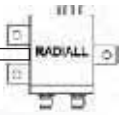

DPDT section

High performances DPDT up to 40 GHz - PLATINUM series

NEW

See Page DPDT - 2

DPDT up to 40 GHz - RAMSES series

See Page DPDT - 8

QUICK ACCESS TO THE RIGHT PAGE

Example : **DC-18 GHz, DPDT with SMA connectors**:
See page DPDT-8

	DIN.1.6/5.6	BNC	QMA	N	TNC	SMA	SMA 2.9
DC - 2.5	DPDT - 8						
DC - 3		DPDT - 12		DPDT - 12	DPDT - 12	DPDT - 8	
DC - 6			DPDT - 8				
DC - 12.4				DPDT - 12	DPDT - 12		
DC - 18					DPDT - 11	DPDT - 8	
DC - 26.5						DPDT - 8	DPDT - 8
DC - 40							DPDT - 8

ROJONE PTY. LTD.

Australian Representatives
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www.rojone.com.au

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HIGH PERFORMANCES DPDT
PLATINUM Series / DPDT up to 40 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 3 . 7 3 1 4 . .

RoHS COMPLIANT

NEW

RF Connectors :
- **3** : SMA up to 6 GHz
- **4** : SMA up to 20 GHz
- **F** : SMA up to 26.5 GHz
- **8** : SMA 2.9 up to 40 GHz (2)

Type :
- 7 : Latching + Self cut-off indicators

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

TTL option :
- **1** : With TTL driver (high level)

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

Actuator Terminals and fixing :
- **8** : HE 10 receptacle with bracket (1)
- **9** : HE 10 receptacle without bracket (1)

Options :
- **4** : With suppression diodes and positive common

(1) : Delivered with 750 mm (30 inches) ribbon cable + HE 10 connector

(2) : Connector SMA 2.9 is equivalent to "K connector®", registered trademark of Anritsu

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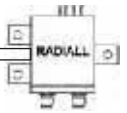
HIGH PERFORMANCES DPDT
PLATINUM Series / DPDT up to 40 GHz

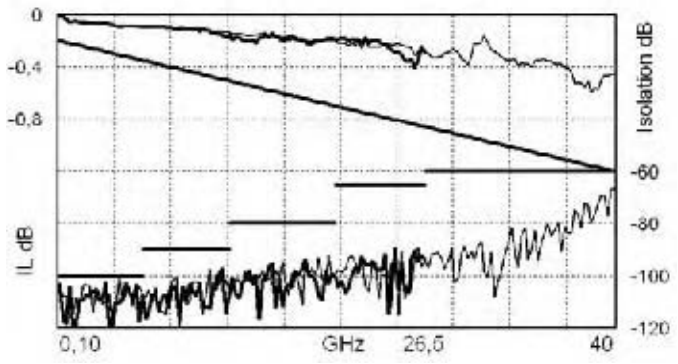


RF PERFORMANCES

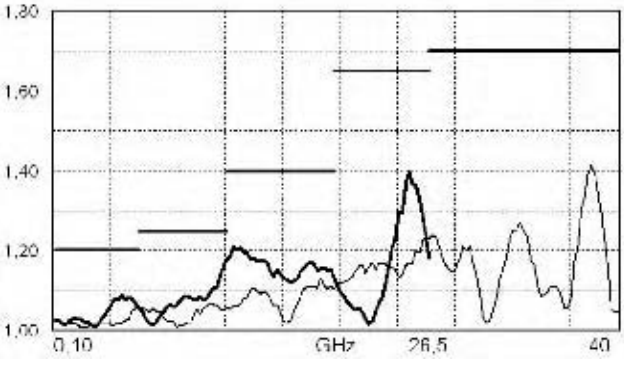
Part Number		R59337314.	R59347314.	R593F7314.	R59387314.
Frequency range	GHz	DC to 6	DC to 20	DC to 26.5	DC to 40
Impedance	Ω	50			
Insertion loss (max)	dB	0.2 + 0.025 x frequency (GHz)			
Isolation (Min)	dB	100	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80 20 to 26.5 GHz : 65	DC to 6 GHz : 100 6 to 12.4 GHz : 90 12.4 to 20 GHz : 80 20 to 26.5 GHz : 65 26.5 to 40 GHz : 60
V.S.W.R. (max)		1.20	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.40 18 to 20 GHz : 1.65	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.40 18 to 20 GHz : 1.65	DC to 6 GHz : 1.20 6 to 12.4 GHz : 1.25 12.4 to 18 GHz : 1.40 18 to 26.5 GHz : 1.65 26.5 to 40 GHz : 1.70
Repeatability (measured at 25°C)	dB	0.03			0.05

TYPICAL RF PERFORMANCES

Insertion Loss and Isolation



V.S.W.R.



——— : 26.5 GHz model with **SMA /** ——— : 40 GHz model with **SMA 2.9**

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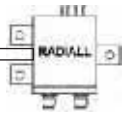

ADDITIONAL SPECIFICATIONS

Operating mode		**Latching**
Nominal operating voltage (across operating temperature)	Vdc	**24** (20 to 32)
Coil resistance (±10%)	Ω	120
Nominal operating current at 23°C	mA	200
Average power		RF path cold switching : see power rating chart on page 6
		Hot switching : 1 watt CW
TTL input	High level	3 to 7 V 1.4mA max at 7 V
	Low level	0 to 0.8 V
Indicator specifications		Maximum withstanding voltage : 60V Maximum current capacity : 150 mA Maximum "ON" resistance : 2.5Ω Minimum "OFF" resistance : 100MΩ
Switching time (max)	ms	15
Life (min) for	SMA	10 million cycles
	SMA 2.9	5 million cycles
Connectors		SMA – SMA 2.9
Actuator terminals		HE10 ribbon receptacle
Weight (max)	g	110

DPDT

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)
Vibration (MIL STD 202, Method 204D, Cond. D)		10-2000 Hz, 10g operating
Shock (MIL STD 202, Method 213B, Cond. C)		50g/6ms, ½ sine operating
Moisture resistance (MIL STD 202, Method 106E, Cond. E)		65°C, 95% RH, 10 days
Altitude storage (MIL STD 202, Method 105C, Cond. B)		50.000 feet (15.240 meters)
RFI (MIL STD 1344, Method 3008 or IEC 61726)		40 dB at 20 GHz

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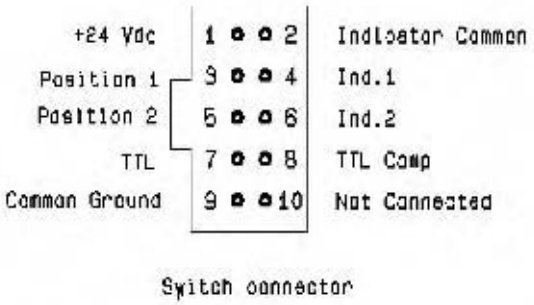
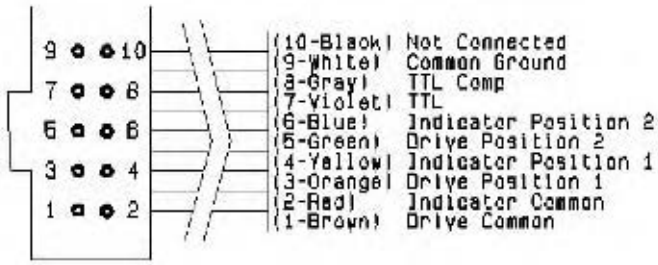
DRIVING THE SWITCH

There is two positions for a transfer switch. Each RF path can be closed by applying Ground or TTL "High" to the corresponding "drive" pin.

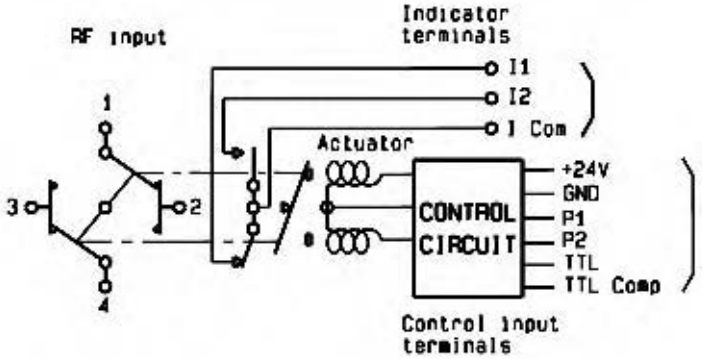


Switch connector



Mating cable connector

SCHEMATIC DIAGRAM



	RF continuity	Indicator
Position 1	1-2 / 3-4	ICom – I1
Position 2	1-3 / 2-4	ICom – I2

Standard drive

- Connect pin 9 to ground (See note 1).
- Connect pin 1 to supply (+20 VDC to +32 VDC)
- Select (close) desired RF paths by applying Ground to the corresponding "drive" pin (Ex: apply Ground to pin 3 to close RF path 1-2 and 3-4).
- To select the second path, ensure that unwanted RF path "drive" pin are disconnected from Ground. Apply Ground to the "drive" pin which corresponds to the desired RF paths (Ex: apply Ground to pin 5 to close RF path 1-3 and 2-4).

TTL drive (Dual line)

- Connect pin 9 to ground.
- Connect pin 1 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 7 and TTL “Low” to pin 8 to close RF paths position 1).
- To select the second path, ensure that unwanted RF path "drive" pins are in TTL "Low" position. Apply TTL "High" to the "drive" pin which correspond to the desired RF path and TTL “low” to the undesired.
  (Ex: apply TTL "High" to pin 8 and TTL “Low” to pin 7 to close RF paths position 2).

TTL drive (Single line)

- Connect pin 9 to ground.
- Connect pin 1 to supply (+20 VDC to +32 VDC)
- Connect pin 8 to TTL “High”.
- Select (close) position 1 by applying TTL "High " to pin 7 (Ex: apply TTL "High" to pin 7 to close RF paths 1-2 and 3-4).
- Select position 2 by applying TTL "Low " to pin 7 (Ex: apply TTL "Low" to pin 7 to close RF paths 1-3 and 2-4).

Note 1

Pin 9 does not need to be grounded for the switch to operate in standard drive. If pin 9 is not grounded, the position indicators will only function while the appropriate drive has applied. Therefore, if a pulse drive is used and continuous indicator operation is required, pin 9 must be grounded.

DPDT

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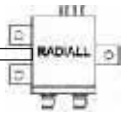
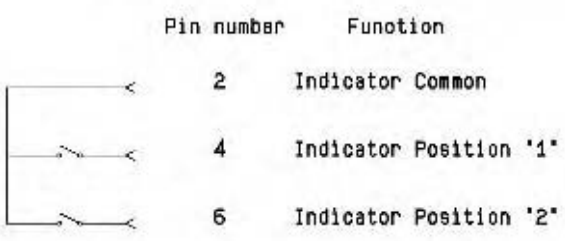
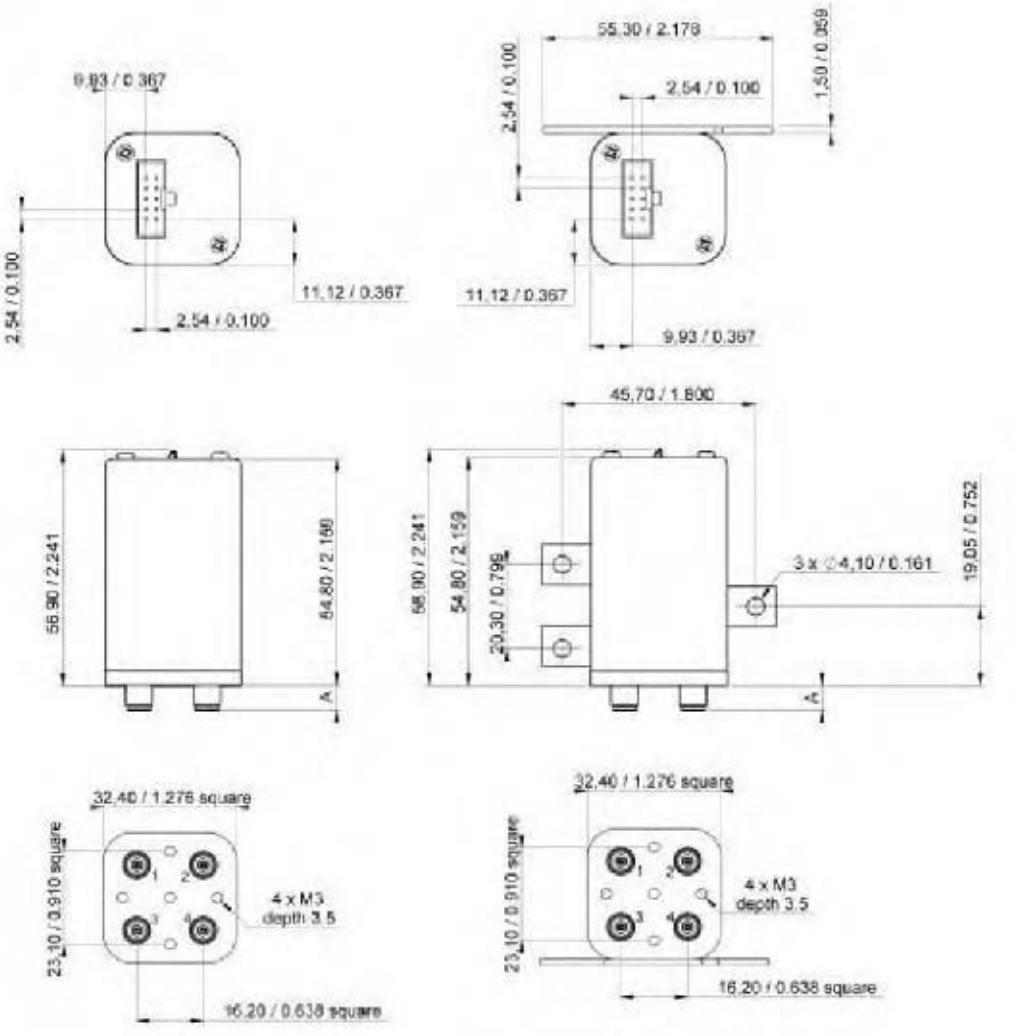


ELECTRONIC POSITION INDICATORS



The electronic position indicators utilise photo-MOS transistors which are driven by the mechanical position of the RF paths moving elements. The circuitry consists of a common which can be connected to an output corresponding to selected RF path. The photo-MOS transistors are configured for AC and/or DC operation. The electronic position indicators require the supply (20 to 32 VDC) to be connected to pin 1 and ground connected to pin 9.

TYPICAL OUTLINE DRAWING



Connectors	SMA	SMA 2.9
A max (mm)	7.4	6.3

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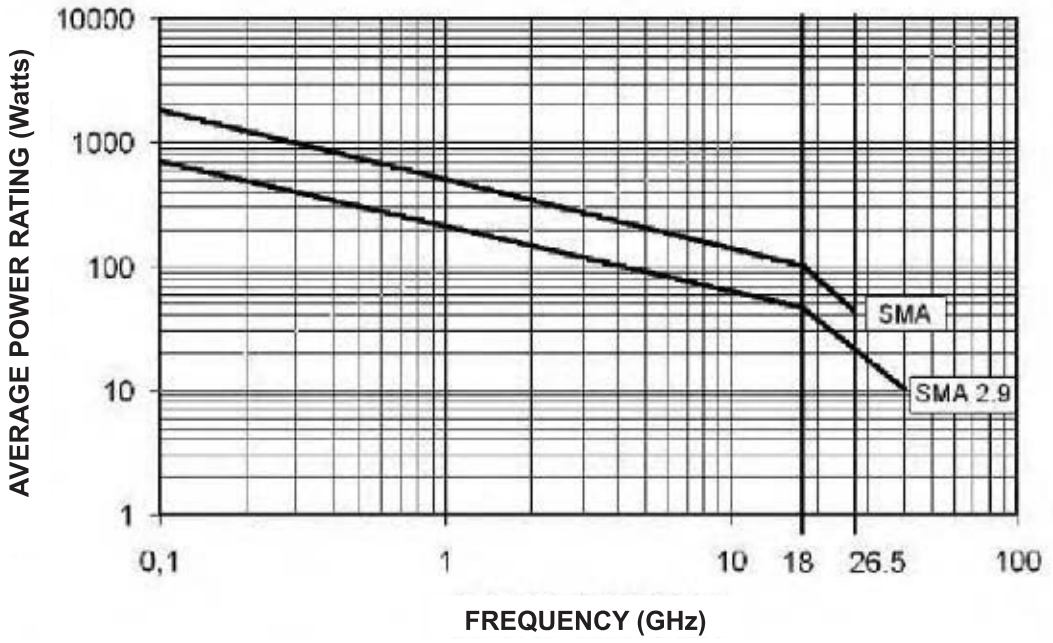
POWER RATING CHART

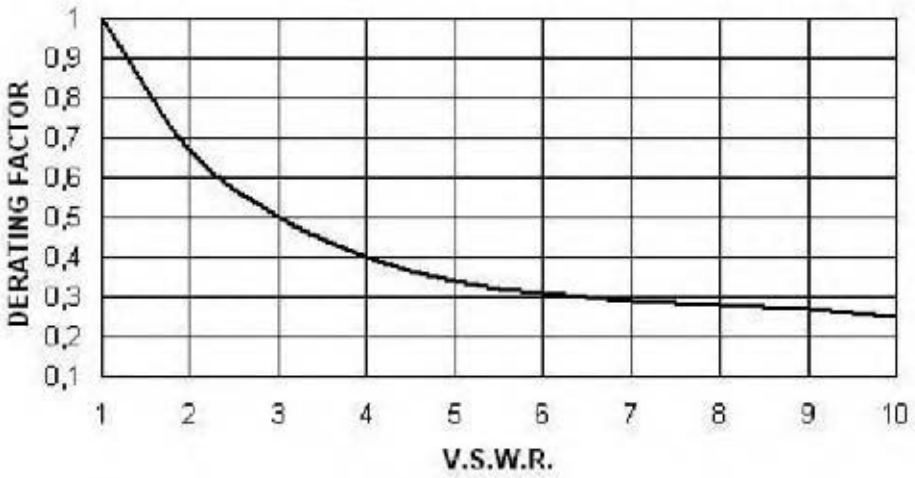
This graph is based on the following conditions :

- 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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DPDT up to 40 GHz - RAMSES Concept

SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6 / 5.6

PART NUMBER SELECTION

R 5 7 7 . . . . . .

RF Connectors :
- **3** : SMA up to 3 GHz
- **E** : QMA up to 6 GHz (4)
- **4** : SMA up to 18 GHz
- **F** : SMA up to 26.5 GHz
- **8** : SMA 2.9 up to 40 GHz (5)
- **9** : DIN 1.6/5.6 up to 2.5 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)

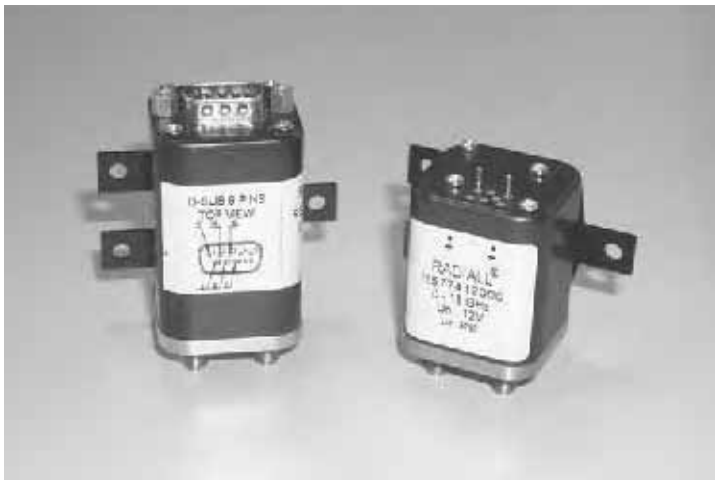
Actuator Voltage :
- **2** : 12 Vdc
- **3** : 28 Vdc

Actuator Terminals and Fixing :
- **0** : Solder pins with bracket
- **2** : Solder pins without bracket
- **5** : D-Sub connector with bracket
- **7** : D-Sub connector without bracket

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

TTL Option :
- **0** : Without TTL driver
- **1** : With TTL Driver (high level)(1)(2)

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 because failsafe switches can be used with both polarities



(4) : The "QLF" trademark (Quick Lock Formula®) standard applies to QMA and QN series and guaranties the full intermateability between suppliers using this trademark. Using QLF certified connectors also guarantees the specified level of RF performances

(5) : Connector SMA 2.9 is equivalent to "K connector®", registered trade mark of Anritsu

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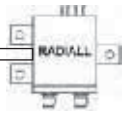
DPDT up to 40 GHz - RAMSES Concept
SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6 / 5.6



RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
DIN 1.6/5.6	DC - 2.5	DC - 1	1.20	0.20	80	75
		1 - 2.5	1.30	0.30	70	
QMA	DC - 6	DC - 3	1.20	0.20	80	50
		3 - 6	1.20	0.30	70	
SMA	DC - 3 DC - 18 DC - 26.5	DC - 3	1.20	0.20	80	50
		3 - 8	1.30	0.30	70	
		8 - 12.4	1.40	0.40	65	
		12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.70	0.70	50	
SMA 2.9	DC - 40	DC - 6	1.30	0.30	70	50
		6 - 12.4	1.40	0.40	60	
		12.4 - 18	1.50	0.50	60	
		18 - 26.5	1.70	0.70	55	
		26.5 - 40	1.90	1.00	50	

See page DPDT-10 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		**Failsafe**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (+/-10%)	Ω	35	200	38	225
Nominal operating current at 23°C	mA	340	140	320	125
Average power		See Power Rating Chart page **Intro-14**			
Switching time (max)	ms	10			
Life (min)		2.5 million cycles			
Connectors		SMA - SMA 2.9 - QMA - SMB - SMC - DIN 1.6/5.6			
Actuator terminals		Solder pins			
Operating temperature range	DIN 1.6/5.6	-25°C to +70 °C			
	SMA - SMA 2.9 - QMA	-40°C to +85 °C			
Storage temperature range	DIN 1.6/5.6	-40°C to +85 °C			
	SMA - SMA 2.9 - QMA	-55°C to +85 °C			
Vibration (MIL STD 202, method 204D, cond.C)		10-2000 Hz , 20g operating			
Shock (MIL STD 202, method 213B, cond.G)		50g / 11 ms, ½ sine operating			

DPDT

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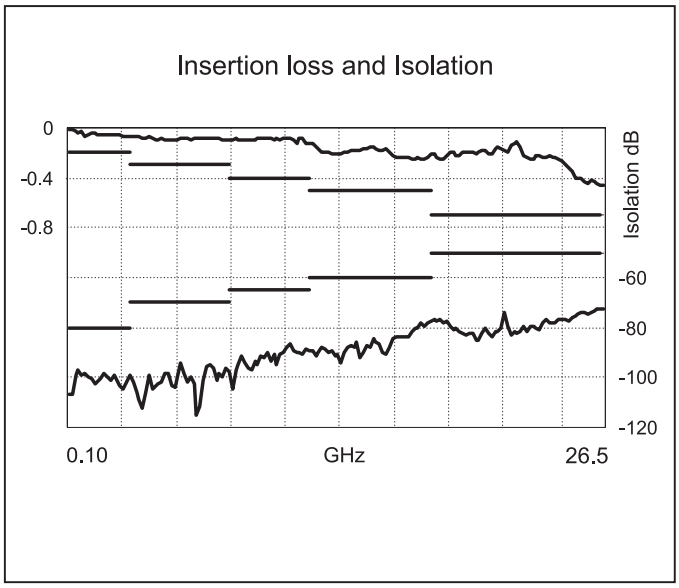
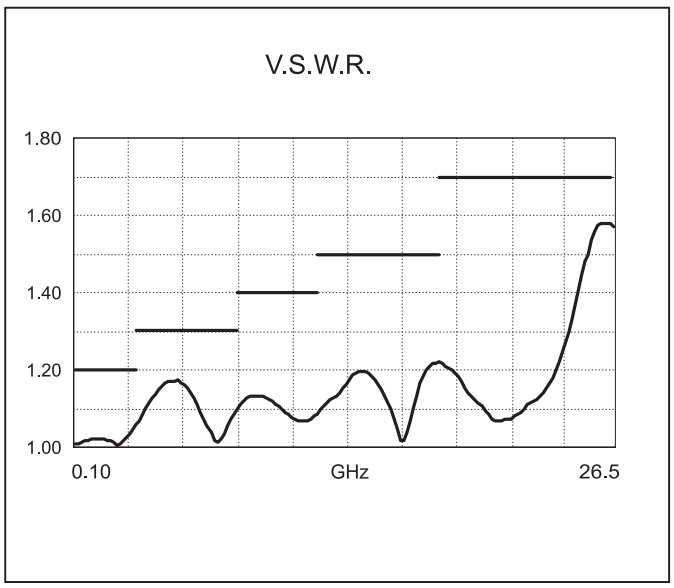
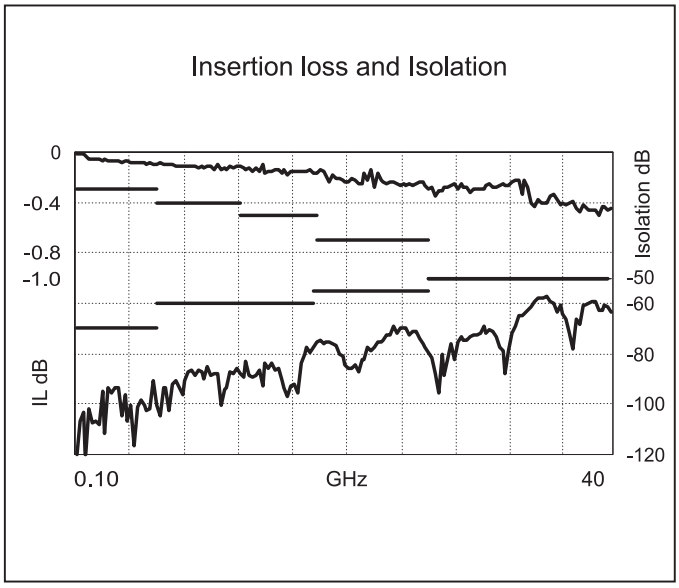
R577 TYPICAL RF PERFORMANCES

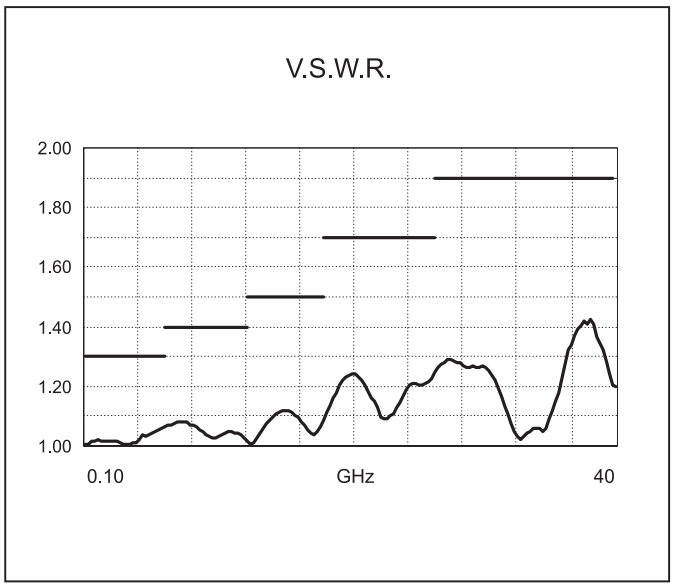
Example : DPDT SMA up to 26.5 GHz





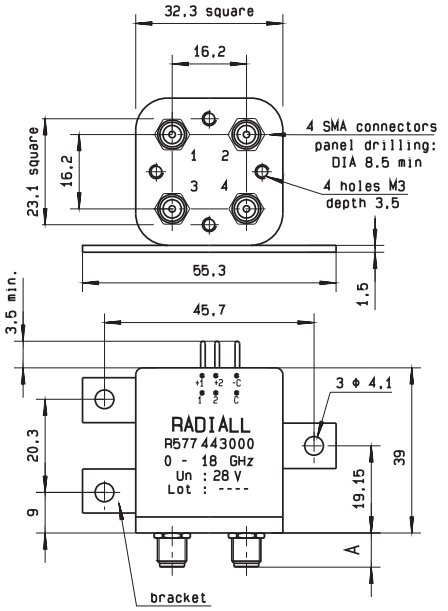
Example : DPDT SMA 2.9 up to 40 GHz





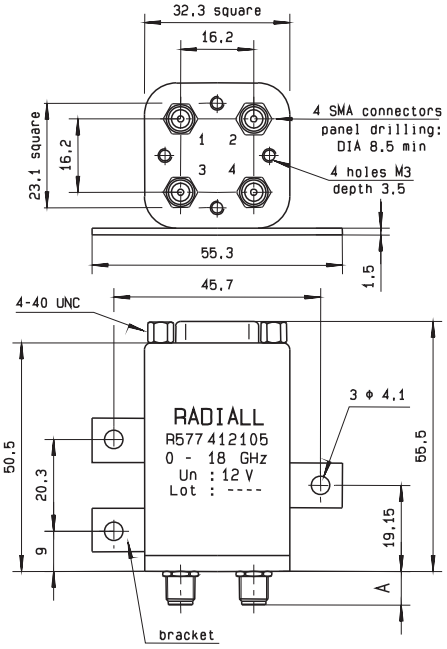
TYPICAL OUTLINE DRAWING

With solder pins and bracket



See page **DPDT-19** for pin identification

With D-Sub connector and bracket



See page **DPDT-19** for pin identification

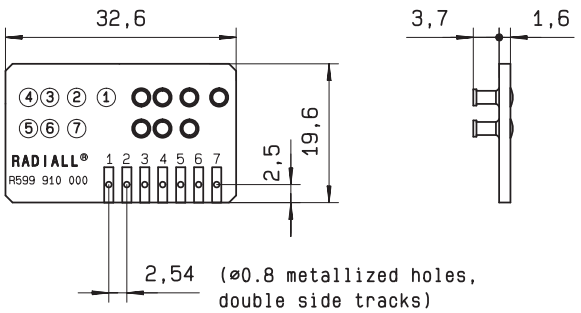
Connectors	SMA	SMA 2.9	QMA	DIN 1.6/5.6
A max (mm)	7.4	6.3	10.8	11.5

DPDT

ACCESSORIES

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

For DPDT model R577 series :



part number : **R599 910 000**

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DPDT up to 12.4 GHz - RAMSES Concept
N - BNC - TNC

PART NUMBER SELECTION

R 5 7 7 . . . . .

RF Connectors :
- **0** : N up to 3 GHz
- **1** : N up to 12.4 GHz
- **2** : BNC up to 3 GHz
- **5** : TNC up to 3 GHz
- **6** : TNC up to 12.4 GHz

Type :
- **1** : Failsafe
- **2** : Failsafe + I.C.
- **3** : Latching
- **4** : Latching + I.C.
- **5** : Latching + S.C.O. (1)
- **6** : Latching + S.C.O. + I.C. (1)

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

Actuator Terminals and Fixing :
- **0** : Solder pins with bracket
- **2** : Solder pins without bracket
- **5** : D-Sub connector with bracket
- **7** : D-Sub connector without bracket

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

TTL Option :
- **0** : Without TTL driver
- **1** : With TTL Driver (high level)(1)(2)

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 because failsafe switches can be used with both polarities

Technical data sheets are available on : ***www.radiall.com***
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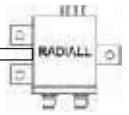
DPDT up to 12.4 GHz - RAMSES Concept
N - BNC - TNC



RF PERFORMANCES

Connectors	Frequency Range GHz		V.S.W.R. (max)	Insertion Loss (max) dB	Isolation (min) dB	Impedance Ohms
BNC	DC - 3	DC - 1	1.15	0.15	85	50
		1 - 2	1.20	0.20	80	
		2 - 3	1.25	0.25	75	
N / TNC	DC - 3	DC - 1	1.15	0.15	85	50
		1 - 2	1.20	0.20	80	
		2 - 3	1.25	0.25	75	
	DC - 12.4	3 - 8	1.35	0.35	70	
		8 - 12.4	1.50	0.50	60	

See page DPDT-14 for typical RF performances

ADDITIONAL SPECIFICATIONS

Operating mode		**Failsafe**		**Latching**	
Nominal operating voltage (across operating temperature)	Vdc	**12** (10.2 to 13)	**28** (24 to 30)	**12** (10.2 to 13)	**28** (24 to 30)
Coil resistance (+/-10%)	Ω	35	200	38	225
Nominal operating current at 23°C	mA	340	140	320	125
TTL input	High Level	2.2 to 5.5 V		800 µA max 5.5 V	
	Low Level	0 to 0.8 V		20 µA max 0.8 V	
Average power		See Power Rating Chart page **Intro-14**			
Switching time (max)	ms	15			
Life (min)		2.5 million cycles			
Connectors		N - TNC - BNC			
Actuator terminals		Solder pins or male 9 pin D-Sub connector			
Operating temperature range		-40°C to +85 °C			
Storage temperature range		-55°C to +85 °C			
Vibration (MIL STD 202, method 204D, cond.C)		10-2000 Hz , 20g		operating	
Shock (MIL STD 202, method 213B, cond.G)		50g / 11 ms, ½ sine		operating	

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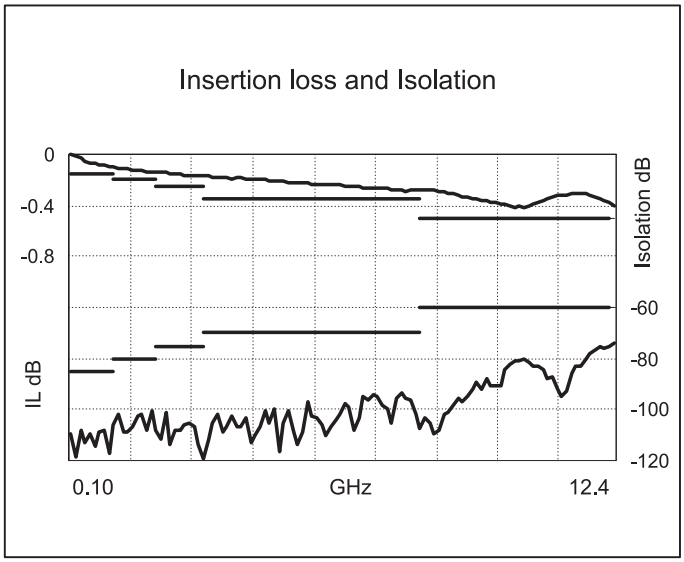
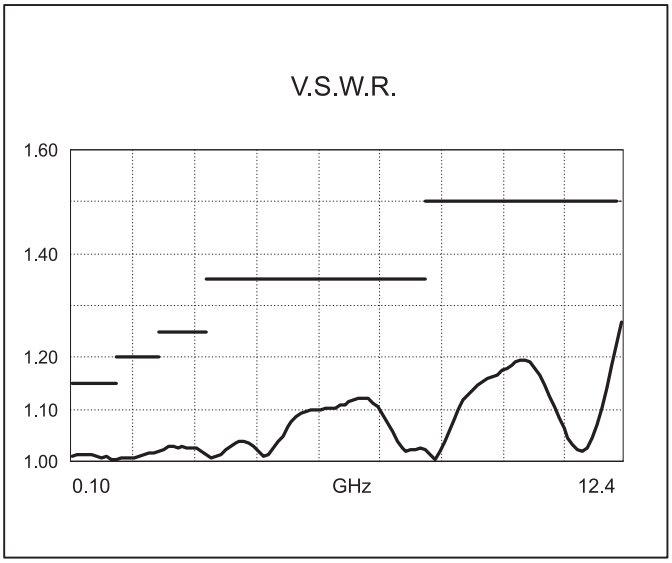
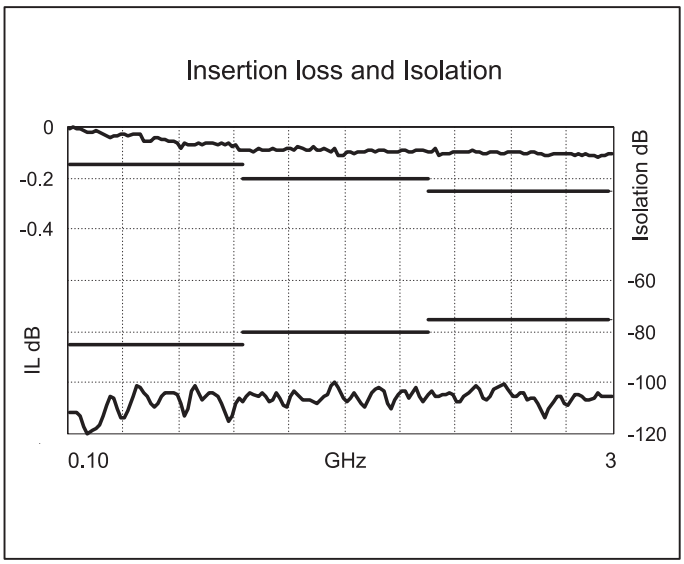
R577 TYPICAL RF PERFORMANCES

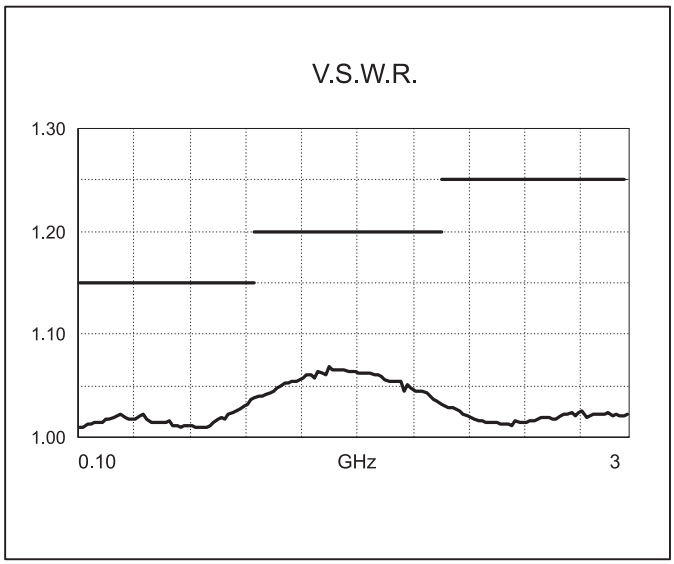
Example : DPDT N/TNC 12.4 GHz





Example : DPDT BNC up to 3 GHz



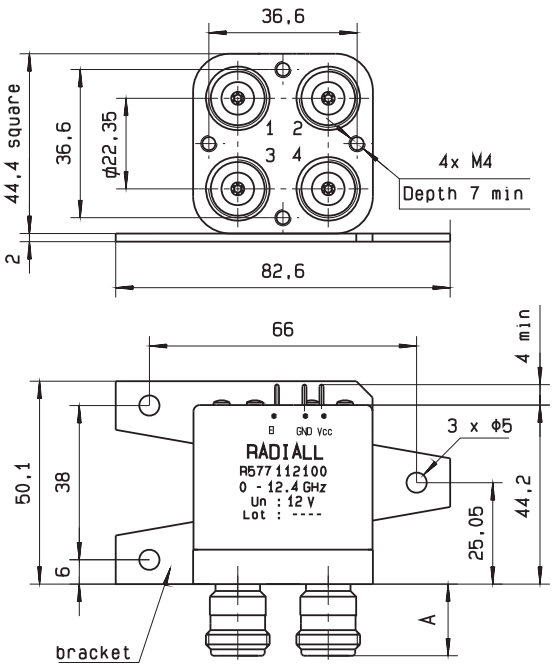


DPDT

DPDT up to 12.4 GHz - RAMSES Concept
N - BNC - TNC

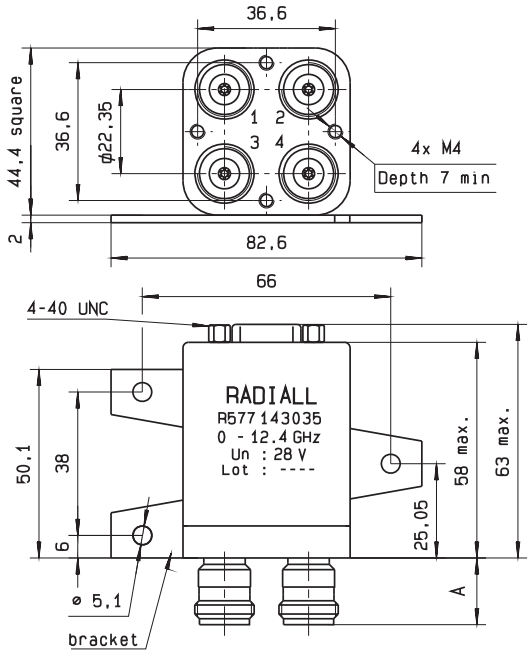
TYPICAL OUTLINE DRAWING

With solder pins and bracket



See page **DPDT-19** for pin identification

With D-Sub connector and bracket



See page **DPDT-19** for pin identification

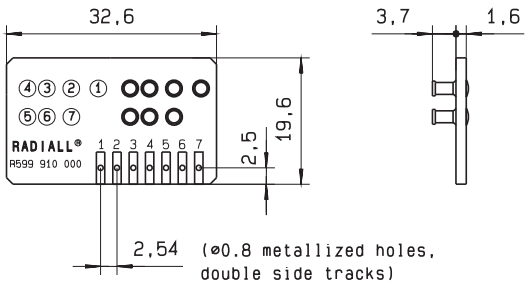
Connectors	N	BNC	TNC
A max (mm)	17.7	11.3	11.3

DPDT

ACCESSORIES

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

For DPDT model R577 series :



part number : **R599 910 000**

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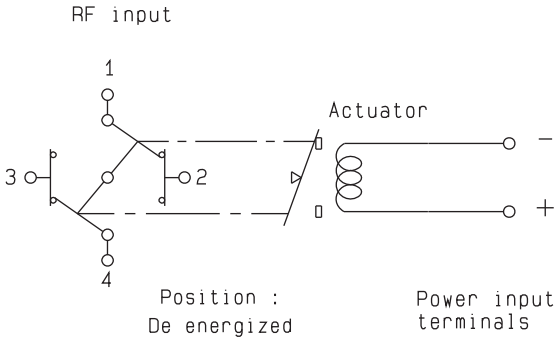
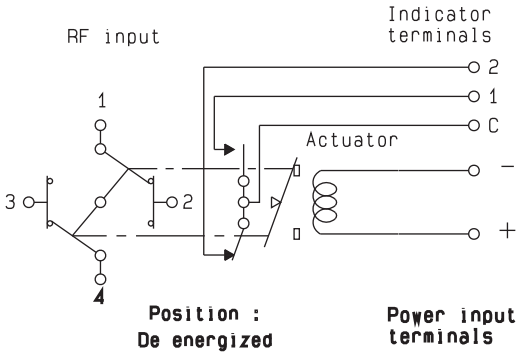
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

FAILSAFE

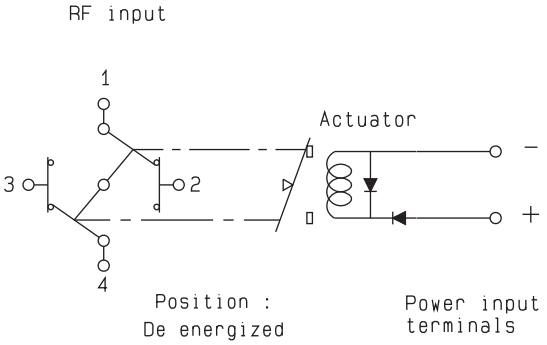
WITHOUT OPTION
R577 -1- 000



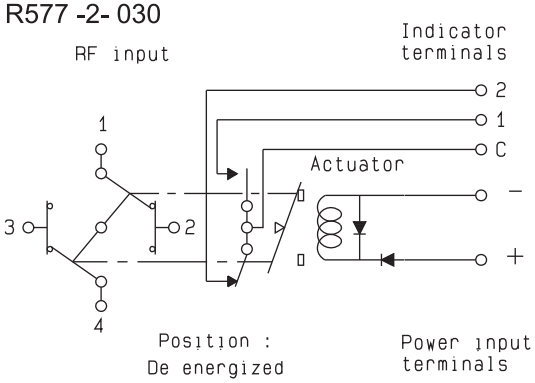
WITH INDICATOR CONTACT
R577 -2- 000



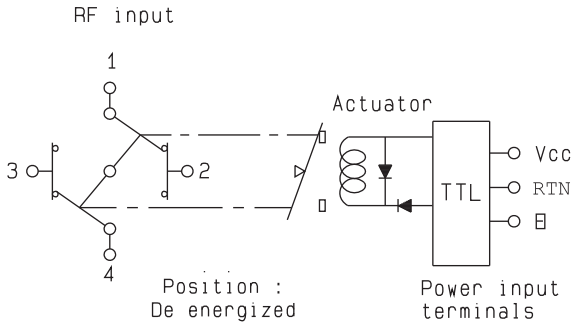
WITH SUPPRESSION DIODES
R577 -1- 030



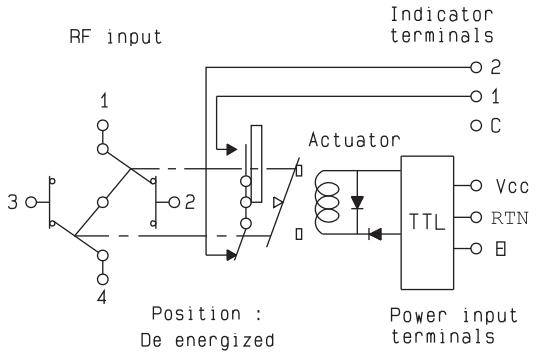
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R577 -2- 030



WITH TTL DRIVER
(suppression diodes are included)
R577 -1- 100



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R577 -2- 100



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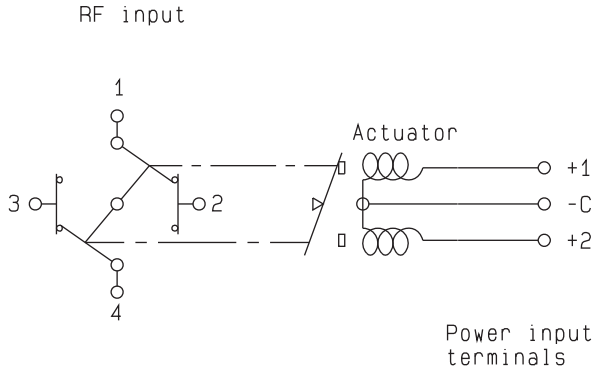
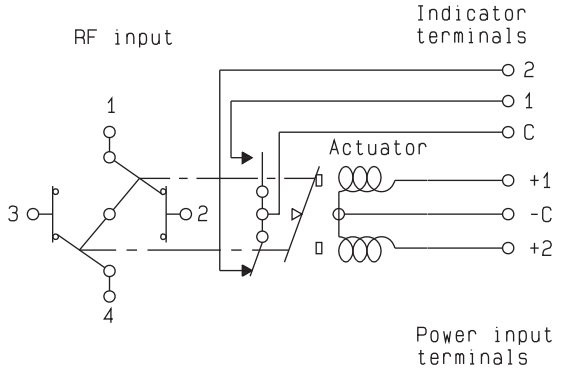
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

LATCHING

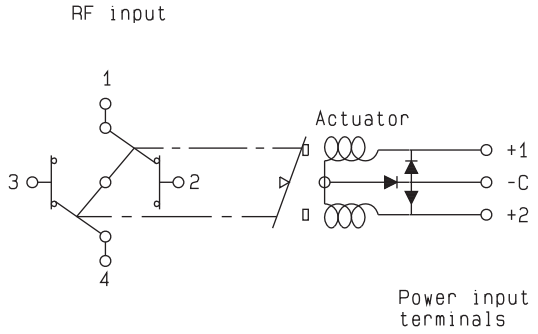
WITHOUT OPTION
R577 -3- 000



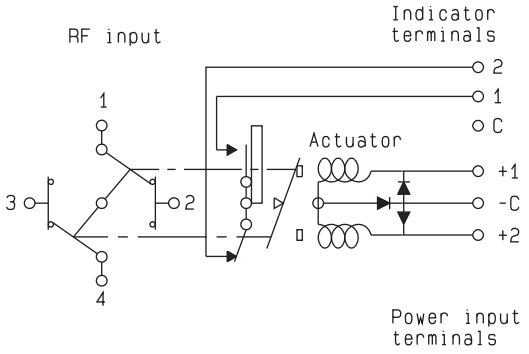
WITH INDICATOR CONTACT
R577 -4- 0000



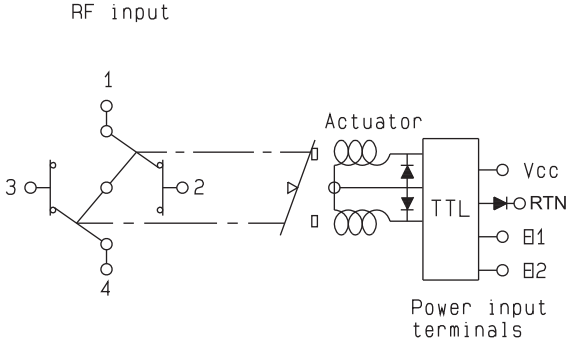
WITH SUPPRESSION DIODES
R577 -3- 030



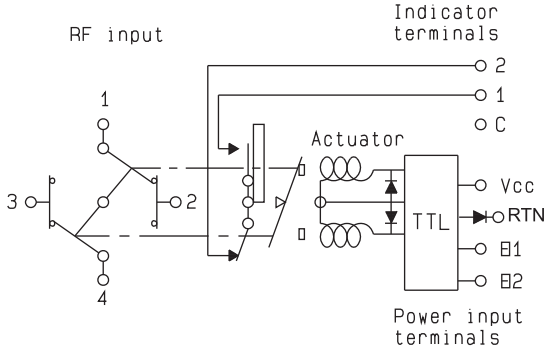
WITH SUPPRESSION DIODES AND INDICATOR CONTACT
R577 -4- 030



WITH TTL DRIVER
(suppression diodes are included)
R577 -3- 100



WITH TTL DRIVER AND INDICATOR CONTACT
(suppression diodes are included)
R577 -4- 100



DPDT

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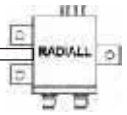
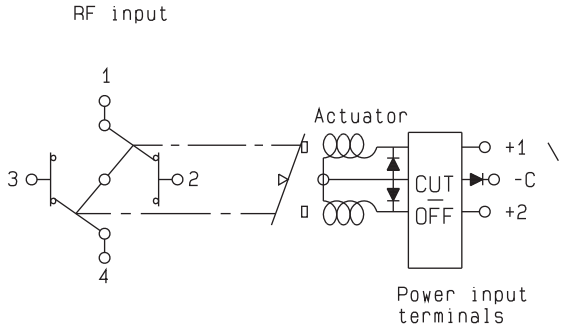
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

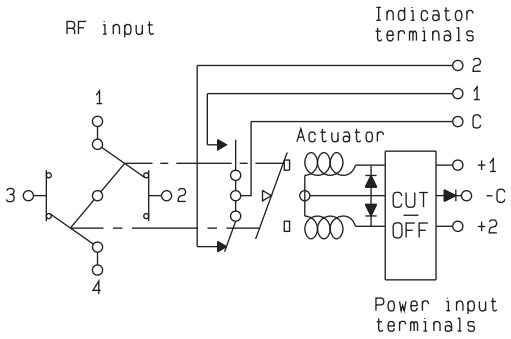


LATCHING

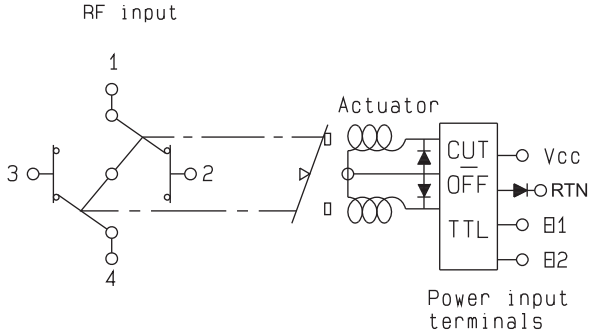
WITH CUT-OFF
(suppression diodes are included)
R577 -5- 000



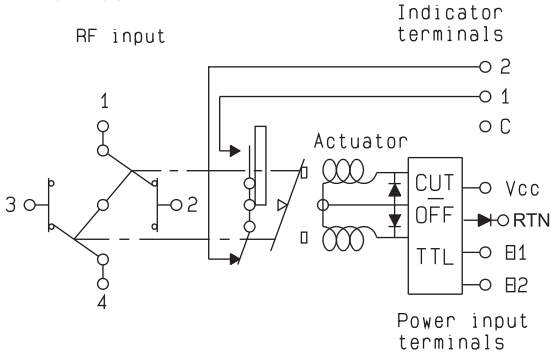
WITH CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R577 -6- 000



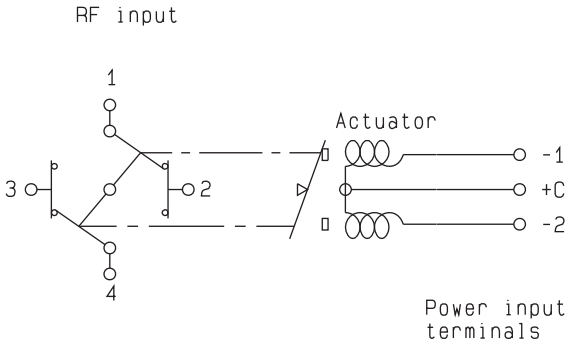
WITH CUT-OFF AND TTL DRIVER
(suppression diodes are included)
R577 -5- 100



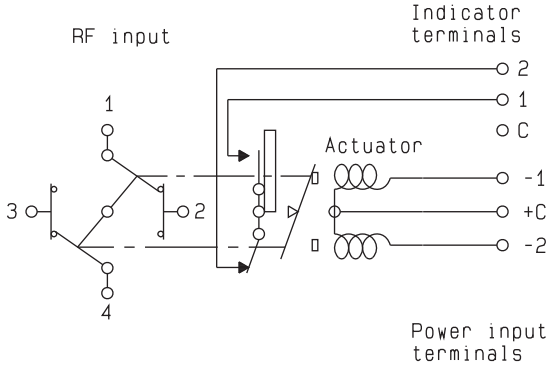
WITH CUT-OFF, TTL AND INDICATOR CONTACT
(suppression diodes are included)
R577 -6- 100



WITH POSITIVE COMMON, NO OPTION
R577 -3- 010



WITH POSITIVE COMMON AND INDICATOR CONTACT
R577 -4- 010



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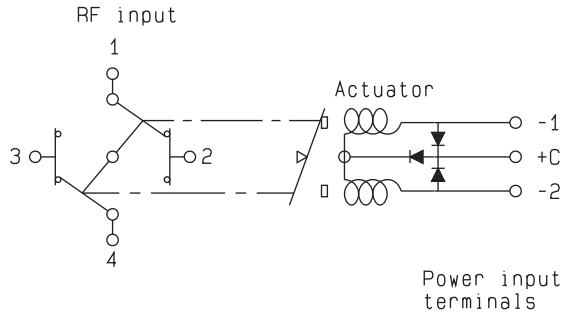
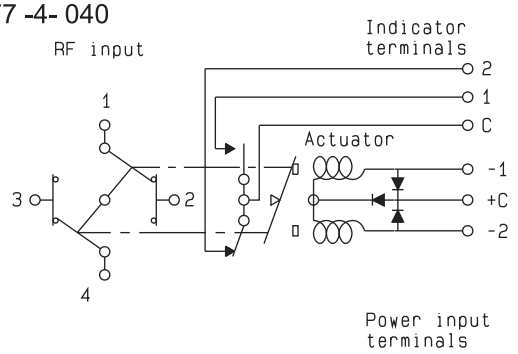
COAXIAL DPDT - ELECTRICAL SCHEMATICS
R577 series

LATCHING

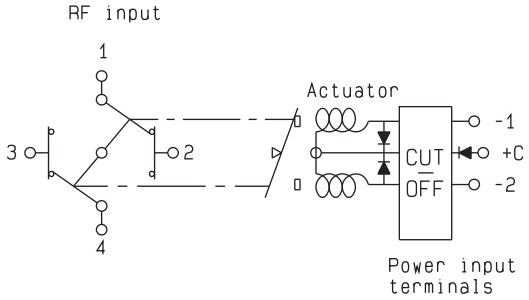
WITH POSITIVE COMMON AND SUPPRESSION DIODES
R577 -3- 040



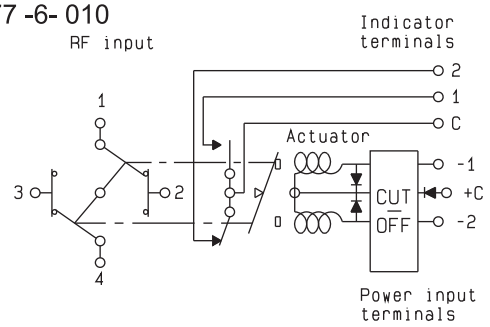
WITH POSITIVE COMMON, SUPPRESSION DIODES AND INDICATOR CONTACT
R577 -4- 040



WITH POSITIVE COMMON AND CUT-OFF
(suppression diodes are included)
R577 -5- 010

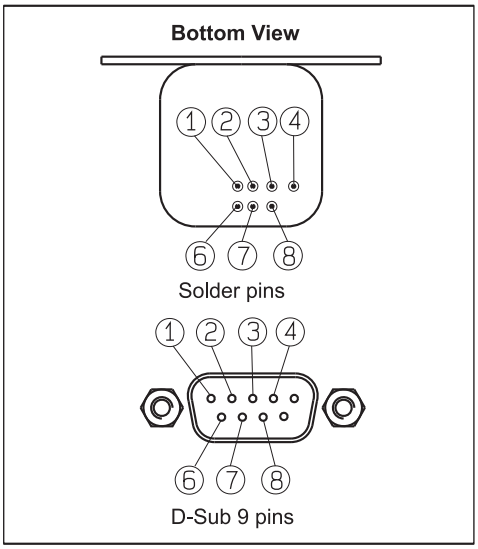


WITH POSITIVE COMMON, CUT-OFF AND INDICATOR CONTACT
(suppression diodes are included)
R577 -6- 010



PIN IDENTIFICATION

Type	PIN						
	1	2	3	4	6	7	8
Failsafe	+		-				
Failsafe + I.C.	E		-		1	2	C
Failsafe + TTL	E		RTN	VCC			
Failsafe + I.C. + TTL	E		RTN	VCC	1	2	C
Latching Latching + Cut-off	-1 or +1	-2 or +2	+C or -C				
Latching + I.C. Latching + I.C. + Cut-off	-1 or +1	-2 or +2	+C or -C		1	2	C
Latching + TTL Latching + TTL + Cut-off	E1	E2	RTN	VCC			
Latching + TTL + I.C. Latching + TTL + I.C. + Cut-off	E1	E2	RTN	VCC	1	2	C



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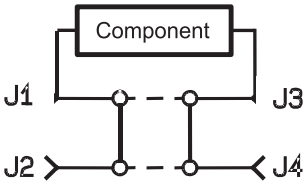
OPTIONAL FEATURES FOR DPDT SWITCHES

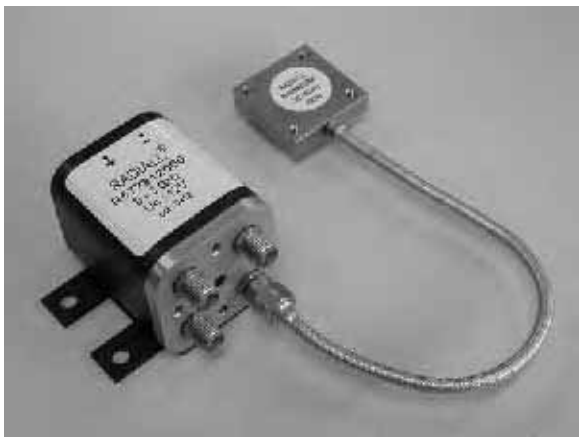
GENERAL

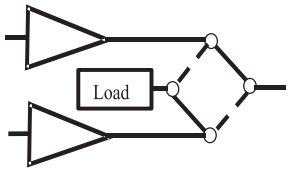
A microwave circuit or component can be inserted into a transmission line by using a DPDT switch as a by-pass product. In event that the short-circuit of the microwave circuit or component is undesirable, the J1/J3 path can be left out (see application option below).

Examples of dedicated application options :



Component inserted in J1 / J3
POS 1 : J2 to J4 : Direct line
POS 2 : J2 to J4 : Component



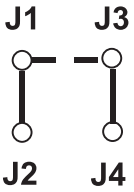


This DPDT with a cable load is used for redundancy purpose for 2 amplifiers, one working, the other one in stand-by.

This DPDT switch with SMA 2.9 connectors up to 41 GHz, waterproof and fitted with lightning suppression components, has been improved for an european military applications.

This DPDT has been fitted with a specific bracket to meet a customer's requirement.

This true By-pass Switch is based on a DPDT with only 3 RF ways instead of 4.



Component inserted in J2/J4
POS 1 : J1 to J3 : Direct line

DPDT

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