

Device Features

- This can be operated at V_c of 3.3V and 4.0V
- Internally matched to 50 ohms
- 30.0 dBm Output IP3 at -3 dBm/tone at 1900MHz
- 14.2 dB Gain at 1900MHz
- 2.1dB Typical N.F
- Highly Reliable InGaP/GaAs HBT Technology
- Lead-free/RoHS-compliant SOT-363 SMT package



Pin Description	
RF IN	3
RF OUT	6
GND	1,2,4,5

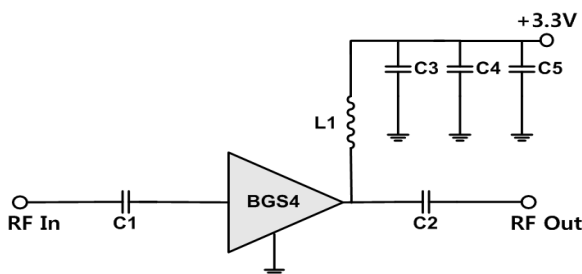
Product Description

BeRex's BGS4 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 BGS4 is designed for high linearity gain block applications that require excellent gain flatness. It is packaged in a RoHS-compliant with SOT-363 surface mount package.

Applications

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

Applications Circuit



BOM	50~500MHz	700~1700MHz	1700~2400MHz	2500~4000MHz
C1	820pF	100pF	10pF	10pF
C2	820pF	100pF	10pF	10pF
C3	100pF	100pF	100pF	100pF
C4	1nF	1000pF	1000pF	1000pF
C5	1uF	1uF	1uF	1uF
L1	820nH	82nH	27nH	18nH

Typical Performance¹

Parameter	Frequency						Unit
	70	900	1900	2140	2650	3500	
$V_c=3.3V$	70	900	1900	2140	2650	3500	MHz
Gain	24.7	19.7	14.2	13.2	11.1	10.3	dB
S11	-19.6	-11.9	-11.4	-13.1	-21.7	-13.2	dB
S22	-14.0	-18.7	-19.7	-17.0	-12.0	-13.9	dB
OIP3 ²	31.0	28.0	30.0	29.5	30.0	30.8	dBm
P1dB	20.4	19.9	18.8	19.0	19.0	18.9	dBm
N.F	2.2	2.1	2.1	2.1	2.2	2.6	dB

Parameter	Frequency						Unit
	70	900	1900	2140	2650	3500	
$V_c=4.0V$	70	900	1900	2140	2650	3500	MHz
Gain	25.6	20.5	15.5	14.6	12.9	11.1	dB
S11	-16.6	-16.1	-10.5	-11.2	-14.2	-14.6	dB
S22	-19.0	-13.9	-25.2	-21.6	-15.8	-9.9	dB
OIP3 ²	35.5	31.0	31.0	30.9	30.7	30.0	dBm
P1dB	22.5	21.6	20.8	20.9	21.3	22.0	dBm
N.F	3.5	3.3	3.7	3.8	4.0	4.2	dB

¹ Device performance _ measured on BeRex's evaluation board at 25°C, 50 Ω system.

² OIP3 _ measured on two tones with a output power -3 dBm/ tone , F2—F1 = 1 MHz.

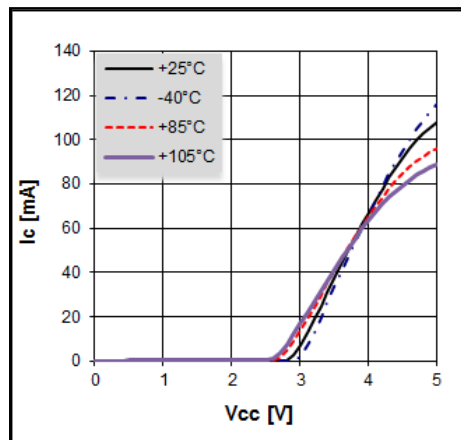
	Min.	Typical	Max.	Unit
Bandwidth	50		4000	MHz
$I_c @ (V_c = 3.3V)$	21	26	31	mA
$I_c @ (V_c = 4.0V)$	56	70	84	mA
dG/dT		-0.0026		dB/°C
R_{TH}		62		°C/W

Absolute Maximum Ratings

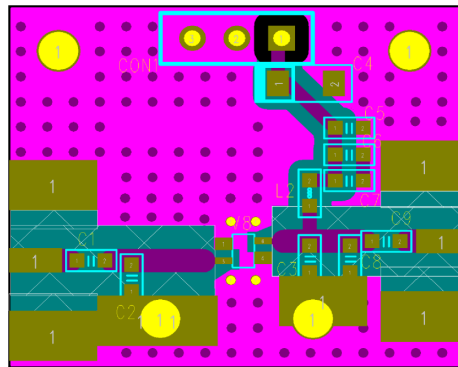
Parameter	Rating	Unit
Operating Case Temperature	-40 to +105	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+220	°C
Operating Voltage	+5	V
Supply Current	110	mA
Input RF Power	24	dBm

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

V-I Characteristics



BeRex SOT363 Evaluation Board

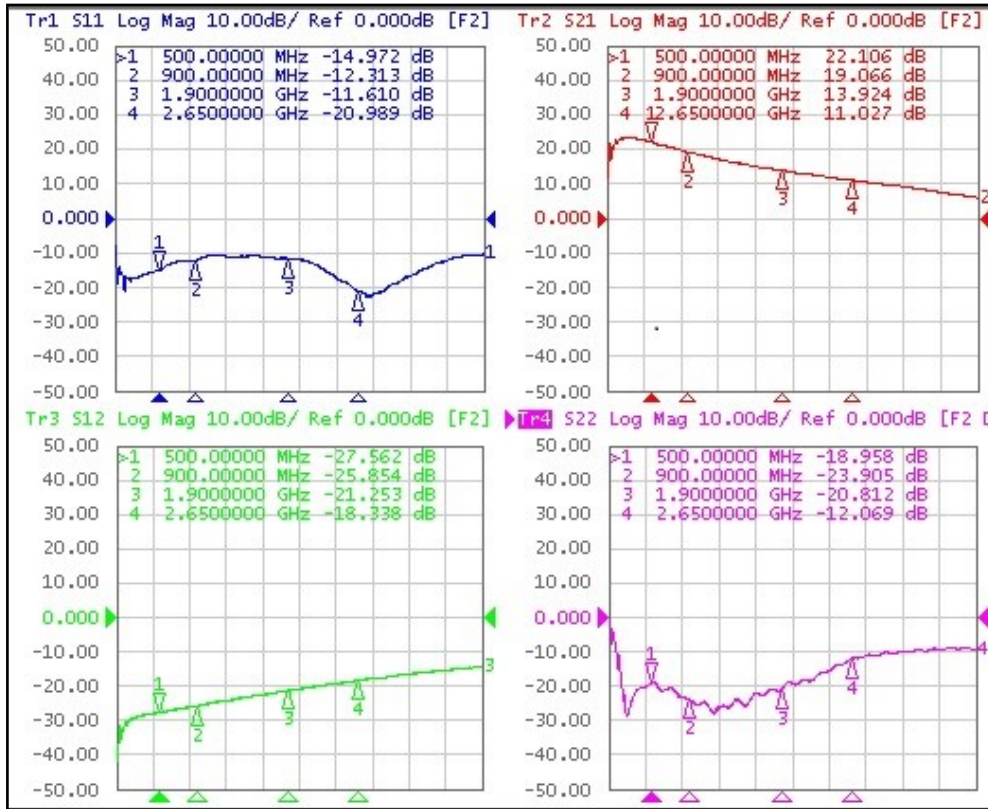


*Dielectric constant _ 4.2 *RF pattern width 52mil *31mil thick FR4

*Without vias under device degrade device performance.

Typical Device Data

S-parameters (Vc=3.3V, Ic=26mA, T=25°C)



S-Parameter

(Vdevice = 3.3V, Icc = 26mA, 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
70.00	0.12	-173.85	12.21	-135.04	0.03	55.80	0.44	-56.12
500.00	0.18	-166.43	12.71	154.64	0.04	46.69	0.11	49.37
900.00	0.24	170.60	9.00	136.41	0.05	62.38	0.06	91.61
1000.00	0.28	168.22	8.46	134.54	0.05	66.84	0.05	89.54
1500.00	0.29	149.21	6.08	126.99	0.07	80.49	0.05	109.83
2000.00	0.25	135.11	4.70	123.57	0.09	92.29	0.11	155.14
2500.00	0.12	156.50	3.76	121.49	0.11	99.74	0.20	150.62
3000.00	0.11	-117.39	3.09	117.36	0.14	103.77	0.31	-171.12
3500.00	0.23	-114.58	2.50	111.71	0.17	103.71	0.34	-153.16
4000.00	0.30	-131.64	1.98	102.77	0.19	101.11	0.33	-128.69

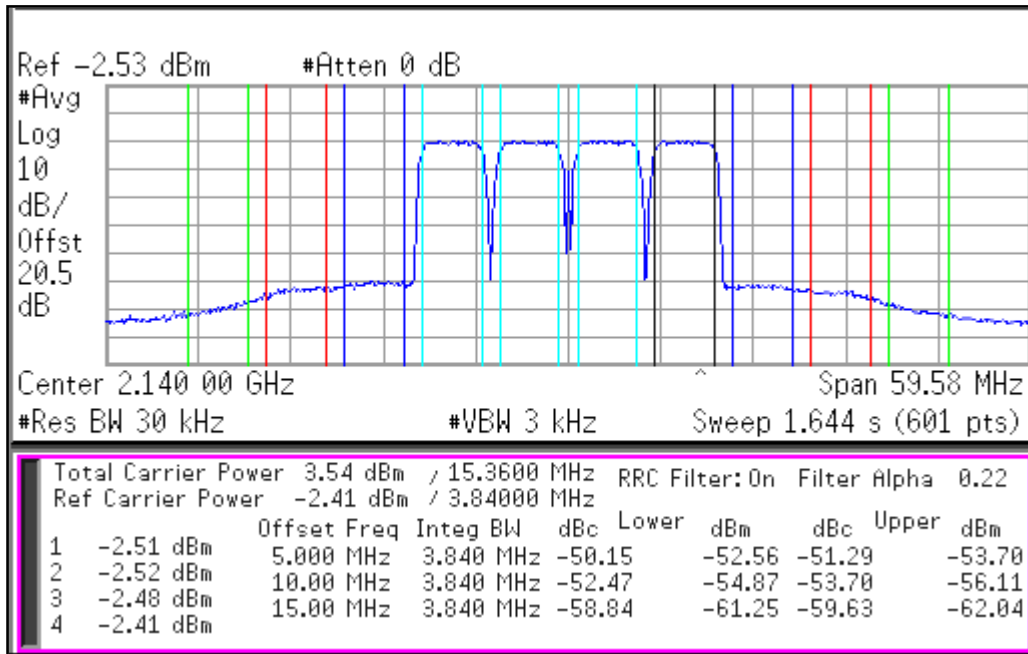
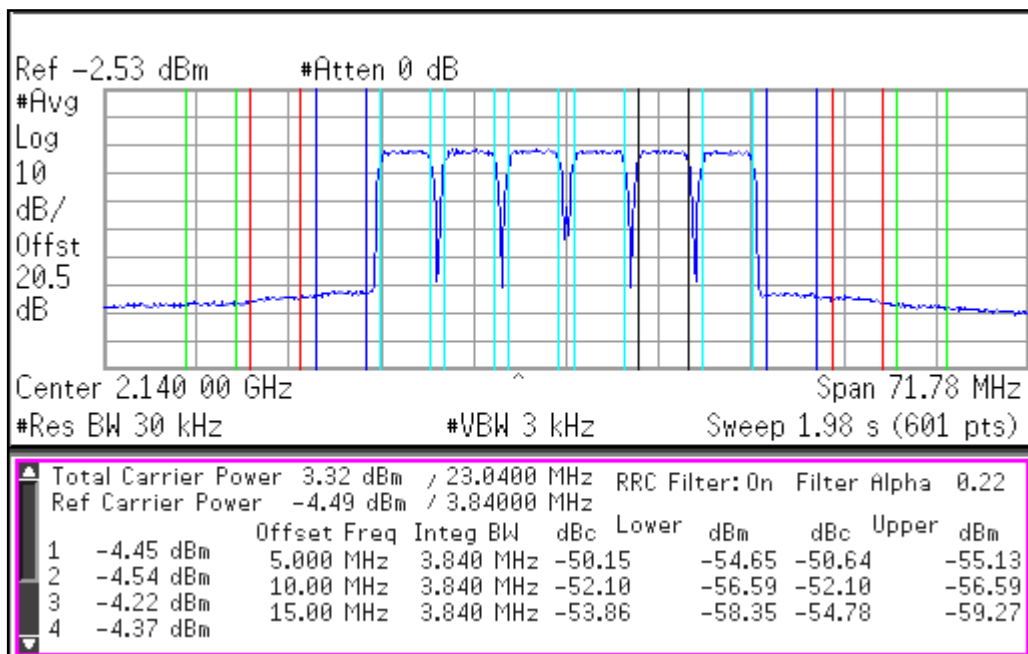
50-4000 MHz Cascadable InGaP HBT Gain Block

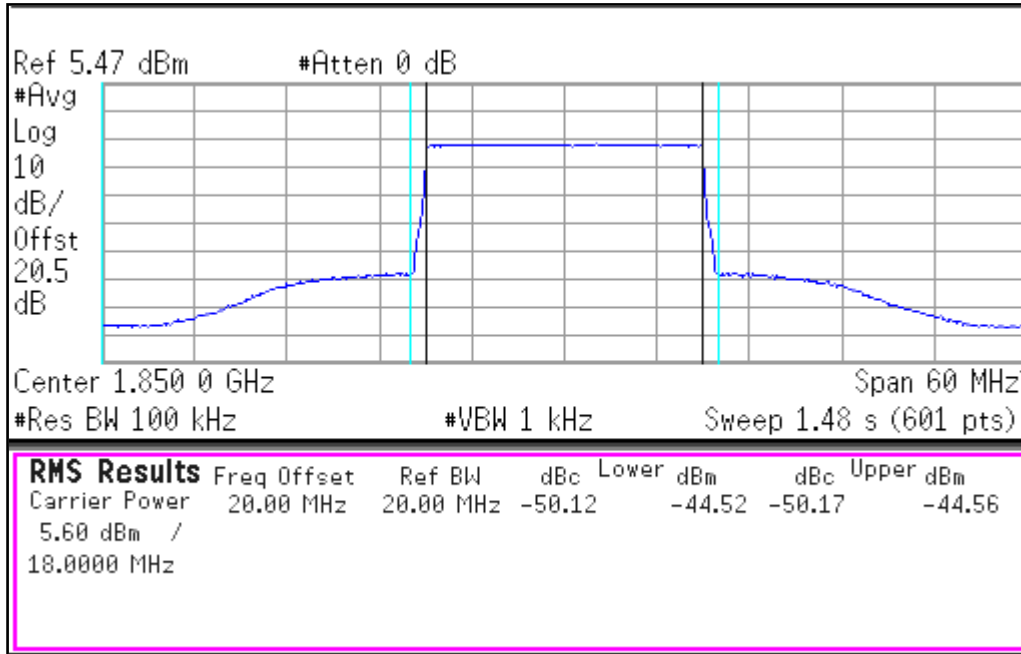
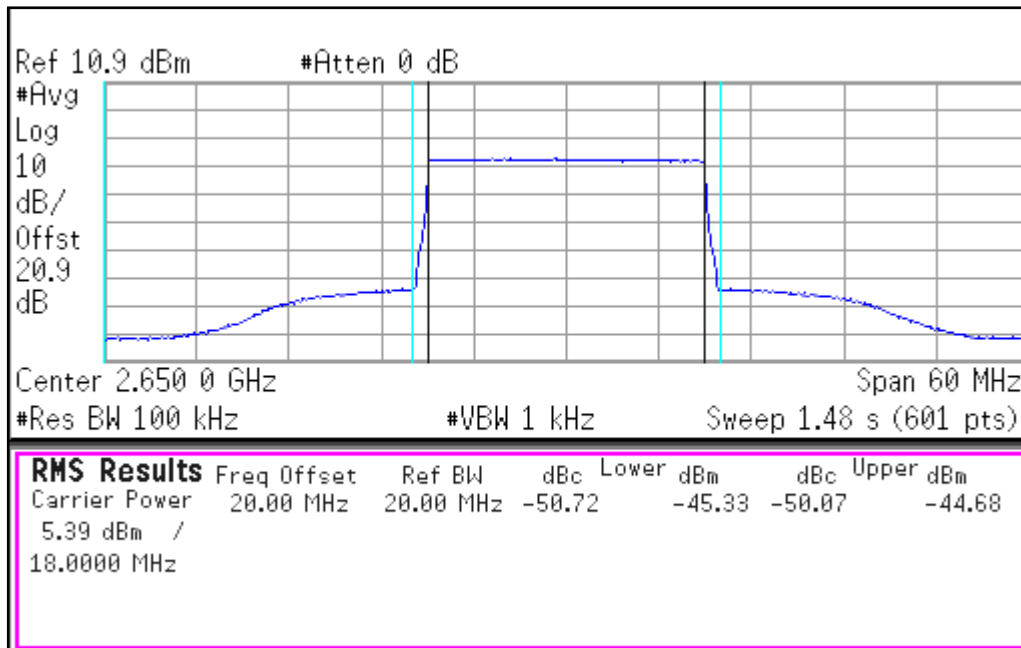
Typical Performance (Vc = 3.3V, Ic = 26mA, T = 25°C)

Freq	MHz	70	500	900	1900	2140	2650	3500
S21	dB	24.7	22	19.7	14.2	13.2	11.1	10.3
S11	dB	-19.6	-18.1	-11.9	-11.4	-13.1	-21.7	-13.2
S22	dB	-14	-14.2	-18.7	-19.7	-17	-12	-13.2
P1	dBm	20.4	20.3	19.9	18.8	19	19	18.9
OIP3	dBm	31	28	28	30	29.5	30	30.8
NF	dB	2.2	2.6	2.1	2.12	2.17	2.28	2.6

Typical Performance (Vc = 4.0V, Ic = 70mA, T = 25°C)

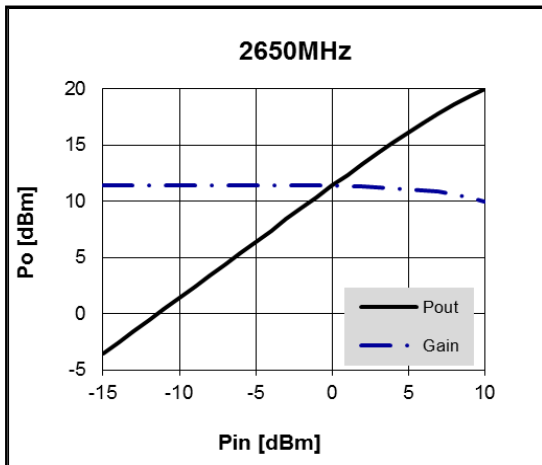
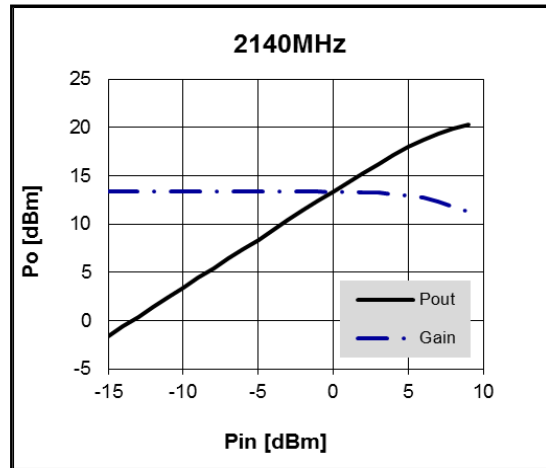
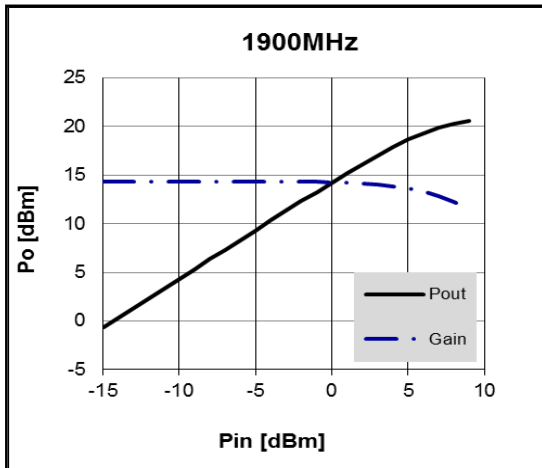
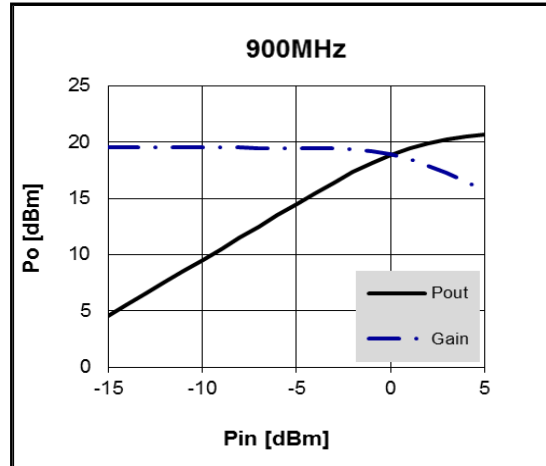
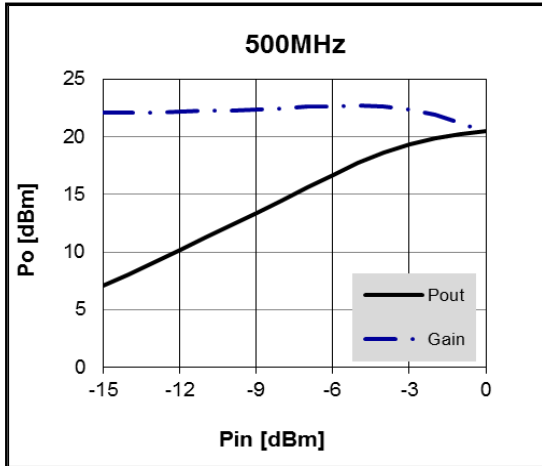
Freq	MHz	70	500	900	1900	2140	2650	3500
S21	dB	25.6	23.2	20.5	15.5	14.6	12.9	11.1
S11	dB	-16.6	-15.1	-16.1	-10.5	-11.2	-14.2	-14.6
S22	dB	-19.0	-17.6	-13.9	-25.2	-21.6	-15.8	-9.9
P1	dBm	22.5	21.7	21.6	20.8	20.9	21.3	22.0
OIP3	dBm	35.5	32.0	31.0	31.0	30.9	30.7	30.0
NF	dB	3.5	3.7	3.3	3.7	3.8	4.0	4.2

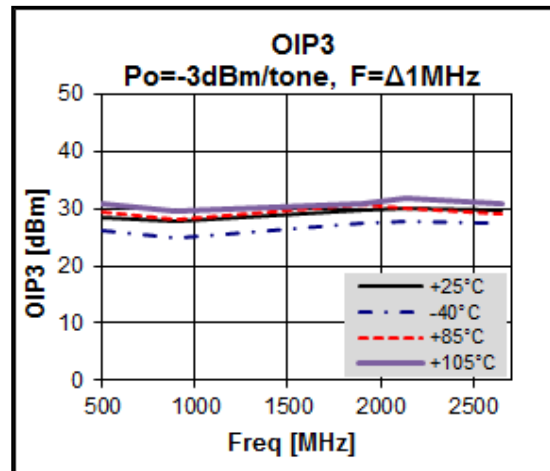
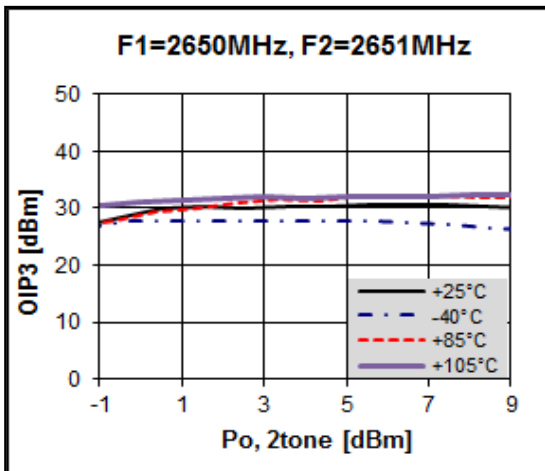
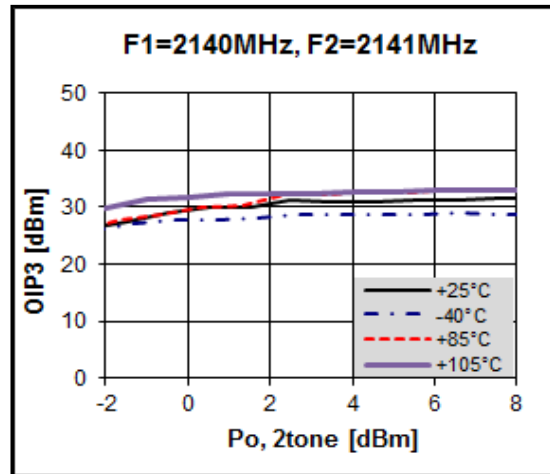
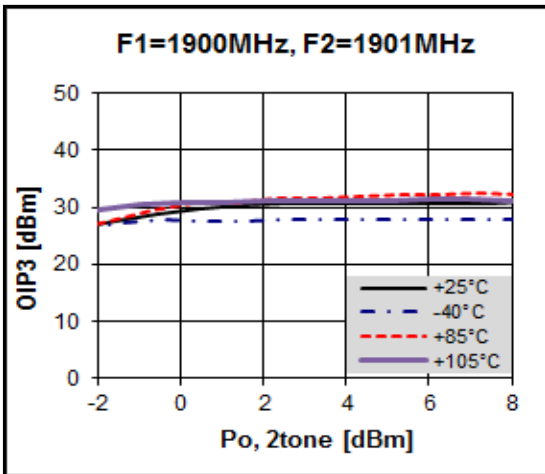
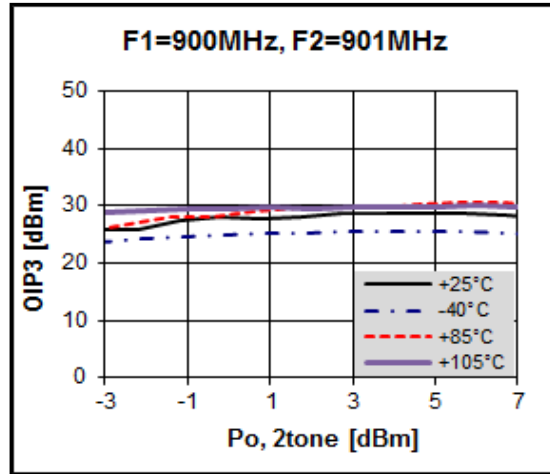
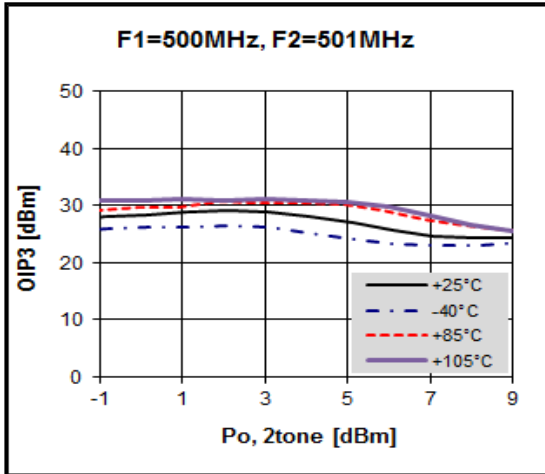
WCDMA 4FA 2140 -50dBc

WCDMA 6FA 2140 -50dBc


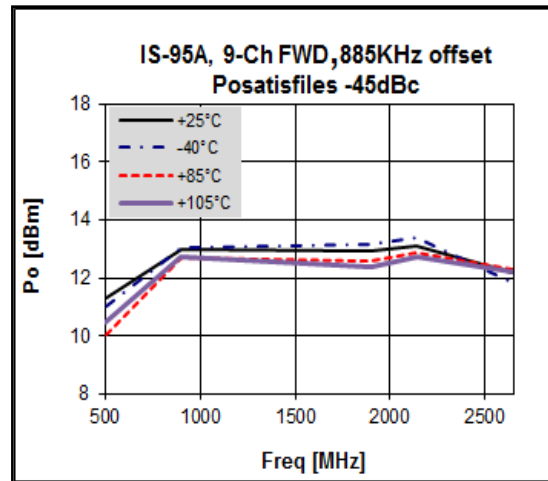
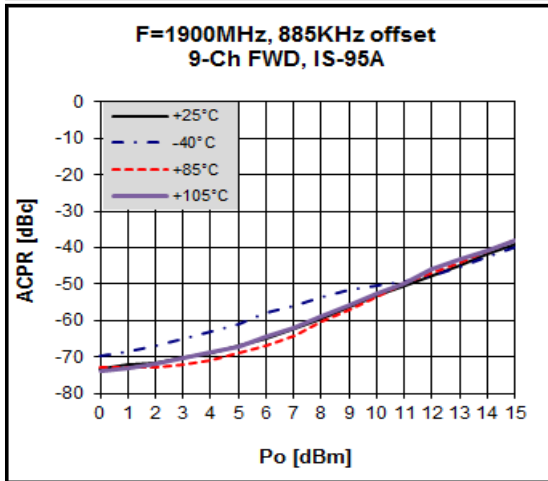
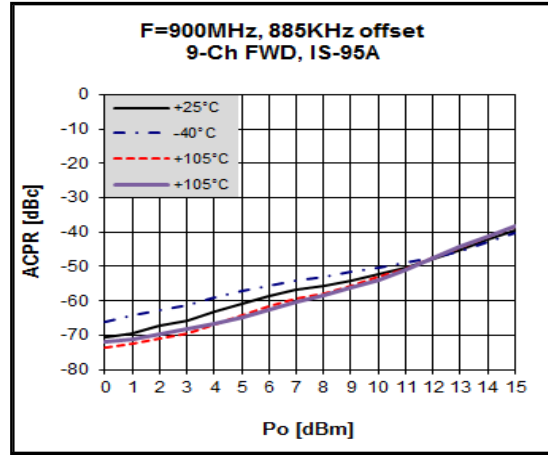
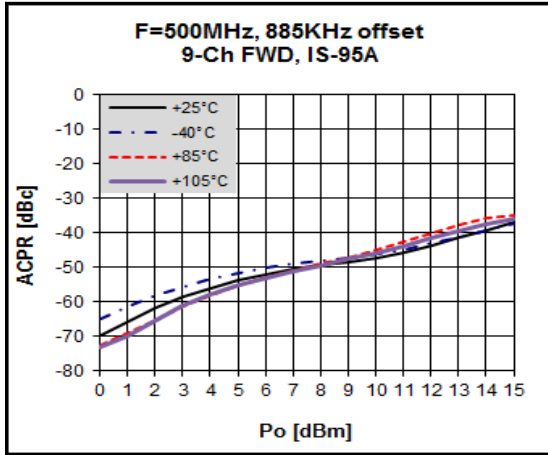
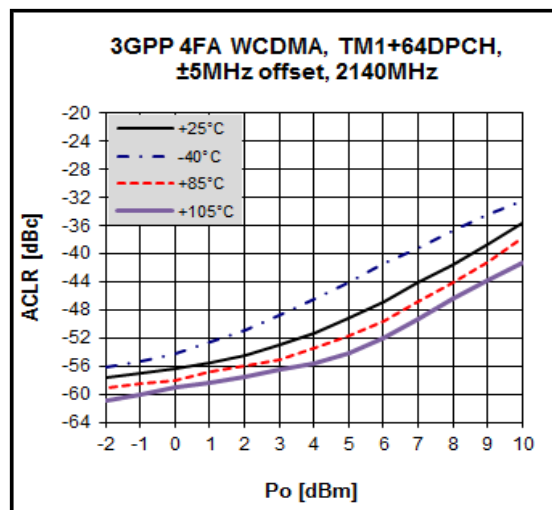
LTE TM3p1 100% 20MHz 1850MHz -50dBc

LTE TM3p1 100% 20MHz 2650MHz -50dBc


Device Performance

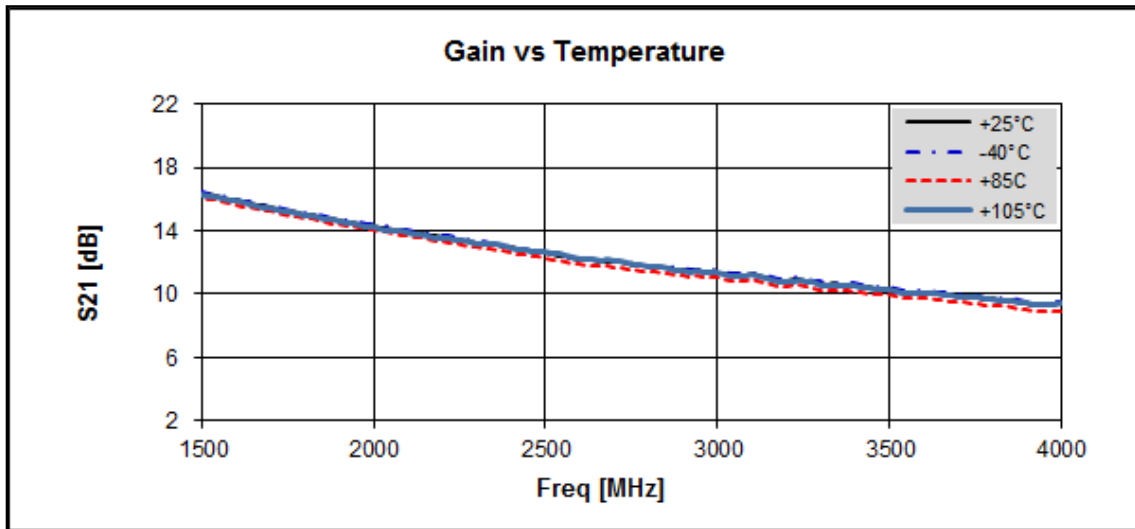
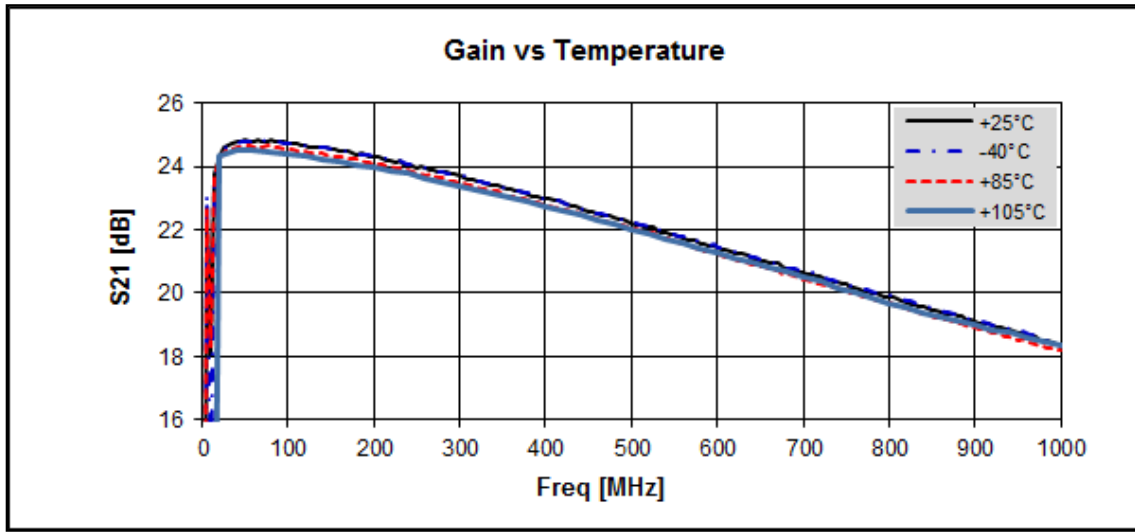
Pin-Pout-Gain

 $V_c = 3.3V, I_c = 26mA$


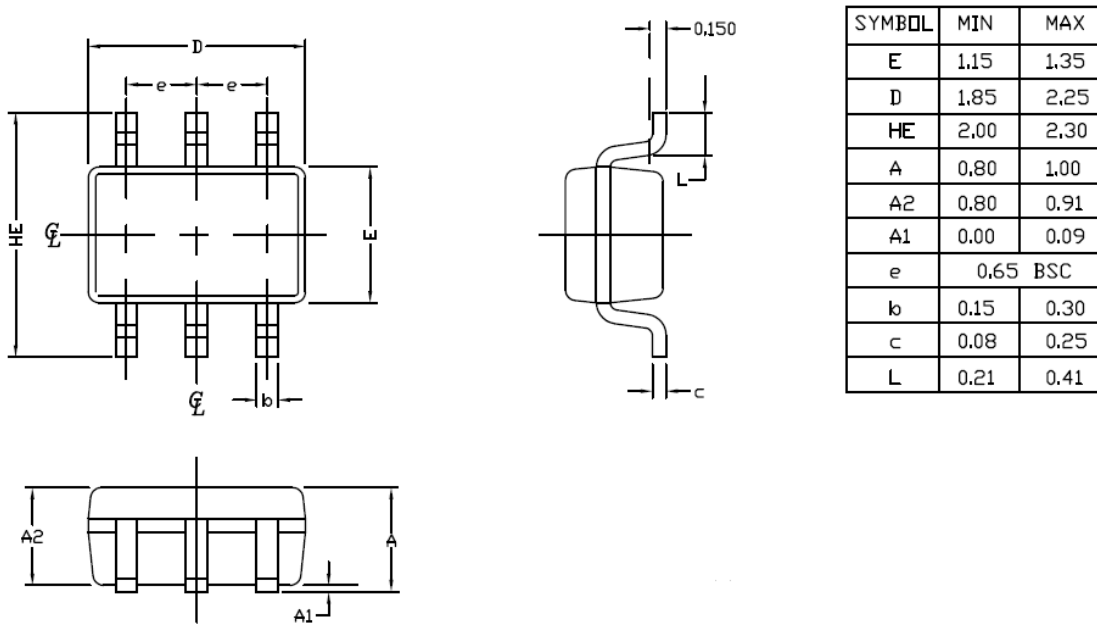
OIP3


ACPR

ACLR


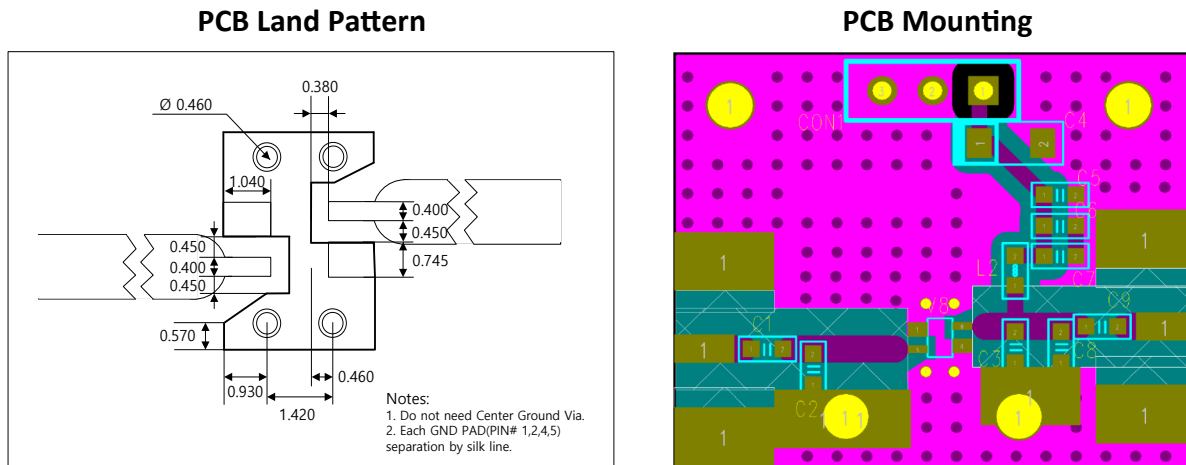
Gain Flatness



Package Outline Dimension



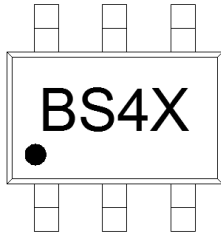
Suggested PCB Land Pattern and PAD Layout



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

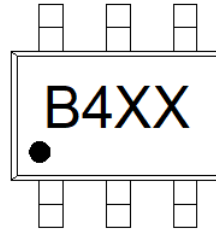
Package Marking



X = Wafer No.

Pin 1

New Package Marking



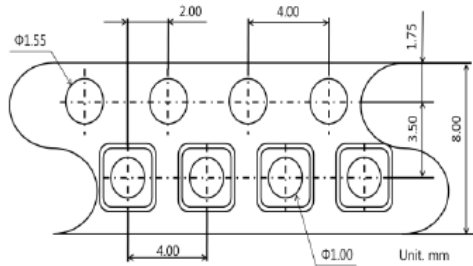
XX = Wafer No.

Pin 1

* Note : New Package marking has been modified from BS4X to B4XX since June 2017.

Tape & Reel

SOT-363



Packaging information:

- Tape Width (mm): 8
- Reel Size (inches): 7
- Device Cavity Pitch (mm): 4
- Devices Per Reel: 3000

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



Proper ESD procedures should be followed when handling this device.

NATO CAGE code:

2	N	9	6	F
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