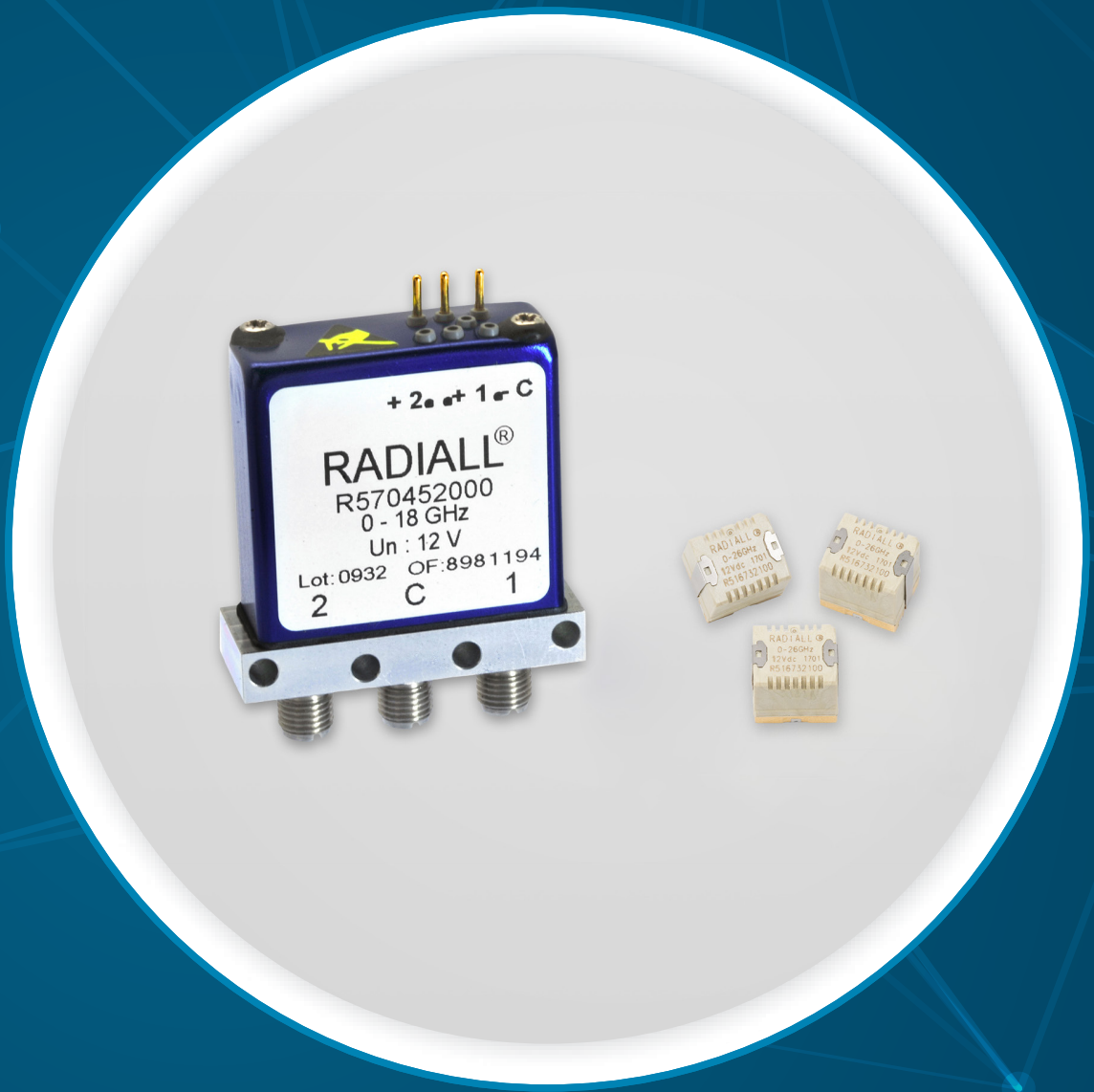


SPDT

Section 2 Table of Contents

SPDT PART NUMBER SELECTION GUIDE[1]

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

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.

Quartz Series

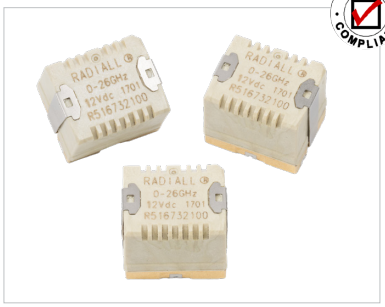
SMT POWER MICRO SPDT WITH 26.5 GHz CAPABILITIES

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.

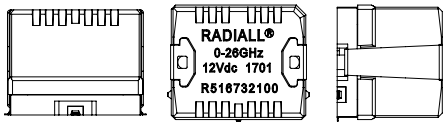
Very low return loss and insertion loss allow this relay to be used in power applications, as well as in typical SMT relay applications such as RF attenuators, RF matrices, spectrum analysers, and telecommunications.

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.)



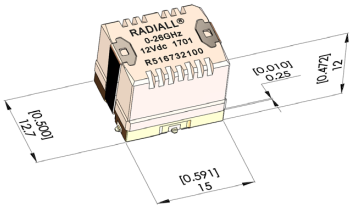
Example of P/N:
R516713100 is a SPDT SMT 26.5 GHz, 24 Vdc, failsafe, not soldered.

ACTUAL SIZE



TYPICAL OUTLINE DRAWING

All dimensions are in millimeters [inches].



PART NUMBER SELECTION

R516 _ _ 10

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 [1]

ACTUATOR TERMINALS
0: Not soldered
T: Soldered on a connectorized test fixture [2]

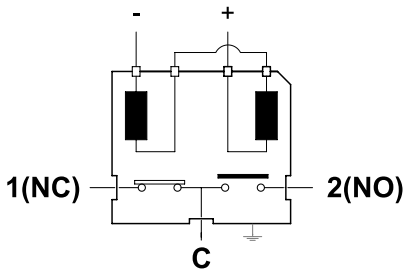
ACTUATOR VOLTAGE
1: 6 Vdc [3]
2: 12 Vdc
3: 24 Vdc

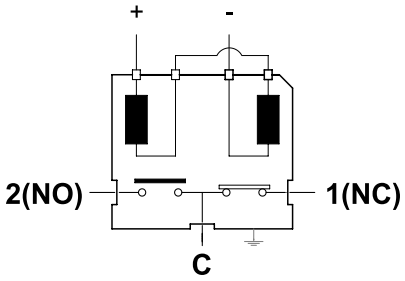
Notes:
1. Can be combined with a failsafe model, so as to achieve the "BYPASS" function (see application details on page 2-6).
2. See details about test fixture dimensions on page 2-4.
3. Only available with type 3.

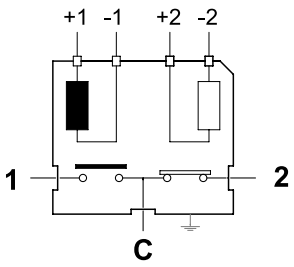
QUARTZ GENERAL SPECIFICATIONS

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

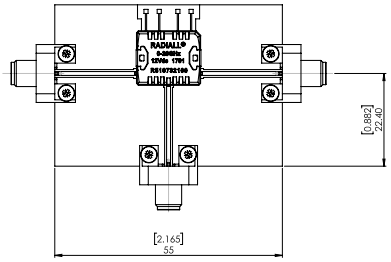
1. Failsafe models may be used down to –40 °C, for this application please follow requirements of AN-R516-51. Contact Radiall for a copy of this application note.

QUARTZ PERFORMANCE (S PARAMETERS AVAILABLE ON REQUEST)

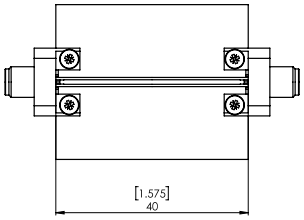
FREQUENCY RANGE GHz		V.S.W.R. (MAX)	INSERTION LOSS (MAX) dB	ISOLATION (MIN) dB	THIRD ORDER INTER MODULATION	IMPEDANCE Ω
				SWITCH ALONE		
DC – 8 DC – 18 DC – 26.5	DC – 3	1.20	0.20	50	-110 dBc typical at 1730 MHz (2 carriers 20 W)	50
	3 – 6	1.35	0.40	40		
	6 – 8	1.40	0.50	40		
	8 – 12.4	1.50	0.60	40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

MEASUREMENT METHOD

RELAY SOLDERED ON TEST FIXTURE [1]



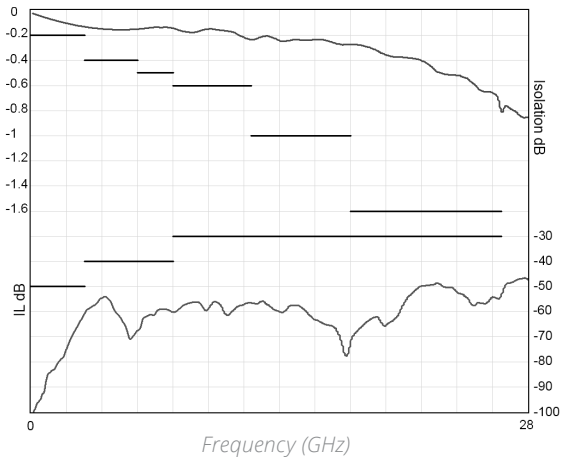
CALIBRATION BOARD



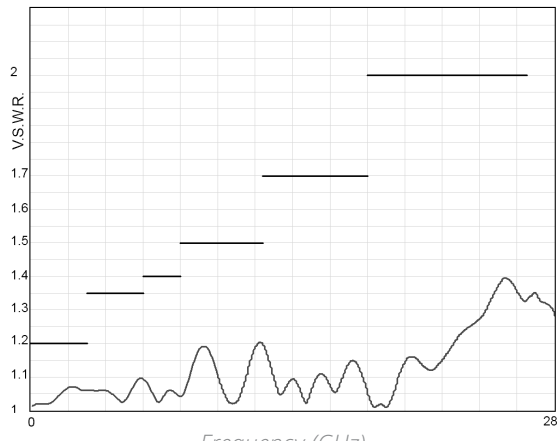
Inputs/Outputs of the calibration board and test fixture are equipped with coaxial type receptacle connectors. The length of the RF tracks is the same on the calibration board and the test fixture circuits. The insertion loss of the relay itself is calculated by subtracting the insertion loss of the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

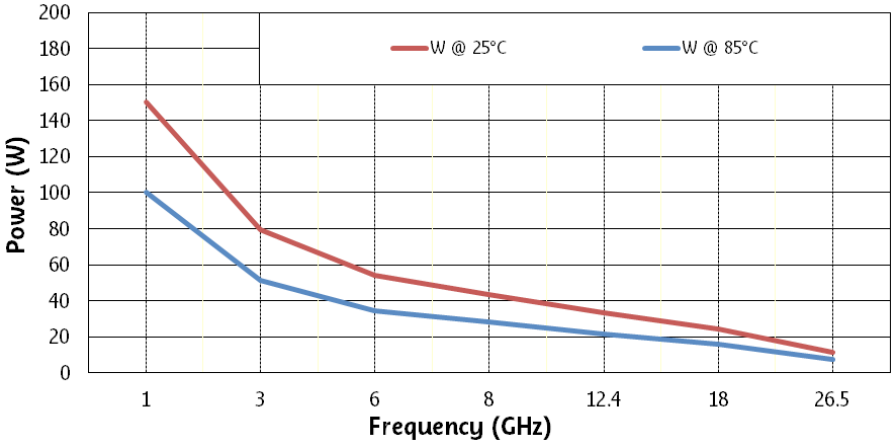
1. Relay soldered on Test Fixture is available. To order, please use the suffix "T" (part number R516 - - - - - T), as explained in page 2-2. All dimensions are in millimeters [inches].

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.

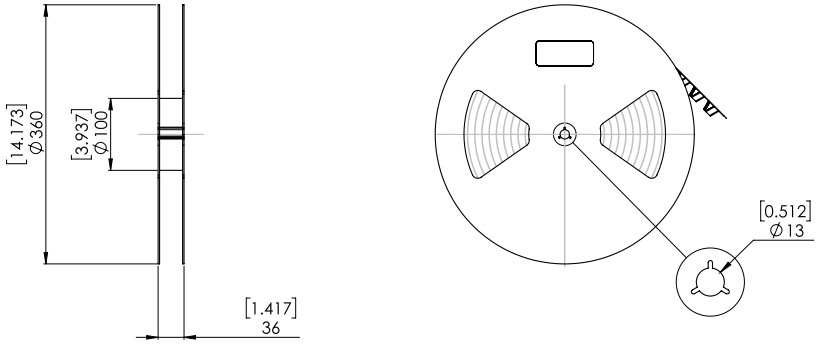


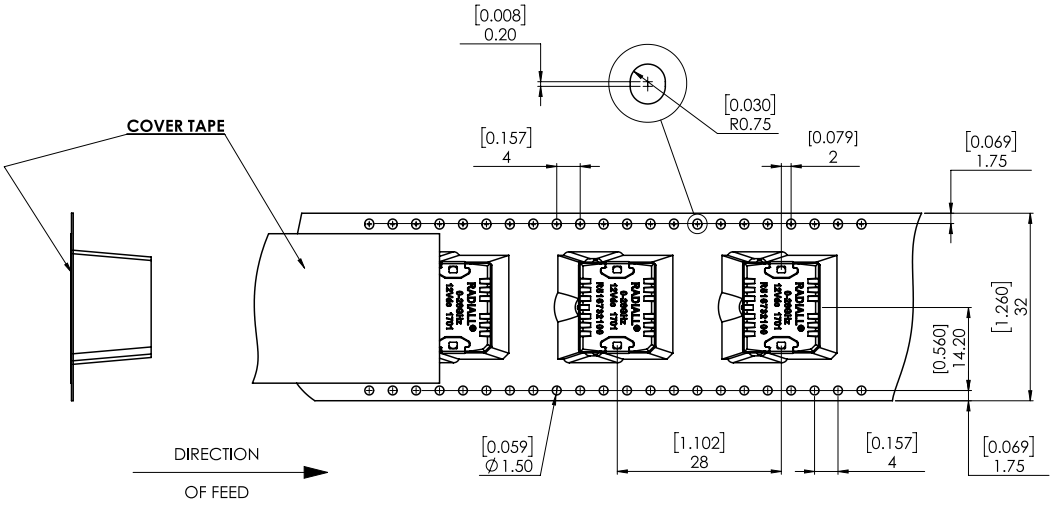
RELAY PACKAGING

ACCORDING TO IEC 286-3 STANDARD

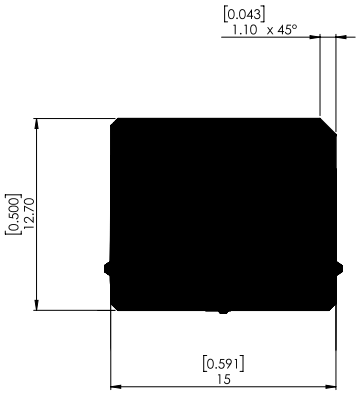
Materials:

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

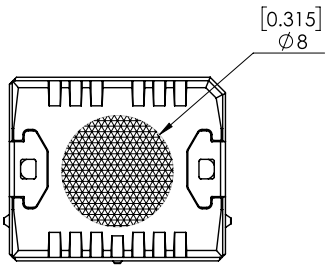




VIDEO SHADOW OF THE RELAY

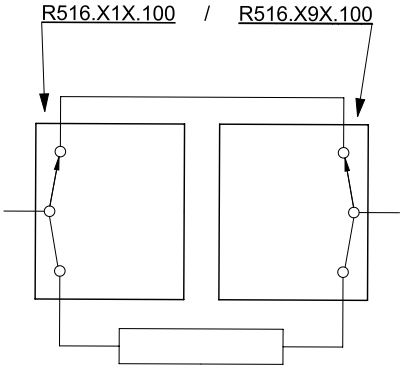


ASPIRATION AREA



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.

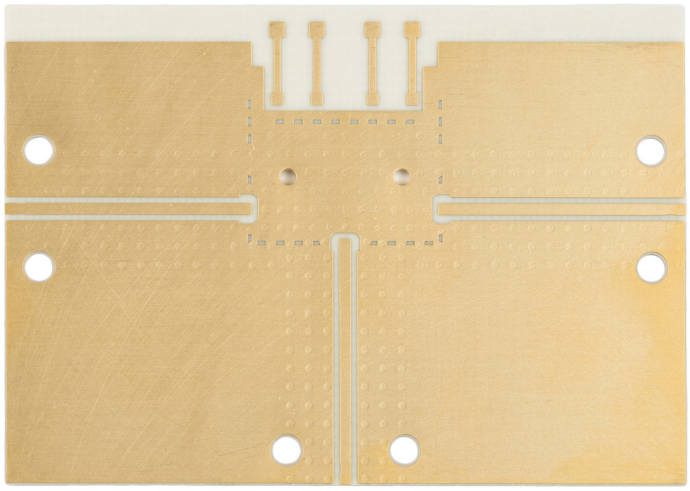
Notes

All dimensions are in millimeters [inches].

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 µm.

Recommended total thickness of RF tracks (copper over thickness + plating): 40 µm.
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

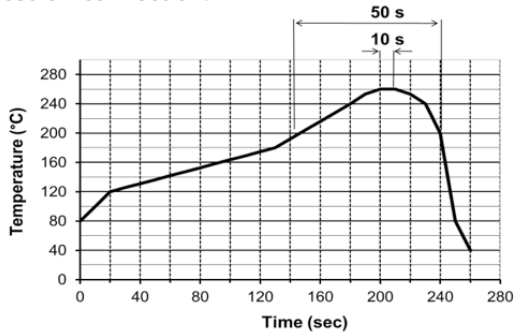
1 - Solder paste: R516 series are “Lead Free”, and Lead Free Sn-Ag3.5-Cu0.7 solder cream may be used as well as standard Sn63–Pb35–Ag2. Radiall recommends using a "no clean - low residue" solder cream (5% solid residue of flux quantity) that will permit the elimination of the cleaning operation step 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 a 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.

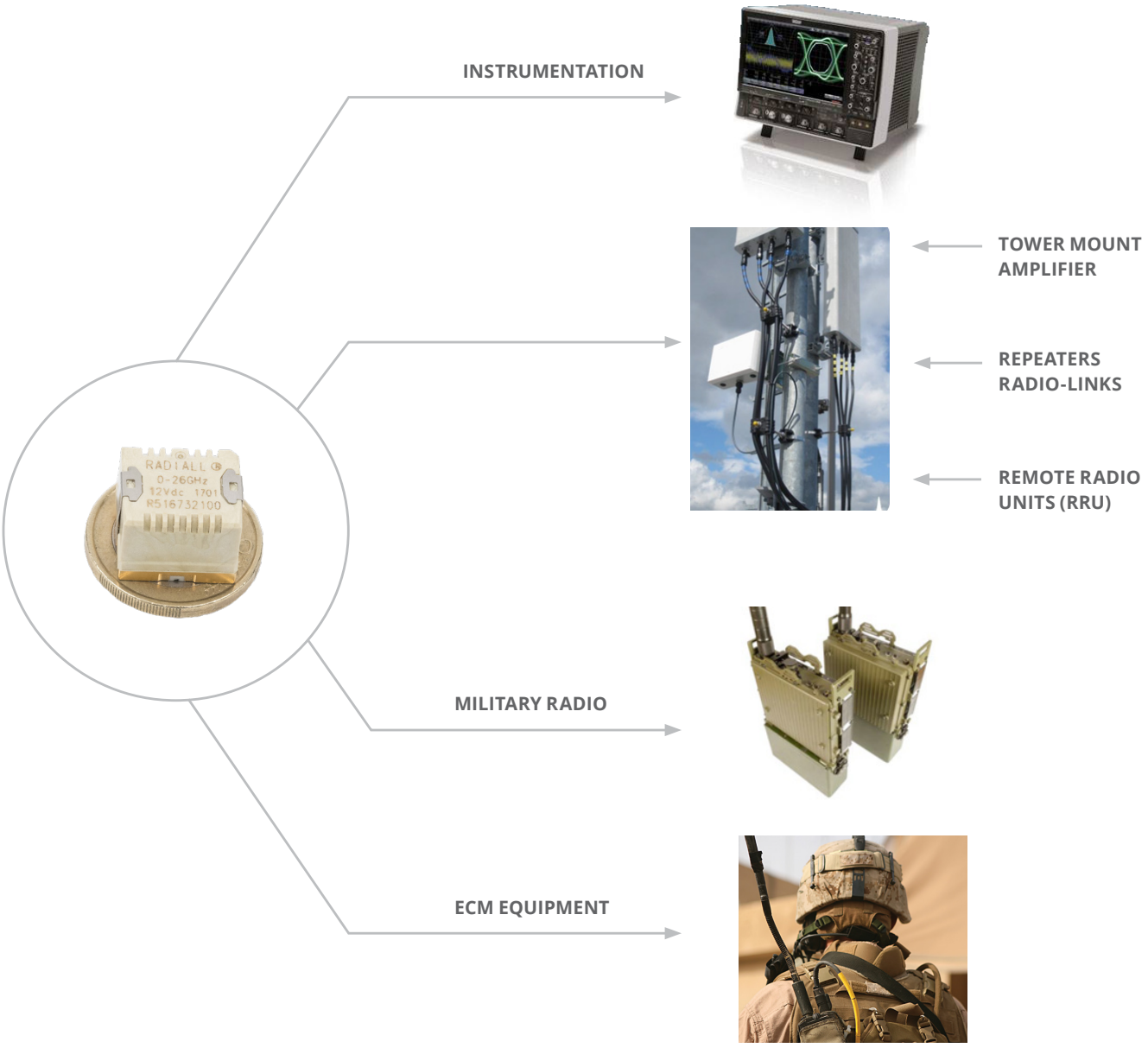
APPLICATIONS

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

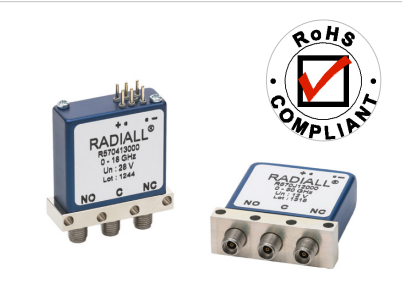
These products offer the same RF Board and soldering process as all RF components but with a reduced weight and size. They are designed to meet all market specifications.



RAMSES Series

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 [5]
4: SMA up to 18 GHz
F: SMA up to 26.5 GHz
8: SMA 2.9 up to 40 GHz [6]
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 [4]

TYPE
1: Failsafe
2: Failsafe + I.C.
3: Latching
4: Latching + I.C.
5: Latching + S.C.O. [1]
6: Latching + S.C.O. + I.C. [1]

ACTUATOR VOLTAGE
2: 12 Vdc
3: 28 Vdc

TTL OPTION
0: Without TTL driver
1: With TTL driver [1 & 2]

OPTIONS
0: Without option
1: Positive common [2 & 3]
3: With suppression diodes [1]
4: With suppression diodes and positive common [1, 2 & 3]

ACTUATOR TERMINALS
0: Solder pins

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 tradermark (Quick Lock Formula®) standard applies to QMA and QN series and guaranties the full intermateability between suppliers using this tradermark. 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.

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	10			
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	50
		3 - 6	1.30	0.30	70	
SMA	DC - 3 DC - 18 DC - 26.5	DC - 3	1.10	0.15	80	
		3 - 8	1.20	0.20	75	
		8 - 12.4	1.20	0.25	65	
		12.4 - 18	1.40	0.35	60	
		18 - 26.5	1.50	0.50	55	
SMA 2.9	DC - 40	DC - 6	1.30	0.30	70	
		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	
PC Board	DC - 3	DC - 3	1.20	0.20	80	
2.4 mm	DC - 50	DC - 6	1.30	0.30	70	
		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	

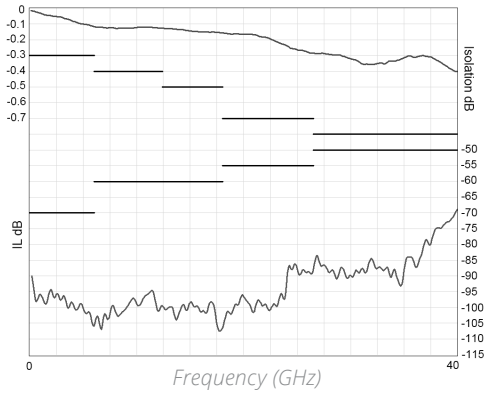
Notes

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

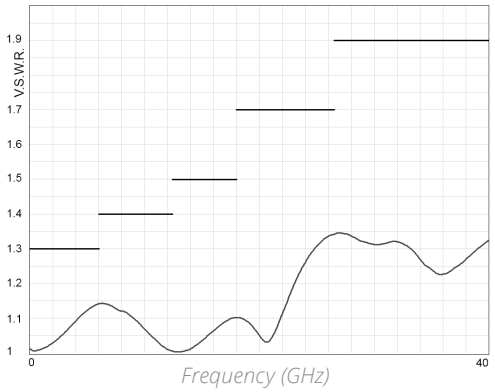
R570 TYPICAL RF PERFORMANCE

Example: SPDT SMA 2.9 up to 40 GHz

INSERTION LOSS & ISOLATION

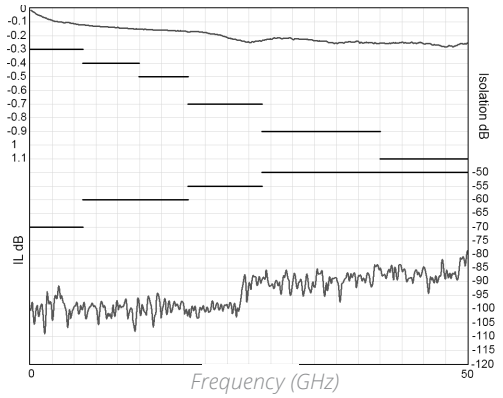


V.S.W.R

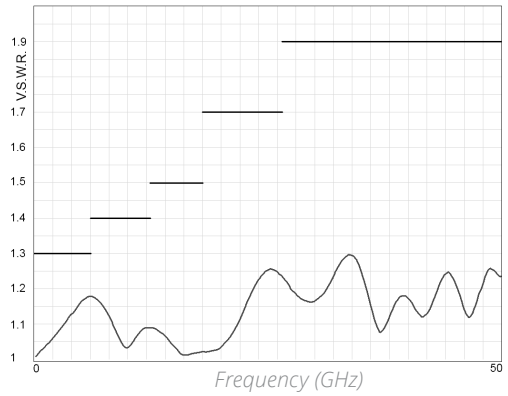


Example: SPDT 2.4 mm up to 50 GHz

INSERTION LOSS & ISOLATION

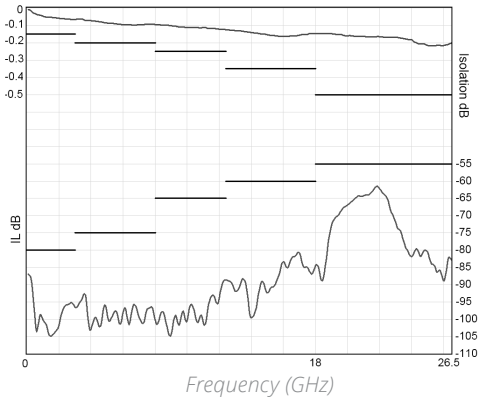


V.S.W.R

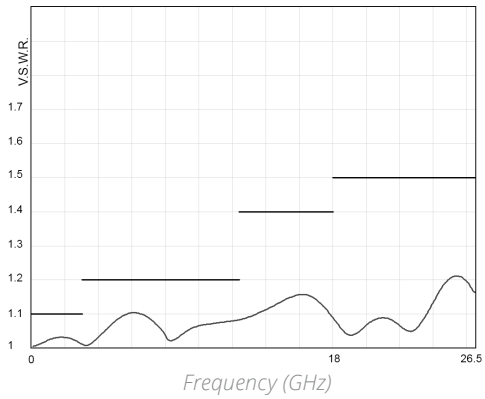


Example: SPDT SMA up to 26.5 GHz

INSERTION LOSS & ISOLATION



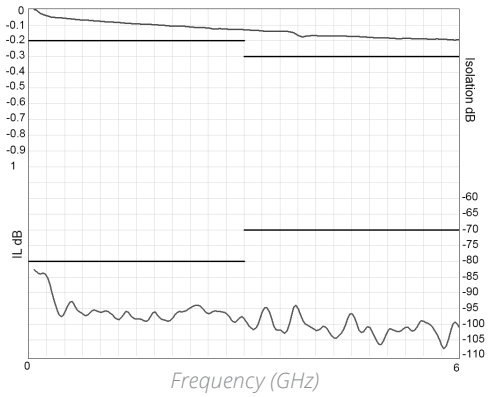
V.S.W.R



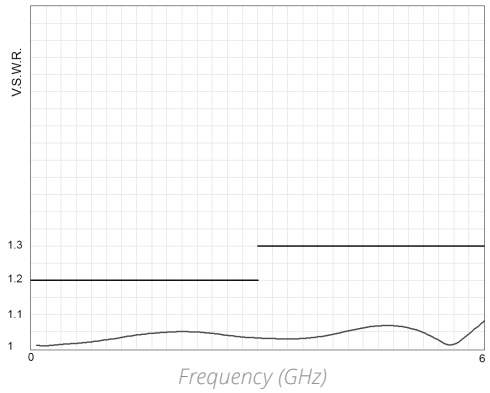
R570 TYPICAL RF PERFORMANCE (CONTINUED)

Example: SPDT QMA up to 6 GHz

INSERTION LOSS & ISOLATION

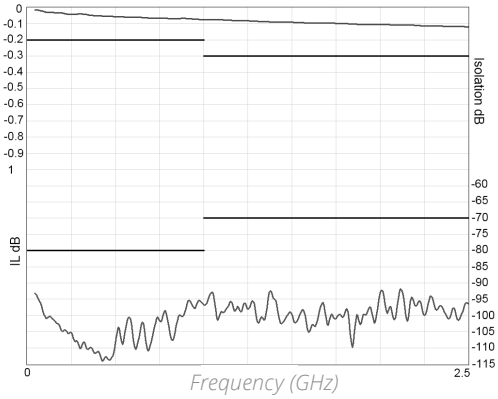


V.S.W.R

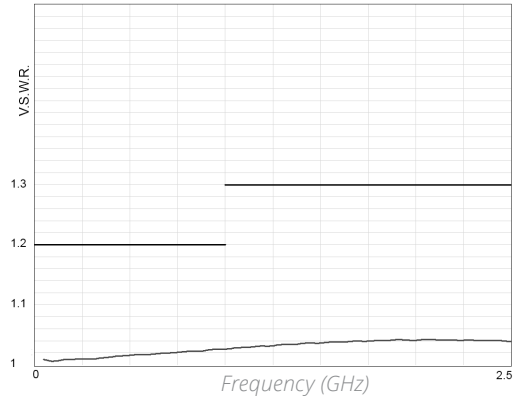


Example: SPDT DIN 1.6/5.6 up to 2.5 GHz

INSERTION LOSS & ISOLATION

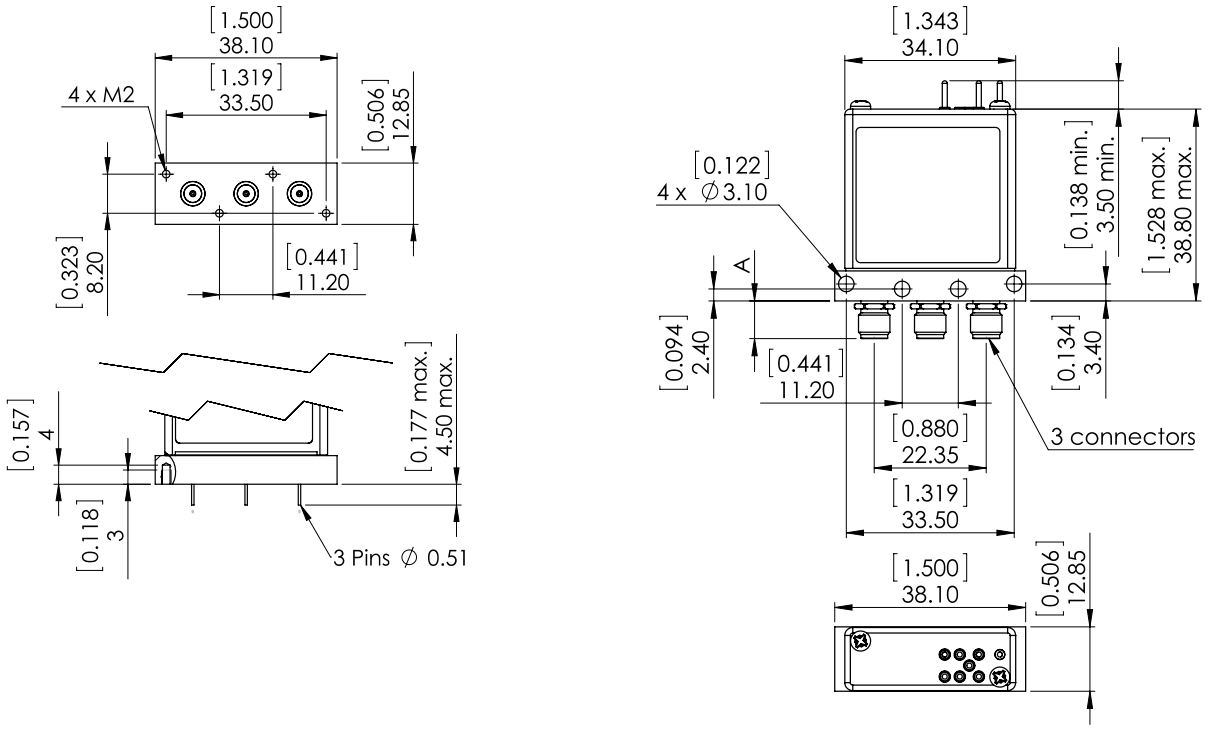


V.S.W.R



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]

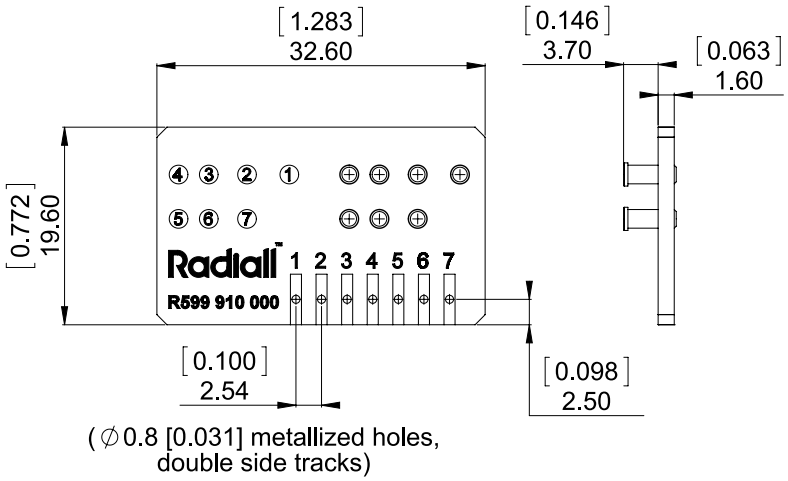


Notes

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.



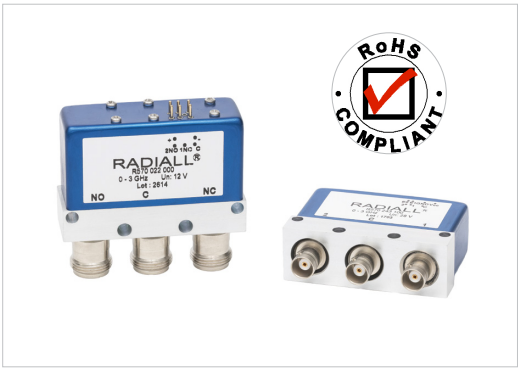
Notes

All dimensions are in millimeters [inches].
The PCB accessory pin number assignment is independant from the pin identification table of the switch.

RAMSES Series

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 supression 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. [1]
6: Latching + S.C.O. + I.C. [1]

ACTUATOR VOLTAGE
2: 12 Vdc
3: 28 Vdc

TTL OPTION
0: Without TTL driver
1: With TTL driver [1 & 2]

OPTIONS
0: Without option
1: Positive common [2 & 3]
3: With suppression diodes [1]
4: With suppression diodes and positive common [1, 2 & 3]

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

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.

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	

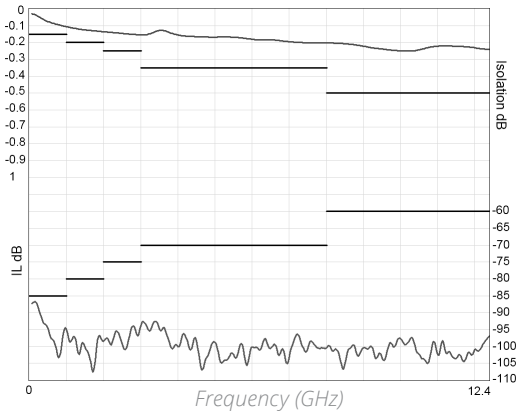
Notes

See page 2-18 for typical RF performance.

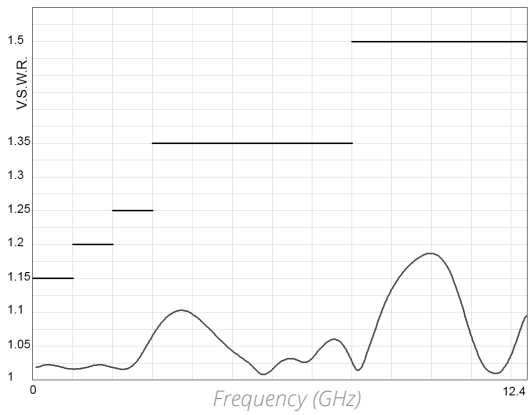
R570 TYPICAL RF PERFORMANCE

Example: SPDT N and TNC up to 12.4 GHz

INSERTION LOSS & ISOLATION

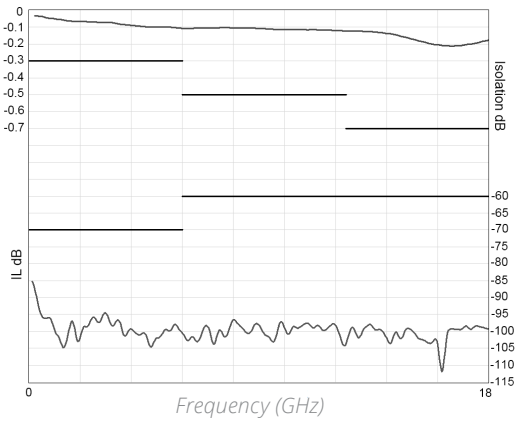


V.S.W.R

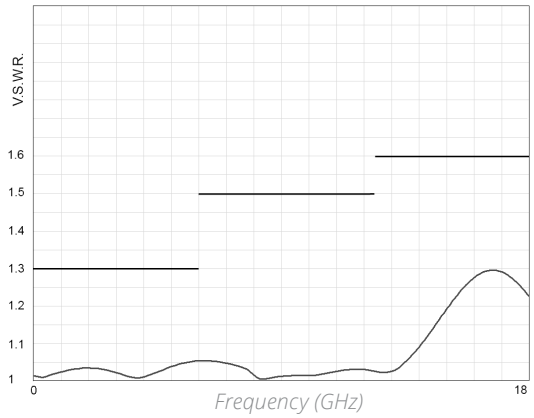


Example: SPDT TNC up to 18 GHz

INSERTION LOSS & ISOLATION

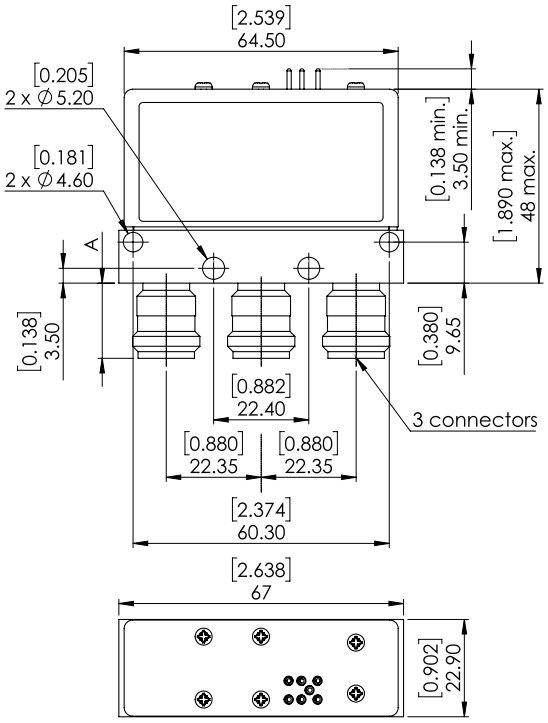


V.S.W.R

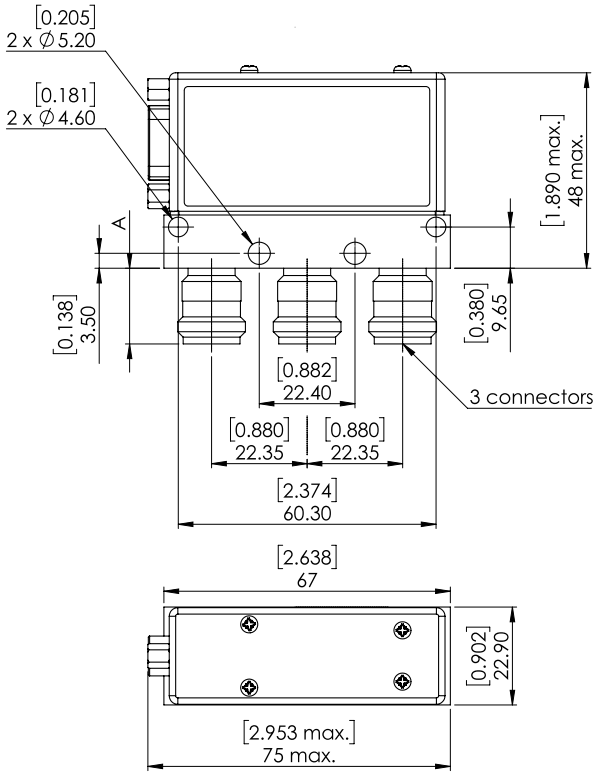


TYPICAL OUTLINE DRAWING

WITH SOLDER PINS



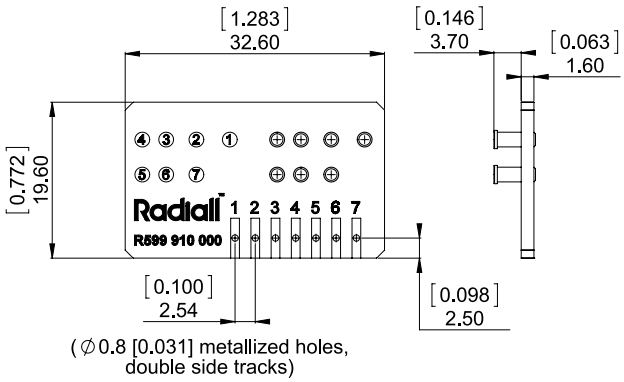
WITH D-SUB CONNECTOR



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.

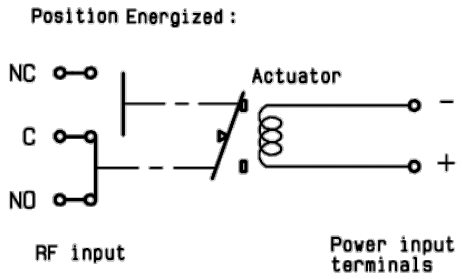
Electrical Schematics

COAXIAL SPDT

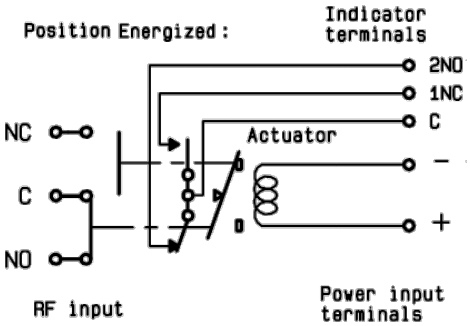
R570 SERIES

FAILSAFE

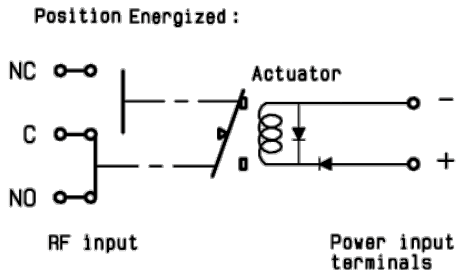
WITHOUT OPTION
R570-1-000



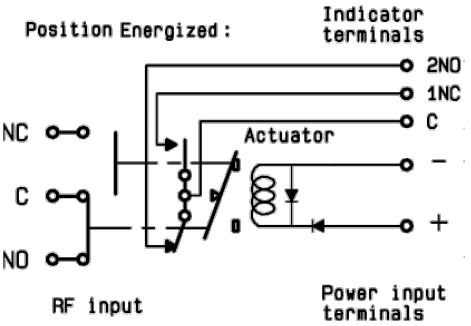
WITH INDICATOR CONTACT
R570-2-000



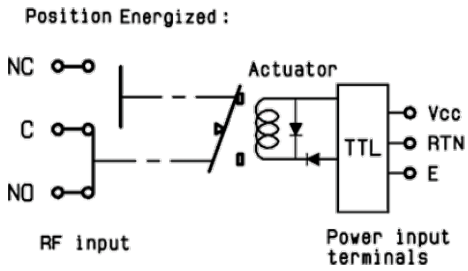
WITH SUPPRESSION DIODES
R570-1-030



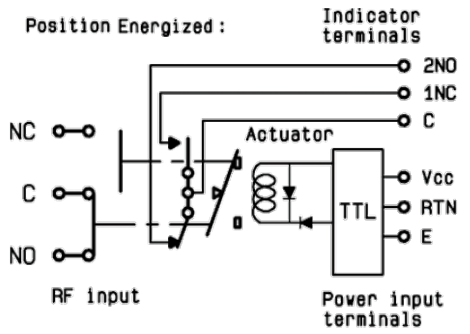
WITH SUPPRESSION DIODES & INDICATOR CONTACT
R570-2-030



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



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



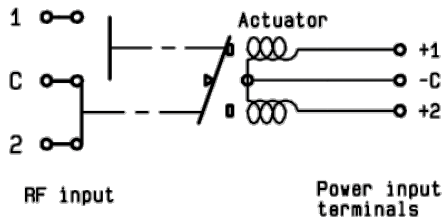
Electrical Schematics

COAXIAL SPDT

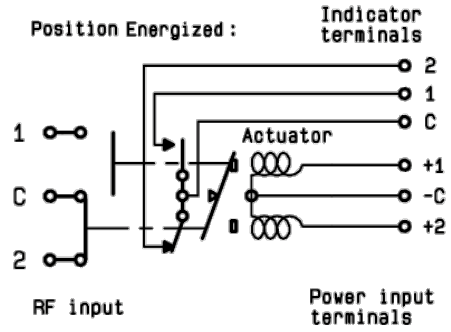
R570 SERIES

LATCHING

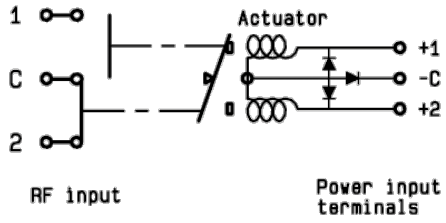
WITHOUT OPTION
R570-3-000



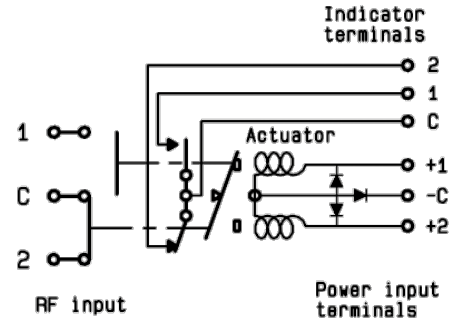
WITH INDICATOR CONTACT
R570-4-000



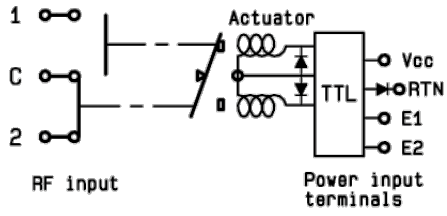
WITH SUPPRESSION DIODES
R570-3-030



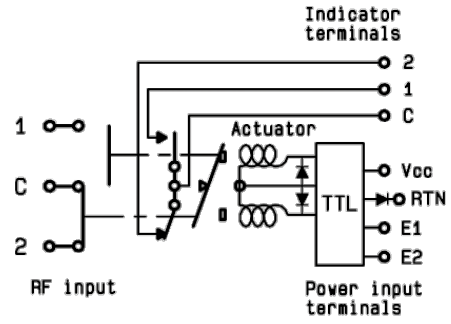
WITH SUPPRESSION DIODES & INDICATOR CONTACT
R570-4-030



WITH TTL DRIVER (SUPRESSION DIODES ARE INCLUDED)
R570-3-100



WITH TTL DRIVER & INDICATOR CONTACT (SUPRESSION DIODES ARE INCLUDED)
R570-4-100



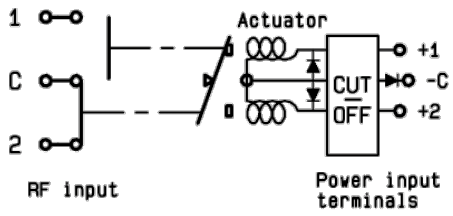
Electrical Schematics

COAXIAL SPDT (CONTINUED)

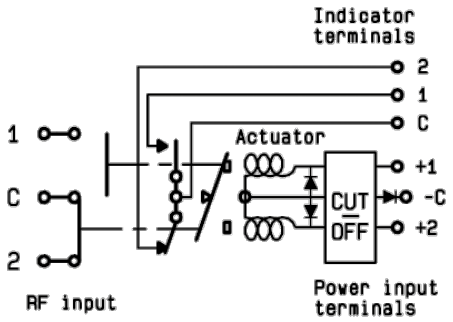
R570 SERIES

LATCHING

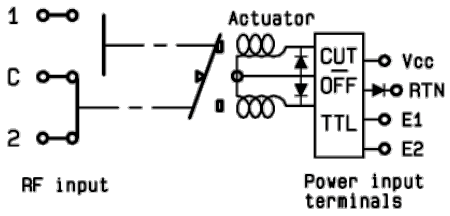
WITH CUT-OFF (SUPRESSION DIODES ARE INCLUDED)
R570-5-100



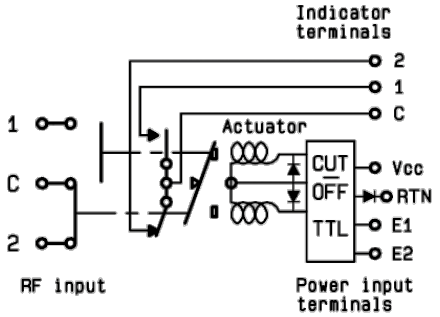
WITH CUT-OFF & INDICATOR CONTACT
(SUPRESSION DIODES ARE INCLUDED)
R570-6-100



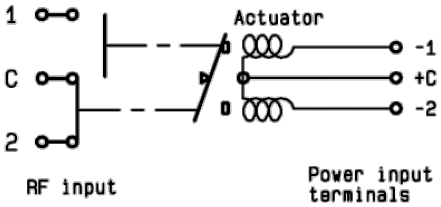
WITH CUT-OFF & TTL DRIVER
(SUPRESSION DIODES ARE INCLUDED)
R570-5-100



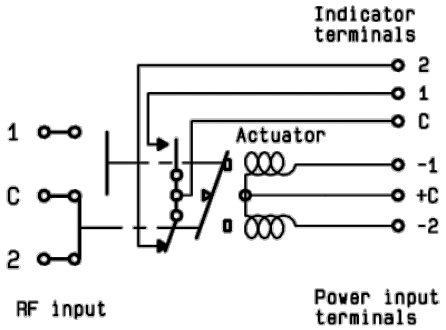
WITH CUT-OFF & INDICATOR CONTACT
(SUPRESSION DIODES ARE INCLUDED)
R570-6-100



WITH POSITIVE COMMON, NO OPTION
R570-3-010



WITH POSITIVE COMMON & INDICATOR CONTACT
R570-5-010



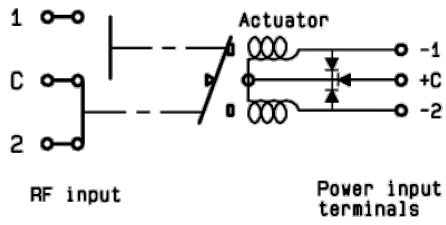
Electrical Schematics

COAXIAL SPDT (CONTINUED)

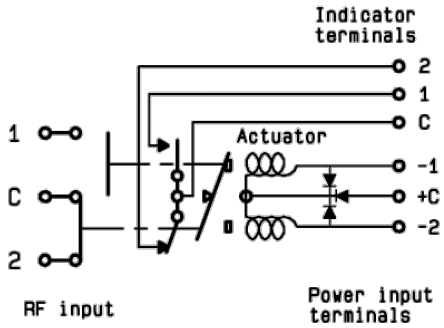
R570 SERIES

LATCHING

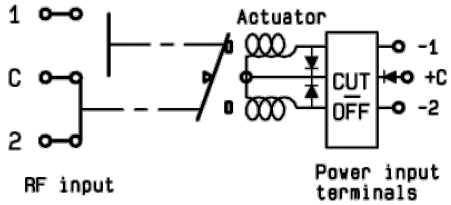
WITH POSITIVE COMMON & SUPPRESSION DIODES
R570-3-040



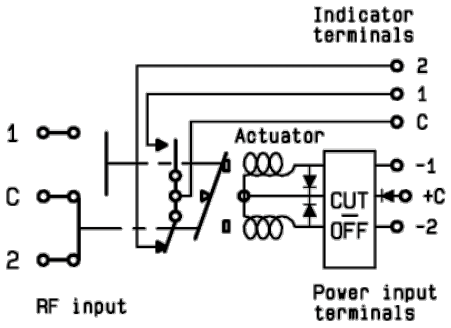
WITH POSITIVE COMMON, SUPPRESSION (DIODES & INDICATOR CONTACT)
R570-4-040



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



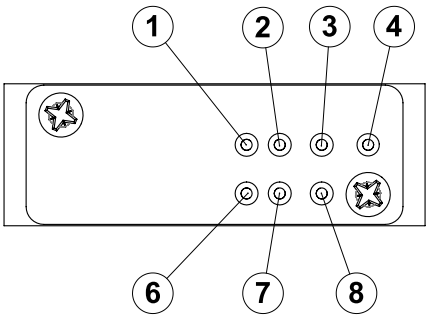
WITH POSITIVE COMMON, CUT-OFF & INDICATOR CONTACT (SUPRESSION DIODES ARE INCLUDED)
R570-6-010



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

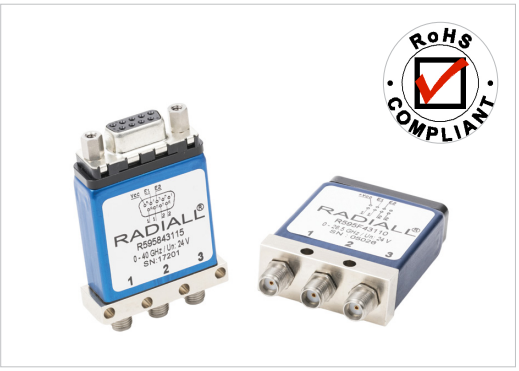
Top View



Platinum Series

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 [1]
4: Latching + I.C. [1]
5: Latching + S.C.O. [1]
6: Latching + S.C.O. + I.C. [1]

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)

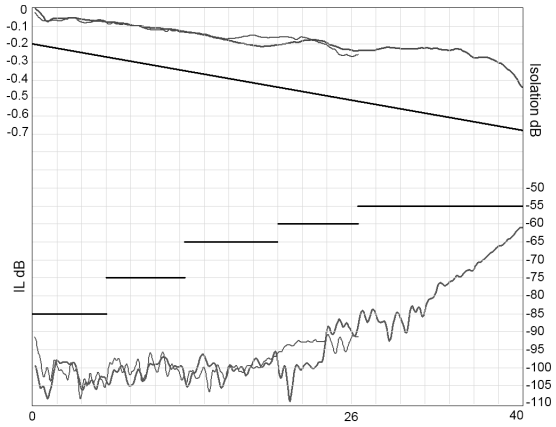
Platinum Series

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 maximun					0.05 dB maximun	

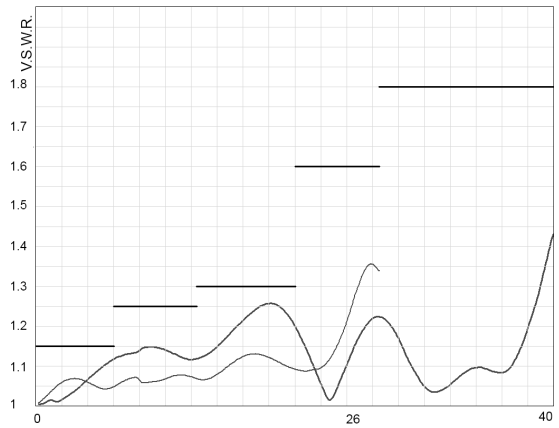
TYPICAL RF PERFORMANCE

INSERTION LOSS & ISOLATION



Frequency (GHz)

V.S.W.R



Frequency (GHz)

SMA —— **SMA 2.9** ▬

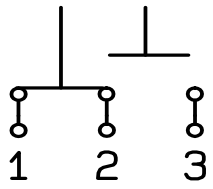
Platinum Series

SWITCH MODEL: NON-TERMINATED SPDT SWITCH

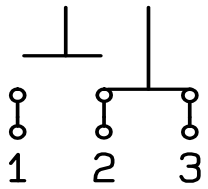
The non-terminated SPDT switch is a single pole double throw switch. This switch is considered "break-before-make."

RF Schematic Diagram

POSITION E1

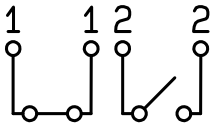


POSITION E2

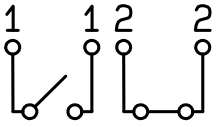


Position Indicator

STATE 11



STATE 22

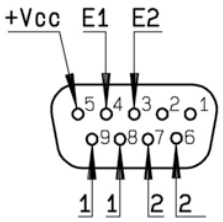


Standard drive option "1"
(Positive common):

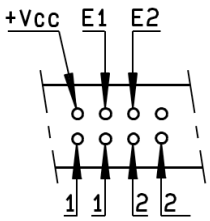
- Connect pin +Vcc to supply (+20 Vdc to +32 Vdc)
- Select desired RF path by applying ground to the corresponding "close" pin (Ex: ground pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open)
- To open desired path and close the new RF path, connect ground to the corresponding "close"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

TTL drive option "2"

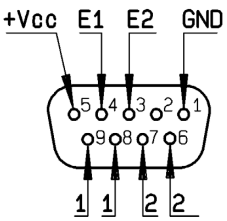
- Connect pin GND to ground
- Connect pin +Vcc to supply (+20 Vdc to +32 Vdc)
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open)
- To open desired path and close the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



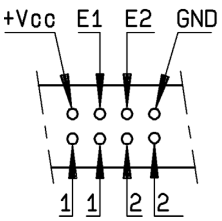
D-Sub connector



Solder pins



D-Sub connector

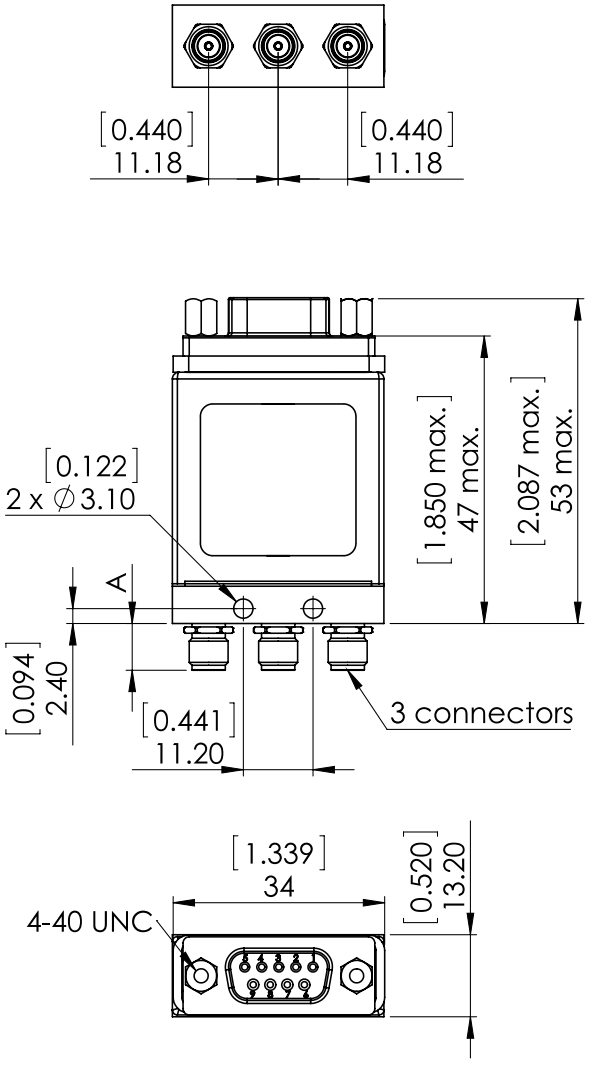


Solder pins

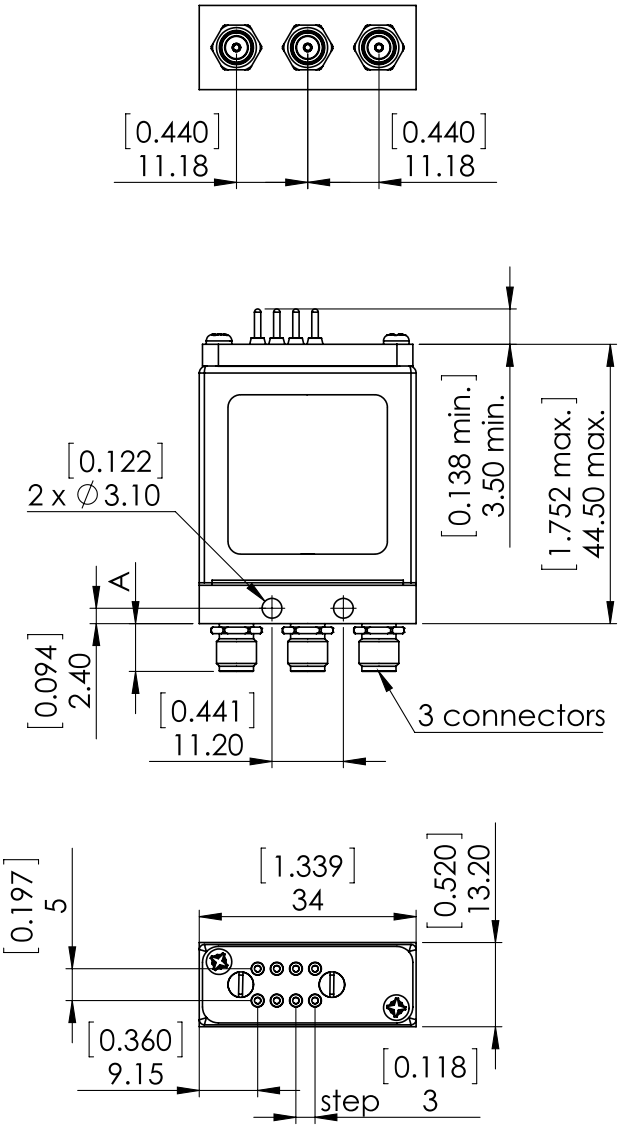
SMA - SMA 2.9

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]

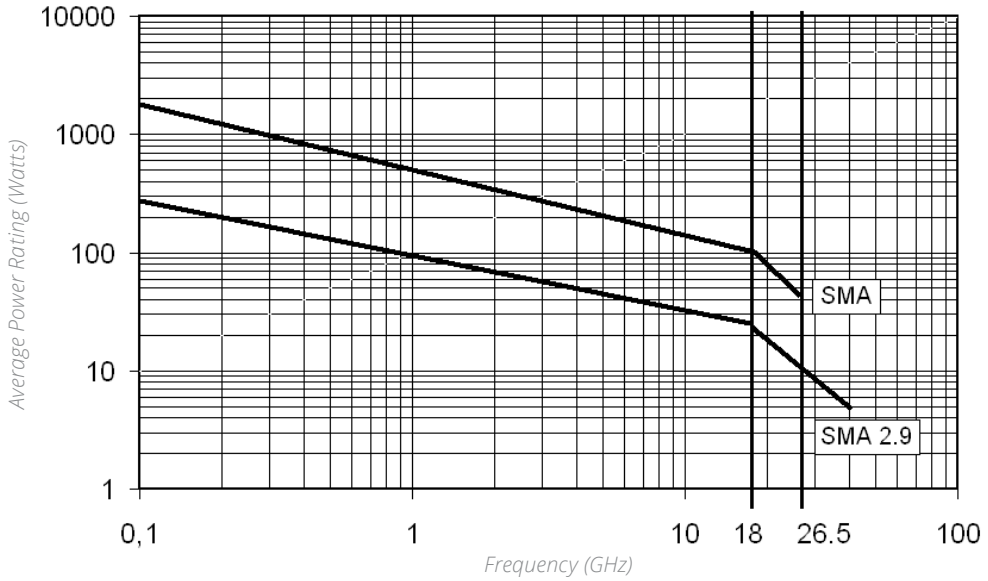
Notes

All dimensions are in millimeters [inches].

RF POWER RATING CHART

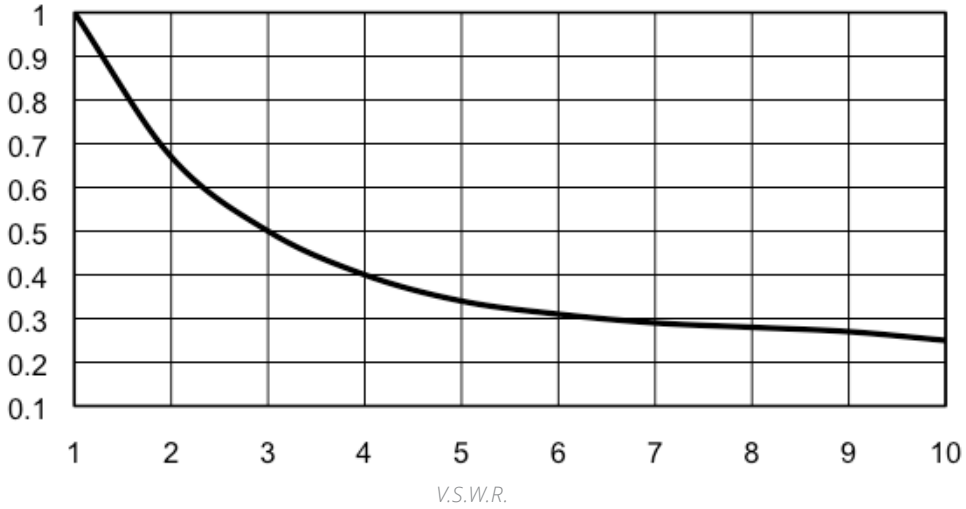
This graph is based on the following conditions:

- *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



OPTIONAL FEATURES

GENERAL

All miniature SPDT switches fitted with SMA, QMA, 2.4 mm or SMA 2.9 connectors can be delivered with 34 mm narrow width RF body.

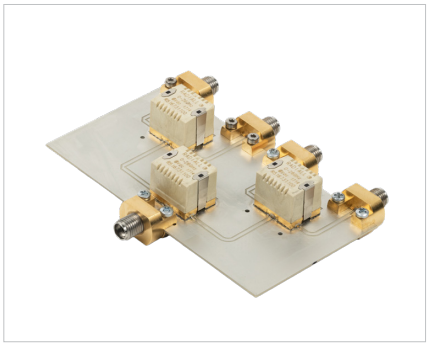
Contact Radiall sales directly for availability.

EXAMPLES OF DEDICATED APPLICATION OPTIONS

SMA SPDT with a SINGLE input TTL driver. This option is available in a latching configuration upon special request. Key advantages include less wires and easier connection.

SPDT with MILC38999 circular connector for L band airbone applications.

SPDT models available for high power military applications (up to 100 watts CW from DC to 18 GHz).



A SP4T design up to 26.5 GHz with SMT relays mounted on a PCB fitted with UMP (Ultra Miniature Pressure) contact. Various switching configurations can be designed according to your specific requests.

SPDT with D-sub connector can be designed.