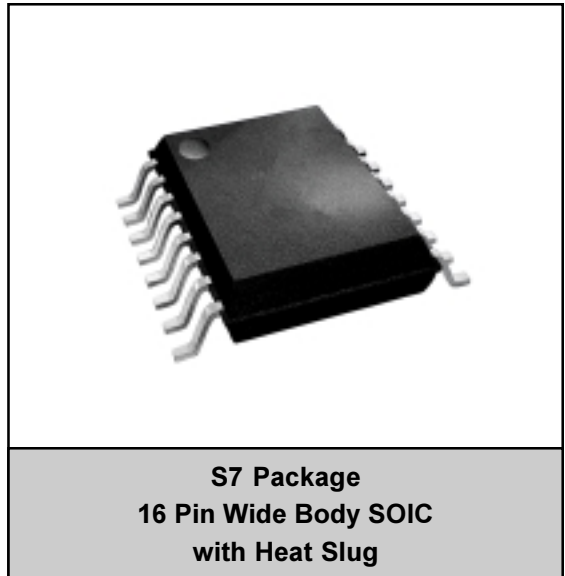


FEATURES

- 15 dB Gain
- Very Low Distortion
- Excellent Input/Output Match
- Low DC Power Consumption
- Good RF Stability with High VSWR Load Conditions
- Surface Mount Package Compatible with Automatic Assembly
- Low Cost
- Repeatability of Monolithic Fabrication
- Meets Cenelec Standard

APPLICATIONS

- CATV Distribution Amplifier
- High Linearity CATV Amplifier



PRODUCT DESCRIPTION

The ACA1205 is a surface mount monolithic GaAs RF Linear Amplifier that has been developed to replace, in new designs, the standard CATV Hybrid amplifiers currently in use. The MMIC consist of two

parallel amplifiers, each with 15 dB gain. The amplifier is optimized for exceptionally low distortion and noise figure while providing flat gain and excellent input and output return loss.

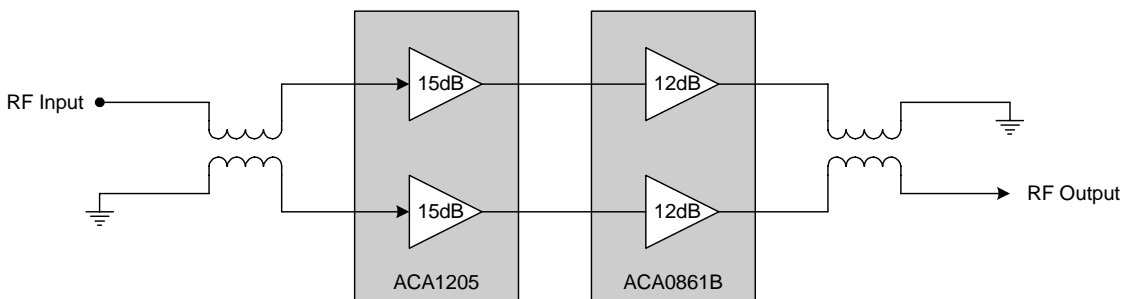


Figure 1: Hybrid Application Diagram

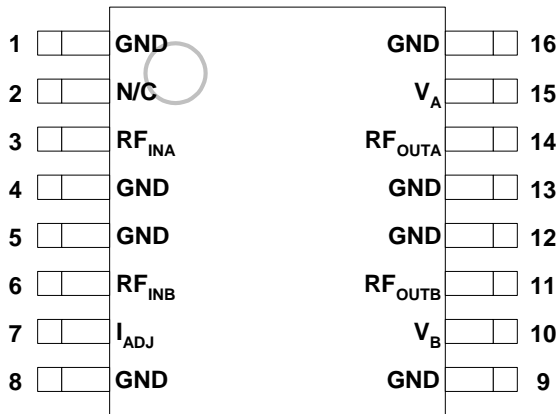


Figure 2: Pin Out

Table 1: Pin Description

| PIN | NAME | DESCRIPTION | PIN | NAME | DESCRIPTION |
|-----|-------------------|----------------------|-----|--------------------|-------------------------|
| 1 | GND | Ground | 9 | GND | Ground |
| 2 | N/C | No Connection | 10 | V _B | Supply for Amplifier B |
| 3 | RF _{INA} | Input to Amplifier A | 11 | RF _{OUTB} | Output from Amplifier B |
| 4 | GND | Ground | 12 | GND | Ground |
| 5 | GND | Ground | 13 | GND | Ground |
| 6 | RF _{INB} | Input to Amplifier B | 14 | RF _{OUTA} | Output from Amplifier A |
| 7 | I _{ADJ} | Current Adjust | 15 | V _A | Supply for Amplifier A |
| 8 | GND | Ground | 16 | GND | Ground |

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER | MIN | MAX | UNIT |
|--|-----|------|------|
| Amplifier Supplies (pins 10, 11, 14, 15) | 0 | +15 | VDC |
| RF Input Power (pins 3, 6) | - | +70 | 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 3 and 6 should be AC-coupled. No external DC bias should be applied.
2. Pin 7 should be pulled to ground through resistor R1, as shown in Figure 3. No external DC bias should be applied.

Table 3: Operating Ranges

| PARAMETER | MIN | TYP | MAX | UNIT |
|--|-----|-----|------|------|
| RF Frequency | 40 | - | 870 | MHz |
| Supply: V_{DD} (pins 10, 11, 14, 15) | - | +12 | - | VDC |
| Operating 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.

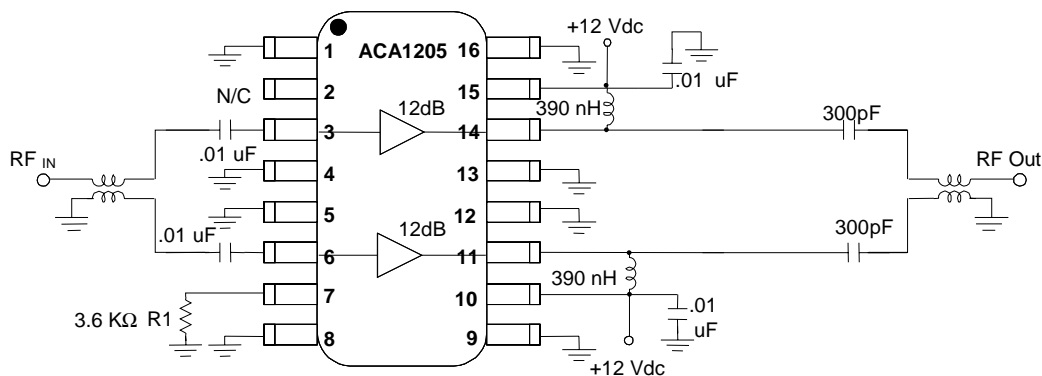
Table 4: Electrical Specifications

(T_A = +25°C, V_{DD} = +12 VDC)

| PARAMETER | MIN | TYP | MAX | UNIT | |
|---|--------------|-----|------|------|-----|
| Gain ⁽¹⁾ | 14.5 | 15 | 15.5 | dB | |
| Gain Flatness ⁽¹⁾ | -0.3 | - | +0.3 | dB | |
| Noise Figure ⁽²⁾ | - | 2.5 | 3.5 | dB | |
| CTB ^{(2),(3)} | 77 Channels | - | -70 | - | dBc |
| | 110 Channels | - | -68 | -64 | dBc |
| | 128 Channels | - | -65 | - | dBc |
| CSO ^{(2),(3)} | 77 Channels | - | -71 | - | dBc |
| | 110 Channels | - | -71 | -66 | dBc |
| | 128 Channels | - | -70 | - | dBc |
| XMOD ^{(2),(3)} | 77 Channels | - | -67 | - | dBc |
| | 110 Channels | - | -63 | -56 | dBc |
| | 128 Channels | - | -59 | - | dBc |
| Supply Current | - | 180 | 200 | mA | |
| Cable Equivalent Slope ⁽¹⁾ | -0.5 | - | 1.0 | dB | |
| Return Loss (input/Output) ⁽¹⁾ | 18 | 22 | - | dB | |
| Thermal Resistance | - | - | 6.0 | °C/W | |

Notes:

- (1) Measured performance of MMIC alone. Balun effects deimbedded from measurement.
- (2) Measured with a balun on input and output of the device. See Figure 3 for test setup.
- (3) Part measured with 110 channel flat input, +34 dBmV output (per channel).



Note: Apply voltage to both +12Vdc lines simultaneously

Figure 3: Test Circuit

PERFORMANCE DATA

Figure 4: Gain/ S21 vs. Frequency

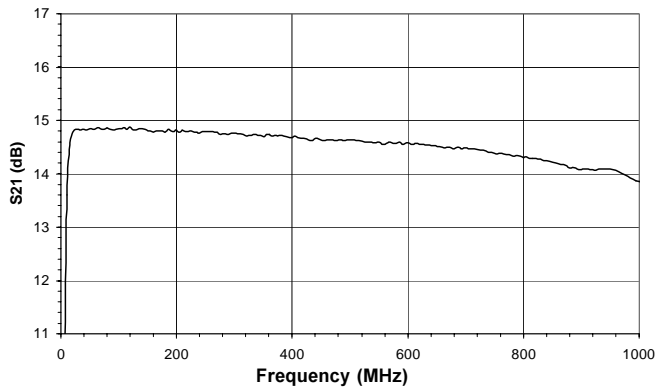


Figure 5: Input Return Loss/ S11 vs. Frequency

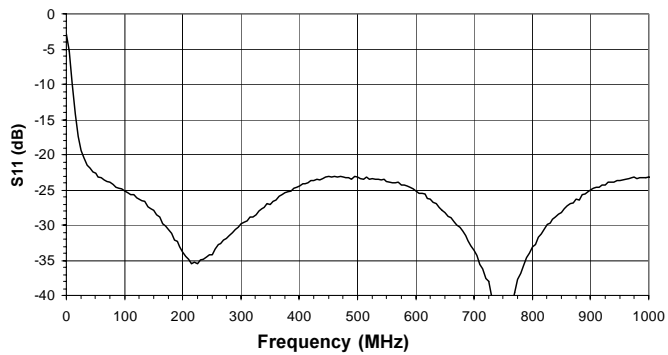


Figure 6: Output Return Loss/ S22 vs. Frequency

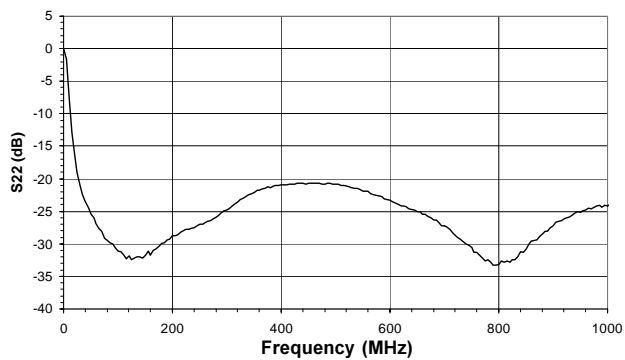


Figure 7: Reverse Isolation/ S12 vs. Frequency

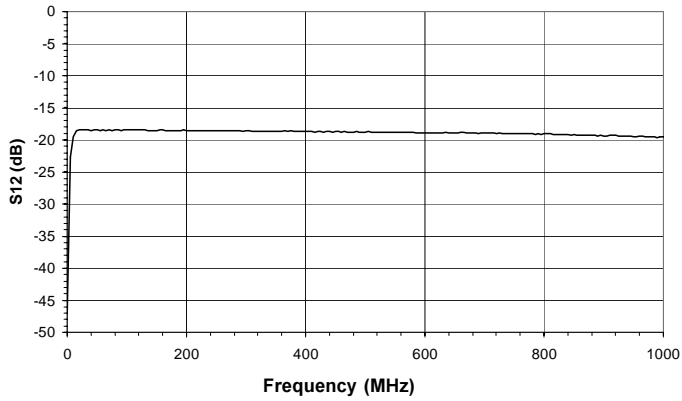
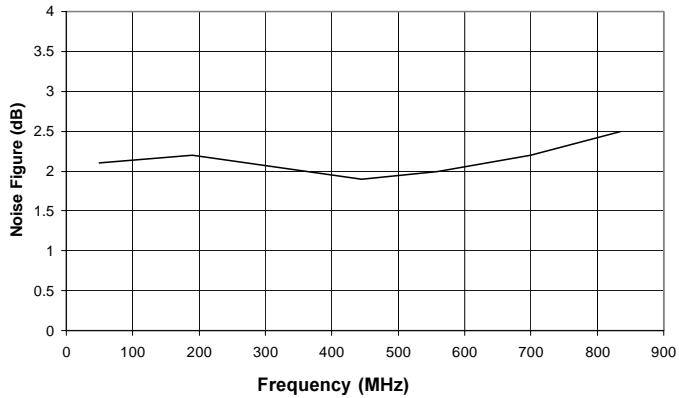
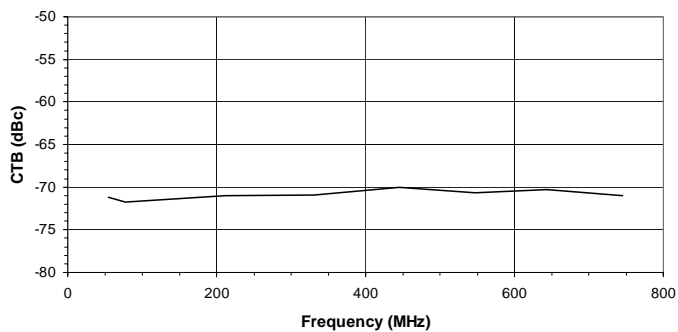


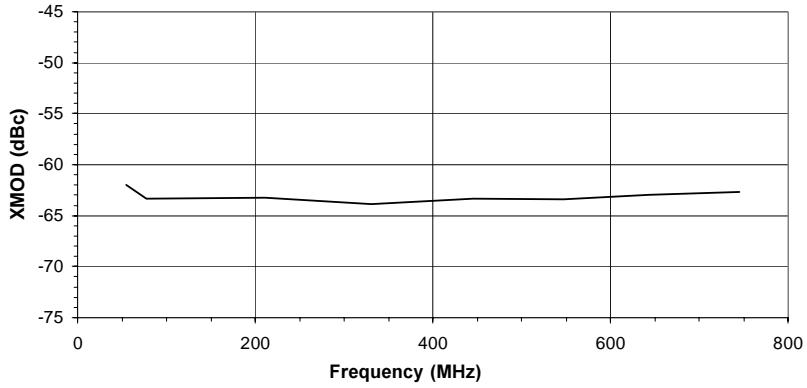
Figure 8: Noise Figure vs. Frequency



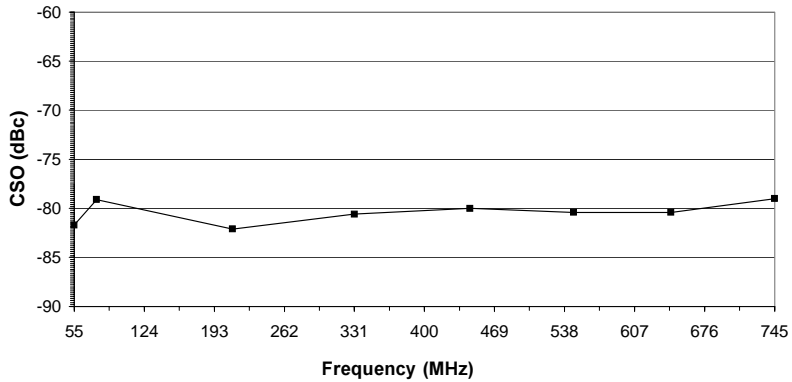
**Figure 9: CTB vs. Frequency
(112 Channel Loading, Flat +34dBmV Output Level)**



**Figure 10: XMOD vs. Frequency
(112 Channel Loading, Flat +34dBmV Output Level)**



**Figure 11: CSO vs. Frequency
(112 Channel Loading, Flat +34dBmV Output Level)**



APPLICATION INFORMATION

The ACA1205 is designed as an input stage. This part can be used alone for low gain, low output level applications or can be cascaded with one of the ACA0861 output stages for higher gain and output

signal drive level. The ACA1205 is a low power dissipation part designed as a driver for the ACA0861B output stage.

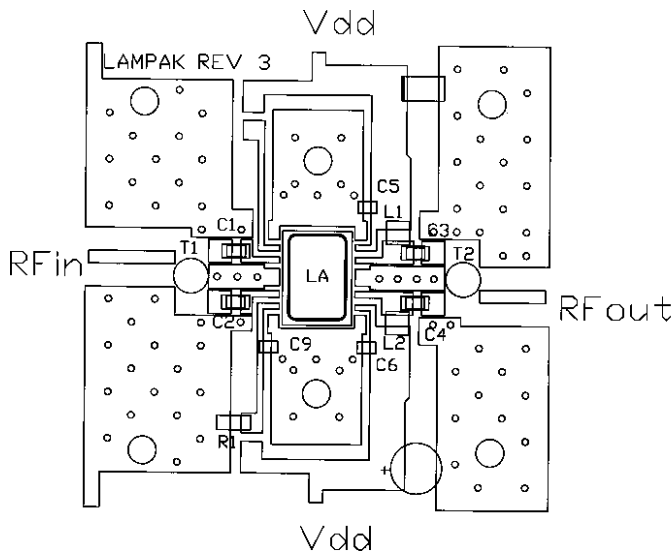


Figure 12: Evaluation Board Layout

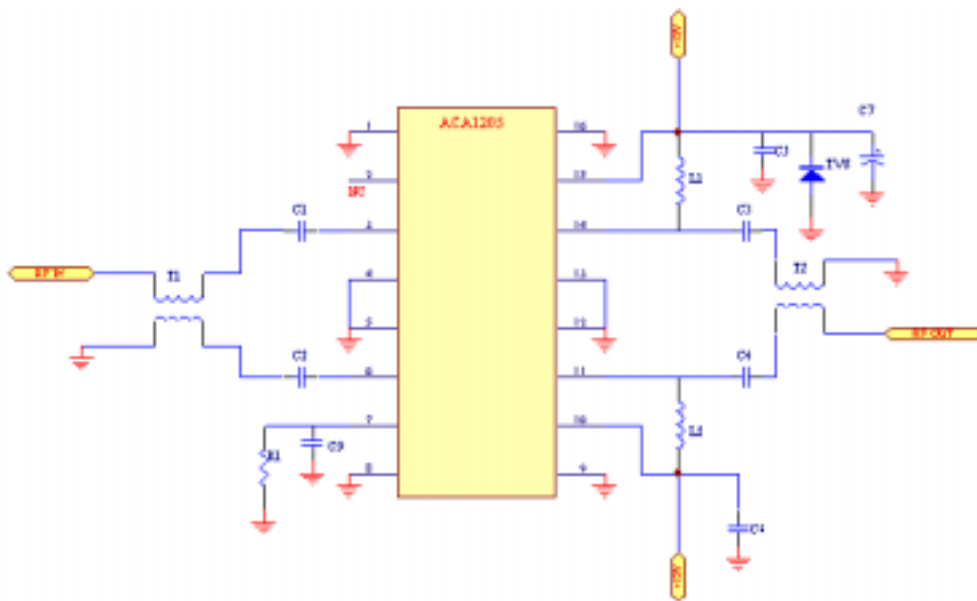


Figure 13: Evaluation Board Schematic

Table 5: Evaluation Board Parts List

| ITEM | DESCRIPTION | QUANTITY | VENDOR | VENDOR P/N |
|--------------|------------------------------|----------|-------------------------|---------------------|
| C1,C2,C5,C6 | 0.01uF. CHIP CAP. | 4 | MURATA | GRM39X7R1103K25V |
| C3,C4 | 300 pF. CHIP CAP. | 2 | MURATA | GRM39X7R301K25V |
| C7 | 47 uF ELECT.CAP. | 1 | DIGI-KEY CORP. | P5275-ND |
| C9 | NOT USED | | | |
| L1,L2 | 390 nH CHIP IND. | 2 | COILCRAFT | 1008CS-391 |
| T1,T2- BALUN | CORE | 2 | PHILLIPS | TC3.4/1.8/1.3-3D3 |
| | WIRE | | MWS WIRE IND. | B2383611 (66256-01) |
| R1 | 3.6k OHMS | 1 | DGI-KEY CORP. | P3.6KACT-ND |
| TVS | TVS 12 VOLT. 600 WATT | 1 | DIGI-KEY CORP. | SMBJ12ACCCT-ND |
| CONNECTOR | 75 OHMS. N MALE PANEL MOUNT. | 2 | PASTERNAK ENTERP. | PE4504 |
| | PRINTED CIRCUIT BOARD | 1 | | |
| INDIUM | 300 x 160 MILS | 1 | INDIUM CORP. OF AMERICA | 14996Y |

Notes:

1. T1, T2 (balun) wind 4 turns thru core as shown. (Figure 14).
2. "N" connector, center pin, should be approximately 80 mils in length.
3. Due to the high power dissipation of this device the PC board should be mounted/ attached to a large heat sink.

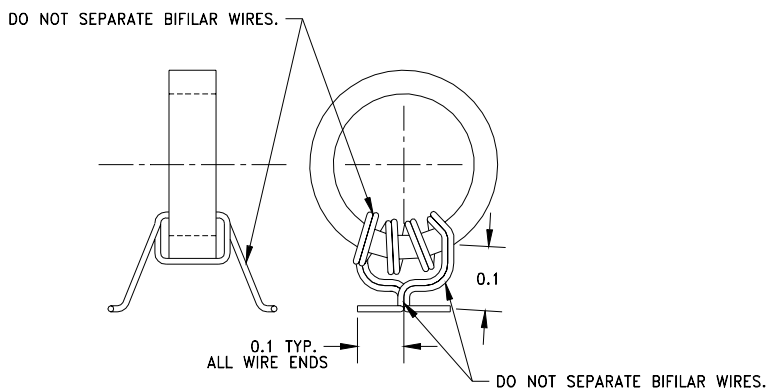
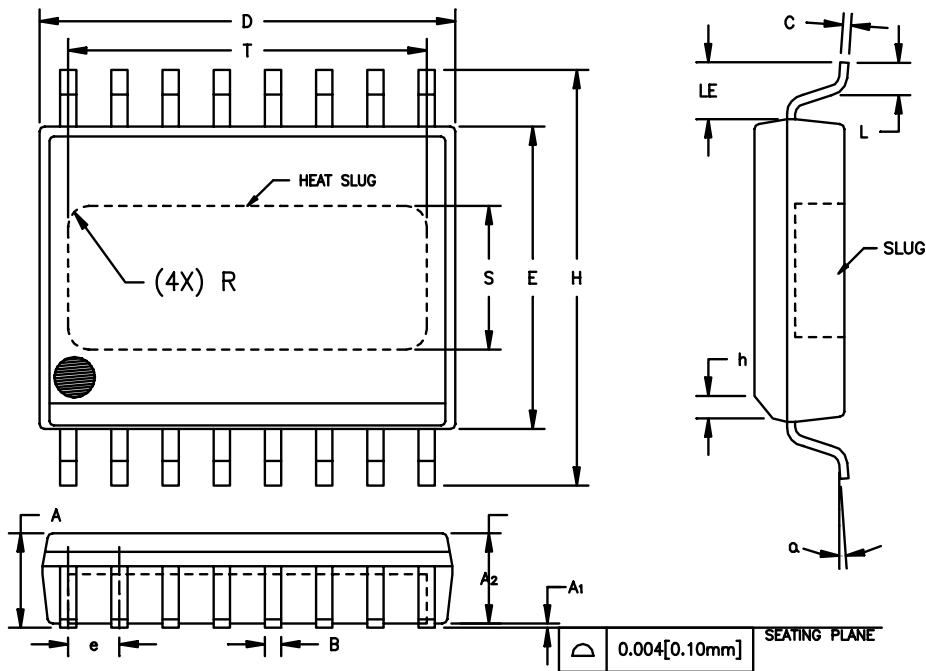


Figure 14: Balun Drawing

PACKAGE OUTLINE



| | 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 | — | |
| q | 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.

Figure 15: S7 Package Outline - 16 Pin Wide Body SOIC with Heat Slug

NOTES

ORDERING INFORMATION

| ORDER NUMBER | TEMPERATURE RANGE | PACKAGE DESCRIPTION | COMPONENT PACKAGING |
|--------------|-------------------|--------------------------------------|----------------------------------|
| ACA1205S7CTR | -40°C to 110°C | 16 Pin Wide Body SOIC with Heat Sink | 1,500 Piece Tape & Reel |
| ACA1205S7C | -40°C to 110°C | 16 Pin Wide Body SOIC with Heat Sink | Plastic Tubes (25 pcs. per tube) |

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