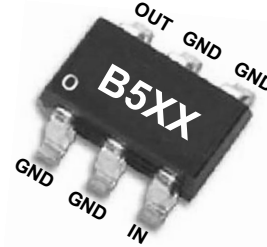


Device Features

- Single Fixed 3V 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

Part Marking (XX:Wafer number)



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

Product Description

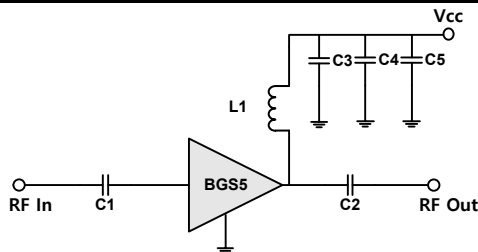
BeRex's BGS5 is a high SiGe HBT MMIC amplifier, internally matched to 50 Ohms without the need for external components. Designed to run directly from a 3V supply. The BGS5 is designed for high linearity 3V gain block applications. It is packaged in a RoHS2-compliant with SOT-363 surface mount package.

Applications

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

Applications Circuit

Application Circuit Values Example				
Freq.	40~700MHz	0.7 ~ 3GHz	3 ~ 4GHz	4 ~ 5GHz
C1/C2	2nF	100pF	10pF	2pF/10pF
L1 (1608 Ind.)	1uH	56nH	12nH	15nH



*C1, C2, C3 =100 pF ± 5%; C4 = 1 nF ± 5%; C5 = 10uF; **L1 = 56nH

**Less than 56nH improves RF performance at over 0.5GHz.

*820nH or higher value L1 improves RF performance at under 500MHz.

*Optimum value of L1 may vary with board design.

*C1,C2=2nF, L1=820nH for 50MHz application.

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

Electrical Specifications

Device performance _ measured on a BeRex evaluation board at 25°C, Vd=3V, 50 Ω system.

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		40		5000	MHz
Test Frequency			900		MHz
Gain		15.0	16.5		dB
Input Return Loss			-17.0		dB
Output Return Loss			-15.0		dB
Output IP3	0 dBm / tone , Δf=1 MHz	28.5	31.5		dBm
Output P1dB		15.2	16.2		dBm
Noise Figure			2.5		dB

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Bandwidth	40		4000	MHz
I _c @ (V _c = 3.0V)	40	52	62	mA
V _c	2.7	3.0	3.3	V
dG/dT		-0.001		
R _{TH}		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	110	mA
Input RF Power	15	dBm

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

40-5000 MHz SILICON GERMANIUM Gain Block

Typical Performance (Vd = 3.0V, Ic = 52mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	19	18.6	17.3	16.5	15	14.6	14.1	13.8	13	12.1
S11	dB	-11	-13.5	-16	-17	-17	-19	-27	-40	-14.1	-18.1
S22	dB	-16	-17.5	-14	-15	-13	-14	-15	-17	-27.6	-11.4
P1	dBm	15	15	15.5	16.2	15.4	15	14.4	14.5	13.5	12.5
OIP3	dBm	32.5	32.5	32.5	31.5	28.5	28	27	27	24.6	23.2
NF	dB	2.2	2.2	2.2	2.5	2.7	2.8	2.9	3	2.79	3.37

Typical Performance (Vd = 2.7V, Ic = 39mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	18.7	18.4	18	16.7	14.9	14.6	14.1	13.7	12.8	11.9
S11	dB	10.9	12.8	15.7	21.9	20.3	23.4	28.2	23.7	-13.2	-16.2
S22	dB	19.8	20.8	21.8	17.8	14.9	15.2	15.8	16.1	-15	-11
P1	dBm	13.4	13.5	13.8	13.7	13.3	12.8	12.8	13.1	12	11
OIP3	dBm	29.5	29.8	29.4	27.7	26.1	25.4	24.8	25	23.4	21.1
NF	dB	2.08	2.04	2.2	2.38	2.6	2.68	2.75	2.83	2.74	3.32

Typical Performance (Vd = 2.8V, Ic = 43mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	18.8	18.5	18.1	16.8	15	14.7	14.2	13.8	12.9	12
S11	dB	11	12.8	15.7	21	19	22.8	29.3	24.9	-13.6	-17
S22	dB	20	20	21	17.5	15	15.4	16.1	16.4	-15.4	-11.1
P1	dBm	14.1	14.1	14.4	14.4	14	13.5	13.5	13.9	12.5	11.7
OIP3	dBm	30.7	31.2	30.8	29	27.3	26.6	26	26.1	24.2	22
NF	dB	2.1	2.07	2.2	2.39	2.62	2.69	2.76	2.84	2.76	3.33

Typical Performance (Vd = 2.9V, Ic = 48mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	18.9	18.6	18.1	16.8	15.1	14.7	14.2	13.9	13	12.1
S11	dB	11	12.8	15.6	20.4	19.5	22.5	30	26.2	-13.8	-17.6
S22	dB	20	20.6	21	17.2	15	15.5	16.3	16.6	-15.5	-11.3
P1	dBm	14.6	14.6	14.9	15.1	14.7	14.1	14.1	14.5	13.1	12.1
OIP3	dBm	32.2	32.3	32	30.3	28.3	27.6	27	27	25	22.7
NF	dB	2.13	2.08	2.22	2.41	2.64	2.71	2.78	2.85	2.78	3.34

Typical Performance (Vd = 3.1V, Ic = 57mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	19.1	18.7	18.3	16.9	15.2	14.8	14.3	14	13.1	12.2
S11	dB	11	12.8	15.5	19.6	19	21.8	30	28.8	-14.4	-18.6
S22	dB	20	20.4	20.5	16.8	15	15.6	16.6	17.2	-16	-11.4
P1	dBm	15.6	15.6	16	16.5	16	15.4	15.2	15.6	14	12.8
OIP3	dBm	33.6	33.8	33.6	32	29.8	29.1	28.3	28.2	25.8	23.6
NF	dB	2.15	2.12	2.26	2.47	2.7	2.76	2.82	2.93	2.83	3.4

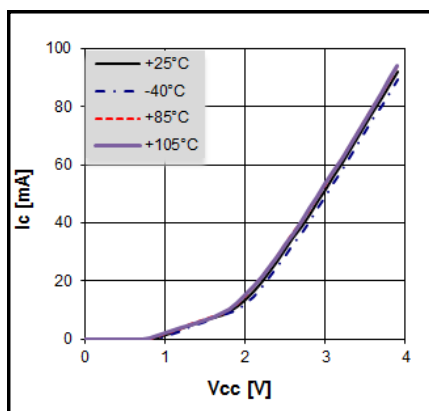
Typical Performance (Vd = 3.2V, Ic = 61mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	19.1	18.7	18.3	17	15.2	14.8	14.4	14	13.1	12.2
S11	dB	11	12.8	15.4	19.3	18.9	21.6	30.1	29.7	-14.6	-19
S22	dB	20.1	20.3	20.2	16.7	15.1	15.7	16.8	17.4	-16.1	-11.5
P1	dBm	16.1	16.1	16.5	17.1	16.6	15.9	15.7	16	14.3	13.2
OIP3	dBm	34.5	34.2	33.8	32.5	30.3	29.5	28.7	28.5	26	23.8
NF	dB	2.2	2.2	2.3	2.5	2.7	2.8	2.9	3.0	2.85	3.42

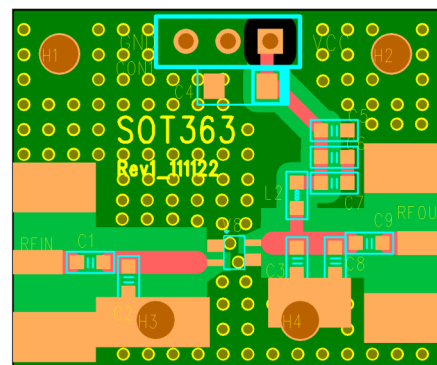
Typical Performance (Vd = 3.3V, Ic = 66mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	19.1	18.8	18.3	17	15.3	14.9	14.4	14	13.2	12.3
S11	dB	11	12.8	15.4	19.1	18.7	21.5	30	30.4	-14.7	-19.4
S22	dB	20	20	20	16.6	15.2	15.8	17	17.5	-16.3	-11.7
P1	dBm	16.5	16.5	17	17.7	17.1	16.3	16.1	16.4	14.5	13.5
OIP3	dBm	34.7	34.7	34.1	32.7	30.5	29.8	28.9	28.6	26	23.8
NF	dB	2.2	2.2	2.3	2.5	2.8	2.8	2.9	3	2.87	3.45

V-I Characteristics

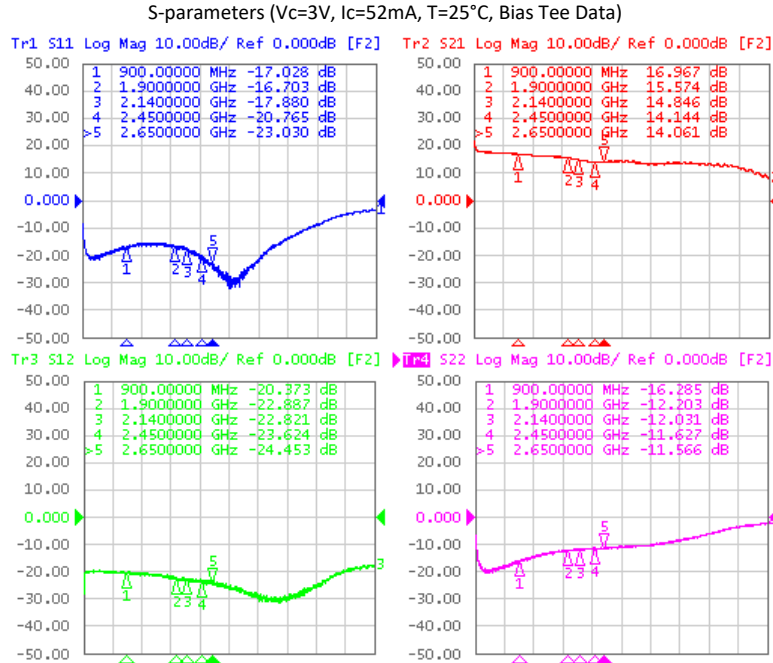


BeRex SOT-363 Evaluation Board



*Dielectric constant _ 4.2 *31mil thick FR4 PCB

Typical Device Data



S-Parameter

(Vdevice = 3.0V, Icc = 52mA, T = 25 °C, calibrated to device leads, Bias Tee Data)

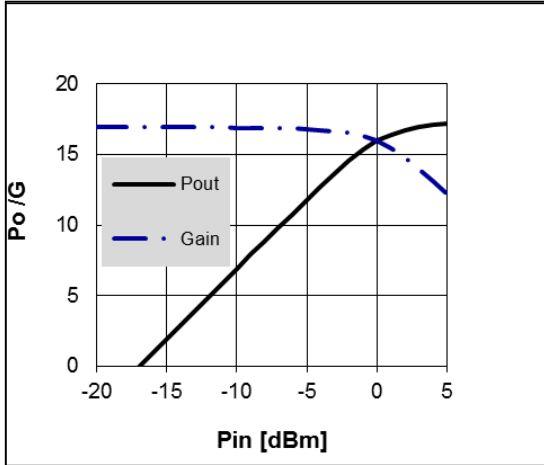
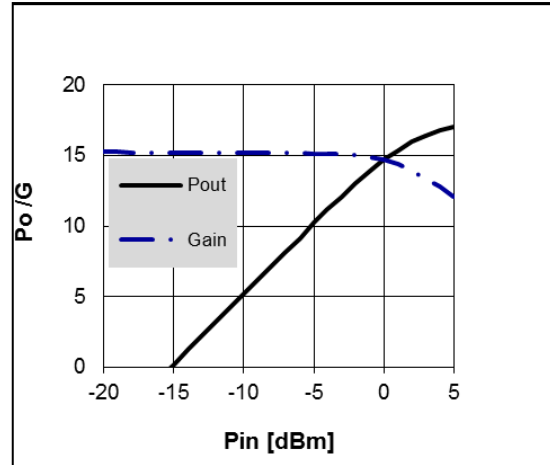
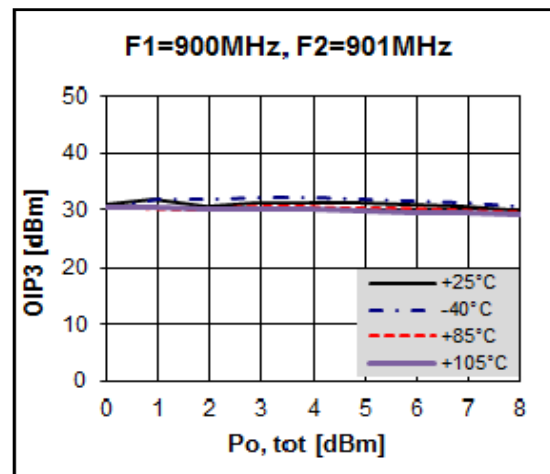
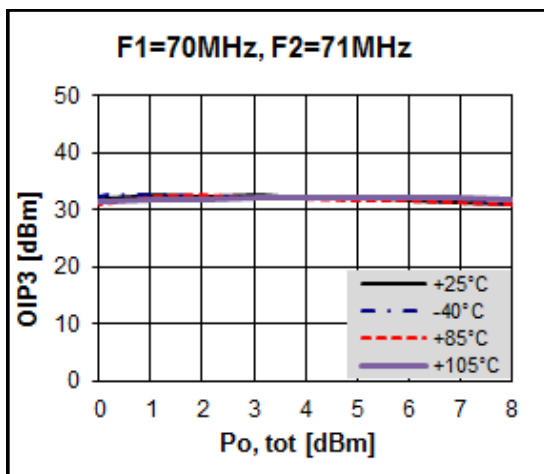
Freq [MHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
70.00	0.121	-121.4	8.14	167.8	0.099	5.99	0.138	-118.5
900.00	0.141	102.7	7.0	145.4	0.094	-4.60	0.152	155.8
1000.00	0.147	94.1	6.99	143.2	0.093	-5.26	0.164	150.5
1500.00	0.159	68.6	6.38	129.0	0.087	-10.2	0.215	127.7
2000.00	0.141	48.2	5.82	112.2	0.074	-10.1	0.248	110.8
2500.00	0.085	31.7	4.97	104.8	0.063	-9.9	0.261	94.7
3500.00	0.066	130.0	4.7	80.8	0.037	3.36	0.296	63.3
4000.00	0.162	123.9	4.6	71.9	0.03	40.6	0.348	50.3

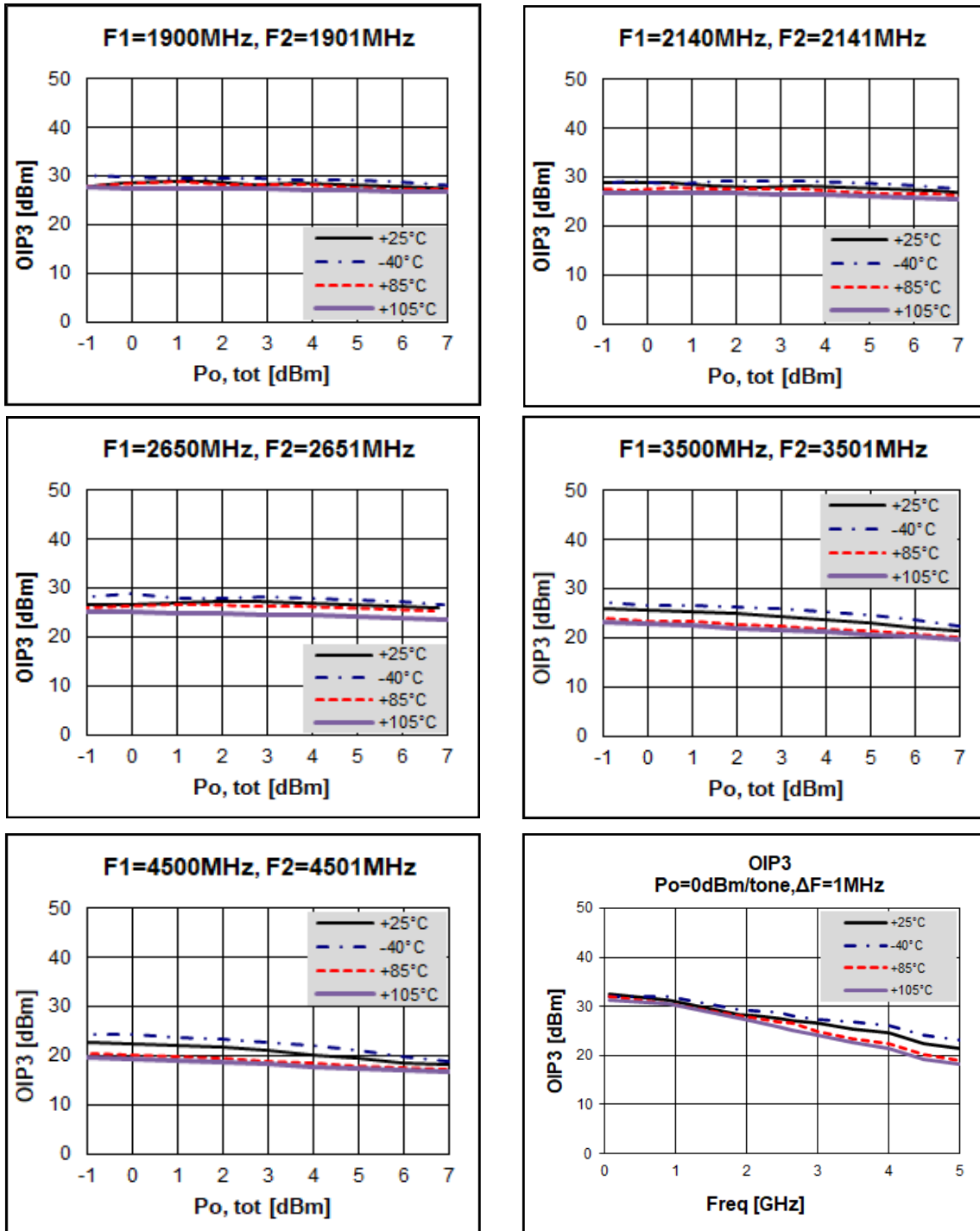
Typical Performance (Vd = 3.0V, Ic = 52mA, T = 25°C)

Freq	MHz	40	50	70	900	1900	2140	2450	2650	3500	4500
S21	dB	19	18.6	17.3	16.5	15	14.6	14.1	13.8	13	12.1
S11	dB	-11	-13.5	-16	-17	-17	-19	-27	-40	-14.1	-18.1
S22	dB	-16	-17.5	-14	-15	-13	-14	-15	-17	-27.6	-11.4
P1	dBm	15	15	15.5	16.2	15.4	15	14.4	14.5	13.5	12.5
OIP3	dBm	32.5	32.5	32.5	31.5	28.5	28	27	27	24.6	23.2
NF	dB	2.2	2.2	2.2	2.5	2.7	2.8	2.9	3	2.79	3.37

Typical Performance
 (Vc=3V, Ic=52mA, T=25°C)

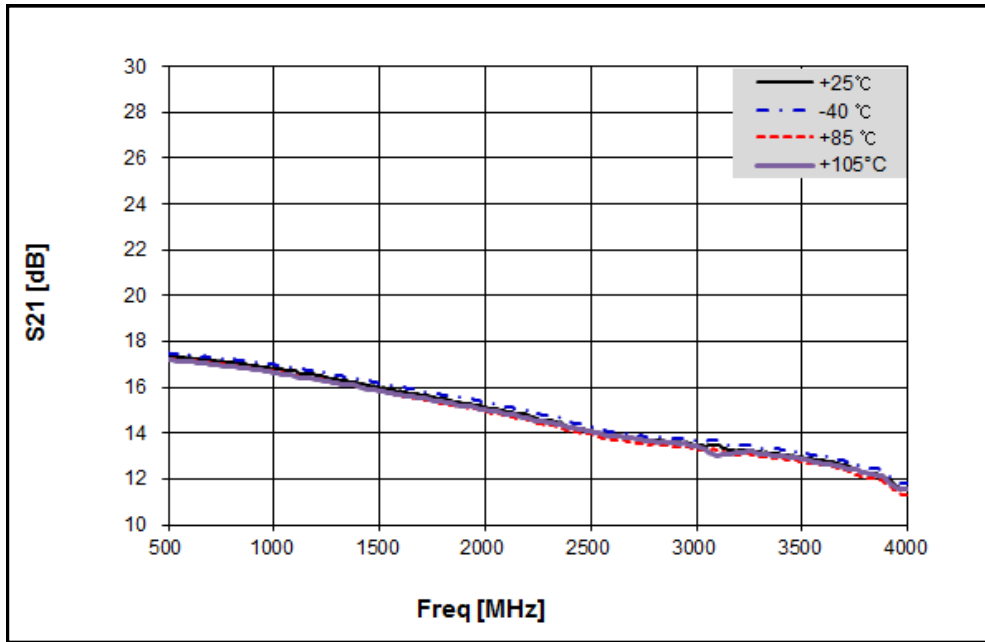
Pin-Pout-Gain


900MHz

1900 MHz
OIP3


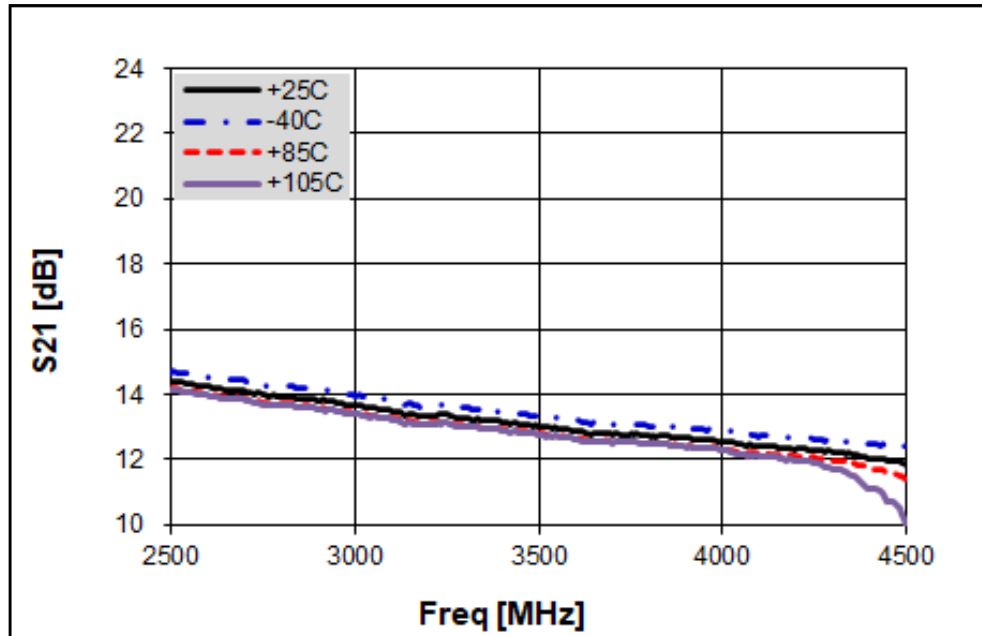
OIP3


Gain Flatness

0.7 ~ 3GHz App

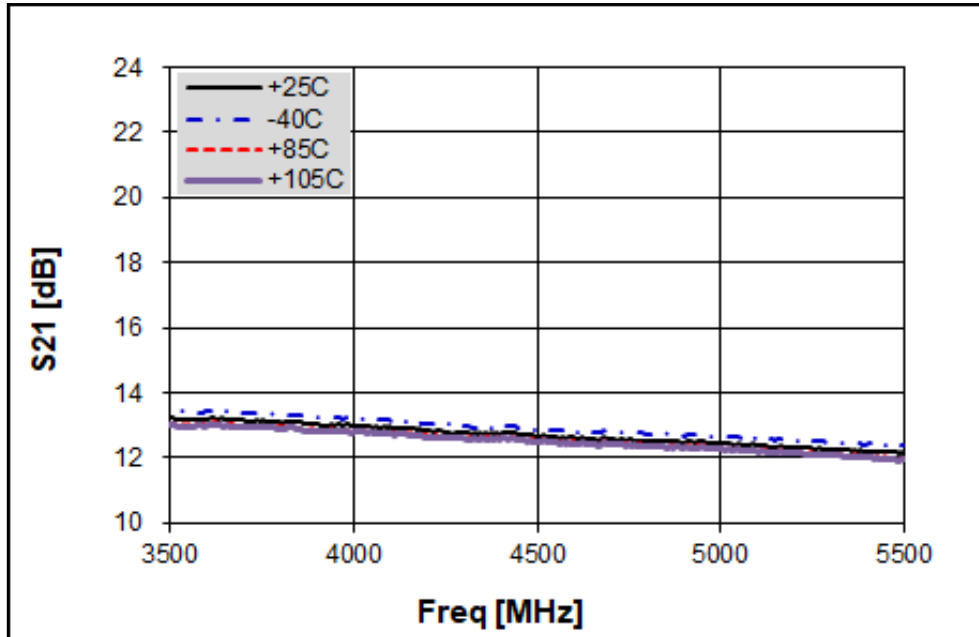


3 ~ 4GHz App

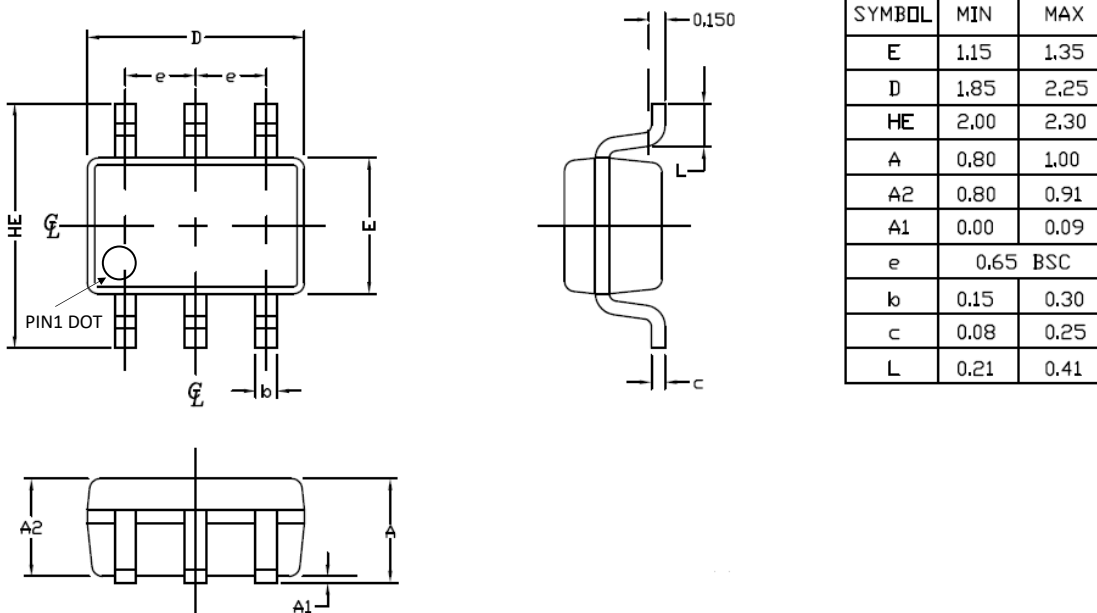


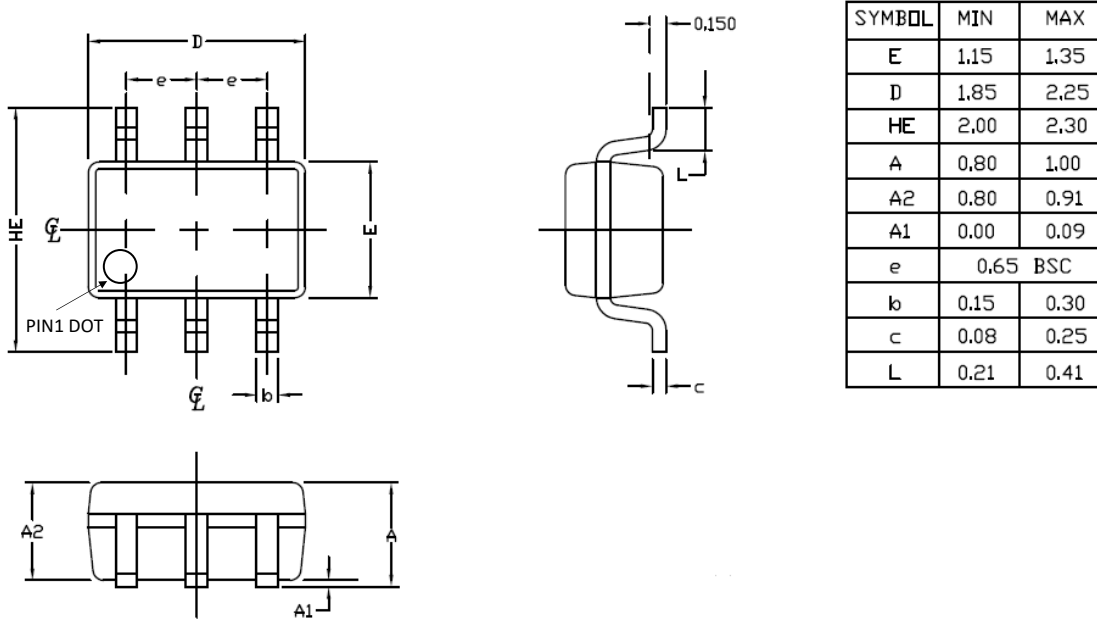
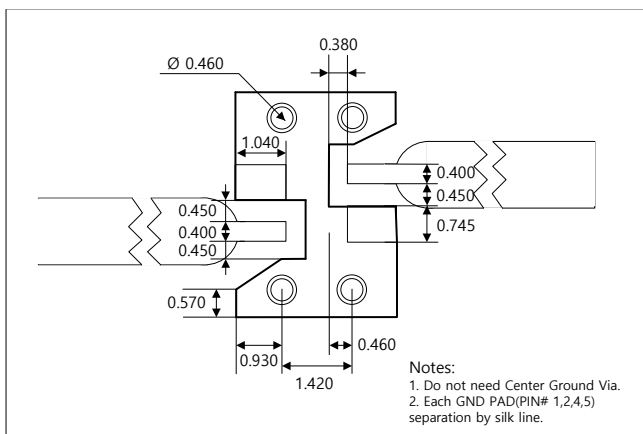
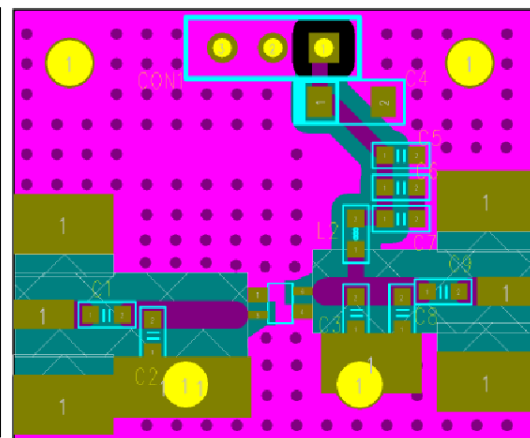
Gain Flatness

4 ~ 5GHz App

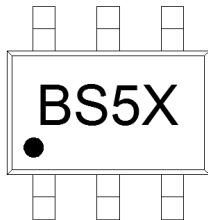


Package Outline Dimension (Unit. mm)



SOT-363 Package Outline Dimension (Unit. mm)

Suggested PCB Land Pattern and PAD Layout
PCB Land Pattern

PCB Mounting


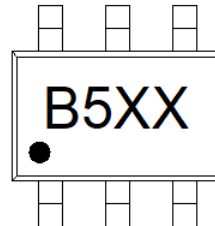
Package Marking



X = Wafer No.

Pin 1

New Package Marking



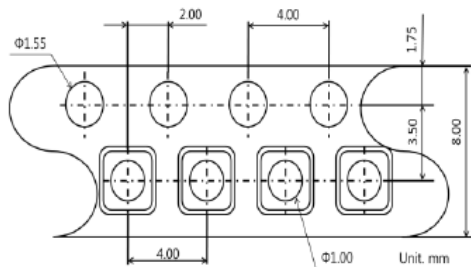
XX = Wafer No.

Pin 1

* Note : New Package marking has been modified from BS5X to B5XX since Sep. 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 1A
Value: Passes < 500V
Test: Human Body Model (HBM)
Standard: JEDEC Standard JS-001-2017

MSL Rating: Level 1 at +260°C convection reflow
Standard: 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
---	---	---	---	---