

## GaAs MMIC SUB-HARMONICALLY PUMPED IRM MIXER 26 - 33 GHz

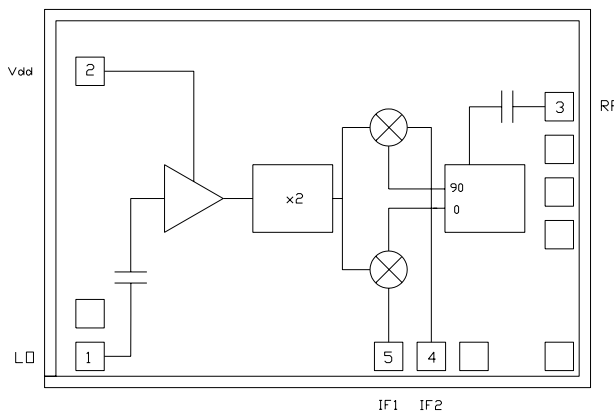
### Typical Applications

- 26 to 33 GHz Microwave Radios
- Up and Down Converter for Point to Point Radios
- Satellite Communication Systems

### Features

- Integrated LO Amplifier: +2 dBm Input
- Sub-Harmonically Pumped (x2) LO
- Image Rejection: 22 dB Typical
- Small Size: 1.24mm x 1.86mm

### Functional Diagram



### General Description

The HMC404 chip is a sub-harmonically pumped (x2) MMIC image rejection mixer with an integrated LO amplifier which can be used as an upconverter or downconverter. The chip utilizes a GaAs PHEMT technology that results in a small overall chip area of 2.31mm<sup>2</sup>. The on-chip 90° hybrid provides excellent amplitude and phase balance resulting in greater than 22 dB of image rejection. The LO amplifier is a single bias (+3V to +4V) two stage design with only +2 dBm nominal drive required.

### Guaranteed Performance, As a Function of Vdd, 25 Deg °C

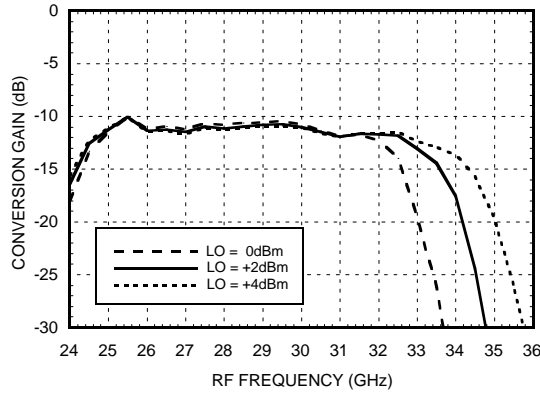
Parameter	IF= 1 GHz LO= +2 dBm & Vdd= +4V			Units
	Min.	Typ.	Max.	
Frequency Range, RF		26 - 33		GHz
Frequency Range LO		13 - 16.5		GHz
Frequency Range, IF		DC - 3		GHz
Conversion Loss (Desired Sideband)		11		dB
Noise Figure		11		dB
Image Rejection		22		dB
Amplitude Balance		±1.5		dB
Phase Balance		±7		Deg
2LO to RF Isolation		35		dB
2LO to IF Isolation		40		dB
IP3 (Input)		17		dBm
1 dB Compression (Input)		+6		dBm
Supply Voltage (Vdd)		4.0		Vdc
Supply Current (Idd)		28		mA

\* Unless otherwise noted, all measurements performed as downconverter.

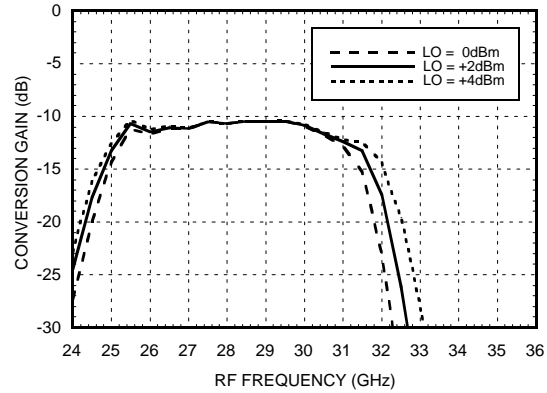
For price, delivery, and to place orders, please contact Hittite Microwave Corporation:  
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## GaAs MMIC SUB-HARMONICALLY PUMPED IRM MIXER 26 - 34 GHz

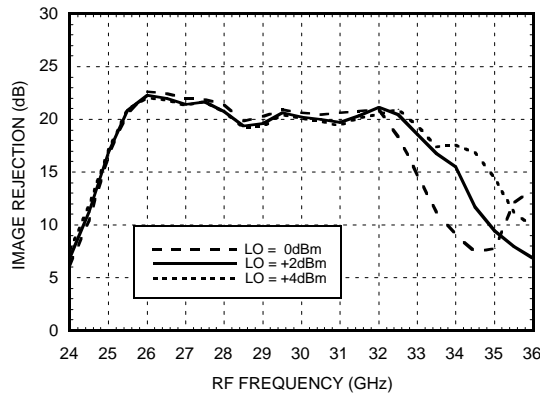
**Conversion Gain to Desired Sideband vs. LO Drive, IF = 1 GHz, Vdd= +4V**



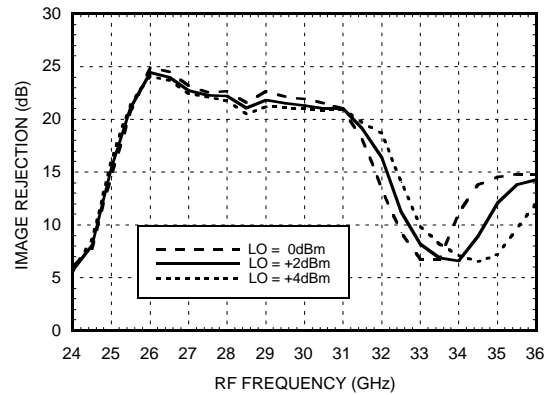
**Conversion Gain to Desired Sideband vs. LO Drive, IF = 1 GHz, Vdd= +3V**



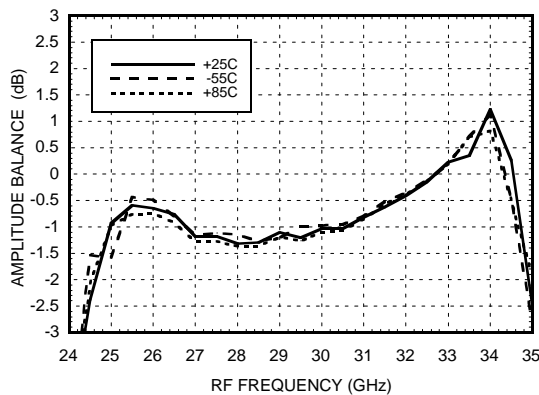
**Image Rejection vs. LO Drive, IF = 1 GHz, Vdd= +4V**



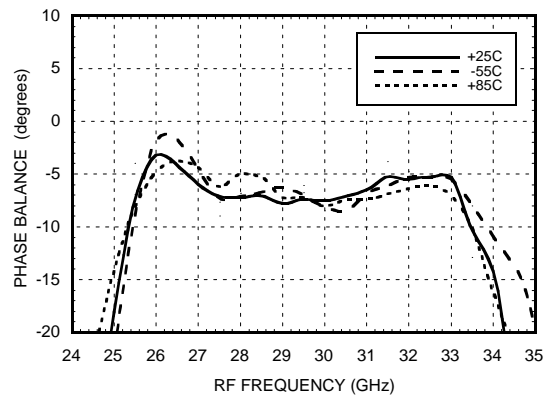
**Image Rejection vs. LO Drive, IF = 1 GHz, Vdd= +3V**



**Amplitude Balance vs. Temperature @ LO = +2 dBm, IF = 100 MHz, Vdd= +4V**

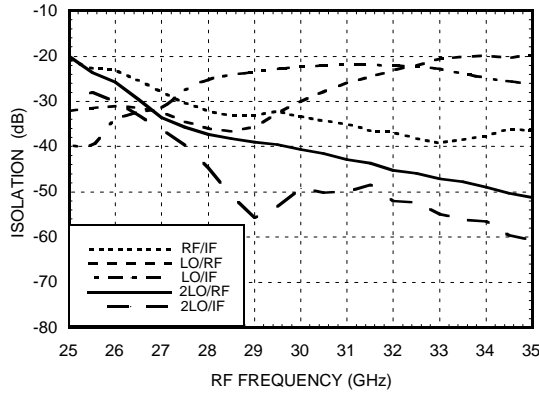


**Phase Balance vs. Temperature @ LO = +2 dBm, IF = 100 MHz, Vdd= +4V**

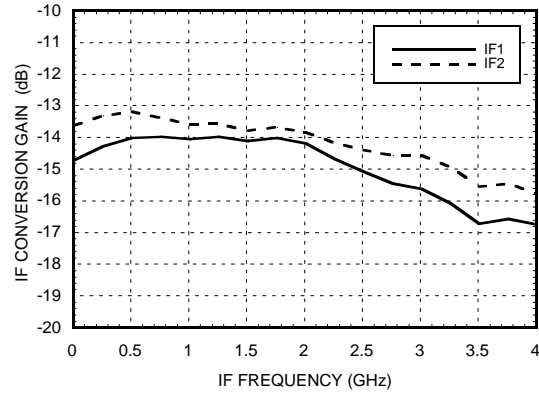


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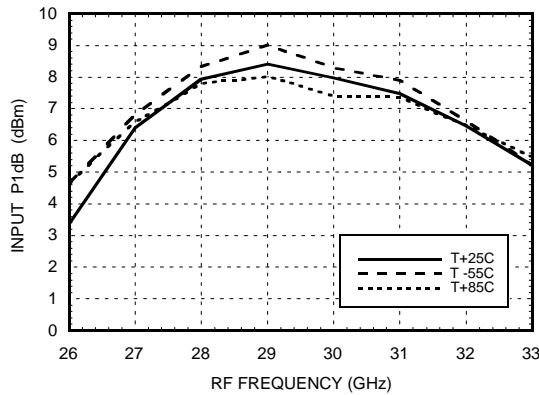
**Isolation @ LO = +2 dBm,  
IF = 100 MHz, Vdd = +4V**



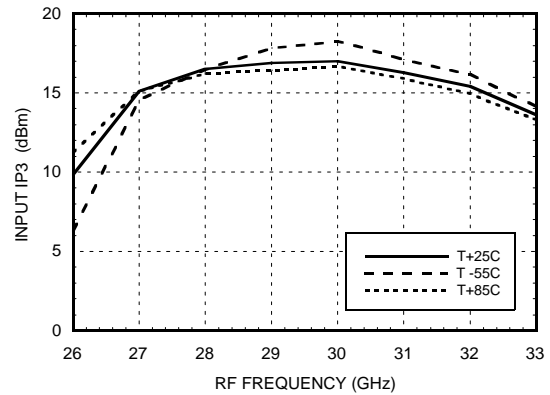
**IF Bandwidth  
@ LO = +2 dBm, Vdd = +4V**



**Input P1dB vs. Temperature  
@ LO = +2 dBm, IF = 1 GHz, Vdd = +4V**



**Input IP3 vs. Temperature  
@ LO = +2 dBm, IF = 1 GHz, Vdd = +4V**



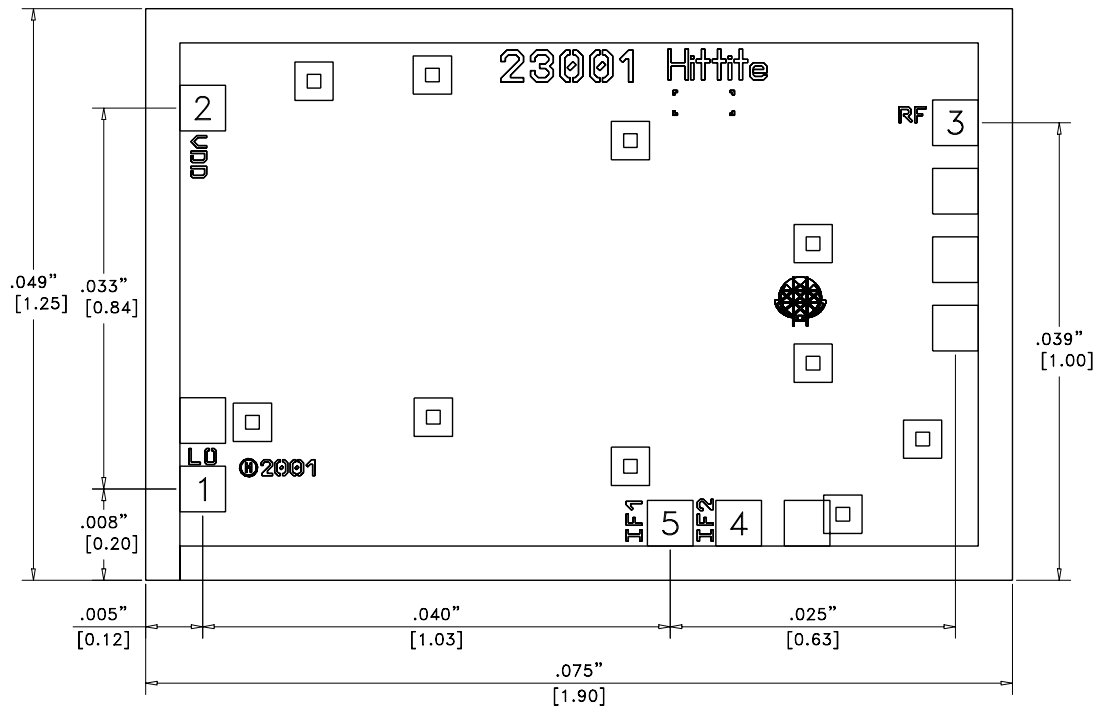
\* Two-tone input power = -10 dBm each tone, 1 MHz spacing.

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### Absolute Maximum Ratings

RF / IF Input (Vdd = +5V)	+13 dBm
LO Drive (Vdd = +5V)	+13 dBm
Vdd	5.5V
Continuous P <sub>diss</sub> (T <sub>a</sub> = 85 °C) (derate 2.64 mW/°C above 85 °C)	238 mW
Storage Temperature	-65 to +150 deg C
Operating Temperature	-55 to +85 deg C



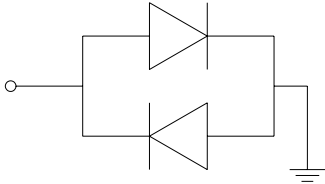
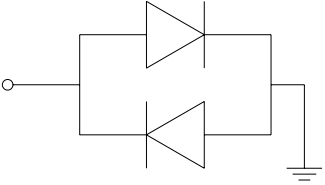
### Pad Locations & Outline Drawing



ALL DIMENSIONS IN INCHES (MILLIMETERS)  
 ALL TOLERANCES ARE ±0.001 (0.025)  
 DIE THICKNESS IS 0.004 (0.100) BACKSIDE IS GROUND  
 BOND PADS ARE 0.004 (0.100) SQUARE  
 BOND PAD SPACING, CTR-CTR: 0.006 (0.150)  
 BACKSIDE METALLIZATION: GOLD  
 BOND PAD METALLIZATION: GOLD  
 NO CONNECTION REQUIRED TO UNLABELED BOND PADS

## GaAs MMIC SUB-HARMONICALLY PUMPED IRM MIXER 26 - 33 GHz

### Pad Description

Pad Number	Function	Description	Interface Schematic
1	LO Port	LO Port. This pad is AC coupled and matched to 50 ohm from 13 - 16.5 GHz	
2	Vdd	Power supply for the LO Amplifier. An external RF bypass capacitor of 100 - 330 pF is required. A MIM border capacitor is recommended. The bond length to the capacitor should be as short as possible. The ground side of the capacitor should be connected to the housing ground.	
3	RF Port	RF Port. This pad is AC coupled and matched to 50 ohm from 26 - 33 GHz.	
4	IF2	IF Port. This pad is DC coupled and should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. Any applied DC voltage to this pin will result in die non-function and possible die failure.	
5	IF1	IF Port. This pad is DC coupled and should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. Any applied DC voltage to this pin will result in die non-function and possible die failure.	

## ***GaAs MMIC SUB-HARMONICALLY PUMPED IRM MIXER 26 - 33 GHz***

**Notes:**