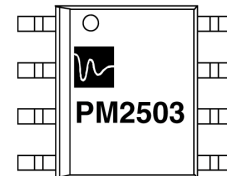


RFIC OSCILLATOR
2000 to 3000 MHz Operation

Features

- 3 - 5 Volt Single Supply
- Output Power 14 dBm @ 5V
- Low Cost Surface Mountable
- Buffered AC Coupled Output



SO-8 Plastic Package

Description

The PM2503 is a GaAs negative resistance (-R) RF IC that requires only a 3.0 - 5.0 Volt bias and a 40mA supply current. An external varactor diode and spiral inductor provide a low cost oscillator solution while providing 14 dBm output power in the 2000 to 3000 MHz frequency range. The PM2503 contains a fundamental oscillator, integrated matching network, buffer amplifier and all bias networks. Potential applications include communication systems, transmitters, receivers, and other systems requiring a small easy to use source.

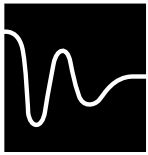
Electrical Characteristics $V_{DD} = 5.0$ V, $T_A = +25^\circ\text{C}$, 50Ω System

Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Center Frequency Range	F		2000		3000	MHz
Power Output	P_{OUT}	$V_{DD} = 5.0$ V	+12.0	+14.0		dBm
Power Output	P_{OUT}	$V_{DD} = 3.0$ V	+8.0	+10.0		dBm
Tuning Bandwidth	BW	F=2445 MHz		200		MHz
Phase Noise	ϕ	F=2445 MHz @ 100 kHz offset, $Q_{RES} > 20$		-85		dBc/Hz
Frequency Drift	Fd	-40 to +85°C, $Q_{RES} > 20$		50		MHz
Frequency Pulling	Fpl	Load VSWR 1.67:1		20		MHz
Frequency Pushing	Fph	± 0.25 V @ $V_{DD} = 5.0$ V		15		MHz/V
Spurious Output	-	Non-harmonic		-60		dBc
Supply Voltage	V_{DD}		+3.0	+5.0		V
Supply Current	I_{DD}			40	55	mA
Thermal Resistance	θ_{JC}			75		°C/W

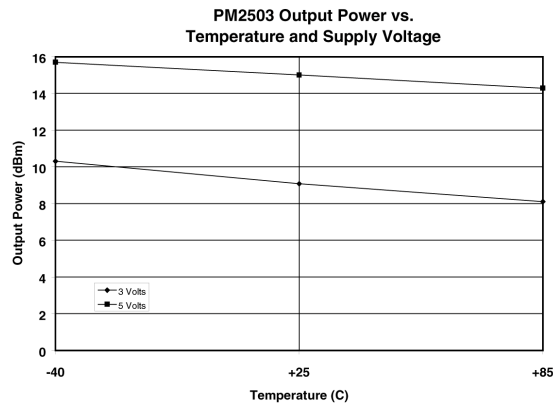
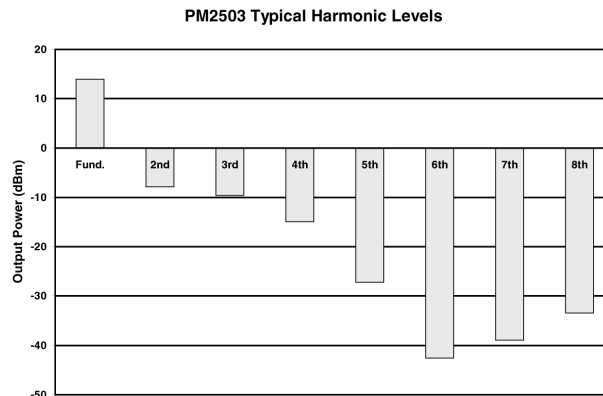
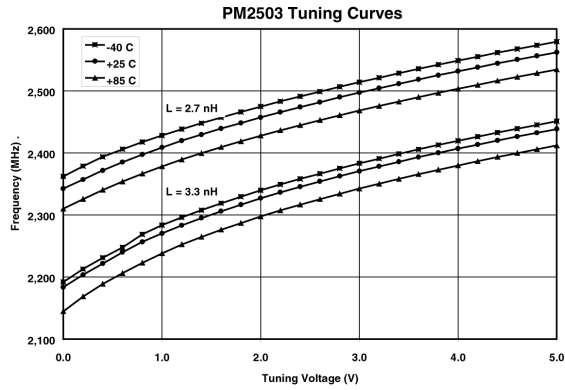
Absolute Maximum Ratings*

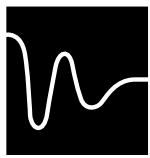
Characteristics	Symbol	Value	Units
DC Drain Voltage	V_{DD}	+8.0	V
DC Block	RF_{OUT}	+15.0	V
Operating Baseplate Temperature	T_{OP}	-40 to +85	°C
Junction Temperature	T_J	+150	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C

*Operation beyond the ratings for one of these parameters may cause permanent damage to device.



TYPICAL CHARACTERISTICS





TYPICAL CHARACTERISTICS

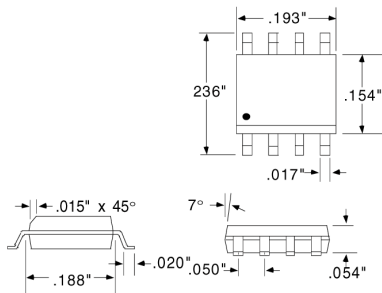
Scattering Parameters, -R Input (Pin 3), T_A = +25°C, 50Ω System

FREQ (MHz)	S ₁₁ , V _{DD} = 3.0V	
	MAG	ANG
1000	1.002	-30.81
1100	1.009	-33.17
1200	1.027	-35.58
1300	1.044	-37.98
1400	1.069	-40.05
1500	1.099	-42.30
1600	1.134	-45.43
1700	1.174	-48.47
1800	1.221	-51.21
1900	1.272	-55.31
2000	1.328	-59.22
2100	1.392	-64.06
2200	1.452	-69.99
2300	1.515	-75.72
2400	1.575	-83.20
2500	1.618	-91.25
2600	1.653	-100.0
2700	1.650	-109.17
2800	1.644	-118.25
2900	1.600	-127.97
3000	1.570	-136.55

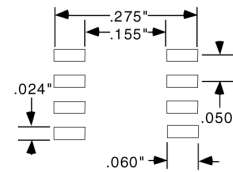
FREQ (MHz)	S ₁₁ , V _{DD} = 5.0V	
	MAG	ANG
1000	1.061	-22.89
1100	1.088	-25.71
1200	1.123	-28.30
1300	1.153	-31.07
1400	1.19	-33.68
1500	1.232	-36.36
1600	1.272	-39.36
1700	1.326	-42.57
1800	1.387	-45.76
1900	1.456	-49.44
2000	1.528	-53.82
2100	1.614	-58.99
2200	1.702	-64.89
2300	1.788	-71.04
2400	1.871	-78.93
2500	1.938	-87.53
2600	1.988	-96.89
2700	1.994	-106.63
2800	1.960	-116.37
2900	1.912	-126.39
3000	1.822	-135.43

PACKAGE SPECIFICATIONS

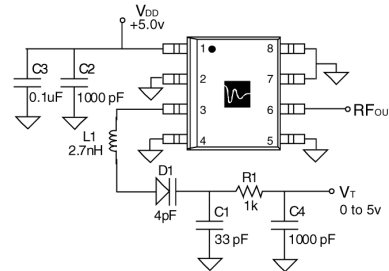
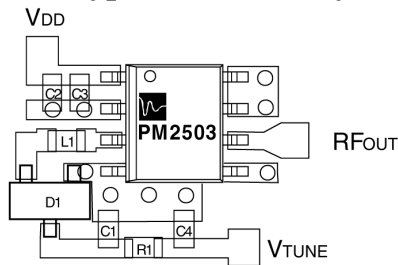
Package Dimensions



Mounting Pad Dimensions



Typical Circuit Layout and Configuration, 2450 MHz Application



Pin Connections

Pin Number	Function
1	V _{DD}
2, 4, 5, 7, 8	GND
3	-R
6	RF _{OUT}

Components List

Reference	Description	Specifications	Value
C1	Capacitor	Commercial grade, 0603	33pF
C2,C4	Capacitor	Commercial grade, 0603	1000pF
C3	Capacitor	Commercial grade, 0603	0.1μF
D1	Varactor	Alpha SMV1400-08	4pF
L1	Inductor	Toko LL1608-2N7S	2.7nH
R1	Resistor	Commercial grade, 0603	1kΩ

Mounting Specifications

The output of the VCO is connected to a 50Ω microstripline. Proper grounding must be provided to insure proper operation. FR-4 PCB (.031 in.) material is suggested for board design. Care should be taken to keep the series inductance low between Pin 3 and L1, and between L1 and D1. The DC voltage at Pin 1 should be clean to avoid degradation of phase noise.

Tuning Considerations

The operating frequency can be changed by modifying L1. Increasing L1 will shift the operating frequency down. Diametrically, decreasing L1 will shift the frequency up. Sensitivity of Vtune can be adjusted by varying the value of the varactor (D1) and C1. C2, C3 and C4 are decoupling capacitors. Values may be substituted depending on system requirements and purity of the DC bias.