SM7497

3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

REV. 0.1
(Prelimiary)

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SAMHOP Microelectronics Corp. **SM7497**

3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

GENERAL DESCRIPTION

The SM7497 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.

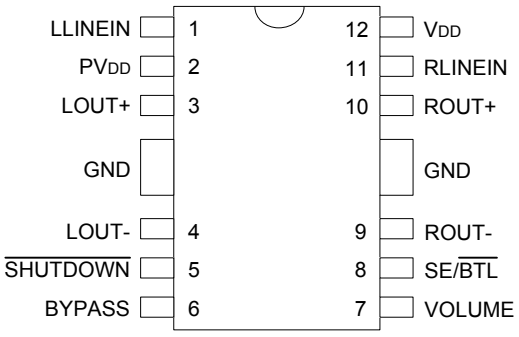
FEATURES

* 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)



SM7497 HDIP 12PIN

3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

PIN DESCRIPTIONS

No.	Pin name	I / O	Function
1	LLINEIN	I	Left channel input signal.
2	PV_{DD}	-	Supply voltage terminal for right power stage.
3	LOUT +	O	Left channel positive audio output.
4	LOUT -	O	Left channel negative audio output.
5	$\overline{SHUTDOWN}$	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	VOLUME	I	Terminal for DC volume control. DC voltage range is 0V to 5V.
8	SE/$\overline{BTL}$	I	Output MUX control. When this terminal is high, SE outputs are selected. When this terminal is low, BTL outputs are selected.
9	ROUT -	O	Right channel negative audio output.
10	ROUT +	O	Right channel positive audio output.
11	RLINEIN	I	Right channel input signal.
12	V_{DD}	-	Supply voltage terminal.
	GND	-	Power ground.

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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}	$\overline{SHUTDOWN}$, SE/$\overline{BTL}$	4.0		V_{DD}	V
Low-level input voltage	V_{IL}	$\overline{SHUTDOWN}$, SE/$\overline{BTL}$	0		0.8	V
Operating free-air temperature	T_A	--	- 40		85	°C

3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

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
Short to GND current limit	I_{Short}	V_{IN} = 0V, R_L = 900mΩ		1.1		A
Output offset voltage (measured differentially)	$\lvert V_{OO} \rvert$	Gain=20dB, SE/$\overline{BTL}$=0V			50	mV
High-level input current (SE/$\overline{BTL}$,$\overline{SHUTDOWN}$,)	$\lvert I_{IH} \rvert$	VI = V_{DD} = PV_{DD}			1	uA
Volume					150	
Low-level input current (SE/$\overline{BTL}$,$\overline{SHUTDOWN}$,VOLUME,)	$\lvert I_{IL} \rvert$	VI= 0V			1	uA
Bypass voltage (Nominally V_{DD}/2)	$V_{(BYPASS)}$	Measured at pin 6,No load (1)		6		V

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	A_{RMS}
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		μV_{RMS}

(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 SM7497 in an LCD monitor with 16Ω speaker outputs and volume control

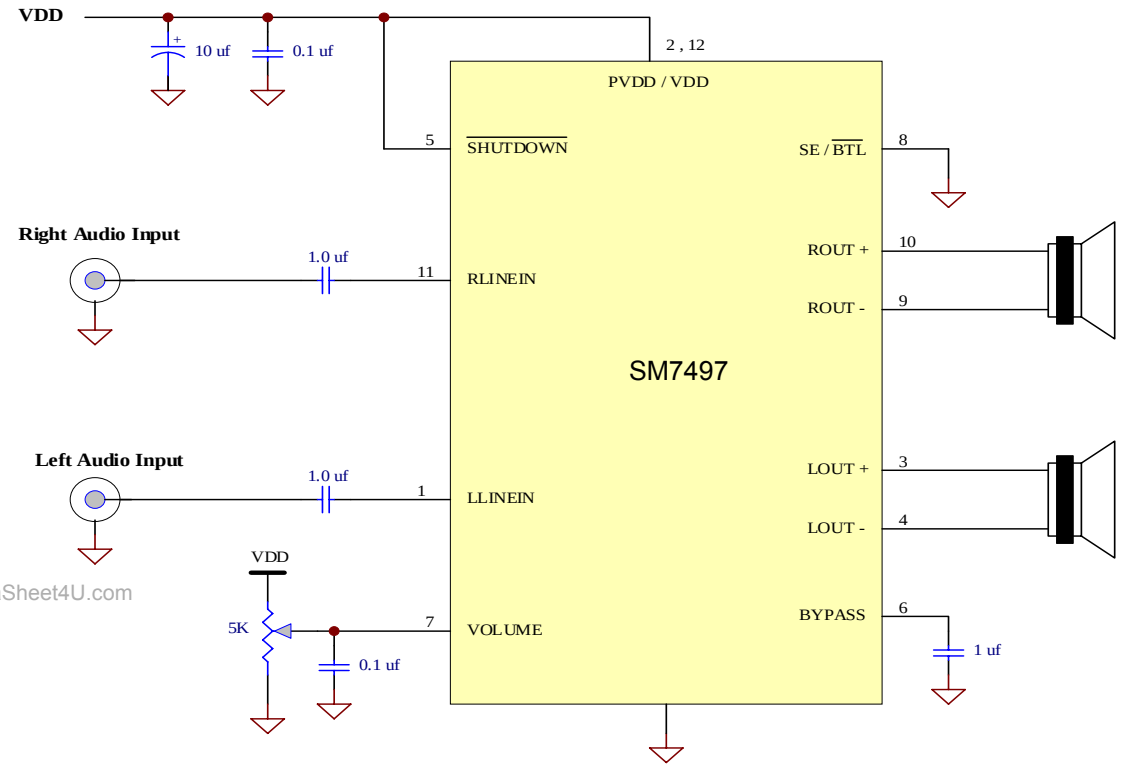

Figure 1. Typical Bridge-Tied-Load(BTL) audio amplifier application circuit for an LCD monitor

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APPLICATION INFORMATION

Application circuit using the SM7497 in an LCD monitor with 8Ω speaker outputs and volume control

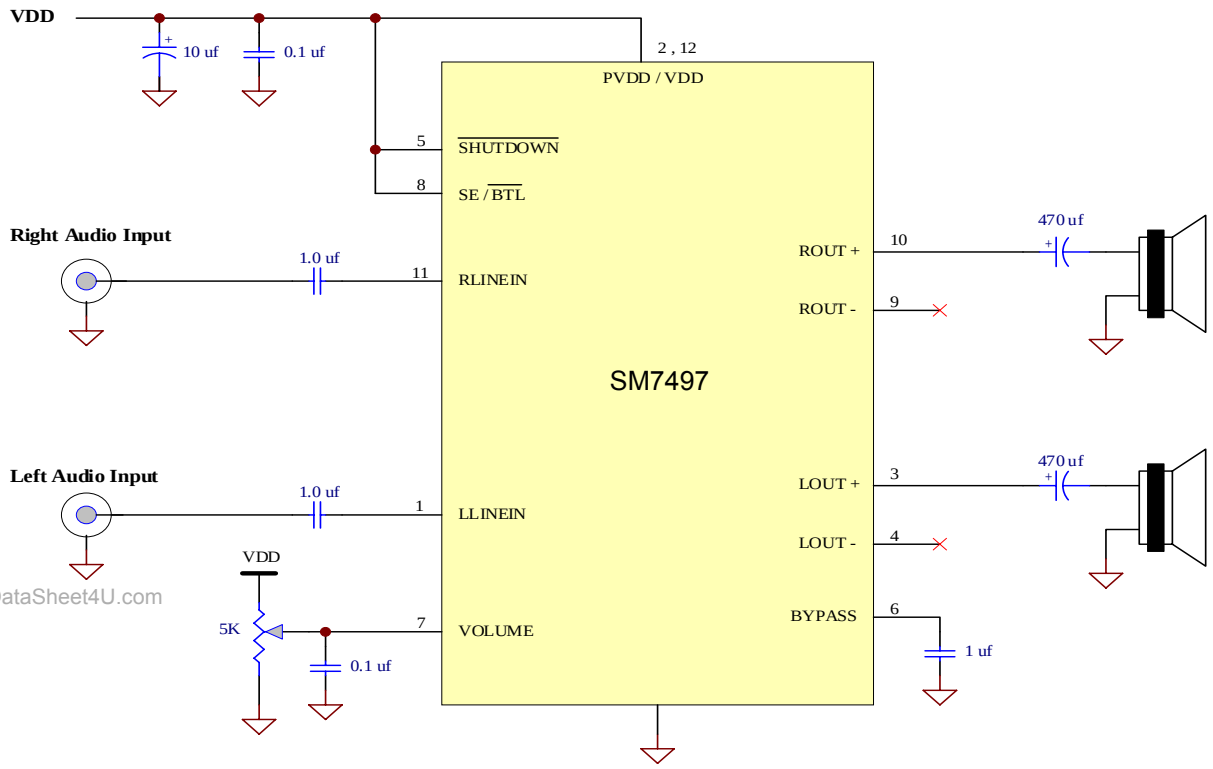


Figure2. Typical Single-Ended (SE) audio amplifier application circuit for an LCD monitor

TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

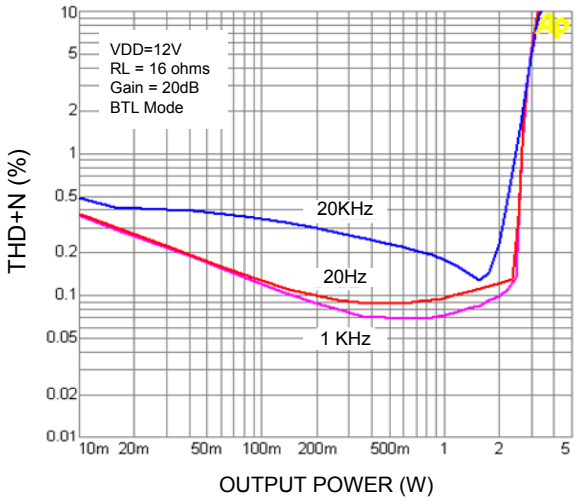


Figure 3

TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

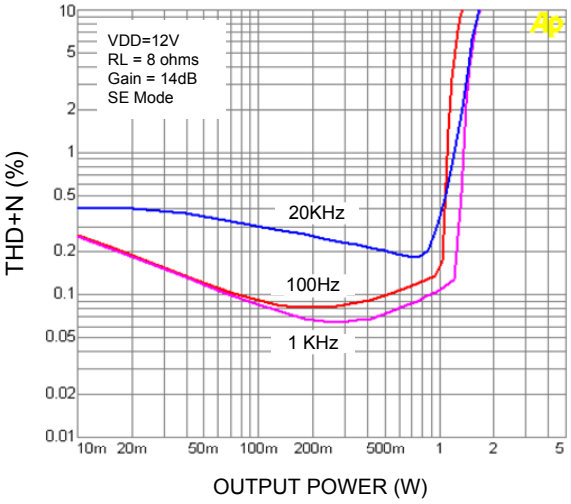


Figure 4

TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

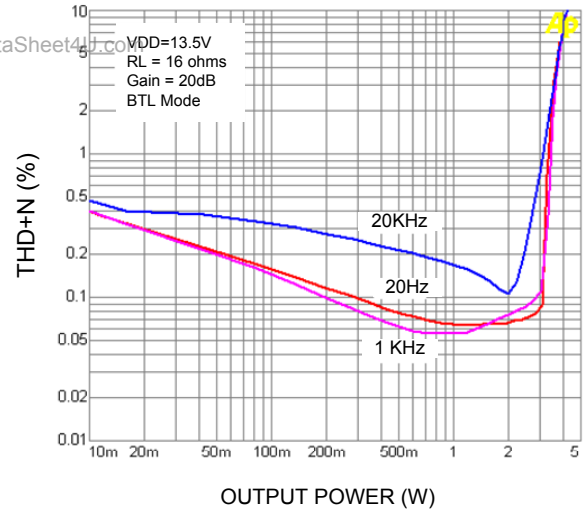


Figure 5

TOTAL HARMONIC DISTORTION +NOISE
vs.
OUTPUT POWER

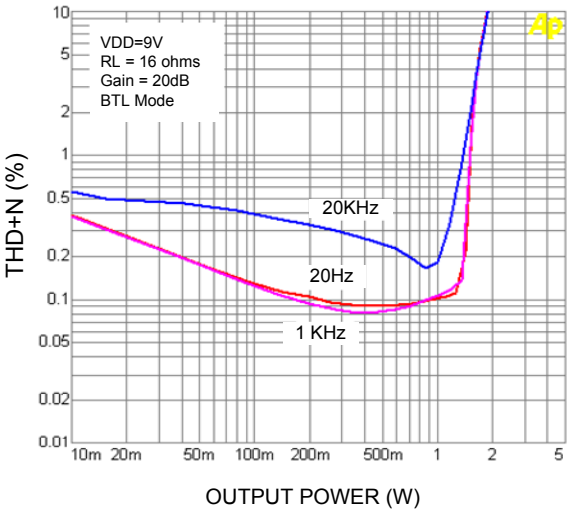


Figure 6

TOTAL HARMONIC DISTORTION +NOISE
vs.
FREQUENCY

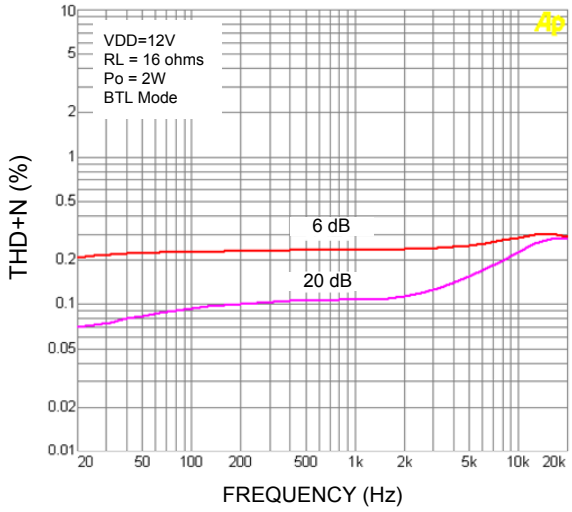


Figure 7

TOTAL HARMONIC DISTORTION +NOISE
vs.
FREQUENCY

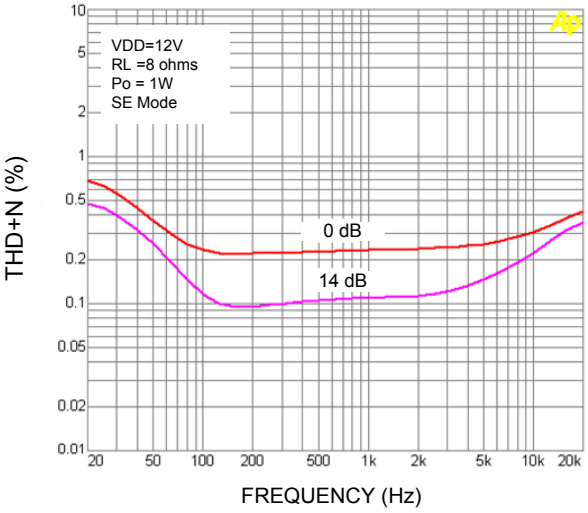


Figure 8

CLOSED LOOP RESPONSE

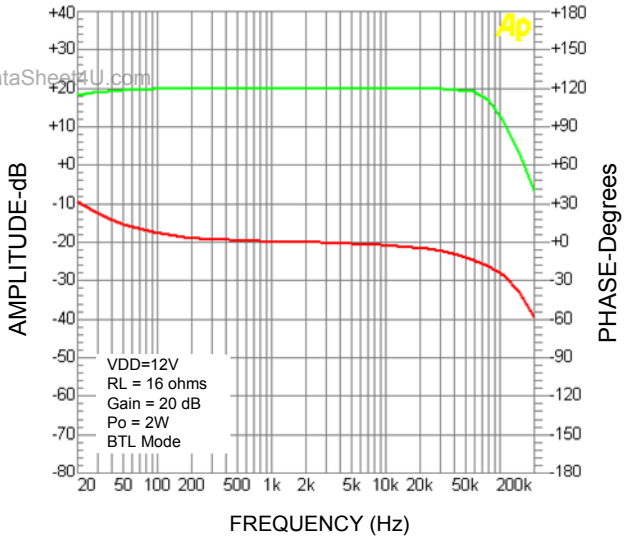


Figure 9

CLOSED LOOP RESPONSE

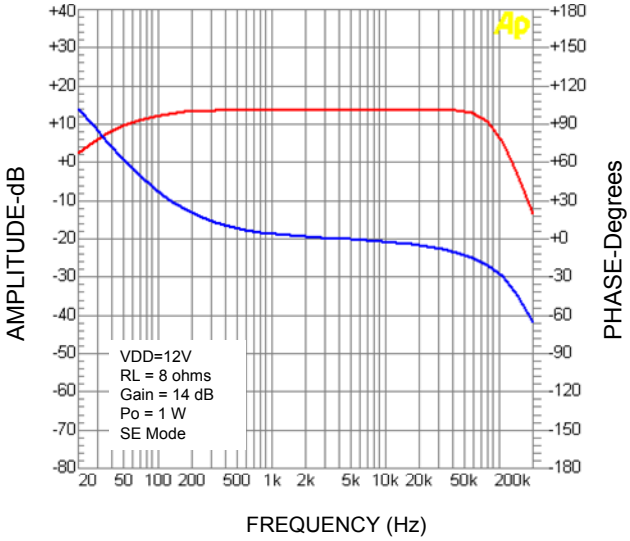


Figure 10

CROSSTALK vs.FREQUENCY

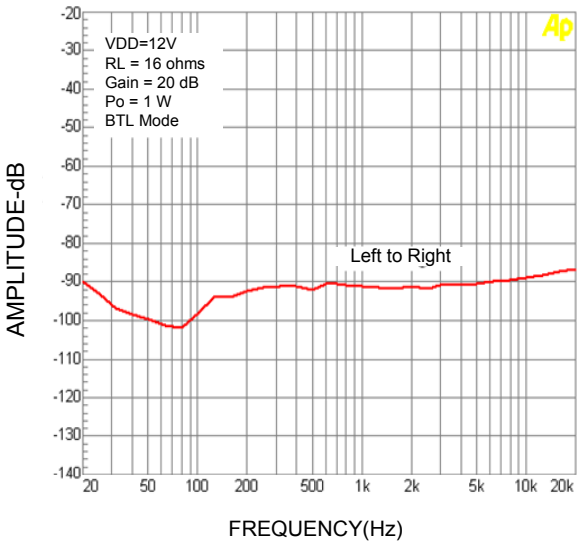


Figure 11

OUTPUT NOISE VOLTAGE vs.FREQUENCY

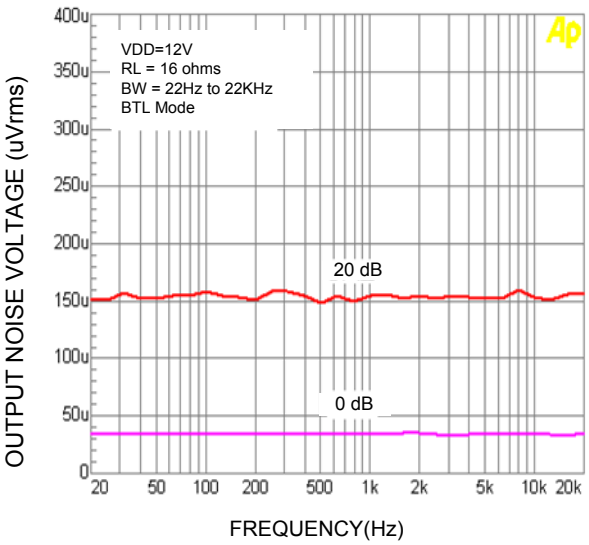


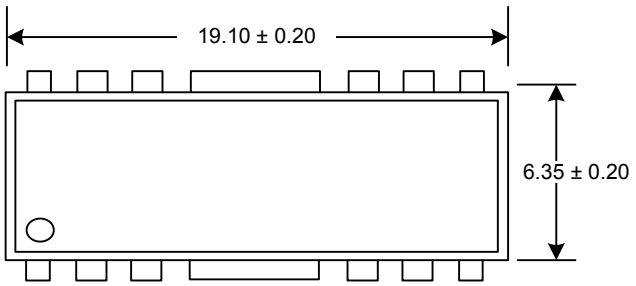
Figure 12

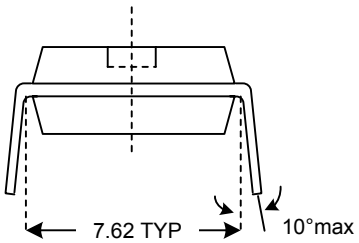
3W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL

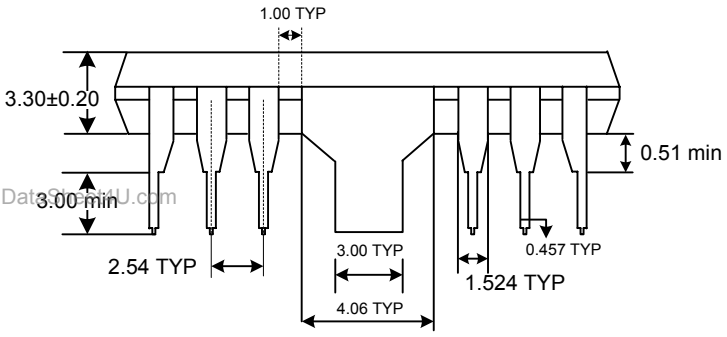
PACKAGE OUTLINE

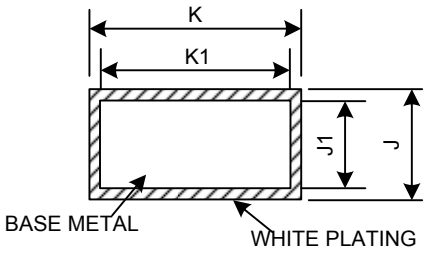
SM7497 12 PIN HDIP

Unit : mm









DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
J	0.219	0.339	0.0086	0.0133
J1	0.219	0.289	0.0086	0.0114
K	0.460	0.560	0.0181	0.0220
K1	0.460	0.510	0.0181	0.0201