GaAs MMIC DOUBLE-BALANCED MIXER 14 - 23 GHz

FEBRUARY 2001

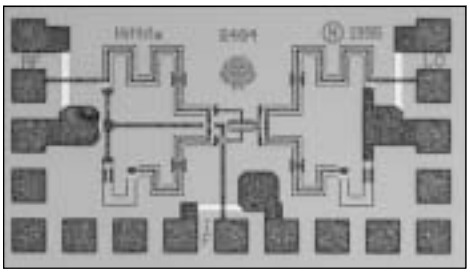
Features

CONVERSION LOSS: 8 to 10 dB

LO/RF ISOLATION: 30 to 55 dB

PASSIVE : NO DC BIAS REQ'D

SMALL SIZE: 0.87 mm x 1.48 mm



General Description

The HMC203 chip is a miniature double-balanced mixer which can be used as an upconverter or downconverter. Excellent isolations are provided by on-chip baluns, which require no external components and no DC bias. The mixer chip can be integrated directly into MIC hybrid applications including 18 GHz TVRO, 23 GHz telecom radios and military systems. Unless otherwise stated, all data was measured with the mixer mounted in a MMIC test fixture. The MMIC was connected to thinfilm 50 ohm transmission lines with 1 mil diameter wirebonds of <10 mils in length.

Guaranteed Performance *With LO Drive of +15 dBm, -55 to +85 deg C*

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.
Frequency Range, RF & LO		14 - 23			15 - 21	
Frequency Range , IF		DC - 2			DC - 2	
Conversion Loss		<10.5	12		8.5	10
Noise Figure (SSB)		<10.5	12		8.5	10
LO to RF Isolation	30	38		30	38	
LO to IF Isolation	35	45		35	45	
RF to IF Isolation	12	17		12	17	
IP3 (Input)		18			18	
IP2 (Input)		40			40	
1dB Gain Compression (Input)		7			7	
Local Oscillator Drive Level	8	15	18	8	15	18

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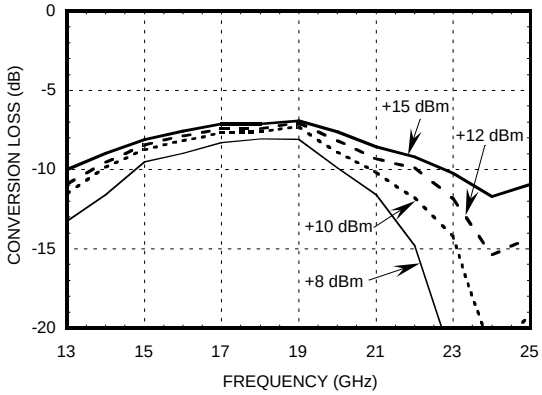
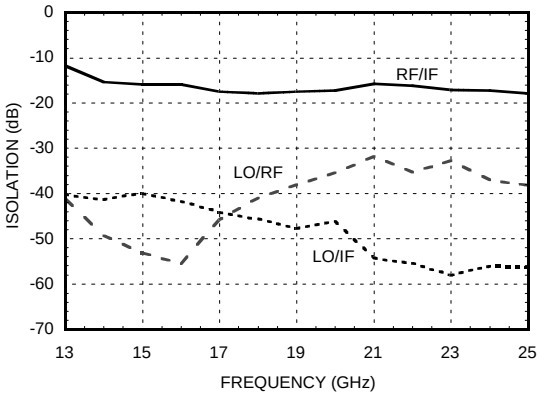
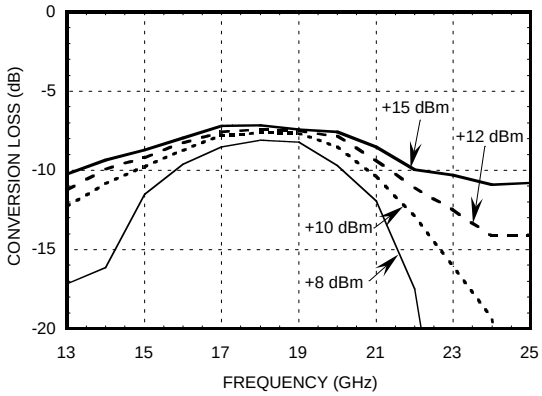
Conversion Loss vs. LO Drive



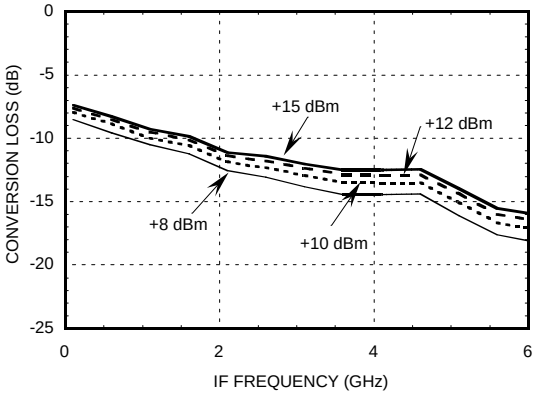
Isolation, LO = +15 dBm



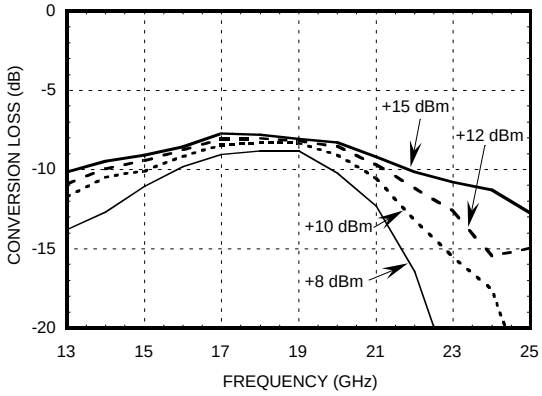
Conversion Loss @ +85 C vs. LO Drive



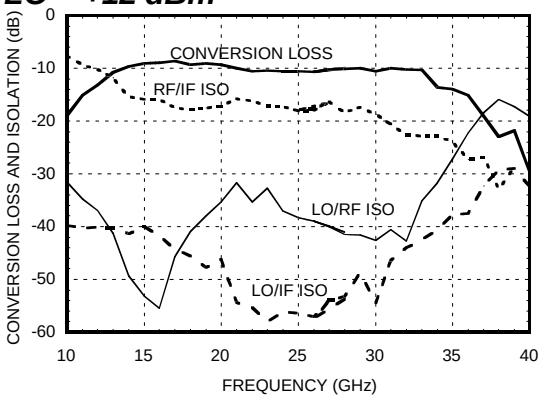
IF Bandwidth LO = 18 GHz @ +15 dBM



Conversion Loss @ -55 C vs. LO Drive



RF Coplanar Probe Data LO = +12 dBm



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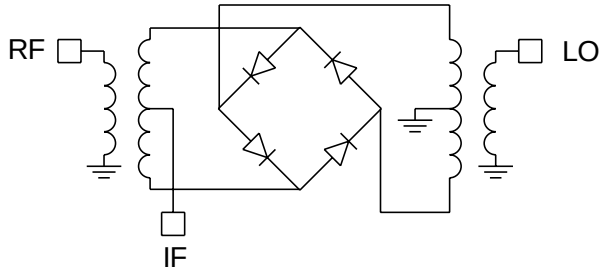
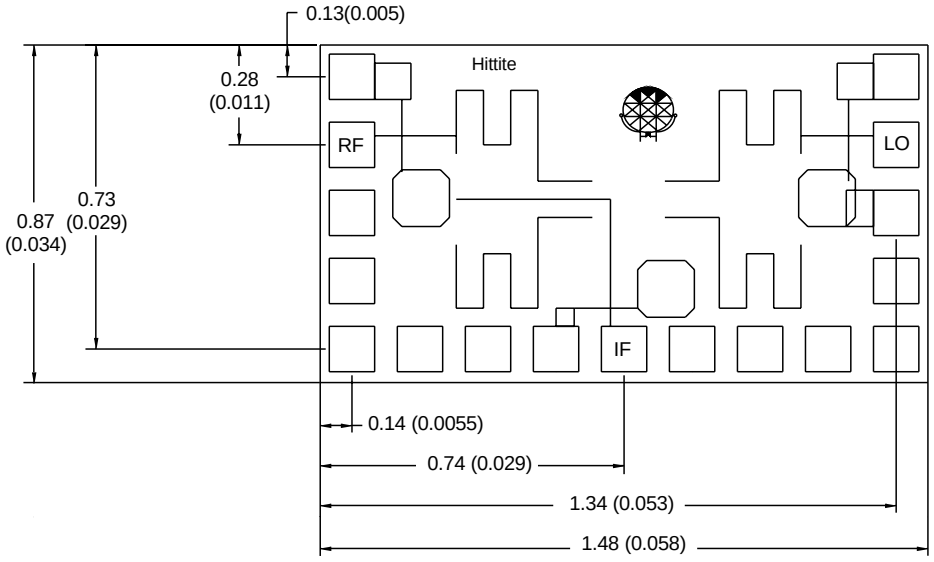
Schematic



Absolute Maximum Ratings

RF/IF Input	+13 dBm
LO Drive	+27 dBm
Storage Temperature	-65 to +150 deg C
Operating Temperature	-55 to +125 deg C

Outline Drawing



ALL DIMENSION IN MILLIMETERS (INCHES)
ALL TOLERANCES ARE ±0.025 (0.001)
DIE THICKNESS IS 0.100 (0.004) BACKSIDE IS GROUND
BOND PADS ARE 0.100 (0.004) SQUARE
BOND PAD SPACING, CTR-CTR: 0.150 (0.006)
BACKSIDE METALLIZATION: GOLD
BOND PAD METALLIZATION: GOLD

Handling Precautions

Follow these precautions to avoid permanent damage.
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 (*see page 8 - 2*).
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 has 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 deg. C and a tool temperature of 265 deg. C. When hot 90/10 nitrogen/hydrogen gas is applied, tool tip temperature should be 290 deg. C.
DO NOT expose the chip to a temperature greater than 320 deg. 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 1.0 mil diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 deg. 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. RF bonds should be as short as possible.