BGS4

50-4000 MHz Cascadable InGaP HBT Gain Block

Preliminary Datasheet

Part Marking (X:Wafer number)

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

Device Features

- Single Fixed 3.3V supply
- 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

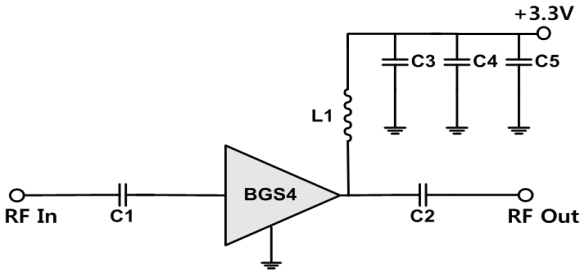
Product Description

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 Performance[1]

Parameter	Frequency						Unit
	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	-18.7	-19.7	-17	-12	-13.9	dB
OIP3[2]	31	28	30	29.5	30	30.8	dBm
P1dB	20.4	19.9	18.8	19	19	18.9	dBm
N.F	2.2	2.1	2.1	2.1	2.2	2.6	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 @ (Vc = 3.3V)	21	26	31	mA
V_C		3.3		V
dG/dT		-0.0026		dB/°C
R_{TH}		62		°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	V
Supply Current	110	mA
Input RF Power	24	dBm

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

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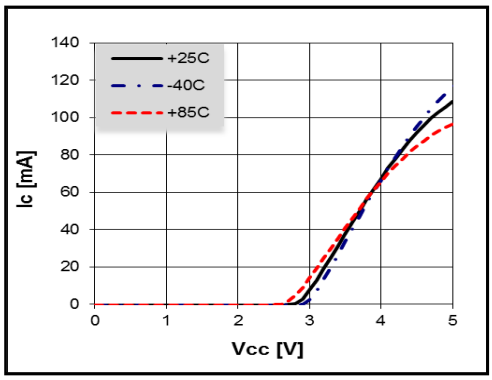
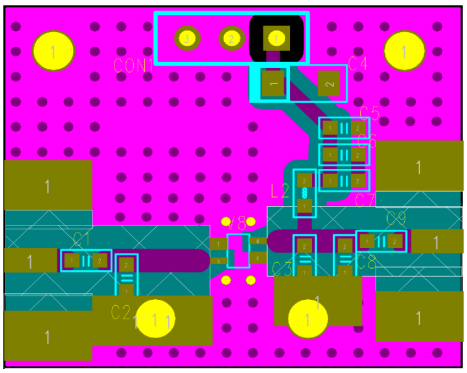
V-I Characteristics



BeRex SOT363 Evaluation Board

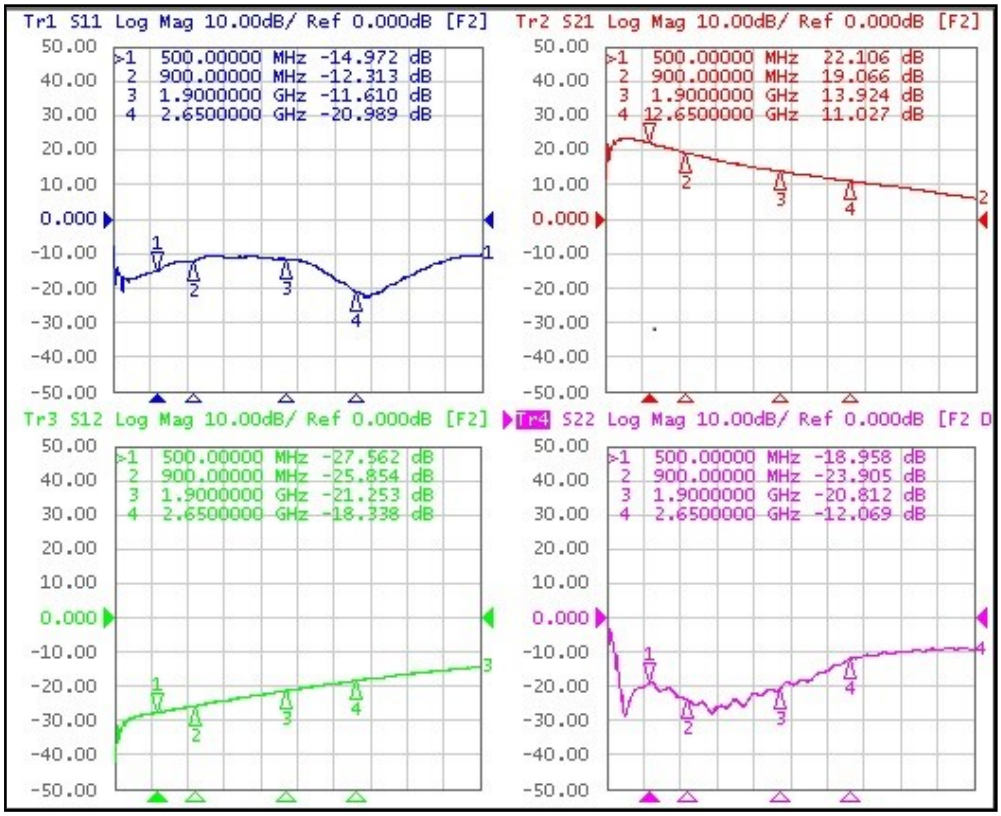


*Dielectric constant _ 4.2 *RF pattern width 52mil *31mil thick FR4

*Without vias under device degrade device performance.

Typical Device Data

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



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50-4000 MHz Cascadable InGaP HBT Gain Block

S-Parameter

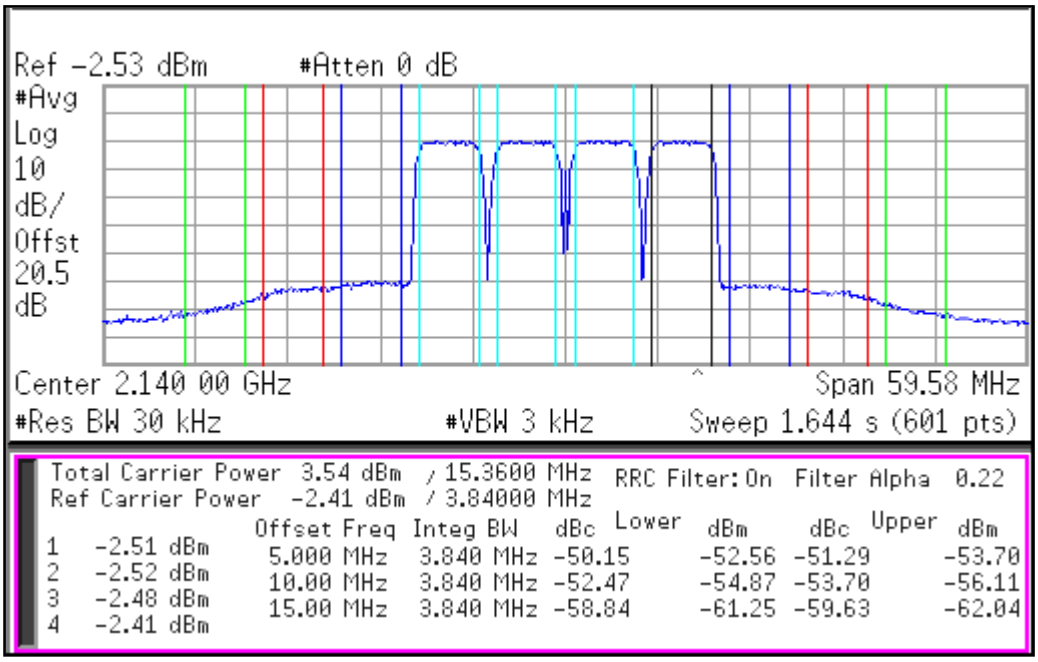
(Vdevice = 3.3V, Icc = 26mA, T = 25 °C, calibrated to device leads)

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

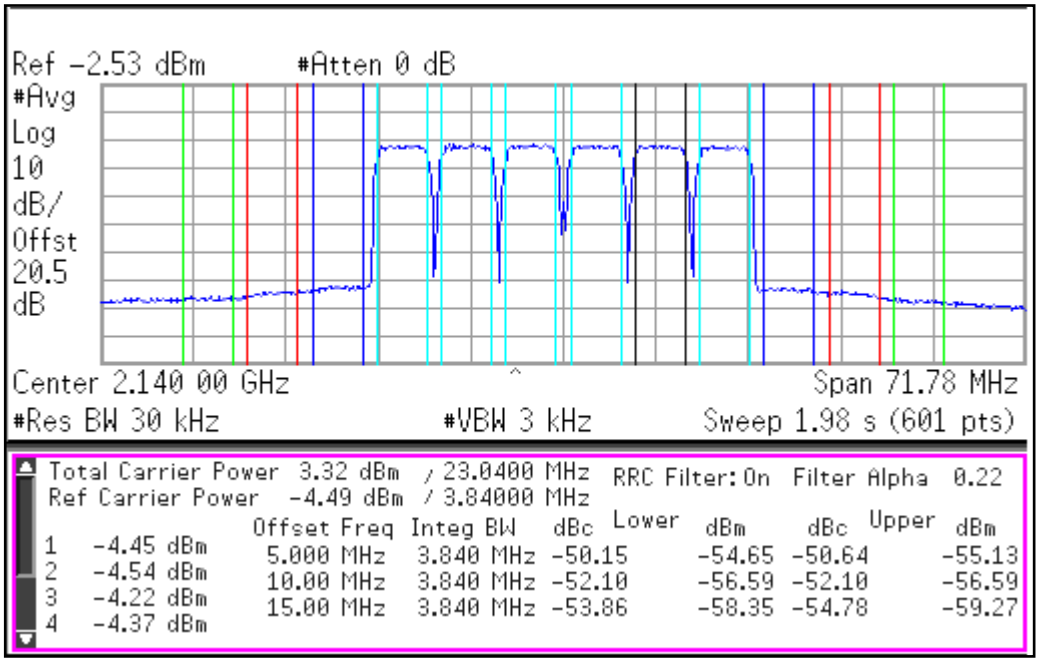
Typical Performance (Vc = 3.3V, Ic = 26mA, T = 25°C)

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

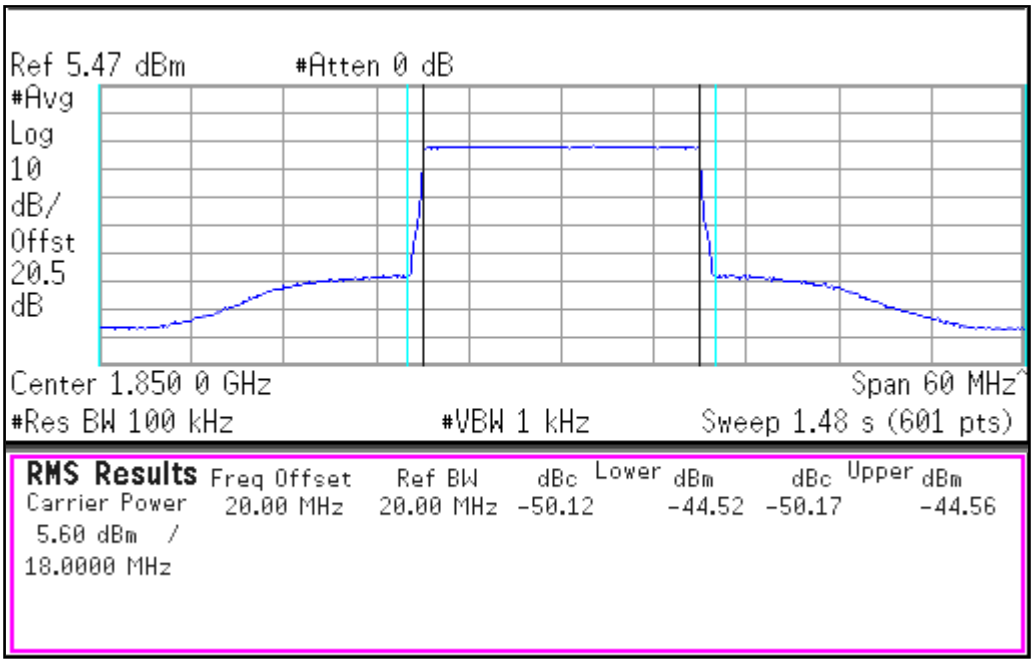
WCDMA 4FA 2140 -50dBc



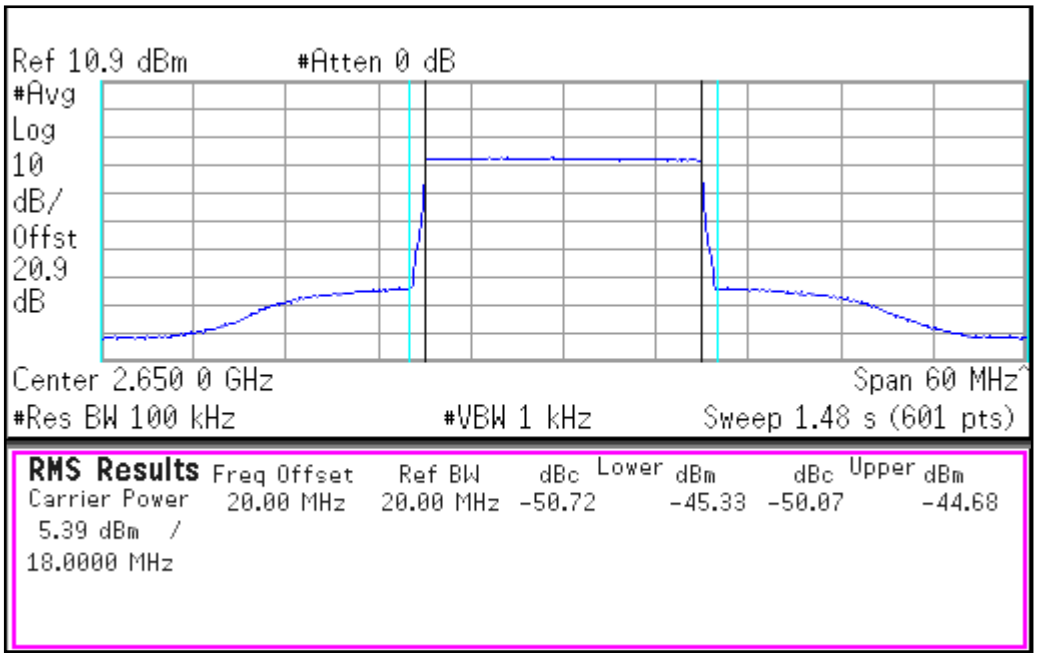
WCDMA 6FA 2140 -50dBc



LTE TM3p1 100% 20MHz 1850MHz -50dBc



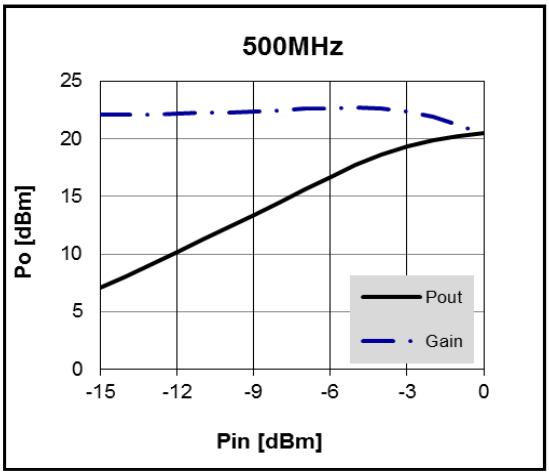
LTE TM3p1 100% 20MHz 2650MHz -50dBc

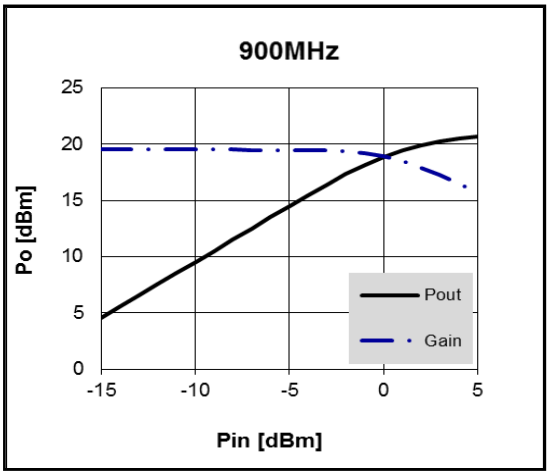


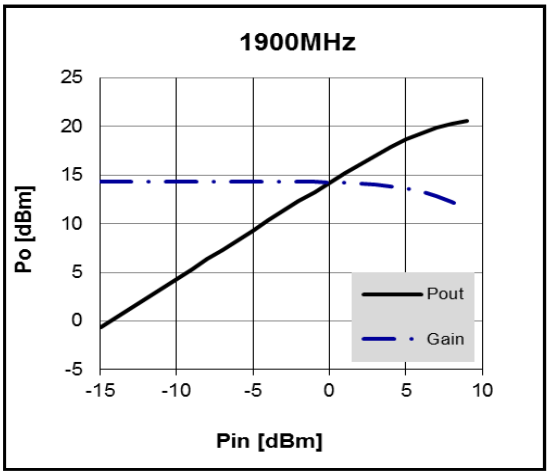
Device Performance

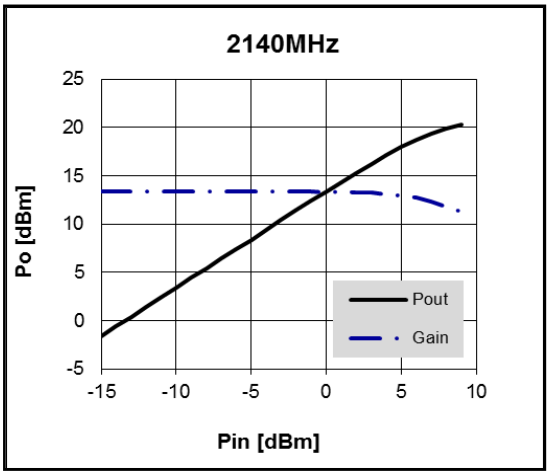
Pin-Pout-Gain

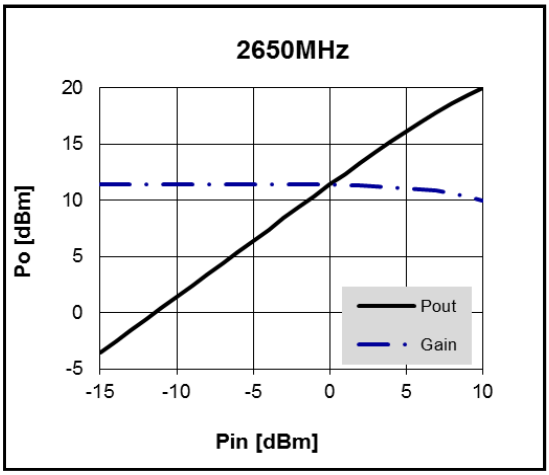
V_c = 3.3V, I_c = 26mA



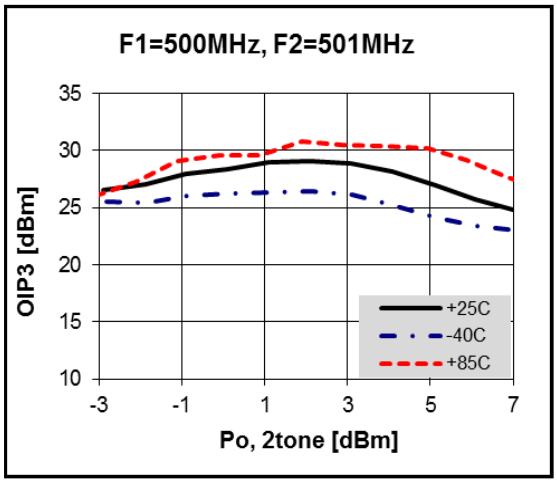


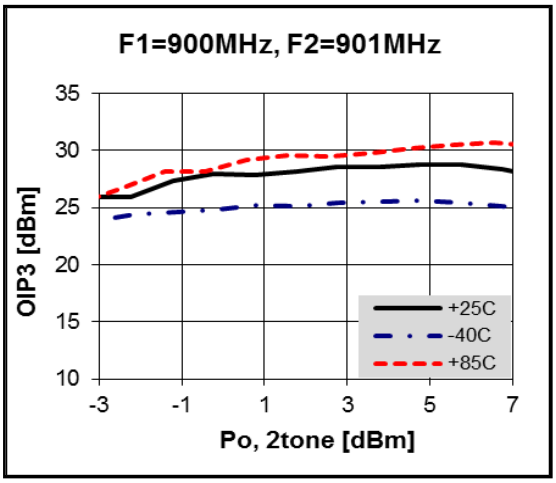


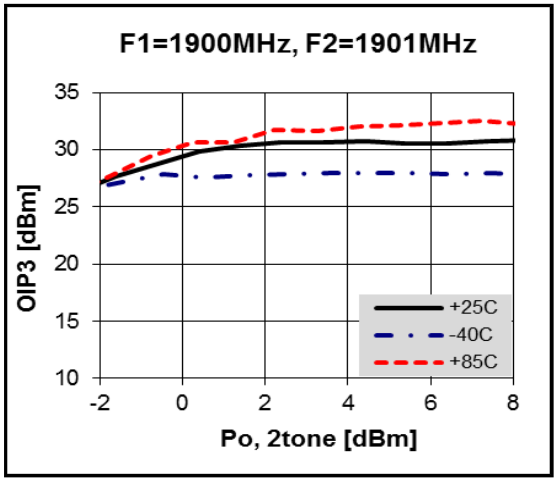


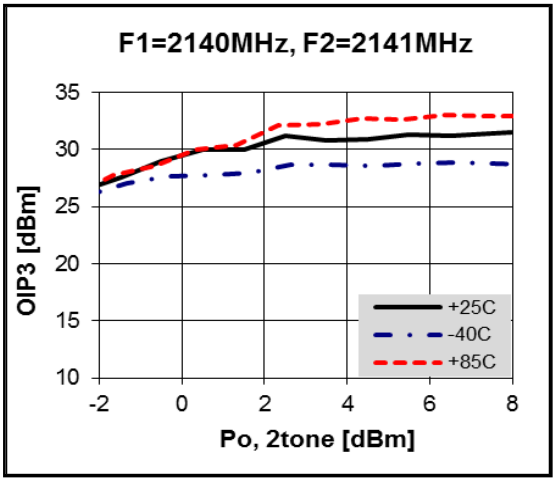


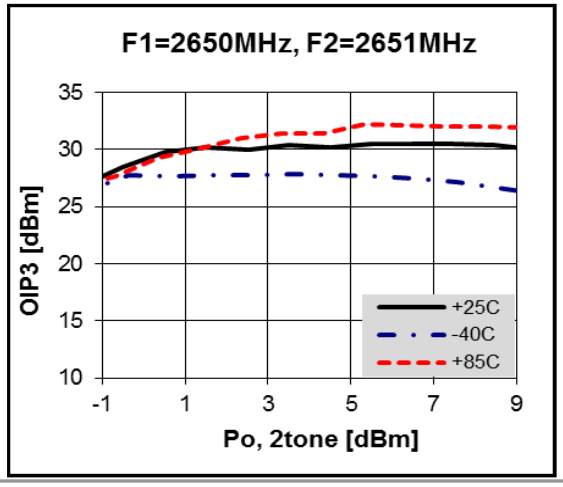
OIP3

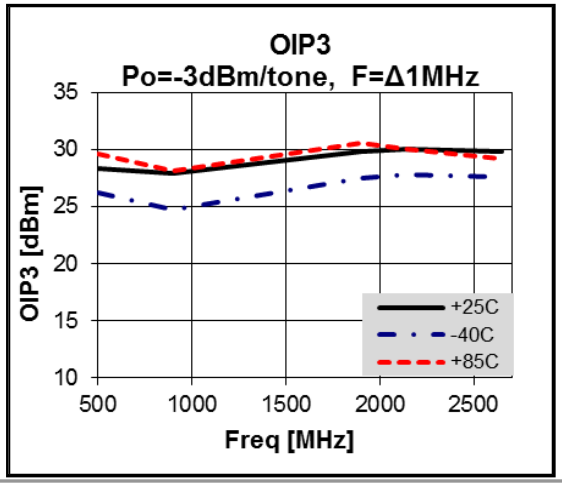




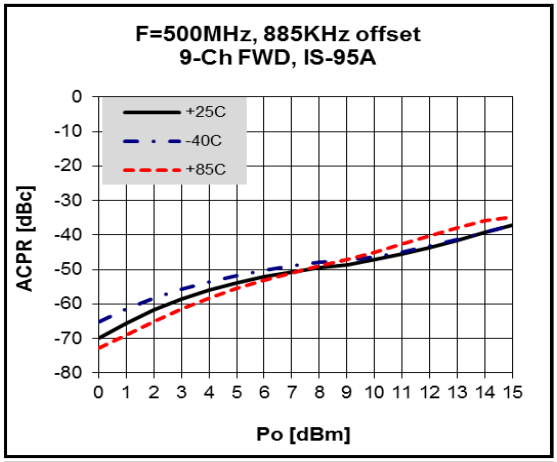


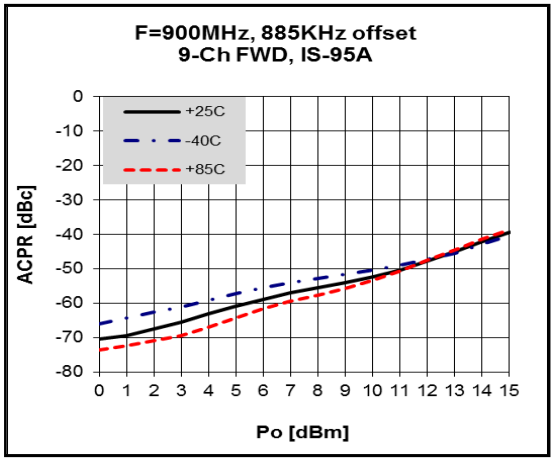


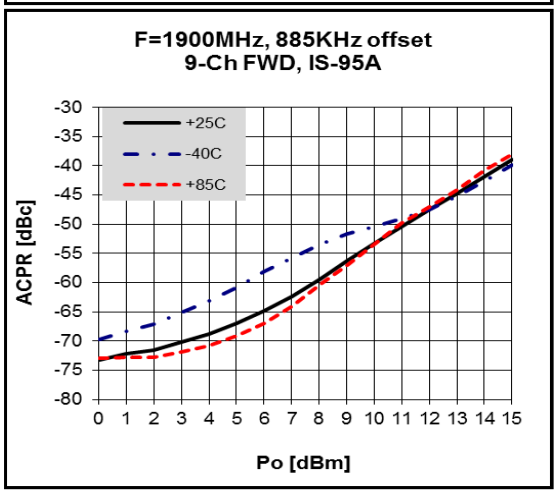


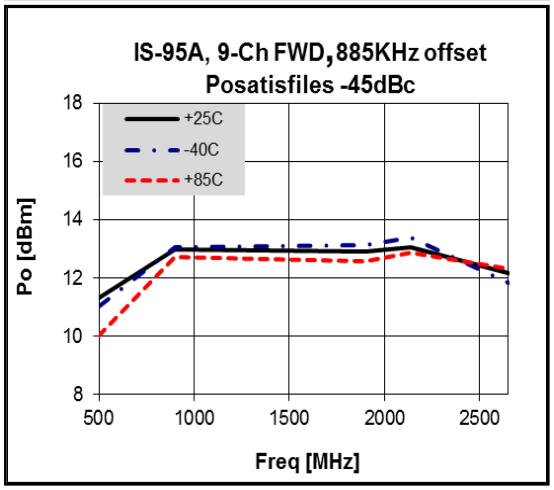


ACPR

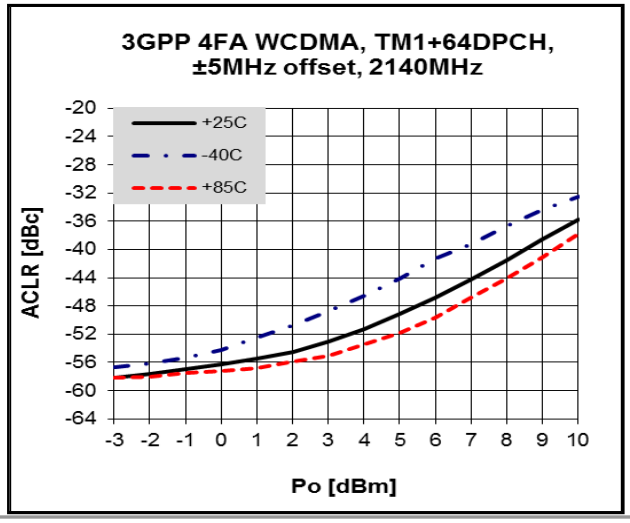




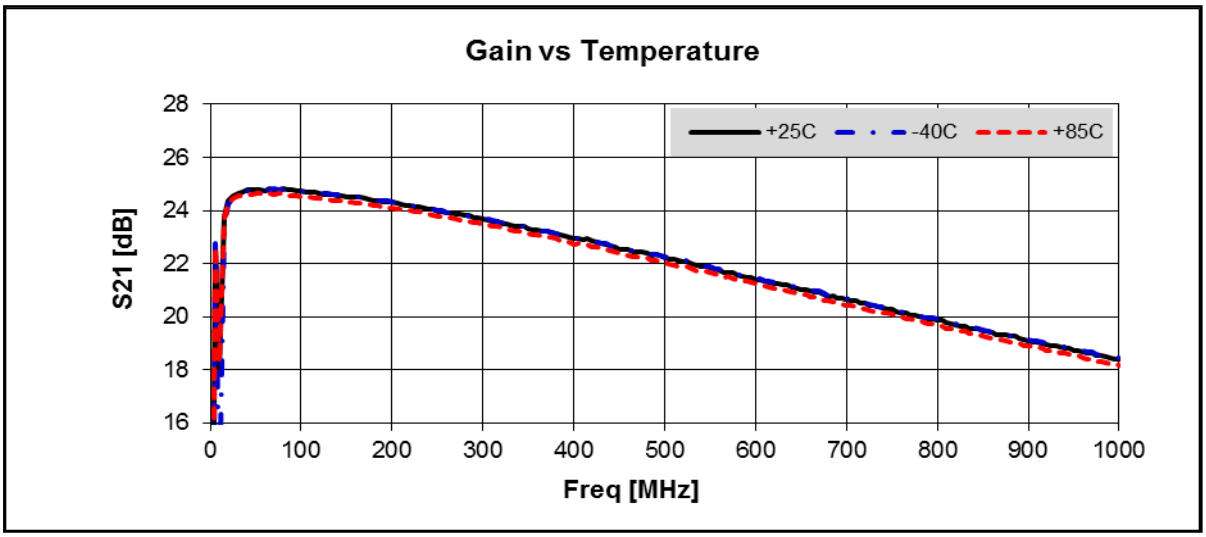


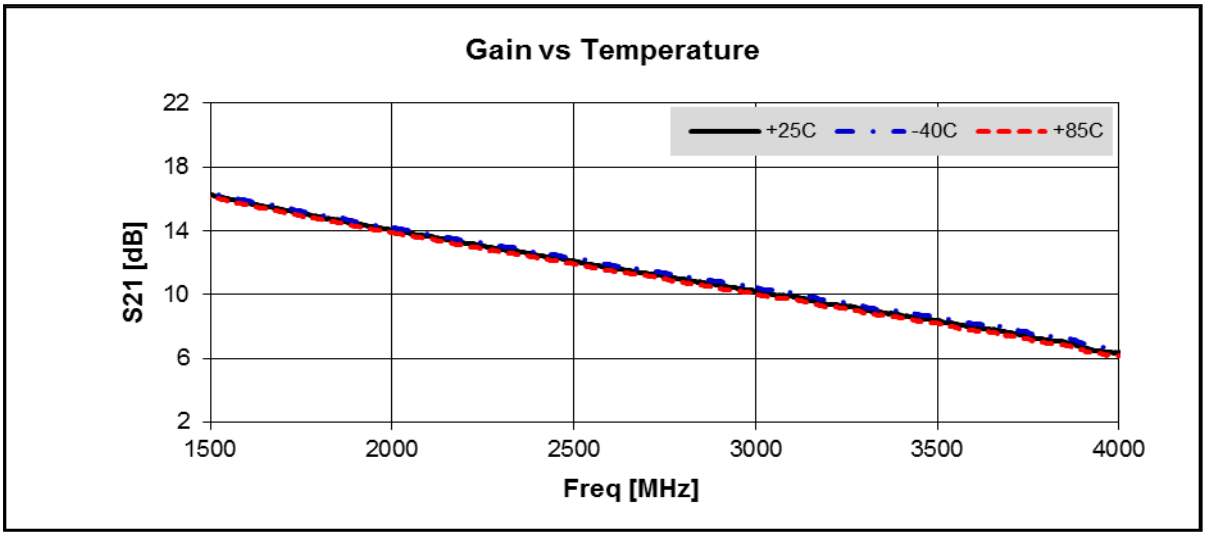


ACLR



Gain Flatness





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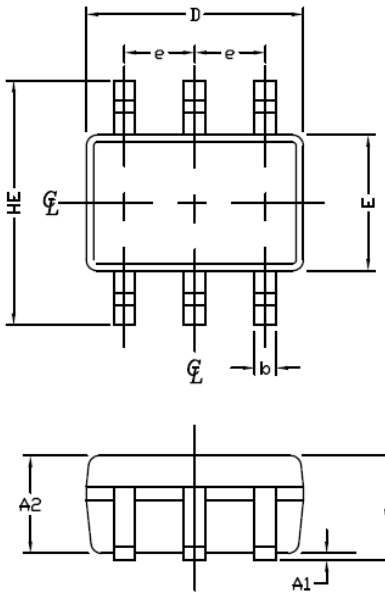
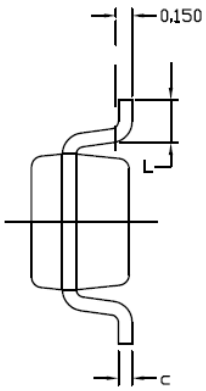
Preliminary Datasheet

Package Outline Dimension

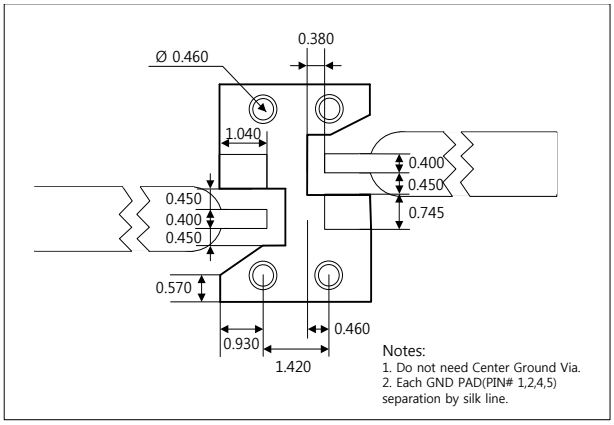




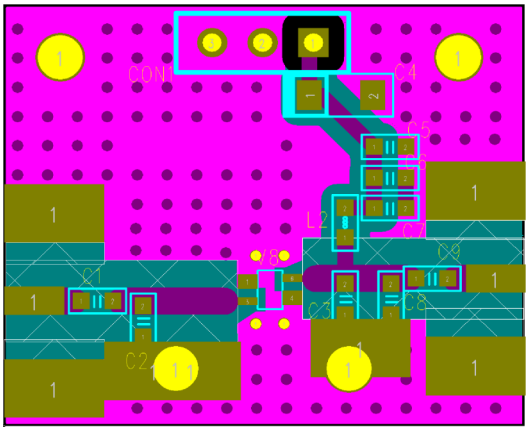
SYMBOL	MIN	MAX
E	1.15	1.35
D	1.85	2.25
HE	2.00	2.30
A	0.80	1.00
A2	0.80	0.91
A1	0.00	0.09
e	0.65 BSC	
b	0.15	0.30
c	0.08	0.25
L	0.21	0.41

Suggested PCB Land Pattern and PAD Layout

PCB Land Pattern



PCB Mounting



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

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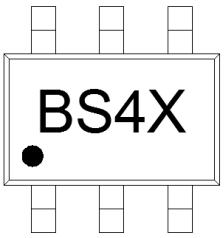
Package Marking

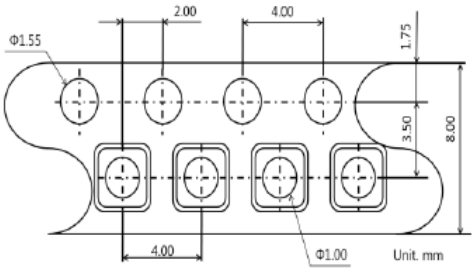


X = Wafer No.

Pin 1

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

NATO CAGE code:

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