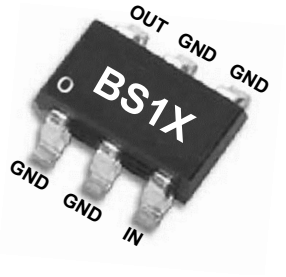
BGS1

50-4000 MHz SILICON GERMANIUM Gain Block

Device Features

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

Part Marking (X: Wafer number)



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

Product Description

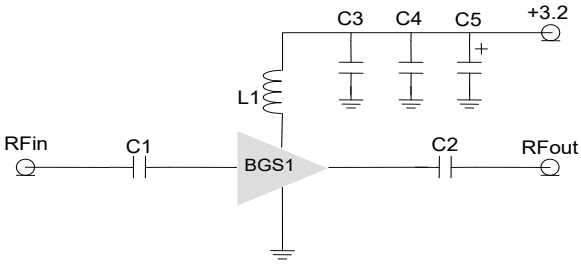
BeRex's BGS1 is a high SiGe HBT MMIC amplifier, internally matched to 50 Ohms without the need for external components. Designed to run directly from a 3.2V supply. The BGS1 is designed for high linearity 3.2V gain block applications . It is packaged in a RoHS-compliant with SOT-363 surface mount package.

Applications

- Driver Amplifier
- Cellular, PCS, GSM, UMTS, WCDMA

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 = 1000 pF ± 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=2000pF, L1=1uH for 70MHz application,

*C1,C2=10pF, L1=12nH for 3.5GHz application,

Typical Performance[1]

Parameter	Frequency						Unit
	70	900	1900	2450	2650	3500	MHz
Gain	23.6	22.2	19.2	17.3	16.2	14.9	dB
S11	-16.8	-31.3	-35.5	-18.3	-15.8	-11.4	dB
S22	-23	-17.1	-11.7	-12.6	-17	-15.3	dB
OIP3[2]	27.5	26	25.4	24	24	19.2	dBm
P1dB	15.9	16.7	14.9	12.6	12.4	9.9	dBm
N.F	3	2.9	3	3.3	3.5	3	dB

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

[2] OIP3 _ measured with two tones at an output of 0 dBm per tone separated by 1 MHz.

	Min.	Typical	Max.	Unit
Bandwidth	70		4000	MHz
I_C @ (Vc = 3.2V)	23	27	31	mA
V_C		3.2		V
dG/dT		0.003		dB/°C
R_{TH}		130		°C/W

Absolute Maximum Ratings

Parameter	Rating	Unit
Operating Case Temperature	-40 to +105	°C
Storage Temperature	-55 to +155	°C
Junction Temperature	+150	°C
Operating Voltage	+3.6	V
Supply Current	100	mA
Input RF Power	15	dBm

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

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Rev. F

BGS1

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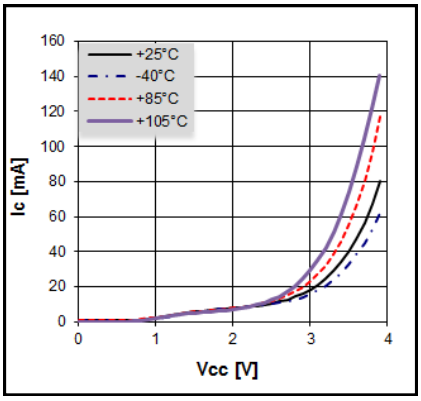
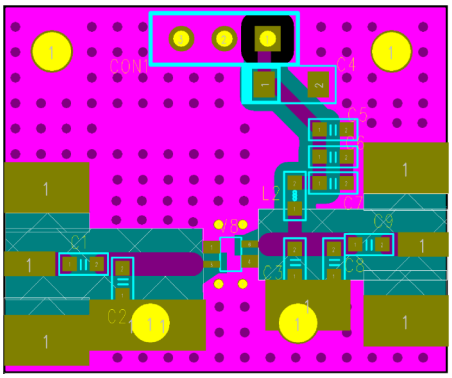
V-I Characteristics



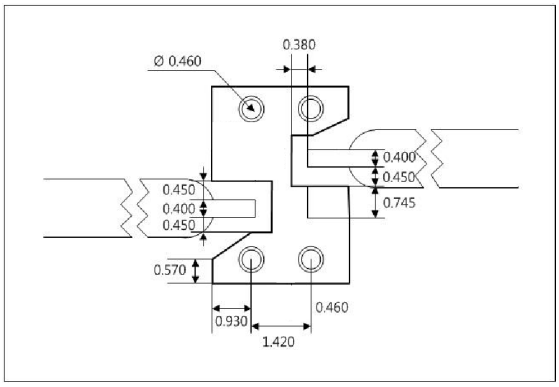
BeRex SOT-363 Evaluation



*Dielectric constant _ 4.2 *31mil thick FR4 PCB

Suggested PCB Land Pattern and PAD Layout

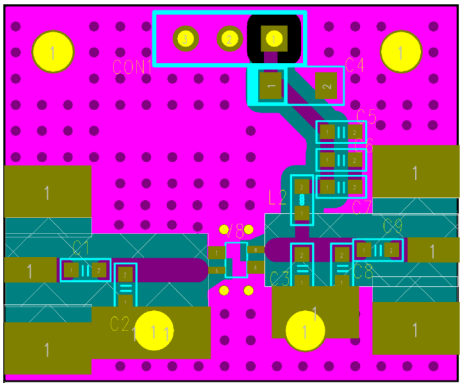
PCB Land Pattern



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

PCB Mounting



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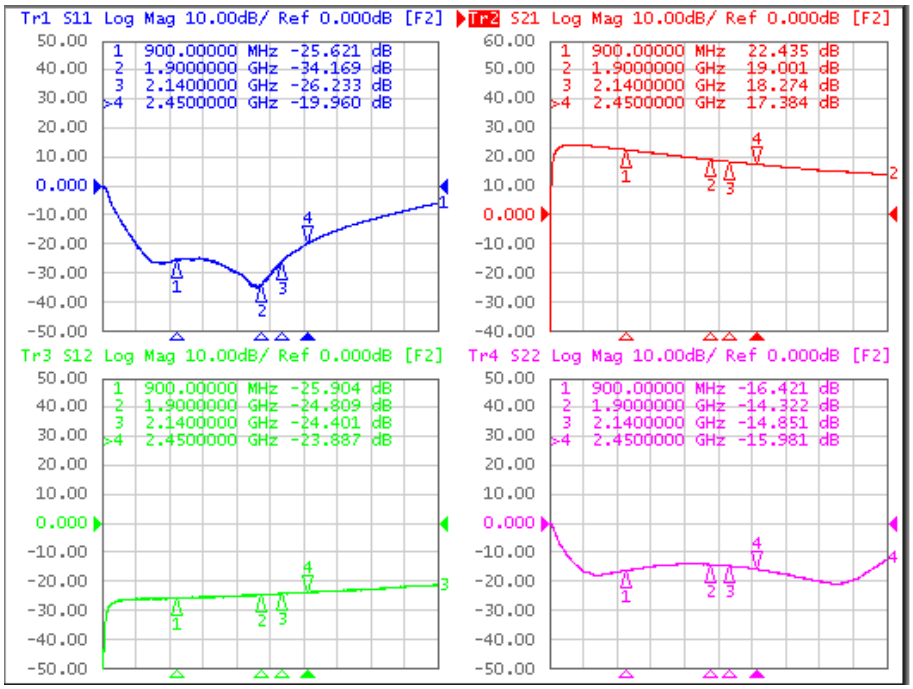
BGS1

50-4000 MHz SILICON GERMANIUM Gain Block

Typical Device Data



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 (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

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BGS1

50-4000 MHz SILICON GERMANIUM Gain Block

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

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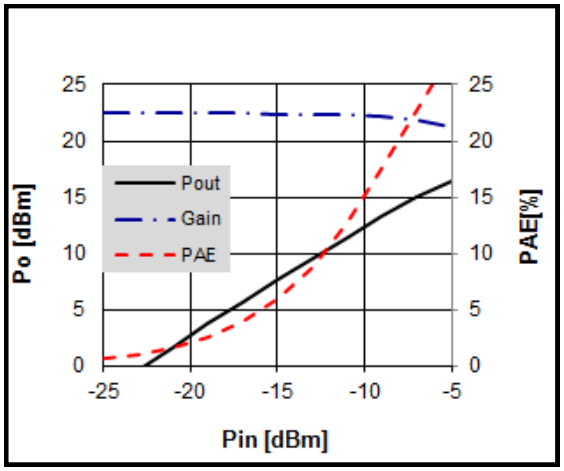
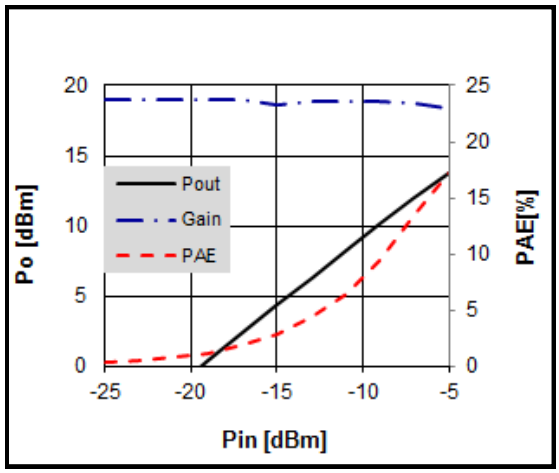
Device Performance

Pin-Pout-Gain

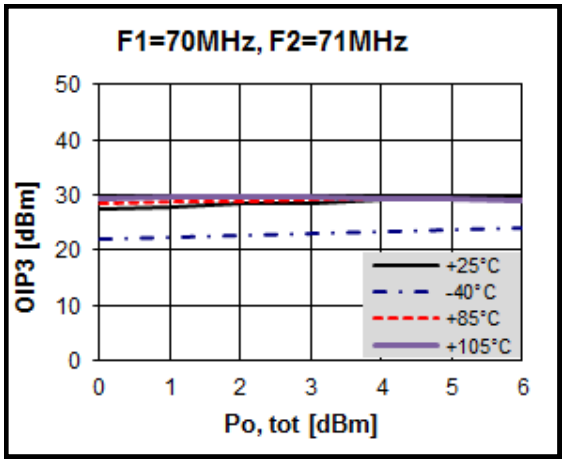


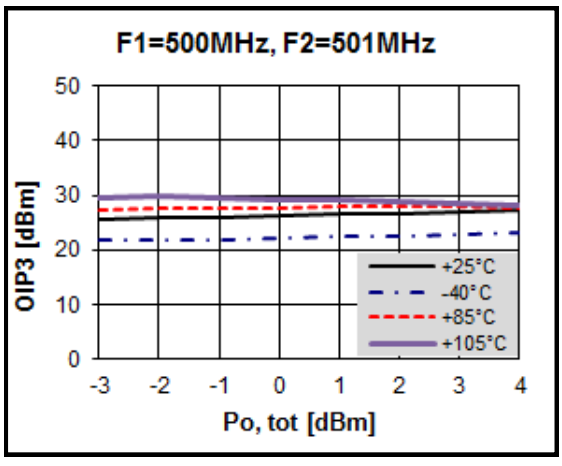
900MHz, 3.2V/27mA



1900 MHz, 3.2V/27mA

OIP3





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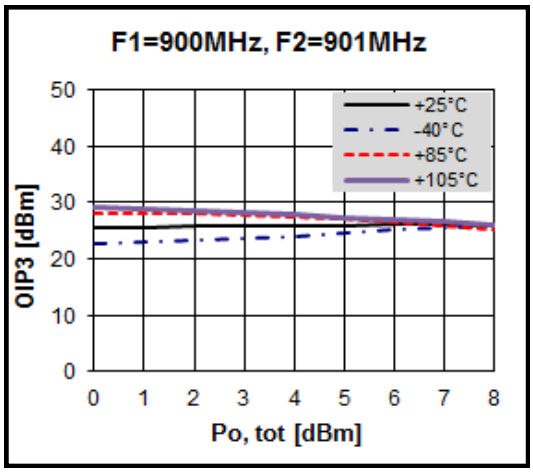
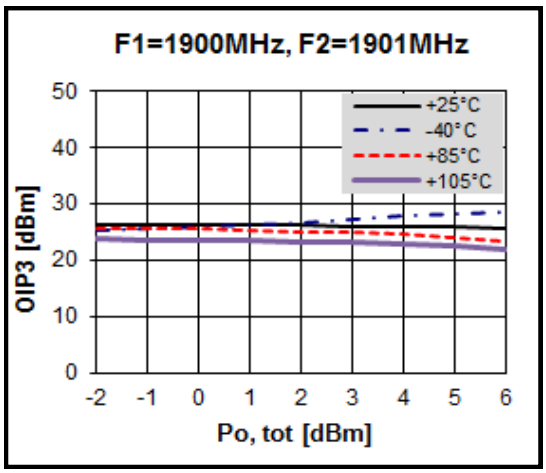
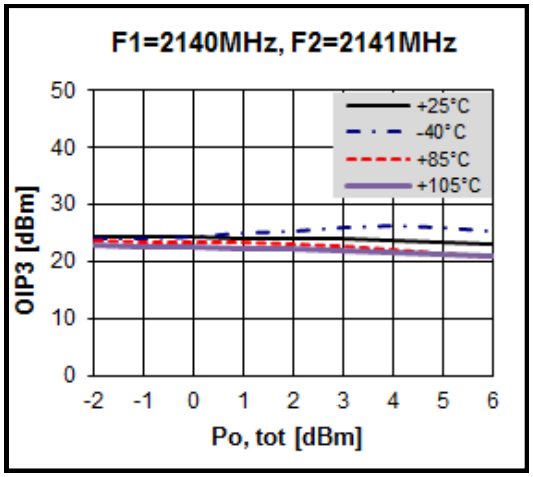
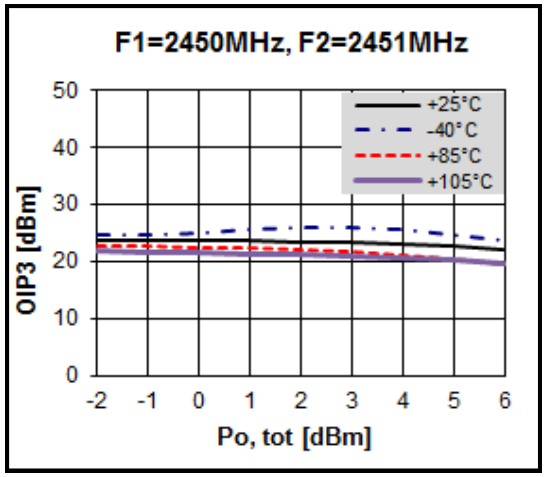
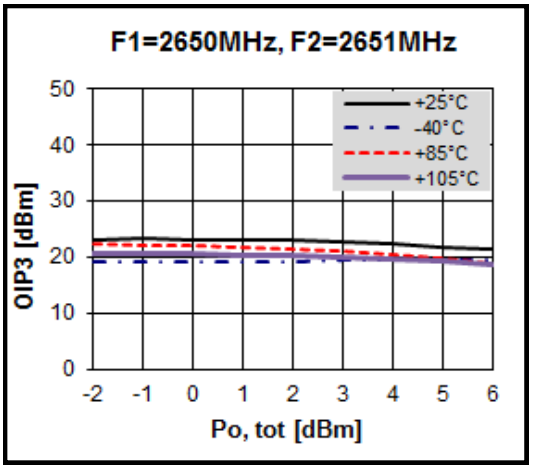
OIP3

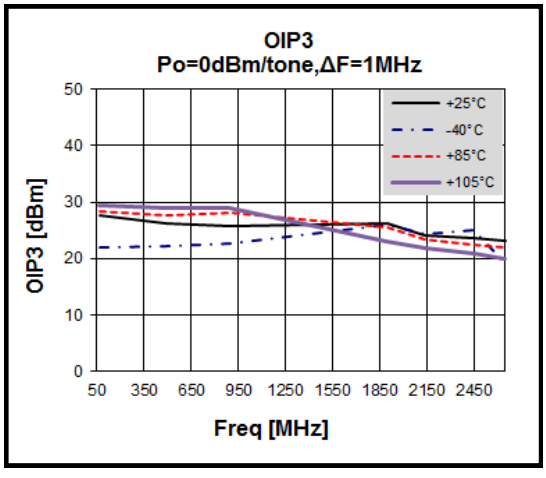












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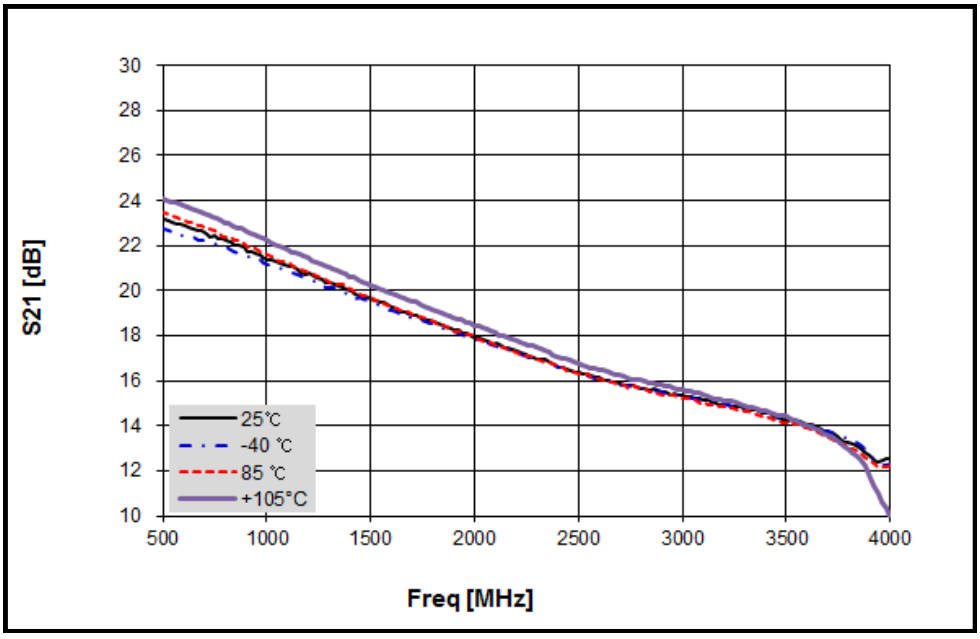
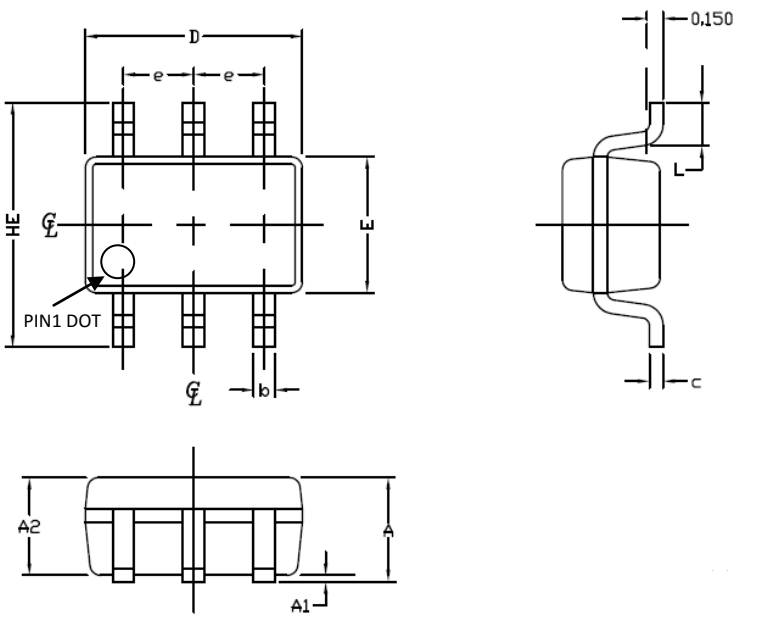
Gain Flatness



SOT-363 Package Outline Dimension (Unit. mm)



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

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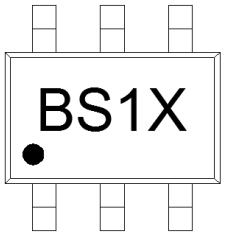
Package Marking

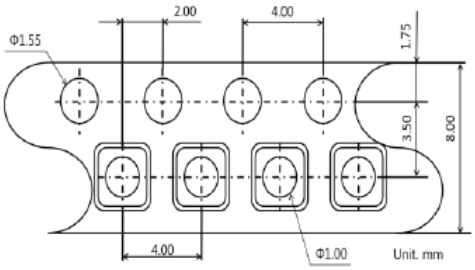


X = Wafer No.

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



Proper ESD procedures should be followed when handling this device.

NATO CAGE code:

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

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