

# SPDT

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**SPDT PART NUMBER SELECTION GUIDE<sup>[1]</sup>**

Quartz SPDT	RAMSES SPDT	PLATINUM SPDT	Series Configuration	DIGITAL POSITION	
R516	R570	R595	-	R: 1-3	
3	-	-	DC - 8 GHz	<b>4: RF CONNECTORS</b>	
4	-	-	DC - 18 GHz		
7	-	-	DC - 26.5 GHz		
-	3	-	SMA 3 GHz		
-	-	3	SMA 6 GHz		
-	4	-	SMA 18 GHz		
-	-	4	SMA 20 GHz		
-	F	F	SMA 26.5 GHz		
-	8	8	SMA 2.9 40 GHz		
-	J	-	2.4mm 50 GHz		
-	E	-	QMA 6 GHz		
-	9	-	DIN 1.6/5.6, 2.5 GHz		
-	H	-	-		
-	A	-	Pc board mount 3 GHz		
-	0	-	N 3 GHz		
1	1	-	N 12.4 GHz		
2	2	-	BNC 3 GHz		
-	5	-	TNC 3 GHz		
-	6	-	TNC 12.4 GHz		
-	D	-	TNC 18 GHz		
1/9	1/2	-	Failsafe	<b>5: TYPE</b>	
3	3/4/5/6	3/4/5/6	Latching		
1	-	-	6 V		
2	2	-	12 V		
-	-	7	15 V		
3	-	3	24 V		
-	3	-	28 V		
-	0	-	Without		
-	1	-	With		
-	-	1	SPDT non-terminated		
1	-	-	-		
-	0	1	Without option		<b>6: VOLTAGE</b>
-	1	1	Positive common		
-	3	-	Suppression diodes		
-	4	-	Suppression diodes and positive common		
-	-	2	Compatible with TTL driver		
0	-	-	-		
0	-	-	Not soldered		
T	-	-	Soldered on a connectorized test fixture		
-	0	0	Solder pins		
-	5	5	D-Sub connector		
-	-	-	Certificate of conformity	<b>7: TTL OPT./ MODEL</b>	
-	-	C	Calibration certificate		
-	-	R	Calibration certificate + RF curves		
-	-	-	-	<b>8: OPTIONS</b>	
-	-	-	-		
-	-	-	-		
-	-	-	-	<b>9: TERMINALS</b>	
-	-	-	-		
-	-	-	-		
-	-	-	-	<b>10: DOCUMENT- ATION</b>	
-	-	-	-		
-	-	-	-		

**Notes**

Example of P/N: R570F12010 is a SPDT SMA 26.5 GHz, failsafe, 12 Vdc, without TTL, with positive common, solder pins.

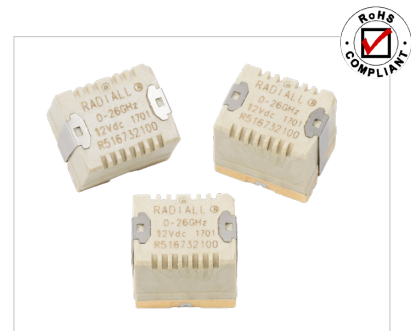
1. For part number creation and available options, see detailed part number selection for each series.

## SMT POWER MICRO SPDT WITH 26.5 GHz CAPABILITIES SURFACE MOUNT TECHNOLOGY

An innovative and original "micro-mechanical" design of the R516 SMT micro-relay offers excellent RF performance, reliability, and repeatability. The miniature size and low installation cost make these coaxial switches an ideal solution.

Very low return loss and insertion loss allow this relay to be used in power applications, as well as in typical SMT relay applications such as RF attenuators, RF matrices, spectrum analysers, and telecommunications.

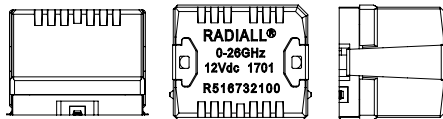
Failsafe models are offered in two RF configurations (direct and inverted). The association of these two products on the same PC board enables the product to perform the bypass function. (For bypass mounting, further information is available on page 2-7.)



### Example of P/N:

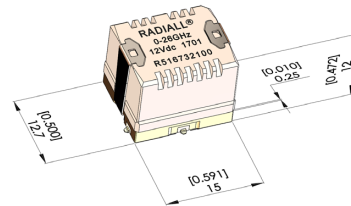
R516713100 is a SPDT SMT 26.5 GHz, 24 Vdc, failsafe, not soldered.

### ACTUAL SIZE



### TYPICAL OUTLINE DRAWING

All dimensions are in millimeters [inches].



### PART NUMBER SELECTION

SERIES PREFIX \_\_\_\_\_

FREQUENCY RANGE \_\_\_\_\_

3: DC – 8 GHz

4: DC – 18 GHz

7: DC – 26.5 GHz

TYPE \_\_\_\_\_

1: Failsafe

3: Latching, 2 coils

9: Failsafe, inverted RF path <sup>[1]</sup>

R516

10

### ACTUATOR TERMINALS

0: Not soldered

T: Soldered on a connectorized test fixture <sup>[2]</sup>

### ACTUATOR VOLTAGE

1: 6 Vdc <sup>[3]</sup>

2: 12 Vdc

3: 24 Vdc

### Notes:

1. Can be combined with a failsafe model, so as to achieve the "BYPASS" function (see application details on page 2-6).

2. See details about test fixture dimensions on page 2-4.

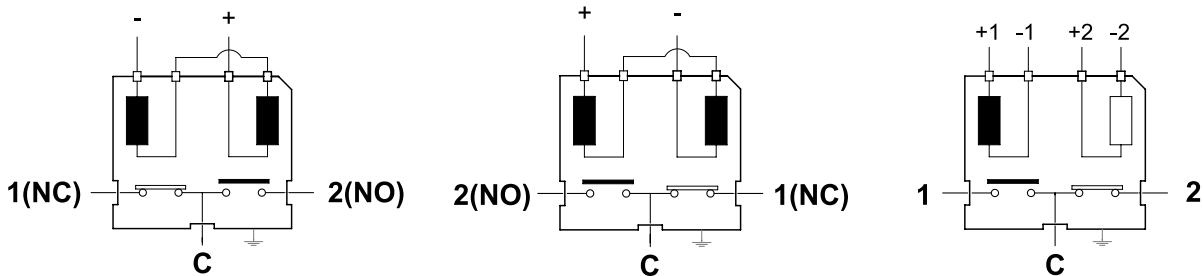
3. Only available with type 3.

Quartz Series

**QUARTZ GENERAL SPECIFICATIONS**

OPERATING MODE		FAILSAFE (TYPES 1 & 9)		LATCHING (TYPE 3)		
Nominal operating voltage (across temperature range)	Vdc	12 (10.5 to 13)	24 (21.5 to 30)	6 (5.1 to 6.6)	12 (10.2 to 13)	24 (20.5 to 30)
Coil resistance at 23 °C (+/- 10%)	Ω	195	710	55	205	865
Operating current at 23 °C	mA	61	32	108	58	32
RF and command ports		Gold-plated access, infrared reflow, forced air oven or hand soldering (Compatible with "lead free" soldering processes)				
Switching time at nominal voltage - Making contacts - Breaking contacts		Max 5 ms (typical 2 ms), including contact bounce time 3 ms				
Life - Cold switching (max 120 cycles/min) - Hot switching (max 20 cycles/min)		2 million cycles		3 million cycles (5 million cycles typical at low level)		
		500.000 cycles				
Insulation		Dielectric test voltage		300 Vrms		
		Insulation resistance at 500 Vdc		> 100 MOhms		
Environmental protection		Lead free construction - Waterproof (acc. To IEC 60529 / IP64)				
Mass		8 g				
Operating temperature range (with no icing nor condensation)	°C	-25 to +70 [1]		-40 to +85		
Storage temperature range	°C	-55 to +85				
Sine vibration (MIL STD 202, Method 204D)		Condition D: 10-2,000 Hz, 20 g		Operating		
		Condition G: 10-2,000 Hz, 30 g		Non-operating		
Shocks (According to MIL STD 202, Method 213B, Cond. C)		100 g / 6 ms, 1/2 sine		Operating		

**PIN IDENTIFICATION (TOP VIEW)**



**FAILSAFE MODEL (TYPE 1)**

VOLTAGE	RF CONTINUITY
De-energized	C <--> 1(NC)
Energized	C <--> 2(NO)

**INVERTED FAILSAFE MODEL FOR BYPASS APPLICATION (TYPE 9)**

VOLTAGE	RF CONTINUITY
De-energized	C <--> 1(NC)
Energized	C <--> 2(NO)

**LATCHING MODEL (TYPE 3)**

VOLTAGE	RF CONTINUITY
-1 +1	C <--> 1
-2 +2	C <--> 2

**Notes**

1. Failsafe models may be used down to -40 °C, for this application please follow requirements of AN-R516-51. Contact Radiall for a copy of this application note.

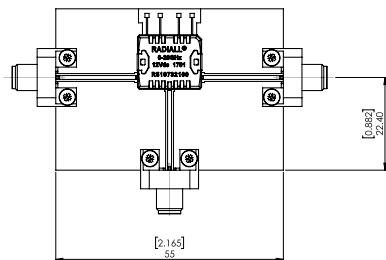
Quartz Series

QUARTZ PERFORMANCE (S PARAMETERS AVAILABLE ON REQUEST)

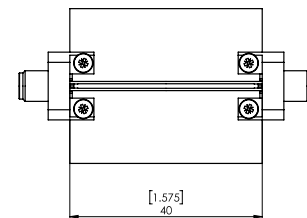
FREQUENCY RANGE GHz	V.S.W.R. (MAX)	INSERTION LOSS (MAX) dB	ISOLATION (MIN) dB	THIRD ORDER INTER MODULATION	IMPEDANCE $\Omega$	
			SWITCH ALONE			
DC - 8 DC - 18 DC - 26.5	DC - 3	1.20	0.20	50	-110 dBc typical at 1730 MHz (2 carriers 20 W)	50
	3 - 6	1.35	0.40	40		
	6 - 8	1.40	0.50	40		
	8 - 12.4	1.50	0.60	40		
	12.4 - 18	1.70	1.00	40		
	18 - 26.5	2.00	1.60	40		

MEASUREMENT METHOD

RELAY SOLDERED ON TEST FIXTURE<sup>[1]</sup>



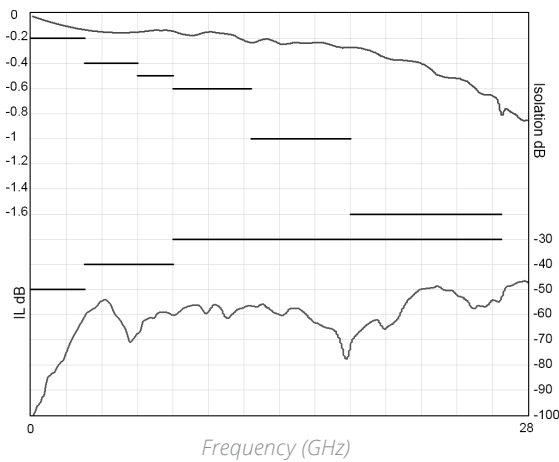
CALIBRATION BOARD



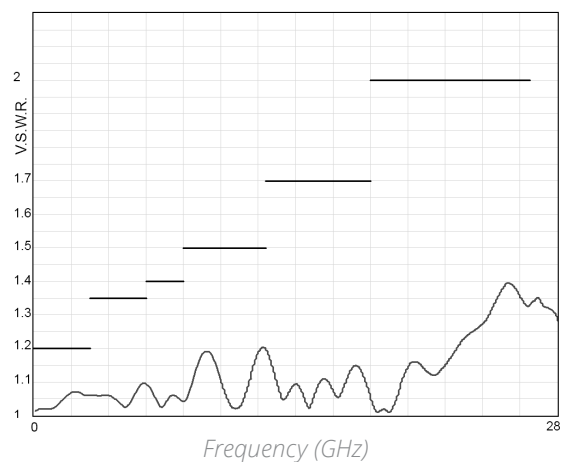
Inputs/Outputs of the calibration board and test fixture are equipped with coaxial type receptacle connectors. The length of the RF tracks is the same on the calibration board and the test fixture circuits. The insertion loss of the relay itself is calculated by subtracting the insertion loss of the "calibration board" to the insertion loss of the "relay soldered on the test fixture."

TYPICAL RF PERFORMANCE

INSERTION LOSS & ISOLATION



V.S.W.R.



Notes

1. Relay soldered on Test Fixture is available. To order, please use the suffix "T" (part number R516 - - - - T), as explained in page 2-2. All dimensions are in millimeters [inches].

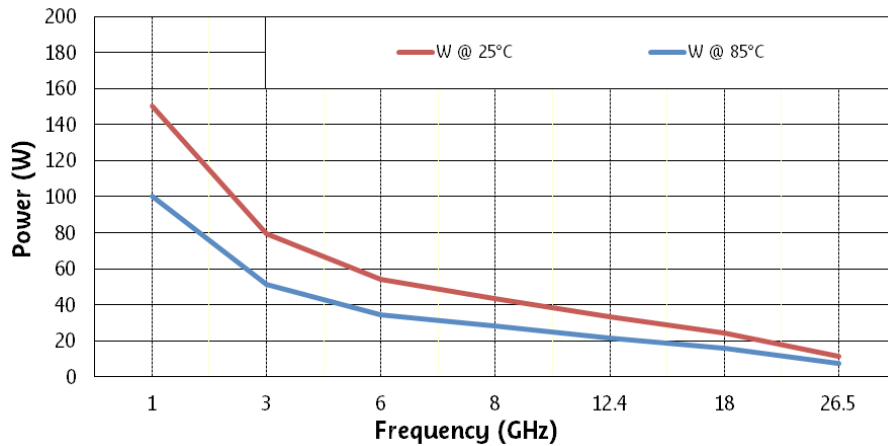
Quartz Series

**RF POWER RATING FOR COLD SWITCHING USE**

(IMPEDANCE 50 OHMS, V.S.W.R. < 1.25)

Power level depends on environmental conditions:

- R516 series have been designed to be used without a cooling fan even for high power applications. However, the power capability may be still improved by using the appropriate cooling fan.
- For failsafe models used with coil permanently supplied (N/O position), the same power level as latching models may be applied.

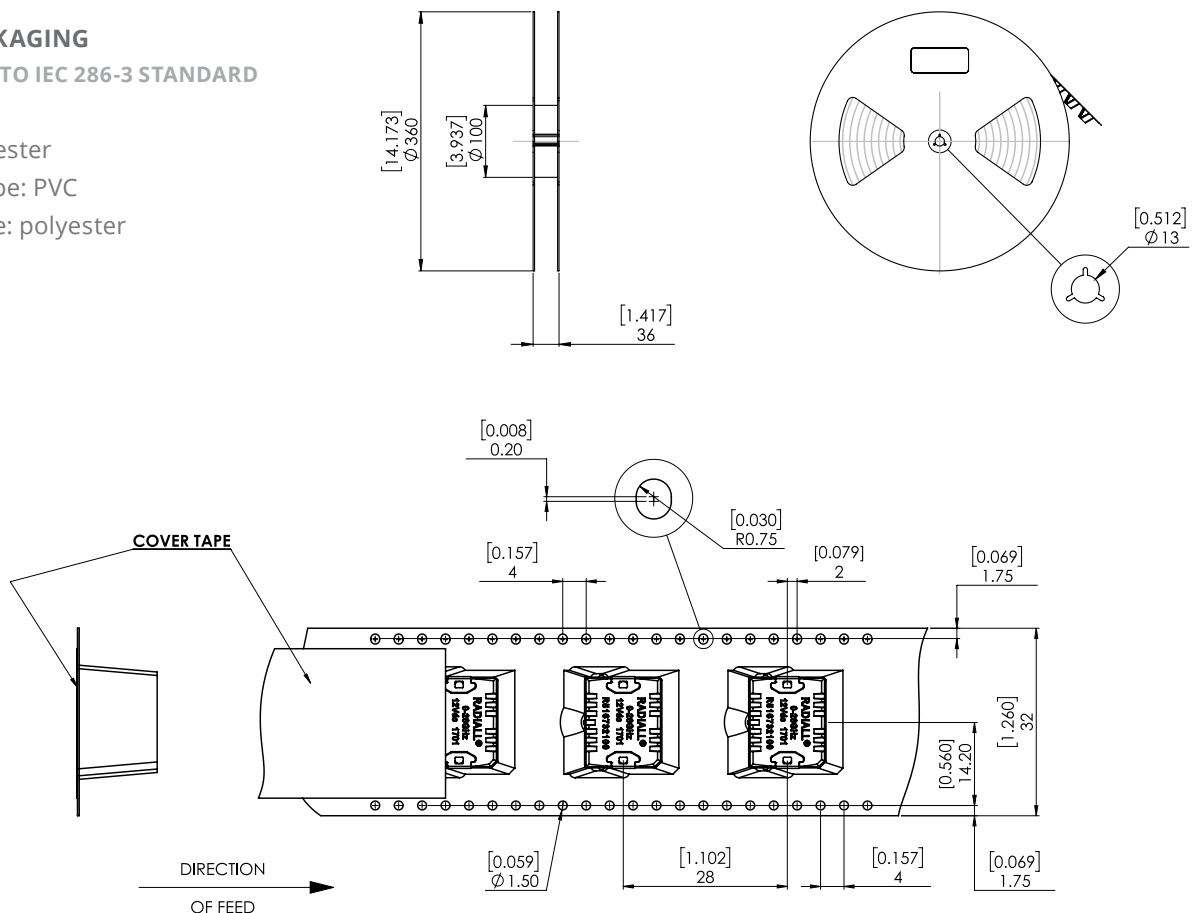


**RELAY PACKAGING**

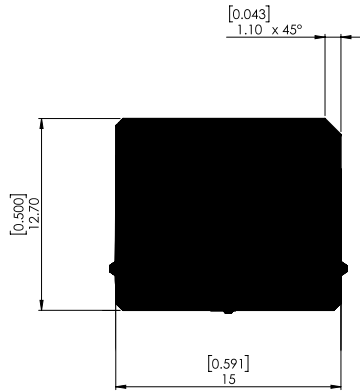
ACCORDING TO IEC 286-3 STANDARD

Materials:

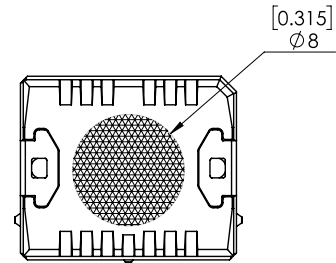
- Reel: polyester
- Carrier tape: PVC
- Cover tape: polyester



**VIDEO SHADOW OF THE RELAY**

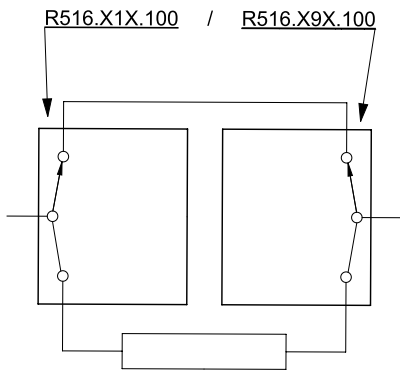


**ASPIRATION AREA**



**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, R516 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. RF performance of bypass switch assemblies depend on the distance between the two RF SMT relays.

**Notes**

All dimensions are in millimeters [inches].

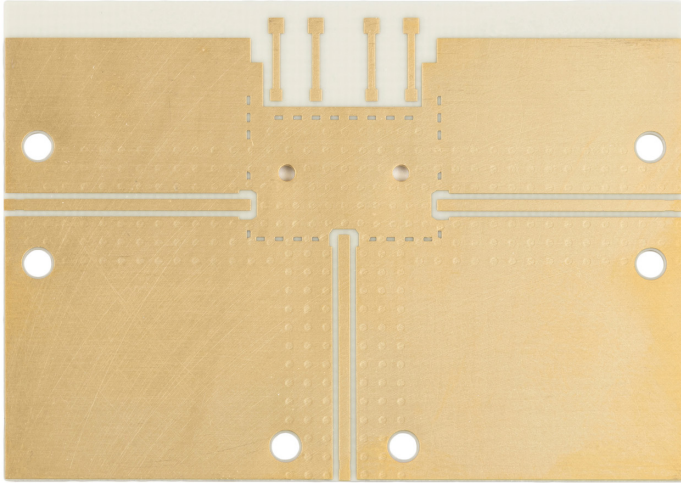


Quartz Series

## PC BOARD MOUNTING

### Board layout

DXF or Gerber format file available upon request.



## SUBSTRATE TYPES

**Recommended substrates are ROGERS RO4003.**

Thickness 0.508 mm Cu double side 17.5  $\mu\text{m}$ .

**Recommended total thickness of RF tracks (copper over thickness + plating): 40  $\mu\text{m}$ .**

Other substrates may be used.

### Notes

Please contact your local sales representative for additional information.

## RECOMMENDED SOLDERING PROCEDURE

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

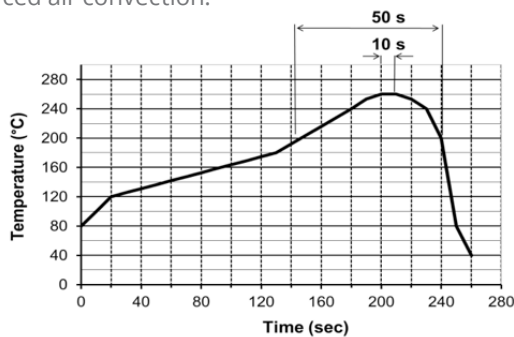
**1 - Solder paste:** R516 series are "Lead Free", and Lead Free Sn-Ag3.5-Cu0.7 solder cream may be used as well as standard Sn63-Pb35-Ag2. Radiall recommends using a "no clean - low residue" solder cream (5% solid residue of flux quantity) that will permit the elimination of the cleaning operation step 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 optically verify that the edges of the zone are clean and without contaminates, and that the PCB zoned areas have not oxydated. The design of the mounting pads and the stenciling area are available upon request, 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 +/- 0.1 mm (+/-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: infrared process:** Please follow the Radiall recommended max temperature profile for infrared 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. For such cleaning process please contact us.*

**6 - Quality check:** Verify by visual inspection that the component is centered on the mounting pads. Solder joints: verify by visual inspection that the formation of meniscus on the pads are proper.

### B - Soldering procedure by manual operation



*Manual soldering is not recommended for high frequencies, as it generates resonance and lower RF characteristics due to gaps between PC board and relay grounds.*

**1 - Solder paste and flux deposition:** Refer to procedure A - 1. Deposit a thin layer of flux on solder pad area. Allow the flux to evaporate a few seconds before applying the solder paste, it will prevent dilution of the paste.

**2 - Solder paste deposition:** Radiall recommends depositing a small amount of solder paste on solder pad area by syringe, according to the manual soldering pattern (available upon request.) Be careful not to apply solder paste outside of the zone area.

**3 - Placement of the component:** During manipulation, avoid contaminating gold 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. To keep better RF characteristics, apply pressure on the relay lid during all the soldering stage, so as to reduce the air gap between the PC board and the relay. If possible, fix the ground plane of the relay on the board with two M1.2 screws before the soldering stage. On each side of the central RF access, the RF body edge must be soldered to the ground of the PC board. To improve RF characteristics and avoid soldering the RF body to the ground, a conductive gasket may be used (please contact us for detailed application note.)

**5 - Cleaning procedure:** Refer to procedure A - 5.

**6 - Quality check:** Verify by visual inspection that component is centered on the mounting pads. Solder joints: verify by visual inspection that there is no solder excess on the RF pads.

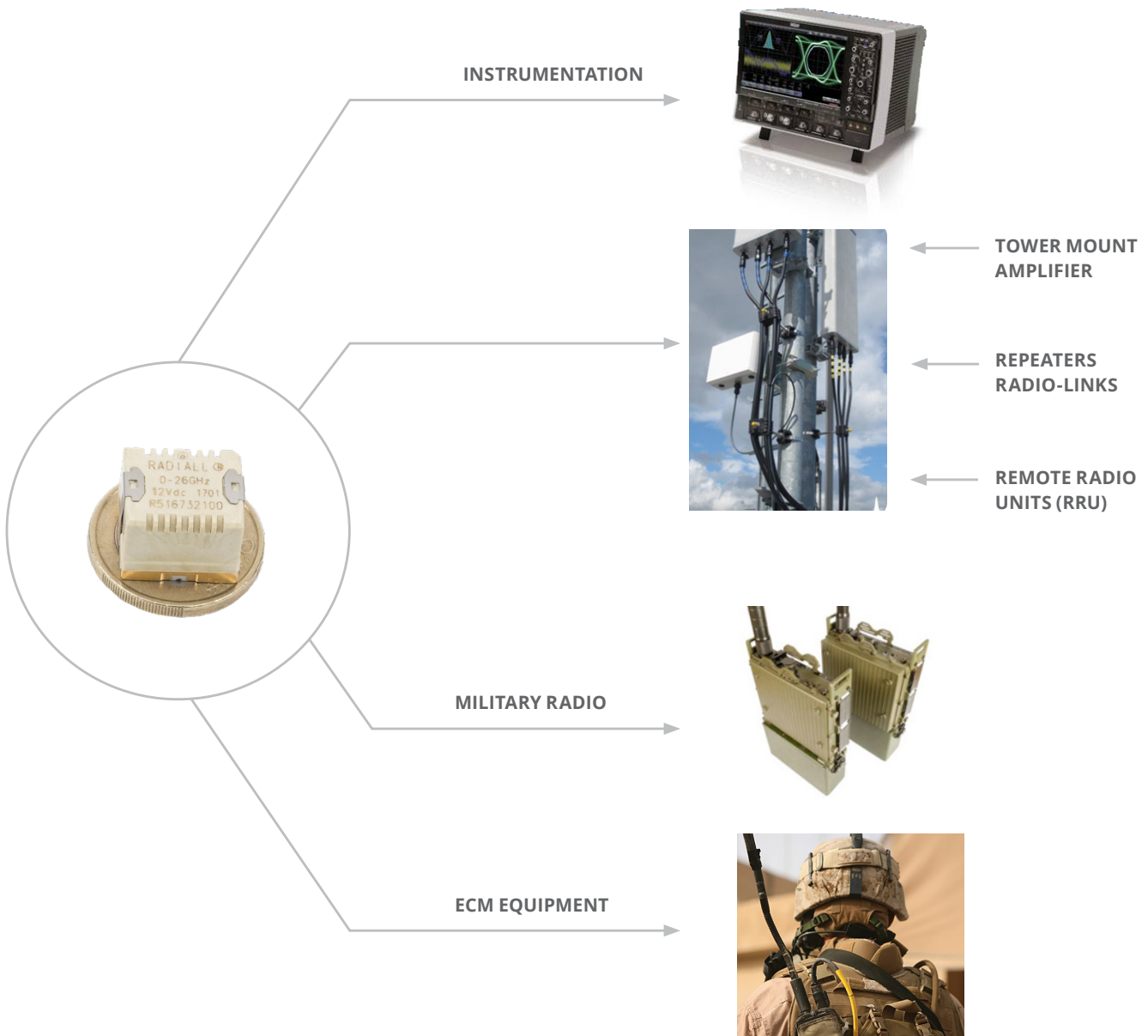
## APPLICATIONS

### PC BOARD MOUNTING

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
- Remote Radio Unit (RRU)
- 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.



## SPDT UP TO 50 GHz

PC BOARD - SMA - SMA 2.9 - 2.4 MM - QMA - DIN 1.6/5.6



Radiall's RAMSES SPDT switches offer excellent reliability, high performance and operating frequencies from DC to 50 GHz. Radiall's RAMSES concept (which provides for a life span of 10 million cycles) offers a variety of options to meet customer needs.

These switches are dedicated to all market applications including: military, instrumentation and telecommunications.

Example of P/N: R570413100 is a SPDT SMA 18 GHz, failsafe, 28 Vdc, with TTL driver, without option, solder pins.

### PART NUMBER SELECTION

# R570

**SERIES PREFIX** \_\_\_\_\_

**FREQUENCY RANGE** \_\_\_\_\_

- 3: SMA up to 3 GHz
- E: QMA up to 6 GHz <sup>[5]</sup>
- 4: SMA up to 18 GHz
- F: SMA up to 26.5 GHz
- 8: SMA 2.9 up to 40 GHz <sup>[6]</sup>
- J: 2.4 mm up to 50 GHz
- 9: DIN 1.6/5.6 up to 2.5 GHz
- A: PC board mount up to 3 GHz <sup>[4]</sup>

**TYPE** \_\_\_\_\_

- 1: Failsafe
- 2: Failsafe + I.C.
- 3: Latching
- 4: Latching + I.C.
- 5: Latching + S.C.O. <sup>[1]</sup>
- 6: Latching + S.C.O. + I.C. <sup>[1]</sup>

**ACTUATOR VOLTAGE** \_\_\_\_\_

- 2: 12 Vdc
- 3: 28 Vdc

**ACTUATOR TERMINALS**

0: Solder pins

**OPTIONS**

- 0: Without option
- 1: Positive common <sup>[2 & 3]</sup>
- 3: With suppression diodes <sup>[1]</sup>
- 4: With suppression diodes and positive common <sup>[1, 2 & 3]</sup>

**TTL OPTION**

- 0: Without TTL driver
- 1: With TTL driver <sup>[1 & 2]</sup>

**Notes:**

I.C.: Indicator contact - S.C.O.: Self Cut-Off.

1. Suppression diodes are already included in Self Cut-Off and TTL option.
2. Polarity is not relevant to application for switches with TTL driver.
3. Positive common shall be specified only with type 3, 4, 5, and 6 because failsafe switches can be used with both polarities.
4. Available only upon request.

5. The QLF trademark (Quick Lock Formula®) standard applies to QMA and QN series and guarantees the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performance.
6. Connector SMA 2.9 is equivalent to "K connector®", registered trademark of Anritsu.



## RAMSES Series

## GENERAL SPECIFICATIONS

OPERATING MODE		FAILSAFE		LATCHING	
Nominal operating voltage (across temperature range)	Vdc	12 (10.2 to 13)	28 (24 to 30)	12 (10.2 to 13)	28 (24 to 30)
Coil resistance at 23 °C (+/-10%)	Ω	47.5	275	58	350
Operating current at 23 °C	mA	250	102	210	80
Average power		See Power Rating Chart page 1-13			
TTL Input	High level	2.2 to 5.5 Volts		800 μA max 5.5 Volts	
	Low level	0 to 0.8 Volts		20 μA max 0.8 Volts	
Indicator rating		1 W / 30 V / 100 mA			
Switching time		ms			
Life	SMA - SMA 2.9 - QMA	10 million cycles			
	DIN 1.6/5.6 - PC Board	5 million cycles			
	2.4 mm	2 million cycles			
Connectors		SMA - SMA 2.9 - QMA - DIN 1.6/5.6 - PC Board - 2.4 mm			
Operating temperature range	DIN 1.6/5.6 - 2.4 mm	-25 °C to +70 °C			
	SMA - SMA 2.9 - QMA - PC Board	-40 °C to +85 °C			
Storage temperature range	DIN 1.6/5.6 - 2.4 mm	-40 °C to +85 °C			
	SMA - SMA 2.9 - QMA - PC Board	-55 °C to +85 °C			
Vibration (MIL STD 202, Method 204D, cond.D)		10-2,000 Hz, 20 g		Operating	
Shock (MIL STD 202, Method 213B, cond.C)		100 g / 6 ms, ½ sine		Operating	

## RF PERFORMANCE

CONNECTORS	FREQUENCY RANGE GHz	V.S.W.R. (MAX)	INSERTION LOSS (MAX) dB	ISOLATION (MIN) dB	IMPEDANCE Ω	
DIN 1.6/5.6	DC - 2.5	DC - 1	1.20	0.20	80	75
		1 - 2.5	1.30	0.30	70	
QMA	DC - 6	DC - 3	1.20	0.20	80	75
		3 - 6	1.30	0.30	70	
SMA	DC - 3 DC - 18 DC - 26.5	DC - 3	1.10	0.15	80	50
		3 - 8	1.20	0.20	75	
		8 - 12.4	1.20	0.25	65	
		12.4 - 18	1.40	0.35	60	
SMA 2.9	DC - 40	DC - 6	1.30	0.30	70	50
		6 - 12.4	1.40	0.40	60	
		12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.70	0.70	55	
PC Board	DC - 3	DC - 3	1.20	0.20	80	50
2.4 mm	DC - 50	DC - 6	1.30	0.30	70	50
		6 - 12.4	1.40	0.40	60	
		12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.70	0.70	55	
		26.5 - 40	1.90	0.80	50	
		40 - 50	1.90	1.10	50	

## Notes

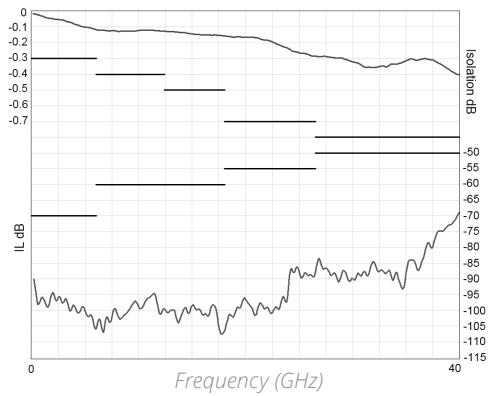
See page 2-12 and 2-13 for typical RF performance.

RAMSES Series

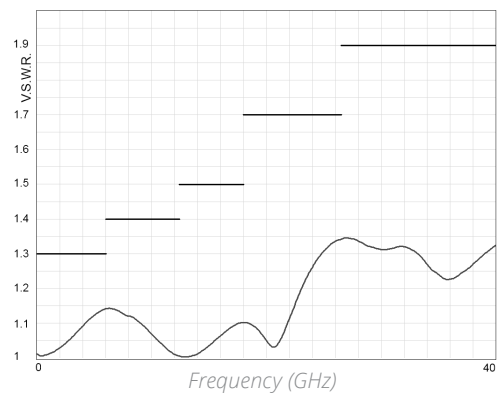
R570 TYPICAL RF PERFORMANCE

Example: SPDT SMA 2.9 up to 40 GHz

INSERTION LOSS & ISOLATION

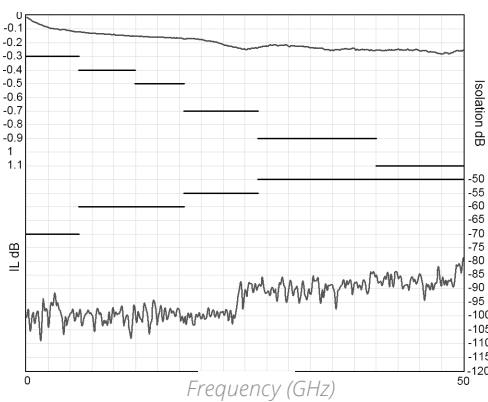


V.S.W.R

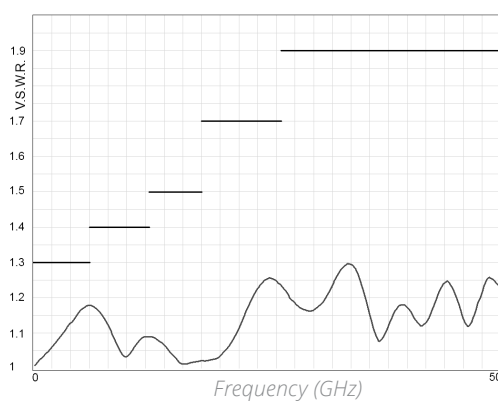


Example: SPDT 2.4 mm up to 50 GHz

INSERTION LOSS & ISOLATION

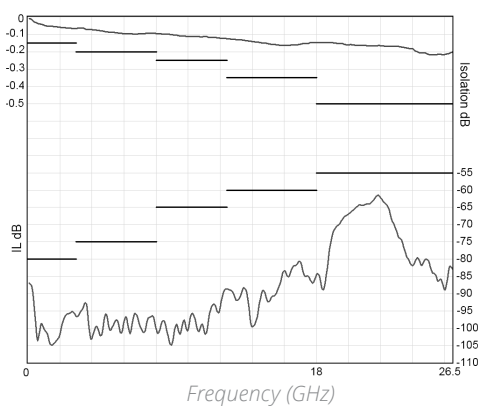


V.S.W.R

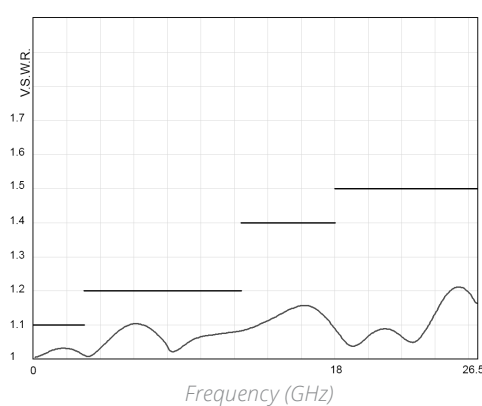


Example: SPDT SMA up to 26.5 GHz

INSERTION LOSS & ISOLATION



V.S.W.R

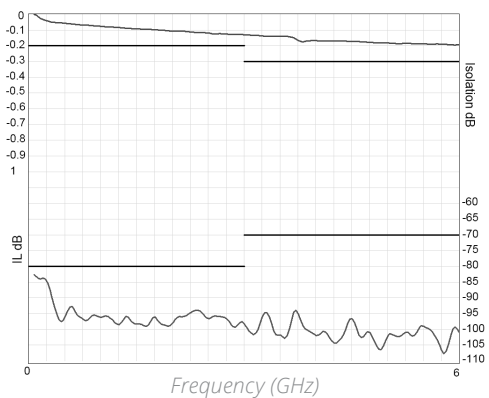


RAMSES Series

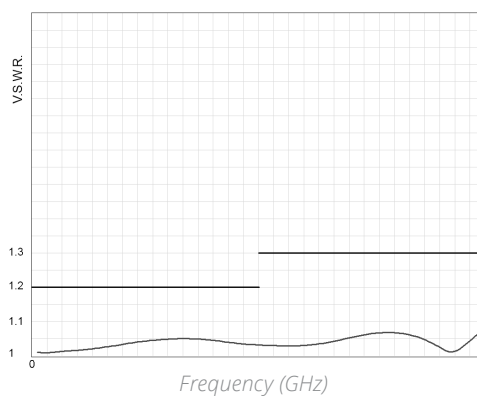
**R570 TYPICAL RF PERFORMANCE (CONTINUED)**

*Example: SPDT QMA up to 6 GHz*

**INSERTION LOSS & ISOLATION**

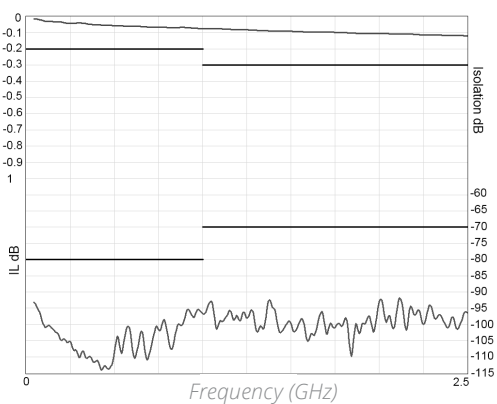


**V.S.W.R**

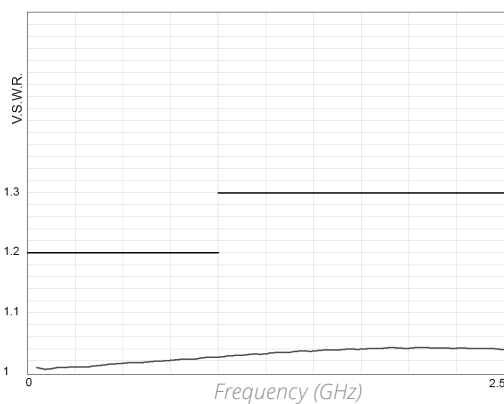


*Example: SPDT DIN 1.6/5.6 up to 2.5 GHz*

**INSERTION LOSS & ISOLATION**

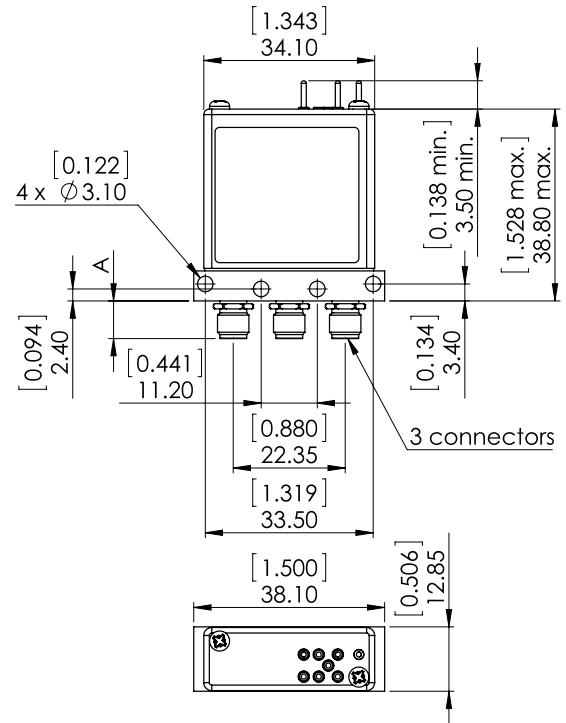
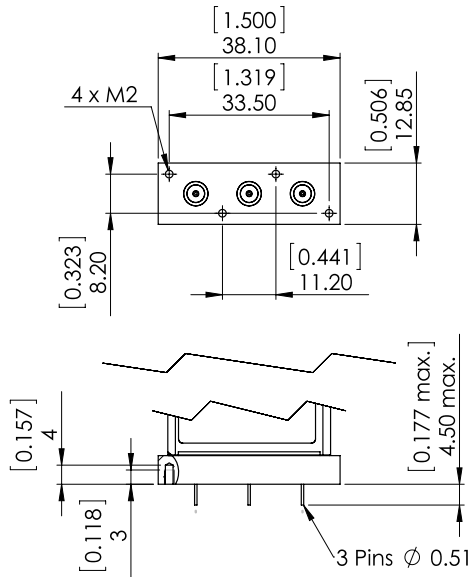


**V.S.W.R**



TYPICAL OUTLINE DRAWING

CONNECTORS	A MAX (MM [INCHES])
SMA	7.7 [0.303]
SMA 2.9 and 2.4 mm	6.7 [0.264]
QMA	10.8 [0.394]
DIN 1.6/5.6	11.5 [0.433]
PC Board	4.5 [0.157]



Notes

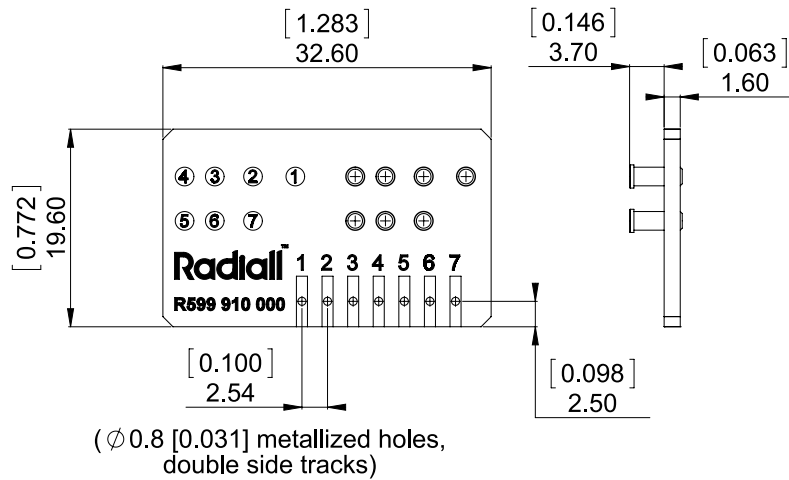
See page 2-23 for pin identification.

All dimensions are in millimeters [inches].



## ACCESSORIES

A printed circuit board interface connector (ordered separately) has been designed for easy mounting on terminals. For SPDT model R570 series = Radiall part number: R599 910 000.



## Notes

All dimensions are in millimeters [inches].

The PCB accessory pin number assignment is independant from the pin identification table of the switch.

## SPDT UP TO 18 GHz

N - TNC - BNC



Radiall's RAMSES SPDT N, BNC and TNC switches are designed for high performance in RF & Microwave systems up to 18 GHz.

Radiall's RAMSES concept (modular concept) offers a full range of configurations. They are commonly used for applications where high power handling capability is required.

These switches are dedicated to all market applications including: defense, instrumentation and telecommunications.

*Example of P/N: R570113035 is a SPDT N 12.4 GHz, failsafe, 28 Vdc, with suppression diodes, without option, D-Sub connector.*

### PART NUMBER SELECTION

# R570

**SERIES PREFIX** \_\_\_\_\_

**FREQUENCY RANGE** \_\_\_\_\_

- 0: N up to 3 GHz
- 1: N up to 12.4 GHz
- 2: BNC up to 3 GHz
- 5: TNC up to 3 GHz
- 6: TNC up to 12.4 GHz
- D: TNC up to 18 GHz

**TYPE** \_\_\_\_\_

- 1: Failsafe
- 2: Failsafe + I.C.
- 3: Latching
- 4: Latching + I.C.
- 5: Latching + S.C.O. <sup>[1]</sup>
- 6: Latching + S.C.O. + I.C. <sup>[1]</sup>

**ACTUATOR VOLTAGE** \_\_\_\_\_

- 2: 12 Vdc
- 3: 28 Vdc

**ACTUATOR TERMINALS**

- 0: Solder pins
- 5: D-Sub connector

**OPTIONS**

- 0: Without option
- 1: Positive common <sup>[2 & 3]</sup>
- 3: With suppression diodes <sup>[1]</sup>
- 4: With suppression diodes and positive common <sup>[1, 2 & 3]</sup>

**TTL OPTION**

- 0: Without TTL driver
- 1: With TTL driver <sup>[1 & 2]</sup>

**Notes**

1. I.C.: Indicator contact - S.C.O.: Self Cut-Off.
1. Suppression diodes are already included in Self Cut-Off and TTL option.
2. Polarity is not relevant to application for switches with TTL driver.
3. Positive common shall be specified only with type 3, 4, 5 and 6 because failsafe switches can be used with both polarities.

## RAMSES Series

## GENERAL SPECIFICATION

OPERATING MODE		FAILSAFE		LATCHING	
Nominal operating voltage (across temperature range)	Vdc	12	28	12	28
		(10.2 to 13)	(24 to 30)	(10.2 to 13)	(24 to 30)
Coil resistance at 23 °C (+/-10%)	Ω	38	200	38	225
Operating current at 23 °C	mA	320	140	320	125
Average power		See Power Rating Chart page 1-13			
TTL input	High level	2.2 to 5.5 Volts / 800 μA max 5.5 Volts			
	Low level	0 to 0.8 Volts / 20 μA max 0.8 Volts			
Indicator rating	ms	1 W/30 V/100 mA			
Switching time	ms	10			
Life		2.5 million cycles			
Connectors		N - TNC - BNC			
Actuator terminals		Solders pins or 9 pin D-Sub connector			
Operating temperature range		-40 °C to +85 °C			
Storage temperature range		-55 °C to +85 °C			
Vibration (MIL STD 202, Method 204D, cond.D)		10 - 2,000 Hz, 20 g		Operating	
Shock (MIL STD 202, Method 213B, cond.C)		100 g, 6 ms, ½ sine		Non-operating	

## RF PERFORMANCE

CONNECTORS	FREQUENCY RANGE GHz	V.S.W.R. (MAX)	INSERTION LOSS (MAX) dB	ISOLATION (MIN) dB	IMPEDANCE Ω	
N/TNC	DC - 3 DC - 12.4	DC - 1	1.15	0.15	85	50
		1-2	1.20	0.20	80	
		2 - 3	1.25	0.25	75	
		3 - 8	1.35	0.35	70	
		8 - 12.4	1.50	0.50	60	
TNC 18	DC - 18	DC - 6	1.30	0.30	70	
		6 - 12.4	1.50	0.50	60	
		12.4 - 18	1.60	0.70	60	
BNC	DC - 3	DC - 1	1.15	0.15	85	
		1 - 2	1.20	0.20	80	
		2-3	1.25	0.25	75	

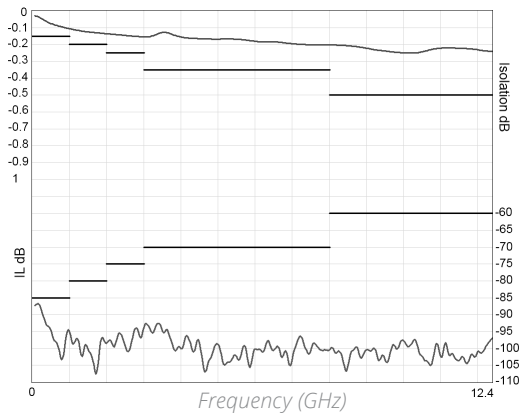
## Notes

See page 2-18 for typical RF performance.

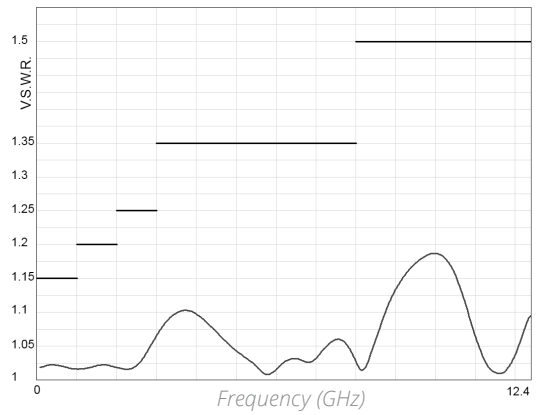
**R570 TYPICAL RF PERFORMANCE**

*Example: SPDT N and TNC up to 12.4 GHz*

**INSERTION LOSS & ISOLATION**

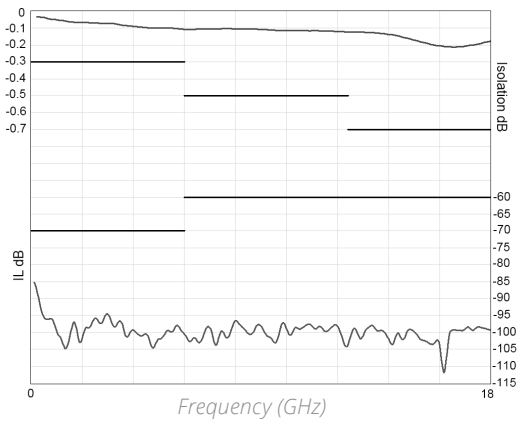


**V.S.W.R**

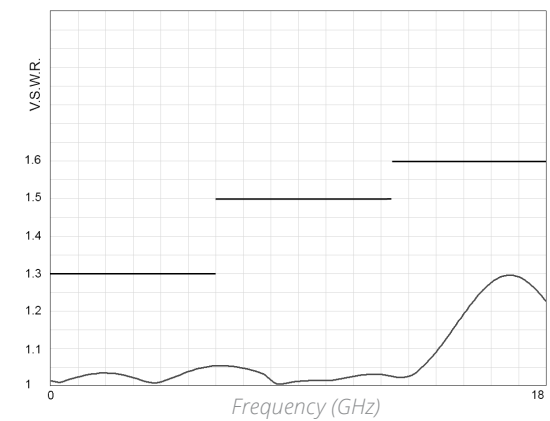


*Example: SPDT TNC up to 18 GHz*

**INSERTION LOSS & ISOLATION**



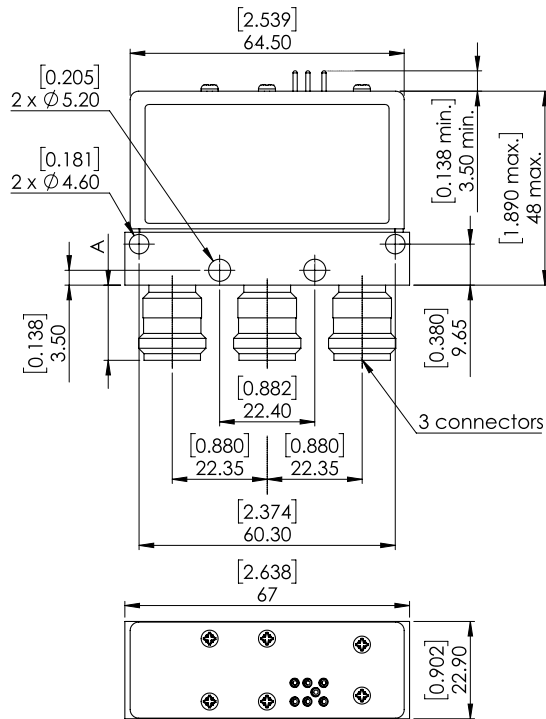
**V.S.W.R**



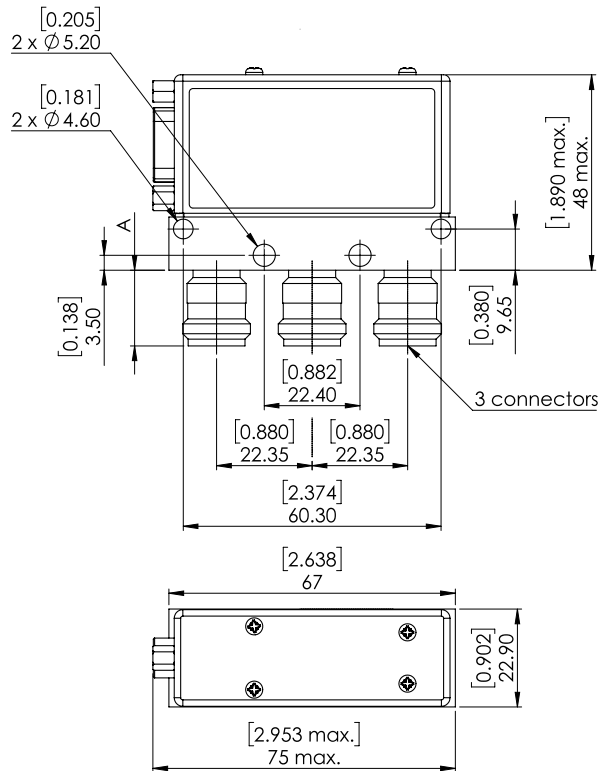
RAMSES Series

TYPICAL OUTLINE DRAWING

WITH SOLDER PINS



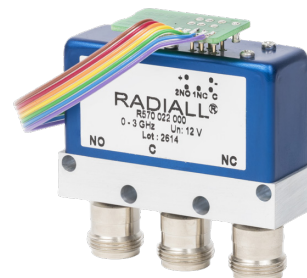
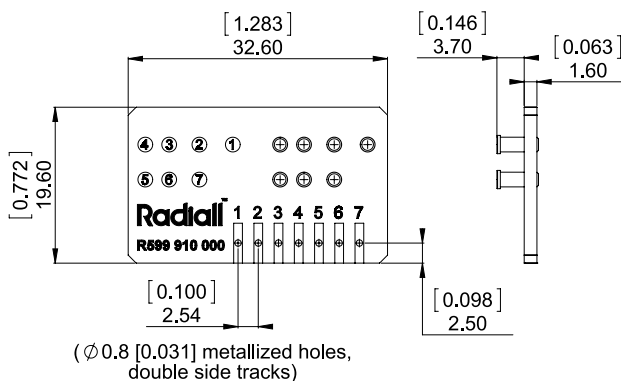
WITH D-SUB CONNECTOR



CONNECTORS	N	TNC	BNC
A max (mm [inches])	18.5 [0.709]	11.5 [0.433]	11.5 [0.433]

ACCESSORIES

A printed circuit board interface connector (ordered separately) has been designed for easy mounting on terminals. For SPDT model R570 series = Radiall part number: R599 910 000



Notes

All dimensions are in millimeters [inches].

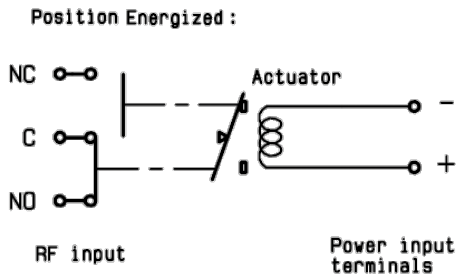
The PCB accessory pin number assignment is independant from the pin identification table of the switch.

## COAXIAL SPDT

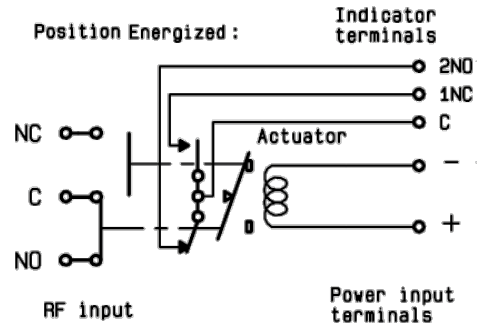
### R570 SERIES

#### FAILSAFE

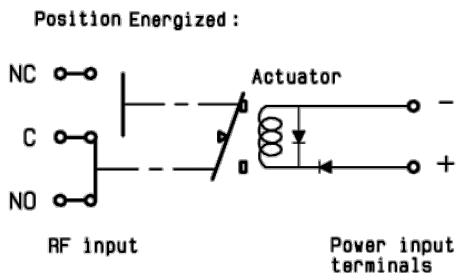
WITHOUT OPTION  
R570-1-000



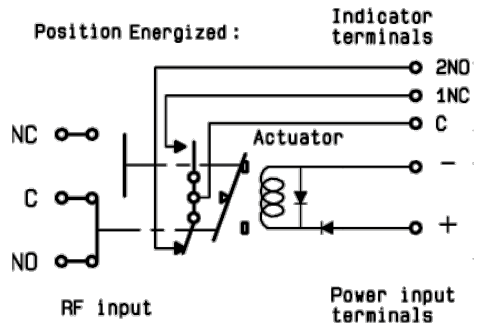
WITH INDICATOR CONTACT  
R570-2-000



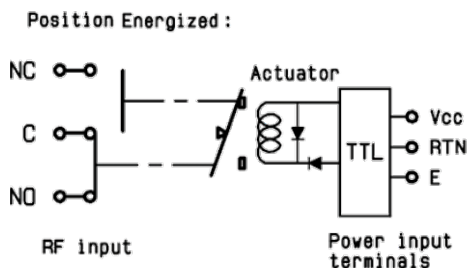
WITH SUPPRESSION DIODES  
R570-1-030



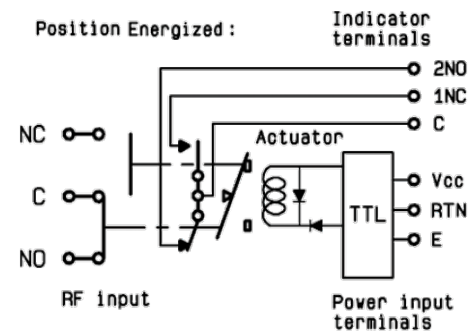
WITH SUPPRESSION DIODES & INDICATOR CONTACT  
R570-2-030



WITH TTL DRIVER (SUPPRESSION DIODES ARE INCLUDED)  
R570-1-100



WITH TTL DRIVER & INDICATOR CONTACT  
(SUPPRESSION DIODES ARE INCLUDED)  
R570-2-100



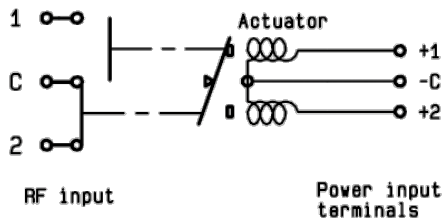
## COAXIAL SPDT

### R570 SERIES

#### LATCHING

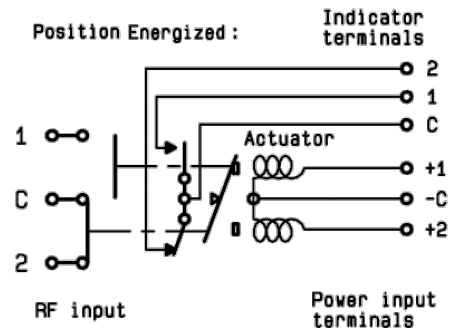
#### WITHOUT OPTION

R570-3-000



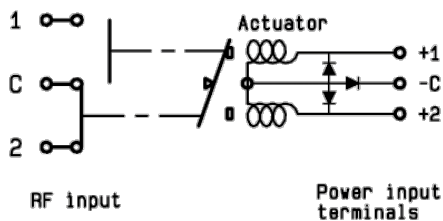
#### WITH INDICATOR CONTACT

R570-4-000



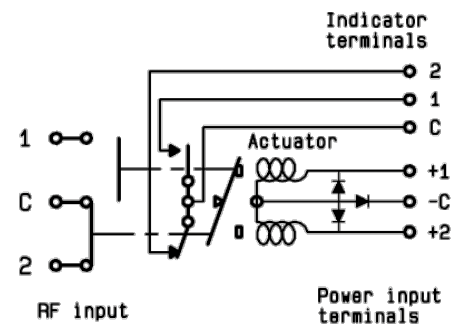
#### WITH SUPPRESSION DIODES

R570-3-030



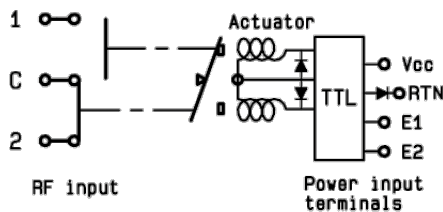
#### WITH SUPPRESSION DIODES & INDICATOR CONTACT

R570-4-030



#### WITH TTL DRIVER (SUPPRESSION DIODES ARE INCLUDED)

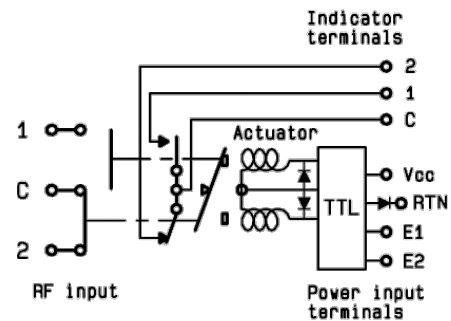
R570-3-100



#### WITH TTL DRIVER & INDICATOR CONTACT

(SUPPRESSION DIODES ARE INCLUDED)

R570-4-100

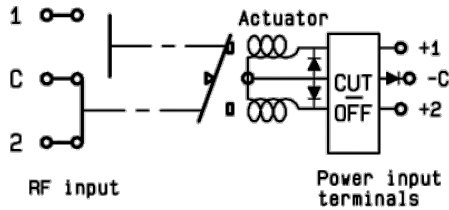


**COAXIAL SPDT (CONTINUED)**

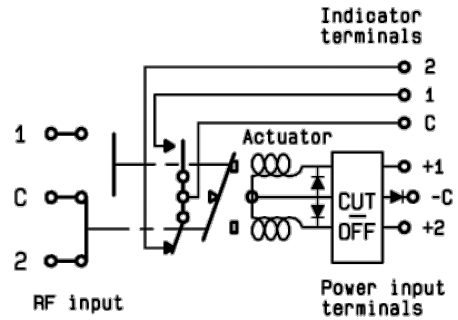
**R570 SERIES**

**LATCHING**

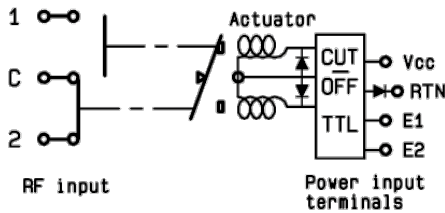
**WITH CUT-OFF (SUPPRESSION DIODES ARE INCLUDED)**  
R570-5-100



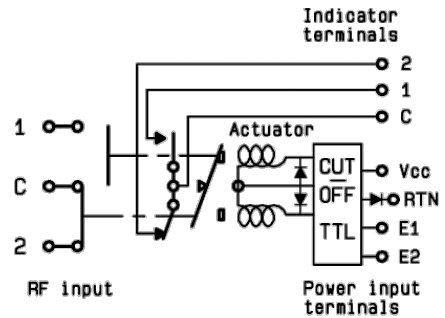
**WITH CUT-OFF & INDICATOR CONTACT (SUPPRESSION DIODES ARE INCLUDED)**  
R570-6-100



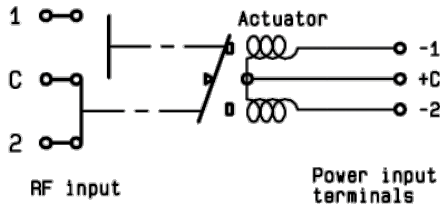
**WITH CUT-OFF & TTL DRIVER (SUPPRESSION DIODES ARE INCLUDED)**  
R570-5-100



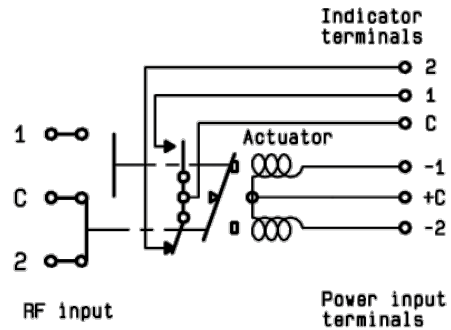
**WITH CUT-OFF & INDICATOR CONTACT (SUPPRESSION DIODES ARE INCLUDED)**  
R570-6-100



**WITH POSITIVE COMMON, NO OPTION**  
R570-3-010



**WITH POSITIVE COMMON & INDICATOR CONTACT**  
R570-5-010



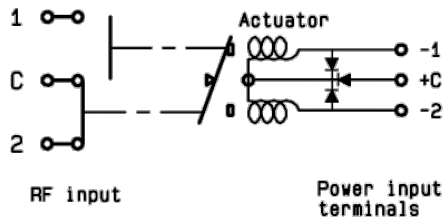


### COAXIAL SPDT (CONTINUED)

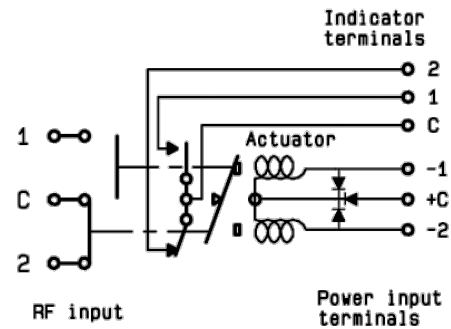
#### R570 SERIES

#### LATCHING

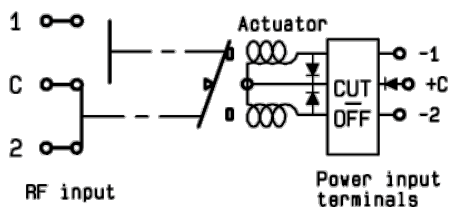
WITH POSITIVE COMMON & SUPPRESSION DIODES  
R570-3-040



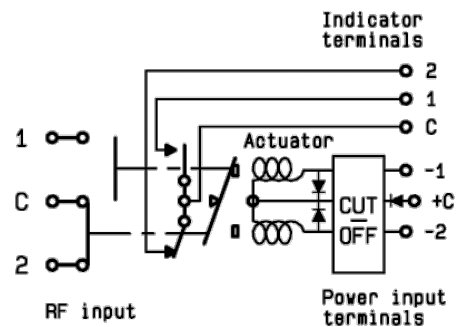
WITH POSITIVE COMMON, SUPPRESSION  
(DIODES & INDICATOR CONTACT)  
R570-4-040



WITH POSITIVE CUT-OFF (SUPPRESSION DIODES ARE INCLUDED)  
R570-5-010

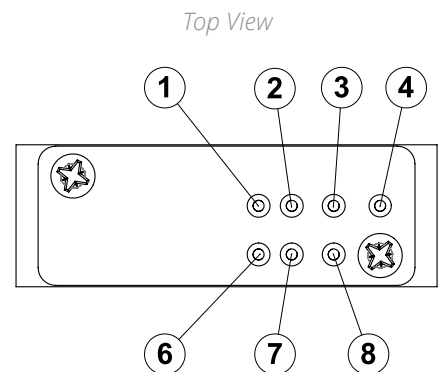


WITH POSITIVE COMMON, CUT-OFF & INDICATOR CONTACT  
(SUPPRESSION DIODES ARE INCLUDED)  
R570-6-010



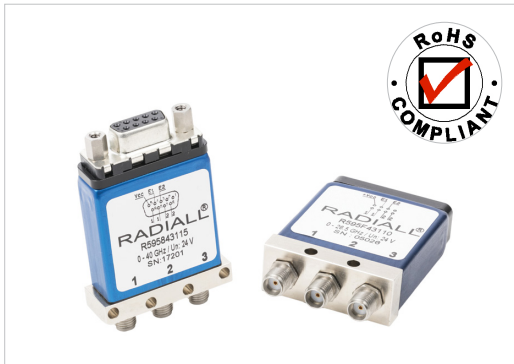
#### PIN IDENTIFICATION

TYPE	PIN						
	1	2	3	4	6	7	8
Failsafe	+		-				
Failsafe + I.C.	+		-		2NO	1NC	C
Failsafe + TTL	E		RTN	VCC			
Failsafe + I.C. + TTL	E		RTN	VCC	2NO	1NC	C
Latching Latching + Cut-off	-2 or +2	-1 or +1	+C or -C				
Latching + I.C. Latching + I.C. + Cut-off	-2 or +2	-1 or +1	+C or -C		2	1	C
Latching + TTL Latching + TTL + Cut-off	E2	E1	RTN	VCC			
Latching + TTL + I.C. Latching + TTL + I.C. + Cut-off	E2	E1	RTN	VCC	2	1	C



## HIGH PERFORMANCE SPDT UP TO 40 GHz

### SMA - SMA 2.9



Radiall's PLATINUM series switches are optimized to perform at a high level over an extended life cycle, with outstanding RF performance, and a guaranteed insertion loss repeatability of 0.03 dB over a life span of 10 million switching cycles. PLATINUM series switches are perfect for automated test and measurement equipment, as well as signal monitoring devices.

*Example of P/N: R595443125 is a SPDT SMA 20 GHz, latching, 24 Vdc, with TTL driver, Indicators, D-Sub connector.*

### PART NUMBER SELECTION

R595

**SERIES PREFIX** \_\_\_\_\_

**FREQUENCY RANGE** \_\_\_\_\_

- 3: SMA up to 6 GHz
- 4: SMA up to 20 GHz
- F: SMA up to 26.5 GHz
- 8: SMA 2.9 up to 40 GHz

**TYPE** \_\_\_\_\_

- 3: Latching <sup>[1]</sup>
- 4: Latching + I.C. <sup>[1]</sup>
- 5: Latching + S.C.O. <sup>[1]</sup>
- 6: Latching + S.C.O. + I.C. <sup>[1]</sup>

**ACTUATOR VOLTAGE** \_\_\_\_\_

- 3: 24 Vdc
- 7: 15 Vdc

**SWITCH MODEL** \_\_\_\_\_

- 1: Non-terminated SPDT switch

**OPTIONS**

- 1: Without option (positive common)
- 2: Compatible TTL driver

**ACTUATOR TERMINALS** \_\_\_\_\_

- 0: Solder pins
- 5: D-Sub connector

**DOCUMENTATION** \_\_\_\_\_

- : Certificate of conformity
- C: Calibration certificate
- R: Calibration certificate + RF curves

**Notes**

- I.C.: Indicator contact - S.C.O.: Self Cut-Off
- 1. Suppression diodes are already included

## Platinum Series

## GENERAL SPECIFICATIONS

OPERATING MODE		LATCHING	
Nominal operating voltage (across temperature range)	Vdc	24 (24 to 30)	15 (12 to 20)
Coil resistance at 23 °C (+/-10%)	Ω	350	120
Operating current at 23 °C	mA	68	125
TTL input	High level	3 to 7 Volts: 800 µA max 7 Volts	
	Low level	0 to 0.8 Volts: 20 µA max 0.8 Volts	
Switching time	ms	15	
Life (Min)	SMA	10 million cycles	
	SMA 2.9	5 million cycles	
Actuator terminals		D-Sub 9 pin female Solder pins	
Weight	g	60	

## ENVIRONMENTAL SPECIFICATIONS

Operating temperature range	-25 °C to + 75 °C
Storage temperature range	-55 °C to +85 °C
Temperature cycling (MIL STD 202F, Method 107D, Cond.A)	-55 °C to +85 °C (10 cycles)
Sine vibration operating (MIL STD 202, Method 204D, Cond.D)	10 - 2,000 Hz, 20 g
Random vibration operating	16.91 g (rms) 50-2,000 Hz 3 min/axis
Shock operating (MIL STD 202, Method 213B, Cond.G)	50 g / 11 ms, sawtooth
Humidity operating	15 to 95% relative humidity
Humidity storage (MIL STD 202, Method 106E, Cond.E)	65 °C, 95% RH, 10 days
Altitude operating	15 ft (4.600 meters)
Altitude storage (MIL STD 202, Method 105C, Cond.B)	50 ft (15.240 meters)

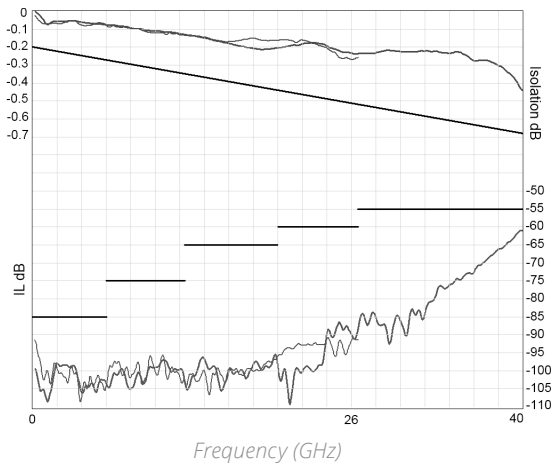
Platinum Series

RF PERFORMANCE

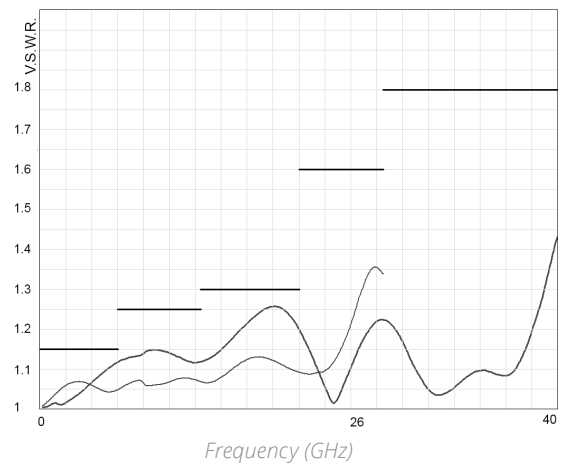
PART NUMBER		R5953--1--	R5954--1--		R595F--1--		R5958--1--		
Frequency range	GHz	DC to 6	DC to 20		DC to 26.5		DC to 40		
Impedance	Ω	50							
Insertion Loss (max)	dB	0.20 + (0.45 / 26.5) × frequency (GHz)							
Isolation (min)	dB	85	DC to 6 GHz 6 to 12.4 GHz 12.4 to 20 GHz	85 75 65	DC to 6 GHz 6 to 12.4 GHz 12.4 to 20 GHz 20 to 26.5 GHz	85 75 65 60	DC to 6 GHz 6 to 12.4 GHz 12.4 to 20 GHz 20 to 26.5 GHz 26.5 to 40 GHz	85 75 65 60 55	
V.S.W.R (max)		1.15	DC to 6 GHz 6 to 12.4 GHz 12.4 to 20 GHz	1.15 1.25 1.30	DC to 6 GHz 6 to 12.4 GHz 12.4 to 20 GHz 20 to 26.5 GHz	1.15 1.25 1.30 1.60	DC to 6 GHz 6 to 12.4 GHz 12.4 to 20 GHz 20 to 26.5 GHz 26.5 to 40 GHz	1.15 1.25 1.30 1.60 1.80	
Repeatability (up to 10 million cycles at 25 °C)	dB	0.03 dB maximum					0.05 dB maximum		

TYPICAL RF PERFORMANCE

INSERTION LOSS & ISOLATION



V.S.W.R



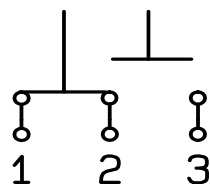
SMA — SMA 2.9 —

**SWITCH MODEL: NON-TERMINATED SPDT SWITCH**

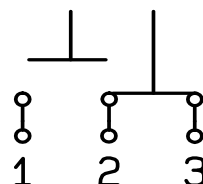
The non-terminated SPDT switch is a single pole double throw switch. This switch is considered "break-before-make."

*RF Schematic Diagram*

**POSITION E1**

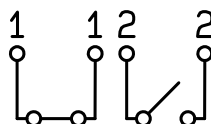


**POSITION E2**

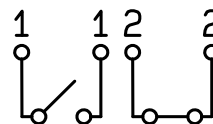


*Position Indicator*

**STATE 11**



**STATE 22**



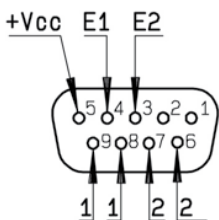
**Standard drive option "1"**

(Positive common):

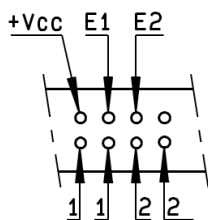
- Connect pin +Vcc to supply (+20 Vdc to +32 Vdc)
- Select desired RF path by applying ground to the corresponding "close" pin (Ex: ground pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open)
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground pin E2 to open RF path 1-2 and close RF path 2-3)

**TTL drive option "2"**

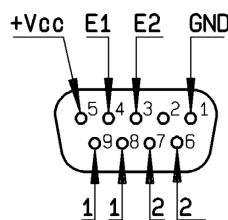
- Connect pin GND to ground
- Connect pin +Vcc to supply (+20 Vdc to +32 Vdc)
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open)
- To open desired path and close the new RF path, apply TTL "High" to the "drive" pin which corresponds to the desired RF path (Ex: apply TTL "High" to pin E2)



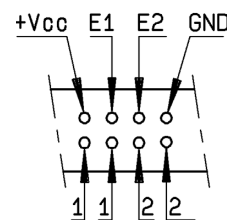
D-Sub connector



Solder pins



D-Sub connector

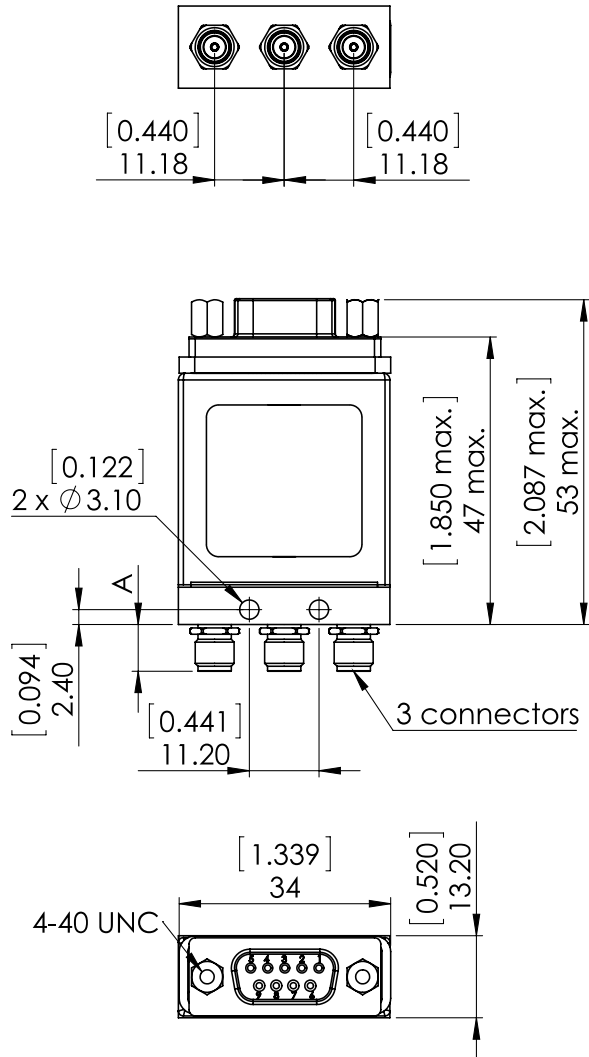


Solder pins

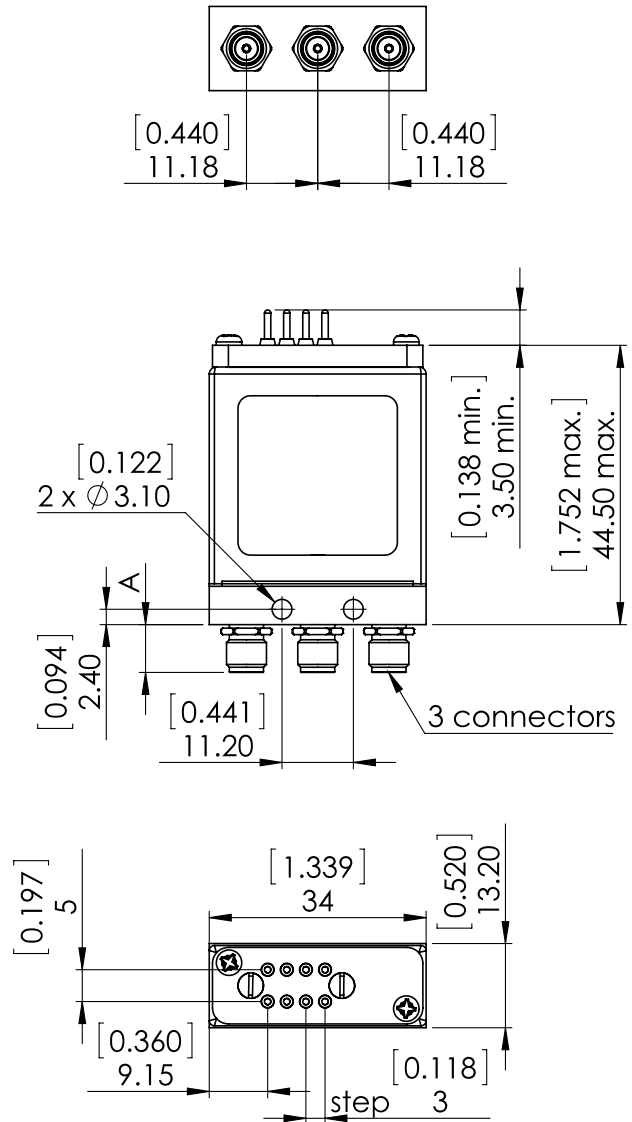
Platinum Series

SMA - SMA 2.9  
TYPICAL OUTLINE DRAWING

WITH D-SUB CONNECTOR



WITH SOLDER PINS



CONNECTORS	A MAX MM [INCHES]
SMA	7.7 [0.303]
SMA 2.9	6.7 [0.264]

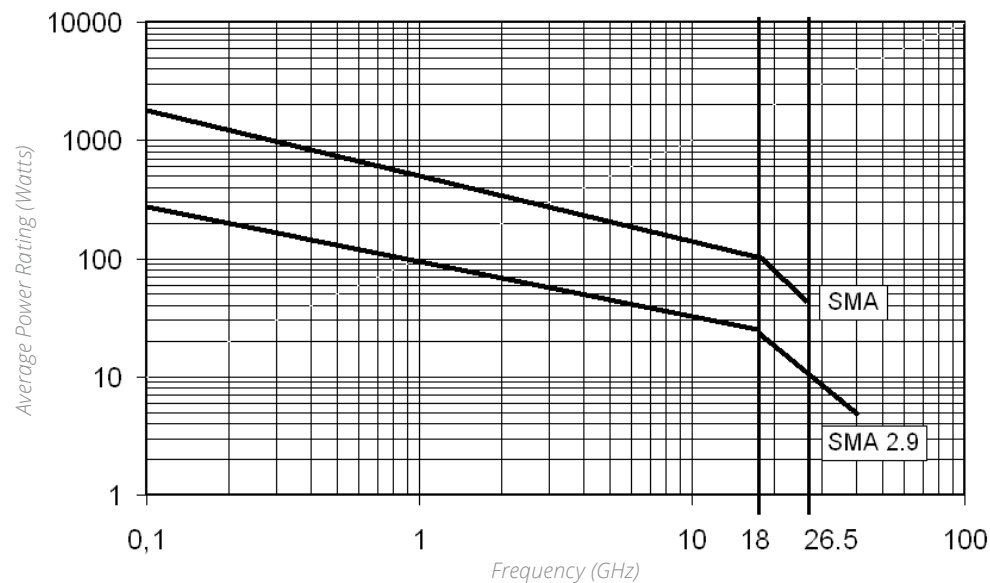
Notes

All dimensions are in millimeters [inches].

### RF POWER RATING CHART

This graph is based on the following conditions:

- Ambient temperature: + 25 °C
- Sea level
- V.S.W.R.: 1 and cold switching



### DERATING FACTOR VERSUS VSWR

The average power input must be reduced for load V.S.W.R. above 1:1

