

**FEATURES**

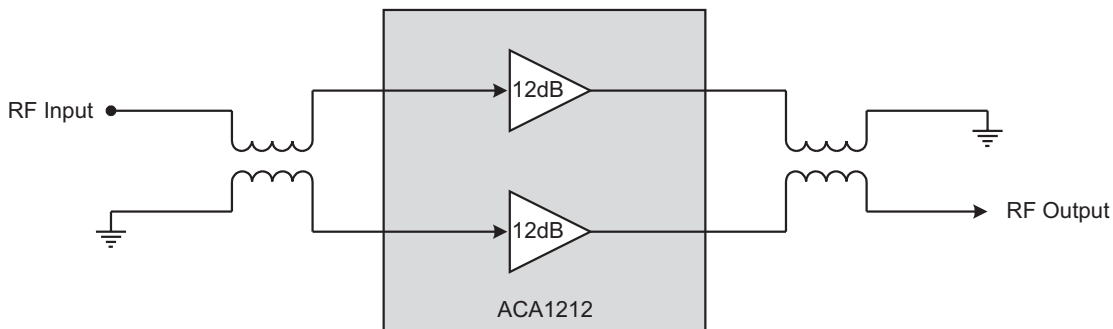
- 50 to 1218 MHz Frequency Range
- Flat Gain
- Very Low Distortion
- Excellent Input/Output Match
- Low DC Power Consumption
- Single 12 V supply
- Surface Mount Package Compatible with Automatic Assembly
- Repeatability of Monolithic Fabrication
- RoHS-Compliant Packaging
- Highly Reliable GaAs MESFET Technology



**PRODUCT DESCRIPTION**

The ACA1212 is a highly linear, high output power integrated RF amplifier designed for CATV head ends and HFC distribution systems. The IC consists of two parallel amplifiers cascaded between transmission line baluns that are optimized for exceptionally low

distortion, high output power, and high crash point in a thermally enhanced surface mount package. The ACA1212 covers the full 50 to 1218 MHz CATV downstream band demanded by DOCSIS 3.1 systems.



**Figure 1: Application Diagram**

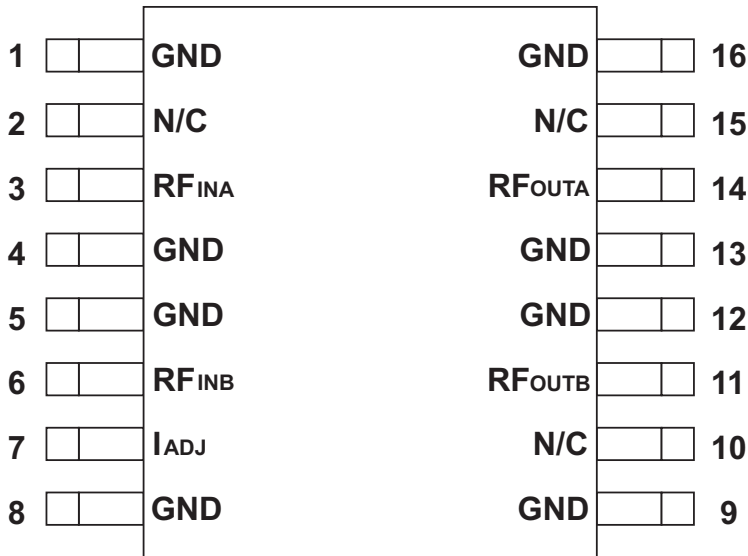


Figure 2: Pinout Diagram

Table 1: Pin Description

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

## ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER                        | MIN  | MAX  | UNIT |
|----------------------------------|------|------|------|
| Amplifier Supplies (pins 11, 14) | 0    | +15  | VDC  |
| RF Input Power (pins 3, 6)       | -    | +70  | dBmV |
| Storage Temperature              | -6.5 | +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.

Table 3: Operating Ranges

| PARAMETER                    | MIN | TYP | MAX  | UNIT |
|------------------------------|-----|-----|------|------|
| RF Frequency                 | 40  | -   | 1218 | MHz  |
| Supply: $V_D$ (pins 11, 14)  | -   | +12 | -    | VDC  |
| Operating Temperature: $T_A$ | -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<sub>A</sub> = +25 °C, V<sub>D</sub> = +12 VDC)**

| PARAMETER                                 | MIN  | TYP  | MAX   | UNIT | COMMENTS     |
|---|------|------|-------|------|--------------|
| Gain <sup>(1)</sup>                       | 10.5 | 11.1 | 11.7  | dB   | at 1.218 GHz |
| Gain Flatness <sup>(1)</sup>              | -    | -    | ± 0.3 | dB   |              |
| Noise Figure <sup>(1)</sup>               | -    | 4    | 4.5   | dB   |              |
| CTB <sup>(1), (2)</sup>                   | -    | -72  | -70   | dBc  |              |
| CSO <sup>(1), (2)</sup>                   | -    | -70  | -68   | dBc  |              |
| XMOD <sup>(1), (2)</sup>                  | -    | -67  | -     | dBc  |              |
| Supply Current                            | -    | 395  | 445   | mA   |              |
| Cable Equivalent Slope <sup>(1)</sup>     | -0.5 | .25  | 1.0   | dB   |              |
| Return Loss (Input/Output) <sup>(1)</sup> | 18   | 22   | -     | dB   |              |
| Thermal resistance (θ <sub>Jc</sub> )     | -    | -    | 6.0   | °C/W |              |

**Notes:**

(1) Measured with a balun on input and output of the device. See Figure 3 for test setup.

(2) Device measured with 79 analog channels, +47 dBmV output power at 1002 MHz with a 3 dB tilt and QAM to 1002 MHz.

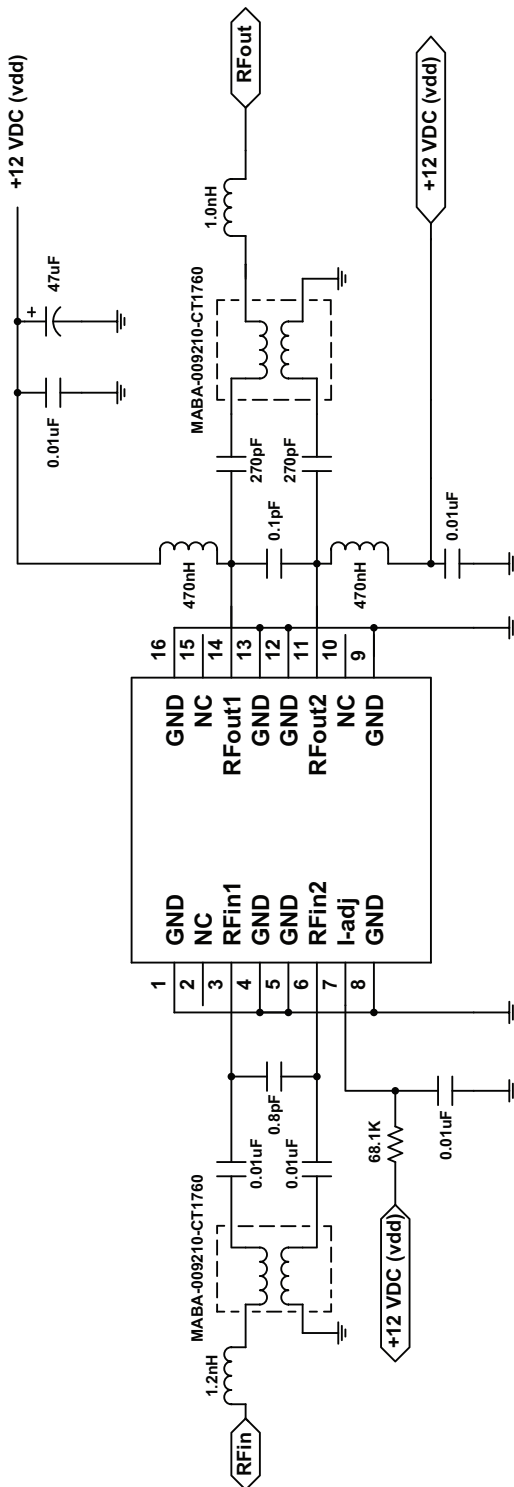
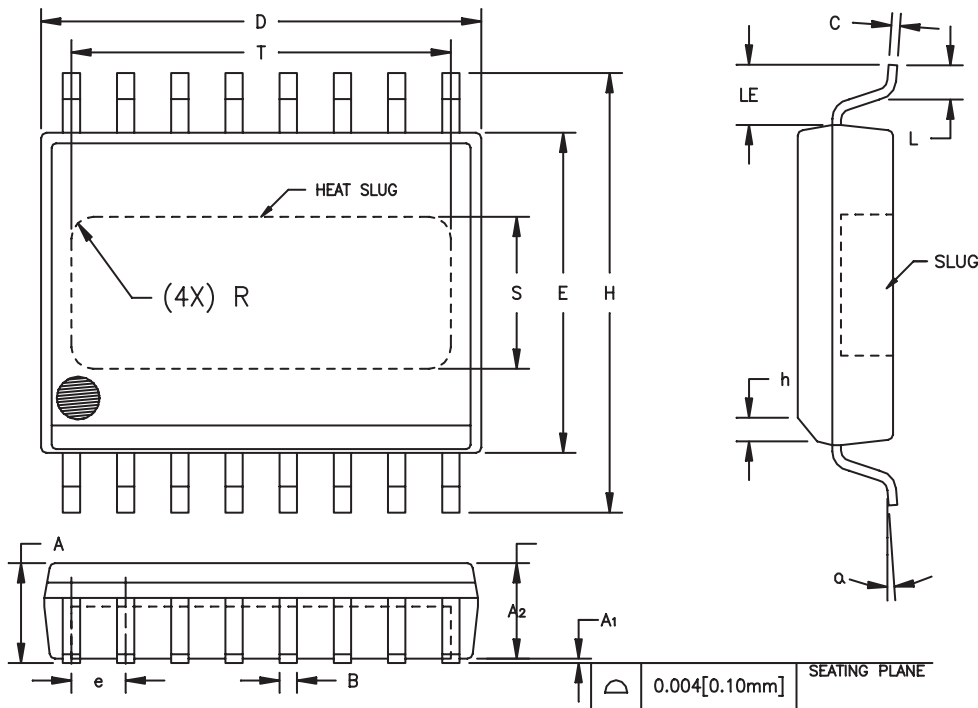


Figure 3: Test Circuit

Table 5: Bill of Materials

| ITEM # | QTY | REFERENCE      | DESCRIPTION                 | PART #              | MANUFACTURER |
|--------|-----|----------------|-----------------------------|---------------------|--------------|
| 1      | 1   | L1             | 1.2nH inductor (0402)       | LQG15HS1N2S02D      | Murata       |
| 2      | 2   | T1,T2          | 1:1 transmission line balun | MABA-009210-CT1760  | Macom        |
| 3      | 5   | C1,C2,C4,C6,C8 | 0.01uF capacitor (0603)     | GRM188R71H-103KA01D | Murata       |
| 4      | 1   | C3             | 0.8pF (0402)                | GRM-1555C1HR80RZ01D | Murata       |
| 5      | 1   | R1             | 68.1Kohm (0402)             | MCR01MRTF6802       | Rohm         |
| 6      | 2   | L2,L3          | 470nH (0805)                | LQH31CNR47M03L      | Murata       |
| 7      | 1   | C5             | 0.1pF (0402)                | GJM-1555C1HR10WB01D | Murata       |
| 8      | 2   | C9,C10         | 270pF (0603)                | GRM1885C1H-271JA01D | Murata       |
| 9      | 1   | L4             | 1.0nH (0402)                | LQG15HS1N0S02D      | Murata       |
| 10     | 1   | C7             | 47uF electrolytic cap       | ECEA1HGE470         | Panasonic    |
| 11     | 2   | CON1-2         | 75 ohm N bulkhead           | PE4504              | Paternack    |

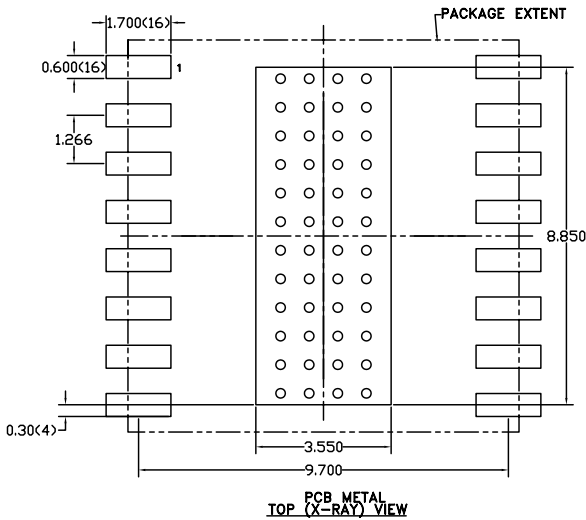
PACKAGE OUTLINE



NOTES:

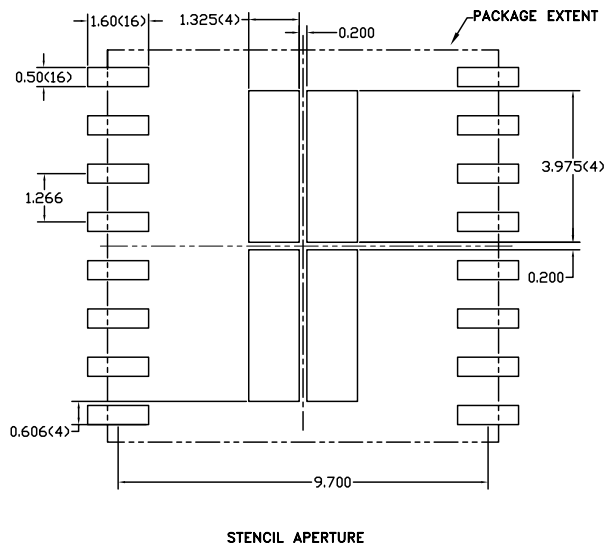
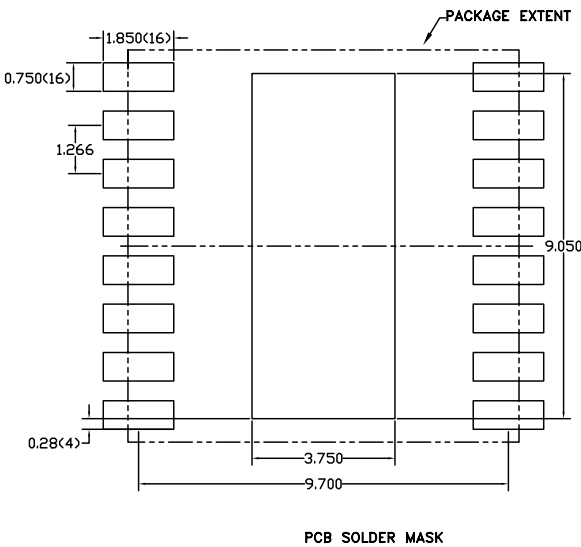
1. CONTROLLING DIMENSION: INCHES
2. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.006 [0.15mm] PER SIDE.
3. DIMENSION "E" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 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



**NOTES:**

- (1) OUTLINE DRAWING REFERENCE: 98001-014
- (2) UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.
- (3) DIMENSIONS IN MILLIMETERS.
- (4) 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.
- (5) RECOMMENDED STENCIL THICKNESS: APPROX. 0.125mm (5 Mils)



**Figure 5: S7 Package Outline - 16 Pin Wide Body SOIC with Heat Slug**

**ORDERING INFORMATION**

| <b>ORDER NUMBER</b> | <b>TEMPERATURE RANGE</b> | <b>PACKAGE DESCRIPTION</b>           | <b>COMPONENT PACKAGING</b> |
|---------------------|--------------------------|--------------------------------------|----------------------------|
| ACA1212P0           | -40 °C to 110 °C         | 16 Pin Wide Body SOIC with Heat Slug | Tubes                      |
| ACA1212P2           | -40 °C to 110 °C         | 16 Pin Wide Body SOIC with Heat Slug | 1,500 Piece Tape and Reel  |
| ACA1212P9           | -40 °C to 110 °C         | 16 Pin Wide Body SOIC with Heat Slug | Partial Reel               |

---

Copyright © 2016 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications.

Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks and the Skyworks symbol are trademarks or registered trademarks of Skyworks Solutions, Inc., in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at [www.skyworksinc.com](http://www.skyworksinc.com), are incorporated by reference.

**Skyworks Solutions, Inc.**

Phone [781] 376-3000 • Fax [781] 376-3100 • [sales@skyworksinc.com](mailto:sales@skyworksinc.com) • [www.skyworksinc.com](http://www.skyworksinc.com)

Skyworks Proprietary and Confidential information • Products and Product Information are Subject to Change Without Notice