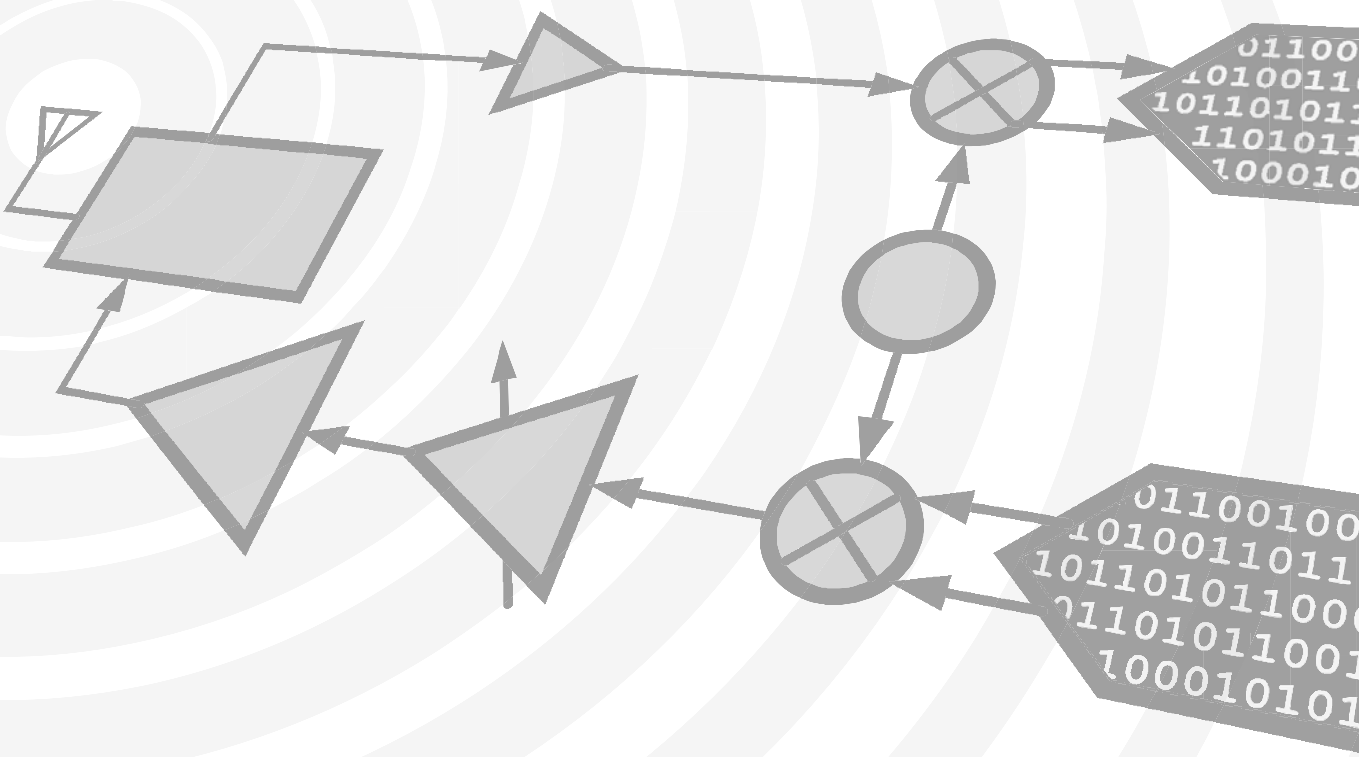
Analog Devices Welcomes Hittite Microwave Corporation

NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED



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MICROWAVE CORPORATION v01.0314

RoHS ✓ EARTH FRIENDLY

HMC1106

GaAs MMIC MIXER 15 - 36 GHz

Typical Applications

The HMC1106 is ideal for:

- Microwave Point-to-Point Radios
- VSAT & SATCOM
- Test Equipment & Sensors
- Military End-Use
- Automotive Radar

Features

Passive: No DC Bias Required

Low LO Power: +15 dBm

LO/RF Isolation: 38 dB

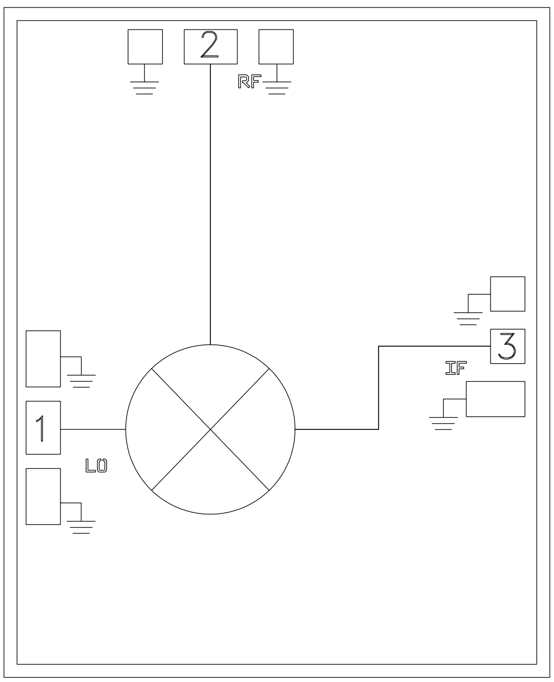
LO/IF Isolation: 32 dB

RF/IF Isolation: 25 dB

Wide IF Bandwidth: DC to 24 GHz

Die Size: 1.79 x 1.46 x 0.1 mm

Functional Diagram



General Description

The HMC1106 is a double-balanced mixer which can be used as a downconverter with DC to 24 GHz at the IF port, 20 to 50 GHz at the LO port, and 15 to 36 GHz at the RF port. This passive MMIC mixer is fabricated with GaAs Shottky diode technology. All bond pads and the die backside are Ti/Au metallized and the Shottky devices are fully passivated for reliable operation. All data shown herein is measured with the chip in a 50 Ohm environment and contacted with RF probes.

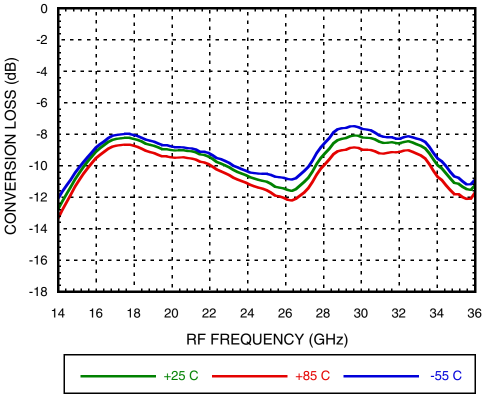
Electrical Specifications, T_A = +25° C, LO = 36.1 GHz, LO = +15 dBm, LSB [1]

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max	Min.	Typ.	Max	Units
RF Frequency Range		15 -24			24 - 27			27 - 36		GHz
LO Frequency Range					20 - 50					GHz
IF Frequency Range					DC - 24					GHz
Conversion Loss		9	12		11	14		10	14	dB
LO to RF Isolation		38			38			38		dB
LO to IF Isolation [2]	25	32		25	32		25	32		dB
RF to IF Isolation [3]	15	22		15	18		15	25		dB
IP3 (Input)		16			16			22		dBm

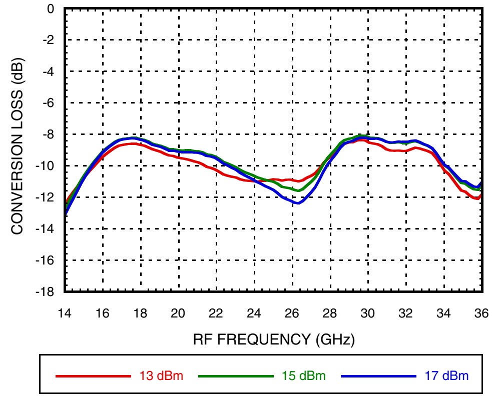
[1] Unless otherwise noted , all measurements performed as downconverter with LO Frequency = 36.1 GHz and LO Power = +15 dBm
[2] Typical value = 22 dB at LO = 20 GHz
[3] Data taken with LO = 30 GHz

GaAs MMIC MIXER 15 - 36 GHz

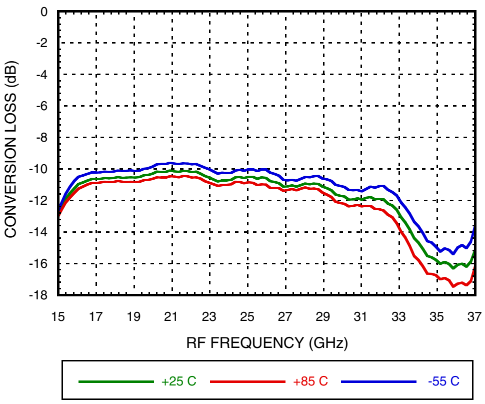
Conversion Loss vs. Temperature LO = 36.1 GHz [1]



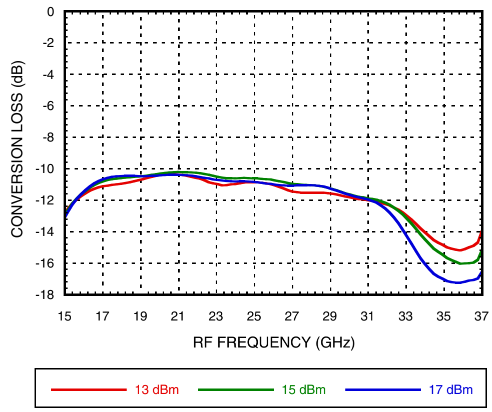
Conversion Loss vs. LO Power LO = 36.1 GHz [1]



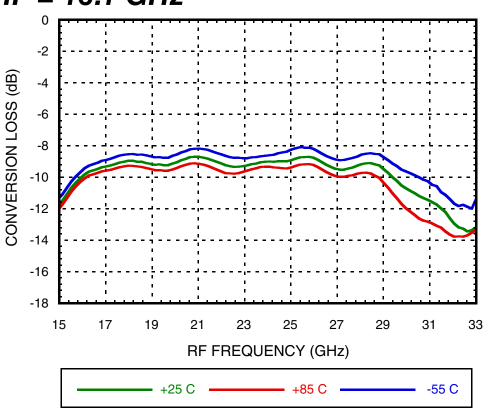
Conversion Loss vs. Temperature IF = 12.1 GHz [2]



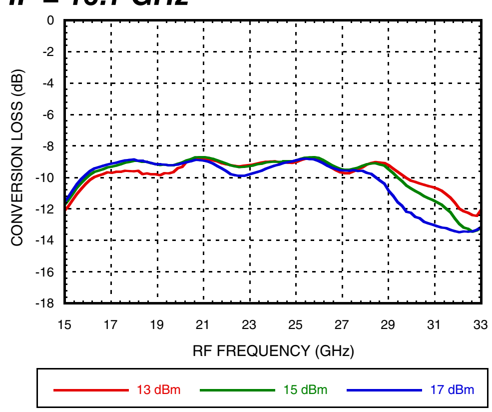
Conversion Loss vs. LO Power IF = 12.1 GHz [2]



Conversion Loss vs. Temperature IF = 16.1 GHz [2]



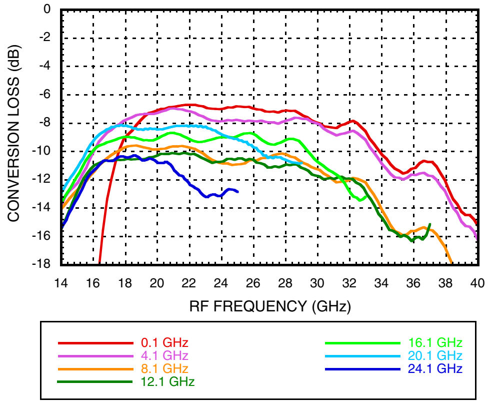
Conversion Loss vs. LO Power IF = 16.1 GHz [2]



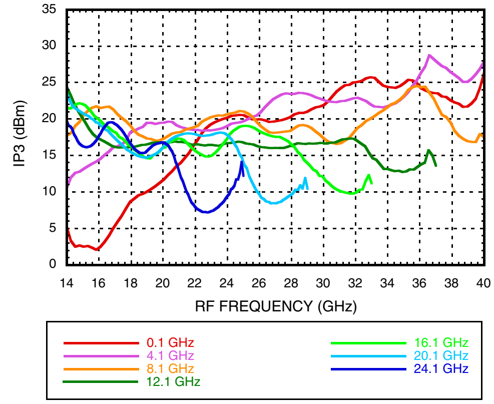
[1] Measurement taken at fixed LO frequency, LSB
[2] Measurement taken at fixed IF frequency, LSB

GaAs MMIC MIXER 15 - 36 GHz

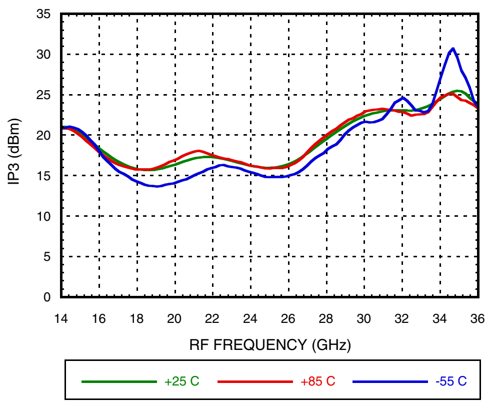
Conversion Loss vs. IF [1]



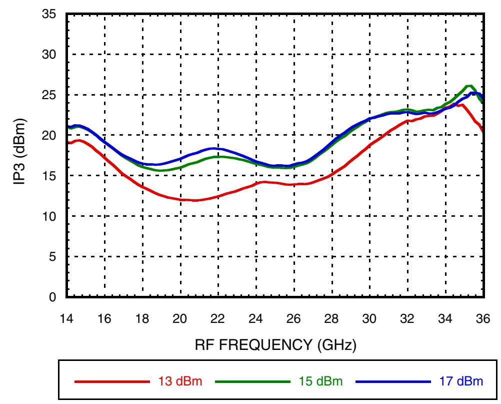
Input IP3 vs. IF [1]



Input IP3 vs. Temperature LO = 36.1 GHz [2]



Input IP3 vs. LO Power LO = 36.1 GHz [2]



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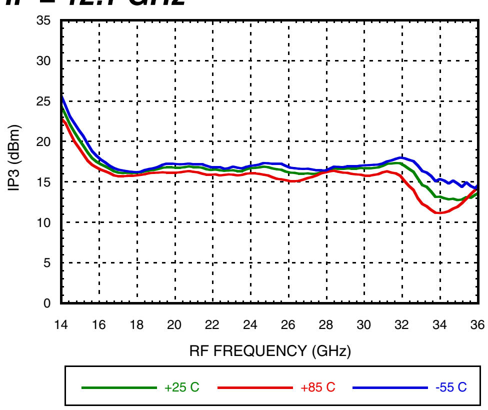
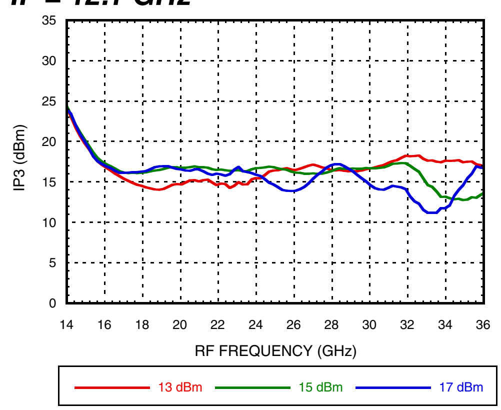
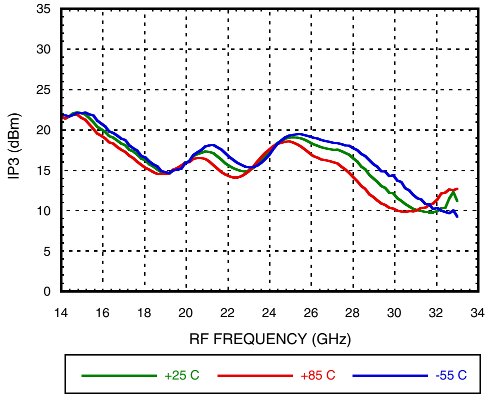


Input IP3 vs. LO Power IF = 12.1 GHz [1]

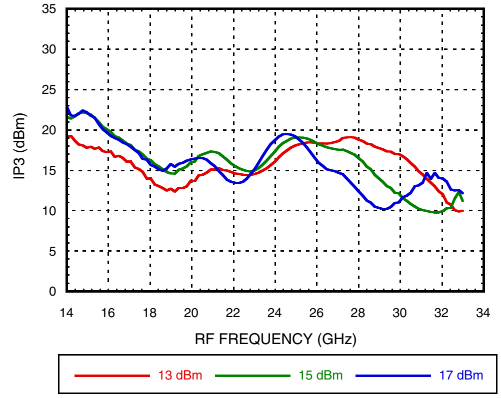


[1] Measurement taken at fixed IF frequency, LSB
[2] Measurement taken at fixed LO frequency, LSB

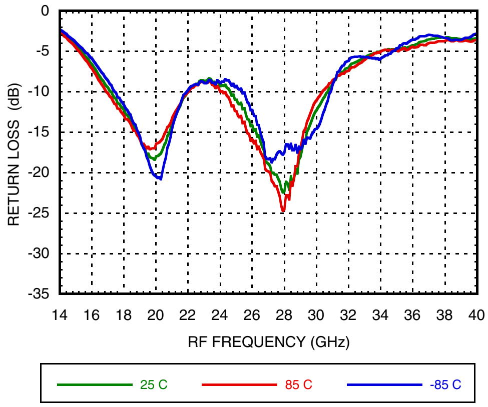
Input IP3 vs. Temperature IF = 16.1 GHz [1]



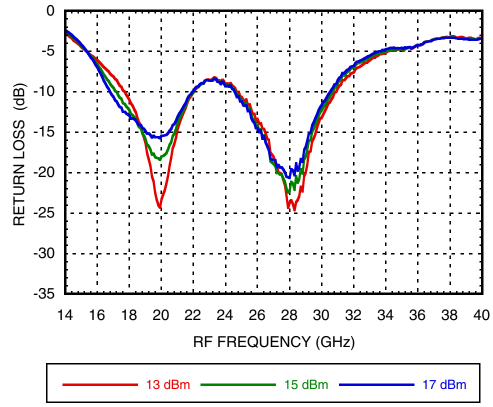
Input IP3 vs. LO Power IF = 16.1 GHz [1]



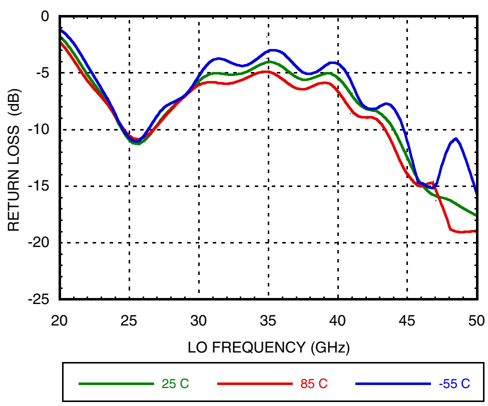
RF Return Loss vs. Temperature LO = 30GHz



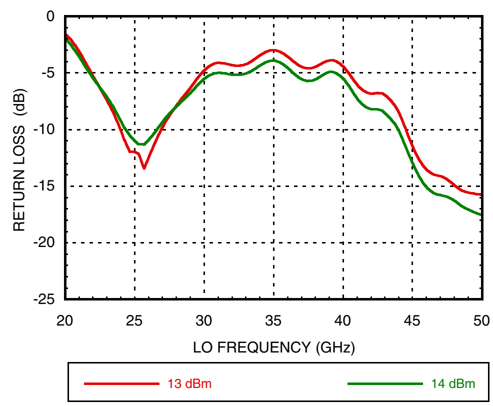
RF Return Loss vs. LO Power LO = 30GHz



LO Return Loss vs. Temperature [2]



LO Return Loss vs. LO Power



[1] Measurement taken at fixed IF frequency, LSB
[2] Measurement taken at LO power = +14 dBm

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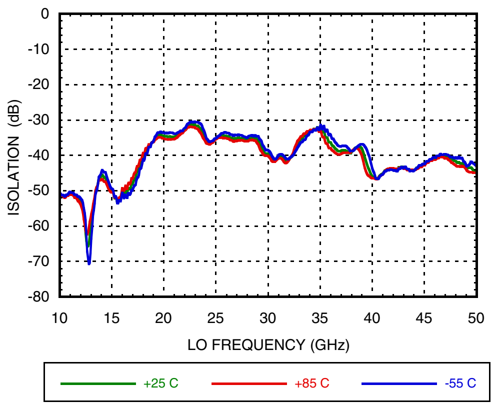
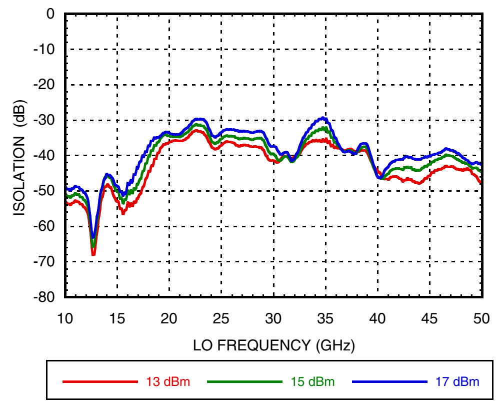
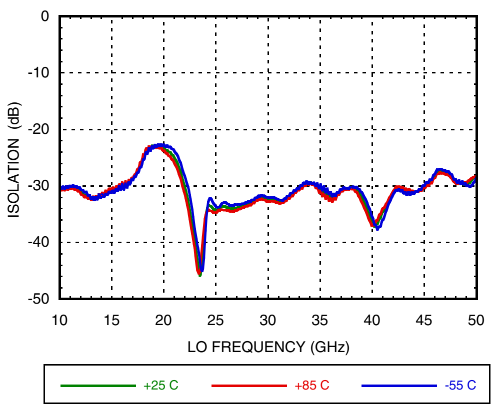
LO/RF Isolation vs. Temperature



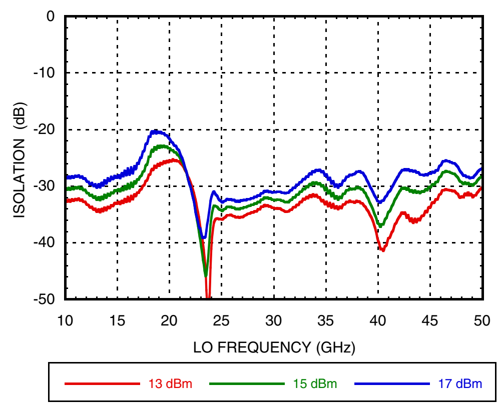
LO/RF Isolation vs. LO Power



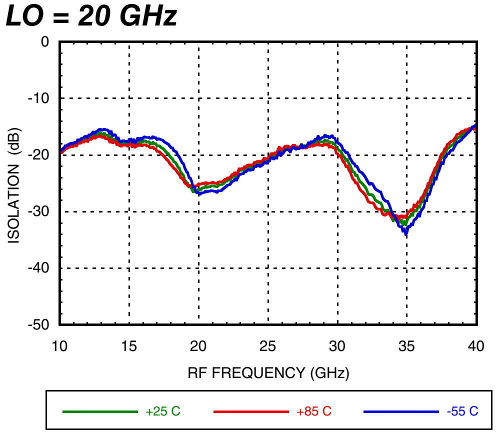
LO/IF Isolation vs. Temperature



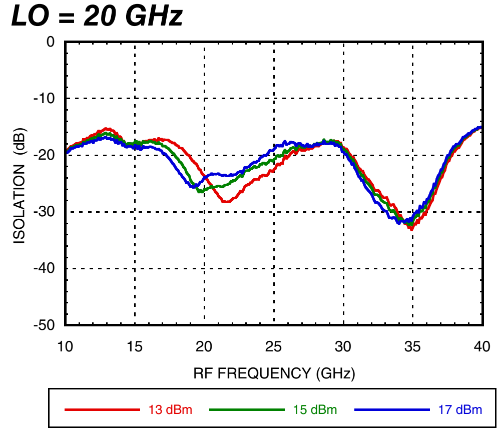
LO/IF Isolation vs. LO Power



RF/IF Isolation vs. Temperature LO = 20 GHz



RF/IF Isolation vs. LO Power LO = 20 GHz



For price, delivery and to place orders: Hittite Microwave Corporation, 2 Elizabeth Drive, Chelmsford, MA 01824
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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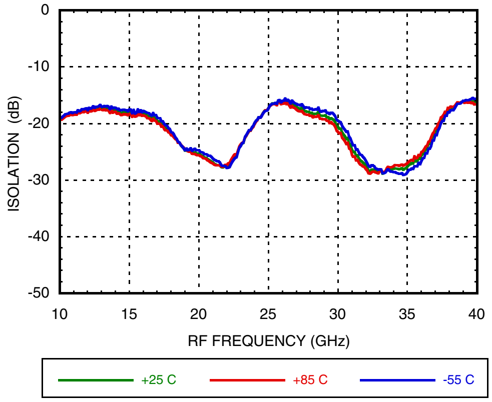
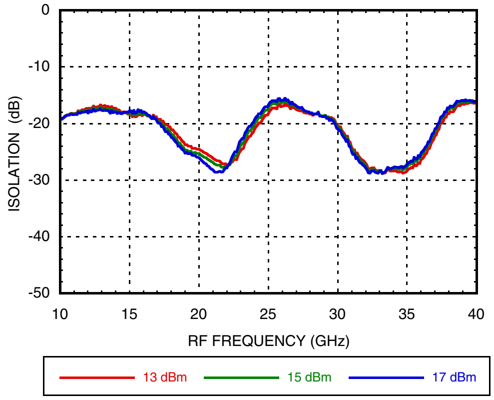
RF/IF Isolation vs. Temperature LO = 30 GHz



RF/IF Isolation vs. LO Power LO = 30 GHz



MxN Spurious Outputs, RF = 20GHz

	nLO				
mRF	0	1	2	3	4
0	xx	1	0	0	0
1	9.8	0	0	0	0
2	58.5	30.3	41.7	0	0
3	0	35	46.6	56	0
4	0	78.5	62.6	57.4	0

RF = 20 GHz @ -4 dBm
LO = 35 GHz @ +13 dBm
Data taken without IF hybrid
All values in dBc below IF power level

MxN Spurious Outputs, RF = 25 GHz

	nLO				
mRF	0	1	2	3	4
0	xx	0	0	0	0
1	12.5	0	22.5	0	0
2	56.5	25	33.3	0	0
3	0	53.7	55.8	57	0
4	0	0	73.6	64.4	68.8

RF = 25 GHz @ -4 dBm
LO = 35 GHz @ +13 dBm
Data taken without IF hybrid
All values in dBc below IF power level

MxN Spurious Outputs, RF = 30 GHz

	nLO				
mRF	0	1	2	3	4
0	xx	5	0	0	0
1	16.5	0.2	22.7	0	0
2	0	42.6	57.3	45.5	0
3	0	0	50.5	60.1	0
4	0	0	63.2	68.5	67.3

RF = 30 GHz @ -4 dBm
LO = 35 GHz @ +13 dBm
Data taken without IF hybrid
All values in dBc below IF power level

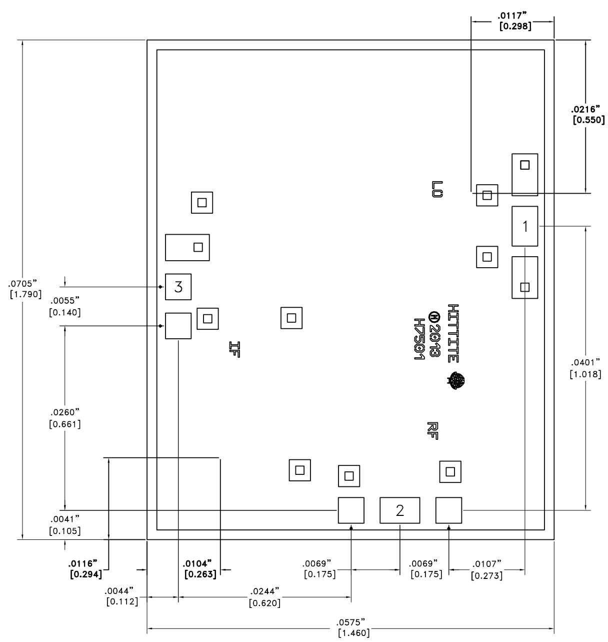
GaAs MMIC MIXER 15 - 36 GHz

Absolute Maximum Ratings

LO Input Power	+17 dBm
Maximum Junction Temperature	175 °C
Continuous Pdiss (T= 85 °C) (derate 1.75 mW/°C above 85°C)	157 mW
Thermal Resistance (R_{TH}) (junction to die bottom)	570 °C/W
Operating Temperature	-55 to +85 °C
Storage Temperature	-65 to 150 °C
ESD Sensitivity (HBM)	Class1A, passed 250V

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



Die Packaging Information [1]

Standard	Alternate
GP-2 (Gel Pack)	[2]

[1] For more information refer to the "Packaging information" Document in the Product Support Section of our website.
[2] For alternate packaging information contact Hittite Microwave Corporation.

NOTES:
1. ALL DIMENSIONS ARE IN INCHES [MM].
2. DIE THICKNESS IS 0.004"
3. BOND PADS 1, 2 & 3 are 0.0059" [0.150] X 0.0039" [0.099].
4. BACKSIDE METALLIZATION: GOLD.
5. BOND PAD METALLIZATION: GOLD.
6. BACKSIDE METAL IS GROUND.
7. CONNECTION NOT REQUIRED FOR UNLABELED BOND PADS.
8. OVERALL DIE SIZE ± 0.002

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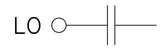
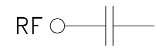
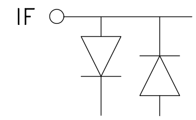
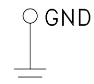
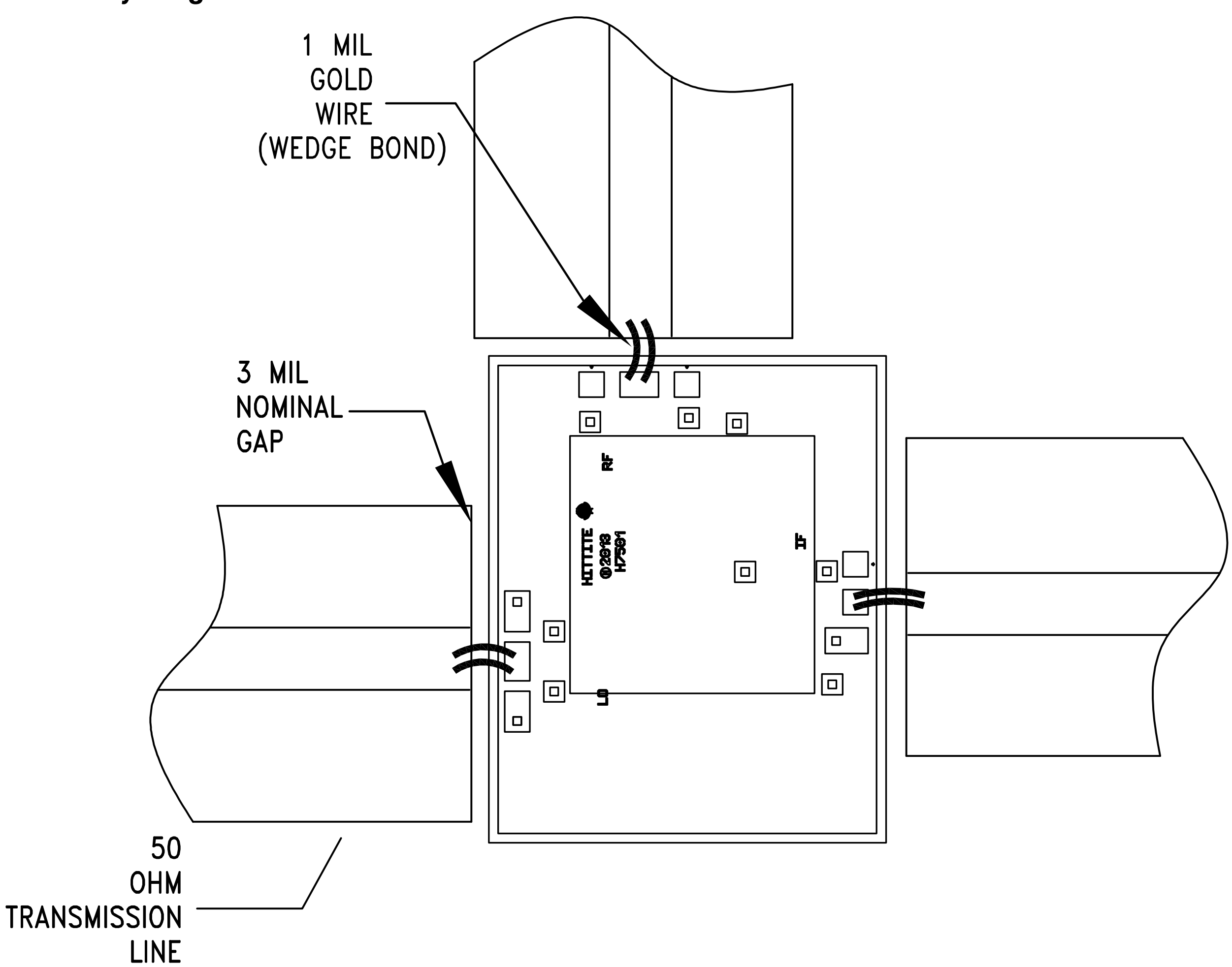
GaAs MMIC MIXER 15 - 36 GHz

Pad Descriptions

Pad Number	Function	Description	Pad Schematic
1	LO	This pad is AC coupled and Matched to 50 Ohms.	
2	RF	This pad is AC coupled and Matched to 50 Ohms.	
3	IF	This pad is DC coupled and Matched to 50 Ohms.	
Die Bottom	GND	Die bottom must be connected to RF/DC ground	

Assembly Diagram



Mounting & Bonding Techniques for Millimeterwave GaAs MMICs

The die should be attached directly to the ground plane eutectically or with conductive epoxy (see HMC general Handling, Mounting, Bonding Note).

50 Ohm Microstrip transmission lines on 0.127mm (5 mil) thick alumina thin film substrates are recommended for bringing RF to and from the chip (Figure 1). One way to accomplish this is to attach the 0.102mm (4 mil) thick die to a 0.150mm (6 mil) thick molybdenum heat spreader (moly-tab) which is then attached to the ground plane (Figure 2). Microstrip substrates should be located as close to the die as possible in order to minimize bond wire length. Typical die-to-substrate spacing is 0.076mm to 0.152 mm (3 to 6 mils).

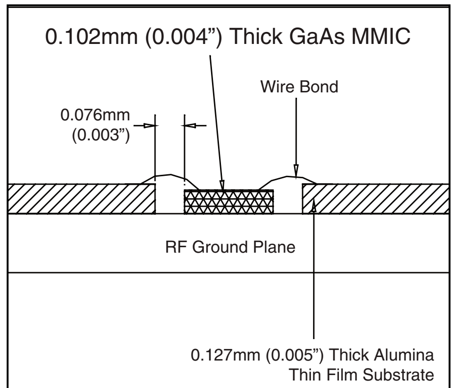


Figure 1.

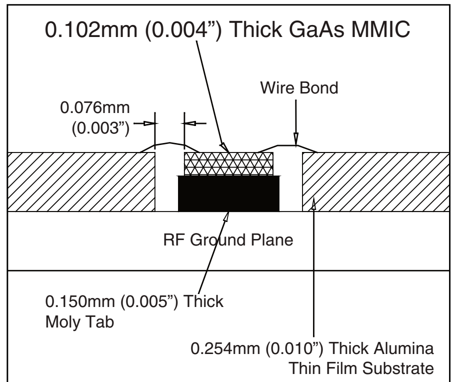


Figure 2.

Handling Precautions

Follow these precautions to avoid permanent damage.

Storage: All bare die are placed in either Waffle or Gel based ESD protective containers, and then sealed in an ESD protective bag for shipment. Once the sealed ESD protective bag has been opened, all die should be stored in a dry nitrogen environment.

Cleanliness: Handle the chips in a clean environment. DO NOT attempt to clean the chip using liquid cleaning systems.

Static Sensitivity: Follow ESD precautions to protect against > ± 250V ESD strikes.

Transients: Suppress instrument and bias supply transients while bias is applied. Use shielded signal and bias cables to minimize inductive pick-up.

General Handling: Handle the chip along the edges with a vacuum collet or with a sharp pair of bent tweezers. The surface of the chip may have fragile air bridges and should not be touched with vacuum collet, tweezers, or fingers.

Mounting

The chip is back-metallized and can be die mounted with AuSn eutectic preforms or with electrically conductive epoxy. The mounting surface should be clean and flat.

Eutectic Die Attach: A 80/20 gold tin preform is recommended with a work surface temperature of 255 °C and a tool temperature of 265 °C. When hot 90/10 nitrogen/hydrogen gas is applied, tool tip temperature should be 290 °C. DO NOT expose the chip to a temperature greater than 320 °C for more than 20 seconds. No more than 3 seconds of scrubbing should be required for attachment.

Epoxy Die Attach: Apply a minimum amount of epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip once it is placed into position. Cure epoxy per the manufacturer's schedule.

Wire Bonding

Ball or wedge bond with 0.025mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. All bonds should be as short as possible <0.31mm (12 mils).

Notes:

Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

Как с нами связаться

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