



三合微科股份有限公司
SAMHOP Microelectronics Corp.

SM7498HL

3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

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**3W STEREO AUDIO POWER AMPLIFIER
WITH ADVANCED DC VOLUME CONTROL**

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(Preliminary)**

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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

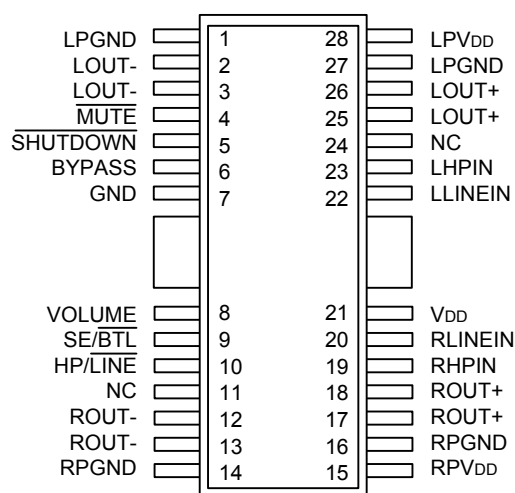
- * 32-step DC volume control
- * Mute and shutdown mode
- * Short circuit and thermal protection
- * SE and BTL selector
- * 3 W Into 16 -Ω Speakers
- * Input MUX
- * Depop circuitry

APPLICATIONS

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

PIN ASSIGNMENTS (TOP VIEW)



SM7498HL 28PIN



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SM7498HL**3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL****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



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SM7498HL**3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL****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
Operating 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 , SHUTDOWN SE/BTL , HP/LINE	4.0		V _{DD}	V
Low-level input voltage	V _{IL}	MUTE , SHUTDOWN SE/BTL , HP/LINE	0		0.8	V
Operating free-air temperature	T _A	--	- 40		85	°C

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SM7498HL**3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL****ELECTRICAL CHARACTERISTICS**(V_{DD} = PV_{DD} = 12V, T_a = 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}	SHUTDOWN=0V, SE/BTL=0V		1	20	uA
Mute current	I _{MUTE}	Mute = 0V, SE/BTL=0V		2.0		mA
Output offset voltage (measured differentially)	V _{OO}	Gain=20dB, SE/BTL=0V			50	mV
High-level input current (SE/BTL, SHUTDOWN, HP/LINE, MUTE)	I _{IH}	V _I = V _{DD} = PV _{DD}			1	uA
Volume					150	
Low-level input current (SE/BTL, SHUTDOWN, VOLUME, HP/LINE, MUTE)	I _{IL}	V _I = 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, T_a = 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 P _O =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.



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SM7498HL**3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL****Table 1. DC Volume Control** ($V_{DD} = 12V$, No Load, Volume pin = 5V)

Voltage on volume pin (V _{bc})	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



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APPLICATION INFORMATION

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

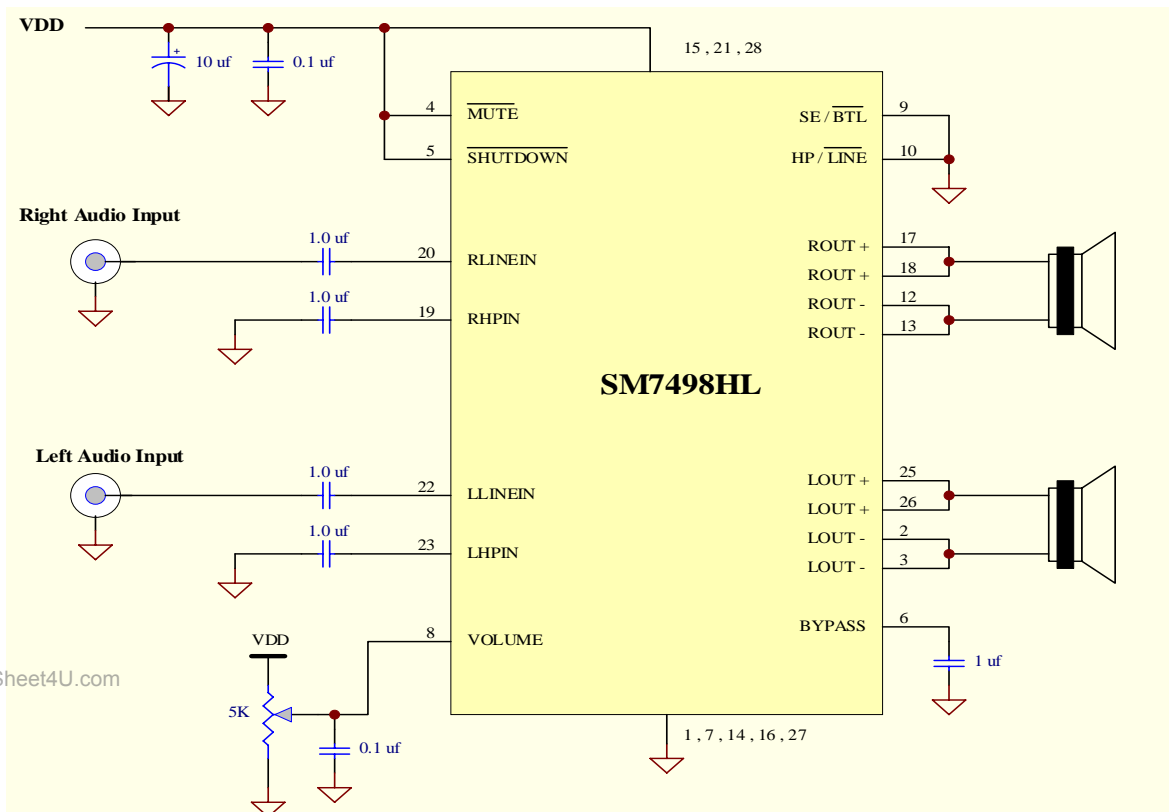


Figure 1. Typical Bridge-Tied-Load(BTL) audio amplifier application circuit for an LCD monitor



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APPLICATION INFORMATION

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

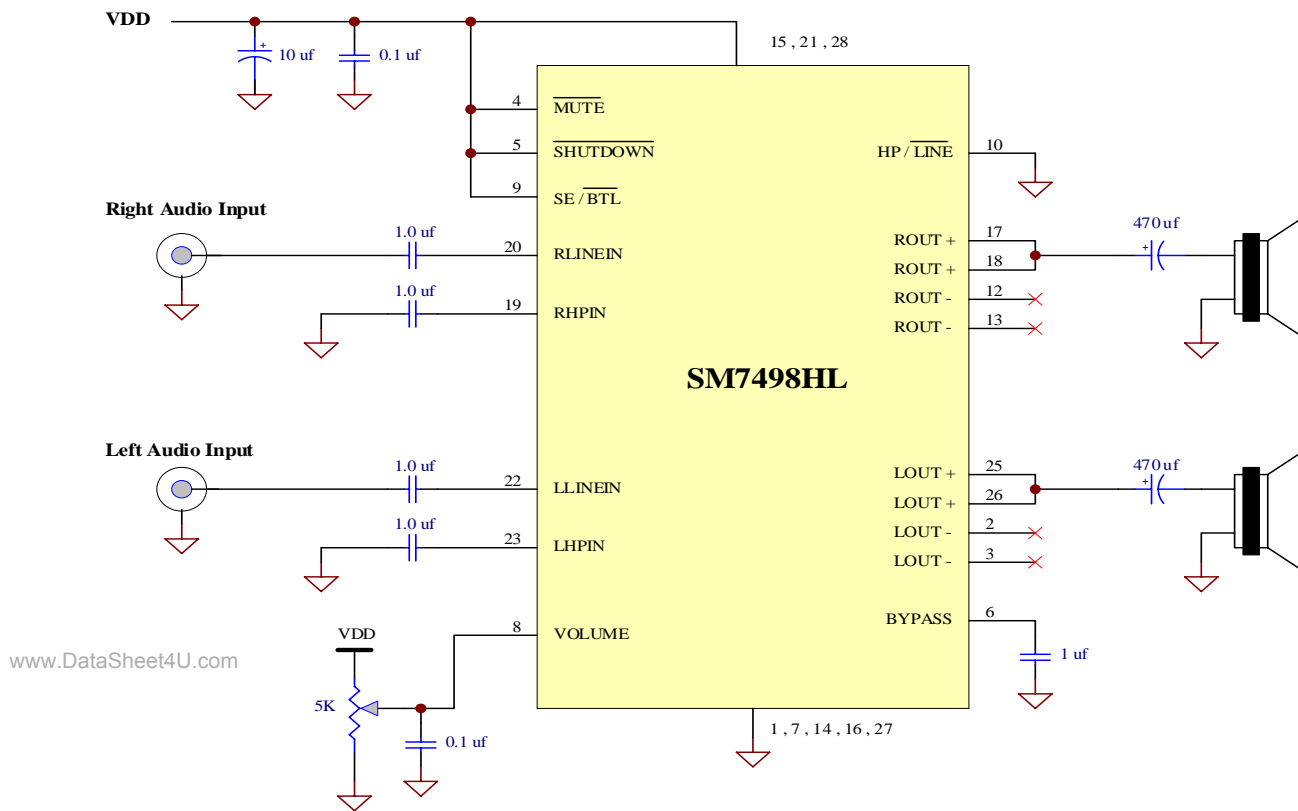
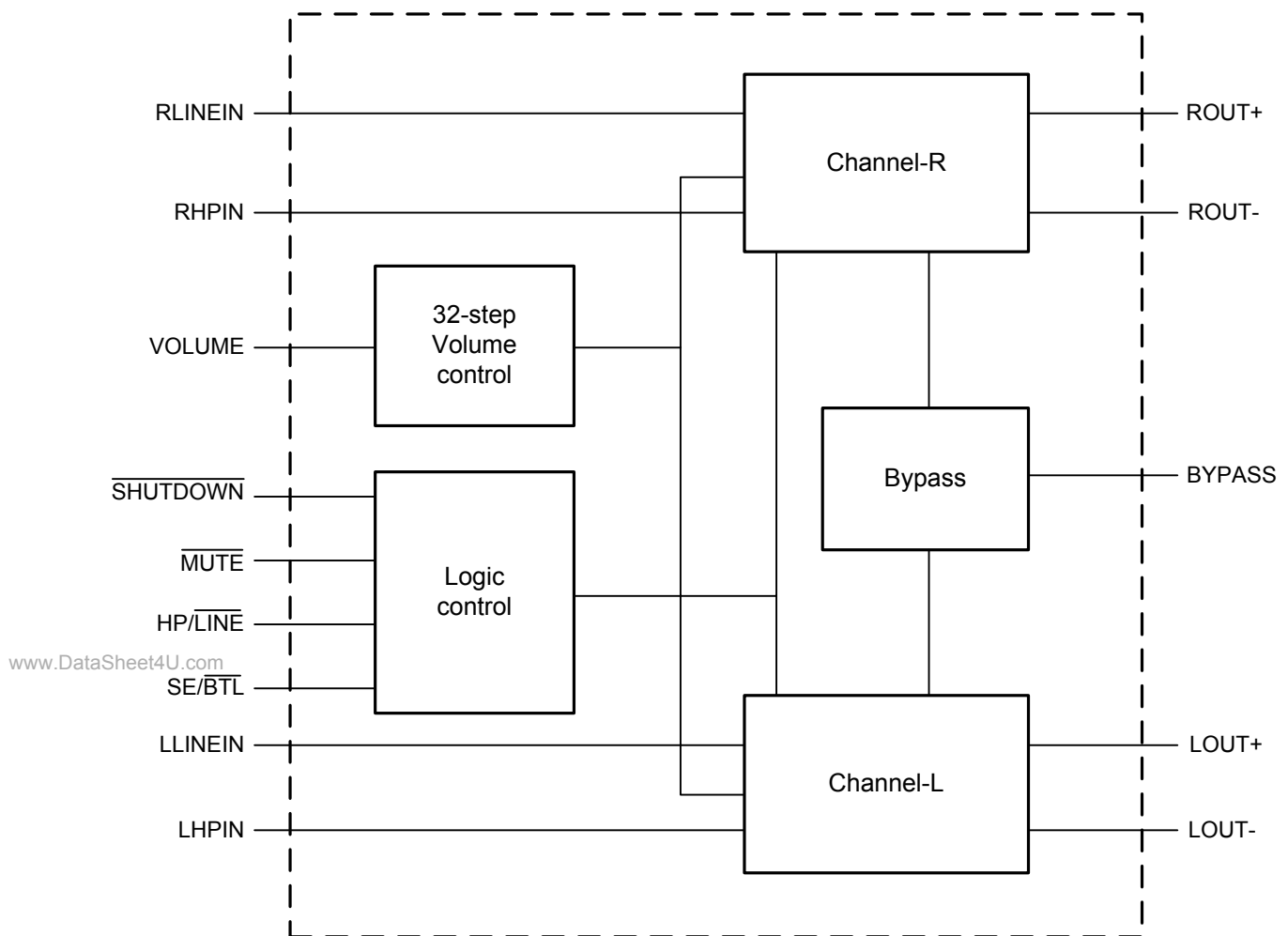


Figure2. Typical Single-Ended (SE) audio amplifier application circuit for an LCD monitor



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FUNCTIONAL BLOCK DIAGRAM





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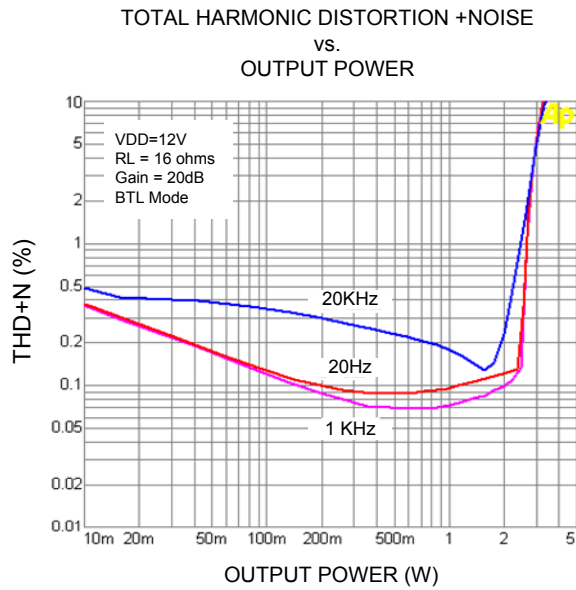


Figure 3

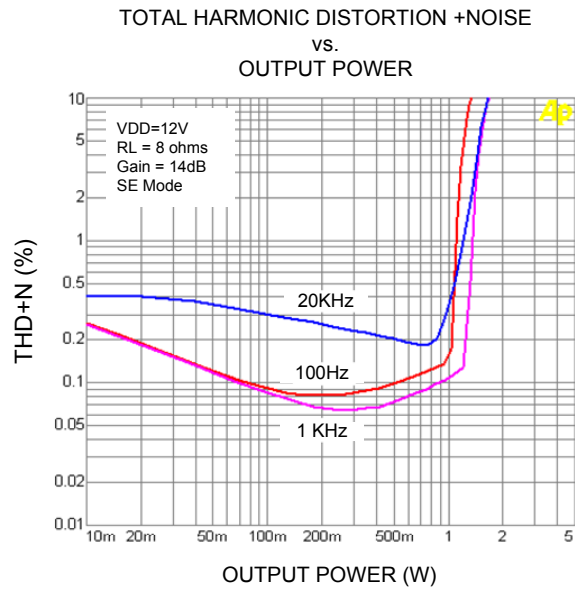


Figure 4

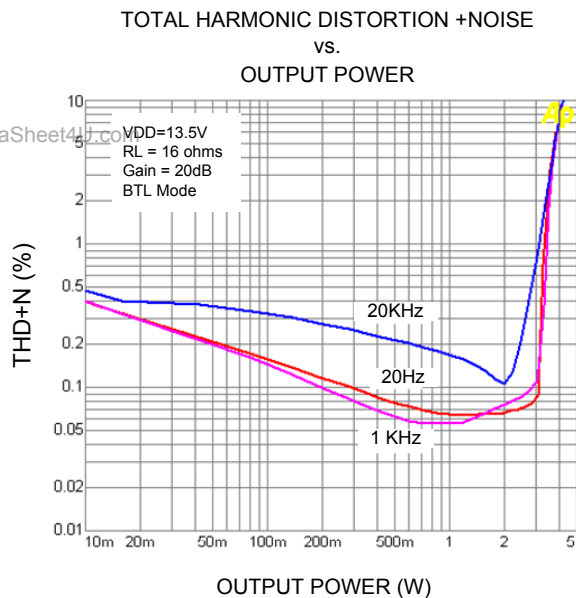


Figure 5

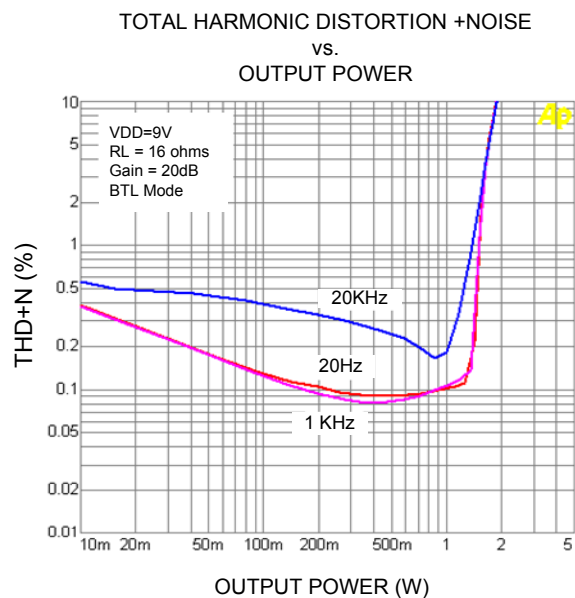


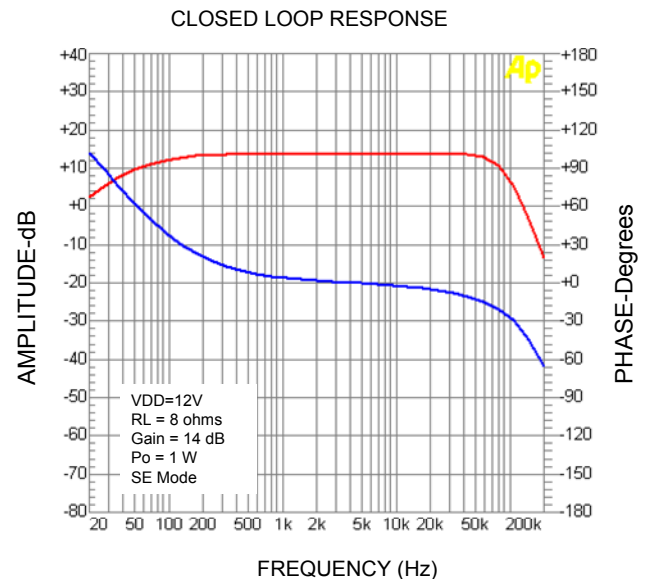
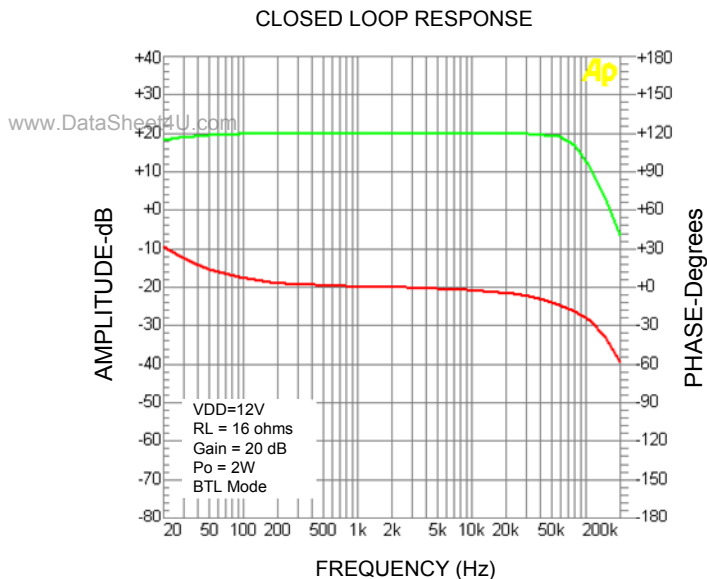
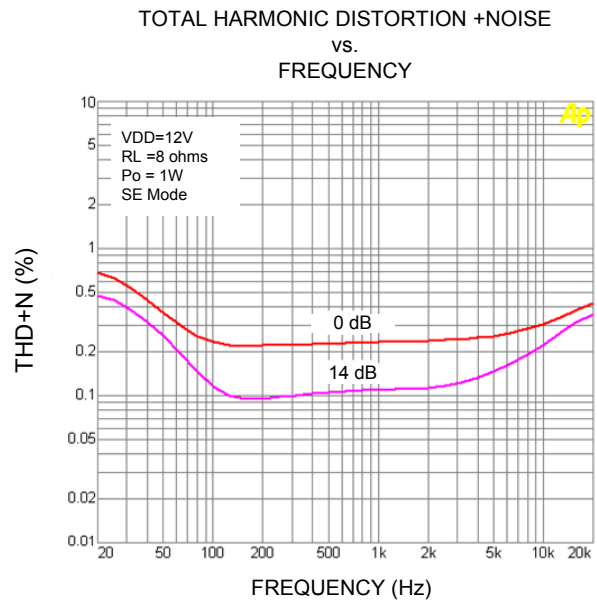
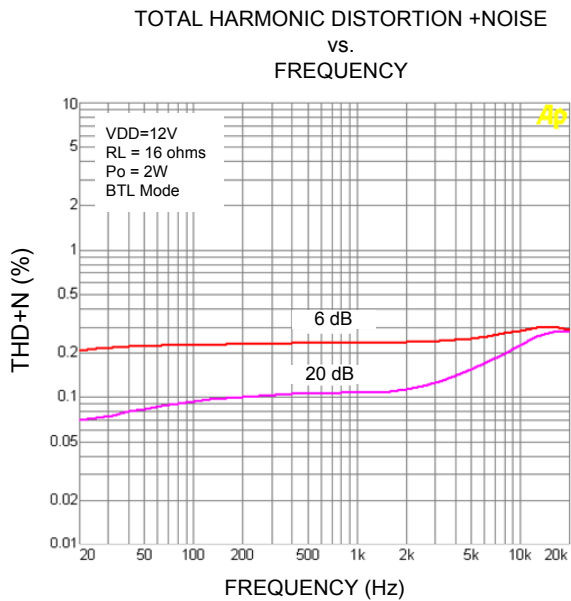
Figure 6



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CROSSTALK vs.FREQUENCY

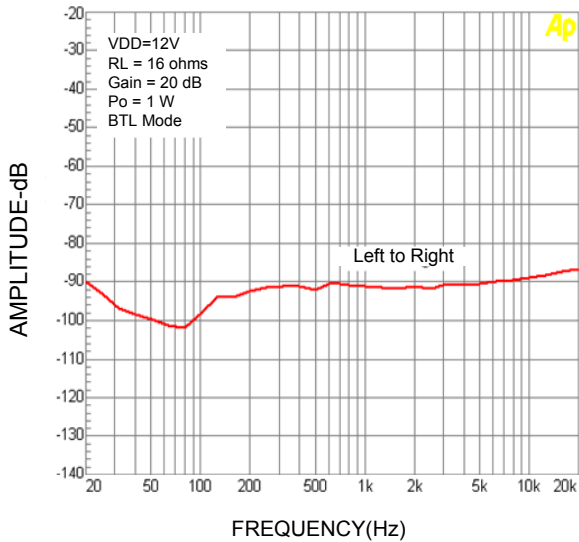


Figure 11

OUTPUT NOISE VOLTAGE vs.FREQUENCY

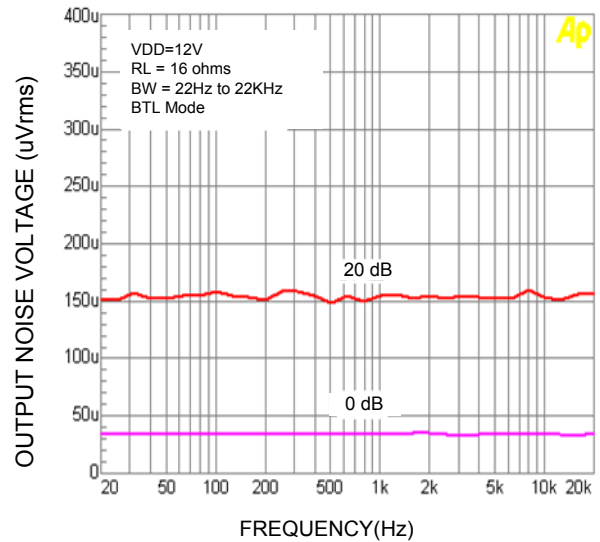


Figure 12



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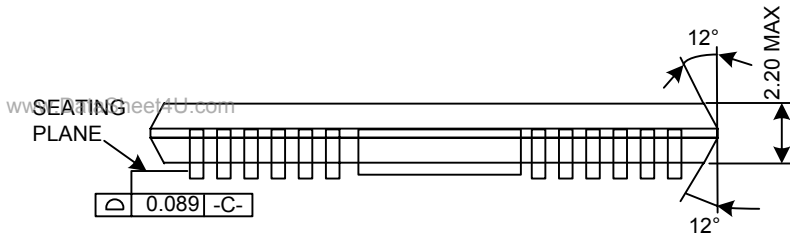
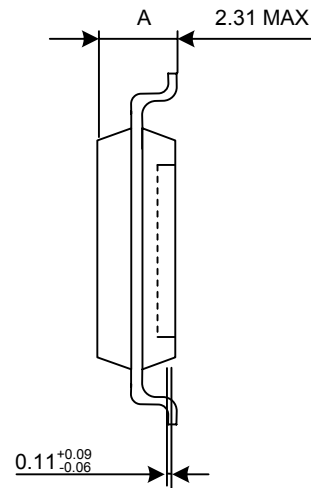
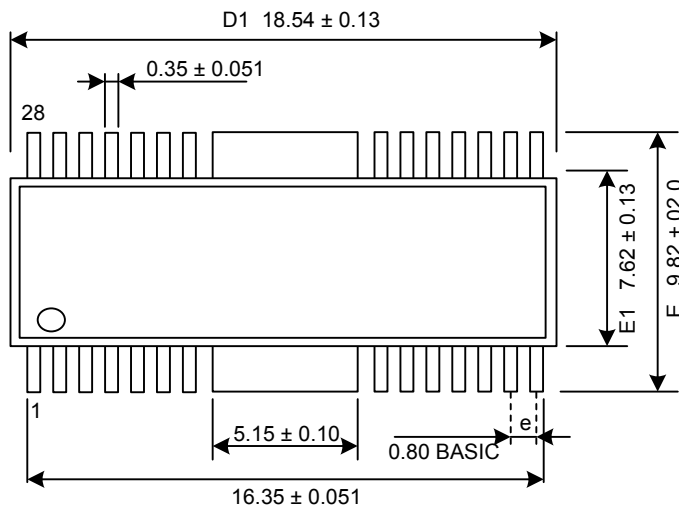
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PACKAGE OUTLINE

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.