BG12C

50-4000 MHz Cascadable InGaP HBT Gain Block

Preliminary Datasheet

Device Features

- OIP3 = 35 dBm @ 900 MHz
- Gain = 20.5 dB @ 900 MHz
- Output P1 dB = 21 dBm @ 900 MHz
- 2.7dB Typical N.F
- 50 Ω Cascadable
- Highly Reliable InGaP/GaAs HBT Technology
- Lead-free/RoHS-compliant SOT-89 SMT package·

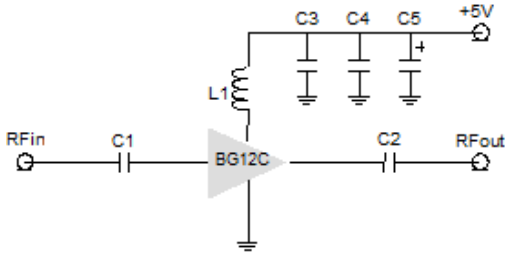
Product Description

BeRex's BG12C 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 BG12C 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 =20pF ± 5%; C4 = 1nF ± 5%; C5 = 10uF; L1 = 22nH ±5%

*less than 22nH(L1) improves RF performance at over 0.9GHz.

*C1, C2, C3, C4 = 1nF ± 5%; C5 = 10uF; L1 = 1uH

*less than 1uH(L1) improves RF performance at under 0.5GHz.

*L1:18nH, C1&C2:10pF for 3.5GHz Application.

Typical Performance[1]

	Frequency						Unit
	70	900	1900	2140	2450	3500	MHz
Gain	21.5	20.5	18.5	18	17.5	16.1	dB
S11	-18	-18	-23.5	-23	-22	-13.7	dB
S22	-25	-25	-18.5	-18	-19	-33.8	dB
OIP3[2]	36	35	33	32	31	27.2	dBm
P1dB	20	21	20	19	18	15.5	dBm
N. F	2.6	2.6	2.7	2.8	2.8	2.8	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 7 dBm per tone separated by 1 MHz.

	Min.	Typical	Max.	Unit
Bandwidth	50		4000	MHz
I_C @ (Vc = 5V)	57	67	77	mA
V_C		5.0		V
dG/dT		-0.002		dB/°C
R_{TH}		59		°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	+5.5	V
Supply Current	90	mA
Input RF Power	23	dBm

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

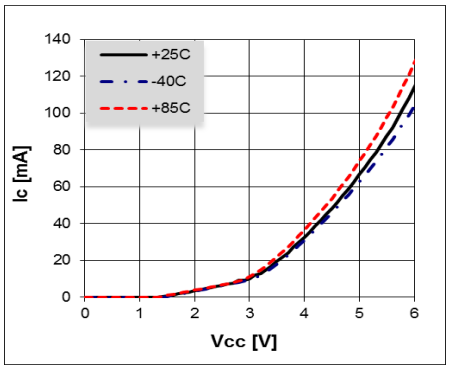
Rev. D

BG12C

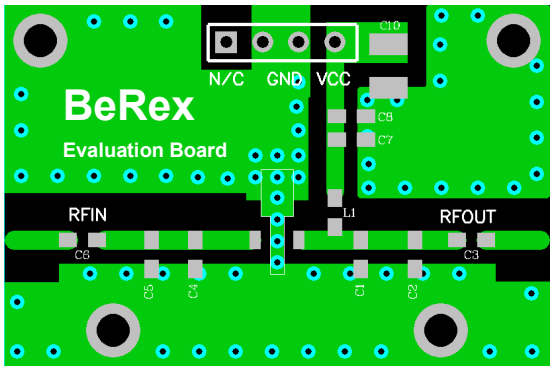
50-4000 MHz Cascadable InGaP HBT Gain

Preliminary Datasheet

V-I Characteristics



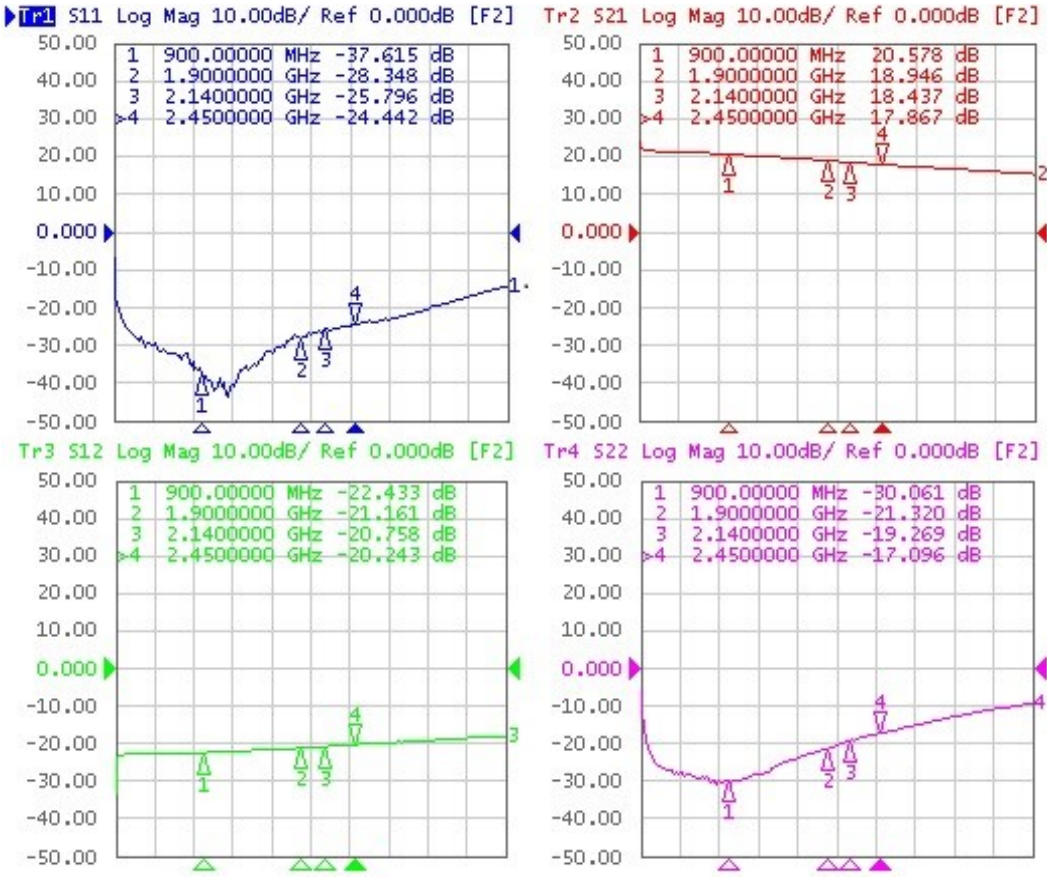
BeRex SOT89 Evaluation Board



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

Typical Device Data

S-parameters (Vc=5V, Ic=67mA, T=25°C)



S-Parameter

(Vdevice = 5.0V, Icc = 67mA, 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	0.920	-30.2	2.573	-61.8	0.015	131.4	0.953	-75.3
500	0.299	-106.9	10.764	150.0	0.069	-0.7	0.230	79.8
1000	0.102	-167.1	10.362	65.1	0.075	-61.6	0.029	-1.9
1500	0.054	76.4	9.289	-4.4	0.079	-109.8	0.082	66.7
2000	0.068	15.8	8.235	-68.4	0.085	-155.9	0.123	17.7
2500	0.083	7.7	7.388	-129.6	0.091	157.6	0.106	-22.3
3000	0.133	-15.3	6.724	170.2	0.097	110.1	0.067	-55.0
3500	0.153	-68.7	6.093	109.7	0.104	60.5	0.043	-142.4
4000	0.160	-161.7	5.554	48.1	0.110	8.7	0.164	113.7

Typical Performance (Vd = 5V, Ic = 67mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2450	3500
S21	dB	21.5	20.5	20.5	18.5	18.0	17.5	16.1
S11	dB	-18.0	-28.5	-18.0	-23.5	-23.0	-22.0	-13.7
S22	dB	-25.0	-20.5	-25.0	-18.5	-18.0	-19.0	-33.8
P1	dBm	20.0	21.0	21.0	20.0	19.0	18.0	27.2
OIP3	dBm	36.0	35.5	35.0	33.0	32.0	31.0	15.5
NF	dB	2.6	2.6	2.6	2.7	2.8	2.8	2.8

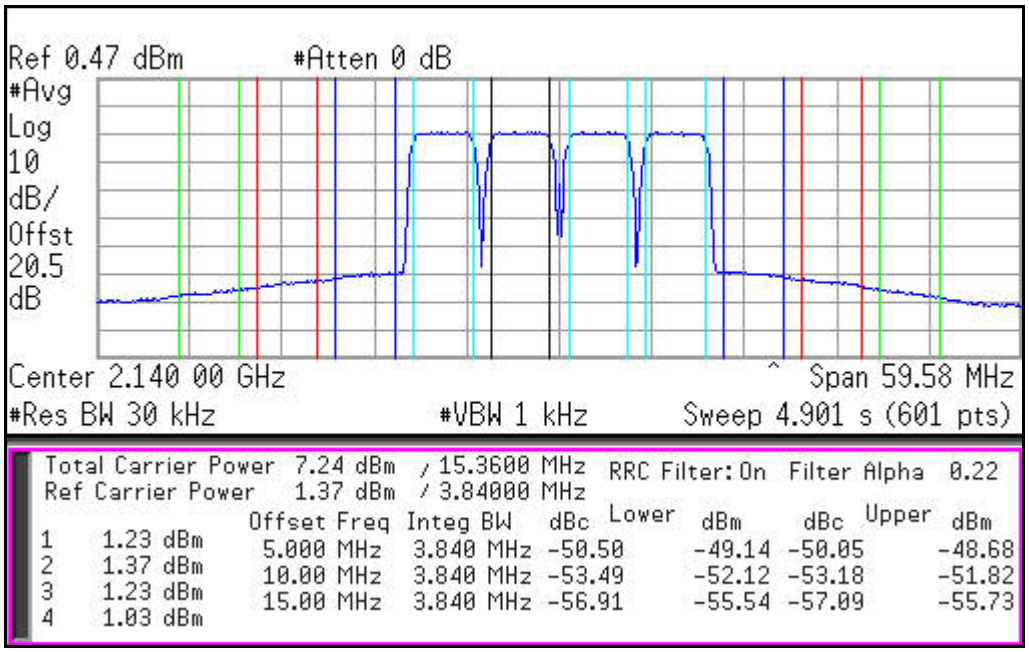
Typical Performance (Vd = 4.7V, Ic = 56mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2450
S21	dB	21.0	20.5	20.0	185.5	18.0	17.5
S11	dB	-17.5	-26.5	-17.5	-24.0	-24.0	-23.5
S22	dB	-24.5	-20.0	-24.0	-18.0	-17.5	-18.0
P1	dBm	18.5	19.0	19.0	18.5	18.0	17.5
OIP3	dBm	33.5	33.0	32.5	31.5	31.0	30.0
NF	dB	2.5	2.5	2.5	2.5	2.6	2.7

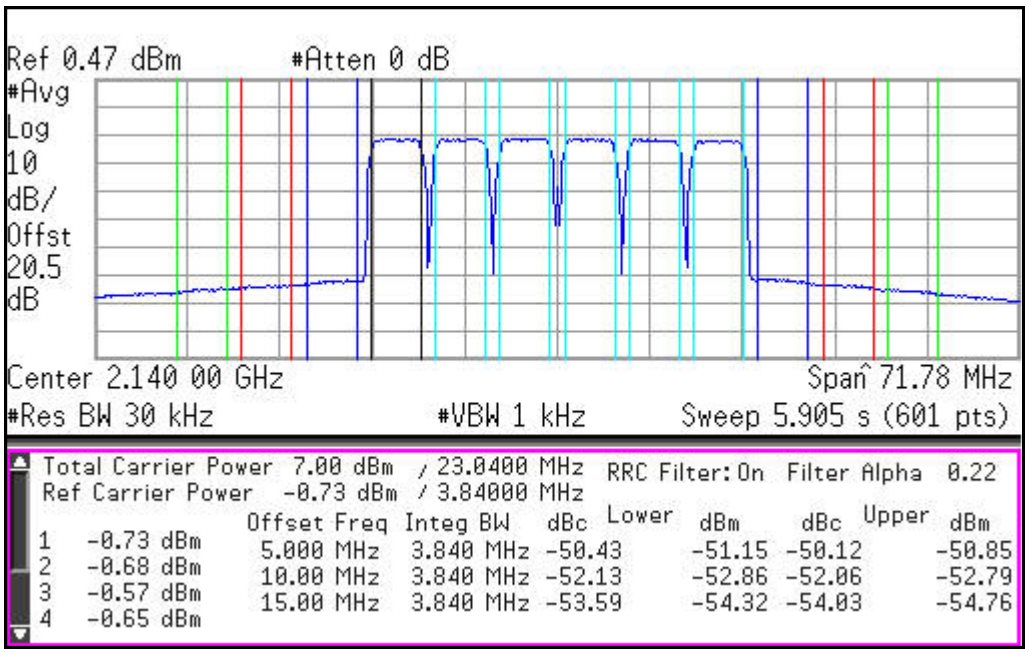
Typical Performance (Vd = 4.5V, Ic = 49mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2450
S21	dB	21.0	20.5	20.2	18.5	18.0	17.5
S11	dB	-17.0	-25.0	-17.0	-24.5	-24.0	-23.0
S22	dB	-23.5	-20.0	-24.0	-18.0	-17.5	-17.5
P1	dBm	18.0	18.0	17.5	17.5	17.5	16.5
OIP3	dBm	31.0	31.0	30.5	30.5	30.0	29.0
NF	dB	2.5	2.5	2.5	2.5	2.6	2.6

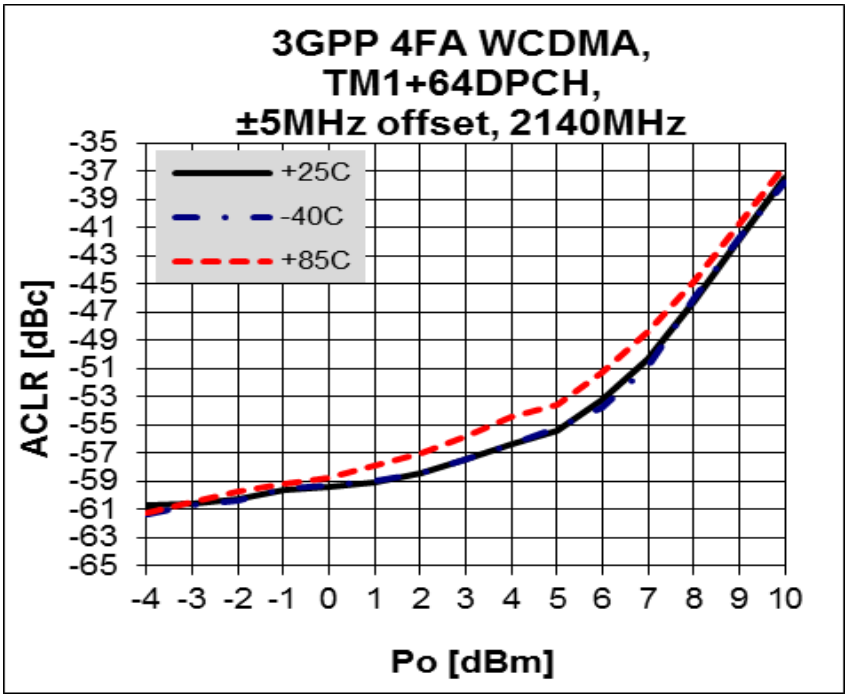
WCDMA 4FA 2140 -50dBc



WCDMA 6FA 2140 –50dBc

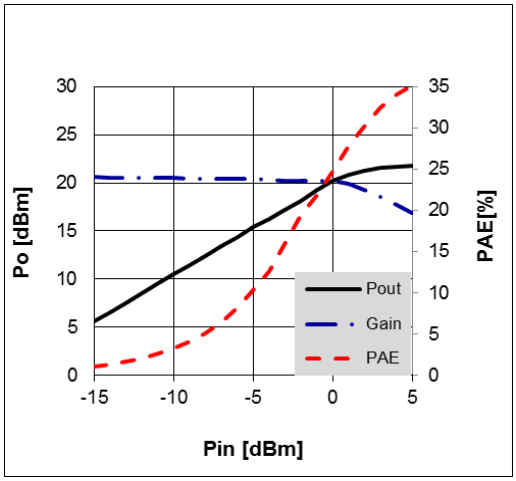


ACLR

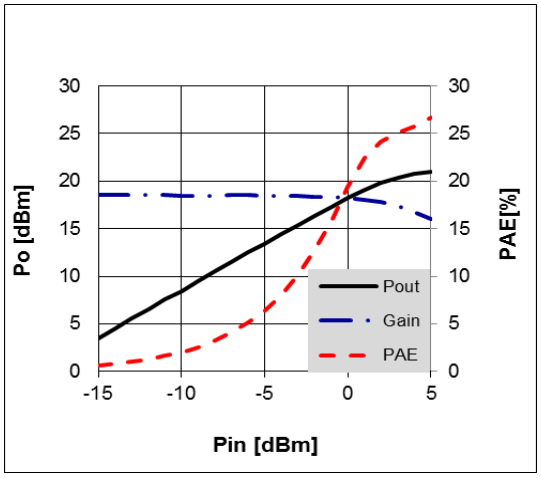


Device Performance

Pin-Pout-Gain

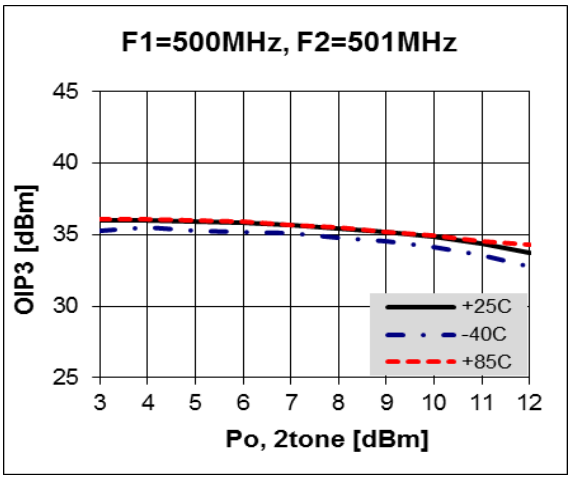


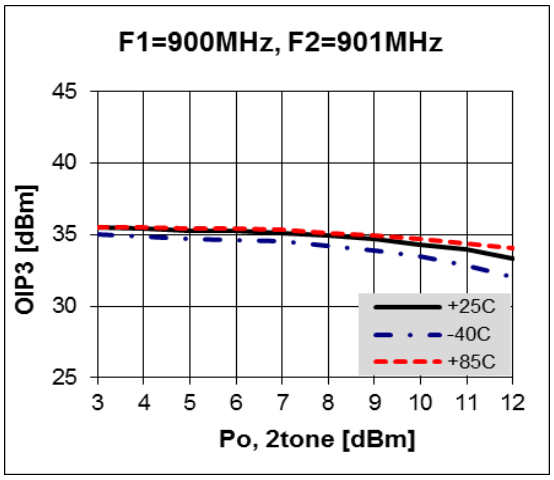
900MHz, 5V/67mA

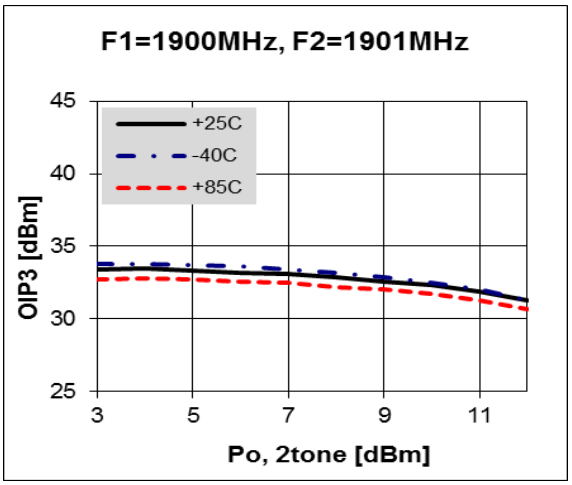


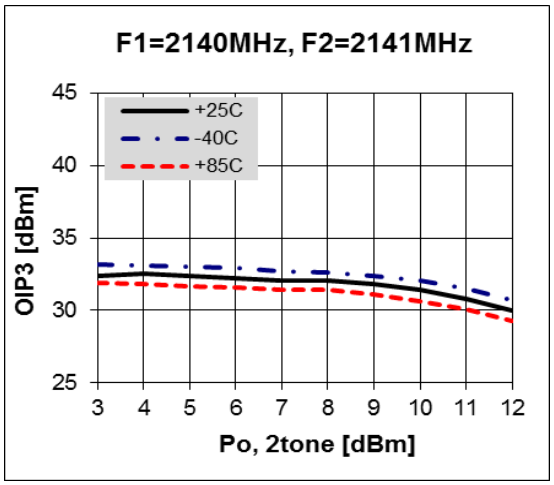
1900 MHz, 5V/67mA

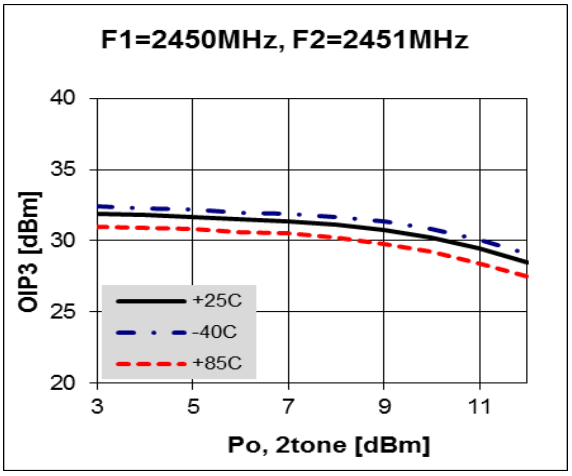
OIP3

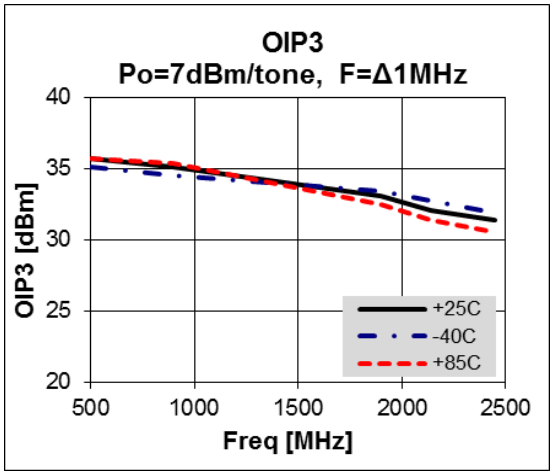




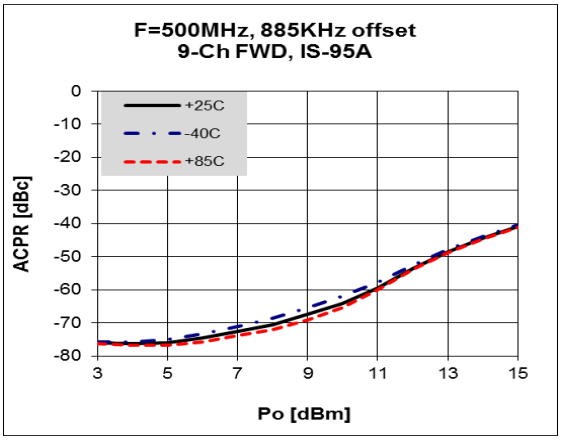


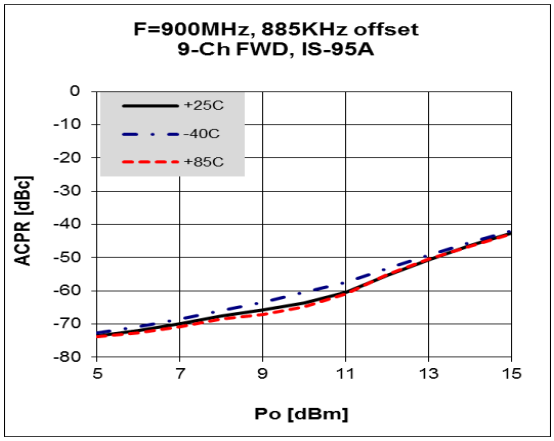


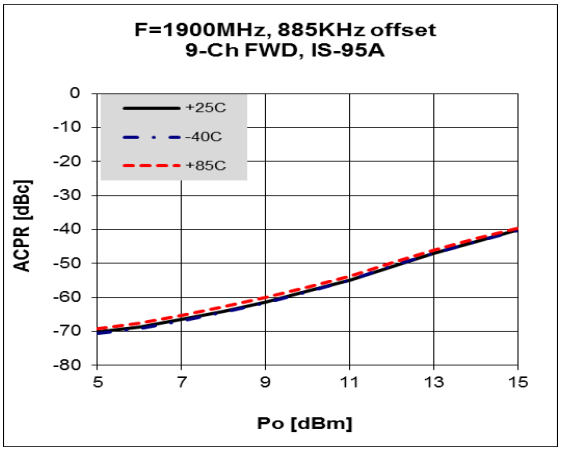


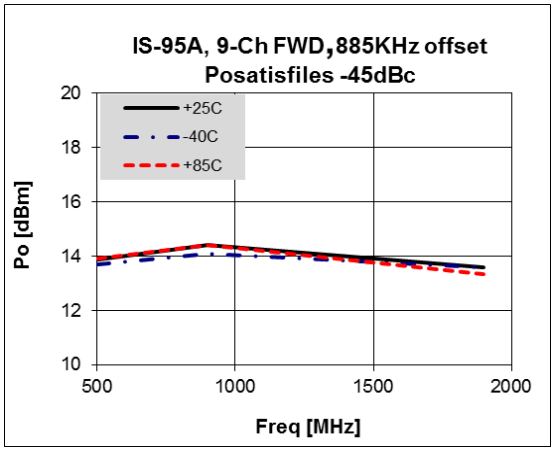


ACPR

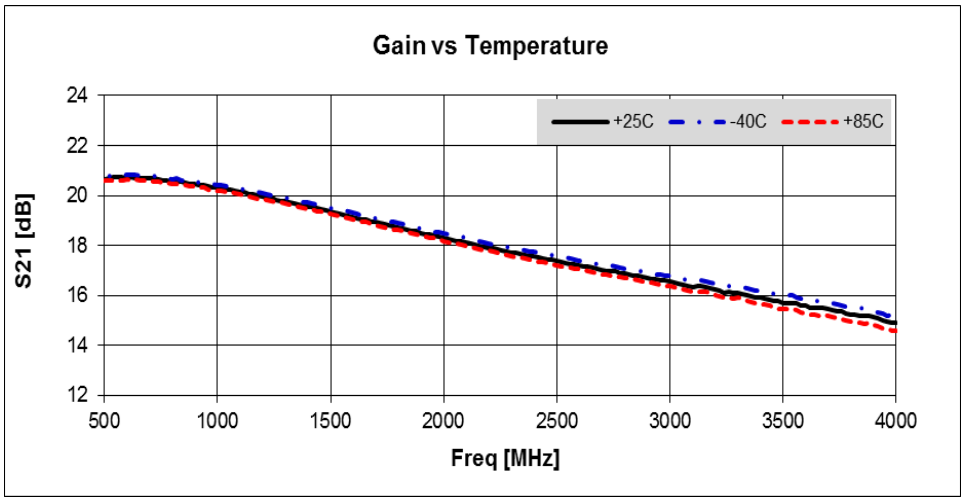




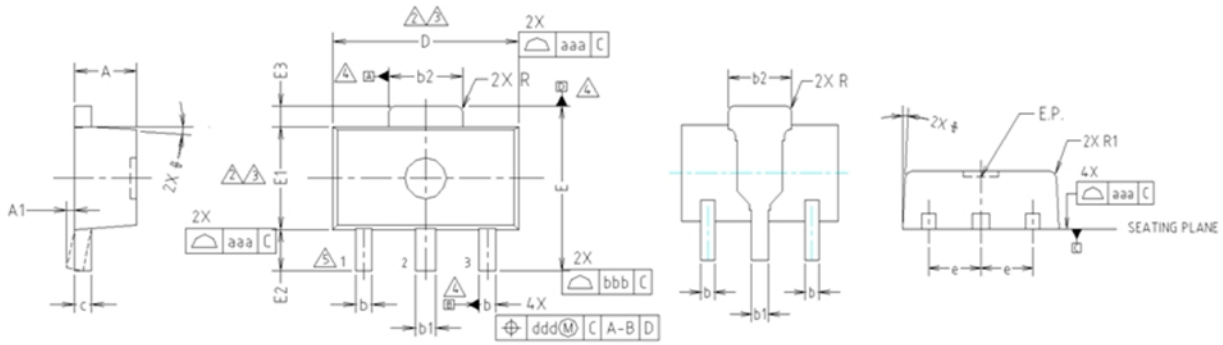




Gain Flatness



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.

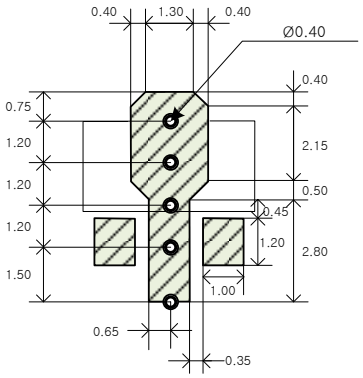
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

SYMBOL	MILLIMETERS			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

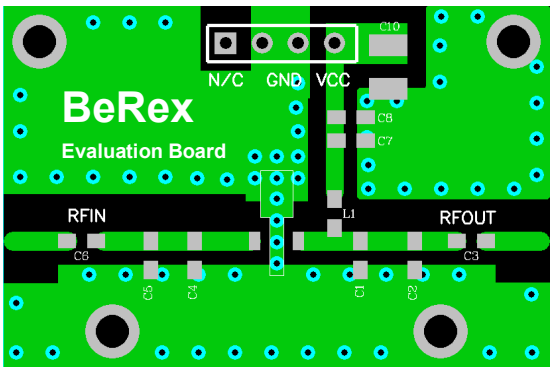
PCB Land Pattern



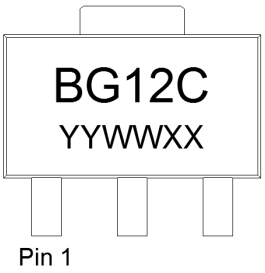
Note : All dimension _ millimeters

PCB lay out _ on BeRex website

PCB Mounting



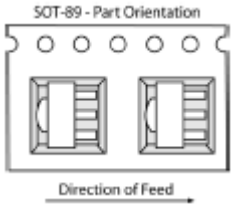
Package Marking



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 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

NATO CAGE code:

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