BGS2

BEREX

50-4000 MHz SILICON GERMANIUM Gain Block

Device Features

- Single Fixed 3V 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

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

Product Description

BeRex's BGS2 is a high SiGe HBT MMIC amplifier, internally matched to 50 Ohms without the need for external components. Designed to run directly from a 3V supply. The BGS2 is designed for high linearity 3V gain block applications . It is packaged in a RoHS-compliant with SOT-363 surface mount package.

Applications

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

Typical Performance[1]

Parameter	Frequency						Unit
	70	**900**	**1900**	**2450**	**2650**	**3500**	**MHz**
Gain	26.5	23.6	19.8	18.1	17.2	15	dB
S11	-19.6	-18.3	-18.6	-18.4	-17.6	-13.7	dB
S22	-15.6	-12.8	-9.9	-10.5	-13.2	-15.7	dB
OIP3[2]	28	25.5	24.5	22.5	25	19.2	dBm
P1dB	15.6	13.4	12.8	10.8	10.4	8.7	dBm
N.F	2.7	2.3	2.2	2.3	2.5	2.7	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.

Applications Circuit

Application Circuit Values Example			
Freq.	70~900MHz	900MHz ~ 3GHz	3GHz ~ 4GHz
C1/C2	2nF	100pF	100pF
L1 (1608 Chip Ind.)	1uH	56nH	27nH
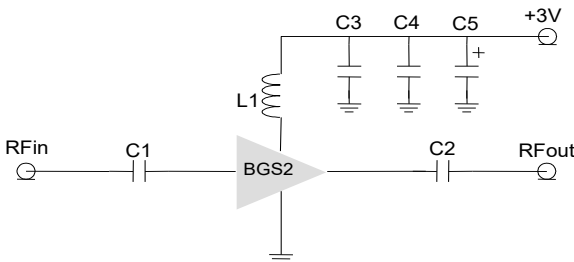
*C1, C2, C3 =100 pF ± 5%; C4 = 1000 pF ± 5%; C5 = 10uF; **L1 = 56nH

**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=100pF, L1=27nH for 3.5GHz application.

	Min.	Typical	Max.	Unit
Bandwidth	70		4000	MHz
I_C @ (Vc = 3V)	30	34	38	mA
V_C		3.0		V
dG/dT		-0.005		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	+3.8	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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V-I Characteristics
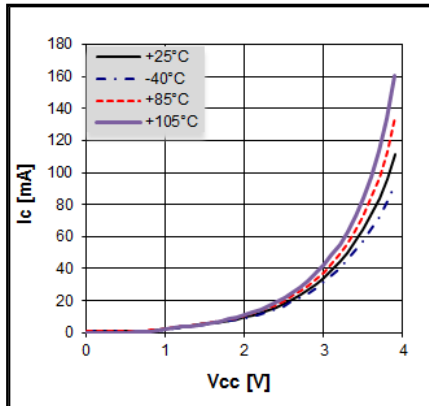
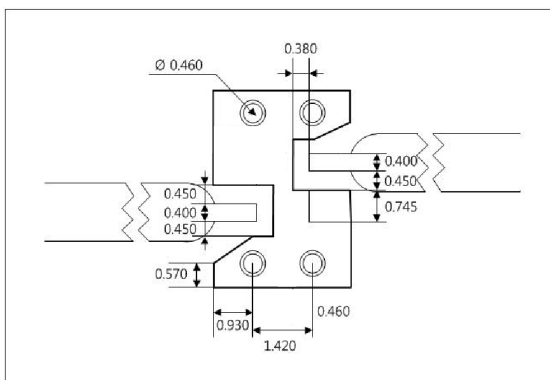### BeRex SOT-363 Evaluation Board
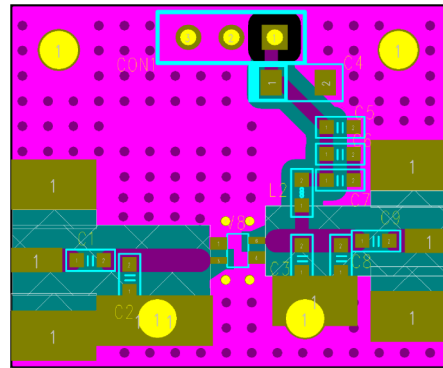
*Dielectric constant _ 4.2   *31mil thick FR4 PCB
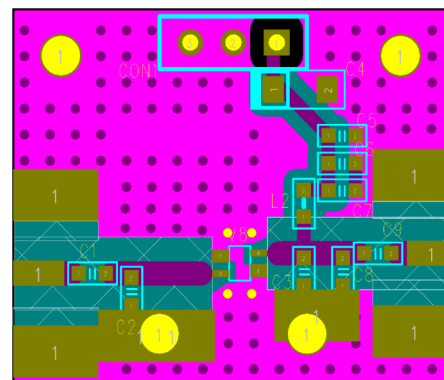
Suggested PCB Land Pattern and PAD Layout

PCB Land Pattern

PCB Mounting

Note : All dimension _ millimeters

PCB lay out _ on BeRex website

BeRex   ●website: www.berex.com   ●email: sales@berex.com   2

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Typical Device Data

S-parameters (Vc=3V, Ic=34mA, T=25°C)
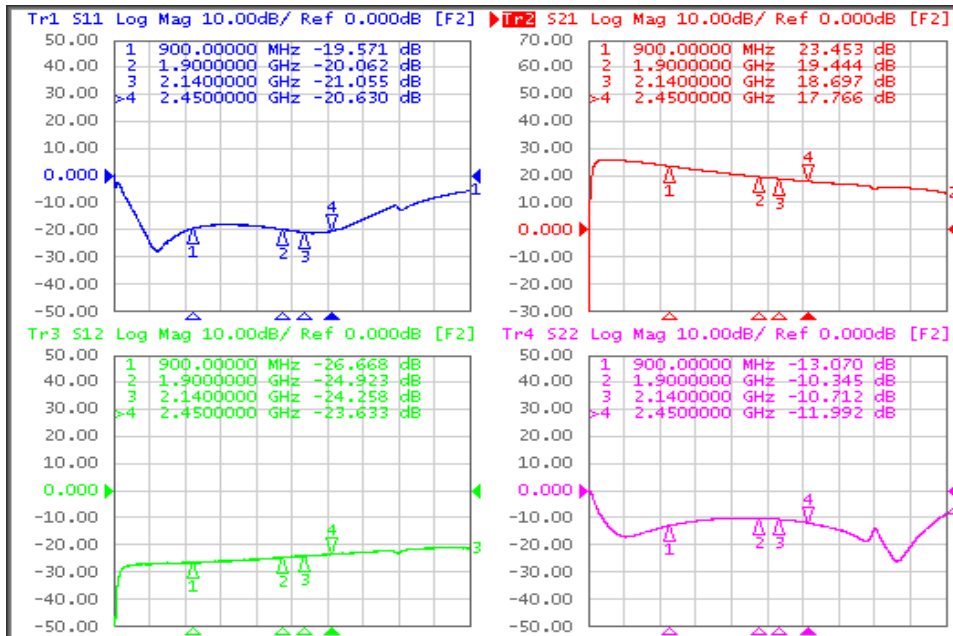
S-Parameter

(Vdevice = 3.0V, Icc = 34mA, 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	-3.69	-52.41	24.13	-121.02	-30.59	82.59	-4.42	-170.10
900	-17.69	34.25	23.38	76.30	-26.60	-28.23	-12.45	142.20
1000	-17.25	22.43	22.95	65.43	-26.52	-34.19	-12.00	136.29
1500	-17.21	-18.66	20.82	16.20	-25.69	-57.19	-10.22	103.27
2000	-19.07	-63.14	19.00	-28.30	-24.73	-82.74	-10.16	73.85
2500	-20.38	-132.94	17.52	-71.11	-23.50	-111.35	-11.80	48.64
3500	-10.04	90.91	15.48	-158.27	-21.28	-175.51	-26.52	64.38
4000	-6.03	26.54	13.56	143.48	-20.97	137.09	-9.21	111.96

Typical Performance (Vd = 3.0V, Ic = 34mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650	3500
S21	dB	26.8	26.5	23.6	19.8	19	18.1	17.2	15.0
S11	dB	-18.4	-19.6	-18.3	-18.6	-18.4	-18.1	-17.6	-13.7
S22	dB	-16	-15.6	-12.8	-9.9	-9.4	-10.5	-13.2	-15.7
P1	dBm	15.4	15.6	13.4	12.8	11.2	10.8	10.4	8.7
OIP3	dBm	28.5	28	25.5	24.5	23	22.5	25	19.2
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3	2.5	2.7

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Typical Performance (Vd = 3.1V, Ic = 41mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650
S21	dB	27.1	26.8	23.7	19.9	19.1	18.2	17.4
S11	dB	-16.7	-17.2	-17.2	-17.9	-17.9	-18.3	-18.0
S22	dB	-15.5	-14.7	-12.5	-9.4	-9.5	-10.6	-13.4
P1	dBm	16.0	16.5	14..0	13.1	12.0	11.2	10.8
OIP3	dBm	29.5	29.0	26.5	25.4	23.5	23.0	25.0
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3	2.5

Typical Performance (Vd = 3.2V, Ic = 47mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650
S21	dB	27.4	27.1	23.9	20.0	19.2	18.3	17.5
S11	dB	-15.2	-15.5	-16.3	-17.2	-17.3	-18.0	-18.3
S22	dB	-14.8	-13.7	-12.1	-9.6	-9.6	-10.7	-13.6
P1	dBm	16.8	17.2	14.6	13.3	12.0	11.2	11.0
OIP3	dBm	30.0	30.0	27.0	26.0	24.0	23.5	25.1
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3	2.5

Typical Performance (Vd = 3.3V, Ic = 53mA, T = 25°C)

Freq	MHz	50	70	900	1900	2140	2450	2650
S21	dB	27.6	27.3	23.9	20.0	19.3	18.4	17.6
S11	dB	-14.1	-14.2	-15.5	-16.7	-16.8	-17.8	-18.4
S22	dB	-14.2	-12.9	-11.8	-9.7	-9.7	-10.0	-13.9
P1	dBm	17.4	18.0	15.0	13.6	12.3	11.7	11.3
OIP3	dBm	32.0	30.0	27.0	26.2	24.5	23.1	26.0
NF	dB	2.7	2.7	2.3	2.2	2.2	2.3	2.5

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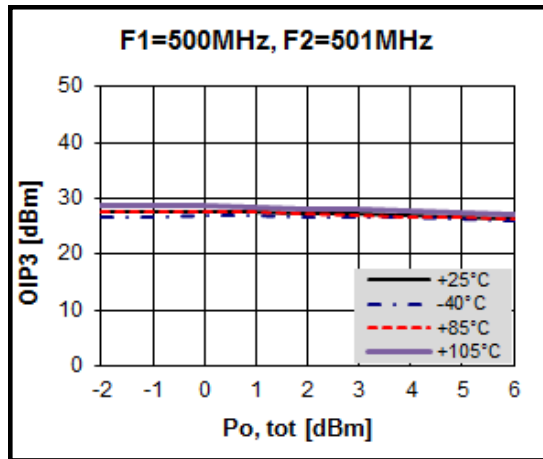
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Device Performance

Pin-Pout-Gain
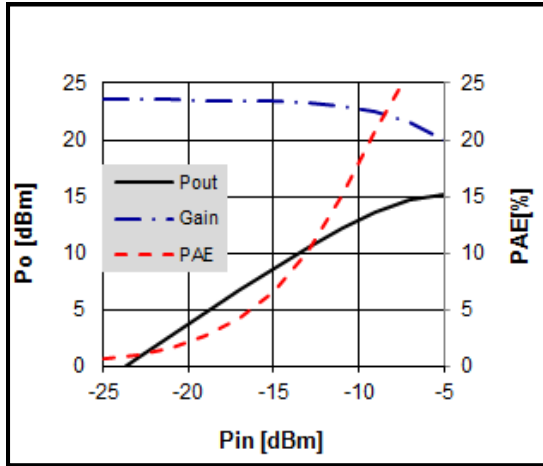
900MHz, 3V/22mA

1900 MHz, 3V/22mA

OIP3

F1=70MHz, F2=71MHz

F1=500MHz, F2=501MHz

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OIP3

F1=900MHz, F2=901MHz

F1=1900MHz, F2=1901MHz

F1=2140MHz, F2=2141MHz

F1=2450MHz, F2=2451MHz

F1=2650MHz, F2=2651MHz

OIP3
Po=0dBm/tone,ΔF=1MHz

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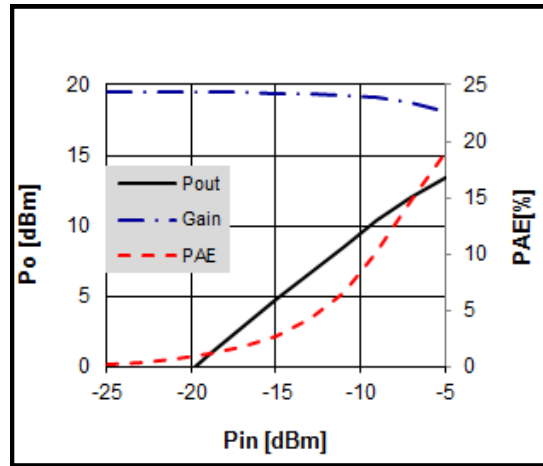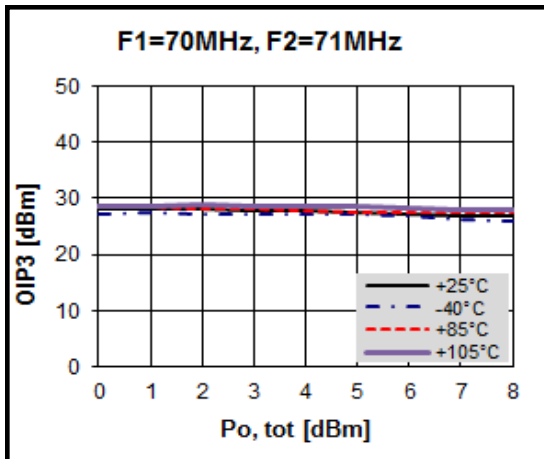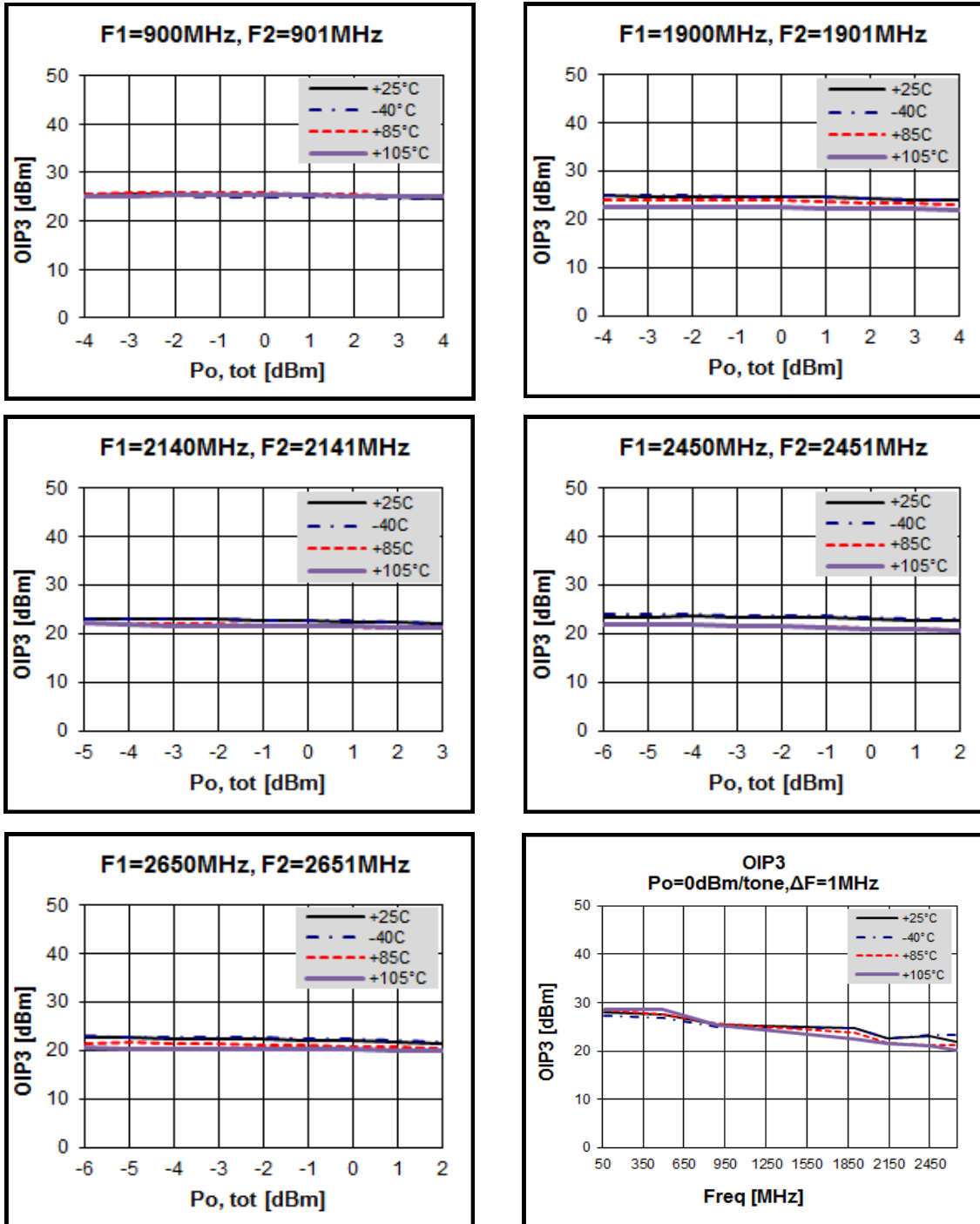
Gain Flatness
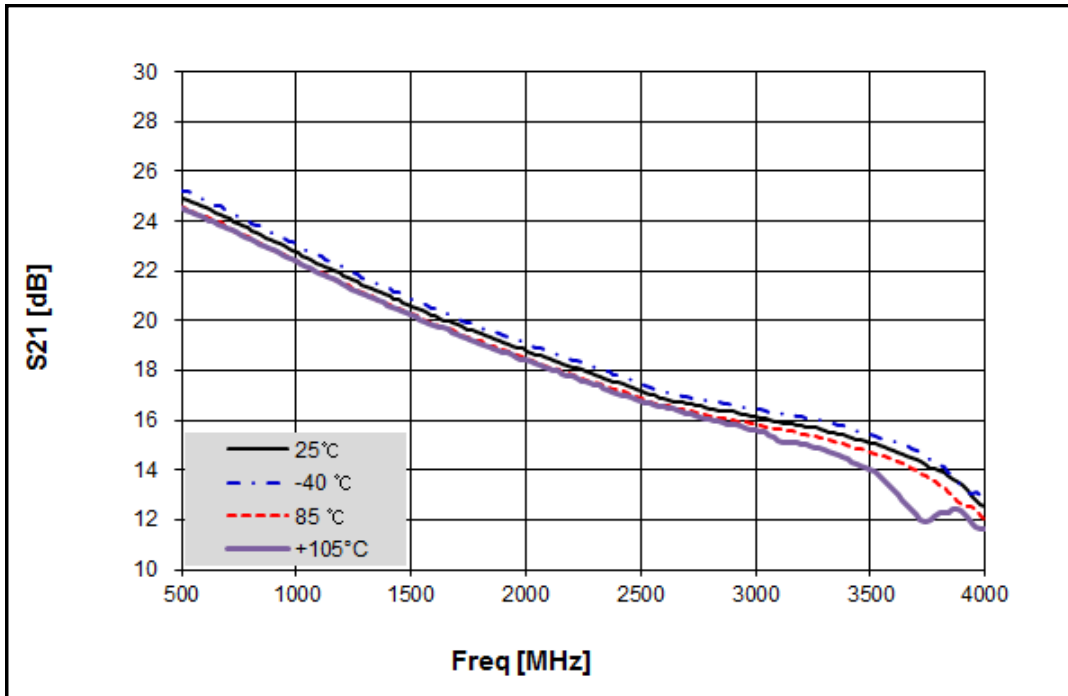
Package Outline Dimension (Unit. mm)

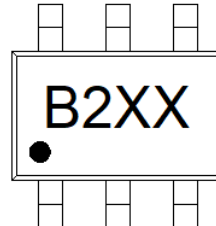| SYMBOL	MIN	MAX
E	1.15	1.35
D	1.85	2.25
HE	2.00	2.30
A	0.80	1.00
A2	0.80	0.91
A1	0.00	0.09
e	0.65	BSC
b	0.15	0.30
c	0.08	0.25
L	0.21	0.41
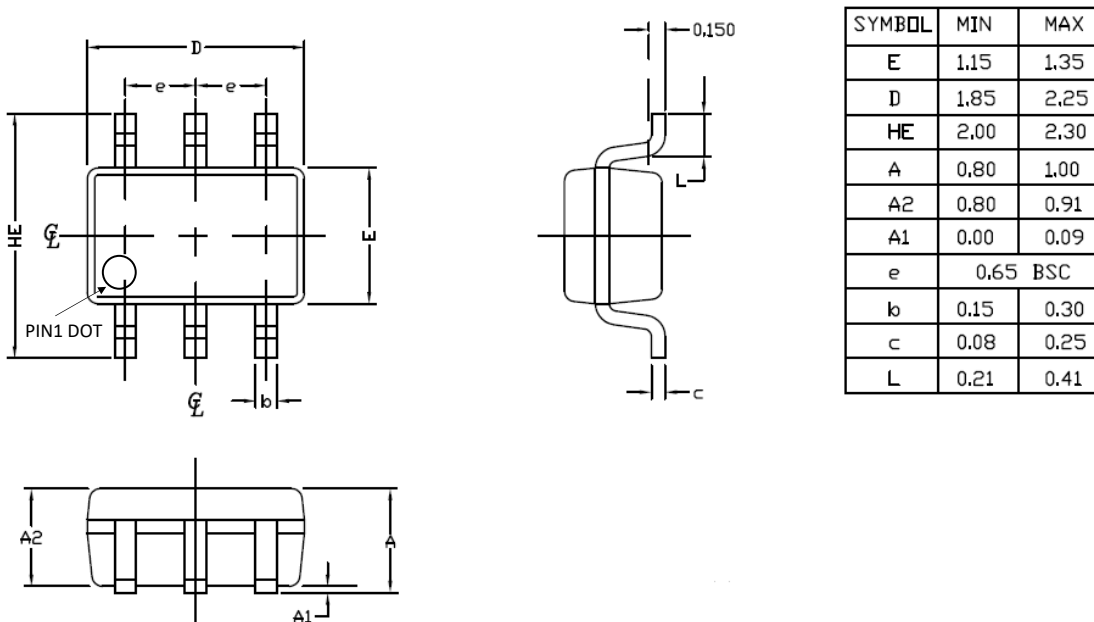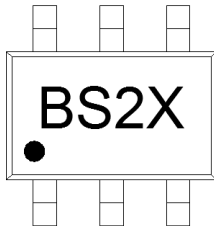
Package Marking

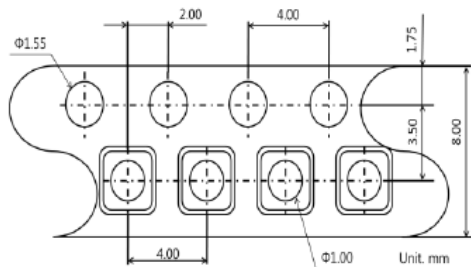
X = Wafer No.

Pin 1

New Package Marking

XX = Wafer No.

Pin 1

* Note : New Package marking has been modified

from BS2X to B2XX since Aug. 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

Caution: ESD Sensitive
Appropriate precautions in handling, packaging
and testing devices must be observed.

Proper ESD procedures should be followed when handling this device.

NATO CAGE code:

2	N	9	6	F