

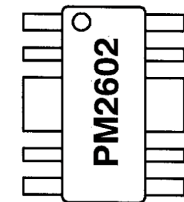


RFIC RF Switch

800 to 2500 MHz Operation

Features

- 1 dB Insertion Loss up to 2.5 GHz, 1 Watt Input
- 25 dB Isolation up to 2.5 GHz, 1 Watt Input
- 50 dBm Input Third Order Intercept
- Single 5 V Positive Supply, Single CMOS Level Control
- *NEW* 10 Pin PM-SOP[™] Package (Half the Size of SO-14)
- Low Profile, PCMCIA Type II Compatible
- Up to 6 GHz Operation: 2 dB Insertion Loss, 20 dB Isolation



PM-SOP[™]
Plastic Package

Description

The PM2602 is a small outline plastic packaged GaAs RFIC SPDT reflective switch developed for medium power T/R switching applications. The switch is asymmetric in that the TX port has a higher input P_{1dB} than the RX port. Both the insertion loss and off-state isolation are guaranteed at a 1 watt incident power level on the TX port. The RX port is specified at lower levels for insertion loss, isolation, and input IP_3 .

Electrical Characteristics

Typical Specifications at $V_{DD} = 5.0V$, $T_A = +25^\circ C$, $f = 2483.5$ MHz.

Minimum and Maximum Specifications guaranteed over frequency band and operational temperature.

Tested in 50 Ω system, using external circuit shown on p. 3.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Frequency Range	f		800		2500	MHz
TX Port						
¹ Off Isolation	ISO_{TX}	$P_{IN} = 30$ dBm	25	30		dB
² Insertion Loss	IL_{TX}	$P_{IN} = 30$ dBm		1.0	1.7	dB
Input 3 rd Order Intercept Point	$IIP_{3, TX}$	$P_{IN} = 15$ dBm per tone		50		dBm
RX Port						
² Insertion Loss	IL_{RX}	$P_{IN} = 15$ dBm		0.9	1.5	dB
³ Off Isolation	ISO_{RX}	$P_{IN} = 15$ dBm	25	30		dB
Input 3 rd Order Intercept Point	$IIP_{3, RX}$	$P_{IN} = 15$ dBm per tone		45		dBm
⁴ Input Return Loss	RL			20		dB
⁵ Switching Speed	t_{sw}	10% to 90%		25		nsec
Operating Supply Current	I_{DD}			2.5	5	mA
Logic "Low" State	V_{LOW}		0		0.2	V
Logic "High" State	V_{HIGH}		$V_{DD} - 0.2$		V_{DD}	V
Thermal Resistance	θ_{JC}	Junction to GND lead		50		$^\circ C/W$

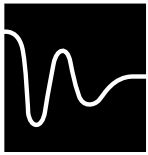
¹ TX to ANT. TX to RX guaranteed same or better by design.

² Does not include blocking capacitor loss (0.15 dB/33 pF cap at 2.5 GHz).

³ RX to ANT. RX to TX guaranteed same or better by design.

⁴ All ports, thru port terminated better than 26 dB RL.

⁵ With 10 pF bypass cap on control line, 74HC04 driver.



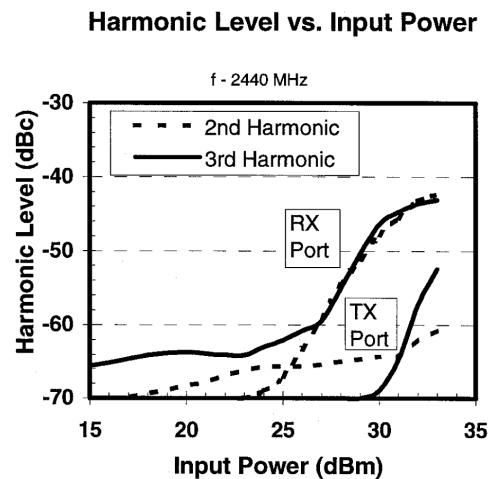
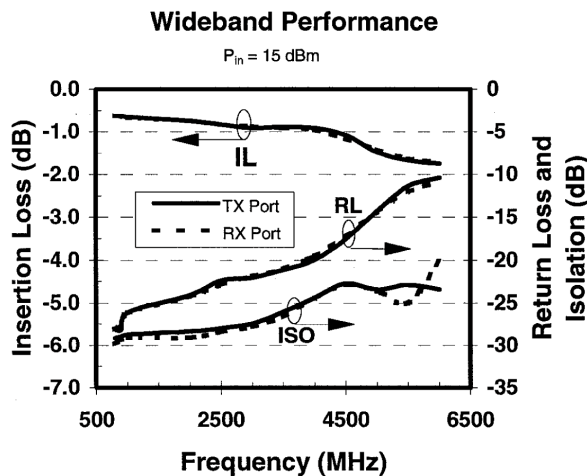
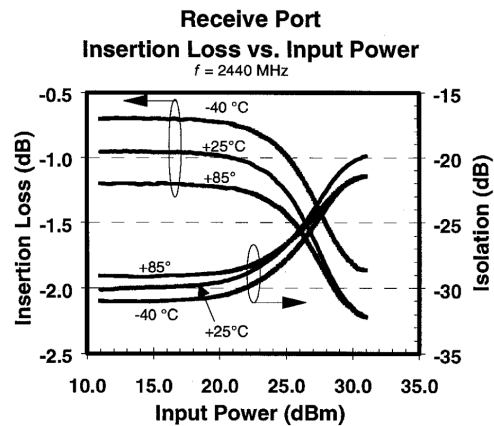
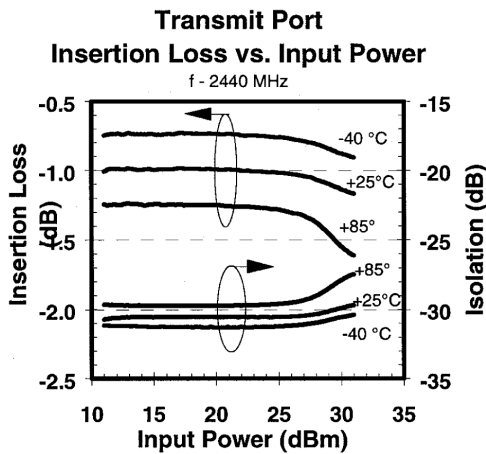
Absolute Maximum Ratings

Characteristics	Symbol	Value	Units
Supply Voltage	V_{DD}	+6.0	V
Control Voltage	V_c	-5.0	V
RF Input Power	P_{IN}	+33	dBm
Operating Temperature	T_{OP}	-40 to +85	°C
Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C

Caution: Operating beyond the specified rating for any of these parameters may cause permanent damage to device.

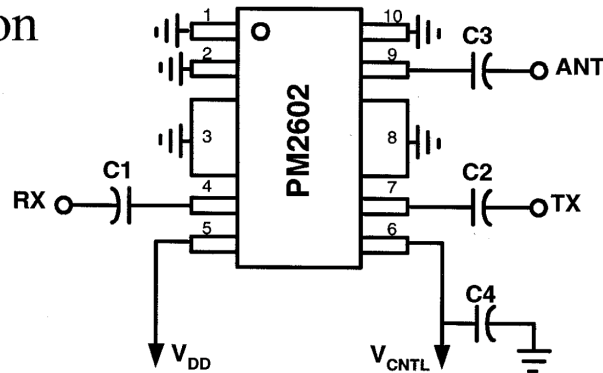
Typical Performance Characteristics

(Obtained using external circuit shown on p. 3)



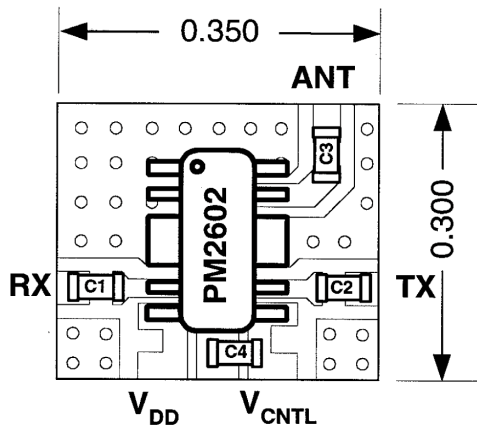
Application Information

The normal operation of the PM2602 is as a transmit/receive switch. The TX and RX ports are connected to an RFPA and an LNA respectively. The antenna is connected to ANT port. In this mode, the TX-RX isolation is better than 25 dB up to 1 watt. The control line must be RF bypassed to insure adequate isolation breakthrough protection at high input power levels. The PM2602 is functional at higher frequencies, providing better than 20 dB isolation and less than 2 dB insertion loss up to 6 GHz. Supply voltage may also be reduced to as low as 3V, but P_{1dB} , IP_3 , and high-power isolation will be degraded. The logic for the switch is set up to allow the same CMOS line to control a p-channel MOSFET to switch on the RFPA during transmit mode, and off during receive mode.



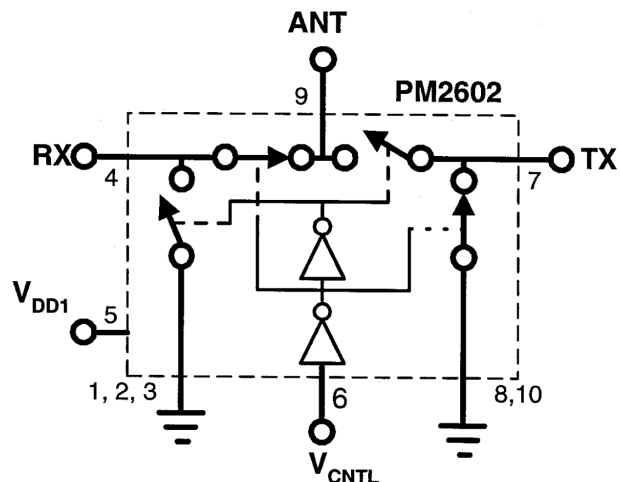
Part	Value/Type	Size
C1, C2, C3	33 pF NPO	0603
C4	10 pF NPO for 1.5 - 2.5 GHz 47 pF for 800-1500 MHz	0603

PCB Layout Information



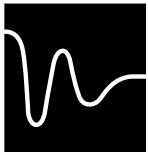
A recommended layout is shown here. C4 must be placed in close proximity ($<.050$ in) from pin 6. The placement of other components is not critical. RF traces may be moved to accommodate layout constraints, but a 50 Ω characteristic impedance must be maintained to insure low insertion loss. Sections of top-side ground plane with multiple ground via holes are required between all RF traces to meet the specified isolation.

Functional Schematic and State Logic



$V_{CNTL} = \text{"Low"}$ \Rightarrow TX switched to ANT
RX isolated (short to GND)

$V_{CNTL} = \text{"High"}$ \Rightarrow RX switched to ANT
TX isolated (short to GND)

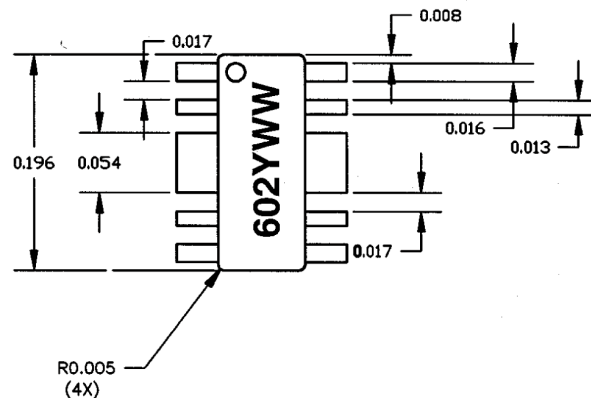
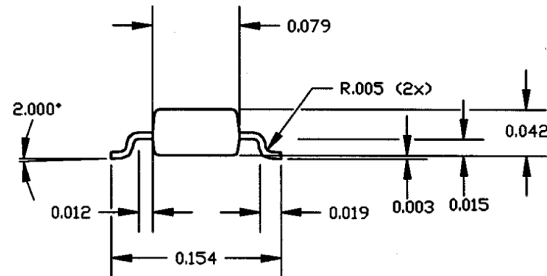


Thermal Considerations

When operating the PM2602 at 1 watt or higher input power, the device dissipation must be taken into consideration. At the maximum rated input power of 2 W, the switch dissipation is approximately 600 mW. Though the temperature rise from baseplate would be only 30 °C, care must be taken to avoid a significant rise in the traces conducting heat away from the PM2602. The fused leads (pins 3, 8) on the PM2602 provide most of the thermal path from the device junction. We recommend 2 oz. copper for the ground plane layer. A minimum of 20 via holes to the component side in close proximity to the ground leads is recommended to avoid thermal rises greater than 10 °C.

Pin Connections

Pin Number	Function
1	GND
2	GND
3	GND
4	RX
5	V _{DD}
6	V _{CNTL}
7	TX
8	GND
9	ANT
10	GND



Part Number Marking System

The PM2602 shall be marked as follows:
 Model Number Code: "602" = PM2602
 Lot Date Code: "Y" = Last Digit of Year
 "WW" = Week During Year