



# TGL2205-SM

## 2-6 GHz 100 Watt VPIN Limiter

### Product Overview

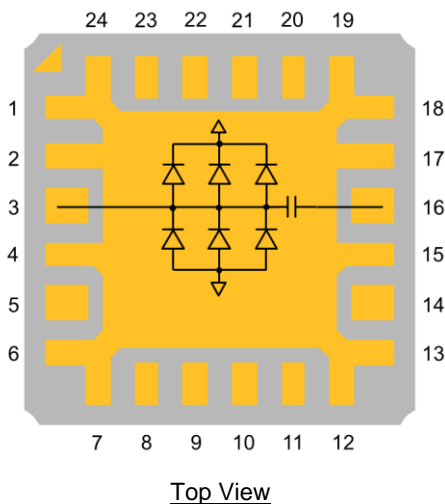
The Qorvo TGL2205-SM is a high power, wideband GaAs VPIN limiter capable of protecting sensitive receive channel components against high power incident signals. The TGL2205-SM does not require DC bias, and achieves a low insertion loss all in a small form factor. These features allow for simple integration with minimal impact to system performance.

The TGL2205-SM operates from 2-6 GHz with low insertion loss of less than 0.6 dB. It can limit up to 100 W incident pulsed-power with a low flat leakage of less than 16.5 dBm.

The TGL2205-SM is offered as a packaged limiter, and is well suited for both commercial and defense related applications.

Lead-free and RoHS compliant.

### Functional Block Diagram



24 Pad 4 x 4 mm Air Cavity QFN Package

### Key Features

- Frequency Range: 2 to 6 GHz
- Insertion Loss: < 0.6 dB
- Peak Power Handling: 100 W
- Flat Leakage: < 16.5 dBm
- Spike Leakage < 17 dBm
- Passive (no DC bias required)
- Integrated DC Blocks on the output
- Recovery time < 115 ns
- Package Dimensions: 4.00 x 4.00 x 1.47 mm

*Performance is typical across frequency. Please reference electrical specification table and data plots for more details.*

### Applications

- Receive Chain Protection
- Commercial and Military Radar

### Ordering Information

| Part          | Description               |
|---------------|---------------------------|
| 1095765       | 2-6 GHz 100W VPIN Limiter |
| 1095768       | TGL2205-SM, EVAL BOARD    |
| TGL2205-SMTR7 | 250 Piece 7" Reel         |

## Absolute Maximum Ratings

| Parameter                                 | Rating        |
|---|---------------|
| Incident Power, CW or Pulsed, 50 Ω, 25 °C | 100 W         |
| Incident Power, CW or Pulsed, 50 Ω, 85 °C | 50 W          |
| Mounting Temperature<br>(30 s max)        | 260 °C        |
| Storage Temperature                       | -40 to 150 °C |

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

## Recommended Operating Conditions

| Parameter                   | Min | Typ. | Max | Units |
|-----------------------------|-----|------|-----|-------|
| Passive – No Bias           |     |      |     |       |
| Operating Temperature Range | -40 | +25  | +85 | °C    |

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

## Electrical Specifications

| Parameter                                      | Conditions <sup>(1)</sup> | Min | Typ.   | Max | Units  |
|--|---------------------------|-----|--------|-----|--------|
| Operational Frequency Range                    |                           | 2   |        | 6   | GHz    |
| Insertion Loss                                 |                           |     | < 0.6  |     | dB     |
| Input Return Loss                              |                           |     | 12     |     | dB     |
| Output Return Loss                             |                           |     | 12     |     | dB     |
| Flat Leakage Power at P <sub>IN</sub> > 30 dBm |                           |     | < 16.5 |     | dBm    |
| Pulse Recovery Time                            |                           |     | < 115  |     | ns     |
| Spike Leakage                                  |                           |     | < 17   |     | dBm    |
| Insertion Loss Temperature Coefficient         |                           |     | 0.003  |     | dB/ °C |

Notes:

1. Test conditions unless otherwise noted: Temp = +25 °C, Tuned EVB Results.

## Thermal and Reliability Information

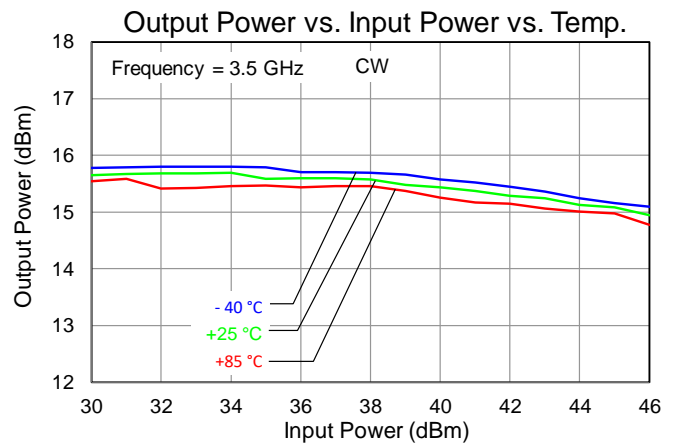
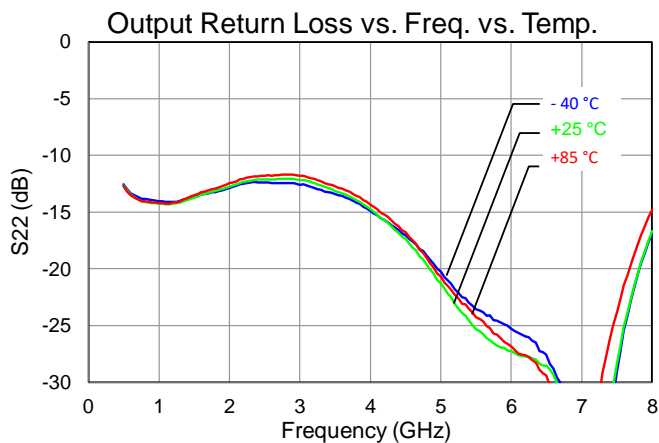
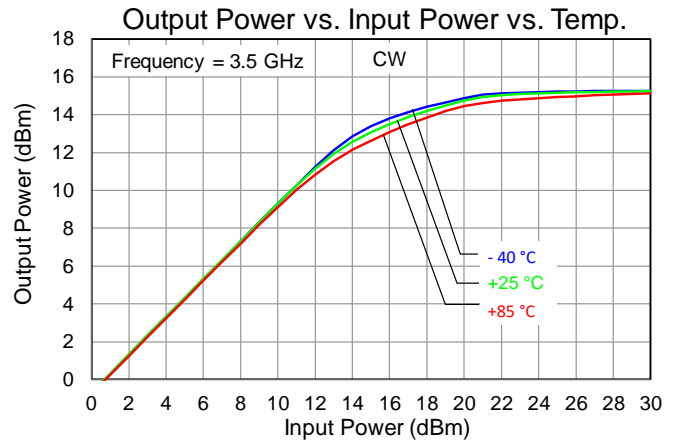
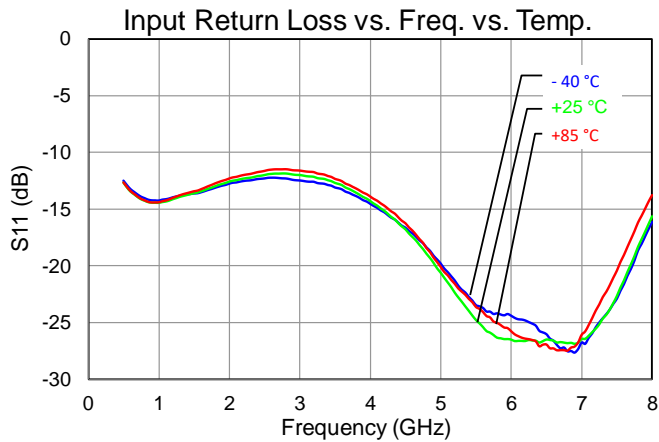
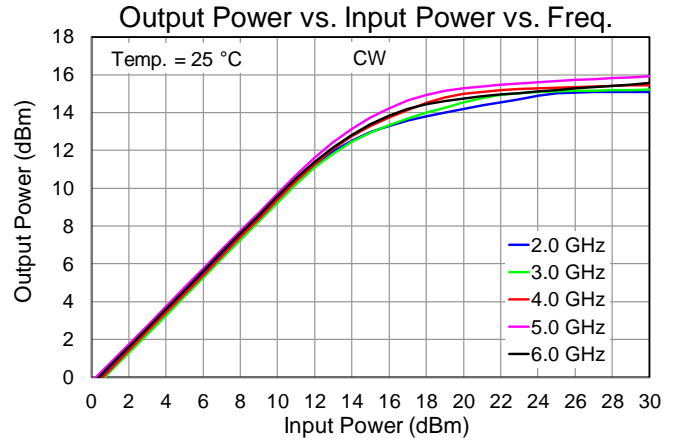
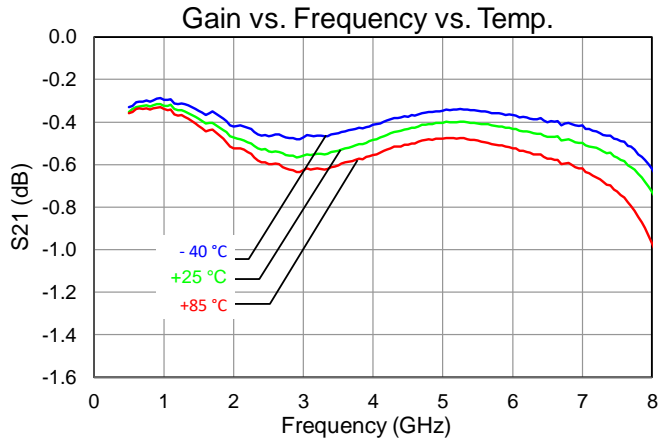
| Parameter  | Test Conditions                                | Value | Units |
|--|--|-------|-------|
| Incident Power<br>(RF Operational Life Test <sup>(1)</sup> ) | 4.5 GHz, CW, 50 Ω, 25 °C                       | 31    | W     |
|  | 4.5 GHz, Pulsed, PW=10 μs, DC=10%, 50 Ω, 25 °C | 100   | W     |

Notes:

1. Test terminated after 168 hours. Insertion Loss remained ≤ 1 dB for device under test.

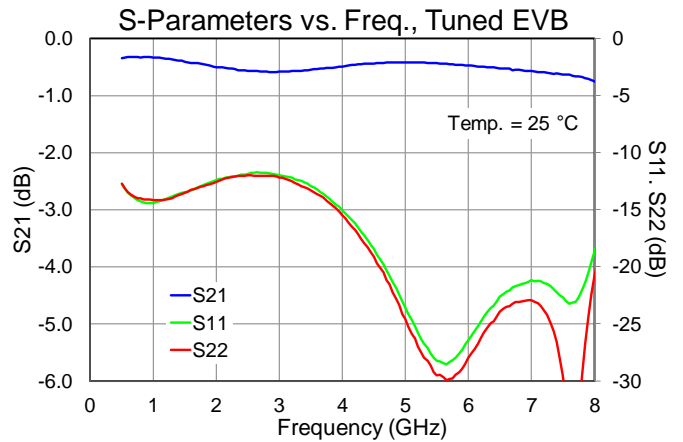
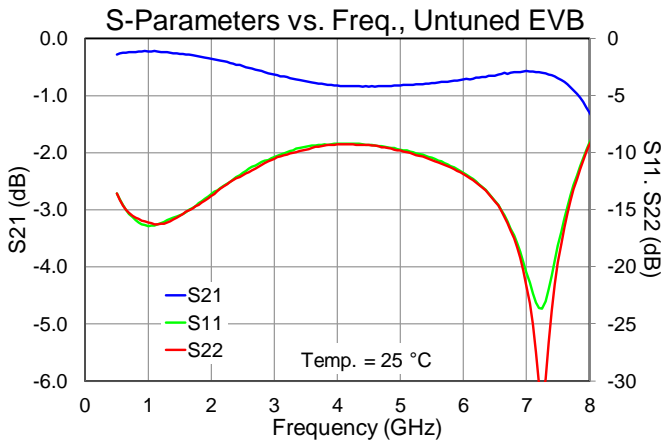
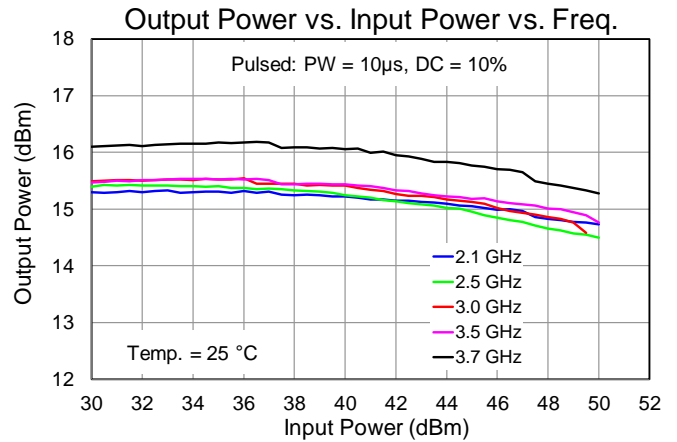
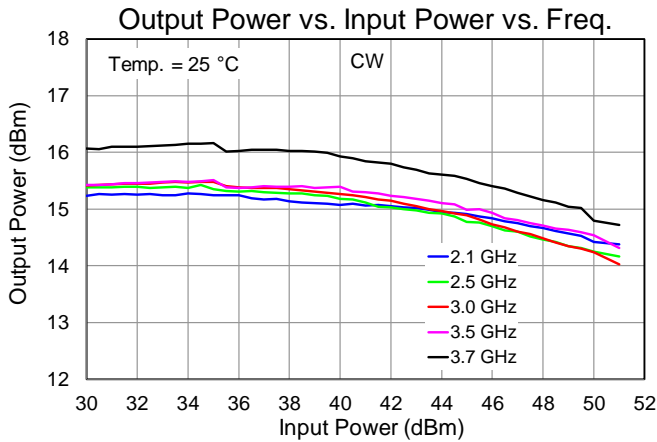
**Performance Plots – Small & Large Signal**

Test conditions unless otherwise noted: CW Power, Temp.=+25 °C, Tuned EVB Performance

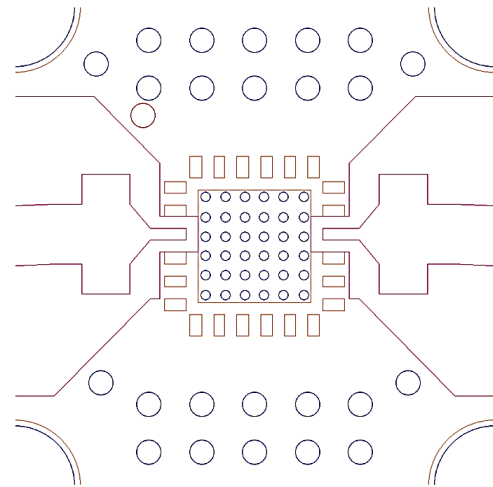
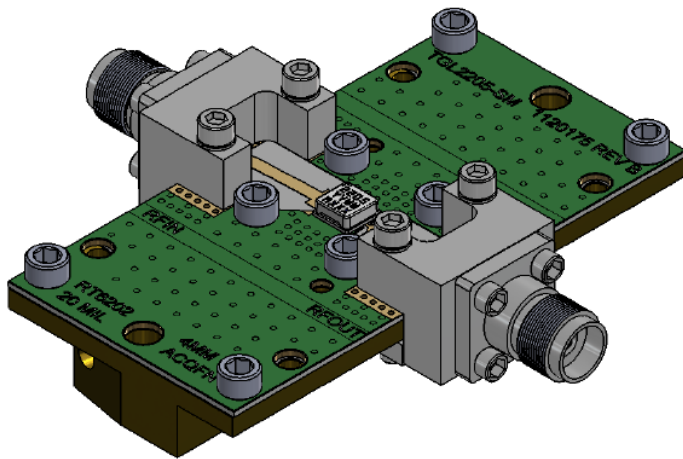


Performance Plots – Small & Large Signal

Test conditions unless otherwise noted: CW power, Temp.=+25 °C, Tuned EVB Performance



## Evaluation Board (EVB) & Mounting Detail

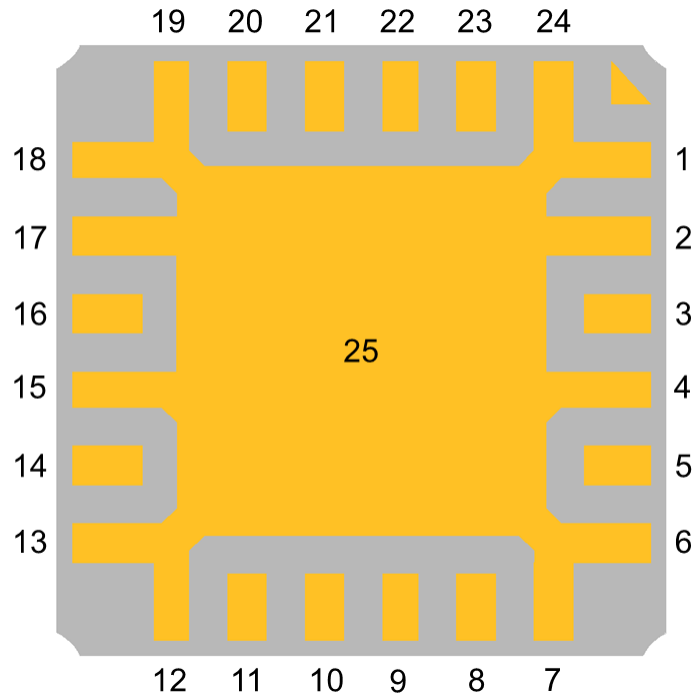


Mounting Detail

### Notes:

1. RF layer is 0.020" thick Rogers RO6202,  $\epsilon_r = 2.94$ . Metal layers are 1-oz copper. Microstrip 50  $\Omega$  line width is 0.050". The microstrip line taper at the connector interface is optimized for the Southwest Microwave end-launch connector 1092-02A-5.
2. The pad pattern shown has been developed and tested for optimized assembly at Qorvo. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.
3. Ground / thermal vias under the DUT are critical for the proper performance of this device.
4. The EVB shown herein utilizes copper filled vias (8 mil diameter) under the DUT to maximize heat transfer away from the DUT under large signal conditions.
5. Thermal dissipation is low for normal non-limiting operation.

Pad Configuration and Description

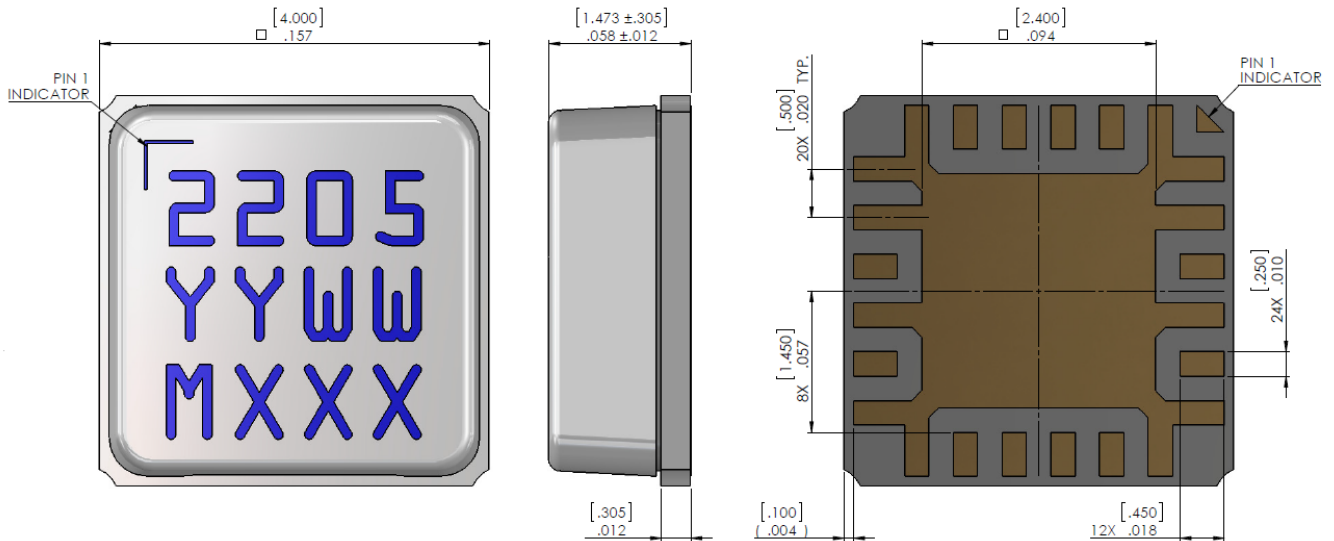


Bottom View

| Pad No.                        | Label     | Description  |
|--------------------------------|-----------|--|
| 1,2,4,6,7,12,13,15,17-19,24,25 | GND       | On PCB, multiple copper-filled vias should be employed under the center pad to minimize inductance and thermal resistance. See page 5 for suggested mounting configuration |
| 3                              | RF Input  | RF Input, matched to 50 Ohms, not DC blocked   |
| 5,8-11,14,20-23                | NC        | No connection; may be grounded if desired  |
| 16                             | RF Output | RF Output, matched to 50 Ohms, DC blocked  |

NOTE: The RF Input and RF Output ports are not interchangeable.

Mechanical Information & Package Marking



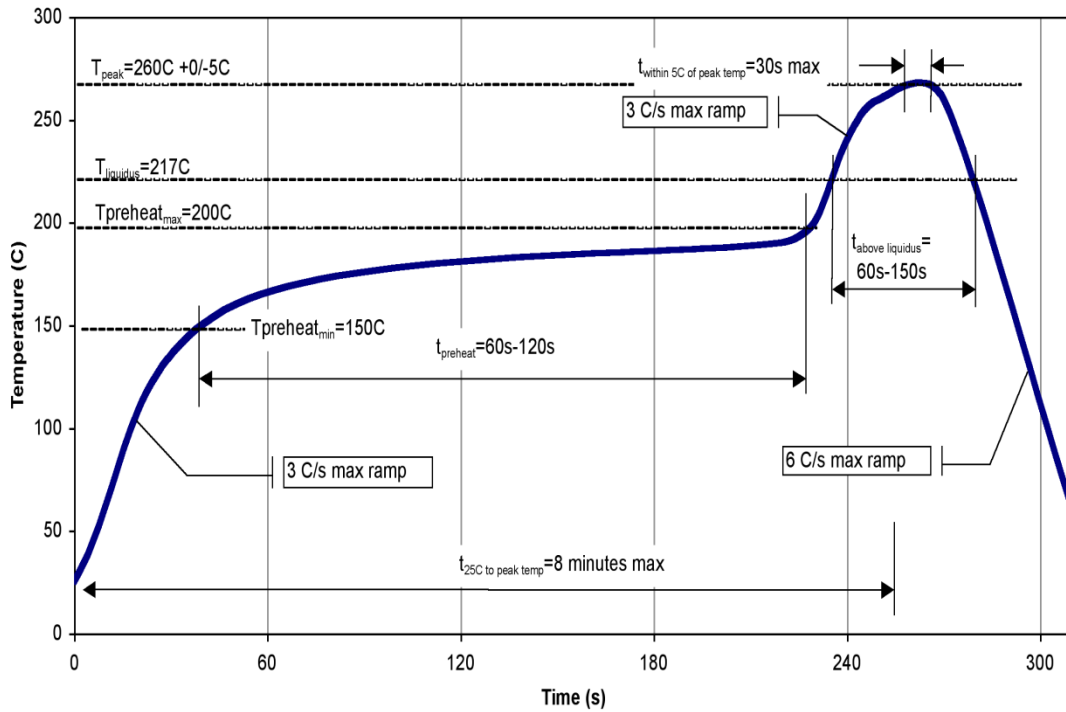
- NOTES:
- MATERIAL:
    - PACKAGE BASE: CERAMIC
    - PACKAGE LID: PLASTIC
    - ALL METALIZED FEATURES ARE GOLD PLATED.
    - PART IS EPOXY SEALED.
  - PART MARKING:
    - 2205 - PART NUMBER
    - YY - PART NUMBER YEAR
    - WW - PART ASSEMBLY WEEK
    - MXXX - BATCH ID

Dimensions are in millimeter. Tolerances are +/- 0.127 mm

Assembly Notes

- Compatible with lead-free soldering process with 260°C peak reflow temperature.
- This package is non-hermetic, and therefore cannot be subjected to aqueous washing. The use of no-clean solder to avoid washing after soldering is recommended
- Solder rework not recommended.
- Contact plating: Ni-Au

Recommended Soldering Profile





## Handling Precautions

| Parameter                        | Rating   | Standard                 |
|----------------------------------|----------|--------------------------|
| ESD – Human Body Model (HBM)     | Class 2  | ESDA / JEDEC JS-001-2012 |
| ESD – Charged Device Model (CDM) | Class C3 | JEDEC JESD22-C101        |
| MSL – Moisture Sensitivity Level | Level 3  | IPC/JEDEC J-STD-020      |



Caution!  
ESD-Sensitive Device

## RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free
- SVHC Free



## Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

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