# Relays

# Reed Relays

# Reed Switches

Factory:

Hasco (Suzhou) Electronics Company Ltd.

SuZhou China

HASCO

Relays · Reed Relays · Reed Switches


**Hasco Relays & Electronics Int'l Corp**

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# 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.

Our products are extensively implemented throughout the automotive, aerospace, fire, safety, security, and telecom industries; in lighting controls, liquid level sensors, HVAC, UPS units and industrial controls.

Doing business with HASCO RELAYS AND ELECTRONICS INTERNATIONAL CORP. offers our customers many advantages:

- We maintain a large on-hand inventory of relays, reed relays, reed switches and magnets; available for immediate direct or drop-shipping worldwide, from either of our two distribution centers.
- We offer person-to-person telephone support including access to our in-house engineers, who are available for design advice and technical support.
- We have over 16 Sales Representative offices located throughout the U.S.A. and worldwide for sales support.
- We offer free samples and literature upon request.
- SERVICE IS OUR MOST IMPORTANT PRODUCT

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# Table of Contents

# BAS/BS/SC SERIES SPDT 1,2,5 Amp

File No.:E75887


## FEATURES

- FCC Pt 68
- Small Package
- Fully sealed
- PC Pin
- Sensitive type and standard type are available

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1C |
| Contact Resistance | 100mΩ (1A 24VDC) |
| Contact Material | AgNi，Gold FLash，Silver Alloy |
| Contact Rating(Resistive) | 1A 125VAC/30VDC<br>1A 240VAC/30VDC<br>2A 125VAC,3A 120VAC<br>5A/120VAC |
| Max. Switching Voltage | 120VAC/30VDC |
| Max. Switching Current | 2A DC/AC BAS,BS,SC<br>5A DC/AC BAS 511 |
| Max. Switching Power | 600VA/60W |
| Mechanical Life | $5\times10^6$ operations |
| Electrical Life | $5\times10^5$ operations resistive load 24VDC,1A<br>$1\times10^5$ operations resistive load 120VAC,0.5A |

## 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 |
| Ambient temperature | | -25°C ~ +70°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 4g |
| Construction | | Sealed、Covered |

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

## ORDERING INFORMATION

BAS 111 DC12 GF - 1 - XXX

- Model
- Coil Power:111=Standard type
  511=Standard type heavy load
- Coil Voltage
- GF:Gold Flash Contacts NIL:No Gold Flash
- 1:Covered Nil:Sealed
- Customer code

BS/SC 211 DC12 GF - 1 - XXX

- Model
- Coil Power:211=Sensitive type
- Coil Voltage
- GF:Gold Flash Contacts NIL:No Gold Flash
- 1:Covered Nil:Sealed
- Customer code

## COIL DATA at 23°C

Standard Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±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 | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±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 |

# BAS/BS/SC SERIES SPDT 1,2,5 Amp

## COIL

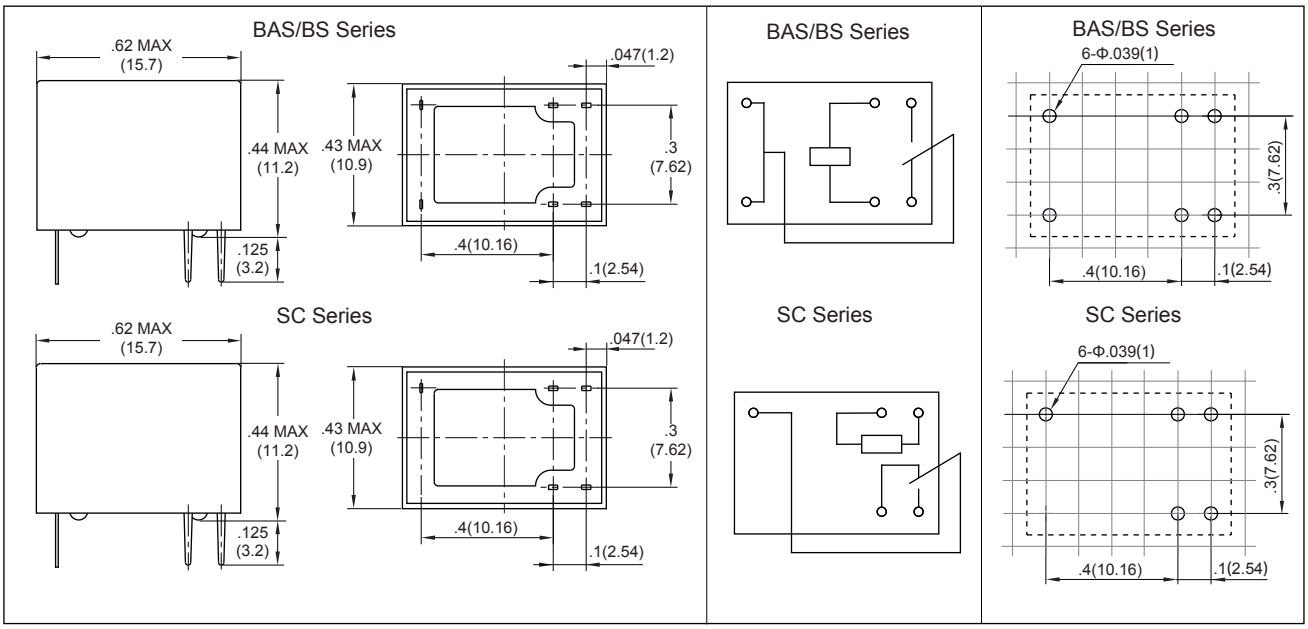
| | |
|---|---|
| Coil Power | Standard Type: 450mW |
| | Sensitive Type: 200mW |

## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 1A 125VAC/30VDC<br>1A 240VAC/30VDC<br>2A 125VAC,3A 120VAC<br>5A/120VAC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

Outline Dimensions | Wiring Diagram (Bottom view) | PCB Layout (Bottom view)

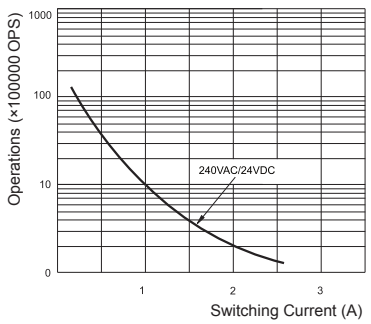



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

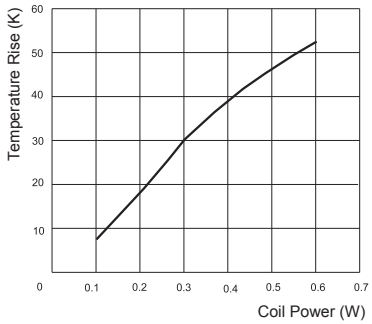
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

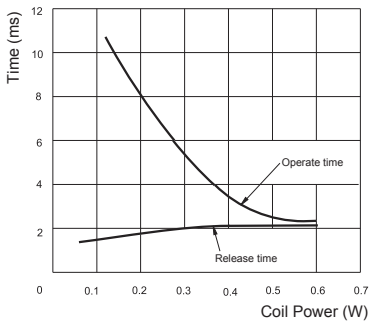
ENDURANCE CURVE




COIL TEMPERATURE RISE



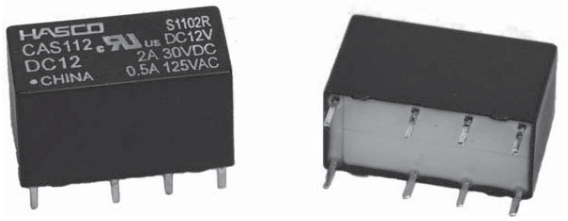

OPERATE TIME




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

# CAS/CS SERIES DPDT 2 Amp

File No.:E75887




## FEATURES

- Sensitive type and standard type are available
- Fully sealed

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 2C |
| Contact Resistance | 50mΩ(0.1A 6VDC) |
| Contact Material | AgNi，Gold FLash，Silver Alloy |
| Contact Rating(Resistive) | 2A/30VDC<br>2.5A/12VDC<br>0.5A/125VAC<br>0.6A/120VAC |
| Max. Switching Voltage | 150VAC/125VDC |
| Max. Switching Current | 2A |
| Max. Switching Power | 75VA/60W |
| Mechanical Life | $2\times10^7$ operations |
| Electrical Life | $2\times10^6$ operations resistive load 20mV 1KHz,1mA |

## 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, 40°C |
| Ambient temperature | | -25°C ~ +85°C |
| Shock Resistance | Functional | 196m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 5g |
| Construction | | Sealed |

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

## ORDERING INFORMATION

CAS112/CS212 DC12 - XXX

Model:
CAS112=Standard type
CS212=Sensitive type

Coil Voltage:3, 5, 6, 9, 12, 18, 24, 48VDC

Customer code

## COIL DATA at 20°C

### Standard Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 3.75 | 0.25 | 7.8 | 45 |
| 6 | 4.50 | 0.30 | 9.7 | 70 |
| 9 | 6.75 | 0.45 | 12.6 | 140 |
| 12 | 9.00 | 0.60 | 19.4 | 280 |
| 24 | 18.72 | 1.20 | 37.6 | 1070 |
| 48 | 36.00 | 2.40 | 74.2 | 4300 |

### Sensitive Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 3.75 | 0.40 | 15.0 | 167 |
| 6 | 4.50 | 0.48 | 18.0 | 240 |
| 9 | 6.75 | 0.72 | 27.0 | 540 |
| 12 | 9.00 | 0.96 | 35.6 | 960 |
| 18 | 12.96 | 1.44 | 53.4 | 2160 |
| 24 | 18.72 | 1.92 | 70.1 | 3840 |
| 48 | 36.00 | 3.84 | 99.1 | 7680 |

# CAS/CS SERIES DPDT 2 Amp

## COIL

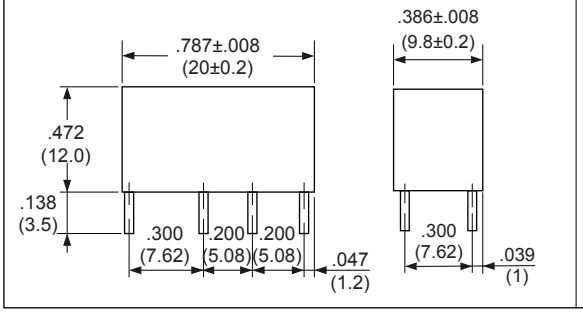
| | |
|---|---|
| Coil Power | Standard Type:500mW ~ 580mW |
| | Sensitive Type:150mW 48V:300mW |

## SAFETY APPROVAL RATINGS

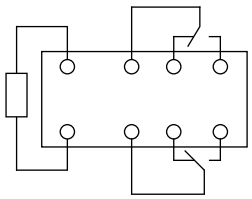
| | |
|---|---|
| UL&CUL | 2A/30VDC<br>2.5A/12VDC<br>0.5A/125VAC<br>0.6A/120VAC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

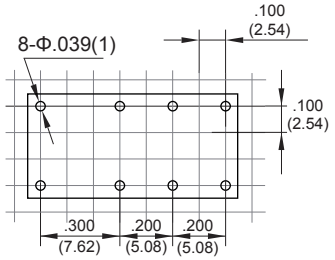
Outline Dimensions




Wiring Diagram (Bottom view)



PCB Layout (Bottom view)

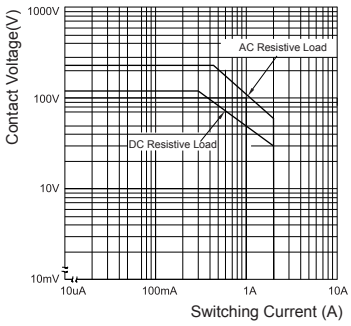



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

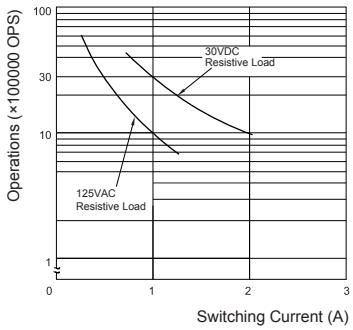
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER




ENDURANCE CURVE




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

# HAS/HS SERIES DPDT 2 Amp

File No.:E75887


## FEATURES

- High sensitive 2 pole relay suitable for signal circuit
- Adopts twin contacts that are superior in contact reliability
- Completely enclosed type relay with sealed construction being superior in durability to the environment
- BABT Certificate NO.609662

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 2C |
| Contact Resistance | 50mΩ (0.1A 6VDC) |
| Contact Material | AgNi，Gold FLash，Silver Alloy |
| Contact Rating(Resistive) | 0.5A 125VAC，2A 30VDC |
| Max. Switching Voltage | 250VAC/220VDC |
| Max. Switching Current | 2A |
| Max. Switching Power | 125VA/60W |
| Mechanical Life | $1\times10^8$ operations |
| Electrical Life | $3\times10^5$ operations (2A 30VDC)<br>$1\times10^6$ operations (1A 30VDC) |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 100MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 1500VAC 1min |
| | Between open contacts | 1000VAC 1min |
| Operate time (at nomi. volt.) | | ≤5ms |
| Release time (at nomi. volt.) | | ≤3.5ms |
| Humidity | | Max.85% RH |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 490m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 4.5g |
| Construction | | Sealed |

## ORDERING INFORMATION

HAS112/HS212 DC12 - XXX

Model:
HAS112=Standard type
HS212=Sensitive type

Coil Voltage:5, 6, 9, 12, 24, 48VDC

Customer code

## COIL DATA at 23°C

### Standard Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 3.5 | 0.5 | 7.5 | 62.5 |
| 6 | 4.2 | 0.6 | 9.0 | 90 |
| 9 | 6.3 | 0.9 | 13.5 | 203 |
| 12 | 8.4 | 1.2 | 18.0 | 360 |
| 24 | 16.8 | 2.4 | 36.0 | 1440 |
| 48 | 33.6 | 4.8 | 72.0 | 5760 |

### Sensitive Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 4.0 | 0.5 | 11.5 | 167 |
| 6 | 4.8 | 0.6 | 13.8 | 240 |
| 9 | 7.2 | 0.9 | 20.7 | 400 |
| 12 | 9.6 | 1.2 | 27.6 | 960 |
| 24 | 19.2 | 2.4 | 55.2 | 3840 |
| 48 | 38.4 | 4.8 | 110.4 | 15360 |

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

# HAS/HS SERIES DPDT 2 Amp

## COIL

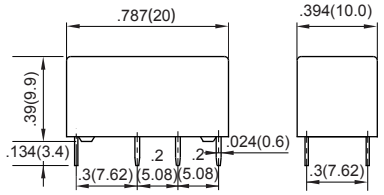
| | |
|---|---|
| Coil Power | Standard Type:400mW<br>Sensitive Type:150mw |
| Temperature rise | ≤65K |

## SAFETY APPROVAL RATINGS

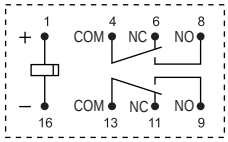
| | |
|---|---|
| UL&CUL | 0.5A 60VDC<br>2A 25VDC<br>2A 30VDC<br>1A 100VAC<br>(Industrial control,business equipment)<br>1A 120VAC<br>2A 125VAC(Telephone equipment)<br>3A 30VDC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

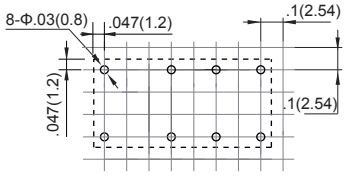
Outline Dimensions




Wiring Diagram (Bottom view)




PCB Layout (Bottom view)

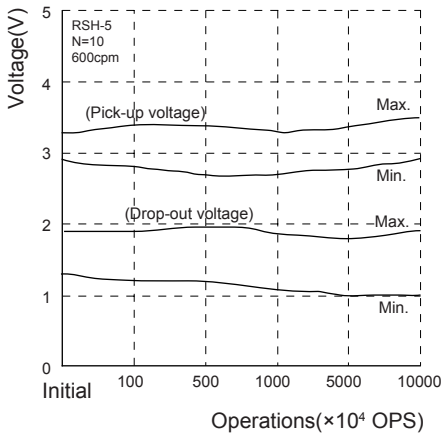



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

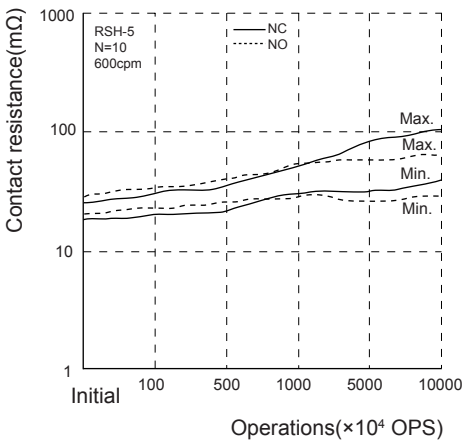
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

Mechanical life test

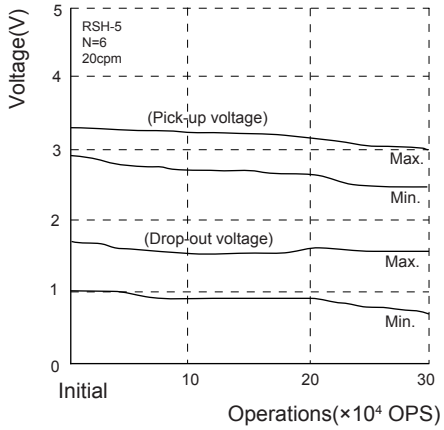



Mechanical life test

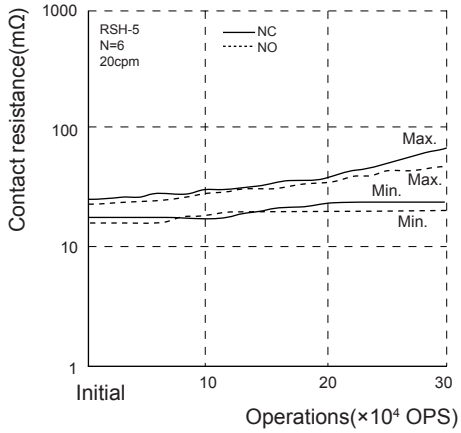


## CHARACTERISTIC CURVES

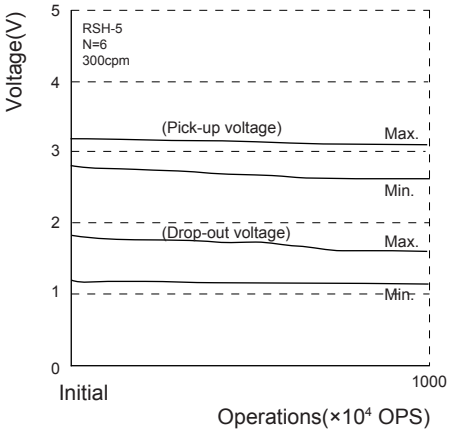
Electrical life test
(2A 30VDC resistive load )



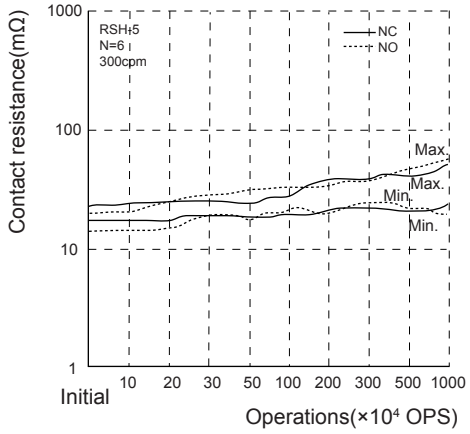

Electrical life test
(2A 30VDC resistive load )




Contact reliability test
(DC 10V-10mA,300cpm,70°C)



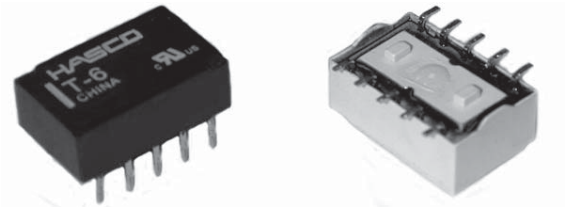

Contact reliability test
(DC 10V-10mA,300cpm,70°C)



# T SERIES DPDT 1 Amp

c UL us
File No.:E75887

RoHS Compliant




## 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
- Dual-in line packaging arrangement fits 1C socket
- Single latching type available
- Fully sealed (immersion cleanable)

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 2C |
| Contact Resistance | 100mΩ (0.1A 6VDC) |
| Contact Material | AgNi，Gold FLash，Silver Alloy |
| Contact Rating(Resistive) | 0.5A 125VAC,1A 30VDC |
| Max. Switching Voltage | 125VAC/110VDC |
| Max. Switching Current | 1A |
| Max. Switching Power | 62.5VA/30W |
| Mechanical Life | $1\times10^8$ operations |
| Electrical Life | $2\times10^5$ operations 1A 30VDC<br>$1\times10^5$ operations 0.5A 125VAC |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (500VDC) |
| Dielectric Strength | Between coil & contacts<br>Between open contacts<br>Between 2 pole contacts | 1000VAC<br>750VAC<br>1000VAC |
| Surge withstand voltage | Between coil & contacts<br>Between open contacts<br>Between 2 pole contacts | 1500VAC<br>1500VAC<br>1500VAC |
| Operate time (at nomi. volt.) | | ≤3ms |
| Release time (at nomi. volt.) | | ≤3ms |
| Humidity | | 98% RH, 40°C |
| Ambient temperature | | -40°C ~ +70°C |
| Shock Resistance | Functional | 490m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | Functional | 10Hz to 55Hz 3mm DA |
| | Destructive | 10Hz to 55Hz 5mm DA |
| Unit weight | | Approx. 1.5g |
| Construction | | Wash tight sealed |

## ORDERING INFORMATION

T L - 12 - XXX

Model

Operating function:
Nil=Single side stable L=1 coil latching
S=Surface mount

Coil Voltage:3, 5, 6, 9, 12, 24VDC

Customer code

## COIL DATA at 20°C

### Single side stable

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 3 | 2.25 | 0.3 | 4.5 | 64.4 |
| 5 | 3.75 | 0.5 | 7.5 | 178 |
| 6 | 4.50 | 0.6 | 9.0 | 257 |
| 9 | 6.75 | 0.9 | 13.5 | 579 |
| 12 | 9.00 | 1.2 | 18.0 | 1028 |
| 24 | 18.00 | 2.4 | 36.0 | 2880 |

### 1 coil latching

| Nominal Voltage VDC | Action Voltage (Max.) VDC | Reset Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 3 | 2.25 | 2.25 | 4.5 | 90 |
| 5 | 3.75 | 3.75 | 7.5 | 250 |
| 6 | 4.50 | 4.50 | 9.0 | 360 |
| 9 | 6.75 | 6.75 | 13.5 | 810 |
| 12 | 9.00 | 9.00 | 18.0 | 1440 |
| 24 | 18.00 | 18.00 | 36.0 | 3840 |

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

# T SERIES DPDT 1 Amp

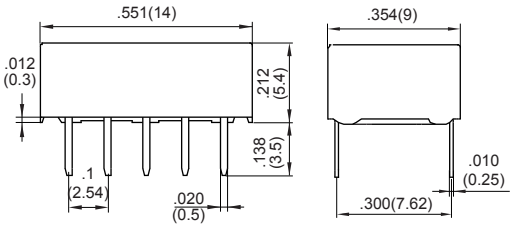
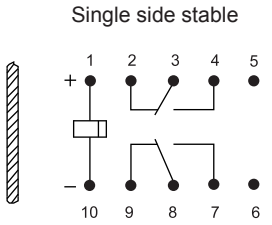
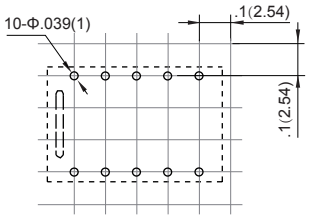
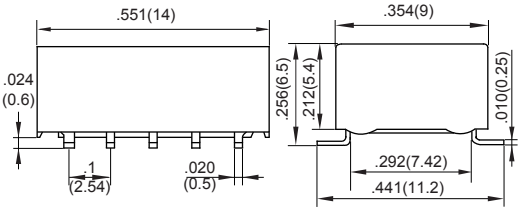
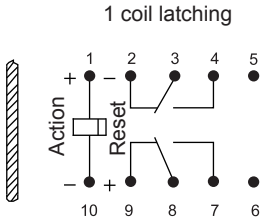
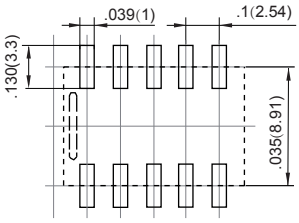
## COIL

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

## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 0.5A/125VAC<br>1A/30VDC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

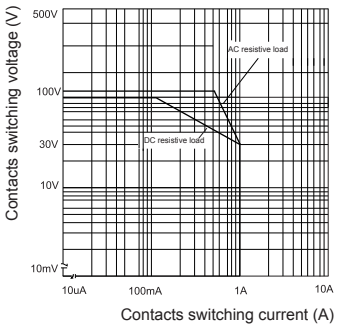
| | Outline Dimensions | Wiring Diagram (Bottom view) | PCB Layout (Bottom view) |
|---|---|---|---|
| Biserial straight pin |  |  |  |
| Surface mount |  |  |  |

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.

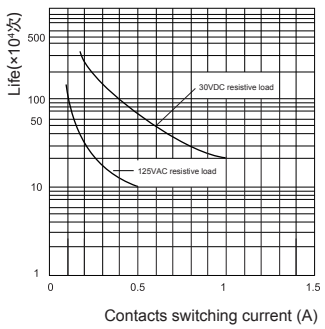
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

Max. switching power curve



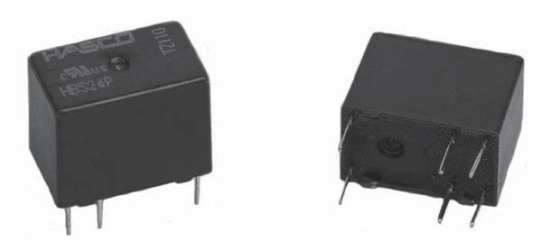

Life curve




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

# HBS SERIES SPDT 1 Amp

File No.:E75887



## FEATURES

- Small size
- Fully sealed

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1C |
| Contact Resistance | 100mΩ (0.1A 6VDC) |
| Contact Material | AgSnO，Silver Alloy |
| Contact Rating(Resistive) | 0.5A/125VAC 30VDC |
| Max. Switching Voltage | 125VAC/60VDC |
| Max. Switching Current | 1A |
| Max. Switching Power | 62.5VA/30W |
| Mechanical Life | $1\times10^5$ operations |
| Electrical Life | $1\times10^7$ operations |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 1000VAC 1min |
| | Between open contacts | 400VAC 1min |
| Operate time (at nomi. volt.) | | ≤5ms |
| Release time (at nomi. volt.) | | ≤5ms |
| Humidity | | 35% ~ 85% RH |
| Ambient temperature | | -30°C ~ +70°C |
| Shock Resistance | | 98m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 3.3mm |
| Unit weight | | Approx. 2.2g |
| Construction | | Covered |

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

## ORDERING INFORMATION

HBS 12 S P - XXX

- Model
- Coil Voltage
- S:Sensitive Nil:Standard
- P:PCB
- Customer code

## COIL DATA at 20°C

### Standard Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 1.5 | 1.20 | 0.15 | 2.25 | 11.3 |
| 3 | 2.40 | 0.30 | 4.5 | 45 |
| 5 | 4.00 | 0.50 | 7.5 | 125 |
| 6 | 4.80 | 0.60 | 9.0 | 180 |
| 9 | 7.20 | 0.90 | 13.5 | 405 |
| 12 | 9.60 | 1.20 | 18.0 | 720 |
| 24 | 19.20 | 2.40 | 36.0 | 2880 |

### Sensitive Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 1.5 | 1.20 | 0.15 | 2.25 | 15 |
| 3 | 2.40 | 0.30 | 4.5 | 60 |
| 5 | 4.00 | 0.50 | 7.5 | 167 |
| 6 | 4.80 | 0.60 | 9.0 | 240 |
| 9 | 7.20 | 0.90 | 13.5 | 540 |
| 12 | 9.60 | 1.20 | 18.0 | 960 |
| 24 | 19.20 | 2.40 | 36.0 | 3840 |

# HBS SERIES SPDT 1 Amp

## COIL

| | |
|---|---|
| Coil Power | Standard Type:200mW |
| | Sensitive Type:150mW |

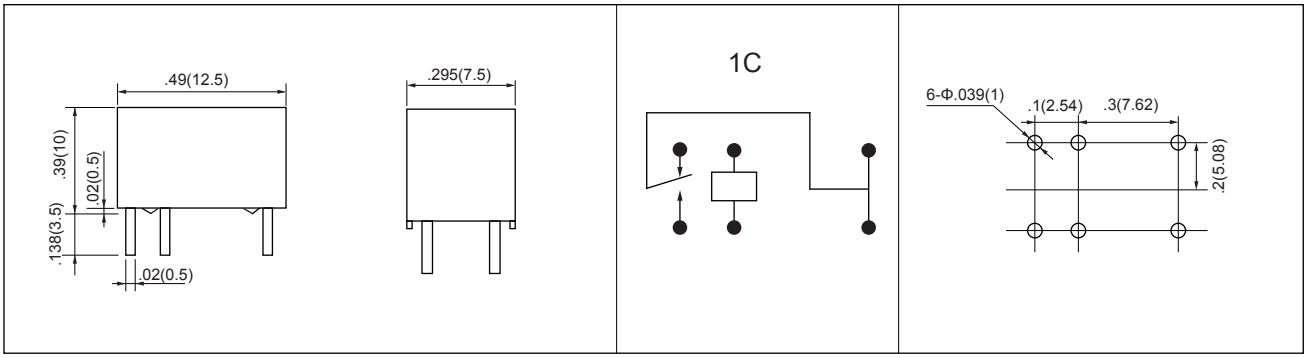
## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL/CUL | 0.1A/30VDC<br>0.3A/60VDC<br>0.5A/125VAC |

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

Unit: inch(mm)

Outline Dimensions | Wiring Diagram (Bottom view) | PCB Layout (Bottom view)

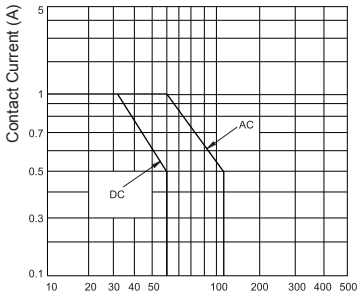



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

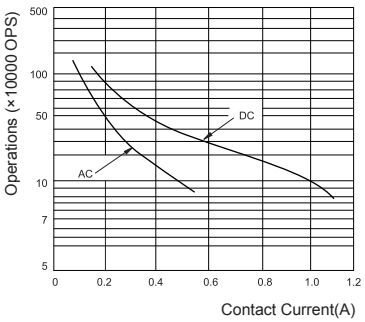
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER




ENDURANCE CURVE




Notice:

(1) To avoid using relay under strong magnetic field which will change the parameters of relays such as pick-up voltage and drop-out voltage.

(2) The relay may be damaged because of falling or when shocking conditions exceed the requirement.

(3) Regarding the plastic sealed relay, we should leave it cooling naturally untill below 40°C after welding, then clean it and deal with coating, remarkably the temperature of solvents should also be controlled below 40°C. Please avoid cleaning the relay by ultrasonic, avoid using the solvents like gasoline, Freon, and so on, which would affect the configuration of relay or influence the environment.

(4) About preferable condition of operation, storage and transportation, please refer to “Relays Terminology”.

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

# TR SERIES SPST-NO 3,5 Amp


RoHS Compliant

Application for CUL/TUV

## FEATURES

- 5A switching capability
- The width less than 7.2mm, Suitable for high density mounting
- 10kV impulse withstand voltage between coil and contacts
- Highly sensitivity: 200mW
- Outline Dimensions: (20.5×7.2×15.3)mm

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A |
| Contact Resistance | 100mΩ(1A 24VDC) |
| Contact Material | AgSnO，Gold FLash，Silver Alloy |
| Contact Rating(Resistive) | 3A/5A 250VAC/30VDC |
| Max. Switching Voltage | 277VAC/30VDC |
| Max. Switching Current | 5A |
| Max. Switching Power | 1385VA/150W |
| Mechanical Life | $5\times10^6$ operations |
| Electrical Life | $1.2\times10^5$ operations |

## ORDERING INFORMATION

TR 1A 5 DC12 S - GF - XXX

- Model
- 1A: 1 Form A
- 5=5A 3=3A
- Coil Voltage
- S:Sealed Nil:Covered
- GF:Gold Flash Contacts Nil:No Gold Flash
- Customer Code

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 4000VAC 1min |
| | Between open contacts | 1000VAC 1min |
| Surge Voltage(Between coil & contacts) | | 10kV(1.2×50μs) |
| Operate time (at nomi. volt.) | | ≤10ms |
| Release time (at nomi. volt.) | | ≤10ms |
| Humidity | | 98% RH, 40°C |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 3g |
| Construction | | Sealed, Covered |

## COIL DATA at 23°C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 3 | 2.25 | 0.18 | 3.90 | 45 |
| 5 | 3.75 | 0.25 | 6.50 | 125 |
| 6 | 4.50 | 0.30 | 7.80 | 180 |
| 9 | 6.75 | 0.45 | 11.70 | 405 |
| 12 | 9.00 | 0.60 | 15.60 | 720 |
| 18 | 13.50 | 0.90 | 23.40 | 1620 |
| 24 | 18.00 | 1.20 | 31.20 | 2880 |

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

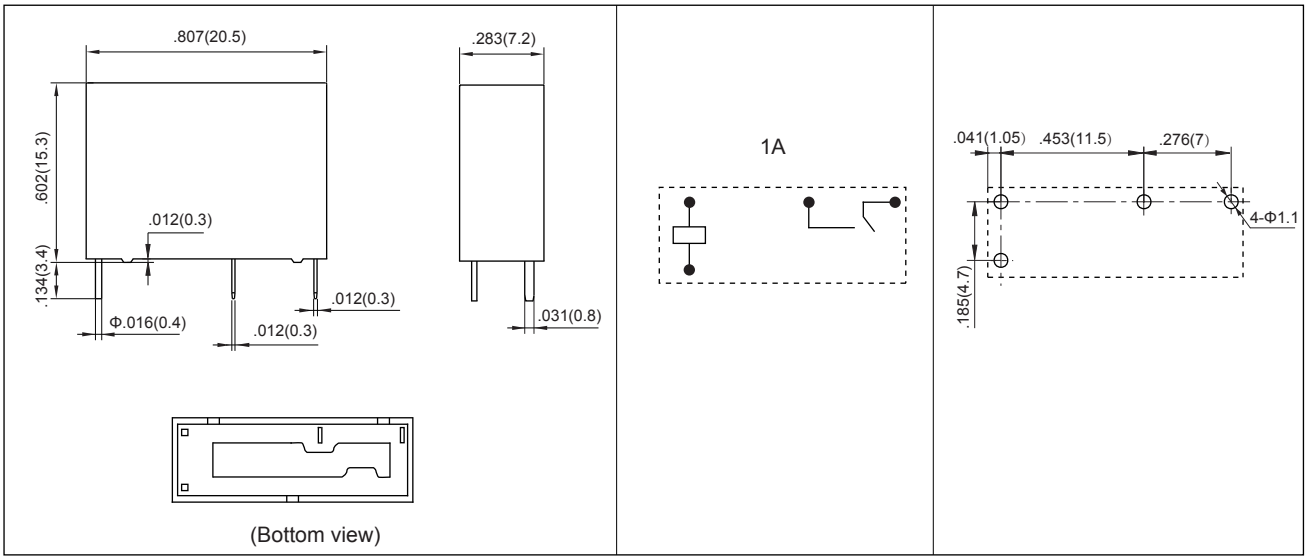
# TR SERIES SPST-NO 3,5 Amp

## COIL

| | |
|---|---|
| Coil Power | 200mW |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

Outline Dimensions | Wiring Diagram (Bottom view) | PCB Layout (Bottom view)

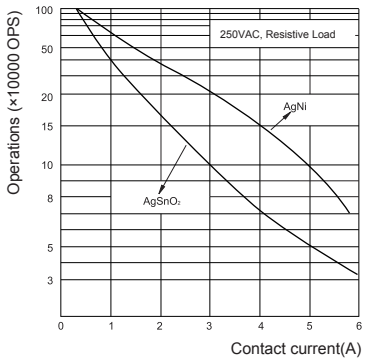



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

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

## CHARACTERISTIC CURVES

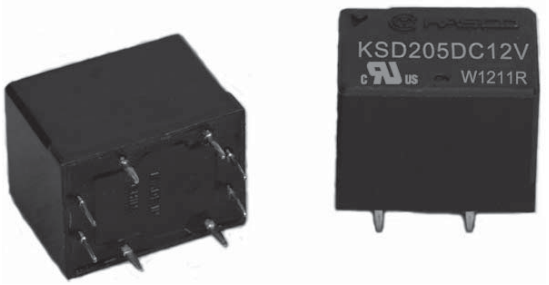
ENDURANCE CURVE



# KSD205 SERIES DPDT 6 Amp

c UL us
File No.:E75887

RoHS Compliant




## FEATURES

- Miniature Two Pole Relay
- High Reliability
- 6 Amp Switching
- Fully Sealed
- Low Cost

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 2C |
| Contact Resistance | 50mΩ (1A 24VDC) |
| Contact Material | AgSnO，AgNi |
| Contact Rating(Resistive) | 5A/30VDC 6A/240VAC |
| Max. Switching Voltage | 250VAC/125VDC |
| Max. Switching Current | 6A |
| Max. Switching Power | 1440VA/150W |
| Mechanical Life | $1\times10^7$ operations |
| Electrical Life | $1\times10^5$ operations |

## ORDERING INFORMATION

KSD205 DC12V - XXX

Model

Coil Voltage:
5, 6, 9, 12, 24VDC

Customer code

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 100MΩ (500VDC) |
| Dielectric Strength | Between coil & contacts | 1500VAC 1min |
| | Between open contacts | 750VAC 1min |
| Operate time (at nomi. volt.) | | ≤10ms |
| Release time (at nomi. volt.) | | ≤5ms |
| Humidity | | 40 ~ 85% RH |
| Ambient temperature | | -25°C ~ +60°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 10g |
| Construction | | Sealed |

## COIL DATA at 20°C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 3 | 2.1 | 0.3 | 4.5 | 15 |
| 5 | 3.5 | 0.5 | 7.5 | 42 |
| 6 | 4.2 | 0.6 | 9.0 | 60 |
| 9 | 6.3 | 0.9 | 13.5 | 135 |
| 12 | 8.4 | 1.2 | 18.0 | 240 |
| 24 | 16.8 | 2.4 | 36.0 | 960 |

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

# KSD205 SERIES DPDT 6 Amp

## COIL

| | |
|---|---|
| Coil Power | 600mW |

## SAFETY APPROVAL RATINGS

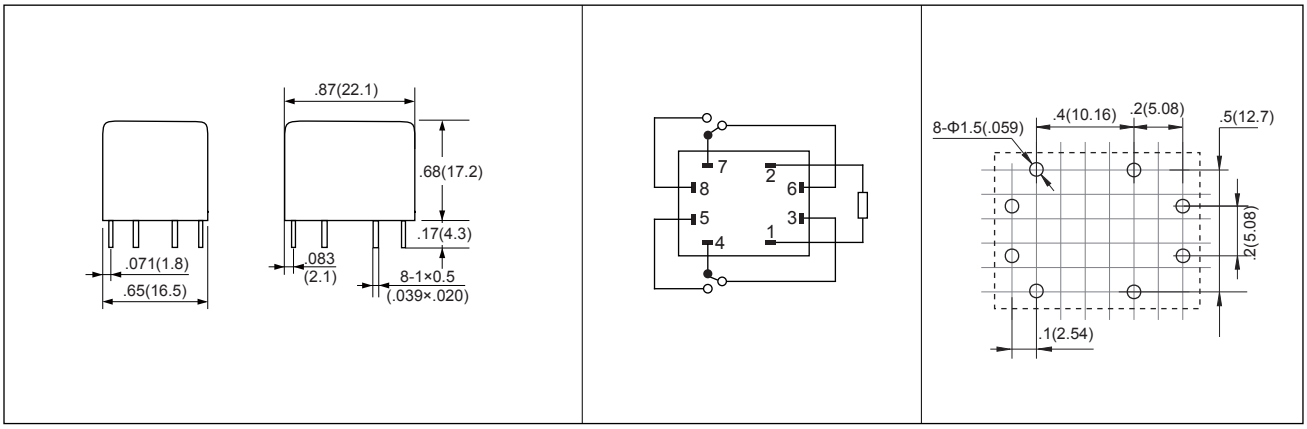
| | |
|---|---|
| UL&CUL | 5A/30VDC<br>6A/240VAC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

Outline Dimensions

Wiring Diagram (Bottom view)

PCB Layout (Bottom view)

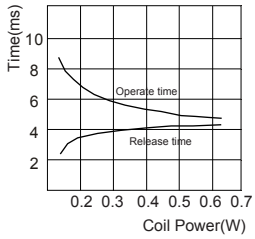



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

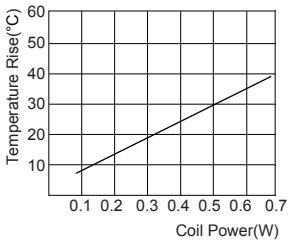
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

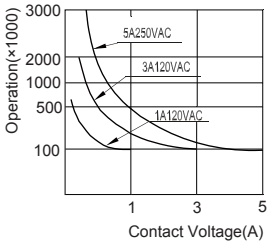
Operate time



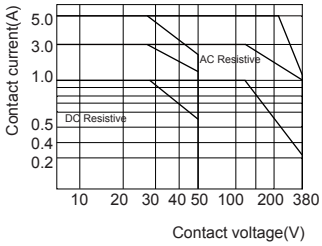

Coil Temp Rise




Life




Contact switching capacity



# RPR SERIES SPDT 10 Amp

c UL us
File No.:E75887

RoHS Compliant


## FEATURES

- 10A switching capability
- 1 Form A and 1 Form C configurations
- Subminiature, standard PCB layout
- Plastic sealed and flux proofed types available
- Outline Dimensions:(18.4×10.2×15.3)mm

## CONTACT RATINGS

| | | | |
|---|---|---|---|
| Contact Arrangement | 1A | | 1C |
| Contact Resistance | 100mΩ (1A 6VDC) | | |
| Contact Material | AgSnO, Silver Alloy | | |
| Contact Rating(Resistive) | Standard type | Sensitive type | Standard type |
| | 5A/250VAC<br>5A/30VDC<br>10A/125VAC | 3A/250VAC<br>3A/30VDC | 3A/250VAC<br>3A/30VDC |
| Max. Switching Voltage | 250VAC/30VDC | | |
| Max. Switching Current | 10A | | |
| Max. Switching Power | 1250VA/150W | | |
| Mechanical Life | $1\times10^7$ operations | | |
| Electrical Life | $1\times10^5$ operations | | |

## 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 |
| Ambient temperature | | -40°C ~ +70°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 6g |
| Construction | | Sealed、Covered |

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

## ORDERING INFORMATION

RPR F 1A 12 -1 S - XXX

- Model
- F:Class F Nil:Class B
- 1A:1 Form A 1C:1 Form C
- Coil Voltage
- 1:Covered Nil:Sealed
- S:Sensitive type Nil:Standard type
- Customer code

## COIL DATA at 20°C

### Standard Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out 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 |

### Sensitive Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±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 |

# RPR SERIES SPDT 10 Amp

## COIL

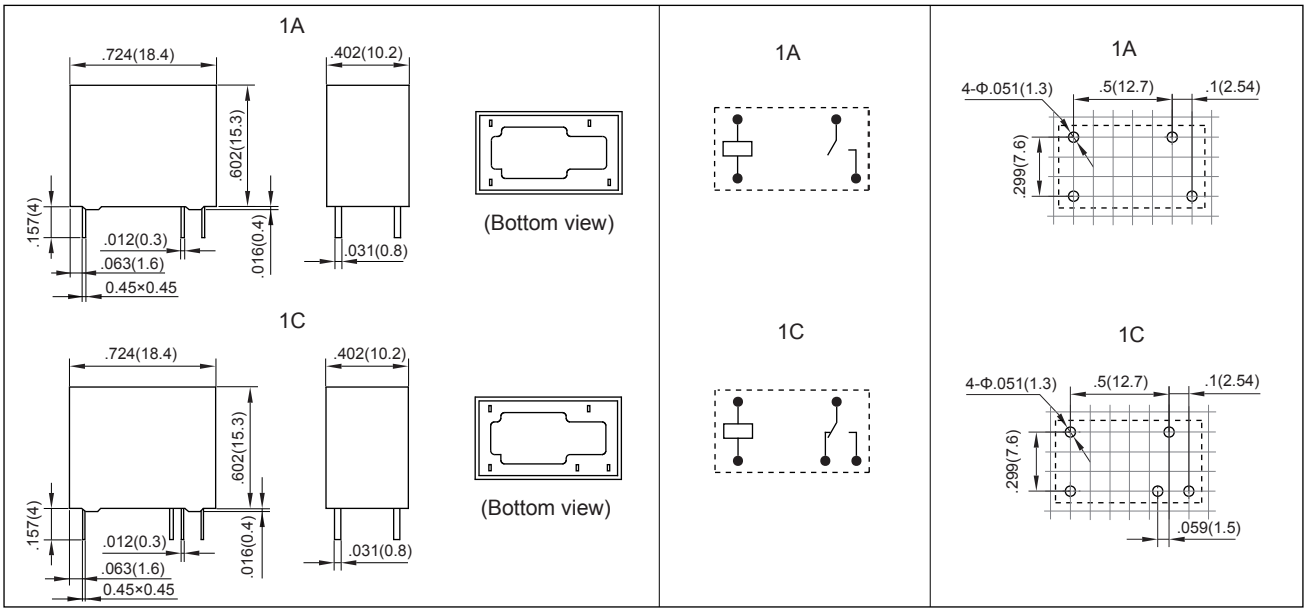
| | |
|---|---|
| Coil Power | Standard Type: 450mW |
| | Sensitive Type: 200mW |

## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 5A/250VAC, 5A/30VDC, 10A/125VAC<br>3A/250VAC, 3A/30VDC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

Outline Dimensions | Wiring Diagram (Bottom view) | PCB Layout (Bottom view)

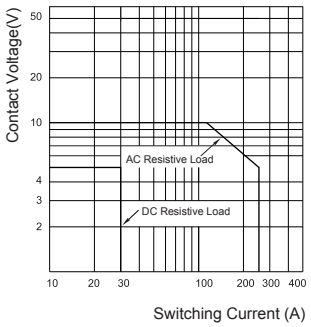



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

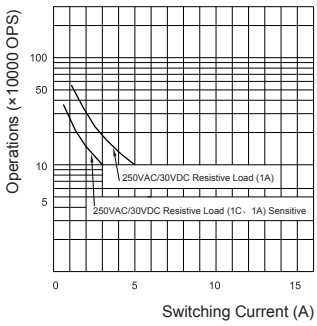
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

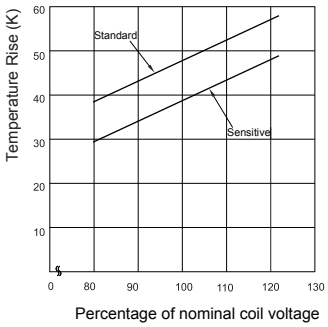
MAXIMUM SWITCHING POWER




ENDURANCE CURVE



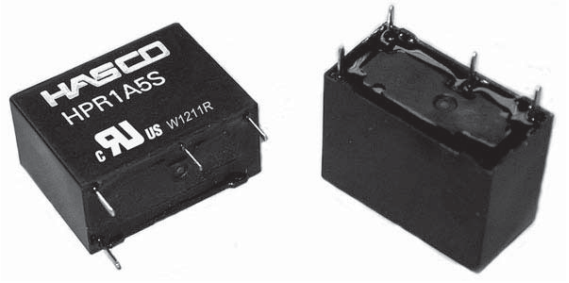

COIL TEMPERATURE RISE



# HPR SERIES SPDT 10 Amp

File No.:E75887

RoHS Compliant




## FEATURES

- 10A switching capability
- 1 Form A and 1 Form C configurations
- Subminiature, standard PCB layout
- Plastic sealed and flux proofed types available
- Outline Dimensions:(20.5×10.2×15.3)mm

## CONTACT RATINGS

| | | | |
|---|---|---|---|
| Contact Arrangement | 1A | 1C | |
| Contact Resistance | 100mΩ (1A 24VDC) | | |
| Contact Material | AgSnO, Silver Alloy | | |
| Contact Rating(Resistive) | 1A | 1C | |
| | | NO | NC |
| | 5A/250VAC<br>5A/30VDC<br>10A/125VAC | 5A/250VAC<br>5A/30VDC<br>10A/125VAC | 3A/250VAC<br>3A/30VDC |
| Max. Switching Voltage | 277VAC/30VDC | | |
| Max. Switching Current | 10A | | 3A |
| Max. Switching Power | 1250VA/150W | | 750VA/90W |
| Mechanical Life | $1\times10^7$ operations | | |
| Electrical Life | $1\times10^5$ operations | | |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (500VDC) |
| Dielectric Strength | Between coil & contacts | 4000VAC 1min |
| | Between open contacts | 1000VAC 1min |
| Operate time (at nomi. volt.) | | ≤8ms |
| Release time (at nomi. volt.) | | ≤5ms |
| Humidity | | 35% ~ 95% RH |
| Ambient temperature | | -40°C ~ +70°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.6mm DA |
| Unit weight | | Approx. 7g |
| Construction | | Sealed, Covered |

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

## ORDERING INFORMATION

HPR F 1A 12 -1 S - XXX

- Model
- F:Class F Nil:Class B
- 1A:1 Form A 1C:1 Form C
- Coil Voltage
- 1:Covered Nil:Sealed
- S:Sensitive type Nil:Standard type
- Customer code

## COIL DATA at 20°C

### Standard Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out 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 |

### Sensitive Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±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 |

# HPR SERIES SPDT 10 Amp

## COIL

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

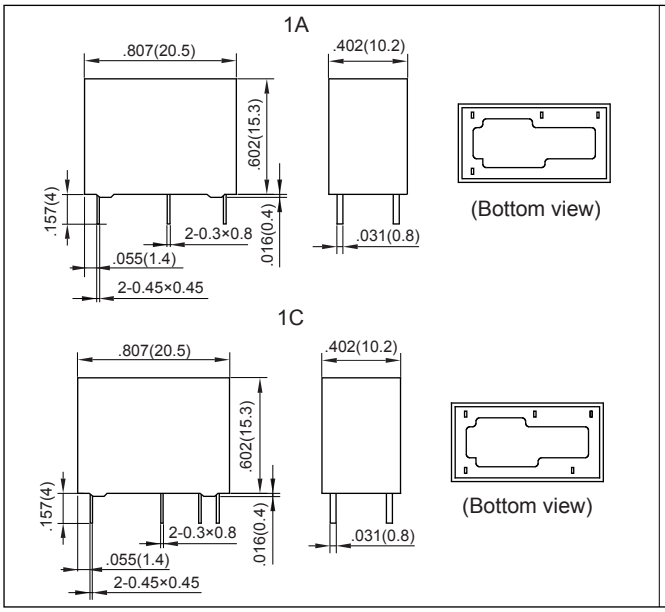
## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 5A/250VAC, 5A/30VDC, 10A/125VAC<br>3A/250VAC, 3A/30VDC |

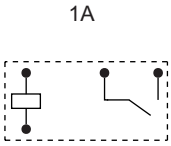
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

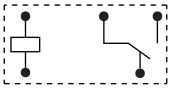
Unit: inch(mm)

Outline Dimensions

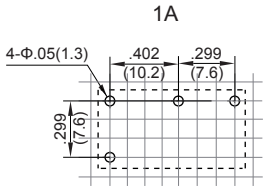


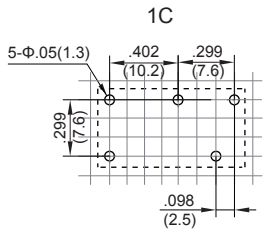

Wiring Diagram (Bottom view)




PCB Layout (Bottom view)



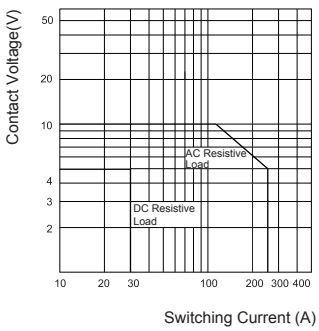




Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

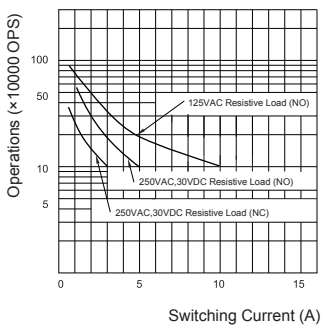
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

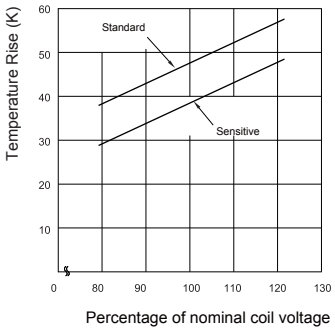
MAXIMUM SWITCHING POWER




ENDURANCE CURVE




COIL TEMPERATURE RISE




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

# KLT SERIES SPDT 3,6,12,15,20 Amp

File No.:E75887

File No.:R 50216304

RoHS Compliant


## 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 | 50mΩ (1A 24VDC) |
| Contact Material | AgSnO，AgCdO，Gold FLash |
| Contact Rating(Resistive) | 3A 120VAC/28VDC<br>6A 120VAC/28VDC<br>12A 120VAC/28VDC<br>15A/120VAC<br>20A/120VAC |
| Max. Switching Voltage | 277VAC/28VDC |
| Max. Switching Current | 20A |
| Max. Switching Power | 5540VA/560W |
| Mechanical Life | $1\times10^7$ operations |
| Electrical Life | $1\times10^5$ operations |

## 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 |
| Ambient temperature | | Class B:-40°C~85°C; Class F:-40°C~105°C |
| Shock Resistance | Functional | 98m/s$^2$ |
| | Destructive | 980m/s$^2$ |
| Vibration resistance | | 10Hz to 55Hz 1.5mm DA |
| Unit weight | | Approx. 12g |
| Construction | | Sealed, Covered |

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

2) Please find coil temperature curve in the characteristic curved below.

## ORDERING INFORMATION

KLT F 1C 12 DC12 - 1 - GF - XXX

- Model
- F:Class F Nil:Class B
- Contact Arrangement:
  - 1A=1 Form A
  - 1B=1 Form B
  - 1C=1 Form C
- Contact Rating
- Coil Voltage
- Nil:Sealed 1:Covered
- GF:Gold Flash
- Customer code

## COIL DATA at 20°C

3A、6A、12A、15A

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±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 | 225 |
| 12 | 9.00 | 1.2 | 15.6 | 400 |
| 24 | 18.0 | 2.4 | 31.2 | 1600 |
| 48 | 64.0 | 4.8 | 62.4 | 6400 |

20A

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out 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 | 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 |
| 24 | 18.0 | 2.4 | 31.2 | 1280 |
| 48 | 64.0 | 4.8 | 62.4 | 5120 |

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

# KLT SERIES SPDT 3,6,12,15,20 Amp

## COIL

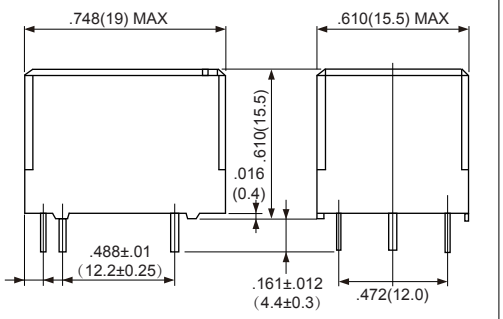
| | |
|---|---|
| Coil Power | 3A-15A: 360mW<br>20A: 450mW |

## SAFETY APPROVAL RATINGS

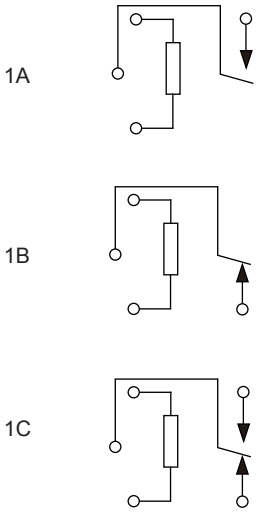
| | | |
|---|---|---|
| UL&CUL | Resistive | 3A 120VAC/28VDC, 6A 120VAC/28VDC<br>12A 120VAC/28VDC, 15A/120VAC<br>20A/120VAC |
| | N.O. Only, Single Pole | 10A 12VDC Tungsten, 1500W 277VAC Ballast<br>15A(1700W) 120VAC Tungsten,<br>1/2hp 120VAC |
| TüV | | 6A 250VAC/28VDC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

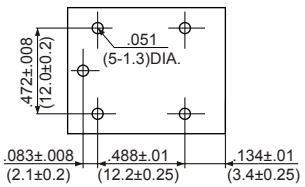
Outline Dimensions




Wiring Diagram (Bottom view)




PCB Layout (Bottom view)

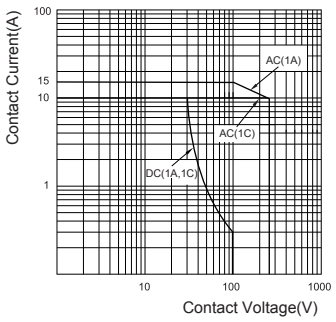



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

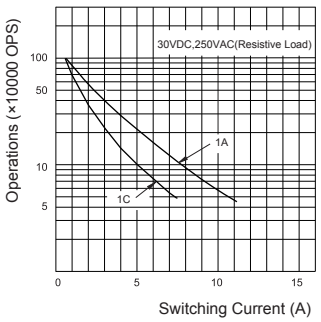
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

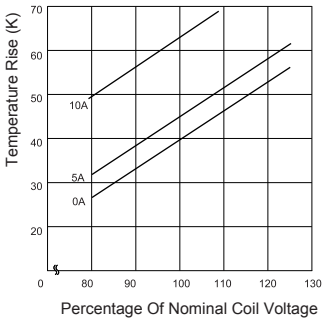
MAXIMUM SWITCHING POWER




ENDURANCE CURVE




COIL TEMPERATURE RISE




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

# KLT-L SERIES LATCHING 3,6,12,15 Amp

File No.:E75887

Patent No.:201120133518.4


## FEATURES

- Highly reliable, low cost
- Miniature size & large switch capacity up to 15A
- High dielectric strength type
- Fully Sealed
- Green Energy Saving

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A、1C |
| Contact Resistance | 50mΩ(1A 24VDC) |
| Contact Material | AgSnO，Silver Alloy |
| Contact Rating(Resistive) | 3A 120VAC/28VDC<br>6A 120VAC/28VDC<br>12A 120VAC/28VDC<br>15A/120VAC |
| Max. Switching Voltage | 277VAC/28VDC |
| Max. Switching Current | 15A |
| Max. Switching Power | 2770VA/300W |
| Mechanical Life | $1\times10^7$ times |
| Electrical Life | $1\times10^5$ times |

## ORDERING INFORMATION

KLT F 1C 12 DC12 - L - XXX

Model

F:Class F Nil:Class B

Contact Arrangement:
1A:1 Form A 1C:1 From C

Contact Arrangement:
3=3A, 6=6A, 12=12A, 15=15A

Coil Voltage:
5, 6, 9, 12, 24, 48VDC

L:Latching LR=Reverse Polarity

Customer Code

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 100MΩ（at 500VDC） |
| Dielectric Strength | Between coil & contacts | 1500VAC 1min |
| | Between open contacts | 750VAC 1min |
| Reacting time (at nomi. volt.) | | 8ms max. |
| Resetting time (at nomi. volt.) | | 5ms max. |
| Humidity | | 45% ~ 85% RH |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz to 55Hz 1.5mm DA |
| Unit weight | | Approx. 12g |
| Construction | | Sealed |

## COIL DATA at 20°C

| Nominal Voltage VDC | Action/Reset Voltage VDC | Impulse Width ms | Coil Resistance Ω±10% |
|---|---|---|---|
| 5 | 4.0 | 100 | 31 |
| 6 | 4.8 | 100 | 45 |
| 9 | 7.2 | 100 | 100 |
| 12 | 9.6 | 100 | 180 |
| 24 | 19.2 | 100 | 720 |
| 48 | 38.4 | 100 | 2880 |

## COIL

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

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

## SAFETY APPROVAL RATINGS

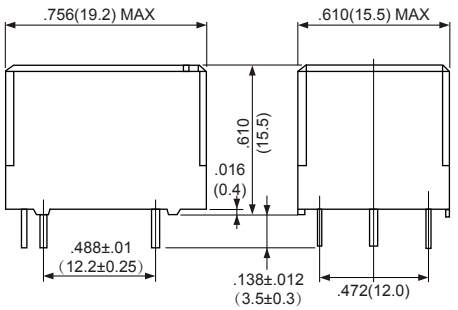
| | | |
|---|---|---|
| UL&CUL | Resistive | 3A 120VAC/28VDC, 6A 120VAC/28VDC<br>12A 120VAC/28VDC<br>15A/120VAC |
| | N.O. Only, Single Pole | 10A 12VDC Tungsten, 1500W 277VAC Ballast<br>15A(1700W) 120VAC Tungsten,<br>1/2hp 120VAC |

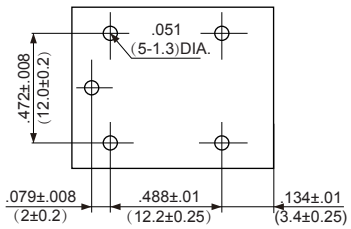
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

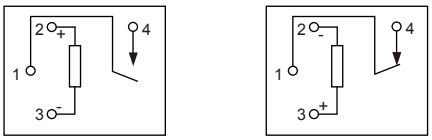
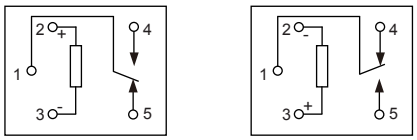
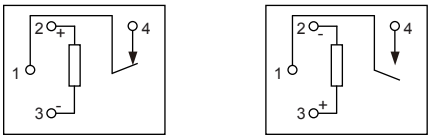
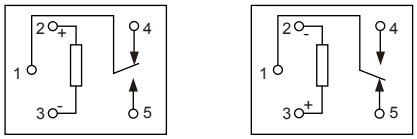
Unit: inch(mm)

Outline Dimensions

PCB Layout
(Bottom view)




| Wiring Diagram (Bottom view) | | 1A | 1C |
|---|---|---|---|
| | Straight Polarity |  |  |
| | Reverse Polarity |  |  |

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.

Notice

1.Relay is on the “reset” or “set” status when being released form 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 on request.

2.In order to maintain “set” or “reset” status, energized voltage to coil should reach the rated voltage, impulse width should be 5 times more than “set” or “reset” time. Do not energize voltage to “set” coil and “reset” coil simultaneously. Long energized time (more than 1 min) should be avoided.

# SSD SERIES SPDT 3,6,10 Amp

File No.:E75887

File No.:R 50215414

RoHS Compliant


## 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 | 1A,1B,1C |
| Contact Resistance | 50mΩ (1A 24VDC) |
| Contact Material | AgSnO，AgCdO |
| Contact Rating(Resistive) | 10A/120VAC 6A/28VDC |
| Max. Switching Voltage | 250VAC/125VDC |
| Max. Switching Current | 10A |
| Max. Switching Power | 2500VA/330W |
| Mechanical Life | $2\times10^7$ operations |
| Electrical Life | $1\times10^5$ operations |

## 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 |
| Ambient temperature | | Class B:-45°C~85°C Class F:-45°C~105°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 10g |
| Construction | | Sealed |

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

## ORDERING INFORMATION

SSD F 106PH DC12 S - XXX

Model

F:Class F Nil:Class B

Contact Rating:
103=3A,106=6A,110=10A

Coil Voltage

S:Sensitive Nil:Standard

Customer code

## COIL DATA at 20°C

### Standard Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out 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 | 16.0 | 1.2 | 15.6 | 320 |
| 24 | 18.0 | 2.4 | 31.2 | 1150 |
| 48 | 36.0 | 4.8 | 62.4 | 4608 |

### Sensitive Type

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 3.75 | 0.5 | 6.5 | 80 |
| 6 | 4.50 | 0.6 | 7.8 | 110 |
| 9 | 6.75 | 0.9 | 11.7 | 250 |
| 12 | 16.0 | 1.2 | 15.6 | 440 |
| 24 | 18.0 | 2.4 | 31.2 | 1780 |

# SSD SERIES SPDT 3,6,10 Amp

## COIL

| | |
|---|---|
| Coil Power | Standard:450mW (24V、48V:500mW)<br>Sensitive:310mW~330mW |

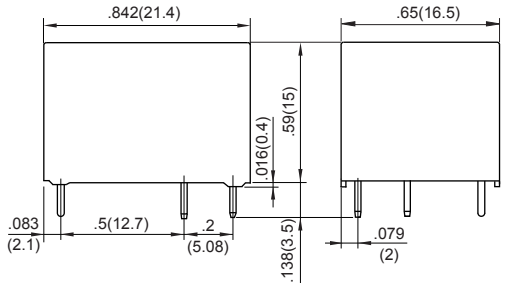
## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 6A 120VAC/28VDC<br>10A 120VAC |
| TüV | 10A/250VAC 10A/28VDC |

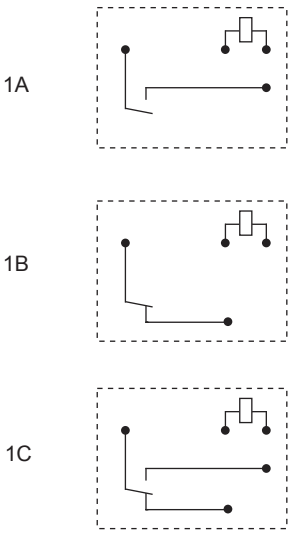
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

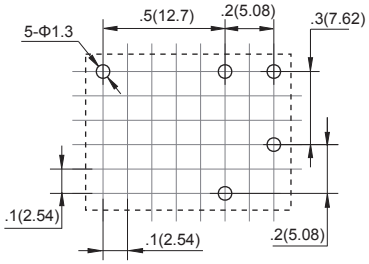
Outline Dimensions




Wiring Diagram (Bottom view)




PCB Layout (Bottom view)

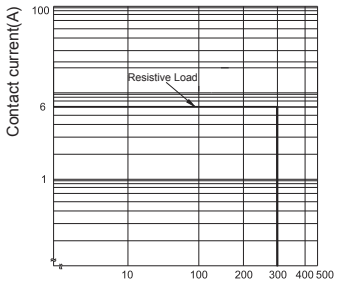



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

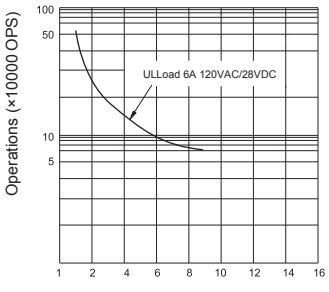
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

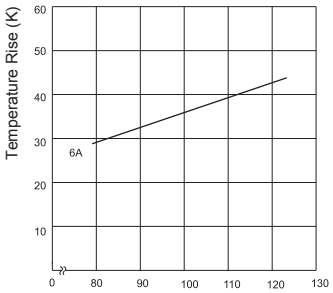
MAXIMUM SWITCHING POWER




ENDURANCE CURVE




COIL TEMPERATURE RISE




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

# SLT SERIES SPDT 10,20 Amp

File No.:E75887


## FEATURES

- Small size
- Light weight
- Low power consumption
- PC board mounting
- Fully sealed

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A,1C |
| Contact Resistance | 100mΩ (1A 6VDC) |
| Contact Material | AgSnO |
| Contact Rating(Resistive) | 20A/14VAC 10A/120VAC |
| Max. Switching Voltage | 380VAC/42VDC |
| Max. Switching Current | 20A |
| Max. Switching Power | 1200VA/280W |
| Mechanical Life | $1\times10^7$ operations |
| Electrical Life | $1\times10^5$ operations |

## ORDERING INFORMATION

SLT 1A 20 DC12 - XXX

- Model
- Contact Arrangement:1A,1C
- Contact Rating:10A & 20A
- Coil Voltage
- Customer code

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (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.) | | ≤5ms |
| Humidity | | 85% RH(20°C) |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 6g |
| Construction | | Sealed |

## COIL DATA at 20°C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 6 | 4.8 | 0.30 | 6.6 | 60 |
| 9 | 7.2 | 0.45 | 9.9 | 135 |
| 12 | 9.6 | 0.60 | 13.2 | 240 |
| 24 | 19.2 | 1.20 | 26.4 | 960 |

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

# SLT SERIES SPDT 10,20 Amp

## COIL

| | |
|---|---|
| Coil Power | 600mW |

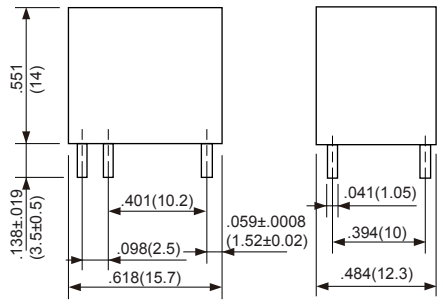
## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 20A/14VDC 10A/120VAC<br>10A/14VDC<br>1/2HP 125VAC |

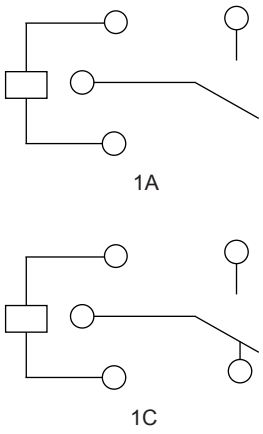
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

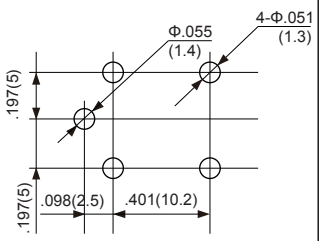
Outline Dimensions




Wiring Diagram (Bottom view)




PCB Layout (Bottom view)

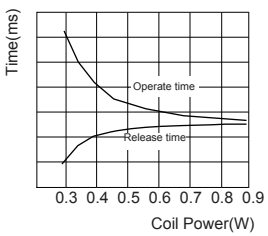



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

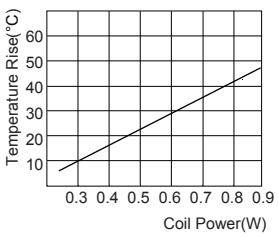
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

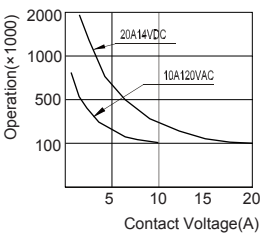
Operate time



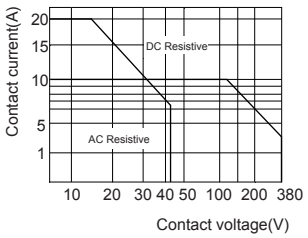

Coil Temp Rise



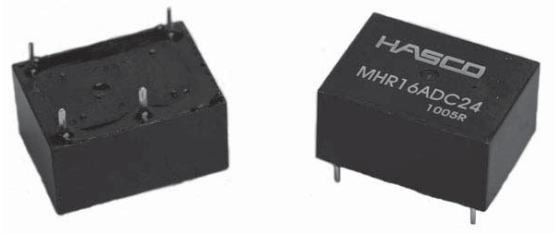

Life




Contact switching capacity



# MHR SERIES SPDT 10,16 Amp




RoHS Compliant

## FEATURES

- Subminiature Light Weight Relay
- Switching Capacity Up to 16A
- High Sensitivity
- P.C.Board Mounting, Direct Pitch Terminal

## CONTACT RATINGS

| | | |
|---|---|---|
| Contact Arrangement | 1A,1C | |
| Contact Resistance | 50mΩ (1A 24VDC) | |
| Contact Material | AgSnO，AgNi | |
| Contact Rating(Resistive) | 1A<br>10A/125,250VAC<br>10A/30VDC<br>1/10HP 125,277VAC | 1C<br>10A/125VAC<br>5A/250VAC,3VDC<br>1/10HP 125,277VAC |
| Max. Switching Voltage | 250VAC/125VDC | |
| Max. Switching Current | 16A | |
| Max. Switching Power | 4000VA/480W | |
| Mechanical Life | $1\times10^7$ operations | |
| Electrical Life | $1\times10^5$ operations | |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 500MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 1500VAC 1min |
| | Between open contacts | 1000VAC 1min |
| Operate time (at nomi. volt.) | | ≤10ms |
| Release time (at nomi. volt.) | | ≤4ms |
| Humidity | | 85% (20°C) |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 9g |
| Construction | | Sealed |

## ORDERING INFORMATION

MHR 16 C DC12 - XXX

- Model: MHR
- 10:10A 16:16A: 16
- A:1A C:1C: C
- Coil Voltage: DC12
- Customer code: XXX

## COIL DATA at 20°C

1A

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 4.0 | 0.25 | 6.5 | 125 |
| 6 | 4.8 | 0.30 | 7.8 | 180 |
| 9 | 7.2 | 0.45 | 11.7 | 405 |
| 12 | 9.6 | 0.60 | 15.6 | 720 |
| 24 | 19.2 | 1.20 | 31.2 | 2880 |

1C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 4.0 | 0.25 | 6.5 | 55.5 |
| 6 | 4.8 | 0.30 | 7.8 | 80 |
| 9 | 7.2 | 0.45 | 11.7 | 180 |
| 12 | 9.6 | 0.60 | 15.6 | 320 |
| 24 | 19.2 | 1.20 | 31.2 | 1280 |

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

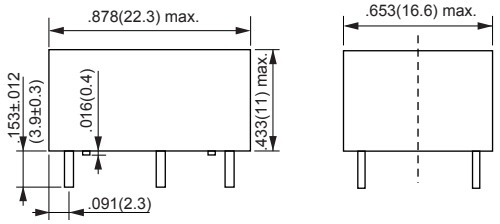
# MHR SERIES SPDT 10,16 Amp

## COIL

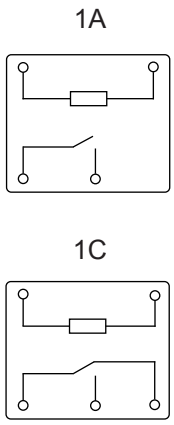
| | |
|---|---|
| Coil Power | 1A:200mW<br>1C:450mW |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

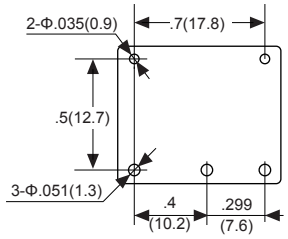
Outline Dimensions




Wiring Diagram (Bottom view)




PCB Layout (Bottom view)

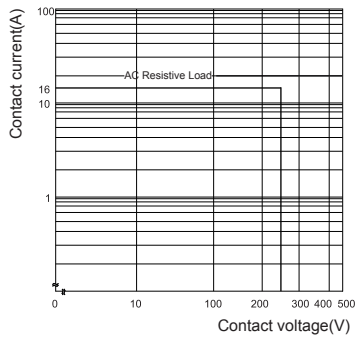



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

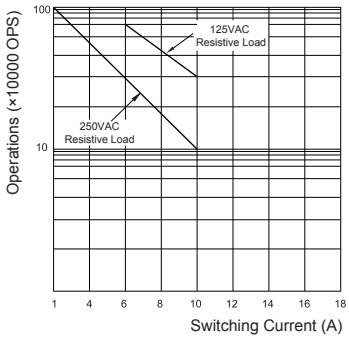
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

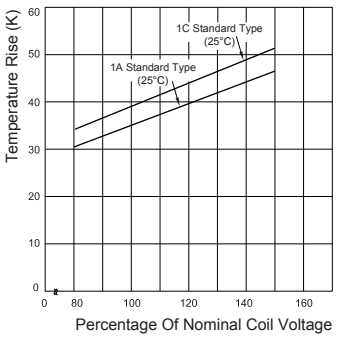
MAXIMUM SWITCHING POWER




ENDURANCE CURVE




COIL TEMPERATURE RISE



# HAT900 SERIES SPDT 30,40 Amp

c UL us
File No.:E75887

File No.:R 50194653

RoHS Compliant


## FEATURES

- 4000VAC high dielectric strength between contacts and coil is available
- Max. switch capacity up to 40A

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A、1B、1C |
| Contact Resistance | 50mΩ(1A 24VDC) |
| Contact Material | AgCdO，AgSnO，Silver Alloy |
| Contact Rating(Resistive) | 30/40A 277VAC 30A/28VDC |
| Max. Switching Voltage | 277VAC/28VDC |
| Max. Switching Current | 40A |
| Max. Switching Power | 11080VA/560W |
| Mechanical Life | $1\times10^7$ operations |
| Electrical Life | $1\times10^5$ operations |

## ORDERING INFORMATION

HAT F 901 C S 30 DC 12 - 1 - XXX

Model
F:Class F
Nil:Class B
901:PCB Pins Only
902:PCB Pins & Quick Connects
903:Quick Connects only-Flange Mount
A:SPST-NO B:SPST-NC
C:SPDT
Nil:Open C:Covered
S:Sealed
Nil:40A 30:30A
Coil:AC or DC
Coil Voltage
without Pin 6
Customer code

Note：902&903 relays do not have pin 6.

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (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, 40°C |
| Ambient temperature | | Class B:-20°C~85°C Class F:-20°C~105°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz to 55Hz 1.5mm DA |
| Unit weight | | Approx. 36g |
| Construction | | Sealed, Covered, open type |

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

## COIL DATA at 25°C

DC

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±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 |

# HAT900 SERIES SPDT 30,40 Amp

AC

| Nominal Voltage VAC | Pick-up Voltage (Max.) VAC | Drop-out Voltage (Min.) VAC | Max. Allowable Voltage VAC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 12 | 9.6 | 1.2 | 15.60 | 27 |
| 24 | 19.2 | 2.4 | 7.80 | 120 |
| 110 | 88.0 | 11.0 | 11.70 | 2360 |
| 120 | 96.0 | 12.0 | 15.60 | 3040 |
| 220 | 176.0 | 22.0 | 19.50 | 13490 |
| 240 | 192.0 | 24.0 | 23.40 | 15735 |
| 277 | 221.6 | 27.7 | 28.60 | 20300 |

## COIL

| | |
|---|---|
| Coil Power | DC:900mW AC:2VA |

## SAFETY APPROVAL RATINGS

| | | |
|---|---|---|
| UL&CUL | NO | 1HP/120VAC, 2HP/277VAC, 2HP/240VAC<br>20A/277VAC Ballast, 30A/120VAC Ballast |
| | NC | 2HP/277VAC, 1HP/120VAC<br>10A/277VAC Ballast,2A/120VAC Tungsten |
| TüV | | 20A/240VAC/14VDC<br>15A/240VAC/14VDC |

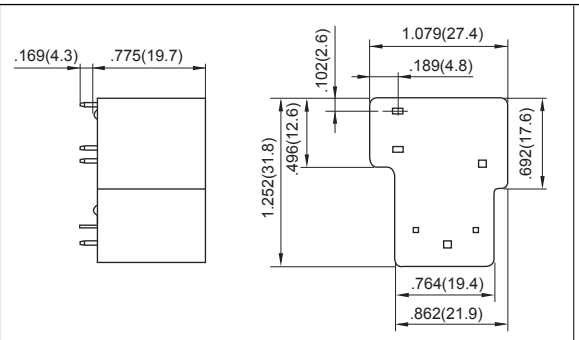
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

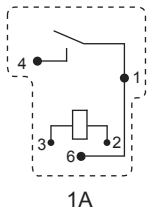
Unit: inch(mm)

Outline Dimensions | Wiring Diagram (Bottom view) | PCB Layout (Bottom view)

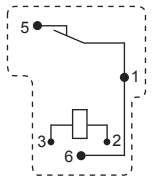
with Pin 6

HAT 901 Series

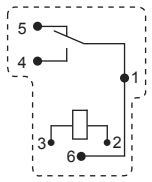


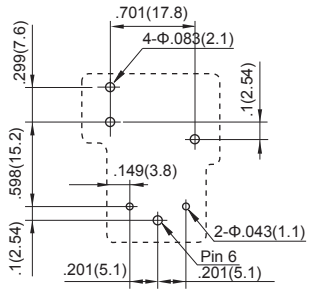

1A



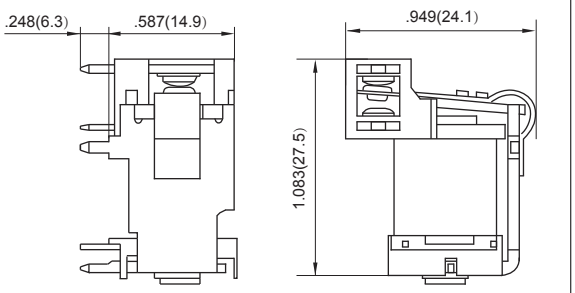

1B

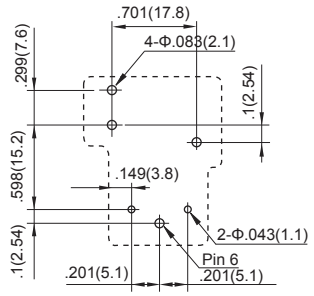



1C

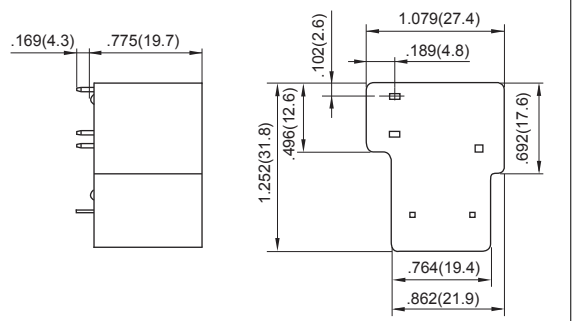


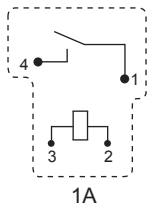

HAT 901 Series Open Type



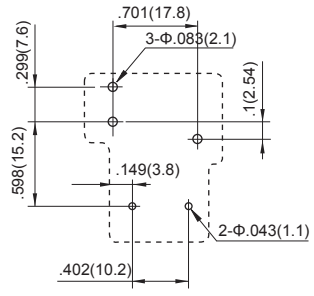

HAT 901 Series without Pin 6




1A

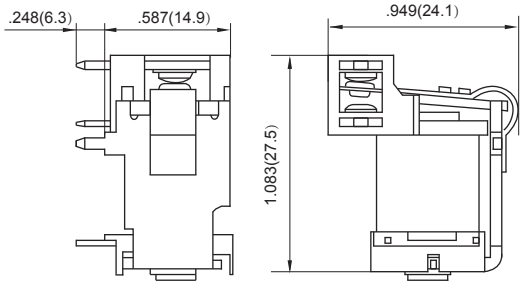
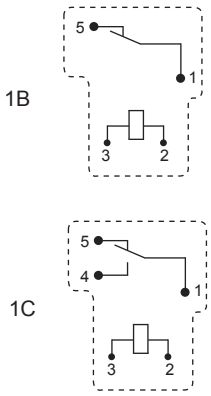
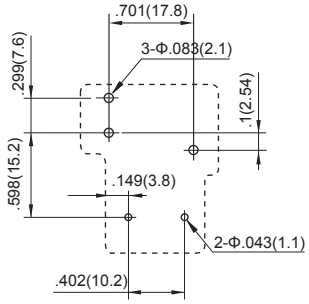
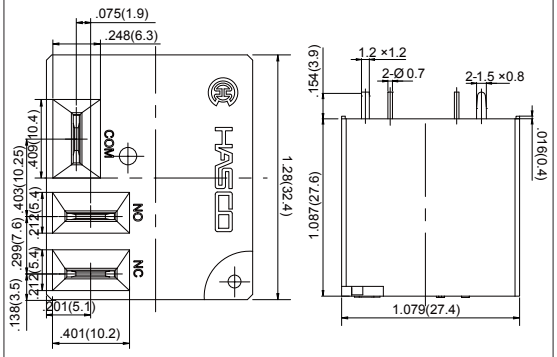
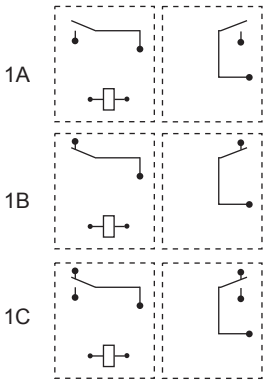
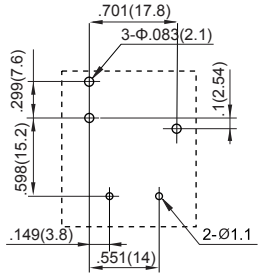
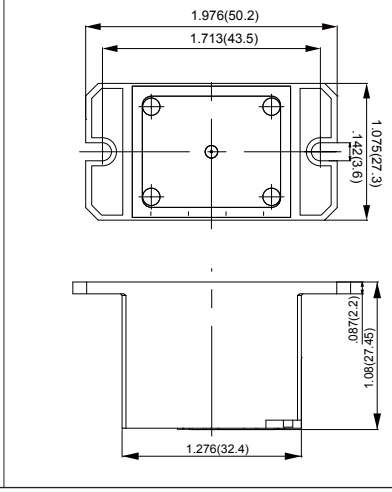
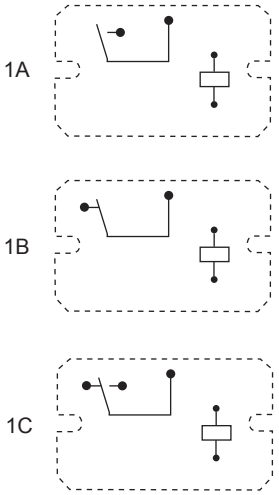
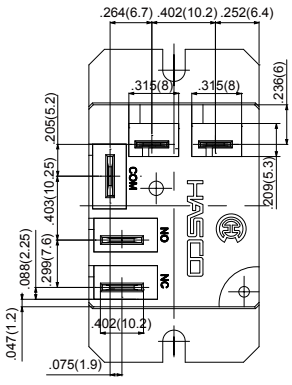
(1B、1C See next page)




**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) |
|---|---|---|---|
| HAT 901 Series Open Type without Pin 6 |  |  |  |
| HAT 902 Series |  |  |  |
| HAT 903 Series |  |  |  |

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.

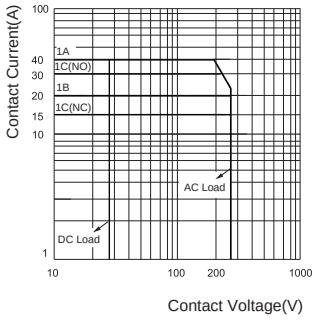
2) The tolerance without indicating for PCB layout is always ±0.1mm.

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

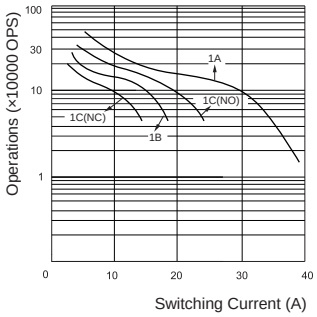
## CHARACTERISTIC CURVES

### HAT901 SERIES

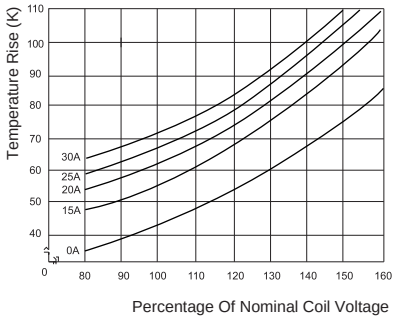
MAXIMUM SWITCHING POWER




ENDURANCE CURVE

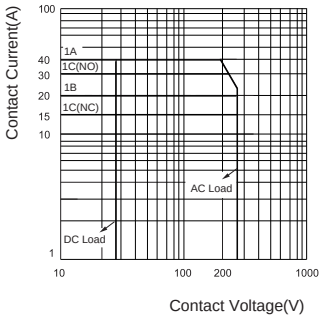



COIL TEMPERATURE RISE

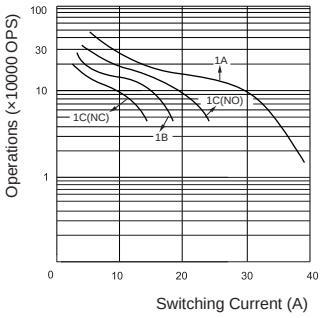



### HAT902 SERIES

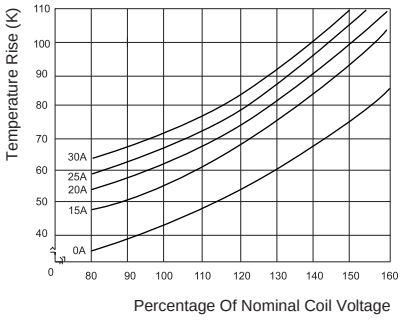
MAXIMUM SWITCHING POWER




ENDURANCE CURVE

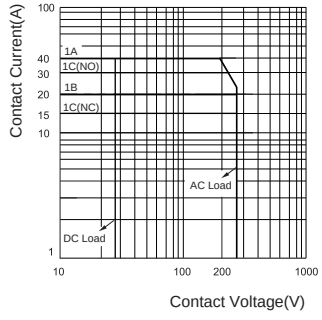



COIL TEMPERATURE RISE

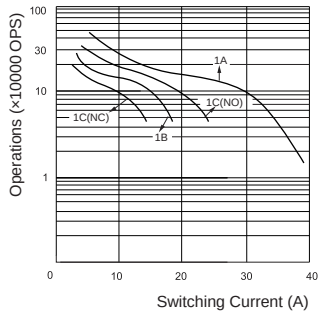



### HAT903 SERIES

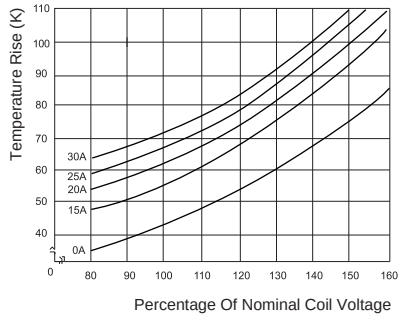
MAXIMUM SWITCHING POWER




ENDURANCE CURVE




COIL TEMPERATURE RISE



# HAT901-L SERIES LATCHING SPDT 30,40 Amp

c UL us
File No.:E75887

RoHS Compliant


Patent No.:201120133518.4

## FEATURES

- Large switch capacity up to 40A
- Green Energy Saving

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A、1C |
| Contact Resistance | 50mΩ(1A 24VDC) |
| Contact Material | AgSnO，Silver Alloy |
| Contact Rating(Resistive) | 30/40A 277VAC 30A/28VDC |
| Max. Switching Voltage | 277VAC/28VDC |
| Max. Switching Current | 40A |
| Max. Switching Power | 7200VA/560W |
| Mechanical Life | $1\times10^7$ times |
| Electrical Life | $1\times10^5$ times |

## ORDERING INFORMATION

HAT F 901 C S 30 DC12 - L - XXX

Model
F:Class F Nil:Class B
901:PCB Pins Only
A:SPST-NO C:SPDT
C:Covered S:Sealed
Nil:40A 30:30A
Coil Voltage
L:Latching LR=Reverse Polarity
Customer Code

Note:This relay do not have pin 6.

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ（at 500VDC） |
| Dielectric Strength | Between coil & contacts | 2000VAC 1min |
| | Between open contacts | 1500VAC 1min |
| Reacting time (at nomi. volt.) | | 15ms max. |
| Resetting time (at nomi. volt.) | | 10ms max. |
| Humidity | | 98% RH,40°C |
| Ambient temperature | | -20°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz to 55Hz 1.5mm DA |
| Unit weight | | Approx. 26g |
| Construction | | Sealed, Covered |

## COIL DATA at 25°C

| Nominal Voltage VDC | Action/Reset Voltage VDC | Impulse Width ms | Coil Resistance Ω±10% |
|---|---|---|---|
| 5 | 4.0 | 100 | 21 |
| 6 | 4.8 | 100 | 30 |
| 9 | 7.2 | 100 | 67.5 |
| 12 | 9.6 | 100 | 120 |
| 24 | 19.2 | 100 | 480 |
| 48 | 38.4 | 100 | 1920 |

## COIL

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

Notes: The data shown above are initial values.

# HAT901-L SERIES LATCHING SPDT 30,40 Amp

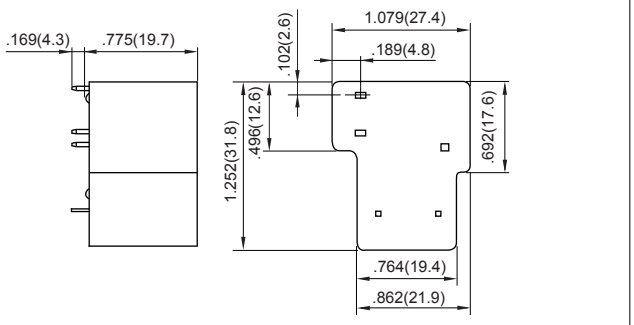
## SAFETY APPROVAL RATINGS

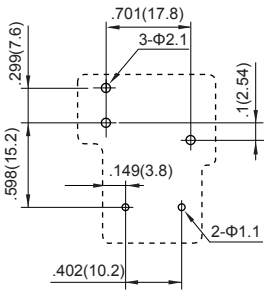
| | | |
|---|---|---|
| UL&CUL | NO | 1HP/120VAC, 2HP/277VAC, 2HP/240VAC<br>20A/277VAC Ballast, 30A/120VAC Ballast |
| | NC | 2HP/277VAC, 1HP/120VAC<br>10A/277VAC Ballast, 2A/120VAC Tungsten |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

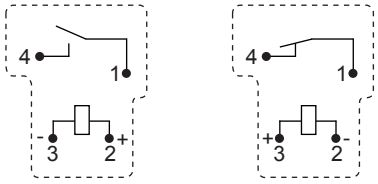
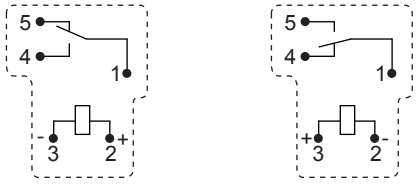
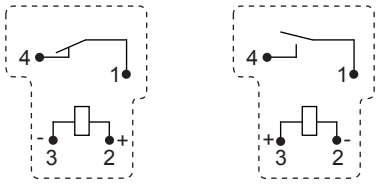
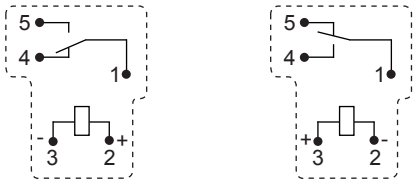
Outline Dimensions

PCB Layout
(Bottom view)




Wiring Diagram (Bottom view)

| | 1A | 1C |
|---|---|---|
| Straight Polarity |  |  |
| Reverse Polarity |  |  |

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.

Notice

1.Relay is on the “reset” or “set” status when being released form 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 on request.

2.In order to maintain “set” or “reset” status, energized voltage to coil should reach the rated voltage, impulse width should be 5 times more than “set” or “reset” time. 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.**

# HAT904 SERIES DPDT 30 Amp

c UL us
File No.:E75887

RoHS Compliant


## FEATURES

- 30A switching capabilities
- DPST-NO and DPDT configuration
- Meets VDE 8mm spacing，4KV dielectric
- Meets UL Class F construction
- Dust cover or sealed version:PCB or QC Terminal
- Outline Dimensions:(52.32×34.5×30.48)mm

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 2A、2C |
| Contact Resistance | 50mΩ(1A 24VDC) |
| Contact Material | AgSnO,AgCdO,Silver Alloy |
| Contact Rating(Resistive) | NO:30A 250VAC、30A 277VAC/28VDC<br>NC:3A 250VAC、3A 277VAC |
| Max. Switching Voltage | 277VAC/28VDC |
| Max. Switching Current | 30A |
| Max. Switching Power | 8310VA/840W |
| Mechanical Life | $5\times10^6$ operations |
| Electrical Life | $1\times10^5$ operations |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (500VDC) |
| Dielectric Strength | Between coil & contacts | 4000VAC 1min |
| | Between open contacts | 1500VAC 1min |
| | Between contacts poles | 2000VAC 1min |
| Operate time (at nomi. volt.) | | ≤25ms |
| Release time (at nomi. volt.) | | ≤25ms |
| Humidity | | 35% ~ 85% RH |
| Ambient temperature | | AC:-40°C~65°C DC:-40°C~85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.65mm DA |
| Unit weight | | Approx. 86g |
| Construction | | Sealed、Covered |

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

## ORDERING INFORMATION

HATF904 2C DC 12 Q C - XXX

- Model: HATF904
- Form: 2A=2 Form A, 2C=2 Form C
- Coil: DC or AC
- Coil Voltage
- Nil:PC Pin, Q:Quick Connect W/Flange Mounting
- Nil:Sealed C:Covered
- Customer code

## COIL DATA at 23°C

DC

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 6 | 4.5 | 0.6 | 9.6 | 22 |
| 12 | 9.0 | 1.2 | 19.2 | 86 |
| 24 | 18.0 | 2.4 | 38.4 | 350 |
| 48 | 36.0 | 4.8 | 76.8 | 1390 |
| 110 | 82.5 | 11.0 | 176.0 | 7255 |

AC

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Coil Resistance Ω±10% | |
|---|---|---|---|---|
| | | | 60 Hz | 50 Hz |
| 24 | 19.2 | 7.2 | 39 | 52 |
| 120 | 96.0 | 36.0 | 950 | 1390 |
| 208 | 166.4 | 62.4 | 2841 | 3900 |
| 240 | 192.0 | 72.0 | 3800 | 5200 |
| 277 | 221.6 | 83.1 | 5200 | 7255 |

# HAT904 SERIES DPDT 30 Amp

## COIL

| | |
|---|---|
| Coil Power | DC:Approx. 1700mW<br>AC:Approx. 4.0VA |

## SAFETY APPROVAL RATINGS

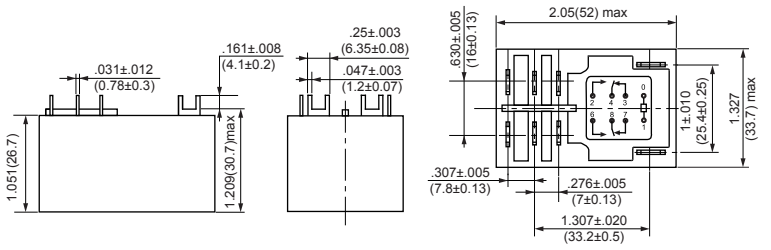
| | |
|---|---|
| UL&CUL | 30A 120VAC/277VAC/28VDC<br>1HP 120VAC, 2.5HP 240VAC<br>TV-10<br>14 FLA/84 LRA 277VAC |

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

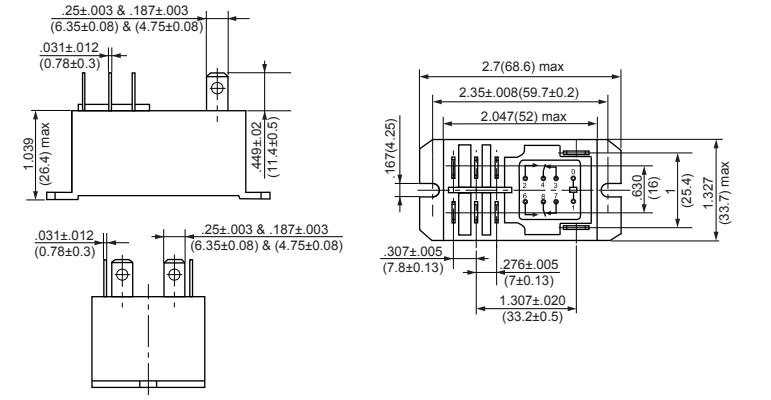
Unit: inch(mm)

### Outline Dimensions

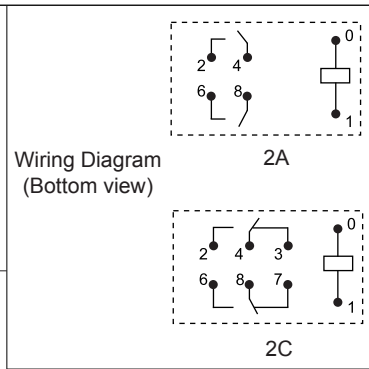
PC Pin



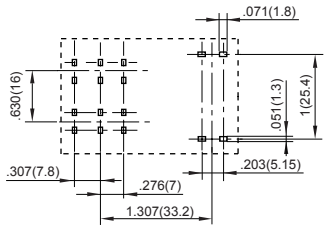

Quick Connect




Wiring Diagram (Bottom view)




PCB Layout (Bottom view)

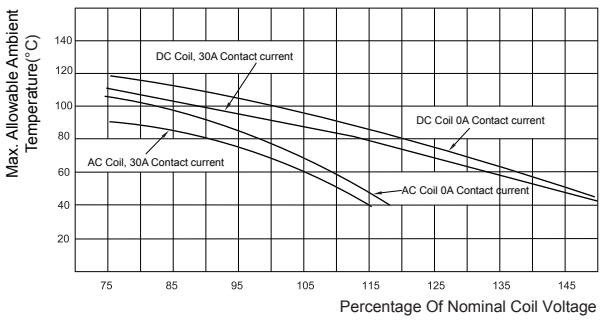



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

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

## CHARACTERISTIC CURVES

MAX. ALLOWABLE AMBIENT TEMPERATURE

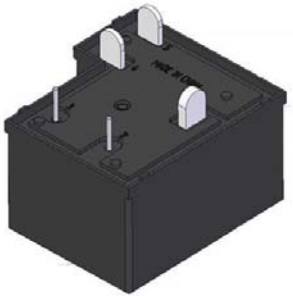



**This datasheet is for customers' reference. All the specifications are subject to change without notice.**

# HAT905 SERIES SPDT 50 Amp

c UL us
File No.:E75887

RoHS Compliant



## 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，Silver Alloy |
| Contact Rating(Resistive) | 50A/277VAC<br>30A/28VDC |
| Max. Switching Voltage | 277VAC/28VDC |
| Max. Switching Current | 50A |
| Max. Switching Power | 13850VA/840W |
| Mechanical Life | $1\times10^7$ operations |
| Electrical Life | $5\times10^4$ operations |

## ORDERING INFORMATION

HAT F 905 C S DC 12 - XXX

- Model: HAT
- F:Class F Nil:Class B
- 905:PCB Pins Only
- A:SPST-NO B:SPST-NC C:SPDT
- Nil:Open C:Covered S:Sealed
- Coil:AC or DC
- Coil Voltage
- Customer code

## 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,40°C |
| Ambient temperature | | Class B:-20°C~85°C Class F:-20°C~105°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 36g |
| Construction | | Sealed, Covered,Open type |

## COIL DATA at 25°C

DC

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±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 | 10080 |

Notes: The data shown above are initial values.

# HAT905 SERIES SPDT 50 Amp

AC

| Nominal Voltage VAC | Pick-up Voltage (Max.) VAC | Drop-out Voltage (Min.) VAC | Max. Allowable Voltage VAC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 12 | 3.75 | 0.50 | 15.60 | 27 |
| 24 | 4.50 | 0.60 | 7.80 | 120 |
| 110 | 6.75 | 0.90 | 11.70 | 2360 |
| 120 | 9.00 | 1.20 | 15.60 | 2560 |
| 220 | 11.25 | 1.50 | 19.50 | 9680 |
| 240 | 13.50 | 1.80 | 23.40 | 11520 |
| 277 | 16.50 | 2.20 | 28.60 | 15300 |

## COIL

| | |
|---|---|
| Coil Power | DC:1200mW<br>AC:2.0VA |

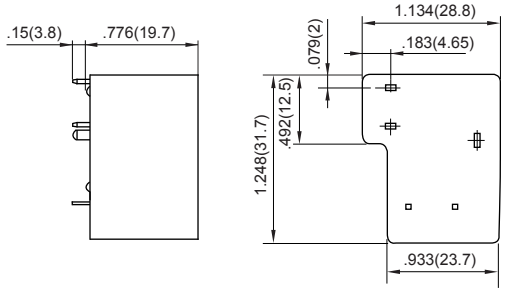
## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 50A/277VAC<br>30A/28VDC |

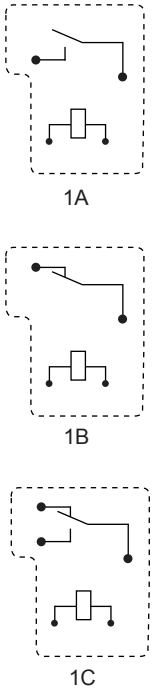
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

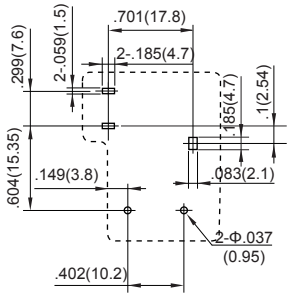
Outline Dimensions




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.

# MKB SERIES SPDT/DPDT 20 Amp

RoHS Compliant


## FEATURES

- Switching capacity up to 20A
- Six different contact arrangements
- PCB mounting
- Open and sealed type is available

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A、1B、1C、2A、2B、2C |
| Contact Resistance | 100mΩ(1A 5VDC) |
| Contact Material | AgSnO，Silver Alloy |
| Min. Load | 0.5A,12VDC |
| Max. Switching Voltage | 75VDC/60VAC |
| Max. Switching Current | 20A |
| Max. Switching Power | 500VA/200W |
| Mechanical Life | $1\times10^7$ operations |
| Electrical Life | $2\times10^5$ operations |

## ORDERING INFORMATION

MKB 012 1C S - XXX

Model

Coil Voltage

Contact Form:
1A:1 Form A 1B:1 Form B 1C:1 Form C
2A:2 Form A 2B:2 Form B 2C:2 Form C

Construction:S=Sealed Nil=Open

Customer code

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 100MΩ (at 500VDC) |
| Dielectric Strength | | 500VAC |
| Operate time (at nomi. volt.) | | ≤10ms |
| Release time (at nomi. volt.) | | ≤10ms |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Open:8g Sealed:12g |
| Construction | | Sealed、Open |

## COIL DATA at 20°C

| Nominal Voltage VDC | Pick-up Voltage VDC | | Drop-out Voltage VDC | | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|---|---|
| | 1A,1B,1C 2A,2B | 2C | 1B,2B | 1A,1C 2A,2C | | |
| 006 | 3.75 | 4.5 | 0.35 | 0.7 | 8 | 28 |
| 012 | 7.50 | 9.0 | 0.70 | 1.4 | 16 | 130 |
| 024 | 15.00 | 18.0 | 1.40 | 2.8 | 31 | 520 |

## COIL

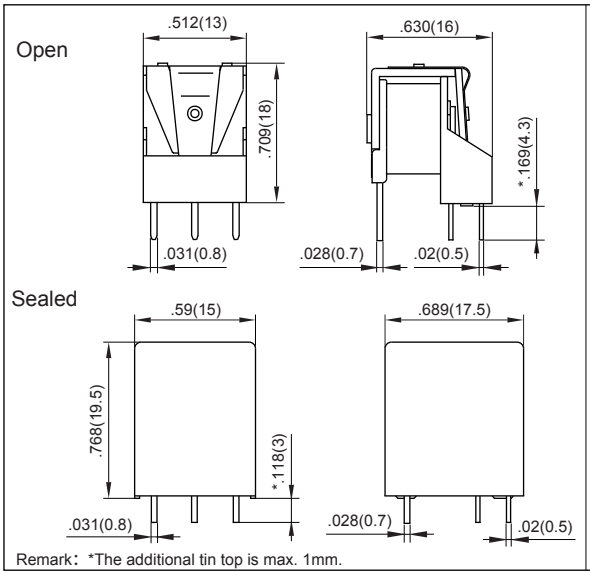
| | |
|---|---|
| Coil Power | 1100mW (6VDC:1300mW) |

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

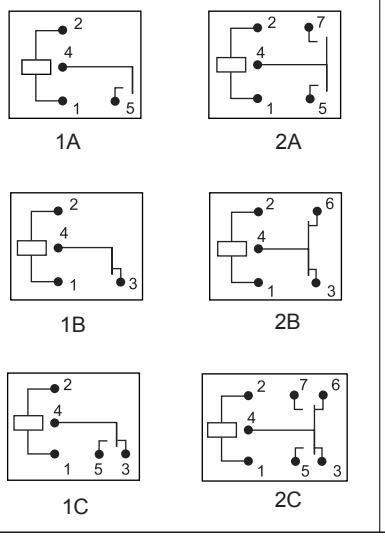
# MKB SERIES SPDT/DPDT 20 Amp

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

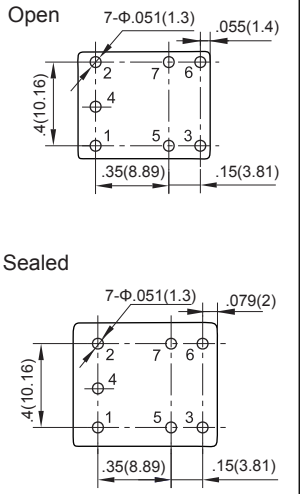
Outline Dimensions




Wiring Diagram (Bottom view)




PCB Layout (Bottom view)

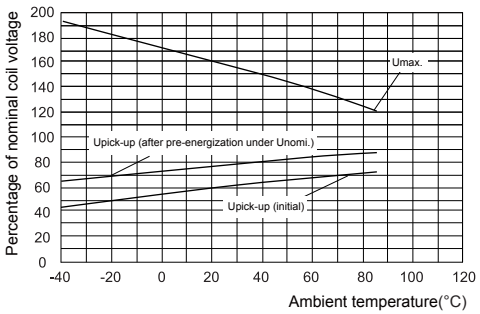



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

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

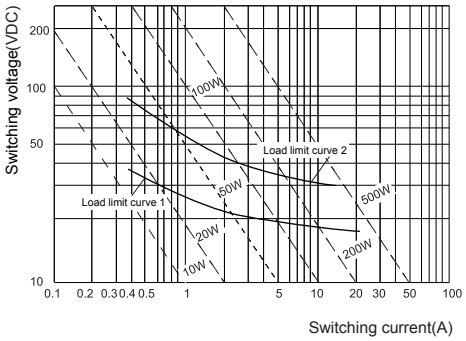
## CHARACTERISTIC CURVES

1.Coil operating voltage range




(1) There should be no contact load applied when maximum continuous operation voltage is applied on coil.
(2) The operating voltage is connected with coil pre-energized time and voltage. After pre-energized, the operating voltage will increase.
(3) The maximum allowable coil temperature is 180°C. For the coil temperature rise which is measured by resistance is average value, we recommend the coil temperature should be below 155°C under the different application ambient, different coil voltage and different load etc.
(4) If the actual operating coil voltage is out of the specified range, please contact HASCO for further details.

2. Load limit curve




(1) 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.
(2) Load limit curve 1: arc extinguishes, during transit time (change over contact).
(3) Load limit curve2: safe shutdown, no stationary arc (make contact).

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

# CARB SERIES Single Pole Automobile 30 Amp

c UL us
File No.:E75887

RoHS Compliant



## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A、1B、1C |
| Contact Resistance | 50mΩ (1A 24VDC) |
| Contact Material | AgSnO，AgNi，Silver Alloy |
| Contact Rating(Resistive) | NO:30A 240VAC、20A 28VDC<br>NC:15A 240VAC、15A 28VDC |
| Max. Switching Voltage | 380VAC/75VDC |
| Max. Switching Current | 30A |
| Max. Switching Power | 7200VA/560W |
| Mechanical Life | $1\times10^7$ operations |
| Electrical Life | $1\times10^5$ operations |

## ORDERING INFORMATION

CARB 1A DC24 H 1 S - XXX

Model

Contact Form: 1A=1 Form A
1B=1 Form B
1C=1 Form C

Coil Voltage

Ambient temperature:
N:-40°C~+85°C H:-55°C~+125°C

1:Open Type 2:Covered

S:Sealed

Customer code

## 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 |
| Ambient temperature | | N:-40°C~+85°C H:-55°C~+125°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 40Hz 1.27mm DA |
| Unit weight | | Open:Approx.16g Sealed:Approx.20g |
| Construction | | Sealed, Covered, open type |

## COIL DATA at 23°C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 12 | 9.6 | 1.2 | 14.4 | 90 |
| 24 | 19.2 | 2.4 | 28.8 | 380 |
| 48 | 38.4 | 4.8 | 57.6 | 2300 |

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

# CARB SERIES Single Pole Automobile 30 Amp

## COIL

| | |
|---|---|
| Coil Power | 12V:1600mW<br>24V:1500mW<br>48V:1000mW |

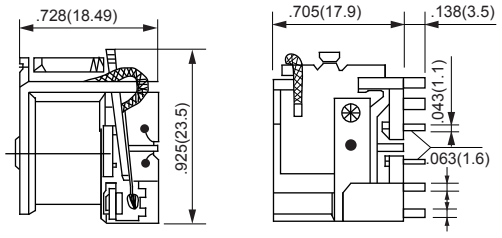
## SAFETY APPROVAL RATINGS

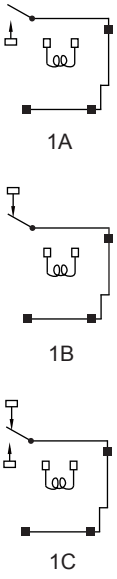
| | |
|---|---|
| UL&CUL | 30A/240VAC<br>20A/28VDC |

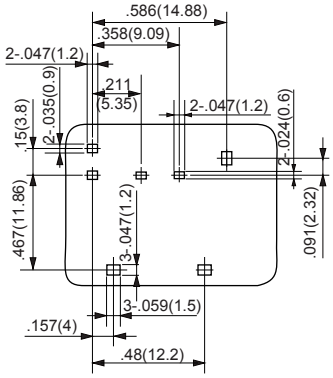
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

Outline Dimensions | Wiring Diagram (Bottom view) | PCB Layout (Bottom view)

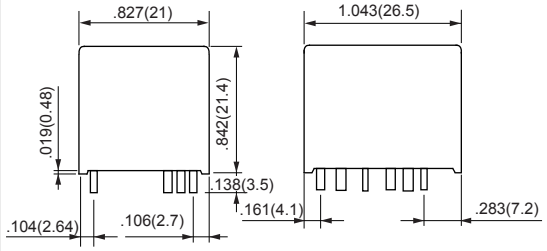
Open Type




Covered

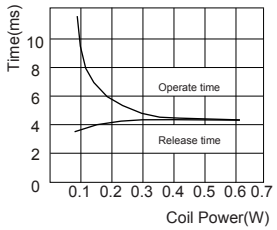



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

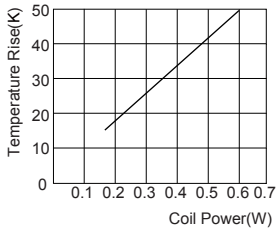
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

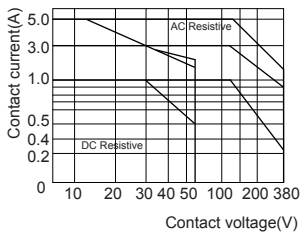
Operate time




Coil Temp Rise




Contact switching capacity



# CAR&CART30/40 SERIES Automotive Relay 30,40 Amp

c UL us
File No.:E75887

RoHS Compliant

## 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，AgNi，Silver Alloy |
| Contact Rating(Resistive) | NO:40A 14VDC<br>NC:30A 14VDC |
| Max. Switching Voltage | 75VDC |
| Max. Switching Current | 40A |
| Max. Switching Power | 560W |
| Mechanical Life | $1\times10^6$ operations |
| Electrical Life | $1\times10^5$ operations |

## ORDERING INFORMATION

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

- Model
- T: Mounting Tab Nil=No Mounting Tab
- 1A=1 Form A 1C=1 Form C
- P:PC Pin Nil:Quick Connect
- 40:40A 30:30A
- Coil Voltage
- S:Sealed Nil:Covered
- SH:Shrouded cover W:Weatherproof cover
- Resistor
- M:Metal tab Nil:Plastic tab
- D:Diode
- Customer code

## 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 |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | | 147m/s² |
| Vibration resistance | | 10Hz ~ 40Hz 1.27mm DA |
| Unit weight | | Approx. 30g |
| Construction | | Sealed, Covered |

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

## COIL DATA at 20°C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out 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 |

## COIL

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

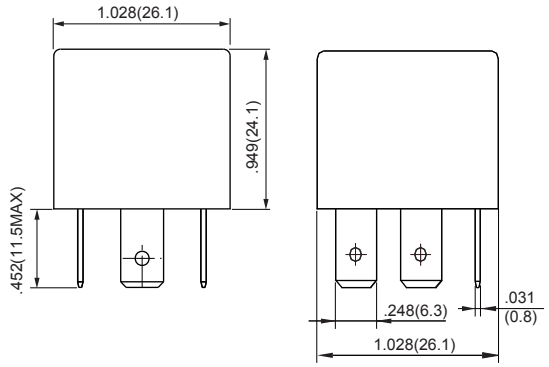
## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | NO:40A/14VDC<br>NC:30A/14VDC |

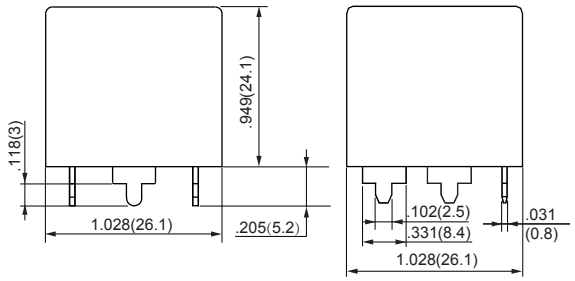
## OUTLINE DIMENSIONS

Unit: inch(mm)

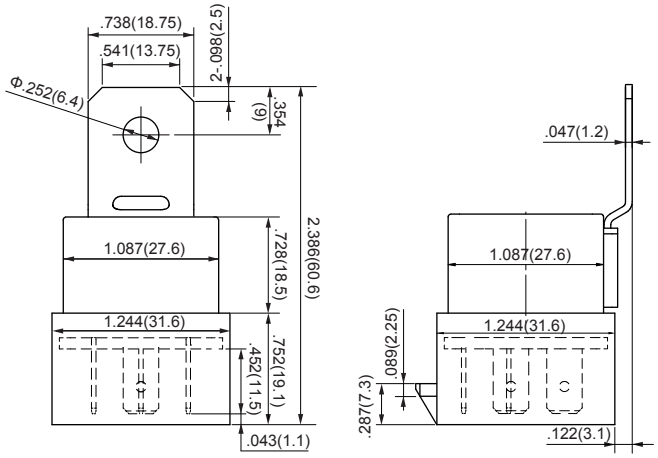
### Quick Connect



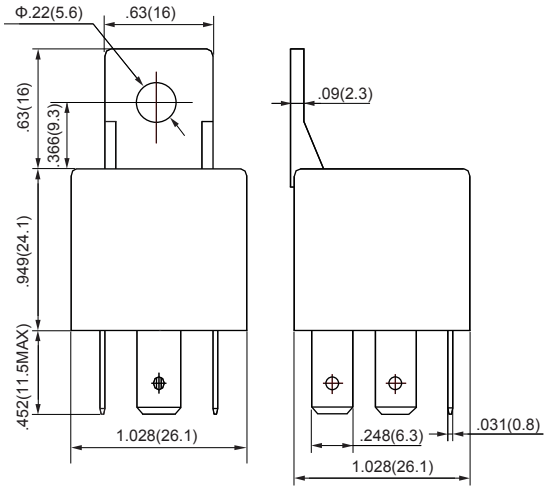

### PC Pin



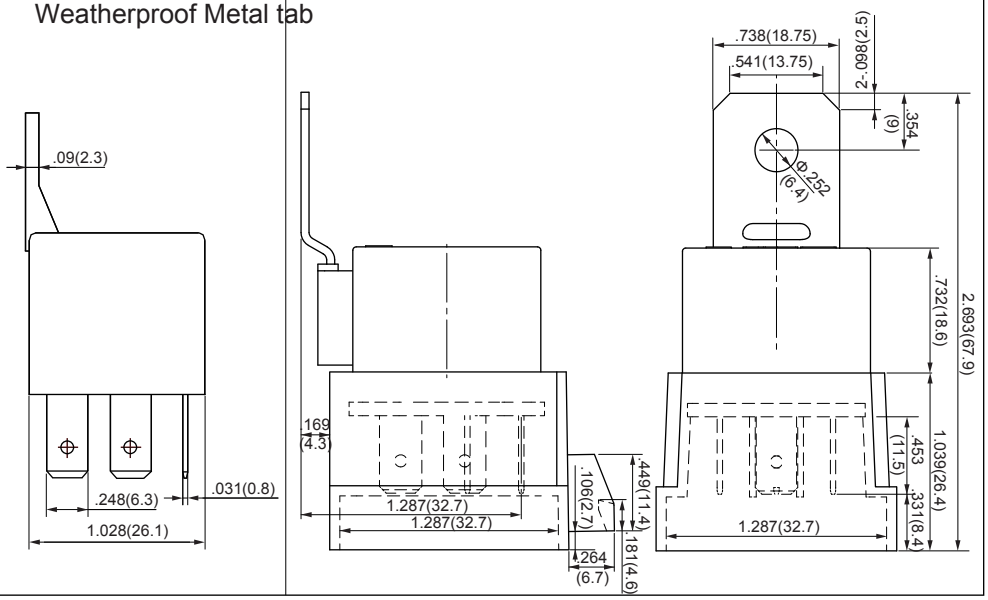

### Shrouded Metal tab




### Plastic tab




### Weatherproof Metal tab




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.

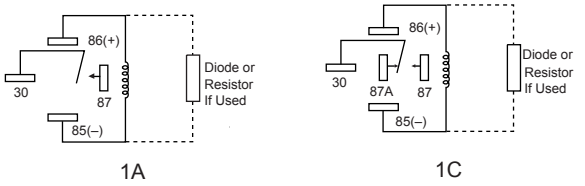
2) The tolerance without indicating for PCB layout is always ±0.1mm.

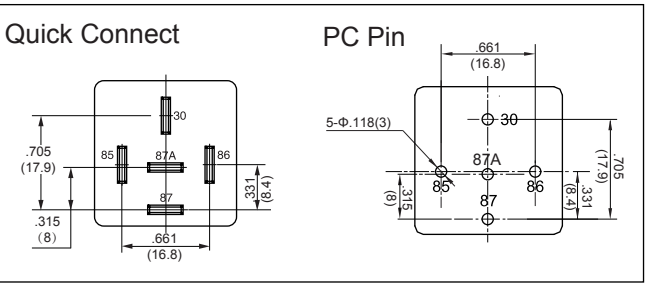
## WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Wiring Diagram
(Bottom view)

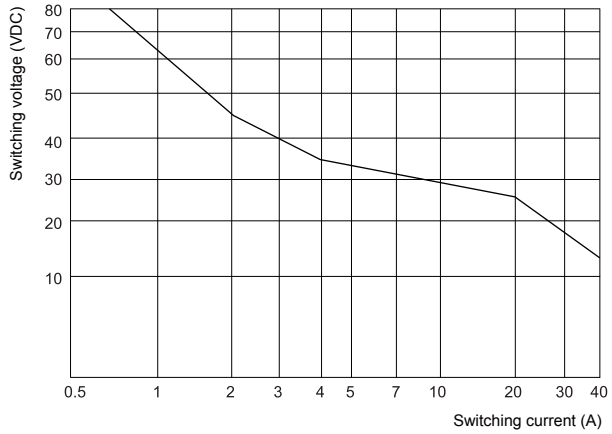
PCB Layout
(Bottom view)




## CHARACTERISTIC CURVES

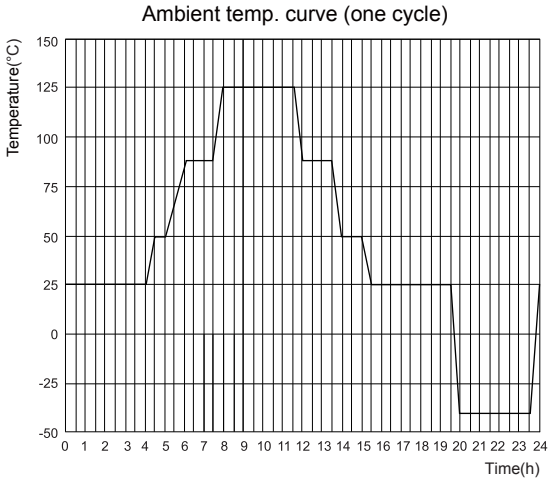
1.Load limit curve(at 23°C)




(1) This chart takes NO contact, resistive load as example.

(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.

2.Ambient temperature curve of the electrical endurance test




(1) The minimum temperature is -40°C.

(2) The maximum temperature is 125°C.

# CAR&CART80 SERIES Automotive Relay 80 Amp

c UL us
File No.:E75887

RoHS Compliant

## 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 | 30mΩ (1A 24VDC) |
| Contact Material | AgSnO，AgNi，Silver Alloy |
| Contact Rating(Resistive) | NO:80A/14VDC<br>NC:60A/14VDC |
| Max. Switching Voltage | 75VDC |
| Max. Switching Current | 80A |
| Max. Switching Power | 1120W |
| Mechanical Life | $1\times10^6$ operations |
| Electrical Life | $1\times10^5$ operations |

## ORDERING INFORMATION

CAR T 1C P 80 DC12 - S - 680R - M - D - XXX

- Model
- T: Mounting Tab; Nil=No Mounting Tab
- 1A=1 Form A; 1C=1 Form C
- P:PC Pin; Nil:Quick Connect
- 80:80A
- Coil Voltage
- S:Sealed Nil:Covered
- Resistor
- M:Metal tab Nil:Plastic tab
- D:Diode
- Customer code

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 100MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 500VAC 1min |
| | Between open contacts | 500VAC 1min |
| Operate time (at nomi. volt.) | | ≤7ms |
| Release time (at nomi. volt.) | | ≤5ms |
| Humidity | | 85% RH 40°C |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | | 294m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.27mm DA |
| Unit weight | | 46g(CAR); 48g(CART) |
| Construction | | Sealed, Covered |

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

## COIL DATA at 23°C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out 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 |

## COIL

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

## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | NO:80A/14VDC NC:60A/14VDC |

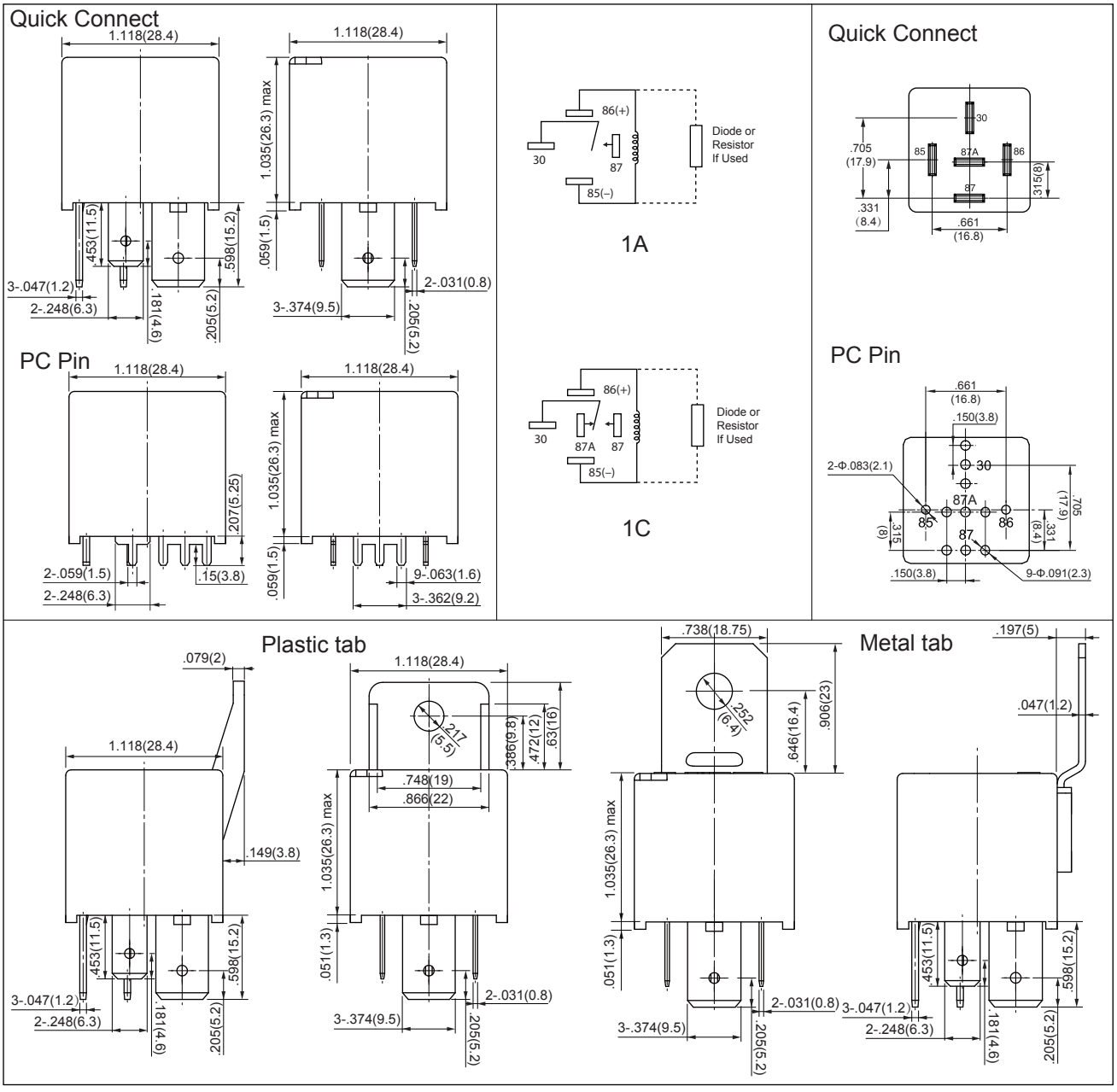
## OUTLINE DIMENSIONS,WIRING DIAGRAM AND PC BOARD LAYOUT.

Unit: inch(mm)

Outline Dimensions

Wiring Diagram (Bottom view)

PCB Layout (Bottom view)

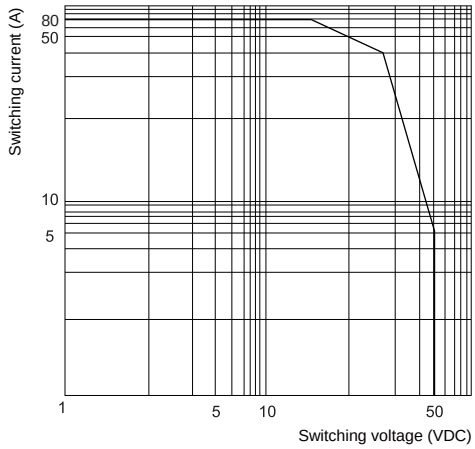



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

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

## CHARACTERISTIC CURVES

1. Load limit curve

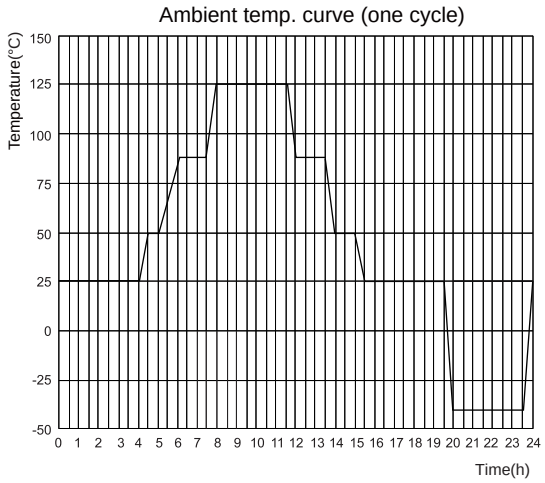



(1) The contact load is resistive.

(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




(1) The minimum temperature is -40°C.

(2) The maximum temperature is 125°C.

# SPR SERIES SPDT/DPDT 12,16,8 Amp

File No.:E75887

RoHS Compliant


## FEATURES

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

## CONTACT RATINGS

| | | |
|---|---|---|
| Contact Arrangement | 1A、1B、1C 2A、2B、2C | |
| Contact Resistance | 50mΩ(at 1A 6VDC) | |
| Contact Material | AgSnO，Gold FLash，Silver AIloy | |
| Contact Rating(Resistive) | 20A 277VAC<br>16A 240VAC<br>16A 24VDC | 8A 240VAC<br>8A 24VDC |
| Max. Switching Voltage | 440VAC/300VDC | |
| Max. Switching Current | 12A/16A | 8A |
| Max. Switching Power | 3000VA/4000VA | 2000VA |
| Mechanical Life | $1\times10^7$ operations | |
| Electrical Life | $1\times10^5$ operations | |

## ORDERING INFORMATION

SPR F 1C 12 DC 12 K - XXX

Model

F:Class F Nil:Class B

Contact arrangement:
1A=1 Form A;2A=2 Form A
1B=1 Form B;2B=2 Form B
1C=1 Form C;2C=2 Form C

Contact Rating:1 Form 12A/16A,
2 Form 8A

Coil:AC or DC

Coil Voltage

Pole Distance:K=5mm R=3.5mm

Customer Code

## 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 max. |
| Release time (at nomi. volt.) | | 5ms max. |
| Humidity | | 35% to 85% RH |
| Ambient temperature | | Class B:-40°C to 85°C Class F:-40°C to 105°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz to 150Hz 10g/5g |
| Unit weight | | Approx. 13.5g |
| Construction | | Sealed |

## COIL DATA at 23°C

DC

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 3.5 | 0.5 | 6.5 | 62 |
| 6 | 4.2 | 0.6 | 7.8 | 90 |
| 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 |

AC

| Nominal Voltage VAC | Pick-up Voltage (Max.) VAC | Drop-out Voltage (Min.) VAC | Coil Current mA | Coil Resistance Ω |
|---|---|---|---|---|
| 24 | 18.0 | 3.6 | 31.6 | 350(1±10%) |
| 115 | 86.3 | 17.3 | 6.6 | 8100(1±15%) |
| 230 | 172.5 | 34.5 | 3.2 | 32500(1±15%) |

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

# SPR SERIES SPDT/DPDT 12,16,8 Amp

## COIL

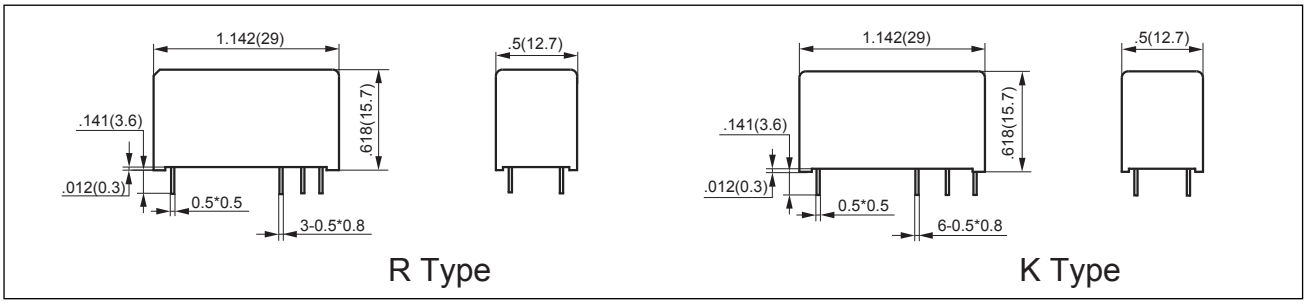
| | |
|---|---|
| Coil Power | DC:400mW (60V、110V:480mW)<br>AC:Approx. 0.75VA |

## SAFETY APPROVAL RATINGS

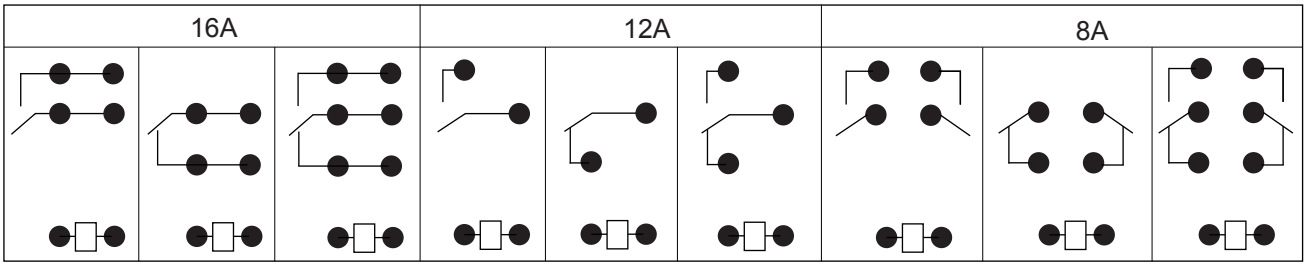
| | |
|---|---|
| UL&CUL | 1A,1B,1C:20A 277VAC;16A 240VAC;16A 24VDC<br>2A,2B,2C:8A 240VAC; 8A 24VDC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

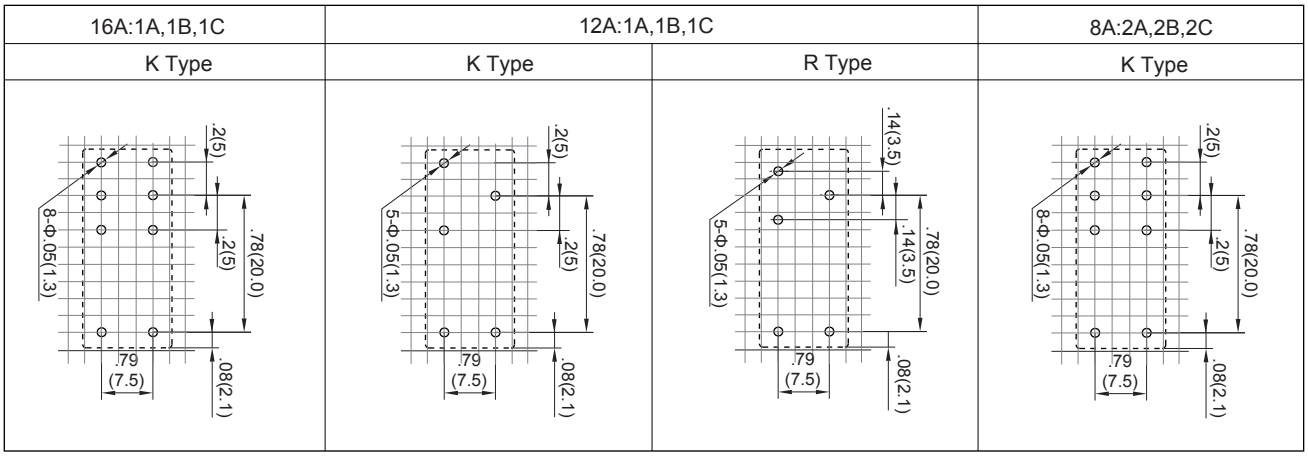
### OUTLINE DIMENSIONS




### Wiring Diagram (Bottom view)




### PCB Layout (Bottom view)

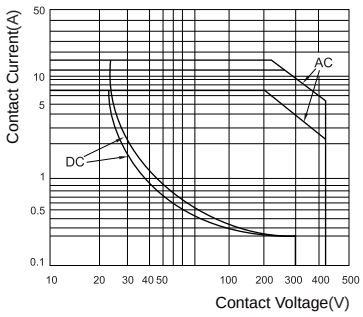



Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

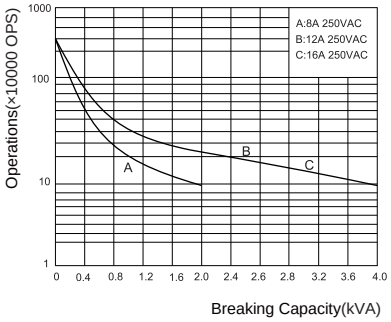
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

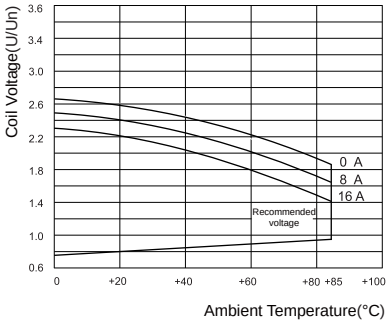
MAXIMUM SWITCHING POWER



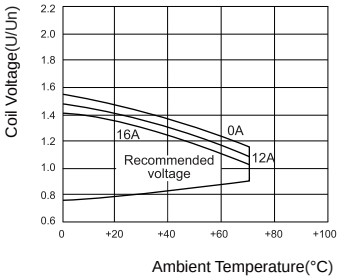

ENDURANCE CURVE




COIL OPERATING RANGE(DC)*




COIL OPERATING RANGE (AC)*




Notes:*The use of a relay with an energising voltage other than the rated coil voltage may lead to reduced electrical life.
An energising voltage over the abver range may damage the insulation of relay coil.

# PR SERIES SPDT/DPDT 10,20 Amp

c UL us
File No.:E75887

File No.:R 09779168

RoHS Compliant



## FEATURES

- High breakdown voltage (4000VAC between coil and contact)
- Large switching capacity(16A 240VAC)
- Fully sealed
- Typical Applications:

General electronic controls or systems, Machine tool controls, Energy control circuits, Industrial machinery controls, Consumer controls (Air-conditioner, Rerigerator, Microwave Oven, etc.), Vending machine, Office machine, etc.

## CONTACT RATINGS

| | | | |
|---|---|---|---|
| Contact Arrangement | 1A、1C 2A、2C | | |
| Contact Resistance | 50mΩ(1A 24VDC) | | |
| Contact Material | AgSnO, Gold FLash, Silver AIloy | | |
| Contact Rating(Resistive) | 10A/277VAC<br>10A/30VDC | 20A/277VAC<br>20A/30VDC | 10A/277VAC<br>5A/30VDC |
| Max. Switching Voltage | 277VAC/30VDC | | |
| Max. Switching Current | 10A | 20A | 10A |
| Max. Switching Power | 2770VA/300W | 5540VA/600W | 2770VA/300W |
| Mechanical Life | $1\times10^7$ operations | | |
| Electrical Life | $1\times10^5$ operations | | |

## ORDERING INFORMATION

PR F 2C 10 DC12 K - XXX

- Model
- F:Class F Nil:Class B
- Contact arrangement: 1A、1C、2A、2C
- Contact Rating: 10=10A 20=20A
- Coil Voltage
- Pole Distance:K=5mm R=3.5mm
- Customer Code

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 5000VAC 1min |
| | Between open contacts | 1000VAC 1min |
| | Between contact sets | 3000VAC 1min |
| Operate time (at nomi. volt.) | | ≤15ms |
| Release time (at nomi. volt.) | | ≤5ms |
| Humidity | | 98% RH,40°C |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 18g |
| Construction | | Sealed |

## COIL DATA at 23°C

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 4.0 | 0.5 | 6.0 | 47 |
| 6 | 4.8 | 0.6 | 7.2 | 68 |
| 9 | 7.2 | 0.9 | 10.8 | 155 |
| 12 | 9.6 | 1.2 | 14.4 | 275 |
| 24 | 19.2 | 2.4 | 28.8 | 1100 |
| 48 | 38.4 | 4.8 | 57.6 | 4400 |
| 110 | 80.0 | 11.0 | 120.0 | 14400 |

## COIL

| | |
|---|---|
| Coil Power | Approx. 530mW (110V:840mW) |

Notes: The data shown above are initial values

# PR SERIES SPDT/DPDT 10,20 Amp

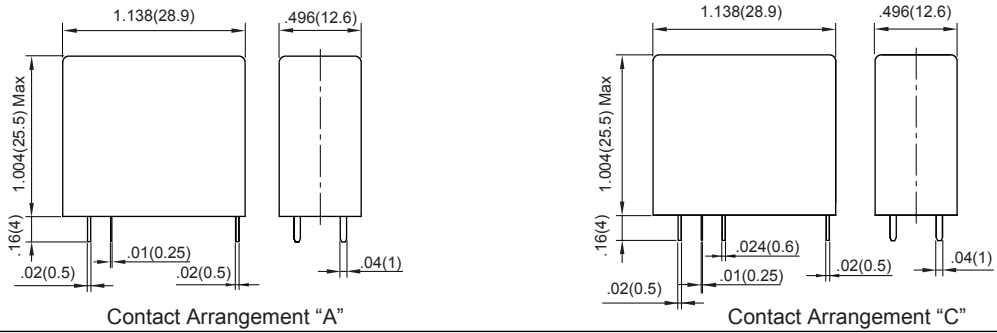
## SAFETY APPROVAL RATINGS

| | |
|---|---|
| UL&CUL | 10A/277VAC/30VDC<br>20A/277VAC/30VDC<br>10A/250VAC 5A/30VDC |

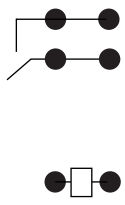
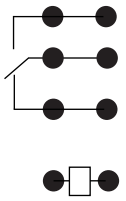
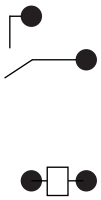
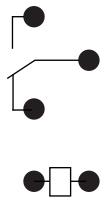
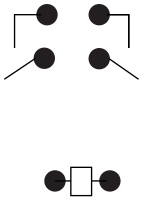
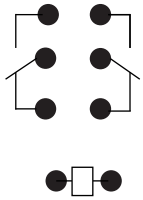
| | |
|---|---|
| TüV | 10A/250VAC<br>10A/14VDC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

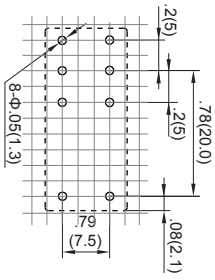
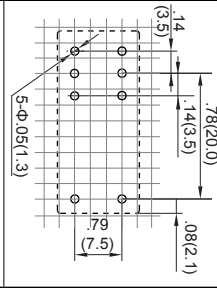
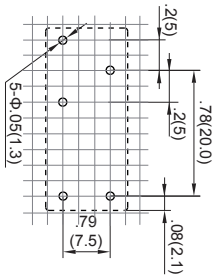
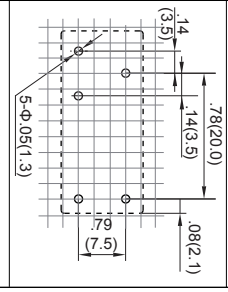
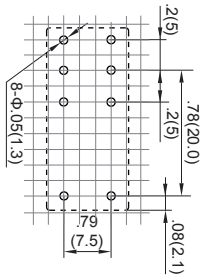
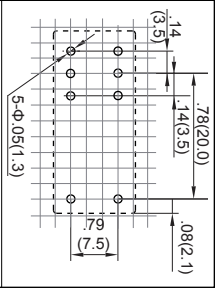
Outline Dimensions




Wiring Diagram (Bottom view)

| PR1 | | | | PR2 | |
|---|---|---|---|---|---|
| 20A | | 10A | | 10A | |
| A | C | A | C | A | C |
|  |  |  |  |  |  |

PCB Layout (Bottom view)

| PR1 | | | | PR2 | |
|---|---|---|---|---|---|
| 20A | | 10A | | 10A | |
| K | R | K | R | K | R |
|  |  |  |  |  |  |



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.

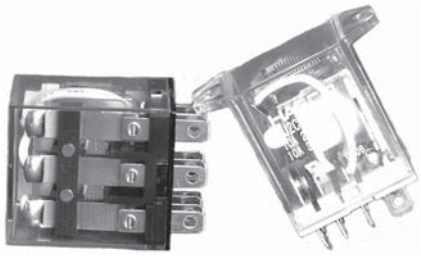
2) The tolerance without indicating for PCB layout is always ±0.1mm.

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

# UJ SERIES SPDT/DPDT/4PDT 15,10 Amp

c UL us
File No.:E75887

RoHS Compliant



## FEATURES

- 1 pole,2 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 | 4C |
| Contact Resistance | 100mΩ(1A 6VDC) | |
| Contact Material | AgSnO, Silver Alloy | |
| Contact Rating(Resistive) | 15A/240VAC<br>15A/30VDC | 10A/240VAC<br>10A/30VDC |
| Max. Switching Voltage | 240VAC/30VDC | |
| Max. Switching Current | 15A | 10A |
| Max. Switching Power | 3600VA/450W | 2400VAC/300W |
| Mechanical Life | $2\times10^7$ operations | |
| Electrical Life | $1\times10^5$ operations | |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 100MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 1500VAC 1min |
| | Between open contacts | 1000VAC 1min |
| Operate time (at nomi. volt.) | | ≤25ms |
| Release time (at nomi. volt.) | | ≤25ms |
| Humidity | | 98% RH, 40°C |
| Ambient temperature | | -40°C ~ +70°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1mm DA |
| Unit weight | | Approx. 37g |
| Construction | | Covered |

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

## ORDERING INFORMATION

UJ F 2 C P AC 220 L FT - XXX

- Model
- F:Class F Nil:Class B
- Number Poles:1,2,4
- Contact Arrangement:C:SPDT
- Terminal Style:
- P=P.C.Board S=Quick Connect
- Coil Input: AC or DC
- Coil Voltage
- L:LED N:NEON
- FT:FLANGE TOP
- Customer Code

## COIL DATA at 23°C

DC

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% | |
|---|---|---|---|---|---|
| | | | | 1C、2C | 4C |
| 5 | 4.0 | 0.5 | 5.5 | 27.5 | 16.6 |
| 6 | 4.8 | 0.6 | 6.6 | 40 | 24 |
| 12 | 9.6 | 1.2 | 13.2 | 160 | 96 |
| 24 | 19.2 | 2.4 | 26.4 | 630 | 360 |
| 48 | 38.4 | 4.8 | 52.8 | 2600 | 1540 |
| 110 | 88.0 | 11.0 | 121.0 | 11000 | 6800 |

AC

| Nominal Voltage VAC | Pick-up Voltage (Max.) VAC | Drop-out Voltage (Min.) VAC | Max. Allowable Voltage VAC | Coil Resistance Ω±10% | |
|---|---|---|---|---|---|
| | | | | 1C、2C | 4C |
| 6 | 4.8 | 1.8 | 6.6 | 11.5 | 5 |
| 12 | 9.6 | 3.6 | 13.2 | 40 | 20 |
| 24 | 19.2 | 7.2 | 26.4 | 160 | 80 |
| 48 | 38.4 | 14.4 | 52.8 | 600 | 320 |
| 120 | 96.0 | 36.0 | 132.0 | 3900 | 2000 |
| 220 | 176.0 | 66.0 | 242.0 | 13000 | 6700 |

# UJ SERIES SPDT/DPDT/4PDT 15,10 Amp

## COIL

| | |
|---|---|
| Coil Power | DC:900~1500mW |
| | AC:1.2~2.5VA |

## SAFETY APPROVAL RATINGS

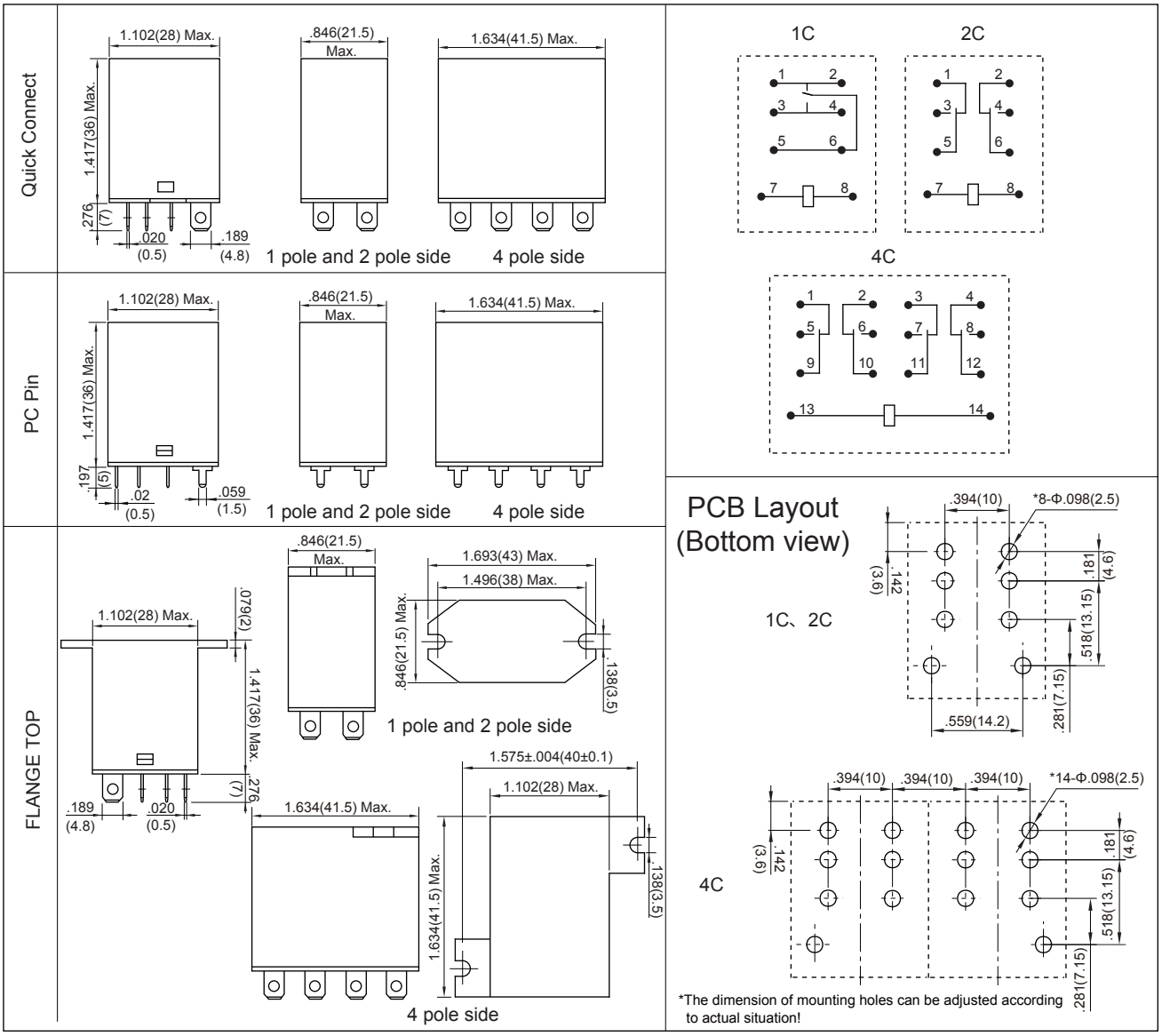
| | |
|---|---|
| UL&CUL | 15A/240VAC<br>1/2HP 277VAC; 1/3HP 120VAC<br>10A/30VDC |

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

Unit: inch(mm)

Outline Dimensions

Wiring Diagram (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.

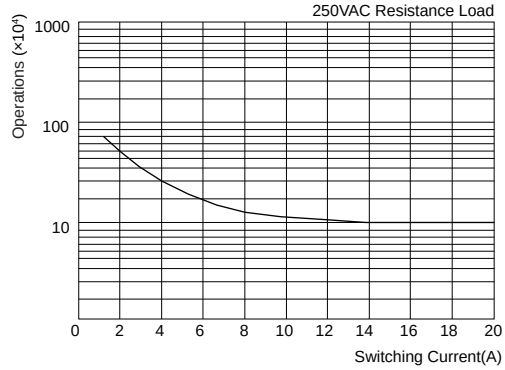
2) The tolerance without indicating for PCB layout is always ±0.1mm.

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

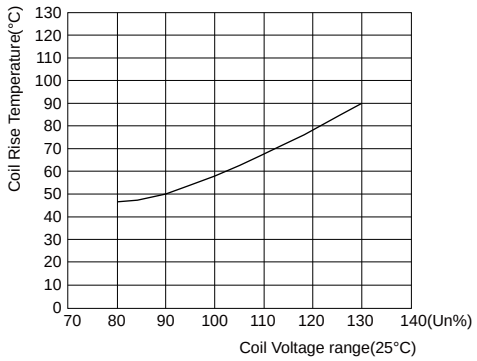
## CHARACTERISTIC CURVES

### 1C

Electrical Life

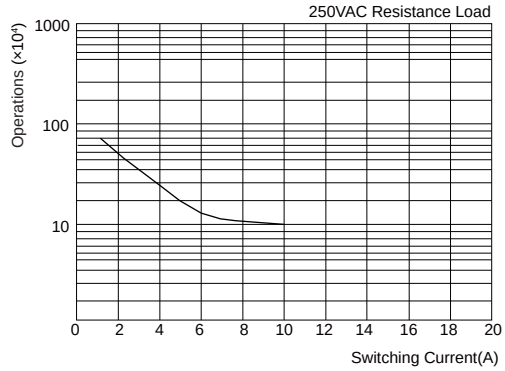



Coil Temperature

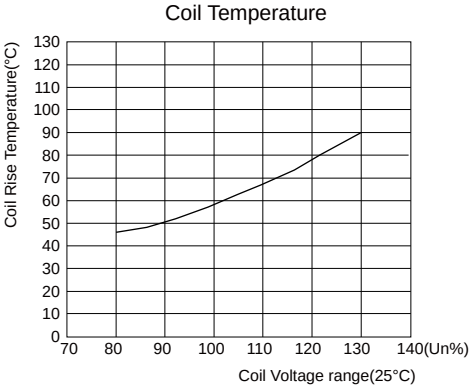



### 2C、4C

Electrical Life



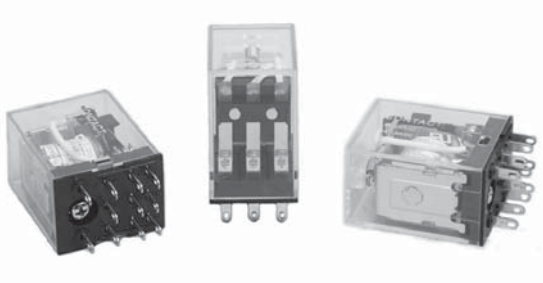

Coil Temperature



# UJJ SERIES DPDT/3PDT/4PDT 7,5 Amp

c UL us
File No.:E75887

RoHS Compliant



## 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/250VAC<br>5A/30VDC | 3A/250VAC<br>3A/30VDC |
| Max. Switching Voltage | 250VAC/30VDC | |
| Max. Switching Current | 7A | 5A |
| Max. Switching Power | 1750VA/210W | 1250VA/150W |
| Mechanical Life | $2\times10^7$ operations | |
| Electrical Life | $1\times10^5$ operations | |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (at 500VDC) |
| Dielectric Strength | Between coil & contacts | 1500VAC 1min |
| | Between open contacts | 1000VAC 1min |
| | Between contacts sets | 1500VAC 1min |
| Operate time (at nomi. volt.) | | ≤25ms |
| Release time (at nomi. volt.) | | ≤20ms |
| Humidity | | 35% ~ 95% RH |
| Ambient temperature | | -40°C ~ +85°C |
| Shock Resistance | Functional | 98m/s² |
| | Destructive | 980m/s² |
| Vibration resistance | | 10Hz ~ 55Hz 1.5mm DA |
| Unit weight | | Approx. 37g |
| Construction | | Covered |

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

## ORDERING INFORMATION

UJJ 2 C P AC 220 L FT - XXX

- Model
- Number Poles:2,3,4
- Contact Arrangement:C:SPDT
- Terminal Style:
- P=P.C.Board S=Quick Connect
- Coil Input: AC or DC
- Coil Voltage
- L:LED N:NEON
- FT:FLANGE TOP
- Customer Code

## COIL DATA at 23°C

DC

| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Max. Allowable Voltage VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 5 | 4.0 | 0.5 | 5.5 | 27.5 |
| 6 | 4.8 | 0.6 | 6.6 | 40 |
| 12 | 9.6 | 1.2 | 13.2 | 160 |
| 24 | 19.2 | 2.4 | 26.4 | 650 |
| 48 | 38.4 | 4.8 | 52.8 | 2600 |
| 110 | 88.0 | 11.0 | 121.0 | 11000 |

AC

| Nominal Voltage VAC | Pick-up Voltage (Max.) VAC | Drop-out Voltage (Min.) VAC | Max. Allowable Voltage VAC | Coil Resistance Ω±10% |
|---|---|---|---|---|
| 6 | 4.8 | 1.8 | 6.6 | 11.5 |
| 12 | 9.6 | 3.6 | 13.2 | 46 |
| 24 | 19.2 | 7.2 | 26.4 | 184 |
| 48 | 38.4 | 14.4 | 52.8 | 735 |
| 120 | 96.0 | 36.0 | 132.0 | 4550 |
| 220/240 | 176.0 | 72.0 | 264.0 | 14400 |

# UJJ SERIES DPDT/3PDT/4PDT 7,5 Amp

## COIL

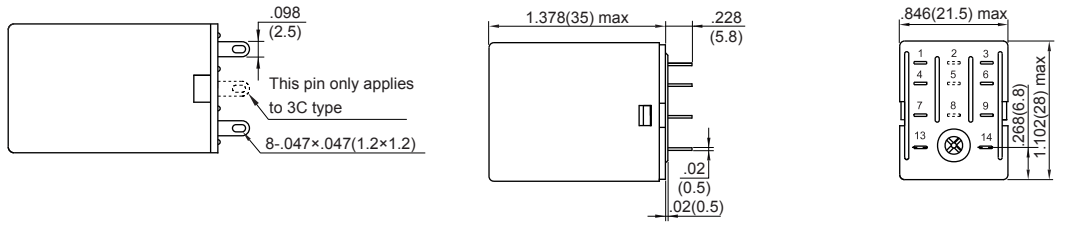
| | |
|---|---|
| Coil Power | DC:900mW~1100mW |
| | AC:1.2VA~1.8VA |

## SAFETY APPROVAL RATINGS

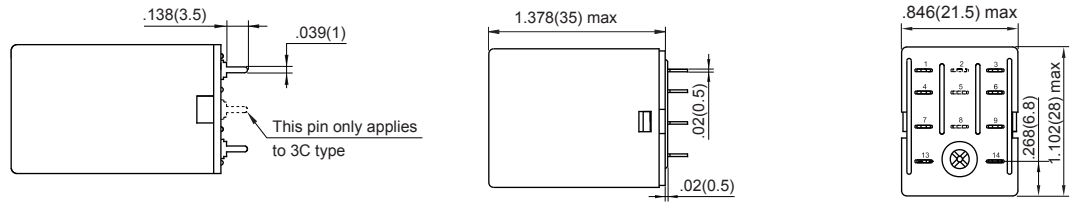
| | |
|---|---|
| UL&CUL | 7A/250VAC/30VDC<br>5A/250VAC/30VDC |

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT. Unit: inch(mm)

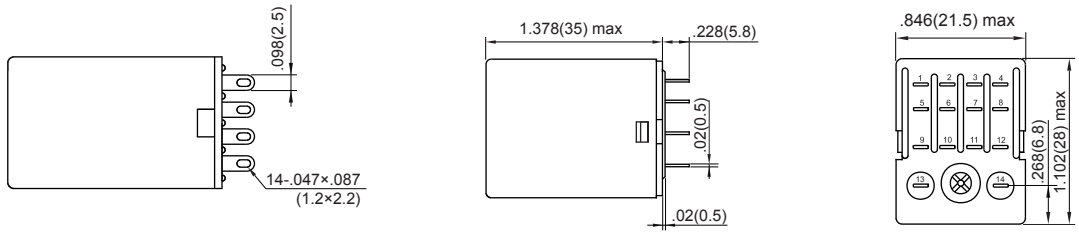
2C & 3C — Quick Connect



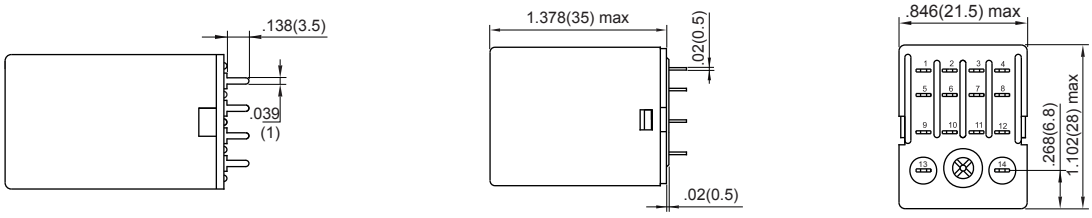

2C & 3C — PC Pin




4C — Quick Connect




4C — PC Pin



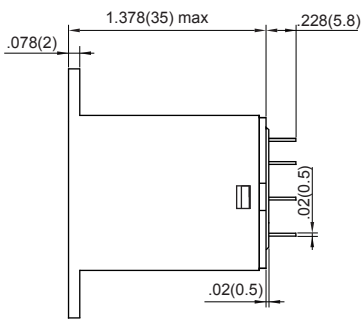
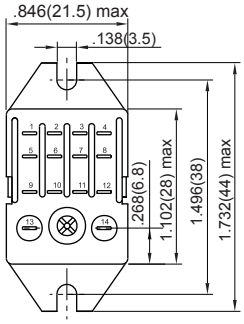
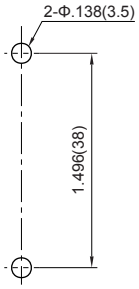
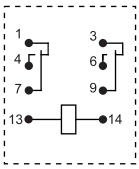
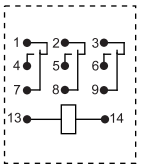
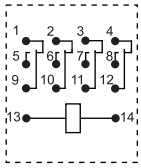
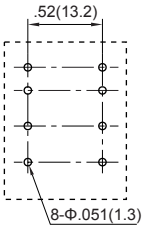
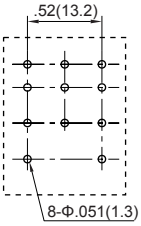
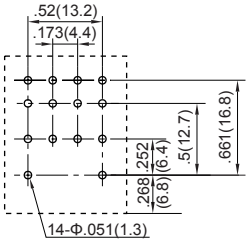

Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

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.**

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

Unit: inch(mm)

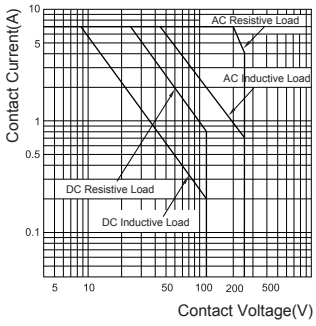
| | | | |
|---|---|---|---|
| FLANGE TOP | Outline Dimensions | | PCB Layout |
| |  |  |  |
| Wiring Diagram (Bottom view) | 2C | 3C | 4C |
| |  |  |  |
| PCB Layout (Bottom view) |  |  |  |

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.

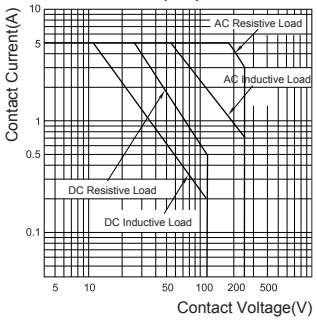
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER (2C,3C)




MAXIMUM SWITCHING POWER (4C)



# SIP/DIP SERIES Small dry Reed relay 0.5 Amp

c UL us
File No.:E75887

RoHS Compliant

## FEATURES

- Molded eoxy body
- FCC Part 68

## ORDERING INFORMATION

D 1A 05 D - XXX

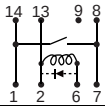
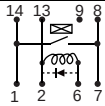
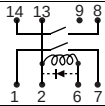
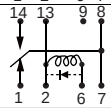
- Model
- Contact Arrangement
- Coil Voltage
- D=With diodes Nil=Without the diodes
- Customer code

S 1A 05 D - XXX

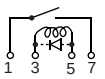
- Model
- Contact Arrangement
- Coil Voltage
- D=With diodes S=Metal cover
- Customer code

## COIL DATA

DIP Specifications

| Contact Form | Part Number | Nominal Voltage (VDC) | Coil Resistanece ±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 Resistanece ±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

# SIP/DIP SERIES Small dry Reed relay 0.5 Amp

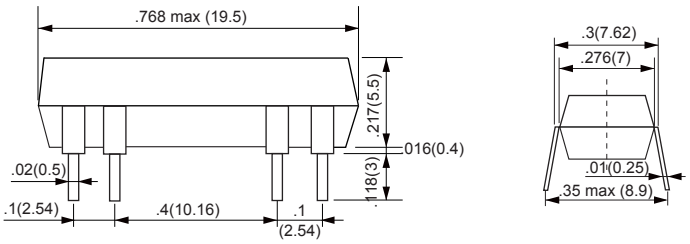
## CHARACTERISTICS

| 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.) | $10^{11}\Omega$ | $10^{11}\Omega$ |
| 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 | $10^8$ (Signal level) | $5\times10^7$ (Signal level) |
| Breakdown Voltage | DC250V across open contact | DC200V across open contact |
| | DC500V between coil and contact | DC500V between coil and contact |
| Operating Temp | -40°C ~ +85°C | -40°C ~ +85°C |
| Storage Temp | -50°C ~ +125°C | -50°C ~ +125°C |
| Minimum Permissible Load | 100mVDC 10μA | 100mVDC 10μA |
| Vibration | 20g(10 ~ 2000Hz) | 20g(10 ~ 2000Hz) |
| Resonant Frequency | 3.5 KHz | 3.5 KHz |

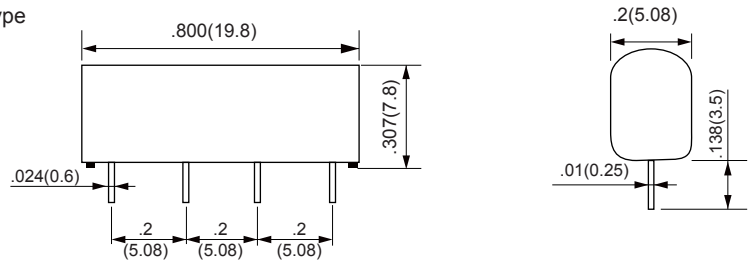
## OUTLINE DIMENSIONS

Unit: inch(mm)

DIP Type




SIP Type



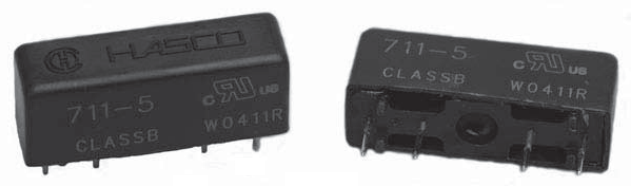

Remark:1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm,tolerance should be ±0.2mm; outline dimension ＞1mm and ≤5mm,tolerance should be ±0.3mm;outline dimension ＞5mm, tolerance should be ±0.4mm.

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

# 700 SERIES Reed Relays

c US
File No.:E75887

RoHS Compliant




## FEATURES

- Choice or 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 | $5\times10^7$ operations $3\times10^6$ 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 |
| Operating Temperature | -40°C ~ +85°C |
| Storage Temperature | -55°C ~ +105°C |

## ORDERING INFORMATION

711 - 5 S - XXX

Model:711、712、713、714、703

Coil Voltage:5, 12, 24VDC

S:Metal cover Nil:No Metal cover

Customer code

## COIL DATA

at 20°C

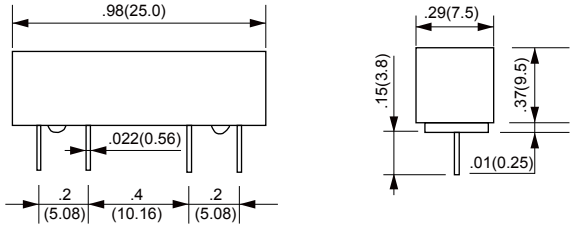
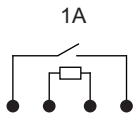
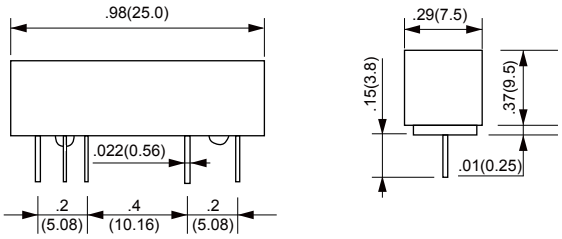
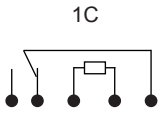
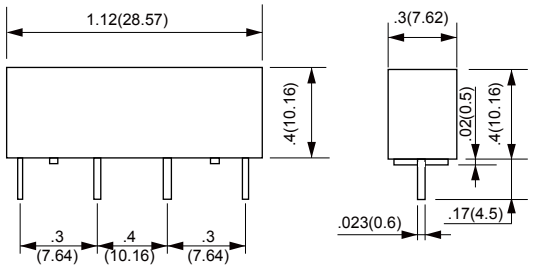
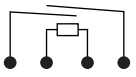
| Part Number | Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Coil Resistance Ω±10% | Contact Rating(UL&CUL) | Breakdown Voltage |
|---|---|---|---|---|---|---|
| 711-5 | 5 | 3.75 | 0.5 | 500 | AC 10VA, DC 10W max.<br>100VDC max.<br>1.0A max.(carry)<br>0.3A max.(switching) | 250VDC across contacts<br>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.<br>150VAC, 200VDC<br>2.5A max.(carry)<br>1.0A max.(switching DC)<br>0.7A max.(switching AC) | 300VDC across contacts<br>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.<br>300VAC, 350VDC<br>2.5A max.(carry)<br>0.5A max.(switching) | 600VDC across contacts<br>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.<br>1.0A max.(switching)<br>2.5A max.(carry)<br>350VDC/300VAC(max. switching) | 1000VDC across contacts<br>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.<br>DC 30V<br>0.5A (carry) 0.2A (switching) | 200VDC min.across contacts<br>2500VDC contact to coil |
| 703-12 | 12 | 9.0 | 1.2 | 500 | | |

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

# 700 SERIES Reed Relays

## OUTLINE DIMENSIONS AND WIRING DIAGRAM.

Unit: inch(mm)

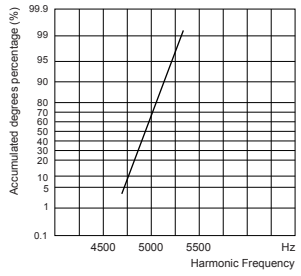
| | Outline Dimensions | Wiring Diagram (Bottom view) |
|---|---|---|
| 711 Series |   |   |
| 703 Series |   |   |
| 712 & 713 & 714 Series |   |   |

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

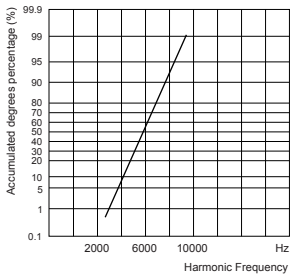
2) The tolerance without indicating for PCB layout is always ±0.1mm.

## CHARACTERISTIC CURVES

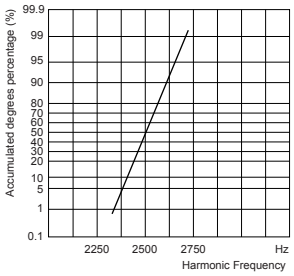
711 Series Harmonic Frequency



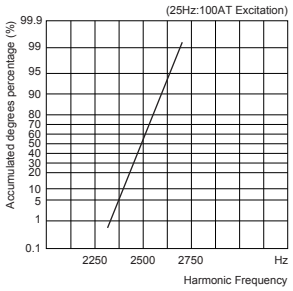

703 Series Harmonic Frequency




712、714 Series Harmonic Frequency




713 Series Harmonic Frequency



# 611 SERIES Mini Reed Relays 0.5 Amp

RoHS Compliant


## FEATURES

- Encapsulated Body
- Small size
- Available with external shield

## CONTACT RATINGS

| | |
|---|---|
| Contact Arrangement | 1A |
| Contact Resistance | 100mΩ |
| Contact Material | Precious Metals |
| Max. Switching Voltage | DC200/AC100 |
| Max. Switching Current | 0.5A |
| Max. Switching Power | 30VA |
| Mechanical Life | $1\times10^8$ operations |
| Electrical Life | $1\times10^5$ operations |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (500VDC) |
| Dielectric Strength | Between coil & contacts | DC500V 1min |
| | Between open contacts | DC250V 1min |
| Operate time (at nomi. volt.) | | ≤0.4ms |
| Release time (at nomi. volt.) | | ≤0.05ms |
| Harmonic frequency | | 5900±400 Hz |
| Max. driving frequency | | 500 Hz |
| Ambient temperature | | -40°C ~ +85°C |
| Unit weight | | Approx. 4g |
| Construction | | Sealed |

Notes: The data shown above are initial values.

## ORDERING INFORMATION

611 - 05 - XXX

Model

Coil Voltage:5=5VDC

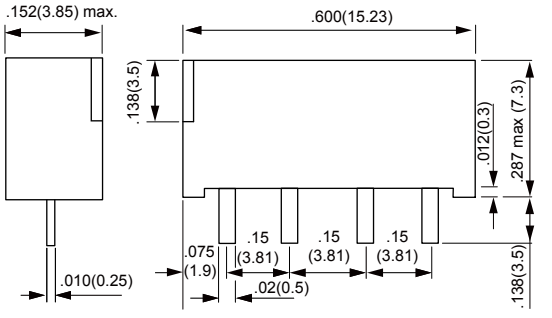
Customer Code

## COIL DATA at 20°C

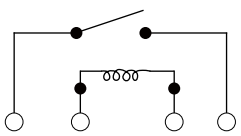
| Nominal Voltage VDC | Pick-up Voltage (Max.) VDC | Drop-out Voltage (Min.) VDC | Rated Current mA | Contiguous Voltage (Max.) VDC | Coil Resistance Ω±10% |
|---|---|---|---|---|---|
| 5 | 3.75 | 0.4 | 10 | 10 | 500 |

## OUTLINE DIMENSIONS AND WIRING DIAGRAM Unit: inch(mm)

Outline Dimensions




Wiring Diagram (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.**

# REED SWITCHES

## HCH Reed Switches

### Specifications

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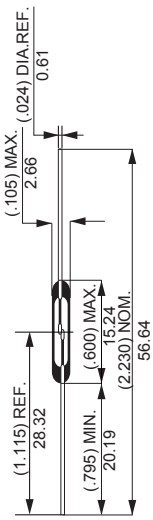
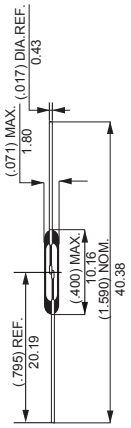
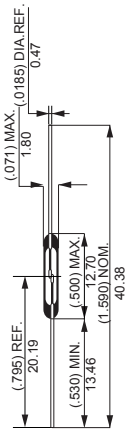
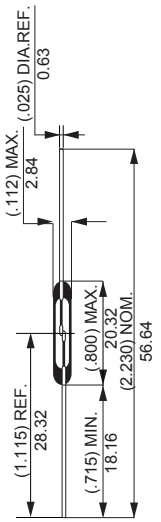
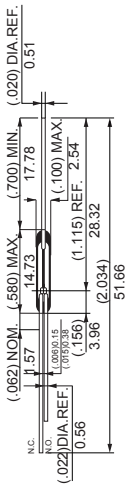


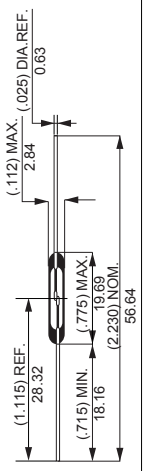

| | HCH25 | HCH211 | HCH219 | HCH229 | HCH551 |
|---|---|---|---|---|---|
| **Electrical Ratings** | | | | | |
| Contact Form | A | A | A | A | C |
| Contact Rating Watt-max. | 20 | 10 | 10 | 50 | 5 |
| Voltage [V] Switching Vdc-max. | 200 | 200 | 200 | 265Vac rms (250Vdc) | 175 |
| Voltage [V] Breakdown Vdc-min. | 250 | 250 | 250 | 750 | 200 |
| Current [A] Switching A-max. | 1.0 | 0.5 | 0.5 | 1.0 | 0.25 |
| Current [A] 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 |
| Resistance [Ω] Insulation Ω-min. | $10^{10}$ | $10^{12}$ | $10^{12}$ | $10^{10}$ | $10^{6}$ |
| 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 |
| Temperature [°C] 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 Tums | 17-38 | 10-25 | 10-25 | 22-43 | 15-30 |
| | Miniature CD | Sub-Miniature | Sub-Miniature | Miniature HV | Miniature Changeover |

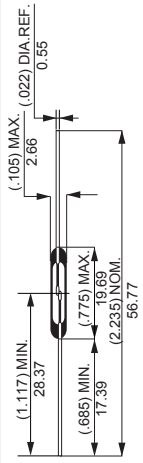
# REED SWITCHES

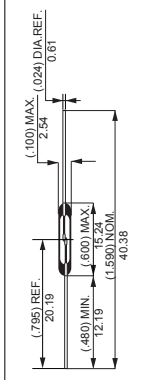
## HCH Reed Switches

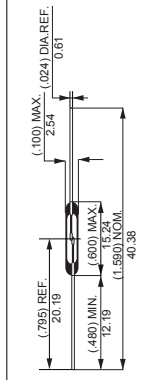
### Specifications

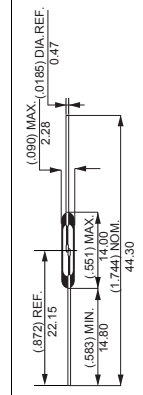
File No.:E75887

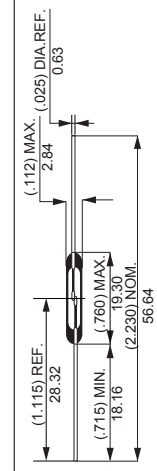



| | HCH2210 | HCH2210V | HCH2212 | HCH9215 | HCH9216 | HCH50WD |
|---|---|---|---|---|---|---|
| **Electrical Ratings** | | | | | | |
| Contact Form | A | A | A | A | A | A |
| Contact Rating Watt-max. | 50 | 10 | 20 | 10 | 10 | 50 |
| Voltage [V] Switching Vdc-max. | 200 | 200 | 200 | 200 | 200 | 200<br>140 |
| Voltage [V] 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 |
| Current [A] 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 |
| Resistance [Ω] Insulation Ω-min. | $10^{10}$ | $10^{12}$ | $10^{12}$ | $10^{10}$ | $10^{10}$ | $10^{10}$ |
| 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 |
| Temperature [°C] 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 | |

# REED SWITCHES

## Specifications

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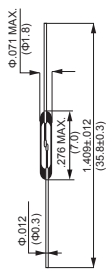
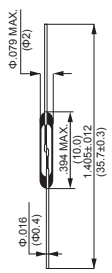
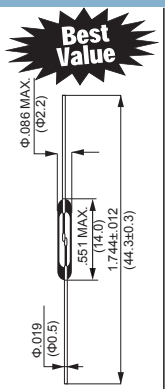
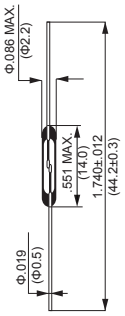
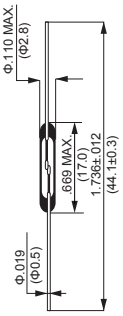
File No.:E75887




| | | | ORD213 | ORD211 | ORD9216 | ORD228 | ORD9215 |
|---|---|---|---|---|---|---|---|
| Electrical Characteristics | Contact | | 1A | 1A | 1A | 1A | 1A |
| | Pull-in Available in ±5 AT ranges | | 10 ~ 40 | 10 ~ 40 | 10 ~ 50 | 10 ~ 50 | 10 ~ 50 |
| | Drop-out | [AT] min. | 5 | 5 | 5 | 5 | 4 |
| | Contact resistance(Initial) | [mΩ] max. | 200 | 100 | 100 | 100 | 150 |
| | Breakdown voltage | [DCV] min. | 150 | 150 | 200 | 200 | 200 |
| | Insulation resistance | [Ω] min. | $10^9$ | $10^9$ | $10^9$ | $10^9$ | $10^9$ |
| | 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 | AC110 / DC100 | 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 | 0.3 | 0.4 |
| | Bounce time | [ms] max. | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 |
| | Release time | [ms] max. | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| | Resonant frequency | [Hz] | 1100 ± 500 | 7500 ± 500 | 5000 ± 400 | 5300 ± 300 | 3700 ± 300 |
| | Maximum operating frequency | [Hz] | 500 | 500 | 500 | 500 | 500 |
| Standard coil | Coil resistance | [Ω] | 600 | 600 | 450 | 450 | 450 |
| | No. of turns | [T] | 5000 | 5000 | 5000 | 5000 | 5000 |
| | Dimensions | [mm] | Φ3.3 × 10 | Φ3.3 × 10 | Φ3.7 × 15 | Φ3.7 × 15 | Φ3.7 × 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 ±2AT. (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 morment the voltage applied to the test coil as removed to the moment the contacts open. Shown by Tris.

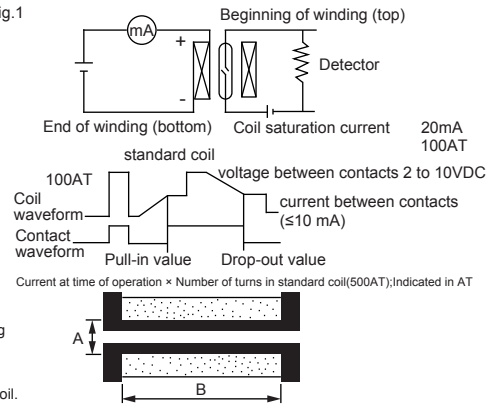
8.Resonant frequency is a vibrating frequency inherent to the reed switch. Avoid application of vibration at this frequency to the switch, otherwise it will cause misoperation.

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 operationg frequency into consideration when designing systems and circuits.

10.Dimensions of standard coil.

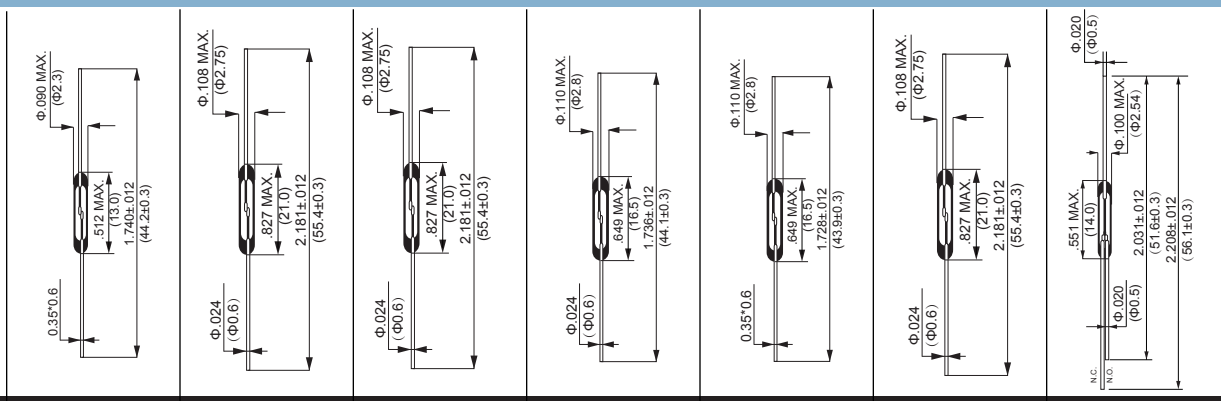
A:Inner diameter of standard coil. B:Length of standard coil.

Fig.1




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

# REED SWITCHES




| | ORD221 | ORD229 | ORD2210 | ORD2211 | ORD2212 | ORD2210V | ORT551 |
|---|---|---|---|---|---|---|---|
| | 1A(offset) | 1A | 1A | 1A | 1A | 1A | 1C |
| | 1 ~ 40 | 15 ~ 40 | 15 ~ 60 | 15 ~ 60 | 15 ~ 45 | 20 ~ 60 | 10 ~ 30 |
| | 5 | 6 | 7 | 8 | RLS/OP>0.8 | 7 | 5 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | 200 | 600 | 250 | 200 | 150 | 1000 | 200 |
| | $10^9$ | $10^{10}$ | $10^{10}$ | $10^9$ | $10^9$ | $10^{10}$ | $10^9$ |
| | 0.3 | 0.5 | 0.5 | 0.3 | 0.5 | 0.5 | 1.5 |
| | 10 | 50 | 50 | 50 | 10 | 100 | 3 |
| | AC100 / DC100 | AC300 / DC350 | AC70(VA) / DC50(W) | AC100 / DC100 | AC100 / DC100 | AC300 / DC350 | AC30 / DC30 |
| | DC 0.3 | DC 0.5 | AC0.7 / DC1.0 | 0.5 In rush 3A | DC 0.2 | DC 1.0 max. | DC 0.2 |
| | 1.0 | 2.5 | 2.5 | 2.5 | 0.5 | 2.5 max. | 0.5 |
| | 0.3 | 0.6 | 0.5 | 0.6 | 0.4 | 0.5 | 1.0 |
| | 0.5 | 0.5 | 0.5 | 0.4 | 1.0 | 0.5 | (NC)1.5 / (NO)1.0 |
| | 0.5 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.5 |
| | 2750 ± 250 | 2500 ± 250 | 2500 ± 250 | 4600 ± 500 | 4200 ± 300 | 2500 ± 250 | 6000 ± 4000 |
| | 500 | 500 | 500 | 500 | 500 | 500 | 200 |
| | 450 | 500 | 500 | 450 | 450 | 450 | 550 |
| | 5000 | 5000 | 5000 | 5000 | 5000 | 5000 | 5000 |
| | Φ3.7 × 15 | Φ4.6 × 21 | Φ4.6 × 21 | Φ3.7 × 15 | Φ3.7 × 15 | Φ3.7 × 15 | Φ4.6 × 10 |
| | 6 | 3 | 3 | 6 | 6 | 6 | 10 |
| | Miniature offset (RH) | High breakdown voltage (RH) | High power (RH) | Lamp load 3.4W Low sound (RH) | Closed different type (RH) | Vacuum (RH) | Ultra-miniature transfer (RH) |

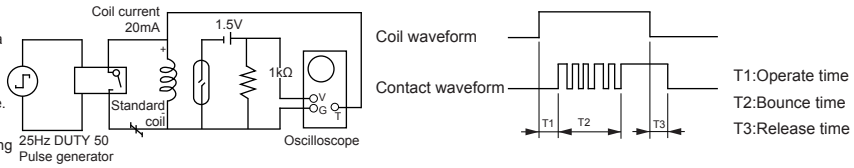
11.If a shock of more than 30G is applied to a reed switch, the pull-in value of the switch will be often caused to change from the standard specification. Therefore, it is recommended not to use the reed switch which has been given such a shock.

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. There fore, 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.

Fig.2




Environmental Characteristics Table 2

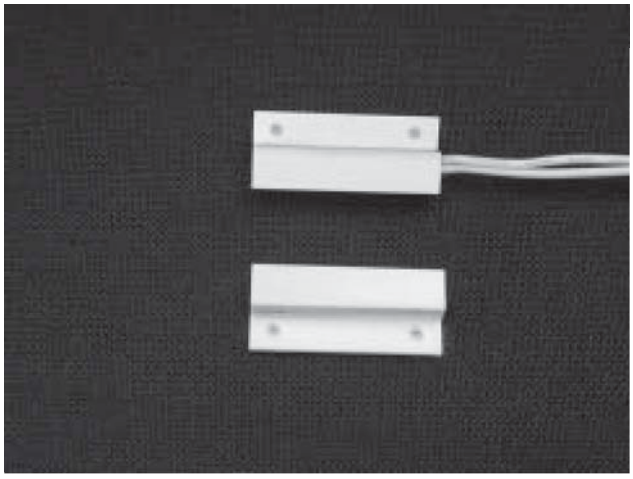
| | Characteristics(Common to All Types) | Test Conditions | Notes |
|---|---|---|---|
| Shock | Shall not misoperate with shock of 30G(11ms) applied | MIL-STD-202E METHOD 213B | 13 |
| Vibration | Shall not misoperate with max. 20G(10-55Hz) | MIL-STD-202E METHOD 210A | 14 |
| Temperature range | Shall 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 |

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

# 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.

# 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.

(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.

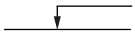
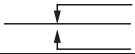
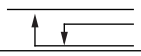
(8) Min. switching current

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

(9) Contact resistace

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

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. |
| D | Continuous (BBM) |  | The combination in which Form A (NO) contact close before Form B (NC) contacts open. |

Note:

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

NO:Nomally open M:Make BBM:Break before Make
NC:Nomally 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

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)

## COIL

(1) Nominal voltage

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

(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 20°C)

(3) Coil resistance

The resistance of the coil for temperature conditions listed in the catalog. (Usually at 20°C/68°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.

(5) Drop-out (Reset) voltage

When the coil voltage on an operate relay is decreased gradually, the relay will release 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 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.

# 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 relay 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 specififcations. 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 Ponts 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 indicative 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 atmophere | 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 (coso), 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 circui, an inrush current of 20 to 40 times large 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 overlayed 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 |
| Contactor load | 3-10 times of the steady state current |

# GENERAL APPLICATION GUIDELINES

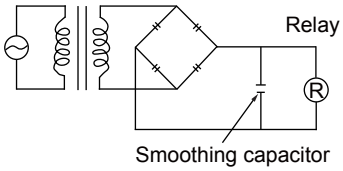
## COIL

(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

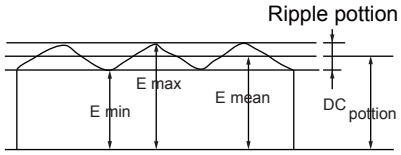



As a power source for DC relays, a battery or either a half or full wave rectifier circuit with smoothing capacitor is used.

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 20°C(68°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.

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

E max.=Maximum value of ripple portion

E min.=Minimum value of ripple

E mean=Average value of ripple portion

## 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*

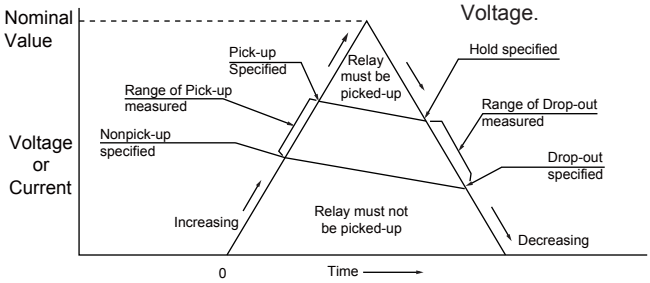
The bifurcated spring is cut deeply enough and separated so as to provide a good independence in a contact even when some insulating particle is trapped between contact on one side.

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 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.

Fig.5 Relationship of Relay Performance




(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 70% 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 Voltag (Release or Must Release Voltage)

When the voltage on an operated relay is decreased, the value at or above 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.

# GENERAL APPLICATION GUIDELINES

## PERFORMANCE

(3) Coil temperature rise

When voltage is applied to a coil, its temperature increases due to juele heat. 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.

$$T=T2-Ta=\frac{R2-RI}{RI}(K+TI)+T1-Ta$$

where, T: Coil temperature rise (°C)
TI: Initial ambient temperature (°C)
T2: Coil temperature after the test (°C)
Ta: Ambient temperature after the test (°C)
RI: Coil resistance at T1 °C (Ω)
R2: Coil resistance at T2 °C (Ω)
K: Constance (=235 for copper wire)
however, I T1 - Ta 1 ≤ 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 temperalure. When voltage is applied to the coil, the coil temperature rises,increasing both coil resistance and pick-up voltage. The coil with it's temperature rise due to voltage impression is called a Hot Coil. To the contrary, when no voltage is impressed 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 20°C 68°F, Cool Coil conditions. For the Hot Coil, because of it's pick-up voltage rise, these is a possibility that hat it may not operate under the same conditions as Cool Coil.Thus,care is required.

(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.

Coil temperature rise

Fig.6 (a)

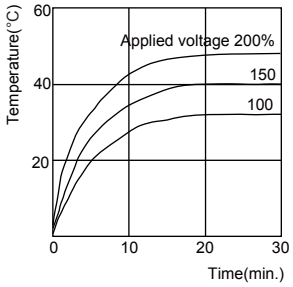



Fig.6 (b)

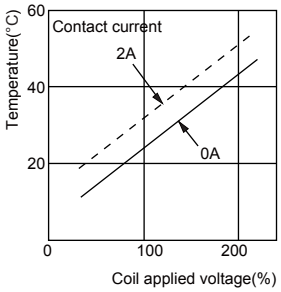



Figure 6 (a) shows the duration characteristics. Figure 6 (b) shows the voltage characteristics in a steady state at constant supply voltage.

*(b) Pick-up voltage*

As the ambient temperature rises, the coil resistance increases, pick-up voltage. Figure 7, line B refers to the relationship. The upper portion of line-B in Fig.7 shows the range of voltage which can be applied to the coil. Line-A is maximum continuous voltage. Thus the relay operating range is the portion surrounded by line A and B.

In order to have stable operation of relay, the APP voltage and the ambient temperature should be in the operating range.

If the ambient temperature increases, pick-up voltages rises, while maximum continuous voltage decrease. Care is required.

(6) Operate time and Release time

There is variation in Operate time and Release Time depending upon voltage/power applied to coil.

Figure 8 shows an example of relationship between Operate Time and Release Time. Figure 8 refers to the phenomenon that according to the fluctuation of coil impressed voltage, Operate Time greatly varies, while Release Time is small. To the extent of large coil imressed voltage, the Operate Time is rapid, but if it is too rapid, the make contact bounce time may be extended.

(7) Safety standards

Laws and regulations demand securing the safety of users from dangers such as electric shock and fire lying around household appliances and other consumer electric equipment or devices.

Major industrial countries across the world already have their own safety standards such as those under control of 'The Electrical Appliance and Material Control Law' in Japan, UL in U.S.A.,CSA in Canada, VDE in Germany, SEMKO in North Europe and BS in GB.

Fig.7 Operating range

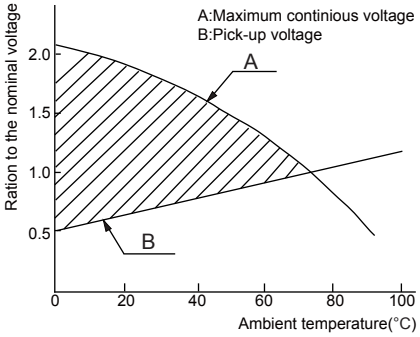
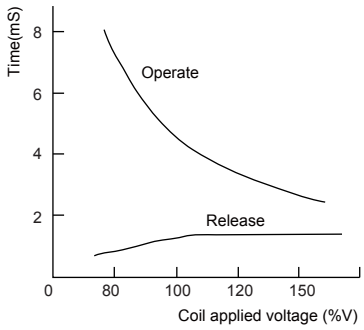



Fig.8 Operate and Release time




## AMBIENT ENVIRONMENT

(1) Silicone compound atmosphere

Silicone compounds such as silicone rubber,silicone paint, silicone grease, etc. emit volatile silicone gas. Note that when silicone is used near relays, switching contacts in the presence of its gas causes silicon to adhere to the contacts and may result in contact failure. In this case, use a substitute that is not silicone based. If the use of silicone compound is inevitable, use a plastic-sealed relay.

(2) Influence of external magnetic field

When transformers, speakers or magnets are located near a relay the characteristics may change and faulty operations may result due to the strong magnetic field generated from the equipment.

The influence depends on the strength of the magnetic field and it should be checked at the installation. In such a case suitable measures such as magnetic shielding or selection of adequate in arrangement of relay should be taken so as to avoid problems.

# 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

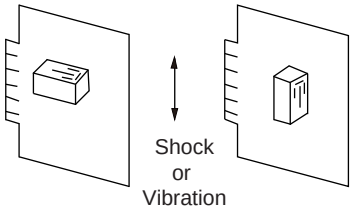
It is recommended to mount the relays so that the surfaces of its contacts are vertical and in Lipper location of relay inside.Such mounting methods prevent dirt and dust as well as scattered contact material (produced due to large loads from which arcs are generated) and powdered metal from adhering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

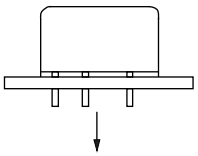
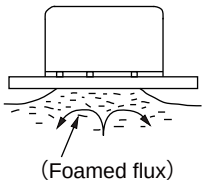
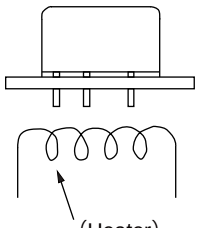
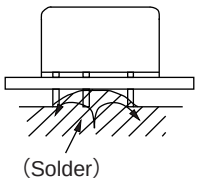
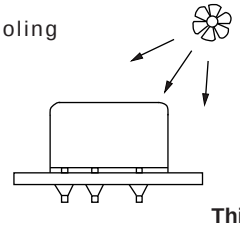
(4) Adjacent mounting

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 bords 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



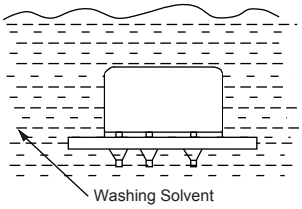

## RELAY SOLDERING AND WASHING GUIDELINES

| Process | Guidelines |
|---|---|
| 1.Mounting of relay  | *Avoid bending and terminals to make the relay self-clinching. Relay performance cannot be guaranteed if the terminals are bent. |
| 2.Flux coating  (Foamed flux) | *Adjust the position of the PC board so that flux does not overflow onto the top of it.<br>*Use rosin-based flux, which is non-corrosive and requires no washing.<br>*Do not use Automatic Flux Coating Method to dust-cover type relays.<br>*Do not overflow onto the top of PC Board, in such a case, the flux may even penetrate a flux-resistant type relay. |
| 3.Preheating  (Heater) | *Be sure to preheat before soldering.<br>*Preheating acts to improve solderability.<br>*Preheat according to the following conditions.<br>Temperature: 100°C 212°F or less<br>Time: Within approx.1 minute<br>*Note that long exposure to high temperatures (e.g. due to a malfunctioning unit) may affect relay characteristics. |
| 4.Soldering  (Solder) | Automatic Soldering<br>*Flow solder is the optimum method for soldering.<br>*Adjust the level of solder so that it does not overflow onto the top of the PC board.<br>*Unless otherwise specified, solder under the following conditions depending on the type of relay.<br>Solder Temperature: Approx.250°C 482°F<br>Soldering Time: Within approx.5 seconds<br>Solder Ration: Sn/Pb=60/40 or 63/37<br>Hand Soldering *Keep the tip of the soldering iron clean.<br>Solder Iron: 30W or 60W<br>Iron Tip Temperature: Approx.300°C 572°C<br>Solder Time: Within approx.3 seconds<br>*Immediate air cooling is recommended to prevent deterioration of the relay and surrounding parts due to soldering heat.<br>*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. |
| 5.Cooling  | |

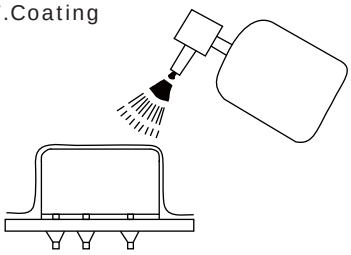
# GENERAL APPLICATION GUIDELINES

## 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.
* Avoil ultrasonic washing on relays.Use of ultrasonic cleaning may cause breaks. In the coil or slight sticking of contacts due to the ultrasonic energy.

Table 6. Washing solvent compatibility chart for sealed relays

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

* 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.

## 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)

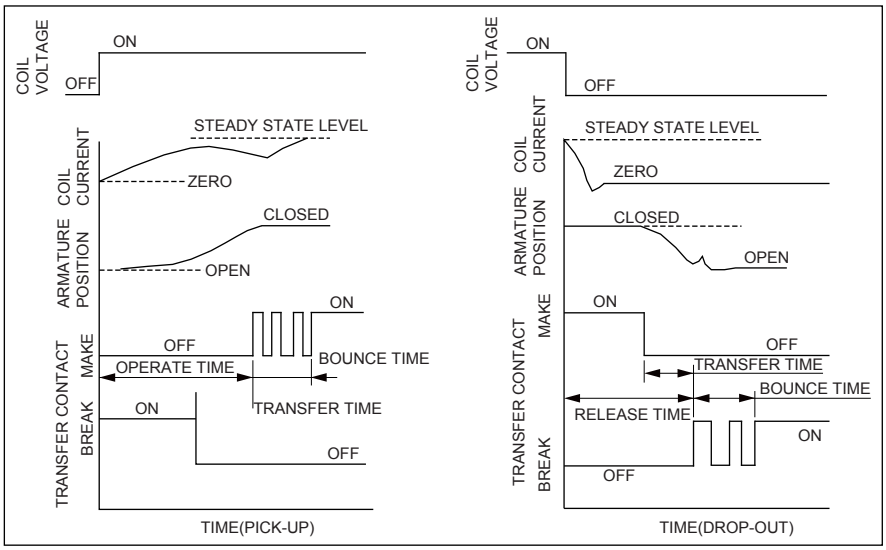
(4) Dielectric strength

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

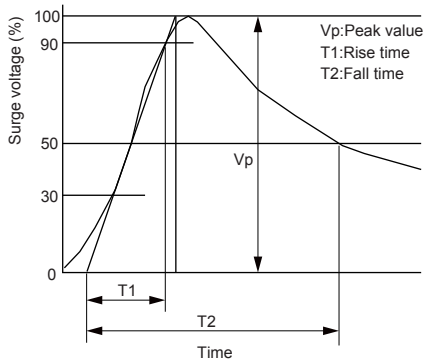



Usually, wave form of this test is specified indicating peak value, rise time and fall time.(cf. Fig.2) In FCC Part 66, T1=10 μS, Vp 1500V are specified.

(6) Insulation resistance

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

Fig.2 Ware form of Surge test



# 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 damages 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.

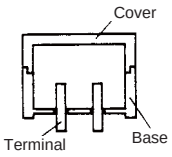
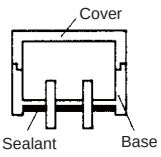
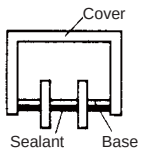
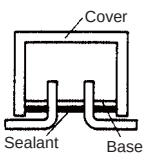
UL(U.S.A.) VDE(Germay) BS(G.B.)
SEMKO(Sweden) CSA(Canada)

(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 | Dust cover Type | Flux Free Type | Sealed Type | Surface Mount Type |
|---|---|---|---|---|
| Structure |  |  |  |  |
| Characteristics | 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 | Surface mounting |
| Automatic Flux Coating | N | Y | Y | Y |
| Automatic Soldering | N | Y | Y | Y |
| Automatic Washing | N | N | Y(Note 1) | Y(Note 1) |
| Manual Soldering | N | Y | Y | - |
| Environmental Gas Resistance | 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.