HMC340LP5

GaAs MMIC SMT DOUBLE-BALANCED DUAL MIXER, 1.7 - 4.5 GHz

Typical Applications

The HMC340LP5 Dual Mixer is ideal for:

- Wireless Infrastructure
- Wireless Local Loop
- Image Reject Mixer
- I/Q Modulator
- SSB Modulator

Features

Conversion Loss: 8.0 dB

LO/RF Isolation: 45 dB

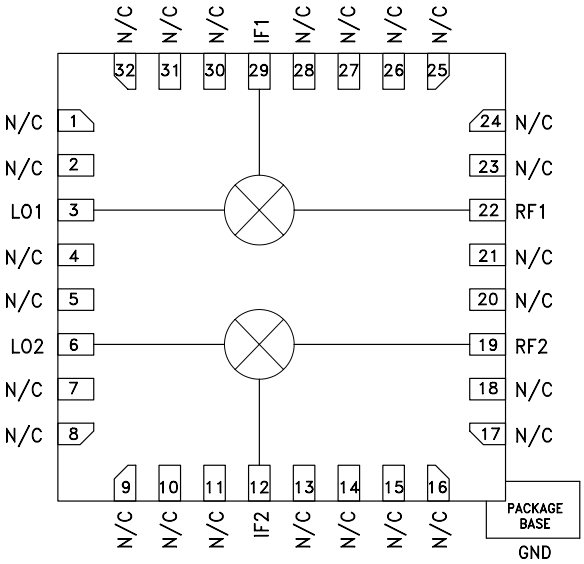
LO/IF Isolation: 33 dB

Input IP3: +20 dBm

Conversion Gain Balance: 0.1 dB

5 x 5 x 1 mm QFN SMT Package

Functional Diagram



General Description

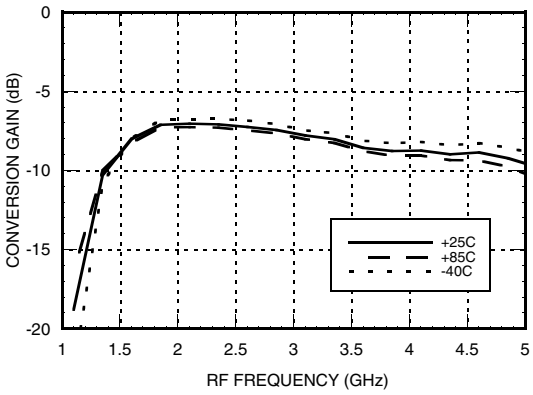
The HMC340LP5 is a double-balanced dual mixer covering 1.7 - 4.5 GHz RF/LO range. This passive MMIC mixer is constructed of GaAs Schottky diodes and on-chip baluns. The device can be used as an upconverter, downconverter, biphase (de)modulator, or phase comparator. The mixer symmetry of the HMC340LP5 makes it an ideal candidate for single sideband or image rejection applications. The consistent MMIC performance will improve system operation and assure regulatory compliance. A low cost, leadless 5x5 mm QFN surface mount package (LP5) houses the dual MMIC mixer IC.

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

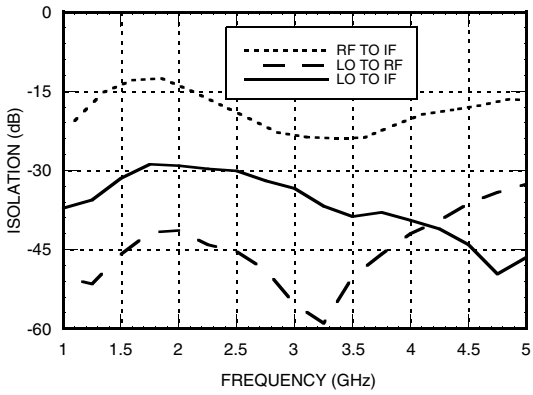
Parameter	LO = +13 dBm IF = 100 MHz						Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range, RF & LO		1.7 - 4.5			3.4 - 3.8		GHz
Frequency Range, IF		DC - 1.5			DC - 1.5		GHz
Conversion Loss		8	10		8	10	dB
Conversion Gain Amplitude Balance		0.10	0.25		0.10	0.25	dB
Noise Figure (SSB)		8	10		8	10	dB
LO to RF Isolation	30	45		40	47		dB
LO to IF Isolation	25	33		33	38		dB
IP3 (Input)		20			23		dBm
1 dB Gain Compression (Input)		12			13		dBm

** Unless otherwise noted, all measurements performed as single channel downconverter.*

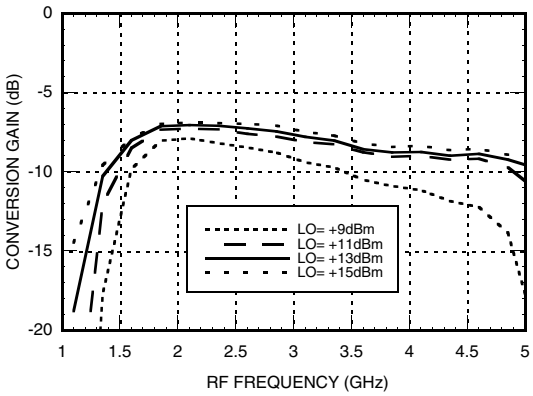
Single Channel: Conversion Gain vs. Temperature @ LO = +13 dBm



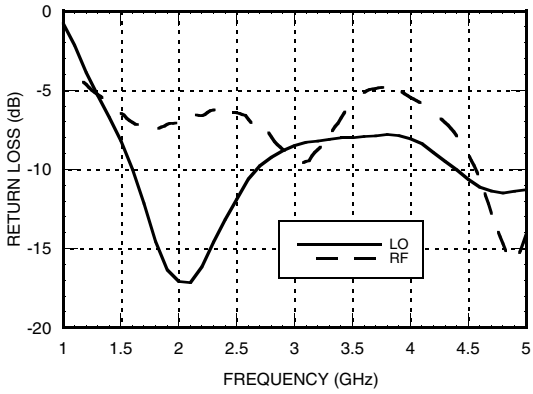
Single Channel: Isolation @ LO = +13 dBm



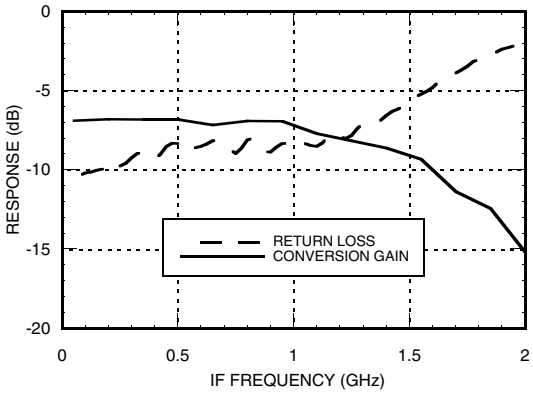
Single Channel: Conversion Gain vs. LO Drive



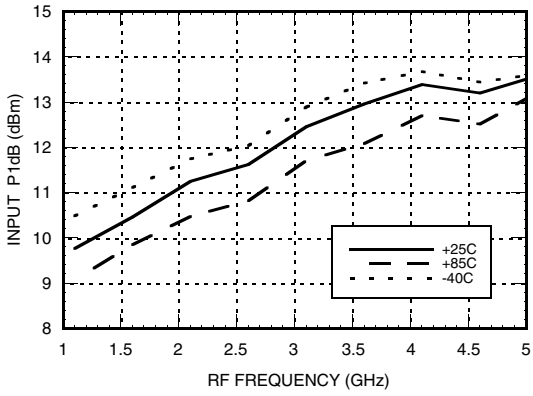
Single Channel: Return Loss @ LO = +13 dBm



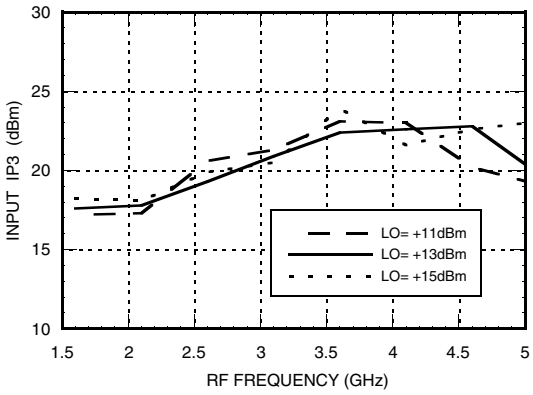
Single Channel: IF Bandwidth @ LO = +13 dBm



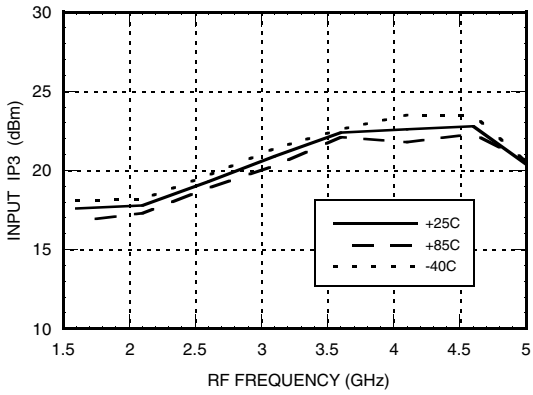
Single Channel: Input P1dB vs. Temperature @ LO = +13 dBm



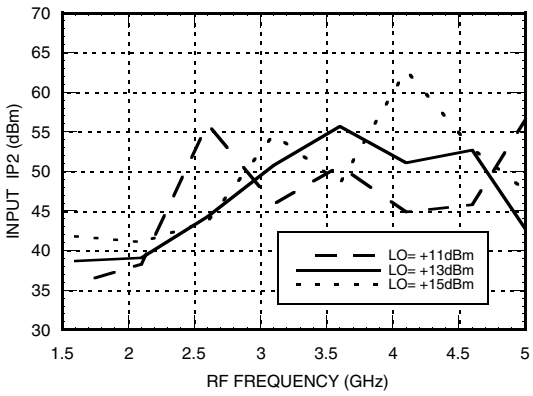
Single Channel: Input IP3 vs. LO Drive



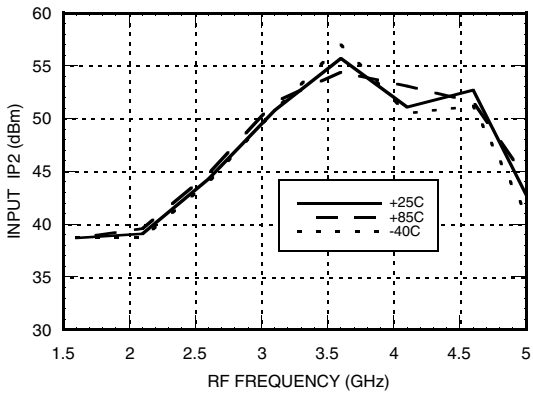
Single Channel: Input IP3 vs. Temperature @ LO = +13 dBm



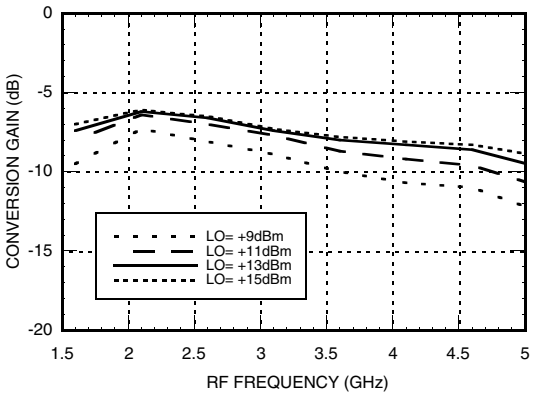
Single Channel: Input IP2 vs. LO Drive



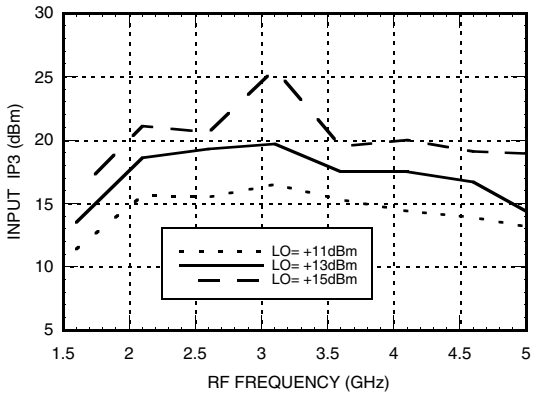
Single Channel: Input IP2 vs. Temperature @ LO = +13 dBm



Single Channel: Upconverter Conversion Gain vs. LO Drive



Single Channel: Upconverter IP3 vs. LO Drive



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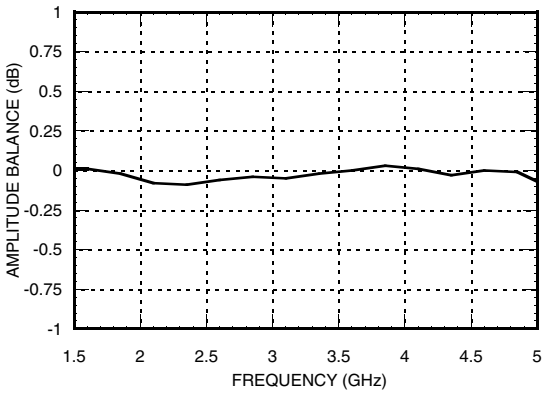
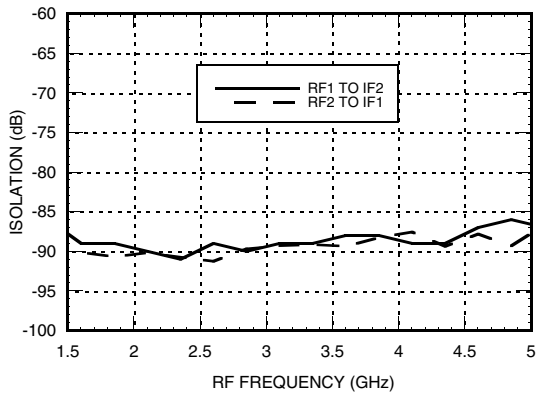
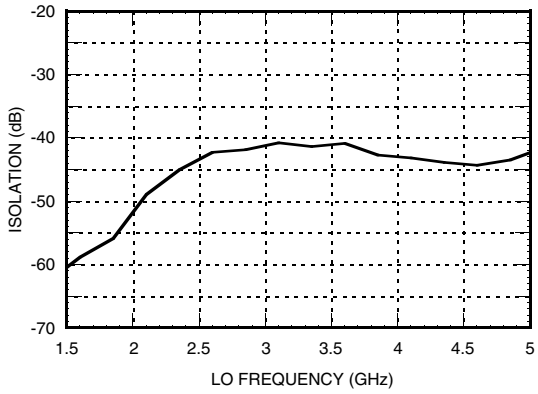
Dual Channel: Conversion Gain Amplitude Balance



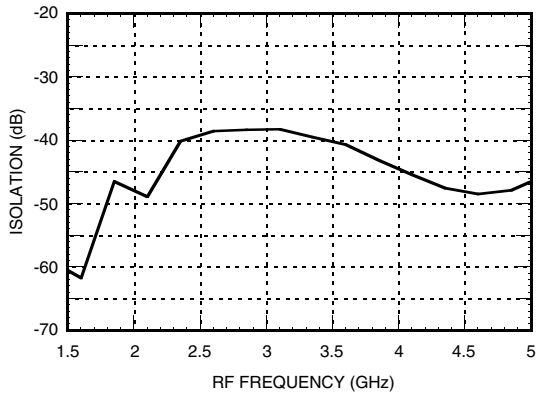
Dual Channel: Channel to Channel Isolation



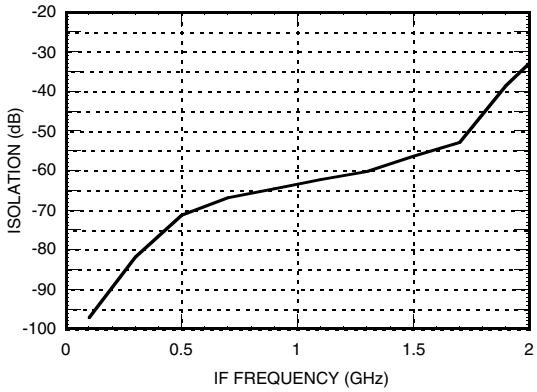
Dual Channel: LO1 to LO2 Isolation



Dual Channel: RF1 to RF2 Isolation



Dual Channel: IF1 to IF2 Isolation



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Harmonics of LO

LO Freq. (GHz)	nLO Spur at RF Port			
	1	2	3	4
1.5	46	33	66	58
2.0	41	28	53	64
2.5	46	29	47	69
3.0	55	36	57	76
3.5	50	44	57	74
4.0	43	48	57	65
4.5	37	54	64	78
5.0	33	53	69	81

LO = +13 dBm
Values in dBc below input LO level measured at RF Port.

MxN Spurious Outputs

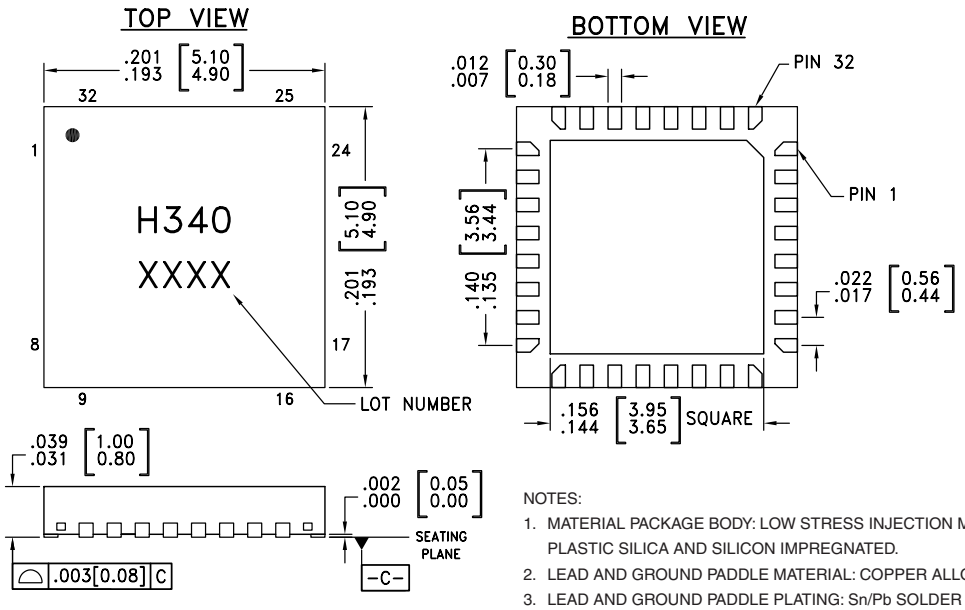
	nLO				
mRF	0	1	2	3	4
0	xx	8	22	22	39
1	15	0	47	42	39
2	75	68	75	69	71
3	76	76	77	73	77
4	76	77	76	76	76

RF = 3.5 GHz @ -10 dBm
LO = 3.6 GHz @ +13 dBm
All values in dBc below IF power level

Absolute Maximum Ratings

RF / IF Input	+13 dBm
LO Drive	+27 dBm
Channel Temperature	150°C
Continuous Pdiss (T = 85°C) (derate 16.55 mW/°C above 85°C)	1.07 W
Thermal Resistance (R_{TH}) (junction to package base)	60.4 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 deg °C

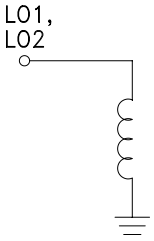
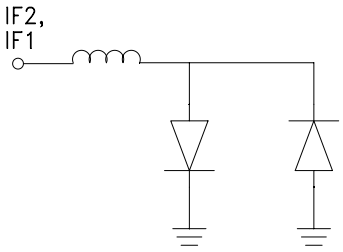
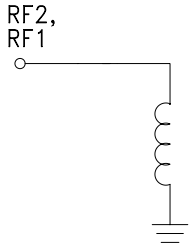
Outline Drawing



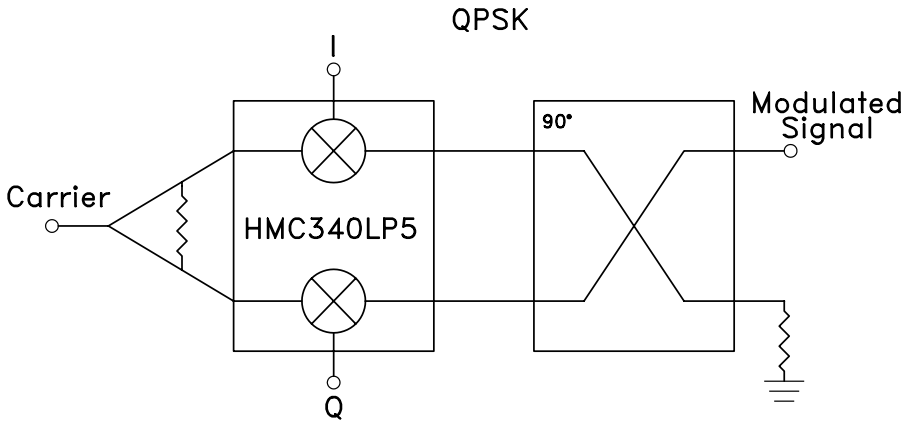
NOTES:

1. MATERIAL PACKAGE BODY: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY
3. LEAD AND GROUND PADDLE PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE
6. PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM. PAD BURR HEIGHT SHALL BE 0.25mm MAXIMUM.
7. PACKAGE WARP SHALL NOT EXCEED 0.05mm.
8. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

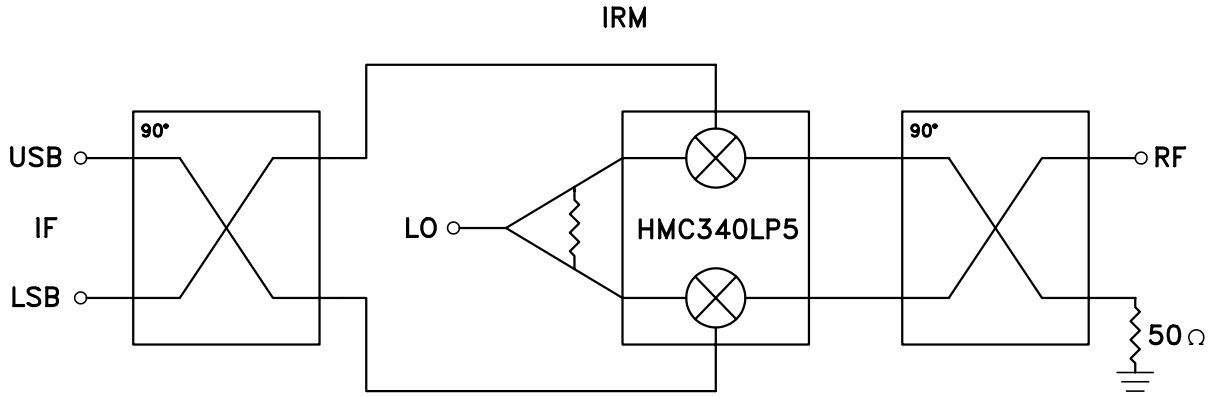
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 2, 4, 5, 7-11, 13-18, 20, 21, 23-28, 30-32	N/C	No Connection. These pins may be connected to RF ground without affecting performance.	
3, 6	LO1, LO2	LO Port: This pin is DC coupled and matched to 50 Ohm from 1.7 to 4.5 GHz.	
12, 29	IF2, IF1	IF Port: This pin is DC coupled. For applications not requiring operation to DC, this port should be DC blocked externally using a series capacitor whose values has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source/sink more than 4mA of current or die non-function and possible die failure will result.	
19, 22	RF2, RF1	RF Port: This pin is DC coupled and matched to 50 Ohm from 1.7 to 4.5 GHz.	
Package Bottom	GND	Package bottom must be connect to RF/DC ground.	

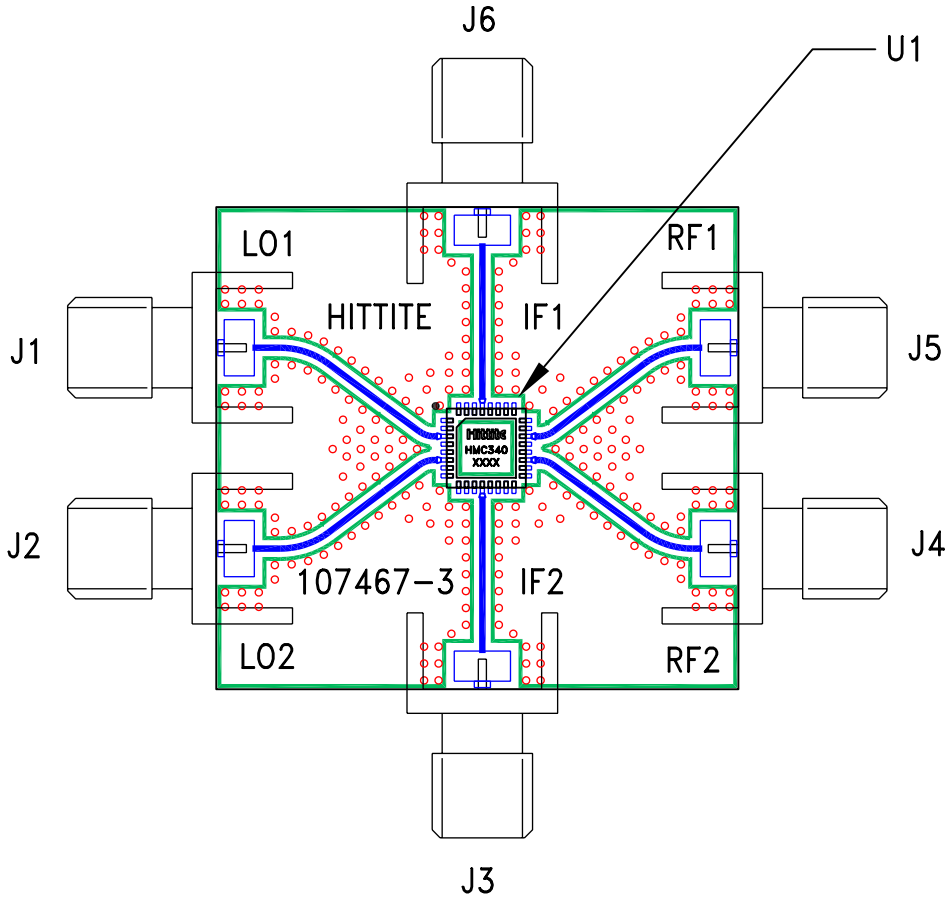
Application Circuit for use as an I/Q Modulator



Application Circuit for use as an IRM Mixer



Evaluation PCB



List of Material

Item	Description
J1 - J6	PC Mount SMA RF Connector
U1	HMC340LP5 Dual Mixer
PCB*	107467 Evaluation Board
* Circuit Board Material: Rogers 4350	

The circuit board used in the final 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.