



## ACU50752

CATV/TV/Cable Modem Upconverter

MMIC

Data Sheet - Rev 2.0

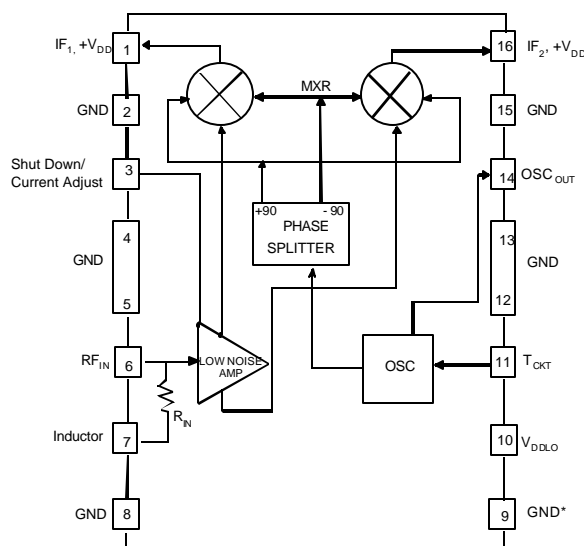
### FEATURES

- 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



### 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 <sub>1</sub> , V <sub>DDIF</sub>	Balanced IF output and supply	9	VC <sub>RTN</sub>	Varactor return
2	GND	Ground	10	V <sub>DDLO</sub>	Oscillator supply
3	V <sub>BIAS</sub>	Shut down/current adjust	11	Tank	Oscillator tank circuit
4	GND	Ground	12	GND	Ground
5	GND	Ground	13	GND	Ground
6	RF <sub>N</sub>	RF Input	14	OSC <sub>OUT</sub>	Oscillator output to Prescaler
7	I <sub>BIAS</sub>	Current Bias	15	GND	Ground
8	GND	Ground	16	IF <sub>2</sub> , V <sub>DDIF</sub>	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**  
**( $T_A = 25\text{ }^{\circ}\text{C}$ ;  $V_{DDIF}, V_{DDLO} = +5\text{V}$ ;  $R_F = 50\text{ to }860\text{ MHz}$ ;  $IF = 1170\text{ MHz}$ )**

PARAMETER	MIN	TYP	MAX	UNIT
Conversion Gain <sup>(1)</sup>	5.0	8.0	-	dB
Gain Flatness <sup>(1)</sup>	-	1.0	-	dB
SSB Noise Figure <sup>(1)</sup>	-	6.5	8.0	dB
CSO <sup>(2)</sup>	-	-60	-57	dBc
CTB <sup>(2)</sup>	-	-60	-57	dBc
Cross Modulation <sup>(3)</sup>	-	-62	-60	dBc
2-Tone 2nd Order Input IP <sup>(4)</sup>	-	40	-	dBm
2-Tone 3rd Order Input IP <sup>(4)</sup>	-	18	-	dBm
LO Phase Noise <sup>(5)</sup>	-	-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 <sup>(1)</sup>	1.0	-	22	V
$I_{DDIF}$	-	58	80	mA
$I_{DDLO}$	-	60	80	mA
Power Consumption	-	600	800	mW

**Notes:**

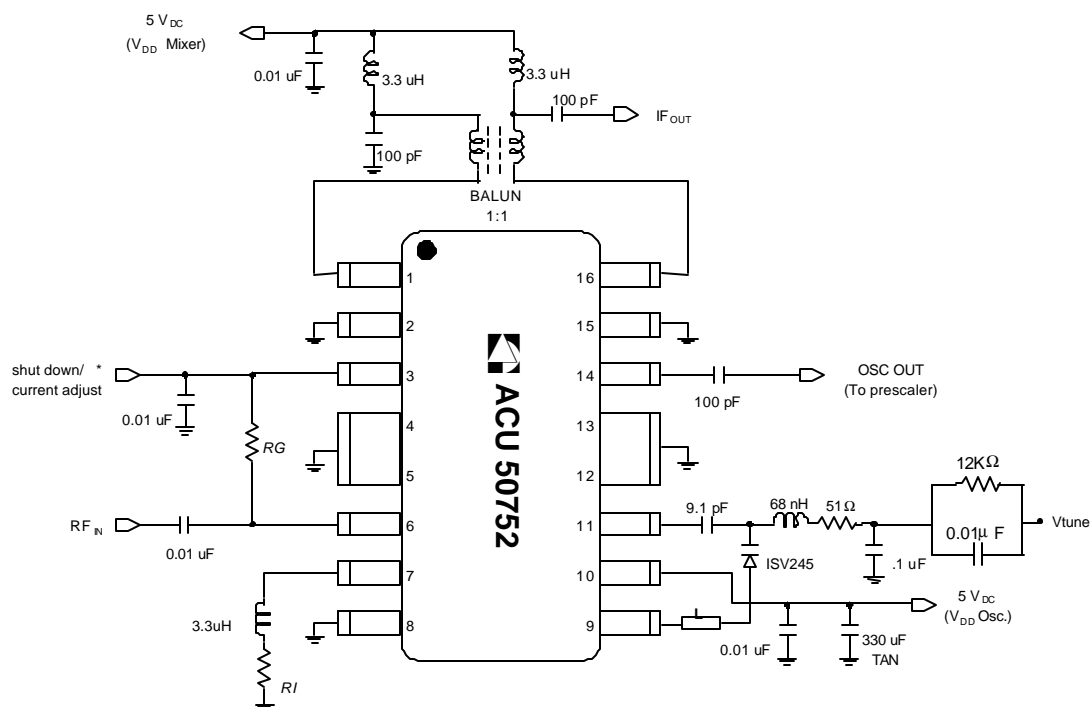
(1) As measured in ANADIGICS test fixture

(2) 128 Channels @ + 7 dBmV

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

(4) Two tones @ -15 dBm each

(5) At 10 KHz offset



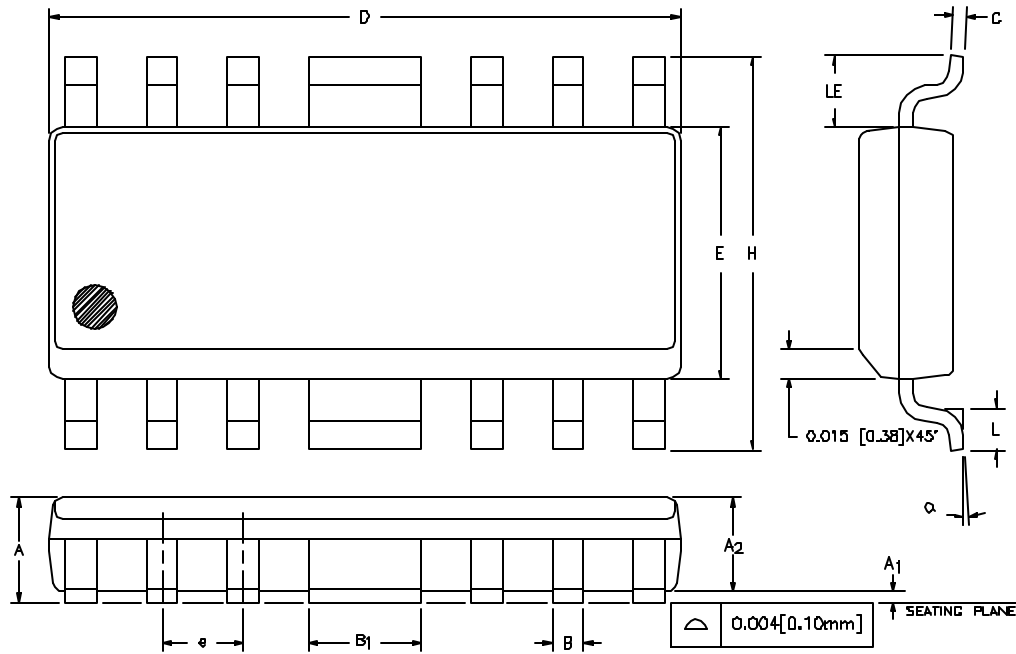
### Figure 2: Test Circuit Schematic

*Notes:*

- |    |   |  |
|----|---|--|
| L  | = | Printed inductor (2~3 nH)  |
| RG | = | Gain control/impedance match resistor (240W 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 |

ACU50752

# PACKAGE OUTLINE



	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	0.058	0.068	1.47	1.73	
A <sub>1</sub>	0.004	0.010	0.10	0.25	
A <sub>2</sub>	0.055	0.065	1.40	1.65	
B	0.013	0.020	0.33	0.50	
B <sub>1</sub>	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
ø	0.050 BSC		1.27 BSC		
H	0.228	0.244	5.74	6.20	
L	0.016	0.040	0.41	1.02	
LE	0.030	—	0.76	—	
Q	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

**ACU50752**

**ORDERING INFORMATION**

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
ACU50752S3CTR	-40°C to +85°C	Modified 16 Pin SOIC	Tape & Reel, 3500 pieces per reel
ACU50752S3C	-40°C to +85°C	Modified 16 Pin SOIC	Tube, 50 pieces per tube



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