DP3T section

High performances DP3T and terminated SPDT up to 26.5 GHz PLATINUM series

NEW

See Page DP3T - 2

DP3T up to 26.5 GHz

See Page DP3T - 12

ROJONE PTY. LTD.

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Technical data sheets are available on : ***www.radiall.com***
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HIGH PERFORMANCES SPDT Terminated
PLATINUM Series / DP3T-SPDT up to 26.5 GHz

Radiall's PLATINUM series switches are optimised to perform 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 5 9 5 . . . . . .

RoHS COMPLIANT

NEW

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 + S.C.O.
- **6** : Latching + S.C.O. + I.C.

Actuator Voltage :
- **3** : 24 Vdc
- **7 :** 15 Vdc

Switch model :
- **2** : Terminated SPDT switch
- **3** : Terminated 4 ports bypass switch
- **4** : Non terminated 5 ports DP3T switch

Documentation
- **-** : certificate of conformity
- **C** : Calibration certificate
- **R** : Calibration certificate + RF curves

Actuator Terminals :
- **0** : Solder pins
- **5** : D-sub connector

Options :
- **1** : Without option (positive common)
- **2** : Compatible TTL driver (high level)

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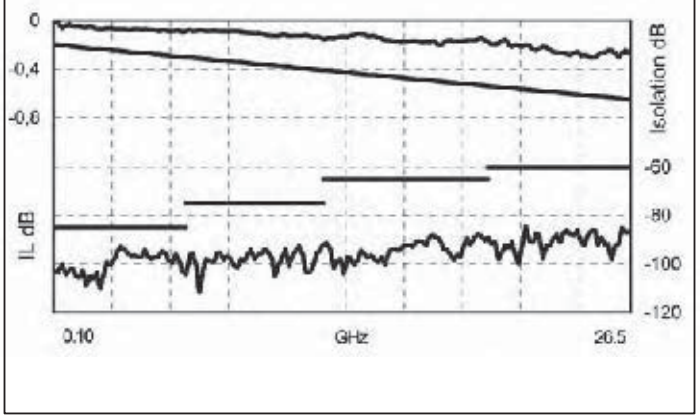
RF PERFORMANCES

Part Number		R5953-----	R5954-----	R595F-----
Frequency Range	GHz	DC to 6	DC to 20	DC to 26.5
Impedance	Ω	50		
Insertion Loss (max)	dB	0.20 + (0.45 / 26.5) x frequency (GHz)		
Isolation (min)	dB	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. (max)		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)	dB	0.03 dB maximum		

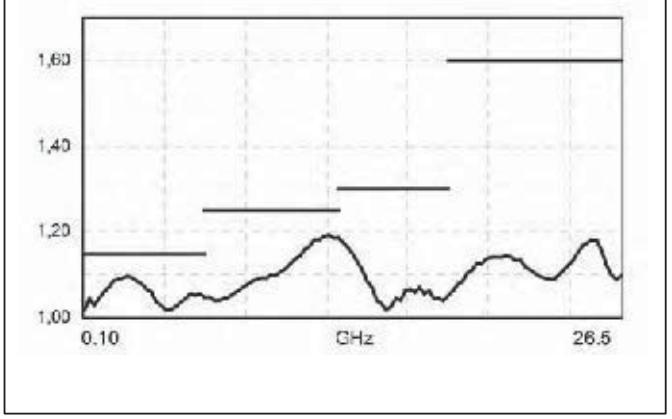
DP3T

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation



V.S.W.R.



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ADDITIONAL SPECIFICATIONS

Operating mode		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**24** (20 to 32)	**15** (12 to 20)
Coil resistance (+/-10%)	Ω	175	60
Nominal operating current at 23°C	mA	140	250
Average power		RF path Cold switching : see Power Rating Chart on **DP3T-11** 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 terminal		D-Sub 9 pin female Solder pins	
Weight (max)	g	100	

DP3T

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/11ms, sawtooth
Humidity operating		15 to 95% RH
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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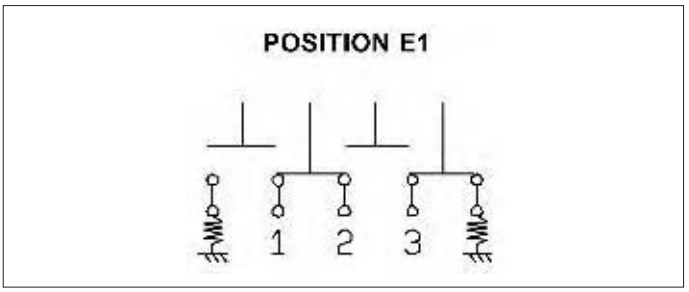
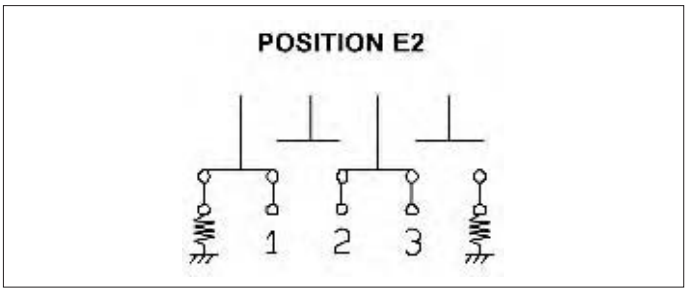
SWITCH MODEL : TERMINATED SPDT SWITCH

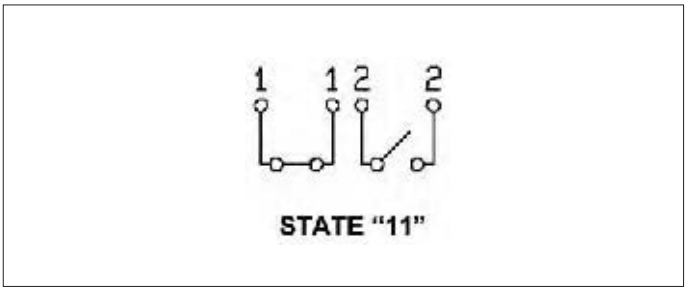
The terminated SPDT switch is a single pole double throw switch. The unused ports are terminated into 50Ω. This switch is "break before make".

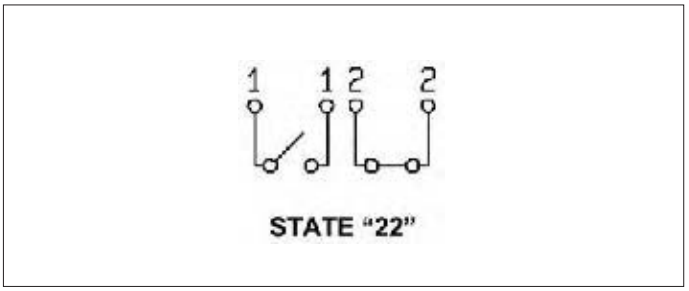
RF SCHEMATIC DIAGRAM





POSITION INDICATOR



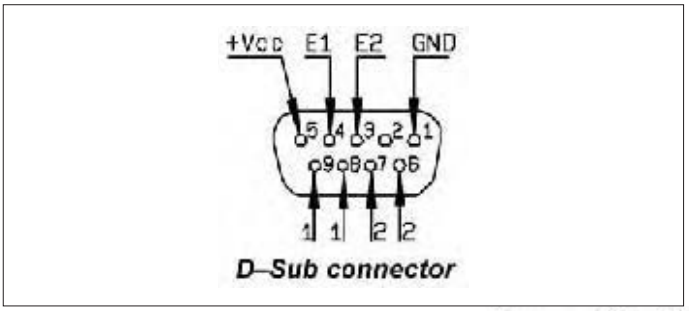


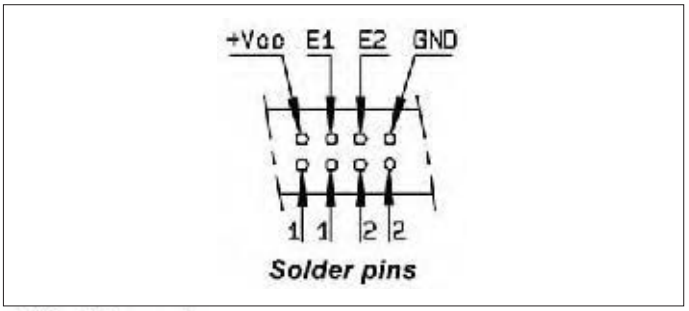
Standard drive option "1" (Positive common) :

- Connect pin +Vcc to supply (+20 Vdc to +32 Vdc).
- 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 (+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 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).





Connect "Gnd" for TTL drive only

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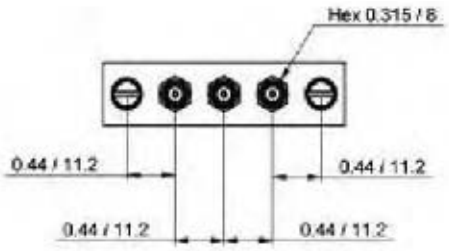

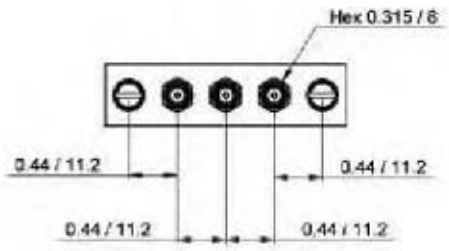

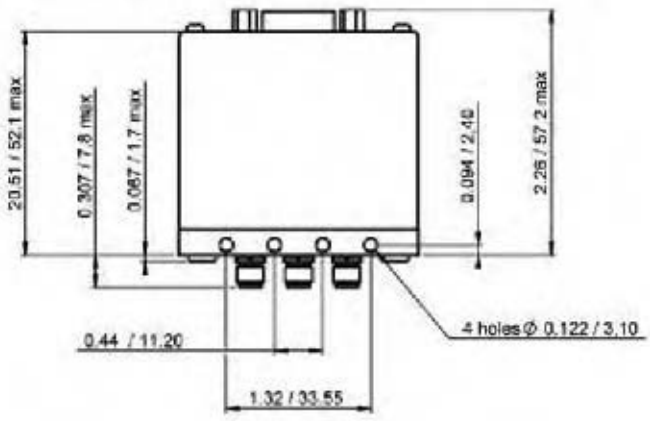

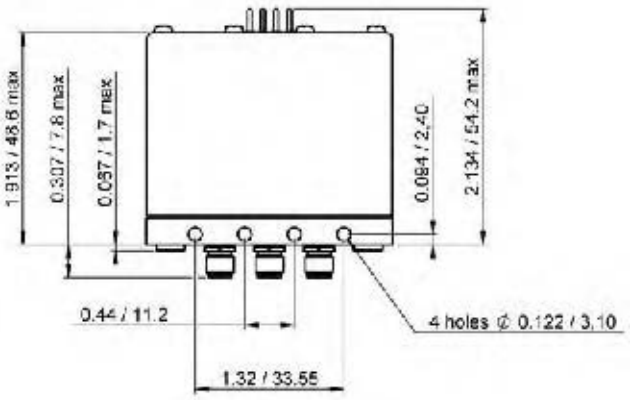

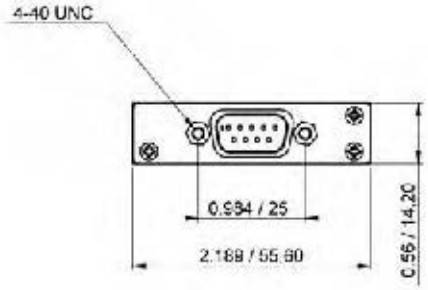

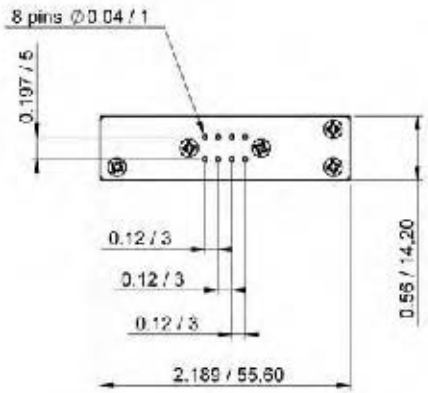

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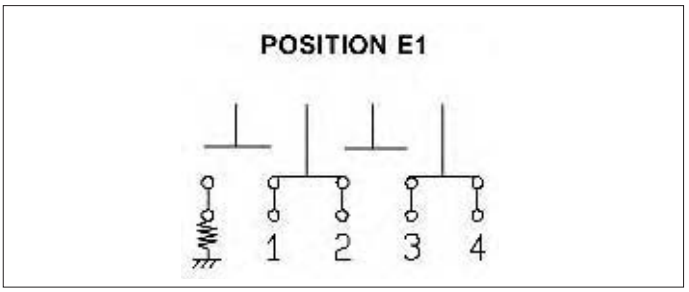
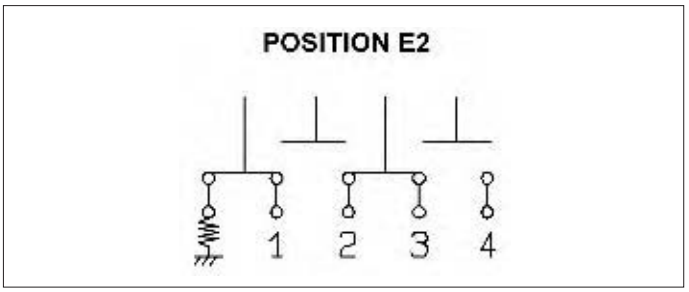
SWITCH MODEL : TERMINATED 4 PORT BYPASS SWITCH

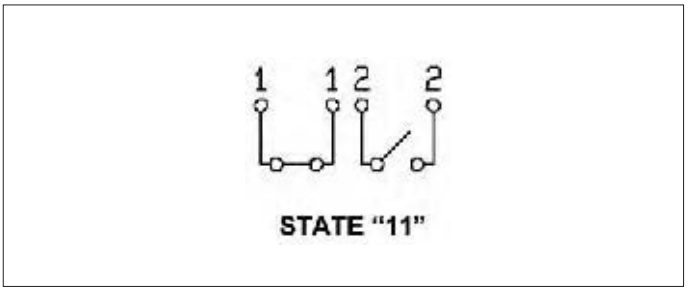
The terminated 4 port bypass switch can terminate into 50Ω the device under test. These switches are “break before make”.

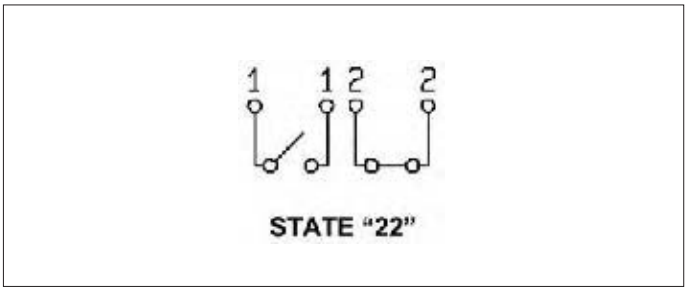
RF SCHEMATIC DIAGRAM





POSITION INDICATOR



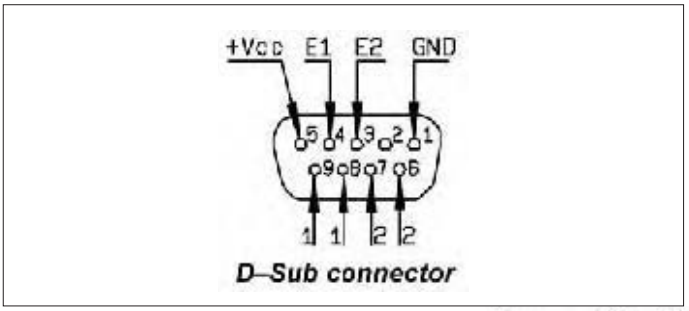


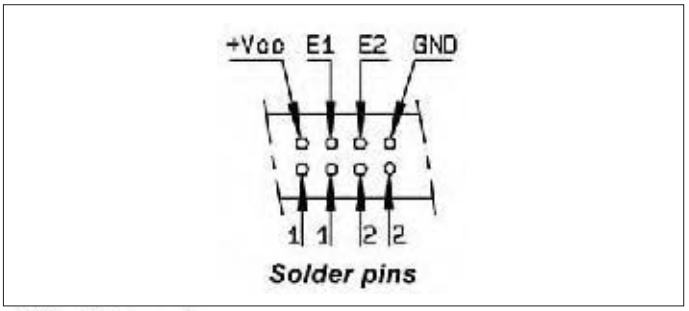
Standard drive option “1” (Positive common) :

- Connect pin +Vcc to supply (+20 Vdc to +32 Vdc).
- 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 (+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 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).





Connect “Gnd” for TTL drive only

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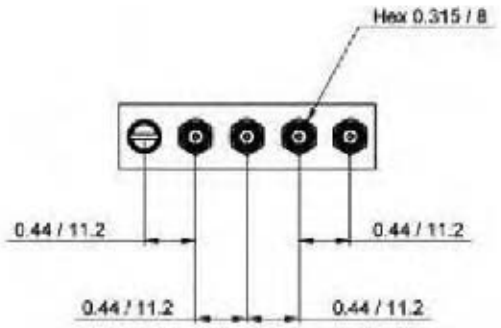

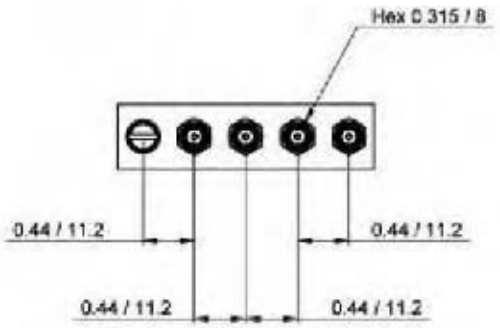

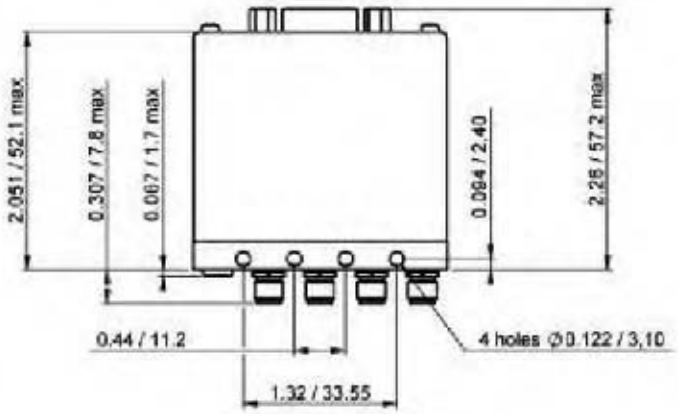

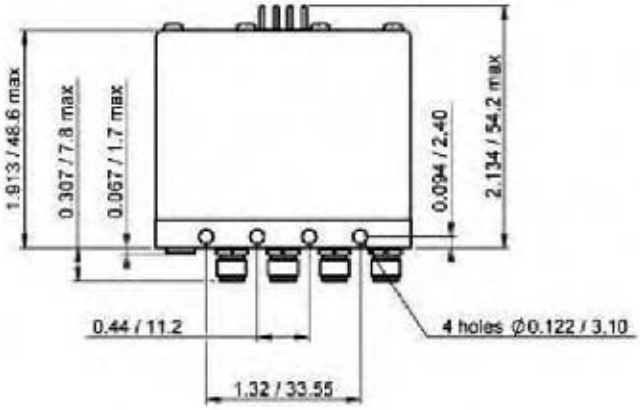

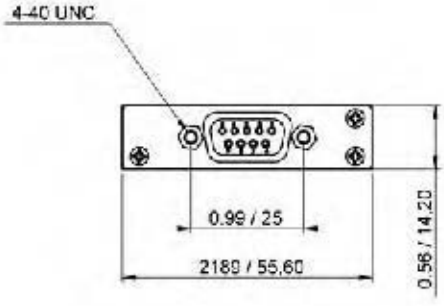

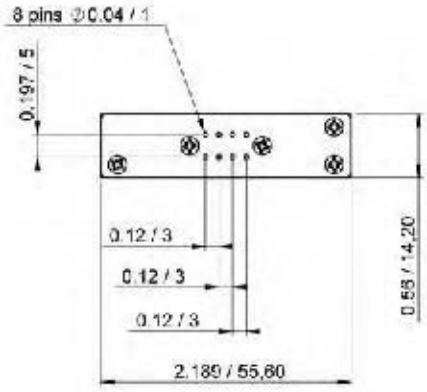

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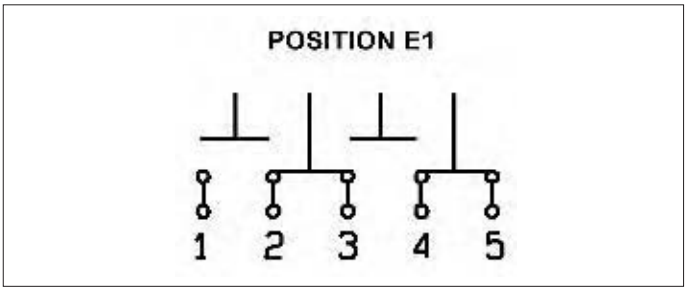
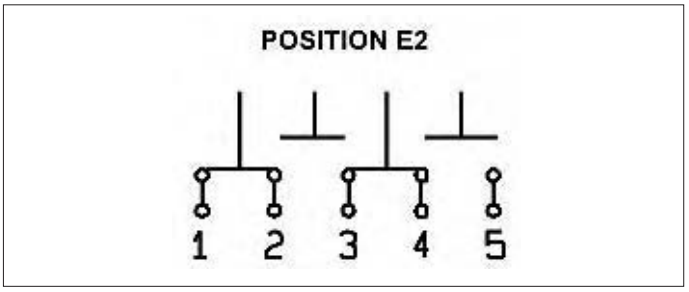
SWITCH MODEL : NON TERMINATED 5 PORT DP3T SWITCH

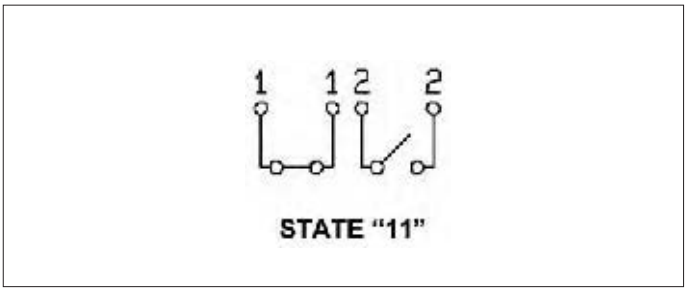
The non terminated 5 port DP3T switch can used as SPDT with high power terminations, as a bypass switch. In this application, the fifth port can be terminated externally with a high power termination. These switches are “break before make”.

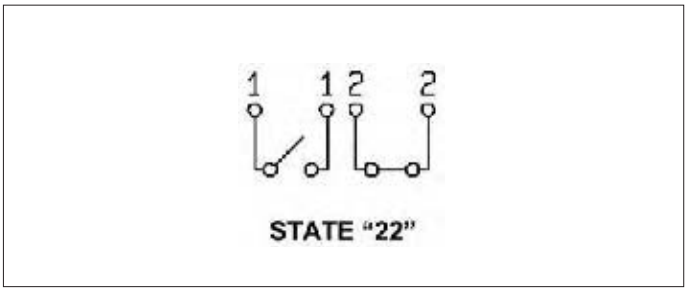
RF SCHEMATIC DIAGRAM





POSITION INDICATOR



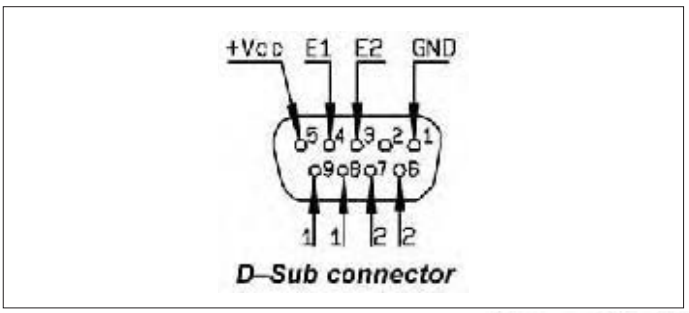


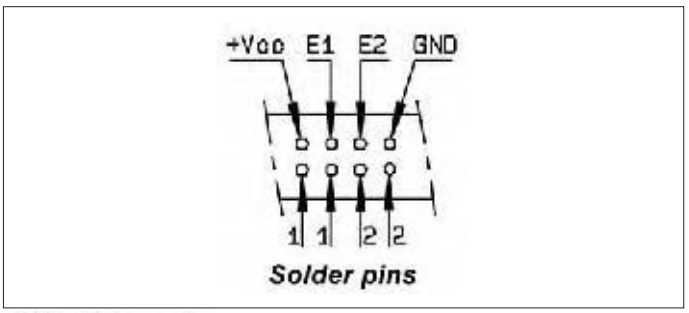
Standard drive option “1” (Positive common) :

- Connect pin +Vcc to supply (+20 Vdc to +32 Vdc).
- 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 (+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 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).





Connect “Gnd” for TTL drive only

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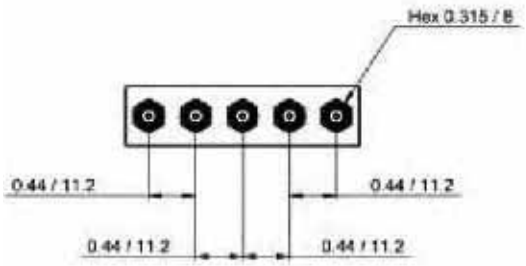
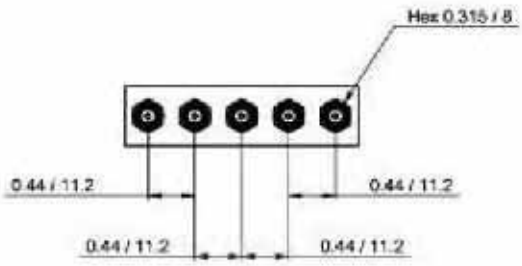
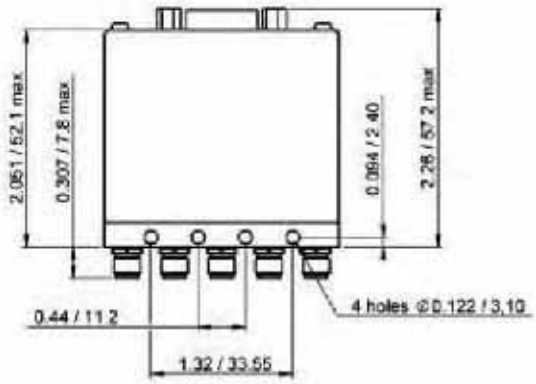
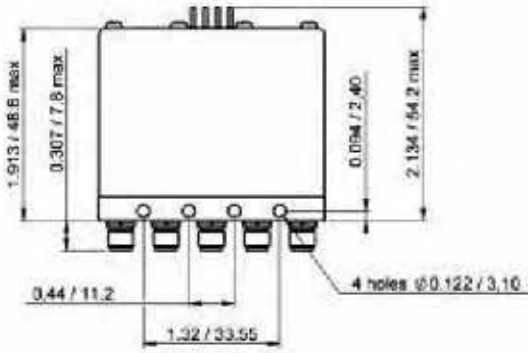
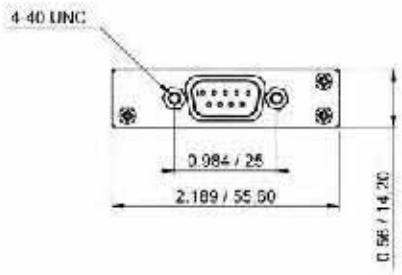
HIGH PERFORMANCES SPDT Terminated
PLATINUM Series / DP3T-SPDT up to 26.5 GHz

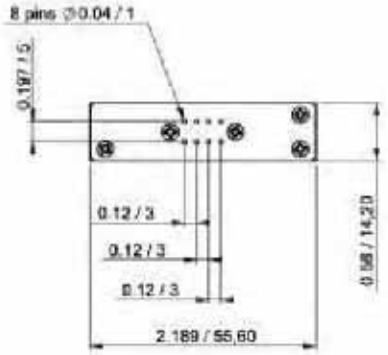












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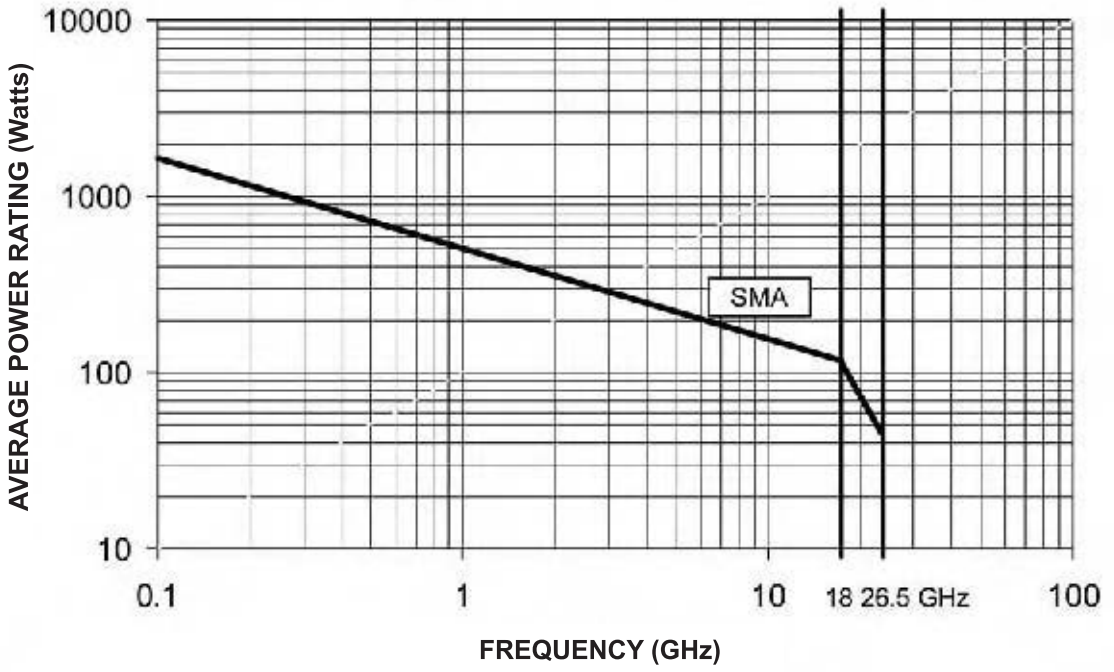
POWER RATING CHART

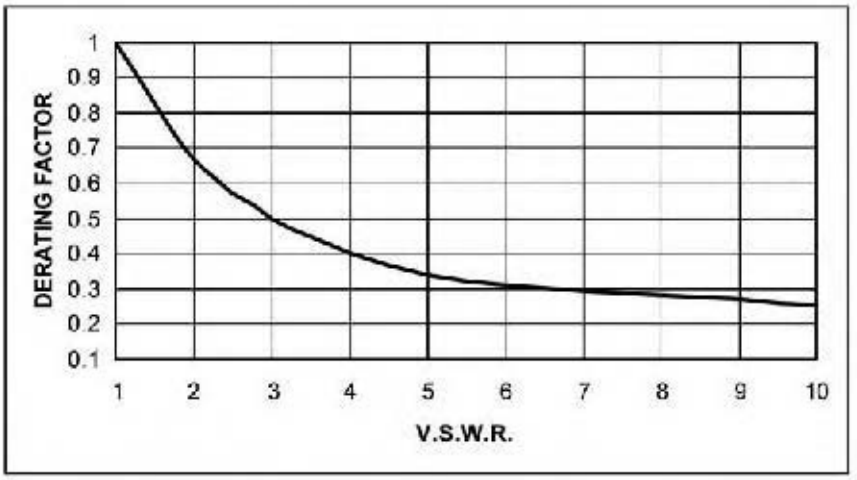
This graph is based on the following conditions :

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



DERATING FACTOR VERSUS VSWR

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



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DP3T and Terminated SPDT RAMSES Concept
Up to 26.5 GHz

PART NUMBER SELECTION

R 5 8 5 . . . . . .

RF Connectors :
- **3** : SMA up to 3 GHz
- **4** : SMA up to 18 GHz
- **F** : SMA up to 26.5 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)
- **7** : Normally open
- **8** : Normally open + I.C.

Actuator Voltage :
- **2** : 12 Vdc
- **3** : 28 Vdc

Actuator Terminals :
- **0** : Solder pins

Options : Updated
- **0** : Without option
- **1** : Positive common (2)(3)
- **3** : With suppression diodes (1)
- **4** : With suppression diodes and positive common (2)(3)

Switch Model:
- **0** : DP3T without TTL Driver (DP3T)
- **1** : DP3T with TTL Driver (DP3T) (high level)(1)(2)
- **2** : SPDT terminated without TTL Driver /(internal termination)
- **3** : SPDT terminated with TTL Driver (high level)(1)(2) / (internal termination)
- **4** : SPDT terminated without TTL Driver /(external termination)
- **5** : SPDT terminated with TTL Driver (high level)(1)(2) / (external termination)
- **6** : Terminated 4 ports bypass no option (external termination)
- **7** : Terminated 4 ports bypass with TTL (external termination)

I.C. : Indicator contact / S.C.O.: Self Cut-Off
(1) : Suppression diodes are already included in self cut-off & TTL option
(2) : Polarity is not relevant to application for switches with TTL driver
(3) : Positive common shall be specified only with type 3, 4, 5, 6, 7 & 8 Because failsafe switches can be used with both polarities

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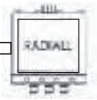
DP3T and Terminated SPDT RAMSES Concept
Up to 26.5 GHz



RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
SMA	DC - 3	DC - 3	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
	DC - 18	8 - 12.4	1.40	0.40	60	
	DC - 26.5	12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.80	0.70	50	

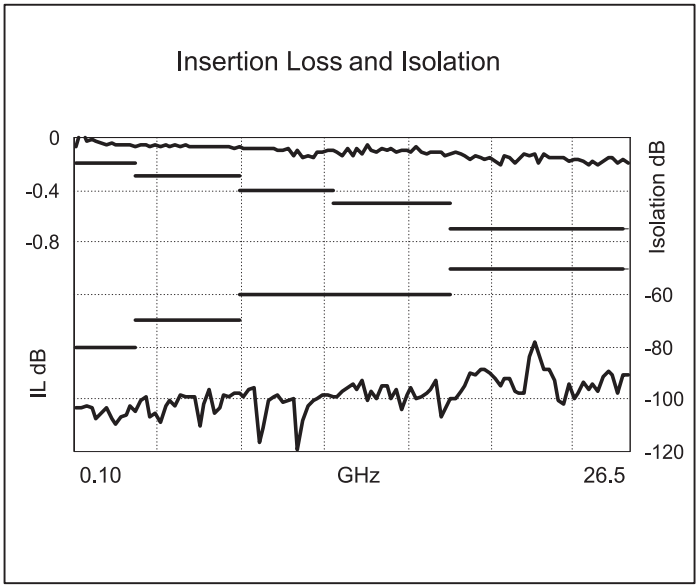
See page DP3T-14 for typical RF performances

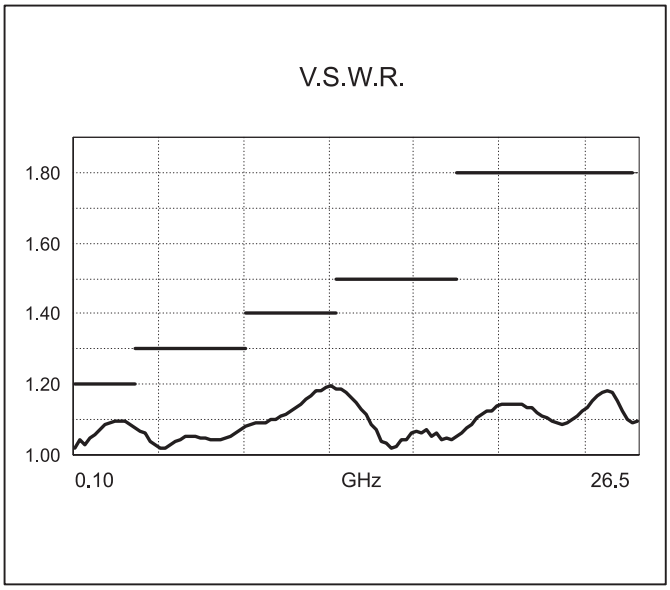
ADDITIONAL SPECIFICATIONS

Operating mode		Failsafe		Latching		Normally open	
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)	**12** (10.2 to 13)	**28** (24 to 32)
Coil resistance (±10%)	Ω	24	138	29	175	47.5	275
Nominal operating current at 23°C	mA	500	205	420	160	250	102
Average power		RF path : see power rating chart on **Intro-14**					
		Internal terminations : 1 watt CW into 50Ω					
TTL input	High level	2.2 to 5.5 V 800 µA max at 5.5 V					
	Low level	0 to 0.8 V 20 µA max at 0.8 V					
Switching time (max)	ms	10					
Life (min)		2 million cycles for products with internal terminations 10 million cycles for all other products					
Connectors		SMA					
Actuator terminals		Solder pins					
Operating temperature range		-40°C, +85°C					
Storage temperature range		-55°C, +85°C					
Vibration (MIL STD 202, method 204D, Cond. D)		10-2000 Hz, 20g operating					
Shock (MIL STD 202, method 213B, Cond. C)		100g / 6 ms, ½ sine operating					

R585 TYPICAL RF PERFORMANCES

Example : DP3T SMA up to 26.5 GHz

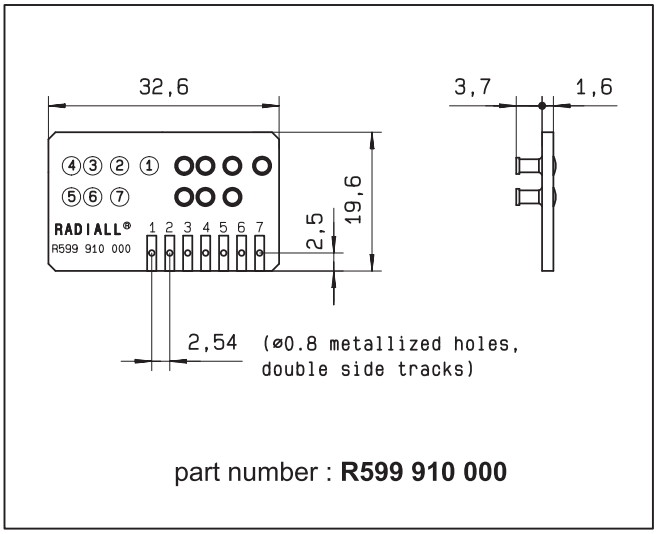




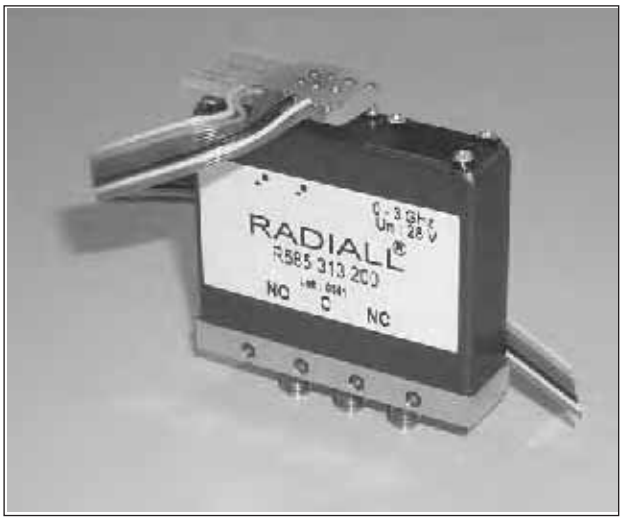
ACCESSORIES

A printed circuit board interface connector has been designed for easy mounting on terminals :
It must be ordered separately.

For DP3T model R585 series :



part number : **R599 910 000**



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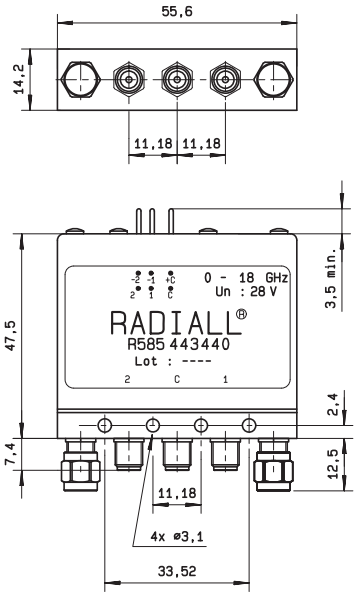
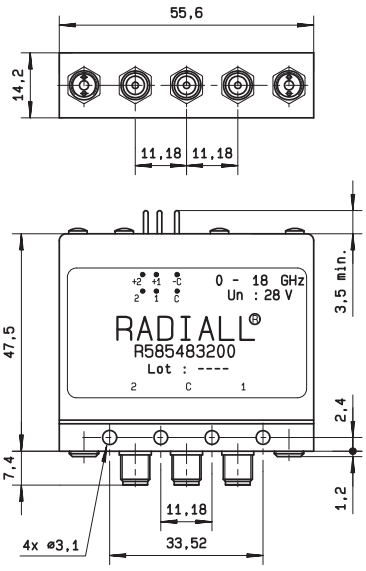
TYPICAL OUTLINE DRAWING

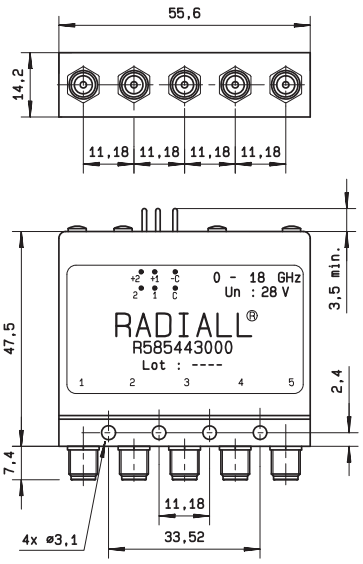


SPDT with external terminations
R585 --- 4--
R585 --- 5--

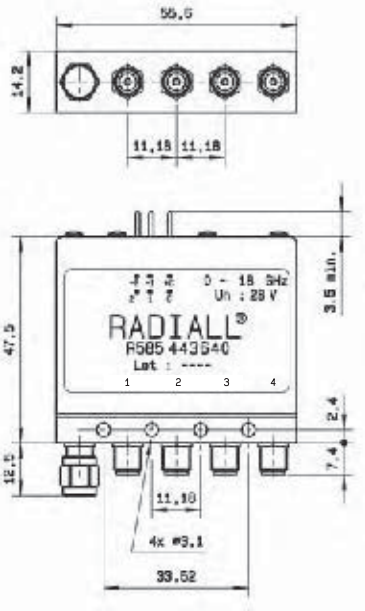
See page **DP3T-21** for pin identification



SPDT with internal terminations
R585 --- 2--
R585 --- 3--



DP3T
R585 --- 0--
R585 --- 1--



Terminated 4 ports BYPASS relay
R585 --- 6--
R585 --- 7--

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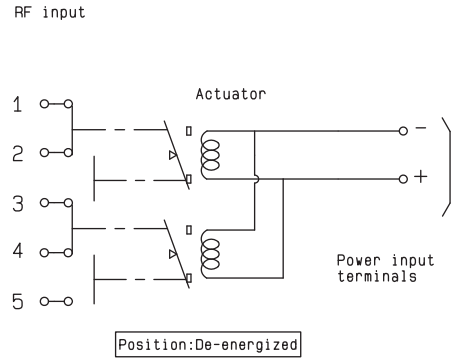
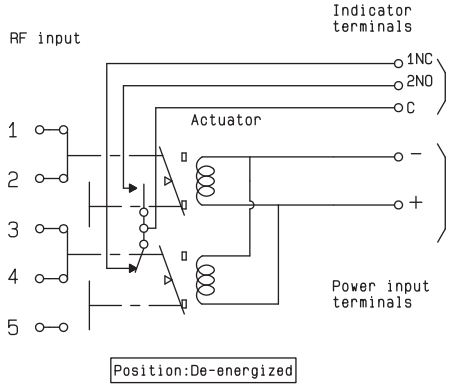
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

FAILSAFE

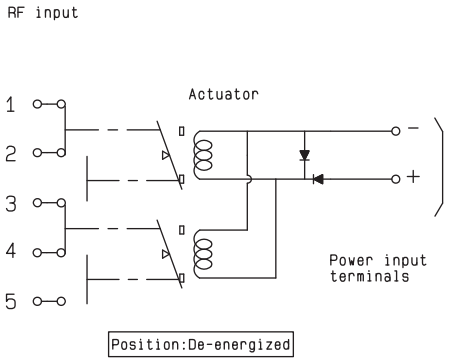
WITHOUT OPTION
R585 -1- 000 / R585 -1- 200 / R585 -1- 400



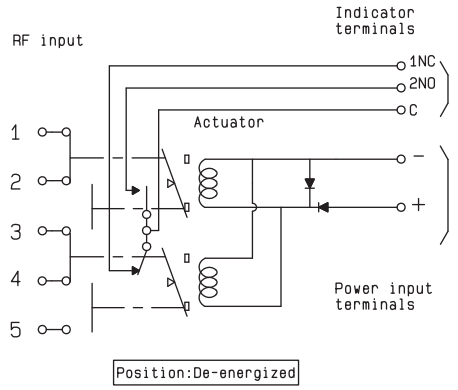
WITH INDICATOR CONTACT
R585 -2- 000 / R585 -2- 200 / R585 -2- 400



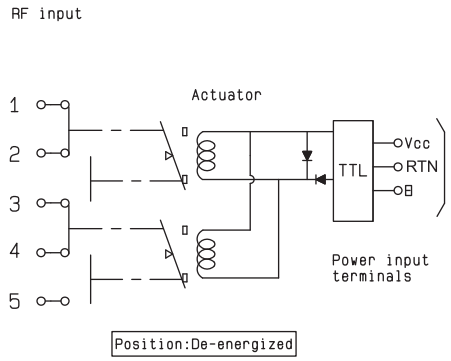
WITH SUPPRESSION DIODES
R585 -1- 030 / R585 -1- 230 / R585 -1- 430



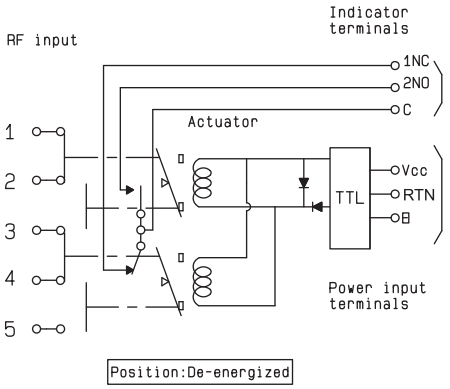
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -2- 030 / R585 -2- 230 / R585 -2- 430



WITH TTL DRIVER
(suppression diodes are included)
R585 -1- 100 / R585 -1- 300 / R585 -1- 500



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -2- 100 / R585 -2- 300 / R585 -2- 500



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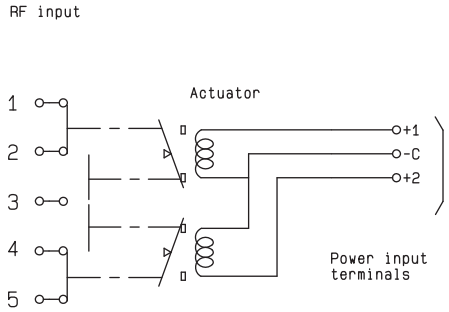
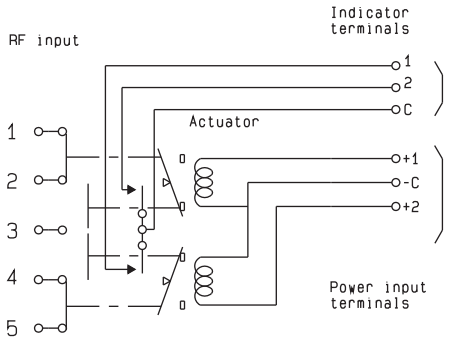
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

NORMALLY OPEN

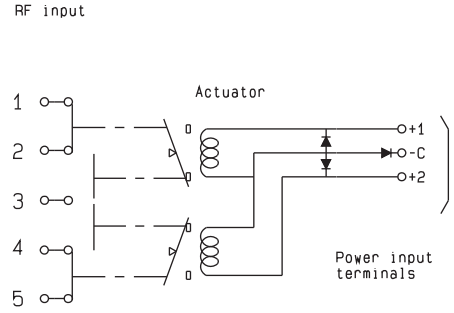
WITHOUT OPTION
R585 -7- 000 / R585 -7- 200 / R585 -7- 400



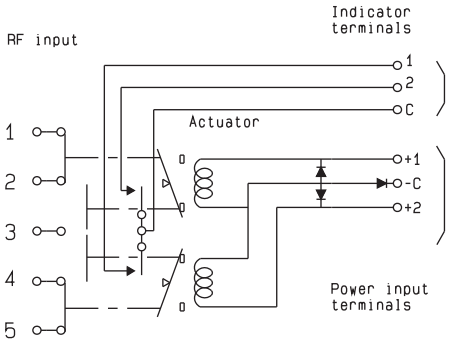
WITH INDICATOR CONTACT
R585 -8- 000 / R585 -8- 200 / R585 -8- 400



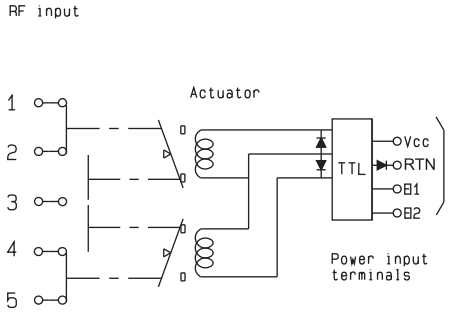
WITH SUPPRESSION DIODES
R585 -7- 030 / R585 -7- 230 / R585 -7- 430



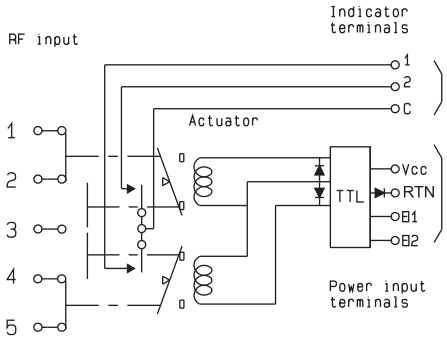
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -8- 030 / R585 -8- 230 / R585 -8- 430



WITH TTL DRIVER
(suppression diodes are included)
R585 -7- 100 / R585 -7- 300 / R585 -7- 500



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -8- 100 / R585 -8- 300 / R585 -8- 500



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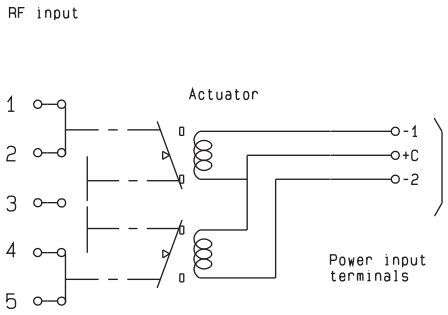
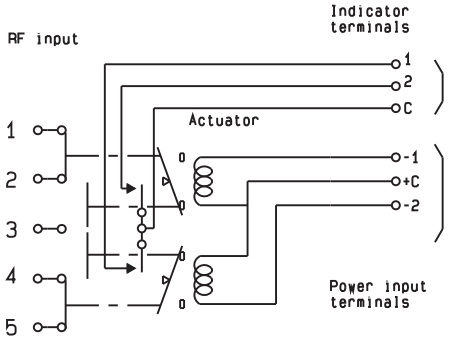
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

NORMALLY OPEN

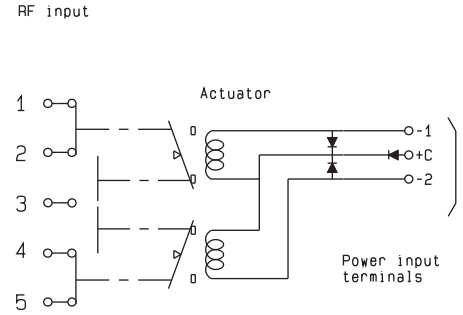
WITH POSITIVE COMMON, NO OPTION
R585 -7- 010 / R585 -7- 210 / R585 -7- 410



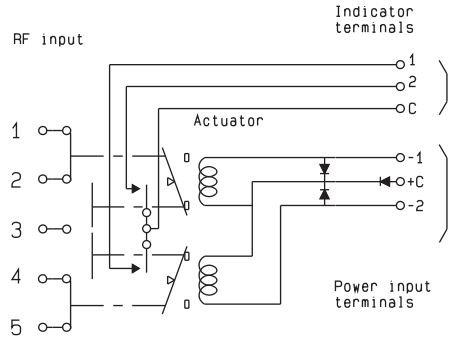
WITH POSITIVE COMMON AND INDICATOR CONTACT
R585 -8- 010 / R585 -8- 210 / R585 -8- 410



WITH POSITIVE COMMON AND SUPPRESSION DIODES
R585 -7- 040 / R585 -7- 240 / R585 -7- 440

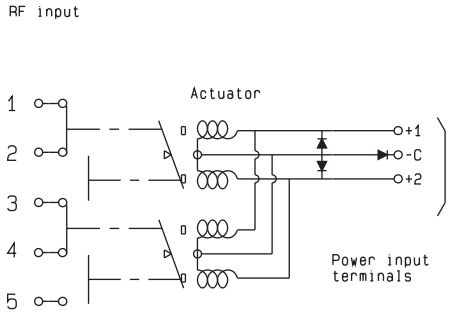


WITH POSITIVE COMMON, INDICATOR CONTACT AND SUPPRESSION DIODES
R585 -8- 040 / R585 -8- 240 / R585 -8- 440

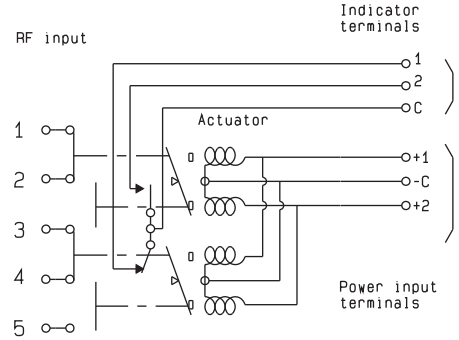


LATCHING

WITHOUT OPTION
R585 -3- 000 / R585 -3- 200 / R585 -3- 400



WITH INDICATOR CONTACT
R585 -4- 000 / R585 -4- 200 / R585 -4- 400



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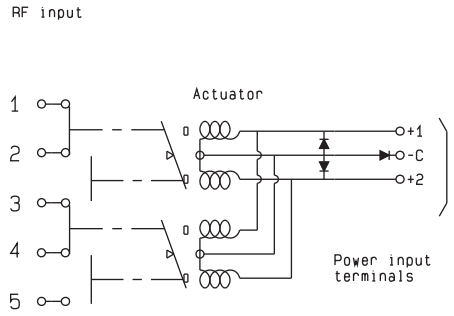
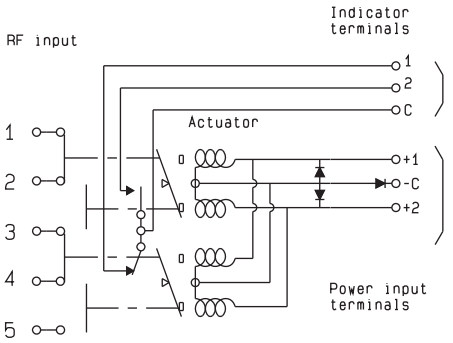
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

LATCHING

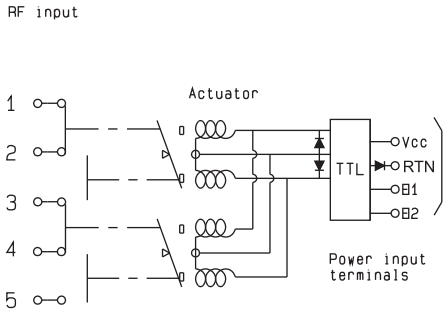
WITH SUPPRESSION DIODES
R585 -3- 030 / R585 -3- 230 / R585 -3- 430



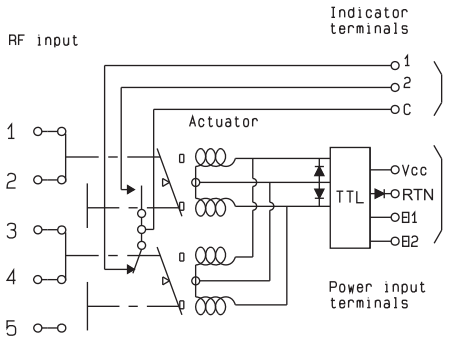
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -4- 030 / R585 -4- 230 / R585 -4- 430



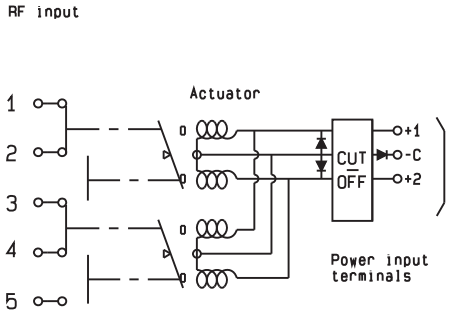
WITH TTL DRIVER
(suppression diodes are included)
R585 -3- 100 / R585 -3- 300 / R585 -3- 500



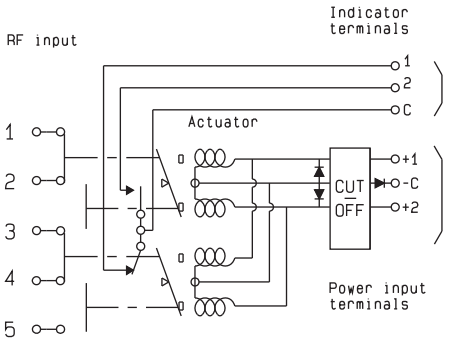
WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -4- 100 / R585 -4- 300 / R585 -4- 500



WITH CUT-OFF
(suppression diodes are included)
R585 -5- 000 / R585 -5- 200 / R585 -5- 400



WITH CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R585 -6- 000 / R585 -6- 200 / R585 -6- 400



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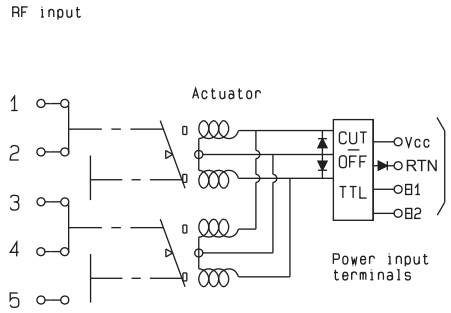
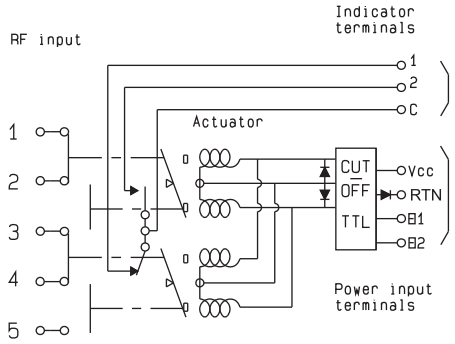
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

LATCHING

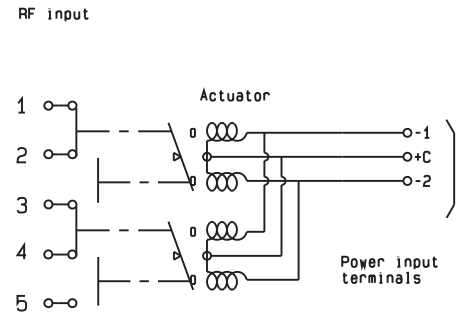
WITH CUT-OFF AND TTL DRIVER
(suppression diodes are included)
R585 -5- 100 / R585 -5- 300 / R585 -5- 500



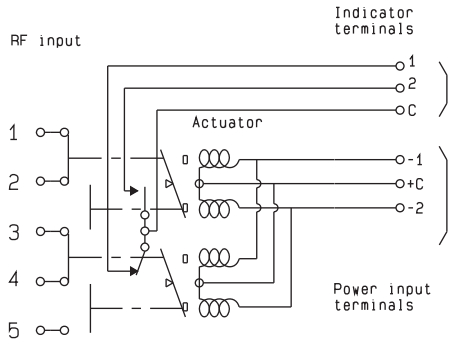
WITH CUT-OFF, TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R585 -6- 100 / R585 -6- 300 / R585 -6- 500



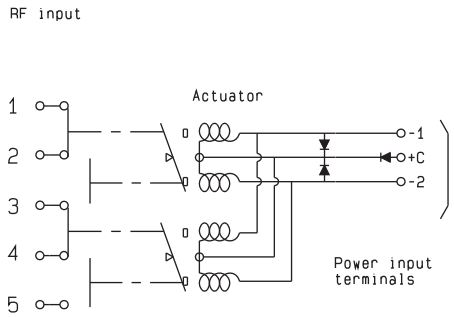
WITH POSITIVE COMMON, NO OPTION
R585 -3- 010 / R585 -3- 210 / R585 -3- 410



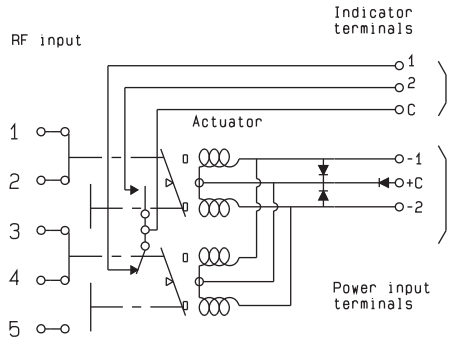
WITH POSITIVE COMMON AND INDICATOR CONTACT
R585 -4- 010 / R585 -4- 210 / R585 -4- 410



WITH POSITIVE COMMON AND SUPPRESSION DIODES
R585 -3- 040 / R585 -3- 240 / R585 -3- 440



WITH POSITIVE COMMON, SUPPRESSION DIODES AND INDICATOR CONTACT
R585 -4- 040 / R585 -4- 240 / R585 -4- 440



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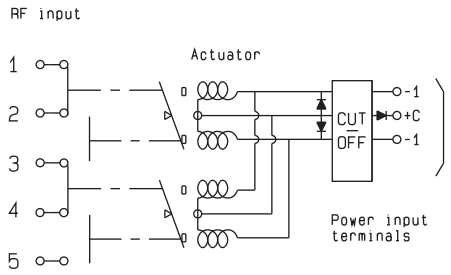
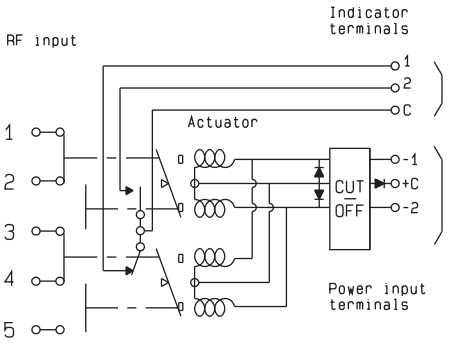
COAXIAL DP3T - ELECTRICAL SCHEMATICS
R585 Serie

LATCHING

WITH POSITIVE COMMON AND CUT-OFF
(suppression diodes are included)
R585 -5- 010 / R585 -5- 210 / R585 -5- 410



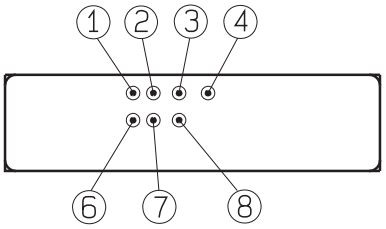
WITH POSITIVE COMMON, CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R585 -6- 010 / R585 -6- 210 / R585 -6- 410



DP3T

PIN IDENTIFICATION

Type	PIN						
	1	2	3	4	6	7	8
Failsafe	+		-				
Failsafe + I.C.	+		-		2NO	1NC	C
Failsafe + TTL	E		RTN	VCC			
Failsafe + I.C. + TTL	E		RTN	VCC	2NO	1NC	C
Latching Latching + Cut-off	-2 or +2	-1 or +1	+C or -C				
Latching + I.C. Latching + I.C. + Cut-off	-2 or +2	-1 or +1	+C or -C		2	1	C
Latching + TTL Latching + TTL + Cut-off	E2	E1	RTN	VCC			
Latching + TTL + I.C. Latching + TTL + I.C. + Cut-off	E2	E1	RTN	VCC	2	1	C
Normally open	-2	-1	+C				
Normally open + I.C.	-2	-1	+C				
Normally open + TTL	E2	E1	RTN	VCC			
Normally open + TTL + I.C.	E2	E1	RTN	VCC	2	1	C



Bottom View

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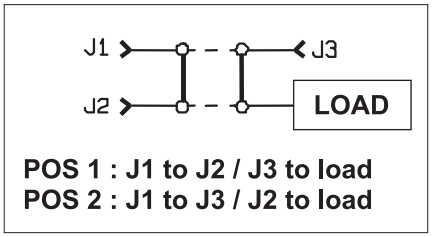
OPTIONAL FEATURES FOR DP3T SWITCHES

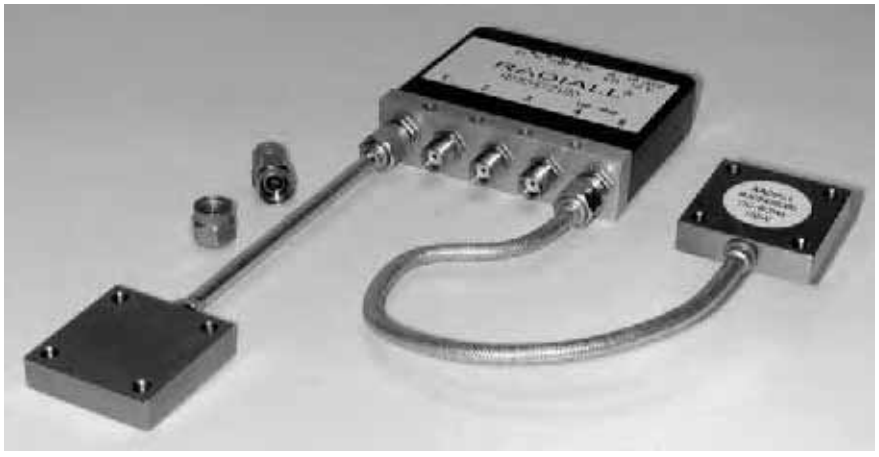
GENERAL

RADIALL DP3T / SPDT terminated have been designed only with SMA connectors.



For all other connectors (N, BNC, etc ...), a same function as SPDT Terminated can be easily done with a standard DPDT and an external load.

Examples of dedicated applications options



This SPDT terminated is composed of a DP3T with SMA connectors and 2 RADIALL cable loads used as medium power terminations.

This SPDT terminated has been built with 2 separate coils for test network customer's application.

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