



SPnT



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SPNT PART NUMBER SELECTION GUIDE*

Digital Position		R1-3/model	4: RF connectors													5: Type	6: Voltage			7: Pos.	8: Options				9: Terminals		10: Documentation										
Series	Configuration		Not terminated	Terminated	SMA 3 GHz	SMA 6 GHz	SMA 18 GHz	SMA 20 GHz	SMA 26.5 GHz	SMA 29.26.5 GHz	SMA 2.9 40 GHz	QMA 6 GHz	DIN 1/6/5/6 2.5 GHz	N 3 GHz	N 12.4 GHz	BNC 3 GHz	TNC 3 GHz	TNC 12.4 GHz	Normally open	Latching	12V	24V	28V	Number of positions	Without option	Positive common	TTL driver	Suppression diodes	Positive common and suppression diodes	BCD TTL driver compatible	Solder pins	D-Sub connector	Micro-D connector	HE 10 receptacle	Certificate of conformity	Calibration certificate	Calibration certificate + RF curves
SUBMIN.	SPnT	R591	-	-	-	3	-	-	7	8	E	-	-	-	-	-	-	-	0	2/6	2	-	3	4/6	0	1	2	3	4	0	-	5	-	-	-	-	
RAMSES	SPnT	R57	3	4	3	-	4	-	F	-	8	E	9	0	1	2	5	6	0/1	2/3/4/5/8/9	2	-	3	0-9	0	1	2	3	4	8	0	5	-	-	-	-	
TITANIUM	SPnT	R51	2	4	-	3	-	4	F	-	8	-	-	-	-	-	-	-	-	7	-	3	-	4/6	-	1	2	-	-	-	-	-	-	7	-	C	R
PLATINUM	SPnT	R594	-	-	-	3	-	4	F	-	8	-	-	-	-	-	-	-	-	4/7	-	3	-	4/6	-	1	2	-	-	-	-	-	-	7	-	C	R

Example of P/N: R591703400 is a SP4T SMA up to 26.5 GHz, normally open, 28 Vdc, without option, solder pins.

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

SUBMINIATURE SPnT up to 40 GHz

SMA – SMA 2.9 – QMA

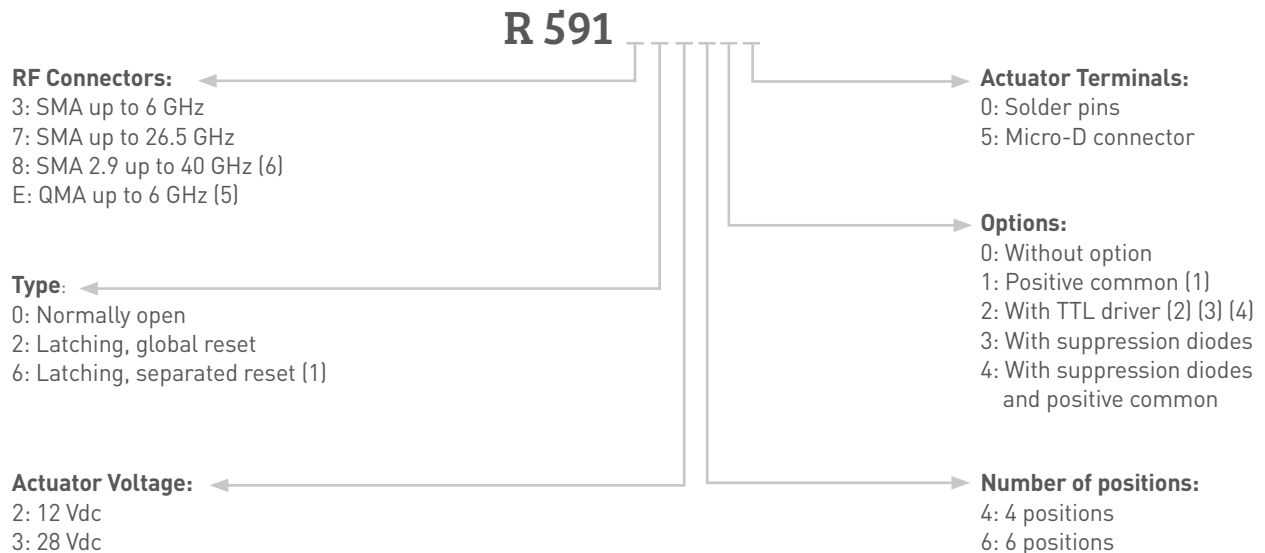


Radiall's R591 coaxial subminiature switches have a typical operating life exceeding 25 million cycles. Providing excellent RF performance, repeatability, and a guaranteed life of 10 million cycles make these switches ideal for Automated Test Equipment (ATE) and other measurement applications. These subminiature switches are also an excellent choice for Mil/Aero applications due to their small size, light weight, and outstanding shock and vibration handling capabilities.

Example of P/N:

R591302420 is a SP4T SMA up to 6 GHz, Normally open, 12 Vdc with TTL driver and solder pins.

PART NUMBER SELECTION



(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): Available with "normally open" models only



(5): The QLF trademark (Quick Lock Formula®) standard applies to QMA and QN series and guarantees the full intermateability between suppliers using this trademark.

Using QLF certified connectors also guarantees the specified level of RF performances.

(6): Connector SMA2.9 is equivalent to "K connector®", registered trademark of Anritsu

SUBMINIATURE SPnT up to 40 GHz

SMA – SMA 2.9 – 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%)	Ω	48	250	60	285
Operating current at 23°C	mA	250	110	200	98
Average power		See RF Power Rating Chart page 1-13			
TTL input	High Level	2.2 to 5.5 Volts		800µA max 5.5 Volts	
	Low Level	0 to 0.8 Volts		20µA max 0.8 Volts	
Switching time (Max)	ms	10			
Life		10 million cycles (SMA, QMA) / 2 million cycles (SMA2.9)			
Connectors		SMA - QMA - SMA 2.9			
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		-40°C to +85°C			
Storage temperature range		-55°C to +85°C			
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, 20.71g	operating		
Shock (According to MIL STD 202, Method 213B, Cond. C)		100g / 6 ms, 1/2 sine	operating		

RF PERFORMANCES

Connectors	Frequency range GHz		V.S.W.R. (max)	Insertion loss (max) dB	Isolation (min) dB	Impedance Ω
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	
		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	
SMA 2.9	DC - 40	DC - 3	1.20	0.20	80	
		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	
		26.5 - 40	2.20	1.10	45	

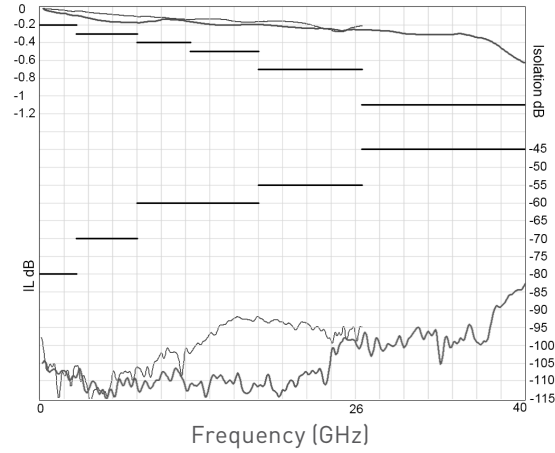
See page 5-4 for typical RF performances

SUBMINIATURE SPnT up to 40 GHz

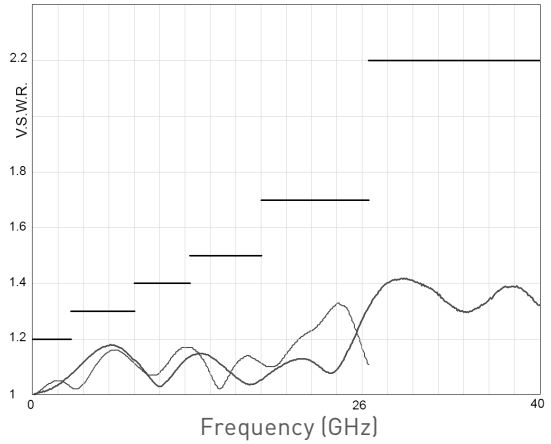
SMA – SMA 2.9 – QMA

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation

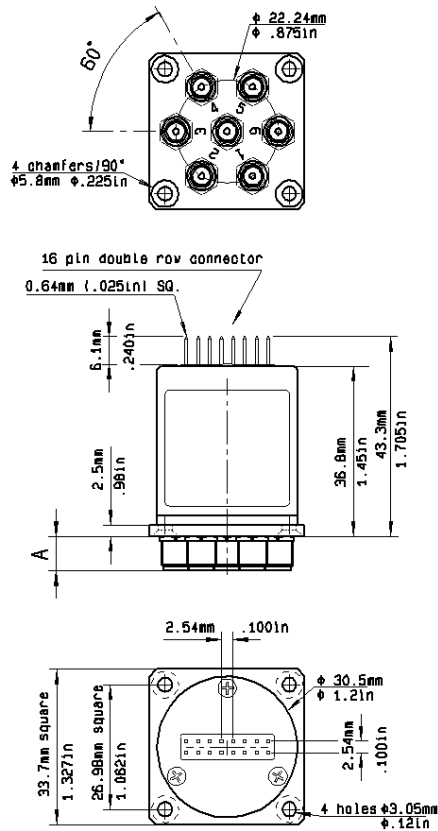


V.S.W.R.

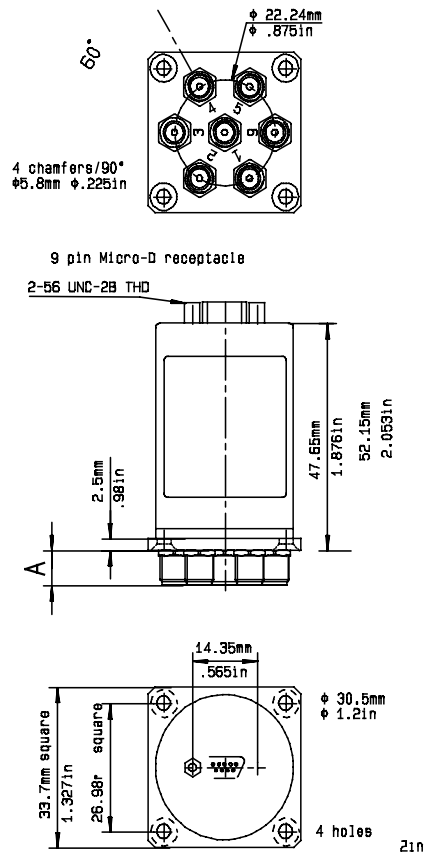


TYPICAL OUTLINE DRAWING (1)

Solder pin Model



Micro-D Model



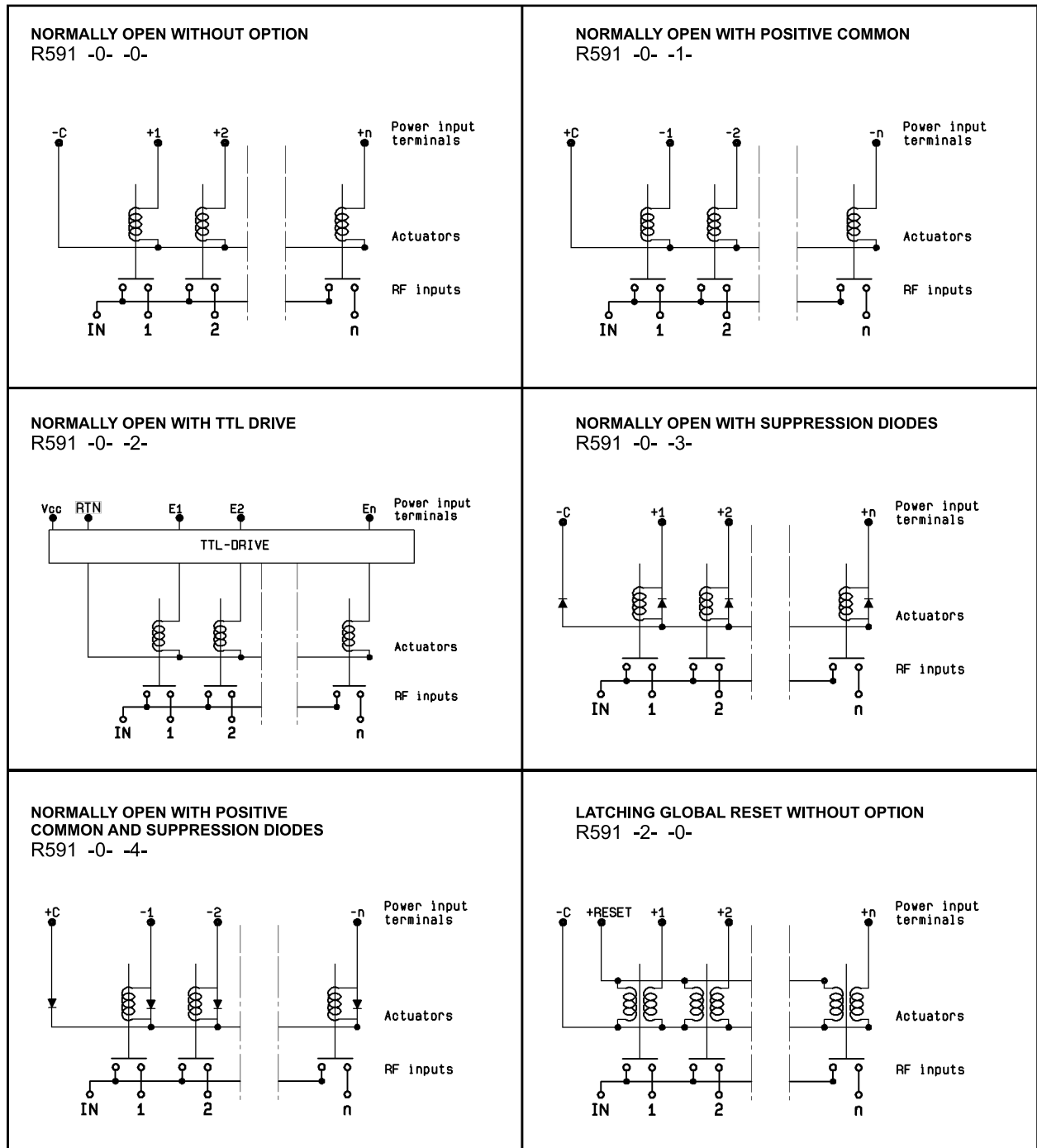
(1) : For SP4T, ways 3 and 6 not connected
All dimensions are in mm/inches

Connectors	SMA	SMA 2.9	QMA
A max (mm/in.)	7.4/0.291	6.3/0.248	10.8/0.425

SUBMINIATURE SPnT up to 40 GHz

SMA – SMA 2.9 – QMA

R591 SERIES ELECTRICAL SCHEMATICS

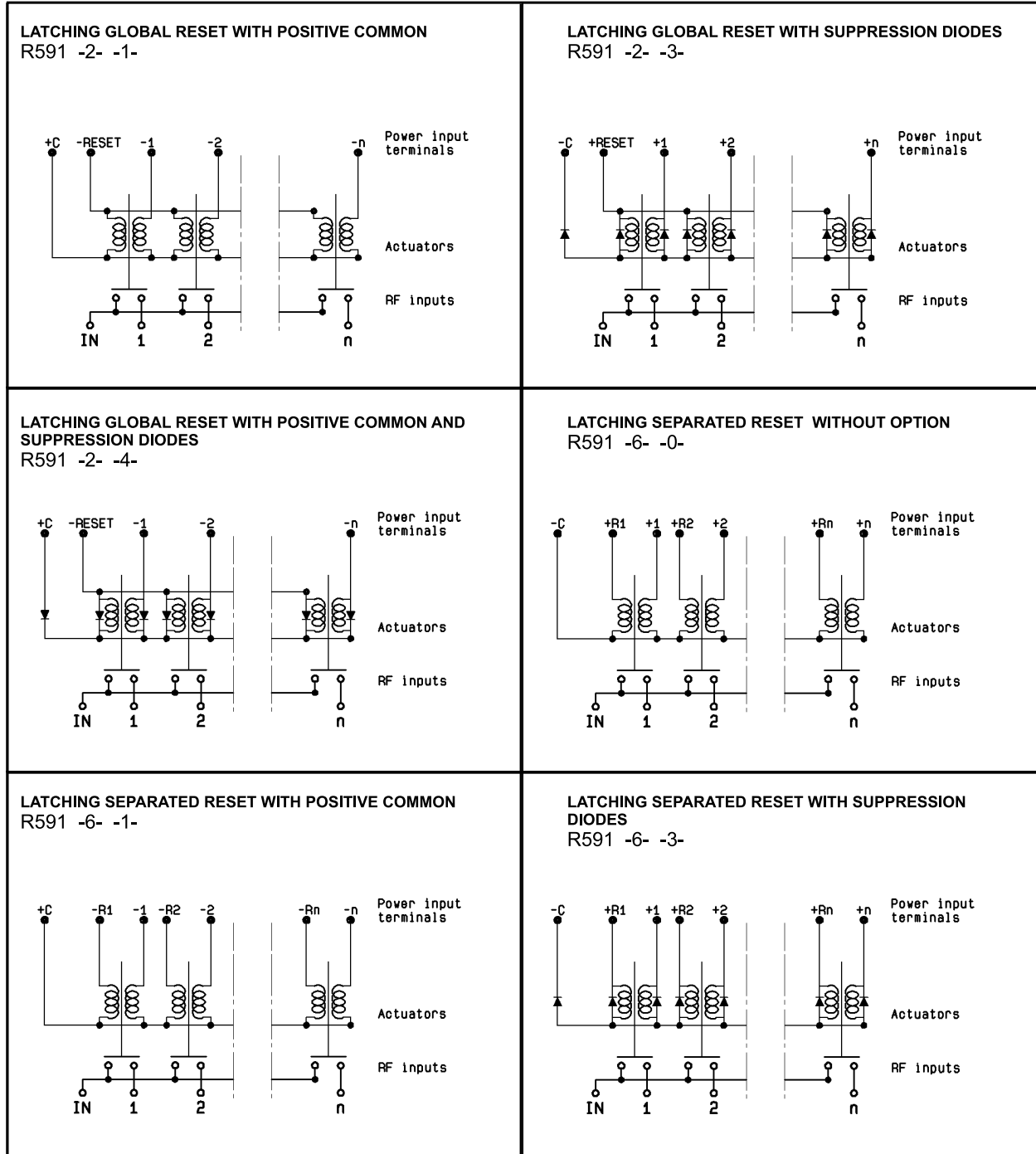


SUBMINIATURE SERIES

SUBMINIATURE SPnT up to 40 GHz

SMA – SMA 2.9 – QMA

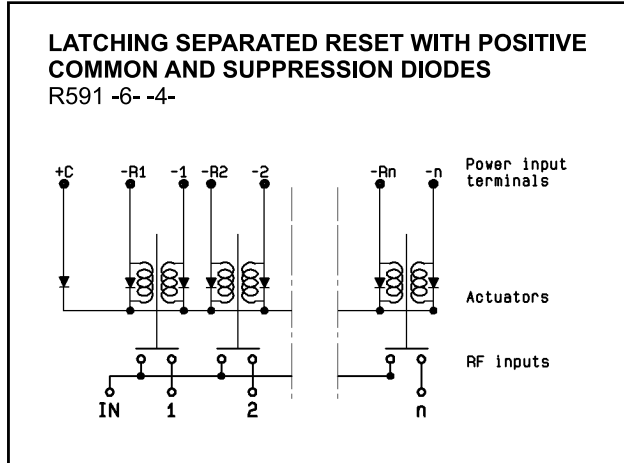
R591 SERIES ELECTRICAL SCHEMATICS



SUBMINIATURE SPnT up to 40 GHz

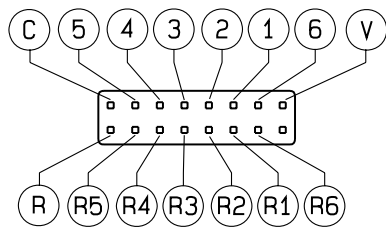
SMA – SMA 2.9 – QMA

R591 SERIES ELECTRICAL SCHEMATICS

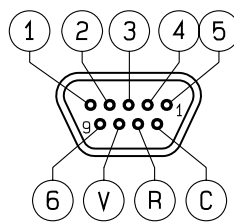


PIN IDENTIFICATION

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	+2	+3	+4	+5	+6	NC	NC	NC	NC	NC	NC	NC
	Positive common	+C	NC	-1	-2	-3	-4	-5	-6	NC	NC	NC	NC	NC	NC	NC
Latching global reset	Negative common	-C	NC	+1	+2	+3	+4	+5	+6	+reset	NC	NC	NC	NC	NC	NC
	Positive common	+C	NC	-1	-2	-3	-4	-5	-6	-reset	NC	NC	NC	NC	NC	NC
Latching individual reset*	Negative common	-C	NC	+1	+2	+3	+4	+5	+6	NC	+res.1	+res.2	+res.3	+res.4	+res.5	+res.6
	Positive common	+C	NC	-1	-2	-3	-4	-5	-6	NC	-res.1	-res.2	-res.3	-res.4	-res.5	-res.6
Normally open with TTL drive		RTN	VCC	E1	E2	E3	E4	E5	E6	NC	NC	NC	NC	NC	NC	NC

*Available with "solder pins" models only.

SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6



Radiall's R573 & R574 multithrow coaxial switches are offered in many configurations (over 40,000 possible combinations) including Terminated and non Terminated options. Radiall offers reliable products, with shorter delivery times and competitive pricing. Excellent typical RF performance make RAMSES switches (40 GHz) ideal for Automated Test Equipment (ATE) and other measurement applications.

These switches are suitable for defense, industrial, instrumentation and telecommunication applications.

Example of P/N:

R574453605 is a terminated SP6T SMA up to 18 GHz, Latching, Self Cut-Off, 28 Vdc, Indicators and male 25 pin D-Sub connector.

PART NUMBER SELECTION

R 57

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) (11)
- 4: SMA up to 18 GHz
- 7: SMA 2.9 up to 26.5 GHz (4) (5) (12)
- F: SMA up to 26.5 GHz (6) (10)
- 8: SMA 2.9 up to 40 GHz (4) (12)
- 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)
- 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 TTL driver compatible (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 equipped with suppression diodes

(2): Standard products are equipped with negative common

(3): Latching BCD driver enables also a global reset through driver code 0000 [see BCD logic coding page 1-11]

(4): Available only up to 6 positions

(5): Model "3" only

(6): Model "4" only up to 6 positions

(7): Option not available for type 4, 5, 8 and 9

(8): Option available only with type 0, 1, 8 and 9

(9): Polarity is not relevant to application for switches with TTL driver

(10): 10 positions are available only up to 22 GHz, 12 positions only up to 18 GHz



(11) : The QLF trademark (quick lock formula®) standard applies to QMA and QN series and guarantees the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performance

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

*For precisions see availability of options chart page 5-9

SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA - DIN 1.6 / 5.6

GENERAL SPECIFICATIONS

Type 2, 3, 4 and 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 global current is: the nominal operating current multiplied by the 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.

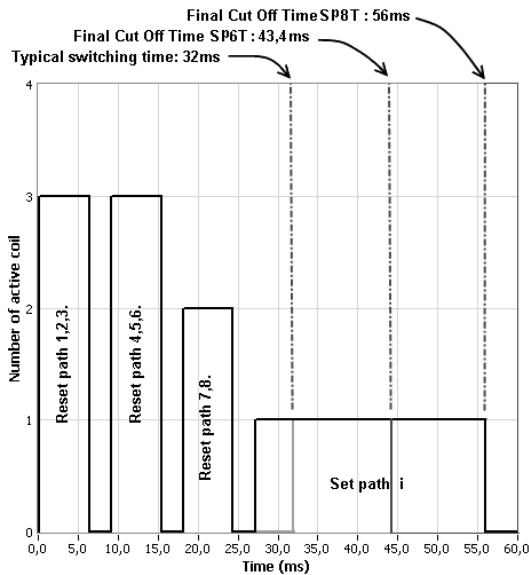
An electronic circuit supplies successively groups of 2, 3 or 4 actuators, in order to limit the maximum current.

The current with this option is the total current of 2, 3 or 4 reset coils in the same time (see table below).

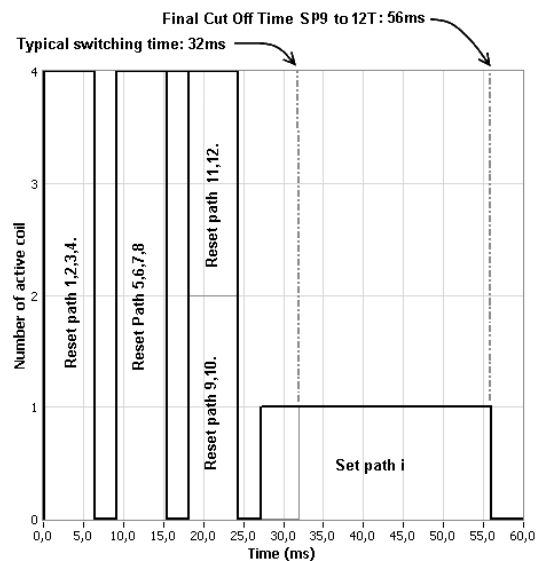
Example: During the AUTOMATIC RESET operation, at 28 Vdc, 4 position switch has a temporary consumption of only 250 mA, during 40 ms maximum.

SWITCHING SEQUENCE

For SP6 to 8T



For SP9 to 12T



n = number of positions

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

Availability of options according to both type and number of positions

Type	Numbers 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

SPnT Terminated & non Terminated up to 40 GHz

**SMA – SMA 2.9 – QMA - DIN 1.6 / 5.6
GENERAL SPECIFICATIONS**

Operating mode		Normally open		Latching	
Nominal operating voltage	Vdc	12 (10.2 / 13)	28 (24 / 30)	12 (10.2 / 13)	28 (24 / 30)
Coil resistance (+/-10%)	Ω	47.5	275	See table on previous page	
Nominal operating current at 23°C	mA	250	102		
Average power		See Power Rating Chart page 1-13			
TTL input	High Level	2.2 to 5.5 V (TTL Option) / 800µA max 5.5 volts 3.5 to 5.5 V (BCD Option)			
	Low Level	0 to 0.8 V (TTL Option) / 20µA max 0.8 volts 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)	Non terminated SP3 to 6T (R573 serie)	SMA - QMA 5 million cycles		SMA 2.9 - 1.6/5.6 2 million cycles	
	Terminated SP3 to 6T (R574 serie)	2 million cycles			
	SP7 to 12T (all models)				
Connectors		SMA - SMA2.9 - QMA - DIN 1.6/5.6			
Actuator terminals		Solder pins or male 25 pin D-sub connector			
Operating temperature range	DIN 1.6/5.6	-25°C to +70°C			
	SMA - SMA 2.9 - QMA	-40°C to +85°C			
Storage temperature range	DIN 1.6/5.6	-40°C to +85°C			
	SMA - SMA 2.9 - QMA	-55°C 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, 1/2 sine operating for SP3 to 8T, survival for SP7 to 12T			

RF PERFORMANCES

SMA Connector						
Number of positions	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ω
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 - 26.5	DC - 3	1.20	0.20	80	
		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	
		18 - 22	1.70	0.70	60	
		22 - 26.5	2.00	1.10	55	
9 to 10	DC - 3 DC - 22	DC - 3	1.20	0.20	80	
		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	
		18 - 22	1.80	0.80	55	
11 to 12	DC - 3 DC - 18	DC - 3	1.20	0.20	80	
		3 - 8	1.40	0.40	70	
		8 - 12.4	1.60	0.60	60	
		12.4 - 15	1.70	0.70	60	
		15 - 18	1.80	0.80	50	

SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

RF PERFORMANCES

SMA2.9 Connector						
Number of positions	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ω
3 to 6	DC - 26.5 DC - 40	DC - 6	1.30	0.20	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	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 Ω
3 to 6	DC - 2.5	DC - 1	1.30	0.20	80	75
		1 - 2.5	1.40	0.30	70	

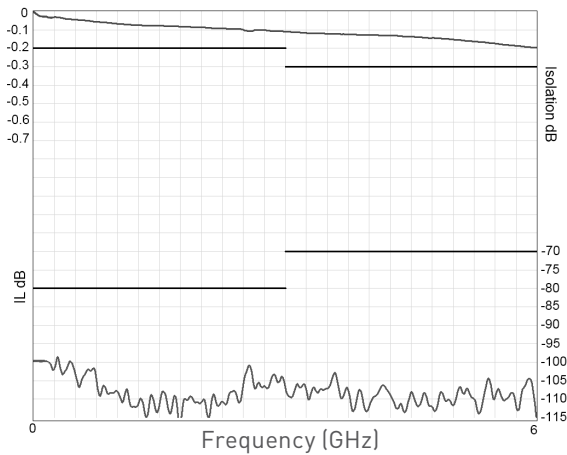
QMA Connector						
Number of positions	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ω
3 to 6	DC - 6	DC - 3	1.20	0.20	80	50
		3 - 6	1.30	0.30	70	

See page 5-12, 5-13, 5-14 and 5-15 for typical RF performances

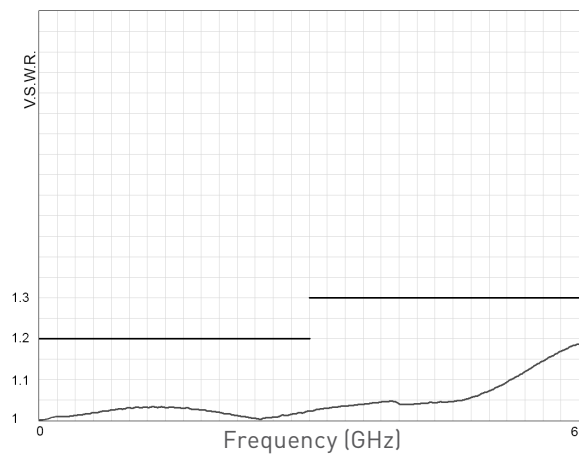
R573 AND R574 TYPICAL RF PERFORMANCES

Example: SP6T QMA up to 6 GHz

Insertion Loss and Isolation



V.S.W.R.

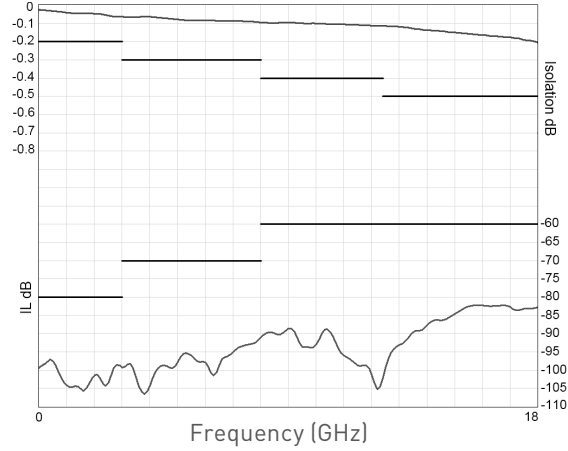


SPnT Terminated & non Terminated up to 40 GHz

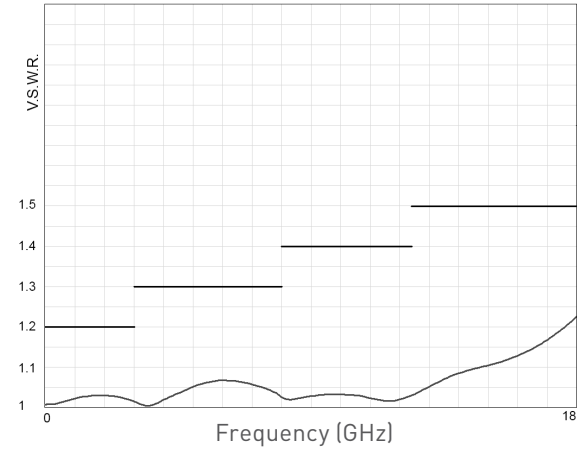
SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

Example: Non terminated SP6T SMA up to 18 GHz

Insertion Loss and Isolation

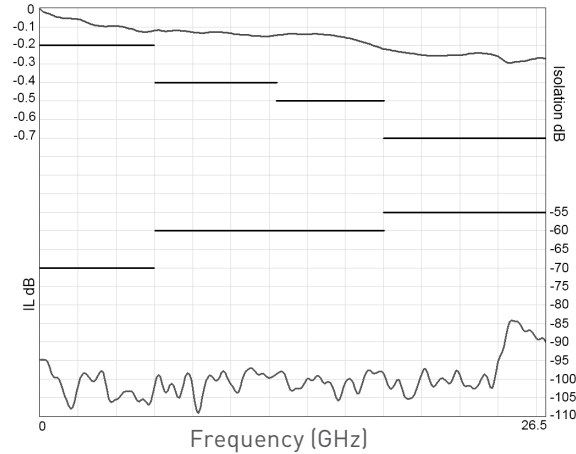


V.S.W.R.

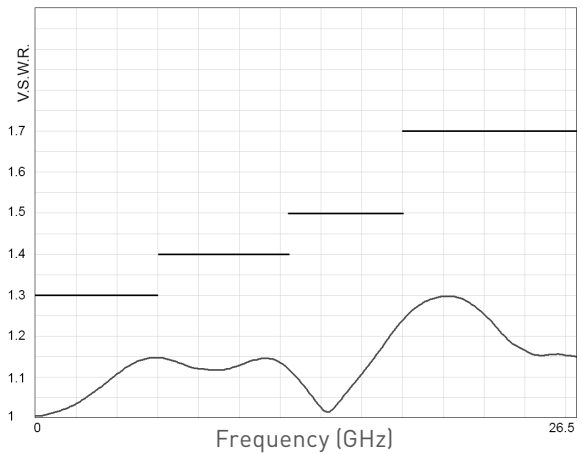


Example: Non terminated SP6T SMA 2.9 up to 26.5 GHz

Insertion Loss and Isolation

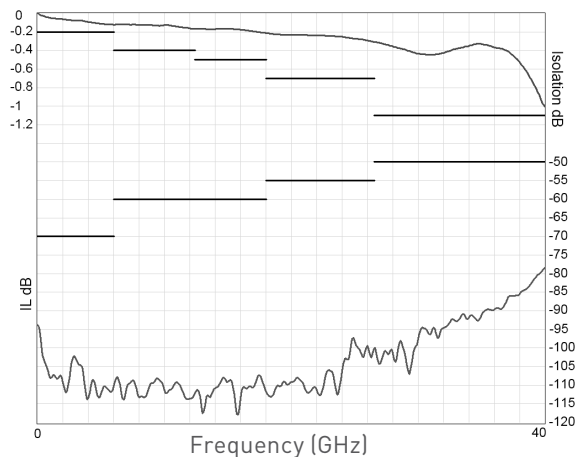


V.S.W.R.

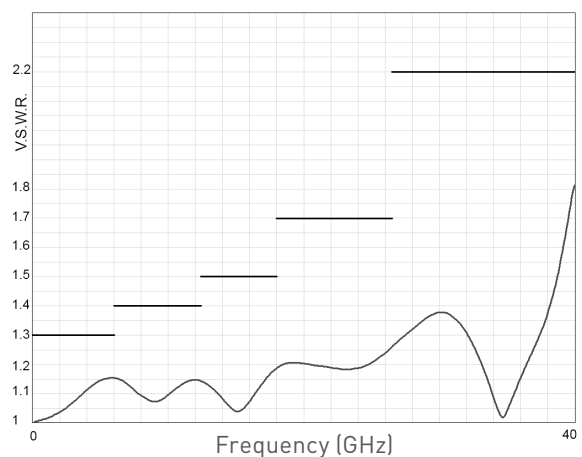


Example: Non terminated SP6T SMA 2.9 up to 40 GHz

Insertion Loss and Isolation



V.S.W.R.

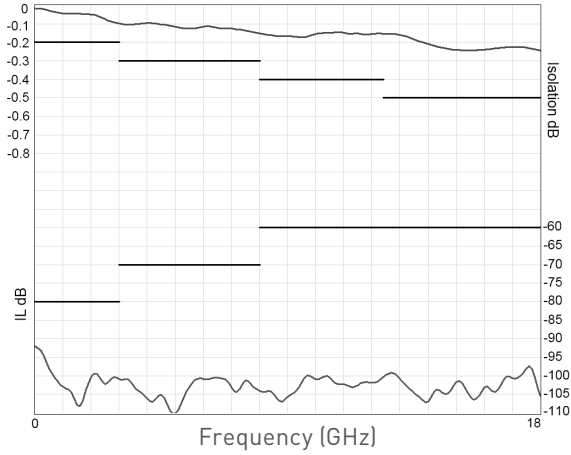


SPnT Terminated & non Terminated up to 40 GHz

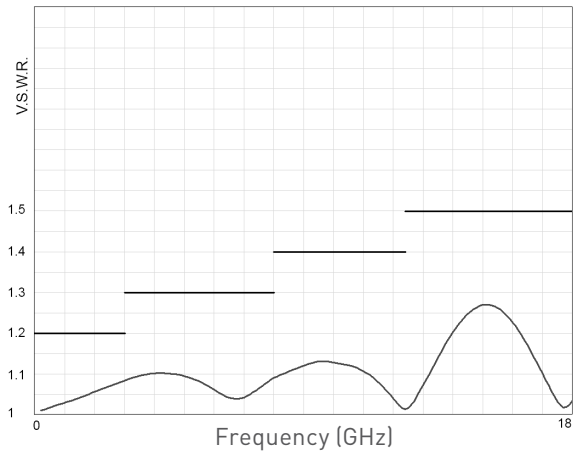
SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

Example: Terminated SP6T SMA up to 18 GHz

Insertion Loss and Isolation

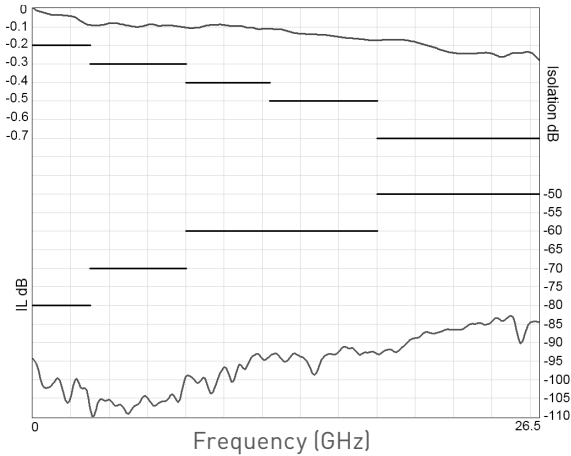


V.S.W.R.

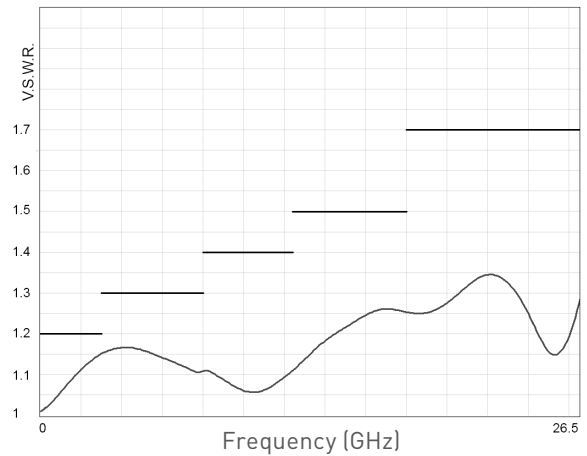


Example: Terminated SP6T SMA up to 26.5 GHz

Insertion Loss and Isolation

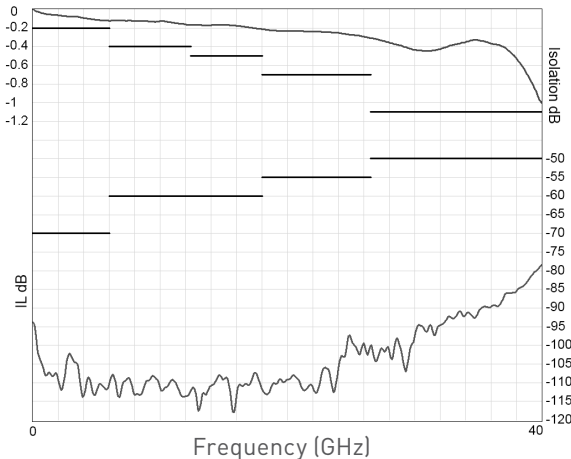


V.S.W.R.

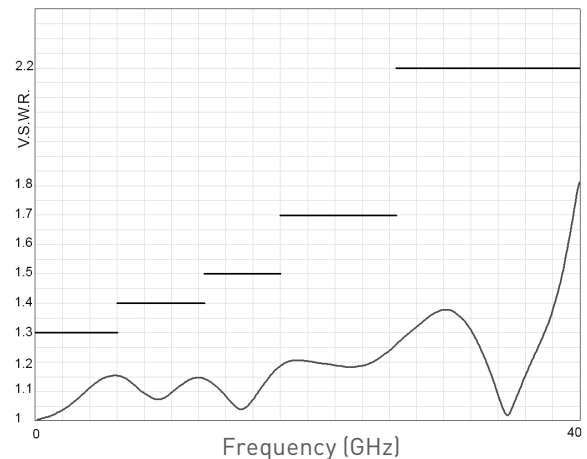


Example: Terminated SP6T SMA 2.9 up to 40 GHz

Insertion Loss and Isolation



V.S.W.R.



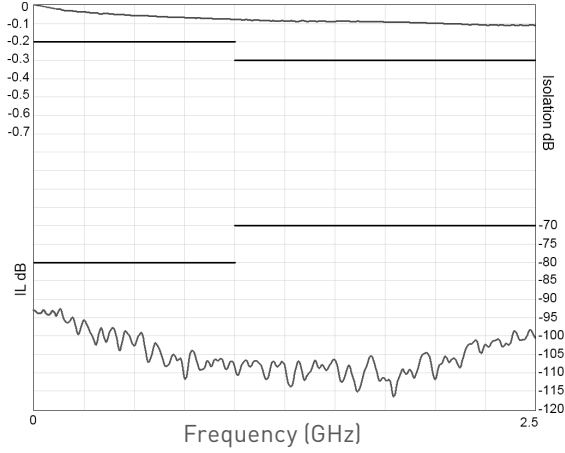
RAMSES SERIES

SPnT Terminated & non Terminated up to 40 GHz

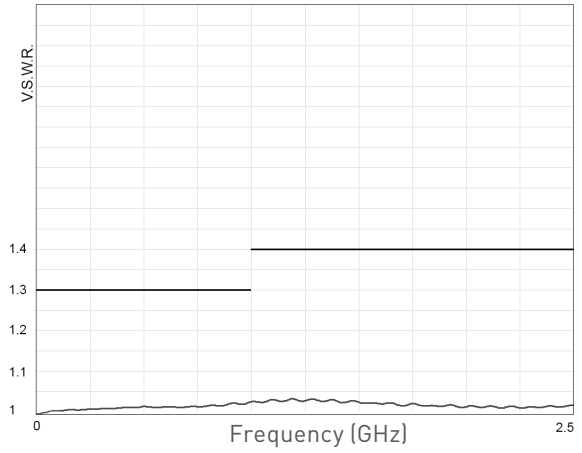
SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

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

Insertion Loss and Isolation

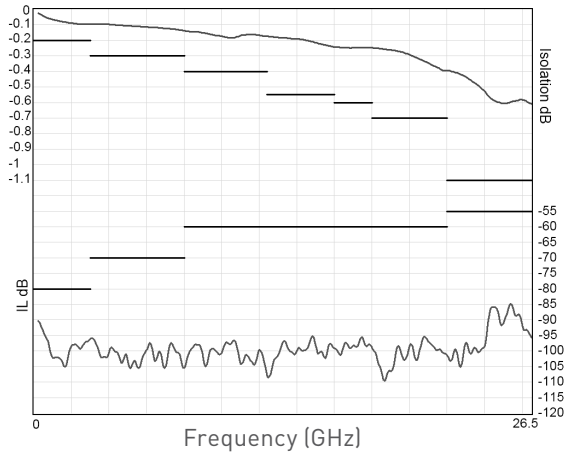


V.S.W.R.

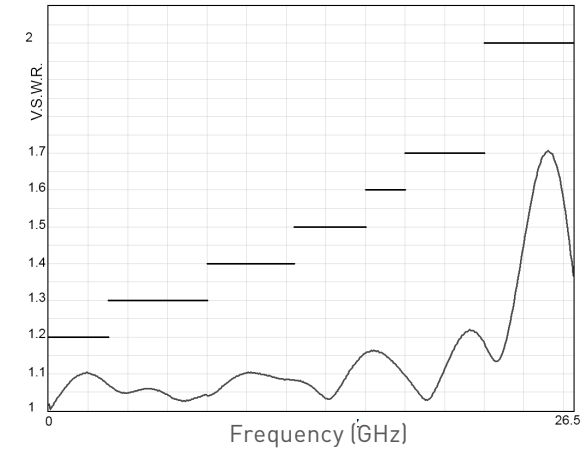


Example: SP8T SMA up to 26.5 GHz

Insertion Loss and Isolation

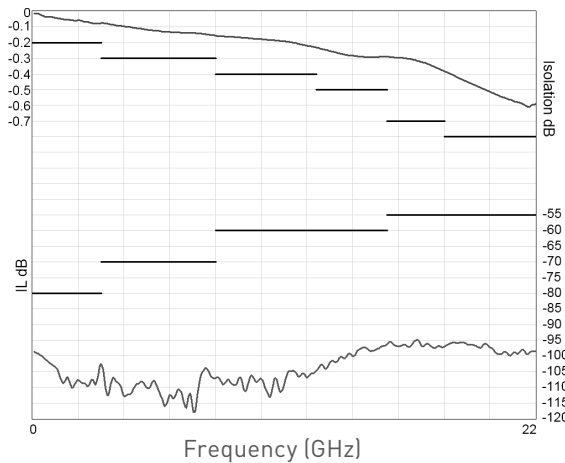


V.S.W.R.

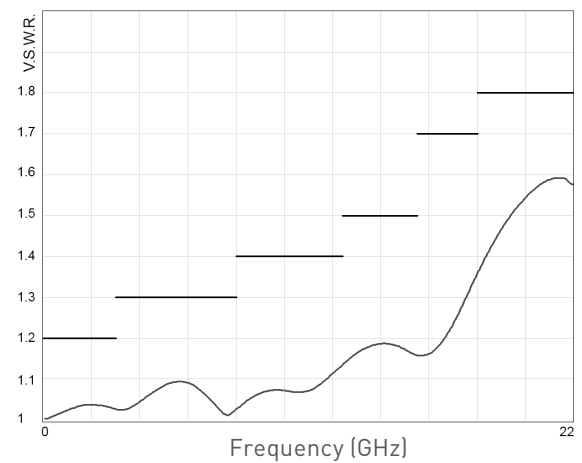


Example: SP10T SMA up to 26.5 GHz

Insertion Loss and Isolation



V.S.W.R.

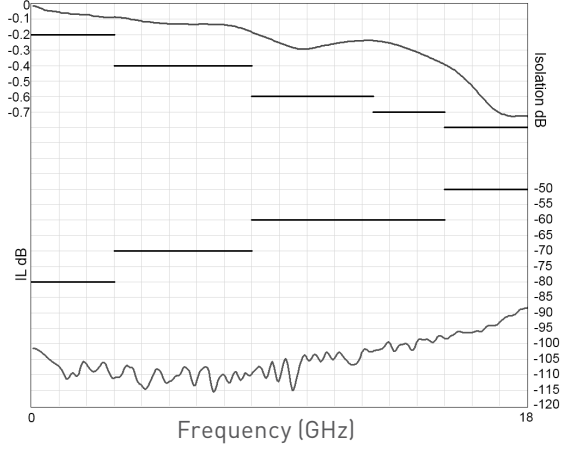


SPnT Terminated & non Terminated up to 40 GHz

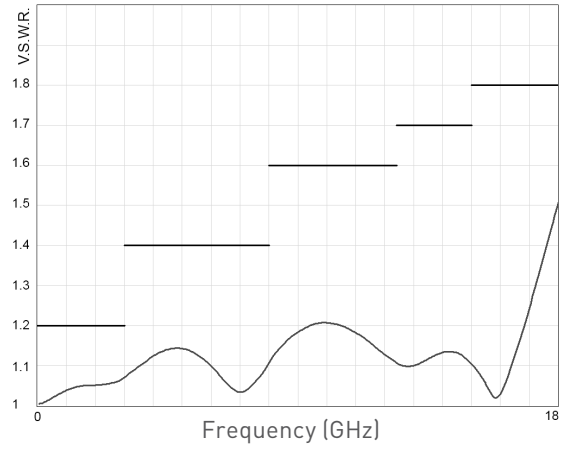
SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

Example: SP12T SMA up to 18 GHz

Insertion Loss and Isolation



V.S.W.R.

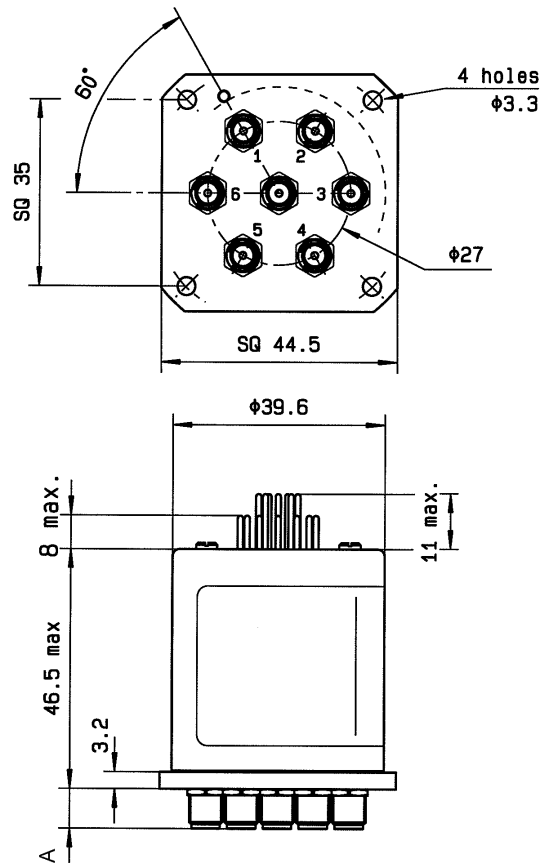


TYPICAL OUTLINE DRAWINGS

NON TERMINATED 3 to 6 positions

Connectors	A max (mm)
SMA up to 26.5 GHz	7.4
SMA2.9 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 pins	Type 0 or 1 with option 0 - 1 - 3 or 4
	Type 2 or 3 with option 0 or 1



RAMSES SERIES

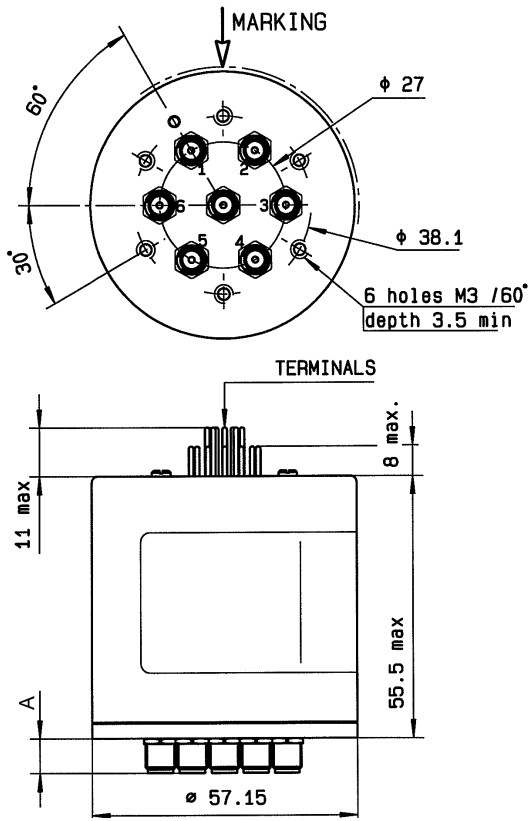
SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

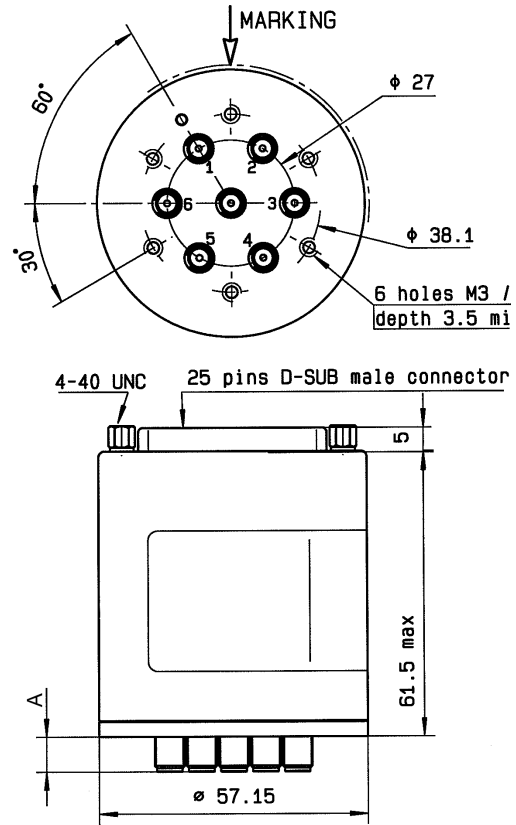
TYPICAL OUTLINE DRAWINGS

NON TERMINATED 3 to 6 positions (continued)

Solder pin model



D-sub model



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
-----------------	------------

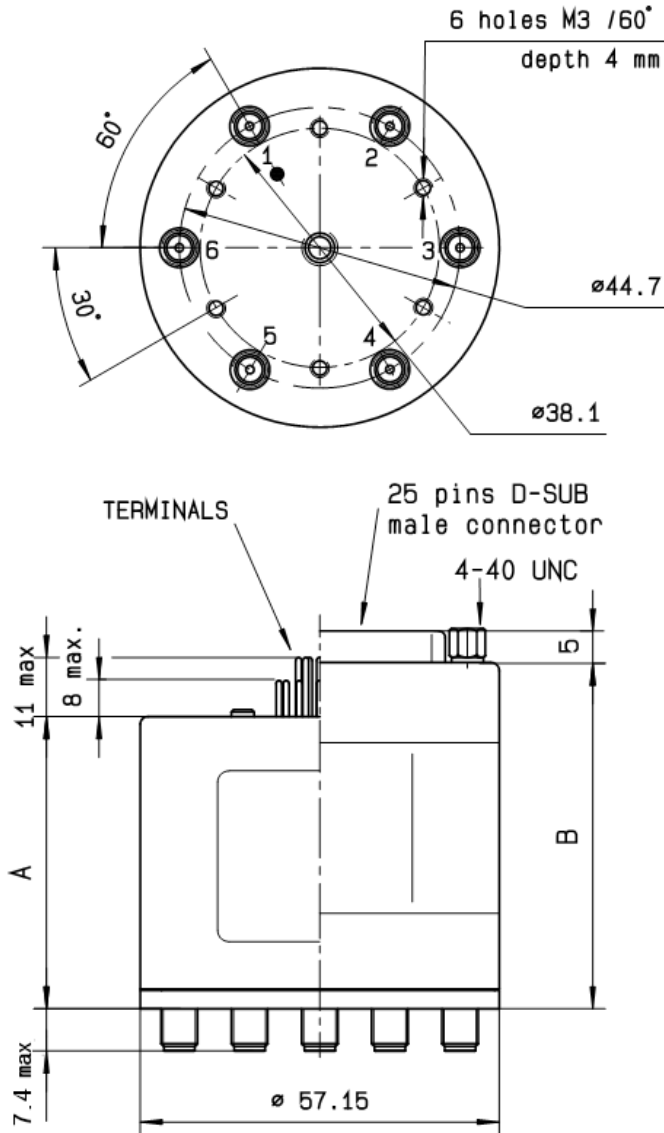
Connectors	A max (mm)
SMA up to 26.5 GHz	7.4
SMA 2.9 up to 40 GHz	6.3
QMA up to 6 GHz	10.8
DIN 1.6/5.6 up to 2.5 GHz	11.5

SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

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

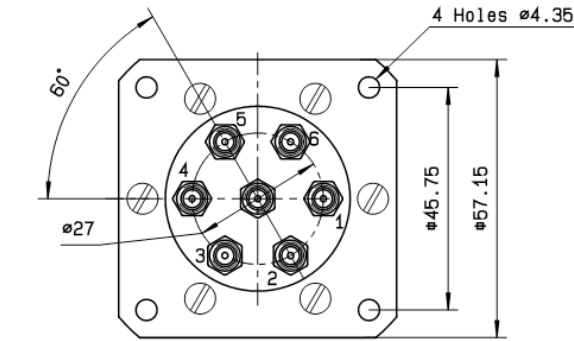
SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA - DIN 1.6 / 5.6

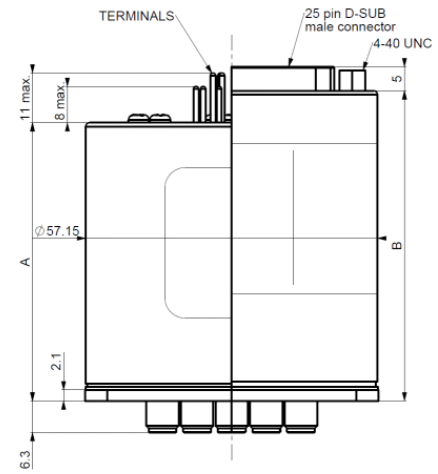
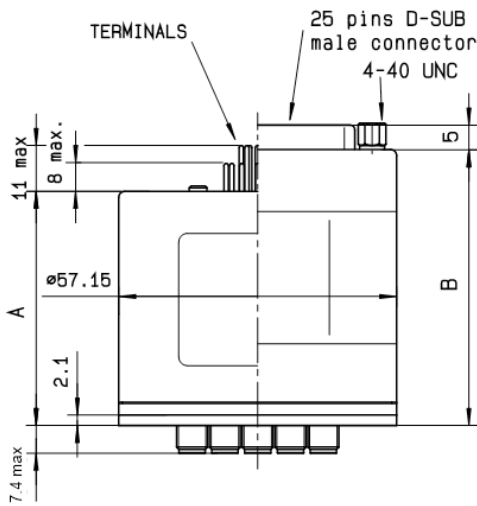
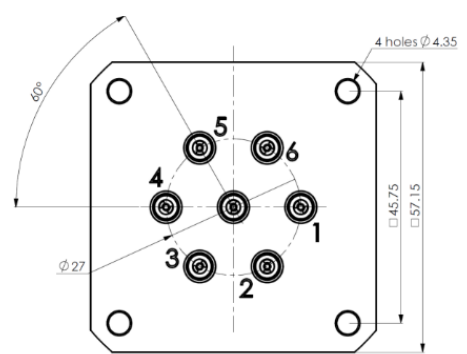
TYPICAL OUTLINE DRAWINGS

TERMINATED 3 to 6 positions 26.5 GHz & 40 GHz

26.5 GHz model



40 GHz model



	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

SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

TYPICAL OUTLINE DRAWINGS

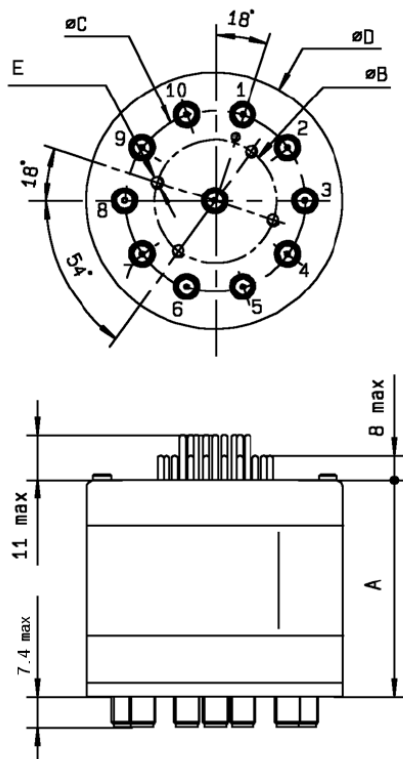
TERMINATED or NON TERMINATED 7 to 12 positions

Type	A (max) 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	56.9	4 holes M3 depth 4mm
9 - 10	30.5	44.7	63.5	
11 - 12	40.6	55.9	68.3	

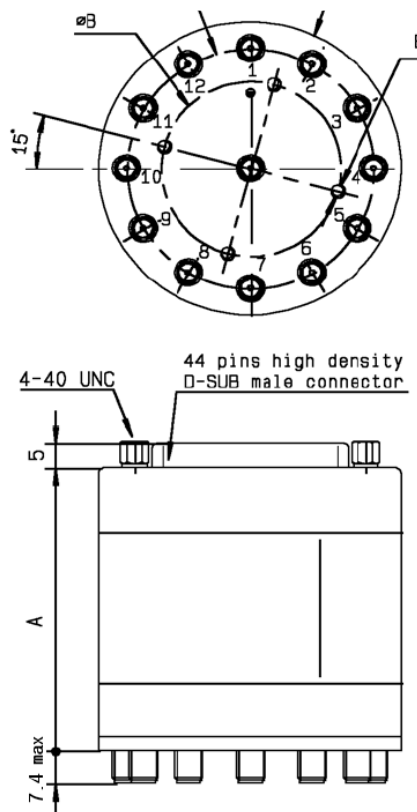
10 position model

Terminated up to 18 GHz with solder pins



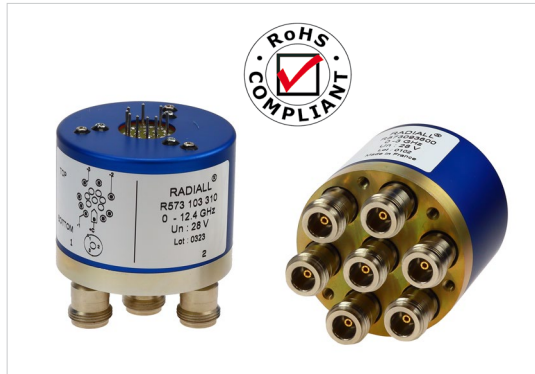
12 position model

Terminated up to 12.4 GHz with D-Sub



SPnT up to 12.4 GHz - RAMSES Concept

N - BNC - TNC



Radiall's R573 & R574 multithrow coaxial switches are offered in many configurations (over 40,000 possible combinations) including Terminated and non Terminated options. Radiall offers reliable products, with shorter delivery times and competitive pricing. Excellent typical RF performance make RAMSES switches (12.4 GHz) ideal for Automated Test Equipment (ATE) and other measurement applications.

These switches are suitable for defense, industrial, and telecommunication applications.

Example of P/N:

R573103600 is a SP6T N up to 12.4 GHz, Normally Open, 28 Vdc, and solder pins.

PART NUMBER SELECTION

R 57

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 (9)
- 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 (1) (8)
- 3: With suppression diodes
- 4: With suppression diodes and positive common (2) (6)
- 8: BCD TTL driver compatible (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
- 2: 12 Positions

I.C.: Indicator contact / S.C.O.: Self Cut-Off / A.R.: Auto Reset

(1): These models are already equipped with suppression diodes

(2): Standard products are equipped with negative common

(3): Latching BCD driver enables also a global reset through driver code 0000

(see BCD logic coding page 1-13)

(4): Available only up 6 positions

(5): Model "3" only

(6): Option not available for type 4, 5, 8 and 9

(7): Option available only with type 0, 1, 8 and 9

(8): Polarity is not relevant to application for switches with TTL driver

(9) 7 to 12 positions are available only up to 8 GHz

*For precisions see availability of options chart page 5-21

SPnT up to 12.4 GHz - RAMSES Concept

N - BNC - TNC

GENERAL SPECIFICATIONS

Type 2, 3, 4 and 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 global current the nominal operating current multiplied by the 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.

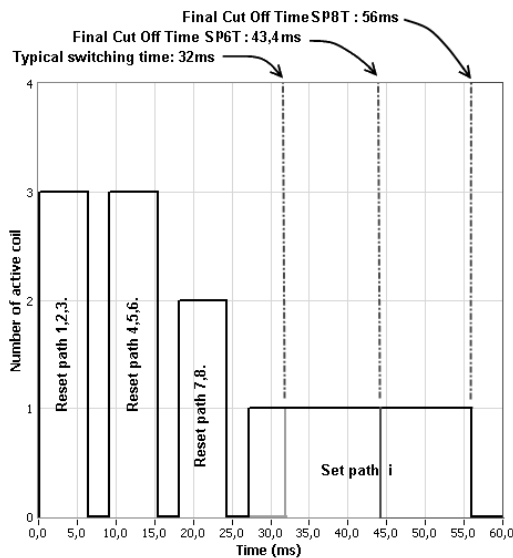
An electronic circuit supplies successively groups of 2, 3 or 4 actuators, in order to limit the maximum current.

The current with this option is the total current of 2, 3 or 4 reset coils in the same time (see table below).

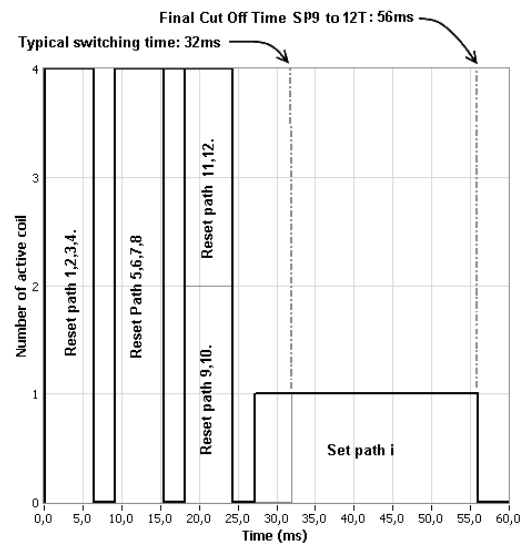
Example: During the AUTOMATIC RESET operation, at 28 Vdc, 4 position switch has a temporary consumption of only 250 mA, during 40 ms maximum.

SWITCHING SEQUENCE

For SP6 to 8T



For SP9 to 12T



n = number of positions

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

Availability of options according to both type and number of positions

Type	Numbers 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

SPnT up to 12.4 GHz - RAMSES Concept

N - BNC - TNC

GENERAL 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 table on previous page	
Nominal operating current at 23°C	mA	250	102		
Average power		See Power Rating Chart page 1-13			
TTL input	High Level	2.2 to 5.5 V (TTL Option) / 3.5 to 5.5 V (BCD Option)		800µA max 5.5 volts	
	Low Level	0 to 0.8 V (TTL Option) / 0 to 1.5 V (BCD Option)		20µA max 0.8 volts	
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)	Non 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		-40°C to +85°C			
Storage temperature range		-55°C to +85°C			
Vibration (MIL STD 202, method 204D, cond.C)		10-2000 Hz , 10g		operating	
Shock (MIL STD 202, method 213B, cond.C)		50g / 1 ms, 1/2 sine		operating	

RF PERFORMANCES

N - TNC - BNC Connector						
Number of positions	Frequency range GHz	V.S.W.R. (max)	Insertion loss (max) dB	Isolation (min) dB	Impedance Ω	
3 to 6	DC - 12.4	DC - 3	1.20	0.20	80	50
		3 - 8	1.35	0.35	70	
		8 - 12.4	1.50	0.50	60	
7 to 10	DC - 8	DC - 3	1.30	0.30	80	
		3 - 8	1.50	0.50	70	
11 to 12	DC - 8	DC - 3	1.35	0.50	70	
		3 - 8	1.70	1.00	60	

See page 5-25 for typical RF performances

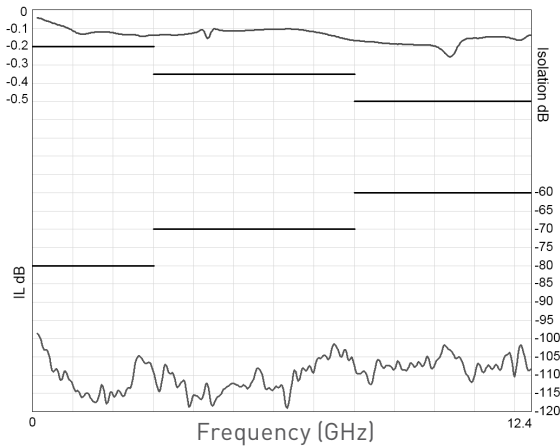
SPnT up to 12.4 GHz - RAMSES Concept

N - BNC - TNC

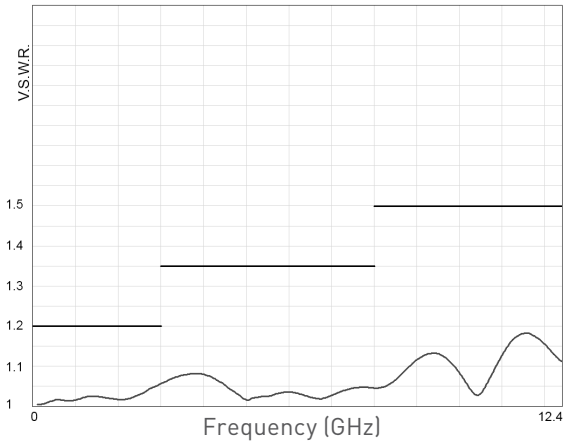
R573 AND R574 TYPICAL RF PERFORMANCES

Example: SP6T N up to 12.4 GHz

Insertion Loss and Isolation

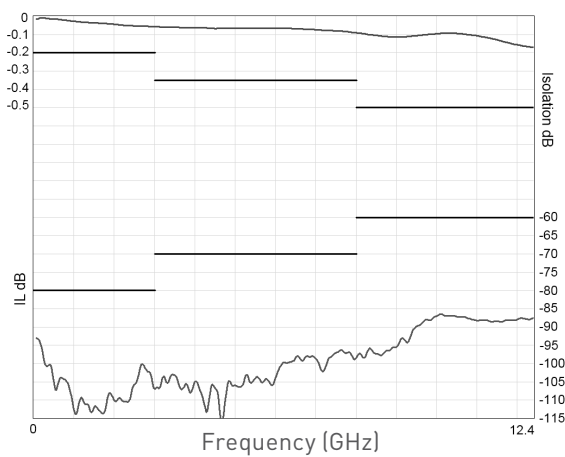


V.S.W.R.

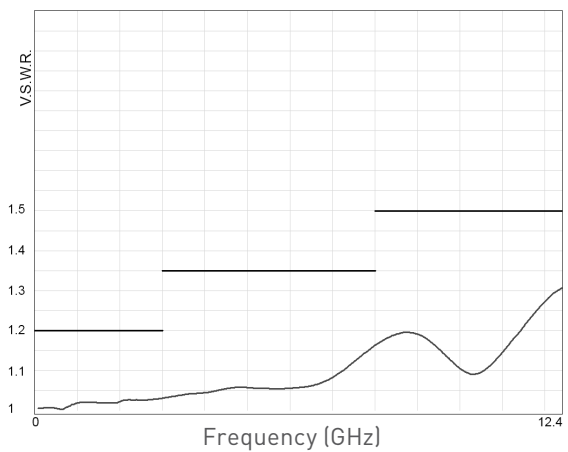


Example: SP6T TNC up to 12.4 GHz

Insertion Loss and Isolation

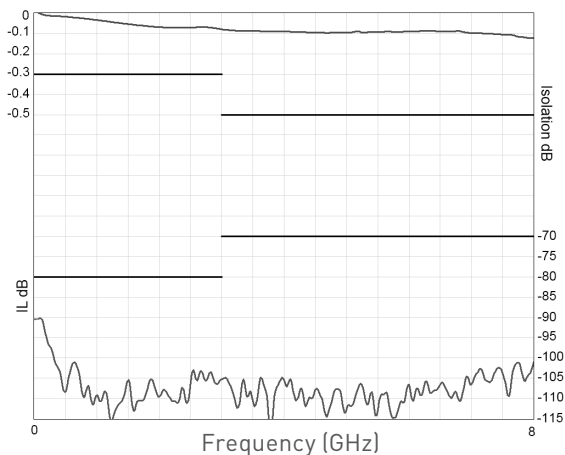


V.S.W.R.

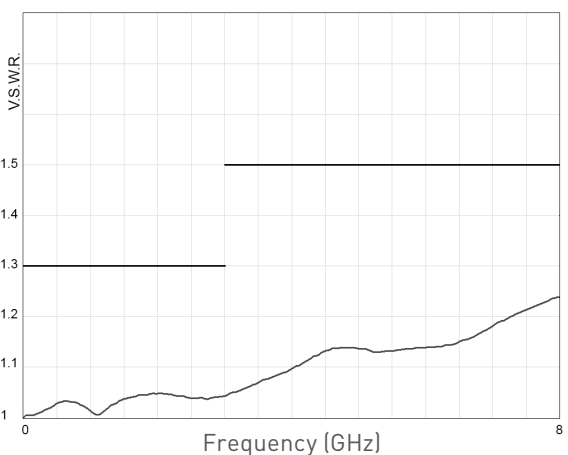


Example: SP8T up to 8 GHz

Insertion Loss and Isolation



V.S.W.R.



SPnT up to 12.4 GHz - RAMSES Concept

N - BNC - TNC

TYPICAL OUTLINE DRAWINGS

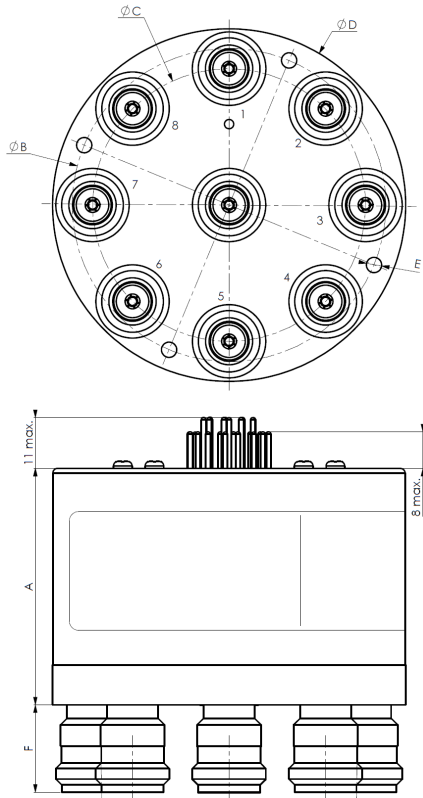
TERMINATED or NOT 3 to 12 positions

Type	A max (mm)	
	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

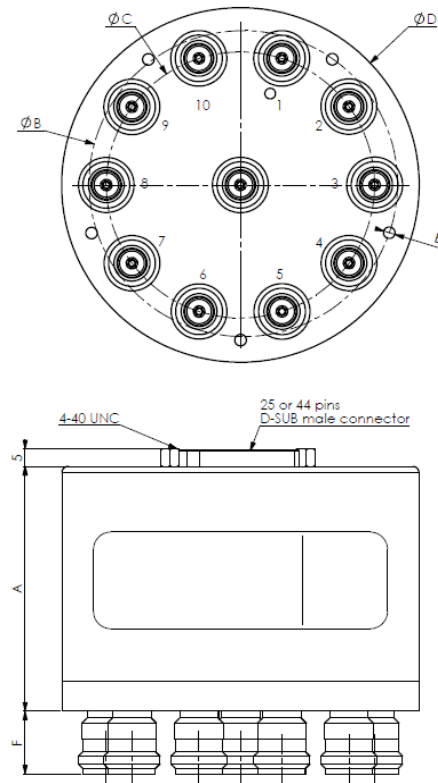
Connectors	F max (mm)
N	18.8
BNC	11
TNC	11

Number of 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 SP8T positions up to 8 GHz
with solder pins



Model SP10T positions up to 8 GHz
D-Sub male connector



RF CONNECTORS ALLOCATION

See on page 5-25 and 5-26

SPnT Terminated & non Terminated up to 40 GHz

SMA - SMA 2.9 - QMA - DIN 1.6 / 5.6

RF CONNECTORS ALLOCATION FOR SPNT SERIES

Connectors A: 1.6/5.6, QMA, SMA, SMA 2.9

Other Connectors: N, BNC, TNC

SPnT 3 ways			
NON TERMINATED Version		TERMINATED Version	
Up to 40 GHz models Without option Connectors A	Up to 40 GHz models With option Connectors A and other connectors	Up to 22 GHz models Connectors A and other connectors	26.5 GHz and 40 GHz models with SMA - SMA 2.9
SPnT 4 ways			
NON TERMINATED Version		TERMINATED Version	
Up to 40 GHz models Without option Connectors A	Up to 40 GHz models With option Connectors A and other connectors	Up to 22 GHz models Connectors A and other connectors	26.5 GHz and 40 GHz models with SMA - SMA 2.9
SPnT 5 ways			
NON TERMINATED Version		TERMINATED Version	
Up to 40 GHz models Without option Connectors A	Up to 40 GHz models With option Connectors A and other connectors	Up to 22 GHz models Connectors A and other connectors	26.5 GHz and 40 GHz models with SMA - SMA 2.9

SPnT Terminated & non Terminated up to 40 GHz

SMA – SMA 2.9 – QMA – DIN 1.6 / 5.6

RF CONNECTORS ALLOCATION (CONTINUED)

Connectors A: 1.6/5.6, QMA, SMA, SMA 2.9

Other Connectors: N, BNC, TNC

SPnT 6 ways			
NON TERMINATED Version		TERMINATED Version	
Up to 40 GHz models Without Option Connectors A	Up to 40 GHz models With Option Connectors A and other connectors	Up to 22 GHz models Connectors A and other 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 (must be ordered separately). Refer to page 5-27 for details.

Accessories - RAMSES Concept

All Connectors

PRINTED CIRCUIT BOARD INTERFACE CONNECTOR

A printed circuit board interface connector (ordered separately) has been designed for easy mounting on terminals.

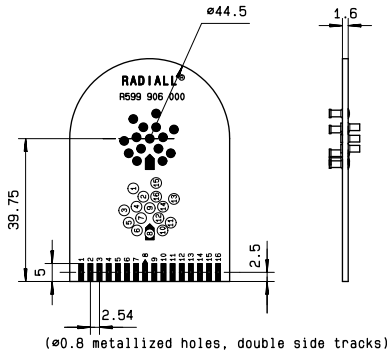
For SPnT model R573 and R574 series: Radiall part number: **R599 906 000 for 3 to 6 positions**

R599 908 000 for 7 to 8 positions

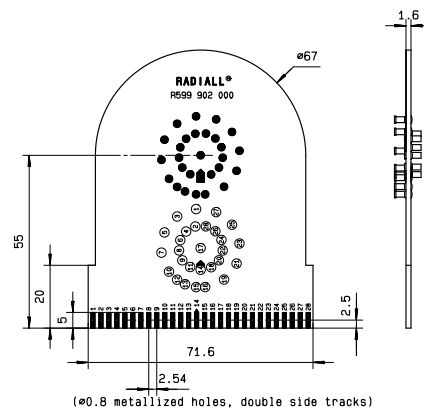
R599 900 000 for 9 to 10 positions

R599 902 000 for 11 to 12 positions

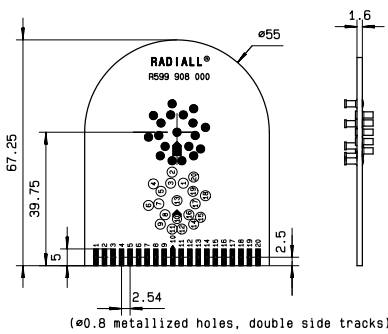
R599906000



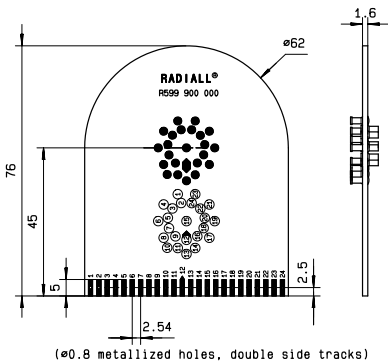
R599902000



R599908000



R599900000



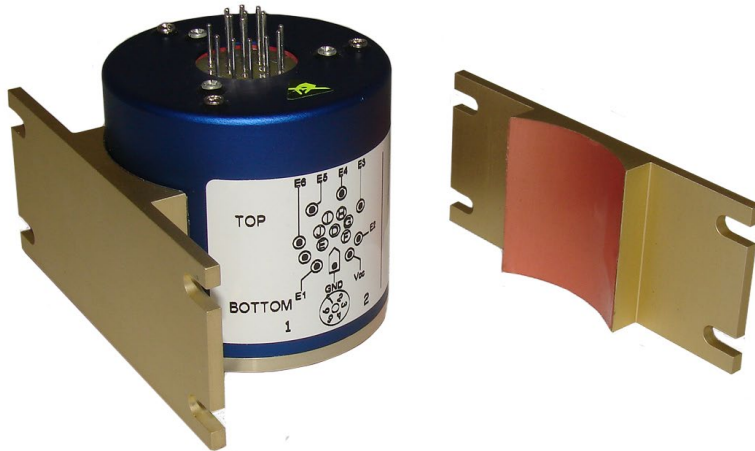
RAMSES SERIES

Accessories - RAMSES Concept

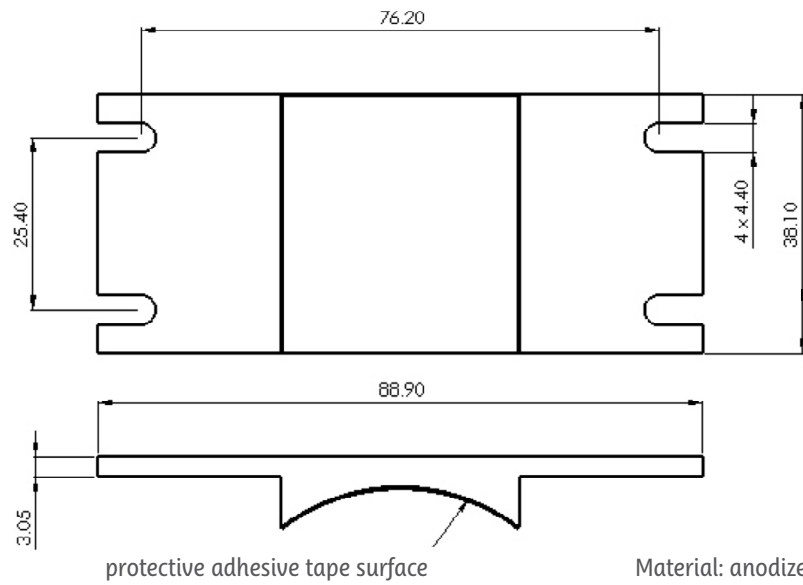
All Connectors

MOUNTING BRACKET

A metal bracket has been designed for an easy mechanical mounting of our SPnT switches for customer installation. These brackets must be ordered separately and assembled according to our recommended process on the following page.



MOUNTING BRACKET



Accessories - RAMSES Concept

All Connectors

FOR MODELS WITH CONNECTORS SMA, QMA, SMA 2.9, DIN 1.6/5.6

Number of positions	Type	Options	Model	Part number
3 to 6 positions	All	2 & 8	R573 series	R599920000
	4, 5, 8, & 9	All	R574 series	
	All	All	R573 series	
7 & 8 positions	All	All	R573 series	R599920000
			R574 series	
9 & 10 positions	All	All	R573 series	R599921000
			R574 series	
11 & 12 positions	All	All	R573 series	R599921000
			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	R599921000
			R574 series	
7 to 12 positions	All	All	R573 series	Not Available
			R574 series	

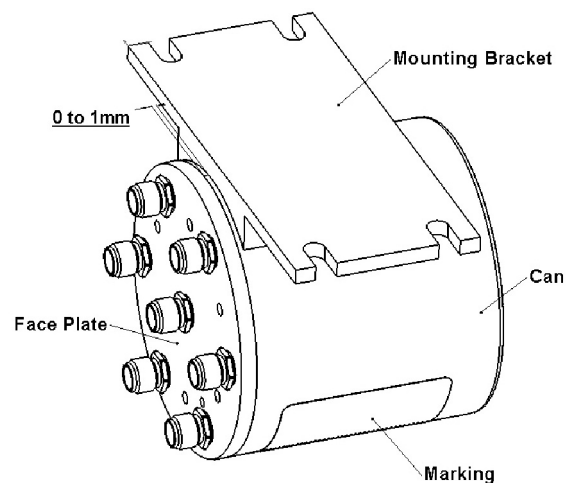
Adhesive Bonding Process

- 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 seconds (10 seconds min) to properly bond the unit (See notes 1 & 2).

- 5) The switch can now be installed on your equipment with 4 screws (not included).



Accessories - RAMSES Concept

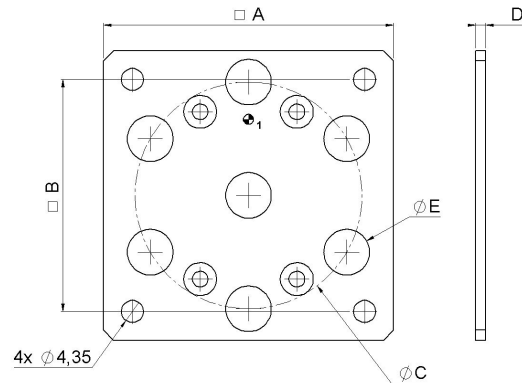
All Connectors

MOUNTING SQUARE FLANGE

A square flange has been designed for easy mechanical mounting of our SPnT switches for customer installation. These flanges must be ordered separately (similar to the mounting bracket) and assembled according to our recommended process



Typical Outline Drawing



Material: Aluminium with Cr3 passivation

Radiall part number	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
R599 308 000	57.15	45.75	27	2	9
R599 309 000	57.15	45.75	44.70	2	9
R599 310 000	63.45	53.45	27	2	9
R599 311 000	63.45	53.45	44.70	2	9
R599 312 000	63.45	53.45	44.70	2	9
R599 313 000	69.80	59.80	44.70	2	9
R599 314 000	74.60	64.60	55.88	2	9
R599 315 000	71.10	60.30	44.70	3	16.20

FOR MODELS WITH CONNECTORS SMA, QMA, SMA2.9, 1.6/5.6

Number of positions	Type	Options	Model	Part number
3 to 6 positions	All	All	R573 series	R599310000
				R599308000
			R574 series	R599311000
				R599309000
7 to 8 positions	All	All	R573 series	R599312000
			R574 series	
9 to 10 positions	All	All	R573 series	R599313000
			R574 series	
11 to 12 positions	All	All	R573 series	R599314000
			R574 series	

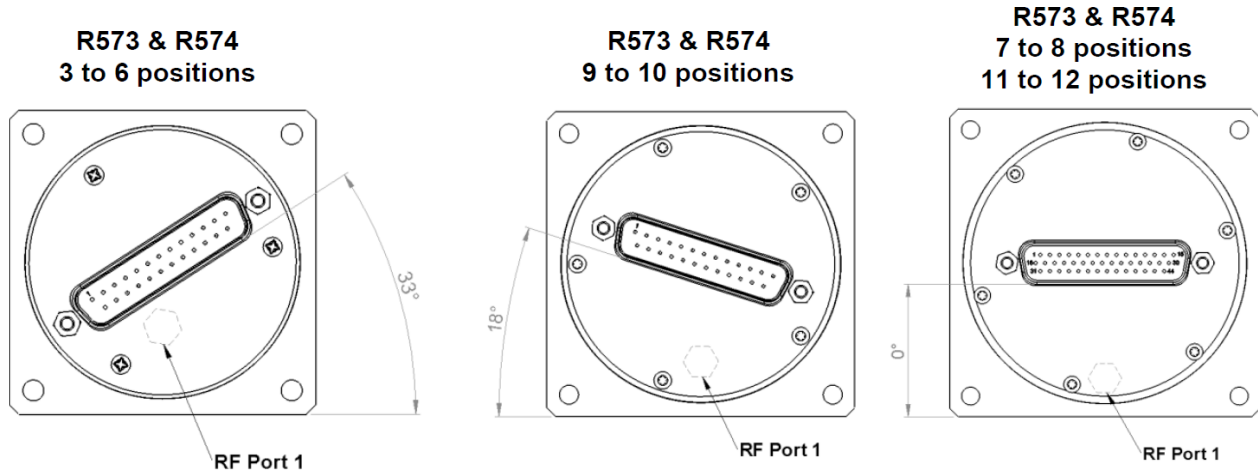
FOR MODELS WITH CONNECTORS N, TNC, BNC

Number of positions	Type	Options	Model	Part number
3 to 6 positions	All	All	R573 series	R599315000
			R574 series	

Accessories - RAMSES Concept

All Connectors

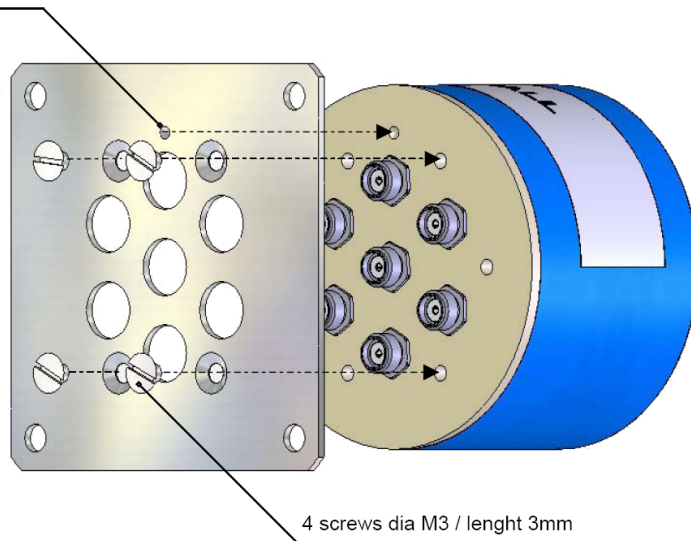
D-SUB CONNECTOR LOCATION



ASSEMBLY INSTRUCTIONS

- 1) Assemble the square flange on the RF body of the switch as the following drawing below.
ATTENTION: Don't forget to correctly position the reference in line with the mark for port 1.
- 2) Tighten the 4 screws (delivered with the square flange).

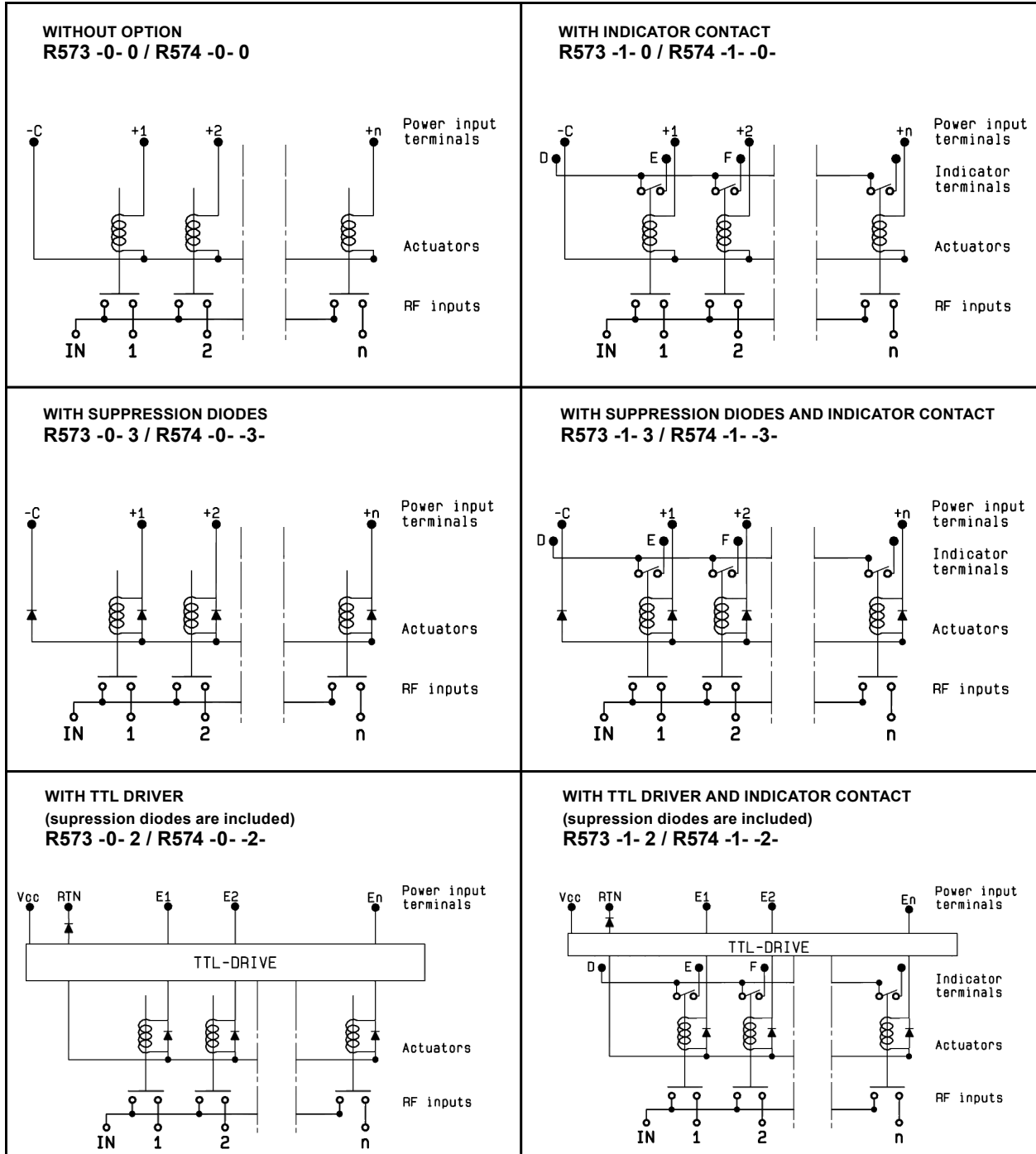
reference mark of port 1



COAXIAL SPnT - Electrical Schematics

R573 - R574 Series

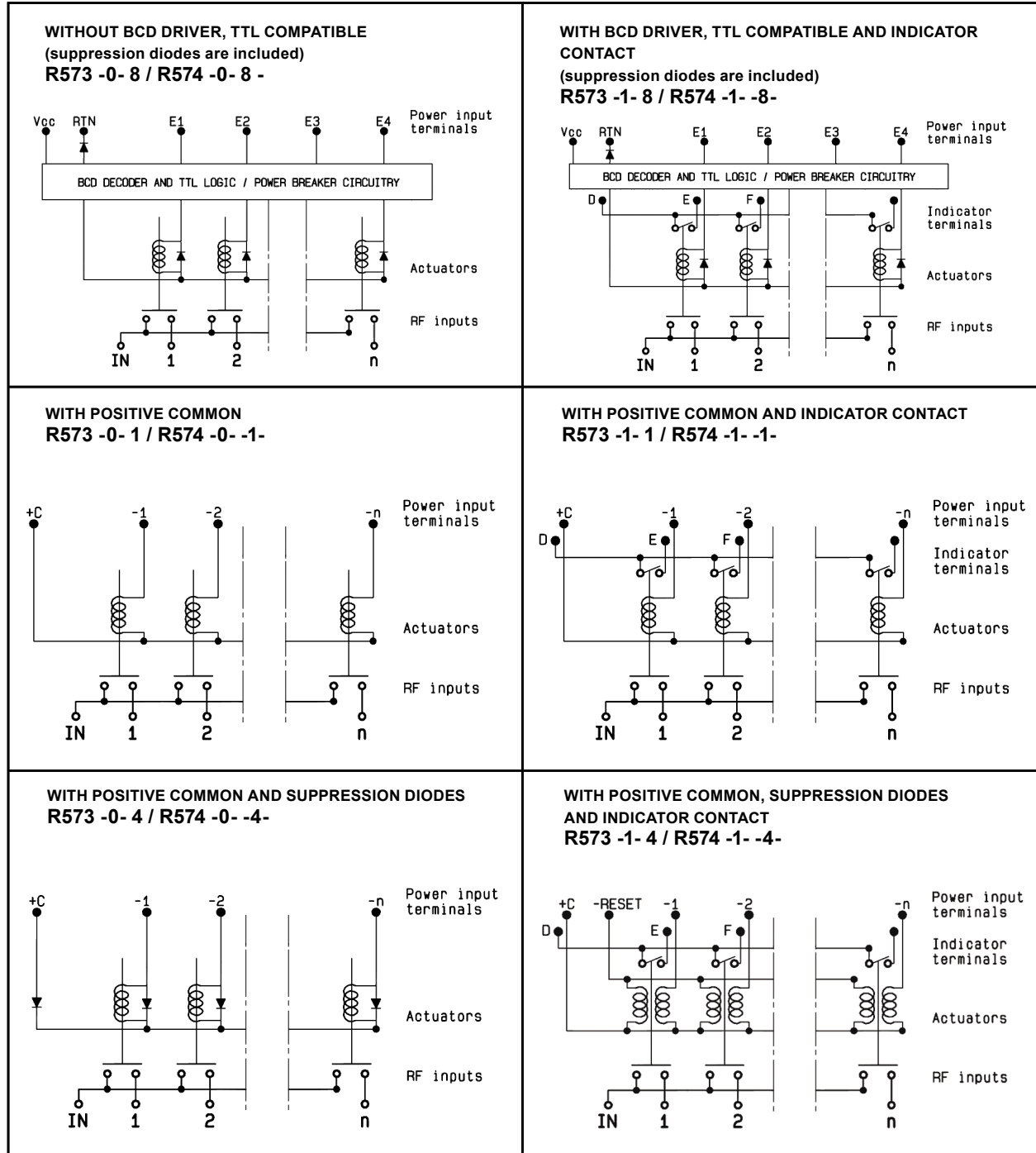
NORMALLY OPEN



COAXIAL SPnT - Electrical Schematics

R573 - R574 Series

NORMALLY OPEN

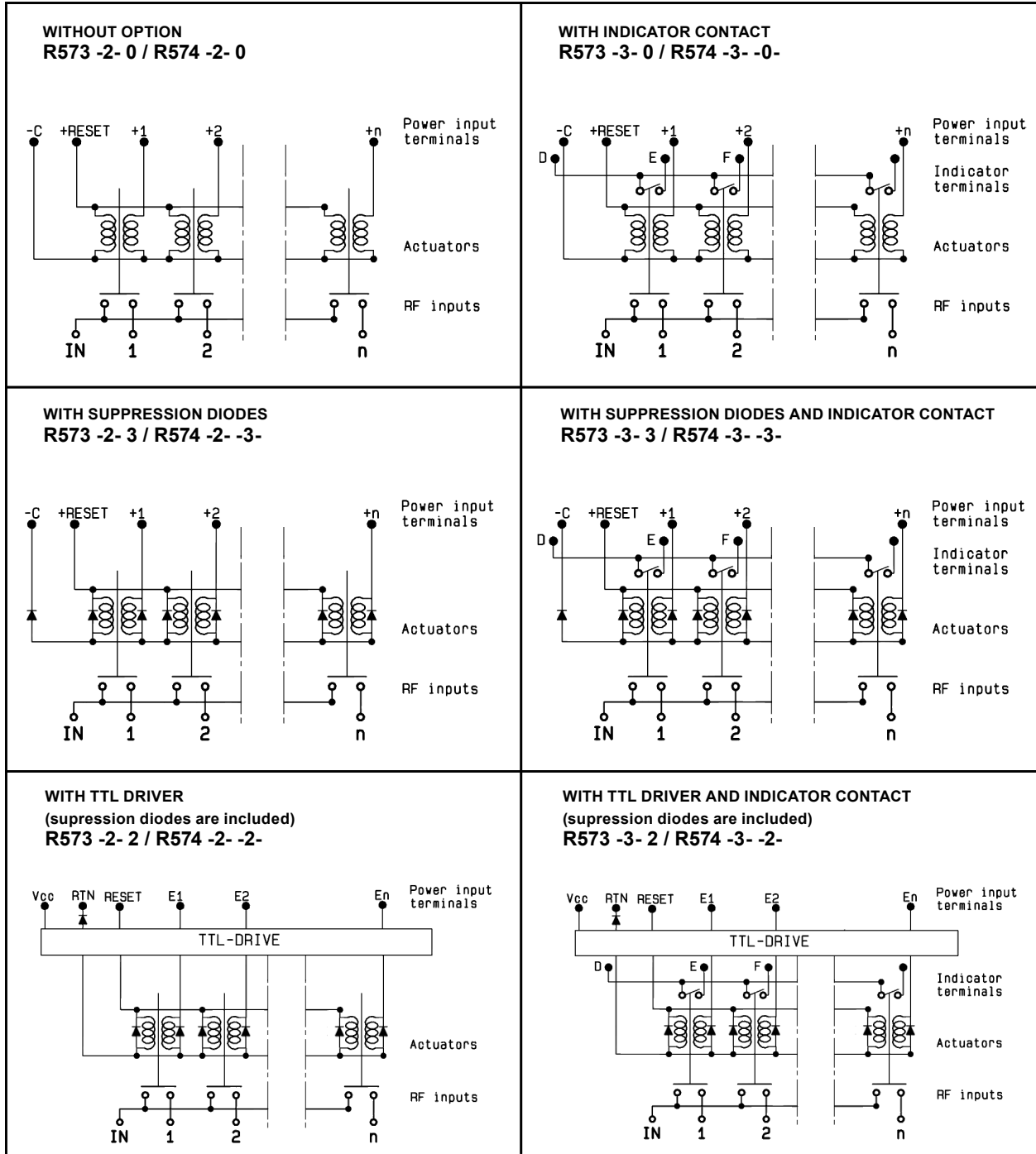


RAMSES SERIES

COAXIAL SPnT - Electrical Schematics

R573 - R574 Series

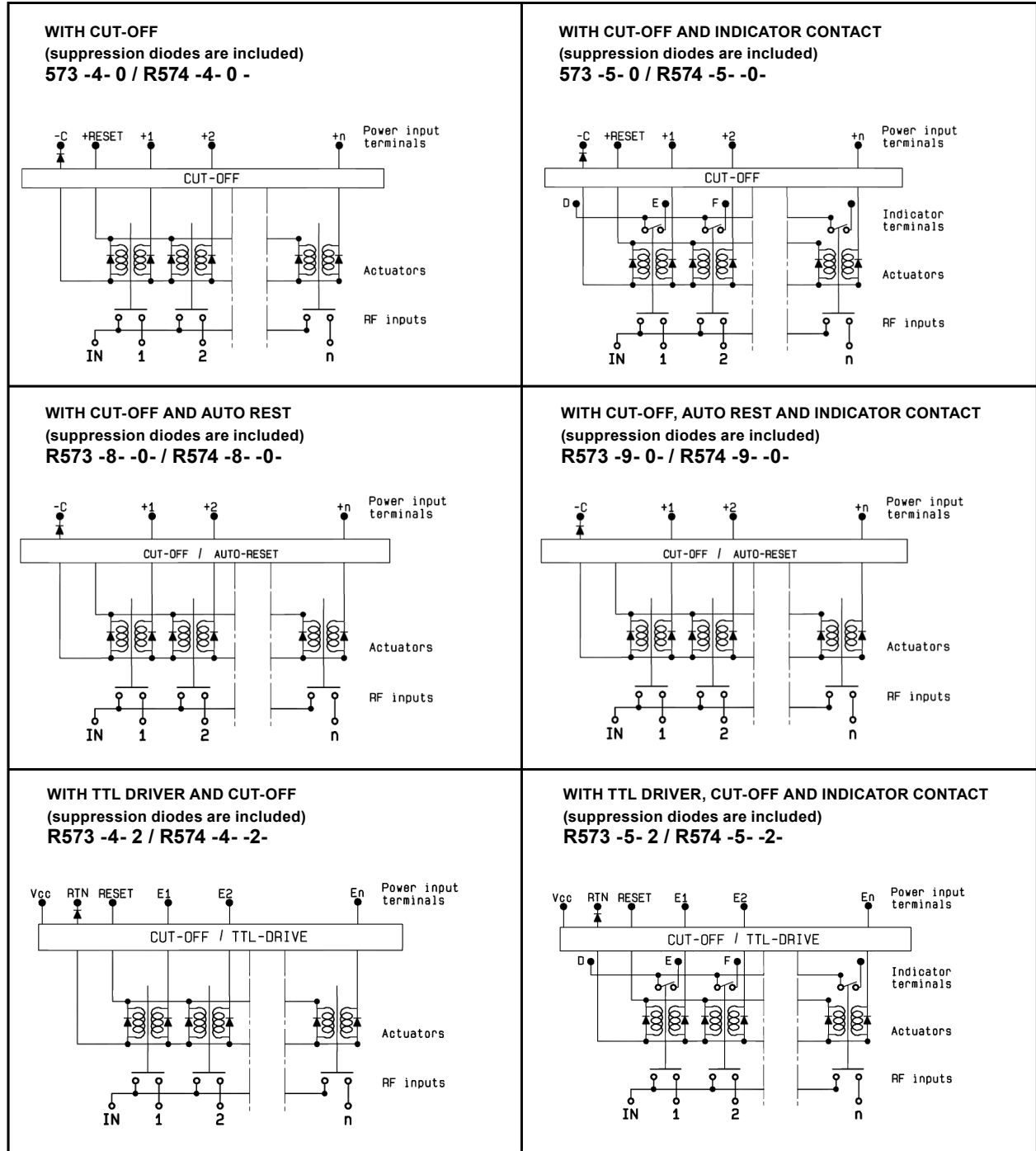
LATCHING



COAXIAL SPnT - Electrical Schematics

R573 - R574 Series

LATCHING

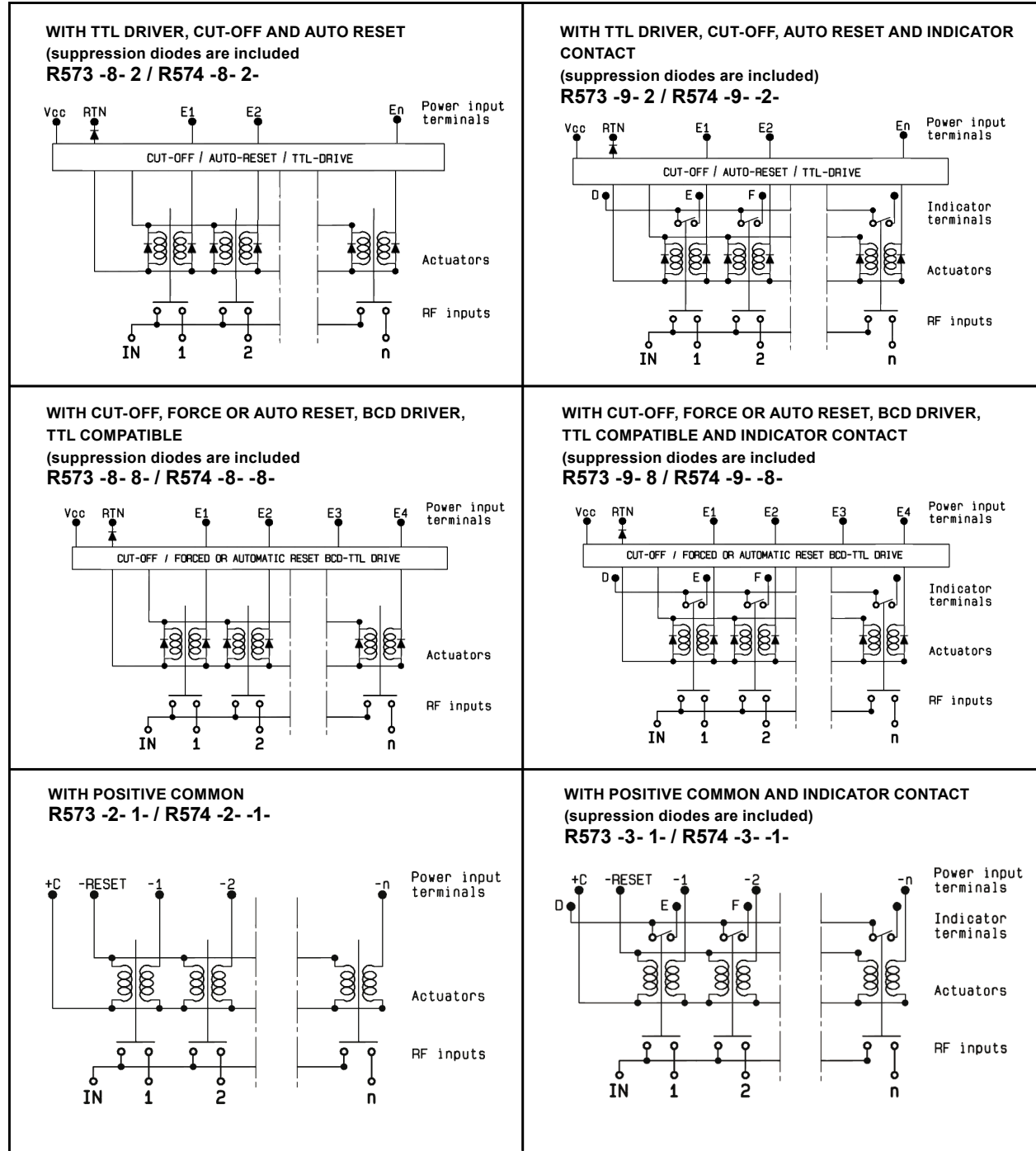


RAMSES SERIES

COAXIAL SPnT - Electrical Schematics

R573 - R574 Series

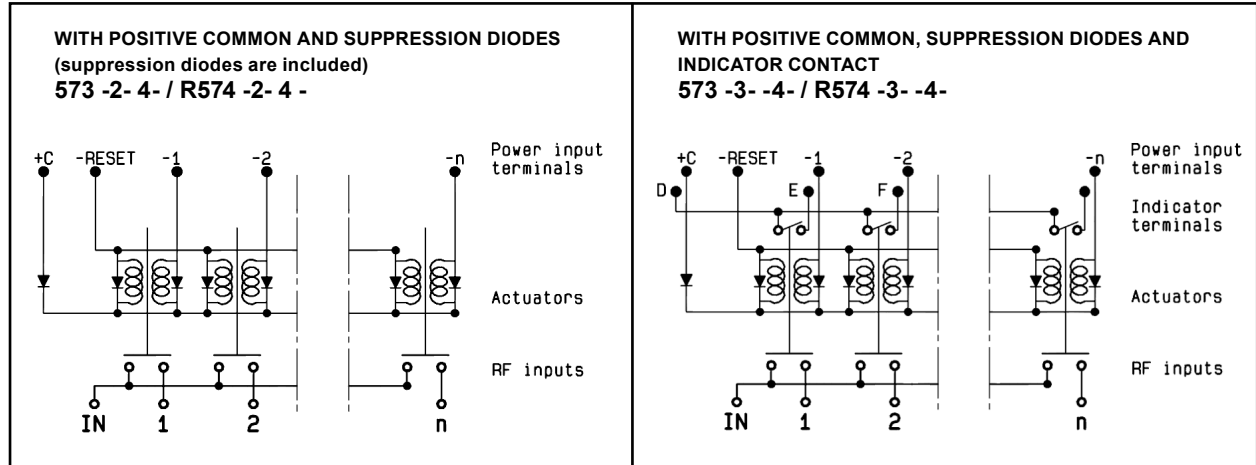
LATCHING



COAXIAL SPnT - Electrical Schematics

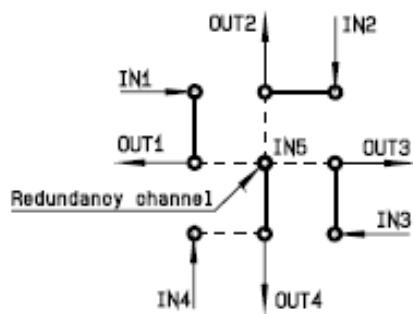
R573 - R574 Series

LATCHING



Optional Features for SPnT (see additional examples on page 5-54)

Examples of dedicated application options



4P3T with redundancy channel on Out 4
In 1 to Out 1, In 2 to Out 2, In 3 to Out 3



7P6T



SP6T terminated with External terminations

A Custom Matrix Switch (4P3T) with 4 Input ports and 4 Output ports configured for 3 transmission systems and one redundancy

channel (N+1: N type). This product can be used also as a SP4T Terminated with low external VSWR or medium power terminations.

High Performance Multiport Switches

TITANIUM Series / SPnT up to 40 GHz



Radiall's TITANIUM switches are optimized to perform at a high level over an extended life cycle. With outstanding RF performance, and a guaranteed insertion loss repeatability of 0.03 dB over a life span of 2.5 million switching cycles, Radiall's TITANIUM switches are a perfect solution for automated test and measurement equipment, as well as signal monitoring devices.

Example of P/N:

R514F73617 is a SP6T SMA up to 26.5 GHz, Latching, Indicators, Self cut-off, Auto-Reset, 24 Vdc and HE10 receptacle.

PART NUMBER SELECTION

R 51

Models:

- 2: Without 50 Ω terminations
- 4: With 50 Ω terminations

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:

- 7: Latching + Self cut-off + Auto Reset + Indicators

Actuator Voltage:

- 3: 24 Vdc

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 + HE10 connector

Options:

- 1: Positive common (without TTL)
- 2: TTL/5V logic with 24 Vdc supply

Number of positions:

- 4: 4 Positions
- 6: 6 Positions

(1) connector SMA 2.9 is equivalent to "K connector®", registered trademark of Anritsu.

High Performance Multiport Switches

TITANIUM Series / SPnT up to 40 GHz

TITANIUM SERIES

GENERAL SPECIFICATIONS

Operating mode		Latching	
Nominal operating voltage (across operating temperature)	Vdc	24 (20/32)	
Coil resistance (+/-10%)	Ω	120	
Operating current at 23°C	mA	200	
Maximum stand-by current	mA	50	
Average power Terminated Model	All models	RF path Cold switching: See Power page 5-44	
		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
	Low Level	0 to 0.8 Volts	-
Indicator specifications		Maximum withstanding voltage	60V
		Maximum current capacity	150 mA
		Maximum "ON" resistance	2.5 Ω
		Minimum "OFF" resistance	100MΩ
Switching time (Max)	ms	15	
Life (Min) for	SMA	2.5 million cycles	
	SMA 2.9	1 million cycles	
Connectors		SMA - SMA 2.9	
Actuator terminals		HE10 ribbon receptacle	
Weight (Max)	g	230	

ENVIRONMENTAL SPECIFICATIONS

Operating temperature range	-25°C to +75°C
Storage temperature range	-55°C to +85°C
Temperature cycling (MIL-STD-202, Method 107D, Cond.A)	-55°C to +85°C (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, 1/2 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)	55dB at 20GHz
Magnetic field	< 5.10 ⁻⁵ gauss at 1 meter

High Performance Multiport Switches

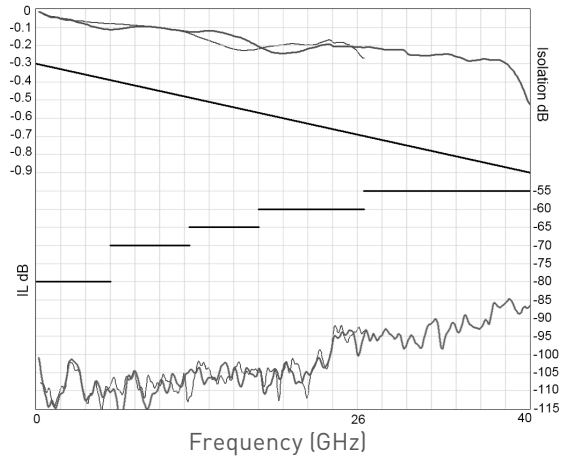
TITANIUM Series / SPnT up to 40 GHz

RF PERFORMANCES

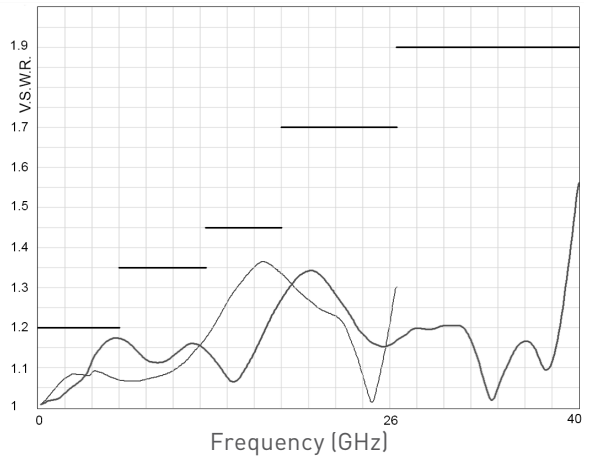
Part number		R51-3-34-7 R51-3-36-7	R51-4-34-7 R51-4-36-7	R51-F-34-7 R51-F-36-7	R51-8-34-7 R51-8-36-7			
Frequency Range	GHz	DC to 6	DC to 20	DC to 26.5	DC to 40			
Impedance	Ω	50						
Insertion Loss (Max)	dB	0.3 + 0.015 x frequency (GHz)						
Isolation (Min)	dB	80	DC to 6 GHz	80	DC to 6 GHz	80	DC to 6 GHz	80
			6 to 12.4 GHz	70	6 to 12.4 GHz	70	6 to 12.4 GHz	70
			12.4 to 20 GHz	65	12.4 to 20 GHz	65	12.4 to 18 GHz	65
					20 to 26.5 GHz	60	18 to 26.5 GHz	60
					26.5 to 40 GHz	55		
V.S.W.R. (Max)		1.20	DC to 6 GHz	1.20	DC to 6 GHz	1.20	DC to 6 GHz	1.20
			6 to 12.4 GHz	1.35	6 to 12.4 GHz	1.35	6 to 12.4 GHz	1.35
			12.4 to 20 GHz	1.45	12.4 to 20 GHz	1.45	12.4 to 18 GHz	1.45
					20 to 26.5 GHz	1.70	18 to 26.5 GHz	1.70
					26.5 to 40 GHz	1.90		
Third order inter Modulation		- 120 dBC typical (2 carriers 20w)						
Repeatability (measured at 25°C)		0.03 dB			0.05 dB			

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation



V.S.W.R.



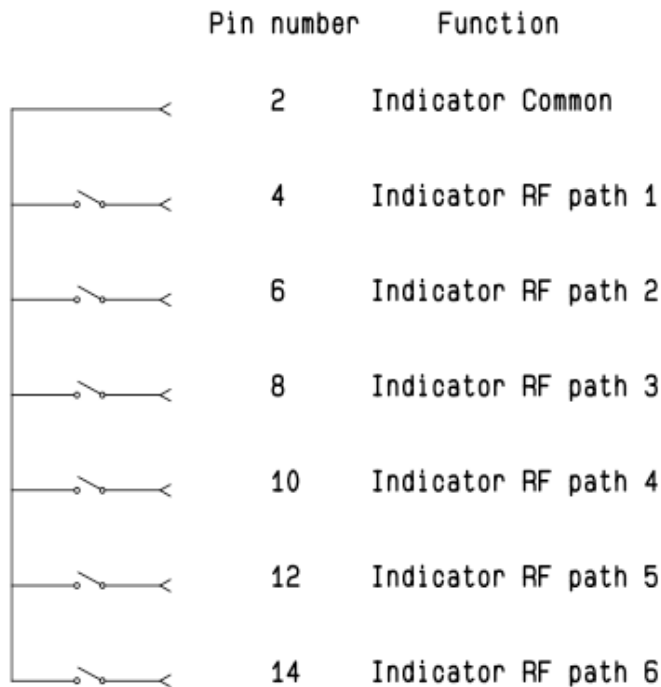
SMA — SMA 2.9 —

High Performance Multiport Switches

TITANIUM Series / SPnT up to 40 GHz

ELECTRONIC POSITION INDICATORS

The electronic position indicators use 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 a 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.



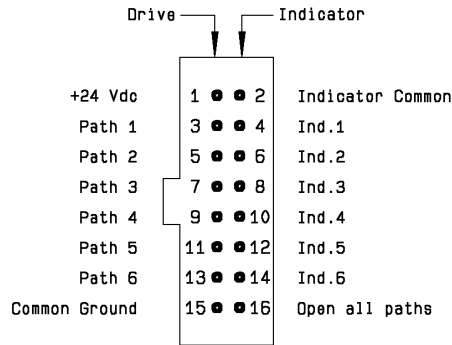
Ways 1 and 4 are not connected for SP4T switches.

High Performance Multiport Switches

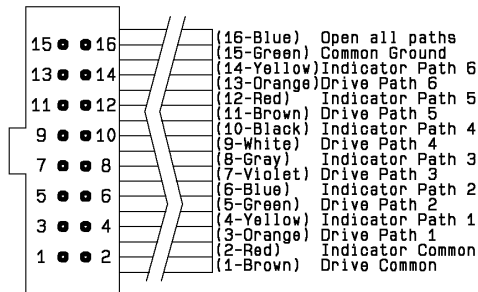
TITANIUM Series / SPnT up to 40 GHz

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.



Switch connector



Mating cable connector

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), then 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), then 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 for at least 15 minutes (minimum), then 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

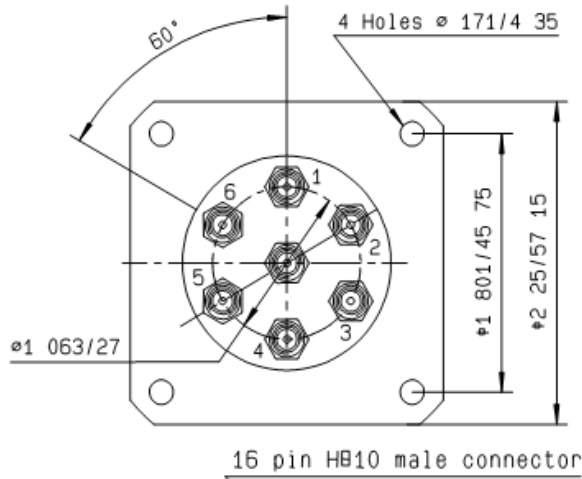
Ways 1 and 4 are not connected for SP4T switches.

High Performance Multiport Switches

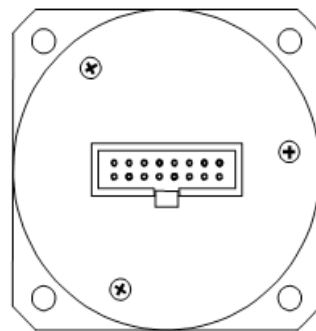
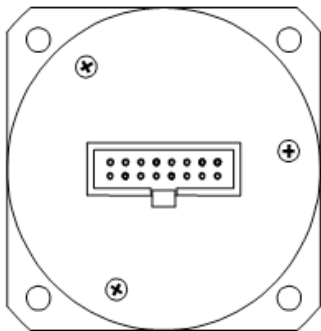
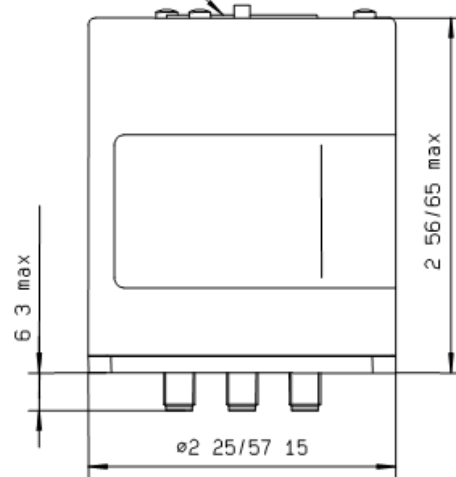
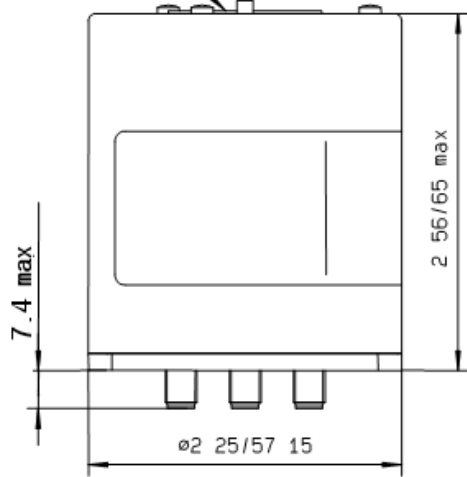
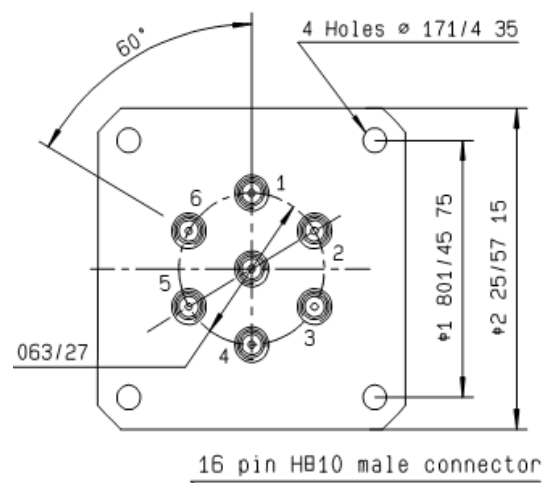
TITANIUM Series / SPnT up to 40 GHz

TYPICAL OUTLINE DRAWING

SMA connectors



SMA2.9 connectors



Ways 1 and 4 are not connected for SP4T switches.

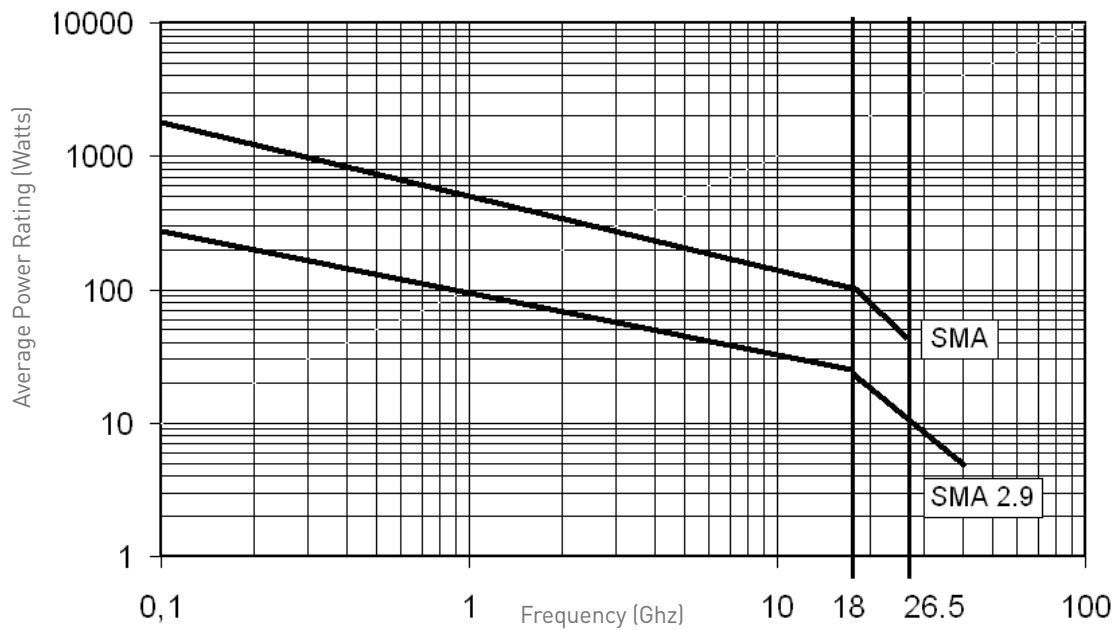
High Performance Multiport Switches

TITANIUM Series / SPnT up to 40 GHz

POWER RATING CHART

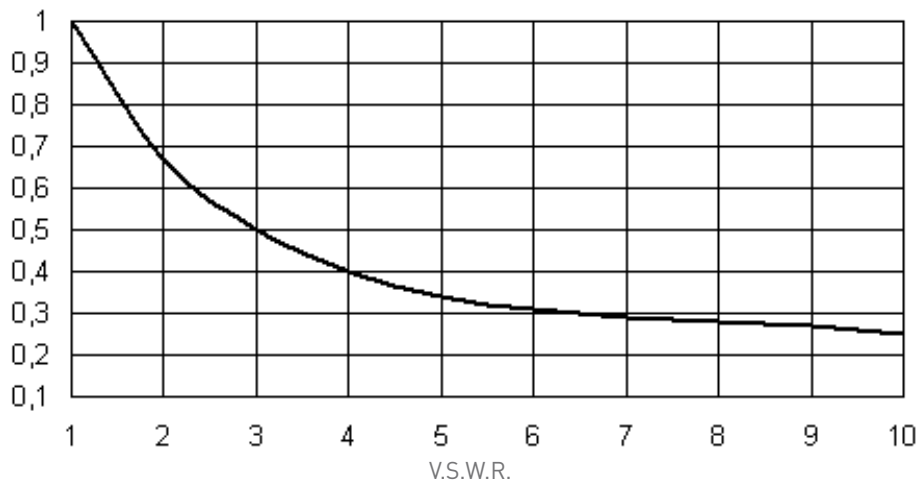
This graph is based on the following conditions:

- 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.

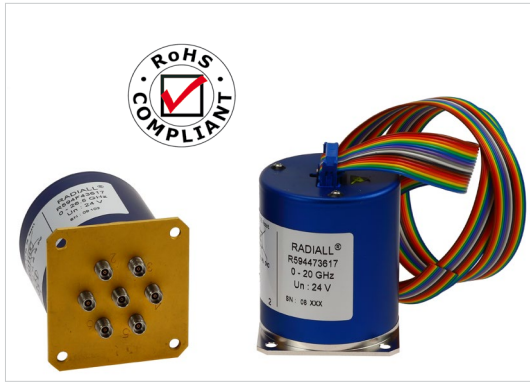


Ways 1 and 4 are not connected for SP4T switches.

This page is left blank intentionally. Please proceed to the Platinum Series.

High Performance Multiport Switches

PLATINUM Series / SPnT terminated up to 40 GHz



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

Example of P/N:

R594873427 is a SPnT SMA2.9 up to 40 GHz, Latching with Indicators, Self cut-off, Auto-Reset, TTL driver and HE10 connector.

PART NUMBER SELECTION

R 594

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 indicator
- 7: Latching + Self cut-off + Auto Reset + Indicators

Actuator Voltage:

- 3: 24 Vdc

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 + HE10 connector

Options:

- 1: Positive common (without TTL) Type "4" or "7"
- 2: TTL/5V logic with 24 Vdc supply Type "7" only

Number of positions:

- 4: 4 Positions
- 6: 6 Positions

[1] connector SMA 2.9 is equivalent to "K connector®", registered trademark of Anritsu.

Ways 1 and 4 are not connected for SP4T switches.

High Performance Multiport Switches

PLATINUM Series / SPnT terminated up to 40 GHz

PLATINUM SERIES

GENERAL SPECIFICATIONS

Operating mode		Latching	
Nominal operating voltage (across operating temperature)	Vdc	24 (20/32)	
Coil resistance (+/-10%)	Ω	120	
Operating current at 23°C	mA	200	
Maximum stand-by current	mA	50	
Average power		RF path Cold switching: See Power page 5-53	
		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
	Low Level	0 to 0.8 Volts	-
Indicator specifications		Maximum withstanding voltage	60V
		Maximum current capacity	150 mA
		Maximum "ON" resistance	2.5 Ω
		Minimum "OFF" resistance	100MΩ
Switching time (Max)	ms	15	
Life (Min) for	SMA	10 million cycles	
	SMA 2.9	2.5 million cycles	
Connectors		SMA - SMA 2.9	
Actuator terminals		HE10 ribbon receptacle	
Weight (Max)	g	230	

ENVIRONMENTAL SPECIFICATIONS

Operating temperature range	-25°C to +75°C
Storage temperature range	-55°C to +85°C
Temperature cycling (MIL-STD-202, Method 107D, Cond.A)	-55°C to +85°C (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, 1/2 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)	55dB at 20GHz
Magnetic field	< 5.10-5 gauss at 1 meter

High Performance Multiport Switches

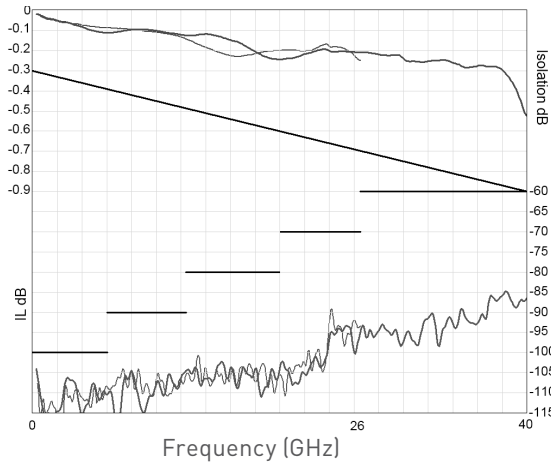
PLATINUM Series / SPnT terminated up to 40 GHz

RF PERFORMANCES

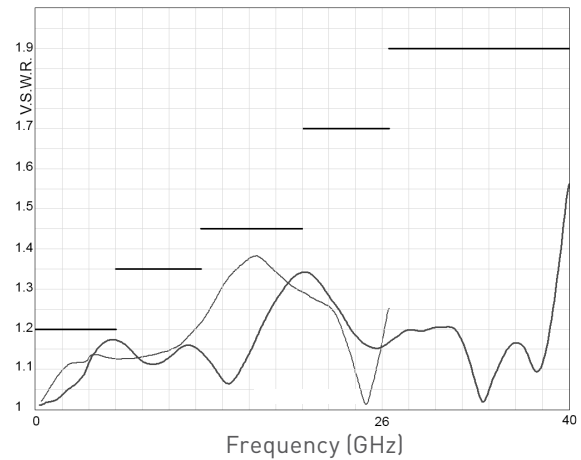
Part number		R5943-34-7	R5944-34-7 R5944-36-7	R594F-34-7 R594F-36-7	R5948-34-7 R5948-36-7			
Frequency Range	GHz	DC to 6	DC to 20	DC to 26.5	DC to 40			
Impedance	Ω	50						
Insertion Loss (Max)	dB	0.3 + 0.015 x frequency [GHz]						
Isolation (Min)	dB	100	DC to 6 GHz	100	DC to 6 GHz	100	DC to 6 GHz	100
			6 to 12.4 GHz	90	6 to 12.4 GHz	90	6 to 12.4 GHz	90
			12.4 to 20 GHz	80	12.4 to 20 GHz	80	12.4 to 18 GHz	80
					20 to 26.5 GHz	70	18 to 26.5 GHz	70
					26.5 to 40 GHz	60		
V.S.W.R. (Max)	dB	1.20	DC to 6 GHz	1.20	DC to 6 GHz	1.20	DC to 6 GHz	1.20
			6 to 12.4 GHz	1.35	6 to 12.4 GHz	1.35	6 to 12.4 GHz	1.35
			12.4 to 20 GHz	1.45	12.4 to 20 GHz	1.45	12.4 to 18 GHz	1.45
					20 to 26.5 GHz	1.70	18 to 26.5 GHz	1.70
							26.5 to 40 GHz	1.90
Repeatability (measured at 25°C)		0.03 dB			0.05 dB			

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation



V.S.W.R.



SMA — SMA 2.9 —

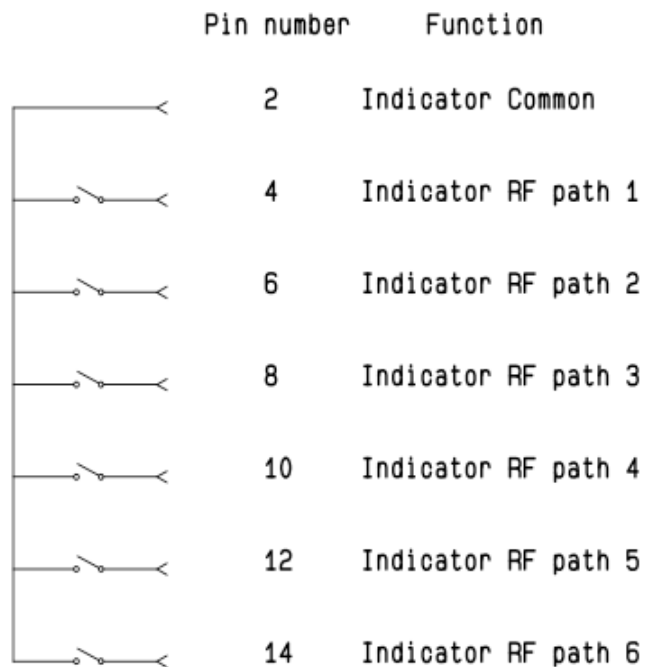
High Performance Multiport Switches

PLATINUM Series / SPnT terminated up to 40 GHz

ELECTRONIC POSITION INDICATORS

THIS OPTION IS NOT AVAILABLE WITH TYPE 4

The electronic position indicators use 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.

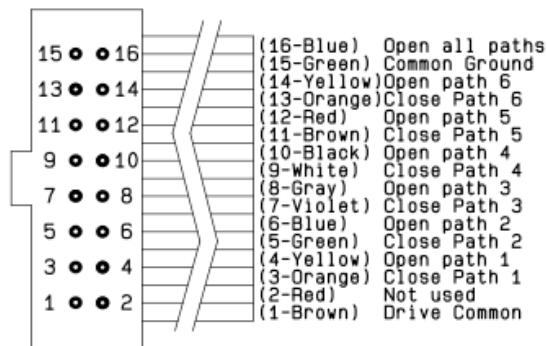
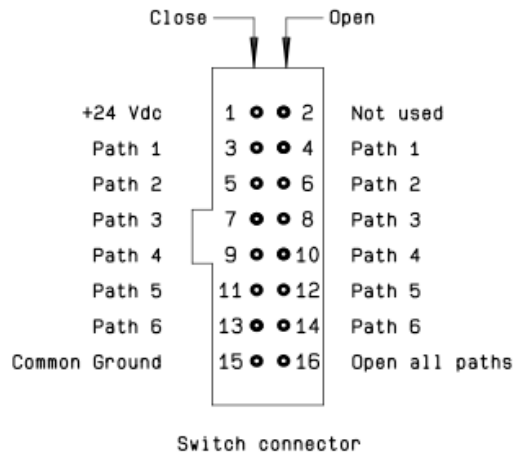
High Performance Multiport Switches

PLATINUM Series / SPnT terminated up to 40 GHz

DRIVING THE SWITCH

Each RF path is driven independently, and 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 +32VDC)
- 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, then 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 the new RF port for at least 15 minutes (minimum), then open the previously selected RF port.

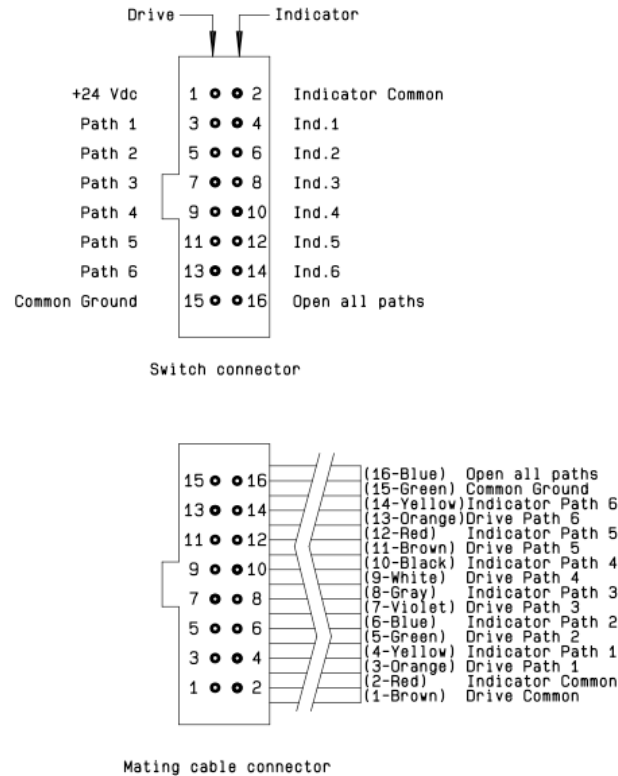
Ways 1 and 4 are not connected for SP4T switches.

High Performance Multiport Switches

PLATINUM Series / SPnT terminated up to 40 GHz

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.



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), then 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, then 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), then 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, then to complete the operation by applying TTL "High" to pin 16

Break-Before-Make:

Open the undesired RF path after 15 minutes (minimum), then close the new RF path.

Make-Before-Break:

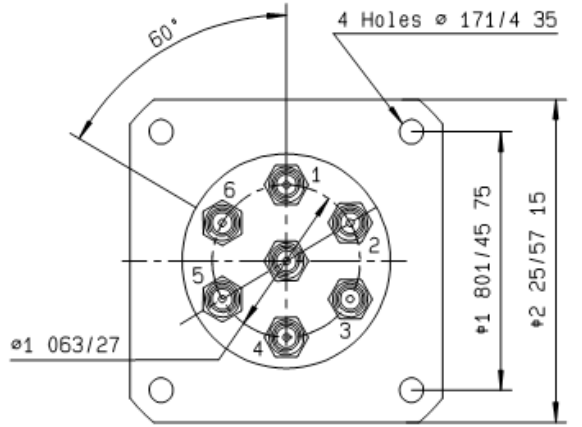
Ensure that the previously selected RF path "drive" is connected to ground (or TTL "High" for option "2"), then close the new RF path.

Ways 1 and 4 are not connected for SP4T switches.

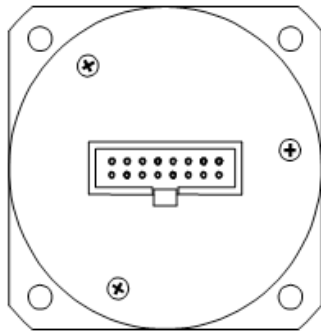
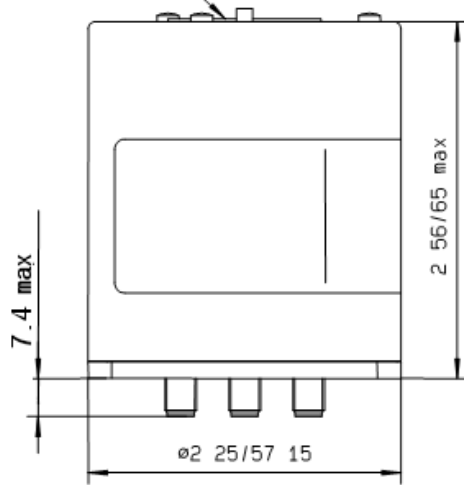
High Performance Multiport Switches

TYPICAL OUTLINE DRAWING

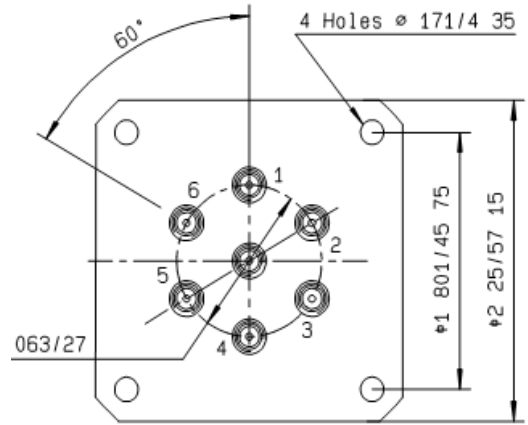
SMA connectors



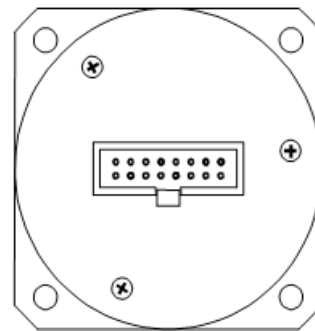
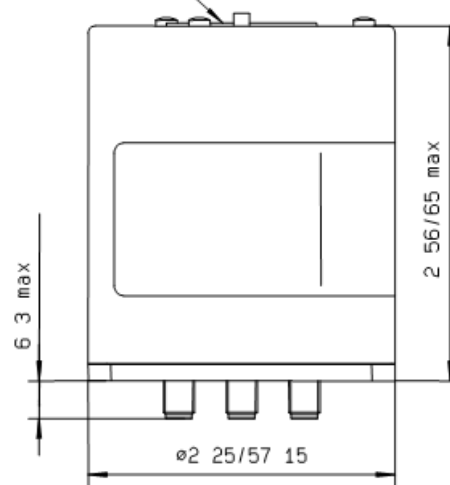
16 pin HB10 male connector



SMA 2.9 connectors



16 pin HB10 male connector



Ways 1 and 4 are not connected for SP4T switches.

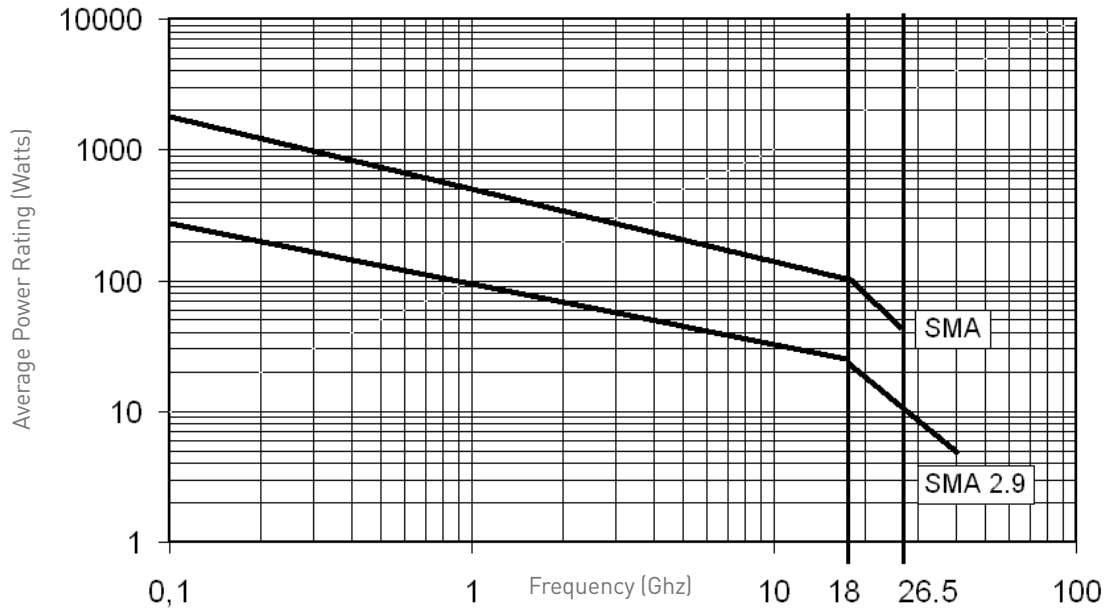
High Performance Multiport Switches

PLATINUM Series / SPnT terminated up to 40 GHz

POWER RATING CHART

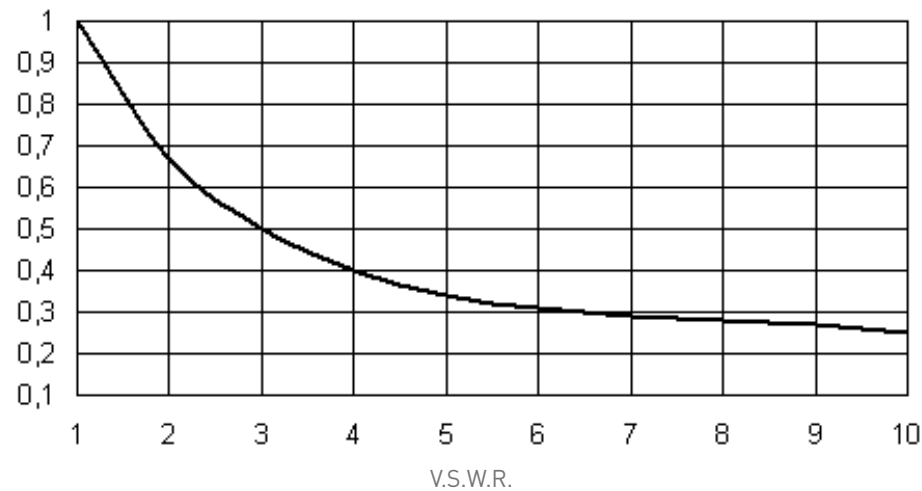
This graph is based on the following conditions:

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



DERATING FACTOR VERSUS VSWR

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



Optional Features For SPnT

EXAMPLES OF DEDICATED APPLICATION OPTIONS



SPnT with flat ribbon cable for easy installation with limited space.



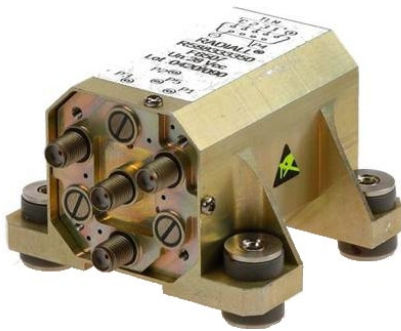
Thermal vacuum SPnT designed based on our expertise in Space. For more detailed information, see page 7-6 to 7-8.



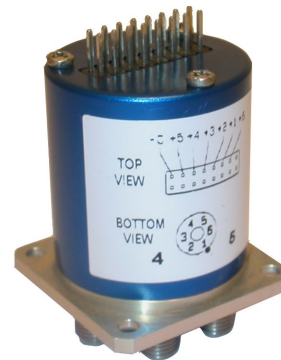
SPnT with special mounting bracket for easy mounting in Automatic Test Equipment.



Subminiature SP6T with a micro D connector instead of solder pins.



SP3T used for a military application with sequential access and severe environmental characteristics.



Subminiature SP6T developed for test bench applications requiring low RF leakage.