BM831

Mixer

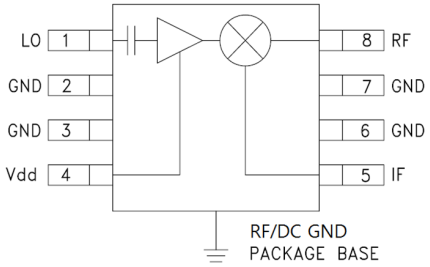
700~1400MHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP

Device Features

- +31.7 dBm Input IP3
- 8.8dB Conversion Loss
- Integrated LO Driver
- -2 to +2dBm LO drive level
- Available 3.3V to 5V single voltage
- MSL 1, MSOP 8, Green / RoHS2 compliant
- ESD HBM Class 1B



Functional Block Diagram



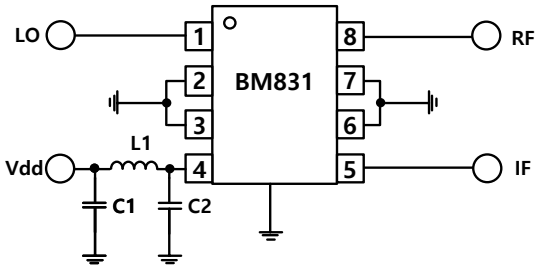
Product Description

The BM831 is a high linearity and dynamic covering range from 700MHz to 1400MHz on 3.3V to 5V with a passive GaAs FET converter and two stage LO driver. This is packaged in a plastic surface mountable MSOP8 with Lead-free / Green / RoHS2 compliant. Typical Input IP3 and Conversion loss are 31.7dBm and 8.8dB, respectively. All devices are 100% RF/DC screened.

Applications

- Base station /Repeaters Infrastructure/Small Cell
- Commercial/Industrial/Military wireless system
- LTE / WCDMA /CDMA Wireless Infrastructure

Application Circuit



RF/DC GND PACKAGE BASE

IF Frequency	BOM	Value
50~100MHz	C1	1nF
	C2	-
	L1	56nH
100~210MHz	C1	-
	C2	1nF
	L1	56nH

*** Note**

- See page 15 for SMT

Recommended Operating Conditions

Parameter	Min.	Typical	Max.	Unit
Bandwidth	700		1400	MHz
I_d @ (Vd = 5.0V)	52	58	64	mA
I_d @ (Vd = 3.3V)	40	45	50	mA
R_{TH}		99		°C/W
Operating Case Temperature	-40		+85	°C

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Typical Performance[1]

Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=5V Ids=58mA

Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
RF Frequency Range	700~800			800~900			900~1000			1000~1100			1100~1400			MHz
LO Frequency Range	750~1010			850~1110			950~1210			1050~1310			1150~1610			MHz
IF Frequency Range	50~210			50~210			50~210			50~210			50~210			MHz
SSB Conversion Loss		10.1			9.1			8.8			8.9			9.3		dB
Input IP3[2]		30.3			31.7			31.7			32.6			32.6		dBm
LO Leakage RF Port		-9.1			-7.2			-6.0			-4.5			-2.8		dBm
LO Leakage IF Port		-15.0			-17.7			-18.7			-16.5			-11.1		dBm
RF-IF Isolation		-20.0			-22.4			-25.6			-25.9			-20.3		dB
RF Return Loss		-11.7			-14.7			-16.0			-16.0			-14.6		dB
IF Return Loss		-10.0			-9.0			-8.5			-8.6			-9.8		dB
Input P1dB		23.7			24.2			24.5			24.3			24.0		dBm
LO Drive Level	-2	0	+2	-2	0	+2	-2	0	+2	-2	0	+2	-2	0	+2	dBm

Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V Ids= 45mA

Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
RF Frequency Range	700~800			800~900			900~1000			1000~1100			1100~1400			MHz
LO Frequency Range	750~1010			850~1110			950~1210			1050~1310			1150~1610			MHz
IF Frequency Range	50~210			50~210			50~210			50~210			50~210			MHz
SSB Conversion Loss		10.0			9.0			8.8			9.0			9.7		dB
Input IP3[2]		32.8			28.5			28.5			28.5			30.3		dBm
LO Leakage RF Port		-11.3			-9.9			-8.9			-7.8			-5.9		dBm
LO Leakage IF Port		-18.1			-21.3			-22.5			-20.3			-15.0		dBm
RF-IF Isolation		-19.1			-22.0			-25.3			-25.5			-19.7		dB
RF Return Loss		-15.3			-19.3			-20.3			-18.1			-15.2		dB
IF Return Loss		-9.0			-7.6			-7.2			-7.7			-7.4		dB
Input P1dB		18.9			19.1			19.1			18.6			17.9		dBm
LO Drive Level	-2	0	+2	-2	0	+2	-2	0	+2	-2	0	+2	-2	0	+2	dBm

[1] Specifications show on 0dBm-LO drived power and 50 MHz-IF frequency in a down converting configuration with high-side LO.
[2] IIP3 is measured on two tone with RF in power 0dBm/ tone , F2—F1 = 1 MHz..

Absolute Maximum Ratings

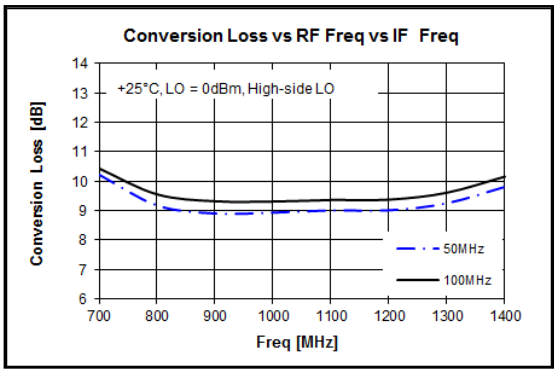
Parameter	Rating	Unit
Storage Temperature	-55 to +155	°C
Junction Temperature	+180	°C
Supply Voltage	+7	V
LO Power	+10	dBm
Input RF/IF Power	+25	dBm

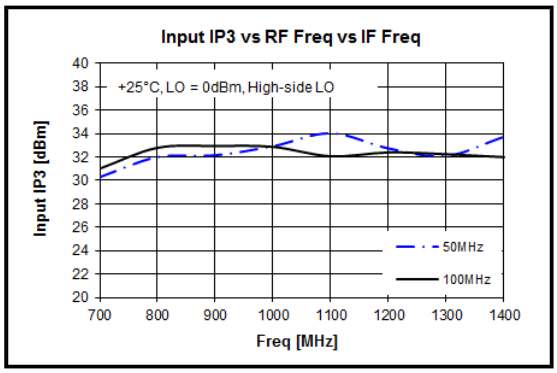
Operation of this device above any of these parameters may result in permanent damage.

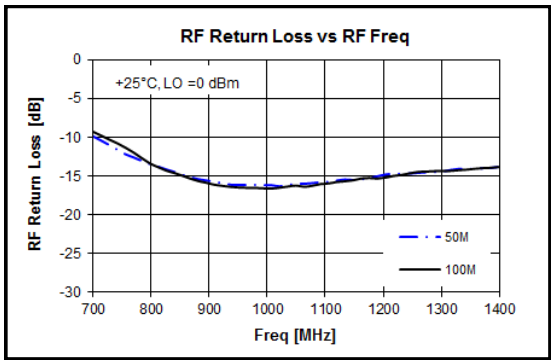
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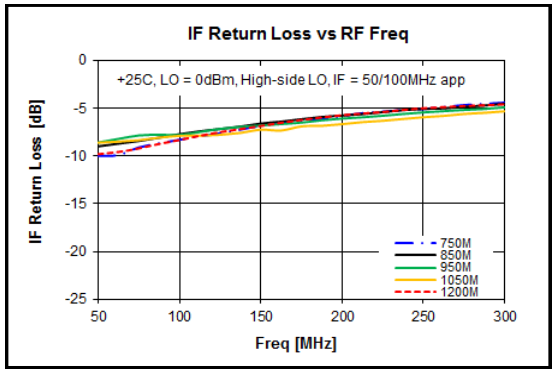
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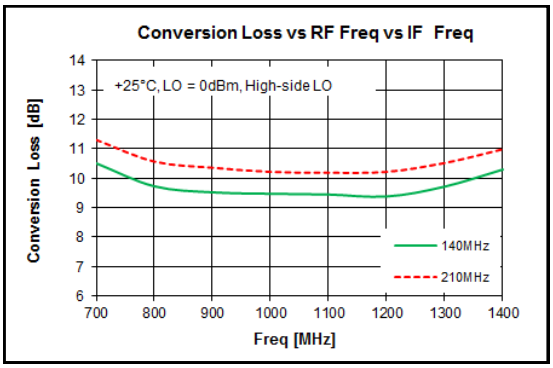
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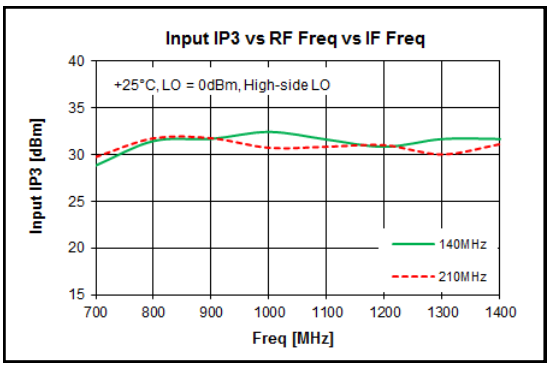


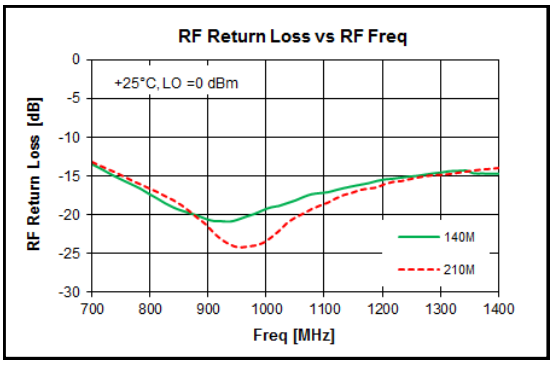


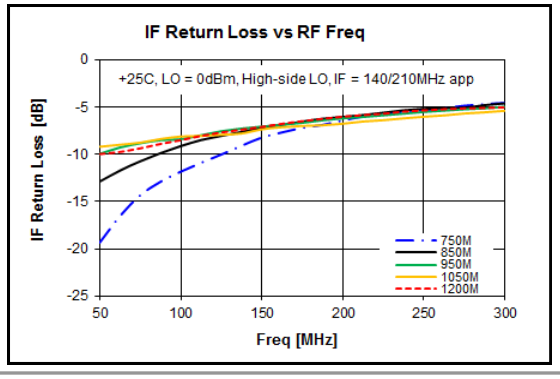








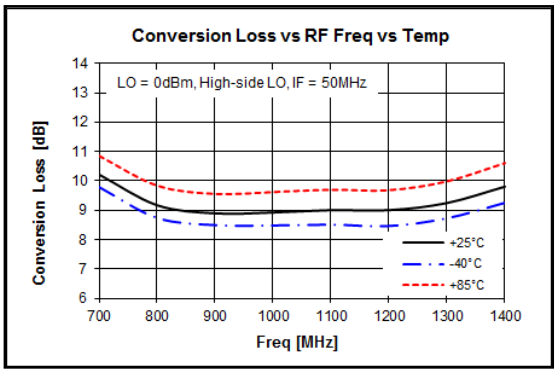


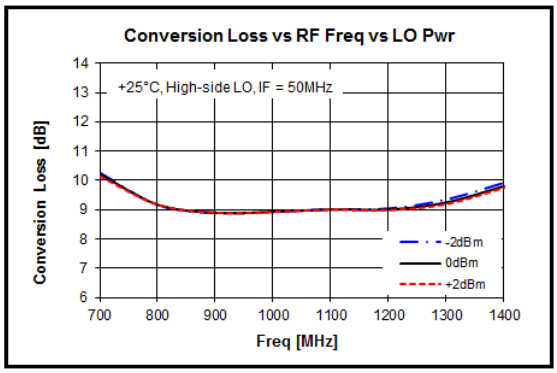


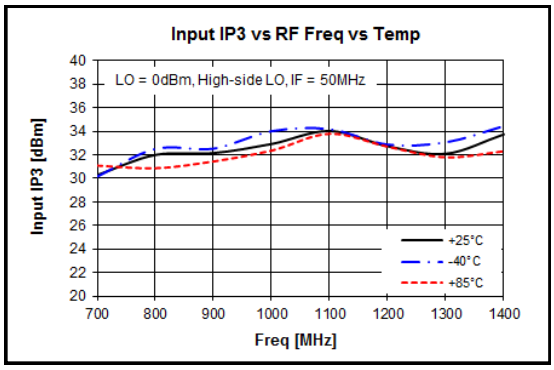
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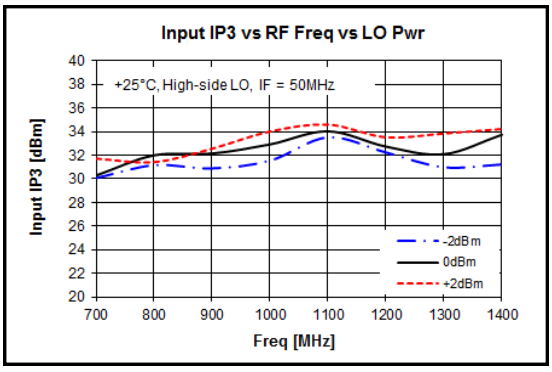
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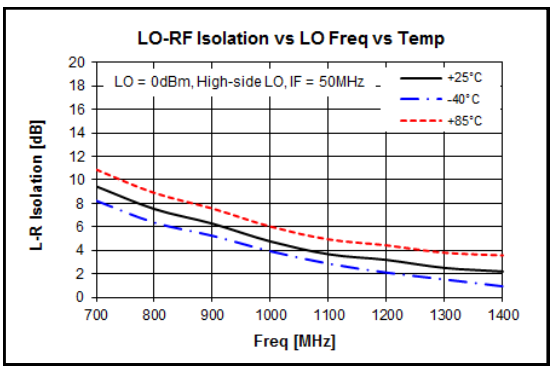
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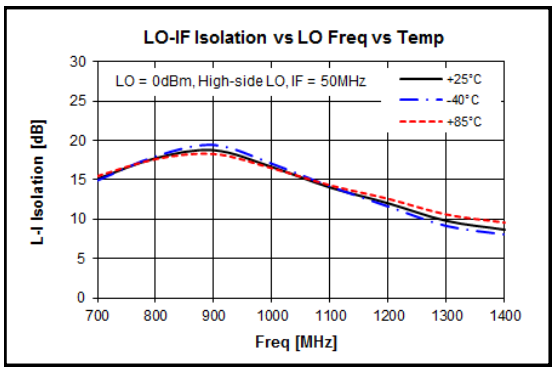


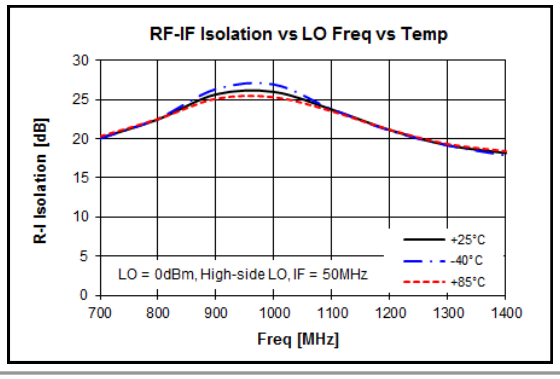


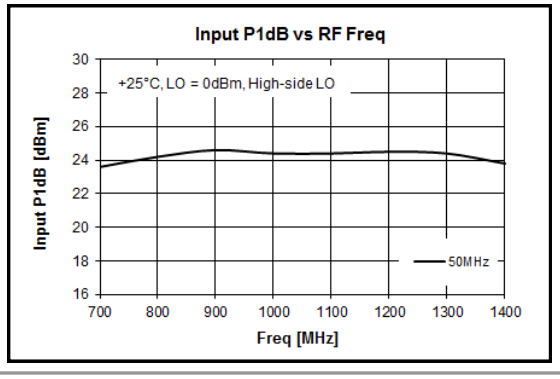








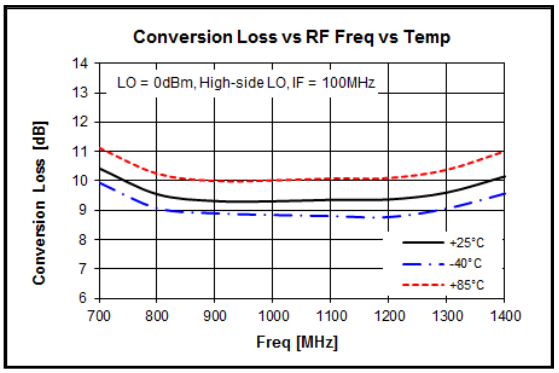


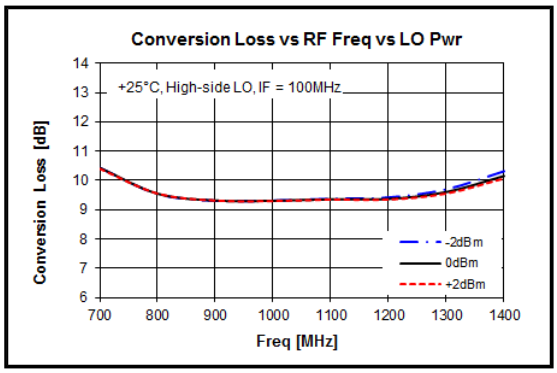


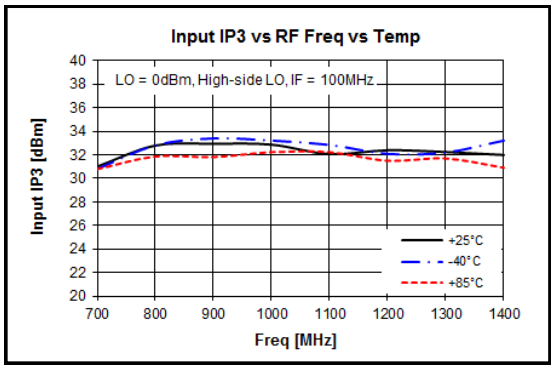
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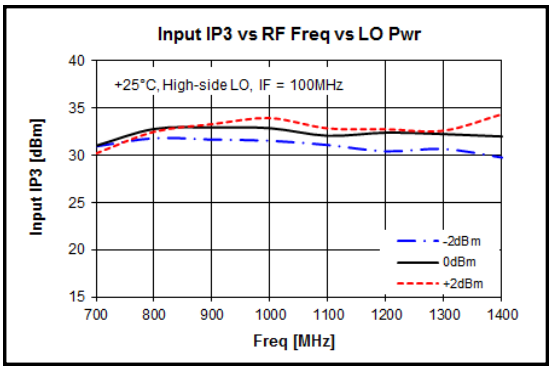
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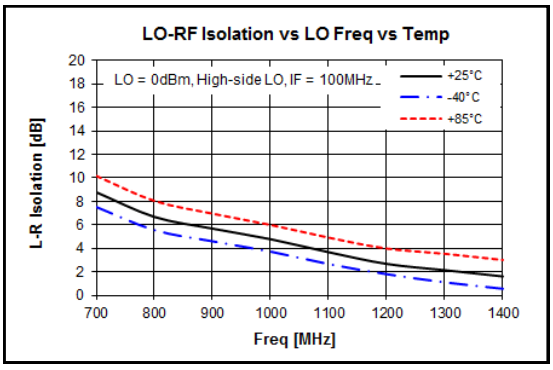
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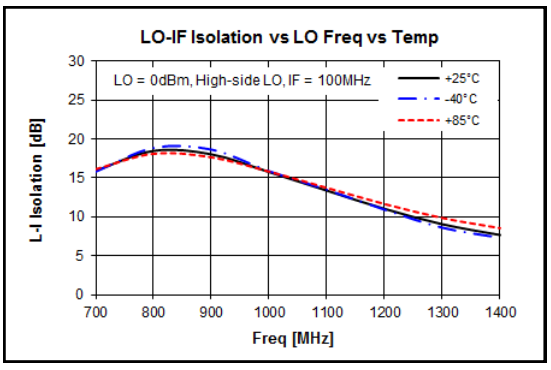


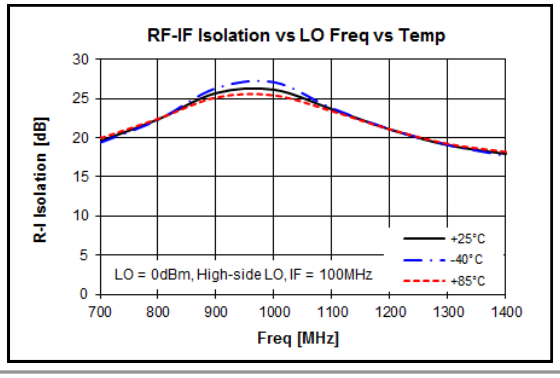


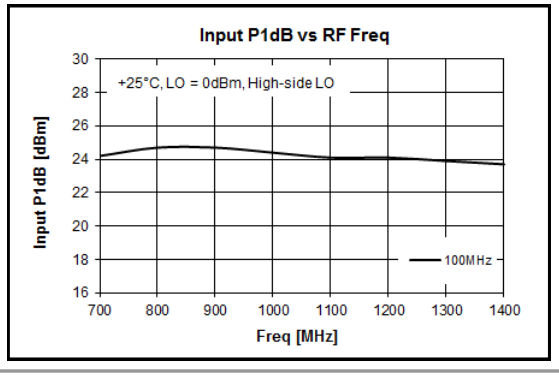








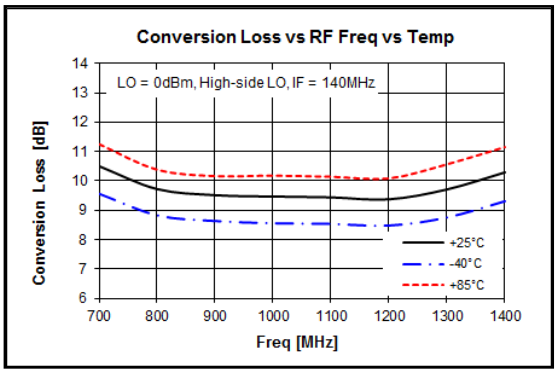


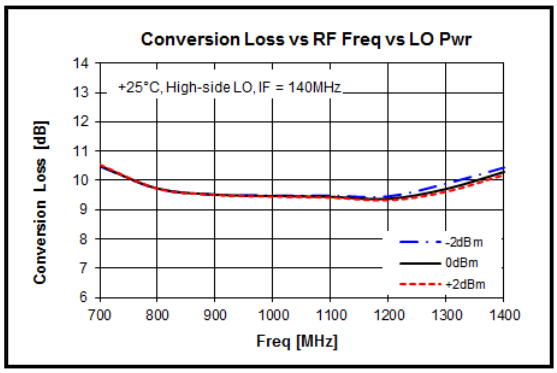


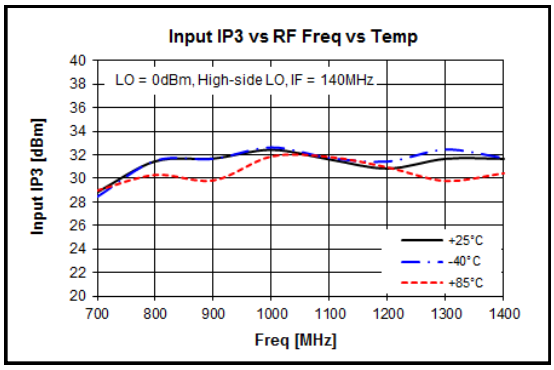
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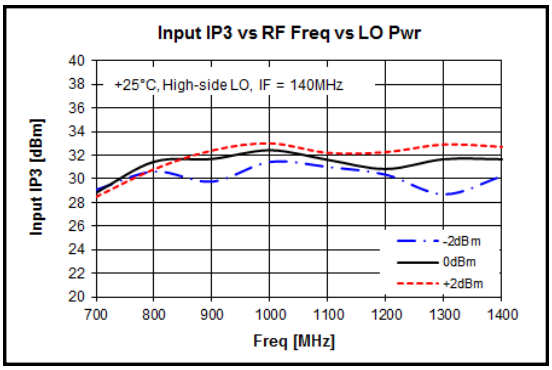
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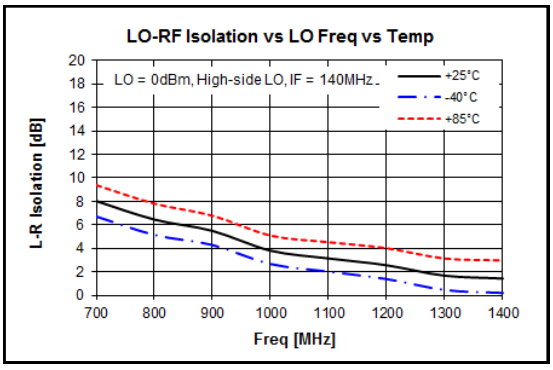
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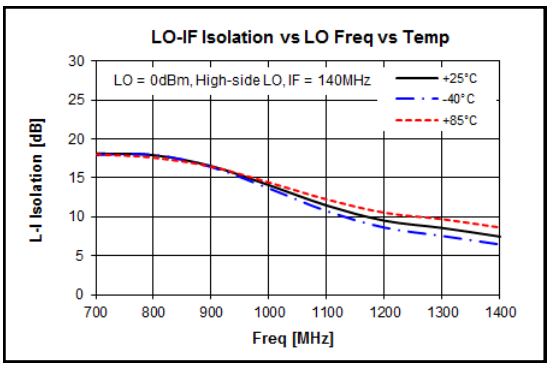


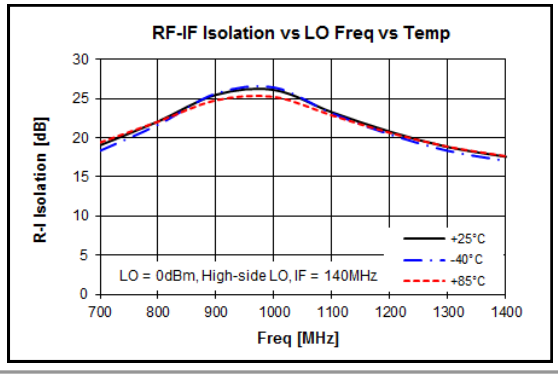


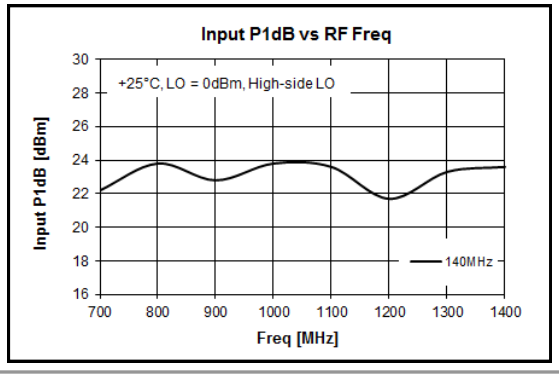








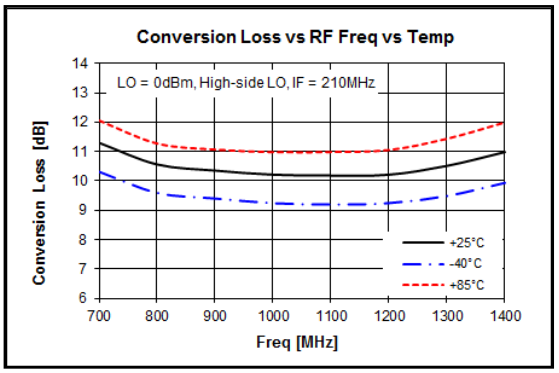


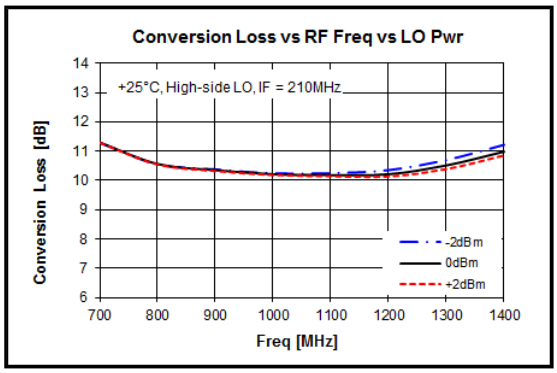


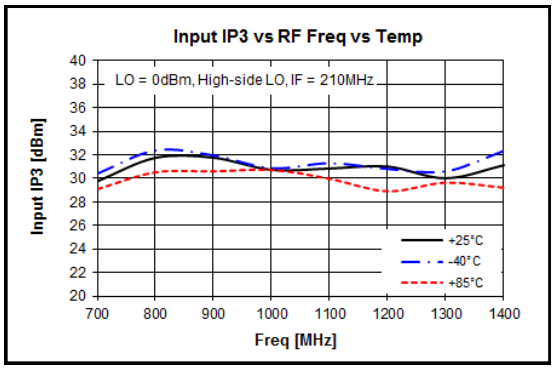
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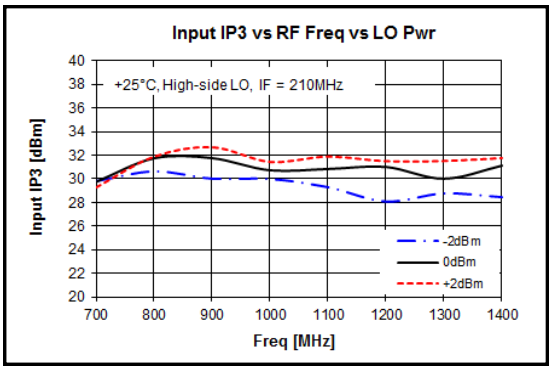
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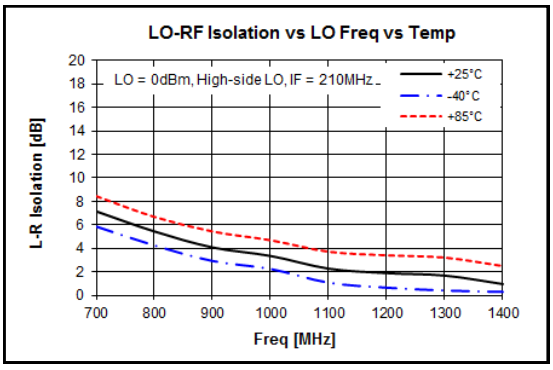
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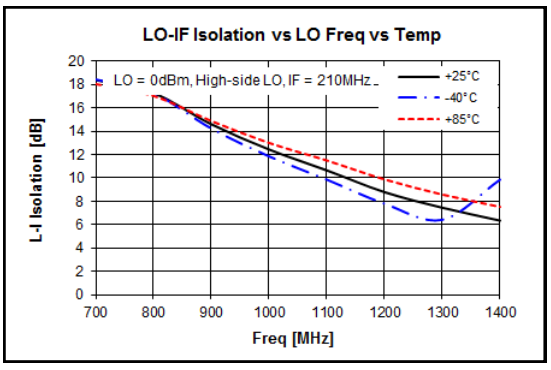


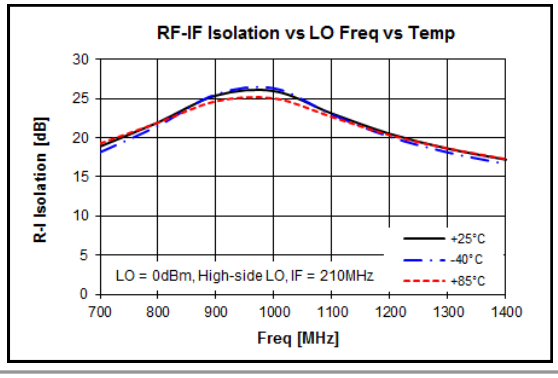


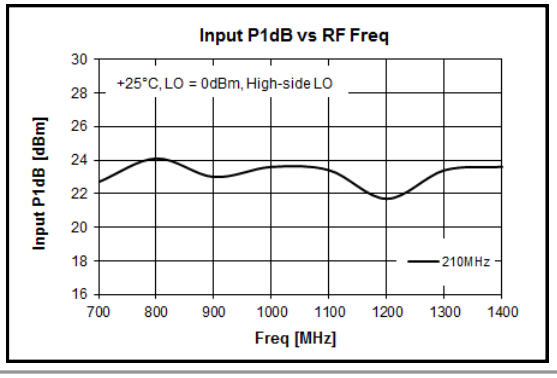








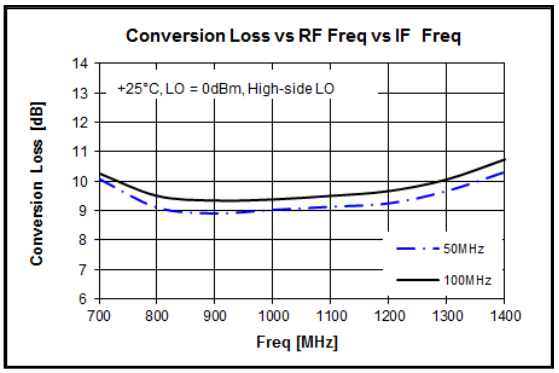


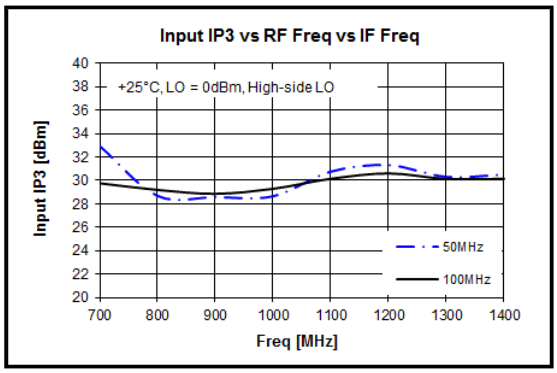


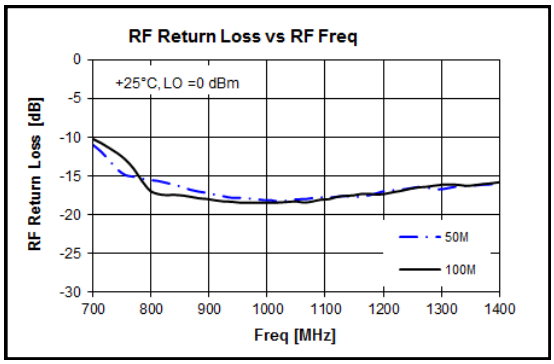
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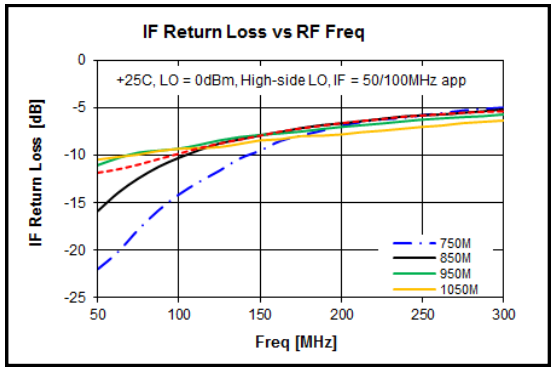
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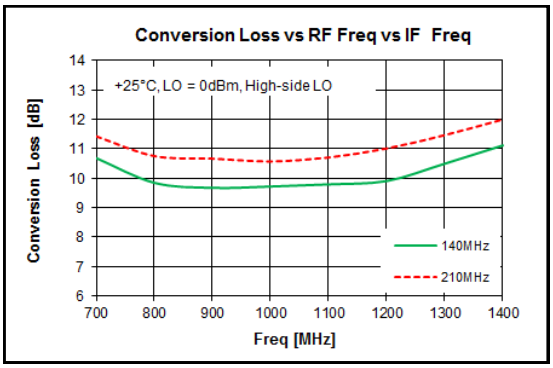
Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V, Ids=45mA, Down converting

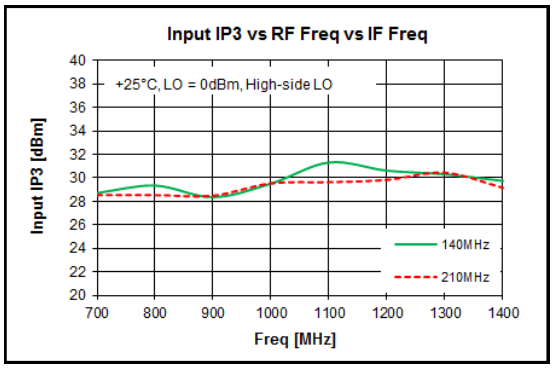


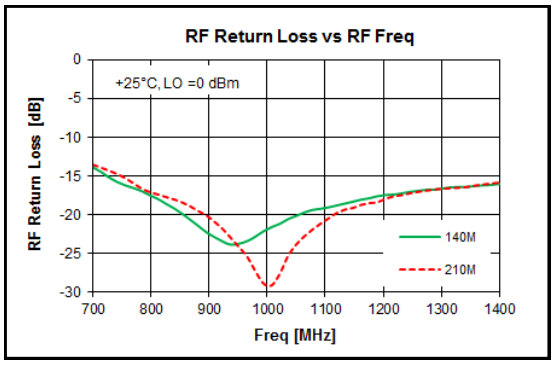


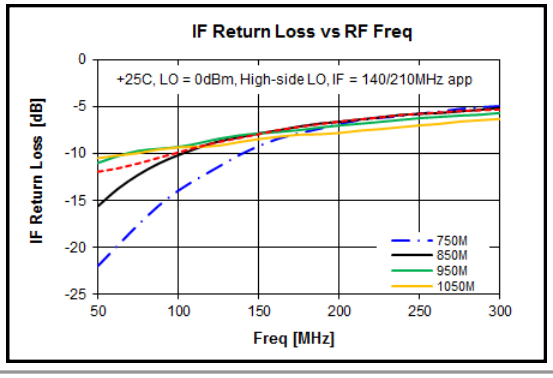








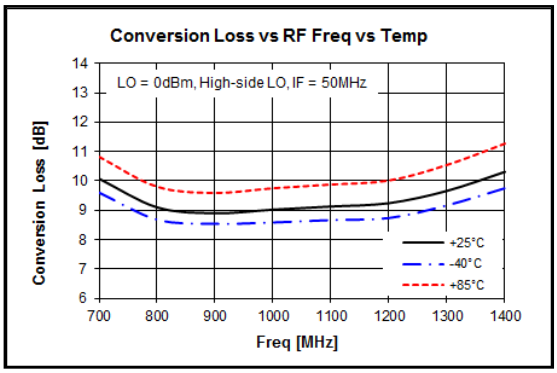


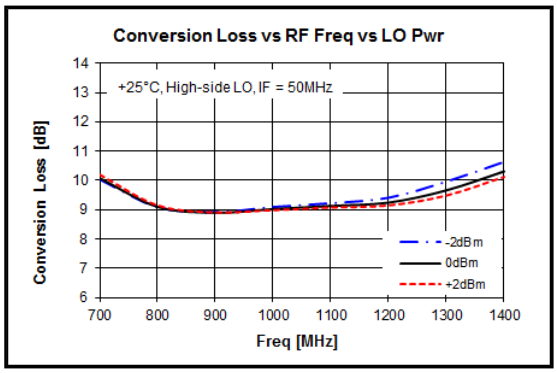


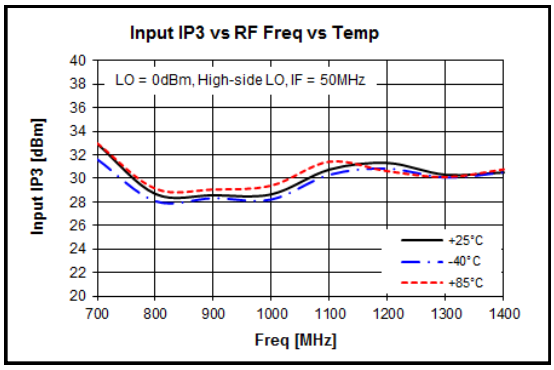
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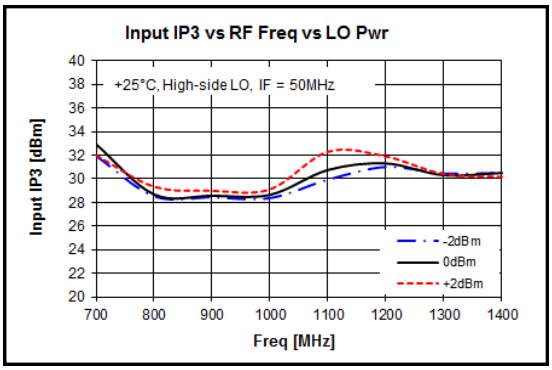
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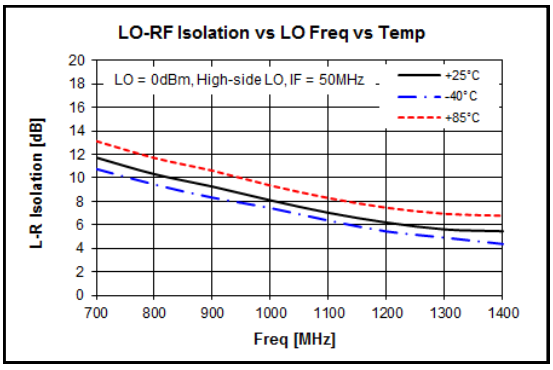
Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V, Ids=45mA, Down converting

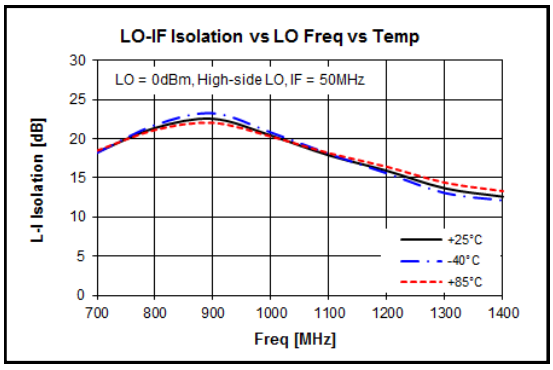


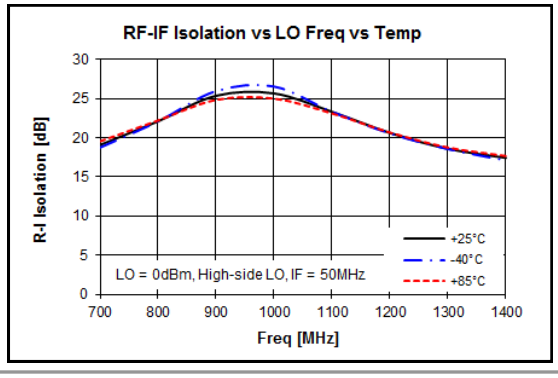


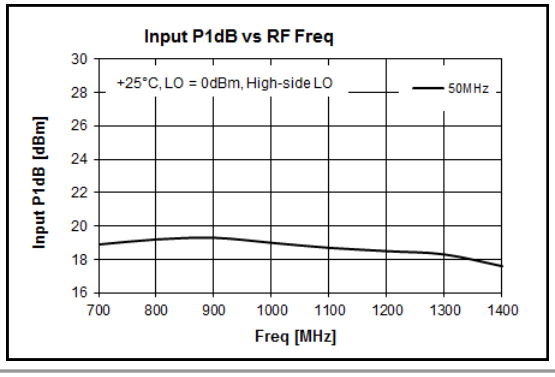








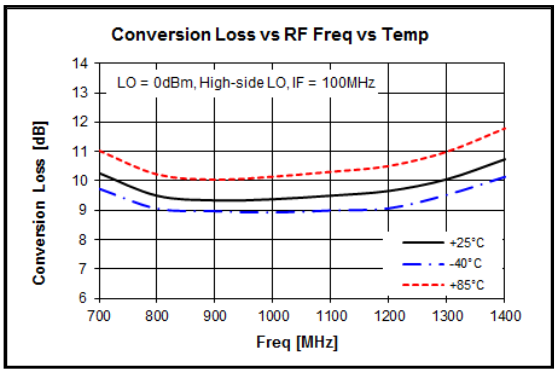


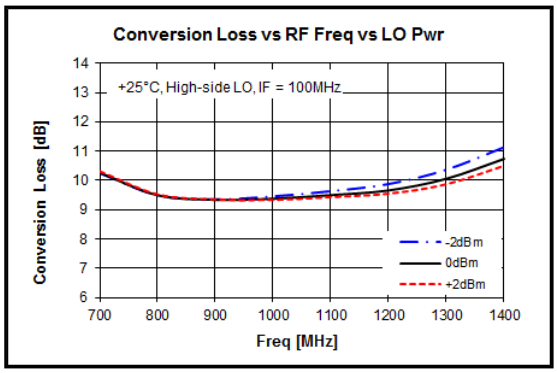


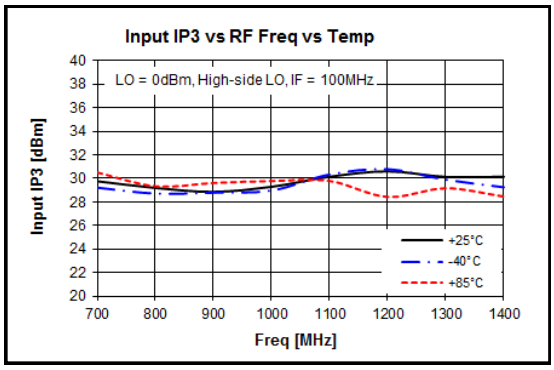
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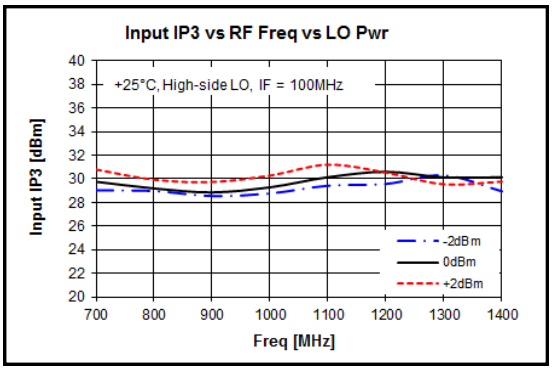
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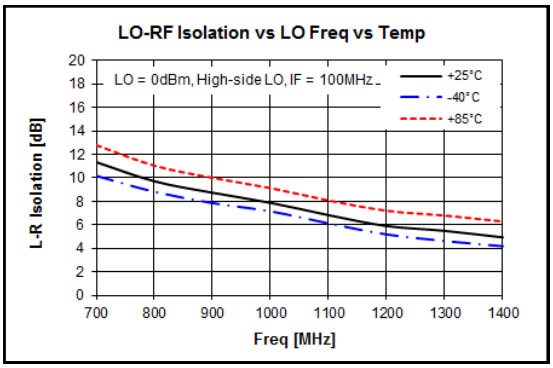
Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V, Ids=45mA, Down converting

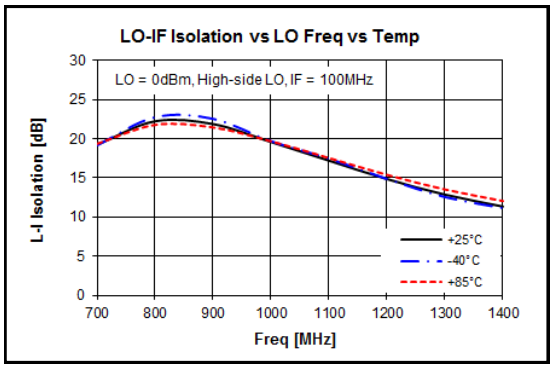


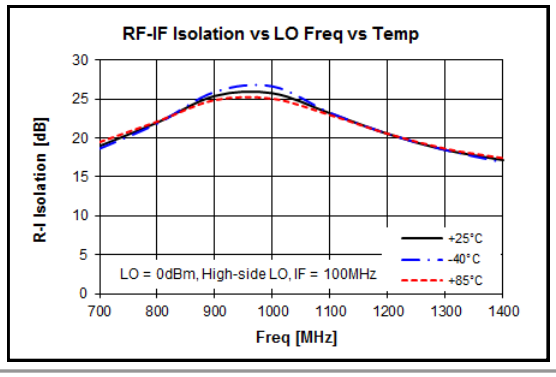


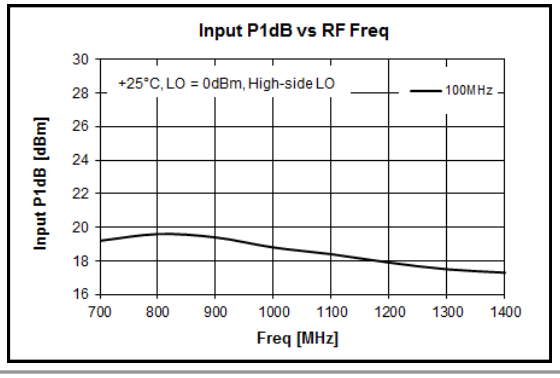








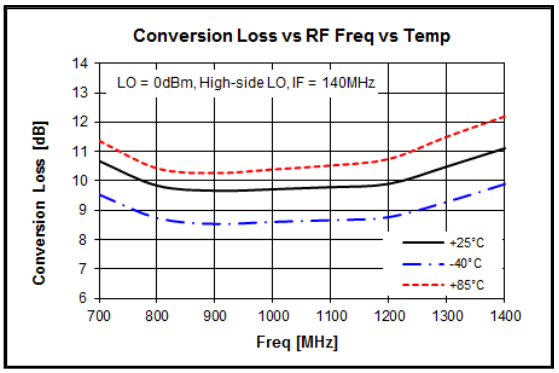


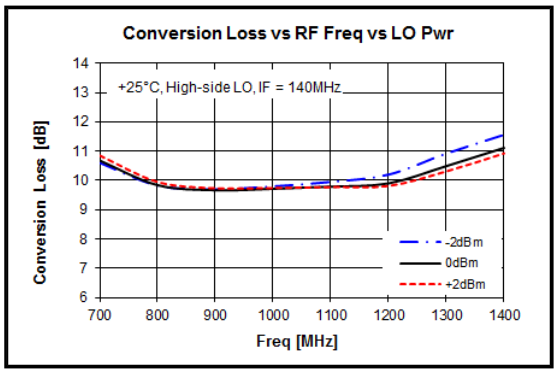


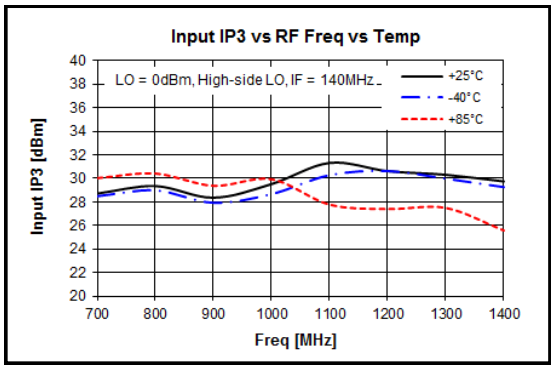
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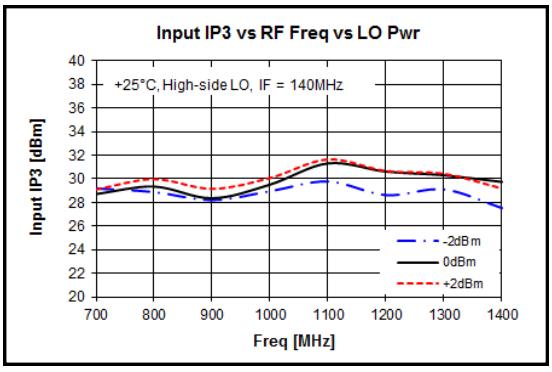
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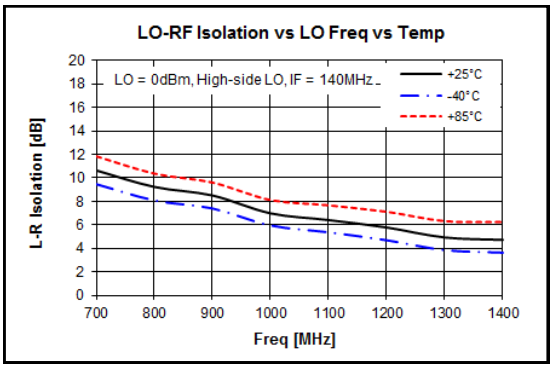
Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V, Ids=45mA, Down converting

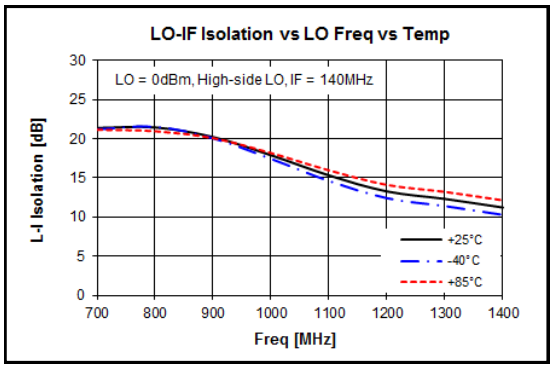


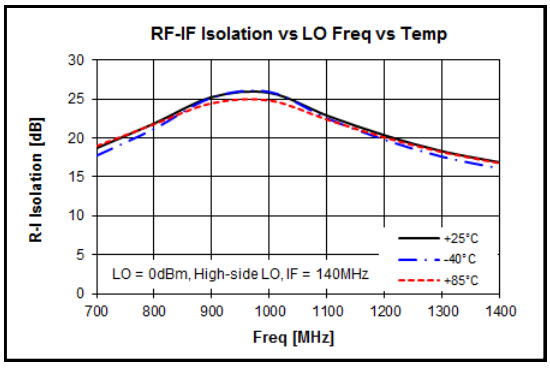


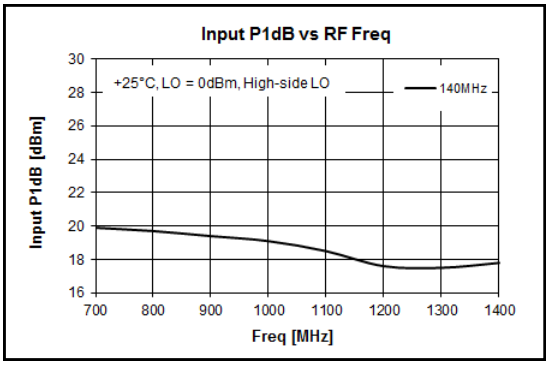








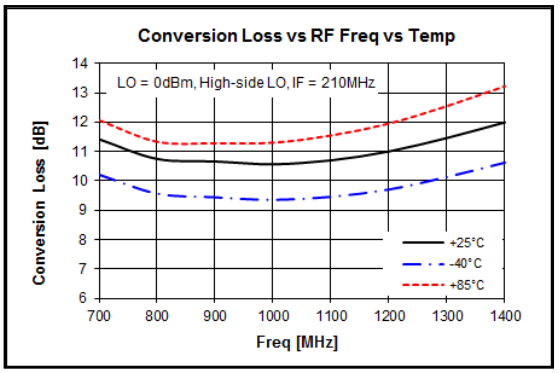


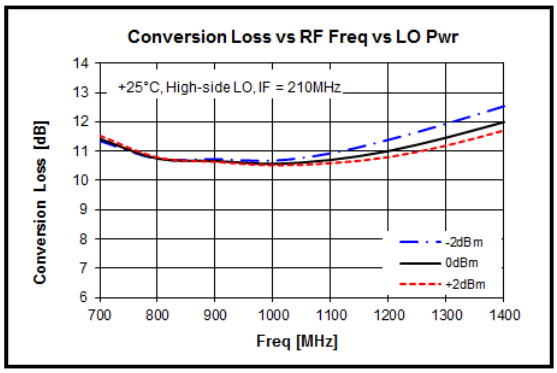


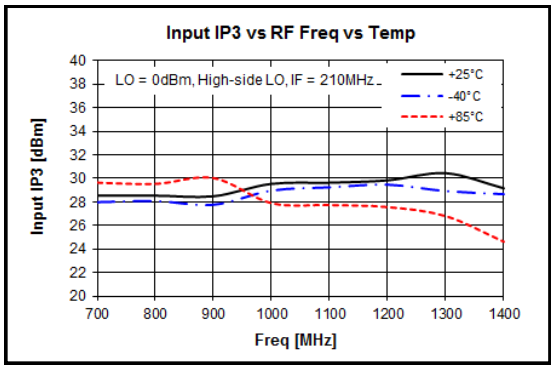
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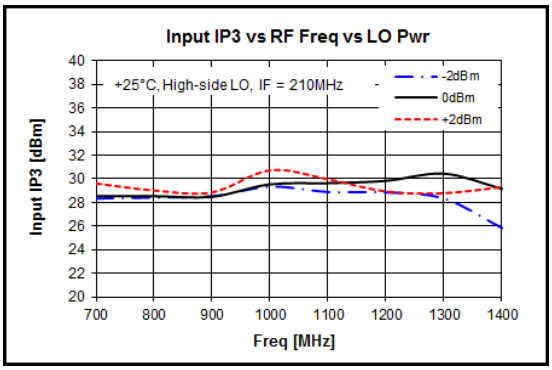
Typical Test Data

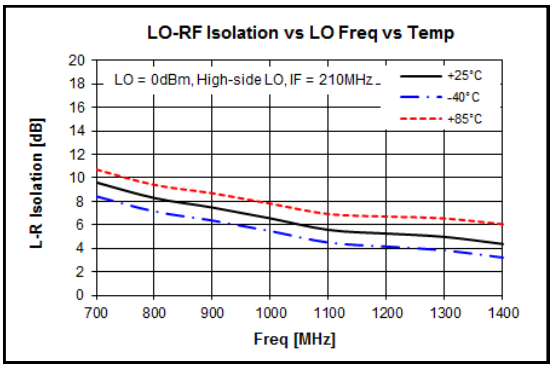
Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V, Ids=45mA, Down converting

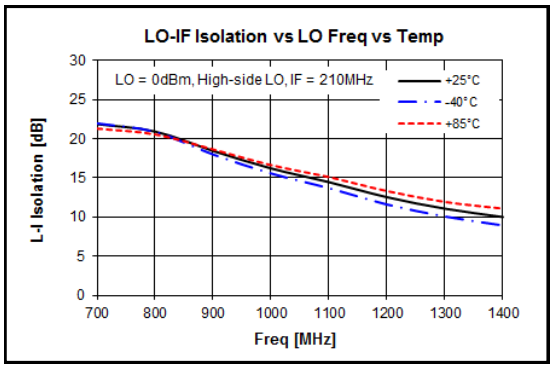


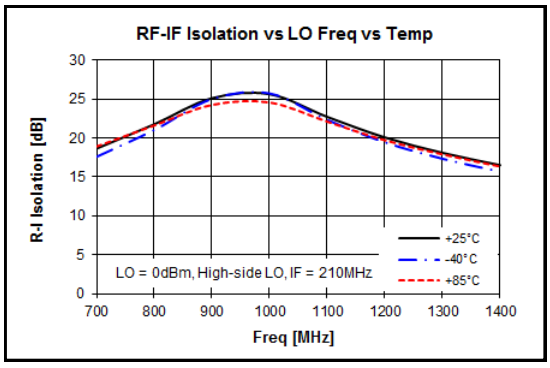


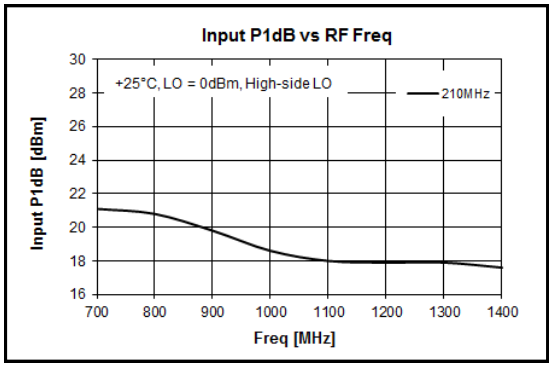








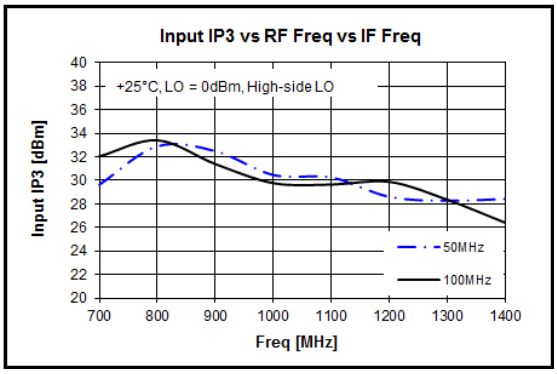


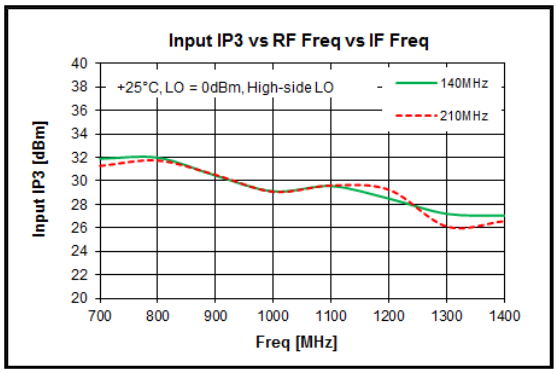


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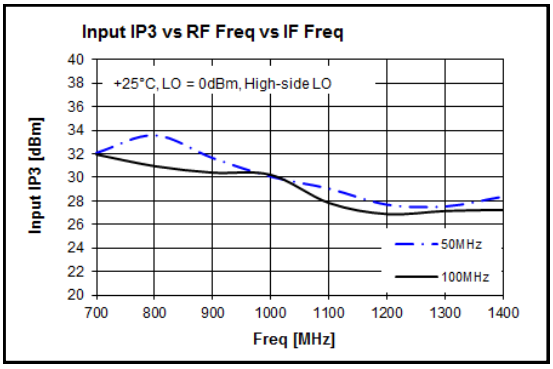
Typical Test Data

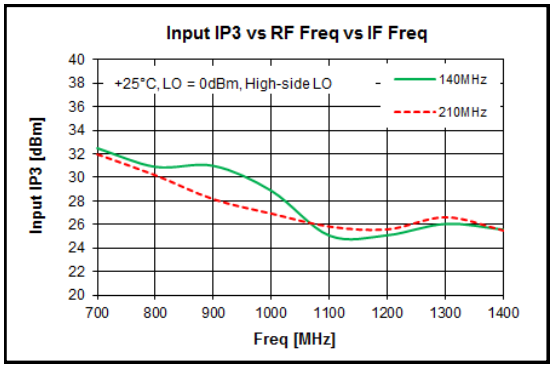
Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=5V, Ids=58mA , Up converting





Test condition _ Measured on BeRex E/B at 25°C, 50ohm system, Vdd=3.3V, Ids=45mA, Up converting





Spur Table

N \ M	0	1	2	3	4	5
0		8	5	6	0	1
1	16	0	42	17	21	18
2	51	61	46	61	50	49
3	75	84	80	75	84	72
4	98	98	108	98	102	105
5	110	114	114	114	114	114

Spur table is $N \times f_{RF} - M \times f_{LO}$ mixer spurious products for 0 dBm input power, unless otherwise noted.

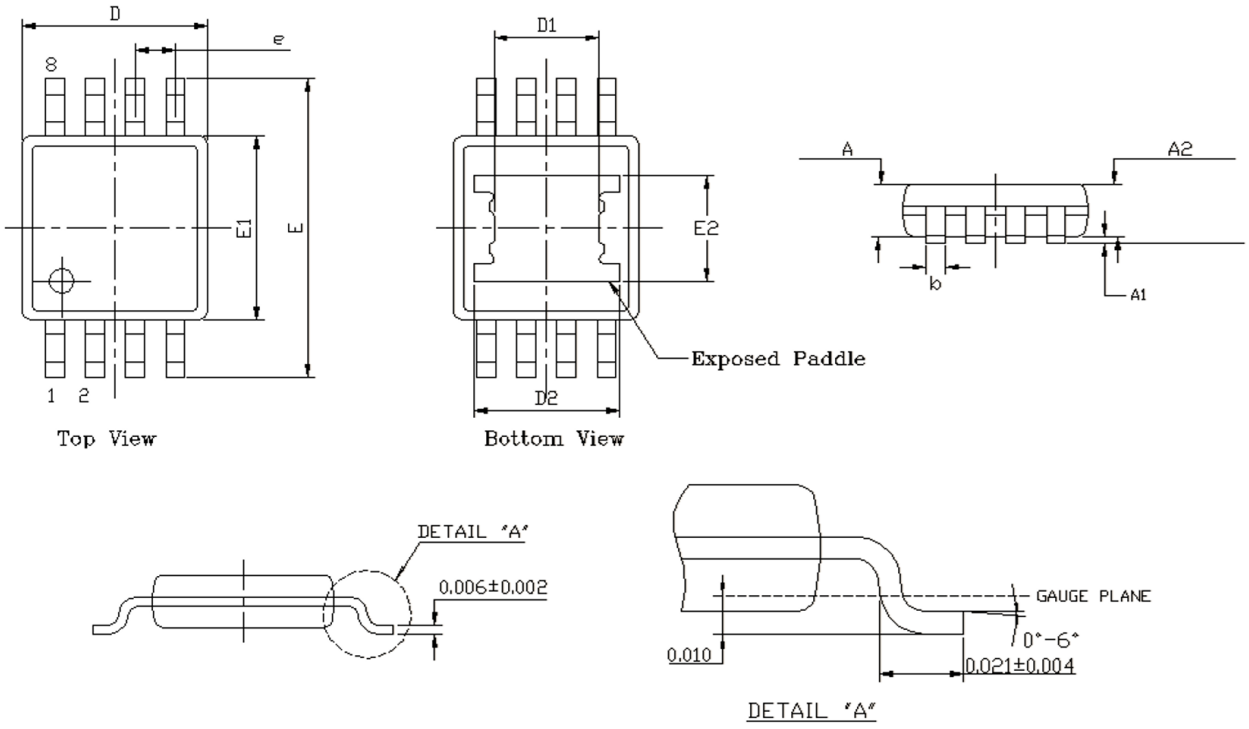
RF Frequency = 900 MHz

LO Frequency = 1041 MHz

All values in dBc relative to the IF Power Level.

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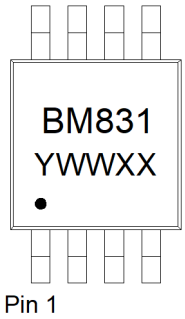
Package Outline Drawing



	A	A1	A2	b	D1	D2	D	E	E1	E2	e
MIN.	-	0.002	0.032	0.009	0.067 REF.	0.093 REF	0.114	0.188	0.114	0.068 REF.	0.026 TYP.
NOM.	0.037	0.003	0.034	-			0.118	0.192	0.118		
MAX.	-	0.005	0.036	0.014			0.122	0.196	0.122		

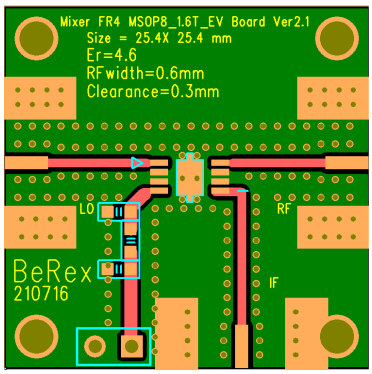
※Remark all unit in inches

Package Marking



Y = Year, WW = Working Week,
XX = Wafer No.

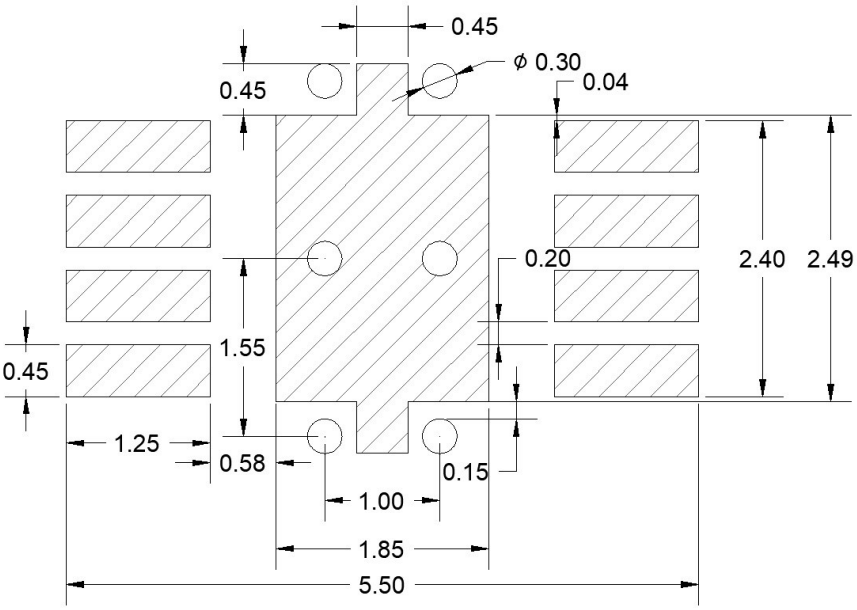
Evaluation Board Drawing



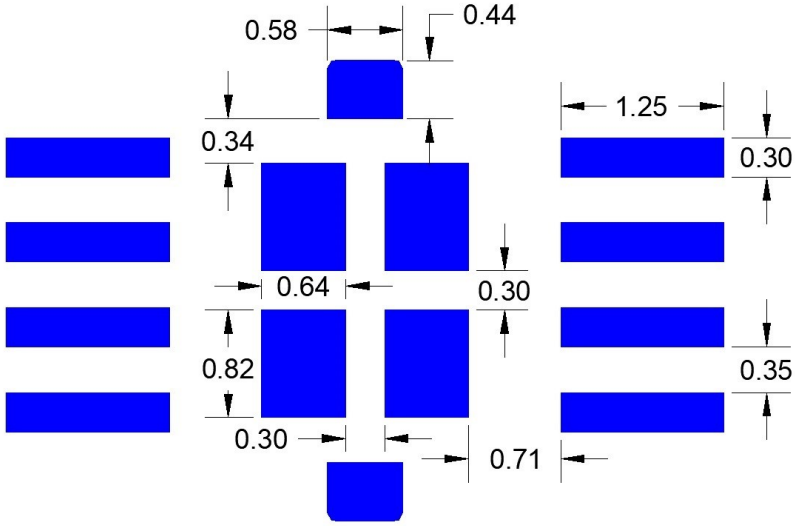
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Suggested PCB Land Pattern and SMT Mask Layout

PCB Land Pattern



SMT Mask layout



Note : 1. Connection to Bottom Ground with multiple via holes.

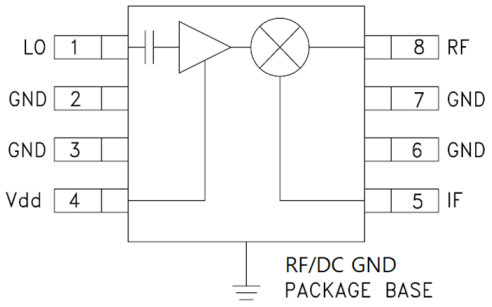
2. All Dimensions _ millimeters.

3. PCB lay out _ on BeRex website.

4. Use over 0.10mm-thick (0.10T) metal mask to avoid incomplete soldering on exposed ground pad.

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Pin Configuration

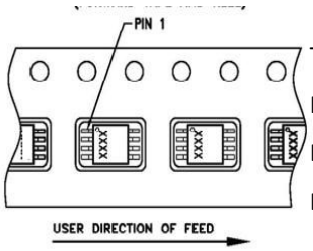


Pin No.	Label	Description
1	LO	Local Oscillator Injection. Internally DC Blocked
2,3,6,7	GND	RF/DC Ground.
4	Vdd	Power supply for LO amplifier
5	IF	Intermediate Frequency
8	RF	Radio Frequency
Backside Paddle	GND	RF/DC Ground. Follow recommended via pattern and ensure good solder attach for best thermal and electrical performance.

Tape & Reel

MSOP8

Packaging information:



Tape Width (mm): 12

Reel Size (inches): 7

Device Cavity Pitch (mm): 8

Devices Per Reel: 1000EA

Lead plating finish

100% Tin Matte finish

(All BeRex products undergoes a 1 hour, 150 degree C, Anneal bake to eliminate thin whisker growth concerns.)

MSL / ESD Rating

ESD Rating: Class 1B

Value: **Passes <1000V**

Test: Human Body Model (HBM)

Standard: JEDEC Standard JS-001-2014

MSL Rating: **Level 1 at +260°C convection reflow**

Standard: JEDEC Standard J-STD-020



Proper ESD procedures should be followed when handling this device.

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RoHS Compliance

This part is compliant with Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2011/65/EU as amended by Directive 2015/863/EU.
This product also is compliant with a concentration of the Substances of Very High Concern (SVHC) candidate list which are contained in a quantity of less than 0.1%(w/w) in each components of a product and/or its packaging placed on the European Community market by the BeRex and Suppliers.

NATO CAGE code:

2	**N**	**9**	**6**	**F**

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