

### Device Features

- 3 ~ 3.2V supply
- No Dropping Resistor Required
- No matching circuit needed
- Green/RoHS2 compliant SOT-363 package
- Application: Driver Amplifier, Cellular, PCS, GSM, UMTS, WCDMA, Wireless Data

### Product Description

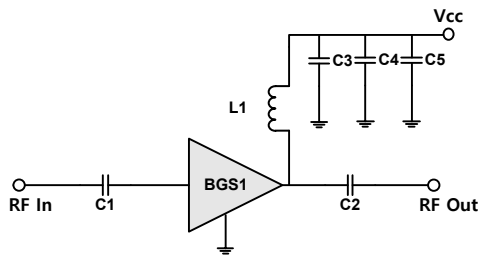
BeRex's BGS1 is a high SiGe HBT MMIC amplifier, internally matched to 50 Ohms without the need for external components. Designed to run directly from a 3.2V supply. The BGS1 is designed for high linearity 3.2V gain block applications. It is packaged in a RoHS2-compliant with SOT-363 surface mount package.

### Applications

- Driver Amplifier
- Cellular, PCS, GSM, UMTS, WCDMA
- Military wireless system

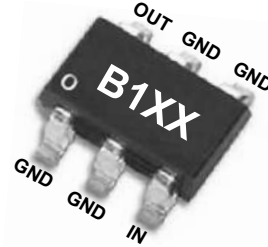
### Applications Circuit

Application Circuit Values Example			
Freq.	70~900MHz	900MHz ~ 3GHz	3GHz ~ 4GHz
C1/C2	2nF	100pF	10pF
L1 (1608 Chip Ind.)	1uH	56nH	12nH



- \*C1, C2, C3 = 100 pF ± 5%; C4 = 1 nF ± 5%; C5 = 10uF; \*\*L1 = 56nH
- \*\*less than 56nH improves RF performance at over 0.9GHz.
- \*1uH or higher value L1 improves RF performance at under 900MHz.
- \*Optimum value of L1 may vary with board design.
- \*C1,C2=2nF, L1=1uH for 70MHz application,
- \*C1,C2=10pF, L1=12nH for 3.5GHz application,

### Part Marking (XX:Wafer number)



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

### Electrical Specifications

Device performance\_ measured on a BeRex evaluation board at 25°C, Vd=3.2V, 50 Ω system.

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		50		4000	MHz
Test Frequency			900		MHz
Gain		20.7	22.2		dB
Input Return Loss			-31.3		dB
Output Return Loss			-17.1		dB
Output IP3	0 dBm / tone , Δf=1 MHz	23.0	26.0		dBm
Output P1dB		15.7	16.7		dBm
Noise Figure			2.9		dB

### Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Bandwidth	50		4000	MHz
I <sub>c</sub> @ (V <sub>c</sub> = 3.2V)	20	26	32	mA
V <sub>c</sub>	3.0	3.2	3.3	V
dG/dT		0.003		
R <sub>TH</sub>		130		°C/W
Operating Case Temperature	-40		+105	°C

Electrical specifications are measured at specified test conditions.

Specifications are not guaranteed over all recommended operating conditions.

### Absolute Maximum Ratings

Parameter	Rating	Unit
Storage Temperature	-55 to +155	°C
Junction Temperature	+165	°C
Supply Voltage	+3.9	V
Supply Current	100	mA
Input RF Power	15	dBm

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

**50-4000 MHz SILICON GERMANIUM Gain Block**

Typical Performance (Vd = 3.2V, Ic = 26mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650	3500
S21	dB	24	23.6	22.2	19.2	18.6	17.3	16.7	14.9
S11	dB	-13.6	-16.8	-31.3	-35.5	-26.5	-18.3	-15.8	-11.4
S22	dB	-20.5	-23	-17.1	-11.7	-11.7	-12.6	-17	-15.3
P1	dBm	15.6	15.9	16.7	14.9	13.2	12.6	12.4	9.9
OIP3	dBm	28	27.5	26	25.4	24.7	24	24	19.2
NF	dB	3	3	2.9	3	3	3.3	3.5	3

Typical Performance (Vd = 3.0V, Ic = 20mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650
S21	dB	22.1	21.8	20.9	18.3	17.7	16.7	16
S11	dB	-10.6	-12.2	-16.8	-19.2	-17.5	-13.9	-12.7
S22	dB	-13.5	-14.8	-16.3	-11.1	-11.1	-11.8	-15.1
P1	dBm	14.7	15	16.6	15.1	13.3	12.9	12.5
OIP3	dBm	20.4	21	23.5	24.4	24.5	24.7	22
NF	dB	3.0	3.0	2.9	3.0	3.0	3.3	3.5

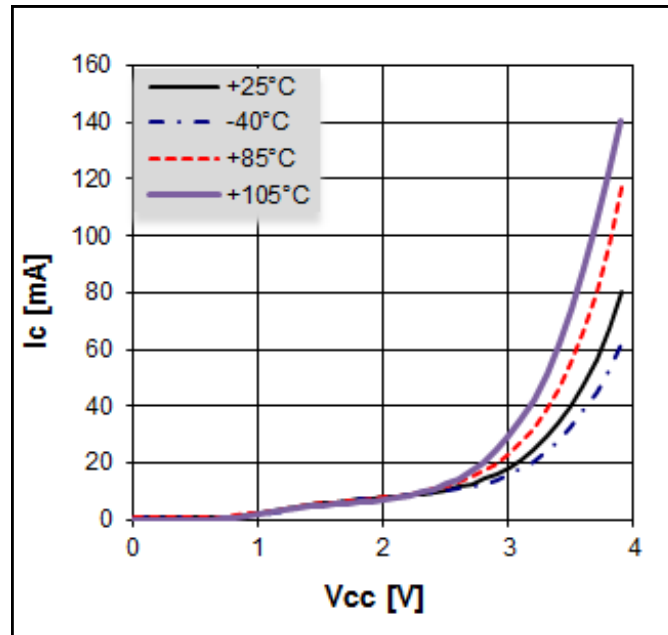
Typical Performance (Vd = 3.1V, Ic = 23mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650
S21	dB	23.1	22.8	21.6	18.8	18.1	17.2	16.4
S11	dB	-12.2	-14.5	-21.8	-24.4	-21.4	-16.1	-14.3
S22	dB	-17	-18.8	-17.6	-11.5	-11.4	-12.3	-16.2
P1	dBm	15.2	15.5	16.7	15.1	13.3	12.6	12.4
OIP3	dBm	24	28	24	25	24.5	24.3	23
NF	dB	3.0	3.0	2.9	3.0	3.0	3.3	3.5

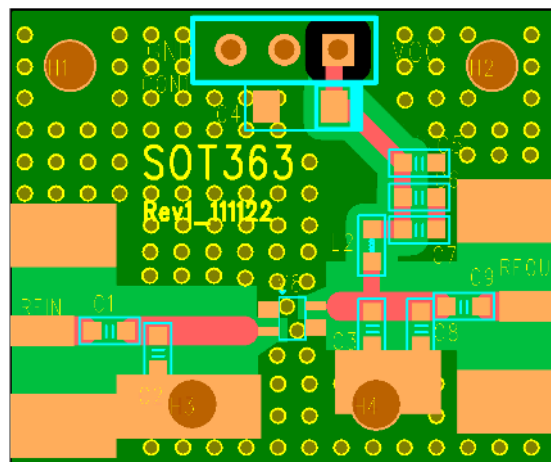
Typical Performance (Vd = 3.3V, Ic = 30mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650
S21	dB	24.7	24.4	22.7	19.6	18.9	17.9	17
S11	dB	-14.2	-17.8	-27.4	-33.6	-31.4	-20.8	-17.2
S22	dB	-20.5	-21.2	-15.8	-11.8	-11.7	-12.8	-17.4
P1	dBm	16	16.3	16.7	14.9	13.3	12.5	12.3
OIP3	dBm	29.5	27.5	27.5	26.5	25	24.5	25
NF	dB	3.0	3.0	2.9	3.0	3.0	3.3	3.5

**V-I Characteristics**



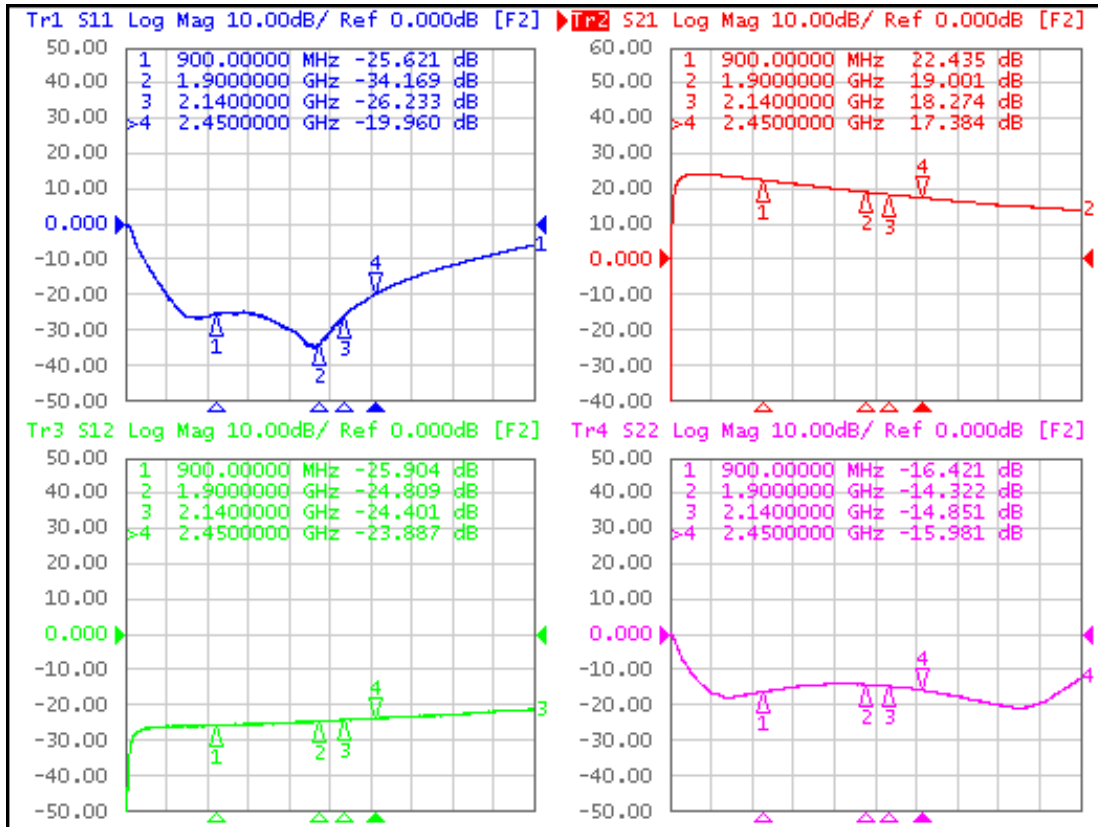
**BeRex SOT-363 Evaluation Board**



\*Dielectric constant \_ 4.2 \*31mil thick FR4 PCB

### Typical Device Data

S-parameters (Vc=3.2V, Ic=26mA, T=25°C)



### S-Parameter

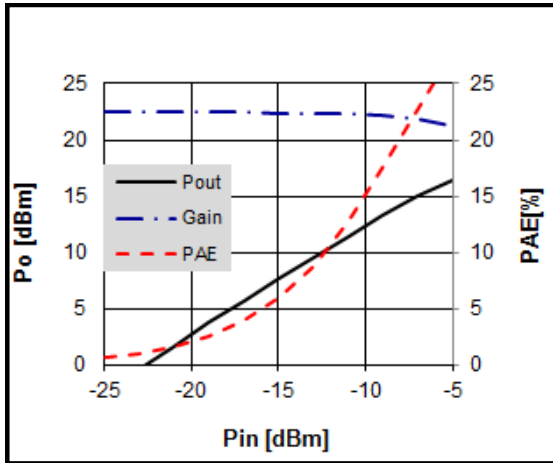
(Vdevice = 3.2V, Icc = 27mA, T = 25 °C, calibrated to device leads)

Freq [MHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
70	-2.88	-59.70	21.80	-126.00	-29.40	76.20	-3.67	-169.00
900	-25.50	58.20	22.40	81.00	-25.90	-33.10	-16.40	137.00
1000	-25.10	42.00	22.10	69.90	-26.10	-38.80	-16.00	134.00
1500	-28.30	-14.50	20.30	19.30	-25.30	-63.90	-14.30	106.00
2000	-30.90	-164.00	18.70	-26.90	-24.60	-90.70	-14.50	81.00
2500	-19.20	137.00	17.30	-71.50	-23.70	-117.00	-16.30	62.00
3500	-9.51	66.10	14.80	-159.00	-22.30	-177.00	-20.80	88.30
4000	-6.07	20.30	13.60	150.00	-21.40	144.00	-12.50	108.00

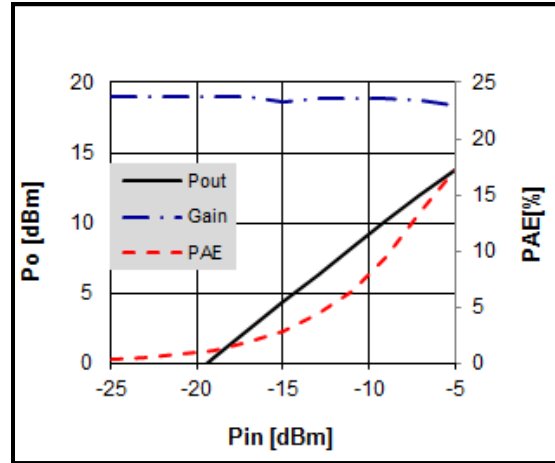
### Typical Performance

( $V_c=3.2V$ ,  $I_c=26mA$ ,  $T=25^\circ C$ )

#### Pin-Pout-Gain

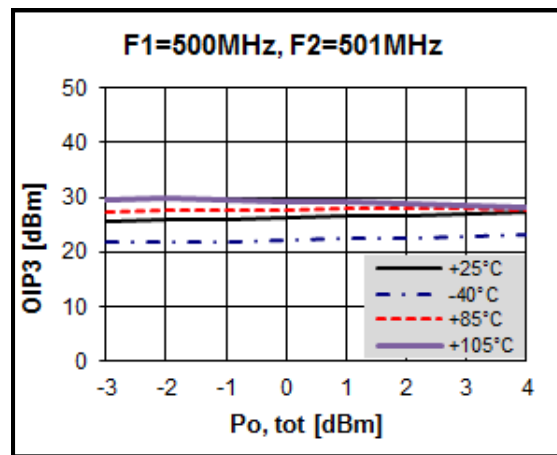
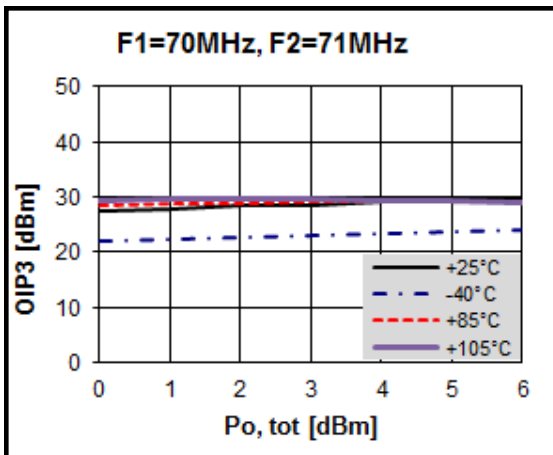


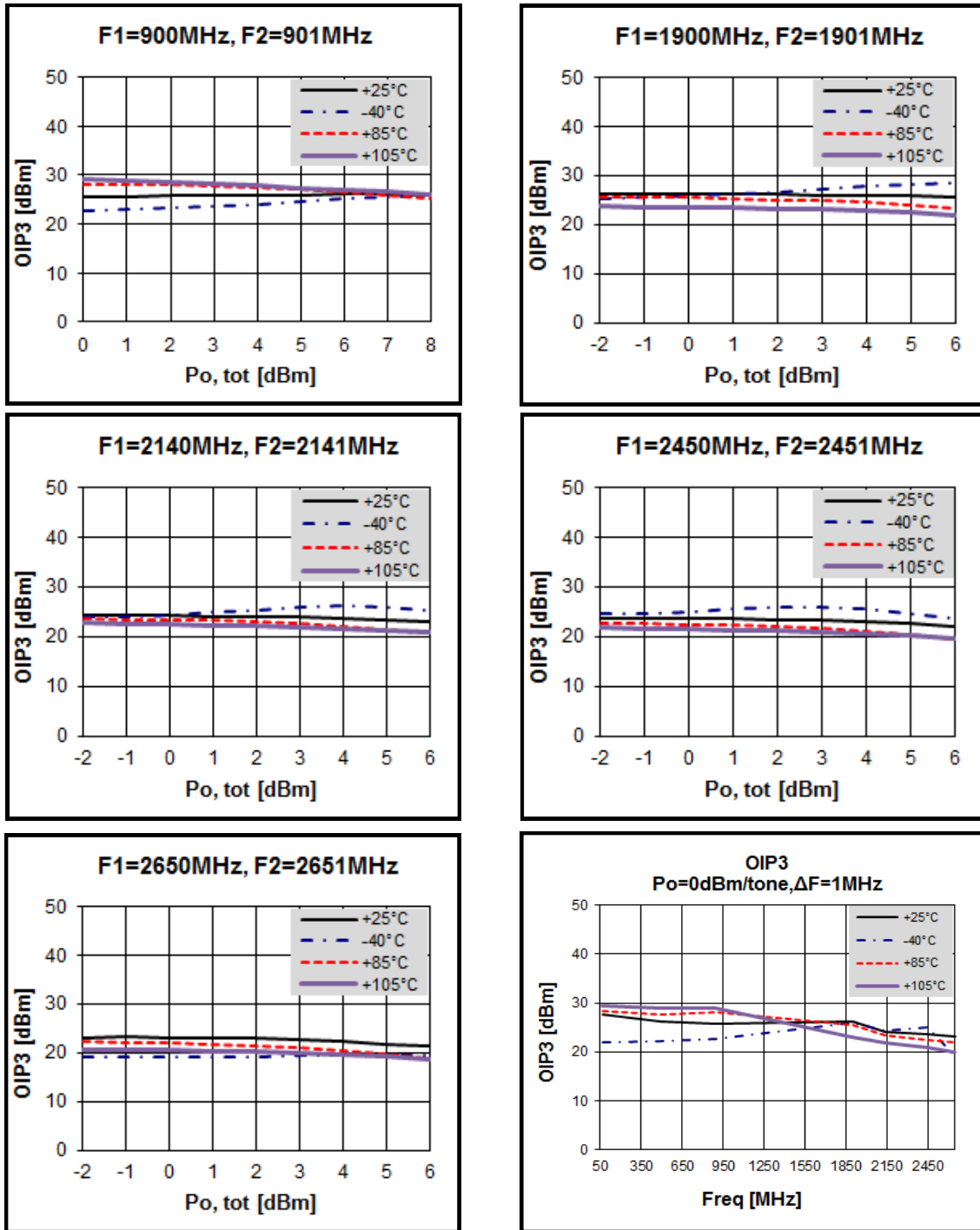
900MHz



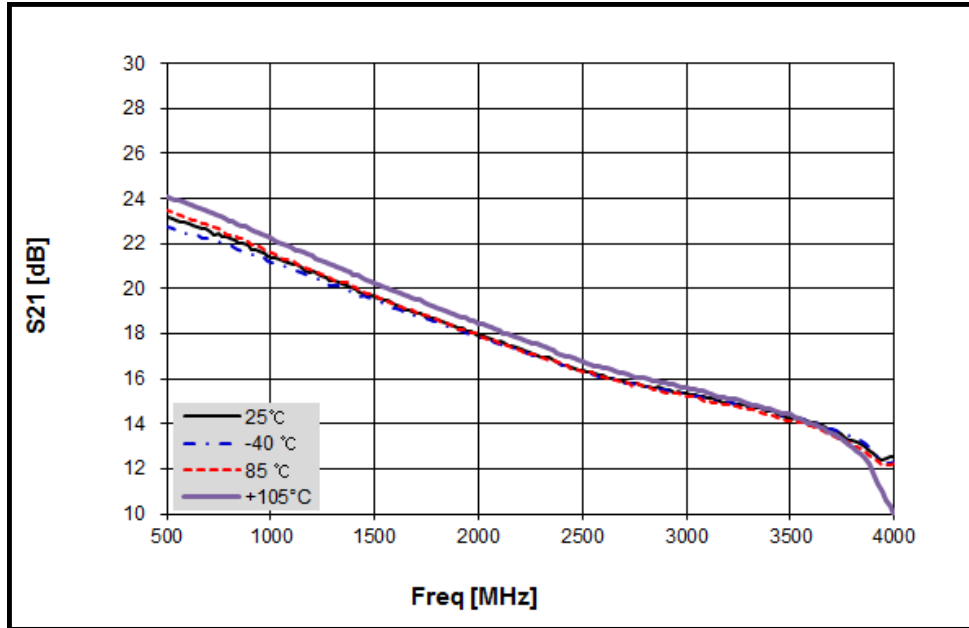
1900 MHz

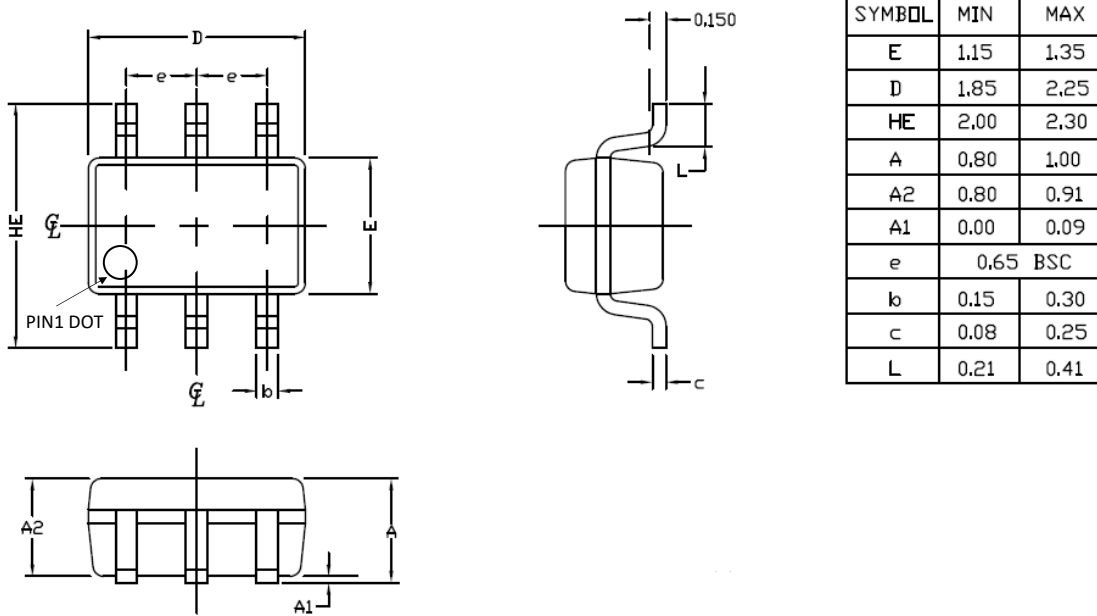
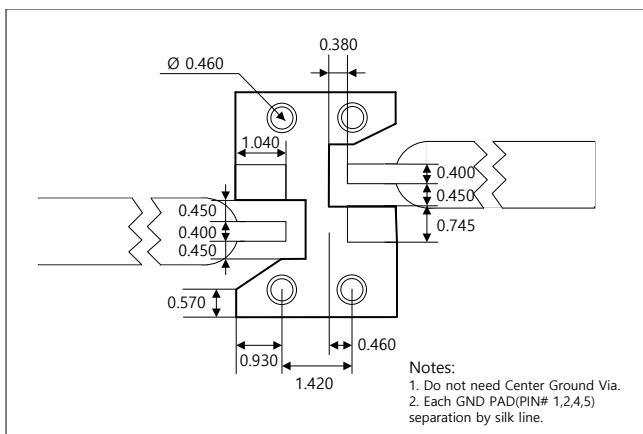
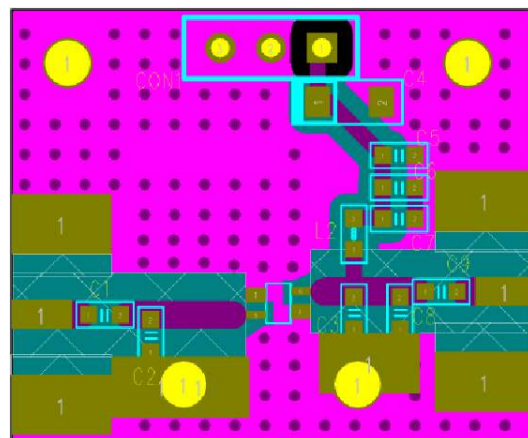
#### OIP3



**OIP3**


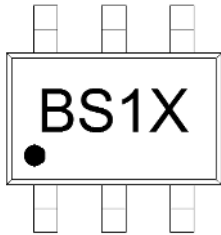
**Gain Flatness**



**SOT-363 Package Outline Dimension (Unit. mm )**

**Suggested PCB Land Pattern and PAD Layout**
**PCB Land Pattern**

**PCB Mounting**




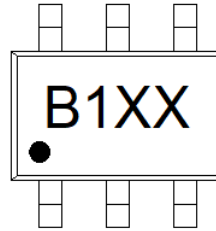
### Package Marking



X = Wafer No.

Pin 1

### New Package Marking



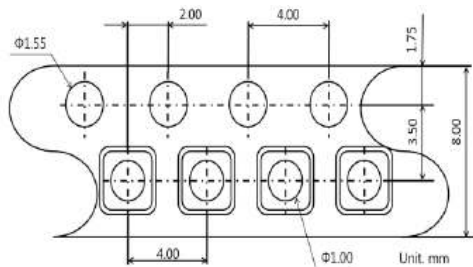
XX = Wafer No.

Pin 1

\* Note : New Package marking has been modified from BS1X to B1XX since Oct. 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

<b>ESD Rating:</b>	Class 1C
<b>Value:</b>	<b>Passes &lt;2000V</b>
<b>Test:</b>	Human Body Model (HBM)
<b>Standard:</b>	JEDEC Standard JESD22-A114
<b>MSL Rating:</b>	<b>Level 1 at +260°C convection reflow</b>
<b>Standard:</b>	JEDEC Standard J-STD-020



Proper ESD procedures should be followed when handling this device.

## RoHS Compliance

This part is compliant with Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2011/65/EU as amended by Directive 2015/863/EU.

This product also is compliant with a concentration of the Substances of Very High Concern (SVHC) candidate list which are contained in a quantity of less than 0.1%(w/w) in each components of a product and/or its packaging placed on the European Community market by the BeRex and Suppliers.

## NATO CAGE code:

2	N	9	6	F
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