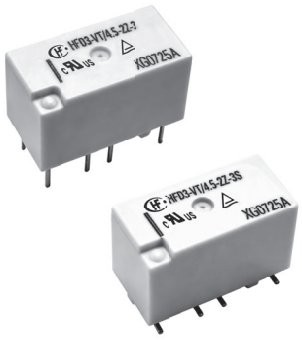
HFD3-VT

3RD GENERATION HIGH-VOLTAGE & HIGH-TEMPERATURE SIGNAL RELAY



c UL us
File No.：E133481

File No.：R 50721982

Features

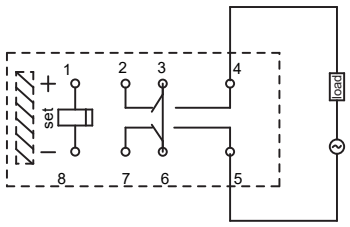
- 3rd-Gen High Temp & High Voltage Signal Relay
- 2 Form A and 2 Form C configurations
- SMT and THT types available
- High switching voltage at 1500VDC 10mA
- 2 pairs of NO contacts connected in series with contact gap≥1.5mm, product in accordance to IEC62776 available

RoHS compliant

CONTACT DATA

Contact arrangement	2A/2C
Contact resistance	100mΩ max. (at 10mA 30mVDC)
Contact material	Ag Ni+Au plated
Contact rating(Res. load)	2A 30VDC, 0.5A 125VAC 10mA 1500VDC, 10mA 1000VDC
Max. switching voltage	1100VAC/1500VDC (Two sets of open contacts are connected in series) 600VAC/800VDC (Single contact)
Max. switching current	2A
Max. switching power	277VA / 60W
Min. applicable load[2)]	10mV 10μA
Mechanical endurance	1×10^7OPS
Electrical endurance	1×10^5OPS(Resistive load, 85℃, 2A 30VDC) 1×10^5OPS(Resistive load, 85℃, 0.5A, 125VAC) 5×10^4OPS(Resistive load, 105℃, 10mA 1500VDC)[(3)] 1×10^5OPS(Resistive load, 105℃, 10mA 1000VDC)[(3)]

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 open contacts are connected in series, as shown below:



Two sets of normally-open contacts connected in series(Bottom view)

COIL

Coil power	Single side stable	Approx. 200mW
	1 coil latching	Approx. 140mW
Temperature rise		≤70K(0.1A, at 105℃) ≤90K(2A, at 85℃)

CHARACTERISTICS

Insulation resistance		1000MΩ (500VDC)
Dielectric strength	Between open contacts(NO)	1500VAC 1min
	Between open contacts(NC)	1000VAC 1min
	Between contact sets	1500VAC 1min
	Between coil & contacts	3000VAC 1min
Surge withstand voltage	Between open contacts (10X160μs)	2.5kV
	Between coil & contacts (2X10μs)	5kV
Operate time (Set time)		6ms max
Release time (Reset time)		6ms 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℃[2)]
Termination		THT,SMT
Unit weight		Approx 2.3g
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) Products of (888) specification are suitable for applications under 105℃ high-temperature environment.

SAFETY APPROVAL RATINGS

UL/CUL TÜV	AgNi+Au plated	2A 30VDC 85℃ 0.5A 125VAC 85℃ 10mA 1000VDC 105℃ 10mA 1500VDC 105℃

Notes: 1) Only for single-stable products.
2) Only typical loads are listed above. Other load specifications can be available upon request.

COIL DATA

23˚C

Single side stable

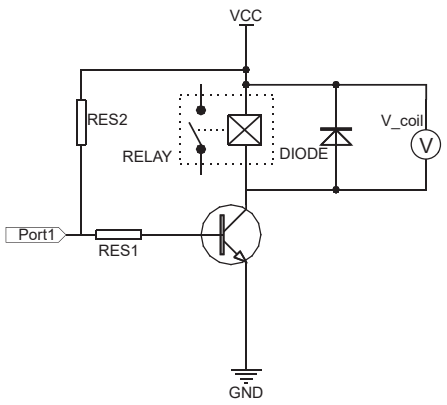
Coil Code	Rated coil Voltage VDC	Pick-up Voltage VDC max.[2)]	Drop-out Voltage VDC max.	Coil Resistance Ω	Nominal Power mW approx	Max. Voltage VDC[5)]
HFD3-VT/1.5	1.5	1.13	0.15	11.2 x (1±10%)	200	3
HFD3-VT/2.4	2.4	1.8	0.24	28.8 x (1±10%)	200	4.8
HFD3-VT/3[3)]	3	2.25	0.3	45x (1±10%)	200	6
HFD3-VT/4.5	4.5	3.38	0.45	101 x (1±10%)	200	9
HFD3-VT/5[3)]	5	3.75	0.5	125 x (1±10%)	200	10
HFD3-VT/6	6	4.5	0.6	180 x (1±10%)	200	12
HFD3-VT/9	9	6.75	0.9	405x (1±10%)	200	18
HFD3-VT/12	12	9	1.2	720x (1±10%)	200	24
HFD3-VT/24	24	18	2.4	2880 x (1±10%)	200	48

1 coil latching

Coil Code	Rated 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-VT/1.5-L1	1.5	1.13	1.13	16.1 x (1±10%)	140	3
HFD3-VT/2.4-L1	2.4	1.8	1.8	41 x (1±10%)	140	4.8
HFD3-VT/3-L1[3)]	3	2.25	2.25	64.3 x (1±10%)	140	6
HFD3-VT/4.5-L1	4.5	3.38	3.38	145 x (1±10%)	140	9
HFD3-VT/5-L1[3)]	5	3.75	3.75	178 x (1±10%)	140	10
HFD3-VT/6-L1	6	4.5	4.5	257 x (1±10%)	140	12
HFD3-VT/9-L1	9	6.75	6.75	579 x (1±10%)	140	18
HFD3-VT/12-L1	12	9	9	1028x (1±10%)	140	24
HFD3-VT/24-L1	24	18	18	4114 x (1±10%)	140	48

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-VT/	12	- 2H	-L1	3	S	R	（XXX）

Type

Coil voltage 1.5，2.4，3，4.5，5，6，9，12，24VDC

Contact arrangement **2H:** 2 Form A **2Z:** 2 Form C

Sort **L1:** 1 coil latching **Nil:** Single side stable

Contact material **3:** AgNi+Gold plated

Terminal type **S:** Standard SMT **Nil:** THT[1)]

Packing style **R:** Tape and reel packing (Only for SMT type)[2)]
Nil: Tube packing(Only for THT type)[3)]

Special code[3)] **XXX:** Customer special requirement **Nil:** Standard
For example: (921) is for vehicle-mounted applications;
(888) is for 105 ˚C high-temperature applications.

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 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) The standard tube length is 624mm,Any special requirement needed, please contact us for more details.
4) The customer special requirement express as special code after evaluating by Hongfa.(921) is a special product characteristic. Example for sample ordering mark: HFD3-VT/12-2Z-3(921).
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.

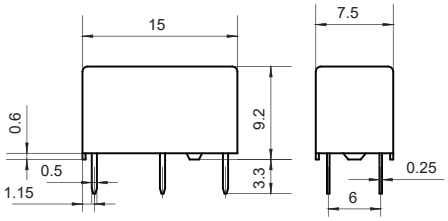
OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

Unit: mm

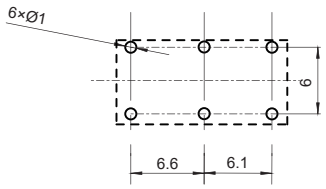
2H type

THT type

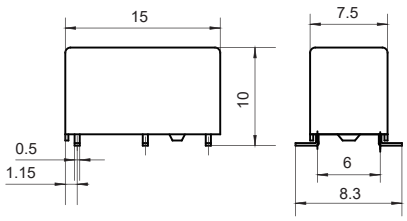
Outline Dimensions

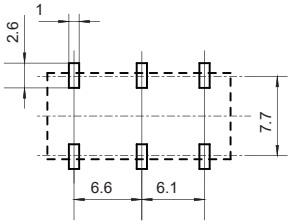


PCB Layout
(Bottom view)



S type: Standard SMT





OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

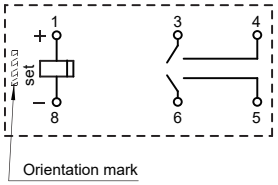
Unit: mm

2H type

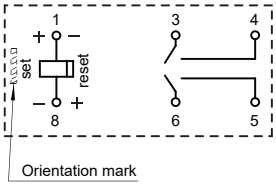
Single side stable

1 coil latching

Wiring Diagram
(Bottom view)



No energized condition



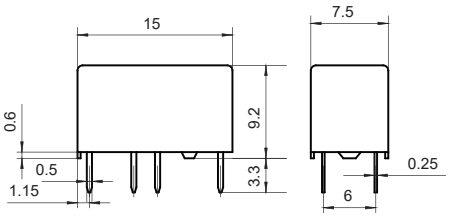
Reset condition

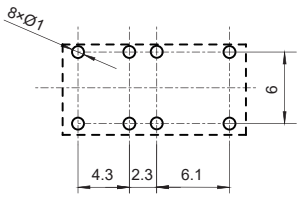
2Z type

Outline Dimensions

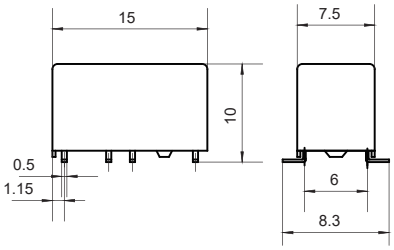
PCB Layout
(Bottom view)

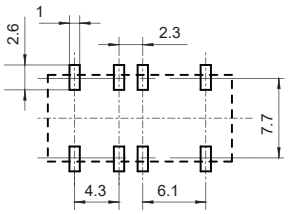
THT type





S type: Standard SMT

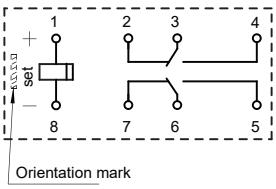




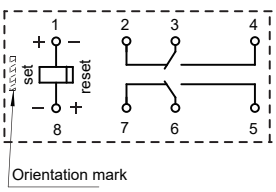
Single side stable

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

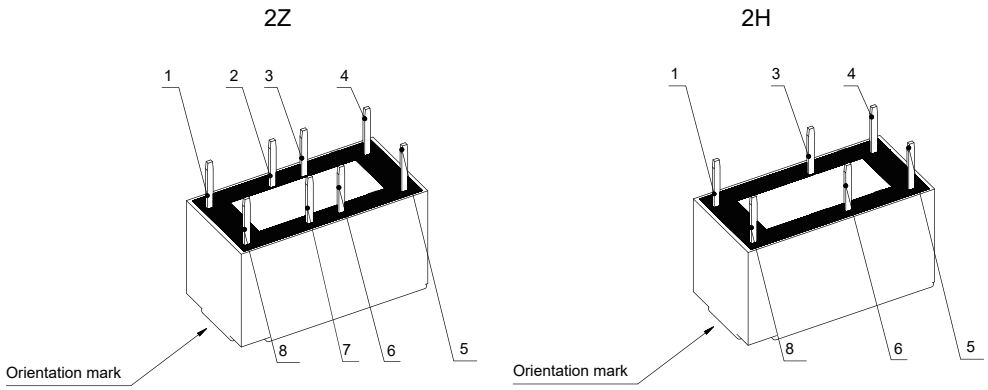


Reset condition

OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

Unit: mm

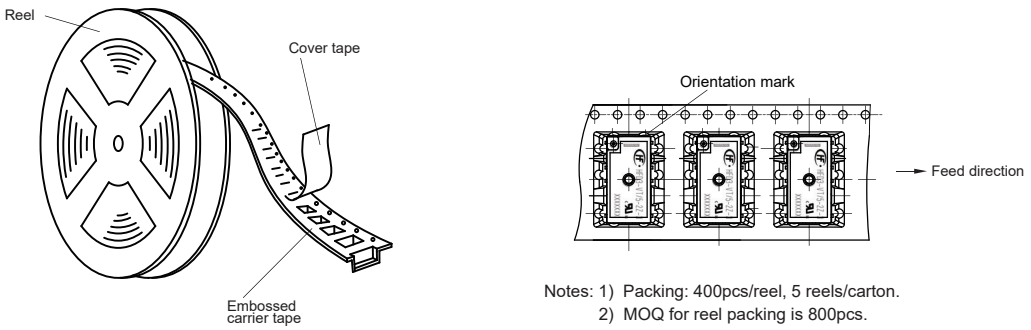
Pin Layout



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.

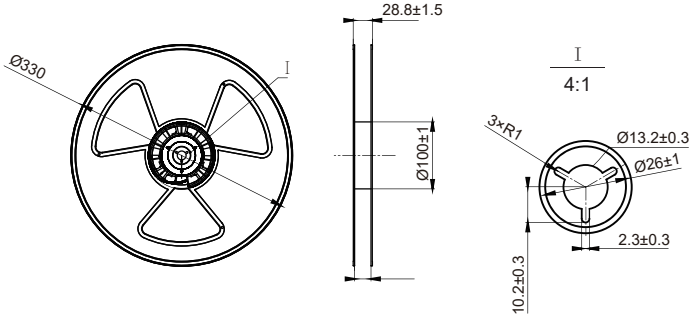
TAPE PACKING

Unit: mm



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

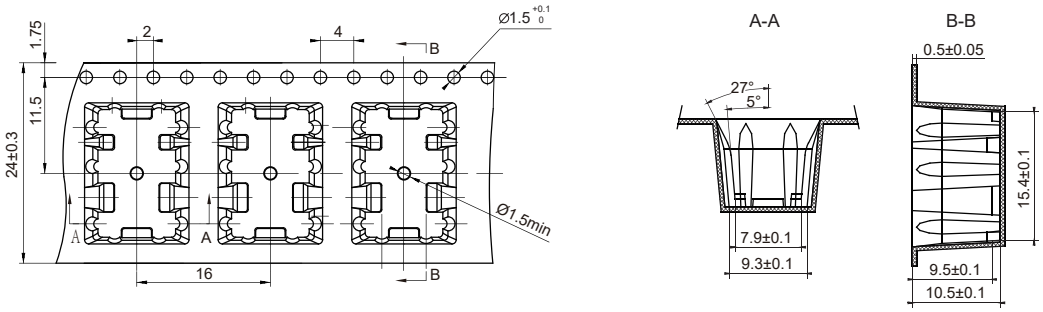
Reel Dimensions



TAPE PACKING

Unit: mm

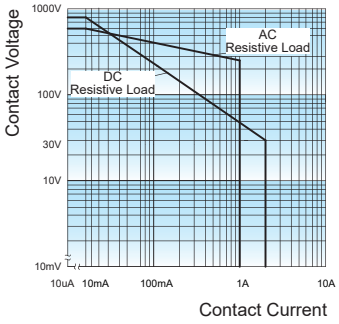
Tape Dimensions



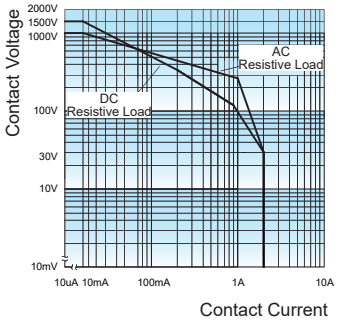
CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER

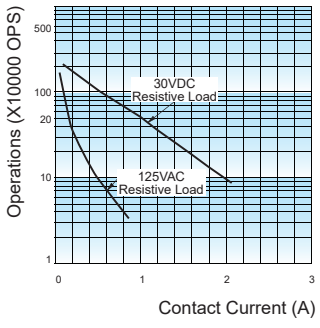
1-pole contacts



2-pole NO contacts wired in series



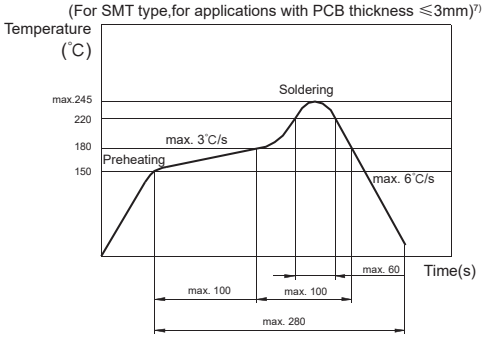
ENDURANCE CURVE



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 if subjected to drop impact or impact exceeding specified conditions.
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.