DM314: Fast Temperature-Stable 5.8 GHz Microwave Detector

Description

DM314 (Fig. 1) is a tunnel diode coaxial microwave detector that is intended primarily for 5800 MHz industrial applications.

The detector delivers well-scaled DC voltage approximately proportional to the input power. The tunnel diode ensures high temperature stability of the output voltage and low video resistance for fast pulse rise/fall times.

Fig. 1. Microwave detector DM314.

Specifications

Frequency range	5500 – 6100 MHz
Frequency response variation (max)	±0.5 dB
Typical output voltage for P = 0.1 mW, R_{LOAD} = 33 kΩ	150 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)	< 0.5 dB
Video resistance (typ)	250 Ω
Max input working power	1 mW
Max input power (destruction limit)	20 mW
Input RF connector	SMA-male
Output DC connector	SMA-female
Dimensions (L × W × H)	38.7 × 18 × 11 mm
Mass	15 g
Operating temperature range	-10 °C to +65 °C
Storage temperature range	-20 °C to +80 °C

Office: S-TEAM Lab, Budova FEI STU B212, Ilkovicova 3, SK-84104 Bratislava, Slovak Republic
Tel./fax: +421-2-6542 7968 **E-mail**: support@s-team.sk http://www.s-team.sk

Typical Transfer Characteristic

Typical detector transfer characteristic for the frequency 5800 MHz, ambient temperature T_a **= 25 °C** and load resistance R_L **= 33 kΩ** is shown in Fig. 2, where *P* is the input microwave power in dBm and *V* is the (negative) output DC voltage in mV. Note that $P_{dBm} = 10*\log(P_{mW}) = 10*\log(P_{\mu W}/1000)$.

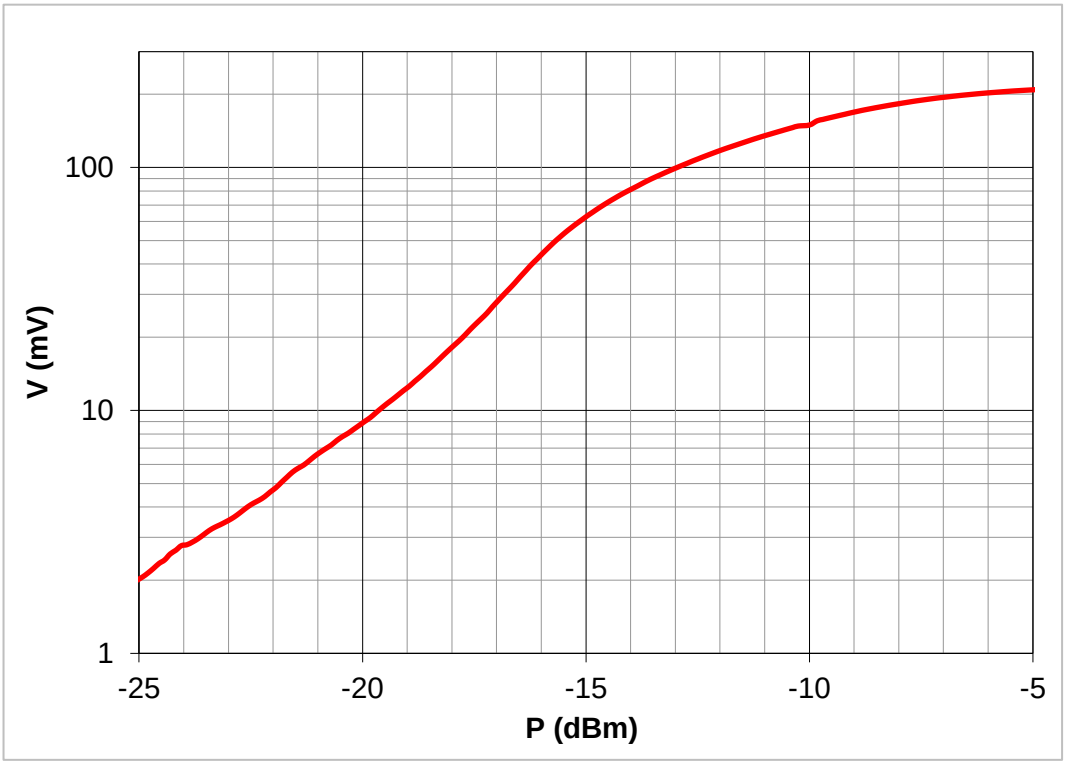

Fig. 2. Typical DM314 transfer characteristic.

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. Fig. 3 shows a typical DM314 correction curve in the lin-lin format.

The curve can be approximated by a 7th degree polynomial

$$P = d_1 V + d_2 V^2 + d_3 V^3 + d_4 V^4 + d_5 V^5 + d_6 V^6 + d_7 V^7$$

where *P* is the input microwave power in microwatts, *V* is the output voltage in millivolts, and d_i are the coefficients listed in Tab. 1. The curve in Fig. 3 and the coefficients in Tab. 1 are valid for an ambient temperature of T_a = 25 °C, load resistance R_L = 33 kΩ, **and the output voltage not exceeding 210 mV** (to avoid using the detector in the saturation region).

Tab. 1. Polynomial coefficients for the DM314 detector correction curves.

Coefficient	Value
d_1	1.5252655E-03
d_2	-5.2885074E-05
d_3	1.1919122E-06
d_4	-1.5035940E-08
d_5	1.0864016E-10
d_6	-4.1176271E-13
d_7	6.3670404E-16

Note

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.

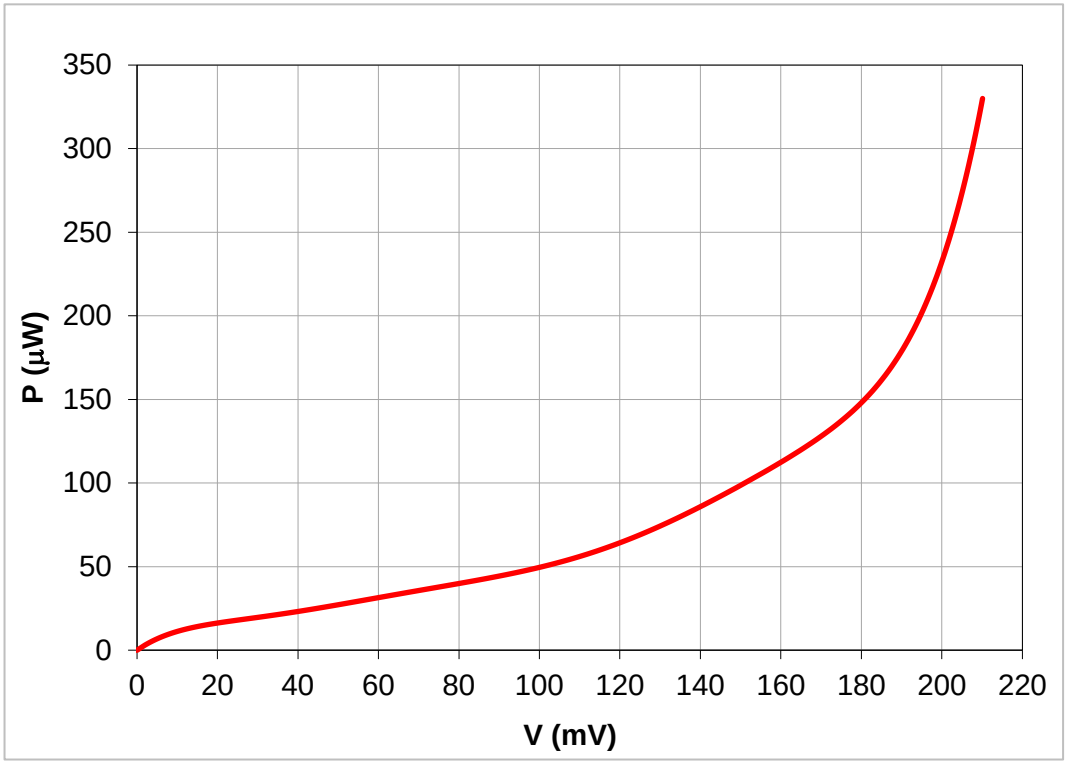

Fig. 3. Typical DM314 correction curves.

Dimensional Drawing

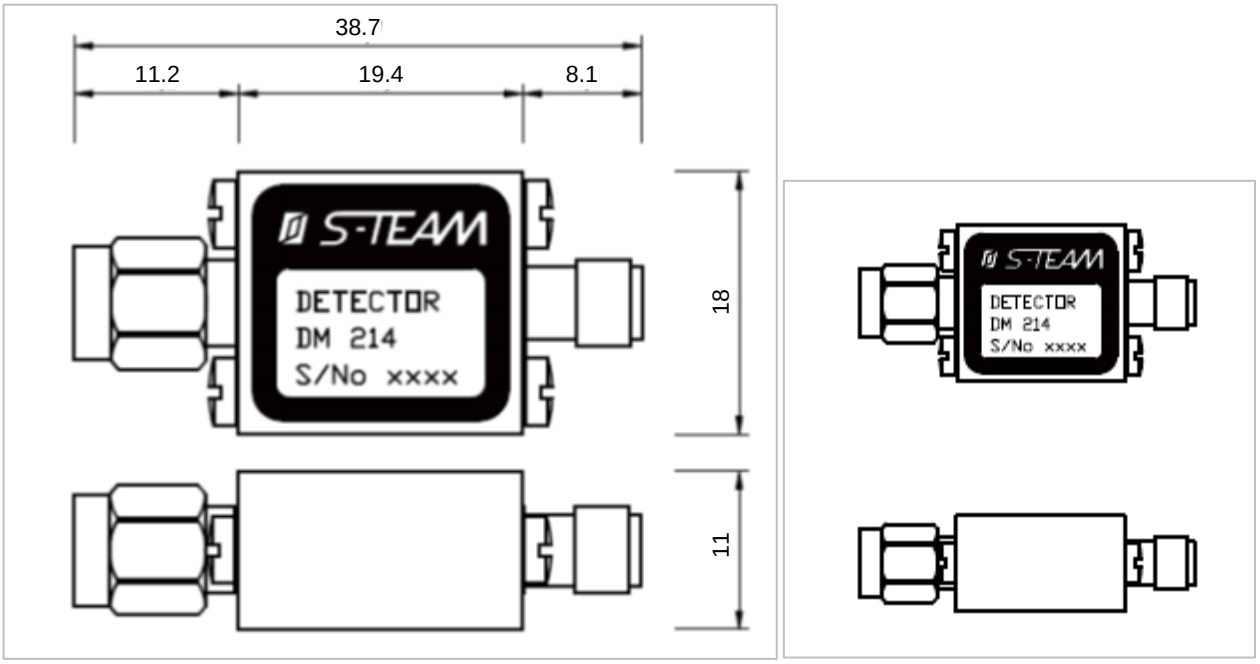

Fig. 4. Basic DM314 dimensions in millimeters (the dimensions are the same as for the DM214 shown). Right: Actual size.