

BD142: Coaxial Bidirectional Detector for 2.45 GHz

General Description

BD142 (Fig. 1) is a bidirectional detector that is intended for simultaneous sampling of the incident and reflected waves in high-power 2450 MHz industrial applications using a coaxial line with 7-16 DIN connectors. This bidirectional detector combines the following components:

- Four-port directional coupler
- Attenuators
- Zero-bias Schottky diode detectors

The detector delivers well-scaled DC voltages approximately proportional to the power of the waves propagating in the forward and reverse directions in the main coaxial line.

The detector transfer curve is generally nonlinear and varies with temperature. A transfer curve of an “average detector” is presented in this datasheet.



Fig. 1. Bidirectional detector BD142.

Specifications

Main line connectors	7-16 DIN male / 7-16 DIN female
Frequency range	2425 – 2475 MHz
Maximum working power	2 kW
Insertion loss	< 0.2 dB
Directivity	25 dB min
Output voltage polarity	Positive
Video resistance (typical)	10.2 kΩ
Internal output capacitance	24 pF
Statistical spread of output voltage	±1 dB (3-σ deviation)
Output voltage temperature variation (+5 °C to +65 °C)	< 3 dB
Detector output connectors	SMA-female
Dimensions (L x W x H)	112.4 mm × 49.5 mm × 40 mm
Mass	420 g
Operating temperature range	-10 °C to +65 °C
Storage temperature range	-20 °C to +80 °C

Detector Correction Curve

A detector correction curve is the inverse of the transfer curve $V = f(P)$ where P is the power of a wave propagating in the main line in a given direction and V is the output voltage of the corresponding channel. The correction curve can serve, in particular in its mathematical form, for determining the input power from the output voltage. Fig. 2 shows a typical correction curve for an ambient temperature of $T_a = 25$ °C, frequency 2450 MHz, and load resistance $R_L = 33$ kΩ.

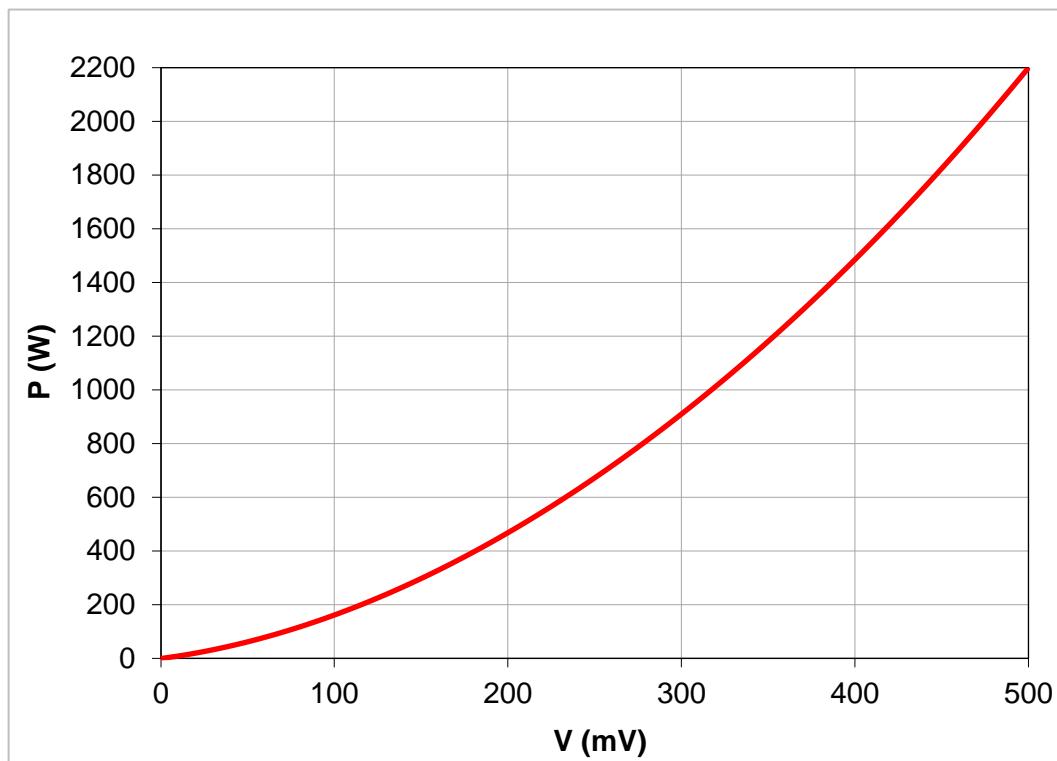


Fig. 2. Typical BD142 correction curve for both directions.

The curve can be approximated by the polynomial

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

where P is the input microwave power, V is the output voltage in millivolts, and d_i are the coefficients listed in Tab. 1.

Tab. 1. Polynomial coefficients for BD142 correction curve.

Coefficient	Value
d_1	8.5407210E-01
d_2	7.9646036E-03
d_3	-3.1950403E-06
d_4	2.8934286E-09

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

Typical Directivity

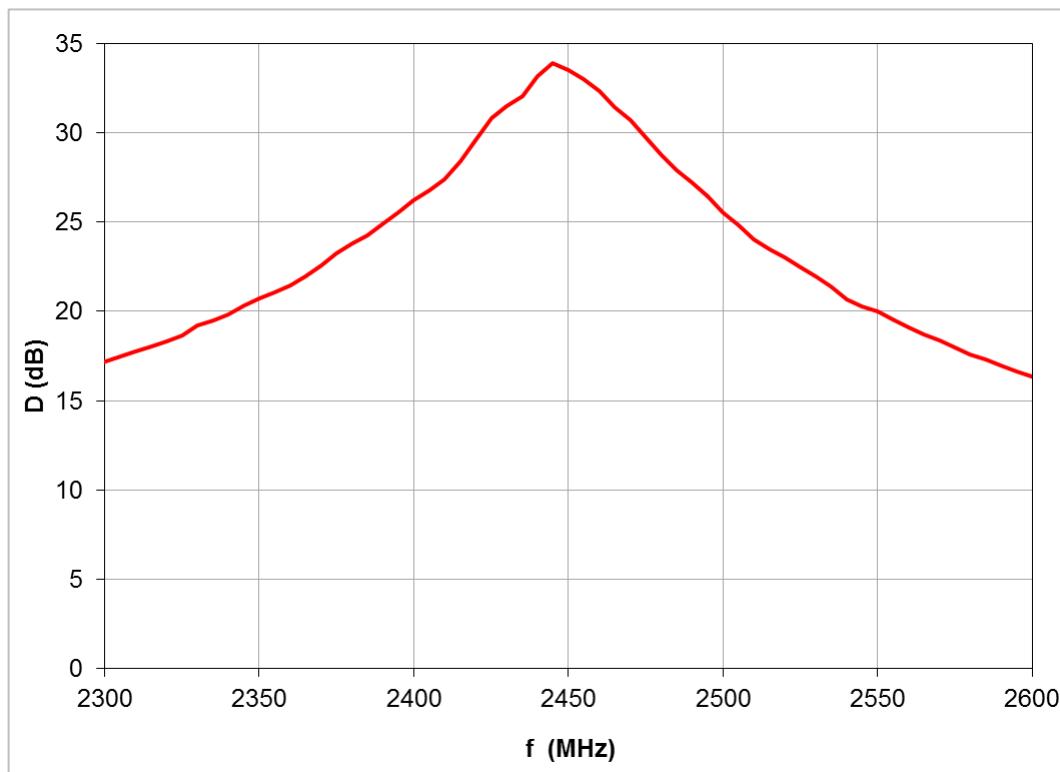


Fig. 3. Typical BD1142 directivity (both directions).

Dimensional Drawing

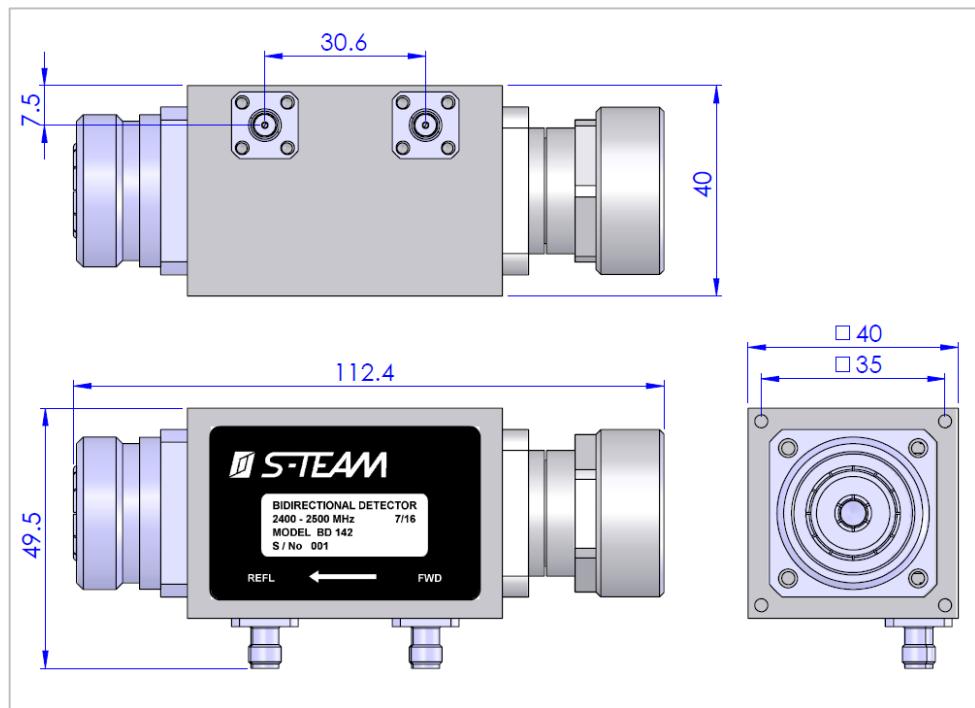


Fig. 4. Basic BD142 dimensions. All dimensions are in millimeters.