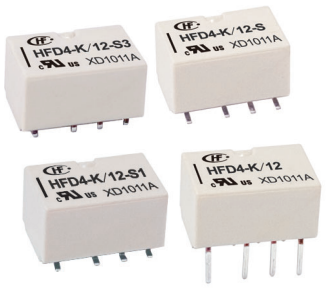
HFD4-K SUBMINIATURE FAST ACTION SIGNAL RELAY



c US
File No.: E133481

File No.: R50600897

Features

- An ideal alternative for small reed relays
- Operate/release (reset) time ⩽ 1.5ms
  Products compliant with operate/release (reset) time ⩽ 1ms available
- Products with mechanical endurance ⩾ 300 million ops available
- 2 Form C configuration
- Single side stable and latching type available
- Providing J-leg SMT version for intensive installation
- Low halogen products conforming to IEC61249-2-21 are available

RoHS compliant

CONTACT DATA

Contact arrangement	2C
Contact resistance[1)]	100mΩ max. (at 10mA 30mVDC)
Contact material	Ag alloy+Au plated
Contact rating(Res. load)	1A 30VDC 0.3A 125VAC
Max. switching current	2A
Max. switching voltage	125VAC/60VDC
Max. switching power	37.5VA/30W
Min. applicable load[2)]	10mV 10μA
Mechanical endurance	1×10^8OPS
Electrical endurance	1×10^5OPS (1A 30VDC, 85℃, 1s on 9s off) 1×10^5OPS (0.3A 125VAC, 85℃, 1s on 9s

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) The electrical endurance is from the tests of one set of open contacts or one sets of close contacts.
4) In applications of small load, long mechanical endurance or long electrical endurance, it is recommended to connect two sets of NO or NC contacts in parallel.

HIGH FREQUENCY (Please refer to the high-frequency characteristic curve for details)

Frequency	100MHz	900MHz
Insertion loss	0.04dB	0.30dB
Voltage standing wave ratio V.SWR	1.06	1.55
Isolation	43dB	21dB

Notes:1) The characteristic impedance of the measuring system is 50Ω;
2) The data shown above is an initial typical value;
3) If you need higher frequency band, please contact us.

CHARACTERISTICS

Insulation resistance		1000MΩ (at 500VDC)
Dielectric strength	Between coil & contacts	1300VAC1min,1500VAC1min[(2)]
	Between open contacts	500VAC 1min
	Between contact sets	1800VAC 1min
Surge withstand voltage	Between open contacts (1.2X50μs)	1000V
	Between coil & contacts (1.2X50μs)	2500V
Operate time (At rated voltage)		1.5ms max.
Release (reset) time (At rated voltage)		1.5ms max.
Shock resistance	Functional	735m/s²
	Destructive	980m/s²
Vibration resistance	Functional	10Hz to 55Hz 3.3mm DA
	Destructive	10Hz to 55Hz 5.0mm DA
Humidity		5% to 85%RH
Ambient temperature		-40℃ to 85℃, -40℃ to 105℃[3)]
Termination		THT,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) For (413) version only, the dielectric strength between coil and contacts is 1500VAC 1min.
3) Products of (888) specification are suitable for applications under 105℃ high-temperature environment.

COIL

Coil power	Single side stable	See table"COIL DATA"
	1 coil latching	See table"COIL DATA"
Temperature rise	⩽50K(1A Load,at 85℃ environment)	

SAFETY APPROVAL RATINGS

UL/CUL	AgNi + Au plated	1A 30VDC 85℃ 0.3A 125VAC 85℃ 1A 30VDC 105℃
TÜV		

Notes:1) Only typical loads are listed above. Other load specifications can be available upon request.

COIL DATA

23℃

Single side stable

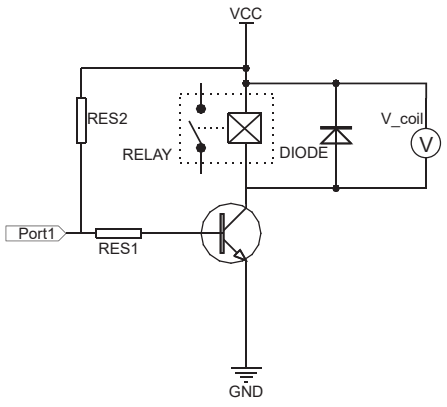
Coil Code	Nominal Coil Voltage VDC	Pick-up Voltage VDC max.[2)]	Drop-out Voltage VDC min.	Coil Resistance Ω	Nominal Power mW approx.	Max. Voltage VDC[5)]
HFD4-K/1.5	1.5	1.13	0.15	11.3×(1±10%)	200	2.2
HFD4-K/2.4	2.4	1.8	0.24	28.8×(1±10%)	200	3.6
HFD4-K/3[3)]	3	2.25	0.3	45×(1±10%)	200	4.5
HFD4-K/4.5	4.5	3.38	0.45	101.3×(1±10%)	200	6.7
HFD4-K/5[3)]	5	3.75	0.5	125×(1±10%)	200	7.5
HFD4-K/6	6	4.5	0.6	180×(1±10%)	200	9.0
HFD4-K/9	9	6.75	0.9	405×(1±10%)	200	13.5
HFD4-K/12	12	9	1.2	720×(1±10%)	200	18.0
HFD4-K/24	24	18	2.4	2880×(1±10%)	200	36.0

1 coil latching

Coil Code	Nominal Coil Voltage VDC	Pick-up Voltage VDC max.[2)]	Reset Voltage VDC max.[2)]	Coil Resistance Ω	Nominal Power mW approx.	Max. Voltage VDC[5)]
HFD4-K/1.5-L	1.5	1.13	1.13	16×(1±10%)	140	3.0
HFD4-K/2.4-L	2.4	1.8	1.8	41×(1±10%)	140	4.8
HFD4-K/3-L[3)]	3	2.25	2.25	64.3×(1±10%)	140	6.0
HFD4-K/4.5-L	4.5	3.38	3.38	145×(1±10%)	140	9.0
HFD4-K/5-L[3)]	5	3.75	3.75	178×(1±10%)	140	10.0
HFD4-K/6-L	6	4.5	4.5	257×(1±10%)	140	12.0
HFD4-K/9-L	9	6.75	6.75	579×(1±10%)	140	18.0
HFD4-K/12-L	12	9	9	1028×(1±10%)	140	24.0
HFD4-K/24-L	24	18	18	2880×(1±10%)	200	36.0

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

2)The initial Pick-up Voltage and Reset Voltage refer to the factory-set values of the relay. To supply rated step voltage to the coil is the foundation of proper relay operation. Please make sure the voltage applied across the coil reaches the rated value before use. Please refer to the typical diagram below for single-stable relay. "V_coil" is the rated voltage of the coil:



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-K/	12	-L	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
Terminal type	**S:** Standard SMT　**S1:** Short terminal SMT **S3:** J-legs SMT　**Nil:** THT [1]
Packing style	**R:** Tape and reel packing (Only for SMT type)[2] **Nil:** Tube packing(Only for THT type)
Special code [4]	**XXX:** Customer special requirement；**Nil:** Standard For instance: (AD6) indicates products with operate/release (reset) time ⩽ 1ms (AL8) is for the product with with mechanical endurance ⩾ 300 million ops (825) is for product suitable for micro-load applications, such as test, medical, communication and others.

Notes: 1) Please use wave soldering or manual soldering for straight-in relay. If you need reflow welding, please confirm the feasibility with us.
2) 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 12 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.
3) When coil sort, terminal type or packing style are needed, pleaes add "-" after coil voltage is selected. For instance, HFD4-K/12-SR.
4) The customer special requirement express as special code after evaluating by Hongfa.
5) The standard tube length is 520mm.
6) 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.Flux proofed and dust cover type relays are prohibited in environments with water vapor and harmful gases (P, Cl, H_2S, SO_2, NO_2). Plastic sealed relays shall be used with practical test verification.

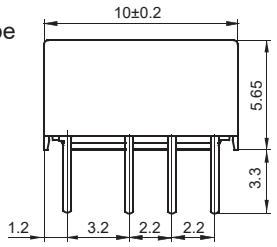
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

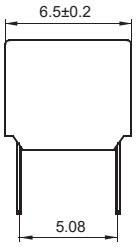
Unit: mm

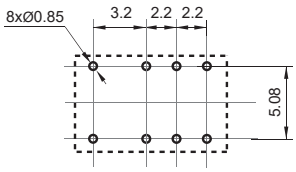
Outline Dimensions

PCB Layout
(Bottom view)

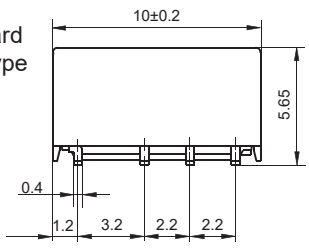
THT type

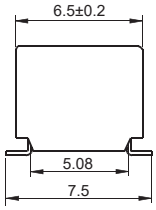


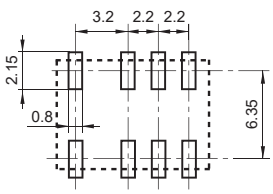




Standard
SMT type







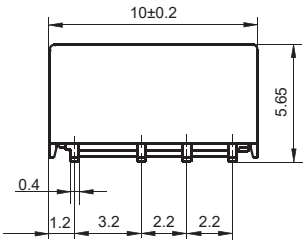
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

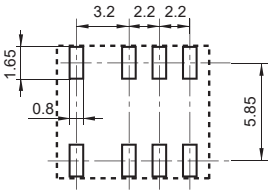
Unit: mm

Outline Dimensions

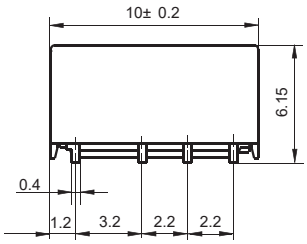
PCB Layout
(Bottom view)

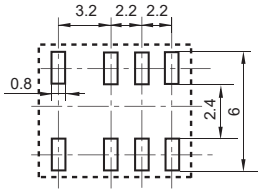
Short terminal
SMT type





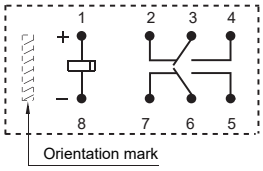
J-legs
SMT type





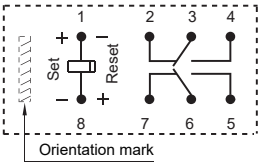
Wiring Diagram
(Bottom view)

Single side stable



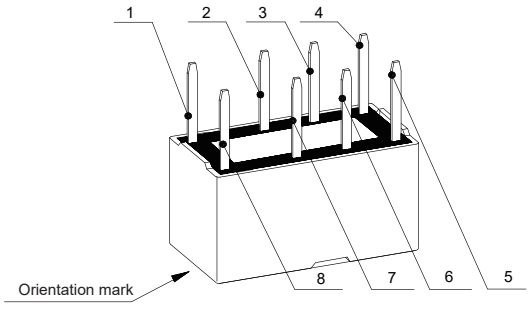
No energized condition

1 coil latching



Reset condition

Pin Layout

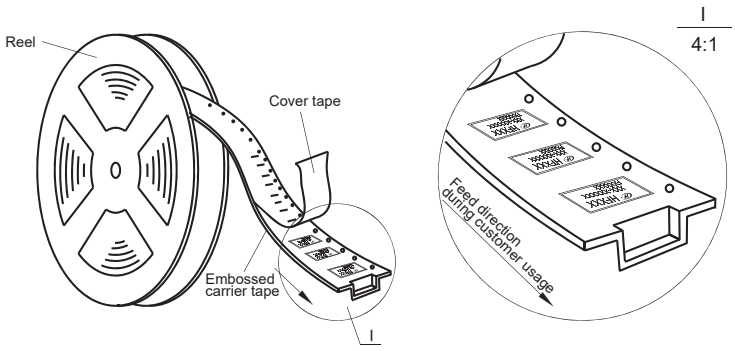


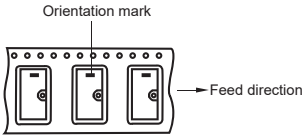
Remark: 1) The pin dimension of the product outline drawing is the size before tinning (it will become larger after tinning), and the mounting hole size is the recommended design size of the PCB board hole. The specific PCB board hole design size can be mapped and adjusted according to the actual product.
2) 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.
3) The tolerance without indicating for PCB layout is always ±0.1mm.
4) The width of the gridding is 2.54mm.

TAPE PACKING

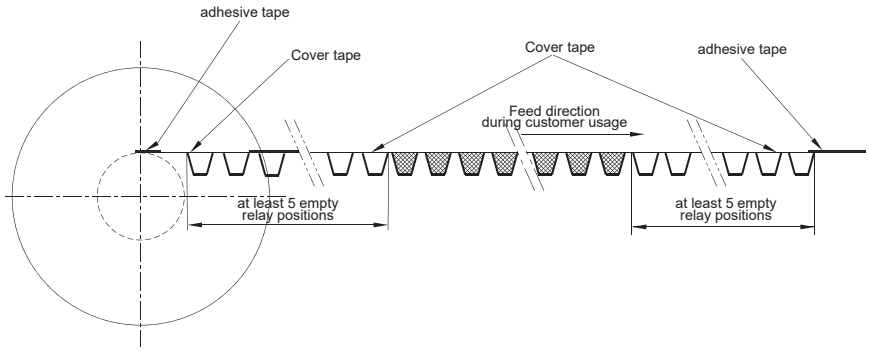
Unit: mm

Direction of Relay Insertion

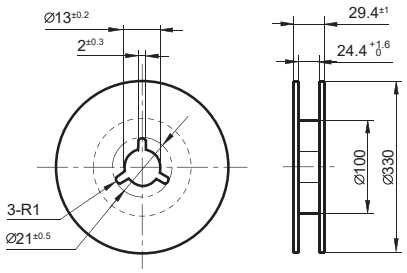




Notes: 1.S type/S1 type:
1) Packing: 900pcs/reel, 4 reels/carton.
2) MOQ for reel packing is 900pcs
2.S3 type:
1) Packing: 850pcs/reel, 4 reels/carton.
2) MOQ for reel packing is 850pcs.



Reel Dimensions

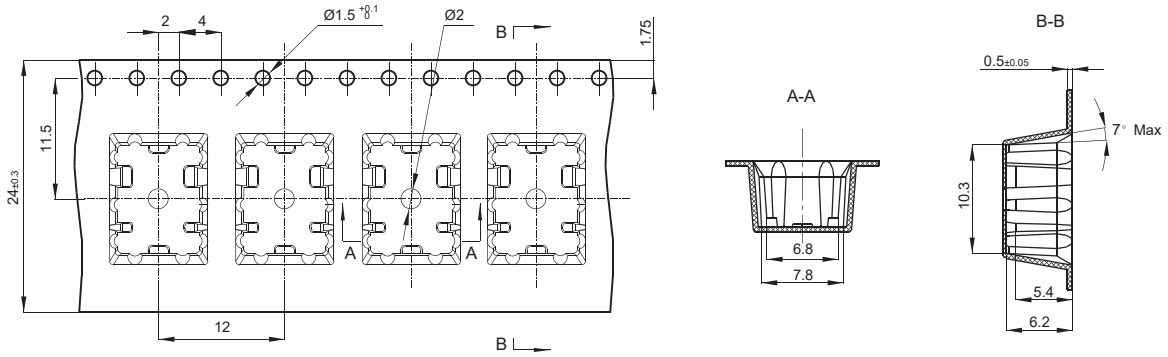


TAPE PACKING

Unit: mm

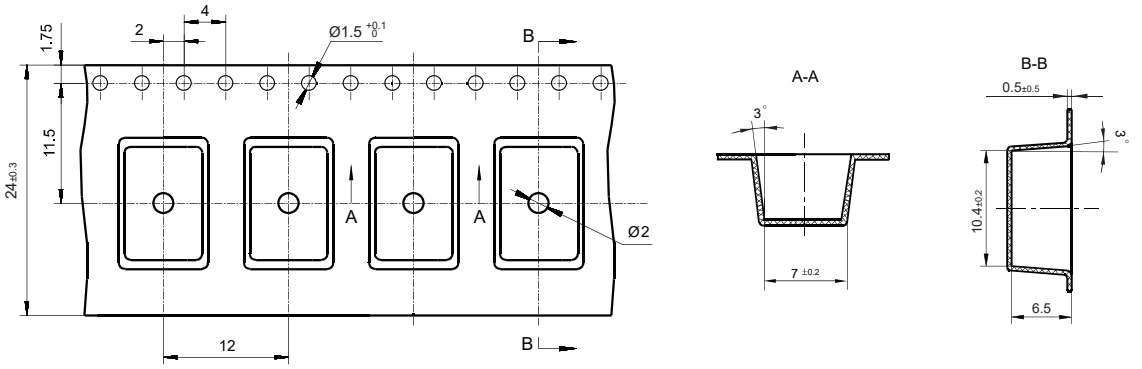
Tape Dimensions

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

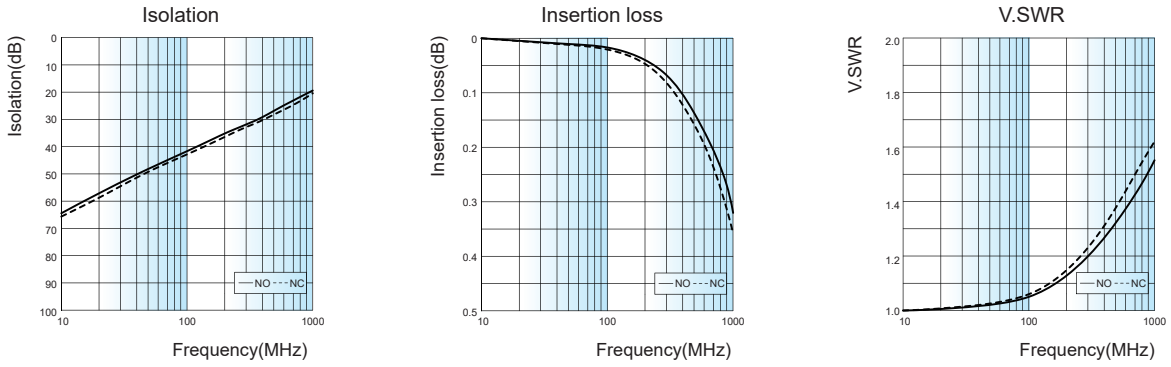


Tape Dimensions

(S3 type: J-legs SMT)



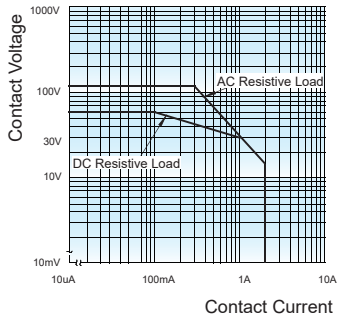
HIGH-FREQUENCY CHARACTERISTICS CURVES



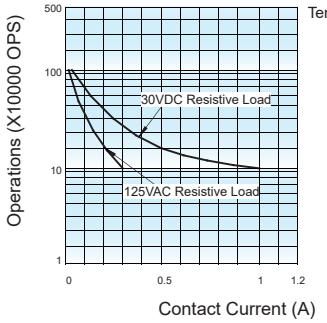
Notes: 1) Ambient temperature at 23℃;
2) The data shown above are initial values;
3) The high-frequency characteristics may vary depending on the differences of PCB boards. So please confirm the endurance and other performance parameters on the actual equipment before use;
4) Test model: HFD4-K/5-SR, Testing instrument: Keysight E5071C network analyzer. The impedance of measuring system is 50 Ω。

CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER

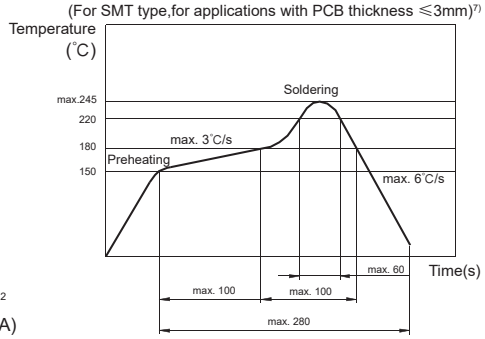


ENDURANCE CURVE



RECOMMENDED REFLOW SOLDERING PROFILE

(For SMT type,for applications with PCB thickness ≤3mm)[7)]



(Measurement point: PCB surface where the relay is mounted)

Test conditions:

Energized with rated voltage

Resistive load, at 85˚C, 1s on 9s off.

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, practical validation shall be performed and confirmed acceptable before mass production if the reflow-soldering profile deviates from our recommended profile. In principle, double reflow-soldering of relays is not recommended. If a second reflow-soldering process is required, the relay shall be cooled down to ambient temperature by natural cooling or forced-air cooling after the first reflow, and practical validation shall be completed and confirmed acceptable prior to mass production.
   For applications with PCB thickness ＞3mm, the temperature of the relay body may be significantly higher than the PCB surface temperature. Practical validation shall be performed and confirmed acceptable before use and mass 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 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.
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 errosion 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.Flux proofed and dust cover type relays are prohibited in environments with water vapor and harmful gases (P, Cl, H_2S, SO_2, NO_2). Plastic sealed relays shall be used with practical test verification.
14) About preferable condition of operation, storage and transportation, please refer to "Explanation to terminology and guidetines 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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