HMC571

v03.0808

GaAs MMIC I/Q DOWNCONVERTER 21 - 25 GHz

Typical Applications

The HMC571 is ideal for:

- Point-to-Point and Point-to-Multi-Point Radio
- Military Radar, EW & ELINT
- Satellite Communications

Features

Conversion Gain: 11 dB

Image Rejection: 24 dB

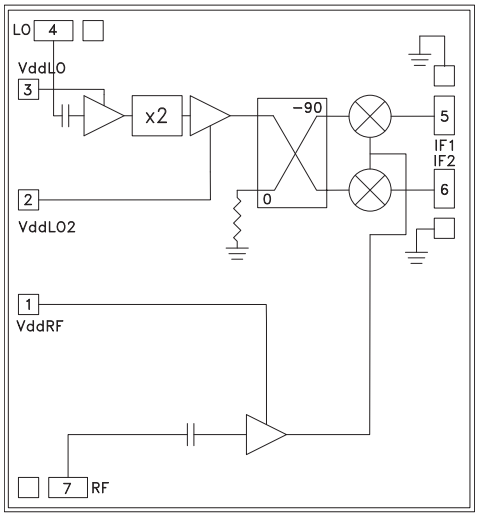
2 LO to RF Isolation: 40 dB

Noise Figure: 3 dB

Input IP3: +5 dBm

Die Size: 2.33 x 2.51 x 0.10 mm

Functional Diagram



General Description

The HMC571 is a compact GaAs MMIC I/Q downconverter chip which provides a small signal conversion gain of 10 dB with a noise figure of 3 dB and 24 dB of image rejection across the frequency band. The device utilizes an LNA followed by an image reject mixer which is driven by an active x2 multiplier. The image reject mixer eliminates the need for a filter following the LNA, and removes thermal noise at the image frequency. I and Q mixer outputs are provided and an external 90° hybrid is needed to select the required sideband. All data shown below is taken with the chip mounted in a 50 Ohm test fixture and includes the effects of 1 mil diameter x 20 mil length bond wires on each port. This product is a much smaller alternative to hybrid style image reject mixer downconverter assemblies.

Electrical Specifications, T_A = +25° C, IF = 100 MHz, LO = +4 dBm, Vdd = 3.5 Vdc*

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range, RF		21.2 - 23.7			21 - 25		GHz
Frequency Range, LO		9 - 14			9 - 14		GHz
Frequency Range, IF		DC - 3.5			DC - 3.5		GHz
Conversion Gain (As IRM)	9	11		8	11		dB
Noise Figure		3			3		dB
Image Rejection	19	22		19	24		dB
1 dB Compression (Input)	-9	-6		-11	-8		dBm
2 LO to RF Isolation	38	45		38	45		dB
2 LO to IF Isolation	28	32		28	32		dB
IP3 (Input)	+2	+5		-2	+5		dBm
Amplitude Balance		0.3			0.7		dB
Phase Balance		5			5		Deg
Total Supply Current		125	165		125	165	mA

*Data taken as IRM with external IF hybrid

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Data Taken As IRM With External IF Hybrid

Conversion Gain vs. Temperature

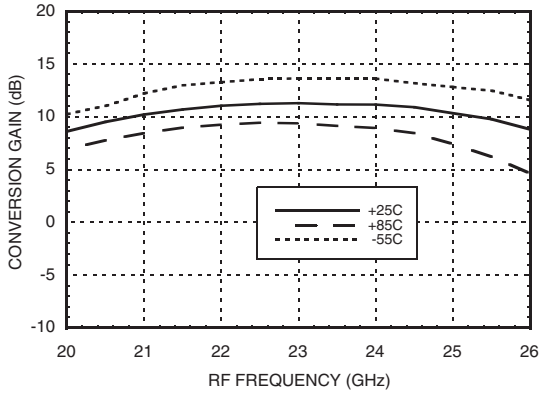
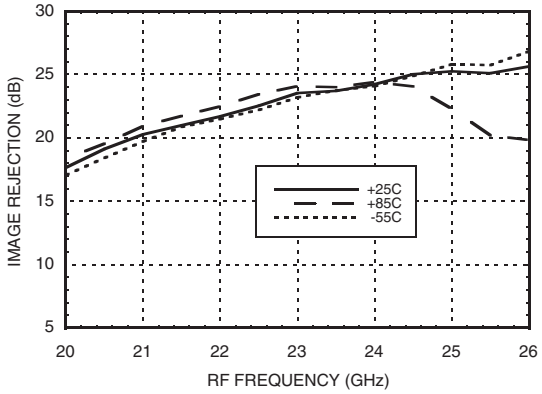
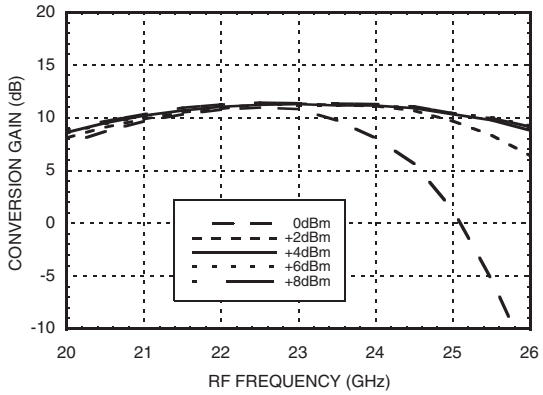


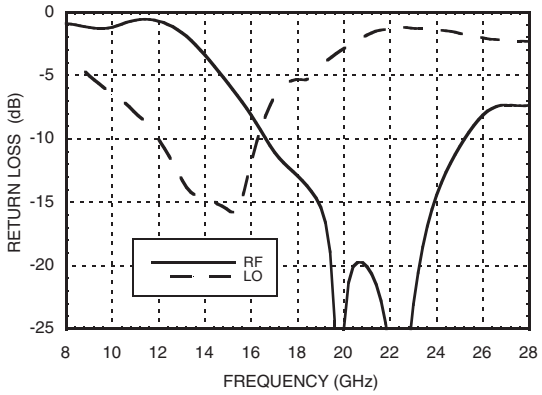
Image Rejection vs. Temperature



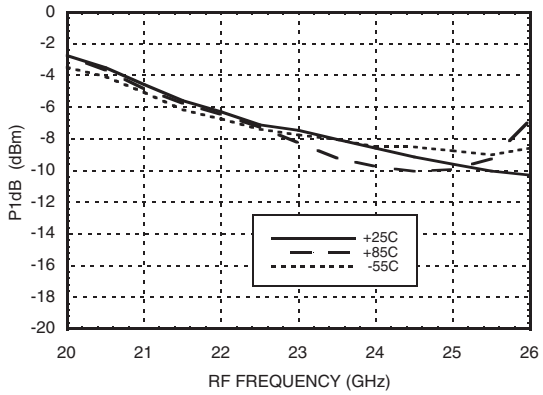
Conversion Gain vs. LO Drive



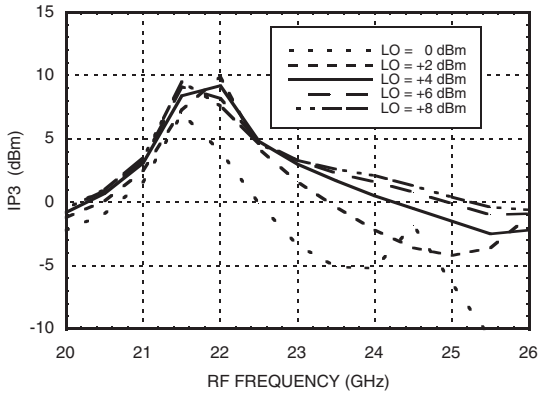
Return Loss



Input P1dB vs. Temperature



Input IP3 vs. LO Drive



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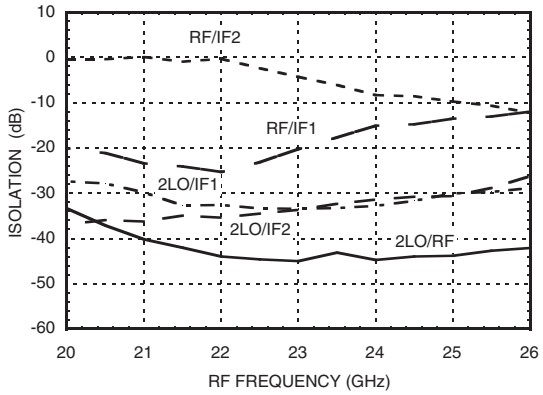
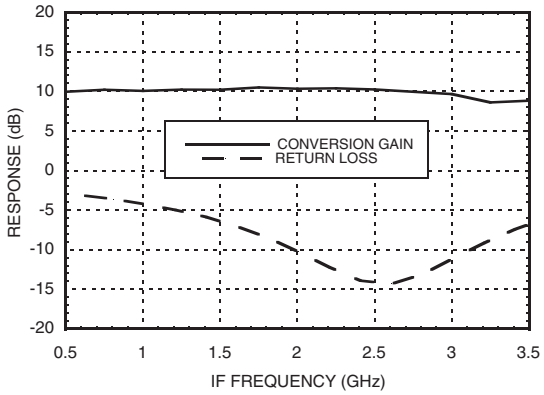
Quadrature Channel Data Taken Without IF Hybrid

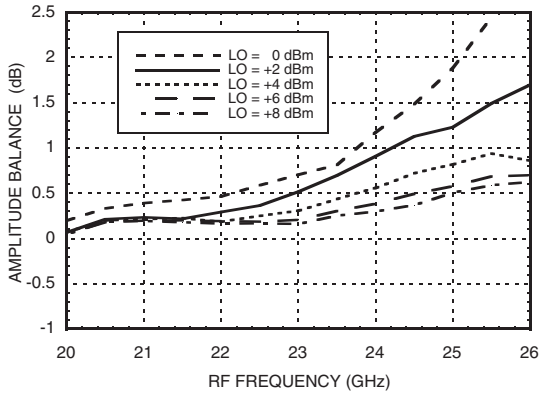
Isolations



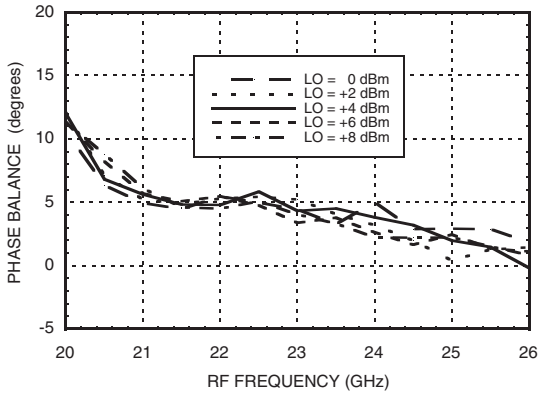
IF Bandwidth*



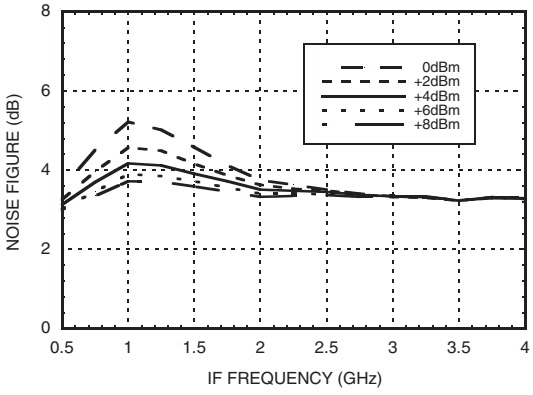
Amplitude Balance vs. LO Drive



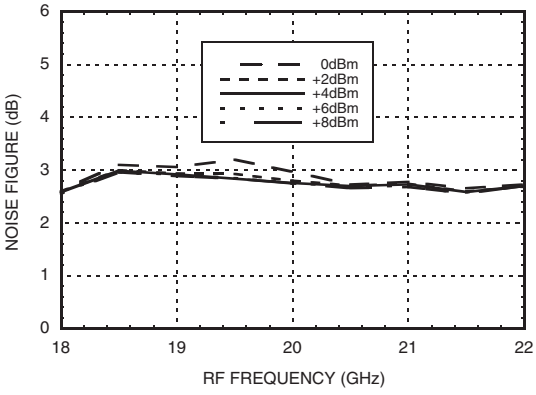
Phase Balance vs. LO Drive



Noise Figure vs. LO Drive, LO Frequency = 10.3 GHz



Noise Figure vs. LO Drive, IF Frequency = 100 MHz



** Conversion gain data taken with external IF hybrid, LO frequency fixed at 10.3 GHz and RF varied*

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MxN Spurious Outputs

	nLO				
mRF	0	1	2	3	4
0	xx	28	19	26	34
1	33	30	0	29	44
2	67	79	62	67	44
3	xx	xx	xx	79	87
4	xx	xx	xx	xx	xx

RF = 22 GHz @ -20 dBm
LO = 10.5 GHz @ +4 dBm
Data taken without IF hybrid
All values in dBc below IF power level (1RF -2LO = 1 GHz)

Absolute Maximum Ratings

RF	+2 dBm
LO Drive	+ 13 dBm
Vdd	5.5V
Channel Temperature	175°C
Continuous Pdiss (T=85°C) (derate 10.2 mW/°C above 85°C)	920 mW
Thermal Resistance (R_{TH}) (channel to package bottom)	98.3 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C
ESD Sensitivity (HBM)	Class 1B

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

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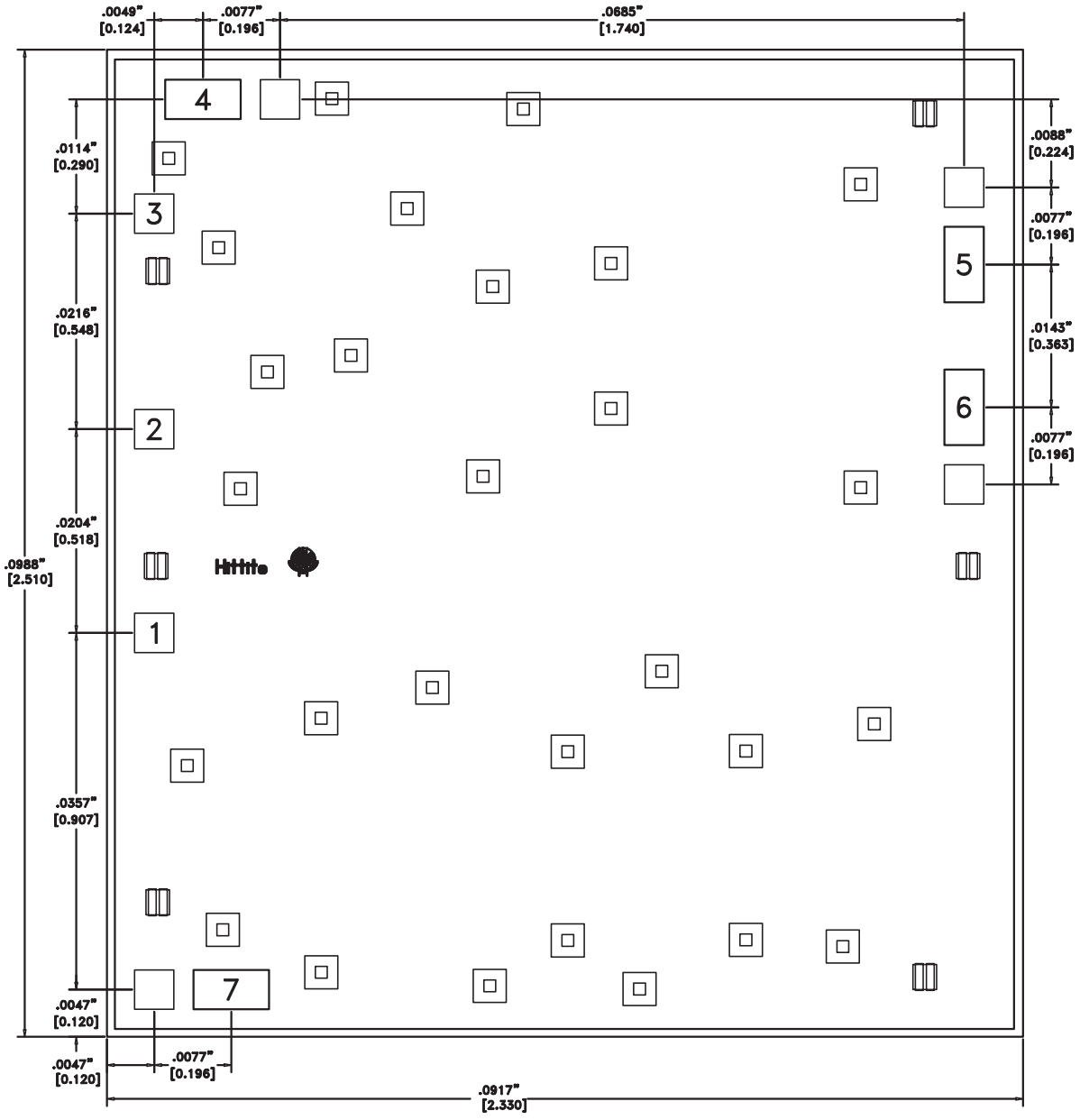
Outline Drawing



Die Packaging Information [1]

Standard	Alternate
GP-1 (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 ARE IN INCHES [MM]
2. DIE THICKNESS IS 0.004"
3. BOND PAD METALIZATION: GOLD
4. BACKSIDE METALIZATION: GOLD
5. BACKSIDE METAL IS GROUND
6. OVERALL DIE SIZE ±0.002

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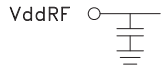
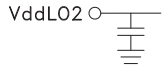
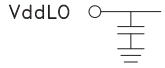
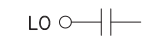
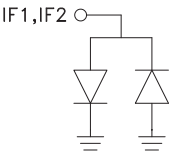
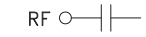
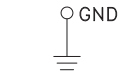
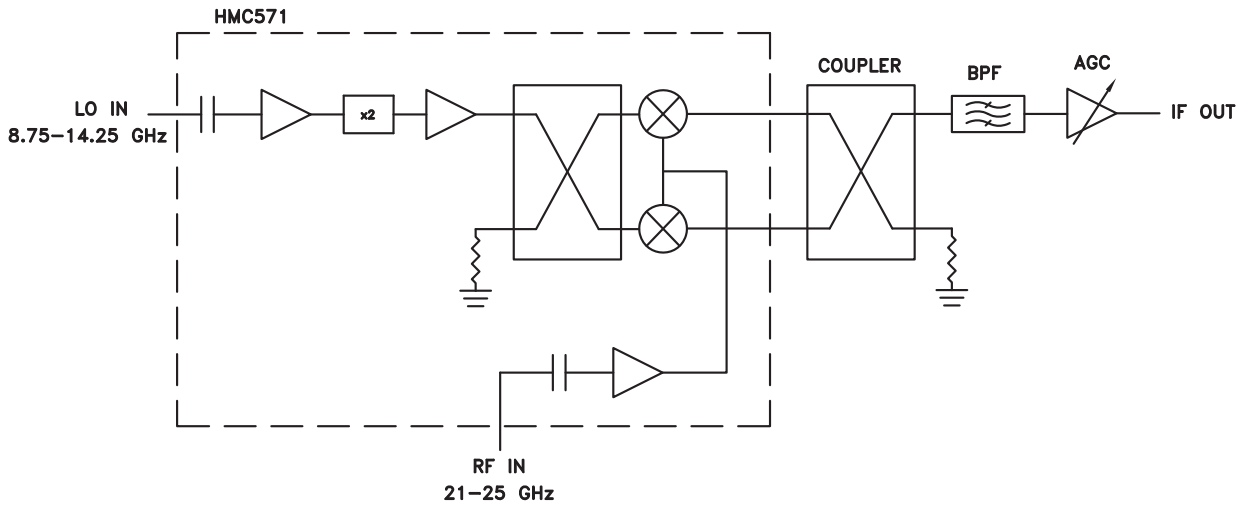
Pad Descriptions

Pad Number	Function	Description	Interface Schematic
1	VddRF	Power supply for RF LNA. External RF bypass capacitors are required.	
2	VddLO2	Power supply for second stage of LO amplifier. External RF bypass capacitors are required.	
3	VddLO	Power supply for first stage of LO amplifier. External RF bypass capacitors are required.	
4	LO	This pad is AC coupled and matched to 50 Ohms.	
5	IF1	This pad is DC coupled for applications not requiring operation to DC. This port should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary frequency range. For operation to DC, this pad must not source /sink more than 3 mA of current or die non - function and possible die failure will result.	
6	IF2		
7	RF	This pad is AC coupled and matched to 50 Ohms.	
	GND	The backside of the die must be connected to RF/DC ground.	

Typical Application



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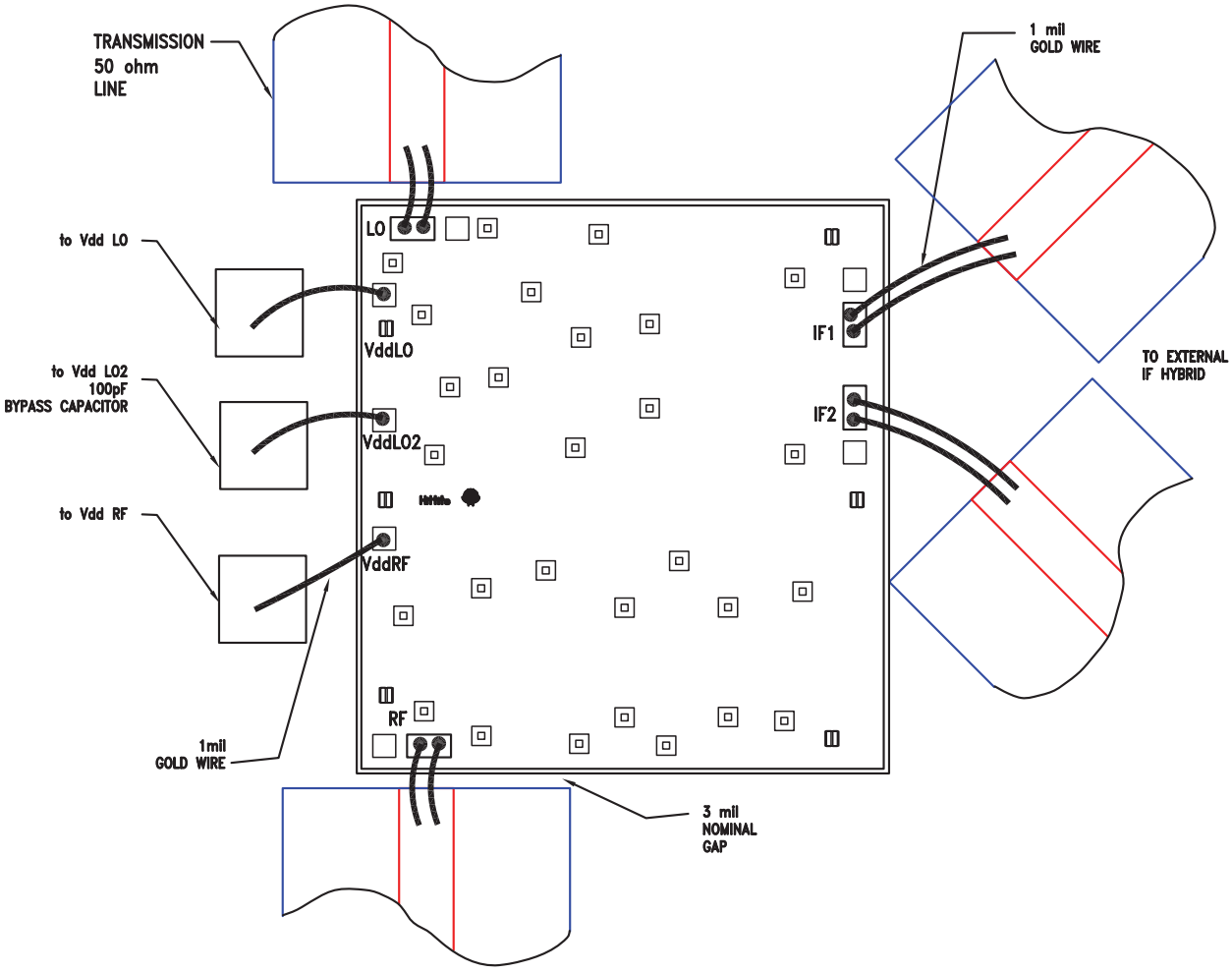
Assembly Drawing



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