50-800 MHz Internally Matched IF Amplifier

Device Features

- 43dBm Output IP3 at 10dBm/tone at 70MHz
- 17.5dB Gain at 70MHz
- 20.5dBm P1dB at 70MHz
- Highly Reliable InGaP/GaAs HBT Technology
- Temperature Compensation Circuit patent
- Over Voltage Protection Circuit patent
- SOT-89 Surface Mount Package
- 50 ohm Cascadeable
- Lead-free/Green/RoHS compliant
- Application: commercial, space, military wireless system

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

Parameters	Test Conditions	Min	Typ	Max	Unit
Frequency Range		50		800	MHz
Gain	70MHz 140MHz 250MHz 500MHz	16.5 16.5 16.5 16.5	17.5 17.5 17.5 17.5	18.5 18.5 18.5 18.5	dB
S11	70MHz 140MHz 250MHz 500MHz		-15.8 -15.4 -15.4 -14.1		dB
S22	70MHz 140MHz 250MHz 500MHz		-17.1 -19.1 -26.3 -16.1		dB
OIP3	70MHz 140MHz 250MHz 500MHz	41.0 40.5 39.0 38.0	43.0 42.5 41.0 40.0		dBm
P1dB	70MHz 140MHz 250MHz 500MHz	19.5 19.5 19.5 20.0	20.5 20.5 20.5 21.0		dBm
Ic	Vc = 5.0V	97	107	117	mA
Vc			5.0		V
dG/dT			-0.003		°C
Rth	Thermal Resistance		50		°C/W

Test conditions unless otherwise noted.

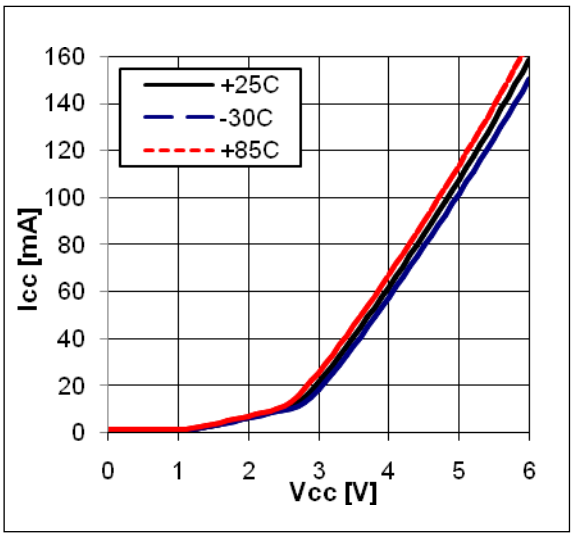
1. Device performance is measured on BeRex evaluation board at 25°C, 50 ohm system.
2. OIP3 measured with two tones at an output power of 10dBm/tone separated by 1MHz.

Absolute Maximum Ratings

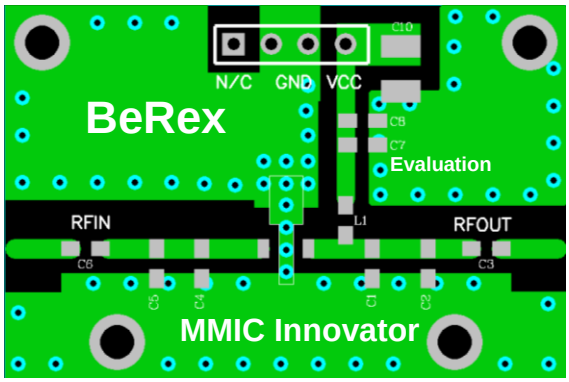
Parameters	Rating
Operating Case temperature	-40 to +85°C
Storage Temperature	-55 to +155°C
Junction Temperature	+220°C
Supply Voltage	6.0V
Max. Device Current	160mA
Input RF Power	23dBm

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

[I-V Characteristics]

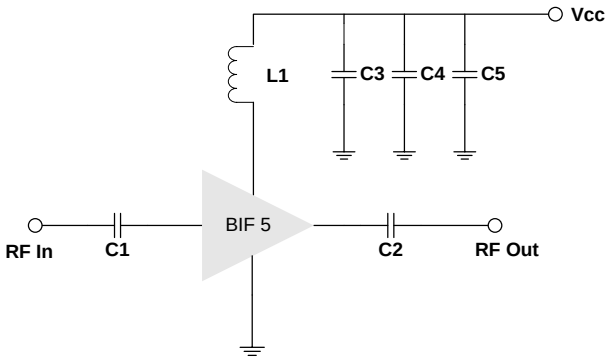


[Generic SOT89 Evaluation Board]



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

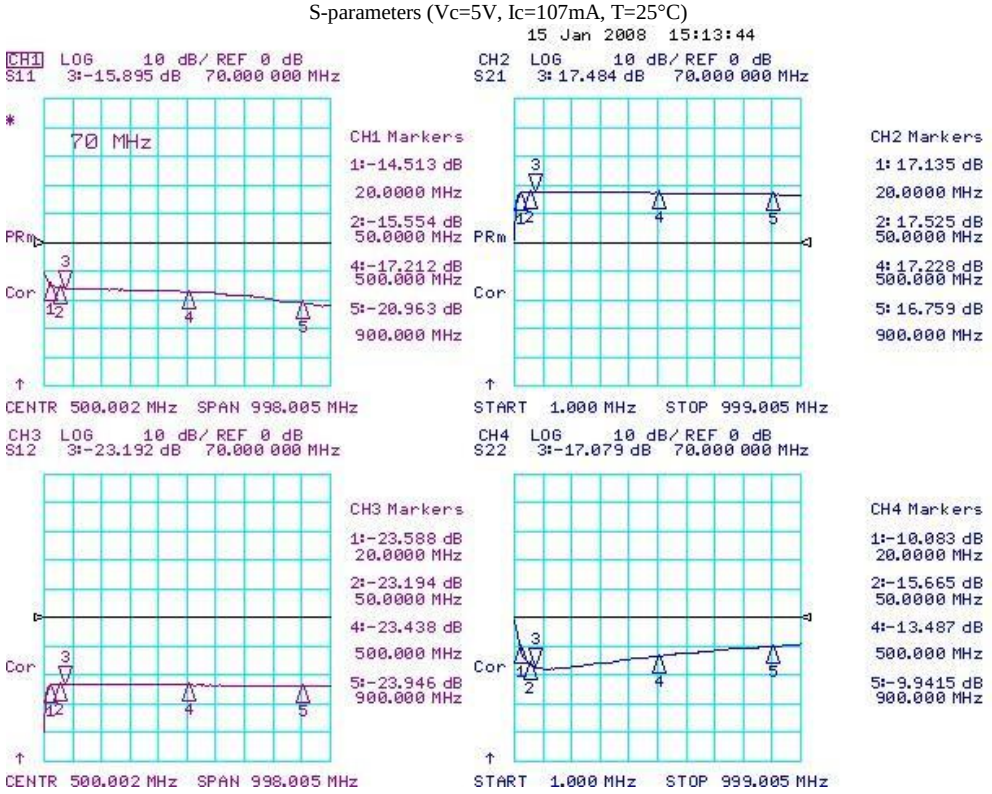
Application Circuit: 20-1500 MHz

Schematic Diagram	BOM		Tolerance
	C1	100nF *100pF	± 5%
	C2	100nF *100pF	± 5%
	C3	100pF	± 5%
	C4	1000pF	± 5%
	C5	10uF	± 20%
	L1	1uH *33nH	±5%

*Application for RF Bandwidth

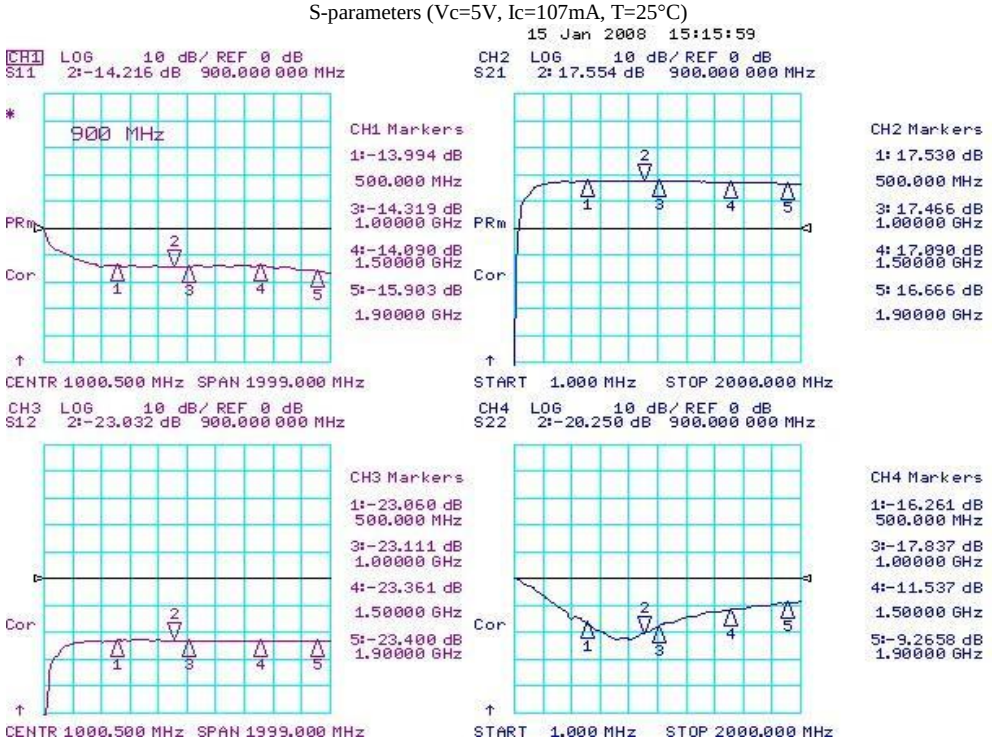
Typical Device Data

S-parameters (Vc=5V, Ic=107mA, T=25°C)



RF Bandwidth

S-parameters (Vc=5V, Ic=107mA, T=25°C)



Typical Performance (Vdevice = 5V, Ic = 107 mA, Ta = 25°C)

Freq	MHz	70	140	250	*500	800
S21	dB	17.5	17.5	17.5	17.5	17.1
S11	dB	-15.8	-15.4	-15.5	-14.1	-18.3
S22	dB	-17.1	-19.1	-26.3	-16.1	-10.8
P1	dBm	20.5	20.5	20.5	21.0	21
OIP3	dBm	43	42.5	41.0	40.0	37
NF	dB	4.0	4.1	4.2	4.3	4.3

Typical Performance (V device = 4.7 V, Ic = 95 mA, Ta = 25 ℃)

Freq	MHz	70	140	250	500	800
S21	dB	17.6	17.5	17.4	17.4	17.1
S11	dB	-15.1	-17.3	-18.1	-17.5	-18.7
S22	dB	-14.3	-13.7	-14.1	-14	-10.7
P1	dBm	19.6	20.2	20.1	20.4	20
OIP3	dBm	41	40.5	39.5	37	35.5
NF	dB	4.0	4.1	4.2	4.3	4.3

Typical Performance (V device = 4.5 V, Ic = 85 mA, Ta = 25 ℃)

Freq	MHz	70	140	250	500	800
S21	dB	17.4	17.4	17.5	17.4	17
S11	dB	-15.3	-17.6	-18.3	-17.8	-18.9
S22	dB	-14.2	-13.5	-13.9	-13.9	-10.6
P1	dBm	19.2	19.0	19.2	19.4	19.4
OIP3	dBm	40.0	41.0	38.5	36.5	35
NF	dB	4.0	4.1	4.2	4.3	4.3

Typical Performance (V device = 4 V, Ic = 63 mA, Ta = 25 ℃)

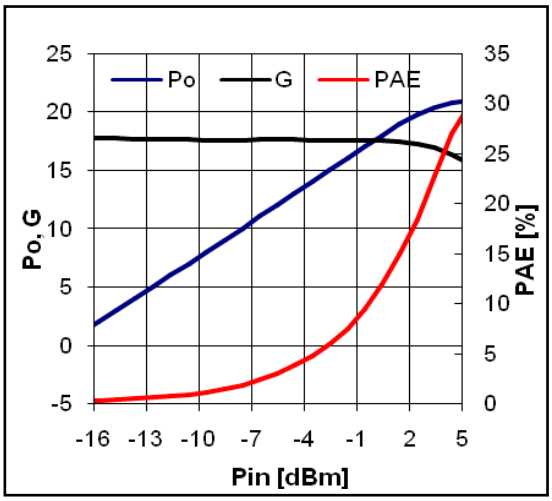
Freq	MHz	70	140	250	500	800
S21	dB	17.4	17.3	17.2	17.2	16.9
S11	dB	-16	-18.6	-19.5	-18.9	-20.1
S22	dB	-13.8	-13.1	-13.5	-13.5	-10.3
P1	dBm	17	17.5	17.7	17.5	17.2
OIP3	dBm	35.5	35.5	35	33	32
NF	dB	4.0	4.1	4.2	4.3	4.3

Typical Performance (V device = 3.5 V, Ic = 41 mA, Ta = 25 ℃)

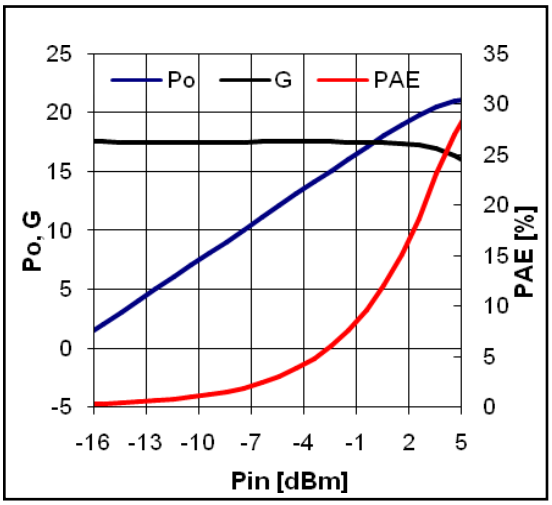
Freq	MHz	70	140	250	500	800
S21	dB	17.1	17.0	16.9	16.8	16.5
S11	dB	-17.9	-21.2	-22.6	-21.7	-23.1
S22	dB	-13.1	-12.3	-12.6	-12.6	-9.8
P1	dBm	13.7	14.6	14.6	14.5	14.2
OIP3	dBm	29	29	29	27.5	27.5
NF	dB	4.0	4.1	4.2	4.3	4.3

Device Performance

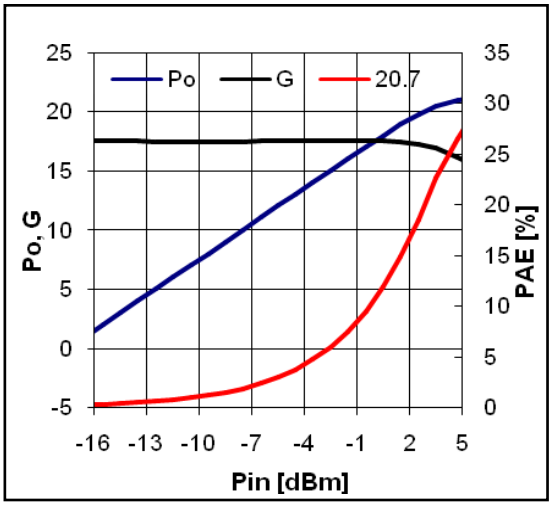
Pin-Pout-Gain



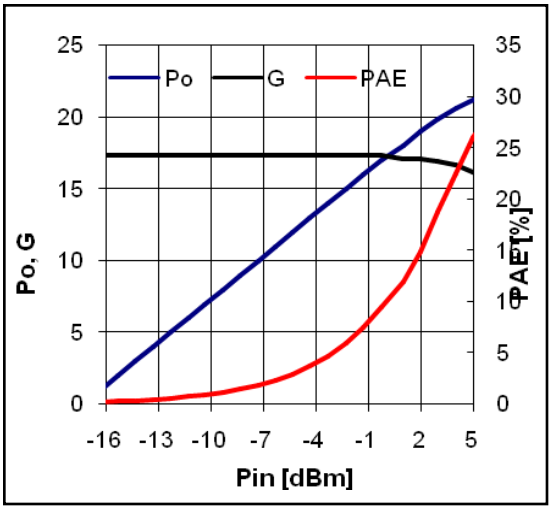
70MHz, 5V/107mA



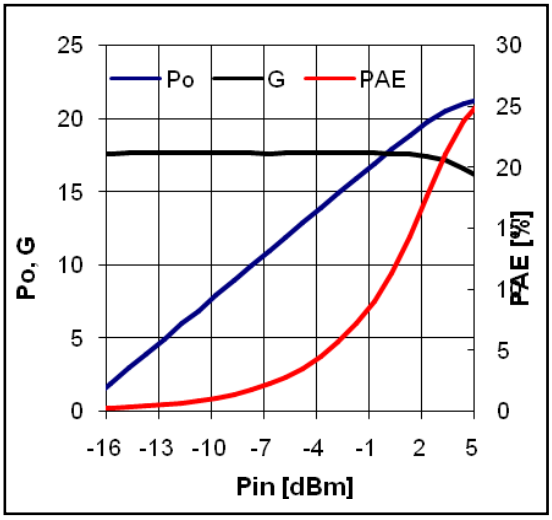
140MHz, 5V/107mA



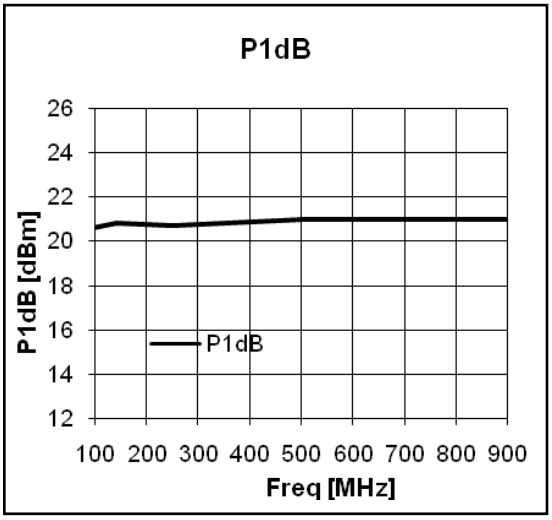
250MHz, 5V/107mA



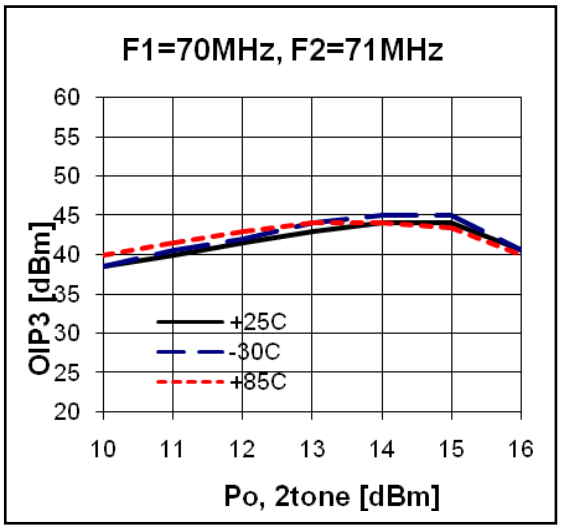
500MHz, 5V/107mA

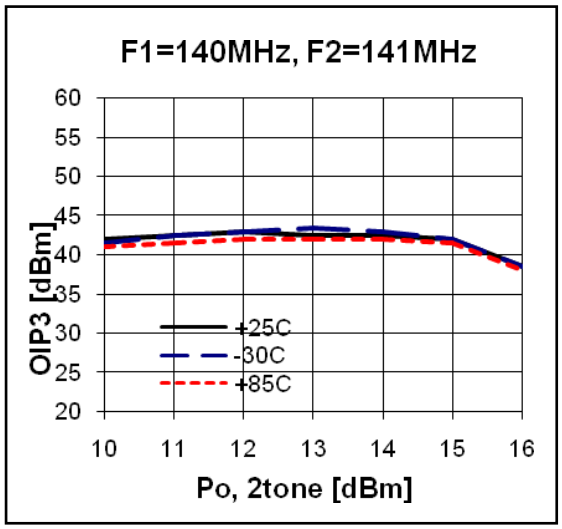


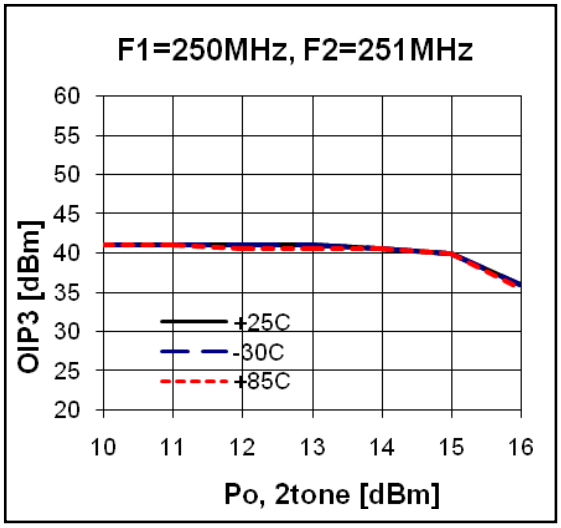
900MHz, 5V/107mA

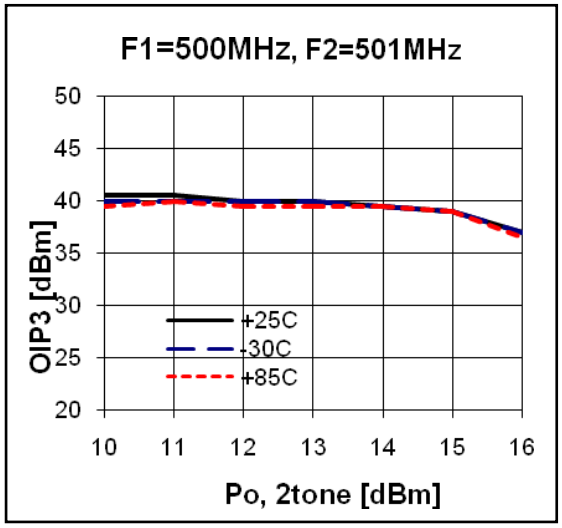


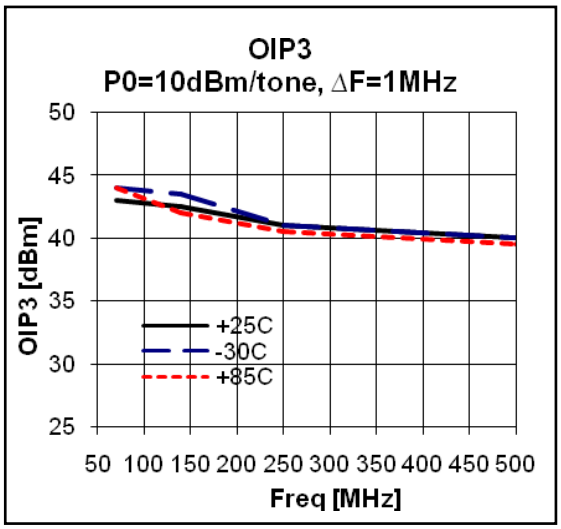
OIP3


F1=70MHz, F2=71MHz
OIP3 [dBm]
60
55
50
45
40
35
30
25
20
10 11 12 13 14 15 16
Po, 2tone [dBm]
+25C
-30C
+85C

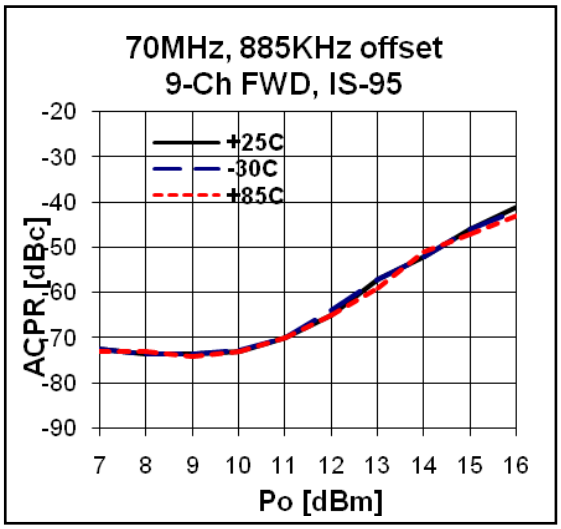

F1=140MHz, F2=141MHz
OIP3 [dBm]
60
55
50
45
40
35
30
25
20
10 11 12 13 14 15 16
Po, 2tone [dBm]
+25C
-30C
+85C

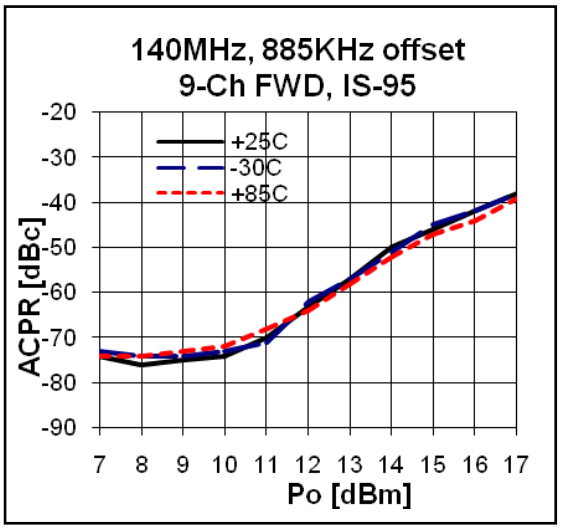

F1=250MHz, F2=251MHz
OIP3 [dBm]
60
55
50
45
40
35
30
25
20
10 11 12 13 14 15 16
Po, 2tone [dBm]
+25C
-30C
+85C

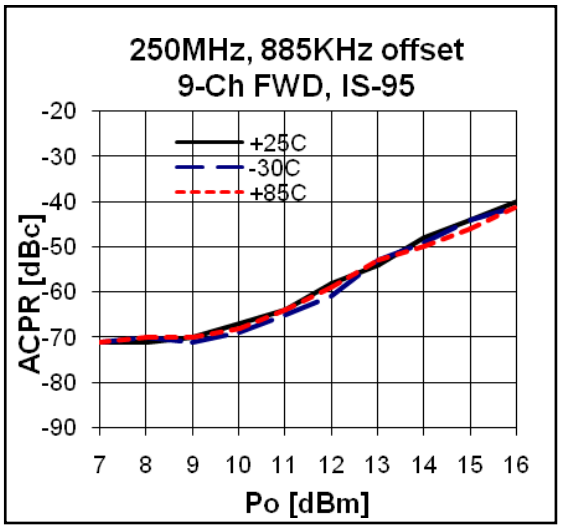

F1=500MHz, F2=501MHz
OIP3 [dBm]
50
45
40
35
30
25
20
10 11 12 13 14 15 16
Po, 2tone [dBm]
+25C
-30C
+85C

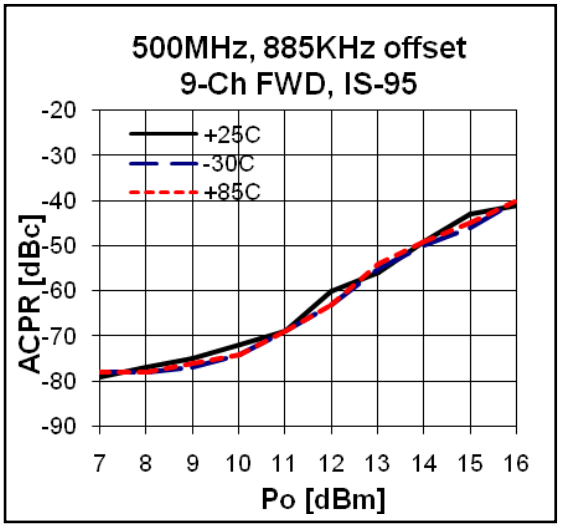

OIP3
P0=10dBm/tone, ΔF=1MHz
OIP3 [dBm]
50
45
40
35
30
25
50 100 150 200 250 300 350 400 450 500
Freq [MHz]
+25C
-30C
+85C

ACPR

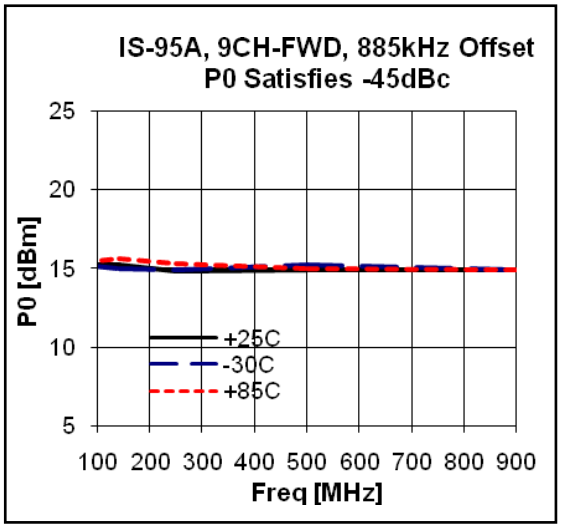

70MHz, 885KHz offset
9-Ch FWD, IS-95
ACPR [dBc]
-20
-30
-40
-50
-60
-70
-80
-90
7 8 9 10 11 12 13 14 15 16
Po [dBm]
+25C
-30C
+85C

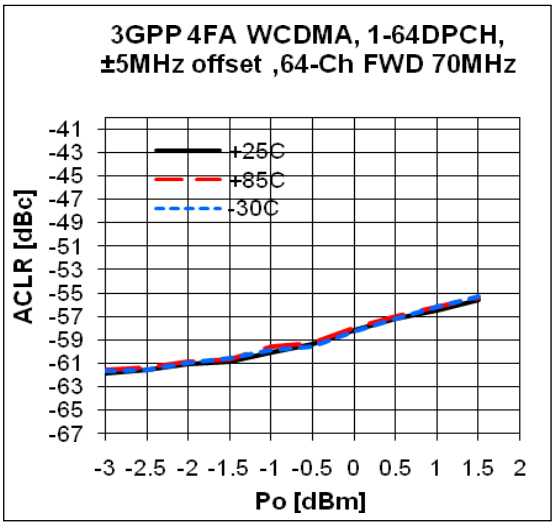

140MHz, 885KHz offset
9-Ch FWD, IS-95
ACPR [dBc]
-20
-30
-40
-50
-60
-70
-80
-90
7 8 9 10 11 12 13 14 15 16 17
Po [dBm]
+25C
-30C
+85C


250MHz, 885KHz offset
9-Ch FWD, IS-95
ACPR [dBc]
-20
-30
-40
-50
-60
-70
-80
-90
7 8 9 10 11 12 13 14 15 16
Po [dBm]
+25C
-30C
+85C

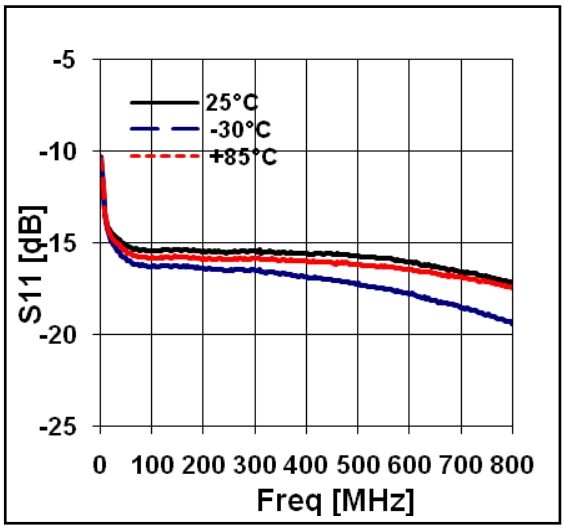

500MHz, 885KHz offset
9-Ch FWD, IS-95
ACPR [dBc]
-20
-30
-40
-50
-60
-70
-80
-90
7 8 9 10 11 12 13 14 15 16
Po [dBm]
+25C
-30C
+85C

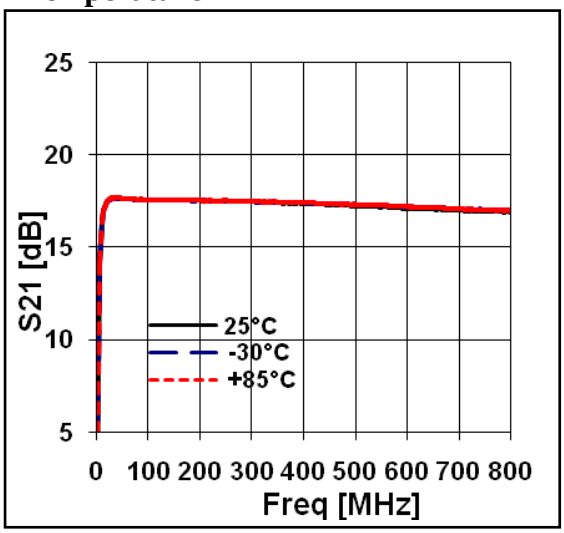
ACLR

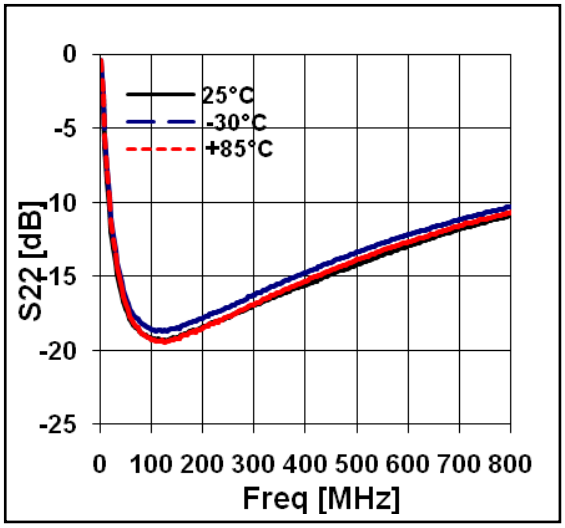

IS-95A, 9CH-FWD, 885kHz Offset
P0 Satisfies -45dBc
P0 [dBm]
25
20
15
10
5
100 200 300 400 500 600 700 800 900
Freq [MHz]
+25C
-30C
+85C

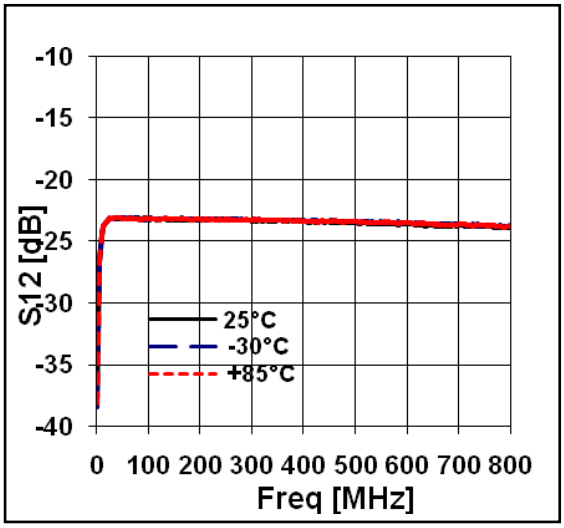

3GPP 4FA WCDMA, 1-64DPCH,
±5MHz offset ,64-Ch FWD 70MHz
ACLR [dBc]
-41
-43
-45
-47
-49
-51
-53
-55
-57
-59
-61
-63
-65
-67
-3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2
Po [dBm]
+25C
+85C
-30C

S-Parameter over Temperature

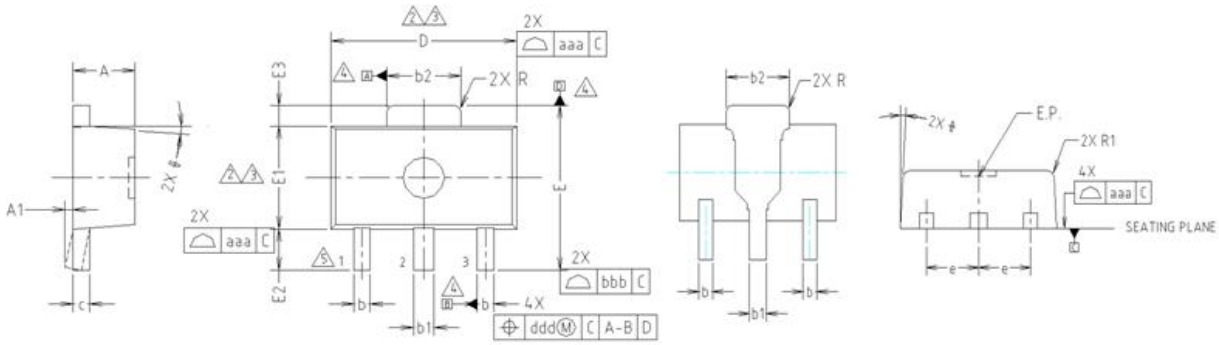








Package Outline Dimension



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 0.10mm FROM THE LEAD TIP.

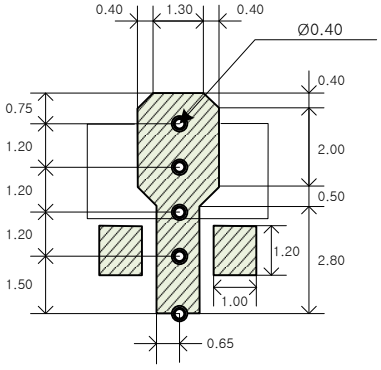
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

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

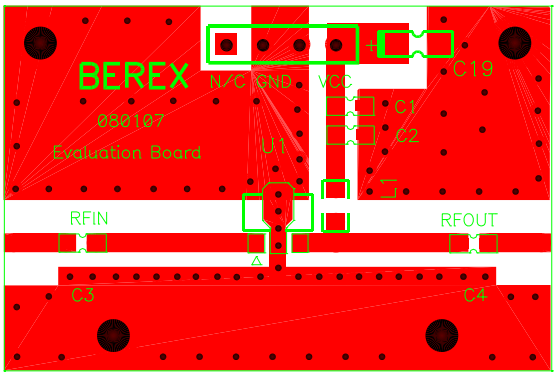
PCB Land Pattern



Note : All dimension are in millimeters

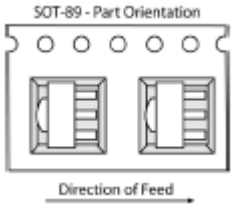
Visit http://www.berex.com for PCB layout

PCB Mounting



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**

NOTICE

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