

# HFD4-I

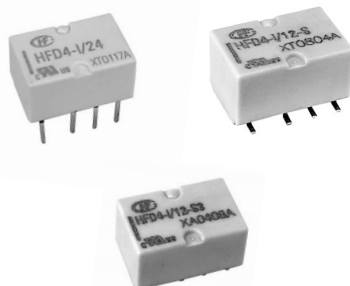
# SUBMINIATURE HIGH LOAD RELAY

**US**

File No.:E133481



File No.:R50333270



## Features

- Surge withstand current up to 3.5A(Valid value)
- Available in accordance with IEC 60335-1
- Low power consumption
- Single side stable and latching type available
- High temperature resistant products at 105°C are available

**RoHS compliant**

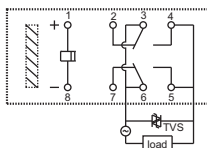
## CONTACT DATA

Contact arrangement	2C	
Contact resistance	100mΩ max. (10mA 30mVDC)	
Contact material	Silver alloy + Au plated	
Contact rating (Res. load)	2A 30VDC 3A 30VDC 0.3A 125VAC 1A 125VAC	
Max. switching voltage	250VAC / 220VDC	
Max. switching current	3.5A(30VAC) (Valid value ,Two sets of normally open contacts in parallel )	
Max. switching power	125VA/90W	
Min. applicable load	5V 1mA	
Mechanical endurance	1 x 10 <sup>7</sup> OPS	
Electrical endurance	Resistive load	1 x 10 <sup>5</sup> ops (85°C, 1s on 9s off, 2A 30VDC) 5 x 10 <sup>4</sup> ops (40°C, 1s on 9s off, 3A 30VDC) 1 x 10 <sup>5</sup> ops (85°C, 1s on 9s off, 0.3A 125VDC) 5 x 10 <sup>4</sup> ops (85°C, 1s on 9s off, 1A 125VDC) 1 x 10 <sup>5</sup> ops (85°C, 1s on 9s off, 1A 250VDC), Two sets of NO contacts in series connection )
	Inductive load <sup>(3)</sup>	1 x 10 <sup>5</sup> OPS [Inrush current 3.5A (250ms) / steady state current 1A 30VAC cos Ø=0.4] [Room temperature, 1s: 9s, two sets of normally open contacts in parallel and connected to the load, Contact plus TVS protection]

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

2) Min. applicable load is reference value. Please perform the confirmation test with the actual load before production since reference value may change according to switching frequencies, environmental conditions and expected contact resistance and reliability.

3)Two sets of normally open contacts in parallel wiring diagram.



## COIL

Coil power	Single side stable	See "COIL DATA"
	1 coil latching	See "COIL DATA"
Temperature rise	70K max.(At 2A load 85°C environment)	

## CHARACTERISTICS

Insulation resistance		1000MΩ (500VDC)
Dielectric strength	Between coil &contacts	1500VAC 1min
	Between open contacts	750VAC 1min
	Between contacts sets	1800VAC 1min
Surge withstand voltage		1500VAC (FCC part 68)
Between open contacts (10/160μs)		2500V(Telecordia)
Between coil &contacts (2/10μs)		
Operate time (set time)		3ms max.
Release time (Reset time)		3ms max.
Ambient temperature		-40°C to 85°C, -40°C to 105°C <sup>(2)</sup>
Humidity		5% to 85% RH
Shock resistance	Functional	735m/s <sup>2</sup>
	Destructive	980m/s <sup>2</sup>
Vibration resistance	Functional	10Hz ~ 55Hz 3.3mm DA
	Destructive	10Hz ~ 55Hz 5.0mm DA
Termination		DIP, SMT
Unit weight		Approx. 0.8g
Moisture sensitivity levels(only for SMT type,JEDEC-STD-020)		MSL-3
Construction		Plastic sealed

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

2) The 888 version is for applications at 105°C.

## SAFETY APPROVAL RATINGS

UL/CUL	AgNi+ Au plated	2A 30VDC (at 85°C) 3A 30VDC (at 40°C) 1A 125VAC (at 85°C) 1A 250VAC (at 85°C) 1A 30VAC (at 105°C)
	AgSnO <sub>2</sub> + Au plated	TV-1 125VAC(at 40°C)
TUV	AgNi+ Au plated	2A 30VDC (at 85°C) 3A 30VDC (at 40°C) 1A 125VAC (at 85°C)
	AgSnO <sub>2</sub> + Au plated	1(1)A 125VAC(at 70°C)

**Notes:**1) Only typical loads are listed above. Other load specifications can be available upon request.And different loads could have different wiring methods.



HONGFA RELAY

ISO9001, IATF16949, ISO14001, ISO45001, IECQ QC 080000, ISO/IEC 27001 CERTIFIED

2024 Rev. 1.00

## COIL DATA

at 23°C

### Single side stable

Coil Code	Nominal Voltage VDC <sup>1)</sup>	Initial Pick-up Voltage VDC <sup>1)</sup> max.	Initial Drop-out Voltage VDC min.	Coil Resistance $\Omega$	Nominal Power mW approx.	Max. Voltage VDC <sup>4)</sup>
HFD4 -I/1.5	1.5	1.13	0.15	16 x (1±10%)	140	3
HFD4 -I/2.4	2.4	1.8	0.24	41 x (1±10%)	140	4.8
HFD4 -I/3	3	2.25	0.3	64.3 x (1±10%)	140	6
HFD4 -I/4.5	4.5	3.38	0.45	145 x (1±10%)	140	9
HFD4 -I/5	5	3.75	0.5	178 x (1±10%)	140	10
HFD4 -I/6	6	4.5	0.6	257 x (1±10%)	140	12
HFD4 -I/9	9	6.75	0.9	579 x (1±10%)	140	18
HFD4 -I/12	12	9	1.2	1028 x (1±10%)	140	24
HFD4 -I/24	24	18	2.4	2880 x (1±10%)	200	48

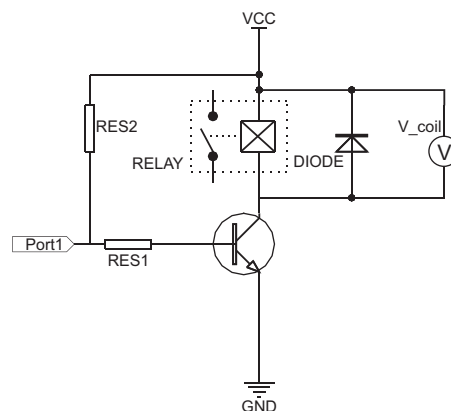
### 1 coil latching

Coil Code	Nominal Voltage VDC <sup>1)</sup>	Initial Pick-up Voltage VDC <sup>1)</sup> max.	Initial Drop-out Voltage VDC min. <sup>1)</sup>	Coil Resistance $\Omega$	Nominal Power mW approx.	Max. Voltage VDC <sup>4)</sup>
HFD4 -I/1.5-L	1.5	1.13	1.13	22.5 x (1±10%)	100	3
HFD4 -I/2.4-L	2.4	1.8	1.8	57.6 x (1±10%)	100	4.8
HFD4 -I/3-L	3	2.25	2.25	90 x (1±10%)	100	6
HFD4 -I/4.5-L	4.5	3.38	3.38	202.5 x (1±10%)	100	9
HFD4 -I/5-L	5	3.75	3.75	250 x (1±10%)	100	10
HFD4 -I/6-L	6	4.5	4.5	360 x (1±10%)	100	12
HFD4 -I/9-L	9	6.75	6.75	810 x (1±10%)	100	18
HFD4 -I/12-L	12	9	9	1440 x (1±10%)	100	24
HFD4 -I/24-L	24	18	18	2880 x (1±10%)	200	48

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

2) To supply rated step voltage to coil is the foundation of relay proper operation. Please make sure the applied voltage to the coil reach at rated values.

Please refer to the typical diagram below for single side stable relay. The "V<sub>coil</sub>" is the rated voltage:



3) In case 5V of transistor drive circuit, it is recommended to use 4.5V type relay, and 3V to use 2.4V type relay.

4) For monostable relays, if you need to drop down voltage and hold mode after reliably operating, make sure that the effective value of holding voltage is not less than 60% of the rated voltage.

5) Maximum voltage refers to the maximum voltage which relay coil could endure in a short period of time.

6) When user's requirements can't be found in the above table, special order allowed.

7) During the relay pick-up or drop-out processes, there are stages of contact pressure change, contact vibration and unstable contact etc. When the voltage applied to coil is gradually changed, it will lengthen the unstable stage and affect relay endurance. To reduce this influence, please apply step voltage (switching circuit) to relay coil.

## ORDERING INFORMATION

	HFD4-I/	24	-L	T	S	R	(XXX)
Type							
Coil voltage	1.5, 2.4, 3, 4.5, 5, 6, 9, 12, 24VDC						
Sort	L: 1 coil latching Nil: Single side stable						
Contact material	T: AgSnO <sub>2</sub> + Au plated Nil: AgNi+ Au plated						
Terminal type	S: Standard SMT S3: J-legs SMT S1: Short terminal SMT Nil: DIP						
Packing style <sup>1)</sup>	R: Tape and reel packing (Only for SMT type) Nil: Tube packing(Only for DIP type)						
Special code <sup>3)</sup>	XXX: Customer special requirement Nil: Standard For instance: Product with 888 suffix is for application at 105°C; (356) indicates a low-halogen product that meets the requirements of IEC 61249-2-21.						

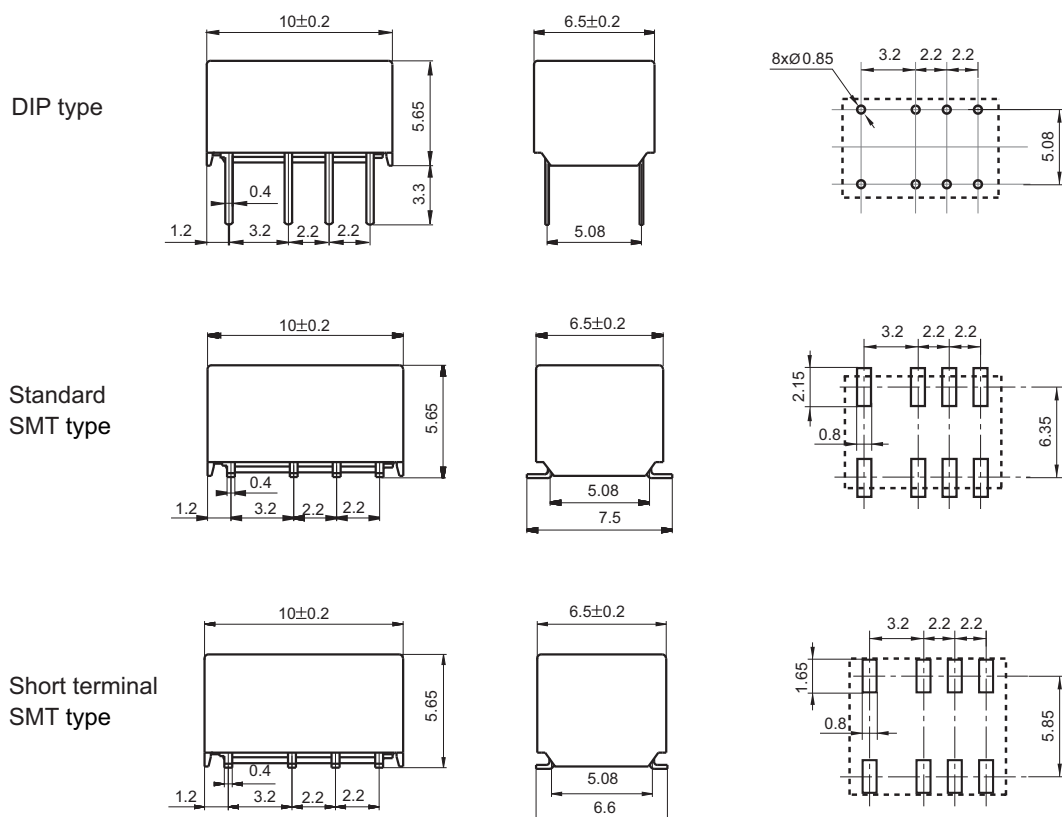
- Notes:** 1) R type (tape and reel) packing is moisture-proof which meets requirement of MSL-3. Please choose R type packing for SMT products. For R type, the letter "R" will only be printed on packing tag but not on relay cover. Tube packing is normally not available for SMT products unless specially requested by customer. But please note that tube packing is not moisture-proof so please bake the products before use according to description of Notice 10 herewith. In addition, tube packaging will be adopted when the ordering quantity of R type is equal to or less than 100 pieces unless otherwise specified.
- 2) When coil sort, contact material, terminal type or packing style are needed, please add "-" after coil voltage is selected. For instance, HFD4-I/12-SR.
- 3) The customer special requirement express as special code after evaluating by Hongfa.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

Unit: mm

Outline Dimensions

PCB Layout  
(Bottom view)

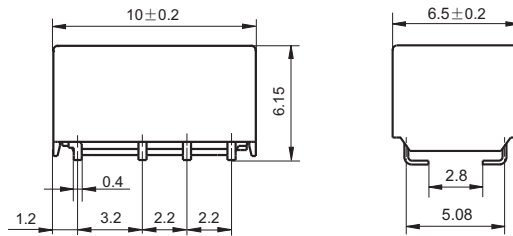


## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

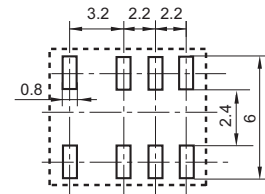
Unit: mm

Outline Dimensions

J-leg SMT type

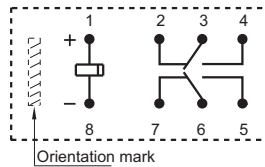


PCB Layout  
(Bottom view)



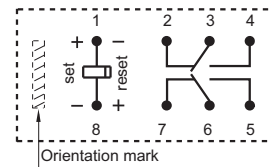
Wiring Diagram  
(Bottom view)

Single side stable



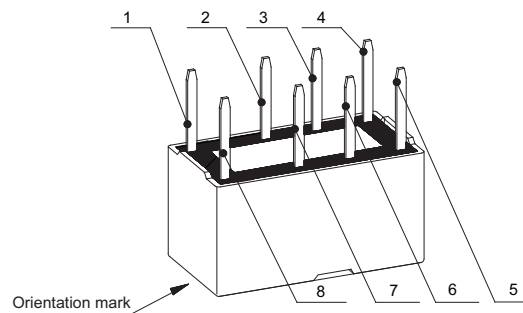
No energized condition

1 coil latching



Reset condition

Pin Layout

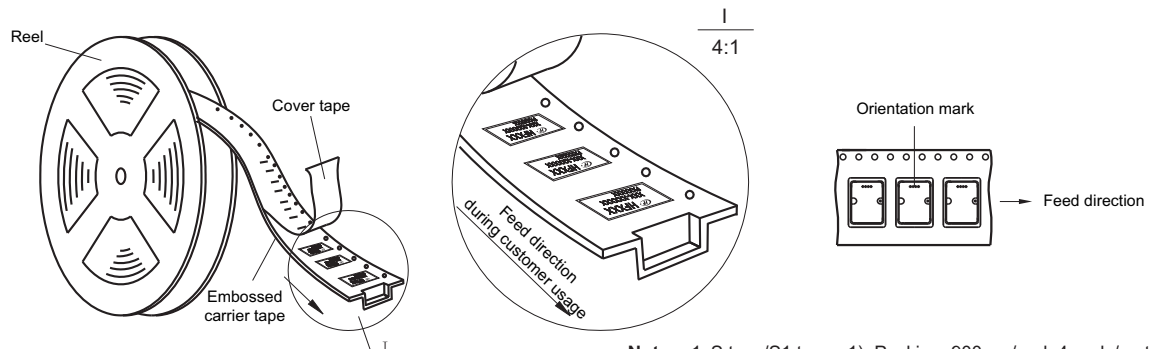


Remark: 1) In case of no tolerance shown in outline dimension: outline dimension  $\leq 1\text{mm}$ , tolerance should be  $\pm 0.2\text{mm}$ ; outline dimension  $> 1\text{mm}$  and  $\leq 5\text{mm}$ , tolerance should be  $\pm 0.3\text{mm}$ ; outline dimension  $> 5\text{mm}$ , tolerance should be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

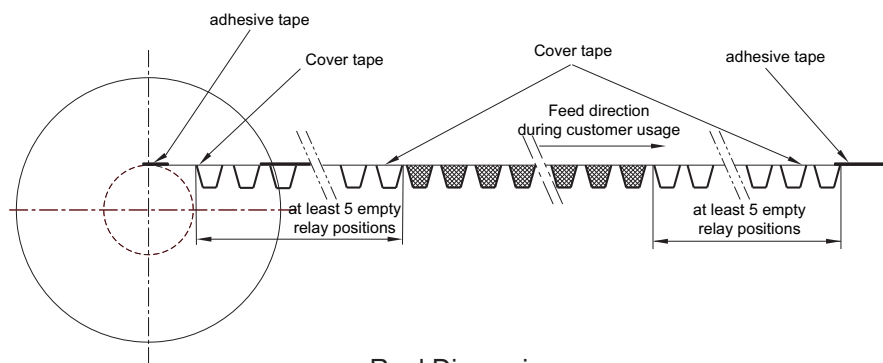
## TAPE PACKING

Unit: mm

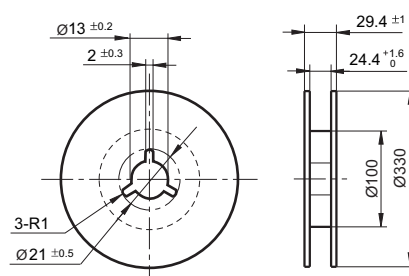
Direction of Relay Insertion



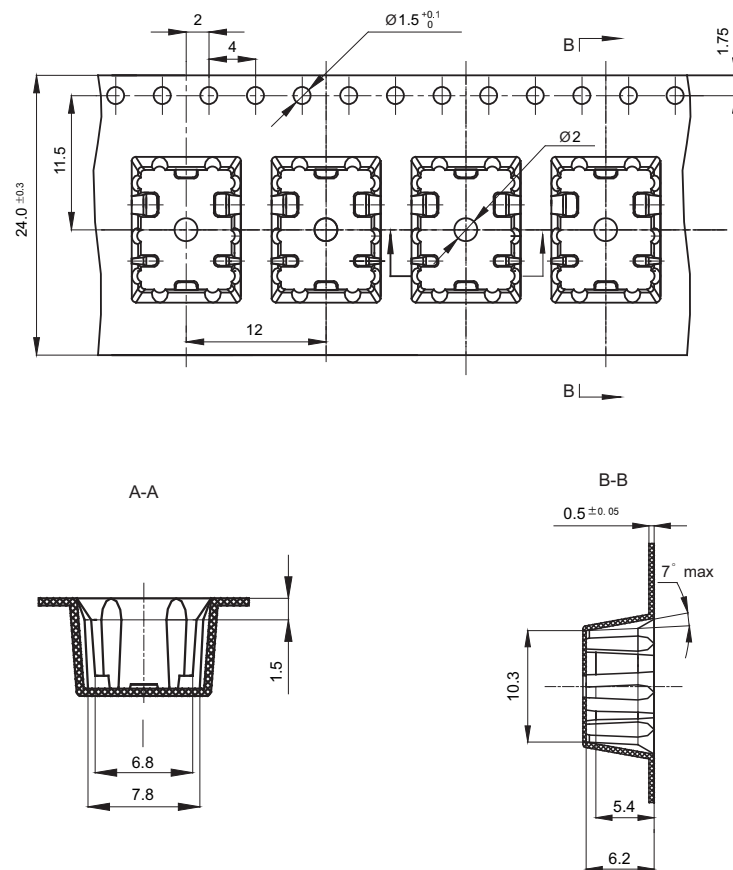
**Notes:** 1. S type/S1 type : 1) Packing: 900pcs/reel, 4 reels/carton.  
2) MOQ for reel packing is 900pcs.  
2. S3 type : 1) Packing : 850pcs/reel , 4 reels/carton.  
2)MOQ for reel packing is 850pcs.



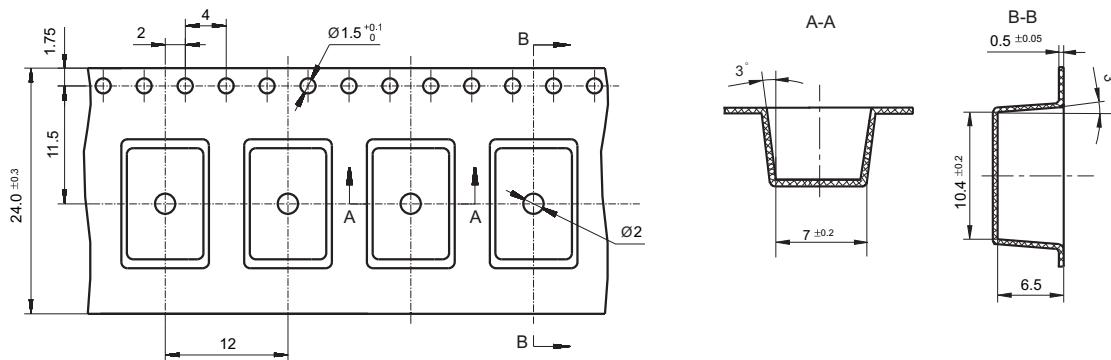
Reel Dimensions



Tape Dimensions (S type: Standard SMT S1 type: Short terminal SMT)

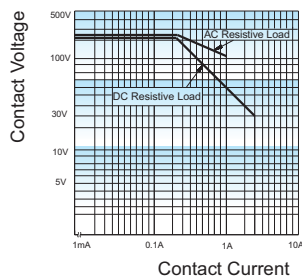


Tape Dimensions (S3 type: J-legs SMT)

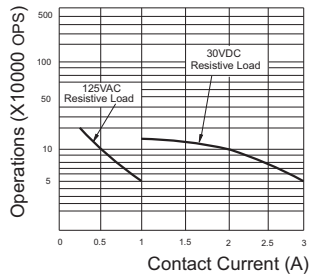


## CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER

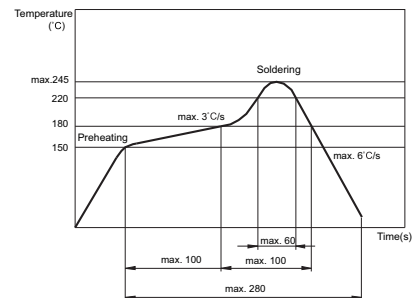


ENDURANCE CURVE



Test conditions:

Energized with rated voltage  
Resistive load, 1s on 9s off.

REFLOW WELDING, TEMPERATURE  
ON PCB BOARD  
RECOMMENDED WELDING TEMPERATURE

## Notice

- 1) This relay is highly sensitive polarized relay, if correct polarity is not applied to the coil terminals, the relay does not operate properly.
- 2) To avoid using relays under strong magnetic field which will change the parameters of relays such as pick-up voltage and drop-out voltage.
- 3) Relay is on the "reset" status when being released from stock, with the consideration of shock risen from transit and relay mounting, it should be changed to the "set" status when application(connecting to the power supply). Please reset the relay to "set" or "reset" status on request.
- 4) Energizing coil with rated voltage is basic for normal operation of a relay, please make sure the energized voltage to relay coil have reached the rated voltage. Regarding latching relay, in order to maintain the "set" or "reset" status, impulse width of the rated voltage applied to coil should be more than 5 times of "set" or "reset" time.
- 5) For a monosteady state relay, after the relay is reliably operated, if it needs to be kept under pressure, make sure that the effective value of the voltage is not less than 60% of the rated voltage;
- 6) The relay may be damaged because of falling or when shocking conditions exceed the requirement.
- 7) For SMT products, validation with real application should be done before your series production, if the reflow-soldering temperature curve is out of our recommendation. Generally, two-time reflow-soldering is not recommended for the relay. However, if two-time reflow-soldering is required, a 60-min. interval should be guaranteed and a validation should be done before production.
- 8) Please use wave soldering or manual soldering for straight-in relay. If you need reflow welding, please confirm the feasibility with us.
- 9) Contact is recommended for suitable condition and specifications if water cleaning or surface process is involved in assembling relays on PCB.
- 10) Regarding the plastic sealed relay, we should leave it cooling naturally until 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.
- 11) Relays packaged in moisture barrier bags meet MSL-3 requirements. The relays should be stored at ambient conditions of ≤30°C and ≤60% RH after they are removed from their packaging, and should be used within 168 hours. If the relays cannot be used within 168 hours, please repack them or store them in a drying oven at 25°C ± 5°C, ≤10% RH. Otherwise, relays may be subjected to a soldering test to check their performance, or they may be used after keeping them in an oven for 72 hours at with 50°C ± 5°C, ≤30% RH.
- 12) When applied with continuous current, the heat from relay coil will age its isolation. Thus, please do not ground connected the coil to reduce electrical erosion if possible. And please provide protection circuit to avoid broken wire and losses.
- 13) Please make sure that there are no silicon-based substances (such as silicon rubber, silicone oil, silicon-based coating agents, silicon fillers, etc.) around the relay, because it will generate silicon-containing volatile gas, which may cause poor contact in case of silicon-containing volatile gas sticking on contact
- 14) About preferable condition of operation, storage and transportation, please refer to "Explanation to terminology and guidelines of relay".
- 15) During the relay pick-up or drop-out processes, there are stages of contact pressure change, contact vibration and unstable contact etc. When the voltage applied to coil is gradually changed, it will lengthen the unstable stage and affect relay endurance. To reduce this influence, please apply step voltage (switching circuit) to relay coil.

## Disclaimer

The specification is for reference only. See to "Terminology and Guidelines" for more information. Specifications subject to change without notice. We could not evaluate all the performance and all the parameters for every possible application. Thus the user should be in a right position to choose the suitable product for their own application. If there is any query, please contact Hongfa for the technical service. However, it is the user's responsibility to determine which product should be used only.

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