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FEATURES

- Integrated Monolithic Downconverter
- 8 dB Noise Figure
- 10 dB Conversion Gain
- High Linearity
- Small Size
- Low Cost
- High Reliability
- RoHS-Compliant Package Option

S3 Package
Modified 16 Pin SOIC

PRODUCT DESCRIPTION

The ACD0900 MMIC is a high performance downconverter fabricated entirely in GaAs. It is designed for use as the second conversion stage in double-conversion tuners and cable modems, downconverting 900 -1200 MHz RF inputs to a fixed IF of 35 - 150 MHz (depending on LO frequency).

The IC incorporates a low noise amplifier, high linearity double balanced mixer, phase splitter and oscillator in a modified SOIC 16 lead surface mount package. The high degree of functionality allows tuner manufactures to reduce size and cost by lowering the component count and decreasing the amount of production alignment steps, while significantly improving performance and reliability.
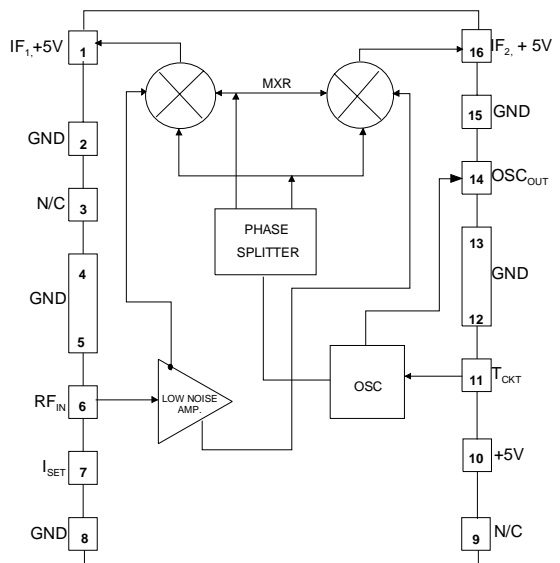

Figure 1: Functional Block Diagram

Table 1: Pin Description

PIN	DESCRIPTION	PIN	DESCRIPTION
1	IF_1, V_{DDIF}	9	NC*
2	GND	10	V_{DDLO}
3	NC	11	T_{CKT}
4	GND	12	GND
5	GND	13	GND
6	RF_{IN}	14	OSC OUT
7	I_{SET}	15	GND
8	GND	16	IF_2, V_{DDIF}

* Do not connect pin 9 to GND

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
V_{DDIF}, V_{DDLO}, V_{OSC}	-	9	Volts
V_{RF}, V_{TCKT} [(1)]	-	0	Volts
Storage Temperature	- 55	200	°C
Soldering Temperature	-	260	°C
Soldering Time	-	5	Sec.
RF Input Power	-	+ 10	dBm
LO Input Power	-	+ 17	dBm
Thermal Resistance	-	25	°C/W

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.

Note:
(1) V_{TCKT}: Maximum voltage that may be applied to pin 11 of the device without damaging the IC. DC blocking capacitor (1500 pF) between pin 11 and the external tuning circuit is mandatory.

Table 3: Operating Ranges

PARAMETER		MIN	TYP	MAX	UNIT
Frequency					
	RF	900	-	1200	
	LO	935	-	1350	MHz
	IF	35	-	150	
V_{DDIF}, V_{DDLO}		4.75	5.0	5.25	VDC
Case Temperature		- 55	-	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°C; V$_{DDIF}$, V$_{DDLO}$ = +5V)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Frequencies RF LO IF	- - -	1170 1245 75	- - -	MHz	
Phase Noise @ 10 KHz Offset	-	- 89	- 85.5	dBc/Hz	
Noise Figure	-	8.0	9.5	dB	
Gain (200Ω Load)[1]	7.8	9.5	-	dB	
3rd Order IMD (200Ω Load)[2]	-	- 59	- 54	dBc	
3rd Order Input IP (200Ω Load)[2]	+ 12	-	-	dBm	
Cross Modulation @ 15 KHz, [2] 99% AM Modulation	-	- 56	-	dBc	
Current Consumption	-	80	110	mA	
Power Consumption @ 5.0V	-	400	-	mW	

Notes:
(1) Combined output (IF$_1$ + IF$_2$) using a balun. NOTE: Gain at either port (uncombined), with unused port
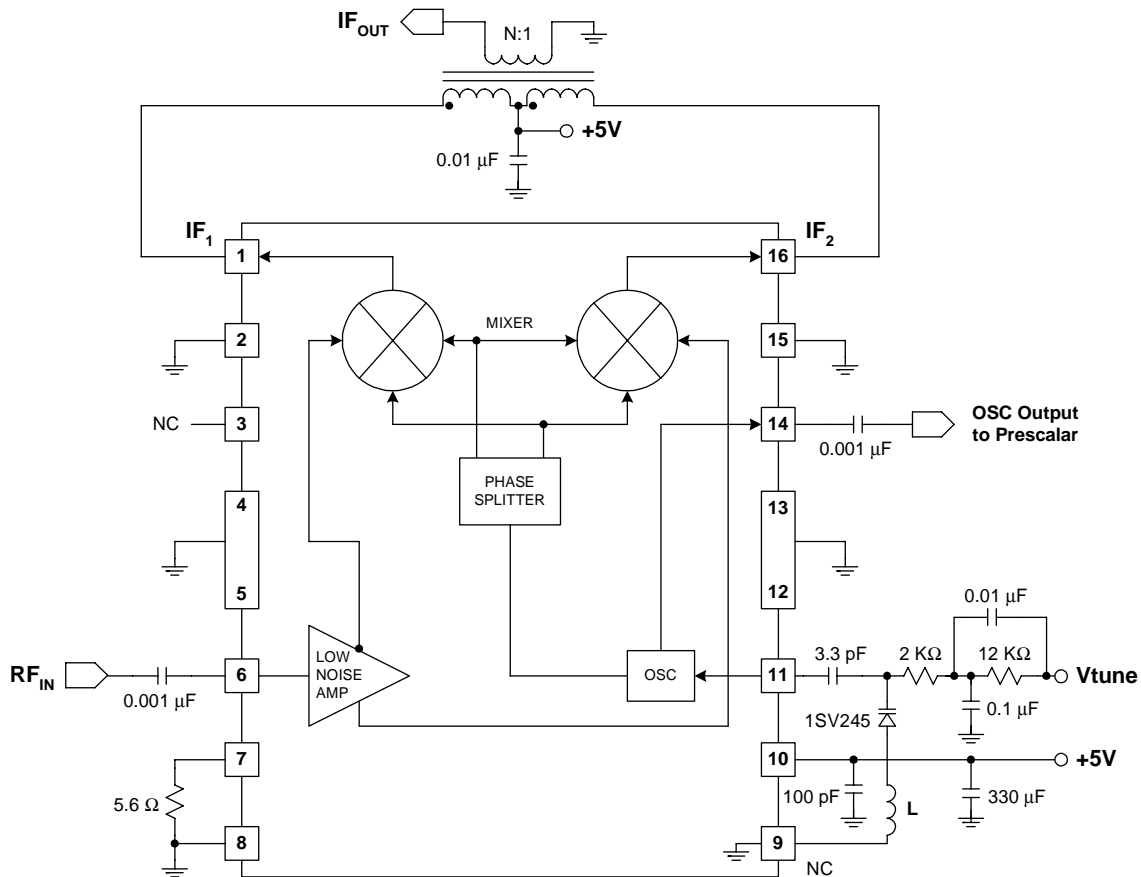*terminated in 50 W, is 3 dB lower*
(2) Two tones @ -15 dBm per tone

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IF$_{OUT}$

N:1

+5V

0.01 µF

IF$_1$

IF$_2$

1

16

MIXER

15

2

NC 3

14

OSC Output
to Prescalar

0.001 µF

PHASE
SPLITTER

4

13

5

12

0.01 µF

LOW
NOISE
AMP

OSC

3.3 pF   2 KΩ   12 KΩ

RF$_{IN}$

6

11

Vtune

0.001 µF

0.1 µF

1SV245

7

10

+5V

5.6 Ω

100 pF

L

330 µF

8

9

NC

Figure 2: Test Circuit Schematic

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PERFORMANCE DATA

Figure 3: RF Input Impedance

START:50MHz
STOP: 2000MHz

1:	50 MHz 183.00Ω - 21.75 jΩ
2:	250 MHz 135.48Ω -58.21 jΩ
3:	750 MHz 75.92Ω - 43.12 jΩ
4:	1000 MHz 64.93Ω - 32.29 jΩ
5 :	2000 MHz 43.79Ω -4.71 jΩ

MEASURED IN 50Ω SYSTEM

IMPEDANCE REFERENCE PLANE AT PIN 6
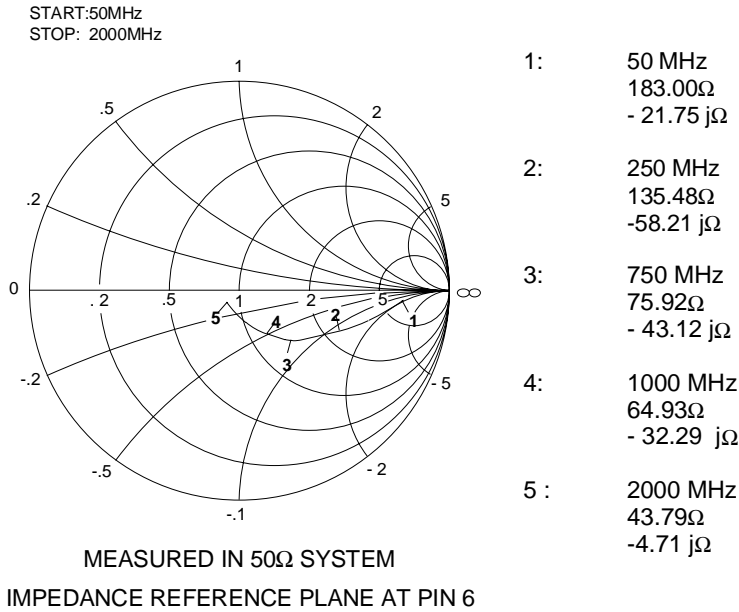
Figure 4: IF Output Impedance

START: 50 MHz
STOP: 500 MHz

1:	50 MHz 251.64Ω - 222.35 jΩ
2:	150 MHz 60.89Ω -144.22 jΩ
3:	250 MHz 26.32Ω - 89.16 jΩ
4:	400 MHz 13.24Ω - 49.55 jΩ
5 :	500 MHz 10.08Ω - 34.10 jΩ

MEASURED IN 50Ω SYSTEM

IMPEDANCE REFERENCE PLANE AT PIN 16

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Figure 5: LO Impedance

START: 50 MHz
STOP: 2000 MHz

MEASURED IN 50Ω SYSTEM
IMPEDANCE REFERENCE PLANE AT PIN 11

1:    50 MHz
    259.67Ω
    - 1200 jΩ

2:    612 MHz
    - 20.97Ω
    - 50.63 jΩ

3:    1000 MHz
    - 9.28Ω
    - 14.88 jΩ

4:    1500 MHz
    - 5.36Ω
    7.99 jΩ

5 :   2000 MHz
    0.64Ω
    27.12 jΩ
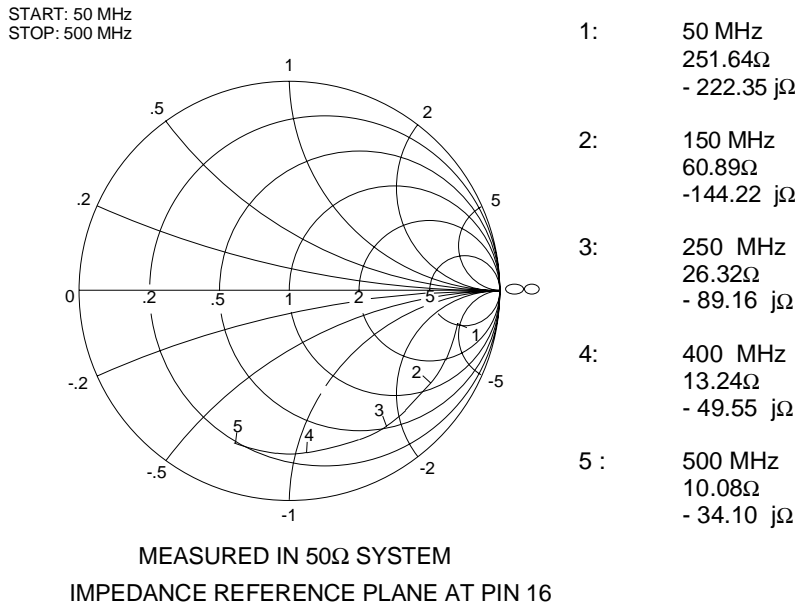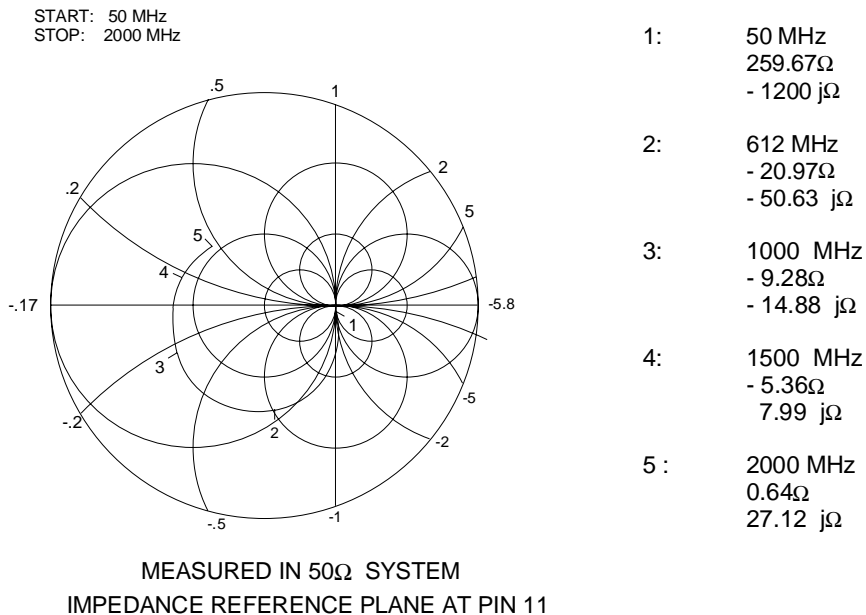
PACKAGE OUTLINE
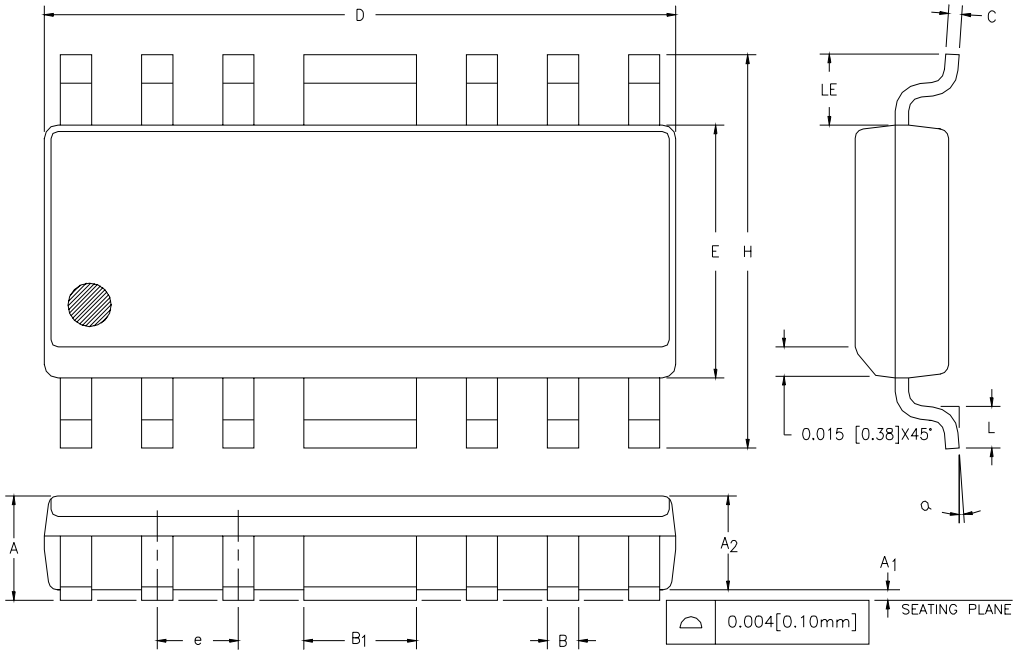
SYMBOL	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	0.058	0.068	1.47	1.73	
A_1	0.004	0.010	0.10	0.25	
A_2	0.055	0.065	1.40	1.65	
B	0.013	0.020	0.33	0.50	
B_1	0.062	0.070	1.58	1.78	
C	0.008	0.010	0.20	0.25	4
D	0.380	0.400	9.66	10.16	2
E	0.150	0.160	3.81	4.06	3
e	0.050 BSC		1.27 BSC		
H	0.226	0.244	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 6: S3 Package Outline - Modified 16 Pin SOIC

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ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
ACD0900S3CTR	-55°C to +85°C	Modified 16 Pin SOIC	Tape & Reel, 3500 pieces per reel
ACD0900RS3P1	-55°C to +85°C	RoHS Compliant Modified 16 Pin SOIC	Tape & Reel, 3500 pieces per reel

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