

FEATURES

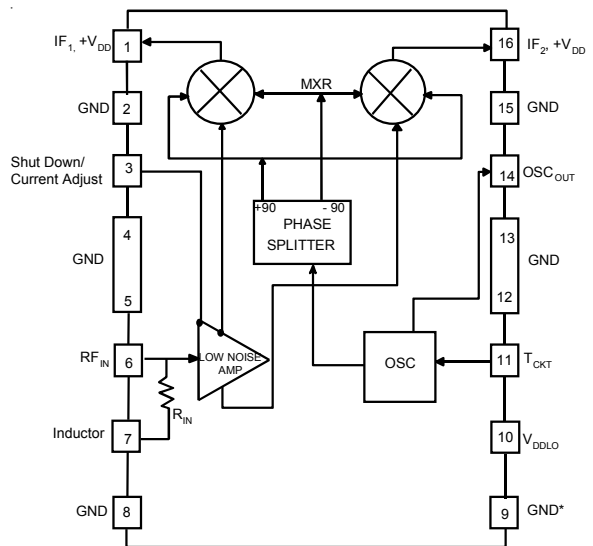
- Integrated Monolithic Upconverter
- Compatible with all digital and analog modulation types
- 5 Volt Operation
- Low Power Consumption
- Low Noise Figure
- High Conversion Gain
- Low Distortion
- Excellent Oscillator Purity and Phase Noise
- Remote Shutdown Feature
- Small Size
- Low Cost
- High Reliability
- RoHS-Compliant Package



S3 Package
Modified 16 Pin SOIC

PRODUCT DESCRIPTION

The ACU50752 is a Monolithic GaAs IC designed to perform the upconverter functions in a double conversion tuner: gain block, local oscillator and balanced mixer. The specifications meet the requirements of CATV, TV and Cable Modem applications. Offered in a modified 16-lead SOIC package and requiring only a single polarity 5 V supply (or 3.5 V, with slightly reduced performance), the IC is well suited for applications where small size, low cost, low auxiliary parts count and a no-compromise performance is important. It provides tuner manufacturers the opportunity to reduce cost by lowering the component count and decreasing the amount of labor-intensive production alignment steps, while significantly improving performance and reliability.



* Varactor return. Do not connect to common ground

Figure 1: Functional Block Diagram

Table 1: Pin Description

| PIN | NAME | DESCRIPTION | PIN | NAME | DESCRIPTION |
|-----|-------------------------------------|-------------------------------|-----|-------------------------------------|--------------------------------|
| 1 | IF ₁ , V _{DDIF} | Balanced IF output and supply | 9 | V _{CRTN} | Varactor return |
| 2 | GND | Ground | 10 | V _{DDL0} | Oscillator supply |
| 3 | V _{BIAS} | Shut down/current adjust | 11 | Tank | Oscillator tank circuit |
| 4 | GND | Ground | 12 | GND | Ground |
| 5 | GND | Ground | 13 | GND | Ground |
| 6 | RF _{IN} | RF Input | 14 | OSC _{OUT} | Oscillator output to Prescaler |
| 7 | I _{BIAS} | Current Bias | 15 | GND | Ground |
| 8 | GND | Ground | 16 | IF ₂ , V _{DDIF} | Balanced IF output and supply |

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER | MIN | MAX | UNIT |
|---|------|------|------|
| $V_{DDIF}, V_{DDL0}, V_{OSC}$ (Pins 1,10,14 & 16) | 0 | 9 | VDC |
| V_{RF}/V_{TUNE} (Pins 6 & 11) | - | 0 | VDC |
| RF Input Voltage | - | +60 | dBmV |
| Storage Temperature | - 55 | +200 | °C |
| Soldering Temperature | - | 260 | °C |
| Soldering Time | - | 5 | 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.

Table 3: Operating Ranges

| PARAMETER | MIN | TYP | MAX | UNIT |
|----------------------------|------|-----|------|------|
| Frequency | | | | |
| RF | 50 | - | 860 | MHz |
| IF | 900 | - | 1200 | |
| LO | 950 | - | 2060 | |
| V_{DDIF} | 4.75 | 5 | 5.25 | VDC |
| V_{DDL0} | 4.75 | 5 | 5.25 | VDC |
| Shutdown Voltage (Pin 3) | - | -2 | - | V |
| Tuning Voltage | 1.5 | - | 27 | V |
| Operating Case Temperature | -40 | - | +85 | °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
($T_A = 25^\circ\text{C}$; $V_{DDIF}, V_{DDLO} = +5\text{V}$; RF = 50 to 860 MHz; IF = 1170 MHz)

| PARAMETER | MIN | TYP | MAX | UNIT |
|--|-----|-----|-----|--------|
| Conversion Gain ⁽¹⁾ | 5.0 | 8.0 | - | dB |
| Gain Flatness ⁽¹⁾ | - | 1.0 | - | dB |
| SSB Noise Figure ⁽¹⁾ | - | 6.5 | 8.0 | dB |
| CSO ⁽²⁾ | - | -60 | -57 | dBc |
| CTB ⁽²⁾ | - | -60 | -57 | dBc |
| Cross Modulation ⁽³⁾ | - | -62 | -60 | dBc |
| 2-Tone 2nd Order Input IP ⁽⁴⁾ | - | 40 | - | dBm |
| 2-Tone 3rd Order Input IP ⁽⁴⁾ | - | 18 | - | dBm |
| LO Phase Noise ⁽⁵⁾ | - | -84 | -81 | dBc/Hz |
| LO Power to Prescaler | -10 | -5 | - | dBm |
| LO to RF Leakage | - | -22 | - | dBm |
| LO to IF Leakage | - | -24 | - | dBm |
| RF to IF Isolation | 40 | 50 | - | dB |
| Tuning Voltage ⁽¹⁾ | 1.0 | - | 22 | V |
| I_{DDIF} | - | 58 | 80 | mA |
| I_{DDLO} | - | 60 | 80 | mA |
| Power Consumption | - | 600 | 800 | mW |

Notes:

(1) As measured in ANADIGICS test fixture

(2) 128 Channels @ + 7 dBmV

(3) 128 Channels, 99 % Modulation @ 15 KHz

(4) Two tones @ -15 dBm each

(5) At 10 KHz offset

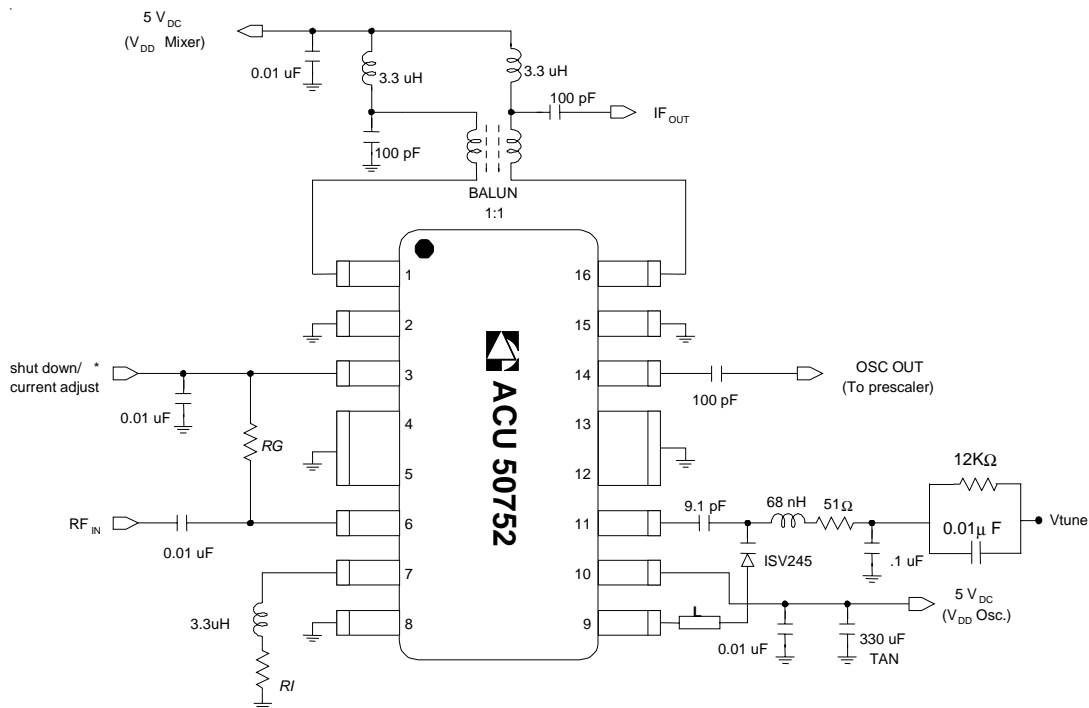
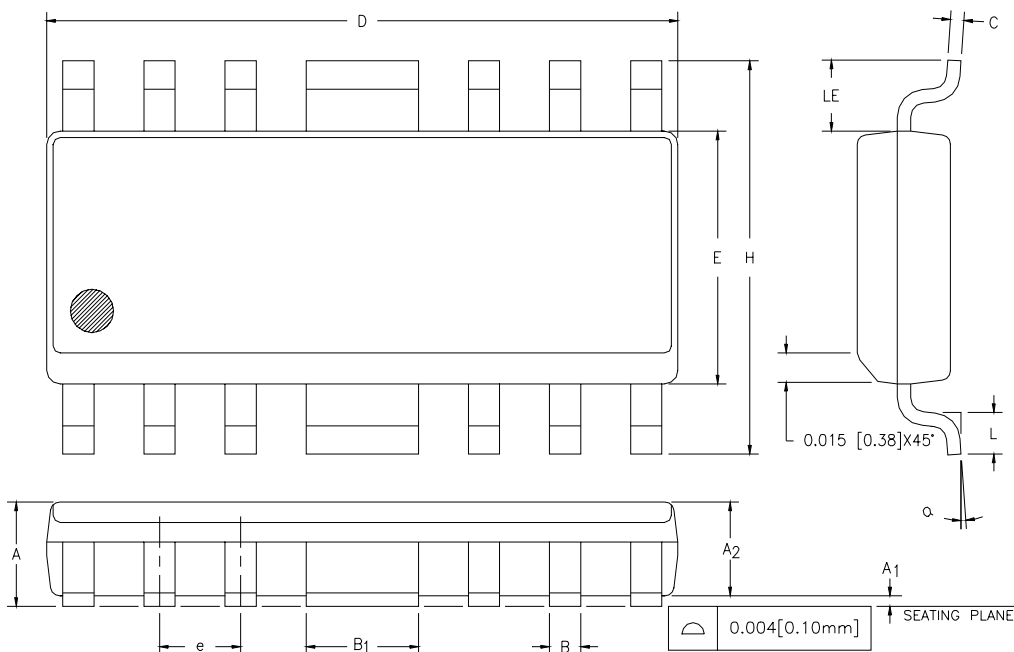


Figure 2: Test Circuit Schematic

Notes:

- | | | |
|----|---|--|
| L | = | Printed inductor (2~3 nH) |
| RG | = | Gain control/impedance match resistor (240Ω for 8 dB gain) |
| RI | = | Current adjust resistor (2.7 W for 60 mA mixer current) |
| * | = | Apply -2 V DC for shutdown, 0< VDC < 0.3 for 60 mA mixer current |

PACKAGE OUTLINE



| S _N B _{OL} | INCHES | | MILLIMETERS | | NOTE |
|--------------------------------|--------|-------|-------------|-------|------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 0.058 | 0.068 | 1.47 | 1.73 | |
| A ₁ | 0.004 | 0.010 | 0.10 | 0.25 | |
| A ₂ | 0.055 | 0.065 | 1.40 | 1.65 | |
| B | 0.013 | 0.020 | 0.33 | 0.50 | |
| B ₁ | 0.062 | 0.070 | 1.58 | 1.78 | |
| C | 0.008 | 0.010 | 0.20 | 0.25 | 4 |
| D | 0.380 | 0.400 | 9.66 | 10.16 | 2 |
| E | 0.150 | 0.160 | 3.81 | 4.06 | 3 |
| e | 0.050 | BSC | 1.27 | BSC | |
| H | 0.226 | 0.244 | 5.74 | 6.20 | |
| L | 0.016 | 0.040 | 0.41 | 1.02 | |
| LE | 0.030 | — | 0.76 | — | |
| α | 0° | 8° | 0° | 8° | |

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. LEAD THICKNESS AFTER PLATING TO BE 0.013 [0.33mm] MAXIMUM.

Figure 3: S3 Package Outline - Modified 16 Pin SOIC

NOTES

ORDERING INFORMATION

| ORDER NUMBER | TEMPERATURE RANGE | PACKAGE DESCRIPTION | COMPONENT PACKAGING |
|---------------|-------------------|---------------------------------------|-----------------------------------|
| ACU50752RS3P1 | -40°C to +85°C | RoHS Compliant Modified16 Pin SOIC | Tape & Reel, 3500 pieces per reel |

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