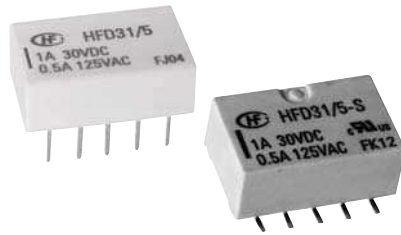


# HFD31

## SUBMINIATURE SIGNAL RELAY



File No.:E133481



### Features

- Offers excellent board space savings
- Surge withstand voltage up to 1500V, meets FCC Part 68
- High contact capacity 1A 30VDC
- Low power consumption
- Single side stable and latching type available
- Single or double coil winding type available
- Environmental friendly product (RoHS compliant)
- Outline Dimensions: (14.0 x 9.0 x 5.0) mm

### CONTACT DATA

|                                    |                                                                                                      |
|------------------------------------|------------------------------------------------------------------------------------------------------|
| Contact arrangement                | 2C                                                                                                   |
| Contact resistance                 | 100mΩ max. (at 10mA 30mVDC)                                                                          |
| Contact material                   | AgPd + Au plated, AgNi + Au plated                                                                   |
| Contact rating<br>(Res. load)      | 1A 30VDC<br>0.5A 125VAC                                                                              |
| Max. switching current             | 2A                                                                                                   |
| Max. switching voltage             | 125VAC/110VDC                                                                                        |
| Max. switching power               | 62.5VA / 30W                                                                                         |
| Min. applicable load <sup>1)</sup> | 10mV 10μA                                                                                            |
| Mechanical endurance               | 1 x 10 <sup>8</sup> ops                                                                              |
| Electrical endurance <sup>2)</sup> | 1 x 10 <sup>5</sup> ops (0.5A 125VAC,<br>Resistive load, AgNi + Au plated,<br>at 70°C, 1s on 9s off) |

**Notes:** 1) 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.

2) Electric endurance data are collected in one pair CO contact test.

### COIL

|            |                    |                                         |
|------------|--------------------|-----------------------------------------|
| Coil power | Single side stable | Approx. 140mW<br>(24VDC: Approx. 200mW) |
|            | 1 coil latching    | Approx. 100mW<br>(24VDC: Approx. 150mW) |
|            | 2 coils latching   | Approx. 200mW<br>(24VDC: Approx. 300mW) |

### CHARACTERISTICS

|                                                                   |                         |                       |
|-------------------------------------------------------------------|-------------------------|-----------------------|
| Insulation resistance                                             |                         | 1000MΩ (at 500VDC)    |
| Dielectric strength                                               | Between coil & contacts | 1000VAC 1min          |
|                                                                   | Between open contacts   | 750VAC 1min           |
|                                                                   | Between contact sets    | 1000VAC 1min          |
| Surge withstand voltage<br>Between open contacts (10/160μs)       |                         | 1500VAC (FCC part 68) |
| Operate time (Set time)                                           |                         | 3ms max.              |
| Release time (Reset time)                                         |                         | 3ms max.              |
| Ambient temperature                                               |                         | -40°C to 70°C         |
| Humidity                                                          |                         | 5% to 85% RH          |
| Vibration resistance                                              |                         | 10Hz to 55Hz 3.0mm DA |
| Shock resistance                                                  | Functional              | 490m/s <sup>2</sup>   |
|                                                                   | Destructive             | 980m/s <sup>2</sup>   |
| Termination                                                       |                         | DIP, SMT              |
| Unit weight                                                       |                         | Approx. 1.5g          |
| Moisture sensitivity levels (Only for<br>SMT type, JEDEC-STD-020) |                         | MSL-3                 |
| Construction                                                      |                         | Plastic sealed        |

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

2) UL insulation system: Class A

### SAFETY APPROVAL RATINGS

|        |                  |                                     |
|--------|------------------|-------------------------------------|
| UL/CUL | AgNi + Au plated | 1A 30VDC<br>2A 30VDC<br>0.5A 125VAC |
|        | AgPd + Au plated | 0.5A 125VAC                         |

**Notes:** 1) All values unspecified are at room temperature.

2) Only typical loads are listed above. Other load specifications



HONGFA RELAY

ISO9001, ISO/TS16949, ISO14001, OHSAS18001, IECQ QC 080000 CERTIFIED

2016 Rev. 1.30

**COIL DATA**

at 23°C

**Single side stable**

| Coil Code | Nominal Voltage VDC | Pick-up Voltage VDC max. | Drop-out Voltage VDC min. | Coil Resistance $\Omega$ | Nominal Power mW approx. | Max. Voltage VDC |
|-----------|---------------------|--------------------------|---------------------------|--------------------------|--------------------------|------------------|
| HFD31/1.5 | 1.5                 | 1.13                     | 0.15                      | 16 x (1±10%)             | 140                      | 2.25             |
| HFD31/2.4 | 2.4                 | 1.8                      | 0.24                      | 41.3 x (1±10%)           | 140                      | 3.6              |
| HFD31/3   | 3                   | 2.25                     | 0.3                       | 64.3 x (1±10%)           | 140                      | 4.5              |
| HFD31/4.5 | 4.5                 | 3.38                     | 0.45                      | 145 x (1±10%)            | 140                      | 6.7              |
| HFD31/5   | 5                   | 3.75                     | 0.5                       | 178 x (1±10%)            | 140                      | 7.5              |
| HFD31/6   | 6                   | 4.5                      | 0.6                       | 257 x (1±10%)            | 140                      | 9                |
| HFD31/9   | 9                   | 6.75                     | 0.9                       | 579 x (1±10%)            | 140                      | 13.5             |
| HFD31/12  | 12                  | 9                        | 1.2                       | 1028 x (1±10%)           | 140                      | 18               |
| HFD31/24  | 24                  | 18                       | 2.4                       | 2880 x (1±10%)           | 200                      | 36               |

**1 coil latching**

| Coil Code    | Nominal Voltage VDC | Set Voltage VDC max. | Reset Voltage VDC max. | Coil Resistance $\Omega$ | Nominal Power mW approx. | Max. Voltage VDC |
|--------------|---------------------|----------------------|------------------------|--------------------------|--------------------------|------------------|
| HFD31/1.5-L1 | 1.5                 | 1.13                 | 1.13                   | 22.5 x (1±10%)           | 100                      | 2.25             |
| HFD31/2.4-L1 | 2.4                 | 1.8                  | 1.8                    | 58 x (1±10%)             | 100                      | 3.6              |
| HFD31/3-L1   | 3                   | 2.25                 | 2.25                   | 90 x (1±10%)             | 100                      | 4.5              |
| HFD31/4.5-L1 | 4.5                 | 3.38                 | 3.38                   | 203 x (1±10%)            | 100                      | 6.7              |
| HFD31/5-L1   | 5                   | 3.75                 | 3.75                   | 250 x (1±10%)            | 100                      | 7.5              |
| HFD31/6-L1   | 6                   | 4.5                  | 4.5                    | 360 x (1±10%)            | 100                      | 9                |
| HFD31/9-L1   | 9                   | 6.75                 | 6.75                   | 810 x (1±10%)            | 100                      | 13.5             |
| HFD31/12-L1  | 12                  | 9                    | 9                      | 1440 x (1±10%)           | 100                      | 18               |
| HFD31/24-L1  | 24                  | 18                   | 18                     | 3840 x (1±10%)           | 150                      | 36               |

**2 coils latching**

| Coil Code    | Nominal Voltage VDC | Set Voltage VDC max. | Reset Voltage VDC max. | Coil Resistance $\Omega$ | Nominal Power mW approx. | Max. Voltage VDC |
|--------------|---------------------|----------------------|------------------------|--------------------------|--------------------------|------------------|
| HFD31/1.5-L2 | 1.5                 | 1.13                 | 1.13                   | 11.3 x (1±10%)           | 200                      | 2.25             |
| HFD31/2.4-L2 | 2.4                 | 1.8                  | 1.8                    | 29 x (1±10%)             | 200                      | 3.6              |
| HFD31/3-L2   | 3                   | 2.25                 | 2.25                   | 45 x (1±10%)             | 200                      | 4.5              |
| HFD31/4.5-L2 | 4.5                 | 3.38                 | 3.38                   | 101 x (1±10%)            | 200                      | 6.7              |
| HFD31/5-L2   | 5                   | 3.75                 | 3.75                   | 125 x (1±10%)            | 200                      | 7.5              |
| HFD31/6-L2   | 6                   | 4.5                  | 4.5                    | 180 x (1±10%)            | 200                      | 9.0              |
| HFD31/9-L2   | 9                   | 6.75                 | 6.75                   | 405 x (1±10%)            | 200                      | 13.5             |
| HFD31/12-L2  | 12                  | 9                    | 9                      | 720 x (1±10%)            | 200                      | 18               |
| HFD31/24-L2  | 24                  | 18                   | 18                     | 1920 x (1±10%)           | 300                      | 36               |

**Notes:** 1) When user's requirements can't be found in the above table, special order allowed.

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

## ORDERING INFORMATION

|                            |                                                                                                    |    |     |   |   |   |       |
|----------------------------|----------------------------------------------------------------------------------------------------|----|-----|---|---|---|-------|
|                            | HFD31 /                                                                                            | 24 | -L1 | 4 | S | R | (XXX) |
| Type                       |                                                                                                    |    |     |   |   |   |       |
| Coil voltage               | 1.5, 2.4, 3, 4.5, 5, 6, 9, 12, 24VDC                                                               |    |     |   |   |   |       |
| Sort                       | L1: 1 coil latching      L2: 2 coils latching<br>Nil: Single side stable                           |    |     |   |   |   |       |
| Contact material           | 4: AgPd+Gold plated      Nil: AgNi+Gold plated                                                     |    |     |   |   |   |       |
| Terminal type              | S: Standard SMT      Nil: DIP                                                                      |    |     |   |   |   |       |
| Packing style              | R: Tape and reel packing (Only for SMT type) <sup>1)</sup><br>Nil: Tube packing(Only for DIP type) |    |     |   |   |   |       |
| Special code <sup>2)</sup> | XXX: Customer special requirement      Nil: Standard                                               |    |     |   |   |   |       |

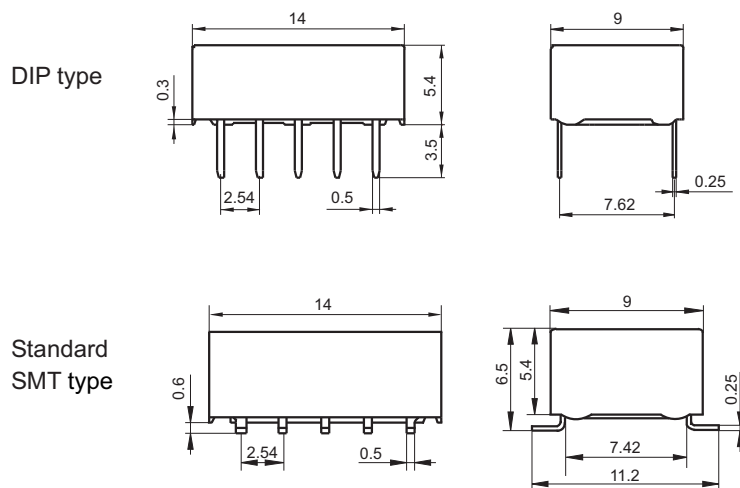
**Notes:** 1) R type (tape and reel) packing is moisture-proof which meets requirement of MSL-3. Please choose R type packing for SMT products. For R type, the letter "R" will only be printed on packing tag but not on relay cover. Tube packing is normally not available for SMT products unless specially 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 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.

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

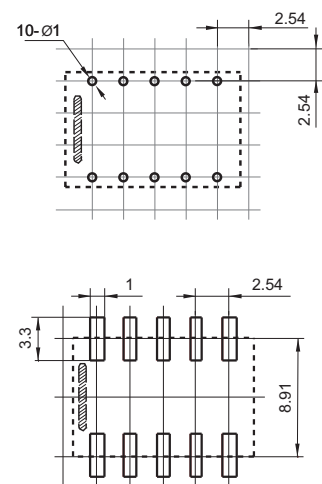
## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

Unit: mm

Outline Dimensions



PCB Layout  
(Bottom view)



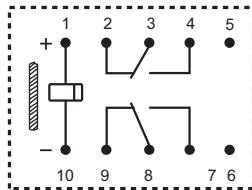
Remark: 1) In case of no tolerance shown in outline dimension: outline dimension  $\leq 1\text{mm}$ , tolerance should be  $\pm 0.2\text{mm}$ ; outline dimension  $> 1\text{mm}$  and  $\leq 5\text{mm}$ , tolerance should be  $\pm 0.3\text{mm}$ ; outline dimension  $> 5\text{mm}$ , tolerance should be  $\pm 0.4\text{mm}$ .  
2) The tolerance without indicating for PCB layout is always  $\pm 0.1\text{mm}$ .  
3) The width of the gridding is 2.54mm.

## OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

Unit: mm

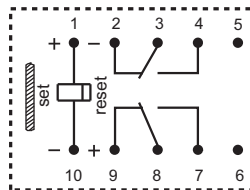
Wiring Diagram  
(Bottom view)

Single side stable



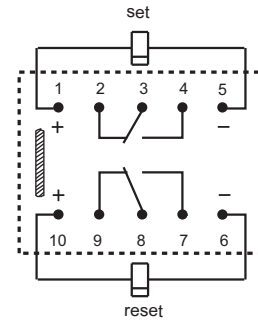
Deenergized condition

1 coil latching



Reset condition

2 coils latching

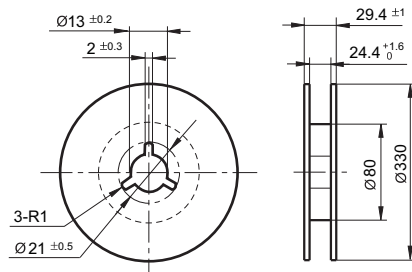


Reset condition

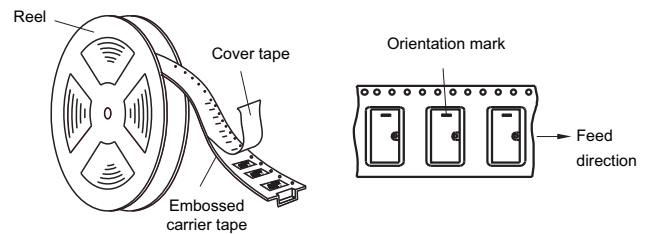
## TAPE & REEL PACKING CONSTRUCTION AND DIMENSION

Unit: mm

Reel Dimensions

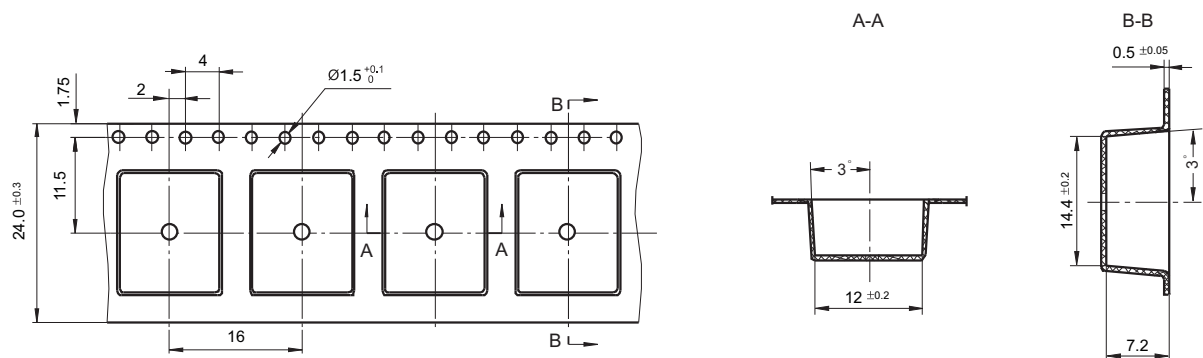


Direction of Relay Insertion



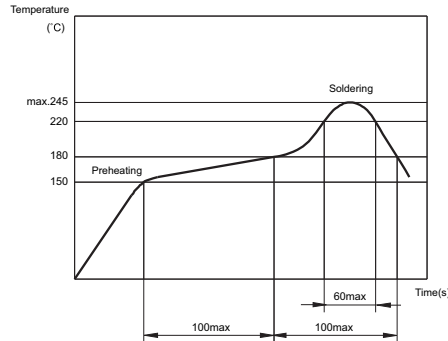
**Notes:** 1) Packing: 550pcs/reel, 4 reels/carton.  
2) MOQ for reel packing is 550pcs.

Tape Dimensions



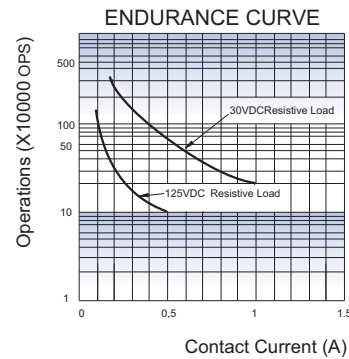
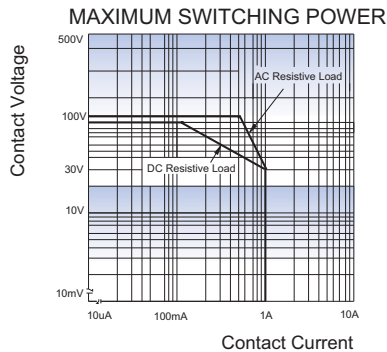
## RECOMMENDED SOLDERING CONDITIONS

Temperature/Time profile of Reflow Soldering see below:



- Notes:** 1) Temperature profile shows Printed Circuit Board surface temperature on the relay terminal portion.  
2) Please check the actual soldering condition to use other method except above mentioned temperature profiles.

## CHARACTERISTIC CURVES



**Test conditions:**  
Resistive load, at 40°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 2 coil latching relay, do not energize voltage to "set" coil and "reset" coil simultaneously.
- 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) Contact is recommended for suitable condition and specifications if water cleaning or surface process is involved in assembling relays on PCB.
- 9) 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.
- 10) About preferable condition of operation, storage and transportation, please refer to "Explanation to terminology and guidetines of relay".
- 11) Relays packaged in moisture barrier bags meet MSL-3 requirements. The relays should be stored at ambient conditions of  $\leq 30^{\circ}\text{C}$  and  $\leq 60\%$  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  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ,  $\leq 10\%$  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  $50^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ,  $\leq 30\%$  RH.

### 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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