RF & MICROWAVE COMPONENTS

Coaxial switching products

RADIALL
The next conneXion

COMPANY Profile

Founded in 1952 in France, RADIALL started as a family owned company making coaxial plugs. Today, RADIALL is an international and global manufacturer of interconnect components including ***RF coaxial connectors and cable assemblies****,* ***antennas****,* ***fiber optic components****,* ***microwave components,*** *and* ***multipin connectors*** *for the Automotive, Civil Aviation, Defense, Industrial, Medical, Space and Telecommunication markets.*

QSE (Quality Safety Environment) POLICY

RADIALL maintains a quality management system conforming to international standards, including for environmental protection. Our customers' recognition of our products quality and sustainability of our company, demonstrates the efficiency of our quality system.

CERTIFICATIONS

Certified ISO 9001 since 1994, RADIALL has a pro-active policy in terms of conforming to international standards. Today, all RADIALL sites are certified to **ISO 9001:2000** and some dedicated activities are AS9100 or TS 16949. Our process approach gives us the tool for continuous improvement in all our activities.

A major step in our environment policy was the **ISO 14001** certification of our Voreppe plant in 2001. RADIALL complies with European directives such as **RoHS** for hazardous substance restrictions and **EuP** for environmentally friendly designs of energy-using products.

Some RADIALL product lines are on **MIL, ESA/SCC** Qualified Product Lists.

RADIALL is therefore proud to be recognized by leading industrial customers for its quality of service and products.

A WORLDWIDE ENGINEERING & MANUFACTURING CAPABILITY

RADIALL has expertise centers and manufacturing locations on 3 continents. Through 9 industrial sites, RADIALL offers customers the proximity they need to obtain the best quality service and delivery performance. Our facilities feature state of the art equipment for the many technologies involved in the design, manufacturing and assembly of interconnect products. This international organization allows RADIALL to offer its outstanding quality products at competitive prices.

Technical information and sales contacts are available on: www.radiall.com

SWITCHING PRODUCTS

CONTENTS

All dimensions in this catalog are given in millimeters

Head office - Rosny sous Bois FRANCE

A WIDE FIELD OF ACTIVITY

Specialized in passive microwave components, the RADIALL's engineering staff designs and manufactures a wide range of coaxial standard devices including terminations, attenuators, couplers, coaxial detectors, coaxial and waveguide switches, covering a wide frequency spectrum from DC to 40 GHz.

EXPERIENCE

Owing to its 50 years experience, its high level of quality and its constant effort in R&D, **RADIALL** has become the **EUROPEAN "N°1"** in coaxial connectors.

Supported by its position, **RADIALL** has excelled in passive microwave component fields for more than 40 years.

RADIALL's competence in design, development and manufacturing of passive microwave components is today widely acknowledged.

CAPACITIES AND FACILITIES

The association inside the same plant of all the technical skills : marketing, R&D, industrialization, manufacturing and quality control enable **RADIALL** to produce a range of high performance and low cost devices for industrial applications as well as high reliability components for severe requirements in military and space fields.

RESEARCH AND DEVELOPMENT

The increasing complexity of microwave systems requires more and more high performance components.

To meet these requirements, the R&D department is constantly engaged in the development of new products as well as improvement on present products.

Fitted out with microwave and mechanical CAD and with the latest generation of microwave test equipments up to 60 GHz, **RADIALL** uses the state-of-the-arts technology to optimize its products and to give the fastest response to the specific customer requirements.

PRODUCTION

Electrical performances of microwave products are closely dependent upon machining quality of individual piece parts and associated plating.

The latest computer-controlled machinary, and an in-house plating department allow **RADIALL** to manufacture high quality piece parts compatible with the requirement of our components.

Owing to its thick film and thin film etching equipments, our production department warrants the quality and the reproductibility of our resistive cells used in most of our terminated switching products.

A “prototype” workshop enables **RADIALL** to give a fast answer to special customer requirements.

All the phases of manufacturing and test are strictly inspected by our quality department, so as to warrant the constancy of our products and to achieve general and specific requirements.

QUALITY AND RELIABILITY AND PATENTS

Quality and reliability : Two major requirements of passive microwave components that **RADIALL** has been taking into account for years. **ISO 9001 V2000** label is the best evidence of quality assurance interfaces at every stage of a product from designing to manufacturing.

All new products are bounded to rigid qualification programs before mass production. In the same way, every element which could affect products quality is tested periodically.


BUREAU VERITAS
Certification

RADIALL

NF EN ISO 9001 : 2000

Also RADIALL switches are patent protected products.

NATO CODE

RADIALL is a qualified microwave components manufacturer under military label (manufacturer code F0503 and F6507). Its products quality assurance has been developed in accordance with N.A.T.O. standards.

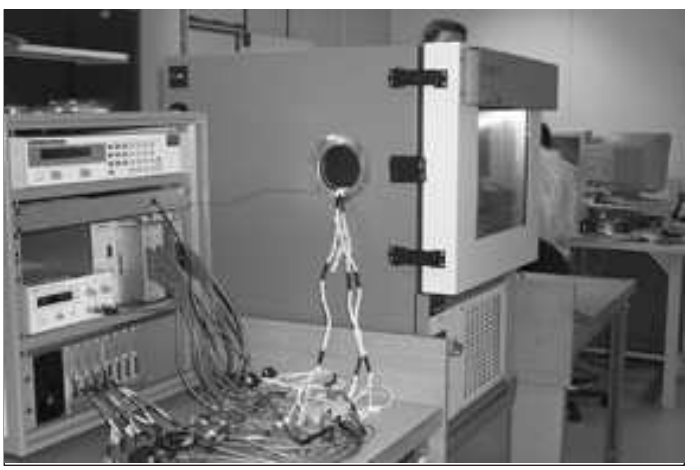
1) A TESTING LABORATORY

As an illutration of **RADIALL**'s commitment to quality and reliability, **RADIALL** has an in-house test laboratory qualified by CECC which permits **RADIALL** to carry out most of tests required by its customers.

2) PARTIAL LIST OF TEST MEANS

● ELECTRICALS

Breakdown voltage	12 KVolts
Insulation resistance	40.10^3 MOhms
Contact resistance	1µOhms

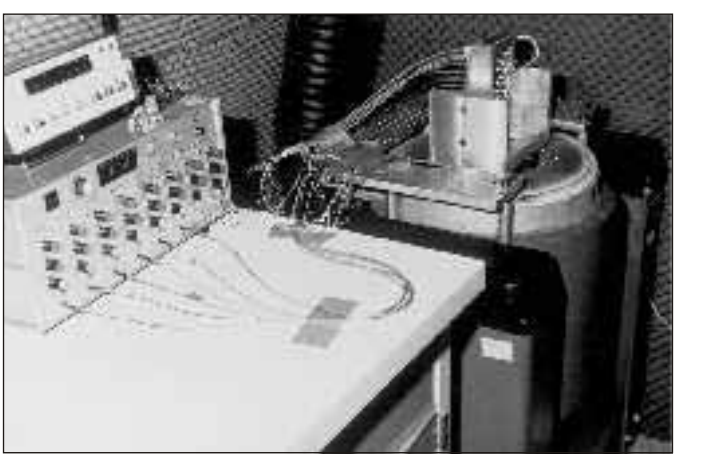


● ENVIRONMENTAL

Vibrations : Sine random	0 - 120g 5 to 4000 Hz
Shocks	30 to 1000g
Shakes	25 to 40g 6 ms
Thermal vacuum	10^{-5} TORR -45 to +100°C
Thermal shock	-70°C +200°C / transfert 20s
Storage temperature	-70°C to +200°C
Humidity	20 to 98% HR
Salt spray	-35°C to +55°C
Hermeticity	Helium 10^{-5} to 10^{-8} atm cm^3/s

● MICROWAVE

V.S.W.R insertion loss Isolation	Vector Network Analyzer From 0.04 up to 60 GHz TDR 150ps
RF Leakage/EMC	Reverberation chamber method 0.5 to 20 GHz / Noise 100 dB
Power Handling	400 W CW at 936 MHz 400 W CW at 17.8 GHz 20 W CW 8 up to 18 GHz 100 W CW at 420 MHz



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3) CAPABILITIES

RADIALL offers coaxial switches in four major markets :

Telecom , Instrumentation, Military and Hi-Rel Space.

RADIALL products are currently used in military airborne, earth stations, Automatic Test Equipments, Instrumentation systems, wireless base stations and space applications including ground segment.

This catalog is intended to be used as a guide in selecting the right type of switch for a given application.

It is important to note that **RADIALL** doesn't limit itself to catalog products and has the flexibility to design a specific product on a tight schedule at a reasonable cost.

RADIALL welcomes discussions of each customer's unique requirements.

4) RELIABILITY

All **RADIALL** coaxial switches offer exceptional reliability and performances. A unique patented design of the actuator and transmission link enables **RADIALL** to guarantee operation from 2 million cycle for Terminated SPnT up to 10 million cycle for SPDT with excellent repeatability.

5) LIST OF APPLICABLE DOCUMENTS

List of related documents covering the general mechanical and environmental tests applicable to the devices described in this catalogue.

AIR 7304	NFC 93563	MIL C39012
DIN 47295	NFC 93564	MIL E 5400
NFC 93561	NFC 96317	MIL STD 202
NFC 93562	MIL DTL 9328	154 IEC

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6) GENERAL SPECIFICATIONS designed to meet MIL DTL 3928 and MIL STD 202

ENVIRONMENTAL CHARACTERISTICS

These requirements are guaranteed according to MIL standard, see applicable product section to get more accurate and detailed information.

Vibrations *Method 204*	10 - 2000 Hz 10g	Operating
Shocks *Method 213*	50g, 1/2 sinus	Non-operating

MECHANICAL CHARACTERISTICS, MATERIALS AND FINISHES

All materials and finishes are in accordance with applicable MIL and NF specifications

All connectors are in accordance with applicable MIL, DIN, NF and CEI specifications.

All dimensions in this catalog are given in millimeters. The non specified dimensions are given within +/- 0.5 mm .

RF body	Aluminium, Gold plated Aluminium, Nickel plated Aluminium with Cr3 passivation
Contacts	Beryllium Copper, Gold plated
Insulator	PTFE, ULTEM 1000
Connectors	Stainless steel, passivated Brass, Nickel plated
Construction	Splash proof
Cover	Aluminium, blue anodized

7) MANUFACTURING AND QUALITY ASSURANCE

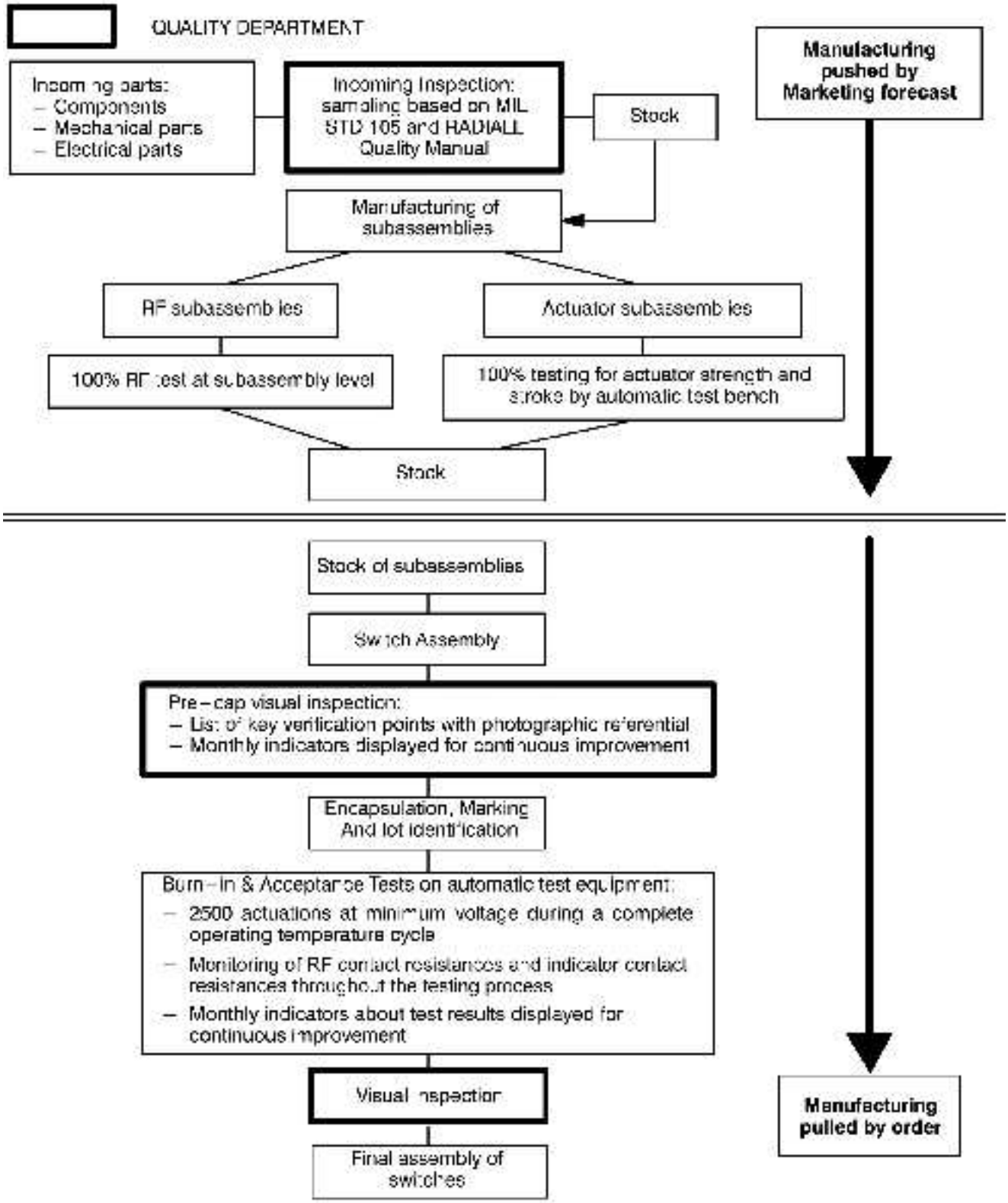
RADIALL's RF switch product line is made of approximately 16 series of switches, with each series divided into a large number of configurations. Part Numbers consist of 9 digits, each digit designating a portion of the part actual identity (such as series, frequency, actuator voltage, etc…). For each digit, 2 to 10 options are available. A complete Part Number represents a unique configuration. Overall, there are more than 80 000 different configurations available with very few sub-assemblies due to the modularity of the **RAMSES** switching line (less than 300 different sub-assemblies).

A PUSH-PULL manufacturing process has been implemented to reduce both lead time and inventory. Based upon Marketing forecast and monthly updates, various sub-assemblies are manufactured.

When an order is received, an automated MRP system selects the appropriate sub-assemblies from stock to manufacture the requested products within a short time frame (a few days to a few weeks) depending on the complexity of the product.

RADIALL has adopted the process management philosophy of " LEAN MANUFACTURING". This process enables the assurance of the best pricing and lead times on our coaxial products by eliminating all stages without added value of our administrative processes and production. This organization was first applied to our RAMSES SPDT coaxial relays and is being expanded to all other coaxial switches.

8) MANUFACTURING AND QUALITY ASSURANCE FLOW CHART



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9) RAMSES Concept

An innovative new system has been designed for constructing electromechanical coaxial RF switches with increased long-term reliability. The **RA**diall **M**odular **S**ystem for **E**lectromechanical **S**witches *(RAMSES)* is a patented concept that enables microwave coaxial switches to be produced with a typical operating life of 10 million cycles while suffering no decrease in contact resistance reliability over time. In addition, the unique internal construction makes the switches cost-competitive with traditional switches.

Friction Effects

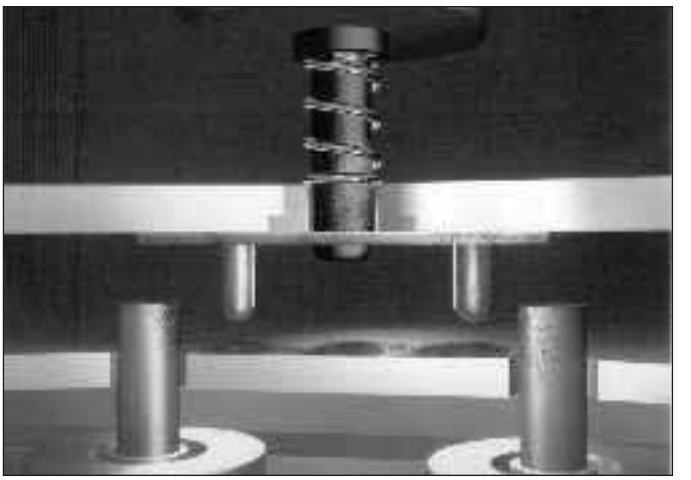
The unique design of *RAMSES* is based on the reduction of friction, which minimizes particle deposits that can interfere with the transmission of lower frequency signals (up to 3 GHz). This particle elimination effect is particularly important for telecommunications applications that are currently in the 900 MHz and 2 GHz regions. In addition, the design involves fewer components than other microwave switches, making it easier and quicker to assemble. These savings directly relate to lower cost for improved performance.

Many of the existing coaxial electromechanical switches also are able to function mechanically for 10 million operations. But the reliability and quality of the electrical contact can seriously degrade during that lifetime. In general, these traditional switches operate by moving a rectangular switching blades section inside a rectangular cavity. The blades are linked with pushers constructed of dielectric material that travel inside an access hole between the RF cavity and switch actuator. The pushers are directed by dielectric material guides. These dielectric parts rub on the blades and inside the access hole and generate isolating particles in the RF cavity that pollute the electrical contacts and ultimately cause running defects.

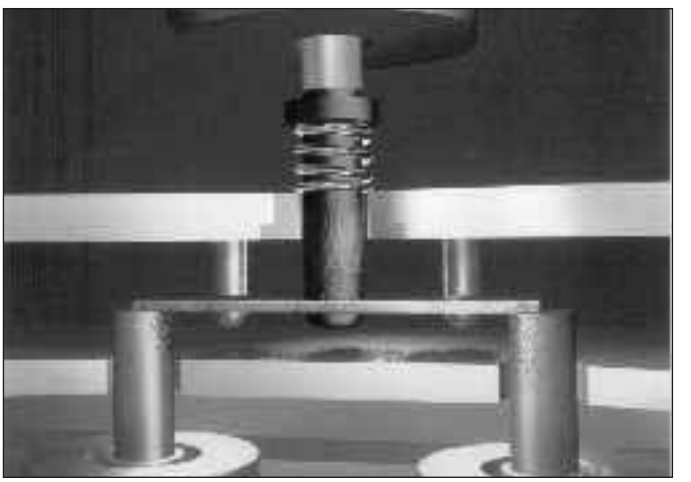
Figure 1 shows the build-up of minute dielectric particles on a set of conventional switch contacts after one million cycles. These defects are not particularly noticeable at very high frequencies since the contact is established by a capacitive effect. However, the insertion loss of the contacts increases considerably at lower frequencies (3GHz and below).

A new actuator Configuration

To eliminate this problem of increased insertion loss in the contacts, *RAMSES* devices incorporate a patented system compressing two parallel blades suspended from a bearer, which enables the guiding and positioning of the commutation blades to be accomplished entirely outside the RF cavity. These blades impose a rectilinear motion on the switching pusher, suppressing both friction and the production of particles inside the RF cavity. The unique



(a) RF line open



(b) RF line closed

Figure 1 : *Conventional switch contacts after one million cycles*

system is extremely small and can be used in all of the RAMSES series switches.

Figure 2 shows a cutaway view of a *RAMSES* coaxial switch displaying the actuator mechanism.

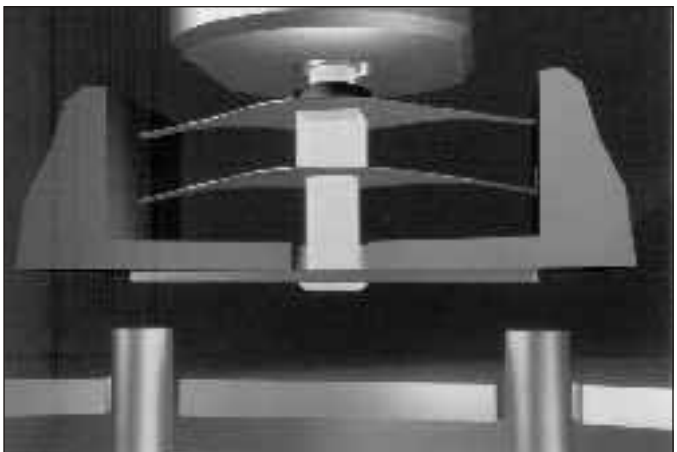
A second improvement involves a new rectilinear actuator design using high energy magnets and a switching performance in relation to its size. The system is used in the production of both fail-safe and latching actuators, depending on how it is applied in the switch. The actuator system also produces sticking forces that far exceed those of traditional actuators; that is, either 500g locking forces or 300 to 800g current forces for a power consumption of 100 mA at 28V. The new actuator has the added advantage of very low magnetic leakage, allowing actuators to be used in close proximity to one another without performance degradation. Finally, the use of a dry, solid lubricant and the control of friction areas produce an

Figure 2 : *A Cutaway view of* ***RAMSES*** *coaxial switch*

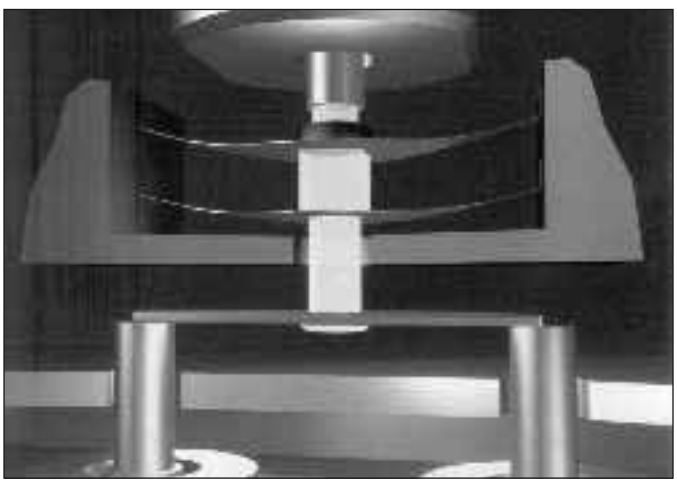
actuator life expectancy of over 50 million operations without defect over a -55° to +85°C temperature range

Switch Performance

RAMSES series switches have successfully survived tests of 10 million switching temperature cycles from -55° to +85°C while demonstrating good contact resistance stability. Visual inspection of these switches after testing has indicated that the RF lines were free of much of the contamination found during similar tests on traditional switches. A comparison of the actual measured contact resistance obtained from monitoring both conventional and *RAMSES* switches during several parts that have already been actuated one million cycles is shown in **figure 4**.



(a) RF line open

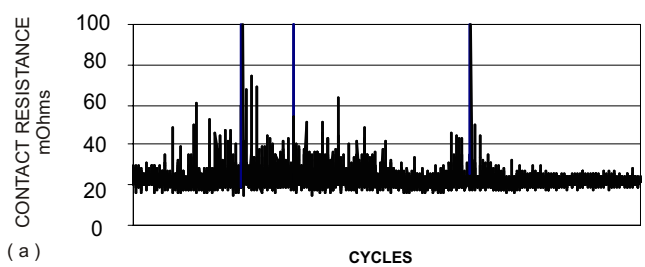


(b) RF line closed

Figure 3 : *A* ***RAMSES*** *set of contacts.*

Figure 3 shows a set of RAMSES contacts.

Although the conventional switch may not be considered a failure, its contact resistance has become unstable, thus degrading its reliability



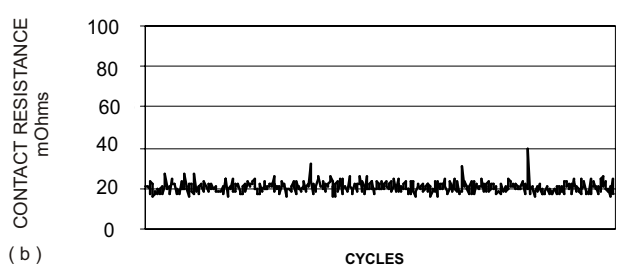


Figure 4 : *A comparison of (a) conventional and (b)* ***RAMSES*** *switch design contact resistance during one million cycles*

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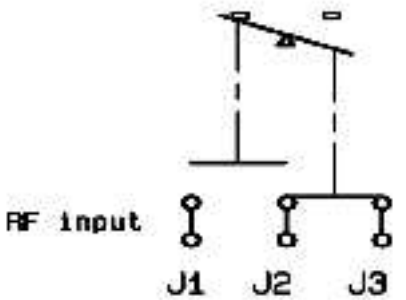
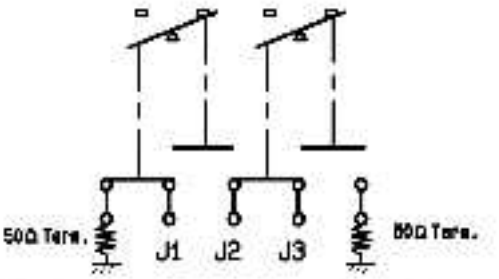
10) RF ARRANGEMENT

COAXIAL SPDT SWITCH
(Single Pole Double Throw)



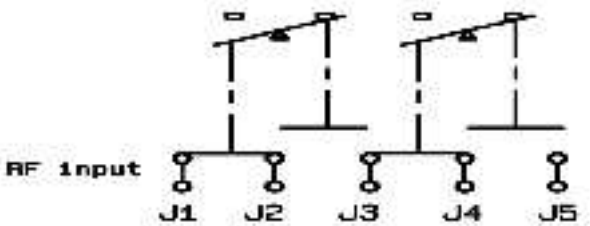
Single pole Double Throw Switch
A switch with one input port and two selectable output ports

COAXIAL SPDT TERMINATED SWITCH
(Single Pole Double Throw Terminated)



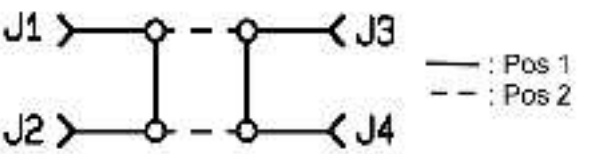
Single Pole Double Throw, Terminated switch
Same as SPDT, but the unused output port is automatically terminated by a 50 Ohm resistive load.

COAXIAL DP3T SWITCH
(Double Pole Three Throw)



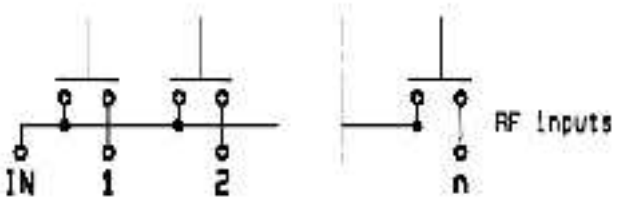
Double Pole Three Throw switch
A switch with two input ports and three output ports. Each input (J2 – J4) can be switched between two adjacent outputs with one output being common to both inputs

COAXIAL TRANSFERT / DPDT SWITCH
(Double Pole Double Throw)



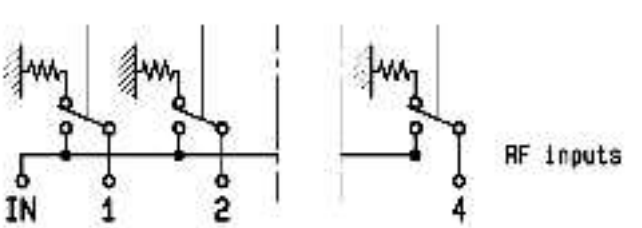
Double Pole Double Throw Switch
A four port switch with two independent paths that operate simultaneously in one of two selected positions.. In a DPDT / Transfer switch, the two transmission paths are provided as shown above

COAXIAL MULTIPOSITION SWITCH
(Single Pole n Throw)



Single Pole n Throw Switch (n < 13)
A switch with one input port and more than two output ports. The multiposition switch allows direct access to any individual output port by energizing the respective actuator RADIALL SPnT switches provide up to 12 Output ports

COAXIAL MULTIPOSITION TERMINATED SWITCH
(Single pole n Throw Terminated)



Single Pole n Throw Terminated Switch (n<13)
Same as SPnT but each unused output port is automatically terminated in a internal 50 Ohm resistive load

11) GLOSSARY

ACTUATOR VOLTAGE

All *RAMSES* series relays are either 12 or 28 Vdc nominal voltage over the entire temperature range. The switches can be operated with a voltage between -15% and +10% of the nominal value. Other voltage as 5 , 15 or 24 Volts can be supplied at the customer's request.

AUTOMATIC "RESET"

Latching version multi-position switches (or SPnT) cause the following scenario :

When a RF path is closed, it remains in the closed position after the voltage is cut-off (latching function). To switch to another path, the first path must be opened via a "RESET" driver, followed by the closing of the second RF path. Without the "RESET" driver, both paths would remain in the ON position at the same time.

To simplify the use of latching product, an "automatic RESET" is recommended. The auto reset feature is accomplished by an electronic circuit which brings about the automatic opening of a previously closed path during changes of position of the switches.

Note : *This option produces a higher current consumption during a few milliseconds (See voltage & current values listed on the product's individual Technical Data Sheet).*

BCD DRIVER INTERFACE

BCD logic coding				***RF & Microwave ways position***
E4	**E3**	**E2**	**E1**	
0	0	0	0	Latching models : all ways in "OFF" position
0	0	0	0	Normally Open models : memory of last position
0	0	0	1	Way IN - 1 in "ON" position
0	0	1	0	Way IN - 2 in "ON" position
0	0	1	1	Way IN - 3 in "ON" position
0	1	0	0	Way IN - 4 in "ON" position
0	1	0	1	Way IN - 5 in "ON" position
0	1	1	1	Way IN - 6 in "ON" position
1	0	0	0	Way IN - 7 in "ON" position
1	0	0	1	Way IN - 8 in "ON" position
1	0	1	0	Way IN - 9 in "ON" position
1	0	1	1	Way IN - 10 in "ON" position
1	1	0	0	Way IN - 11 in "ON" position
1	1	0	1	Way IN - 12 in "ON" position
1	1	1	1	Latching models : memory of last position
1	1	1	1	Normally Open models : all ways arein "OFF" position

Nota *: E1, E2, E3 and E4 are BCD driver pins of the product. E4 applies only with 8 positions or more. E3 applies only with 4 positions or more.*

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GLOSSARY (continued)

BREAK BEFORE MAKE

RADIALL coaxial relays are considered “break before make”. In a break before make product the contact of the first path leaves its state before the final contact has been established.

FAILSAFE

A switch with an actuator that contains a return mechanism, either mechanical or magnetic, that provides RF connection to one selected position when no voltage is applied to the power terminals. This type of switch requires continuous voltage to maintain RF connection to any other position.

FREQUENCY RANGE

The frequency range indicated for each device indicates the maximum frequency RADIALL will guarantee the product’s performance.

INDICATOR CONTACTS

Electrical contacts of “open circuit, short-circuit” type, mechanically linked to the actuator and synchronized with switched RF paths, ensure the recopy of positions of RF transmission paths. When a microwave path is switched, the corresponding indicator contact is closed. It is generally used with pilot lamps to indicate position of RF contacts (characteristics are given for a resistive load).

INSERTION LOSS

The difference in the power level received at the load before and after the insertion of a device in a transmission line. Insertion loss is measured in decibels below the input power.

INTERMODULATION

Intermodulation (PIM), or intermod for short, is a form of signal distortion that occurs whenever signals of two or more frequencies are produced in a passive device which contains some linear response. This interference phenomenon is attributable to many sources such as low contact pressure, dirty interconnects, magnetic materials or other anodic effect. The typical value for RADIALL coaxial switches is around 120 dBc (with 2 carriers at +43dBm), however products can be designed for better performances upon request.

ISOLATION

The RF leakage from a connected path to any connector outside that path. Isolation is measured in decibels below the input power.

LATCHING

A switch with an actuator that contains a mechanism, either mechanical or magnetic, that will maintain a chosen RF contact path whether voltage is maintained or not after switching is accomplished. A pulse length of a duration equal to the maximum switching time is enough to change the switch position.

LIFE

Number of toggles a product is able to carry out. Relays and switches of *RAMSES* and *PLATINUM* ranges have a life duration from 2 to 10 million of cycles.

GLOSSARY (continued)

MULTIPIN CONNECTORS

Series	Type of		Pins Number	Comments
	Switches	Connector		
RAMSES SPDT	SPDT => R570	D Sub (male)	9 pins	Available only on products described on page SPDT-22
	SPDT => R572	Not Available		Only solder pins
PLATINUM SPDT	SPDT => R595	D-Sub (male)	9 pins	Non mentioned models
RAMSES DPDT	DPDT => R577	Not available		
PLATINUM DPDT	DPDT => R593	HE10 ribbon receptacle (male)	10 pins	Delivered with ribbon cable
RAMSES DP3T (1)	DP3T => R580	Not Available		Only solder pins
PLATINUM DP3T (1)	DP3T => R595	D Sub (male)	9 pins	
RAMSES SPnT	SPnT => R573/R574			
	5 to 10 positions	D-Sub (male)	25 pins	
	11 and 12 positions		44 pins	High density
	SPnT => R591 4 and 5 positions	Micro D receptacle (female)	9 pins	
PLATINUM SPnT	SPnT => R594			
	4 and 5 positions	HE10 ribbon receptacle (male)	10 pins	Delivered with ribbon cable 750 mm (30 inches) + HE10 connector (female)

***Note** (1) : RAMSES & PLATINUM Terminated SPDT are included in R585 & R595 series.*

NORMALLY OPEN

Normally open is a mode of operation in which all output ports of the switch are disconnected from the input port until a voltage is applied to a selected position.

PLATINUM series

By adapting our concept RAMSES (without friction) and our knowledge to manufacture coaxial switches since more than 40 years. RADIALL introduced a new range of high performances coaxial switches to the market place : PLATINUM series.

Following an increasing need of the instrumentation market, our coaxial switches PLATINUM are optimized to equip all your automatic test benches or measureament equipments. Indeed with a guarantee insertion loss repeatability of 0.03 dB over all the life span of the product (10 million) we answer the highest requirements of RF performances necessary for this type of equipment. Moreover, with a full range coaxial switches such as SPDT-DP3T (R595 series), transfer relay DPDT (R593 series) and multithrow switches SPnT (R594 series), with this same level of RF performances, are available to answer to your need.

POLARITY

Common minus polarity potential is choosen by RADIALL for its standard products. An inverted polarity (common plus) is available on *RAMSES* range, ask RADIALL for availability.

***Note :** For PLATINUM series, common plus polarity potential is choosen for its standard products.*

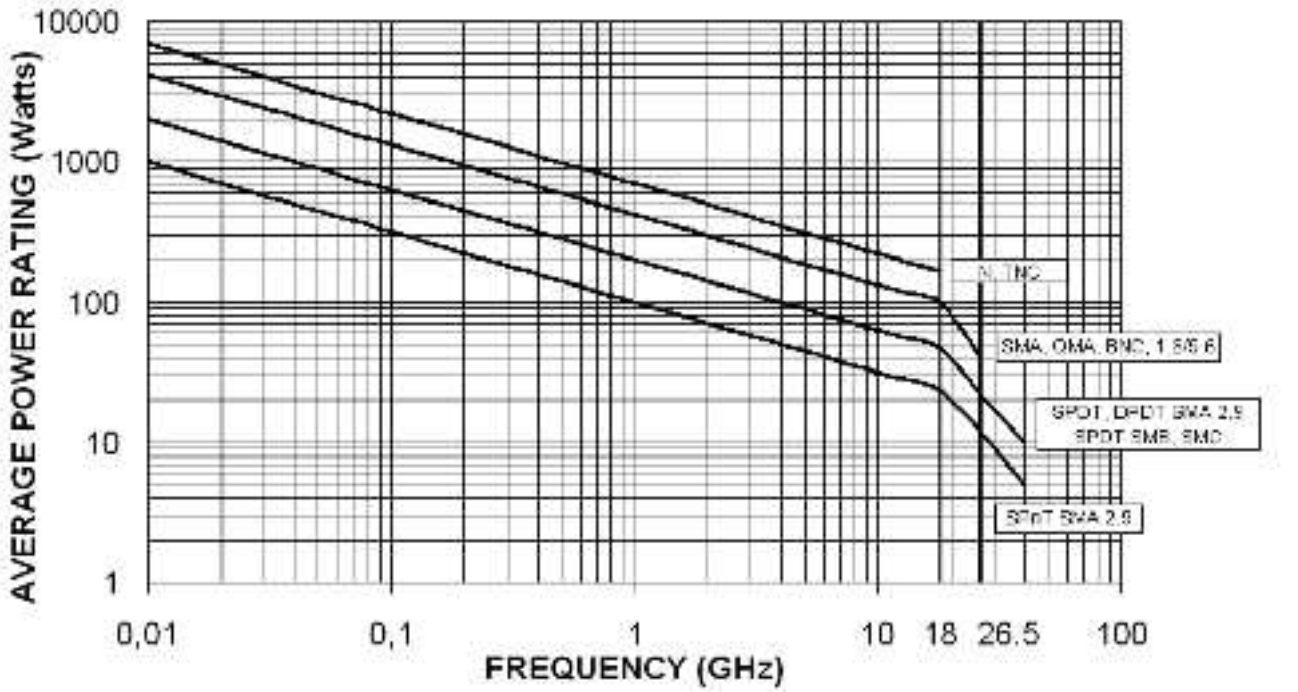
GLOSSARY (continued)

RF POWER RATING

The RF power rating is the capability of handling RF power (CW power) through closed contacts. The RF power should be removed during switching. Power ratings assume unity V.S.W.R. (matched load) at room temperature (25°C), sea level pressure (14.7 p.s.i.) and cold switching. See below the CW power capability Vs. Frequency Chart. Changes in these specifications require power derating (see derating factor versus V.S.W.R.).

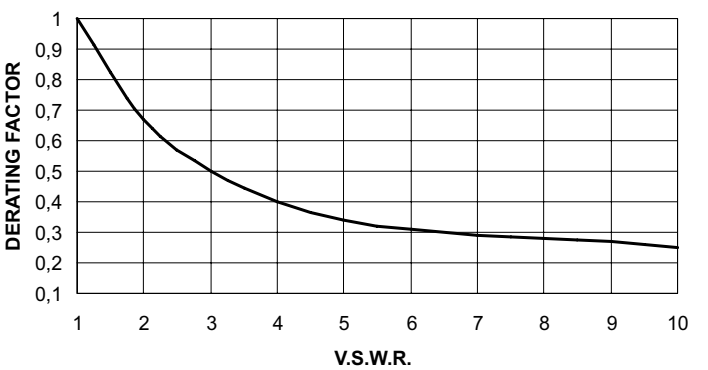
This graph is based on the following conditions :

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



DERATING FACTOR VERSUS VSWR

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



For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

GLOSSARY (continued)

PEAK POWER HANDLING

It is the maximum peak power which, when applied at room temperature under a pulse of one microsecond every millisecond, will not permanently change the specifications of the switch. Any overpowering beyond this limit will alter the RF performances of the switch.

RF CONNECTORS

RF connectors are 50 or 75 Ohms female, unless otherwise specified. The applicable mating dimensions, materials and finished are in accordance with applicable sections of international standard (MIL C 39012, DIN 47295).

N.B RADIALL 75 Ohms coaxial switches are availables with only DIN 1.6/5.6 RF connector which is "srew, snap and slide".However others connectors such as SSMB 75 Ohms can be designed upon request.

REPEATABILITY

It is the maximum standard deviation in insertion loss specifications on each path over all life of the product. Insertion loss repeatability (0.03 dB over 10 million) is specified for all *PLATINUM* series.

SELF CUT OFF

This term refers to the ability of a switch to disconnect the actuator voltage as the switching of the position is carried out. The system applies to latching relays and is achieved with solid state circuity. Self cut-off time for our RAMSES coaxial switches is from 40ms to 120ms.

SOLDER PINS

RAMSES relays are equiped with solder pins, for the control and indicator contacts. The maximum temperature during soldering should not exceed 250°C during 30 seconds or 300°C during 10 seconds for leadfree soldering process.

SUPPRESSION DIODE

Diode connected in parallel with the coil of a switch to suppress transient voltage generated by the self inductance of the coil during the driver signal cut-off. This option is systematically enclosed in all TTL, SELF CUT-OFF, and all electronic interfaces.

SWITCHING TIME

The total amount of time between application of voltage to the actuator terminals and completion of switching including all contact bounces, if any. Total switching time consists of three parts, namely inductive delay in the actuator coil, transfer time of the RF contacts, and bounce time of the RF contacts.

TTL DRIVER INTERFACE

This term points out an interface realised thanks to an electronic circuit which enables to drive either relays or switches by TTL logic signals. Products equiped with such an option have therefore a pin for the voltage of the actuator (12V or 28V) as well as a TTL driver pin shared per position. The polarity is not relevant to application for switches with this option. The logic used is a positive one that is to say "high level" nominal +5V (2.2-5.5 V) of TTL signal means logic "1" enabling to close the corresponding microwave way. Low level, i.e logic "0", voltage is 0-0.8V.

GLOSSARY (continued)

V.S.W.R.

The Voltage Standing Wave Ratio is a measurement of the return loss or level of the reflected signal of a device connected on a transmission line. V.S.W.R. is linked to the coefficient of reflection (r) by the equation :

$$V.S.W.R = \frac{1+|r|}{1-|r|} \qquad r = \frac{Z-Zo}{Z+Zo}$$

with : **r** is the coefficient of reflection

Zo is the characteristic impedance of the ligne

Z the impedance of the ligne

V.S.W.R varies from 1 to ∞, a value equal to 1 represents a perfect matching.

12) CONVERSION MEASUREMENT UNIT

- Convert inch to millimiters : 1 Inch = 25.4 mm / 1 meter = 39.3 Inches

- Convert centimeters to feet : 1 foot = 30.40 cm /1 meter = 3.28 feet

- Convert kilogram to pounds : 1 kg = 2.20 Lb / 1 pound = 0.45 Kg

13) POWER CONVERSION

Power (dBm) / Power (W)

dBm	Power	dBm	Power	dBm	Power	dBm	Power
-49	0,01 µW	-24	3,98 µW	**1**	1,26 mW	26	398,11 mW
-48	0,02 µW	-23	5,01 µW	2	1,58 mW	27	501,19 mW
-47	0,02 µW	-22	6,31 µW	3	2 mW	28	630,96 mW
-46	0,03 µW	-21	7,94 µW	4	2,51 mW	29	794,33 mW
-45	0,03 µW	-20	**10 µW**	5	3,16 mW	**30**	**1 W**
-44	0,04 µW	**-19**	12,59 µW	6	3,98 mW	31	1,26 W
-43	0,05 µW	-18	15,85 µW	7	5,01 mW	32	1,58 W
-42	0,06 µW	-17	19,95 µW	8	6,31 mW	**33**	**2 W**
-41	0,08 µW	-16	25,12 µW	9	7,94 mW	34	2,51 W
-40	0,10 µW	-15	31,62 µW	10	**10 mW**	35	3,16 W
-39	0,13 µW	-14	39,81 µW	**11**	12,59 mW	36	3,98 W
-38	0,16 µW	-13	50,12 µW	12	15,85 mW	37	5,01 W
-37	0,20 µW	-12	63,10 µW	13	19,95 mW	38	6,31 W
-36	0,25 µW	-11	79,43 µW	14	25,12 mW	39	7,94 W
-35	0,32 µW	-10	100 µW	15	31,62 mW	**40**	**10 W**
-34	0,40 µW	-9	125,89 µW	16	39,81 mW	41	12,59 W
-33	0,50 µW	-8	158,49 µW	17	50,12 mW	42	15,85 W
-32	0,63 µW	-7	199,53 µW	18	63,10 mW	43	19,95 W
-31	0,79 µW	-6	251,19 µW	19	79,43 mW	44	25,12 W
-30	**1 µW**	-5	316,23 µW	20	**100 mW**	45	31,62 W
-29	1,26 µw	-4	398,11 µW	**21**	125,89 mW	46	39,81 W
-28	1,58 µW	-3	501,19 µW	22	158,48 mW	47	50,12 W
-27	**2 µW**	-2	630,96 µW	23	199,52 mW	48	63,10 W
-26	2,51 µW	-1	794,33 µW	24	251,19 mW	49	79,43 W
-25	3,16 µW	**0**	**1 mW**	25	316,23 mW	**50**	**100 W**

dBm = 10 Log_{10} (milliwatts)
P (milliwatts) = 10^ (dBm / 10)

14) REFLEXION COEFFICIENT / RETURN LOSS CONVERSION

Reflection Coefficient	V.S.W.R	Return Loss (dB)	Reflection Coefficient	V.S.W.R	Return Loss (dB)	Reflection Coefficient	V.S.W.R	Return Loss (dB)
0	1.00	∞	0.13	**1.30**	17.7	0.26	**1.7**	11.7
0.01	1.02	40.0	0.135	1.31	17.4	0.265	1.72	11.5
0.015	1.03	36.0	0.14	1.33	17.1	0.27	1,74	11.4
0.02	1.04	34.0	0.145	1.34	16.8	0.275	1.76	11.2
0.025	1.05	32.0	0.15	**1,35**	16.5	0.28	1,78	11,1
0.03	1.06	30.5	0,155	1.37	16.2	0.285	**1.80**	10.9
0.035	1.07	29.1	0.16	1.38	15.9	0.29	1.82	10.8
0.04	1.08	28.0	0.165	**1.40**	15.7	0.295	1.83	10.7
0.045	1.09	26.9	0.17	1.41	15.4	0.3	1.85	10.5
0.046	1.09	26.7	0.175	1.42	15.1	0.305	1.86	10.3
0.05	**1.10**	26.0	0.18	1.44	14.9	0.31	**1.90**	10.2
0.055	1.11	25.2	0.185	**1.45**	14.7	0.32	1.94	9.8
0.06	1.12	24.4	0.19	1.47	14.4	0.33	1.98	9.7
0.065	1.13	23.7	0.195	1.48	14.2	0.34	2.04	9.4
0.07	**1.15**	23.1	0.2	**1.50**	14.0	0.35	2.08	9.2
0.075	1.16	22.5	0.205	1.52	13.8	0.36	2.13	8.9
0.08	1.17	21.9	0.21	1.53	13.6	0.37	2.18	8.7
0.085	1.18	21.4	0.215	1.55	13.4	0.38	2.23	8.4
0.09	1.19	20.9	0.22	1.56	13.2	0.39	2,.8	8.2
0.095	**1.20**	20.4	0.225	1.58	13.0	0.4	2.34	7.9
0.1	1.22	20.0	0.23	**1.60**	12.8	0.41	2.40	7.7
0.105	1.23	19.6	0.235	1.61	12.6	0.42	**2.45**	7.6
0.11	1.24	19.2	0.24	1.63	12.4	0.43	2.51	7.3
0.115	**1.25**	18.8	0.245	**1.65**	12.2	0.44	2.57	7.1
0.12	1.27	18.4	0.25	1.67	12.0	0.45	2.63	6.9
0.125	1.28	18.1	0.255	1.68	11.9	0.5	**3.00**	6.0

Reflection Coefficient : (p)
Voltage Standing Wave Ratio : (1 + p) / (1 - p)
Return Loss (dB) : (-20 Log_{10}(1 -p^2))

15) TEMPERATURE EQUIVALENCE

CENTIGRADE / FAHRENHEIT

°C	°F	°C	°F	°C	°F	°C	°F
-80	-112.0	9	48.2	47	116.6	85	185.0
-70	-94.0	10	50.0	48	118.4	86	186.8
-60	-76.0	11	51.8	49	120.2	87	188.6
-50	-58.0	12	53.6	50	122.0	88	190.4
-45	-49.1	13	55.4	51	123.8	89	192.2
-40	-40.0	14	57.2	52	125.6	90	194.0
-35	-31.0	15	59.0	53	127.4	91	195.8
-30	-22.0	16	60.8	54	129.2	92	197.6
-25	-13.0	17	62.6	55	131.0	93	199.4
-20	-4.0	18	64.4	56	132.8	94	201.2
-19	-2.2	19	66.2	57	134.6	95	203.0
-18	-0.4	20	68.0	58	136.4	96	204.8
-17	1.4	21	69.8	59	138.2	97	206.6
-16	3.2	22	71.6	60	140.0	98	208.4
-15	5.0	23	73.4	61	141.8	99	210.2
-14	6.8	24	75.2	62	143.6	100	212.0
-13	8.6	25	77.0	63	145.4	105	221.0
-12	10.4	26	78.8	64	147.2	110	230.0
-11	12.2	27	80.6	65	149.0	115	239.0
-10	14.0	28	82.4	66	150.8	120	248.0
-9	15.8	29	84.2	67	152.6	130	266.0
-8	17.6	30	86.0	68	154.4	140	284.0
-7	19.4	31	87.8	69	156.2	150	302.0
-6	21.2	32	89.6	70	158.0	160	320.0
-5	23.0	33	91.4	71	159.8	170	338.0
-4	24.8	34	93.2	72	161.6	180	356.0
-3	26.6	35	95.0	73	163.4	190	374.0
-2	28.4	36	96.8	74	165.2	200	392.0
-1	30.2	37	98.6	75	167.0	250	482.0
0	32.0	38	100.4	76	168.8	300	572.0
1	33.8	39	102.2	77	170.6	350	662.0
2	35.6	40	104.0	78	172.4	400	752.0
3	37.4	41	105.8	79	174.2	500	932.0
4	39.2	42	107.6	80	176.0	600	1112.0
5	41.0	43	109.4	81	177.8	700	1292.0
6	42.8	44	111.2	82	179.6	800	1472.0
7	44.6	45	113.0	83	181.4	900	1652.0
8	46.4	46	114.8	84	183.2	1000	1832.0

Temp (°C) = ((°F-32) x 5) /9

Temp (°F) = ((9 x °C) / 5) + 32

16) DERATING TEMPERATURE INFORMATION

The temperature at which the switches are used has an effect on the coil resistance. This is due to the variation of the resistivity of copper with respect to temperature. The pick up voltage also varies with respect to temperature.

Mathematical formula of the variation of coil resistance versus the temperature is as follows :

$$R' = R (1 + K (t' - t))$$

K = temperature coefficient (0.0038 for copper)

R = coil resistance (Ω) at temperature t (°C)

R' = coil resistance (Ω) at temperature t' (°C)

Example of calculation

Device : SPDT failsafe R570413000 - How to calculate current at 70°C with this relay ?

In reference with specifications as specified in the technical data sheet

Coil resistance 275 Ω at 25°C (R=275, t=25, t'=70)

Nominal current = 102 mA at 25°C

Nominal voltage = 28 volts

New coil resistance at 70°C will be :

R' = 275 (1 + 0.0038 (70 - 25))

R' = 275 x 2.71

R' = 323 Ω

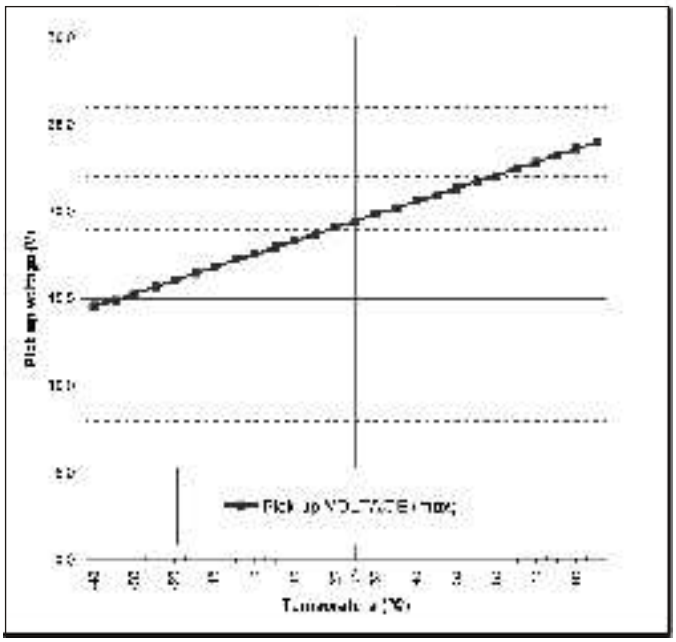
According to the second law (U = R I), at 70°C :

U = R I

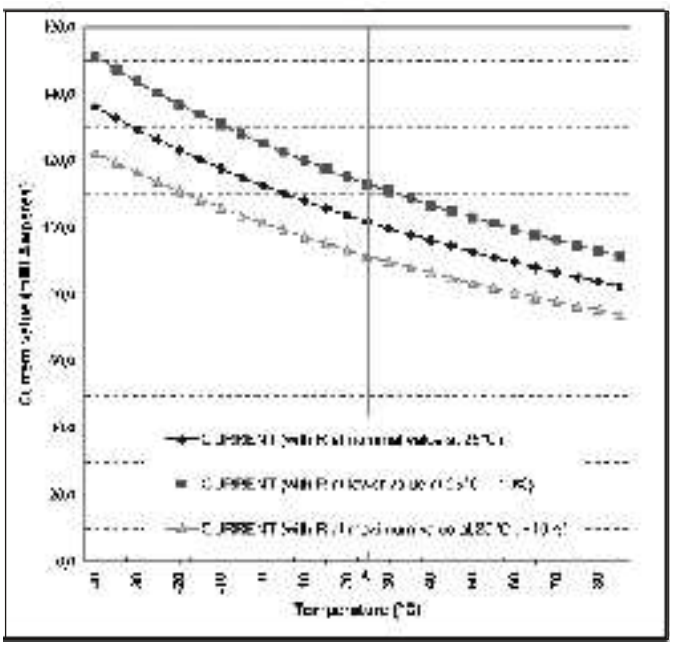
I = 87 mA

The following graphics are examples of calculation for the same product R570413000 (SPDT failsafe)

Maximum pick up voltage versus temperature

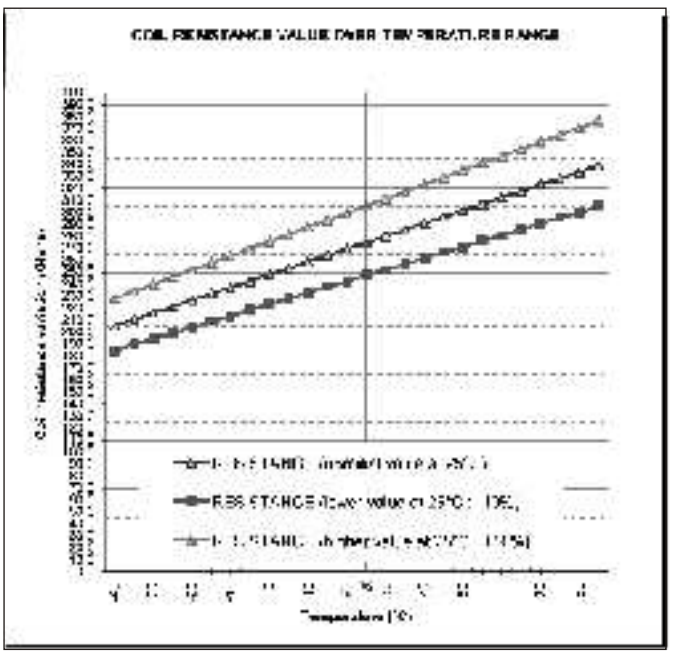


Current value versus voltage over temperature range

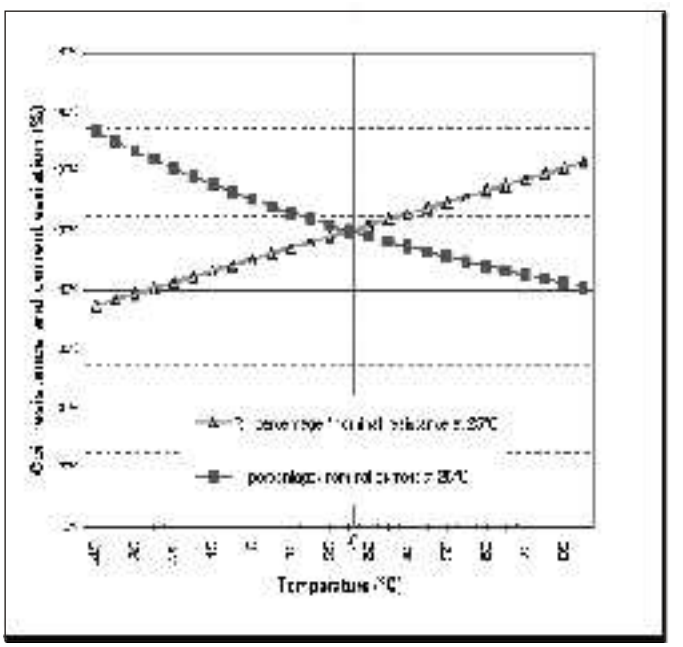


All standard RAMSES references curves are availables upon request (see adress email below)

Coil resistance value versus temperature



Maximum pick up voltage variation versus temperature

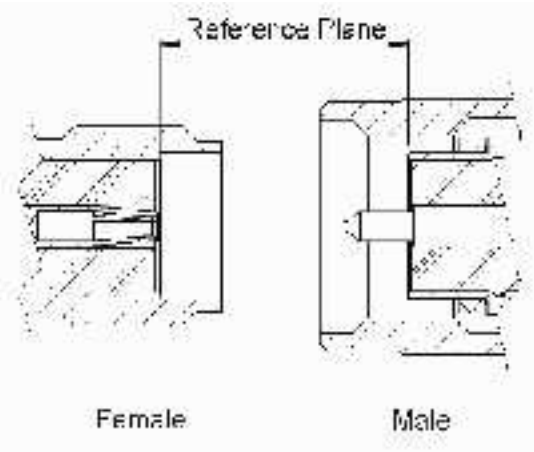


17) USER HANDBOOK FOR CONNECTOR ASSEMBLY ON OUR COAXIAL SWITCHES

How to connect RF coaxial connectors on RADIALL Switches?

to avoid irreversible damage on RF Switches some precautions shall be implemented

a) Connectors with correct interface dimension shall be used



Appropriate torque on the connector avoid damage on the contacts. Specific tool with calibrate torque shall be used.

Apply the recommended torque as defined below.

SMA connectors	From 80 to 120 cm
TNC connectors	339 N.cm

b) Connexion of semi rigid cable using the center contact of the cable as pin for connecting the female connector

If the center contact is not is the same alignment that the female socket, the Switch RF connector could be damaged

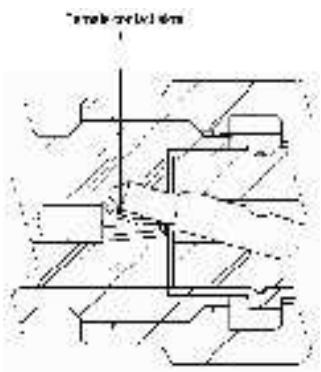


Fig A : *Misaligned pin between insulator and female contacts slots*

RF connector with removable nut can assure by visual control that the center contact is correctly positionned.

Cable	Connector
.085"	**R125 052 500**
.141"	**R125 055 500**

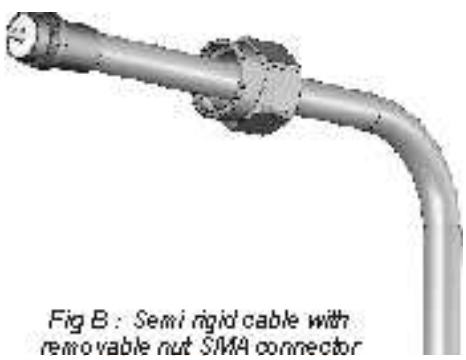
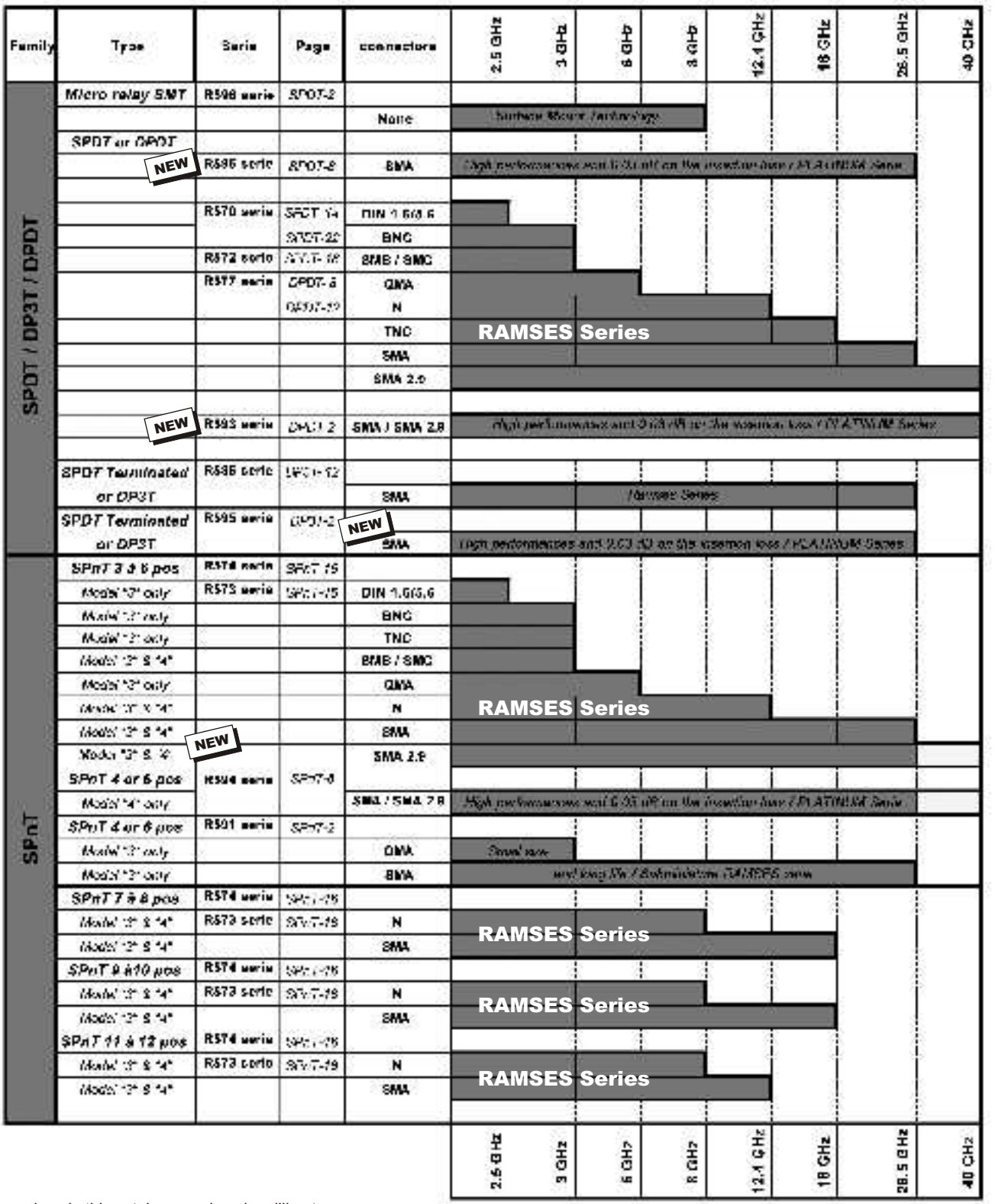


Fig B : Semi rigid cable with removable nut SMA connector

SWITCHING PRODUCTS SELECTION GUIDE

How to find the right product for your application ?..

Model '3' only => Not terminated version
Model '4' only => terminated version



All dimensions in this catalog are given in millimeters

SPDT section

SMT Power Micro-SPDT with 10 GHz capabilities

See Page SPDT-2

High performances SPDT up to 26.5 GHz - PLATINUM series

NEW

See Page SPDT-8

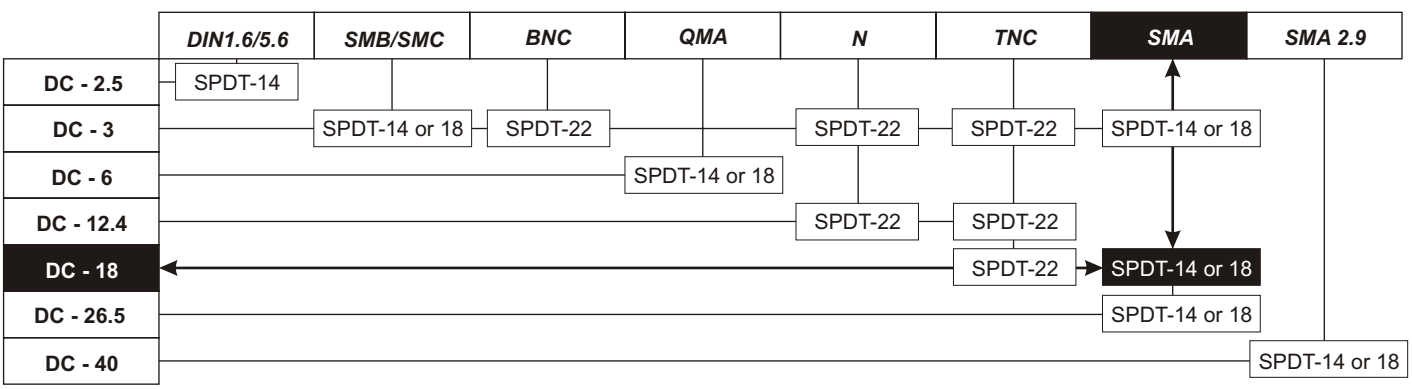
SPDT up to 40 GHz

QUICK ACCESS TO THE RIGHT PAGE

Example : **DC-18 GHz, SPDT with SMA connectors**

See page SPDT-14 for standard version (R570 --- ---)

or see page SPDT-18 for low size version (R572 --- ---)



SPDT Terminated up to 26.5 GHz

See DP3T Section page DP3T-1

High performances terminated SPDT up to 26.5 GHz - PLATINUM series

See DP3T Section page DP3T-6

NEW

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

Micro-SPDT RELAYS

SMT Power Micro-SPDT with 10 GHz capabilities
SURFACE MOUNT TECHNOLOGY

An innovative and original “micro-mechanical” design allows the R596 SMT micro-relay to bring together the excellent reliability, RF and repeatability characteristics of coaxial switches with the miniature size and low cost implementation of surface mount components. 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.

PART NUMBER SELECTION

R 5 9 6 . . . . 0 .

RoHS COMPLIANT

Updated

SPDT

Frequency range :
- **3** : DC-3 GHz
- **8** : DC-8 GHz

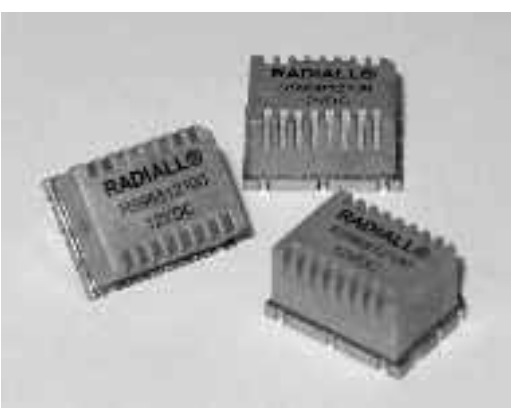
Type :
- **1** : Failsafe
- **3** : Latching, 2 coils

Actuator Voltage :
- **2** : 12 Vdc (1)
- **3** : 24 Vdc

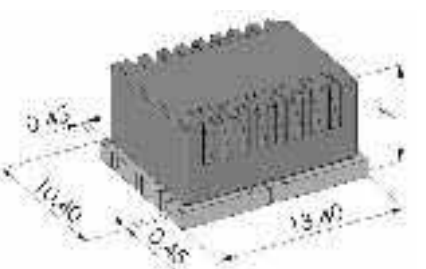
Packaging style (2) **:**
- **0** : Standard packaging
- **2** : Tape and reel of 200 relays (2)
- **5** : Tape and reel of 500 relays (2)
- **9** : Tape without reel (2)(4)
- **T** : Soldered on a connectorized test fixture (2)(3)

Product range :
- **0** : SPDT grade C
- **1** : SPDT grade M

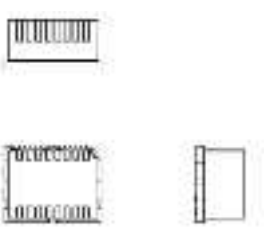
(1) : For 12V failsafe model only : this relay can be used either with 6 Vdc or 12 Vdc actuator voltage, depending on the PC board connections (see schematics page **SPDT-3**)
(2) : Non standard packaging symbols (2, 5, or T) are not marked on the relay
(3) : See details about test fixture dimensions on page **SPDT-4**
(4) : Tape delivered without reel, available for all specific quantities up to 200 pcs



TYPICAL OUTLINE DRAWING



ACTUAL SIZE



Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

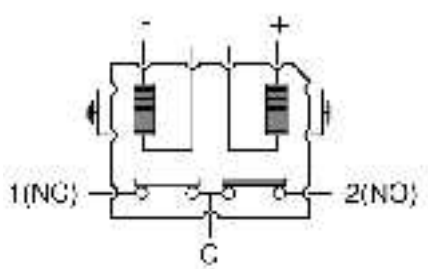
GENERAL SPECIFICATIONS

Operating mode		**Failsafe**			**Latching**	
Nominal operating voltage (across temperature range)	Vdc	**6** (1) (5.1 to 6.5)	**12** (1) (10.2 to 13)	**24** (20 to 30)	**12** (10.2 to 13)	**24** (20 to 30)
Coil resistance at 23°C (±10%)	Ω	82	330	1130	205	865
Operating current at 23°C	mA	73	36	25	58	32
RF and command ports		½ hole gold plated, infrared reflow, forced air oven or hand soldering (compatible with "lead-free" soldering processes)				
Switching time at nominal voltage	Making contacts Breaking contacts	Max 4 ms (typical 1.8 ms), including contact bounce time Max 1 ms (typical 0.5 ms)				
Switching time (max) at nominal voltage	ms	5 (typical 1.8 ms), including contact bounce time				
Life	Cold switching (max 120 cycles/min) Hot switching (max 20 cycles/min)	Grade M : 2 million cycles Grade C : 500.000 cycles 500.000 cycles (1W, impedance 50Ω, V.S.W.R. < 1.25)				
Construction		"LEAD FREE" construction – Waterproof (acc. To IEC 60529/IP67)				
Mass		< 2g				
Operating temperature range (with no icing condensation)	Grade M Grade C	-25°C to +85°C -20°C to +70°C			-40°C to +85°C -20°C to +70°C	
Storage temperature range		-55°C to +85°C				
Sine vibration (MIL STD 202, method 204D)		Cond. D : 10-2000 Hz, 20g operating Cond. G : 10-2000 Hz, 30g non operating				
Random vibration (MIL STD 202, Method 214A, Profil I)		Cond. F : 50-2000 Hz, 20.71g (rms) operating Cond. H : 50-2000 Hz, 29.28g (rms) non operating				
Shocks (According to MIL STD 202, Method 213B, Cond. C)		100g / 6 ms, ½ sine operating				

(1) The same failsafe relay reference can be used either with 6 Vdc or 12 Vdc actuator voltage, depending on the PC board connections (see schematics below).

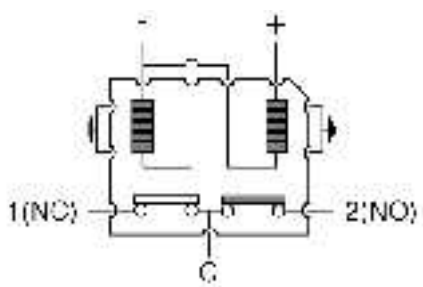
PIN IDENTIFICATION

Schematics **(Top view)**

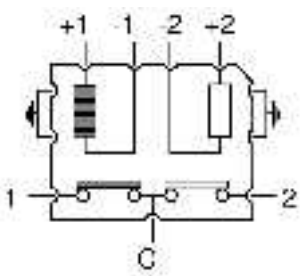


Failsafe model connection
(12 Vdc or 24 Vdc)

Voltage	RF continuity
De-energized	C <-> 1(NC)
Energized	C <-> 2(NC)



Connection of a failsafe 12 Vdc model to be used with a 6 Vdc Power supply



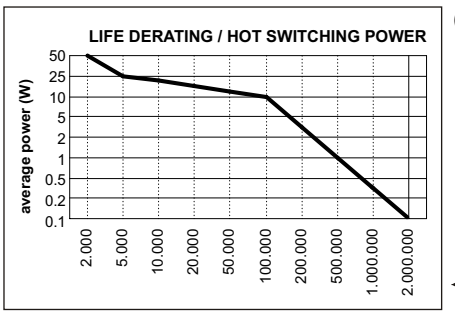
Latching model connection
(12 Vdc or 24 Vdc)

Voltage	RF continuity
-1 +1	C <-> 1
-2 +2	C <-> 2

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

RF PERFORMANCES

Frequency Range GHz		V.S.W.R (max)	Insertion Loss (max) dB	Isolation (min) dB		Average power W		Third order Inter modulation	Impedance ohms
				switch alone	switch + board layout (1)	(2) cold switching	(3) hot switching		
DC – 3 DC – 8	DC – 1	1.10	0.10	50	50	**120**	50	- 120 dBc typical (2 carriers 20W)	50
	1 – 2	1.20	0.20	45	40	**70**	50		
	2 – 3	1.35	0.30	40	30	**40**	40		
	3 – 6	1.35	0.40	35	30	**25**	25		
	6 – 8	1.40	0.80	30	30	**5**	5		



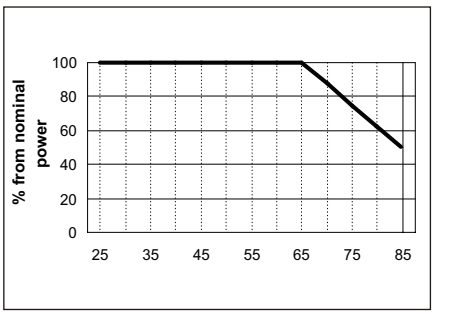
(2) Cold switching, without cooling fan

Latching models : no derating from -40°C to +85°C

Failsafe models : see power derating curve

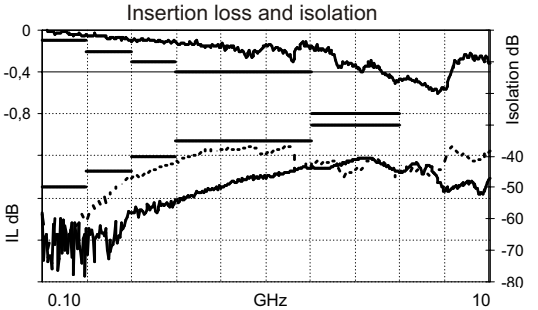
(3) For hot switching use only :

see RF contact life derating curve (impedance 50, V.S.W.R. <1.25, 30 cycles/mn)

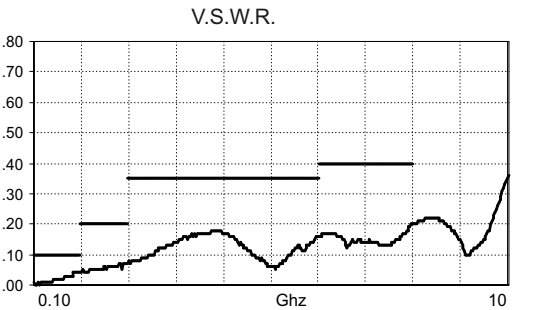


TYPICAL PERFORMANCES

Insertion loss and isolation



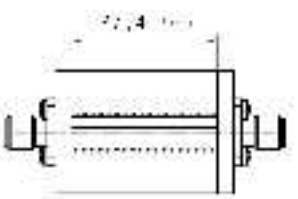
V.S.W.R.



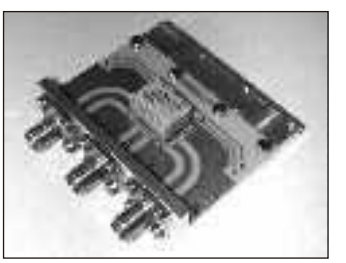
(1) Taking account of the reduction of isolation due to coupling between PCB microstrip lines (see isolation dotted curve above and measurement method below)

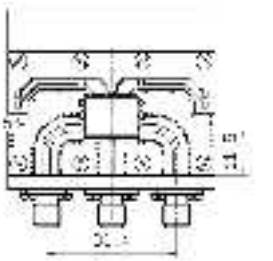
Measurement method

Calibration board



Test Fixture **(4)**





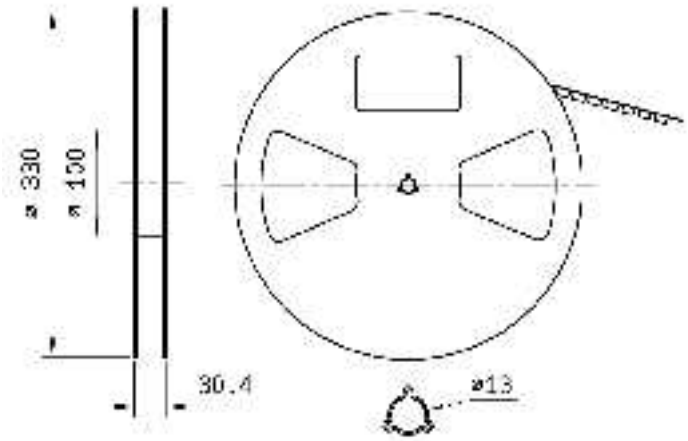
Inputs/Outputs of the calibration board and test fixture are equipped with SMA type receptacle connectors, **RADIALL** part number R125 510 000. The insertion loss of the relay itself is calculated by subtracting the insertion loss of the calibration board to the insertion loss of the relay welded on the final board layout in accordance with the recommended implementation shown above (see dimension details on following pages).

(4) Test Fixture available.To order, please use the suffix «T» (part number R596 - - - - - T), as explained in page **SPDT-2**.

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

RELAY PACKAGING

ACCORDING TO IEC 286-3 STANDARD

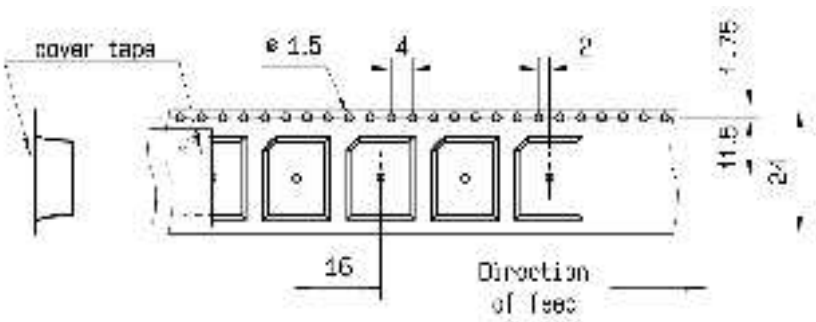


MATERIALS

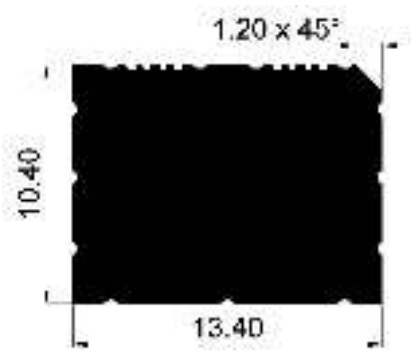
Reel : polyester

Carrier tape : antistatic PETG (polyester)

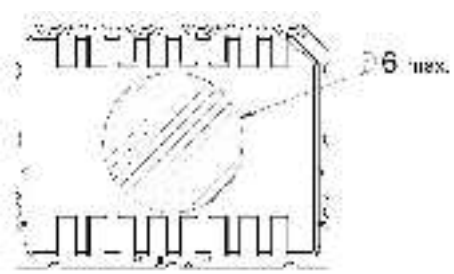
Cover tape : polyester



Video shadow of the relay



Aspiration area



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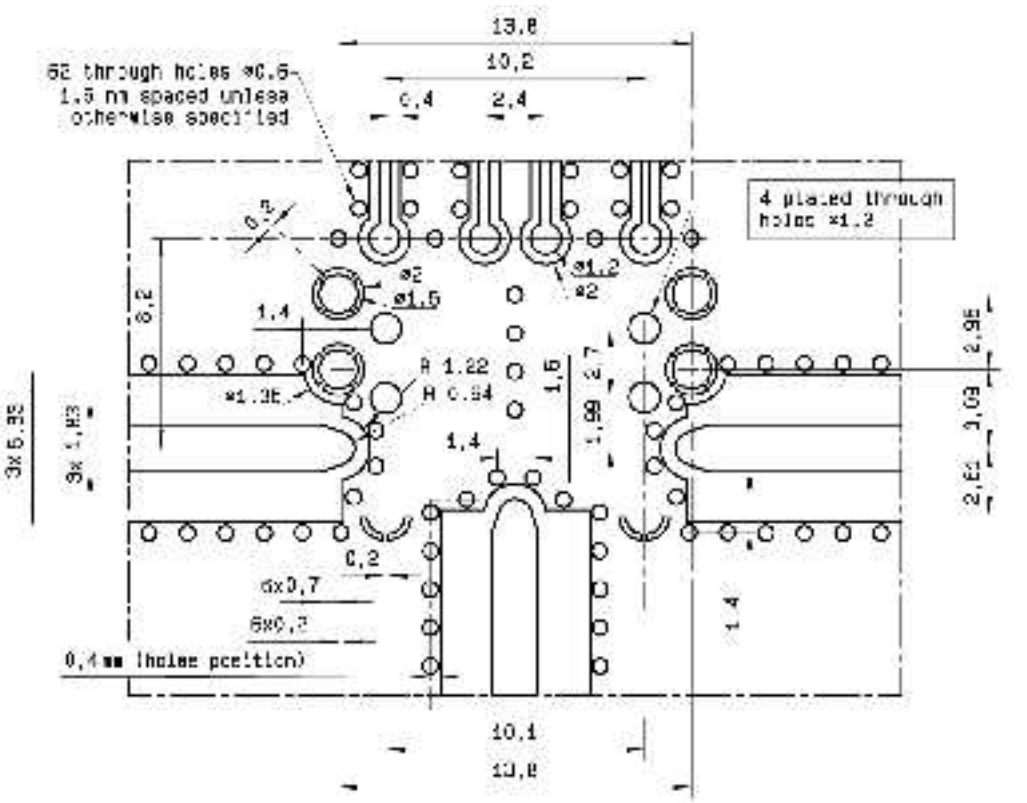
PC BOARD MOUNTING



Board layout

DXF or GERBER format file available upon request **(1)**

Substrate Types

Recommended substrates are **ROGERS RO4003** or **ARLON 25N**,

- **Mounting face** : Thickness 0.813 mm Cu double side 17.5µm. Width of track 1.83 mm

  Others substrates : **RO4350**, thickness 0.813 mm Cu double side 17.5µm. Width of track 1.80 mm

  25FR, thickness 0.813 mm Cu double side 17.5µm. Width of track 1.76 mm

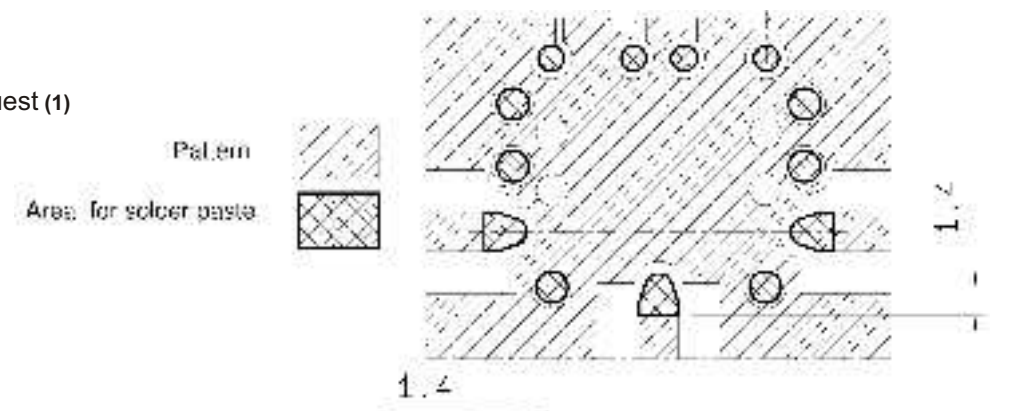
- **Opposite face** : Plating all over the face.

Total thickness of the tracks (copper over thickness + plating) : 40µm.

Other substrates may be used (for instance standard FR4), if provided with adequate modification of the tracks width.

Relay soldering pattern

DXF format file available upon request **(1)**



(1) Please contact us by E-Mail : switchingproducts@radiall.com

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RECOMMENDED SMT SOLDERING PROCEDURES

A - Soldering procedure using automatic pick and place equipment

***1**-Solder paste :*

R596 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 given on page 5, for a thickness of the silk-screen printing of 0.15 mm (0.006 ").

***3**-Placement of the component :*

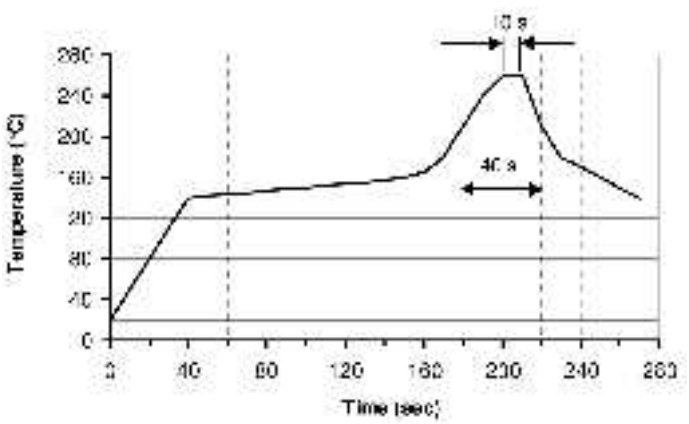
For small lightweight components such as chip components, a self-alignment effect can be expected if small placement errors exist. However, this effect is not as expected for relays components and they require a accurate positioning on their soldering pads, typically +/- 0.1mm (+/-0.004").

Place the relay onto the PCB with automatic pick and place equipment. Various types of suction can be used.

RADIALL does not recommend using adhesive agents on the component or on the PCB.

***4**-Soldering : infra-red process*

Please follow the **RADIALL** recommended temperature profile for infra-red reflow or forced air convection :



CAUTION : higher temperature (>260°C) and longer process duration would damage permanently 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.

***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, and have a capilarity amount upper the third of the height.

B - Soldering procedure by manual operation

***1**-Solder paste and flux deposition :*

Refer to procedure A-1

Deposite a thin layer of flux on mounting zone.

Allow the flux to evaporate a few seconds before applying the solder paste, in order to avoid dilution of the paste.

***2**-Solder paste deposition :*

RADIALL recommends depositing a small amount of solder paste on the mounting zone area by syringe.

Be careful, not to apply solder paste outside of the zone area.

***3**-Placement of the component :*

During manipulation, avoid contaminating the lead surfaces by contact with fingers.

Place the component on the mounting zone by pressing on the top of the relay lid.

***4**-Hand soldering :*

Iron wattage 30 to 60 W.

Tip temperature 280 to 300°C for max. 5 seconds

To keep good RF characteristics above 3GHz, it is important to solder RF ports first, and apply pressure on the relay lid during all the soldering stage, so as to reduce the air gap between the PC board and the relay.

***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.

***6**-Quality check :*

Verify by visual inspection that component is centred on the mounting pads.

Solder joints : verify by visual inspection that the formation of meniscus on the RF pads are proper, and have a capillarity amount higher than one third of the height.

High performances SPDT
PLATINUM series / SPDT up to 26.5 GHz

Radiall's PLATINUM series switches are optimised to perform a high level over an extended life span. With outstanding RF performances, 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.

PART NUMBER SELECTION

R 5 9 5 . . . 1 . . .

RoHS COMPLIANT

NEW

RF connectors :
- **3** : SMA up to 6 GHz
- **4** : SMA up to 20 GHz
- **F** : SMA up to 26.5 GHz

Type :
- **3** : Latching
- **4** : Latching + indicators
- **5** : Latching + S.C.O.
- **6** : Latching + S.C.O. + I.C.

Actuator Voltage :
- **3** : 24 Vdc
- **7** : 15 Vdc

Switch model :
- **1** : Non terminated SPDT switch

Documentation :
- **-** : Certificate of conformity
- **C** : Calibration certificate
- **R** : Calibration certificate + RF curve

Actuator terminals :
- **0** : Solder pins
- **5** : D-Sub connector

Options :
- **1** : Without option (positive common)
- **2** : Compatible TTL driver (high level)

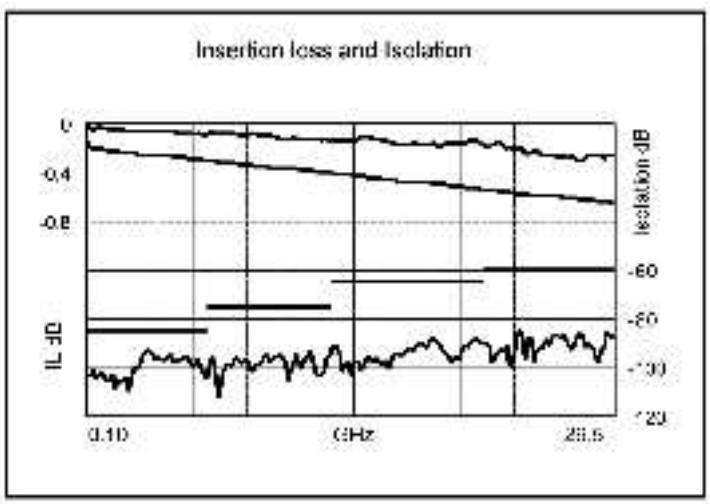
Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

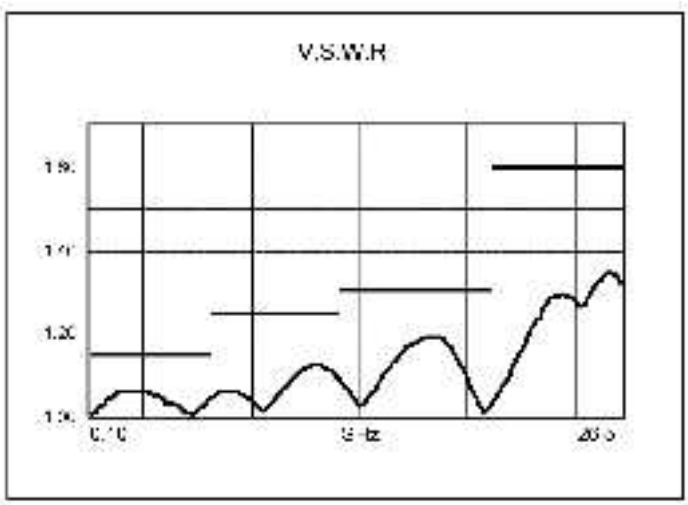
RF PERFORMANCES

Part Number		R5953--1--	R5954--1---	R595F--1--
Frequency Range	GHz	DC to 6	DC to 20	DC to 26.5
Impedance	Ω	50		
Insertion Loss (max)	dB	0.20 + (0.45 / 26.5) x frequency (GHz)		
Isolation (min)	dB	85	DC to 6 GHz : 85 6 to 12.4 GHz : 75 12.4 to 20 GHz : 65	DC to 6 GHz : 85 6 to 12.4 GHz : 75 12.4 to 20 GHz : 65 20 to 26.5 GHz : 60
V.S.W.R.(Maxi)		1.15	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.30 18 to 20 GHz : 1.60	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.30 18 to 26.5 GHz : 1.60
Repeatability (Up to 10 million cycles measured at 25°C)	dB	0.03 dB maximum		

SPDT

TYPICAL RF PERFORMANCES





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ADDITIONAL SPECIFICATIONS

Operating mode		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**24** (20 to 32)	**15** (12 to 20)
Coil resistance (+/-10%)	Ω	350	120
Nominal operating current at 23°C	mA	68	125
Average power		RF path Cold switching : see Power Rating Chart on **SPDT-13** Hot switching : 1 Watt CW	
TTL input	High Level	3 to 7 V : 800 µA max at 7 V	
	Low Level	0 to 0.8 V : 20 µA max at 0.8V	
Switching time (max)	ms	15	
Life (min)		10 million cycles	
Connectors		SMA	
Actuator terminal		D-Sub 9 pin female Solder pins	
Weight (max)	g	60	

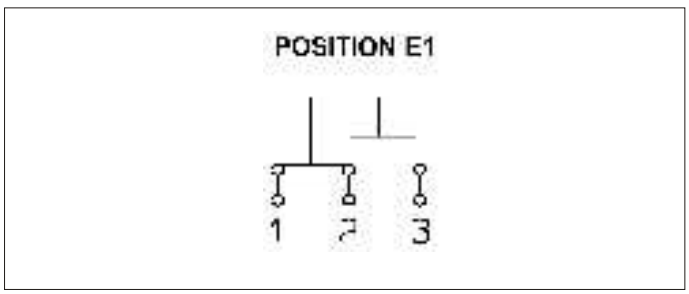
ENVIRONMENTAL SPECIFICATIONS

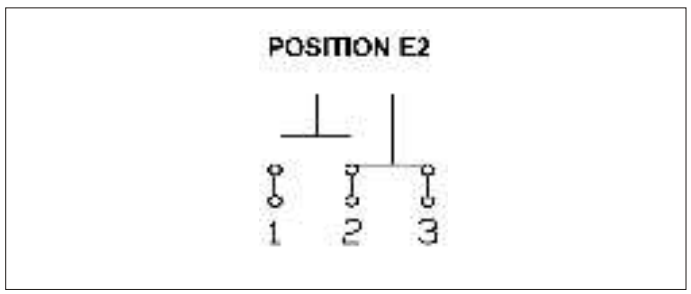
Operating temperature range	°C	-25 to +75
Storage temperature range	°C	-55 to +85
Temperature cycling (MIL-STD-202F, Method 107D, Cond.A)	°C	-55 to +85 (10 cycles)
Sine vibration operating (MIL STD 202, Method 204D, Cond.D)		10-2000 Hz, 20g
Random vibration operating		16.91g (rms) 50–2000 Hz 3min/axis
Shock operating (MIL STD 202, Method 213B, Cond.G)		50g / 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		15.000 feet (4.600 meters)
Altitude storage (MIL STD 202, Method 105C, Cond.B)		50.000 feet (15.240 meters)

SWITCH MODEL : NON TERMINATED SPDT SWITCH

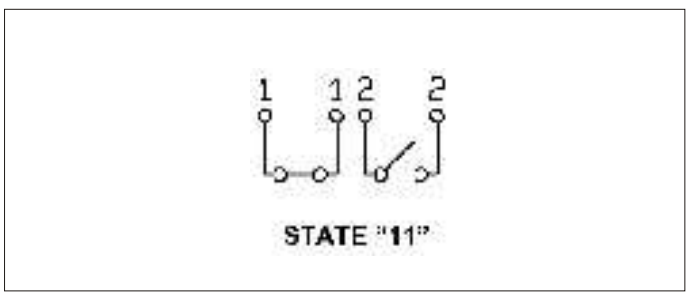
The non terminated SPDT switch is a single pole double throw switch. This switch is “break before make”.

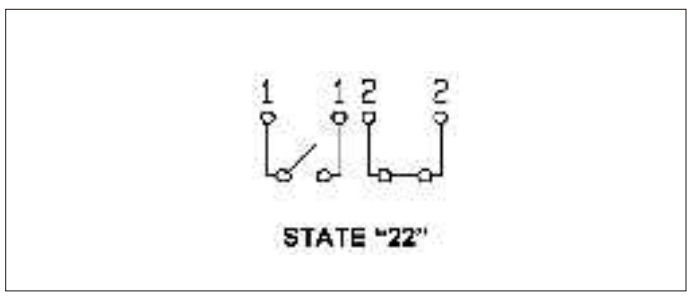
RF SCHEMATIC DIAGRAM





POSITION INDICATOR



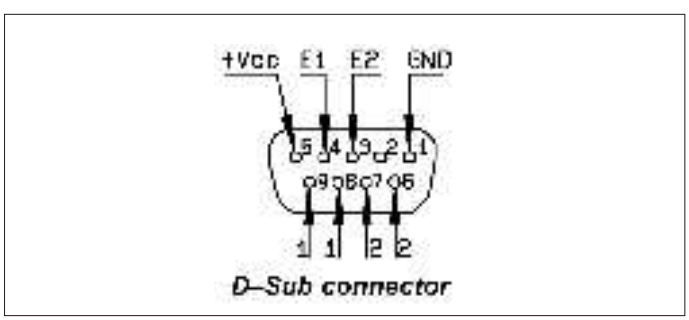


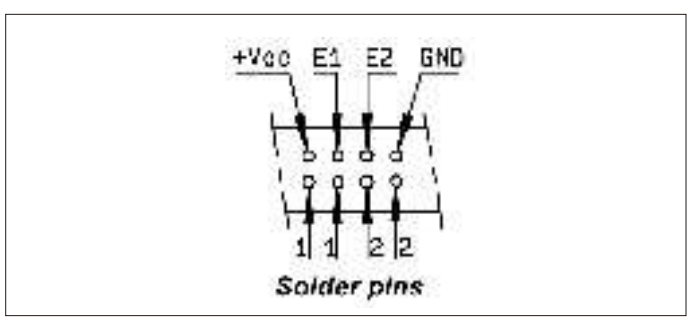
Standard drive option “1” (Positive common) :

- 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 to open RF path 1-2 and close RF path 2-3).





Connect "Gnd" for TTL drive only

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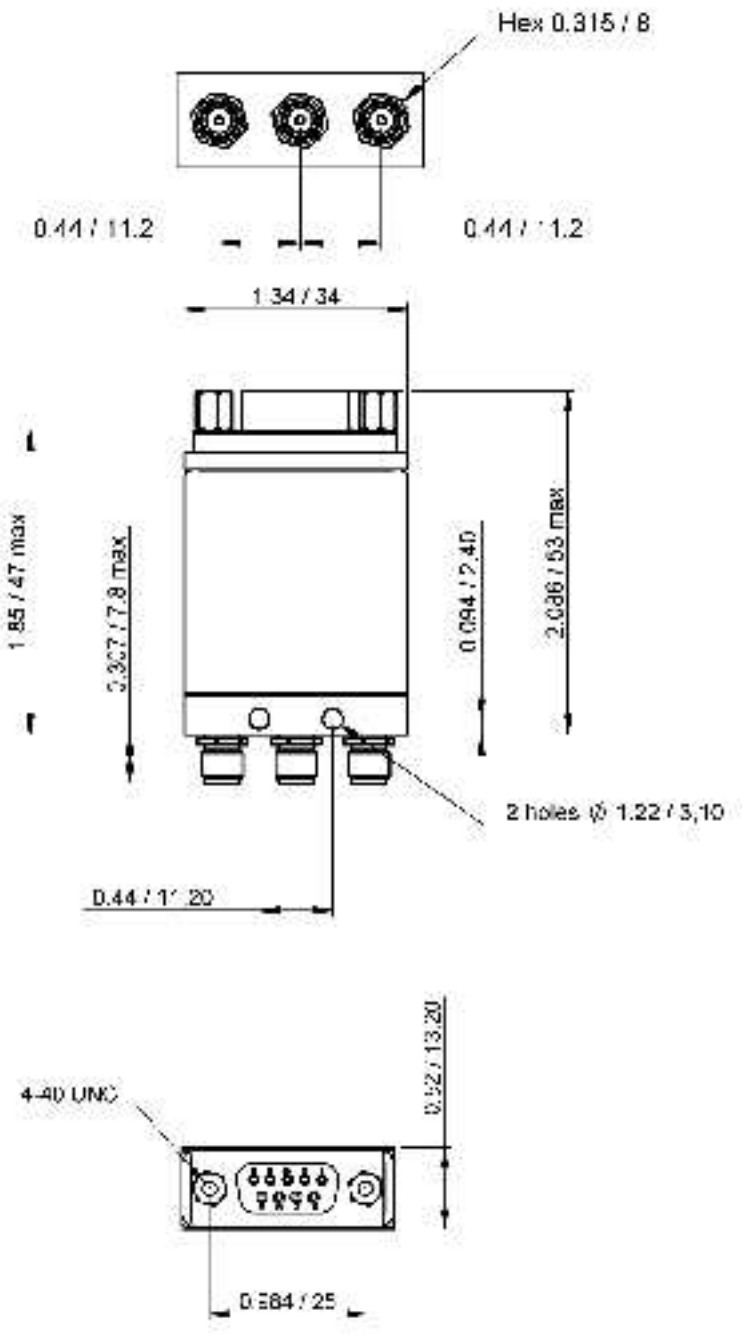
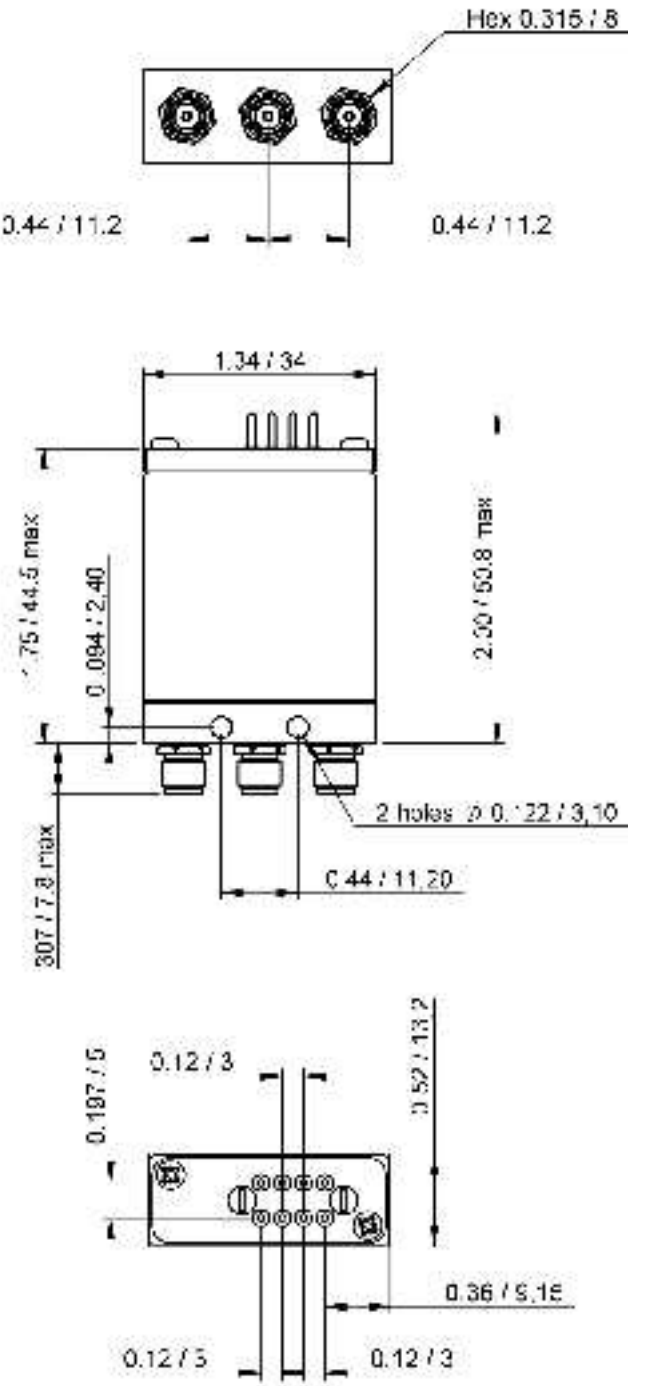
With D-sub connector



With solder pins



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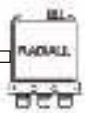
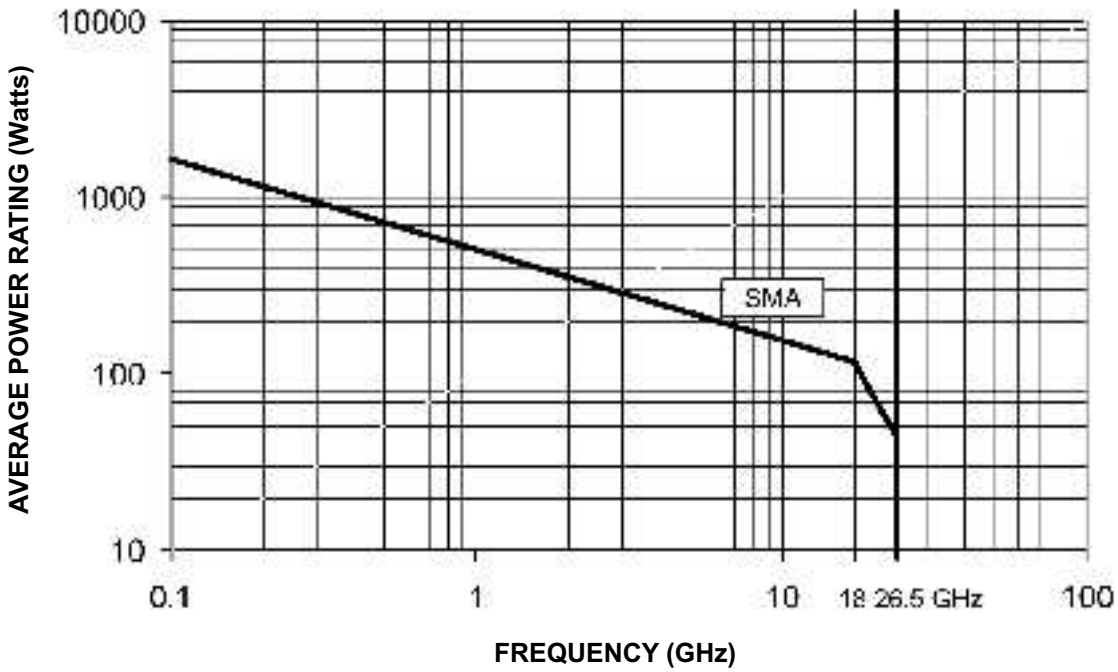


POWER RATING CHART

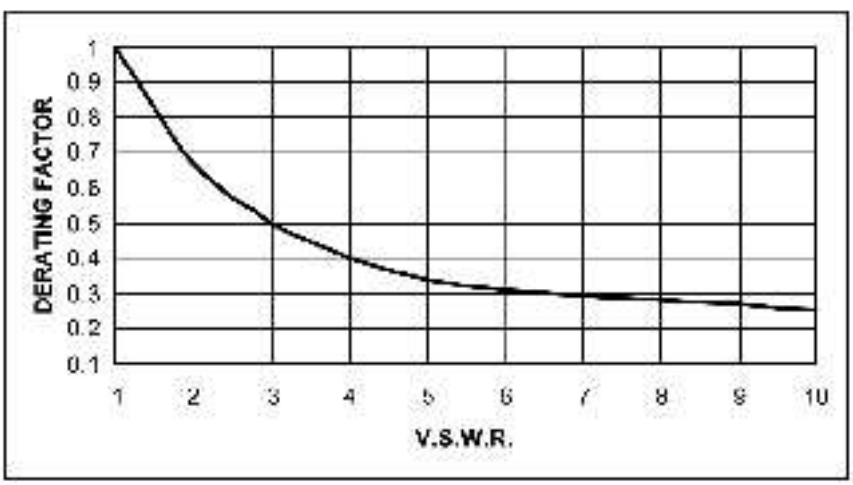
This graph is based on the following conditions :

- 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



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SPDT up to 40 GHz - RAMSES Concept
SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6/5.6

PART NUMBER SELECTION

R 5 7 0 . . . . .

RF Connectors :
- **3** : SMA up to 3 GHz
- **B** : SMB up to 3 GHz
- **C** : SMC up to 3 GHz
- **E** : QMA up to 6 GHz (4)
- **4** : SMA up to 18 GHz
- **F** : SMA up to 26.5 GHz
- **8** : SMA 2.9 up to 40 GHz (5)
- **9** : DIN 1.6/5.6 up to 2.5 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

Actuator Terminals :
- **0** : Solder pins

Options :
- **0** : Without option
- **1** : Positive common (2)(3)
- **3** : With suppression diodes (1)
- **4** : With suppression diodes and positive common (2)(3)

TTL Option :
- **0** : Without TTL driver
- **1** : With TTL driver (High level)(1)(2)

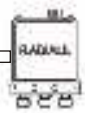
I.C. : Indicator contact - S.C.O. : Self Cut-Off
(1) : Suppression diodes are already included in self cut-off & TTL option
(2) : Polarity is not relevant to application for switches with TTL driver
(3) : Positive common shall be specified only with type 3, 4, 5 & 6 because failsafe switches can be used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

(4) : The "QLF" trademark (Quick Lock Formula®) standard applies to QMA and QN series and guaranties the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performances

(5) : Connector SMA 2.9 is equivalent to "K connector®", registered trade mark of Anritsu

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

SPDT up to 40 GHz - RAMSES Concept
SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6/5.6



RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
DIN 1.6/5.6	DC - 2.5	DC - 1	1.20	0.20	80	75
		1 - 2.5	1.30	0.30	70	
SMB - SMC	DC - 3	0 - 3	1.20	0.20	80	50
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	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
		8 - 12.4	1.40	0.40	60	
		12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.70	0.70	55	
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	
		26.5 - 40	1.90	0.80	50	

See page SPDT-16 , SPDT-20 and SPDT-21 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		**Failsafe**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (+/-10%)	Ω	47.5	275	58	350
Nominal operating current at 23°C	mA	250	102	210	80
Average power		See Power Rating Chart page **Intro-14**			
TTL input	High Level	2.2 to 5.5 V		800 µA max 5.5 V	
	Low Level	0 to 0.8 V		20 µA max 0.8 V	
Indicator rating		1 W / 30 V / 100 mA			
Switching time (max)	ms	10			
Life (min)	SMA - SMA 2.9 - QMA	10 million cycles			
	DIN 1.6/5.6 - SMB - SMC	5 million cycles			
Connectors		SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6/5.6			
Actuator terminals		Solder pins			
Operating temperature range	SMA - SMA 2.9 - QMA	-25 to +70 °C			
	DIN 1.6/5.6 - SMB - SMC	-40 to +85 °C			
Storage temperature range °C	SMA - SMA 2.9 - QMA	-40 to +85 °C			
	DIN 1.6/5.6 - SMB - SMC	-55 to +85 °C			
Vibration (MIL STD 202 , method 204D, cond.D)		10-2000 Hz , 20g operating			
Shock (MIL STD 202 , method 213B, cond.C)		100g / 6 ms , ½ sine operating			

Technical data sheets are available on : ***www.radiall.com***
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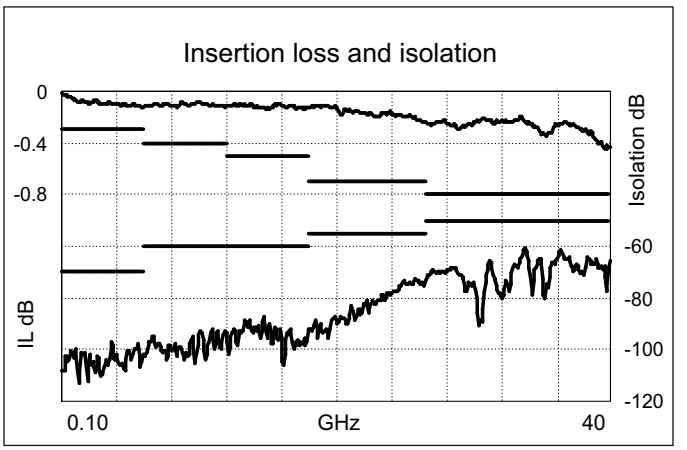
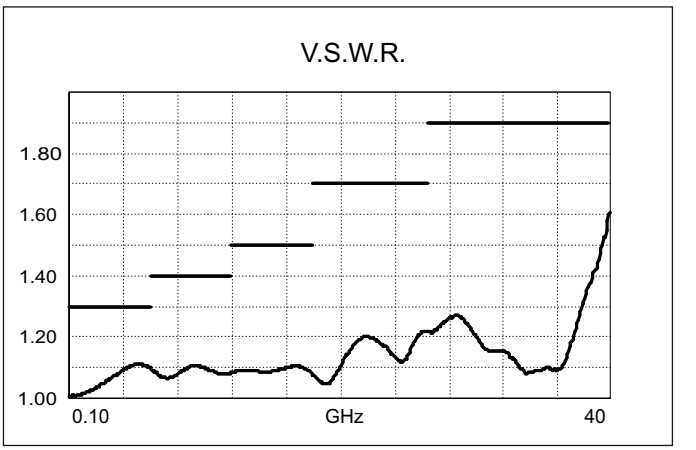
R570 AND R572 TYPICAL RF PERFORMANCES

Example : SPDT SMA 2.9 up to 40 GHz

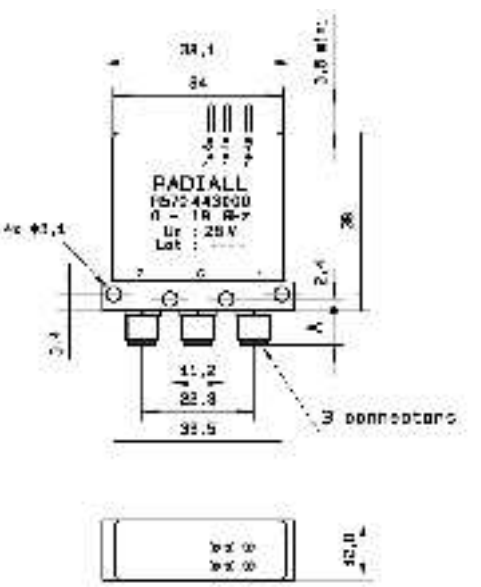




SPDT

TYPICAL OUTLINE DRAWING

Connectors	*A max (mm)*
SMA	7.4
SMA 2.9	6.3
SMB - SMC	9.3
QMA	10.8
DIN 1.6/5.6	11.5



See page **SPDT-29** for pin identification

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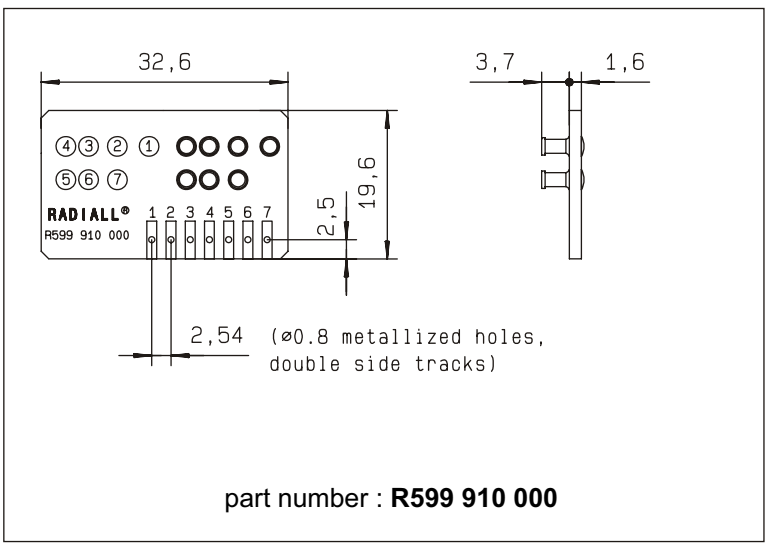
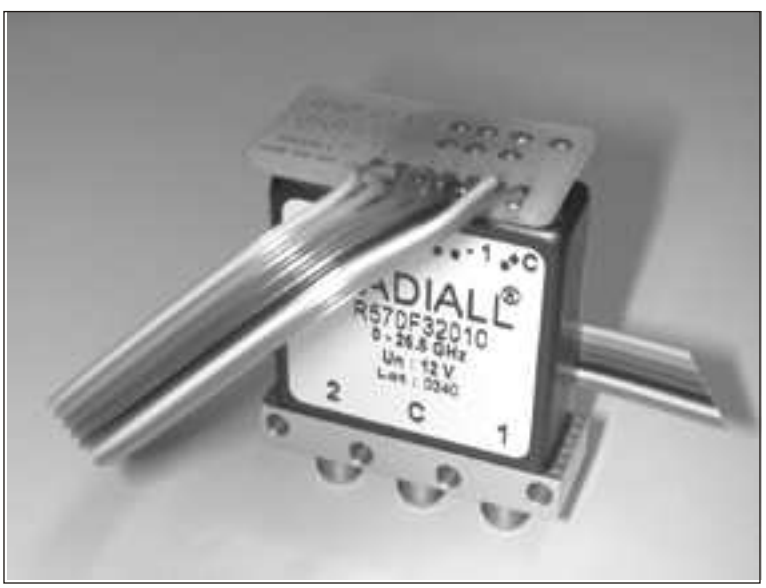
ACCESSORIES

A printed circuit board interface connector has been designed for easy mounting on terminals : it must be ordered separately.

For SPDT model R570 series :



part number : **R599 910 000**



Technical data sheets are available on : ***www.radiall.com***
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PART NUMBER SELECTION

Low consumption actuator & reduced size

R 5 7 2 . . . 0 . 0

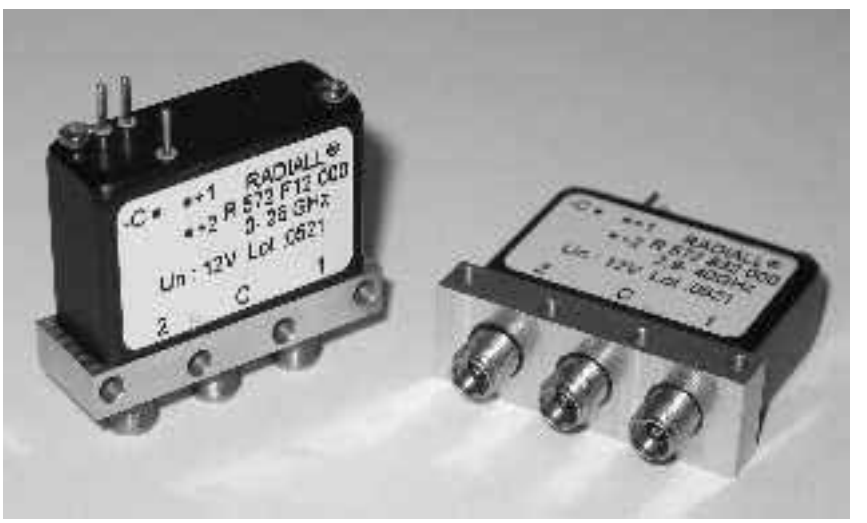
RF Connectors :
- **3** : SMA up to 3 GHz
- **B** : SMB up to 3 GHz
- **C** : SMC up to 3 GHz
- **E** : QMA up to 6 GHz (2)
- **4** : SMA up to 18 GHz
- **F** : SMA up to 26.5 GHz
- **8** : SMA 2.9 up to 40 GHz (3)
- **9** : DIN 1.6/5.6 up to 2.5 GHz

Type :
- **1** : Failsafe
- **3** : Latching

Options :
- **0** : Without option
- **1** : Positive common (1)

Actuator Voltage :
- 2 : 12 Vdc
- 3 : 28 Vdc

(1) : Positive common shall be specified only with type 3 because failsafe switches can be used with both polarities



(2) : The "QLF" trademark (Quick Lock Formula®) standard applies to QMA and QN series and guaranties the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performances

(3) : Connector SMA 2.9 is equivalent to "K connector®", registered trade mark of Anritsu

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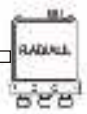
SPDT up to 40 GHz - RAMSES Concept
SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6/5.6



RF PERFORMANCES

Low consumption actuator & reduced size

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
DIN 1.6/5.6	DC - 2.5	DC - 1	1.20	0.20	80	75
		1 - 2.5	1.30	0.30	70	
SMB - SMC	DC - 3	DC - 3	1.20	0.20	80	50
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	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
		8 - 12.4	1.40	0.40	60	
		12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.70	0.70	55	
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	
		26.5 - 40	1.90	0.80	50	

See page SPDT-16, SPDT-20 and SPDT-21 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		**Failsafe**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (+/-10%)	Ω	47.5	275	58	350
Nominal operating current at 23°C	mA	250	102	210	80
Average power		See Power Rating Chart page **Intro-14**			
Switching time (max)	ms	10			
Life (min)		2.5 million cycles			
Connectors		SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6/5.6			
Actuator terminals		Solder pins			
Operating temperature range	SMA - SMA 2.9 - QMA	-25 to +70 °C			
	DIN 1.6/5.6 - SMB - SMC	-40 to +85 °C			
Storage temperature range °C	SMA - SMA 2.9 - QMA	-40 to +85 °C			
	DIN 1.6/5.6 - SMB - SMC	-55 to +85 °C			
Vibration (MIL STD 202, method 204D, cond.C)		10-2000 Hz , 20g operating			
Shock (MIL STD 202, method 213B, cond.G)		50g / 11 ms, ½ sine non operating			

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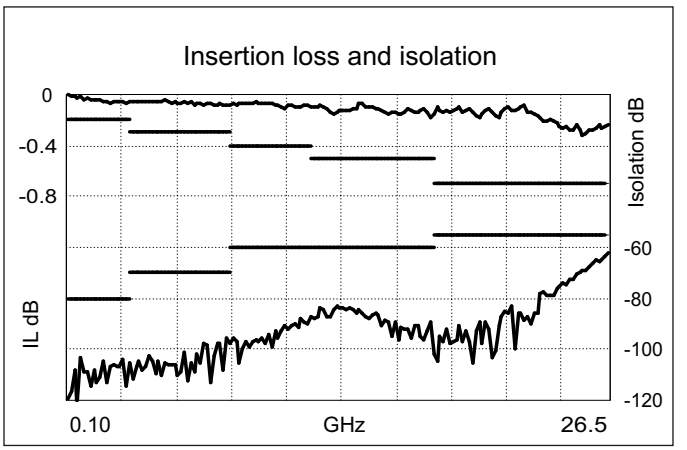
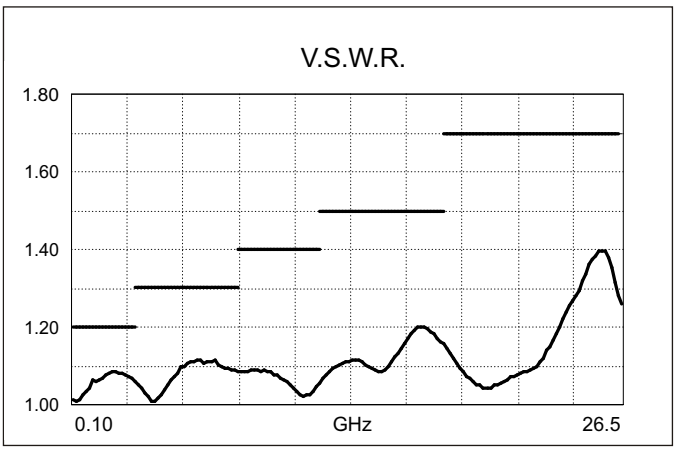
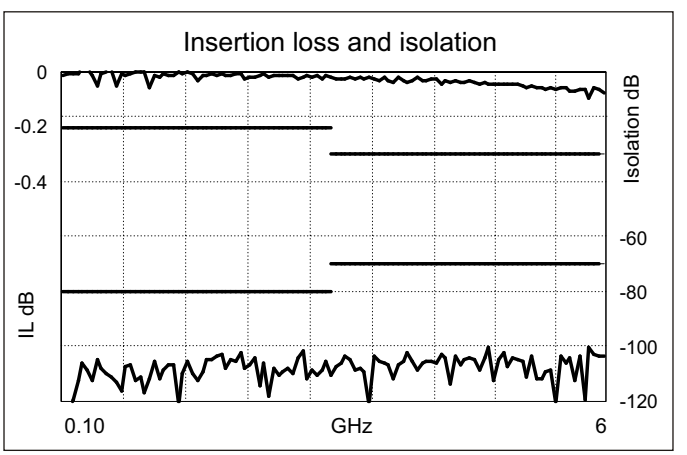
R570 AND R572 TYPICAL RF PERFORMANCES *Low consumption actuator & reduced size*

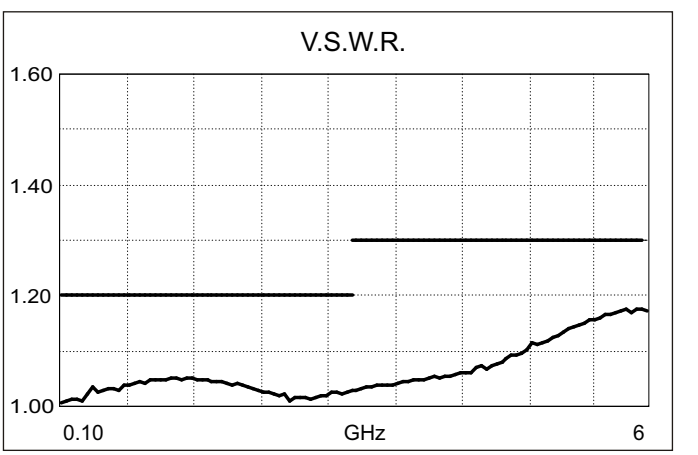
Example : SPDT SMA up to 26.5 GHz





Example : SPDT QMA up to 6 GHz





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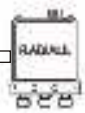
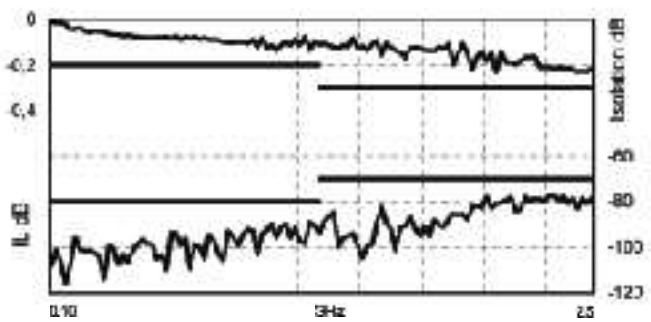


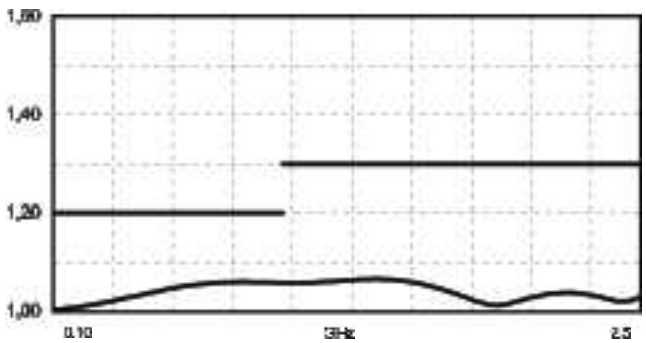
Low consumption actuator & reduced size

Example : SPDT DIN 1.6/5.6 up to 2.5 GHz

Insertion loss and isolation

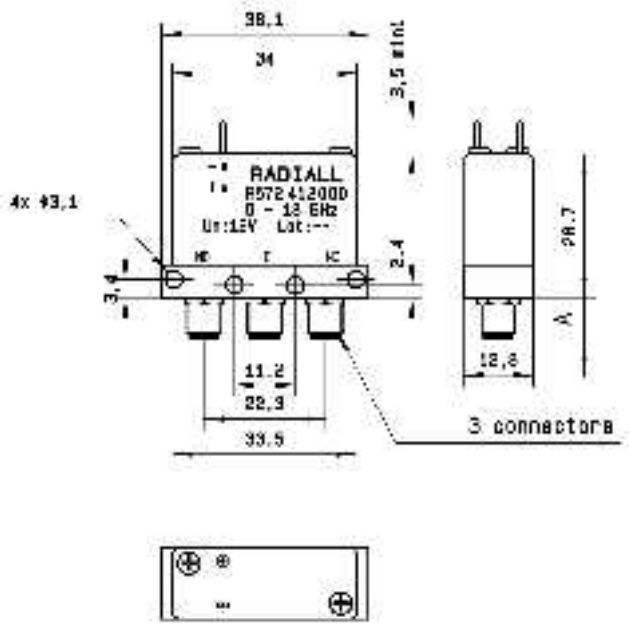


V.S.W.R.



TYPICAL OUTLINE DRAWING

Connectors	*A max (mm)*
SMA	**7.4**
SMA 2.9	**6.3**
SMB - SMC	**9.3**
QMA	**10.8**
DIN 1.6/5.6	**11.5**



See page **SPDT-29** for pin identification

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SPDT up to 18 GHz - RAMSES Concept
N - TNC - BNC

PART NUMBER SELECTION

R 5 7 0 . . . . . .

RF Connectors :
- **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)

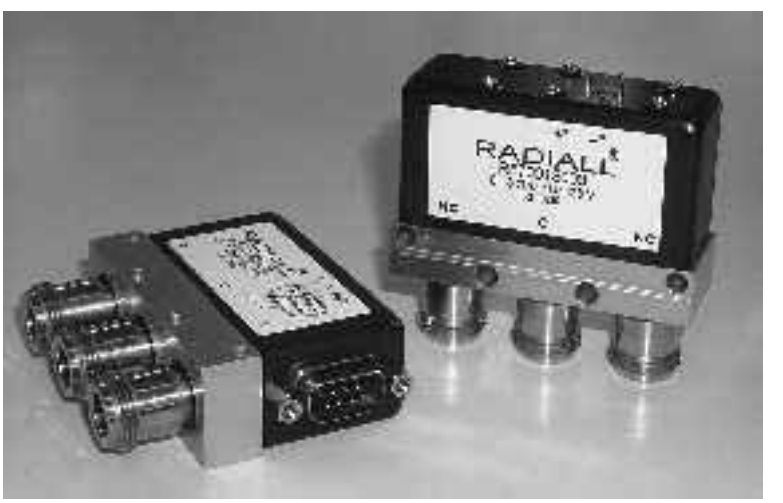
Actuator Voltage :
- **2** : 12 Vdc
- **3** : 28 Vdc

Actuator Terminals :
- **0** : Solder pins
- **5** : D-Sub connector

Options :
- **0** : Without option
- **1** : Positive common (2)(3)
- **3** : With suppression diodes (1)
- **4** : With suppression diodes and positive common (2)(3)

TTL Option :
- **0** : Without TTL driver
- **1** : With TTL driver (high level)(1)(2)

I.C. : Indicator contact / S.C.O.: Self Cut-Off
(1) : Suppression diodes are already included in self cut-off & 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 & 6 because failsafe switches can be used with both polarities



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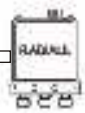
SPDT up to 18 GHz - RAMSES Concept
N - TNC - BNC



RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
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 GHz	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	

See page SPDT-24 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		**Failsafe**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (+/-10%)	Ω	47.5	275	58	350
Nominal operating current at 23°C	mA	250	102	210	80
Average power		See Power Rating Chart page **Intro-14**			
TTL input	High Level	2.2 to 5.5 V		800 µA max 5.5 V	
	Low Level	0 to 0.8 V		20 µA max 0.8 V	
Switching time (max)	ms	15			
Life (min)		2.5 million cycles			
Connectors		N - TNC - BNC			
Actuator terminals		Solder pins or 9 pin D-Sub connector			
Operating temperature range		-40 to +85 °C			
Storage temperature range °C		-55 to +85 °C			
Vibration (MIL STD 202 , method 204D, cond.D)		10-2000 Hz, 20g operating			
Shock (MIL STD 202 , method 213B, cond.C)		100g / 6 ms, ½ sine non operating			

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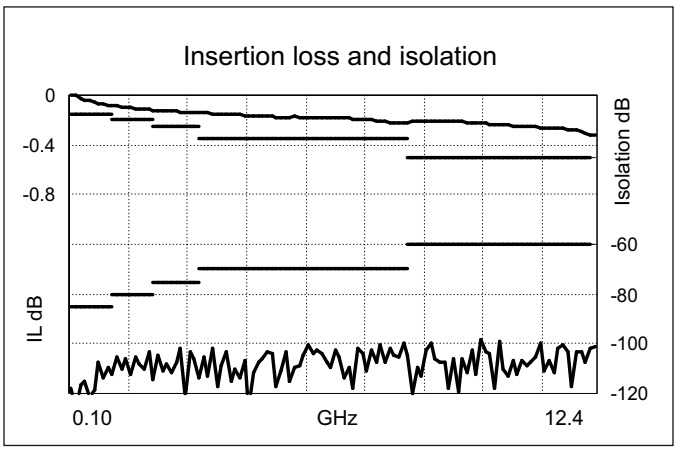
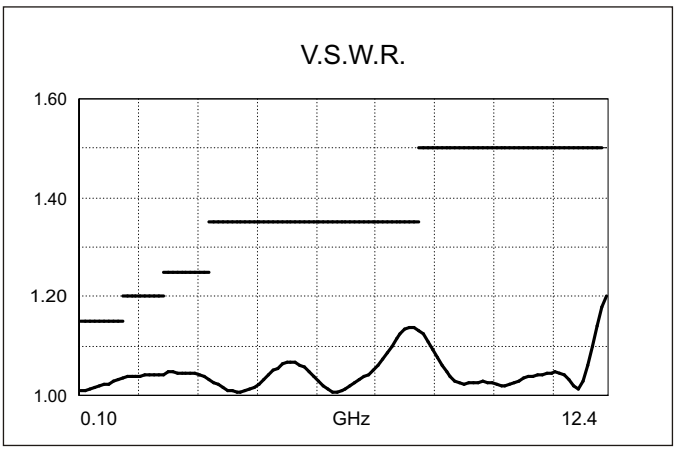
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

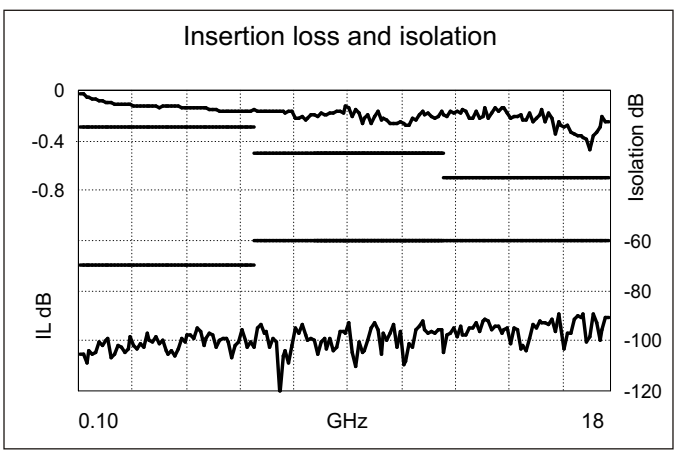
R570 TYPICAL RF PERFORMANCES

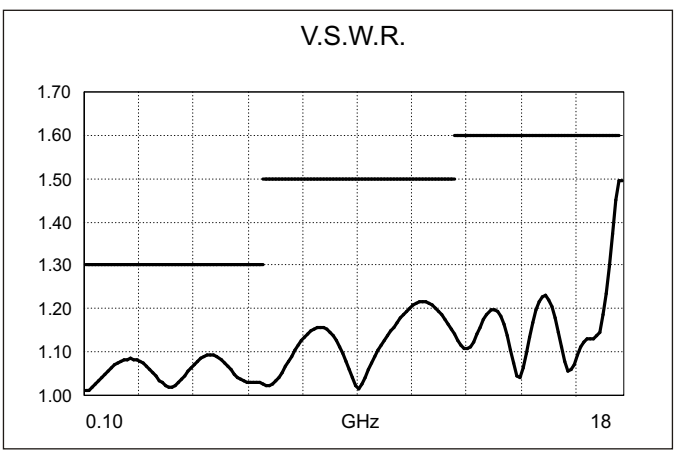
Example : SPDT N and TNC up to 12.4 GHz





Example : SPDT TNC up to 18 GHz





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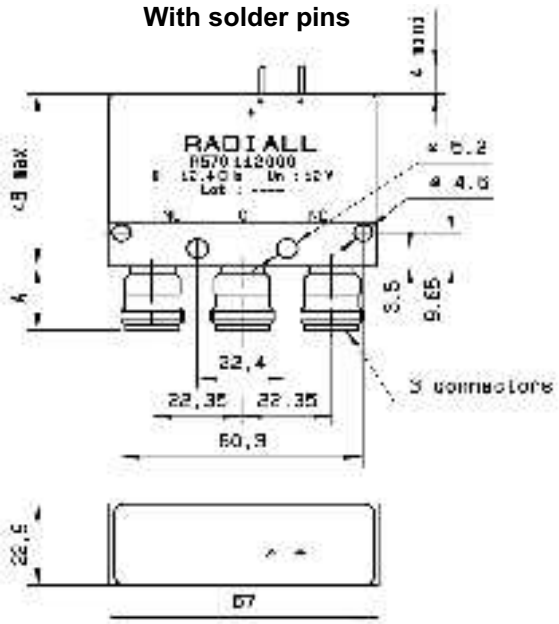
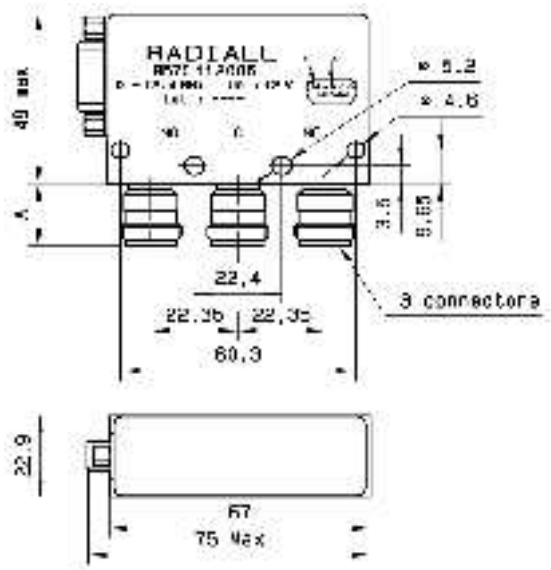
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

TYPICAL OUTLINE DRAWING

With solder pins



With D-Sub connector



See page **SPDT-29** for pin identification

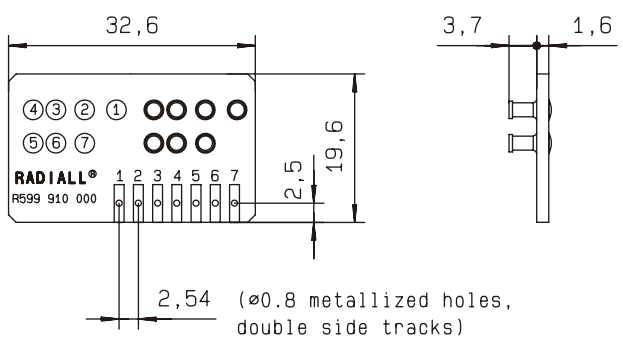
See page **SPDT-29** for D-Sub pin identification

Connectors	N	TNC	BNC
A max (mm)	17.7	11.3	11.3

ACCESSORIES

A printed circuit board interface connector has been designed for easy mounting on terminals : it must be ordered separately.

For SPDT model R570 series :



part number : **R599 910 000**

Technical data sheets are available on : ***www.radiall.com***
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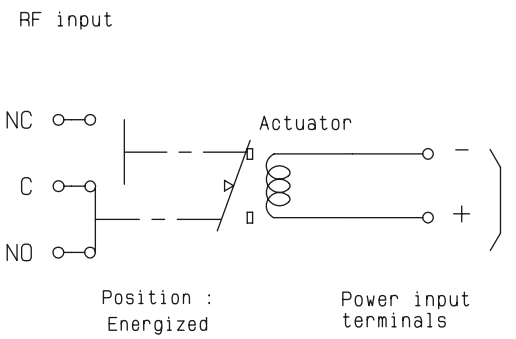
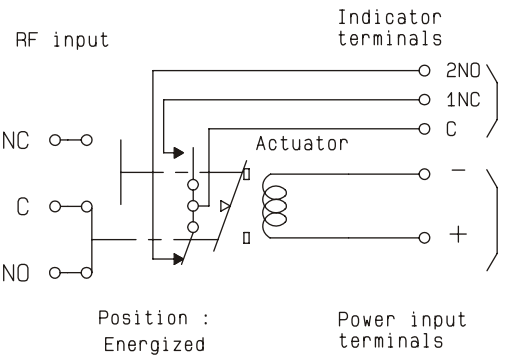
COAXIAL SPDT - ELECTRICAL SCHEMATICS
R570/R572 series

FAILSAFE

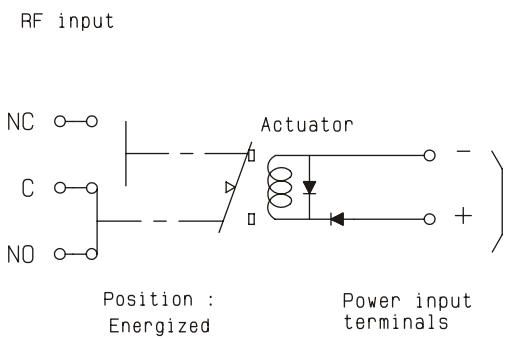
WITHOUT OPTION
R570 -1- 000 / R572 -1- 000



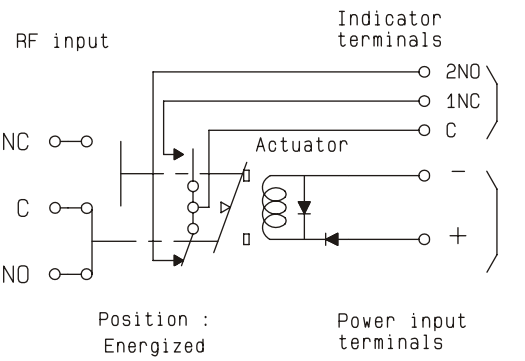
WITH INDICATOR CONTACT
R570 -2- 000



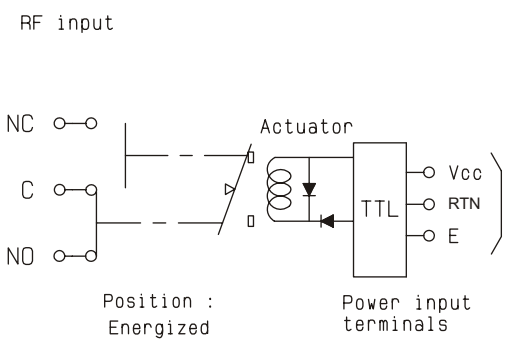
WITH SUPPRESSION DIODES
R570 -1- 030



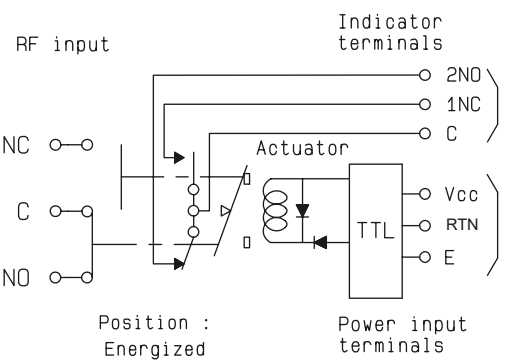
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R570 -2- 030



WITH TTL DRIVER
(suppression diodes are included)
R570 -1- 100



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R570 -2- 100



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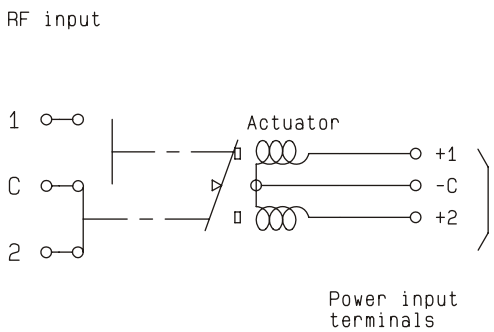
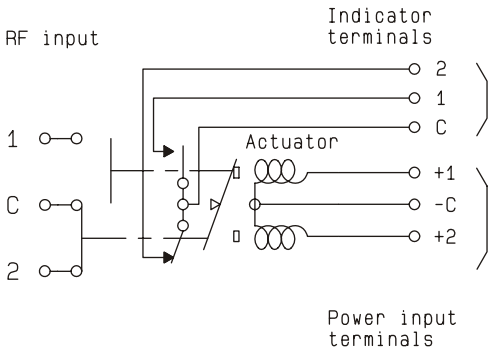
COAXIAL SPDT - ELECTRICAL SCHEMATICS
R570/R572 series

LATCHING

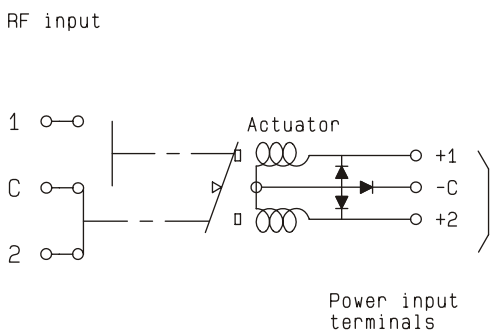
WITHOUT OPTION
R570 -3- 000 and R572 -3- 000



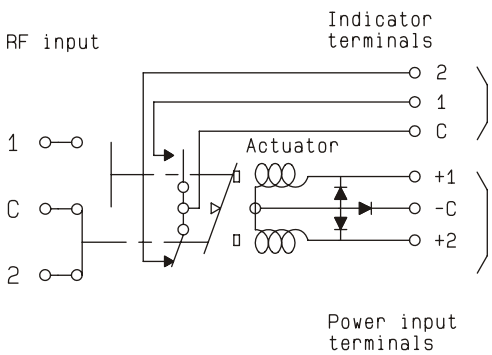
WITH INDICATOR CONTACT
R570 -4- 000



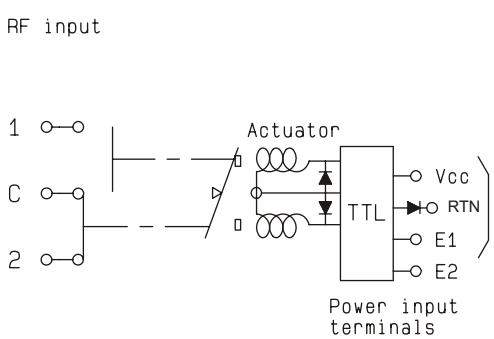
WITH SUPPRESSION DIODES
R570 -3- 030



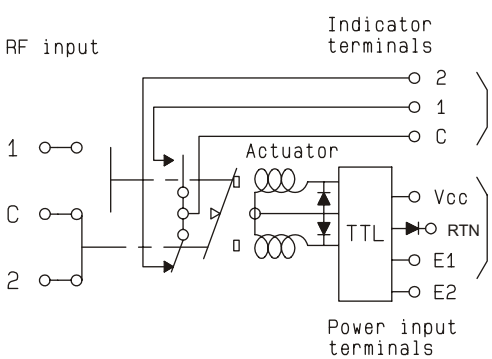
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R570 -4- 030



WITH TTL DRIVER
(suppression diodes are included)
R570 -3- 100



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R570 -4- 100



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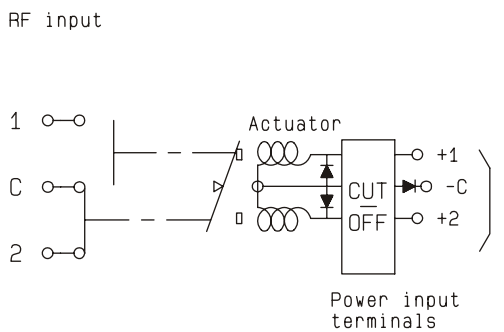
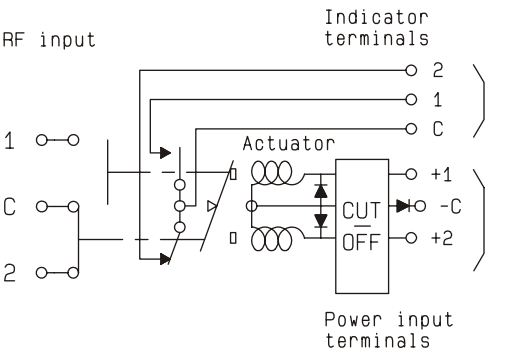
COAXIAL SPDT - ELECTRICAL SCHEMATICS
R570/R572 series

LATCHING

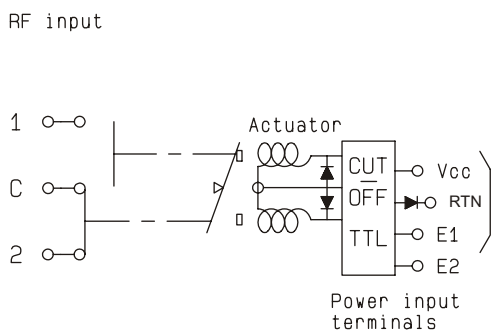
WITH CUT-OFF
(suppression diodes are included)
R570 -5- 000



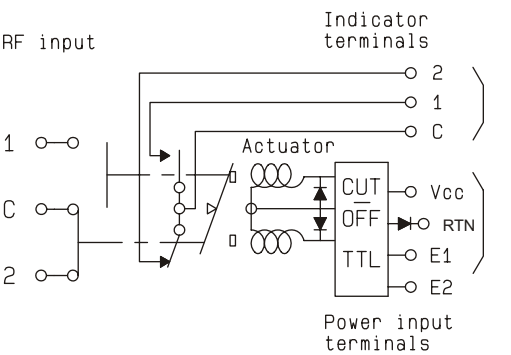
WITH CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R570 -6- 000



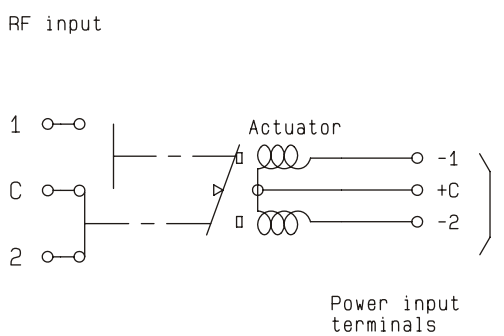
WITH CUT-OFF AND TTL DRIVER
(suppression diodes are included)
R570 -5- 100



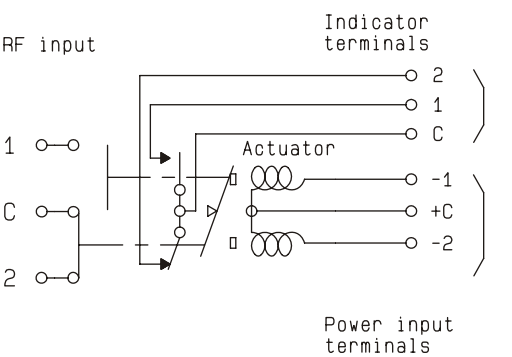
WITH CUT-OFF, TTL AND INDICATOR CONTACT
(suppression diodes are included)
R570 -6- 100



WITH POSITIVE COMMON, NO OPTION
R570 -3- 010 / R572 -3- 010



WITH POSITIVE COMMON AND INDICATOR CONTACT
R570 -4- 010



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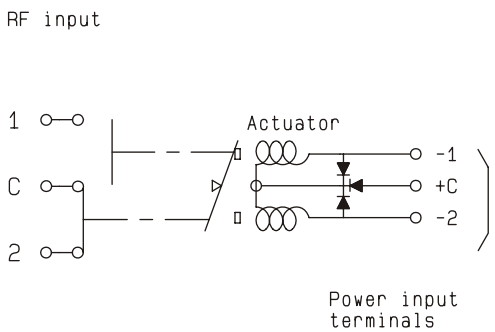
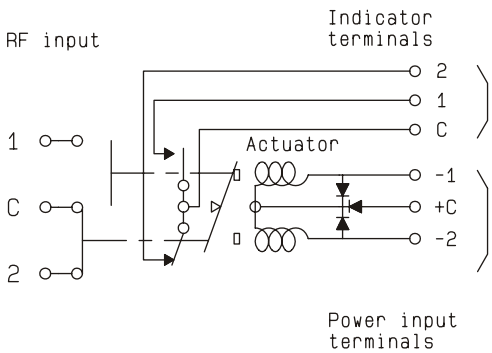
COAXIAL SPDT - ELECTRICAL SCHEMATICS
R570/R572 series

LATCHING

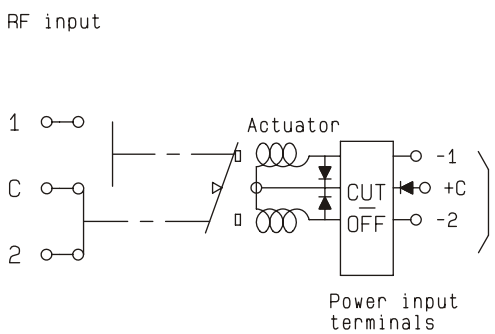
WITH POSITIVE COMMON AND SUPPRESSION DIODES
R570 -3- 040



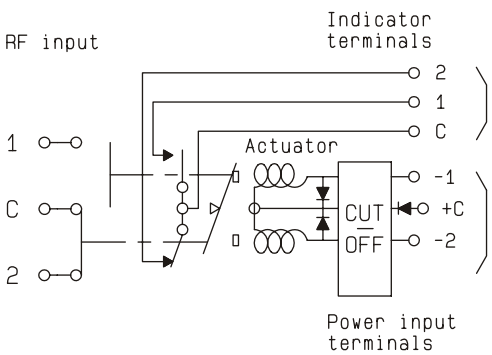
WITH POSITIVE COMMON, SUPRESSION DIODES AND INDICATOR CONTACT
R570 -4- 040



WITH POSITIVE COMMON AND CUT-OFF
(suppression diodes are included)
R570 -5- 010



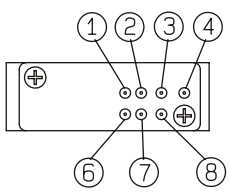
WITH POSITIVE COMMON, CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R570 -6- 010



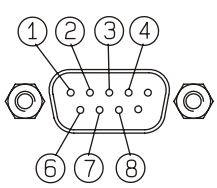
PIN IDENTIFICATION

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

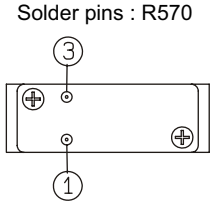
Bottom view



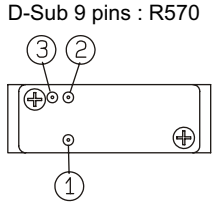
Solder pins : R570



D-Sub 9 pins : R570



Solder pins : failsafe R572



Latching R572

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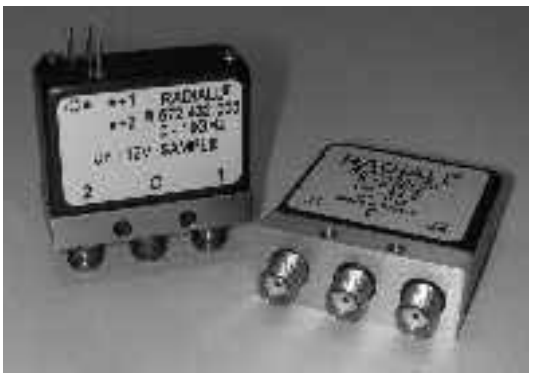
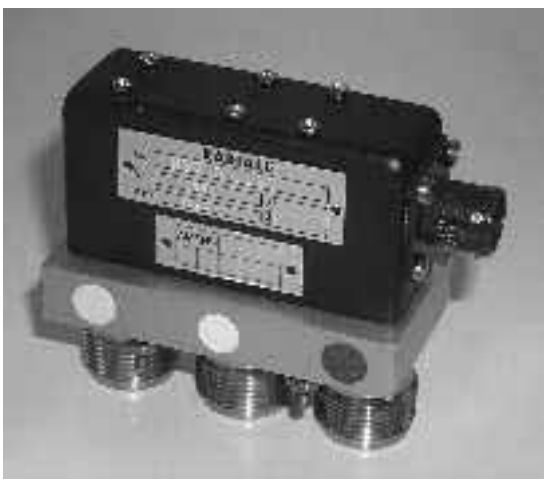
OPTIONAL FEATURES FOR SPDT

GENERAL



All miniature SPDT switches fitted with SMA, QMA, SMC, SMB or SMA 2.9 connectors can be delivered with 34 mm narrow width RF body. Ask RADIALL for availability.

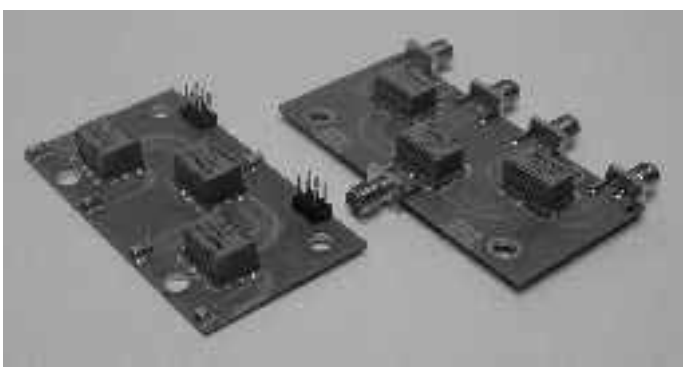
Examples of dedicated application options :



This SPDT with HN coaxial connectors and MILC38999 circular connectors for L band airborne applications.

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

A SMA SPDT with single input TTL driver. This option is available in latching configuration upon special request. Key advantage : less wires, easier connection.



A SP4T design up to 8 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 request.

A SMA SPDT with a specific RF body (with mounting leg) for easy mounting on front panel of switching matrix.

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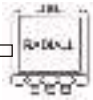


DP3T section

High performances DP3T and terminated SPDT up to 26.5 GHz PLATINUM series

NEW

See Page DP3T - 2

DP3T up to 26.5 GHz

See Page DP3T - 12

HIGH PERFORMANCES SPDT Terminated
PLATINUM Series / DP3T-SPDT up to 26.5 GHz

Radiall's PLATINUM series switches are optimised to perform a high level over an extended life span. With outstanding RF performances, 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.

PART NUMBER SELECTION

R 5 9 5 . . . . . .

RoHS COMPLIANT

NEW

RF Connectors :
- **3** : SMA up to 6 GHz
- **4** : SMA up to 20 GHz
- **F** : SMA up to 26.5 GHz

Type :
- **3** : Latching
- **4** : Latching + Indicators
- **5** : Latching + S.C.O.
- **6** : Latching + S.C.O. + I.C.

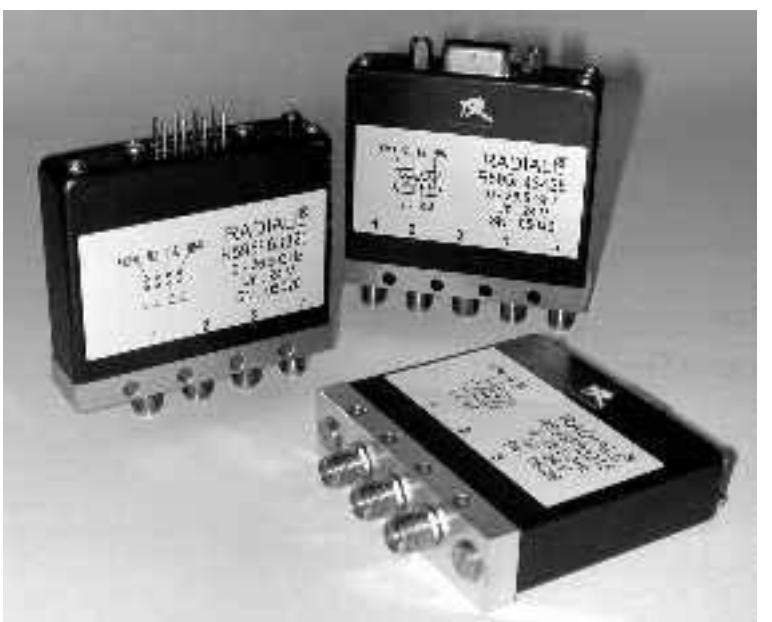
Actuator Voltage :
- **3** : 24 Vdc
- **7 :** 15 Vdc

Switch model :
- **2** : Terminated SPDT switch
- **3** : Terminated 4 ports bypass switch
- **4** : Non terminated 5 ports DP3T switch

Documentation
- **-** : certificate of conformity
- **C** : Calibration certificate
- **R** : Calibration certificate + RF curves

Actuator Terminals :
- **0** : Solder pins
- **5** : D-sub connector

Options :
- **1** : Without option (positive common)
- **2** : Compatible TTL driver (high level)



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HIGH PERFORMANCES SPDT Terminated
PLATINUM Series / DP3T-SPDT up to 26.5 GHz

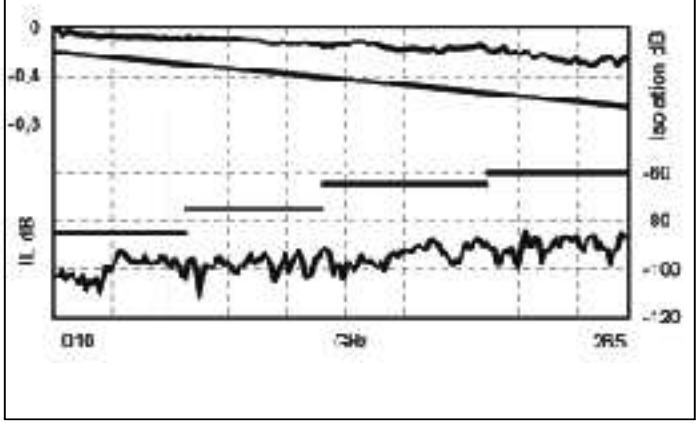
RF PERFORMANCES

Part Number		R5953-----	R5954-----	R595F-----
Frequency Range	GHz	DC to 6	DC to 20	DC to 26.5
Impedance	Ω	50		
Insertion Loss (max)	dB	0.20 + (0.45 / 26.5) x frequency (GHz)		
Isolation (min)	dB	85	DC to 6 GHz : 85 6 to 12.4 GHz : 75 12.4 to 20 GHz : 65	DC to 6 GHz : 85 6 to 12.4 GHz : 75 12.4 to 20 GHz : 65 20 to 26.5 GHz : 60
V.S.W.R.(Maxi)		1.15	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.30 18 to 20 GHz : 1.60	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.30 18 to 26.5 GHz : 1.60
Repeatability (Up to 10 million cycles measured at 25°C)	dB	0.03 dB maximum		

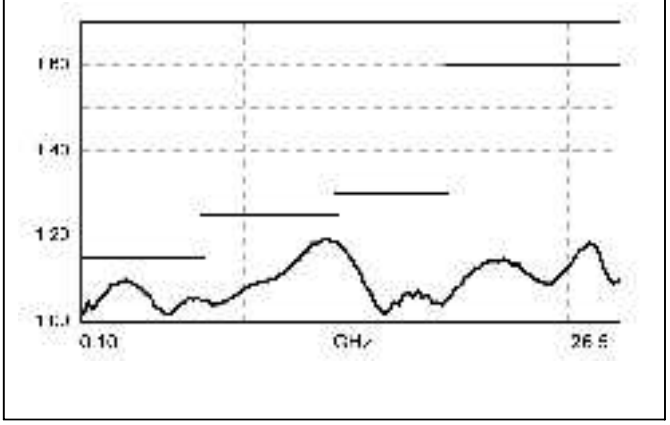
DP3T

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation



V.S.W.R.



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ADDITIONAL SPECIFICATIONS

Operating mode		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**24** (20 to 32)	**15** (12 to 20)
Coil resistance (+/-10%)	Ω	175	60
Nominal operating current at 23°C	mA	140	250
Average power		RF path Cold switching : see Power Rating Chart on **DP3T-11** Hot switching : 1 Watt CW	
		Internal terminations 1 Watt average into 50 Ω	
TTL input	High Level	3 to 7 V : 800 µA max at 7 V	
	Low Level	0 to 0.8 V : 20 µA max at 0.8V	
Switching time (max)	ms	15	
Life (min)		10 million cycles	
Connectors		SMA	
Actuator terminal		D-Sub 9 pin female Solder pins	
Weight (max)	g	100	

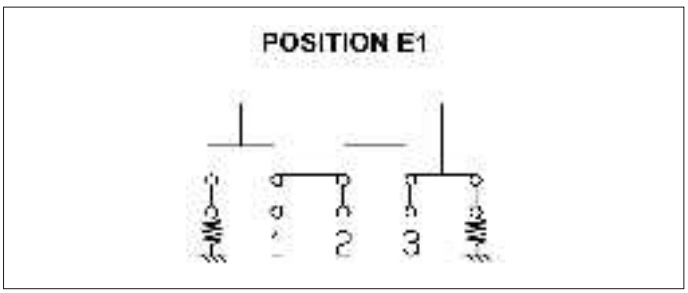
ENVIRONMENTAL SPECIFICATIONS

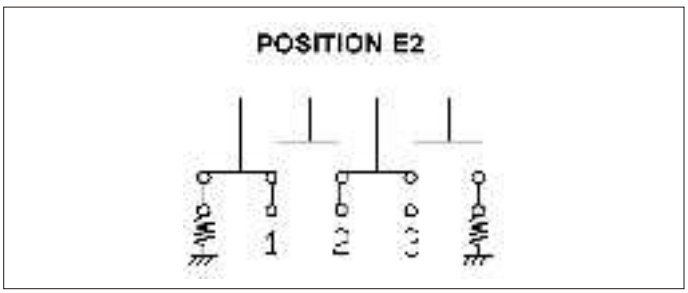
Operating temperature range	°C	-25 to +75
Storage temperature range	°C	-55 to +85
Temperature cycling (MIL STD 202F, Method 107D, Cond. A)	°C	-55 to +85 (10 cycles)
Sine vibration operating (MIL STD 202, Method 204D, Cond. D)		10-2000 Hz, 20g
Random vibration operating		16.91g (rms) 50-2000 Hz 3min/axis
Shock operating (MIL STD 202, Method 213B, Cond. G)		50g/11ms, sawtooth
Humidity operating		15 to 95% RH
Humidity storage (MIL STD 202, Method 106E, Cond. E)		65°C, 95% RH, 10 days
Altitude operating		15.000 feet (4.600 meters)
Altitude storage (MIL STD 202, Method 105C, Cond. B)		50.000 feet (15.240 meters)

SWITCH MODEL : TERMINATED SPDT SWITCH

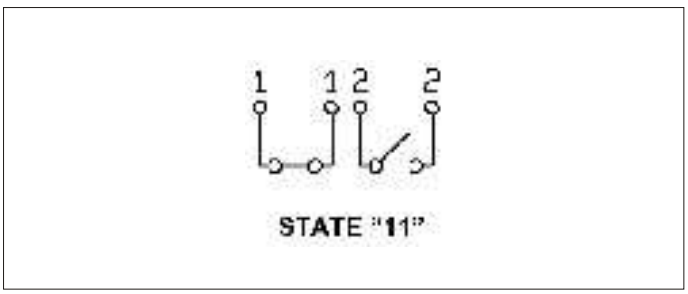
The terminated SPDT switch is a single pole double throw switch. The unused ports are terminated into 50Ω. This switch is "break before make".

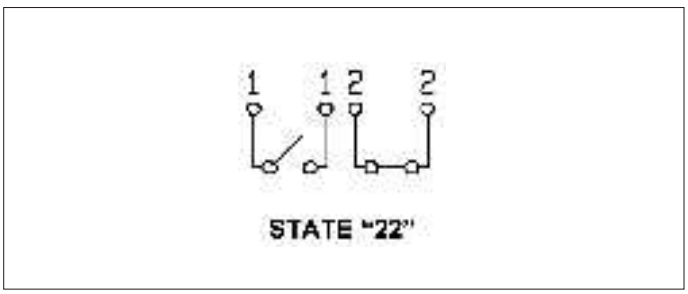
RF SCHEMATIC DIAGRAM





POSITION INDICATOR



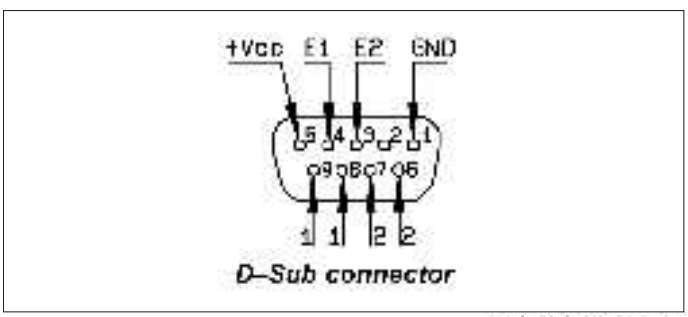


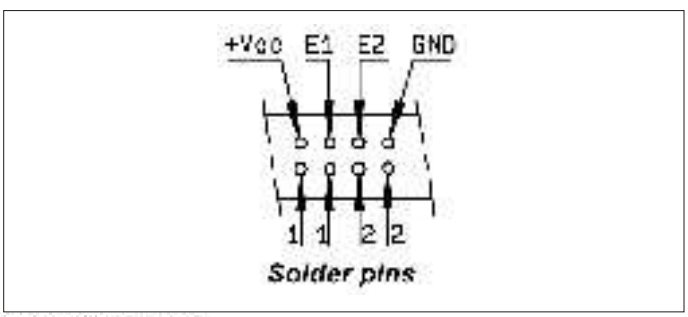
Standard drive option "1" (Positive common) :

- 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 to open RF path 1-2 and close RF path 2-3).





Connect "Gnd" for TTL drive only

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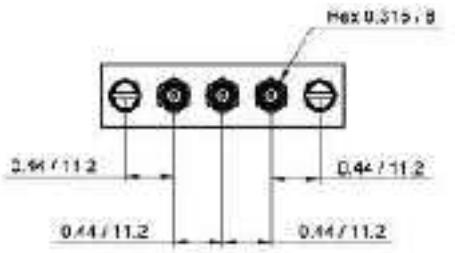

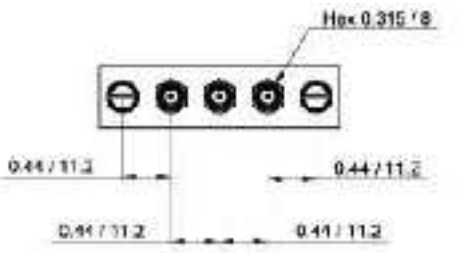

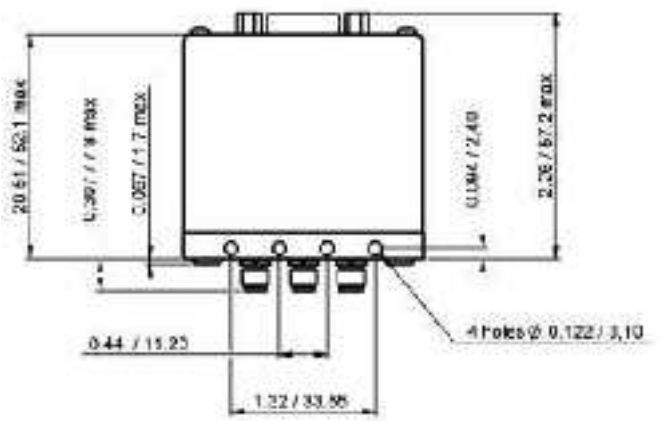

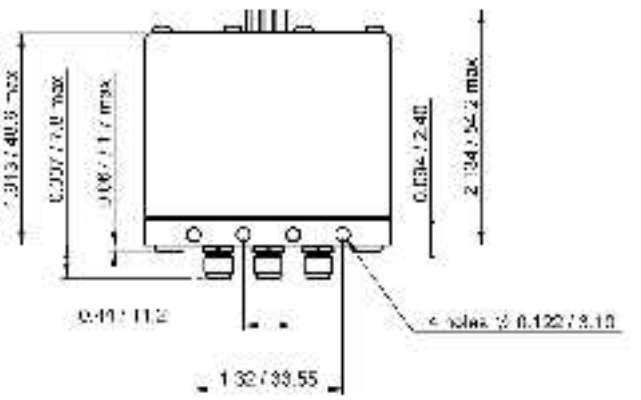

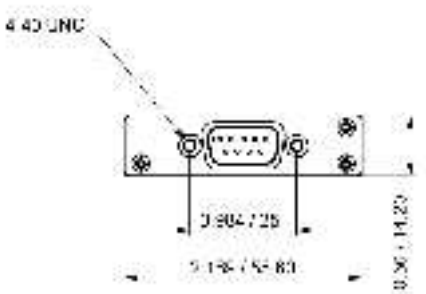

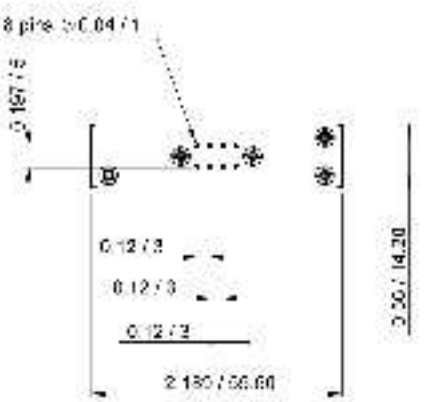

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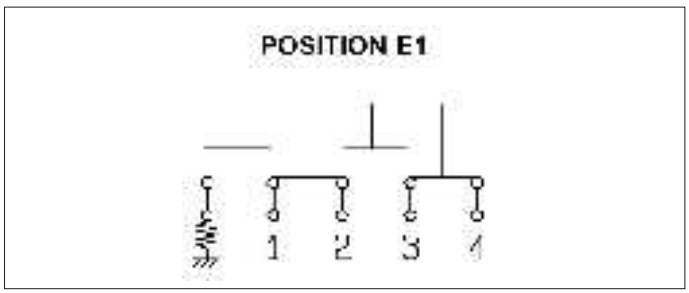
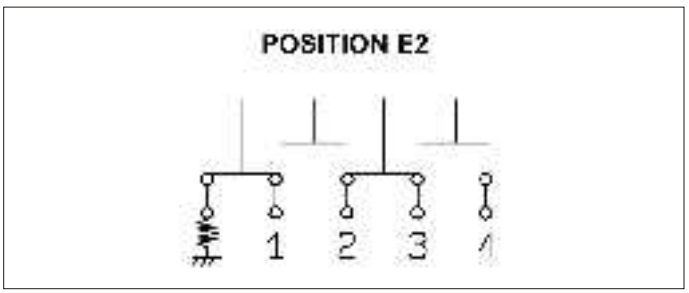
SWITCH MODEL : TERMINATED 4 PORT BYPASS SWITCH

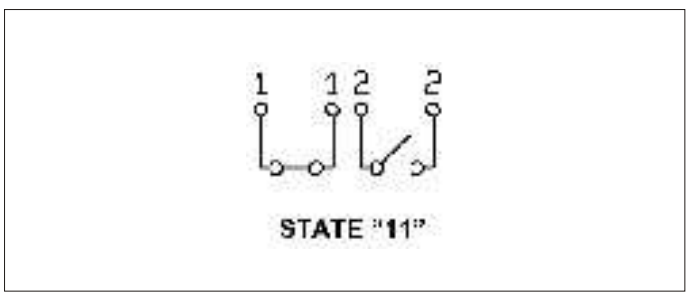
The terminated 4 port bypass switch can terminate into 50Ω the device under test. These switches are “break before make”.

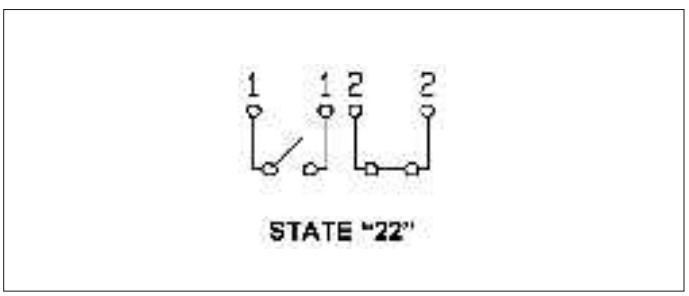
RF SCHEMATIC DIAGRAM





POSITION INDICATOR



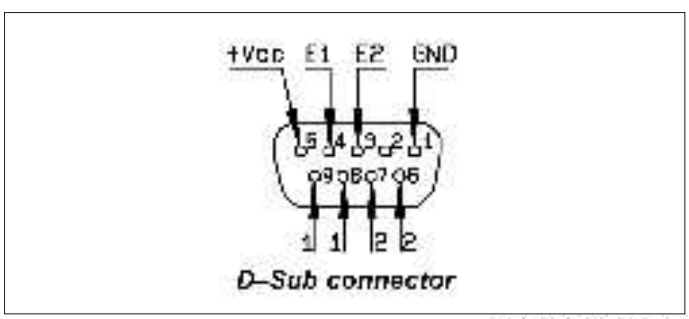


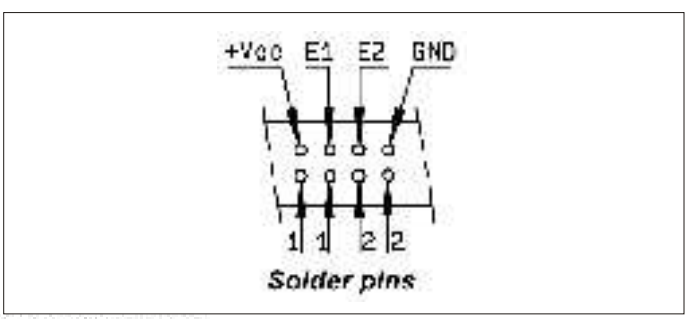
Standard drive option “1” (Positive common) :

- 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 to open RF path 1-2 and close RF path 2-3).





Connect "Gnd" for TTL drive only

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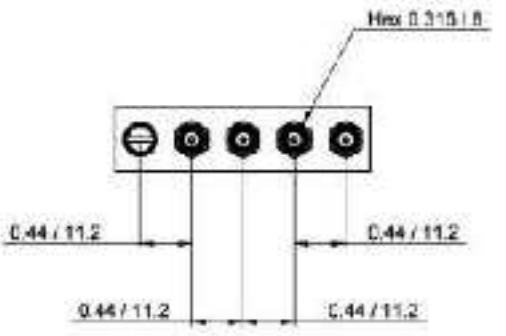

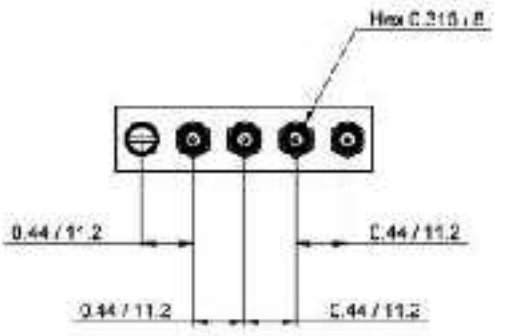

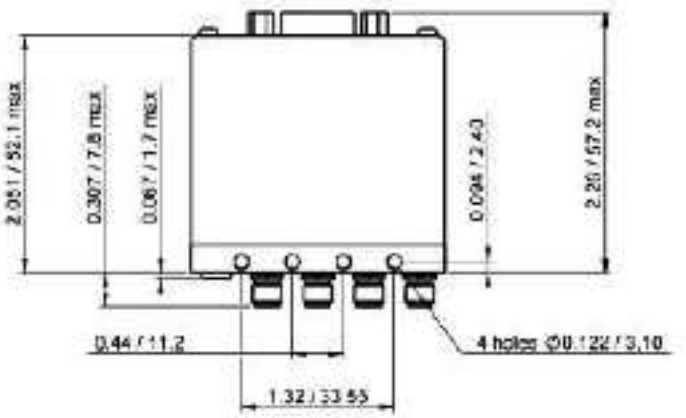

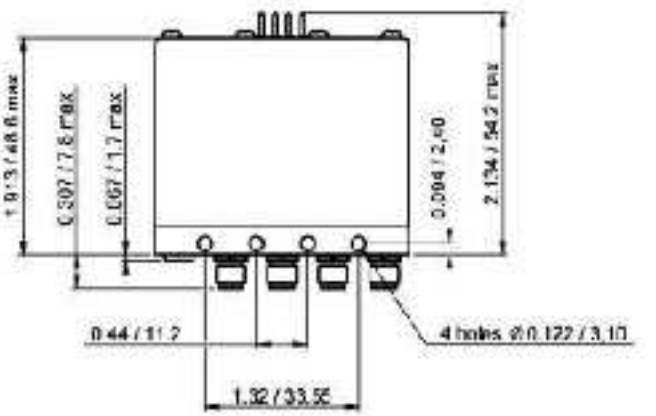

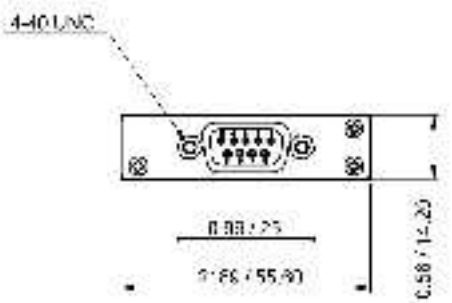

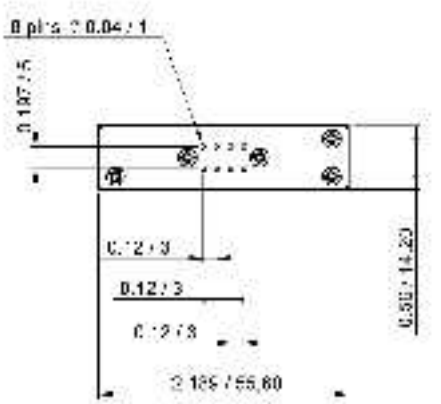

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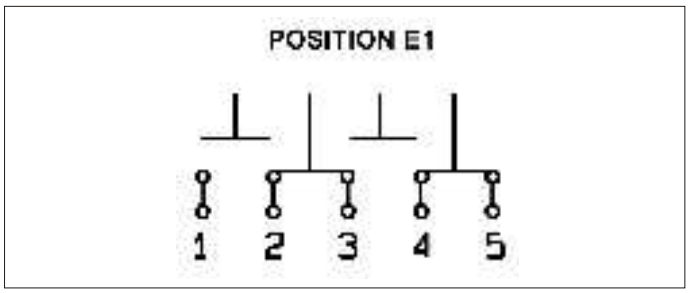
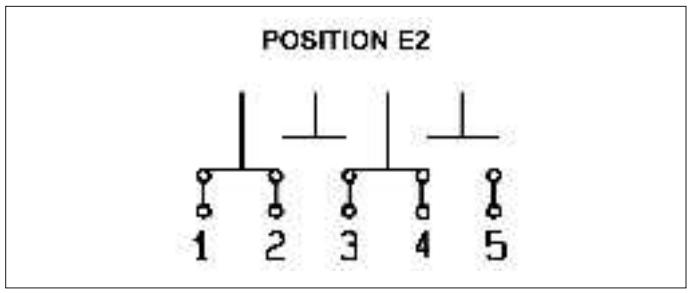
SWITCH MODEL : NON TERMINATED 5 PORT DP3T SWITCH

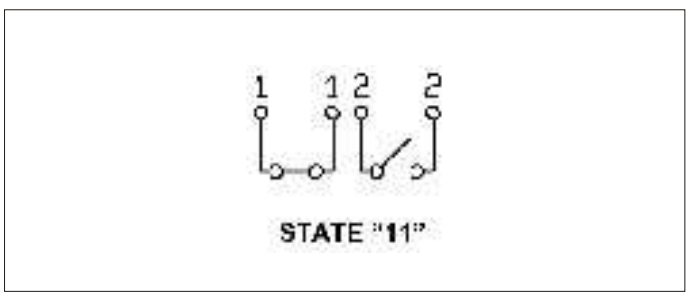
The non terminated 5 port DP3T switch can used as SPDT with high power terminations, as a bypass switch. In this application, the fifth port can be terminated externally with a high power termination. These switches are “break before make”.

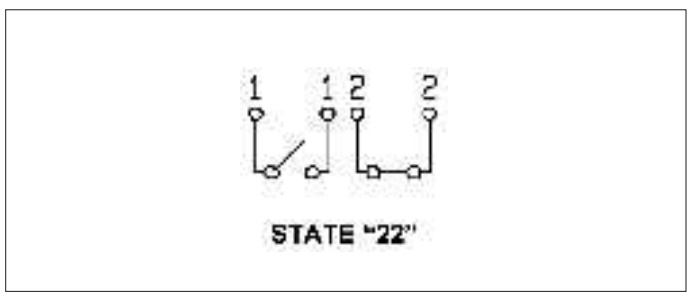
RF SCHEMATIC DIAGRAM





POSITION INDICATOR



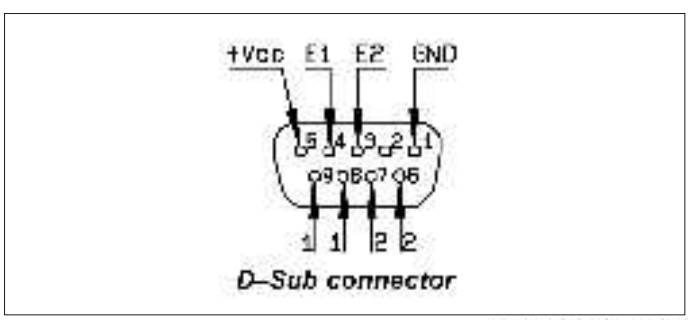


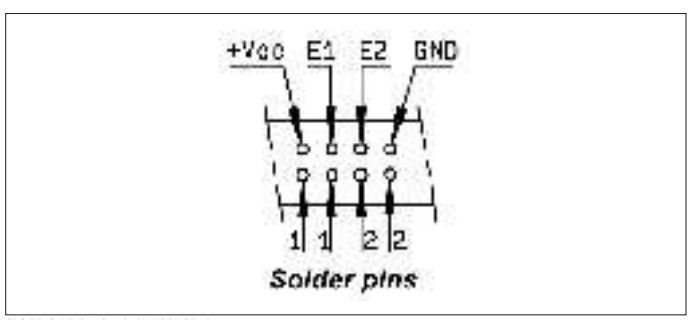
Standard drive option “1” (Positive common) :

- 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 to open RF path 1-2 and close RF path 2-3).





Connect "Gnd" for TTL drive only

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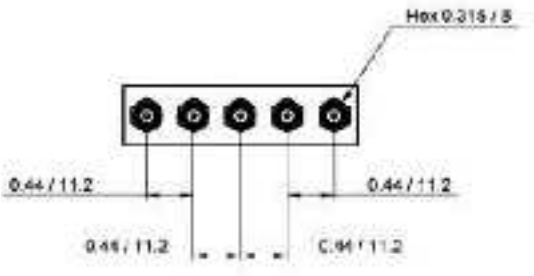
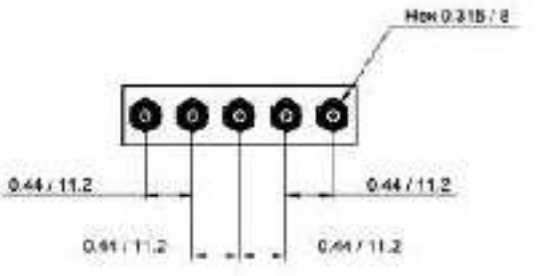
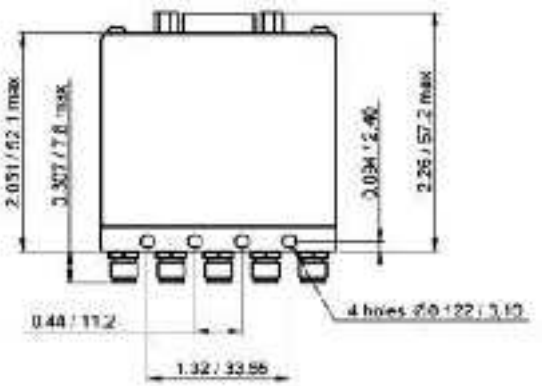
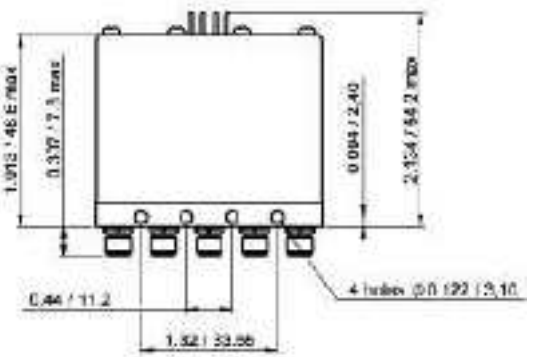
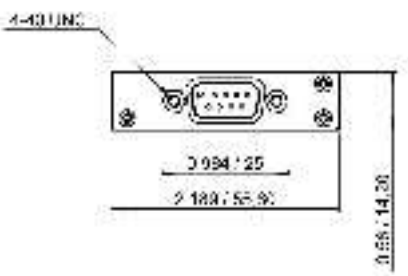
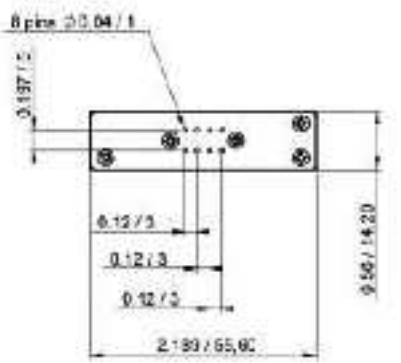

Hex 0.315 / 8
0.44 / 11.2
0.44 / 11.2
0.44 / 11.2
0.44 / 11.2


Hex 0.315 / 8
0.44 / 11.2
0.44 / 11.2
0.44 / 11.2
0.44 / 11.2


2.051 / 52.1 max
3.307 / 7.8 max
2.26 / 57.2 max
0.44 / 11.2
1.32 / 33.55


0.337 / 8.5 max
0.094 / 2.40
2.154 / 54.2 max
0.44 / 11.2
1.32 / 33.55

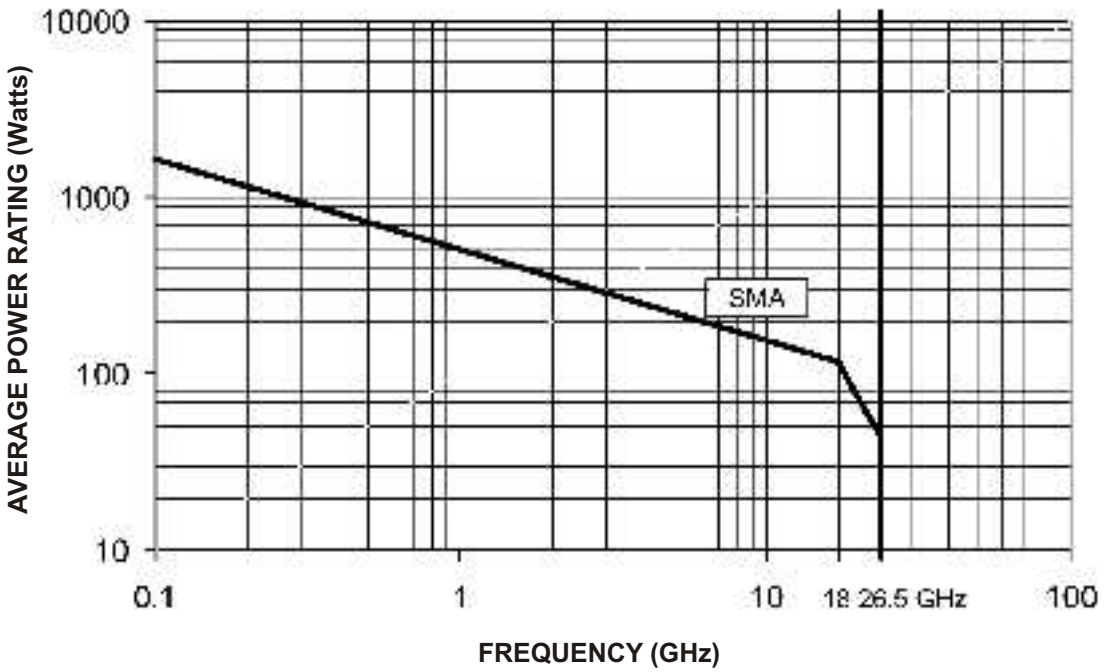

4-40 UNC
0.994 / 25
2.189 / 55.60
0.56 / 14.20


0.12 / 3
0.12 / 3
0.12 / 3
2.189 / 55.60
0.56 / 14.20

POWER RATING CHART

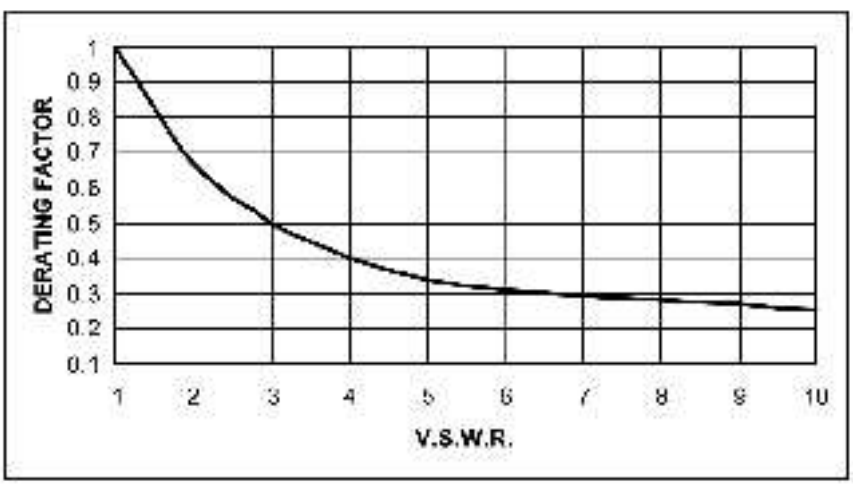
This graph is based on the following conditions :

- 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



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DP3T and Terminated SPDT RAMSES Concept
Up to 26.5 GHz

PART NUMBER SELECTION

R 5 8 5 . . . . .

RF Connectors :
- **3** : SMA up to 3 GHz
- **4** : SMA up to 18 GHz
- **F** : SMA up to 26.5 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)
- **7** : Normally open
- **8** : Normally open + I.C.

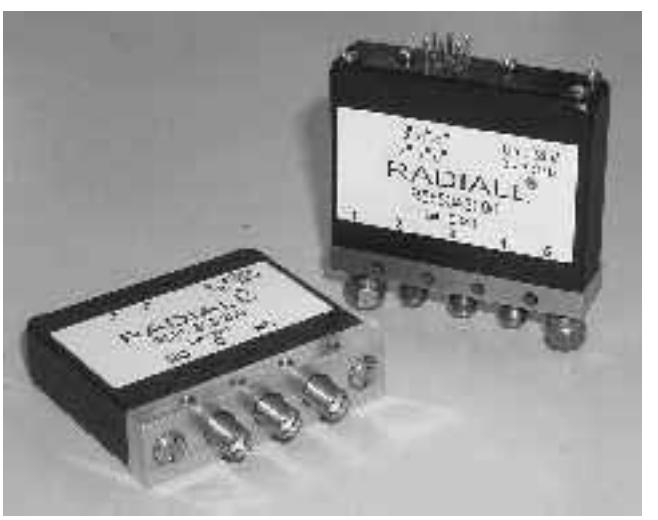
Actuator Voltage :
- **2** : 12 Vdc
- **3** : 28 Vdc

Actuator Terminals :
- **0** : Solder pins

Options : Updated
- **0** : Without option
- **1** : Positive common (2)(3)
- **3** : With suppression diodes (1)
- **4** : With suppression diodes and positive common (2)(3)

Switch Model:
- **0** : DP3T without TTL Driver (DP3T)
- **1** : DP3T with TTL Driver (DP3T) (high level)(1)(2)
- **2** : SPDT terminated without TTL Driver /(internal termination)
- **3** : SPDT terminated with TTL Driver (high level)(1)(2) / (internal termination)
- **4** : SPDT terminated without TTL Driver /(external termination)
- **5** : SPDT terminated with TTL Driver (high level)(1)(2) / (external termination)
- **6** : Terminated 4 ports bypass no option (external termination)
- **7** : Terminated 4 ports bypass with TTL (external termination)

I.C. : Indicator contact / S.C.O.: Self Cut-Off
(1) : Suppression diodes are already included in self cut-off & 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, 6, 7 & 8 Because failsafe switches can be used with both polarities



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DP3T and Terminated SPDT RAMSES Concept
Up to 26.5 GHz

RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
SMA	DC - 3	DC - 3	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
	DC - 18	8 - 12.4	1.40	0.40	60	
	DC - 26.5	12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.80	0.70	50	

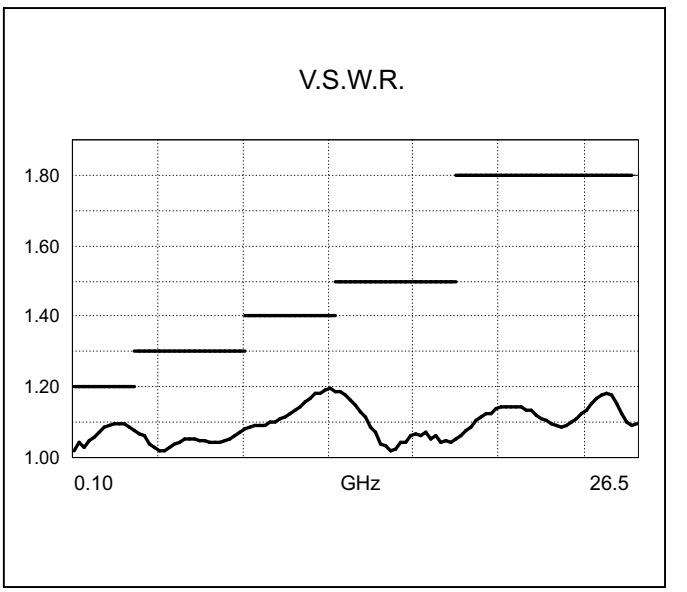
See page DP3T-14 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		Failsafe		Latching		Normally open	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 32)
Coil resistance (±10%)	Ω	24	138	29	175	47.5	275
Nominal operating current at 23°C	mA	500	205	420	160	250	102
Average power		RF path : see power rating chart on **Intro-14**					
		Internal terminations : 1 watt CW into 50Ω					
TTL input	High level	2.2 to 5.5 V 800 μA max at 5.5 V					
	Low level	0 to 0.8 V 20 μA max at 0.8 V					
Switching time (max)	ms	10					
Life (min)		2 million cycles for products with internal terminations 10 million cycles for all other products					
Connectors		SMA					
Actuator terminals		Solder pins					
Operating temperature range	°C	-40, +85					
Storage temperature range	°C	-55, +85					
Vibration (MIL STD 202, method 204D, Cond. D)		10-2000 Hz, 20g operating					
Shock (MIL STD 202, method 213B, Cond. C)		100g / 6 ms, ½ sine operating					

R585 TYPICAL RF PERFORMANCES

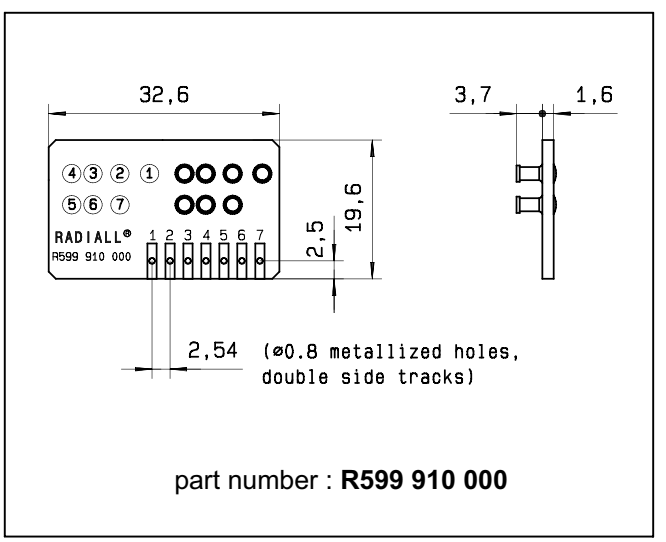
Example : DP3T SMA up to 26.5 GHz



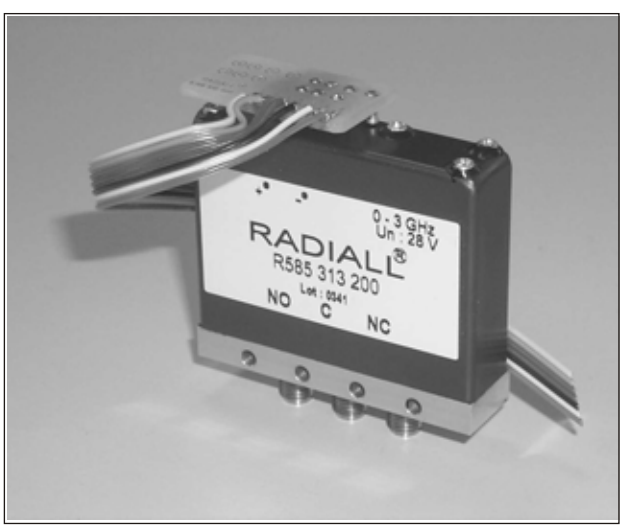
ACCESSORIES

A printed circuit board interface connector has been designed for easy mounting on terminals :
It must be ordered separately.

For DP3T model R585 series :



part number : **R599 910 000**



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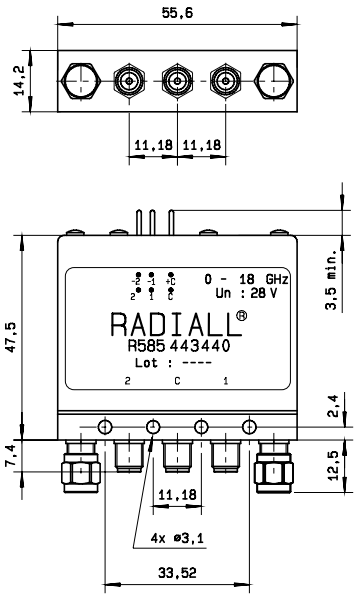
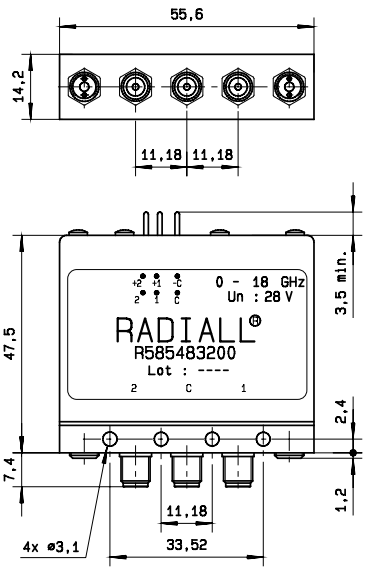
TYPICAL OUTLINE DRAWING

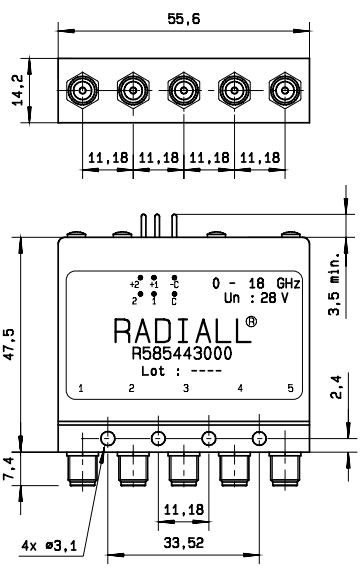


SPDT with external terminations
R585 --- 4--
R585 --- 5--

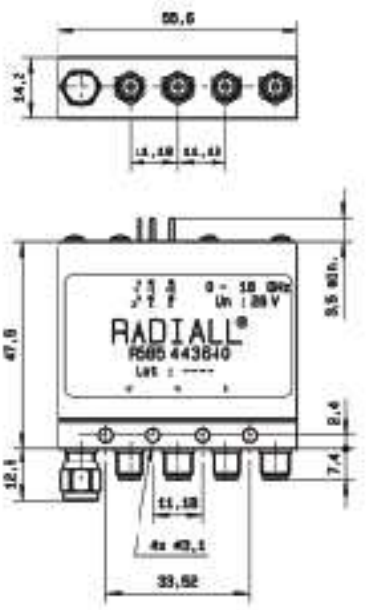
See page **DP3T-21** for pin identification



SPDT with internal terminations
R585 --- 2--
R585 --- 3--



DP3T
R585 --- 0--
R585 --- 1--



Terminated 4 ports BYPASS relay
R585 --- 6--
R585 --- 7--

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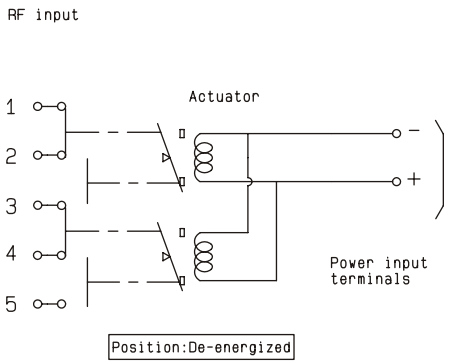
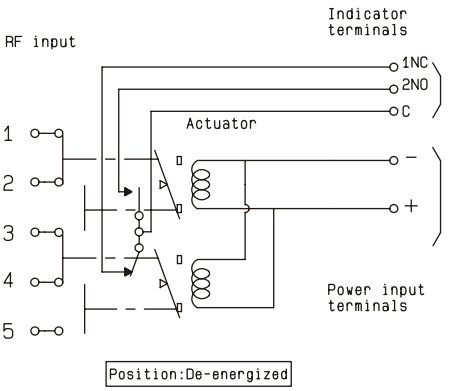
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

FAILSAFE

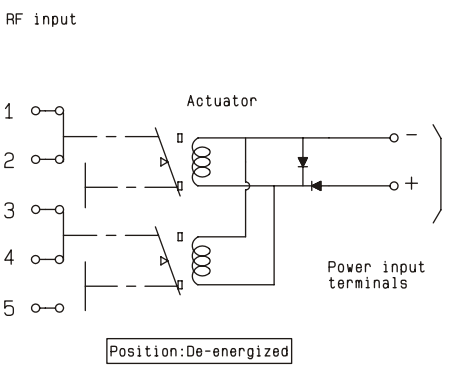
WITHOUT OPTION
R585 -1- 000 / R585 -1- 200 / R585 -1- 400



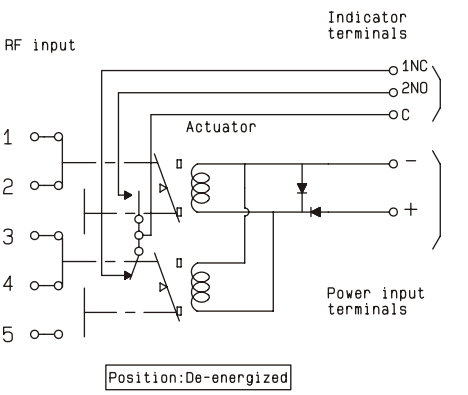
WITH INDICATOR CONTACT
R585 -2- 000 / R585 -2- 200 / R585 -2- 400



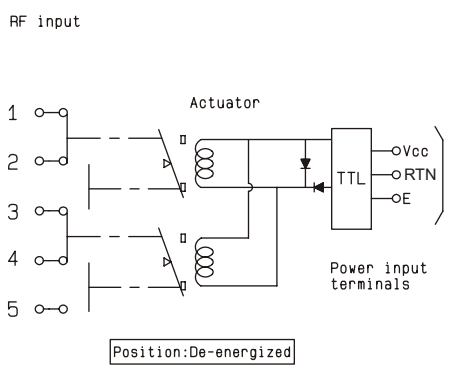
WITH SUPPRESSION DIODES
R585 -1- 030 / R585 -1- 230 / R585 -1- 430



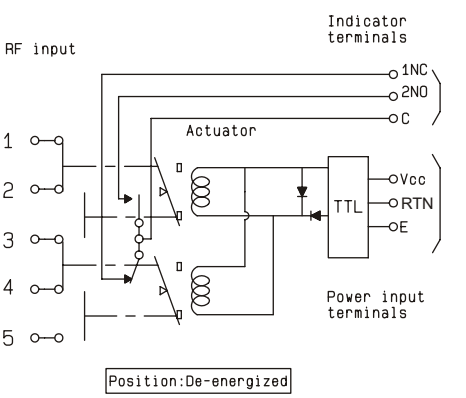
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -2- 030 / R585 -2- 230 / R585 -2- 430



WITH TTL DRIVER
(suppression diodes are included)
R585 -1- 100 / R585 -1- 300 / R585 -1- 500



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -2- 100 / R585 -2- 300 / R585 -2- 500



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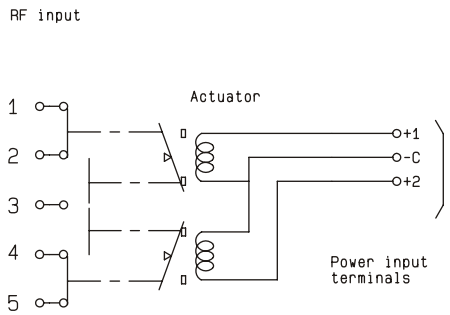
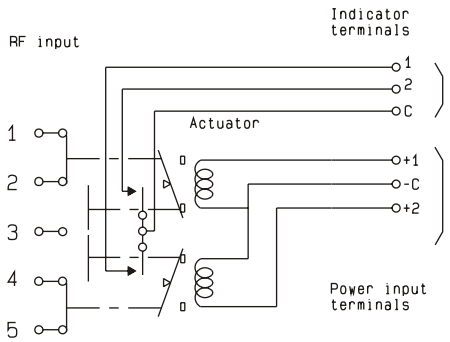
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

NORMALLY OPEN

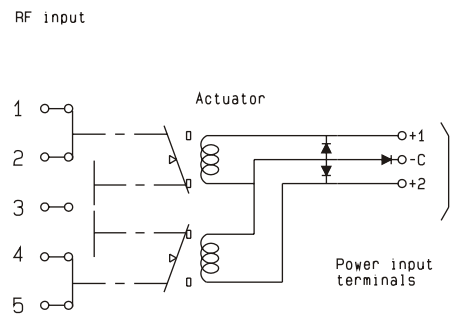
WITHOUT OPTION
R585 -7- 000 / R585 -7- 200 / R585 -7- 400



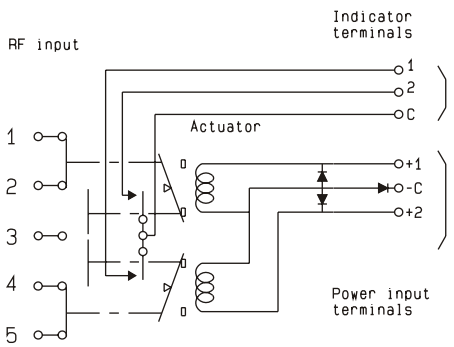
WITH INDICATOR CONTACT
R585 -8- 000 / R585 -8- 200 / R585 -8- 400



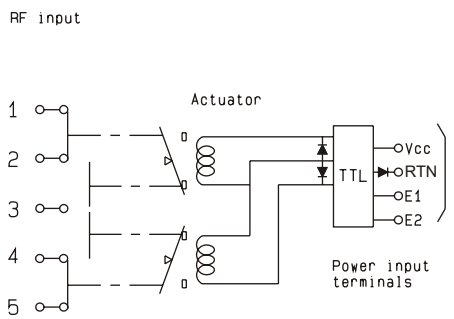
WITH SUPPRESSION DIODES
R585 -7- 030 / R585 -7- 230 / R585 -7- 430



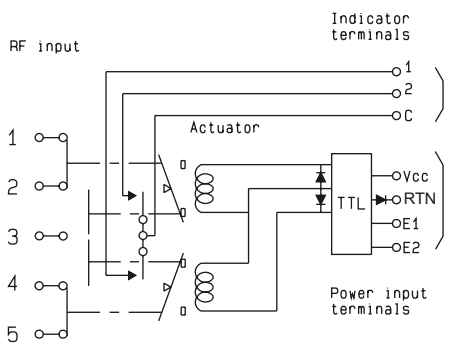
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -8- 030 / R585 -8- 230 / R585 -8- 430



WITH TTL DRIVER
(suppression diodes are included)
R585 -7- 100 / R585 -7- 300 / R585 -7- 500



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -8- 100 / R585 -8- 300 / R585 -8- 500



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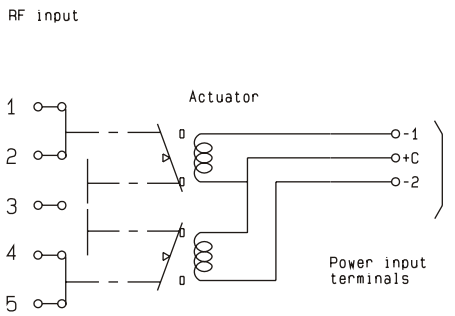
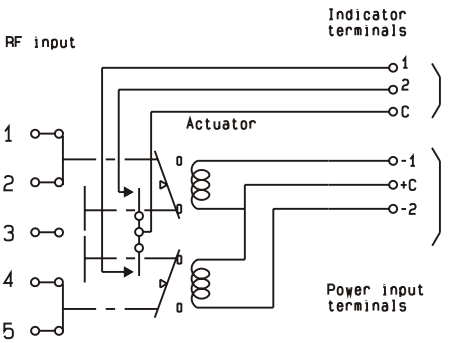
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

NORMALLY OPEN

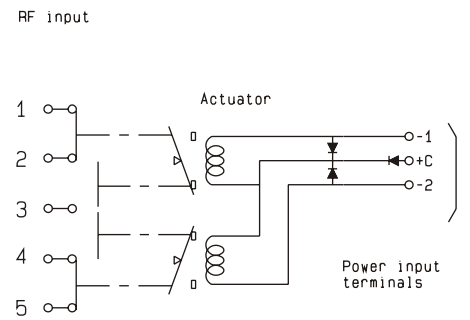
WITH POSITIVE COMMON, NO OPTION
R585 -7- 010 / R585 -7- 210 / R585 -7- 410



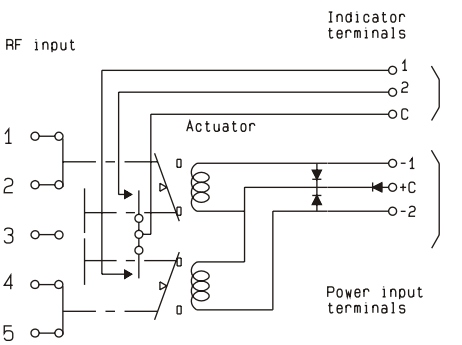
WITH POSITIVE COMMON AND INDICATOR CONTACT
R585 -8- 010 / R585 -8- 210 / R585 -8- 410



WITH POSITIVE COMMON AND SUPPRESSION DIODES
R585 -7- 040 / R585 -7- 240 / R585 -7- 440

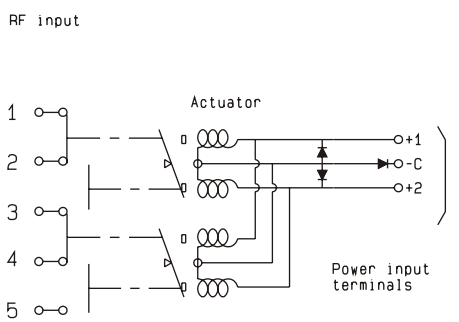


WITH POSITIVE COMMON, INDICATOR CONTACT AND SUPPRESSION DIODES
R585 -8- 040 / R585 -8- 240 / R585 -8- 440

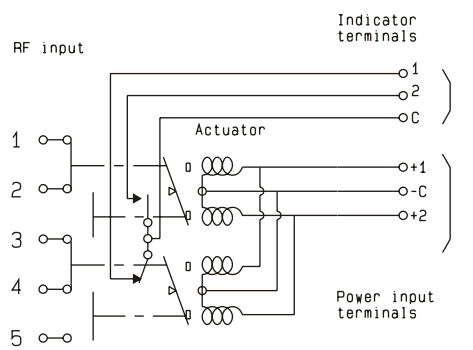


LATCHING

WITHOUT OPTION
R585 -3- 000 / R585 -3- 200 / R585 -3- 400



WITH INDICATOR CONTACT
R585 -4- 000 / R585 -4- 200 / R585 -4- 400



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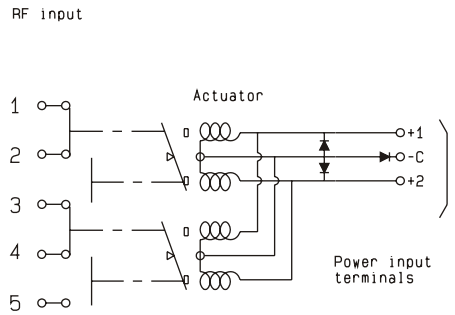
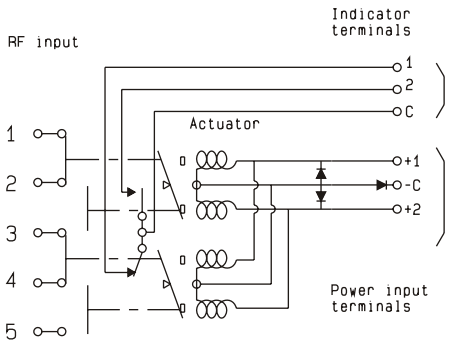
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

LATCHING

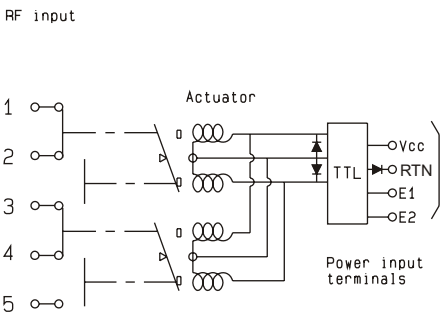
WITH SUPPRESSION DIODES
R585 -3- 030 / R585 -3- 230 / R585 -3- 430



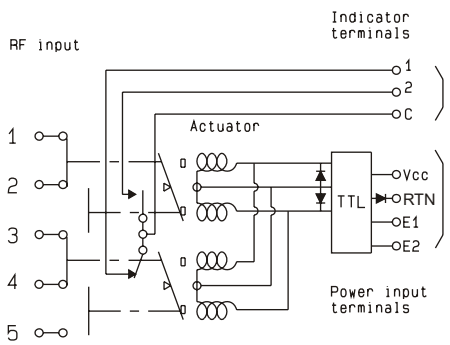
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -4- 030 / R585 -4- 230 / R585 -4- 430



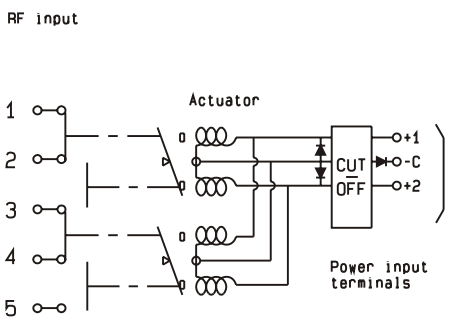
WITH TTL DRIVER
(suppression diodes are included)
R585 -3- 100 / R585 -3- 300 / R585 -3- 500



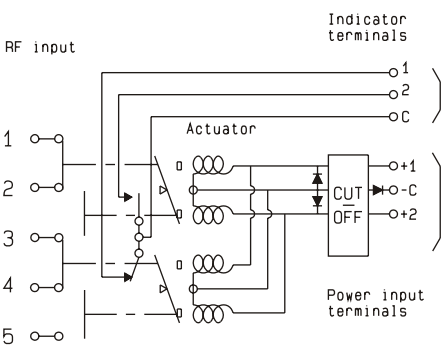
WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -4- 100 / R585 -4- 300 / R585 -4- 500



WITH CUT-OFF
(suppression diodes are included)
R585 -5- 000 / R585 -5- 200 / R585 -5- 400



WITH CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R585 -6- 000 / R585 -6- 200 / R585 -6- 400



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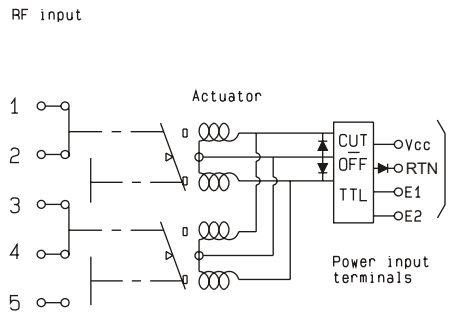
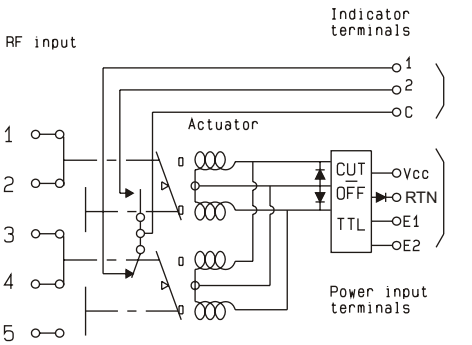
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

LATCHING

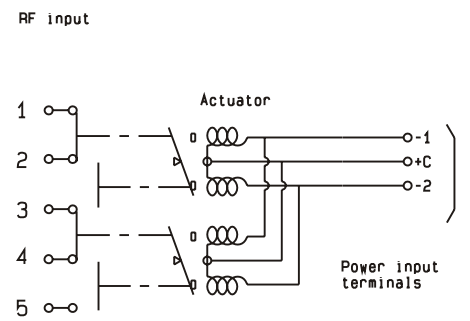
WITH CUT-OFF AND TTL DRIVER
(suppression diodes are included)
R585 -5- 100 / R585 -5- 300 / R585 -5- 500



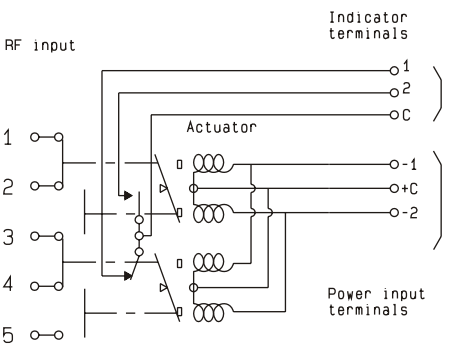
WITH CUT-OFF, TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -6- 100 / R585 -6- 300 / R585 -6- 500



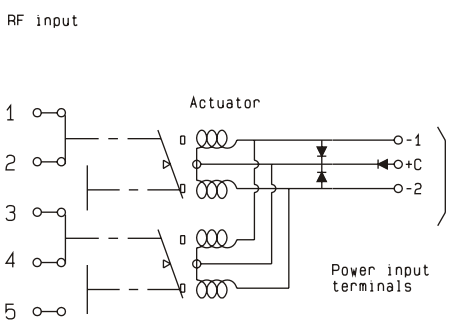
WITH POSITIVE COMMON, NO OPTION
R585 -3- 010 / R585 -3- 210 / R585 -3- 410



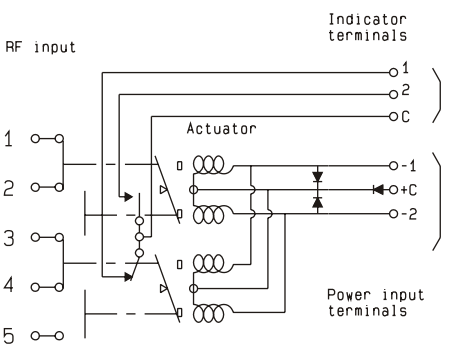
WITH POSITIVE COMMON AND INDICATOR CONTACT
R585 -4- 010 / R585 -4- 210 / R585 -4- 410



WITH POSITIVE COMMON AND SUPPRESSION DIODES
R585 -3- 040 / R585 -3- 240 / R585 -3- 440



WITH POSITIVE COMMON, SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -4- 040 / R585 -4- 240 / R585 -4- 440



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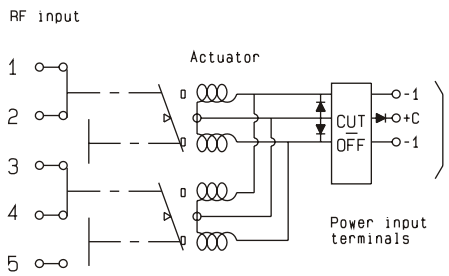
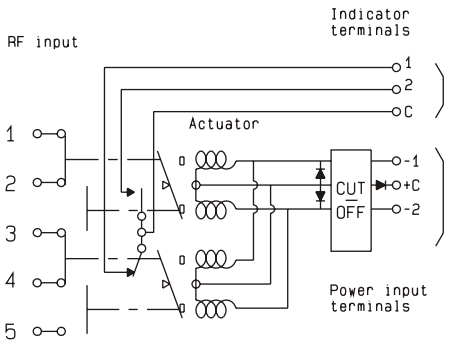
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

LATCHING

WITH POSITIVE COMMON AND CUT-OFF
(suppression diodes are included)
R585 -5- 010 / R585 -5- 210 / R585 -5- 410



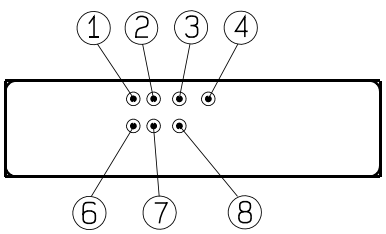
WITH POSITIVE COMMON, CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R585 -6- 010 / R585 -6- 210 / R585 -6- 410



DP3T

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
Normally open	-2	-1	+C				
Normally open + I.C.	-2	-1	+C				
Normally open + TTL	E2	E1	RTN	VCC			
Normally open + TTL + I.C.	E2	E1	RTN	VCC	2	1	C



Bottom View

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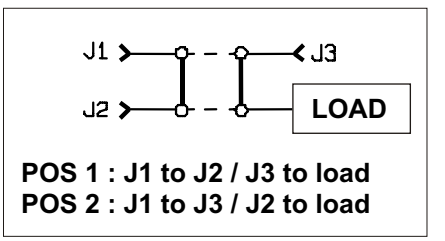
OPTIONAL FEATURES FOR DP3T SWITCHES

GENERAL

RADIALL DP3T / SPDT terminated have been designed only with SMA connectors.



For all other connectors (N, BNC, etc ...), a same function as SPDT Terminated can be easily done with a standard DPDT and an external load.

Examples of dedicated applications options

This SPDT terminated is composed of a DP3T with SMA connectors and 2 RADIALL cable loads used as medium power terminations.

This SPDT terminated has been built with 2 separate coils for test network customer's application.

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DPDT section

High performances DPDT up to 40 GHz - PLATINUM series

NEW

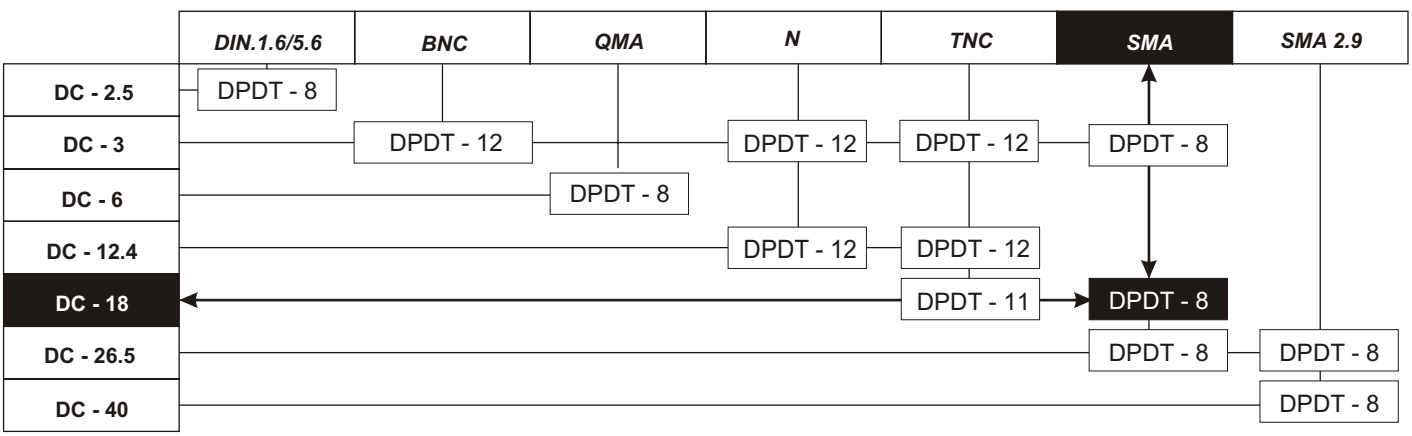
See Page DPDT - 2

DPDT up to 40 GHz - RAMSES series

See Page DPDT - 8

QUICK ACCESS TO THE RIGHT PAGE

Example : **DC-18 GHz, DPDT with SMA connectors**:
See page DPDT-8



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HIGH PERFORMANCES DPDT
PLATINUM Series / DPDT up to 40 GHz

Radiall's PLATINUM series switches are optimised to perform a high level over an extended life span. With outstanding RF performances, 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.

PART NUMBER SELECTION

R 5 9 3 . 7 3 1 4 . .

RoHS COMPLIANT

NEW

RF Connectors :
- **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 (2)

Type :
- 7 : Latching + Self cut-off indicators

Actuator Voltage :
- **3** : 24 Vdc

TTL option :
- **1** : With TTL driver (high level)

Documentation
- **-** : certificate of conformity
- **C** : Calibration certificate
- **R** : Calibration certificate + RF curves

Actuator Terminals and fixing :
- **8** : HE 10 receptacle with bracket (1)
- **9** : HE 10 receptacle without bracket (1)

Options :
- **4** : With suppression diodes and positive common

(1) : Delivered with 750 mm (30 inches) ribbon cable + HE 10 connector

(2) : Connector SMA 2.9 is equivalent to "K connector®", registered trademark of Anritsu

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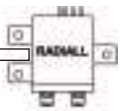
HIGH PERFORMANCES DPDT
PLATINUM Series / DPDT up to 40 GHz

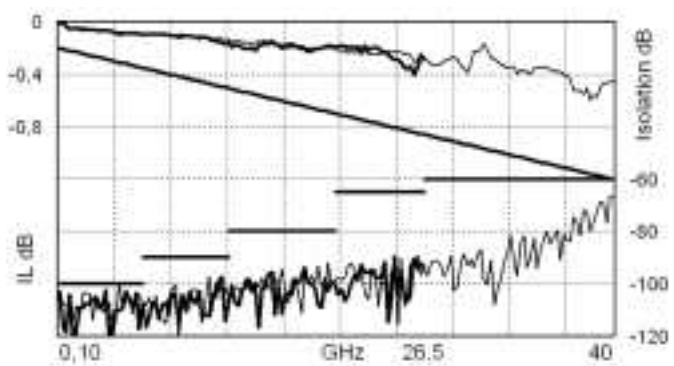


RF PERFORMANCES

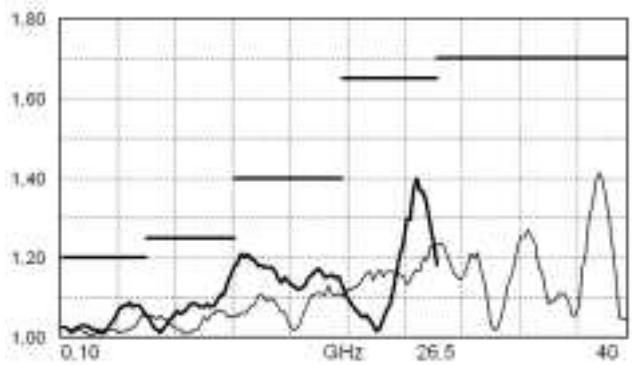
Part Number		R59337314.	R59347314.	R593F7314.	R59387314.
Frequency range	GHz	DC to 6	DC to 20	DC to 26.5	DC to 40
Impedance	Ω	50			
Insertion loss (max)	dB	0.2 + 0.025 x frequency (GHz)			
Isolation (Min)	dB	100	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80 20 to 26.5 GHz : 65	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80 20 to 26.5 GHz : 65 26.5 to 40 GHz : 60
V.S.W.R. (max)		1.20	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.40 18 to 20 GHz : 1.65	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.40 18 to 20 GHz : 1.65	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.40 18 to 26.5 GHz : 1.65 26.5 to 40 GHz : 1.70
Repeatability (measured at 25°C)	dB	0.03			0.05

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation



V.S.W.R.



——— : 26.5 GHz model with **SMA /** ——— : 40 GHz model with **SMA 2.9**

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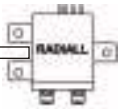
ADDITIONAL SPECIFICATIONS

Operating mode		**Latching**
Nominal operating voltage (across operating temperature)	Vdc	**24** (20 to 32)
Coil resistance (±10%)	Ω	120
Nominal operating current at 23°C	mA	200
Average power		RF path cold switching : see power rating chart on page 6
		Hot switching : 1 watt CW
TTL input	High level	3 to 7 V 1.4mA max at 7 V
	Low level	0 to 0.8 V
Indicator specifications		Maximum withstanding voltage : 60V Maximum current capacity : 150 mA Maximum "ON" resistance : 2.5Ω Minimum "OFF" resistance : 100MΩ
Switching time (max)	ms	15
Life (min) for	SMA	10 million cycles
	SMA 2.9	5 million cycles
Connectors		SMA – SMA 2.9
Actuator terminals		HE10 ribbon receptacle
Weight (max)	g	110

ENVIRONMENTAL SPECIFICATIONS

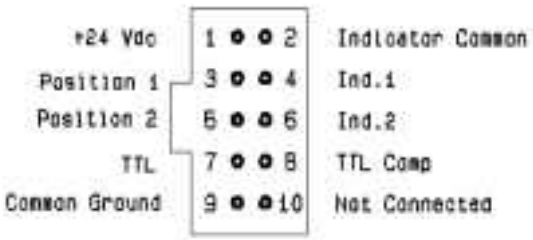
Operating temperature range	°C	-25 to +75
Storage temperature range	°C	-55 to +85
Temperature cycling (MIL STD 202, Method 107D, Cond. A)	°C	-55 to +85 (10 cycles)
Vibration (MIL STD 202, Method 204D, Cond. D)		10-2000 Hz, 10g operating
Shock (MIL STD 202, Method 213B, Cond. C)		50g/6ms, ½ sine operating
Moisture resistance (MIL STD 202, Method 106E, Cond. E)		65°C, 95% RH, 10 days
Altitude storage (MIL STD 202, Method 105C, Cond. B)		50.000 feet (15.240 meters)
RFI (MIL STD 1344, Method 3008 or IEC 61726)		40 dB at 20 GHz

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the word : switchingproducts@radiall.com***

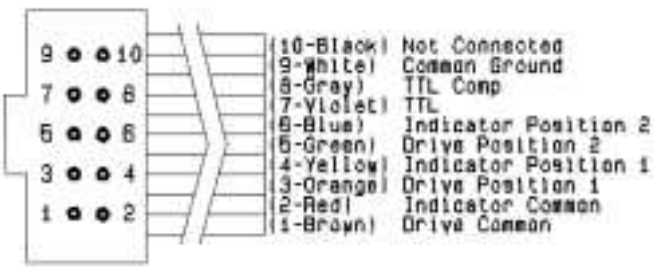


DRIVING THE SWITCH

There is two positions for a transfer switch. Each RF path can be closed by applying Ground or TTL "High" to the corresponding "drive" pin.

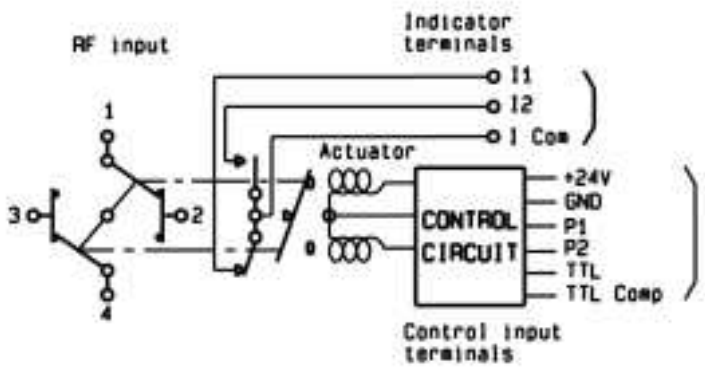


Switch connector



Mating cable connector

SCHEMATIC DIAGRAM



	RF continuity	Indicator
Position 1	1-2 / 3-4	ICom – I1
Position 2	1-3 / 2-4	ICom – I2

Standard drive

- Connect pin 9 to ground (See note 1).
- Connect pin 1 to supply (+20 VDC to +32 VDC)
- Select (close) desired RF paths by applying Ground to the corresponding "drive" pin (Ex: apply Ground to pin 3 to close RF path 1-2 and 3-4).
- To select the second path, ensure that unwanted RF path "drive" pin are disconnected from Ground. Apply Ground to the "drive" pin which corresponds to the desired RF paths (Ex: apply Ground to pin 5 to close RF path 1-3 and 2-4).

TTL drive (Dual line)

- Connect pin 9 to ground.
- Connect pin 1 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 7 and TTL “Low” to pin 8 to close RF paths position 1).
- To select the second path, ensure that unwanted RF path "drive" pins are in TTL "Low" position. Apply TTL "High" to the "drive" pin which correspond to the desired RF path and TTL “low” to the undesired.
  (Ex: apply TTL "High" to pin 8 and TTL “Low” to pin 7 to close RF paths position 2).

TTL drive (Single line)

- Connect pin 9 to ground.
- Connect pin 1 to supply (+20 VDC to +32 VDC)
- Connect pin 8 to TTL “High”.
- Select (close) position 1 by applying TTL "High " to pin 7 (Ex: apply TTL "High" to pin 7 to close RF paths 1-2 and 3-4).
- Select position 2 by applying TTL "Low " to pin 7 (Ex: apply TTL "Low" to pin 7 to close RF paths 1-3 and 2-4).

Note 1

Pin 9 does not need to be grounded for the switch to operate in standard drive. If pin 9 is not grounded, the position indicators will only function while the appropriate drive has applied. Therefore, if a pulse drive is used and continuous indicator operation is required, pin 9 must be grounded.

DPDT

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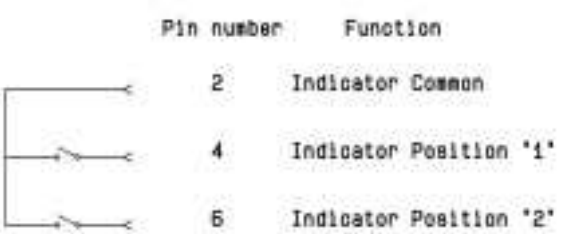
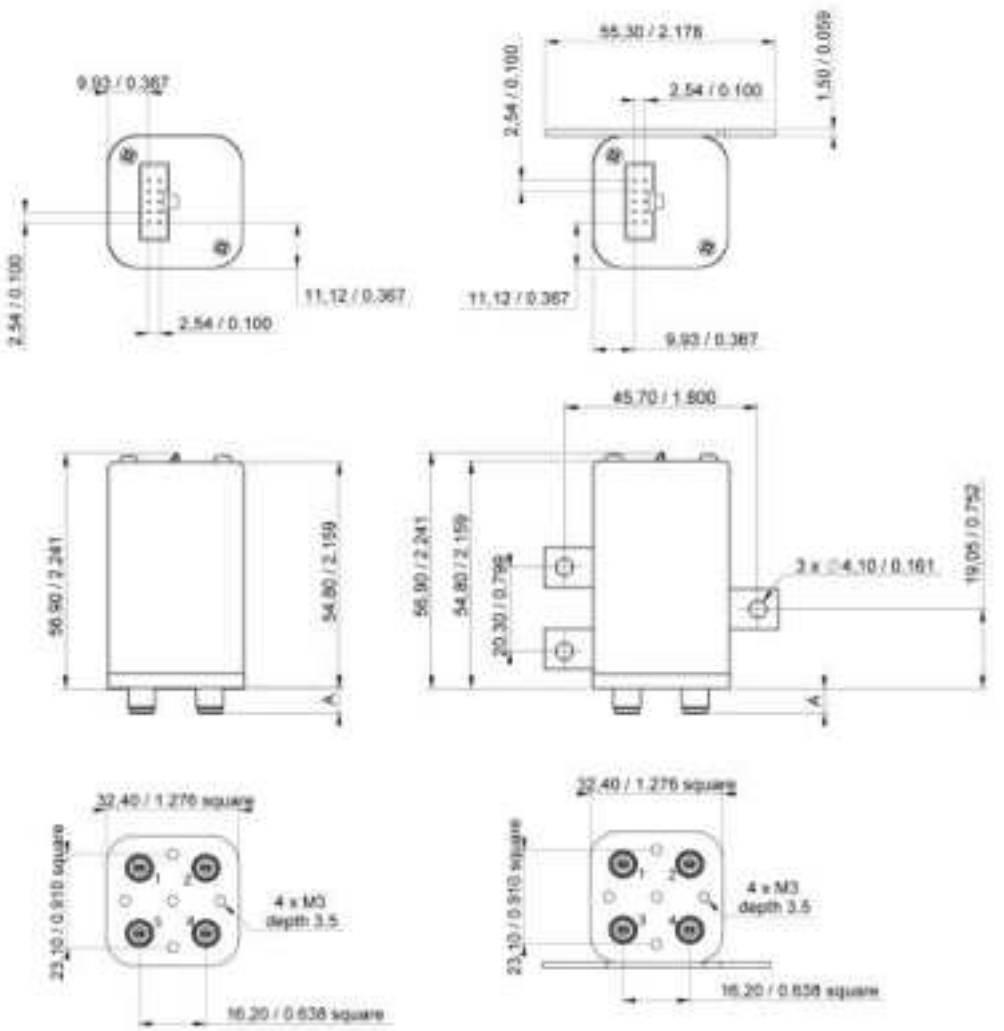
ELECTRONIC POSITION INDICATORS



The electronic position indicators utilise photo-MOS transistors which are driven by the mechanical position of the RF paths moving elements. The circuitry consists of a common which can be connected to an output corresponding to selected RF path. The photo-MOS transistors are configured for AC and/or DC operation. The electronic position indicators require the supply (20 to 32 VDC) to be connected to pin 1 and ground connected to pin 9.

TYPICAL OUTLINE DRAWING



Connectors	SMA	SMA 2.9
A max (mm)	7.4	6.3

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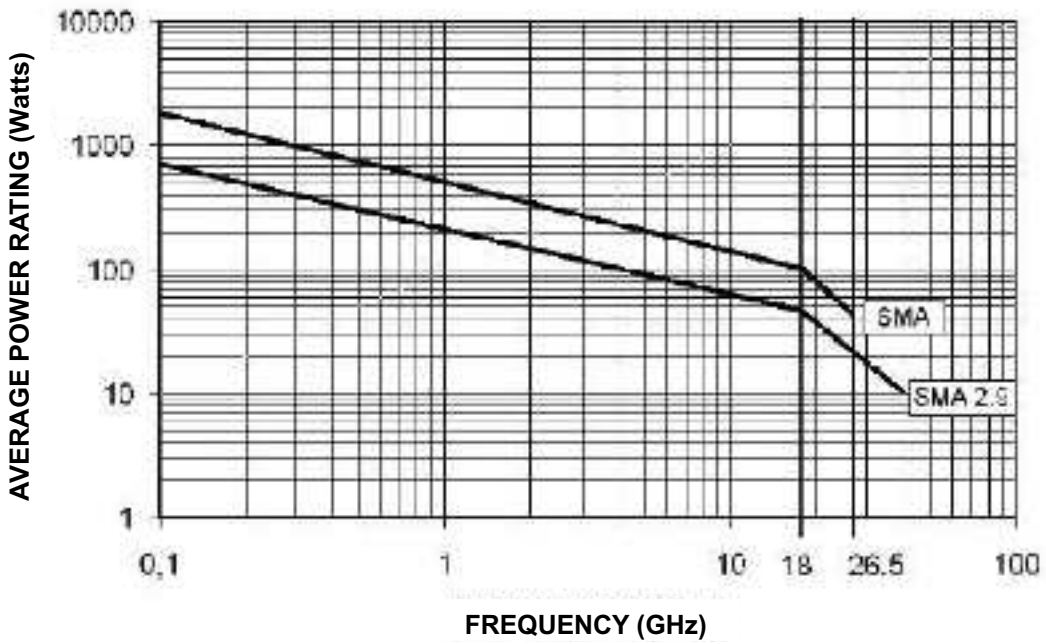
POWER RATING CHART

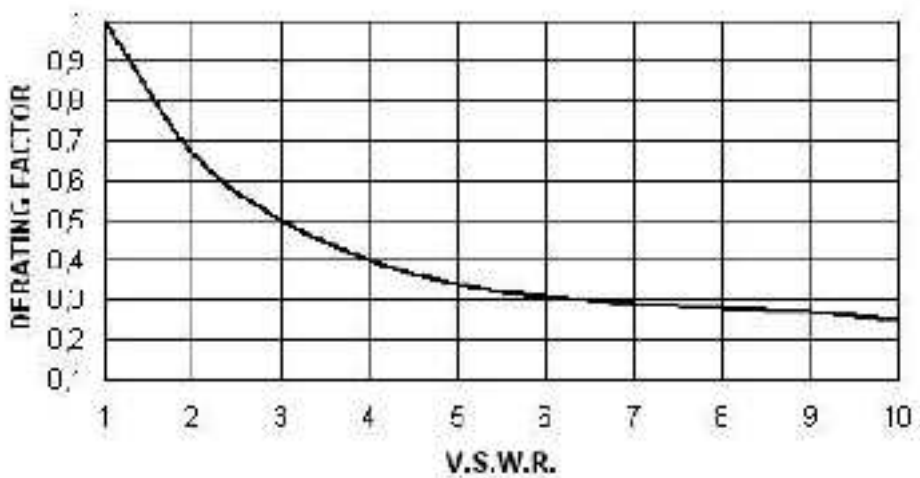
This graph is based on the following conditions :

- 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



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DPDT up to 40 GHz - RAMSES Concept

SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6 / 5.6

PART NUMBER SELECTION

R 5 7 7 . . . . . .

RF Connectors :
- **3** : SMA up to 3 GHz
- **E** : QMA up to 6 GHz (4)
- **4** : SMA up to 18 GHz
- **F** : SMA up to 26.5 GHz
- **8** : SMA 2.9 up to 40 GHz (5)
- **9** : DIN 1.6/5.6 up to 2.5 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

Actuator Terminals and Fixing :
- **0** : Solder pins with bracket
- **2** : Solder pins without bracket
- **5** : D-Sub connector with bracket
- **7** : D-Sub connector without bracket

Options :
- **0** : Without option
- **1** : Positive common (2)(3)
- **3** : With suppression diodes (1)
- **4** : With suppression diodes and positive common (2)(3)

TTL Option :
- **0** : Without TTL driver
- **1** : With TTL Driver (high level)(1)(2)

I.C. : Indicator contact / S.C.O. : Self Cut-Off
(1) : Suppression diodes are already included in self cut-off & 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, & 6 because failsafe switches can be used with both polarities

(4) : The "QLF" trademark (Quick Lock Formula®) standard applies to QMA and QN series and guaranties the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performances

(5) : Connector SMA 2.9 is equivalent to "K connector®", registered trade mark of Anritsu

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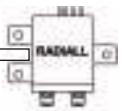
DPDT up to 40 GHz - RAMSES Concept
SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6 / 5.6



RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
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	1.20	0.30	70	
SMA	DC - 3 DC - 18 DC - 26.5	DC - 3	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
		8 - 12.4	1.40	0.40	65	
		12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.70	0.70	50	
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	
		26.5 - 40	1.90	1.00	50	

See page DPDT-10 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		**Failsafe**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (+/-10%)	Ω	35	200	38	225
Nominal operating current at 23°C	mA	340	140	320	125
Average power		See Power Rating Chart page **Intro-14**			
Switching time (max)	ms	10			
Life (min)		2.5 million cycles			
Connectors		SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6/5.6			
Actuator terminals		Solder pins			
Operating temperature range	DIN 1.6/5.6	-25 to +70 °C			
	SMA - SMA 2.9 - QMA	-40 to +85 °C			
Storage temperature range °C	DIN 1.6/5.6	-40 to +85 °C			
	SMA - SMA 2.9 - QMA	-55 to +85 °C			
Vibration (MIL STD 202, method 204D, cond.C)		10-2000 Hz , 20g operating			
Shock (MIL STD 202, method 213B, cond.G)		50g / 11 ms, ½ sine operating			

DPDT

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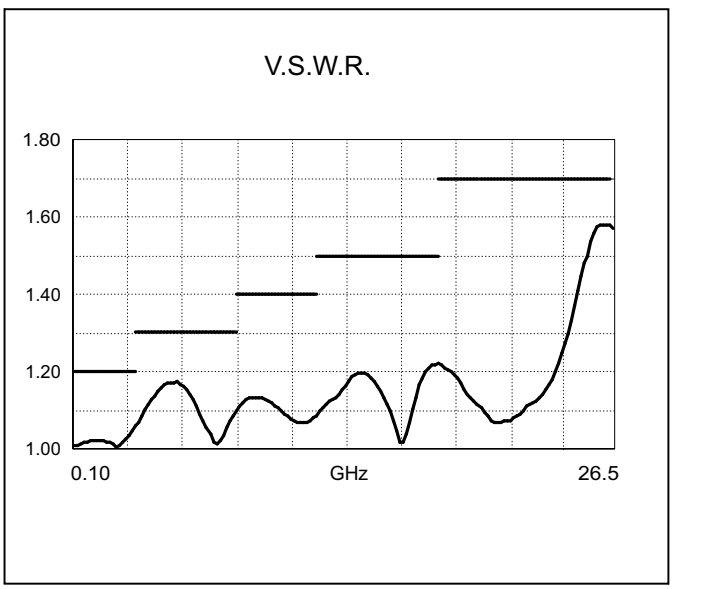
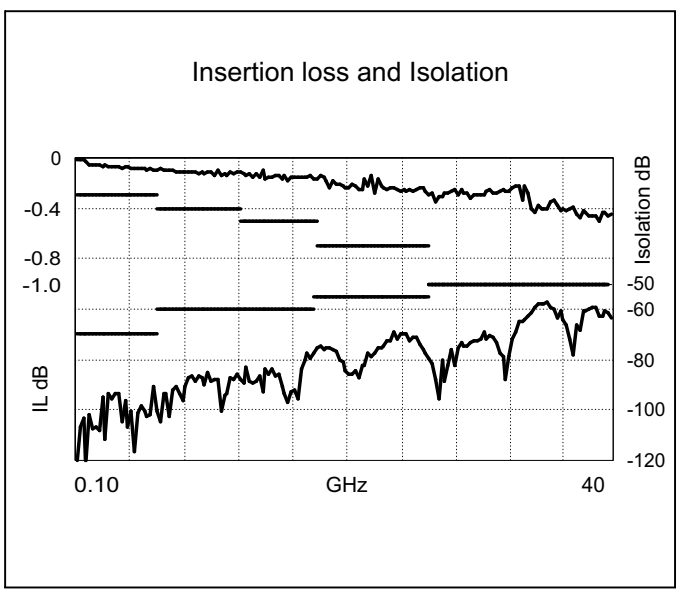
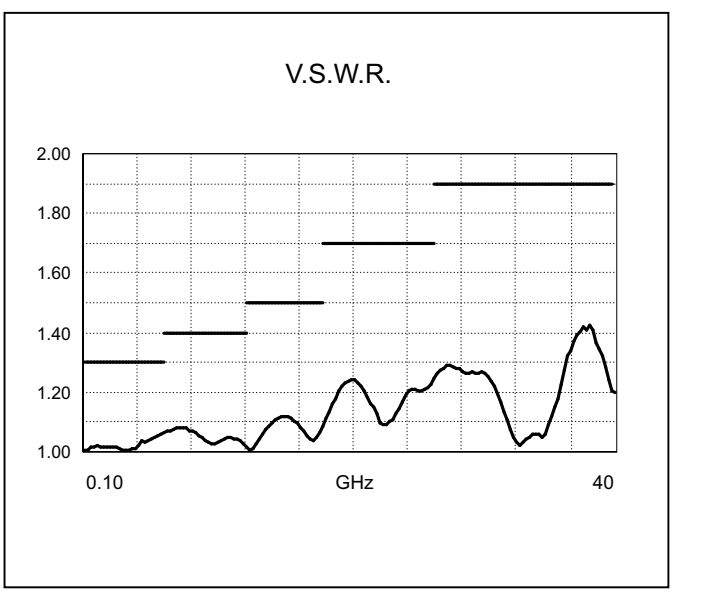
R577 TYPICAL RF PERFORMANCES

Example : DPDT SMA up to 26.5 GHz



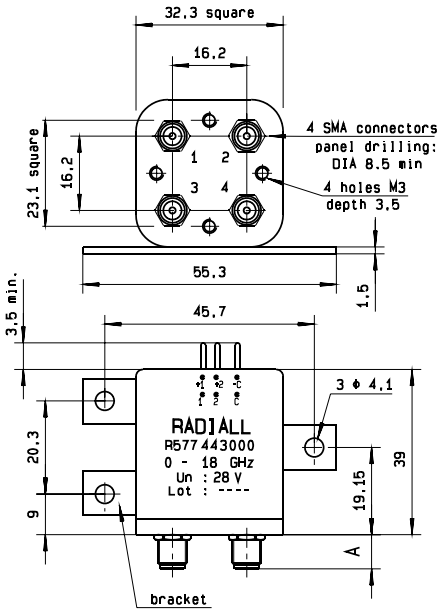
Example : DPDT SMA 2.9 up to 40 GHz





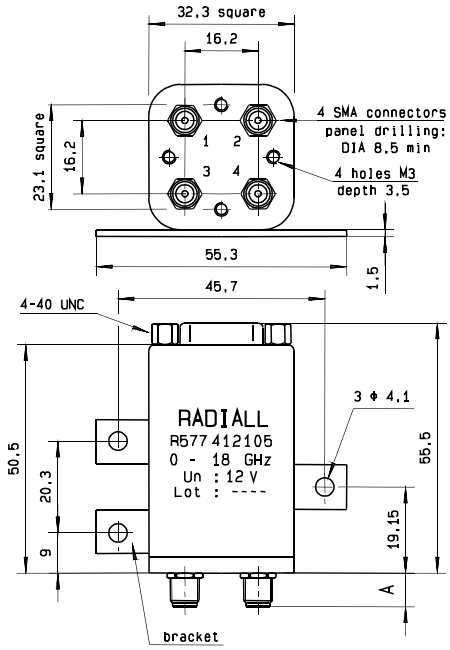
TYPICAL OUTLINE DRAWING

With solder pins and bracket



See page **DPDT-19** for pin identification

With D-Sub connector and bracket



See page **DPDT-19** for pin identification

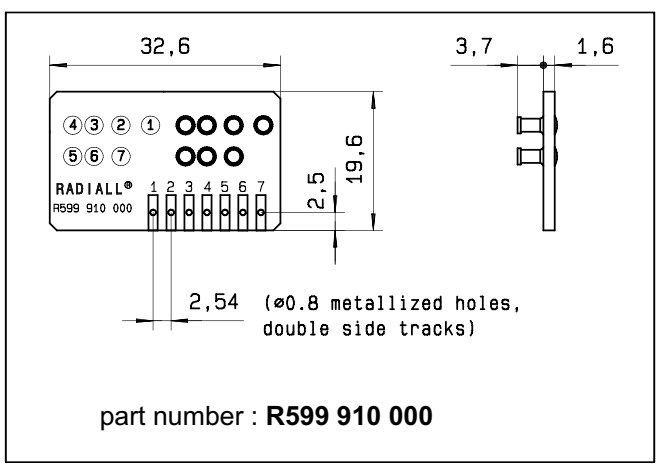
Connectors	SMA	SMA 2.9	QMA	DIN 1.6/5.6
A max (mm)	7.4	6.3	10.8	11.5

DPDT

ACCESSORIES

A printed circuit board interface connector has been designed for easy mounting on terminals :
It must be ordered separately.

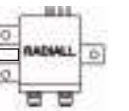
For DPDT model R577 series :



part number : **R599 910 000**

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the word : switchingproducts@radiall.com***

DPDT up to 12.4 GHz - RAMSES Concept
N - BNC - TNC



PART NUMBER SELECTION

R 5 7 7 . . . . .

RF Connectors :
- **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

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

Actuator Terminals and Fixing :
- **0** : Solder pins with bracket
- **2** : Solder pins without bracket
- **5** : D-Sub connector with bracket
- **7** : D-Sub connector without bracket

Options :
- **0** : Without option
- **1** : Positive common (2)(3)
- **3** : With suppression diodes (1)
- **4** : With suppression diodes and positive common (2)(3)

TTL Option :
- **0** : Without TTL driver
- **1** : With TTL Driver (high level)(1)(2)

I.C. : Indicator contact / S.C.O. : Self Cut-Off
(1) : Suppression diodes are already included in self cut-off & 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 & 6 because failsafe switches can be used with both polarities

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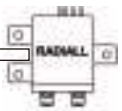
DPDT up to 12.4 GHz - RAMSES Concept
N - BNC - TNC



RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
BNC	DC - 3	DC - 1	1.15	0.15	85	50
		1 - 2	1.20	0.20	80	
		2 - 3	1.25	0.25	75	
N / TNC	DC - 3	DC - 1	1.15	0.15	85	50
		1 - 2	1.20	0.20	80	
		2 - 3	1.25	0.25	75	
	DC - 12.4	3 - 8	1.35	0.35	70	
		8 - 12.4	1.50	0.50	60	

See page DPDT-14 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		**Failsafe**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (+/-10%)	Ω	35	200	38	225
Nominal operating current at 23°C	mA	340	140	320	125
TTL input	High Level	2.2 to 5.5 V		800 µA max 5.5 V	
	Low Level	0 to 0.8 V		20 µA max 0.8 V	
Average power		See Power Rating Chart page **Intro-14**			
Switching time (max)	ms	15			
Life (min)		2.5 million cycles			
Connectors		N - TNC- BNC			
Actuator terminals		Solder pins or male 9 pin D-Sub connector			
Operating temperature range	°C	-40 to +85 °C			
Storage temperature range	°C	-55 to +85 °C			
Vibration (MIL STD 202, method 204D, cond.C)		10-2000 Hz , 20g		operating	
Shock (MIL STD 202, method 213B, cond.G)		50g / 11 ms, ½ sine		operating	

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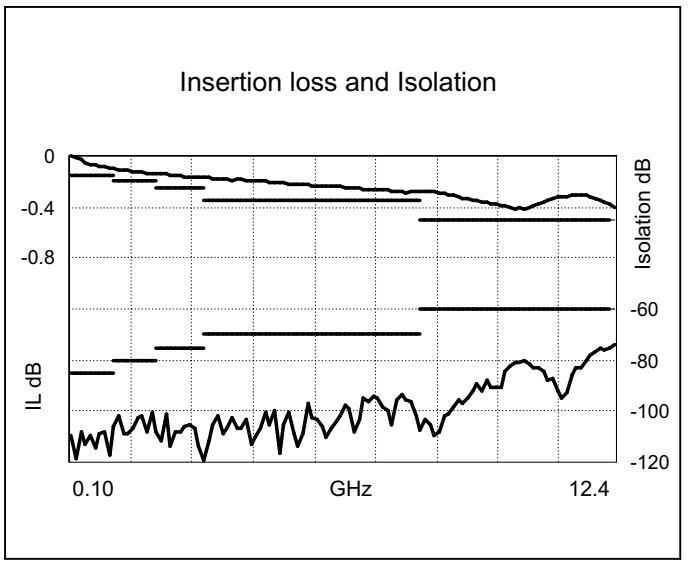
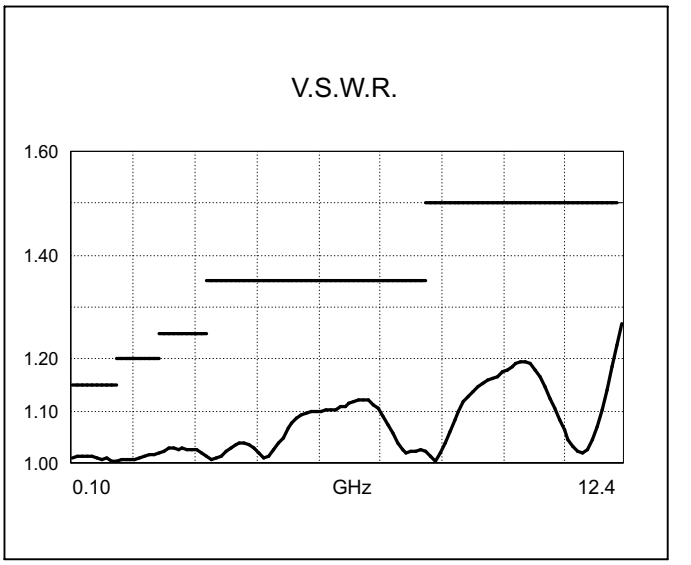
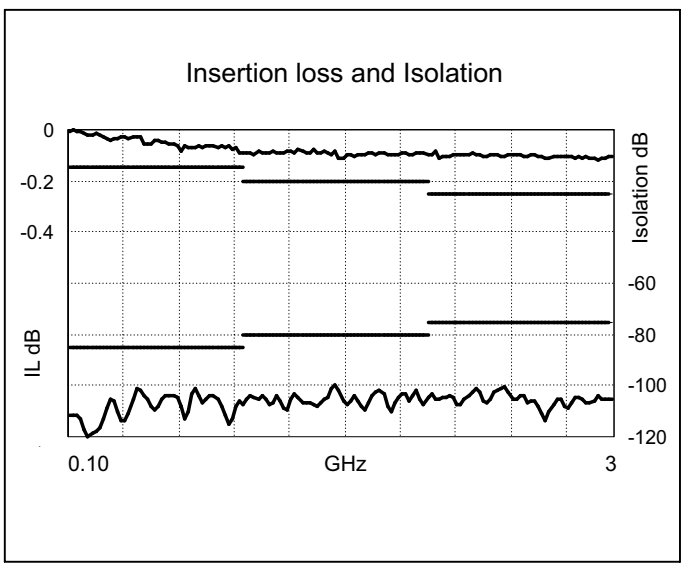
R577 TYPICAL RF PERFORMANCES

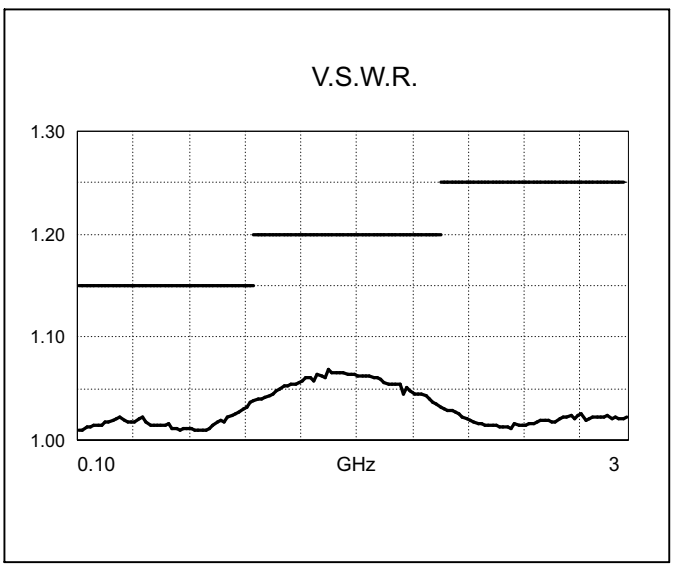
Example : DPDT N/TNC 12.4 GHz





Example : DPDT BNC up to 3 GHz



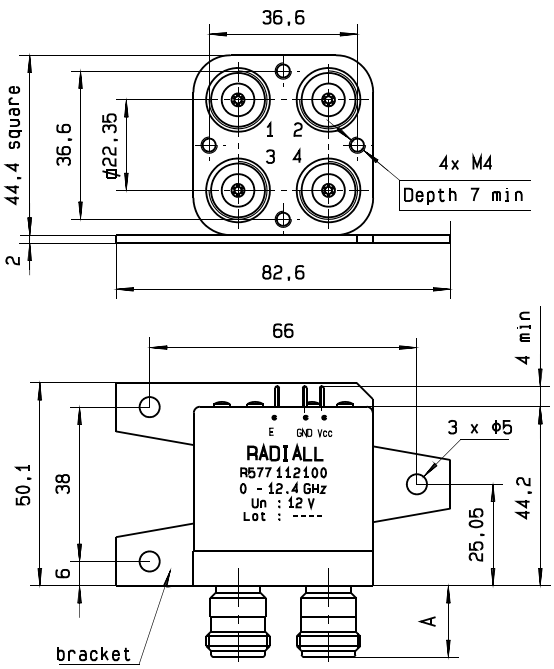


DPDT

DPDT up to 12.4 GHz - RAMSES Concept
N - BNC - TNC

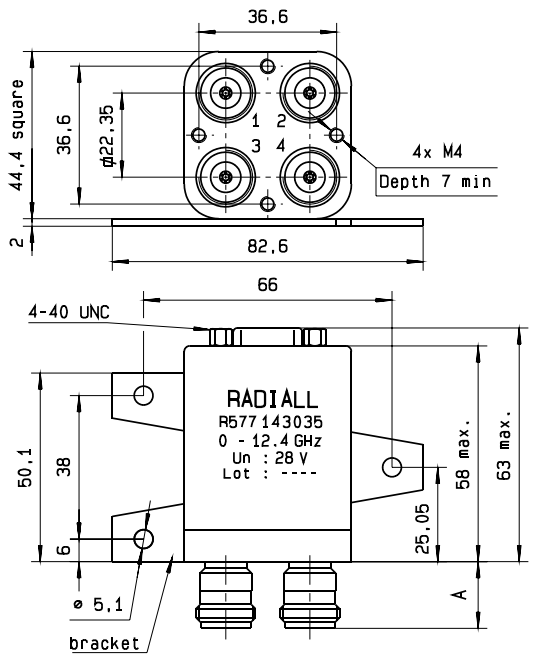
TYPICAL OUTLINE DRAWING

With solder pins and bracket



See page **DPDT-19** for pin identification

With D-Sub connector and bracket



See page **DPDT-19** for pin identification

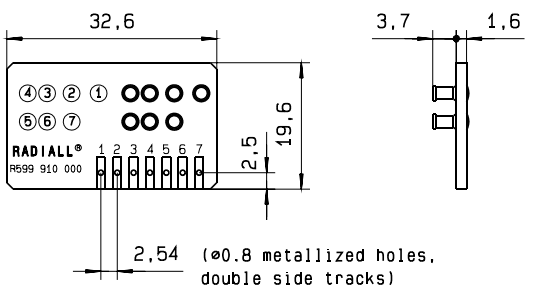
Connectors	N	BNC	TNC
A max (mm)	17.7	11.3	11.3

DPDT

ACCESSORIES

A printed circuit board interface connector has been designed for easy mounting on terminals :
It must be ordered separately.

For DPDT model R577 series :



part number : **R599 910 000**

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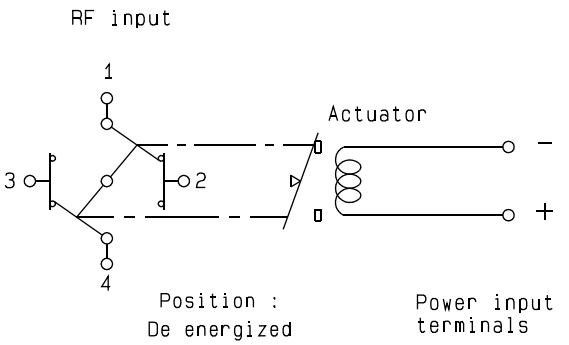
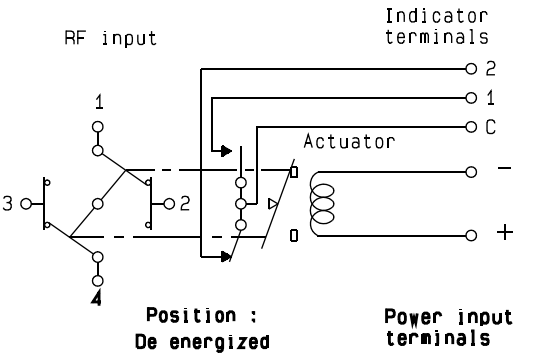
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

FAILSAFE

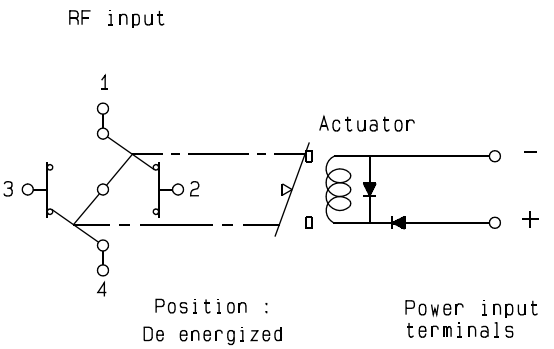
WITHOUT OPTION
R577 -1- 000



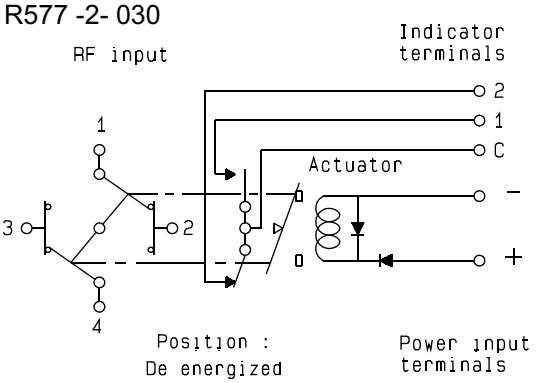
WITH INDICATOR CONTACT
R577 -2- 000



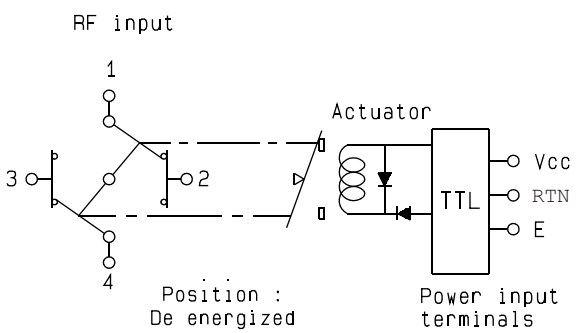
WITH SUPPRESSION DIODES
R577 -1- 030



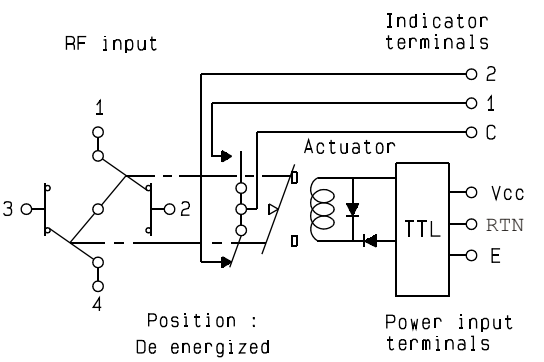
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R577 -2- 030



WITH TTL DRIVER
(suppression diodes are included)
R577 -1- 100



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R577 -2- 100



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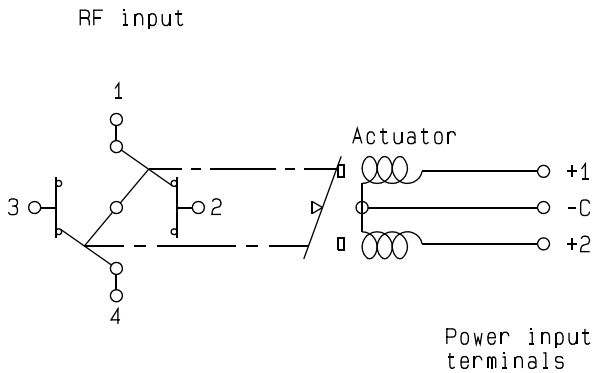
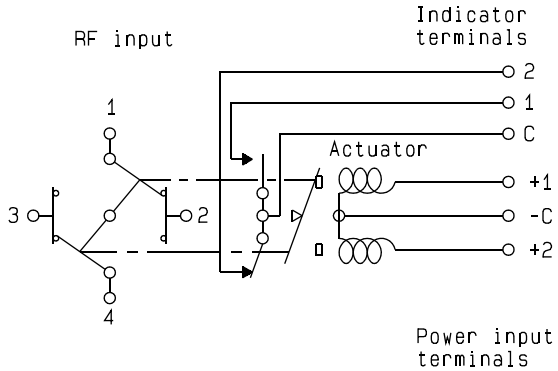
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

LATCHING

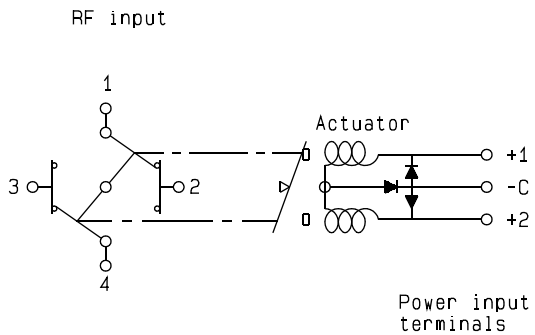
WITHOUT OPTION
R577 -3- 000



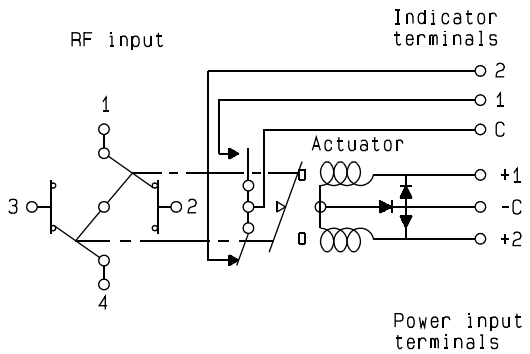
WITH INDICATOR CONTACT
R577 -4- 0000



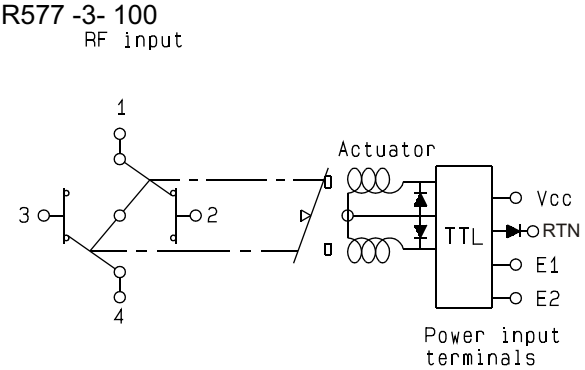
WITH SUPPRESSION DIODES
R577 -3- 030



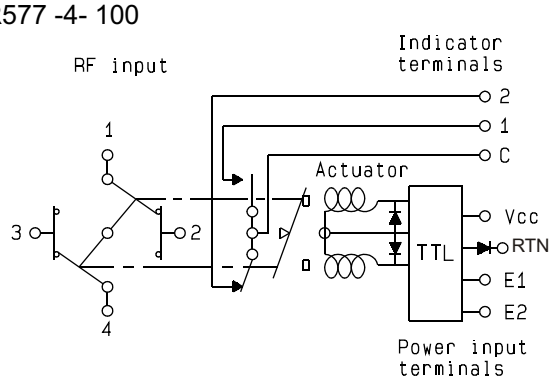
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R577 -4- 030



WITH TTL DRIVER
(suppression diodes are included)
R577 -3- 100



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R577 -4- 100



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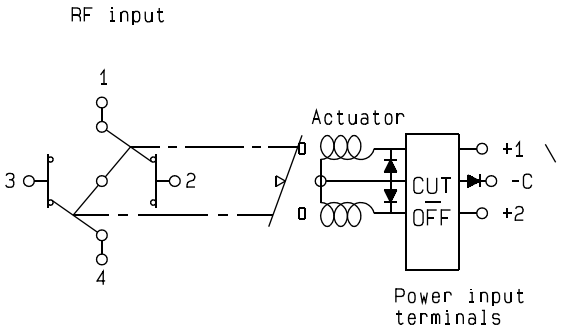
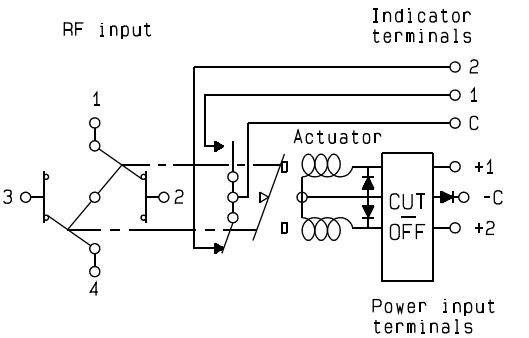
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

LATCHING

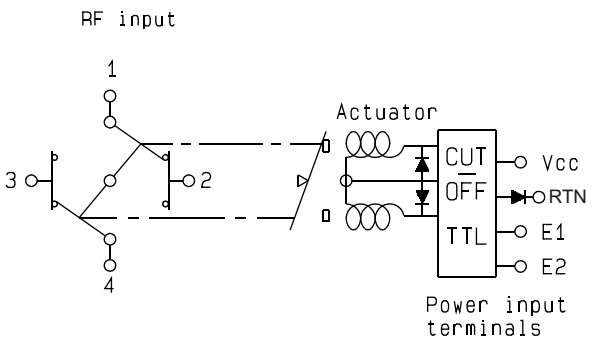
WITH CUT-OFF
(suppression diodes are included)
R577 -5- 000



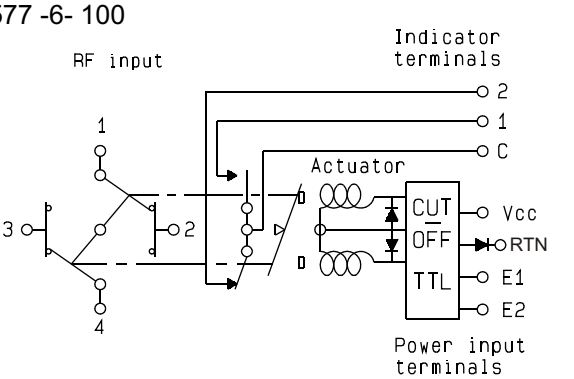
WITH CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R577 -6- 000



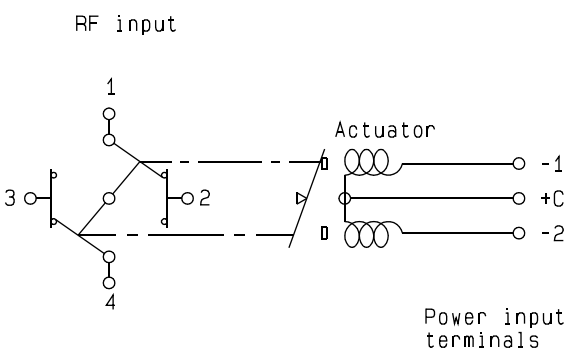
WITH CUT-OFF AND TTL DRIVER
(suppression diodes are included)
R577 -5- 100



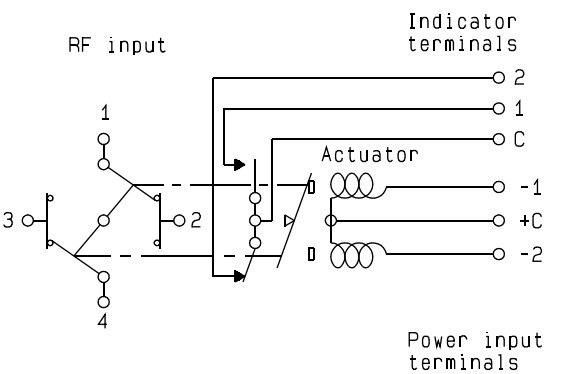
WITH CUT-OFF, TTL AND INDICATOR CONTACT
(suppression diodes are included)
R577 -6- 100



WITH POSITIVE COMMON, NO OPTION
R577 -3- 010



WITH POSITIVE COMMON AND INDICATOR CONTACT
R577 -4- 010



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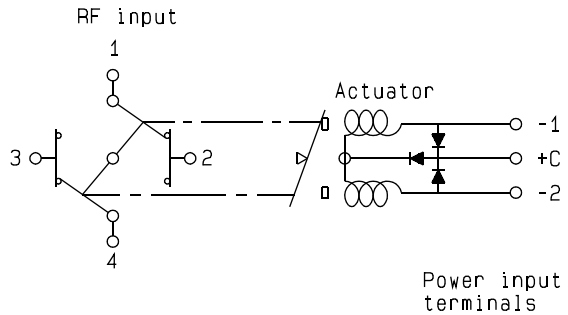
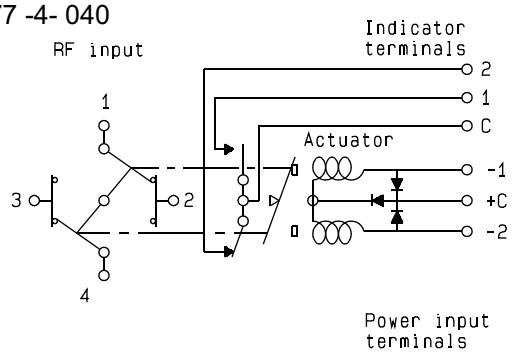
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

LATCHING

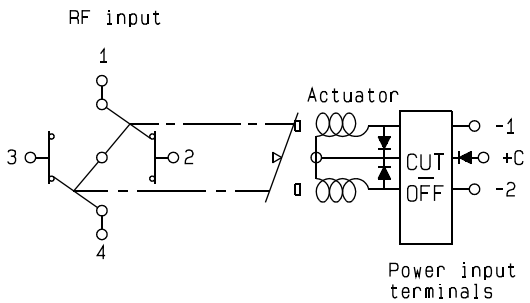
WITH POSITIVE COMMON AND SUPPRESSION DIODES
R577 -3- 040



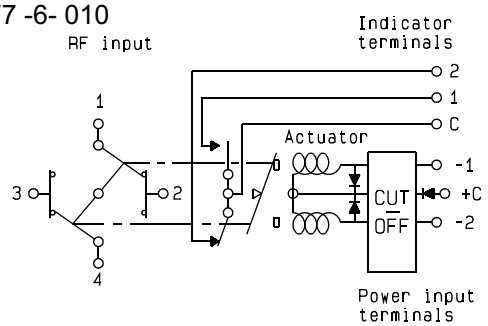
WITH POSITIVE COMMON, SUPPRESSION DIODES AND INDICATOR CONTACT
R577 -4- 040



WITH POSITIVE COMMON AND CUT-OFF
(suppression diodes are included)
R577 -5- 010



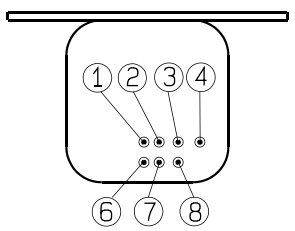
WITH POSITIVE COMMON, CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R577 -6- 010



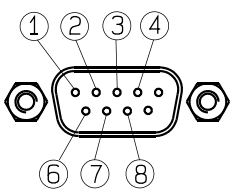
PIN IDENTIFICATION

Type	PIN						
	1	2	3	4	6	7	8
Failsafe	+		-				
Failsafe + I.C.	E		-		1	2	C
Failsafe + TTL	E		RTN	VCC			
Failsafe + I.C. + TTL	E		RTN	VCC	1	2	C
Latching Latching + Cut-off	-1 or +1	-2 or +2	+C or -C				
Latching + I.C. Latching + I.C. + Cut-off	-1 or +1	-2 or +2	+C or -C		1	2	C
Latching + TTL Latching + TTL + Cut-off	E1	E2	RTN	VCC			
Latching + TTL + I.C. Latching + TTL + I.C. + Cut-off	E1	E2	RTN	VCC	1	2	C

Bottom View



Solder pins



D-Sub 9 pins

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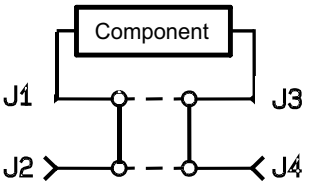
OPTIONAL FEATURES FOR DPDT SWITCHES

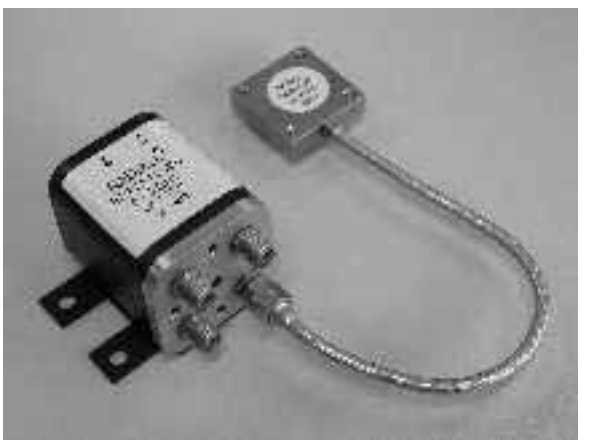
GENERAL

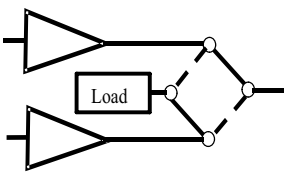
A microwave circuit or component can be inserted into a transmission line by using a DPDT switch as a by-pass product. In event that the short-circuit of the microwave circuit or component is undesirable, the J1/J3 path can be left out (see application option below).



Component inserted in J1 / J3
POS 1 : J2 to J4 : Direct line
POS 2 : J2 to J4 : Component

Examples of dedicated application options :



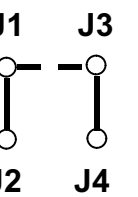


This DPDT with a cable load is used for redundancy purpose for 2 amplifiers, one working, the other one in stand-by.

This DPDT switch with SMA 2.9 connectors up to 41 GHz, waterproof and fitted with lightning suppression components, has been improved for an european military applications.

This DPDT has been fitted with a specific bracket to meet a customer's requirement.

This true By-pass Switch is based on a DPDT with only 3 RF ways instead of 4.



Component inserted in J2/J4
POS 1 : J1 to J3 : Direct line

DPDT

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SPnT section

Coaxial Subminiature SPnT up to 26.5 GHz

See Page SPnT - 2

High Performances Multiport Switches up to 40 GHz

PLATINUM series

Updated

See Page SPnT - 8

Updated

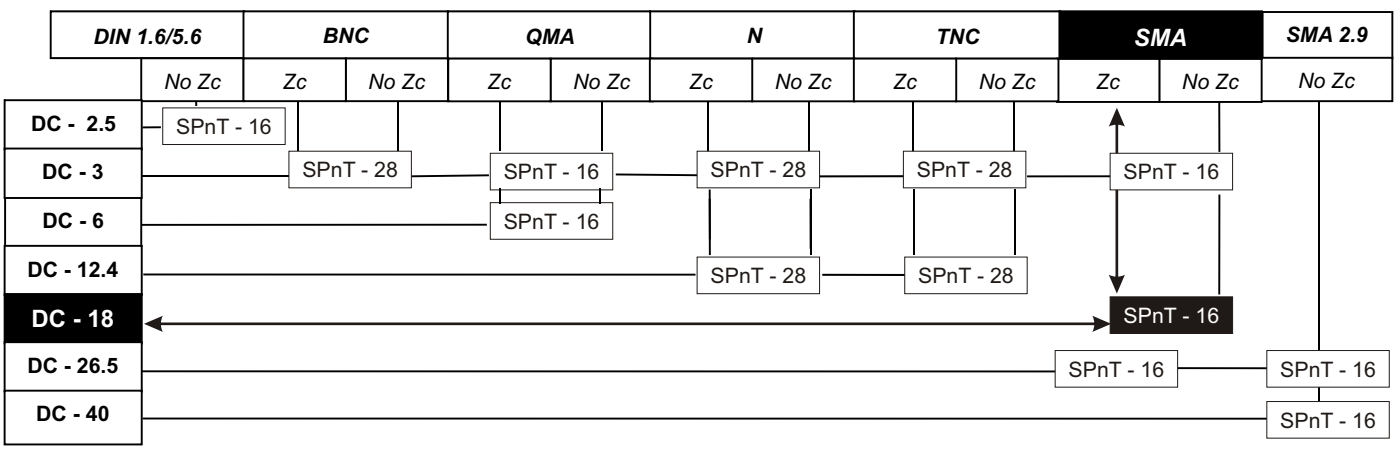
Coaxial SPnT 40 GHz - RAMSES series

See Page SPnT - 16

QUICK ACCESS TO THE RIGHT PAGE

Example : **DC-18 GHz, SPnT Zc with SMA connectors**

See page SPnT-16



Note : Zc *: Terminated versions*
No Zc : *Non terminated versions*

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SUBMINIATURE SPnT up to 26.5 GHz
SMA - QMA

R591 RADIALL coaxial subminiature switches have a typical operating life exceeding 25 million cycles. Excellent RF & repeatability characteristics along with a guaranteed life of 10 million cycles make these switches ideal for Automated Test Equipment (ATE) and other measurement applications. These miniature switches are also an excellent choice for Mil/Aero applications due to their small size, light weight, as well as outstanding shock and vibration handling capabilities.

PART NUMBER SELECTION

R 5 9 1 . . . . . .

RF Connectors :
- **3** : SMA up to 6 GHz
- **7** : SMA up to 26.5 GHz
- **E** : QMA up to 6 GHz (4)

Type :
- **0** : Normally open
- **2** : Latching, global reset
- **6** : Latching, separated reset (1)

Actuator Voltage :
- **2** : 12 Vdc
- **3** : 28 Vdc

Number of positions :
- **4** : 4 positions
- **6** : 6 positions

Options :
- **0** : Without option
- **1** : Positive common
- **2** : Normally open with TTL driver (high level)(2)(3)
- **3** : With suppression diodes
- **4** : With suppression diodes and positive common

Actuator Terminals :
- **0** : Solder pins
- **5** : Micro-D connector

(1) : Available with "solder pins" models only
(2) : Polarity is not relevant to application for switches with TTL driver
(3) : Suppression diodes are already included with TTL option

(4) : The "QLF" trademark (Quick Lock Formula®) standard applies to QMA and QN series and guaranties the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performances

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SUBMINIATURE SPnT up to 26.5 GHz
SMA - QMA

GENERAL SPECIFICATIONS

Operating mode		Normally open		Latching	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 / 13)	**28** (21 / 30)	**12** (10.2 / 13)	**28** (21 / 30)
Coil resistance (+/-10%)	Ohms	48	250	60	285
Operating current at 23°C	mA	250	110	200	98
Average power		See RF Power Rating Chart on **Intro-14**			
TTL input	High Level	2.2 to 5.5 Volts			
	Low Level	0 to 0.8 Volts			
Switching time (max)	ms	10			
Life		10 million cycles			
Connectors		SMA / QMA			
Actuator terminals		**Solder Pins** : double row connector for wrapping, soldering (250°C max / 30 sec), or connecting to 2.54 mm pitch female connector. **9 pin micro-D** receptacle M83513/07-A according to MIL-C-85513.			
Operating temperature range	°C	-40 to +85			
Storage temperature range	°C	-55 to +85			
Sine vibration (According to MIL STD 202, Method 204D, Cond. D)		10-2000 Hz, 20g operating			
Random vibration (According to MIL STD 202, Method 214A, Profile I, Cond. F)		50-2000 Hz, 20.71grms operating			
Shock (According to MIL STD 202, Method 213B, Cond. C)		100g / 6 ms, ½ sine operating			

RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
QMA / SMA	DC – 6	DC – 3	1.20	0.20	80	50
		3 – 6	1.30	0.30	70	
SMA	DC – 26.5	DC – 3	1.20	0.20	80	50
		3 – 8	1.30	0.30	70	
		8 – 12.4	1.40	0.40	60	
		12.4 – 18	1.50	0.50	60	
		18 – 26.5	1.60	0.60	55	

SPnT

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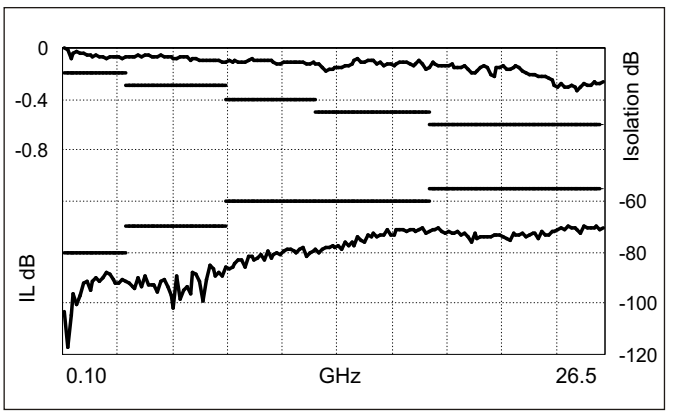
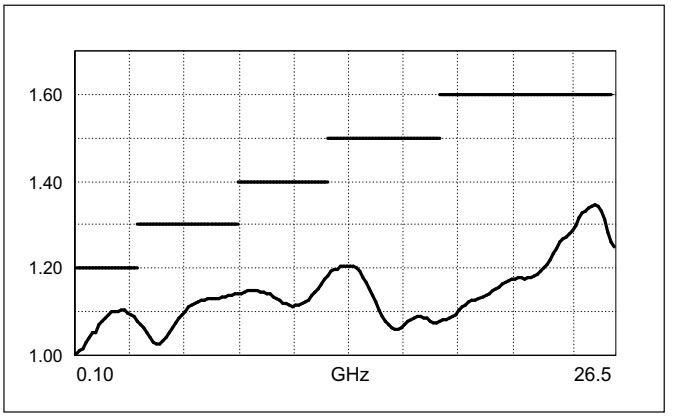
SUBMINIATURE SPnT up to 26.5 GHz
SMA - QMA

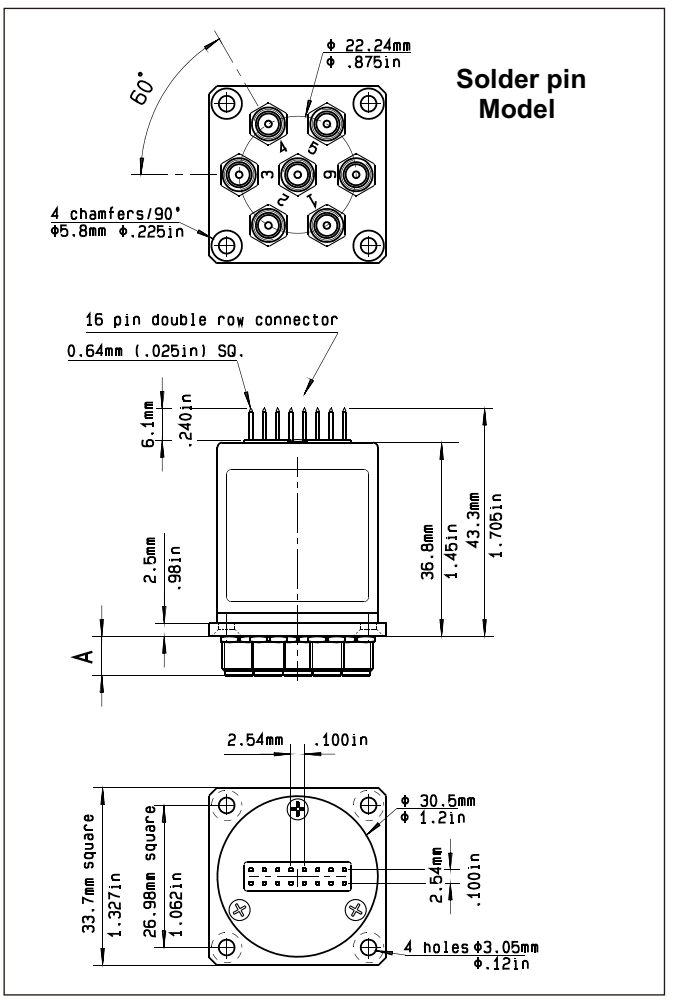
TYPICAL RF PERFORMANCES

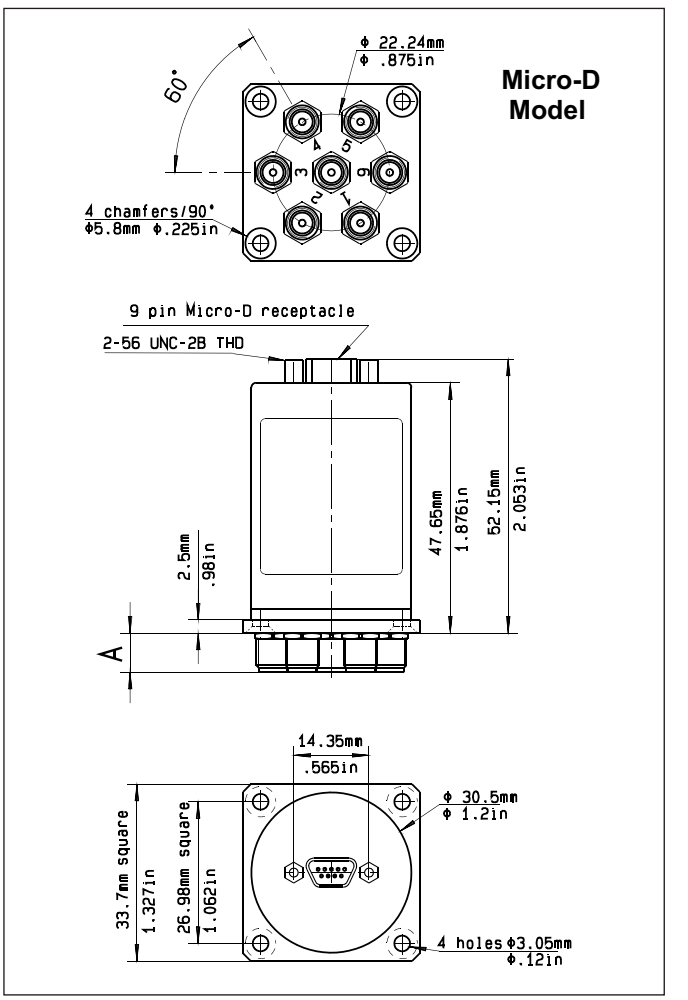




Connectors	SMA	QMA
A max (mm/inches)	7.4/0.291	10.8/0.425

TYPICAL OUTLINE DRAWING (1)





(1) : For SP4T, way 3 and 6 not connected

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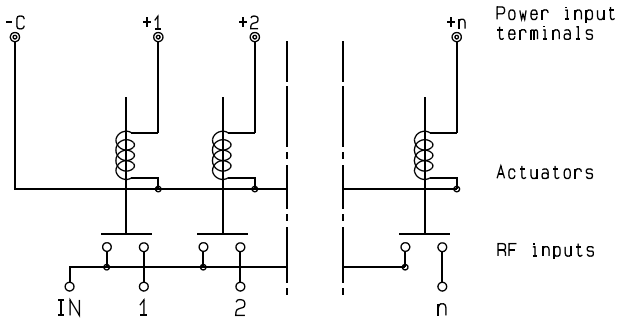
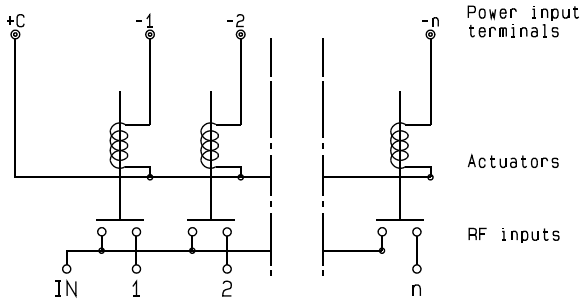
R591 SERIES ELECTRICAL SCHEMATICS

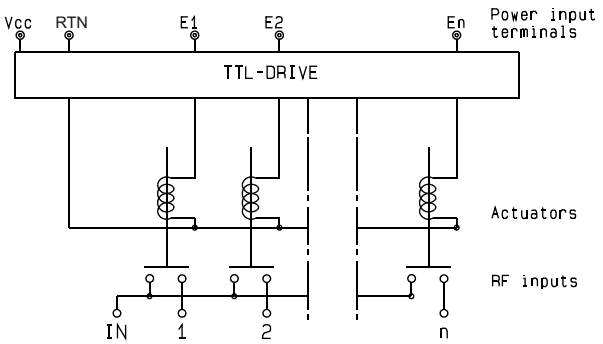
NORMALLY OPEN WITHOUT OPTION
R591 -0- -0-



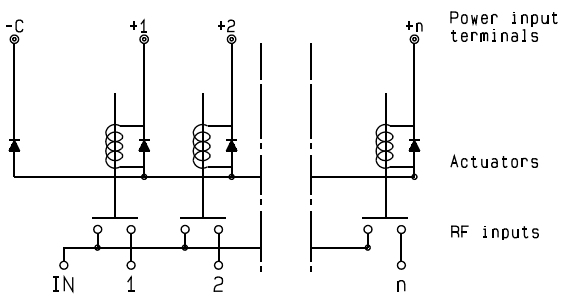
NORMALLY OPEN WITH POSITIVE COMMON
R591 -0- -1-



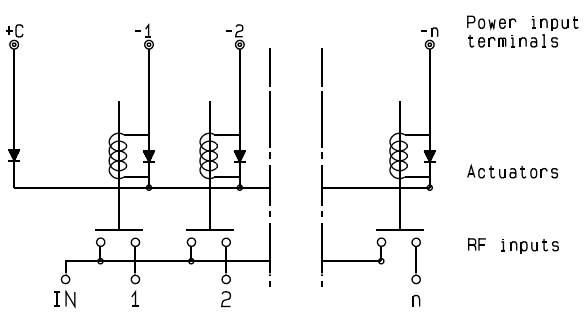
NORMALLY OPEN WITH TTL DRIVE
R591 -0- -2-



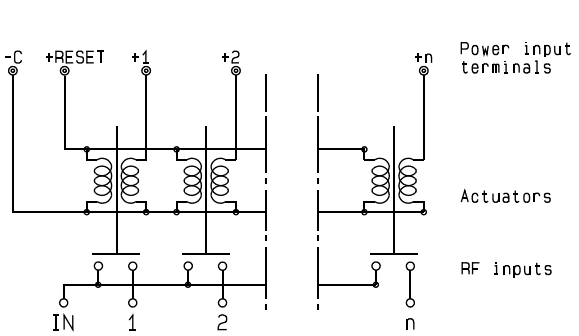
NORMALLY OPEN WITH SUPPRESSION DIODES
R591 -0- -3-



NORMALLY OPEN WITH POSITIVE COMMON AND SUPPRESSION DIODES
R591 -0- -4-



LATCHING GLOBAL RESET WITHOUT OPTION
R591 -2- -0-



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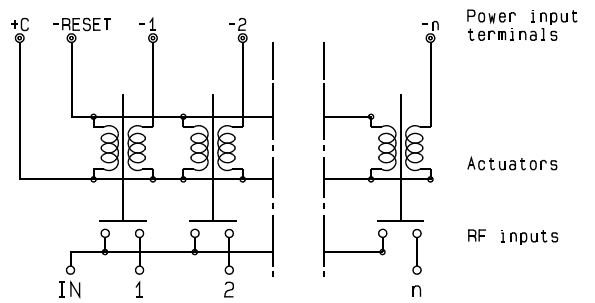
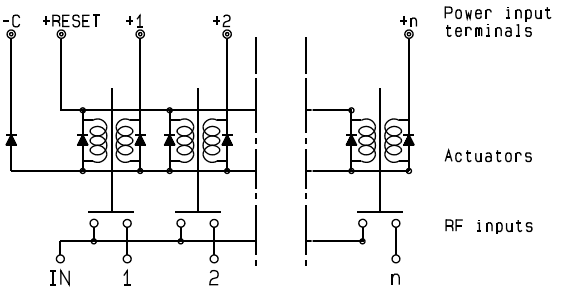
R591 SERIES ELECTRICAL SCHEMATICS

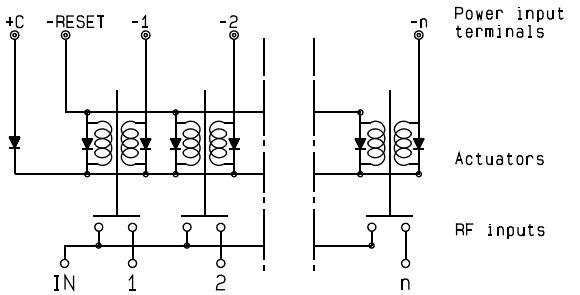
LATCHING GLOBAL RESET WITH POSITIVE COMMON
R591 -2- -1-



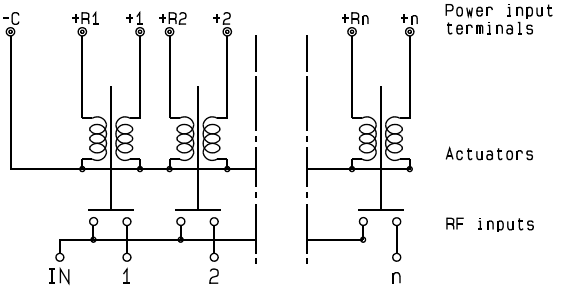
LATCHING GLOBAL RESET WITH SUPPRESSION DIODES
R591 -2- -3-



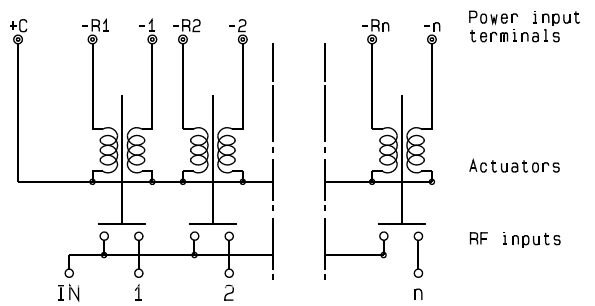
LATCHING GLOBAL RESET WITH POSITIVE COMMON AND SUPPRESSION DIODES
R591 -2- -4-



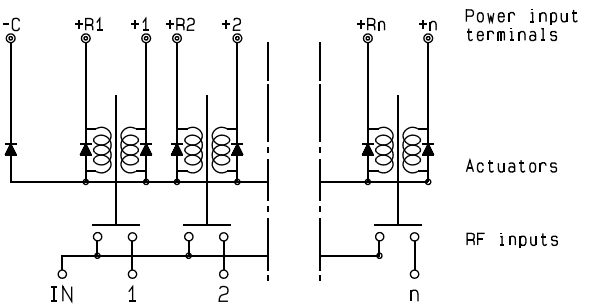
LATCHING SEPARATED RESET WITHOUT OPTION
R591 -6- -0-



LATCHING SEPARATED RESET WITH POSITIVE COMMON
R591 -6- -1-



LATCHING SEPARATED RESET WITH SUPPRESSION DIODES
R591 -6- -3-



SPnT

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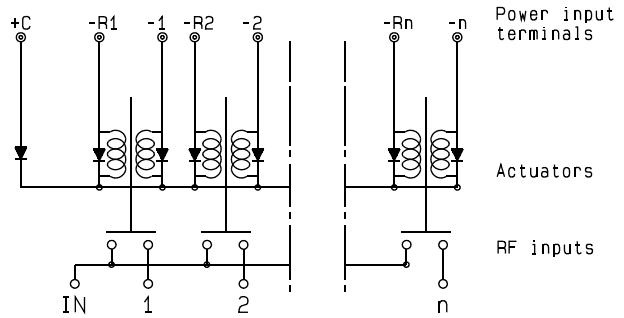
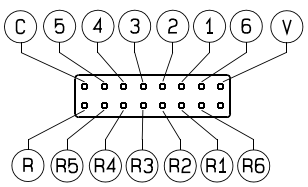
R591 SERIES ELECTRICAL SCHEMATICS

LATCHING SEPARATED RESET WITH POSITIVE COMMON AND SUPPRESSION DIODES
R591 -6- -4-

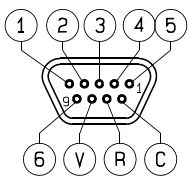


PIN IDENTIFICATION

Solder pins (top view)*



9 pin Micro-D (top view)



* : Compatible with 2.54 mm pitch double row 16 contact female connector

- NC : not connected
- For SP4T, ways 3 and 6 not connected
- Pin R = reset of all paths

Type		C	V	1	2	3	4	5	6	R	R1	R2	R3	R4	R5	R6
Normally open	negative common	-C	NC	+1	+1	+3	+4	+5	+6	NC	NC	NC	NC	NC	NC	NC
	positive common	+C	NC	-1	-1	-3	-4	-5	-6	NC	NC	NC	NC	NC	NC	NC
Latching global reset	negative common	-C	NC	+1	+1	+3	+4	+5	+6	+reset	NC	NC	NC	NC	NC	NC
	positive common	+C	NC	-1	-1	-3	-4	-5	-6	-reset	NC	NC	NC	NC	NC	NC
Latching individual reset	negative common	-C	NC	+1	+1	+3	+4	+5	+6	NC	+res.1	+res.2	+res.3	+res.4	+res.5	+res.6
	positive common	+C	NC	-1	-1	-3	-4	-5	-6	NC	-reset	-res.2	-res.3	-res.4	-res.5	-res.6
Normally open with TTL drive		GND or RTN	Vcc	E1	E2	E3	E4	E5	E6	NC	NC	NC	NC	NC	NC	NC

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HIGH PERFORMANCES MULTIPORT SWITCHES

PLATINUM Series / SPnT terminated up to 40 GHz

Radiall's PLATINUM SERIES switches are optimised to perform at a high level over an extended life span. With outstanding RF performances, 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

PART NUMBER SELECTION

R 5 9 4 . . 3 . . 7 .

Updated

RF Connectors :
- **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 (1)

Type :
- **4** : Latching + Self cut-off without indicators
- **7** : Latching + Self cut-off + Auto Reset + indicators

Number of positions :
- **4** : 4 positions
- **6** : 6 positions

Options :
- **1** : Positive common (without TTL)
- **2** : TTL/5V logic with 24 Vdc supply Type “7” only

Documentation :
- **-** : Certificate Of Conformity
- **C** : Calibration certificate
- **R** : Calibration certificate + RF curves

Actuator Terminal :
- **7** : HE 10 receptacle, delivered with 750 mm (30 inches) ribbon cable + HE 10 connector

(1) : Connector SMA 2.9 is equivalent to “K connector®”, registered trademark of Anritsu

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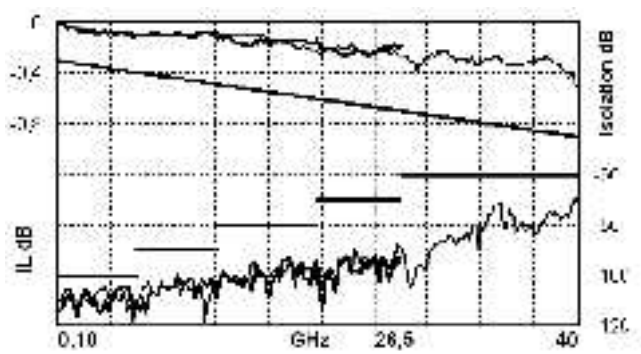
RF PERFORMANCES

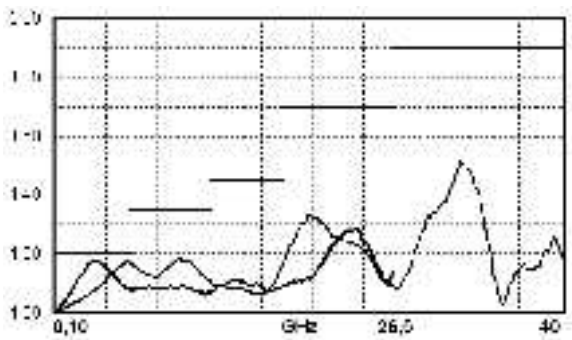
Part Number		**R5943.34.7 R5943.36.7**	**R5944.34.7 R5944.36.7**	**R594F.34.7 R594F.36.7**	**R5948.34.7 R5948.36.7**
Frequency range	GHz	DC to 6	DC to 20	DC to 26.5	DC to 40
Impedance	Ω	50			
Insertion loss (max)	dB	0.3 + 0.015 x frequency (GHz)			
Isolation (Min)	dB	100	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80 20 to 26.5 GHz : 70	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80 20 to 26.5 GHz : 70 26.5 to 40 GHz : 60
V.S.W.R. (max)		1.20	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.35 12.4 to 18 GHz : 1.45 18 to 20 GHz : 1.70	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.35 12.4 to 18 GHz : 1.45 18 to 26.5 GHz : 1.70	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.35 12.4 to 18 GHz : 1.45 18 to 26.5 GHz : 1.70 26.5 to 40 GHz : 1.90
Repeatability (measured at 25°C)	dB	0.03 max			0.05 max

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation



V.S.W.R.



——— : 26.5 GHz model with **SMA /** ——— : 40 GHz model with **SMA 2.9**

SPnT

ADDITIONAL SPECIFICATIONS

Operating mode		**Latching**
Nominal operating voltage (across operating temperature)	Vdc	**24** (20 to 32)
Coil resistance (±10%)	Ω	120
Nominal operating current at 23°C	mA	200
Maximum stand-by current	mA	50
Average power		RF path Cold switching : see power rating chart on SPnT-15 Hot switching : 1 Watt CW
		Internal terminations : 1 Watt average into 50 Ω
TTL input	High level	3 to 7 V : 1.4 mA max at Vcc max and Vinput 3.85 Vdc
	Low level	0 to 0.8 V
Indicator specifications		Maximum withstanding voltage : 60 V Maximum current capacity : 150 mA Maximum "ON" resistance : 2.5 Ω Minimum "OFF" resistance : 100 MΩ
Switching time (max)	ms	15
Life (min) **for**	SMA	10 million cycles
	SMA 2.9	2 million cycles
Connectors		SMA – SMA 2.9
Actuator terminals		HE10 ribbon receptacle
Weight (max)	g	230

ENVIRONMENTAL SPECIFICATIONS

Operating temperature range	°C	-25 to +75
Storage temperature range	°C	-55 to +85
Temperature cycling (MIL-STD-202 , Method 107D , Cond.A)	°C	-55 to +85 (10 cycles)
Vibration (MIL STD 202 , Method 204D , Cond.D)		10-2000 Hz , 10g operating
Shock (MIL STD 202 , Method 213B , Cond.C)		50g / 6 ms , ½ sine operating
Moisture resistance (MIL STD 202 , Method 106E , Cond.E)		65°C, 95% RH, 10 days
Altitude storage (MIL STD 202 , Method 105C , Cond.B)		50,000 feet (15,240 meters)
RFI (MIL STD 1344 , Method 3008 or IEC 61726)		55 dB at 20 GHz
Magnetic field		< 5.10^{-5} gauss at 1 meter

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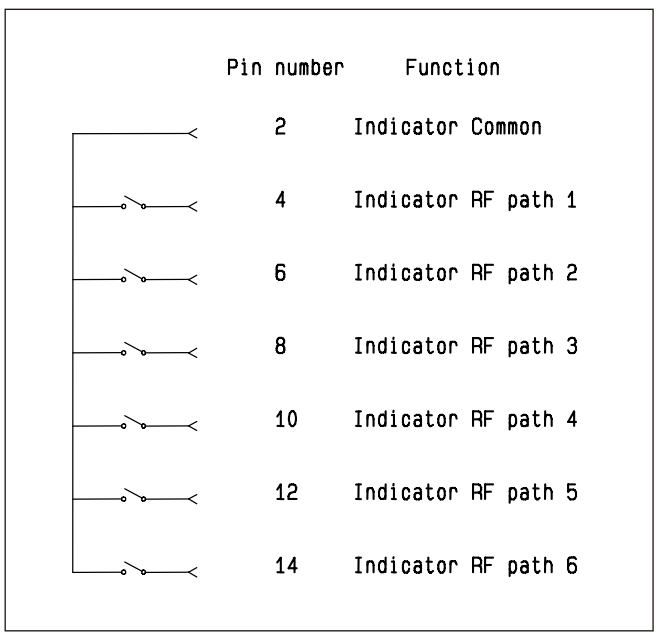
ELECTRONIC POSITION INDICATORS

This option is not available with type 4.

The electronic position indicators utilise photo-MOS transistors which are driven by the mechanical position of the RF paths moving elements. The circuitry consists of a common which can be connected to an output corresponding to selected RF path. If one or several RF paths are closed, the corresponding indicators are connected to the common. The photo-MOS transistors are configured for AC and/or DC operation. The electronic position indicators require the supply (20 to 32 VDC) to be connected to pin 1 and ground connected to pin 15.

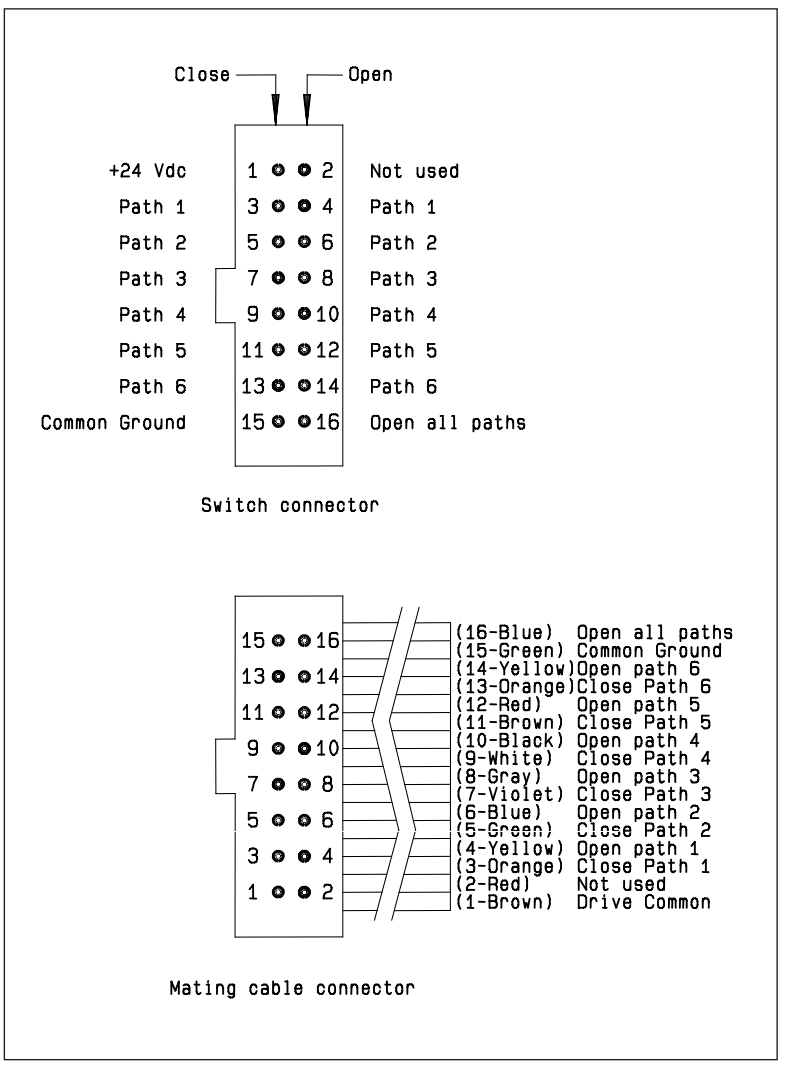


Ways 1 and 4 are not connected for SP4T switches.

DRIVING THE SWITCH

Each RF path is driven independently. Each path can be closed or open by applying ground to the corresponding "open" or "close" pin.

Type 4 : without TTL and without indicator.



Standard drive

- Connect pin 15 to ground.
- Connect pin 1 to supply (+20 VDC to +32 VDC).
- Select desired RF path by applying ground to the corresponding "close" pin (Ex: ground pin 3 to close RF path 1).
- To open desired RF path connect ground to the corresponding "open" pin (Ex: ground pin 4 to open RF path 1).
- To open all RF paths, first ensure that all RF path "close" pins are disconnected from ground. To complete the operation, connect pin 16 to ground.

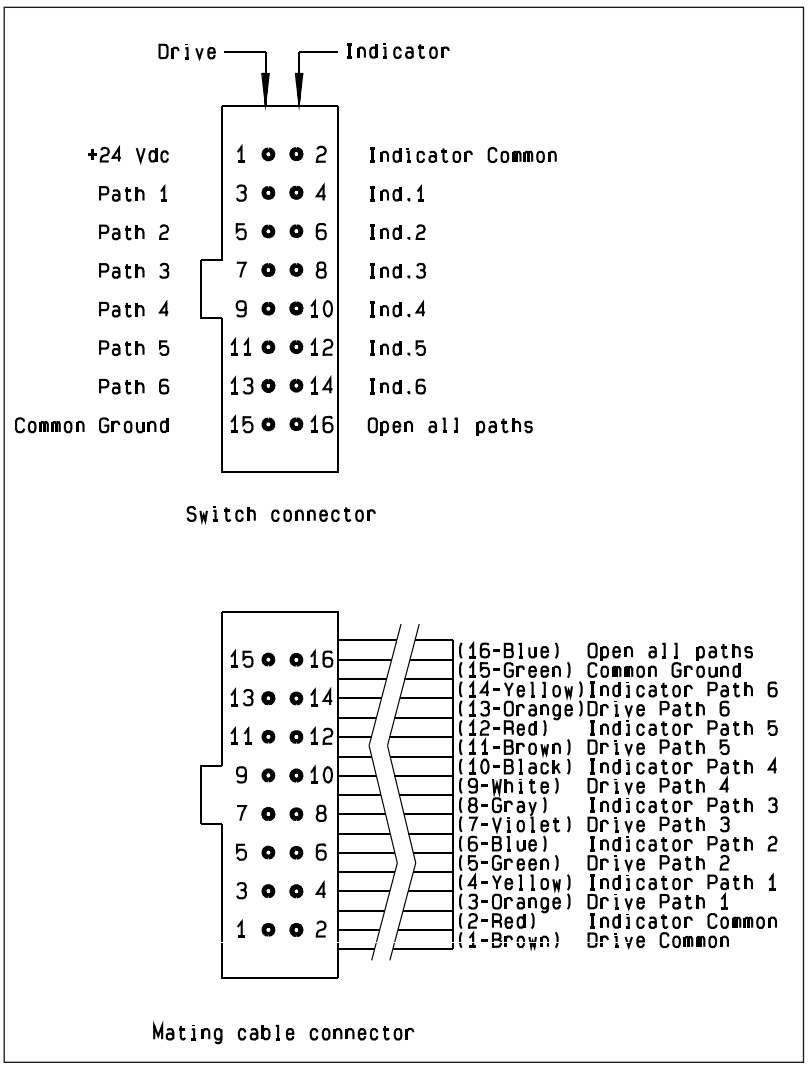
Make-Before-Break

Make-Before-Break switching can be accomplished by closing the new RF path before opening the previously selected RF path. To complete the operation, close the new RF port. A minimum of 15 ms must be allowed before opening the previously selected RF port.

Ways 1 and 4 are not connected for SP4T switches.

Type 7 : with TTL (option "2") /without TTL (option "1") and indicators.

Each RF path can be closed by applying Ground or TTL "High" for option 2 to the corresponding "drive" pin. In general, except for Make-Before-Break drive, all other RF paths are simultaneously opened by internal logic.



Ways 1 and 4 are not connected for SP4T switches.

Standard drive option "1"

- Connect pin 15 to ground.
- Connect pin 1 to supply (+20 VDC to +32 VDC)
- Select (close) desired RF path by applying Ground to the corresponding "drive" pin (Ex: apply Ground to pin 3 to close RF path 1).
- To select another path, ensure that all unwanted RF path "drive" pins are disconnected from Ground (to prevent multiple RF path engagement). Apply Ground to the "drive" pin which corresponds to the desired RF path.
- To open all RF paths, ensure that all RF path "drive" pins are disconnected from Ground. Complete the operation by applying Ground to pin 16.

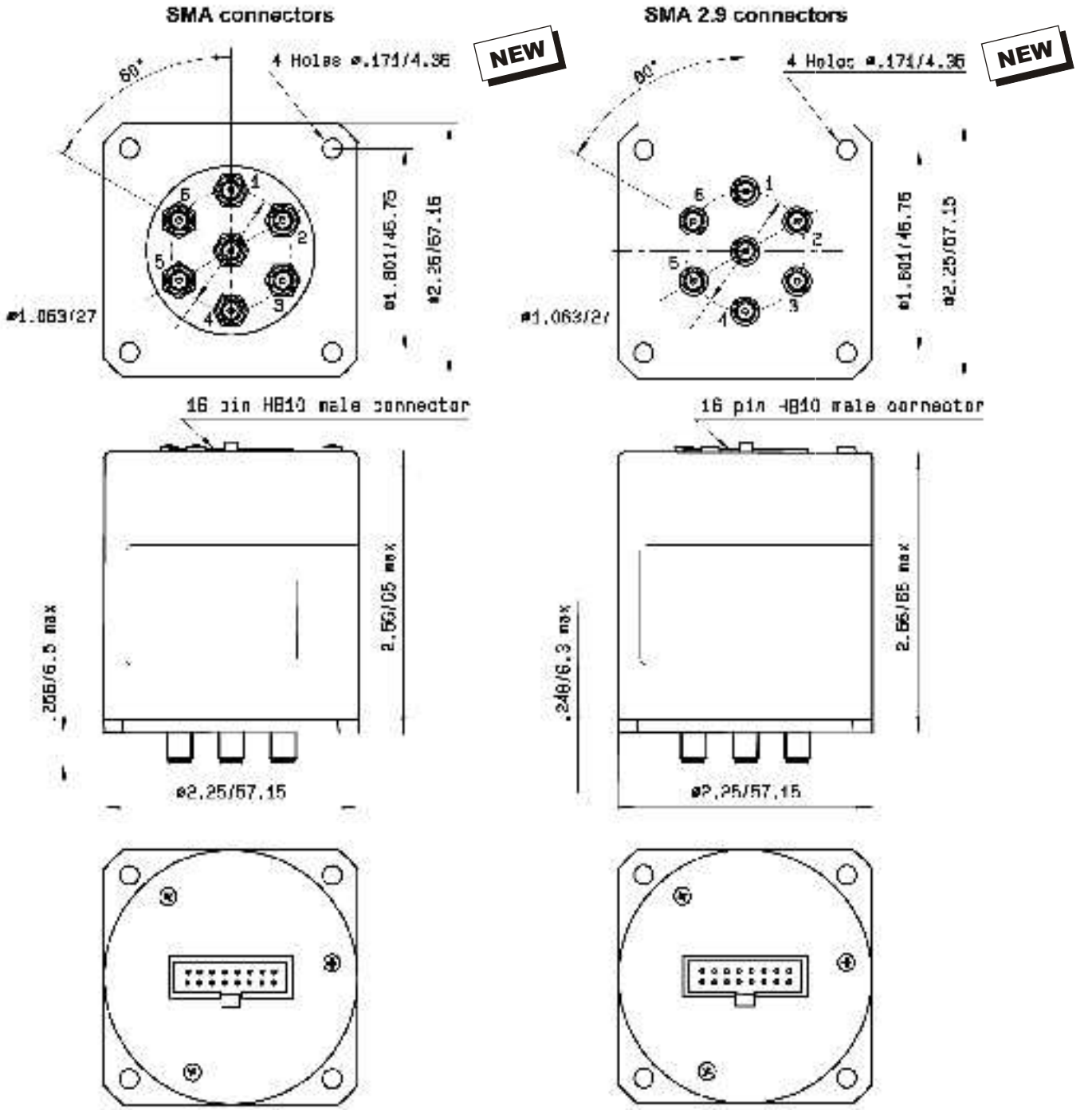
TTL drive option "2"

- Connect pin 15 to ground.
- Connect pin 1 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 3 to close RF path 1).
- To select another path, ensure that all unwanted RF path "drive" pins are in TTL "Low" position (to prevent multiple RF path engagement). Apply TTL "High" to the "drive" pin which corresponds to the desired RF path
- To open all RF paths, ensure that all RF path "drive" pins are in TTL "Low" position. Complete the operation by applying TTL "High" to pin 16.

Break-Before-Make
Open the undesired RF path. After 15 ms (minimum), close the new RF port.

Make-Before-Break
Ensure that the previously selected RF path "drive" is connected to Ground (or TTL "High" for option "2", then close the new RF path.

TYPICAL OUTLINE DRAWING



Ways 1 and 4 are not connected for SP4T

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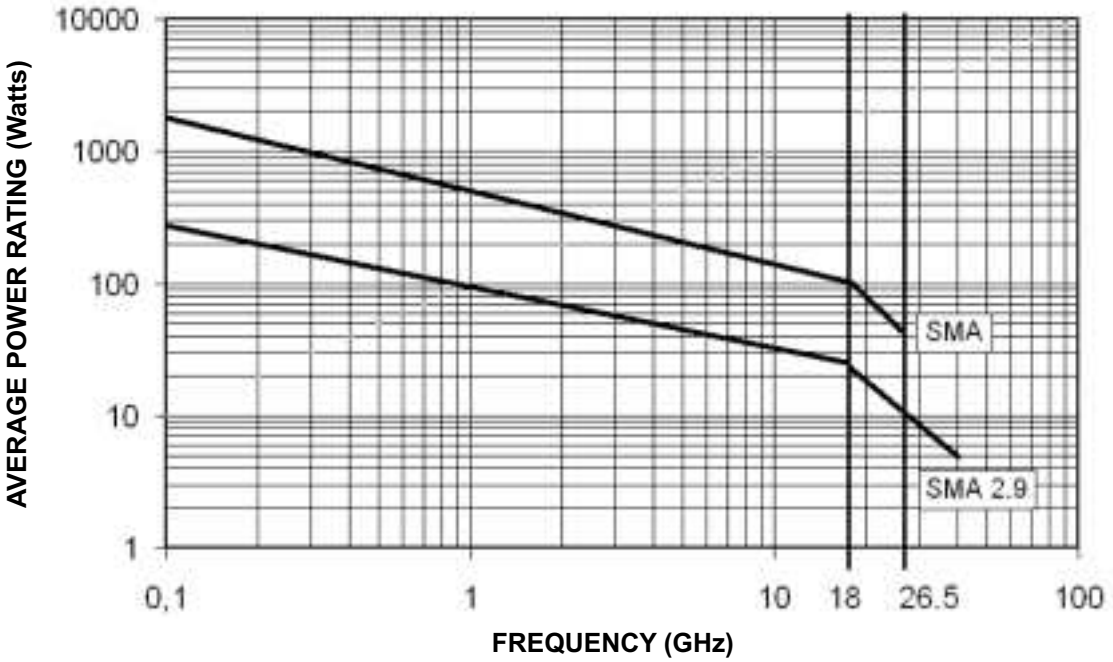
POWER RATING CHART

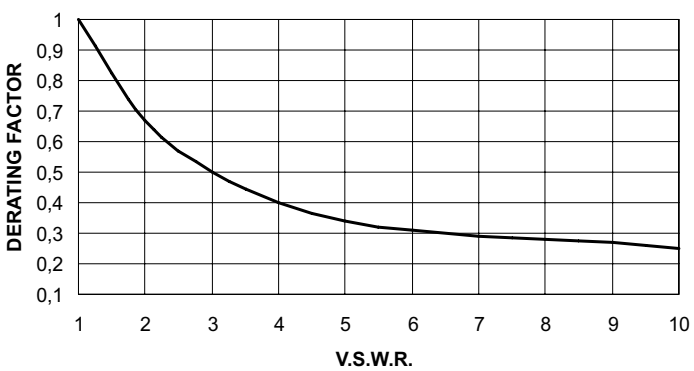
This graph is based on the following conditions :

- 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



SPnT

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PART NUMBER SELECTION

R 5 7 . . . . . .

Model :
3 : Without 50 Ω termination
4 : With 50 Ω termination

RF Connectors :
3 : SMA up to 3 GHz
E : QMA up to 6 GHz (4)(5)(10)
4 : SMA up to 18 GHz
7 : SMA 2.9 up to 26.5 GHz (4)(5)
F : SMA up to 26.5 GHz (4)(6)
8 : SMA 2.9 up to 40 GHz (4)(11)
9 : DIN 1.6/5.6 up to 2.5 GHz (4)(5)

Type :
0 : Normally open
1 : Normally open + I.C.
2 : Latching
3 : Latching + I.C.
4 : Latching + S.C.O. (1)(4)
5 : Latching + S.C.O.+ I.C. (1)(4)
8 : Latching + S.C.O.+ A.R. (1)(4)
9 : Latching + S.C.O.+ I.C. + A.R. (1)

Actuator Voltage :
2 : 12 Vdc
3 : 28 Vdc

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

Options :
0 : Without option
1 : Positive common (2)(7)
2 : Compatible TTL driver (high level)(1)(9)
3 : With suppression diodes
4 : With suppression diodes and positive common (2)(7)
8 : BCD driver TTL compatible (high level)(1)(3)(8)(9)

Number of Positions :
3 : 3 Positions
4 : 4 Positions
5 : 5 Positions
6 : 6 Positions
7 : 7 Positions
8 : 8 Positions
9 : 9 Positions
0 : 10 Positions
1 : 11 Positions
2 : 12 Positions

I.C. : Indicator contact / S.C.O. : Self Cut-Off / A.R. : Auto Reset.
(1) : These models are already equiped with suppression diodes.
(2) : Standard products are equiped with negative common.
(3) : Latching BCD driver enables also a global reset through driver code 0000 (see BCD logic coding page Intr-11).
(4) : Available only up to 6 positions.
(5) : Model "3" only.
(6) : Model "4" only.
(7) : Option not available for type 4,5,8 & 9.
(8) : Option available only with type 0,1,8 & 9.
(9) : Polarity is not relevant to application for switches with TTL driver

SPnT

Type 2, 3, 4 & 5 :
- Latching models have a RESET pin which commands the reset of all positions. This command should be used before switching from one position to another. If not, two positions will be set at the same time.
Note : During the RESET operation the current is : Nominal operating current x number of positions.

Type 8, 9 :
- Latching models with AUTOMATIC RESET are available; these products have an internal SET/RESET circuit which automatically resets all the non-selected positions and sets the desired position. This option simplifies the use of latching switches by suppressing the RESET command in switching sequence.
An electronic circuit supplies successively groups of 2 or 3 actuators, in order to limit the maximum current.
The current with this option is the total current of 2 or 3 reset coils at the same time (see table and switching sequence on following page).
Example : During the AUTOMATIC RESET operation, at 28V, 4 position switch has temporarily a consumption of only 250 mA, during 40 ms maximum.

(10) : The "QLF" trademark (Quick Lock Formula®) standard applies to QMA and QN series and guaranties the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performances

(11) : Connector SMA 2.9 is equivalent to "K connector®", registered trade mark of Anritsu

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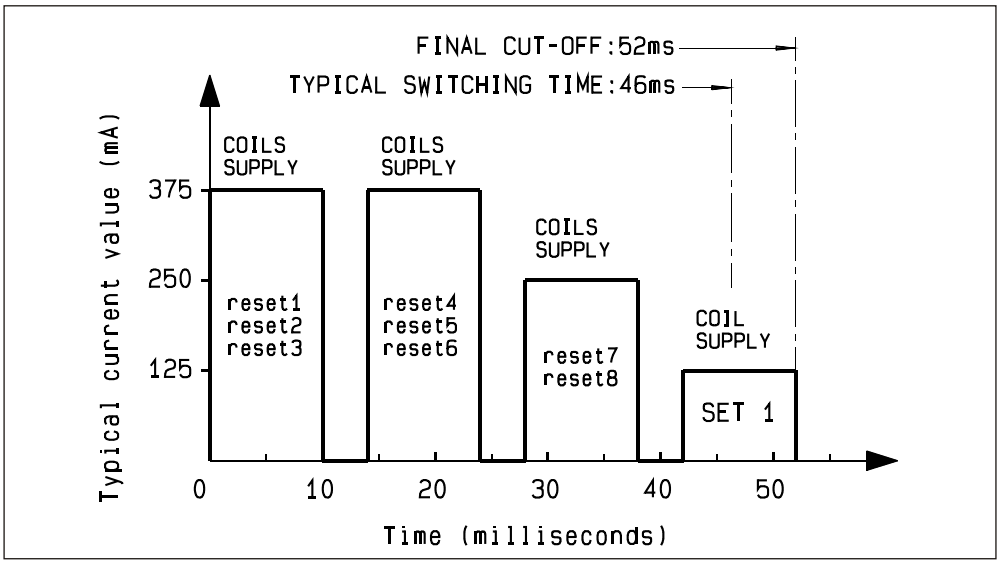
SWITCHING SEQUENCE



Operating total current at 23 °C (mA) SPnT LATCHING				
Number of positions	12 Volts		28 Volts	
	Manual Reset	Automatic Reset	Manual Reset	Automatic Reset
3 to 4	**320 x n**	640	**125 x n**	250
5 to 8	**320 x n**	960	**125 x n**	375
9 to 12	**320 x n**	1280	**125 x n**	500

n = number of positions

AVAILABILITY OF OPTIONS ACCORDING TO BOTH TYPE AND NUMBER OF POSITIONS

Type	Number of positions	Available Options
0 or 1	**3 to 12**	0 - 1 - 2 - 3 - 4 - 8
2 or 3	**3 to 6**	0 - 1 - 2 - 3 - 4
	7 to 12	0 - 1 - 3 - 4
4 or 5	**3 to 6**	0 - 2
	7 to 12	Not available
8 or 9	**3 to 12**	0 - 2 - 8

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ADDITIONAL SPECIFICATIONS

SMA Connector						
Number of positions	**Frequency Range GHz**		**V.S.W.R. (max)**	**Insertion Loss (max) dB**	**Isolation (min) dB**	**Impedance Ohms**
3 to 6	DC - 3 DC - 18 DC - 26.5	DC - 3	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
		8 - 12.4	1.40	0.40	60	
		12.4 - 18	1.50	0.50	60	
		18 – 26.5	1.70	0.70	50	
7 to 8	DC - 3 DC - 18	DC - 3	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
		8 - 12.4	1.40	0.40	60	
		12.4 - 16	1.50	0.55	60	
		16 - 18	1.60	0.60	60	
9 to 10	DC - 3 DC - 18	DC - 3	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
		8 - 12.4	1.40	0.40	60	
		12.4 - 15.5	1.50	0.50	60	
		15.5 - 18	1.70	0.70	55	
11 to 12	DC - 3 DC - 12.4	DC - 3	1.20	0.20	80	50
		3 - 8	1.40	0.35	70	
		8 - 12.4	1.80	0.70	60	

SMA 2.9 Connector						
Number of positions	**Frequency Range GHz**		**V.S.W.R. (max)**	**Insertion Loss (max) dB**	**Isolation (min) dB**	**Impedance Ohms**
3 to 6		DC - 6	1.30	0.20	70	50
	DC - 26.5	6 - 12.4	1.40	0.40	60	
		12.4 - 18	1.50	0.50	60	
	DC - 40	18 - 26.5	1.70	0.70	55	
		26.5 - 40	2.20	1.10	50	

1.6/5.6 Connector						
Number of positions	**Frequency Range GHz**		**V.S.W.R. (max)**	**Insertion Loss (max) dB**	**Isolation (min) dB**	**Impedance Ohms**
3 to 6	DC - 2.5	DC - 1	1.30	0.20	80	75
		1 - 2.5	1.40	0.30	70	

QMA Connector						
Number of positions	**Frequency Range GHz**		**V.S.W.R. (max)**	**Insertion Loss (max) dB**	**Isolation (min) dB**	**Impedance Ohms**
3 to 6	DC - 6	DC - 3	1.20	0.20	80	50
		3 - 6	1.30	0.30	70	

See pages SPnT-19, SPnT-20, SPnT-21, SPnT-22 and SPnT-23 for typical RF performances

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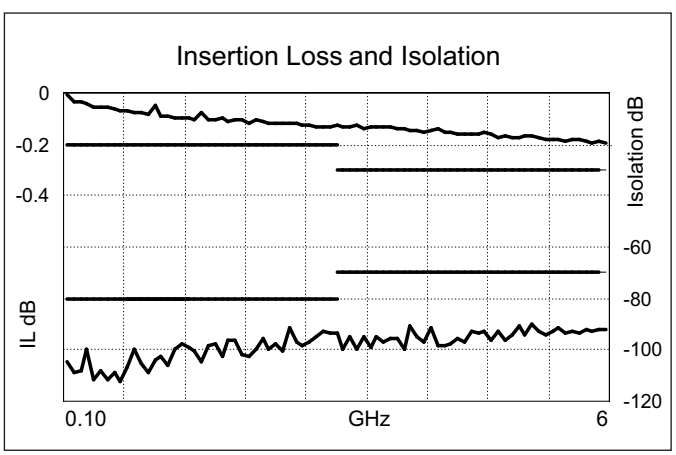
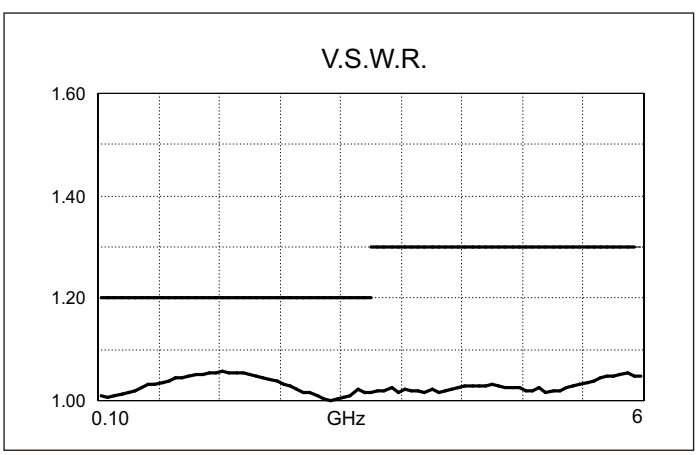
ADDITIONAL SPECIFICATIONS

Operating mode		**Normally open**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (±10%)	Ω	47.5	275	See page **SPnT-17**	
Nominal operating current at 23°C	mA	250	102		
Average power		See RF Power rating chart page Intro-13			
TTL input	High level	2.2 to 5.5 V (TTL option) / 3.5 to 5.5 (BCD option)			
	Low level	0 to 0.8 V (TTL option / 0 to 1.5 V (BCD option)			
Indicator rating		1 W / 30 V / 100 mA			
Switching time (max)	ms	15 ms For automatic reset models SP3T to SP6T : 40 ms SP7T to SP12T : 55 ms			
Life (min) **for**	connectors	SMA - QMA		SMA 2.9 – 1.6/5.6	
	non terminated SP3 to 6T (R573 serie)	5 million cycles		2 million cycles	
	terminated SP3 to 6T (R574 serie)	2 million cycles			
	SP7T to 12T (all models)				
Connectors		SMA – QMA - SMA 2.9 – 1.6/5.6			
Actuator terminals		Solder pins or male 25 pin D-Sub connector			
Operating temperature range	DIN 1.6/5.6	-25 to +70°C			
	SMA – QMA - SMA 2.9	-40 to +85°C			
Storage temperature range	DIN 1.6/5.6	-40 to +85°C			
	SMA – QMA - SMA 2.9	-55 to +85°C			
Vibration (MIL STD 202, method 204D, Cond. D)		10-2000 Hz, 20g operating for SP3 to 8T, survival for SP7 to 12T			
Shock (MIL STD 202, method 213B, Cond. C)		100g, 6 ms, ½ sine operating for SP3 to 8T, survival for SP7 to 12T			

R573 AND R574 TYPICAL RF PERFORMANCES

Example : Non terminated SP6T QMA up to 6 GHz





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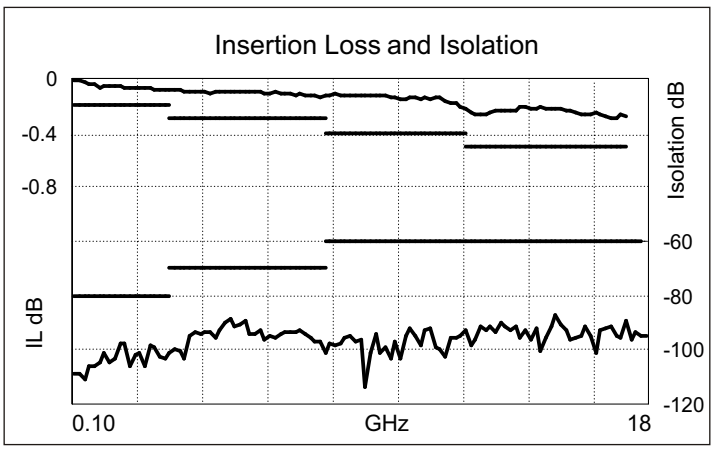
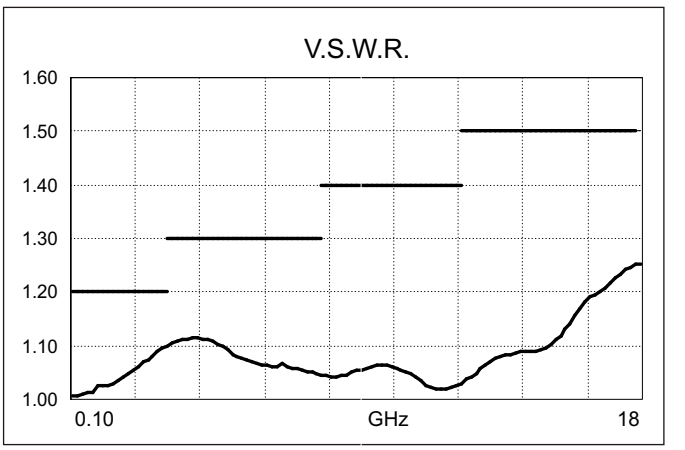
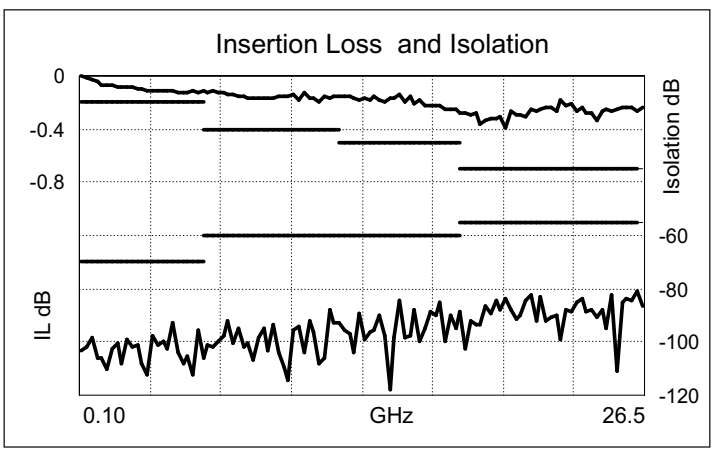
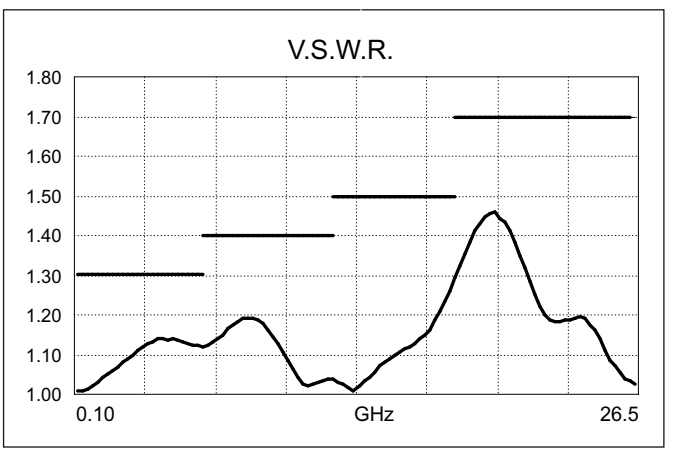
Example : Non terminated SP6T SMA up to 18 GHz



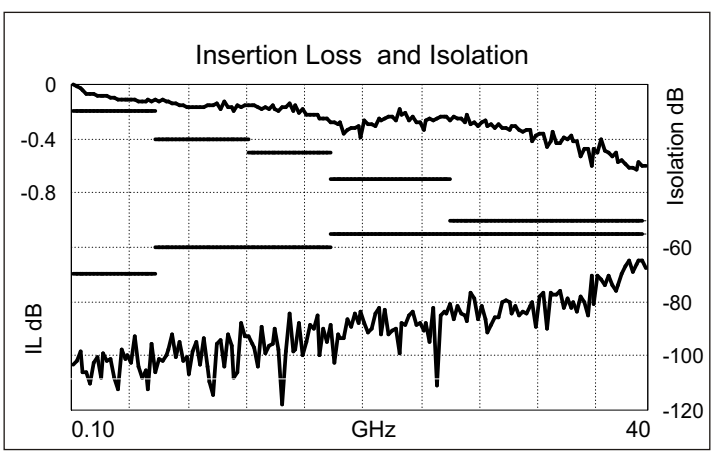


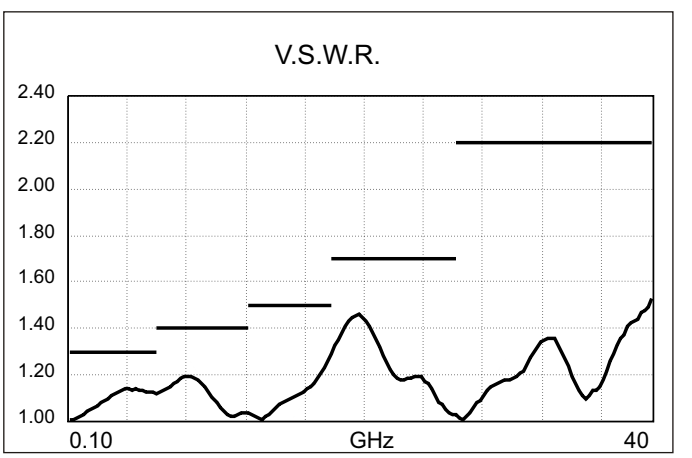
Example : Non terminated SP6T SMA 2.9 up to 26.5 GHz





Example : Non terminated SP6T SMA 2.9 up to 40 GHz





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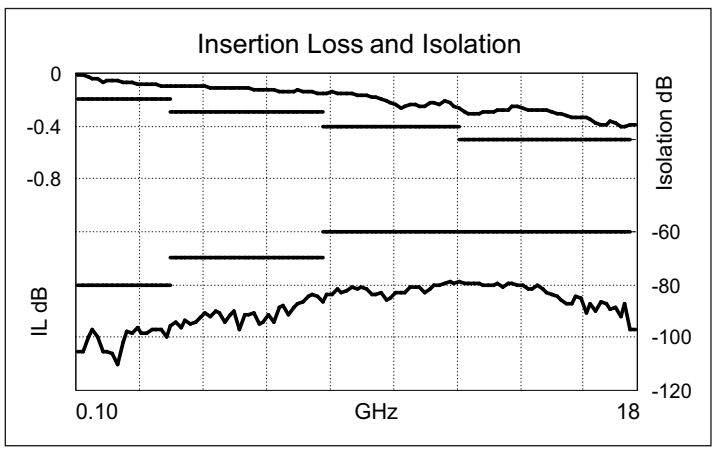
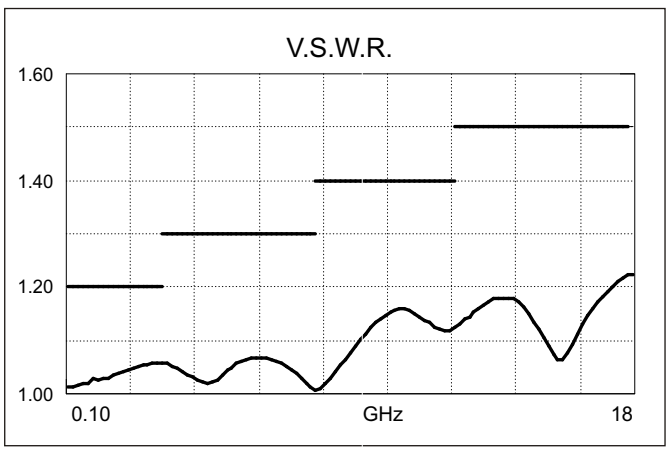
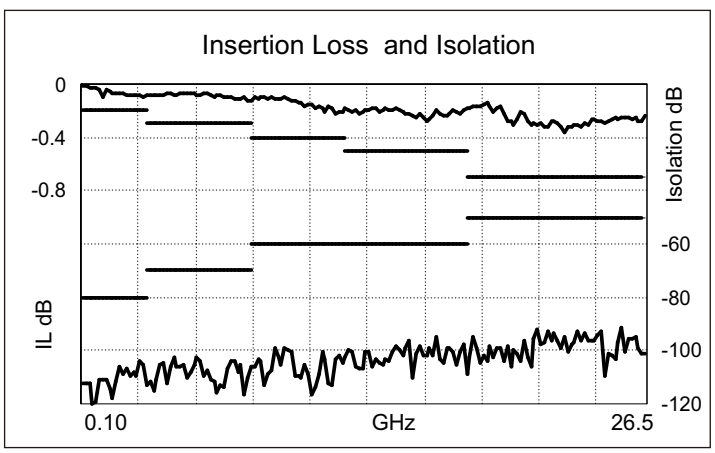
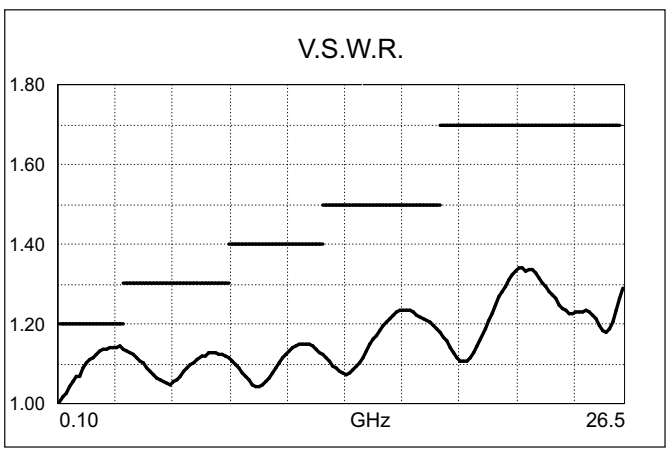
Example : Terminated SP6T SMA up to 18 GHz



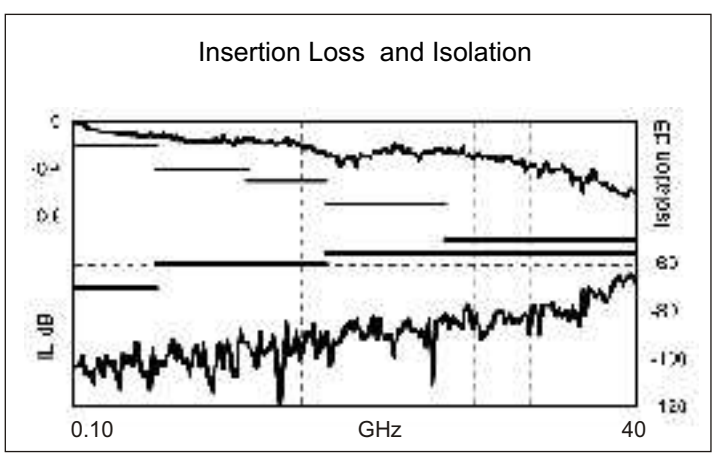


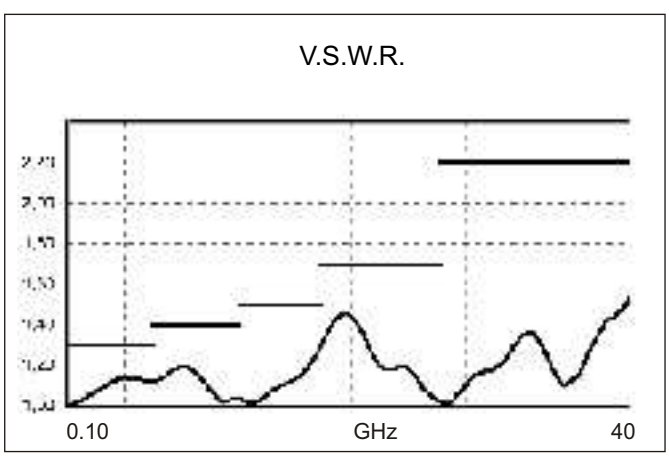
Example : Terminated SP6T SMA up to 26.5 GHz





Example : Terminated SP6T SMA 2.9 up to 40 GHz





SPnT

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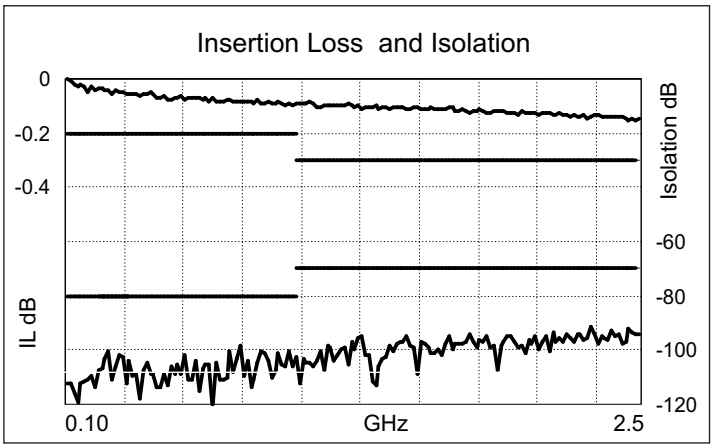
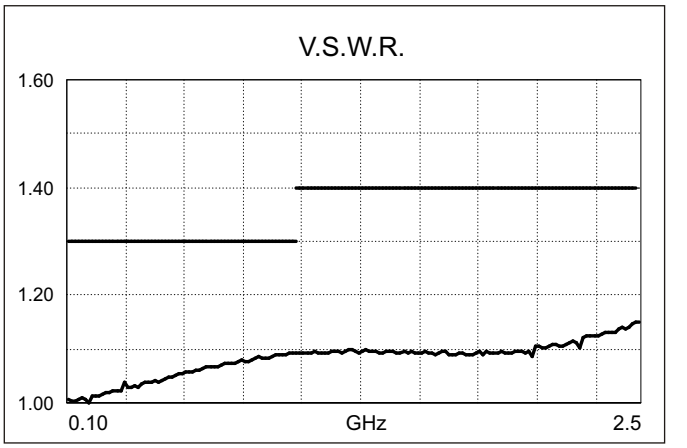
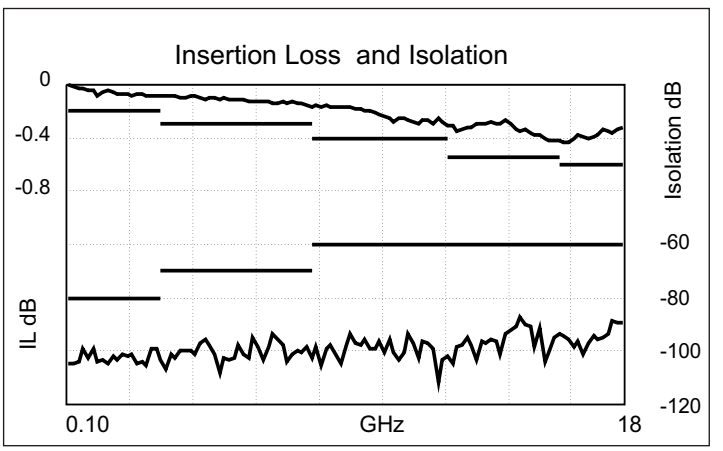
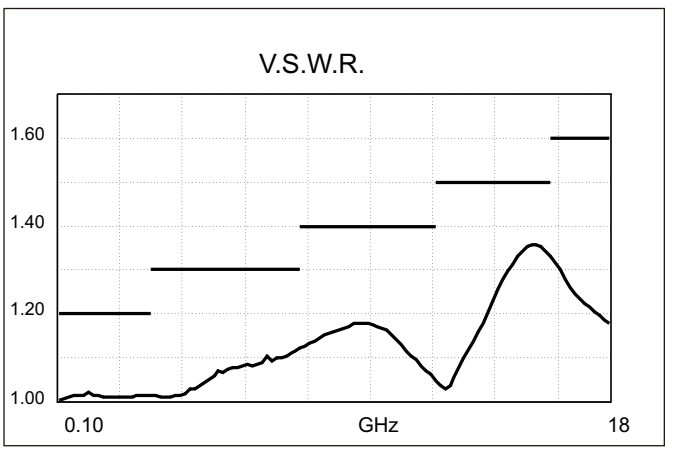
Example : Non terminated SP6T 1.6/5.6 up to 2.5 GHz



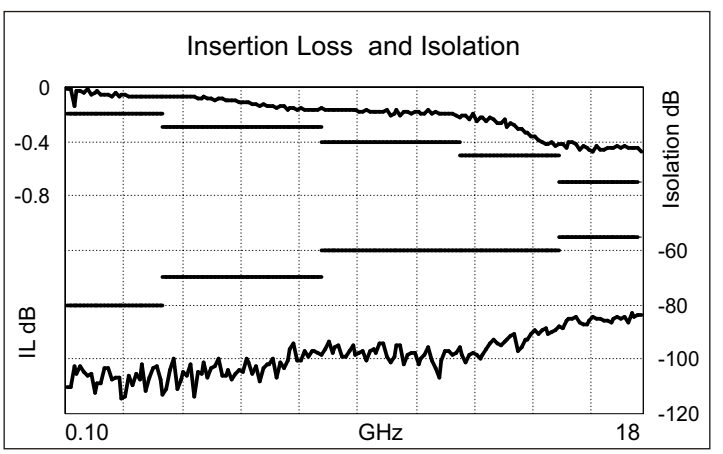


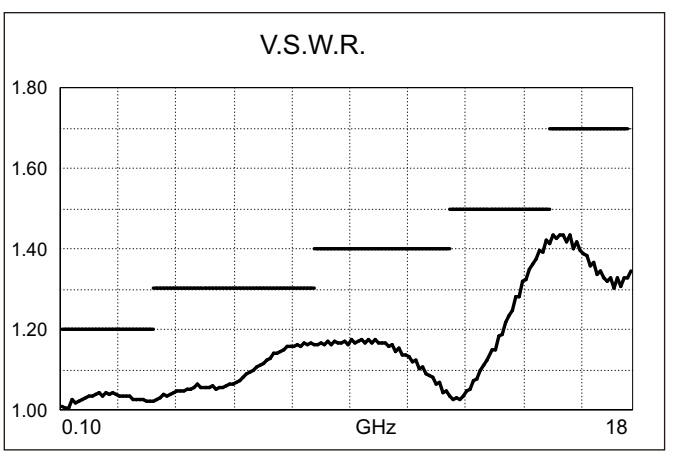
Example : SP8T SMA up to 18 GHz





Example : SP10T SMA up to 18 GHz





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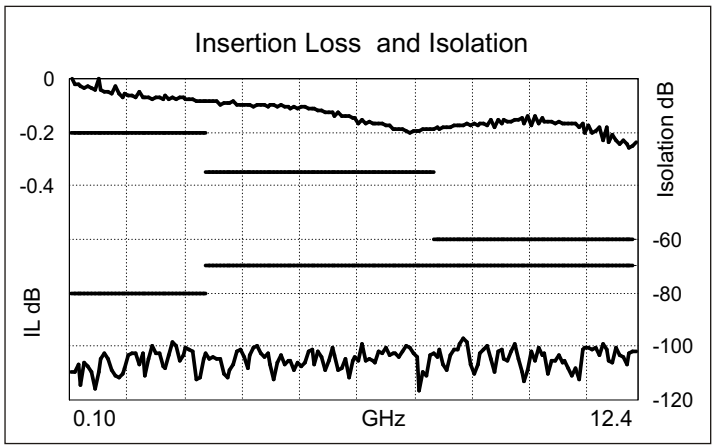
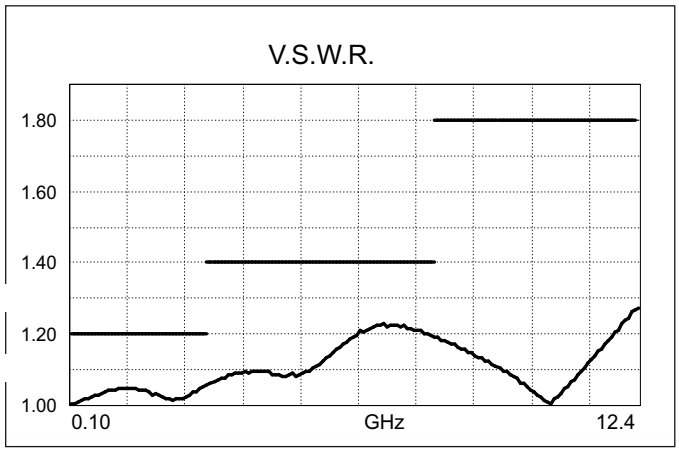
SPnT up to 40 GHz - RAMSES Concept
SMA - SMA 2.9 - QMA - DIN 1.6/5.6

Example : SP12T SMA up to 12.4 GHz

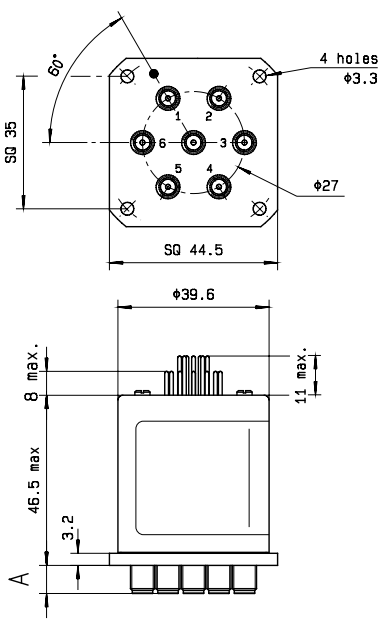




TYPICAL OUTLINE DRAWINGS

NON TERMINATED 3 to 6 positions

Connectors	*A max (mm)*
SMA up to 26.5 GHz	**7.4**
SMA 2.9 up to 40 GHz	**6.3**
QMA up to 6 GHz	**10.8**
DIN 1.6/5.6 up to 2.5 GHz	**11.5**



Solder	Type 0 or 1 with option 0 - 1- 3 or 4
Pins	Type 2 or 3 with option 0 or 1

SPnT

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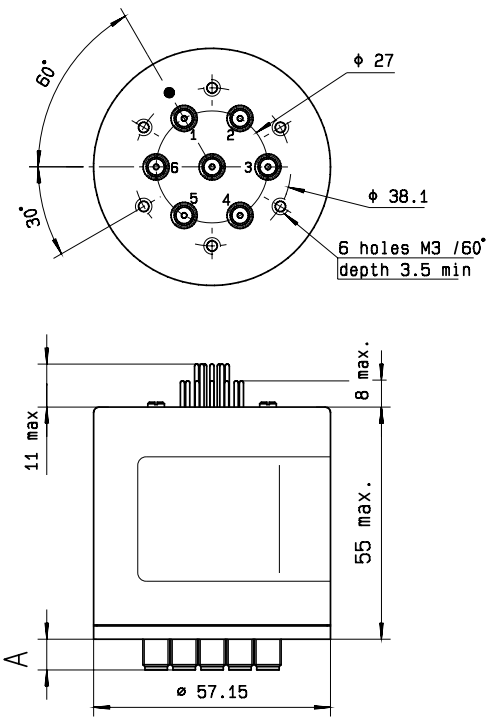
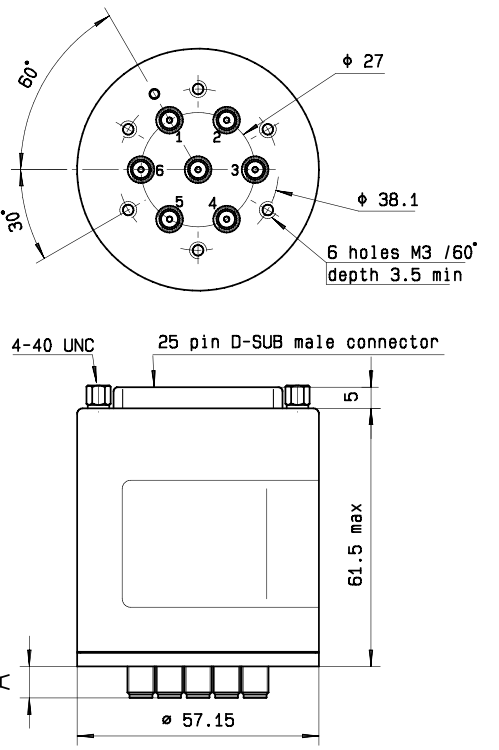
TYPICAL OUTLINE DRAWINGS

NON TERMINATED 3 to 6 positions (Cont)



Solder Pins	**Type 0 or 1 with option 2 or 8**
	Type 2 or 3 with option 2 - 3 - 4 or 8
	Type 4 - 5 - 8 or 9 with option 0 - 2 or 8



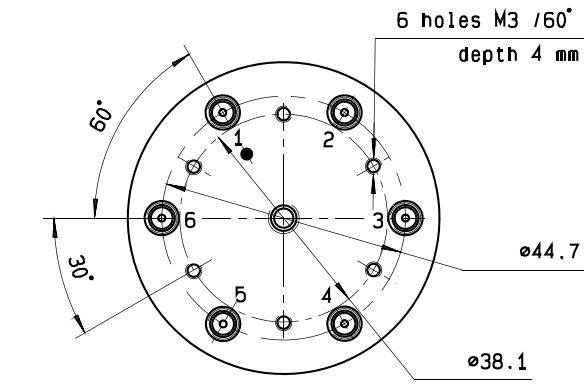
D-Sub connector	**All models**

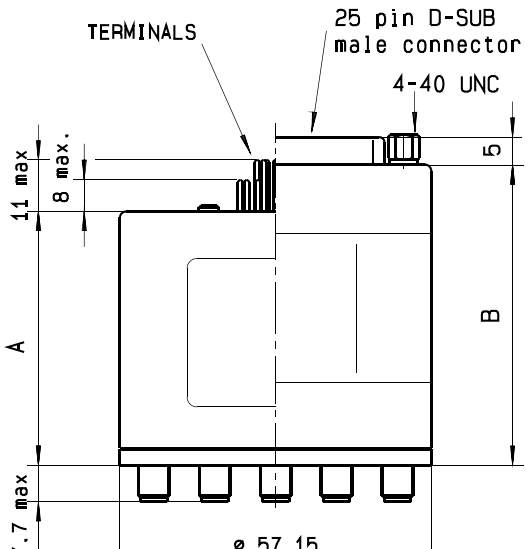
Connectors	*A max (mm)*
SMA up to 26.5 GHz	**7.4**
SMA 2.9 up to 40 GHz	**6.3**
QMA up to 6 GHz	**10.8**
DIN 1.6/5.6 up to 2.5 GHz	**11.5**

SPnT

TYPICAL OUTLINE DRAWINGS

TERMINATED 3 to 6 positions





	A	B
	Solder Pins	D-Sub connector
Type 0 - 1 - 2 or 3 with option 0 - 1 - 3 or 4	**46.5**	**61.5**
Type 0 - 1 - 2 or 3 with option 2 or 8	**55.5**	**61.5**
Type 4 - 5 - 8 or 9 with option 0 - 1 - 2 or 8	**55.5**	**61.5**

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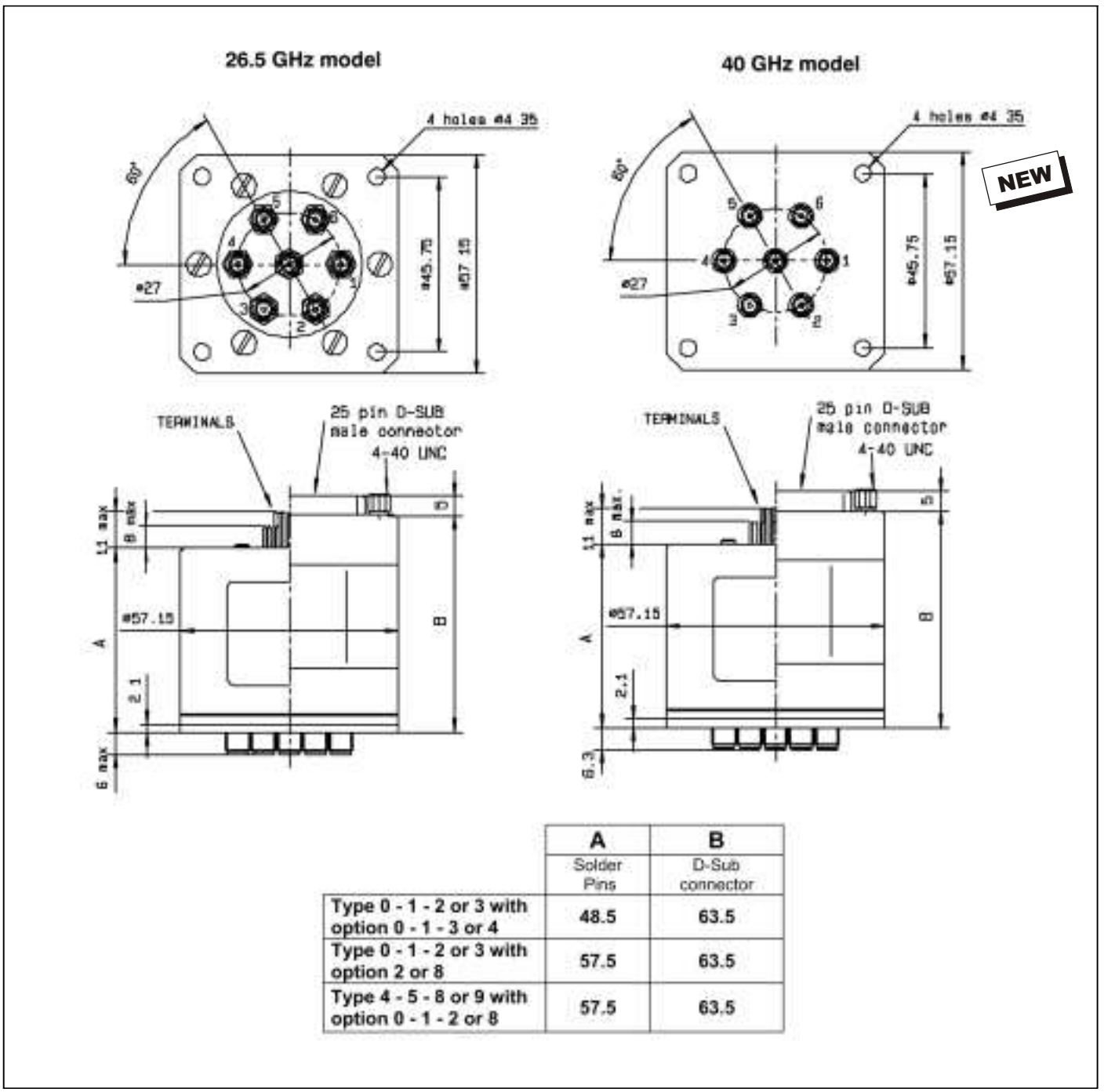
TYPICAL OUTLINE DRAWINGS

TERMINATED 3 to 6 positions



	A	B
	Solder Pins	D-Sub connector
Type 0 - 1 - 2 or 3 with option 0 - 1 - 3 or 4	48.5	63.5
Type 0 - 1 - 2 or 3 with option 2 or 8	57.5	63.5
Type 4 - 5 - 8 or 9 with option 0 - 1 - 2 or 8	57.5	63.5

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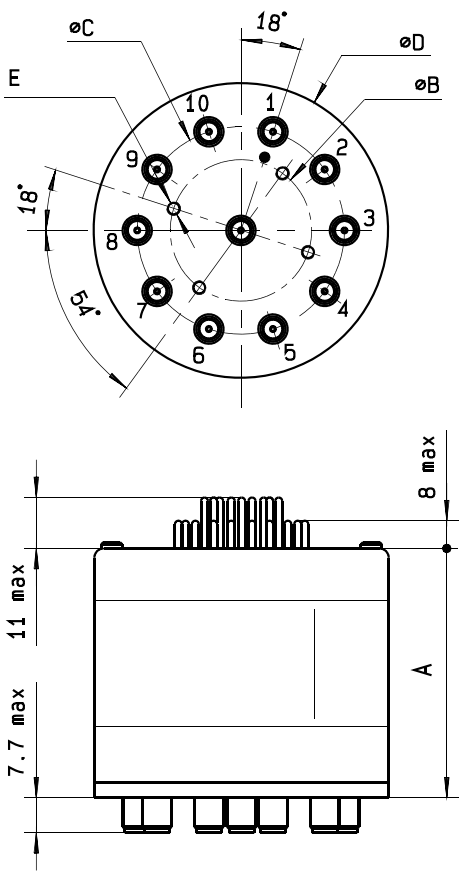
TYPICAL OUTLINE DRAWINGS

TERMINATED or NOT, 7 to 12 positions

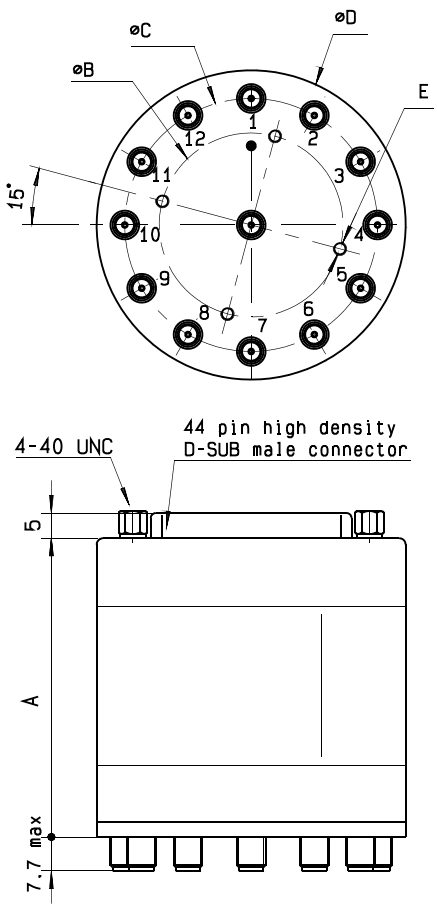
Type	A maxi (mm)	
	Solder Pins	D-Sub connector
Type 0 - 1 - 2 or 3 with option 0 - 1 - 3 or 4	**50**	**66**
Type 0 - 1 - 2 or 3 with option 2 or 8 and Type 4 - 5 - 8 or 9 with option 0 - 1 - 2 or 8	**61**	**66**

Number of positions	**B** diameter	**C** diameter	**D** diameter	**E**
7 - 8	**49.8**	**44.7**	**57.15**	**4 holes M3**
9 - 10	**30.5**	**44.7**	**63.5**	
11 - 12	**40.6**	**55.9**	**68.3**	**depth 4mm**

10 position model
Terminated, up to 18 GHz with solder pins



12 position model
Terminated, up to 12.4 GHz with D-Sub



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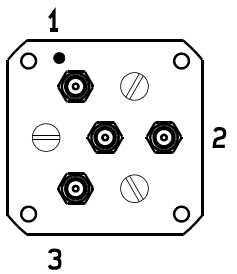
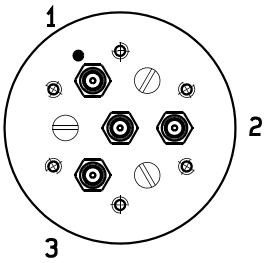
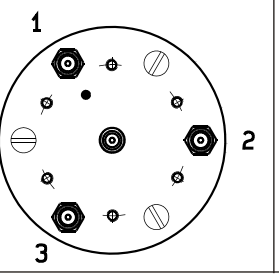
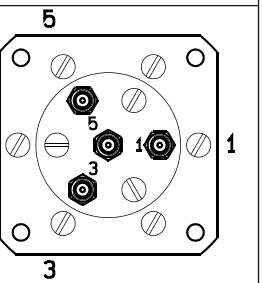
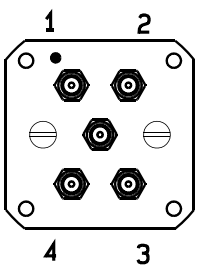
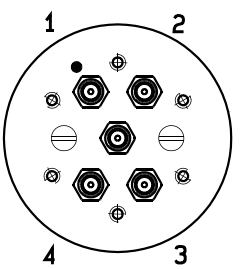
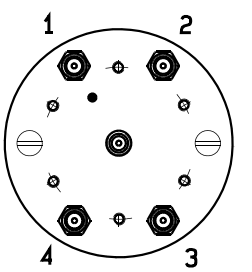
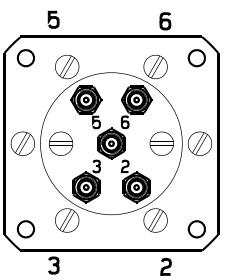
RF Connectors allocation for SPnT serie :

Connectors "A" : 1.6/5.6, QMA, SMA, SMA2.9
Other Connectors : N, BNC, TNC

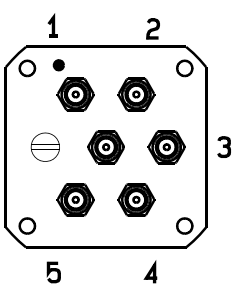
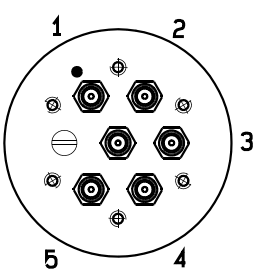
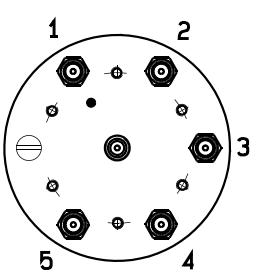
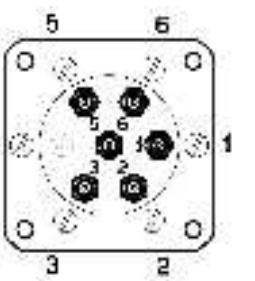
SPnT 3 ways

NON TERMINATED Version		TERMINATED Version	
Up to 18 GHz models Up to 40 GHz models Connectors "A"	Up to 18 GHz models All Connectors	Up to 18 GHz models All Connectors	26.5 GHz and 40 GHz models with SMA - SMA 2.9
			

SPnT 4 ways

NON TERMINATED Version		TERMINATED Version	
Up to 18 GHz models Up to 40 GHz models Connectors "A"	Up to 18 GHz models All Connectors	Up to 18 GHz models All Connectors	26.5 GHz and 40 GHz models with SMA - SMA 2.9
			

SPnT 5 ways

NON TERMINATED Version		TERMINATED Version	
Up to 18 GHz models Up to 40 GHz models Connectors "A"	Up to 18 GHz models All Connectors	Up to 18 GHz models All Connectors	26.5 GHz and 40 GHz models with SMA - SMA 2.9
			

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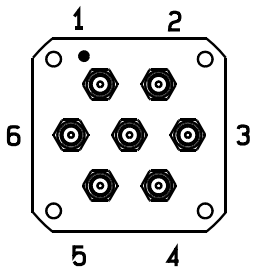
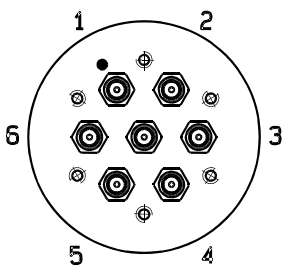
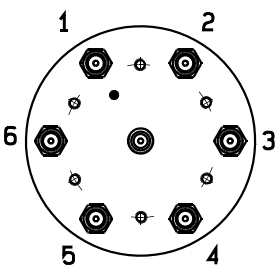
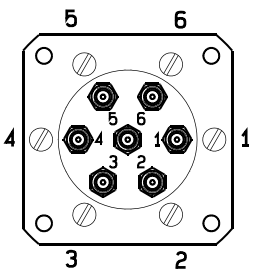
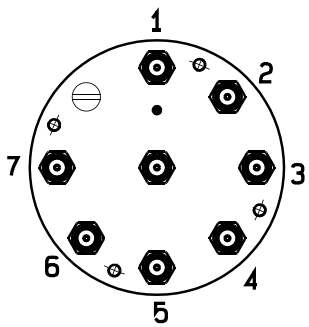
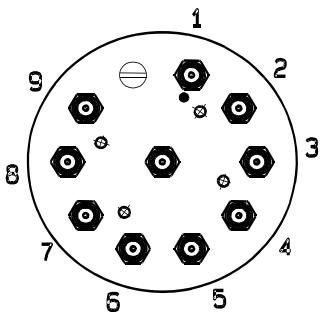
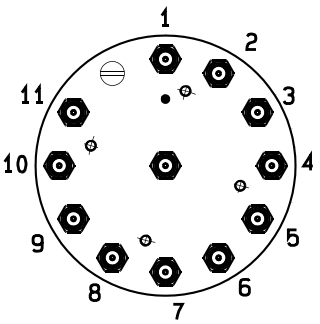
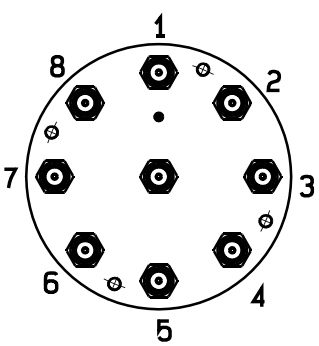
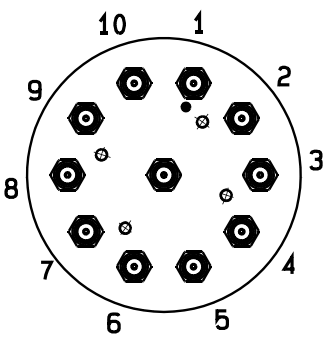
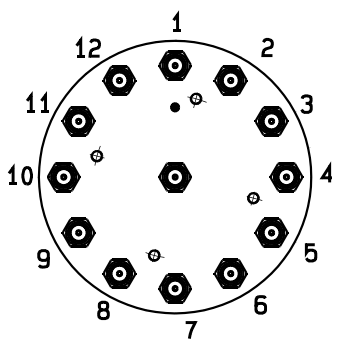
RF Connectors allocation (continued) :

SPnT 6 ways			
NON TERMINATED Version		TERMINATED Version	
Up to 18 GHz models Up to 40 GHz models Connectors "A"	Up to 18 GHz models All Connectors	Up to 18 GHz models All Connectors	26.5 GHz and 40 GHz models with SMA - SMA 2.9
			

SPnT 7 and 8 ways	SPnT 9 and 10 ways	SPnT 11 and 12 ways
All connectors	All connectors	All connectors
		
		

ACCESSORIES

A printed circuit board interface connector has been designed for easy mounting on terminals :
It must be ordered separately. See on page **SPnT-35**.

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

PART NUMBER SELECTION

R 5 7 . . . . . .

Model :
- **3** : Without 50 Ω termination
- **4** : With 50 Ω termination

RF Connectors :
- **0** : N up to 3 GHz
- **1** : N up to 12.4 GHz
- **2** : BNC up to 3 GHz (4)(5)
- **5** : TNC up to 3 GHz (4)(5)
- **6** : TNC up to 12.4 GHz (4)(5)

Type :
- **0** : Normally open
- **1** : Normally open + I.C.
- **2** : Latching
- **3** : Latching + I.C.
- **4** : Latching + S.C.O. (1)(4)
- **5** : Latching + S.C.O.+ I.C. (1)(4)
- **8** : Latching + S.C.O.+ A.R. (1)
- **9** : Latching + S.C.O.+ I.C. + A.R. (1)

Actuator Voltage :
- **2** : 12 Vdc
- **3** : 28 Vdc

Actuator Terminals :
- **0** : Solder pins
- **5** : D-Sub connector

Options :
- **0** : Without option
- **1** : Positive common (2)(6)
- **2** : Compatible TTL driver (high level)(1)(8)
- **3** : With suppression diodes
- **4** : With suppression diodes and positive common (2)(6)
- **8** : BCD driver TTL compatible (high level)(1)(3)(7)(8)

Number of Positions :
- **3** : 3 Positions
- **4** : 4 Positions
- **5** : 5 Positions
- **6** : 6 Positions
- **7** : 7 Positions
- **8** : 8 Positions
- **9** : 9 Positions
- **0** : 10 Positions
- **1** : 11 Positions

I.C. : Indicator contact / S.C.O. : Self Cut-Off / A.R. : Auto Reset.
(1) : These models are already equiped with suppression diodes.
(2) : Standard products are equiped with negative common.
(3) : Latching BCD driver enables also a global reset through driver code 0000 (see BCD logic coding page Intr-11).
(4) : Available only up to 6 positions.
(5) : Model "3" only.
(6) : Option not available for type 4,5,8 & 9.
(7) : Option available only with type 0,1,8 & 9.
(8) : Polarity is not relevant to application for switches with TTL driver.

SPnT

ADDITIONAL INFORMATION

Type 2, 3, 4 & 5 :
- Latching models have a RESET pin which commands the reset of all positions. This command should be used before switching from one position to another. If not, two positions will be set at the same time.

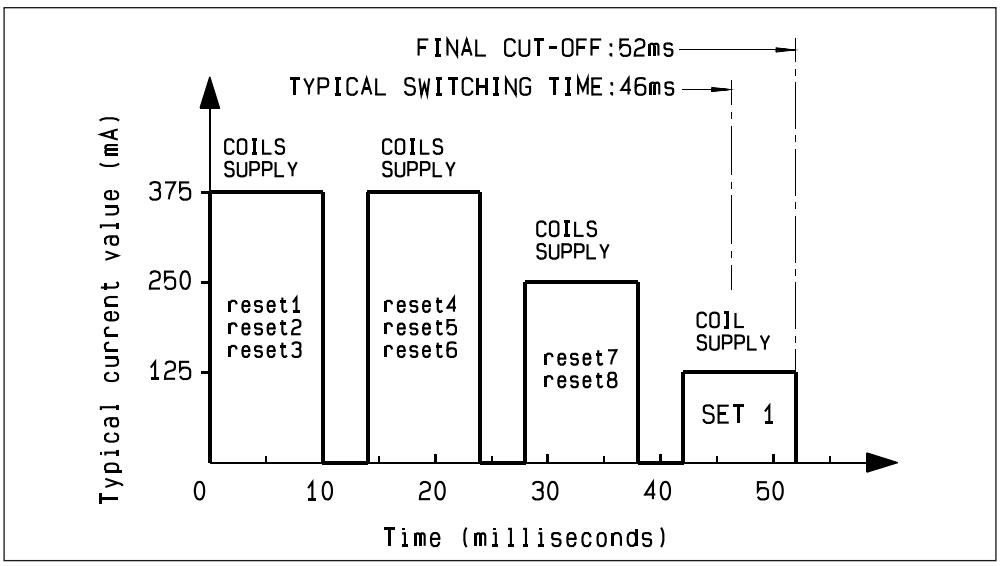
Note : During the RESET operation the current is : Nominal operating current x number of positions.

Type 8, 9 :
- Latching models with AUTOMATIC RESET are available; these products have an internal SET/RESET circuit which automatically resets all the non-selected positions and sets the desired position. This option simplifies the use of latching switches by suppressing the RESET command in switching sequence.

An electronic circuit supplies successively groups of 2 or 3 actuators, in order to limit the maximum current.
The current with this option is the total current of 2 or 3 reset coils at the same time (see table and switching sequence on following page).
Example : During the AUTOMATIC RESET operation, at 28V, 4 position switch has temporarily a consumption of only 250 mA, during 40 ms maximum.

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

SWITCHING SEQUENCE



Operating total current at 23 °C (mA) SPnT LATCHING				
Number of positions	12 Volts		28 Volts	
	Manual Reset	Automatic Reset	Manual Reset	Automatic Reset
3 to 4	**320 x n**	640	**125 x n**	250
5 to 8	**320 x n**	960	**125 x n**	375
9 to 12	**320 x n**	1280	**125 x n**	500

n = number of positions

AVAILABILITY OF OPTIONS ACCORDING TO BOTH TYPE AND NUMBER OF POSITIONS

Type	Number of positions	Available Options
0 or 1	**3 to 12**	0 - 1 - 2 - 3 - 4 - 8
2 or 3	**3 to 6**	0 - 1 - 2 - 3 - 4
	7 to 12	0 - 1 - 3 - 4
4 or 5	**3 to 6**	0 - 2
	7 to 12	Not available
8 or 9	**3 to 12**	0 - 2 - 8

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SPnT up to 12.4 GHz - RAMSES Concept
N - BNC - TNC

RF PERFORMANCES

N - BNC - TNC - Connector						
Number of positions	**Frequency Range GHz**		**V.S.W.R.** (max)	**Insertion Loss** (max) dB	**Isolation** (min) dB	**Impedance** Ohms
	DC - 3 DC - 12.4	DC - 3	1.20	0.20	80	50
3 to 6		3 - 8	1.35	0.35	70	
		8 - 12.4	1.50	0.50	60	
7 to 10	DC - 3 DC - 8	DC - 3	1.30	0.30	80	50
		3 - 8	1.50	0.50	70	
11 to 12	DC - 3 DC - 8	DC - 3	1.35	0.30	70	50
		3 - 8	1.70	0.50	60	

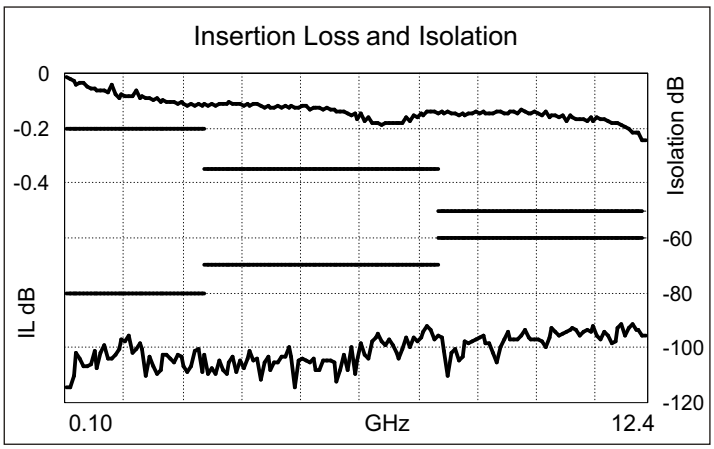
See page SPnT - 33 for typical RF performances

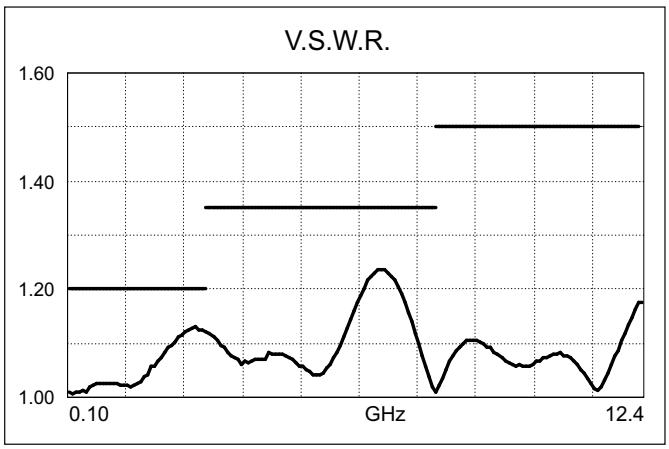
ADDITIONAL SPECIFICATIONS

Operating mode		**Normally open**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 / 13)	**28** (24 / 30)	**12** (10.2 / 13)	**28** (24 / 30)
Coil resistance (+/-10%)	Ω	47.5	275	See page **SPnT-31**	
Nominal operating current at 23°C	mA	250	102		
Average power		See Power Rating Chart page **Intro-14**			
TTL input	High Level	2.2 to 5.5 V (TTL Option) / 3.5 to 5.5 V (BCD Option)			
	Low Level	0 to 0.8 V (TTL Option) / 0 to 1.5 V (BCD Option)			
Indicator rating		1 Watt / 30 Volts / 100 mA			
Switching time (max)	ms	15 ms For automatic reset models : SP3T to SP6T => 40 ms SP7T to SP12T => 50 ms			
Life (min)	Not terminated SP3 to 6T (R573 serie)	2 million cycles			
	terminated SP3 to 6T (R574 serie)				
	SP7 to 12T (all models)				
Connectors		N - TNC - BNC			
Actuator terminals		Solder pins or male 25 pin D-Sub connector			
Operating temperature range	°C	-40 to +85			
Storage temperature range	°C	-55 to +85			
Vibration (MIL STD 202 , method 204D , cond.C)		10-2000 Hz , 10g operating			
Shock (MIL STD 202 , method 213B , cond.C)		50g / 1 ms , ½ sine operating			

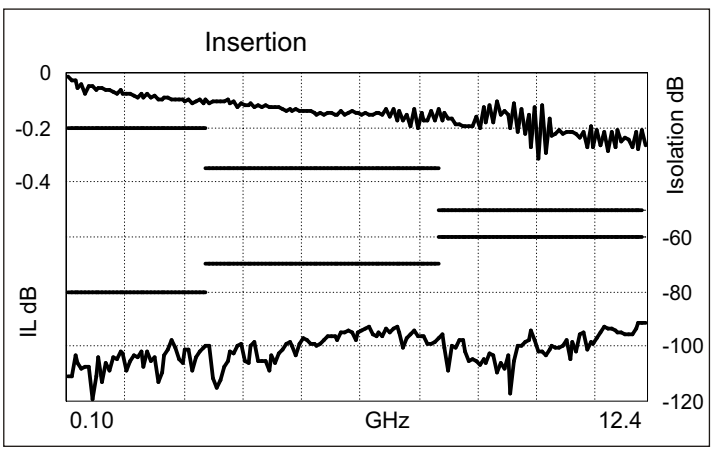
R573 AND R574 TYPICAL RF PERFORMANCES

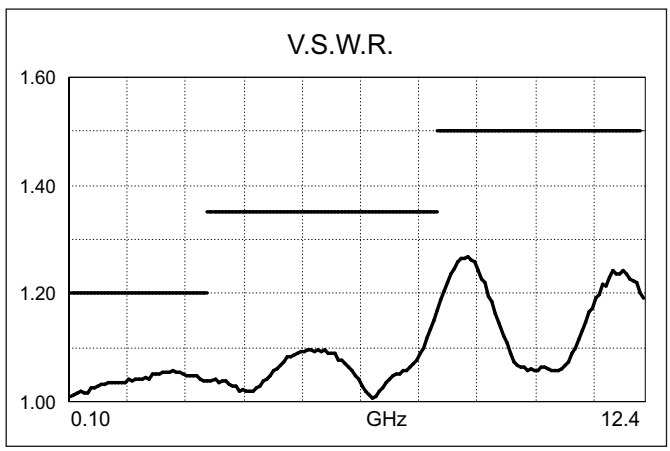
Example : SP6T N up to 12.4 GHz



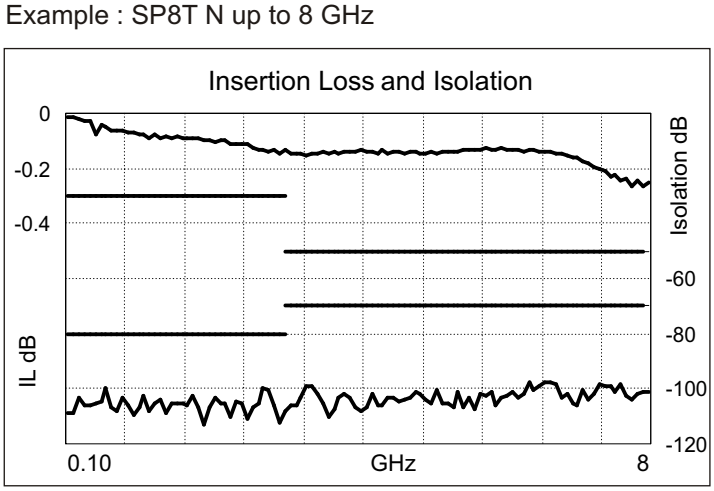


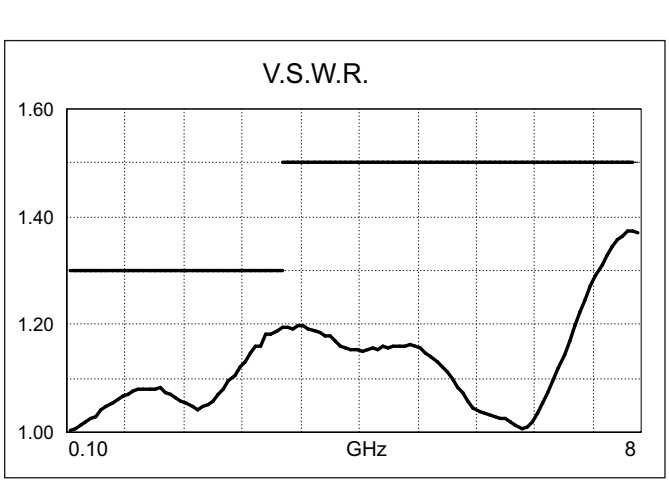
Example : SP6T TNC to 12.4 GHz





Example : SP8T N up to 8 GHz





Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

TYPICAL OUTLINE DRAWINGS

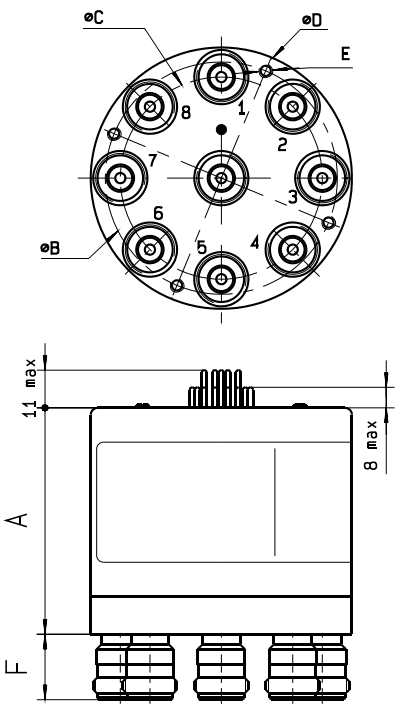
TERMINATED or NOT, 3 to 12 positions

Connectors	*F max*
N	**17.7**
BNC	**11.3**
TNC	**11.3**

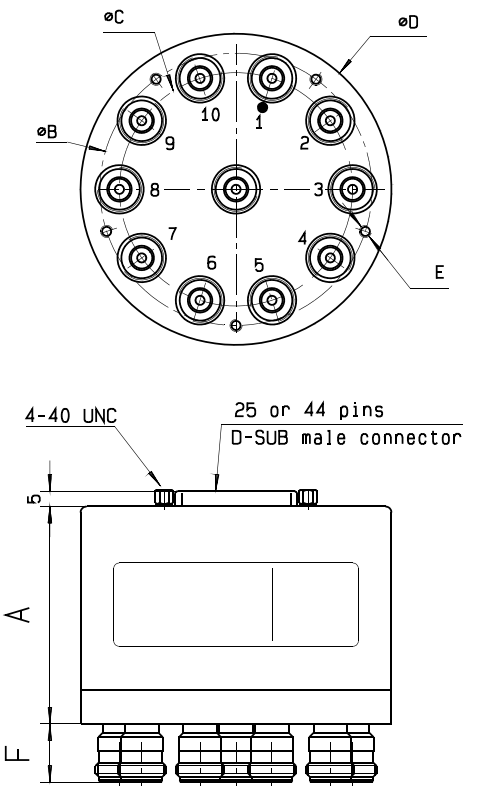
	A maxi	
Type	Solder Pins	D-Sub connector
Type 0 - 1 - 2 or 3 with option 0 - 1 - 3 or 4	**56**	**66**
Type 0 - 1 - 2 or 3 with option 2 or 8 and Type 4 - 5 - 8 or 9 with option 0 - 1 - 2 or 8	**71**	**71**

Nbre de positions	**B** diameter	**C** diameter	**D** diameter	**E**
3 - 6	**54**	**44.7**	**63.5**	**6 holes M4/60°**
7 - 8	**67.7**	**58.9**	**76.2**	**4 holes M4/90°**
9 - 10	**88.9**	**76.2**	**101.6**	**5 holes M4/72°**
11 - 12	**67.7**	**101.6**	**127**	**6 holes M4/60°**

Model 8 positions up to 12.4 GHz
With solder pins



Model 10 positions up to 8 GHz
D-Sub male connector



RF CONNECTORS ALLOCATION

See on page **SPnT-28** and **SPnT-29**

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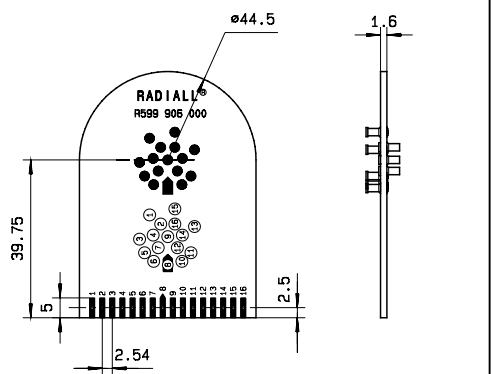
PRINTED CIRCUIT BOARD INTERFACE CONNECTOR

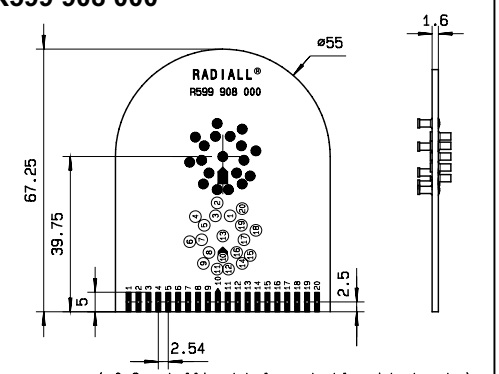
A printed circuit board interface connector has been designed for easy mounting on terminals :
It must be ordered separately.

For SPnT model R573 and R574 series : Radiall part number : **R599 906 000 for 3 to 6 positions**
R599 908 000 for 7 to 8 positions
R599 900 000 for 9 to 10 positions
R599 902 000 for 11 to 12 positions

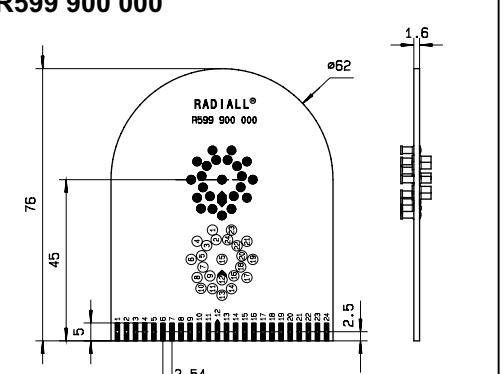
R599 906 000



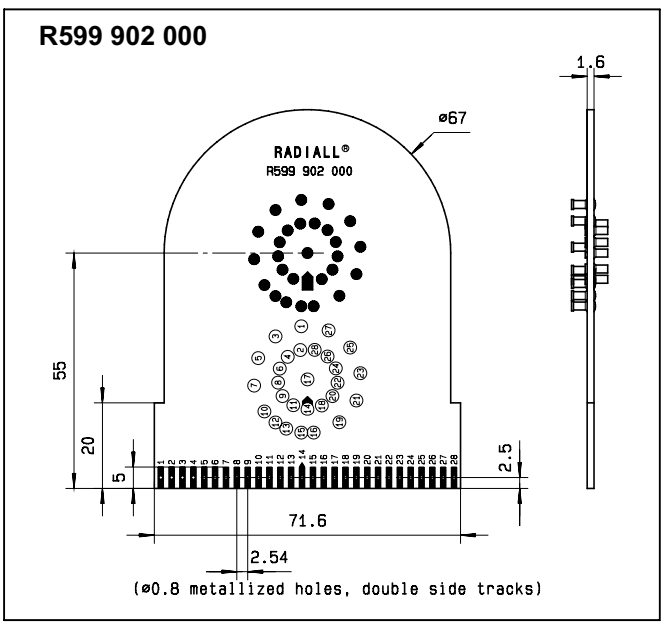
R599 908 000

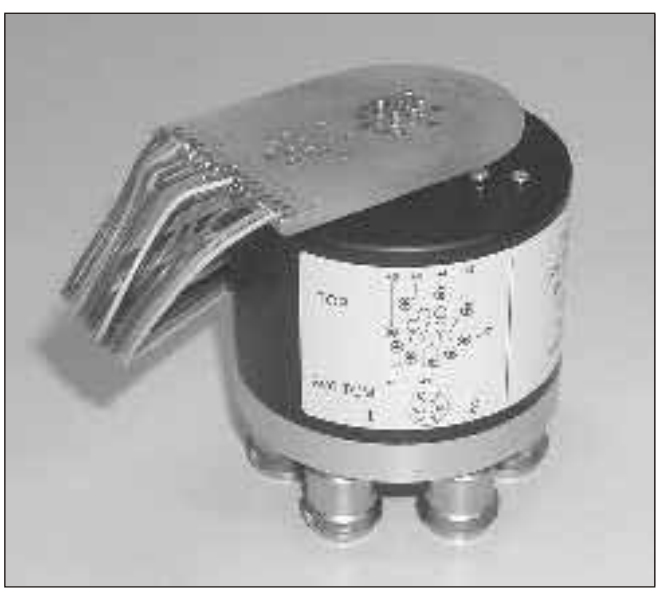


R599 900 000



R599 902 000





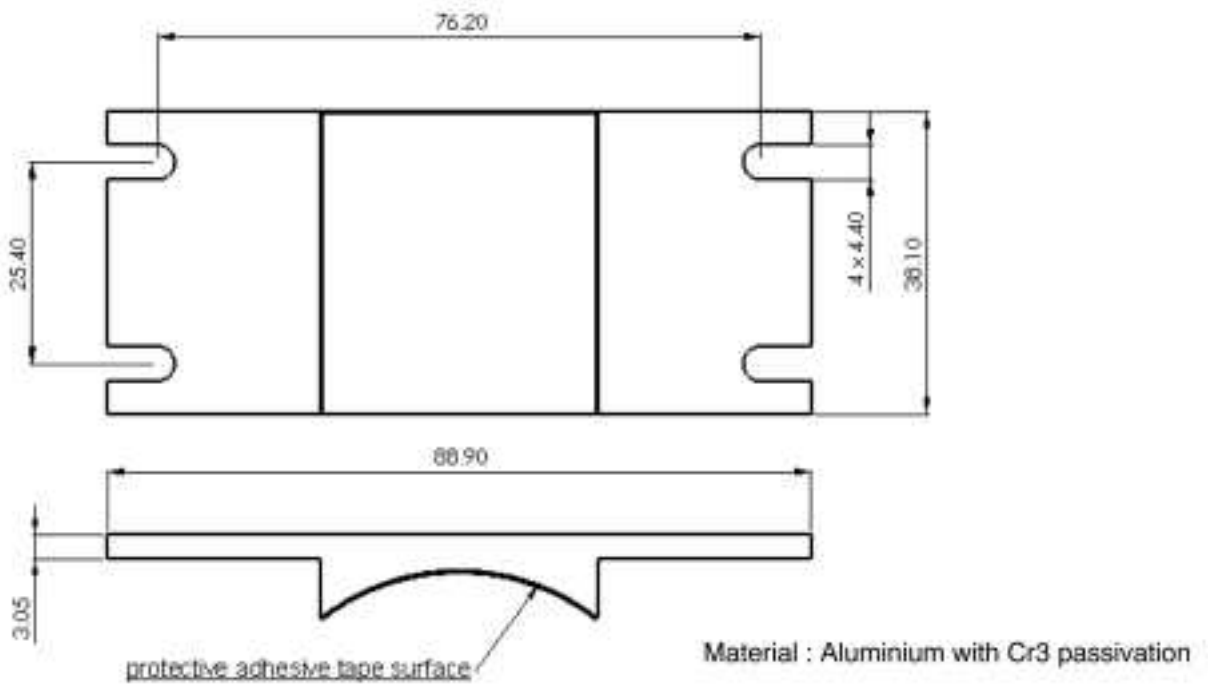
Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

MOUNTING BRACKET

A range a bracket has been designed for easy machanical mounting of our multithrows switches in your equipment. These brackets must be ordered separately and assembled by yourself according to our recommended process on the next following page.

NEW

TYPICAL OUTLINE DRAWINGS



SPnT

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

For models with connectors SMA, QMA, SMA 2.9

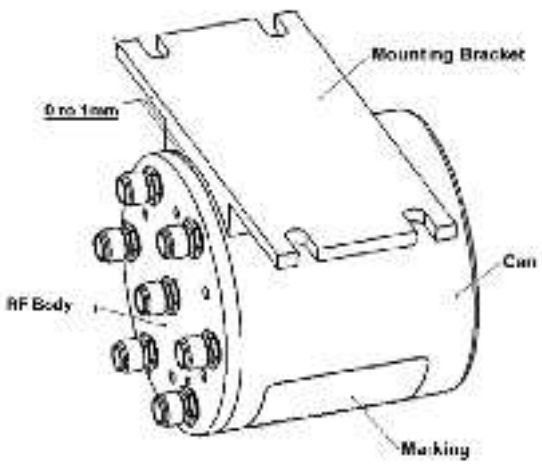
Number of positions	Type	Options	Model	Part Number
3 to 6 positions	All	2 & 8	R573 series	**R599 920 000**
	4,5,8 & 9	All		
	All	All	R574 series	
7 & 8 positions	All		R573 series	**R599 920 000**
			R574 series	
9 & 10 positions	All	All	R573 series	**R599 921 000**
			R574 series	
11 & 12 positions	All	All	R573 series	**R599 922 000**
			R574 series	

For models with connectors N, TNC, BNC

Number of positions	Type	Options	Model	Part Number
3 to 6 positions	All	All	R573 series	**R599 921 000**
			R574 series	
7 to 12 positions	All	All	R573 series	Not Available
			R574 series	

ADHESIVE BONDING PROCESS

1) Clean the can with alcohol (Isopropanol or Ethanol)
2) Remove the protective adhesive tape surface
3) Glue the mounting bracket only on the blue can and not on the RF body. Do not glue mounting bracket on the marking (see drawing)
4) Firmly press the mounting bracket against the can, and maintain pressure for several second (10 seconds min), then, unit is now properly bonded (see note 1 & 2)
5) Product can be assembled in your equipment with four screws (non included)



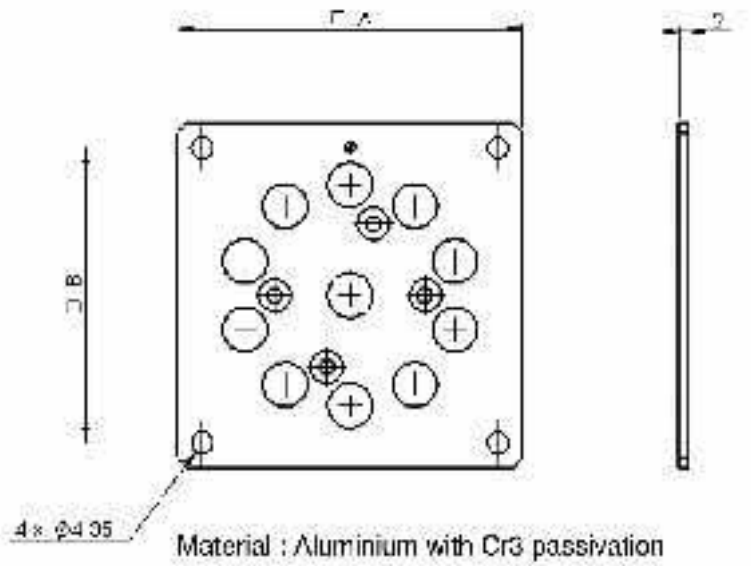
SPnT

MOUNTING SQUARE FLANGES

A range a square flange has been designed for easy machanical mounting of our multithrows switches in your equipment, especially on front panel. These supports must be ordered separately (like mounting brackets) and assembled by yourself according to our recommended process on the next following page.

NEW

TYPICAL OUTLINE DRAWINGS



RADIALL Part Number	A (mm)	B (mm)
R599 310 000	63.45	53.45
R599 311 000	63.45	53.45
R599 312 000	63.45	53.45
R599 313 000	69.8	59.8
R599 314 000	74.6	64.6

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

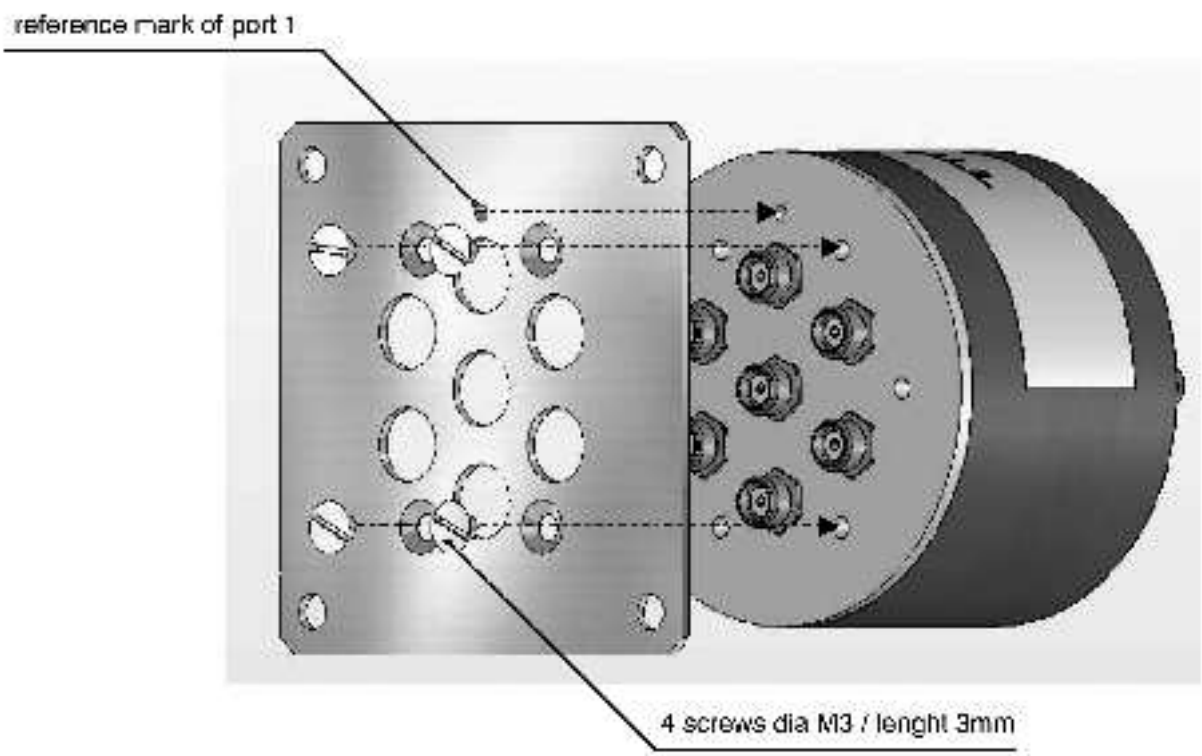
For models with connectors SMA, QMA, SMA 2.9

Number of positions	Type	Options	Model	Part Number
3 to 6 positions	All	All	R573 series	**R599310000**
			R574 series	**R599311000**
7 & 8 positions	All	All	R573 series	**R599312000**
			R574 series	
9 & 10 positions	All	All	R573 series	**R599313000**
			R574 series	
11 & 12 positions	All	All	R573 series	**R599314000**
			R574 series	

For models with connectors 1.6/5.6, N, TNC, BNC : available upon request

MOUNTING PROCESS

1) Assemble the square flange on the RF body of the switch as the following drawing below.
CAUTION : don't forget to positione correctly the reference mark of port 1
2) Screw the four screws (delivered with the square flange)



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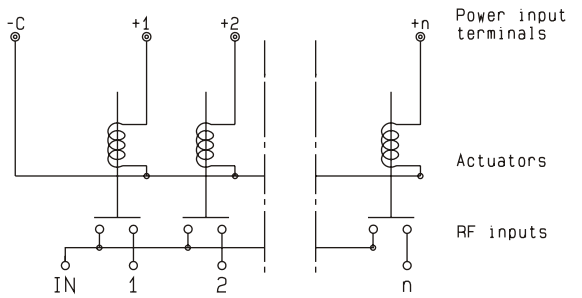
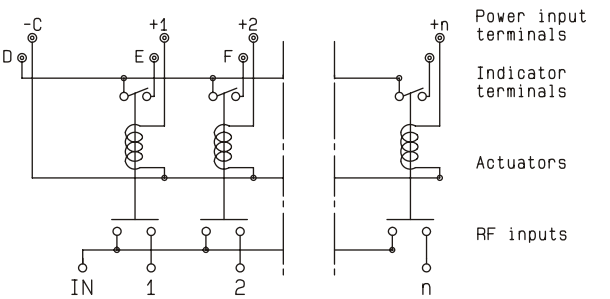
COAXIAL ELECTRICAL SCHEMATICS
R573 & R574 series

NORMALLY OPEN

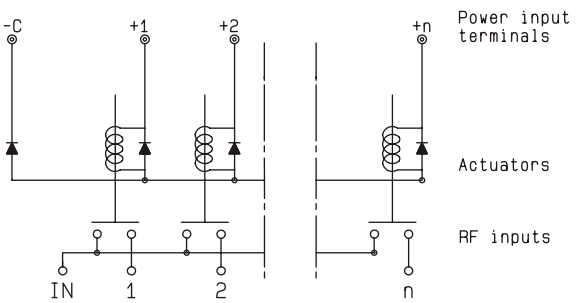
WITHOUT OPTION
R573 -0- -0- / R574 -0- -0-



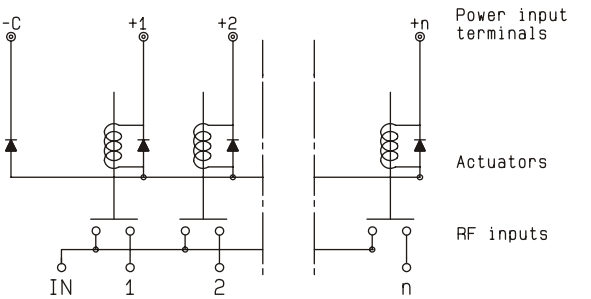
WITH INDICATOR CONTACT
R573 -1- -0-/ R574 -1- -0-



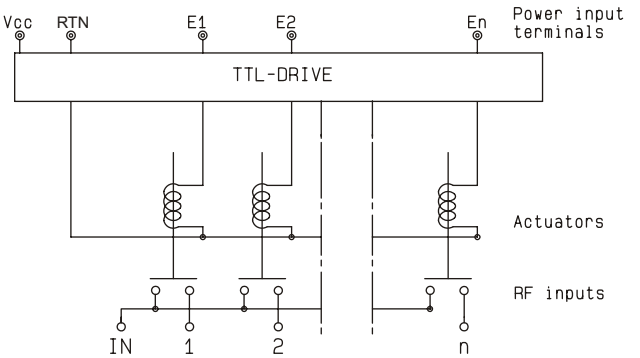
WITH SUPPRESSION DIODES
R573 -0- -3- / R574 -0- -3-



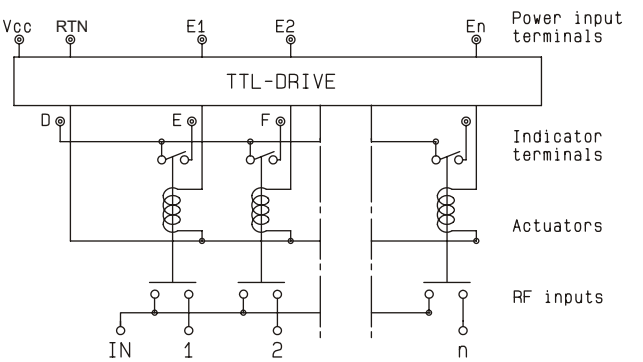
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R573 -1- -3- / R574 -1- -3-



WITH TTL DRIVER
(suppression diodes are included)
R573 -0- -2- / R574 -0- -2-



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R573 -1- -2- / R574 -1- -2-



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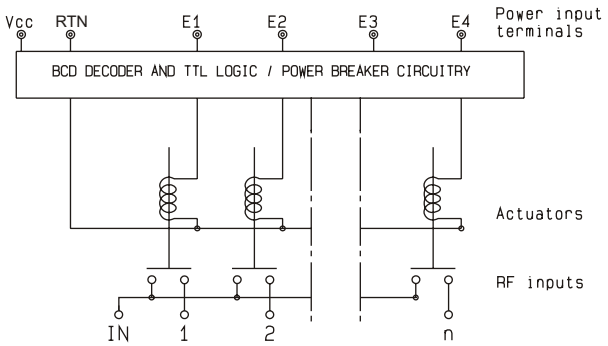
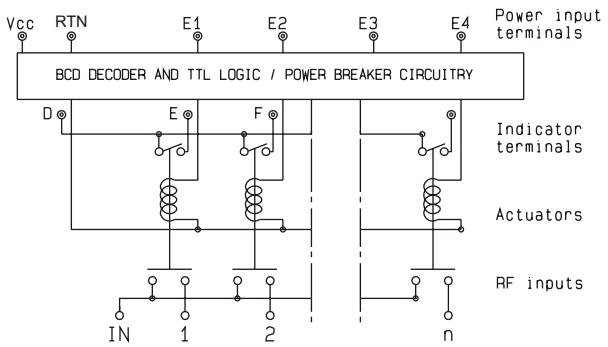
COAXIAL ELECTRICAL SCHEMATICS
R573 & R574 series

NORMALLY OPEN

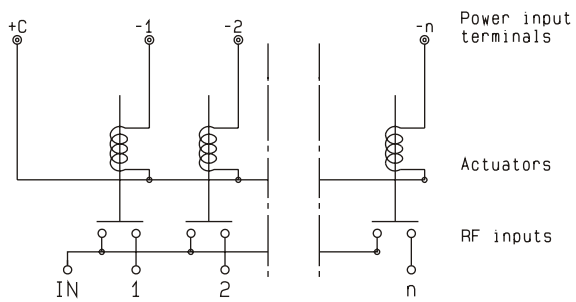
WITH BCD DRIVER, TTL COMPATIBLE
(suppression diodes are included)
573 -0- -8- / R574 -0- -8-



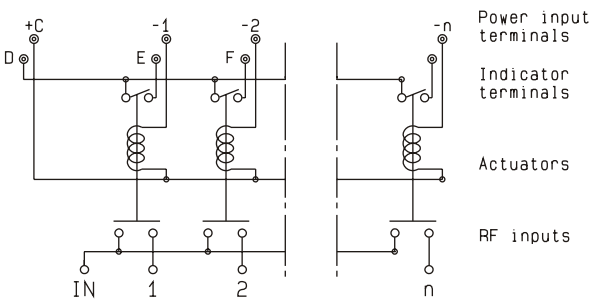
WITH BCD DRIVER, TTL COMPATIBLE AND INDICATOR CONTACT
(suppression diodes are included)
573 -1- -8- / R574 -1- -8-



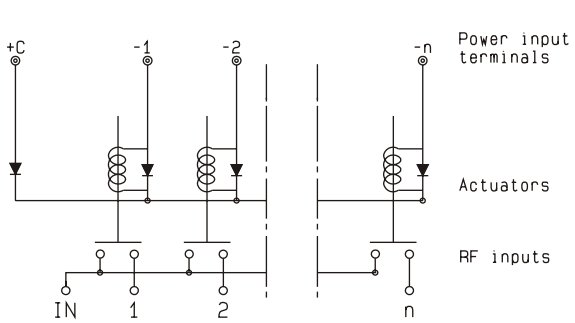
WITH POSITIVE COMMON
R573 -0- -1- / R574 -0- -1-



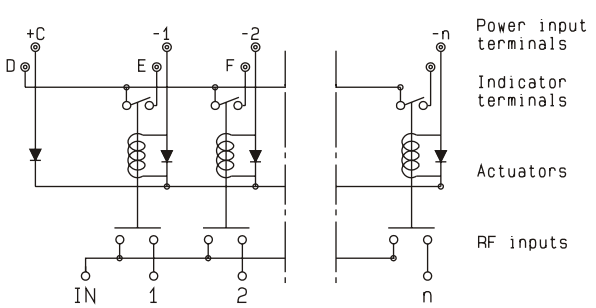
WITH POSITIVE COMMON AND INDICATOR CONTACT
R573 -1- -1- / R574 -1- -1-



WITH POSITIVE COMMON AND SUPPRESSION DIODES
R573 -0- -4- / R574 -0- -4-



WITH POSITIVE COMMON, SUPPRESSION DIODES AND INDICATOR CONTACT
R573 -1- -4- / R574 -1- -4-



SPnT

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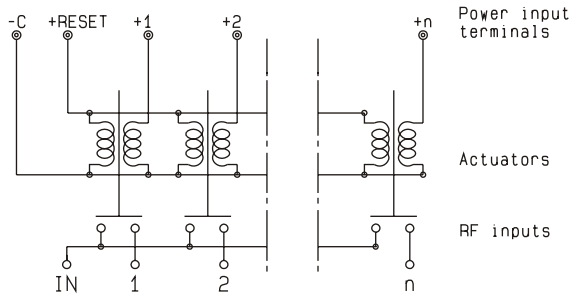
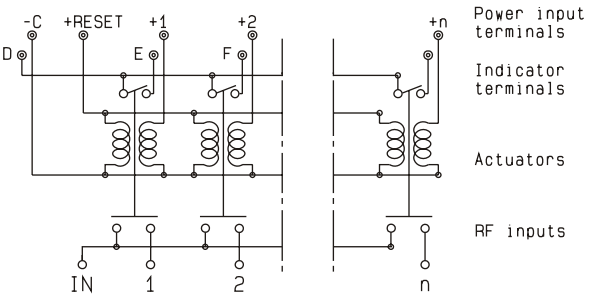
COAXIAL ELECTRICAL SCHEMATICS
R573 & R574 series

LATCHING

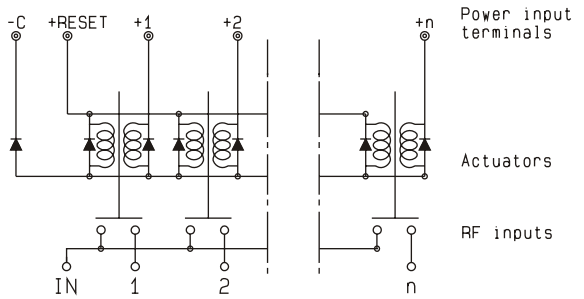
WITHOUT OPTION
R573 -2- -0- / R574 -2- -0-



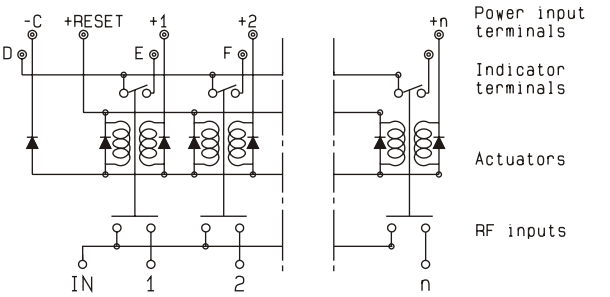
WITH INDICATOR CONTACT
R573 -3- -0-/ R574 -3- -0-



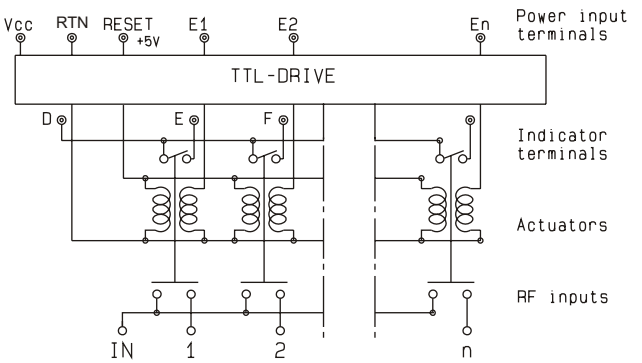
WITH SUPPRESSION DIODES
R573 -2- -3- / R574 -2- -3-



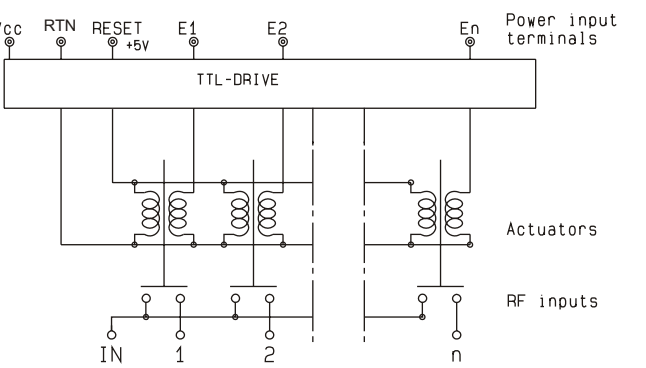
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R573 -3- -3- / R574 -3- -3-



WITH TTL DRIVER
(suppression diodes are included)
R573 -2- -2- / R574 -2- -2-



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R573 -3- -2- / R574 -3- -2-



SPnT

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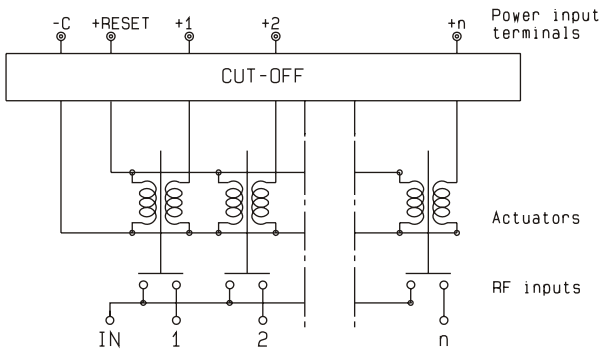
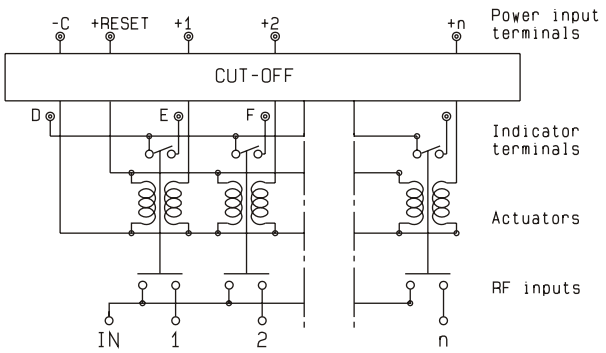
COAXIAL ELECTRICAL SCHEMATICS
R573 & R574 series

LATCHING

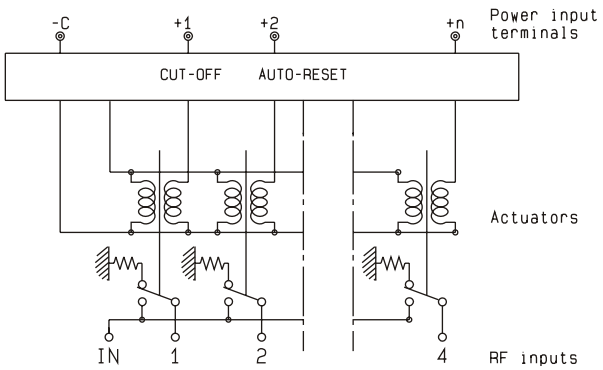
WITH CUT-OFF
(suppression diodes are included)
573 -4- -0- / R574 -4- -0-



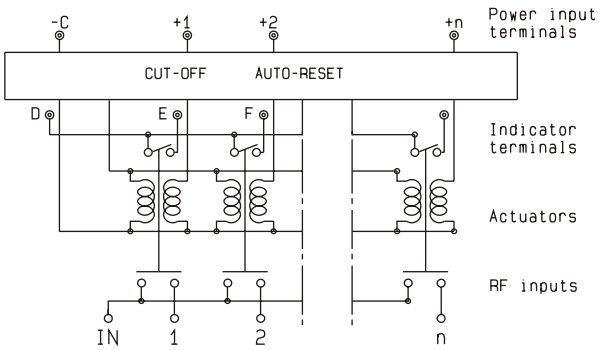
WITH CUT- OFF AND INDICATOR CONTACT
(suppression diodes are included)
573 -5- -0- / R574 -5- -0-



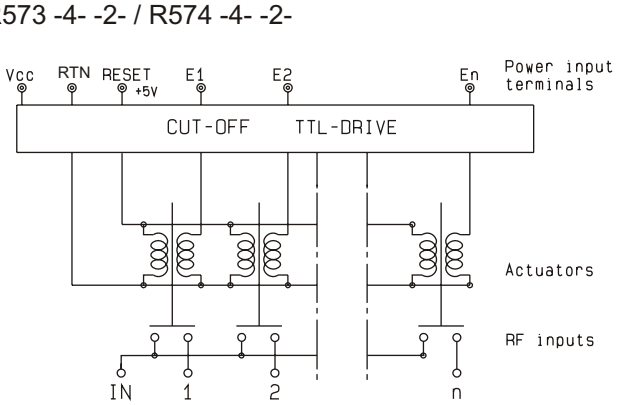
WITH CUT-OFF AND AUTO RESET
(Suppression diodes are included
R573 -8- -0- / R574 -8- -0-



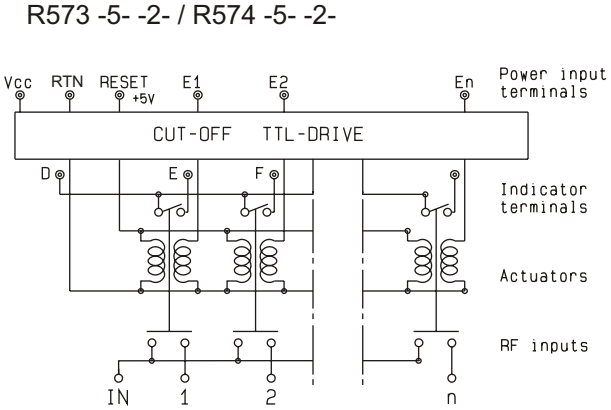
WITH CUT-OFF, AUTO RESET AND INDICATOR CONTACT
(Suppression diodes are included)
R573 -9- -0- / R574 -9- -0-



WITH TTL DRIVER AND CUT- OFF
(Suppression diodes are included)
R573 -4- -2- / R574 -4- -2-



WITH TTL DRIVER, CUT-OFF AND INDICATOR CONTACT
(Suppression diodes are included)
R573 -5- -2- / R574 -5- -2-



SPnT

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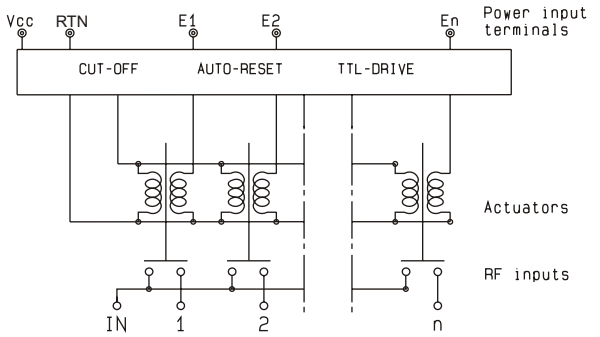
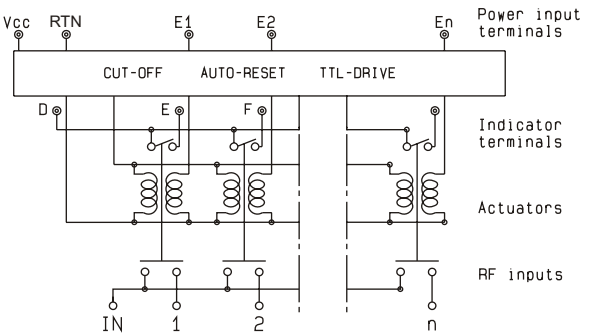
COAXIAL SPnT - ELECTRICAL SCHEMATICS
R573 & R574 series

LATCHING

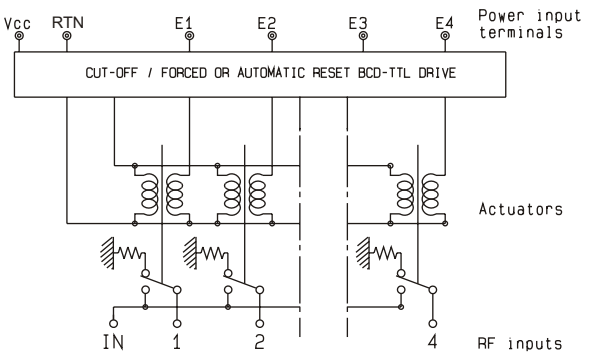
WITH TTL DRIVER, CUT-OFF AND AUTO RESET
(Suppression diodes are included)
R573 -8- -2- / R574 -8- -2-



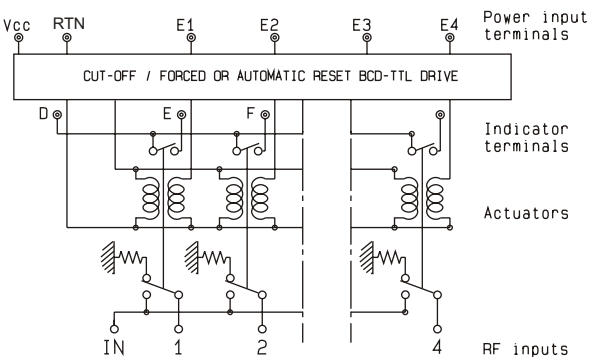
WITH TTL DRIVER, CUT-OFF, AUTO RESET AND INDICATOR CONTACT
(Suppression diodes are included)
R573 -9- -2-/ R574 -9- -2-



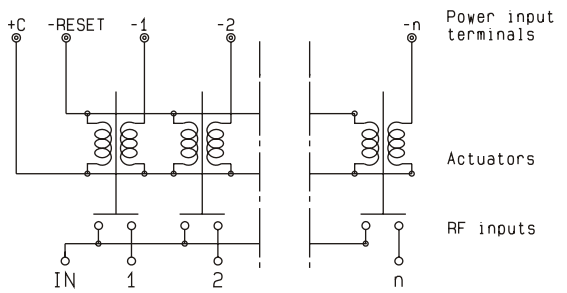
WITH CUT-OFF, FORCED OR AUTO RESET, BCD DRIVER, TTL COMPATIBLE
(Suppression diodes are included)
R573 -8- -8- / R574 -8- -8-



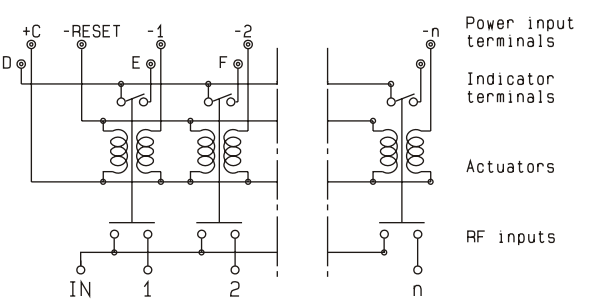
WITH CUT-OFF, FORCED OR AUTO RESET, BCD DRIVER, TTL COMPATIBLE AND INDICATOR CONTACT
(Suppression diodes are included)
R573 -9- -8- / R574 -9- -8-



WITH POSITIVE COMMON
R573 -2- -1- / R574 -2- -1-



WITH POSITIVE COMMON AND INDICATOR CONTACT
(suppression diodes are included)
R573 -3- -1- / R574 -3- -1-



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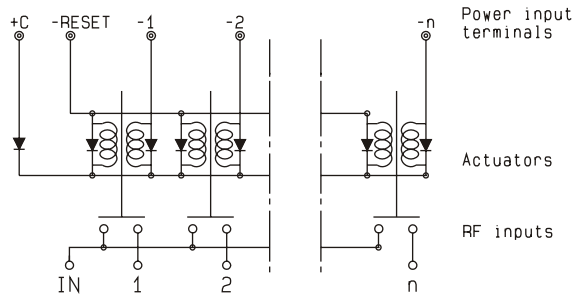
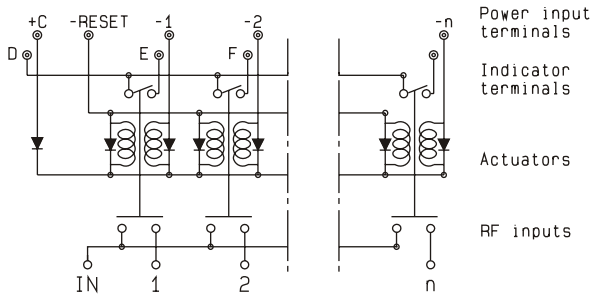
LATCHING

WITH POSITIVE COMMON AND SUPPRESSION DIODES
(suppression diodes are included)
573 -2- -4- / R574 -2- -4-

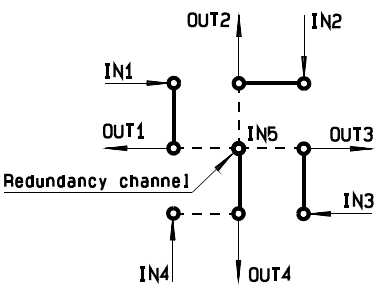


WITH POSITIVE COMMON, SUPPRESSION DIODES AND INDICATOR CONTACT
573 -3- -4- / R574 -3- -4-



OPTIONAL FEATURES FOR SPnT

Examples of dedicated application options (Continued)



5P4T with redundancy channel on Out 4
In1 to Out 1, In2 to Out 2, In 3 to Out 3

7P6T

SP6T terminated with
External terminations

A Custom Matrix Switch (5P4T) with 4 Input ports and 4 Output ports configured for 4 transmission systems and one redundancy channel (N+1 : N type). This product can be used also as a SP4T Terminated with external low VSWR or medium power terminations.

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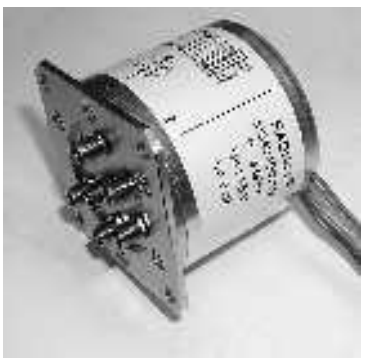
OPTIONAL FEATURES for SPnT

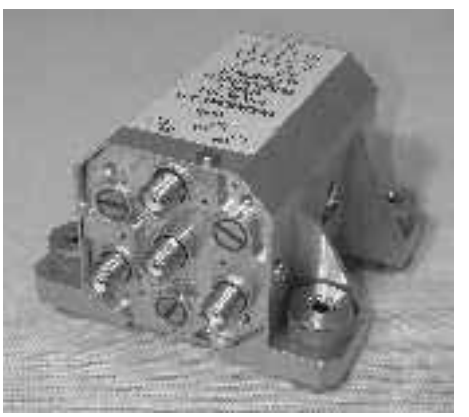
Examples of dedicated application options



A SPnT with a flat ribbon cable for an easy mounting when space is reduced.

A SPnT with a specific bracket for an easy mounting in an Automatic Test Equipment

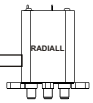
Based upon our know-how for Space application, this SPnT has been designed for thermal vaccum application.



This SP3T (based upon our know-how for space activity) has been designed for airborne military application (sequential access and severe environmental characterics)

This Subminiature SPnT has been improved for automatic test benches where very low RF leakage is needed.

A miniature SP6T with a D-Sub connector instead of Solder pins



SPACE section

General Information

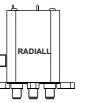
See Page Space - 2

Low Power models

See Page Space - 3

High Power models

See Page Space - 11



GENERAL INFORMATION / SPECIFICATIONS

Radiall Hi-Rel switches are based on RADIALL's 40+ years heritage of hundreds of thousands of products designed, manufactured, qualified & delivered for commercial & military markets.

A 20+ years heritage for space coaxial switches based on more than 180 satellites worldwide using our products on board can ensure to our customers, the highest level of quality & reliability.

RADIALL Hi-Rel coaxial switches have been fully evaluated & approved by European Space Agency for Space use according to ESCC3603 generic specification and following detail specifications

Product	Power cap.	Frequency	Connectors	Drive	Detail specification
SPDT	Low power	DC - 18 GHz	SMA	Latching	**ESCC3603002**
SPDT	Low power	Up to 31 GHz	SMA2.9	Latching	**ESCC3603007**
DPDT	Low power	Up to 31 GHz	SMA2.9	Latching	**ESCC3603008**
T-Switch	Low power	Up to 31 GHz	SMA2.9	Sequential	**ESCC3603009**
T-Switch	Low power	Up to 31 GHz	SMA2.9	Random	**ESCC3603009**
T-Switch	High power	Up to 8 GHz	TNC	Random	**ESCC3603010**

RADIALL also provides a full range of Hi-Rel switches for space use which offers our customers significant cost saving, while satisfying most typical requirements for communication satellite applications according to RAD-GEN-SWIT-001 and following detail specifications :

Product	Power cap.	Frequency	Connectors	Drive	Detail specification
SPDT	Low power	DC - 18 GHz	SMA	Latching	**RAD-DET-SPDT-003**
SPDT	Low power	Up to 31 GHz	SMA2.9	Latching	**RAD-DET-SPDT-001**
SPDT	High power	Up to 4.8 GHz	TNC	Latching	**RAD-DET-SPDT-002**
DPDT	Low power	DC - 18 GHz	SMA	Latching	**RAD-DET-DPDT-001**
DPDT	Low power	Up to 31 GHz	SMA2.9	Latching	**RAD-DET-DPDT-001**
T-Switch	Low power	DC - 18 GHz	SMA	Sequential	**RAD-DET-TSSD-001**
T-Switch	Low power	Up to 31 GHz	SMA2.9	Sequential	**RAD-DET-TSSD-001**
T-Switch	Low power	DC - 18 GHz	SMA	Random	**RAD-DET-TSRD-001**
T-Switch	Low power	Up to 31 GHz	SMA2.9	Random	**RAD-DET-TSRD-001**
T-Switch	High power	Up to 8 GHz	TNC	Random	**RAD-DET-TSRD-001**
DP3T	Low power	DC - 18 GHz	SMA	Latching	
DP3T	High power	DC - 4.8 GHz	TNC	Latching	**RAD-DET-DP3T-002**

LOW POWER COAXIAL SPDT SWITCH

LOW-POWER LATCHING COAXIAL SPDT SWITCH according to RADIALL Specification RAD-DET-SPDT-001

- S switch configuration
- DC to 18 GHz with SMA connectors
- Up to 31 GHz with SMA 2.9 connectors
- Telemetry circuit
- D-Sub or solder pins
- Suppression diodes
- From 49 grams

RF PERFORMANCES

DC - 18 GHz

Frequency (GHz)	DC - 1.8	1.8 - 4.2	4.2 - 8.4	8.4 - 14.5	14.5 - 18
Insertion loss (max) (dB)	0.15		0.25	0.30	0.40
V.S.W.R (max)	1.10	1.20	1.25		1.40
Isolation (min) (dB)	70				60

Ka-band

Frequency (GHz)	17.5 - 21.5	27.5 - 31
Insertion loss (max) (dB)	0.40	0.50
V.S.W.R (max)	1.30	1.40
Isolation (min) (dB)	70	55

ELECTRICAL CHARACTERISTICS

	RAD-DET-SPDT-001 latching	RAD-DET-SPDT-003 latching
Actuator	latching	latching
Control signal voltage	22/ 26 / 29 VDC (Min / Nominal / Max)	22 / 26 / 29 VDC
Actuator current	361 mA max 29VDC / 25°	63 mA

MECHANICAL CHARACTERISTICS

Command and DC interface	9 Pin D-Sub connector or solder Pins
Life	100 000 cycles (200 000 actuations)
Switching time	20 ms max
Mass	From 49 grams

ENVIRONMENTAL CHARACTERISTICS

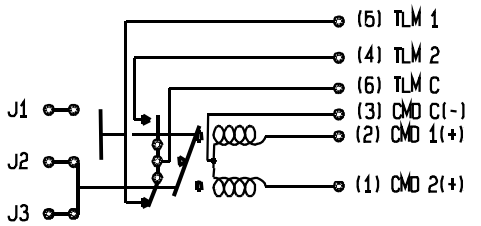
Operation temperature range	- 25°C / + 80°C
Non operating temperature range	- 35°C / 80°C
Vibration Sinus Random	5 - 100 Hz / 20g QM level 20 - 2000 Hz / 28.57 grms QM level / 19 grms FM level
Shocks	½ sinus / 1200g / 0.25 ms QM level
Pressure	Free space vacuum

For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

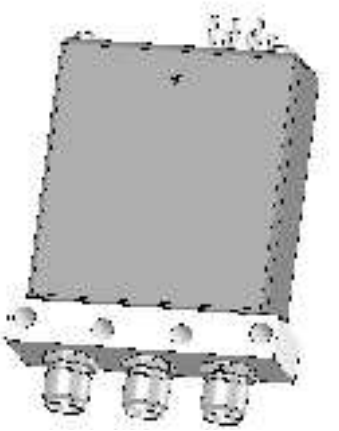
LOW POWER COAXIAL SPDT SWITCH

SCHEMATICS & DRAWINGS given for examples

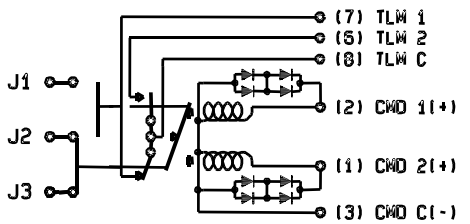
SPDT, RF body fixing, pins



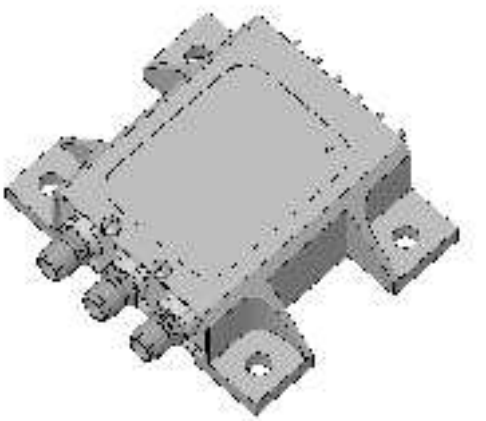
Position 1 : J1-J2
Position 2 : J2-J3



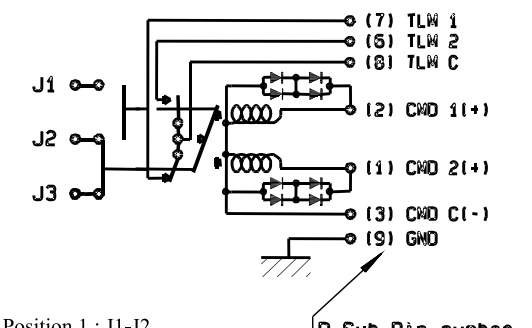
SPDT, lay down, pins



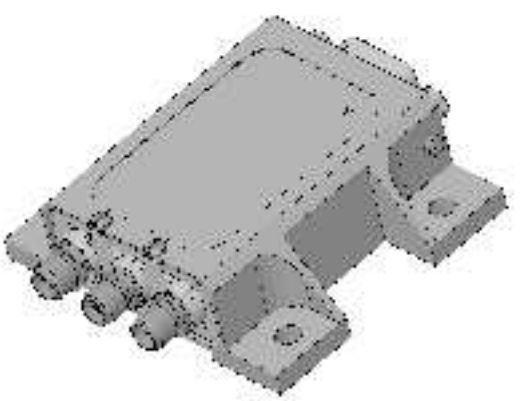
Position 1 : J1-J2
Position 2 : J2-J3



SPDT, lay down, pins



Position 1 : J1-J2
Position 2 : J2-J3

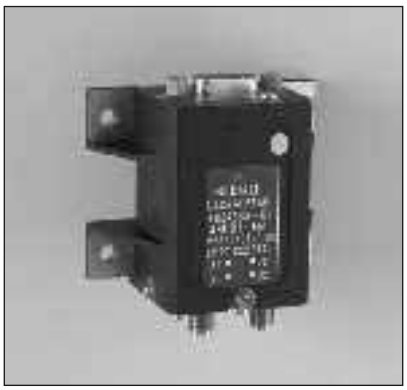


For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

LOW POWER COAXIAL DPDT SWITCH

LOW-POWER LATCHING COAXIAL DPDT SWITCH according to RADIALL Specification RAD-DET-DPDT-001

- C switch configuration
- DC to 18 GHz with SMA connectors
- Up to 31 GHz with SMA 2.9 connectors
- Telemetry circuit
- D-Sub or solder pins
- Suppression diodes
- From 92 grams



RF PERFORMANCES

DC - 18 GHz

Frequency (GHz)	DC - 1.8	1.8 - 4.2	4.2 - 8.4	8.4 - 14.5	14.5 - 18
Insertion loss (max) (dB)	0.15		0.25	0.30	0.40
V.S.W.R (max)	1.10	1.20	1.25		1.40
Isolation (min) (dB)	70				60

Ka-band

Frequency (GHz)	17.5 - 21.5	27.5 - 31
Insertion loss (max) (dB)	0.40	0.50
V.S.W.R (max)	1.30	1.40
Isolation (min) (dB)	70	55

ELECTRICAL CHARACTERISTICS

Actuator	Latching
Control signal voltage	22 / 26 / 29 VDC (Min / Nominal / Max)
Actuator current	63 mA max @ 29VDC / 25°C 361 mA max @ 29VDC / 25°C for Ka-band models

MECHANICAL CHARACTERISTICS

Command and DC interface	9 Pin D-Sub connector or solder Pins
Life	100 000 cycles (200 000 actuations)
Switching time	20 ms max
Mass	From 49 grams

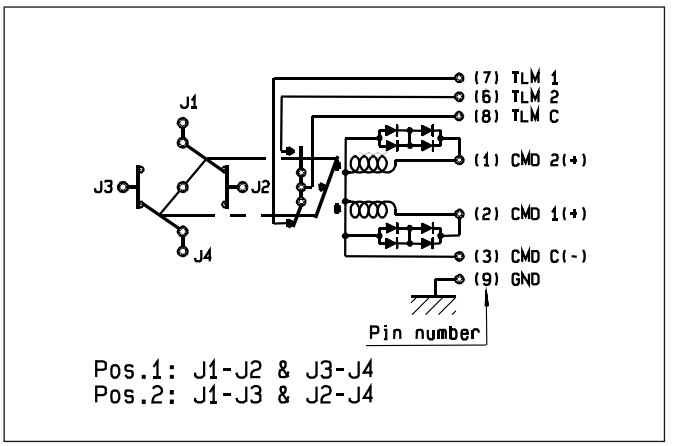
ENVIRONMENTAL CHARACTERISTICS

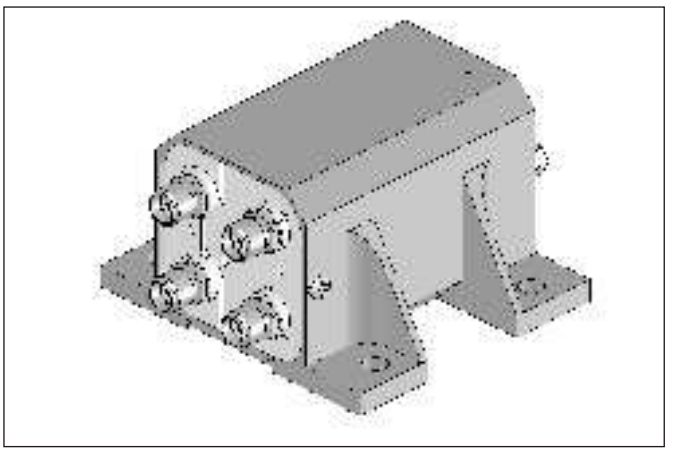
Operation temperature range	- 25°C / + 80°C
Non operating temperature range	- 35°C / 80°C
Vibration Sinus Random	5 - 100 Hz / 20g QM level 20 - 2000 Hz / 28.57 grms QM level / 19 grms FM level
Shocks	½ sinus / 1200g / 0.25 ms QM level
Pressure	Free space vacuum

For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

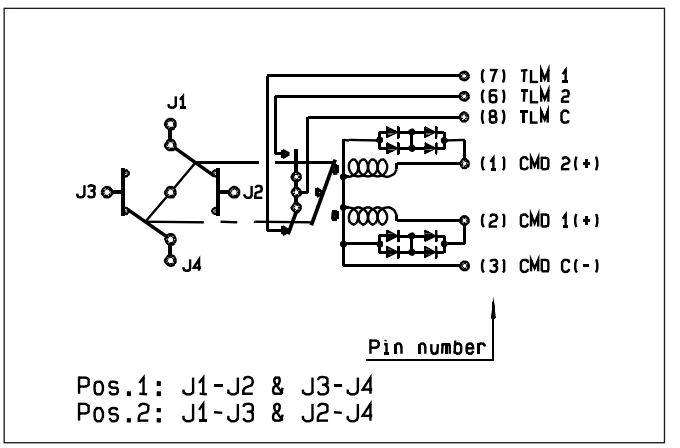
SCHEMATICS & DRAWINGS given for examples

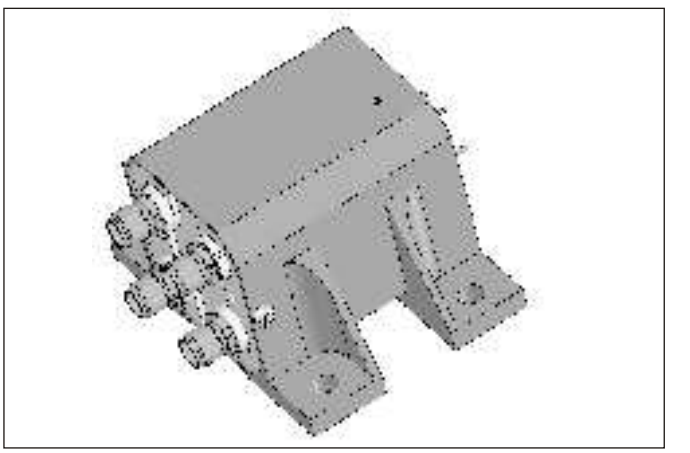
C-Switch, Lay-down, D-Sub



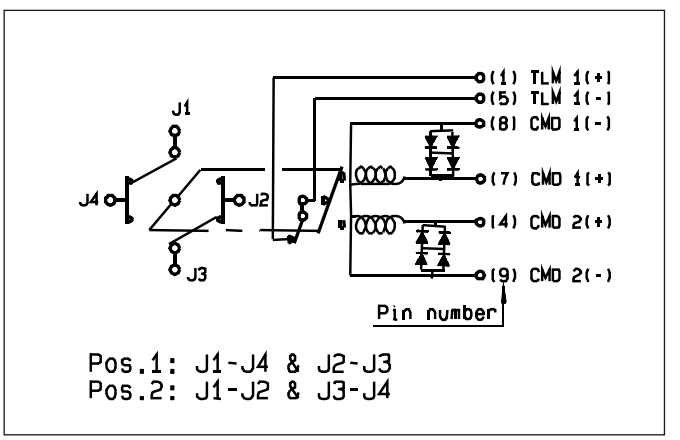


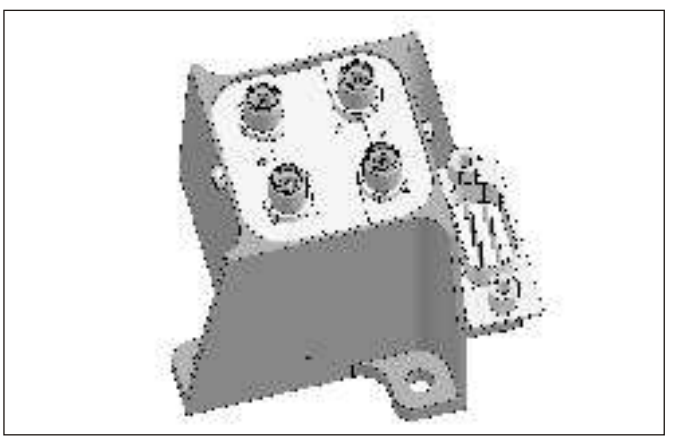
C-Switch, Lay-down, D-Sub





C-Switch, Stand-up, D-Sub





For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

LOW POWER COAXIAL T SWITCH

LOW-POWER LATCHING COAXIAL T SWITCH
according to RADIALL Specification : RAD-DET-TSSD-001 & RAD-DET-TSRD-001

- Random or Sequential drive
- DC to 18 GHz with SMA connectors
- Up to 31 GHz with SMA 2.9 connectors
- Telemetry circuit
- D-Sub or solder pins
- Suppression diodes
- From 105 grams

RF PERFORMANCES

DC - 18 GHz

Frequency (GHz)	DC - 1.8	1.8 - 4.2	4.2 - 8.4	8.4 - 14.5	14.5 - 18
Insertion loss (max) (dB)	0.17	0.20	0.25	0.35	0.50
V.S.W.R (max)	1.10	1.20	1.25	1.30	1.60
Isolation (min) (dB)	70				60

Ka-band

Frequency (GHz)	17.5 - 21.5	27.5 - 31
Insertion loss (max) (dB)	0.40	0.50
V.S.W.R (max)	1.30	1.40
Isolation (min) (dB)	70	55

ELECTRICAL CHARACTERISTICS

Actuator	Sequential drive	Random drive
Application specification	RAD-DET-TSSD-001	RAD-DET-TSRD-001
Control signal voltage	22 / 26 / 29 VDC (Min / Nominal / Max)	22 / 26 / 29 VDC (Min / Nominal / Max)
Actuator current	416 mA max @ 29VDC / 25°C	373 mA max @ 29VDC / 25°C

MECHANICAL CHARACTERISTICS

Command and DC interface	9 Pin D-Sub connector or solder Pins
Life	100 000 cycles (200 000 actuations)
Switching time	20 ms max
Mass	From 49 grams

ENVIRONMENTAL CHARACTERISTICS

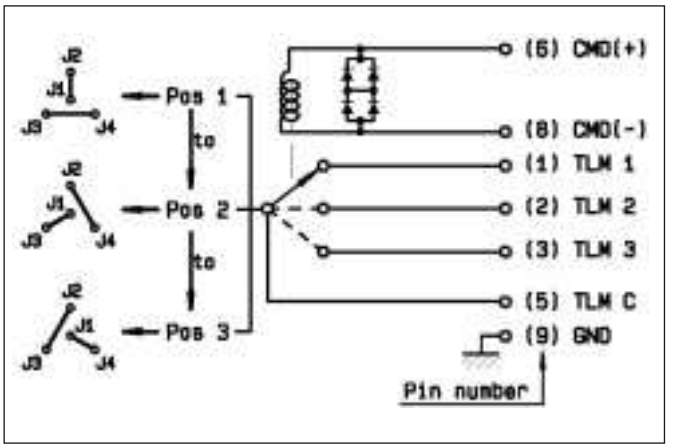
Operation temperature range	- 25°C / + 80°C
Non operating temperature range	- 35°C / 80°C
Vibration Sinus Random	5 - 100 Hz / 20g QM level 20 - 2000 Hz / 28.57 grms QM level / 19 grms FM level
Shocks	½ sinus / 1200g / 0.25 ms QM level
Pressure	Free space vacuum

For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

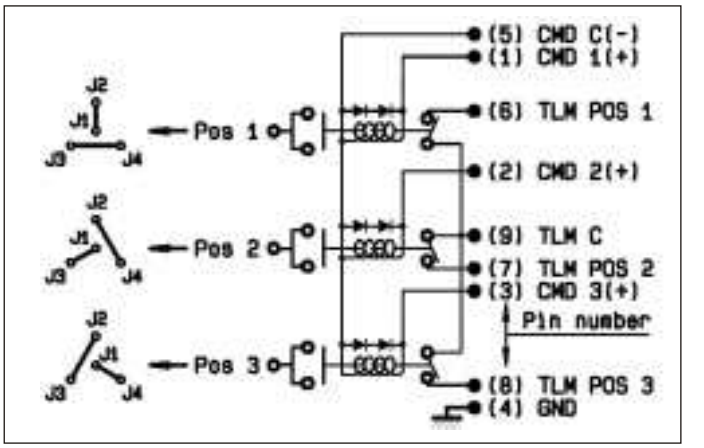
LOW POWER COAXIAL T SWITCH

SCHEMATICS & DRAWINGS given for examples

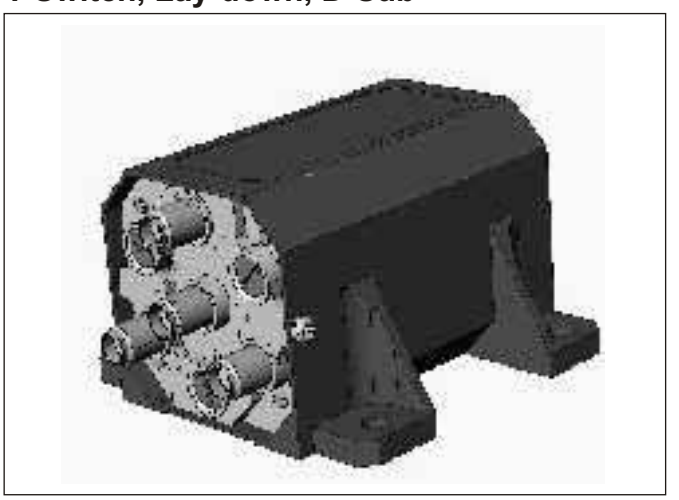
Sequential Drive



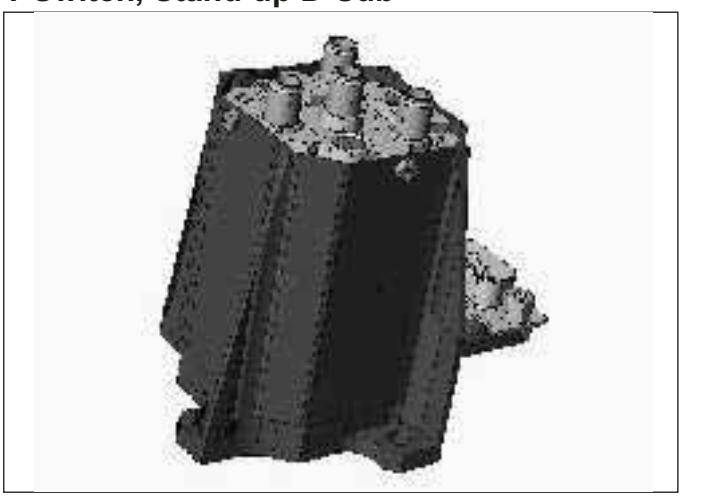
Random Drive



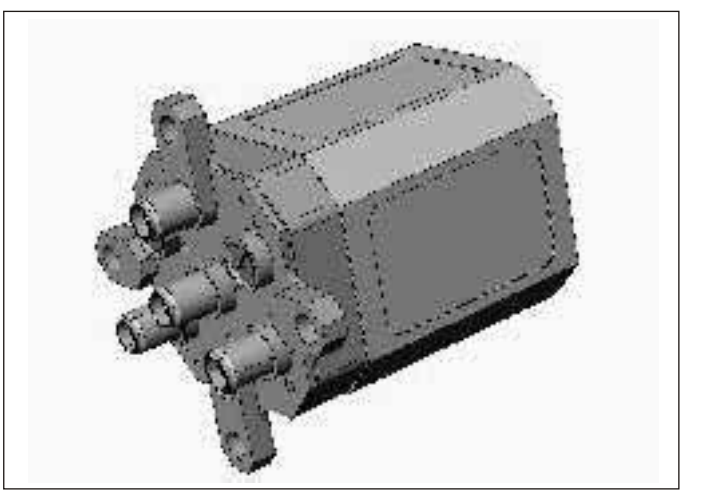
T-Switch, Lay-down, D-Sub



T-Switch, Stand-up D-Sub



T-Switch, Fixing Plate Pins



For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

LOW POWER COAXIAL DP3T SWITCH

LOW-POWER LATCHING COAXIAL DP3T SWITCH

- DC to 18 GHz with SMA connectors
- Telemetry circuit
- D-Sub
- Suppression diodes
- From 125 grams

RF PERFORMANCES

DC - 18 GHz

Frequancy (GHz)	1.0 - 4.2	5.5 - 8.8	10.5 - 13	13 - 18
Insertion loss (max) (dB)	0.12	0.20	0.25	0.40
V.S.W.R. (max)	1.12	1.20	1.22	1.33
Isolation (min) (dB)	70	65	60	

ELECTRICAL CHARACTERISTICS

Actuator	Latching
Control signal voltage	24 / 26 / 32 VDC (Min / Nominal / Max)
Actuator current	92 mA max @29VDC / 25°C 143 mA max @32VDC / -30°C

MECHANICAL CHARACTERISTICS

Command and DC interface	9 Pin D-Sub connector or solder Pins
Life	100 000 cycles (200 000 actuations)
Switching time	35 ms max
Mass	From 265 grams

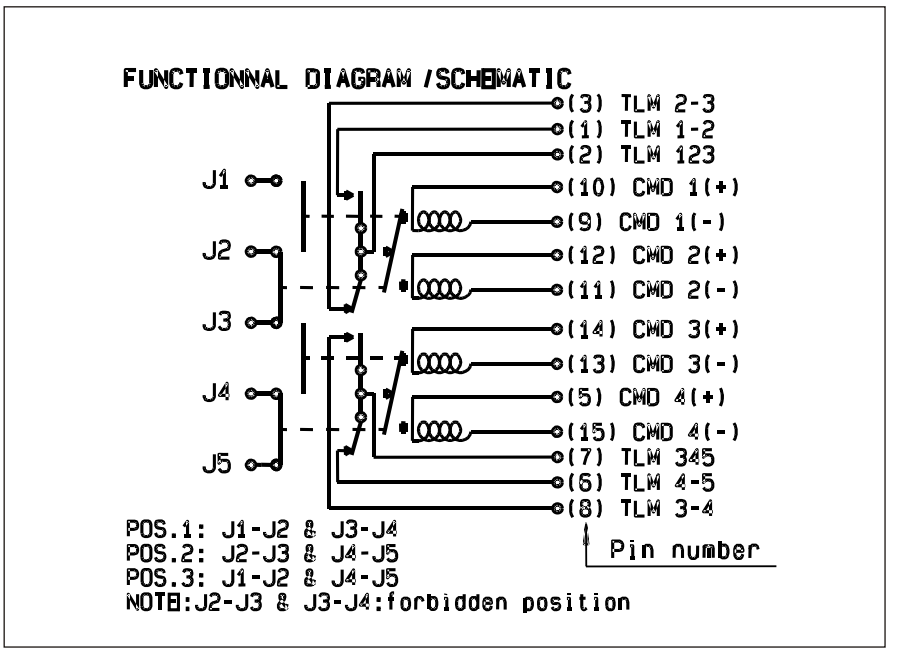
ENVIRONMENTAL CHARACTERISTICS

Operation temperature range	- 25°C / + 80°C
Non operating temperature range	- 35°C / 80°C
Vibration Sinus **Random**	5 - 100 Hz / 20g QM level 20 - 2000 Hz / 27 grms QM level / 18 grms FM level
Shocks	½ sinus / 1200g / 0.25 ms QM level
Pressure	Free space vacuum

For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

LOW POWER COAXIAL DP3T SWITCH

SCHEMATICS & DRAWINGS given for examples

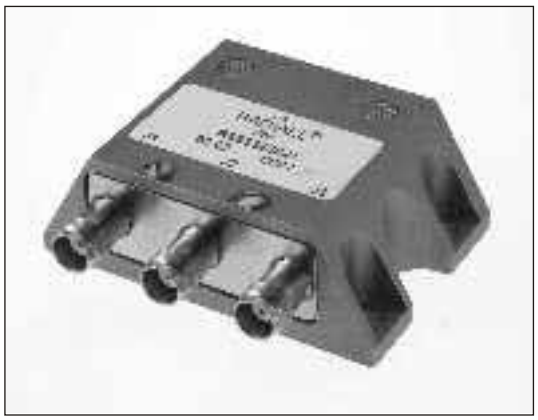


For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

HIGH POWER COAXIAL SPDT SWITCH

HIGH-POWER LATCHING COAXIAL SPDT SWITCH according to RADIALL Specification RAD-DET-SPDT-002

- S switch configuration
- TNC connectors
- Up to 2.2 GHz, up to 190 Watts CW
- Up to 4.8 GHz, up to 102 Watts CW
- Telemetry circuit
- D-Sub
- Suppression diodes



RF PERFORMANCES

DC - 2.2 GHz Variant 001

Frequency (GHz)	0.04 - 1	1 - 1.6	1. 6 - 2.2
Insertion Loss (max) (dB)	0.12		
V.S.W.R. (max)	1.2		
Isolation (min) (dB)	70		
Power handing multipactor free (6 dB margin)	40 Watts @ 1 GHz	100 Watts @ 1.6 GHz	190 Watts @ 2.2 GHz

DC - 4.8 GHz Variant 002

Frequency (GHz)	0.04 - 1	1 - 1.6	1.6 - 2.2	2.2 - 4.8
Insertion Loss (max) (dB)	0.12			0.22
V.S.W.R. (max)	1.2			1.38
Isolation (min) (dB)	70			60
Power Handling multipactor free (6 dB margin)	5 Watts @ 1 GHz	29 Watts @ 1.6 GHz	55 Watts @ 2.2 GHz	102 Watts @ 3 GHz

ELECTRICAL CHARACTERISTICS

Actuator	Latching
Control signal voltage	20 / 26 / 30 VDC (Min / Nominal / Max)
Actuator current	198 mA max @30VDC / 25°C

MECHANICAL CHARACTERISTICS

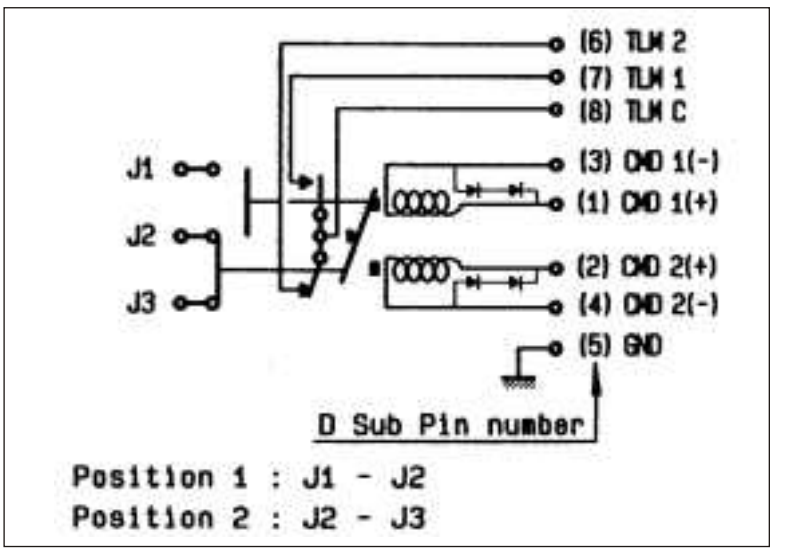
Command and DC interface	9 Pin D-Sub connector or solder Pins
Life	100 000 cycles (200 000 actuations)
Switching time	35 ms max
Mass	From 265 grams

HIGH POWER COAXIAL SPDT SWITCH

ENVIRONMENTAL CHARACTERISTICS

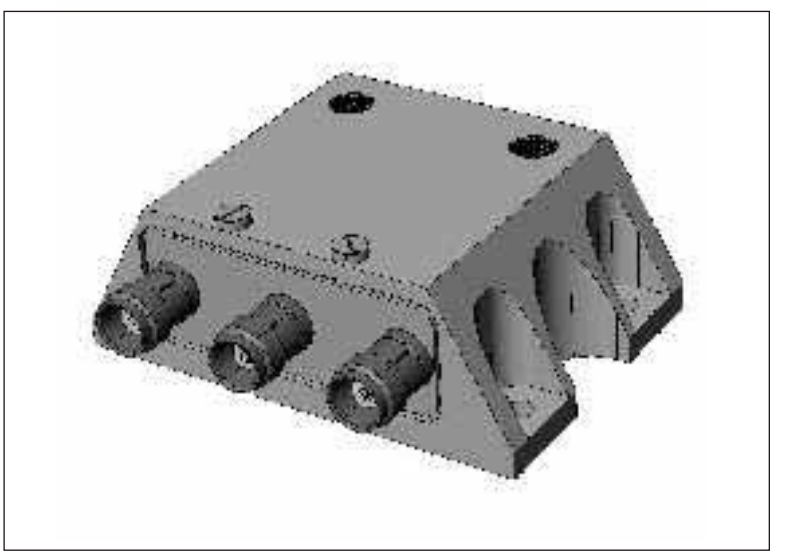
Operation temperature range	- 25°C / + 80°C
Non operating temperature range	- 35°C / 80°C
Vibration Sinus **Random**	5 - 100 Hz / 20g QM level 20 - 2000 Hz / 27 grms QM level / 18 grms FM level
Shocks	½ sinus / 1200g / 0.25 ms QM level
Pressure	Free space vacuum

SCHEMATICS given for examples



DRAWING

SPDT Switch, lay Down D-Sub - variant 001 & 002



For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

HIGH POWER COAXIAL DP3T SWITCH

HIGH-POWER LATCHING COAXIAL DP3T SWITCH according to RADIALL Specification RAD-DET-DP3T-002

- TNC connectors
- DC to 2.2 GHz, up to 160 Watts CW
- DC to 4.8 GHz, up to 102 Watts CW
- Telemetry circuit
- D-Sub
- Suppression diodes

RF PERFORMANCES

DC - 2.2 GHz Variant 001

Frequency (GHz)	0.04 - 1	1 - 1.6	1. 6 - 2.2
Insertion Loss (max) (dB)	0.12		
V.S.W.R. (max)	1.2		
Isolation (min) (dB)	70		
Power handing multipactor free (6 dB margin)	33 Watts @ 1 GHz	85 Watts @ 1.6 GHz	160 Watts @ 2.2 GHz

DC - 4.8 GHz Variant 002

Frequency (GHz)	0.04 - 1	1 - 1.6	1.6 - 2.2	2.2 - 4.8
Insertion Loss (max) (dB)	0.12			0.22
V.S.W.R. (max)	1.2			1.38
Isolation (min) (dB)	70			60
Power Handling multipactor free (6 dB margin)	5 Watts @ 1 GHz	29 Watts @ 1.6 GHz	55 Watts @ 2.2 GHz	102 Watts @ 3 GHz

ELECTRICALCHARACTERISTICS

Actuator	Latching
Control signal voltage	20 / 26 / 30 VDC (Min / Nominal / Max)
Actuator current	198 mA max @30VDC / 25°C

MECHANICAL CHARACTERISTICS

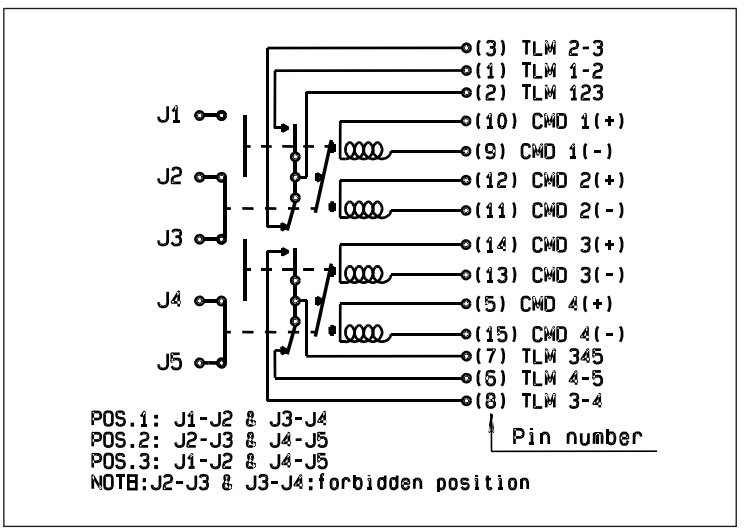
Command and DC interface	9 Pin D-Sub connector or solder Pins
Life	100 000 cycles (200 000 actuations)
Switching time	35 ms max
Mass	From 390 grams

HIGH POWER COAXIAL DP3T SWITCH

ENVIRONMENTAL CHARACTERISTICS

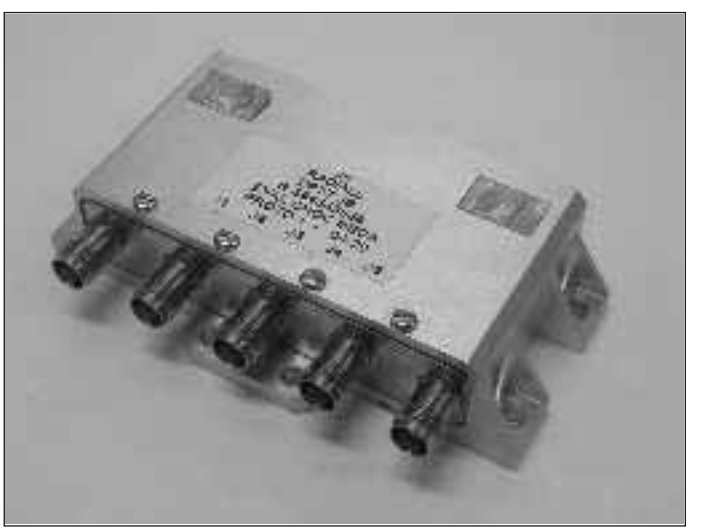
Operation temperature range	- 25°C / + 80°C
Non operating temperature range	- 35°C / 80°C
Vibration Sinus	5 - 100 Hz / 20g QM level
Random	20 - 2000 Hz / 27 grms QM level / 18 grms FM level
Shocks	½ sinus / 1200g / 0.25 ms QM level
Pressure	Free space vacuum

SCHEMATICS given for example



DRAWING

DP3T Switch, lay Down D-Sub - variant 001 & 002



For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

HIGH POWER COAXIAL T SWITCH

HIGH-POWER LATCHING COAXIAL SWITCH according to RADIALL Specification : RAD-DET-TSRD-002

TNC connectors

- DC to 8 GHz
- Up to 120 Watts CW @ 4 GHz
- Random Drive
- Telemetry circuit
- D-Sub or solder pins
- Suppression diodes
- Stand-up or Lay down mounting
- From 340 grams

RF PERFORMANCES

DC - 2.2 GHz Variant 001

Frequency (GHz)	DC - 2	2 - 4.8	4.8 - 6	6 - 8
Insertion Loss (max) (dB)	0.17	0.20	0.30	0.40
V.S.W.R. (min) (dB)	1.10	1.25	1.35	1.50
Isolation (min) (dB)	70			
Power Handling multipactor free (6 dB margin)	48 Watts @ 2 GHz	120 Watts @ 4 GHz	110 Watts @ 6 GHz	95 Watts @ 8 GHz

ELECTRICAL CHARACTERISTICS

Actuator	Latching
Control signal voltage	20 / 26 / 29 VDC (Min / Nominal / Max)
Actuator current	490 mA max @ 29VDC / 25°C

MECHANICAL CHARACTERISTICS

Command and DC interface	9 Pin D-Sub connector or solder Pins
Life	100 000 cycles (300 000 actuations)
Switching time	35 ms max
Mass	From 340 grams

ENVIRONMENTAL CHARACTERISTICS

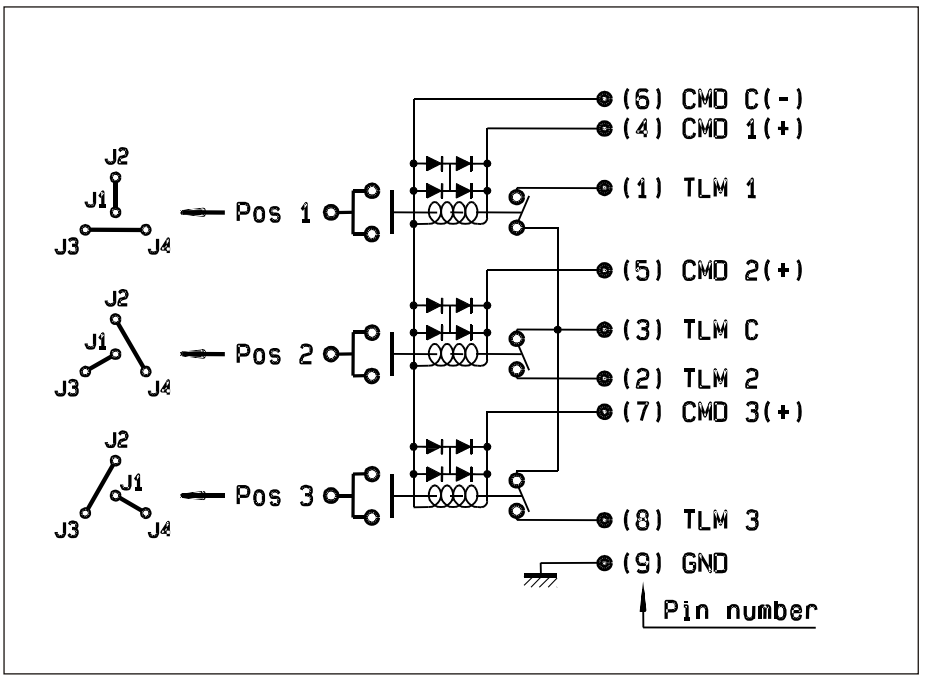
Operation temperature range	- 25°C / + 80°C
Non operating temperature range	- 35°C / 80°C
Vibration	
Sinus	5 - 100 Hz / 20g QM level
Random	20 - 2000 Hz / 27 grms QM level / 18 grms FM level
Shocks	½ sinus / 1200g / 0.25 ms QM level
Pressure	Free space vacuum

For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

HIGH POWER COAXIAL T SWITCH

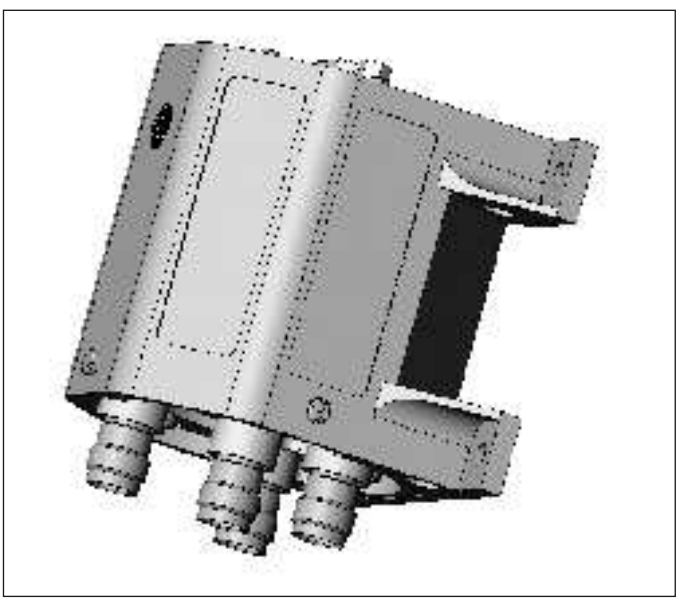
SCHEMATIC given for examples

T-Switch, TNC, D-Sub - variant 001 & 002

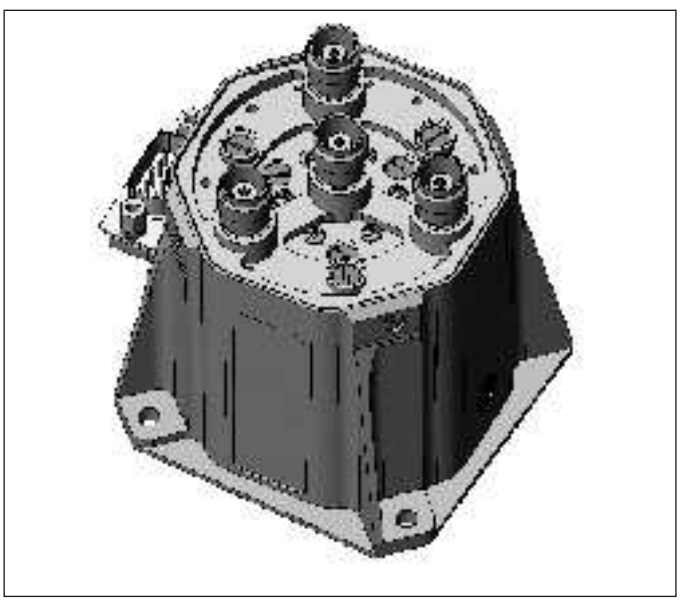


DRAWING

T Switch, Lay down D-Sub - variant 001



T-Switch, Stand-up, D-Sub - variant 002



Space

For more technical information, consult us / E-mail : ***spaceproducts@radiall.com***

OTHER section

RF Microwave products

See Page Others - 2

Space qualified products

See Page Others - 3

Switch applications

See Page Others 4 and 5

GENERAL INFORMATION

Specialized in passive RF& Microwave components, RADIALL engineering staff develops and manufactures a wide range of others coaxial standard devices including terminations, attenanuators, couplers, coaxial detectors, lighting protectors, rotary joints, covering a wide frequency spectrum from DC to 40 GHz for telecom, aeronautic, intrumentation and military application.

For SPACE application, RADIALL offers too a full package of space components according with ESA specifications including attenuators, terminations, couplers, connectors, coaxial cable assemblies (with SHF or semi-rigid cables) for L, S, C, X, Ku and Ka band application.

RF MICROWAVE PRODUCTS

Terminations up to 40 GHz

(**R404** & **R405**) 50 & 75 Ω/ 1W to 120W. Connectorized in SMA, QMA, SMB, SMC, BMA, BNC, N, TNC, QN, 7/16 etc. Version

Also available: **cable load.....**

Couplers up to 18 GHz

(**R432** & **R433**) 50 Ω. Connectorized, hybrid (3 dB) and directional (6, 10, 20, 30 dB)

Attenuators up to 40 GHz

(**R410** & **R420**) 50 Ω & 75 Ω/ 1W to 100W. Connectorized in SMA, QMA, SMB, SMC, BNC, N; TNC, QN, 7/16.

Lightning protectors

(**R445** & **R446**) 50 Ω. Quarter wave stub and gas discharge technologies. Available in N, 7/16, TNC, QN, etc. Style

Rotary joints

(**R447**) 50 Ω Available in SMA and N style up to 18 GHz

Others

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

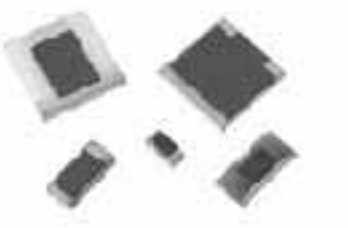
Phase Shifters up to 18 GHz

(**R499**) 50 Ω. Available in SMA style, 0 to 180° phase shift

DC Blocks up to 40 GHz

(**R443**) 50 Ω. Available in SMA, BNC, TNC, N and QMA style

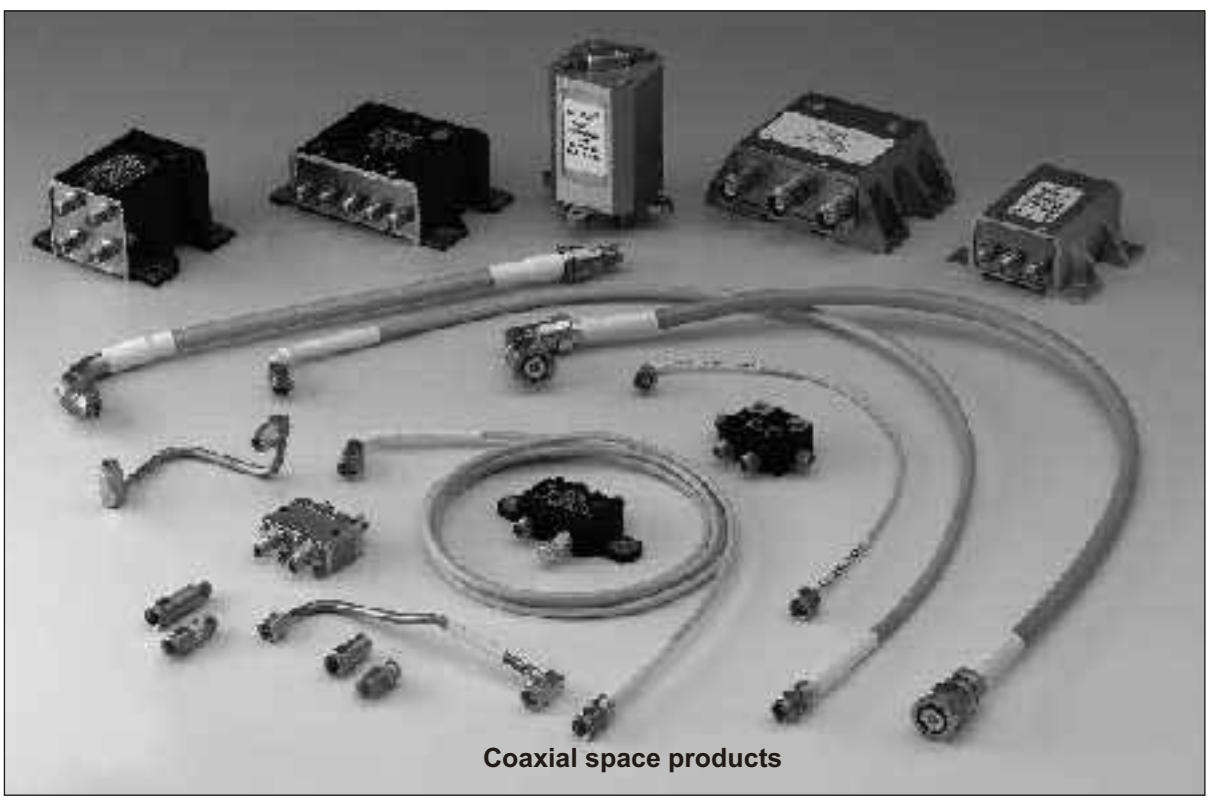
SMT Couplers & Terminations



(**R431**) 50 Ω. Available in standard and mini size, hybrid (3 dB) and directional (6 or 10 dB)
(R401) 50 ohms/ 2W to 120W/ ALN or Al203 chip

SPACE QUALIFIED PRODUCTS

- Coaxial connectors DC to 40 GHz
- Low losses cables assemblies DC to 40 GHz
- Coaxial terminations DC to 40 GHz
- Coaxial attenuators DC to 40 GHz
- Coaxial couplers up to 31 GHz
- Coaxial switches DC to 31 GHz
- Coaxial phase shifters DC to 18 GHz



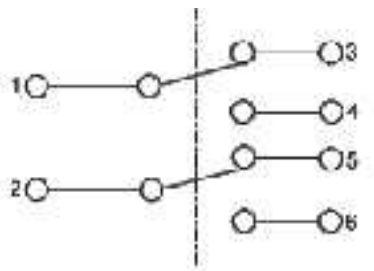
Coaxial space products

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

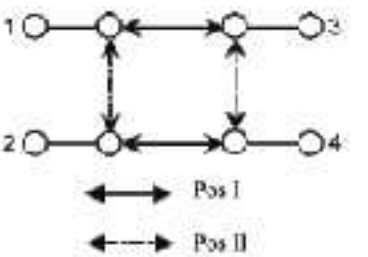
SWITCHES APPLICATIONS

Coaxial Transfer switches or DPDT .

A DPDT is Double Pole Double Throw switch that provides two independent pairs of RF paths through it. These pairs are actuated simultaneaously .The transfer switch is basically a modified DPDT device. A true DPDT switch is a six port device that contains completely independent transmission paths.
In a transfert switch, two transmission paths are not totallity independent as shown below .



DPDT

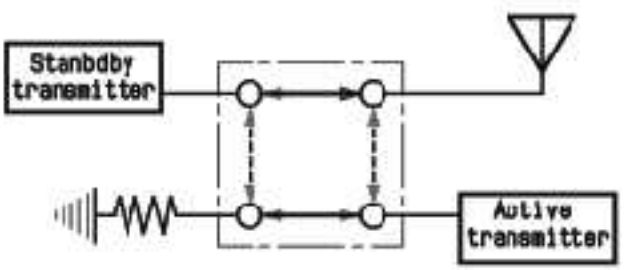


TRANSFER

Examples of applications of the transfer switch :

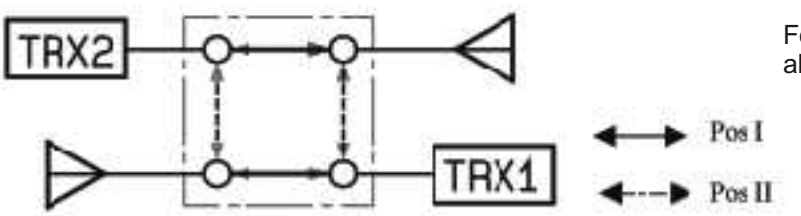
R577 Ramses or R593 Platinum series can be selected for this application

Redundancy of two transmitters :



Active transmitter is connected to antenna. In a same time, for redundancy / maintenance purpose, a second transmitter is terminated to a medium power termination, in hot standby position, ready for switching to antenna in case of failure of active

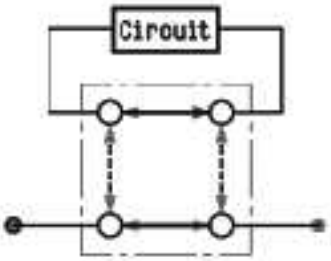
Two transmitters to two antennas :



For a better diversity of signal, 2 antennas are alternately connected to either two transmitters

Technical data sheets are available on : ***www.radiall.com***
For more technical information, consult us / E-mail : ***USA : rfswitchusa@radiall.com / Rest of the world : switchingproducts@radiall.com***

Coaxial Transfert as a Bypass switch use for circuit insertion :

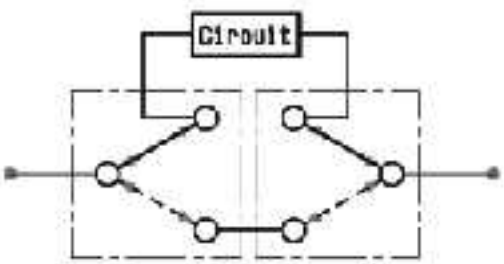


A full RF or microwave passive circuit or circuit element as a filter can be inserted into a coaxial transmission line by using a transfer switch. This element is short shorted by a blade of transfer in through way position

Other RF arrangements for a Bypass function :

Two SPDT switches configured to operate as a Bypass switch

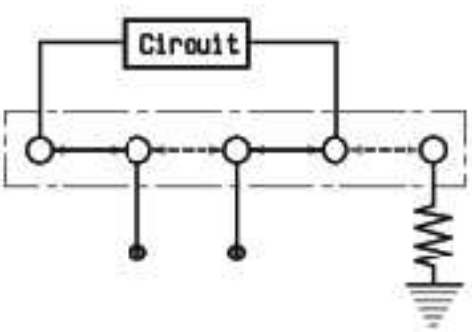
R570 Ramses, R596 (Surface Mount Technology) or R595 Platinum series can be perfectly used to achieve a Bypass function :

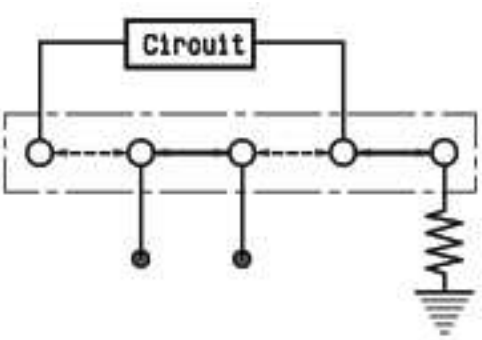


The basic product called SPDT (Single Pole Double Throw) can be used to perform a Bypass switch. The advantages of using 2 SPDT relays instead of a transfer switch are a possible reduction in total package size. In general, use of 2 SPDT allows a higher isolation than a transfer switch.

A DP3T switch configured to operate as a transfer switch

A R585 Ramses or R595 Platinum series can be selected to insert a passive or active component or circuit in a RF or microwave ligne.





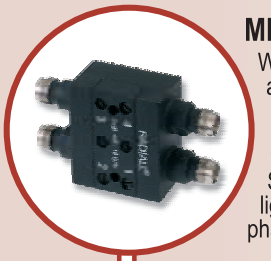
An active component as an amplifier can be inserted in a microwave line; this amplifier is connected on a 50 Ω termination (as a booster in Hot standby status) when non inserted in main coaxial ligne.

NOTES

A global range
To meet your needs

ANTENNAS

RADIALL develops and produces antennas for frequencies from 27 MHz to 6 GHz.
- Technologies used: wire, patch, printed, wire- plate, PIFA
- Numerous types of antennas: single pole, dipole, network, passive or active (with LNA), adaptable and intelligent, outdoor or integrated.

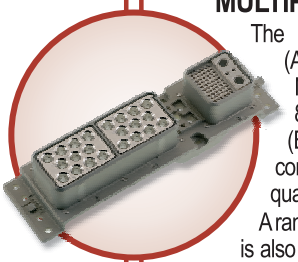


MICROWAVE COMPONENTS

Wide range of coaxial terminations and attenuators using standard interfaces (SMA, QMA, N, QN...) from low (1W) to high power (100W) and new cable load solution, chip terminations up to 18 GHz, hybrid or directional SMT couplers up to connectorized couplers, lightning protectors, detectors, rotary joints, phase shifters, DC Blocks...

AEP CONNECTORS

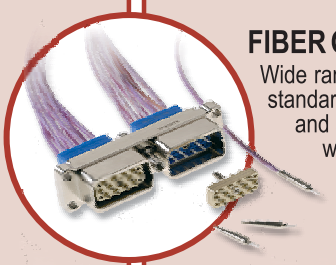
AEP, a RADIALL US subsidiary, design RF connectors for the demanding requirements of military field radio and avionics systems:
- Coaxial waterproof connectors with a unique system of sealing.
- MIL-PRF-39012 QPL connectors
- SSMB and SSMC superior connectors
- SLB Self Aligning connector system.



MULTIPIN CONNECTORS

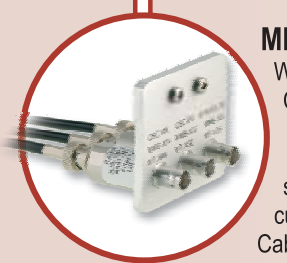
The range includes rack and panel connectors (Arinc 404 & MIL-C-81659B DSX, Arinc 600 NSX & S280W551 BPX, EN3682/MIL-C-83527 MPX JN1123 TCX), modular connector (EPX® series), compatible with a large variety of contacts : signal, power, RF, data bus, fiber optic, quadrax and twinax.

A range of wire to wire and wire to board connectors is also available: B & MCSR heavy duty connectors, M, MM, MB, MBC rectangular miniature, MMC series.



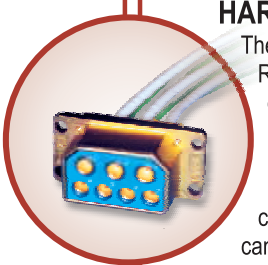
FIBER OPTIC CONNECTORS

Wide range of interconnect solutions, including standard connector interfaces for multimode and singlemode fiber (LC, SC, FC, ST...) as well as connectors and termini contacts (MIL-T-29504, ARINC 801) for harsh environment applications (aeronautic, military, naval, medical, railway...). Great flexibility for custom design.



MICROWAVE SUB-SYSTEMS

We design Filters, Duplexers, Splitters and Combiners, Switching matrix, interconnection racks and enclosures, Custom assemblies, ... Our expertise includes Microwave passive systems design, Mechanical integration to customer environment, Thermal management, Cabling, wiring, harnessing, …

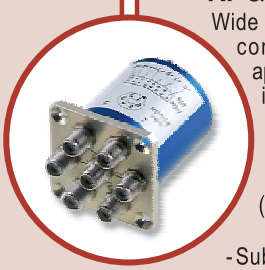


HARNESSES

The combination of design and manufacturing of RF and microwave cables as well as multipin connectors (EPX®, ARINC 404 and 600) allows RADIALL to be a specialist of harnesses for on-board (aeronautic, navy...) or land (railways, removed antenna…) equipment or communications systems. All types of contacts can be used and mixed such as signal, power, RF, quadrax, fiber optic...

RF & MICROWAVE CABLE ASSEMBLIES

RG, Eco-Friendly, Handformable, Semi-rigid, SHF Ultra-low loss (General Interconnect, Outdoor, Airframe phase matching large choice of interfaces, Lightweight), …



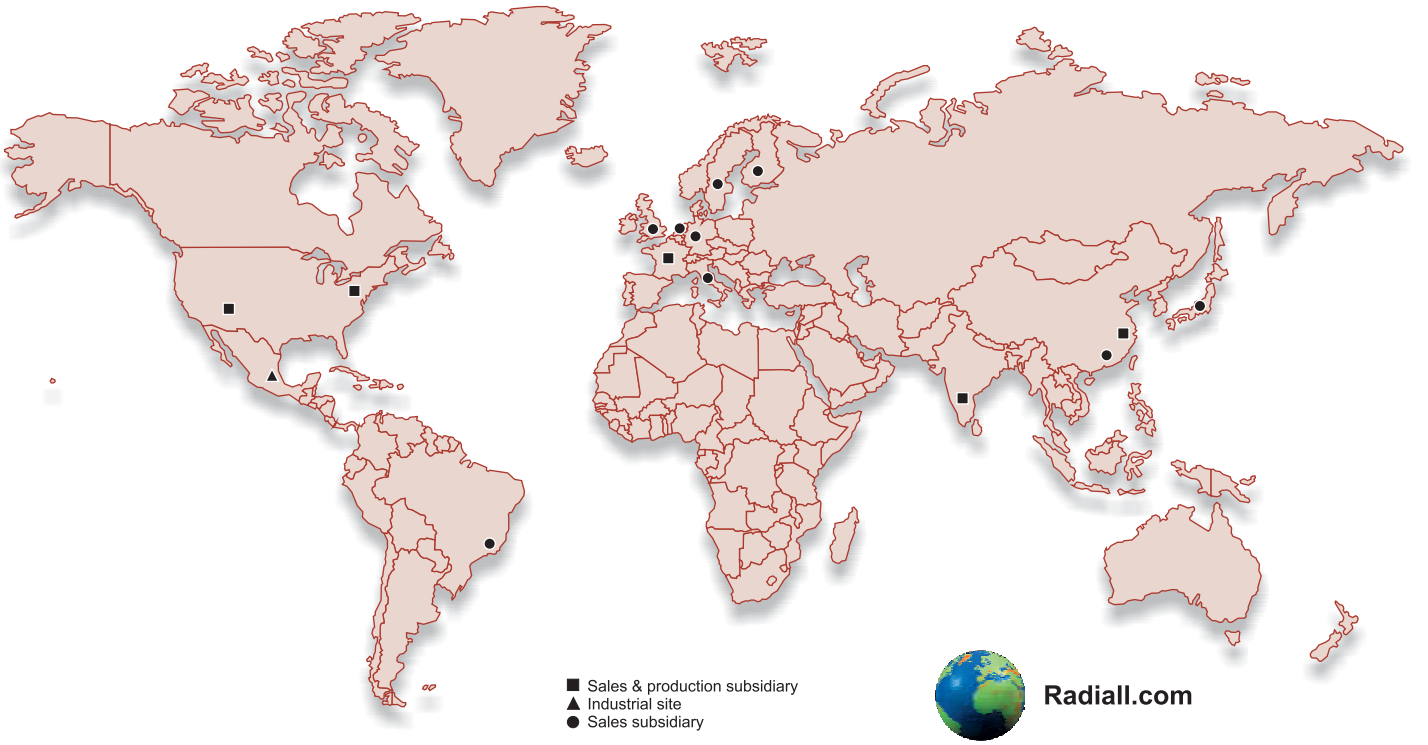
RF & MICROWAVE SWITCHES

Wide range of coaxial switching products for commercial, military and instrumentation applications. Available with a large choice of interfaces (SMA, QMA, N, ...), from DC to 40 GHz.

Main products:
- Standard RAMSES series.
- PLATINUM series with high repeatability (0.03 dB) on insertion loss during 10 million actuations.
- Subminiature SPnT up to 26.5 GHz.
- SMT high power micro-SPDT.

RF COAXIAL CONNECTORS

The widest range of coaxial connectors in the world from microminiature (UMP) to standard connectors (7/16) covering the frequency range of DC to 65 GHz mixing standardized and custom interfaces (UMP, IMP, MMS, MMT, QMA, QN, MMBX).



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RADIALL
The next conneXion

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