

# Application Alley

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## Integrated Circuits - Reed Relays

Reed Relays Carry Out Switching Functions in Performance Boards Used in Integrated Circuits



Custom  
Engineered  
Solutions for  
Tomorrow

## Introduction

Chip makers use new performance boards for every new chip they develop. Since most integrated circuit/chip makers generally have large factories devoted to the testing of their chips. Hundreds of testers are typically used on a 24 hour/7 days a week basis. Each tester may be well over \$1,000,000. So when a new chip is developed, which is often, having to go purchase hundreds of new testers can be a very costly option. Fortunately, most times all that is necessary is the need to change to new performance boards. These performance boards can be directly configured for the new chip and acts as the transition from the new chip to the existing testers. Most of the time, these performance boards have many reed relays carrying out the switching, allowing the integrated circuit signals from the tester to properly test the device under test.

### Dimensions (mm)

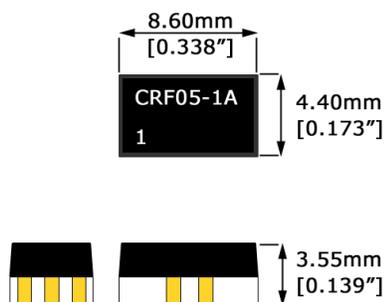


Figure 1. CRF physical layout

## The Performance Boards Used in Integrated Circuits Use Reed Relays as Well

Performance boards are used in conjunction with integrated circuits to directly connect the actual test functions from the test system to the integrated circuit under test. The millions of gates in these tiny chips all need to be properly tested. The performance boards play the critical interconnect role.

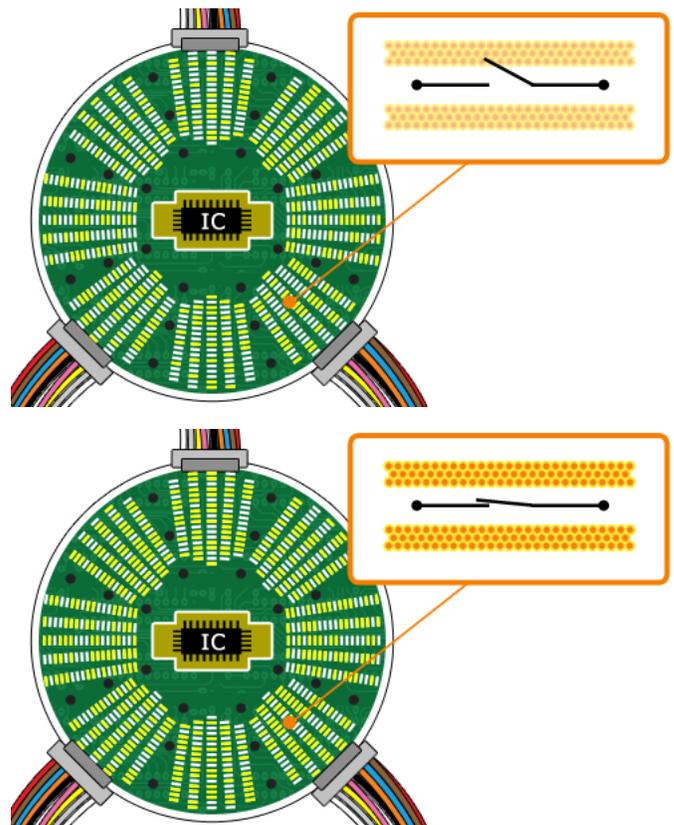


Figure 2. This is a typical performance board which is usually loaded with relays circling the center, which is where the IC is tested.

## Features

- High reliability
- Ideal RF characteristics
- Ideal for carrying fast digital pulses with skew rates less than 20 picoseconds.
- Ability to carry RF signals from DC up to 20 GHz (SRF)
- 50  $\Omega$  characteristic impedance
- Switch to shield capacitance < 0.5 picofarads
- Dielectric strength across the contacts 200 volts
- Contacts dynamically tested
- Surface mounted
- Very low profile
- BGAs available

- Rugged thermoset over-molded packaging
- Qual-shield arrangement

Specifications (@ 20°C) CRF Series				
	Min	Typ	Max	Units
<b>Coil characteristics</b>				
Coil resistance	135	150	165	Ω
Coil voltage		5.0		V
Pull-In			3.75	V
Drop-Out	0.85			V
<b>Switch characteristics</b>				
Contact rating			10	Watts
Switching voltage			170	V
Switching current			0.5	Amps
Carry current			0.5	Amps
Static contact resistance			250	mΩ
Dynamic contact resistance			250	mΩ
Dielectric from voltage across the contacts	210			V
Dielectric from voltage coil to contacts	1500			V
Insertion Loss (@ the -3 dB down point)			7	GHz
Operate time			0.1	msec
Release time			20	μsec
Operate temp	-10		100	°C
Storage temp	-55		125	°C

\*Coil parameters will vary by 0.2% /oC

### Applications

- Any factories where integrated circuit testing is being carried out for the following: Digital memory chips, VLSI, ASICS, microprocessors, analog chips, mixed signal (analog and digital), discrete ICs.

Integrated circuits are rapidly changing the world we live in. Every year new faster integrated circuit chips become available that are used in the marketplace to speed up computers, expand cell phone features, and present new products. These new chips present quite a challenge to automatic test equipment (ATE) makers that need to develop the testers to test them. Since the testers cost generally in the 1 to 5 million dollar range, depending on options and

add-ons, scraping these testers with each new generation of new chips would represent prohibitive costs. Performance boards have extended the life of the IC testers for several years and defers those up front capital expenditures. With each new integrated circuit, new performance boards are generated that create the interconnects necessary to test the new IC. With new chips being introduced almost weekly, the need for new performance boards is an ongoing process. Generally the interconnect points are made using reed relays. These relays need to have very good RF characteristics to be capable of passing fast digital pulses and passing analog RF signals. With hundreds of testers in a typical chip maker factory, the number performance boards used is quite high, and correspondingly, the reed relay usage is even higher.

Standex-Meder's line of RF relays are specially designed to switch and pass fast digital pulses in a 50 ohm impedance environment while offering excellent isolation. Standex-Meder's SRF series using a quad-shield that has only 0.5 pf from the open switch to its shield and only 0.2 pf across the open contacts. This series can switch and carry pulses shorter than 50 pico-seconds with no discernible effect on the pulse's leading and trailing edge.

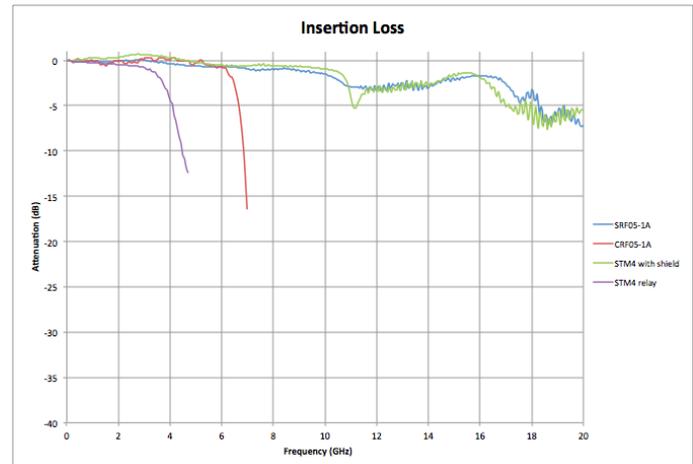
Surface Mount RF Reed Relay Series				Illustration
Series	Dimensions			
	mm	inches		
SRF	W	4.0	0.157	
	H	3.2	0.126	
	L	7.5	0.295	
CRF	W	4.4	0.173	
	H	3.5	0.137	
	L	8.6	0.338	

Standex-Meder's CRF series offers a flat insertion loss from DC up to 7 GHz, while the SRF series offers an insertion loss from DC to 20 GHz. Both series are ultra small with surface mount lead configurations. Standex-Meder's LP series is available for through hole mounting and socketing

Standex-Meder's reed relays use hermetically sealed reed switches that are further packaged in strong high strength thermoset molding compound, and can therefore be subject to various environments without any loss of reliability.

The reed relay is an excellent choice because it can operate reliably over a wide temperature range, and represents an economical way to carry out billions of switching operations.

## Insertion Loss



Find out more about our ability to propel your business with our products by visiting [www.standexmeder.com](http://www.standexmeder.com) or by giving us a [hello@standexelectronics.com](mailto:hello@standexelectronics.com) today! One of our brilliant engineers or solution selling sales leaders will listen to you immediately.