LOW PIM

Section 6 Table of Contents

RAMSES SERIES

LOW PIM PART NUMBER SELECTION GUIDE[1]

DIGITAL POSITION		R 1-3:	4: RF CONNECTORS		5: TYPE			6: VOLTAGE		7: TTL		8: OPTIONS				9: TERMINALS	
Series	Configuration	-	N 12.4 GHz	SMA 18 GHz	Failsafe	Latching	Normally open[1]	12 V	28 V	Without TTL	With TTL	Without option	Positive common	Supression diodes	Positive common and suppression diodes	Solder pins	D-Sub connector
RAMSES	SPDT	R570LP	1	4	0/1	2/3/5/6	-	2	3	0	1	0	1	3	4	0	5
	DPDT	R577LP	1	4	0/1	2/3/5/6	-	2	3	0	1	0	1	3	4	0	5

DIGITAL POSITION		R 1-3:	4: RF CONNECTORS		5: TYPE			6: VOLTAGE		7: POS.		8: OPTIONS					9: TERMINALS	
Series	Configuration		N 12.4 GHz	SMA 18 GHz	Failsafe	Latching	Normally open[1]	12 V	28 V	Number of positions	With TTL	Without option	Positive common	TTL Driver	Supression diodes	Positive common and suppression diodes	Solder pins	D-Sub connector
RAMSES	SPnT	R573LP	1	4	-	2/3/4/5/8/9	0/1	2	3	4/6		0	1	2	3	4	0	5

Notes

Example of P/N: R573423600LP is a SP6T SMA 18 GHz, latching, 28 Vdc, without option, solder pins.
1. For part number creation and available options, see detailed part number selection for each series.

RAMSES Series

SPDT LOW PIM UP TO 18 GHz

To meet growing market demands created by the deployment of 4G/LTE networks, Radiall has introduced a new range of Low PIM switches. RAMSES SPDT Low PIM switches are perfectly suited for RF test systems and test benches requiring excellent passive intermodulation performance up to 18 GHz; with a guarantee PIM performance of -160 dBc at +43 dBm over a life span of 2 million switching cycles. These products are specific to instrumentation and telecommunication applications.

Example of P/N: R570413030LP is a SPDT Low PIM SMA 18 GHz, failsafe, 28 Vdc, with supression diodes, solder pins.

PART NUMBER SELECTION

R570 ____ LP

SERIES PREFIX

FREQUENCY RANGE
1: N up to 12.4 GHz
4: SMA up to 18 GHz

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

ACTUATOR VOLTAGE
2: 12 Vdc
3: 28 Vdc

TTL OPTION
0: Without TTL driver
1: With TTL driver [1 & 3]

OPTIONS[5]
0: Without option
1: Positive common [2]
3: With suppression diodes
4: With suppression diodes and positive common [2]

ACTUATOR TERMINALS
0: Solder pins
5: D-Sub connector [4]

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

RAMSES Series

GENERAL 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 at 23 °C (+/- 10%)	SMA	Ω	47.5	275	58	350
	N		38	200	38	225
Operating current at 23 °C	SMA	mA	250	102	210	80
	N		320	140	320	125
Average power			See Power Rating Chart on page 1-16			
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		ms	15 ms			
Life (Min)			2 million cycles			
Connectors			SMA - N			
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.D)			10 - 2,000 Hz - 20 g operating			
Shock (MIL STD 202, method 213B, cond.C)			100 g/6 ms - ½ sine operating			

Reset: supply voltage time 1 sec. max./duty cycle 10%

RF PERFORMANCE

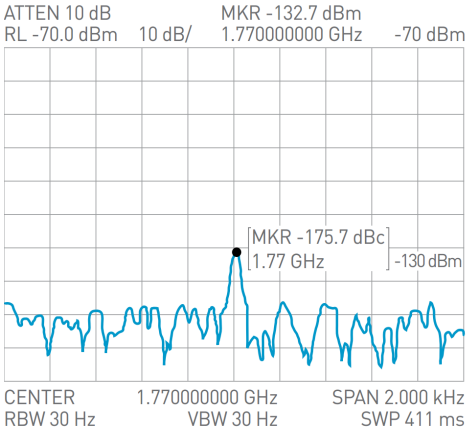
CONNECTORS	FREQUENCY RANGE GHz		V.S.W.R. (MAX)	INSERTION LOSS (MAX) dB	ISOLATION (MIN) dB	IMPEDANCE Ω	THIRD ORDER INTERMODULATION
N	DC - 12.4	DC - 1	1.15	0.15	85	50	-160 dBc at +43 dBm (2 carriers 20 W)
		1 - 2	1.20	0.20	80		
		2 - 3	1.25	0.25	75		
		3 - 8	1.35	0.35	70		
		8 - 12.4	1.50	0.50	60		
SMA	DC - 18	DC - 3	1.10	0.15	80		
		3 - 8	1.20	0.20	75		
		8 - 12.4	1.20	0.25	65		
		12.4 - 18	1.40	0.35	60		

PASSIVE INTERMODULATION

TONE 1	1,810 MHz, approximately 43 dBm
TONE 2	1,850 MHz, approximately 43 dBm
3RD ORDER PIM	160 dBc at 1,770 MHz

Depending on application, carrier powers and frequencies — PIM measurements can vary. PIM testing is not measured during product acceptance test.

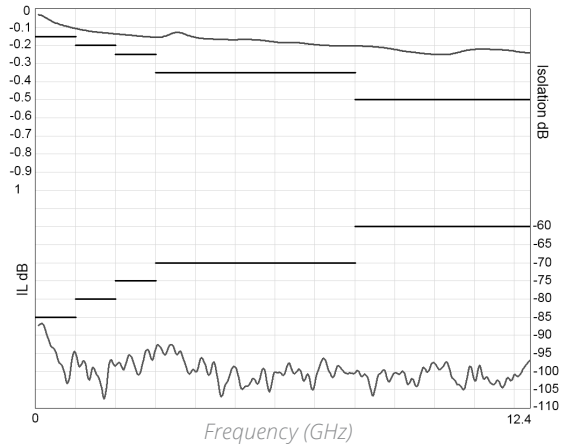
OUTSTANDING PIM PERFORMANCE



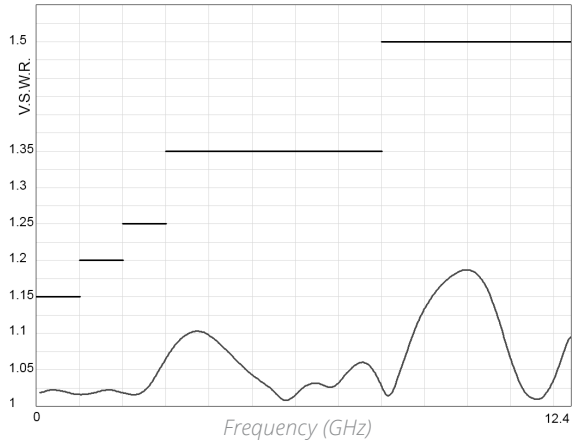
TYPICAL RF PERFORMANCE

Example: SPDT N up to 12.4 GHz

INSERTION LOSS & ISOLATION

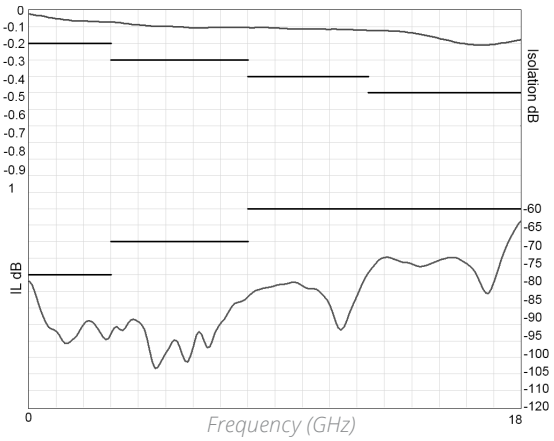


V.S.W.R

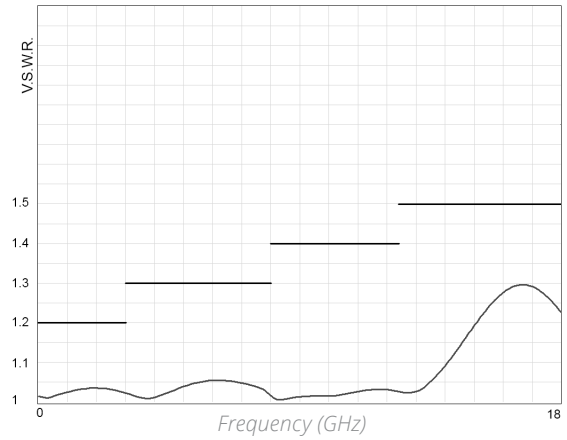


Example: SPDT SMA up to 18 GHz

INSERTION LOSS & ISOLATION



V.S.W.R

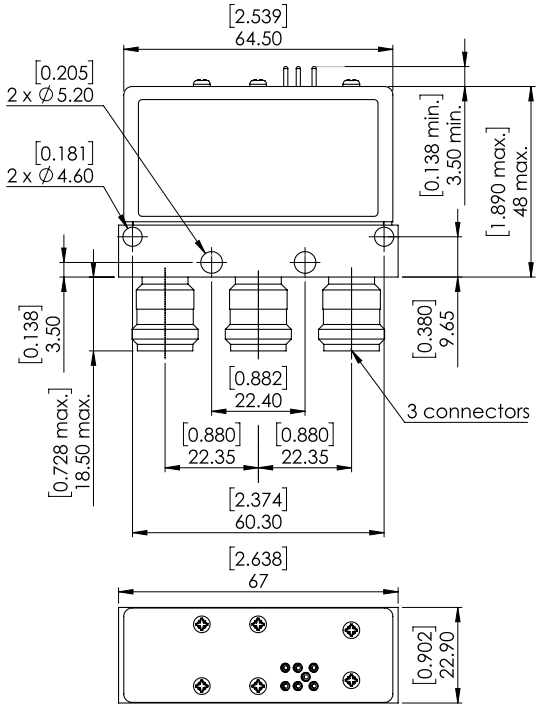


Notes

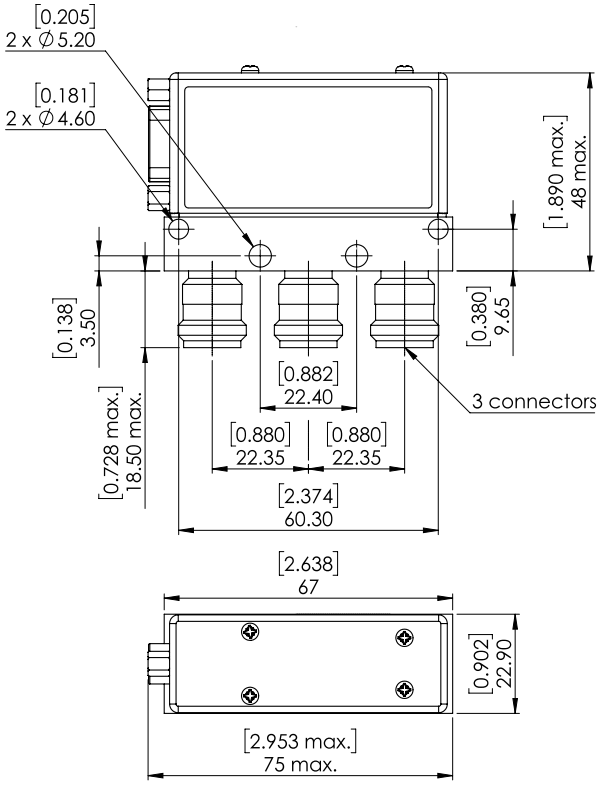
See electrical schematics from page 2-20 to 2-23.

TYPICAL OUTLINE DRAWING

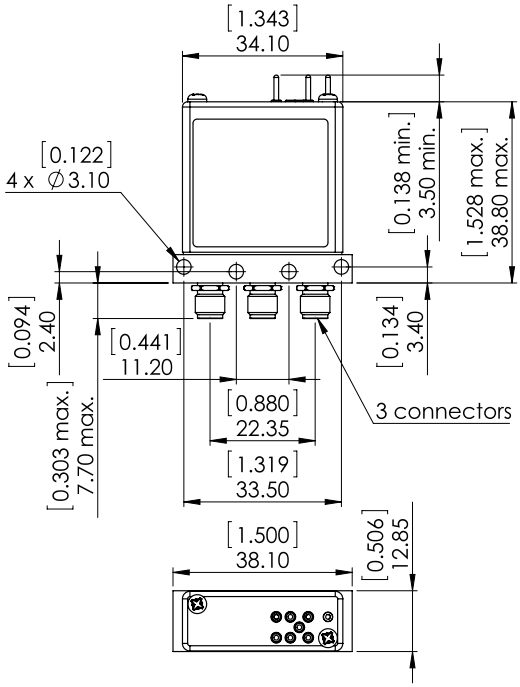
EXAMPLE: SPDT N UP TO 12.4 GHz WITH PINS



EXAMPLE: SPDT N UP TO 12.4 GHz WITH D-SUB



EXAMPLE: SPDT SMA UP TO 18 GHz



Notes

All dimensions are in millimeters [inches].

DPDT LOW PIM UP TO 18 GHz

To meet growing market demands created by the deployment of 4G/LTE networks, Radiall has introduced a new range of Low PIM switches. RAMSES DPDT Low PIM switches are perfectly suited for RF test systems and test benches requiring excellent passive intermodulation performance up to 18 GHz; with a guarantee PIM performance of -160 dBc at +43 dBm over a life span of 2 million switching cycles. These products are specific to instrumentation and telecommunication applications.

Example of P/N: R577163105LP is a DPDT Low PIM N 12.4 GHz latching with Indicators, Self Cut-Off, 28 Vdc, TTL driver, D-Sub connector.

PART NUMBER SELECTION

R577 _ _ _ _ _ _ LP

SERIES PREFIX

FREQUENCY RANGE
1: N up to 12.4 GHz
4: SMA up to 18 GHz

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

ACTUATOR VOLTAGE
2: 12 Vdc
3: 28 Vdc

TTL OPTION
0: Without TTL driver
1: With TTL driver [1 & 3]

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

ACTUATOR TERMINALS
0: Solder pins
5: D-Sub connector [4]

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

RAMSES Series

GENERAL 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	35	200	38	225
Nominal operating current at 23 °C	mA	340	140	320	125
Average power		See Power Rating Chart on page 1-13			
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	15			
Life (min)		2 million cycles			
Connectors		SMA - N			
Actuator terminals		Solder pins or male 9 pin D-Sub connector			
Operating temperature range		-40°C to +85°C			
Storage temperature range		-55°C to +85°C			
Vibration (MIL STD 202, method 204D, cond.C)		10-2000 Hz, 10 g		operating	
Shock (MIL STD 202, method 213B, cond.G)		50 g/11 ms, ½ sine		operating	

RF PERFORMANCE

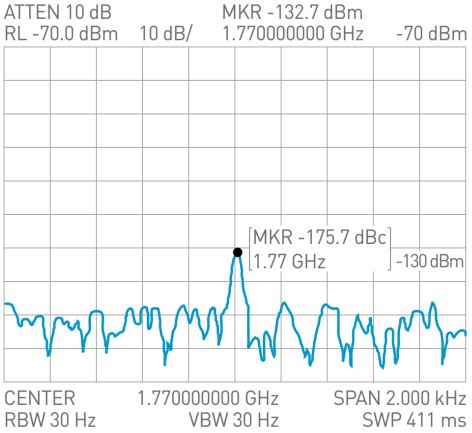
CONNECTORS	FREQUENCY RANGE GHz		V.S.W.R. (MAX)	INSERTION LOSS (MAX) dB	ISOLATION (MIN) dB	IMPEDANCE Ω	THIRD ORDER INTERMODULATION
N	DC - 3 DC - 12.4	DC - 1	1.15	0.15	85	50	-160 dBc at +43 dBm (2 carriers 20 W)
		1 - 2	1.20	0.20	80		
		2 - 3	1.25	0.25	75		
		3 - 8	1.35	0.35	70		
		8 - 12.4	1.50	0.50	60		
SMA	DC - 3 DC - 18	DC - 3	1.20	0.20	80		
		3 - 8	1.30	0.30	70		
		8 - 12.4	1.40	0.40	65		
		12.4 - 18	1.50	0.50	60		

PASSIVE INTERMODULATION

TONE 1	1,810 MHz, approximately 43 dBm
TONE 2	1,850 MHz, approximately 43 dBm
3RD ORDER PIM	160 dBc at 1,770 MHz

Depending on application, carrier powers and frequencies — PIM measurements can vary. PIM testing is not measured during product acceptance test.

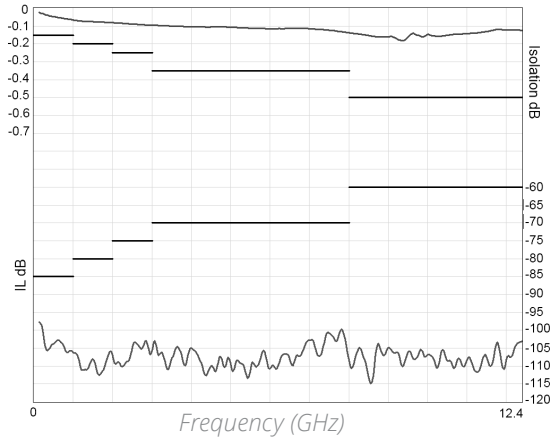
OUTSTANDING PIM PERFORMANCE



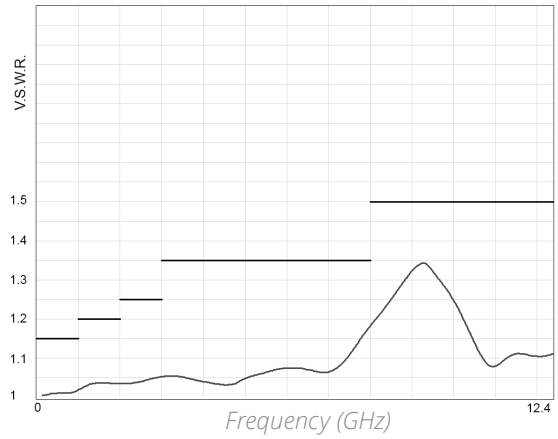
TYPICAL RF PERFORMANCE

Example: DPDT N up to 12.4 GHz

INSERTION LOSS & ISOLATION

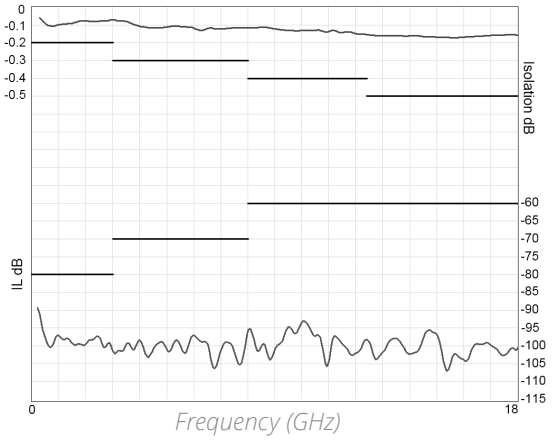


V.S.W.R

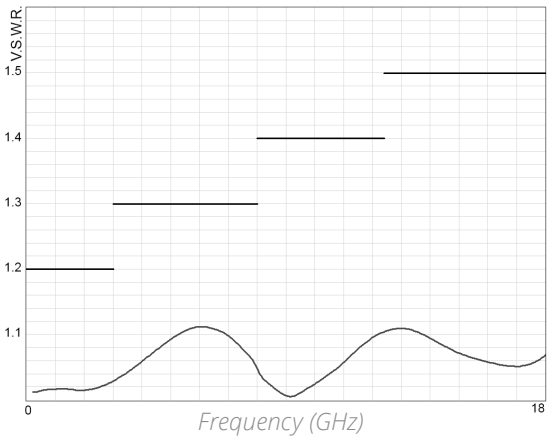


Example: DPDT SMA up to 18 GHz

INSERTION LOSS & ISOLATION



V.S.W.R

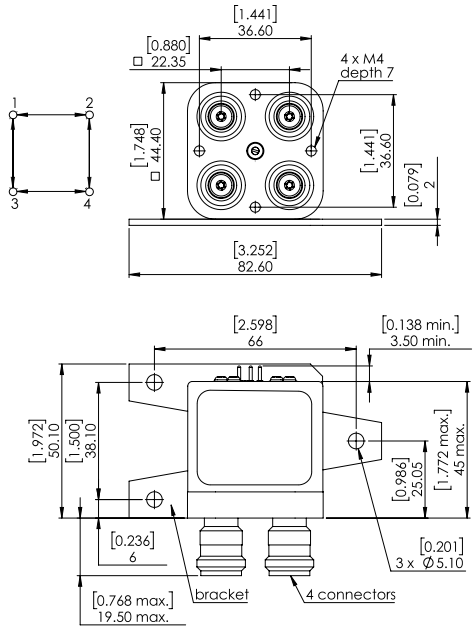


Notes

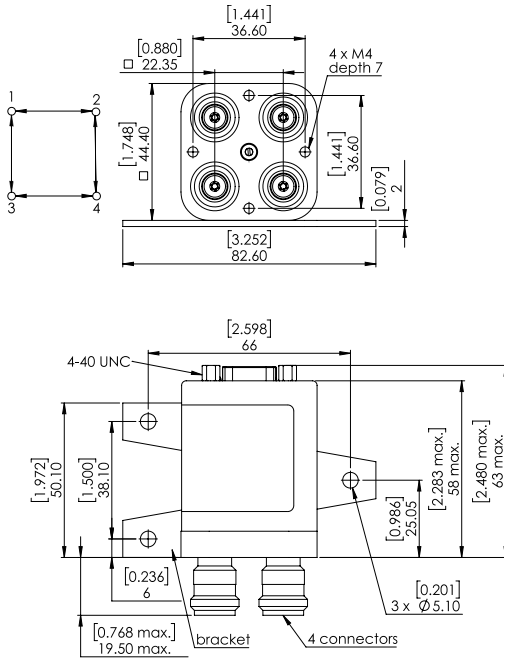
See electrical schematics from page 4-10 to 4-13.

TYPICAL OUTLINE DRAWING

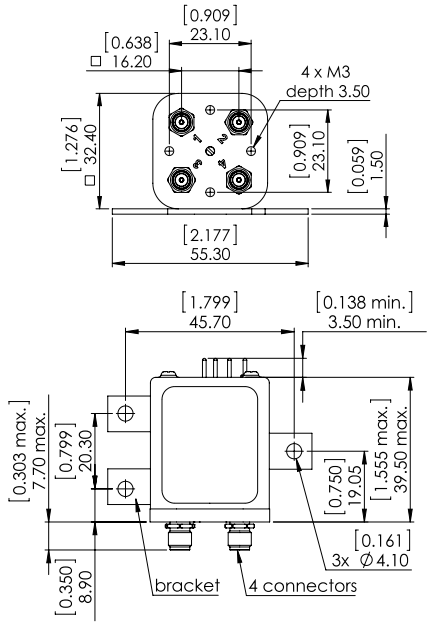
EXAMPLE: DPDT N UP TO 12.4 GHz WITH PINS



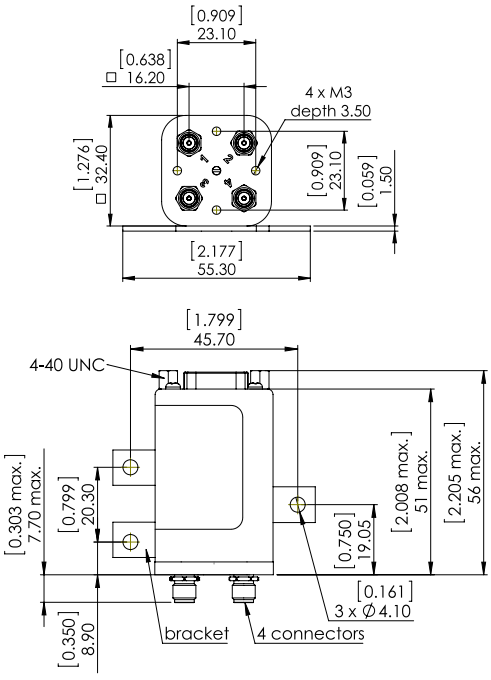
EXAMPLE: DPDT N UP TO 12.4 GHz WITH D-SUB



EXAMPLE: DPDT SMA UP TO 18GHz WITH PINS



EXAMPLE: DPDT SMA UP TO 18 GHz WITH D-SUB

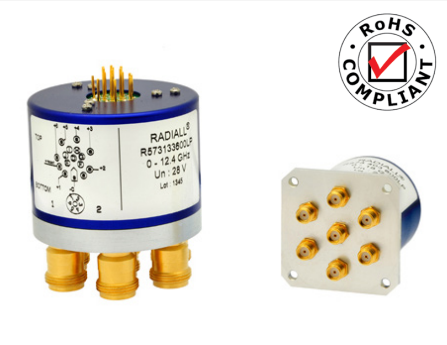


Notes

All dimensions are in millimeters [inches].

RAMSES Series

SPNT LOW PIM UP TO 18 GHz



To meet growing market demands created by the deployment of 4G/LTE networks, Radiall has introduced a new range of Low PIM switches. RAMSES SPnT Low PIM switches are perfectly suited for RF test systems and test benches requiring excellent passive intermodulation performance up to 18 GHz; with a guarantee PIM performance of -160 dBc at +43 dBm over a life span of 2 million switching cycles. These products are specific to instrumentation and telecommunication applications.

Example of P/N: R573403600LP is a SP6T Low PIM SMA up to 18 GHz, Normally Open, 28 Vdc, without option and solder pins.

PART NUMBER SELECTION

R57 3 _ _ _ _ _ _ LP

SERIES PREFIX

MODEL
3: Without 50 Ω termination

RF CONNECTORS
1: N up to 12.4 GHz
4: SMA up to 18 GHz

TYPE
0: Normally open
1: Normally open + I.C.
2: Latching
3: Latching +I.C.
4: Latching + S.C.O. [1]
5: Latching + S.C.O. + I.C. [1]
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

NUMBER OF POSITIONS
4: 4 Positions
6: 6 Positions

OPTIONS
0: Without option
1: Positive common [5]
2: Compatible TTL driver [1 & 2]
3: With suppression diodes
4: With suppression diodes and positive common [3]
8: BCD TTL driver compatible [1, 2, 4, & 5]

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

Notes
I.C.: Contact / S.C.O.: Self Cut-Off / A.R.: Auto Reset
1. These models are already equipped with suppression diodes
2. Polarity is not relevant to application for switches with TTL driver
3. Option available only for type 0, 1, 2 and 3
4. Latching BCD driver enables also a global reset through driver code 0000 (see BCD logic coding page 1-11)
5. Option available only with type 0, 1, 2, 3 and with type 8 and 9 combined with 28 Vdc.

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.

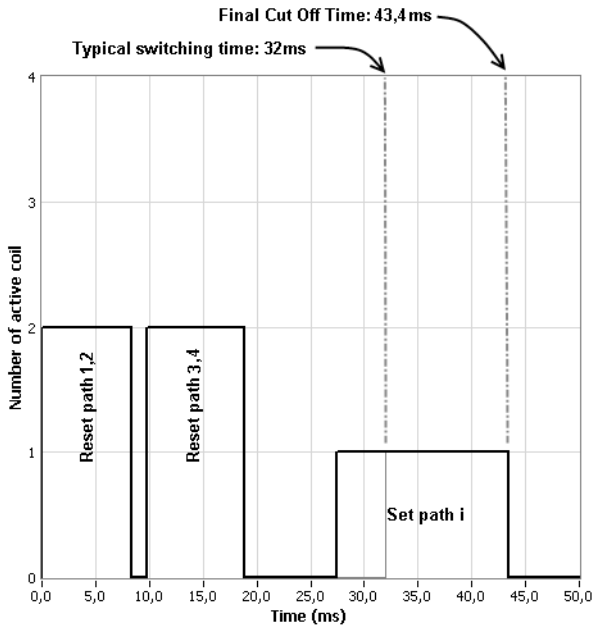
Note: During the RESET operation the global current is the nominal operating current multiplied by the number of positions.

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).

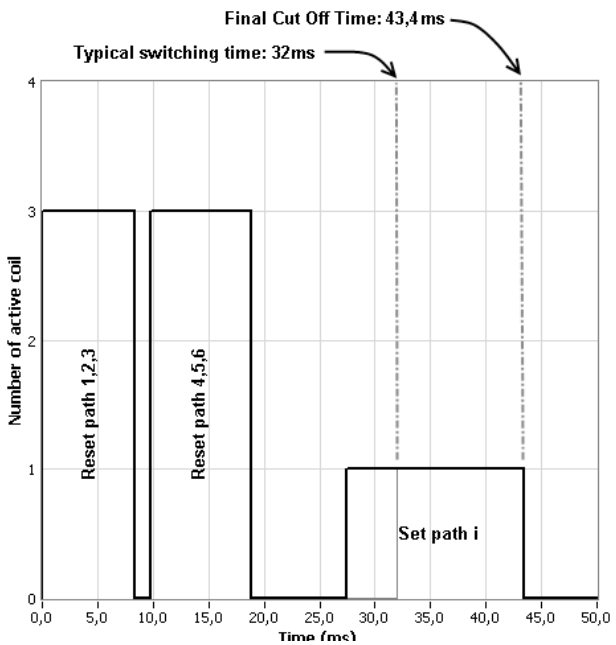
Example: During the AUTOMATIC RESET operation, at 28 Vdc, 4 position switch has a temporary consumption of only 250 mA, during 40 ms maximum.

SWITCHING SEQUENCE

FOR SP4T



FOR SP6T



Notes
See electrical schematics from page 5-38 to 5-43.

GENERAL 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 at 23 °C (+/-10%)	Ω	47.5	275	38	225
Nominal operating current at 23 °C	mA	250	102	320 Reset SP4T: 1280 mA* Reset SP6T: 1920 mA*	125 Reset SP4T: 500 mA* Reset SP6T: 750 mA*
Average power		See Power Rating Chart on page 1-13			
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 W/30 V/100 mA			
Switching time (max)	ms	15 For automatic reset models: 40			
Life (min)		2 million cycles			
Connectors		SMA - N			
Actuator terminals		Solder pins or male 25 pin D-Sub connector			
Operating temperature range		-25 °C to +70 °C			
Storage temperature range		-55 °C to +85 °C			
Vibration (MIL STD 202, method 204D, cond.D)		10 - 2,000 Hz , 20 g		operating	
Shock (MIL STD 202, method 213B, cond.C)		100 g/6 ms, ½ sine		operating	

**Reset: supply voltage time 1 sec. max./duty cycle 10%*

RF PERFORMANCE

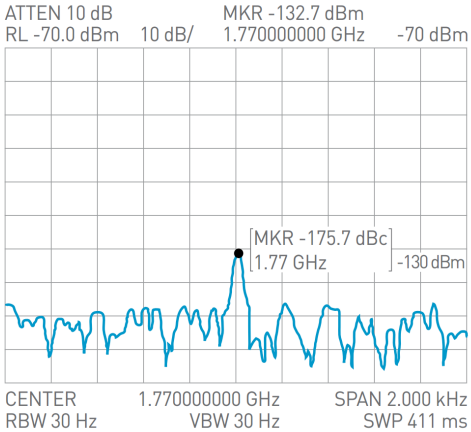
CONNECTORS	NUMBER OF POSITIONS	FREQUENCY RANGE GHz		V.S.W.R. (MAX)	INSERTION LOSS (MAX) dB	ISOLATION (MIN) dB	IMPEDANCE Ω	THIRD ORDER INTERMODULATION
SMA	4 and 6	DC - 18	DC - 3	1.20	0.20	80	50	-160 dBc at +43 dBm (2 carriers 20 W)
			3 - 8	1.30	0.30	70		
			8 - 12.4	1.40	0.40	60		
			12.4 - 18	1.50	0.50	60		
N		DC - 12.4	DC - 3	1.20	0.20	80		
			3 - 8	1.35	0.35	70		
			8 - 12.4	1.50	0.50	60		

PASSIVE INTERMODULATION

TONE 1	1,810 MHz, approximately 43 dBm
TONE 2	1,850 MHz, approximately 43 dBm
3RD ORDER PIM	160 dBc at 1,770 MHz

Depending on application, carrier powers and frequencies — PIM measurements can vary. PIM testing is not measured during product acceptance test.

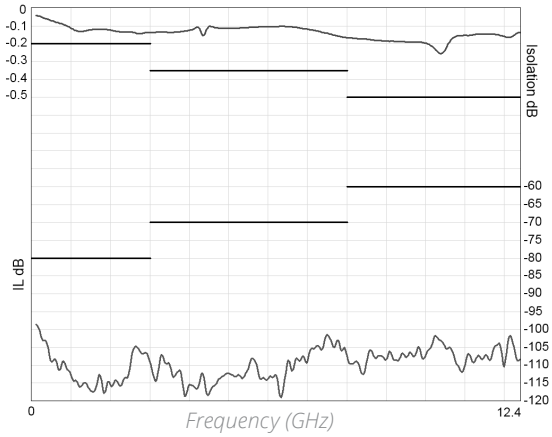
OUTSTANDING PIM PERFORMANCE



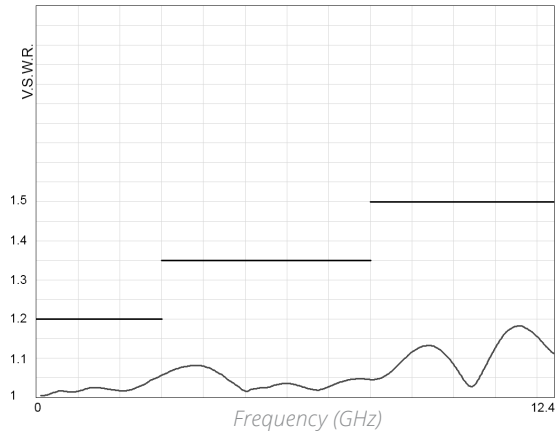
TYPICAL RF PERFORMANCE

Example: SP6T N up to 12.4 GHz

INSERTION LOSS & ISOLATION

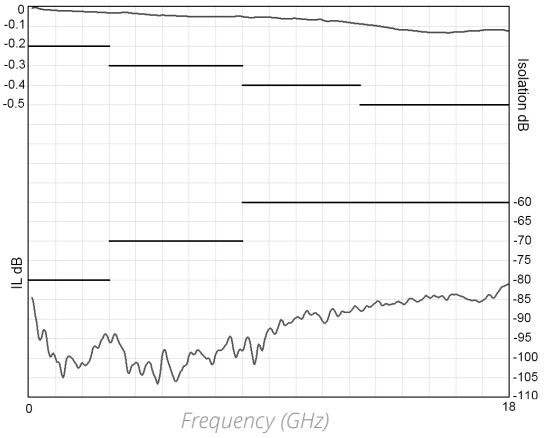


V.S.W.R

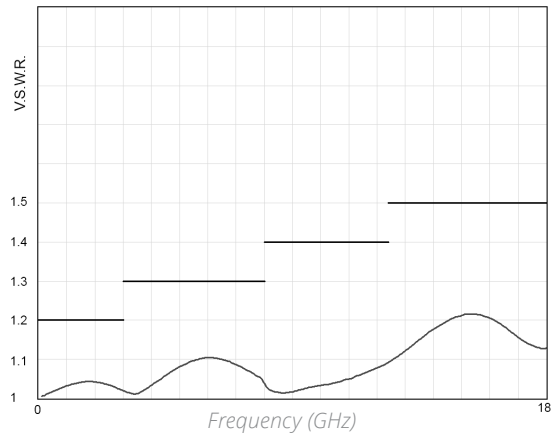


Example: SP6T SMA up to 18 GHz

INSERTION LOSS & ISOLATION

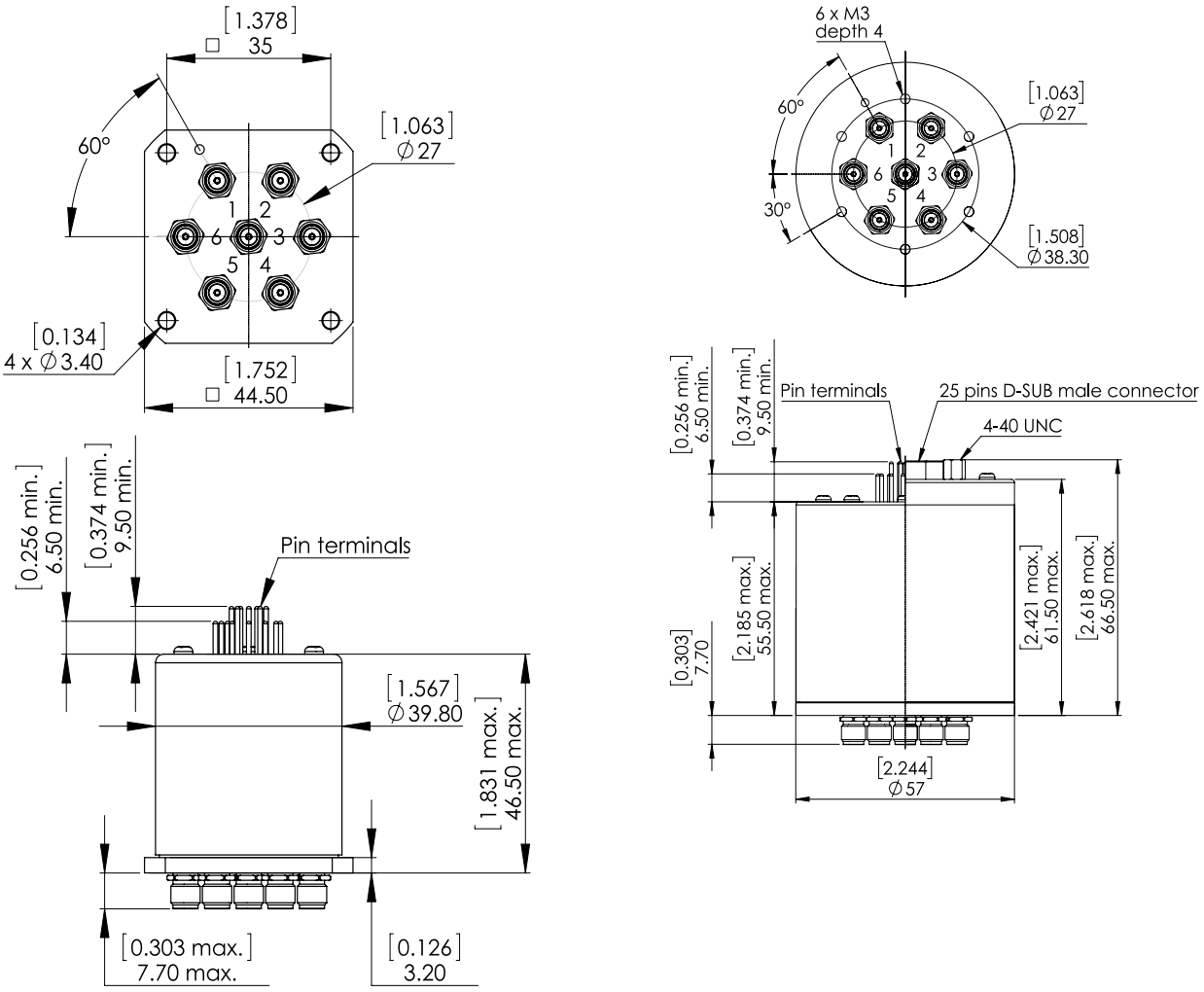


V.S.W.R



TYPICAL OUTLINE DRAWING

Example: SPnT SMA up to 18 GHz



SOLDER PINS	Type 0 or 1 with option 0 - 1 - 3 or 4
	Type 2 or 3 with option 0 or 1

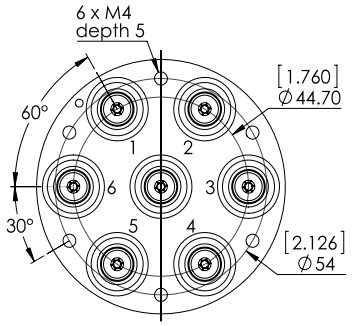
SOLDER PINS	Type 0 or 1 with option 2 or 8
	Type 2 or 3 with option 2 - 3 - 4 or 8
	Type 4 - 5 - 8 or 9 with option 0 - 2 or 8

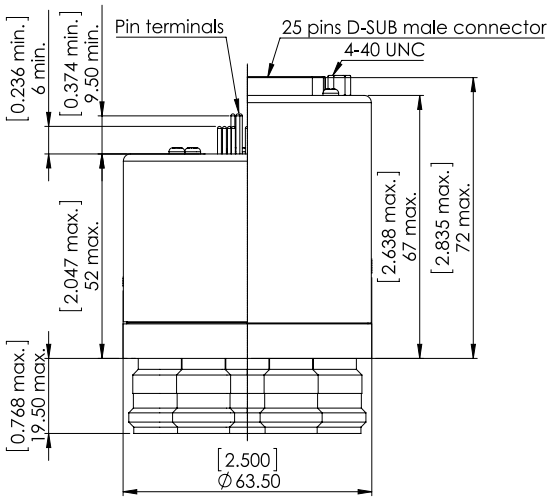
D-SUB CONNECTOR	All models

Notes

All dimensions are in millimeters [inches].

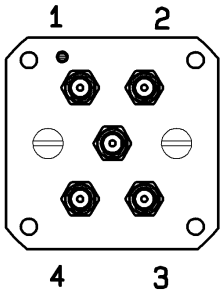
Example: SPnT N up to 12.4 GHz



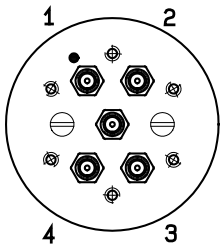


RF CONNECTOR ALLOCATION

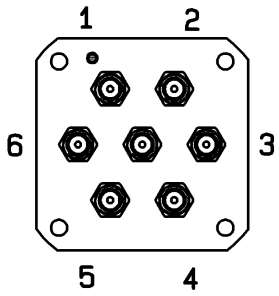
SP4T



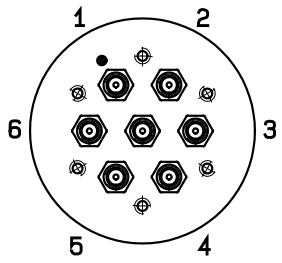
SMA



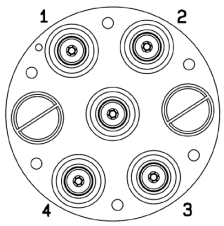
SP6T



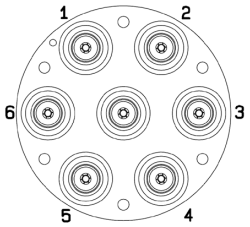
SMA



N



N



Notes

All dimensions are in millimeters [inches].

COAXIAL LOW PIM SWITCHES - ELECTRICAL SCHEMATICS

TYPE		FAILSAFE	LATCHING		
Options		Without option	Without option	Cut-off	C+ and suppression diodes
		Indicator contact	Indicator contact	Cut-off and I.C.	C+, suppression diodes and I.C.
		Suppression diodes	Suppression diodes	Cut-off and TTL Driver	C+ and cut-off
		Suppression diodes and I.C.	Suppression diodes and I.C.	Cut-off, TTL and I.C.	C+, cut-off and I.C.
		TTL Driver	TTL Driver	C+	-
		TTL Driver and I.C.	TTL Driver and I.C.	C+ and I.C.	
Page Number	SPDT	see page 2-20	see page 2-21	see page 2-22	see page 2-23
	DPDT	see page 4-10	see page 4-11	see page 4-12	see page 4-13

TYPE		NORMALLY OPEN		LATCHING			
Options		Without option	BCD TTL driver	Without option	Cut-off	TTL Driver, Cut-off and Auto reset	C+ and suppression diodes
		Indicator contact	BCD TTL driver and I.C.	Indicator contact	Cut-off and I.C.	TTL Driver, Cut-off, Auto reset and I.C.	C+, suppression diodes and I.C.
		Suppression diodes	C+	Suppression diodes	Cut-off and Auto reset	BCD TTL Driver, Cut-off and Auto reset	C+, Cut-off and Auto reset
		Suppression diodes and I.C.	C+ and I.C.	Supression diodes and I.C.	Cut-off, Auto reset and I.C.	BCD TTL Driver, Cut-off, Auto reset and I.C.	C+, Cut-off, Auto reset and I.C.
		TTL Driver	C+ and suppression diodes	TTL Driver	Cut-off and TTL Driver	C+	-
		TTL Driver and I.C.	C+, suppression diodes and I.C.	TTL Driver and I.C.	Cut-off, TTL and I.C.	C+ and I.C.	-
Page Number	SPnT	see page 5-38	see page 5-39	see page 5-40	see page 5-41	see page 5-42	see page 5-43