

DM214: Fast Temperature-Stable Microwave Detector

General Description

DM214 is a small-housing, tunnel diode coaxial microwave detector covering the frequency range 100 MHz – 4 GHz but intended primarily for 915 MHz and 2450 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. Detector DM214.

Specifications

Frequency range	880 – 930 MHz	2350 – 2550 MHz
Frequency response variation (max)	±0.25 dB	±0.5 dB
Typical output voltage for $P = 1 \text{ mW}$, $R_{\text{LOAD}} = 33 \text{ k}\Omega$	220 mV	230 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	

Typical Transfer Characteristics

Fig. 2 below shows typical detector transfer characteristics for 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 $P_{\text{dBm}} = 10 \cdot \log(P_{\text{mW}})$.

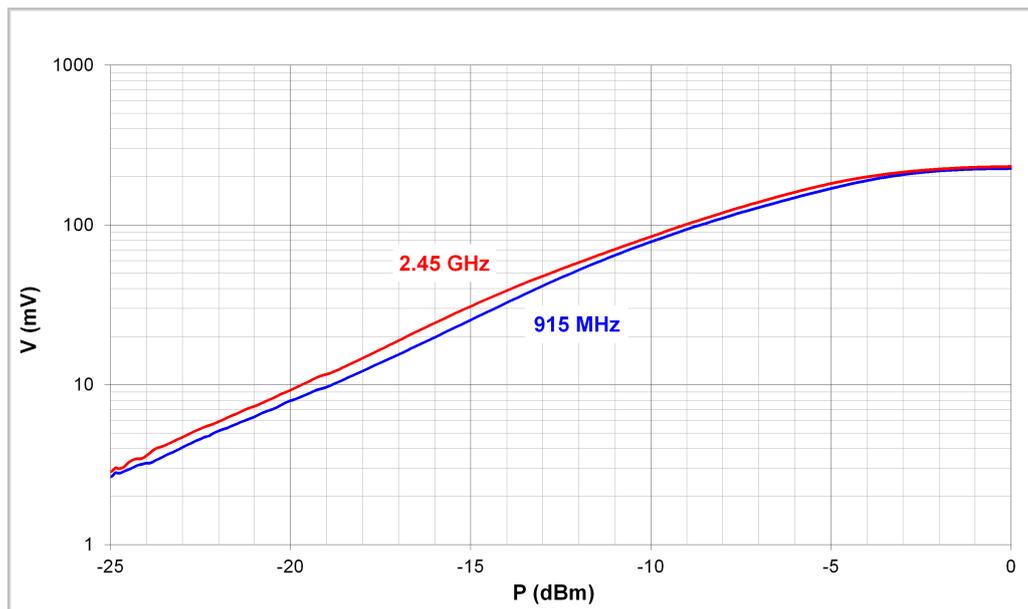


Fig. 2. Typical DM214 transfer characteristics.

Detector Correction Curves

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. Typical DM214 correction curves in lin-lin format are shown in Fig. 3 below.

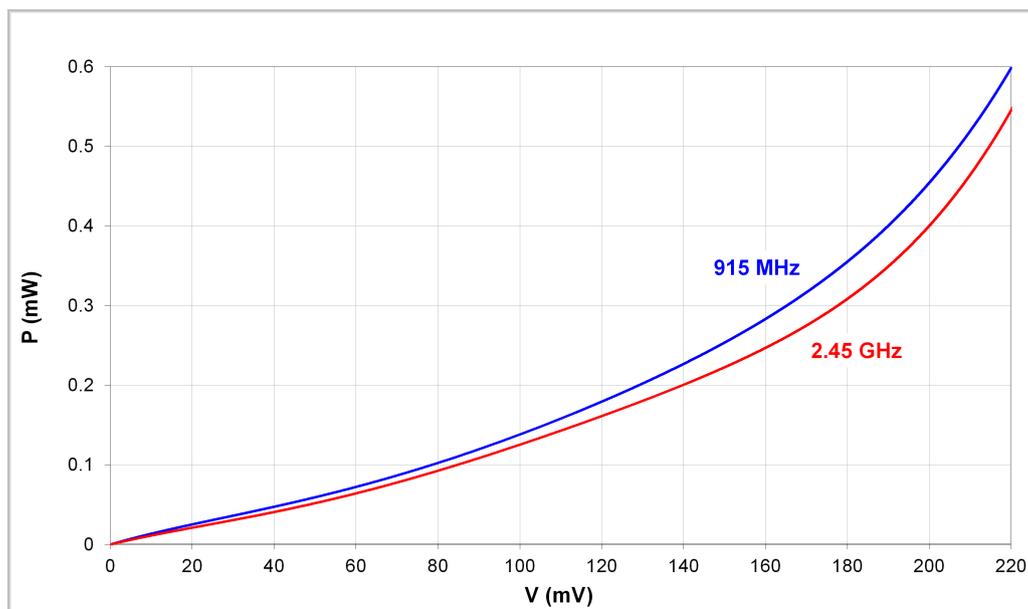


Fig. 3. Typical DM214 correction curves.

The curves 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 210 mV**.

Tab. 1. Polynomial coefficients for the DM214 detector correction curves.

Frequency:	915 MHz	2.45 GHz
d_1	1.4903894E-03	1.2430940E-03
d_2	-1.6404612E-05	-1.4451703E-05
d_3	2.7777734E-07	2.9077875E-07
d_4	-1.6104676E-09	-1.9062158E-09
d_5	3.6466985E-12	4.5418784E-12

Please be aware that these functions are a statistical average based on evaluation of a number of detectors. The behavior of individual detectors may vary.

Dimensional Drawing

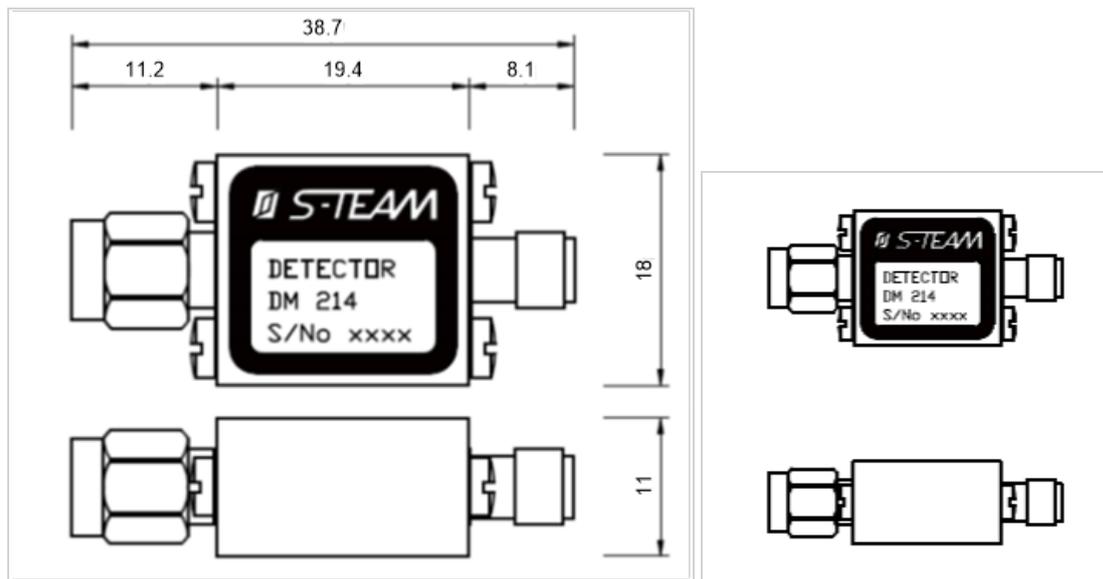


Fig. 4. Basic DM214 dimensions in millimeters. Right: Actual size.