Power Detector Bare Die
5 - 44 GHz

MADT-011000-DIE
Rev. V2

Features

- Input Power: -15 to +15 dBm
- Dynamic Range: 30 dB
- DC supply: 4.5 V, 70 µA
- Die size: 1.00 × 0.75 × 0.1 mm
- Passivated Die
- ESD Protected
- RoHS* Compliant

Applications

- Microwave Radios
- Radar Application
- Test & Measurement Equipment

Description

MADT-011000-DIE is a single-ended, internally-matched power detector with wide frequency range and high dynamic range. The circuit consumes 70 µA from a 4.5 V supply, while matched detector and reference diodes provide temperature compensation in differential operation.

The 100 µm thick GaAs die is fully passivated for reliability and ease of handling.

MADT-011000-DIE is well suited for power control in microwave radios, test and measurement equipment, and radar applications.

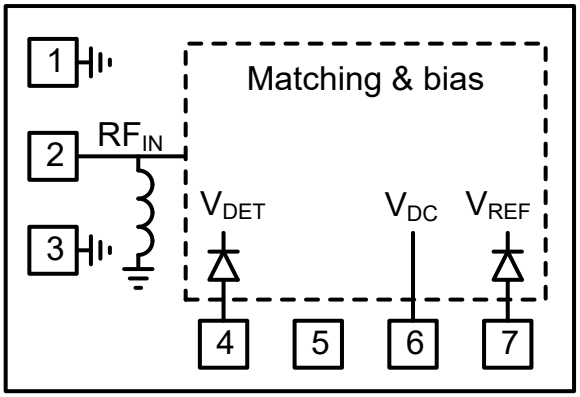
MADT-011000-DIE is also available in a 3 mm QFN package. Refer to datasheet MADT-011000.

Ordering Information[1]

Part Number	Package
MADT-011000-DIE	Vacuum release gel pack[1]
MADT-011000-SB2	Sample Board

1. Die quantity varies.

Functional Schematic



Bond-pad Configuration[2]

Pin #	Function
1	GND/NC
2	RFIN
3	GND/NC
4	VDET
5	NC
6	VDC
7	VREF
8	GND[2]

2. The die backside must be connected to RF, DC and thermal ground.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications: Freq. = 5 - 44 GHz, T_A = +25°C, V_{DC} = 4.5 V, Z_0 = 50 Ω[3]

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Input Power	—	dBm	-15	—	+15
Dynamic Range	Vref - Vdet > 5 mV	dB	30	—	—
Vdelta	Vdelta = Vref - Vdet	mV	5	—	2500
Return Loss	5 - 10 GHz 10 - 12 GHz 12 - 36 GHz 36 - 42 GHz 42 - 44 GHz	dB	—	-11 -12 -11 -12 -9	-9 -11 -9 -9 -6.5
Supply Voltage	—	V	—	4.5	—
Current Consumption	—	µA	60	70	80

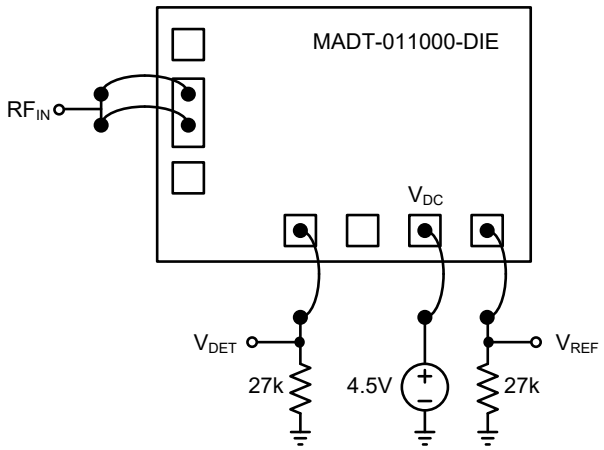
3. All specifications refer to CW input signal.

Absolute Maximum Ratings[4,5]

Parameter	Absolute Maximum
Input Power	18 dBm
VDC	6 V
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. MACOM does not recommend sustained operation near these survivability limits.

Application Circuit[6,7,8]



6. External 27 kΩ resistors are required for optimum performance.
7. Typical Vref = 0.83V
8. Attach bare die to PCB or carrier using conductive epoxy

Handling Procedures

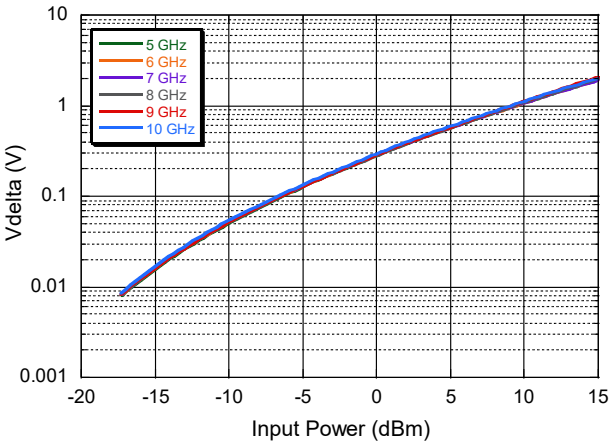
Please observe the following precautions to avoid damage:

Static Sensitivity

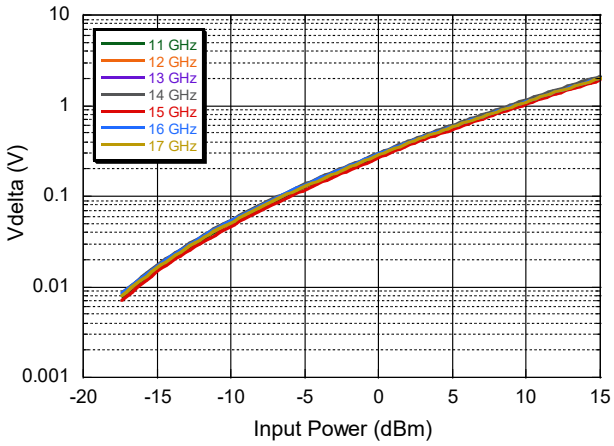
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1B devices.

Typical Performance Curves

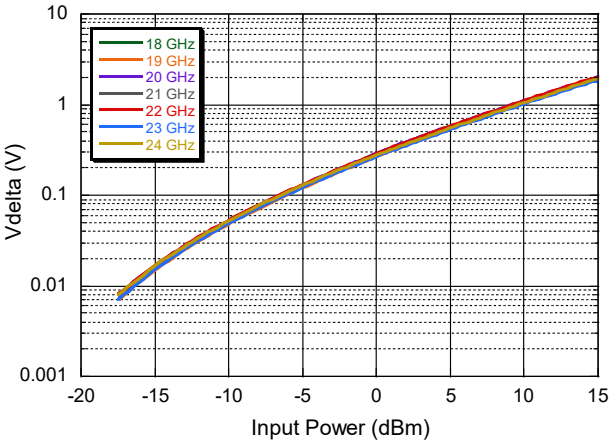
Vdelta vs. Input Power, 5 - 10 GHz



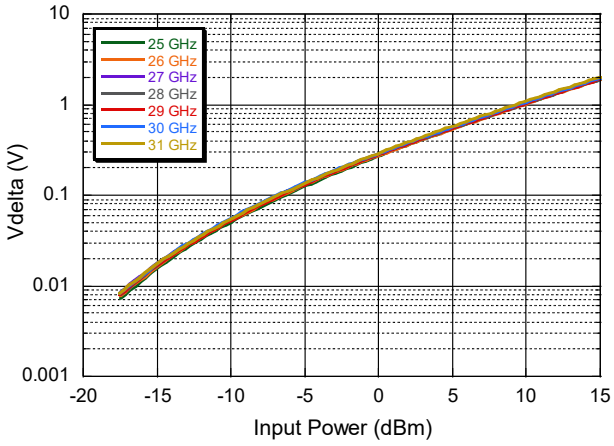
Vdelta vs. Input Power, 11 - 17 GHz



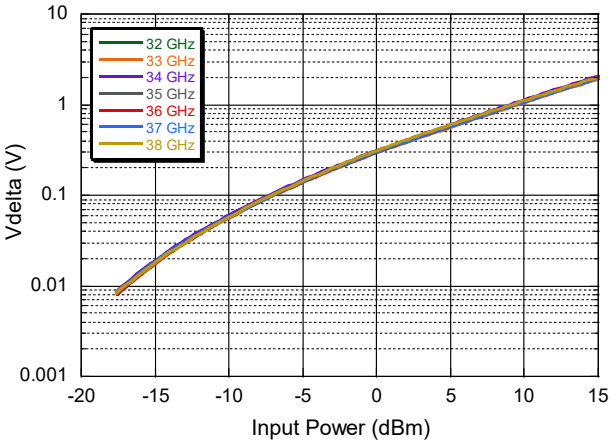
Vdelta vs. Input Power, 18 - 24 GHz



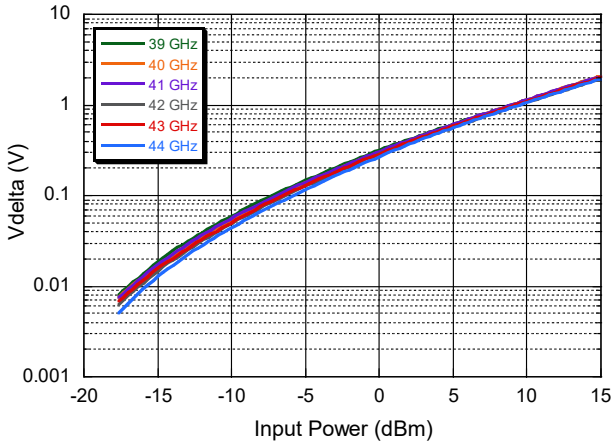
Vdelta vs. Input Power, 25 - 31 GHz



Vdelta vs. Input Power, 32 - 38 GHz

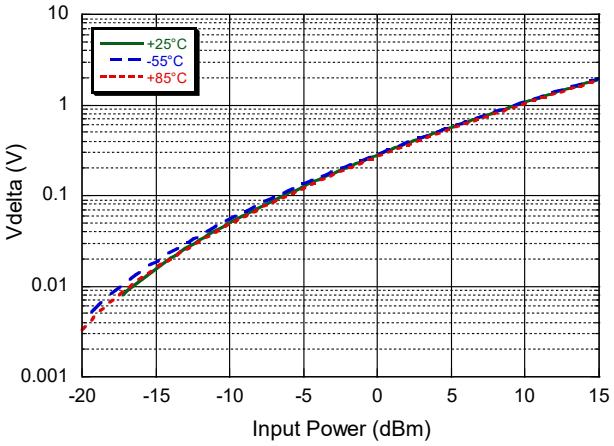


Vdelta vs. Input Power, 39 - 44 GHz

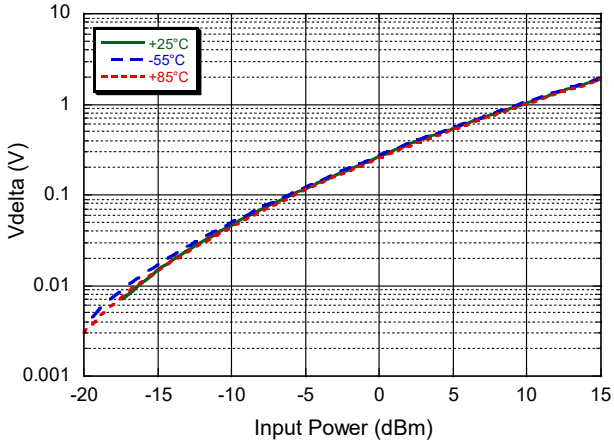


Typical Performance Curves

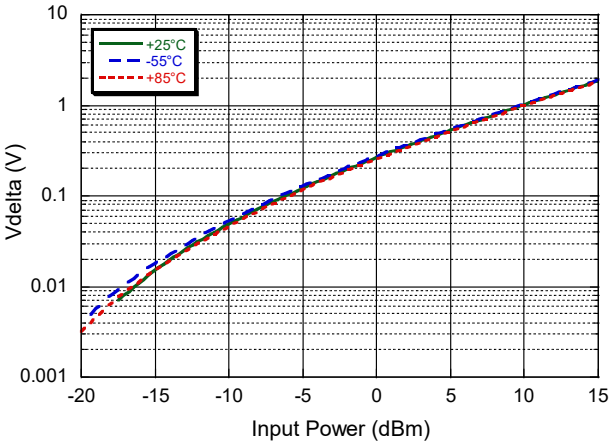
Vdelta vs. Temperature, 5 GHz



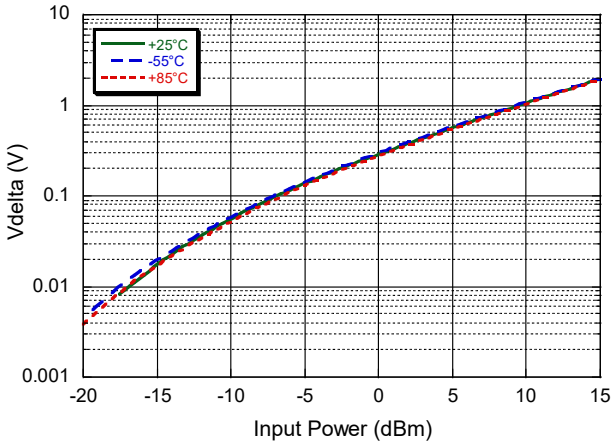
Vdelta vs. Temperature, 15 GHz



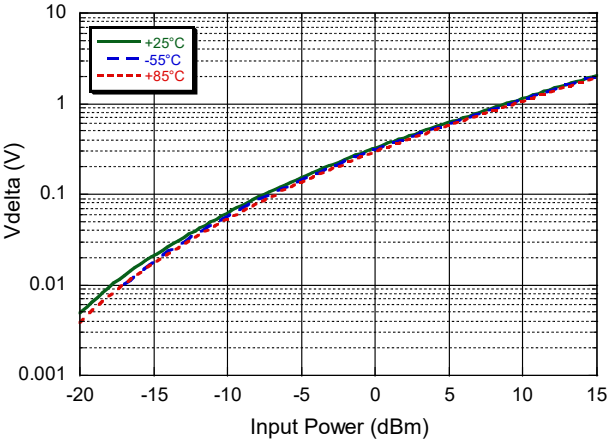
Vdelta vs. Temperature, 23 GHz



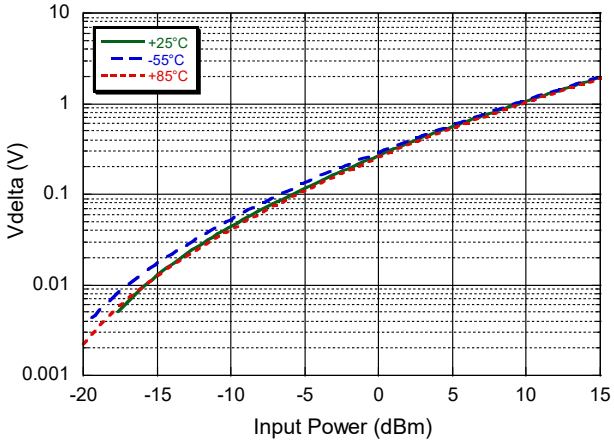
Vdelta vs. Temperature, 30 GHz



Vdelta vs. Temperature, 38 GHz

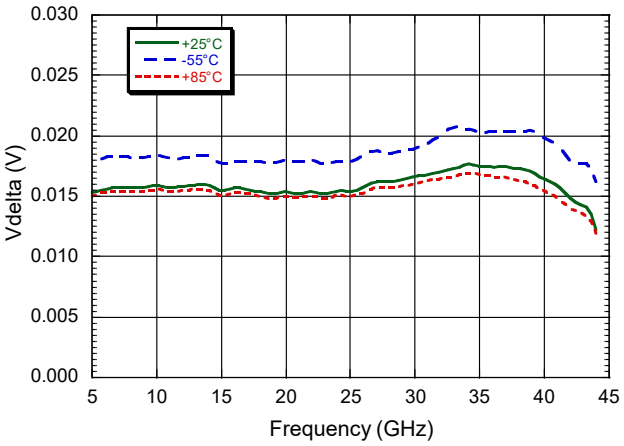


Vdelta vs. Temperature, 44 GHz

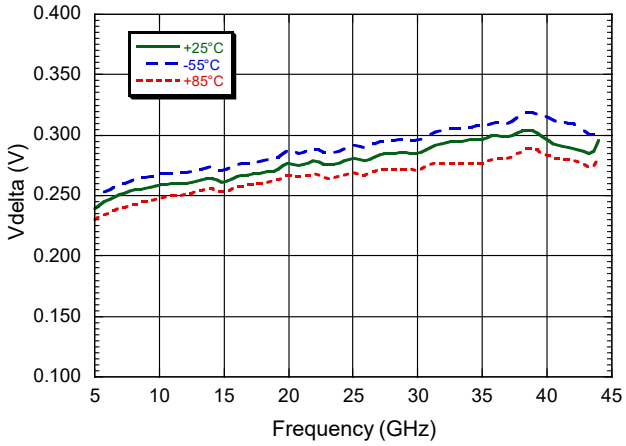


Typical Performance Curves

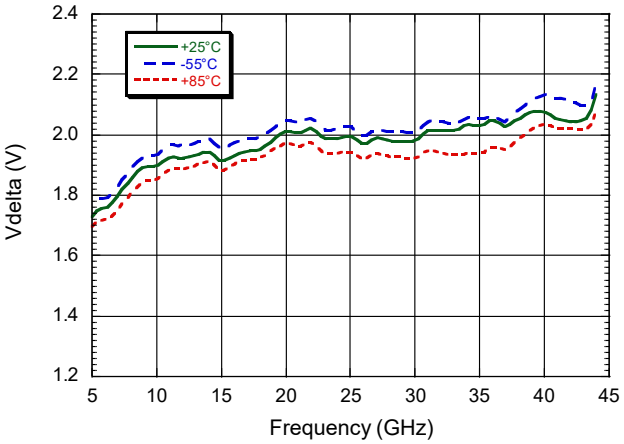
Vdelta vs. Frequency, P_{IN} = -15 dBm



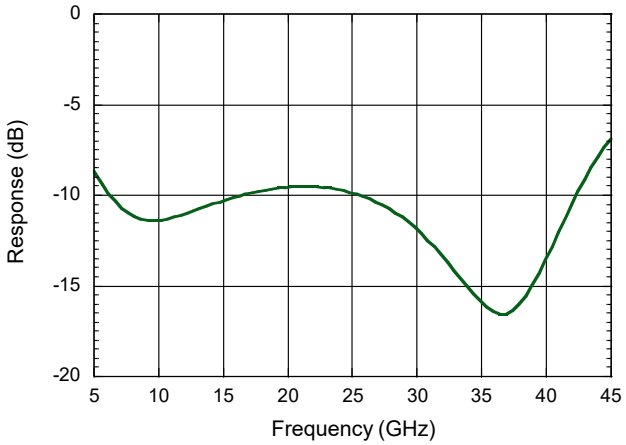
Vdelta vs. Frequency, P_{IN} = 0 dBm



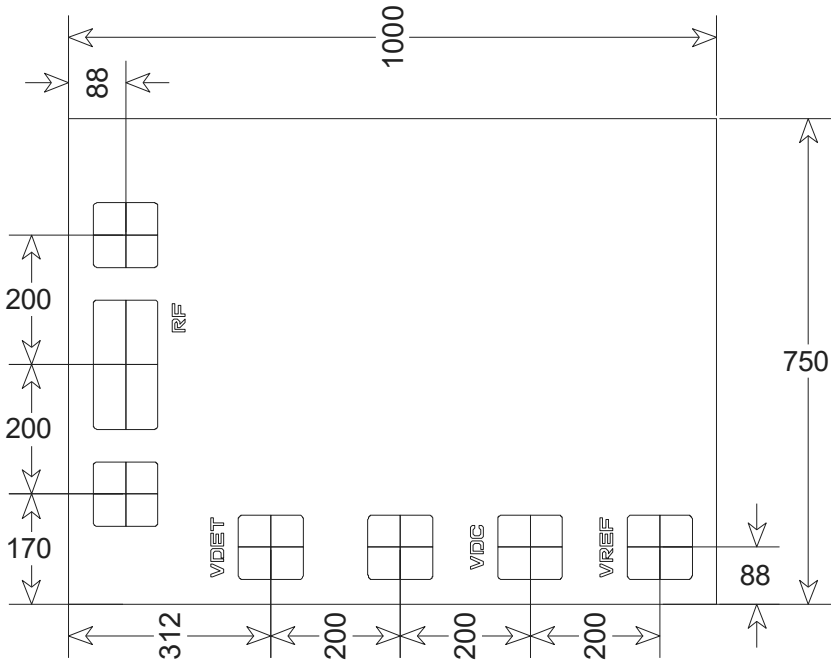
Vdelta vs. Frequency, P_{IN} = +15 dBm



Input Return Loss vs. Frequency



Outline Drawing



Notes:
All units are in microns, unless otherwise noted, with a tolerance of ±5 µm.
Die thickness is 100 ±10 µm
RF bond-pad is 100 × 200 µm.
All other bond-pads are 100 × 100 µm.