## 1. Description

- The MA001 is a limiter fabricated using GaAs PIN MMIC process. The device operates from 15 to 38GHz, with an insertion loss of less than 0.7dB, input and output return losses of less than -14dB, a power handling capability of 43dBm(400us,10%), and a flat leakage of 17.5dBm. No input or output DC-blocking capacitors are integrated on-chip.

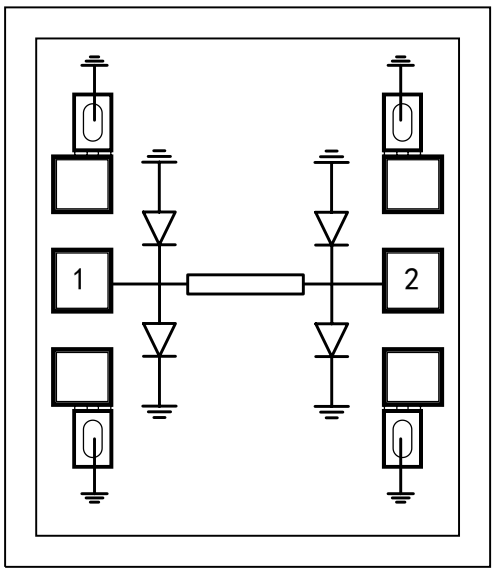



**Figure 1. MA001 Functional Block Diagram**

## 2. Applications

- TX/RX Modules

## 3. Features

- Operating Frequency: 15-38GHz
- Insertion Loss: -0.7dB
- Input/Output Return Loss: -16dB / -14dB
- Power Handling Capability: 43dBm (400us,10%)
- Flat Leakage: 17.5dBm
- Die Size: 0.73 x 0.85 x 0.10mm

## 4. Brief Typical Performance

**Table 1. Brief Typical Performance**

| Parameter | 15-38GHz | Units |
|---|---|---|
| Insertion Loss | -0.7 | dB |
| Input Return Loss | -16 | dB |
| Output Return Loss | -14 | dB |
| Power Handing Capability | 43 | dBm |
| Flat Leakage at $P_{IN}$>20dBm | 17.5 | dBm |

- Test condition: Input signal pulsed, Pulse width =400us, Duty cycle = 10%

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## 5. Recommended Operating Conditions

**Table 2. Recommended Operating Conditions**

| Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|
| Operating Temperature Range | -55 | 25 | 125 | °C |
| Operating Frequency | 15 | - | 38 | GHz |
| Maximum Input Power | - | - | 43 | dBm |

## 6. RF Characteristics ($T_C$ = 25˚C)

**Table 3. RF Characteristics[1]**

| Parameter | Symbol | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Operating Frequency | Freq | 15 | - | 38 | GHz |
| Insertion Loss @ 38GHz | IL | - | -0.7 | - | dB |
| Input Return Loss | RLin | - | -16 | - | dB |
| Output Return Loss | RLout | - | -14 | - | dB |
| Power Handing Capability | Pc | - | 43 | - | dBm |
| Flat Leakage | FL | - | 17.5 | - | dBm |

[1]. Test condition: Input signal pulsed, Pulse width =400us, Duty cycle = 10%

## 7. Typical Performance Curve

### ■ Small-signal Characteristics Curve

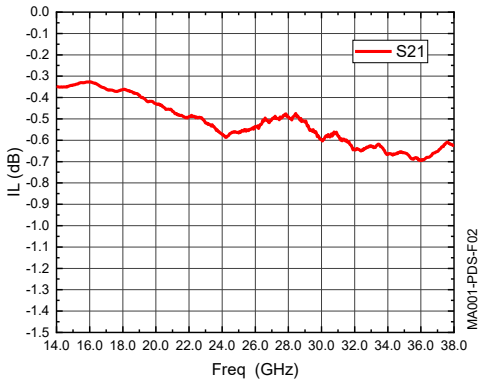



**Figure 2. Insertion Loss Characteristics**

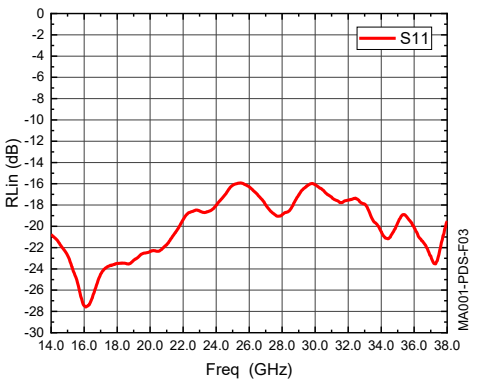



**Figure 3. Input Return Loss Characteristics**

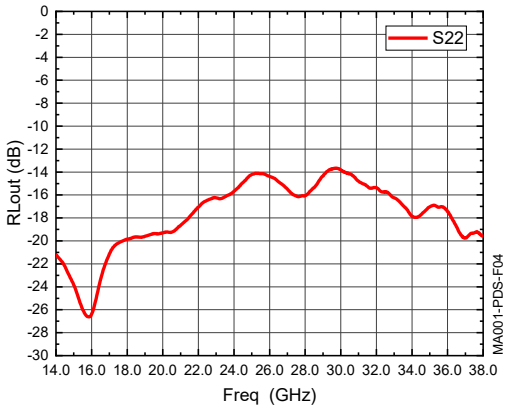



**Figure 4. Output Return Loss Characteristics**

## ■ Power Characteristics

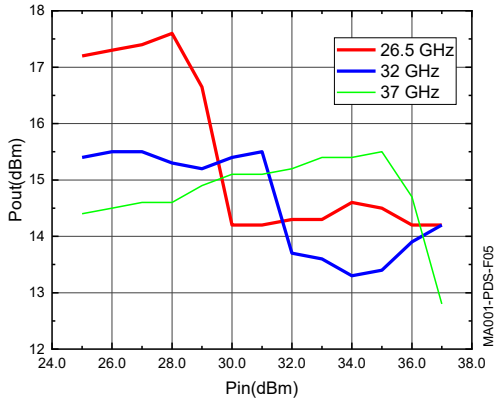
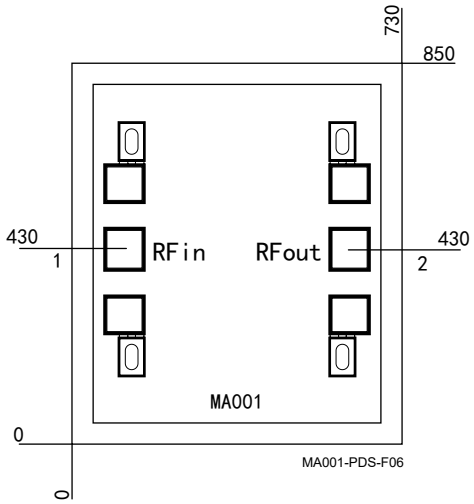



**Figure 5. Flat Leakage Characteristics**

## 8. Outline Dimensions




- Dimensions shown in micrometre

**Figure 6. MA001 Outline Dimensions**

**Table 4. Pad Description**

| Pad | Symbol | Description |
|---|---|---|
| 1 | RFin | RF Input |
| 2 | RFout | RF Output |

## 9. Assembly Information

### ■ Assembly Diagram

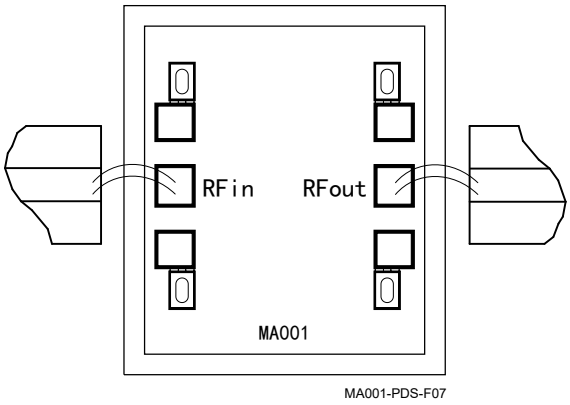



**Figure 7. MA001 Assembly Diagram**

- **Eutectic Die Attach:** It is best to use an 80% Au/20% Sn preform. Do not expose the chip to a temperature greater than 300°C for more than 30sec.
- **Wire Bonding:** RF bonds made with 1mil gold wire are recommended for the RF ports. Keep all bonds as short as possible, less than 0.35mm.

## 10. Handling Precautions

- **Storage**
  All bare dies ship in either Waffle or Gel Pak, which is an ESD protective container, and then sealed in an ESD protective bag. After opening the sealed ESD protective bag, all dies must be stored in a dry nitrogen environment.
- **Cleanliness**
  Handle the dies in a clean environment. Never use liquid cleaning systems to clean the dies.
- **ESD Caution**
  ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore proper ESD precautions should be taken to avoid performance degradation or loss of functionality.




## 11. Contact Information

For the latest specifications, additional product information, technical support and sales support, please contact:

- **Email:** RF.support@raytrontek.com
- **Web:** www.raytrontek.com

## 12. Disclaimer

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