

### 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

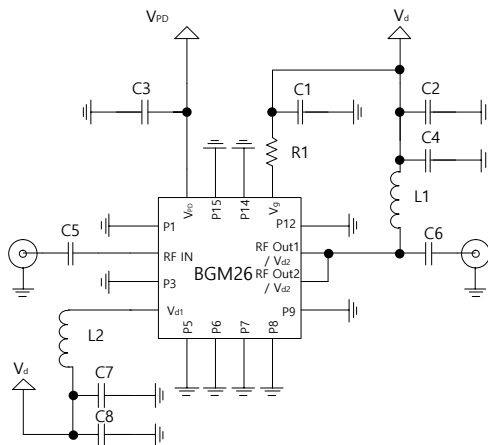
### Product Description

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 mm<sup>2</sup> 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<sub>d</sub>=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 ,<br>Δf=1 MHz | 27.0 | 30.0  |      | dBm  |
| Output P1dB                 |                            | 18.5 | 19.5  |      | dBm  |
| 5G NR ACLR <sup>1</sup>     |                            | 7.9  | 8.9   |      | dBm  |
| Noise Figure <sup>2</sup>   |                            |      | 3.0   | 3.2  | dB   |

Device performance \_ measured on a BeRex evaluation board at 25°C, V<sub>d</sub>=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 ,<br>Δf=1 MHz | 22.0 | 25.0  |      | dBm  |
| Output P1dB                 |                            | 13.5 | 14.5  |      | dBm  |
| 5G NR ACLR <sup>1</sup>     |                            | 2.2  | 3.2   |      | dBm  |
| Noise Figure <sup>2</sup>   |                            |      | 3.2   | 3.4  | dB   |

<sup>1</sup> ACLR Channel Power measured at -50dBc.

- 5G NR Downlink FR1 : SCS 30KHz, CBW 100MHz, 256QAM, PAR 9.66 at 0.01% Prob.

<sup>2</sup> 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 <sub>d</sub> @ (V <sub>d</sub> = 5.0V) | 72   | 90    | 108  | mA    |
| I <sub>d</sub> @ (V <sub>d</sub> = 3.3V) | 45   | 56    | 67   | mA    |
| V <sub>d</sub>                           | 3.3  | 5     | 5.25 | V     |
| dG/dT                                    |      | 0.006 |      | dB/°C |
| R <sub>TH</sub>                          |      | 50    |      | °C/W  |
| Operating Case Temperature               | -40  |       | +115 | °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   |
| 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 ( $V_d=5V$ , $I_d=90mA$ , $T=25^\circ C$ )

| 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 <sup>1</sup>         | 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 <sup>3</sup> | 9.3       | 9.5   | 9.1   | -     | -     | dBm  |
| 5G NR ACLR <sup>4</sup>   | -         | -     | -     | 8.9   | 6.8   | dBm  |
| Noise Figure <sup>5</sup> | 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 <sup>2</sup>         | 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 <sup>3</sup> | 4.0       | 4.0   | 3.2   | -     | -     | dBm  |
| 5G NR ACLR <sup>4</sup>   | -         | -     | -     | 3.2   | 0.3   | dBm  |
| Noise Figure <sup>5</sup> | 3.0       | 3.0   | 3.0   | 3.2   | 3.8   | dB   |

<sup>1</sup> 2 dBm / tone,  $\Delta f=1$  MHz

<sup>2</sup> 0 dBm / tone,  $\Delta f=1$  MHz

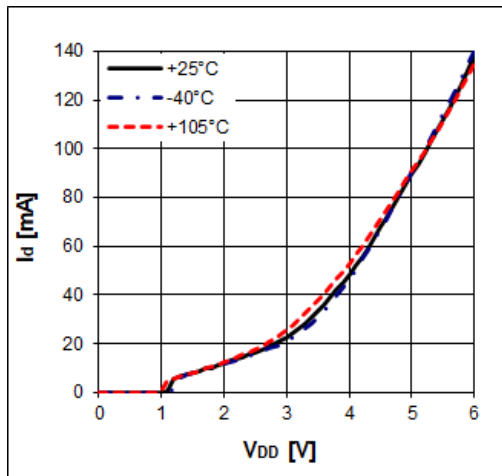
<sup>3</sup> LTE set-up: 3GPP LTE, FDD E-TM3.1, 20MHz BW,  $\pm 20$ MHz offset, PAR 9.75 at 0.01% Prob. ACLR Channel Power measured at -50dBc

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

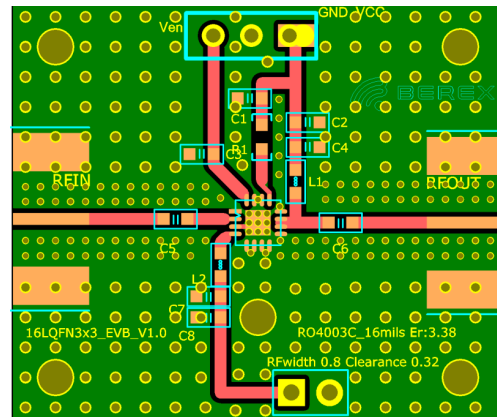
<sup>5</sup> NF : Losses on input and output transmission lines on PCB are not de-embedded.

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

### V-I Characteristics

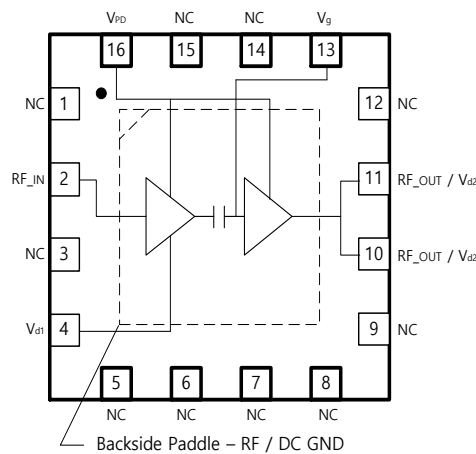


### Evaluation Board



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

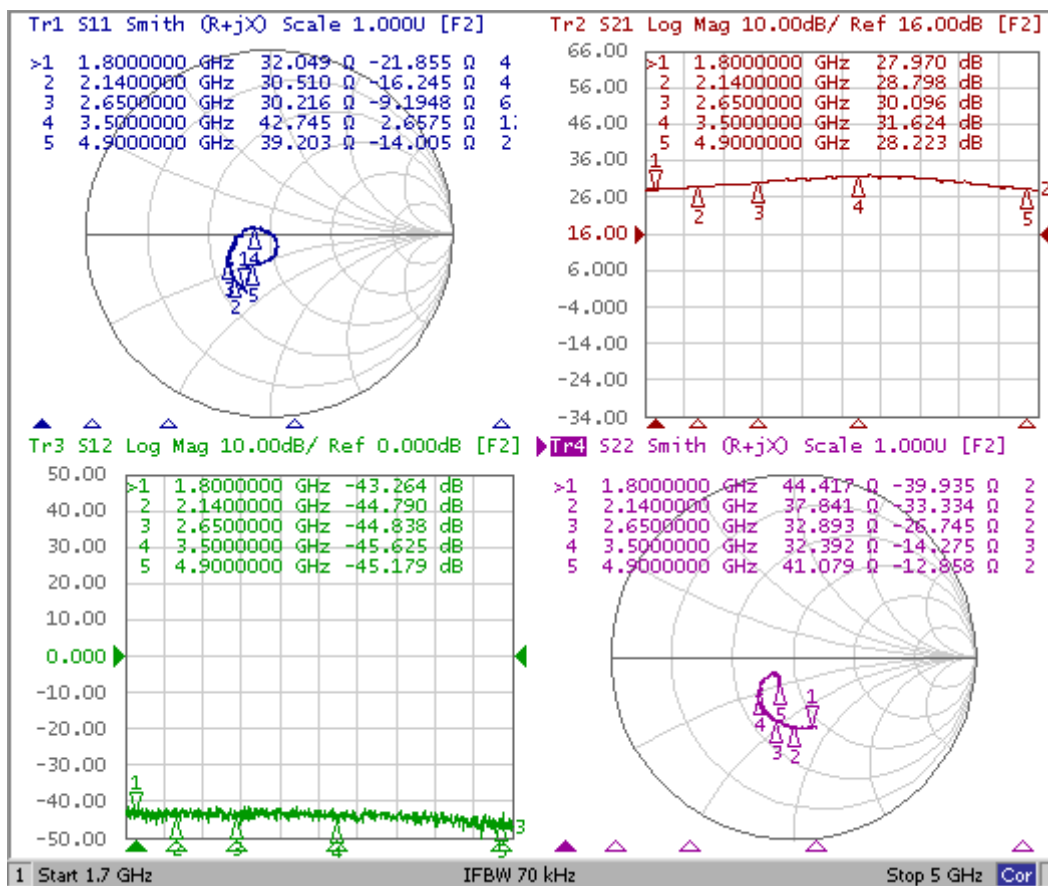
### Pin Configuration and Description



| Pin No.                | Name                     | Description                                                                                                                                          |
|------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2                      | RF_IN                    | RFinput pin. A DC Block is required.                                                                                                                 |
| 4                      | V <sub>d1</sub>          | Supply V <sub>d1</sub> through choke/Inductor for the first stage of the device.                                                                     |
| 10,11                  | RF_OUT / V <sub>d2</sub> | RFoutput / V <sub>d2</sub> pin. Supply V <sub>d2</sub> through choke/Inductor for the second stage of the device.                                    |
| 13                     | V <sub>g</sub>           | V <sub>g</sub> sets I <sub>dq</sub> through external resistor for V <sub>d</sub> =5V or V <sub>d</sub> =3.3V.                                        |
| 16                     | V <sub>PD</sub>          | Power on/off control pin. 0 ≤ V <sub>PD</sub> ≤ 0.63V disables device.<br>If function is not desired, Supply 1.17 ≤ V <sub>PD</sub> ≤ V <sub>d</sub> |
| 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 ( $V_d=5V$ ,  $I_d=90mA$ ,  $T=25^{\circ}C$ )

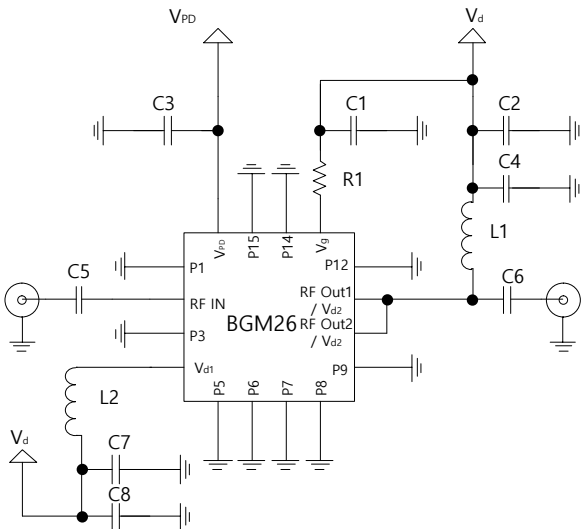


## S-Parameter

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

| Freq  | S11   | S11      | S21    | S21      | S12   | S12     | S22   | S22      |
|-------|-------|----------|--------|----------|-------|---------|-------|----------|
| [MHz] | [Mag] | [Ang]    | [Mag]  | [Ang]    | [Mag] | [Ang]   | [Mag] | [Ang]    |
| 1700  | 0.337 | -110.94  | 24.954 | -23.825  | 0.006 | 24.006  | 0.399 | -70.933  |
| 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 |

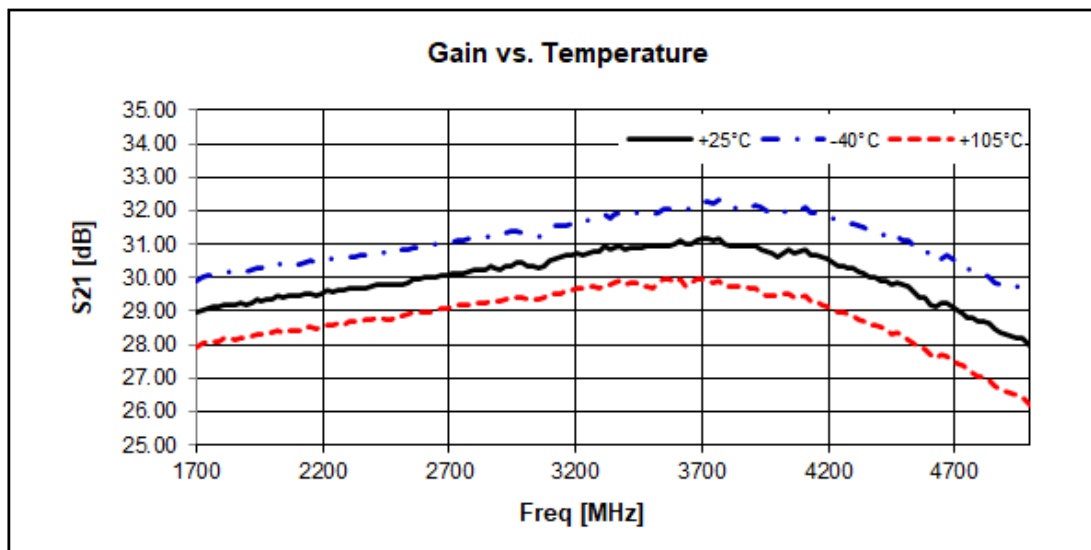
### Application Circuit: 1700~5000 MHz

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

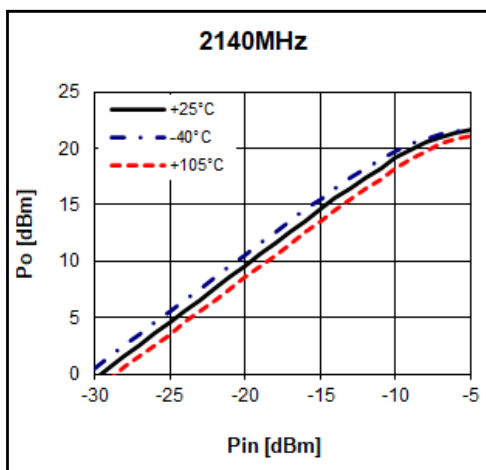
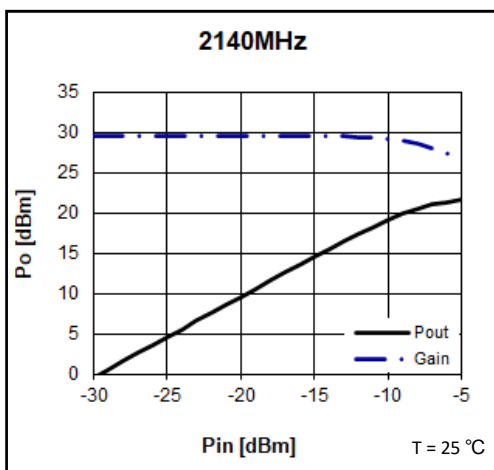
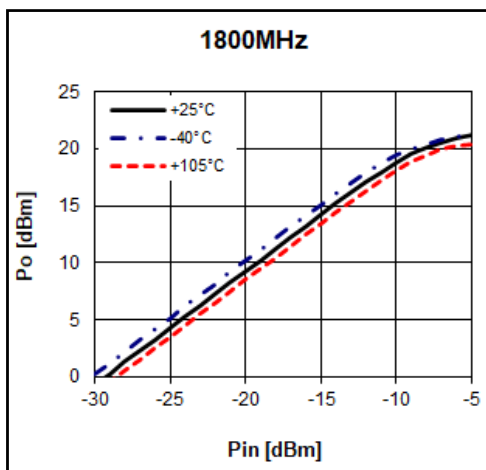
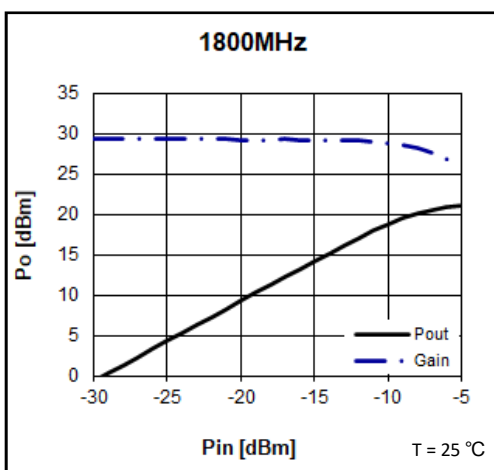
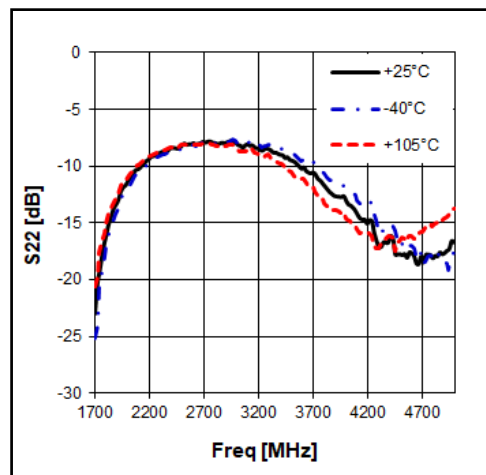
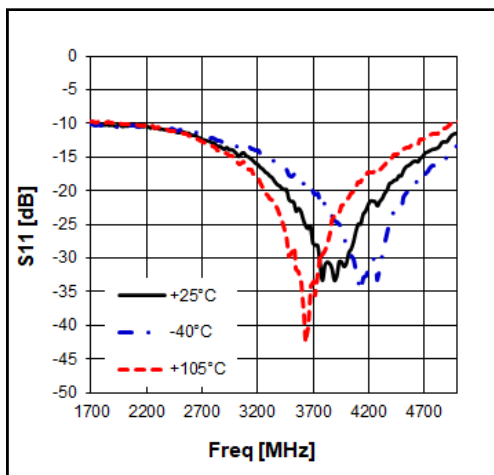
\* 3.3V R1 = 3Kohm

### Typical Performance

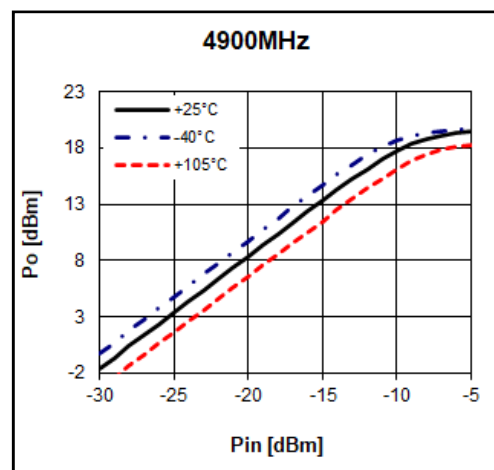
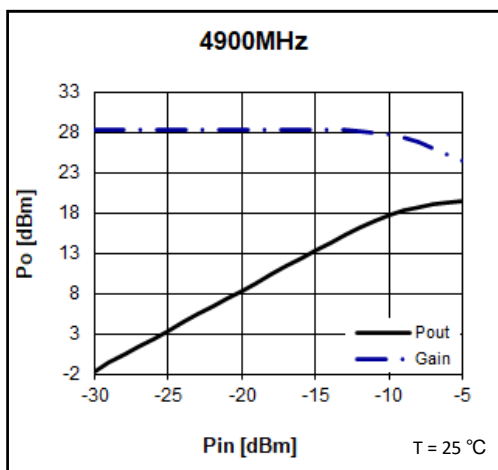
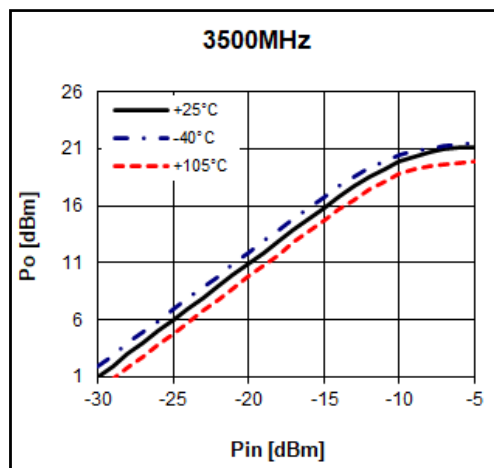
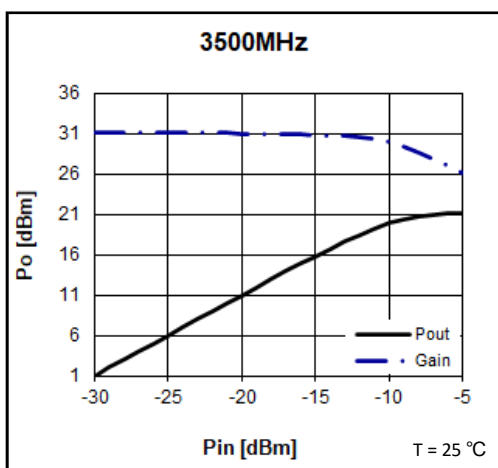
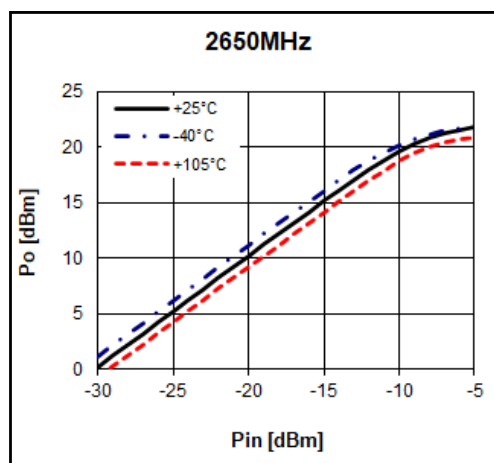
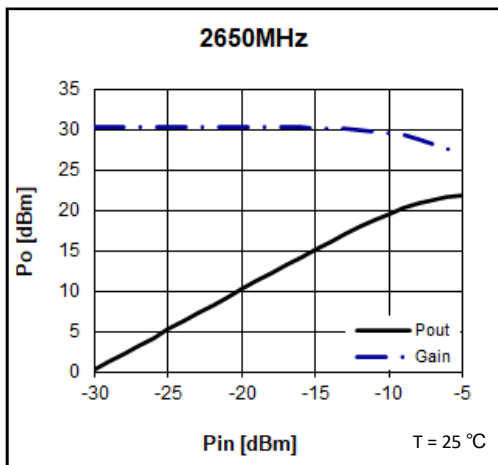
$V_d = 5V, I_d = 90mA$



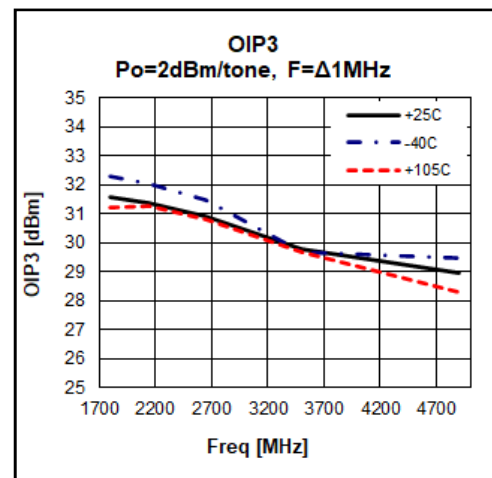
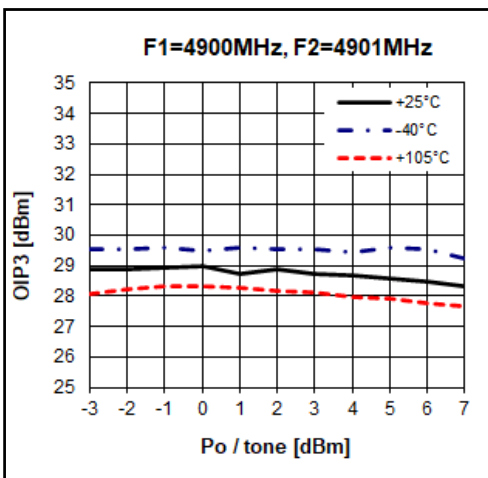
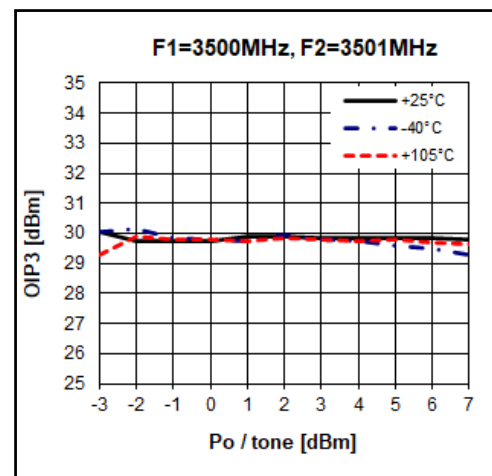
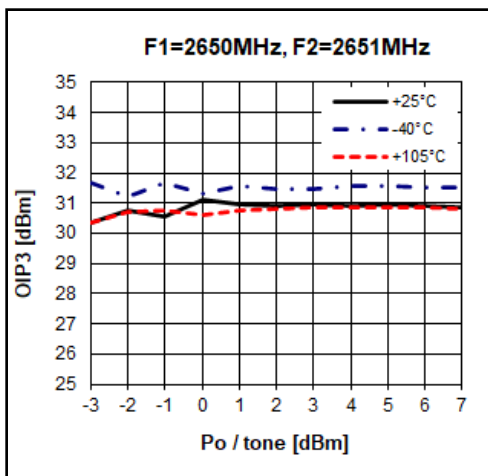
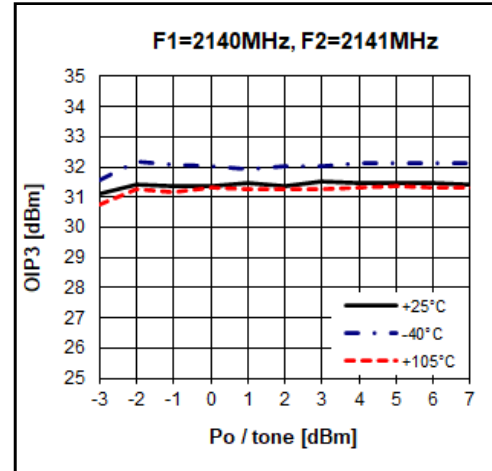
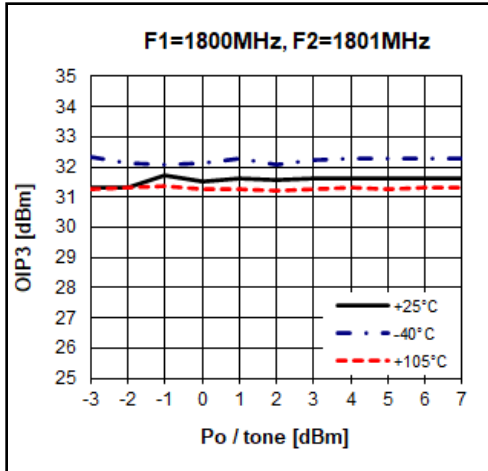
$V_d = 5V$ ,  $I_d = 90mA$

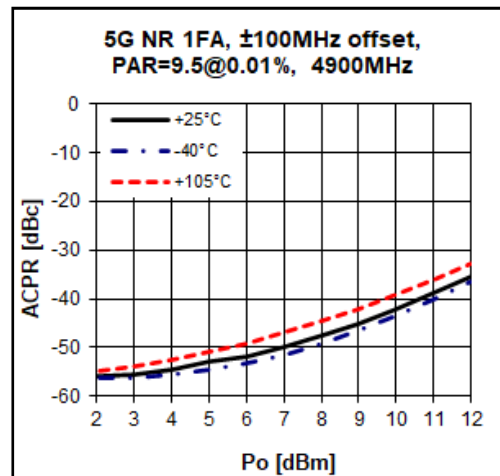
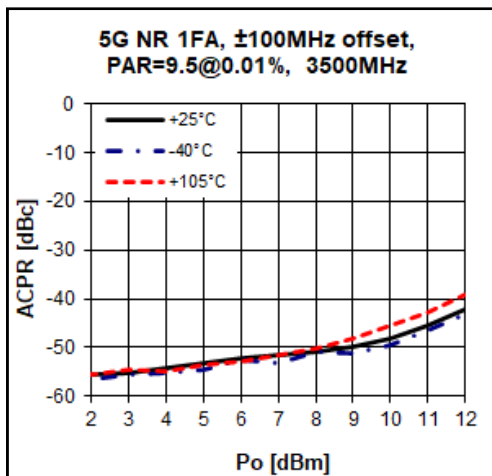
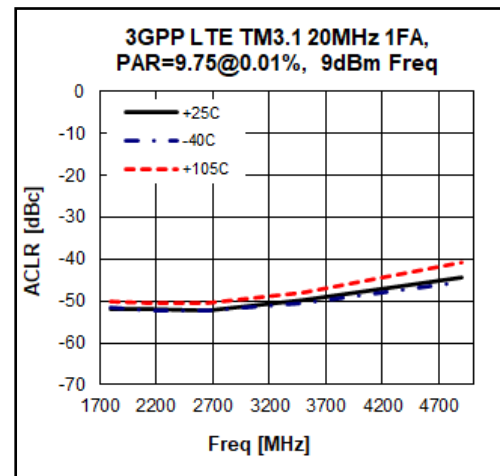
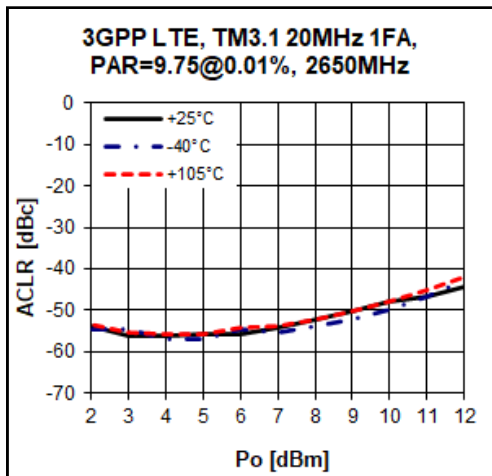
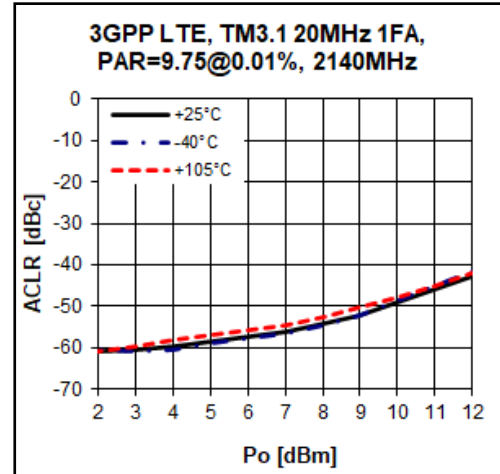
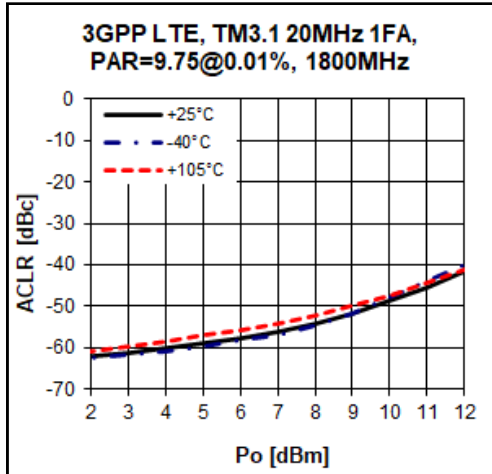


$V_d = 5V$ ,  $I_d = 90mA$



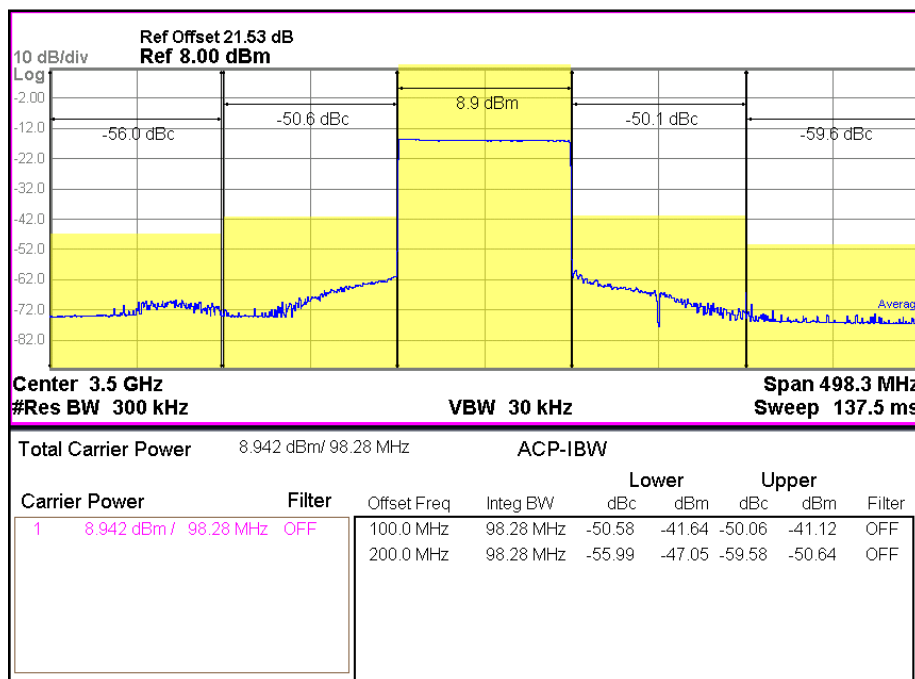
$V_d = 5V$ ,  $I_d = 90mA$



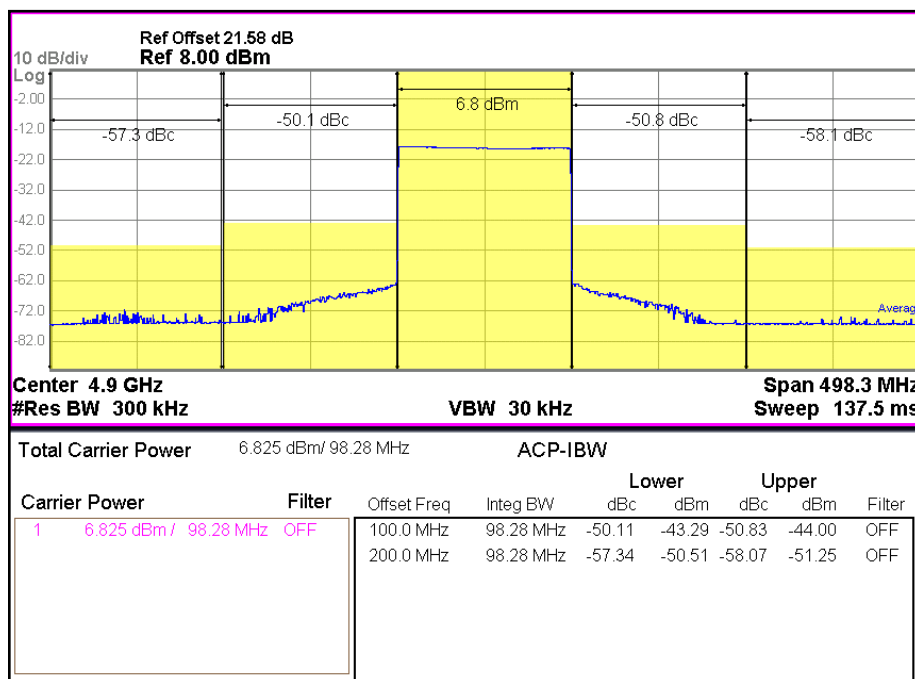
$V_d = 5V, I_d = 90mA$ 


$V_d = 5V$ ,  $I_d = 90mA$

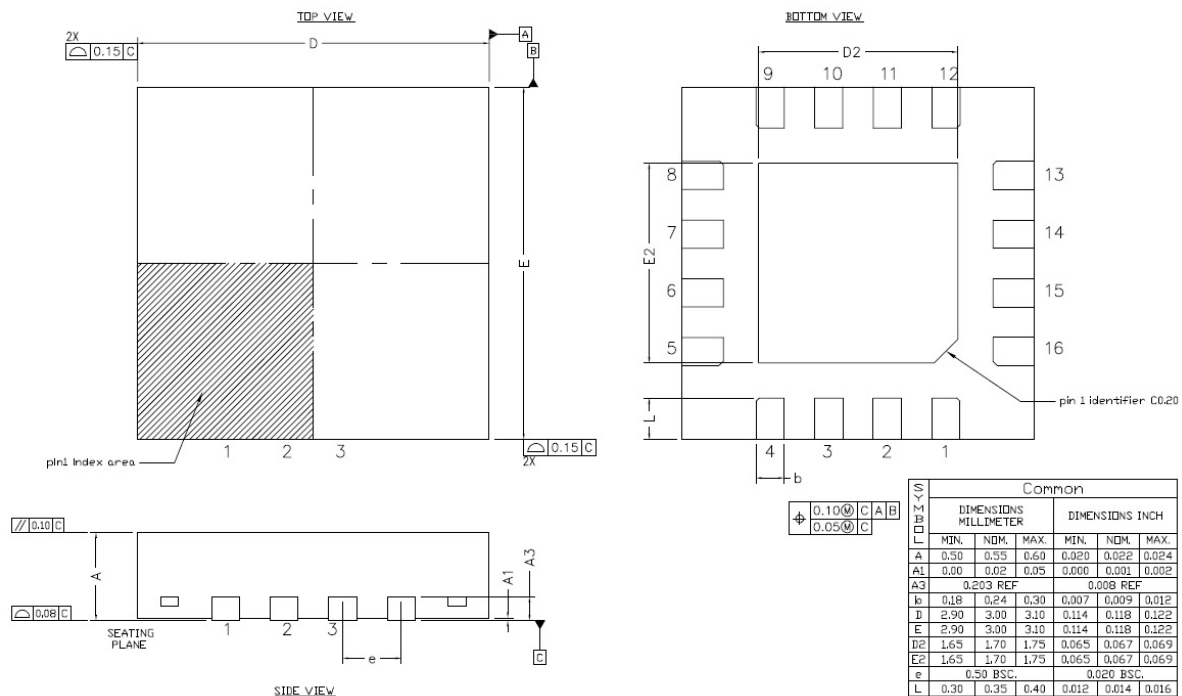
### 3GPP 5G NR 1FA 3.5GHz ( -50dBc) T = 25 °C



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



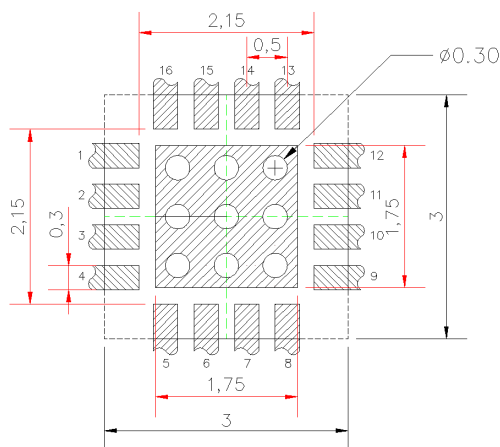
### Package Outline Drawing



Note : All dimension \_ millimeters

### Suggested PCB Land Pattern and PAD Layout

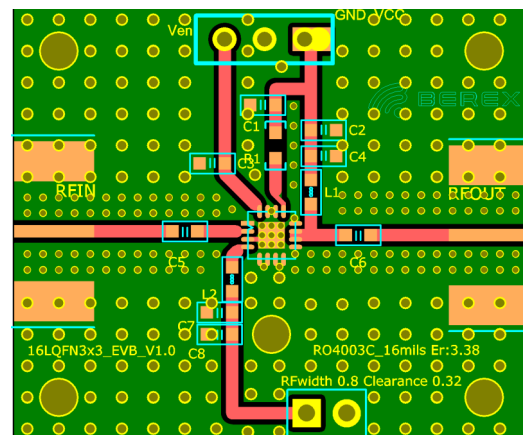
#### PCB Land Pattern



Note : All dimension \_ millimeters

PCB lay out \_ on BeRex website

#### PCB Mounting



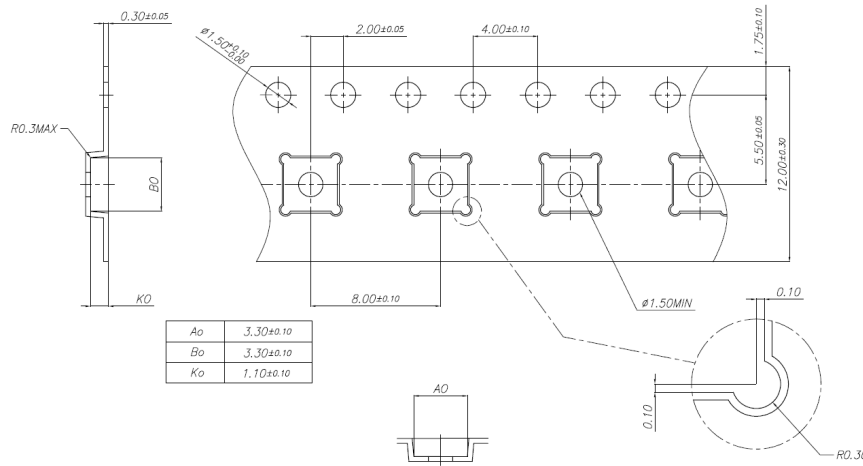
### Package Marking



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

|                    |                                            |
|--------------------|--------------------------------------------|
| <b>ESD Rating:</b> | Class 1B                                   |
| <b>Value:</b>      | <b>Passes &lt;1000V</b>                    |
| <b>Test:</b>       | Human Body Model (HBM)                     |
| <b>Standard:</b>   | JEDEC Standard JS-001-2017                 |
| <b>MSL Rating:</b> | <b>Level 1 at +260°C convection reflow</b> |
| <b>Standard:</b>   | 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 |
|---|---|---|---|---|