# MD707

## GaAs MMIC x3 passive frequency multiplier 7…17 GHz

- frequency range input 7…17 GHz
- frequency range output 21…51 GHz
- conversion loss < 25 dB
- F0 Isolation > 25 dB
- RF max power input $P_{max}$ = +27 дБм
- RF power input $P_{in}$ = +15 dBm
- die size 1300 × 2200 µm

### Application

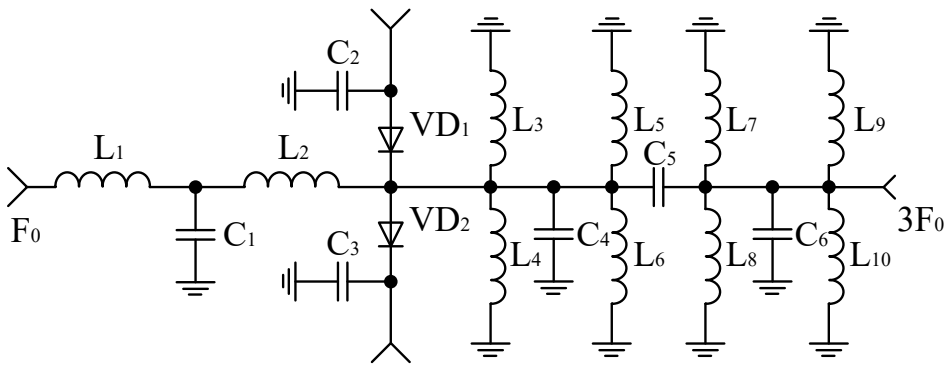
- communications
- radars
- test and measurement equipment

The MD707 is an x3 passive frequency multiplier based on GaAs Schottky diode technology. Requires no external components or matching circuitry. It is ideally suited for applications where small size is a need. Does not require DC biasing. Input frequency range from 7 to 17 GHz, output frequency range from 21 to 51 GHz. Suppression of undesired fundamental and higher order harmonics is up to 25 dB typical with respect to input signal level. The MD707 is compatible with conventional die attach methods which make it ideal for MCM and hybrid microcircuit applications.

### Electrical specifications (T = 20 °C)

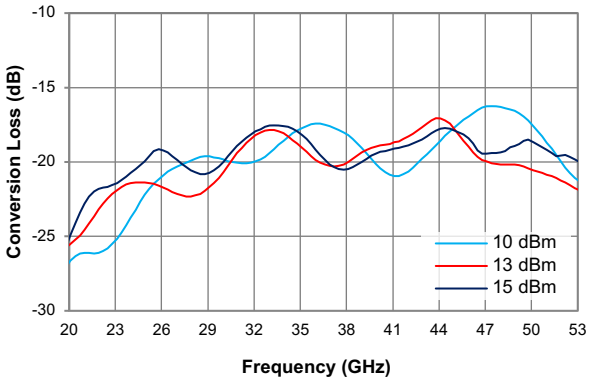
| Symbol | Parameter | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $P_{BX}$ | RF power input | | +10 | | | +13 | | | +15 | | dBm |
| $\Delta F_{BX}$ | Frequency range input | | 8…17 | | | 8…17 | | | 7…17 | | GHz |
| $\Delta F_{ВЫХ}$ | Frequency range output | | 24…51 | | | 24…51 | | | 21…51 | | GHz |
| CL | Conversion loss | — | 25 | 27 | — | 25 | 27 | — | 23 | 25 | dB |
| $ISO_{F0}$ | F0 isolation | — | — | — | — | 10 | — | 10 | 10 | 10 | dB |
| $ISO_{2F0}$ | 2F0 isolation | — | — | — | — | 25 | — | 25 | 30 | 32 | dB |
| $ISO_{4FO}$ | 4F0 isolation | — | — | — | — | 30 | — | 30 | 32 | 35 | dB |
| $P_{MAX}$ | RF max power input | | | | | +27 | | | | | dBm |

### Circuit schematic

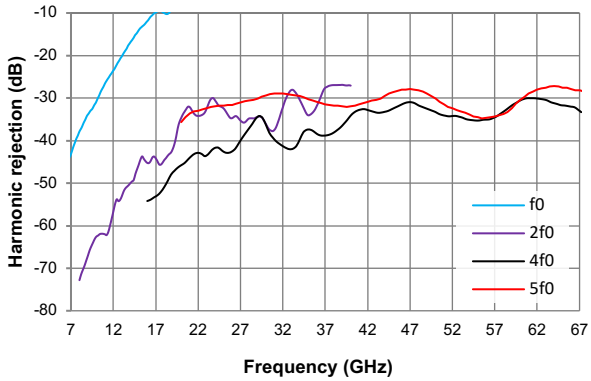


## Typical characteristics (T = 25 °C)

### Conversion Loss

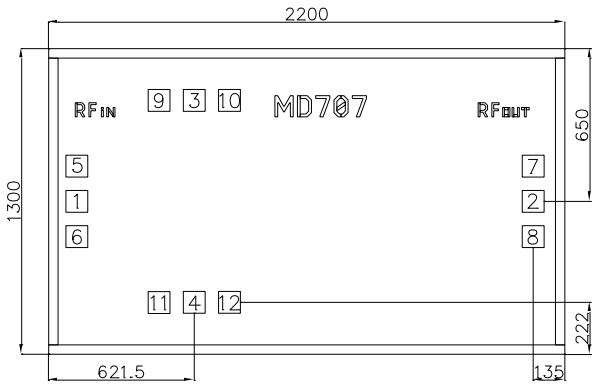



### Harmonic Rejection




**REMARK** All measurements performed with RF input power PIN = +15 dBm.

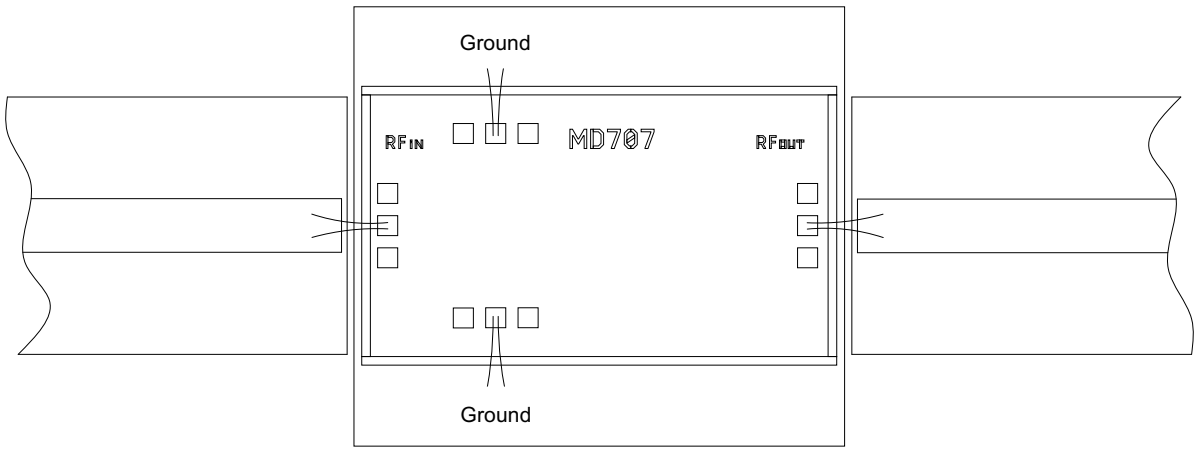
## Mechanical data




- Chip size 1300 × 2200 μm (before wafer dicing), thickness 100 μm;
- Bond pad dimensions are shown in the bond pad center;
- Bond pad and backside metallization: gold;
- RF pads are 100 × 100 μm.

| Pad number | Port | Description |
|---|---|---|
| 1 | $RF_{IN}$ | RF input $F_0$ |
| 2 | $RF_{OUT}$ | RF output $3F_0$ |
| 3 | — | Out diode anode |
| 4 | — | Out diode cathode |
| 5 | — | GND |
| 6 | — | GND |
| 7 | — | GND |
| 8 | — | GND |
| 9 | — | GND |
| 10 | — | GND |
| 11 | — | GND |
| 12 | — | GND |

## Assembly diagram



## Application notes

**Mounting**
The chip is back-metallized and can be die mounted with AuSn eutectic preforms or with electrically conductive epoxy. The mounting surface should be clean and flat. The 50 Ohm Microstrip transmission lines on 0.127mm thick alumina thin film substrates are recommended for bringing RF to and from the chip (Figure 1). One way to accomplish this is to attach the 0.102 mm thick die to a 0.150 mm thick molybdenum heat spreader (molytab) which is then attached to the ground plane (Figure 2). Microstrip substrates should be located as close to the die as possible in order to minimize bond wire length. Typical die-to-substrate spacing is 0.1mm.

**Wire Bonding**
A recommendation for RF pads (1, 2) is two wires diameter 25 µm, length 300 µm.

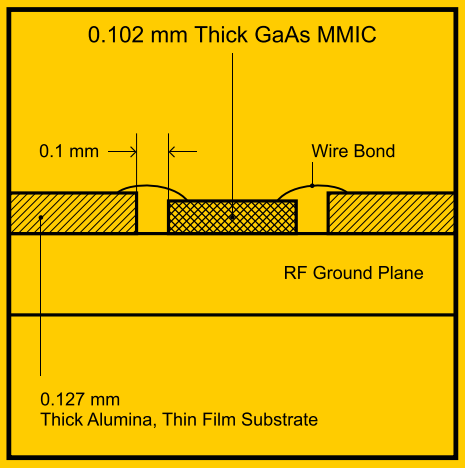



Figure 1.

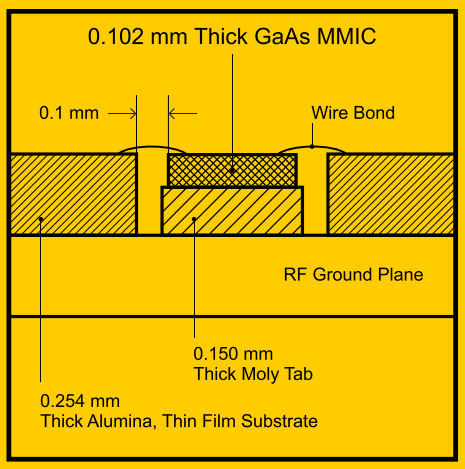



Figure 2.

## Recommended ESD Management

This device is susceptible to electrostatic and mechanical damage. Dies are supplied in antistatic containers, which should be opened in cleanroom conditions at an appropriately grounded antistatic workstation. Devices need careful handling using correctly designed collets, vacuum pickups or, with care, sharp tweezers.