

DATA SHEET

ACA2460: 1218 MHz CATV Push-Pull Driver Amplifier

Applications

- DOCSIS® and Euro DOCSIS® 3.1 (D3.1) compliant downstream
- RF Pre-amplifier for node + 0 HFC and FTTC/FTTB networks
- Final stage amplifier in FTTC applications

Features

- 50 to 1218 MHz frequency range
- Total composite power: +67 dBmV
- Gain: 28 dB 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



Description

The ACA2460 is a highly linear low-noise, high-gain RF pre-amplifier module in the industry standard SOIC-16 wide body SMT package. Designed to drive DOCSIS3.1 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.

A block diagram of the ACA2460 is shown in Figure 1. The device package and pinout are shown in Figure 2. Signal pin assignments and functional pin descriptions are described in Table 1.



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

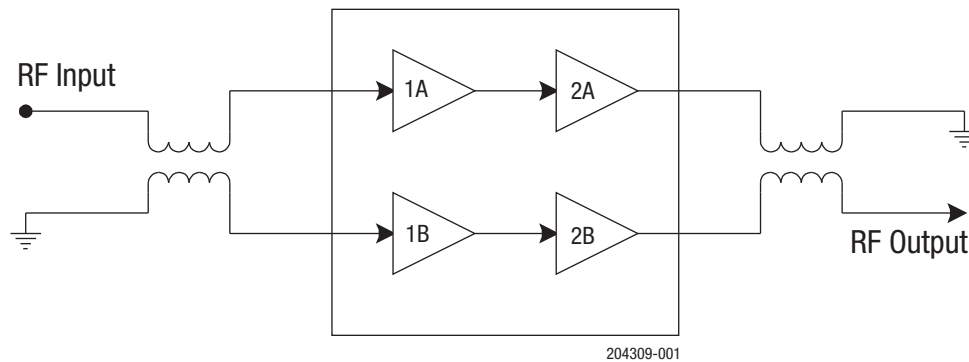
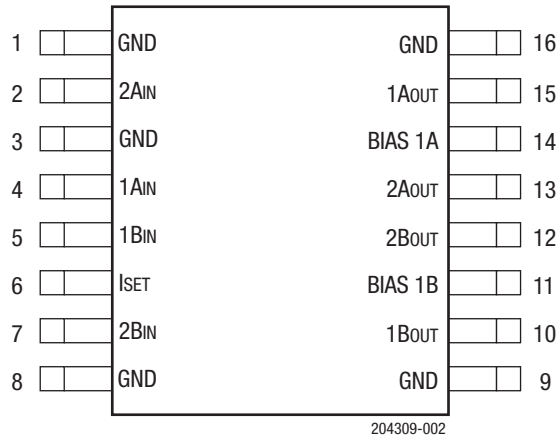


Figure 1. ACA2460 Block Diagram



**Figure 2. ACA2460 Pinout
(Top View)**

Table 1. ACA2460 Signal Pin Descriptions

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	9	GND	Ground
2	2AIN	Amplifier 2A input	10	1BOUT	Amplifier 1B output
3	GND	Ground	11	BIAS 1B	Bias for 1B amplifier
4	1AIN	Amplifier 1A input	12	2BOUT	Amplifier 2B output and supply
5	1BIN	Amplifier 1B input	13	2AOUT	Amplifier 2A output and supply
6	ISET	Current adjust	14	BIAS 1A	Bias for 1A amplifier
7	2BIN	Amplifier 2B input	15	1AOUT	Amplifier 1A output
8	GND	Ground	16	GND	Ground

Electrical and Mechanical Specifications

The absolute maximum ratings of the ACA2460 are provided in Table 2. Recommended operating conditions are specified in Table 3, and electrical specifications are provided in Table 4.

Table 2. ACA2460 Absolute Maximum Ratings¹

Parameter	Minimum	Maximum	Units
Supply (pins 12 and 13)	0	+28	VDC
Current adjust (pin 6)	0	+4	VDC
RF power at inputs (pins 4 and 5)		+75	dBmV
Storage temperature	-65	+150	°C
Soldering temperature		+260	°C
Soldering time		5.0	sec
Electrostatic discharge:			
Charged Device Model (CDM)		500	V
Human Body Model (HBM)		250	V

¹ Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

² Pins 2, 4, 5, and 7 should be AC coupled. No external DC bias should be applied.

³ Pin 6 should be AC-grounded and/or pulled to ground through a resistor for current control.

⁴ Pins 10, 11, 14, and 15 should have no other external bias applied.

ESD HANDLING: *Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

Table 3. ACA2460 Recommended Operating Conditions¹

Parameter	Symbol	Min	Typ	Max	Units
RF frequency	f	50		1218	MHz
Supply voltage	V _{DD}		+24		VDC
Case temperature	T _{CASE}	-40		+100	°C

¹ Performance is guaranteed only under the conditions listed in this table.

Table 4. ACA2460 Electrical Specifications

T_A = +25 °C, V_{DD} = +24 VDC, f = 50 to 1218 MHz, 75 Ω System, All Specifications Measured on the Evaluation Board, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Gain ³	G	1218 MHz	27	28	28.5	dB
Gain flatness to 1218 MHz ^{2,3}				± 0.2		dB
Cable equivalent slope ³				1.3		dB
Noise figure	NF			5		dB
Composite triple beat ¹	CTB			-68	-65	dBc
Composite second order ¹	CSO			-67	-63	dBc
Cross modulation ¹	XMOD			-60		dBc
Composite intermodulation noise ¹	CIN			-65	-63	dB
Input return loss ³	RL			-20	-18	dB
Output return loss: ³ 50 to 500 MHz 500 to 1218 MHz	RL			-20 -20	-18 -16	dB dB
Thermal resistance	θ _{Jc}	Junction to case slug		2.7	3.3	°C/W
Supply current				290	320	mA

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

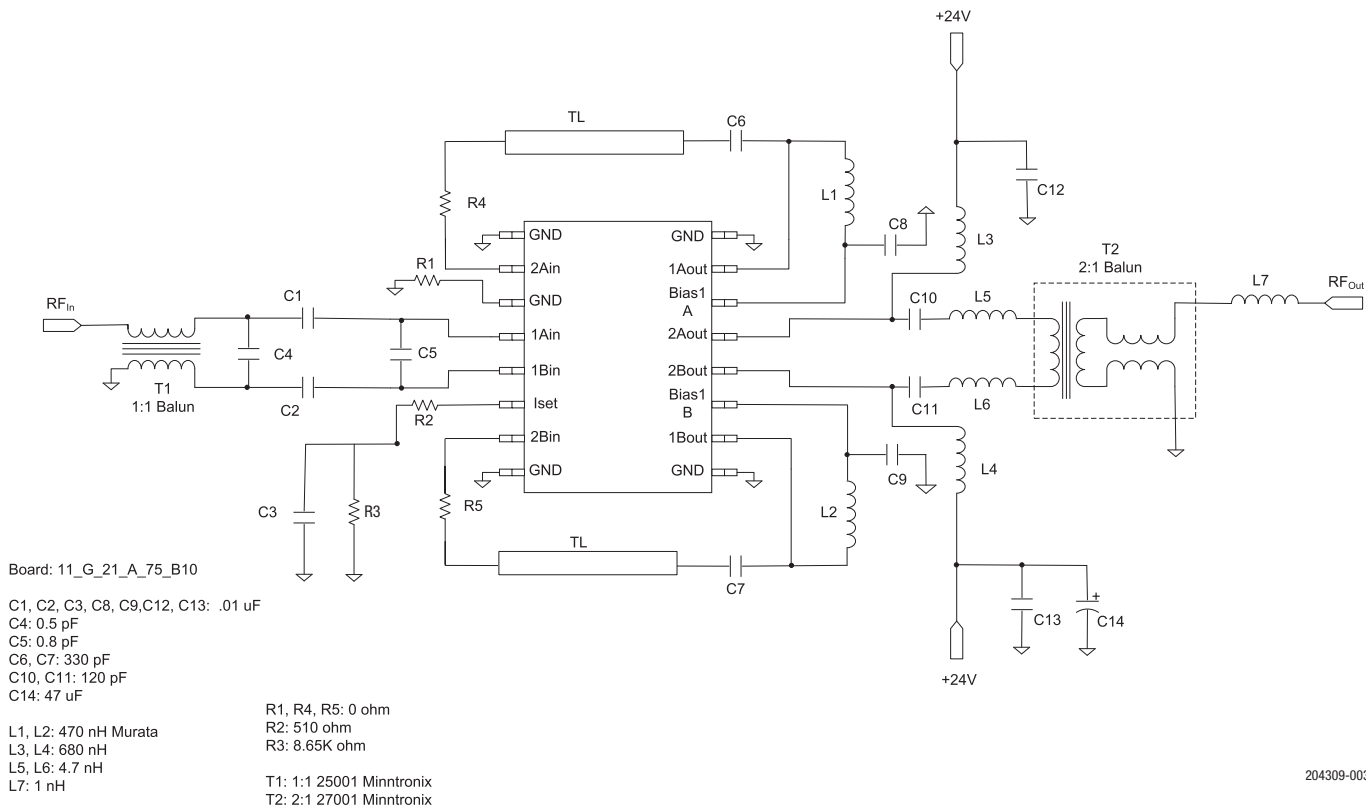
² Peak deviation from a straight line between gain value at 50 MHz and 1218 MHz.

³ Measured in application circuit in Figure 3.

Evaluation Board Description

The ACA2460 Evaluation Board is used to test the performance of the ACA2460 device. An Evaluation Board schematic is provided

in Figure 3. Table 6 provides the Bill of Materials (BOM) list for Evaluation Board components.



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Figure 3. ACA2460 Evaluation Board Schematic

Table 5. ACA2460 Evaluation Board Bill of Materials (BOM)

Component	Description	Value	Component	Description	Value
C1, C2, C3, C8, C9, C12, C13	0402 capacitor	0.01 uF	L5, L6	Allied 0603 inductor	4.7 nH
C4	0402 capacitor	0.5 pF	L7	0402 chip inductor	1 nH
C5	0402 capacitor	0.8 pF	L10	0402 chip inductor	2 nH
C6, C7	0402 capacitor	330 pF	R1, R4, R5	0402 resistor	0 Ω
C10, C11	0402 capacitor	120 pF	R2	0402 resistor	510 Ω
C14	0402 capacitor	47 uF	R3	0402 resistor	8.65 kΩ
L1, L2	0402 inductor	470 nH	T1	Minntronix 1:1 Balun	MRF-25001
L3, L4	Murata 0805 inductor	680 nH	T2	Minntronix 2:1 Balun	MRF-27001

Package Dimensions

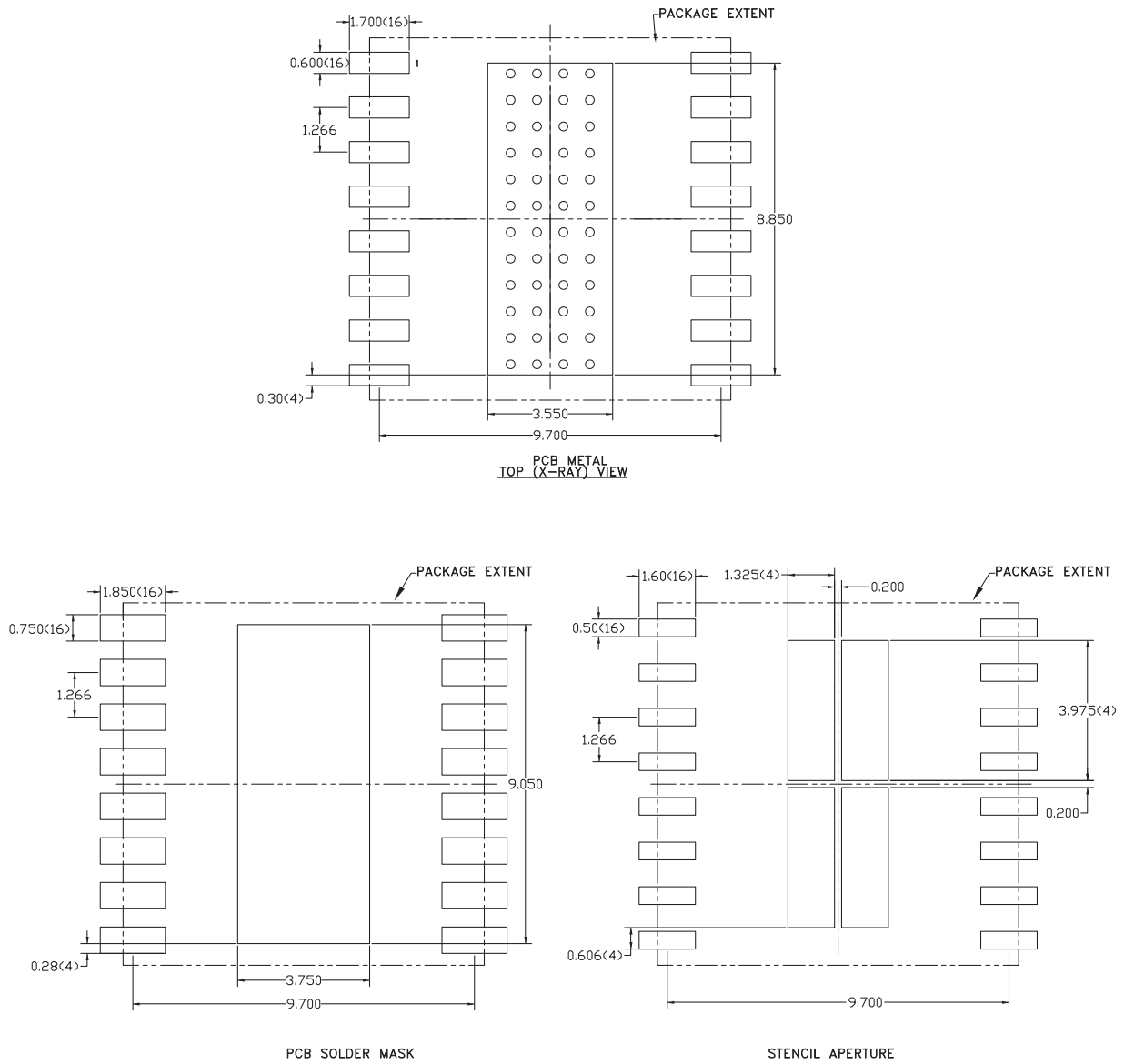
The PCB layout footprint drawing for the ACA2460 is shown in Figure 4. The package dimensions for the ACA2460 are shown in Figure 5. The tape and reel dimensions are provided in Figure 6.

Package and Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The ACA2460 is rated to Moisture Sensitivity Level 2 (MSL2) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.

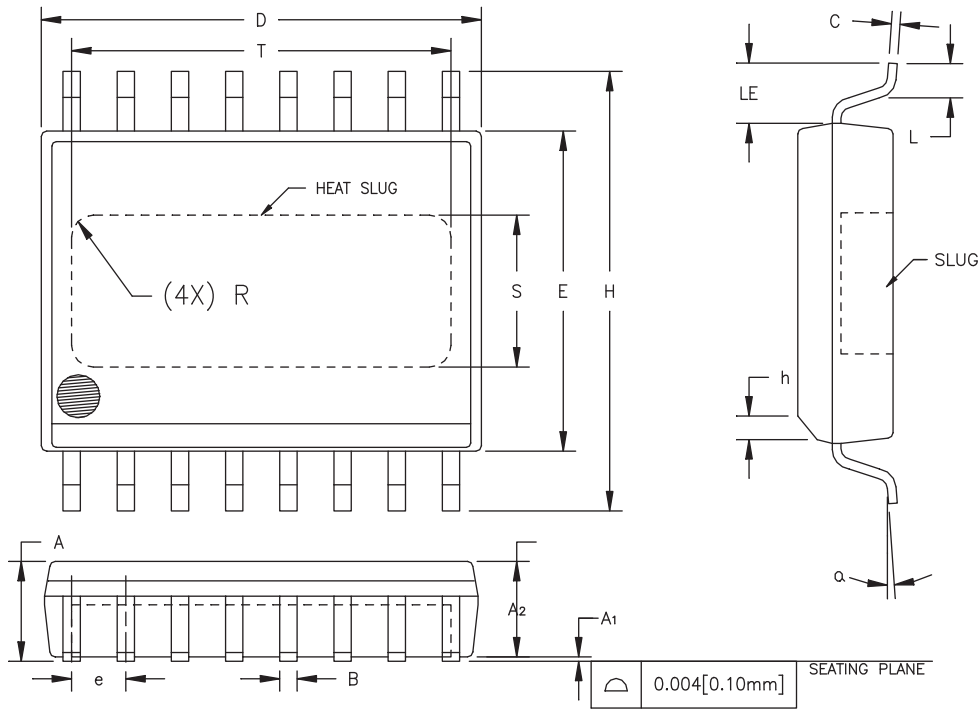


NOTES:

- (1) UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.
- (2) DIMENSIONS IN MILLIMETERS.
- (3) VIAS SHOWN IN PCB METAL VIEW ARE FOR REFERENCE ONLY. NUMBER & SIZE OF THERMAL VIAS REQUIRED DEPENDENT ON HEA DISSIPATION REQUIREMENT AND THE PC PROC SS CAPABILITY.
- (4) RECOMMENDED STENCIL THICKNESS: APPROX. 0.125mm (5 Mils)

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Figure 4. ACA2460 PCB Layout Footprint Dimensions



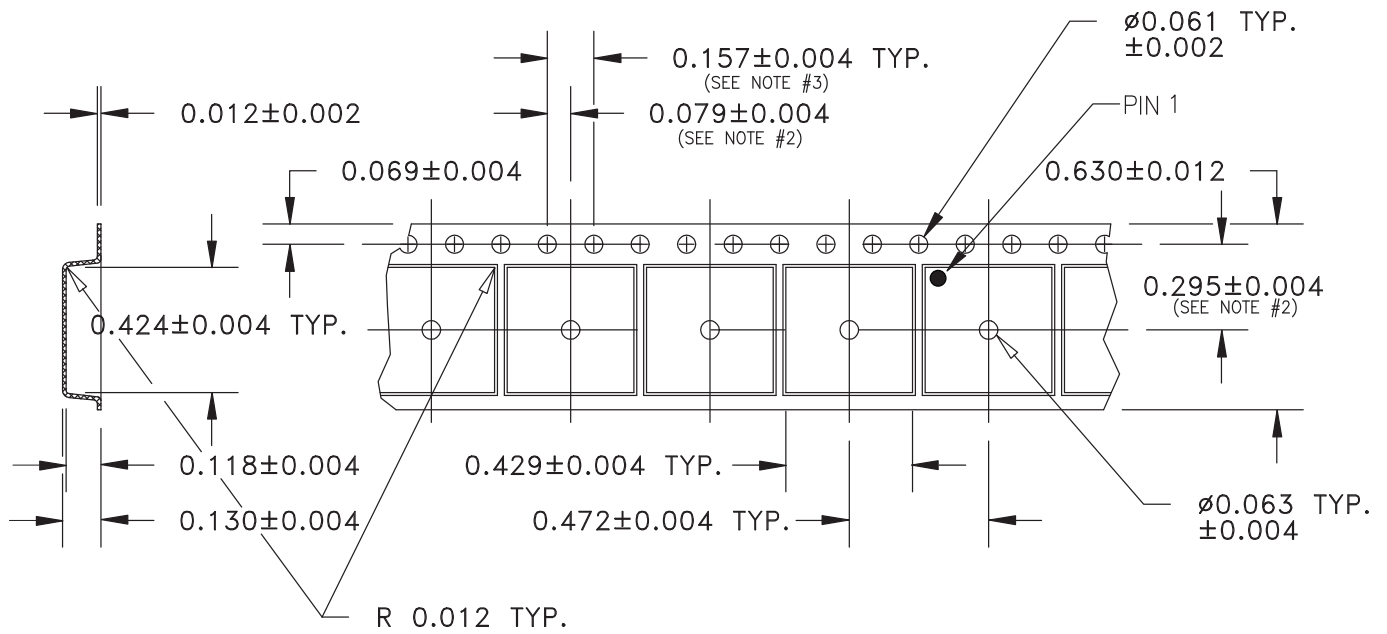
SYMBOL	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	0.087	0.098	2.21	2.49	
A ₁	0.000	0.004	0.00	0.10	6
A ₂	0.087	0.094	2.21	2.39	
B	0.013	0.019	0.33	0.48	
C	0.007	0.009	0.18	0.23	
D	0.398	0.412	10.11	10.46	2
E	0.290	0.300	7.37	7.62	3
e	0.050	BSC	1.27	BSC	4
H	0.394	0.418	10.01	10.62	
h	0.010	0.028	0.25	0.71	
L	0.024	0.040	0.61	1.02	
LE	0.052	—	1.32	—	
α	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 (A₁) MEASURED FROM BOTTOM OF SLUG.

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Figure 5. ACA2460 Package Dimensions



- NOTES: 1. MATERIAL – CONDUCTIVE POLYSTYRENE.
 2. MEASURED FROM CENTERLINE OF SPROCKET HOLE TO CENTERLINE OF POCKET.
 3. CUMULATIVE TOLERANCE OF 10 SPROCKET HOLES IS ± 0.008.

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Figure 6. ACA2460 Tape and Reel Dimensions

Ordering Information

Part Number	Package Description	Component Packaging
ACA2460P2	16-pin wide body SOIC with heat slug	1500-piece tape and reel
EVB2460	Evaluation Board	

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