ANALOG DEVICES

HMC339

v02.1007

GaAs MMIC SUB-HARMONICALLY PUMPED MIXER, 33 - 42 GHz

Typical Applications

The HMC339 is ideal for:

- 33 to 42 GHz Microwave Radios
- Up and Down Converter for Point to Point Radios
- Satellite Communication Systems

Features

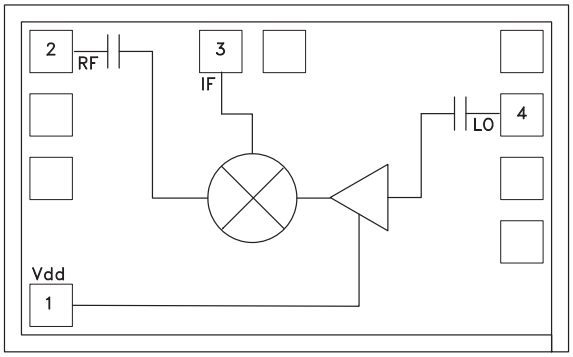
Integrated LO Amplifier: +2 dBm Input

Sub-Harmonically Pumped (x2) LO

High 2LO/RF Isolation: > 37 dB

Die Size: 1.32 x 0.81 x 0.1 mm

Functional Diagram



General Description

The HMC339 chip is a sub-harmonically pumped (x2) MMIC 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 1.07mm^2. The 2LO to RF isolation is excellent eliminating the need for additional filtering. The LO amplifier is a single bias (+3V to +4V) two stage design with only +2 dBm nominal drive requirement. All data is measured with the chip in a 50 ohm test fixture connected via 0.025mm (3 mil) ribbon bonds of minimal length <0.31 mm (<12 mils).

Electrical Specifications, T_A = +25° C, As a Function of Vdd

Parameter	IF = 1 GHz LO = +2 dBm & Vdd = +4V			IF = 1 GHz LO = +2 dBm & Vdd = +3V			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF	33 - 42			33 - 38			GHz
Frequency Range, LO	16.5 - 21			16.5 - 19			GHz
Frequency Range, IF	DC - 3			DC - 3			GHz
Conversion Loss		10	13		10	12	dB
Noise Figure (SSB)		10	13		10	12	dB
2LO to RF Isolation	27	37		23	37		dB
2LO to IF Isolation	30	40		25	40		dB
IP3 (Input)	5	10		3	8		dBm
1 dB Compression (Input)	-4	0		-5	-1		dBm
Supply Current (Idd)		28	38		25	38	mA

**Unless otherwise noted, all measurements performed as downconverter, IF= 1 GHz.*

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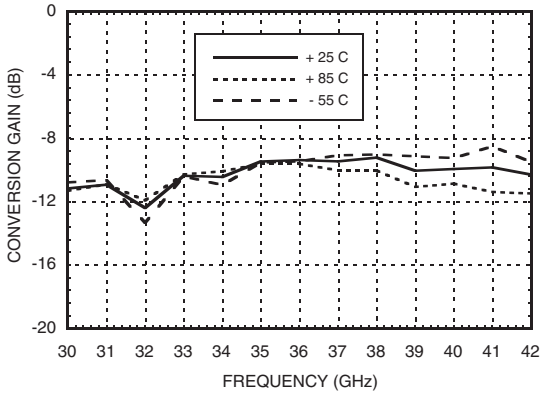
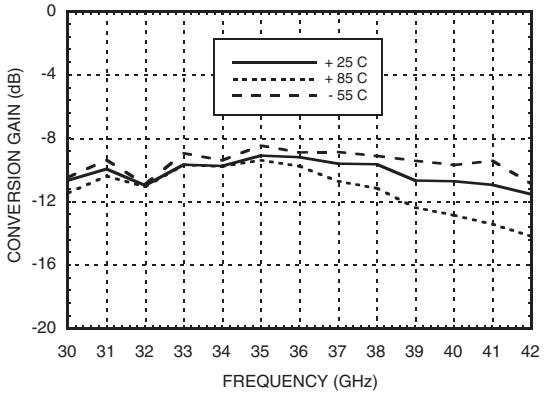
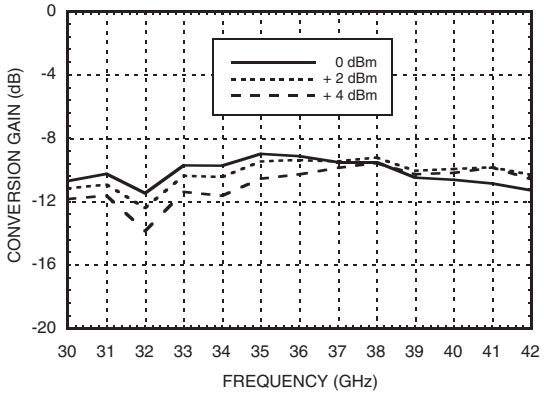
Conversion Gain vs. Temperature @ LO = +2 dBm, Vdd= +4V



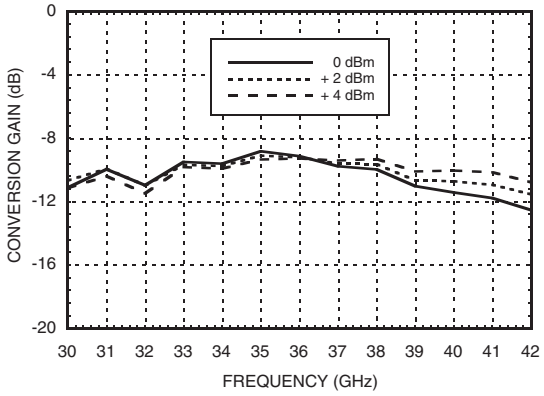
Conversion Gain vs. Temperature @ LO = +2 dBm, Vdd= +3V



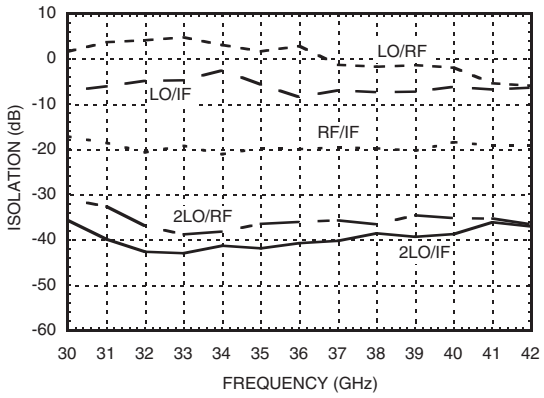
Conversion Gain vs. LO Drive @ Vdd = +4V



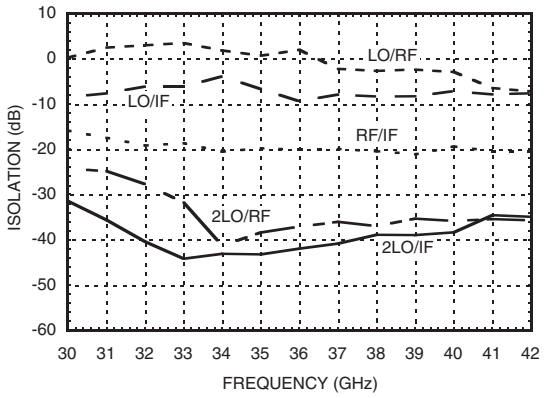
Conversion Gain vs. LO Drive @ Vdd = +3V



Isolation @ LO = +2 dBm, Vdd = +4V



Isolation @ LO = +2 dBm, Vdd = +3V



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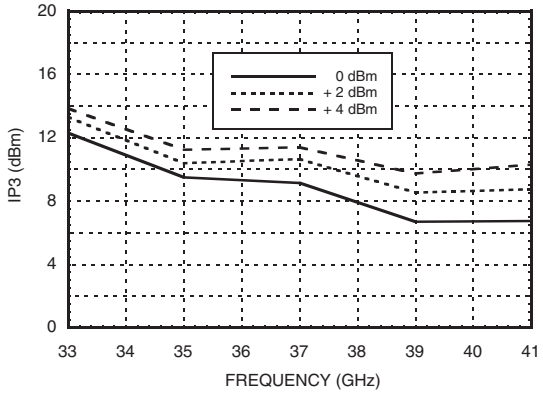
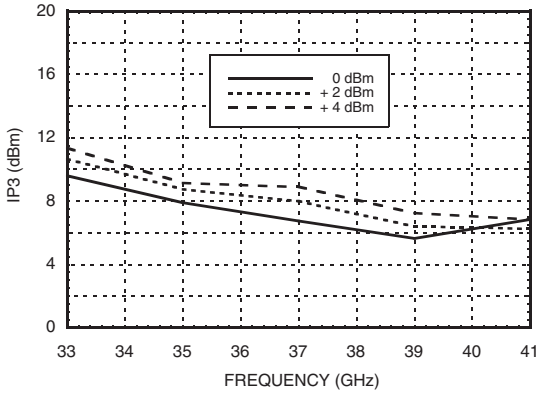
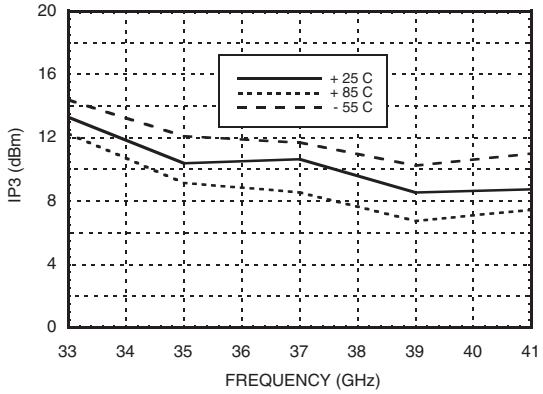
Input IP3 vs. LO Drive @ Vdd = +4V*



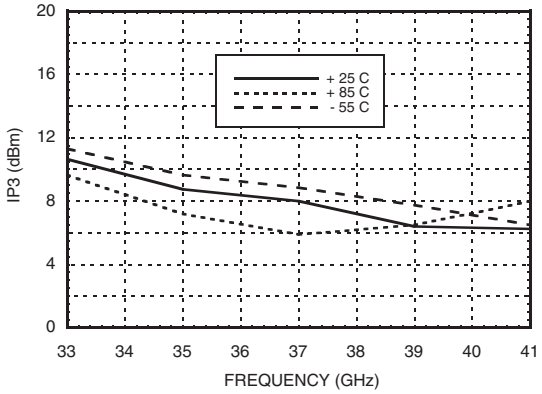
Input IP3 vs. LO Drive @ Vdd = +3V*



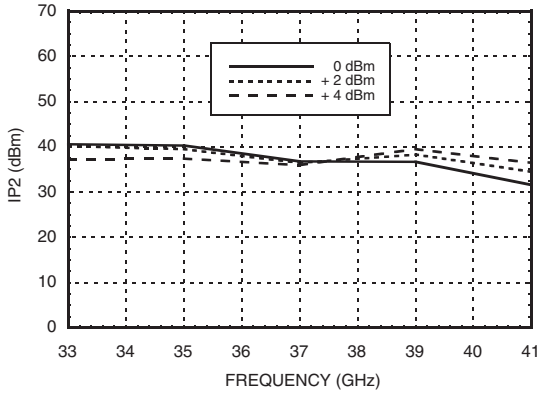
Input IP3 vs. Temperature @ LO = +2 dBm, Vdd = +4V*



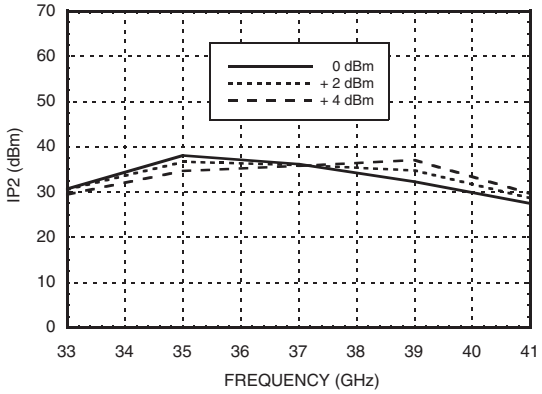
Input IP3 vs. Temperature @ LO = +2 dBm, Vdd = +3V*



Input IP2 vs. LO Drive @ Vdd = +4V*



Input IP2 vs. LO Drive @ Vdd = +3V*



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

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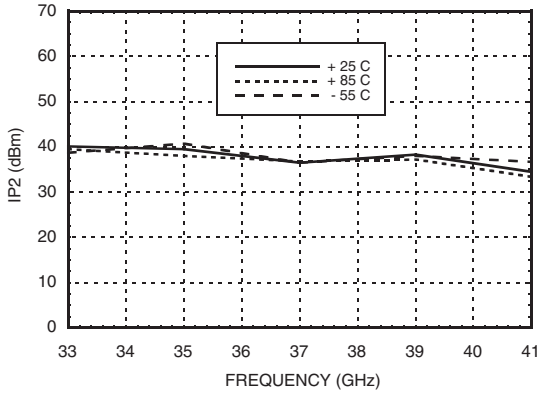
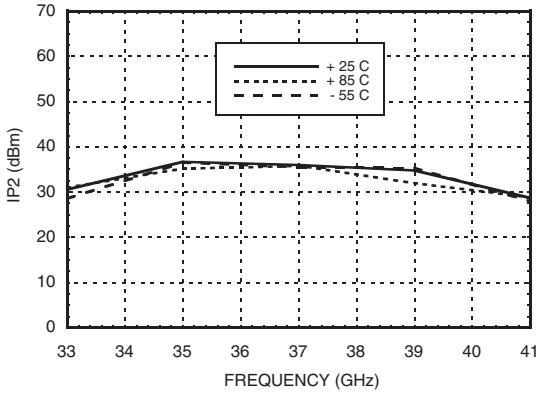
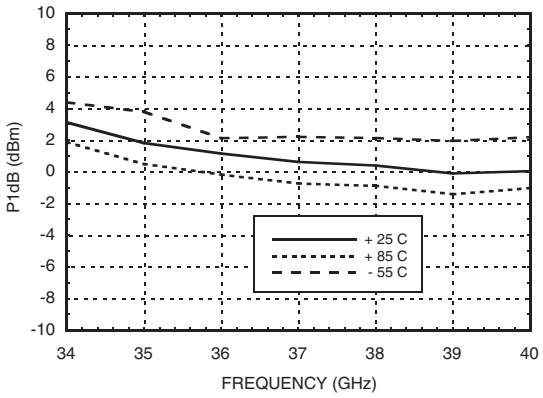
Input IP2 vs. Temperature @ LO = +2 dBm, Vdd = +4V*



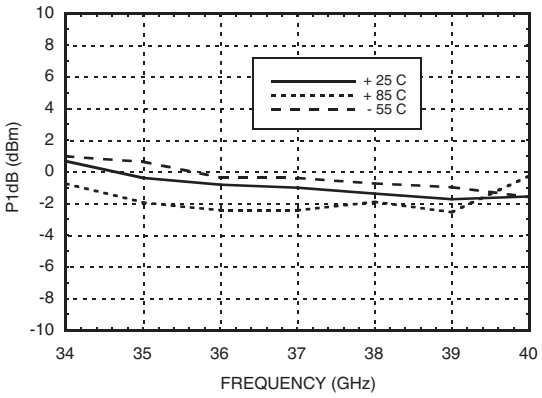
Input IP2 vs. Temperature @ LO = +2 dBm, Vdd = +3V*



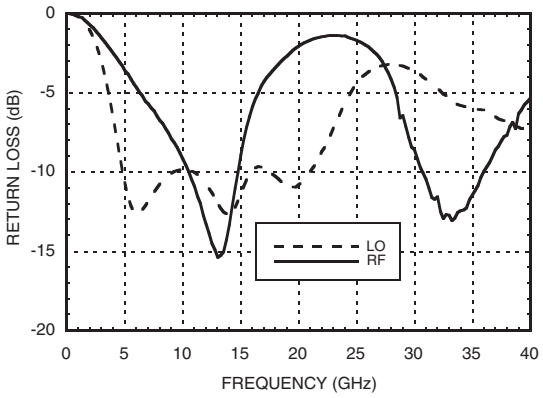
Input P1dB vs. Temperature @ LO = +2 dBm, Vdd = +4V



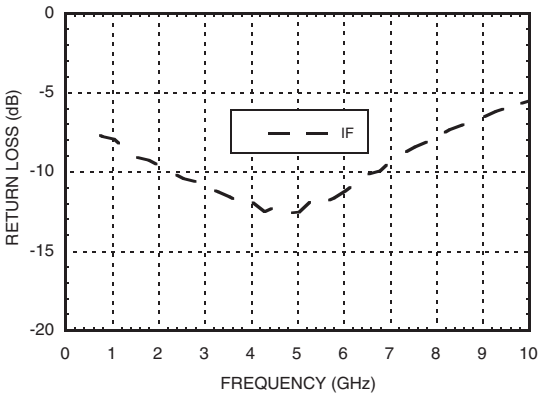
Input P1dB vs. Temperature @ LO = +2 dBm, Vdd = +3V



RF & LO Return Loss @ LO = +2 dBm, Vdd = +4V



IF Return Loss @ LO = +2 dBm, Vdd = +4V



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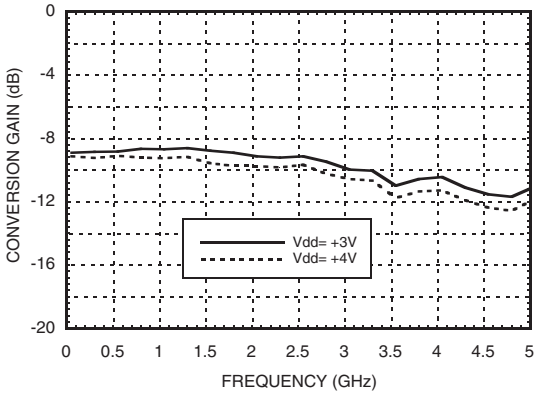
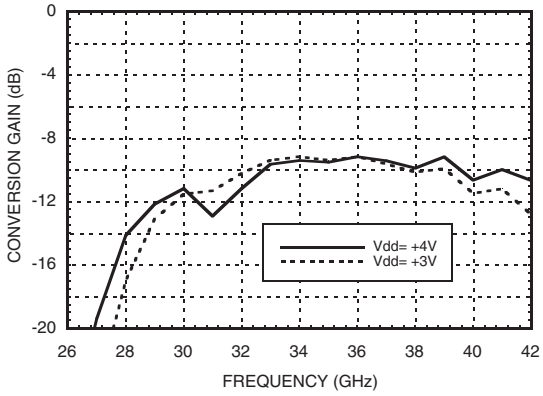
GaAs MMIC SUB-HARMONICALLY PUMPED MIXER, 33 - 42 GHz

IF Bandwidth @ LO = +2 dBm



Upconverter Performance Conversion Gain, LO = +2 dBm, Vdd = +4V



MxN Spurious @ IF Port, Vdd = +4V

	nLO					
mRF	±5	±4	±3	±2	±1	0
-2	44					
-1		42	53			
0				18	-14	
1				X	42	13
2		55	47			

RF = 39 GHz @ -10 dBm
LO = 19 GHz @ +2 dBm
All values in dBc below IF power level.
Measured as downconverter

MxN Spurious @ RF Port, Vdd = +4V

	nLO					
mIF	±5	±4	±3	±2	±1	0
-2					30	
-1				X	36	
0				13	-20	
1				X	36	3
2					37	54

IF = 1 GHz @ -10 dBm
LO = 19 GHz @ +2 dBm
All values in dBc below RF power level.
Measured as upconverter

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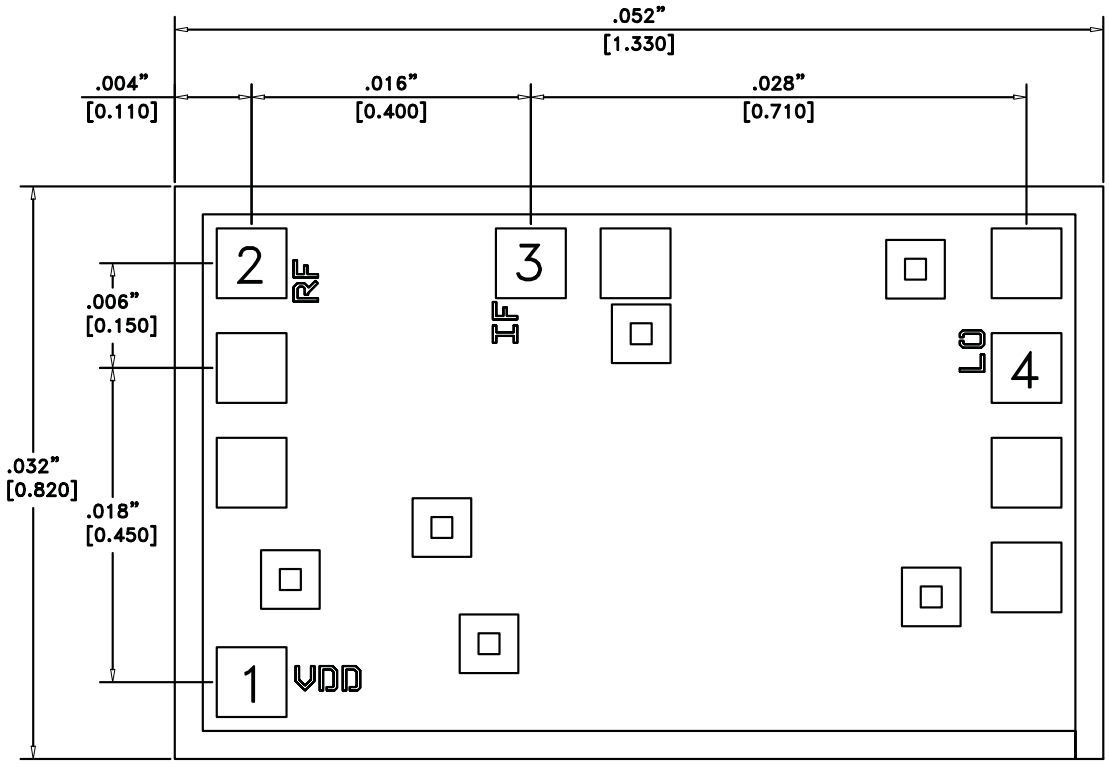
Absolute Maximum Ratings

RF / IF Input (Vdd = +5V)	+13 dBm
LO Drive (Vdd = +5V)	+13 dBm
Vdd	+5.5V
Continuous Pdiss (Ta = 85 °C) (derate 2.64 mW/°C above 85 °C)	238 mW
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



Die Packaging Information [1]

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

[1] Refer to the "Packaging Information" section for die packaging dimensions.
[2] For alternate packaging information contact Hittite Microwave Corporation.

NOTES:
1. ALL DIMENSIONS IN INCHES (MILLIMETERS)
2. ALL TOLERANCES ARE ±0.001 (0.025)
3. DIE THICKNESS IS 0.004 (0.100) BACKSIDE IS GROUND
4. BOND PADS ARE 0.004 (0.100) SQUARE
5. BOND PAD SPACING, CTR-CTR: 0.006 (0.150)
6. BACKSIDE METALLIZATION: GOLD
7. BOND PAD METALLIZATION: GOLD

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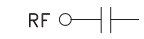
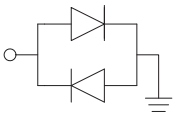
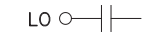
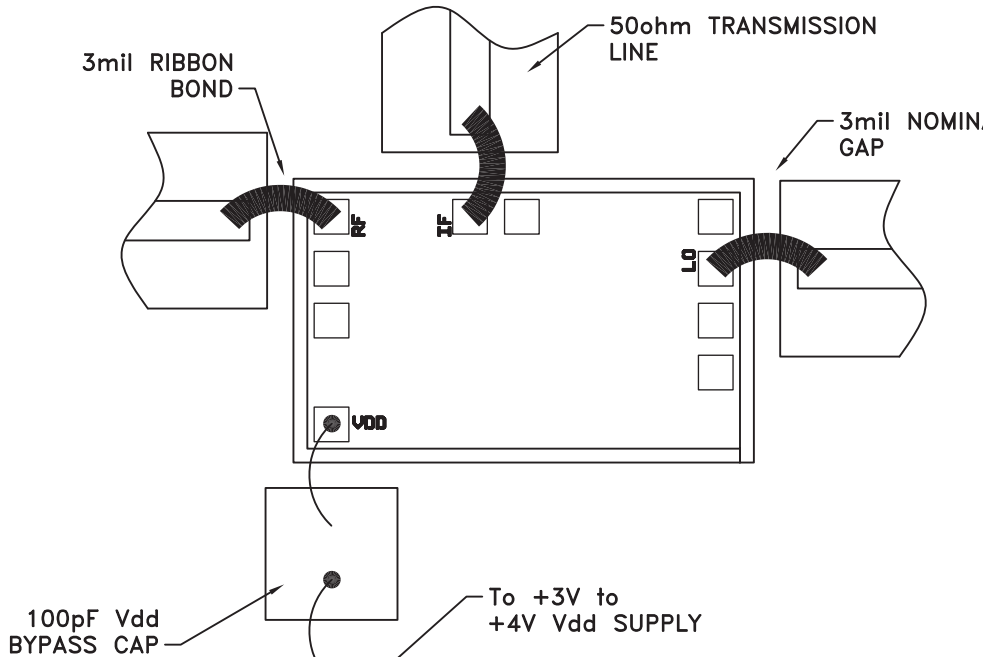
Pad Descriptions

Pad Number	Function	Description	Interface Schematic
1	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.	
2	RF	This pad is AC coupled and matched to 50 Ohm.	
3	IF	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.	
4	LO	This pad is AC coupled and matched to 50 Ohm.	

Assembly Diagram



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