MD705

GaAs MMIC x2 passive frequency multiplier 10…30 GHz

- frequency range input 10…30 GHz
- frequency range output 20…60 GHz
- conversion loss < 14 dB
- F0 Isolation > 25 dB
- RF max power input P_{max} = +27 дБм
- RF power input P_{in} = +15 dBm
- die size 1150 × 1850 µm

Application

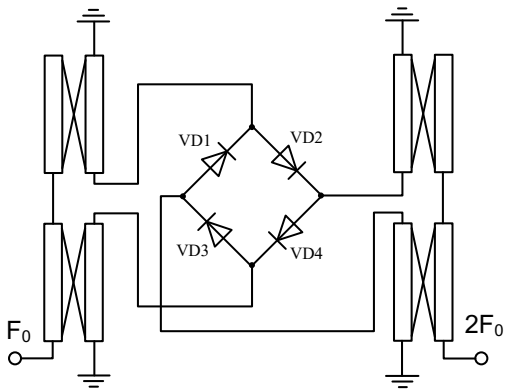
- communications
- radars
- test and measurement equipment

The MD705 is a x2 passive frequency multiplier based on GaAs Schottky diode technology. The diode requires no external components or matching circuitry. Suppression of undesired fundamental and higher order harmonics is up to 25 dB typical with respect to input signal level. The MD705 is compatible with conventional die attach methods which make it ideal for MCM and hybrid microcircuit applications.

Electrical specifications (T = 25 °C)

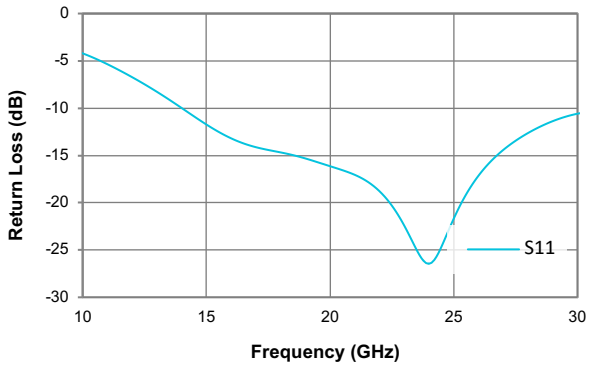
Symbol	Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Unit
P_{IN}	RF power input		+10			+12			+15		dBm
ΔF_{IN}	Frequency range input		10…28			10…30			10…30		GHz
ΔF_{OUT}	Frequency range output		20…56			20…60			20…60		GHz
CL	Conversion loss	—	16	18	—	14	16	30	35	35	dB
ISO_{F0}	F0 isolation	—	—	—	—	30	—	35	35	37	dB
ISO_{3F0}	3F0 isolation	—	—	—	—	32	—	25	37	27	dB
ISO_{4FO}	4F0 isolation	—	—	—	—	25	—	30	35	35	dB
P_{MAX}	RF max power input					+27					dBm

Circuit schematic

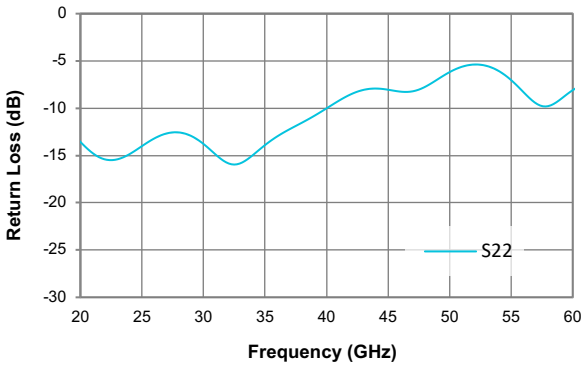


Typical characteristics (T = 25 °C)

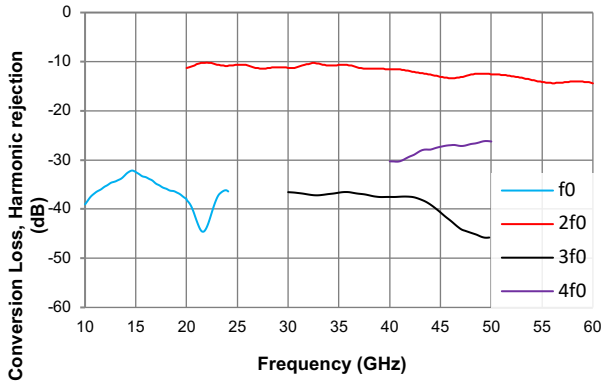
Return Loss, S11



Return Loss, S22

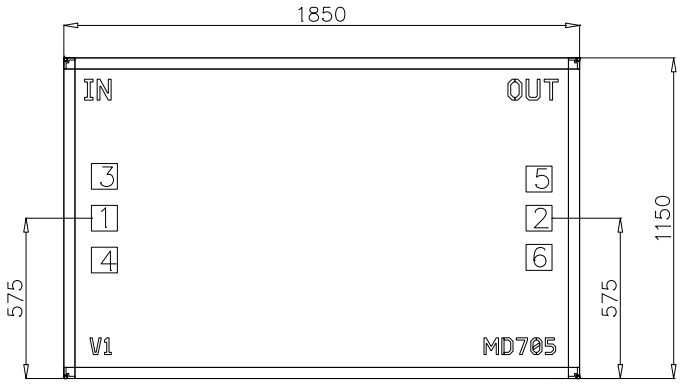


Conversion Loss, Harmonic Rejection



REMARK All measurements performed with RF input power P_{IN} = +15 dBm.

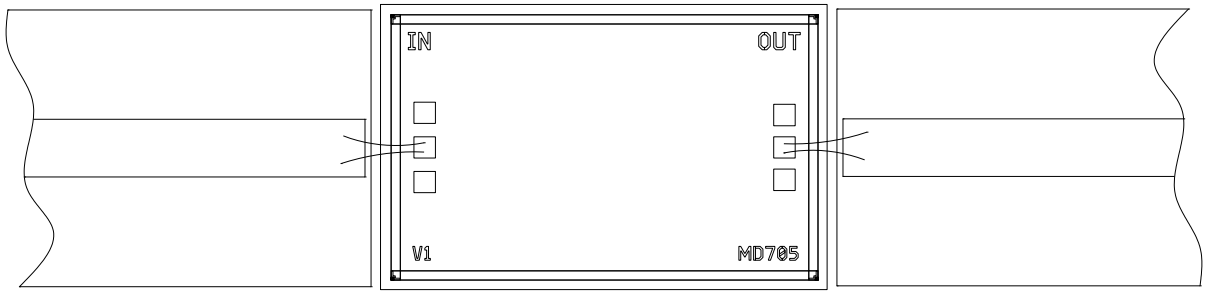
Mechanical data



- Chip size 1150 × 1850 µm (before wafer dicing);
- Die thickness 100 µm;
- Bond pad and backside metallization: gold;
- RF pads are 100 × 100 µm.

Pad number	Port	Description
1	IN	RF input F_0
2	OUT	RF output $2F_0$
3	—	GND
4	—	GND
5	—	GND
6	—	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, 3) is two wires diameter 25 µm, length 300 µm.

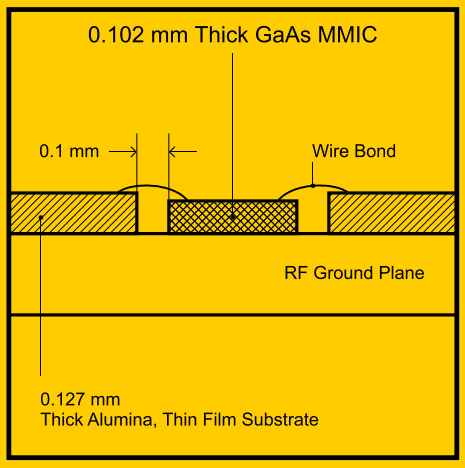


Figure 1

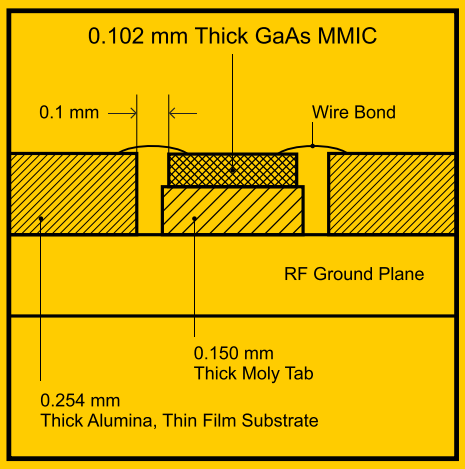


Figure 2.

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.