7 GHz High Frequency Reed Relay for 50 Ω Impedance

DESCRIPTION

The MEDER CRF Series Reed Relay is a low-profile device made with a ceramic case that exactly matches the thermal coefficient of expansion of the reed switch glass and the reed lead to eliminate any potential packaging stress. Capable of switching up to 7 GHz with <40 ps rise times for digital operations, this leadless 50 Ohm reed relay is the smallest in the industry and switches into the billions of operations.

Capable of withstanding reflow-soldering operations up to 260°C, the relay uses no internal solder and has 1 μV typical thermal offset. Measuring only 8.6 mm x 4.4 mm x 3.4 mm, the leadless design eliminates skewing of leads and co-planarity issues.

FEATURES

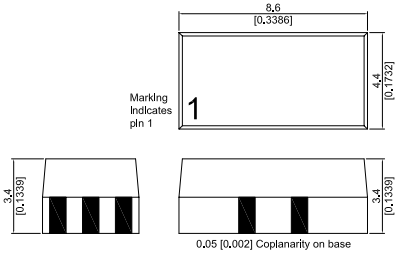
- Ceramic / thermoset molded package
- Patent pending
- Smallest in the industry
- No lead frame surface mount design eliminates skewing of leads and coplanarity issues
- No internal solder connections
- Minimum path length for RF
- Up to 7 GHz switching frequencies
- Ability to switch fast pulses with rise times of 40 pico seconds or less
- Available with BGA
- Internal magnetic shield standard
- Very low profile
- Gold plated leads for high conductivity RF path
- Low thermal offset typical 1 μV
- TCE matching of all internal components
- Insulation resistance typical 10^{14} ohms
- 3 Volt option available

APPLICATIONS

- Test and measurement
- Medical Equipment
- Telecommunications
- High frequency applications

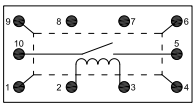
DIMENSIONS (Non-BGA)

*All dimensions in mm (inches)

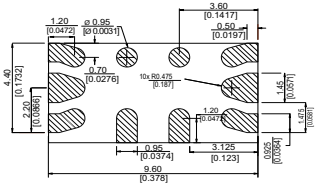


PIN OUT

(Top View)

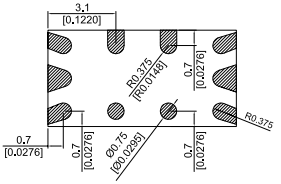


PCB LAYOUT



PAD LAYOUT

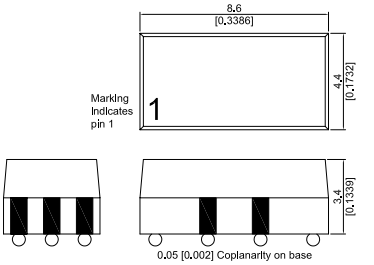
(Bottom View)



7 GHz High Frequency Reed Relay for 50 Ω Impedance

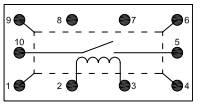
DIMENSIONS (with BGA)

*All dimensions in mm (inches)



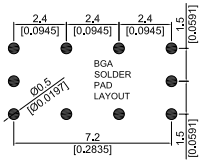
PIN OUT

(Top View)

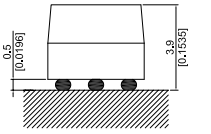


PAD / PCB LAYOUT

(Bottom View)



POST REFLOW



Height: max.

ORDER INFORMATION

Series	Nominal Voltage	Contact Form	Option
CRF	05-	1A	X
Options			S*
* Solder Ball Option (non-BGA part number is CRF05-1A)			

Part Number Example

CRF05 - 1AS

05 is the nominal voltage
1A is the contact form
S is the solder ball option

COIL DATA

Contact Form	Switch Model	Coil Voltage		Coil Resistance			Pull-In Voltage	Drop-Out Voltage	Nominal coil Power
All Data at 20 °C *		VDC		Ω			VDC	VDC	mW
		Nom.	Max.	Min.	Typ.	Max.	Max.	Min.	Typ.
1A	80	5	7.5	135	150	165	3.75	0.75	167
* the pull-in / drop-out voltages and coil resistance will change at the rate 0,4% per °C									

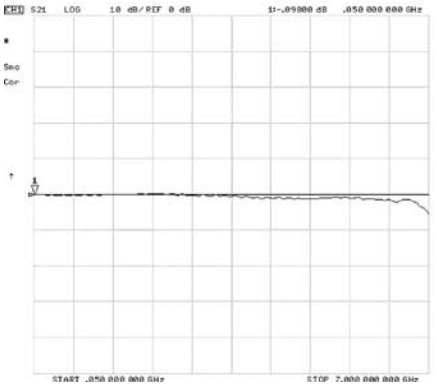
7 GHz High Frequency Reed Relay for 50 Ω Impedance

RELAY DATA

All Data at 20° C	Switch Model --> Contact Form -->	Contact 80 Form A			
Contact Ratings	**Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Contact Ratings	Any DC combination of V & A not to exceed their individual max.'s.			10	W
Switching Voltage	DC or peak AC			170	V
Switching Current	DC or peak AC			0.5	A
Carry Current	DC or peak AC			0.5	A
Bulk Resistance	Through all plated material on substrate		200	350	mΩ
Static Contact Resistance	w/ 0.5 V & 50 mA		75	100	mΩ
dynamic Contact Resistance	Measured w/ 0.5 V & 50mA		100	150	mΩ
Insulation Resistance (100 Volts applied)	Across Contact Contact to coil and shield	10^{10} 10^{13}	10^{12} 10^{14}		Ω
Breakdown Voltage	Across Contact Coil to contact	210 1500			VDC
Operate Time incl. Bounce	Measured w/ nominal voltage			0.1	ms
Release Time	No coil suppression			0.02	ms
Capacitance (@ 10 kHz)	Across Contact Contact to coil and shield		0.1 0.7		pF
Life Expectancies					
Switching 5 V - 10mA	DC <10 pF stray cap.		1000		10^6 Cycles
For other load requirements, see the life test section on P. 151.					
Environmental Data					
Shock Resistance	1/2 Sine wave duration for 11 ms			50	g
Vibration Resistance	From 10 - 2000 Hz			10	g
Ambient Temperature	10 °C/ minute max. allowable	-40		125	°C
Storage Temperature	10 °C/ minute max. allowable	-55		125	°C
Soldering Temperature	5 sec. dwell			260	°C
Material of Case	Themoset / Ceramic				
Material of pads	Ag plated				

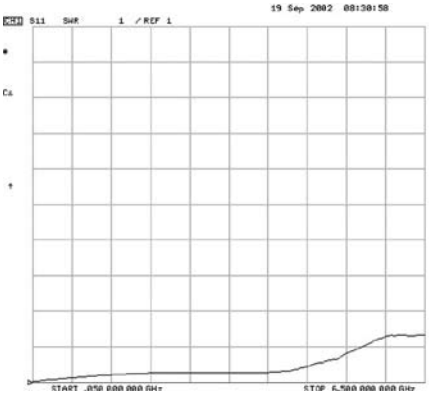
7 GHz High Frequency Reed Relay for 50 Ω Impedance

Insertion Loss:



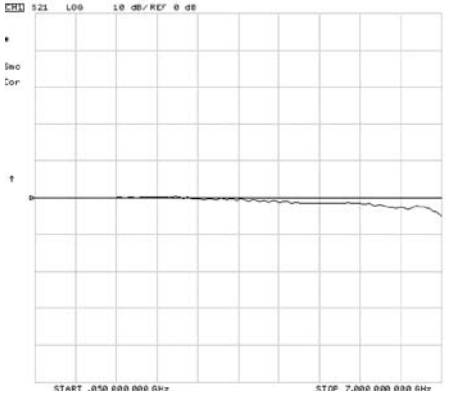
Insertion loss tested to 7 GHz for the CRF Reed Relay. Horizontal full scale: 7.0 GHz. Vertical scale: 10 dB/div referenced from the 0 mark.

VSWR:



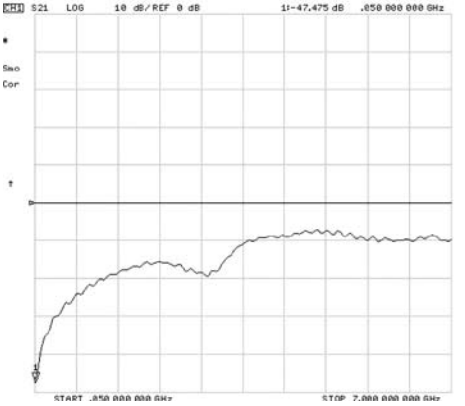
Voltage Standing Wave Ratio (VSWR) tested to 6.5 GHz for the CRF Reed Relays. Horizontal full scale: 6.5 GHz. Vertical scale: 1.0/div referenced from the bottom line 1.0 mark.

Copper Wire Insertion Loss:



Insertion loss tested to 7 GHz for the CRFReed Relay but with the internal Reed Switch replaced with a bare copper wire. Horizontal full scale: 7.0 GHz. Vertical scale: 10 dB/div referenced from the 0 mark.

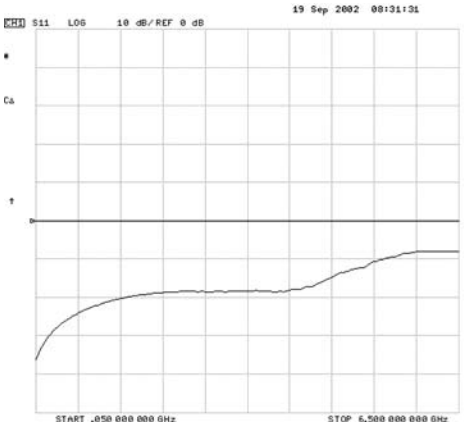
Isolation:



Isolation tested to 7 GHz for the CRF Reed Relay. Horizontal full scale: 7.0 GHz. Vertical scale: 10 dB/div referenced from the 0 mark.

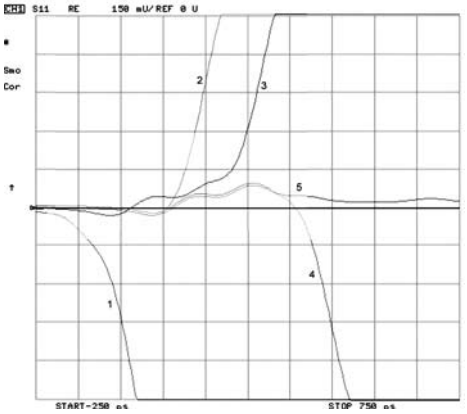
7 GHz High Frequency Reed Relay for 50 Ω Impedance

Return Loss:



Return loss tested to 6.5 GHz for the CRF Reed Relay. Horizontal full scale: 6.5 GHz. Vertical scale: 10 dB/div referenced from the 0 mark.

Characteristic Impedance:



Represents the characteristic impedance going through the CRF Reed Relay. Waves 1 through 5 depict calibration points. Horizontal full scale: 750 ps. Vertical scale: 150 mUnit/div referenced from the 0 unit mark. The vertical scale measures the reflection coefficient.

1 - Short Before Relay

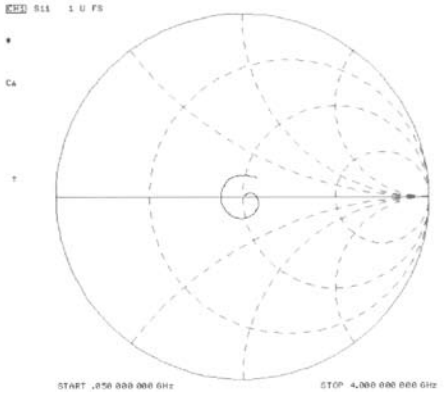
2 - Open Contacts

3 - Close Contacts

4 - Closed Contacts - Shorted

5 - Closed Contacts - 50 Ohm

Smith Chart:



Shows a Smith Chart plotted for frequencies to 4 GHz. The second dotted circle starting from the right is the 50 Ohm impedance point.