30 MHz to 6 GHz RF/IF Gain Block

Preliminary Technical Data

ADL5610

FEATURES

Fixed gain of 18.4 dB
Broad operation from 30 MHz to 6 GHz
High dynamic range gain block
Input/output internally matched to 50 Ω
Integrated bias control circuit
OIP3 of 38.4 dBm at 900 MHz
P1dB of 20.6 dBm at 900 MHz
Noise figure of 2.1 dB at 900 MHz
Single 5V power supply
Low quiescent current of 90 mA
Wide operating temperature range of -40°C to 105°C
Thermally efficient SOT-89 package
ESD rating of ±1.5 kV (Class 1C)

FUNCTIONAL BLOCK DIAGRAM

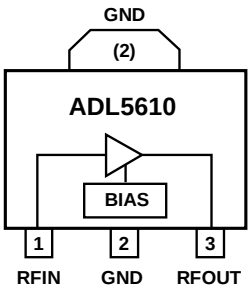

Figure 1. Functional Block Diagram

GENERAL DESCRIPTION

The ADL5610 is a single ended RF/IF gain block amplifier that provides broadband operation from 30 MHz to 6 GHz. The ADL5610 provides a low noise figure of 2 dB with a very high OIP3 of over 38 dBm simultaneously, which delivers a high dynamic range.

The ADL5610 provides a gain of 18 dB, which is stable over frequency, temperature, power supply, and from device to device. The amplifier is offered in the industry standard SOT-89 package, and internally matched to 50 Ω at the input and output, making the ADL5610 very easy to implement in a wide variety of applications. The only external parts required are the input/output ac coupling capacitors, power supply decoupling capacitors, and bias inductor.

The ADL5610 has a high ESD rating of ±1.5 kV (Class 1C), and is also fully specified for operation across the wide temperature range of −40°C to +105°C.

A fully populated RoHS-compliant evaluation board is available.

Rev. PrA

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SPECIFICATIONS

V_{POS} = 5 V and T_A = 25°C, unless otherwise noted.

Table 1.

Parameter	Conditions	Min	Typ	Max	Unit
OVERALL FUNCTION					
Frequency Range		30		6000	MHz
FREQUENCY = 900 MHz					
Gain			18.4		dB
Output 1 dB Compression Point			20.6		dBm
Output Third-Order Intercept	Δf = 1 MHz, output power (P_{OUT}) = 3 dBm per tone		38.4		dBm
Noise Figure			2.1		dB
FREQUENCY = 1900 MHz					
Gain			17.9		dB
Output 1 dB Compression Point			20.0		dBm
Output Third-Order Intercept	Δf = 1 MHz, output power (P_{OUT}) = 3 dBm per tone		38.1		dBm
Noise Figure			2.6		dB
POWER INTERFACE	V_{POS}				
Supply Voltage		4.75	5	5.25	V
Supply Current			90.1		mA
vs. Temperature	-40˚C≤T_A≤+85˚C		-7/+12		mA
Power Dissipation	V_{POS} = 5V		0.45		W

ABSOLUTE MAXIMUM RATINGS

Table 2.

Parameter	Rating
Supply Voltage, V_{POS}	TBD V
Input Power (50 Ω Impedance)	TBD dBm
Internal Power Dissipation (Paddle Soldered)	TBD W
Maximum Junction Temperature	150°C
Operating Temperature Range	−40°C to +105°C
Storage Temperature Range	−65°C to +150°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.

THERMAL RESISTANCE

Table 3 lists the junction-to-air thermal resistance (θ_{JA}) and the junction-to-paddle thermal resistance (θ_{JC}) for the ADL5610.

Table 3. Thermal Resistance

Package Type	θ_{JA}[1]	θ_{JC}[2]	Unit
3-Lead SOT-89	TBD	TBD	°C/W

[1]Measured on Analog Devices evaluation board. For more information about board layout, see Soldering Information and Recommended PCB Land Pattern section.
[2]Based on simulation with JEDEC standard JESD51.

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

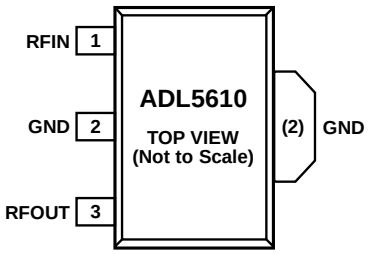


Figure 2.Pin Configuration

Table 4. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	RFIN	RF Input. This pin requires a dc blocking capacitor.
2	GND	Ground. Connect this pin to a low impedance ground plane.
3	RFOUT	RF Output and Supply Voltage. DC bias is provided to this pin through an inductor that is connected to the external power supply. RF path requires a dc blocking capacitor.
Exposed Paddle		Exposed Paddle. Internally connected to GND. Solder to a low impedance ground plane.

TYPICAL PERFORMANCE CHARACTERISTICS

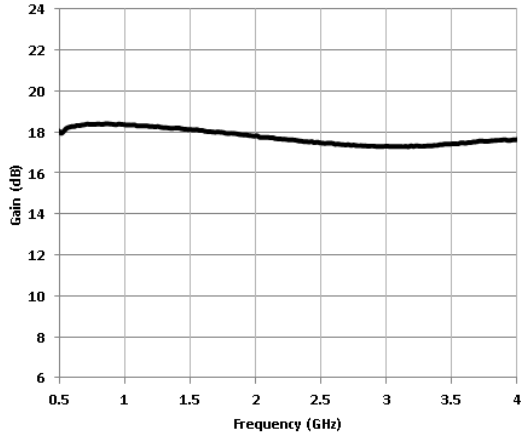


Figure 3. Gain vs. Frequency, 0.5-4.0GHz

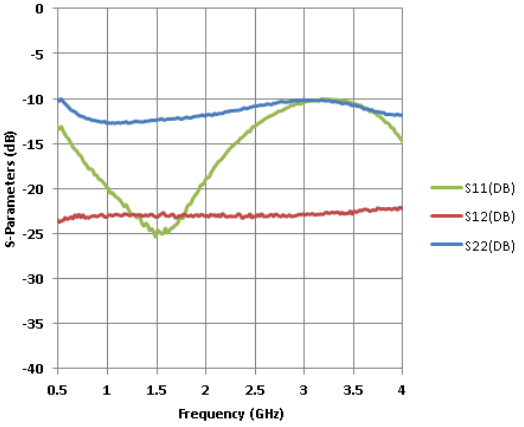


Figure 6. Input Return Loss (S11), Output Return Loss (S22), and Reverse Isolation (S12) vs. Frequency, 0.5-4.0GHz

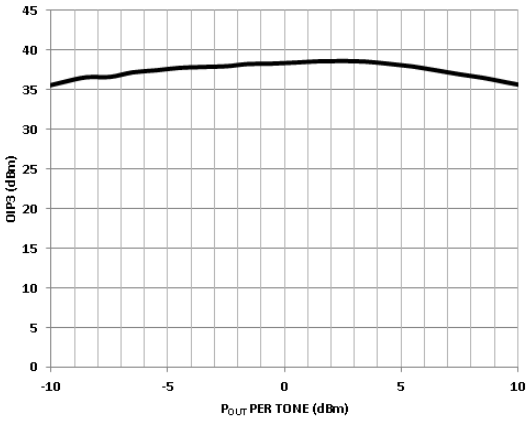


Figure 4. OIP3 vs. P_{OUT}, 900MHz

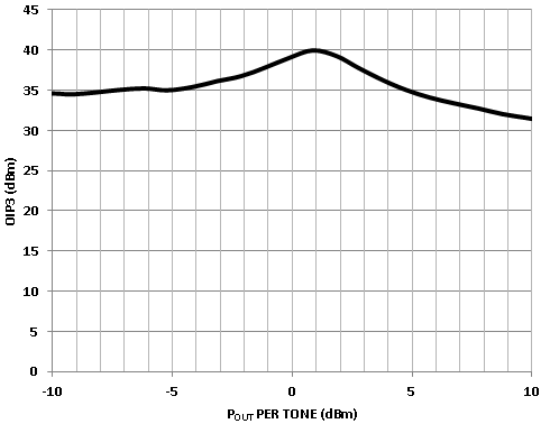


Figure 7. OIP3 vs. P_{OUT}, 1900MHz

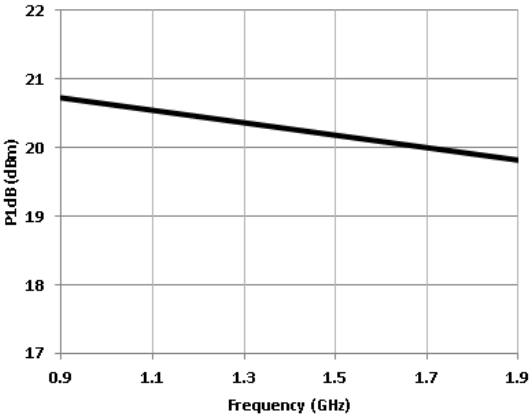


Figure 5. P1dB vs. Frequency, 0.9-1.9GHz

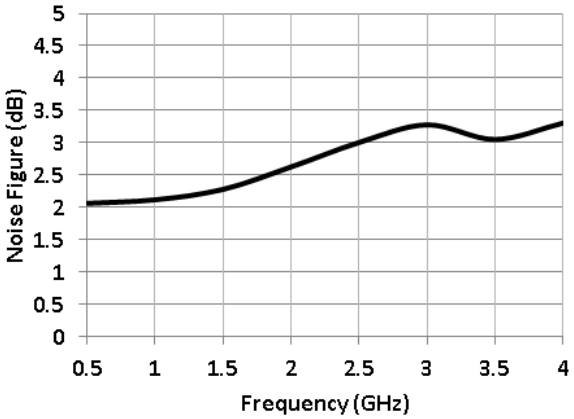


Figure 8. Noise Figure vs. Frequency, 0.5-4.0GHz

EVALUATION BOARD

Figure 9 shows the schematic for the ADL5610 evaluation board. The board is powered by a single 5 V supply. The components used on the board are listed in Table 5. Power can be applied to the board through clip-on leads (V_{POS}, GND).

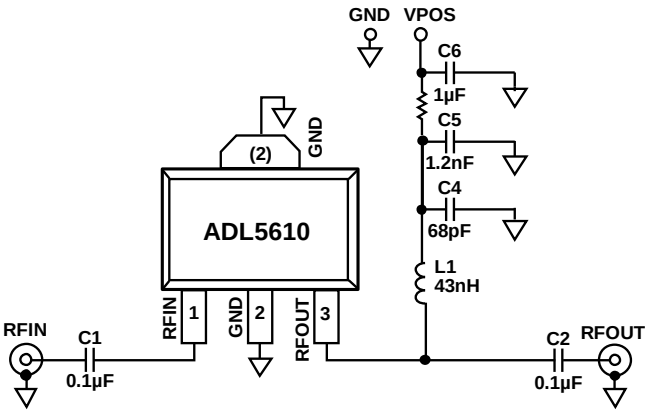


Figure 9. Evaluation Board Schematic

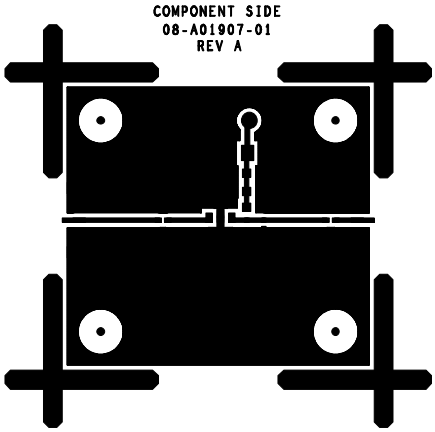
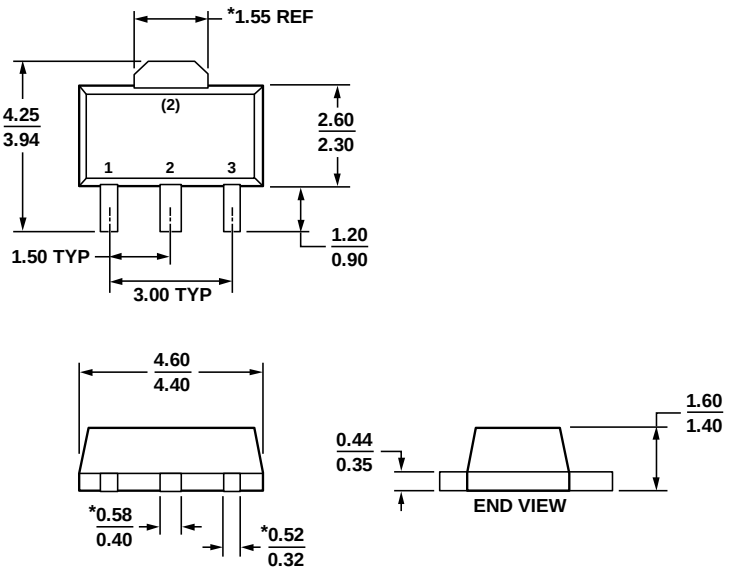


Figure 10. Evaluation Board Layout (Top)

Table 5. Evaluation Board Configuration Options

Component	Function	Default Value
C1, C2	AC-coupling capacitors.	0.1 µF 0402
L1	DC bias inductor.	43 nH 0603 (Coilcraft 0603HP or equivalent)
V_{POS}, GND	Clip-on terminals for power supply.	
C4, C5, C6	Power supply decoupling capacitors	C4 = 68 pF, 0603, C5 = 1.2 nF, 0603, C6 = 1 µF, 1206

OUTLINE DIMENSIONS



*COMPLIANT TO JEDEC STANDARDS TO-243 WITH EXCEPTION TO DIMENSIONS INDICATED BY AN ASTERISK.

Figure 11. 3 Lead Small Outline Transistor Package {SOT-89} (RK-3)
Dimensions shown in Millimeters

ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
ADL5610ARKZ-R7[1]	–40°C to +105°C	3-Lead SOT-89, 7" Tape and Reel	RK-3
ADL5610-EVALZ[1]	–40°C to +105°C	Evaluation Board	

[1] Z = RoHS Compliant Part.

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