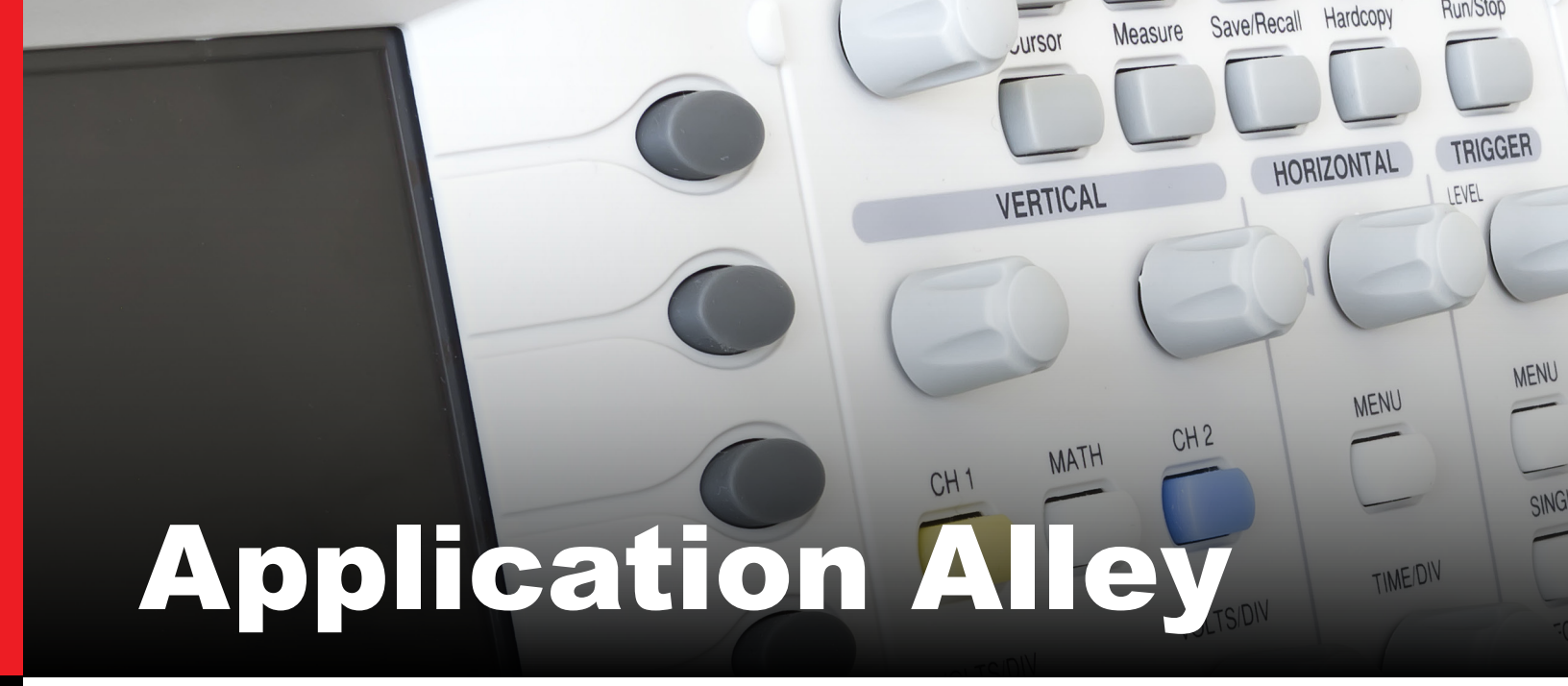

Application Alley

PARTNER | SOLVE | DELIVER

Oscilloscopes - Reed Relays

Fast Oscilloscopes Use Reed Relays in their Feedback Loops

Standex MEDER ELECTRONICS

Custom Engineered Solutions for Tomorrow

Introduction

Electronics based products play an indispensable role in our everyday world, even though we cannot see the waveforms and interaction within the product at the component level. However, in the typical electronics lab, it is very important for the design engineer to be able to "look" into a circuit and "see" what is happening. Oscilloscopes are what allow this to happen. Engineers many years ago invented the oscilloscope that portrays voltages and currents in a visual fashion on a CRT (cathode ray tube). The oscilloscope technology has now totally gone over to LCD screens for visual portrayal. Now with increasing speeds and fast pulses making up the digital world, oscilloscope designers have been challenged to develop the ability to portray these fast digital pulses. MEDER's reed relays play a key role in the necessary feedback loops for operational amplifiers within the oscilloscope.

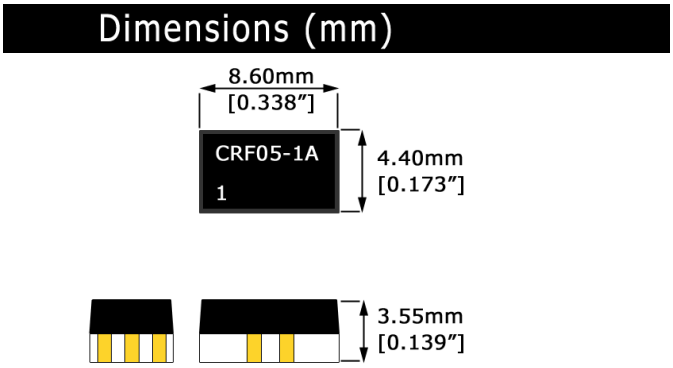

Figure 1. CRF physical layout

Reed Relays in the Feedback Loop in Fast Oscilloscopes Help Meet the Requirements in the Fast Digital World

Today we all want our computers and cell phones to run faster and faster. For this to happen fast digital pulses are required where clock speeds are exceeding 2 GHz. With these fast digital signals being processed through digital circuitry, it is often necessary to view these pulses as they are processed. Hence the need for fast digital oscilloscopes.

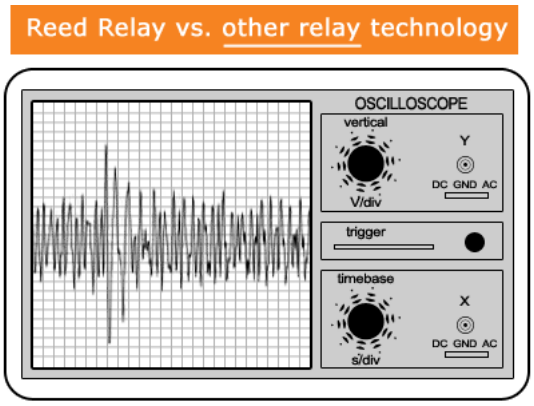

Figure 2. Shows a noisy pattern for technology other than a reed relay used in an oscilloscope.

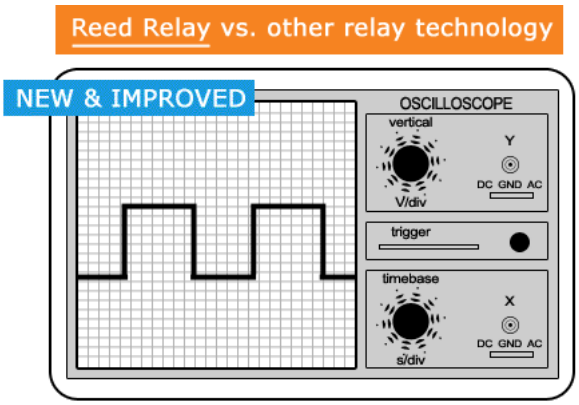

Figure 3. A perfect square pulse pattern is depicted when reed relay technology is used in an oscilloscope.

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)
- Switch to shield capacitance < 0.5 picofarads
- Dielectric strength across the contacts 200 volts
- Contacts dynamically tested

Fast Oscilloscopes Use Reed Relays in their Feedback Loops

Applications

- Ideal for use in fast digital oscilloscopes where a frequency response is needed from DC up to 20 GHz.
- Any applications where frequencies and/or fast digital pulses up to 20 GHz are involved.

Specifications (@ 20°C) CRF Series				
	Min	Typ	Max	Units
Coil characteristics				
Coil resistance	135	150	165	Ω
Coil voltage		5.0		V
Pull-In			3.75	V
Drop-Out	0.85			V
Switch characteristics				
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				

Almost all oscilloscopes have several time ranges, which is certainly the case with fast digital oscilloscopes. These time ranges allow the user to select the different time ranges to evaluate both slower signals as well as faster pulses by just changing ranges. This is generally accomplished in the feedback loops of an operational amplifier. Semiconductor switches offer too much leakage and interaction between ranges, where simply put, the isolation in not good enough. Electromechanical relays are large, bulky, and very costly. Standex-Meder's line of RF reed relays represents a technically savvy low cost solution.

The CR series is one of our smallest and most versatile RF frequency reed relays. The CRF Series has a flat insertion loss from DC up to 7 GHz, attained by keeping the signal path as short as possible and using an internal coaxial shield with a consistent 50 Ohm impedance path. Not only is it excellent with RF signals, but is also great for digital signals where the skew rates or effects on the rise time of fast digital pulses is less than 40 picoseconds (ps) through the relay. This makes it ideal for use in digital oscilloscopes. Our new SRF series extends the insertion loss out to 20GHz and can carry digital pulse as fast as 20 ps.

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.

Surface Mount RF Reed Relay Series				
	Dimensions	mm	inches	Illustration
Series				
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	