Standex Electronics

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Application Alley

Reed Switch & Sensor Technology for Test & Measurement Applications

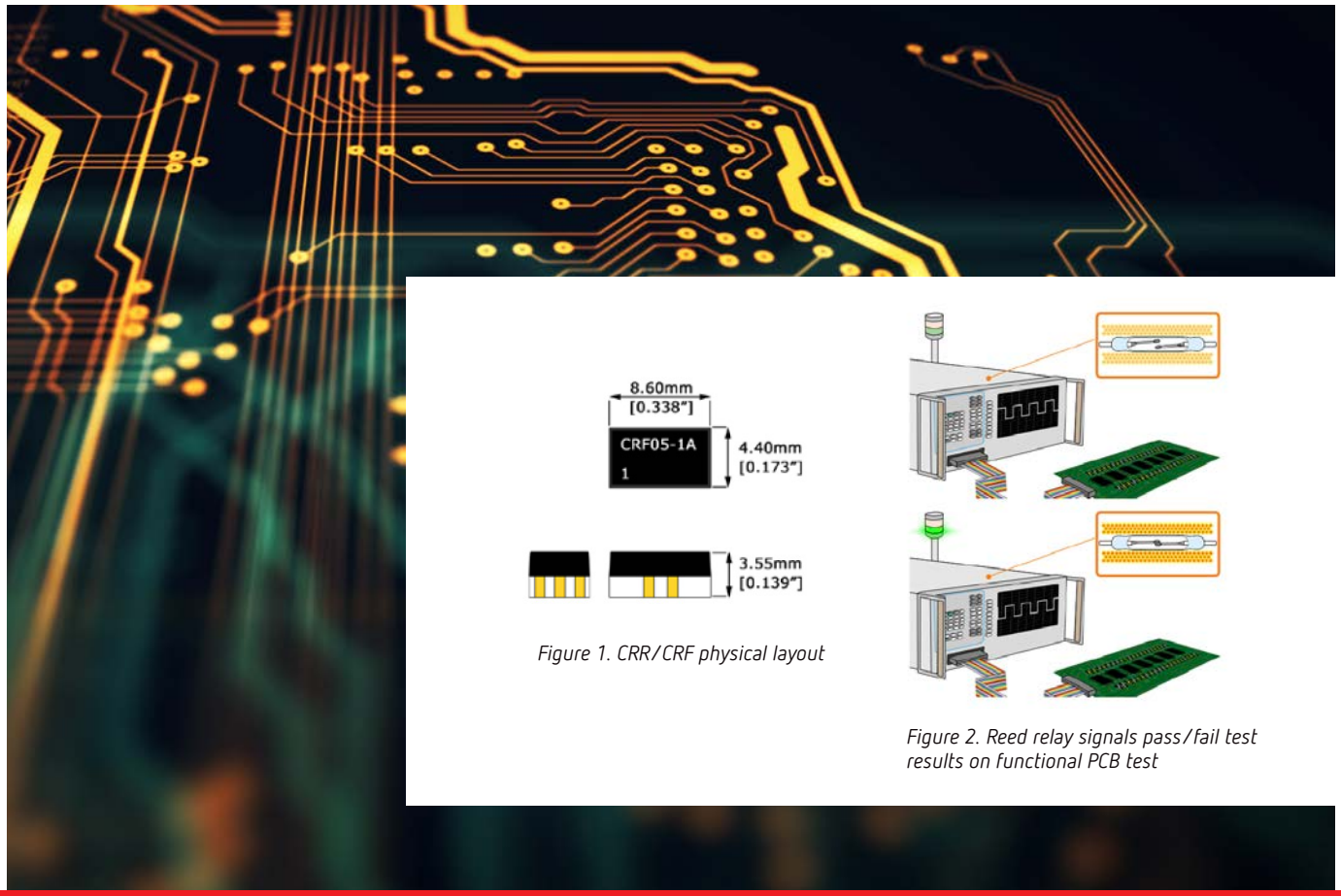

Figure 1. CRR/CRF physical layout

Figure 2. Reed relay signals pass/fail test results on functional PCB test

Reed Switch Features:

- Ability to switch up to 10,000 Volts
- Ability to switch currents up to 5 Amps
- Ability to switch or carry as low as 10 nano-Volts without signal loss
- Ability to switch or carry as low as 1 femtoAmp without signal loss
- Ability to switch or carry up to 7 GigaHz with minimal signal loss
- Isolation across the contacts up to 10^{15} W
- Contact resistance (on resistance) typical 50 milliOhms (mW)
- In its off state it requires no power or circuitry
- Ability to offer a latching feature
- Operate time in the 100 ms to 300 ms range
- Ability to operate over extreme temperature ranges from −55 °C to +200 °C
- Ability to operate in all types of environments including air, water, vacuum, oil, fuels, and dust-laden atmospheres
- Ability to withstand shocks up to 200 Gs
- Ability to withstand vibration environments of 50 Hz to 2000 Hz at up to 30 g
- Long life. With no wearing parts, load switching under 5 Volts at 10 mA, will operate well into the billions of operations
- No power consumption, ideal for portable and battery-powered devices
- No switching noise

With the ever-increasing requirements for electronics and electronic systems, the need exists to be able to make voltage and current measurements covering several orders of magnitude from nano-volts to kilovolts and from femtoamps to amps.

Our specialized Reed Relays have helped designers meet this challenge and are ideal for testing power discrete semiconductors like power fets, mosfets, power transistors, etc.

Over the years, the Reed Switch has shrunk in size from approximately 50 mm (2 inches) to 3.9 mm (0.15 inches). These smaller sizes have opened up many more applications, particularly in RF and fast time domain requirements.

Without question, the Reed Switch's hermeticity lends itself to more switching applications than any other switching device. Its ability to be used as a complete sensing component by itself or the ease of packaging it into special sensing requirements is done without any complicated process or high tooling costs.

There are so many existing and potential applications for Reed Sensors that it would be impossible to discuss them all here. However, we will cover some of the basic test and measurement applications that we hope will give insight and new considerations for your present and future projects.

Test and Measurement

- Automatic Test Equipment (ATE) Systems
- PCB Testing
- IC Testing
- Testing Integrated Circuits Such As:
  - Digital Memory Chips
  - VLSI
  - ASICS
  - Microprocessors
  - Analog Chips
  - Mixed Signal (Analog And Digital)
  - Discrete ICs

PCB Testing - Reed Relays Are a Key Component in Testing Functional PCBs

Almost every piece of electronic equipment today uses printed circuit boards (PCBs). These PCBs range from a few square mm (0.08 square inches) to as large as 600 mm by 600 mm (2 ft by 2 ft). On the larger PCBs there may be 1000s of test points that need their functionality determined.

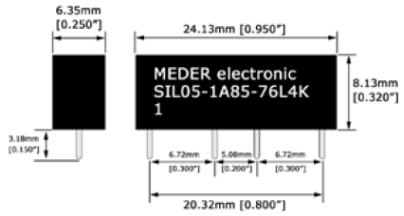

Figure 3. SIL HV Physical layout

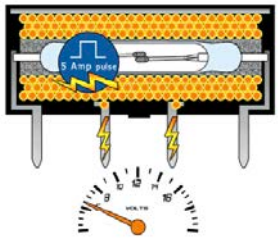

Figure 4. Depicts a perfect square wave pulse of 5 Amps traveling across the closed reed switch contact surface

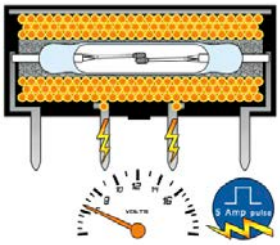

Figure 5. The 5 Amp pulse remains undistorted when it passes completely through the reed relay's switch

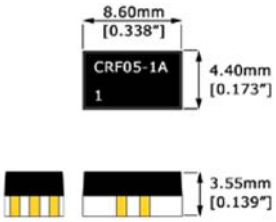

Figure 6. CRF physical layout

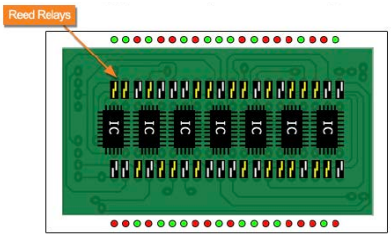

Figure 6. Integrated circuit test board showing IC's and reed relays

Because of size restrictions, isolation, relatively fast acting and good RF characteristics, Reed Relays are often chosen as the testing switch. A fully loaded tester can house over 20,000 Reed Relays. If there is one relay failure, this is equivalent to a failure level of 50 part per million (PPM).

Standex Reed Relays have stepped up to meet these requirements. That's why our relays have become the accepted standard in the Automatic Test Equipment (ATE) industry.

IC Testing - Reed Relays in Testing Integrated Circuits

Whether we are checking the time on our wristwatch, making a phone call, watching children play with their electronic toys, or at work/home on our computer, etc – integrated circuits are at work getting the job done. Chip designers continue to develop new integrated circuits that are smaller, faster acting and have more switching gates.

Standex'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.
Switches used in testing have to be carefully selected making sure they can switch and carry these fast pulses without distortion and operate in a reliable manner for billions of operations. Test equipment designers have found that Standex Electronics' specially designed ultra-small relay series capably accomplishes the task for billions of operations.

Oscilloscopes - Reed Relays

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 exceed 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.

Standex Reed Relays play a key role in the necessary feedback loops for operational amplifiers within the oscilloscope.

The CR series is one of our smallest and most versatile RF frequency Reed Relays. Not only is it excellent with RF signals, but it 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.

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About Standex Electronics

Standex Electronics is a worldwide market leader in designing, engineering, and manufacturing 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.

If your application requires one of our standard sensors from our catalog, that's clearly the best approach and the quickest solution to satisfying your design requirement. However, more than half of our shipped sensors are from special requirements. Since many sensing requirements are unique, working with customers on their special applications is expected.

Because at Standex, **"custom is standard."**

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

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