BL081

5-4000 MHz Wideband Low Noise Amplifier

Device Features

- NF = 0.95 dB @ 900MHz at RF connectors of Demo board
- Gain = 20.5 dB @ 900 MHz
- OIP3 = 28.5 dBm @ 900MHz
- Output P1 dB = 17.5 dBm @ 900MHz
- 5V/27mA, MTTF > 100 Years, MSL 1, Class 0
- RoHS2-compliant SOT-89 SMT package

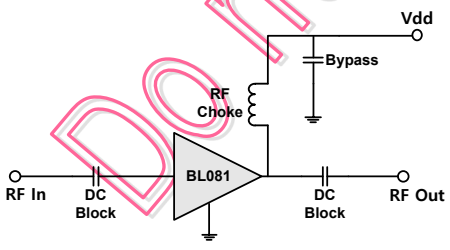
Product Description

BeRex's BL081 is a high performance LNA based on GaAs material with E-pHEMT process, packaged in a RoHS2-compliant with SOT-89 surface mount package. It is designed for use where low noise and high linearity are required and features low noise and high OIP3 with ***low current*** at wideband frequency. It requires a few external matching components. All devices are 100% RF/DC tested and classified as HBM ESD ***Class 0***.

Applications

- Base station Infrastructure/RFID
- Commercial/Industrial/Military wireless system

Applications Circuit



*external matching circuit: refer to the page 4 to 12.

Electrical Specifications

Device performance _ measured on a BeRex evaluation board at 25°C, Vd=5V, 50 Ω system.

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		5		4000	MHz
Test Frequency			900		MHz
Gain		19	20.5		dB
Input Return Loss			-20.0		dB
Output Return Loss			-22.0		dB
Output IP3	5 dBm / tone , Δf=1 MHz	25.5	28.5		dBm
Output P1dB		16.5	17.5		dBm
Noise Figure*			0.95	1.15	dB

* Noise Losses on input and output transmission lines on PCB are not de-embedded.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Bandwidth	5		4000	MHz
I_C @ (Vc = 5V)	21	27	33	mA
V_C	4.75	5.0	5.25	V
R_{TH}		63		°C/W
Operating Case Temperature	-40		+85	°C

Electrical specifications are measured at specified test conditions.

Specifications are not guaranteed over all recommended operating conditions.

Absolute Maximum Ratings

Parameter	Rating	Unit
Storage Temperature	-55 to +155	°C
Junction Temperature	+160	°C
Supply Voltage	+6.0	V
Supply Current	160	mA
Input RF Power	30	dBm

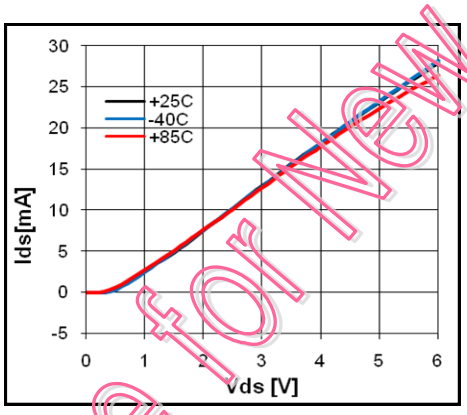
Operation of this device above any of these parameters may result in permanent damage.

Typical Performance (Vd=5V, Id=27mA, T=25°C)

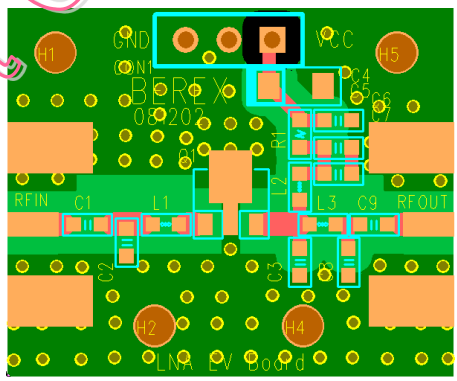
Parameter	Frequency					Unit
	900	1900	2140	2450	3500	MHz
Gain	20.5	17.0	16.0	15.5	13.4	dB
S11	-20.0	-20.0	-20.0	-21.0	-18.3	dB
S22	-22.0	-17.0	-17.0	-17.0	-12.1	dB
OIP3[2]	28.5	30.0	30.0	30.0	31.1	dBm
P1dB	17.5	17.5	17.5	17.5	18.5	dBm
Noise Figure	0.95	1.13	1.15	1.25	1.4	dB

* NF : Losses on input and output transmission lines on PCB are not de-embedded.

V-I Characteristics



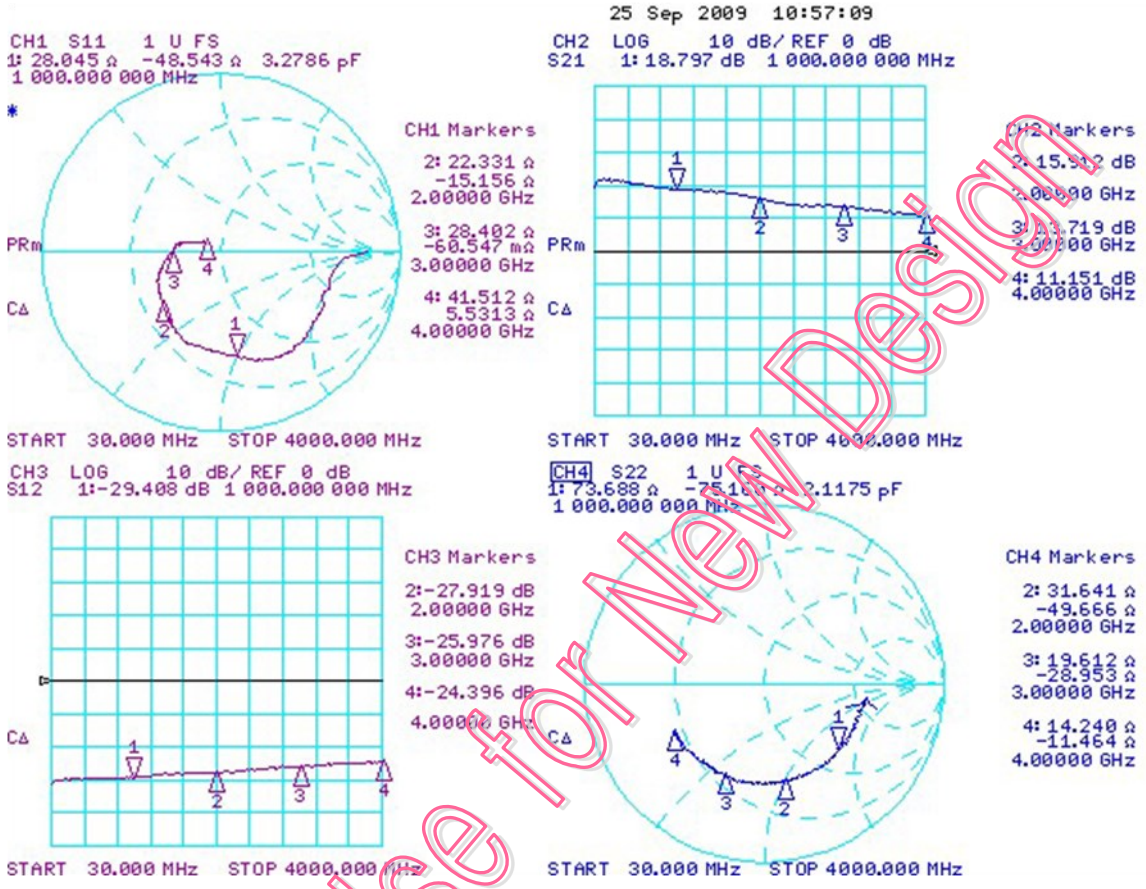
BeRex SOT89 Evaluation Board



*Dielectric constant _ 4.2 *RF pattern width 52mil *31mil thick FR4 PCB

Typical Device Data

S-parameters (Vd=5V, Id=27mA, T=25°C)

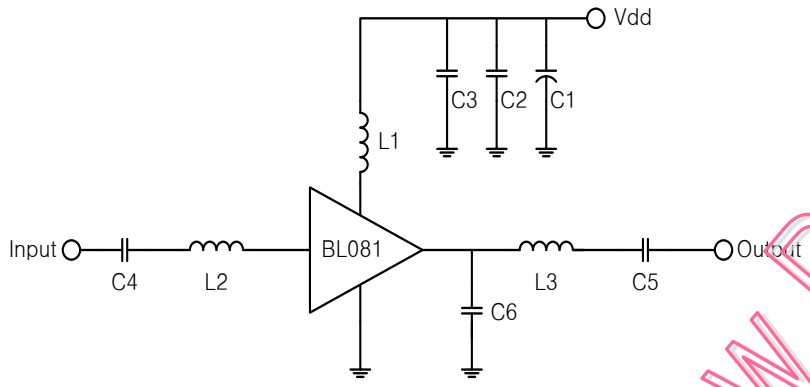


S-Parameter

(Vdevice = 5.0V, Icc = 27mA, T = 25 °C, calibrated to device leads)

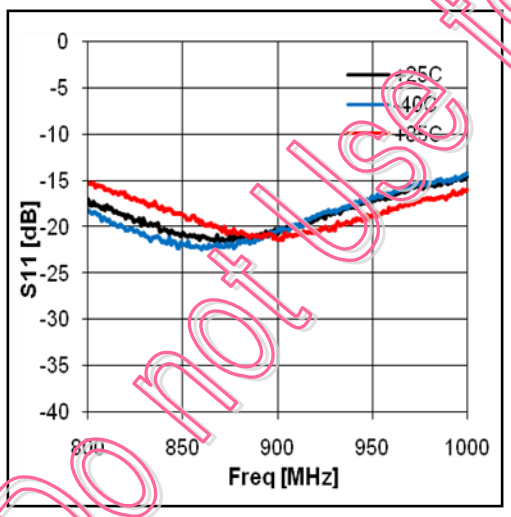
Freq [MHz]	S11 [Mag]	S11 [Ang]	S21 [Mag]	S21 [Ang]	S12 [Mag]	S12 [Ang]	S22 [Mag]	S22 [Ang]
100	0.637	-10.630	12.304	172.181	0.032	12.944	0.569	-8.574
500	0.678	-53.138	10.733	148.743	0.033	10.572	0.558	-21.318
1000	0.589	-82.755	8.815	126.435	0.035	17.891	0.554	-41.116
1500	0.513	-117.379	7.781	105.710	0.039	22.555	0.553	-60.200
2000	0.429	-139.689	6.261	82.420	0.041	23.205	0.555	-78.933
2500	0.371	-160.253	4.886	74.655	0.046	29.503	0.563	-96.918
3000	0.280	179.851	4.870	63.131	0.051	27.793	0.558	-114.110
3500	0.205	164.524	4.016	47.709	0.056	27.902	0.554	-133.482
4000	0.107	144.464	3.553	41.113	0.061	27.767	0.567	-153.176

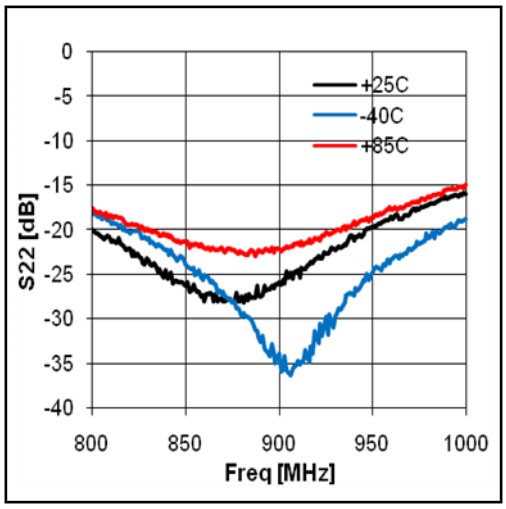
Application Circuit: 900 MHz

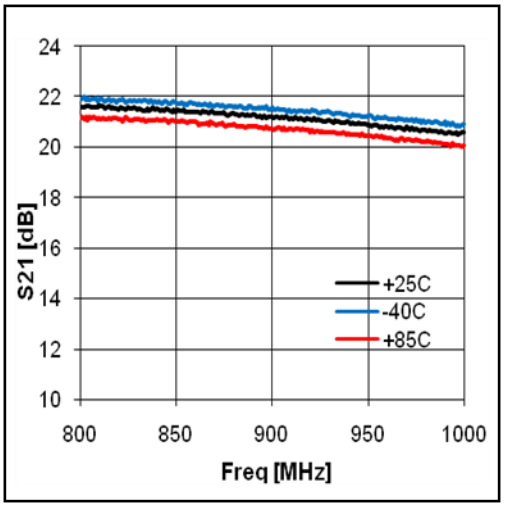
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	100nH	±5%
	L2	8.2nH	±5%
	L3	10nH	±5%

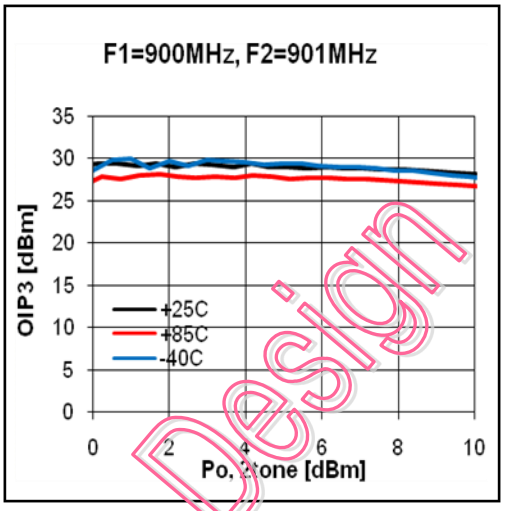
Typical Performance

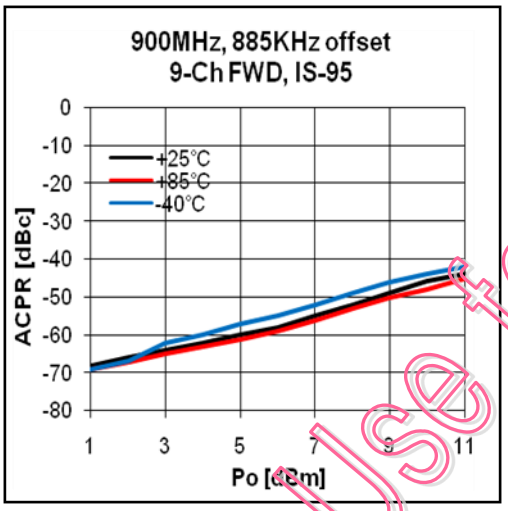
(Vd=5V, Id=27mA, T=25°C)

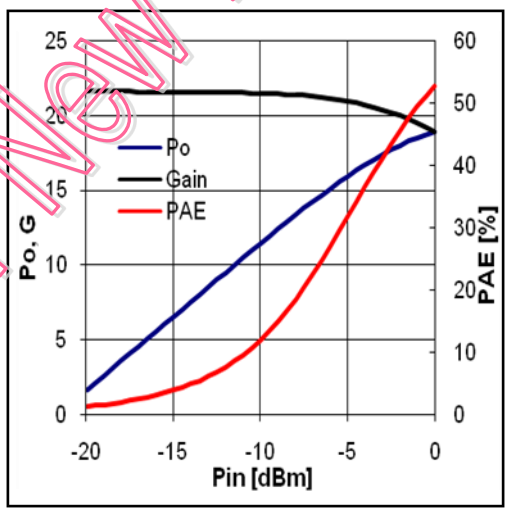












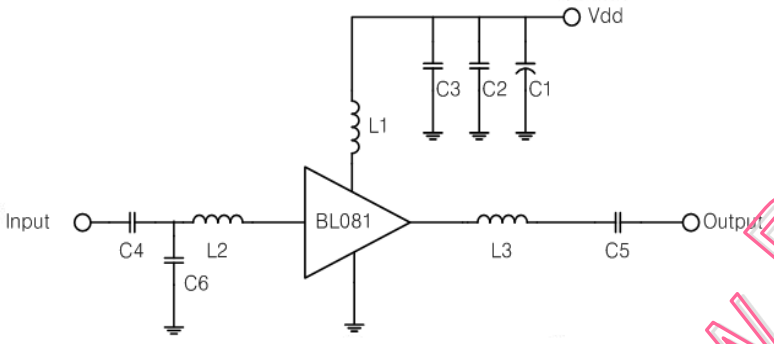
Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 25mA)

Freq	MHz	900	1900	2140	2450
Temp [°C]	-40	0.78	0.96	0.98	0.92
	25	0.98	1.25	1.18	1.16
	85	1.12	1.45	1.48	1.45

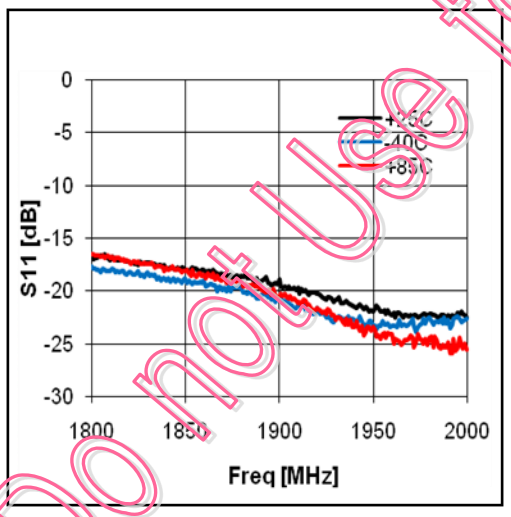
* NF : Losses on input and output transmission lines on PCB are not de-embedded.

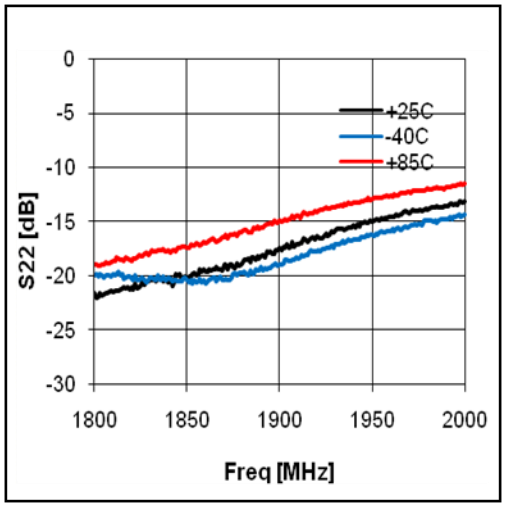
Application Circuit: 1900 MHz

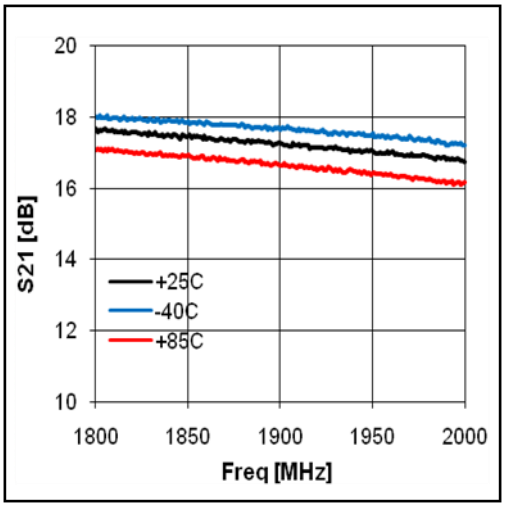
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	± 5%
	C5	100pF	± 5%
	C6	0.75pF	± 5%
	L1	18nH	±5%
	L2	2.7nH	±5%
	L3	2.7nH	±5%

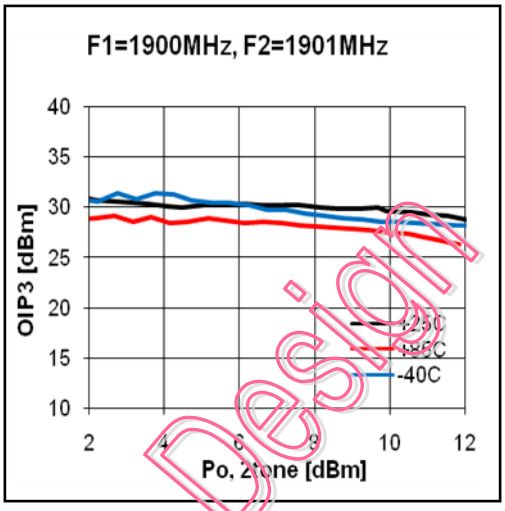
Typical Performance

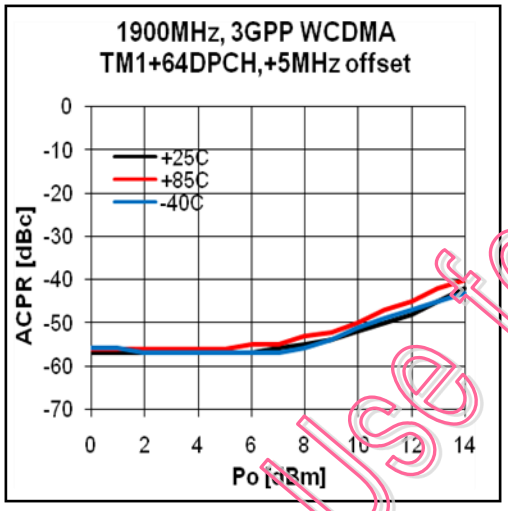
(Vd=5V, Id=27mA, T=25°C)

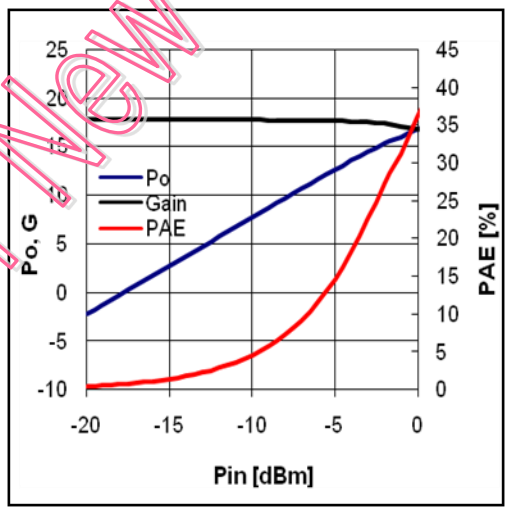












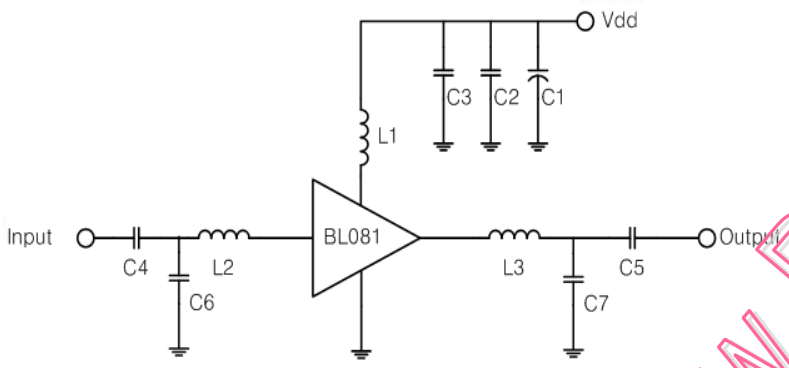
Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 25mA)

Freq	MHz	900	1900	2140	2450
Temp [°C]	-40	0.78	0.96	0.98	0.92
	25	0.98	1.25	1.18	1.16
	85	1.12	1.45	1.48	1.45

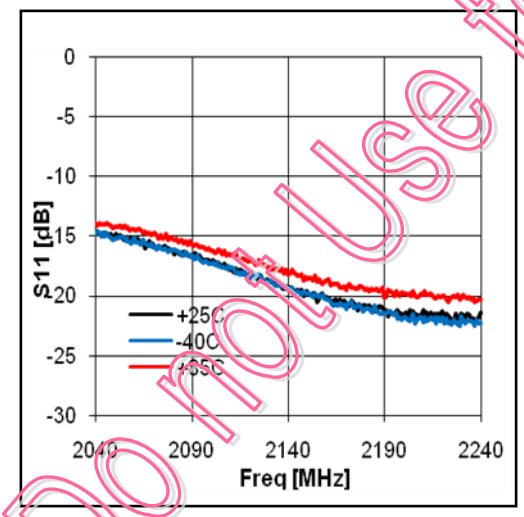
* NF : Losses on input and output transmission lines on PCB are not de-embedded.

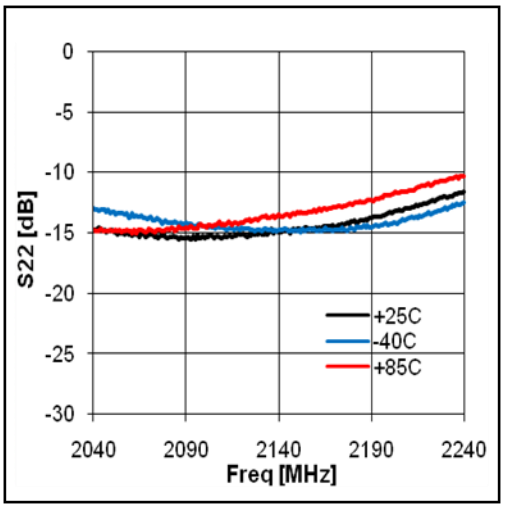
Application Circuit: 2140 MHz

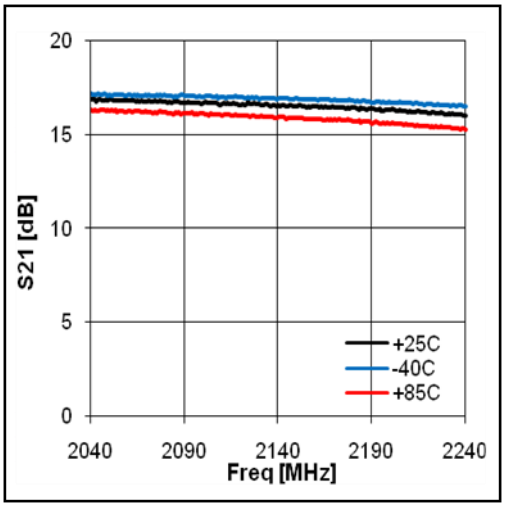
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1000pF	± 5%
	C3	100pF	±5%
	C4	18pF	± 5%
	C5	18pF	± 5%
	C6	0.75pF	± 5%
	C7	0.5pF	±5%
	L1	33nH	±5%
	L2	1.5nH	±5%
	L3	4.7nH	±5%

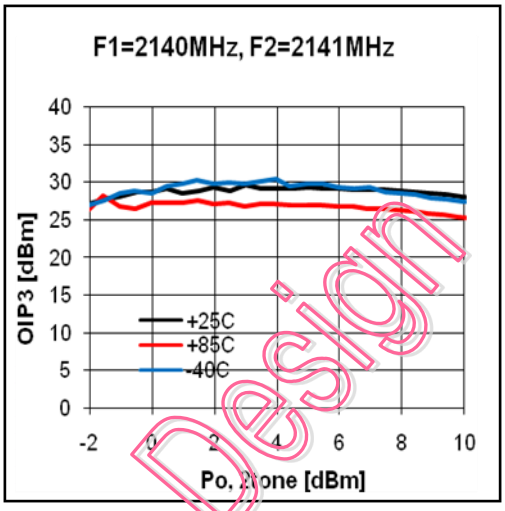
Typical Performance

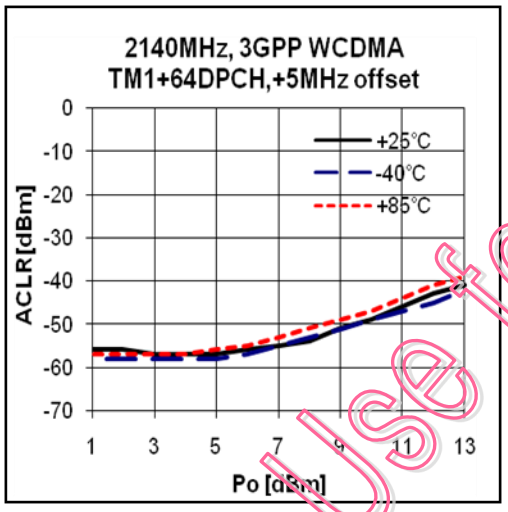
(Vd=5V, Id=27mA, T=25°C)

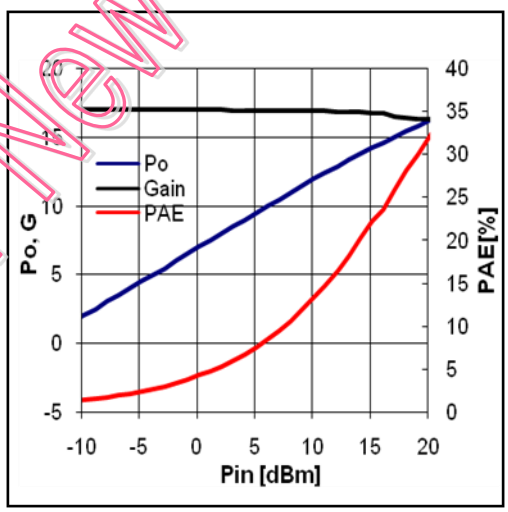












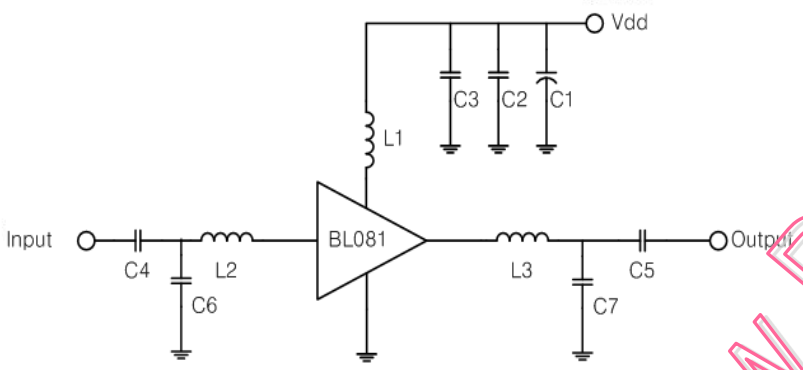
Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 25mA)

Freq	MHz	900	1900	2140	2450
Temp [°C]	-40	0.78	0.96	0.98	0.92
	25	0.98	1.25	1.18	1.16
	85	1.12	1.45	1.48	1.45

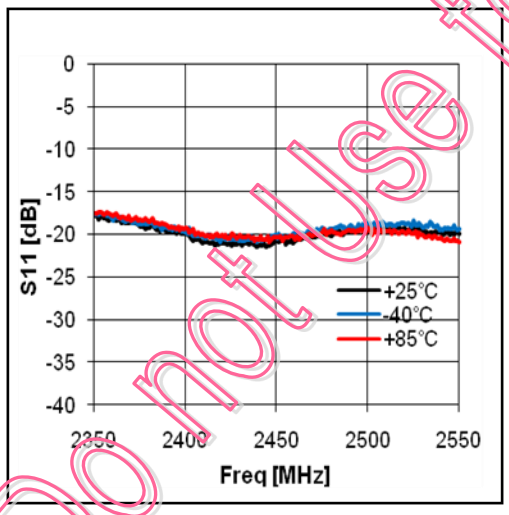
* NF : Losses on input and output transmission lines on PCB are not de-embedded.

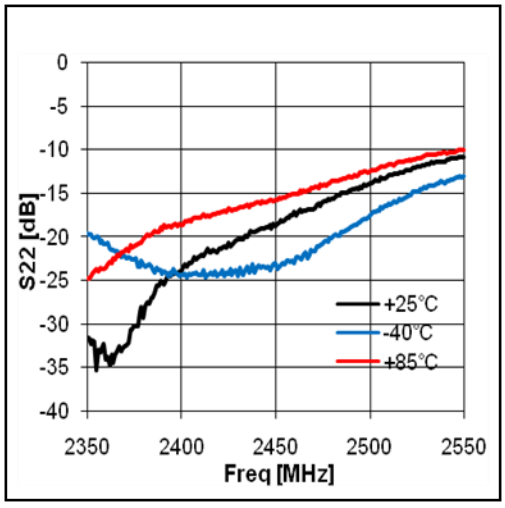
Application Circuit: 2450 MHz

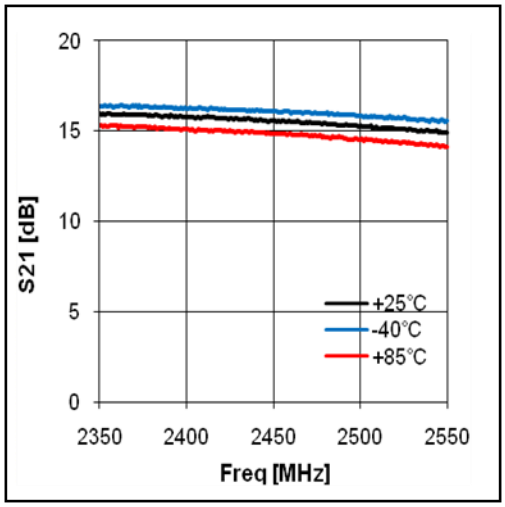
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1000pF	± 5%
	C3	100pF	±5%
	C4	22nF	± 5%
	C5	22nF	± 5%
	C6	0.5pF	± 5%
	C7	1pF	±5%
	L1	47nH	±5%
	L2	1.8nH	±5%
	L3	3.9nH	±5%

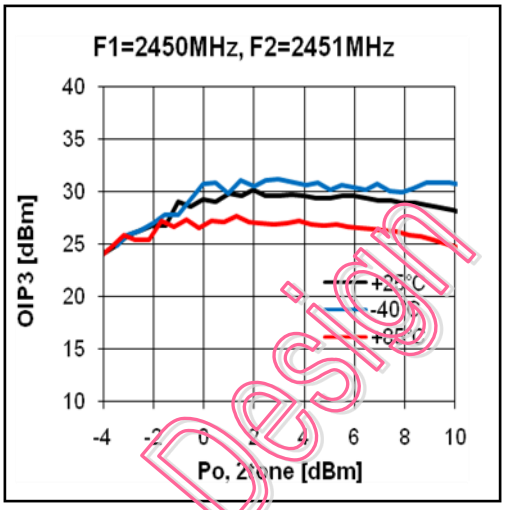
Typical Performance

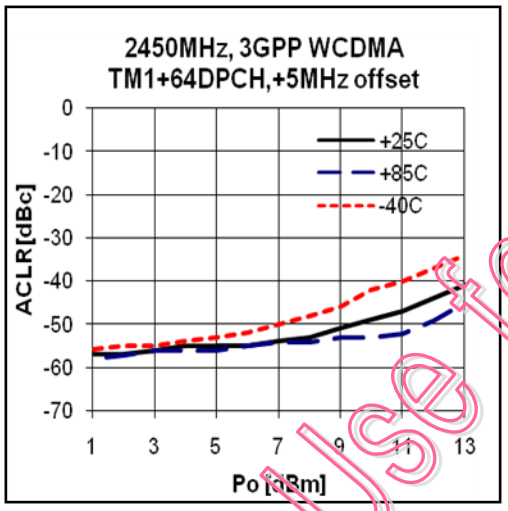
(Vd=5V, Id=27mA, T=25°C)

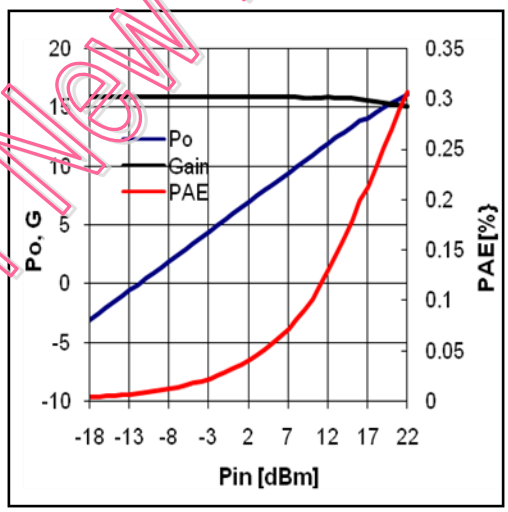












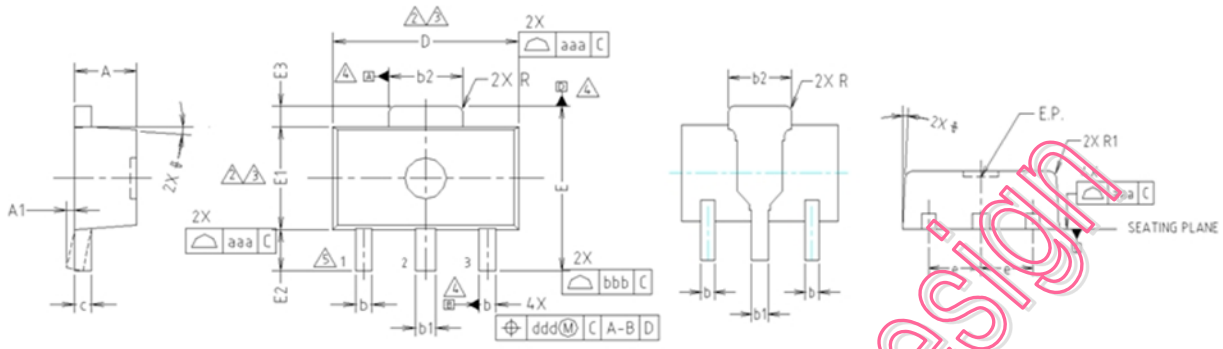
Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 25mA)

Freq	MHz	900	1900	2140	2450
Temp [°C]	-40	0.78	0.96	0.98	0.92
	25	0.98	1.25	1.18	1.16
	85	1.12	1.45	1.48	1.45

* NF : Losses on input and output transmission lines on PCB are not de-embedded.

Package Outline Dimension



NOTE:
1. DIMENSIONS IN MILLIMETERS.

2. DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.5mm PER END. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.5mm PER SIDE.

3. DIMENSIONS D AND E1 ARE DETERMINED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.

4. DATUMS A, B AND D TO BE DETERMINED 0.10mm FROM THE LEAD TIP.

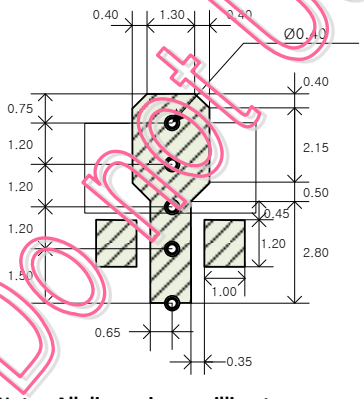
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

SYMBOL	MILLIMETERS MINIMUM	NOMINAL	MAXIMUM	NOTE
A	1.4	1.50	1.60	
A1	0.00	–	0.10	
b	0.3	0.42	0.48	
b1	0.48	0.52	0.58	
b2	1.79	1.82	1.87	
c	0.40	0.42	0.46	
D	4.40	4.50	4.70	2,3
E1	3.70	4.00	4.30	
E	2.40	2.50	2.70	2,3
E2	0.80	1.00	1.20	
E3	0.40	0.50	0.60	
e		1.50 TYP.		
θ		4° TYP.		
R		0.15 TYP.		
R1	–	–	0.20	

SYMBOL	TOLERANCES OF FORM AND POSITION	NOTE
aaa	0.15	
bbb	0.20	
ccc	0.10	
ddd	0.10	

Suggested PCB Land Pattern and PAD Layout

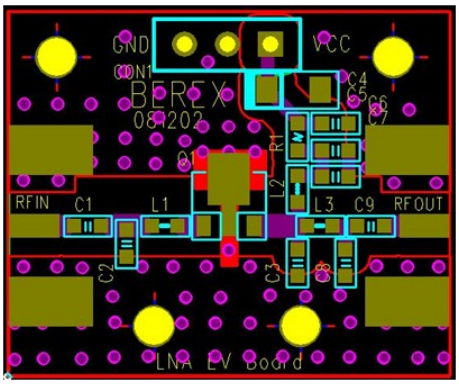
PCB Land Pattern



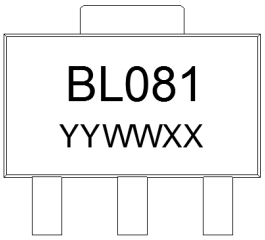
Note : All dimension _ millimeters

PCB lay out _ on BeRex website

PCB Mounting



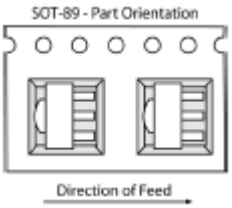
Package Marking



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

Tape & Reel

SOT89



Packaging information:

Tape Width (mm): 12

Reel Size (inches): 7

Device Cavity Pitch (mm): 8

Devices Per Reel: 1000

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 0
Value:	**Passes <200V**
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JESD22-A114
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.

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:

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