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# LA7784

## Monolithic Linear IC Downconverter IC for Digital CATV

### Overview

The LA7784 is a downconverter IC for digital CATV. It accepts RF input frequencies from 50 to 150MHz and supports the DOCSIS (USA) and Euro-DOCSIS (Europe) standards.

### Features

- RF Mixer.
- Attenuation control for RF Mixer.
- Driver for SAW filter.
- IF AGC amplifier.
- IF Driver amplifier for ADC.

### Specifications

#### Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$	Pin 8, 14, 19, 20, 21, 22, 26, 27	6.0	V
Circuit voltages	$V \text{ max}$	Pin 9	$V_{CC}$	V
Circuit current	$I_{12, 13}$	Pin 12, 13 sink current	2	V
Allowable power dissipation	$P_d \text{ max}$	$T_a \leq 70^\circ\text{C}$	900*	mW
Operating temperature range	$T_{opr}$		-20 to +70	$^\circ\text{C}$
Storage temperature range	$T_{stg}$		-55 to +150	$^\circ\text{C}$

\* On the board (114.3×76.1×1.6mm)

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

#### Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$	Pin 8, 14, 19, 20, 21, 22, 26, 27	5.0	V
Operating supply voltage range	$V_{CC \text{ op}}$	Pin 8, 14, 19, 20, 21, 22, 26, 27	4.5 to 5.5	V

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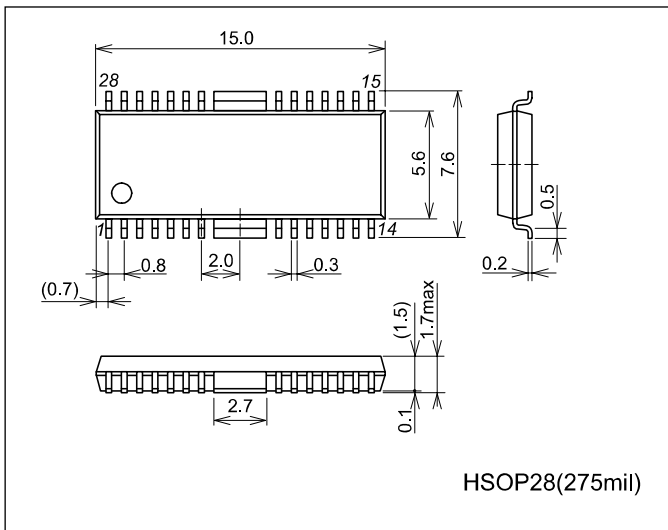
**AC Characteristics** at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 3.3\text{V}$

Parameter	Symbol	Pin No.	Conditions	Ratings			Unit
				min	typ	max	
Circuit current	$I_{\text{total}}$	8, 14, 19, 20, 21, 22, 26, 27	No Signal	80	105	130	mA
RF input frequency range	$f_{(\text{RF})}$	23, 24	$f_c: -3\text{dB}$	50		150	MHz
RF AGC range	GR1	26, 27	$V_9 = 2.5 \text{ to } 0\text{V}$	45	53		dB
Mixer conversion gain	CG1	26/23, 24 27/23, 24	$V_9 = 2.5\text{V}$	19	22	25	dB
Mixer inter modulation 1	IM3 1	26/23, 24 27/23, 24	Input = $75\text{dB}\mu$ $V_9 = 2.5\text{V}$	40	50		dB
IF input frequency range	$f_{(\text{IF})}$	4, 5	$f_c: -3\text{dB}$	30		100	MHz
IF amplifier gain	$G_{(\text{AGC})}$	12/4, 5 13/4, 5	$V_9 = 2.5\text{V}$	51	55	59	dB
IF inter modulation 2	IM3 2	12/4, 5 13/4, 5	Output = $110\text{dB}\mu$	40	50		dB
Range	GR2	12, 13	IF Output Level $< \pm 1\text{dB}$	3	5		dB
IF AGC output level	$V_{O(\text{IF}) 1}$	12	Single output		1.0		Vp-p
IF output level	$V_{O(\text{IF}) 2}$	13	Single output		1.0		Vp-p

## Package Dimensions

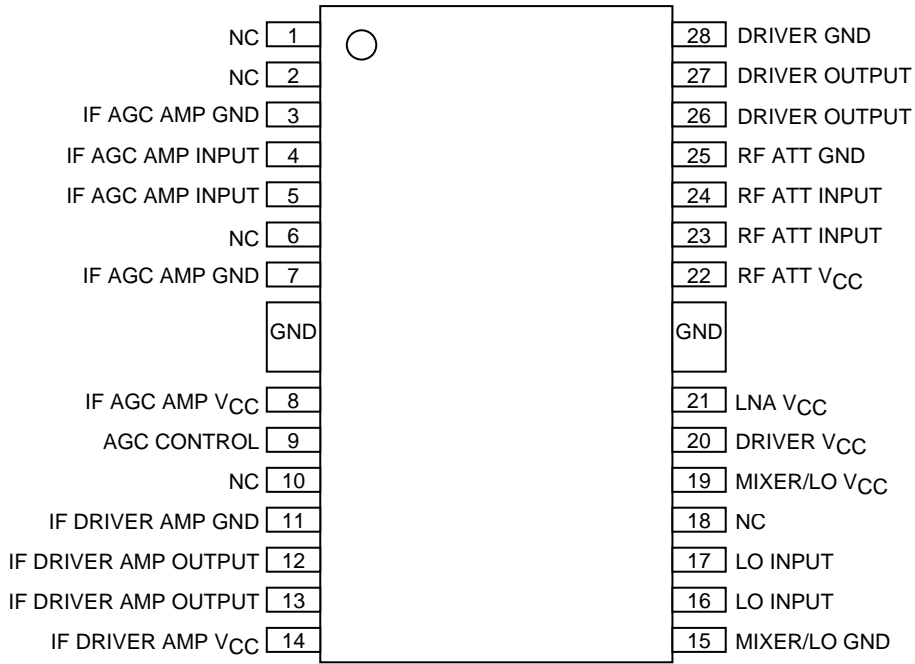
unit: mm

3222A

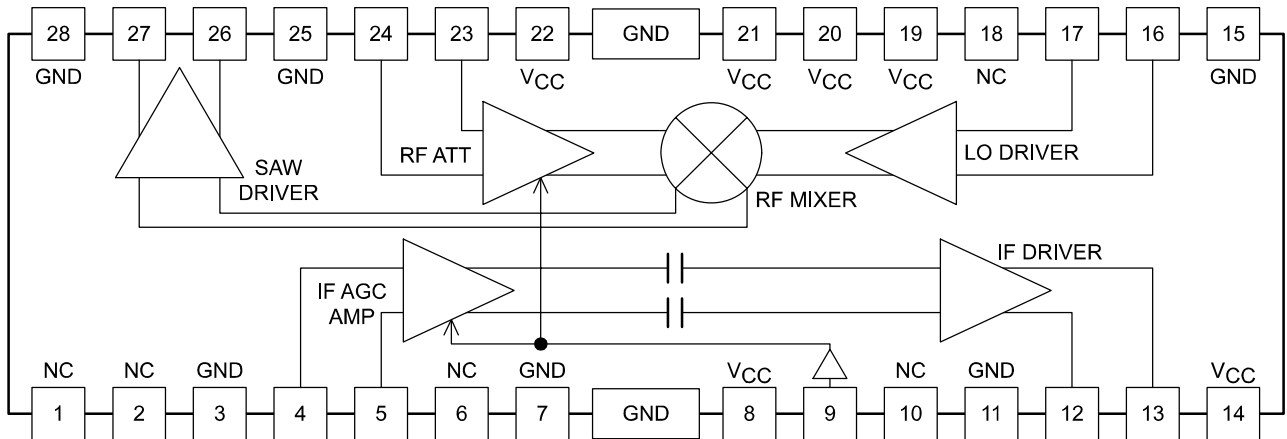


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## Pin Assignment



## Block Diagram

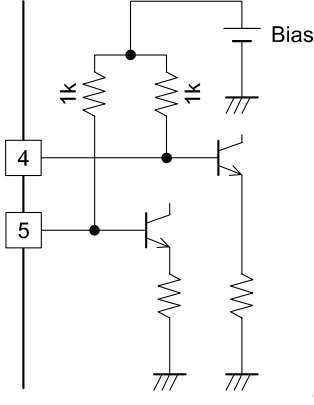
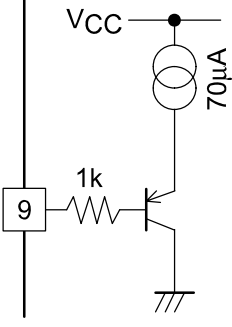


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## Pin Description

(unit: Ω)

Pin Number	Description	Equivalent circuit
1	No Connection	
2	No Connection	
3	AGC Amp GND	
4 5	AGC Amp Input	 <p style="text-align: right; font-size: small;">OMP05090</p>
6	No Connection	
7	AGC Amp GND	
8	AGC Amp V <sub>CC</sub>	
9	AGC Control	 <p style="text-align: right; font-size: small;">OMP05091</p>
10	No Connection	
11	Post Amp GND	

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(unit:  $\Omega$ )

Pin Number	Description	Equivalent circuit
12 13	Post Amp Outputs	<p style="text-align: right; margin-right: 50px;">OMP05092</p>
14	Post Amp $V_{CC}$	
15	Mixer/LO GND	
16 17	LO Input	<p style="text-align: right; margin-right: 50px;">OMP05093</p>
18	No Connection	
19	Mixer/LO $V_{CC}$	
20	Driver $V_{CC}$	

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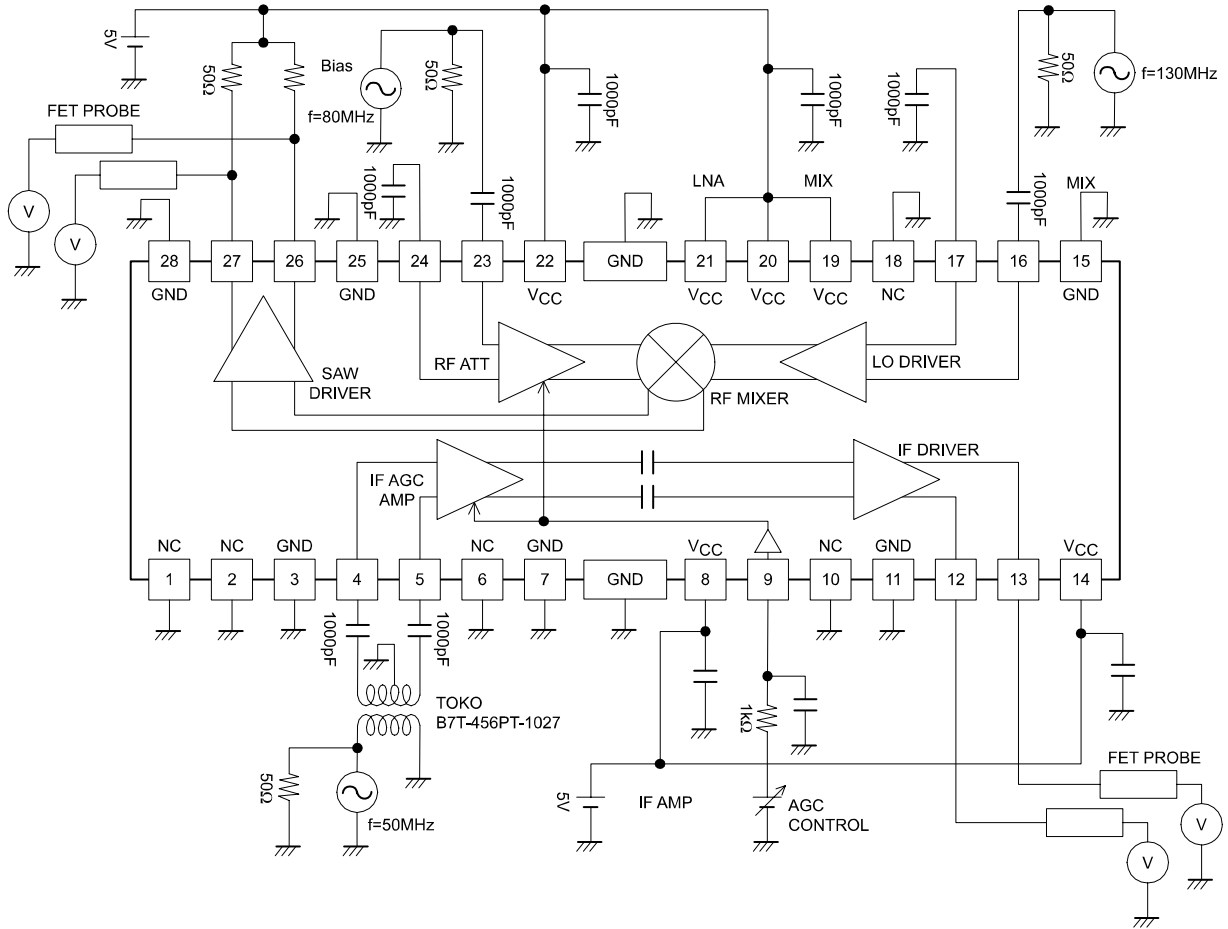
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(unit:  $\Omega$ )

Pin Number	Description	Equivalent circuit
21 22	LNA V <sub>CC</sub>	<p style="text-align: right; margin-top: 10px;">OMP05094</p>
23 24	LNA Inputs	
25	LNA GND	
26 27	Driver Outputs	<p style="text-align: right; margin-top: 10px;">OMP05095</p>
28	Driver Gnd	

Test Circuit



OMB05022

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