

Device Features

- OIP3 = 28.7 dBm @ 1900 MHz
- Gain = 16.2 dB @ 1900 MHz
- Output P1 dB = 16.6dBm @ 1900 MHz
- 50 Ω Cascadable
- Patented temperature compensation
- RoHS2-compliant SOT-89 SMT package



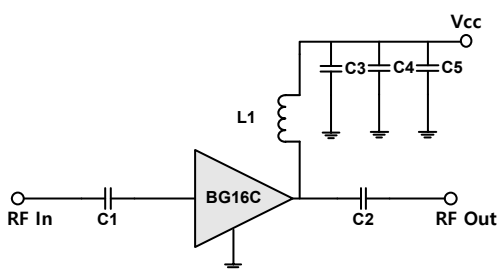
Product Description

BeRex's BG16C is a high performance InGaP/ GaAs HBT MMIC amplifier, internally matched to 50 Ohms and uses a patented **temperature compensation** circuit to provide stable current over the operating temperature range without the need for external components. The BG16C is designed for high linearity gain block applications that require **low power consumption** at 5V. It is packaged in a RoHS2-compliant with SOT-89 surface mount package.

Applications

- Base station Infrastructure/RFID
- Commercial/Industrial/Military wireless system

Applications Circuit



*C1, C2, C3 =100 pF ± 5%; C4 = 1000 pF ± 5%; C5 = 10uF; L1 = 33nH ±5%

*Less than 20nH improves RF performance at over 1.9GHz.

*40nH or higher value L1 improves RF performance at under 500MHz.

*Optimum value of L1 may vary with board design.

Electrical Specifications

Device performance : measured on a BeRex evaluation board at 25°C, Vc=5V, 50 Ω system.

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		5		4000	MHz
Test Frequency			1900		MHz
Gain		14.7	16.2		dB
Input Return Loss			-22.6		dB
Output Return Loss			-17.5		dB
Output IP3	3 dBm / tone , Δf=1 MHz	25.7	28.7		dBm
Output P1dB		15.6	16.6		dBm
Noise Figure			4.9		dB

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Bandwidth	5		4000	MHz
I _c @ (V _c = 5V)	34	42	50	mA
V _c	4.5	5	5.25	V
dG/dT		-0.004		dB/°C
R _{TH}		50		°C/W
Operating Case Temperature	-40		+85	°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	120	mA
Input RF Power	23	dBm

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

Typical Performance (Vc=5V, Ic=42mA, T=25°C)

Parameter	70	500	900	1900	2140	2450	3000	3500	MHz
Gain	19.9	17.4	17.1	16.2	15.9	15.3	14.5	14.1	dB
S11	-10.3	-23.8	-13.8	-22.6	-26.7	-20.0	-16.2	-17.5	dB
S22	-9.2	-16.1	-13.1	-17.5	-16.4	-14.5	-13.6	-15.7	dB
OIP3	27.5	27.0	29.7	28.7	28.1	27.3	26.1	25.0	dBm
P1dB	15.2	15.0	15.7	16.6	15.3	15.6	13.9	13.1	dBm
LTE 20M ACLR*	3.8	4.0	4.8	5.5	4.9	4.1	3.1	-	dBm
5G NR ACLR*	-	-	-	-	-	-	-	1.2	dBm
Noise Figure	4.3	4.6	4.7	4.8	4.9	4.9	4.9	5.0	dB

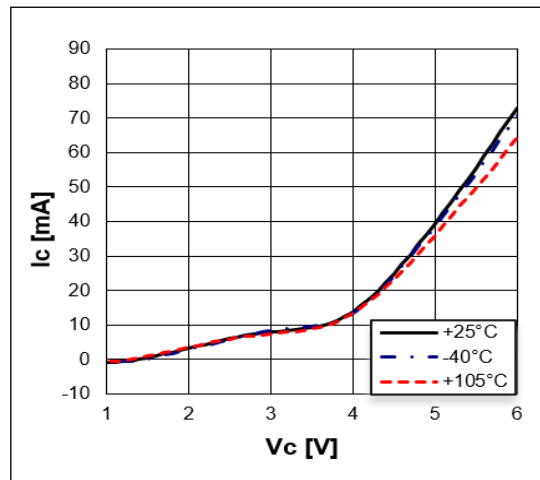
*ACLR Channel Power measured at -50dBc.

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

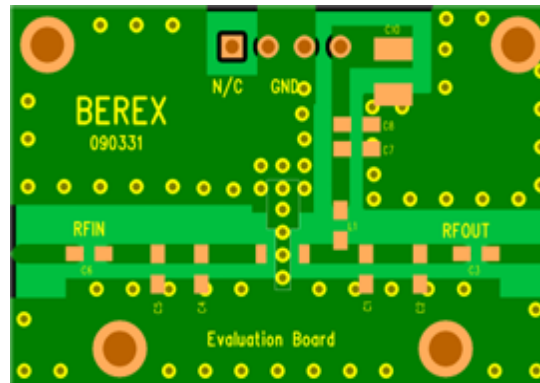
- 5G set-up: 3GPP 5G NR, 100MHz BW, ±100MHz offset, PAR 9.5 at 0.01% Prob.

*NF : Losses on input and output transmission lines on PCB are not de-embedded

V-I Characteristics



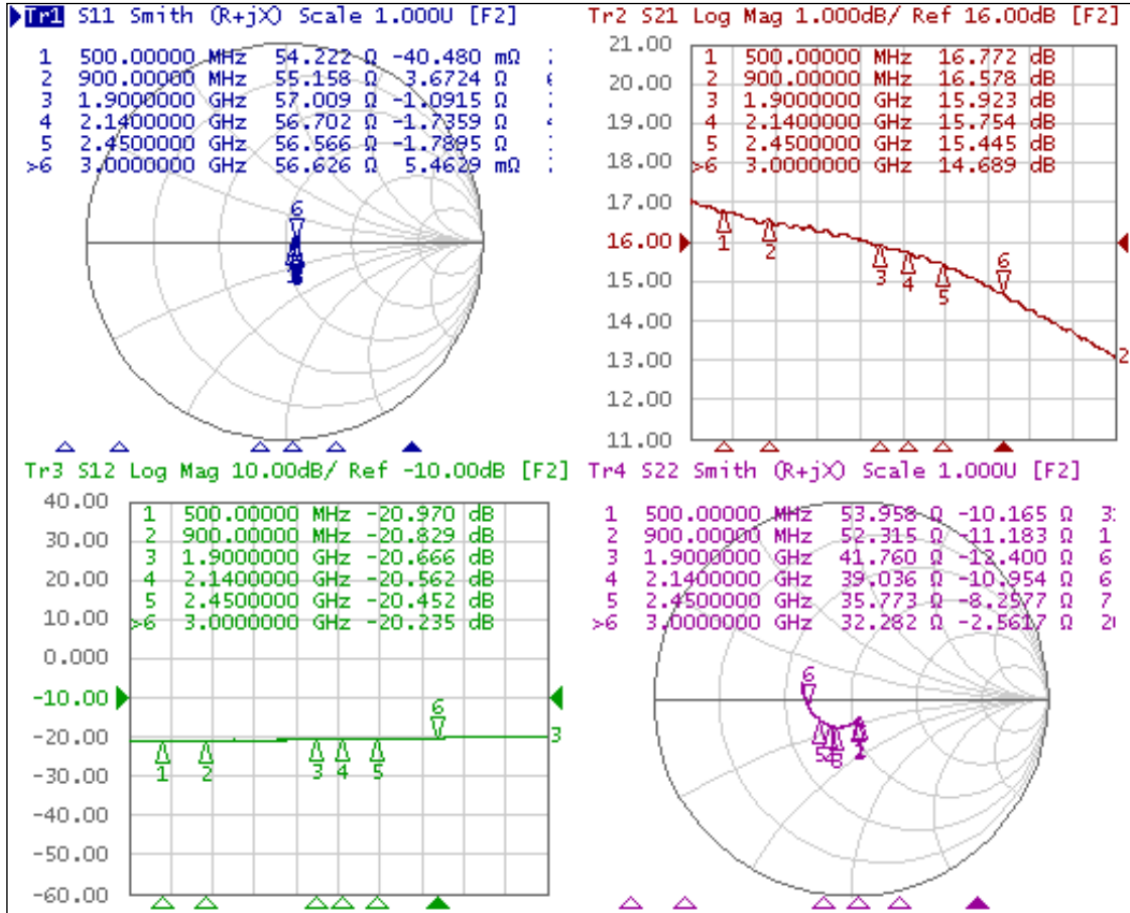
BeRex SOT-89 Evaluation Board



*Dielectric constant : 4.2 *RF pattern width 52mil *31mil thick FR-4 PCB

Typical Device Data

S-parameters (Vc=5V, Ic=42mA, T=25°C)

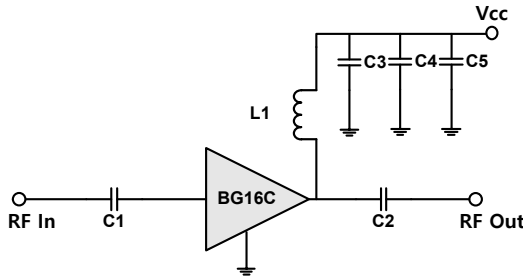


S-Parameters

(Vdevice = 5.0V, Icc = 42mA, T = 25 °C, calibrated to device leads)

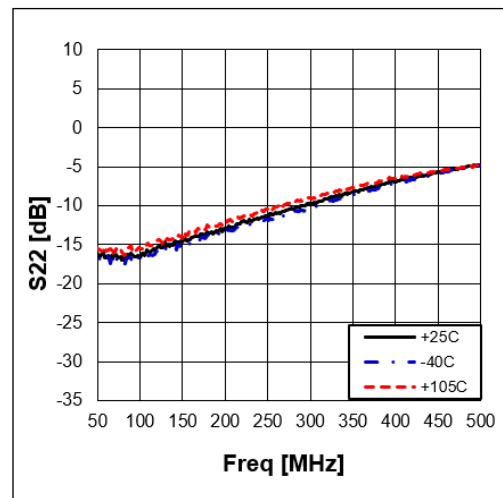
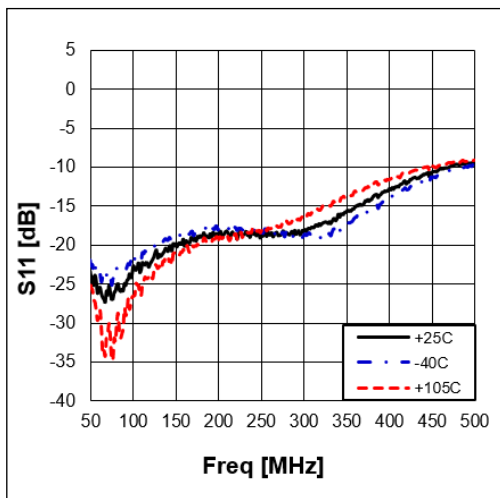
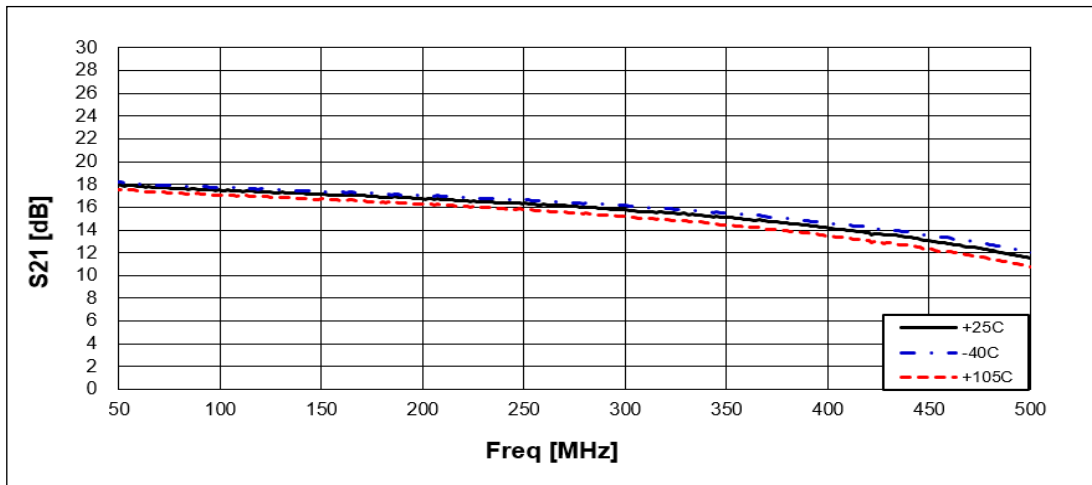
Freq [MHz]	S11 [Mag]	S11 [Ang]	S21 [Mag]	S21 [Ang]	S12 [Mag]	S12 [Ang]	S22 [Mag]	S22 [Ang]
100	0.27	-48.34	7.45	164.26	0.08	15.88	0.30	-57.97
500	0.04	-17.09	6.95	154.73	0.09	0.42	0.11	-66.65
1000	0.07	15.07	6.70	136.05	0.09	-4.86	0.11	-75.13
1500	0.08	5.45	6.43	116.30	0.09	-9.04	0.14	-94.73
2000	0.07	-11.98	6.17	96.40	0.09	-12.26	0.17	-121.53
2500	0.06	-20.51	5.85	76.41	0.09	-16.42	0.19	-148.25
3000	0.06	-5.72	5.42	55.95	0.10	-20.71	0.21	-169.47
3500	0.06	-4.39	4.91	37.65	0.10	-25.68	0.24	173.32
4000	0.05	-26.28	4.50	20.16	0.10	-30.31	0.26	161.69

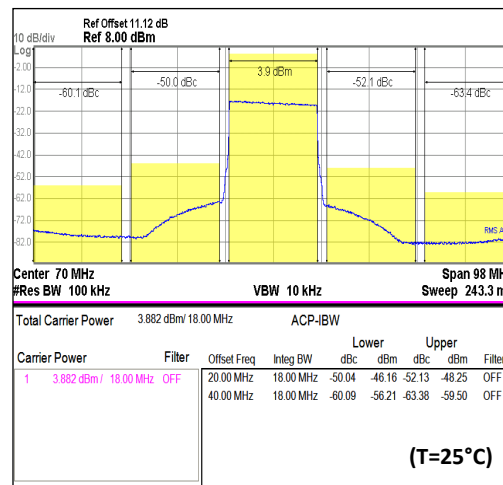
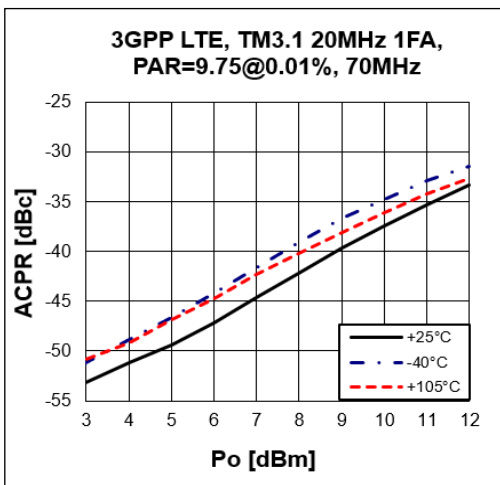
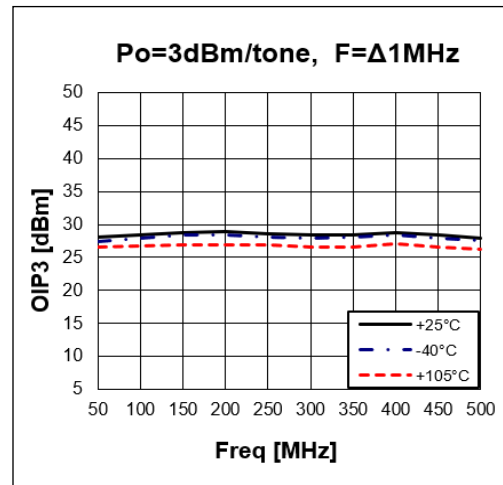
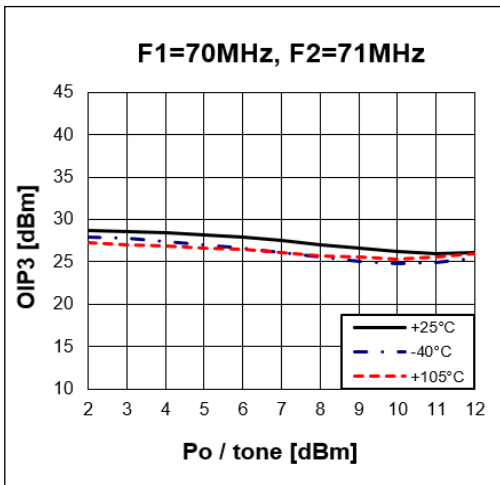
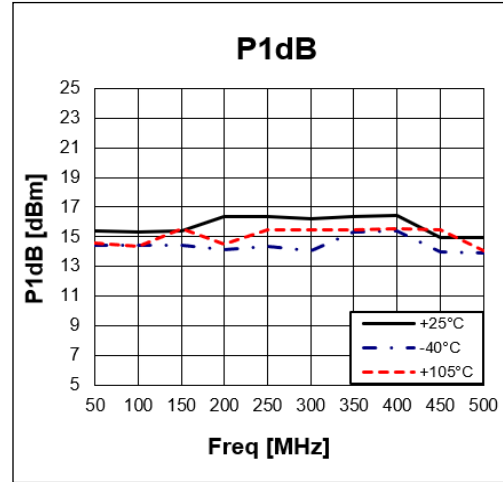
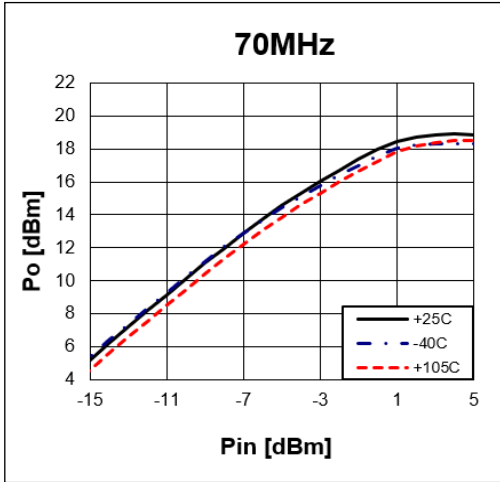
Application Circuit: 5 – 500MHz

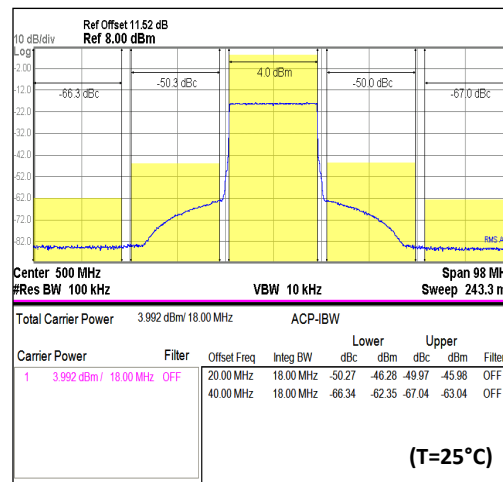
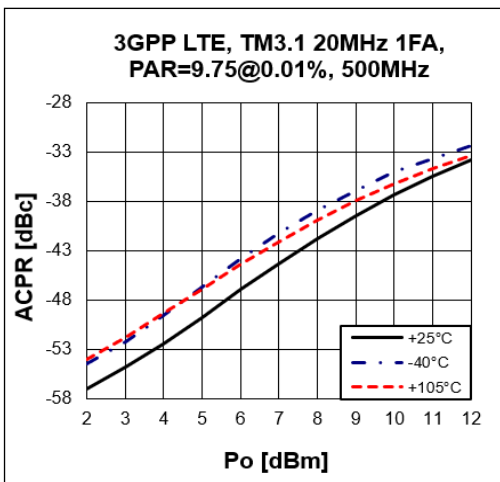
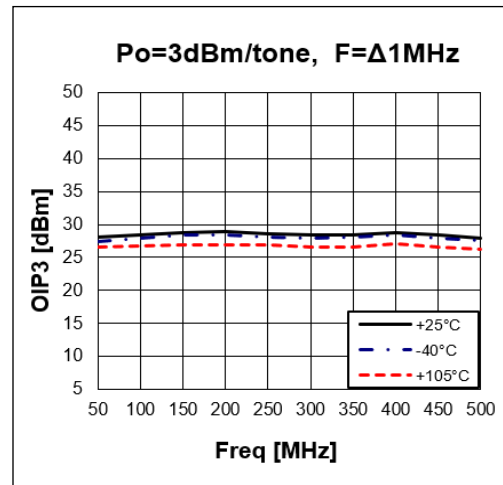
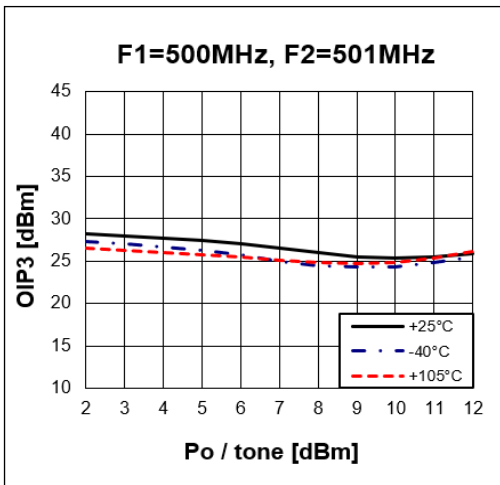
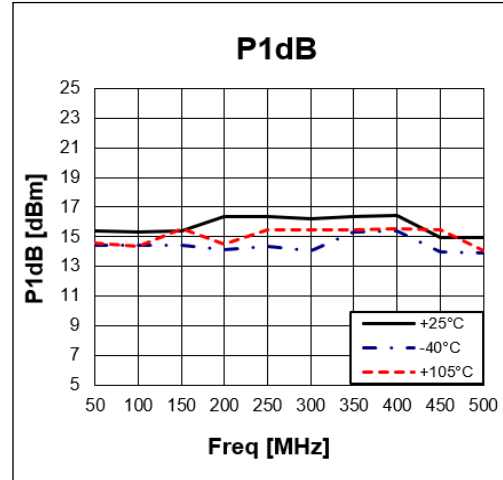
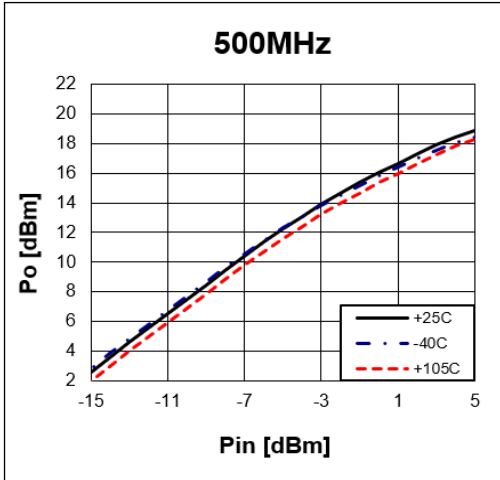
Schematic Diagram		BOM	Tolerance
	C1	10nF	± 5%
	C2	10nF	± 5%
	C3	100pF	± 5%
	C4	1nF	± 5%
	C5	10uF	± 5%
	L1	820nH	± 5%

Typical Performance

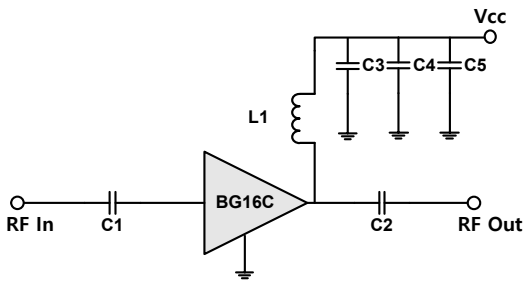
$V_c = 5V, I_c = 42mA, T = 25^\circ C$





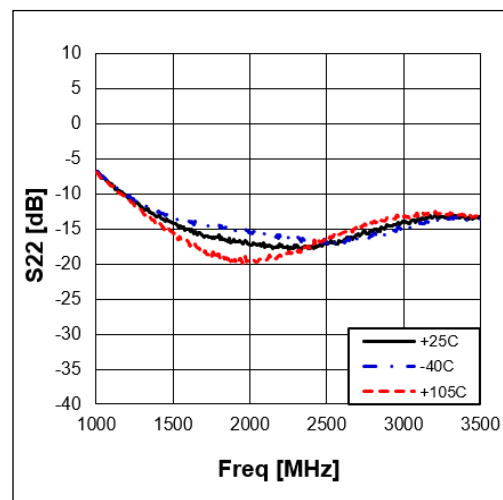
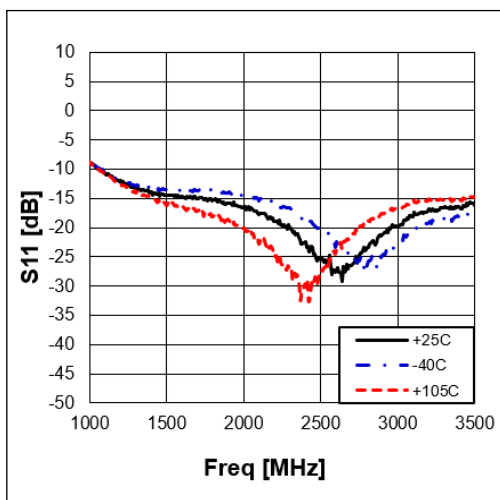
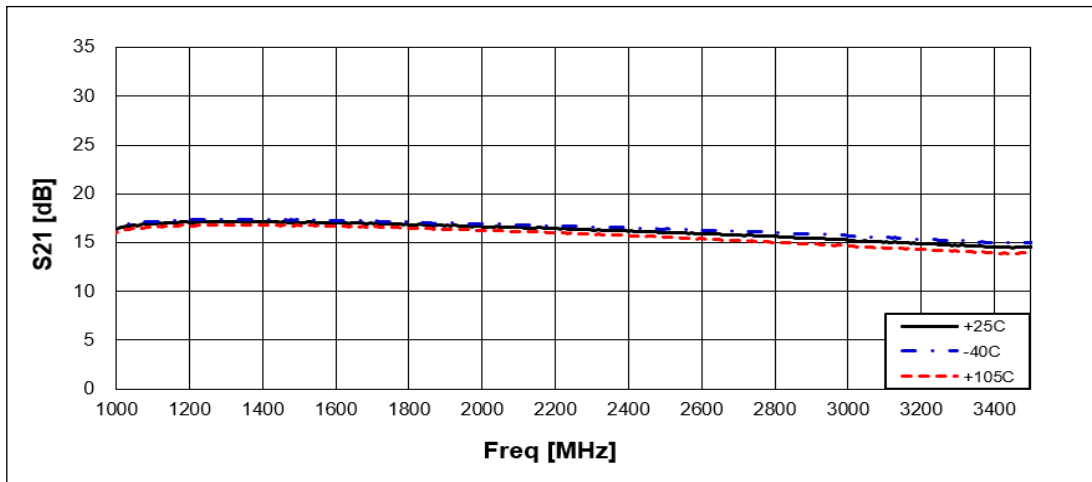


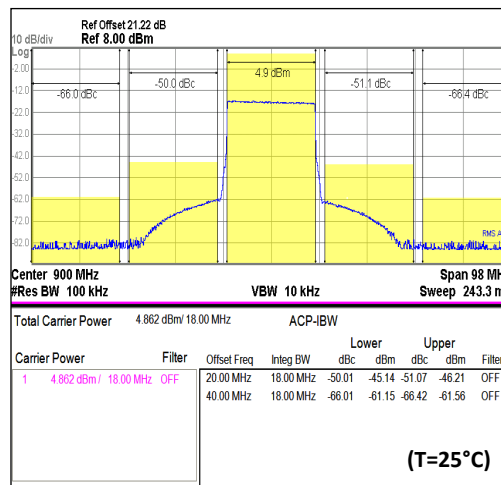
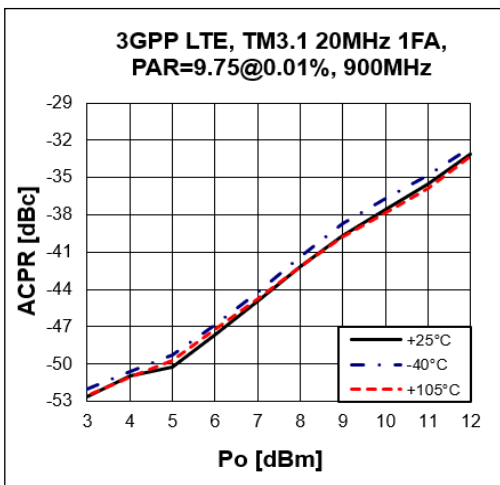
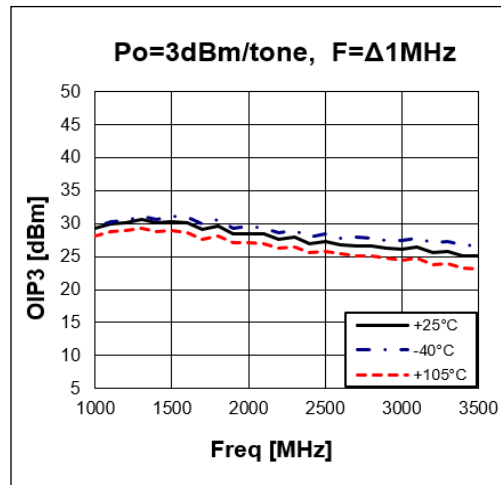
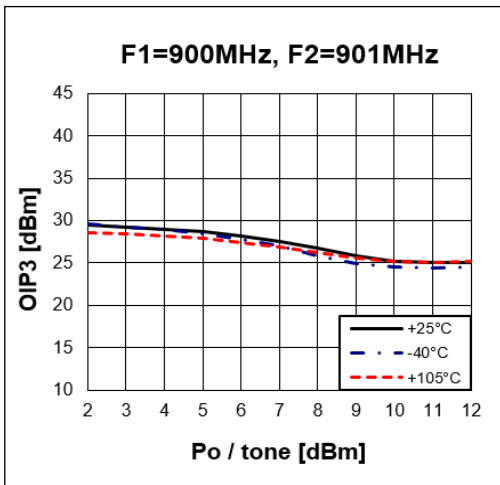
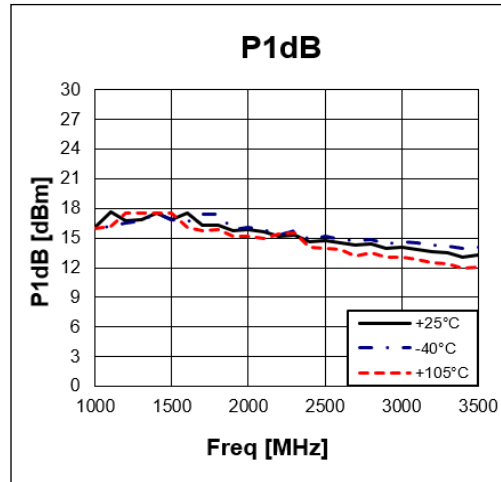
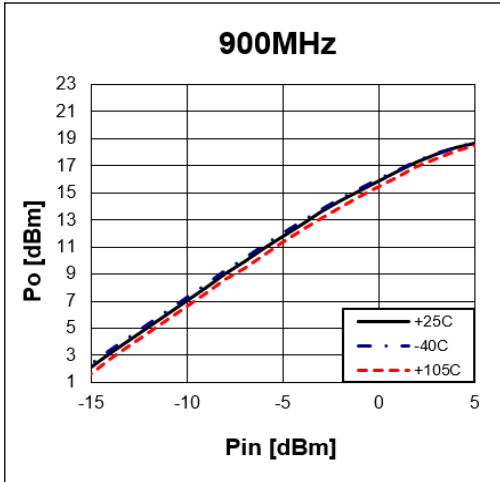
Application Circuit: 900 – 3500MHz

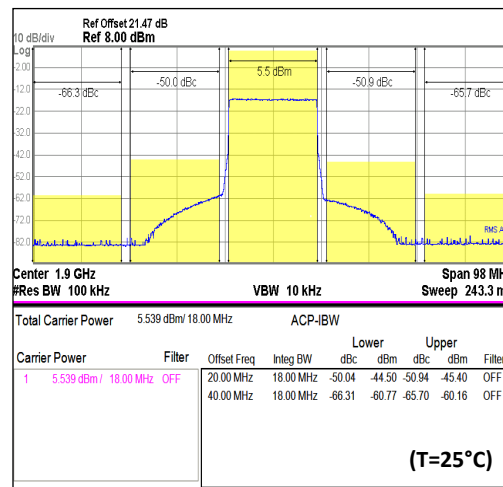
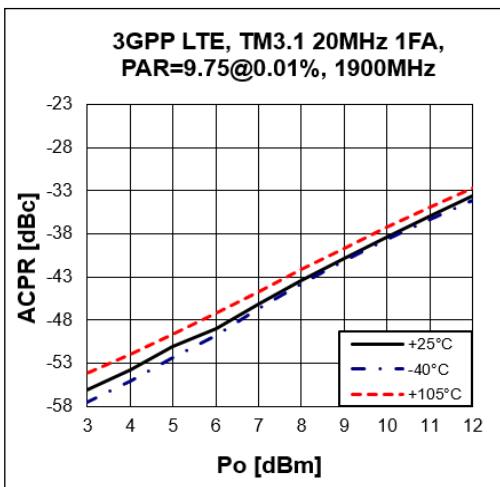
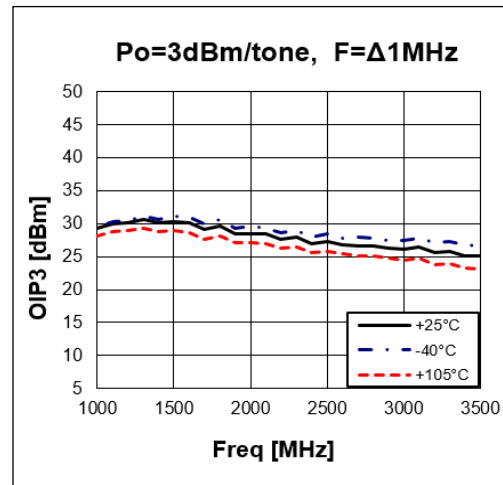
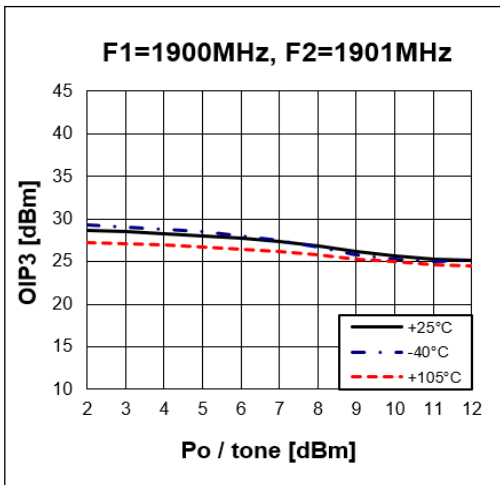
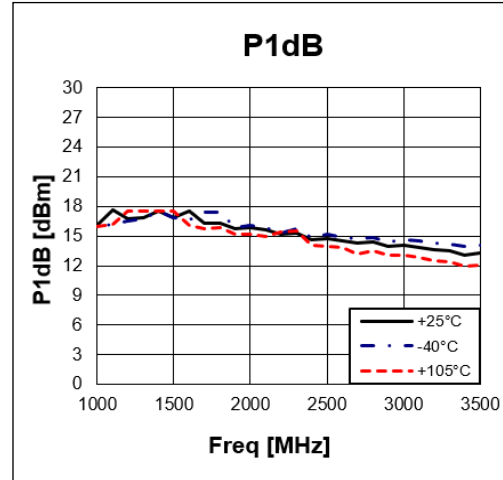
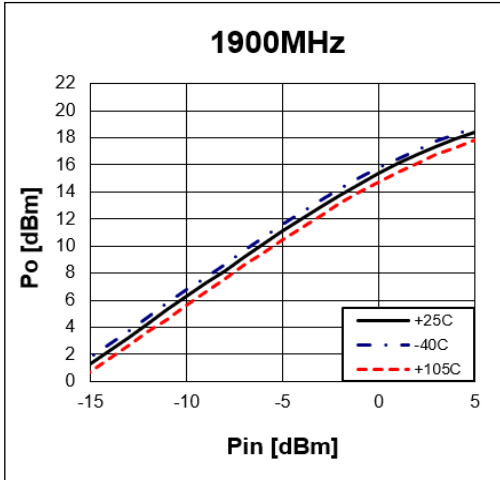
Schematic Diagram		BOM		Tolerance	
		C1	100pF	± 5%	
		C2	100pF	± 5%	
		C3	100pF	± 5%	
		C4	1nF	± 5%	
		C5	10uF	± 5%	
		L1	33nH	± 5%	

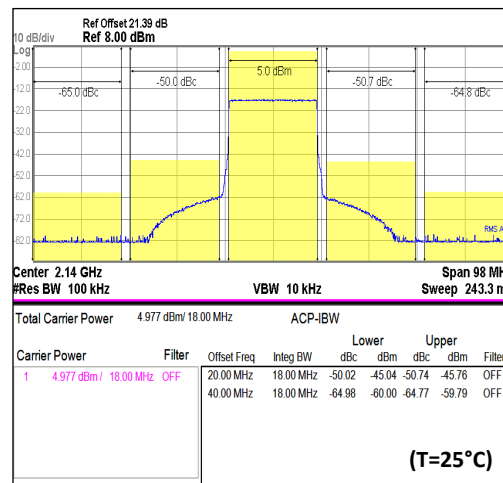
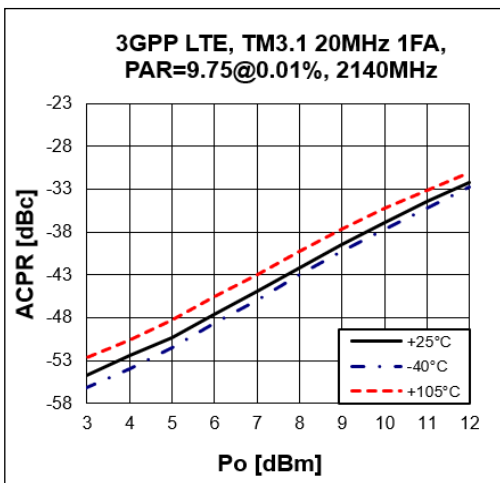
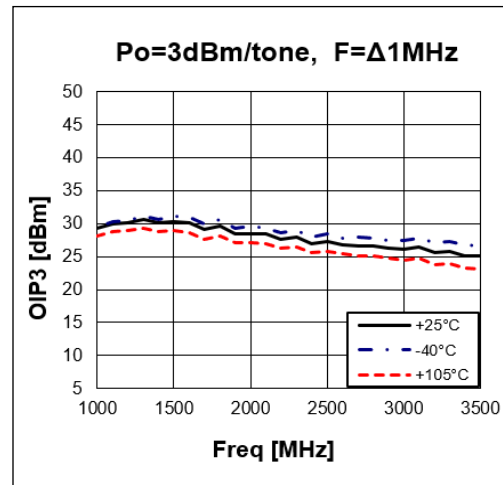
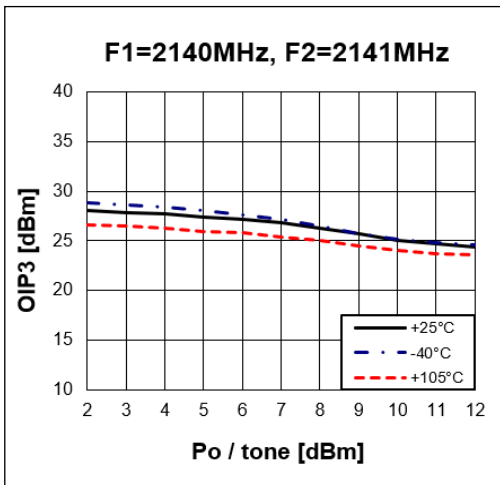
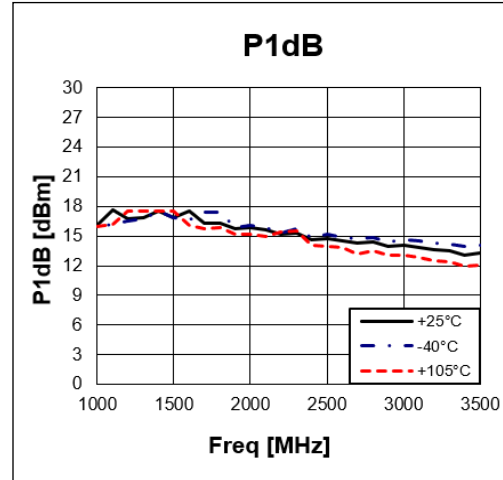
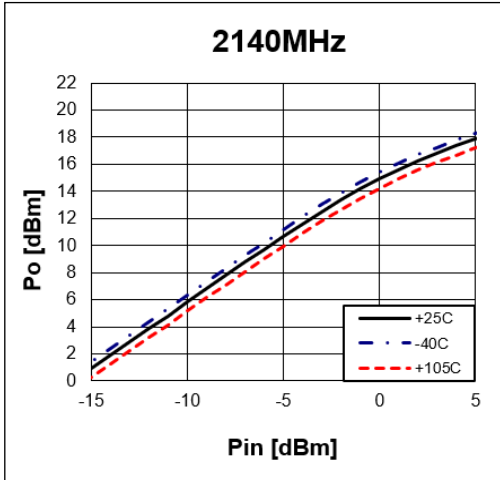
Typical Performance

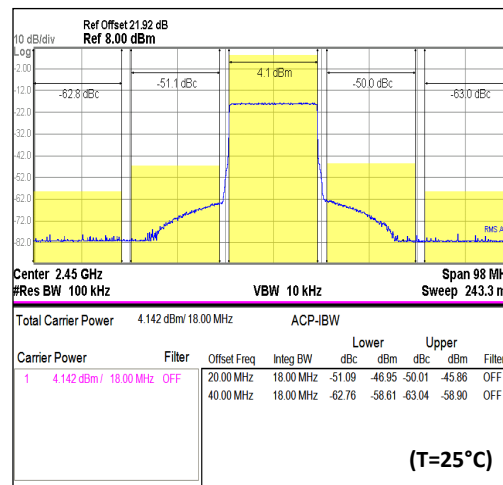
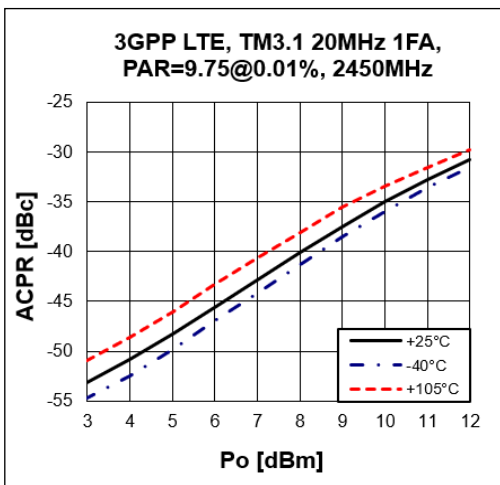
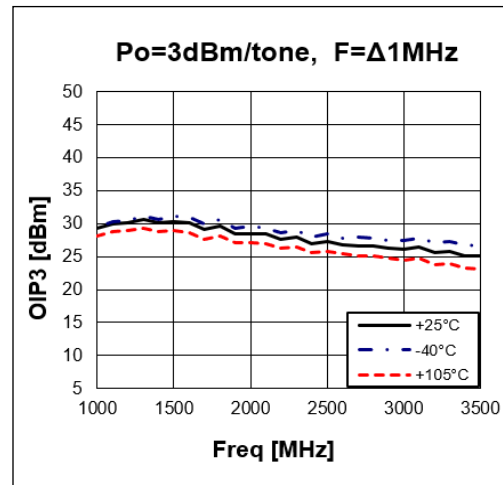
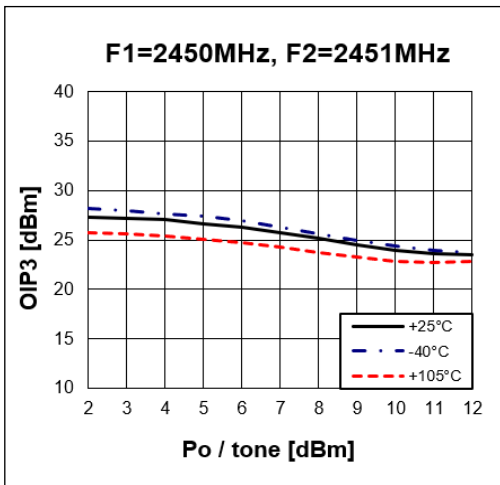
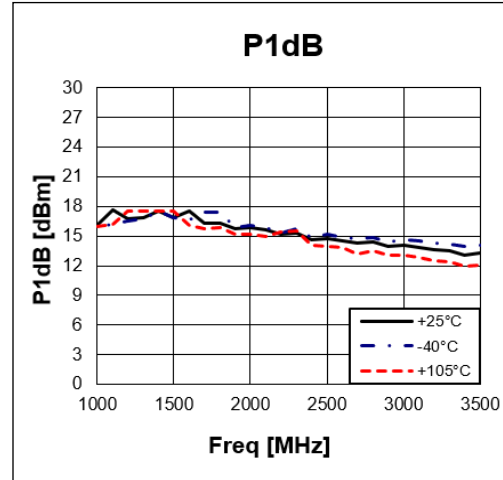
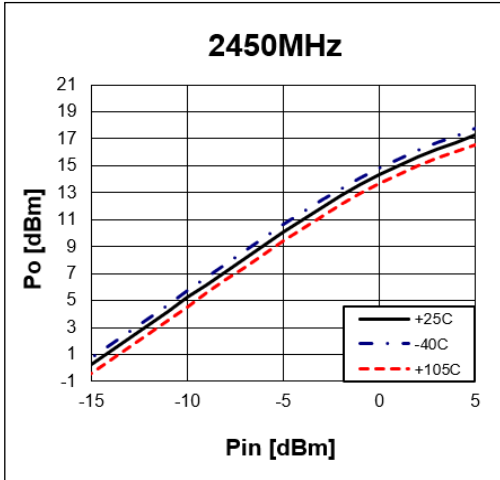
$V_c = 5V, I_c = 42mA, T=25^\circ C$

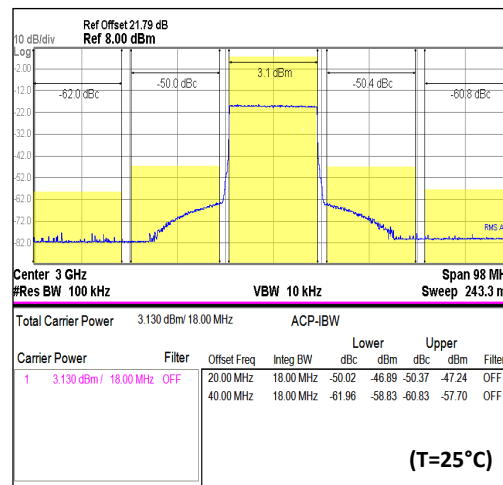
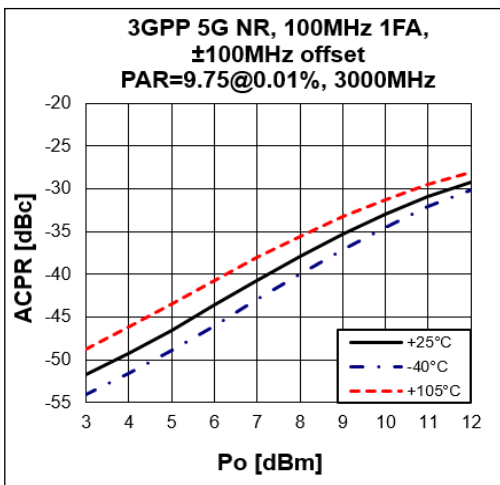
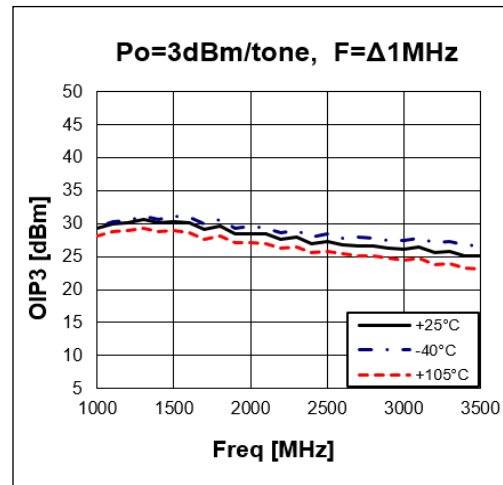
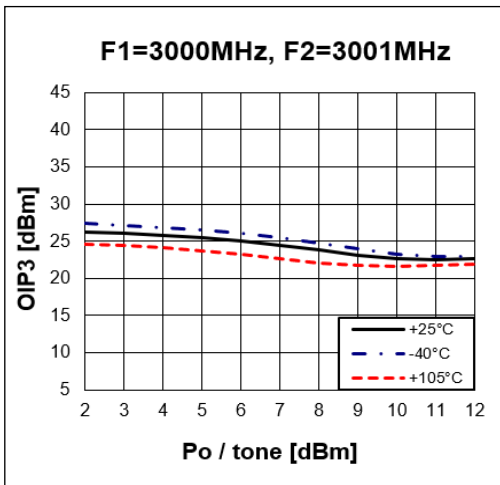
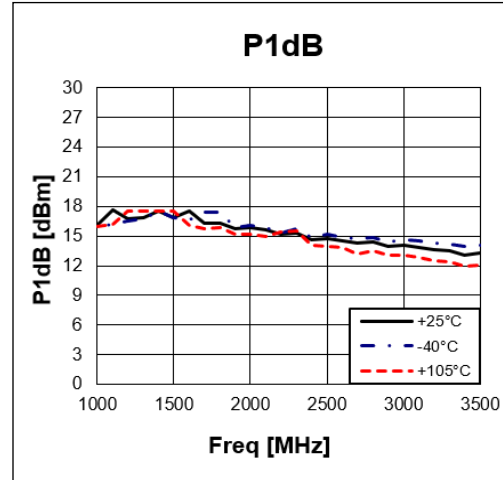
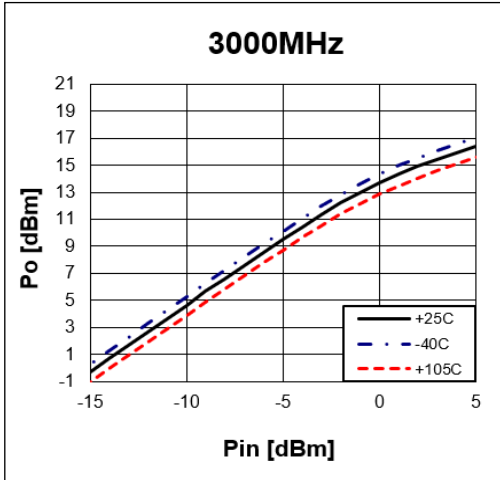


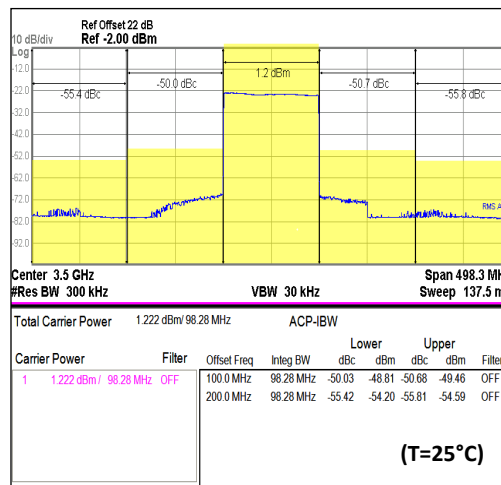
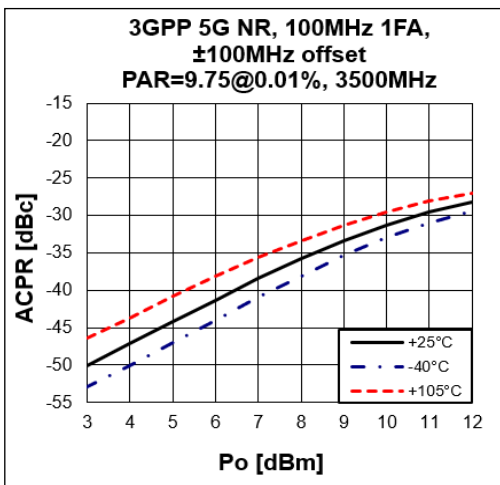
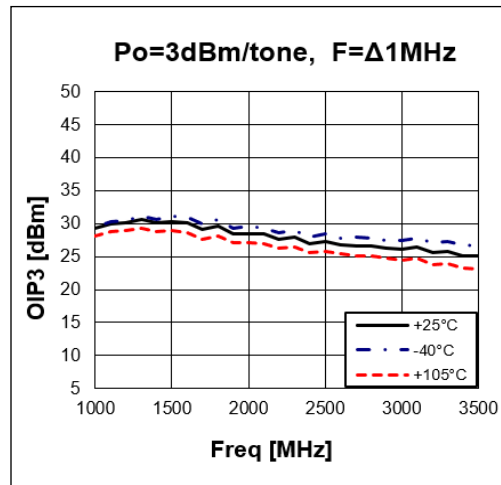
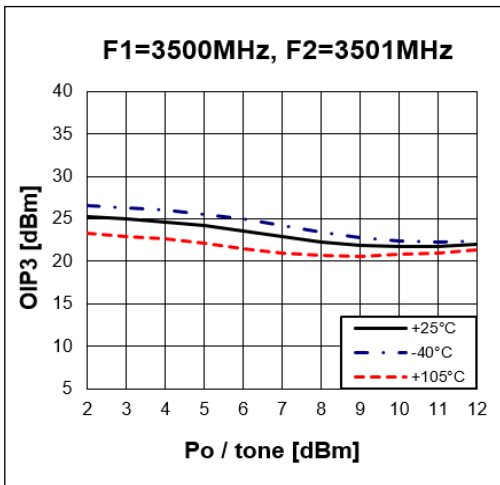
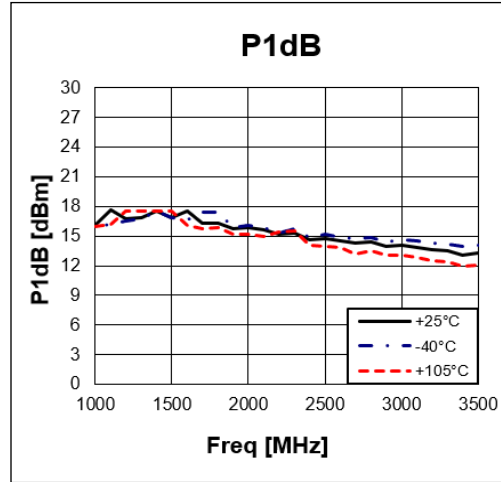
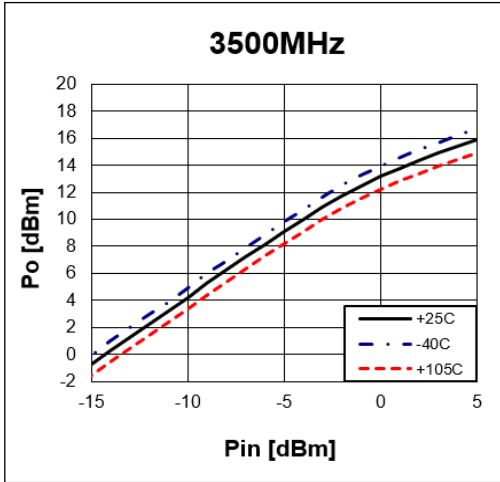






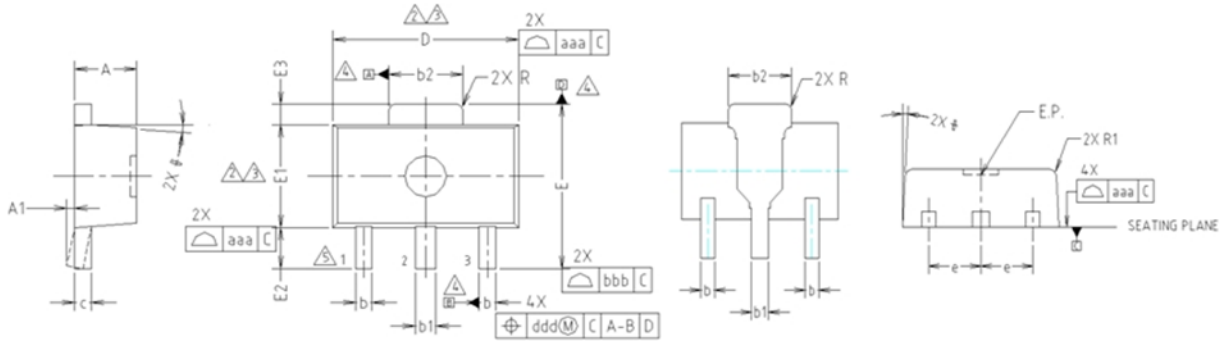






*Staircase pattern in the ACLR high band is caused by spectrum analyzer characteristics.

Package Outline Dimensions

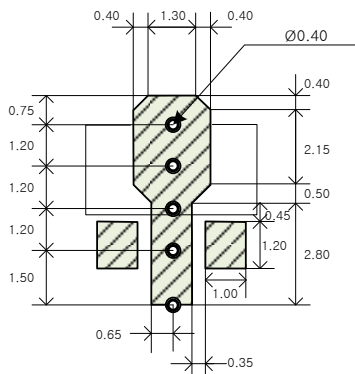


- NOTE:**
 1. DIMENSIONS IN MILLIMETERS.
- ⚠ DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.5mm PER END. DIMENSION E1 DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.5mm PER SIDE.
 - ⚠ DIMENSIONS D AND E1 ARE DETERMINED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
 - ⚠ DATUMS A, B AND D TO BE DETERMINED 0.18mm FROM THE LEAD TIP.
 - ⚠ TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	1.40	1.50	1.60	
A1	0.00	—	0.10	
b	0.38	0.42	0.48	
b1	0.48	0.52	0.58	
b2	1.79	1.82	1.87	
c	0.40	0.42	0.46	
D	4.40	4.50	4.70	2,3
E	3.70	4.00	4.30	
E1	2.40	2.50	2.70	2,3
E2	0.80	1.00	1.20	
E3	0.40	0.50	0.60	
e	1.50 TYP.			
φ	4° TYP.			
R	0.15 TYP.			
R1	—	—	0.20	
SYMBOL	TOLERANCES OF FORM AND POSITION		NOTE	
aaa	0.15			
bbb	0.20			
ccc	0.10			
ddd	0.10			

Suggested PCB Land Pattern and PAD Layout

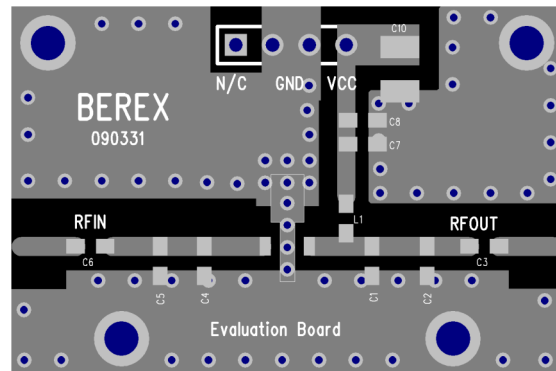
PCB Land Pattern



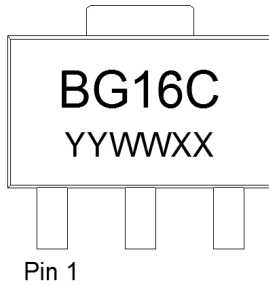
Note : All dimension in millimeters

PCB lay out : see BeRex website

PCB Mounting

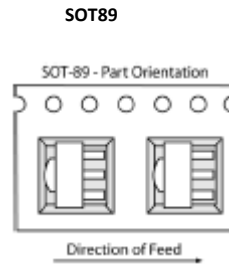


Package Marking



YY = Year, WW = Working Week,
XX = Wafer No.

Tape & Reel



Packaging information:

Tape Width (mm): 12
Reel Size (inches): 7
Device Cavity Pitch (mm): 8
Devices Per Reel: 1000

Lead plating finish

100% Tin Matte finish

(All BeRex products undergo a 1 hour, 150 degree °C, annealing bake to eliminate tin whisker growth concerns.)

MSL / ESD Rating

ESD Rating: Class 2
Value: Passes <4000V
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD JS-001-2017

MSL Rating: Level 1 (260°C convection reflow)
Standard: JEDEC Standard J-STD-020F



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 complies 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 component of a product and/or its packaging placed on the European Union market by the BeRex and its Suppliers.

NATO CAGE code:

2	N	9	6	F
---	---	---	---	---