Product Features

Operating Frequency: 10GHz~20GHz

Conversion Loss: 7.6dB@15GHz

Input Power for 1dB Compression: 13.8dBm@15GHz

Input Third-Order Interception: 20.9dBm@15GHz

LO/RF Isolation: 38.3dB@15GHz

LO/IF Isolation: 29.1dB@15GHz

Package: QFN16 (3mm×3mm)

General Description

The BR9136FDJ is a miniaturized double-balanced mixer manufactured using GaAs process. Covering the frequency range of 10GHz ~ 20GHz, the mixer mainly completes the conversion from RF to IF frequency with characteristics of high stability, low conversion loss, high isolation, wide IF bandwidth, which can be used as an upconverter, downconverter, biphase modulation/ demodulation or phase comparator.

Application

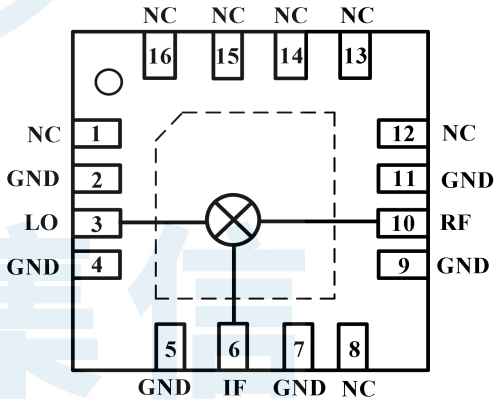
Satcom

Electronic Countermeasures

Base Station, Repeaters

Public Safety and Telematics

Functional Block Diagram



Ordering Information

Part Number	Package	Description
BR9136FDJ	QFN16	10GHz ~20GHz Double Balanced Mixer

Absolute Maximum Ratings

Maximum RF/IF Input Power: +19dBm

Maximum LO Input Power: +21dBm

Recommended Operating Conditions

Operating Temperature: -55℃ ~ +125℃

Storage Temperature: -65℃ ~ +150℃

Note: Operation of the device outside the parameter ranges given absolute-maximum-ratings conditions may cause permanent damage, and. exposure to absolute-maximum-ratings conditions for extended periods will affect the reliability.

ESD WARNING

ELECTROSTATIC SENSITIVE DEVICE

OBSERVE HANDLING PRECAUTIONS

ESD Rating: Class 0

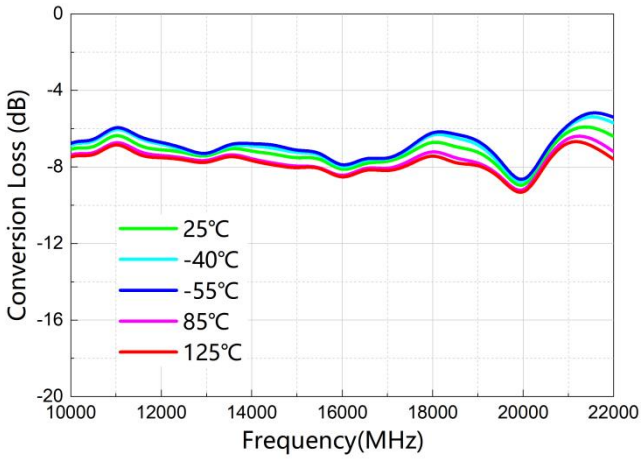
Electrical Specifications (unless otherwise Notes, TA=+25℃, P_{RF}=-10dBm, EVB test results)

Serial Number	Parameter	Test Condition				RF Frequency/Typical Value						Units
		LO power (dBm)	RF power (dBm)	IF Frequency (MHz)	High /Low LO	10	12	14	16	18	20	GHz
1	Conversion Loss	11	-10	100	low	-7.1	-7.7	-7.5	-8.8	-6.8	-12.6	dB
		13				-6.8	-7.1	-7.2	-8.4	-6.5	-9.6	
		15				-6.7	-6.7	-6.9	-8.2	-6.4	-8.9	
		11	-10	100	high	-7.4	-7.4	-7.8	-8.9	-6.9	-10.6	
		13				-7.0	-6.9	-7.5	-8.4	-6.5	-9.2	
		15				-6.7	-6.5	-7.2	-8.2	-6.3	-8.7	
2	LO to RF Isolation	13	-10	100	high	43.3	44.8	39.3	40.9	37.5	39.3	dB
3	LO to IF Isolation	13	-10	100	high	32.3	28.9	28.3	27.4	28.6	34.7	
4	RF to IF Isolation	13	-10	100	high	29.6	32.1	28.6	29.3	28.9	30.7	
5	IP1dB	13	-10	100	high	10.7	12.6	12.7	14.2	13.1	14.6	dBm
		15	-10	100	high	11.4	13.1	13.3	14.8	14.1	15.1	
6	IIP3	13	-10	100	high	18.7	23.3	19.7	20.9	20.1	22.2	dBm
		15	-10	100	high	20.0	20.8	20.0	21.8	21.6	21.6	
7	RF Return Loss	13	-10	100	high	-15.8	-6.7	-14.6	-6.5	-10.9	-8.4	dB

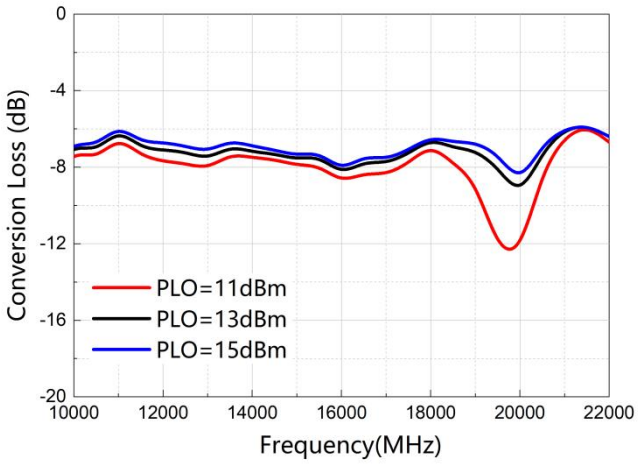
Serial Number	Parameter	Test Condition				IF Frequency/Typical Value					Units
		LO Power (dBm)	LO Frequency (GHz)	IF Frequency (MHz)	High / Low LO	100	500	2000	4000	6000	MHz
8	Return loss IF	13	10	-	high	-15.4	-14.5	-13.9	-15.5	-11.2	dB
		13	15	-	high	-9.8	-10.2	-10.6	-9.3	-10.5	
		13	20	-	high	-12.3	-9.6	-7.88	-11.6	-10.3	
Serial Number	Parameter	Test Condition				IF Frequency/Typical Value					Units
		LO Power (dBm)	RF Power (dBm)	LO Frequency (GHz)	High / Low LO	100	500	2000	4000	6000	MHz
9	Frequency Conversion Loss (IF Bandwidth)	13	-10	12	low	-6.5	-7.6	-7.2	-8.1	-7.5	dB
		13	-10	18	high	-6.1	-7.3	-7.1	-6.9	-7.0	

Typical Performance (EVB test results)

Conversion Loss, Down Conversion, IF=100MHz, PRF=-10dBm, Low LO

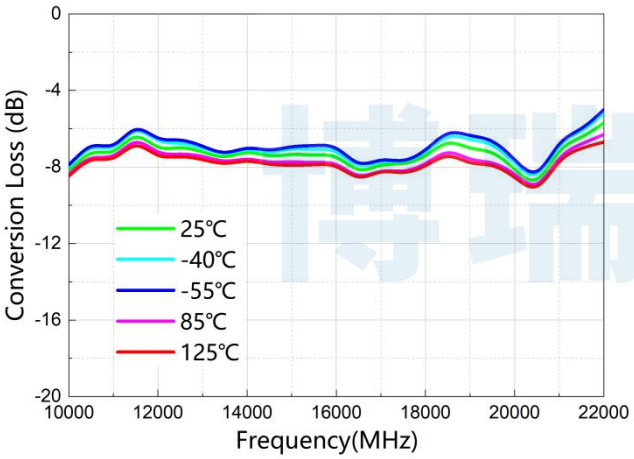


Conversion Loss @ PLO=13dBm

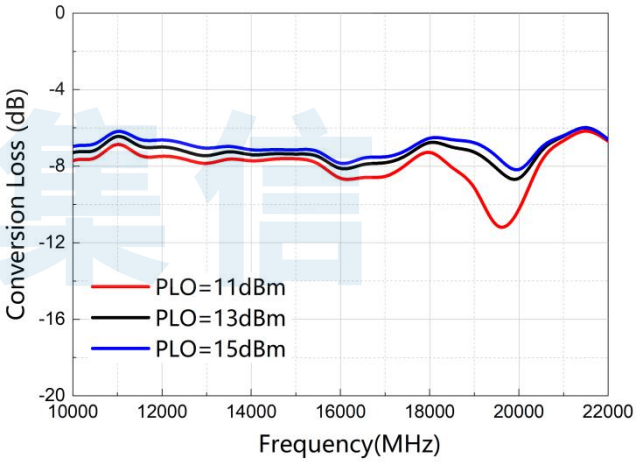


Conversion Loss vs LO Drive

Conversion Loss, Down Conversion, IF=100MHz, PRF=-10dBm, High LO

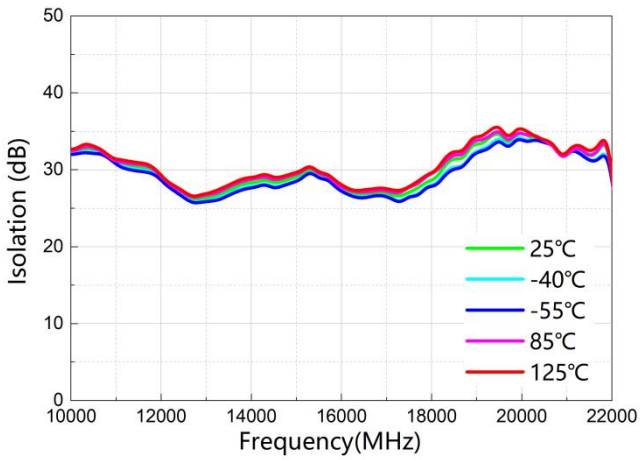


Conversion Loss @ PLO=13dBm

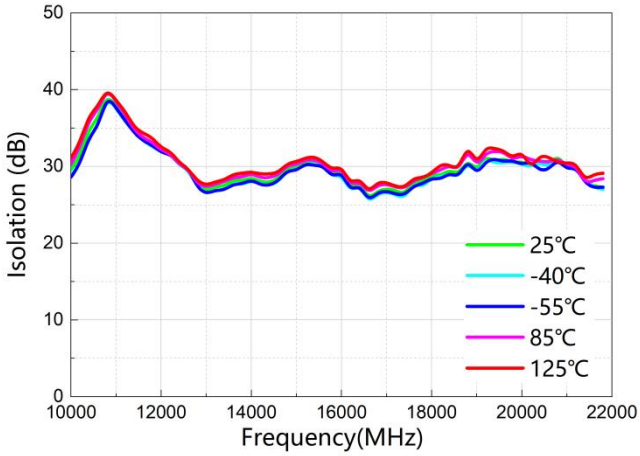


Conversion Loss vs LO Drive

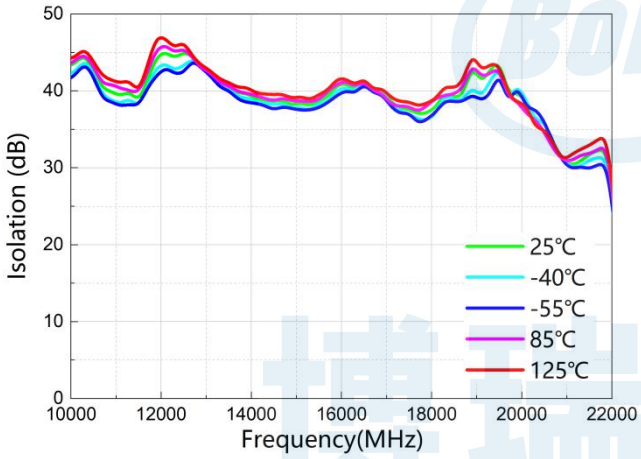
Isolation, Down Conversion, High LO, IF=100MHz, P_{LO}=13dBm



Isolation LO-IF

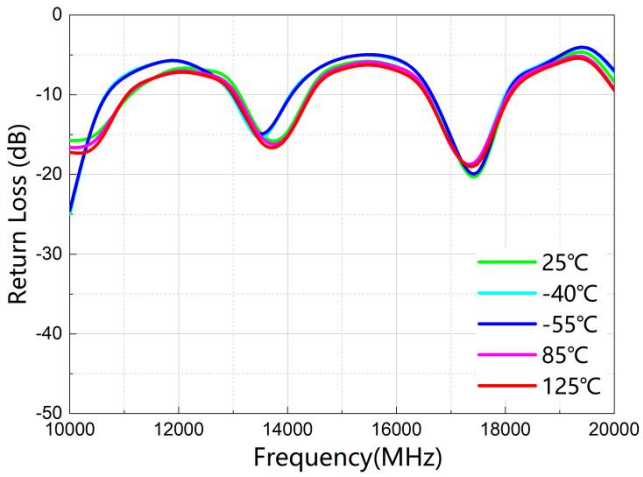


Isolation RF−IF

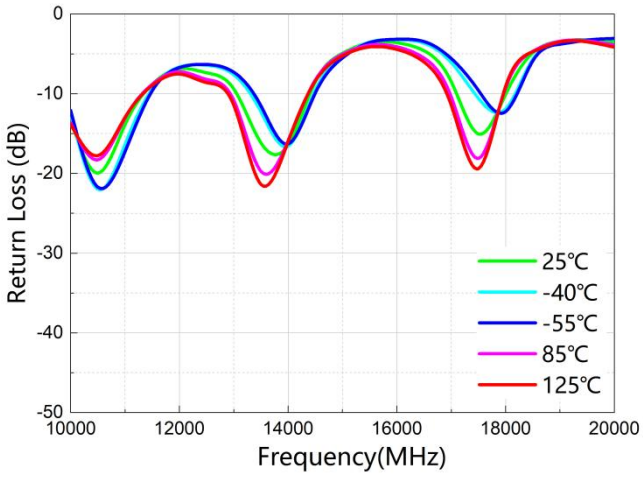


Isolation LO−RF

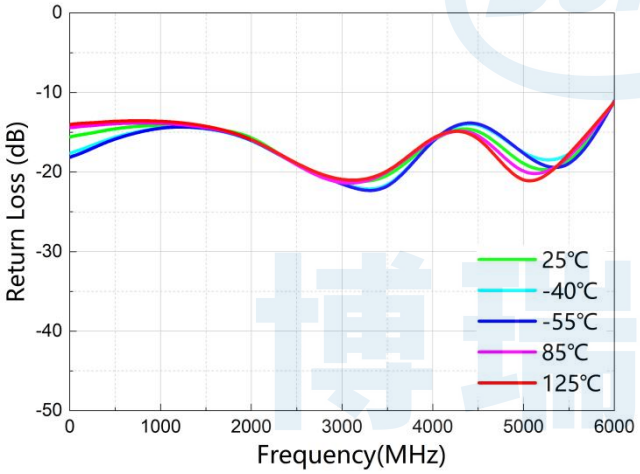
Return Loss, Down Conversion, High LO, IF=100MHz, P_{LO}=13dBm



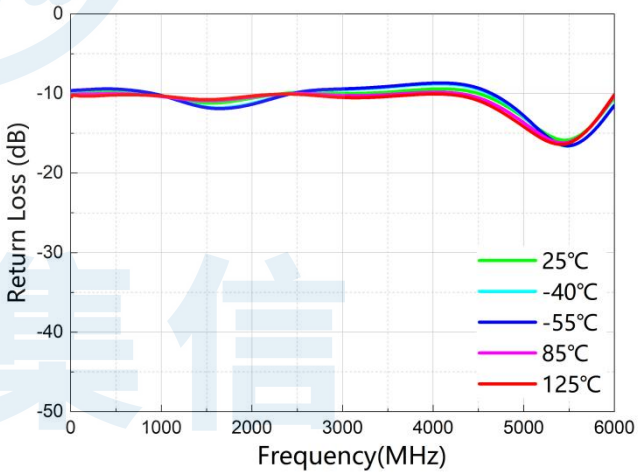
RF Return Loss



LO Return Loss

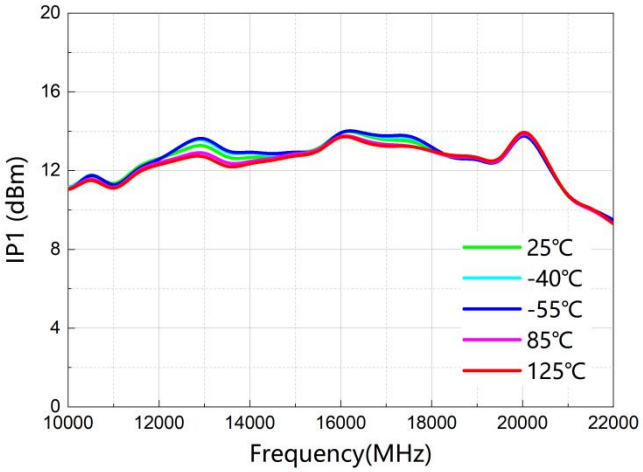


IF Return Loss @F_{LO}=10GHz

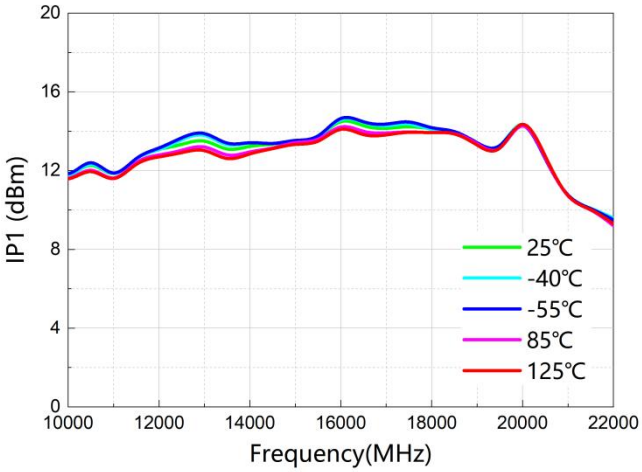


IF Return Loss @F_{LO}=15GHz

IP1dB, High LO, IF=100MHz, P_{RF}=-10dBm

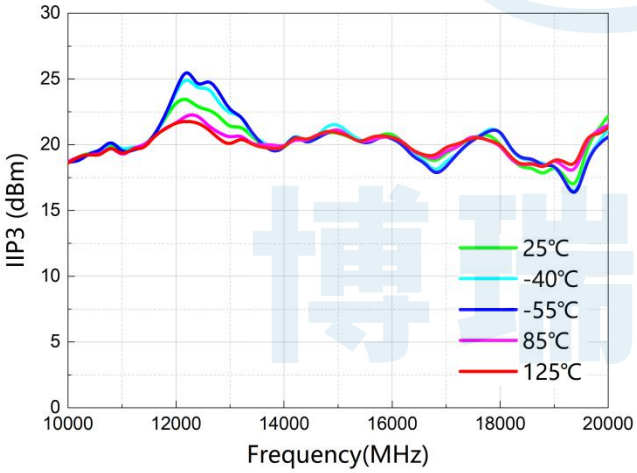


IP1dB@P_{LO}=13dBm

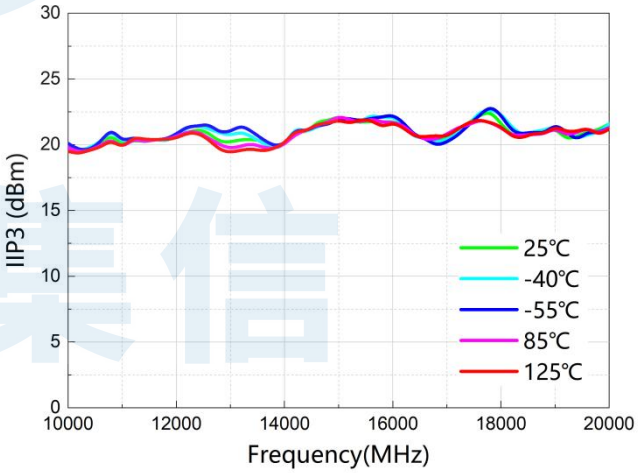


IP1 IP1dB @P_{LO}=15dBm

IIP3, High LO, IF=100MHz, P_{RF}=-10dBm

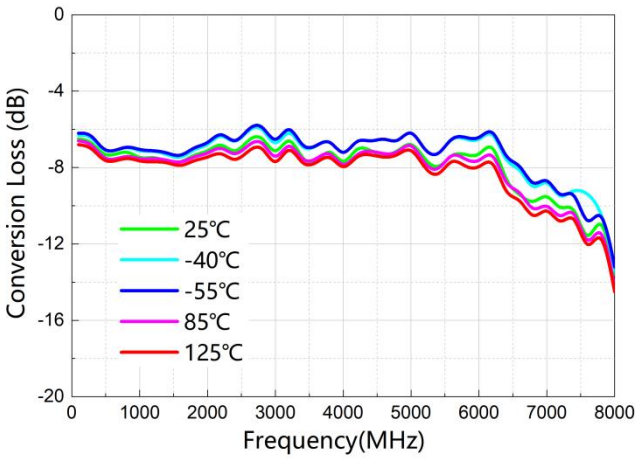


IIP3@P_{LO}=13dBm

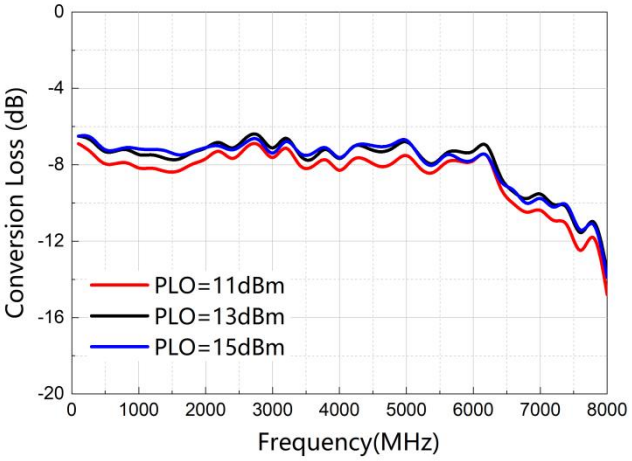


IIP3@P_{LO}=15dBm

IF Bandwidth, Low LO, P_{RF}=-10dBm

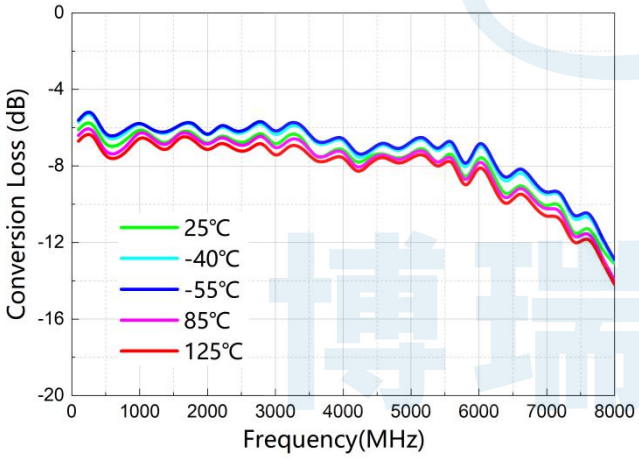


Conversion Loss@ P_{LO}=13dBm, F_{LO}=1.2GHz

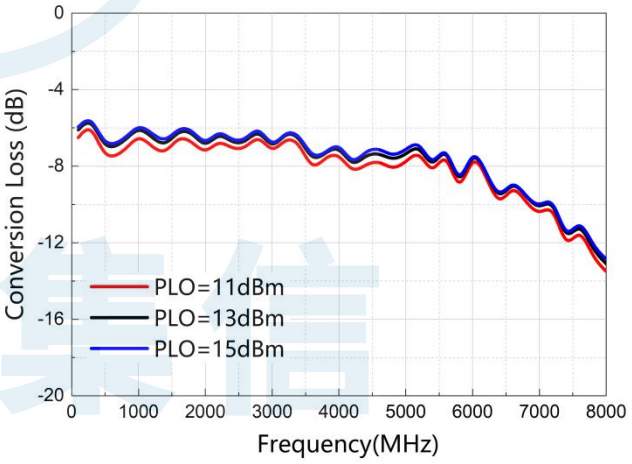


Conversion Loss vs LO Drive @F_{LO}=1.2GHz

IF Bandwidth, High LO, P_{RF}=-10dBm

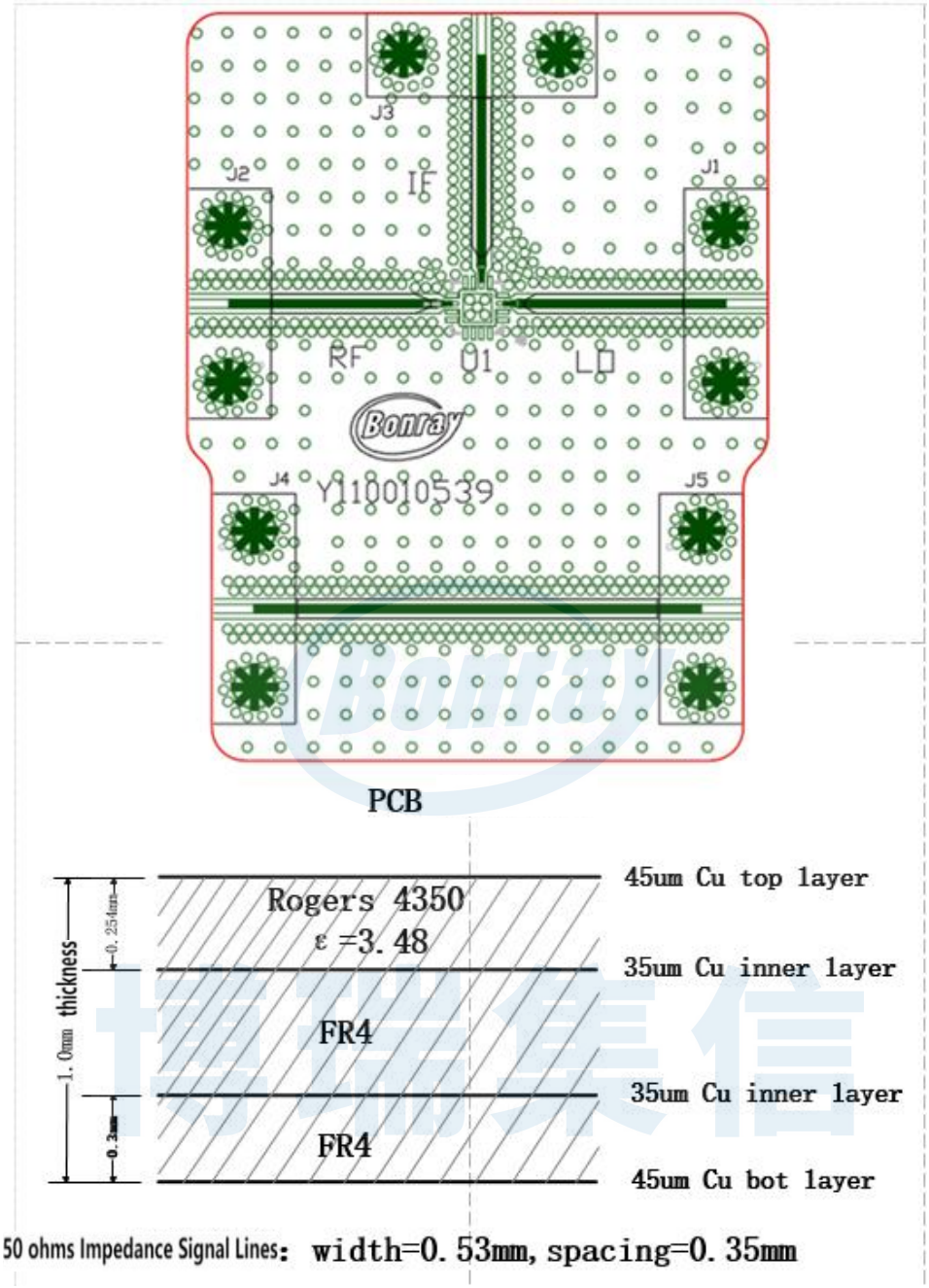


Conversion Loss@P_{LO}=13dBm, F_{LO}=1.8GHz

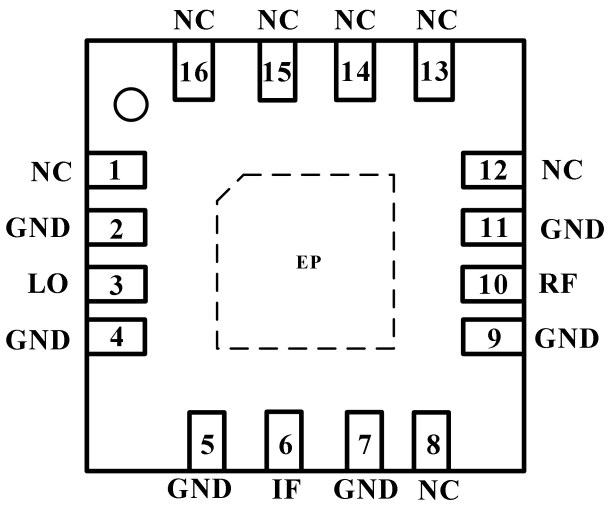


Conversion Loss vs LO Drive @ F_{LO}=1.8GHz

PCB Evaluation Board

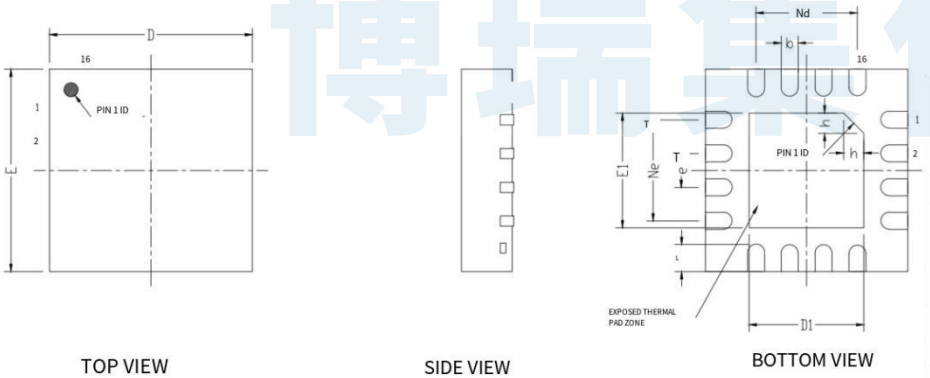


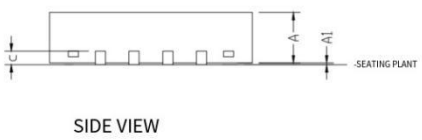
Pin Configuration and Description



Pin Number	Pin Name	Description
2,4,5,7,9,11	GND	RF/DC ground pins. Connect to RF/DC ground.
3	LO	LO pin. This pin is DC coupled
1,8,12,13,14,15,16	NC	No electrical connection. Provide grounded land pads for PCB mounting integrity.
10	RF	RF pin. This pin is DC coupled
6	IF	IF pin. A suitable series capacitor needs to be selected to filter out the DC signal for applications not requiring to DC.
-	EP	Exposed pins that must be connected to RF/DC ground.

Package Dimensions (mm)





SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.75	0.80	0.85
A1	0.01	0.02	0.05
b	0.20	0.25	0.30
c		0.270REF	
D	2.90	3.00	3.10
D1	1.60	1.70	1.80
e		0.50BSC	
Ne		1.50BSC	
Nd		1.50BSC	
E	2.90	3.00	3.10
E1	1.60	1.70	1.80
L	0.25	0.30	0.35
h	0.30	0.35	0.40