700 MHz to 1000 MHz GaAs Matched RF PA Pre-Driver

Preliminary Technical Data

ADL5322

FEATURES

Internally matched input and output of 50 ohms
High Third Order Output Intercept of +43 dBm
Typical P1dB of 27 dBm
Internally biased
DC blocked with AC coupling
3X3 LFCSP Package
Typical fixed gain of 20 dB
Operational frequency of 700 MHz to 1 GHz
Temperature and power supply stable
Noise Figure: 5 dB
Power supply: 5 V

APPLICATIONS

Multi carrier and digital wireless base station infrastructure
CDMA and CDMA2000 base stations
BTS equipment such as High Power Amplifiers (HPA's) and pre-drivers.

GENERAL DESCRIPTION

The ADL5322 is a high linearity GaAs driver amplifier that is internally matched to 50 Ohms for operation in the 700 MHz to 1000 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 capacitors are all on-chip. The ADL5322 is available in a Pb-free 3mm x 3 mm 8-pin Chip scale package with an operating temperature from -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM

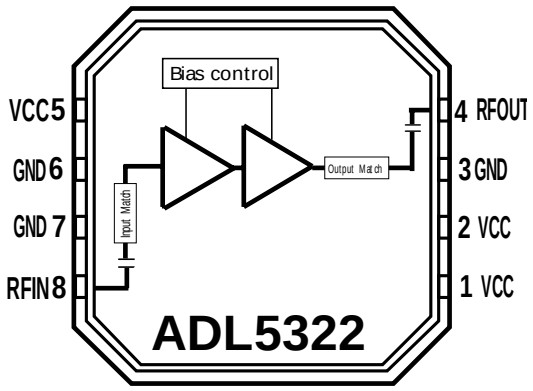

Figure 1.

Rev. PrC 5/1/06

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SPECIFICATIONS

Table 1. V_{CC} = 5 V, T_A = 25°C

Parameter	Conditions	Min	Typ	Max	Unit
Frequency Range		700		1000	MHz
Gain	Freq = 850 MHz		20.3		dB
	vs. Frequency 832 MHz to 870 MHz		±0.125		dB
	vs. Temperature, -40 °C to +85 °C		±1		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.1		dB
	Freq = 880 MHz		20.2		dB
	vs. Frequency 869 MHz to 894 MHz		±0.125		dB
	vs. Temperature, -40 °C to +85 °C		±1		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.1		dB
	Freq = 940 MHz		19.8		dB
	vs. Frequency 925 MHz to 960 MHz		±0.125		dB
	vs. Temperature, -40 °C to +85 °C		±1.2		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.1		dB
P1dB	Freq = 850 MHz		27.8		dBm
	vs. Frequency 832 MHz to 870 MHz		±0.1		dB
	vs. Temperature, -40 °C to +85 °C		±1		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.5		dB
	Freq = 880 MHz		28		dBm
	vs. Frequency 869 MHz to 894 MHz		±0.1		dB
	vs. Temperature, -40 °C to +85 °C		±1		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.5		dB
	Freq = 940 MHz		27.8		dBm
	vs. Frequency 925 MHz to 960 MHz		±0.2		dB
	vs. Temperature, -40 °C to +85 °C		±1		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.5		dB
Noise Figure	Freq = 830 MHz to 960 MHz		5		dB
Input Return Loss	Freq = 830 MHz to 960 MHz		-10		dB
Output Return Loss	Freq = 830 MHz to 960 MHz		-10		dB
OIP3	Freq = 850 MHz		43		dBm
	vs. Frequency 832 MHz to 870 MHz		±0.2		dB
	vs. Temperature, -40 °C to +85 °C		±0.6		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.5		dB
	Freq = 880 MHz		43.4		dBm
	vs. Frequency 869 MHz to 894 MHz		±0.2		dB
	vs. Temperature, -40 °C to +85 °C		±0.6		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±0.5		dB
	Freq = 940 MHz		43.4		dBm
	vs. Frequency 925 MHz to 960 MHz		±0.2		dB
	vs. Temperature, -40 °C to +85 °C		±0.6		dB
	vs. Voltage 5V, @ 5% (4.75V – 5.25V)		±1		dB
Power Supply					
Supply Voltage		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	1.8 V rms
θ_{JC} (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.

TYPICAL PERFORMANCE CHARACTERISTICS

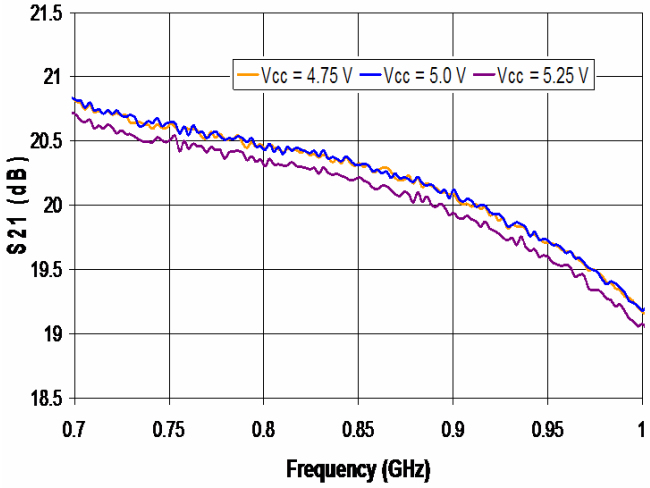

Figure 2. Gain vs. Frequency and Supply, V_S = 4.75 V, 5 V, and 5.25 V, T_A = 25°C

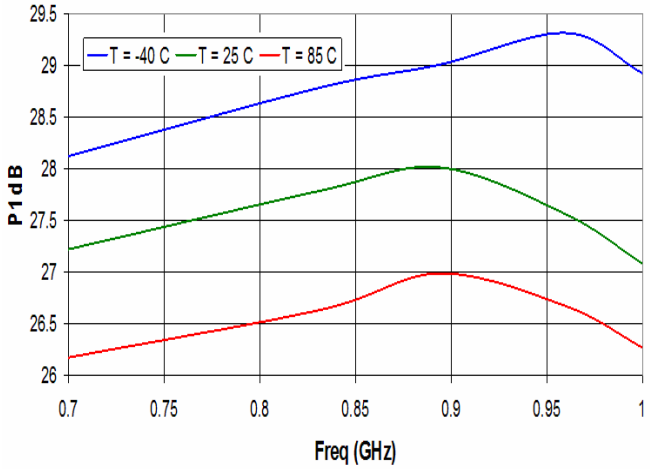

Figure 3. $P_{1\,dB}$ vs. Frequency and Temperature, V_S = 5 V, T_A = −40°C, +25°C, and +85°C

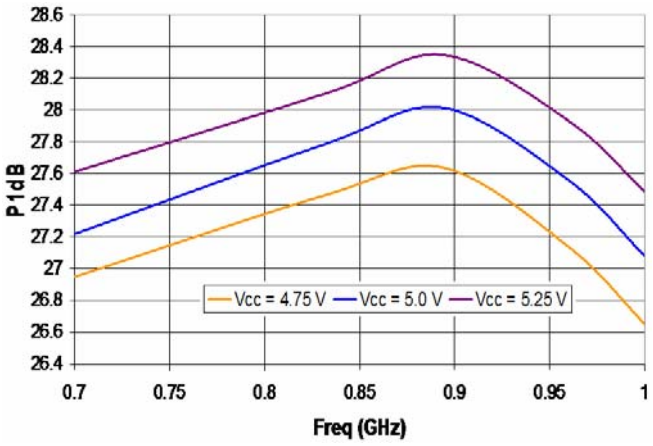

Figure 4. O $P_{1\,dB}$ vs. Frequency and Supply, V_S = 4.75 V, 5 V, and 5.25 V, T_A = 25°C

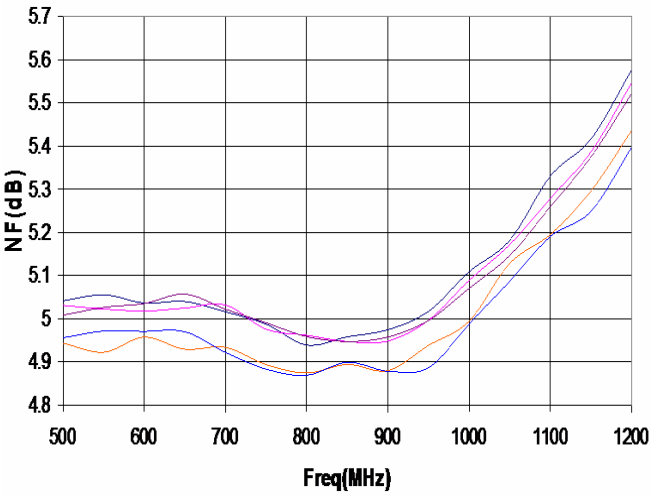

Figure 5. Noise Figure vs. Frequency, Multiple Devices, V_s = 5 V, T_A = 25°C

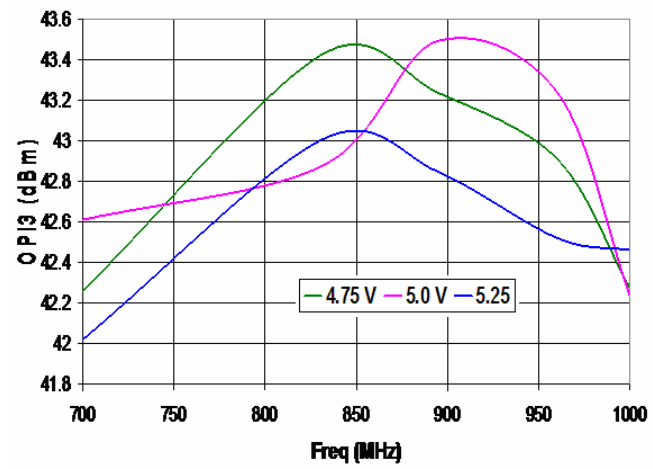

Figure 6. OIP3 vs. Frequency and Supply, V_S = 4.75 V, 5 V, and 5.25 V, T_A = 25°C, Pout = +5 dBm per tone

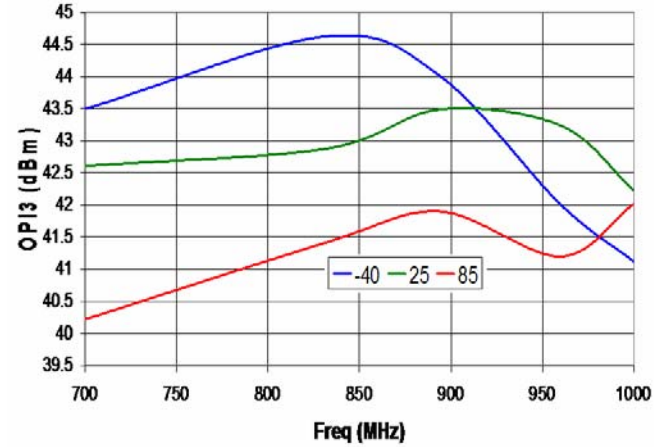

Figure 7. OIP3 vs. Frequency and Temperature, Vs = 5 V, T_A = -40°C, +25°C, and +85°C

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

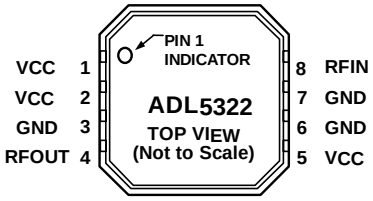

Figure 3. Pin Configuration

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

EVALUATION BOARD

Figure 8. shows the schematic of the ADL5322 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.

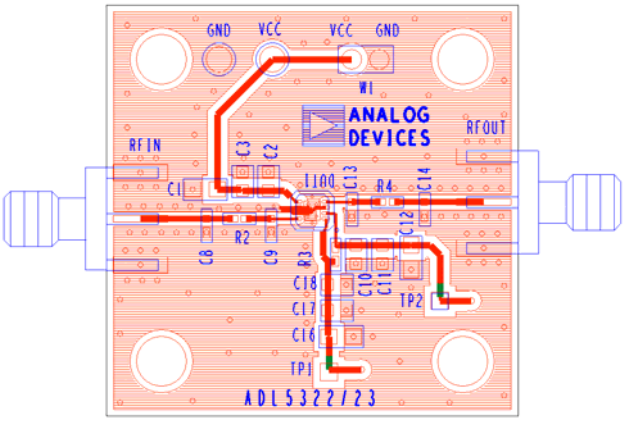

Figure 13. Evaluation board component side view

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

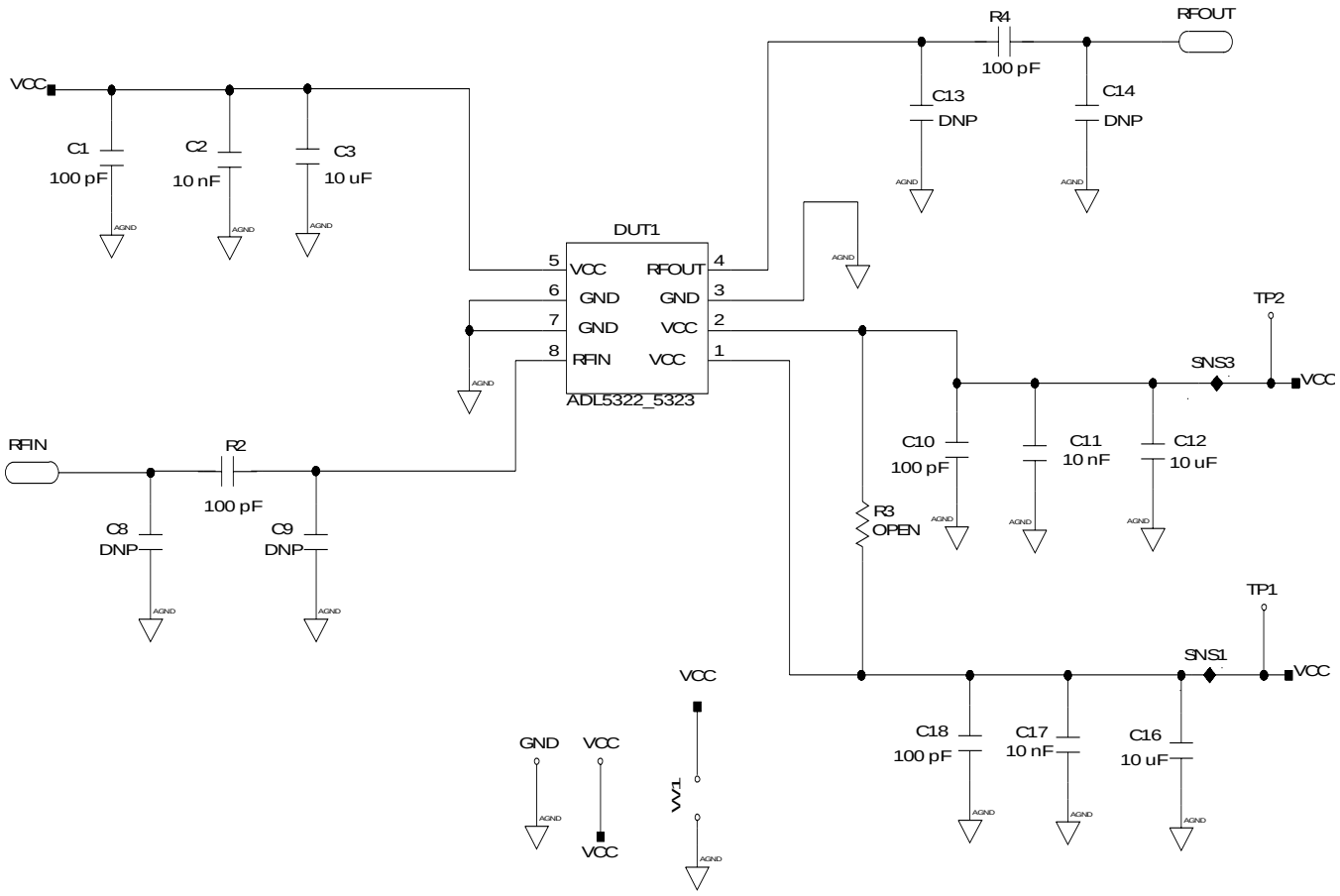

Figure 12. Evaluation Board Schematic

OUTLINE DIMENSIONS

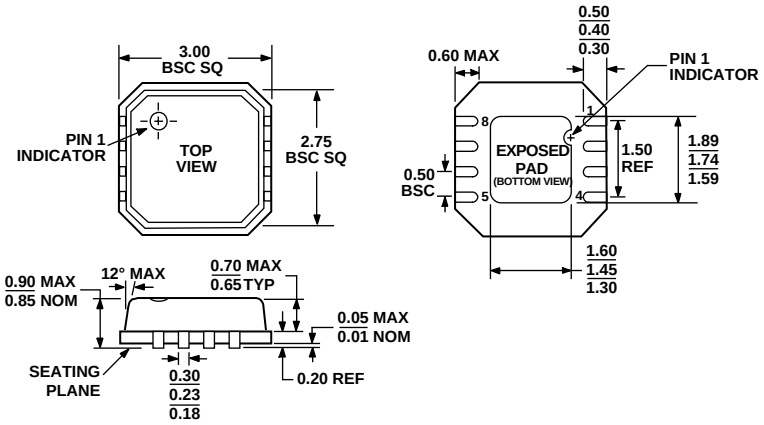

Figure 15. 8-Lead Lead Frame Chip Scale Package
Dimensions shown in millimeters

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
ADL5322ACPZ-R7	−40°C to +85°C	8-Lead LFCSP_VD, 7" Tape and Reel	CP-8-2
ADL5322ACPZ-WP		8-Lead LFCSP_VD, Waffle Pack	CP-8-2
ADL5322-EVAL		Evaluation Board	

PR06057-0-5/06(PrC)