20 MHz to 500 MHz IF Gain Blocks

Preliminary Technical Data

ADL5532

FEATURES

Fixed gain of 15 dB
Operation up to 500 MHz
+39.1 dBm OIP3 at 70 MHz
Noise Figure 3.0 dB at 70 MHz
Input/output internally matched to 50 Ω
Temperature and power supply stable
Power supply: 5 V
Power supply current: 95 mA
1000 V ESD (Class 1C)

FUNCTIONAL BLOCK DIAGRAM

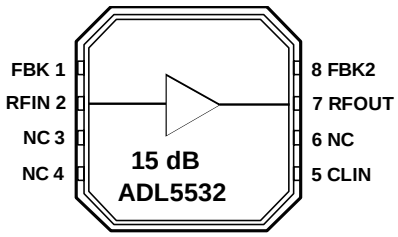

Figure 1. Block Diagram

GENERAL DESCRIPTION

The ADL5532 is a broadband, fixed-gain, linear amplifier that operate at frequencies up to 500 MHz. The device can be used in a wide variety of wired and wireless devices including cellular, GSM and WCDMA, and broadband applications.

Gain is stable over frequency, temperature, power supply and from device to device. The ADL5532 achieves an OIP3 of 39.1 dBm with an output compression point of +19.9 dBm and a noise figure of 3.0 dB.

This amplifier is single-ended and internally matched to 50 Ω with an input return loss of 10 dB. Only input/output ac-coupling capacitors, a power supply decoupling capacitor and external inductor are required for operation.

The amplifier operates with a 5 V supply consuming 95 mA of current.

The ADL5532 is fabricated on a GaAs HBT process and has an ESD rating of 1000 V (Class 1C). The device is packaged in a 3mm x 3mm LFCSP that uses an exposed paddle for excellent thermal impedance and operates from −40°C to +85°C. A fully populated evaluation board is available.

Rev. PrD 5/07

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REVISION HISTORY

5/07—Rev. PrD: Preliminary Version

SPECIFICATIONS

ADL5532 VPOS = 5 V, T_A = 25°C, unless otherwise noted.

Table 1.

Parameter	Conditions	Min	Typ	Max	Unit
OVERALL FUNCTION					
Frequency Range		20		500	MHz
Gain vs. Frequency	± 50 MHz. Center Frequency = 190 MHz or 380 MHz		±0.12		dB
Input Return Loss (S11)	30 MHz to 500 MHz		-10		dB
Output Return Loss (S22)	30 MHz to 500 MHz		-10		dB
FREQUENCY = 70 MHz					
Gain			16.1		dB
vs. Temperature	−40°C ≤ T_A ≤ +85°C		±.25		dB
Output 1 dB Compression Point			19.7		dBm
Output Third-Order Intercept	Δf = 1 MHz, Output Power (P_{OUT}) = 0 dBm (per tone)		39.1		dBm
Noise Figure			3.0		dB
FREQUENCY = 190 MHz					
Gain			15.8		dB
vs. Temperature	−40°C ≤ T_A ≤ +85°C		±.25		dB
Output 1 dB Compression Point			19.9		dBm
Output Third-Order Intercept	Δf = 1 MHz, Output Power (P_{OUT}) = 0 dBm (per tone)		38.5		dBm
Noise Figure			3.0		dB
FREQUENCY = 380 MHz					
Gain			15.5		dB
vs. Temperature	−40°C ≤ T_A ≤ +85°C		±.25		dB
Output 1 dB Compression Point			19.6		dBm
Output Third-Order Intercept	Δf = 1 MHz, Output Power (P_{OUT}) = 0 dBm (per tone)		35.6		dBm
			3.5		dB
POWER INTERFACE	Pins RFOUT,Vcc				
Supply Voltage		4.75	5	5.25	V
Supply Current			95		mA
vs. Temp	−40°C ≤ T_A ≤ +85°C		104		mA
Power Dissipation	VPOS = 5V		475		mW

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage, VPOS	5.5 V
Input Power (re: 50 Ω)	+12 dBm
Internal Power Dissipation (Paddle Soldered)	650 mW
θ_{JA} (Paddle Soldered)	TBD °C/W
Maximum Junction Temperature	150 °C
Operating Temperature Range	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C
(Soldering 60 sec)	240°C

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

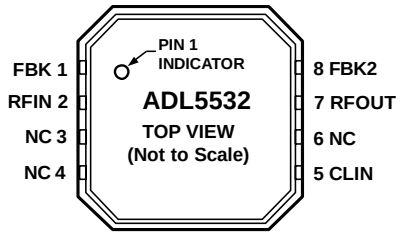

Figure 2. Pin Configuration

Table 3. Pin Function Descriptions Single

Pin No.	Mnemonic	Description
1,8	FBK1, FBK2	For operation below 50 MHz a 100nF capacitor should be connected between these pins.
2	RFIN	RF Input: Requires a DC blocking capacitor. For normal operating conditions a 10 nF capacitor is recommended
7	RFOUT	RF Output and Bias: DC bias provided to this pin through an inductor. For normal operating conditions a 470 nH inductor is recommended. RF path requires a DC blocking capacitor. For normal operating conditions a 10 nF capacitor is recommended.
3, 4, 6	NC	No Connect
5	CLIN	A 100 nF capacitor connected between pin 5 and ground provides decoupling for the on board linearizer.
	Exposed Paddle	Internally connected to GND. Solder to a low impedance ground plane

TYPICAL PERFORMANCE CHARACTERISTICS

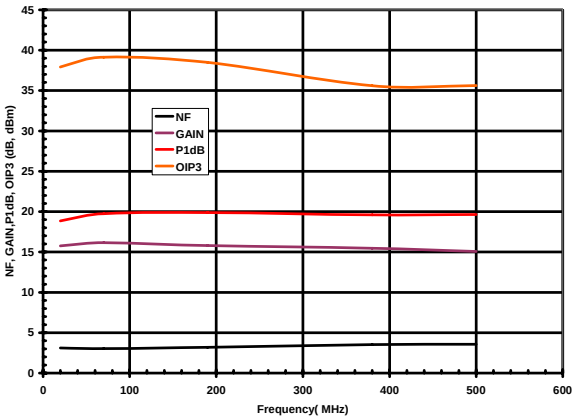

Figure 3 ADL5532 Gain, Noise Figure, OIP3 and P1dB vs Frequency

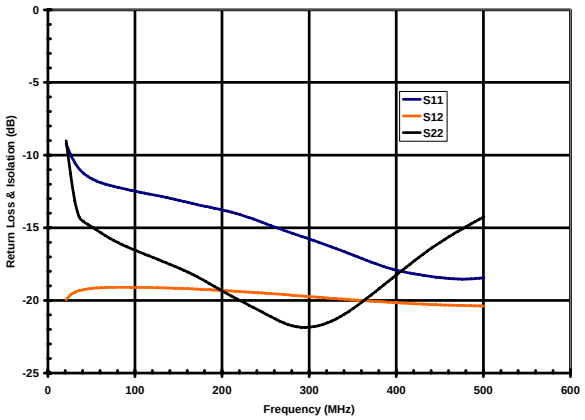

Figure 5. ADL5532 Input / Output Return Loss and Reverse Isolation vs Frequency

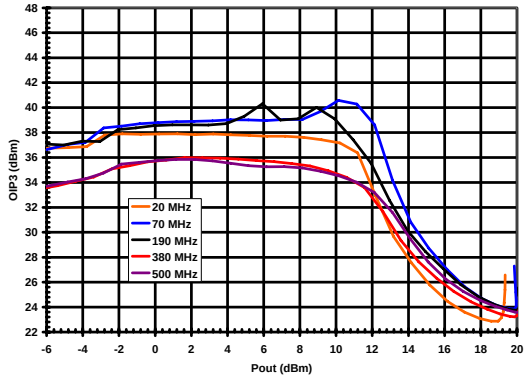

Figure 4 ADL5532 OIP3 vs Pout and Frequency

EVALUATION BOARD

Figure 6 shows the schematic for the ADL5532 evaluation board. The board is powered by a single 5V supply.

The components used on the board are listed in. Table 4 Power can be applied to the board through clip-on leads (Vcc, Gnd), or through Jumper W1.

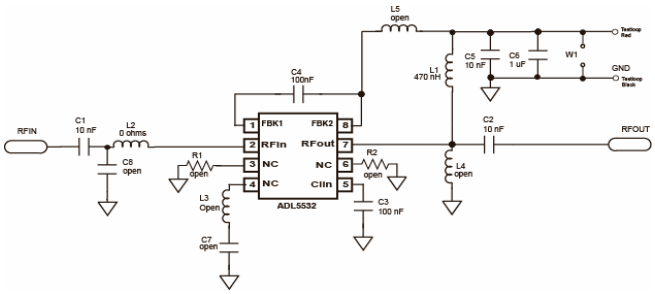

Figure 6. Evaluation Board Schematic

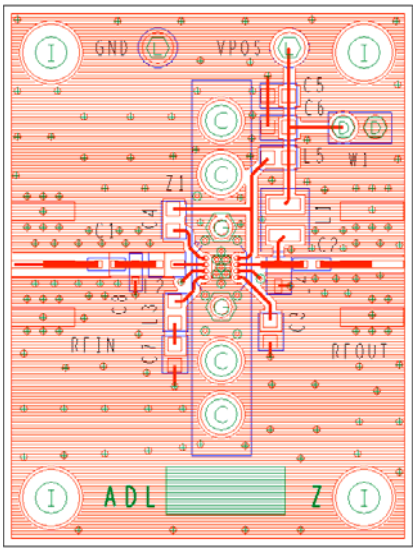

Figure 7. Evaluation Board Layout (Top)

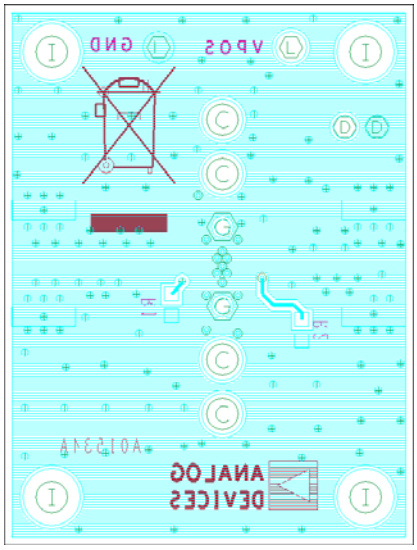

Figure 8. Evaluation Board Layout (Bottom)

Table 4. Evaluation Board Configuration Options

Component	Function	Default Value
C1, C2	AC-coupling capacitors.	10 nF 0402
C3,	Provides decoupling for the on board linearizer.	C3 100 nF 0603
C4	Stabilizes the internal feedback loop for operation below 50 MHz.	C4 100 nF 0603
C5, C6	Power Supply decoupling capacitors capacitor.	C5 10 nF 0603
		C6 1 µF 0603
C7, C8		Open 0603
L1	DC bias inductor.	82 nH L0603
L2, L3, L4, L5		Open 0603
VCC & GND	Clip-on terminals for power supply.	VCC Red
		GND Black
W1	2-pin jumper for connection of ground and supply via cable.	
R1, R2		Open 0603

OUTLINE DIMENSIONS

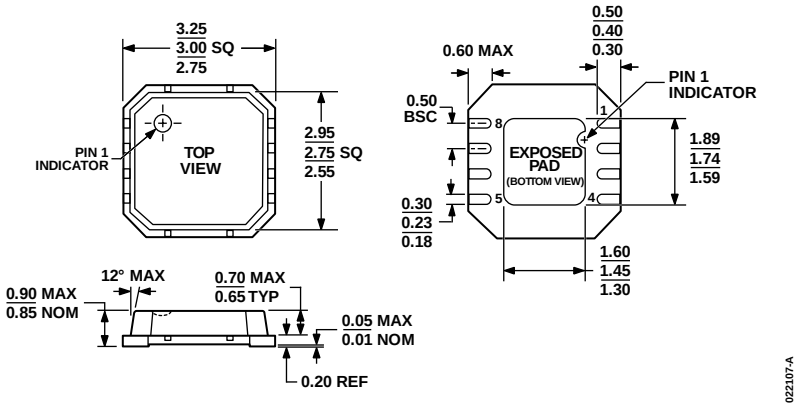

Figure 9. 8-Lead Lead Frame Chip Scale Package [LFCSP_VD]
3mm × 3 mm Body, Very Thin, Dual Lead
CP-8-2
Dimensions shown in millimeters

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option	Branding	Ordering Quantity
ADL5532ACPZ-R7[1]	−40°C to +85°C	8-Lead LFCSP Tape and Reel	CP-8-2		
ADL5532ACPZ-WP[1]	−40°C to +85°C	8-Lead LFCSP Waffle Pack	CP-8-2		
ADL5532-EVALZ		Evaluation Board			

[1] Z = Pb-free part.

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