

Our Most Important Connection is with You.™

**SMT Power Micro SPDT with 10 GHz Capabilities**

**SURFACE MOUNT TECHNOLOGY**

Patent pending



An innovative and original "micro-mechanical" design of the R596 SMT micro-relay offers, excellent RF performance, reliability, and repeatability. The miniature size, and low installation cost make these coaxial switches an ideal solution.

Very low return loss and insertion loss allow this relay to be used in power applications, as well as in typical SMT relay applications such as RF attenuators, RF matrices, spectrum analysers, and telecommunications.

Failsafe models are offered in two RF configurations (direct and inverted). The association of these two products on the same PC board enables the product to perform the bypass function. (For bypass mounting, further information is available on page 2-8).

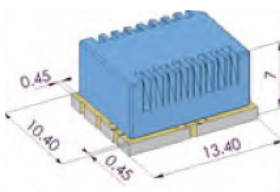
Actual Size



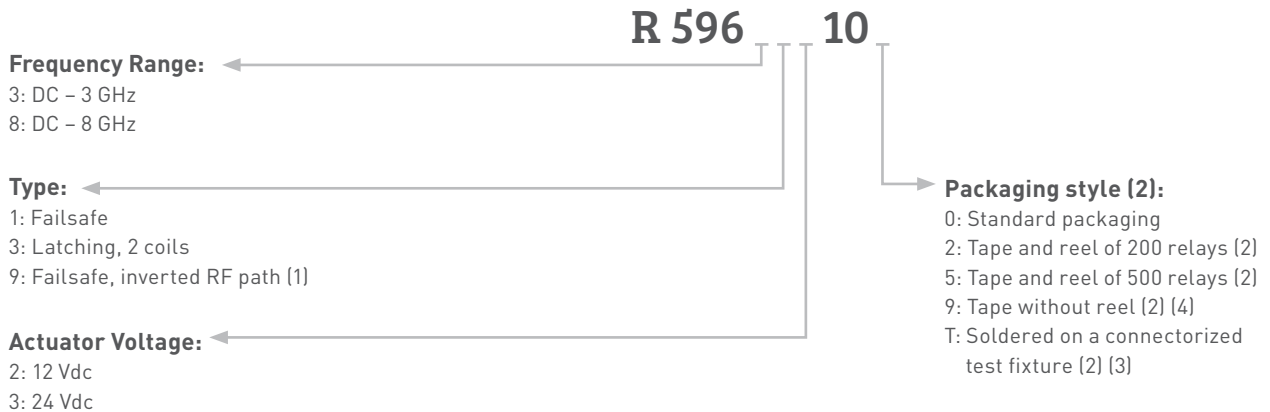
Example of P/N:

R596813100 is a SPDT SMT 8 GHz, 24 Vdc, failsafe, standard packaging.

Typical Outline Drawing  
(All dimensions in mm)



**PART NUMBER SELECTION**



(1): To be associated with a failsafe model, so as to achieve the "BYPASS" function (see application details on page 2-8)  
 (2): Non standard packaging symbols (2, 5, 9 or T) are not marked on the relay  
 (3): See details about test fixture dimensions on page 2-4  
 (4): Tape delivered without reel, available for all specific quantities up to 200 pieces

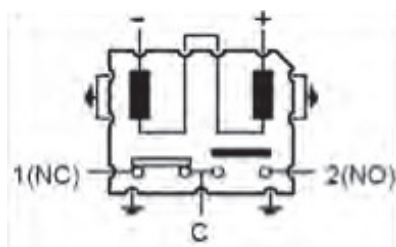
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**SLIM LINE GENERAL SPECIFICATIONS**

Operating mode		Failsafe (types 1 and 9)		Latching (type 3)	
Nominal operating voltage (across temperature range)	Vdc	12 (10.2 to 13)	24 (20.5 to 30)	12 (10.2 to 13)	24 (20.5 to 30)
Coil resistance at 23 °C (+/-10%)	Ω	330	1130	205	865
Operating current at 23 °C	mA	36	25	58	32
RF and command ports		1/2 hole gold plated, Infrared reflow, forced air oven or hand soldering (Compatible with lead free soldering processes)			
Switching time at nominal voltage	Making contacts Breaking contacts	Max 4ms (typical 1.8ms), including contact bounce time Max 1ms (typical 0.5ms)			
Life	- Cold switching (max 120 cycles/min) - Hot switching (max 20 cycles/min)	2 million cycles 500.000 cycles (1W, impedance 50Ω, V.S.W.R. < 1.25)			
Insulation		Dielectric test voltage		300 Vrms	
		Insulation resistance at 500Vdc		> 100 MOhms	
Environmental protection		Lead free construction - Waterproof (acc. To IEC 60529 / IP67)			
Mass		< 2g			
Operating temperature range (with no icing nor condensation)	°C	-25 to +85 (5)		-40 to +85	
Storage temperature range	°C	- 55 to +85			
Sine vibration (MIL STD 202, Method 204D)		- Condition D: 10-2000 Hz, 20g		operating	
		- Condition G: 10-2000 Hz, 30g		non operating	
Random vibration (MIL STD 202, Method 214A, Profile I)		- Condition F: 50-2000 Hz, 20.71g		operating	
		- Condition H: 50-2000 Hz, 29.28g		non operating	
Shocks (According to MIL STD 202, Method 213B, Cond. C)		100g / 6 ms, 1/2 sine		operating	

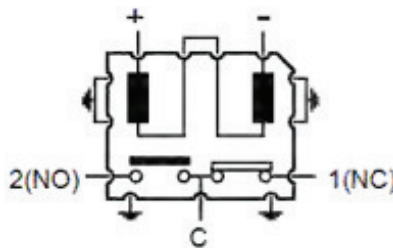
(5): Failsafe models may be used down to -40°C, but if coil remains permanently supplied at nominal voltage, the holding current value must be reduced from 45% to 55% to avoid internal condensation.  
(for more details, see Radiall application note AN-R596-51 on page 2-10).

**PIN IDENTIFICATION (TOP VIEW)**



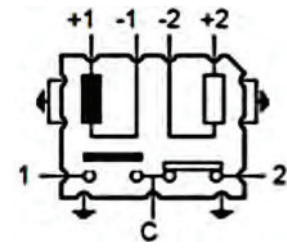
**Failsafe model  
(Type 1)**

Voltage	RF continuity
De-energized	C <--> 1(NC)
Energized	C <--> 2(NO)



**Inverted failsafe model for  
Bypass application (Type 9)**

Voltage	RF continuity
De-energized	C <--> 1(NC)
Energized	C <--> 2(NO)



**Latching model  
(Type 3)**

Voltage	RF continuity
-1 +1	C <--> 1
-2 +2	C <--> 2

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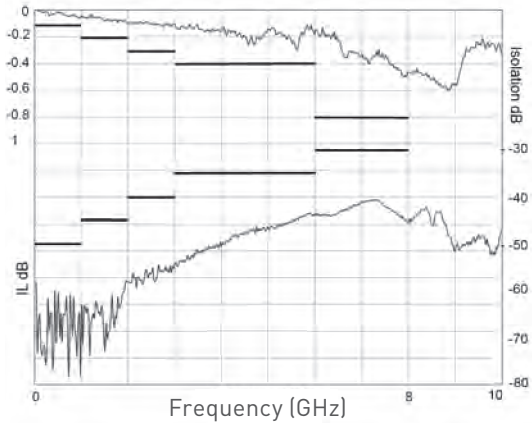
**SLIM LINE PERFORMANCE (S PARAMETERS AVAILABLE ON REQUEST)**

Frequency range GHz		V.S.W.R. (max)	Insertion loss (max) dB	Isolation (min) dB		Average power W (see page 2-5)		Third order Inter modulation	Impedance $\Omega$
				switch alone	switch + board layout (6)	cold switching	hot switching		
DC - 3 DC - 8	DC - 1	1.10	0.10	50	50	400	50	-120 dBc typical (2 carriers 20W)	50
	1 - 2	1.20	0.20	45	40	280	50		
	2 - 3	1.35	0.30	40	30	175	40		
	3 - 6	1.35	0.40	35	30	50	25		
	6 - 8	1.40	0.80	30	30	35	5		

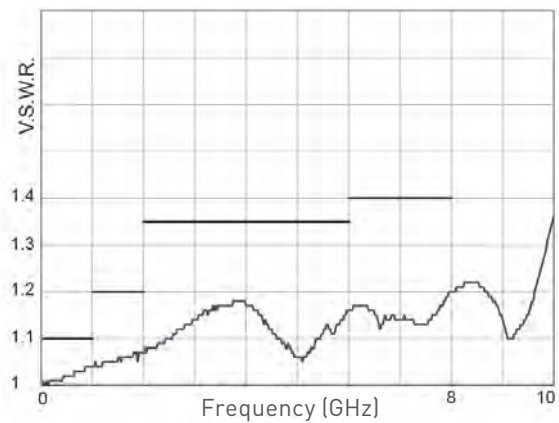
(6): taking account of the reduction of isolation due to coupling between PCB microstrip lines (see isolation dotted curve above and measurement method below)

**TYPICAL RF PERFORMANCES**

**Insertion Loss and Isolation**

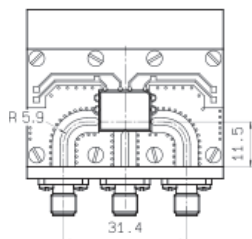
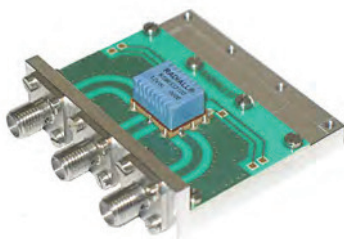


**V.S.W.R**

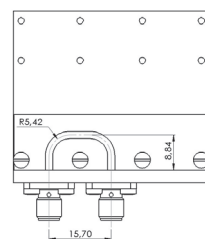


**MEASUREMENT METHOD**

Relay soldered on test fixture (7)



Calibration board



Inputs/Outputs of the calibration board and test fixture are equipped with SMA type receptacle connectors (Radiall part number R125 510 000). The length of the RF tracks is the same on the calibration board and the test fixture circuits. The insertion loss of the relay itself is calculated by subtracting the insertion loss of the “calibration board” to the insertion loss of the “relay welded on the test fixture”.

(7): Relay soldered on Test Fixture is available. To order, please use the suffix "T" (part number R596 - - - - T), as explained in page 2-2.

## SMT Power Micro SPDT with 10 GHz Capabilities

### RF POWER RATING FOR COLD SWITCHING USE

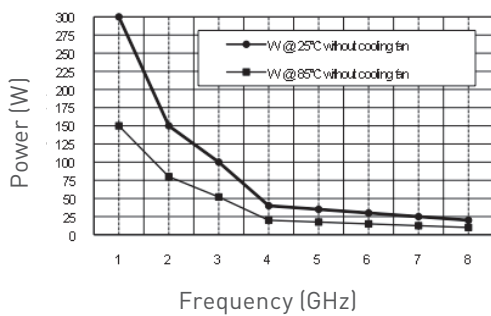
(Impedance 50 Ohms, V.S.W.R. < 1.25)

Power level depends on environmental conditions:

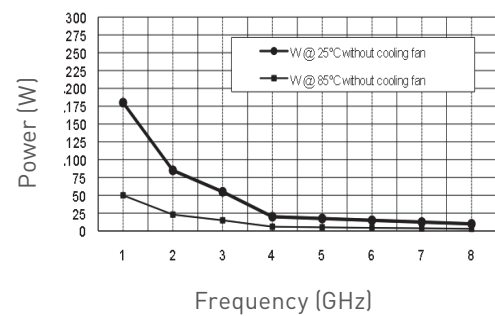
- R596 series have been designed to be used without a cooling fan even for high power applications. However, the power capability may be still improved by using the appropriate cooling fan.

- For failsafe models used with coil permanently supplied (N/O position), the same power level as latching models may be applied: see on application note N° AN-R596-51 on page 2-10, how to implement a “low holding current” function on your PC board, to avoid internal overheating and increase the RF power level.

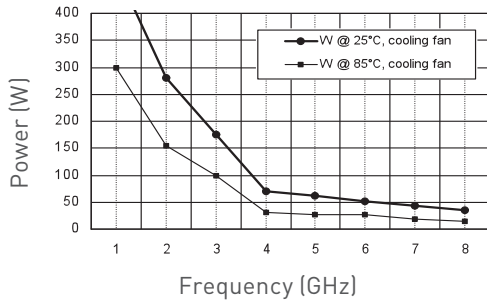
No cooling fan - Latching (all models)  
Failsafe: NC pos. & No with low holding voltage



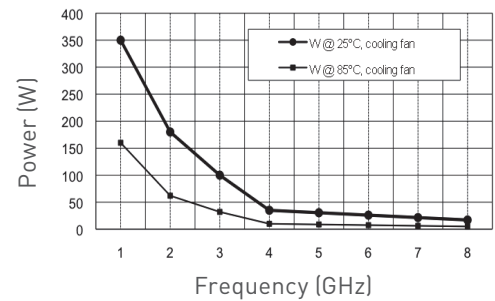
No cooling fan  
Failsafe: No pos. Supplied at nominal voltage



With cooling fan - Latching (all models)  
Failsafe: NC pos. & NO with low holding voltage



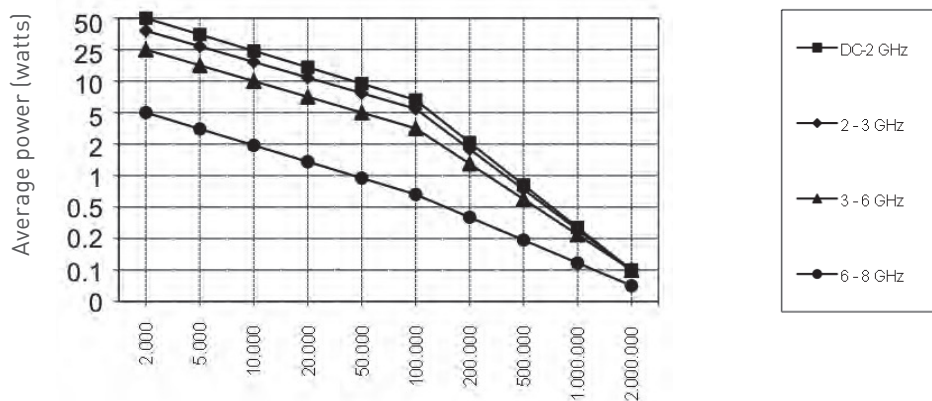
With cooling fan  
Failsafe: No pos. Supplied at nominal voltage



### LIFE DERATING CURVE FOR HOT SWITCHING USE

(Impedance 50 Ohms, V.S.W.R. < 1.25) General Specifications

Impedance 50Ω  
V.S.W.R. < 1.25  
max switching frequency:  
30 cycles per mn



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**RELAY PACKAGING**

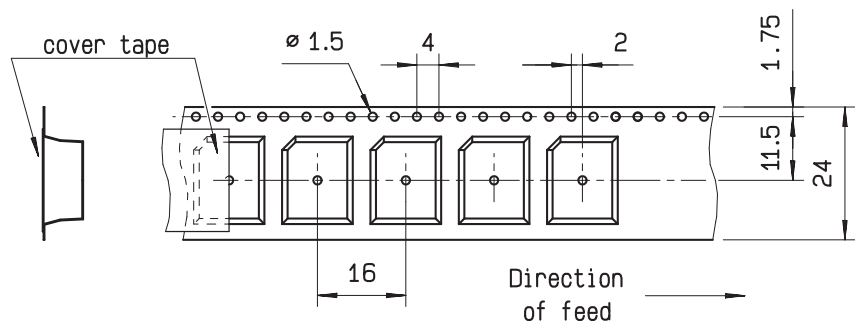
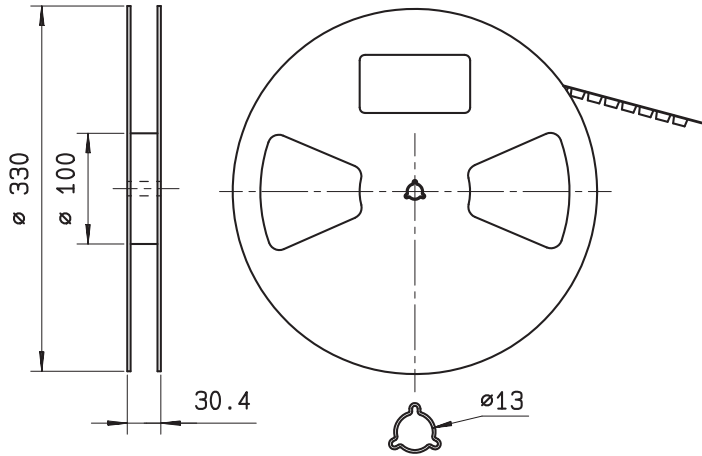
According to IEC 286-3 standard

**Materials:**

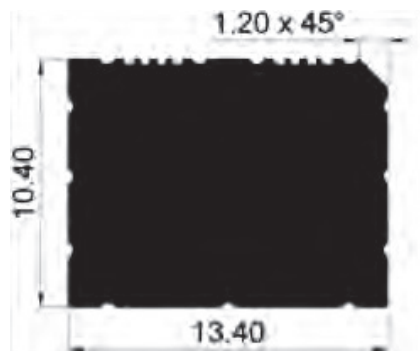
Reel: polyester

Carrier tape: antistatic PETG (polyester)

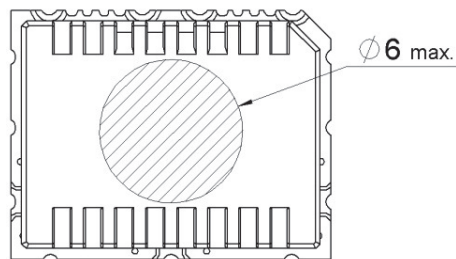
Cover tape: polyester



Video shadow of the relay



Aspiration Aera

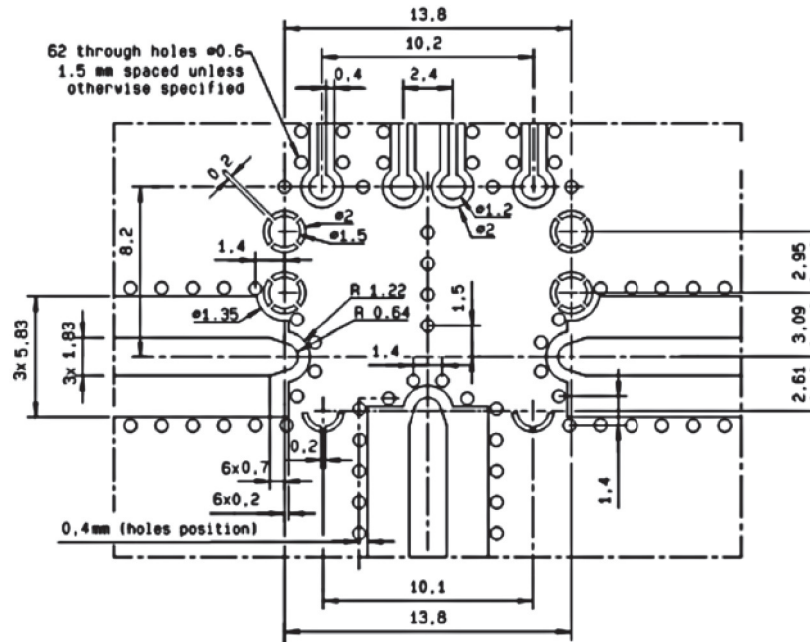


## SMT Power Micro SPDT with 10 GHz Capabilities

### PC BOARD MOUNTING

#### Board layout

DXF or Gerber format file available upon request (8)



#### Substrate types

Recommended substrates are **ROGERS RO4003** or **ARLON 25N**

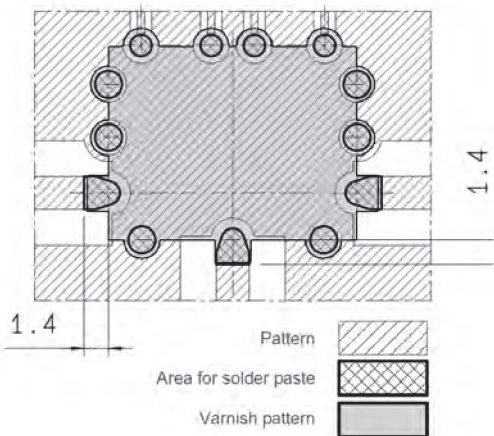
- **Mounting face:** Thickness 0.813 mm Cu double side 17.5µm. Width of track 1.83 mm  
 Others substrates: **RO4350**, thickness 0.813 mm Cu double side 17.5µm. Width of track 1.80 mm  
**25FR**, thickness 0.813 mm Cu double side 17.5µm. Width of track 1.76 mm

- **Opposite face:** Plating all over the face

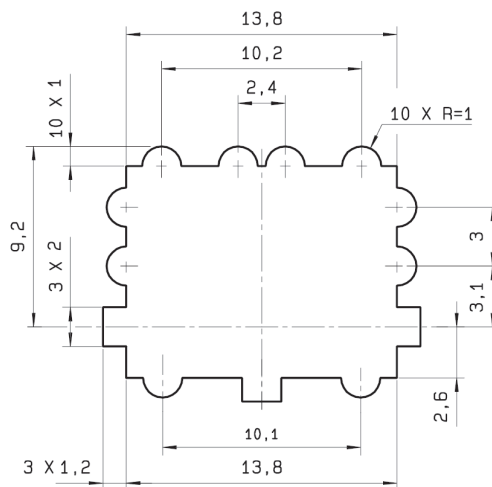
**Total thickness of the tracks (copper over thickness + plating): 40µm**

Other substrates may be used (for instance standard FR4), if provided with adequate modification of the tracks width.

#### Soldering Pattern



#### Varnish Pattern



Please contact your local sales representative for additional information