

DM311/DM313: General-Purpose 5.8 GHz Microwave Detectors

General Description

DM311 and DM313 are small-housing, general-purpose, zero-bias Schottky diode coaxial microwave detectors intended primarily for 5800 MHz industrial applications. The detectors deliver well-scaled DC voltage approximately proportional to the input power.

DM311 has a cubic outline (Fig. 1 below left) while DM313 (Fig. 1 below right) has a flat outline. Otherwise, their electric parameters are identical.



Fig. 1. Microwave detectors DM311 (left) and DM313 (right).

Specifications

Frequency range	5500 – 6100 MHz
Frequency response variation (max)	±0.5 dB
Typical output voltage; $P = 1 \text{ mW}$, $R_{\text{LOAD}} = 33 \text{ k}\Omega$	220 mV
VSWR max	2
VSWR typ	1.3
Statistical spread of output voltage	±1 dB (3- σ deviation)
Output voltage polarity	Negative
Output voltage temperature variation (5 to 65 °C)	< 3 dB
Video resistance (typ)	6 k Ω
Max input working power	10 mW
Max input power (destruction limit)	100 mW
Input RF connector	N-male
Output DC connector	SMA-female
Dimensions (L × W × H)	DM311: 46.9 × 19.4 × 19.4 mm DM313: 38.7 × 18 × 11 mm
Mass	DM311: 50 g DM313: 15 g
Operating temperature range	-10 °C to +65 °C
Storage temperature range	-20 °C to +80 °C

Typical Transfer Characteristic

[Fig. 2](#) below shows typical detector transfer characteristic for frequency 5800 MHz, ambient temperature $T_a = 25\text{ }^\circ\text{C}$ and load resistance $R_L = 33\text{ k}\Omega$, where P is the input microwave power in dBm and V is the (negative) output DC voltage in mV. Note that $P_{\text{dBm}} = 10 \cdot \log(P_{\text{mW}})$.

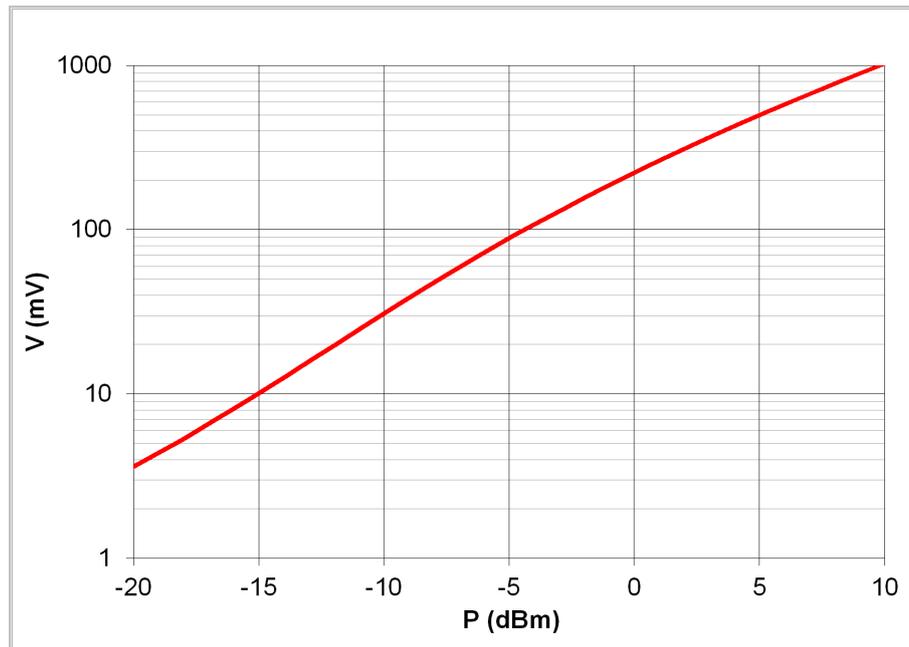


Fig. 2. Typical DM311/DM313 transfer characteristic.

Detector Correction Curve

A detector correction curve is the inverse of the transfer curve. It can serve, in particular in its mathematical form, for determining the input power from the output voltage. A typical DM311/DM313 correction curve in lin-lin format is shown in [Fig. 3](#) on the next page.

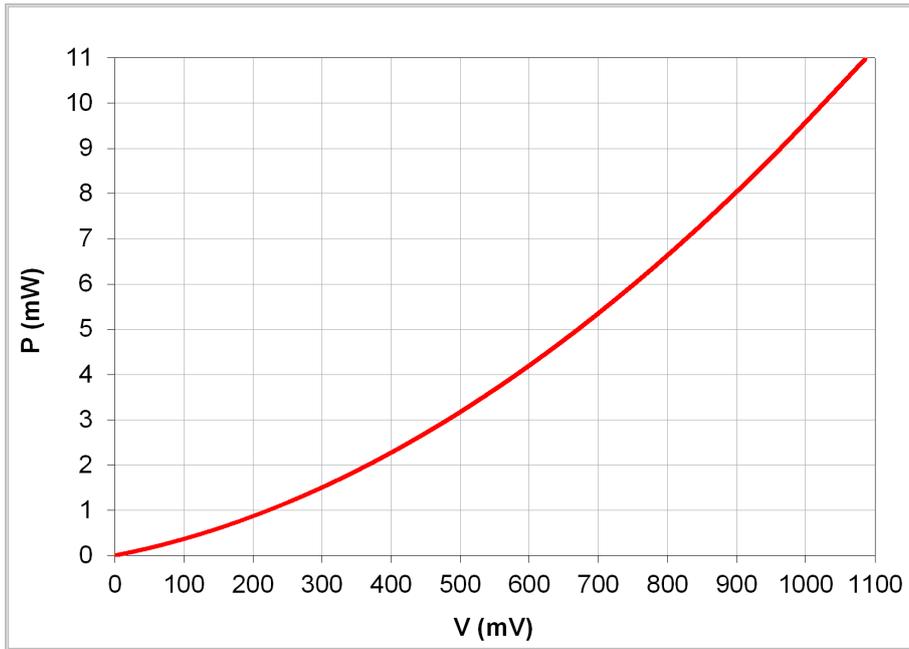


Fig. 3. Typical DM311/DM313 correction curves.

The curve can be approximated by the polynomial

$$P = d_1V + d_2V^2 + d_3V^3 + \dots + d_nV^n$$

where P is the input microwave power in milliwatts, V is the output voltage in millivolts, and d_i are the polynomial coefficients listed below. The correction curves and the polynomial coefficients are valid for $T_a = 25\text{ }^\circ\text{C}$, $R_L = 33\text{ k}\Omega$, and for **output voltages not exceeding about 1100 mV**.

Tab. 1. Polynomial coefficients for the DM311/DM313 detector correction curves.

Coefficient	Value
d_1	2.9796503E-03
d_2	6.8857676E-06
d_3	-2.9442634E-10

Please be aware that this function is a statistical average based on evaluation of a number of detectors. The behavior of individual detectors may vary.

Dimensional Drawings

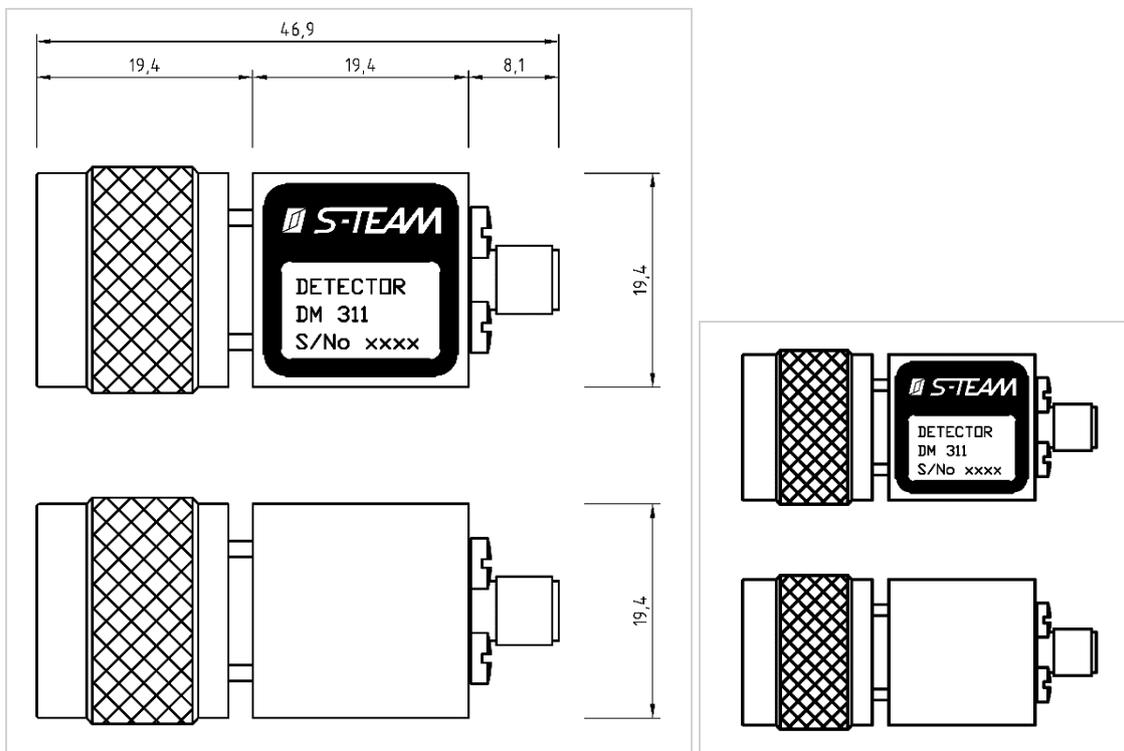


Fig. 4. Basic DM311 dimensions in millimeters. Right: Actual size.

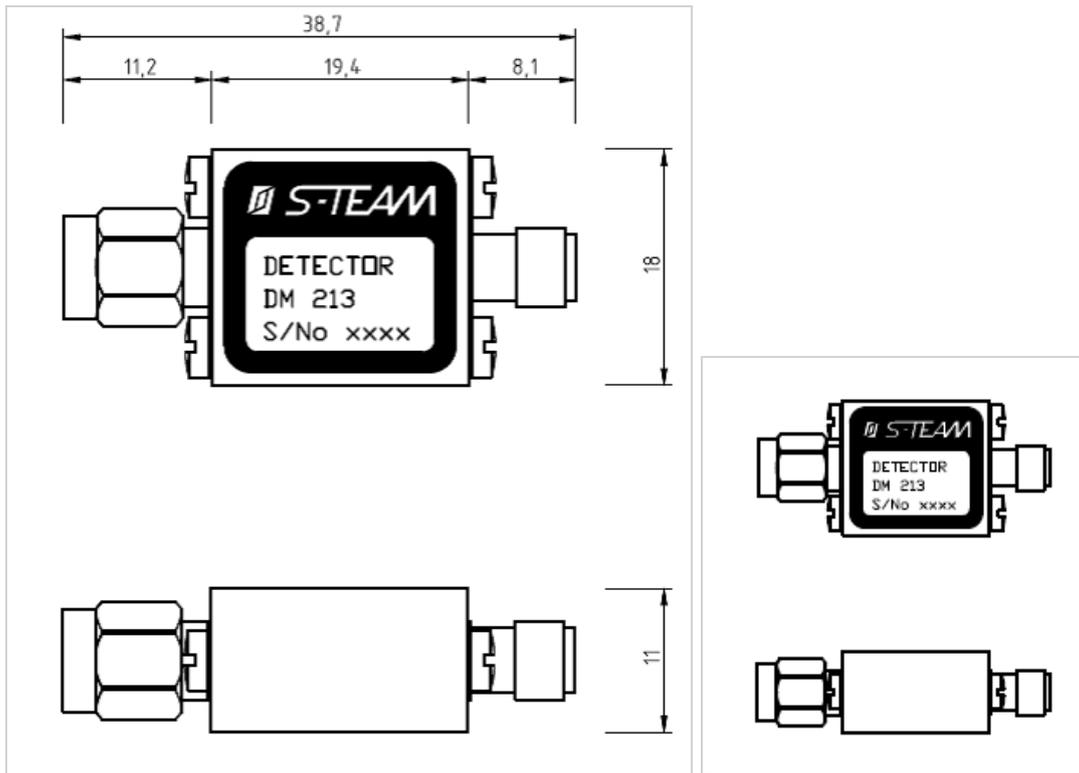


Fig. 5. Basic DM313 dimensions in millimeters (the dimensions are the same as for the DM213 shown). Right: Actual size.