

High Linearity MMIC Mixer with Integrated Local Oscillator Amplifier, 1700 - 2000 MHz

Rev. V2

Features

- Up or Down Frequency Conversion
- High Input IP3: 21 dBm
- Low LO Drive: -5 dBm to +5 dBm
- Very Low Current: 7 mA
- Single Ended Ports, 50-Ohm Impedance
- Small Plastic Package: SOT-26

Description

The MD57-0002 is a passive MMIC mixer with an on-chip LO buffer amplifier that allows the MD57-0002 to operate with LO drive levels of -5 dBm to +5 dBm. The MD57-0002 features single ended ports and does not require the use of external baluns. All ports are 50-ohm impedance.

The MD57-0002 is ideally suited for up and down frequency convertor applications in DCS1800, PCS1900, PHS and 3G wireless communications equipment requiring low LO power, high linearity, low conversion loss and very low current consumption.

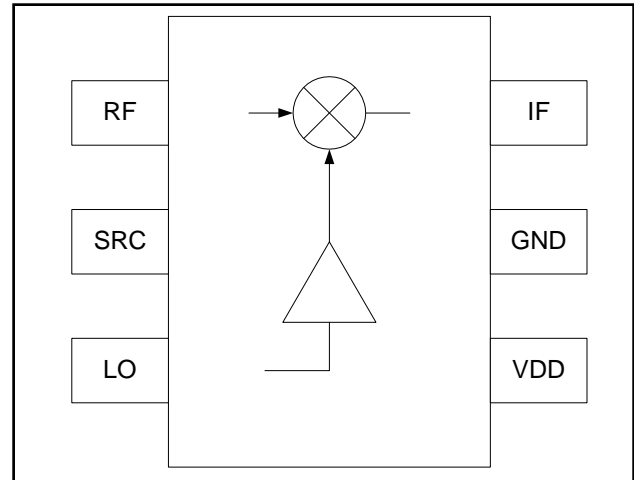
The MD57-0002 is fabricated using a 0.5 micron gate length GaAs MESFET process. This process features full passivation for increased RF performance and enhanced reliability.

Ordering Information ¹

Part Number	Package
MD57-0002	Bulk Packaging
MD57-0002TR	1000 piece reel
MD57-0002SMB	Sample Test Board

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

Pin #	Pin Name	Description
1	RF	RF Input/Output
2	SRC	LO Amplifier Bias Resistor
3	LO	LO Input
4	V _{DD}	LO Amplifier Bias Voltage
5	GND	Ground
6	IF	IF Input/Output

Absolute Maximum Ratings ²

Parameter	Absolute Maximum
Input RF/IF Power	+27 dBm
Input LO Power	+17 dBm
Voltage	+6 V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

2. Exceeding any one or combination of these limits may cause permanent damage to this device.

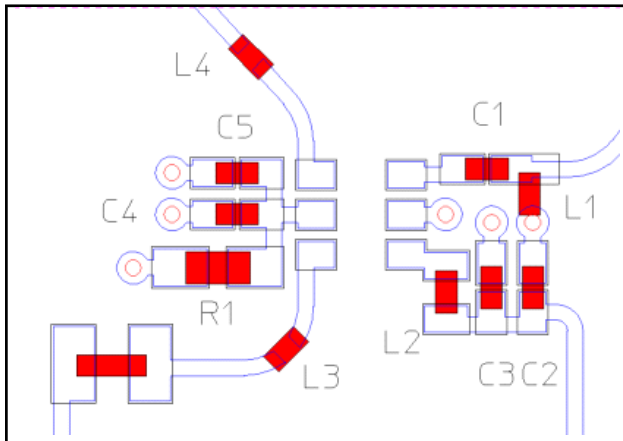
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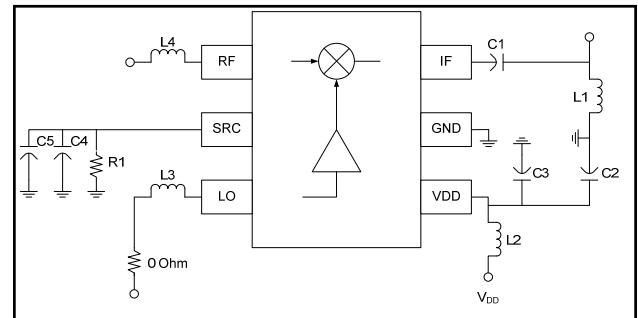
Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_0 = 50\ \Omega$, LO $V_{DD} = 5\ \text{V}$
 RF = 1900 MHz (-10 dBm), LO = 1660 MHz (0 dBm), IF = 240 MHz

Parameter	Test Conditions	Units	Min	Typ	Max
Conversion Loss	—	dB	—	8.5	10.5
Noise Figure	—	dB	—	8.5	—
Input IP3	Tone Spacing = 300 KHz	dBm	18.5	21	—
Input P1dB	—	dBm	—	15	—
Isolation	RF to IF	dB	—	18	—
	LO to IF	dB	—	5	—
	LO to RF	dB	—	13	—
Current	$V_{DD} = 5\ \text{V}$	mA	—	7	10

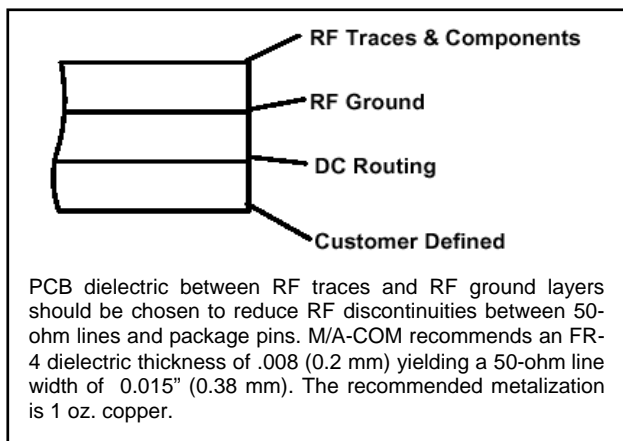
Recommended PCB Configuration



PCB Schematic



PCB Cross Section View



External Circuitry Parts List

Part	Value	Purpose
R1	200 Ω	LO Amplifier Bias Resistor
L1	27 nH	IF matching Inductor ³
L2	3.3 nH	LO V_{DD} Inductor
L3	7.5 nH	LO Input Matching
L4	3.3 nH	RF Port Matching
C1	100 pF	IF DC Blocking Capacitor
C2	0.1 μF	IF V_{DD} Bypass Capacitor
C3	6 pF	RF V_{DD} Bypass Capacitor
C4	5 pF	RF Source Bypass
C5	0.1 μF	IF Source Bypass

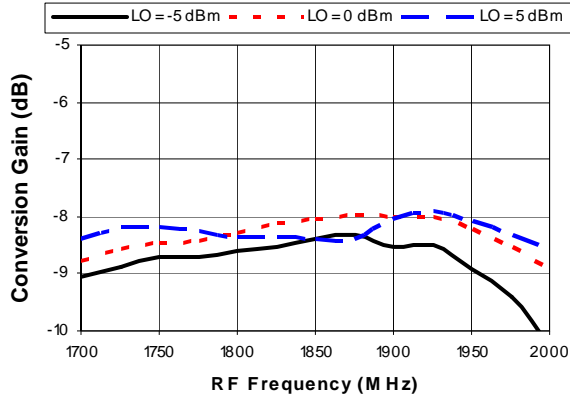
3. L1 can be changed to 47 nH for lower IF frequencies (down to 150 MHz).

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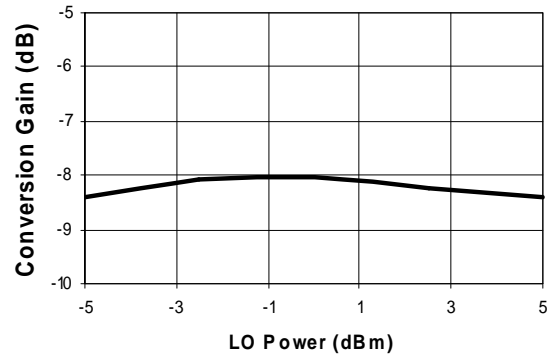
Rev. V2

Typical Performance Curves @ +25°C (IF Frequency = 240 MHz, Low Side LO)

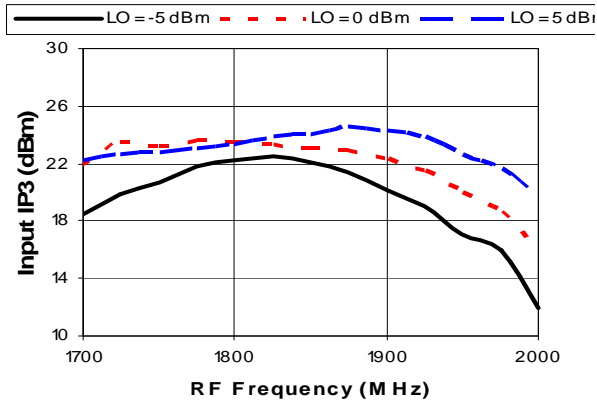
Conversion Gain vs. Frequency



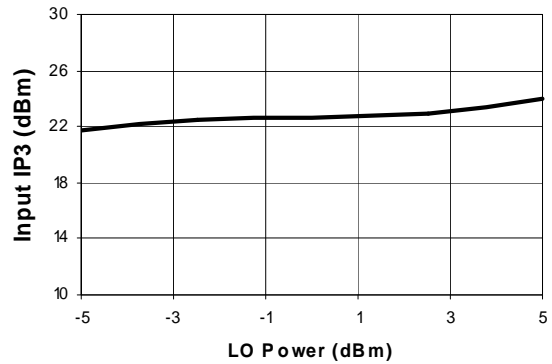
Conversion Gain vs. LO Power, 1850 MHz RF



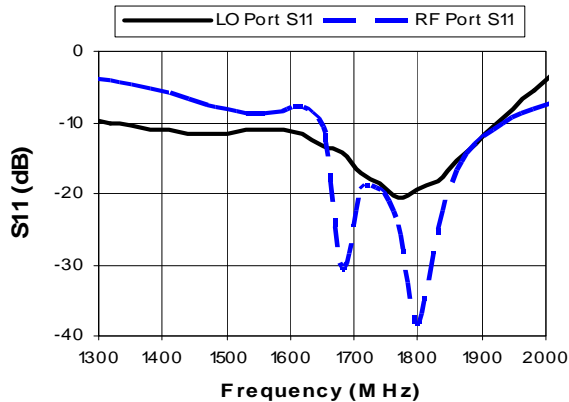
Input IP3 vs. Frequency



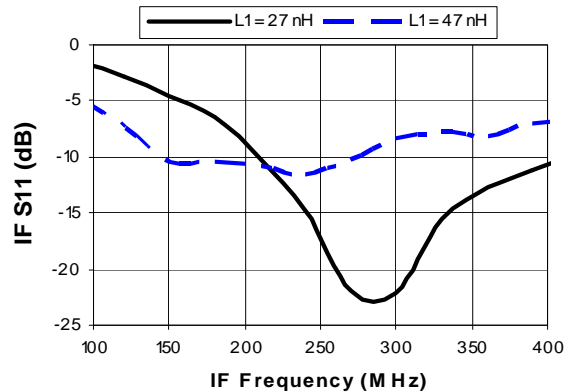
Input IP3 vs. LO Power, 1850 MHz RF



LO and RF Return Loss



IF Return Loss (LO Power = 0 dBm)

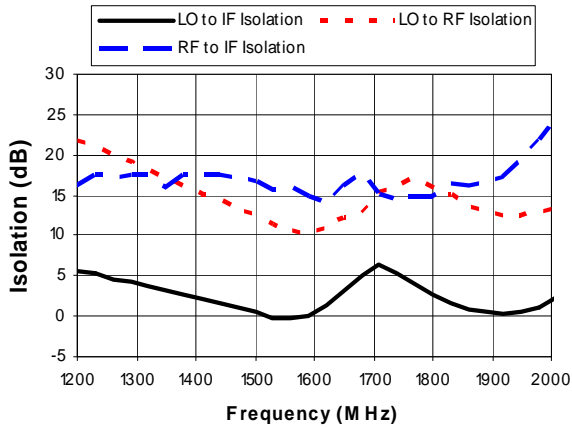


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Typical Performance Curves @ +25°C

Isolation vs. Frequency



SOT-26

