

**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.

**APPLICATIONS**

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

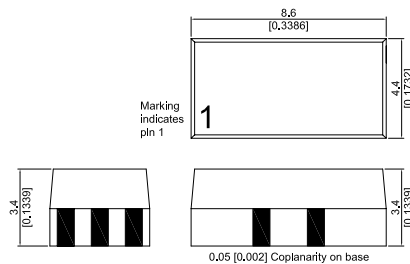


**FEATURES**

- 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<sup>14</sup> ohms
- 3 Volt option available

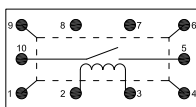
**DIMENSIONS (Non-BGA)**

\*All dimensions in mm (inches)



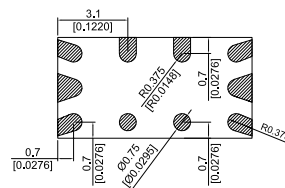
**PIN OUT**

(Top View)



**PAD LAYOUT**

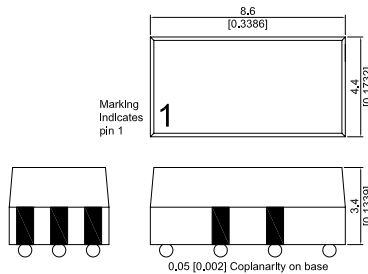
(Bottom View)



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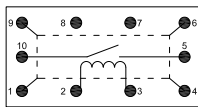
### DIMENSIONS (with BGA)

\*All dimensions in mm (inches)



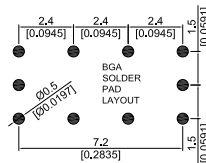
### PIN OUT

(Top View)

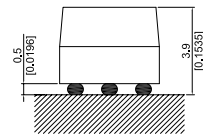


### PAD LAYOUT

(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

### CR 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.	Min.	Max.	Min.	Max.	Typ.
1A	80	5	7.5	135	150	165	0.85	3.75	0.75	3.65	167

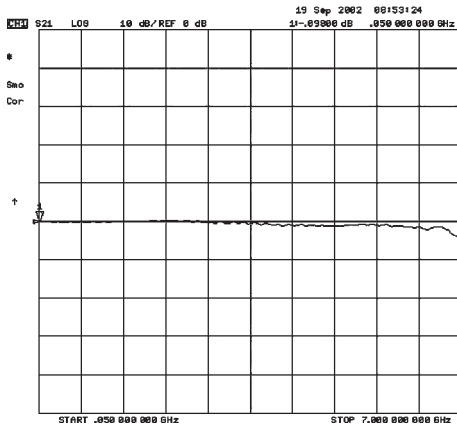
\* The pull-in / drop-out voltages and coil resistance will change at the rate of 0.4% per °C.

RELAY DATA

All data at 20 °C	Switch Model → Contact Form →	Contact 80 Form A			
Contact Ratings	Conditions	Min.	Typ.	Max.	Units
Contact Rating	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/ 0.5V & 50mA		75	100	mΩ
Dynamic Contact Resistance	Measured w/ 0.5V & 50mA		100	150	mΩ
Insulation Resistance (100 Volts applied)	Across contacts	10 <sup>10</sup>	10 <sup>12</sup>		Ω
	Contact to coil and shield	10 <sup>13</sup>	10 <sup>14</sup>		
Breakdown Voltage	Across contacts	210			VDC
	Contact to coil and shield	1500			
Operate Time, incl. Bounce	Measured w/ 100% overdrive			0.1	ms
Release Time	No suppression			0.02	ms
Capacitance (@ 10 kHz)	Across contacts		0.1		pF
	Contact to coil and shield		0.7		
<b>Life Expectancies</b>					
Switching 5 Volts@ 10mA	DC only & <10 pF stray cap.		1000		10 <sup>6</sup> Cycles
For other load requirements please see our life test section located on page 151.					
<b>Environmental Data</b>					
Shock Resistance	1/2 sine wave duration 11ms			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	Thermoset / Ceramic				
Material of pads	Ag Plated				

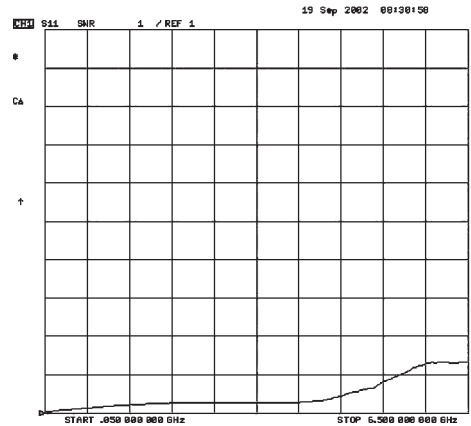
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### Insertion Loss:



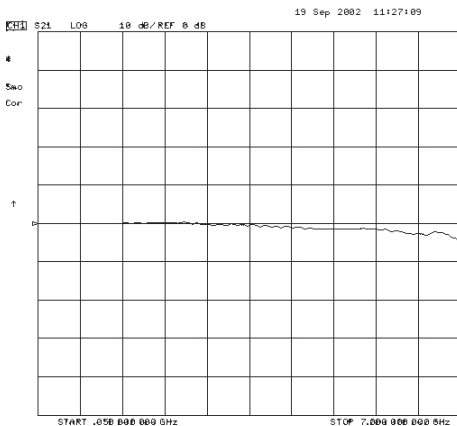
Insertion loss tested to 7 GHz for the CRF Reed Relay. Horizontal full scale: 7.0 GHz. Vertical scale: 10 dB/div referenced from the 0 mark.

### VSWR:



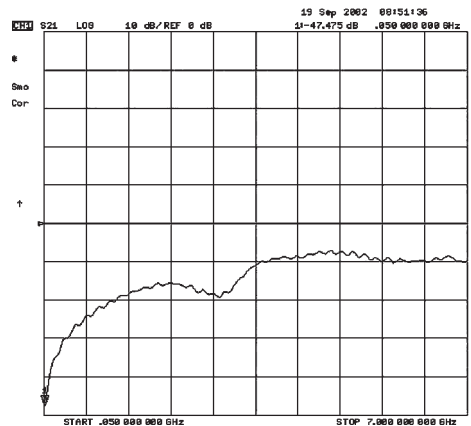
Voltage Standing Wave Ratio (VSWR) tested to 6.5 GHz for the CRF Reed Relays. Horizontal full scale: 6.5 GHz. Vertical scale: 1.0/div referenced from the bottom line 1.0 mark.

### Copper Wire Insertion Loss:



Insertion loss tested to 7 GHz for the CRF Reed 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.

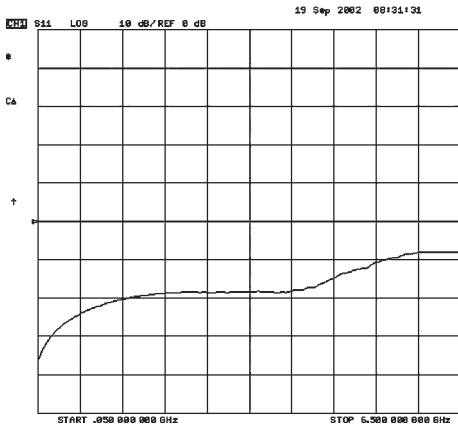
### Isolation:



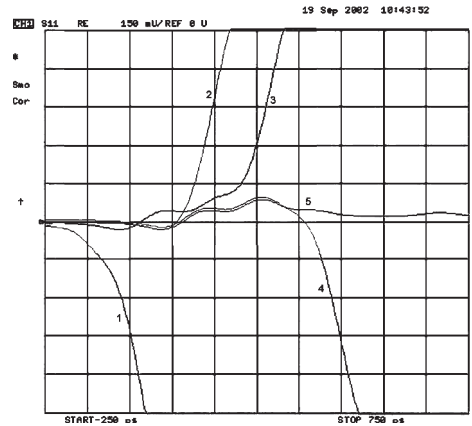
Isolation tested to 7 GHz for the CRF Reed Relay. Horizontal full scale: 7.0 GHz. Vertical scale: 10 dB/div referenced from the 0 mark.

Return Loss:

Characteristic Impedance:

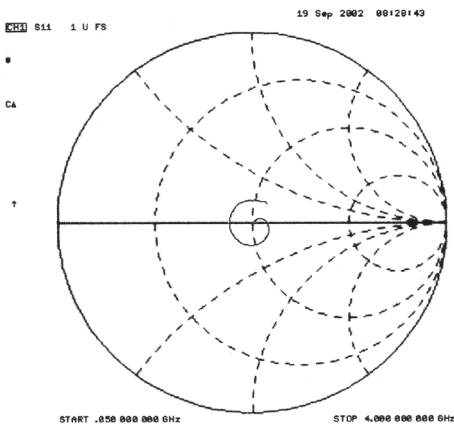


Return loss tested to 6.5 GHz for the CRF Reed Relay. Horizontal full scale: 6.5 GHz. Vertical scale: 10 dB/div referenced from the 0 mark.



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.

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.

- 1 - Short Before Relay
- 2 - Open Contacts
- 3 - Close Contacts
- 4 - Closed Contacts - Shorted
- 5 - Closed Contacts - 50 Ohm