

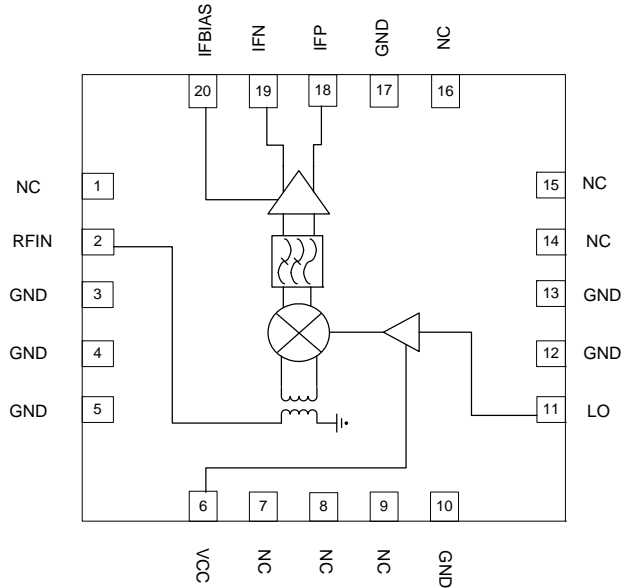


Features

- RF: 1500MHz to 2200MHz
- LO: 1400MHz to 2400MHz
- IF: 50MHz to 300MHz
- Operates Both High and Low-Side LO
- Conversion Gain: 7.5dB (IF=50MHz)
- Input IP3: 29dBm
- Input P1dB: 14dBm
- Adjustable Current and IP3 (via IFBIAS)
- Single +5V Supply

Applications

- Cellular, 3G Infrastructure
- WiBro, WiMax LTE
- Wireless Backhaul
- High Performance Communications Systems
- GMSK, QPSK, DQPSK, QAM Modulation



Functional Block Diagram

Product Description

The RFX1015 is a high linearity down-converter module designed for use in Cellular, 3G, LTE, and other high performance communications systems. The RFX1015 contains an integrated LO buffer amp and a passive mixer core with an amplified differential IF output. The integrated LO buffer lowers the LO drive requirement to a friendly 0dBm typical. The RFX1015 supports both low and high-side LO injection for IF frequencies up to 300MHz. The RFX1015 also offers an adjustable IP3 range via the IFBIAS pin. Users can lower the IF amplifier DC current to save DC power when they don't require the device's peak linearity performance.

Ordering Information

RFMX1015SQ	Sample Bag with 25 pieces
RFMX1015SR	7" Reel with 100 pieces
RFMX1015TR7	7" Reel with 750 pieces
RFMX1015TR13	13" Reel with 2500 pieces
RFMX1015PCK-410	1500MHz to 2200MHz PCBA with 5-piece Sample Bag

Optimum Technology Matching® Applied

- | | | | |
|---|--|-------------------------------------|------------------------------------|
| <input type="checkbox"/> GaAs HBT | <input type="checkbox"/> SiGe BiCMOS | <input type="checkbox"/> GaAs pHEMT | <input type="checkbox"/> GaN HEMT |
| <input checked="" type="checkbox"/> GaAs MESFET | <input type="checkbox"/> Si BiCMOS | <input type="checkbox"/> Si CMOS | <input type="checkbox"/> BiFET HBT |
| <input checked="" type="checkbox"/> InGaP HBT | <input checked="" type="checkbox"/> SiGe HBT | <input type="checkbox"/> Si BJT | <input type="checkbox"/> LDMOS |

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Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage (V_{CC})	5.5	V
Maximum RF Input Power	18	dBm
Maximum LO Input Power	10	dBm
Maximum Power Dissipation	1.5	W
Operating Temperature Range	-40 to +85	°C
Storage Temperature Range	-40 to +150	°C
Maximum Junction Temperature	+150	°C
ESD Rating - Human Body Model	Class 1A	
Moisture Sensitivity Level	MSL 3	



Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

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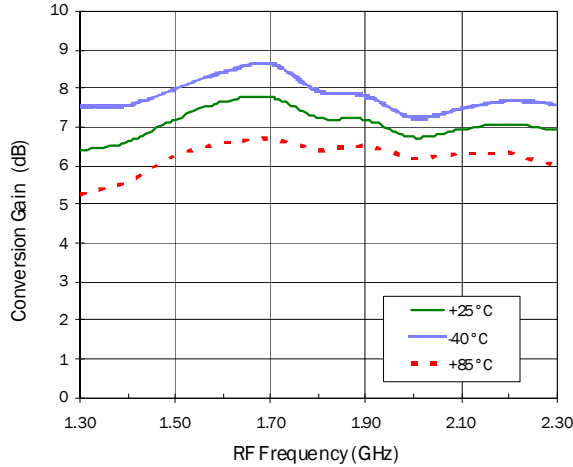
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
General Performance					
Conversion Gain	6.5	7.0	8.5	dB'	$f_{RF} = 1960\text{MHz}$, $f_{LO} = 1810\text{MHz}$
Input Third Order Intercept		29		dBm	$f_{RF1} = 1960\text{MHz}$, $f_{RF2} = 1961\text{MHz}$, $f_{LO} = 1810\text{MHz}$, -5 dBm/tone
Input 1dB Compression Point		14		dBm	$f_{RF} = 1960\text{MHz}$, $f_{LO} = 1810\text{MHz}$
Noise Figure		14.5		dB	SSB NF, $f_{RF} = 1960\text{MHz}$, $f_{LO} = 1910\text{MHz}$
LO Leakage at RF Port		-22		dBm	LO=0dBm
LO Leakage at IF Port		-23		dBm	LO=0dBm
RF to IF Isolation		39		dB	LO=0dBm, $P_{RF} = 0\text{dBm}$
2RF to 2LO Spurious Response		-63		dBc	$P_{RF} = -10\text{dBm}$
3RF to 3LO Spurious Response		-70		dBc	$P_{RF} = -10\text{dBm}$
RF Interface					
Frequency Range	1500		2200	MHz	
Input Return Loss		12		dB	IF port terminated, LO=0dBm
Input Impedance		50		Ω	
LO Interface					
Frequency Range	1400		2400	MHz	
LO Input Power	-3	0	3	dBm	
Return Loss		15		dB	IF port terminated
Impedance		50		Ω	
IF Interface					
Frequency Range	50		300	MHz	
Output Return Loss		15		dB	
Differential Output Impedance		200		Ω	
Power Supply					
Supply Voltage (V_{CC})	4.75	5	5.25	V	
Supply Current (I_{CC})	175	200	240	mA	Sum of all currents.
Thermal Resistance of LO Amp		93		C/W	Based on LO Amp current (pin 6)
Thermal Resistance of IF Amp		88		C/W	Based on IF Amp current (pins 18 and 19)

Notes:

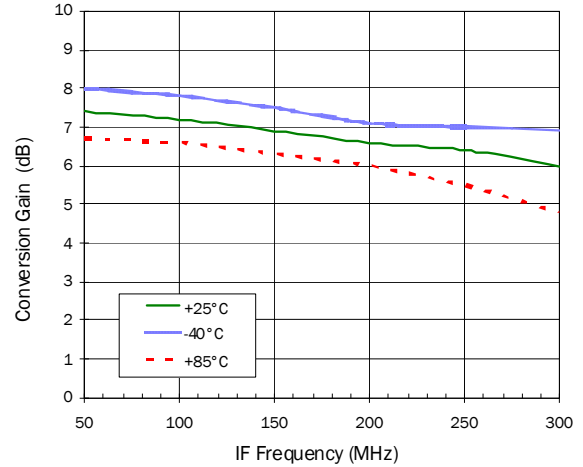
1. Data shown for $V_{CC} = 5.0\text{V}$, LO Power = 0dBm, $T = 25^\circ\text{C}$
2. All measurements performed with an RFMD IF BALUN (P/N RFXF2553) on the EVM.

For all graphs: Typical Performance - Low Side LO ($f_{RF} > f_{LO}$), $V_{CC} = 5.0V$, $P_{LO} = 0dBm$, $P_{RF} = 0dBm$, $f_{IF} = 150 MHz$, unless otherwise noted.

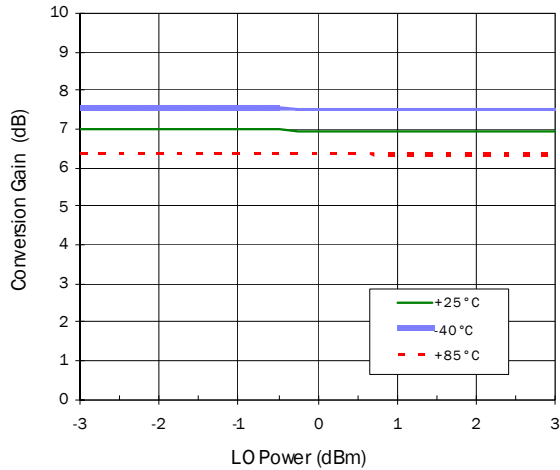
Conversion Gain vs. RF Frequency



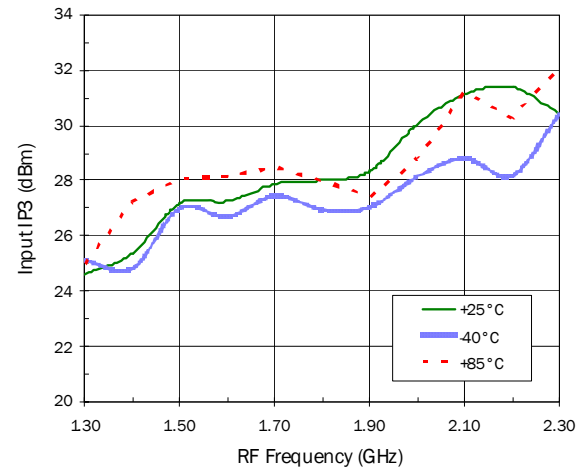
Conversion Gain vs. IF Frequency (LO=1900MHz)



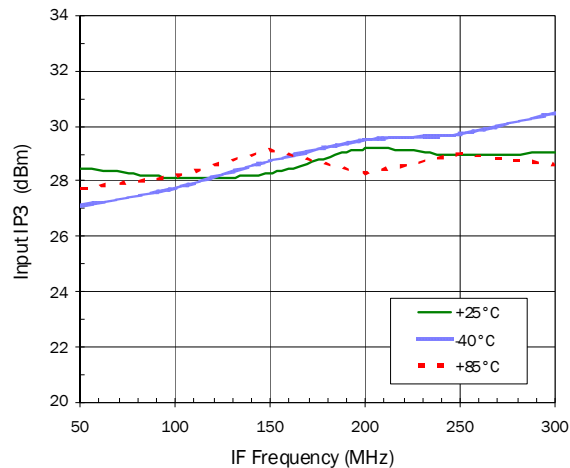
Gain vs. LO Power (RF=1950MHz, LO=1800 MHz)



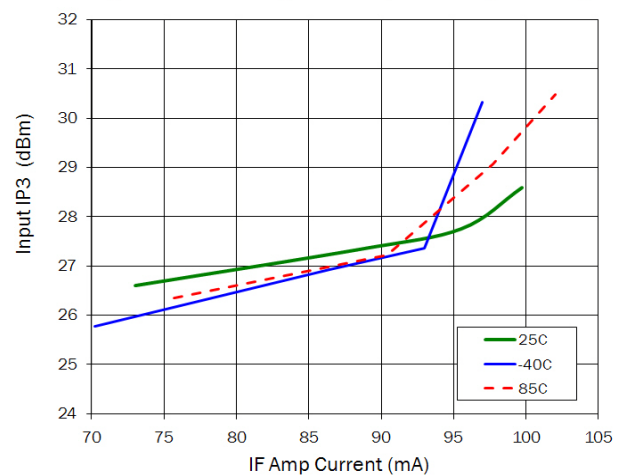
Input IP3 vs. RF Frequency



Input IP3 vs. IF Frequency (RF=1950MHz)

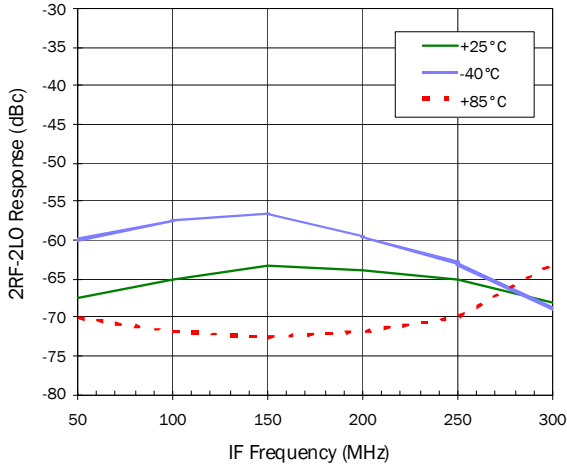


Input IP3 vs. IF Amp Current (IFBIAS adjustment)

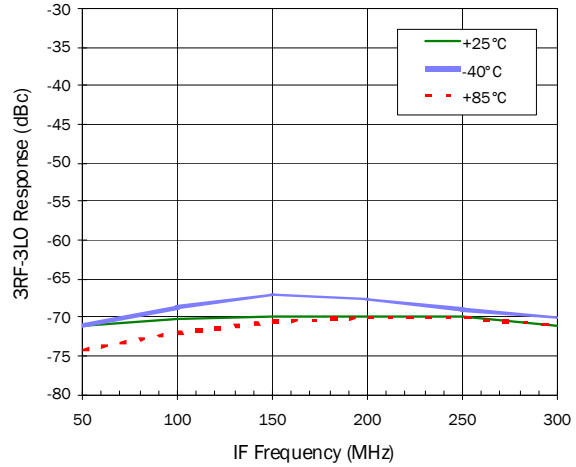


For all graphs: Typical Performance - Low Side LO ($f_{RF} > f_{LO}$), $V_{CC} = 5.0V$, $P_{LO} = 0dBm$, $P_{RF} = 0dBm$, $f_{IF} = 150MHz$, unless otherwise noted.

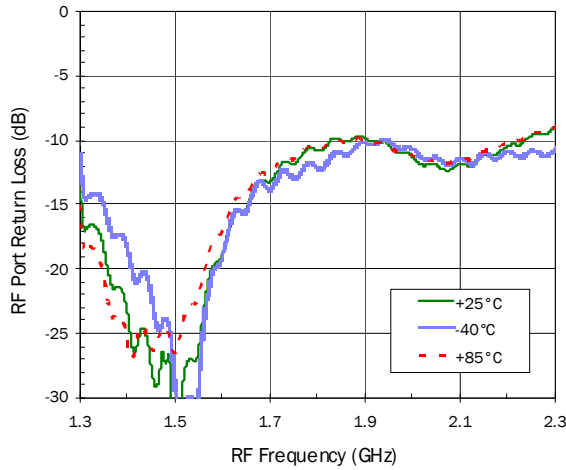
2RF-2LO Response vs. IF Freq (RF=1950MHz)



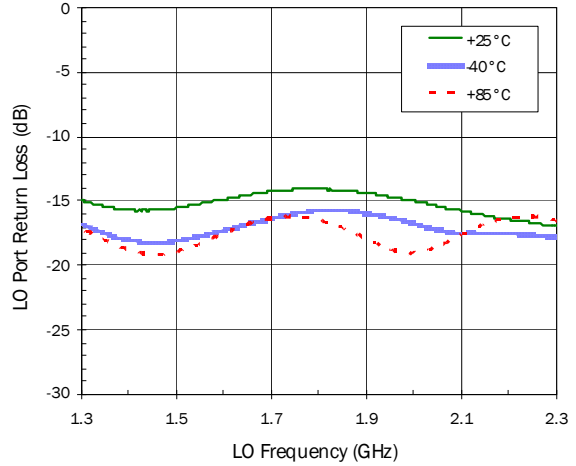
3RF-3LO Response vs. IF Freq (RF=1950MHz)



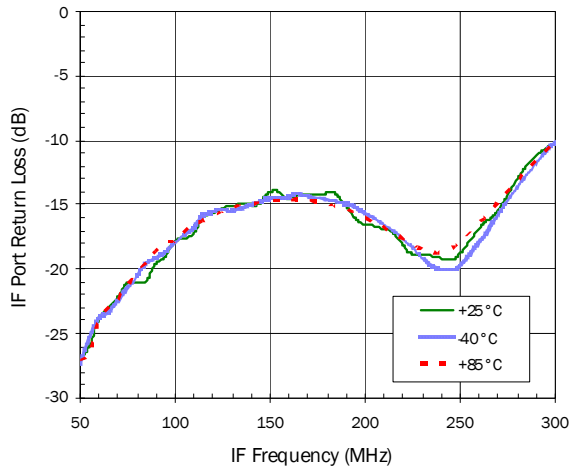
RF Port Return Loss vs. RF Frequency



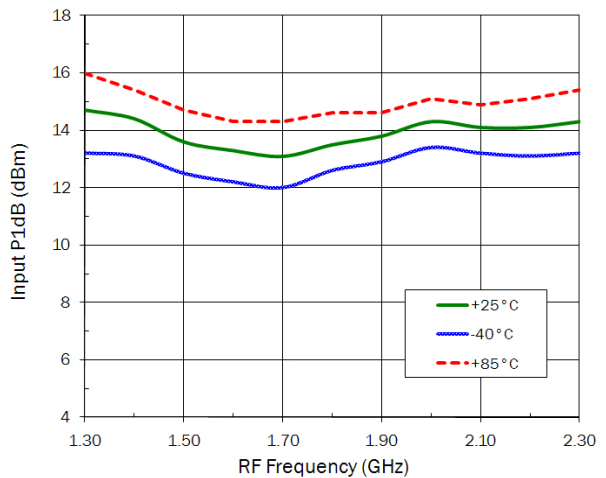
LO Port Return Loss vs. LO Frequency



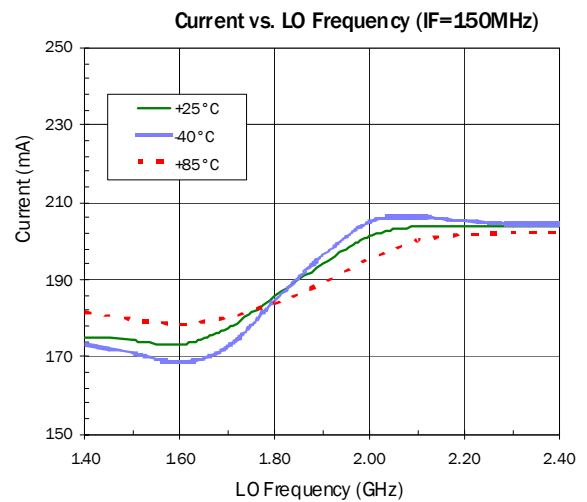
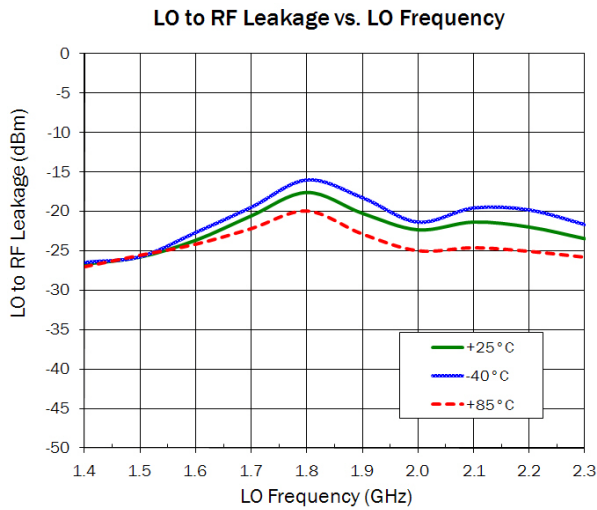
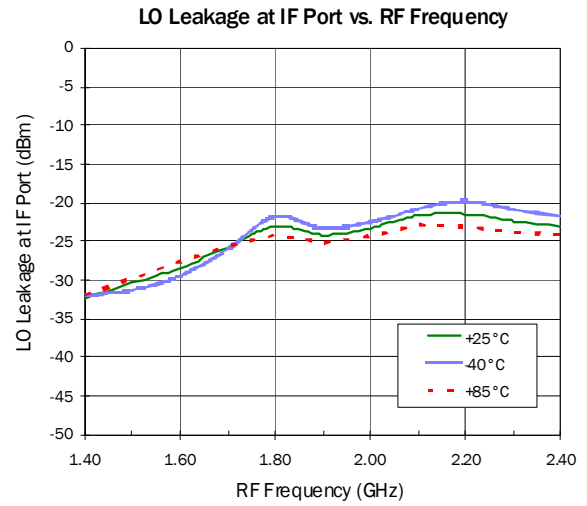
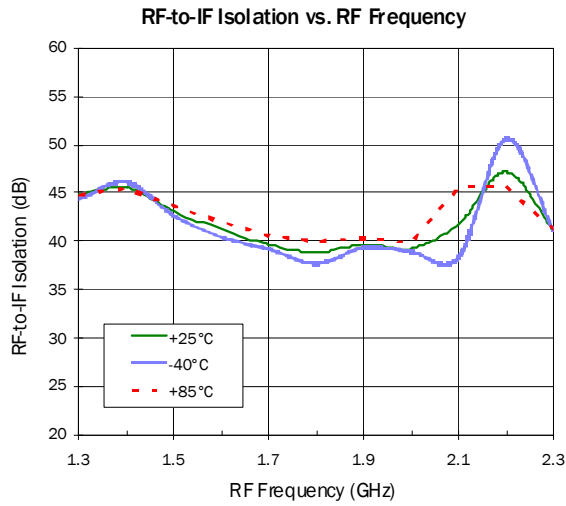
IF Port Return Loss vs. IF Frequency



Input P1dB vs. RF Frequency

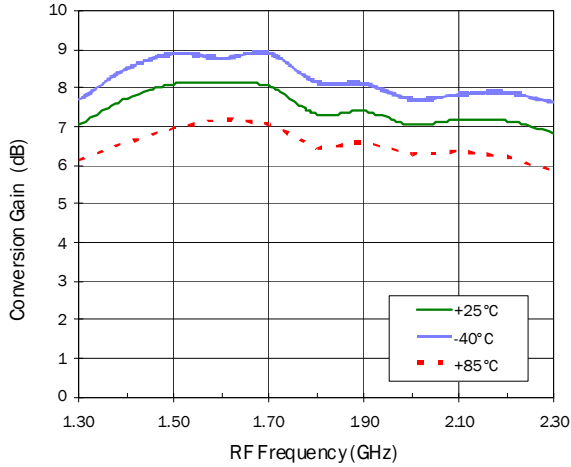


For all graphs: Typical Performance - Low Side LO ($f_{RF} > f_{LO}$), $V_{CC} = 5.0V$, $P_{LO} = 0dBm$, $P_{RF} = 0dBm$, $f_{IF} = 150MHz$, unless otherwise noted.

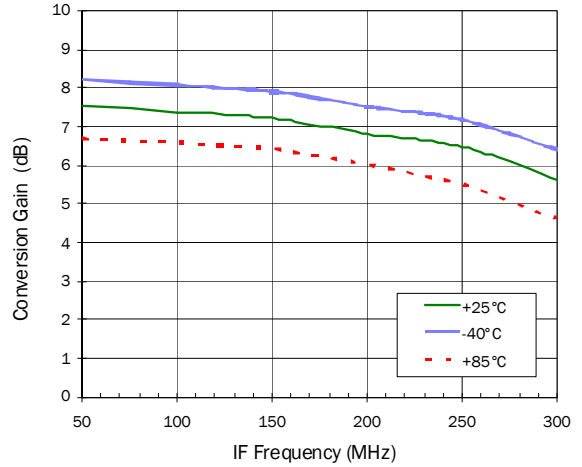


For all graphs: Typical Performance - High Side LO ($f_{RF} > f_{LO}$), $V_{CC} = 5.0V$, $P_{LO} = 0dBm$, $P_{RF} = 0dBm$, $f_{IF} = 150MHz$, unless otherwise noted.

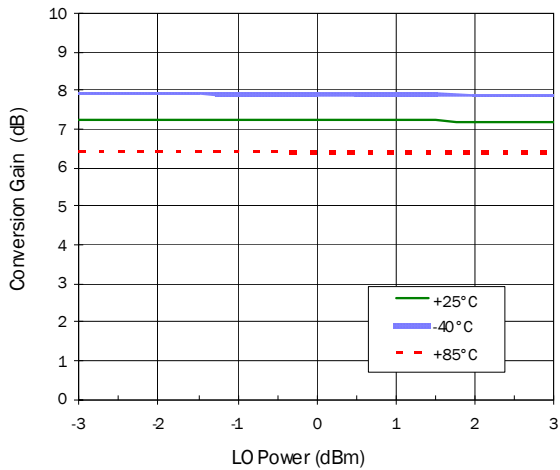
Conversion Gain vs. RF Frequency (High Side LO)



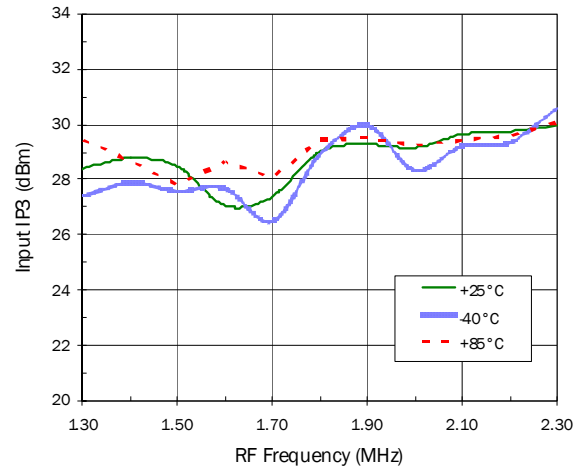
Gain vs. IF Freq (RF=1950MHz, High Side LO)



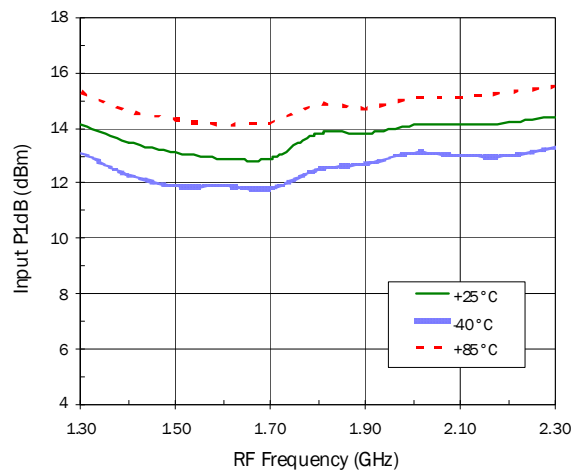
Gain vs. LO Power (RF=1950MHz, LO=2100MHz)



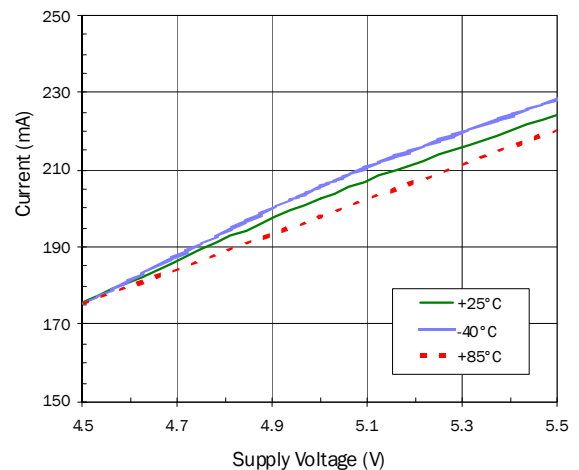
Input IP3 vs. RF Frequency (High Side LO)



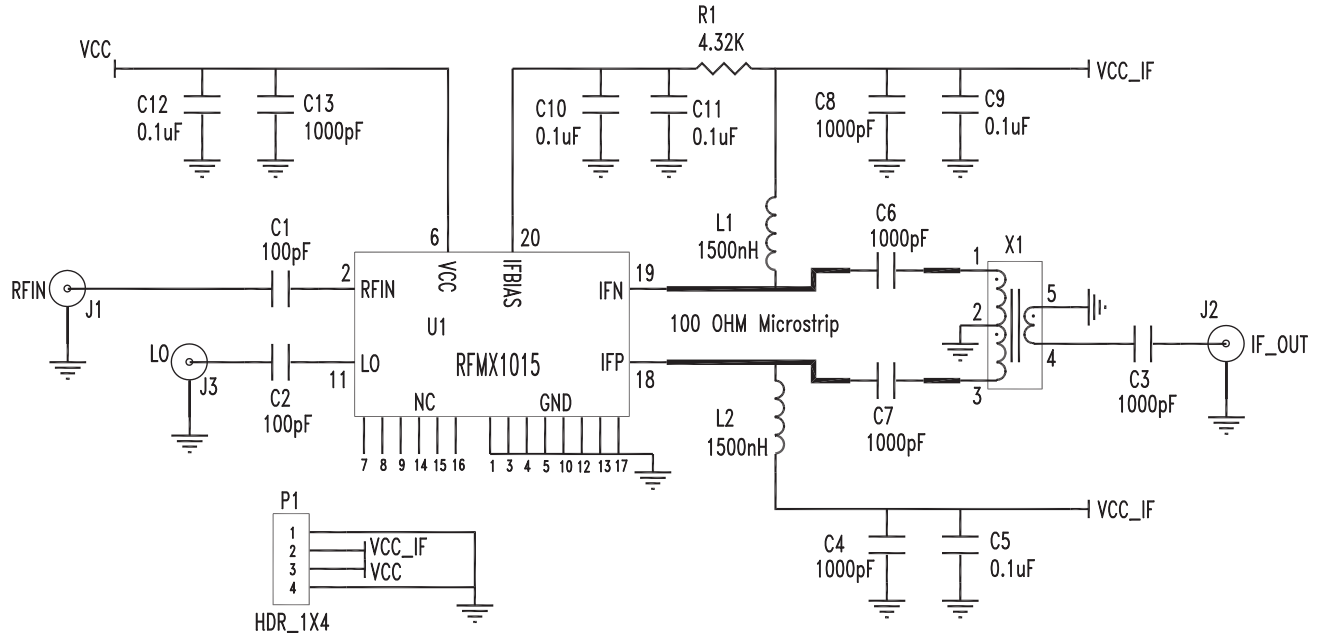
Input P1dB vs. RF Frequency (High Side LO)



Current vs. Supply Voltage



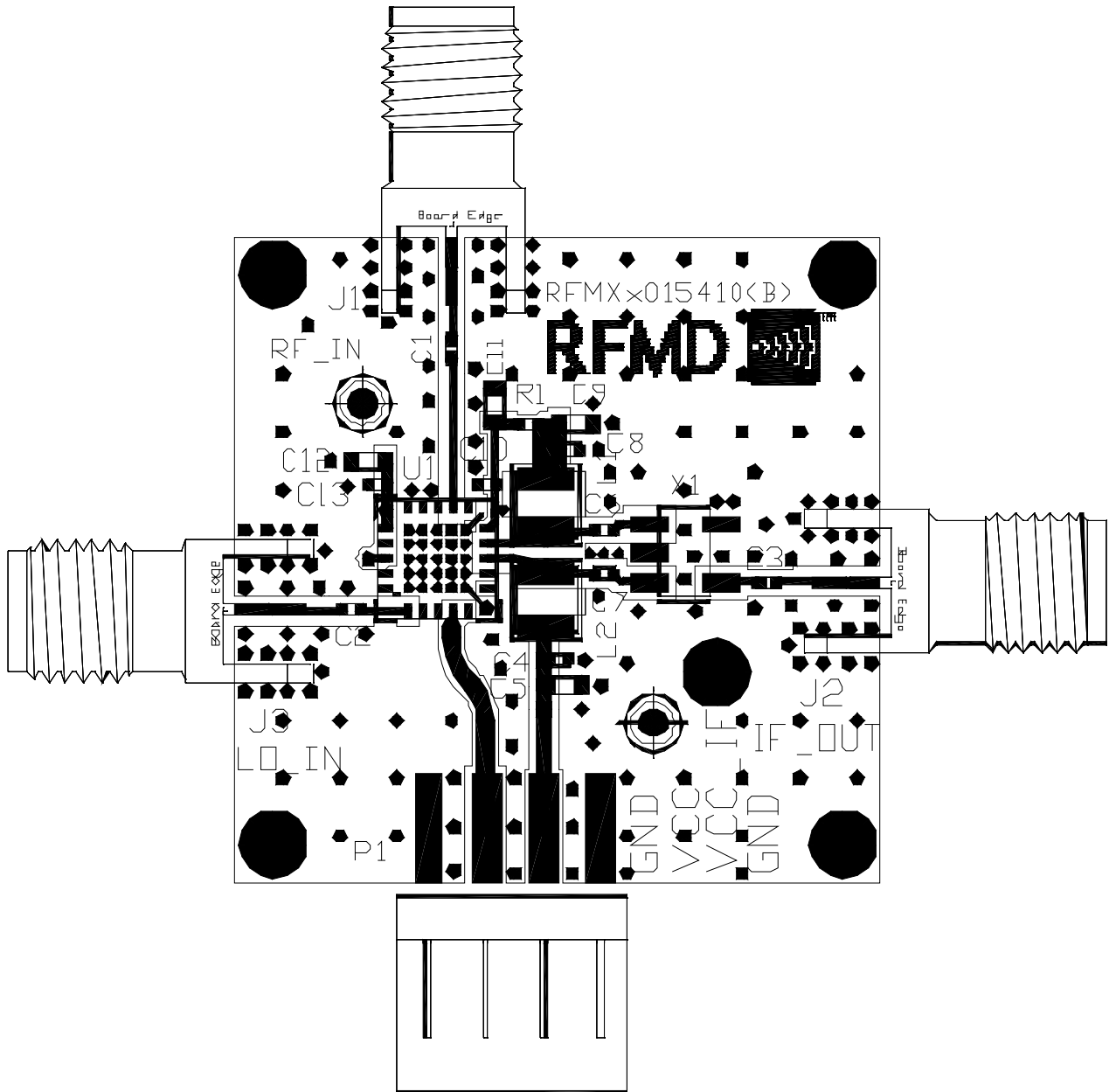
Evaluation Board Schematic



Evaluation Board Bill of Materials

Description	Reference Designator	Manufacturer	Manufacturer's P/N
PCB			RFMX015410(B)
CAP, 100pF, 5%, 50V, C0G, 0402	C1, C2	Murata	GRM1555C1H101JZ01D
CAP, 1000pF, 10%, 50V, X7R, 0402	C3, C4, C6, C7, C8, C13	Murata	GRM155R71H102KA01E
CAP, 0.1uF, 10%, 16V, X7R, 0603	C5, C9, C11, C12	Murata	GRM188R71C104KA01D
CAP, 0.1uF, 10%, 16V, X7R, 0402	C10	Murata	GRM155R71C104KA88D
CONN, SMA, END LNCH, MINI, FLT, 0.062"	J1, J2, J3	Emerson	142-0741-851
IND, 1500nH, 5%, W/W, 1008	L1, L2	Coilcraft	1008CS-152XJBC
CONN, HDR, ST, PLRZD, 4-PIN, 0.100"	P1	ITW Pancon	MPSS100-4-C
RES, 4.32K, 1%, 1/16W, 0402	R1	Vishay	CRCW0402 4K32 1% 100 RT7
2GHz Differential IF Down-converter module	U1	RFMD	RFMX1015
RFXF2553, WELDED 350 MHz 1:4 TRANSFORMER	X1	RFMD	RFXF2553

Evaluation Board Assembly Drawing



Pin	Function	Description
1	NC	No internal connection. Can be NC or GND on the PCB.
2	RFIN	RF Single-ended input, external DC block required.
3	GND	Ground.
4	GND	Ground.
5	GND	Ground.
6	VCC	Supply voltage to Mixer and LO buffer amplifier.
7	NC	No internal connection. Can be NC or GND on the PCB.
8	NC	No internal connection. Can be NC or GND on the PCB.
9	NC	No internal connection. Can be NC or GND on the PCB.
10	GND	Ground.
11	LO	Local Oscillator Single-ended Input, external DC block required.
12	GND	Ground.
13	GND	Ground.
14	NC	No internal connection. Can be NC or GND on the PCB.
15	NC	No internal connection. Can be NC or GND on the PCB.
16	NC	No internal connection. Can be NC or GND on the PCB.
17	GND	Ground.
18	IFP	IF Differential Output and V _{CC} for IF Amplifier (collector voltage).
19	IFN	IF Differential Output and V _{CC} for IF Amplifier (collector voltage).
20	IFBIAS	IF Amplifier Current control (30mA range) Min Current: IFBIAS=0V (~75mA) Max Current: IFBIAS=5V (~105mA) Current between 75mA to 105mA: IFBIAS voltage between 0V to 5V.

Package Drawing (Dimensions in millimeters)

