BGE02

30-4000 MHz BROADBAND AMPLIFIER

Device Features

- Single Fixed 3.3V Supply
- Gain = 17.4dB @ 3.5GHz
- Gain Flatness < 1dB @ 3~4GHz
- Output P1 dB = 17.7 dBm @ 3.5GHz
- OIP3 = 34.5dBm @ 3.5GHz
- Internally matched to 50 ohms
- RoHS2-compliant SOT-363 SMT package

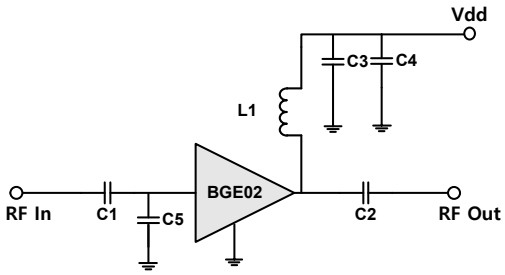
Product Description

The BGE02 is a BroadBand, GaAs E-pHEMT Amplifier that is ideal for applications demanding high linearity in a wideband of 30-4000 MHz. The BGE02 is internally matched to 50 Ohms and requires no external matching components. It is available in RoHS2-compliant SOT-363 SMT package. These devices are 100% DC and RF tested to assure quality and performance.

Applications

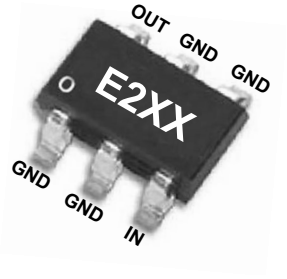
- Repeaters
- Mobile Infrastructure
- LTE / WCDMA / EDGE / CDMA /5G NR / WIFI
- General Purpose Wireless

Applications Circuit



BOM@GHz	0.03~1	0.5~4	3~4
C1	1nF	100pF	10pF
C2	1nF	100pF	10pF
C3	100pF	100pF	100pF
C4	1uF	1uF	1uF
C5	NA	NA	0.5pF
L1	680nH	12nH	5.6nH

Part Marking (XX: Lot 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=3.3V, 50 Ω system.

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		30		4000	MHz
Test Frequency			3500		MHz
Gain		15.9	17.4		dB
Input Return Loss			-27.8		dB
Output Return Loss			-10.0		dB
Output IP3	0 dBm / tone , Δf=1 MHz	31.5	34.5		dBm
Output P1dB		16.7	17.7		dBm
5G NR ACLR*		6.6	7.6		dBm
Noise Figure			1.9		dB

*ACLR Channel Power measured at -50dBc.

- 5G set-up: 3GPP 5G NR, 100MHz BW, ±100MHz offset, PAR 9.5 at 0.01% Prob.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Bandwidth	30		4000	MHz
I_d @ (V_d = 3.3V)	56	69	82	mA
V_d	3.2	3.3	3.4	V
dG/dT		0.018		dB/°C
R_{TH}		51.3		°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	+6.0	V
Supply Current	140	mA
Input RF Power	26	dBm

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

Typical Performance (Vd=3.3V, Id=69mA, T=25°C)

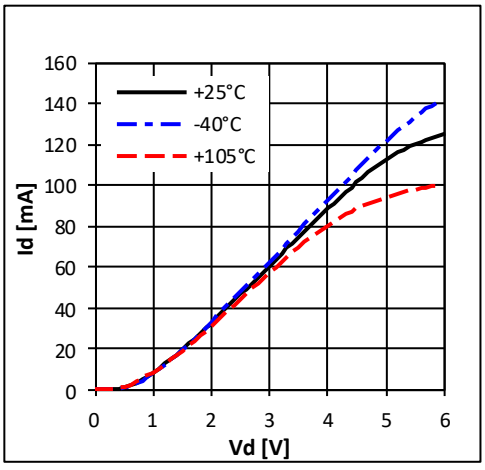
Parameter	Frequency					Unit
	70	900	1900	2650	3500[1]	MHz
Gain	21.3	20.3	19.3	17.7	17.4	dB
S11	-13.0	-18.6	-13.4	-11.5	-27.8	dB
S22	-22.2	-18.4	-24.5	-12.7	-10.0	dB
OIP3	35.1	34.6	34.4	33.3	34.5	dBm
P1dB	18.8	18.7	17.8	17.5	17.7	dBm
LTE 20M ACLR*	9.8	9.3	8.7	8.0	-	dBm
5G NR ACLR*	-	-	-	-	7.6	dBm
Noise Figure	1.43	1.32	1.49	1.84	1.90	dB

*ACLR Channel Power measured at -50dBc.

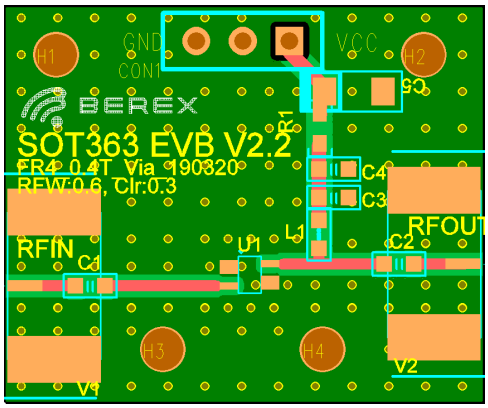
- LTE set-up: 3GPP LTE, FDD E-TM3.1, 20MHz BW, ±20MHz offset, PAR 9.75 at 0.01% Prob.

- 5G set-up: 3GPP 5G NR, 100MHz BW, ±100MHz offset, PAR 9.5 at 0.01% Prob.

V-I Characteristics



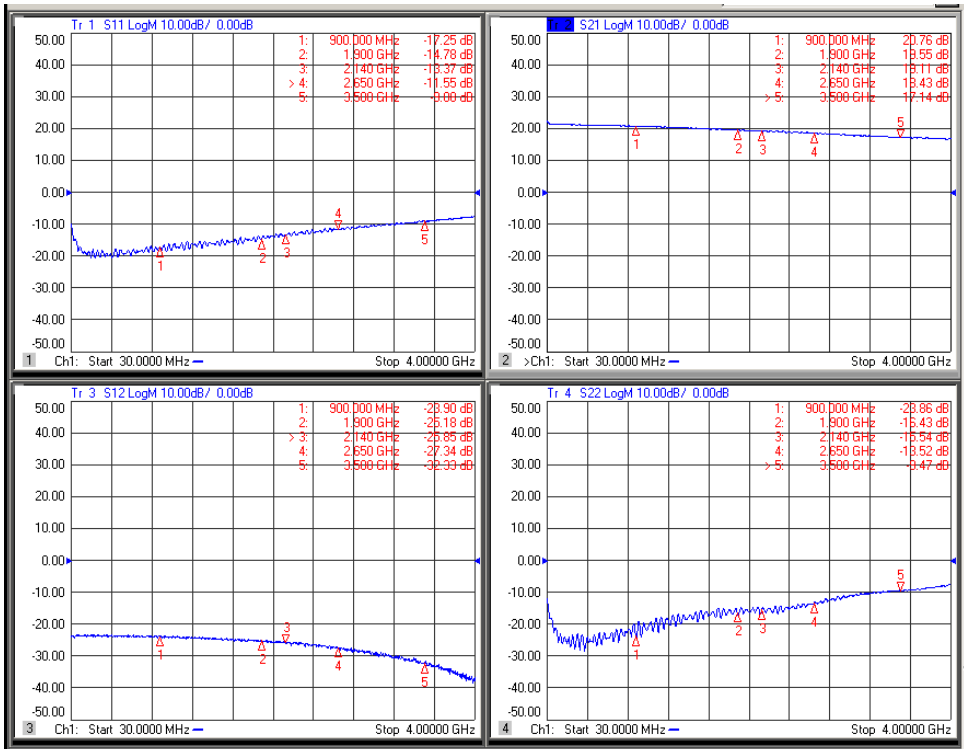
BeRex SOT-363 Evaluation Board



*Dielectric constant _ 4.6 *RF pattern width 0.6T *0.4T thick FR4 PCB

Typical Device Data

S-parameters (V_d=3.3V, I_d=69mA, T=25°C, Bias Tee Data)

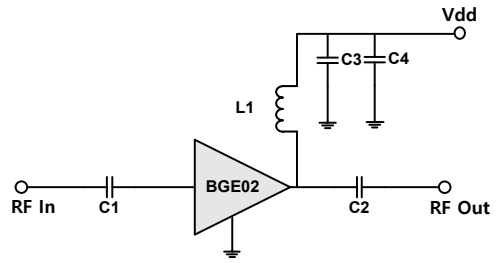


S-Parameter

(V_d = 3.3V, I_d = 69mA, T = 25 °C, calibrated to device leads, Bias Tee Data)

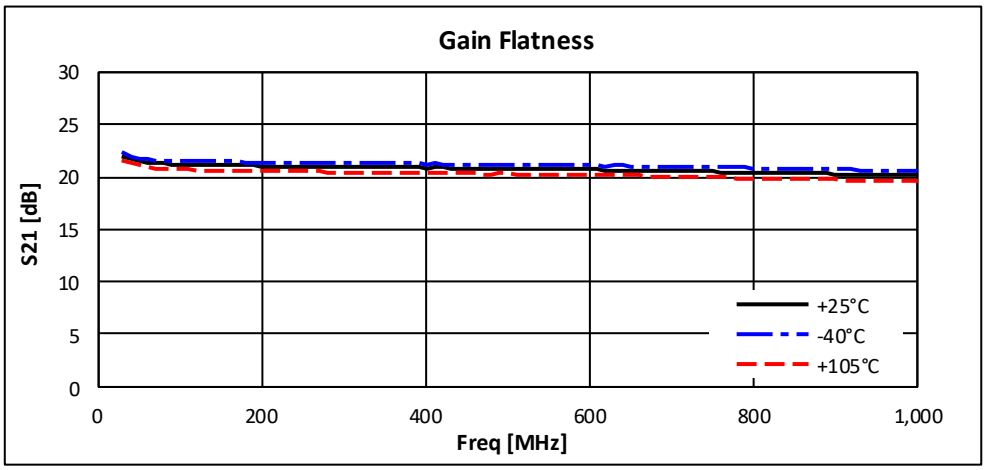
Freq [MHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
70	0.122	-0.132	-11.606	1.835	0.063	0.008	0.075	-0.097
500	0.069	-0.074	-10.491	3.996	0.065	-0.007	0.067	-0.004
900	0.028	-0.134	-8.816	6.392	0.062	-0.013	0.069	-0.019
1000	0.002	-0.153	-8.303	6.797	0.061	-0.015	0.085	-0.021
1500	-0.019	-0.154	-5.283	8.615	0.054	-0.023	0.122	-0.068
2000	-0.107	-0.179	-2.499	8.924	0.043	-0.028	0.123	-0.108
2500	-0.175	-0.162	0.249	8.638	0.033	-0.030	0.084	-0.178
3000	-0.242	-0.181	2.298	7.420	0.022	-0.029	0.026	-0.274
3500	-0.318	-0.158	3.725	6.129	0.006	-0.022	-0.073	-0.331
4000	-0.398	-0.109	5.009	4.467	-0.002	-0.014	-0.229	-0.348

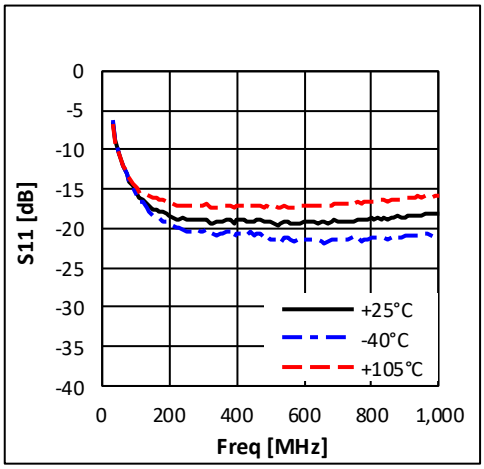
IF Application Circuit: 30 – 1000MHz

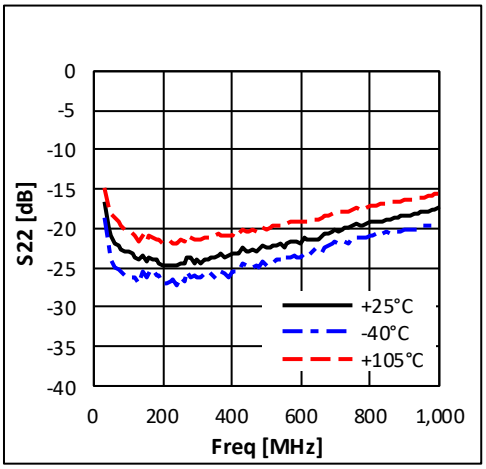
Schematic Diagram	BOM		Tolerance
	C1	1nF	± 5%
	C2	1nF	± 5%
	C3	100pF	± 5%
	C4	1uF	± 5%
	L1	680nH	± 5%

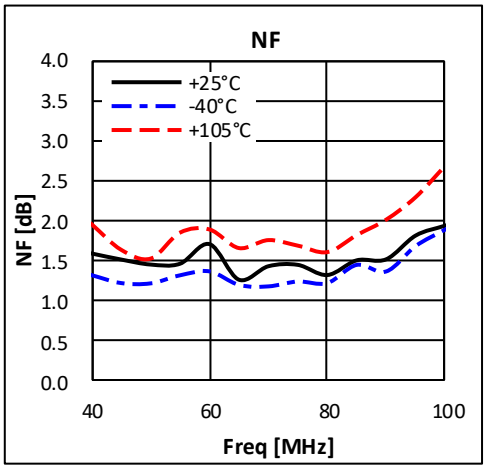
Typical Performance

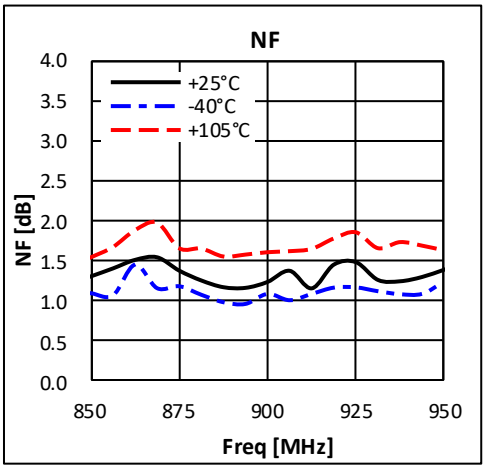
(V_d = 3.3V, I_d = 69mA, T=25°C)

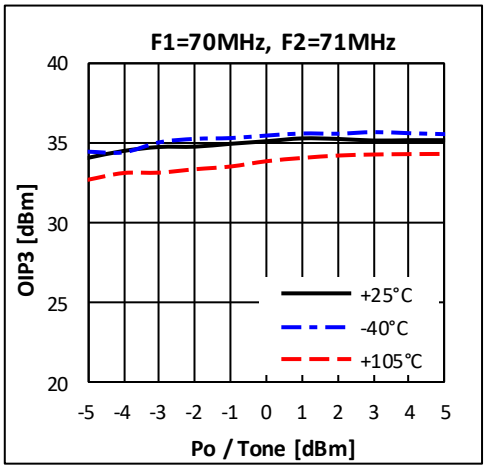


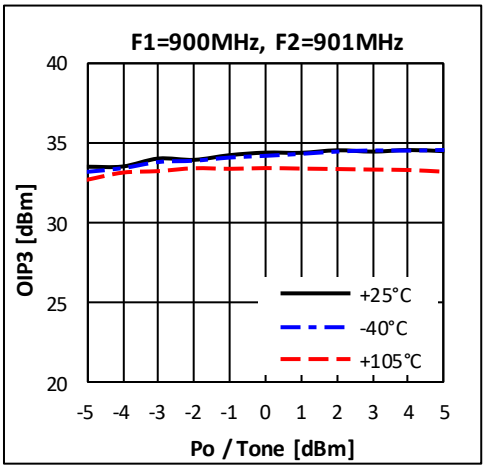


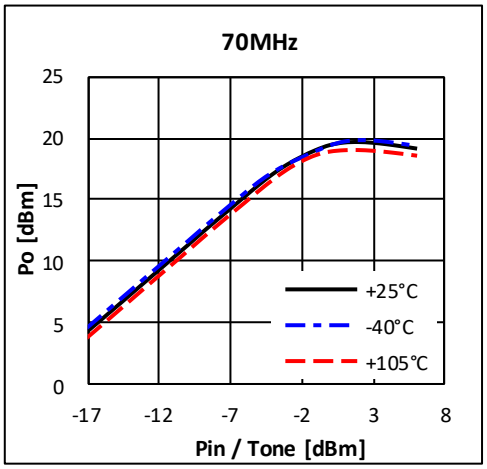


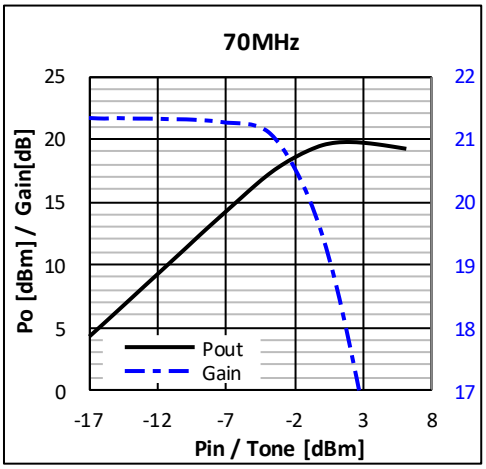


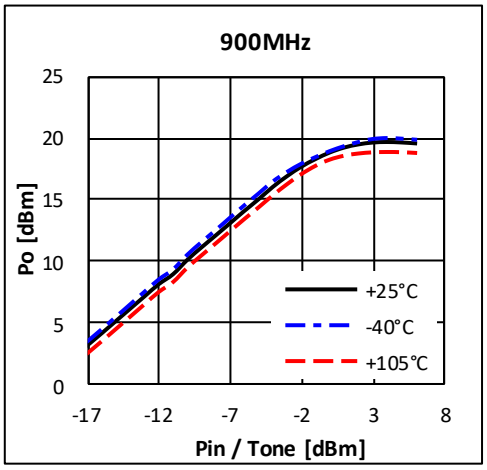


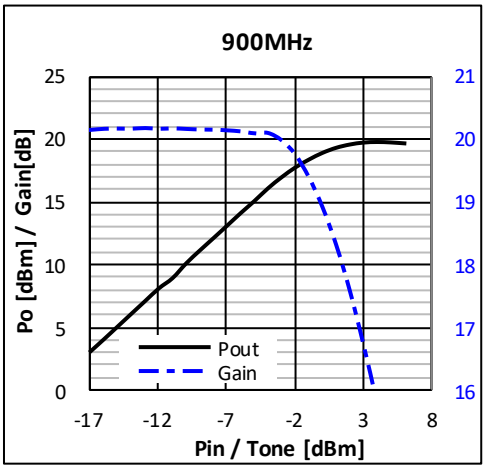


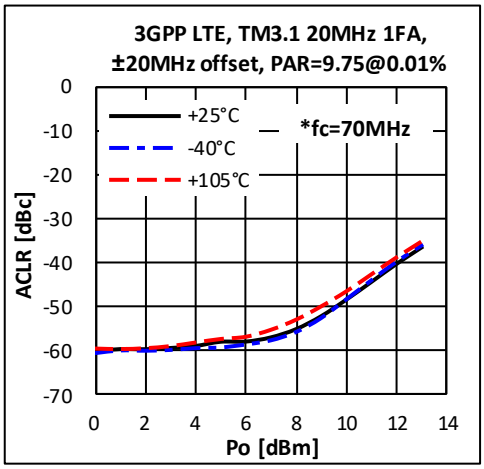


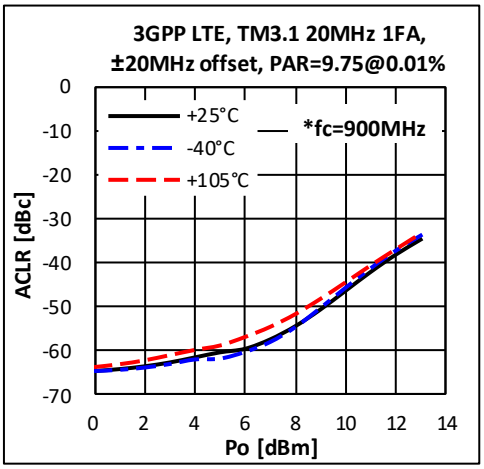


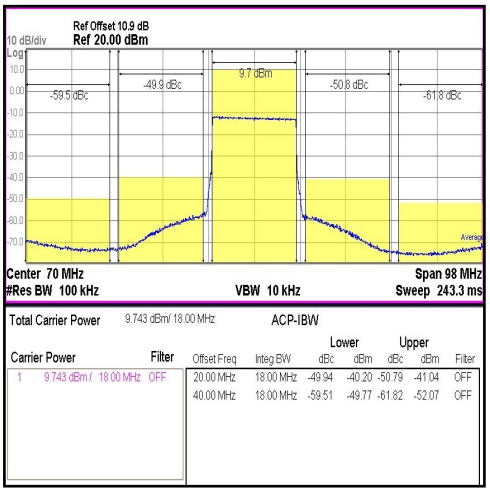


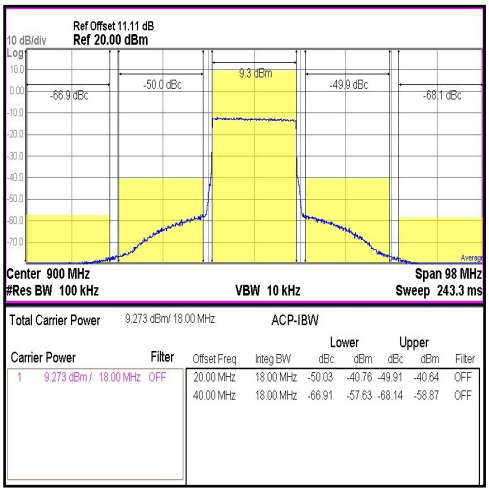




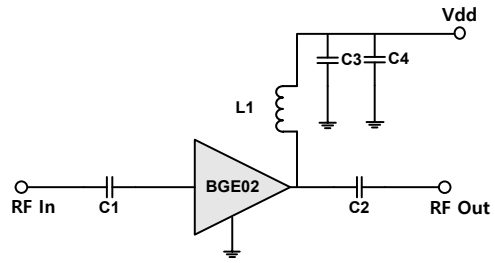






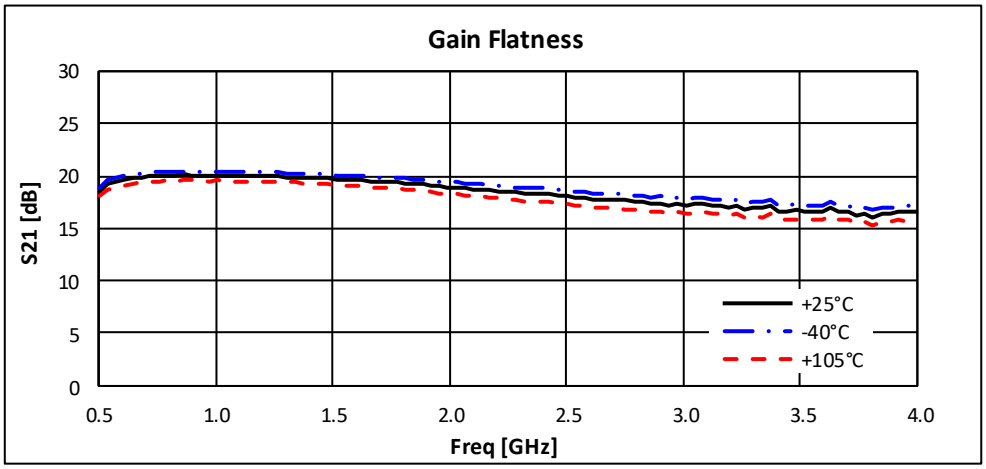


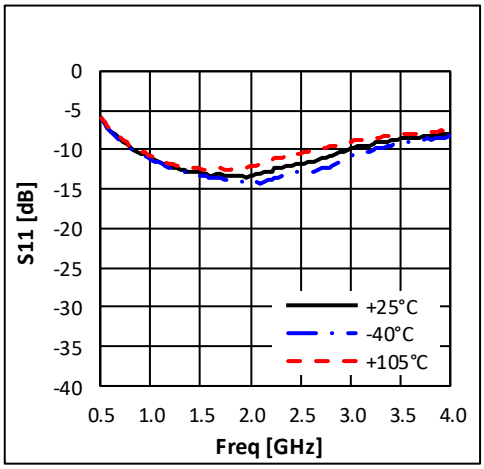
RF Application Circuit: 500 – 4000MHz

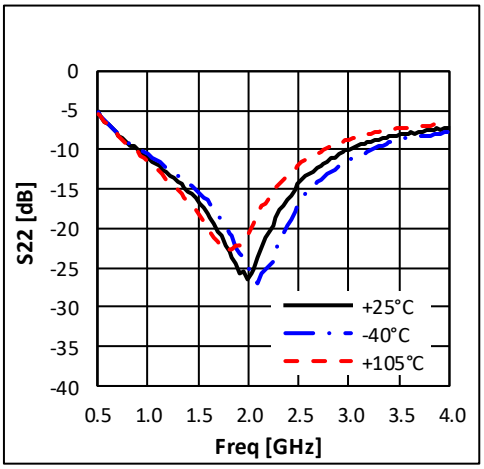
Schematic Diagram	BOM		Tolerance
	C1	100pF	± 5%
	C2	100pF	± 5%
	C3	100pF	± 5%
	C4	1uF	± 5%
	L1	12nH	± 5%

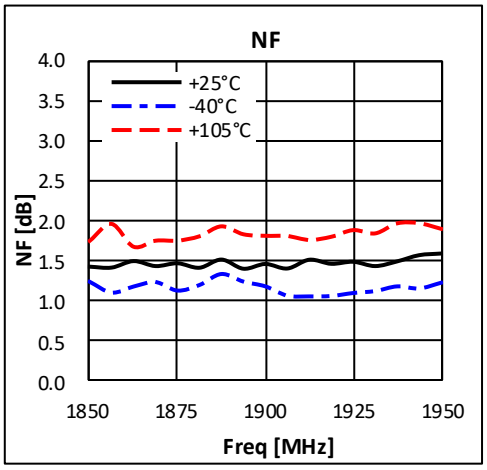
Typical Performance

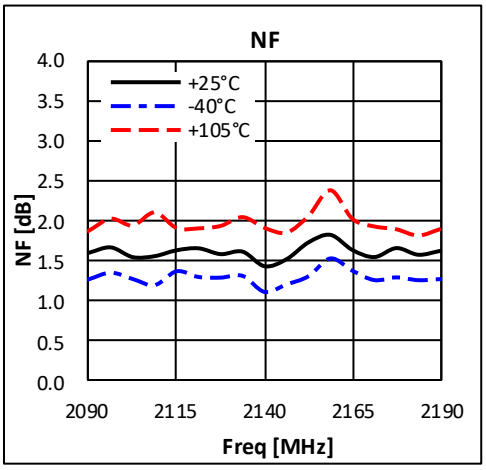
V_d = 3.3V, I_d = 69mA, T=25°C

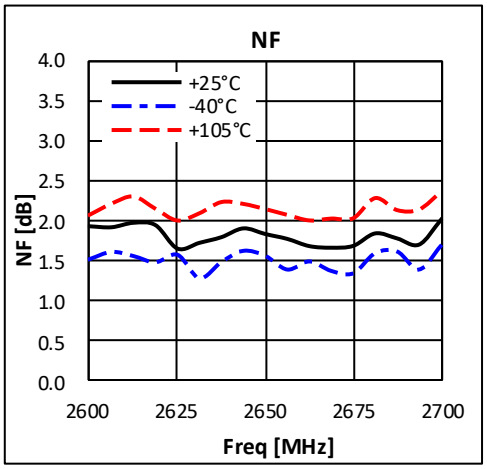


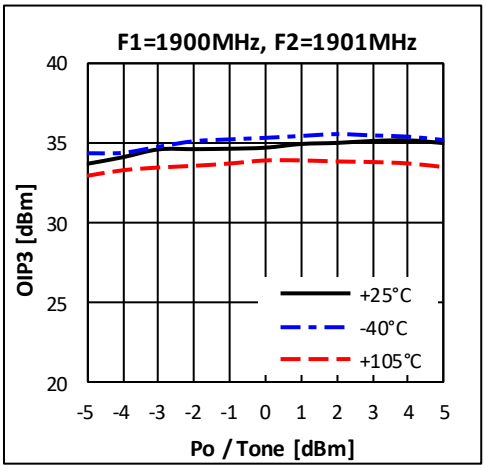


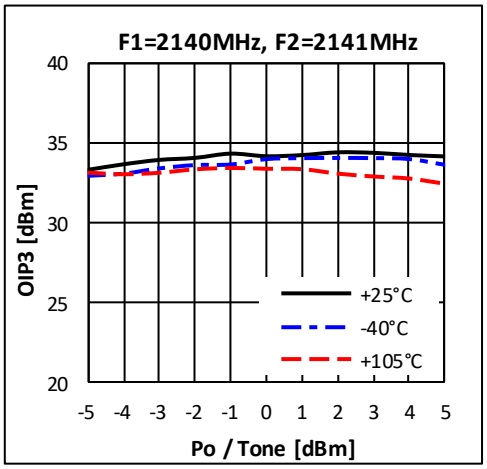


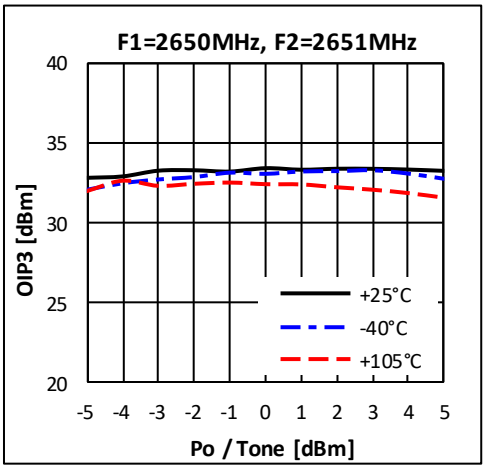


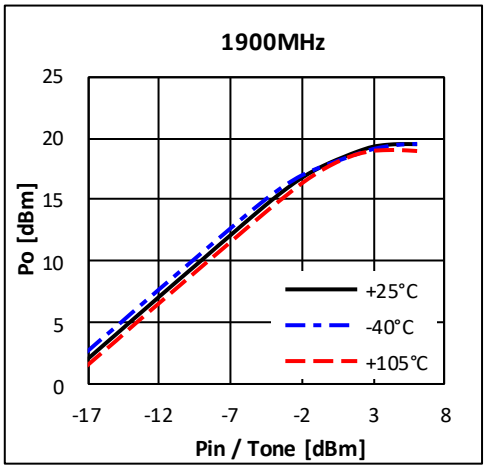


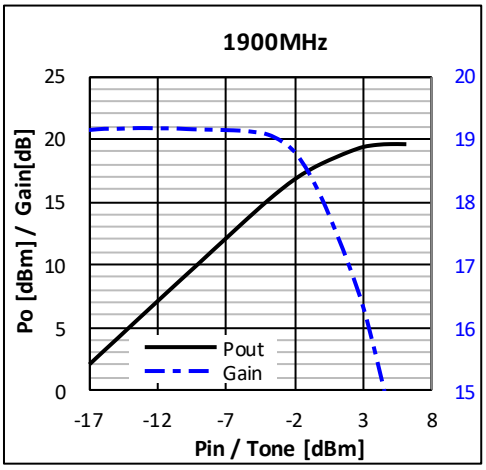


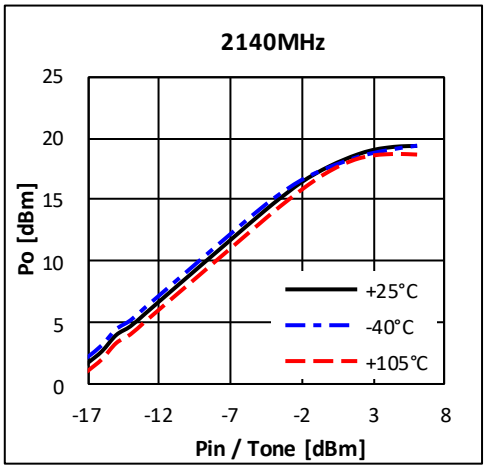


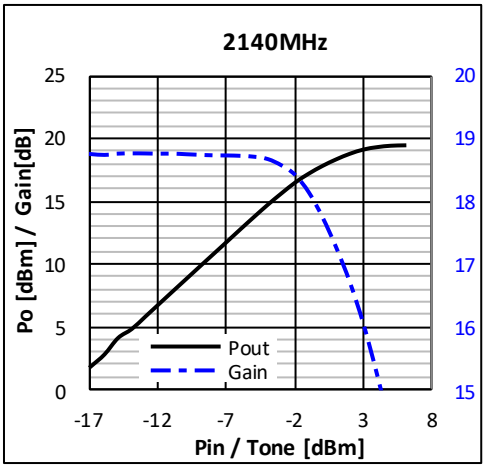


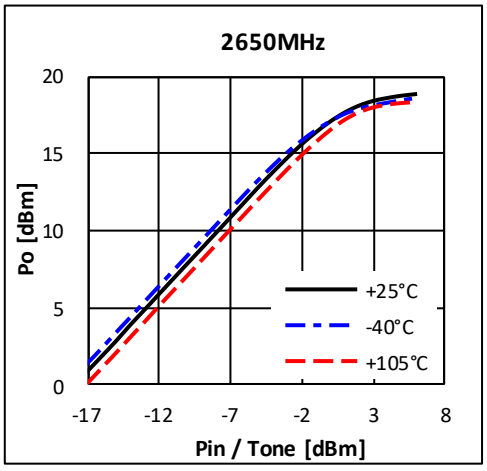


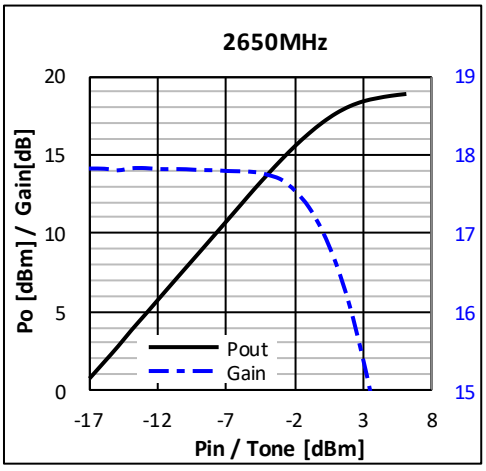


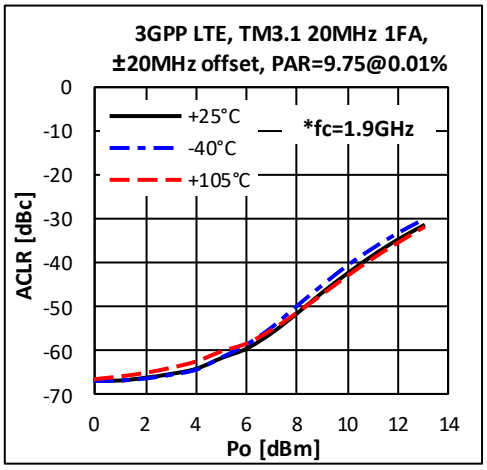


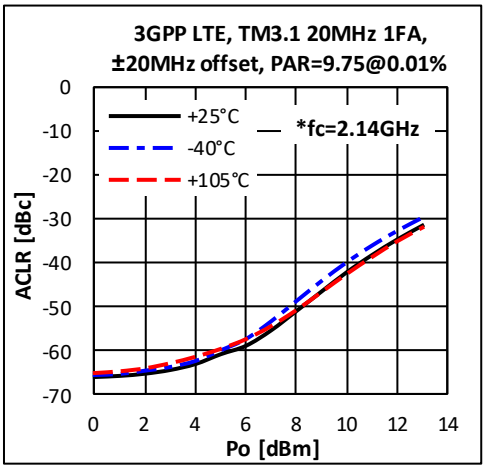


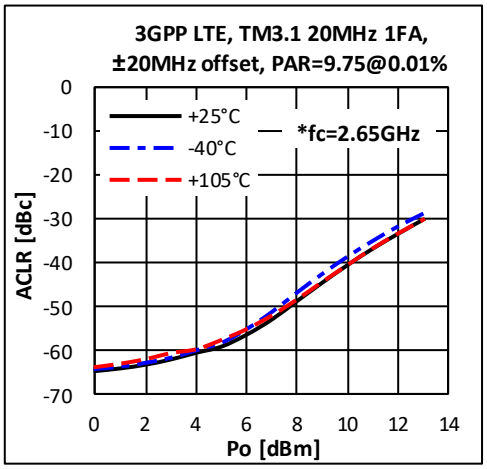


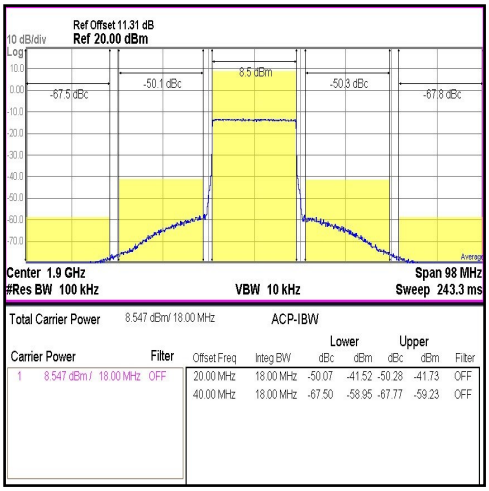


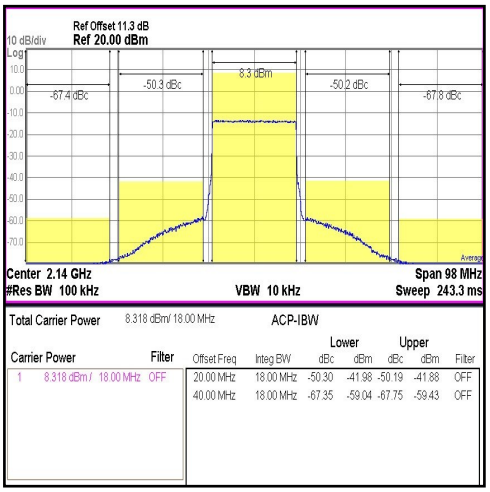


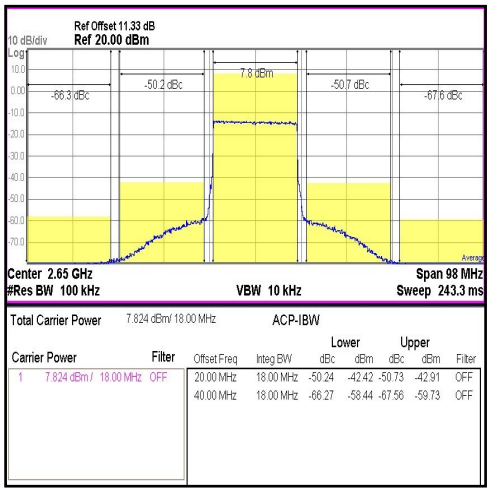




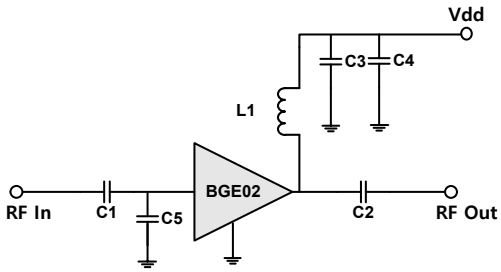






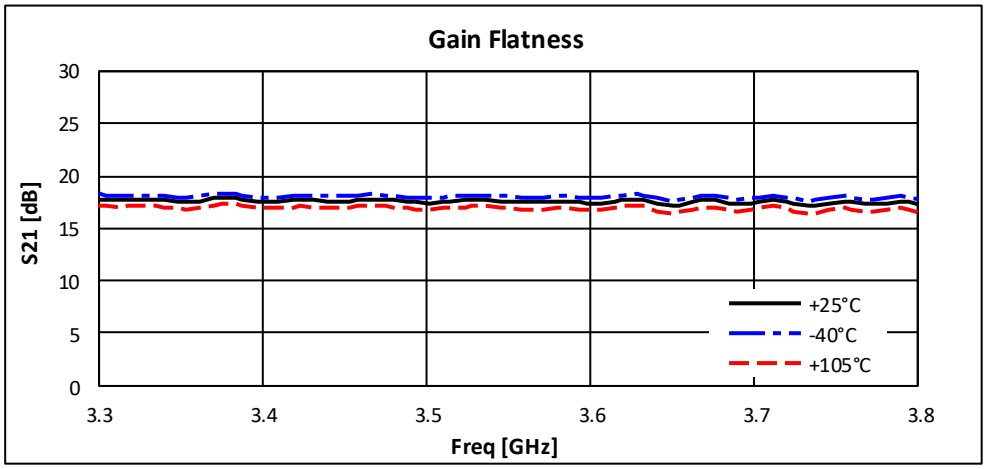


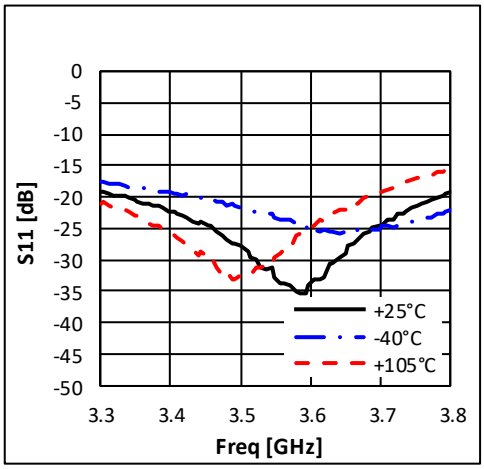
3.5GHz Application Circuit: 3000 – 4000MHz

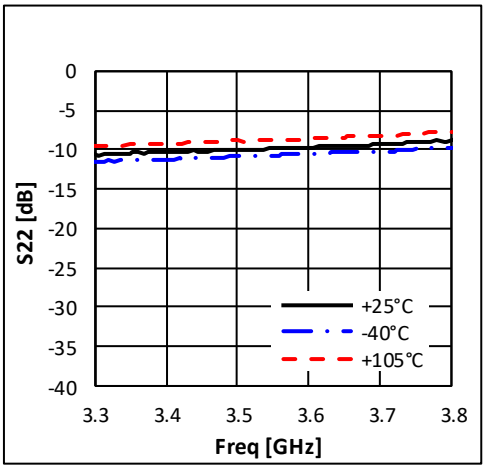
Schematic Diagram	BOM		Tolerance
	C1	10pF	± 5%
	C2	10pF	± 5%
	C3	100pF	± 5%
	C4	1uF	± 5%
	C5	0.5pF	± 5%
	L1	5.6nH	± 5%

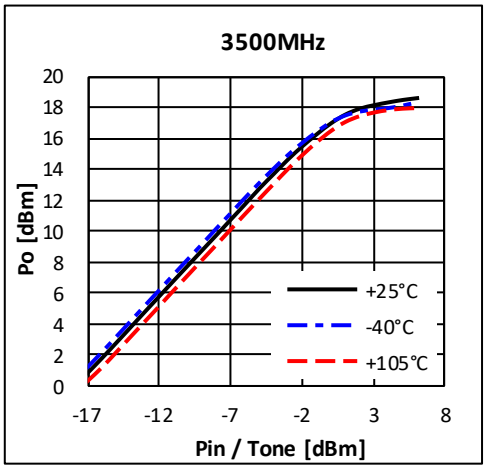
Typical Performance

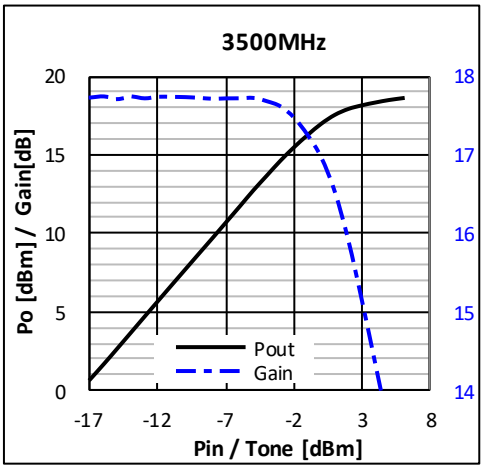
V_d = 3.3V, I_d = 69mA, T=25°C

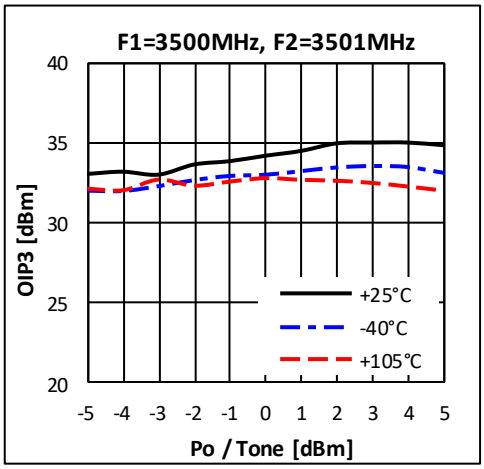


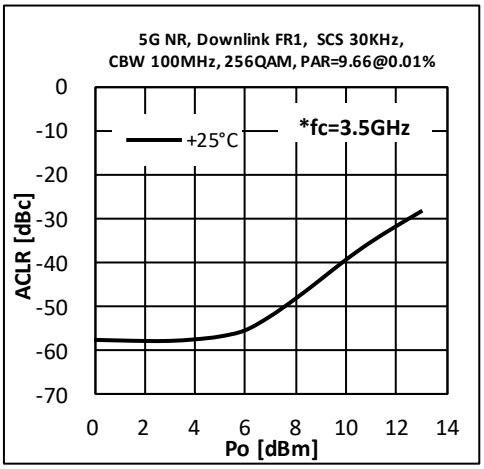


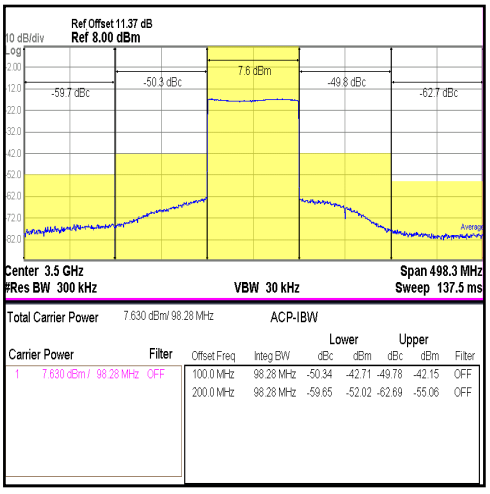


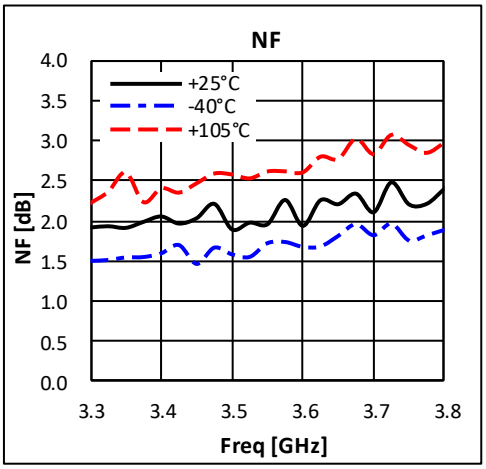




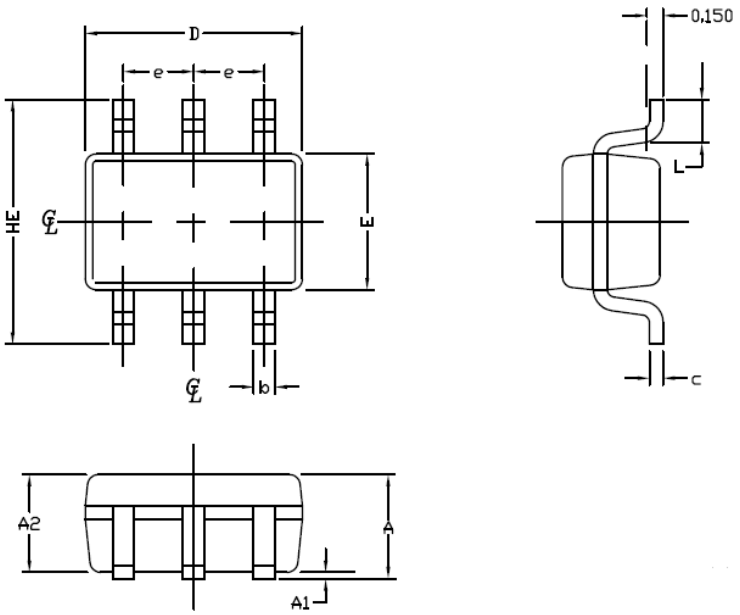








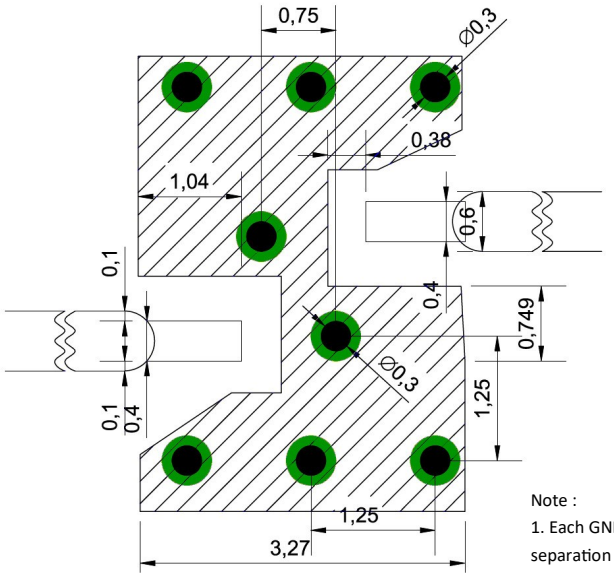
Package Outline Dimension



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

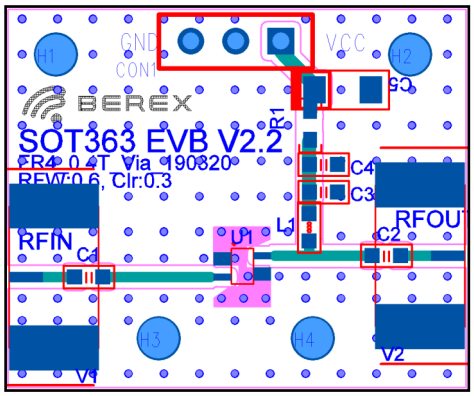
Suggested PCB Land Pattern and PAD Layout

PCB Land Pattern



Note :
1. Each GND PAD(PIN# 1,2,4,5) separation by silk line

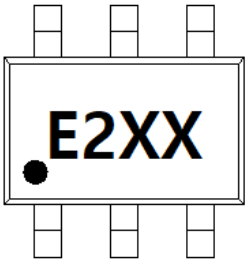
PCB Mounting



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

Package Marking

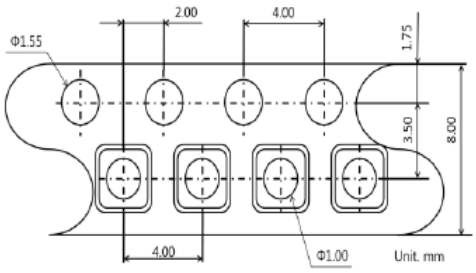


XX = Wafer No.

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

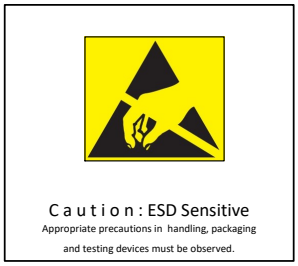
Lead plating finish

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 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