

BG11C

50-4000 MHz Cascadable InGaP HBT Gain Block



Device Features

- OIP3 = 30 dBm @ 1900 MHz
- Gain = 21.9 dB @ 900 MHz
- Output P1 = 17.3 dBm @ 1900 MHz
- 50 Ω Cascadable
- Patented temperature compensation
- Lead-free/RoHS-compliant SOT-89 SMT package



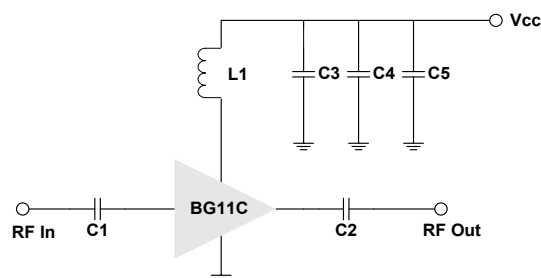
Product Description

BeRex's BG11C is a high performance InGaP HBT MMIC amplifier is 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 BG11C is designed for high linearity gain block applications that require excellent gain flatness and over voltage protection without additional external components. It is packaged in a RoHS-compliant SOT-89 surface mount package.

Applications

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

Applications Circuit



C1, C2, C3 = 100 pF $\pm$ 5%; C4 = 1000 pF $\pm$ 5%; C5 = 10 μ F; L1 = 33 nH $\pm$ 5%

*C1, C2 = 12 nF; L1 = 2.7 μ H for IF Bandwidth

Typical Performance¹

Parameter	Frequency					Unit
	70	500	900	1900	2450	
Gain	22.8	22.3	21.9	20.8	19.9	dB
S11	-18.6	-17.5	-18.8	-18.5	-26.0	dB
S22	-7.1	-19.4	-17.0	-16.0	-16.1	dB
OIP3 ²	29.9	28.0	29.5	30.0	28.0	dBm
P1dB	15.9	15.8	16.4	17.3	16.5	dBm
Noise Figure	4.3	4.5	3.9	4.0	4.2	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 6 dBm per tone separated by 1 MHz.

	Min.	Typical	Max.	Unit
Bandwidth	50		4000	MHz
I _C @ (V _C = 5V)	38	48	58	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	+6.0	V
Supply Current	160	mA
Input RF Power	23	dBm

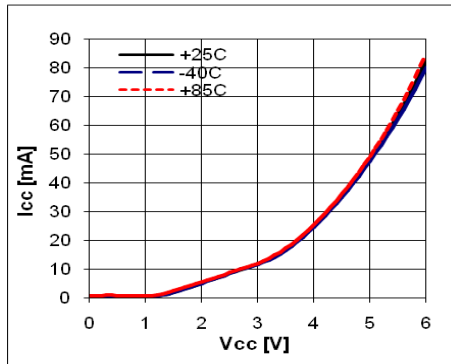
Operation of this device above any of these parameters may result in permanent damage.

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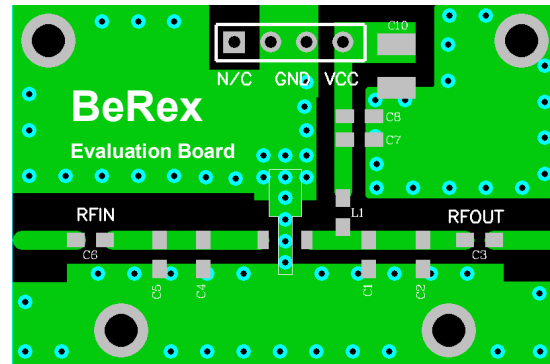
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V-I Characteristics



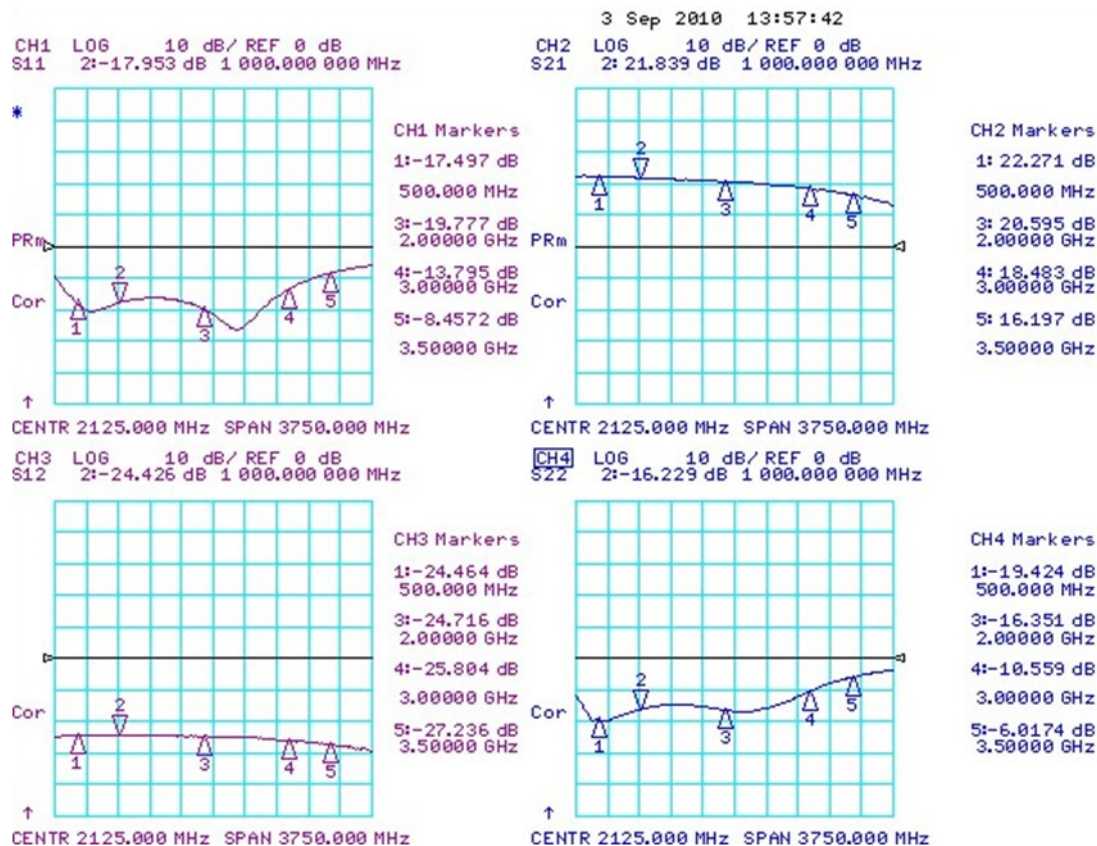
BeRex SOT89 Evaluation Board



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

Typical Device Data

S-parameters (V_c=5V, I_c=48mA, T=25°C)



S-Parameter

(V_{device} = 5.0V, I_{cc} = 50mA, 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	0.443	-174.9	16.668	168.4	0.043	18.7	0.412	-35.0
500	0.533	148.5	13.133	149.2	0.064	3.2	0.134	-55.9
1000	0.500	115.5	13.361	128.8	0.061	-5.7	0.068	-42.3
1500	0.441	81.3	12.965	101.3	0.064	-10.7	0.047	-16.2
2000	0.336	52.9	11.607	79.4	0.060	-19.6	0.050	41.9
2500	0.257	10.3	12.000	54.8	0.062	-24.0	0.122	49.5
3000	0.155	-35.7	10.969	22.2	0.058	-31.7	0.189	26.0
3500	0.114	-105.1	8.593	-5.2	0.059	-36.1	0.297	-0.7
4000	0.131	167.8	6.650	-30.9	0.059	-44.6	0.373	-29.3

Typical Performance (V_d = 5V, I_c = 48mA, T = 25°C)

Freq	MHz	70	150	250	500	900	1900	2140	2450	3500
S21	dB	22.8	22.5	22.4	22.3	21.9	20.8	20.4	19.9	16.2
S11	dB	-18.6	-17.2	-19	-17.5	-18.8	-18.5	-21.8	-26	-8.5
S22	dB	-7.1	-10.5	-16.6	-19.4	-17	-16	-16.7	-16.1	-6
P1	dBm	15.9	15.9	16	15.8	16.4	17.3	17	16.5	
OIP3	dBm	29.9	28	30	28	29.5	30	29	28	
NF	dB	4.3	4.8	4.2	4.5	3.9	4.0	4.1	4.2	

Typical Performance (V_d = 4.7V, I_c = 40mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2450	3500
S21	dB	22.6	22	21.7	20.6	20.4	19.8	16.2
S11	dB	-17.2	-16.3	-17.4	-17.7	-21.2	-28.4	-8.5
S22	dB	-6.9	-17.9	-15.8	-15.6	-16.8	-16.8	-6
P1	dBm	14.5	14.1	14.4	14.5	15.8	15.5	
OIP3	dBm	27.2	25	26	28	26	25	
NF	dB	4.2	4.5	3.8	4.0	4.1	4.1	

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Typical Performance (Vd = 4.5V, Ic = 35mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2450	3500
S21	dB	22.3	21.8	21.5	20.5	20.2	19.7	16.1
S11	dB	-16.1	-15.3	-16.2	-16.9	-20.1	-30.1	-8.6
S22	dB	-6.6	-16.7	-14.8	-15.1	-16.7	-17.3	-6
P1	dBm	13	12.9	13	14.3	13.5	15	
OIP3	dBm	25.6	23	24	26	25	23	
NF	dB	4.1	4.4	3.8	3.9	4.0	4.1	

Typical Performance (Vd = 4.0V, Ic = 35mA, T = 25°C)

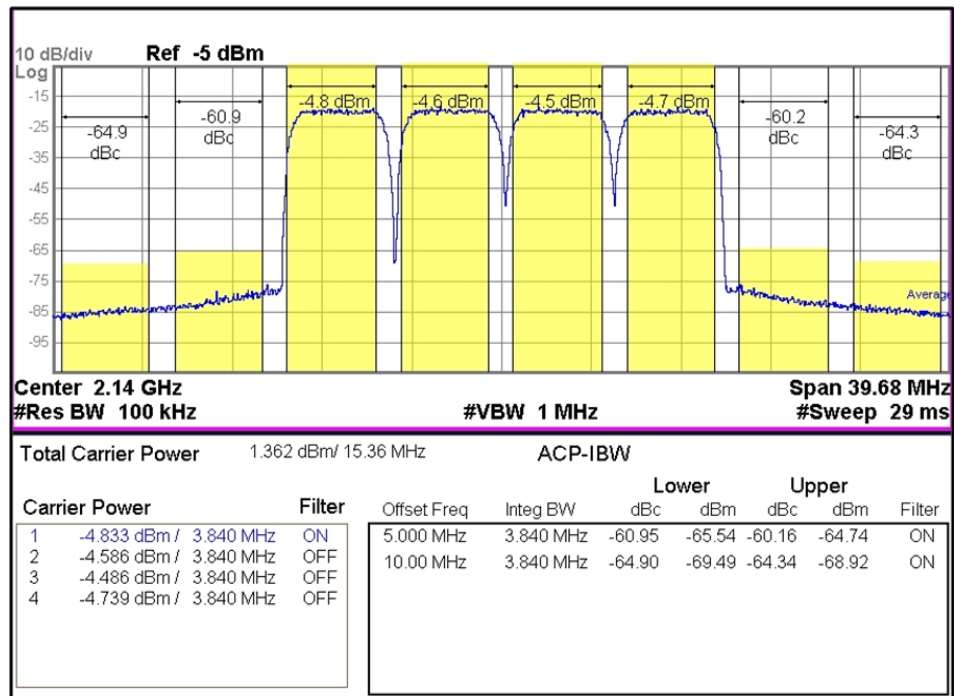
Freq	MHz	70	500	900	1900	2140	2450	3500
S21	dB	21.1	20.6	20.4	19.8	19.7	19.4	15.9
S11	dB	-12.8	-11.8	-12.2	-13.1	-15.3	-21.5	-9.4
S22	dB	-5.8	-12.8	-11.6	-12.7	-15	-18.9	-6.3
P1	dBm	9.1	8.7	8	10	11	13	
OIP3	dBm	20.6	17	19	19.5	19	17	
NF	dB	4.0	4.4	3.7	3.8	3.9	4.0	

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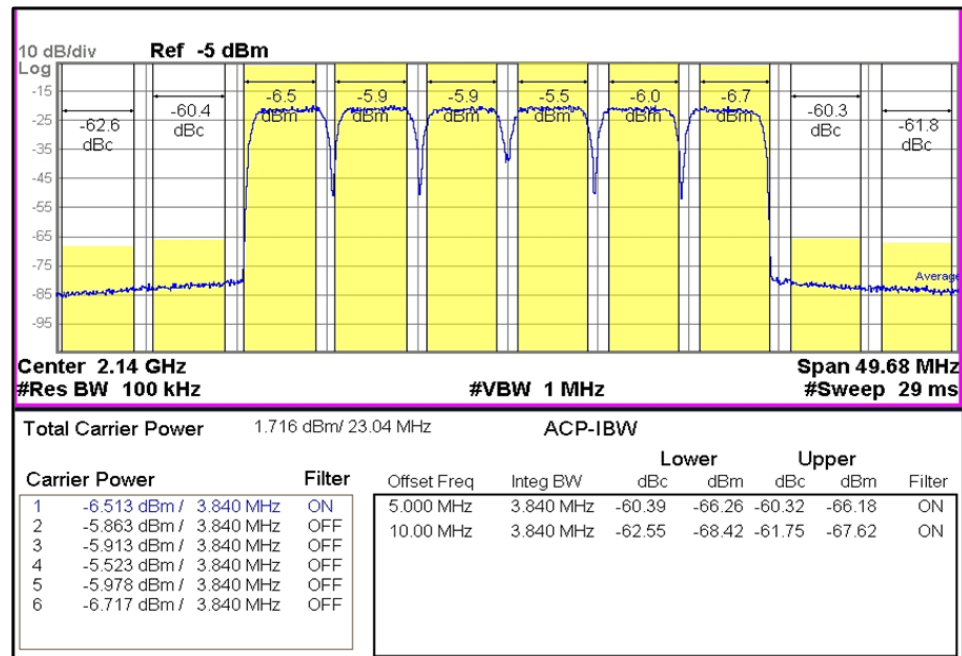
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WCDMA 4FA 2140 -60dBc



WCDMA 6FA 2140 -60dBc

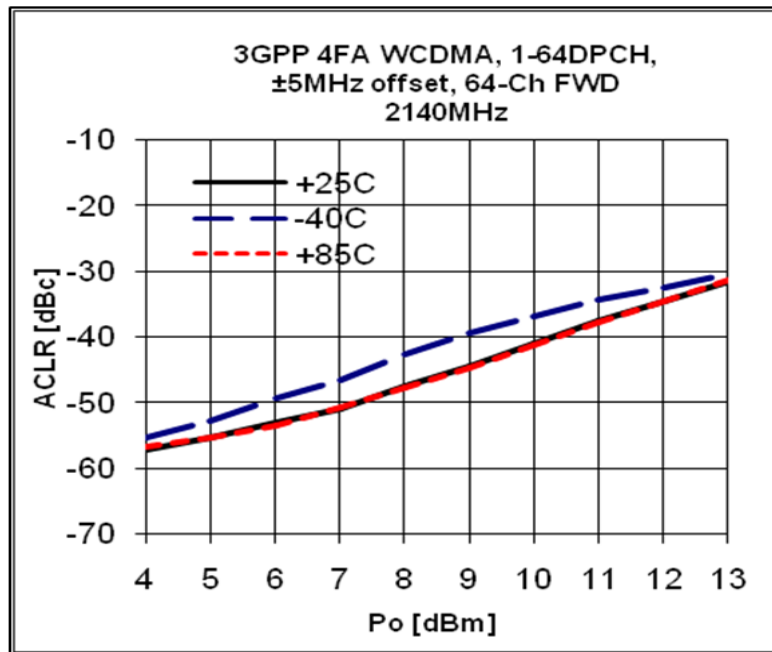


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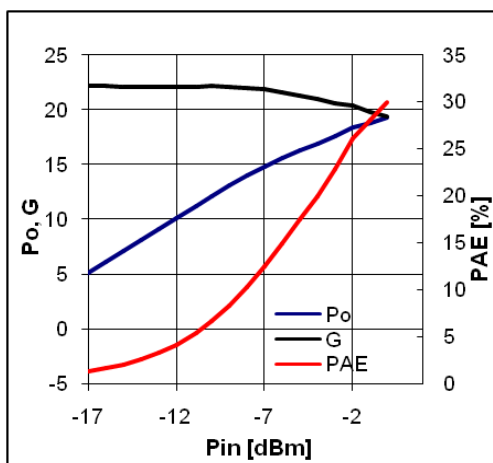


ACLR

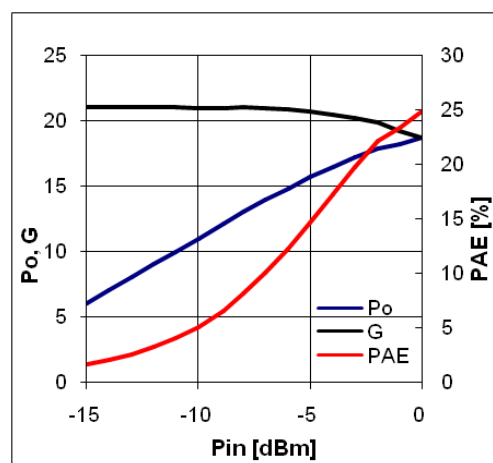


Device Performance

Pin-Pout-Gain



900MHz, 5V/48mA



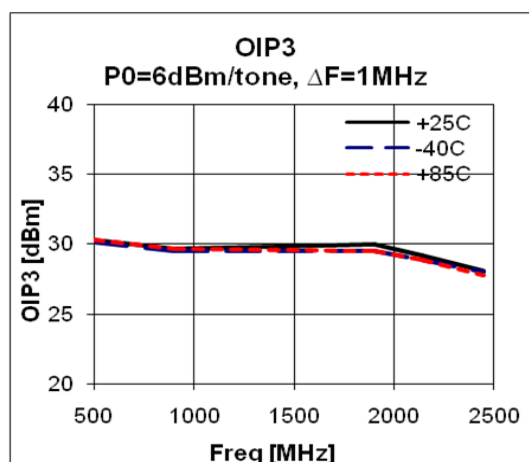
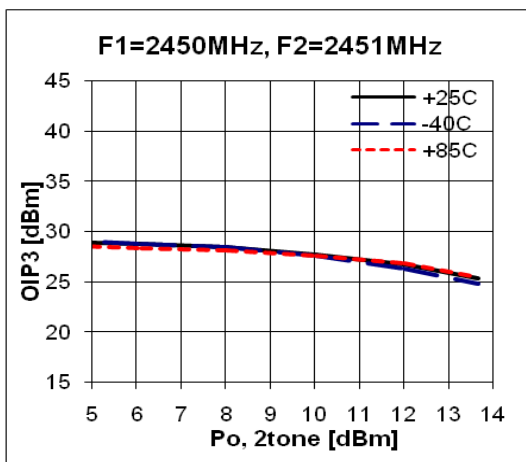
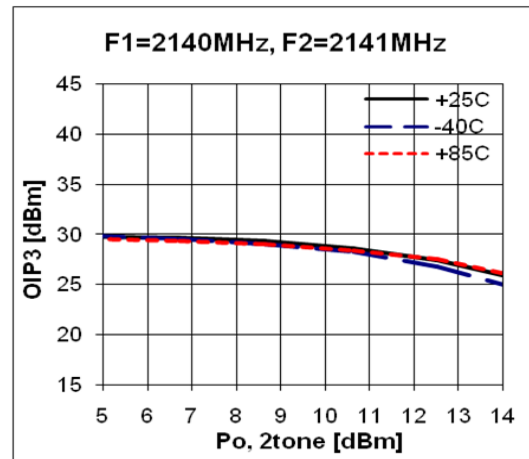
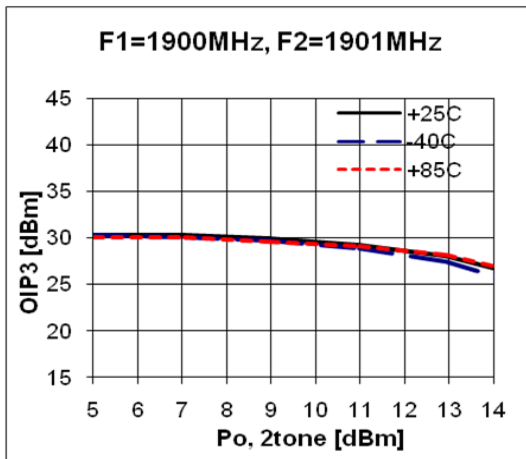
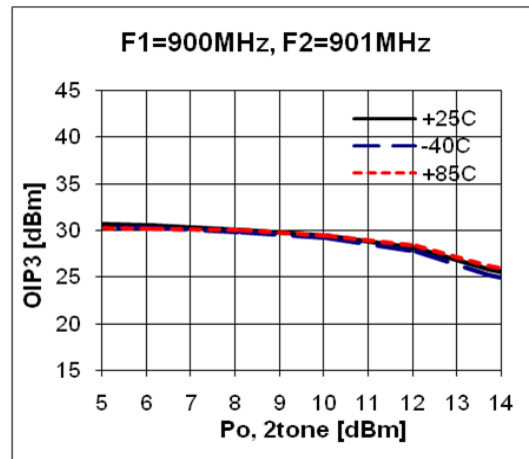
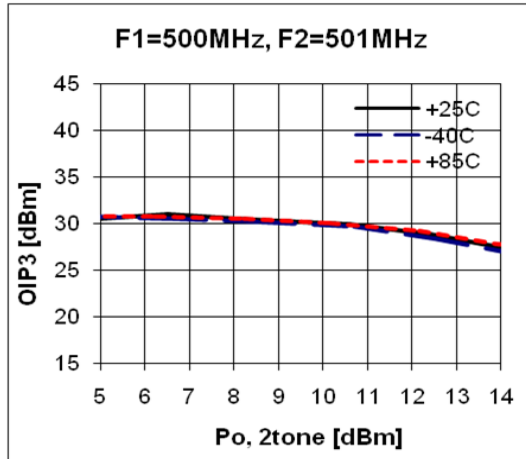
1900 MHz, 5V/48mA

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OIP3

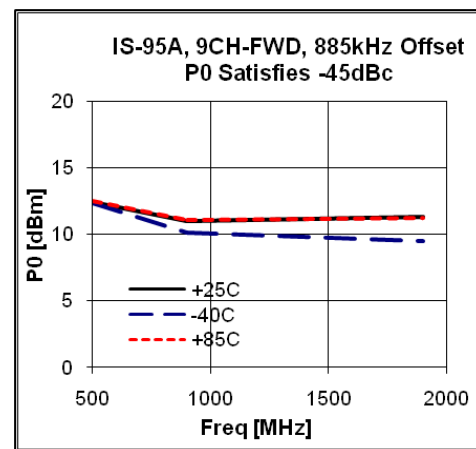
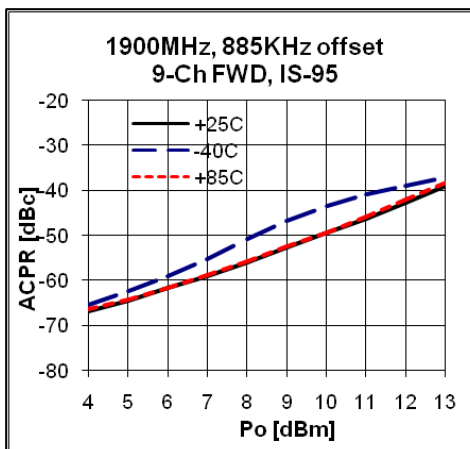
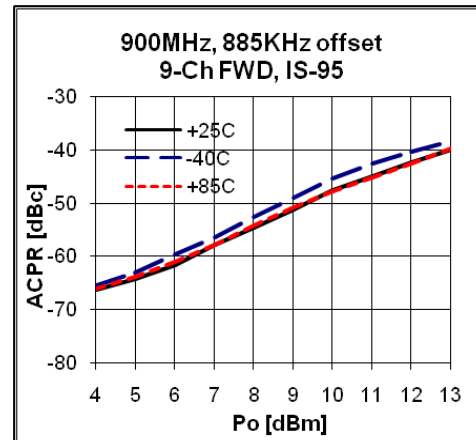
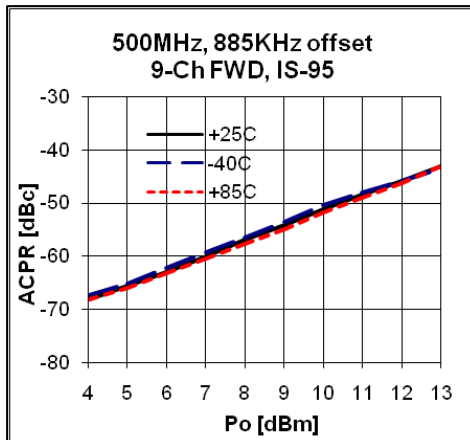


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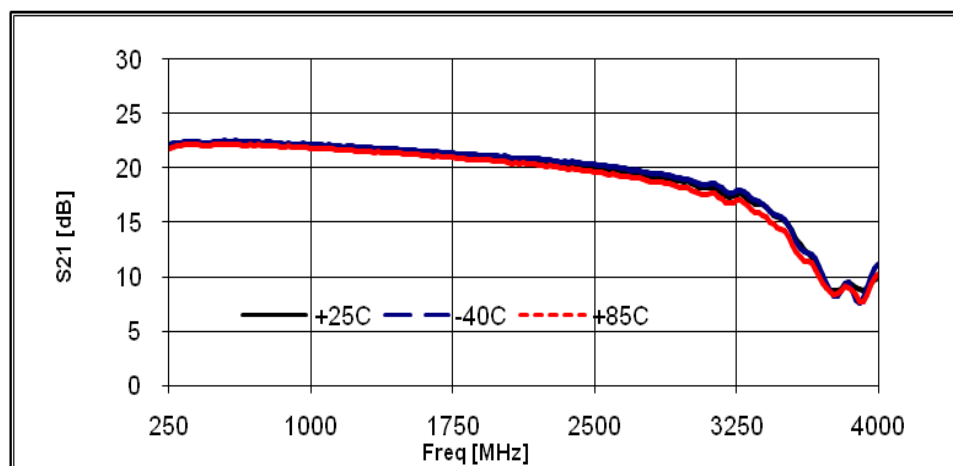
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ACPR



Gain Flatness

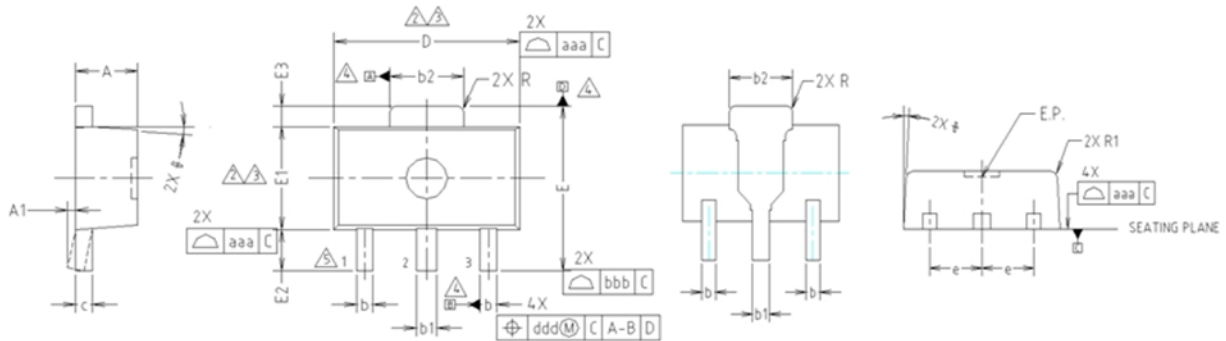


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Package Outline Dimension



NOTE:

1. DIMENSIONS IN MILLIMETERS.

⚠ 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.

⚠ 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.

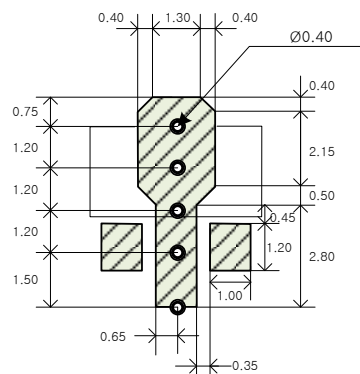
⚠ DATUMS A, B AND D TO BE DETERMINED 0.18mm FROM THE LEAD TIP.

⚠ 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.			
φ	4° TYP.			
R	0.15 TYP.			
R1	—	—	0.20	
SYMBOL	TOLERANCES OF FORM AND POSITION		NOTE	
	aaa	bbb		
aaa	0.15			
bbb	0.20			
ccc	0.10			
ddd	0.10			

Suggested PCB Land Pattern and PAD Layout

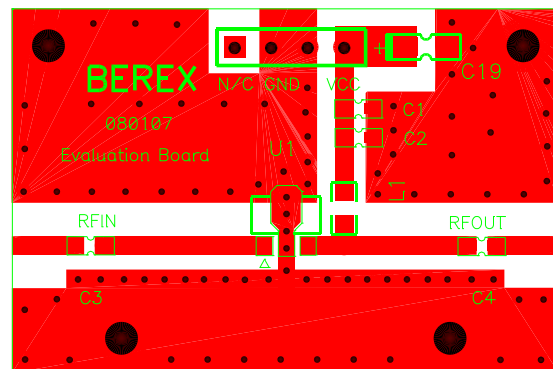
PCB Land Pattern



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

PCB Mounting

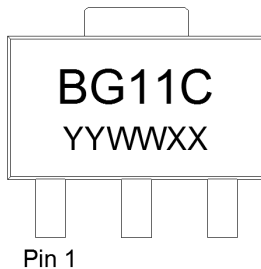


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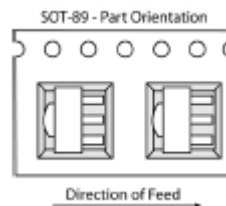
Package Marking



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 1C
Value:	Passes <2000V
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
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