# DM212: Fast Temperature-Stable Microwave Detector

## Description

DM212 (Fig. 1) is a 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.

Standard output voltage polarity is negative; optionally, it can be positive (DM212P).


Fig. 1. Detector DM212.

## 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 mW, $R_{LOAD}$ = 33 kΩ | 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 (optionally positive) | |
| 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 | N-male | |
| Output DC connector | BNC-female | |
| Dimensions (L × W × H) | 58 × 26 × 26 mm | |
| Mass | 90 g | |
| Operating temperature range | -10 °C to +65 °C | |
| Storage temperature range | -20 °C to +80 °C | |

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## Typical Transfer Characteristics

Typical detector transfer characteristics for an ambient temperature of $T_a$ = 25 °C and load resistance $R_L$ = 33 kΩ are 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 $P_{dBm} = 10*\log(P_{mW})$.

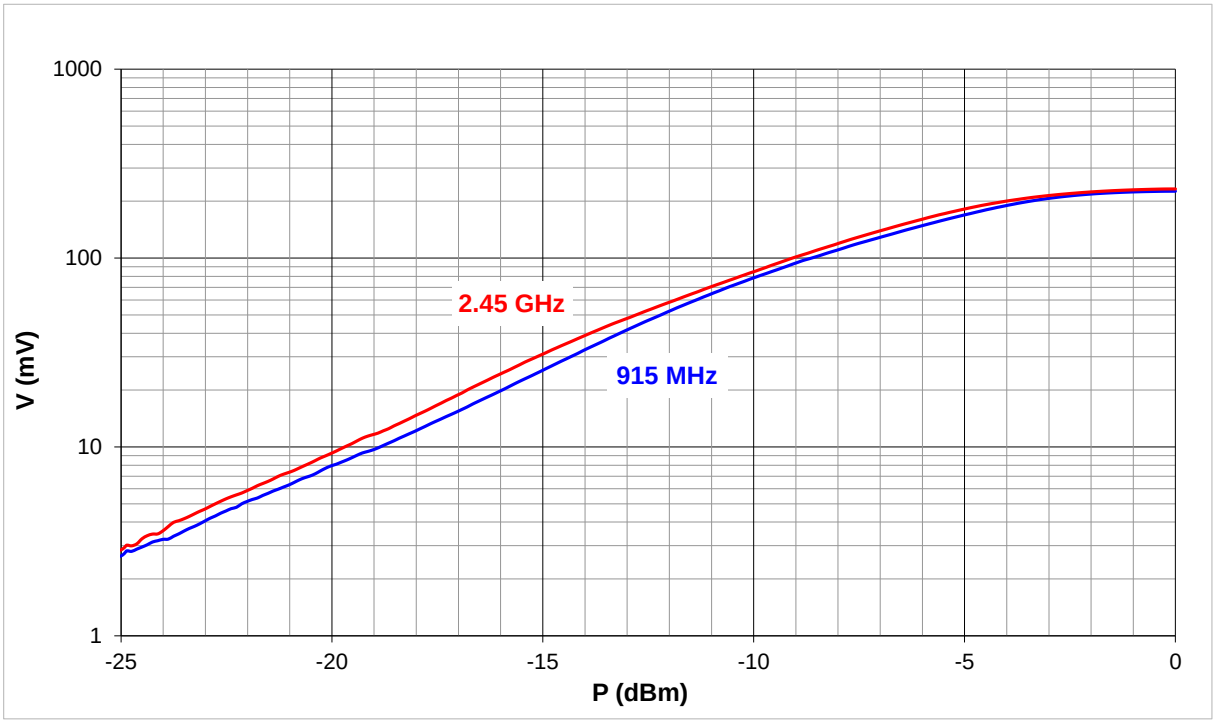


Fig. 2. Typical DM212 transfer characteristics.

## 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. Fig. 3 shows a typical DM212 correction curves in lin-lin format.

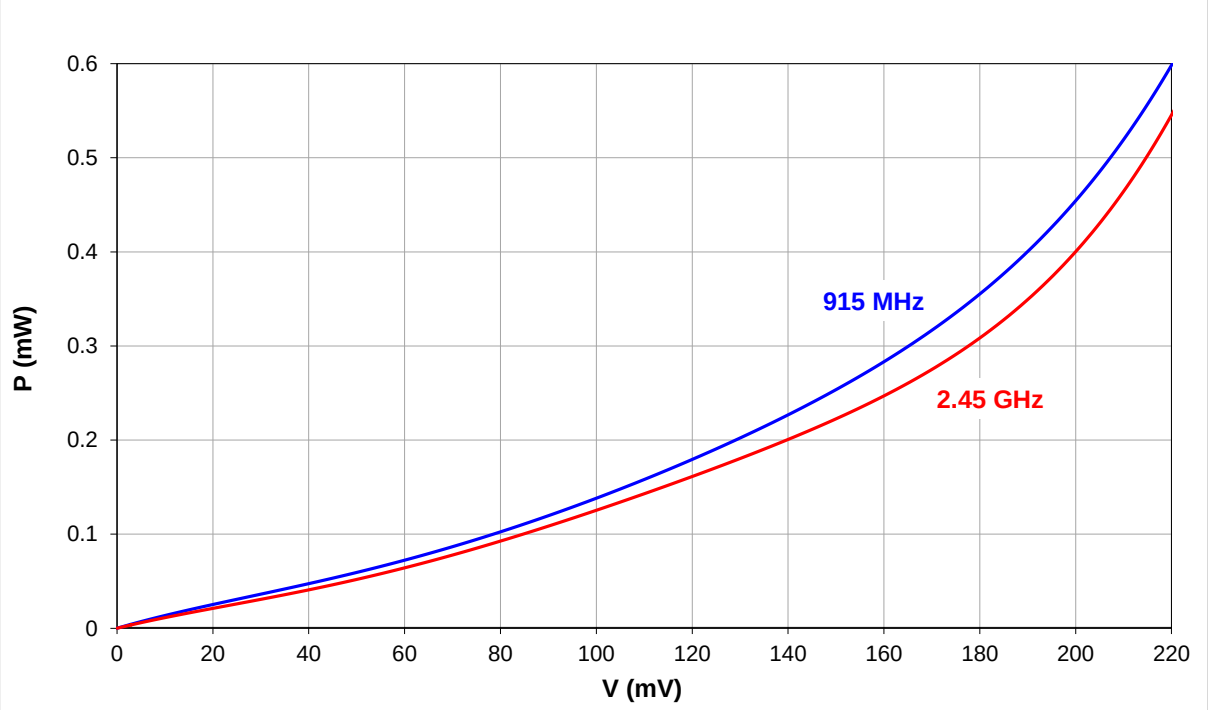


Fig. 3. Typical DM212 correction curves.

The curves can be approximated by the polynomial

$$P = d_1 V + d_2 V^2 + d_3 V^3 + d_4 V^4 + d_5 V^5$$

where $P$ is the input microwave power in milliwatts, $V$ is the output voltage in millivolts, and $d_i$ are the coefficients listed in Tab. 1. The curves in Fig. 3 and the coefficients in Tab. 1 are valid for $T_a$ = 25 °C, $R_L$ = 33 kΩ **and for the output voltages not exceeding 210 mV** (to avoid using the detector in the saturation region).

Tab. 1. Polynomial coefficients for the DM212 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 |

### Note

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

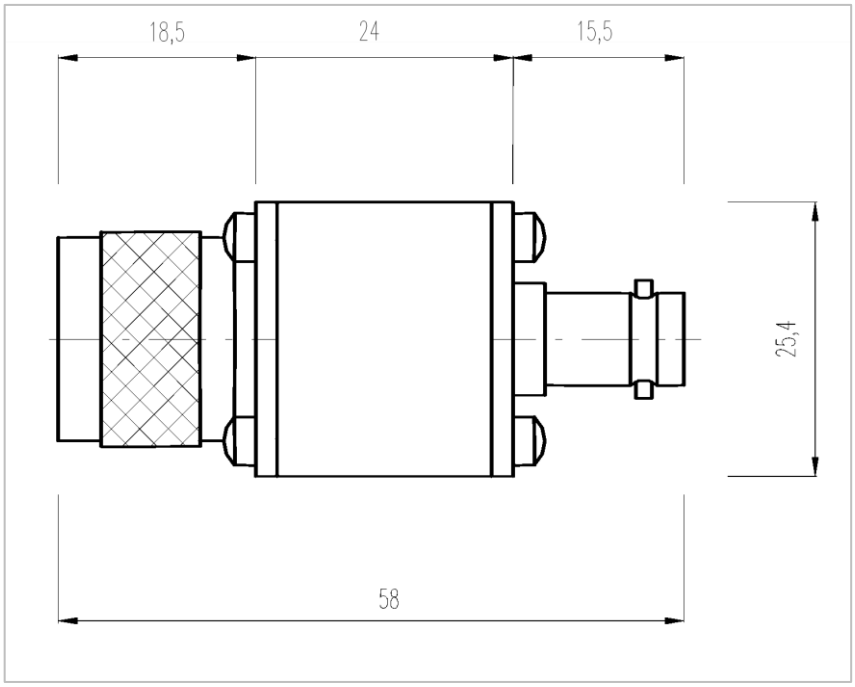


Fig. 4. Basic DM212 dimensions (millimeters).