BG15A

50-4000 MHz Cascadable InGaP HBT Gain Block

Device Features

- OIP3 = 31 dBm @ 1900 MHz
- Gain = 19 dB @ 1900 MHz
- Output P1 dB = 17.4 dBm @ 1900 MHz
- 50 Ω Cascadable
- Patented temperature compensation
- Lead-free/RoHS-compliant SOT-89 SMT package



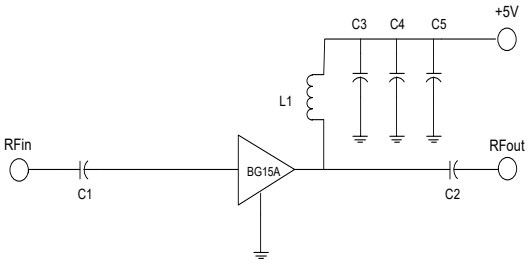
Product Description

BeRex's BG15A is a high performance InGaP/ GaAs HBT MMIC amplifier, internally matched to 50 Ohms and uses a patented ***temperature compensation*** circuit to provide stable current over the operating temperature range without the need for external components. The BG15A is designed for high linearity gain block applications that require excellent gain flatness. It is packaged in a RoHS-compliant with SOT-89 surface mount package.

Applications

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

Applications Circuit



*C1, C2, C3 =100 pF ± 5%; C4 = 1000 pF ± 5%; C5 = 10uF; L1 = 33nH

*less than 20nH improves RF performance at over 1.9GHz.

*40nH or higher value L1 improves RF performance at under 500MHz.

*Optimum value of L1 may vary with board design.

*L1:15nH, C1&C2:10pF for 3.5GHz Application.

Typical Performance[1]

	Frequency						Unit
	500	900	1900	2140	2450	3500	MHz
Gain	21.5	21.0	19.0	18.5	18.0	16.6	dB
S11	-15.0	-24.0	-31.0	-30.0	-26.0	-15.8	dB
S22	-16.0	-23.0	-14.0	-12.0	-11.0	-11.8	dB
OIP3[2]	33.0	32.5	31.0	30.5	29.5	28.0	dBm
P1dB	18.3	17.8	17.4	17.1	16.7	15.3	dBm
N. F	2.9	2.9	2.9	2.9	3.1	3.3	dB

[1] Device performance _ measured on a BeRex evaluation board at 25°C, 50 Ω system.

[2] OIP3 _ measured with two tones at an output of 2 dBm per tone separated by 1 MHz.

	Min.	Typical	Max.	Unit
Bandwidth	50		4000	MHz
I_C @ (Vc = 5V)	45	55	65	mA
V_C		5.0		V
dG/dT		-0.004		dB/°C
R_{TH}		50		°C/W

Absolute Maximum Ratings

Parameter	Rating	Unit
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+220	°C
Operating Voltage	+6.5	V
Supply Current	150	mA
Input RF Power	23	dBm

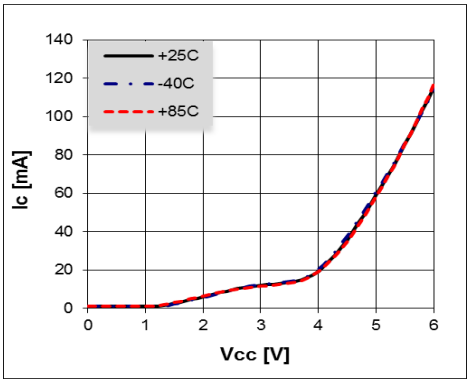
Operation of this device above any of these parameters may result in permanent damage.

Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex

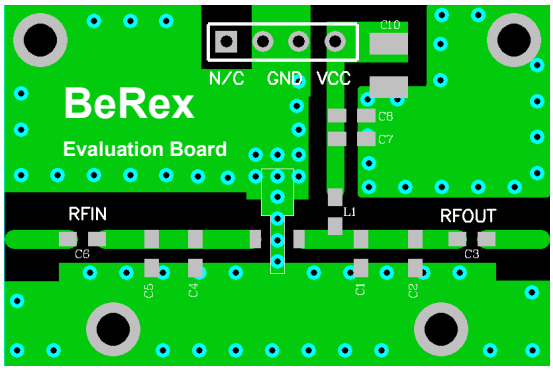
BG15A

50-4000 MHz Cascadable InGaP HBT Gain Block

V-I Characteristics



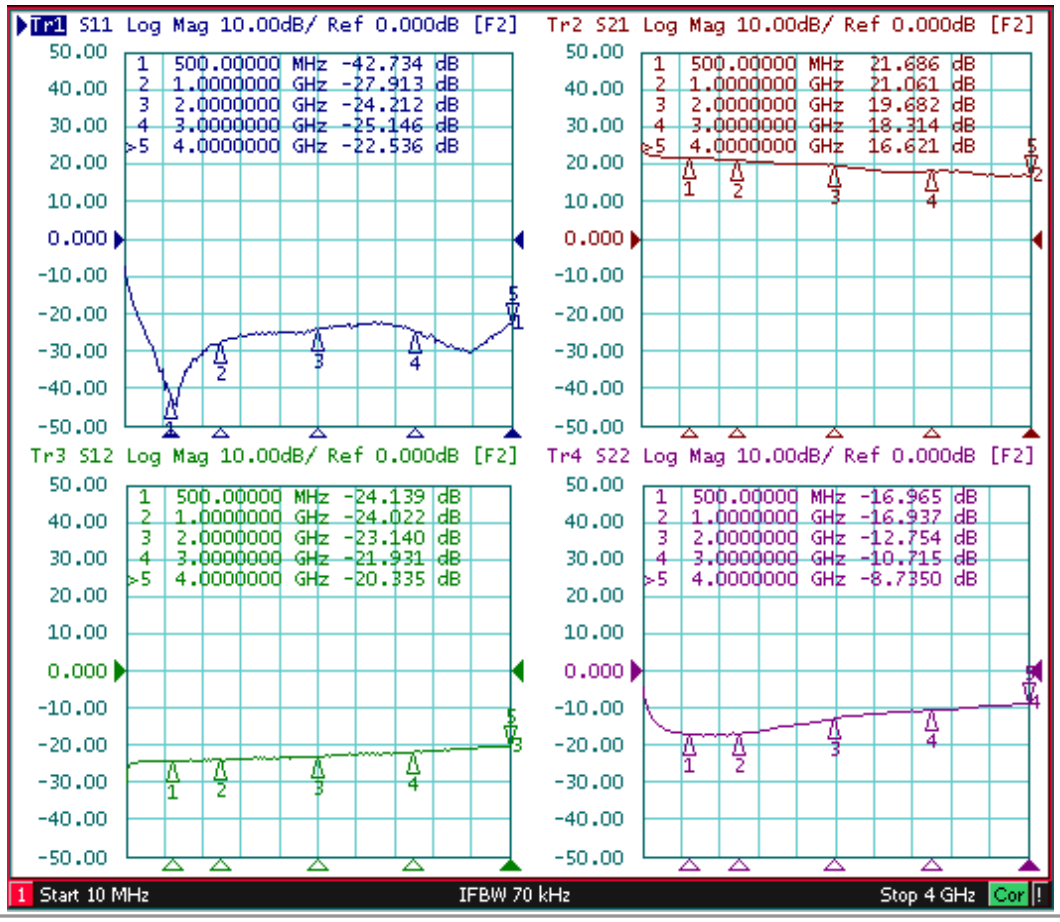
BeRex SOT89 Evaluation Board



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

Typical Device Data

S-parameters (Vc=5V, Ic=55mA, T=25°C)



Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex

S-Parameter

(Vdevice = 5.0V, Icc = 55mA, 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	-17.12	-70.67	22.42	166.08	-24.78	10.98	-12.21	-47.15
500	-45.97	-28.59	21.69	152.68	-24.23	3.75	-17.02	-59.37
1000	-27.71	49.94	21.03	129.89	-23.87	4.82	-16.95	-98.65
1500	-25.16	19.40	20.13	109.78	-23.55	4.32	-14.89	-136.56
2000	-24.04	-24.04	19.64	88.33	-22.99	4.25	-12.73	-160.57
2500	-22.67	-66.92	17.89	70.92	-22.44	1.78	-11.45	175.59
3000	-25.21	-88.13	18.32	57.98	-21.89	0.48	-10.68	149.91
3500	-29.79	-48.67	17.33	34.33	-21.04	-3.97	-9.65	120.48
4000	-22.55	3.50	16.65	19.49	-20.36	-8.63	-8.73	89.25

Typical Performance (Vd = 5V, Ic = 55mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2450	3500
S21	dB	23	21.5	21.2	19.2	18.7	18.0	16.6
S11	dB	-11.7	-14.6	-23.9	-32.9	-29.4	-25.3	-15.8
S22	dB	-10.4	-16.1	-23.2	-14.1	-12.5	-11.1	-11.8
P1	dBm	18.7	18.3	17.8	17.4	17.1	16.7	15.3
OIP3	dBm	33	33.2	32.7	31.2	30.5	29.6	28.0
NF	dB	2.8	2.9	2.9	2.9	2.9	3.1	3.3

Typical Performance (Vd = 4.7V, Ic = 41mA, T = 25°C)

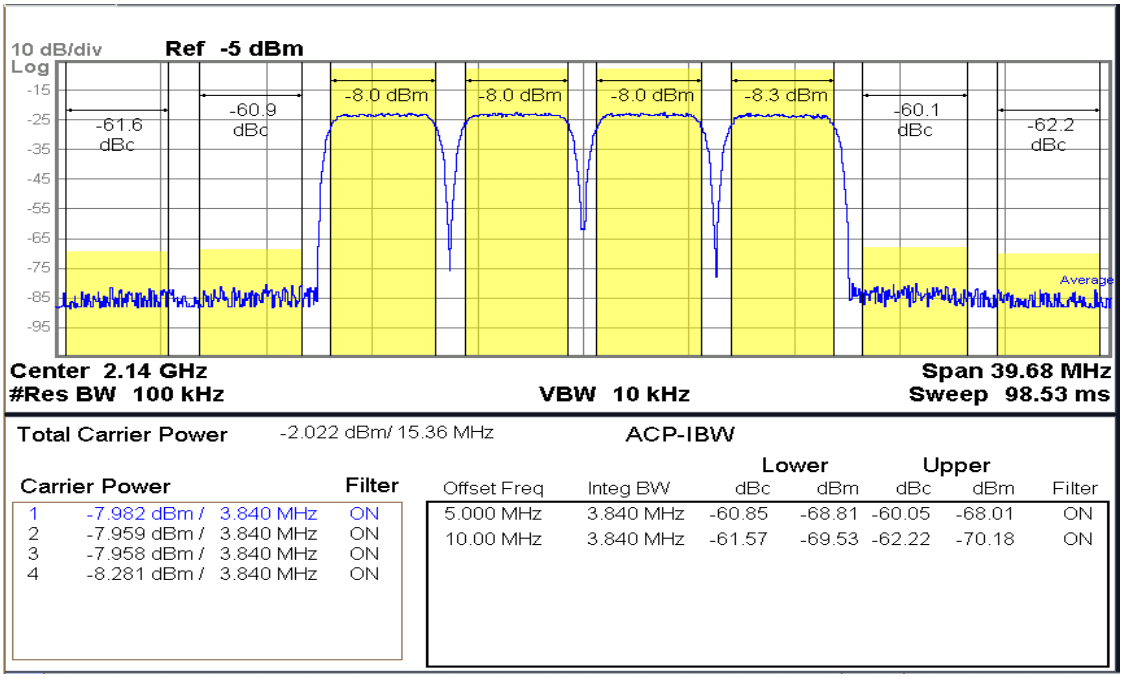
Freq	MHz	70	500	900	1900	2140	2450
S21	dB	22.6	21.1	20.9	19.0	18.5	17.7
S11	dB	-11.2	-14.0	-22.7	-34.4	-29.4	-25.1
S22	dB	-9.8	-15.3	-20.1	-13.2	-12.0	-10.7
P1	dBm	16.6	16.6	16.1	16.2	16.2	16
OIP3	dBm	28.8	29	28.7	28.5	28.1	27.7
NF	dB	2.7	2.8	2.8	2.8	2.8	3.0

Typical Performance (Vd = 4.5V, Ic = 34mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2450
S21	dB	22.2	20.7	20.6	18.8	18.3	17.5
S11	dB	-10.6	-13.3	-20.6	-29.8	-26.7	-23
S22	dB	-9.0	-14.2	-17.7	-12.4	-11.2	-10.2
P1	dBm	14.5	14.6	13.9	14.4	14.5	14.8
OIP3	dBm	25.3	25.5	25.1	25.3	25.2	25
NF	dB	2.6	2.8	2.8	2.8	2.8	3.0

Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex

WCDMA 4FA 2140 -60dBc

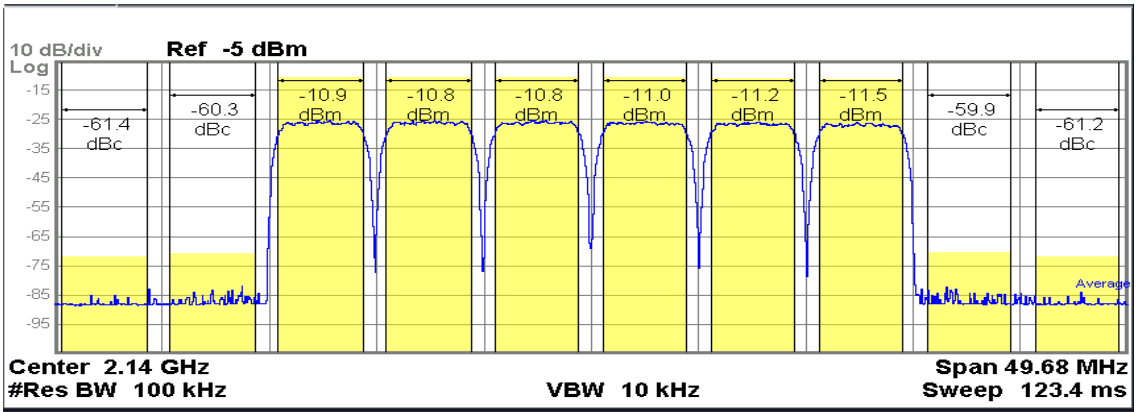


Total Carrier Power -2.022 dBm/ 15.36 MHz ACP-IBW

Carrier Power			Filter
1	-7.982 dBm /	3.840 MHz	ON
2	-7.959 dBm /	3.840 MHz	ON
3	-7.958 dBm /	3.840 MHz	ON
4	-8.281 dBm /	3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-60.85	-68.81	-60.05	-68.01	ON
10.00 MHz	3.840 MHz	-61.57	-69.53	-62.22	-70.18	ON

WCDMA 6FA 2140 -60dBc



Total Carrier Power -3.232 dBm/ 23.04 MHz ACP-IBW

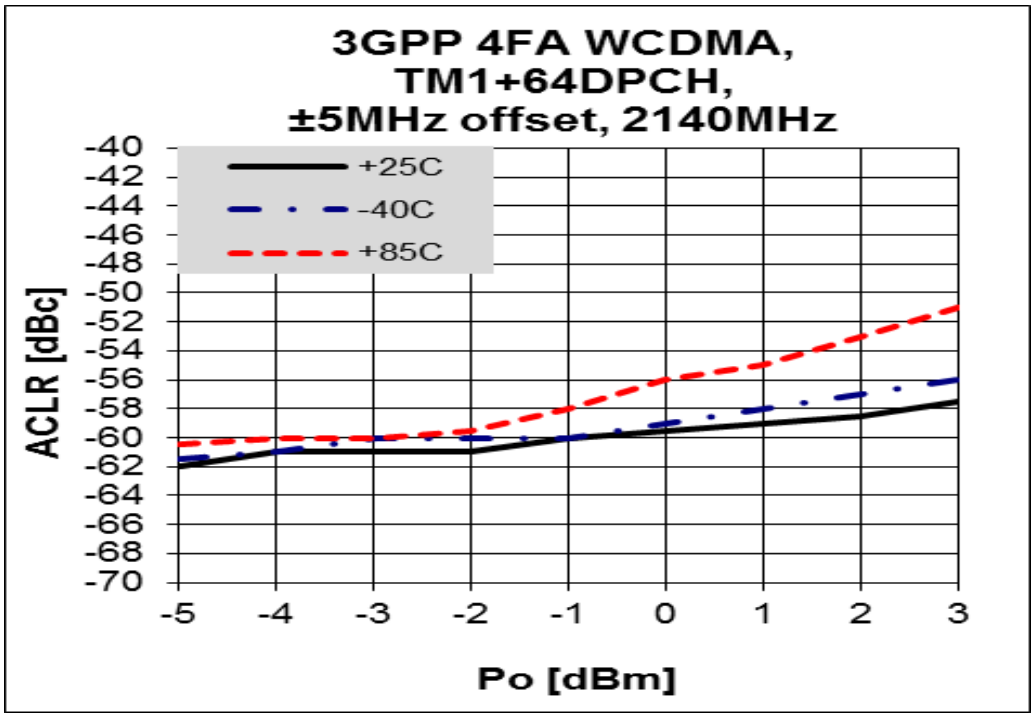
Carrier Power			Filter
1	-10.90 dBm /	3.840 MHz	ON
2	-10.78 dBm /	3.840 MHz	ON
3	-10.78 dBm /	3.840 MHz	ON
4	-10.95 dBm /	3.840 MHz	ON
5	-11.21 dBm /	3.840 MHz	ON
6	-11.50 dBm /	3.840 MHz	ON

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
5.000 MHz	3.840 MHz	-60.35	-71.12	-59.95	-70.72	ON
10.00 MHz	3.840 MHz	-61.45	-72.22	-61.25	-72.02	ON

Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.

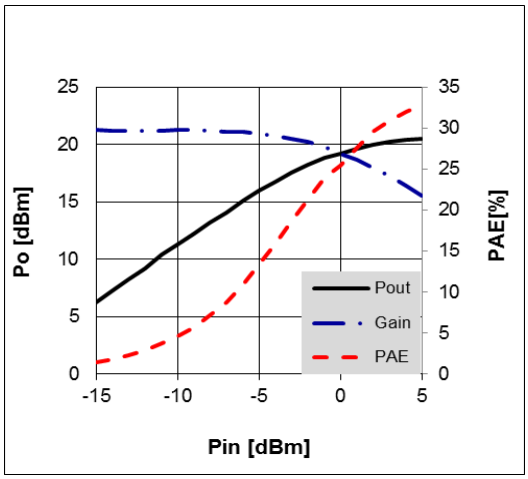
All other trademarks are the property of their respective owners. © 2018 BeRex

ACLR

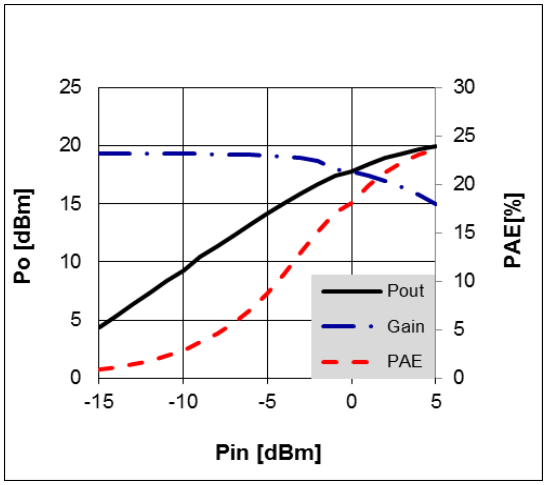


Device Performance

Pin-Pout-Gain



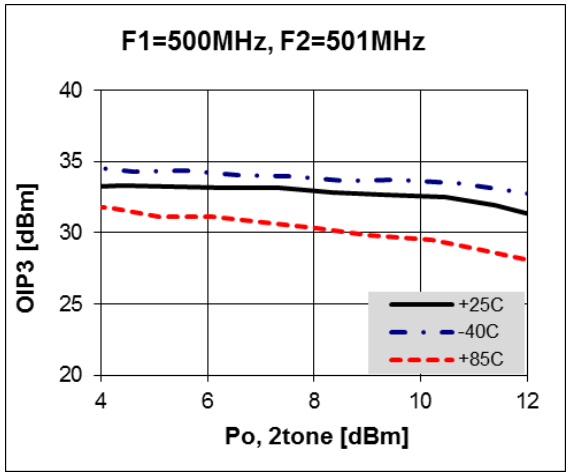
900MHz, 5V/55mA

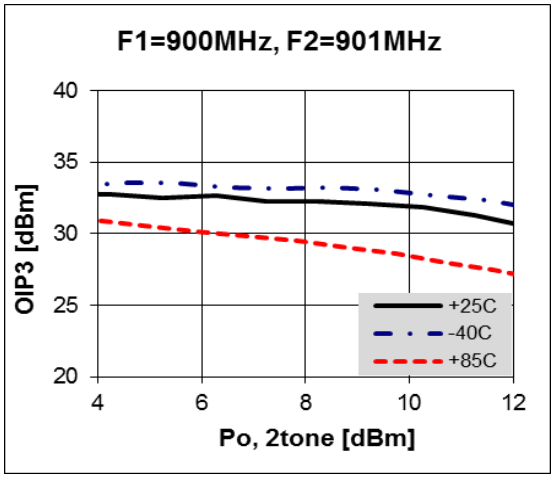


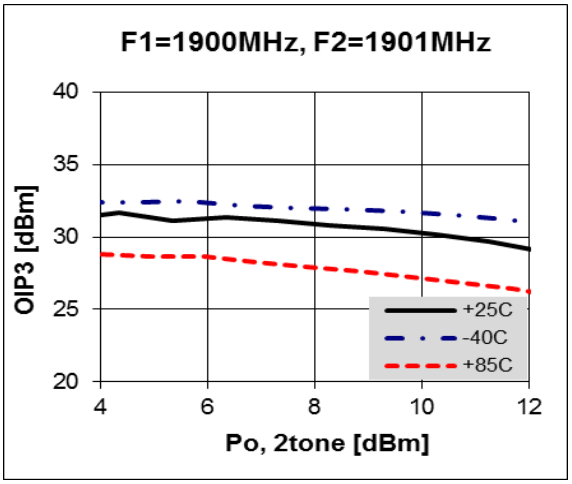
1900 MHz, 5V/55mA

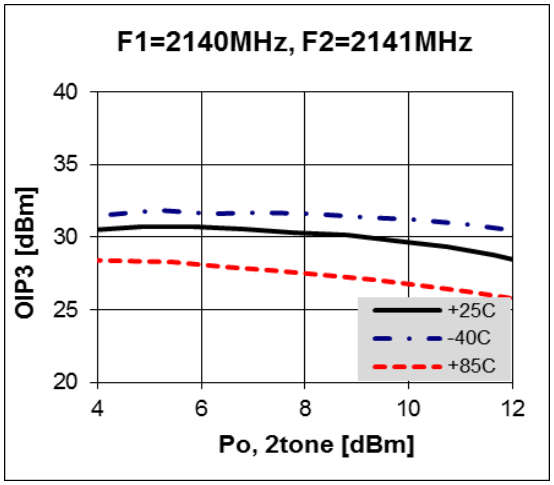
Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex

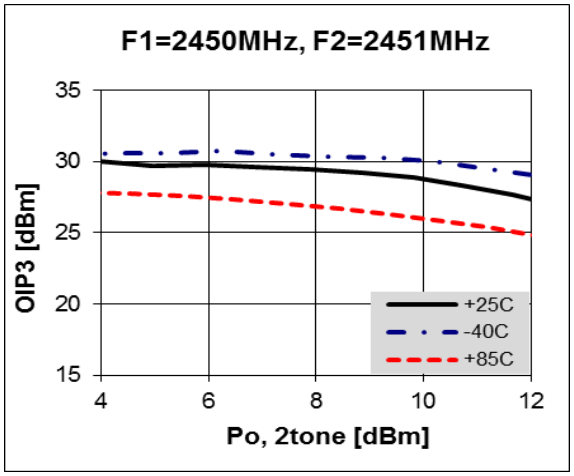
OIP3

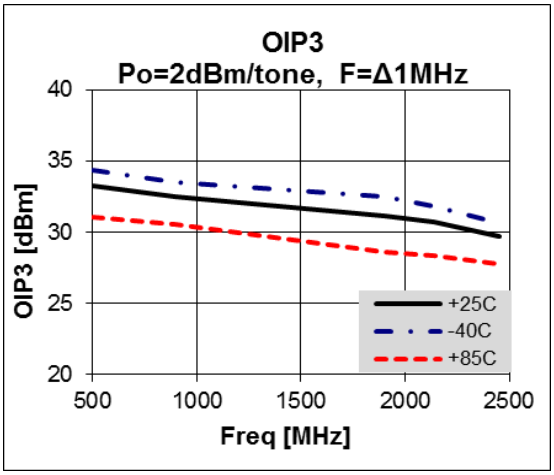






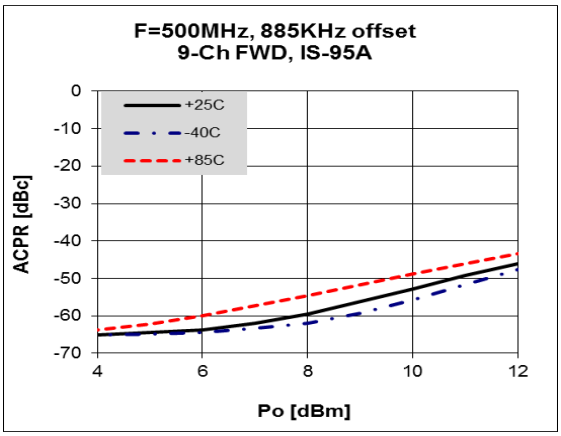


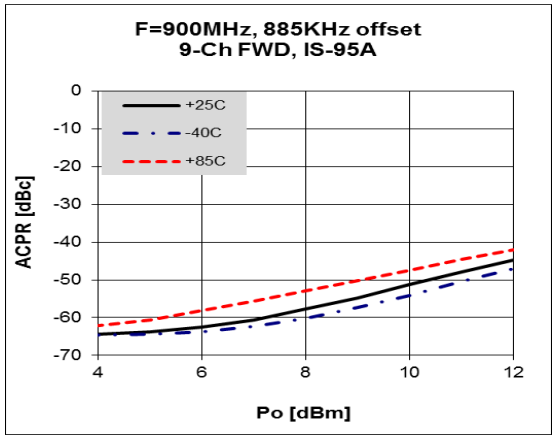


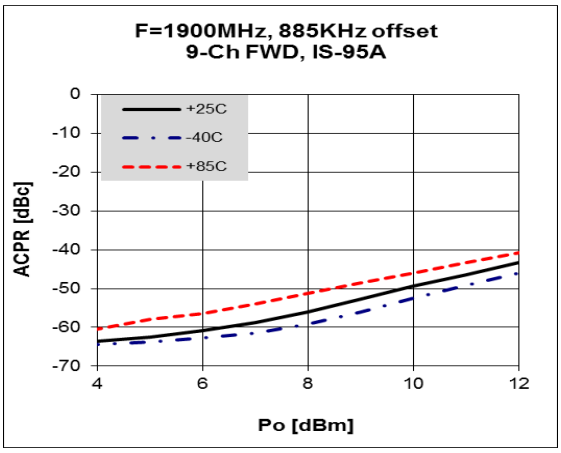


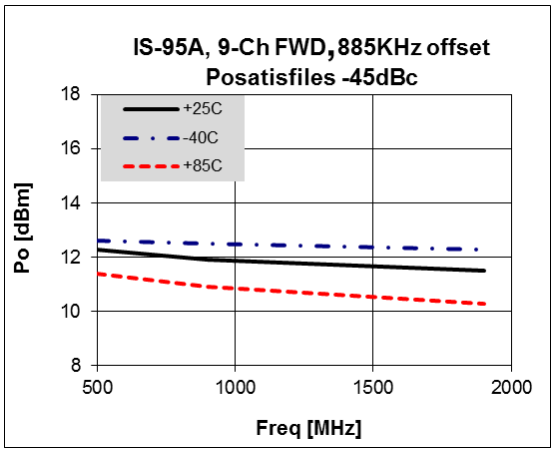
Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex

ACPR

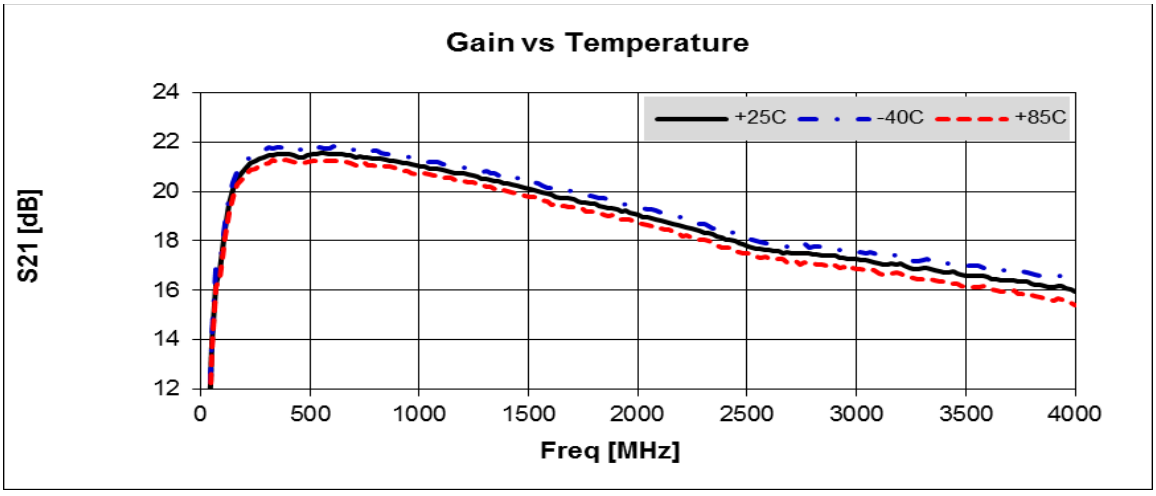






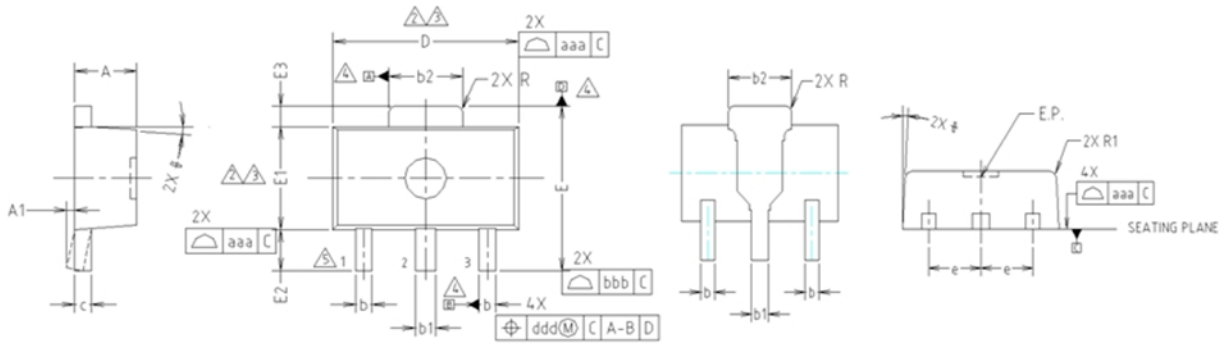


Gain Flatness



Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex

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.

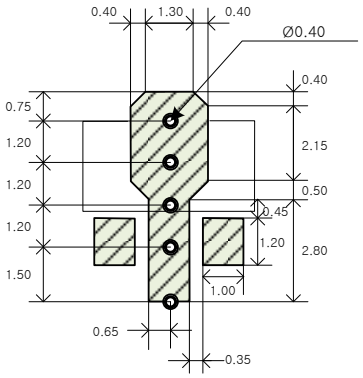
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

SYMBOL	MILLIMETERS MINIMUM	NOMINAL	MAXIMUM	NOTE
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

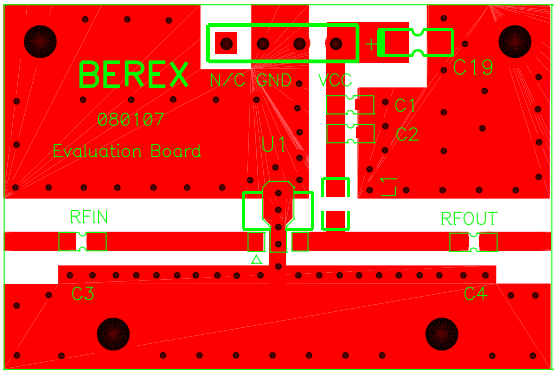
PCB Land Pattern



Note : All dimension _ millimeters

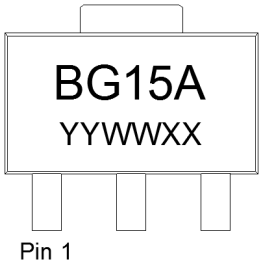
PCB lay out _ on BeRex website

PCB Mounting



Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex

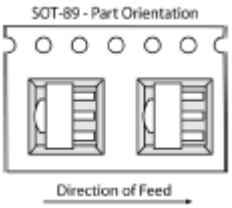
Package Marking



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 2
Value:	**Passes <4000V**
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



Proper ESD procedures should be followed when handling this device.

NATO CAGE code:

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

Specifications and information are subject to change and products may be discontinued without notice. BeRex is a trademark of BeRex.
All other trademarks are the property of their respective owners. © 2018 BeRex