

Device Features

- Gain = 31.0 dB @ 3500MHz
- OIP3 = 30.0 dBm @ 3500MHz
- Output P1 dB = 19.5 dBm @ 3500 MHz
- 5G NR ACLR = 8.9 dBm @ 3500MHz
- Internally matched to 50 ohms
- Fast shut down to support TDD systems
- Green/RoHS2 Compliant QFN 16L 3x3 Package

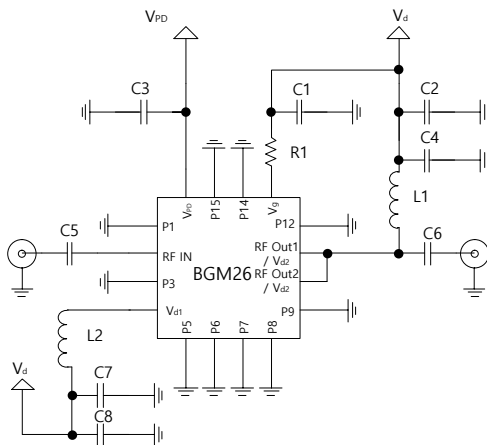
Product Description

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 1700-6000 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 Massive MIMO
- Mobile Infrastructure
- Repeater / DAS
- General Purpose Wireless
- TDD / FDD System

Applications Circuit



*BOM : refer to the page 5.
*Refer to App note for 5.8G circuit

Part Marking



Electrical Specifications

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

| Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------------|-------------------------|------|-------|------|------|
| Operational Frequency Range | | 1700 | | 6000 | MHz |
| Test Frequency | | | 3500 | | MHz |
| Gain | | 29.5 | 31.0 | | dB |
| Input Return Loss | | | -21.5 | | dB |
| Output Return Loss | | | -9.6 | | 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 | | 7.9 | 8.9 | | dBm |
| Noise Figure ² | | | 3.0 | 3.2 | dB |

Device performance _ measured on a BeRex evaluation board at 25°C, V_d=3.3V, 50 Ω system.

| Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------------------|-------------------------|------|-------|------|------|
| Operational Frequency Range | | 1700 | | 6000 | MHz |
| Test Frequency | | | 3500 | | MHz |
| Gain | | 27.5 | 29.0 | | dB |
| Input Return Loss | | | -34.5 | | dB |
| Output Return Loss | | | -10.2 | | dB |
| Output IP3 | 0 dBm / tone , Δf=1 MHz | 22.0 | 25.0 | | dBm |
| Output P1dB | | 13.5 | 14.5 | | dBm |
| 5G NR ACLR ¹ | | 2.2 | 3.2 | | dBm |
| Noise Figure ² | | | 3.2 | 3.4 | dB |

¹ACLR 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 | | 6000 | 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_d | V |
| | Off state(shutdown) | 0 | | 0.63 | V |
| Current, I_d | On state 5V | 72 | 90 | 108 | mA |
| | On state 3.3V | 45 | 56 | 67 | mA |
| | Off state(shutdown) | | 3 | | mA |
| Switching 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 ($V_d=5V$, $I_d=90mA$, $T=25^\circ C$)

| Parameter | Frequency | | | | | Unit |
|---------------------------|-----------|-------|-------|-------|-------|------|
| | 1800 | 2140 | 2650 | 3500 | 4900 | MHz |
| Gain | 29.2 | 29.5 | 30.0 | 31.0 | 28.3 | dB |
| S11 | -10.1 | -10.4 | -11.7 | -21.5 | -12.6 | dB |
| S22 | -15.8 | -9.8 | -8.0* | -9.6* | -17.6 | dB |
| OIP3 ¹ | 31.6 | 31.4 | 30.9 | 30.0 | 28.9 | dBm |
| P1dB | 19.4 | 19.5 | 19.9 | 19.5 | 17.8 | dBm |
| LTE 20M ACLR ³ | 9.3 | 9.5 | 9.1 | - | - | dBm |
| 5G NR ACLR ⁴ | - | - | - | 8.9 | 6.8 | dBm |
| Noise Figure ⁵ | 2.8 | 2.9 | 2.9 | 3.0 | 3.5 | dB |

Typical RF Performance ($V_d=3.3V$, $I_d=56mA$, $T=25^\circ C$)

| Parameter | Frequency | | | | | Unit |
|---------------------------|-----------|-------|-------|-------|-------|------|
| | 1800 | 2140 | 2650 | 3500 | 4900 | MHz |
| Gain | 27.2 | 27.6 | 28.1 | 29.0 | 25.1 | dB |
| S11 | -9.7 | -10.3 | -12.7 | -34.5 | -9.3 | dB |
| S22 | -14.1 | -9.0 | -7.2 | -10.2 | -14.1 | dB |
| OIP3 ² | 26.7 | 26.6 | 26.2 | 25.0 | 22.2 | dBm |
| P1dB | 15.2 | 15.6 | 15.6 | 14.5 | 12.3 | dBm |
| LTE 20M ACLR ³ | 4.0 | 4.0 | 3.2 | - | - | dBm |
| 5G NR ACLR ⁴ | - | - | - | 3.2 | 0.3 | dBm |
| Noise Figure ⁵ | 3.0 | 3.0 | 3.0 | 3.2 | 3.8 | dB |

¹ 2 dBm / tone, $\Delta f=1$ MHz

² 0 dBm / tone, $\Delta f=1$ MHz

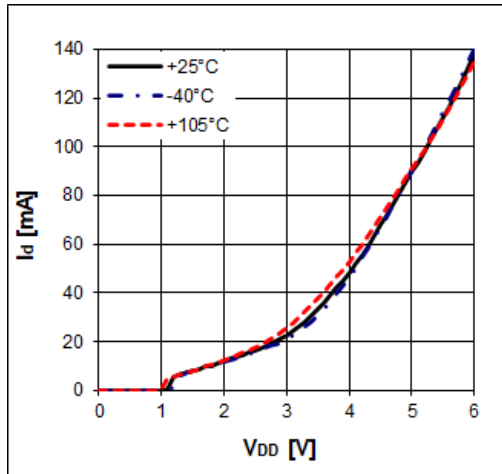
³ LTE set-up: 3GPP LTE, FDD E-TM3.1, 20MHz BW, ± 20 MHz offset, PAR 9.75 at 0.01% Prob. ACLR Channel Power measured at -50dBc

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

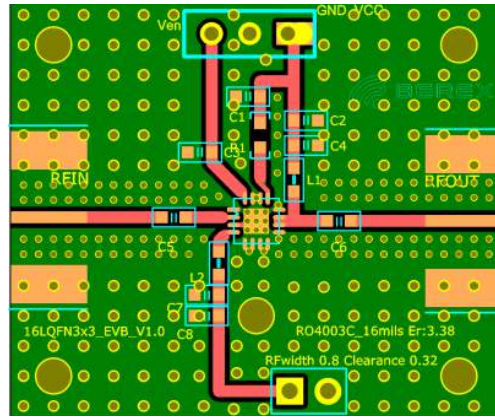
⁵ NF : Losses on input and output transmission lines on PCB are not de-embedded.

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

V-I Characteristics

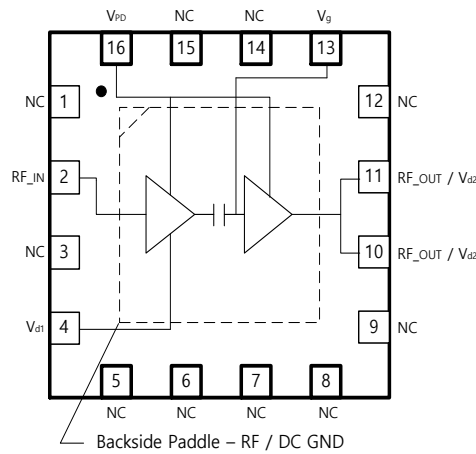


Evaluation Board



*Dielectric constant _ 3.38 *RF pattern width 0.8T *16mil thick RO4003PCB

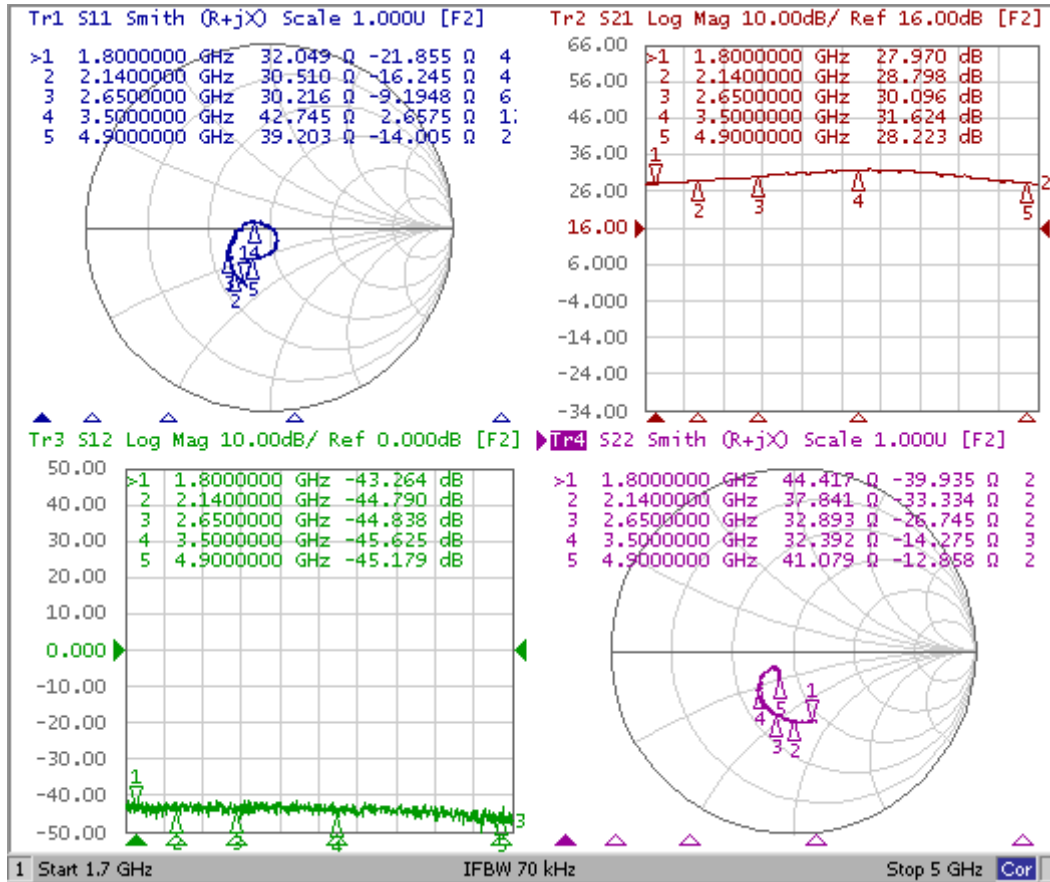
Pin Configuration and Description



| Pin No. | Name | Description |
|------------------------|--------------------------|--|
| 2 | RF_IN | RFinput pin. A DC Block is required. |
| 4 | V _{d1} | Supply V _{d1} through choke/Inductor for the first stage of the device. |
| 10,11 | RF_OUT / V _{d2} | RFoutput / V _{d2} pin. Supply V _{d2} through choke/Inductor for the second stage of the device. |
| 13 | V _g | V _g sets I _{dq} through external resistor for V _d =5V or V _d =3.3V. |
| 16 | V _{PD} | Power on/off control pin. 0 ≤ V _{PD} ≤ 0.63V disables device. If function is not desired, Supply 1.17 ≤ V _{PD} ≤ V _d |
| 1,3,5,6,7,8,9,12,14,15 | NC | No internal connection to die. May be connected to ground. |
| Backside Paddle | RF /DC GND | Exposed Pad is RF/DC ground, must be soldered to PCB. |

Typical Device Data

S-parameters ($V_d=5V, I_d=90mA, T=25^\circ C$)

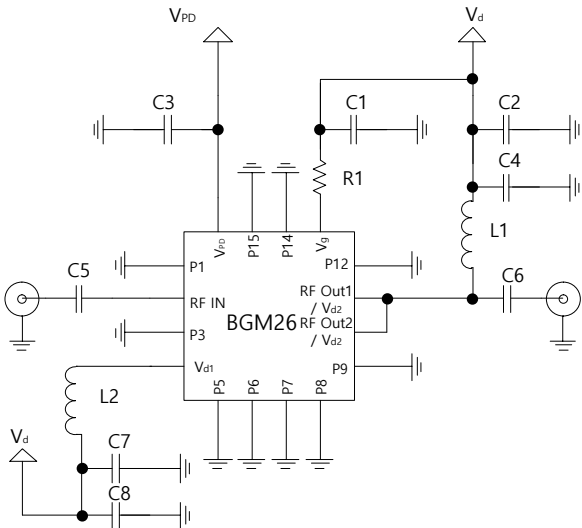


S-Parameter

($V_d = 5.0V, I_d = 90mA, T = 25^\circ C$, calibrated to device leads)

| Freq [MHz] | S11 [Mag] | S11 [Ang] | S21 [Mag] | S21 [Ang] | S12 [Mag] | S12 [Ang] | S22 [Mag] | S22 [Ang] |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | 1700 | 0.337 | -110.94 | 24.954 | -23.825 | 0.006 | 24.006 | 0.399 |
| 2000 | 0.32 | -123.904 | 26.967 | -38.207 | 0.006 | 12.693 | 0.389 | -83.733 |
| 2500 | 0.266 | -142.954 | 30.435 | -63.361 | 0.007 | 11.499 | 0.362 | -100.432 |
| 3000 | 0.198 | -162.89 | 35.963 | -90.273 | 0.007 | -5.321 | 0.337 | -113.715 |
| 3500 | 0.089 | 162.418 | 38.504 | -125.308 | 0.006 | -22.48 | 0.283 | -132.564 |
| 4000 | 0.033 | -54.949 | 37.008 | -160.249 | 0.007 | -38.315 | 0.201 | -141.521 |
| 4500 | 0.122 | -83.949 | 30.702 | 168.485 | 0.005 | -66.287 | 0.141 | -134.333 |
| 5000 | 0.22 | -123.301 | 24.639 | 140.468 | 0.004 | -91.45 | 0.186 | -117.132 |

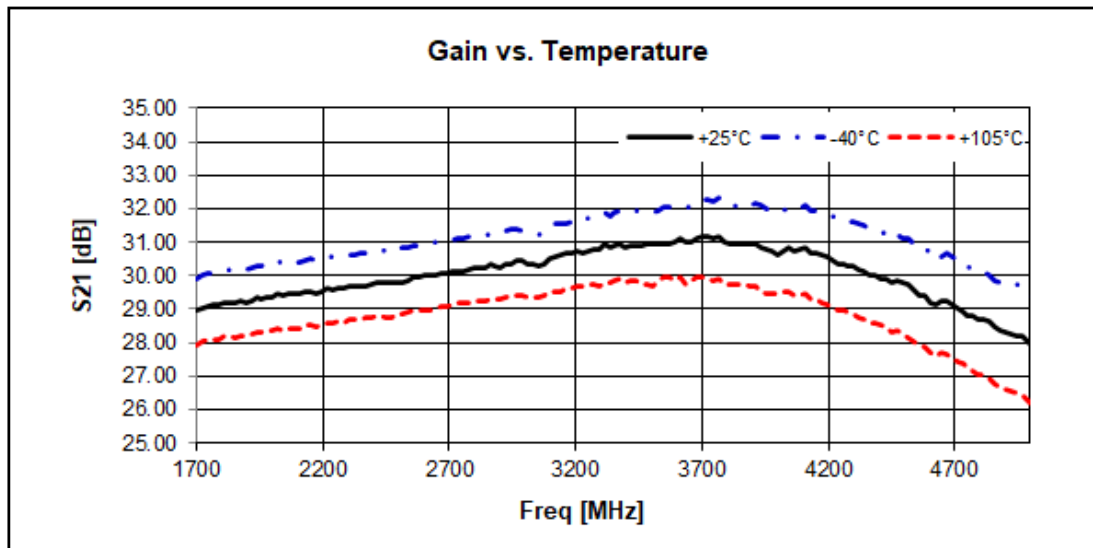
Application Circuit: 1700~5000 MHz

| Schematic Diagram | BOM | | Size |
|-------------------|--|---------|------|
| |  | C1 | 1nF |
| 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 |

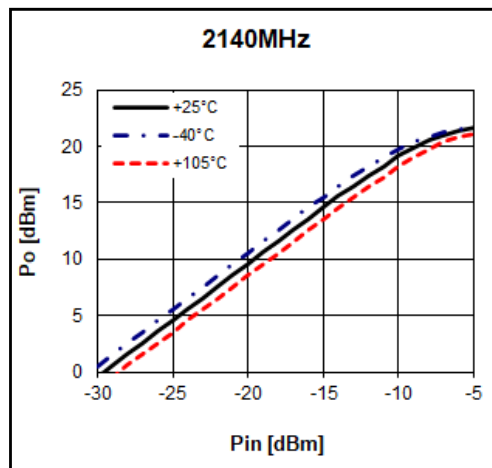
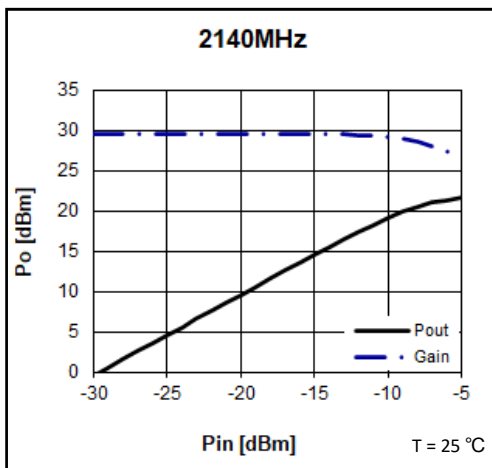
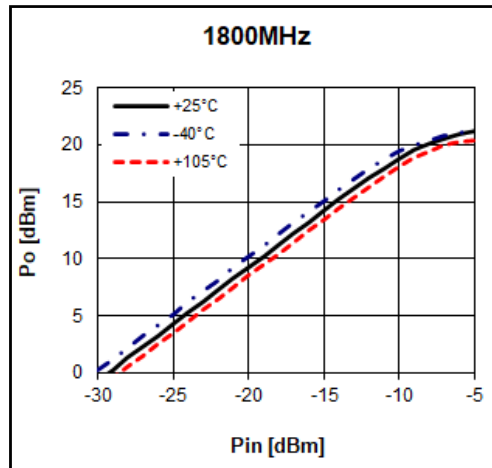
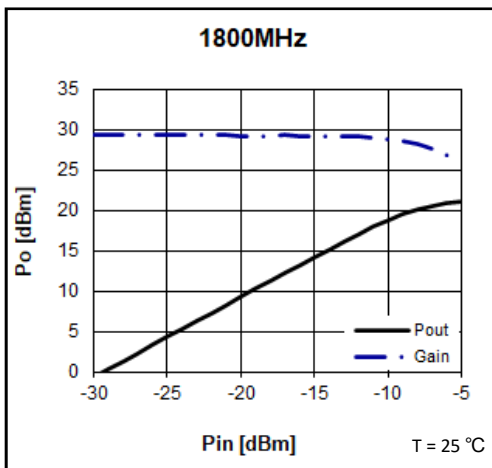
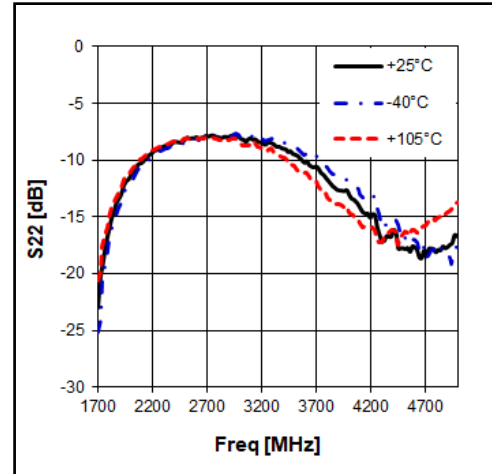
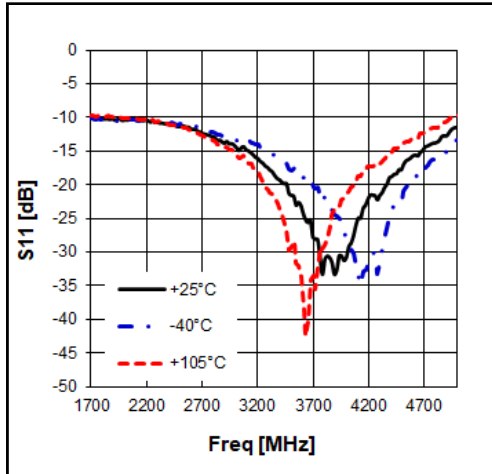
* 3.3V R1 = 3Kohm

Typical Performance

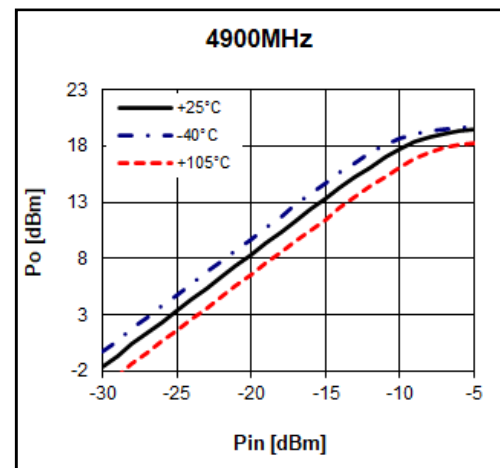
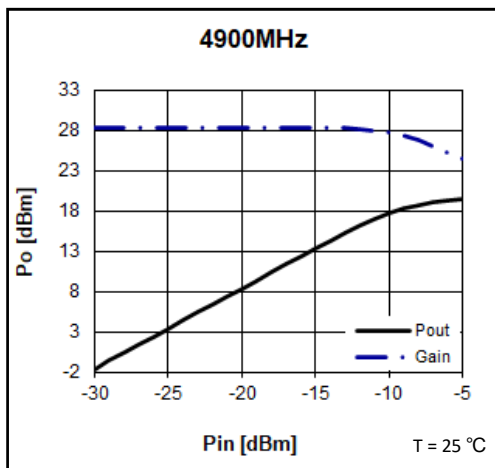
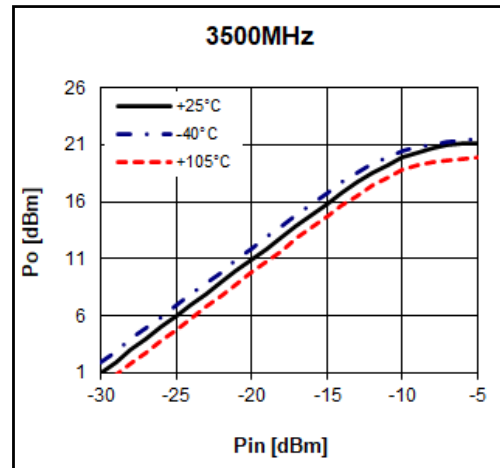
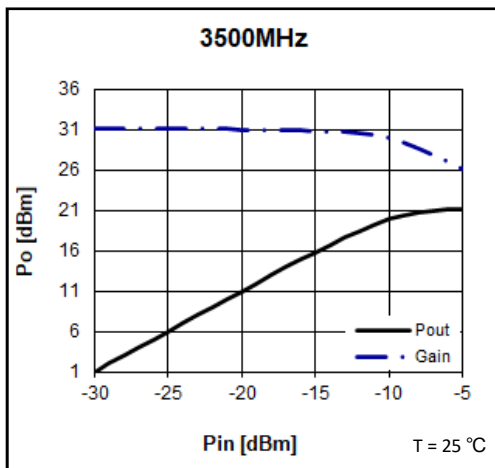
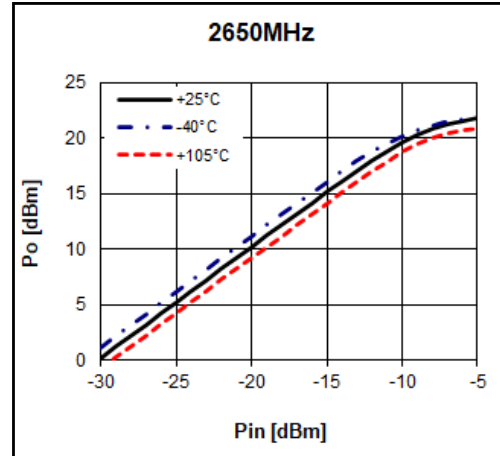
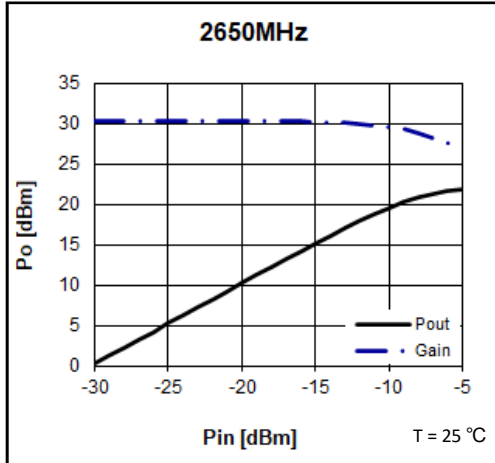
$V_d = 5V, I_d = 90mA$



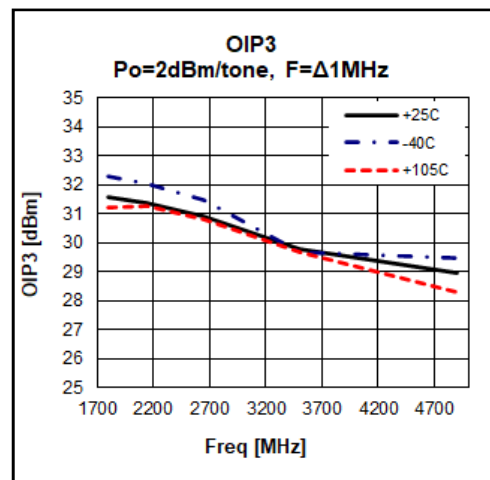
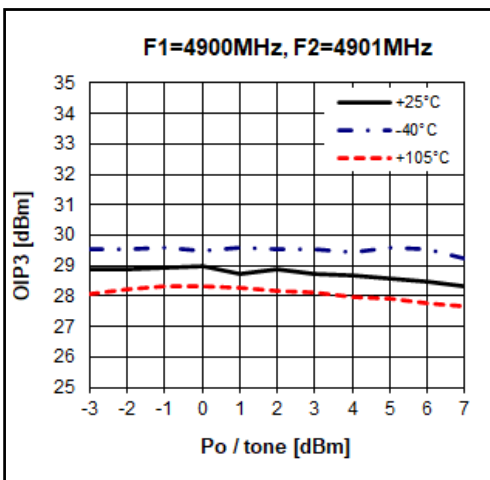
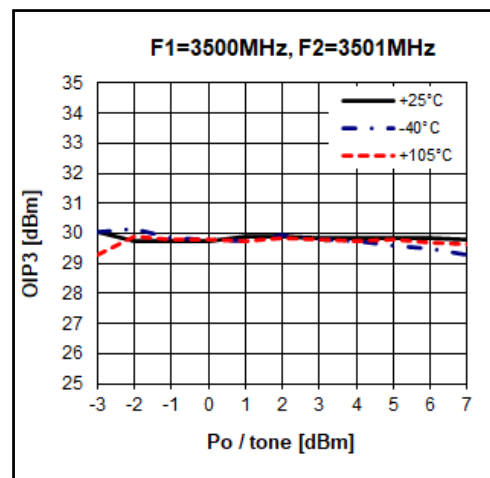
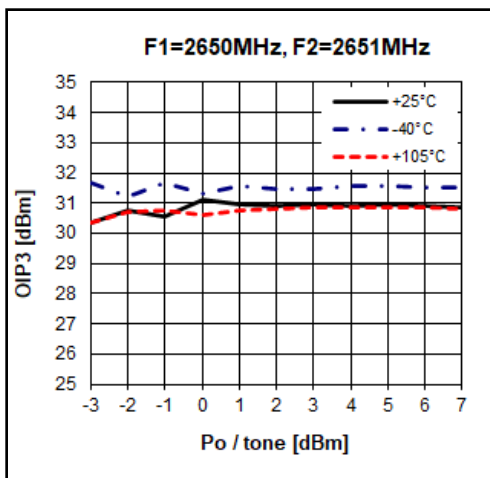
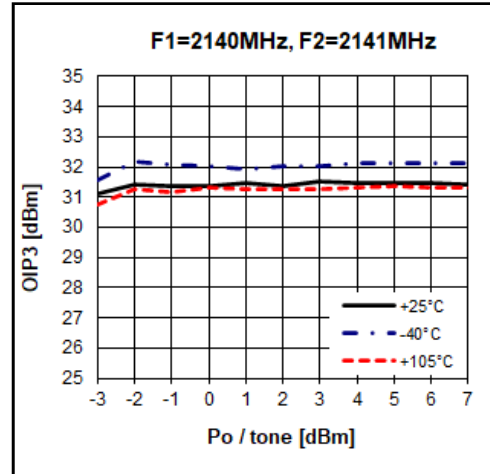
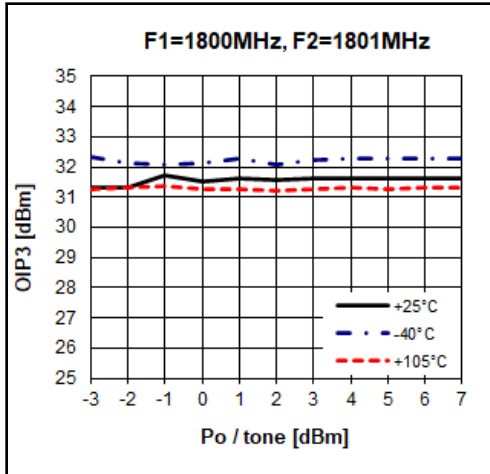
$V_d = 5V, I_d = 90mA$



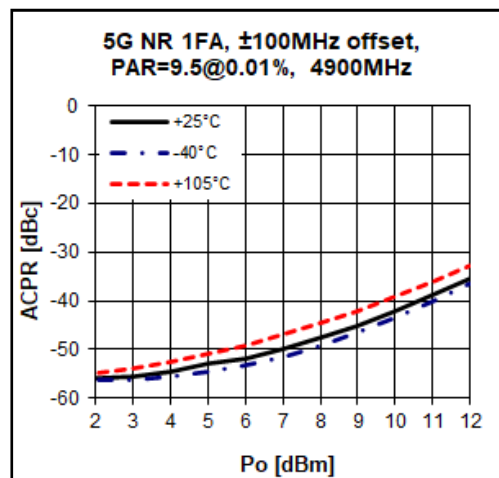
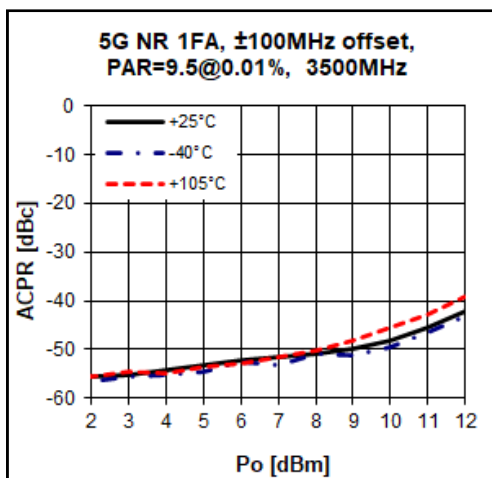
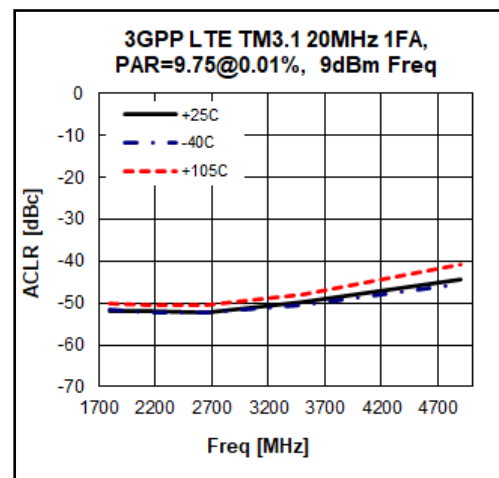
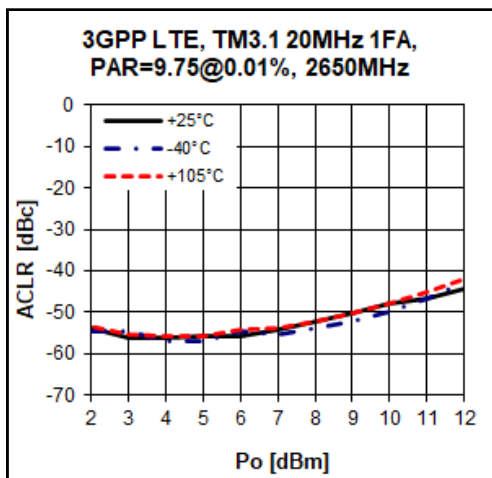
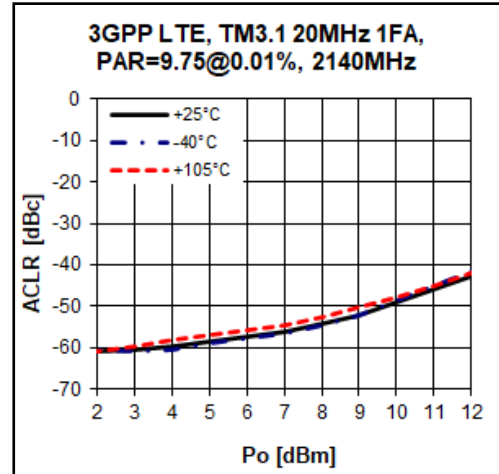
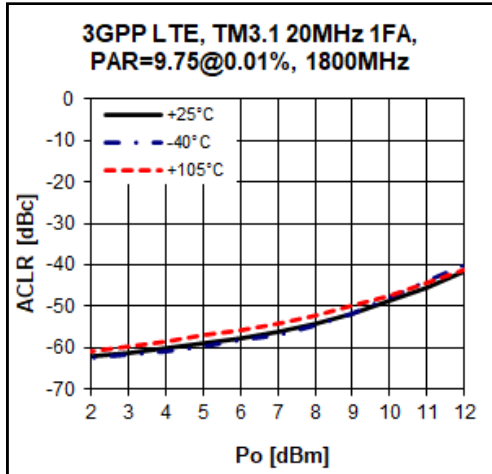
$V_d = 5V, I_d = 90mA$



$V_d = 5V, I_d = 90mA$

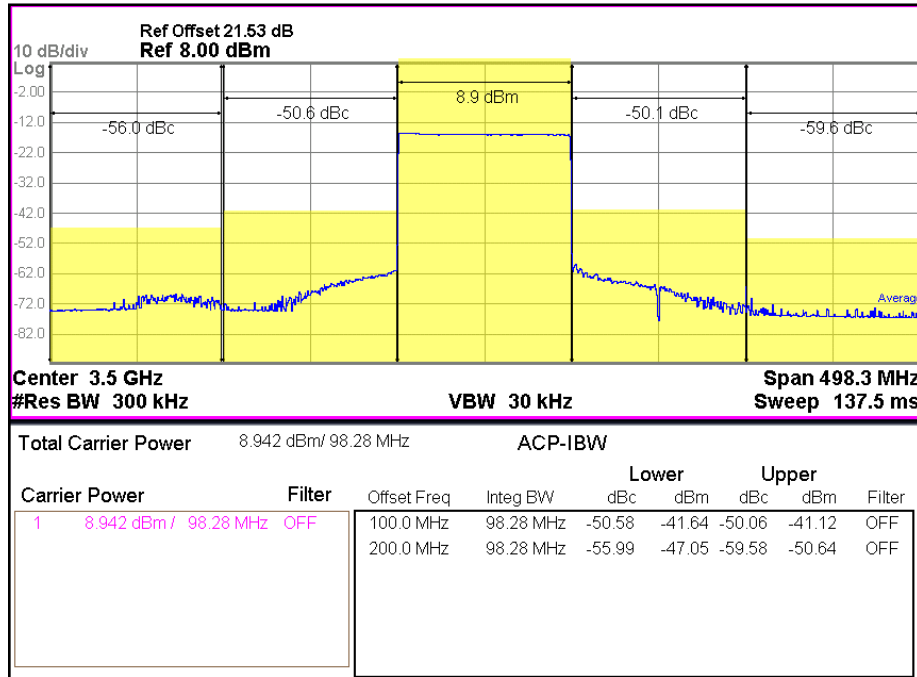


$V_d = 5V, I_d = 90mA$

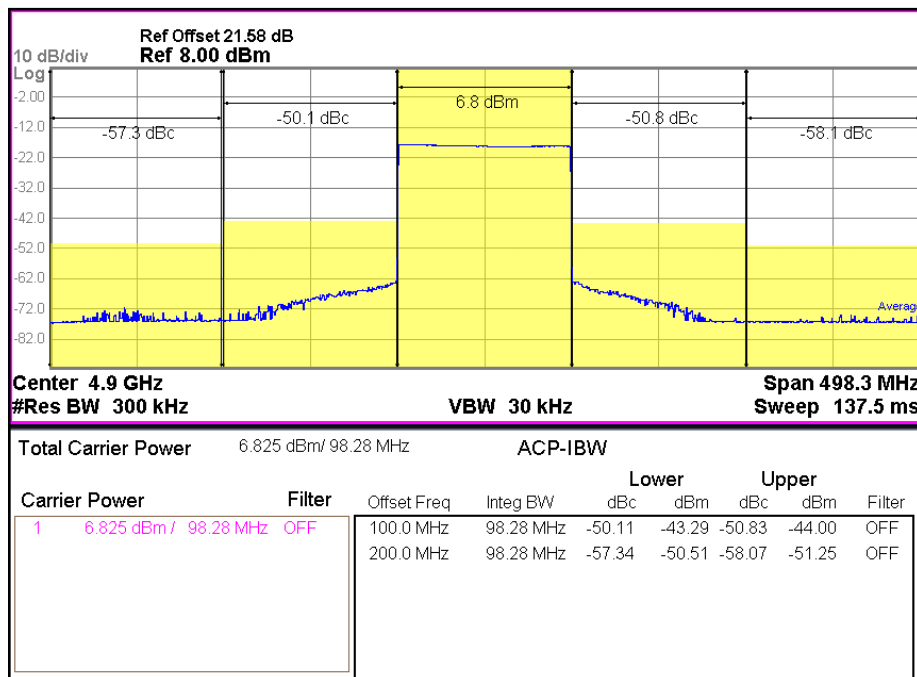


$V_d = 5V, I_d = 90mA$

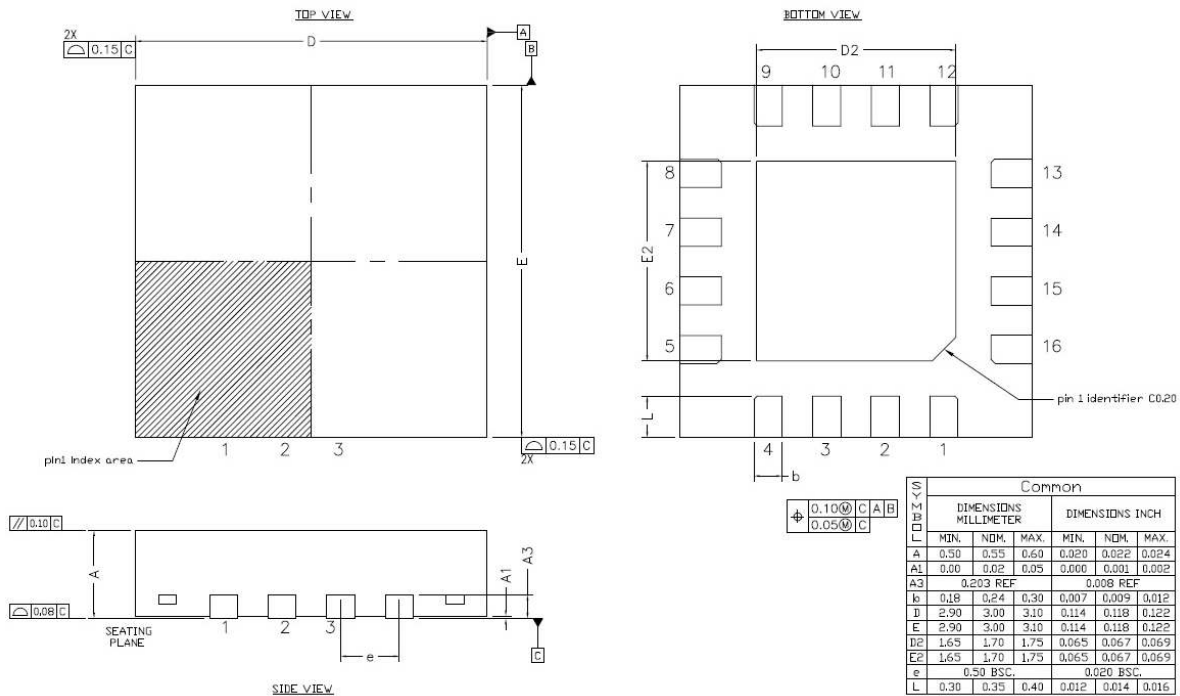
3GPP 5G NR 1FA 3.5GHz (-50dBc) T = 25 °C



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

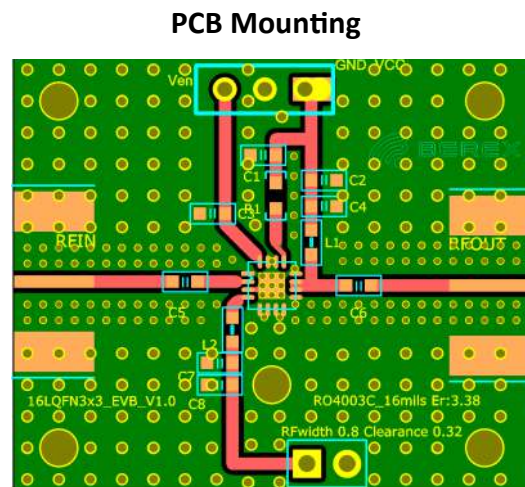
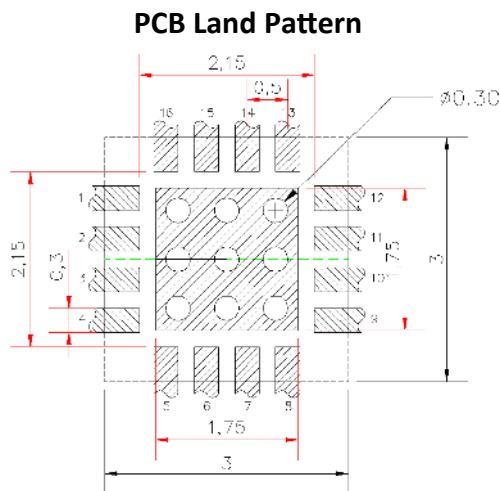


Package Outline Drawing



Note : All dimension _ millimeters

Suggested PCB Land Pattern and PAD Layout



Note : All dimension _ millimeters

PCB lay out _ on BeRex website

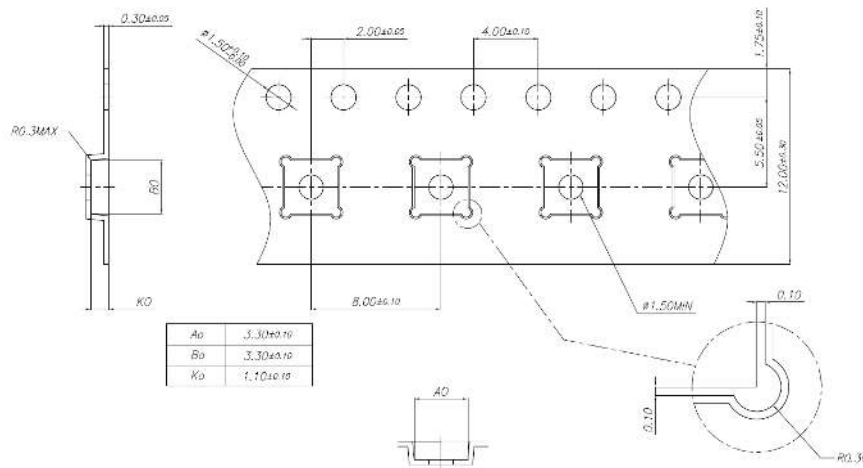
Package Marking



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 1B |
| Value: | Passes <1000V |
| 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 |
|---|---|---|---|---|