HFD48　3GHz SUBMINIATURE HIGH-FREQUENCY RELAY

Features

● Excellent high-frequency characteristics at 3GHz:
　Insertion loss≤0.6dB，VSWR≤1.4
　Isolation：between open contacts≥18dB,
　between contact sets≥25dB
● Operate/Release（Reset）time≤1.5ms
　Products with Operate/Release（Reset）time≤1ms are available
● 2 Form C configuration
● Single-side stable and latching types available
● SMT type available
● Small product size

RoHS compliant

CONTACT DATA

Contact arrangement		2Z
Contact resistance[1]		≤100mΩ (10mA 30mVDC)
Contact material		Sliver alloy + Au plated
Contact rating	Resistive load	1A 15VDC
		0.15A 125VAC
	High frequency load	1W 3GHz
Max. switching voltage		125VAC / 30VDC
Max. switching current		1A (15VDC)
Max. switching power		18.75VA / 15W /1W 3GHz
Min. applicable load[2]		10mV 10μA
Mechanical endurance		1 x 10⁸OPS
Electrical endurance	Resistive load	1 x 10⁵OPS(1A 15VDC, 85℃, 1s on 9s off)
		1 x 10⁵OPS(0.15A 125VAC, 85℃, 1s on 9s off)
	High frequency load[3]	1 x 10⁵OPS(1W 3GHz, 85℃, 1s on 9s off)

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) These values are for a V.SWR of 1.2 max. at the load.

COIL

Coil power	Single-side stable	See "COIL DATA"
	1 coil latching	See "COIL DATA"
Temperature rise		50K max. (1A load, ambient temperature 85℃)

HIGH-FREQUENCY CHARACTERISTICS

frequency		3GHz
Isolation	between open contacts	≥18dB
	between contact sets	≥25dB
Insertion loss		≤0.6dB
V.SWR		≤1.4
Through maximum power		3W[4]

Notes: 1) The characteristic impedance of the measuring system is 50Ω；
　　2) The data shown above are initial values.
　　3) Please contact us if the relay will be used in an application that requires radio repeatability in high-frequency characteristics for the microload area (such as test and measurement equipment and ATE,etc.)
　　4) These values are for a V.SWR of 1.2 max. at the load.

CHARACTERISTICS

Insulation resistance		1000MΩ (500VDC)
Dielectric strength	Between coil & contacts	750VAC 1min
	Between open contacts	500VAC 1min
	Between contact sets	750VAC 1min
	Between coil, contact and grounding	500VAC 1min
Operate time (Set time)		≤ 1.5ms
Release time (Reset time)		≤ 1.5ms
Ambient temperature		-40℃ to 85℃
Humidity		5% to 85% RH
Vibration resistance	Functional	735m/s²
	Destructive	980m/s²
Shock resistance	Functional	10Hz to 55Hz 3.3mm DA
	Destructive	10Hz to 55Hz 5.0mm DA
Termination		SMT
Unit weight		Approx .1.2g
Moisture sensitivity levels (Only for SMT type, JEDEC-STD-020)		MSL3
Construction		Plastic sealed

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

COIL DATA

Single side stable

Coil Code	Nominal Voltage VDC	Pick-up Voltage VDC max.	Drop-out Voltage VDC min.	Coil Resistance Ω	Nominal Power mW approx.	Max.[4] Voltage VDC
HFD48/1.5	1.5	≤1.13	≥0.15	11.3 x (1±10%)	200	2.2
HFD48/2.4	2.4	≤1.8	≥0.24	28.9 x (1±10%)	200	3.6
HFD48/3	3	≤2.25	≥0.3	45 x (1±10%)	200	4.5
HFD48/4.5	4.5	≤3.38	≥0.45	101.3 x (1±10%)	200	6.7
HFD48/5	5	≤3.75	≥0.5	125 x (1±10%)	200	7.5
HFD48/6	6	≤4.5	≥0.6	180 x (1±10%)	200	9.0
HFD48/9	9	≤6.75	≥0.9	405 x (1±10%)	200	13.5
HFD48/12	12	≤9	≥1.2	720 x (1±10%)	200	18.0
HFD48/24	24	≤18	≥2.4	2880 x (1±10%)	200	36.0

1 coil latching

Coil Code	Nominal Voltage VDC	Pick-up Voltage VDC max.	Reset Voltage VDC max.	Coil Resistance Ω	Nominal Power mW approx.	Max.[4] Voltage VDC
HFD48/1.5-L	1.5	≤1.13	≤1.13	16 x (1±10%)	140	3.0
HFD48/2.4-L	2.4	≤1.8	≤1.8	41 x (1±10%)	140	4.8
HFD48/3-L	3	≤2.25	≤2.25	64.3 x (1±10%)	140	6.0
HFD48/4.5-L	4.5	≤3.38	≤3.38	145 x (1±10%)	140	9.0
HFD48/5-L	5	≤3.75	≤3.75	178 x (1±10%)	140	10.0
HFD48/6-L	6	≤4.5	≤4.5	257 x (1±10%)	140	12.0
HFD48/9-L	9	≤6.75	≤6.75	579 x (1±10%)	140	18.0
HFD48/12-L	12	≤9	≤9	1028 x (1±10%)	140	24.0
HFD48/24-L	24	≤18	≤18	2880 x (1±10%)	200	36.0

Notes: 1) Applying rated voltage to both ends of the relay coil is the basis for the normal operation of the relay. Please confirm whether the voltage applied to both ends of the relay coil reaches the rated value before using.
2) In order to compensate for the voltage drop of the transistor, it is recommended to use a 4.5V specification relay when the power supply voltage of transistors is 5V; and when it is 3V, the recommendation is to use a 2.4V specification relay.
3) For mono-stable relays, after it operated reliably, the effective value of the maintained voltage should not be less than 60% of the rated voltage if it requires a step-down hold.
4) The maximum voltage refers to the maximum overvoltage that the relay coil can withstand in a short time.
5) When the user has special requirements different from the above parameters, it can be negotiated.

ORDERING INFORMATION

	HFD48 /	24	-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					
Packing style	R: Tape and reel packing					
Special code[2]	XXX: Customer special requirement Nil: Standard For instance: Product with A45 suffix is Operate/Release（Reset）time≤1ms					

Notes: 1) R type (tape and reel) packing is moisture-proof which meets requirement of MSL-3. For R type, the letter "R" will only be printed on packing tag but not on relay cover.
2) Customer's special requirements will be identified by special codes after evaluation.
3) A hyphen mark "-" should be added between coil voltage and sort/terminal type/packing style if any, for example: HFD48/24-SR.
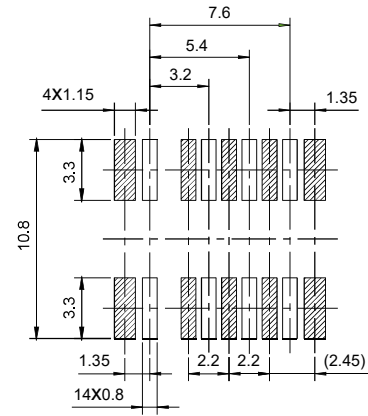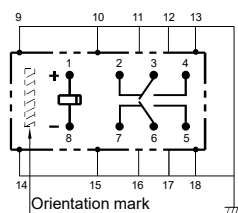
Outline Dimensions
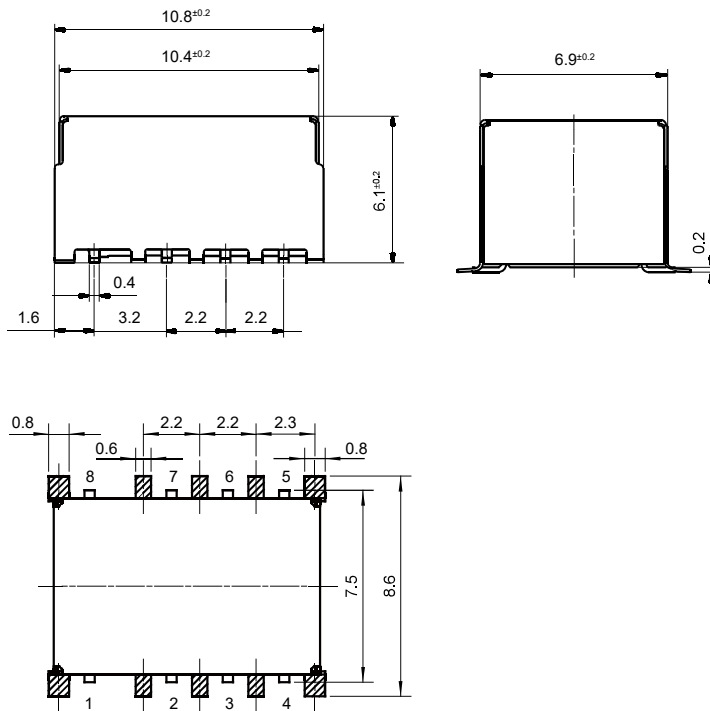
PCB Layout
(Bottom view)

Remark: 1) ▨ represents the ground terminal or ground mounting hole.
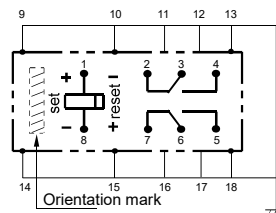
Wiring Diagram

Single side stable(Bottom view)
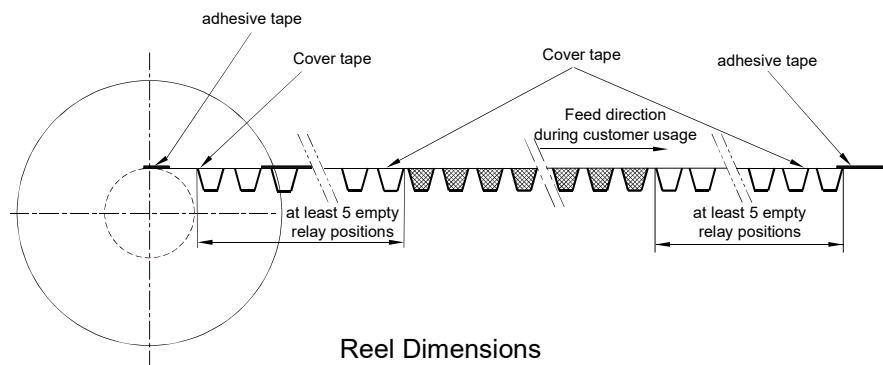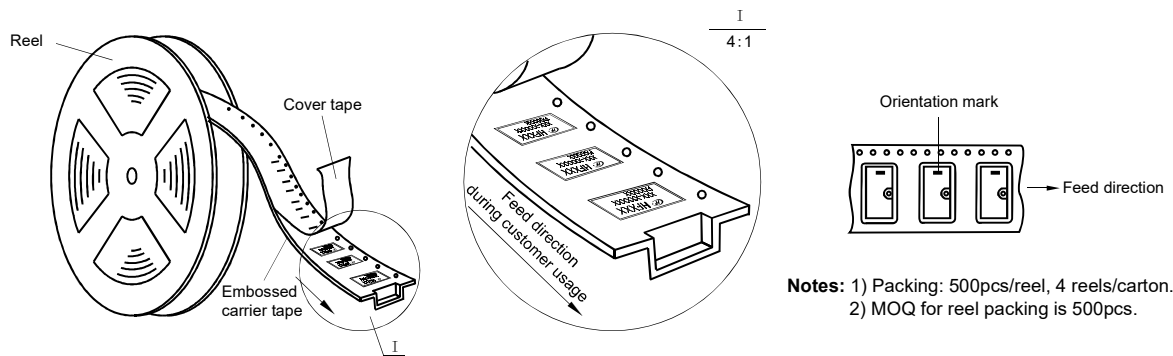
No energized condition

1 coil latching(Bottom view)

Reset condition

Remark: 1)In case of no tolerance shown in outline dimension: outline dimension ≤1mm, tolerance should be ±2mm; outline dimension >1mm and ≤5mm, tolerance should be ±3mm; outline dimension >5mm, tolerance should be ±4mm.
2)The tolerance without indicating for PCB layout is always ±1mm.
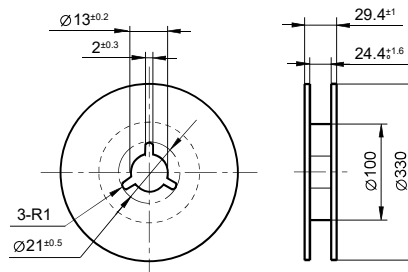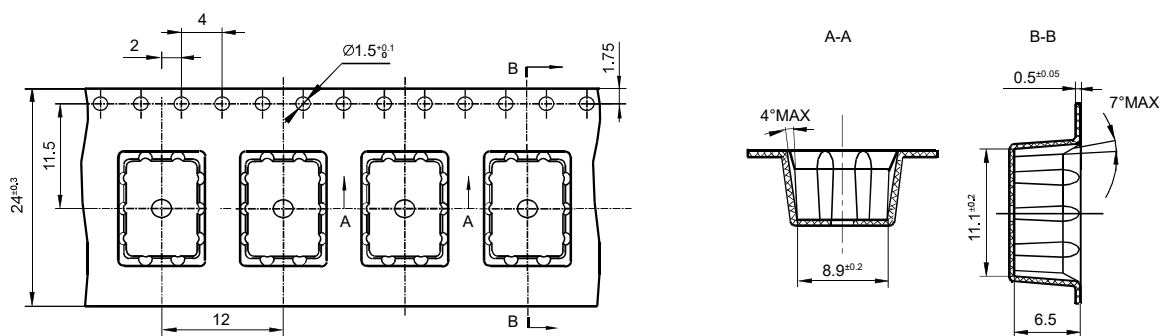3) 9 to18 are relay ground Termination.

Direction of Relay Insertion

Reel

Cover tape

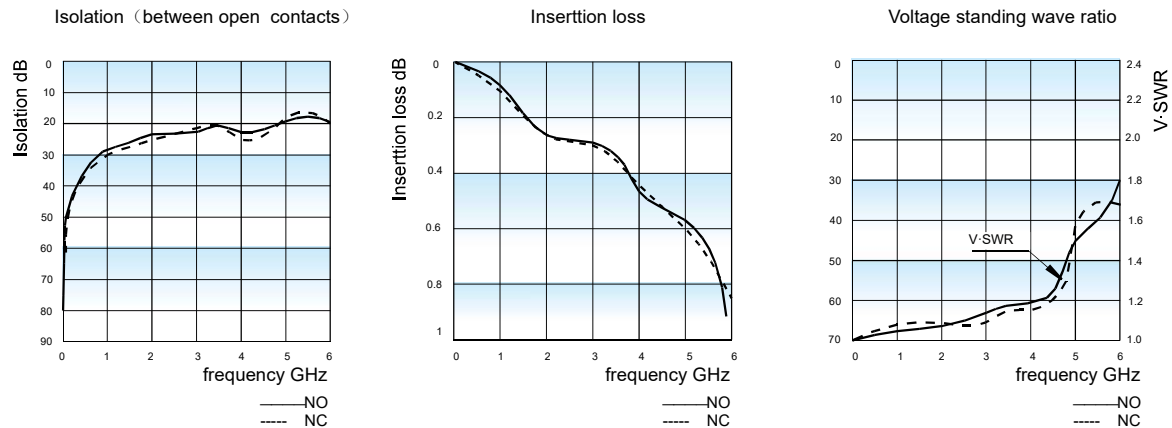Embossed carrier tape

Feed direction during customer usage

Orientation mark

Feed direction

Notes: 1) Packing: 500pcs/reel, 4 reels/carton.
2) MOQ for reel packing is 500pcs.

adhesive tape

Cover tape

Cover tape

adhesive tape

Feed direction during customer usage

at least 5 empty relay positions

at least 5 empty relay positions

Reel Dimensions

$\varnothing 13^{\pm 0.2}$

$2^{\pm 0.3}$

$\varnothing 100$

$\varnothing 330$

$29.4^{\pm 1}$

$24.4^{+1.6}_{0}$

3-R1

$\varnothing 21^{\pm 0.5}$

Tape Dimensions

4

2

$\varnothing 1.5^{+0.1}_{0}$

1.75

11.5

$24^{\pm 0.3}$

12

B

B

A

A

A-A

B-B

$0.5^{\pm 0.05}$

4°MAX

7°MAX

$8.9^{\pm 0.2}$

$11.1^{\pm 0.2}$

6.5

HIGH FREQUENCY CHARACTERISTICS CURVES

Isolation（between open contacts）

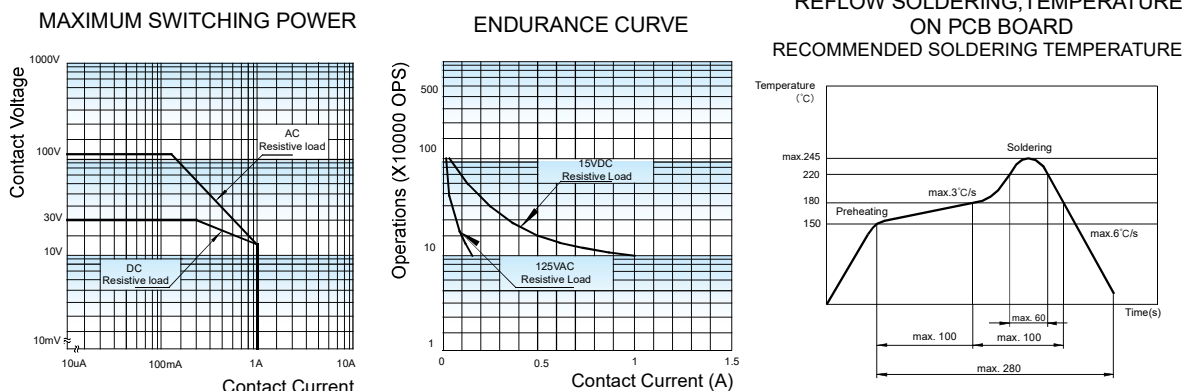Inserttion loss

Voltage standing wave ratio

—— NO
----- NC

—— NO
----- NC

—— NO
----- NC

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: HFD48/5-SR, test instrument: Keysight E5071C network analyzer, the characteristic impedance of the measurement system is 50Ω.

CHARACTERISTIC CURVES

MAXIMUM SWITCHING POWER

ENDURANCE CURVE

REFLOW SOLDERING,TEMPERATURE ON PCB BOARD
RECOMMENDED SOLDERING TEMPERATURE

Test conditions:
Coil holding voltage excitation，
Resistive load，85℃，
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 single-side stable relays, if voltage drop is needed to maintain the operation of relay after the relay operates reliably, please ensure that the effective value of the holding 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, 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 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.
    10) About preferable condition of operation, storage and transportation, please refer to "Explanation to terminology and guidetines of relay".

CHARACTERISTIC CURVES

11) For relays with moisture-proof package, the package meets requirements of MSL-3.After opening the package,please store the relays in an environment of ≤30°C, ≤60% RH,and use them within 168 hours.If the relays can't be used up in time it's recommended to repack them with vacuum packaging or store them in a drying oven of 25°C±5°C, ≤10% RH.If the storage conditions exceed the aforementioned conditions please perform actual soldering confirmation or bake the relays at 50°C±5°C, ≤30% RH for 72 hours before use.

12) Please be sure to avoid switching both large and small or radio-frequency loads with the same relay. Because switching large load is likely to incur splashes which, if being attached to the contacts, will lead to the contact failure or decline of the radio-frequency characteristics when the relay switches the small or high-frequency load.

13) When the relay is used in a long-term continuous energization circuit, the coil insulation material will age due to the self-heating of the coil; therefore, please try not to ground the relay coil to reduce the risk of electrical corrosion. At the same time, please design an appropriate safety circuit to prevent losses due to disconnection.

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.

15) For other recommended usage, storage and transportation conditions, please refer to "Relay Terminology Explanation and Selection Guide".

Disclaimer