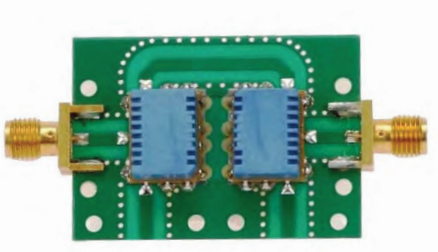


Our Most Important Connection is with You.™

**SMT Power Micro SPDT with 10 GHz Capabilities**

**BYPASS APPLICATION**

Failsafe Micro-relay typical implantation

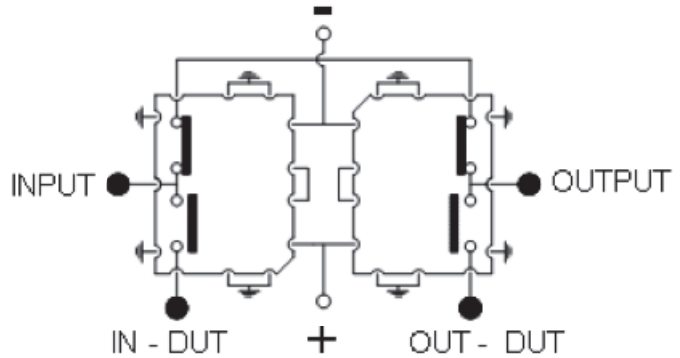
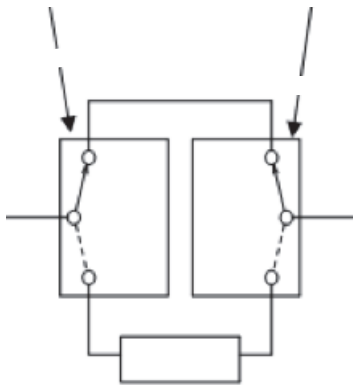


SPDT relays (Single Pole Double Throw) can be used to achieve a bypass switch function. For SMT applications, R596 series, relays are available in two failsafe versions, standard and inverted, to provide symmetric RF ports implantation possibility. The “side by side” implementation of these two versions on a PCB effectively produces the bypass function. The package size is reduced and interconnecting tracks are shortened. Required in order to protect the receiver for transmit/receive applications. Depending on the distance between the two relays, this configuration can achieve high isolation levels, up to 80 dB @ 1GHz, 70 dB @ 2 GHz, and 60 dB @ 6GHz.

**BYPASS TYPICAL IMPLANTATION & PIN IDENTIFICATION**

(Top View)

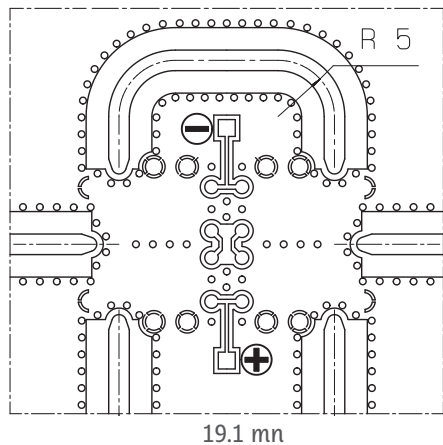
R596.X1X.XXX / R596.X9X.XXX



Voltage	RF continuity
De-energized	INPUT <-> OUTPUT (direct line)
Energized	INPUT <-> IN-DUT / OUT-DUT <-> OUTPUT

**BYPASS PC BOARD MOUNTING**

Example of Board layout for bypass application



(See detailed board layout on page 2-7)

## SMT Power Micro SPDT with 10 GHz Capabilities

### RECOMMENDED SOLDERING PROCEDURE

#### A-Soldering procedure using automatic pick and place equipment

##### 1-Solder paste

R596 series are Lead free. Lead free Sn-Ag3.5-Cu0.7 solder cream may be used as well as standard Sn63-Pb35-Ag2. Radiall recommends using a no clean - low residue solder cream (5% solid residue of flux quantity) that will permit the elimination of the cleaning operation step after soldering.

Note: Due to the gold plating of the switch PCB interface, it is important to use a paste made with silver. This will help in avoiding formation of intermetallics as part of the solder joint.

##### 2-Solder paste deposition

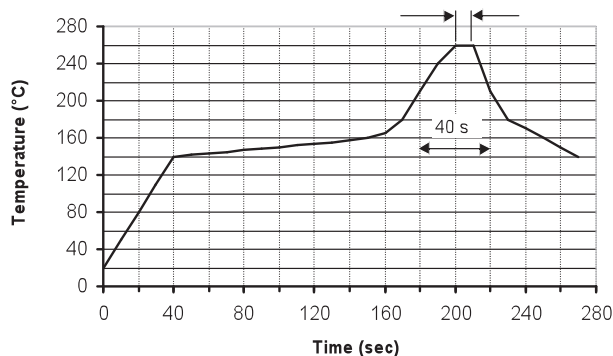
Solder cream may be applied on the board with screen printing or dispenser technologies. For either method, the solder paste must be coated to appropriate thickness and shapes to achieve good solder wetting. Please verify that the edges of the zone are clean and without contamination and that the PCB zoned areas have not oxidized. The design of the mounting pads and the stenciling area are given on page 2-7, for a thickness of the silk-screen printing of 0.15 mm (0.006").

##### 3-Placement of the component

For small lightweight components such as chip components, a self-alignment effect can be expected if small placement errors exist. However, this effect is not as expected for relays components and they require an accurate positioning on their soldering pads, typically +/- 0.1mm (+/- 0.004"). Place the relay onto the PCB with automatic pick and place equipment. Various types of suction can be used. Radiall does not recommend using adhesive agents on the component or on the PCB.

##### 4-Soldering: infra-red process

Please refer to the recommended temperature profile for infra-red reflow or forced air convection:



Higher temperature (>260°C) and longer process duration would permanently damage the switches.

##### 5-Cleaning procedure

On miniature relays, high frequency cleaning may cause the contacts to stick. If cleaning is needed, please avoid ultrasonic cleaning and use alcohol based cleaning solutions.



In-line cleaning process, spraying, immersion, especially under temperature, may cause a risk of degradation of internal contacts.

##### 6-Quality check

Verify by visual inspection that the component is centered on the mounting pads. For solder joints, verify by visual inspection that the formation of meniscus on the pads are proper, and have a capillarity amount at least a third of the height.

#### B- Soldering procedure by manual operation

##### 1-Solder paste and flux deposition

Refer to procedure A - 1

Deposit a thin layer of flux on mounting zone, and allow the flux to evaporate a few seconds before applying the solder paste, in order to avoid dilution of the paste.

##### 2-Solder paste deposition

Radiall recommends depositing a small amount of solder paste on the mounting zone area by syringe. Be careful, not to apply solder paste outside of the zone area.

##### 3-Placement of the component:

During manipulation, avoid contaminating the lead surfaces by contact with fingers. Place the component on the mounting zone by pressing on the top of the relay lid.

##### 4-Hand soldering

Iron wattage 30 to 60 W. Tip temperature 280 to 300°C for maximum 5 seconds to keep good RF characteristics above 3GHz. It is important to solder RF ports first, and apply pressure on the relay lid during all the soldering stage, to reduce the air gap between the PC board and the relay.

##### 5-Cleaning procedure

Refer to procedure A - 5

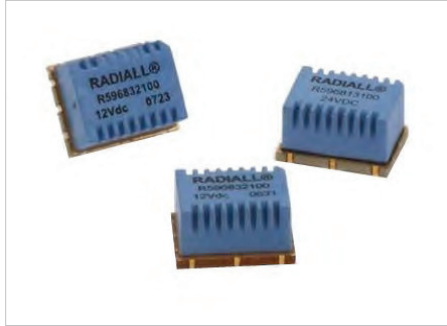
##### 6-Quality check

Verify by visual inspection that component is centred on the mounting pads. For solder joints, verify by visual inspection that the formation of meniscus on the pads are proper, and have a capillarity amount at least a third of the height.

### SMT Power Micro SPDT with 10 GHz Capabilities

#### APPLICATION NOTE AN-R596-051

Subject: How to use failsafe R596 micro-relays over all the guaranteed temperature range, in or condensation environmental conditions.



RF and electrical characteristics are guaranteed on all failsafe R596 switches over their operating temperature range (-25°C to +85°C), and under “no icing nor condensation” conditions.

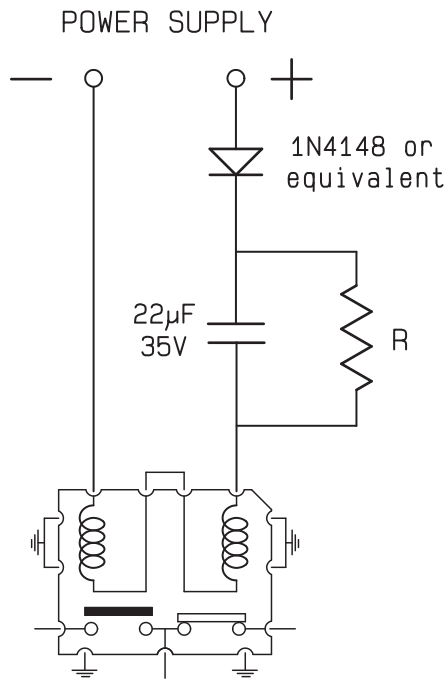
In extreme applications, with failsafe models used at low temperature, continuously in the N/O position (coil permanently supplied), N/C contact failures may occur, due to the high gradient of temperature between the coil (heated by the permanent power 500mW) and the RF paths. N/O contact resistance remains satisfactory, but condensation deposits ice on the open contact N/C, and when power is cut, the N/C position is not correctly established.

Failsafe models can be continuously driven when energized from -40°C, if the coil is not permanently supplied at nominal voltage, and heating and internal condensation is avoided. Once the relay has switched, the operating voltage must be reduced by 50% +/-5%. This low holding voltage is possible on R596 series, as it is enough to maintain the switch in “energized” position (for instance 5.4V to 6.6V for a 12V model). Furthermore it allows the user to save energy, by combining the advantages of latching and failsafe models.

This “holding current” function can be achieved by the implementation of a simple electronic drive on the command PC Board (1 resistor, 1 diode and 1 capacitor), for 12V and 24V models. A typical circuit design is shown on the schematic below. A few milliseconds after switching, the current is divided by two, and the absorbed power is divided by four (i.e. 6V and 110mW for a 12V model).

To reduce the voltage by 50%, the value of resistance R must be equal to the total resistance of the switch coil:

- 12V models: 330 Ohms 1/4W
- 24V models: 1200 Ohms 1/4W



R596 FAILSAFE RELAY

## Applications

### EXAMPLE OF SMT APPLICATIONS

The SMT Series offers a large range of products which can be used in many applications such as:

- Tower mount amplifiers
- Instrumentation
- Military radios
- ECM equipment
- BTS
- Radio-Links
- Repeaters

These products offer the same RF Board and soldering process as all RF components but with a reduced weight and size. They are designed to meet all market specifications.

