BIG4

30-600 MHz Internally Matched IF Amplifier

Device Features

- OIP3 = 41 dBm @ 140 MHz
- Gain = 20.5 dB @ 140 MHz
- Output P1 dB = 20.5 dBm @ 140 MHz
- NF = 2.7 @ 140MHz at Demo Board
- 50 Ω Cascadable
- RoHS2-compliant SOT-89 SMT package

Product Description

BeRex's BIG4 is a high performance InGaP/ GaAs HBT MMIC amplifier, internally matched to 50 Ohms. The BIG4 is designed for high linearity IF amplifier that require excellent gain ,high OIP3 and flatness. It is packaged in a RoHS2-compliant with SOT-89 surface mount package.

Typical Performance[1]

Parameter	Frequency				Unit
	70	140	200	500	MHz
Gain	20.9	20.7	20.2	19.5	dB
S11	-17.0	-17.0	-16.0	-15.0	dB
S22	-14.0	-14.0	-14.0	-14.0	dB
OIP3[2]	40.5	41.0	41.0	41.0	dBm
P1dB	21.0	20.5	20.5	20.0	dBm
Noise Figure	2.7	2.9	3.0	3.1	dB

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

[2] OIP3 _ measured on two tones with a output power 8 dBm/ tone , F2—F1 = 1 MHz.

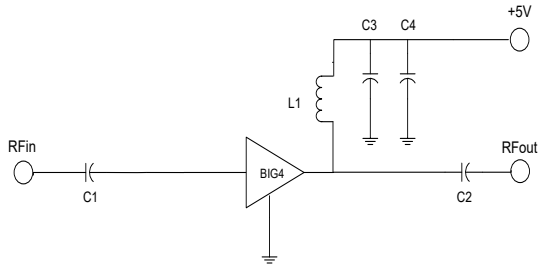
Applications

- Base station Infrastructure/RFID
- Commercial/Industrial

Recommended Operating Conditions

Parameter	Min.	Typical	Max.	Unit
Bandwidth	30		600	MHz
I_C @ (Vc = 5V)	75	85	95	mA
V_C	4.0	5.0	5.5	V
dG/dT		-0.004		dB/°C
R_{TH}		45.6		°C/W

Applications Circuit



*30 ~ 180 MHz BOM

*C1, C2, C4 = 1000pF ± 5%; C3= 100 pF ± 5%

*L4 = 820 nH ± 10%

*180 ~ 600 MHz BOM

* C1, C2, = 330 pF ± 5%; C3= 100 pF ± 5%; C4 = 1000 pF ± 5%

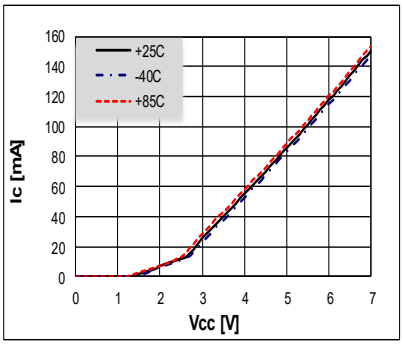
* L1 = 470nH ±10%

Absolute Maximum Ratings

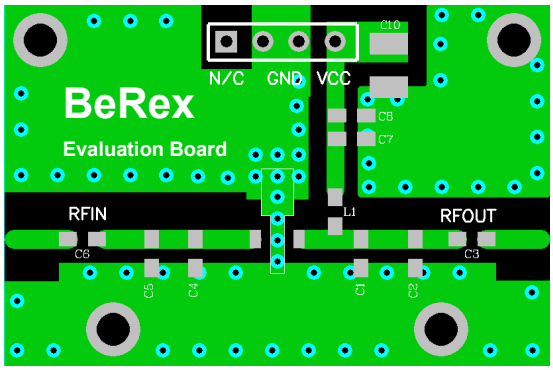
Parameter	Rating	Unit
Operating Case Temperature	-40 to +85	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+170	°C
Supply Voltage	+7.0	V
Supply Current	220	mA
Input RF Power	24	dBm

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

V-I Characteristics



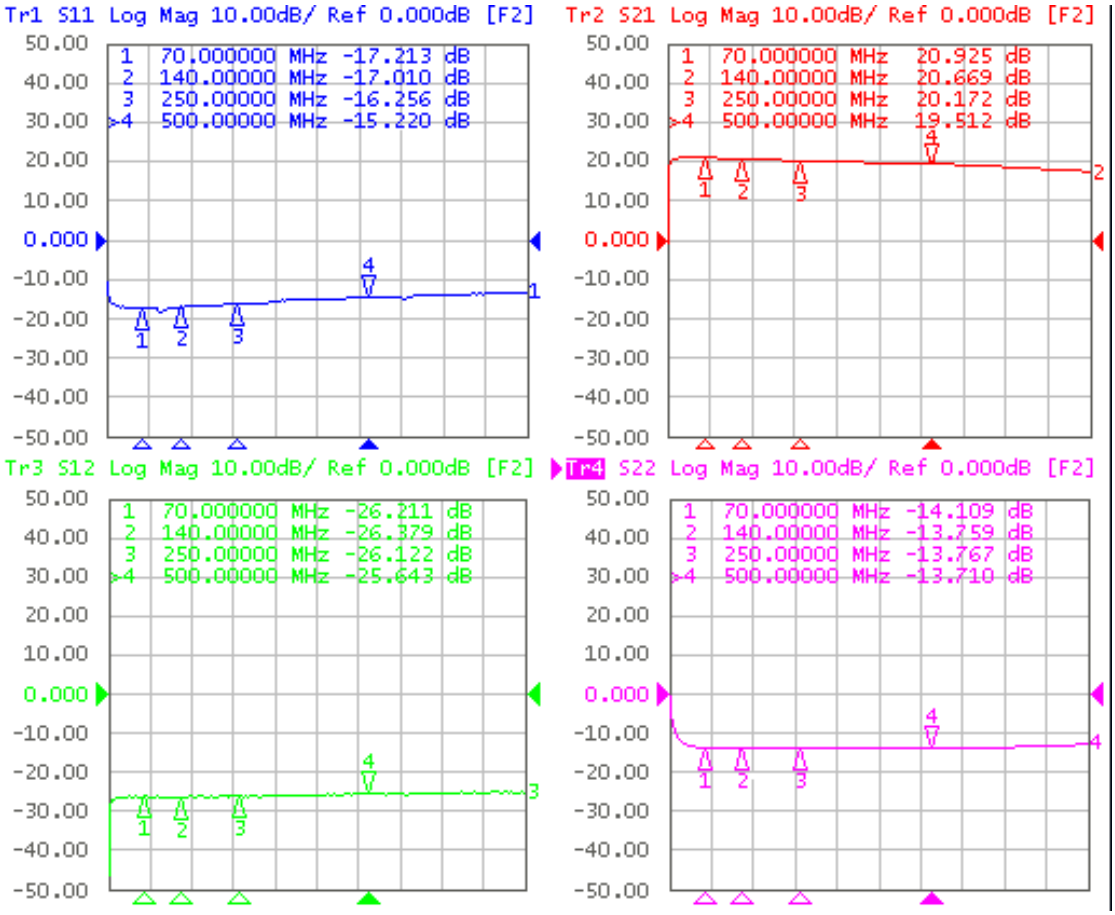
BeRex SOT89 Evaluation Board



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

Typical Device Data

S-parameters (Vc=5V, Ic=85mA, T=25°C)



S-Parameter

(Vdevice = 5.0V, Icc = 85mA, T = 25 °C, calibrated to device leads)

Freq	S11 [Mag]	S11 [Ang]	S21 [Mag]	S21 [Ang]	S12 [Mag]	S12 [Ang]	S22 [Mag]	S22 [Ang]
10	0.157	-123.984	10.573	-164.133	0.045	17.385	0.374	72.915
50	0.136	-167.871	11.157	175.363	0.049	-0.228	0.242	13.751
100	0.128	173.348	10.815	161.017	0.047	-8.112	0.212	-22.446
150	0.139	174.122	10.709	153.774	0.048	-6.939	0.211	-22.963
200	0.146	166.542	10.500	143.841	0.049	-11.844	0.211	-36.578
250	0.153	160.271	10.220	134.777	0.050	-15.489	0.208	-47.662
300	0.162	156.423	9.827	126.897	0.050	-18.816	0.197	-54.376
350	0.171	147.583	9.514	118.288	0.051	-22.998	0.207	-65.467
400	0.175	140.352	9.170	109.469	0.052	-26.778	0.208	-74.685
450	0.180	132.283	8.846	102.128	0.052	-31.226	0.208	-83.020
500	0.184	124.571	8.415	94.048	0.053	-36.395	0.211	-91.510
550	0.184	117.806	7.979	86.713	0.052	-40.148	0.206	-102.404
600	0.199	111.317	7.779	80.185	0.054	-42.302	0.206	-103.288

Application Circuit: 70-500 MHz

Typical Performance (Vd = 5V, Ic = 85mA, T = 25°C)

Freq	MHz	70	140	200	500
S21	dB	20.9	20.7	20.2	19.5
S11	dB	17.2	17.0	16.3	15.2
S22	dB	14.1	13.8	13.8	13.7
P1	dBm	21.0	20.6	20.4	20.3
OIP3	dBm	40.5	41.0	41.0	41.3
NF	dB	2.7	2.9	3.0	3.1

Typical Performance (Vd = 4.7V, Ic = 76mA, T = 25°C)

Freq	MHz	70	140	200	500
S21	dB	20.9	20.6	20.1	19.3
S11	dB	17.7	17.5	16.7	15.3
S22	dB	13.8	13.5	13.5	13.4
P1	dBm	19.9	19.8	19.6	20.1
OIP3	dBm	39.3	40.3	40.2	40
NF	dB	2.7	2.9	3.0	3.1

Typical Performance (Vd = 4.5V, Ic = 69mA, T = 25°C)

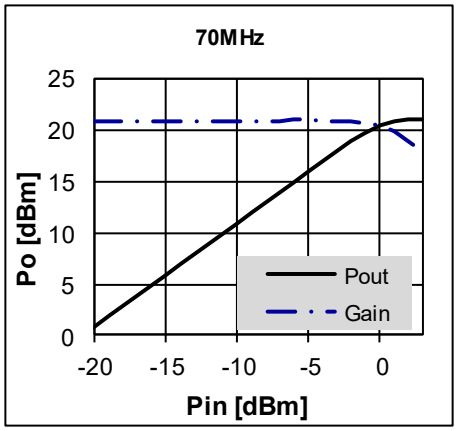
Freq	MHz	70	140	200	500
S21	dB	20.8	20.5	20	19.2
S11	dB	18.1	17.9	17	15.2
S22	dB	13.4	13.1	13.2	13.2
P1	dBm	19.3	19.1	18.9	18.8
OIP3	dBm	38.9	39.1	39.0	39.0
NF	dB	2.6	2.8	2.9	3.0

Typical Performance (Vd = 4V, Ic = 50mA, T = 25°C)

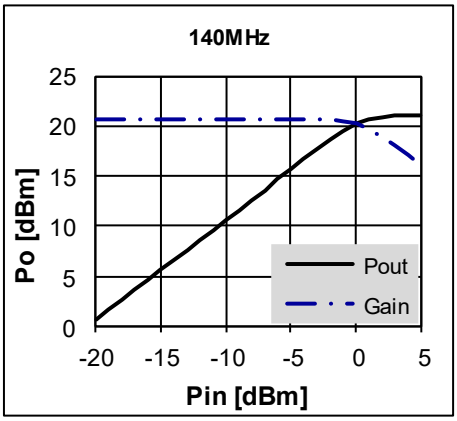
Freq	MHz	70	140	200	500
S21	dB	20.6	20.4	19.9	19.1
S11	dB	19.8	19.5	18.4	16.1
S22	dB	11.9	12.5	12.7	12.6
P1	dBm	16.9	17.1	16.8	16.6
OIP3	dBm	34.4	34.0	33.7	34.7
NF	dB	2.6	2.8	2.9	3.0

Device Performance

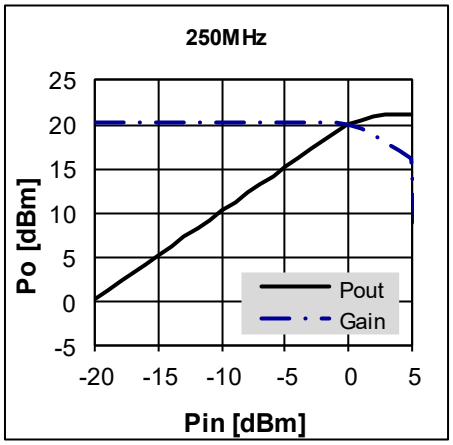
Pin-Pout-Gain



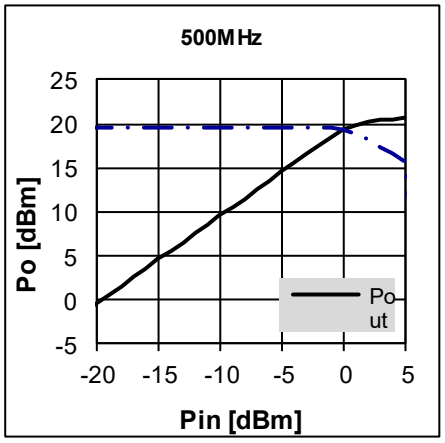
70MHz, 5V/85mA



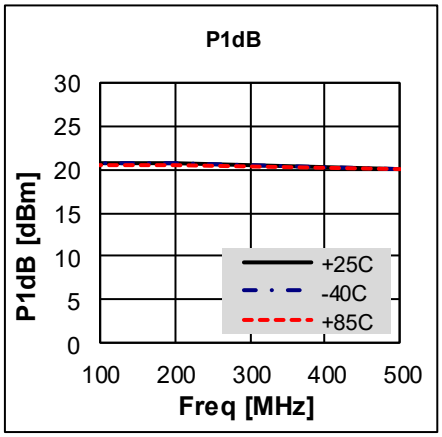
140MHz, 5V/85mA



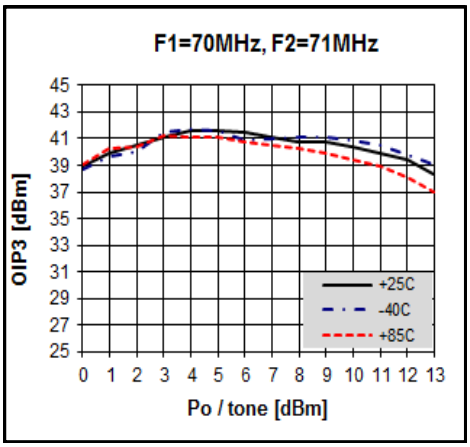
250MHz, 5V/85mA

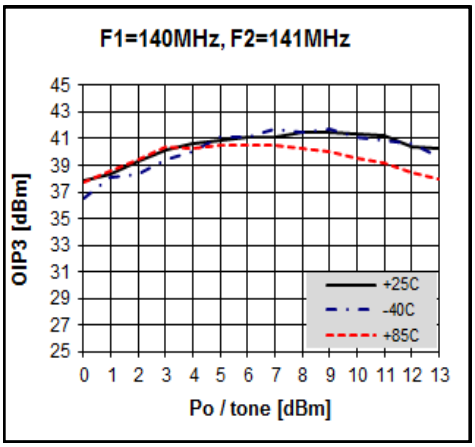


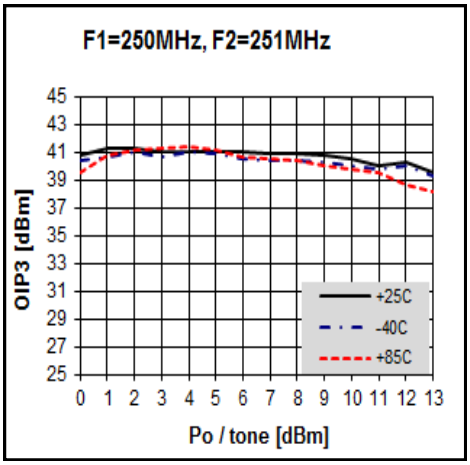
500MHz, 5V/85mA

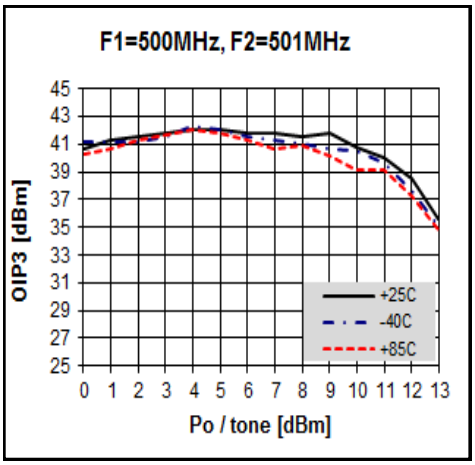


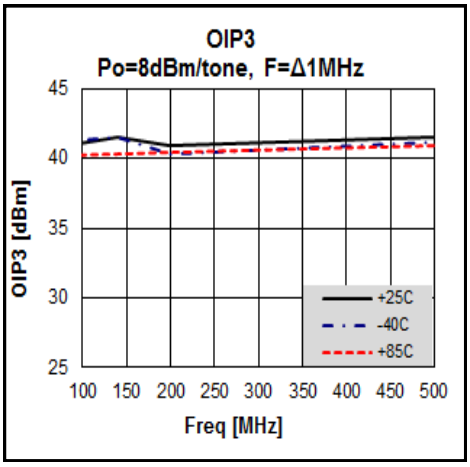
OIP3



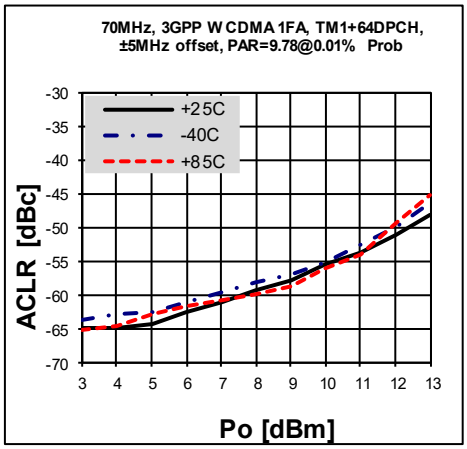


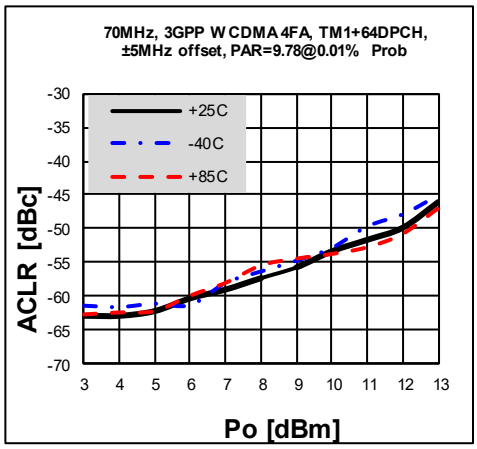


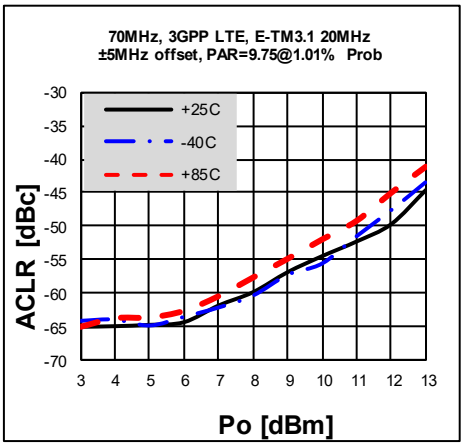


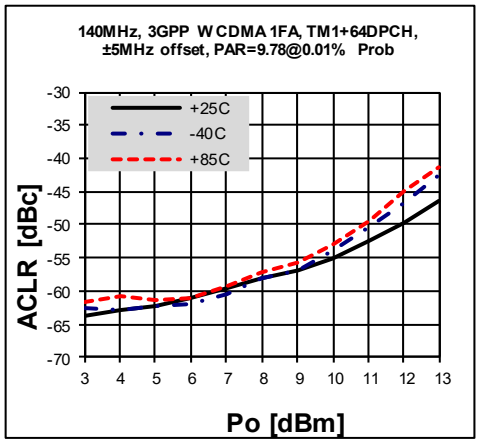


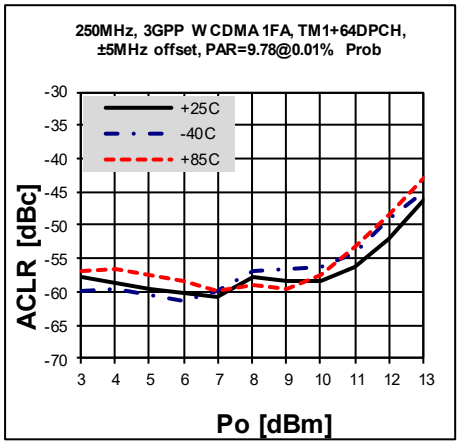
ACLR / LTE

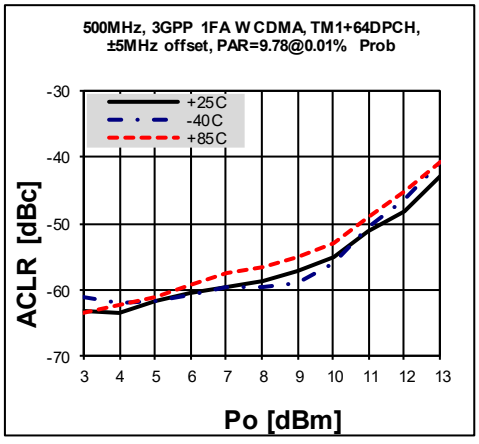


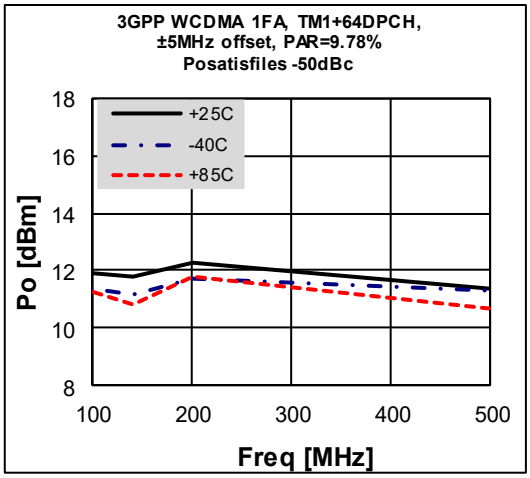




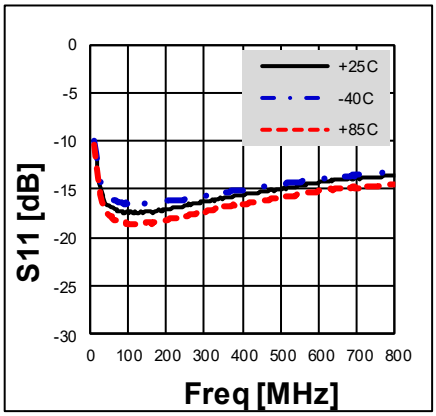


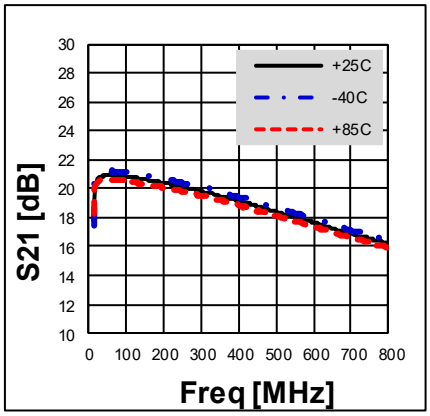


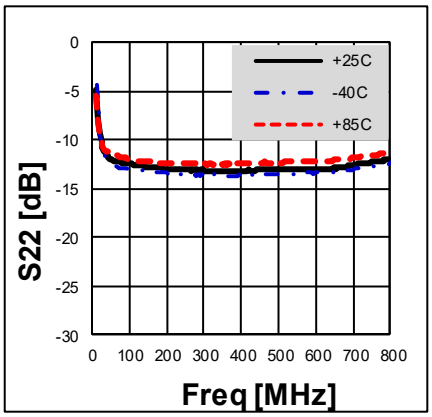


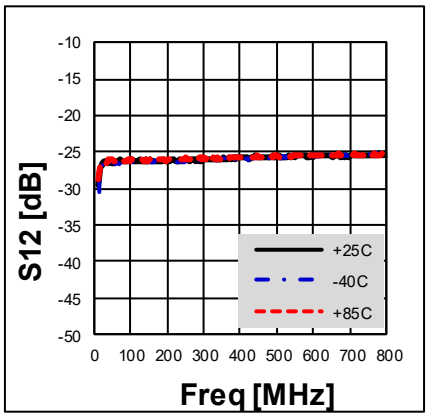


S-Parameters over Temperature

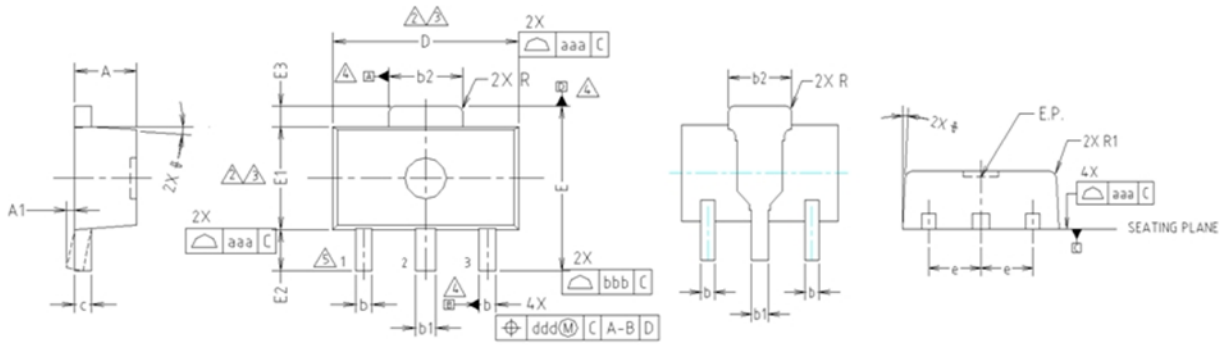








Package Outline Dimension



NOTE:

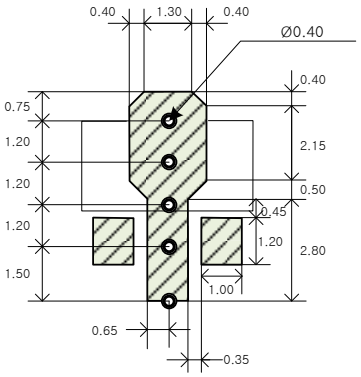
1. DIMENSIONS IN MILLIMETERS.
2. DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.5mm PER END. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.5mm PER SIDE.
3. DIMENSIONS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

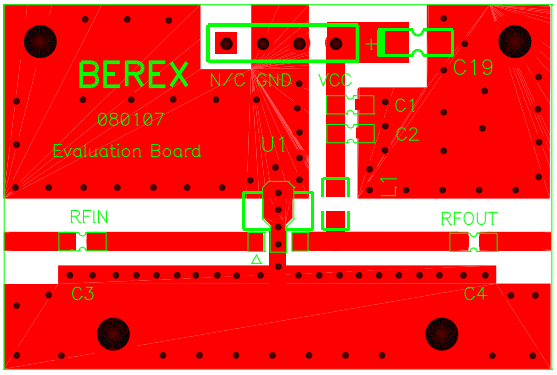
PCB Land Pattern



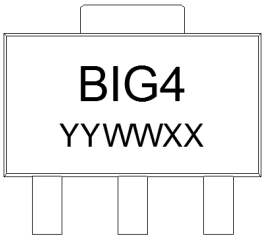
Note : All dimension _ millimeters

PCB lay out _ on BeRex website

PCB Mounting



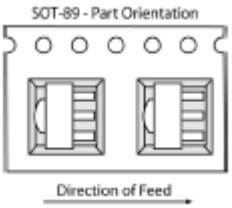
Package Marking



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 1C
Value:	**Passes <2000V**
Test:	Human Body Model (HBM)
Standard:	JEDEC Standard JS-001-2012
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**