



# SKYWORKS®

## ACA2461 1218 MHz CATV CATV Push-Pull Driver Amplifier PRELIMINARY DATA SHEET

### FEATURES

- 40 to 1218 MHz Frequency Range
- $\geq +45$  dBmV/channel Output Power
- 25 dB Gain at 1218 MHz
- Single +24 V Supply
- Operating Current = 290 mA
- Surface Mount Package Compatible with Automatic Assembly and excellent reliability
- Halogen Free/RoHS Compliant

### APPLICATIONS

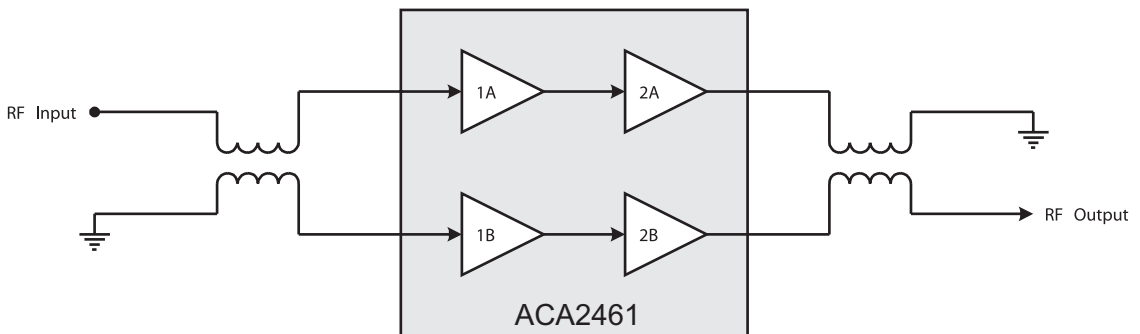
- DOCSIS® and Euro DOCSIS® 3.1 (D3.1) Compliant Downstream (DS)
- RF Pre-Amplifier for Node + 0 HFC and FTTC/FTTB Networks
- Final Stage Amplifier in FTTC Applications

### PRODUCT DESCRIPTION

The ACA2461 is a highly linear low noise high gain RF pre-amplifier module in the industry standard SOIC-16 SMT package. Designed to drive D3.1 compliant power doublers in Deep Fiber Node CATV infrastructure applications, the module consists of two parallel amplifiers in cascade forming a push-pull



optimized for low noise, low distortion, high output power per channel, and high TCP. Advanced GaAs optimizes operating current making the module an excellent choice for environmentally friendly “GREEN” applications.



**Figure 1: Block Diagram**

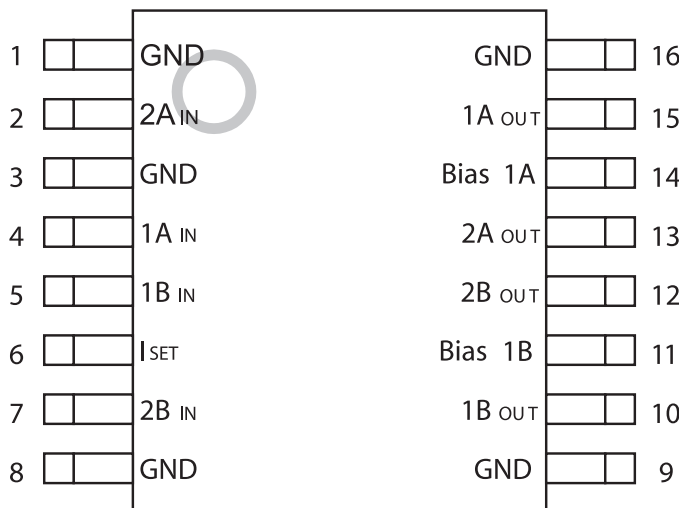


Figure 2: Pin Out

Table 1: Pin Description

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
1	GND	Ground	9	GND	Ground
2	2A <sub>IN</sub>	Amplifier 2A Input	10	1B <sub>OUT</sub>	Amplifier 1B Output
3	GND	Ground	11	Bias 1B	Bias for 1B Amplifier
4	1A <sub>IN</sub>	Amplifier 1A Input	12	2B <sub>OUT</sub>	Amplifier 2B Output and Supply
5	1B <sub>IN</sub>	Amplifier 1B Input	13	2A <sub>OUT</sub>	Amplifier 2A Output and Supply
6	I <sub>SET</sub>	Current Adjust	14	Bias 1A	Bias for 1A Amplifier
7	2B <sub>IN</sub>	Amplifier 2B Input	15	1A <sub>OUT</sub>	Amplifier 1A Output
8	GND	Ground	16	GND	Ground

## ELECTRICAL CHARACTERISTICS

Table 2: Absolute Mimimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply (pins 12, 13)	0	+28	VDC
Current Adjust (pin 6)	0	+4	VDC
RF Power at Inputs (pins 4, 5)	-	+75	dBmV
Storage Temperature	-65	+150	°C
Soldering Temperature	-	+260	°C
Soldering Time	-	5.0	Sec

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Notes:

- (1) Pins 2, 4, 5 and 7 should be AC-coupled. No external DC bias should be applied.
- (2) Pin 6 should be AC-grounded and/or pulled to ground through a resistor for current control.
- (3) Pins 10, 11, 14 and 15 should have no other external bias applied.

Table 3: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT
RF Frequency	40	-	1200	MHz
Supply Voltage (V <sub>DD</sub> )	-	+24	-	VDC
Case Temperature	-40	-	+110	°C

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical specifications.

**Table 4: Electrical Characteristics (See Notes 1, 3, & 4)**  
**(T<sub>A</sub> = +25 °C, V<sub>DD</sub> = +24 VDC, f = 50 to 1218 MHz, 75 Ω system)**

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Gain (1218 MHz)	25.9	26.7	27.5	dB	f = 1218 MHz, See Note 3
Cable Equivalent Slope	1.6	2.2	2.8	dB	See Note 3
Gain Flatness to 1218 MHz	-	± 0.2	-	dB	See Notes 2 & 3
Noise Figure (NF)	-	5	-	dB	
Composite Triple Beat (CTB)	-	-68	-65	dBc	See Note 1
Composite Second Order (CSO)	-	-67	-63	dBc	See Note 1
Cross Modulation (XMOD)	-	-60	-	dBc	See Note 1
Composite Intermodulation Noise (CIN)	-	-65	-63	dBc	See Note 1
Modulation Error Ratio (MER)	-	TBD	-	dB	See Note 4
Total Composite Power (TCP)	-	65.4	-	dBmV	See Notes 5 & 6
Input Return Loss (IRL)	-	-20	-18	dB	See Note 3
Output Return Loss (ORL)	-	-20	-18	dB	See Note 3
Supply Current		290	320	mA	

Notes: All specifications as measured on evaluation assembly.

(1) Measured with 79 NTSC analog channels plus digital SC-256-QAM channels to 1000 MHz, +47 dBmV output power and 0.0 dB tilt.

(2) Peak deviation from a straight line between gain value at 50 MHz and 1218 MHz.

(3) Measured in application circuit.

(4) MER measured @ +65.4 dBmV TCP referenced to 1218-MHz, 111 to 1218 MHz, 256-SC-QAM, 10-dB Tilt.

(5) Measured at 1218-MHz using All-Digital SC-256-QAM from 111 to 1218-MHz, 10-dB Tilt.

(6) Measured at 1218-MHz using analog NTSC from 54-550 MHz plus SC-256-QAM from 550 to 1218-MHz @-6dB below analog, 0-dB Tilt.

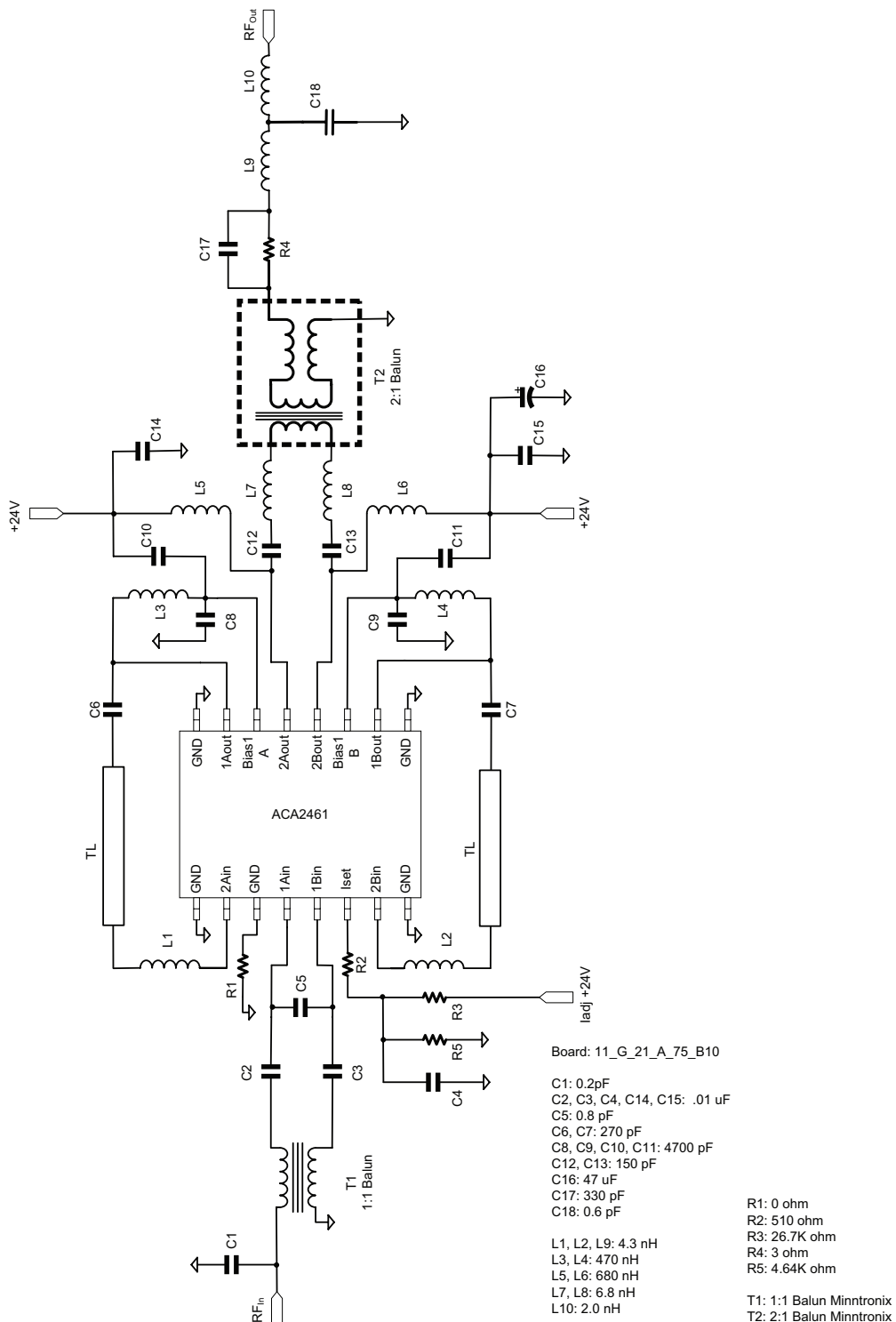
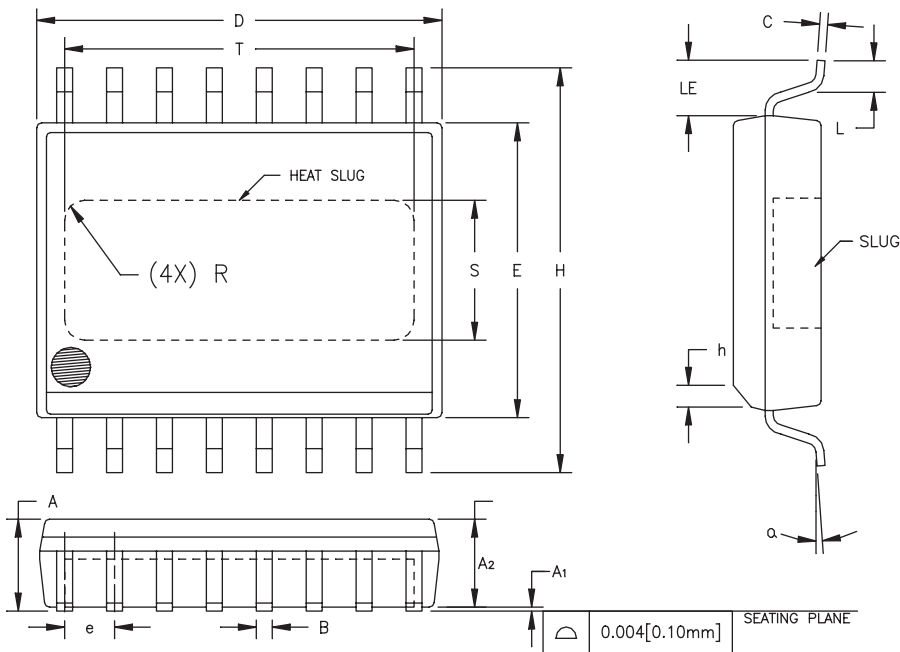


Figure 3: Application Schematic

Table 5: Bill of Materials

ITEM #	QTY	REFERENCE	DESCRIPTION	VALUE
1	1	C1	0402 capacitor	0.2pF
2	5	C2, C3, C4, C14, C15	0402 capacitor	0.01uF
3	1	C5	0402 capacitor	0.8 pF
4	2	C6, C7	0402 capacitor	270 pF
5	4	C8, C9, C10, C11	0402 capacitor	4700 pF
6	2	C12, C13	0402 capacitor	150 pF
7	1	C16	Electrolytic cap.	47 uF
8	1	C17	0402 capacitor	150 pF
9	1	C18	0402 capacitor	0.6 pF
10	3	L1, L2, L9	0402 chip inductor	4.3 nH
11	2	L3, L4	Murata 0805 IND	470 nH
12	2	L5, L6	Allied 0603 IND	680 nH
13	2	L7, L8	0402 chip inductor	6.8 nH
14	1	L10	0402 chip inductor	2.0 nH
15	1	R1	0402 resistor	0 ohm
16	1	R2	0402 resistor	510 ohm
17	1	R3	0402 resistor	26.7K ohm
18	1	R4	0402 resistor	3 ohm
19	1	R5	0402 resistor	4.64K ohm
20	1	T1	1:1 Balun Minntronix	MRF-25001
21	1	T2	2:1 Balun Minntronix	MRF-27001

PACKAGE OUTLINE



SYMBOL	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	0.087	0.098	2.21	2.49	
A <sub>1</sub>	0.000	0.004	0.00	0.10	6
A <sub>2</sub>	0.087	0.094	2.21	2.39	
B	0.013	0.019	0.33	0.48	
C	0.007	0.009	0.18	0.23	
D	0.398	0.412	10.11	10.46	2
E	0.290	0.300	7.37	7.62	3
e	0.050	BSC	1.27	BSC	4
H	0.394	0.418	10.01	10.62	
h	0.010	0.028	0.25	0.71	
L	0.024	0.040	0.61	1.02	
LE	0.052	—	1.32	—	
a	0°	8°	0°	8°	
S	0.120	0.140	3.05	3.56	5
T	0.330	0.350	8.38	8.89	5
R	REF.	0.015	REF.	0.38	5

NOTES:

1. CONTROLLING DIMENSION: INCHES
2. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.006 [0.15mm] PER SIDE.
3. DIMENSION "E" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 0.010 [0.25mm] PER SIDE.
4. MAXIMUM LEAD TWIST/SKEW TO BE ±0.005 [0.13mm].
5. DIMENSIONS "S", "T" AND "R" INDICATE EXPOSED SLUG AREA.
6. STANDOFF HEIGHT (A<sub>1</sub>) MEASURED FROM BOTTOM OF SLUG.

Figure 4: Package Outline - 16 Pin Wide Body SOIC with Heat Slug

## ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
ACA2461P2	-40 °C to +110 °C	RoHS Compliant 16 Pin Wide Body SOIC with Heat Slug	1,500 Piece Tape and Reel



NOTES

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