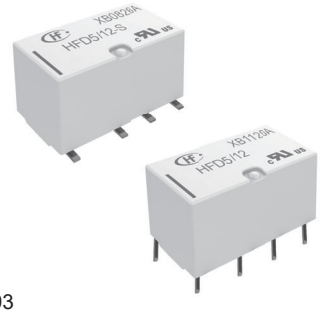
HFD5 MINIATURE 5TH GENERATION SIGNAL RELAY

c UL us
File No.：E133481

File No.：R50522293



Features

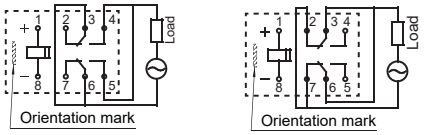
- MINIATURE 5th generation signal relay
- Low coil power at 50mW. Coil (5V) operating current≤10mA. Can be directly driven by microprocessor.
- Bifurcated contacts
- Products with electrical endurance ⩾3x10⁸ops available, It is an ideal replacement device for small reed relays
- High temperature resistant products at 105℃ are available
- Products compliant with IEC 60079 available
- Products compliant with IEC 60335-1 available
- Both THT & SMT types available
- Single side stable and latching type available
- Smallest size in signal relay industry: 9.0(L)×4.8(W)×4.9(H) mm

RoHS compliant

CONTACT DATA

Contact arrangement	2C
Contact resistance	100mΩ max. (at 10mA 30mVDC)
Contact material	Ag alloy+Au plated
Contact rating(Res. load)	1A 30VDC, 0.3A 125VAC
Max. switching voltage	250VAC/220VDC
Max. switching current	2A(30VDC)
Max. switching power	62.5VA/60W
Min. applicable load[2]	10mV 10μA
Mechanical endurance	1×10⁸OPS
Electrical endurance[3]	1×10⁵ OPS (85℃, 1s on：9s off, NO or NC, 1A 30VDC) 1×10⁵ OPS (85℃, 1s on：9s off, NO or NC, 0.3A 125VAC) 3×10⁸ OPS(AJ8)[4] (40℃，0.1s on：0.1s off，Two sets of NO or NC in paralle[5], 10mA 5VDC)

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) Only typical loads are listed above. Other load specifications can be available upon request.
4) (AJ8) indicates products with electrical endurance ⩾ 3x10⁸ OPS.
5) Two sets of NO or NC parallel wiring diagrams (bottom view) are as follows:



6) For low level and long durability applications, it is recommended to use two sets of NO or NC in parallel. If you need to use a single set of NO or NC, please contact our company.

HIGH-FREQUENCY CHARACTERISTICS[1]

Frequency[2]	100MHz	900MHz
Insertion loss[3]	0.03dB	0.3dB
V.SWR[3]	1.05	1.4
Isolation[3]	45dB	25dB

Notes:1)The characteristic impedance of the measuring system is 50Ω.
2)If there is a demand for frequencies higher than 1GHz, please contact us.
3)The data shown above are initial values.

CHARACTERISTICS

Insulation resistance		1000MΩ(at 500VDC)
Dielectric strength	Between open contacts	750VAC 1min
	Between coil & contacts	1500VAC 1min
	Between contact sets	1000VAC 1min
Surge withstand voltage	Between open contacts (10X160μs)	1500V(FCC part 68)
	Between coil & contacts (2X10μs)	2500V(Telecordia)
Operate time (Set time)		2ms max.
Release time (Reset time)		2ms 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℃
Termination		THT,SMT
Unit weight		Approx. 0.5g
Moisture sensitivity levels(Only for SMT type,JEDEC-STD-020)		MSL-3
Construction		Plastic sealed

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

COIL

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

SAFETY APPROVAL RATINGS

UL/CUL	Ag alloy+Au plated	1A 30VDC 85℃ 2A 30VDC 40℃ 0.3A 125VAC 85℃ 0.5A 125VAC 40℃
TÜV	Ag alloy+Au plated	1A 30VDC 85℃ 2A 30VDC 40℃ 0.3A 125VAC 85℃ 0.5A 125VAC 40℃

Notes:1) Only some typical rating are listed above.If more details are required,please contact us.

COIL DATA

23˚C

Single side stable

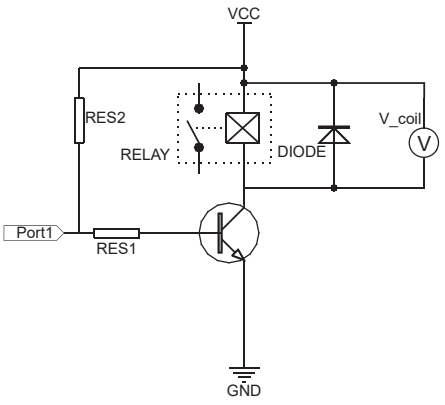
Coil Code	Nominal Coil Voltage VDC	Pick-up Voltage VDC max.[2)]	Drop-out Voltage VDC min.	Coil Resistance Ω	Rated Coil Current mA	Nominal Power mW approx	Max. Voltage VDC[5)]
HFD5/1.5	1.5	1.2	0.15	45×(1±10%)	33.3	50	2.2
HFD5/2.4	2.4	1.92	0.24	115.2×(1±10%)	20.8	50	3.6
HFD5/3 [3)]	3	2.4	0.3	180×(1±10%)	16.7	50	4.5
HFD5/4.5	4.5	3.6	0.45	405×(1±10%)	11.1	50	6.7
HFD5/5 [3)]	5	4	0.5	500×(1±10%)	10	50	7.5
HFD5/6	6	4.8	0.6	720×(1±10%)	8.3	50	9
HFD5/9	9	7.2	0.9	1620×(1±10%)	5.6	50	13.5
HFD5/12	12	9.6	1.2	2880×(1±10%)	4.2	50	18
HFD5/24	24	19.2	2.4	5760×(1±10%)	4.2	100	36

1 coil latching

Coil Code	Nominal Coil Voltage VDC	Pick-up Voltage VDC max.[2)]	Reset Voltage VDC max.[2)]	Coil Resistance Ω	Rated Coil Current mA	Nominal Power mW approx	Max. Voltage VDC[5)]
HFD5/1.5-L	1.5	1.2	1.2	45×(1±10%)	33.3	50	3
HFD5/2.4-L	2.4	1.92	1.92	115.2×(1±10%)	20.8	50	4.8
HFD5/3-L [3)]	3	2.4	2.4	180×(1±10%)	16.7	50	6
HFD5/4.5-L	4.5	3.6	3.6	405×(1±10%)	11.1	50	9
HFD5/5-L [3)]	5	4	4	500×(1±10%)	10	50	10
HFD5/6-L	6	4.8	4.8	720×(1±10%)	8.3	50	12
HFD5/9-L	9	7.2	7.2	1620×(1±10%)	5.6	50	18
HFD5/12-L	12	9.6	9.6	2880×(1±10%)	4.2	50	24
HFD5/24-L	24	19.2	19.2	5760×(1±10%)	4.2	100	36

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

	HFD5/	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 **Nil:** THT[1)]					
Packing style	**R:** Tape and reel packing (Only for SMT type)[2)] **Nil:** Tube packing(Only for THT type)					

Special code

XXX: Customer special requirement **Nil:** Standard

For instance: Product with AN9 suffix is for low-level load applications, such as semiconductor testing, medical, communication etc. The dielectric strength between coil and contact is ≥ 1000VAC.

Product with 825 suffix is applicable to low level load applications with dielectric withstand voltage between coil and contact ⩾1500VAC 1 min.

Product with AJ8 suffix is indicate electrical endurance⩾3x10^8 OPS,dielectric withstand voltage between coiland contact ⩾1000VAC 1 min.

Product with 888 suffix is for application at 105℃,dielectric withstand voltage between coiland contact ⩾1000VAC 1 min.

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 11 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, HFD5/12-SR.

4) The customer special requirement express as special code after evaluating by Hongfa.

5) 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.

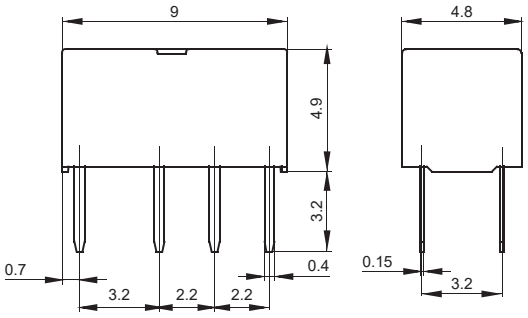
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

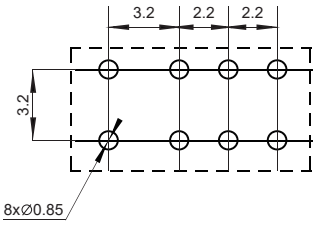
Unit: mm

Outline Dimensions

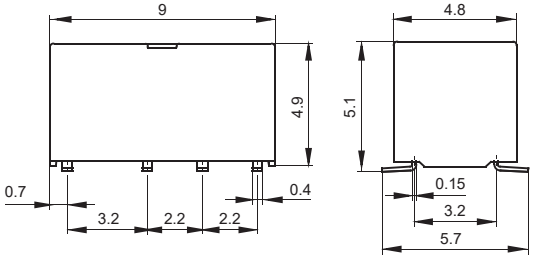
PCB Layout(Bottom view)

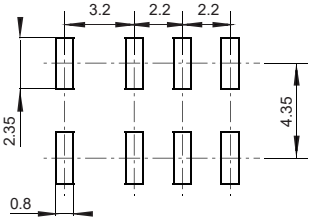
THT





S type: Standard SMT





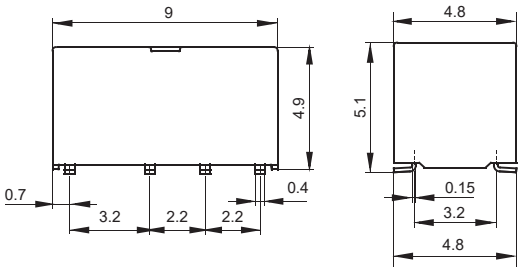
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

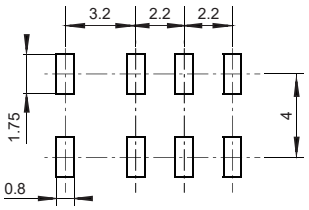
Unit: mm

Outline Dimensions

PCB Layout(Bottom view)

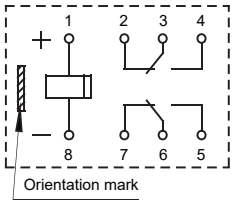
S1: Short terminal SMT





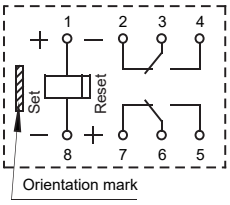
Wiring Diagram(Bottom view)

Single side stable



No energized condition

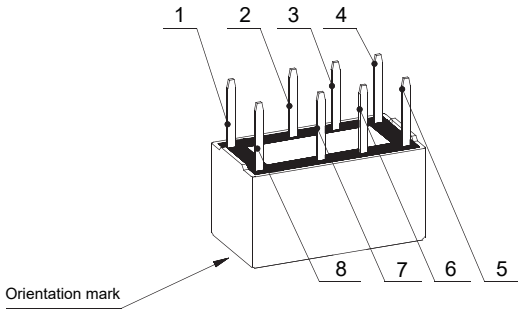
1 coil latching



Reset condition

Pin Layout

Single side stable & 1 coil latching



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.

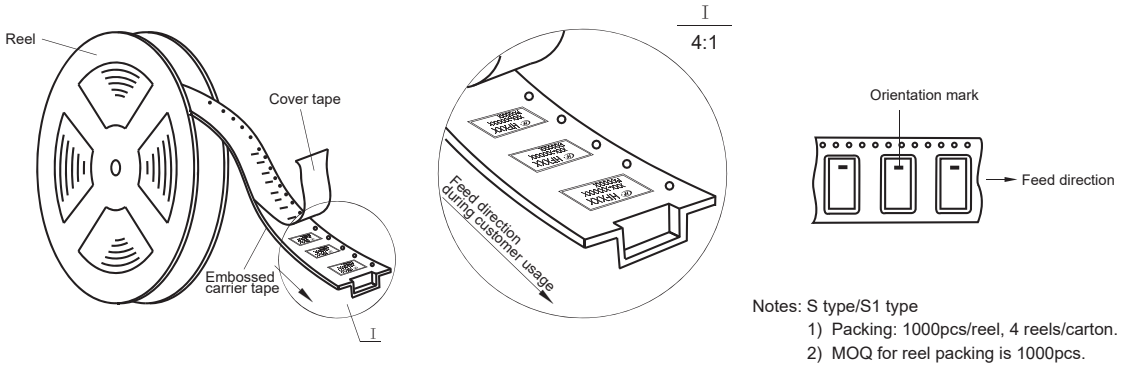
2) The tolerance without indicating for PCB layout is always ±0.1mm.

3) The pin dimension of the product outline drawing is the size before tinning（it wil become laraer 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 adiusted according to the actual product.

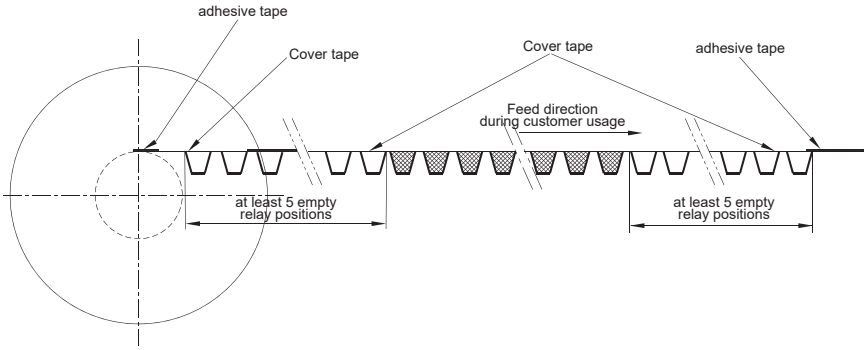
TAPE PACKING

Unit: mm

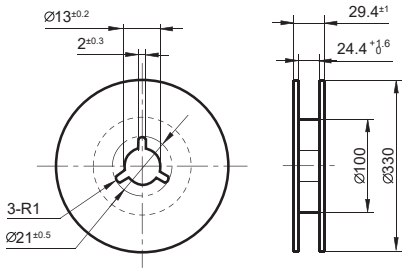
Direction of Relay Insertion



Notes: S type/S1 type
1) Packing: 1000pcs/reel, 4 reels/carton.
2) MOQ for reel packing is 1000pcs.



Reel Dimensions

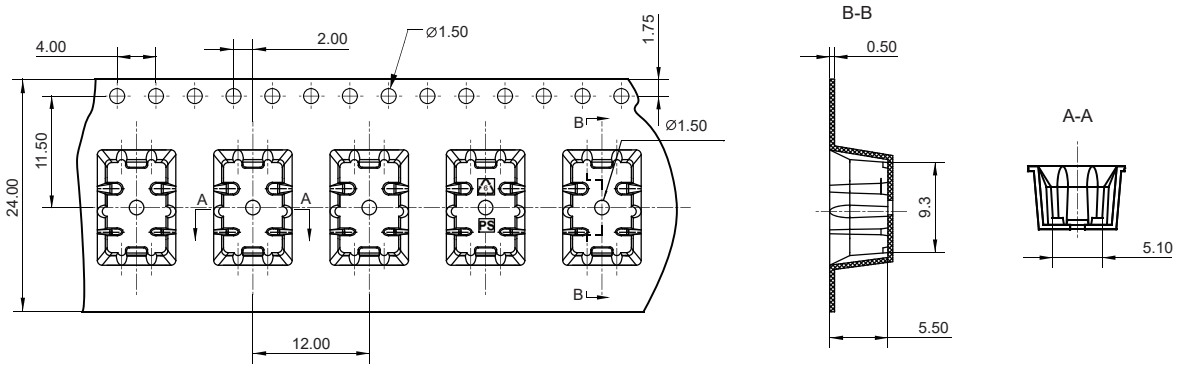


TAPE PACKING

Unit: mm

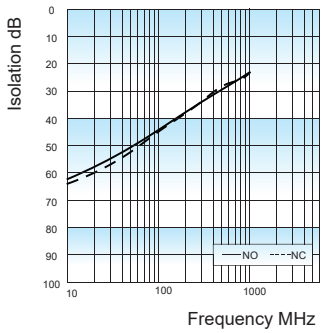
Tape Dimensions

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

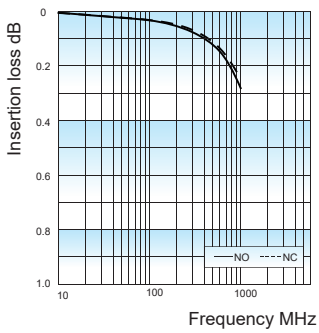


HIGH FREQUENCY CHARACTERISTICS CURVES

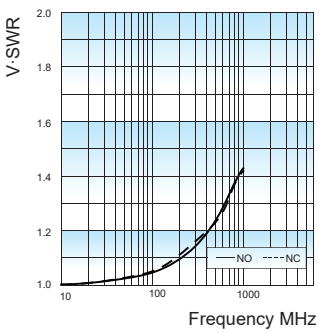
ISOLATION



INSERTION LOSS



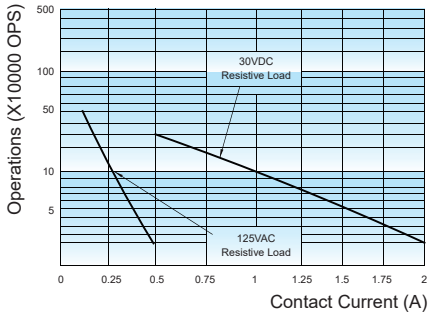
VOLTAGE STANDING WAVE RATIO



Remark: 1) Ambient temperature conditions is 23℃;
2) The data shown above are initial values.
3) The high-frequency characteristics will vary depending on the PCB board.Please be sure to check performance parameters including durability in actual equipment before use.
4) Test model and specification: HFD5/XX-SR, test instrument: Keysight E5071C network analyzer, the characteristic impedance of the measurement system is 50Ω.

CHARACTERISTIC CURVES

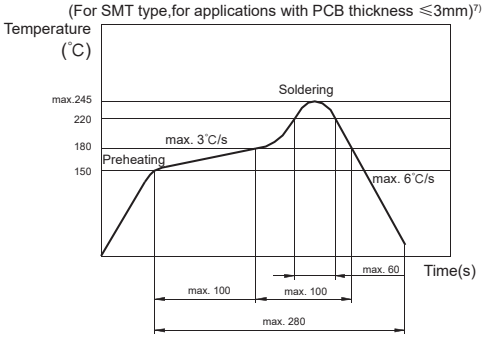
ENDURANCE CURVE



Test conditions:
Resistive load, 1s on 9s off.

RECOMMENDED REFLOW SOLDERING PROFILE

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



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

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℃ after welding, then clean it and deal with coating, remarkably the temperature of solvents should also be controlled below 40℃.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℃ 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℃±5℃, ≤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℃±5℃, ≤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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