SM7498HL

3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

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(Prelimiary)

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3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

GENERAL DESCRIPTION

The SM7498HL is a stereo Class AB audio power amplifier that drives 3 W/channel of continuous RMS power into a 16-Ω load. Advanced dc volume control minimizes external components.TV and monitor benefit from the integrated feature set that minimizes external components without sacrificing functionality.

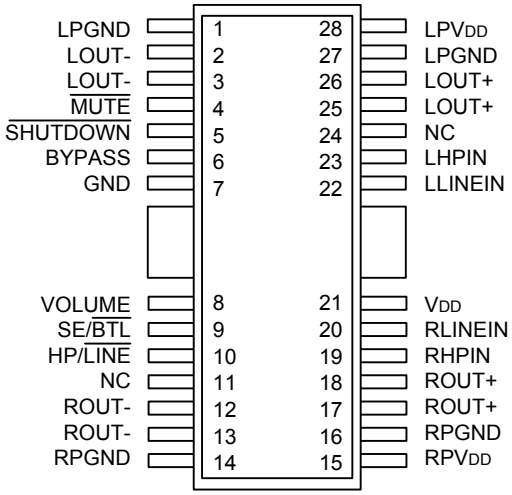
FEATURES

* 32-step DC volume control
* Mute and shutdown mode
* Short circuit and thermal protection
* SE and BTL selector
* 3 W Into 16 -Ω Speakers
* Input MUX
* Depop circuitry

APPLICATIONS

* Small panel LCD TV
* LCD Monitors
* Portable DVD
* Mini speaker
* Digital broadcast system

PIN ASSIGNMENTS (TOP VIEW)



SM7498HL 28PIN

PIN DESCRIPTIONS

No.	Pin Name	I / O	Function
1.27	LPGND	-	Left channel power ground
2.3	LOUT-	O	Left channel negative audio output
4	$\overline{\text{MUTE}}$	I	Places the amplifier in mute mode if a TTL logic low is placed on this terminal
5	$\overline{\text{SHUTDOWN}}$	I	Places the amplifier in shutdown mode if a TTL logic low is placed on this terminal
6	BYPASS	I	Tap to voltage divider for internal midsupply bias generator used for analog reference.
7	GND	-	Power ground
8	VOLUME	I	Terminal for dc volume control. DC voltage range is 0V to 5V
9	SE/$\overline{\text{BTL}}$	I	Output MUX control. When this terminal is high, SE outputs are selected. When this terminal is low, BTL outputs are selected.
10	HP/$\overline{\text{LINE}}$	I	Input MUX control. When logic high, RHPIN and LHPIN inputs are selected. When logic low, RLINEIN and LLINEIN inputs are selected.
12.13	ROUT-	O	Right channel negative audio output
14,16	RPGND	-	Right channel power ground
15	RPV_{DD}	-	Supply voltage terminal for right power stage
17.18	ROUT+	O	Right channel positive audio output
19	RHPIN	I	Right channel input, selected when HP/$\overline{\text{LINE}}$ is held high
20	RLINEIN	I	Right channel input, selected when HP/$\overline{\text{LINE}}$ is held low
21	V_{DD}	-	Supply voltage terminal
22	LLINEIN	I	Left channel input, selected when HP/$\overline{\text{LINE}}$ is held low
23	LHPIN	I	Left channel input, selected when HP/$\overline{\text{LINE}}$ is held high
25.26	LOUT+	O	Left channel positive audio output
28	LPV_{DD}	-	Supply voltage terminal for left power stage
11.24	NC		No connection

MAXIMUM RATINGS (Ta = 40~85°C)

Characteristic	Symbol	Rating	Unit
Supply Voltage	V_{DD}	-0.3 ~ 14.5	V
Input Voltage	V_I	- 0.3 ~ V_{DD} +0.3	V
Operating free-air temperature range	T_A	- 40 ~ 85	°C
Operaing junction temperature range	T_J	- 40 ~150	°C
Storage temperature range	T_{stg}	- 65 ~150	°C
Lead temperature 1.6 mm (1/16 inch) from case for 10 seconds	-	260	°C

RECOMMENDED OPERATING CONDITION

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	V_{DD}	--	9.0		13.5	V
High-level input voltage	V_{IH}	MUTE , $\overline{\text{SHUTDOWN}}$ SE/$\overline{\text{BTL}}$, HP/$\overline{\text{LINE}}$	4.0		V_{DD}	V
Low-level input voltage	V_{IL}	MUTE , $\overline{\text{SHUTDOWN}}$ SE/$\overline{\text{BTL}}$, HP/$\overline{\text{LINE}}$	0		0.8	V
Operating free-air temperature	T_A	--	- 40		85	°C

ELECTRICAL CHARACTERISTICS

(V_{DD} =PV_{DD} = 12V, Ta = 25°C unless otherwise noted)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Supply current	I_{DD}	No load		25	40	mA
Shutdown current	I_{SD}	$\overline{SHUTDOWN}$=0V, SE/$\overline{BTL}$=0V		1	20	uA
Mute current	Imute	Mute = 0V, SE/$\overline{BTL}$=0V		2.0		mA
Output offset voltage (measured differentially)	$\lvert V_{OO} \rvert$	Gain=20dB, SE/$\overline{BTL}$=0V			50	mV
High-level input current ($\overline{SE/BTL}$,$\overline{SHUTDOWN}$,HP/$\overline{LINE}$,$\overline{MUTE}$)	$\lvert I_{IH} \rvert$	VI = V_{DD} = PV_{DD}			1	uA
Volume					150	
Low-level input current ($\overline{SE/BTL}$,$\overline{SHUTDOWN}$,VOLUME, HP/$\overline{LINE}$, $\overline{MUTE}$)	$\lvert I_{IL} \rvert$	VI= 0V			1	uA
Bypass voltage (Nominally V_{DD}/2)	$V_{(BYPASS)}$	Measured at pin 6,No load (1)		6		V
Short to GND current limit	I Short	V_{IN} = 0V, R_L = 900mΩ		1.1		A

OPERATING CHARACTERISTICS

(V_{DD} =PV_{DD} =12V, R_L =16Ω, Gain = 6dB, Ta = 25°C unless otherwise noted)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Power (2)	P_O	THD+N=1%, f=1kHz, R_L=16Ω ,BTL mode , Gain=20dB		2.7		W
		THD+N=10%, f=1kHz, R_L=16Ω ,BTL mode , Gain=20dB		3.2		
		THD+N=1%, f=1kHz, R_L=8Ω ,SE mode , Gain=14dB		1.4		
		THD+N=10%, f=1kHz, R_L=8Ω ,SE mode , Gain=14dB		1.7		
High-level output voltage	V_{OH}	Measured between output and V_{DD}			600	mV
Low-level output voltage	V_{OL}	Measured between output and GND			400	mV
Supply current, max Power into a 16 Ω load	I_{DD}	Output current PO=3W, Stereo repetitive peak			1.5	ARMS
Total harmonic distortion+noise	THD + N	P_O =1W, f=1KHz, f=20Hz to 30kHz BTL Mode		0.1		%
Maximum output power bandwidth	B_{OM}	THD=5%		> 20		kHz
Noise output voltage (3)		Gain = 0dB,$C_{(BYP)}$ =1.0 uf		36		μVRMS

(1) At 9.0V < V_{DD} < 13.5V the DC bypass voltage is approximately V_{DD}/2

(2) Output power is measured at the output terminals of the IC.

(3) Noise voltage is measured in a bandwidth of 22Hz to 22KHz.

Table 1. DC Volume Control (V_{DD} = 12V, No Load, Volme pin = 5V)

Voltage on volume pin (V_{DC})	Speaker volume (dB)	Headphone volume (dB)
0 ~ 0.65	-65	-70
0.65 ~ 0.79	-39.5	-45.4
0.79 ~ 0.91	-37.6	-43.6
0.91 ~ 1.05	-35.6	-41.6
1.05 ~ 1.18	-33.5	-39.5
1.18 ~ 1.30	-31.7	-37.7
1.30 ~ 1.44	-29.6	-35.7
1.44 ~ 1.56	-27.7	-33.7
1.56 ~ 1.70	-25.9	-32.0
1.70 ~ 1.82	-23.8	-29.8
1.82 ~ 1.96	-22.1	-28.1
1.96 ~ 2.08	-20.0	-26.0
2.08 ~ 2.21	-18.0	-24.1
2.21 ~ 2.35	-15.9	-21.9
2.35 ~ 2.47	-13.9	-20.0
2.47 ~ 2.59	-12.0	-18.1
2.59 ~ 2.73	-10.0	-16.0
2.73 ~ 2.85	-7.97	-14.0
2.85 ~ 2.99	-5.97	-12.0
2.99 ~ 3.12	-4.00	-10.0
3.12 ~ 3.24	-2.01	-8.04
3.24 ~ 3.38	0.01	-6.01
3.38 ~ 3.50	1.98	-4.05
3.50 ~ 3.64	3.96	-2.07
3.64 ~ 3.76	5.97	0.05
3.76 ~ 3.89	7.98	1.96
3.89 ~ 4.02	9.96	3.95
4.02 ~ 4.15	12.0	5.95
4.15 ~ 4.29	13.9	7.93
4.29 ~ 4.41	15.9	9.92
4.41 ~ 4.53	18.0	11.9
4.53 ~ 5.00	19.9	13.9

APPLICATION INFORMATION

Application circuit using the SM7498HL in an LCD monitor with 16Ω speaker outputs and volume control

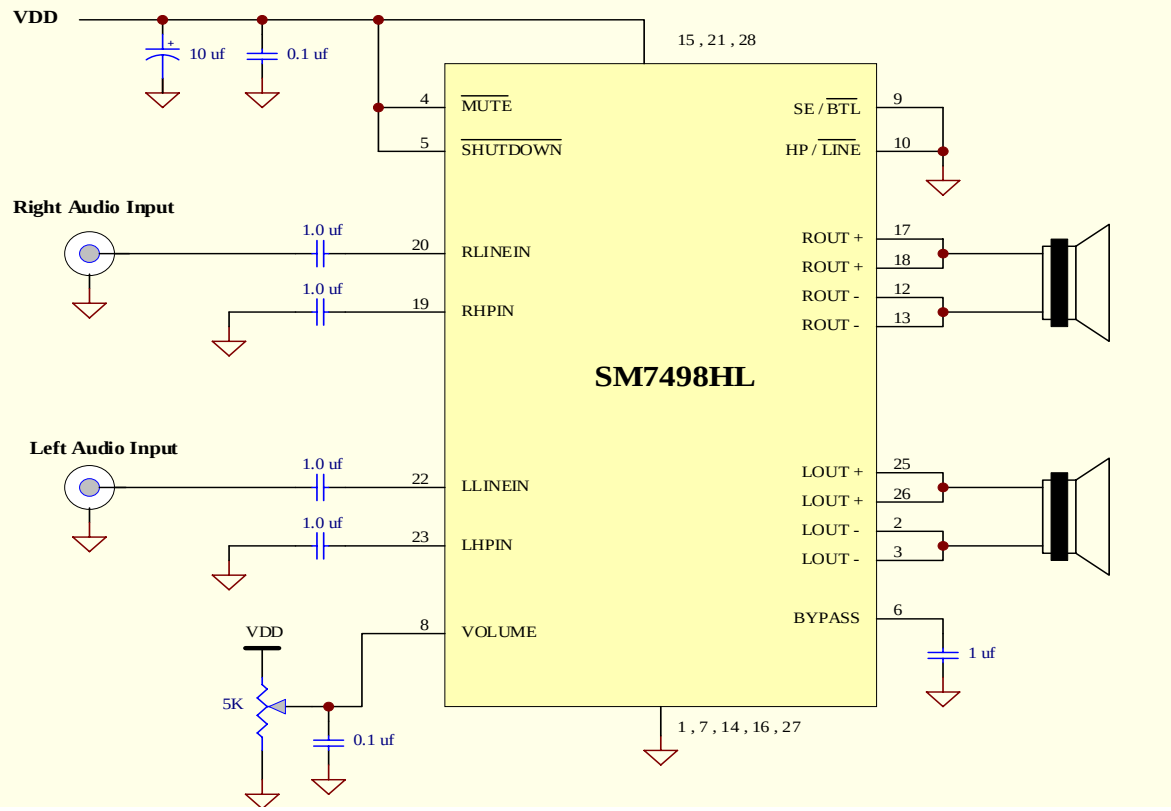


Figure 1. Typical Bridge-Tied-Load(BTL) audio amplifier application circuit for an LCD monitor

APPLICATION INFORMATION

Application circuit using the SM7498HL in an LCD monitor with 8Ω speaker outputs and volume control

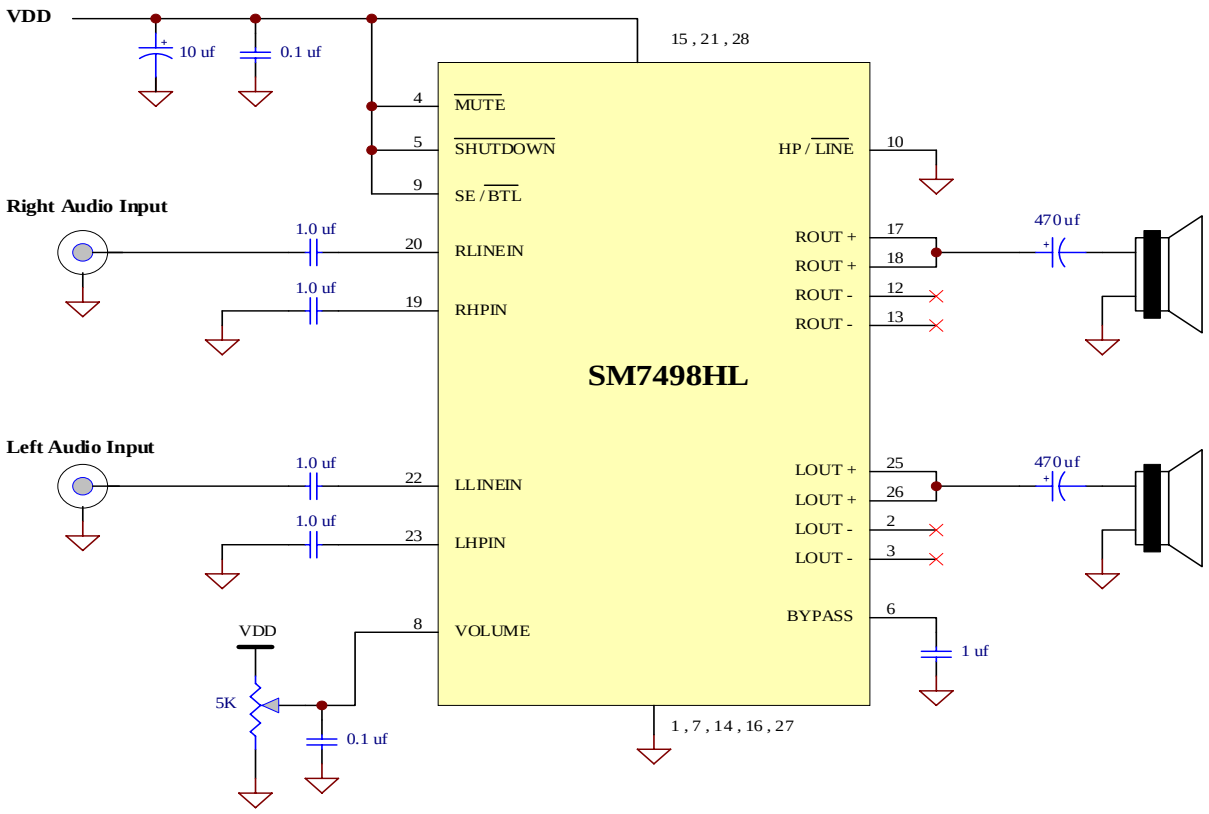
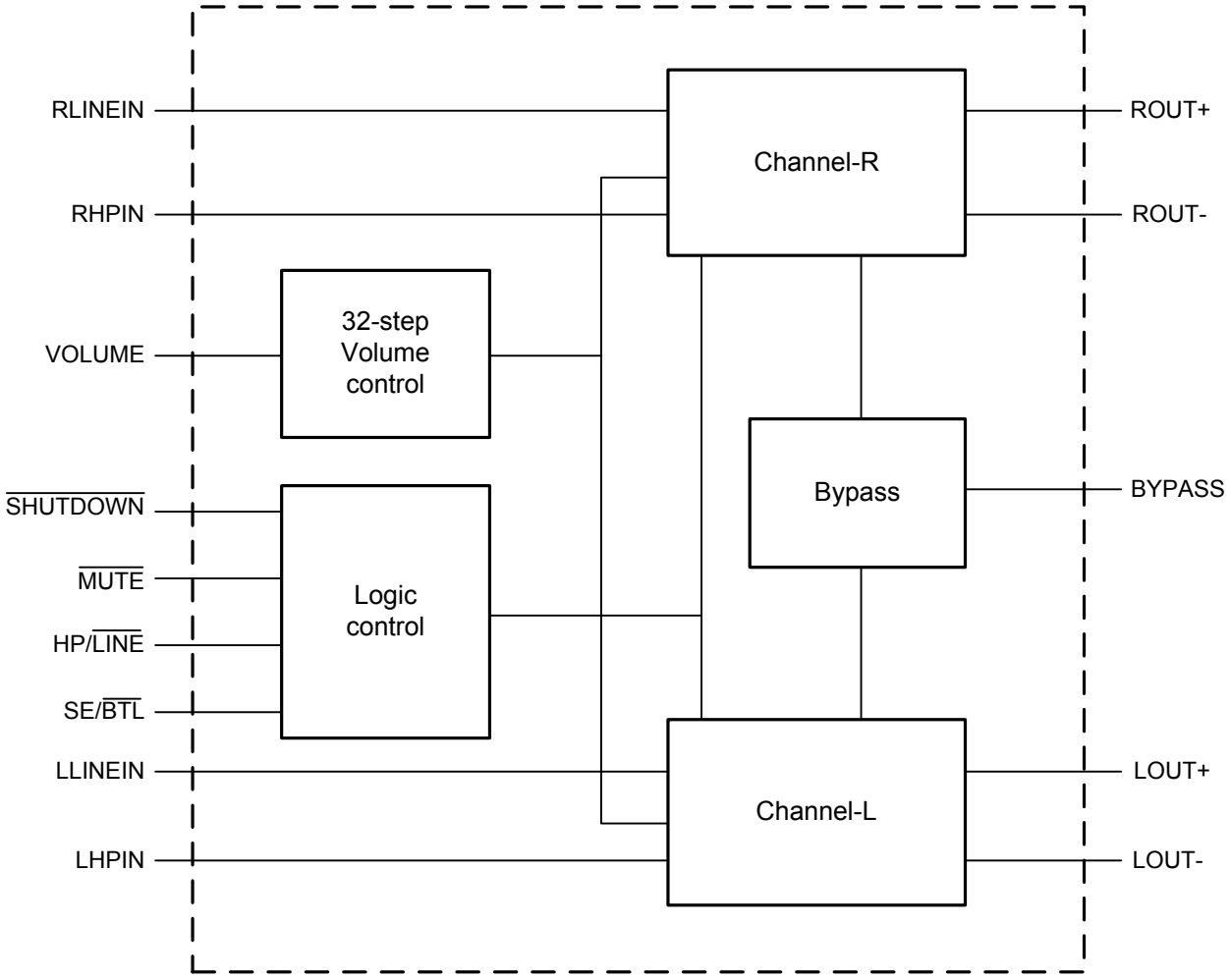


Figure2. Typical Single-Ended (SE) audio amplifier application circuit for an LCD monitor

FUNCTIONAL BLOCK DIAGRAM



TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

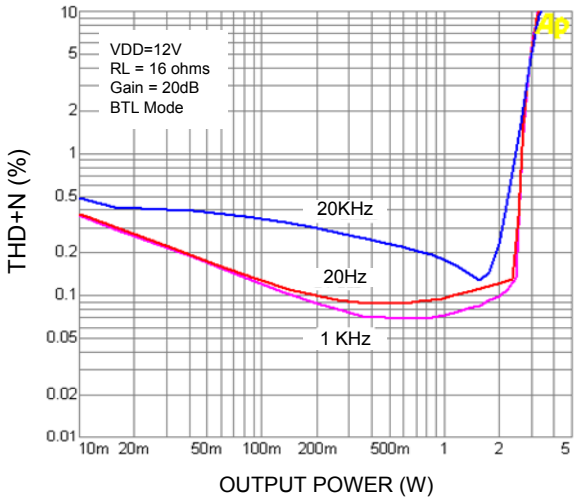


Figure 3

TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

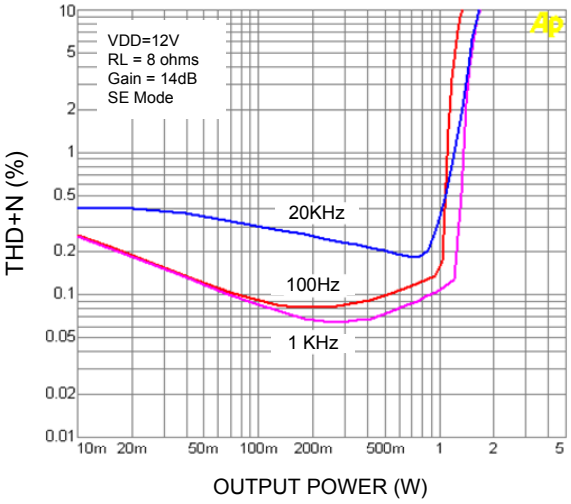


Figure 4

TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

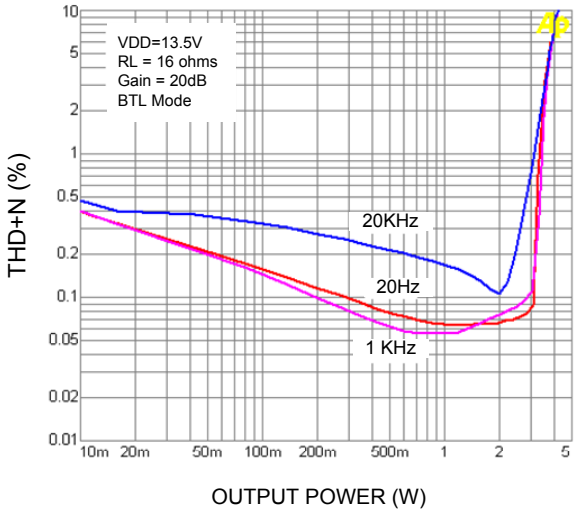


Figure 5

TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

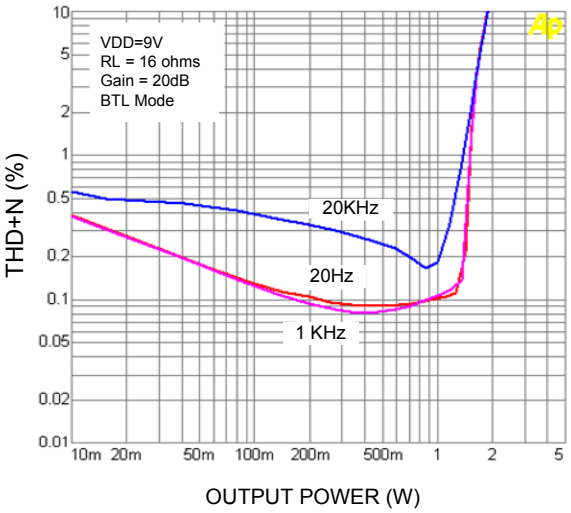


Figure 6

TOTAL HARMONIC DISTORTION +NOISE
vs.
FREQUENCY

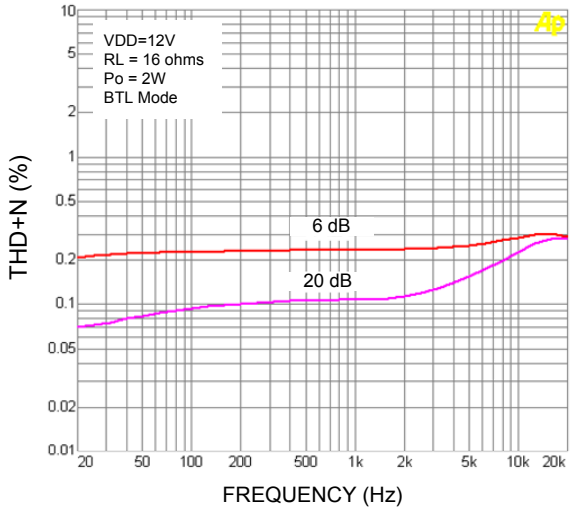


Figure 7

TOTAL HARMONIC DISTORTION +NOISE
vs.
FREQUENCY

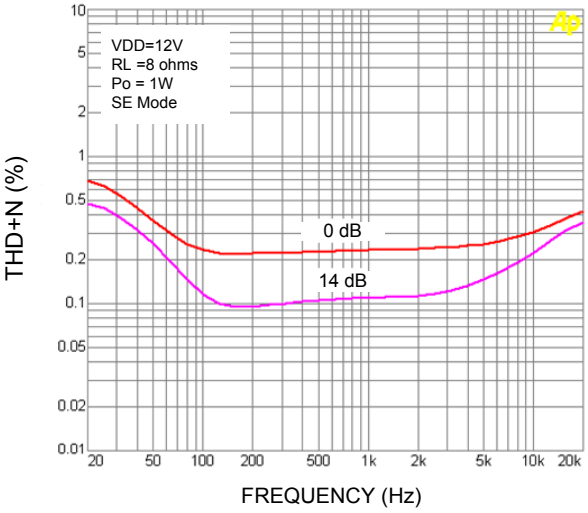


Figure 8

CLOSED LOOP RESPONSE

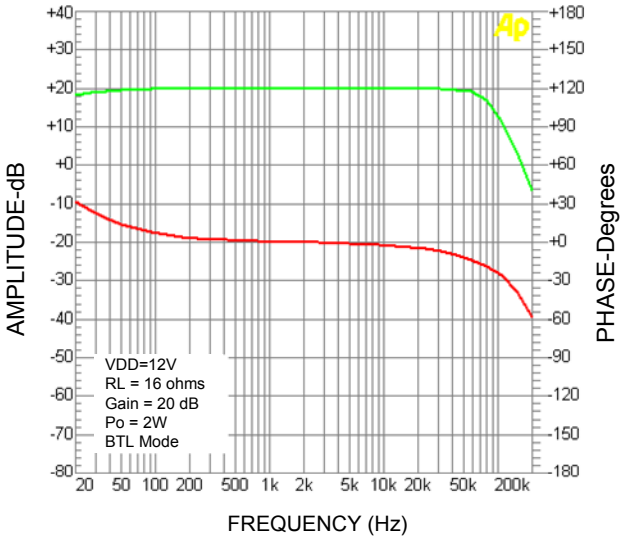


Figure 9

CLOSED LOOP RESPONSE

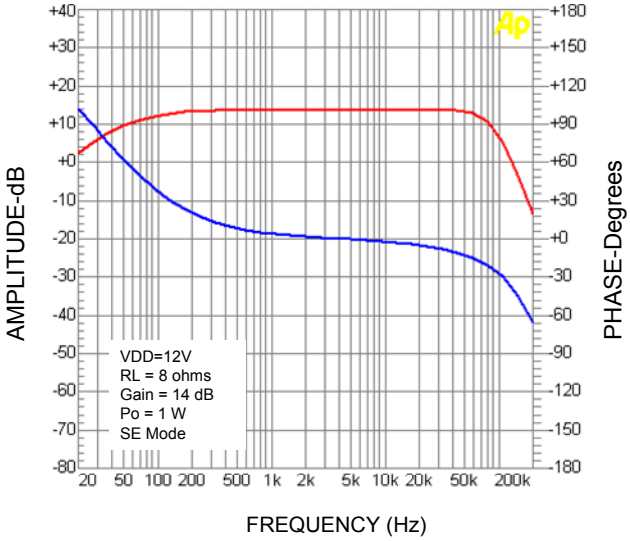


Figure 10

CROSSTALK vs.FREQUENCY

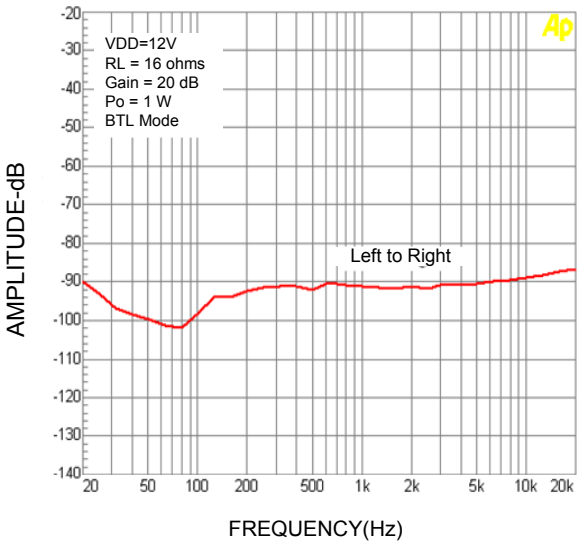


Figure 11

OUTPUT NOISE VOLTAGE vs.FREQUENCY

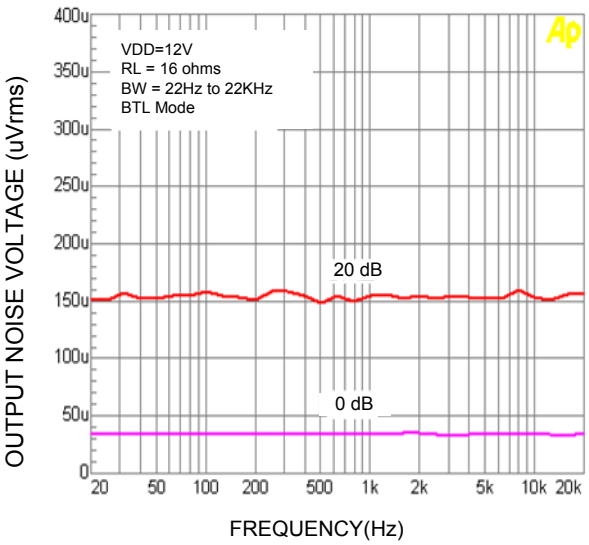


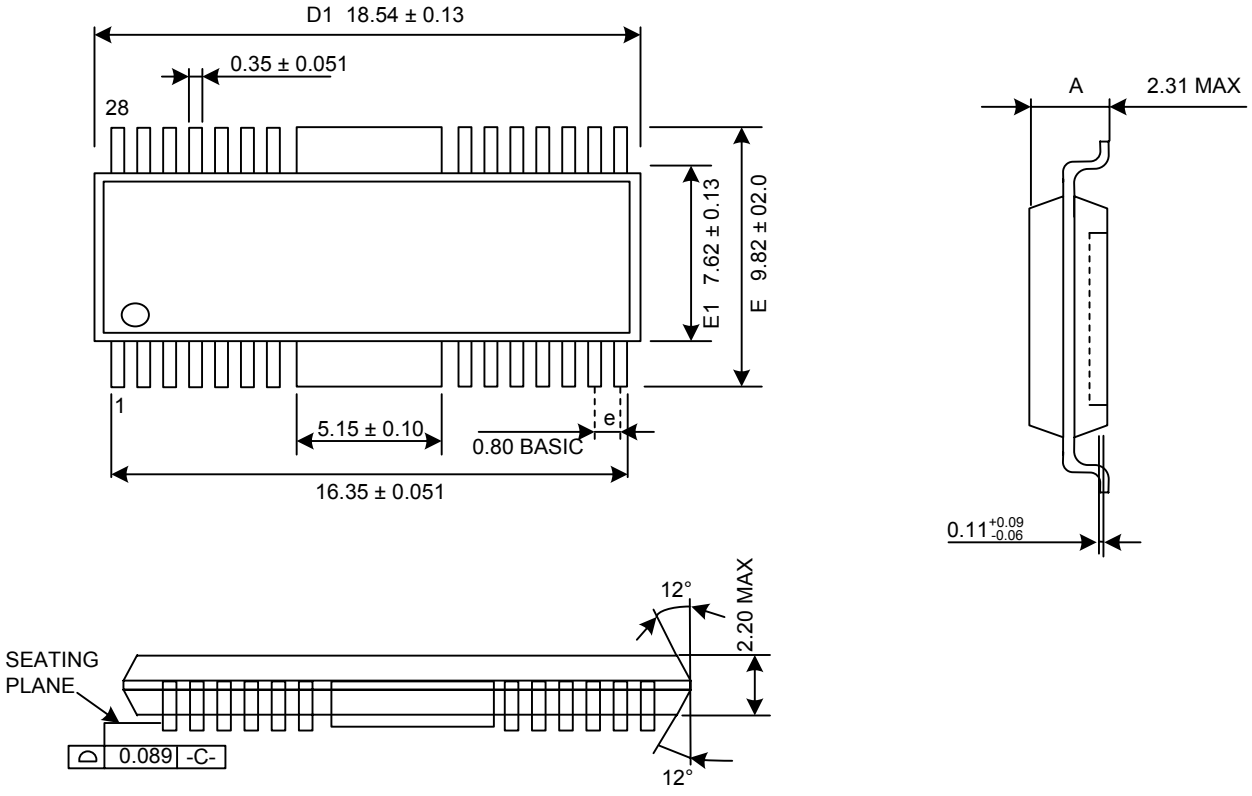
Figure 12

3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

PACKAGE OUTLINE

Unit : mm

SM7498HL 28 PIN HSOP (150mil)



NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (MM) .
2. DIMENSION D1&E1 DOES NOT INCLUDE MOLD PROTRUSION.
3. COPLANARITY OF ALL LEADS SHALL BE (BEFORE TEST) 0.089 MM MAX. FROM THE SEATING PLANE. UNLESS OTHERWISE SPECIFIED.