5-4000 MHz Wideband Low Noise Amplifier

Device Features

- Low NF 0.95dB@900MHz
- 20.5dB Gain at 900MHz, 17dB Gain at 1900MHz
- 30dBm OIP3, 17.5dBm P1dB at 1900MHz @5V, 25mA
- 5V Single supply, MTTF > 100 Years
- Highly Reliable GaAs E-PHEMT Technology
- Lead-free/Green/RoHS compliant SOT89 package
- Application: commercial, space, military wireless system

Electrical Specifications (T_a = 25°C, Vs = 5V)

Parameters	Test Conditions	Min	Typ	Max	Unit
Frequency Range		5		4000	MHz
Gain	900MHz	18.0	20.5	22.0	dB
	1900MHz	15.0	17.0	19.0	
	2140MHz	14.0	16.0	18.0	
	2450MHz	13.5	15.5	17.5	
	3500MHz	11.1	13.1	15.1	
S11	900MHz		-20.0		dB
	1900MHz		-20.0		
	2140MHz		-20.0		
	2450MHz		-21.0		
	3500MHz		-35.0		
S22	900MHz		-22.0		dB
	1900MHz		-17.0		
	2140MHz		-17.0		
	2450MHz		-17.0		
	3500MHz		-18.0		
OIP3	900MHz	26.0	28.5		dBm
	1900MHz	27.0	30.0		
	2140MHz	26.0	30.0		
	2450MHz	26.0	30.0		
	3500MHz	30.0	32.0		
P1dB	900MHz		17.5		dBm
	1900MHz		17.5		
	2140MHz		17.5		
	2450MHz		17.5		
	3500MHz		17.5		
NF	900MHz		0.95		dB
	1900MHz		1.13		
	2140MHz		1.15		
	2450MHz		1.25		
	3500MHz		1.25		
Ids	Vdevice = 5.0V	15	27	35	mA
Rth	Thermal Resistance		63		°C/W

Test conditions unless otherwise noted.

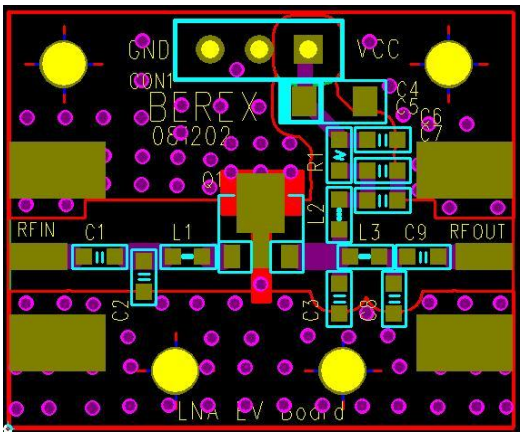
1. Device performance is measured on BeRex evaluation board at 25°C, 50 ohm system.
2. OIP3 measured with two tones at an output power of 5dBm/tone separated by 1MHz

Absolute Maximum Ratings

Parameters	Rating
Operating Case temperature	-40 to +85°C
Storage Temperature	-55 to +155°C
Junction Temperature	+220°C
Supply Voltage	6.0V
Max. Device Current	160mA
Input RF Power	23dBm

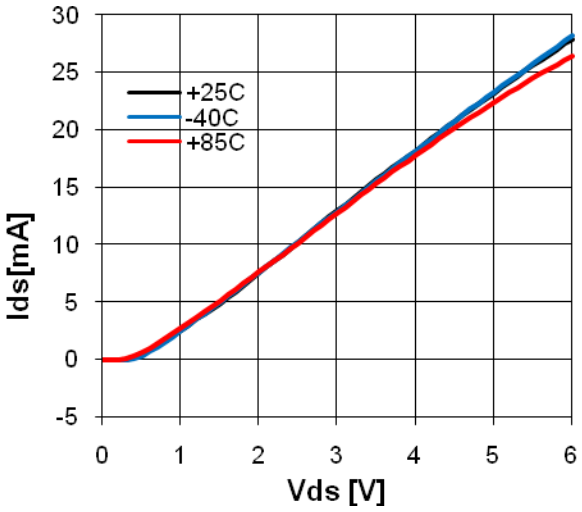
Operation of this device above any of these parameters may result in permanent damage.

[Generic SOT89 Evaluation Board]



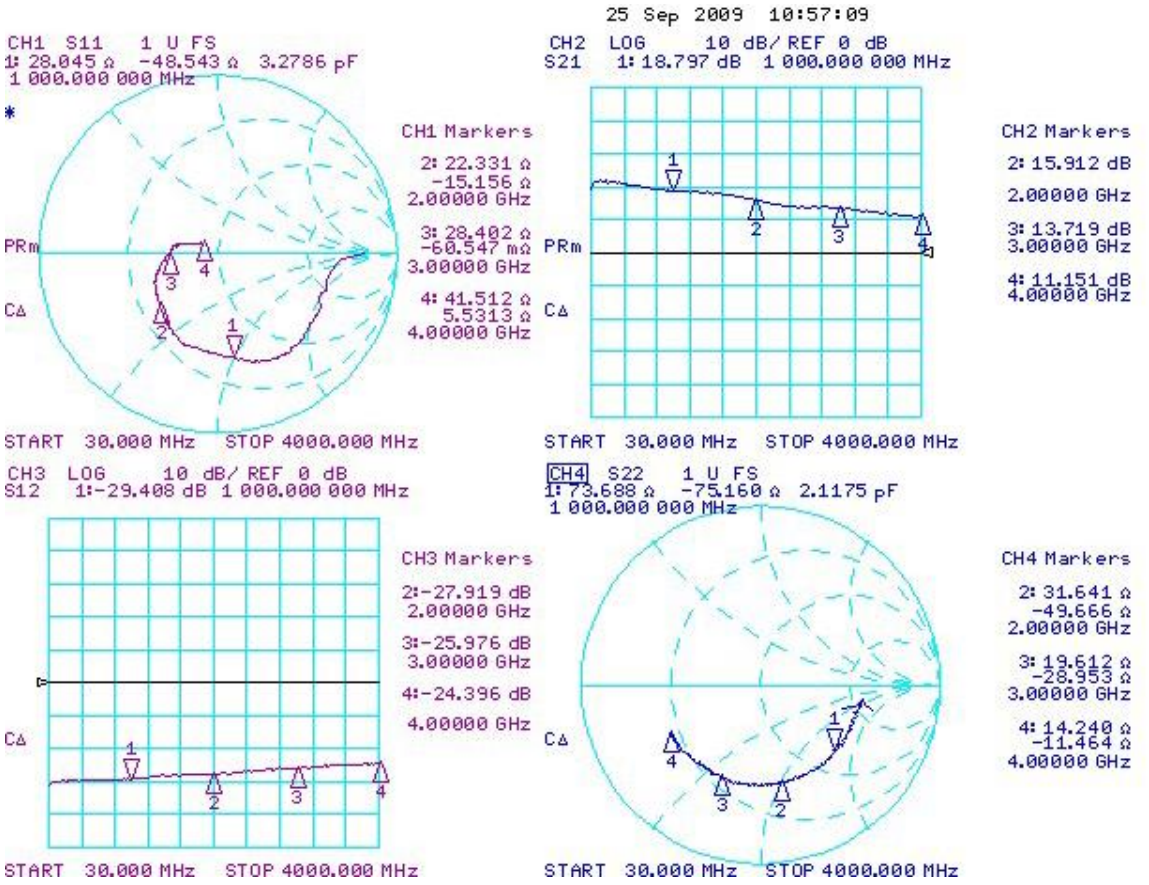
*Dielectric constant is 4.2
*RF pattern width 52mil
*31mil thick FR4 PCB

[I-V Characteristics]



Typical Device Data

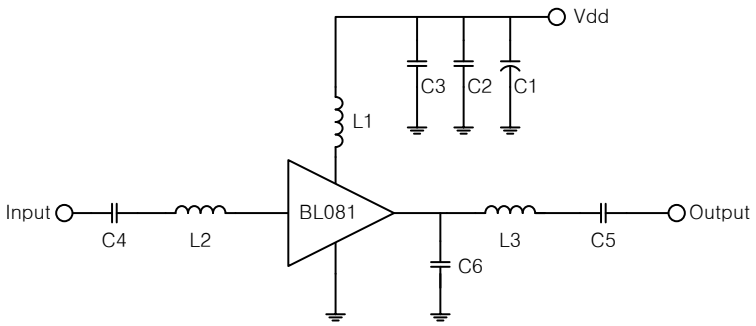
S-parameters (Vdevice=5V, Ids=25mA, Ta=25°C)



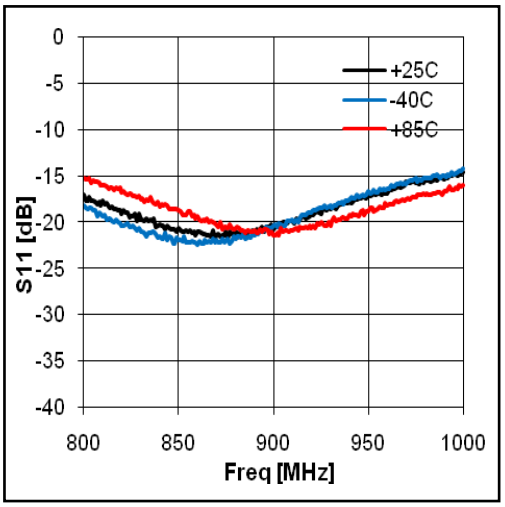
S-Parameter
(5V/25mA)

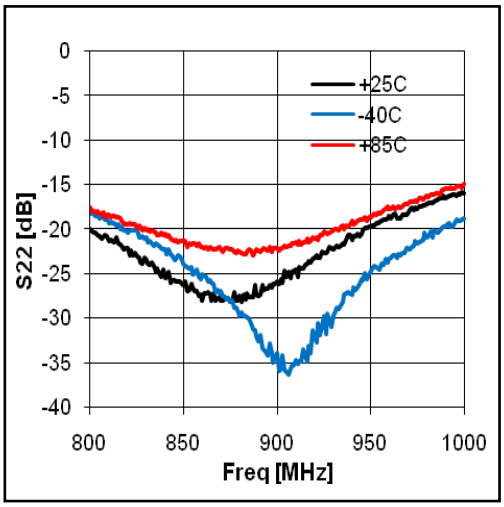
Freq [MHz]	S11 [Mag]	S11 [Ang]	S21 [Mag]	S21 [Ang]	S12 [Mag]	S12 [Ang]	S22 [Mag]	S22 [Ang]
100	0.637	-10.630	12.304	172.181	0.032	12.944	0.569	-8.574
500	0.678	-53.138	10.733	148.743	0.033	10.572	0.558	-21.318
1000	0.589	-82.755	8.815	126.435	0.035	17.891	0.554	-41.116
1500	0.513	-117.379	7.781	105.710	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

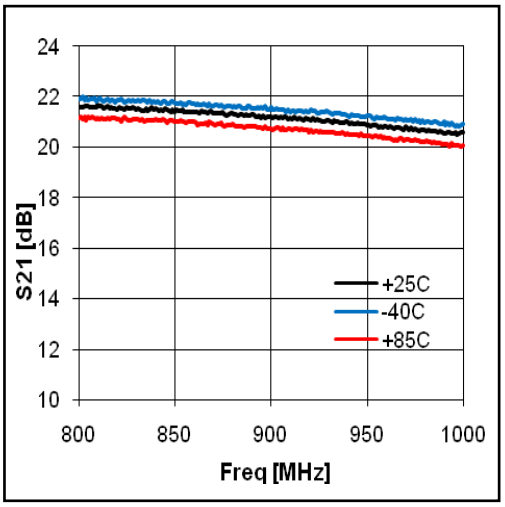
Application Circuit: 900 MHz

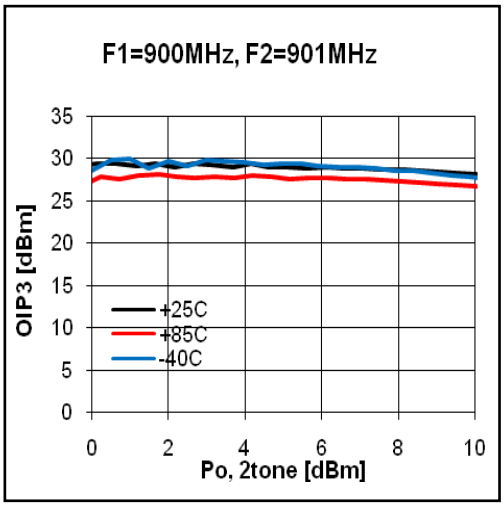
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	±5%
	C5	100pF	±5%
	C6	0.5pF	± 5%
	L1	100nH	±5%
	L2	8.2nH	±5%
	L3	10nH	±5%

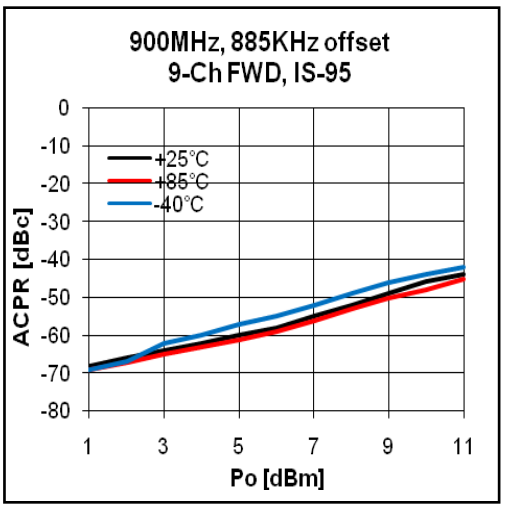
Typical Performance

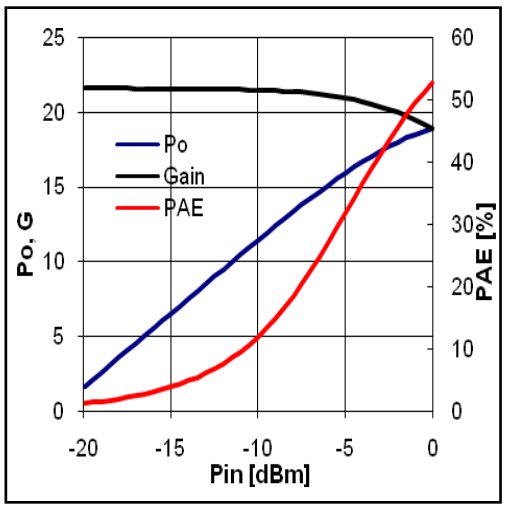










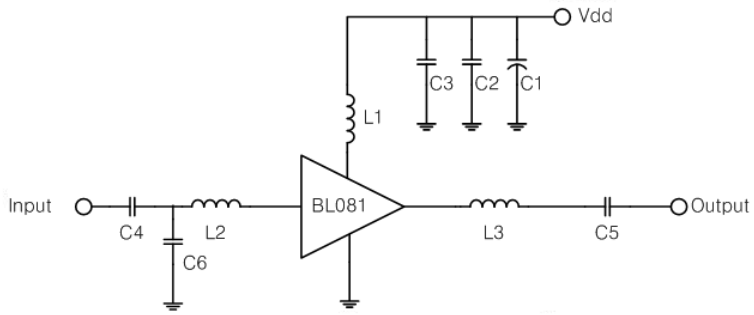


Noise Figure Temperature Performance

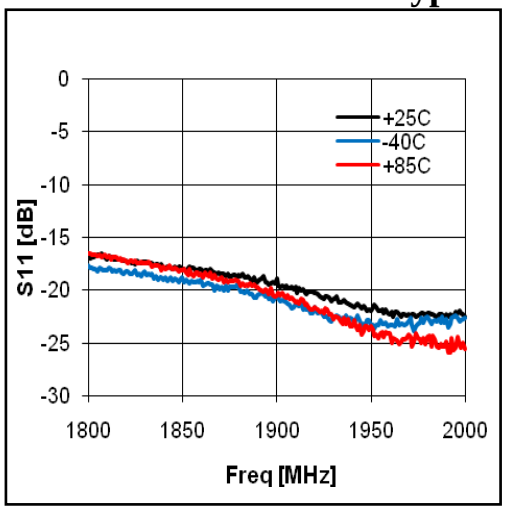
(Vds = 5.0V, Ids = 25.0mA)

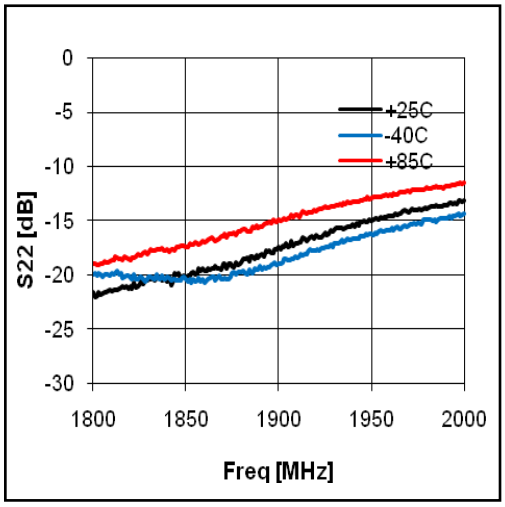
Freq	MHz	900	1900	2140	2450
Temp [°C]	-40	0.78	0.96	0.98	0.92
	25	0.98	1.25	1.18	1.16
	85	1.12	1.45	1.48	1.45

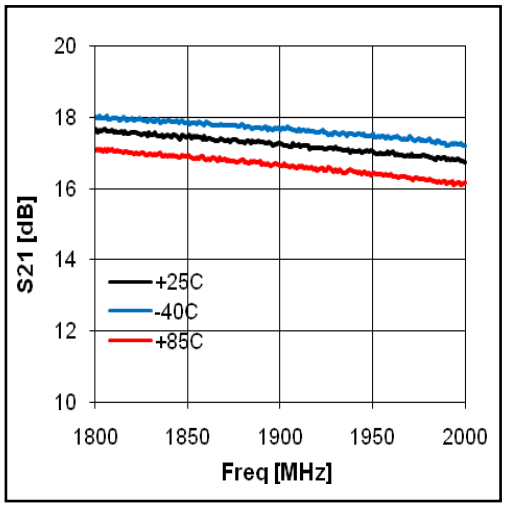
Application Circuit: 1900 MHz

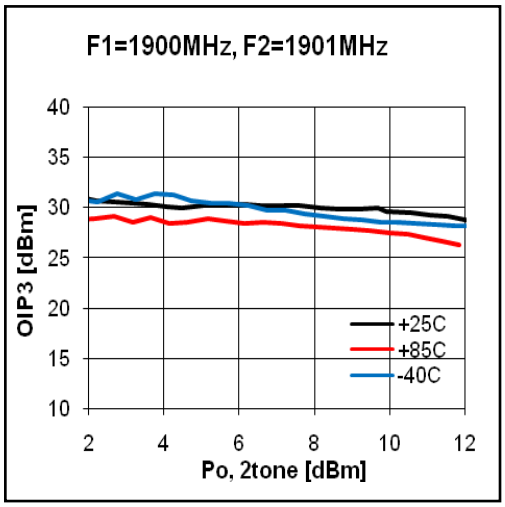
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1nF	± 5%
	C3	100pF	±5%
	C4	100pF	± 5%
	C5	100pF	± 5%
	C6	0.75pF	± 5%
	L1	18nH	±5%
	L2	2.7nH	±5%
	L3	2.7nH	±5%

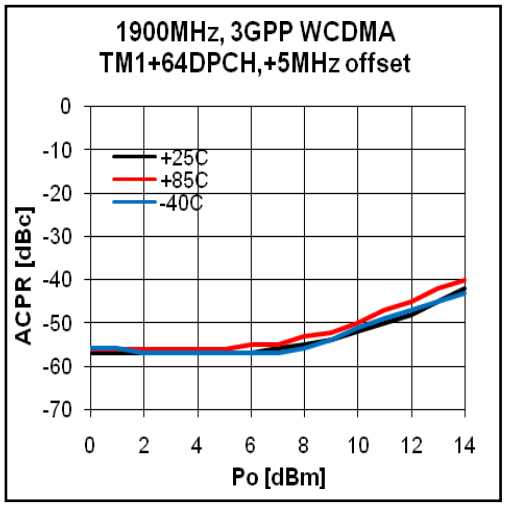
Typical Performance

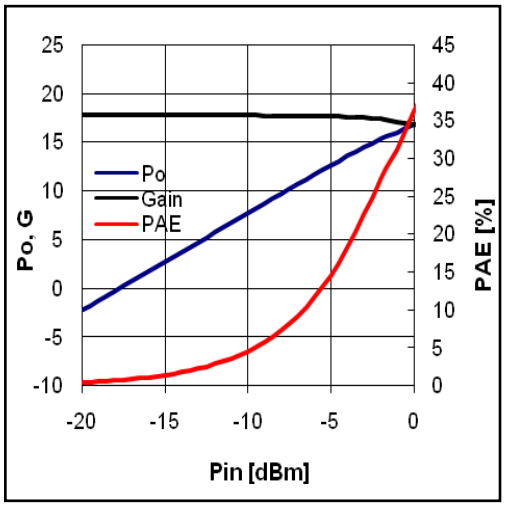




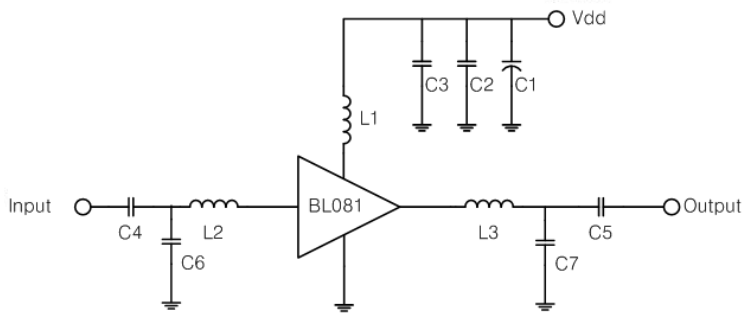




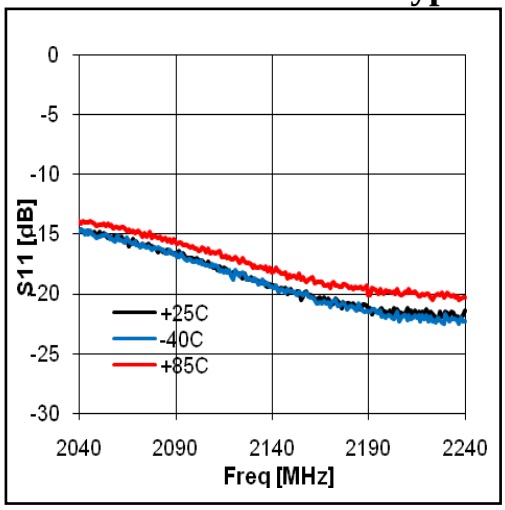


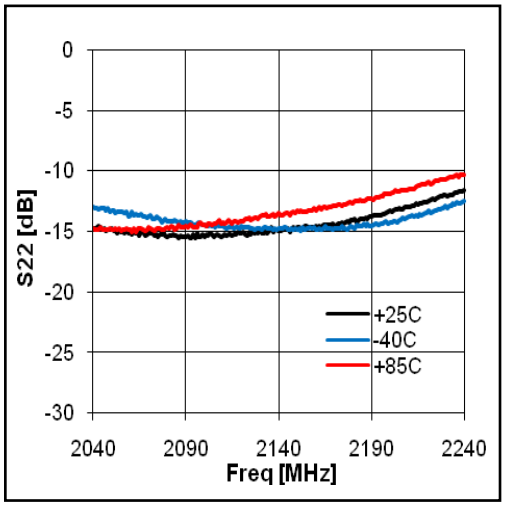


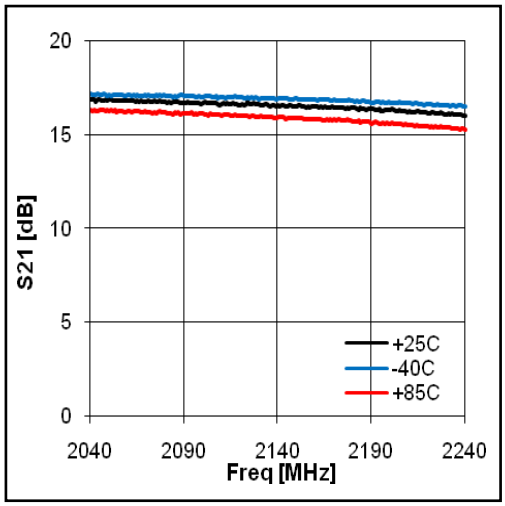
Application Circuit: 2140 MHz

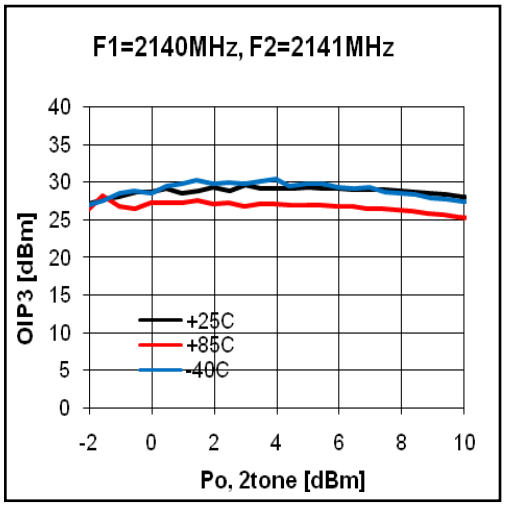
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1000pF	± 5%
	C3	100pF	±5%
	C4	18pF	± 5%
	C5	18pF	± 5%
	C6	0.75pF	± 5%
	C7	0.5pF	±5%
	L1	33nH	±5%
	L2	1.5nH	±5%
	L3	4.7nH	±5%

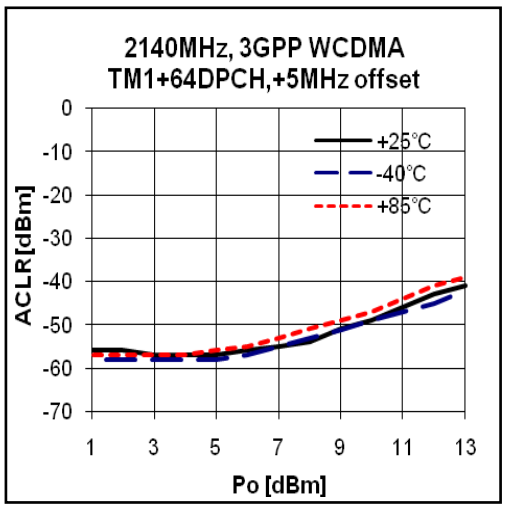
Typical Performance

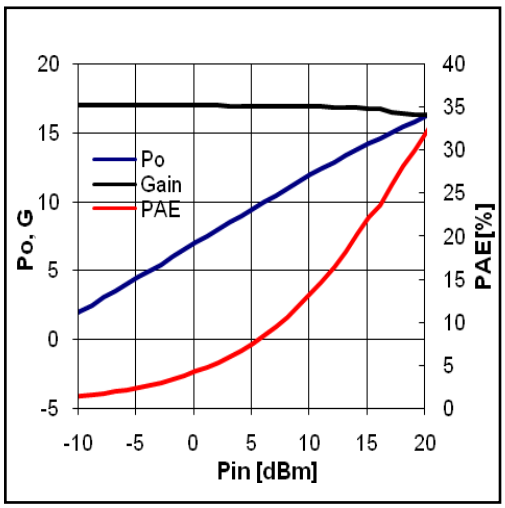




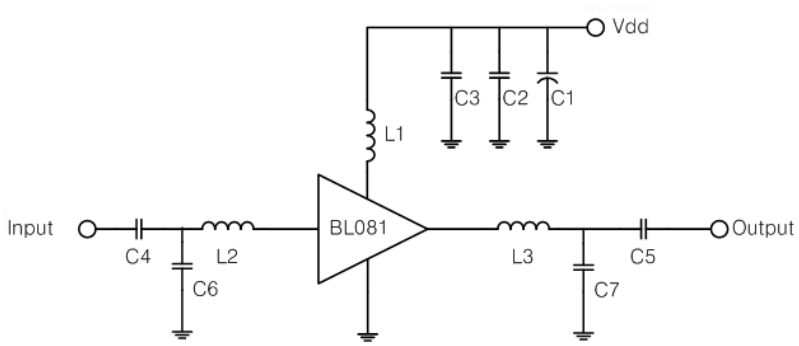




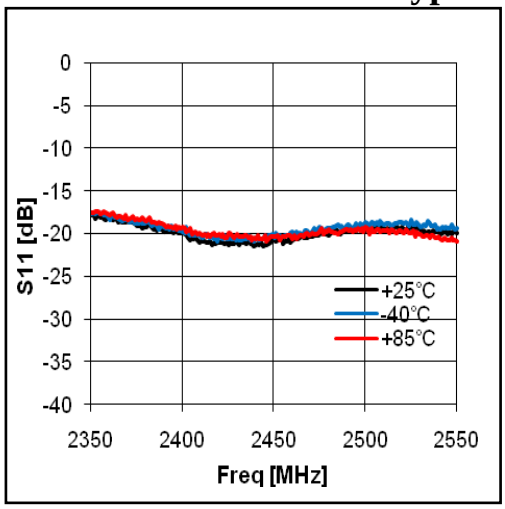


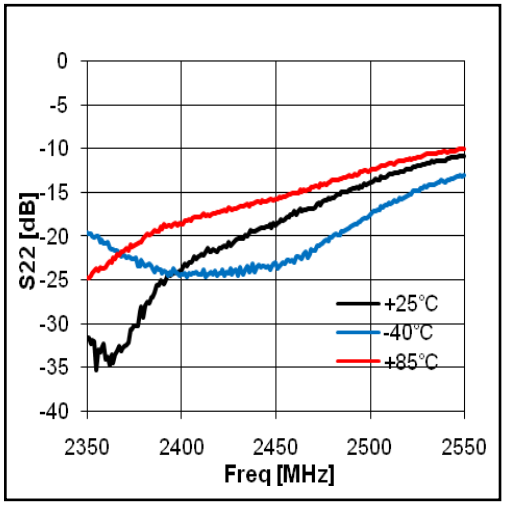


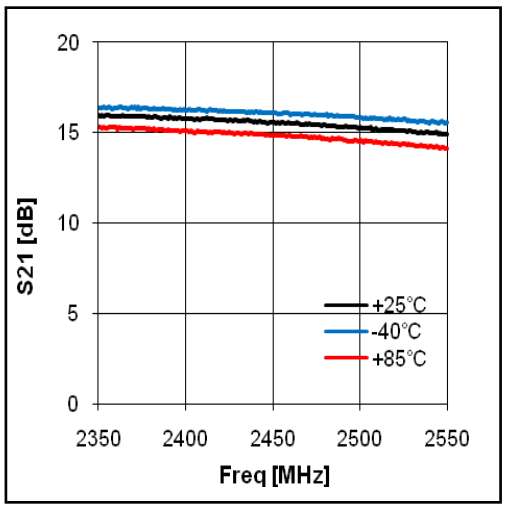
Application Circuit: 2450 MHz

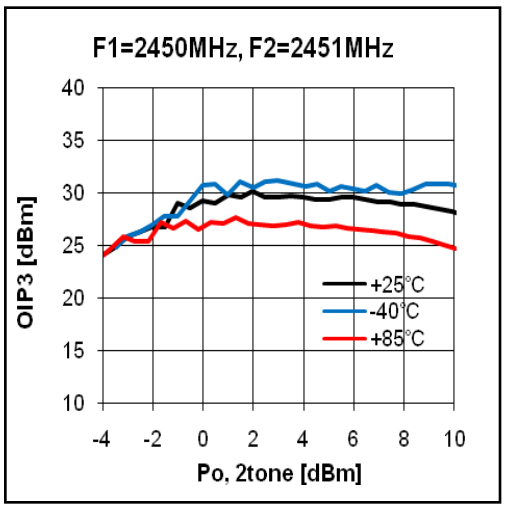
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1000pF	± 5%
	C3	100pF	±5%
	C4	22pF	± 5%
	C5	22pF	± 5%
	C6	0.5pF	± 5%
	C7	1pF	±5%
	L1	47nH	±5%
	L2	1.8nH	±5%
	L3	3.9nH	±5%

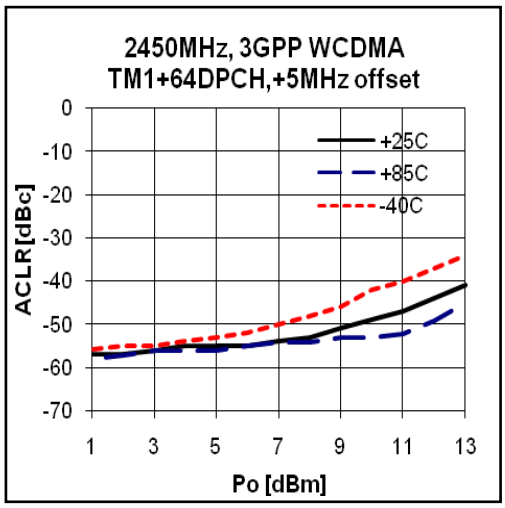
Typical Performance

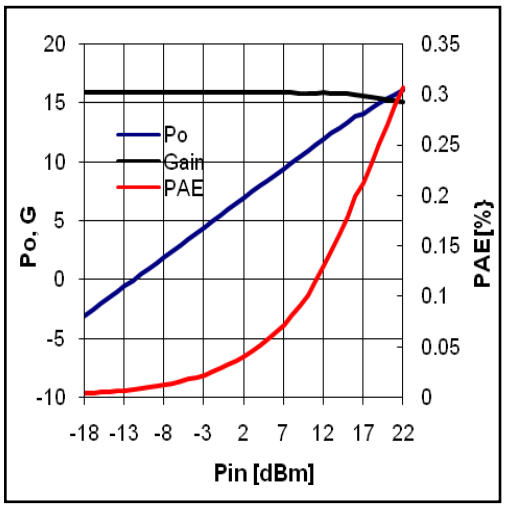




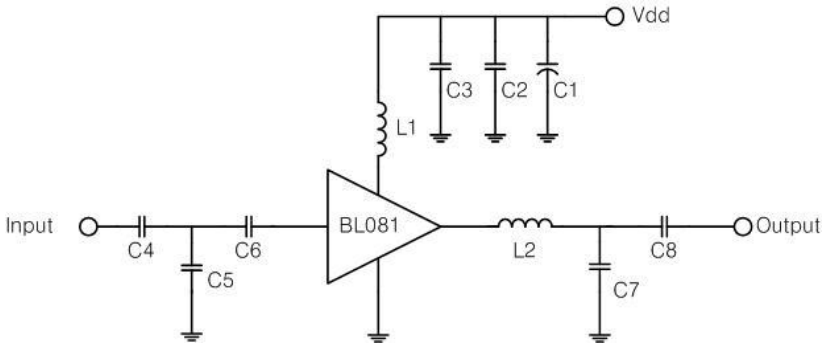




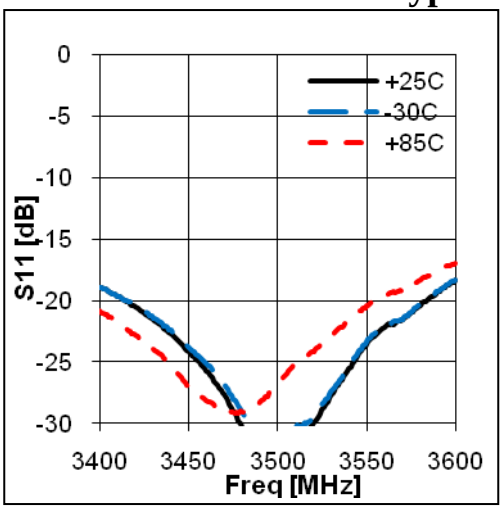


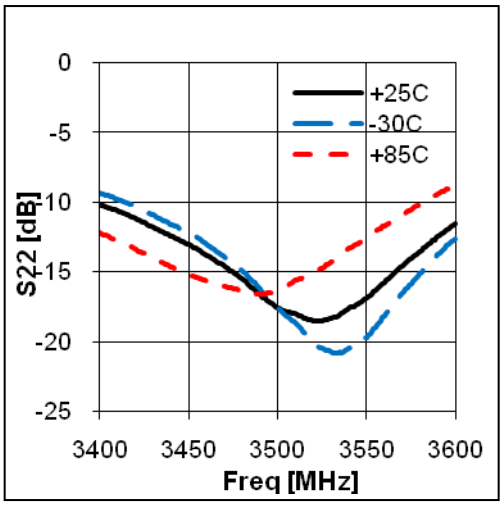


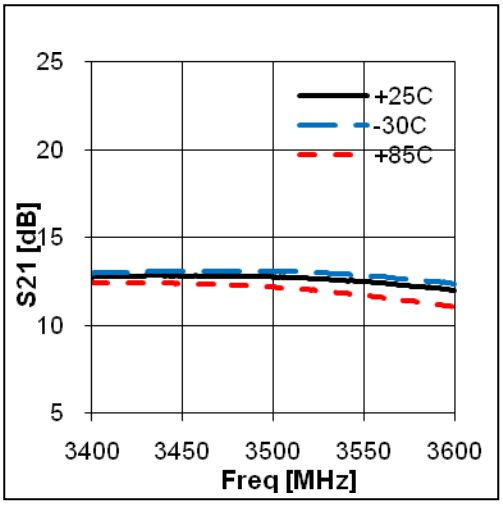
Application Circuit: 3500 MHz

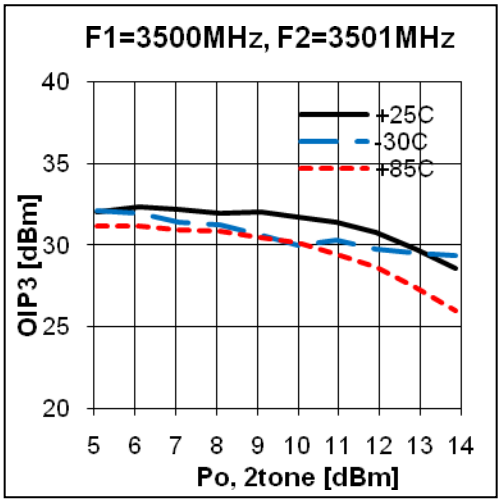
Schematic Diagram	BOM		Tolerance
	C1	10uF	± 20%
	C2	1000pF	± 5%
	C3	100pF	±5%
	C4	18pF	± 5%
	C5	0.5pF	± 5%
	C6	3.3pF	± 5%
	C7	1pF	±5%
	C8	18pF	±5%
	L1	33nH	±5%
	L2	1.5nH	±5%

Typical Performance







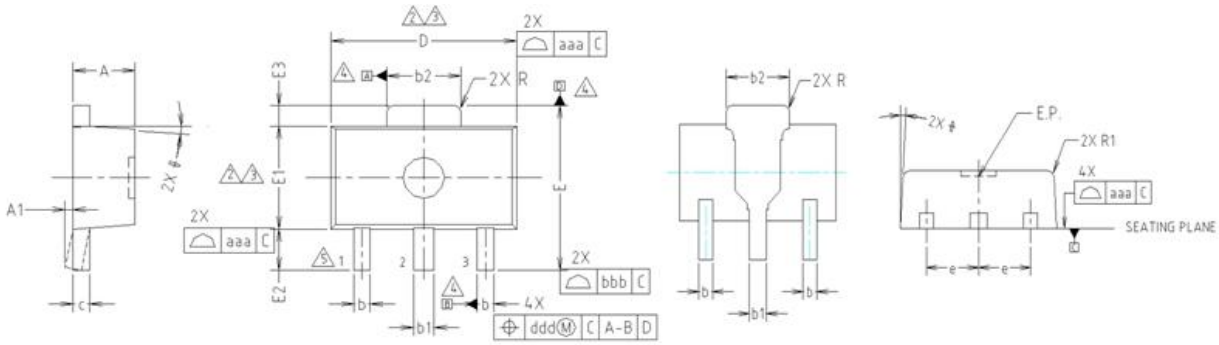


Noise Figure Temperature Performance

(Vds = 5.0V, Ids = 25.0mA)

Freq	MHz	900	1900	2140	2450	3500
Temp [°C]	-40	0.78	0.96	0.98	0.92	1.20
	25	0.98	1.25	1.18	1.16	1.45
	85	1.12	1.45	1.48	1.45	1.65

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 0.18mm FROM THE LEAD TIP.

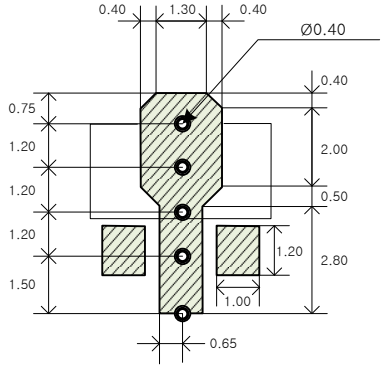
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	1.40	1.50	1.60	
A1	0.00	–	0.10	
b	0.38	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
E	3.70	4.00	4.30	
E1	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	

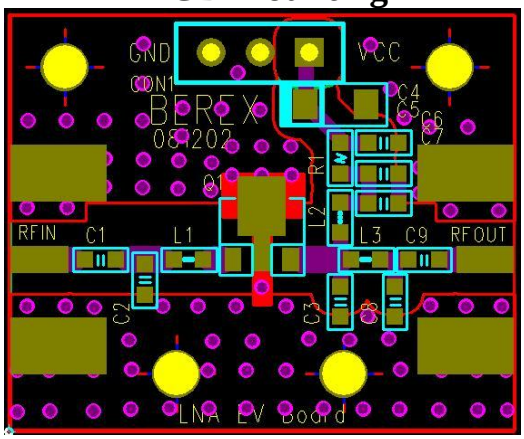
Suggested PCB Land Pattern and PAD Layout

PCB Land Pattern



Note : All dimension are in millimeters

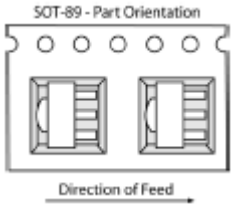
PCB Mounting



Visit http://www.berex.com for PCB layout

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 1A
Value	Passes <500V
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

NATO CAGE code:

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

NOTICE

BeRex Corporation reserves the right to make changes of product specification or to discontinue product at any time without notice.