BM831

Mixer

0.7~1.4GHz 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, Lead-free / Green / RoHS compliant
- ESD HBM Class 1B

Product Description

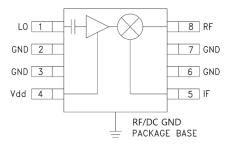
The BM831 is a high linearity and dynamic covering range from 0.7GHz to 1.4GHz on 3.3V to 5V with a passive GaAs FET converter and two stage LO driver. This is packaged in a plastic surface mountable MSOP8 with Lead-free / Green / RoHS compliant. Typical Input IP3 and Conversion loss are 31.7dBm and 8.8dB, respectively. All devices are 100% RF/DC screened.





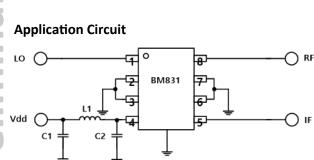
MSOP 8 Package

Functional Block Diagram



Applications

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



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

* Notices

- Pls use 0.15T metal thickness for SMT



- See page 15 for more detail

Parameter	Rating	Unit
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+126	°C
Operating 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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BeRex

0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP

Typical Performance¹



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

Ī	Parameter	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Min	Тур	Max	Units
I	RF Frequency Range	-	700~800)		800~900)	9	00~100	0	10	000~110	00	1:	100~140	00	MHz
1	LO Frequency Range	7	/50~101	0	8	50~111	0	9	50~121	0	1()50~131	10	11	150~161	LO	MHz
1	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
l	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

SSB COnversion Loss																
Input IP3 ²		30.3			31.7			31.7			32.6			32.6		dBm
O Leakage RF Port		-9.1			-7.2			-6.0			-4.5			-2.8		dBm
O 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
F Return Loss		-10.0			-9.0			-8.5			-8.6			-9.8		dB
nput P1dB		23.7			24.2			24.5			24.3			24.0		dBn
LO Drive Level	-2	0	+2	-2	0	+2	-2	0	+2	-2	0	+2	-2	0	+2	dBn
Daramatar	Ndin	Turn	Max	Mim	Turn	Max	Min	Turn	Max	N 4 im	Turn	Max	N 41m	Turn	Max	1.1
Parameter	Min	Typ	Max	Min	Typ	Max	Min	Tvn	Max	Min	Tvn	Max	Min	Typ	Max	Uni
	Min	Тур	Max	Min	Тур	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
RF Frequency Range	7	700~800)		800~900)	9	00~100	0	1	000~110	00	1	100~140	00	MH
RF Frequency Range	7))	9		0	1		00	1		00	MH
RF Frequency Range LO Frequency Range	7	700~800) 0		800~900	0	9	00~100	0	10	000~110)0 10	1	100~140	00 10	Uni MH MH MH
RF Frequency Range LO Frequency Range IF Frequency Range	7	700~800 50~101) 0		800~900 50~111	0	9	00~100 50~121	0	10	000~110 050~131)0 10	1	100~14(150~16:	00 10	МН МН
RF Frequency Range LO Frequency Range IF Frequency Range SSB Conversion Loss	7	700~800 50~101 50~210) 0		800~900 50~111 50~210	0	9	00~100 50~121 50~210	0	10	000~110 050~131 50~210)0 10	1	100~14(150~16: 50~210	00 10	мн мн мн
RF Frequency Range LO Frequency Range IF Frequency Range SSB Conversion Loss Input IP3 ²	7	700~800 50~101 50~210 10.0) 0		800~900 50~111 50~210 9.0	0	9	00~100 50~121 50~210 8.8	0	10	000~110 050~131 50~210 9.0)0 10	1	100~140 150~161 50~210 9.7	00 10	MH MH MH dB
RF Frequency Range O Frequency Range F Frequency Range SSB Conversion Loss nput IP3 ² O Leakage RF Port	7	700~800 50~101 50~210 10.0 32.8) 0		800~900 50~111 50~210 9.0 28.5	0	9	00~100 50~121 50~210 8.8 28.5	0	10	000~110 050~131 50~210 9.0 28.5)0 10	1	100~14(150~16: 50~210 9.7 30.3	00 10	MH MH MB dB
RF Frequency Range LO Frequency Range F Frequency Range SSB Conversion Loss Input IP3 ² LO Leakage RF Port LO Leakage IF Port	7	700~800 50~101 50~210 10.0 32.8 -11.3) 0		800~900 50~111 50~210 9.0 28.5 -9.9	0	9	00~100 50~121 50~210 8.8 28.5 -8.9	0	10	000~110 050~131 50~210 9.0 28.5 -7.8)0 10	1	100~14(150~162 50~210 9.7 30.3 -5.9	00 10	MH MH dB dBr dBr
RF Frequency Range LO Frequency Range F Frequency Range SSB Conversion Loss nput IP3 ² LO Leakage RF Port LO Leakage IF Port RF-IF Isolation	7	700~800 50~1010 50~210 10.0 32.8 -11.3 -18.1) 0		800~900 50~111 50~210 9.0 28.5 -9.9 -21.3	0	9	00~100 50~121 50~210 8.8 28.5 -8.9 -22.5	0	10	000~110 050~131 50~210 9.0 28.5 -7.8 -20.3)0 10	1	100~14(150~16: 50~210 9.7 30.3 -5.9 -15.0	00 10	MH MH dB dBr dBr
RF Frequency Range LO Frequency Range F Frequency Range SSB Conversion Loss Input IP3 ² LO Leakage RF Port LO Leakage IF Port RF-IF Isolation RF Return Loss	7	700~800 50~101 50~210 10.0 32.8 -11.3 -18.1 -19.1) 0		800~900 50~111 50~210 9.0 28.5 -9.9 -21.3 -22.0	0	9	00~100 50~121 50~210 8.8 28.5 -8.9 -22.5 -25.3	0	10	000~110 050~131 50~210 9.0 28.5 -7.8 -20.3 -25.5)0 10	1	100~14(150~16: 50~210 9.7 30.3 -5.9 -15.0 -19.7	00 10	MH MH dBr dBr dBr dBr dBr dBr
Parameter RF Frequency Range LO Frequency Range IF Frequency Range SSB Conversion Loss Input IP3 ² LO Leakage RF Port LO Leakage IF Port RF-IF Isolation RF Return Loss IF Return Loss Input P1dB	7	700~800 50~101 50~210 10.0 32.8 -11.3 -18.1 -19.1 -15.3) 0		800~900 50~111 50~210 9.0 28.5 -9.9 -21.3 -22.0 -19.3	0	9	00~100 50~121 50~210 8.8 28.5 -8.9 -22.5 -25.3 -20.3	0	10	000~110 050~131 50~210 9.0 28.5 -7.8 -20.3 -25.5 -18.1)0 10	1	100~14(150~16: 50~210 9.7 30.3 -5.9 -15.0 -19.7 -15.2	00 10	MH MH dB dBr dBr dBr

Parameter	Min.	Typical	Max.	Unit
Bandwidth	700		1400	MHz
I _d @ (Vd = 5.0V)		58.0		mA
I _d @ (Vd = 3.3V)		45.0		mA
R _{TH}		99.0		°C/W

¹Specifications 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..

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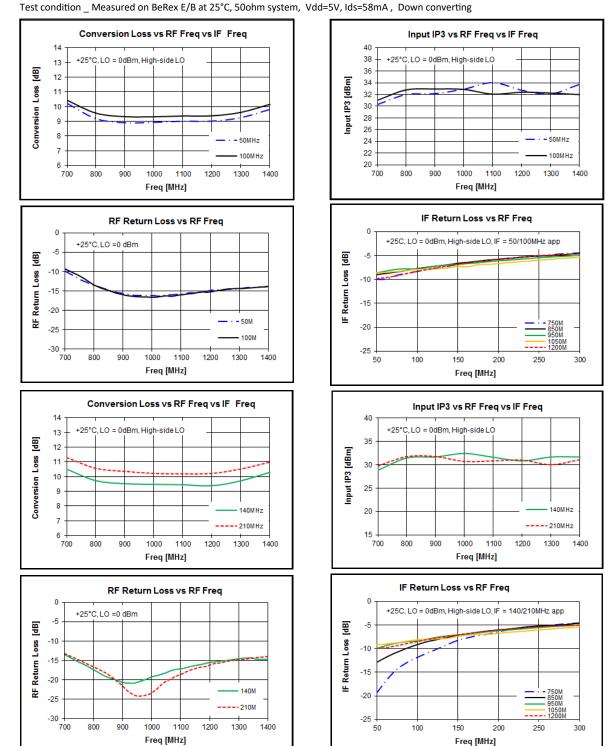
•website: <u>www.berex.com</u>

•email: sales@berex.com

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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



Typical Test Data

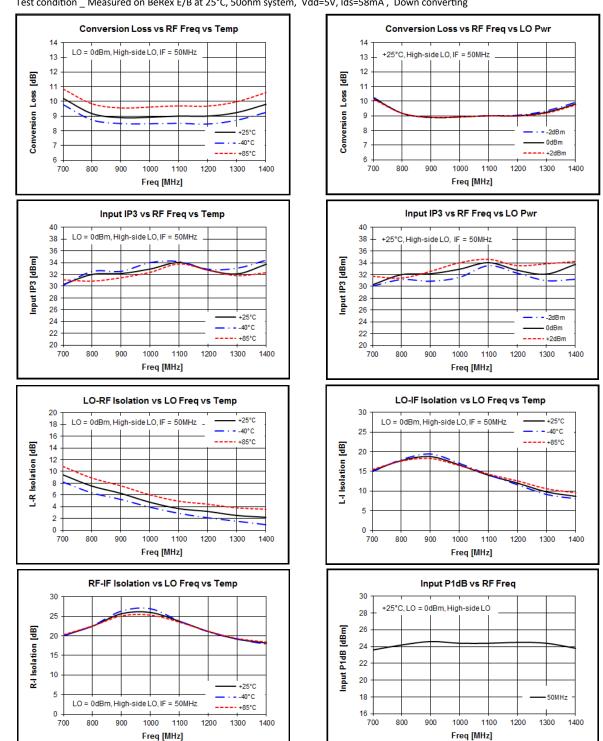
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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



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

Typical Test Data

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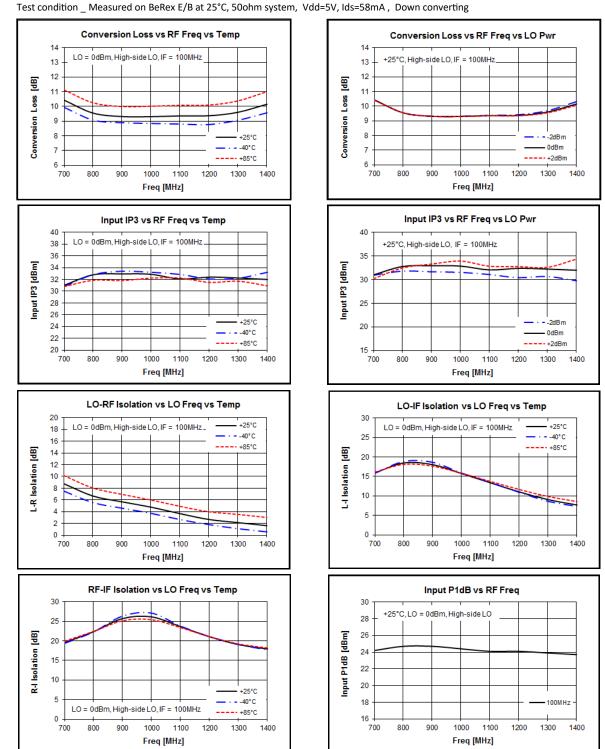
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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



Typical Test Data

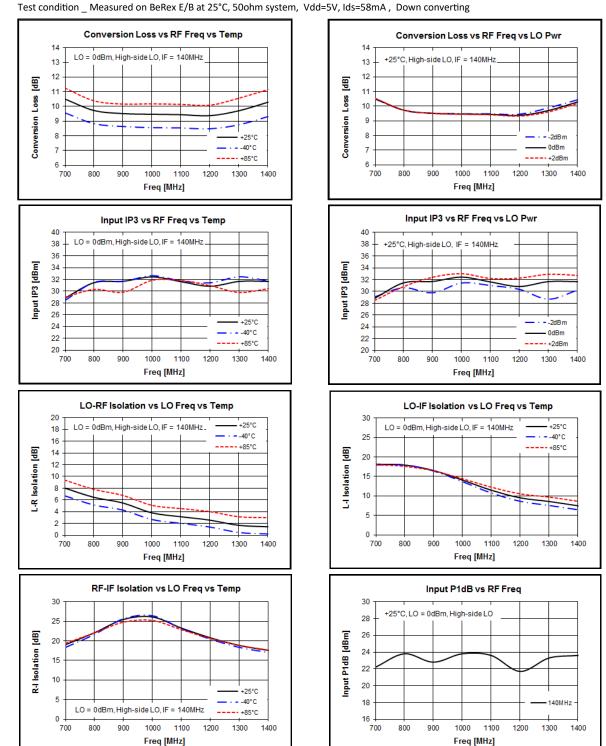
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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



Typical Test Data

Preliminary Datasheet

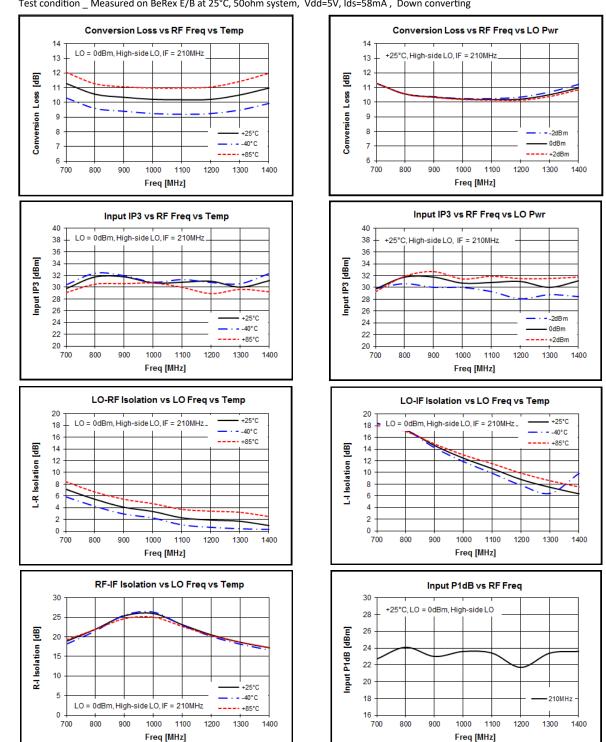


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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



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

Typical Test Data

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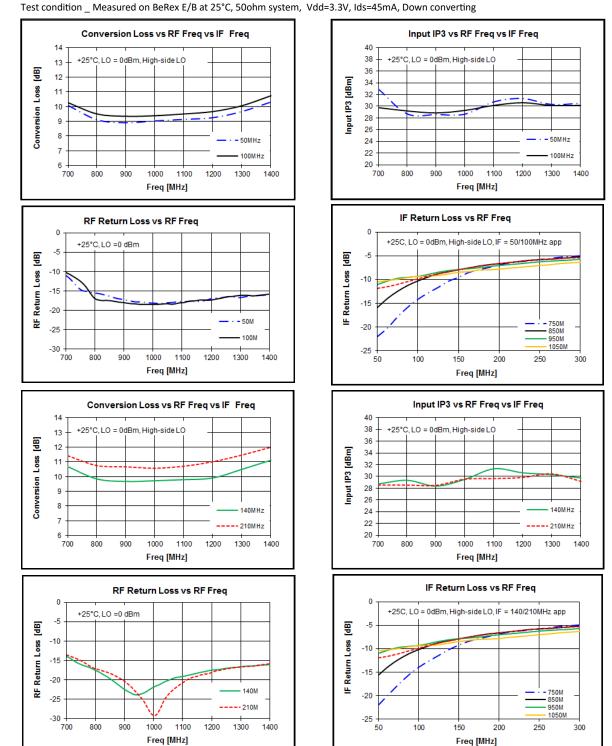
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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



Typical Test Data

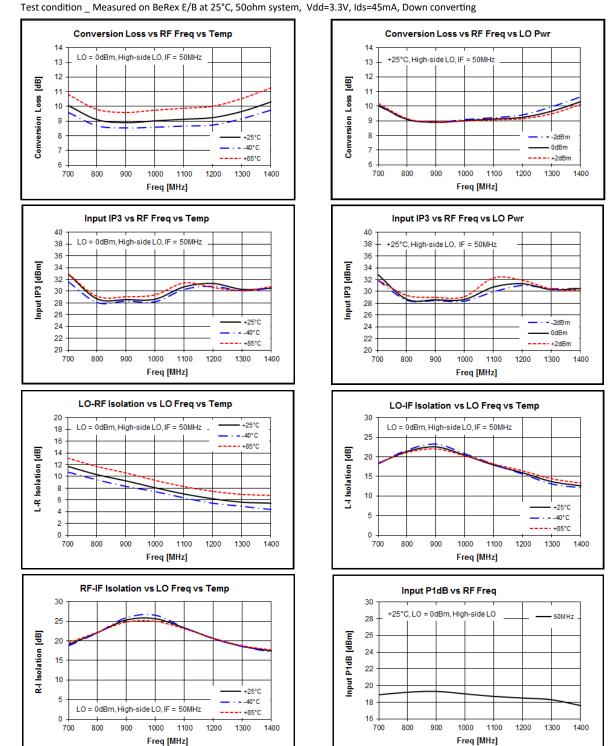
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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



Typical Test Data

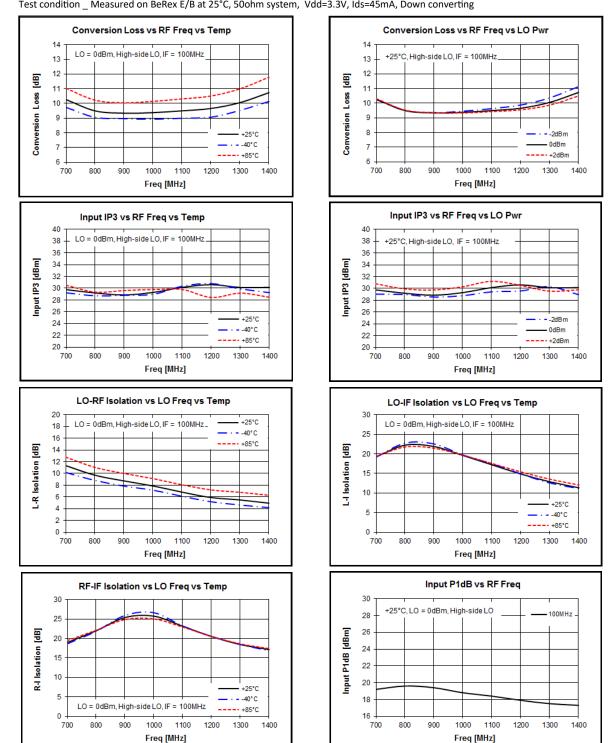
Preliminary Datasheet

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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



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

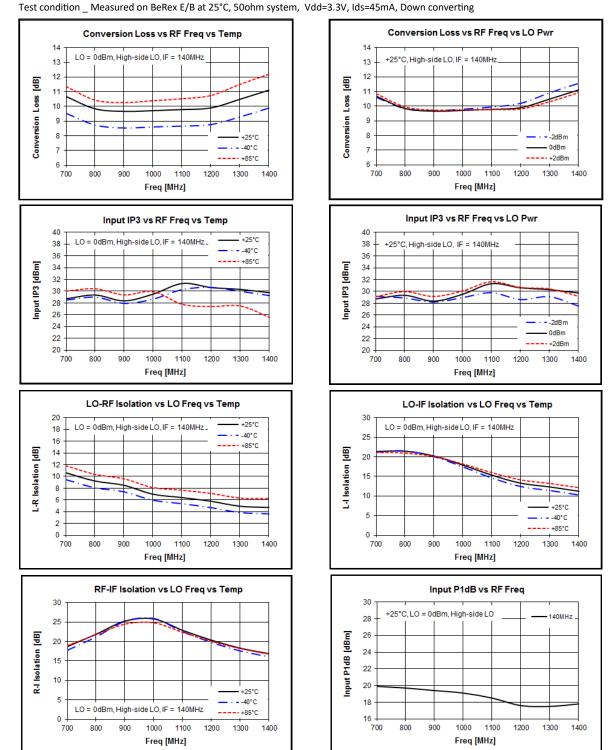
Typical Test Data

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0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP



Typical Test Data

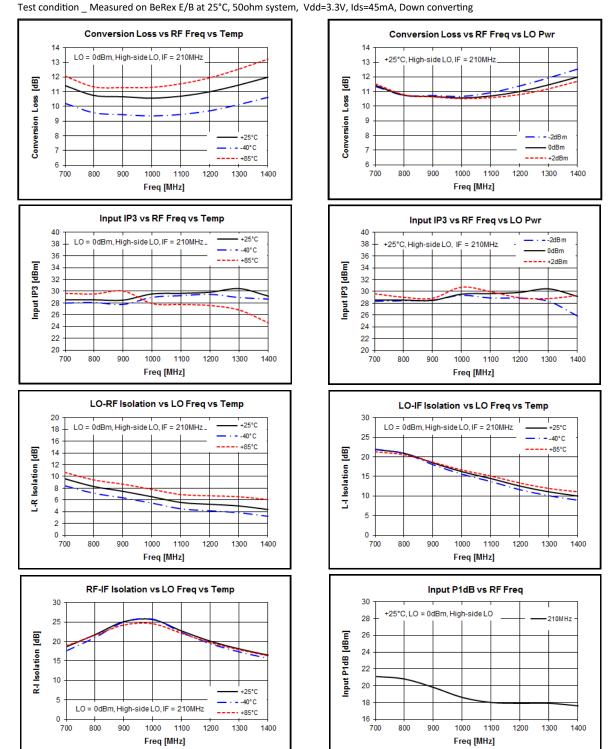
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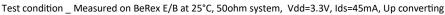
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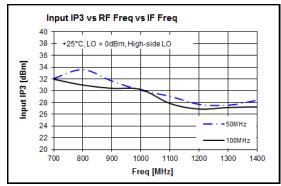
0.7~1.4GHz High IIP3 GaAs MMIC Mixer with Integrated LO AMP

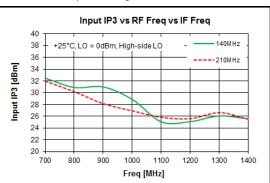
Typical Test Data

Input IP3 vs RF Freq vs IF Freq Input IP3 vs RF Freq vs IF Freq 40 40 38 +25°C, LO = 0dBm, High-side LO 38 +25°C, LO = 0dBm, High-side LO -140MHz 36 36 ----210MHz Input IP3 [dBm] 34 34 Input IP3 [dBm] 32 32 30 30 28 28 26 26 50MHz 24 24 22 22 100MHz 20 20 700 800 900 1000 1100 1200 1300 1400 700 800 900 1000 1100 1200 1300 Freq [MHz] Freq [MHz]

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







Spur Table

Ν	

			М			
	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

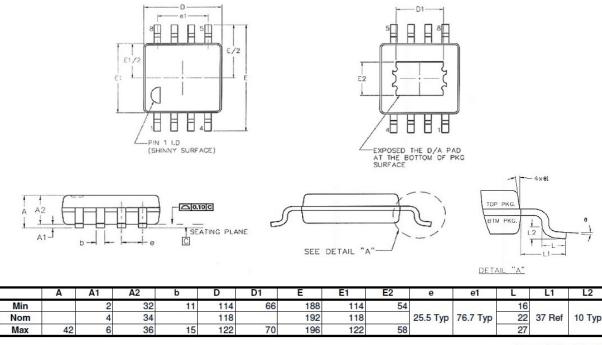
All values in dBc relative to the IF Power Level.

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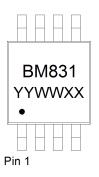


Package Outline Drawing

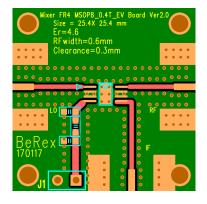


*Remark all unit in mils

Package Marking



Evaluation Board Drawing



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XX = Wafer No.

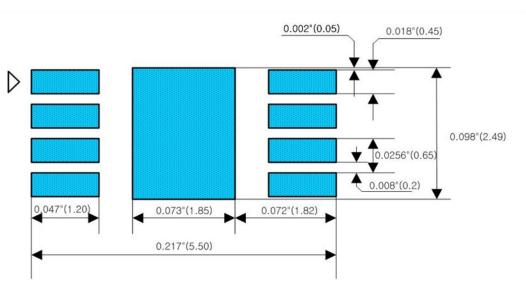
YY = Year, WW = Working Week,

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Suggested PCB Land Pattern and PAD Layout

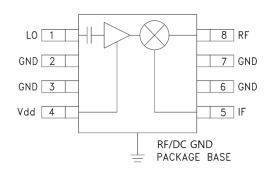


PCB Land Pattern

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

- 2. Via holes _ as many as possible.
- 3. All Dimensions _ millimeters.
- 4. PCB lay out _ on BeRex website.
- 5. Use 0.15T metal mask to avoid incomplete soldering on exposed ground pad.

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 electri- cal performance.

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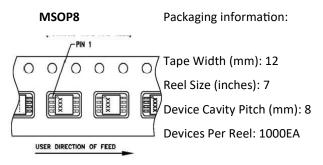
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Tape & Reel



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 JESD22-A114B

MSL Rating: Level 1 at +265°C convection reflow

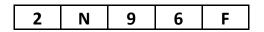
Standard: JEDEC Standard J-STD-020



Appropriate precautions in handling, packaging and testing devices must be observed.



NATO CAGE code:





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