BGM26

1700-5000 MHz Gain Block 2stage AMP

Preliminary Datasheet

Device Features

- Gain = 31.5 dB @ 3500MHz
- OIP3 = 30.0 dBm @ 3500MHz
- Output P1 dB = 19.5 dBm @ 3500 MHz
- 5GNR ACLR = 9.5 dB @ 3500MHz
- Internally matched to 50 ohms
- Fast shut down to support TDD systems
- Green/RoHS2 Compliant QFN 16L 3x3 Package

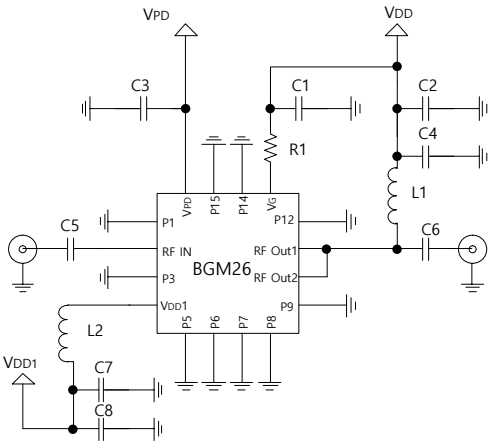
Product Description

The BGM26 is a 2stage Gain Block Amp for Higher gain BroadBand, GaAs E-pHEMT Amplifier that is ideal for applications demanding high linearity in a wideband of 1700-5000 MHz. BGM26 is in RoHS2 compliant QFN 16L 3x3 mm2 surface mount package. It can be used in fast shutdown switching speed for TD-LTE & TD 5G NR application. These devices are 100% DC and RF tested to assure quality and performance.

Applications

- 5G m-MIMO
- Mobile Infrastructure
- Repeater / DAS
- General Purpose Wireless
- TDD / FDD System

Applications Circuit



*BOM : refer to the page 6.

Part Marking

Electrical Specifications

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

Parameter	Conditions	Min	Typ	Max	Unit
Operational Frequency Range		1700		5000	MHz
Test Frequency			3500		MHz
Gain		30.0	31.5		dB
Input Return Loss			-17.0		dB
Output Return Loss			-9.7		dB
Output IP3	2 dBm / tone , Δf=1 MHz	27.0	30.0		dBm
Output P1dB		18.5	19.5		dBm
5G NR ACLR[1]		8.5	9.5		dBm
Noise Figure[2]			2.9	3.1	dB

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		1700		5000	MHz
Test Frequency			3500		MHz
Gain		28.5	30.0		dB
Input Return Loss			-23.7		dB
Output Return Loss			-10.1		dB
Output IP3	0 dBm / tone , Δf=1 MHz	25	28		dBm
Output P1dB		14.7	15.7		dBm
5G NR ACLR[1]		4.7	5.7		dBm
Noise Figure[2]			3.0	3.2	dB

[1]ACLR Channel Power measured at -50dBc.
- 5G NR Downlink FR1 : SCS 30KHz, CBW 100MHz, 256QAM, PAR 9.66 at 0.01% Prob.

[2] NF : PCB losses at input and output transmission lines are not de-embedded .

Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Bandwidth	1700		5000	MHz
I_d @ (V_d = 5.0V)	72	90	108	mA
I_d @ (V_d = 3.3V)	45	56	67	mA
V_d	3.3	5	5.25	V
dG/dT		0.006		dB/°C
R_{TH}		50		°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.

Recommended Operating Conditions

Parameter	Condition	Min.	Typical	Max.	Unit
Shutdown Control	On state	1.17		V_{DD}	V
	Off state(shutdown)	0		0.63	V
Current, I_{DD}	On state 5V		90		mA
	On state 3.3V		56		mA
	Off state(shutdown)		3		mA
Switchcing Time	Rise time(10% to 90%)		200		ns
	Fall time(90% to 10%)		200		ns

Absolute Maximum Ratings

Parameter	Rating	Unit
Storage Temperature	-55 to +155	°C
Junction Temperature	150	°C
Supply Voltage	+6	V
Supply Current	180	mA
Input RF Power	23	dBm

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

Typical RF Performance (Vd=5V, Id=90mA, T=25°C)

Parameter	Frequency					Unit
	1800	2140	2650	3500	4900	MHz
Gain	29.5	29.9	30.5	31.5	29.0	dB
S11	-10.8	-11.7	-12.3	-17.0	-12.2	dB
S22	-21.0	-14.1	-9.5*	-9.7*	-15.5	dB
OIP3[1]	31.1	31.0	30.7	30.0	29.0	dBm
P1dB	19.4	19.7	19.5	19.5	18.0	dBm
LTE 20M ACLR[3]	9.3	9.7	9.7	-	-	dBm
5G NR ACLR[4]	-	-	-	9.5	8.0	dBm
Noise Figure[5]	2.8	2.8	2.8	2.9	3.2	dB

Typical RF Performance (Vd=3.3V, Id=56mA, T=25°C)

Parameter	Frequency					Unit
	1800	2140	2650	3500	4900	MHz
Gain	27.9	28.1	28.9	30.0	26.8	dB
S11	-9.9	-10.5	-11.7	-23.7	-10.1	dB
S22	-13.3	-15.8	-11.1	-10.6	-11.0	dB
OIP3[2]	28.4	28.5	28.5	28	26.2	dBm
P1dB	15.8	16.1	16.0	15.7	13.7	dBm
LTE 20M ACLR[3]	4.2	5.0	5.0	-	-	dBm
5G NR ACLR[4]	-	-	-	5.7	2.0	dBm
Noise Figure[5]	2.9	2.9	2.9	3.0	3.3	dB

[1] 2 dBm / tone , Δf=1 MHz

[2] 0 dBm / tone , Δf=1 MHz

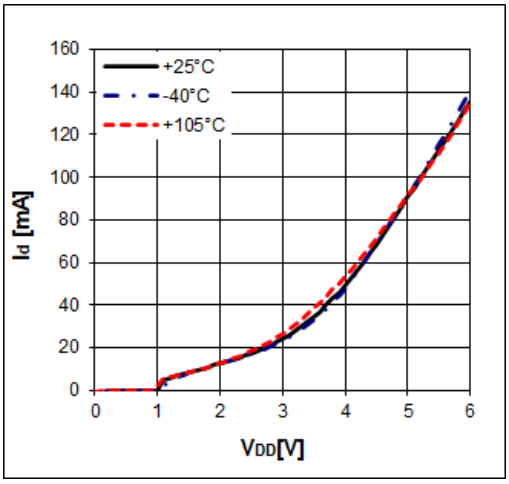
[3] LTE set-up: 3GPP LTE, FDD E-TM3.1, 20MHz BW, ±20MHz offset, PAR 9.75 at 0.01% Prob. ACLR Channel Power measured at -50dBc

[4] 5G NR Downlink FR1 : SCS 30KHz, CBW 100MHz, 256QAM, PAR 9.66 at 0.01% Prob. ACLR Channel Power measured at -50dBc

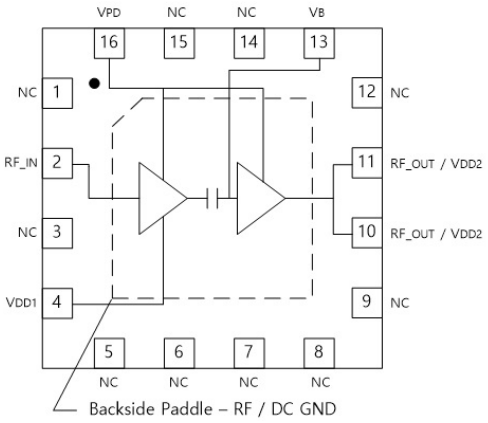
[5] NF : Losses on input and output transmission lines on PCB are not de-embedded.

* S22 can be improved to less than –10dB, if L1 is 1.2nH

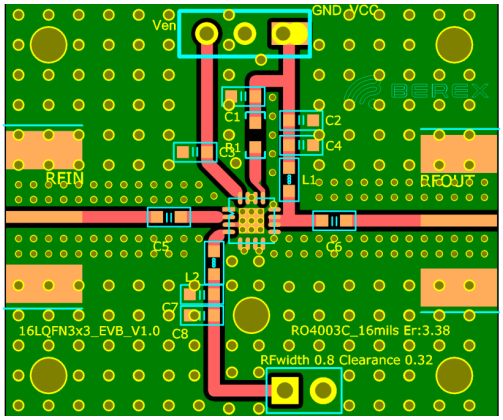
V-I Characteristics



Pin Configuration



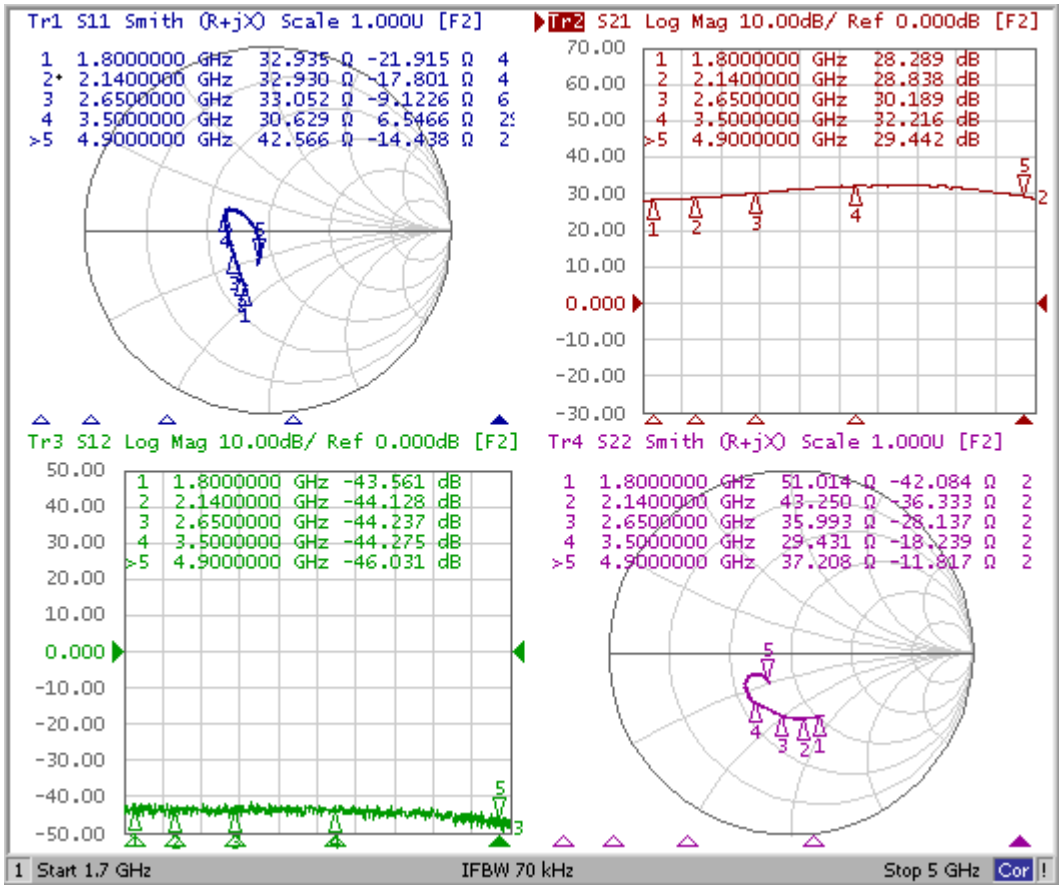
Evaluation Board



*Dielectric constant _ 3.38 *RF pattern width 0.85T *16mil thick RO4003PCB

Typical Device Data

S-parameters (V_d=5V, I_d=90mA, T=25°C)

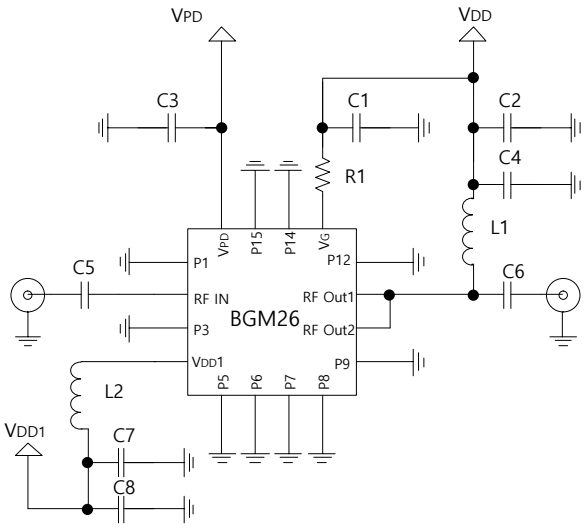


S-Parameter

(Vdevice = 5.0V, I_d = 90mA, 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]
1700	0.325	-110.201	25.517	-16.888	0.007	39.287	0.387	-62.232
2000	0.305	-118.017	27.105	-31.468	0.007	15.555	0.375	-73.756
2500	0.241	-135.785	30.560	-52.630	0.008	11.046	0.355	-92.950
3000	0.227	-175.997	35.760	-78.180	0.006	1.932	0.336	-109.424
3500	0.253	157.487	40.750	-106.258	0.006	-11.364	0.336	-125.684
4000	0.187	148.158	41.269	-139.167	0.006	-23.806	0.310	-143.211
4500	0.068	-147.361	36.512	-174.271	0.006	-48.406	0.223	-147.689
5000	0.193	-107.373	27.444	155.919	0.004	-85.549	0.206	-124.717

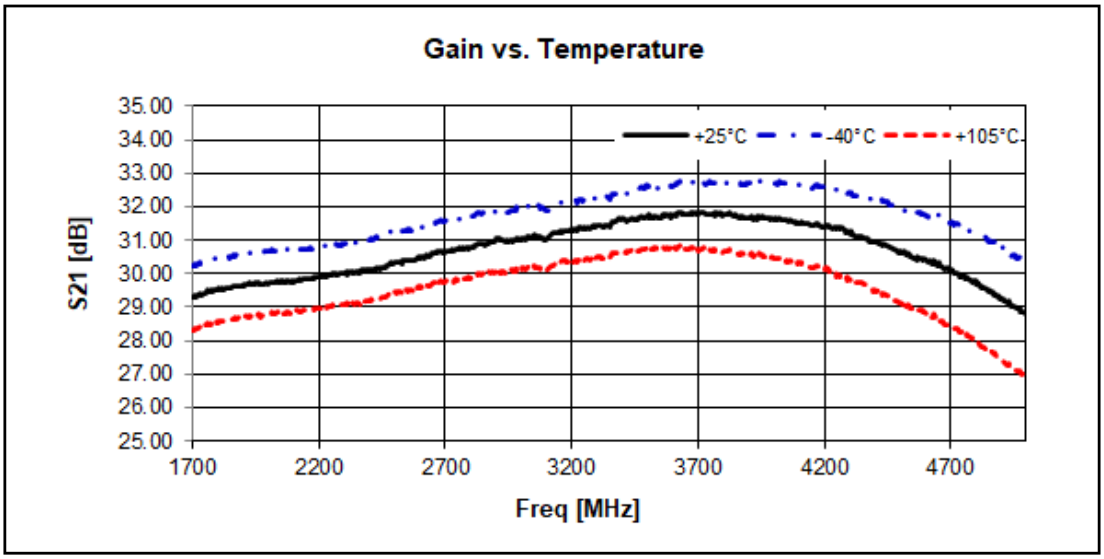
Application Circuit: 1700~5000 MHz

Schematic Diagram	BOM		Size
	C1	1nF	1608
	C2	1nF	1608
	C3	NC	1608
	C4	100pF	1608
	C5	11pF	1608
	C6	2pF	1608
	C7	100pF	1608
	C8	1nF	1608
	L1	2.2nH	1608
	L2	1nH	1608
	R1	4.3Kohm	1608

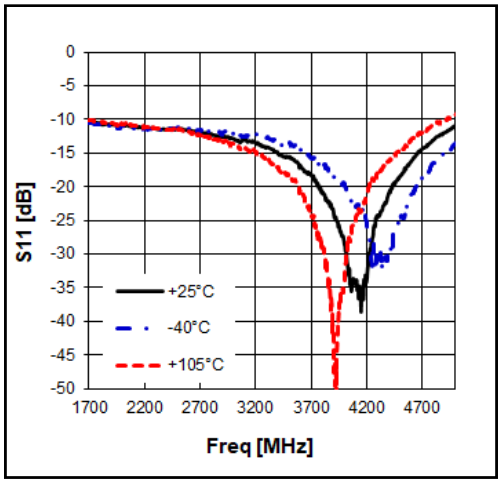
* 3.3V R1 = 3Kohm

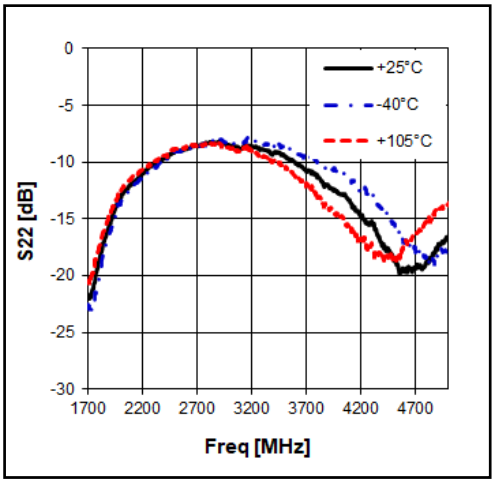
Typical Performance

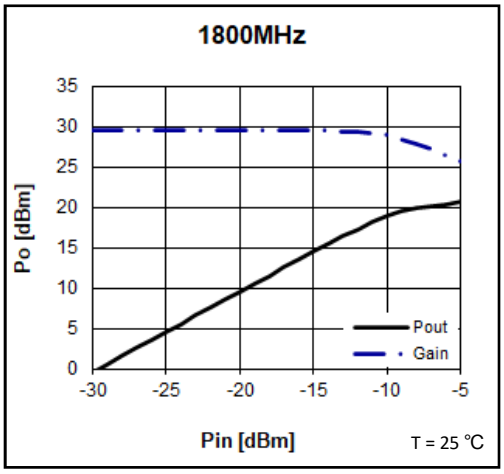
V_{ds} = 5V, I_{ds} = 90mA

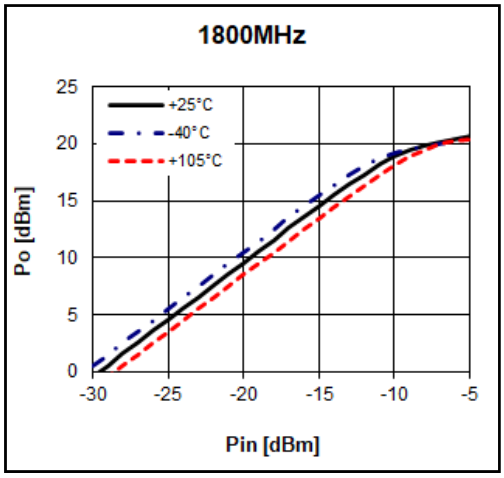


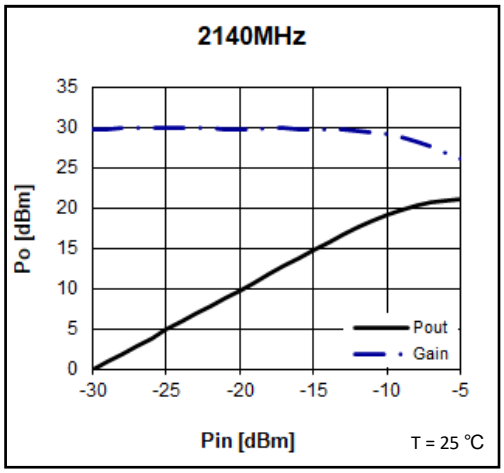
V_{ds} = 5V, I_{ds} = 90mA

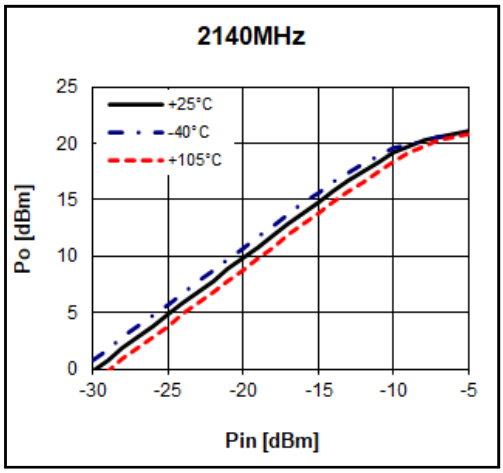




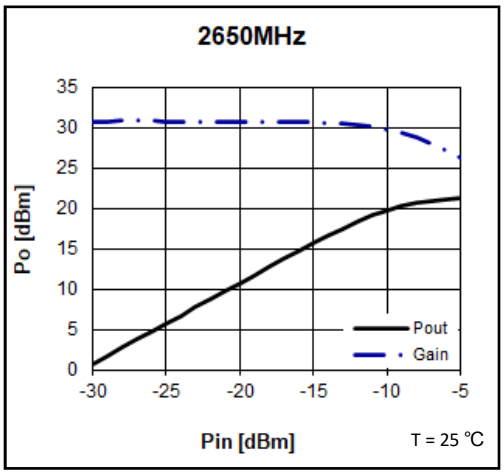


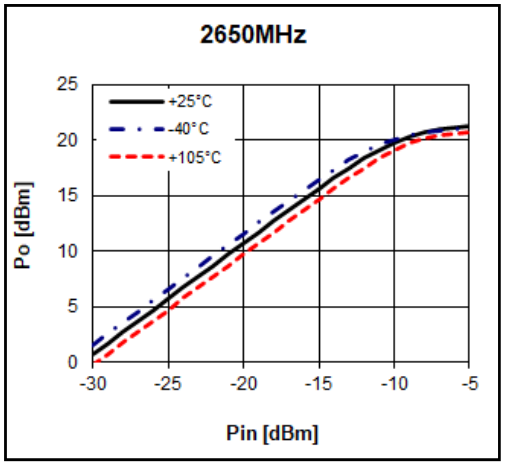


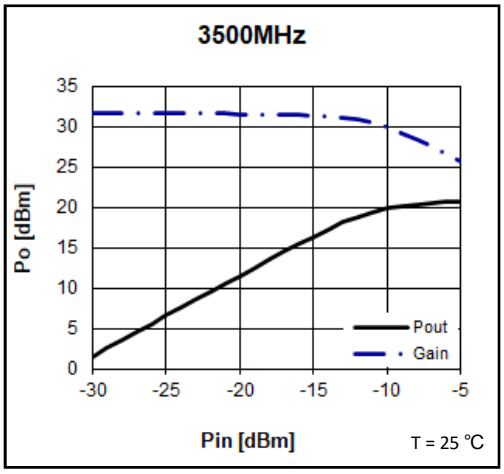


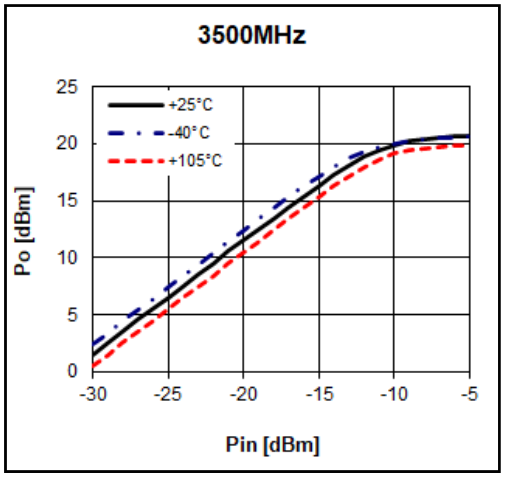


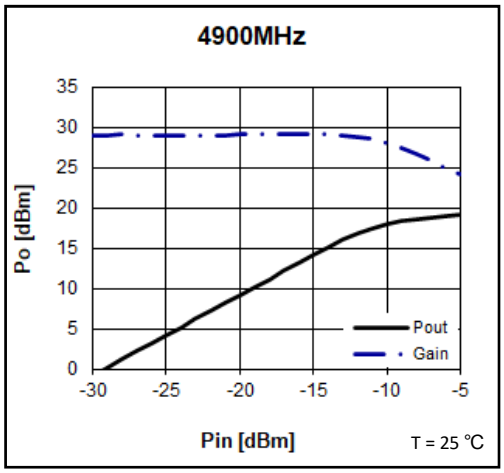
V_{ds} = 5V, I_{ds} = 90mA

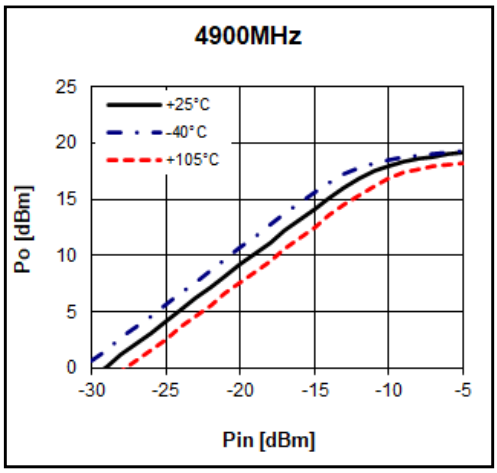




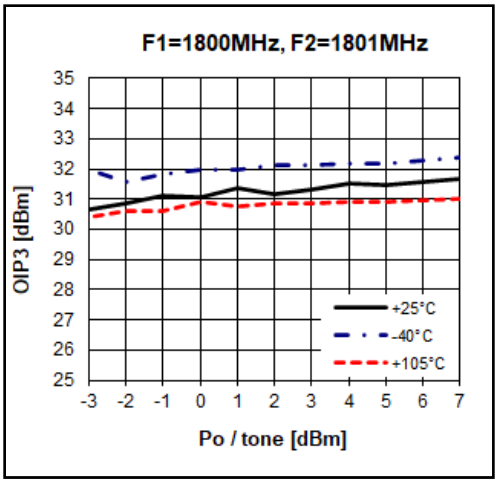


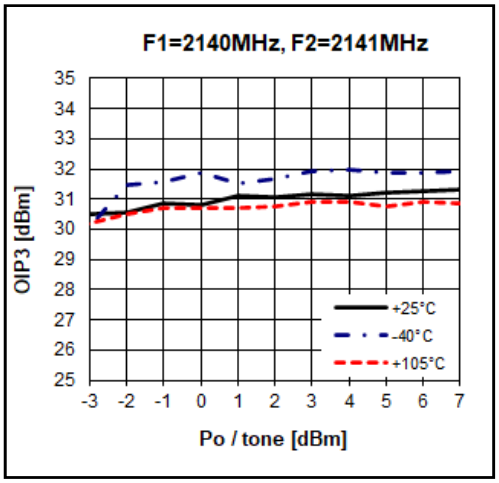


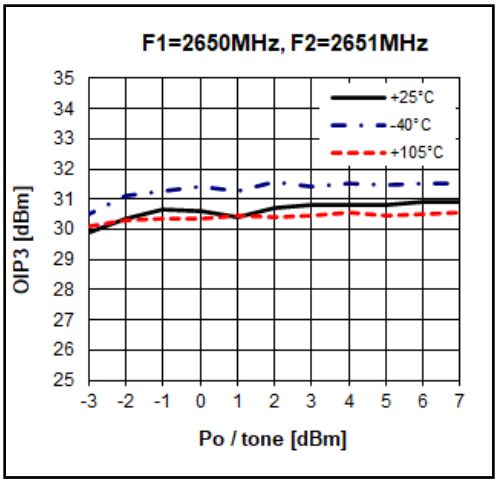


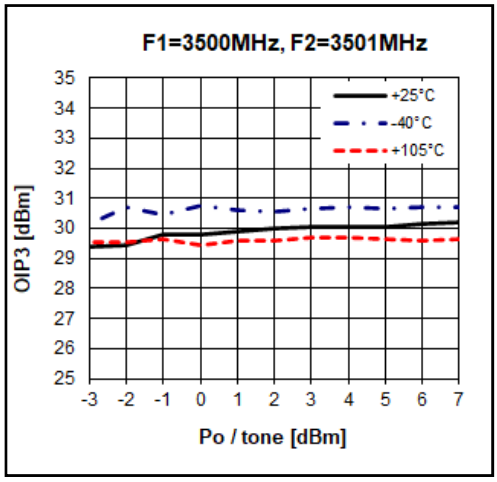


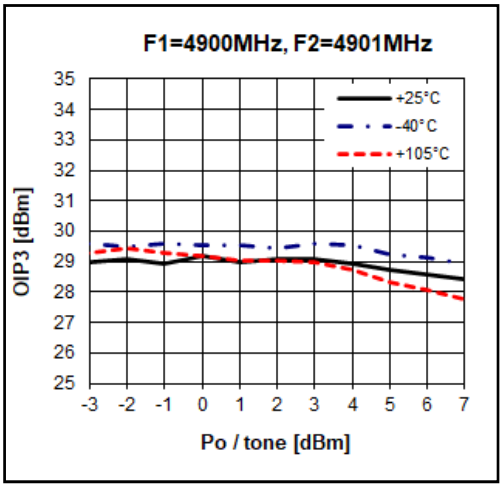
V_{ds} = 5V, I_{ds} = 90mA

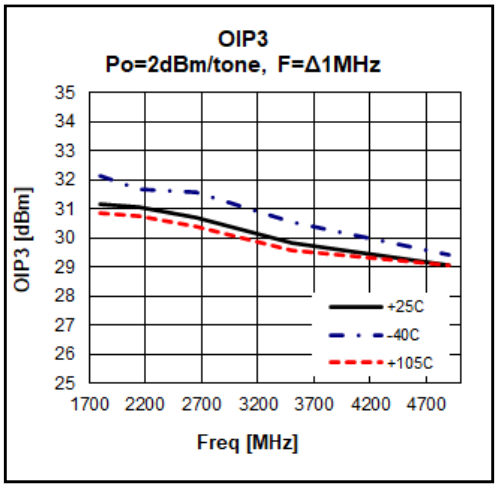




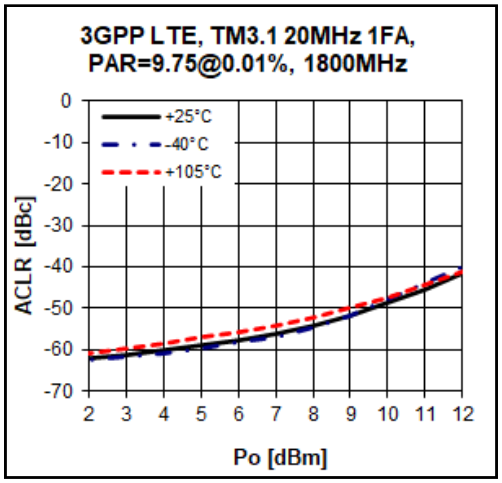


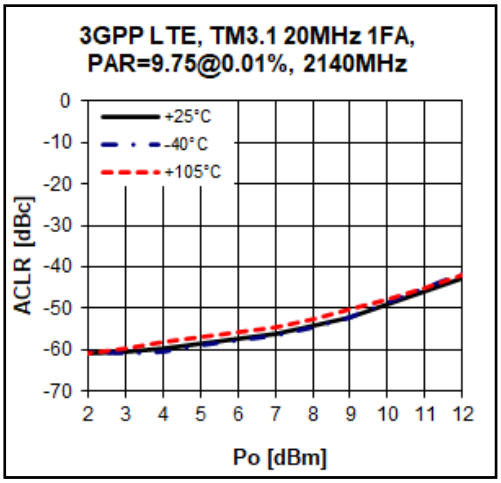


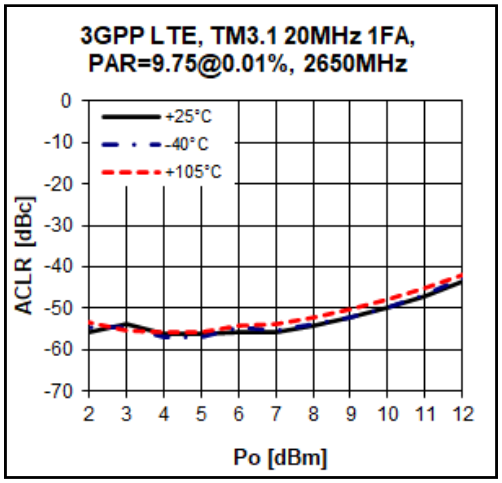


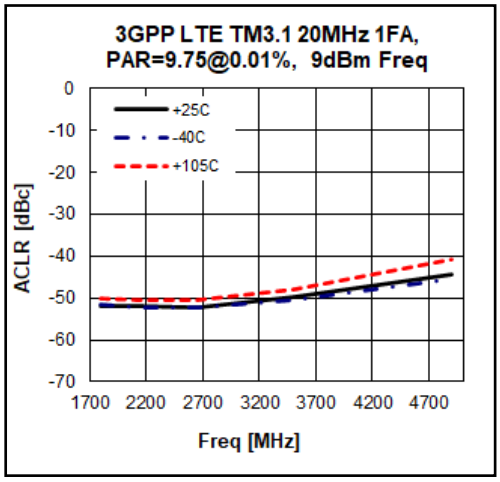


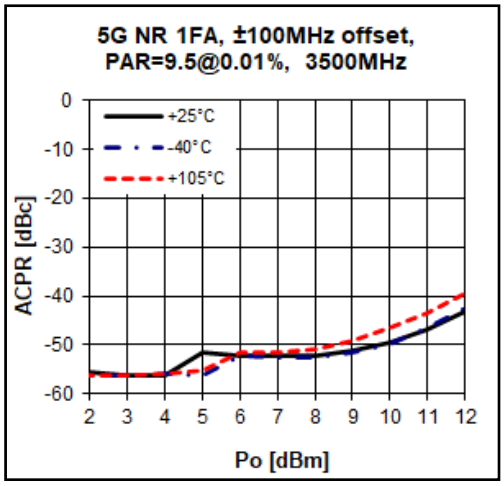
V_{ds} = 5V, I_{ds} = 90mA

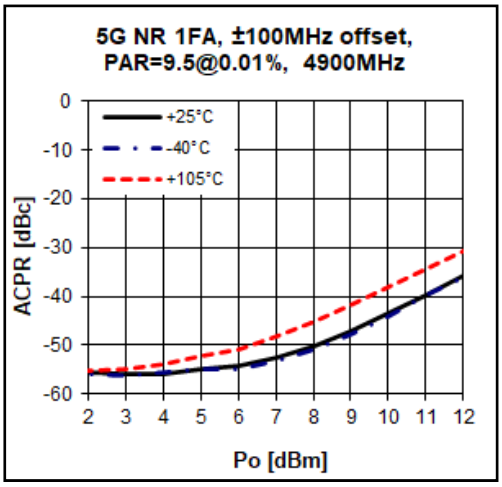






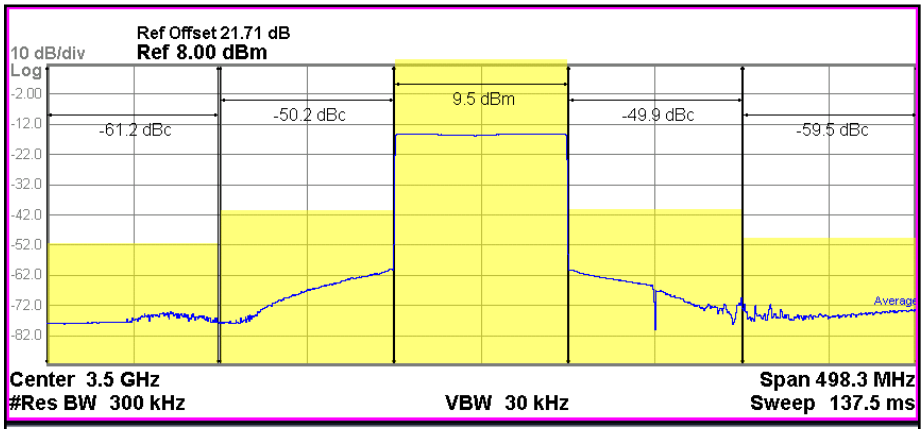






V_{ds} = 5V, I_{ds} = 90mA

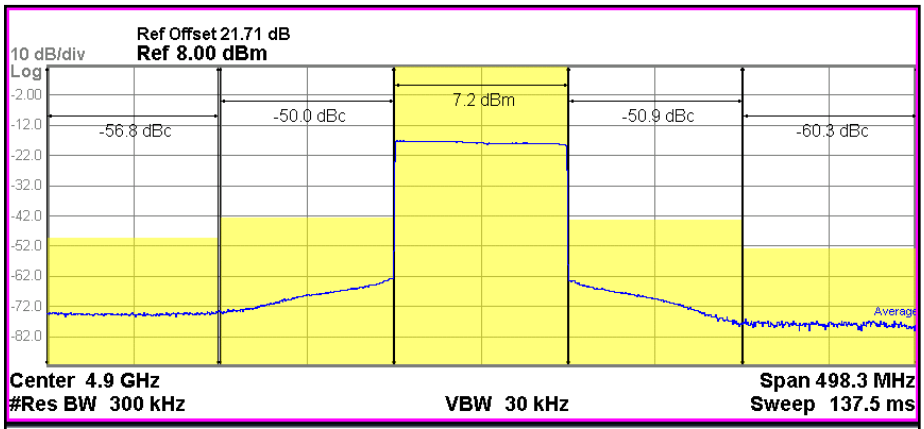
3GPP 5GNR 1FA 3.5GHz (-50dBc) T = 25 °C



Total Carrier Power 9.531 dBm/ 98.28 MHz ACP-IBW

Carrier Power		Filter	Offset Freq	Integ BW	Lower dBc	Lower dBm	Upper dBc	Upper dBm	Filter
1	9.531 dBm / 98.28 MHz	OFF	100.0 MHz	98.28 MHz	-50.17	-40.64	-49.94	-40.41	OFF
			200.0 MHz	98.28 MHz	-61.21	-51.68	-59.51	-49.97	OFF

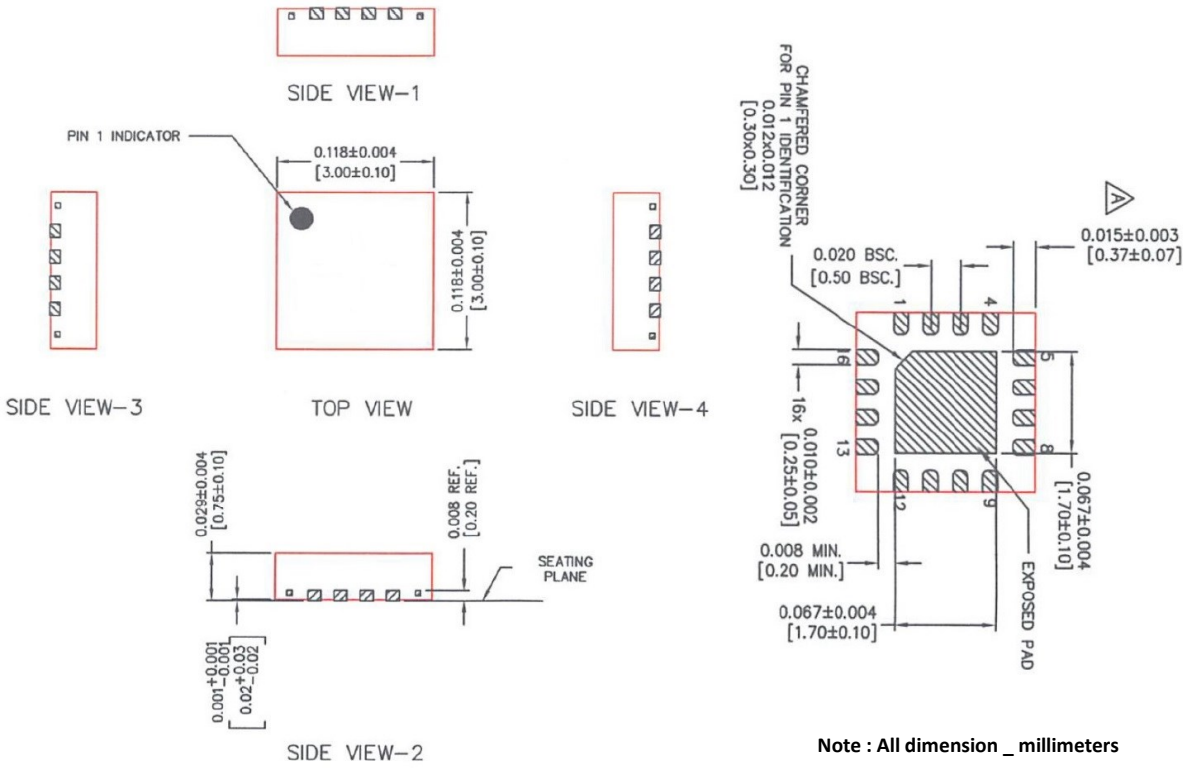
3GPP 5GNR 1FA 4.9GHz (-50dBc) T = 25 °C



Total Carrier Power 7.198 dBm/ 98.28 MHz ACP-IBW

Carrier Power		Filter	Offset Freq	Integ BW	Lower dBc	Lower dBm	Upper dBc	Upper dBm	Filter
1	7.198 dBm / 98.28 MHz	OFF	100.0 MHz	98.28 MHz	-50.01	-42.81	-50.92	-43.72	OFF
			200.0 MHz	98.28 MHz	-56.81	-49.62	-60.25	-53.05	OFF

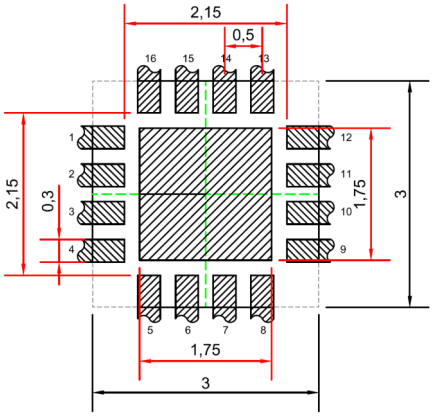
Package Outline Drawing



Note : All dimension _ millimeters

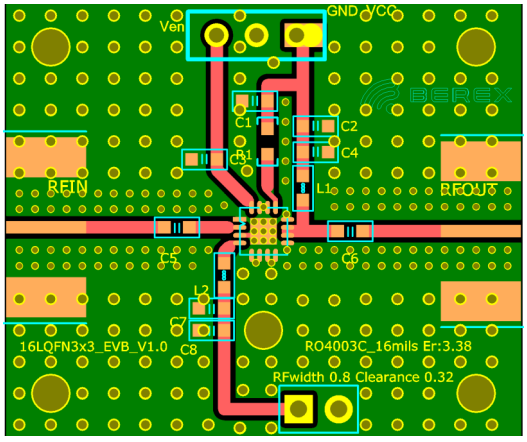
Suggested PCB Land Pattern and PAD Layout

PCB Land Pattern



Note : All dimension _ millimeters

PCB Mounting



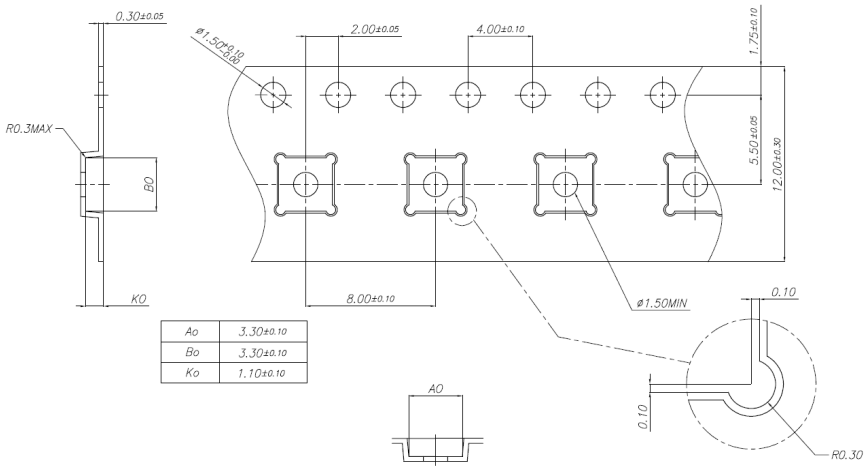
PCB lay out _ on BeRex website

Package Marking

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

Pin 1

Tape & Reel



Packaging information:

Tape Width (mm): 8

Reel Size (inches): 7

Device Cavity Pitch (mm): 4

Devices Per Reel: 1000

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**