

**RADIALL**

TECHNICAL DATA SHEET

R 595 - - - - -**HIGH PERFORMANCE DP3T - SPDT SWITCHES**

Issue : 09-March-2010

DP3T - SPDT Coaxial Switches DC to 6 GHz, DC to 20 GHz, DC to 26.5 GHz

Radiall's PLATINUM SERIES switches are optimised to perform at a high level over an extended life span. With outstanding RF performances, and a guaranteed Insertion Loss repeatability of 0.03 dB over a life span of 10 million switching cycles. PLATINUM SERIES switches are perfect for automated test and measurement equipment, as well as signal monitoring devices.

PART NUMBER SELECTION**R 595**

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

Type :
 3 : Latching
 4 : Latching + Indicators
 5 : Latching + Self Cut-Off
 6 : Latching + Self Cut-Off + Indicators

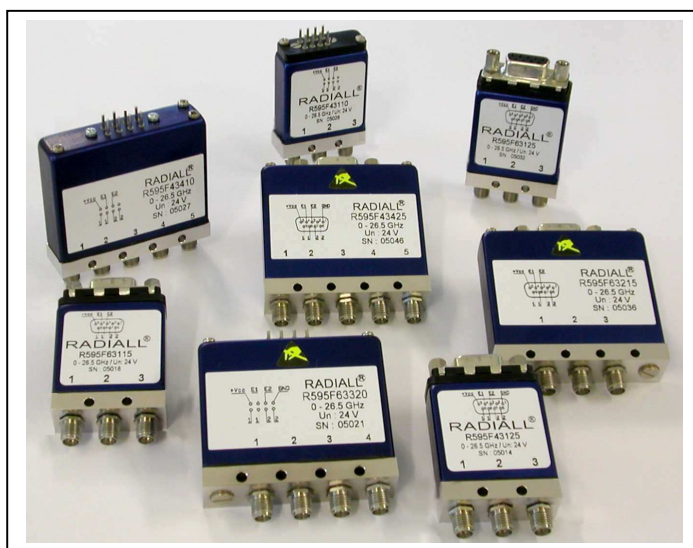
Actuator Voltage :
 3 : 24 Vdc
 7 : 15 Vdc

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

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

Options :
 1 : Without option (Positive common)
 2 : Compatible TTL driver (high level)

Switch model :
 1 : Non terminated SPDT switch
 2 : Terminated SPDT switch
 3 : Terminated 4 port bypass switch
 4 : Non terminated 5 port DP3T switch

PICTURE

ISO 9001 certified

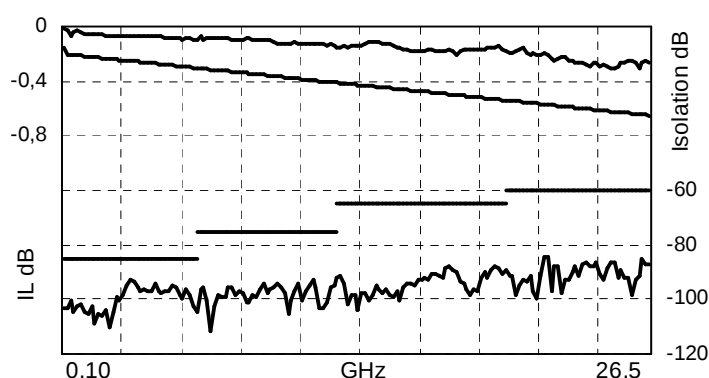
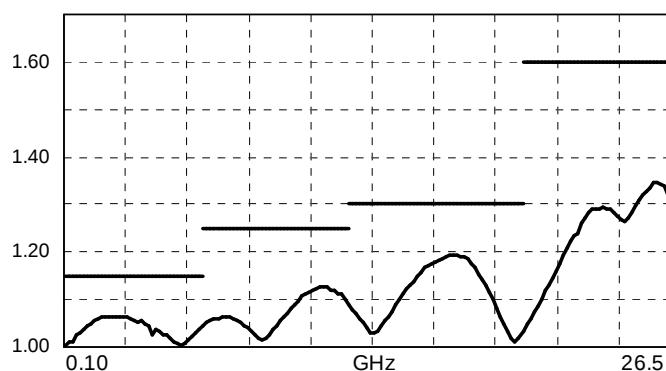
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**RADIALL****TECHNICAL DATA SHEET****R 595 - - - - -****HIGH PERFORMANCE DP3T - SPDT SWITCHES***Issue : 09-March-2010***RF PERFORMANCES**

PART NUMBER	R5953-----	R5954-----	R595F-----
Frequency Range GHz	DC to 6	DC to 20	DC to 26.5
Impedance Ohms	50		
Insertion Loss dB (Maximum)	$0.20 + (0.45 / 26.5) \times \text{frequency (GHz)}$		
Isolation dB (Minimum)	85	DC to 6 GHz : 85 6 to 12.4 GHz : 75 12.4 to 20 GHz : 65	DC to 6 GHz : 85 6 to 12.4 GHz : 75 12.4 to 20 GHz : 65 20 to 26.5 GHz : 60
V.S.W.R. (Maximum)	1.15	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.30 18 to 20 GHz : 1.60	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.30 18 to 26.5 GHz : 1.60
Repeatability (Up to 10 million cycles measured at 25°C)	0.03 dB maximum	0.03 dB maximum	0.03 dB maximum

TYPICAL RF PERFORMANCES**Insertion Loss and Isolation****V.S.W.R.****RADIALL®**

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**RADIALL****TECHNICAL DATA SHEET****R 595 - - - - -****HIGH PERFORMANCE DP3T - SPDT SWITCHES***Issue : 09-March-2010***ADDITIONAL SPECIFICATIONS**

Operating mode		Latching		
Nominal operating voltage (across operating temperature) Vdc			24 (20 / 32)	15 (12 / 20)
Coil resistance (+/-10%) Ohms		SPDT	350	120
		Terminated SPDT, DP3T, Bypass	175	60
Nominal operating current at 23°C mA		SPDT	68	125
		Terminated SPDT, DP3T, Bypass	140	250
Average power		RF path Cold switching : see Power Rating Chart on page 12 Hot switching : 1 Watt CW		
		Internal terminations 1 Watt average into 50 Ω		
TTL input	High Level	3 to 7 V	800 μA max at 7 V	
	Low Level	0 to 0.8 V	20 μA max at 0.8V	
Switching time (max) ms		15		
Life (min)		10 million cycles		
Connectors		SMA		
Actuator terminals		D-Sub 9 pin female Solder pins		
Weight (max) g		SPDT	< 60	
		Terminated SPDT, DP3T, Bypass	< 100	

ENVIRONMENTAL SPECIFICATIONS

Operating temperature range	°C	-25 to +75
Storage temperature range	°C	-55 to +85
Temperature cycling (MIL-STD-202F , Method 107D , Cond.A)	°C	-55 to +85 (10 cycles)
Sine vibration operating (MIL STD 202 , Method 204D , Cond.D)		10-2000 Hz, 20g
Random vibration operating		16.91g (rms) 50-2000 Hz 3min/axis
Shock operating (MIL STD 202 , Method 213B , Cond.G)		50g / 11 ms, sawtooth
Humidity operating		15 to 95% relative humidity
Humidity storage (MIL STD 202 , Method 106E , Cond.E)		65°C, 95% RH, 10 days
Altitude operating		15,000 feet (4,600 meters)
Altitude storage (MIL STD 202 , Method 105C , Cond.B)		50,000 feet (15,240 meters)

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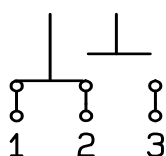
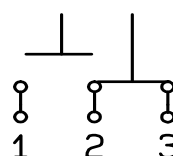
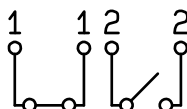
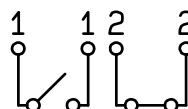
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**SWITCH MODEL 1 : NON TERMINATED SPDT SWITCH**

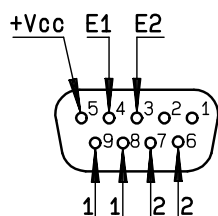
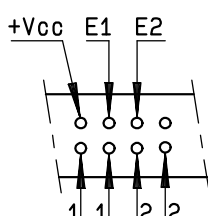
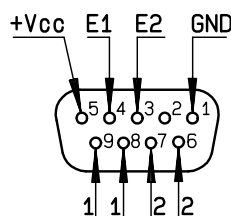
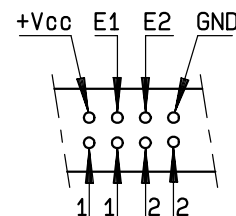
The non terminated SPDT switch is a single pole double throw switch. This switch is "break before make".

RF SCHEMATIC DIAGRAM**POSITION E1****POSITION E2****POSITION INDICATORS****STATE "11"****STATE "22"****Standard drive option "1" (Positive common):**

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

TTL drive option "2"

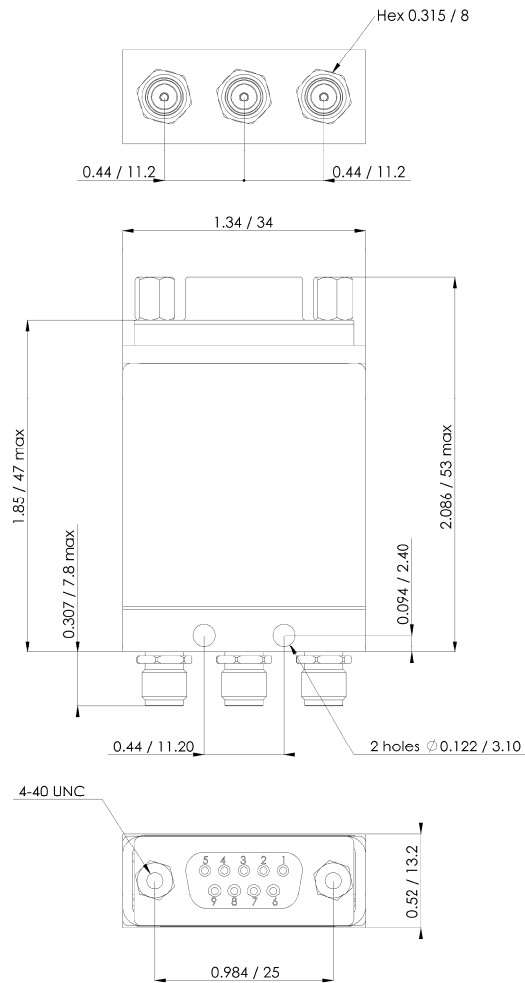
- Connect pin GND to ground.
- Connect pin +Vcc to supply
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, apply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

**D-Sub connector****Solder pins****D-Sub connector****Solder pins**

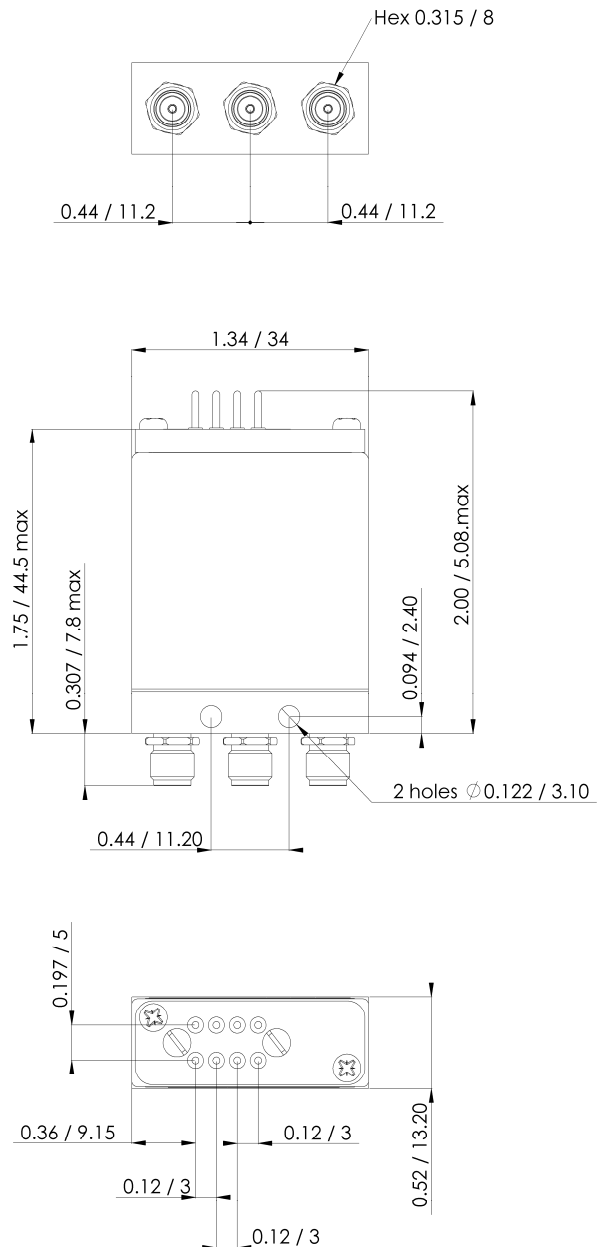
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All dimensions are in inches/millimetres.

With D-Sub connector



With solder pins

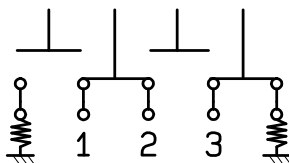
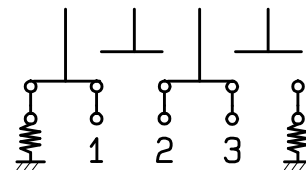
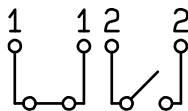
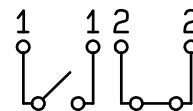
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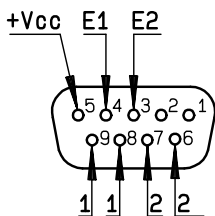
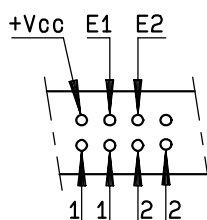
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**SWITCH MODEL 2 : TERMINATED SPDT SWITCH**

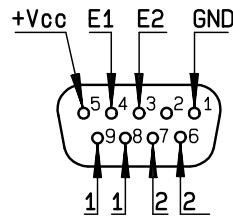
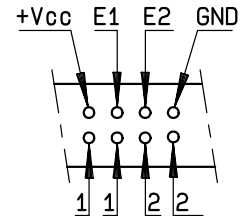
The terminated SPDT switch is a single pole double throw switch. The unused ports are terminated into 50 ohms. This switch is "break before make".

RF SCHEMATIC DIAGRAM**POSITION E1****POSITION E2****POSITION INDICATORS****STATE "11"****STATE "22"****Standard drive option "1" (Positive common):**

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

**D-Sub connector****Solder pins****TTL drive option "2"**

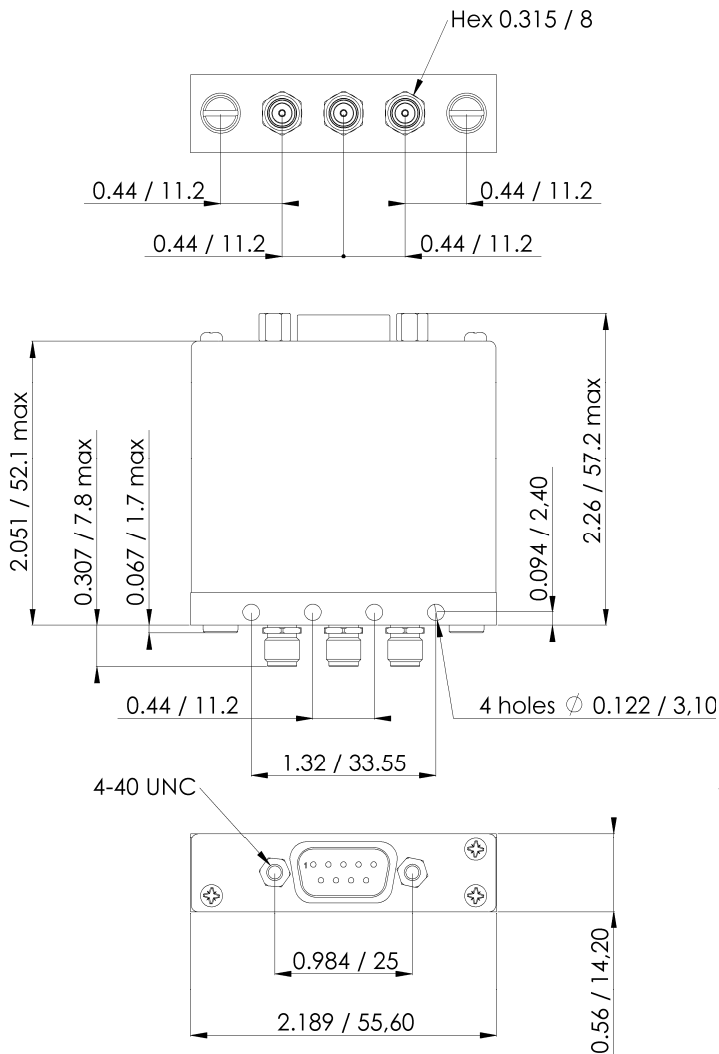
- Connect pin GND to ground.
- Connect pin +Vcc to supply
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, apply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

**D-Sub connector****Solder pins**

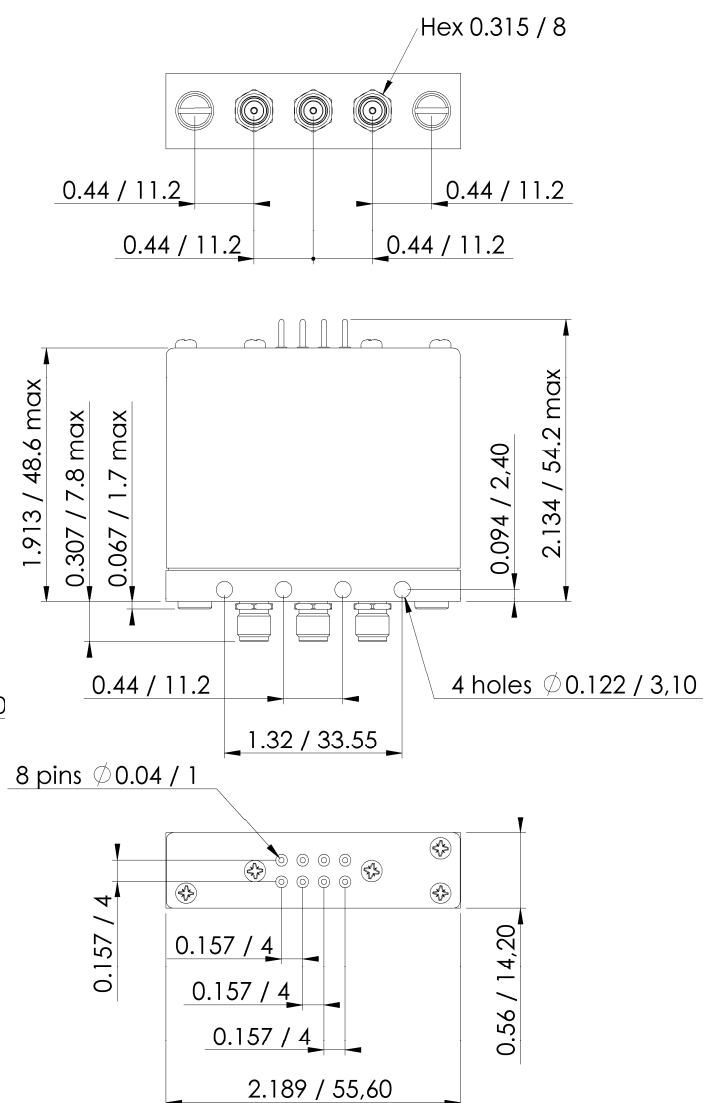
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With D-Sub connector



With solder pins

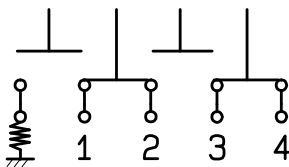
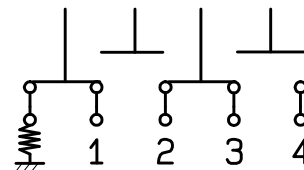
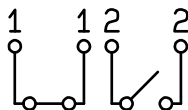
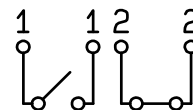
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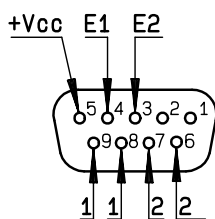
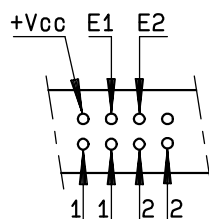
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**SWITCH MODEL 3 : TERMINATED 4 PORT BYPASS SWITCH**

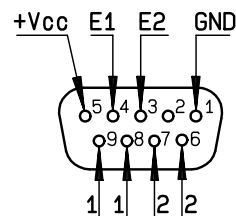
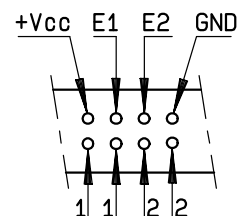
The terminated 4 port bypass switch can terminate into 50 ohms the device under test. These switches are "break before make".

RF SCHEMATIC DIAGRAM**POSITION E1****POSITION E2****POSITION INDICATORS****STATE "11"****STATE "22"****Standard drive option "1" (Positive common):**

- Connect pin +Vcc to supply.
- Select desired RF path by applying ground to the corresponding "close" pin (Ex: ground pin E1 to switch to position E1. RF path 1-2 and RF path 3-4 closed and RF path 2-3 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground pin E2 to open RF path 1-2 and 3-4 and close RF path 2-3).

**D-Sub connector****Solder pins****TTL drive option "2"**

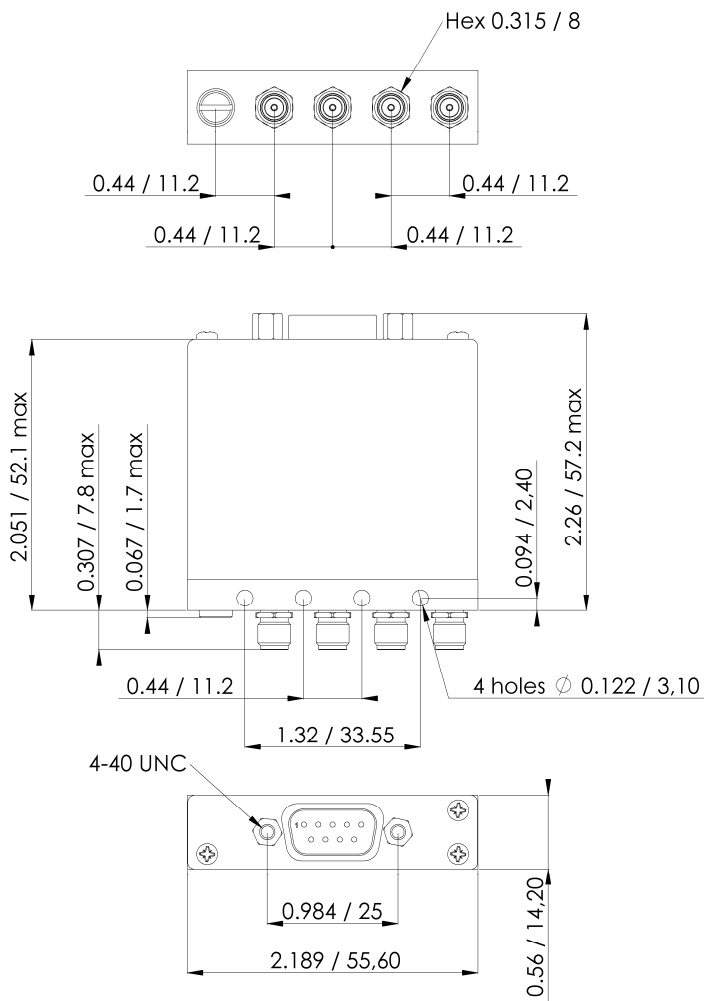
- Connect pin GND to ground.
- Connect pin +Vcc to supply.
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 1-2 and 3-4 closed and RF path 2-3 open).
- To open desired path and close the new RF path, apply TTL "High" to the "drive" pin which corresponds to the desired RF path.
(Ex: apply TTL "High" to pin E2 to open RF path 1-2 and 3-4 and close RF path 2-3).

**D-Sub connector****Solder pins**

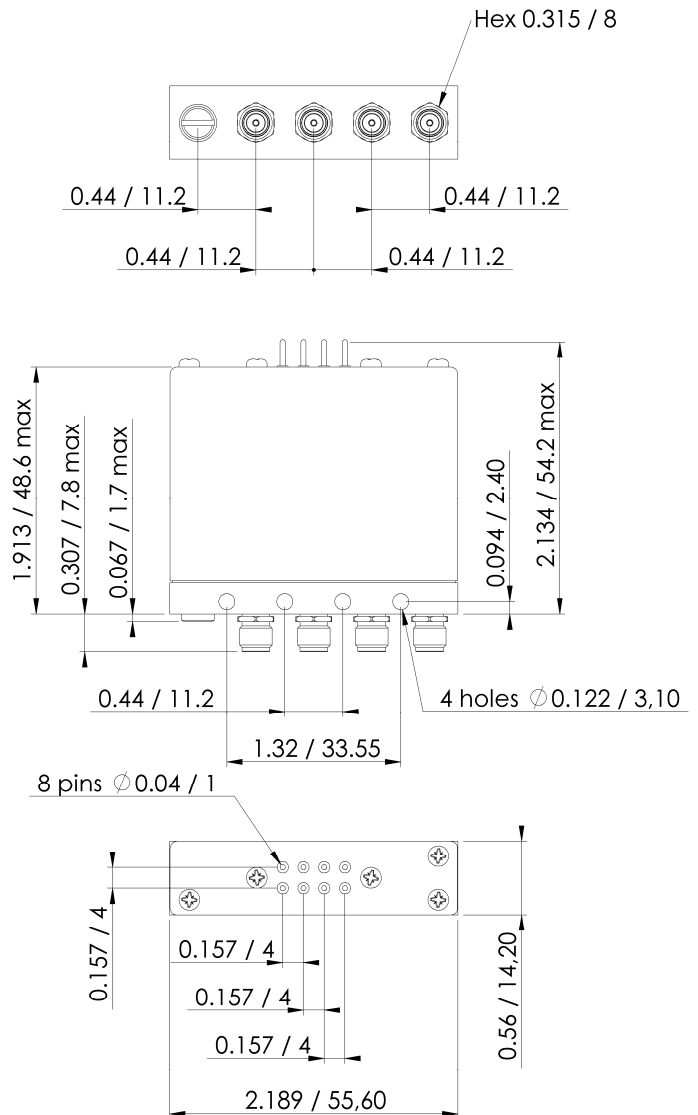
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With D-Sub connector



With solder pins



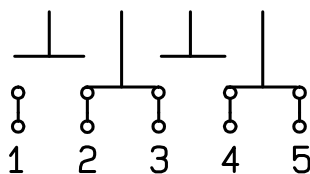
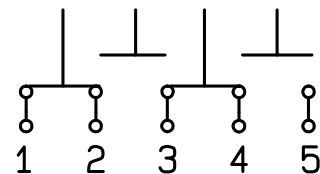
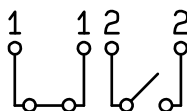
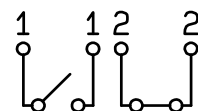
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**SWITCH MODEL 4 : NON TERMINATED 5 PORT DP3T SWITCH**

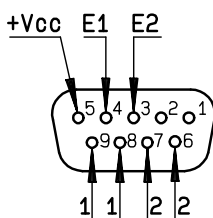
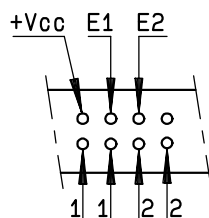
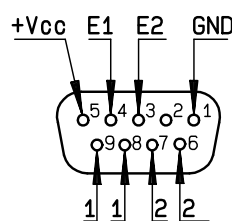
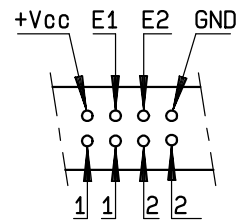
The non terminated 5 port DP3T switch can be used as SPDT with high power terminations, as a bypass switch. In this application, the fifth port can be terminated externally with a high power termination. These switches are "break before make".

RF SCHEMATIC DIAGRAM**POSITION E1****POSITION E2****POSITION INDICATORS****STATE "11"****STATE "22"****Standard drive option "1" (Positive common):**

- Connect pin +Vcc to supply.
- Select desired RF path by applying ground to the corresponding "close" pin (Ex: ground pin E1 to switch to position E1. RF path 2-3 and RF path 4-5 closed and RF path 1-2 and RF path 3-4 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground pin E2 to open RF path 2-3 and 4-5 and close RF path 1-2 and 3-4).

TTL drive option "2"

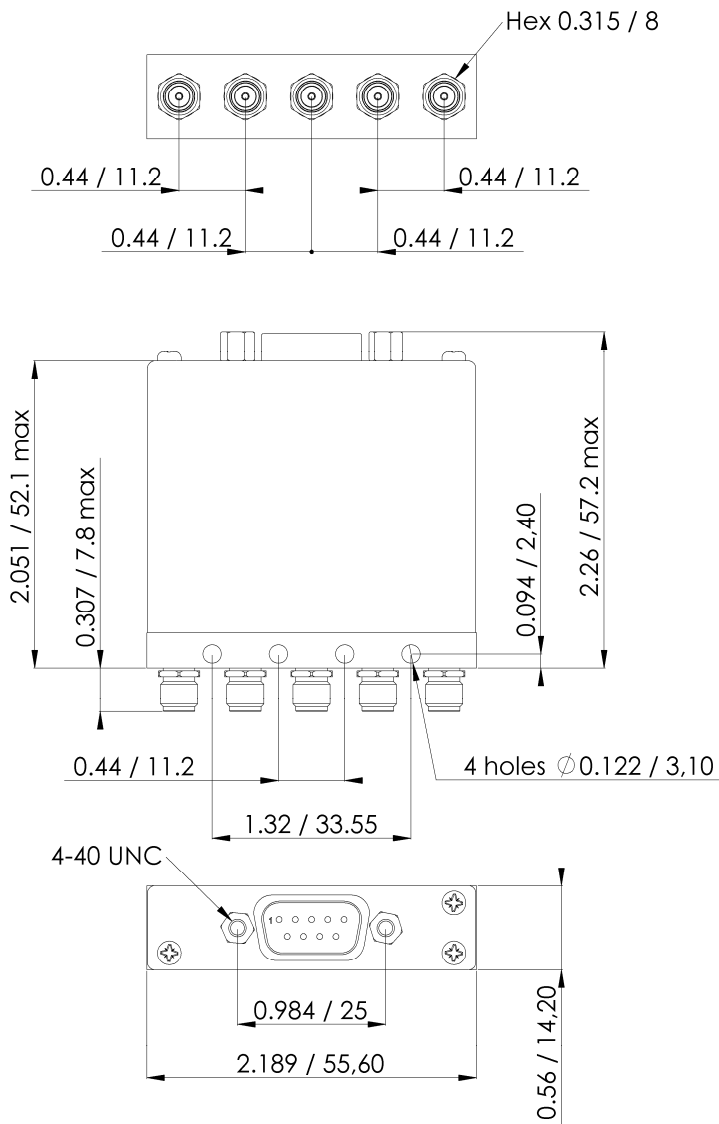
- Connect pin GND to ground.
- Connect pin +Vcc to supply.
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 2-3 and RF path 4-5 closed and RF path 1-2 and 3-4 open).
- To open desired path and close the new RF path, apply TTL "High" to the "drive" pin which corresponds to the desired RF path. (Ex: apply TTL "High" to pin E2 to open RF path 2-3 and 4-5 and close RF path 1-2 and 3-4).

**D-Sub connector****Solder pins****D-Sub connector****Solder pins**

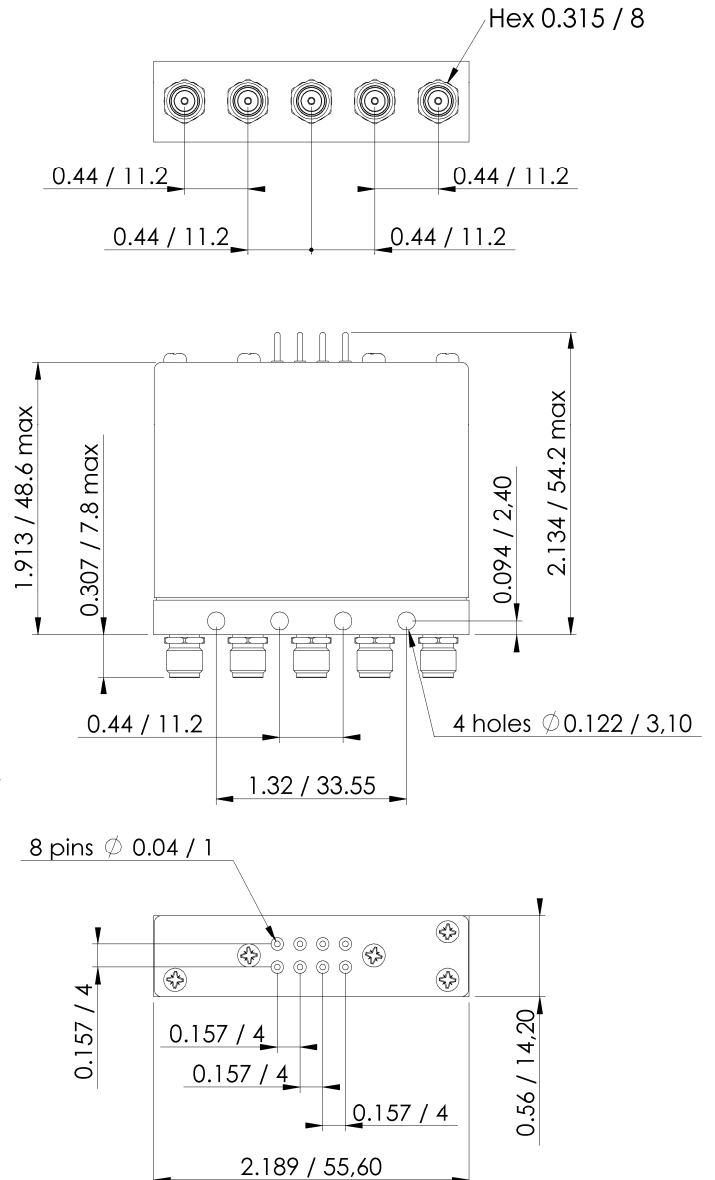
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With D-Sub connector



With solder pins



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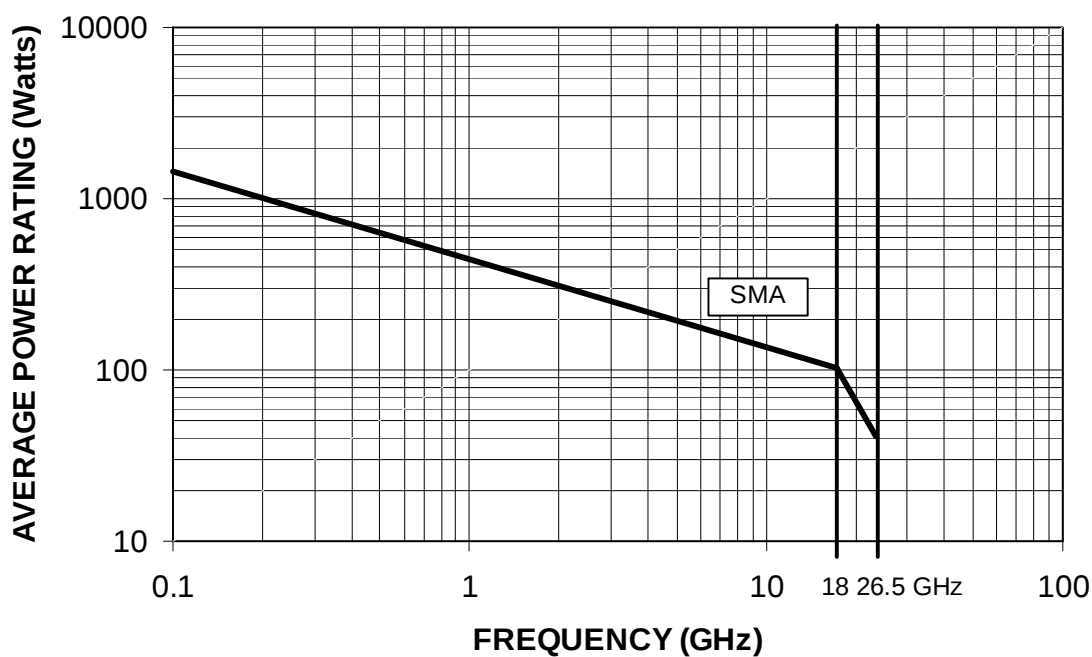
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**POWER RATING CHART**

This graph is based on the following conditions :

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



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

