2 GHz to 43.5 GHz, 500MHz BW Envelope Detector

Preliminary Technical Data

ADL6012

FEATURES

- Microwave Envelope tracking detector
- Envelope output bandwidth: 500 MHz
- Differential 100Ω Envelope Output
- Broadband 50 Ω input impedance
- Accurate response from 2 GHz to 43.5 GHz with minimal slope variation
- Input range of –10 dBm to +15 dBm
- Low power consumption: 26mA at 5 V
- 3 mm × 2 mm, 10-lead LFCSP package

APPLICATIONS

- Microwave point to point links
- Microwave instrumentation
- Radar-based measurement systems

FUNCTIONAL BLOCK DIAGRAM

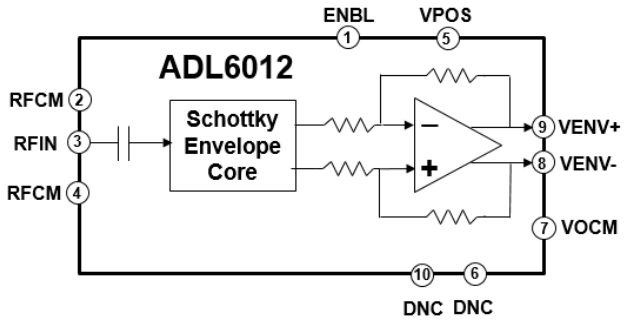

Figure 1.

GENERAL DESCRIPTION

The ADL6012 is a versatile, broadband Envelope detector covering the microwave frequencies from 2 to 43.5 GHz. It provides state-of-the-art accuracy with low power consumption (90 mW) in a simple, easy to use 10-lead LFCSP package. The envelope output is pseudo-differential with 500MHz BW, 100Ω differential output impedance and variable common-mode capability.

The detector cell uses a proprietary Schottky diode array to extract both the positive and the negative envelopes of the RF signal. These two envelope voltages are buffered and level shifted using an externally applied VOCM voltage and presented on the ENVP and ENVM pins. The envelope outputs are designed to drive 400 Ω differential load and up to 2pF of capacitance to ground on each output. The envelope output bears the signature of typical diode non-linearity and has 20dB linear range at the top end.

The input power can range from −10 dBm to +15 dBm

A subtle aspect of the balanced detector topology used in ADL6012 is that even-order distortion, caused by nonlinear source loading, at the input is substantially reduced compared with a simple diode detector. This is an important benefit in applications where a low ratio coupler is used to extract a signal sample. This s a significant improvement over traditional diode detectors.

The Envelope output can be used to detect and correct LO leakage in IQ modulators in point-to-point Microwave radios, employing higher order QAM modulations, where LO leakage in the transmit signal causes EVM degradation. The ADL6012 envelope detector outputs can also be used in extremely fast signal detection applications where log or RMS responding detection capability, is not needed.

The ADL6012 is specified for operation from −40°C to +85°C. The ADL6012 is available in a 10-lead, 3 mm × 2 mm LFCSP package.

Rev. PrA Document Feedback

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ADL6012* PRODUCT PAGE QUICK LINKS

Last Content Update: 07/19/2017

COMPARABLE PARTS

View a parametric search of comparable parts.

EVALUATION KITS

- ADL6012 Evaluation Board

DOCUMENTATION

Data Sheet

- ADL6012: 2 GHz to 43.5 GHz, 500MHz BW Envelope Detector Preliminary Data Sheet

DESIGN RESOURCES

- ADL6012 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

DISCUSSIONS

View all ADL6012 EngineerZone Discussions.

SAMPLE AND BUY

Visit the product page to see pricing options.

TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

DOCUMENT FEEDBACK

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SPECIFICATIONS

VPOS = 5.0 V, T_A = 25°C, 50 Ω source input impedance, single-ended input drive, unless otherwise stated. Envelope output loaded with 400 Ω differential.

Table 1.

Parameter	Test Conditions/Comments	Min	Typ[1]	Max	Unit
RF INPUT INTERFACE	RFIN pin				
Operating Frequency		2		43.5	GHz
Input Range	2 to 43.5 GHz		25		dB
Nominal Max Input Power			+15		dBm
Nominal Minimum Input Power			-10		dBm
Temperature Drift	RFIN = +10 dBm		±1		dB
Input Impedance	Single-ended input drive		50		Ω
ENVELOPE OUTPUT INTERFACE	Pins VEV+, VEV-				
Output Impedance	Differential		100		Ω
Output Bandwidth			500		MHz
Slope	(VEV+ - VEV-) / V_{RFI}		0.75		V/V
Intercept			0		V
Common Mode Voltage	Must be applied to VOCM	0.9	1.65	VPOS/2	V
POWER SUPPLY	Pin VPOS				
Supply Voltage		4.75	5.0	5.25	V
Quiescent Current	T_A = 25°C, no signal at RFIN, VPOS = 5.0 V		26		mA

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

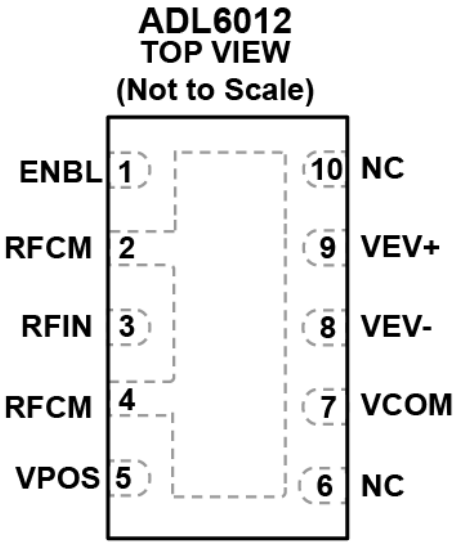

Figure 2. Pin Configuration

Table 2. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	ENBL	Device Enable. Connect to VPOS for enabled state. Connect to ground for disable state.
2, 4	RFCM	Device Grounds. Connect the RFCM pins to the system ground using a low impedance ground plane together with the exposed pad (EPAD).
3	RFIN	Signal Input. The RFIN pin is ac-coupled and has an RF input impedance of approximately 50 Ω.
5	VPOS	Supply Voltage. The operational range is from 4.75 V to 5.25 V. Decouple the power supply using the suggested capacitor values of 100 pF and 0.1 µF and locate these capacitors as close as possible to the VPOS pin.
6, 10	NC	Device No Connects. Leave these pins unconnected.
7	VOCM	Output Common-mode control. Set to 1.65V nominal. Adjustable from 0.9V to 2.5V.
8, 9	VENV-, VENV+	Envelope detector Pseudo-differential output. VEV- and VEV+ are the negative and positive outputs, respectively for the envelope detector output. 50Ω output impedance per pin forms a 100Ω differential output impedance. 400Ω differential load and 2pF to ground per pin drive capability.
	EPAD	Exposed Pad. The exposed pad (EPAD) on the underside of the device is also internally connected to ground and requires good thermal and electrical connection to the ground of the printed circuit board (PCB). Connect all ground pins to a low impedance ground plane together with the EPAD.

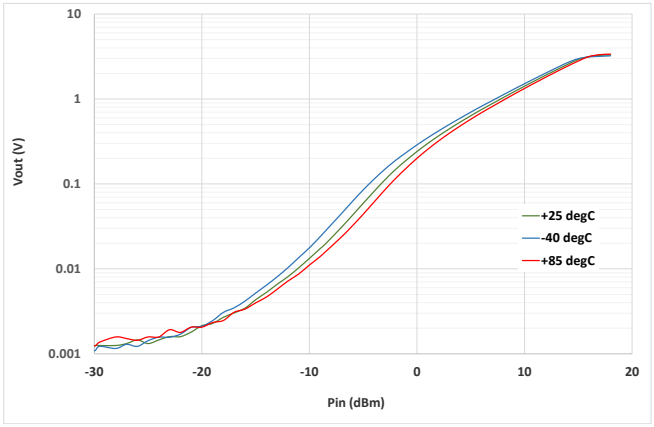

Figure 3. VENV+ - VENV- vs. RFIN and Temperature at 2 GHz

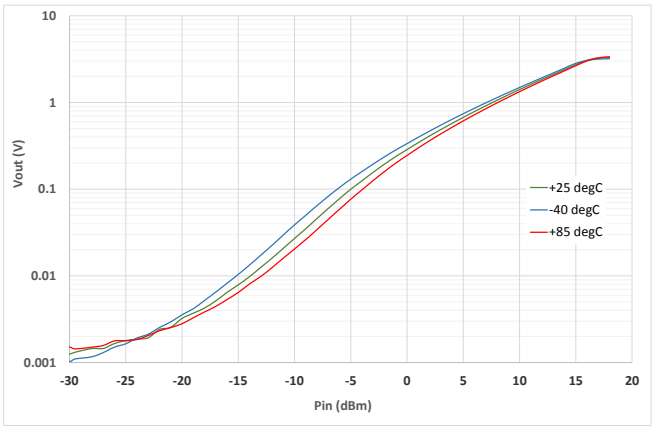

Figure 4. VENV+ - VENV- vs. RFIN and Temperature at 5 GHz

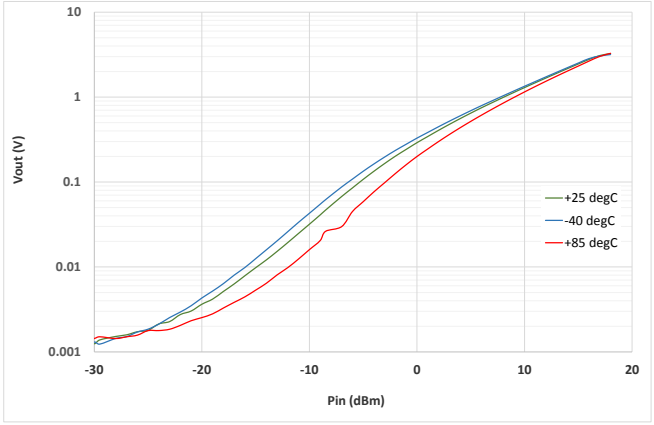

Figure 5. VENV+ - VENV- vs. RFIN and Temperature at 10 GHz

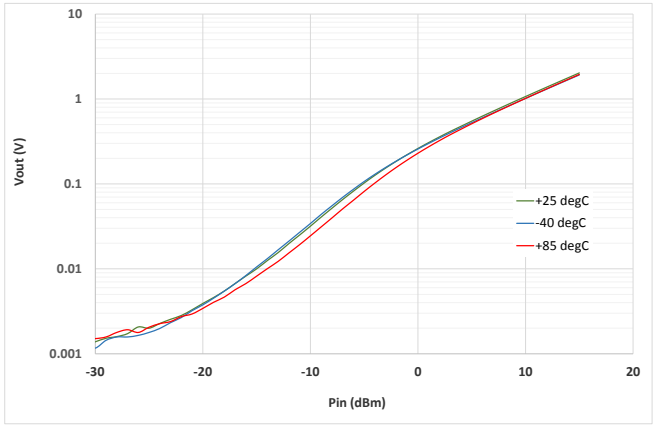

Figure 6. VENV+ - VENV- vs. RFIN and Temperature at 20 GHz

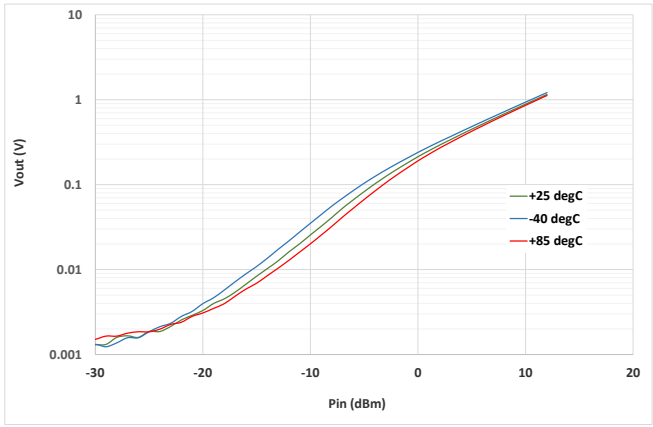

Figure 7. VENV+ - VENV- vs. RFIN and Temperature at 30 GHz

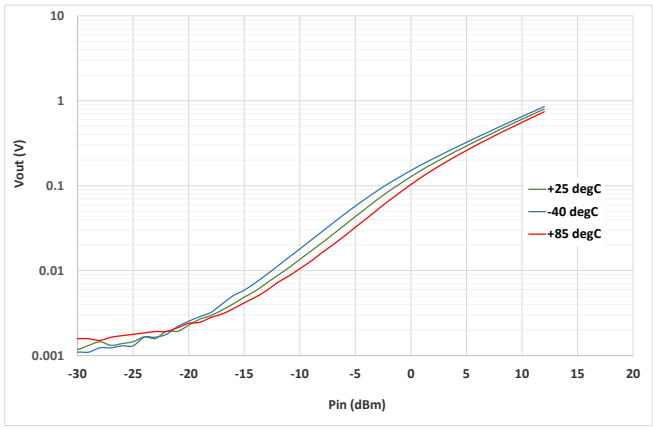

Figure 8. VENV+ - VENV- vs. RFIN and Temperature at 40 GHz

Figure 9. VENV+ Pulse Response.

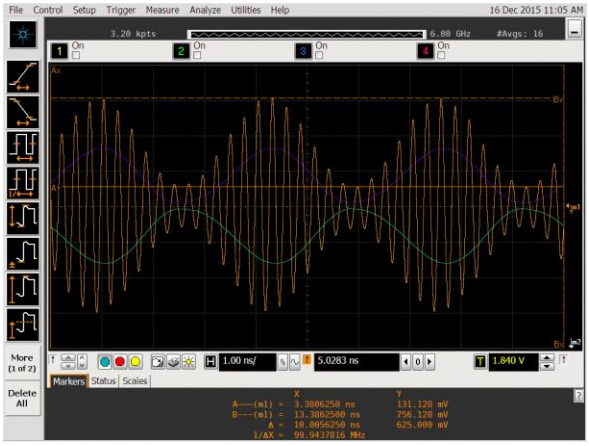

Figure 10. VENV+ (purple) and VENV- (green) response to 300 MHz AM modulation on RFIN (orange). VOCM = 1.65 V.

EVALUATION BOARD

ADL6012-EVALZ a fully populated, 4-layer, FR4- based valuation board. For normal operation, it requires a 3.3 V or 5 V power supply. The 5 V power supply should be connected to the VPOS and GND test loops. The RF input and load should be applied to the RFIN 2.92 mm connector. The differential envelope output signal is available on the connectors labelled VRMS_ENV+ and NCON_VEV-.

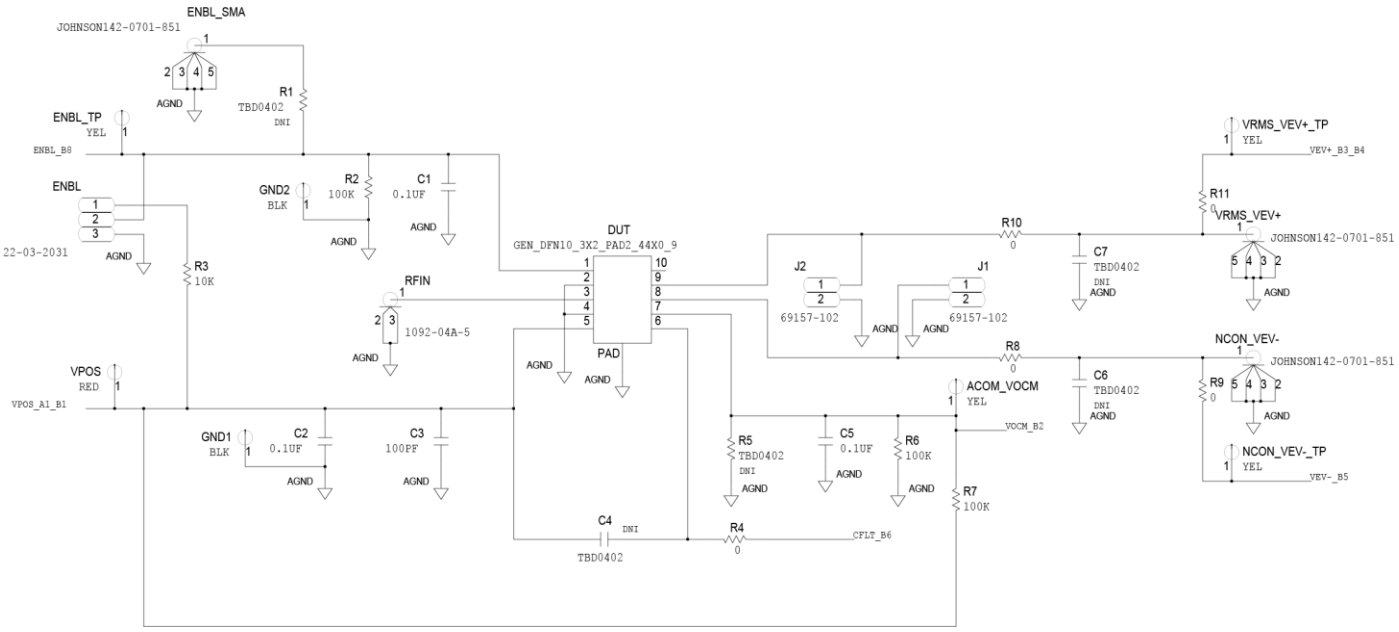

Figure 11. Evaluation Board Schematic