



*SANYO Semiconductors*

**DATA SHEET**

**LA7791T**

Monolithic Linear IC

For CATV/Cable Modem

Variable Gain Controlled Amplifier

## Overview

The LA7791T is variable gain controlled amplifier with upstream driver. It is ideally suited for use with QAM/QSPK transmitter system.

## Functions

- Differential input amplifier
- Attenuator amplifier
- Driver amplifier with differential output
- Power Save function (Power Save control pin)
- Shut Down function (Shut Down control pin)
- Serial bus interface

## Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Supply Voltage	$V_{CC}$ max	Pin 2,19	6.0	V
Maximum Voltages1	$V_{in}$ max	Pin 8,9,10,12,18	$V_{CC}$	V
Maximum Voltages2	$V_{out}$ max	Pin 15,16	8.0	V
Allowable Power Dissipation	$P_{dmax}$	$T_a \leq +75^\circ\text{C}$	830	mW
Operating Temperature Range	$T_{opr}$		-20 to +75	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$		-55 to +150	$^\circ\text{C}$

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# LA7791T

## Recommended Operating Conditions at $T_a = 25^\circ C$

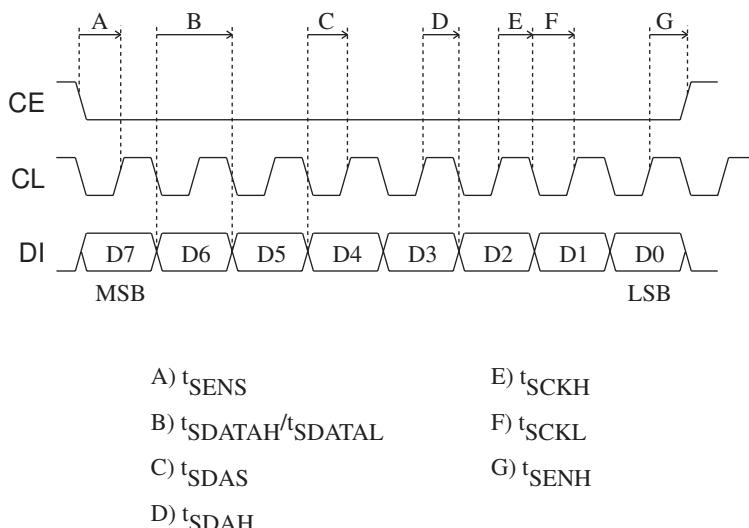
Parameter	Symbol	Conditions	Ratings	Unit
Recommended Supply Voltage	$V_{CC}$	Pin 2,19	5.0	V
Operating Supply Voltage Range	$V_{CC\ op}$	Pin 2,19	4.75 to 5.25	V

**Electrical Characteristics** at  $T_a = 25^\circ C$ ,  $V_{CC} = 5V$ ,  $V_{in} = 29dBmV$  diff.,  $f = 20MHz$ ,  $R_{in} = 75\Omega$ ,  $R_{out} = 75\Omega$ , unless otherwise noted.

Parameter	Symbol	Pin No.	Conditions	Ratings			Unit
				min	typ	max	
Quiescent Current 1	$I_{CCO-1}$	2,15,16,19	0 to 15dB attenuation		180		mA
Quiescent Current 2	$I_{CCO-2}$	2,15,16,19	16 to 63dB attenuation		90		mA
Quiescent Current 3	$I_{CCO-ps}$	2,15,16,19	Power Save Mode (TXEN:V18=0V)		6.6		mA
Quiescent Current 4	$I_{CCO-swsd}$	2,15,16,19	Software Shut Down Mode (D7=0)		3.4		mA
Quiescent Current 5	$I_{CCO-sd}$	2,15,16,19	Shut Down Mode (SD:V12=0V)		1.2		mA
<b>Input Characteristics</b>							
Input Impedance	$Z_{in}$	5,6		1.6	2	2.4	$k\Omega$
<b>Overall Characteristics</b>							
Gain Flatness	Rfrq	5,6,15,16	$V_{out}=60dBmV$ Diff, $f=5$ to $42MHz$ , Ref at $20MHz$		0.5		dB
Gain Flatness	Rfrq	5,6,15,16	$V_{out}=60dBmV$ Diff, $f=5$ to $65MHz$ , Ref at $20MHz$		1.5	2.0	dB
Gain Control Range	Gcont	5,6,15,16	$f=20MHz$ , Differential output		63		dB
Maximum Gain	Gmax	5,6,15,16	$f=20MHz$ , Differential output	31.2	33.7	36.2	dB
Minimum Gain	Gmin	5,6,15,16	$f=20MHz$ , Differential output		-29.3		dB
Gain Step	Gstep	5,6,15,16	$f=20MHz$ , Differential output	0.7	1	1.3	dB
IM2	IM2	5,6,15,16	40MHz and 40.2MHz 54dBmV/tone Diff.	50	65		$dBc$
IM3	IM3	5,6,15,16	40MHz and 40.2MHz 54dBmV/tone Diff.	46	62		$dBc$
<b>Output Characteristics</b>							
Output Signal Level	$V_o$	5,6,15,16	Differential output		63		$dBmV$
Output Noise Level	$V_n$	5,6,15,16	Differential output		187	300	$nV\sqrt{Hz}$
Switching transients voltage	$V_{tran}$	5,6,15,16	Differential output	5	100		$mV$
<b>Power Save Characteristics</b> (Low active: Low---Power Save mode)							
Power Save Attenuation	Att-ps	5,6,15,16, 18	$V_{in}=29dBmV$ , 5 to $70MHz$ , $V_{in}/V_{out}$	59	85		dB
Setting Time	Tset	15,16,18	TXEN(18pin) on/off		2		us
Power Save on Voltage	$V_{ps-on}$	15,16,18	Low, TXEN off			0.8	V
Power Save off Voltage	$V_{ps-off}$	15,16,18	High, TXEN on	2.0		$V_{CC}$	V
<b>Shut Down Characteristics</b> (Low active: Low---Shut Down mode)							
Shut Down on Voltage	$V_{shut-on}$	12,15,16	Low, SD(12pin) on			0.8	V
Shut Down off Voltage	$V_{shut-off}$	12,15,16	High, SD(12pin) off	2.0		$V_{CC}$	V

## Serial Timing Characteristics

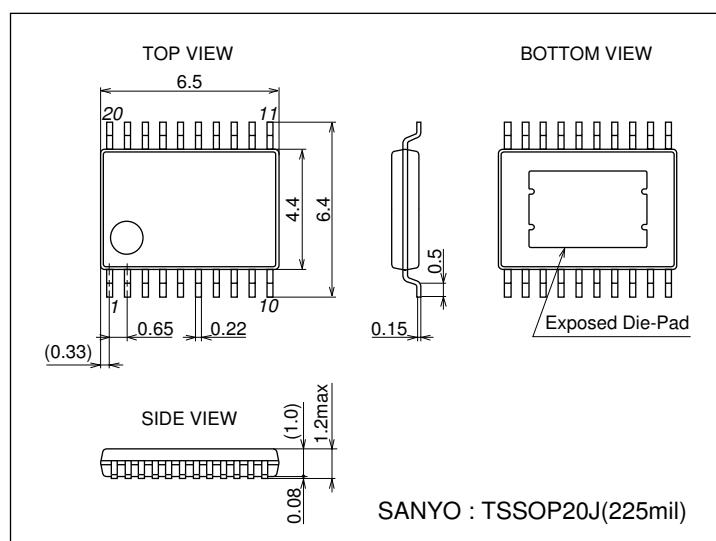
Parameter	Symbol	Pin No.	Conditions	Ratings			Unit
				min	typ	max	
CE to CL Rise Setup Time	$t_{SENS}$	8,10		100			ns
CE to CL Rise Hold Time	$t_{SENH}$	8,10		100			ns
DI to CL Setup Time	$t_{SDAS}$	9,10		100			ns
DI to CL Hold Time	$t_{SDAH}$	9,10		100			ns
DI Pulse Width High	$t_{DATAH}$	9		200			ns
DI Pulse Width Low	$t_{DATAL}$	9		300			ns
CL Pulse Width High	$t_{SCKH}$	10		200			ns
CL Pulse Width Low	$t_{SCKL}$	10		300			ns



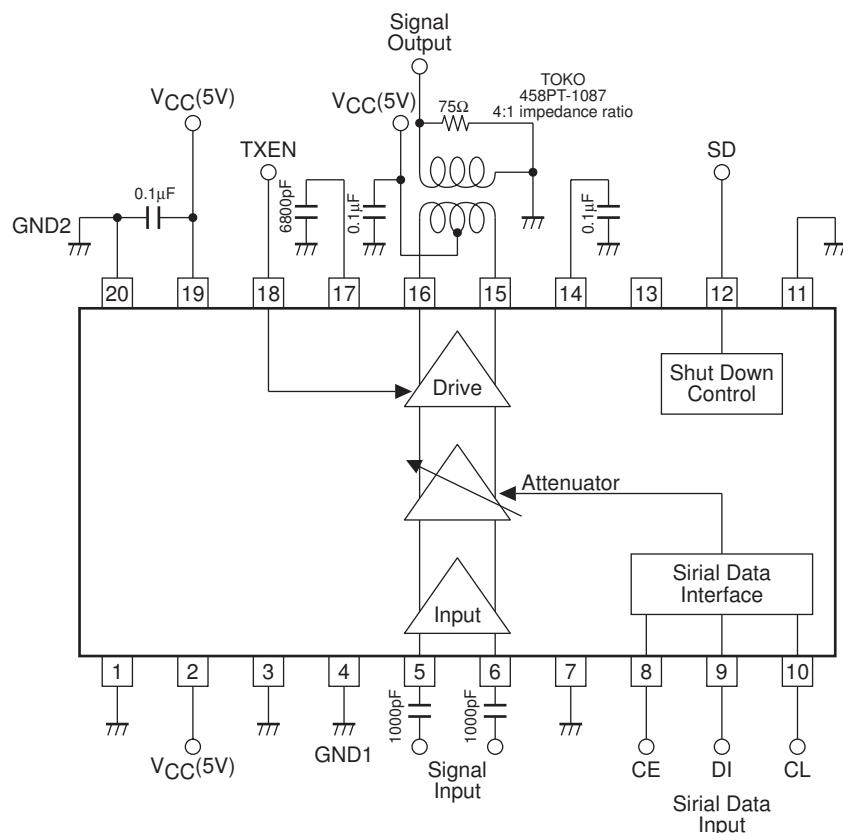
## Package Dimensions

unit : mm (typ)

3279



## Block Diagram and Application Circuit Example



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