



Application Alley

Oscilloscopes - Reed Relays

Fast Oscilloscopes Use Reed Relays in their Feedback Loops

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.

Dimensions (mm)

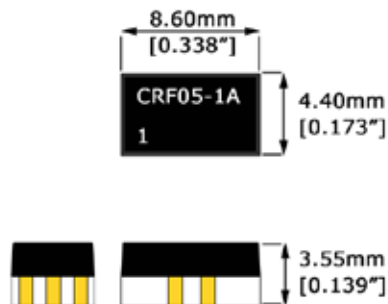


Figure 1. CRF physical layout

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.

Reed Relay vs. other relay technology

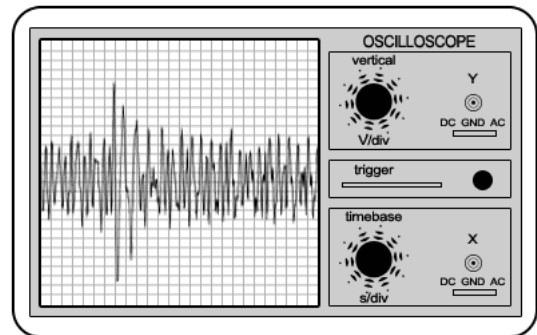


Figure 2. Shows a noisy pattern for technology other than a reed relay used in an oscilloscope.

Reed Relay vs. other relay technology

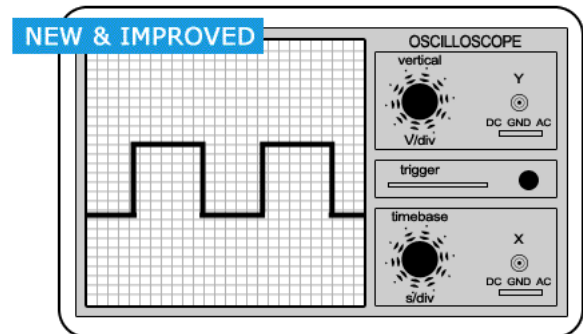


Figure 3. A perfect square pulse pattern is depicted when reed relay technology is used in an oscilloscope.

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

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 is not good enough. Electromechanical relays are large, bulky, and very costly. Standex Electronics'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 Electronics'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

Series	Dimensions	Dimensions		Illustration
		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	

Find out more about our ability to propel your business with our products by visiting www.standelectronic.com or by giving us a hello@standelectronic.com today! One of our brilliant engineers or solution selling sales leaders will listen to you immediately.

About Standex Electronics

Standex Electronics is a worldwide market leader in the design, engineering, and manufacture of standard and custom electro-magnetic components, including magnetics products and reed switch-based solutions.

Our magnetics offerings include planar, current sense, and conventional low- and high-frequency transformers and inductors. Reed switch-based solutions include Meder, Kent, and KOFU brand reed switches, as well as a complete portfolio of reed relays, and a comprehensive array of fluid level, proximity, motion, water flow, HVAC condensate, hydraulic pressure differential, capacitive, conductive and inductive sensors.

We offer engineered product solutions for a broad range of product applications in the transportation, automotive, medical, test and measurement, military and aerospace, aviation, HVAC, appliance, security and safety, and general power and industrial markets.

Standex Electronics has a commitment to absolute customer satisfaction through a partner, solve, and deliver approach. With a global organization that offers sales support, engineering capabilities, and technical resources worldwide – we implement customer driven innovation that puts the customer first.

For more information on Standex Electronics, visit us on the web at standexelectronics.com.

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