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v03.0514

HMC558LC3B

GaAs MMIC FUNDAMENTAL MIXER, 5.5 - 14.0 GHz
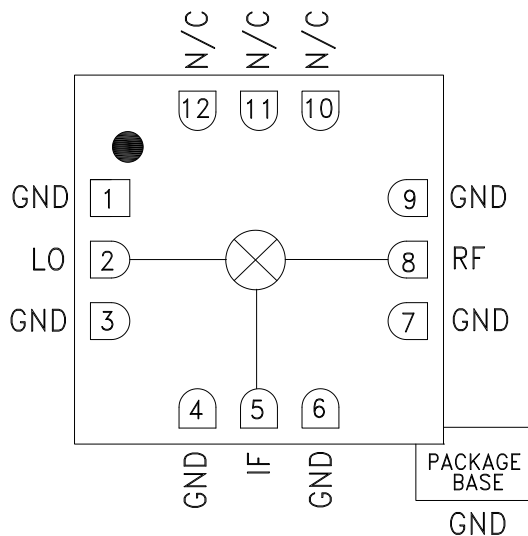
Typical Applications

The HMC558LC3B is ideal for:

• Point-to-Point Radios

• Point-to-Multi-Point Radios

• Test Equipment & Sensors

• Military End-Use

Features

Passive Double Balanced Topology

High LO/RF Isolation: 45 dB

Low Conversion Loss: 7 dB

Wide IF Bandwidth: DC - 6 GHz

12 Lead Ceramic 3x3mm SMT Package: 9mm^2

Functional Diagram

General Description

The HMC558LC3B is a general purpose double balanced mixer in a leadless RoHS compliant SMT package that can be used as an upconverter or downconverter between 5.5 and 14 GHz. This mixer is fabricated in a GaAs MESFET process, and requires no external components or matching circuitry. The HMC558LC3B provides excellent LO to RF and LO to IF isolation due to optimized balun structures and operates with LO drive levels as low as +9 dBm. The RoHS compliant HMC558LC3B eliminates the need for wire bonding, and is compatible with high volume surface mount manufacturing techniques.

Electrical Specifications, T_A = +25° C, IF= 100 MHz, LO= +15 dBm*

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range, RF & LO		5.5 - 10.0			10.0 - 14.0		GHz
Frequency Range, IF		DC - 6			DC - 6		GHz
Conversion Loss		7	9.5		8.5	10	dB
Noise Figure (SSB)		7	9.5		8.5	10	dB
LO to RF Isolation	35	45		30	36		dB
LO to IF Isolation	20	25		20	25		dB
RF to IF Isolation	8	14		10	16		dB
IP3 (Input)		20			24		dBm
IP2 (Input)		54			46		dBm
1 dB Gain Compression (Input)		11			13		dBm

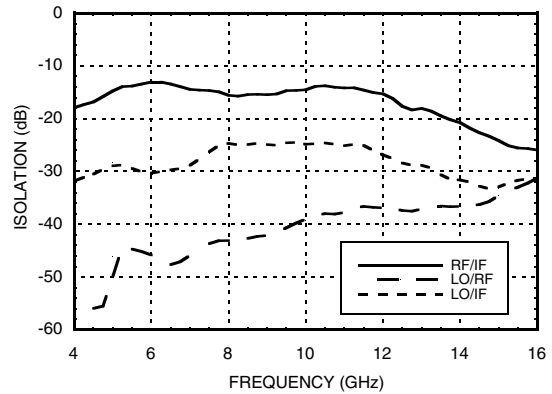*Unless otherwise noted, all measurements performed as downconverter, IF= 100 MHz.*

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Phone: 978-250-3343   Fax: 978-250-3373   Order On-line at www.hittite.com
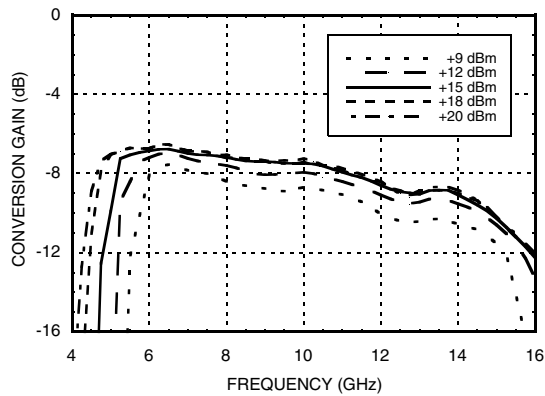Application Support: Phone: 978-250-3343 or apps@hittite.com

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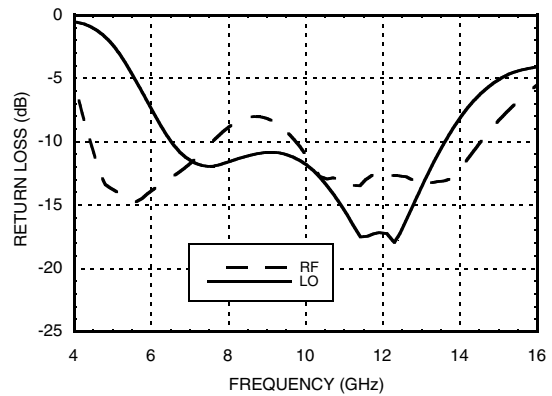## Conversion Gain vs. Temperature @ LO = +15 dBm
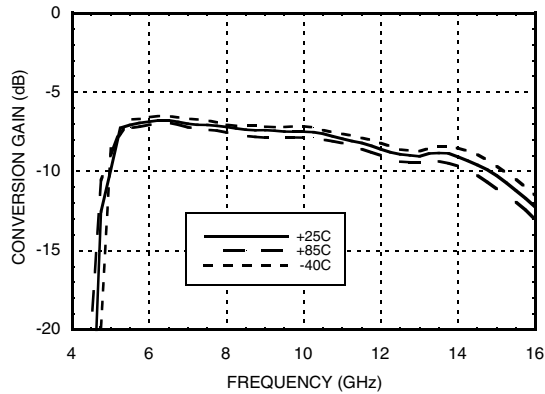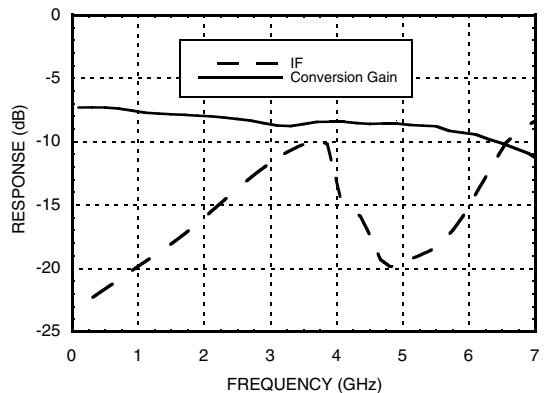

Isolation @ LO = +15 dBm

Conversion Gain vs. LO Drive

Return Loss @ LO = +15 dBm

IF Bandwidth @ LO = +15 dBm

Upconverter Performance Conversion Gain vs. LO Drive

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GaAs MMIC FUNDAMENTAL
MIXER, 5.5 - 14.0 GHz

RoHS✓ EARTH FRIENDLY
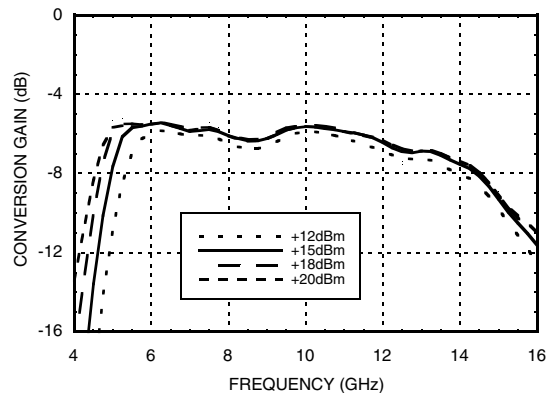
MIXERS - SINGLE & DOUBLE BALANCED - SMT

Input IP3 vs. LO Drive *

Legend: +9 dBm, +12 dBm, +15 dBm, +18 dBm, +20 dBm
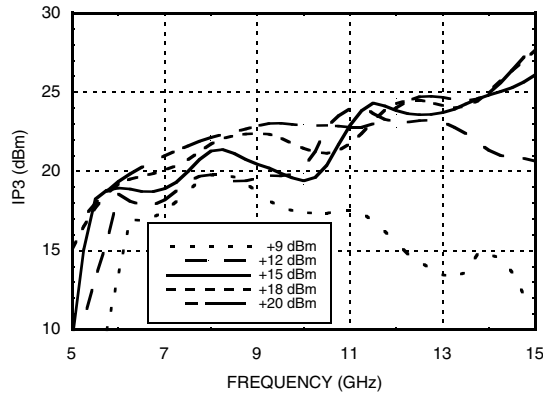
Input IP3 vs. Temperature @ LO = +15 dBm *

Legend: +25C, +85C, -40C

Input IP2 vs. LO Drive *

Legend: +9 dBm, +12 dBm, +15 dBm, +18 dBm, +20 dBm
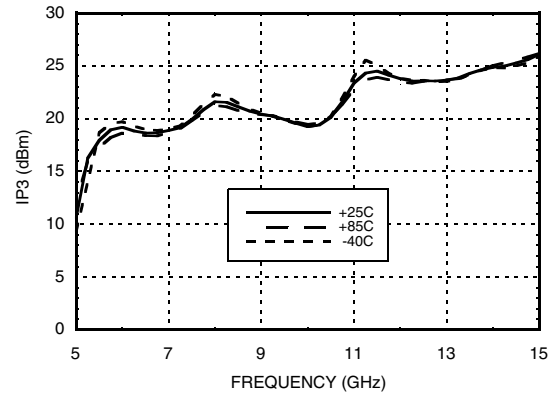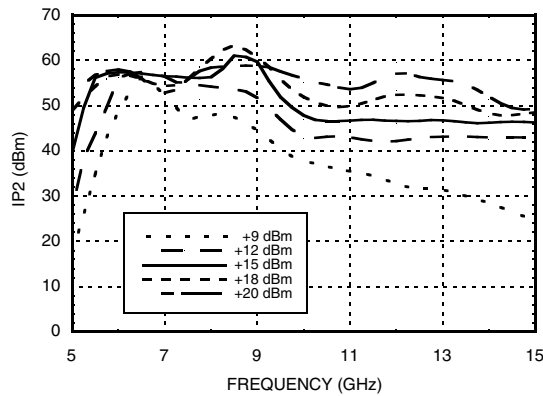
Input IP2 vs. Temperature @ LO = +15 dBm *

Legend: +25C, +85C, -40C
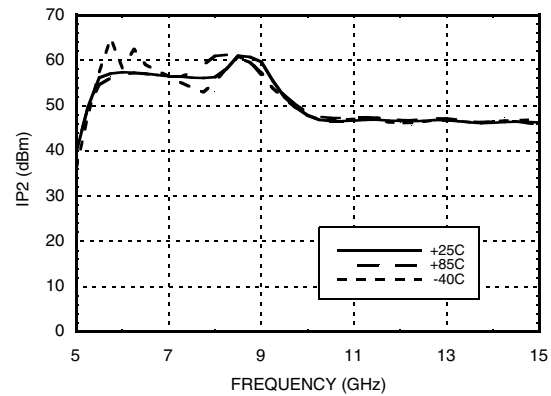
Input P1dB vs. Temperature @ LO = +15 dBm

Legend: +25C, +85C, -40C
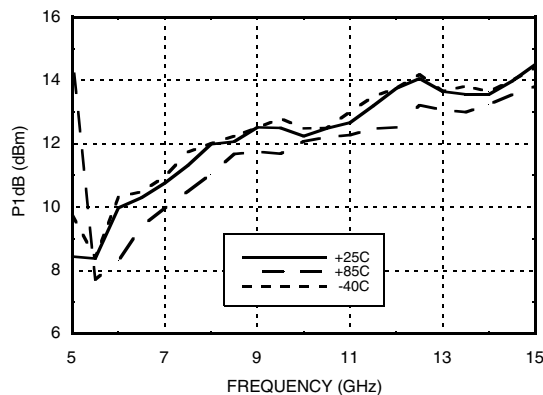
MxN Spurious Outputs

mRF	nLO				
	0	1	2	3	4
0	xx	-6	22	17	33
1	10	0	25	49	51
2	78	50	82	51	74
3	78	78	75	75	78
4	78	78	78	78	78

RF = 8.1 GHz @ -10 dBm
LO = 8 GHz @ +15 dBm
All values in dBc below the IF output power level.

* Two-tone input power = -10 dBm each tone, 1 MHz spacing.

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RoHS ✓
EARTH FRIENDLY

Absolute Maximum Ratings

RF / IF Input	+25 dBm
LO Drive	+25 dBm
Channel Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 3.25 mW/°C above 85 °C)	211 mW
Thermal Resistance (channel to ground paddle)	307 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

ELECTROSTATIC SENSITIVE DEVICE
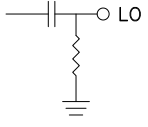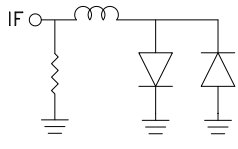OBSERVE HANDLING PRECAUTIONS

Outline Drawing

NOTES:
1. PACKAGE BODY MATERIAL: ALUMINA.
2. LEAD AND GROUND PADDLE PLATING:
   30-80 MICROINCHES GOLD OVER 50 MICROINCHES MINIMUM NICKEL.
3. DIMENSIONS ARE IN INCHES (MILLIMETERS).
4. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
5. CHARACTERS TO BE HELVETICA MEDIUM, .025 HIGH, BLACK INK,
   OR LASER MARK LOCATED APPROX. AS SHOWN.
6. PACKAGE WARP SHALL NOT EXCEED 0.05MM DATUM – C –
7. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED
   TO PCB RF GROUND.

Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [2]
HMC558LC3B	Alumina, White	Gold over Nickel	MSL3 [1]	H558 XXXX

[1] Max peak reflow temperature of 260 °C
[2] 4-Digit lot number XXXX

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Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 3, 4, 6, 7, 9	GND	Package bottom must also be connected to RF/DC ground.	GND
2	LO	This pin is DC coupled and matched to 50 Ohms.	LO
5	IF	This pin is DC coupled. For applications not requiring operation to DC, this port should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source or sink more than 2 mA of current or part non-function and possible part failure will result.	IF
8	RF	This pin is DC coupled and matched to 50 Ohms.	RF
10, 11, 12	N/C	No connection required. These pins may be connected to RF/DC ground without affecting performance.	

RoHS✔
EARTH FRIENDLY
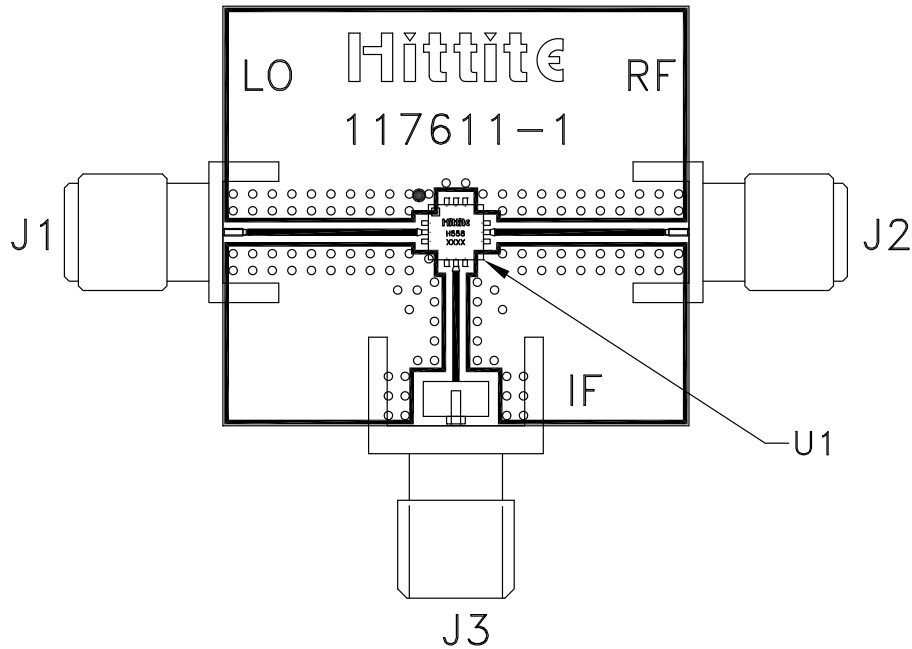
Evaluation PCB

List of Materials for Evaluation PCB 109952 [1]

Item	Description
J1 - J2	SRI SMA Connector
J3	Johnson SMA Connector
U1	HMC558LC3B Mixer
PCB [2]	117611 Evaluation PCB

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Arlon 25 RF

The circuit board used in this application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Hittite upon request.

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