

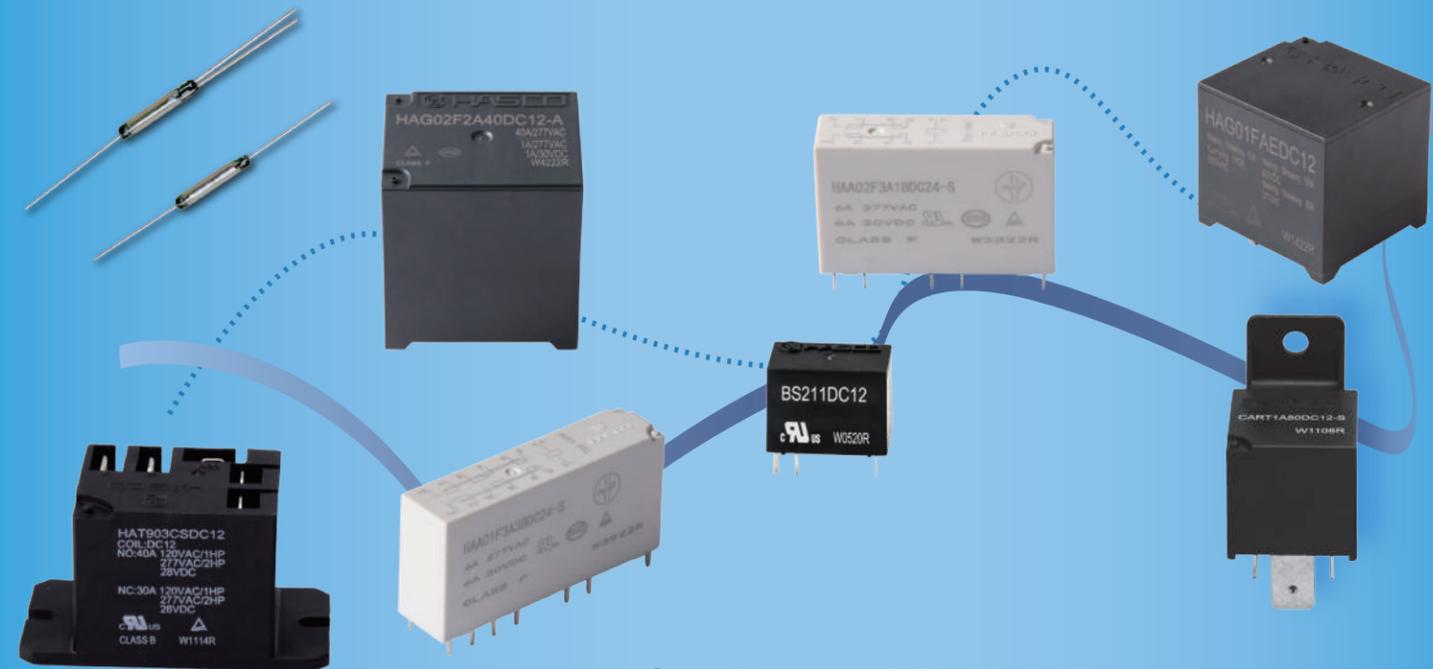


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SuZhou China



11/2022



## **HASCO RELAYS AND ELECTRONICS INTERNATIONAL CORP.**

Since its founding in 1976, the staff and engineers of HASCO RELAYS AND ELECTRONICS INTERNATIONAL CORP. have dedicated themselves to manufacturing the most reliable, cost effective, and technologically advanced electromechanical relays available.

HASCO RELAYS AND ELECTRONICS INTERNATIONAL CORP. manufactures and ships worldwide from our 100% wholly owned factory and warehouse distribution center located in Suzhou, China; and from our corporate offices and distribution facility in New York, U.S.A.

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ISO 9001 CERTIFICATE



ISO 14001 CERTIFICATE



SA8000 CERTIFICATE

# Table of Contents

## POWER RELAY

HAT901 Series.....	01
HAT902 Series.....	06
HAT903 Series.....	11
HAT904 Series.....	16
HAT905 Series.....	19
HAT905G Series.....	22
HAT905K Series.....	25
HPK Series.....	28
HPR Series.....	31
KLT Series.....	34
PLT Series.....	37
PR Series.....	42
RPR Series.....	46
SPR Series.....	49
SSD Series.....	55

## NEW ENERGY RELAY

HAG01 Series.....	57
HAG01M Series.....	59
HAG02 Series.....	61
HAP02 Series.....	65
HAP03 Series.....	67

## SAFETY RELAY

HAA01 Series.....	69
HAA02 Series.....	73
HAA03 Series.....	76

## SIGNAL RELAY

BS/BAS/SC Series.....	81
CAS/CS Series.....	84
T Series.....	86

## AUTOMOTIVE RELAY

CAR40 Series.....	90
CAR80 Series.....	94
CAR100 Series.....	98
CARB Series.....	100
HAV2 Series.....	102
HAV3 Series.....	106

## INDUSTRIAL RELAY

UJ Series.....	109
UJJ Series.....	115

## LATCHING RELAY

HAP01 Series.....	120
HAT901-L Series.....	123
KLT-L Series.....	125
SPR-L Series.....	128
PW Series.....	134

## REED RELAY

DIP/SIP Series.....	137
700 Series.....	139
Reed Switches.....	141

## RELAY SOCKET

PR SOCKETS.....	146
H4 SOCKET.....	151

## OTHERS

Relays Terminology.....	152
General Application Guidelines.....	153



File No.:E75887



File No.:R 50194653



## FEATURES

- 4kV Type: 4000VAC high dielectric strength (between contacts and coil)
- Max. switch capacity up to 40A
- Wide contact gap available

## CONTACT RATINGS

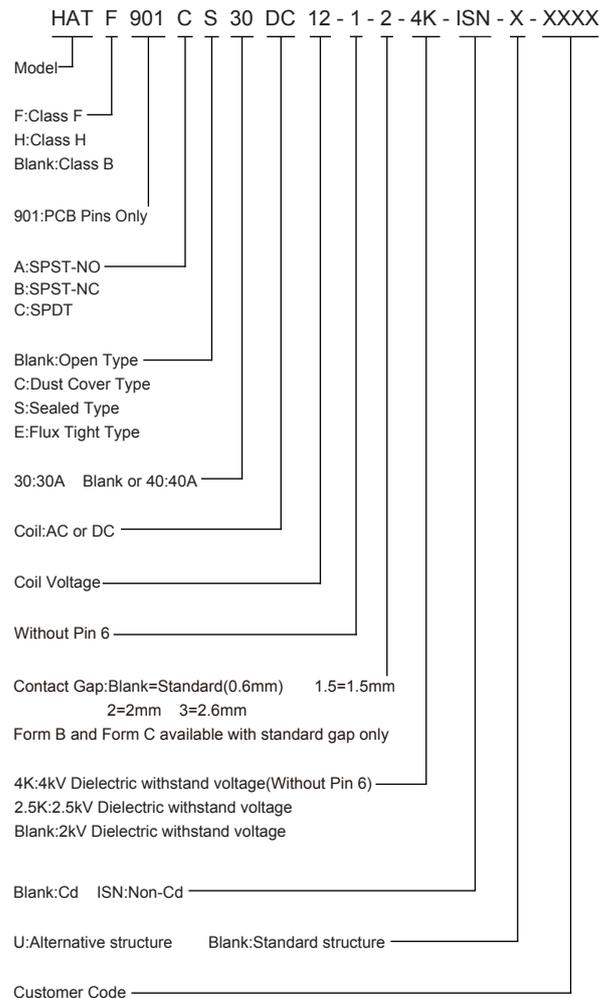
Contact Arrangement	1A, 1B, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	30A(Non-Cd only), 40A(Cd, Non-Cd)
Contact Rating(Resistive)	30/40A 277VAC, 30A/28VDC
Max. Switching Voltage	277VAC/28VDC
Max. Switching Current	40A
Max. Switching Power	11080VA/840W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2000/2500/4000VAC 1min
	Between open contacts	1500VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	98% RH	
Operation temperature	DC:-55°C~+85°C; AC:-55°C~+60°C	
UL Class B/F/H	Insulation System Class B/F/H	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz to 55Hz 1.5mm DA	
Unit weight	Approx. 25g	
Construction	Sealed Type, Dust Cover Type, Open Type, Flux Tight Type	

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

### COIL DATA

at 25°C

#### DC

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.75	0.50	6.50	27
6	4.50	0.60	7.80	40
9	6.75	0.90	11.70	97
12	9.00	1.20	15.60	155
15	11.25	1.50	19.50	256
18	13.50	1.80	23.40	380
22	16.50	2.20	28.60	640
24	18.00	2.40	31.20	660
48	36.00	4.80	62.40	2560
110	82.50	11.00	143.00	13400

#### AC

Nominal Voltage VAC	Operate Voltage (Max.) VAC	Release Voltage (Min.) VAC	*Max. Allowable Voltage VAC	Coil Resistance $\Omega \pm 10\%$
12	9.6	1.2	14.40	27
24	19.2	2.4	28.80	120
110	88.0	11.0	132.0	2360
120	96.0	12.0	144.0	3040
220	176.0	22.0	264.0	13490
240	192.0	24.0	288.0	15735
277	221.6	27.7	332.4	20300

#### Notes:

- 1) "\*\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

### COIL

Coil Power	DC:Approx. 900mW AC:2VA
------------	-------------------------

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## SAFETY APPROVAL RATINGS

UL&CUL	Cd Contact (40A)	<p>N.O.:30A 28VDC; N.C.:30A/28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:10A 480VAC; N.C.:10A 480VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 240VAC, 25×10<sup>4</sup> OPS</p> <p>N.O.:30A 277VAC; N.C.:30A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 277VAC; N.C.:40A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 305VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 480VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC; N.C.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC; N.C.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120/208VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:10FLA, 30LRA, 240VAC;</p> <p>N.C.:10FLA, 30LRA, 240VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:12FLA, 30LRA, 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:30FLA, 90LRA, 120VAC, 1×10<sup>5</sup> OPS</p> <p>N.C.:5FLA, 15LRA, 120VAC, 3×10<sup>4</sup> OPS</p> <p>N.O.:8.8FLA, 52.8LRA, 240VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:20FLA, 60LRA, 277VAC, 1×10<sup>5</sup> OPS</p> <p>N.C.:20FLA, 60LRA, 277VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:20A 277VAC; N.C.:20A 277VAC, Ballast, 1×10<sup>5</sup> OPS</p> <p>N.O.:30A 120VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.O.:16A 277VAC, Electronic Ballast, 6×10<sup>4</sup> OPS</p> <p>N.O.:TV8 277VAC</p> <p>N.O.:A300 Pilot Duty, 6×10<sup>3</sup> OPS</p> <p>N.O.:277VAC, 1100 VA Pilot Duty, 6×10<sup>3</sup> OPS</p>
	Non-Cd Contact (40A)	<p>N.O.:30A 28VDC; N.C.:30A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 277VAC; N.C.:40A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 28VDC, G.P., 40°C, 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 305VAC, G.P., -40°C to +40°C, 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC; N.C.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC; N.C.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 120VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:10A 277VAC, Electronic Ballast, 55°C, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC, Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:5A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.O.:TV8 277VAC</p>
	Non-Cd Contact (30A)	<p>N.O.:30A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.C.:20A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.C.:20A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:1HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:1/4HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p>

TüV	Cd Contact (40A)	<p>N.O.:40A 277VAC; N.C.:40A 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 28VDC; N.C.:40A 28VDC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 277VAC, 8×10<sup>3</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 28VDC, 6×10<sup>3</sup> OPS</p>
	Non-Cd Contact (40A)	<p>N.O.:40A 277VAC, 85°C, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 277VAC, 5×10<sup>4</sup> OPS</p> <p>N.C.:40A 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 28VDC; N.C.:40A 28VDC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 28VDC, 1×10<sup>4</sup> OPS</p>
	Non-Cd Contact (30A)	<p>N.O./N.C.:20A(make)/15A(break) 240VAC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:20A(make)/15A(break) 14VDC, 1×10<sup>4</sup> OPS</p>

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# HAT901 SERIES

# POWER RELAY

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

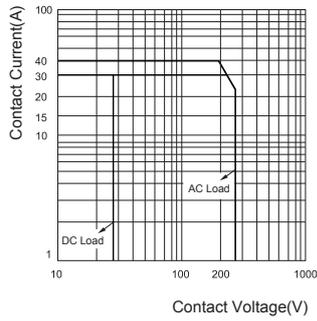
### PCB Layout (Bottom view)

<p>HAT901 Series (with Pin 6)</p>		<p>1A</p> <p>1B</p>	
<p>HAT901 Series (with Pin 6) Open Type</p>		<p>1C</p>	
<p>HAT901 Series (without Pin 6)</p>		<p>1A</p> <p>1B</p>	
<p>HAT901 Series (without Pin 6) Open Type</p>		<p>1C</p>	
<p>Unless otherwise specified tolerances are:</p>			
<p>≤1mm</p>	<p>&gt; 1mm and ≤5mm</p>	<p>&gt; 5mm</p>	<p>* The tolerance without indicating for PCB layout is always ±0.1mm.</p>
<p>±0.2mm</p>	<p>±0.3mm</p>	<p>±0.4mm</p>	

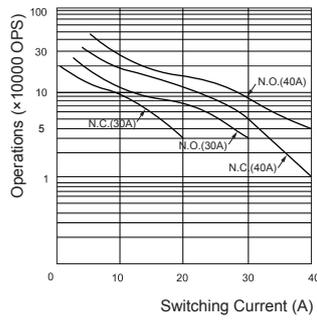
This datasheet is for customers' reference. All the specifications are subject to change without notice.

## CHARACTERISTIC CURVES

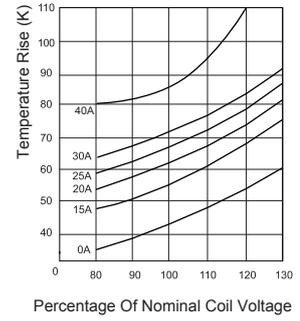
MAXIMUM SWITCHING POWER



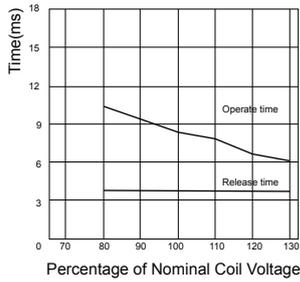
ENDURANCE CURVE



COIL TEMPERATURE RISE



OPERATE TIME / RELEASE TIME



This datasheet is for customers' reference. All the specifications are subject to change without notice.

# HAT902 SERIES

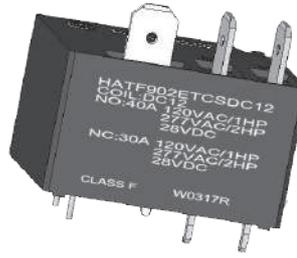
# POWER RELAY



File No.:E75887



File No.:R 50194653



## FEATURES

- 4kV Type: 4000VAC high dielectric strength (between contacts and coil)
- Max. switch capacity up to 40A
- Wide contact gap available
- Suitable for .25"(6.35mm) Q.C. terminals

## CONTACT RATINGS

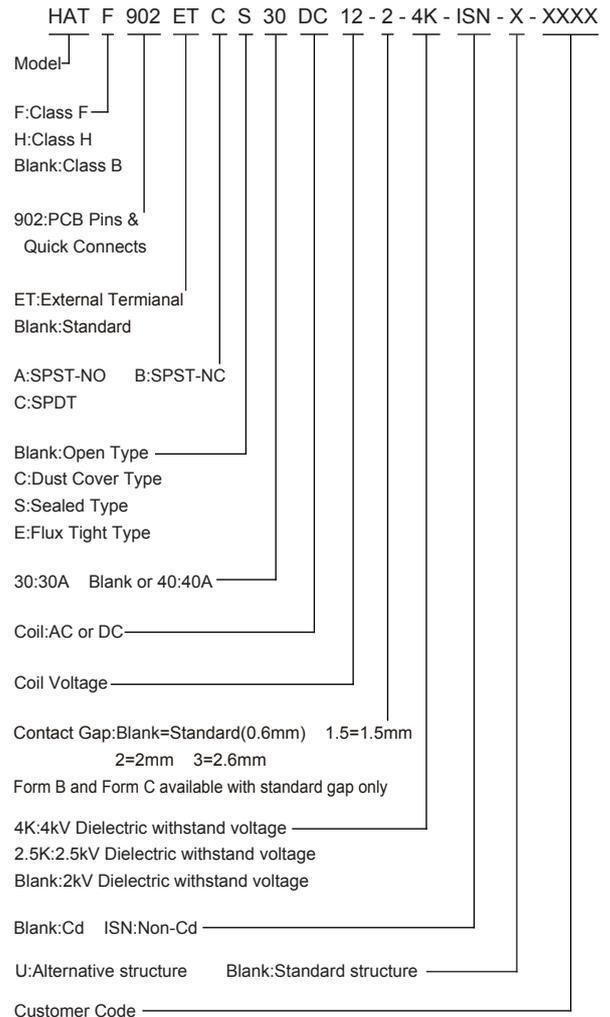
Contact Arrangement	1A, 1B, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	30A(non-Cd only), 40A(Cd, non-Cd)
Contact Rating(Resistive)	30A/40A 277VAC, 30A/28VDC
Max. Switching Voltage	277VAC/28VDC
Max. Switching Current	40A
Max. Switching Power	11080VA/840W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2000/2500/4000VAC 1min
	Between open contacts	1500VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	98% RH	
Operation temperature	DC:-55°C~+85°C; AC:-55°C~+60°C	
UL Class B/F/H	Insulation System Class B/F/H	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz to 55Hz 1.5mm DA	
Unit weight	Approx. 36g	
Construction	Sealed Type, Dust Cover Type, Open Type, Flux Tight Type	

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



Notes:  
1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.  
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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### COIL DATA

at 25°C

#### DC

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.75	0.50	6.50	27
6	4.50	0.60	7.80	40
9	6.75	0.90	11.70	97
12	9.00	1.20	15.60	155
15	11.25	1.50	19.50	256
18	13.50	1.80	23.40	380
22	16.50	2.20	28.60	640
24	18.00	2.40	31.20	660
48	36.00	4.80	62.40	2560
110	82.50	11.00	143.00	13400

#### AC

Nominal Voltage VAC	Operate Voltage (Max.) VAC	Release Voltage (Min.) VAC	*Max. Allowable Voltage VAC	Coil Resistance $\Omega \pm 10\%$
12	9.6	1.2	14.40	27
24	19.2	2.4	28.80	120
110	88.0	11.0	132.0	2360
120	96.0	12.0	144.0	3040
220	176.0	22.0	264.0	13490
240	192.0	24.0	288.0	15735
277	221.6	27.7	332.4	20300

Note: "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.

### COIL

Coil Power	DC: Approx. 900mW AC: 2VA
------------	---------------------------

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

## SAFETY APPROVAL RATINGS

UL&CUL	Cd Contact (40A)	<p>N.O.:30A 28VDC; N.C.:30A/28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:10A 480VAC; N.C.:10A 480VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 240VAC, 25×10<sup>4</sup> OPS</p> <p>N.O.:30A 277VAC; N.C.:30A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 277VAC; N.C.:40A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 305VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 480VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC; N.C.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC; N.C.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120/208VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:10FLA, 30LRA, 240VAC;</p> <p>N.C.:10FLA, 30LRA, 240VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:12FLA, 30LRA, 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:30FLA, 90LRA, 120VAC, 1×10<sup>5</sup> OPS</p> <p>N.C.:5FLA, 15LRA, 120VAC, 3×10<sup>4</sup> OPS</p> <p>N.O.:8.8FLA, 52.8LRA, 240VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:20FLA, 60LRA, 277VAC, 1×10<sup>5</sup> OPS</p> <p>N.C.:20FLA, 60LRA, 277VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:20A 277VAC; N.C.:20A 277VAC, Ballast, 1×10<sup>5</sup> OPS</p> <p>N.O.:30A 120VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.O.:16A 277VAC, Electronic Ballast, 6×10<sup>4</sup> OPS</p> <p>N.O.:TV8 277VAC</p> <p>N.O.:A300 Pilot Duty, 6×10<sup>3</sup> OPS</p> <p>N.O.:277VAC, 1100 VA Pilot Duty, 6×10<sup>3</sup> OPS</p>
	Non-Cd Contact (40A)	<p>N.O.:30A 28VDC; N.C.:30A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 277VAC; N.C.:40A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 28VDC, G.P., 40°C, 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 305VAC, G.P., -40°C to +40°C, 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC; N.C.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC; N.C.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 120VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:10A 277VAC, Electronic Ballast, 55°C, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC, Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:5A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.O.:TV8 277VAC</p>
	Non-Cd Contact (30A)	<p>N.O.:30A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.C.:20A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.C.:20A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:1HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:1/4HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p>

TüV	Cd Contact (40A)	<p>N.O.:40A 277VAC; N.C.:40A 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 28VDC; N.C.:40A 28VDC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 277VAC, 8×10<sup>3</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 28VDC, 6×10<sup>3</sup> OPS</p>
	Non-Cd Contact (40A)	<p>N.O.:40A 277VAC, 85°C, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 277VAC, 5×10<sup>4</sup> OPS</p> <p>N.C.:40A 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 28VDC; N.C.:40A 28VDC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 28VDC, 1×10<sup>4</sup> OPS</p>
	Non-Cd Contact (30A)	<p>N.O./N.C.:20A(make)/15A(break) 240VAC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:20A(make)/15A(break) 14VDC, 1×10<sup>4</sup> OPS</p>

### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.

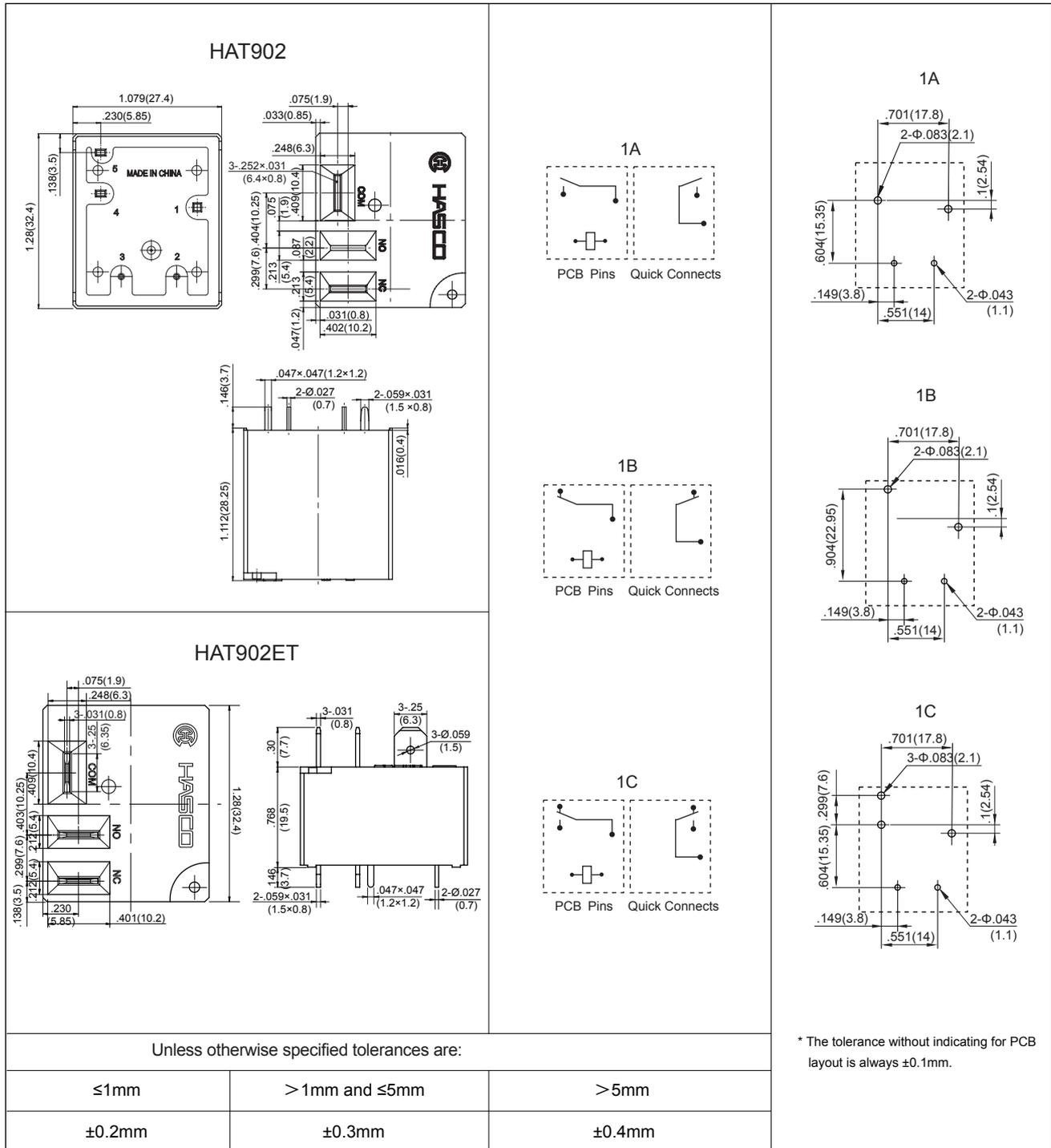
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

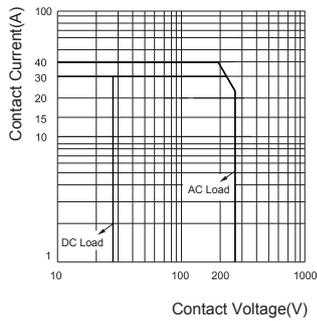
Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

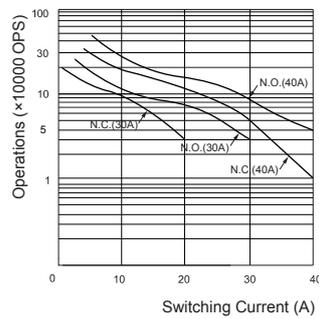


## CHARACTERISTIC CURVES

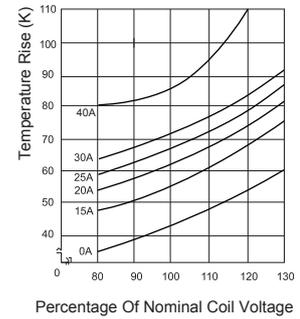
MAXIMUM SWITCHING POWER



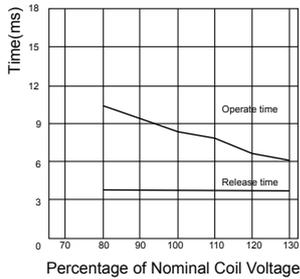
ENDURANCE CURVE



COIL TEMPERATURE RISE



OPERATE TIME / RELEASE TIME



This datasheet is for customers' reference. All the specifications are subject to change without notice.

# HAT903 SERIES

# POWER RELAY



File No.:E75887



File No.:R 50194653



## FEATURES

- Max. switch capacity up to 40A
- Wide contact gap available
- Suitable for .25"(6.35mm) Q.C. terminals

## CONTACT RATINGS

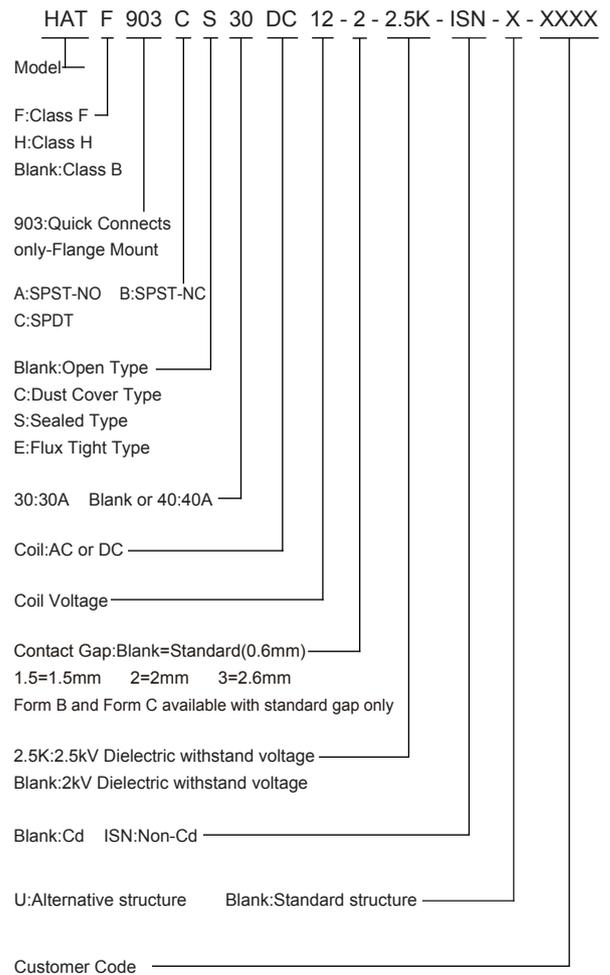
Contact Arrangement	1A, 1B, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	30A(Non-Cd only), 40A(Cd, Non-Cd)
Contact Rating(Resistive)	30A/40A 277VAC, 30A/28VDC
Max. Switching Voltage	277VAC/28VDC
Max. Switching Current	40A
Max. Switching Power	11080VA/840W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance		1000MΩ (at 500VDC)
Dielectric Strength	Between coil & contacts	2000/2500VAC 1min
	Between open contacts	1500VAC 1min
Operate time (at nomi. volt.)		≤15ms
Release time (at nomi. volt.)		≤10ms
Humidity		98% RH
Operation temperature		DC:-55°C~+85°C; AC:-55°C~+60°C
UL Class B/F/H		Insulation System Class B/F/H
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance		10Hz to 55Hz 1.5mm DA
Unit weight		Approx. 36g
Construction		Sealed Type, Dust Cover Type, Open Type, Flux Tight Type

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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RELAYS & ELECTRONICS INTL. CORP. TEL:(516) 328-9292 FAX:(516)326-9125 www.hascorelays.com email:info@hascorelays.com

# RELAYS

### COIL DATA

at 25°C

#### DC

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.75	0.50	6.50	27
6	4.50	0.60	7.80	40
9	6.75	0.90	11.70	97
12	9.00	1.20	15.60	155
15	11.25	1.50	19.50	256
18	13.50	1.80	23.40	380
22	16.50	2.20	28.60	640
24	18.00	2.40	31.20	660
48	36.00	4.80	62.40	2560
110	82.50	11.00	143.00	13400

#### AC

Nominal Voltage VAC	Operate Voltage (Max.) VAC	Release Voltage (Min.) VAC	*Max. Allowable Voltage VAC	Coil Resistance $\Omega \pm 10\%$
12	9.6	1.2	14.40	27
24	19.2	2.4	28.80	120
110	88.0	11.0	132.0	2360
120	96.0	12.0	144.0	3040
220	176.0	22.0	264.0	13490
240	192.0	24.0	288.0	15735
277	221.6	27.7	332.4	20300

#### Notes:

- 1) "\*\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

### COIL

Coil Power	DC:Approx. 900mW AC:2VA
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# RELAYS

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## SAFETY APPROVAL RATINGS

UL&CUL	Cd Contact (40A)	<p>N.O.:30A 28VDC; N.C.:30A/28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:10A 480VAC; N.C.:10A 480VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 240VAC, 25×10<sup>4</sup> OPS</p> <p>N.O.:30A 277VAC; N.C.:30A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 277VAC; N.C.:40A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 305VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 480VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC; N.C.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC; N.C.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120/208VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:10FLA, 30LRA, 240VAC;</p> <p>N.C.:10FLA, 30LRA, 240VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:12FLA, 30LRA, 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:30FLA, 90LRA, 120VAC, 1×10<sup>5</sup> OPS</p> <p>N.C.:5FLA, 15LRA, 120VAC, 3×10<sup>4</sup> OPS</p> <p>N.O.:8.8FLA, 52.8LRA, 240VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:20FLA, 60LRA, 277VAC, 1×10<sup>5</sup> OPS</p> <p>N.C.:20FLA, 60LRA, 277VAC, 1×10<sup>5</sup> OPS</p> <p>N.O.:20A 277VAC; N.C.:20A 277VAC, Ballast, 1×10<sup>5</sup> OPS</p> <p>N.O.:30A 120VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.O.:16A 277VAC, Electronic Ballast, 6×10<sup>4</sup> OPS</p> <p>N.O.:TV8 277VAC</p> <p>N.O.:A300 Pilot Duty, 6×10<sup>3</sup> OPS</p> <p>N.O.:277VAC, 1100 VA Pilot Duty, 6×10<sup>3</sup> OPS</p>
	Non-Cd Contact (40A)	<p>N.O.:30A 28VDC; N.C.:30A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 277VAC; N.C.:40A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 28VDC, G.P., 40°C, 6×10<sup>3</sup> OPS</p> <p>N.O.:40A 305VAC, G.P., -40°C to +40°C, 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC; N.C.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC; N.C.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 120VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:10A 277VAC, Electronic Ballast, 55°C, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC, Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:5A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.O.:TV8 277VAC</p>
	Non-Cd Contact (30A)	<p>N.O.:30A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.C.:20A 28VDC, 6×10<sup>3</sup> OPS</p> <p>N.O.:30A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.C.:20A 277VAC, G.P., 6×10<sup>3</sup> OPS</p> <p>N.O.:1HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:1HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:2HP 277VAC, 6×10<sup>3</sup> OPS</p> <p>N.C.:1/4HP 120VAC, 6×10<sup>3</sup> OPS</p> <p>N.O.:20A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.C.:10A 277VAC Ballast, 6×10<sup>3</sup> OPS</p> <p>N.O.:15A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p> <p>N.C.:2A 120VAC Tungsten, 6×10<sup>3</sup> OPS</p>

TüV	Cd Contact (40A)	<p>N.O.:40A 277VAC; N.C.:40A 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 28VDC; N.C.:40A 28VDC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 277VAC, 8×10<sup>3</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 28VDC, 6×10<sup>3</sup> OPS</p>
	Non-Cd Contact (40A)	<p>N.O.:40A 277VAC, 85°C, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 277VAC, 5×10<sup>4</sup> OPS</p> <p>N.C.:40A 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O.:40A 28VDC; N.C.:40A 28VDC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 277VAC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:40A(make)/30A(break) 28VDC, 1×10<sup>4</sup> OPS</p>
	Non-Cd Contact (30A)	<p>N.O./N.C.:20A(make)/15A(break) 240VAC, 1×10<sup>4</sup> OPS</p> <p>N.O./N.C.:20A(make)/15A(break) 14VDC, 1×10<sup>4</sup> OPS</p>

### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

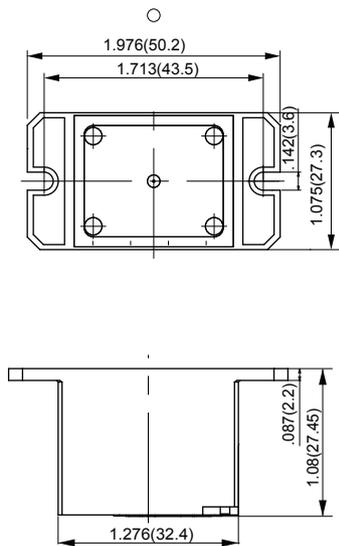
# HAT903 SERIES

# POWER RELAY

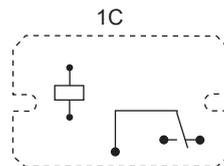
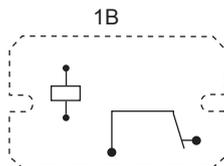
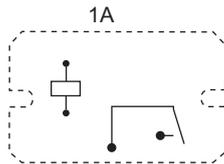
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND LAYOUT.

Unit: inch(mm)

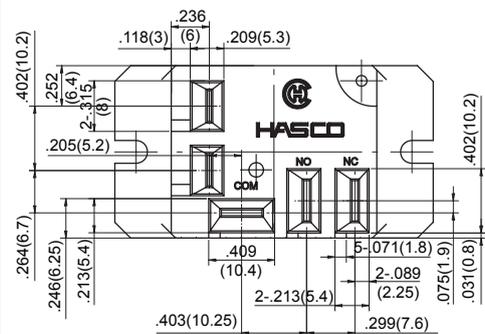
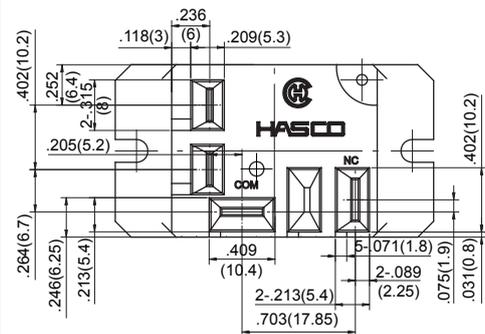
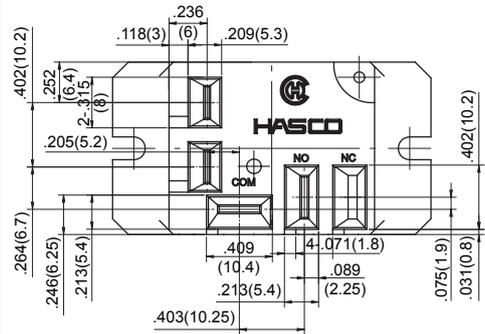
### Outline Dimensions



### Wiring Diagram (Top view)



### Layout (Top view)



Unless otherwise specified tolerances are:

≤1mm	> 1mm and ≤5mm	>5mm
±0.2mm	±0.3mm	±0.4mm

\* The tolerance without indicating for layout is always ±0.1mm.

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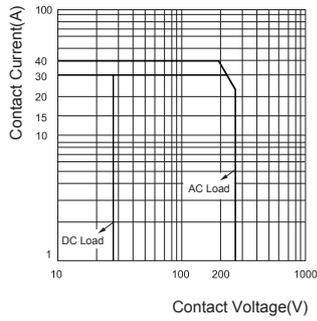
# RELAYS

\* SINCE 1976 \*

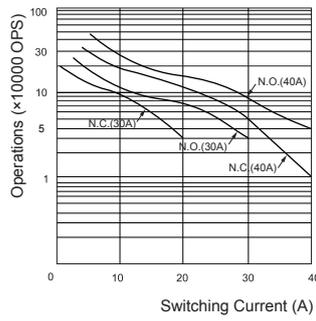
TEL:(516) 328-9292 FAX:(516)326-9125 www.hascorelays.com email:info@hascorelays.com

## CHARACTERISTIC CURVES

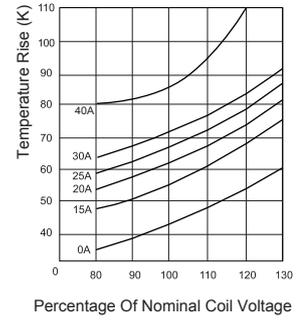
MAXIMUM SWITCHING POWER



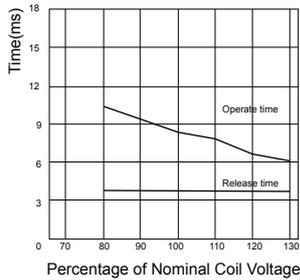
ENDURANCE CURVE



COIL TEMPERATURE RISE



OPERATE TIME / RELEASE TIME



This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.: CQC21002292049



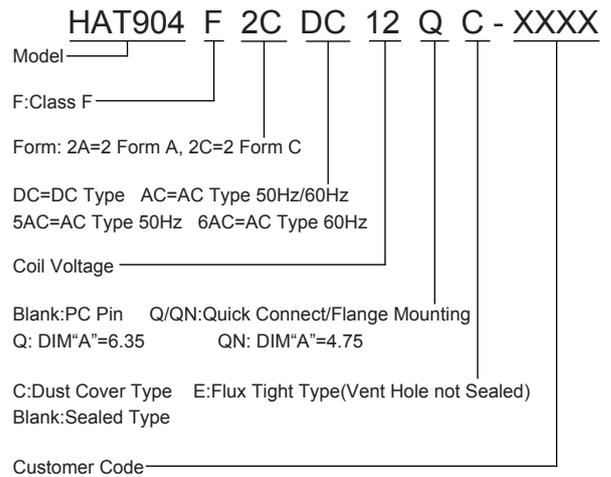
## FEATURES

- 50A switching capabilities
- DPST-N.O. and DPDT configuration
- Meets 8mm spacing, 4K VAC dielectric strength
- Meets UL Class F insulation system
- Dust cover or sealed version & PCB or QC Terminal
- Outline Dimensions: (52.0×33.7×26.7)mm

## CONTACT RATINGS

Contact Arrangement	2A, 2C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	N.O.:50A/277VAC, 30A/30VDC N.C.:3A/277VAC
Max. Switching Voltage	277VAC/30VDC
Max. Switching Current	50A/40A
Max. Switching Power	13850VA/1200W
Mechanical Life	5×10 <sup>6</sup> operations
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	4000VAC 1min
	Between open contacts	1500VAC 1min
	Between contacts sets	2000VAC 1min
Operate time (at nomi. volt.)	≤25ms	
Release time (at nomi. volt.)	≤25ms	
Humidity	5% ~ 85% RH	
Operation temperature	DC: -40°C~+85°C, AC: -40°C~+65°C	
UL Class F	Insulation System Class F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.65mm DA	
Unit weight	Approx. 86g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes: The data shown above are initial values.

## COIL DATA

at 25°C

### DC

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
5	3.8	0.5	8.0	15.3
6	4.5	0.6	9.6	22
12	9.0	1.2	19.2	86
24	18.0	2.4	38.4	350
28	21.0	2.8	44.8	470
48	36.0	4.8	76.8	1390
110	82.5	11.0	176.0	7255

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# RELAYS

## COIL DATA at 25°C

AC

Nominal Voltage VAC	Operate Voltage (Max.) VAC	Release Voltage (Min.) VAC	*Max. Allowable Voltage VAC	Coil Resistance $\Omega \pm 10\%$	
				60 Hz	50 Hz
12	9.6	2.4	13.2	8.00	9.5
24	19.2	4.8	26.4	35.7	45
120	96.0	24.0	132	830	1125
208	166.4	41.6	229	2600	3278
220	176.0	44.0	242	2870	3800
240	192.0	48.0	264	3800	4500
277	221.6	55.4	305	4700	5960

AC(50Hz/60Hz)

Nominal Voltage VAC	Operate Voltage (Max.) VAC		Release Voltage (Min.) VAC		*Max. Allowable Voltage VAC	Coil Resistance $\Omega \pm 10\%$
	50 Hz	60 Hz	50 Hz	60 Hz		
120	88.0	96.0	22.0	24.0	132	950
208	160.0	166.4	40.0	41.6	229	2481
240	176.0	192.0	44.0	48.0	264	3800
277	200.0	221.6	50.0	55.4	305	5485

Note:

\*\*Max Allowable Voltage\*: The relay coil can endure max allowable voltage for a short period time only.

## COIL

Coil Power	DC: Approx. 1700mW AC: Approx. 4.0VA
------------	---

## SAFETY APPROVAL RATINGS

UL&CUL	N.O.	30A 277VAC/250VAC/240VAC/125VAC, General use & Resistive, 100K cycles, 85°C 1.5HP 120VAC, Motor, 50K cycles, 40°C 2HP 240VAC, Motor, 50K cycles, 40°C 2HP 600VAC, Motor, 100K cycles, 40°C 110LRA/25.3FLA 240VAC, Definite purpose, 100K cycles, 40°C
	N.C.	3A 277VAC/250VAC/240VAC/125VAC, General use & Resistive, 100K cycles, 85°C

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

TüV	N.O.	50A 277VAC, Resistive, 20k cycles 40A 277VAC, Resistive, 30k cycles 30A 120VAC/277VAC, Resistive, 200K cycles 20A 480VAC, Resistive, 100K cycles 10A 600VAC, Resistive, 100K cycles 20A 28VDC, Resistive, 100K cycles
	N.C.	3A 277VAC, Resistive, 100K cycles 3A 400VAC, Resistive, 30K cycles 2A 480VAC, Resistive, 100K cycles 1A 600VAC, Resistive, 100K cycles
	C.O.	N.O.: 30A 400VAC, N.C.: 3A 400VAC, 30K cycles
CQC	N.O.	50A 277VAC, Resistive, 20k cycles 30A 250VAC/400VAC, 30A/30VDC, 100K cycles
	N.C.	3A 250VAC/400VAC, 3A/30VDC, 100K cycles
	C.O.	N.O.: 30A 250VAC/400VAC, 30A/30VDC, 100K cycles N.C.: 3A 250VAC/400VAC, 3A/30VDC, 100K cycles

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# RELAYS

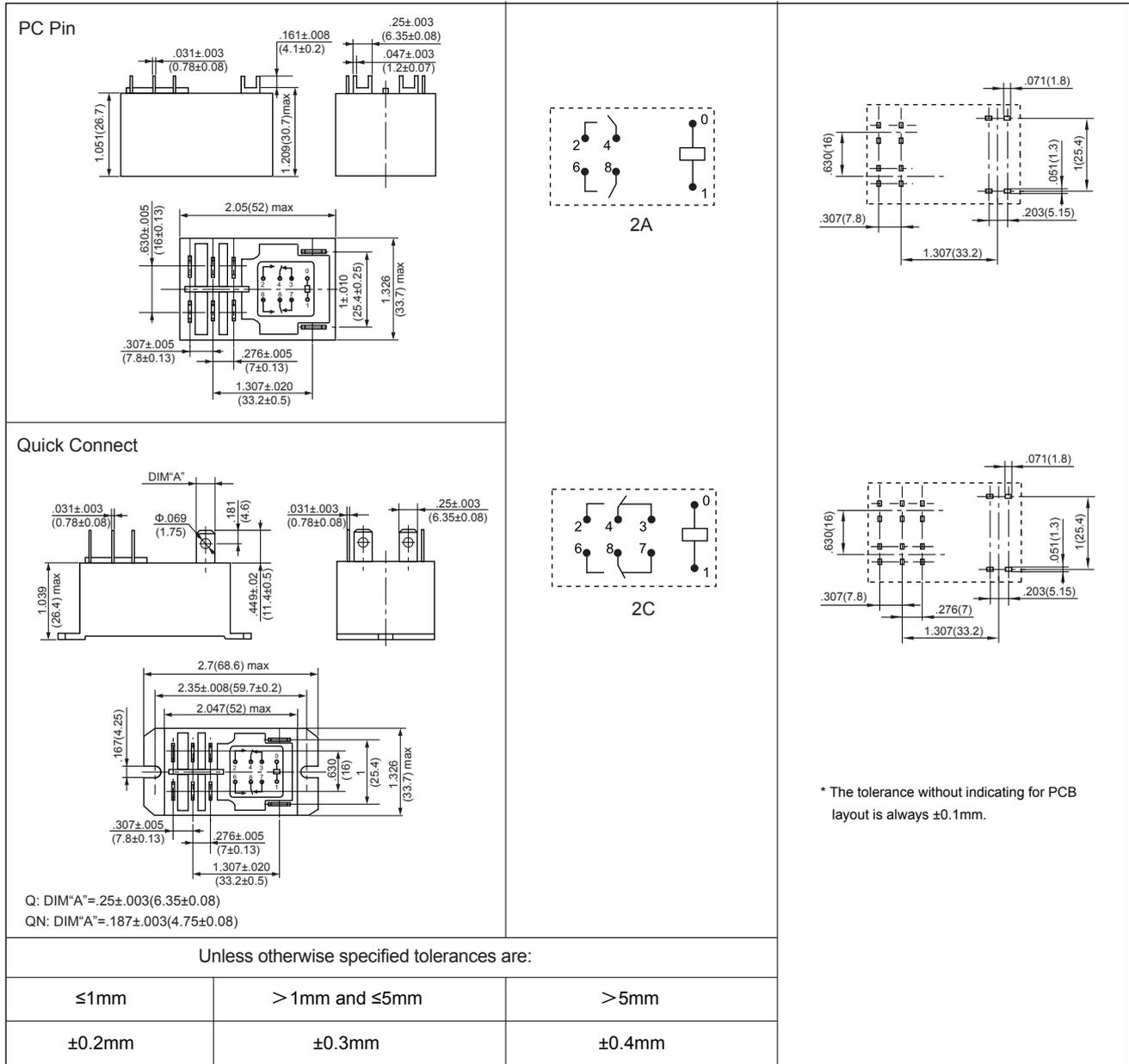
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### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



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# HAT905 SERIES

# POWER RELAY



## FEATURES

- 4000VAC high dielectric strength between contacts and coil is available
- Max. switch capacity up to 60A

## CONTACT RATINGS

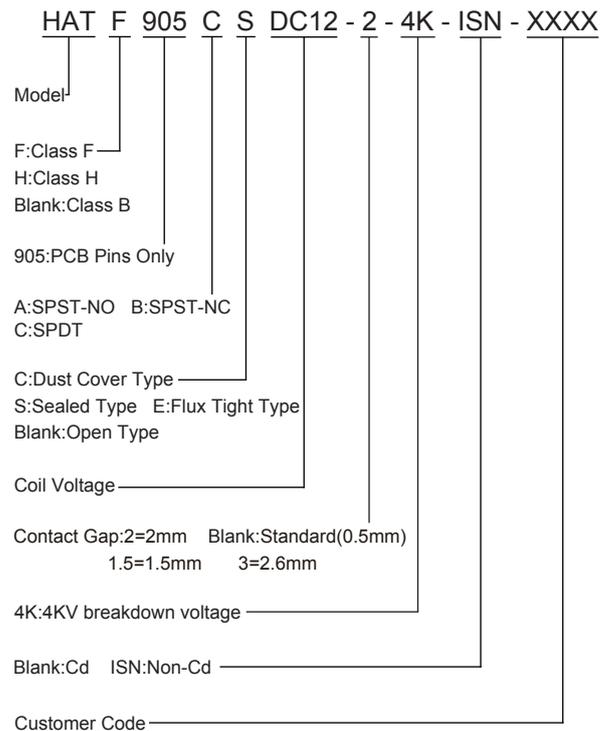
Contact Arrangement	1A, 1B, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgCdO, AgSnO
Contact Rating(Resistive)	50A/277VAC, 30A/28VDC 60A/277VAC(P/N with the code 5451)
Max. Switching Voltage	277VAC/28VDC
Max. Switching Current	60A
Max. Switching Power	16620VA/840W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2000VAC 1min
	Between open contacts	1500VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	98% RH	
Operation temperature	-40°C~+85°C	
UL Class B/F/H	Insulation System Class B/F/H	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 27g	
Construction	Sealed Type, Dust Cover Type, Open Type, Flux Tight Type	

Notes: The data shown above are initial values.

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.75	0.50	6.50	21
6	4.50	0.60	7.80	30
9	6.75	0.90	11.70	67.5
12	9.00	1.20	15.60	120
15	11.25	1.50	19.50	187.5
18	13.50	1.80	23.40	270
22	16.50	2.20	28.60	400
24	18.00	2.40	31.20	480
48	36.00	4.80	62.40	1920
110	82.50	11.00	143.00	10800

Note: \*\*Max Allowable Voltage\*\*: The relay coil can endure max allowable voltage for a short period time only.

## COIL

Coil Power	1200mW
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## SAFETY APPROVAL RATINGS

UL&CUL	Cd Contact	N.O.	50A 277VAC, 6×10 <sup>3</sup> OPS 40A 277VAC, 50°C, 6×10 <sup>3</sup> OPS 45A 277VAC, 65°C, 6×10 <sup>3</sup> OPS 30A 28VDC, 6×10 <sup>3</sup> OPS 5A 277VAC, Electronic Ballast, 6×10 <sup>3</sup> OPS
		N.C.	30A 28VDC, 6×10 <sup>3</sup> OPS
Non-Cd Contact	N.O.	50A 277VAC, G.P., 65°C, 6×10 <sup>3</sup> OPS 20A 277VAC, Ballast, 6×10 <sup>3</sup> OPS 30A 28VDC, G.P., 6×10 <sup>3</sup> OPS 60A 277VAC(P/N with the code 5451), 40°C 6×10 <sup>3</sup> OPS	
	N.C.	20A 277VAC, G.P., 6×10 <sup>3</sup> OPS 30A 28VDC, G.P., 6×10 <sup>3</sup> OPS	

TüV	Non-Cd Contact	N.O.:35A 250VAC, 85°C, 1×10 <sup>4</sup> OPS N.O.:40A 230VAC, 70°C, 1×10 <sup>4</sup> OPS N.O.:50A 277VAC, 85°C, 6×10 <sup>3</sup> OPS N.O.:30A 277VAC, 85°C, 1×10 <sup>4</sup> OPS N.O.:50A 28VDC, 85°C, 1×10 <sup>4</sup> OPS N.O.:40A 28VDC, 70°C, 1×10 <sup>4</sup> OPS N.C.:15A 250VAC, 85°C, 1×10 <sup>4</sup> OPS N.C.:30A 277VAC, 85°C, 1×10 <sup>4</sup> OPS N.C.:30A 28VDC, 85°C, 1×10 <sup>4</sup> OPS N.C.:20A 28VDC, 70°C, 1×10 <sup>4</sup> OPS N.O./N.C.:20A/15A 250VAC, 85°C, 1×10 <sup>4</sup> OPS N.O./N.C.:40A/20A 277VAC, 25°C, 6×10 <sup>3</sup> OPS N.O./N.C.:50A/30A 28VDC, 85°C, 1×10 <sup>4</sup> OPS
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### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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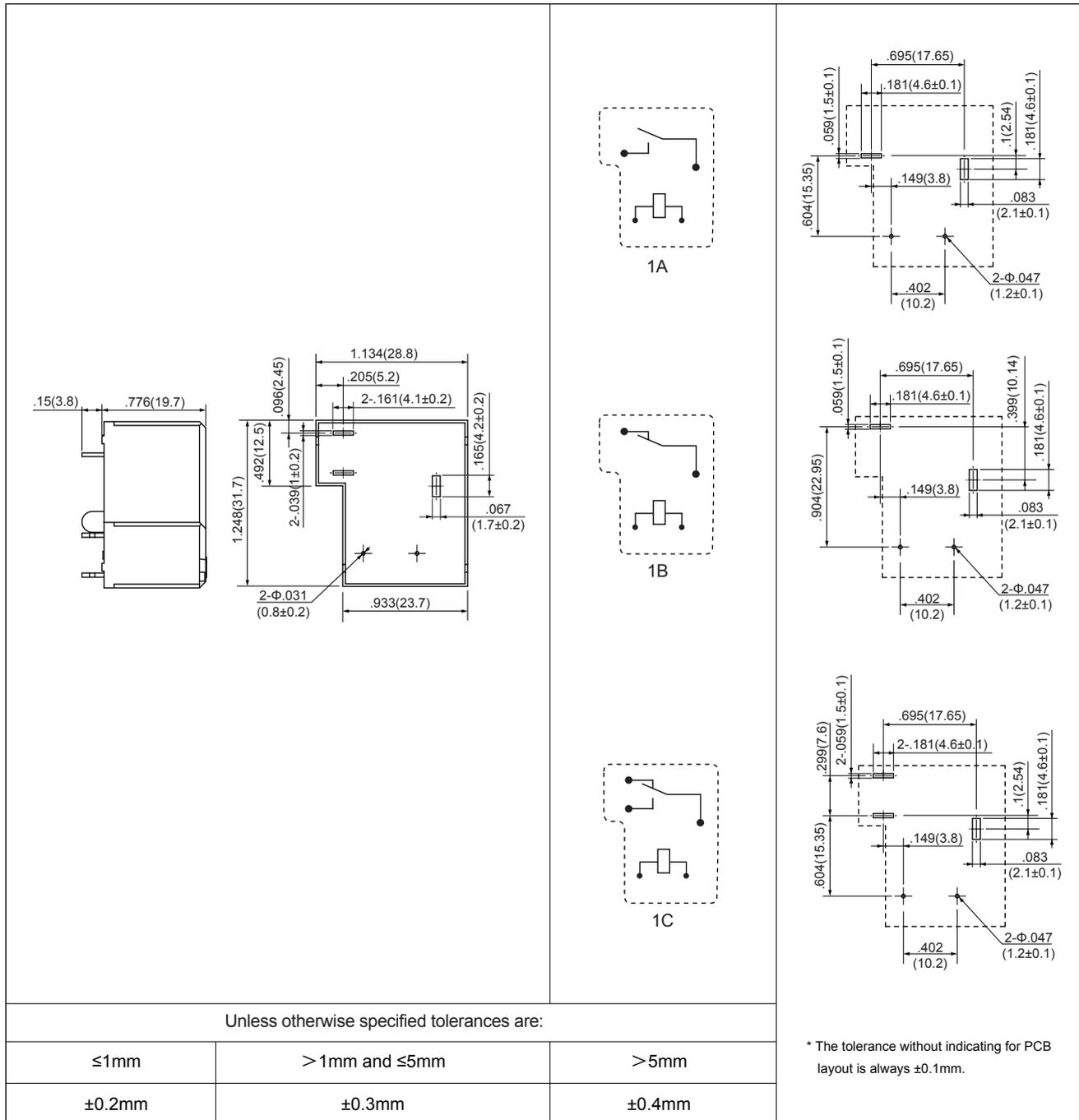
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



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# HAT905G SERIES

# POWER RELAY



File No.:E75887



File No.:R 50514896



File No.:CQC22002338071



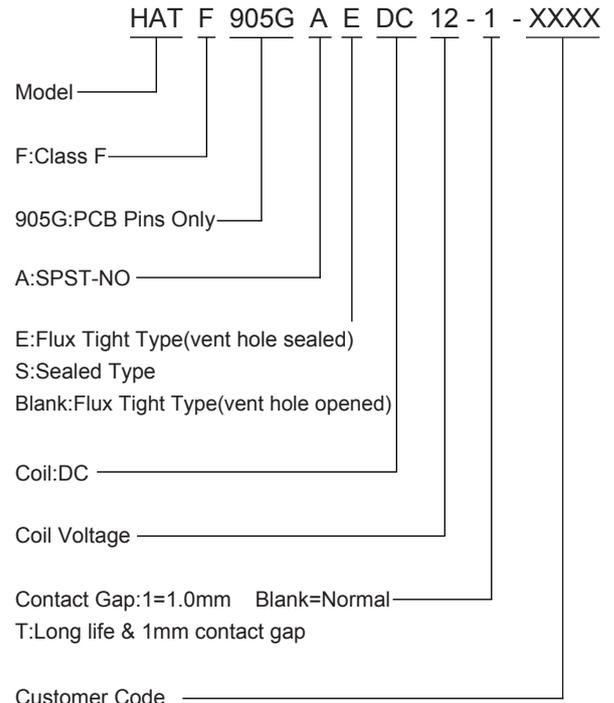
## FEATURES

- 4kVAC dielectric strength (between coil and contacts)
- Max. switching current 60A
- High surge current resistance:1600A
- Product in accordance to IEC 62368-1 available
- Apply to EV AC charging equipment

## CONTACT RATINGS

Contact Arrangement	1A
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	60A/277VAC
Max. Switching Voltage	277VAC
Max. Switching Current	60A
Max. Switching Power	16620VA
Mechanical Life	1×10 <sup>6</sup> OPS
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION



## CHARACTERISTICS

Insulation Resistance		1000MΩ (at 500VDC)
Dielectric Strength	Between coil & contacts	4000VAC 1min
	Between open contacts	1500VAC 1min
Surge voltage(Between coil & contacts)		6KV(1.2/50μs)
Operate time (at nomi. volt.)		≤15ms
Release time (at nomi. volt.)		≤10ms
Humidity		5%~85% RH
Operation temperature		-40°C~+105°C
UL Class F		Insulation System Class F
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance		10Hz ~ 55Hz 1.5mm DA
Unit weight		Approx. 30g
Construction		Flux Tight Type, Sealed Type

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**



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## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
6	4.50	0.60	7.80	30
12	9.00	1.20	15.60	120
24	18.00	2.40	31.20	480
48	36.00	4.80	62.40	1920
110	82.50	11.00	143.00	10800

Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	1200mW
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## SAFETY APPROVAL RATINGS

	Standard Type	Long Life Type
UL&CUL	60A/277VAC, 1s:9s, 40°C, 1×10 <sup>4</sup> OPS 50A/277VAC, 1s:9s, 65°C, 3×10 <sup>4</sup> OPS, GP Load 40A/277VAC, 1s:9s, 85°C, 3×10 <sup>4</sup> OPS, GP Load 32A/277VAC, 1s:9s, 105°C, 3×10 <sup>4</sup> OPS 30A/28VDC, 1s:9s, 85°C, 6×10 <sup>3</sup> OPS 30A/24VDC, 1s:9s, 85°C, 3×10 <sup>4</sup> OPS 2HP/250VAC, 1s:9s, 85°C, 5×10 <sup>4</sup> OPS 8A/250VAC, Tungsten, 1s:59s, 65°C, 1×10 <sup>4</sup> OPS AC-15 6A/230VAC, 1s:9s, 65°C, 1×10 <sup>4</sup> OPS	40A/277VAC, 1s:9s, 85°C, 5×10 <sup>4</sup> OPS 2HP/250VAC, 1s:9s, 85°C, 5×10 <sup>4</sup> OPS AC-15 6A/230VAC, 1s:9s, 65°C, 5×10 <sup>4</sup> OPS TV-8/277VAC, 1s:59s, 65°C, 5×10 <sup>4</sup> OPS 40A/277VAC, 1s:9s, 85°C, 3×10 <sup>4</sup> OPS, GP Load 32A/277VAC, 1s:9s, 105°C, 3×10 <sup>4</sup> OPS 30A/28VDC, 1s:9s, 85°C, 6×10 <sup>3</sup> OPS 30A/24VDC, 1s:9s, 85°C, 3×10 <sup>4</sup> OPS 8A/250VAC, Tungsten, 1s:59s, 65°C, 1×10 <sup>4</sup> OPS AC-15 6A/230VAC, 1s:9s, 65°C, 1×10 <sup>4</sup> OPS
TüV	60A/277VAC, 1s:9s, 40°C, 1×10 <sup>4</sup> OPS 50A/277VAC, 1s:9s, 65°C, 3×10 <sup>4</sup> OPS 40A/277VAC, 1s:9s, 85°C, 3×10 <sup>4</sup> OPS 32A/277VAC, 1s:9s, 105°C, 3×10 <sup>4</sup> OPS 30A/24VDC, 1s:9s, 85°C, 3×10 <sup>4</sup> OPS 30A/28VDC, 1s:9s, 85°C, 6×10 <sup>3</sup> OPS	50A/277VAC, 1s:9s, 65°C, 5×10 <sup>4</sup> OPS 40A/277VAC, 1s:9s, 85°C, 5×10 <sup>4</sup> OPS 32A/277VAC, 1s:9s, 105°C, 5×10 <sup>4</sup> OPS
CQC	60A/277VAC, 1s:9s, 40°C, 1×10 <sup>4</sup> OPS 50A/277VAC, 1s:9s, 65°C, 3×10 <sup>4</sup> OPS 40A/277VAC, 1s:9s, 85°C, 3×10 <sup>4</sup> OPS 32A/277VAC, 1s:9s, 105°C, 3×10 <sup>4</sup> OPS 30A/28VDC, 1s:9s, 85°C, 6×10 <sup>3</sup> OPS	50A/277VAC, 1s:9s, 65°C, 5×10 <sup>4</sup> OPS 40A/277VAC, 1s:9s, 85°C, 5×10 <sup>4</sup> OPS 32A/277VAC, 1s:9s, 105°C, 5×10 <sup>4</sup> OPS

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# HAT905G SERIES

# POWER RELAY

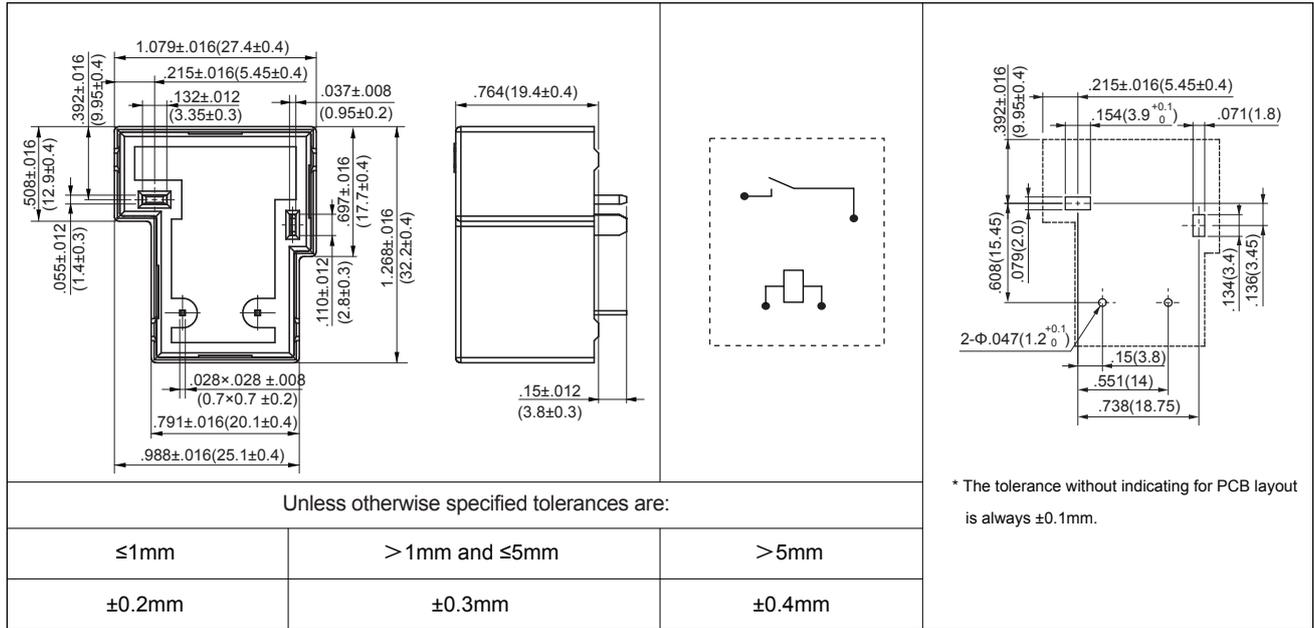
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

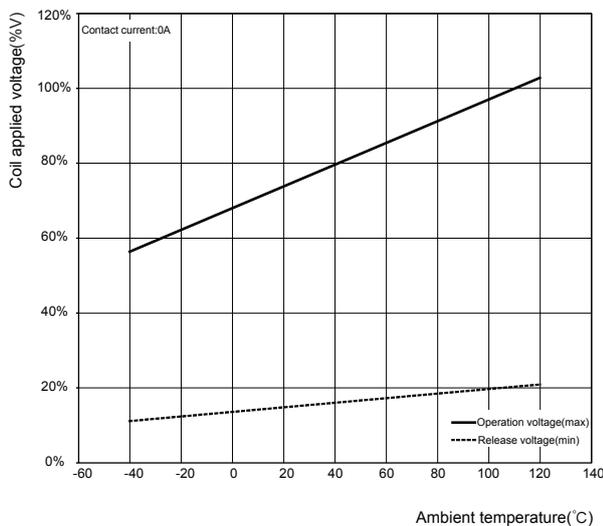
Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

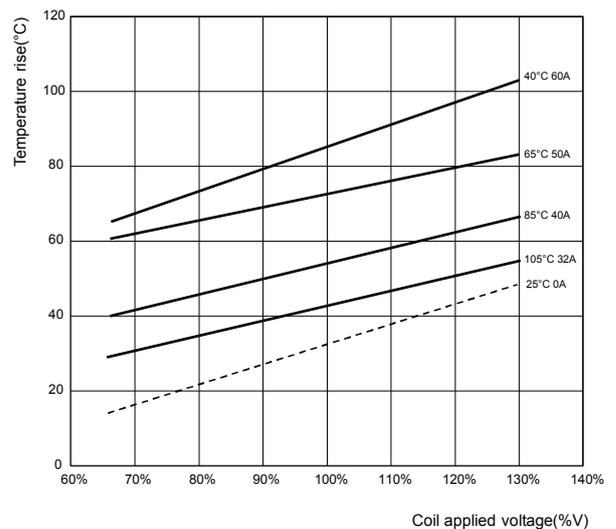


## CHARACTERISTIC CURVES

AMBIENT TEMPERATURE CHARACTERISTICS  
AND COIL APPLIED VOLTAGE



COIL TEMPERATURE RISE



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# HAT905K SERIES

# POWER RELAY



File No.:E75887



File No.:R 50290157



## FEATURES

- 4000VAC high dielectric strength between contacts and coil is available
- Max. switch capacity up to 50A

## CONTACT RATINGS

Contact Arrangement	1A, 1B, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgCdO, AgSnO
Contact Rating(Resistive)	50A/277VAC 30A/28VDC
Max. Switching Voltage	277VAC/28VDC
Max. Switching Current	50A
Max. Switching Power	13850VA/840W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2000VAC 1min
	Between open contacts	1500VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	98% RH	
Operation temperature	-40°C~+85°C	
UL Class B/F/H	Insulation System Class B/F/H	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 36g	
Construction	Sealed Type, Dust Cover Type, Open type, Flux Tight Type	

Notes: The data shown above are initial values.

## ORDERING INFORMATION

HAT F 905K C S DC12 - 2 - 4K - ISN - P - XXXX

Model

F:Class F  
H:Class H  
Blank:Class B

905K:PCB Pins Only

A:SPST-NO C:SPDT  
B:SPST-NC

C:Dust Cover Type  
S:Sealed Type  
Blank:Open Type  
E:Flux Tight Type

Coil Voltage

Contact Gap:2=2mm 1=1mm 1.5=1.5mm  
Blank=Standard(0.5mm) 3=2.6mm

4K:4KV breakdown voltage

Blank:Cd ISN:Non-Cd

Coil Power:P=0.9W Blank=1.2W

Customer Code

Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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# RELAYS

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$	
				0.9W	1.2W
5	3.75	0.50	6.50	27	21
6	4.50	0.60	7.80	40	30
9	6.75	0.90	11.70	97	67.5
12	9.00	1.20	15.60	155	120
15	11.25	1.50	19.50	256	187.5
18	13.50	1.80	23.40	380	270
22	16.50	2.20	28.60	640	400
24	18.00	2.40	31.20	660	480
48	36.00	4.80	62.40	2560	1920
110	82.50	11.00	143.00	13400	10800

Note:\*\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.

## COIL

Coil Power	0.9W, 1.2W
------------	------------

## SAFETY APPROVAL RATINGS

UL&CUL	Cd Contact	N.O.	50A 277VAC, 6×10 <sup>3</sup> OPS 40A 277VAC, 50°C, 6×10 <sup>3</sup> OPS 45A 277VAC, 65°C, 6×10 <sup>3</sup> OPS 34A 277VAC, 60°C, 6×10 <sup>3</sup> OPS 30A 28VDC, 6×10 <sup>3</sup> OPS 5A 277VAC, Electronic Ballast, 6×10 <sup>3</sup> OPS
		N.C.	30A 28VDC, 6×10 <sup>3</sup> OPS
	Non-Cd Contact	N.O.	50A 277VAC, G.P., 65°C, 6×10 <sup>3</sup> OPS 20A 277VAC, Ballast, 6×10 <sup>3</sup> OPS 30A 28VDC, G.P., 6×10 <sup>3</sup> OPS
		N.C.	20A 277VAC, G.P., 6×10 <sup>3</sup> OPS 30A 28VDC, G.P., 6×10 <sup>3</sup> OPS

TüV	Non-Cd Contact	N.O.:35A 250VAC, 85°C, 1×10 <sup>4</sup> OPS
		N.O.:40A 230VAC, 70°C, 1×10 <sup>4</sup> OPS
		N.O.:50A 277VAC, 85°C, 6×10 <sup>3</sup> OPS
		N.O.:30A 277VAC, 85°C, 1×10 <sup>4</sup> OPS
		N.O.:50A 28VDC, 85°C, 1×10 <sup>4</sup> OPS
		N.O.:40A 28VDC, 70°C, 1×10 <sup>4</sup> OPS
		N.C.:15A 250VAC, 85°C, 1×10 <sup>4</sup> OPS
		N.C.:30A 277VAC, 85°C, 1×10 <sup>4</sup> OPS
		N.C.:30A 28VDC, 85°C, 1×10 <sup>4</sup> OPS
		N.C.:20A 28VDC, 70°C, 1×10 <sup>4</sup> OPS
		N.O./N.C.:20A/15A 250VAC, 85°C, 1×10 <sup>4</sup> OPS
		N.O./N.C.:40A/20A 277VAC, 25°C, 6×10 <sup>3</sup> OPS
		N.O./N.C.:50A/30A 28VDC, 85°C, 1×10 <sup>4</sup> OPS
N.O./N.C.:40A/20A 28VDC, 25°C, 6×10 <sup>3</sup> OPS		

### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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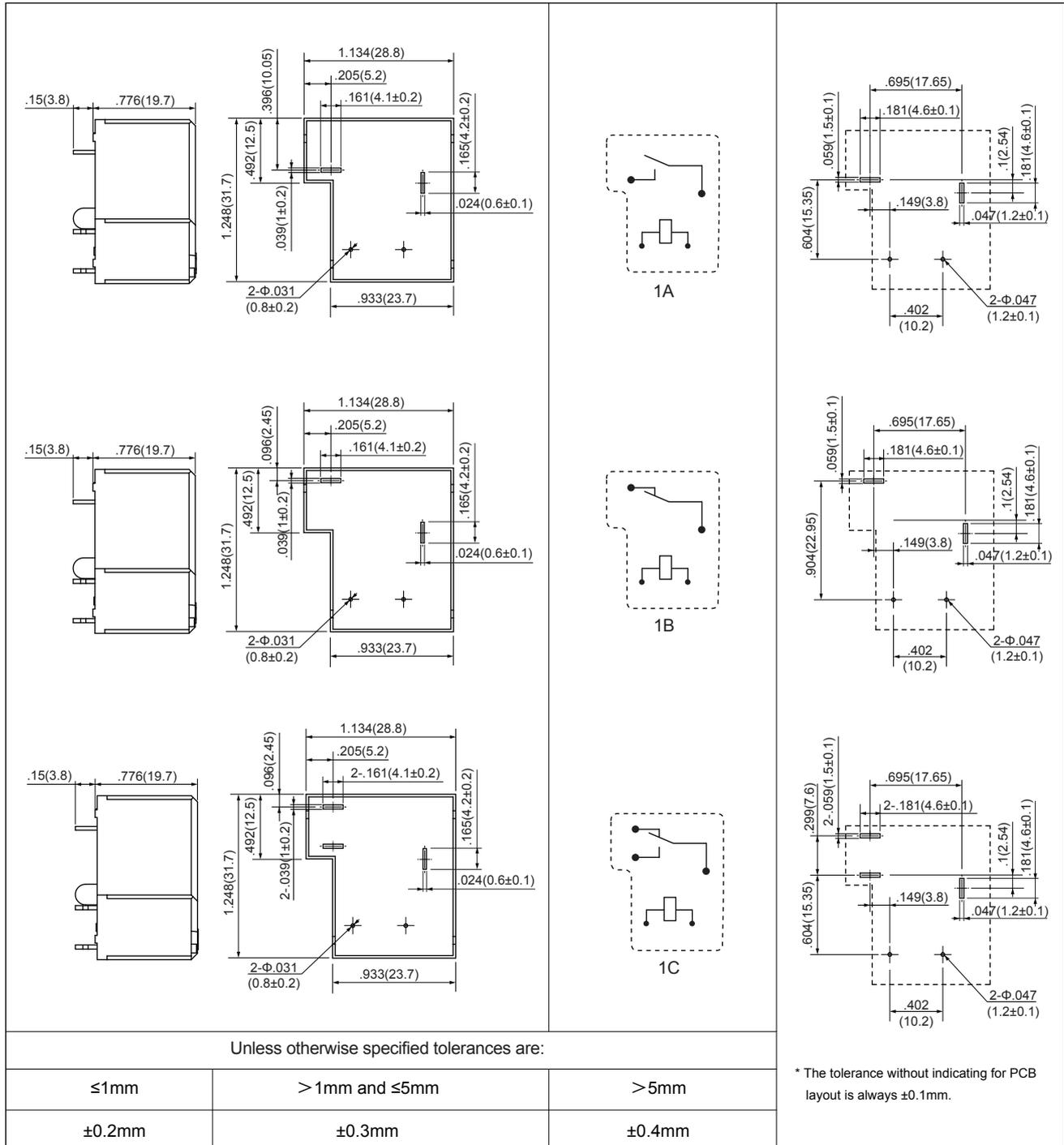
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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File No.:E75887



File No.:R 50390115



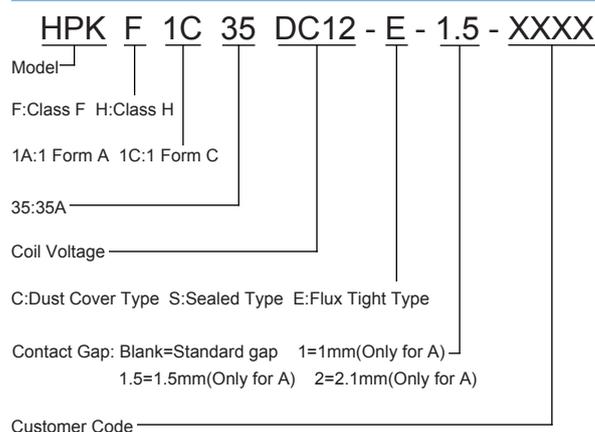
## FEATURES

- 35A switching capability
- Surge voltage up to 6kV (between coil and contacts)
- 1 Form C and 1 Form A configurations available
- Dust Cover Type, Flux Free Type and Sealed Type is available
- Creepage Distance up to 6mm
- Outline Dimensions: 21.6mm×16.0mm×20.6mm

## CONTACT RATINGS

Contact Arrangement	1A, 1C
Contact Resistance	≤100mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	N.O.:35A/277VAC N.C.:16A/277VAC
Max. Switching Voltage	277VAC
Max. Switching Current	35A
Max. Switching Power	9695VA
Mechanical Life	1×10 <sup>5</sup> operations(frequency 9,000 operations/hr)
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	4000VAC 1min
	Between open contacts	1500VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	85%	
Operation temperature	-40°C~+85°C(105°C for Class H)	
Class F/H	Insulation System Class F/H	
Shock Resistance	Operating extremes	10G
	Damage limits	100G
Vibration resistance	10Hz ~ 50Hz 1.0mm DA	
Unit weight	Approx. 15g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC <sup>(1)</sup>	Release Voltage (Min.) VDC	Holding Voltage at 85°C VDC <sup>(2)</sup>	Coil Resistance Ω±10%
6	4.8	0.30	1.92~2.16	22
9	7.2	0.45	2.88~3.24	49
12	9.6	0.60	3.84~4.32	86
24	19.2	1.20	7.68~8.64	345
48	38.4	2.40	15.36~17.28	1380

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RELAYS & ELECTRONICS INT'L. CORP.

\* SINCE 1976 \*

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# RELAYS

## COIL

Power consumption at rated voltage	1670mW
Power consumption at holding voltage	190mW <sup>(2)</sup>

**Notes:**

- (1) To energize relay properly apply 100%~120% nominal coil voltage for 200ms.
- (2) Coil holding voltage is 32~36% of nominal voltage after applying nominal voltage for 200ms.
- (3) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## SAFETY APPROVAL RATINGS

UL&CUL	N.O.:35A 277VAC, 70°C, 5×10 <sup>4</sup> OPS(HPKH only)
	N.O.:32A 277VAC, 85°C, 34×10 <sup>3</sup> OPS(HPKH only)
	N.O.:25A 277VAC, 105°C, 5×10 <sup>4</sup> OPS(HPKH only)
	N.O.:35A 277VAC Resistive, 24×10 <sup>3</sup> OPS
	N.O.:25A 277VAC/35VDC, 40°C, 5×10 <sup>4</sup> OPS
	N.O.:5A 120VAC E.Ballast, 40°C, 6×10 <sup>3</sup> OPS
	N.O.:TV-8 277VAC
	N.C.:16A 277VAC, 40°C, 7×10 <sup>3</sup> OPS
	N.C.:16A 277VAC, 85°C, 15×10 <sup>3</sup> OPS(HPKH only)
	N.C.:32A Carry Current

TüV	N.O.:50A/30VDC, 25°C, 5×10 <sup>4</sup> OPS
	N.O.:35A/277VAC, 25°C, 5×10 <sup>4</sup> OPS
	N.O.:25A/277VAC, 105°C, 1×10 <sup>4</sup> OPS
	N.O.:32A/277VAC, 85°C, 1×10 <sup>4</sup> OPS
	N.O.:35A/277VAC, 70°C, 1×10 <sup>4</sup> OPS

**NOTES:**

- 1. All values without specified temperature are at 25°C.
- 2. The above lists the typical loads only. Other loads may be available upon request.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

<p>Unless otherwise specified tolerances are:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">≤1mm</td> <td style="width: 33%; text-align: center;">&gt; 1mm and ≤5mm</td> <td style="width: 33%; text-align: center;">&gt;5mm</td> </tr> <tr> <td style="text-align: center;">±0.2mm</td> <td style="text-align: center;">±0.3mm</td> <td style="text-align: center;">±0.4mm</td> </tr> </table>			≤1mm	> 1mm and ≤5mm	>5mm	±0.2mm	±0.3mm	±0.4mm
≤1mm	> 1mm and ≤5mm	>5mm						
±0.2mm	±0.3mm	±0.4mm						
<p>* The tolerance without indicating for PCB layout is always ±0.1mm.</p>								

This datasheet is for customers' reference. All the specifications are subject to change without notice.



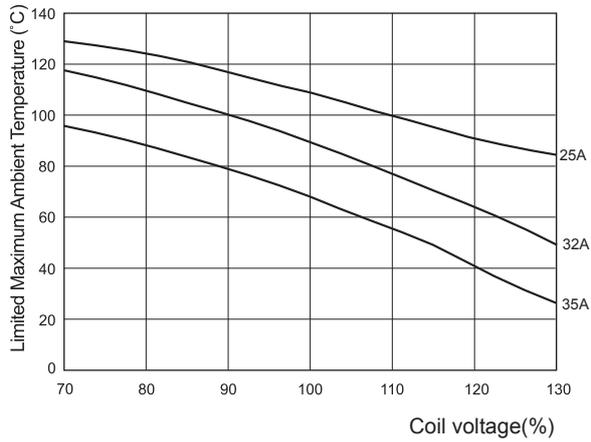
# RELAYS

\* SINCE 1976 \*

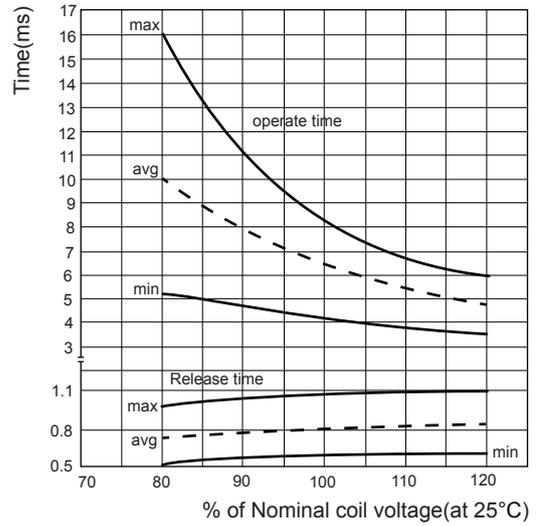
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## CHARACTERISTIC CURVES

Coil operating range (DC)



Operate time / Release time



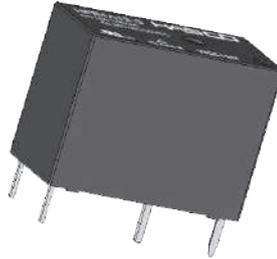
This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



File No.:R 50325379



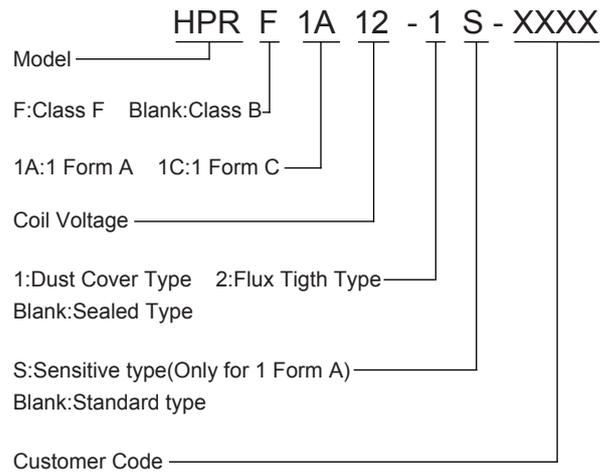
## FEATURES

- 10A switching capability
- 1 Form A and 1 Form C configurations
- Subminiature, standard PCB layout
- Sealed Type, Dust Cover Type and Flux Tight Type is available.

## CONTACT RATINGS

Contact Arrangement	1A	1C	
Contact Resistance	≤100mΩ (1A 24VDC)		
Contact Material	AgSnO		
Contact Rating(Resistive)	1A	1C	
		N.O.	N.C.
	5A/250VAC 5A/30VDC 10A/125VAC	5A/250VAC 5A/30VDC 10A/125VAC	5A/250VAC 5A/30VDC
Max. Switching Voltage	250VAC/150VDC		
Max. Switching Current	10A	5A	
Max. Switching Power	1250VA/150W		
Mechanical Life	45×10 <sup>4</sup> OPS		
Electrical Life	1A type:1×10 <sup>5</sup> OPS (5A 250VAC, Resistive load, Room temp., 1s on 1s off) 1C type:5×10 <sup>4</sup> OPS (N.O./N.C.:5A 250VAC, Resistive load, Room temp., 1.5s on 1.5s off)		

## ORDERING INFORMATION



## CHARACTERISTICS

Insulation Resistance	1000MΩ (500VDC)	
Dielectric Strength	Between coil & contacts	4000VAC 1min
	Between open contacts	750VAC 1min
Operate time (at nomi. volt.)	≤20ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	85%	
Operation temperature	-40°C~+85°C	
UL Class F	Insulation System Class F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 7g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

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# RELAYS

## COIL DATA

at 25°C

### Standard Type

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.75	0.25	6.5	63
6	4.50	0.30	7.8	90
9	6.75	0.45	11.7	202
12	9.00	0.60	15.6	360
24	18.0	1.20	31.2	1440

### Sensitive Type(Only for 1 Form A)

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.75	0.25	7.5	125
6	4.50	0.30	9.0	180
9	6.75	0.45	13.5	405
12	9.00	0.60	18.0	720
24	18.0	1.20	36.0	2800

#### Notes:

- 1) "\*\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	Standard Type: 400mW
	Sensitive Type: 200mW

## SAFETY APPROVAL RATINGS

UL&CUL		
	HPRF	N.O.:5A 250VAC, 100°C, 5×10 <sup>4</sup> OPS
		N.O.:5A 30VDC, 100°C, 2×10 <sup>4</sup> OPS
		N.O.:10A 125AC, 100°C, 5×10 <sup>4</sup> OPS
		N.O.:1/6HP 125VAC, 40°C, 5×10 <sup>4</sup> OPS
		N.C.:5A 250VAC, 100°C, 5×10 <sup>4</sup> OPS
		N.C.:5A 30VDC, 100°C, 2×10 <sup>4</sup> OPS
	HPR	N.O.:5A 250VAC, 1×10 <sup>5</sup> OPS
		N.O.:5A 30VDC, 1×10 <sup>5</sup> OPS
		N.O.:10A 125AC, 1×10 <sup>5</sup> OPS
		N.C.:5A 250VAC, 1×10 <sup>5</sup> OPS
		N.C.:5A 30VDC, 1×10 <sup>5</sup> OPS
		N.C.:5A 30VDC, 1×10 <sup>5</sup> OPS

TüV	
	N.O.:10A 125VAC, 2×10 <sup>4</sup> OPS
	N.C.:5A 250VAC, 5×10 <sup>4</sup> OPS
	N.C.:5A 30VDC, 5×10 <sup>4</sup> OPS
	N.O./N.C.:5A 250VAC, 5×10 <sup>4</sup> OPS
	N.O./N.C.:5A 30VDC, 5×10 <sup>4</sup> OPS
	N.O./N.C.:5A 30VDC, 5×10 <sup>4</sup> OPS

#### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)

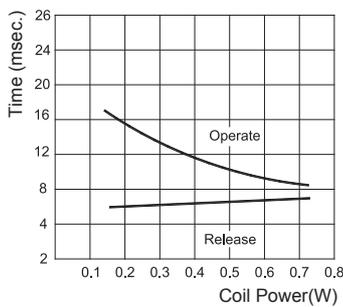
Unless otherwise specified tolerances are:

≤1mm	> 1mm and ≤5mm	> 5mm
±0.2mm	±0.3mm	±0.4mm

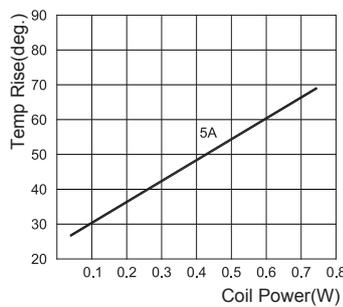
\* The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

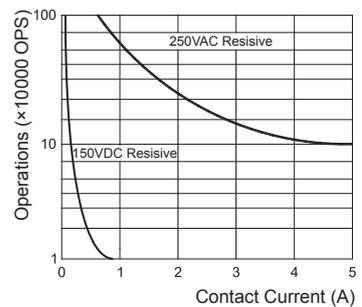
### Timing



### Coil Temperature Rise



### Life Curves



This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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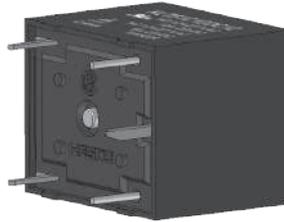
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File No.:E75887



File No.:R 50306227



## FEATURES

- Highly reliable, low cost
- Miniature size & large switch capacity up to 20A
- High dielectric strength type
- Fully Sealed

## CONTACT RATINGS

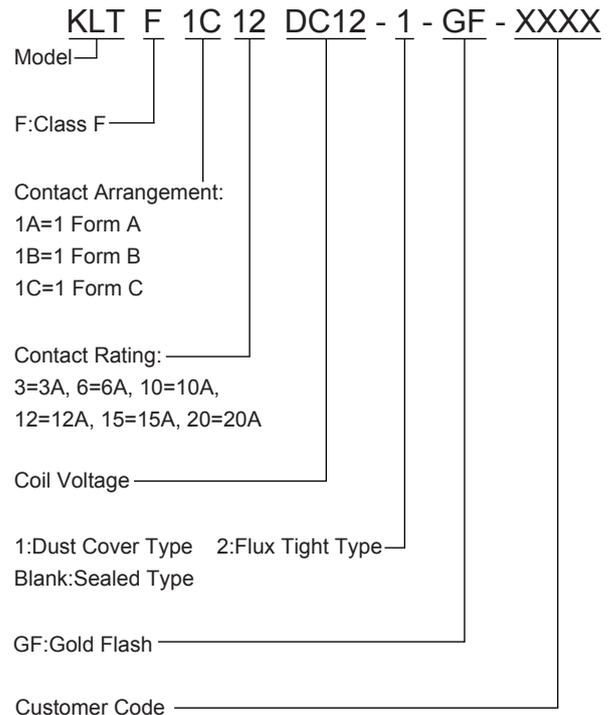
Contact Arrangement	1A, 1B, 1C
Contact Resistance	≤100mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	3A 277VAC/28VDC; 6A 277VAC/28VDC; 10A 277VAC/28VDC; 12A 277VAC/28VDC; 15A 277VAC/28VDC; 20A 277VAC/28VDC
Max. Switching Voltage	277VAC/28VDC
Max. Switching Current	20A
Max. Switching Power	5540VA/560W
Mechanical Life	1×10 <sup>6</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance		100MΩ (at 500VDC)
Dielectric Strength	Between coil & contacts	1500VAC 1min
	Between open contacts	750VAC 1min
Operate time (at nomi. volt.)		≤8ms
Release time (at nomi. volt.)		≤5ms
Humidity		45% ~ 85% RH
Operation temperature		-55°C~+105°C
UL Class F		Insulation System Class F
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance		10Hz to 55Hz 1.5mm DA
Unit weight		Approx. 12g
Construction		Sealed Type, Dust Cover Type, Flux Tight Type

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

## COIL DATA

at 25°C

### 3A, 6A, 10A, 12A, 15A

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
3	2.25	0.3	3.9	25
5	3.75	0.5	6.5	70
6	4.50	0.6	7.8	100
9	6.75	0.9	11.7	220
12	9.00	1.2	15.6	400
18	13.5	1.8	23.4	900
24	18.0	2.4	31.2	1600
48	36.0	4.8	62.4	6400

### 20A

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
3	2.25	0.3	3.9	20
5	3.75	0.5	6.5	55
6	4.50	0.6	7.8	80
9	6.75	0.9	11.7	180
12	9.00	1.2	15.6	320
18	13.5	1.8	23.4	720
24	18.0	2.4	31.2	1280
48	36.0	4.8	62.4	5120

#### Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	3A-15A: 360mW 20A: 450mW
------------	-----------------------------

## SAFETY APPROVAL RATINGS

UL&CUL		
	3A	3A 277VAC, G.P., 40°C, 6×10 <sup>3</sup> OPS 3A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS 3.6A 277VAC, Ballast, 40°C, 6×10 <sup>3</sup> OPS
	6A	6A 277VAC, G.P., 40°C, 6×10 <sup>3</sup> OPS 6A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS 3.6A 277VAC, Ballast, 40°C, 6×10 <sup>3</sup> OPS
	10A	10A 277VAC, G.P., 40°C, 6×10 <sup>3</sup> OPS 10A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS
	12A	12A 277VAC, G.P., 40°C, 6×10 <sup>3</sup> OPS 12A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS N.O./N.C.:10A/5A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS 3.6A 277VAC, Ballast, 40°C, 6×10 <sup>3</sup> OPS
	15A	15A 277VAC, G.P., 40°C, 6×10 <sup>3</sup> OPS N.O.:15A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS N.C.:12A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS N.O./N.C.:10A/5A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS 3.6A 277VAC, Ballast, 40°C, 6×10 <sup>3</sup> OPS
	20A	20A 277VAC, G.P., 40°C, 6×10 <sup>3</sup> OPS N.O.:20A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS N.C.:12A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS N.O./N.C.:10A/5A 28VDC, G.P., 40°C, 6×10 <sup>3</sup> OPS 3.6A 277VAC, Ballast, 40°C, 6×10 <sup>3</sup> OPS

TüV	
	(KLT20)N.O.:20A 277VAC, 25°C, 3×10 <sup>4</sup> OPS N.O.:20A 125VAC, 25°C, 5×10 <sup>4</sup> OPS (KLT20)N.O.:15A 125VAC, 85°C, 2×10 <sup>4</sup> OPS N.O.:12A 250VAC, 105°C, 2×10 <sup>4</sup> OPS (KLT20)N.O.:20A 28VDC, 85°C, 2×10 <sup>4</sup> OPS N.C.:12A 277VAC, 25°C, 1×10 <sup>4</sup> OPS (KLT20)N.C.:12A 28VDC, 85°C, 2×10 <sup>4</sup> OPS N.O./N.C.:12A/10A 250VAC, 85°C, 1×10 <sup>4</sup> OPS N.O./N.C.:12A/10A 28VDC, 85°C, 1×10 <sup>4</sup> OPS

#### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.

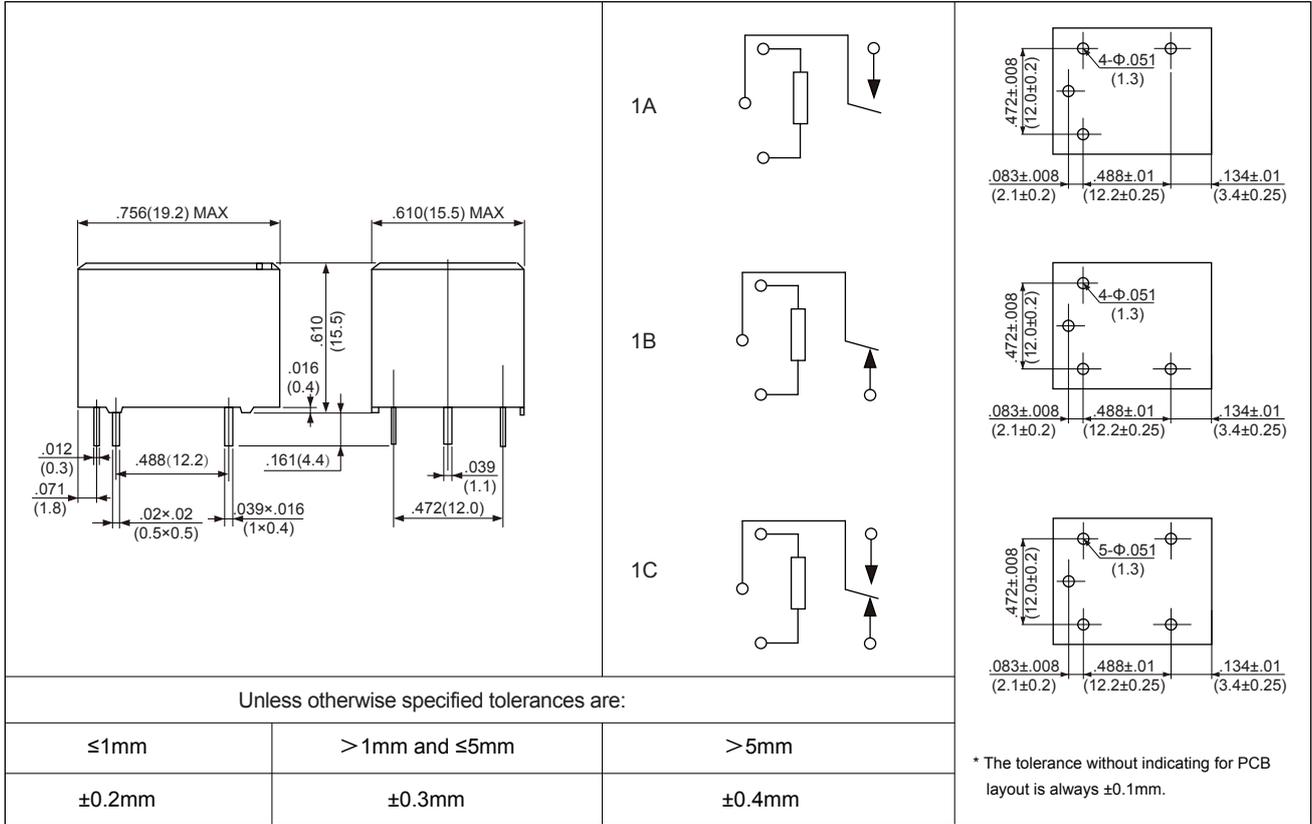
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

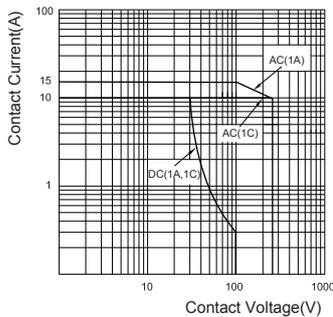
Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

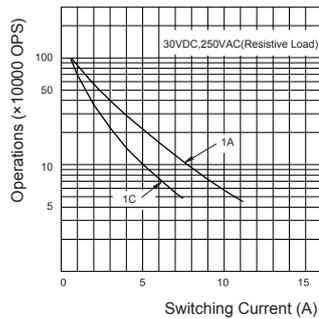


## CHARACTERISTIC CURVES

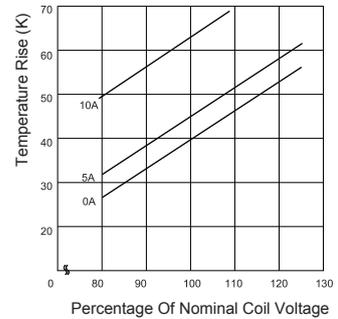
MAXIMUM SWITCHING POWER



ENDURANCE CURVE



COIL TEMPERATURE RISE



This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:R 50267950



## FEATURES

- 20A or 25A switching capability
- Surge voltage up to 6kV (between coil and contacts)
- Explosion-proof products available

## CONTACT RATINGS

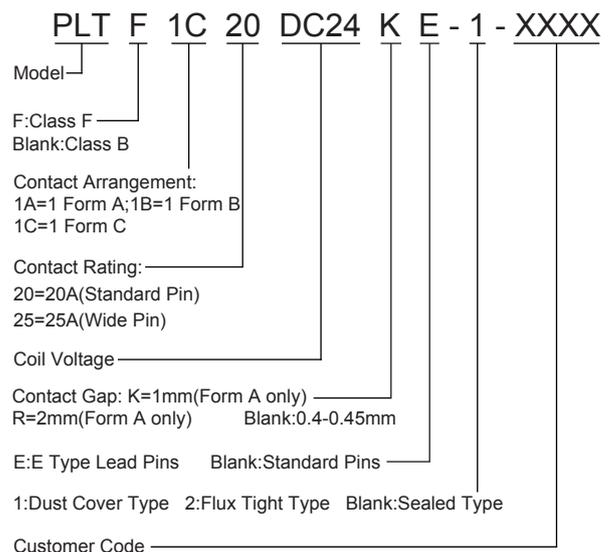
Contact Arrangement	1A, 1B, 1C	
Contact Resistance	≤100mΩ(1A 24VDC)	
Contact Material	AgSnO, AgSnOIn	
Contact Rating(Resistive)	N.O.:20A/277VAC N.C.:16A/125VAC	N.O.:25A/125VAC 17A/277VAC N.C.:20A/125VAC
Max. Switching Voltage	400VAC	400VAC(NO)
Max. Switching Current	20A	25A
Max. Switching Power	5540VA	4709VA
Mechanical Life	1×10 <sup>7</sup> operations	
Electrical Life	See more details at "safety approval ratings"	

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2500VAC(PLT)/3500VAC(PLT-E) 1min
	Between open contacts	1000VAC 1min
Surge voltage(between coil & contacts)	6kV(1.2×50μs)	
Creepage(between coil & contacts)	≥4.8mm(PLT), ≥7.3mm(PLT-E)	
Clearance(between coil & contacts)	≥4.8mm(PLT), ≥7.3mm(PLT-E)	
Operate time (at nomi. volt.)	≤10ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	5%~85% RH	
Operation temperature	-40°C~+105°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz to 55Hz 1.5mm DA	
Unit weight	Approx. 14g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



- Notes:
1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
  2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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# RELAYS

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## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$	
				20A	25A
3	2.25	0.3	3.9	25	20
5	3.75	0.5	6.5	70	55
6	4.50	0.6	7.8	100	80
9	6.75	0.9	11.7	225	180
12	9.00	1.2	15.6	400	320
18	13.50	1.8	23.4	900	720
24	18.00	2.4	31.2	1600	1280
48	36.00	4.8	62.4	6400	5120

**Notes:**

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	20A:360mW 25A:450mW
------------	------------------------

## SAFETY APPROVAL RATINGS

UL&CUL	Non-Cd Contact (20A)	N.O.:20A 277VAC, G.P., 6×10 <sup>3</sup> OPS(40°C) N.O.:10A 120VAC, 3×10 <sup>4</sup> OPS(40°C) N.O.:5A 240VAC, 1×10 <sup>5</sup> OPS(40°C) N.O.:3A, 10A Inrush, 24VAC Pilot duty, 3×10 <sup>4</sup> OPS(40°C) N.O.:1A, 10A Inrush, 240VAC Pilot duty, 1×10 <sup>5</sup> OPS(40°C) N.O.:1.7A, 17A Inrush, 40VAC Pilot duty, 1×10 <sup>5</sup> OPS(40°C) N.O.:3.8FLA, 22.8 LRA, 120VAC HP, 1×10 <sup>5</sup> OPS(40°C) N.O.:3.6FLA, 21.6 LRA, 240VAC HP, 3×10 <sup>4</sup> OPS(40°C) N.O.:1.9FLA, 11.4 LRA, 240VAC HP, 1×10 <sup>5</sup> OPS(40°C) N.O.:8A 120VAC TV, 25×10 <sup>3</sup> OPS(40°C) N.O./N.C.:1/2HP 120VAC, 6×10 <sup>3</sup> OPS(40°C) N.O./N.C.:1/2HP 240VAC, 6×10 <sup>3</sup> OPS(40°C) N.C.:16A 125VAC, G.P., 6×10 <sup>3</sup> OPS(40°C) N.C.:10A 120VAC, 3×10 <sup>4</sup> OPS(40°C) N.C.:1.7A, 17A Inrush, 240VAC Pilot duty, 3×10 <sup>4</sup> OPS(40°C) N.C.:3.6FLA, 21.6 LRA, 240VAC HP, 3×10 <sup>4</sup> OPS(40°C) N.C.: 1000W 120VAC Tungsten, 1×10 <sup>4</sup> OPS(40°C) N.C.:3A 277VAC Electronic Ballast, 6×10 <sup>3</sup> OPS(40°C) N.C.:5A 277VAC Electronic Ballast, 6×10 <sup>3</sup> OPS(40°C)
	Non-Cd Contact (25A)	N.O.:25A 125VAC, G.P., 6×10 <sup>3</sup> OPS(40°C) N.O.:17A 277VAC, G.P., 6×10 <sup>3</sup> OPS(40°C) N.O.: 1500W 277VAC Ballast, 6×10 <sup>3</sup> OPS(40°C) N.O.:1700W 120VAC Tungsten, 6×10 <sup>3</sup> OPS(40°C) N.C.:20A 125VAC, G.P., 6×10 <sup>3</sup> OPS(40°C) N.C.: 1500W 277VAC Ballast, 6×10 <sup>3</sup> OPS(40°C) N.C.:1700W 120VAC Tungsten, 6×10 <sup>3</sup> OPS(40°C)

TüV	Non-Cd Contact (20A)	N.O.:16A 250VAC, 1×10 <sup>4</sup> OPS N.C.:10A 250VAC, 1×10 <sup>4</sup> OPS N.O.:16A 250VAC; N.C.:10A 250VAC, 1×10 <sup>4</sup> OPS
-----	----------------------	---

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

	Outline Dimensions	Wiring Diagram (Bottom view)	PCB Layout (Bottom view)						
20A	<p>Standard Pins</p> <p>Vent-hole (Top View)</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>						
25A	<p>Standard Pins</p> <p>Vent-hole (Top View)</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>						
<p>Unless otherwise specified tolerances are:</p> <table border="1"> <tr> <td>≤1mm</td> <td>&gt;1mm and ≤5mm</td> <td>&gt;5mm</td> </tr> <tr> <td>±0.2mm</td> <td>±0.3mm</td> <td>±0.4mm</td> </tr> </table>				≤1mm	>1mm and ≤5mm	>5mm	±0.2mm	±0.3mm	±0.4mm
≤1mm	>1mm and ≤5mm	>5mm							
±0.2mm	±0.3mm	±0.4mm							
<p>* The tolerance without indicating for PCB layout is always ±0.1mm.</p>									

This datasheet is for customers' reference. All the specifications are subject to change without notice.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)

<p>20A</p>	<p>E Type Lead Pins</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>
<p>25A</p>	<p>E Type Lead Pins</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>	<p>1 Form A</p> <p>1 Form B</p> <p>1 Form C</p>
<p>Unless otherwise specified tolerances are:</p>		<p>* The tolerance without indicating for PCB layout is always ±0.1mm.</p>	
<p>≤1mm</p>	<p>&gt; 1mm and ≤5mm</p>	<p>&gt; 5mm</p>	
<p>±0.2mm</p>	<p>±0.3mm</p>	<p>±0.4mm</p>	

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

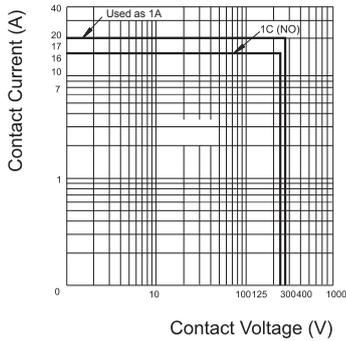
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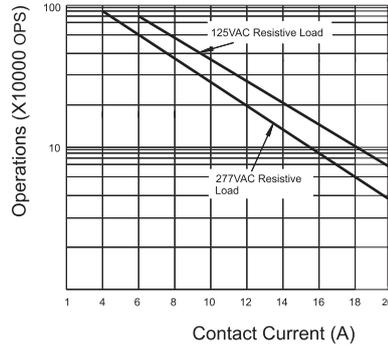
## CHARACTERISTIC CURVES

### 20A

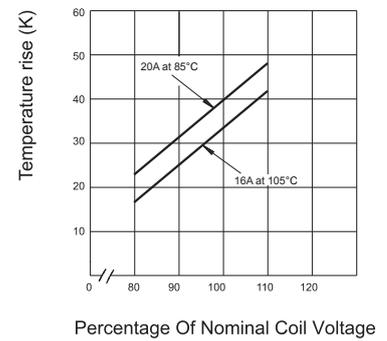
MAX. SWITCHING POWER



ENDURANCE CURVE (N.O.)

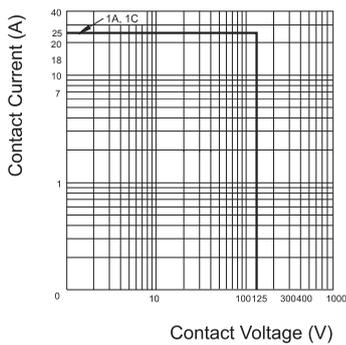


COIL TEMPERATURE RISE

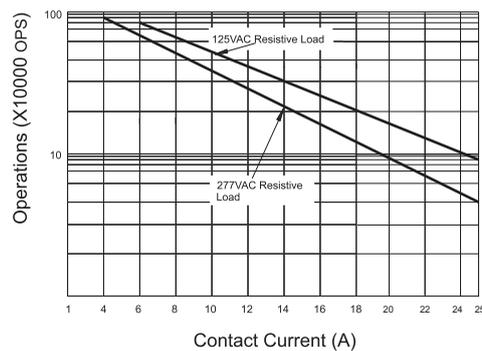


### 25A

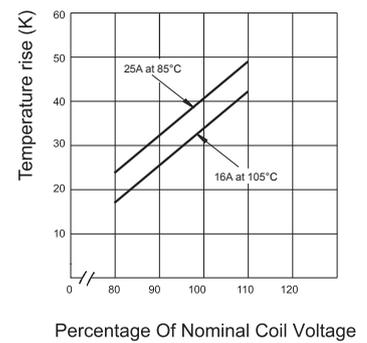
MAX. SWITCHING POWER



ENDURANCE CURVE (N.O.)



COIL TEMPERATURE RISE



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File No.:E75887



File No.:R 50261062



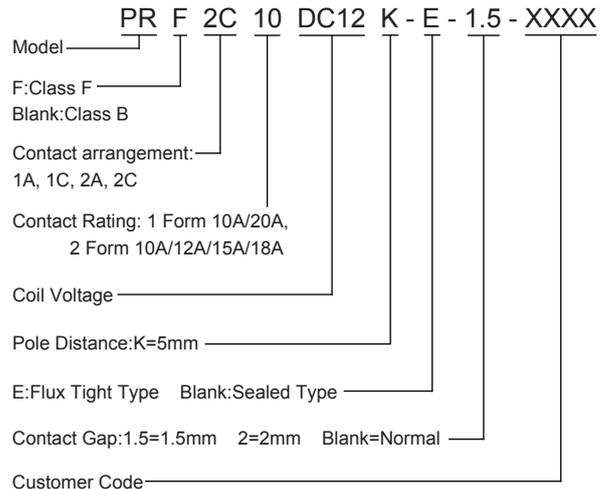
## FEATURES

- High breakdown voltage (5000VAC between coil and contact)
- Large switching capacity (20A 277VAC)
- Typical Applications:
  - General electronic controls or systems, Machine tool controls, Energy control circuits, Industrial machinery controls, Consumer controls (Air-conditioner, Refrigerator, Microwave Oven, etc.), Vending machine, Office machine, etc.

## CONTACT RATINGS

Contact Arrangement	1A, 1C	2A, 2C
Contact Resistance	≤50mΩ(1A 24VDC)	
Contact Material	AgSnO <sub>2</sub> , AgSnOIn	
Contact Rating(Resistive)	10A/277VAC 10A/30VDC	20A/277VAC 20A/30VDC
	10A/277VAC 5A/30VDC	12A/277VAC 6A/30VDC 15A/277VAC 18A/277VAC
Max. Switching Voltage	277VAC/30VDC	
Max. Switching Current	10A	20A
Max. Switching Power	2770VA/300W	5540VA/600W
Mechanical Life	Normal:1×10 <sup>7</sup> OPS 1.5mm:5×10 <sup>5</sup> OPS 2mm:3×10 <sup>5</sup> OPS	
Electrical Life	See more details at "safety approval ratings"	

## ORDERING INFORMATION



- Notes:
1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
  2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	1000VAC 1min(Normal contact gap) 2000VAC 1min(1.5mm contact gap) 2500VAC 1min(2mm contact gap)
	Between contact sets	3000VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	98% RH	
Operation temperature	-40°C~+85°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 18g	
Construction	Sealed Type, Flux Tight Type	

Notes: The data shown above are initial values

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%		
				Normal	1.5mm	2mm
5	4.0	0.5	6.0	47	32	18
6	4.8	0.6	7.2	68	45	26
9	7.2	0.9	10.8	155	102	58
12	9.6	1.2	14.4	275	180	103
24	19.2	2.4	28.8	1100	720	412
48	38.4	4.8	57.6	4400	2880	1650
110	80.0	11.0	120.0	14400	—	—

Note: \*Max Allowable Voltage\*: The relay coil can endure max allowable voltage for a short period time only.



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# RELAYS

## COIL

Coil Power	Normal Contact Gap: Approx. 530mW 1.5mm Contact Gap: 800mW 2mm Contact Gap: 1400mW 110V: 840mW
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## SAFETY APPROVAL RATINGS

UL&CUL	Form 1	N.O./N.C.:16A/16A 277VAC, G.P., 1×10 <sup>5</sup> OPS N.O./N.C.:16A/16A 30VDC, 5×10 <sup>4</sup> OPS N.O./N.C.:1/2HP 120VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:1-1/2HP 240VAC, 6×10 <sup>3</sup> OPS N.O.:10A 277VAC Tungsten, 2.5×10 <sup>4</sup> OPS N.O.:TV-10 277VAC, 2.5×10 <sup>4</sup> OPS N.O./N.C.:20A 277VAC/30VDC, 6×10 <sup>3</sup> OPS N.O./N.C.:10A/10A 277VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:10A/10A 30VDC, 6×10 <sup>3</sup> OPS N.O./N.C.:1/4HP 120VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:1/2HP 240VAC, 6×10 <sup>3</sup> OPS
	Form 2	N.O.:18A 277VAC, 85°C, 2.5×10 <sup>4</sup> OPS N.O.:15A 277VAC, G.P., 6×10 <sup>3</sup> OPS N.O.:12A 277VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:10A/10A 277VAC, G.P., 6×10 <sup>3</sup> OPS N.O./N.C.:5A/5A 30VDC, 6×10 <sup>3</sup> OPS N.O./N.C.:1/8HP 120VAC, 6×10 <sup>3</sup> OPS N.O.:1/4HP 120VAC, 6×10 <sup>3</sup> OPS N.O.:1/2HP 240VAC, 6×10 <sup>3</sup> OPS N.O.:1/3HP 120VAC, 6×10 <sup>3</sup> OPS N.O.:3/4HP 240VAC, 6×10 <sup>3</sup> OPS N.O.:TV-5 120VAC/277VAC, 2.5×10 <sup>4</sup> OPS N.O.:TV-8 277VAC, 2.5×10 <sup>4</sup> OPS

TüV	Form 1	N.O.:20A 277VAC, 1×10 <sup>5</sup> OPS N.O./N.C.:16A/16A 277VAC, 1×10 <sup>5</sup> OPS N.O./N.C.:16A/16A 30VDC, 6×10 <sup>4</sup> OPS
	Form 2	N.O.:18A 277VAC, 85°C, 5×10 <sup>4</sup> OPS N.O.:15A 277VAC, 5×10 <sup>4</sup> OPS N.O.:10A 277VAC, 5×10 <sup>4</sup> OPS N.O./N.C.:12A/6A 277VAC, 2×10 <sup>4</sup> OPS N.O./N.C.:12A/6A 30VDC, 2×10 <sup>4</sup> OPS N.O.:12A 277VAC; N.C.:6A 277VAC, 5×10 <sup>4</sup> OPS N.O.:12A 30VDC; N.C.:6A 30VDC, 5×10 <sup>4</sup> OPS N.O./N.C.:5A/5A 250VAC, 5×10 <sup>4</sup> OPS N.O./N.C.:5A/5A 30VDC, 5×10 <sup>4</sup> OPS

### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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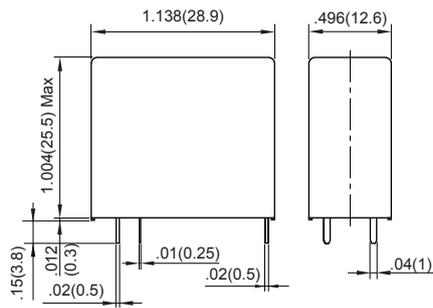
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# RELAYS

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

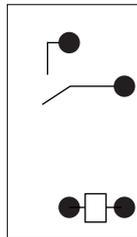
### Outline Dimensions



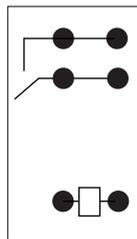
Contact Arrangement "A"

### Wiring Diagram (Bottom view)

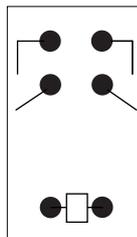
1A10



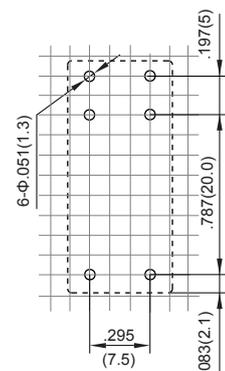
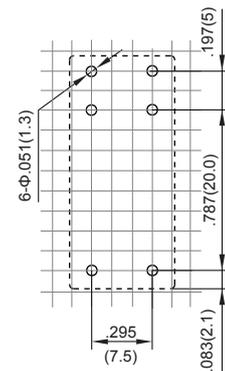
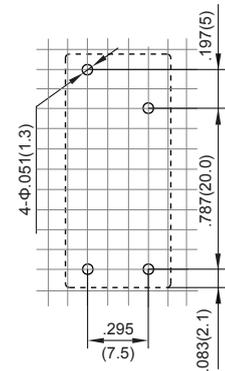
1A20



2A



### PCB Layout (Bottom view)



Unless otherwise specified tolerances are:

≤1mm	>1mm and ≤5mm	>5mm
±0.2mm	±0.3mm	±0.4mm

\* The tolerance without indicating for PCB layout is always ±0.1mm.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

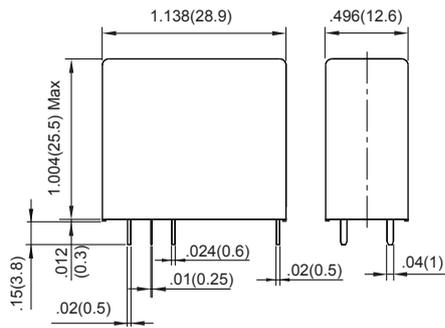
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## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

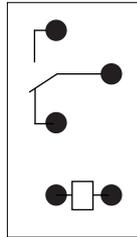
### Outline Dimensions



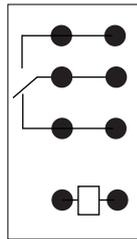
Contact Arrangement "C"

### Wiring Diagram (Bottom view)

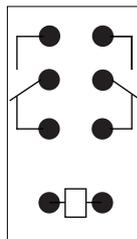
1C10



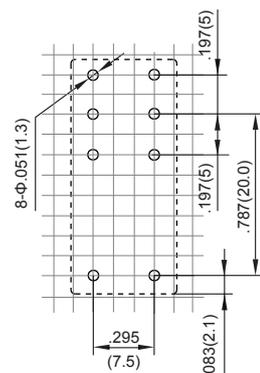
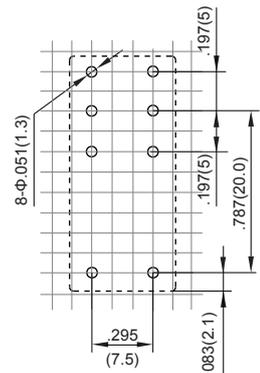
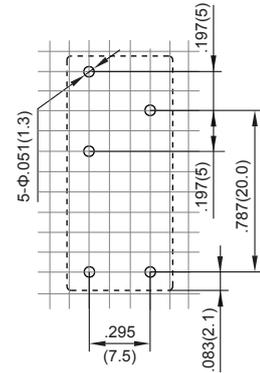
1C20



2C



### PCB Layout (Bottom view)



Unless otherwise specified tolerances are:

≤1mm	>1mm and ≤5mm	>5mm
±0.2mm	±0.3mm	±0.4mm

\* The tolerance without indicating for PCB layout is always ±0.1mm.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



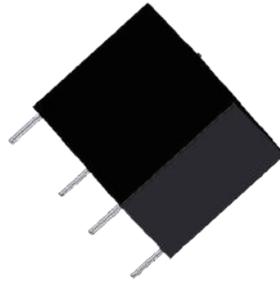
# RELAYS

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File No.:E75887



## FEATURES

- 10A switching capability
- 1 Form A and 1 Form C configurations
- Subminiature, standard PCB layout
- Sealed Type, Dust Cover Type and Flux Free Type is available
- Outline Dimensions:(18.4×10.2×15.3)mm

## CONTACT RATINGS

Contact Arrangement	1A	1C				
Contact Resistance	≤100mΩ (1A 24VDC)					
Contact Material	Silver Alloy					
Contact Rating(Resistive)	Standard type		Sensitive type		Standard type	
	High capacity		Standard		High capacity	
	-H Type 10A/250VAC 10A/30VDC	5A/250VAC 5A/30VDC 10A/277VAC	3A/250VAC 3A/30VDC	-T type NO:8A/250VAC 8A/30VDC NC:5A/250VAC 5A/30VDC	10A/277VAC 3A/30VDC	
Max. Switching Voltage	277VAC/30VDC					
Max. Switching Current	10A					
Max. Switching Power	2770VA/300W					
Mechanical Life	1×10 <sup>7</sup> operations					
Electrical Life	See more details at "safety approval ratings"					

## CHARACTERISTICS

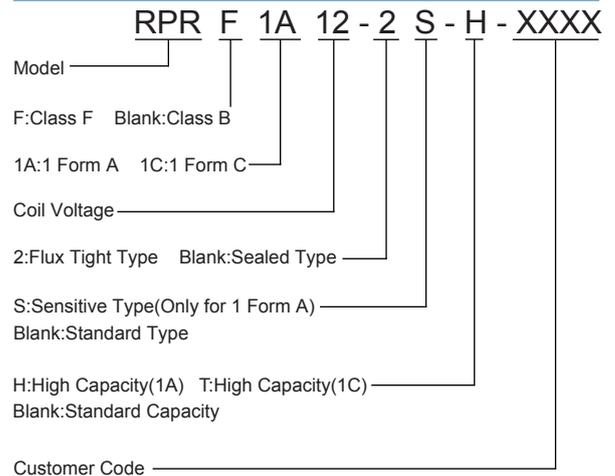
Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2500VAC 1min
	Between open contacts	1000VAC 1min
Operate time (at nomi. volt.)	≤8ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	35% ~ 95% RH	
Operation temperature	-40°C~+85°C	
Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 6g	
Construction	Sealed Type, Flux Tight Type	

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

## ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## COIL DATA

at 25°C

Standard Type

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
3	2.25	0.15	3.9	20
5	3.75	0.25	6.5	55
6	4.50	0.30	7.8	80
9	6.75	0.45	11.7	180
12	9.00	0.60	15.6	320
18	13.5	0.90	23.4	720
24	18.0	1.20	31.2	1280
48	36.0	2.40	62.4	5120

Note: \*\*Max Allowable Voltage\*: The relay coil can endure max allowable voltage for a short period time only.



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# RELAYS

## COIL DATA at 25°C

Sensitive Type(Only for 1 Form A)

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
3	2.25	0.15	4.5	45
5	3.75	0.25	7.5	125
6	4.50	0.30	9.0	180
9	6.75	0.45	13.5	400
12	9.00	0.60	18.0	720
18	13.5	0.90	27.0	1600
24	18.0	1.20	36.0	2800

Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	Standard Type: 450mW
	Sensitive Type: 200mW

## SAFETY APPROVAL RATINGS

UL&CUL	1A	1C
	Sensitive N.O.:3A 250VAC, 40°C, 6×10 <sup>3</sup> OPS Sensitive N.O.:3A 30VDC, 40°C, 6×10 <sup>3</sup> OPS High Capacity N.O.:10A 250VAC, 40°C, 6×10 <sup>3</sup> OPS High Capacity N.O.:10A 30VDC, 40°C, 6×10 <sup>3</sup> OPS Standard Capacity N.O.:5A 250VAC, 40°C, 6×10 <sup>3</sup> OPS Standard Capacity N.O.:5A 30VDC, 40°C, 6×10 <sup>3</sup> OPS Standard Capacity N.O.:10A 125VAC, 40°C, 6×10 <sup>3</sup> OPS Standard Capacity N.O.:10A 277VAC, 85°C, 2×10 <sup>4</sup> OPS(UL PENDING)	High Capacity N.O.:8A 250VAC, 40°C, 6×10 <sup>3</sup> OPS High Capacity N.O.:8A 30VDC, 40°C, 6×10 <sup>3</sup> OPS High Capacity N.C.:5A 250VAC, 40°C, 6×10 <sup>3</sup> OPS High Capacity N.C.:5A 30VDC, 40°C, 6×10 <sup>3</sup> OPS Standard Capacity N.O.:10A 277VAC, 85°C, 2×10 <sup>4</sup> OPS(UL PENDING) Standard Capacity N.O.:3A 30VDC, 40°C, 6×10 <sup>3</sup> OPS Standard Capacity N.O.:3A 250VAC, 40°C, 6×10 <sup>3</sup> OPS

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

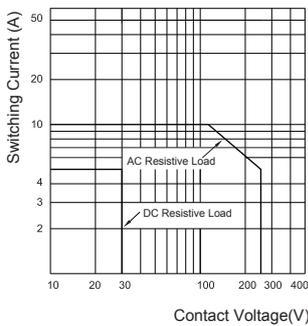
### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)

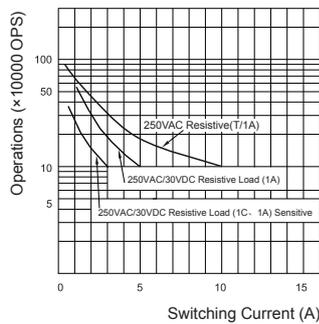
		<p>1A</p>	<p>1A</p>						
<p>1C</p>		<p>1C</p>							
<p>Unless otherwise specified tolerances are:</p> <table border="1"> <tr> <td>≤1mm</td> <td>&gt; 1mm and ≤5mm</td> <td>&gt; 5mm</td> </tr> <tr> <td>±0.2mm</td> <td>±0.3mm</td> <td>±0.4mm</td> </tr> </table>			≤1mm	> 1mm and ≤5mm	> 5mm	±0.2mm	±0.3mm	±0.4mm	<p>* The tolerance without indicating for PCB layout is always ±0.1mm.</p>
≤1mm	> 1mm and ≤5mm	> 5mm							
±0.2mm	±0.3mm	±0.4mm							

## CHARACTERISTIC CURVES

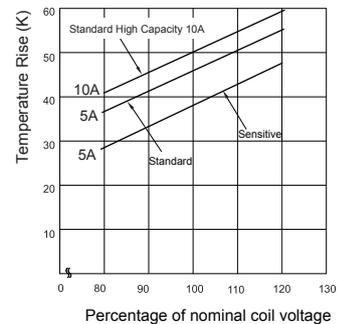
MAXIMUM SWITCHING POWER



ENDURANCE CURVE



COIL TEMPERATURE RISE



This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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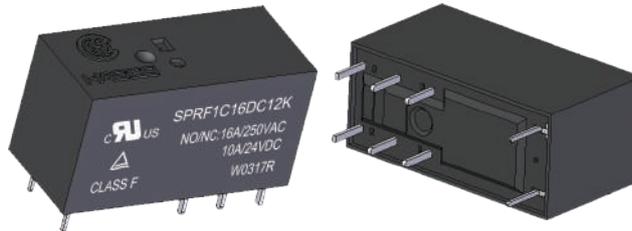
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File No.:E75887



File No.:R 50215857



## FEATURES

- Small size for high density mounting
- Up to 5000VAC Dielectric strength

## CONTACT RATINGS

Contact Arrangement	1A, 1B, 1C	2A, 2B, 2C
Contact Resistance	≤100mΩ (1A 24VDC)	
Contact Material	AgSnO	
Contact Rating(Resistive)	20A 277VAC 16A 250VAC 16A 24VDC	8A 250VAC 8A 24VDC
Max. Switching Voltage	440VAC/300VDC	
Max. Switching Current	20A	8A
Max. Switching Power	5540VA	2000VA
Mechanical Life	1×10 <sup>7</sup> operations	
Electrical Life	See more details at "safety approval ratings"	

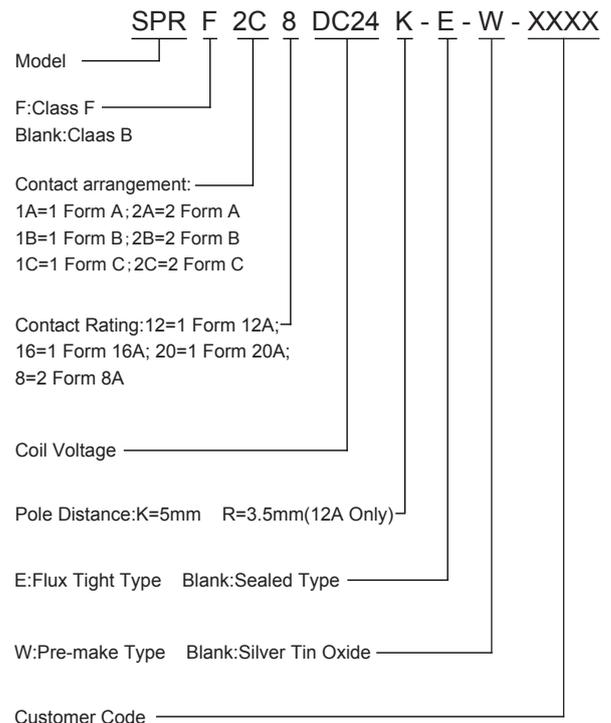
## CHARACTERISTICS

Insulation Resistance	1000MΩ(at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	1000VAC 1min
	Between contacts sets	2500VAC 1min
Operate time (at nomi. volt.)	≤10ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	35% to 85% RH	
Operation temperature	-40°C ~ +85°C/-40°C ~ +105°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz to 150Hz 10g/5g	
Unit weight	Approx. 13.5g	
Construction	Flux Tight Type, Sealed Type	

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

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## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.5	0.5	6.5	62
6	4.2	0.6	7.8	90
9	6.3	0.9	11.7	203
12	8.4	1.2	15.6	360
24	16.8	2.4	31.2	1440
48	33.6	4.8	62.4	5760
60	42.0	6.0	78.0	7500
110	77.0	11.0	143.0	25200

Note:

\*\*Max Allowable Voltage\*\*: The relay coil can endure max allowable voltage for a short period time only.

## COIL

Coil Power	DC:400mW (60V、110V:480mW)
------------	---------------------------

## SAFETY APPROVAL RATINGS

UL&CUL	Form	Rating
	1 Form	N.O.:20A 277VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:16A 24VDC, 6×10 <sup>3</sup> OPS N.C.:16A 250VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:16A 277VAC(85°C), 6×10 <sup>3</sup> OPS N.O.:1HP 120VAC(50°C), 6×10 <sup>3</sup> OPS N.O./N.C.:2HP 240VAC, Horse Power, 6×10 <sup>3</sup> OPS N.O./N.C.:12A 250VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:10A 24VDC, 6×10 <sup>3</sup> OPS
	-W	N.O.:5A 240VAC Ballast, 6×10 <sup>3</sup> OPS N.O.:8A 277VAC, Electronic Ballast, 2×10 <sup>4</sup> OPS(50°C)
	2 Form	N.O./N.C.:8A 24VDC, 6×10 <sup>3</sup> OPS N.O./N.C.:8A 250VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:1/2 HP 120VAC, 6×10 <sup>3</sup> OPS

TüV	Form	Rating
	1 Form	N.O.:20A 277VAC, 85°C, 3×10 <sup>4</sup> OPS N.O.:17A 277VAC, 105°C, 8×10 <sup>4</sup> OPS N.O./N.C.:16A 277VAC, 85°C, 3×10 <sup>4</sup> OPS N.O.:17A 30VDC, 105°C, 1×10 <sup>5</sup> OPS N.O./N.C.:16A 24VDC, 85°C, 5×10 <sup>4</sup> OPS
	2 Form	N.O.:8A 277VAC/240VAC, 85°C, 6×10 <sup>4</sup> OPS N.C.:8A 277VAC/240VAC, 85°C, 1×10 <sup>5</sup> OPS N.O.:8A 24VDC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:8A 277VAC/240VAC, 85°C, 8×10 <sup>4</sup> OPS N.O./N.C.:8A 24VDC, 85°C, 5×10 <sup>4</sup> OPS N.O./N.C.:10A 250VAC, 105°C, 2×10 <sup>4</sup> OPS

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

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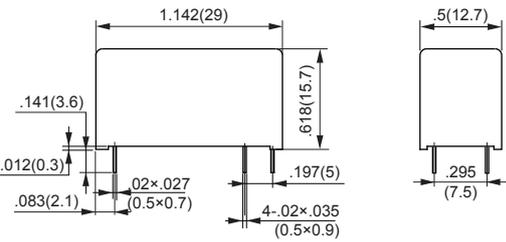
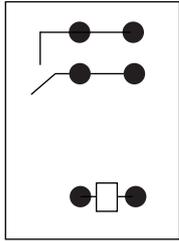
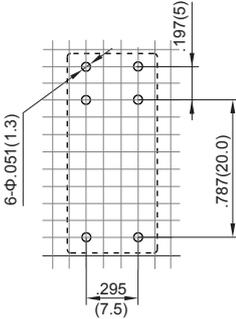
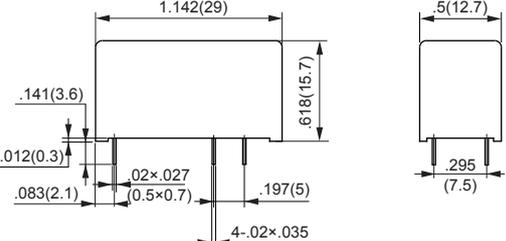
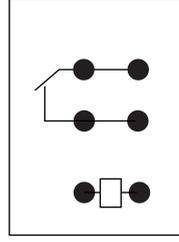
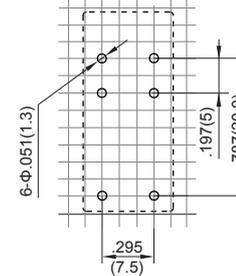
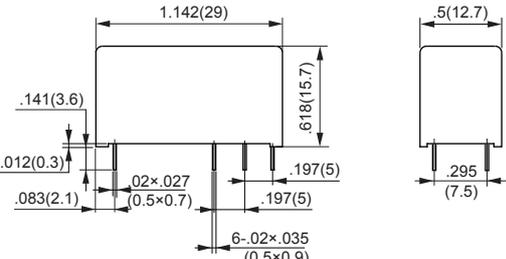
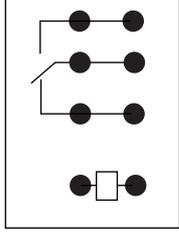
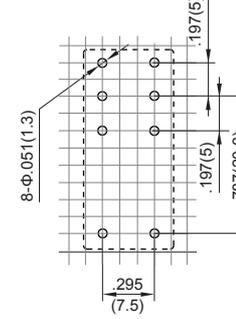
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)

16A/20A K Type			
<p>1A</p> 			
<p>1B</p> 			
<p>1C</p> 			
Unless otherwise specified tolerances are:			
≤1mm	> 1mm and ≤5mm	> 5mm	
±0.2mm	±0.3mm	±0.4mm	
			* The tolerance without indicating for PCB layout is always ±0.1mm.

This datasheet is for customers' reference. All the specifications are subject to change without notice.





## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)

8A K Type			
2A	<p>Dimensions: 1.142(29) width, .5(12.7) height, .141(3.6) top offset, .012(0.3) bottom offset, .083(2.1) mounting hole offset, .02x.027 (0.5x0.7) mounting holes, .197(5) terminal offset, 4-.02x.035 (0.5x0.9) terminals, .295(7.5) terminal width.</p>	<p>Wiring diagram showing 4 terminals: 2 common (top), 2 normally open (middle), and 2 normally closed (bottom).</p>	<p>PCB layout showing 6 mounting holes (6-φ.051(1.3)), .197(5) terminal offset, .787(20.0) terminal width, and .295(7.5) terminal width.</p>
2B	<p>Dimensions: 1.142(29) width, .5(12.7) height, .141(3.6) top offset, .012(0.3) bottom offset, .083(2.1) mounting hole offset, .02x.027 (0.5x0.7) mounting holes, .197(5) terminal offset, 4-.02x.035 (0.5x0.9) terminals, .295(7.5) terminal width.</p>	<p>Wiring diagram showing 4 terminals: 2 common (top), 2 normally open (middle), and 2 normally closed (bottom).</p>	<p>PCB layout showing 6 mounting holes (6-φ.051(1.3)), .197(5) terminal offset, .787(20.0) terminal width, and .295(7.5) terminal width.</p>
2C	<p>Dimensions: 1.142(29) width, .5(12.7) height, .141(3.6) top offset, .012(0.3) bottom offset, .083(2.1) mounting hole offset, .02x.027 (0.5x0.7) mounting holes, .197(5) terminal offset, 6-.02x.035 (0.5x0.9) terminals, .295(7.5) terminal width.</p>	<p>Wiring diagram showing 6 terminals: 2 common (top), 2 normally open (middle), and 2 normally closed (bottom).</p>	<p>PCB layout showing 8 mounting holes (8-φ.051(1.3)), .197(5) terminal offset, .787(20.0) terminal width, and .295(7.5) terminal width.</p>
Unless otherwise specified tolerances are:			
≤1mm	> 1mm and ≤5mm	> 5mm	* The tolerance without indicating for PCB layout is always ±0.1mm.
±0.2mm	±0.3mm	±0.4mm	

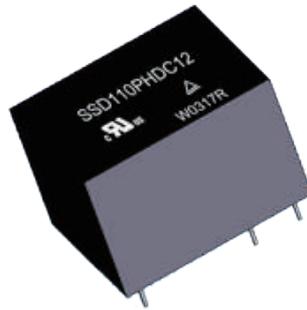
This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



File No.:R 50215414



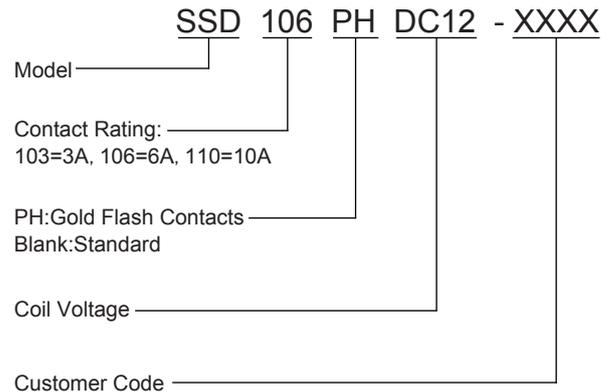
## FEATURES

- Highly reliable, low cost
- Miniature size & large switch capacity up to 10A
- High dielectric strength type
- Printed circuit terminals fits grid with 2.54mm
- CUL recognized
- Fully Sealed

## CONTACT RATINGS

Contact Arrangement	1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	Silver Alloy
Contact Rating(Resistive)	10A/120VAC, 6A/28VDC
Max. Switching Voltage	300VAC/28VDC
Max. Switching Current	10A
Max. Switching Power	2500VA/280W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION



## CHARACTERISTICS

Insulation Resistance		100MΩ (at 500VDC)
Dielectric Strength	Between coil & contacts	3000VAC 1min
	Between open contacts	750VAC 1min
Operate time (at nomi. volt.)		≤7ms
Release time (at nomi. volt.)		≤4ms
Humidity		45% ~ 85% RH
Operation temperature		-40°C~+85°C
UL Class B		Insulation System Class B
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance		10Hz ~ 55Hz 1.5mm DA
Unit weight		Approx. 10g
Construction		Sealed Type

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
3	2.25	0.3	3.9	20
5	3.75	0.5	6.5	56
6	4.50	0.6	7.8	80
9	6.75	0.9	11.7	180
12	9.00	1.2	15.6	320
24	18.0	2.4	31.2	1150
48	36.0	4.8	62.4	4608

Notes:

- 1) "\*\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	450mW (24V, 48V:500mW)
------------	------------------------

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

## SAFETY APPROVAL RATINGS

UL&CUL	103	N.O./N.C.:3A 120VAC, G.P., 6×10 <sup>3</sup> OPS
	106	N.O./N.C.:6A 120VAC, G.P., 6×10 <sup>3</sup> OPS N.O./N.C.:1/8HP 120VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:1/8HP 240VAC, 6×10 <sup>3</sup> OPS
	110	N.O./N.C.:10A 120VAC, G.P., 50°C, 6×10 <sup>3</sup> OPS Pilot Duty C300. N.O./N.C.:1/8HP 120VAC, 50°C, 6×10 <sup>3</sup> OPS N.O./N.C.:1/8HP 240VAC, 50°C, 6×10 <sup>3</sup> OPS N.O./N.C.:6A 300VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:6A 28VAC, 6×10 <sup>3</sup> OPS
TüV	10A/250VAC, 10A/28VDC	

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

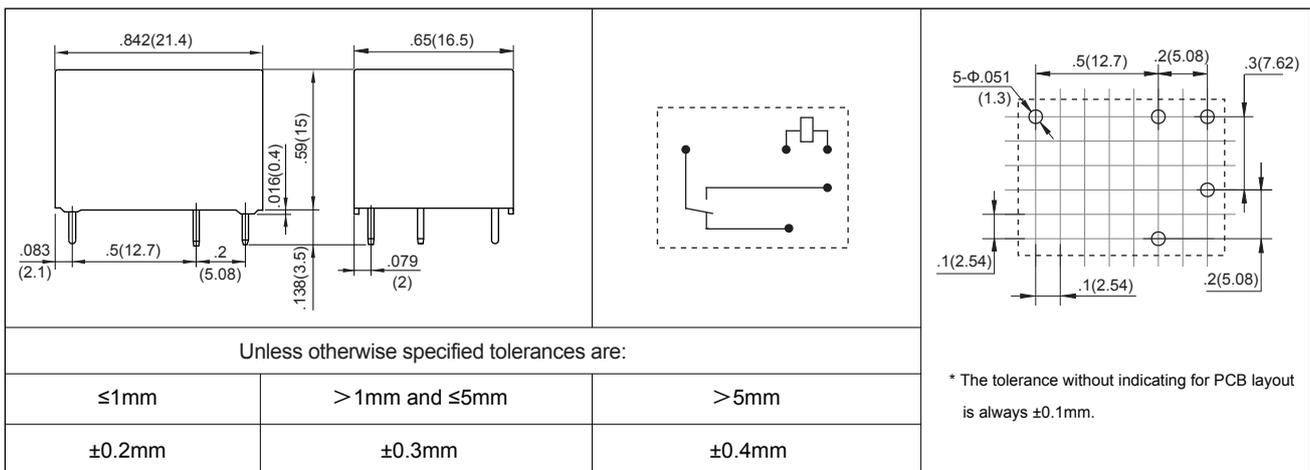
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

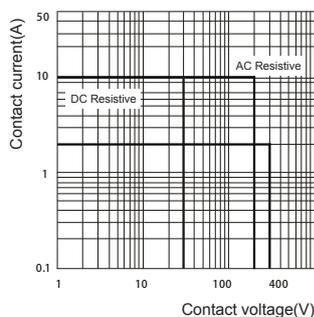
Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

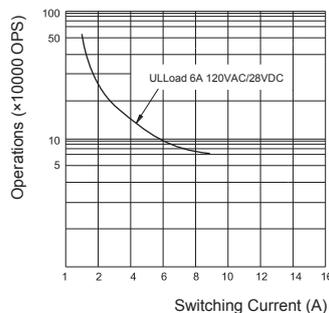


## CHARACTERISTIC CURVES

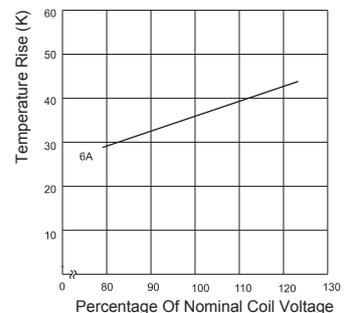
CONTACT SWITCHING CAPACITY



ENDURANCE CURVE



COIL TEMPERATURE RISE



This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



File No.:R 50471143



## FEATURES

- High capacity: Max. switching current 160A
- SPDM contact configuration with large contact gap 3.0mm
- Coil holding voltage can be reduced to 50~55% V of the nominal coil voltage for saving energy

## CONTACT RATINGS

Contact Arrangement	1A
Contact Resistance	Max.10mΩ (by voltage drop 6VDC 20A)
Contact Material	AgSnO
Contact Rating (Resistive)	Making 40A Carrying 140A Breaking 40A/400VAC, 85°C
Max. Switching Voltage	800VAC
Max. Switching Current	160A
Max. Switching Power	48000VA
Mechanical Life	1×10 <sup>6</sup> operations
Electrical Life	Making 40A, Carrying 140A, Breaking 40A, On 1s/Off 9s, at 85°C, 50K OPS

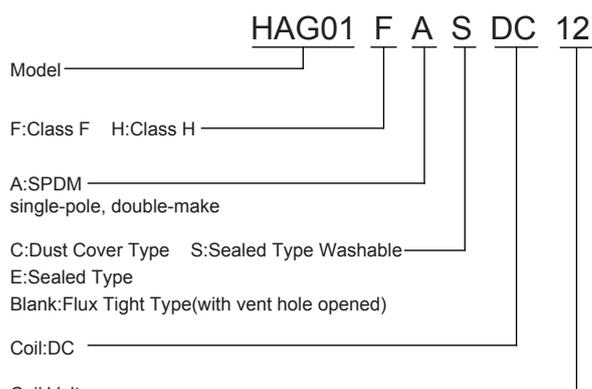
## CHARACTERISTICS

Insulation Resistance		1000MΩ (at 500VDC)
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	2000VAC 1min
Surge Voltage		10kV(1.2/50μs)
Operate time (at nomi. volt.)		≤30ms
Release time (at nomi. volt.)		≤10ms
Humidity		5%~85% RH
Operation temperature		-40°C~+85°C
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance		10Hz ~ 55Hz 1.5mm DA
Unit weight		Approx. 130g
Construction		Sealed Type Washable, Sealed Type Dust Cover Type, Flux Tight Type

Notes: The data shown above are initial values.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

## ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
6	4.50	0.30	6.60	14.4
9	6.75	0.45	9.90	32.4
12	9.00	0.60	13.20	57.6
24	18.00	1.20	26.40	230.4

Note:\*\*Max Allowable Voltage\*: The relay coil can endure max allowable voltage for a short period time only.

## COIL

Coil Power	Approx. 2.5W
Holding Voltage	40% to 100% Un (at 25°C) 50% to 60% Un (at 85°C)

- Notes: 1) The coil holding voltage applied to coil 100ms after the rated voltage.  
2) To avoid overheating and burning, the coil can not be consistently applied to with voltage larger than maximum holding voltage.



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# RELAYS

## SAFETY APPROVAL RATINGS

UL&CUL	Making 60A, carrying 140A, breaking 60A 277VAC at 85°C, 5×10 <sup>4</sup> OPS
	Making 60A, carrying 150A, breaking 60A 277VAC at 65°C, 5×10 <sup>4</sup> OPS
	Making 40A, carrying 140A, breaking 40A 400VAC at 85°C, 5×10 <sup>4</sup> OPS
	Making 45A, carrying 160A, breaking 45A 690VAC at 65°C, 5×10 <sup>4</sup> OPS
	Making 30A, carrying 140A, breaking 30A 800VAC at 85°C, 5×10 <sup>4</sup> OPS
	Making 60A, carrying 160A, breaking 60A 800VAC at 25°C, 1×10 <sup>4</sup> OPS
	277VAC 80A at 85°C, 7×10 <sup>4</sup> OPS
	48VDC 100A at 85°C, 6×10 <sup>3</sup> OPS
	60VDC 150A at 25°C, 6×10 <sup>3</sup> OPS
	60VDC 80A at 85°C, 1×10 <sup>5</sup> OPS

TüV	Making 60A, carrying 140A, breaking 60A 277VAC at 85°C, 5×10 <sup>4</sup> OPS
	Making 60A, carrying 150A, breaking 60A 277VAC at 65°C, 5×10 <sup>4</sup> OPS
	Making 40A, carrying 140A, breaking 40A 400VAC at 85°C, 5×10 <sup>4</sup> OPS
	Making 45A, carrying 160A, breaking 45A 690VAC at 65°C, 5×10 <sup>4</sup> OPS
	Making 30A, carrying 140A, breaking 30A 800VAC at 85°C, 5×10 <sup>4</sup> OPS
	Making 60A, carrying 160A, breaking 60A 800VAC at 25°C, 1×10 <sup>4</sup> OPS
	277VAC 80A at 85°C, 7×10 <sup>4</sup> OPS
	48VDC 100A at 85°C, 6×10 <sup>3</sup> OPS
	60VDC 150A at 25°C, 6×10 <sup>3</sup> OPS
	60VDC 80A at 85°C, 1×10 <sup>5</sup> OPS

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

<p>Top view dimensions: 1.835(46.6) width, 1.693(43) height. Mounting hole offset: .106(2.7) from top edge, .079(2) from left edge, .031(0.8) from right edge. Bottom view dimensions: 1.693(43) width, .472(12) mounting hole offset from left edge, .110(2.8) from right edge.</p>		<p>PCB layout dimensions: .890(22.6) total width, .319(8.1) terminal offset from left edge, .748(19) terminal spacing, .134(3.4) terminal width, .055(1.4) terminal thickness, .110(2.8) terminal offset from right edge, .496(12.6) terminal offset from bottom edge, .787(20) total width of terminal area.</p> <p>* The tolerance without indicating for PCB layout is always ±0.1mm.</p>
Unless otherwise specified tolerances are:		
≤1mm	> 1mm and ≤5mm	> 5mm
±0.2mm	±0.3mm	±0.4mm

This datasheet is for customers' reference. All the specifications are subject to change without notice.

# HAG01M SERIES

## NEW ENERGY RELAY



File No.:E75887



File No.:R 50471143



### FEATURES

- With arc extinguishing magnets
- High performance DC relay for photovoltaic power generation systems, energy storage system and xEV charging device, etc

### CONTACT RATINGS

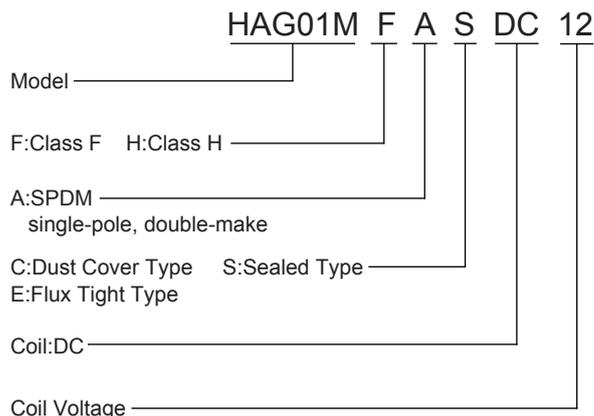
Contact Arrangement	1A
Contact Resistance	Max.10mΩ (by voltage drop 6VDC 20A)
Contact Material	Silver Alloy(Non-Cd)
Contact Rating(Resistive)	15A 500VDC, On 1s/Off 19s, 30,000 ops.
Max. Switching Voltage	500VDC
Max. Switching Current	15A
Mechanical Life	1×10 <sup>6</sup> operations
Electrical Life	15A 500VDC, ON 1s/OFF 19s 30,000 ops 20A 300VDC, ON 1s/OFF 19s 30,000 ops

### CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	2000VAC 1min
Surge Voltage	10kV(1.2/50μS)	
Operate time (at nomi. volt.)	≤30ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	5%~85% RH	
Operating Condition	-40°C~+85°C	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 130g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes: The data shown above are initial values.

### ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

### COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
6	4.50	0.30	6.60	14.4
9	6.75	0.45	9.90	32.4
12	9.00	0.60	13.20	57.6
24	18.00	1.20	26.40	230.4

Note:\*\*Max Allowable Voltage\*: The relay coil can endure max allowable voltage for a short period time only.

### COIL

Coil Power	Approx. 2.5W
------------	--------------

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

# HAG01M SERIES

# NEW ENERGY RELAY

## SAFETY APPROVAL RATINGS

UL&CUL	20A 300VDC, ON 0.5s/OFF 9s, 25°C, 3×10 <sup>4</sup> OPS
	20A 300VDC, ON 0.5s/OFF 9s, 85°C, 1×10 <sup>4</sup> OPS

TüV	10A 500VDC, ON 1s/OFF 9s, 25°C, 3×10 <sup>4</sup> OPS
	15A 500VDC, ON 1s/OFF 19s, 25°C, 3×10 <sup>4</sup> OPS
	20A 300VDC, ON 1s/OFF 19s, 25°C, 3×10 <sup>4</sup> OPS
	10A 500VDC, ON 1s/OFF 9s, 85°C, 1×10 <sup>4</sup> OPS
	15A 500VDC, ON 1s/OFF 19s, 85°C, 1×10 <sup>4</sup> OPS
	20A 300VDC, ON 1s/OFF 19s, 85°C, 1×10 <sup>4</sup> OPS

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

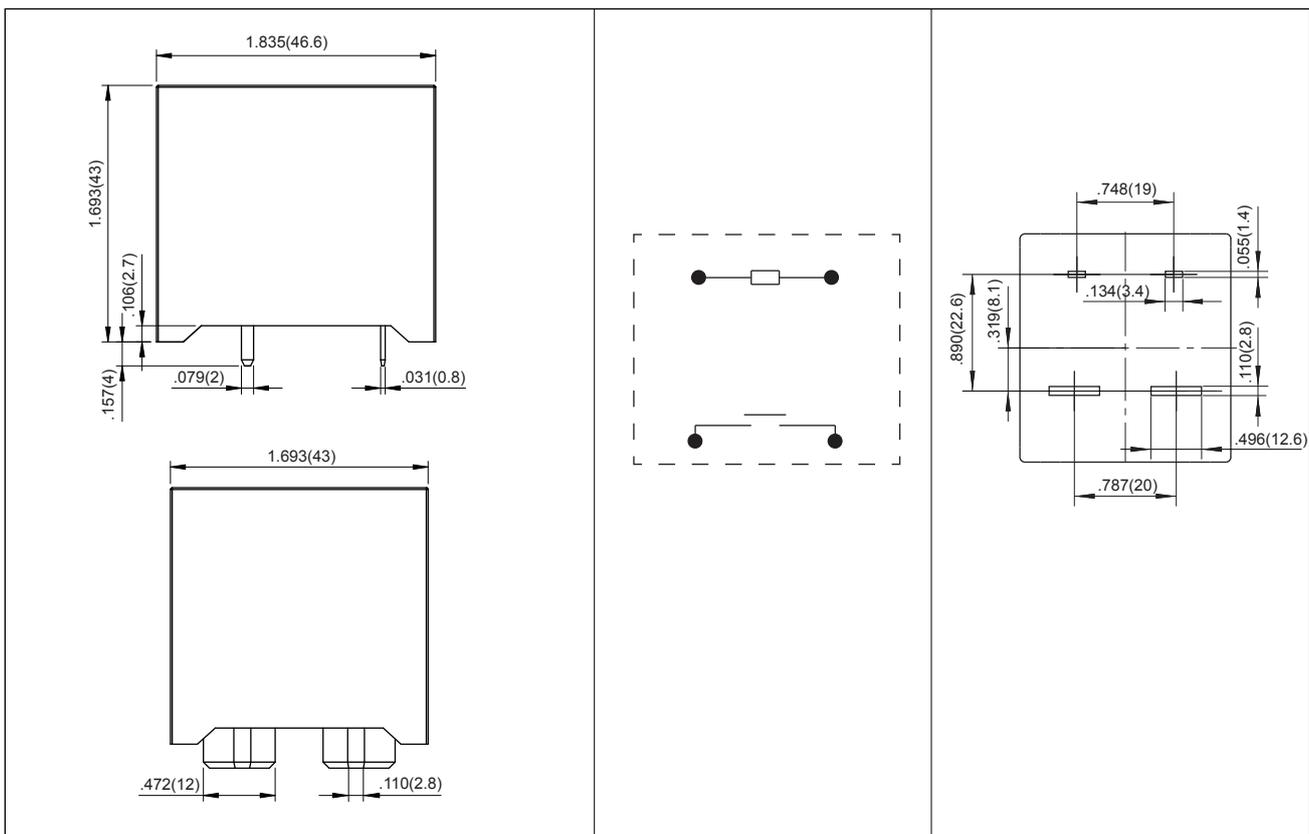
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



- Remark: 1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm, tolerance should be ±0.2mm; outline dimension > 1mm and ≤5mm, tolerance should be ±0.3mm; outline dimension >5mm, tolerance should be ±0.4mm.
- 2) The tolerance without indicating for PCB layout is always ±0.1mm.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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Agency Approval  
Pending



File No.:R50492936



File No.:CQC21002292050



## FEATURES

- 40A+ 2 poles main contacts + one set of auxiliary contacts
- Contact gap 3.6mm (main contacts)
- RT III type water-sealed relay
- Suitable for inverters, charging piles and energy storage systems for solar photovoltaic power generation

## CONTACT RATINGS

Contact Arrangement	2A, 2A+1A, 2A+1B
Contact Resistance	Max.100mΩ (by voltage drop 6VDC 1A)
Contact Material	AgSnOIn
Contact Rating(Resistive)	40A/277VAC
Contact Gap	3.6mm
Max. Switching Voltage	480VAC/60VDC
Max. Switching Current	40A
Max. Switching Power	11080VA
Mechanical Life	Min. 5×10 <sup>6</sup> OPS
Electrical Life	See more details at "safety approval ratings"

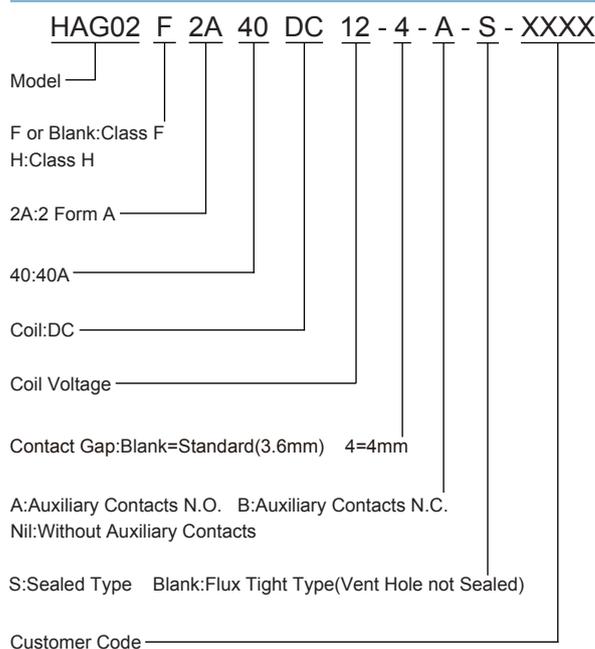
## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	2000VAC 1min
	Between contacts sets	5000VAC 1min
	Between auxiliary contacts	1000VAC 1min
Surge breakdown voltage (Between contact and coil)	10000V	
Operate time (at nomi. volt.)	≤30ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	5% to 85% RH	
Operation temperature	-40°C~+85°C	
UL Class F/H	Insulation System Class F/H	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz to 55Hz 1.5mm DA	
Unit weight	Approx. 64g	
Construction	Sealed Type, Flux Tight Type	

Notes: The data shown above are initial values.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

## ORDERING INFORMATION



Notes:

1. PC board assembled with flux tight type relays can not be washed and/or coated.
2. Flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	Coil Resistance Ω±10%	Max. Allowable Voltage VDC
6	4.50	0.30	19.1	110%V of nominal coil voltage 150%V of nominal coil voltage*1
9	6.75	0.45	43.1	
12	9.00	0.60	76.6	
24	18.00	1.20	306.4	
48	36.00	2.40	1225.5	

Notes:\*1. With no more than 24 hours per time with non-consecutive voltage application time.



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# RELAYS

# HAG02 SERIES

NEW ENERGY RELAY

## COIL

Coil Power	Approx. 1880mW
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## SAFETY APPROVAL RATINGS

Other agency approval (Pending)	Main Contacts	40A/277VAC, Resistive, 65°C, 1×10 <sup>4</sup> OPS 35A/277VAC, Resistive, 85°C, 3×10 <sup>4</sup> OPS 32A/277VAC, Resistive, 85°C, 5×10 <sup>4</sup> OPS 20A/277VAC, Resistive, 85°C, 1×10 <sup>5</sup> OPS 20A/277VAC, Resistive, 105°C, 1×10 <sup>4</sup> OPS 15A/480VAC, Resistive, 85°C, 1×10 <sup>5</sup> OPS 80A/277VAC, Resistive, 85°C, 1×10 <sup>3</sup> OPS(Contacts in parallel) 40A/60VDC, Resistive, 50°C, 1×10 <sup>5</sup> OPS Making 10A Loading 40A Breaking 10A 277VAC, Resistive Load, 85°C, 5×10 <sup>4</sup> OPS TV-8 277VAC, 40°C, 2.5×10 <sup>4</sup> OPS TV-10 120VAC, 40°C, 2.5×10 <sup>4</sup> OPS
	Auxiliary Contacts	1A 30VDC, Resistive, 85°C, 1×10 <sup>5</sup> OPS 1A 277VAC, Resistive, 85°C, 1×10 <sup>5</sup> OPS
TüV & CQC	Main Contacts	40A/277VAC, Resistive, 65°C, 1×10 <sup>4</sup> OPS 35A/277VAC, Resistive, 85°C, 3×10 <sup>4</sup> OPS 32A/277VAC, Resistive, 85°C, 5×10 <sup>4</sup> OPS 20A/277VAC, Resistive, 85°C, 1×10 <sup>5</sup> OPS 20A/277VAC, Resistive, 105°C, 1×10 <sup>4</sup> OPS 15A/480VAC, Resistive, 85°C, 1×10 <sup>5</sup> OPS 80A/277VAC, Resistive, 85°C, 1×10 <sup>4</sup> OPS(Contacts in parallel) 40A/60VDC, Resistive, 50°C, 1×10 <sup>5</sup> OPS Making 10A Loading 40A Breaking 10A 277VAC, Resistive Load, 85°C, 5×10 <sup>4</sup> OPS
	Auxiliary Contacts	1A 30VDC, 85°C, 1×10 <sup>5</sup> OPS 1A 277VAC, 85°C, 1×10 <sup>5</sup> OPS

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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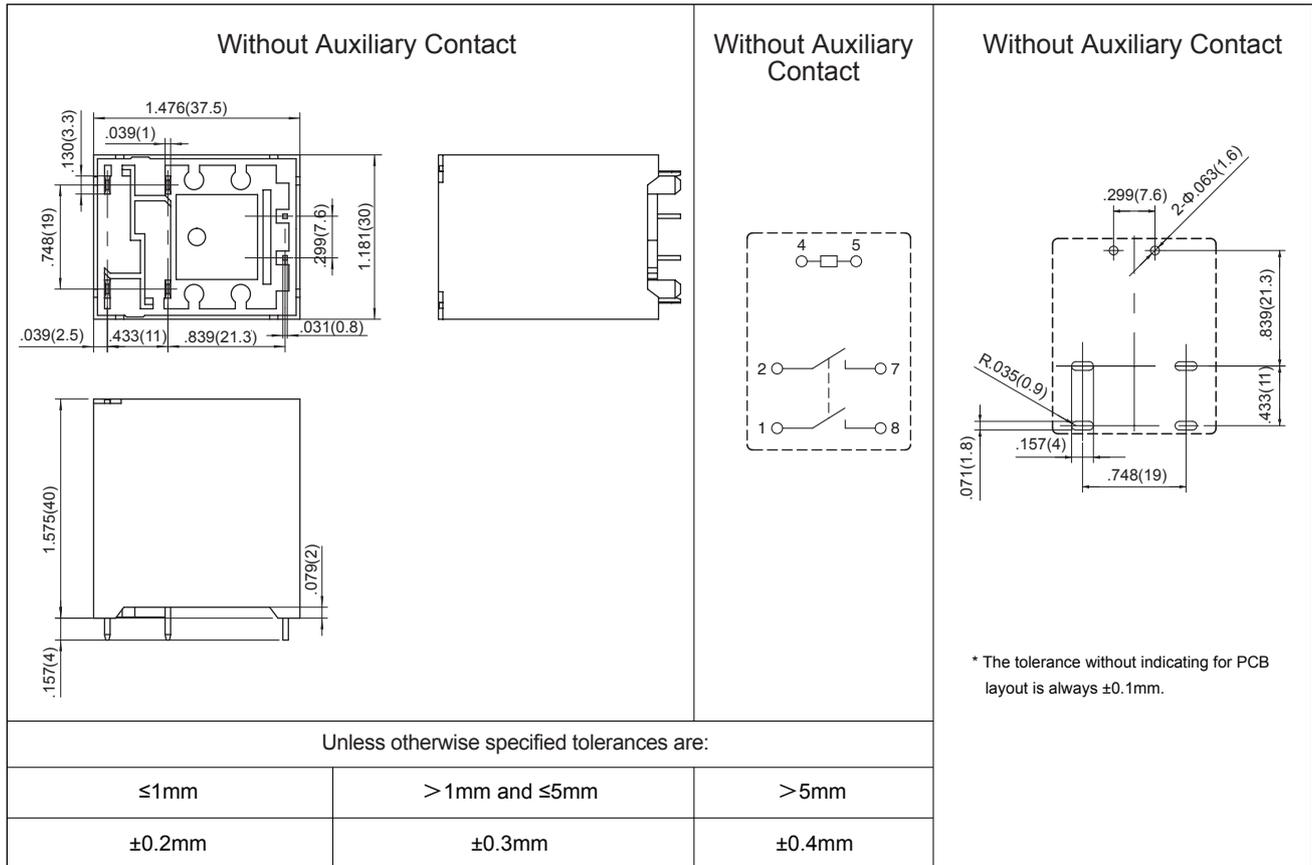
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

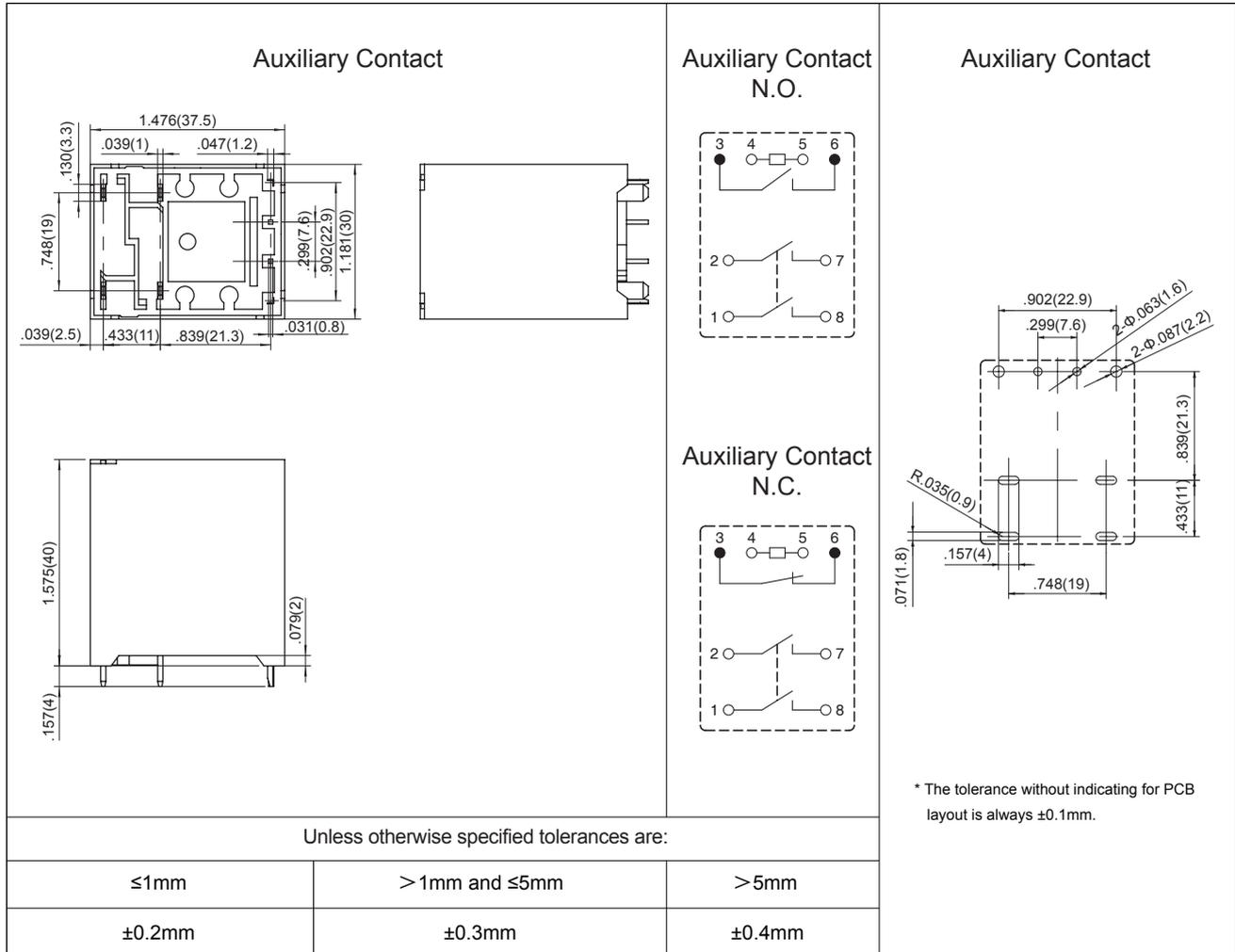
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



File No.:R 50461488



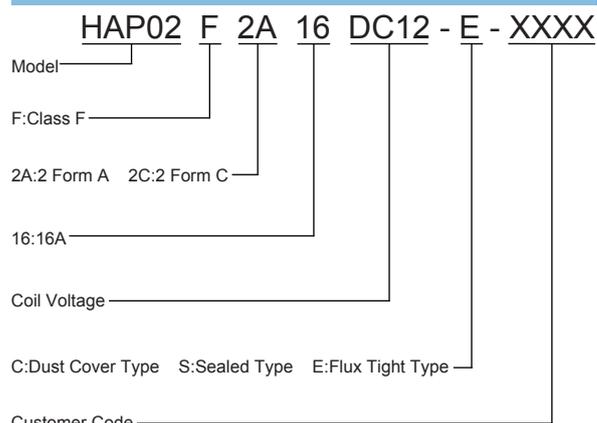
## FEATURES

- 2 Form A and 2 Form C configurations
- Low height, only 15.7mm
- Creepage/clearance distance > 10mm,
- Meets reinforce insulation
- 5KVAC dielectric strength (between coil and contacts)

## CONTACT RATINGS

Contact Arrangement	2A, 2C
Contact Resistance	≤100mΩ (1A 6VDC)
Contact Material	AgSnO
Contact Rating	16A/277VAC
Max. Switching Voltage	277VAC
Max. Switching Current	16A
Max. Switching Power	4432VA
Mechanical Life	5×10 <sup>6</sup> operations
Electrical Life	1×10 <sup>5</sup> operations (2NO:16A/277VAC, Resistive load 85°C, 1s on 9s off)

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	1000VAC 1min
	Between contacts sets	2500VAC 1min
Surge Voltage(Between coil & contacts)	10kVAC(1.2/50μs)	
Operate time (at nomi. volt.)	≤10ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	5% to 85% RH	
Operation temperature	-40°C~+105°C	
Class F	Insulation System Class F	
Shock Resistance	Operating extremes	98m/s <sup>2</sup>
	Damage limits	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 50Hz 1.0mm DA	
Unit weight	Approx. 16.5g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes: The data shown above are initial values.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
5	3.5	0.50	7.5	31.3
6	4.2	0.60	9.0	45.0
9	6.3	0.90	13.5	101.3
12	8.4	1.20	18.0	180
24	16.8	2.40	36.0	720
48	33.6	4.80	72.0	2880

### Note:

\*"Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.

## COIL

Coil Power      Approx. 800mW



\* SINCE 1976 \*

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# RELAYS

## SAFETY APPROVAL RATINGS

UL & CUL & CQC	N.O.:16A/277VAC, Resistive, $5 \times 10^4$ OPS, 85°C
	N.O.:5A 120VAC, E. Ballast, $6 \times 10^3$ OPS, 40°C
	N.O.:1HP 240VAC, Horse Power, $6 \times 10^3$ OPS, 40°C
	N.O.:TV-8 120VAC, $2.5 \times 10^4$ OPS, 50°C
	N.C.:16A/277VAC, Resistive, $2 \times 10^4$ OPS, 85°C
	N.O./N.C.:16A/277VAC, Resistive, $6 \times 10^3$ OPS, 85°C

TüV	N.O.:16A/277VAC, Resistive, $1 \times 10^5$ OPS, 85°C
	N.O.:16A/277VAC, Resistive, $5 \times 10^4$ OPS, 105°C
	N.C.:16A/277VAC, Resistive, $5 \times 10^4$ OPS, 85°C
	N.O./N.C.:16A/277VAC, Resistive, $2 \times 10^4$ OPS, 85°C

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

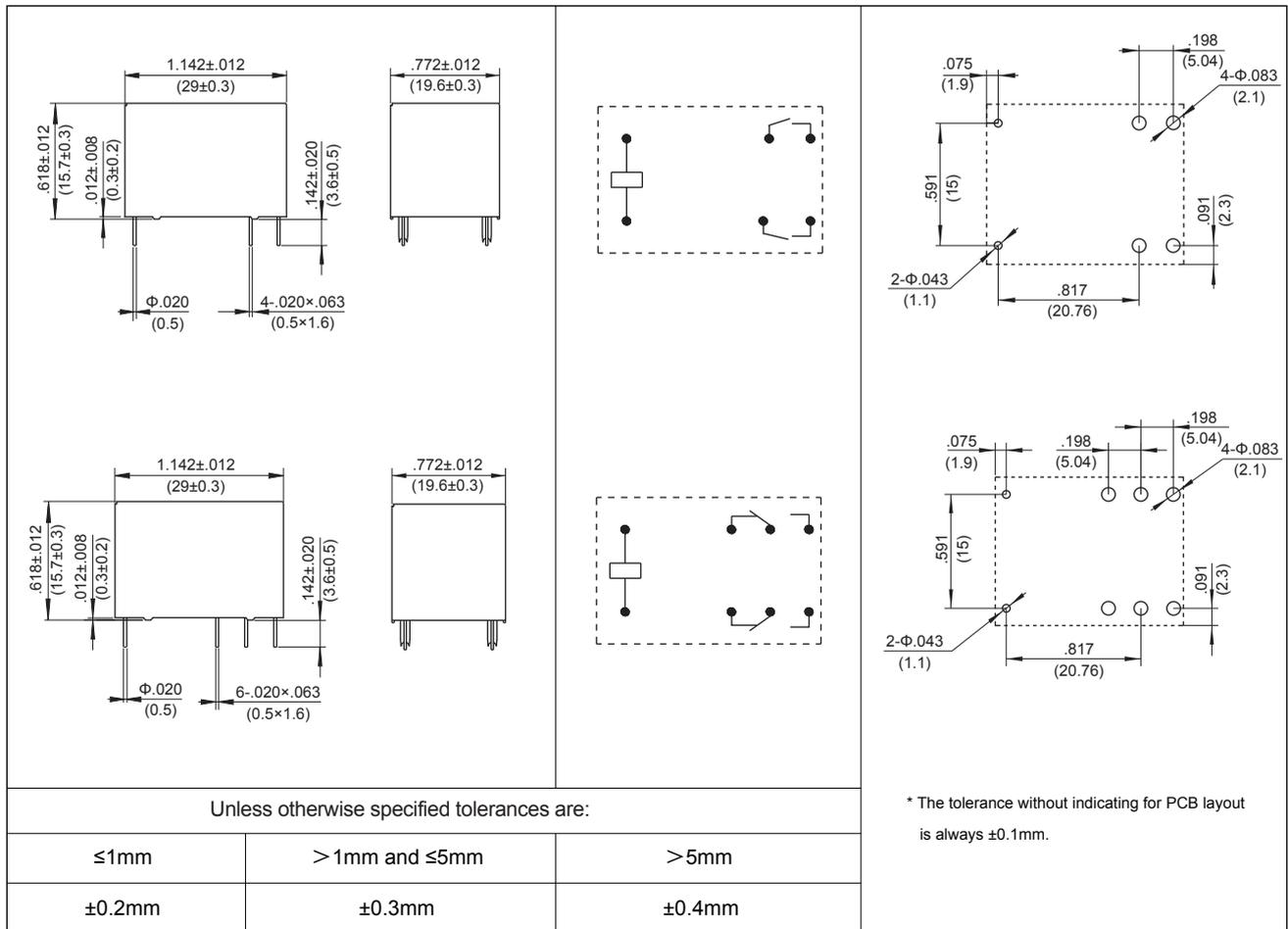
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

# HAP03 SERIES

# NEW ENERGY RELAY



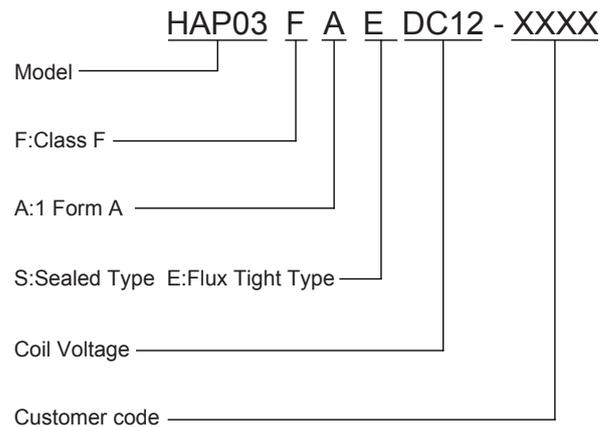
## FEATURES

- 4.5kV dielectric strength (between coil and contacts)
- Heavy load up to 6925VA
- Ideal for motor switching
- PCB layouts available
- Outline Dimensions: 30.4mm×15.9mm×23.3mm

## CONTACT RATINGS

Contact Arrangement	1A
Contact Resistance	≤100mΩ (1A 6VDC)
Contact Material	AgSnO
Contact Rating	Resistive: 20A/277VAC Motor: 2HP/277VAC
Max. Switching Voltage	277VAC
Max. Switching Current	25A
Max. Switching Power	6925VA
Mechanical Life	2×10 <sup>6</sup> operations
Electrical Life	20A/277VAC, Resistive load, 85°C, ON:OFF=1.5s:1.5s, 1×10 <sup>5</sup> OPS 25A/277VAC, Resistive load, 85°C, ON:OFF=1s:9s, 1×10 <sup>5</sup> OPS

## ORDERING INFORMATION



- Notes:
1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
  2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	4500VAC 1min
	Between open contacts	1000VAC 1min
Surge Voltage(Between coil & contacts)	10kV(1.2/50μs)	
Operate time (at nomi. volt.)	≤20ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	5% to 85% RH	
Operation temperature	-40°C~+85°C	
UL Class F	Insulation System Class F	
Shock Resistance	Operating extremes	196m/s <sup>2</sup>
	Damage limits	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 50Hz 1.5mm DA	
Unit weight	Approx. 21g	
Construction	Sealed Type, Flux Tight Type	

- Notes: 1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
5	3.5	0.50	6.0	27.8
12	8.4	1.20	14.4	160
24	16.8	2.40	28.8	640
48	33.6	4.80	57.6	2560

- Notes:
- 1) "\*\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
  - 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power      Approx. 900mW



# RELAYS

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# HAP03 SERIES

# NEW ENERGY RELAY

## SAFETY APPROVAL RATINGS

UL&CUL	20A/277VAC, 25°C, ON:OFF=1.5s:1.5s, 1×10 <sup>5</sup> OPS
	20A/30VDC, 85°C, ON:OFF=1s:9s, 1×10 <sup>5</sup> OPS
	25A/277VAC, 85°C, ON:OFF=1s:9s, 1×10 <sup>5</sup> OPS
	2HP 277VAC, 85°C, ON:OFF=1s:9s, 1×10 <sup>5</sup> OPS

TüV	20A/277VAC, 25°C, ON:OFF=1.5s:1.5s, 1×10 <sup>5</sup> OPS
	20A/30VDC, 85°C, ON:OFF=1s:9s, 1×10 <sup>5</sup> OPS
	25A/277VAC, 85°C, ON:OFF=1s:9s, 1×10 <sup>5</sup> OPS
	25A/277VAC, 85°C, ON:OFF=1s:9s, 1×10 <sup>5</sup> OPS

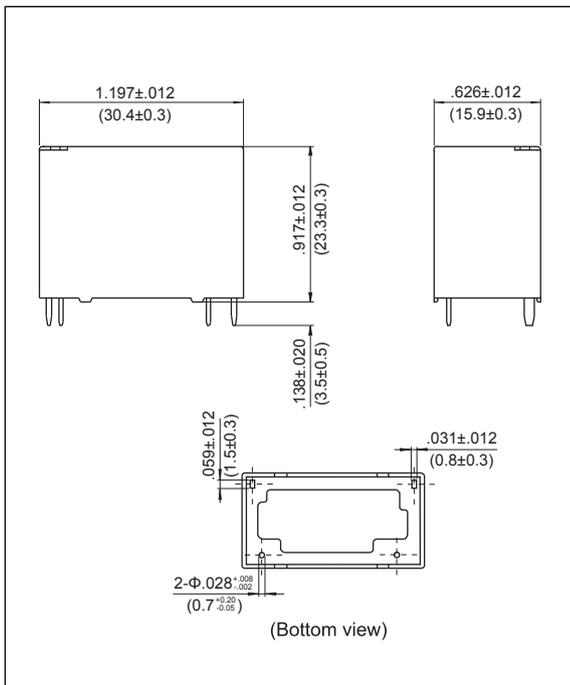
**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

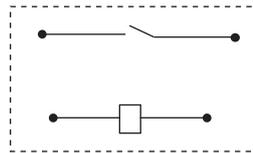
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

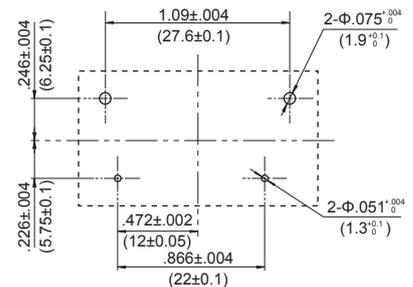
### Outline Dimensions



### Wiring Diagram (Bottom view)



### PCB Layout (Bottom view)



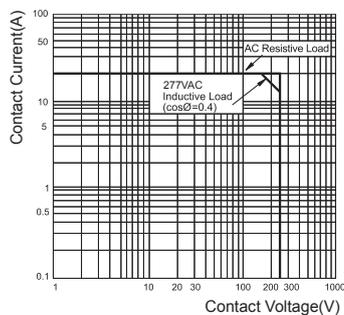
\* The tolerance without indicating for PCB layout is always ±0.1mm.

Unless otherwise specified tolerances are:

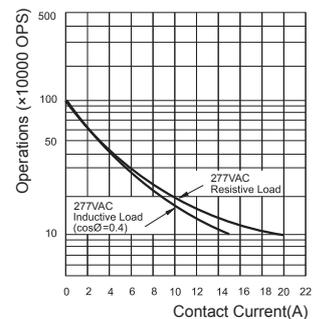
≤1mm	>1mm and ≤5mm	>5mm
±0.2mm	±0.3mm	±0.4mm

## CHARACTERISTIC CURVES

### MAXIMUM SWITCHING POWER



### ENDURANCE CURVE



**Test conditions:**

Room temp., 1s on 9s off.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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# HAA01 SERIES

# SAFETY RELAY

**CULUS**  
File No.:E75887

**UL**  
File No.:R 50507988



File No.:CQC21002307826



## FEATURES

- Multi contact arrangements: 5NO+1NC, 4NO+2NC, 3NO+3NC
- Forcibly guided contacts according to EN50205
- 6A switching capability
- Low input power: 500mW
- Reinforced insulation between input and output, and some reinforced insulation between different poles
- UL insulation system: Class F

## CONTACT RATINGS

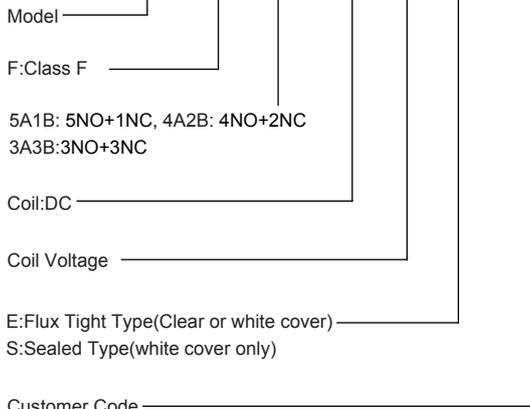
Contact Arrangement	5A1B, 4A2B, 3A3B
Forcibly guided contacts Type (according to EN50205)	Type A
Contact Resistance	≤100mΩ (1A 6VDC)
Contact Material	Gold Flash+Silver Alloy
Contact Rating(Resistive)	6A 277VAC/30VDC
Max. Switching Voltage	400VAC/30VDC
Max. Switching Current	6A
Max. Switching Power	1662VA/180W
Mechanical Life	1×10 <sup>7</sup> OPS
Electrical Life	1×10 <sup>5</sup> OPS(1NO: 6A 30VDC, Resistive Load, 85°C, 1s on and 9s off) 1×10 <sup>5</sup> OPS(1NO: 6A 277VAC, Resistive Load, 85°C, 1s on and 9s off)

## CHARACTERISTICS

Insulation Resistance		1000MΩ (at 500VDC)
Dielectric Strength	Between coil & contacts	4000VAC 1min
	Between open contacts	1500VAC 1min
	Between contacts sets	2500VAC 1 min(11-12/13-14) 4000VAC 1 min(Other)
Surge voltage	Between coil & contacts	10kV(1.2/50μs)
	Between contacts sets	5kV(1.2/50μs)
Operate time (at nomi. volt.)		≤20ms
Release time (at nomi. volt.)		≤20ms
Humidity		5% to 85% RH
Operation temperature		-40°C~+85°C
UL Class F		Insulation System Class F
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance		N.O./N.C.: 10Hz to 55Hz 1.5mm DA N.O.: 55Hz to 200Hz, 98m/s <sup>2</sup> N.C.: 55Hz to 200Hz, 49m/s <sup>2</sup>
Creepage distance	Between coil & contacts	8mm
	Between contacts	5.5mm
Clearance distance	Between coil & contacts	8mm
	Between contacts	5.5mm
Unit weight		Approx. 25g
Construction		Flux Tight Type, Sealed Type

## ORDERING INFORMATION

HAA01 F 5A1B DC 24 - E - XXXX



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**



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## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
6	4.50	0.60	6.60	72
9	6.75	0.90	9.90	162
12	9.00	1.20	13.20	288
18	13.50	1.80	19.80	648
21	15.75	2.10	23.10	882
24	18.00	2.40	26.40	1152
36	27.00	3.60	39.60	2592
48	36.00	4.80	52.80	4608
110	82.50	11.00	121.00	20862

**Notes:**

- 1) \*\*Max Allowable Voltage\*\*: The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	500mW(110V: Approx. 580mW)
------------	----------------------------

## SAFETY APPROVAL RATINGS

UL&CUL	N.O./N.C.:6A 277VAC/250VAC/240VAC/125VAC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:6A 30VDC, 85°C, 1×10 <sup>5</sup> OPS N.O.:2A 240VAC(AC-15), 55°C, 1×10 <sup>5</sup> OPS N.C.:2A 240VAC(AC-15), 55°C, 8.5×10 <sup>4</sup> OPS N.O./N.C.:3A 120VAC(AC-15), 40°C, 5×10 <sup>4</sup> OPS N.O./N.C.:1A 24VDC(DC-13), 55°C, 5×10 <sup>4</sup> OPS
TüV	N.O./N.C.:6A 277VAC/250VAC/125VAC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:6A 30VDC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:2A 240VAC(AC-15), 55°C, 1×10 <sup>5</sup> OPS N.O./N.C.:3A 120VAC(AC-15), 55°C, 5×10 <sup>4</sup> OPS N.O./N.C.:1A 24VDC(DC-13), 55°C, 5×10 <sup>4</sup> OPS
CQC	N.O./N.C.:6A 277VAC/250VAC/125VAC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:6A 30VDC, 85°C, 1×10 <sup>5</sup> OPS

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**



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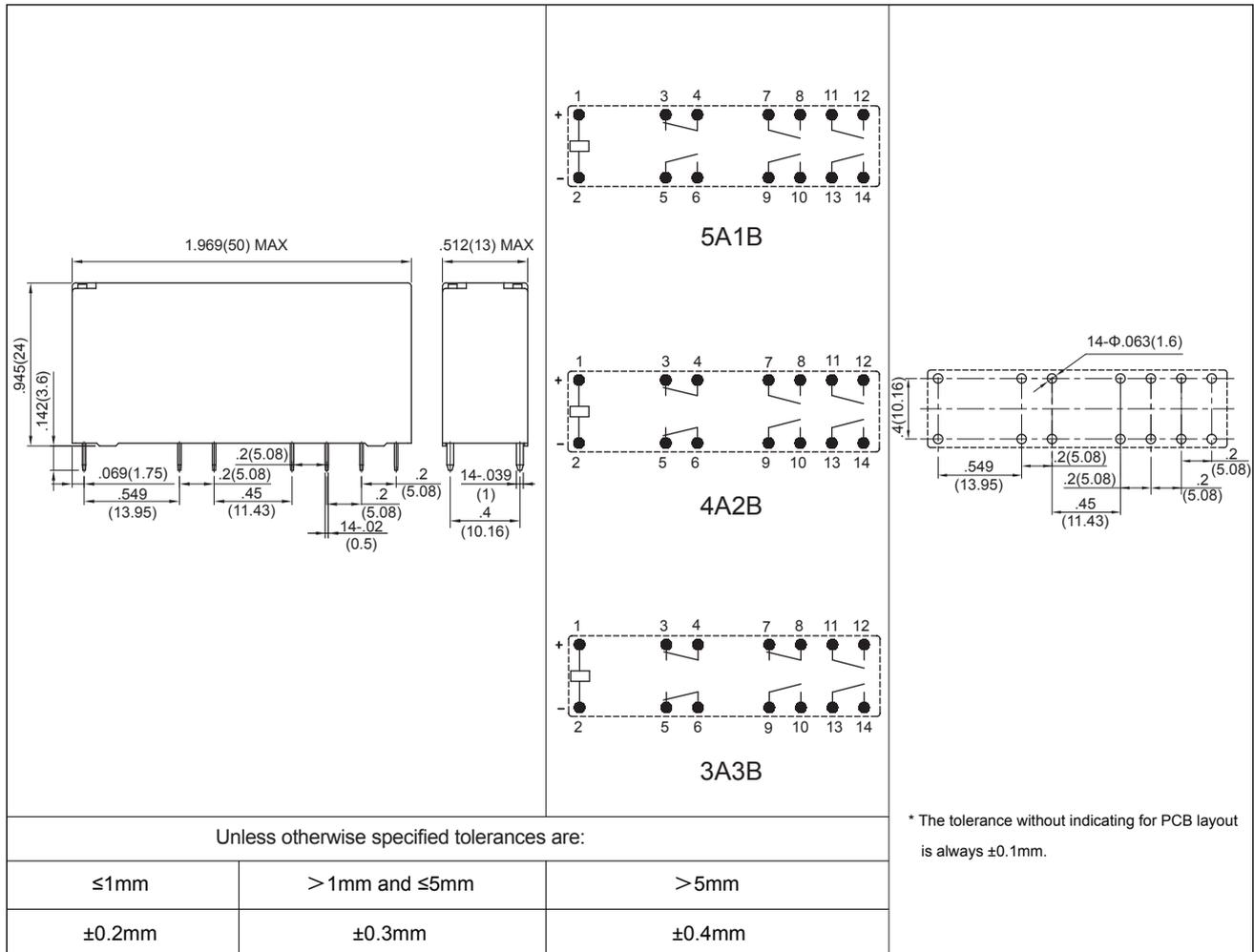
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

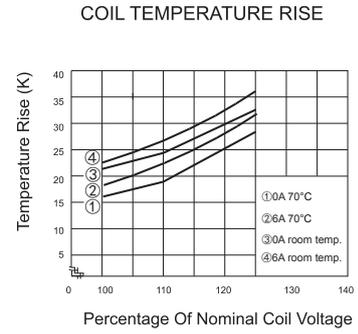
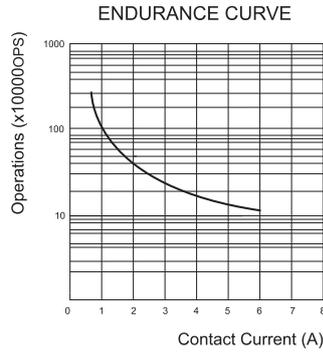
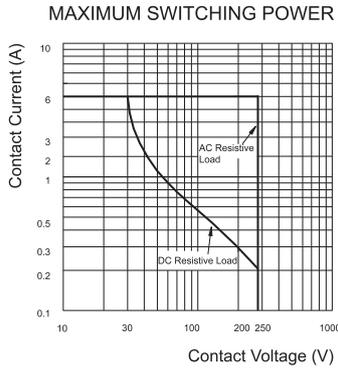
Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

## CHARACTERISTIC CURVES



**Test conditions:**  
 1NO, Resistive load, 250VAC,  
 Room temp., 1s on 9s off

This datasheet is for customers' reference. All the specifications are subject to change without notice.



## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
6	4.50	0.60	6.60	100
9	6.75	0.90	9.90	225
12	9.00	1.20	13.20	400
18	13.50	1.80	19.80	900
21	15.75	2.10	23.10	1225
24	18.00	2.40	26.40	1600
36	27.00	3.60	39.60	3600
48	36.00	4.80	52.80	6400
110	82.50	11.00	121.00	28810

**Notes:**

- 1) "\*\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	360mW(110V: Approx. 420mW)
------------	----------------------------

## SAFETY APPROVAL RATINGS

UL&CUL	N.O./N.C.:6A 277VAC/250VAC/240VAC/125VAC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:6A 30VDC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:2A 240VAC(AC-15), 55°C, 1.5×10 <sup>4</sup> OPS N.O./N.C.:1A 24VDC(DC-13), 40°C, 5×10 <sup>4</sup> OPS
TüV	N.O./N.C.:6A 277VAC/250VAC/125VAC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:6A 30VDC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:2A/1.5A 240VAC(AC-15), 40°C, 1×10 <sup>4</sup> OPS N.O./N.C.:1A 24VDC(DC-13), 40°C, 5×10 <sup>4</sup> OPS
CQC	N.O./N.C.:6A 277VAC/250VAC/125VAC, 85°C, 1×10 <sup>5</sup> OPS N.O./N.C.:6A 30VDC, 85°C, 1×10 <sup>5</sup> OPS

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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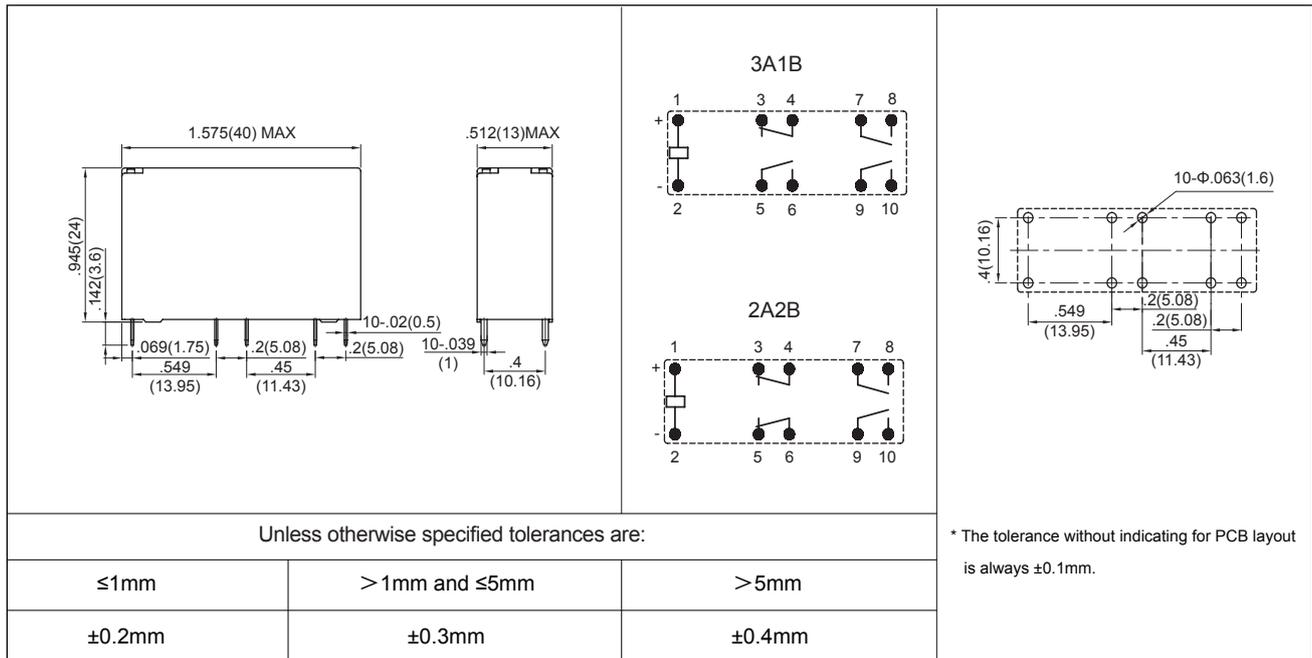
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

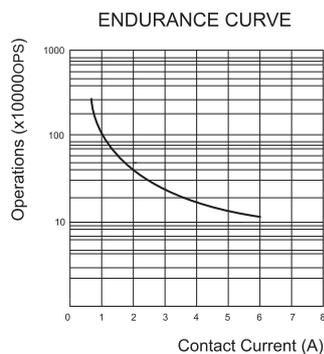
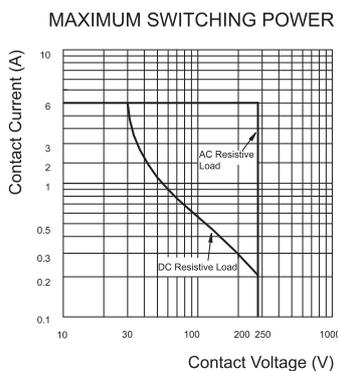
Outline Dimensions

Wiring Diagram  
(Bottom view)

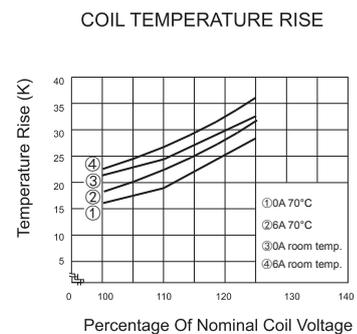
PCB Layout  
(Bottom view)



## CHARACTERISTIC CURVES



**Test conditions:**  
1NO, Resistive load, 250VAC,  
Room temp., 1s on 9s off



This datasheet is for customers' reference. All the specifications are subject to change without notice.



## FEATURES

- Multi contact arrangements: 2 Form C, 1NO+1NC(AB1), 1NO+1NC(AB2)
- Forcibly guided contacts according to EN50205
- 8A switching capability
- High insulation capability(1.2/50µs):10kV surge voltage between coil & contacts and 6kV between contact sets
- UL insulation system:Class F

## CONTACT RATINGS

Contact Arrangement	2C, AB1, AB2
Forcibly guided contacts Type (according to EN50205)	AB1, AB2:Type A 2C:Type B
Contact Resistance	≤100mΩ (1A 6VDC)
Contact Material	Silver Alloy
Contact Rating(Resistive)	8A 277VAC/30VDC
Max. Switching Voltage	400VAC/30VDC
Max. Switching Current	8A
Max. Switching Power	2216VA/240W
Mechanical Life	1×10 <sup>7</sup> OPS
Electrical Life	1×10 <sup>5</sup> OPS(1NO: 8A 277VAC/30VDC, Resistive Load, 85°C, 1s on and 9s off) 1×10 <sup>5</sup> OPS(1NC: 6A 277VAC/30VDC, Resistive Load, 85°C, 1s on and 9s off)

## CHARACTERISTICS

Insulation Resistance		1000MΩ (at 500VDC)
Dielectric Strength	Between coil & contacts	4000VAC 1min
	Between open contacts	1500VAC 1min
	Between contacts sets	3000VAC 1min
Surge voltage	Between coil & contacts	10kV(1.2/50µs)
	Between contacts sets	2.5kV(1.2/50µs)
	Between contacts sets	6kV(1.2/50µs)
Operate time (at nomi. volt.)		≤15ms
Release time (at nomi. volt.)		≤10ms
Humidity		5% to 85% RH
Operation temperature		-40°C~+85°C
UL Class B/F		Insulation System Class B/F
Shock Resistance	Functional	N.O.:98m/s <sup>2</sup> N.C.:49m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance		N.O.: 10Hz to 55Hz 1.6mm DA 55Hz to 200Hz 98m/s <sup>2</sup> N.C.: 10Hz to 55Hz 0.4mm DA
Creepage distance	Between coil & contacts	8mm
	Between contacts	5.5mm
Clearance distance	Between coil & contacts	8mm
	Between contacts	5.5mm
Unit weight		Approx. 20g
Construction		Flux Tight Type, Sealed Type

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

This datasheet is for customers' reference. All the specifications are subject to change without notice.

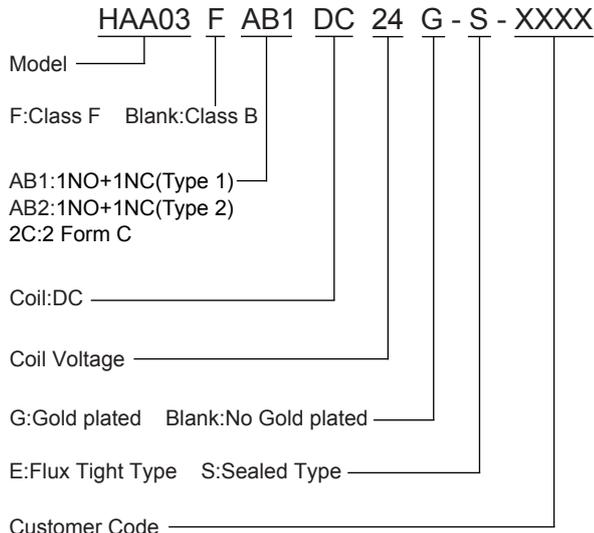


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# RELAYS

## ORDERING INFORMATION



**Notes:**

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## COIL DATA at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
5	3.80	0.50	7.50	35.7
6	4.50	0.60	9.00	51
9	6.80	0.90	13.50	116
12	9.00	1.20	18.00	206
15	11.3	1.50	22.50	321
18	13.5	1.80	27.00	483
21	15.8	2.10	31.50	630
24	18.0	2.40	36.00	823
36	27.0	3.60	54.00	1851
40	30.0	4.00	60.00	2286
48	36.0	4.80	72.00	3291
60	45.0	6.00	90.00	5142
80	64.0	8.00	120.0	9143
110	82.5	11.0	165.0	17285

**Notes:**

- 1) \*\*Max Allowable Voltage\*\*: The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**



# RELAYS

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## COIL

Coil Power	700mW
------------	-------

## SAFETY APPROVAL RATINGS

UL&CUL	<p>N.O.:8A/6A 277VAC/250VAC/240VAC/125VAC, on/off 1s/9s, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O.:8A/6A 30VDC, on/off 1s/9s, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.C.:6A 277VAC/250VAC/240VAC/125VAC, on/off 9s/1s, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.C.:6A 30VDC, on/off 9s/1s, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O./N.C.:1A 24VDC, on/off 1s/1s, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O.:Pilot duty A300/240VAC, on/off 1s/9s, 70°C, 5×10<sup>4</sup>OPS</p> <p>N.O.:Pilot duty B300/240VAC, on/off 1s/9s, 70°C, 12×10<sup>4</sup>OPS</p> <p>N.C.:Pilot duty B300/240VAC, on/off 9s/1s, 70°C, 1.5×10<sup>4</sup>OPS</p>
TüV	<p>N.O.:8A/6A 277VAC/250VAC/240VAC/125VAC, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O.:8A/6A 30VDC, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O.:4A 60VDC, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.C.:6A 277VAC/250VAC/240VAC/125VAC, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.C.:6A 30VDC, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O./N.C.:1A 24VDC, on/off 1s/1s, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O.:3A 240VAC(AC-15), 55°C, 5×10<sup>4</sup>OPS</p> <p>N.C.:1.5A 240VAC(AC-15), 55°C, 5×10<sup>4</sup>OPS</p> <p>N.O.:3A 24VDC(DC-13), 55°C, 5×10<sup>4</sup>OPS</p> <p>N.C.:1A 24VDC(DC-13), 55°C, 5×10<sup>4</sup>OPS</p>
CQC	<p>N.O.:8A/6A 277VAC/250VAC/240VAC/125VAC, 85°C, 5×10<sup>4</sup>OPS</p> <p>N.O.:8A/6A 30VDC, 85°C, 5×10<sup>4</sup>OPS</p> <p>N.C.:6A 277VAC/250VAC/240VAC/125VAC, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.C.:6A 30VDC, 85°C, 1×10<sup>5</sup>OPS</p> <p>N.O./N.C.:1A 24VDC, on/off 1s/1s, 85°C, 1×10<sup>5</sup>OPS</p>

### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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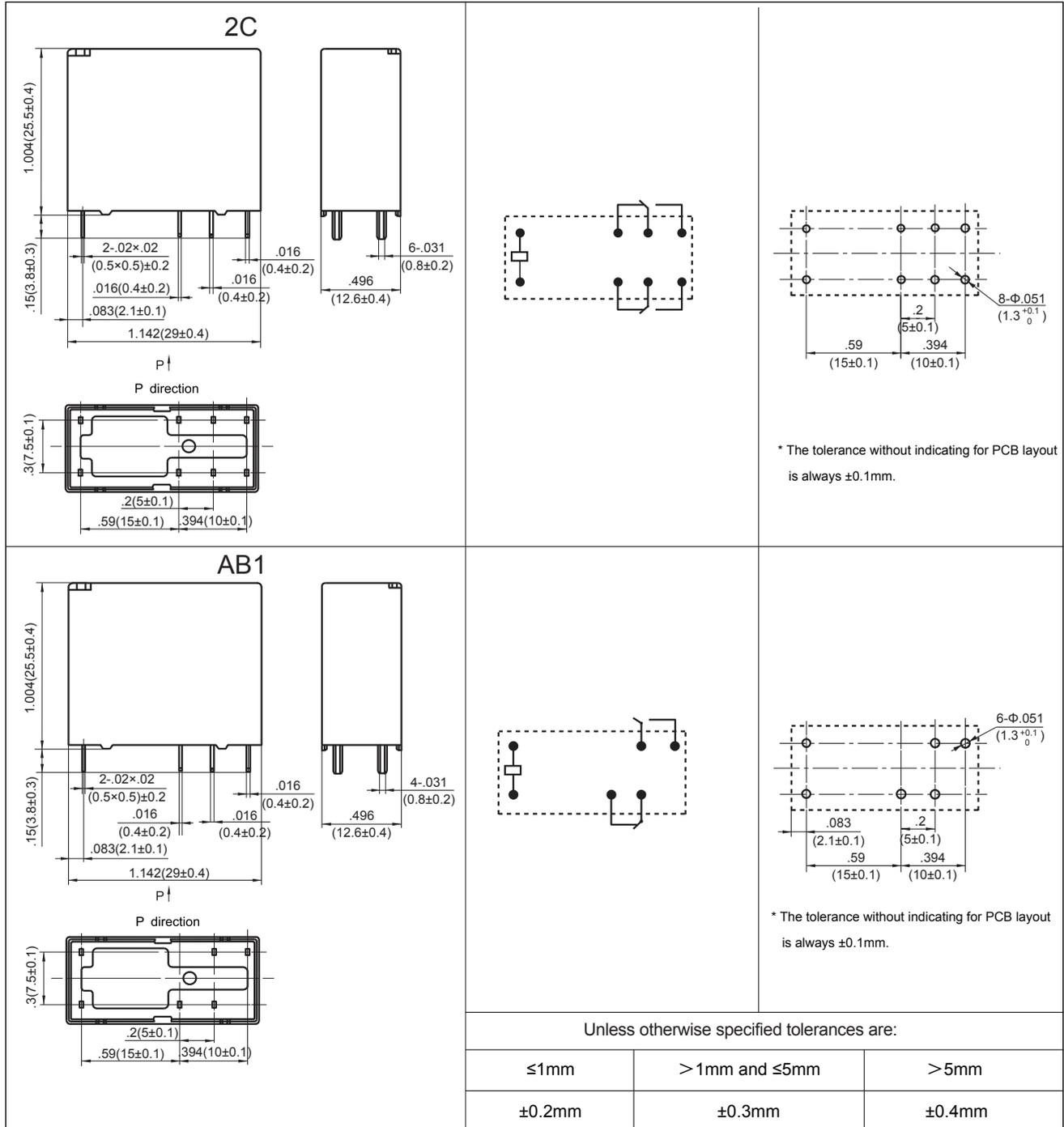
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

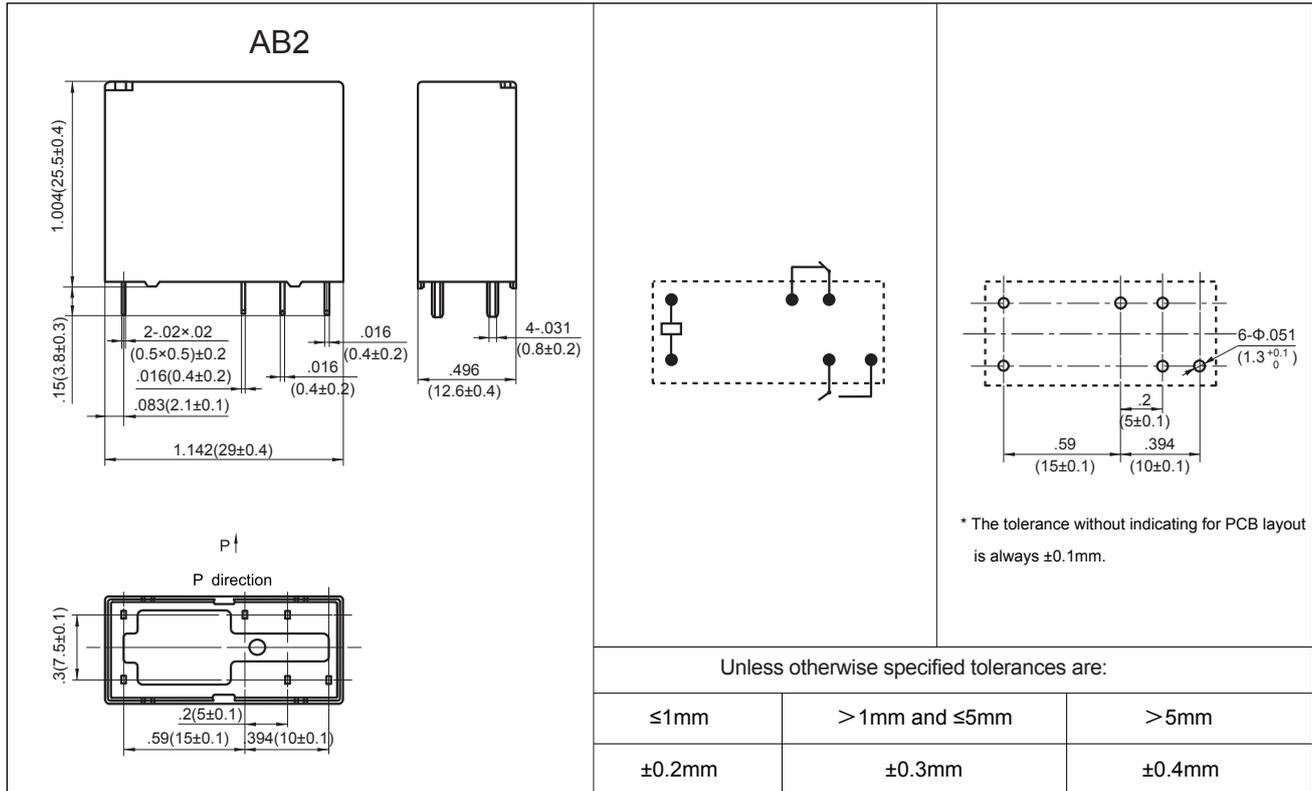
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

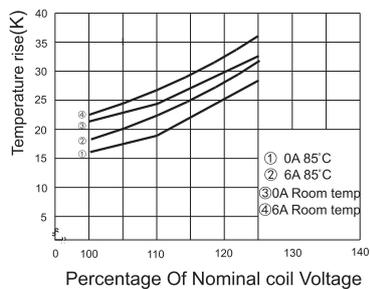
Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

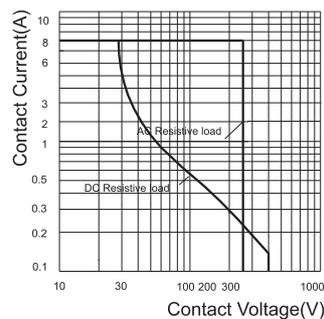


## CHARACTERISTIC CURVES

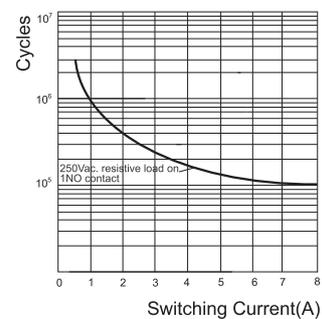
COIL TEMPERATURE RISE



LOAD BREAKING CAPACITY



ELECTRICAL ENDURANCE



**Test conditions:**

1NO, Resistive load, 250VAC, Room temp., 1s on 9s off.

The data shown above are typical values.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



File No.:R 50300956



## FEATURES

- FCC Pt 68
- Small Package
- Sealed Type
- PC Pin
- Sensitive type and standard type are available

## CONTACT RATINGS

Contact Arrangement	1C	
Contact Resistance	≤100mΩ (1A 24VDC)	
Contact Material	AgSnO	
Contact Rating(Resistive)	BAS111, BS211, SC211	BAS511
	N.O.: 2A/240VAC, 2A/30VDC N.C.: 1A/240VAC, 2A/30VDC	N.O./N.C.: 5A/120VAC 5A/30VDC
Max. Switching Voltage	240VAC/30VDC	120VAC/30VDC
Max. Switching Current	2A	5A
Max. Switching Power	480VA/60W	600VA/150W
Mechanical Life	5×10 <sup>6</sup> operations	
Electrical Life	See more details at "safety approval ratings"	

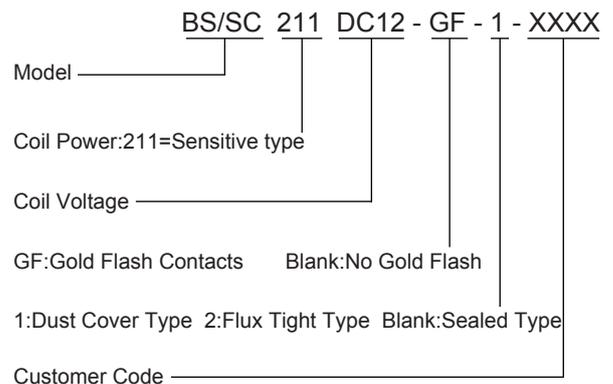
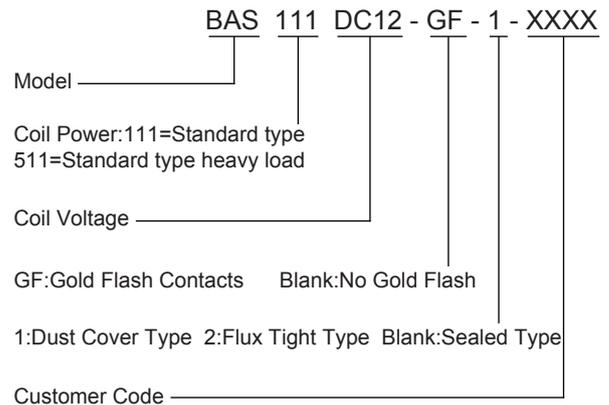
## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	1000VAC 1min
	Between open contacts	500VAC 1min
Operate time (at nomi. volt.)	≤10ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	35% ~ 85% RH	
Operation temperature	-40°C~+85°C	
UL Class B	Insulation System Class B	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 4g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

## ORDERING INFORMATION



Notes:  
1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.  
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.



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# RELAYS

## COIL DATA

at 25°C

### Standard Type

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
3	2.1	0.3	3.3	20
5	3.5	0.5	5.5	56
6	4.2	0.6	6.6	80
9	6.3	0.9	9.9	180
12	8.4	1.2	13.2	320
24	16.8	2.4	26.4	1280
48	33.6	4.8	52.8	5120

### Sensitive Type

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
3	2.1	0.3	4.8	45
5	3.5	0.5	8.0	120
6	4.2	0.6	9.6	180
9	6.3	0.9	14.4	400
12	8.4	1.2	19.2	700
24	16.8	2.4	38.4	2800

#### Notes:

- 1) \*\*Max Allowable Voltage\*\*: The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	Standard Type: 450mW
	Sensitive Type: 200mW

## SAFETY APPROVAL RATINGS

UL&CUL	Model	Rating
UL&CUL	BAS111 BS211 SC211	N.O.:2A 240VAC, $6 \times 10^3$ OPS N.O.:2A 30VDC, $6 \times 10^3$ OPS N.C.:2A 30VDC, $6 \times 10^3$ OPS N.C.:1A 240VAC, $6 \times 10^3$ OPS N.O./N.C.:2A 240VAC, $6 \times 10^3$ OPS N.O./N.C.:2A 30VDC, $6 \times 10^3$ OPS N.O./N.C.:1A 240VAC, $1 \times 10^5$ OPS
	BAS511	N.O./N.C.:5A 120VAC, $6 \times 10^3$ OPS N.O./N.C.:5A 30VDC, $6 \times 10^3$ OPS N.O.:2A 120VAC, $6 \times 10^3$ OPS N.O.:2A 30VDC, $6 \times 10^3$ OPS N.O./N.C.:3FLA 12VDC, $1 \times 10^4$ OPS
TüV	BAS111 BS211	N.O.:1A 240VAC, $5 \times 10^4$ OPS N.O.:2A 125VAC, $1 \times 10^4$ OPS N.C.:2A 30VDC, $1 \times 10^4$ OPS
	BAS511	N.O.:5A 120VAC; N.C.:5A 120VAC, $1 \times 10^4$ OPS N.O.:5A 30VDC; N.C.:5A 30VDC, $1 \times 10^4$ OPS

#### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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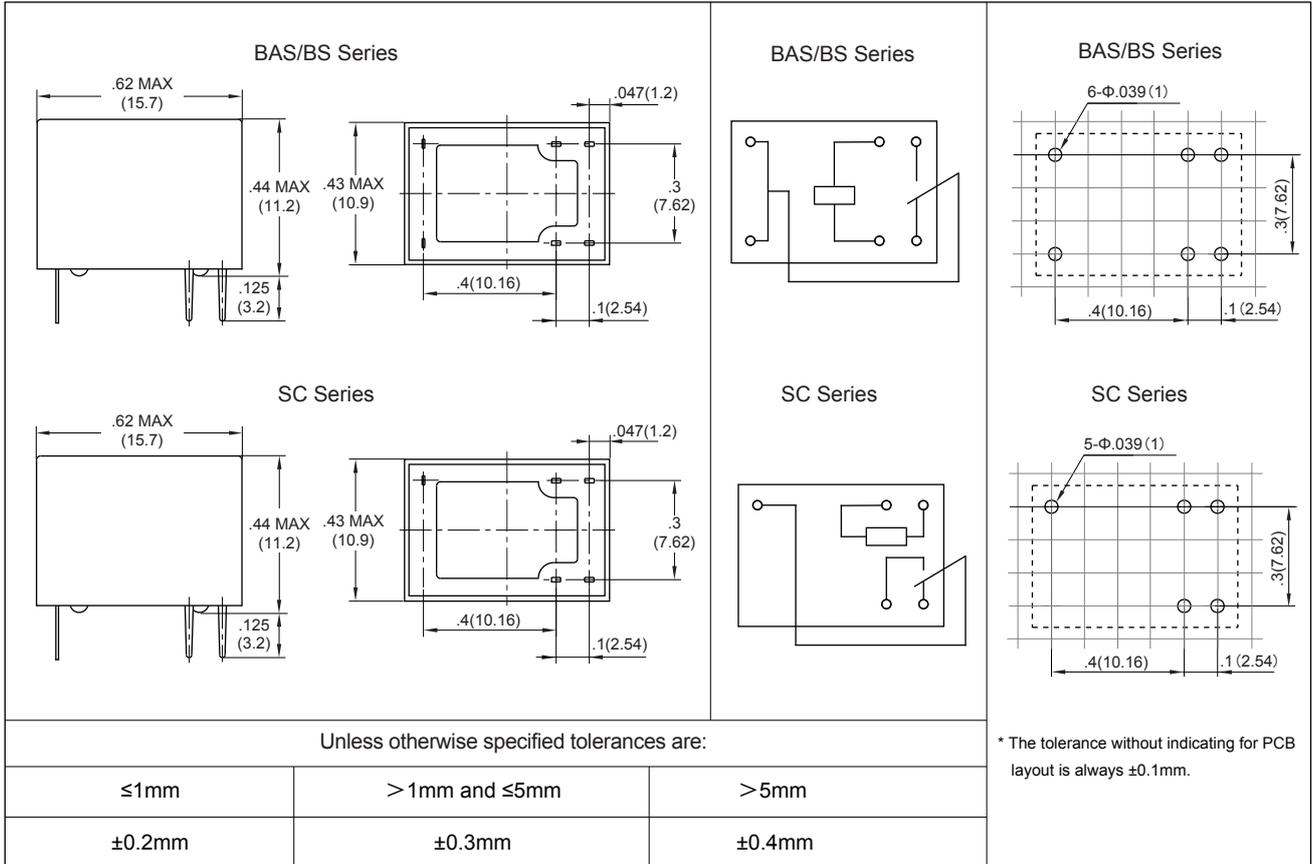
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

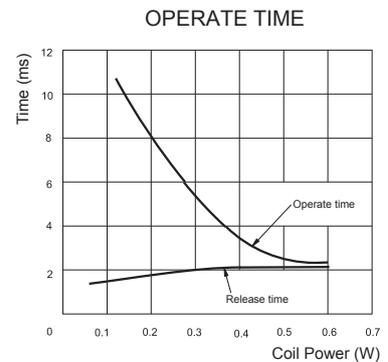
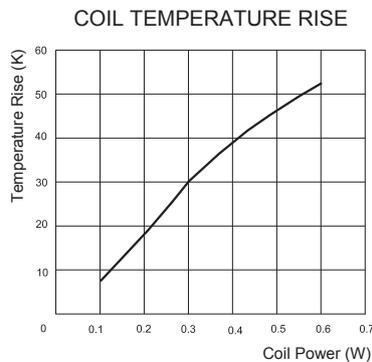
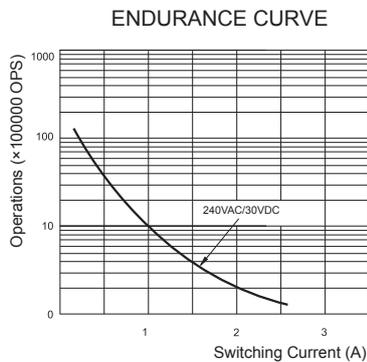
Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



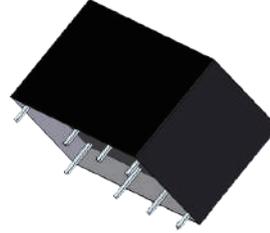
## CHARACTERISTIC CURVES



This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



## FEATURES

- Sensitive type and standard type are available
- Fully Sealed

## CONTACT RATINGS

Contact Arrangement	2C
Contact Resistance	≤100mΩ(100mA 6VDC)
Contact Material	Silver Alloy, Gold FLash
Contact Rating(Resistive)	2A/30VDC, 2.5A/12VDC 0.5A/125VAC, 0.6A/120VAC
Minimum Load	1mA/10mV(Reference Value)
Max. Switching Voltage	240VAC/120VDC
Max. Switching Current	2A
Max. Switching Power	72VA/60W
Mechanical Life	1×10 <sup>8</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	1000VAC 1min
	Between open contacts	1000VAC 1min
Operate time (at nomi. volt.)	≤7ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	98% RH	
Operation temperature	-40°C~+85°C	
UL Class B	Insulation System Class B	
Shock Resistance	Functional	100m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1.5mm DA	
Unit weight	Approx. 5g	
Construction	Sealed Type	

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION

**CAS112/CS212 DC12 - XXXX**

Model: \_\_\_\_\_  
 CAS112=Standard type  
 CS212=Sensitive type

Coil Voltage \_\_\_\_\_

Customer Code \_\_\_\_\_

## COIL DATA

at 25°C

### Standard Type

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
5	3.75	0.25	7.0	45
6	4.50	0.30	8.4	66
9	6.75	0.45	12.3	140
12	9.00	0.60	17.4	280
24	18.00	1.20	34.0	1070
48	36.00	2.40	64.9	3900

### Sensitive Type

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
5	3.75	0.25	12.5	167
6	4.50	0.30	15.0	240
9	6.75	0.45	22.5	540
12	9.00	0.60	30.0	960
18	13.50	0.90	40.0	1620
24	18.00	1.20	52.9	2880
48	36.00	2.40	84.9	7680

Notes:

1) "\*Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.

2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

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# RELAYS

# CAS/CS SERIES

# SIGNAL RELAY

## COIL

Coil Power	Standard Type: 500mW ~ 590mW
	Sensitive Type: 150mW ~ 300mW

## SAFETY APPROVAL RATINGS

UL&CUL	N.O./N.C.: 2A 30VDC, 6×10 <sup>3</sup> OPS
	N.O./N.C.: 2.5A 12VDC, 6×10 <sup>3</sup> OPS
	N.O./N.C.: 0.5A 125VAC, G.P., 6×10 <sup>3</sup> OPS
	N.O./N.C.: 0.6A 120VAC, G.P., 6×10 <sup>3</sup> OPS

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

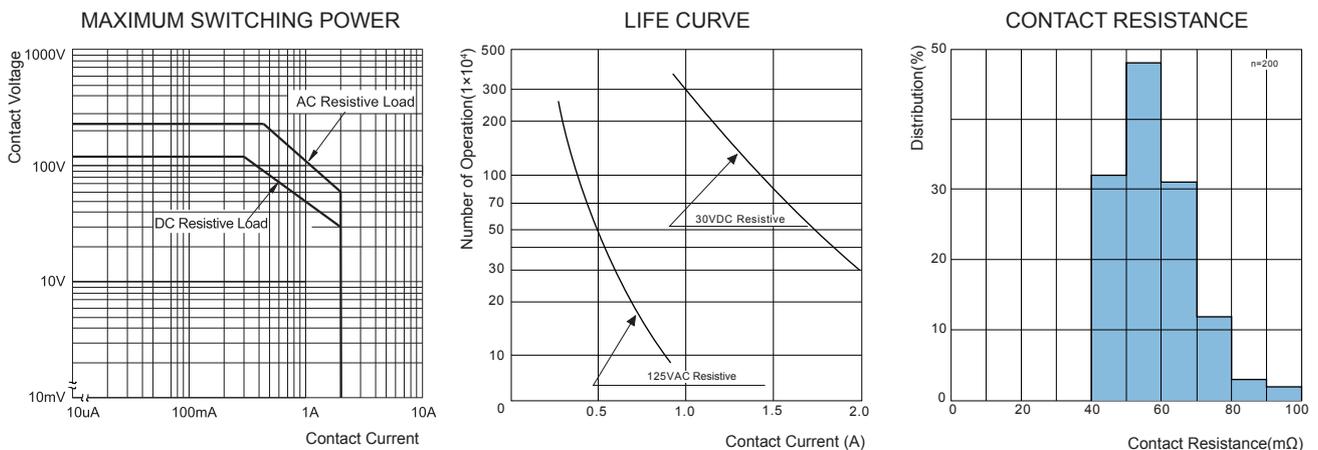
### PCB Layout (Bottom view)

\*Note: CAS Series is .445(11.3)max.  
CS Series is .492(12.5)max.

Unless otherwise specified tolerances are:		
≤1mm	> 1mm and ≤5mm	>5mm
±0.2mm	±0.3mm	±0.4mm

\* The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES



This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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File No.:E75887



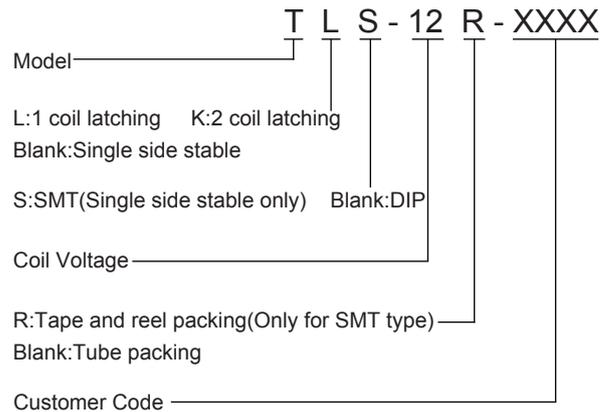
## FEATURES

- Compact size and low profile:  
5(H)mm×14(L)mm×9(W)mm
- Meets FCC part 68 requirements
- High sensitivity:140mW nominal operating power
- SMT and DIP types available
- Fully Sealed

## CONTACT RATINGS

Contact Arrangement	2C
Contact Resistance	≤100mΩ (10mA 6VDC)
Contact Material	Silver Alloy, Gold Flash
Contact Rating(Resistive)	1A/30VDC; 0.5A/125VAC
Max. Switching Voltage	250VAC/220VDC
Max. Switching Current	1A
Max. Switching Power	62.5VA/30W
Mechanical Life	1×10 <sup>8</sup> operations
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION



## CHARACTERISTICS

Insulation Resistance		1000MΩ (500VDC)
Dielectric Strength	Between coil & contacts	1000VAC 1min
	Between open contacts	1000VAC 1min
	Between 2 pole contacts	1000VAC 1min
Surge withstand voltage	Between coil & contacts	1500VAC 1min
	Between open contacts	1500VAC 1min
	Between 2 pole contacts	2500VAC 1min
Operate time (at nomi. volt.)		≤2ms
Release time (at nomi. volt.)		≤1.5ms
Humidity		98% RH
Operation temperature		-40°C~+85°C
UL Class B		Insulation System Class B
Shock Resistance	Functional	490m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	Functional	10Hz to 55Hz 3mm DA
	Destructive	10Hz to 55Hz 5mm DA
Unit weight		Approx. 1.5g
Construction		Sealed Type

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## COIL DATA

at 25°C

### Single side stable

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
3	2.25	0.3	7.5	64.3
5	3.75	0.5	12.5	178
6	4.50	0.6	15.0	257
9	6.75	0.9	22.5	579
12	9.00	1.2	30.0	1028
24	18.00	2.4	48.0	2880

Note: \*\*Max Allowable Voltage\*: The relay coil can endure max allowable voltage for a short period time only.

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# RELAYS

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## COIL DATA

at 25°C

### 1 coil latching

Nominal Voltage VDC	Action Voltage (Max.) VDC	Reset Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
3	2.25	2.25	8.7	90
5	3.75	3.75	14.5	250
6	4.50	4.50	17.4	360
9	6.75	6.75	26.1	810
12	9.00	9.00	34.8	1440
24	18.00	18.00	57.6	3840

### 2 coil latching

Nominal Voltage VDC	Action Voltage (Max.) VDC	Reset Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$	
				Set Coil	Reset Coil
3	2.25	2.25	6.0	45	45
5	3.75	3.75	10.0	125	125
6	4.50	4.50	12.0	180	180
9	6.75	6.75	18.0	405	405
12	9.00	9.00	24.0	720	720
24	18.00	18.00	36.0	1920	1920

#### Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	Single side stable:140mW(24VDC:200mW) 1 coil latching:100mW(24VDC:150mW) 2 coil latching:200mW(24VDC:300mW)
------------	---

## SAFETY APPROVAL RATINGS

UL&CUL	0.5A/125VAC, 6×10 <sup>3</sup> OPS 1A/30VDC, 6×10 <sup>3</sup> OPS
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#### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

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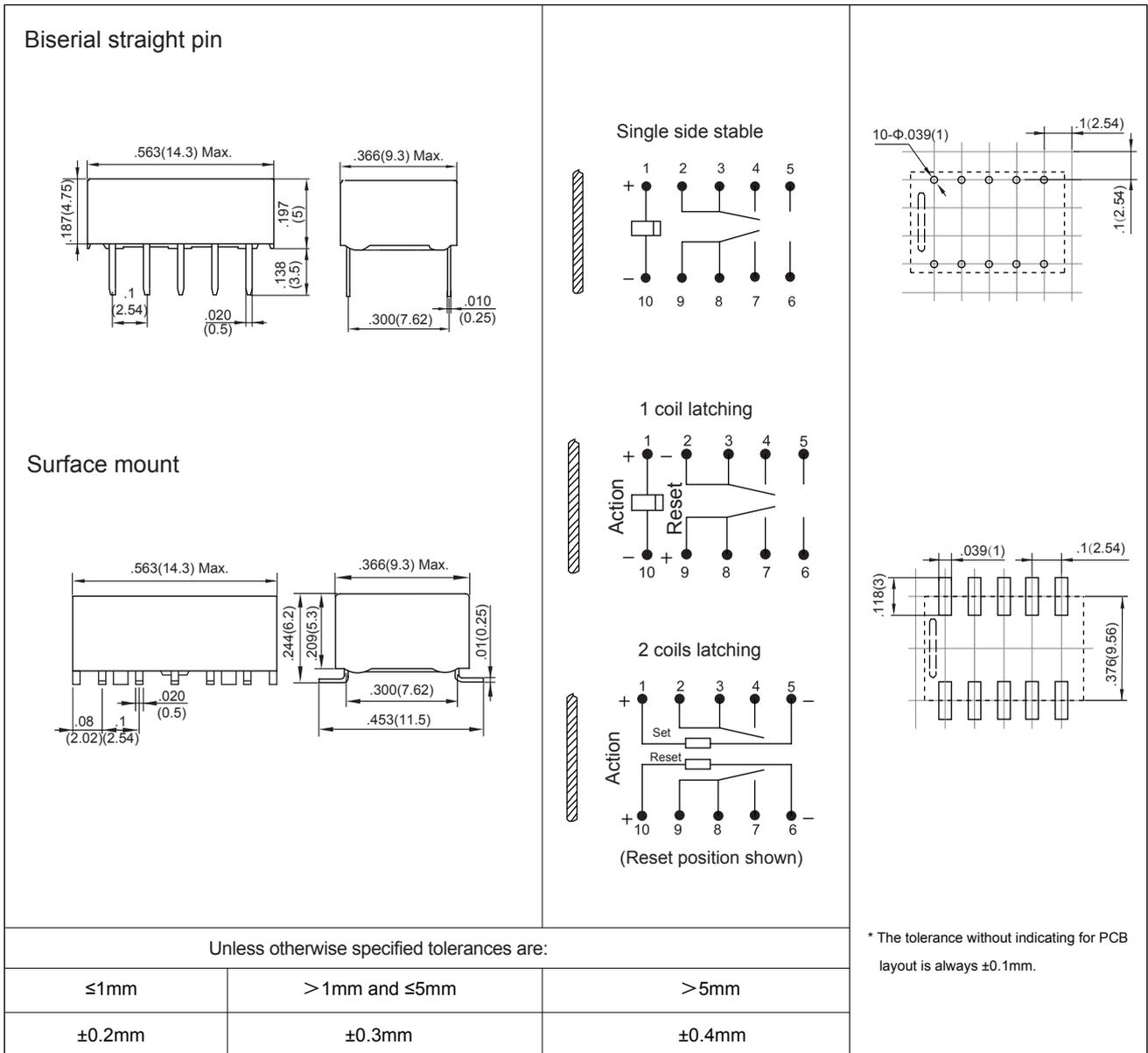
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

### Outline Dimensions

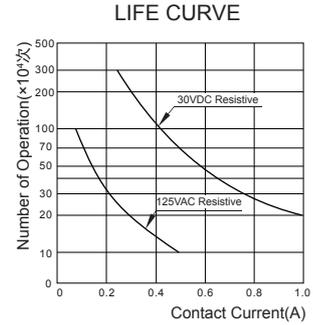
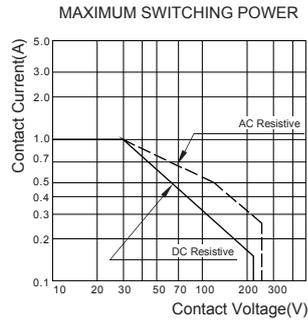
### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

## CHARACTERISTIC CURVES



This datasheet is for customers' reference. All the specifications are subject to change without notice.

# CAR&CART40 SERIES

# AUTOMOTIVE RELAY



File No.:R 50451203



## FEATURES

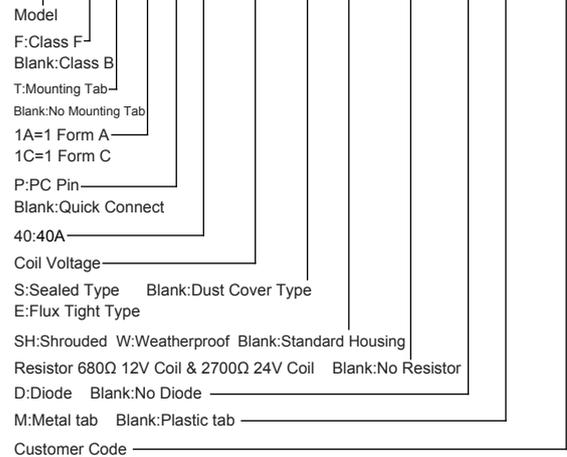
- High contact rating 40A
- High temperature design
- 1 Form A and 1 Form C arrangements
- Quick connect and P.C.Board terminals
- Mounting Tab option

## CONTACT RATINGS

Contact Arrangement	1A, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	N.O.:40A/14VDC N.C.:30A/14VDC
Max. Switching Voltage	75VDC
Max. Switching Current	40A
Max. Switching Power	560W
Mechanical Life	1×10 <sup>6</sup> operations
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION

CAR F T 1C P 40 DC12-S-SH-680R-D-M-XXXX



Notes:

- 1) Shrouded and weather proof available only in metal tab.
- 2) For more details, please contact us directly.
- 3) PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
- 4) Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	500VAC 1min
	Between open contacts	500VAC 1min
Operate time (at nomi. volt.)	≤10ms	
Release time (at nomi. volt.)	≤10ms	
Operation temperature	-40°C~+85°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	147m/s <sup>2</sup>	
Vibration resistance	10Hz ~ 40Hz 1.27mm DA	
Unit weight	Approx. 30g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

- Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
6	4.2	0.6	7.8	20
12	8.4	1.2	15.6	80
24	16.8	2.4	31.2	320
36	25.2	3.6	46.8	720
48	33.6	4.8	62.4	1280

Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

## COIL

Coil Power	1800mW
------------	--------

## SAFETY APPROVAL RATINGS

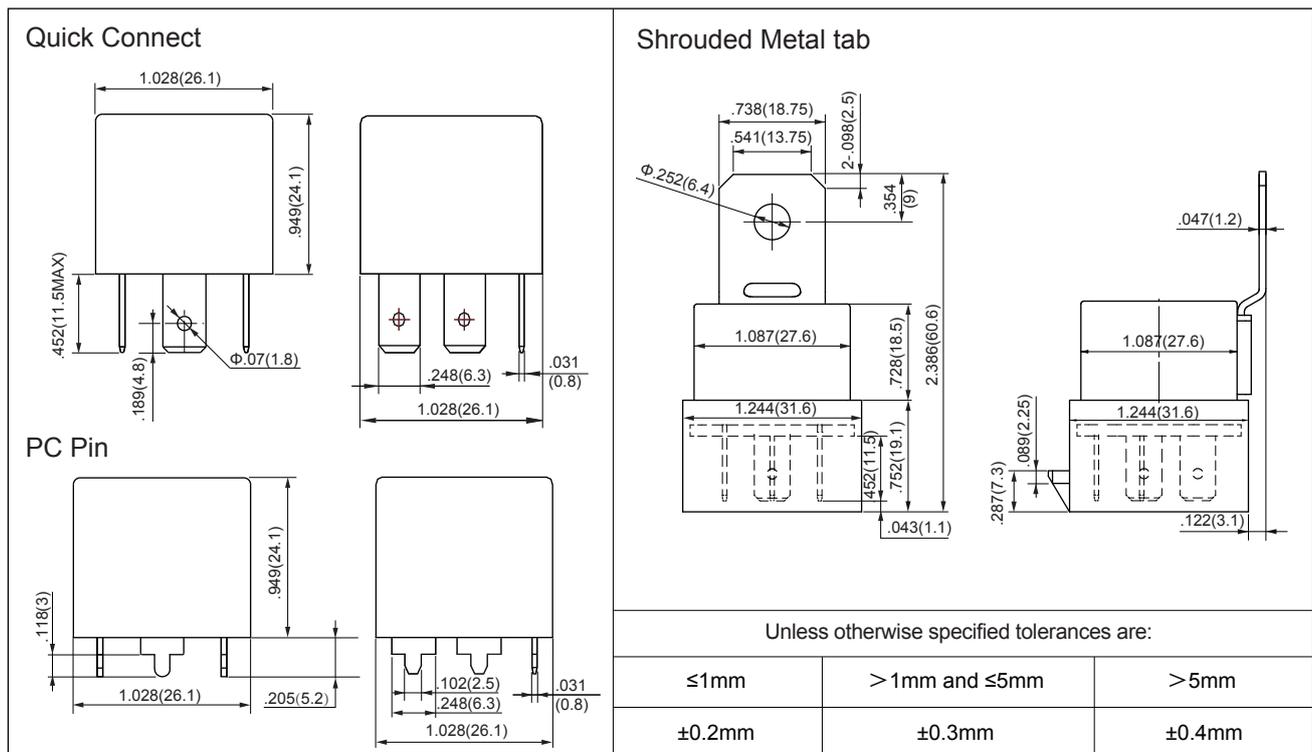
UL&CUL	N.O.:40A 14VDC, Resistive, 6×10 <sup>5</sup> OPS N.O.:15A 24VDC, Resistive, 6×10 <sup>3</sup> OPS N.C.:30A 14VDC, Resistive, 6×10 <sup>3</sup> OPS N.C.:15A 24VDC, Resistive, 6×10 <sup>3</sup> OPS CAR1A40DC12-S: N.O.:5.83A 18VDC, Pilot duty.
TüV	N.O.:20A 28VDC, 1×10 <sup>5</sup> OPS N.O.:40A 14VDC, 1×10 <sup>5</sup> OPS N.O./N.C.:20A/10A 28VDC, 1×10 <sup>5</sup> OPS N.O./N.C.:40A/20A 14VDC, 1×10 <sup>5</sup> OPS

### NOTES:

- All values without specified temperature are at 25°C.
- The above lists the typical loads only. Other loads may be available upon request.

## OUTLINE DIMENSIONS

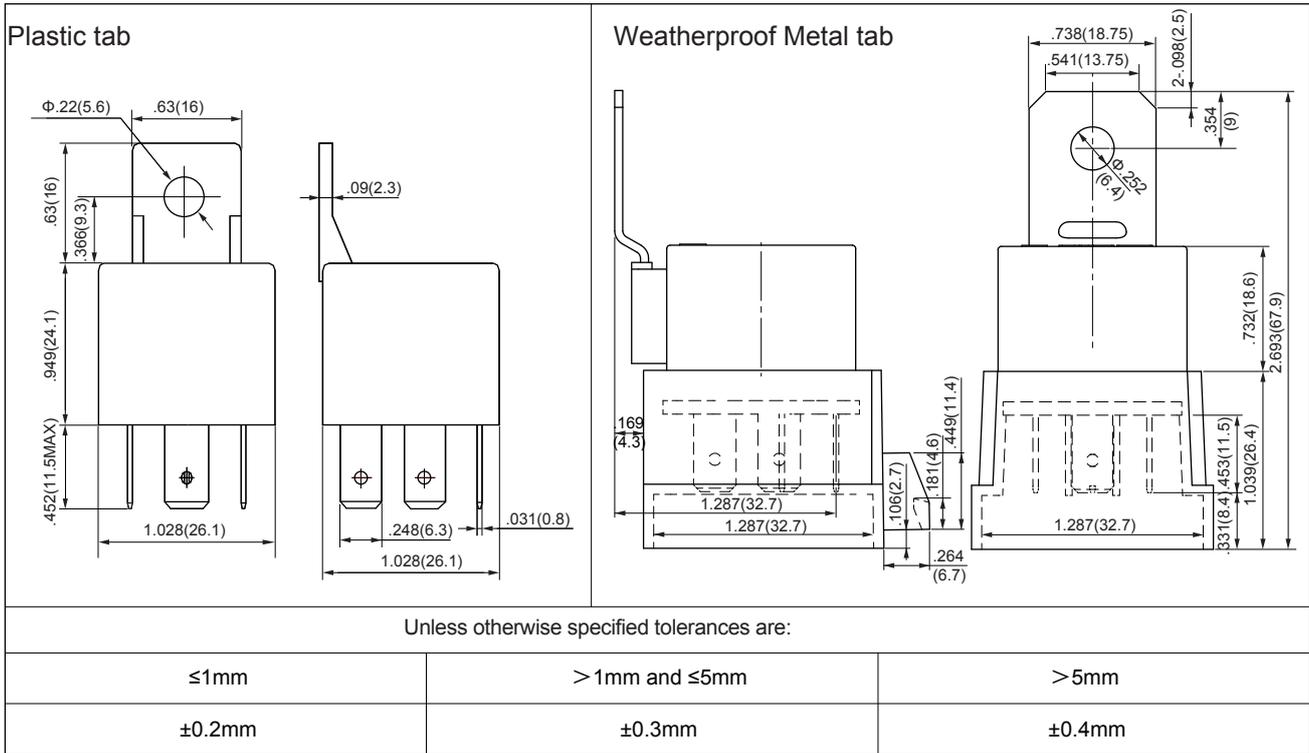
Unit: inch(mm)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

## OUTLINE DIMENSIONS

Unit: inch(mm)

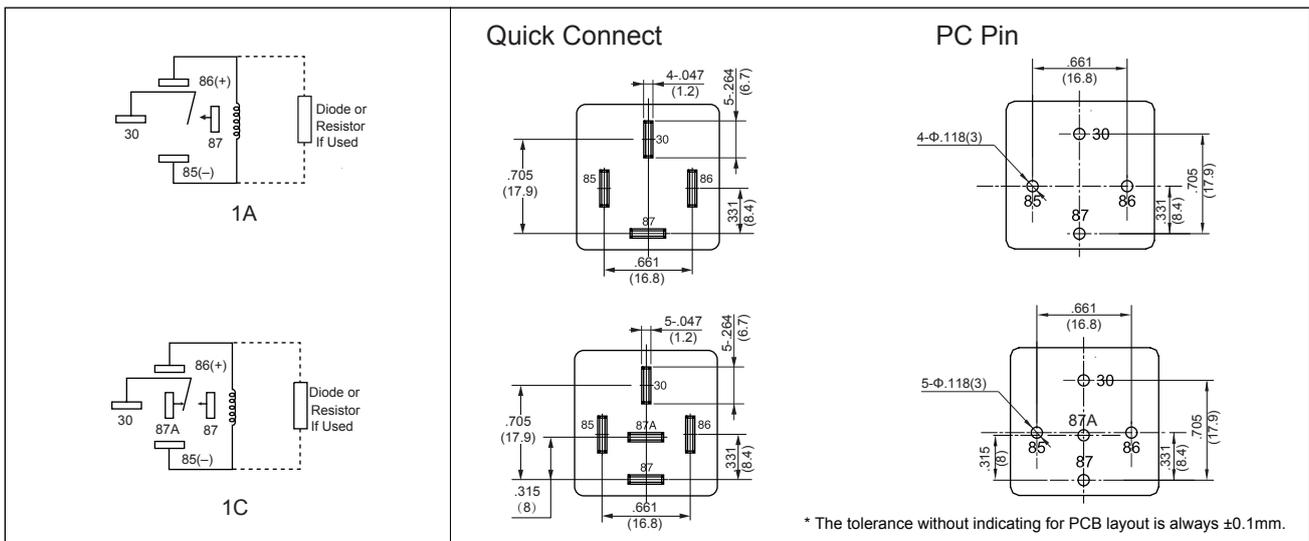


## WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.



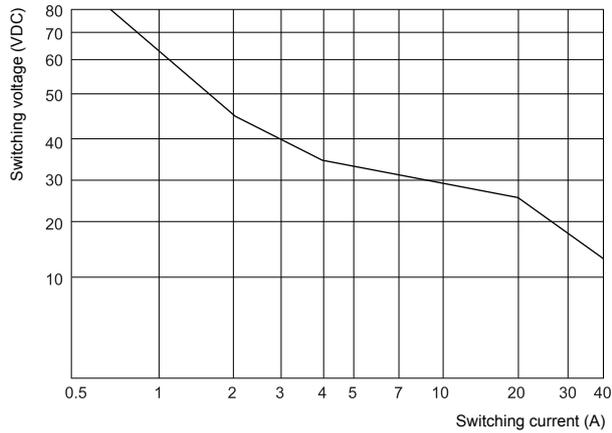
# RELAYS

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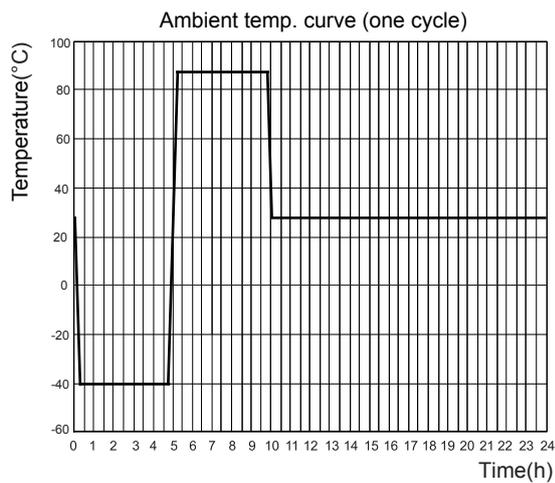
## CHARACTERISTIC CURVES

1. Load limit curve(at 25°C)



This chart takes NO contact, resistive load as example.

2. Ambient temperature curve of the electrical endurance test



(1) The minimum temperature is -40°C.

(2) The maximum temperature is 85°C.

This datasheet is for customers' reference. All the specifications are subject to change without notice.

# CAR&CART80 SERIES

# AUTOMOTIVE RELAY



File No.:E75887



File No.:R 50304236



## FEATURES

- High contact rating 80A
- 1 Form A and 1 Form C arrangements
- Quick connect and P.C.Board terminals
- Mounting Tab option

## CONTACT RATINGS

Contact Arrangement	1A, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	N.O.:80A/14VDC N.C.:60A/14VDC
Max. Switching Voltage	75VDC
Max. Switching Current	On: 200A, Off: 80A (Resistive), 14VDC
Max. Switching Power	1120W
Mechanical Life	1×10 <sup>7</sup> operations(300 times/minute)
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION

CAR F T 1C P 80 DC12-S-SH-680R-D-M-XXXX

Model

F:Class F

Blank:Class B

T:Mounting Tab

Blank:No Mounting Tab

1A=1 Form A

1C=1 Form C

P:PC Pin

Blank:Quick Connect

80:80A

Coil Voltage

S:Sealed Type Blank:Dust Cover Type

E:Flux Tight Type

SH:Shrouded W:Weatherproof Blank:Standard Housing

Resistor 680Ω 12V Coil & 2700Ω 24V Coil Blank:No Resistor

D:Diode Blank:No Diode

M:Metal tab Blank:Plastic tab

Customer Code

Notes:

- 1) Shrouded and weather proof available only in metal tab.
- 2) For more details, please contact us directly.
- 3) PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
- 4) Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.
- 5) It is recommended when switching maximum load the vent hole be opened by removing the protrusion for removing inside gasses created by heat.

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	500VAC 1min
	Between open contacts	500VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤10ms	
Humidity	85% RH	
Operation temperature	-40°C~+85°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	294m/s <sup>2</sup>	
Vibration resistance	10Hz ~ 55Hz 3mm DA	
Unit weight	46g(CAR); 48g(CART)	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
6	4.2	0.6	7.8	20
12	8.4	1.2	15.6	80
24	16.8	2.4	31.2	320
36	25.2	3.6	46.8	720
48	33.6	4.8	62.4	1280

Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

# CAR&CART80 SERIES

# AUTOMOTIVE RELAY

## COIL

Coil Power	1800mW
------------	--------

## SAFETY APPROVAL RATINGS

UL&CUL	N.O.:80A/14VDC, General Use/Resistive, 6×10 <sup>5</sup> OPS N.C.:60A/14VDC, General Use/Resistive, 6×10 <sup>5</sup> OPS
TüV	N.O.:80A/14VDC, 1×10 <sup>5</sup> OPS N.C.:80A/14VDC, 1×10 <sup>5</sup> OPS

### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

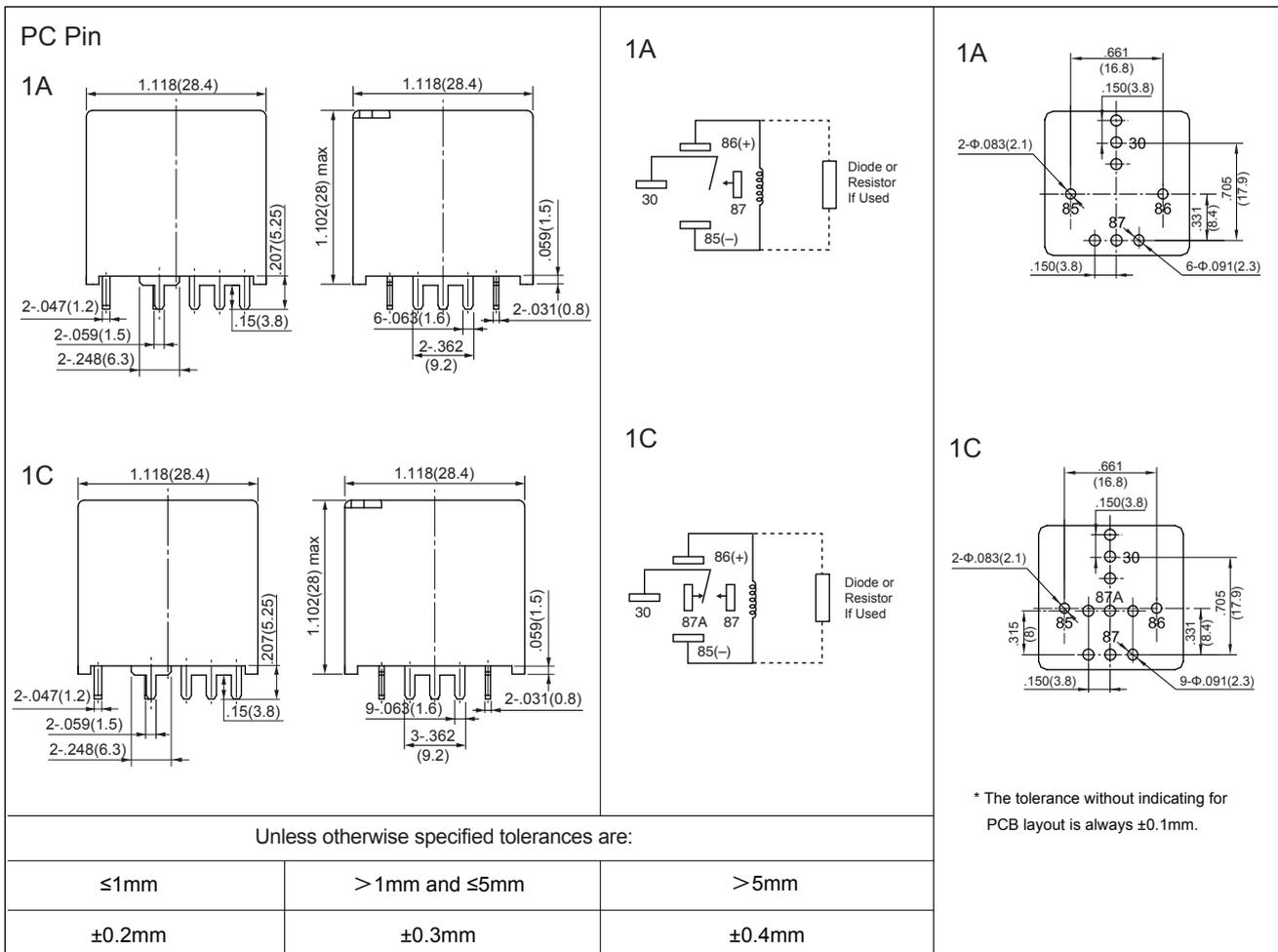
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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# CAR&CART80 SERIES

# AUTOMOTIVE RELAY

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND LAYOUT.

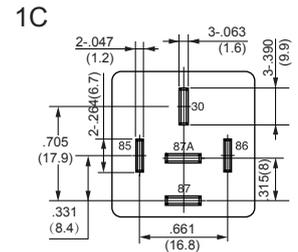
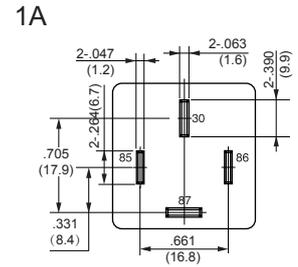
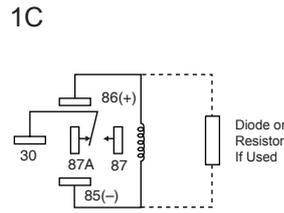
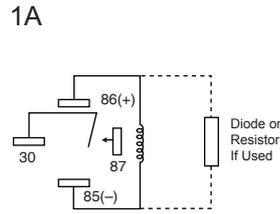
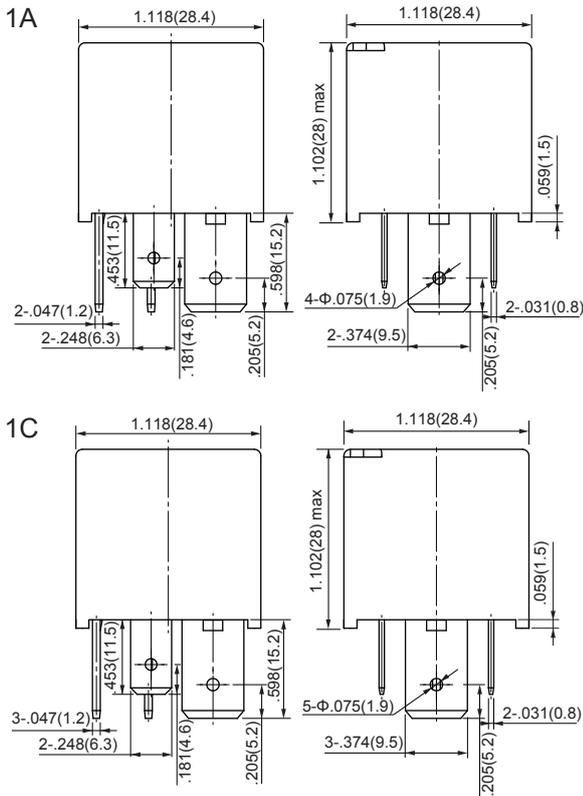
Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### Layout (Bottom view)

#### Quick Connect

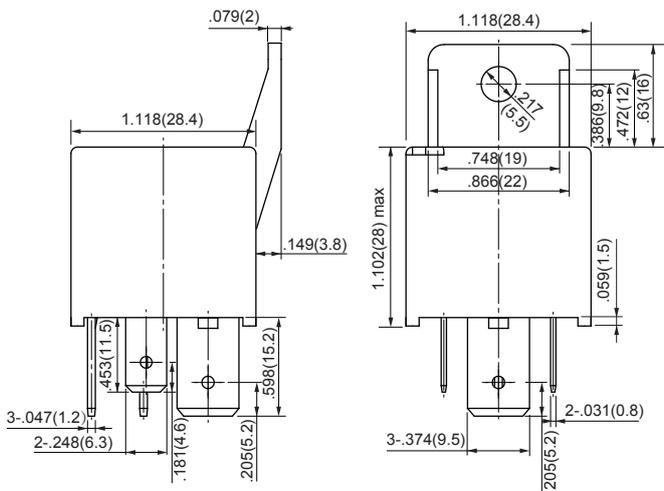


\* The tolerance without indicating for PCB layout is always  $\pm 0.1$ mm.

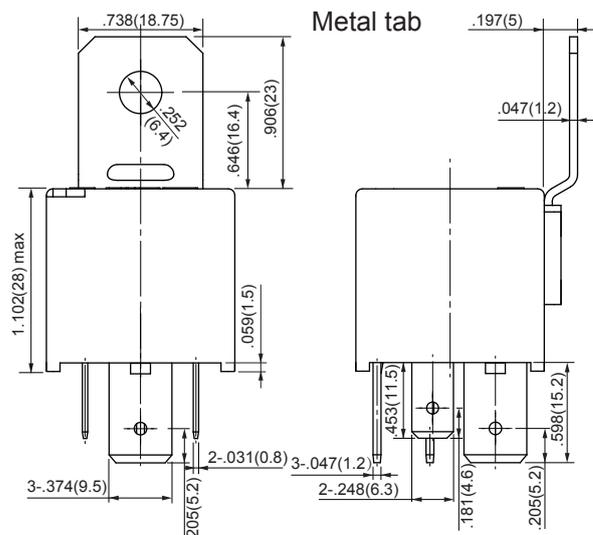
Unless otherwise specified tolerances are:

$\leq 1$ mm	$> 1$ mm and $\leq 5$ mm	$> 5$ mm
$\pm 0.2$ mm	$\pm 0.3$ mm	$\pm 0.4$ mm

#### Plastic tab



#### Metal tab



This datasheet is for customers' reference. All the specifications are subject to change without notice.



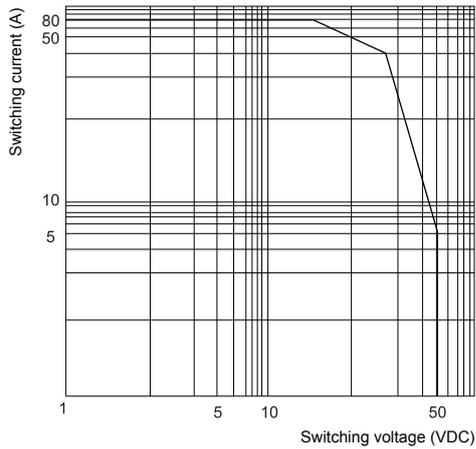
# RELAYS

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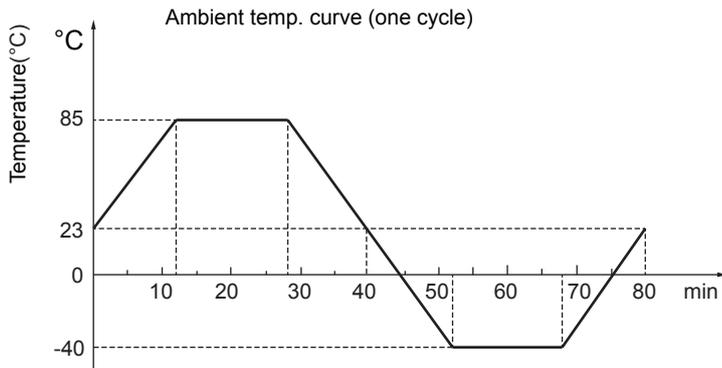
## CHARACTERISTIC CURVES

### 1. Load limit curve



This chart takes NO contact, resistive load as example.

### 2. Ambient temperature curve of the electrical endurance test



- (1) The minimum temperature is -40°C.
- (2) The maximum temperature is 85°C.

This datasheet is for customers' reference. All the specifications are subject to change without notice.

# CAR100 SERIES

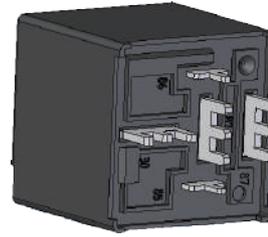
# AUTOMOTIVE RELAY



File No.:E75887 \*



File No.:R 50304236



## CONTACT RATINGS

Contact Arrangement	1A, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	N.O.:100A/14VDC N.C.:100A/14VDC
Max. Switching Voltage	75VDC
Max. Switching Current	100A
Max. Switching Power	1400W
Mechanical Life	1×10 <sup>6</sup> operations
Electrical Life	See more details at "safety approval ratings"

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	500VAC 1min
	Between open contacts	500VAC 1min
Operate time (at nomi. volt.)	≤12ms	
Release time (at nomi. volt.)	≤5ms	
Humidity	85% RH	
Operation temperature	-40°C~+85°C	
UL Class F	Insulation System Class F	
Shock Resistance	294m/s <sup>2</sup>	
Vibration resistance	10Hz ~ 55Hz 1.27mm DA	
Unit weight	Approx. 46g	
Construction	Sealed Type, Dust Cover Type, Flux Tight Type	

Notes: The data shown above are initial values.

## COIL

Coil Power	1800mW
------------	--------

## ORDERING INFORMATION

Model: **CAR F 1C P 100 DC12 - S - 680R - D - 2015 - XXXX**

F:Class F  
Blank:Class B  
1A=1 Form A  
1C=1 Form C  
P:PC Pin  
Blank:Quick Connect  
100:100A  
Coil Voltage  
S:Sealed Type Blank:Dust Cover Type  
E:Flux Tight Type  
Resistor 680Ω 12V Coil & 2700Ω 24V Coil  
Blank:No Resistor  
D:Diode Blank:No Diode  
2015:Special Type Blank:Standard Type  
Customer Code

Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.
3. -2015=UL RECOGNIZED
4. It is recommended when switching maximum load the vent hole be opened by removing the protrusion for removing inside gasses created by heat.

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
6	4.2	0.6	7.8	20
12	8.4	1.2	15.6	80
24	16.8	2.4	31.2	320

Note: \*Max Allowable Voltage\*: The relay coil can endure max allowable voltage for a short period time only.

## SAFETY APPROVAL RATINGS

UL&CUL	N.O.:100A 14VDC, 50°C, 6×10 <sup>3</sup> OPS N.O.:70A 14VDC, 50°C, 6×10 <sup>3</sup> OPS(CARFIAP100DCXX-S-2015-5352)
TüV	N.O./N.C.:100A/14VDC, 1×10 <sup>5</sup> OPS CARFIAP100DC24-S-2015-5352:70A/14VDC, 85°C, 2×10 <sup>4</sup> OPS

NOTES: 1. All values without specified temperature are at 25°C.

2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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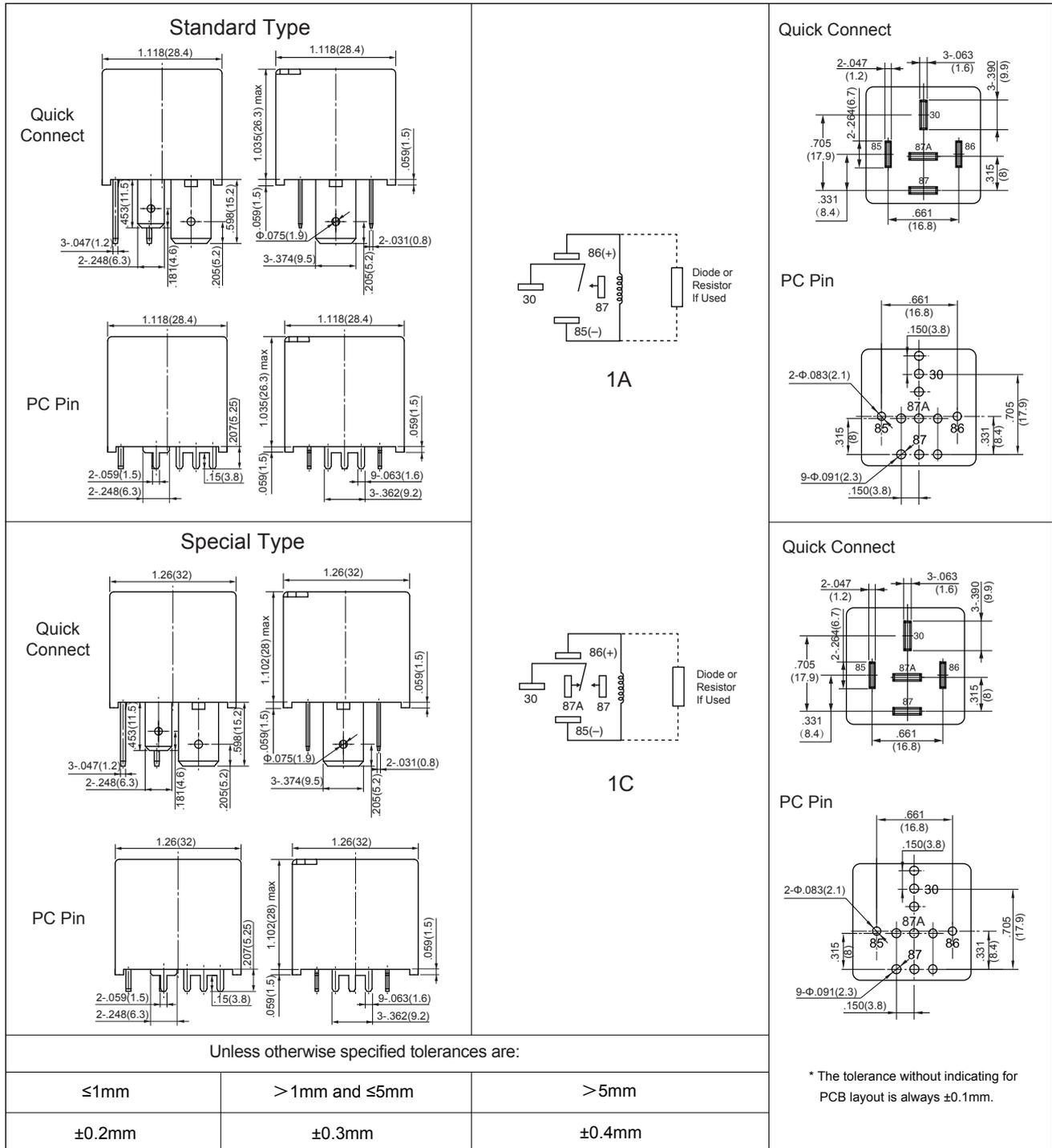
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### Layout (Bottom view)

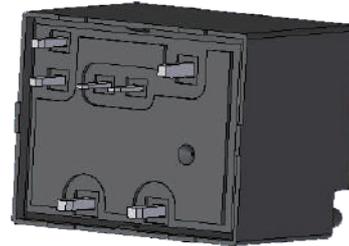


\* The tolerance without indicating for PCB layout is always ±0.1mm.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



## CONTACT RATINGS

Contact Arrangement	1A, 1B, 1C
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	N.O.:30A/240VAC, 20A/28VDC N.C.:15A/240VAC, 15A/28VDC
Max. Switching Voltage	380VAC/75VDC
Max. Switching Current	30A
Max. Switching Power	7200VA/560W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

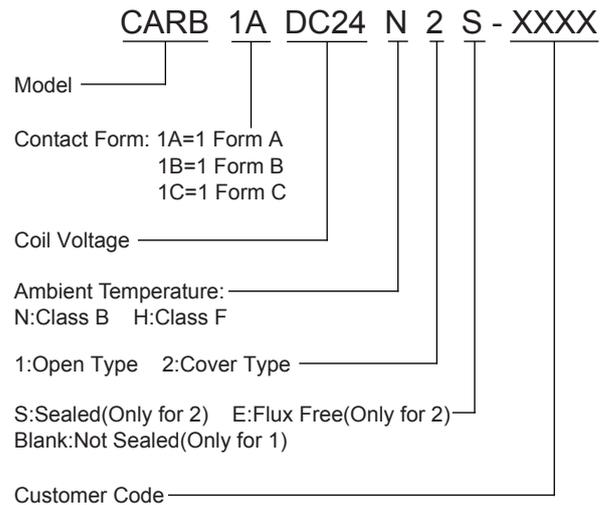
## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	1500VAC 1min
	Between open contacts	1000VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤10ms	
Operation temperature	-40°C~+85°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 40Hz 1.27mm DA	
Unit weight	Open:Approx.16g Sealed:Approx.20g	
Construction	Sealed Type, Open Type, Flux Tight Type	

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
6	4.2	0.6	7.2	19
9	6.3	0.9	10.8	50
12	8.4	1.2	14.4	90
24	16.8	2.4	28.8	380
48	33.6	4.8	57.6	2300

Notes:

- 1) "\*"Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

# CARB SERIES

# AUTOMOTIVE RELAY

## COIL

Coil Power	6V:1900mW
	9~12V:1600mW
	24V:1500mW
	48V:1000mW

## SAFETY APPROVAL RATINGS

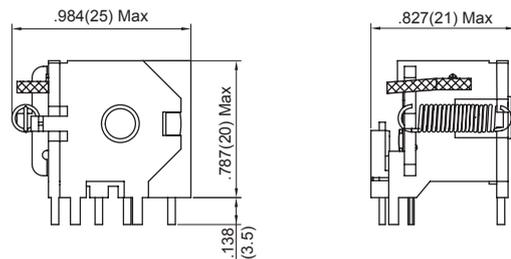
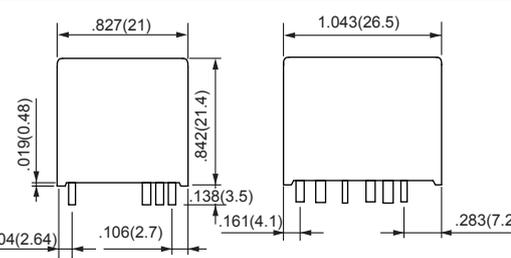
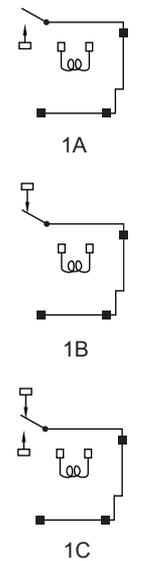
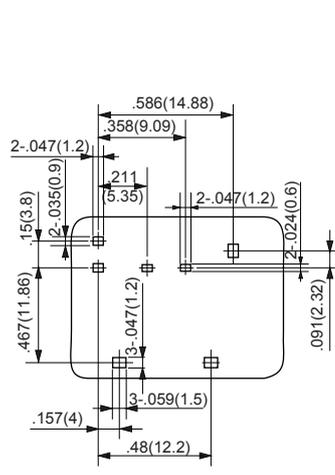
UL&CUL	N.O.:30A/240VAC, Resistive, 6×10 <sup>3</sup> OPS
	N.O.:20A/28VDC, Resistive, 6×10 <sup>3</sup> OPS
	N.O.:10A/240VAC, AC Electrical Discharge Lamps(Ballast)
	N.C.:15A/240VAC, Resistive, 6×10 <sup>3</sup> OPS
	N.C.:15A/28VDC, Resistive, 6×10 <sup>3</sup> OPS
	N.C.:7.5A/240VAC, AC Electrical Discharge Lamps(Ballast)

### NOTES:

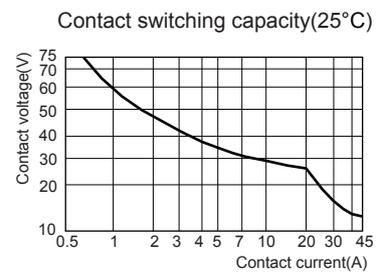
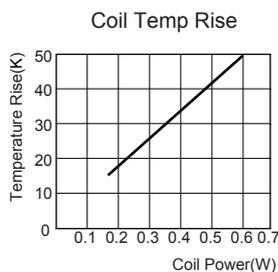
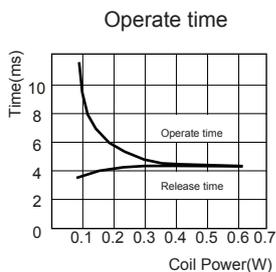
1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions	Wiring Diagram (Bottom view)	PCB Layout (Bottom view)
<p><b>Open Type</b></p>  <p><b>Covered</b></p> 		
Unless otherwise specified tolerances are:		
≤1mm	> 1mm and ≤5mm	> 5mm
±0.2mm	±0.3mm	±0.4mm
		* The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES



This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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**UNDER  
DEVELOPMENT**



## FEATURES

- 80A switching capability
- Extended temp. rang up to 125°C
- Transient suppression resistor or diode available

## CHARACTERISTICS

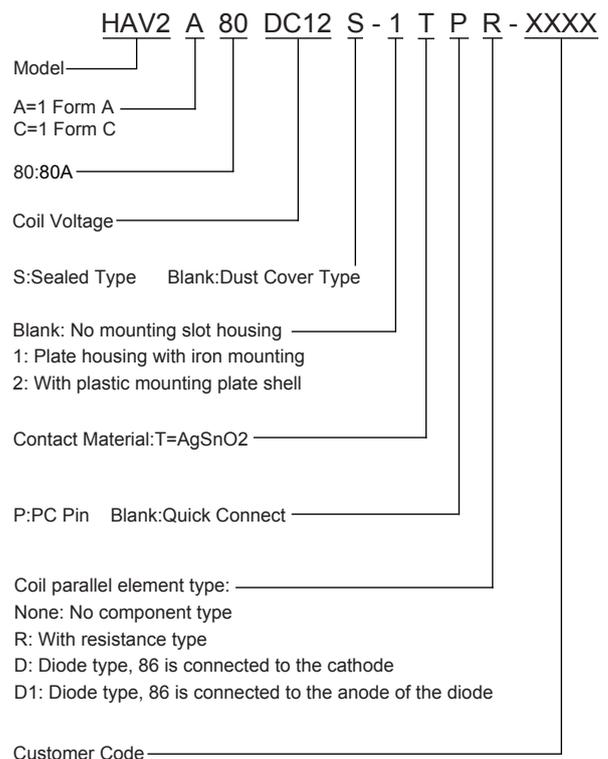
Contact Arrangement	1A, 1C
Voltage Drop	Typ: 200mV(at 10A), Max.: 250mV(at 10A)
Max. Continuous Current	80A(25°C), 50A(85°C), 30A(125°C)
Max. Switching Current	Make(NO):200A Break(NO):80A(Resistive, 13.5VDC)
Min. Contact Load	1A 6VDC
Electrical Endurance	See "CONTACT DATA"
Mechanical Endurance	1×10 <sup>6</sup> OPS(300OPS/min)
Insulation Resistance	100MΩ (at 500VDC)
Dielectric Strength	500VAC
Operate time(at nomi. vol.)	≤10ms
Release time(at nomi. vol.)	≤10ms
Ambient Temperature	-40°C~+125°C
Vibration Resistance	5Hz to 22.3Hz 10mm DA 22.3Hz to 500Hz 98m/s <sup>2</sup>
Shock Resistance	294m/s <sup>2</sup>
Termination	QC, PCB
Unit weight	Approx. 38g
Construction	Sealed Type, Dust Cover Type
Mechanical Data <sup>3)</sup>	housing retention(pull & push):200N min. terminal retention(pull & push):100N min. terminal resistance to bending (front & side):10N min.

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

3) Only valid for quick connect version.

## ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.

2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

## CONTACT DATA

Load Voltage	Load Type		Load Current A	ON/OFF Ratio		Electrical Endurance OPS	Contact Material	Ambient temp.	
				ONs	OFFs				
13.5VDC	Resistive	Make	80	2	3	1×10 <sup>5</sup>	AgSnO <sub>2</sub>	at 25°C	
		Break	80						
	Inductive	Make	150	2	4	1×10 <sup>5</sup>	AgSnO <sub>2</sub>	See Ambient temp. curve	
		Break	50						
	Lamp	Make	200	2	2	1×10 <sup>5</sup>	AgSnO <sub>2</sub>		
		Break	40						
27VDC	Resistive	Make	40	2	2	1×10 <sup>5</sup>	AgSnO <sub>2</sub>		at 25°C
		Break	40						

## COIL DATA

at 25°C

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance Ω±10%
12	7.2	1.2	20.2	90
24	16.0	2.4	40.5	320

Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	12V:1600mW 24V:1800mW -R:12V=1800mW, 24V=2000mW
------------	---

This datasheet is for customers' reference. All the specifications are subject to change without notice.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

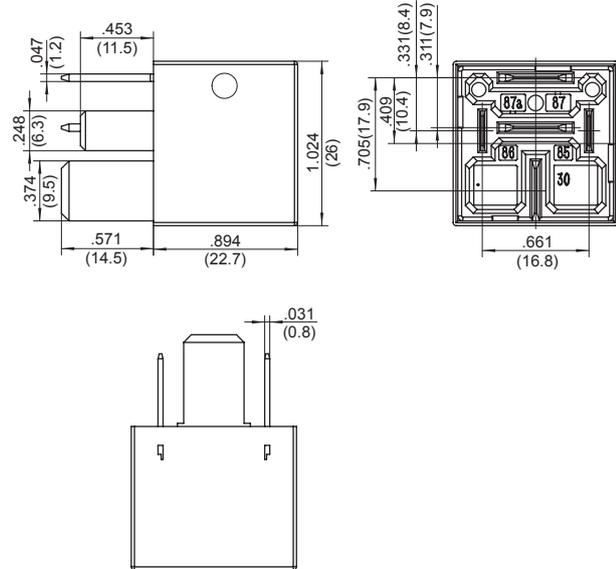
Unit: inch(mm)

### Outline Dimensions

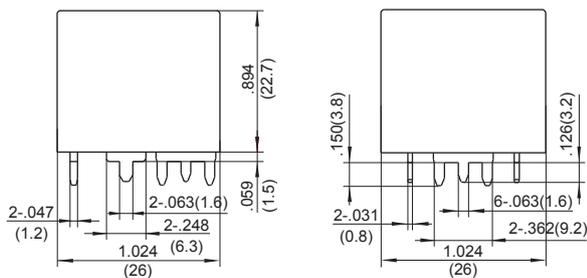
### Wiring Diagram (Bottom view)

### Layout (Bottom view)

#### Quick Connect

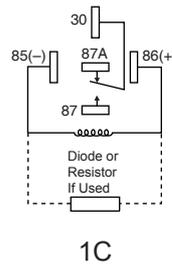
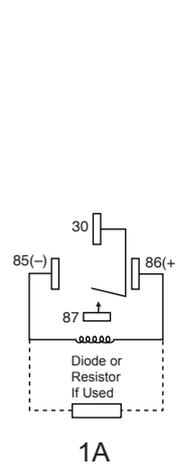


#### PC Pin

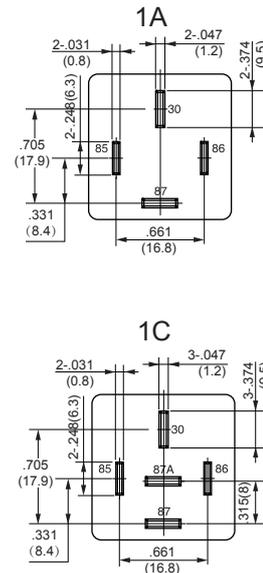


Unless otherwise specified tolerances are:

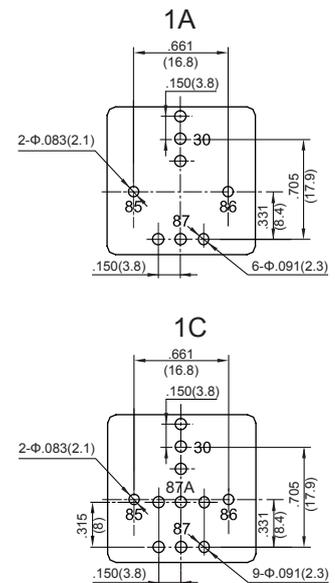
≤1mm	>1mm and ≤5mm	>5mm
±0.2mm	±0.3mm	±0.4mm



#### Quick Connect



#### PCB Layout

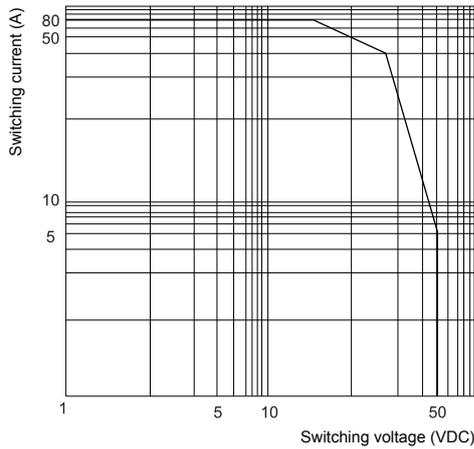


\* The tolerance without indicating for PCB layout is always ±0.1mm.

This datasheet is for customers' reference. All the specifications are subject to change without notice.

## CHARACTERISTIC CURVES

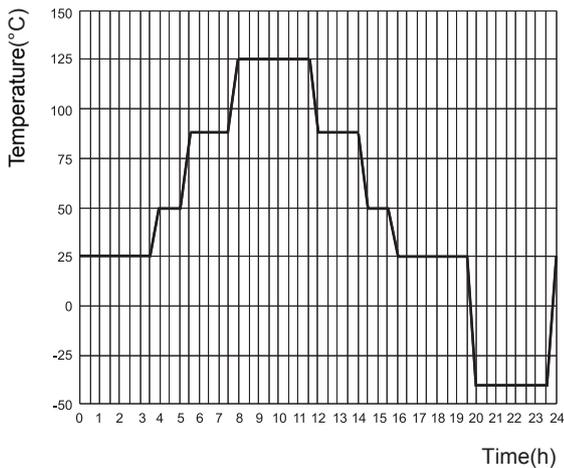
### 1. Load limit curve



- (1) The contact load is resistive.
- (2) The load and electrical endurance tests are made according to "CONTACT DATA" parameters' table. If actual load voltage, current, or operate frequency is different from "CONTACT DATA" table, please arrange corresponding tests for confirmation.
- (3) This chart takes 80A load as example.

### 2. Ambient temperature curve of the electrical endurance test

Ambient temp. curve (one cycle)



- (1) The minimum temperature is -40°C.
- (2) The maximum temperature is 125°C.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# HAV3 SERIES

# AUTOMOTIVE RELAY

## COIL

Coil Power	1.6W
------------	------

## SAFETY APPROVAL RATINGS

Agency Approval Pending	N.O.:45A/14VDC, ON:OFF=1.5s:1.5s, 1×10 <sup>5</sup> OPS
	N.C.:30A/14VDC, ON:OFF=1.5s:1.5s, 1×10 <sup>5</sup> OPS
	Flasher:
	N.O.:2*21W+5W, ON:OFF=0.375s:0.375s, 1000h
	N.O.:4*21W+2*5W, ON:OFF=0.375s:0.375s, 360h

**NOTES:**

- All values without specified temperature at 25°C.
- The above only lists the typical loads. Other loads may be available upon request.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)

<p><b>European Type</b></p>			
<p><b>American Type</b></p>			
<p>Unless otherwise specified tolerances are:</p>			<p>* The tolerance without indicating for PCB layout is always ±0.1mm.</p>
≤1mm	> 1mm and ≤5mm	>5mm	
±0.2mm	±0.3mm	±0.4mm	

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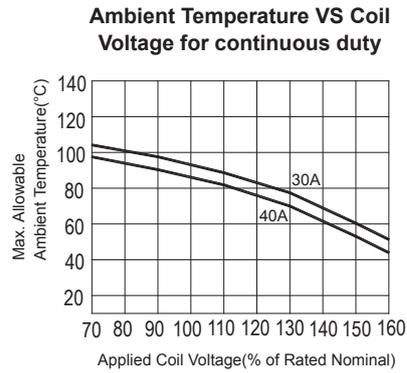
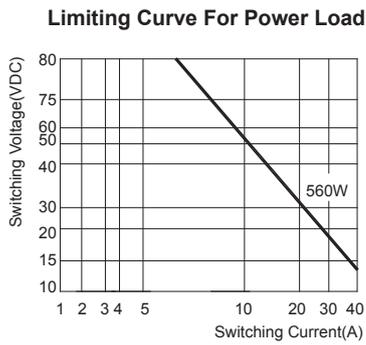


# RELAYS

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## CHARACTERISTIC CURVES



**Assumptions:**

1. Thermal resistance=45° per watt
2. Nominal coil resistance
3. Curves are based on 1.6watts at 20°

This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



## FEATURES

- 1 pole, 2 pole, 3 pole and 4 pole contact arrangement is available
- Many types of terminal style
- Transparent dust-proof cover, variety of installation methods
- Multiple sockets available

## CONTACT RATINGS

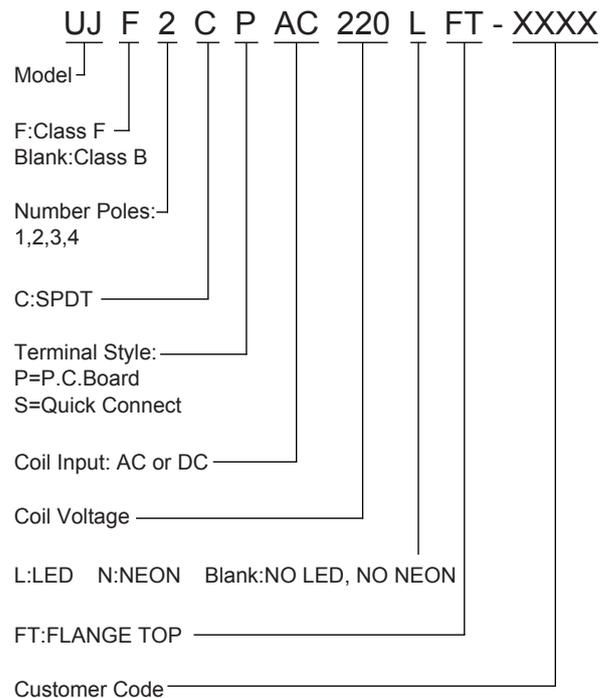
Contact Arrangement	1C, 2C	3C, 4C
Contact Resistance	≤100mΩ (1A 6VDC)	
Contact Material	Silver Alloy	
Contact Rating(Resistive)	15A/240VAC 10A/30VDC	10A/240VAC
Max. Switching Voltage	240VAC/30VDC	
Max. Switching Current	15A	10A
Max. Switching Power	3600VA/300W	2400VAC/300W
Mechanical Life	2×10 <sup>7</sup> operations	
Electrical Life	See more details at "safety approval ratings"	

## CHARACTERISTICS

Insulation Resistance	100MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2000VAC 1min
	Between open contacts	1000VAC 1min
	Between contacts sets	1000VAC 1min
Operate time (at nomi. volt.)	≤20ms	
Release time (at nomi. volt.)	≤20ms	
Humidity	35% ~ 85% RH	
Operation temperature	-40°C~+85°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1mm DA	
Unit weight	1C:37g 2C:50g 3C:58g 4C:65g	
Construction	Dust Cover Type	

Notes:1) The data shown above are initial values.  
2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



### Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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# RELAYS

## COIL DATA

at 25°C

DC

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$		
				1C, 2C	3C	4C
5	3.75	0.5	5.5	27.5	17.0	16.6
6	4.5	0.6	6.6	40.0	25.0	24.0
12	9.0	1.2	13.2	180	100	96.0
24	18.0	2.4	26.4	630	400	360
48	36.0	4.8	52.8	2600	1600	1540
110	82.5	11.0	121.0	11000	8400	6800

AC

Nominal Voltage VAC	Operate Voltage (Max.) VAC	Release Voltage (Min.) VAC	*Max. Allowable Voltage VAC	Coil Resistance $\Omega \pm 10\%$		
				1C, 2C	3C	4C
6	4.8	1.8	6.6	11.5	6.50	5.00
12	9.6	3.6	13.2	40.0	102	20.0
24	19.2	7.2	26.4	180	230	80.0
48	38.4	14.4	52.8	600	2500	320
120	96.0	36.0	132.0	3900	10000	2000
220	176.0	66.0	242.0	13000	10000	6700

Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	DC:900~1800mW
	AC:1.2~2.5VA

## SAFETY APPROVAL RATINGS

UL&CUL	UJ1/2	N.O./N.C.:15A 240VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:10A 277VAC, Ballast, 6×10 <sup>3</sup> OPS N.O./N.C.:1/2HP 277VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:1/3HP 120VAC, 6×10 <sup>3</sup> OPS N.O./N.C.:10A 30VDC, 6×10 <sup>3</sup> OPS
	UJ3/4	N.O./N.C.:10A 240VAC, 6×10 <sup>3</sup> OPS

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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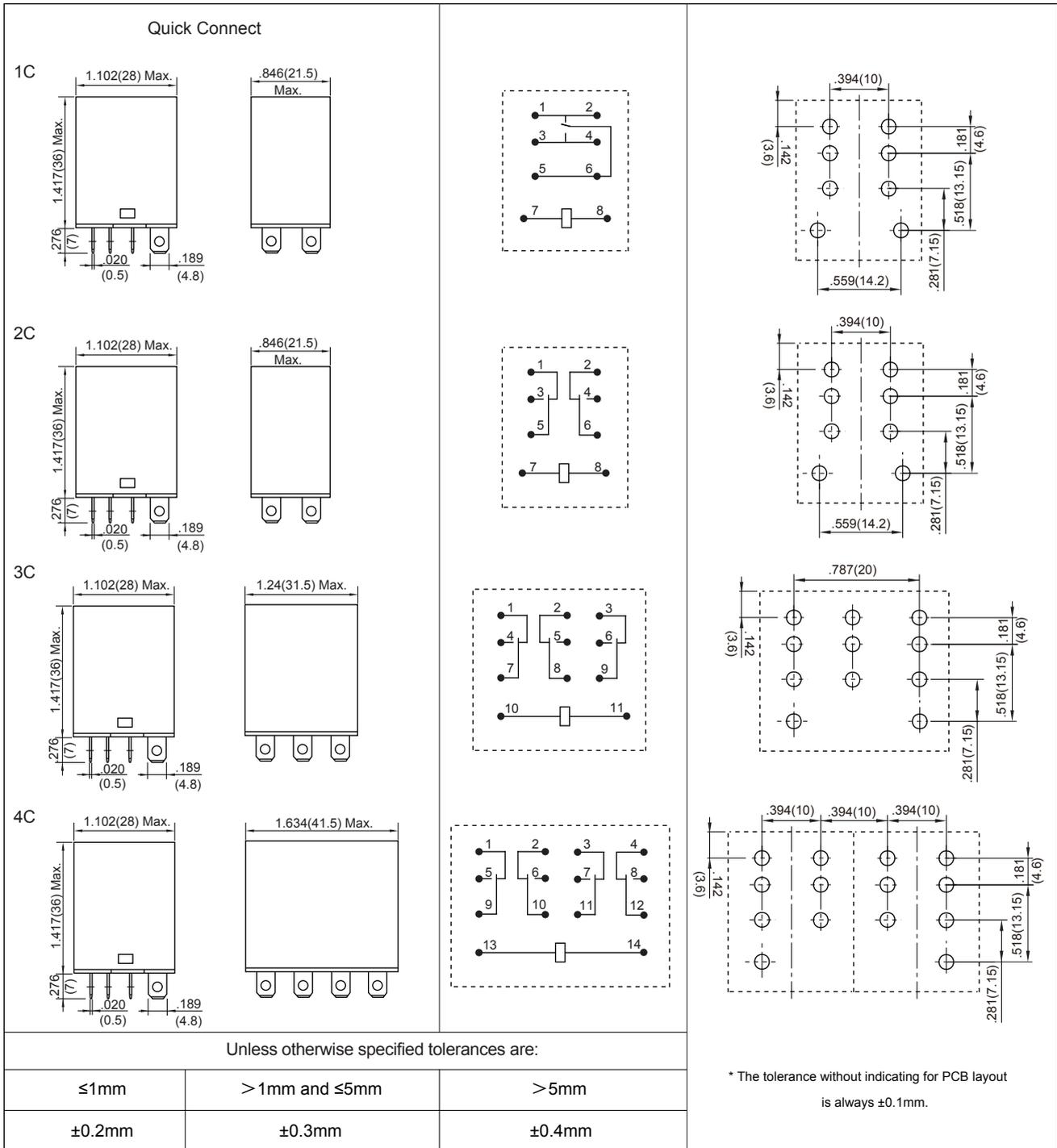
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

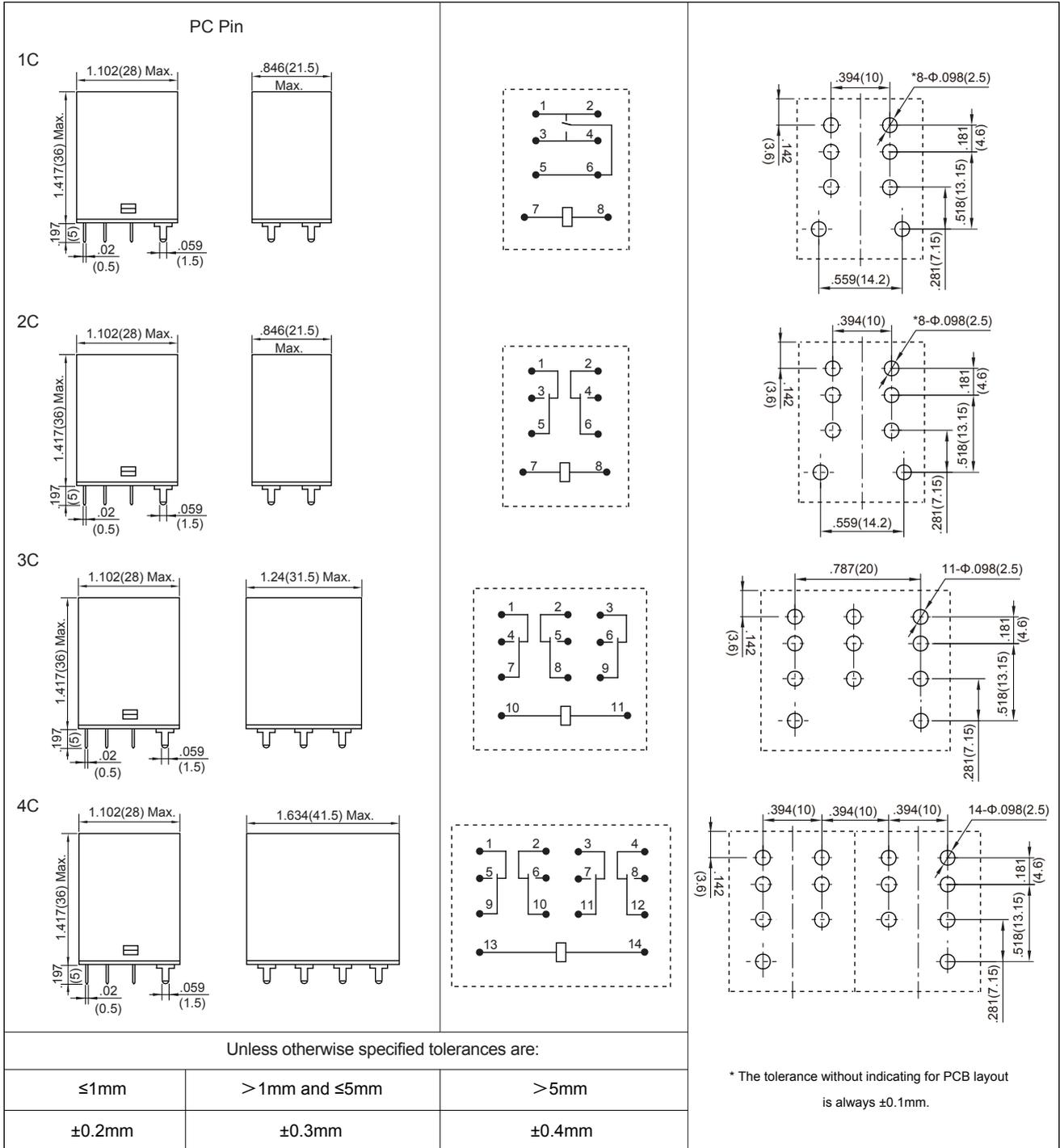
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



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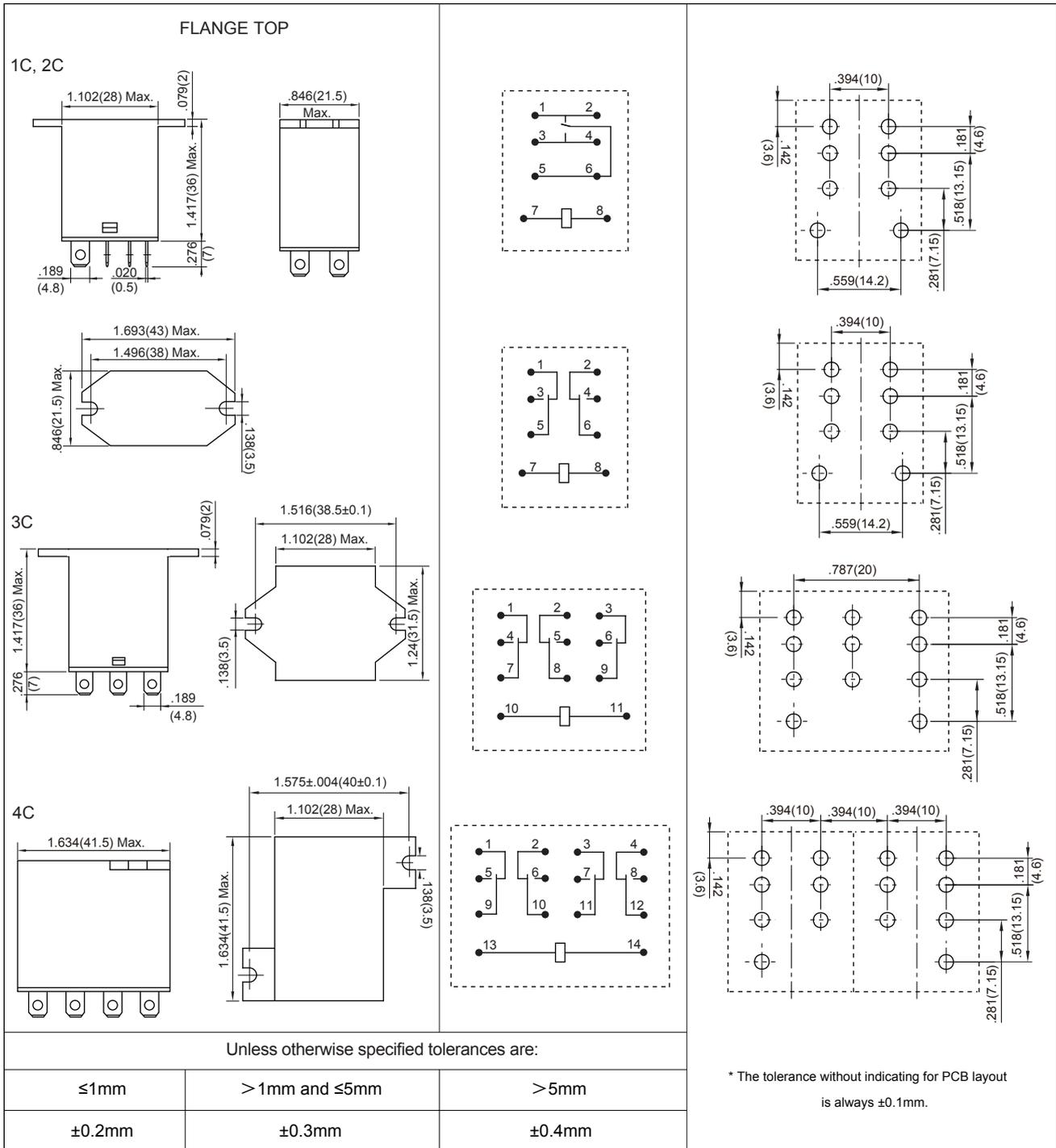
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

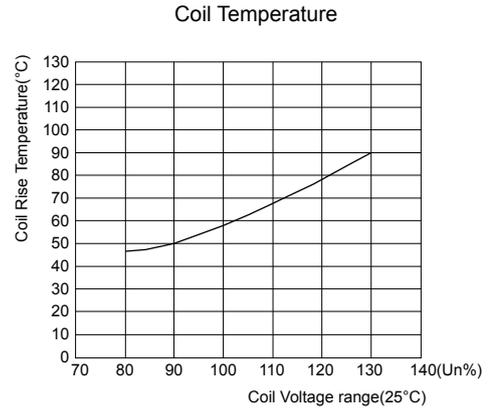
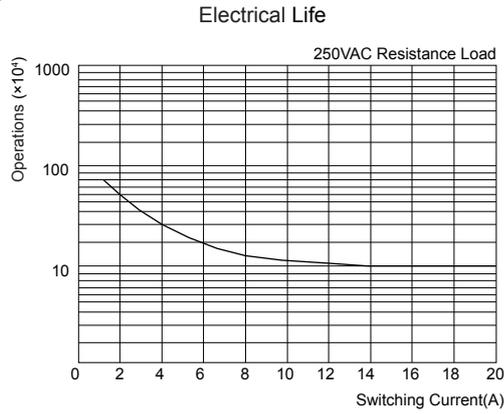
### PCB Layout (Bottom view)



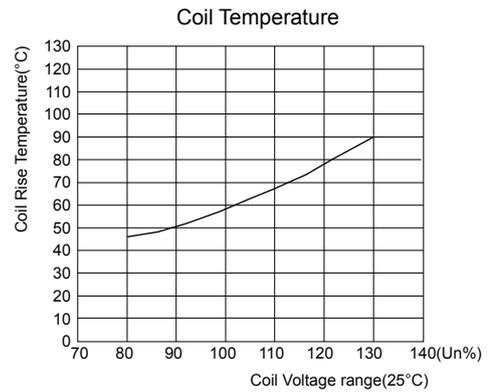
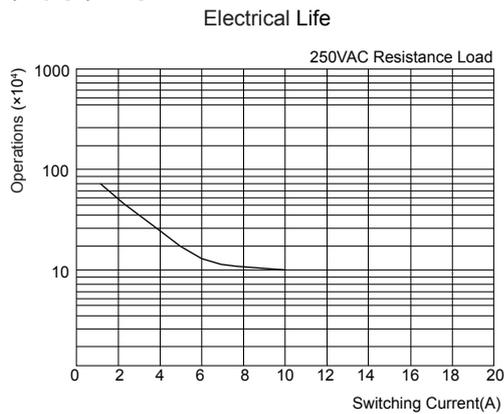
This datasheet is for customers' reference. All the specifications are subject to change without notice.

## CHARACTERISTIC CURVES

1C



2C、3C、4C



This datasheet is for customers' reference. All the specifications are subject to change without notice.



File No.:E75887



## FEATURES

- 2 pole, 3 pole and 4 pole contact arrangement is available
- Many types of terminal style
- Transparent dust-proof cover, variety of installation methods

## CONTACT RATINGS

Contact Arrangement	2C, 3C	4C
Contact Resistance	≤50mΩ (1A 24VDC)	
Contact Material	AgSnO, Silver Alloy	
Contact Rating(Resistive)	5A/240VAC	3A/240VAC
Max. Switching Voltage	240VAC	
Max. Switching Current	5A	3A
Max. Switching Power	1200VA	720VA
Mechanical Life	2×10 <sup>7</sup> operations	
Electrical Life	See more details at "safety approval ratings"	

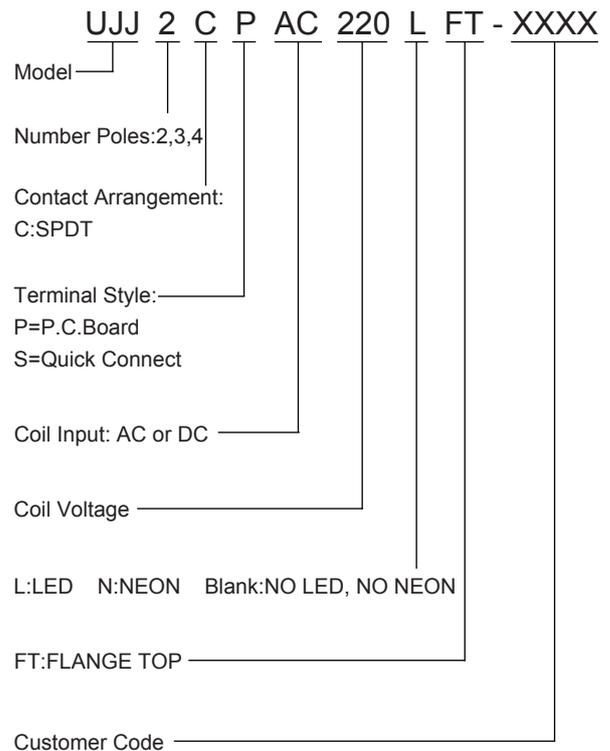
## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2000VAC 1min
	Between open contacts	1000VAC 1min
	Between contacts sets	1000VAC 1min
Operate time (at nomi. volt.)	≤20ms	
Release time (at nomi. volt.)	≤20ms	
Humidity	35% ~ 85% RH	
Operation temperature	-40°C~+85°C	
UL Class B	Insulation System Class B	
Shock Resistance	Functional	98m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 55Hz 1mm DA	
Unit weight	Approx. 37g	
Construction	Dust Cover Type	

Notes:1) The data shown above are initial values.

2) Please find coil temperature curve in the characteristic curves.

## ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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# RELAYS

## COIL DATA

at 25°C

### DC

Nominal Voltage VDC	Operate Voltage (Max.) VDC	Release Voltage (Min.) VDC	*Max. Allowable Voltage VDC	Coil Resistance $\Omega \pm 10\%$
5	3.75	0.5	5.5	27.5
6	4.5	0.6	6.6	40.0
12	9.0	1.2	13.2	180
24	18.0	2.4	26.4	630
48	36.0	4.8	52.8	2600
110	82.5	11.0	121.0	11000

### AC

Nominal Voltage VAC	Operate Voltage (Max.) VAC	Release Voltage (Min.) VAC	*Max. Allowable Voltage VAC	Coil Resistance $\Omega \pm 10\%$
6	4.8	1.8	6.6	11.5
12	9.6	3.6	13.2	40.0
24	19.2	7.2	26.4	180
48	38.4	14.4	52.8	600
120	96.0	36.0	132.0	3900
220	176.0	66.0	242.0	13000

#### Notes:

- 1) "Max Allowable Voltage": The relay coil can endure max allowable voltage for a short period time only.
- 2) The coil resistance varies at different temperatures. Please refer to the characteristic curve when using at different temperatures.

## COIL

Coil Power	DC:900mW~1100mW
	AC:1.2VA~1.8VA

## SAFETY APPROVAL RATINGS

UL&CUL	UJJ 2/3	N.O./N.C.:5A 240VAC, $6 \times 10^3$ OPS
	UJJ 4	N.O./N.C.:3A 240VAC, 85°C, $6 \times 10^3$ OPS

#### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



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# RELAYS

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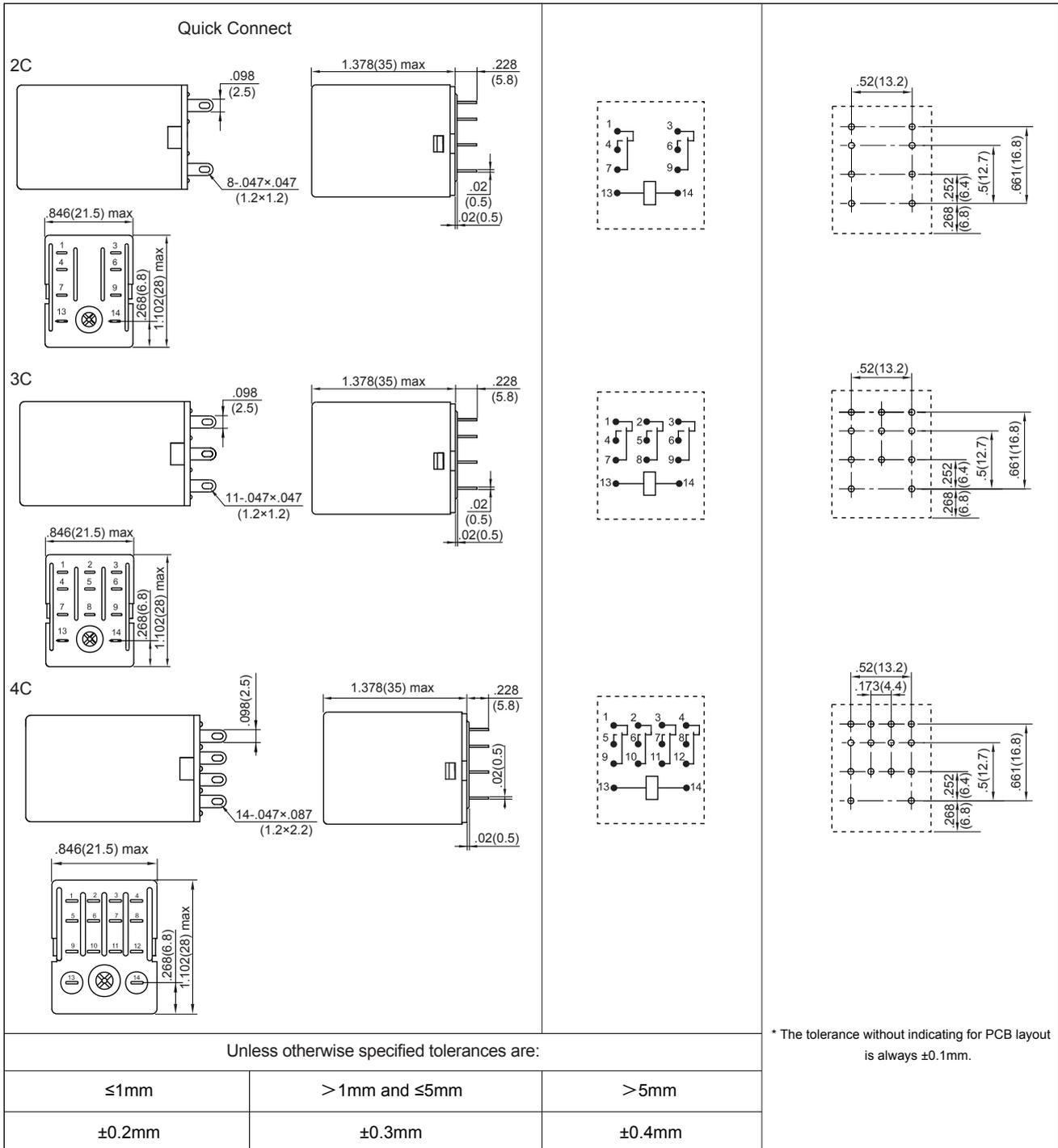
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### Layout (Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

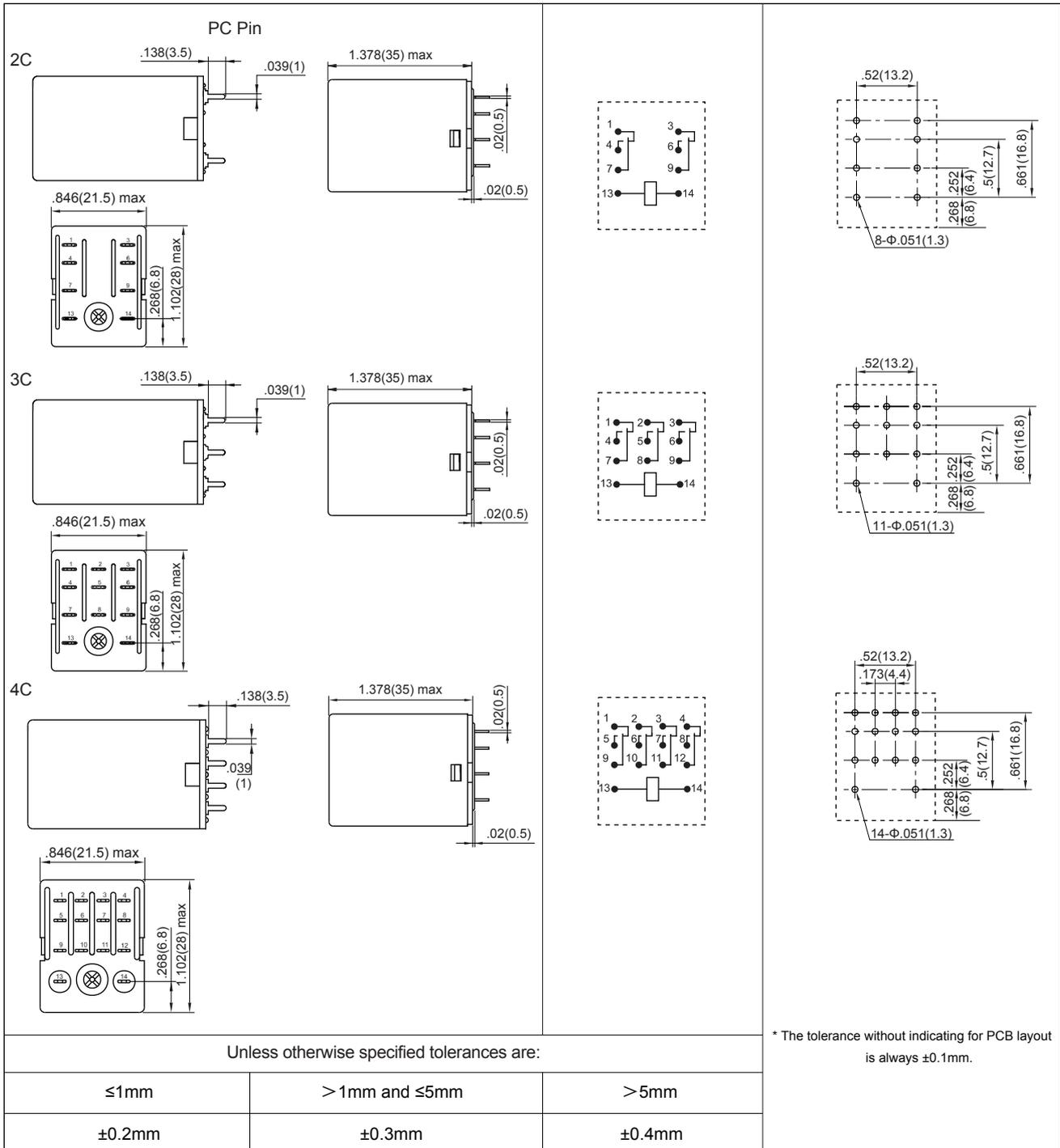
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



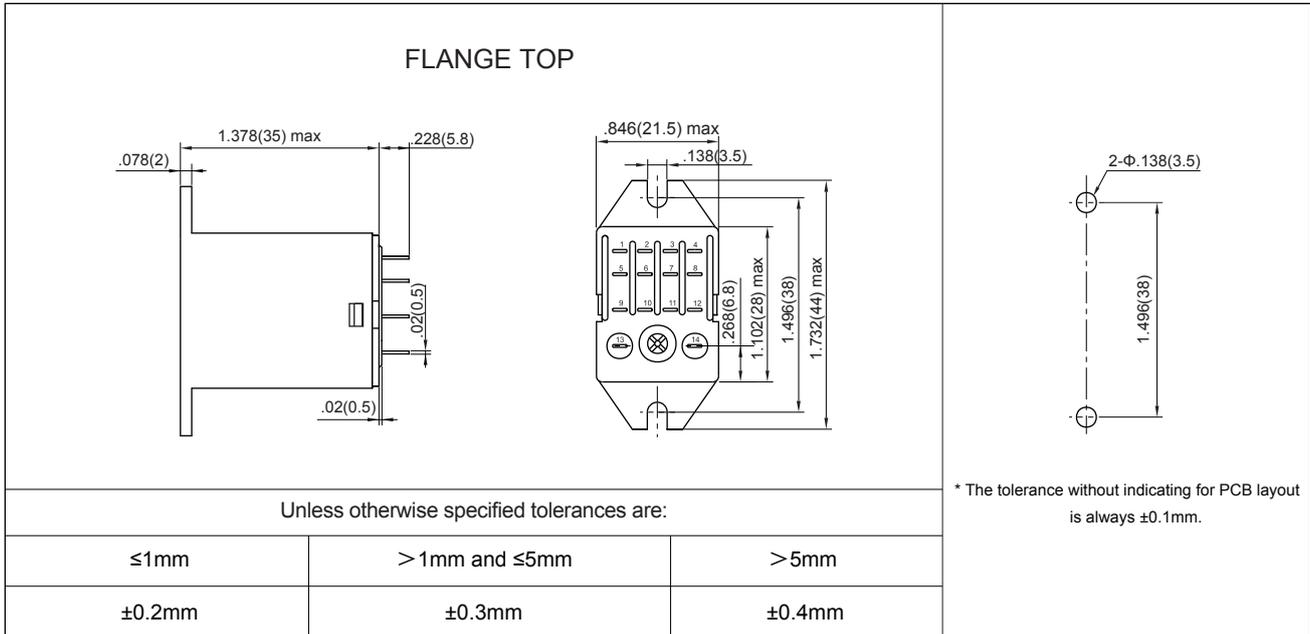
This datasheet is for customers' reference. All the specifications are subject to change without notice.

## OUTLINE DIMENSIONS AND PC BOARD LAYOUT.

Unit: inch(mm)

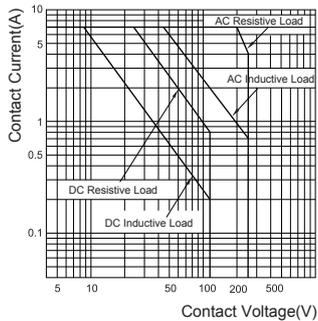
### Outline Dimensions

### PCB Layout (Bottom view)

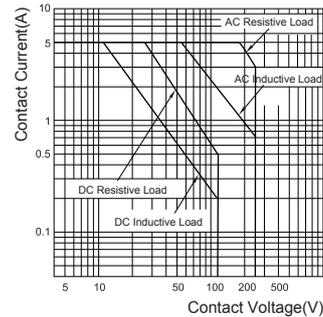


## CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER  
(2C,3C)



MAXIMUM SWITCHING POWER  
(4C)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

Agency Approval  
Pending



File No.:R 50492934



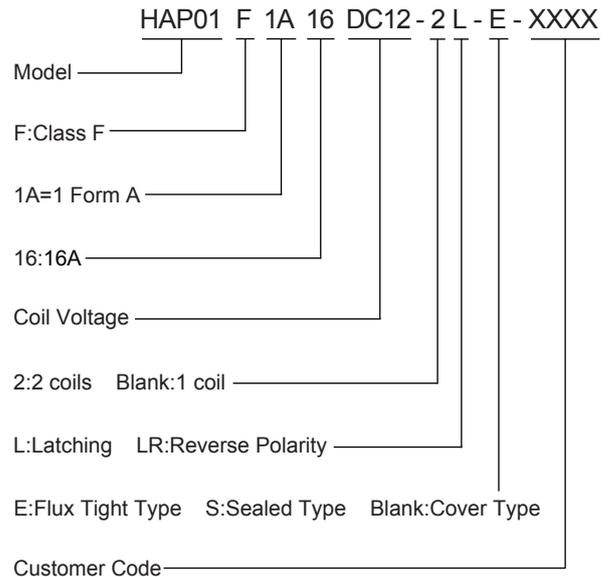
## FEATURES

- Dielectric strength(between contact and coil):  
5000V
- 16A switching capacity

## CONTACT RATINGS

Contact Arrangement	1A
Contact Resistance	≤100mΩ (1A 6VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	16A 277VAC, 2×10 <sup>4</sup> (Resistive, 85°C) 600W 120VAC, 2.5×10 <sup>4</sup> (Incandescent lamp, 50°C) 8A 277VAC, 6×10 <sup>3</sup> (Standard ballast, 50°C) 5A 120VAC, 6×10 <sup>3</sup> (Electronic ballast, 40°C) 5A 240VAC, 2.5×10 <sup>4</sup> (TV-5, 40°C)
Max. Switching Voltage	277VAC
Max. Switching Current	16A
Max. Switching Power	4432VA
Mechanical Life	1×10 <sup>6</sup> operations
Electrical Life	See more details at "safety approval ratings"

## ORDERING INFORMATION



## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	1000VAC 1min
Operate time (at nomi. volt.)	≤15ms	
Release time (at nomi. volt.)	≤15ms	
Humidity	5 to 85% R.H.	
Operation temperature	-40°C~+85°C	
UL Class F	Insulation System Class F	
Shock Resistance	Functional	100m/s <sup>2</sup> (half-wave pulse of sine wave:10ms, Detection time:10μs)
	Destructive	1000m/s <sup>2</sup> (half-wave pulse of sine wave:6ms)
Vibration Resistance	Functional	10Hz to 55Hz 1.5mm DA(Detection time:10μs)
	Destructive	10Hz to 55Hz 3mm DA
Unit weight	Approx. 7.7g	
Construction	Flux Tight Type, Sealed Type,	

Notes: The data shown above are initial values.

Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

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# RELAYS

### COIL DATA at 25°C

Nominal Voltage VDC	Set/Reset Voltage (Max.) VDC	*Impulse Width (Min.) ms	Coil Resistance $\Omega \pm 10\%$		
			1 Coil	2 Coils	
				Set coil	Reset coil
3	2.4	30	45	22.5	22.5
5	4.0	30	125	62.5	62.5
6	4.8	30	180	90.0	90.0
9	7.2	30	405	202.5	202.5
12	9.6	30	720	360.0	360.0
24	19.2	30	2880	1440.0	1440.0

\* For the Set time/Reset time it is recommended to use a minimum 30 ms pulse duration for the nominal coil voltage to compensate for varying ambient temperature and relay aging.

### COIL

Coil Power	1 Coil: 200mW 2 Coils: 400mW
------------	---------------------------------

### SAFETY APPROVAL RATINGS

Other agency approval (Pending)	Resistive:16A 277VAC, 85°C Resistive:5A 30VDC, 85°C Incandescent lamp:600W 120VAC, 50°C Standard ballast:8A 277VAC, 50°C Electronic ballast:5A 120VAC, 40°C TV-5:5A 240VAC, 40°C
TüV	N.O.:16A 277VAC, 85°C, 2×10 <sup>4</sup> OPS N.O.:16A 277VAC, 60°C, 5×10 <sup>4</sup> OPS N.O.:8A 125VAC, 85°C, 5×10 <sup>4</sup> OPS N.O.:5A 347VAC, 85°C, 5×10 <sup>4</sup> OPS N.O.:5A 30VDC, 85°C, 5×10 <sup>4</sup> OPS

#### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

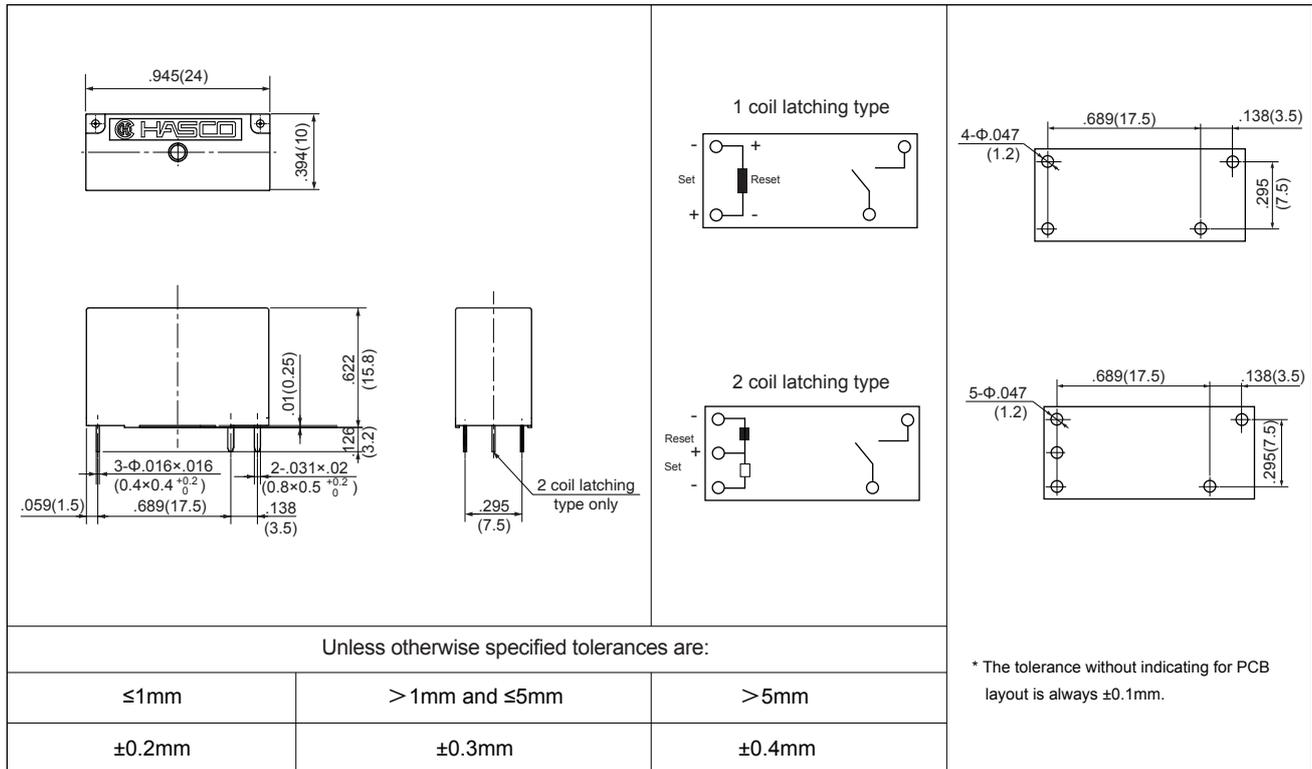
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### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



#### Notice:

- Relay is on the "reset" or "set" status when being released from stock, with the consideration of shock risen from transit and relay mounting, relay would be changed to "set" or "reset" status, therefore, when application (connecting the power supply), please reset the relay to "set" or "reset" status as required.
- Do not energize voltage to "set" coil and "reset" coil simultaneously. Long energized time (more than 1 min) should be avoided.

This datasheet is for customers' reference. All the specifications are subject to change without notice.

# HAT901-L SERIES

## LATCHING RELAY



File No.:E75887



File No.:R 50390114



Patent No.:201120133518.4



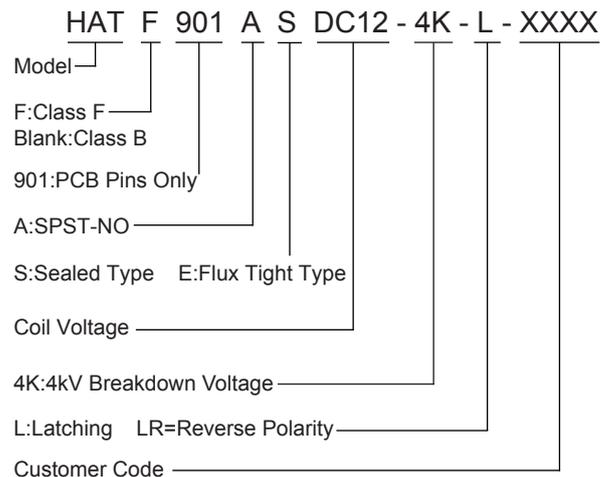
### FEATURES

- Large switch capacity up to 40A
- Green Energy Saving
- 4kV Type: 4000VAC high dielectric strength (between contacts and coil)

### CONTACT RATINGS

Contact Arrangement	1A
Contact Resistance	≤50mΩ (1A 24VDC)
Contact Material	AgSnO
Contact Rating(Resistive)	40A/277VAC, 30A/28VDC
Max. Switching Voltage	277VAC/28VDC
Max. Switching Current	40A
Max. Switching Power	11080VA/840W
Mechanical Life	1×10 <sup>7</sup> operations
Electrical Life	See more details at "safety approval ratings"

### ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.
3. This relay do not have pin 6.

### CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	2000/2500/4000VAC 1min
	Between open contacts	1500VAC 1min
Reacting time (at nomi. volt.)	≤15ms	
Resetting time (at nomi. volt.)	≤10ms	
Humidity	98% RH	
Operation temperature	-40°C~+85°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	29.4m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz to 55Hz 1.5mm DA	
Unit weight	Approx. 26g	
Construction	Sealed Type, Flux Tight Type	

Notes: The data shown above are initial values.

### COIL DATA

at 25°C

Nominal Voltage VDC	Action/Reset Voltage VDC	*Impulse Width ms	Coil Resistance Ω±10%
5	4.0	≥30	21
6	4.8	≥30	30
9	7.2	≥30	67.5
12	9.6	≥30	120
24	19.2	≥30	480
48	38.4	≥30	1920

\* For the Set time/Reset time it is recommended to use a minimum 30 ms pulse duration for the nominal coil voltage to compensate for varying ambient temperature and relay aging.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



RELAYS & ELECTRONICS INTL. CORP.

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# RELAYS

# HAT901-L SERIES

# LATCHING RELAY

## COIL

Coil Power	1200mW
------------	--------

## SAFETY APPROVAL RATINGS

UL&CUL	N.O.:30A 28VDC, 6×10 <sup>3</sup> OPS N.O.:40A 277VAC, G.P., 6×10 <sup>3</sup> OPS N.O.:40A 305VAC, G.P., 6×10 <sup>3</sup> OPS N.O.:1HP 120VAC, 6×10 <sup>3</sup> OPS N.O.:2HP 277VAC, 6×10 <sup>3</sup> OPS N.O.:20A 277VAC Ballast, 6×10 <sup>3</sup> OPS N.O.:30A 120VAC Ballast, 6×10 <sup>3</sup> OPS N.O.:10A 277VAC, Electronic Ballast, 6×10 <sup>3</sup> OPS N.O.:15A 120VAC Tungsten, 6×10 <sup>3</sup> OPS N.O.:TV8 277VAC
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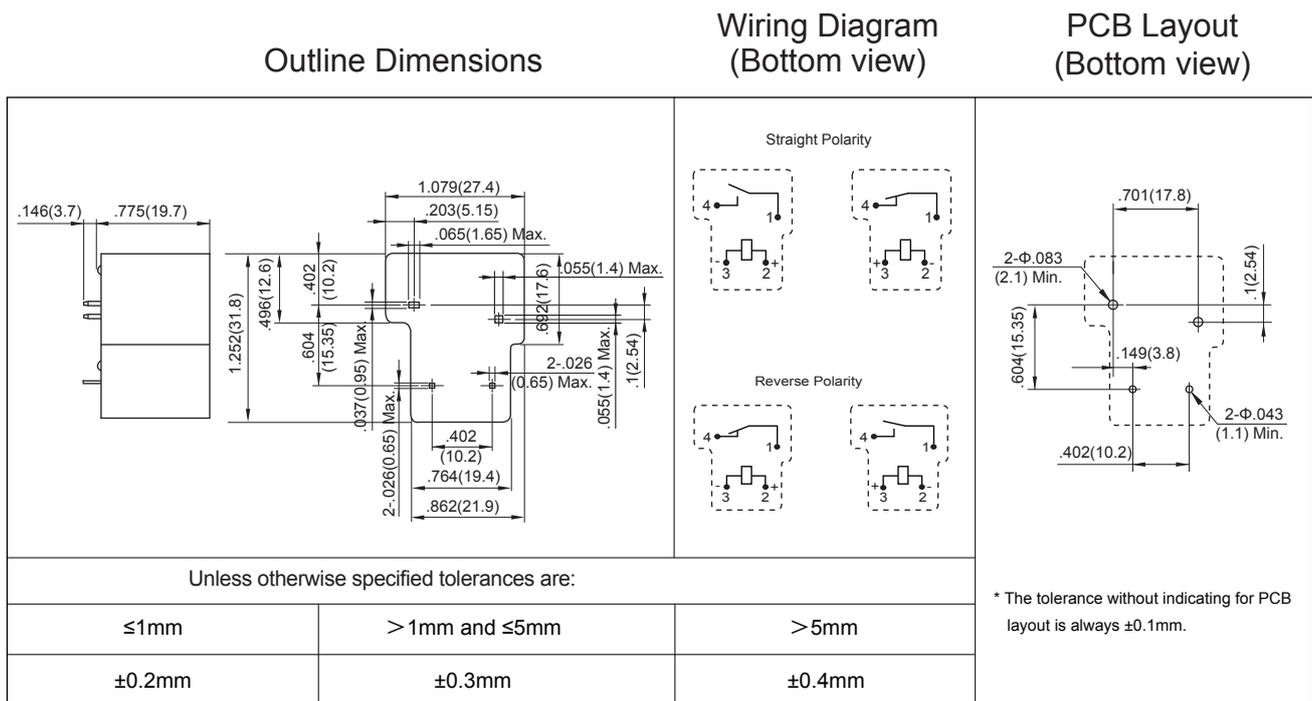
TüV	N.O.:40A/277VAC, 30A/28VDC, 3×10 <sup>4</sup> OPS
-----	---

### NOTES:

- All values without specified temperature are at 25°C.
- The above lists the typical loads only. Other loads may be available upon request.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)



### Notice:

- Relay is on the "reset" or "set" status when being released from stock, with the consideration of shock risen from transit and relay mounting, relay would be changed to "set" or "reset" status, therefore, when application (connecting the power supply), please reset the relay to "set" or "reset" status as required.
- Do not energize voltage to "set" coil and "reset" coil simultaneously. Long energized time (more than 1 min) should be avoided.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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# KLT-L SERIES

LATCHING RELAY

## COIL

Coil Power	800mW
------------	-------

## SAFETY APPROVAL RATINGS

UL&CUL	N.O.:5A 277VAC, Ballast, 75°C, 6×10 <sup>3</sup> OPS N.O.:5A 120VAC, Ballast, 75°C, 6×10 <sup>3</sup> OPS
TüV	3A 120VAC/28VDC, 3×10 <sup>4</sup> OPS 6A 120VAC/28VDC, 3×10 <sup>4</sup> OPS 12A 120VAC/28VDC, 3×10 <sup>4</sup> OPS 15A 120VAC/28VDC, 3×10 <sup>4</sup> OPS

### NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

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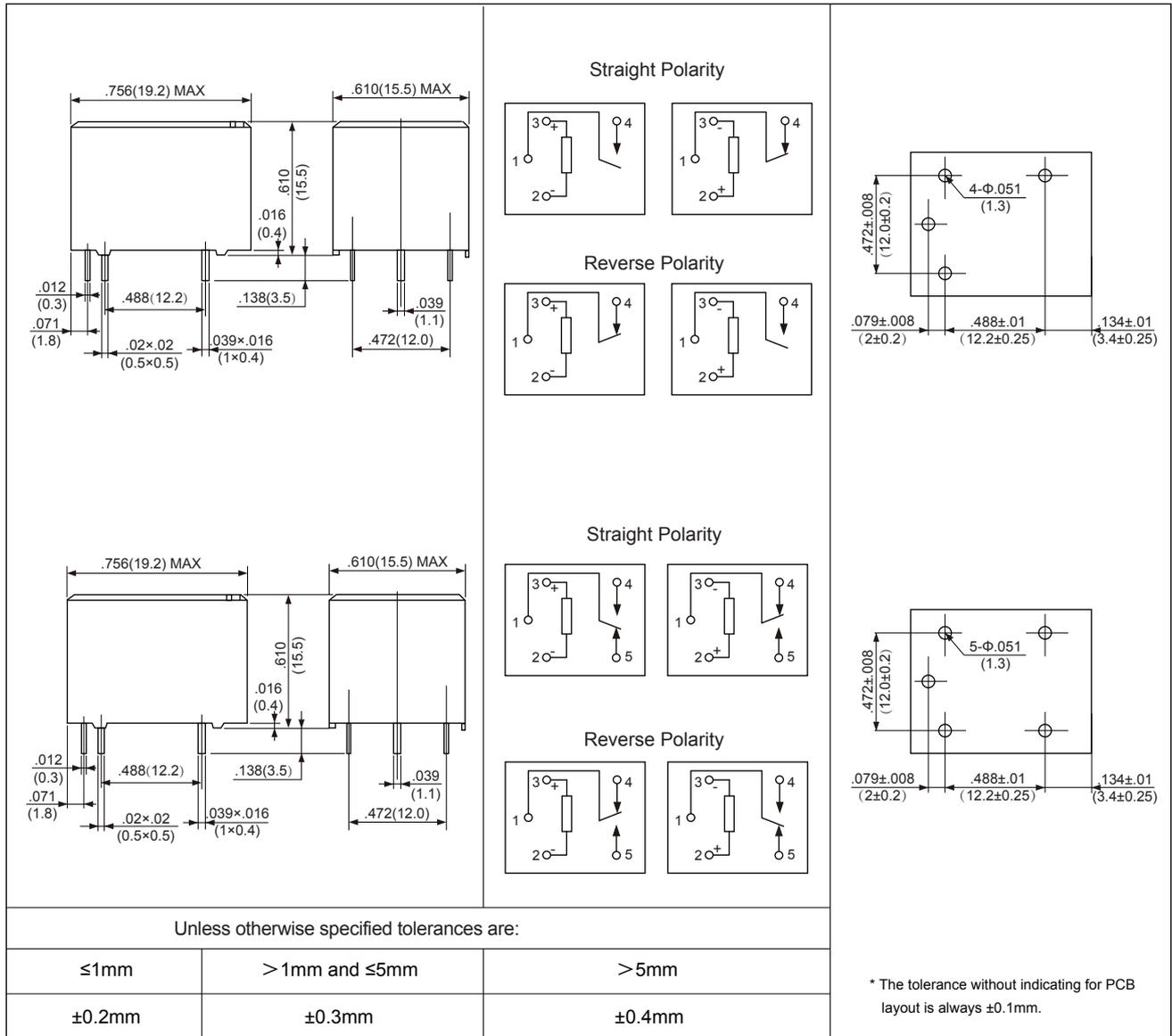
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



**Notice:**

1. Relay is on the "reset" or "set" status when being released from stock, with the consideration of shock risen from transit and relay mounting, relay would be changed to "set" or "reset" status, therefore, when application (connecting the power supply), please reset the relay to "set" or "reset" status as required.
2. Do not energize voltage to "set" coil and "reset" coil simultaneously. Long energized time (more than 1 min) should be avoided.

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# RELAYS

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# SPR-L SERIES

# LATCHING RELAY



File No.:E75887



File No.:R50311399



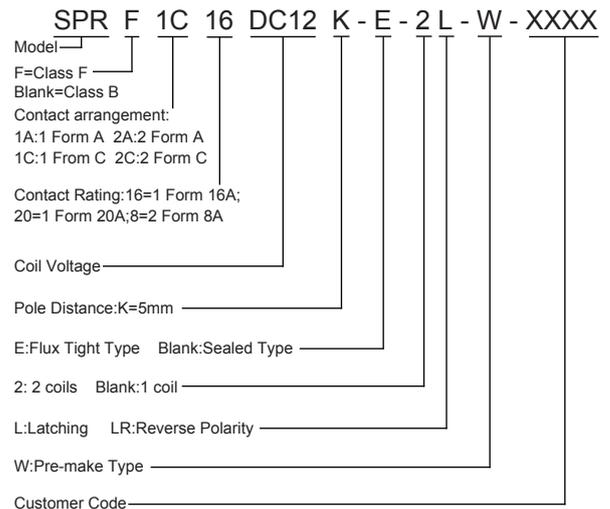
## FEATURES

- Small size for high density mounting
- Up to 5000VAC Dielectric strength
- For inrush peak currents up to 80A

## CONTACT RATINGS

Contact Arrangement	1A, 1C	2A, 2C
Contact Resistance	≤100mΩ (at 1A 24VDC)	
Contact Material	AgSnO	
Contact Rating(Resistive)	20A/277VAC 16A/24VDC	12A/240VAC 8A/24VDC
Max. Switching Voltage	440VAC/300VDC	
Max. Switching Current	20A	12A
Max. Switching Power	5540VA	2880VA
Mechanical Life	1×10 <sup>7</sup> operations	
Electrical Life	See more details at "safety approval ratings"	

## ORDERING INFORMATION



## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	1000VAC 1min
	Between contacts sets	2500VAC 1min
Reacting time (at nomi. volt.)	≤10ms	
Resetting time (at nomi. volt.)	≤10ms	
Humidity	35% ~ 85% RH	
Operation temperature	-55°C~+85°C	
UL Class B/F	Insulation System Class B/F	
Shock Resistance	Functional	29.4m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	10Hz ~ 150Hz 10g/5g	
Unit weight	Approx.13.5g	
Construction	Sealed Type, Flux Tight Type	

Notes: The data shown above are initial values.

## COIL DATA

at 25°C

Nominal Voltage VDC	Action/Reset Voltage VDC	*Impulse Width ms	Coil Resistance Ω±10%	
			1 Coil	2 Coils
5	3.75	≥30	62	42
6	4.50	≥30	90	55
12	9.00	≥30	360	240
24	18.00	≥30	1440	886
48	36.00	≥30	5760	—
60	45.00	≥30	7500	—
110	82.50	≥30	25200	—

\* For the Set time/Reset time it is recommended to use a minimum 30 ms pulse duration for the nominal coil voltage to compensate for varying ambient temperature and relay aging.

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# RELAYS

## COIL

Coil Power	1 Coil: 400mW(60V、 110V:480mW)
	2 Coils: 5V:595mW      6V:655mW
	12V:600mW      24:650mW

## SAFETY APPROVAL RATINGS

UL&CUL	1 Form	N.O./N.C.:20A 277VAC(85°C), 6×10 <sup>3</sup> OPS N.O./N.C.:15 FLA 120VAC, Horse Power, 6×10 <sup>3</sup> OPS N.O./N.C.:15A/120VAC, Tunsgten, 6×10 <sup>3</sup> OPS N.O./N.C.:15A/120VAC, Ballast, 6×10 <sup>3</sup> OPS N.O.:10A 277VAC, Ballast, 6×10 <sup>3</sup> OPS
	-W	N.O.:10A 250VAC, 6×10 <sup>3</sup> OPS N.O.:20A 120VAC, 6×10 <sup>3</sup> OPS N.O.:8A 120VAC, Tunsgten, 6×10 <sup>3</sup> OPS N.O.:7.2 FLA, 43LRA, 120VAC, Motor, 6×10 <sup>3</sup> OPS N.O.:4.9 FLA, 29LRA, 240VAC, Motor, 6×10 <sup>3</sup> OPS N.O.:8A 120VAC, Ballast, 6×10 <sup>3</sup> OPS N.O.:5A 240VAC, Ballast, 6×10 <sup>3</sup> OPS N.O.:8A 120VAC, Electronic Ballast, 6×10 <sup>3</sup> OPS
	2 Form	N.O./N.C.:12A 240VAC, 6×10 <sup>3</sup> OPS
TüV	1 Form	N.O.:20A 277VAC, 6×10 <sup>3</sup> OPS N.O.:16A 277VAC, 5×10 <sup>4</sup> OPS N.O.:16A 24VDC, 5×10 <sup>4</sup> OPS N.C.:12A 277VAC, 2×10 <sup>4</sup> OPS N.O./N.C.:16A/8A 277VAC, 1×10 <sup>4</sup> OPS N.O./N.C.:16A/8A 24VDC, 1×10 <sup>4</sup> OPS
	2 Form	N.O./N.C.:8A/6A 240VAC, 2×10 <sup>4</sup> OPS N.O./N.C.:8A/6A 24VDC, 2×10 <sup>4</sup> OPS

**NOTES:**

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

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# RELAYS

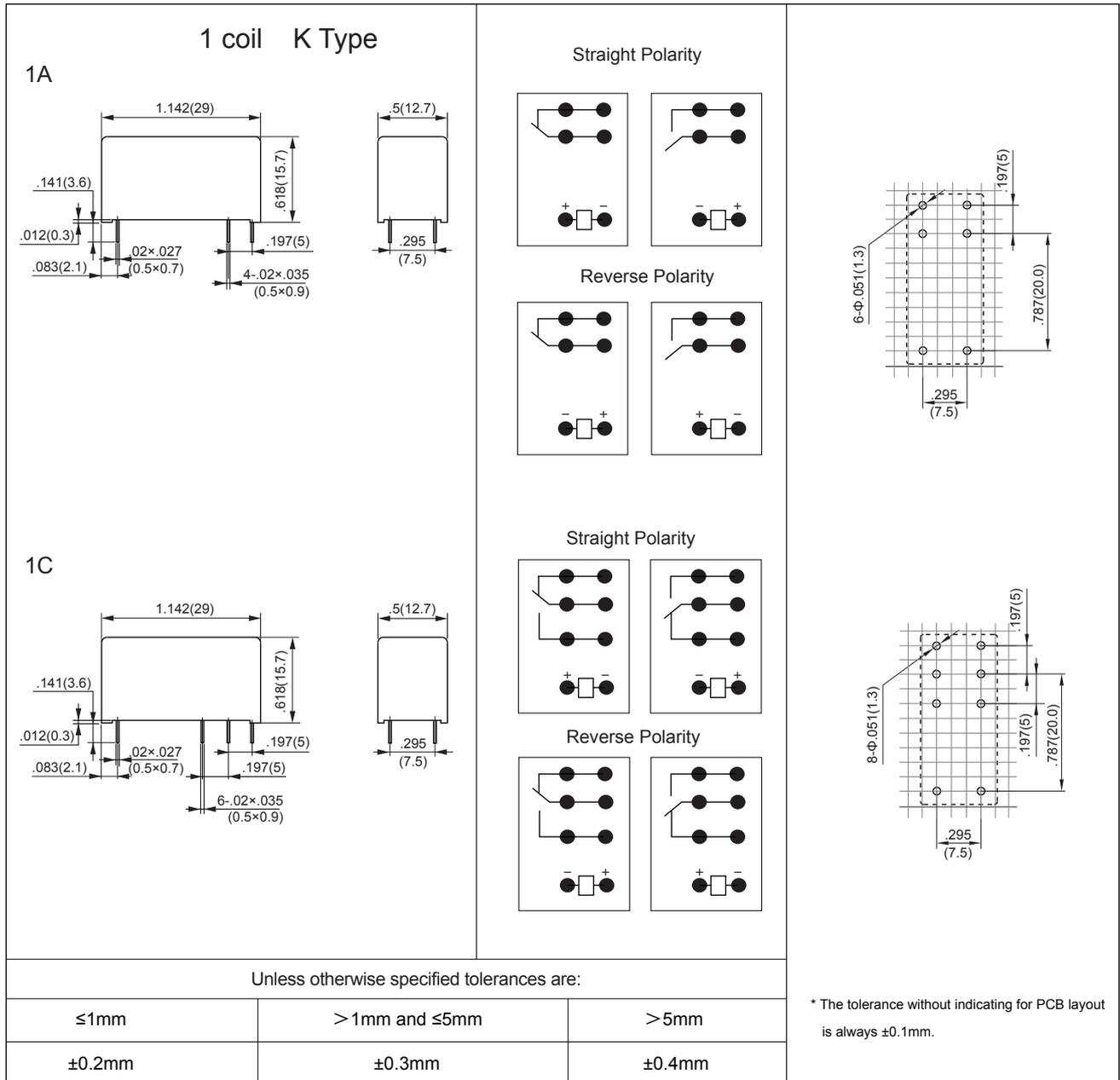
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

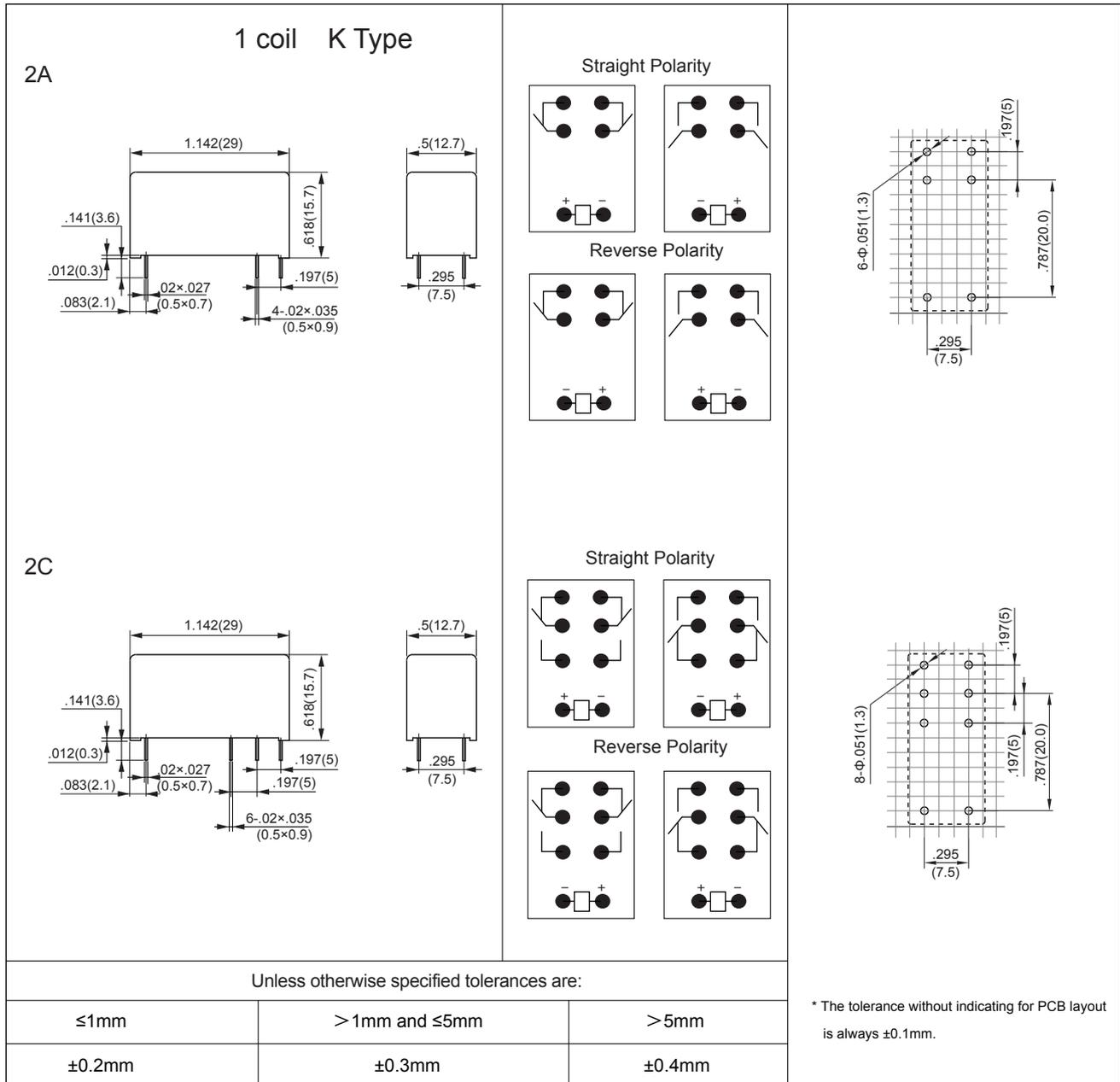
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



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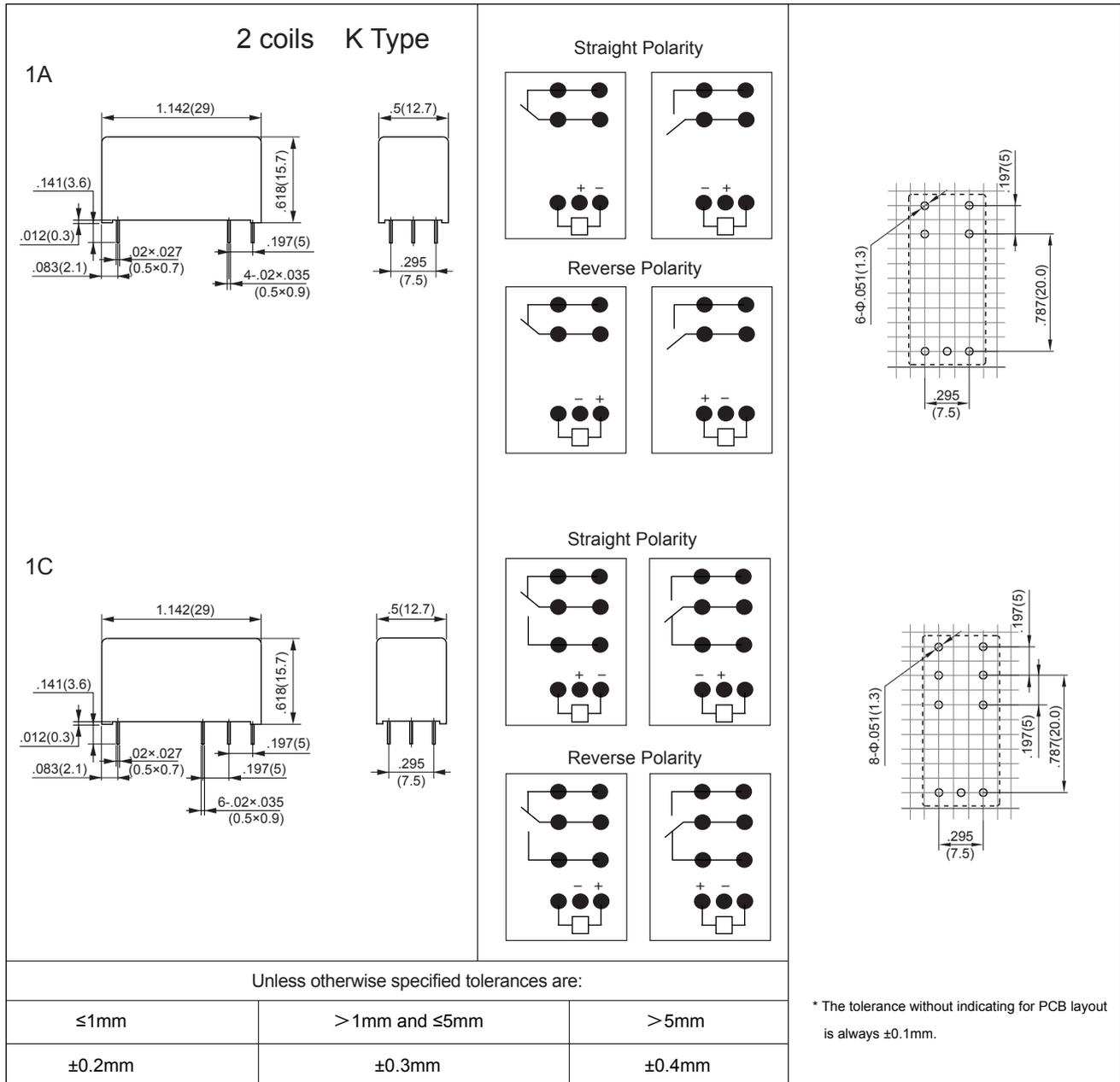
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



This datasheet is for customers' reference. All the specifications are subject to change without notice.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch (mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)

**2A**

**2 coils K Type**

Straight Polarity

Reverse Polarity

**2C**

Straight Polarity

Reverse Polarity

Unless otherwise specified tolerances are:		
≤1mm	> 1mm and ≤5mm	> 5mm
±0.2mm	±0.3mm	±0.4mm

\* The tolerance without indicating for PCB layout is always ±0.1mm.

**Notice**

- Relay is on the "reset" or "set" status when being released from stock, with the consideration of shock risen from transit and relay mounting, relay would be changed to "set" or "reset" status, therefore, when application (connecting the power supply), please reset the relay to "set" or "reset" status as required.
- Do not energize voltage to "set" coil and "reset" coil simultaneously. And also long energized time (more than 1 min) should be avoided.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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# PW SERIES

# LATCHING RELAY



File No.:E75887



File No.:R 50453392



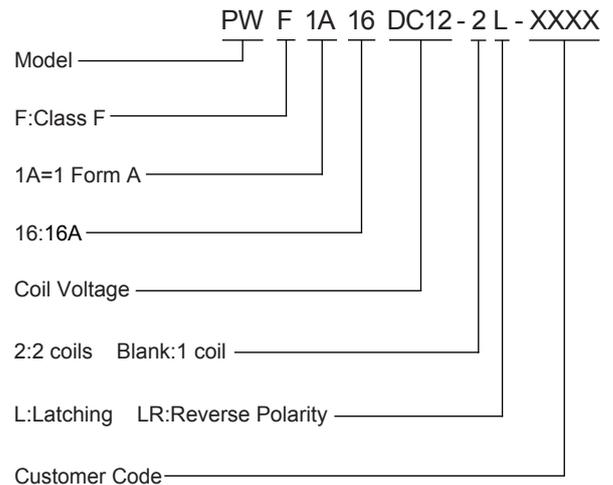
## FEATURES

- Green Energy Saving
- Creepage Distance up to 8mm
- Meet RoHS compliant

## CONTACT RATINGS

Contact Arrangement	1A	
Contact Resistance	≤100mΩ (1A 6VDC)	
Contact Material	AgSnO	
Contact Rating(Resistive)	16A/277VAC	
Max. Switching Voltage	277VAC	
Max. Switching Current	16A	
Max. Switching Power	4432VA	
Electrical Life	Resistive load	Min. 2×10 <sup>4</sup> OPS (16A/277VAC, ON:OFF=1s:5s) Min. 5×10 <sup>4</sup> OPS (8A/250VAC, at 20 times/min.)
	Inrush current	Min. 1.2×10 <sup>4</sup> Inrush 100A
Short Circuit Test Current	1500A/277VAC, 6ms, 1 cycle	
Mechanical Life	1×10 <sup>6</sup> OPS	

## ORDERING INFORMATION



Notes:

1. PC board assembled with dust cover type and flux tight type relays can not be washed and/or coated.
2. Dust cover type and flux tight type relays can not be used in the environment with dust, or H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub> or similar gaseous environment etc.

## CHARACTERISTICS

Insulation Resistance	1000MΩ (at 500VDC)	
Dielectric Strength	Between coil & contacts	5000VAC 1min
	Between open contacts	1000VAC 1min
Set time(at nomi. volt.)	≤15ms	
Reset time(at nomi. volt.)	≤15ms	
Humidity	5%~85% R.H.	
Operation temperature	-40°C~+85°C	
UL Class F	Insulation System Class F	
Shock Resistance	Functional	100m/s <sup>2</sup> (half-wave pulse of sine wave:10ms, Detection time:10μs)
	Destructive	1000m/s <sup>2</sup> (half-wave pulse of sine wave:6ms)
Vibration Resistance	Functional	10Hz to 55Hz 2mm DA(Detection time:10μs)
	Destructive	10Hz to 55Hz 3mm DA
Unit weight	Approx. 7.5g	
Construction	Flux Tight Type	

Notes: The data shown above are initial values.

## COIL DATA

at 25°C

Nominal Voltage VDC	Set/Reset Voltage (Max.) VDC	*Impulse Width ms	Coil Resistance Ω±10%		
			1 Coil	2 Coils	
				Set coil	Reset coil
3	2.4	30	45	22.5	22.5
5	4.0	30	125	62.5	62.5
6	4.8	30	180	90.0	90.0
9	7.2	30	405	202.5	202.5
12	9.6	30	720	360.0	360.0
24	19.2	30	2880	1440.0	1440.0

\* For the Set time/Reset time it is recommended to use a minimum 30 ms pulse duration for the nominal coil voltage to compensate for varying ambient temperature and relay aging.

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# RELAYS

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## COIL

Coil Power	1 Coil: 200mW 2 Coils: 400mW
------------	---------------------------------

## SAFETY APPROVAL RATINGS

UL&CUL	16A 277VAC Resistive, 85°C, 2×10 <sup>4</sup> OPS 16A 277VAC Resistive, 70°C, 5×10 <sup>4</sup> OPS 8A 250VAC Resistive, 85°C, 5×10 <sup>4</sup> OPS 8A 125VAC Resistive, 85°C, 5×10 <sup>4</sup> OPS 5A 30VDC Resistive, 85°C, 5×10 <sup>4</sup> OPS 5A 347VAC Resistive, 85°C, 5×10 <sup>4</sup> OPS 1200W Standard ballast 277VAC, 50°C, 6×10 <sup>3</sup> OPS 1A 277VAC E. ballast, 40°C, 12×10 <sup>3</sup> OPS
TüV	16A/277VAC(cosΦ=1.0), 85°C, 2×10 <sup>4</sup> OPS 16A/277VAC(cosΦ=1.0), 60°C, 5×10 <sup>4</sup> OPS 8A/250VAC(cosΦ=1.0), 85°C, 5×10 <sup>4</sup> OPS 5A/347VAC(cosΦ=1.0), 85°C, 5×10 <sup>4</sup> OPS 5A/30VDC(0ms), 85°C, 5×10 <sup>4</sup> OPS

NOTES:

1. All values without specified temperature are at 25°C.
2. The above lists the typical loads only. Other loads may be available upon request.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



# RELAYS

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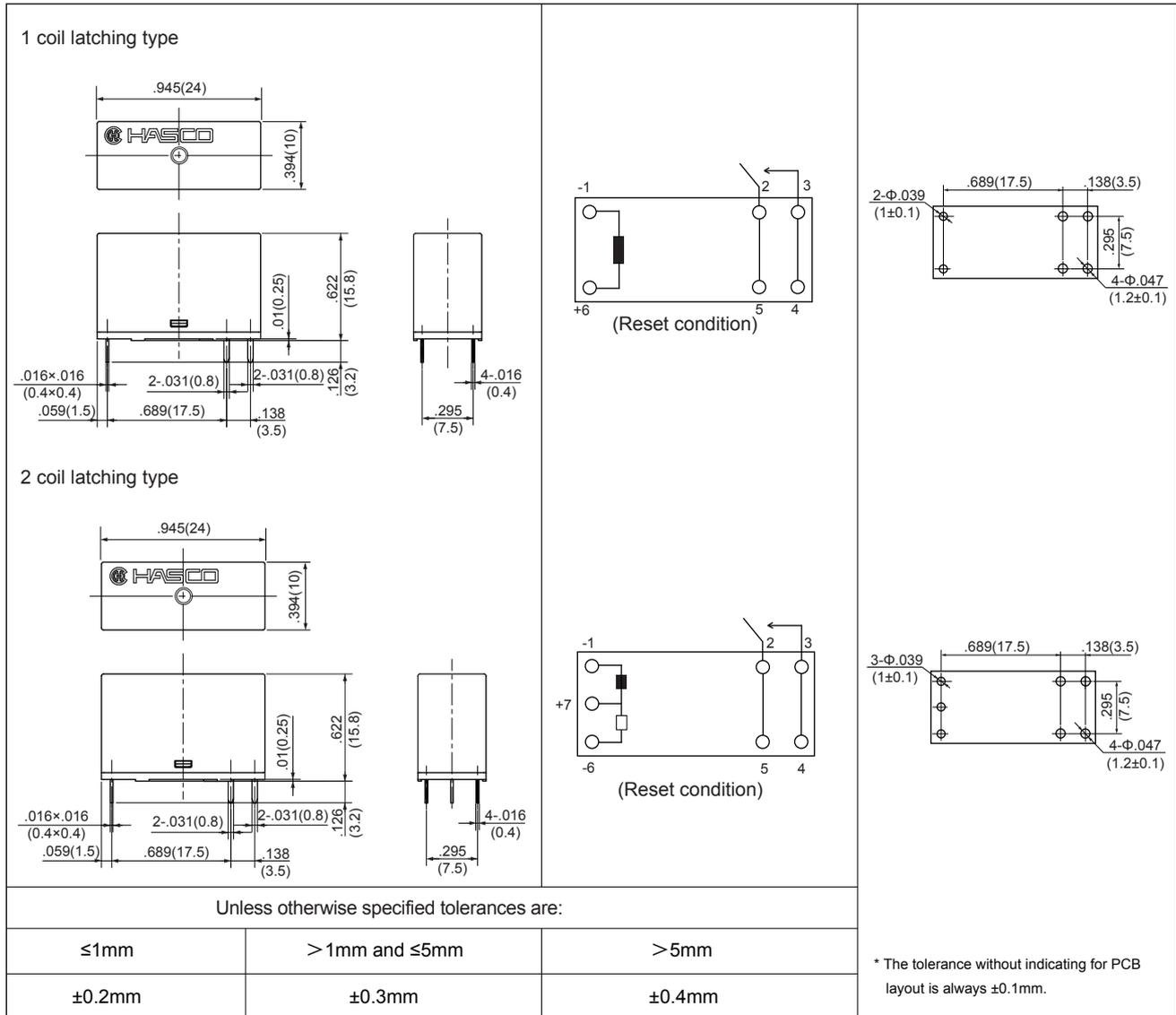
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

### Outline Dimensions

### Wiring Diagram (Bottom view)

### PCB Layout (Bottom view)



Notice:

- Relay is on the "reset" or "set" status when being released from stock, with the consideration of shock risen from transit and relay mounting, relay would be changed to "set" or "reset" status, therefore, when application (connecting the power supply), please reset the relay to "set" or "reset" status as required.
- Do not energize voltage to "set" coil and "reset" coil simultaneously. Long energized time (more than 1 min) should be avoided.

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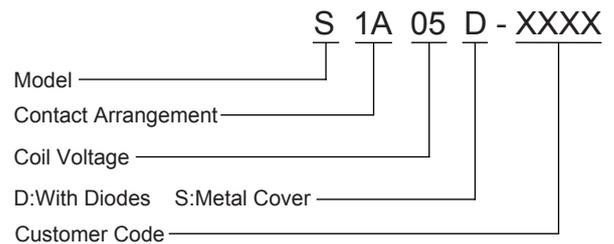
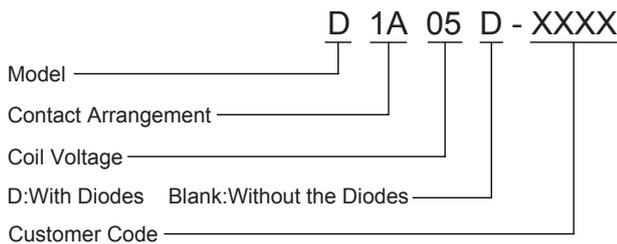
File No.:E75887



## FEATURES

- Molded epoxy body
- FCC Part 68

## ORDERING INFORMATION



## COIL DATA

at 25°C

### DIP Specifications

Contact Form	Part Number	Nominal Voltage (VDC)	Coil Resistance ±10%	Must Operate (VDC)	Must Release (VDC)	Rated Current (mA)	Continuous Voltage (max)	Circuit Schematic
1A SPST-NO	D1A05(D)	5	500	3.75	1.0	10	10	
	D1A12(D)	12	1000	9.00	1.2	12	20	
	D1A24(D)	24	2150	18.00	2.4	11.1	28	
1B SPST-NC	D1B05(D)	5	500	3.75	1.0	10	7	
	D1B12(D)	12	1000	9.00	1.2	12	15	
	D1B24(D)	24	2150	18.00	2.4	11.1	28	
2A DPST-NO	D2A05(D)	5	140	3.75	1.0	35.7	10	
	D2A12(D)	12	500	9.00	1.2	24	20	
	D2A24(D)	24	2150	18.00	2.4	11.1	28	
1C SPDT-CO	D1C05(D)	5	200	3.75	1.0	25	10	
	D1C12(D)	12	500	9.00	1.2	24	20	
	D1C24(D)	24	2150	18.00	2.4	11.1	28	

### SIP Specifications

Contact Form	Part Number	Nominal Voltage (VDC)	Coil Resistance ±10%	Must Operate (VDC)	Must Release (VDC)	Rated Current (mA)	Continuous Voltage (max)	Circuit Schematic
1A SPST-NO	S1A05(D)	5	500	3.75	1.0	10	10	
	S1A12(D)	12	1000	9.00	1.2	12	20	
	S1A24(D)	24	2000	18.00	2.4	12	28	

\*Form B SIP Available

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# RELAYS

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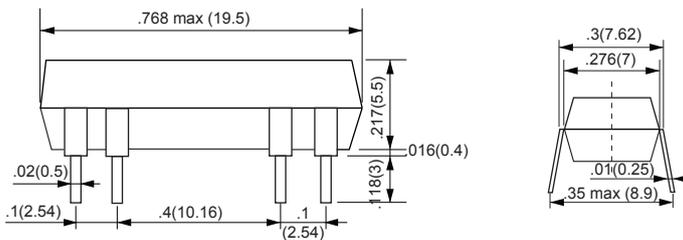
## CHARACTERISTICS

Item	Contact Form	2A,1A,1B	1C
Contact Resistance		100mΩ max. (Initial)	150mΩ max. (Initial)
Operate Time(Max.)		0.5ms	1.0ms
Bounce Time(Max.)		0.5ms	2.0ms
Release Time(Max.)		0.2ms	0.2ms
Insulation Resistance(Min.)		10 <sup>11</sup> Ω	10 <sup>11</sup> Ω
Contact Material		Precious Metals	Precious Metals
Power(Max.)		10VA	3VA
Switching Voltage(Max.)		200VDC	100VDC
Switching Current(Max.)		0.5A	0.25A
Carry Current(Max.)		1.0A	0.5A
Life Expectancy		10 <sup>8</sup> (Signal level)	5×10 <sup>7</sup> (Signal level)
Breakdown Voltage		DC250V across open contact	DC200V across open contact
		DC500V between coil and contact	DC500V between coil and contact
Operation temperature		-40°C ~ +85°C	-40°C ~ +85°C
UL Class B/F		Insulation System Class B/F	Insulation System Class B/F
Minimum Permissible Load		100mVDC 10μA	100mVDC 10μA
Vibration		20g(10 ~ 2000Hz)	20g(10 ~ 2000Hz)
Resonant Frequency		3.5 KHz	3.5 KHz

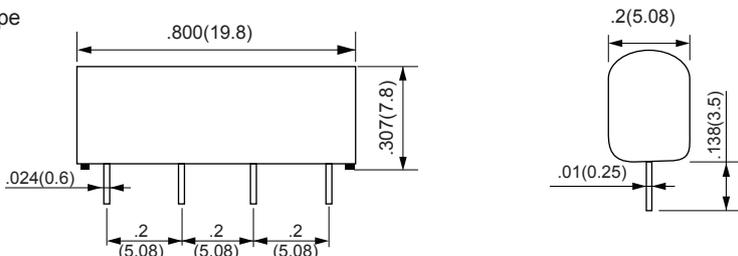
## OUTLINE DIMENSIONS

Unit: inch(mm)

### DIP Type



### SIP Type



Remark: 1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm, tolerance should be ±0.2mm; outline dimension >1mm and ≤5mm, tolerance should be ±0.3mm; outline dimension >5mm, tolerance should be ±0.4mm.

2) The tolerance without indicating for PCB layout is always ±0.1mm.

This datasheet is for customers' reference. All the specifications are subject to change without notice.



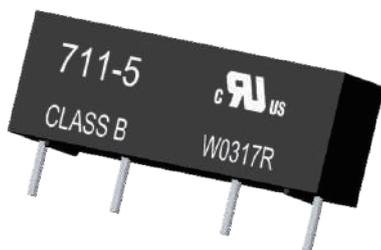
# RELAYS

\* SINCE 1976 \*

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File No.:E75887



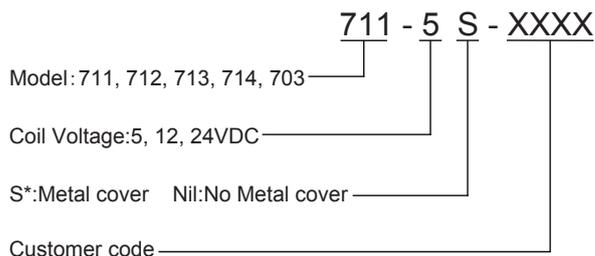
## FEATURES

- Choice of normal, heavy duty or hi voltage
- FCC Part 68
- Epoxy molded

## CHARACTERISTICS

Operate time (at nomi. volt.)	≤0.5ms
Release time (at nomi. volt.)	≤0.2ms
Contact Resistance(Initial)	≤150mΩ
Life Expectancy	3×10 <sup>6</sup> operations(Rated Load )
Insulation Resistance	1000MΩ
Vibration	20G (10-2000Hz)
Thermal Shock	-55°C ~ +105°C
Moisture Resistance	60°C-90% 240 hours
Terminal Strength	225g
Operation temperature	-40°C~+85°C
UL Class B	Insulation System Class B

## ORDERING INFORMATION



Remark:

S\*: Metal Cover is not washable.

## COIL DATA

at 25°C

Part Number	Nominal Voltage VDC	Pick-up Voltage (Max.) VDC	Drop-out Voltage (Min.) VDC	Coil Resistance Ω±10%	Contact Rating(UL&CUL) (25°C)	Breakdown Voltage
711-5	5	3.75	0.5	500	AC 10VA, DC 10W max. 100VDC max. 1.0A max.(carry) 0.3A max.(switching)	250VDC across contacts 2500VDC contact to coil
711-12	12	9.0	1.2	1000		
711-24	24	18.0	2.4	2000		
712-5	5	3.75	0.5	500	AC 70VA, DC 50W max. 150VAC, 200VDC 2.5A max.(carry) 1.0A max.(switching DC) 0.7A max.(switching AC)	300VDC across contacts 2500VDC contact to coil
712-12	12	9.0	1.2	1000		
712-24	24	18.0	2.4	2000		
713-5	5	3.75	0.5	500	AC 50VA, DC 50W max. 300VAC, 350VDC 2.5A max.(carry) 0.5A max.(switching)	600VDC across contacts 2500VDC contact to coil
713-12	12	9.0	1.2	1000		
713-24	24	18.0	2.4	2000		
714-5	5	3.75	0.5	500	100VA max. 1.0A max.(switching) 2.5A max.(carry) 350VDC/300VAC(max. switching)	1000VDC across contacts 2500VDC contact to coil
714-12	12	9.0	1.2	1000		
714-24	24	18.0	2.4	2000		
703-5	5	3.75	0.5	125	AC 3VA, DC 3W max. DC 30V 0.5A (carry) 0.2A (switching)	200VDC min.across contacts 2500VDC contact to coil
703-12	12	9.0	1.2	500		
703-24	24	18.0	2.4	2000		

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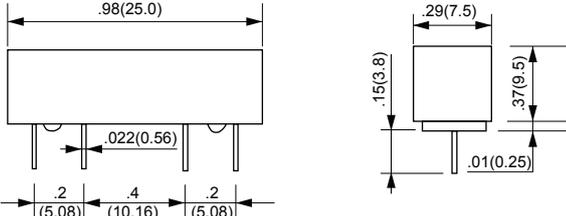
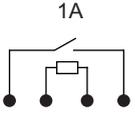
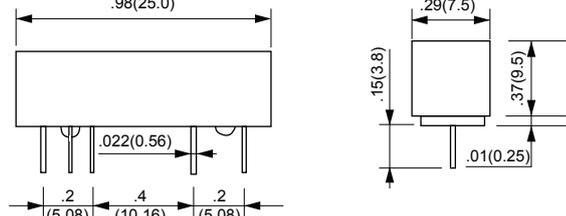
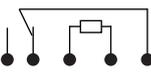
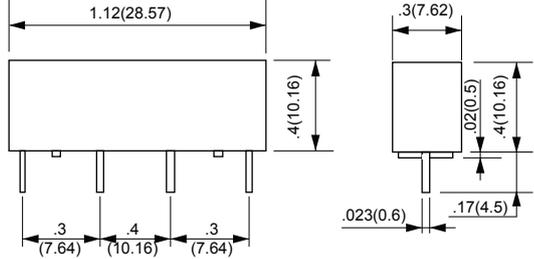
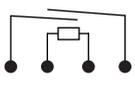
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## OUTLINE DIMENSIONS AND WIRING DIAGRAM.

Unit: inch(mm)

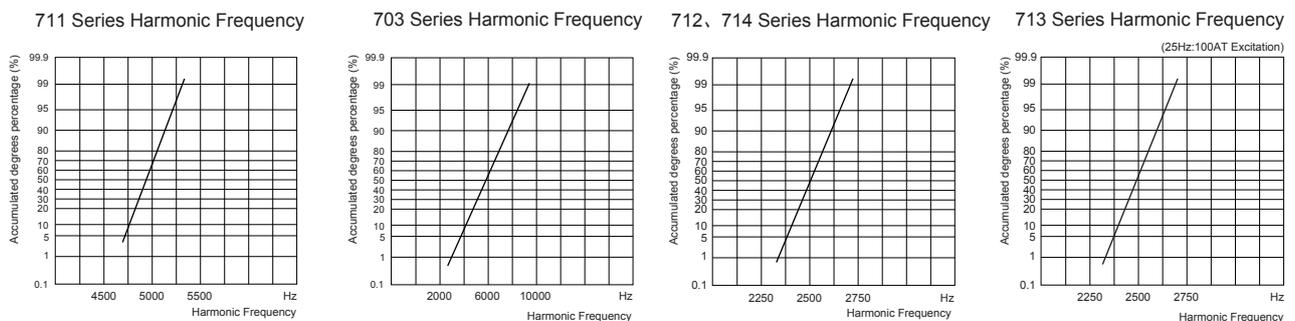
### Outline Dimensions

### Wiring Diagram (Bottom view)

711 Series		
703 Series		
712 & 713 & 714 Series		

- Remark: 1) In case of no tolerance shown in outline dimension: outline dimension  $\leq 1\text{mm}$ , tolerance should be  $\pm 0.2\text{mm}$ ; outline dimension  $> 1\text{mm}$  and  $\leq 5\text{mm}$ , tolerance should be  $\pm 0.3\text{mm}$ ; outline dimension  $> 5\text{mm}$ , tolerance should be  $\pm 0.4\text{mm}$ .  
 2) The tolerance without indicating for PCB layout is always  $\pm 0.1\text{mm}$ .

## CHARACTERISTIC CURVES



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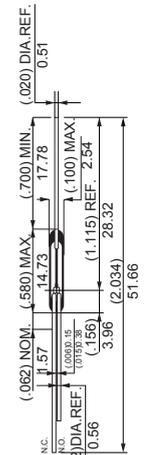
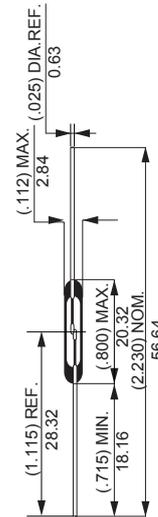
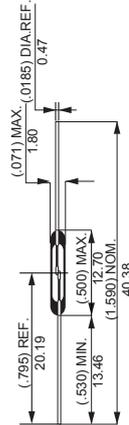
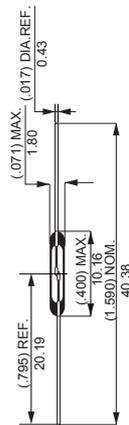
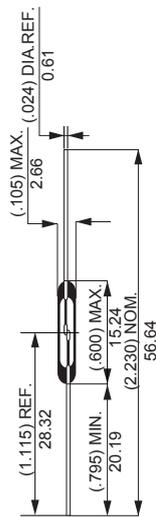
# REED SWITCHES

## HCH Reed Switches

### Specifications



File No.:E75887



HCH25

HCH211

HCH219

HCH229

HCH551

### Electrical Ratings

Contact Form		A	A	A	A	C
Contact Rating	Watt-max.	20	10	10	50	5
Voltage [V]	Switching Vdc-max.	200	200	200	265Vac rms (250Vdc)	175
	Breakdown Vdc-min.	250	250	250	750	200
Current [A]	Switching A-max.	1.0	0.5	0.5	1.0	0.25
	Carry A-max.	1.2	1.0	0.8	2.5	1.5
Resistance [Ω]	Contact, Initial Ω-max.	0.100	0.120	0.100	0.100	0.100
	Insulation Ω-min.	10 <sup>10</sup>	10 <sup>12</sup>	10 <sup>12</sup>	10 <sup>10</sup>	10 <sup>6</sup>
Capacitance Contact	pF-typ	0.4	0.2	0.3	0.2	1.0
Temperature [°C]	Operating °C	-40 ~ +125	-40 ~ +125	-40 ~ +125	-20 ~ +125	-40 ~ +125
	Storage °C	-65 ~ +125	-65 ~ +125	-65 ~ +125	-65 ~ +125	-65 ~ +125

### OPERATING CHARACTERISTICS

Operating Time	ms-max.	0.7	0.5	0.6	0.75	0.7
Release Time	ms-max.	0.2	0.1	0.2	0.3	1.0
Shock	11ms 1/2 Sine Wave G-max.	100	100	100	100	50
Vibration	50-2000 Hertz G-max.	30	30	30	30	30
Resonant Frequency	Hz-typ	6250	8500	9500	2100	11000

### MAGNETIC CHARACTERISTICS

Pull-in Range	Ampere Turns	17-38	10-25	10-25	22-43	15-30
		Miniature CD	Sub-Miniature	Sub-Miniature	Miniature HV	Miniature Changeover

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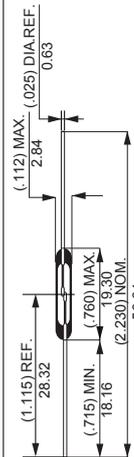
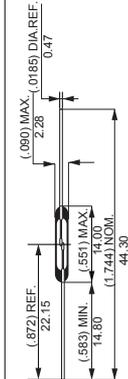
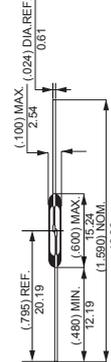
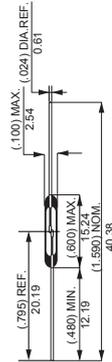
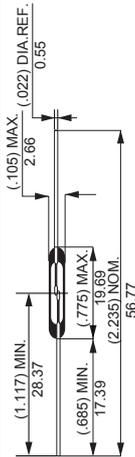
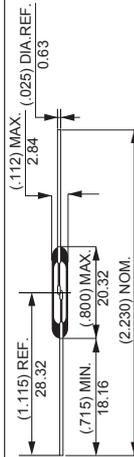
# REED SWITCHES

## HCH Reed Switches

### Specifications



File No.:E75887



HCH2210

HCH2210V

HCH2212

HCH9215

HCH9216

HCH50WD

### Electrical Ratings

Contact Form		A	A	A	A	A	A
Contact Rating	Watt-max.	50	10	20	10	10	50
Voltage [V]	Switching Vdc-max.	200	200	200	200	200	200
	Breakdown Vdc-min.	300	2000	250	250	250	300(400)
Current [A]	Switching A-max.	1.5	0.5	1.0	0.5	0.5	1.0,0.7
	Carry A-max.	3.0	1.3	1.0	1.2	1.2	3.0,2.1
Resistance [Ω]	Contact, Initial Ω-max.	0.100	0.100	0.100	0.100	0.100	0.100
	Insulation Ω-min.	10 <sup>10</sup>	10 <sup>12</sup>	10 <sup>12</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>
Capacitance Contact	pF-typ	0.2	0.2	0.4	0.2	0.2	0.2
Temperature [°C]	Operating °C	-40 ~ +125	-75 ~ +125	-40 ~ +125	-40 ~ +125	-40 ~ +125	-40 ~ +125
	Storage °C	-65 ~ +125	-75 ~ +125	-65 ~ +125	-65 ~ +125	-65 ~ +125	-65 ~ +125

### OPERATING CHARACTERISTICS

Operating Time	ms-max.	0.75	0.75	0.6	0.6	0.6	
Release Time	ms-max.	0.3	0.3	0.2	0.2	0.2	
Shock	11ms 1/2 Sine Wave G-max.	100	100	100	100	100	
Vibration	50-2000 Hertz G-max.	30	30	30	30	30	
Resonant Frequency	Hz-typ	2100	3200	6250	3900	5200	

### MAGNETIC CHARACTERISTICS

Pull-in Range	Ampere Turns	22-43	17-38	17-38	12-38	10-30	
		Miniature Power	Miniature HV	Sub-Miniature	Sub-Miniature	Sub-Miniature	

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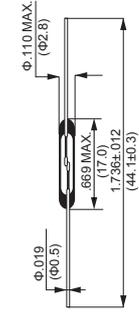
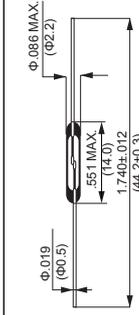
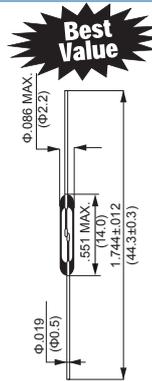
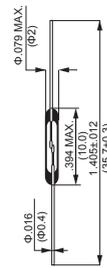
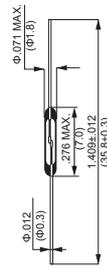
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# REED SWITCHES

## Specifications



File No.:E75887



		ORD213	ORD211	ORD324	ORD228	ORD9215	
Electrical	Contact	1A	1A	1A	1A	1A	
Characteristics	Pull-in Available in $\pm 5$ AT ranges	10 ~ 40	10 ~ 40	10 ~ 50	10 ~ 50	10 ~ 50	
	Drop-out	[AT] min.	5	5	5	4	
	Contact resistance(Initial)	[m $\Omega$ ] max.	200	100	100	100	150
	Breakdown voltage	[VDC] min.	150	150	200	200	200
	Insulation resistance	[ $\Omega$ ] min.	$10^9$	$10^9$	$10^{10}$	$10^9$	$10^9$
	Electrostatic capacitance	[pF] max.	0.4	0.2	0.3	0.3	0.3
	Contact rating	[VA,W]	1.0	1.0	10	10	10
	Maximum switching voltage	[V]	AC24 / DC24	AC24 / DC24	AC140 / DC200	AC110 / DC100	AC110 / DC100
	Maximum switching current	[A]	DC 0.1	DC 0.1	DC 0.5	DC 0.4	0.3
	Maximum carry current	[A]	0.3	0.3	1.0	1.0	1.0
Operating Characteristics	Operating time	[ms] max.	0.3	0.3	0.3	0.4	
	Bounce time	[ms] max.	0.3	0.3	0.3	0.4	
	Release time	[ms] max.	0.05	0.05	0.05	0.05	
	Resonant frequency	[Hz]	$1100 \pm 500$	$7500 \pm 500$	$5000 \pm 400$	$5300 \pm 300$	$3700 \pm 300$
	Maximum operating frequency	[Hz]	500	500	500	500	500
Standard coil	Coil resistance	[ $\Omega$ ]	600	600	450	450	
	No. of turns	[T]	5000	5000	5000	5000	
	Dimensions	[mm]	$\Phi 3.3 \times 10$	$\Phi 3.3 \times 10$	$\Phi 3.7 \times 15$	$\Phi 3.7 \times 15$	$\Phi 3.7 \times 15$
	Type No.	8	8	6	6	6	
Features (Contact material)		Ultra-miniature (RH)	Ultra-miniature (RH)	General purpose miniature(RH)	General purpose miniature(RH)	General purpose miniature(RH)	

\*Magnets also available, Available Cut and Bent as Well as on Reed.

Notes:

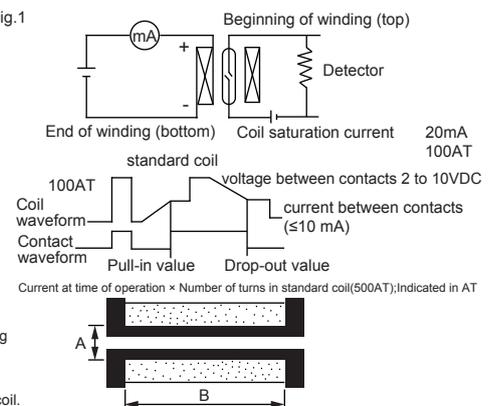
- 1.Pull-in & drop-out were measured by using OKI standard coil.\*This value of drop-out is prescribed when pull-in is over 20AT. When pull-in is less than 20AT, drop-out are 5 MIN & RLS/OP >0.7. Tolerance at measurement is  $\pm 2$ AT. (Fig.1)
- 2.Measurements are made by the four-terminal voltage reduction method where the 100AT excitation is given to the switch using the OKI standard coil to close the contacts, and 10mA current is applied.
- 3.This value varies depending on the pull-in value (contact gap). In this measurement, the pull-in value is about 20AT.(MIL-STD-202D METHOD 301)
- 4.Measurement is made by using a DC 100V super megger.(MIL-STD-202D METHOD 302)
- 5.The value shows the time required for the contacts to cause the first contact bounce after applying the voltage to the OKI standard test coil. The times is shown at top in Fig.2

- 6.Bouncing is caused when the contact close. Bounce time means the time when opening and closing of the contacts are being repeated before the contacts are completely closed. Shown by T bounce.
- 7.Release time means the time from the moment the voltage applied to the test coil as removed to the moment the contacts open. Shown by Tris.
- 8.Resonant frequency is a vibrating frequency inherent to the reed switch. Avoid application of vibration at this frequency to the switch, otherwise it will cause misoperation.
- 9.The reed switch can be operated with a frequency higher than the maximum operating frequency. However, operation with such a frequency will often cause an endless chattering at the time of ON operation. It is recommended for the designer to take the maximum operating frequency into consideration when designing systems and circuits.
- 10.Dimensions of standard coil.

A:Inner diameter of standard coil.

B:Length of standard coil.

Fig.1



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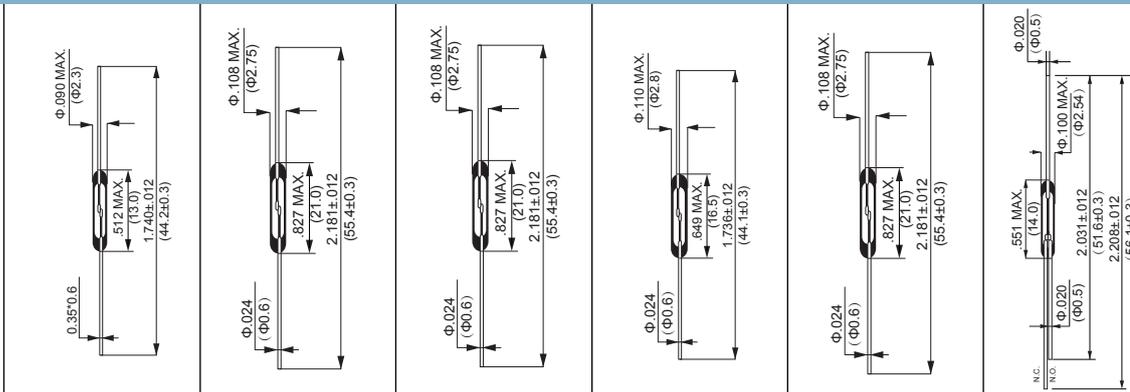


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# RELAYS

# REED SWITCHES



	ORD221	ORD229	ORD2210	ORD2211	ORD2210V	ORT551
	1A(offset)	1A	1A	1A	1A	1C
	1 ~ 40	15 ~ 40	15 ~ 60	15 ~ 60	20 ~ 60	10 ~ 30
	5	6	7	8	7	5
	100	100	100	100	100	100
	200	600	250	200	1000	200
	10 <sup>9</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>9</sup>	10 <sup>10</sup>	10 <sup>9</sup>
	0.3	0.5	0.5	0.3	0.5	1.5
	10	50	AC70(VA) / DC50(W)	50	100	3
	AC100 / DC100	AC300 / DC350	AC150 / DC200	AC100 / DC100	AC300 / DC350	AC30 / DC30
	DC 0.3	DC 0.5	AC0.7 / DC1.0	0.5 In rush 3A	DC 1.0 max.	DC 0.2
	1.0	2.5	2.5	2.5	2.5 max.	0.5
	0.3	0.6	0.5	0.6	0.5	1.0
	0.5	0.5	0.5	0.4	0.5	(NC)1.5 / (NO)1.0
	0.5	0.05	0.05	0.05	0.05	0.5
	2750 ± 250	2500 ± 250	2500 ± 250	4600 ± 500	2500 ± 250	6000 ± 4000
	500	500	500	500	500	200
	450	500	500	450	450	550
	5000	5000	5000	5000	5000	5000
	Φ3.7 × 15	Φ4.6 × 21	Φ4.6 × 21	Φ3.7 × 15	Φ3.7 × 15	Φ4.6 × 10
	6	3	3	6	6	10
	Miniature offset (RH)	High breakdown voltage (RH)	High power (RH)	Lamp load 3.4W Low sound (RH)	Vacuum (RH)	Ultra-miniature transfer (RH)

11. If a shock of more than 30G is applied to a reed switch, the pull-in value of the switch will be often caused to change from the standard specification. Therefore, it is recommended not to use the reed switch which has been given such a shock.

12. If a vibration of more than 1 kHz is applied to a reed switch, even a very small acceleration to it will easily cause the switch to misoperate to close due to its resonant frequency.

13. In practice the reed switch can operate beyond the specified range. In case of magnet driving, however, some magnets show decrease of magnetic flux even at the lowest temperature of the range depending on their temperature characteristics. Therefore, it is recommended to consider the range as a general guide line.

14. The actual tensile strength is more than 5 kg (breakdown). However, considering the lead not to get out of position, the value for the static load is shown here.

## Environmental Characteristics Table 2

	Characteristics(Common to All Types)	Test Conditions	Notes
Shock	Shall not misoperate with shock of 30G(11ms) applied	MIL-STD-202E METHOD 213B	13
Vibration	Shall not misoperate with max. 20G(10-55Hz)	MIL-STD-202E METHOD 210A	14
Temperature range	Shall be operational in the range of -40~125°C	MIL-STD-202E METHOD 107D	15
Lead tensile strength	Shall withstand against 2Kg static load	MIL-STD-202E METHOD 211A	16

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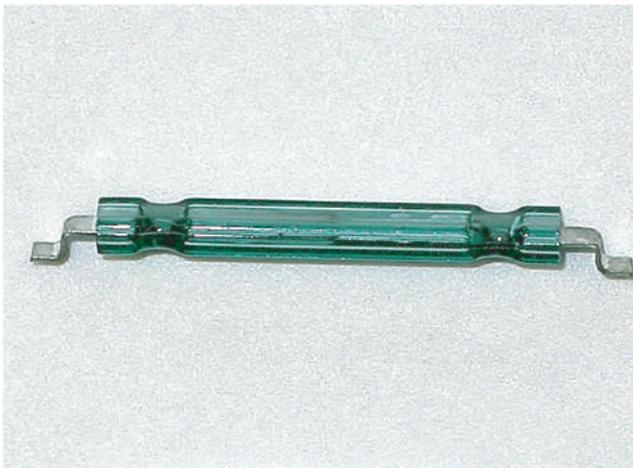
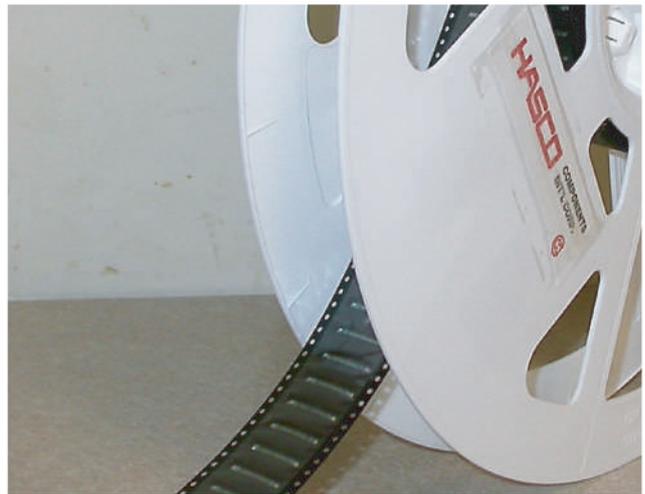
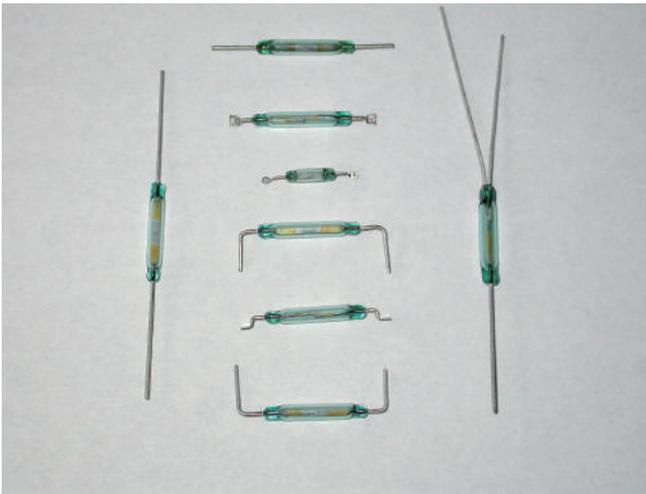
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# REED SWITCHES

Our reed switches are available in multiple styles and housing types in either SMT or through hole designs. We can custom bend and produce any reed configuration either bare or in a housing. Simply send us your specs for us to quote.

**Please note:** HASCO can produce and/or stuff any PC board with a reed switch or relay in house at our state of the art production facility.



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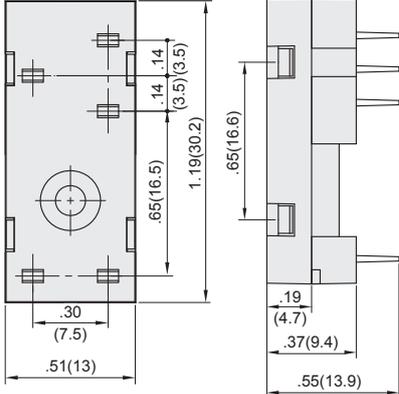
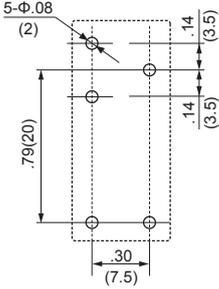
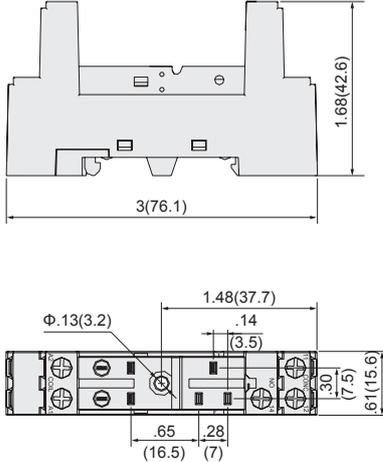
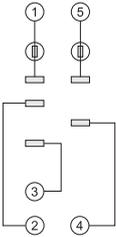


# PR SOCKETS

# RELAY SOCKET

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Socket	Outline Dimensions	Wiring Diagram /PCB Layout	Accessory Available
<p>PR-1C-R-A1</p>  <p>PCB Terminal, PCB or Screw mounting</p>			<p>*metal retainer PR-H1</p> <p>Notes: When the socket is fitted with PR-H1 retainer, the withstand voltage is 1500VAC.</p>
<p>PR-1C-R-C2</p>  <p>Screw Terminal, PCB or Screw mounting With finger protection device</p>			<p>*plastic retainer PR-H6</p> <p>*marker PR-M1</p>

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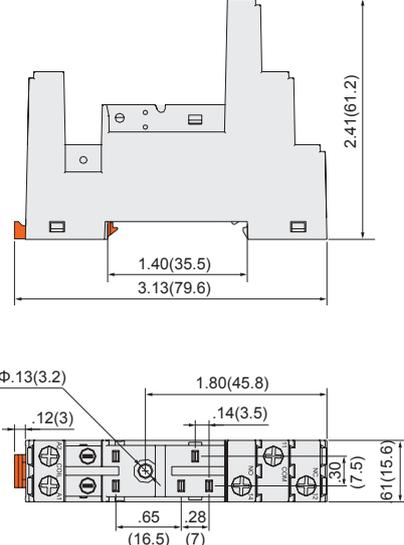
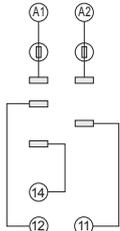
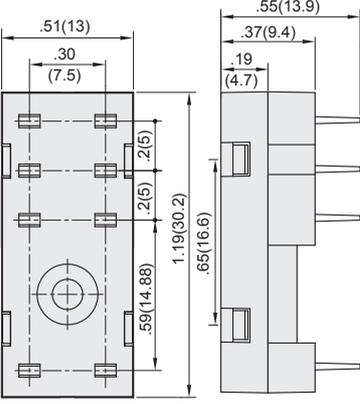
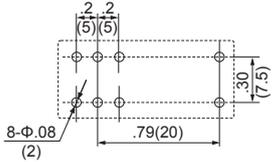
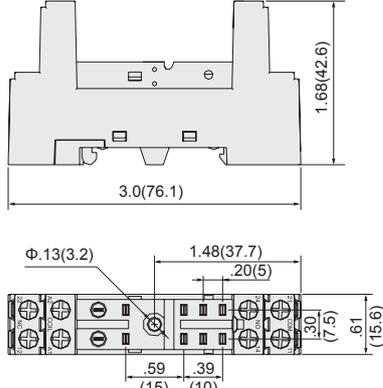
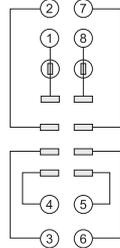
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# RELAYS

# PR SOCKETS

# RELAY SOCKET

Socket	Outline Dimensions	Wiring Diagram /PCB Layout	Accessory Available
 <p>Screw Terminal, DIN rail or Screw mounting, With finger protection device</p>	 <p>2.41(61.2) 1.40(35.5) 3.13(79.6) Φ.13(3.2) 1.80(45.8) 12(3) .14(3.5) .30(7.5) .65(16.5) .28(7) 61(15.6)</p>	 <p>A1 A2 14 11 12</p>	<p>*plastic retainer PR-H6 *marker PR-M1</p>
 <p>PCB Terminal, PCB or Screw mounting, When it used with SPR1C/ PR1C and relay type K, two poles of socket load must be connected in parallel.</p>	 <p>.51(13) .30(7.5) .2(5) .2(5) 1.19(30.2) .65(16.6) .59(14.88) .55(13.9) .37(9.4) .19(4.7)</p>	 <p>2 2 (5)(5) 8-Φ.08(2) .79(20) .30(7.5)</p>	<p>*metal retainer PR-H1/H3 Notes: When the socket is fitted with PR-H1/H3 retainer, the withstand voltage is 1500VAC.</p>
 <p>Screw Terminal, DIN rail or Screw mounting, With finger protection device When it used with SPR1C/ PR1C and relay type K, "2"- "7", "4"- "5", "3"- "6" of socket must be connected in parallel.</p>	 <p>1.68(42.6) 3.0(76.1) Φ.13(3.2) 1.48(37.7) .20(5) .30(7.5) .59(15) .39(10) 61(15.6)</p>	 <p>2 7 1 8 4 5 3 6</p>	<p>*plastic retainer PR-H4/H6 *marker PR-M1</p>

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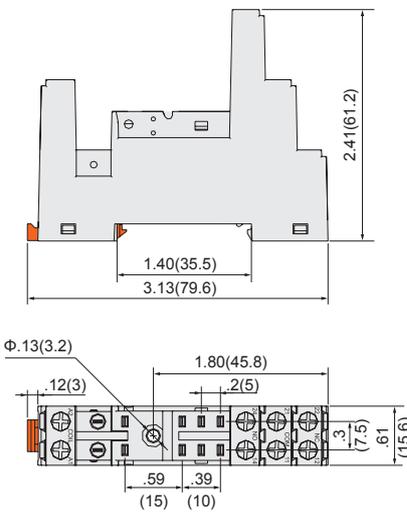
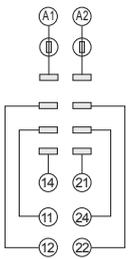
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# PR SOCKETS

# RELAY SOCKET

Socket	Outline Dimensions	Wiring Diagram /PCB Layout	Accessory Available
 <p>PR-2C-K-C3</p> <p>Screw Terminal, DIN rail or Screw mounting, With finger protection device When it used with SPR1C/ PR1C and relay type K, "14"- "21", "11"- "24", "12"- "22" of socket must be connected in parallel.</p>	 <p>Dimensions: 2.41(61.2), 1.40(35.5), 3.13(79.6), <math>\Phi</math>.13(3.2), 1.80(45.8), .12(3), .2(5), .3(7.5), .61(15.6), .59(15), .39(10)</p>	 <p>Wiring diagram showing terminals A1, A2, 14, 21, 11, 24, 12, 22.</p>	<p>*plastic retainer PR-H4/H6 *marker PR-M1</p>

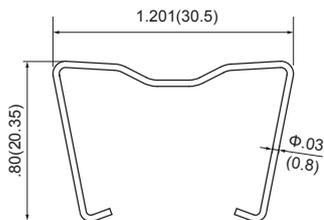
Notes: \*Should accessories needed, please order with the correct type.

## DIMENSION OF RELATED ACCESSORY(TO BE ORDERED SEPARATELY)

Unit: inch(mm)

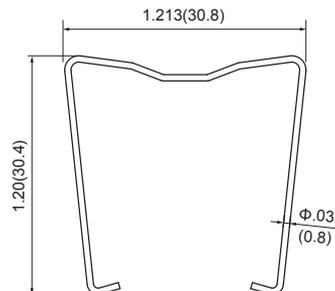
### Retainer

PR-H1(metal retainer)



Remark: Applicable for SPR etc.

PR-H3(metal retainer)



Remark: Applicable for PR etc.

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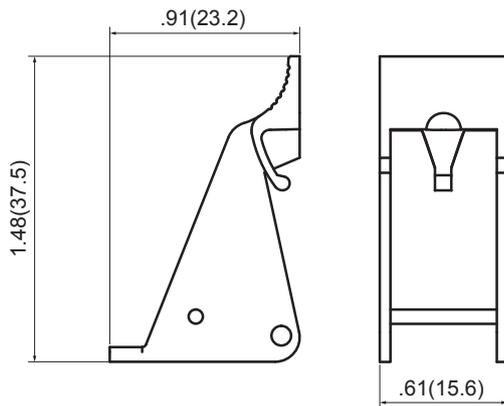
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## DIMENSION OF RELATED ACCESSORY(TO BE ORDERED SEPARATELY)

Unit: inch(mm)

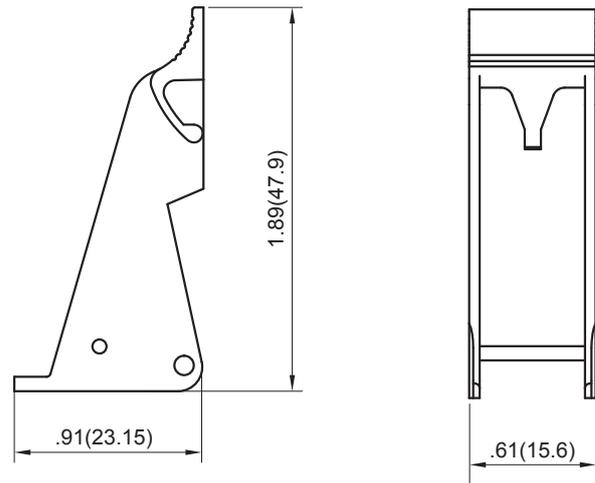
### Retainer

PR-H4(Plastic retainer)



Remark: Applicable for SPR etc.

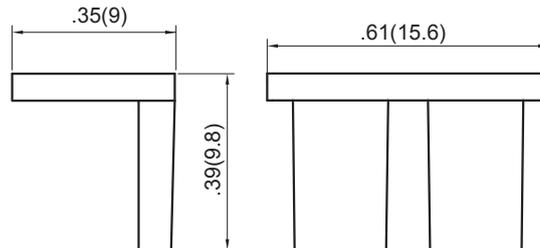
PR-H6(Plastic retainer)



Remark: Applicable for PR etc.

### Marker

PR-M1



Unless otherwise specified tolerances are:			
≤5mm	>5mm and ≤20mm	>20mm and ≤50mm	>50mm
±0.3mm	±0.4mm	±0.5mm	±1mm

### Notes on selecting sockets:

- Please choose suitable relay socket according to the actual mounting requirement, relay contact poles and terminal layout. Should any questions on selection, please contact HASCO for the technical support.
- Socket which can be mounted with markers is furnished with a marker.
- DIN rail mounting: recommend to use standard rail 35×7.5×1mm, 35×15×1mm.
- The height tolerance of the metal retainer may not comply with the above-marked tolerance, and the actual assembly tightness shall prevail.

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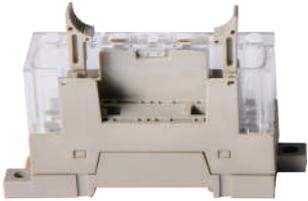
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# H4 SOCKET

# RELAY SOCKET



## FEATURES

- The dielectric strength (between coil and contacts) can reach 2500VAC and the insulation resistance is 1000MΩ
- DIN rail or Screw mounting
- With diode to protect the coil and to eliminate the converse current
- With finger protection device
- Built-in retainer and extractor

## CHARACTERISTICS

Type	Nominal Voltage	Nominal Current	Ambient Temperature	Unit weight	Notes
H4-4C-C2-ND	250VAC	6A	-25°C to 55°C	Approx. 49g	With LED

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND CIRCUIT DIAGRAM

Unit: inch(mm)

Outline Dimensions	Wiring Diagram / PCB Layout	Circuit Diagram
<p>2.35(59.8)</p> <p>882(22.4)</p> <p>R.079 (2)</p> <p>34 (8.7)</p> <p>2.83(72)</p> <p>34 (8.7)</p> <p>Φ.157 (4.0)</p> <p>(Top View)</p> <p>Screw Terminal, DIN rail mounting, With finger protection device</p>	<p>(Top View)</p> <p>(Top View)</p> <p>3.13(79.5)</p> <p>.039 (1.0)</p> <p>R.079 (2)</p> <p>Φ.157 (4.0)</p> <p>57 (14.5)</p>	<p>With LED</p>

Unless otherwise specified tolerances are:

≤5mm	>5mm and ≤20mm	>20mm and ≤50mm	>50mm
±0.3mm	±0.4mm	±0.5mm	±1mm

Notes: DIN rail mounting: recommend to use standard rail 35\*7.5\*1mm \ 35\*15\*1mm.

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# RELAYS TERMINOLOGY

## CONTACT

### (1) Contact arrangement

Denotes the contact switching combinations available on a relay and are defined in terms of number of poles, number of throws (single or double), normal position (open or close), and the sequence to make and break.

Fundamental contact arrangements are give in Table 1.

### (2) Contact type

The one structure of contact forming the contact parts, Single contact and Bifurcated contact are offered.

### (3) Contact material

The contacts are fastened to the movable leaf spring and stationary terminal to ensure electrical contact. Usually they are made of materials that mainly consist of silver because of its high electrical and thermal conductivity. For small-current loads, the gold-plated or the gold-overlay silver contacts are generally used.

### (4) Contacting

The typical power, voltage or current, which a relay can turn on and off under specified conditions of load, ambient temperature and humidity. Usually, the contact rating refers to resistive load.

### (5) Max. switching power

The upper limit of power which can be switched by the contacts. This value will be lower than the product of the maximum voltage and the maximum current. Care should be taken not to be exceed this value.

## COIL

### (1) Nominal voltage

A single value of voltage intended to be applied to the coil.

### (2) Nominal Power

The value of power used by the coil at nominal voltage. For DC coils, expressed in Watts.

$$\text{Nominal power} = \frac{V^2}{R}$$

V: Nominal voltage

R: Coil Resistance (at 25°C)

### (3) Coil resistance

The resistance of the coil for temperature conditions listed in the catalog. (Usually at 25°C/77°F)

### (4) Pick-up (Set) voltage

When the coil voltage is increased gradually from 0V, the relay will operate at a certain voltage. This voltage is called the Pick-up voltage. The Pick-up voltage in the catalog shows the maximum value. In case of latching relay, the Pick-up voltage is called the Set Voltage.

### (6) Max. switching voltage

The maximum open circuit voltage which can safely be switched by the contacts. AC and DC voltage maximums will differ in most cases.

### (7) Max. switching current

The maximum current which can safely be switched by the contacts. AC and DC current maximums may differ.

### (8) Min. switching current

The minimum value of current that can be reliably switched by the contacts.

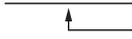
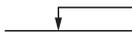
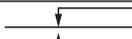
### (9) Contact resistance

The electrical resistance of closed contacts measured at their associated terminals.

### (10) Contact gap

The shortest distance between open contacts.

**Table 1 Fundamental contact arrangement**

Form	Description	Symbol	Performance
A	Make (NO)		The combination in which the contacts are open in normal or unoperated position.
B	Break (NC)		The combination in which the contacts are closed in the unoperated position.
C	Transfer (BBM)		The combination in which Form B (NC) contact open before Form A(NO) contacts close.

Note:

1. Abbreviations used to define the nature of the contacts are as follows:

NO:Normally open M:Make BBM:Break before Make  
NC:Normally closed B:Break MBB:Make before Break

2. Double switching combinations are called 2 Form A (2A) or 2 Form C (2C)

3. The following abbreviations are used occasionally.

SP: Single pole ST: Single throw

DP: Double pole DT: Double throw

DM: Double Make

EX.:

SPST NO:1 Make (1 Form A or 1a)

SPST NC:1 Break (1 Form B or 1b)

SPDT:1 Transfer (1 Form C or 1c)

DPDT:2 Transfer (2 Form C or 2c)

4PDT:4 Transfer (4 Form C or 4c)

### (5) Drop-out (Reset) voltage

When the coil voltage on an operate relay is decreased gradually, the relay will release contacts at a certain voltage. This voltage is called the Drop-out voltage. The Drop-out voltage is called the Reset voltage, when the reverse voltage is increased on the coil of operate relay, the voltage at which the relay will release.

### (6) Operating power

The value of power used by the coil at Pick-up voltage.

### (7) Max. continuous voltage

The maximum value of voltage that can be applied continuously to the coil without causing damage.

### (8) Operating function

• *Single side stable type:*

Relay which turns on when the coil is energized and turns off when de-energized.

• *1 Coil latching type:*

Relay with a latching construction that can maintain the on or off state with a pulse input. With one coil, the relay is set or reset by applying signals of opposite polarities.

• *2 Coil latching type:*

Relay with a latching construction composed of 2 coils, set coil and reset coil.

The relay is set or reset by alternately applying pulse signals of the same polarity.

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# RELAYS

# GENERAL APPLICATION GUIDELINES

## MAIN POINTS TO SELECT SUITABLE RELAY

A relay may meet with a variety of ambient conditions during actual usage. In order to avoid unexpected failure in result, testing over practical range under actual operating condition is required. For proper use of relays, the characteristics of the selected rel-

ay should be well known, and the conditions of relay use has to be investigated to determine whether they are matched to the environmental conditions. In addition, the coil conditions, contact conditions, and the ambient conditions for the

relay that is actually used must be sufficiently known in determining the relay specifications. The table below shows a summary of points of consideration for relay selection. It may be used as a reference for investigation of items and points of caution.

**Table 2. Main Points to Select Relays**

Item	Specification Points	Consideration Points
Contact	Contact arrangement	Contact forms, number of poles, Contact sequence
	Contact load	Level of load, AC or DC, resistive or inductive or capacitive, counter voltage of inductive load
	Contact material	Contact material should be matched to the level of load
	Life	Number of operations, Frequency in switching
Coil	Coil voltage	Nominal voltage, power source ripple
	Pick-up and Drop-out voltage	Fluctuation in supply voltage, Rise in Pick-up and Drop-out voltage due to the coil resistance rise
	Coil resistance	Power consumption of coil temperature rise according to the coil temperature rise
	Temperature rise	Ambient temperature and coil temperature rise according to the applied voltage.
Insulation	Dielectric strength	Do specifications of the relays match that required in the equipment?
	Surge withstand voltage	
	Insulation resistance	
Environment	Ambient temperature and humidity	Range of ambient temperature and humidity in the use location.
	Vibration and shock	Level of vibration and shock in the use location.
	Ambient atmosphere	No presence of gas which may cause contact failure.
Others	Mounting method	The method of flux coating, soldering, washing and mounting?
	Cover	Material of cover (compatibility with washing solution)
	Relay construction	Sealed or non-sealed type relays.
	Special condition	Are there any special conditions?

## CONTACT

### (1) Contact load

The phenomena in the contacts of relays greatly vary depending on contact load level such as kind of load and current level as well as contact material and size, opening speed and contact bounce.

#### \*Switching current

AC current is alternately reduced to zero but DC current is not, so the arc discharge current at breaking of load current is hard to be extinguished for DC current.

Therefore the duration of the arc discharge is longer in DC circuit than AC circuit and the maximum DC switching current is smaller than AC load.

#### \*Resistive load

Resistive load is a standard load in life tests and the contact ratings in catalogue are usually specified with resistive load.

In resistive load circuit, it is assumed that there is no inrush or counter breaking current on switching of loads.

#### \*Inductive load

Inductive loads such as electromagnetic relay, solenoids and motors easily generate a high counter voltage between their coils and cause arc discharge across the relay contacts.

Because the level of inductive load is affected by the load current and the power factor ( $\cos\Phi$ ), the life is decreased when the power factor is lowered.

In circuit with load such as motor, solenoid, transformer and others, an inrush current of several times larger than the steady current is generated at the time of connecting the load.

It is necessary to select the contact that has a sufficient capacity for the conditions.

#### \*Capacitive load

In a capacitive load circuit, an inrush current of 20 to 40 times larger than the steady state current is produced. A surge suppressor should be used to prevent contact welding.

### (2) Contact material

Relay contacts must be made from material that allows contact resistance to be low and stable, that is not quickly worn by the arc, and that has a high fusing point. At present there is no material that meets these conditions, and it appears unlikely that one will be found in the near future.

### (3) Low level circuit

Circuits with several volts and several mA or less are called low-level circuits. At low levels, silver contacts form an oxide or sulfide film on their surface under certain conditions, which makes contact resistance unstable. If the circuit impedance is high, although the high contact resistance itself does not cause problems, the noise is easily produced. To maintain stability of contact resistance in a sulfurating atmosphere, contact of gold overlaid on silver-palladium are effective.

**Table 3. Typical load and Inrush Current**

Kind of Load	Inrush current
Resistive load	Steady state current
Solenoid load	10-20 times of the steady state current
Motor load	5-10 times of the steady state current
Incandescent lamp load	10-15 times of the steady state current
Mercury lamp load	Approx. 3 times of the steady state current
Condenser load	20-40 times of the steady state current
Transformer load	5-15 times of the steady state current
Contact load	3-10 times of the steady state current

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# RELAYS

# GENERAL APPLICATION GUIDELINES

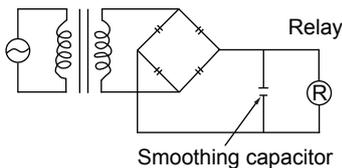
## COIL

### (1) Coil voltage of DC relay

For the operation of DC relays, standards exist for power source voltage, with DC voltage standard set at DC5,6,9,12,24 and 48. Because of the gradual increase or decrease of the current impressed on the coil causing possible delay in movement of the contacts, there is a possibility that the specified contact capacity may not be satisfied.

So, consideration should be given to the method of applying voltage on the coil.

### (2) Power source fluctuation



## PERFORMANCE

### (1) Contact resistance

#### (a) Contact wipe

The contact resistance of clean surface is extremely low, such as several mΩ. In practice, some kind of film is formed on to almost all of the contact surfaces and the contact resistance varies depending on the properties of that film.

To clean such film and stabilize contact resistance, distance of the contact wipe is increased.

When contacts open and close, the contacted surfaces slid together, thus effecting a breakage of nonconductive film formed on the contact surfaces.

#### (b) Contamination of contact surface

The Possible causes of contamination that effects increases in contact resistance are as follows.

\*Adherence of fiber, scale and particles of plastic mold, etc.

\*Adherence of silicone oxides.

\*Adherence and deposits of non-conducting material produced through a chemical reaction with the gas absorbed onto the contact face.

\*Adherence and deposits of carbon powders produced at contact surface

\*Oxidation and sulfuration of metallic powders on the contact surface.

#### (c) A bifurcated contact is contaminated

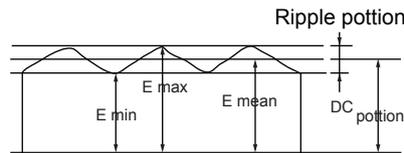
The bifurcated spring is cut deeply enough and separated so as to provide a good independence in a contact even when some insulating particle is trapped between

As a power source for DC relays, a battery or either a half or full wave rectifier circuit with smoothing capacitor is used.

The characteristics with regard to the excitation voltage of the relay will change depending on the type of power source, and thus, in order to display stable characteristics, the most desirable method is perfect DC.

In the case of ripple included in the DC power source, if the smoothing capacitor is too small, humming develops and unsatisfactory condition is produced, due to the influence of the ripple.

Fig.4 Ripple factor of rectifier circuit



This ripple is calculated using the formula described in Fig.4 and it is necessary to give consideration to use of a power source with less than a 5% ripple.

### (3) Coil resistance

The resistance of coil is specified according to the nominal voltage of the relay. Generally, the nominal value of coil resistance is that at 25°C(77°F) and the allowable range is limited to within ±10%. The resistance/temperature relationship for copper wire is about 4‰ for 1°C, and with this ratio, the coil resistance increases.

$$\text{Ripple factor} = \frac{E_{\text{max.}} - E_{\text{min.}}}{E_{\text{mean}}} \times 100(\%)$$

E max.=Maximum value of ripple portion

E min.=Minimum value of ripple

E mean=Average value of ripple portion

contact on one side.

In this case, the contact of the other side can serve to maintain a good contact, with the sufficient mechanical independence between the two members. So, the bifurcated contacts have successfully reduced contact failures.

#### (d) Sealed relay

Sealed relays are available. This feature excludes the ingress of organic gases and dust in atmosphere and allows immersion cleaning. When a sealed type relays switches the load in the presence of organic gases inside relay, it produces carbon powders on the contacts which create rise of contact resistance and acceleration of contact consumption. In order to avoid such problems, the constituent components are annealed for physical and chemical stability. This annealing process drives off residual volatiles in the plastics, insuring a contaminant free environment inside the sealed relay, resulting in more stable contact resistance over life.

### (2) Coil

\*Nominal Coil Voltage (Rated Coil voltage)

A single value voltage intended by design to be applied to the coil or input.

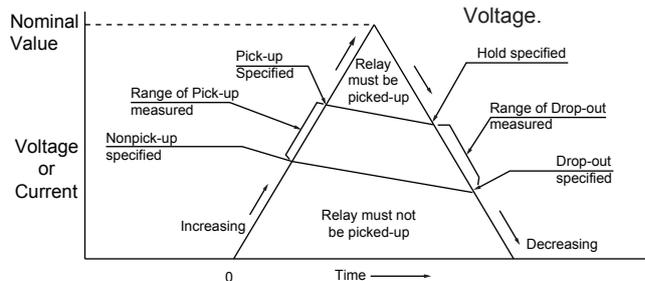
\*Pick-up Voltage (Pull-in Voltage or Must Operate Voltage)

When the voltage on an unoperated relay is increased, the value at or below which all contacts must function (transferred). The pick-up voltage is generally assigned to 75% of nominal coil voltage so that the relay can function without failure owing to fluctuation of voltage supplied, ambient temperature raise and irregularity of coil resistance.

\*Drop-out Voltage (Release or Must Release Voltage)

When the voltage on an operated relay is decreased, the value at or below which all contacts must revert to their unoperated position. The drop-out voltage is generally assigned to 10% of nominal coil voltage. Figure 5 shows the relationship between Pick-up Voltage and Drop-out Voltage.

Fig.5 Relationship of Relay Performance



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# RELAYS

# GENERAL APPLICATION GUIDELINES

## PERFORMANCE

### (3) Coil temperature rise

When voltage is applied to a coil, its temperature increases due to joules. Coil temperature rise can be calculated from the temperature coefficient of the copper wire by measuring the coil resistance. The coil temperature rise can be obtained by the next expression.

$$T = T_2 - T_a = \frac{R_2 - R_1}{R_1} (K + T_1) + T_1 - T_a$$

where, T: Coil temperature rise (°C)

T1: Initial ambient temperature (°C)

T2: Coil temperature after the test (°C)

Ta: Ambient temperature after the test (°C)

R1: Coil resistance at T1 °C (Ω)

R2: Coil resistance at T2 °C (Ω)

K: Constance (=235 for copper wire)

however,  $|T_1 - T_a| \leq 5$  (°C)

### (4) Hot coil and Cool coil

The coil temperature with no voltage applied on the coil is usually to be equal to the ambient temperature. When voltage is applied to the coil, the coil temperature rises, increasing both coil resistance and pick-up voltage. The coil with its temperature rise due to voltage impression is called a Hot Coil. To the contrary, when no voltage is applied on coil, the coil, temperature of which is equal to ambient temperature, is called a Cool Coil.

In general, the values for characteristics such as pick-up voltage, drop-out voltage and so on are measured at the ambient temperature of 25°C(77°F), Cool Coil conditions.

For the Hot Coil, because of its pick-up voltage rise, there is a possibility that it may not operate under same conditions as cool coil.

### (5) Operating range

#### (a) Maximum continuous voltage

The maximum voltage that can be applied continuously to the coil without causing damage. When a voltage greater than the maximum continuous voltage is applied to the coil (layers may short) the coil may burn out, due to the temperature rise. Do not exceed the usable operating range shown in the Fig. 7.

## ENVIRONMENT

### (1) About use, storage, and transportation environment

Please avoid direct sunlight during use, storage and transportation, and keep it at room temperature, humidity and pressure.

- If it is left or used in a high temperature and humidity environment for a long time, an oxide film or a vulcanized film will form on the surface of the contact, resulting in failures such as poor contact.

- If the surrounding temperature changes

rapidly in a high temperature and humidity environment, condensation will form inside the relay. This condensation will cause poor insulation, leakage of the insulating material surface (conduction phenomenon), and deterioration of insulation.

In addition, in a high-humidity environment, in a load switch accompanied by a large arc discharge, blue-green corrosion products may sometimes be generated inside the relay. In order to prevent the generation of these substances, it is recommended that you use the relay in an environment with low humidity.

- If you want to use the relay after a long period of storage, please check the power condition before using it. Even if the relay is not used at all and kept in storage, chemical changes may occur on the contact surface, which may cause unstable contact and contact obstacles, and sometimes the solderability of the terminal may decrease.

### (2) About the use environment

- Please absolutely prohibit the use in flammable gas or explosive gas environment. The arc and heat generated when the relay is switched on and off may cause fire and explosion.

- Please do not use it in a dusty environment. Otherwise, dust will enter inside the relay, resulting in poor contact of the contacts. If you have to use it in such an environment, please consider whether to use plastic sealed or metal sealed type relay.

### (3) About the use of malignant gas (silicon, sulfide gas, organic gas) environment

Please do not use it in an environment where there are silicon gas, sulfide gas (SO<sub>2</sub>, H<sub>2</sub>S), or organic gas.

If the relay is placed or used in a sulfide gas or organic gas environment for a long time, the surface of the contact will sometimes corrode, resulting in unstable contact and contact obstacles, and the solderability of the terminal decreases.

Also, if the relay is placed or used in a silicon gas environment for a long time, a silicon film will be formed on the contact surface, resulting in poor contact.

If the treatment in the table below is carried out, the influence of the vicious gas will be reduced.

Item	Treatment
Outer box and shell part	It adopts a sealing structure that uses a gasket, etc.
Relay	Use plastic sealed relay (but not including a silicon environment) or sealed relay
Substrate and copper foil part	Coating treatment
Connector part	Gold plating and rhodium plating

### (4) About adhesion of water, chemicals, solvents, and oil

Do not use or store in an environment where water, chemicals, solvents, and oils are attached.

If water or chemicals adhere to the relay, it will cause rust, corrosion, resin deterioration, and electric leakage, resulting in burnout. Solvent adhesion such as thinner and gasoline can also cause the mark to disappear or the parts to deteriorate.

If oil adheres to the transparent cover (made of polycarbonate), white turbidity of the case or cracks on the case may occur.

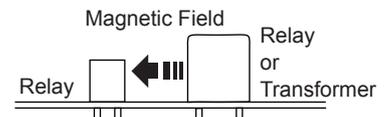
### (5) About vibration and shock

Please do not apply vibration or shock above the rated value to the relay. If abnormal vibration or shock is applied, it will not only cause maloperation, but also cause malfunction due to deformation or damage of the internal parts of the relay. In addition, in order not to apply abnormal vibration to the relay, please install it in a place where it will not be affected by the vibration-producing equipment (motor, etc.), using an appropriate method (actual installation).

### (6) About the external magnetic field

Please do not use it in places where there is an external magnetic field above 800A/m.

If it is used in a place with a strong external magnetic field, it may cause malfunction. In addition, the arc discharge that occurs between the contacts during switching will be bent by the magnetic field, causing a short circuit and poor insulation.



### (7) About external load

Please do not use or store the relay with external load applied to it. Otherwise, the initial performance of the relay will not be maintained.

### (8) About the attachment of magnetic particles

Please do not use the relay in an environment with many magnetic particles. Magnetic particles attached to the cover will not maintain its performance.

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# GENERAL APPLICATION GUIDELINES

## MOUNTING OF RELAYS

### (1) Mounting direction

Mounting direction is important for optimum relay characteristics.

### (2) Shock and vibration resistance

It is ideal to mount the relay so that the movement of contacts and armature is perpendicular to the direction of vibration or shock, as shown in Fig. 10.

### (3) Contact reliability

It is recommended to mount the relays so that the surfaces of its contacts are vertical and in Lipper location of relay inside. Such mounting methods prevent dirt and dust as well as scattered contact material (produced due to large loads from which arcs are

generated) and powdered metal from adhering to them. Furthermore, it is not desirable to switch both a large load and a low level load with a single relay.

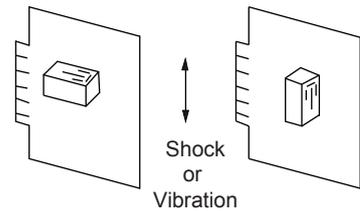
The scattered contact material produced when switching the low level load and may cause contact failure. Therefore, avoid mounting the relay with its low level load contacts located below the large load contacts.

### (4) Adjacent mounting

When many relays are mounted close together, abnormally high temperature may result from the combined heat generated. Mount relays with sufficient spacing between

them to prevent heat buildup. This also applies when a large number of boards mounted with relays are installed as in a card rack. Be sure the ambient temperature of the relays does not exceed the value listed in the catalog.

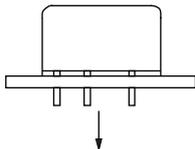
**Fig.10 Direction of relays**



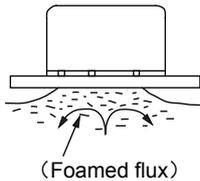
## RELAY SOLDERING AND WASHING GUIDELINES

### Process

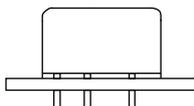
#### 1. Mounting of relay



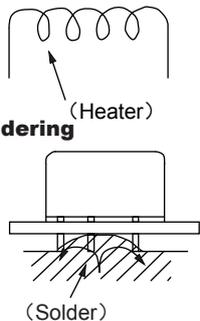
#### 2. Flux coating



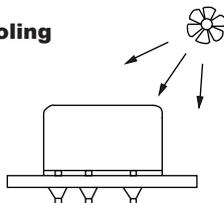
#### 3. Preheating



#### 4. Soldering



#### 5. Cooling



### Guidelines

\*Avoid bending of terminals to make the relay self-clinching.

Relay performance cannot be guaranteed if the terminals are bent.

\*Adjust the position of the PC board so that flux or solder does not overflow onto the top of it.

\*Use of NO clean flux, which is non-corrosive and requires no washing.

\*Do not use Automatic Flux Coating Method to dust-cover type relays.

\*Do not overflow onto the top of PC Board, in such a case, the flux may even penetrate a flux-resistant type relay.

\*Be sure to preheat before soldering.

\*Preheating acts to improve solderability.

\*Preheat according to the following conditions.

Temperature	100°C 212°F or less
Time	Within approx. 1 minute

\*Note that long exposure to high temperatures (e.g. due to a malfunctioning unit) may affect relay characteristics.

### Automatic Wave Soldering

\*Wave soldering is the optimum method for soldering.

\*Adjust the level of solder so that it does not overflow onto the top of the PC board.

\*Unless otherwise specified, solder under the following conditions depending on the type of relay.

Preheat time 20°C-100°C	Rising slope 20°C-120°C	Decreasing slope Peak-150°C	Soldering temperature 255°C-265°C
90±5 seconds	< 3°C/s	< 4°C/s	3-5s

**Hand Soldering** \*Keep the tip of the soldering iron clean.

Solder Iron	30W or 60W
Iron Tip Temperature	Approx. 350°C 662°F
Solder Time	Within approx. 3 seconds

\*Immediate air cooling is recommended to prevent deterioration of the relay and surrounding parts due to soldering heat.

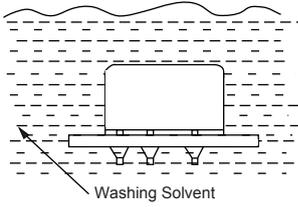
\*Although the sealed type relay can be cleaned, avoid immersing the relay into cold liquid (such as washing solvent) immediately after soldering. Doing so may deteriorate the sealing performance.

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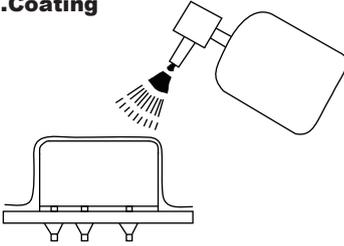
# GENERAL APPLICATION GUIDELINES

## RELAY SOLDERING AND WASHING GUIDELINES

### 6. Washing



### 7. Coating



#### Guidelines

- \* Do not wash flux-resistant type relays and dust cover type relays by immersion.
- \* Careless washing may cause washing solvent to penetrate the relay.
- \* Plastic sealed type relays can be washed by immersion. Use washing solvents shown in Table 6.
- \* Use of other washing solvent may damage the relay case and cover, and also cause washing solvent to penetrate the relay.
- \* Avoid ultrasonic washing on relays. Use of ultrasonic cleaning may cause breaks. In the coil or slight sticking of contacts due to the ultrasonic energy.
- \* If the PC board is to be coated to prevent the insulation of the PC board from deteriorating due to corrosive gases and high temperature, note the following.
- \*\* Do not coat dust-cover type relays and flux-resistant type relays.
- \*\* Depending on the type, some coating materials may have an adverse affect on relays, select coating materials carefully.

**Table 6. Washing solvent compatibility chart for sealed relays**

Washing solvent	
Chlorinated	Chlorothene VG,N Trichloroethylene Perchloroethylene Methylene chloride
Alcohol	Ethanol IPA
Aqueous	Hollis 310 Indusco 624,1000 Lonco Terg

## RELAY TERMINOLOGY: PERFORMANCE

### (1) Operate (Set) time

Time from initial energization to the first opening of closed contact or first closing of open contact. This time does not include any bounce time. In case of latching relays, this is called "Set time". (cf. Fig.1)

### (2) Release (Reset) time

Time from initial de-energization of the relay coil to first opening of closed contact or first closing of open contact. This time does not include any bounce time. In case of latching relays, this is called "Reset time".

This means the time from initial reverse energization of the coil to first opening of closed contact or first closing of open contact. (cf. Fig.1)

### (3) Bounce time

Internally caused intermittent and undesired opening of closed contact or closing of open contacts of a relay. (cf. Fig.1)

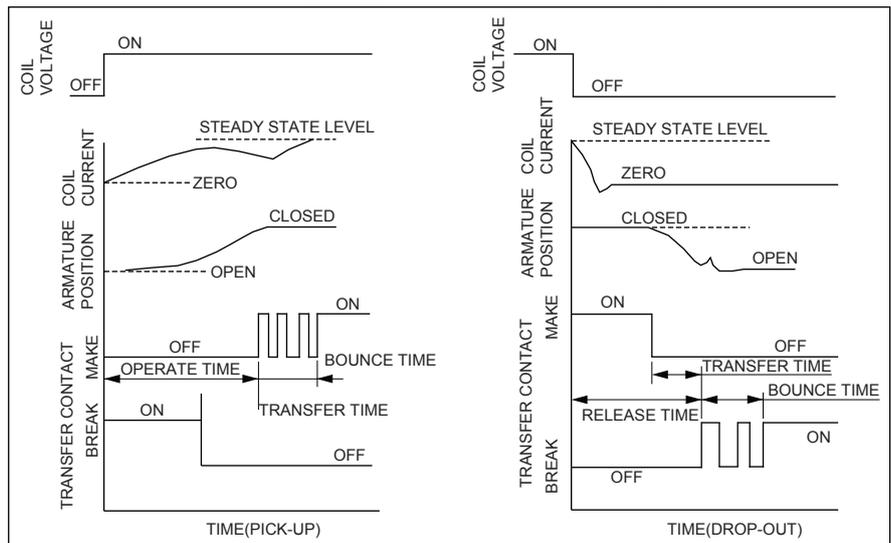
### (4) Dielectric strength

The maximum allowable AC(RMS) voltage (50/60Hz) which may be applied between two specified test points, usually for 1 minute in duration. In general, the maximum leak current is 1 mA.

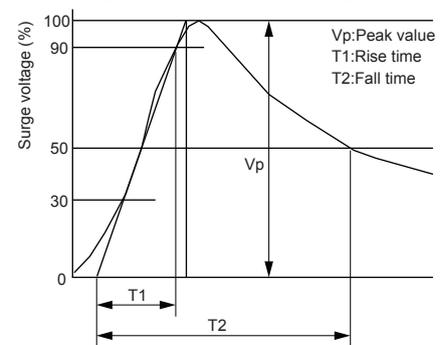
### (5) Surge withstand voltage

The maximum allowable peak surge voltage which may be applied between two specified test points.

**Fig.1 Typical time traces of relay**



**Fig.2 Wave form of Surge test**



Usually, wave form of this test is specified indicating peak value, rise time and fall time. (cf. Fig.2) In FCC Part 66, T1=10  $\mu$ S, Vp 1500V are specified.

### (6) Insulation resistance

The resistance between all mutually insulated conducting sections of the relay. This value changes depending on the ambient temperature and humidity.

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\* SINCE 1976 \*

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# RELAYS

# GENERAL APPLICATION GUIDELINES

## RELAY TERMINOLOGY: PERFORMANCE

### (7) Capacitance

The electrostatic capacitance between mutually insulated conducting sections of the relay. Usually this value is measured at 1 kHz.

### (8) Life

- Mechanical life

The minimum number of operations which the relay can be operated under nominal conditions with no load on the contacts.

- Electrical life

The minimum number of operations which the relay can be operated under nominal conditions with specified load on the contacts.

### (9) Vibration resistance

The resistance to the vibration applicable to the relay, expressed as a displacement and frequency range.

- Functional

The vibration which can be applied to the relay during service without causing the openings of the closed contacts for more than the specified time.

- Destructive

The vibration which can be allowed by the relay during shipping, installation, without damages and changes in its operating characteristics.

### (10) Shock resistance

The resistance to the shock applicable to the relay, expressed as an acceleration in G.

- Functional

The shock can be applied to the relay during service without causing the openings of the closed contacts for more than the specified time.

- Destructive

The shock which can be allowed by the relay during shipping, installation, without damage and changes in its operating characteristics.

### (11) Temperature range

The range of ambient temperature in which the relay can be used without damage in its characteristics or functions.

### (12) Safely standard

Standard for the prevention of electric shock hazards and fire accidents differs in content from country to country.

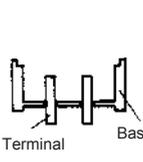
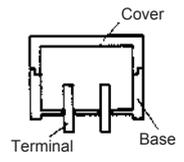
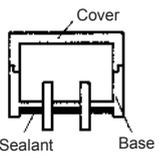
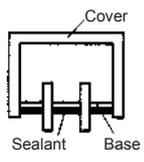
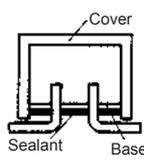
UL(U.S.A.) VDE(Germay) BS(G.B.) SEMKO(Sweden) CSA(Canada)

### (13) Structure of relays

Relays are classified in 4 types as Fig. 3 by the structure of terminals, cover and case, and mounting method of the relay.

Fig. 3 Structure of relays

(Y:Yes N:No)

Item	Open Type	Dust cover Type	Flux Tight Type	Sealed Type	Surface Mount Type
Structure					
Characteristics	Unprotected shell	Most basic construction and there is gap between cover and base, and between base and terminals.	Terminals are sealed with base by sealant. The joint level between cover and base is higher than the PC board surface.	All the gaps between case and base, base and terminals are sealed by sealant.	All the gaps between case and base, base and terminals are sealed by sealant. Terminals are formed in "L" shape intended to be soldered by reflow soldering.
Mounting Method	Insertion mounting	Insertion mounting	Insertion mounting	Insertion mounting	Surface mounting
Automatic Flux Coating	N	N	Y	Y	Y
Automatic Soldering	N	N	Y	Y	Y
Automatic Washing	N	N	N	Y(Note 1)	Y(Note 1)
Manual Soldering	N	N	Y	Y	-
Environmental Gas Resistance	N	N	N	Y(Note 2)	Y(Note 2)

Note1:It is needed to select suitable washing solvent.

Note2:In explosive gas environment, use the metallic hermetic seal types.

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# GENERAL APPLICATION GUIDELINES

## Failure analysis

The following table describes the failure analysis table when there is a problem with the relay operation. Please check the circuit etc. according to the table below. In addition, if no abnormality is found during circuit inspection, and it is estimated that the fault is caused by the relay, please consult the sales staff of our company (please do not disassemble the relay, otherwise the cause of the fault cannot be determined).

The relay consists of a coil part, a contact part, an iron core part, and other structural parts, but the most prone to failure of these parts is the contact part, followed by the coil part. However, most of these failures are caused by external factors such as usage methods and usage conditions. Therefore, full research can be done before use, and most failures can be prevented after the correct choice is made.

The following table lists the main failure modes of related relays, and lists the possible causes and countermeasures.

Failure	Causes	Countermeasures
(1)Maloperation	<ul style="list-style-type: none"> <li>①Rated coil voltage selection error</li> <li>②Bad wiring</li> <li>③No input signal</li> <li>④Power supply voltage drop</li> <li>⑤Circuit voltage drop(Especially when working with large machines nearby or when wiring for long distances)</li> <li>⑥The working voltage (inductive voltage) rises due to the rise of the ambient temperature(Especially DC type)</li> <li>⑦Open Coil</li> </ul>	<ul style="list-style-type: none"> <li>①Reselect the rated voltage</li> <li>②Confirm the voltage between the coil terminals</li> <li>③Confirm the voltage between the coil terminals</li> <li>④Confirm the power supply voltage</li> <li>⑤Confirm the circuit voltage</li> <li>⑥Relay individual action test</li> <li>⑦ · Refer to item (3) when caused by burnout · When it is caused by electrical corrosion, confirm the polarity of the coil voltage</li> </ul>
(2)Reset failure	<ul style="list-style-type: none"> <li>①Input signal disconnection failure</li> <li>②The circuitous line causes voltage to be applied to the coil</li> <li>③Residual voltage caused by combination circuits such as semiconductor circuits</li> <li>④Coil and capacitor in parallel cause reset delay</li> <li>⑤Welding of contacts</li> </ul>	<ul style="list-style-type: none"> <li>①Confirm the voltage between the coil terminals</li> <li>②Confirm the voltage between the coil terminals</li> <li>③Confirm the voltage between the coil terminals</li> <li>④Confirm the voltage between the coil terminals</li> <li>⑤For welding, please refer to item (4)</li> </ul>
(3)Coil burnt out	<ul style="list-style-type: none"> <li>①Improper voltage applied to the coil</li> <li>②Rated coil voltage selection error</li> <li>③Short circuit between coil layers</li> </ul>	<ul style="list-style-type: none"> <li>①Reselect the rated voltage</li> <li>②Reconfirm the use environment</li> <li>③Reconfirm the use environment</li> </ul>
(4)Contact welding	<ul style="list-style-type: none"> <li>①The connected load equipment is too large(insufficient contact capacity)</li> <li>②Switching frequency is too high</li> <li>③Short circuit of load circuit</li> <li>④Buzzer causes abnormal switching of contacts</li> <li>⑤Reach the specified number of durability</li> </ul>	<ul style="list-style-type: none"> <li>①Confirm load capacity</li> <li>②Confirm switch times</li> <li>③Confirm load circuit</li> <li>④Refer to the buzzer section of item (7)</li> <li>⑤Confirm contact rating</li> </ul>
(5)Poor contact	<ul style="list-style-type: none"> <li>①Contact surface oxidation</li> <li>②Contact wear and deterioration</li> <li>③Poor use leads to terminal dislocation and contact dislocation</li> </ul>	<ul style="list-style-type: none"> <li>① · Reconfirm the use environment · Reselect relay</li> <li>②Reach the specified number of durability</li> <li>③Note when using: · Vibration and shock resistance · Welding operation</li> </ul>
(6)Abnormal consumption of contacts	<ul style="list-style-type: none"> <li>①Relay selection is not suitable</li> <li>②Insufficient consideration of load equipment(especially motor load, solenoid load, tungsten load)</li> <li>③No contact protection circuit</li> <li>④Insufficient withstand voltage between adjacent contacts</li> </ul>	<ul style="list-style-type: none"> <li>①Reselect</li> <li>②Reselect</li> <li>③Add spark suppression circuit, etc.</li> <li>④Reselect relay</li> </ul>
(7)Buzz	<ul style="list-style-type: none"> <li>①Insufficient voltage applied to the coil</li> <li>②Excessive power ripple (DC type)</li> <li>③Rated coil voltage selection error</li> <li>④Input voltage rises slowly</li> <li>⑤Wear of iron core parts</li> <li>⑥Foreign matter is mixed in between the movable spring and the iron core</li> <li>⑦Relay Buzz when both coils are energized at the same time for 2 coil latching relay</li> </ul>	<ul style="list-style-type: none"> <li>①Confirm the voltage between the coil terminals</li> <li>②Confirm ripple factor</li> <li>③Reselect the rated voltage</li> <li>④Circuit addition changes</li> <li>⑤Reach the specified number of durability</li> <li>⑥Remove foreign matter</li> <li>⑦Avoid energizing both coil at the same time</li> </ul>

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