



# SANYO Semiconductors

## DATA SHEET

# 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*        | mA   |
| Operating temperature range | $T_{opr}$           |                                   | -20 to +70  | mW   |
| Storage temperature range   | $T_{stg}$           |                                   | -55 to +150 | °C   |

\* On the board (114.3×76.1×1.6mm)

**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    |

■ Any and all SANYO Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO Semiconductor representative nearest you before using any SANYO Semiconductor products described or contained herein in such applications.

■ SANYO Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor products described or contained herein.

**SANYO Semiconductor Co., Ltd.**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

# LA7784

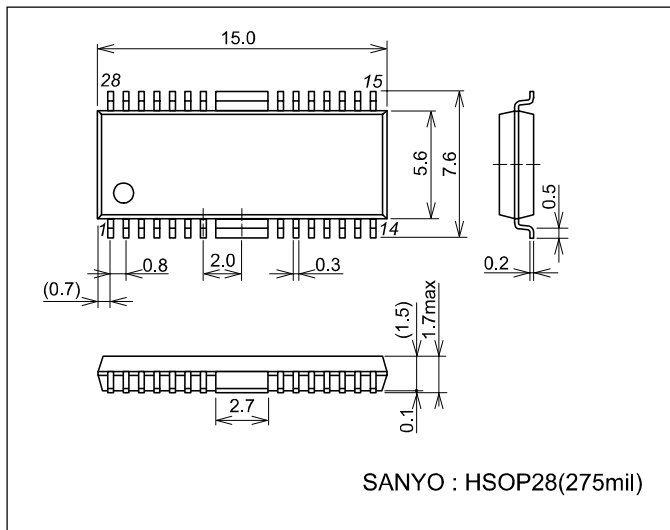
## AC Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 3.3\text{V}$

| 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                        | $V_9 = 2.5$ to $0\text{V}$                      | 45      | 53  |     | dB   |
| Mixer conversion gain    | CG1                  | 26/23, 24<br>27/23, 24        | $V_9 = 2.5\text{V}$                             | 19      | 22  | 25  | dB   |
| Mixer inter modulation 1 | IM3 1                | 26/23, 24<br>27/23, 24        | Input = $75\text{dB}\mu$<br>$V_9 = 2.5\text{V}$ | 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<br>13/4, 5            | $V_9 = 2.5\text{V}$                             | 51      | 55  | 59  | dB   |
| IF inter modulation 2    | IM3 2                | 12/4, 5<br>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 |

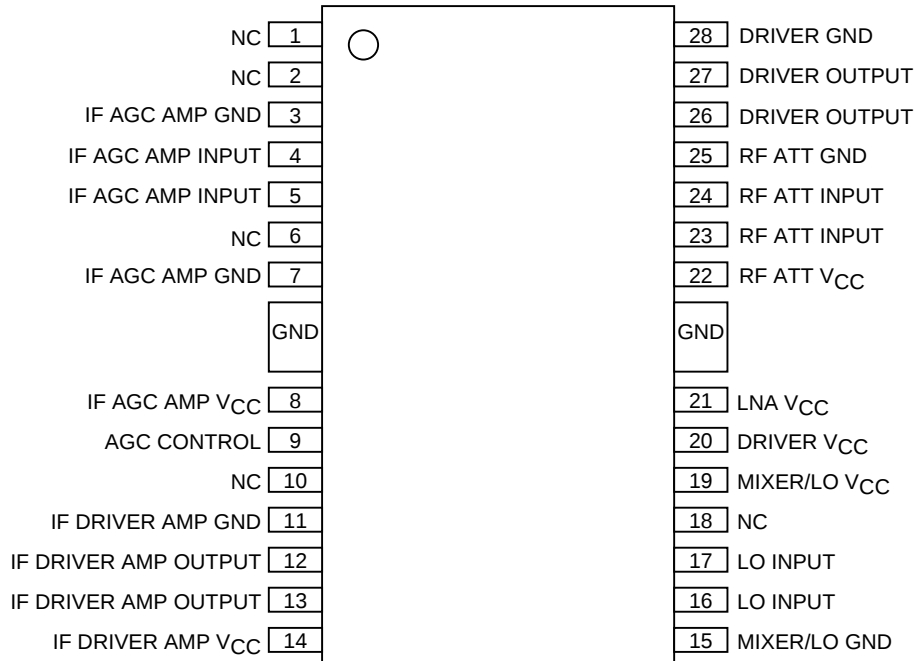
## Package Dimensions

unit: mm

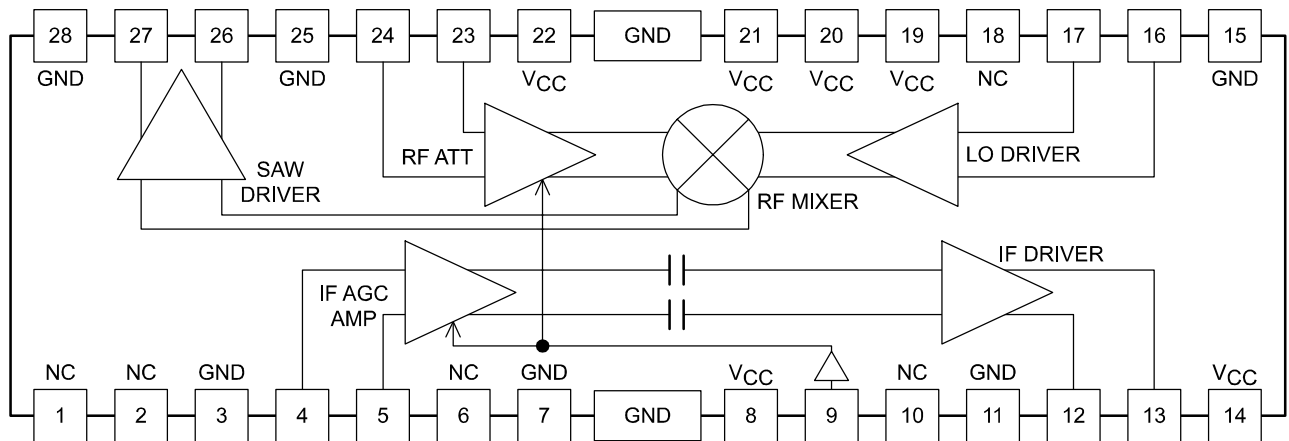
3222A



## Pin Assignment



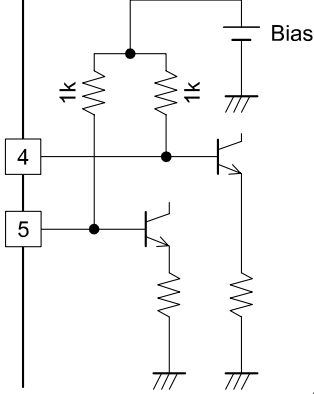
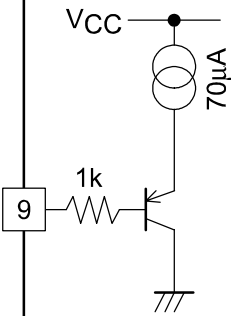
## Block Diagram



OMB05021

## Pin Description

(unit:  $\Omega$ )

| Pin Number | Description      | Equivalent circuit                                                                                  |
|------------|------------------|-----------------------------------------------------------------------------------------------------|
| 1          | No Connection    |                                                                                                     |
| 2          | No Connection    |                                                                                                     |
| 3          | AGC Amp GND      |                                                                                                     |
| 4<br>5     | AGC Amp Input    |  <p>OMP05090</p>  |
| 6          | No Connection    |                                                                                                     |
| 7          | AGC Amp GND      |                                                                                                     |
| 8          | AGC Amp $V_{CC}$ |                                                                                                     |
| 9          | AGC Control      |  <p>OMP05091</p> |
| 10         | No Connection    |                                                                                                     |
| 11         | Post Amp GND     |                                                                                                     |

Continued on next page.

# LA7784

Continued from preceding page.

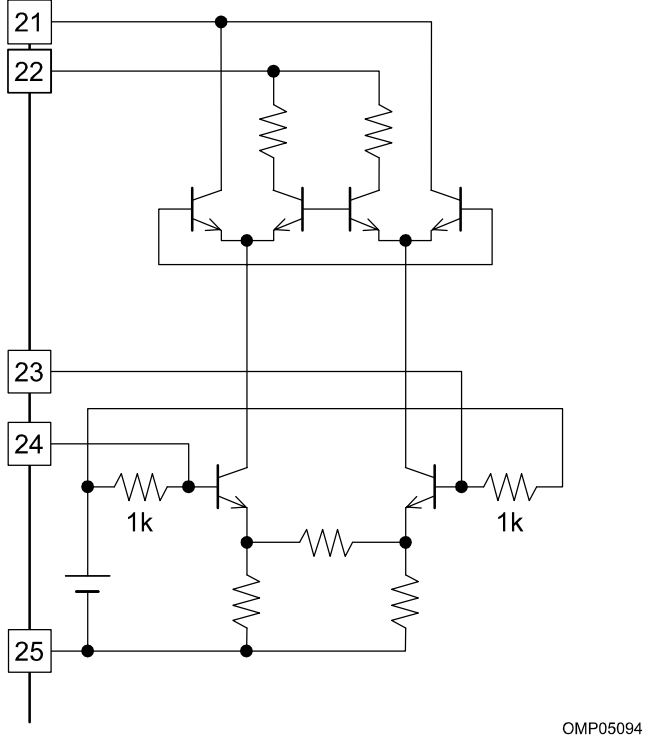
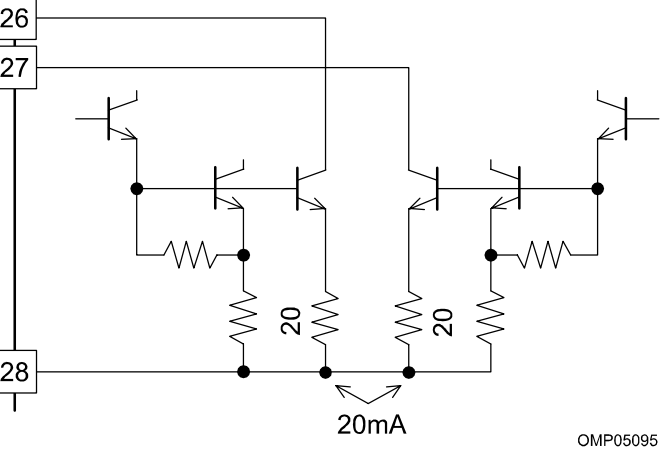
(unit:  $\Omega$ )

| Pin Number | Description       | Equivalent circuit |
|------------|-------------------|--------------------|
| 12<br>13   | Post Amp Outputs  |                    |
| 14         | Post Amp $V_{CC}$ |                    |
| 15         | Mixer/LO GND      |                    |
| 16<br>17   | LO Input          |                    |
| 18         | No Connection     |                    |
| 19         | Mixer/LO $V_{CC}$ |                    |
| 20         | Driver $V_{CC}$   |                    |

Continued on next page.

Continued from preceding page.

(unit: Ω)

| Pin Number | Description         | Equivalent circuit                                                                                   |
|------------|---------------------|------------------------------------------------------------------------------------------------------|
| 21<br>22   | LNA V <sub>CC</sub> |  <p>OMP05094</p>   |
| 23<br>24   | LNA Inputs          |                                                                                                      |
| 25         | LNA GND             |                                                                                                      |
| 26<br>27   | Driver Outputs      |  <p>OMP05095</p> |
| 28         | Driver Gnd          |                                                                                                      |

