1700 MHz to 2400 MHz GaAs Matched RF PA Pre-Driver

Preliminary Technical Data

ADL5323

FEATURES

Internally Matched to 50 Ω Input and Output
Third Order Output Intercept 43 dBm
P1dB 28 dBm
Operational frequency of 1.7 GHz to 2.4 GHz
Gain 20 dB
Noise Figure 4.5 dB
Internal Biasing & AC Coupling
3x3mm LFCSP
Power supply: 5V

APPLICATIONS

Single-Carrier and Multi-Carrier Base Station Transceivers
Linear Power Amplifiers

GENERAL DESCRIPTION

The ADL5323 is a high linearity GaAs driver amplifier that is internally matched to 50 Ohms for operation in the 1700 MHz to 2400 MHz frequency range. The amplifier, which has a gain of 20 dB, has been specially designed for use in the output stage of a cellular base station radio or as an input pre-amplifier in a multi-carrier base station power amplifier. Matching, biasing as well as input and output coupling are all on-chip. The ADL5323 is available in a 3mm x 3 mm 8-pin Chip scale package. The ADL5323 is available in a Pb-free 3mm x 3 mm 8-pin Chip Scale Package with an operating temperature of -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM

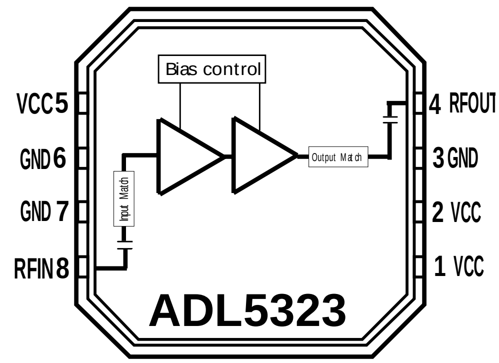

Figure 1.

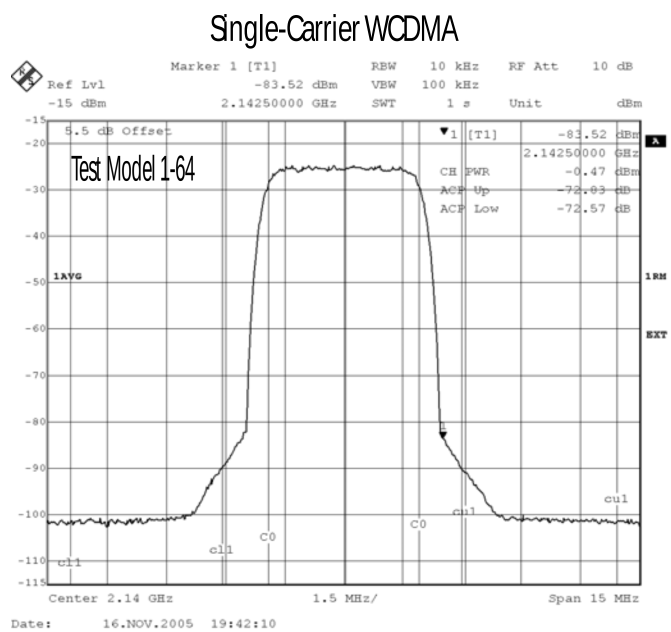

Figure 2. ACPR WCDMA Single Carrier Spectral Plot, Test Model 1-64, 2140 MHz without noise floor correction

Rev. PrC 5.1.06

One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106, U.S.A.
Tel: 781.329.4700 www.analog.com
Fax: 781.461.3113

SPECIFICATIONS

V_{CC} = 5 V, T_A = 25°C

Table 1.

Parameter	Conditions	Min	Typ	Max	Unit
OVERALL FUNCTION					
Frequency Range		1700		2400	MHz
Gain	Freq = 1960 MHz		20.5		dB
	vs. Frequency 1930 MHz to 1990 MHz		±0.25		dB
	vs. Temperature, -40 °C to +85 °C		±1.25		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.1		dB
	Freq = 2140 MHz		19		dB
	vs. Frequency 2110 MHz to 2170 MHz		±0.25		dB
	vs. Temperature, -40 °C to +85 °C		±1.5		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.1		dB
P1dB	Freq = 1960 MHz		28		dBm
	Vs. Freq, 1930 MHz to 1990 MHz		±0.1		dBm
	vs. Temperature, -40 °C to +85 °C		±1		dBm
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±1		dB
	Freq = 2140 MHz		28		dB
	vs. Freq = 2110 MHz to 2170 MHz		±0.25		dB
	vs. Temperature, -40 °C to +85 °C		±1		dBm
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±1		dBm
Noise Figure	Freq = 1930 MHz to 1990 MHz		4.4		dB
	Freq = 2110 MHz to 2170 MHz		4.6		
Input Return Loss	Freq = 1930 MHz to 1990 MHz		-18		dB
	Freq = 2110 MHz to 2170 MHz		-18		
Output Return Loss	Freq = 1930 MHz to 1990 MHz		-13		dB
	Freq = 2110 MHz to 2170 MHz		-20		dB
OIP3	Carrier Spacing = 1 MHz, ,Pout = +5 dBm per carrier				
	Freq = 1960 MHz		42.5		dBm
	vs. Frequency 1930 MHz to 1990 MHz		±0.5		
	vs. Temperature, -40 °C to +85 °C		-1		dB
	vs. Voltage, 4.75 V to 5.25 V		±1		dB
	Freq = 2140 MHz		43.5		dBm
	vs. Frequency 2110 MHz to 2170 MHz		±0.5		dB
	vs. Temperature, -40 °C to +85 °C		-1		dB
	vs. Voltage, 4.75 V to 5.25 V		±2		dB
Supply Voltage	Operating range 5VDC +/- 10%	4.75	5	5.25	V
Supply Current	Pout = +5 dBm		320		mA
Operating Temperature		-40		+85	°C

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage, VPOS	5 V
Input Power (re: 50 Ω)	18 dBm
Equivalent Voltage	1.8V rms
θ_{JC} (Paddle Soldered)	28.5°C/W
Maximum Junction Temperature	150°C
Operating Temperature Range	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature Range (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. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

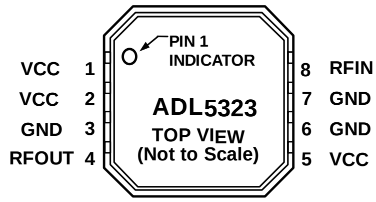

Figure 3. Pin Configuration

Table 3. Pin Function Descriptions

Pin No.	Mnemonic	Description
1,2,5	VCC	**Positive 5 V Supply Voltage:** Bypass these three pins with independent power supply decoupling networks (100 pF, 10 nF, and 10 µF).
3,6,7	GND	**Device Ground**
4	RFOUT	**RF Output:** Internally dc blocked and matched to 50 Ω.
8	RFIN	**RF Input**: Internally dc blocked and matched to 50 Ω.
	EP	**Exposed Paddle**: Connect to ground plane via a low impedance path

TYPICAL PERFORMANCE CHARACTERISTICS

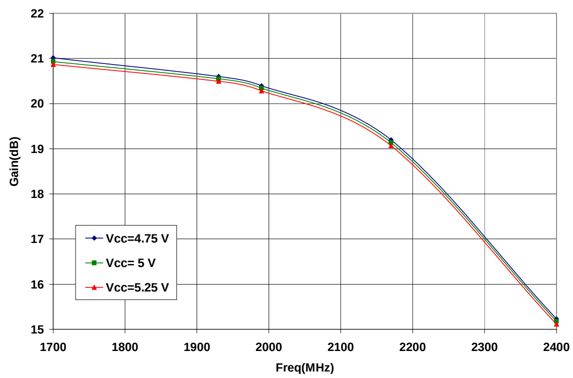

Figure 4. Gain vs. Frequency, Vcc = 4.75 V, 5 V, and 5.25 V, T_A = 25°C

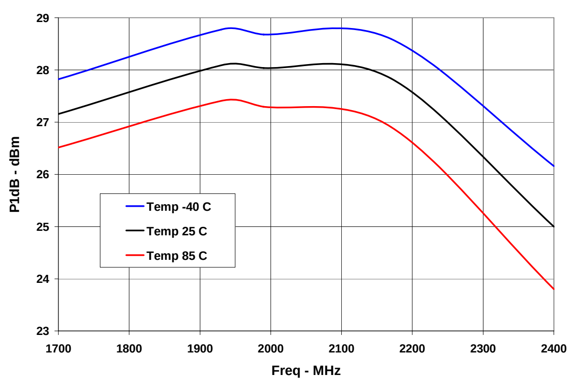

Figure 5. $P_{1\,dB}$ vs. Frequency and Temperature, Vcc = 5 V, T_A = −40°C, +25°C, and +85°C

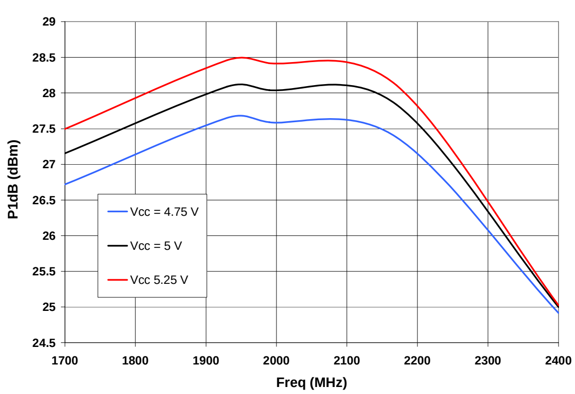

Figure 6. $P_{1\,dB}$ vs. Frequency and Supply, Vcc = 4.75 V, 5 V, and 5.25 V, T_A = 25°C

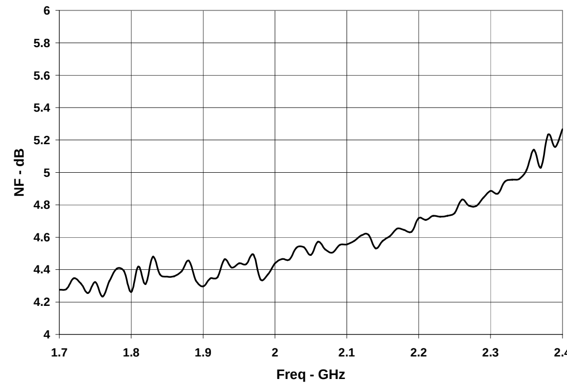

Figure 7. Noise Figure vs. Frequency, Vcc = 5 V, T_A = 25°C

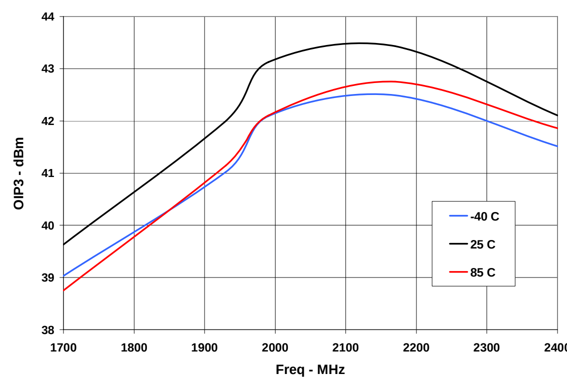

Figure 8. *OIP3 vs. Frequency and Temperature, Vcc = 5 V, TA = -40°C, +25°C & +85°C*

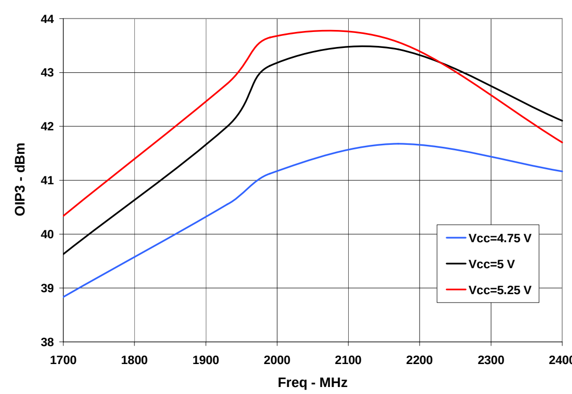

Figure 9. OIP3 vs. Frequency and Supply , Vcc = 4. 75 V, 5 V & 5.25 V, T_A = 25°C

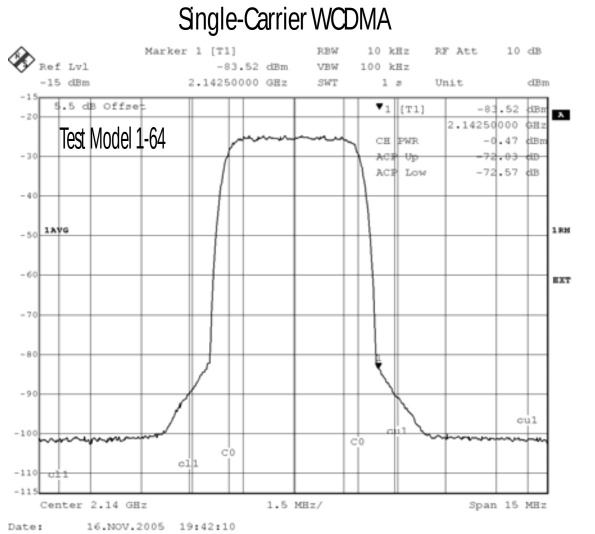

Figure 10. ACPR WCDMA Single Carrier Spectral Plot, Test Model 1-64, 2140 MHz without noise floor correction

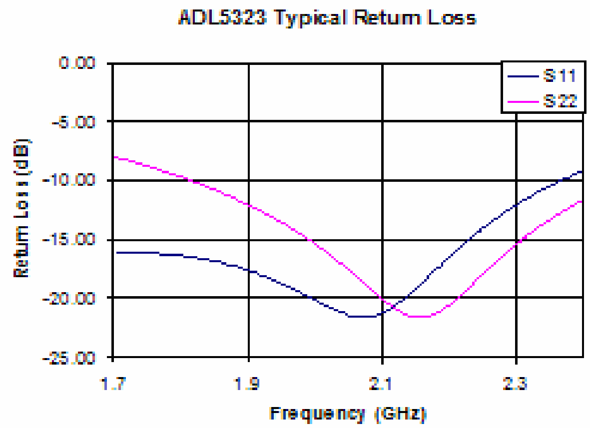

Figure 12. Input and Output Return Loss

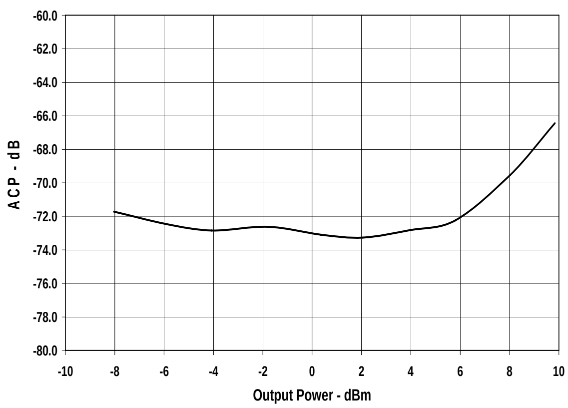

Figure 11. Adjacent Channel Power Ratio vs. Pout @ 2140 MHz, Single Carrier WCDMA, Test Model 1-64.

EVALUATION BOARD

Figure 3. shows the schematic of the ADL5323 evaluation board. The board is powered by a single supply in the 4.75 V to 5.25 V range. The power supply is decoupled by a 10 µF and a 100 pF capacitors. See table 4 for evaluation board component values. Note that all three Vcc pins (pins 1,2,5) should be independently bypassed as shown above for proper operation.

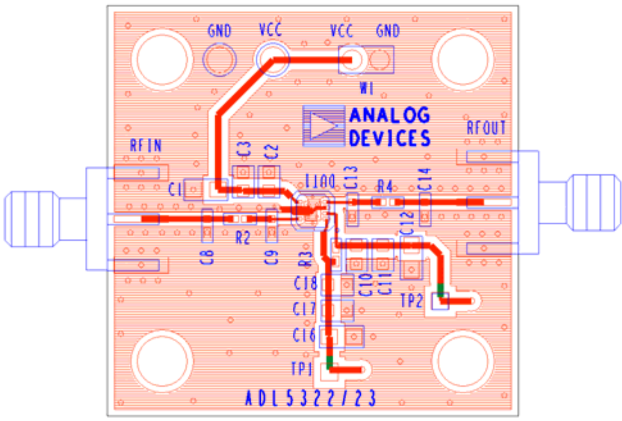

Figure 13. Evaluation board component side view

Table 4. Evaluation board components

Component	Function	Default Value
C3, C12, C16	Low frequency bypass capacitors	10 µF, 0402
C2, C11, C17	Low frequency bypass capacitors	10 nF, 0402
C1, C10, C18	High frequency bypass capacitors	100 pF, 0402
C8, C13, C14	Open	Open , 0402
R2, R4	AC coupling capacitors (can also use 0 Ω resistors since the device has internal ac-coupling caps)	100 pF, 0402

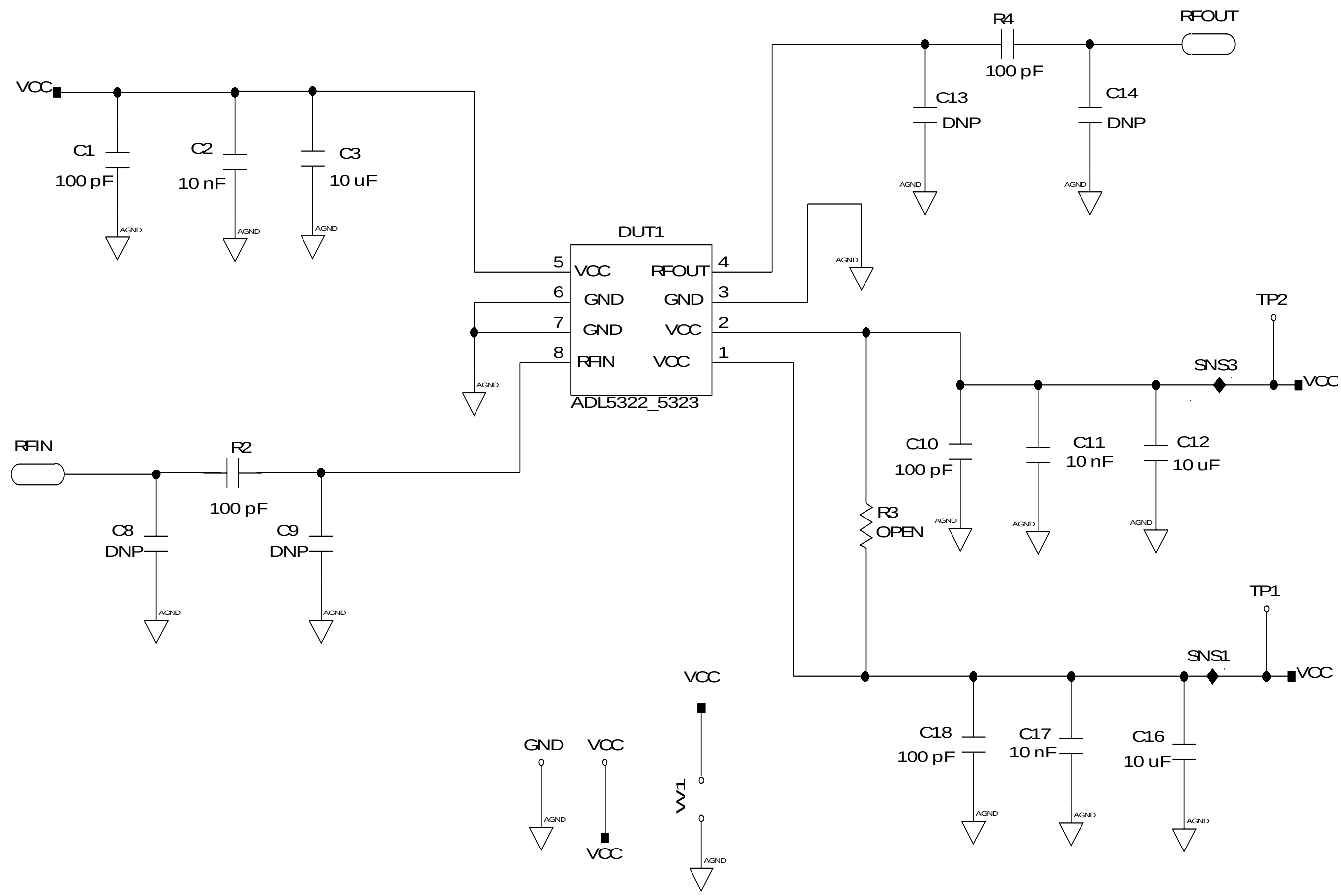

Figure 12. Evaluation Board Schematic

OUTLINE DIMENSIONS

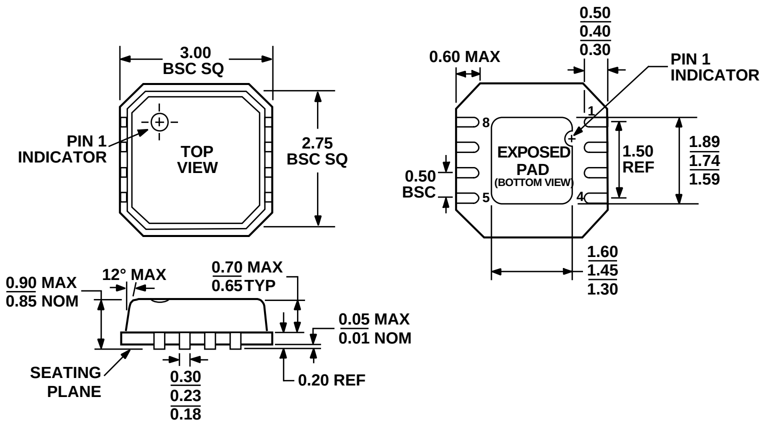

Figure 15. 8-Lead Lead Frame Chip Scale Package
Dimensions shown in millimeters

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
ADL5323ACPZ-R7	–40°C to +85°C	8-Lead LFCSP_VD, 7" Tape and Reel	CP-8-2
ADL5323ACPZ-WP		8-Lead LFCSP_VD, Waffle Pack	CP-8-2
ADL5323-EVAL		Evaluation Board	

PR06058-0-5/06 (PrC)