# Product Specification

## RS16168 20W CW 30MHz -12GHz Wideband Power Limiter

### General Description

The RS16168 is a SOI technology-enhanced power limiter designed for use in mobile and other portable products.

Unlike traditional PIN diode solutions, the RS16168 eliminates the need for external bias components such as DC blocking capacitors, RF choke inductors and bias resistors.

It delivers low insertion loss and high linearity under non-limiting power levels and fast response time in a limiting event, ensuring protection of sensitive circuitry. It also offers excellent ESD rating and ESD protection.

### Features

- Monolithic drop-in solution with no external bias components
- Low insertion loss: 0.45 dB typical to 3.0 GHz
- High linearity
  - IP2: 85 dBm typical
  - IP3: 42 dBm typical
- Small package, 3 x 3 mm, 16 pins QFN package

### Functional Block Diagram

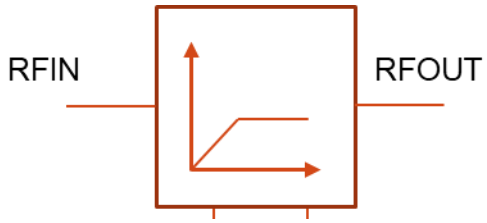



**Figure 1**

### Applications

- Mobile
- Portable device
- Test equipment
- Pin diode replacement

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## Absolute Maximum Ratings

**Table 1**

| Parameter | Min | Max | Units |
|---|---|---|---|
| Maximum Junction Temperature | | 140 | °C |
| Storage Temperature Range | -65 | 150 | °C |
| Lead Temperature (soldering, 10s) | | 260 | °C |
| ESD Voltage– HBM (Per JESD22-A114) | | Class 2 (2000V) | |
| ESD Voltage – CDM (Per JESD22-C101) | | Class IV (500V) | |

*Stresses above those listed above may cause permanent damage to the device. Functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

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## Recommended Operating Conditions

**Table 2**

| Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Operating Temp Range | Case Temperature | -40 | | 85 | ℃ |
| RF Frequency Range | | 30 | | 12000 | MHz |
| Input CW power | 30MHz, 25℃ , with heat sink, 1 hour | | | 43 | dBm |
| Input CW power | 3.8GHz, 25℃, with heat sink, 1 hour | | | 43 | dBm |
| Input CW power | 12GHz, 25℃, with heat sink, 1 hour | | | 43 | dBm |

*Operation should be restricted to the limits in the Recommended Operating Conditions table. Operation between operating range maximum and absolute maximum for extended periods may reduce reliability.*

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## Specification

**Typical Application Circuit, Normal mode, $T_C$ = +25°C, $F_{RF}$ = 1000MHz, Input power = 0dBm per tone unless otherwise stated. PCB board trace and connector losses are de-embedded unless otherwise noted.**

**Table 3**

| Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Insertion Loss | 30MHz - 1000MHz | | 0.25 | | dB |
| | 1000MHz – 4000MHz | | 0.3 | | |
| | 4000MHz – 8000MHz | | 0.5 | | |
| | 8000MHz – 12000MHz | | 0.7 | | |
| Return Loss | 30MHz - 1000MHz | | -28 | | dB |
| | 1000MHz – 4000MHz | | -25 | | |
| | 4000MHz – 8000MHz | | -18 | | |
| | 8000MHz – 12000MHz | | -17 | | |
| Threshold, input P1dB | 30MHz | | 18.5 | | dBm |
| | 0.7GHz | | 18.3 | | |
| | 3.8GHz | | 18.2 | | |
| | 6.5GHz | | 17.5 | | |
| | 12GHz | | 15 | | |
| Max leakage power | 30MHz | | 22.5 | | dBm |
| | 0.7GHz | | 19 | | |
| | 3.8GHz | | 16.3 | | |
| | 6.5GHz | | 14.7 | | |
| | 12GHz | | 11.6 | | |
| Input IP2 | 2 GHz, Pin = -5dBm | | 85 | | dBm |
| Input IP3 | 2 GHz, Pin = -5dBm | | 42 | | dBm |
| Response time | 2GHz, 43dBm | | 80 | | ns |
| Recovery time | 2GHz, 43dBm | | 650 | | |

## Pin Diagram

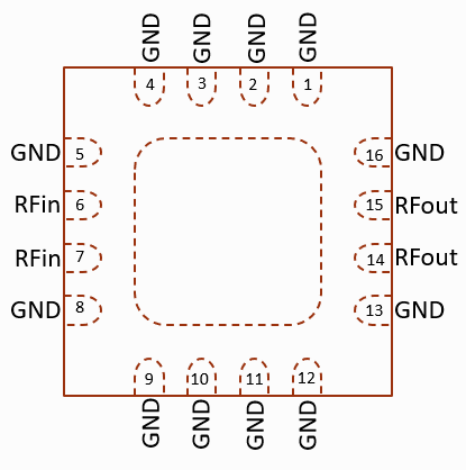



**Figure 2**

## Pin Description

**Table 4**

| Pin No. | Label | Description |
|---|---|---|
| 1 – 16 except 6, 7, 14, 15 | GND | Ground. |
| 6, 7 | RFin | RF input. The RF pins do not require DC blocking capacitors for proper operation if the 0 VDC requirement is met. |
| 14, 15 | RFout | RF output. The RF pins do not require DC blocking capacitors for proper operation if the 0 VDC requirement is met. |

## Application Circuit

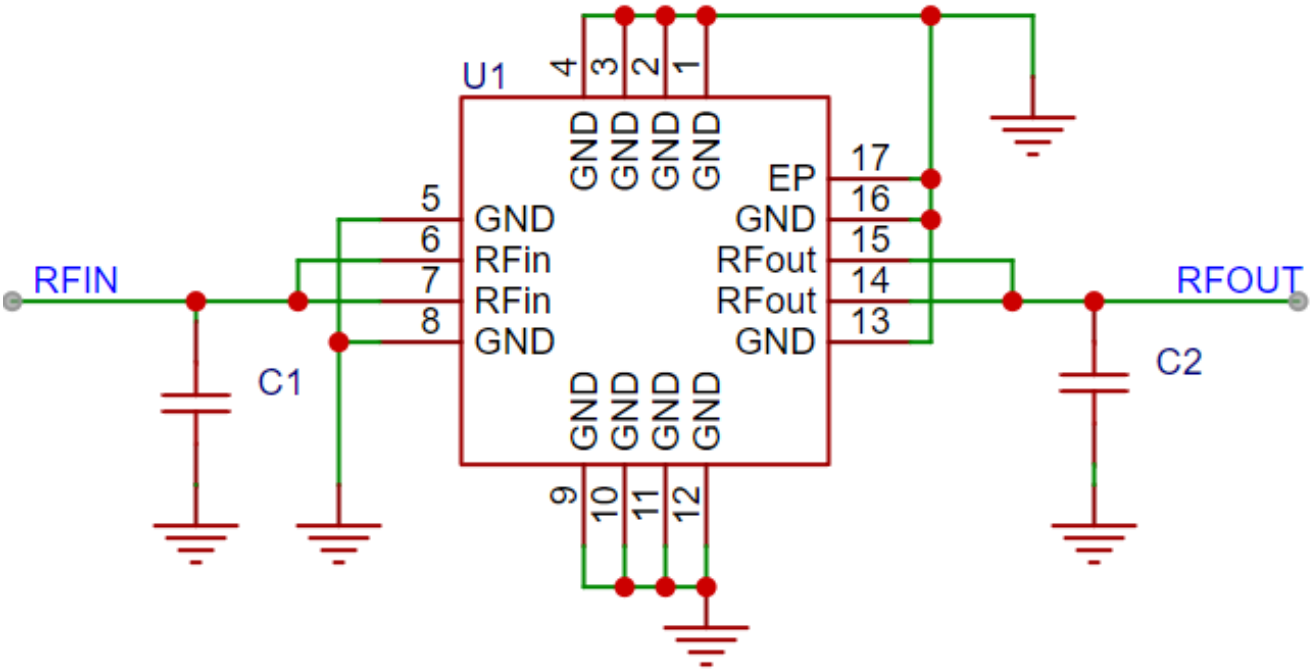



**Figure 3**

**Table 5**

| Reference Designator | Value | Description |
|---|---|---|
| C1,C2 | \ | C0402 |

## Typical Performance Characteristics

Figure 4. Insertion Loss

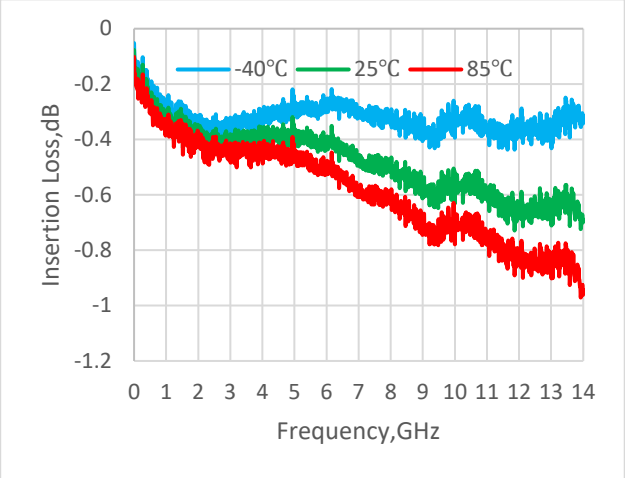



Figure 5. Return Loss

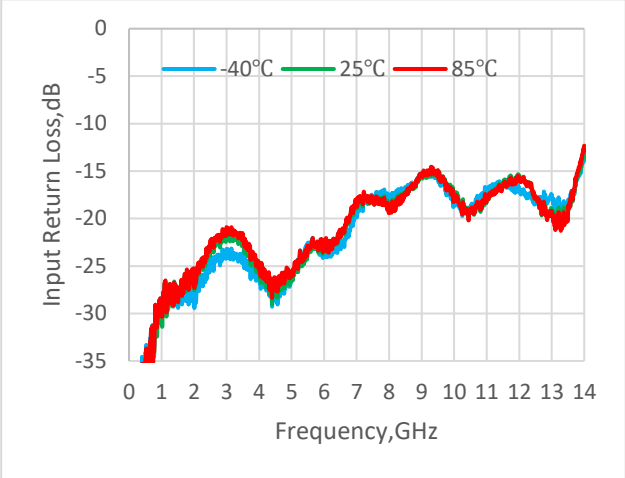



Figure 6. Pin VS Pout over Frequency

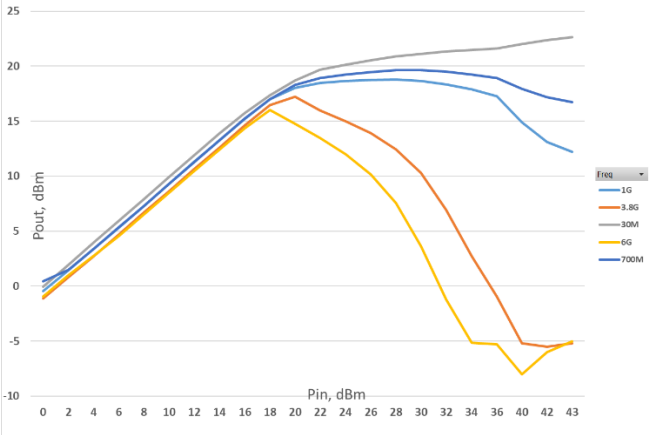



Figure 7. Response Time (2GHz 43dBm CW input)

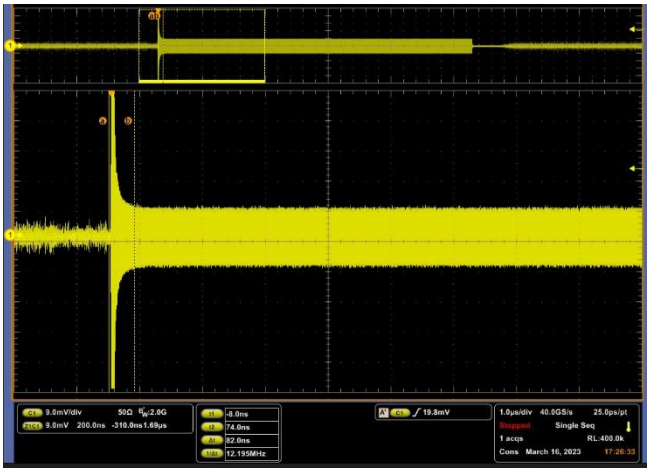
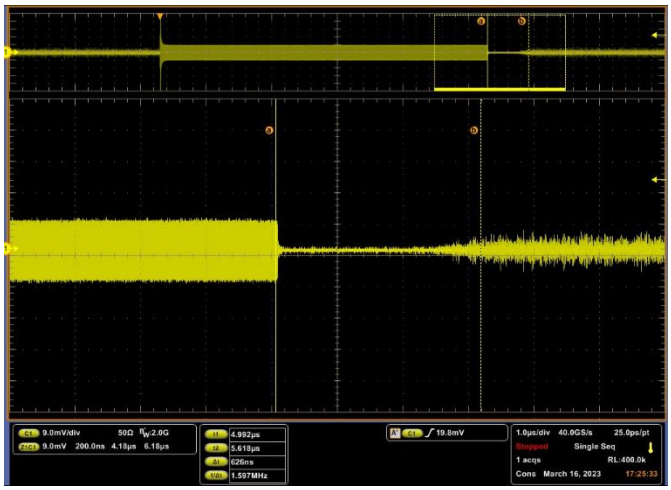
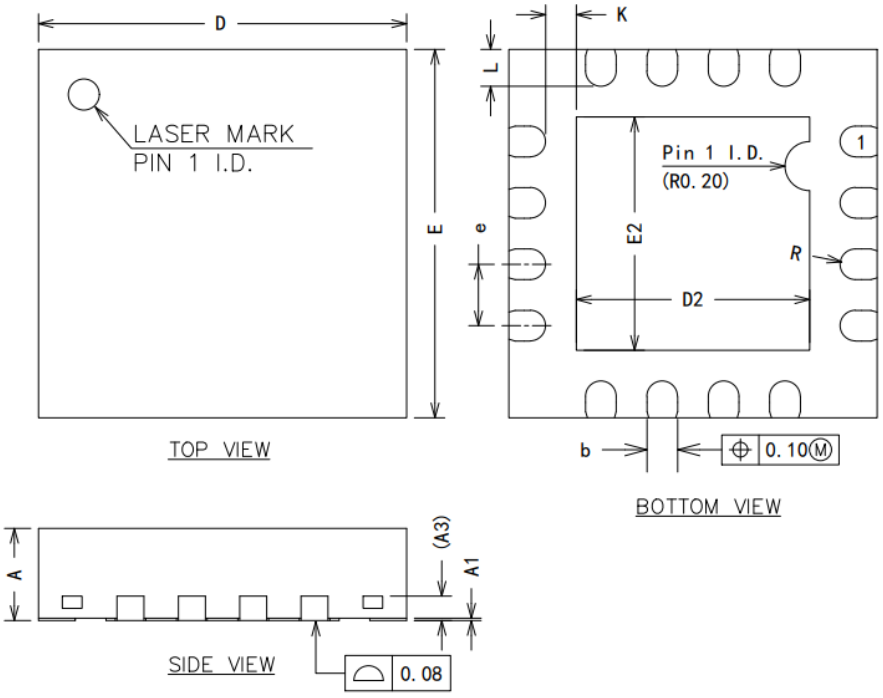


Figure 8. Recovery Time (2GHz 43dBm CW input)



## Package Drawing




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | 0.02 | 0.05 |
| A3 | | 0.20REF | |
| b | 0.20 | 0.25 | 0.30 |
| D | 2.90 | 3.00 | 3.10 |
| E | 2.90 | 3.00 | 3.10 |
| D2 | 1.80 | 1.90 | 2.00 |
| E2 | 1.80 | 1.90 | 2.00 |
| e | 0.40 | 0.50 | 0.60 |
| K | 0.15 | 0.25 | 0.35 |
| L | 0.25 | 0.30 | 0.35 |
| R | 0.10 | – | – |

**Figure 9**

## Revision History

**Table 6**

| Revision Number | Revision Date | Description | Modifications |
|---|---|---|---|
| 0 | 2021/5/7 | Draft | — |
| 0.1 | 2023/2/16 | Initial release | |
| 0.2 | 2025/06/03 | | Features/Recommended Operating Conditions/Specification/Pin Diagram /Applications Information/ Typical Performance Characteristics /Package Drawing |

## Document Categories

### Advance Information

The product is in a formative or design stage. The datasheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

### Preliminary Specification

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### Product Specification

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