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ISSUE 22-06-2018

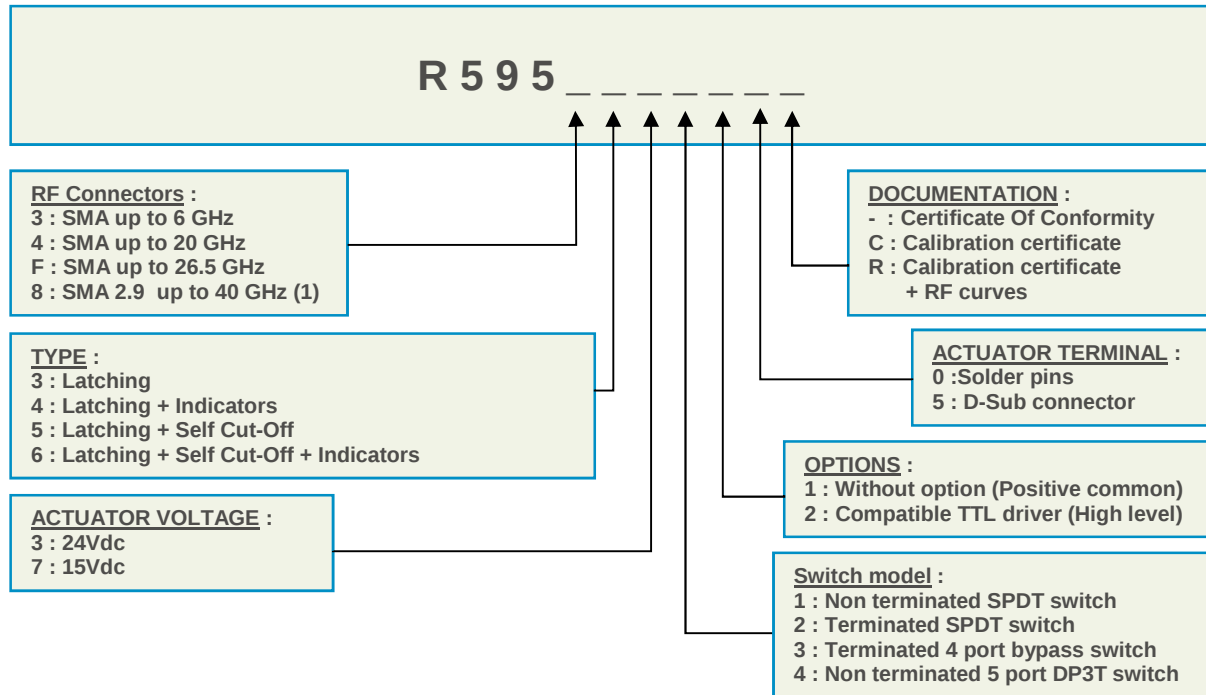
SERIES DP3T/SPDT

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 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



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

### PICTURE



### 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)                              | $0.20 + (0.45 / 26.5) \times \text{frequency (GHz)}$ |                                                                     |                                                                                              |                                                                                                                       |
| Isolation dB (Minimum)                                   | 85                                                   | DC to 6 GHz : 85<br>6 to 12.4 GHz : 75<br>12.4 to 20 GHz : 65       | DC to 6 GHz : 85<br>6 to 12.4 GHz : 75<br>12.4 to 20 GHz : 65<br>20 to 26.5 GHz : 60         | DC to 6 GHz : 85<br>6 to 12.4 GHz : 75<br>12.4 to 20 GHz : 65<br>20 to 26.5 GHz : 60<br>26.5 to 40 GHz : 55           |
| V.S.W.R. (Maximum)                                       | 1.15                                                 | DC to 6 GHz : 1.15<br>6 to 12.4 GHz : 1.25<br>12.4 to 20 GHz : 1.30 | DC to 6 GHz : 1.15<br>6 to 12.4 GHz : 1.25<br>12.4 to 20 GHz : 1.30<br>20 to 26.5 GHz : 1.60 | DC to 6 GHz : 1.15<br>6 to 12.4 GHz : 1.25<br>12.4 to 20 GHz : 1.30<br>18 to 26.5 GHz : 1.60<br>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



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SERIES DP3T/SPDT

PART NUMBER R595 XXX XXX

### ADDITIONAL SPECIFICATIONS

| Operating mode                                                    |                               | Latching                                                                                   |                   |
|-------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------|-------------------|
| Nominal operating voltage (Vdc)<br>(across operating temperature) |                               | 24 (20 / 32)                                                                               | 15 (12 / 20)      |
| Coil resistance (+/-10%) (Ohms)                                   |                               | SPDT                                                                                       | 350               |
|                                                                   |                               | Terminated SPDT, DP3T, Bypass                                                              | 120               |
| Nominal operating current at 23°C (mA)                            |                               | SPDT                                                                                       | 175               |
|                                                                   |                               | Terminated SPDT, DP3T, Bypass                                                              | 60                |
| Average power                                                     |                               | SPDT                                                                                       | 68                |
|                                                                   |                               | Terminated SPDT, DP3T, Bypass                                                              | 125               |
| All models                                                        | Terminated model              | RF path Cold switching : See Power Rating Chart on final page<br>Hot switching : 1 Watt CW |                   |
|                                                                   |                               | Internal terminations 1 Watt average into 50Ω                                              |                   |
|                                                                   |                               | External terminations 0.5 Watt average into 50Ω                                            |                   |
| 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 for                                                      | SMA                           | 10 million cycles                                                                          |                   |
|                                                                   | SMA 2.9                       | 5 million cycles                                                                           |                   |
| Connectors                                                        |                               | SMA – SMA 2.9                                                                              |                   |
| Actuator terminal                                                 |                               | D-Sub pin female<br>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-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)       |

### 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



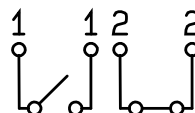
Position E2



#### INDICATORS POSITION



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



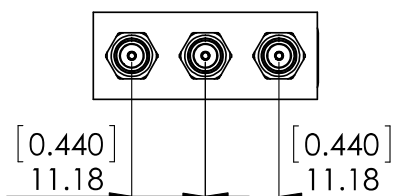
D-Sub connector



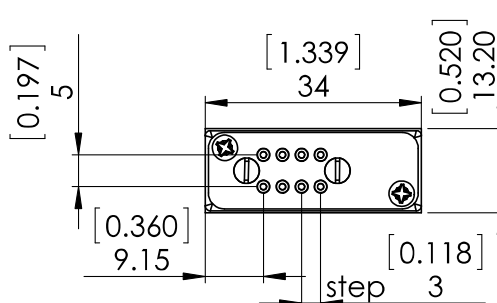
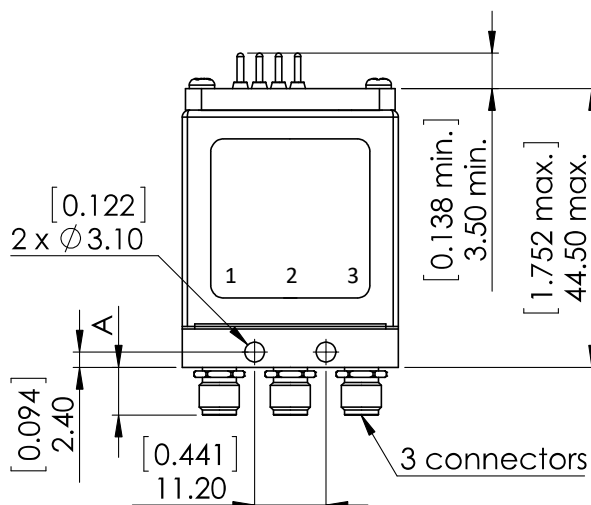
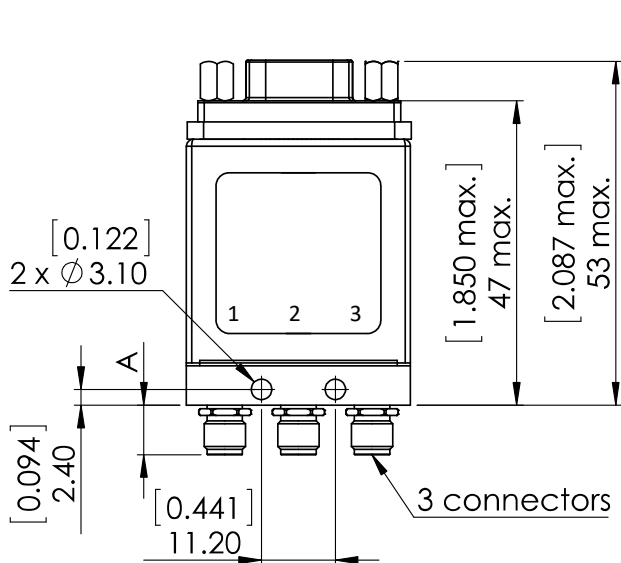
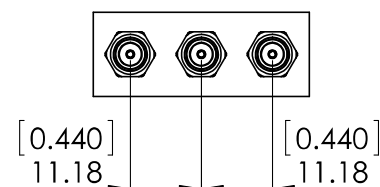
Solder pins

All dimensions are in millimetres [inches].

With D-Sub connector



With solder pins

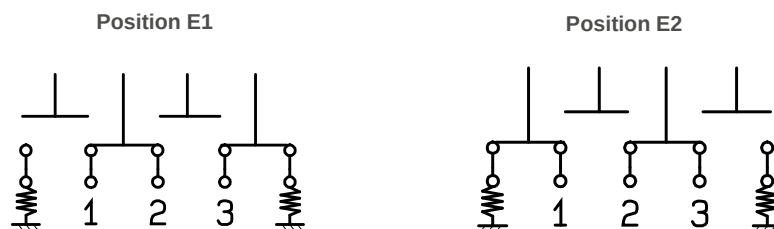


| Connectors          | A max mm [inches] |
|---------------------|-------------------|
| SMA up to 26.5GHz   | 7.7 [0.303]       |
| SMA 2.9 up to 40GHz | 6.7 [0.264]       |

### 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

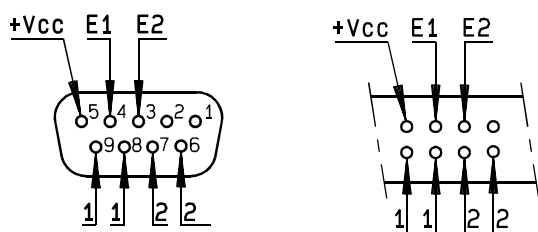


#### Standard drive option "1" (Positive common):

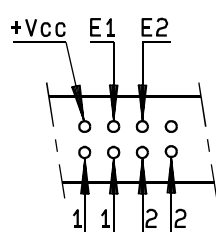
- Connect pin +Vcc to supply
- Select desired RF path by applying ground to the corresponding "Close" pin (Ex: ground pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground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

#### TTL drive option "2"

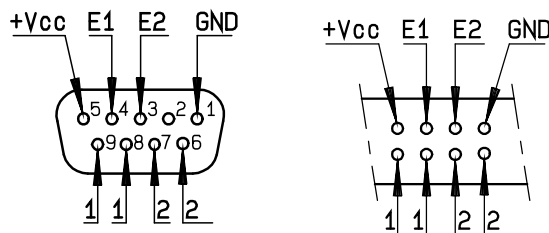
- Connect pin GND to ground.
- Connect pin +Vcc to supply
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, apply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



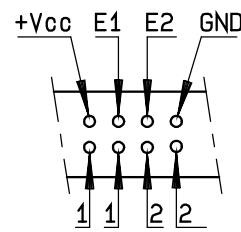
D-Sub connector



Solder pins



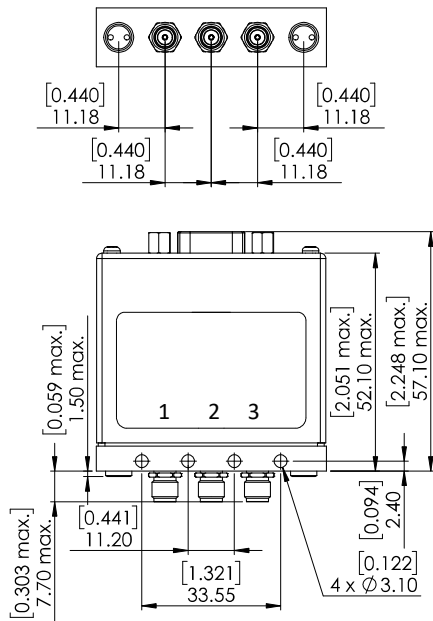
D-Sub connector



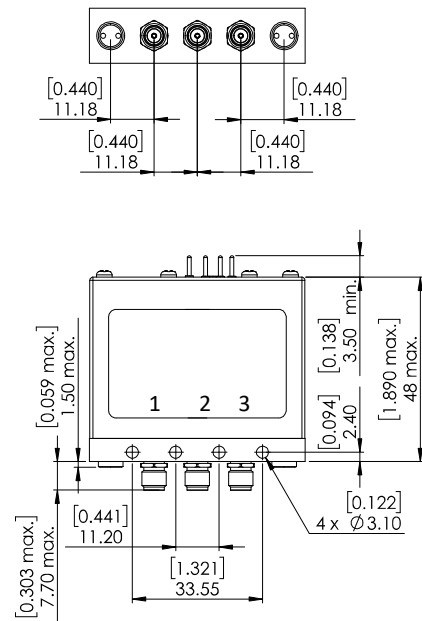
Solder pins

All dimensions are in millimetres [inches].

**Model 26.5 GHz with D-Sub connector**



**Model 26.5 GHz with solder pins**



**Model 40 GHz with D-Sub connector**



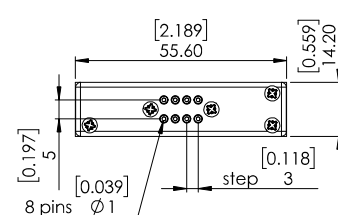
**Model 40 GHz with solder pins**



**TOP view - D-Sub connector**



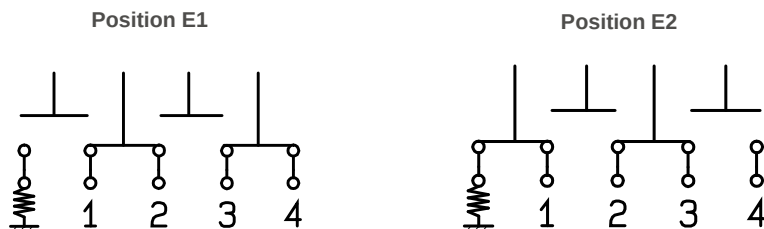
**TOP view - solder pins**



### 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

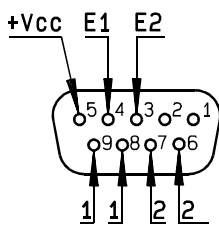


#### Standard drive option "1" (Positive common):

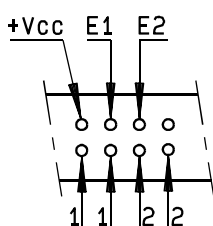
- Connect pin +Vcc to supply
- Select desired RF path by applying ground to the corresponding "Close" pin (Ex: ground pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, connect ground to the corresponding "close" pin (Ex: ground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

#### TTL drive option "2"

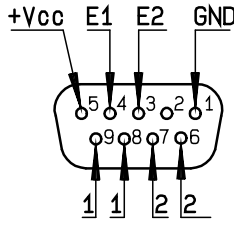
- Connect pin GND to ground.
- Connect pin +Vcc to supply
- Select (close) desired RF path by applying TTL "High" to the corresponding "drive" pin (Ex: apply TTL "High" to pin E1 to switch to position E1. RF path 1-2 closed and RF path 2-3 open).
- To open desired path and close the new RF path, apply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



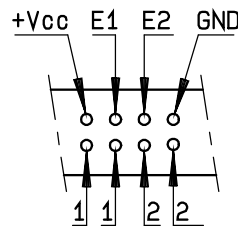
D-Sub connector



Solder pins



D-Sub connector



Solder pins

All dimensions are in millimetres [inches].

**Model 26.5 GHz with D-Sub connector**



**Model 26.5 GHz with solder pins**



**Model 40 GHz with D-Sub connector**



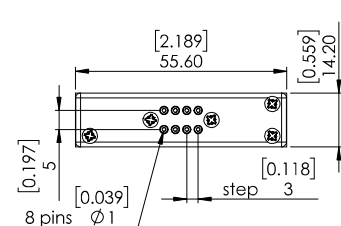
**Model 40 GHz with solder pins**



**TOP view - D-Sub connector**



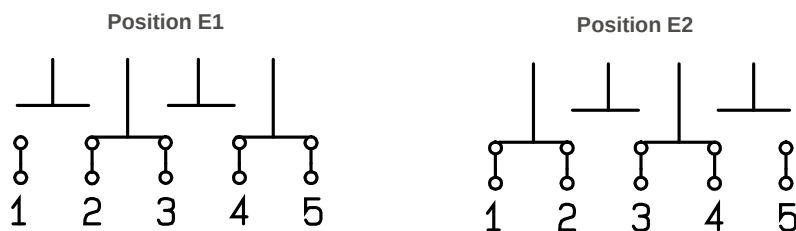
**TOP view - solder pins**



### 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



#### INDICATORS POSITION

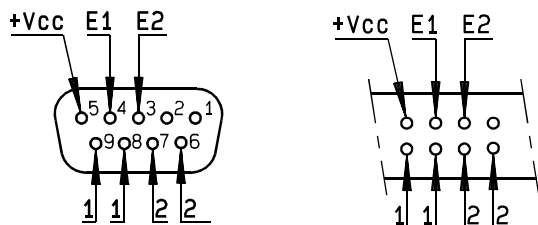


#### Standard drive option "1" (Positive common):

- 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 2-3 and 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)

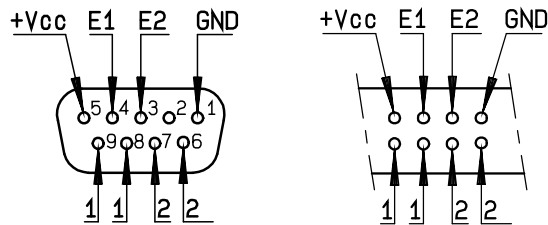
#### TTL drive option "2"

- 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

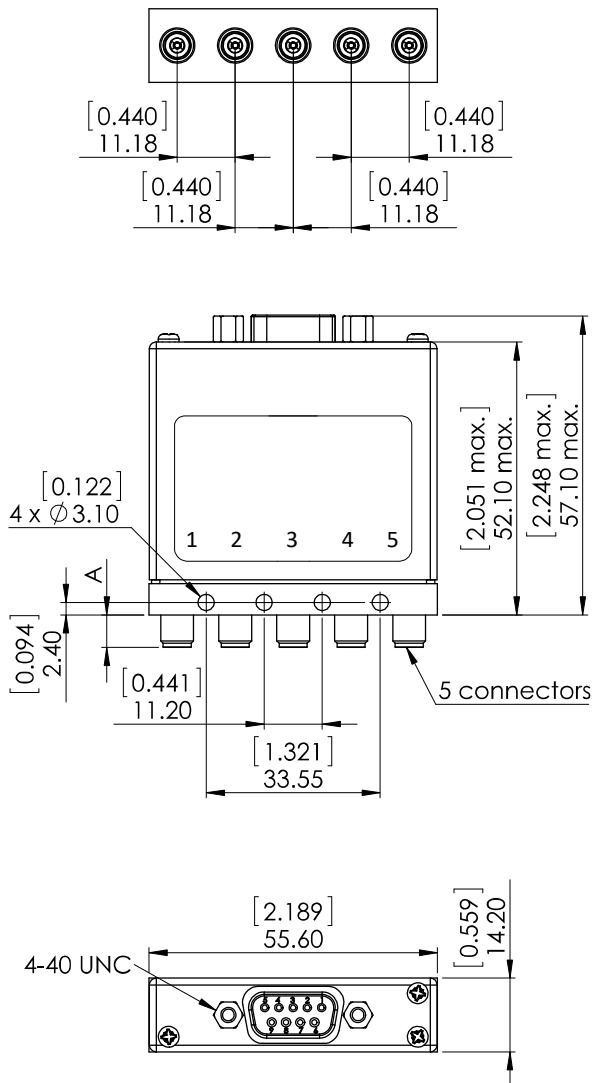


D-Sub connector

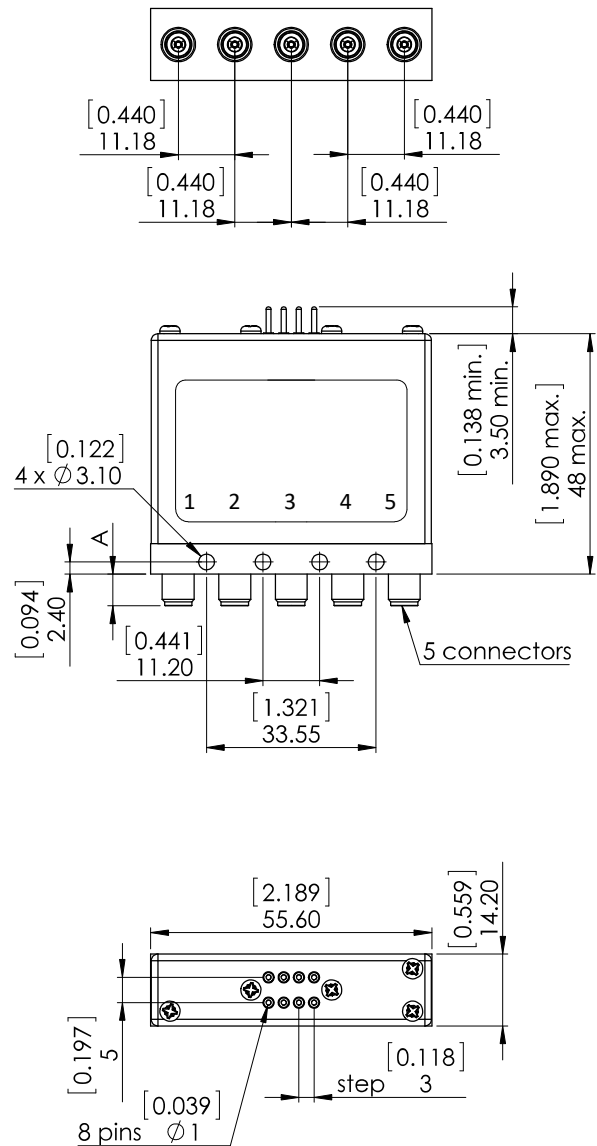
Solder pins

All dimensions are in millimetres [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]       |

#### 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.

