

# HFD2

# SUBMINIATURE DIP RELAY



File No.:E133481



File No.: R 50306253



File No.:CQC13002095174(Single side stable)  
CQC13002095175(Latching)



## Features

- High sensitive: 150mW
- Matching standard 16 pin IC socket
- High switching capacity: 125VA / 90W
- Bifurcated contacts
- Epoxy sealed for automatic wave soldering and cleaning
- Single side stable and latching type available

RoHS compliant

## CONTACT DATA

Contact arrangement	2C
Contact resistance	100mΩ max. (at 10mA 30mVDC)
Contact material	see ordering info.
Contact rating (Res. load)	1A 125VAC, 2A 30VDC 3A 30VDC
Max. switching voltage	250VAC / 220VDC
Max. switching current	3A
Max. switching power	125VA / 90W
Min. applicable load <sup>1)</sup>	10mV 10μA
Mechanical endurance	1 x 10 <sup>8</sup> OPS
Electrical endurance <sup>2)</sup>	5 x 10 <sup>4</sup> OPS (2A 30VDC, Ag contact, Resistive load, 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.

## CHARACTERISTICS

Insulation resistance	1000MΩ (at 500VDC)
Dielectric strength	Between coil & contacts 1 coil: 1500VAC 1min 2 coils: 1000VAC 1min
	Between open contacts 1000VAC 1min
Operate time (at rated. volt.)	4.5ms max.
Release time (at rated. volt.)	3.5ms max.
Set time (latching)	4.5ms max.
Reset time (latching)	4.5ms max.
Ambient temperature	-40 °C to 85°C
Humidity	5% to 85% RH
Vibration resistance	10Hz to 55Hz 1.5mm DA
Shock resistance	Functional 490m/s <sup>2</sup>
	Destructive 980m/s <sup>2</sup>
Termination	PCB (DIP)
Unit weight	Approx. 4.5g
Construction	Plastic sealed

**Notes:** 1) The data shown above are initial values.  
2) UL insulation system: Class A

## COIL

Coil power		Sensitive	Standard
	Single side stable	Approx. 150mW	Approx. 200mW
	1 coil latching	Approx. 75mW	Approx. 100mW
	2 coils latching	Approx. 150mW	Approx. 200mW
Temperature rise	65K max.		

## COIL DATA

at 23°C

### Single side stable Standard type

Coil Code	Coil Nominal Voltage VDC <sup>1)</sup>	Initial Pick-up Voltage VDC max. <sup>1)</sup>	Initial Drop-out Voltage VDC min.	Coil Resistance x(1±10%) Ω	Max. Voltage VDC <sup>4)</sup>
003-M	3	2.30	0.3	45	6
005-M	5	3.75	0.5	125	10
006-M	6	4.50	0.6	180	12
009-M	9	6.75	0.9	405	18
012-M	12	9.00	1.2	720	24
015-M	15	11.25	1.5	1125	30
024-M	24	18.0	2.4	2880	48
048-M	48	36.0	4.8	11520	96

### Single side stable Sensitive type

Coil Code	Coil Nominal Voltage VDC <sup>1)</sup>	Initial Pick-up Voltage VDC max. <sup>1)</sup>	Initial Drop-out Voltage VDC min.	Coil Resistance x(1±10%) Ω	Max. Voltage VDC
003-S	3	2.4	0.3	60	7.0
005-S	5	4.0	0.5	167	11.5
006-S	6	4.8	0.6	240	13.8
009-S	9	7.2	0.9	540	20.8
012-S	12	9.6	1.2	960	27.7
015-S	15	12.0	1.5	1500	34.6
024-S	24	19.2	2.4	3840	55.4



HONGFA RELAY

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

2023 Rev. 1.00

## COIL DATA

at 23°C

### 1 coil latching Standard type

Coil Code	Coil Nominal Voltage VDC <sup>1)</sup>	Initial Set / Reset Voltage VDC max. <sup>1)</sup>	Coil Resistance x(1±10%) Ω	Max. Voltage VDC <sup>4)</sup>
003-M-L1	3	2.25	90	8.4
005-M-L1	5	3.75	250	14
006-M-L1	6	4.5	360	17
009-M-L1	9	6.75	810	25
012-M-L1	12	9.0	1440	34
015-M-L1	15	11.25	2220	42
024-M-L1	24	18.0	4000	56

### 2 coils latching Standard type

Coil Code	Coil Nominal Voltage VDC <sup>1)</sup>	Initial Set / Reset Voltage VDC max. <sup>1)</sup>	Coil Resistance x(1±10%) Ω	Max. Voltage VDC <sup>4)</sup>
003-M-L2	3	2.25	45	6
005-M-L2	5	3.75	125	10
006-M-L2	6	4.5	180	12
009-M-L2	9	6.75	405	18
012-M-L2	12	9.0	720	24
015-M-L2	15	11.25	1125	30
024-M-L2	24	18.0	2040	48

### 1 coil latching Sensitive type

Coil Code	Coil Nominal Voltage VDC <sup>1)</sup>	Initial Set / Reset Voltage VDC max. <sup>1)</sup>	Coil Resistance x(1±10%) Ω	Max. Voltage VDC <sup>4)</sup>
003-S-L1	3	2.4	120	9.6
005-S-L1	5	4.0	330	16
006-S-L1	6	4.8	480	19
009-S-L1	9	7.2	1080	29
012-S-L1	12	9.6	1920	39
015-S-L1	15	12.0	3000	43
024-S-L1	24	19.2	7680	78

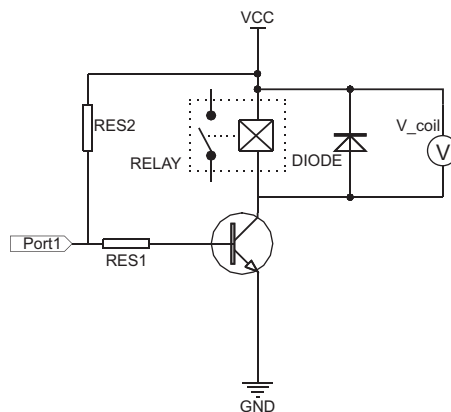
### 2 coils latching Sensitive type

Coil Code	Coil Nominal Voltage VDC <sup>1)</sup>	Initial Set / Reset Voltage VDC max. <sup>1)</sup>	Coil Resistance x(1±10%) Ω	Max. Voltage VDC <sup>4)</sup>
003-S-L2	3	2.4	60	6.9
005-S-L2	5	4.0	167	11.5
006-S-L2	6	4.8	240	13.8
009-S-L2	9	7.2	540	20.8
012-S-L2	12	9.6	960	27.7
015-S-L2	15	12.0	1500	34.6
024-S-L2	24	19.2	3840	55.4

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

2) To supply rated step voltage to coil is the foundation of relay proper operation. Please make sure the applied voltage to the coil reach at rated values.

Please refer to the typical diagram below for single side stable relay. The "V\_coil" is the rated voltage:



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.

## TYPICAL CONTACT LIFE EXPECTANCY

Voltage	Power	Electrical endurance	
		Resistive Load	Inductive Load (For AC $\cos\phi=0.7$ )
50mVDC	50 $\mu$ W	5 x 10 <sup>7</sup> OPS	5 x 10 <sup>7</sup> OPS
30VDC	20W	3 x 10 <sup>6</sup> OPS	1 x 10 <sup>6</sup> OPS
30VDC	30W	1 x 10 <sup>6</sup> OPS	3 x 10 <sup>5</sup> OPS
30VDC	60W	1 x 10 <sup>5</sup> OPS	1.5 x 10 <sup>4</sup> OPS
60VDC	20W	3 x 10 <sup>6</sup> OPS	--
60VDC	30W	5 x 10 <sup>5</sup> OPS	--
60VDC	60W	1 x 10 <sup>5</sup> OPS	--
30VAC	40VA	3 x 10 <sup>6</sup> OPS	1 x 10 <sup>6</sup> OPS
30VAC	80VA	1 x 10 <sup>6</sup> OPS	3 x 10 <sup>5</sup> OPS
30VAC	120VA	1 x 10 <sup>5</sup> OPS	1.5 x 10 <sup>4</sup> OPS
60VAC	40VA	3 x 10 <sup>6</sup> OPS	1 x 10 <sup>6</sup> OPS
60VAC	80VA	1 x 10 <sup>6</sup> OPS	3 x 10 <sup>5</sup> OPS
60VAC	120VA	1 x 10 <sup>5</sup> OPS	1.5 x 10 <sup>4</sup> OPS
125VAC	40VA	3 x 10 <sup>6</sup> OPS	1 x 10 <sup>6</sup> OPS
125VAC	80VA	1 x 10 <sup>6</sup> OPS	3 x 10 <sup>5</sup> OPS
125VAC	125VA	1 x 10 <sup>5</sup> OPS	1.5 x 10 <sup>4</sup> OPS

## SAFETY APPROVAL RATINGS

UL/CUL	AgPd/AgPd+Gold plated AgPd/Ag+Gold plated	0.5A 60VDC 2A 30VDC 1A 125VAC 2A 125VAC
	AgPd/Ag+Gold plated	3A 40VDC(40°C)
	Ag+Gold plated/ Ag+Gold plated	2A 30VDC 3A 30VDC(70°C) 1A 125VAC 2A 125VAC
TÜV	AgPd/AgPd+Gold plated AgPd/Ag+Gold plated Ag+Gold plated	2A 30VDC(70°C) 3A 30VDC(70°C) 1A 125VAC(70°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.

## ORDERING INFORMATION

Type	HFD2 / 012 -S -L2 -A (XXX)
Coil voltage	3, 5, 6, 9, 12, 15, 24, 48VDC <sup>1)</sup>
Coil power	M: Standard S: Sensitive
Sort	L1: 1 coil latching L2: 2 coils latching Nil: Single side stable
Contact material	A: AgPd/AgPd+Gold plated D: Ag+Gold plated/Ag+Gold plated Nil: AgPd/Ag+Gold plated <sup>2)</sup>
Special code <sup>3)</sup>	XXX: Customer special requirement Nil: Standard

Notes: 1) 48VDC coil voltage is only for single side stable & standard type.

2) XXX1/XXX2 : XXX1 stands for movable contact material, XXX2 stands for stationary contact material, for example, "A" means that the movable contact material is AgPd, stationary contact material AgPd+Gold plated.

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

4) Standard tube packing length is 527mm. Any special requirement needed, please contact us for more details.

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.

# OUTLINE DIMENSIONS, WIRING DIAGRAM AND PC BOARD LAYOUT

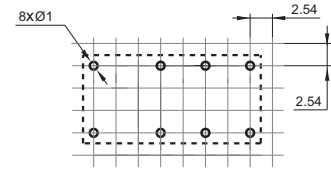
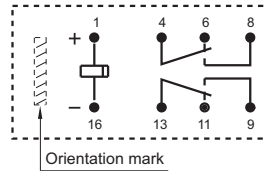
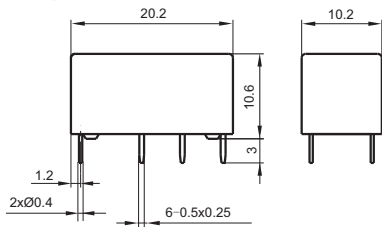
Unit: mm

Outline Dimensions

Wiring Diagram  
(Bottom view)

PCB Layout  
(Bottom view)

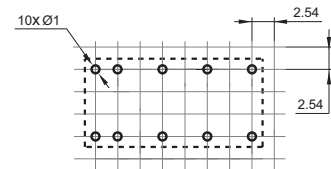
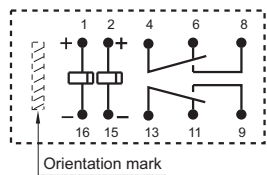
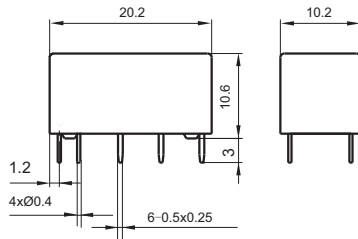
Single side stable  
or 1 coil latching



Matching 16 pin IC socket

For latching, diagram shows the "reset" position  
Energize terminals 1 and 16 to "set"  
Reverse energize terminals 1 and 16 to "reset"

2 coils latching



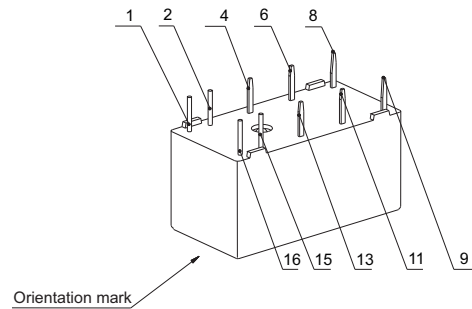
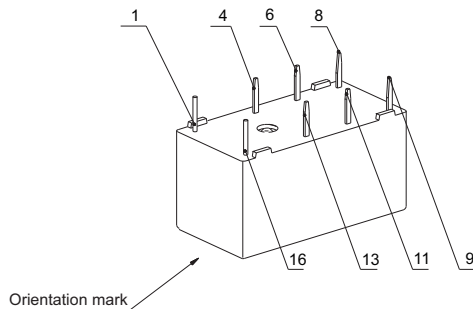
Matching 16 pin IC socket

Diagram shows the "reset" position  
Energize terminals 1 and 16 to "set"  
Energize terminals 2 and 15 to "reset"

Single side stable & 1 coil latching

2 coils latching

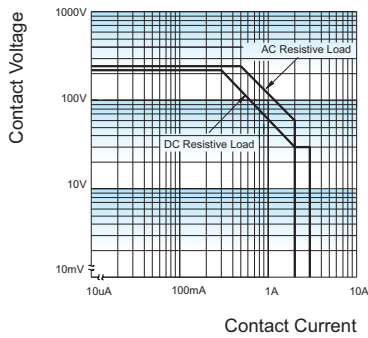
Pin Layout



- 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  $\leq 1\text{mm}$ , 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  $\pm 0.4\text{mm}$ .
- 3) The tolerance without indicating for PCB layout is always  $\pm 0.1\text{mm}$ .
- 4) The width of the gridding is 2.54mm.

## CHARACTERISTIC CURVES

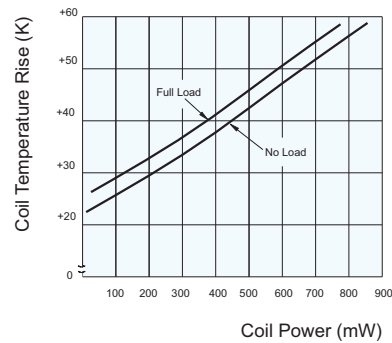
MAXIMUM SWITCHING POWER



**Test conditions:**

Resistive load, at 70°C, 1s on 9s off.

COIL TEMPERATURE RISE



- 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 energize 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) 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 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.
- 11) 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 erosion if possible. And please provide protection circuit to avoid broken wire and losses.
- 12) 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
- 13) About preferable condition of operation, storage and transportation, please refer to "Explanation to terminology and guidelines of relay".
- 14) 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.