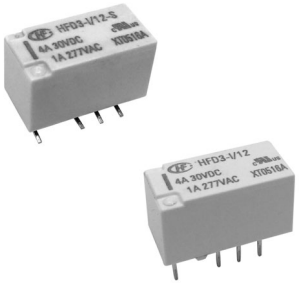
HFD3-I MINIATURE SIGNAL RELAY

c UL us
File No.:E133481

File No.:R 50433438



Features

- Third generation Signal relay
- Contact arrangement: 2 Form A,2 Form C available
- High contact switching capacity
- Withstand inrush current at 7.5A(Effective value)
- SMT and THT types available
- Single side stable and latching type available

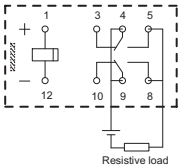
RoHS compliant

CONTACT DATA

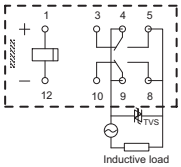
Contact arrangement	2A,2C
Contact resistance[1)]	⩽100mΩ (10mA 30mVDC)
Contact material	Ag Alloy + Au plated
Contact rating (Res. load)	5A 30VDC 4A 30VDC 2A 30VDC 1A 277VAC
Max. switching voltage	277VAC / 220VDC
Max. switching current	4A (Single contact) 7.5A(Two sets of open contacts in parallel,Valid value)
Max.continuous current	2A
Max. switching power	277VA / 150W
Min. applicable load[2)]	5V 1mA
Mechanical endurance	1 x 10^7OPS
Electrical endurance	1 x 10^5OPS(Resistive load,40˚C 4A 30VDC)[3)] 1 x 10^5OPS(Resistive load,85˚C 2A 30VDC)[3)] 1 x 10^5OPS(Resistive load,85˚C 1A 277VAC)[3)] 2 x 10^5OPS(Inductive load,Room temp. 250ms Inrush current 7.5A(effective value)/ Stable current 1.5A(effective value) 30VAC(COSØ=0.4)(ON:OFF=1s:9s), TVS protection for contacts (two sets of open contacts in parallel)[4)] 5x10^4OPS(Resistive load, 85˚C 5A 30VDC) (two sets of open contacts in parallel)[4)]

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 of resistive load is from the tests of one set of open contacts or one sets of close contacts.
4) Two sets of open contacts in parallel(Add TVS protection across contacts for inductive loads).
Two sets of open contacts in parallel:

Resistive load wiring diagram



Inductive load wiring diagram



It is in released status are in the diagram(single side stable type)

COIL

Coil power	Single side stable	Approx. 140mW
	1 coil latching	Approx. 100mW
	2 coils latching	Approx. 200mW
Temperature rise	60K max(2A Resistive load 85˚C environment)	

CHARACTERISTICS

Insulation resistance		1000MΩ (500VDC)
Dielectric strength	Between open contacts	1000VAC 1min
	Between contact sets	1500VAC 1min
	Between coil&contact	2000VAC 1min, 3000VAC 1min[2)]
Surge withstand voltage	Between open contacts (10/160μs)	1500VAC (FCC part 68)
	Between coil & contacts (2/10μs)	2500VAC (Telecordia)
Operate time (Set time)		⩽ 4ms
Release time (Reset time)		⩽ 4ms
Ambient temperature		-40˚C to 85˚C
Humidity		5% to 85% RH
Shock resistance	Functional	735m/s^2
	Destructive	980m/s^2
Vibration resistance	Functional	10Hz to 55Hz 3.3mm DA
	Destructive	10Hz to 55Hz 5.0mm DA
Termination		THT, SMT
Unit weight		Approx.2g
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) 2-pole NO products with characteristic code (131): dielectric strength between coil and contacts⩾3000 VAC,1 min.

SAFETY APPROVAL RATINGS

UL/CUL **TÜV**	Ag Alloy + Au plated	4A 30VDC, 40˚C 2A 30VDC, 85˚C 1A 277VAC, 85˚C

Notes: 1) All values unspecified are at room temperature.
2) Only typical loads are listed above. Other load specifications can be available upon request.

COIL DATA

at 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	Nominal Power mW approx.	Max. Voltage VDC[5]
HFD3-I/1.5	1.5	1.13	0.15	16 x (1±10%)	140	3.0
HFD3-I/2.4	2.4	1.8	0.24	41 x (1±10%)	140	4.8
HFD3-I/3[3]	3	2.25	0.3	64.3 x (1±10%)	140	6.0
HFD3-I/4.5	4.5	3.38	0.45	145 x (1±10%)	140	9.0
HFD3-I/5[3]	5	3.75	0.5	178 x (1±10%)	140	10
HFD3-I/6	6	4.5	0.6	257 x (1±10%)	140	12
HFD3-I/9	9	6.75	0.9	579 x (1±10%)	140	18
HFD3-I/12	12	9	1.2	1028 x (1±10%)	140	24
HFD3-I/24	24	18	2.4	4114 x (1±10%)	140	48

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]
HFD3-I/1.5-L1	1.5	1.13	1.13	22.5 x (1±10%)	100	3.0
HFD3-I/2.4-L1	2.4	1.8	1.8	58 x (1±10%)	100	4.8
HFD3-I/3-L1[3]	3	2.25	2.25	90 x (1±10%)	100	6.0
HFD3-I/4.5-L1	4.5	3.38	3.38	203 x (1±10%)	100	9.0
HFD3-I/5-L1[3]	5	3.75	3.75	250 x (1±10%)	100	10
HFD3-I/6-L1	6	4.5	4.5	360 x (1±10%)	100	12
HFD3-I/9-L1	9	6.75	6.75	810 x (1±10%)	100	18
HFD3-I/12-L1	12	9	9	1440 x (1±10%)	100	24
HFD3-I/24-L1	24	18	18	5760 x (1±10%)	100	48

2 coils latching

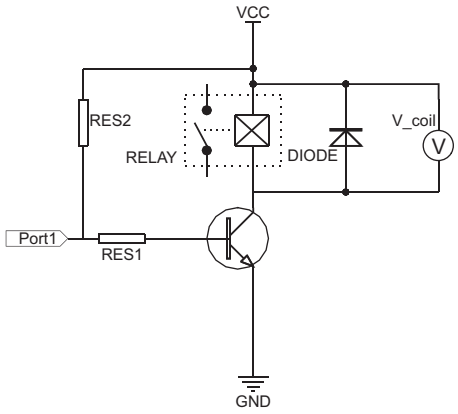
Coil Code	Nominal Coil Voltage VDC	Pick-up Voltage VDC max.[2]	Reset Voltage VDC max.[2]	Coil Resistance Ω	Nominal Power mW approx.	Max. Voltage VDC[5]
HFD3-I/1.5-L2	1.5	1.13	1.13	11.2 x (1±10%)	200	3.0
HFD3-I/2.4-L2	2.4	1.8	1.8	29 x (1±10%)	200	4.8
HFD3-I/3-L2[3]	3	2.25	2.25	45 x (1±10%)	200	6.0
HFD3-I/4.5-L2	4.5	3.38	3.38	101 x (1±10%)	200	9.0
HFD3-I/5-L2[3]	5	3.75	3.75	125 x (1±10%)	200	10
HFD3-I/6-L2	6	4.5	4.5	180 x (1±10%)	200	12
HFD3-I/9-L2	9	6.75	6.75	405 x (1±10%)	200	18
HFD3-I/12-L2	12	9	9	720 x (1±10%)	200	24
HFD3-I/24-L2	24	18	18	2880 x (1±10%)	200	48

COIL DATA

at 23˚C

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

	HFD3-I/	24	-2H	-L2	S	R	(XXX)
Type							
Coil voltage	1.5, 2.4, 3, 4.5, 5, 6, 9, 12, 24VDC						
Contact arrangement	**2H:** 2 Form A **Nil:** 2 Form C						
Sort	**L1:** 1 coil latching **Nil:** Single side stable **L2:** 2 coils latching(Only for 2 Form C)						
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[3]	**XXX:** Customer special requirement **Nil:** Standard						

Notes: 1) THT relays: Use wave or manual soldering. Confirm reflow soldering feasibility with us first.

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

4) When coil sort,contact material,terminal type or packing style are needed,please add "-" after coil voltage is selected.For instance, HFD3-I/12-SR.

5) For products that should meet the explosion-proof requirements of "IEC 60079 series",please note [Ex] after the specification while placing orders.Not all products have explosion-proof certification,so please contact us if necessary, in order to select the suitable products.

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

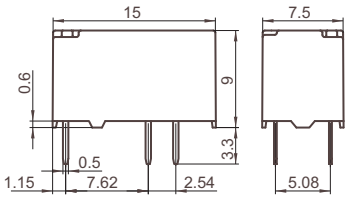
Unit: mm

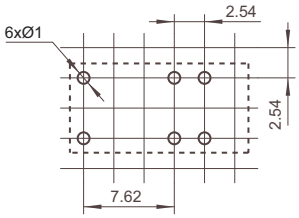
2H Type

Outline Dimensions

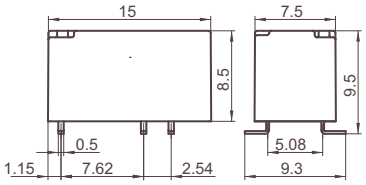
PCB Layout
(Bottom view)

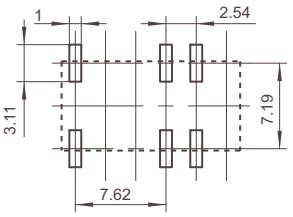
THT type



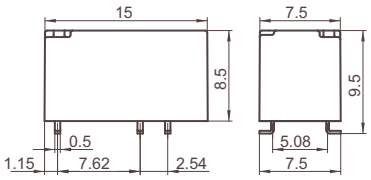


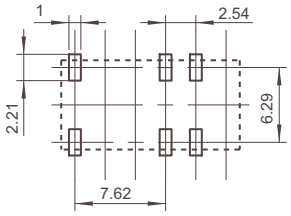
S type: Standard SMT





S1 type: Short terminal SMT





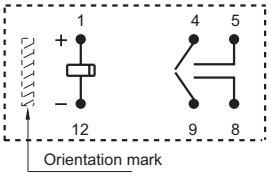
Single side stable

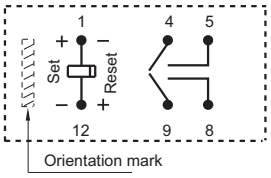
1 coil latching

Wiring Diagram

(Bottom view)

(Please pay attention to the coil polarity. Please determine the polarity by the wiring diagram and pin diagram)



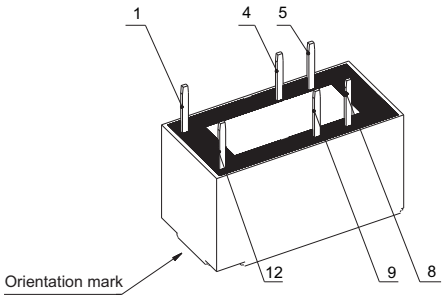


No energized condition

Reset condition

Single side stable & 1 coil latching

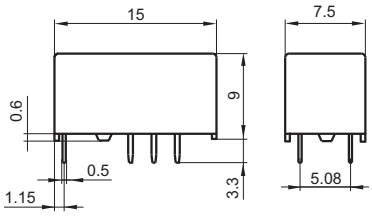
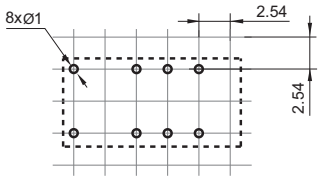
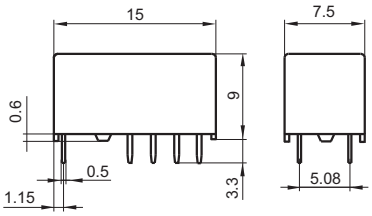
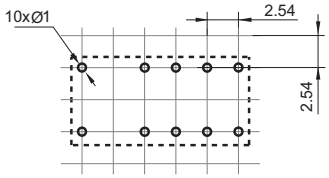
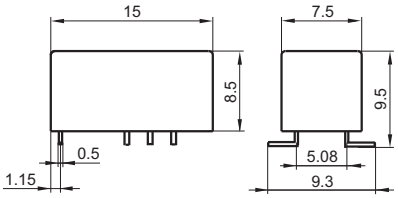
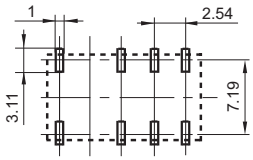
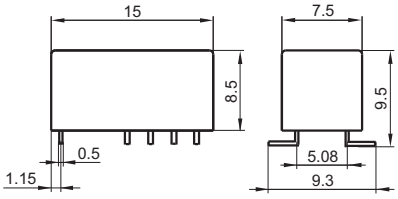
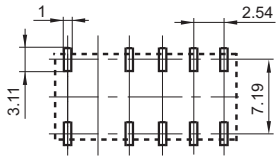
Pin Layout



OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

Unit: mm

2Z Type

	Outline Dimensions	PCB Layout (Bottom view)
THT type	Single side stable & 1 coil latching	Single side stable & 1 coil latching
		
	2 coils latching	2 coils latching
		
S type: Standard SMT	Single side stable & 1 coil latching	Single side stable & 1 coil latching
		
	2 coils latching	2 coils latching
		

OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

Unit: mm

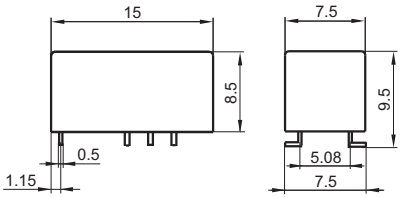
2Z Type

Outline Dimensions

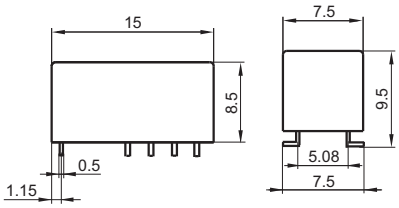
PCB Layout
(Bottom view)

S1 type: Short terminal SMT

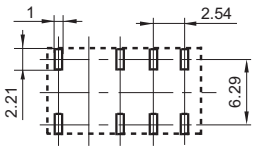
Single side stable & 1 coil latching



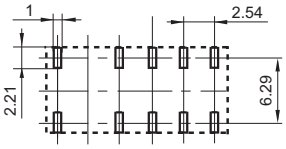
2 coils latching



Single side stable & 1 coil latching



2 coils latching

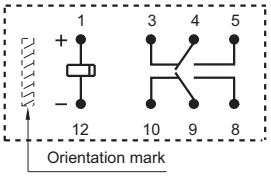


Wiring Diagram

(Bottom view)

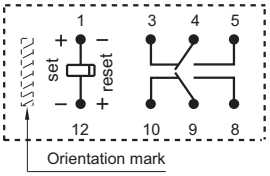
(Please pay attention to the coil polarity. Please determine the polarity by the wiring diagram and pin diagram)

Single side stable



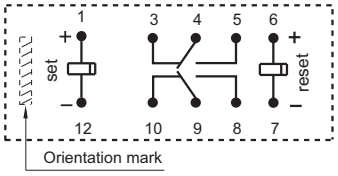
No energized condition

1 coil latching



Reset condition

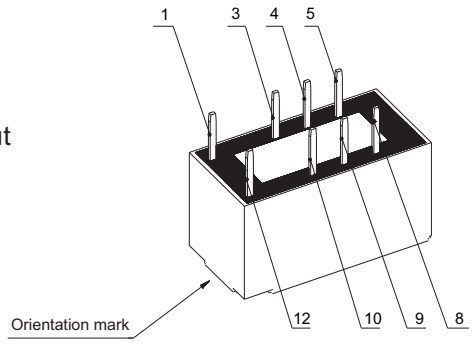
2 coils latching



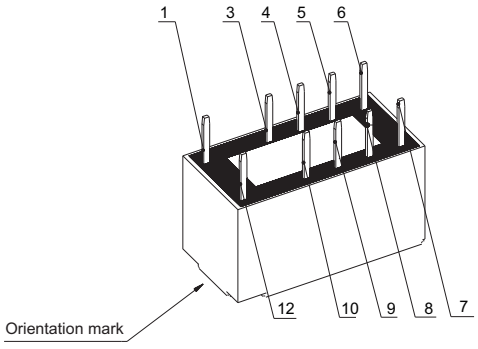
Reset condition

Pin Layout

Single side stable & 1 coil latching



2 coils latching

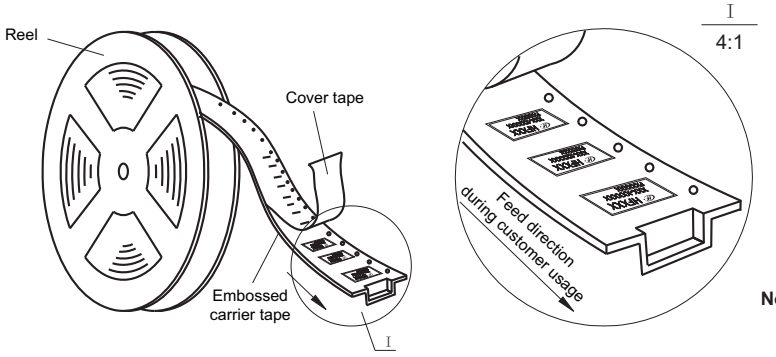


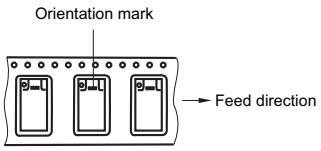
Remark: 1) The pin dimensions are before tin dipping(it will be larger after tin dipping).The mount hole demensions are recommended for PCB hole design. The final PCB hole dimensions can be adjusted according to the actual measured values of products.
2) In case of no tolerance shown in outline dimension: 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.

TAPE PACKING

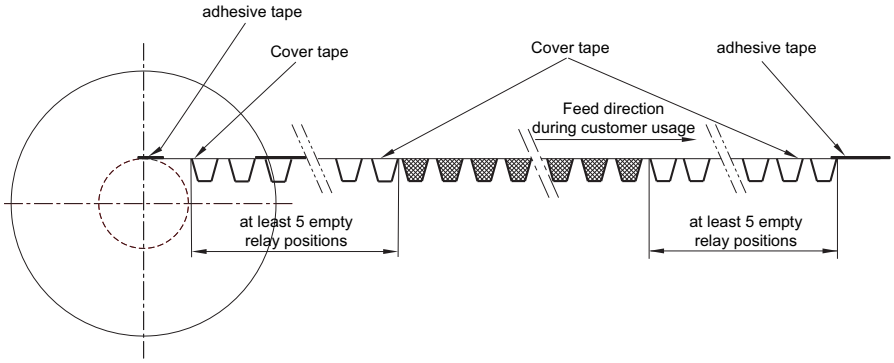
Unit: mm

Direction of Relay Insertion

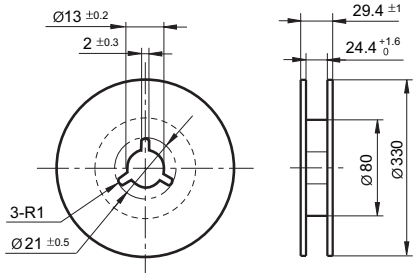




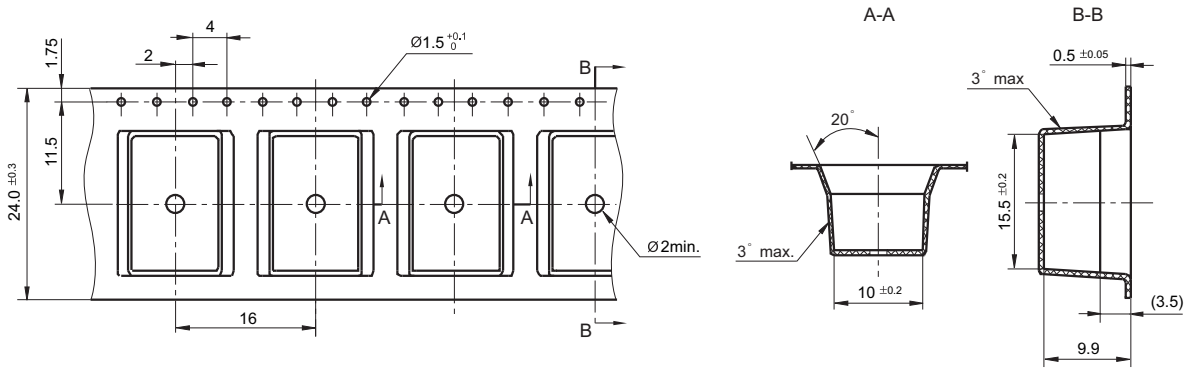
Notes: 1) Packing: 400pcs/reel, 5 reels/carton.
2) MOQ for reel packing is 800pcs.



Reel Dimensions



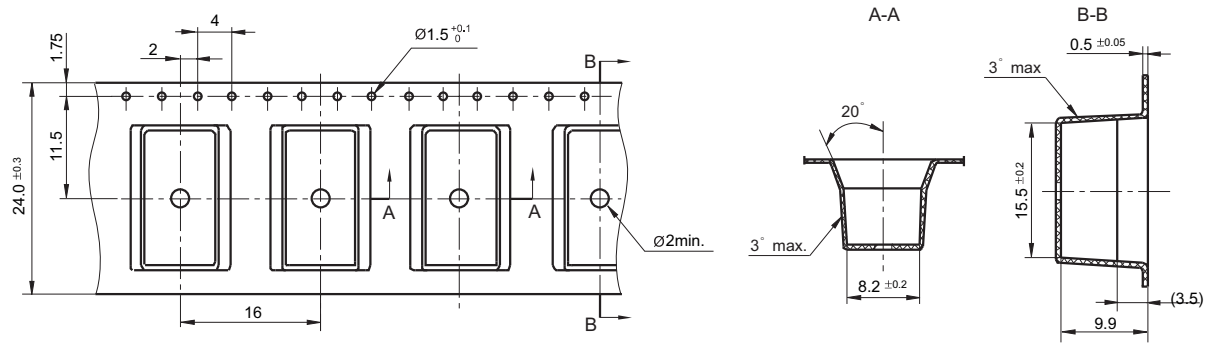
Tape Dimensions (S type: Standard SMT)



TAPE PACKING

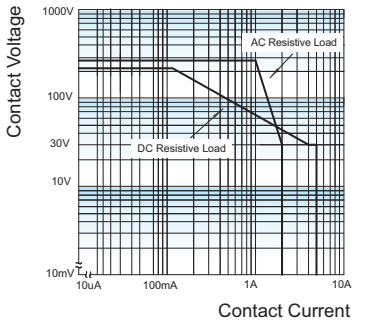
Unit: mm

Tape Dimensions (S1 type: Short terminal SMT)

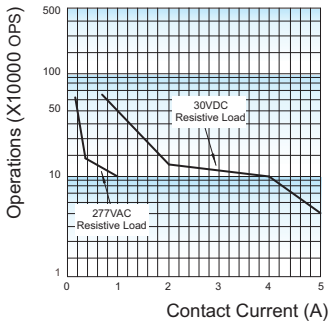


CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER

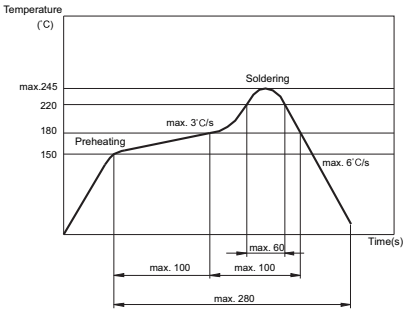


ENDURANCE CURVE



RECOMMENDED REFLOW SOLDERING PROFILE

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



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

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) For 2 coil latching relay,do not emergize voltage to "set" coil and "reset" coil simultaneously.
7) The relay may be damaged because of falling or when shocking conditions exceed the requirement.
8) 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.
9) Please use wave soldering or manual soldering for straight-in relay. If you need reflow welding, please confirm the feasibility with us.
10) Contact is recommended for suitable condition and specifications if water cleaning or surface process is involved in assembling relays on PCB.
11) 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 thesolvents like gasoline, Freon, and so on, which would affect the configuration of relay or influence the environment.
12) 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.
13) 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.
14) 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.
15) About preferable condition of operation, storage and transportation, please refer to "Explanation to terminology and guidetines of relay".
16) 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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