

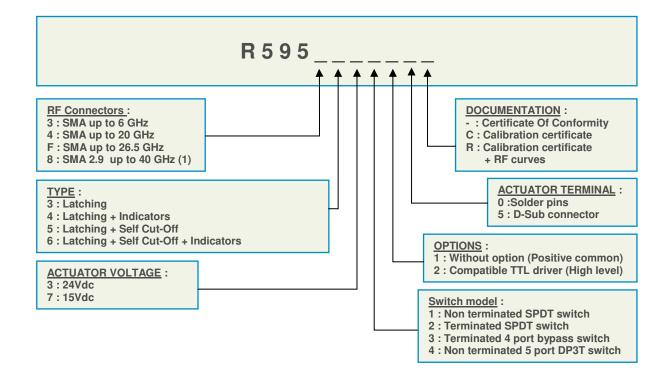
HIGH PERFORMANCE DP3T-SPDT SWITCHES PLATINUM Series

PAGE 1/12 ISSUE 05-11-18 SERIES DP3T/SPDT PART NUMBER R595 XXX XXX

# DP3T-SPDT Coaxial Switches DC to 6 GHz, DC to 20 GHz, DC to 26.5 GHz, DC to 40 GHz

Radiall's PLATINUM SERIES switches are optimized 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



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

## **PICTURE**





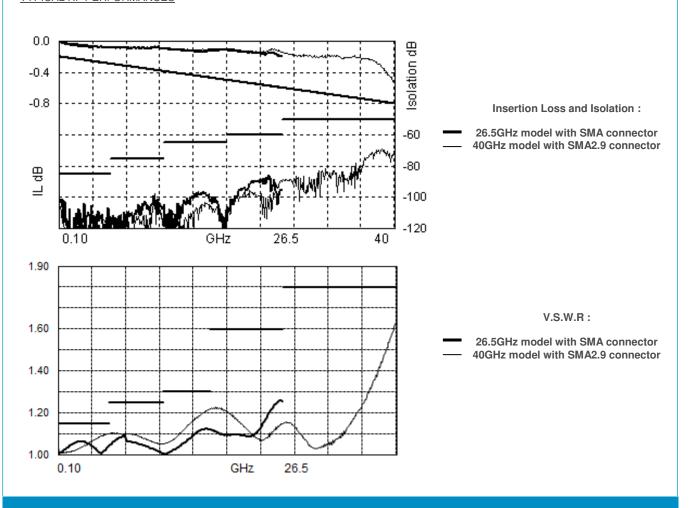


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## RF PERFORMANCES

PART NUMBER	R5953	R5954	R595F	R5958	
Frequency Range GHz	DC to 6	DC to 20	DC to 26.5	DC to 40	
Impedance Ohms	50				
Insertion Loss dB (Maximum)	0.20 + (0.45 / 26.5) x 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	DC to 6 GHz : 85 6 to 12.4 GHz : 75 12.4 to 20 GHz : 65 20 to 26.5 GHz : 60 26.5 to 40 GHz : 55	
V.S.W.R. (Maximum)	1.15	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 20 GHz : 1.30	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 20 GHz : 1.30 20 to 26.5 GHz : 1.60	DC to 6 GHz : 1.15 6 to 12.4 GHz : 1.25 12.4 to 20 GHz : 1.30 18 to 26.5 GHz : 1.60 26.5 to 40 GHz : 1.80	
Third order Inter Modulation	-120 dBc typical (2 carriers 20W)				
Repeatability (up to 10 million cycles measured at 25°C)	0.03 dB maximum			0.05 dB maximum	

#### TYPICAL RF PERFORMANCES





HIGH PERFORMANCE DP3T-SPDT SWITCHES PLATINUM Series

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## **ADDITIONAL SPECIFICATIONS**

Operating mode		Latching			
Nominal operating voltage (Vdc) (across operating temperature)			2	24 (20 / 32)	<b>15</b> (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
	All models	RF path Cold switching : See Power Rating Chart on final path Hot switching : 1 Watt CW		g Chart on final page	
Average power	Terminated model	Internal terminations 1 Watt average into $50\Omega$			
		External terminations 0.5 Watt average into 50Ω			
	High Level	3 to 7 V		800 μA max at 7 V	
TTL input	Low Level	0 to 0.8 V		20 μA max at 0.8V	
Switching time max (ms)		15			
116	SMA	10 million cycles			
Life min for	SMA 2.9	5 million cycles			
Connectors		SMA – SMA 2.9			
Actuator terminal		D-Sub pin female Solder pins			
	SPDT	< 60		_	
Weight max (g)	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-202 , 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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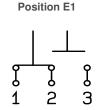
SERIES DP3T/SPDT

PART NUMBER R595 XXX XXX

# SWITCH MODEL 1: NON TERMINATED SPDT SWITCH

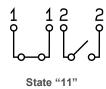
The non-terminated SPDT switch is a single pole double throw switch. This switch is "break before make".

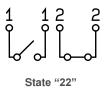
#### RF SCHEMATIC DIAGRAM





#### **INDICATORS POSITION**





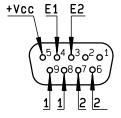
#### Standard drive option "1" (Positive common):

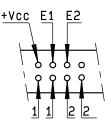
- Connect pin +Vcc to supply
- Select desired RF path by applying ground to the corresponding "Close" pin (Ex: ground pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground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

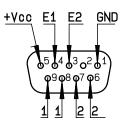
desired RF path. (Ex: apply TTL "High" to pin E2 to open RF path 1-2 and close RF path 2-3).



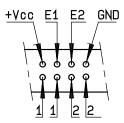


**D-Sub** connector

Solder pins







Solder pins



HIGH PERFORMANCE DP3T-SPDT SWITCHES PLATINUM Series

PAGE **5/12** SERIES DP3T/SPDT ISSUE **05-11-18** PART NUMBER R595 XXX XXX All dimensions are in millimeters [inches]. With D-Sub connector With solder pins [0.440] 0.440 0.440 0.440 11.18 11.18 11.18 11.18 [0.138 min.] 3.50 min. 2.087 max. 1.850 max. 53 max 0.122 47 max.  $\begin{bmatrix} 0.122 \\ 2 \times \emptyset \ 3.10 \end{bmatrix}$  $2 \times \bigcirc 3.10$ 3  $\oplus$  $\oplus$ Ф 0.094 0.441 3 connectors 11.20 3 connectors 0.441 11.20 1.339 [1.339] 34 34 4-40 UNC 88888 0.360 [0.118] 9.15 3 step Connectors

	, , , , , , , , , , , , , , , , , , , ,		
SMA up to 26.5GHz	7.7 [0.303]		
SMA 2.9 up to 40GHz	6.7 [0.264]		
-	_		





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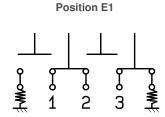
SERIES DP3T/SPDT

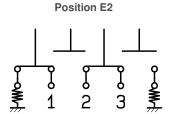
PART NUMBER R595 XXX XXX

# SWITCH MODEL 2: TERMINATED SPDT SWITCH

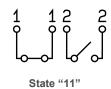
The-terminated SPDT switch is a single pole double throw switch. The unused ports are terminated into 50ohms. This switch is "break before make".

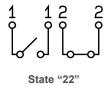
#### RF SCHEMATIC DIAGRAM





#### **INDICATORS POSITION**





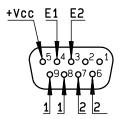
#### Standard drive option "1" (Positive common):

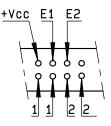
- Connect pin +Vcc to supply
- Select desired RF path by applying ground to the corresponding "Close" pin (Ex: ground pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground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

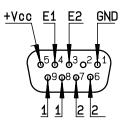
(Ex: apply  $\dot{\text{TTL}}$  "High" to pin E2 to open RF path 1-2 and close RF path 2-3).



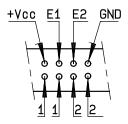


**D-Sub connector** 

Solder pins







Solder pins





SERIES DP3T/SPDT PAGE 7/12 ISSUE **05-11-18** PART NUMBER R595 XXX XXX All dimensions are in millimeters [inches]. Model SMA with D-Sub connector Model SMA with solder pins [0.440] [0.440] [0.440] \_11.18 [0.440] 11.18 11,18 [0.440] [0.440]0.440 0.440 <u> 11.18</u> 11.18 11.18 11.18  $\prod \prod$ [2.248 max.] 57.10 max. [2.051 max.] 52.10 max. [0.059 max.] 1.50 max. [0.138] 3.50 [1.917 max.] 48.70 max. [0.059 max.] 1 2 3 [0.094] 2.40 2 3 0.094 4 [0.122][0.441 11.20 [0.303 max.] 7.70 max. [0.441] [0.303 max.] 7.70 max. Ø3.10 11.20 0.122 [1.321] [1.321] x Ø3.10 Model SMA2.9 with D-Sub connector Model SMA2.9with solder pins 0 [0.440] 11.18 [0.440] 11.18 [0.440] 11.18 [0.440] 11.18 [0.440][0.440] 11.18 [0.440] <u>11.18</u> 11.18 11.18  $\prod \prod$ [0.138 min.] 3.50 min. [2.248 max.] 57.10 max. [2.051 max.] 52.10 max. [0.122] 4 x Ø 3.10 [1.917 max.] 48.70 max. [0.122] 4 x Ø 3.10 [0.094] 2.40 [0.094] 2 [0.827 max.] 21 max. [0.264 max.] 6.70 max. [0.2**6**4 max.] 6.70 max. [0.441] [0.441] 11.20 [1.321] [1.321] **TOP view - D-Sub connector** TOP view - solder pins [2.189] [2.189] 55.60 55.60 4-40 UNC **©**0000@ O (\*\*\*\*)O [0.197] 5 [0.118] [0.039] 8 pins





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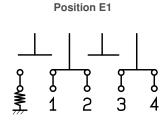
SERIES DP3T/SPDT

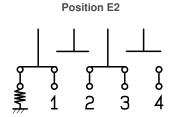
PART NUMBER R595 XXX XXX

## SWITCH MODEL 3: TERMINATED 4 PORT BYPASS SWITCH

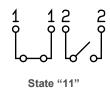
The terminated 4 port bypass switch can terminate into 50 ohms the device under test. These switches are "break before make".

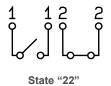
#### RF SCHEMATIC DIAGRAM





#### **INDICATORS POSITION**





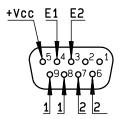
#### Standard drive option "1" (Positive common):

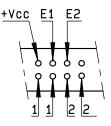
- Connect pin +Vcc to supply
- Select desired RF path by applying ground to the corresponding "Close" pin (Ex. ground pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground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

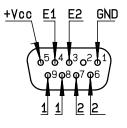
(Ex: apply  $\dot{\text{TTL}}$  "High" to pin E2 to open RF path 1-2 and close RF path 2-3).

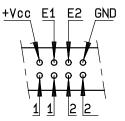




**D-Sub connector** 

Solder pins





**D-Sub** connector

Solder pins





PAGE 9/12 SERIES DP3T/SPDT ISSUE **05-11-18** PART NUMBER R595 XXX XXX All dimensions are in millimeters [inches]. Model 26.5 GHz with D-Sub connector Model 26.5 GHz with solder pins 0 [0.440] [0.440] [0.440] 0.440 11.18 11.18 11.18 [0.440] [0.440] [0.440] 0.440 11.18 11,18 11,18  $\prod$ 1111= [2.248 max.] 57.10 max. [2.051 max.] 52.10 max. - [0.059 max.] 1.50 max. [0.138] 3.50 r [1.917 max.] 48.70 max. [0.059 max.] 2 [0.094] 2.40 3 2 3 4 [0.094] 2.40 [0.122] 4 x Ø3.10 [0,303 max.] 7.70 max. 0.441 [0.441] [0.303 max.] 7.70 max. 11.20 11.20 0.122 [1.321] [1.321] Model 40 GHz with D-Sub connector Model 40 GHz with solder pins 0 [0.440] 11.18 [0.440] 11.18 [0.440] [0.440]11.18 11.18 [0.440] 11.18 [0.440] [0.440][0.440] ПП [0.138 min.] 3.50 min. [0.122][2.248 max.] 57.10 max. [2.051 max.] 52.10 max. [1.917 max.] 48.70 max. [0.122] 4 x Ø 3.10 4 x ♥3.10 [0.827 max.] [0.094] 21 max. 2.40 [0.094] 2.40 2 3 3 2 Ф [0.827 max.] 21 max. [0.264 max.] 6.70 max.\_ [0.264 max.] 6.70 max. [0.441] 11.20 [1.321] [1.321] **TOP view - D-Sub connector** TOP view - solder pins [2.189] 55.60 [2.189] 4-40 UNC (8888) (88889) (2) [0.197] 5 [0.118] step [0.039] 8 pins 01





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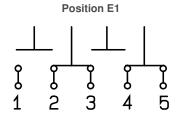
SERIES DP3T/SPDT

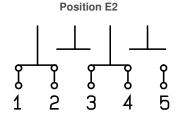
PART NUMBER R595 XXX XXX

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

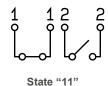
The non-terminated 5 port DP3T switch can used as SPDT with high power terminations, as a bypass switch. In this application, the fifth port can be terminated externally with a high power termination. These switches are "break before make".

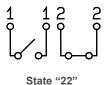
#### RF SCHEMATIC DIAGRAM





#### **INDICATORS POSITION**





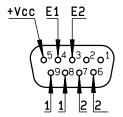
## Standard drive option "1" (Positive common):

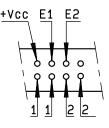
- Connect pin +Vcc to supply
- Select desired RF path by applying ground to the corresponding "Close" pin (Ex: ground pin E1 to switch to position E1. RF path 2-3and RF path 4-5 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground pin E2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

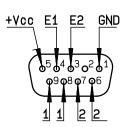
(Ex: apply TTL "High" to pin E2 to open RF path 2-3 and 4-5 and close RF path 1-2 and 3-4).



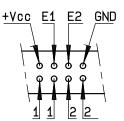


**D-Sub** connector

Solder pins







Solder pins

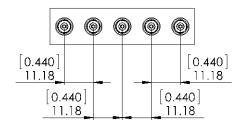


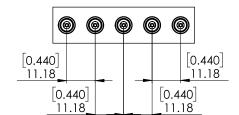


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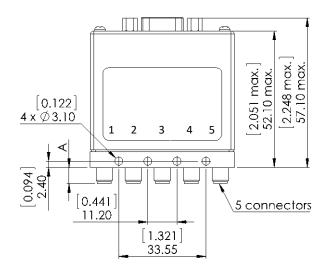
All dimensions are in millimeters [inches].

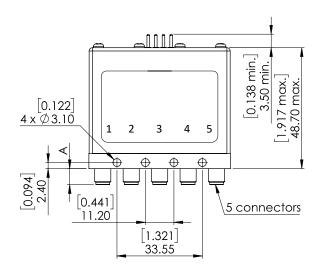
#### With D-Sub connector

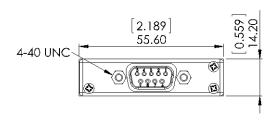


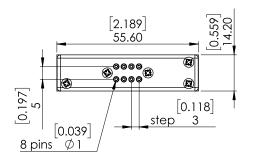


With solder pins









Connectors	A max mm [inches]		
SMA up to 26.5GHz	7.7 [0.303]		
SMA 2.9 up to 40GHz	6.7 [0.264]		



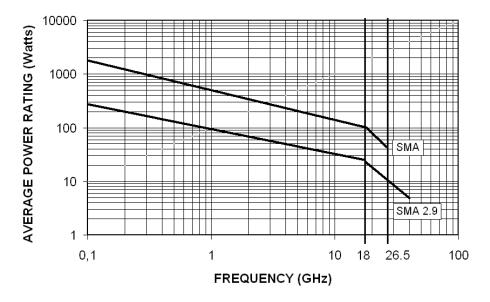
HIGH PERFORMANCE DP3T-SPDT SWITCHES PLATINUM Series

PAGE **12/12** SERIES DP3T/SPDT ISSUE **05-11-18** PART NUMBER R595 XXX XXX

## **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 V.S.W.R.

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

