MD903

Power detector 0.01…50 GHz

- frequency range 0.01…50 GHz
- dynamic range −50…+20 dBm
- square-law detection −50…−10 dBm
- output voltage: positive, negative or differential
- no DC bias required

Application

- test and measurement equipment
- communications
- radars

The MD903 is provides a very wide RF input bandwidth from 10 MHz up to 50 GHz. Dynamic range equals 70 dB. The MMIC is utilizing QZBD process based on a vertical GaAs zero bias diode. The MD903 is compatible with conventional die attach methods which make it ideal for MCM and hybrid microcircuit applications.

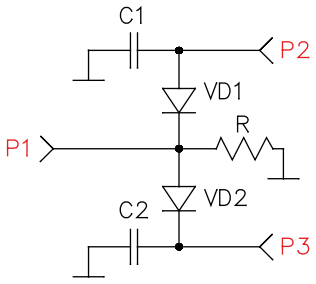
Electrical specifications (T = 25 °C)

Symbol	Parameter	Min.	Typ.	Max.	Unit
ΔF	Frequency range	0.01	—	50	GHz
G	Voltage sensitivity	—	950	—	μV / μW
TSS	Tangential sensitivity	−54	—	—	dBm

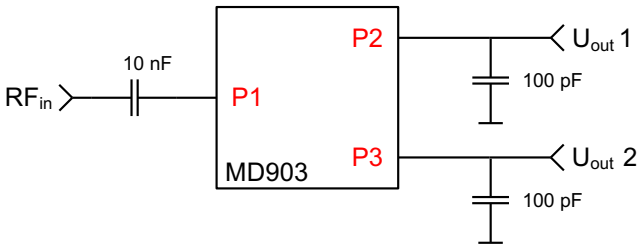
Absolute maximum ratings

Parameter	Value	Unit
Incident RF power	+23	dBm
Operating temperature	−60…+100	°C
Storage temperature	−60…+150	°C

Schematic circuit

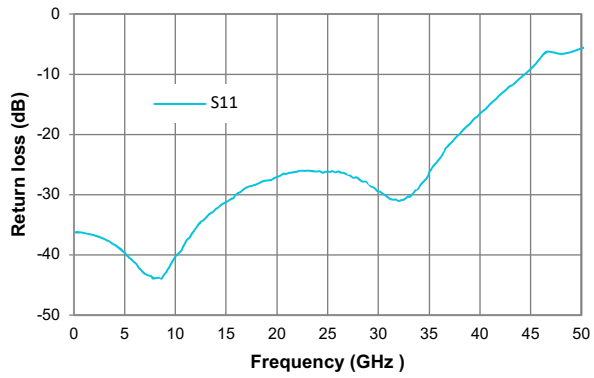


Application circuit

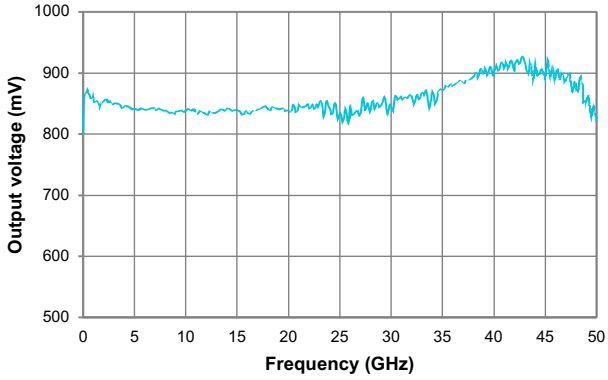


Typical characteristics (T = 25 °C)

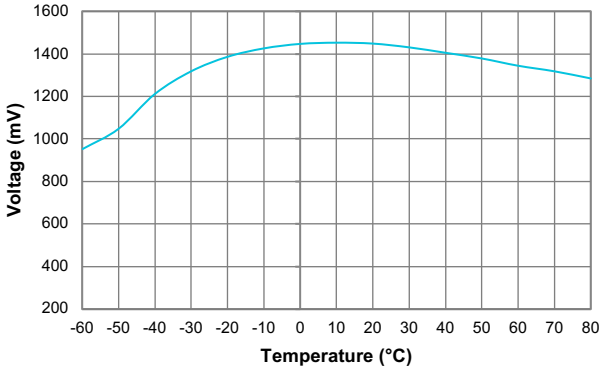
Return loss



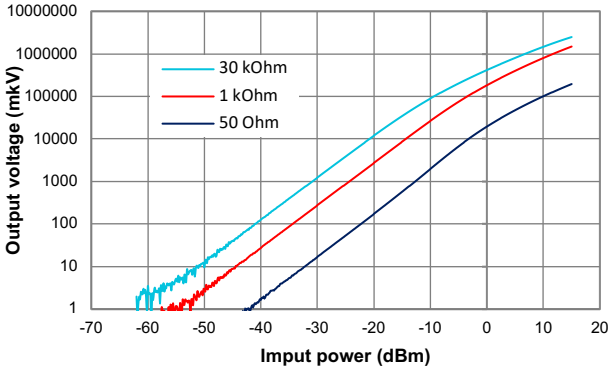
Vdet vs. Frequency



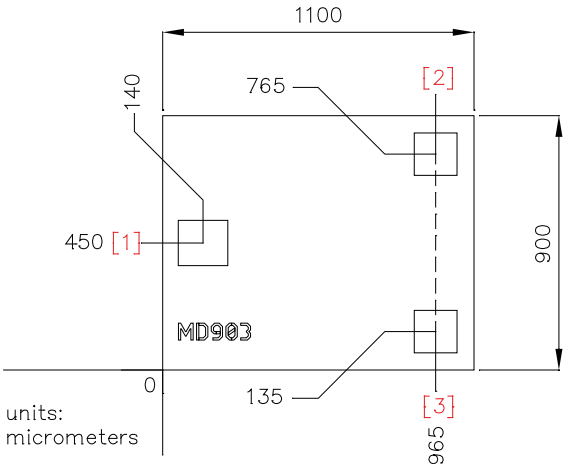
Vdet vs. Temperature



Transfer characteristics for different Rload



Mechanical data



— All specified dimensions are valid before wafer dicing. Assume following tolerances: –30… –40 μm for chip size dimensions, 0…–40 μm for bond pad location distances;
— Die thickness is 100±5 μm.

Pad number	Port	Description	Pad size (X×Y), μm
1	P1	RF input	175 × 160
2	P2	Negative voltage output	150 × 150
3	P3	Positive voltage output	

REMARK Differential output voltage V_{DIFF} is obtained between ports P2 and P3: $V_{DIFF}=|V_{P2}|+|V_{P3}|$

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 0.127 mm 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
Bond pad metallization: gold. Thermo-compression or thermo-sonic bonding techniques may be used to attach bonding wires, foil stripe or ribbon to bond pads. The length of connections should be as short as possible to obtain the best microwave performance.

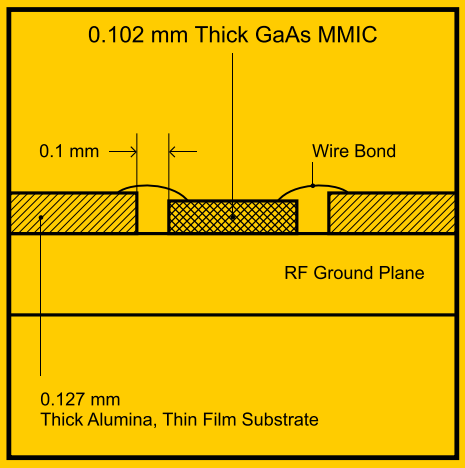


Figure 1.

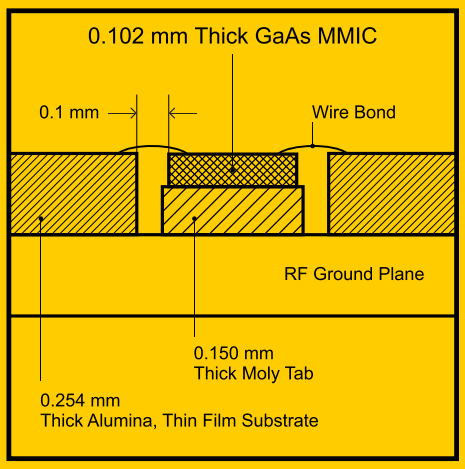


Figure 2.

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.