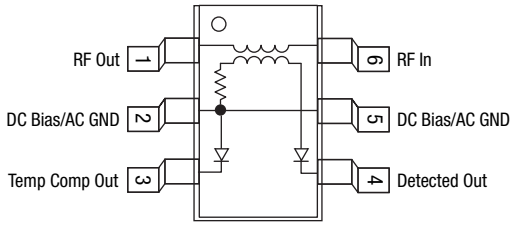
DATA SHEET

DD02-999, DD02-999LF: 650 MHz–3 GHz Directional Detector

Features

- Frequency coverage: 650 MHz to 3 GHz
- Low insertion loss: 0.2 dB typ. up to 2 GHz
- Directivity: 23 dB typ.
- Small outline SC-88 (6-Lead SC-70)
- Built-in temperature compensating diode
- Low cost for high-volume handset applications
- Available lead (Pb)-free and RoHS-compliant MSL-1 @ 260 °C per JEDEC J-STD-020

Pin Out



Description

The DD02-999 directional detector is designed to operate from 650 MHz to 3 GHz. It contains a high-directivity directional coupler, the coupled arm of which drives a GaAs Schottky detector diode. It also contains an identical GaAs Schottky diode used for temperature compensation. This part is packaged in the miniature SC-88 package. The DD02-999LF is packaged in the lead (Pb)-free SC-88 package and is fully compliant with current RoHS requirements.

The DD02-999 provides detection of the input signal amplitude only, by virtue of the directivity of the on-chip directional coupler. The sensitivity of the detector diode is improved through the application of an external 5 µA (nominal) forward bias current produced by an external 1 V (nominal) voltage source. This bias current is also applied to the temperature compensation diode. Temperature compensation of the detected output voltage can be accomplished by subtracting the output voltage from the temperature compensation Schottky diode, which is thermally coupled to the detector Schottky diode via their common substrate, from the detected output voltage.

This part is rated to operate from -40 °C to 85 °C.

An evaluation board is available upon request.

NEW Skyworks offers lead (Pb)-free, RoHS (Restriction of Hazardous Substances)-compliant packaging.

Innovation to Go™
Now available for purchase online.

Electrical Specifications at 25 °C

T_A = 25 C, Z_0 = 50 Ω, P_{IN} = 10 dBm, V_{BIAS} = 1 V at pins 2 and 5, R_{LOAD} = 100 kΩ, unless otherwise noted

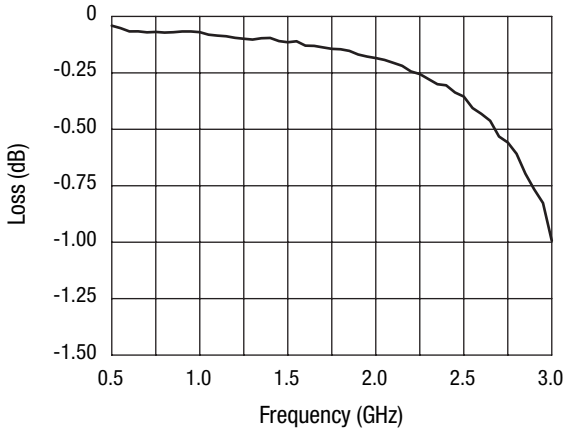
Parameter	Frequency	Min.	Typ.	Max.	Unit
Detected output voltage @ 10 dBm	0.8–1.2 GHz 1.8–2.0 GHz	60 130	80 160	105 190	mV mV
Insertion loss	0.8–1.2 GHz 1.8–2.0 GHz		0.1 0.2	0.2 0.3	dB dB
Input return loss	0.8–1.2 GHz 1.8–2.0 GHz		30 25	22 20	dB dB
Output return loss	0.8–1.2 GHz 1.8–2.0 GHz		30 25	22 20	dB dB
Directivity	0.8–1.2 GHz 1.8–2.0 GHz	17 16	20 13		dB dB
Schottky noise voltage (1 MHz bandwidth)	RF power off		200		µV
Schottky diode DC voltage	RF power off		510		mV
DC offset voltage	RF power off	-5	0	5	mV
Video resistance	RF power off		7500		Ω

Conditions: 10 dBm input power, 1 V applied to Pin 2 and 5 (See test circuit).
All data was taken with R_{LOAD} = 100 kΩ.

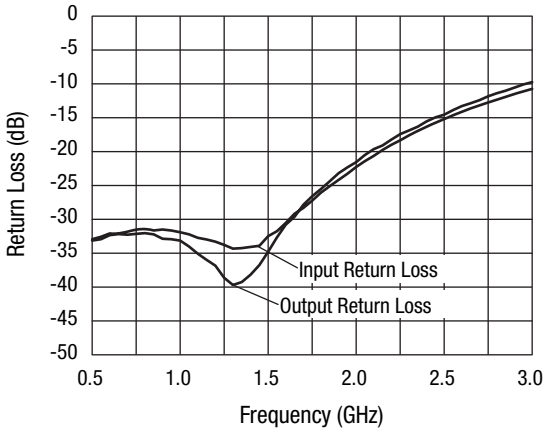
Detected output voltage is the difference between V_{REF} and V_{DET}. A digital voltmeter was used as a differential amplifier.

Typical Performance Data

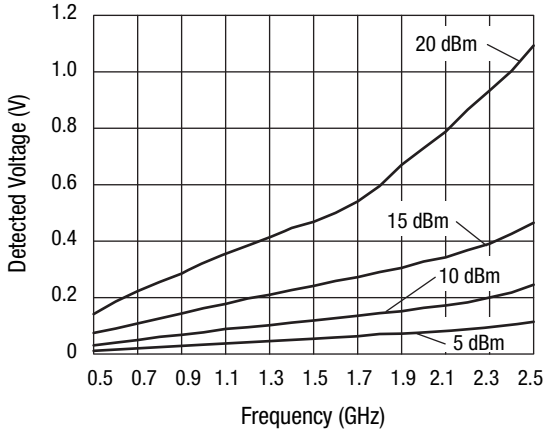
T_A = 25 C, Z_0 = 50 Ω, unless otherwise noted



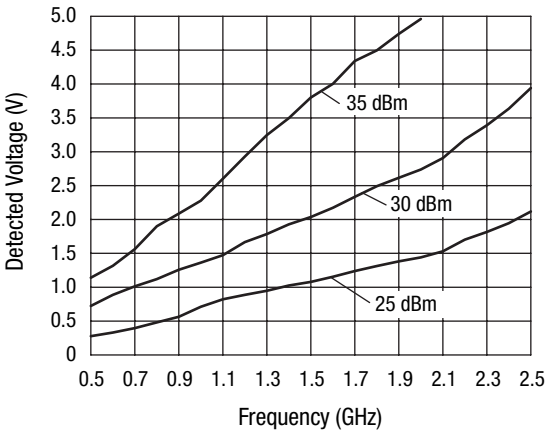
Insertion Loss vs. Frequency



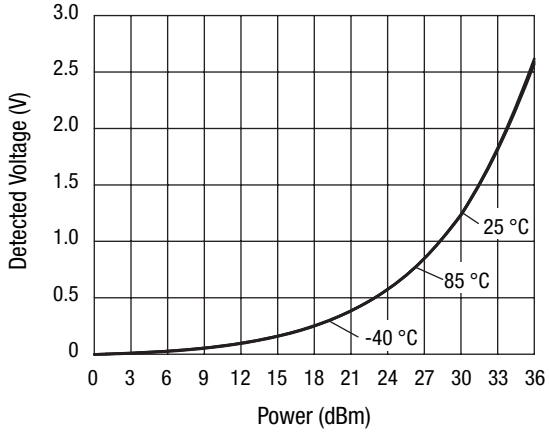
Return Loss vs. Frequency



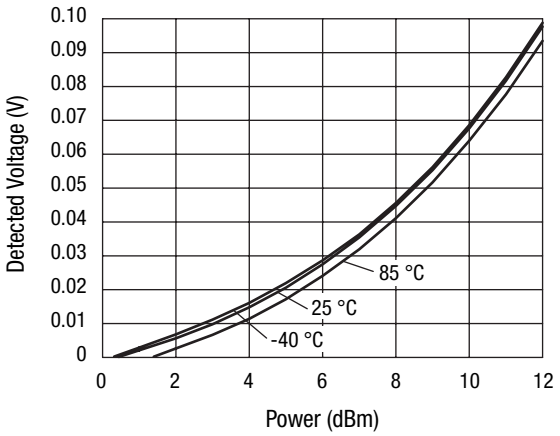
Differential Detected Voltage vs. Frequency and Power



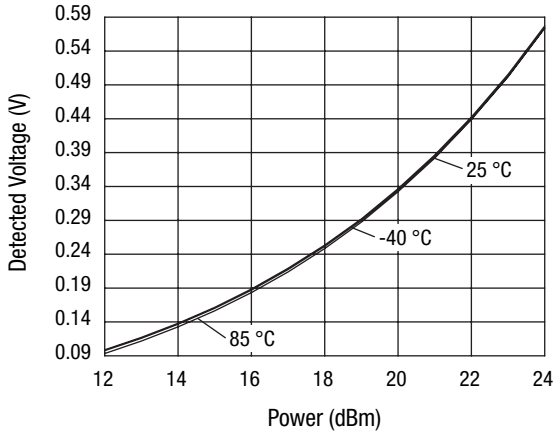
Differential Detected Voltage vs. Frequency & Power



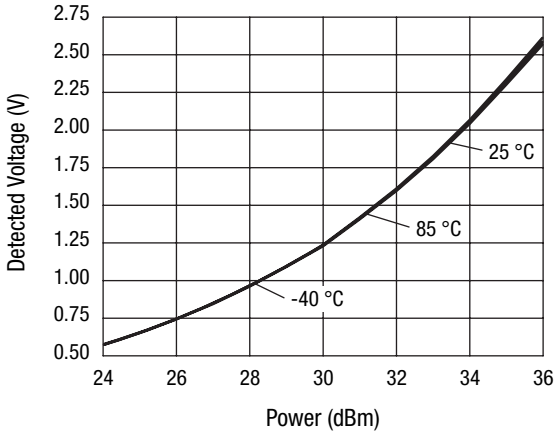
Differential Detected Voltage vs. Power and Temperature @ 900 MHz



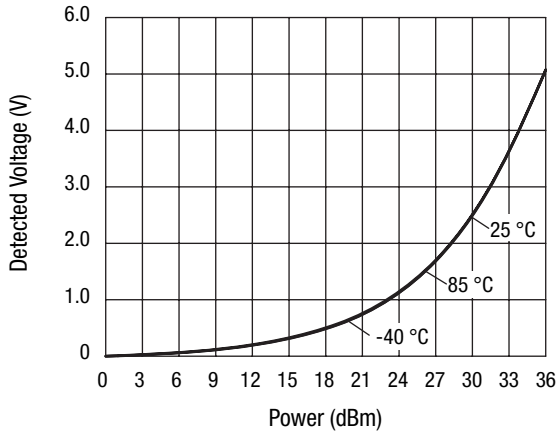
Differential Detected Voltage vs. Power and Temperature @ 900 MHz



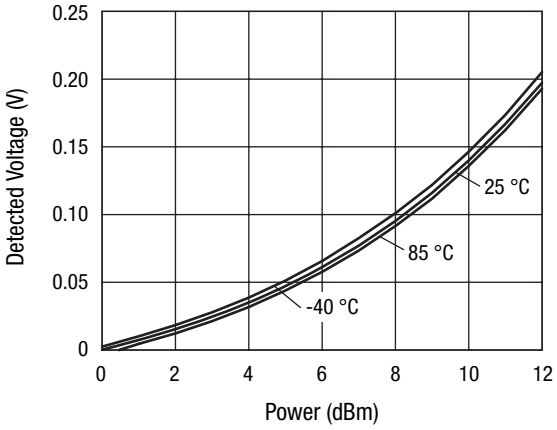
Differential Detected Voltage vs. Power and Temperature @ 900 MHz



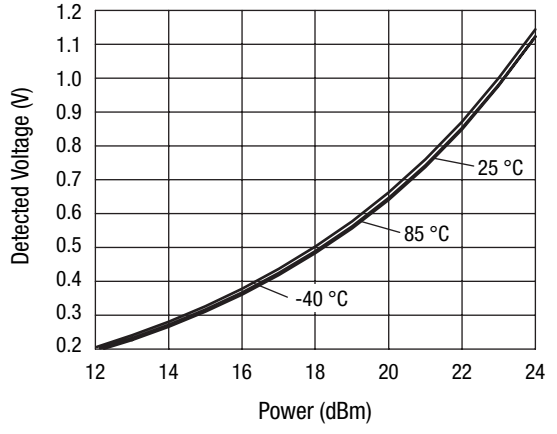
Differential Detected Voltage vs. Power and Temperature @ 900 MHz



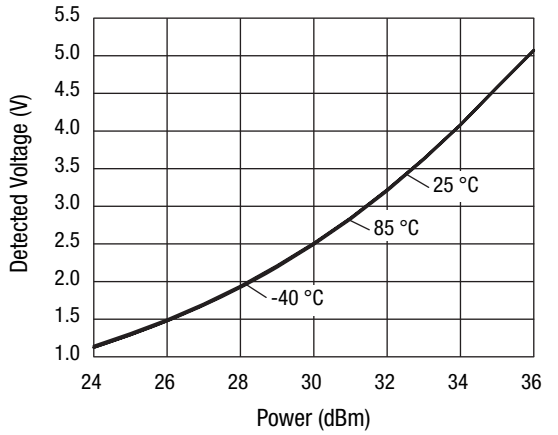
Differential Detected Voltage vs. Power and Temperature @ 1900 MHz



Differential Detected Voltage vs. Power and Temperature @ 1900 MHz

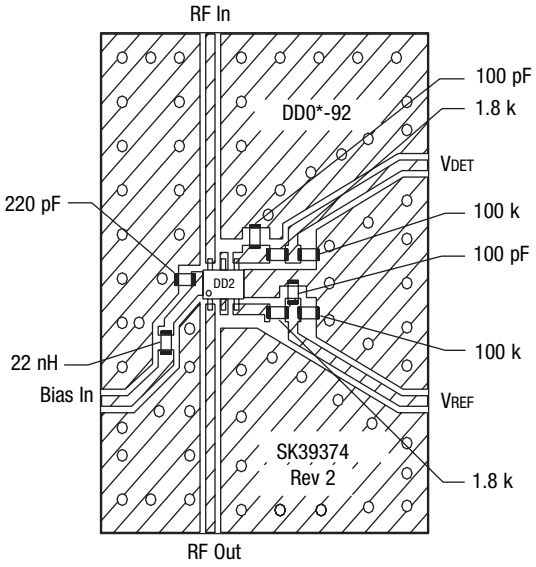


Differential Detected Voltage vs. Power and Temperature @ 1900 MHz

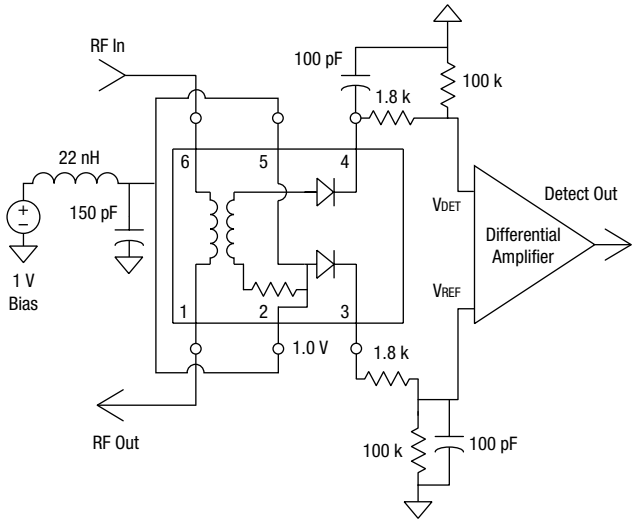


Differential Detected Voltage vs. Power and Temperature @ 1900 MHz

Evaluation Board Layout



Application Circuit



Differential amplifier not included on test board.

Recommended Solder Reflow Profiles

Refer to the *"Recommended Solder Reflow Profile"* Application Note.

Tape and Reel Information

Refer to the *"Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation"* Application Note.

Absolute Maximum Ratings

Characteristic Value	
Incident power (CW) @ SWR = 2 max.	4 W @ < 1 GHz 2 W @ 1–2.5 GHz
DC bias current	10 mA
Operating temperature	-40 °C to +85 °C
Storage temperature	-65 °C to +150 °C
ESD	200 V

Performance is guaranteed only under the conditions listed in the specifications table and is not guaranteed under the full range(s) described by the Absolute Maximum specifications. Exceeding any of the absolute maximum/minimum specifications may result in permanent damage to the device and will void the warranty.

CAUTION: *Although this device is designed to be as robust as possible, ESD (Electrostatic Discharge) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions must be employed at all times.*

SC-88 (6-Lead SC-70)