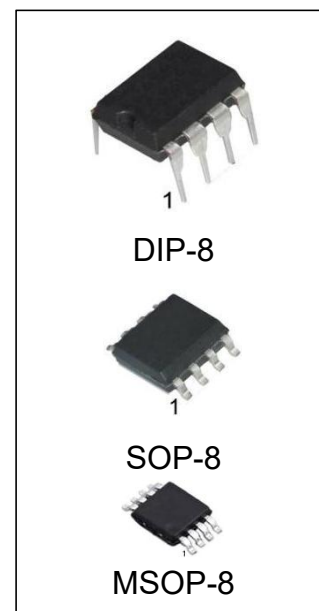


1.2-Watts Mono Filter-free Audio Power Amplifier

Features

- 2.5-5.5V Operation Voltage
- 63dB PSRR at 217Hz, VDD=5V
- 0.1μA ultra low current shutdown mode
- Improved pop & click circuitry
- Unique Modulation Scheme Reduces EMI Emissions
- 0.1-μA Shutdown Current
- No output coupling capacitors, snubber networks or bootstrap capacitors required
- External gain configuration capability
- Shutdown Pin has 0.4V Compatible Thresholds
- BTL output can drive capacitive loads
- RoHS compliant and 100% lead(Pb)-free



Applications

- PMP,PSP, Game, Data-Bank
- Cellular and Smart mobile phone

Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
LM4890AN	DIP-8	LM4890A	TUBE	2000/box
LM4890AM/TR	SOP-8	LM4890A	REEL	2500/reel
LM4890AMM/TR	MSOP-8	4890A	REEL	3000/reel

General Description

The LM4890A is an audio power amplifier designed for portable communication device applications such as mobile phone applications. The LM4890A is capable of delivering 1.2W of continuous average power to an 8Ω load and with less than 1% distortion (THD+N) from a 5.2V power supply, and 350mW to a 8Ω load from a 3V power supply.

The LM4890A provides high quality audio while requiring few external components and minimal power consumption. It features a low-power shutdown mode, which is achieved by driving the SHUTDOWN pin with logic low.

The LM4890A contains circuitry to prevent from “pop and click” noise that would otherwise occur during turn-on and turn-off transitions. For maximum flexibility, the LM4890A provides an externally controlled gain (with resistors), as well as an externally controlled turn-on and turn-off times (with the bypass capacitor).

Typical Application Circuit

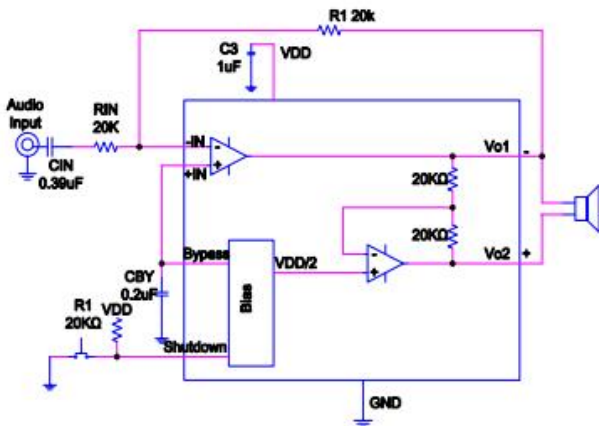


Figure 1.Single Input

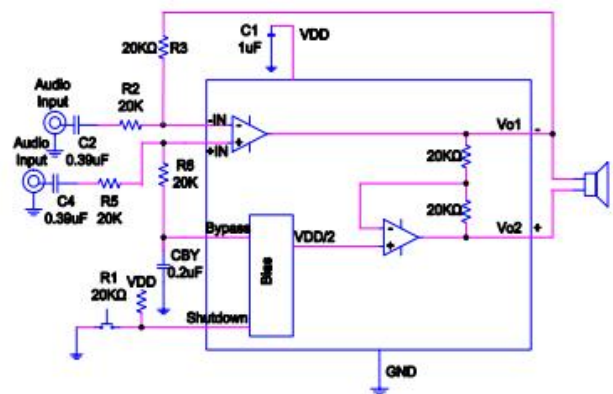
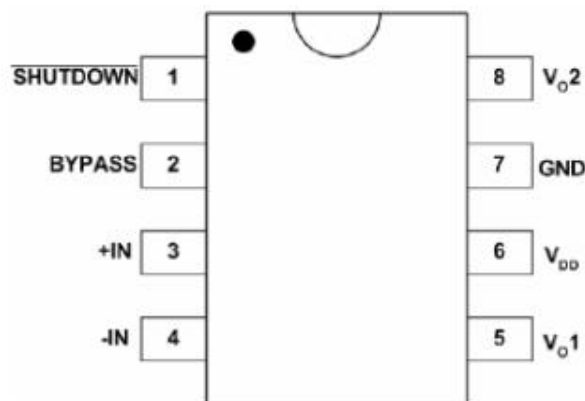


Figure 2.Differential Input

Functional Pin Description

Pin Configurations



DIP-8/SOP-8/MSOP-8

Pin Description

Pin	Name	Description
1	SHDN	The device enters in shutdown mode when a low level is applied on this pin.
2	BYPASS	Bypass capacitor pin which provides the common mode voltage.
3	+IN	Positive input of the first amplifier, receives the common mode voltage.
4	-IN	Negative input of the first amplifier, receives the audio input signal. Connected to the feedback resistor Rf and to the input resistor Rin.
5	VO1	Negative output of the LM4890A. Connected to the load and to the feedback resistor Rf.
6	VDD	Analog VDD input supply.
7	GND	Ground connection for circuitry.
8	VO2	Positive output of the LM4890A.

Absolute Maximum Ratings

Condition	Min	Max
Input Voltage to GND	-0.3V	6V
Other pin Voltage to GND	-0.3V	6V
Junction Temperature, T_{JMAX}	-	150°C
Storage Temperature Rang, T_{stg}	-65°C	150°C
ESD Susceptibility	-	2kV
Maximum Soldering Temperature (at leads, 10 sec)	-	260°C
Thermal Resistance θ_{JA}	-	165°C/W
Package Dissipation P_D	-	0.9W

Note: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

Electrical Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
VOS	Output offset voltage (measured differentially)	$V_i=0V, A_v=2V/V, V_{DD}=2.5V$ to 5.5V		5	25	mV
IQ	Quiescent current	$V_{DD}=5.5V$, no load		2.5		mA
		$V_{DD}=3.6V$, no load		1.40		
		$V_{DD}=2.5V$, no load		1.06		
ISHDN	Shutdown Current	$V_{SHDN}=0.35V, V_{DD}=2.5V$ to 5.5V	0.1	2.0		μA
RDS(ON)	Static drain-source on-state resistance	$V_{DD}=5.5V$, no load		400		mΩ
		$V_{DD}=3.6V$, no load		500		
		$V_{DD}=2.5V$, no load		700		
Po	Output power	$V_{DD}=5.2V, R_L=8\Omega, THD=1\%, f=1KHz$		1.2		W
VSHDN	Start up voltage threshold		1.4			V
	Shutdown voltage threshold				0.4	
THD+N	Total harmonic distortion plus noise	$V_{DD}=5V, P_o=1W, R_L=8\Omega, f=1KHz$		0.123		%
		$V_{DD}=3.6V, P_o=0.5W, R_L=8\Omega, f=1KHz$		0.130		
		$V_{DD}=2.5V, P_o=0.2W, R_L=8\Omega, f=1KHz$		0.163		
PSRR	Supply ripple rejection ratio	$V_{DD}=3.6V$, Inputs ac-grounded with $C_i=2\mu F$ $F=217Hz, V(ripple)=200mV$		-63		dB
CMRR	Common mode rejection ratio	$V_{DD}=3.6V, V_{ic}=1V_{pp}$ $F=217Hz$		-62		dB
Zt	Start-up time from shutdown	$V_{DD}=3.6V$		45		mS

Typical Operating Characteristics

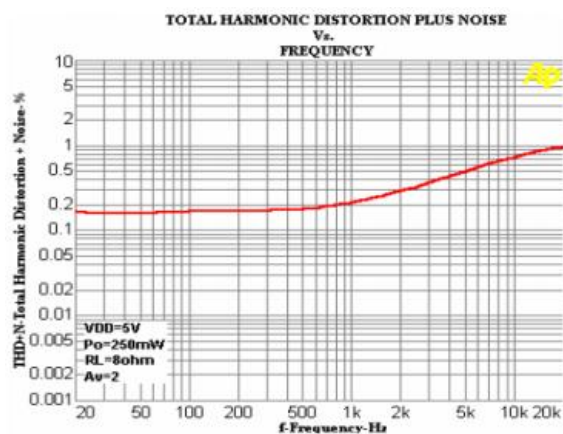


Figure 3.

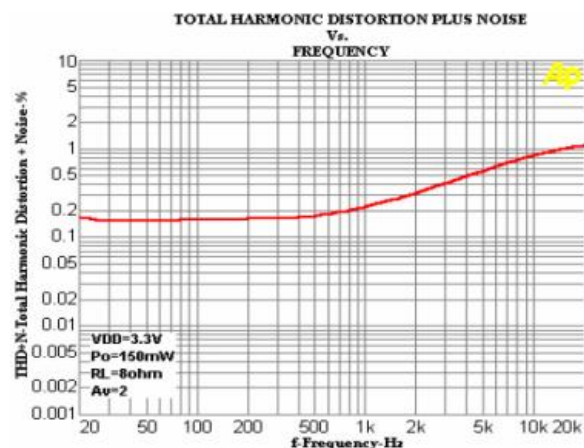


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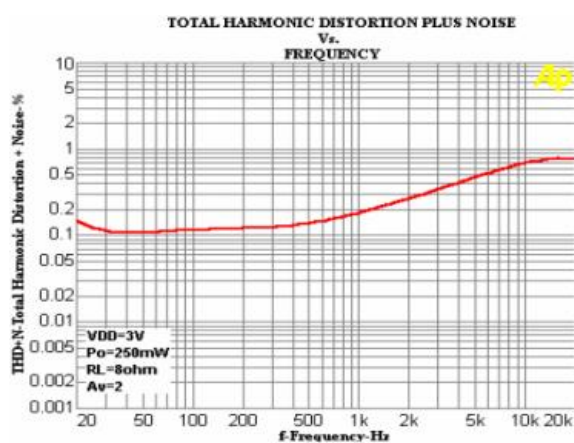


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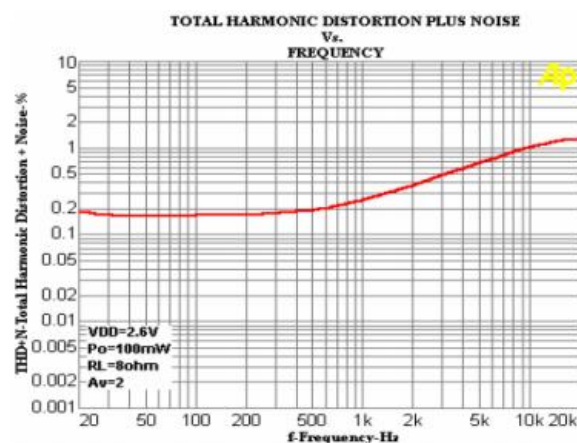


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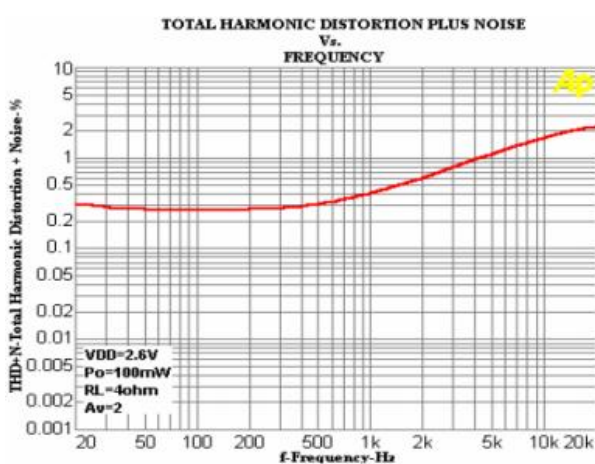


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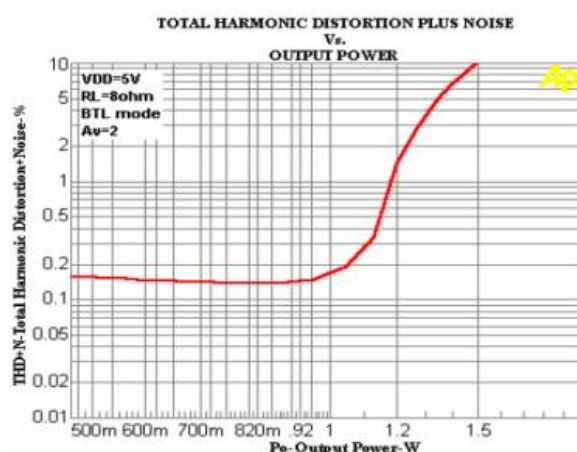


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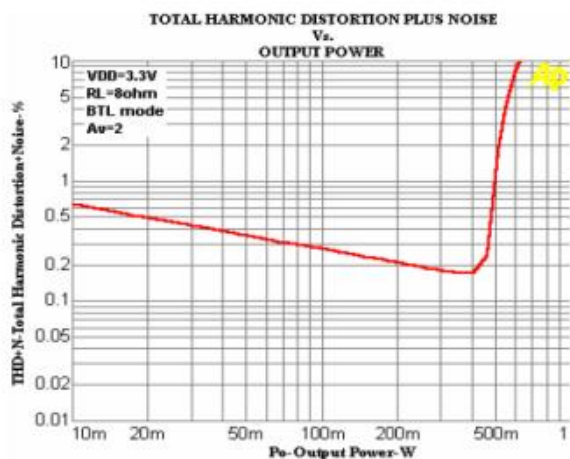


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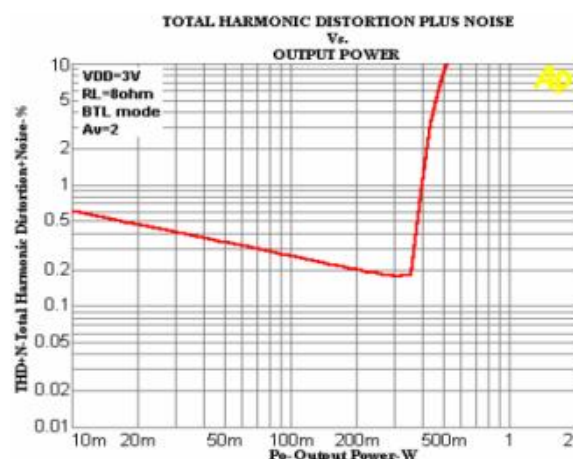


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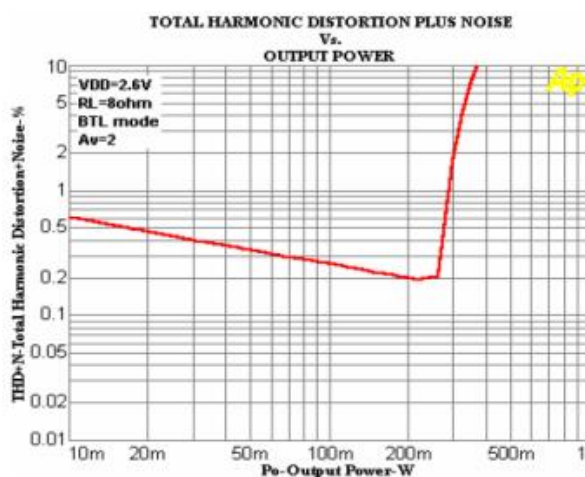


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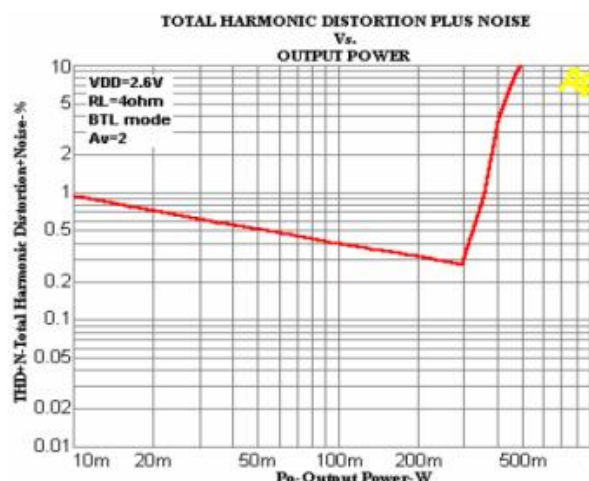


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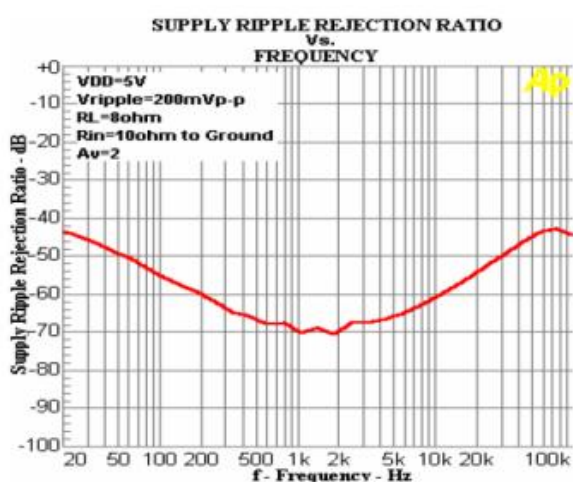


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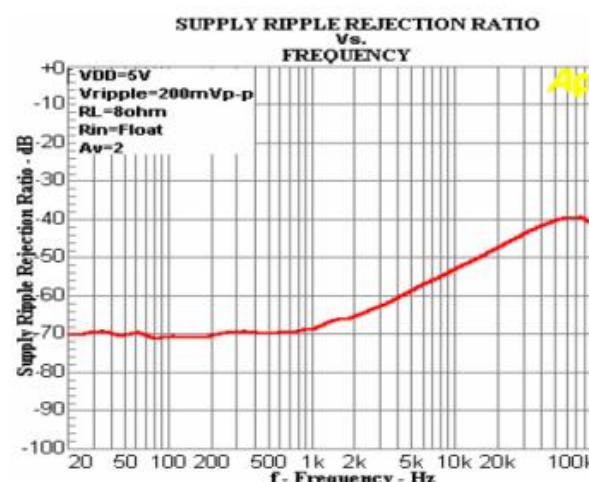


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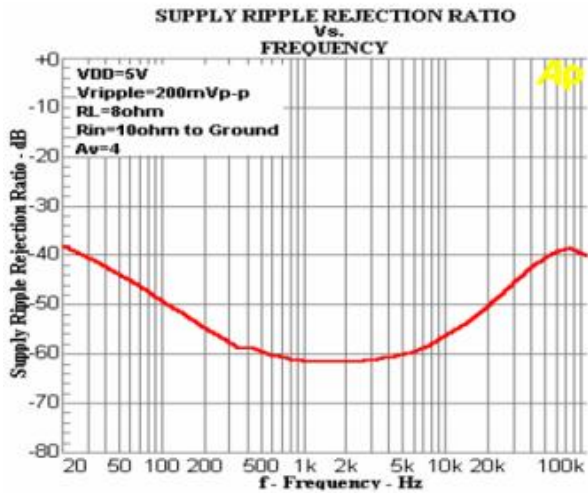


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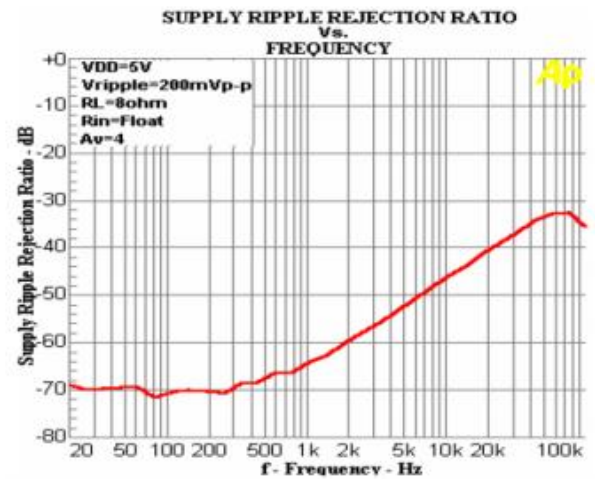


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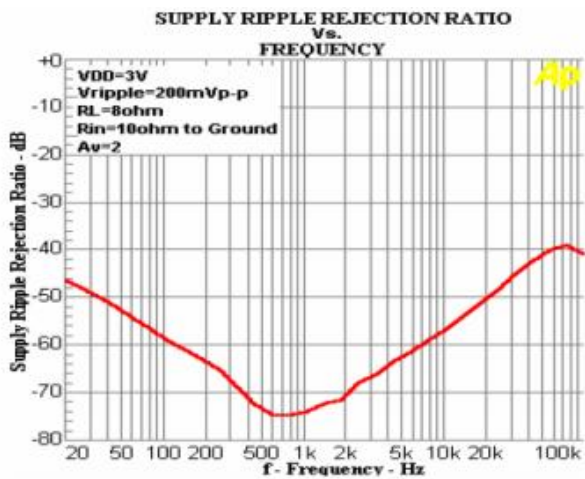


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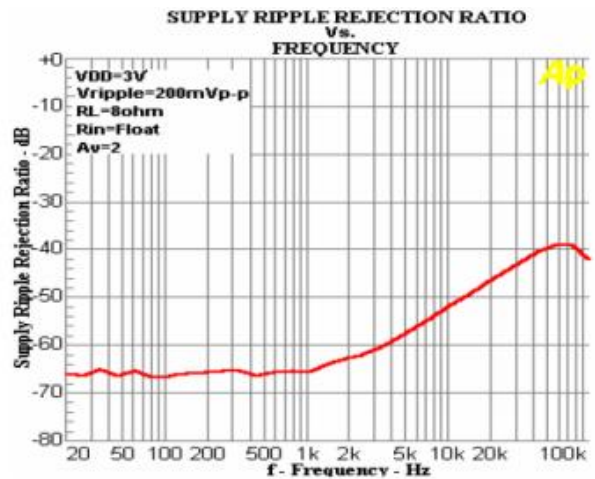


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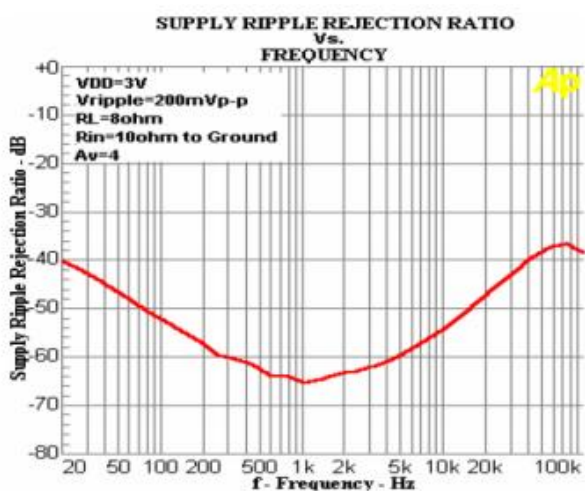


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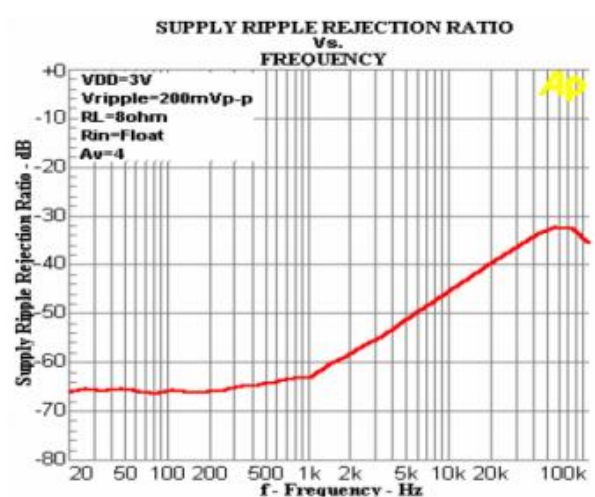


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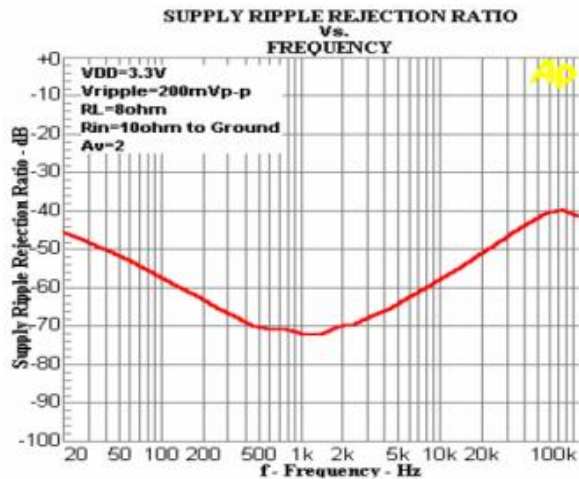


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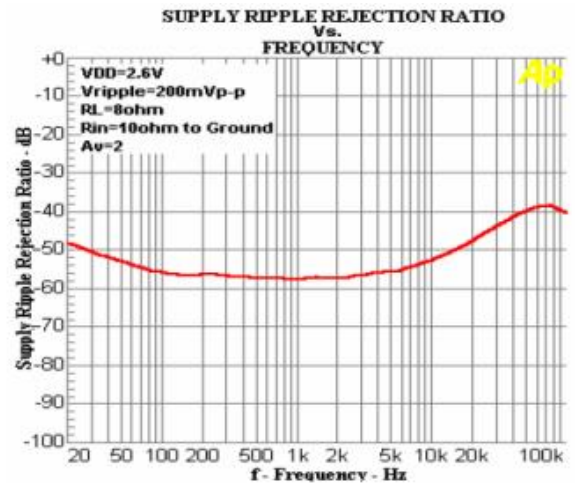


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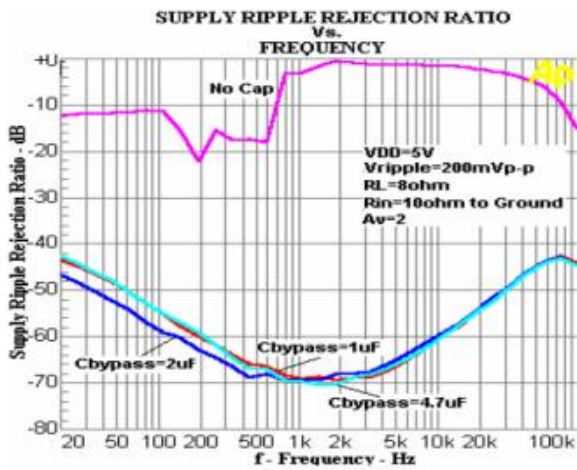


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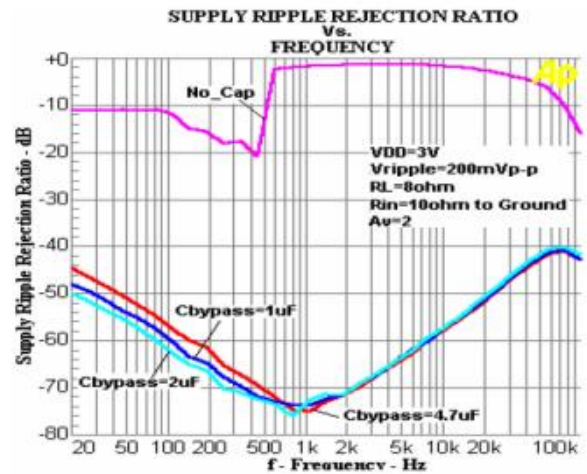


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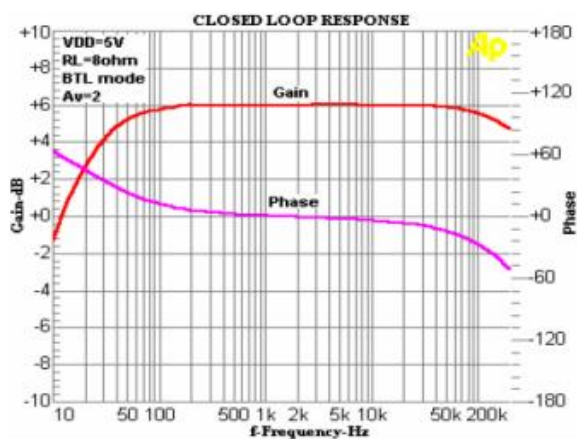


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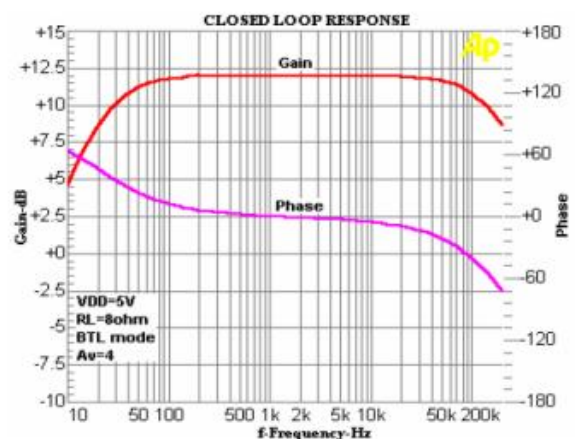


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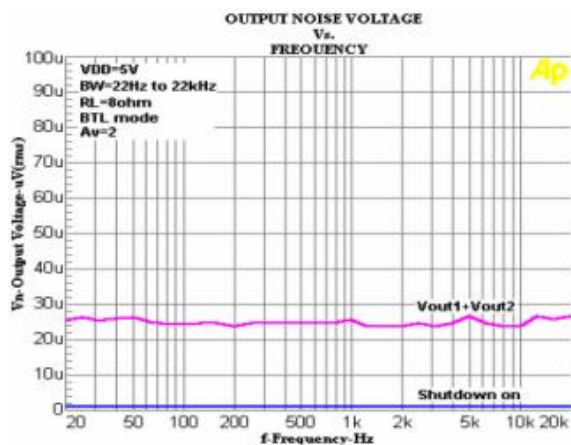


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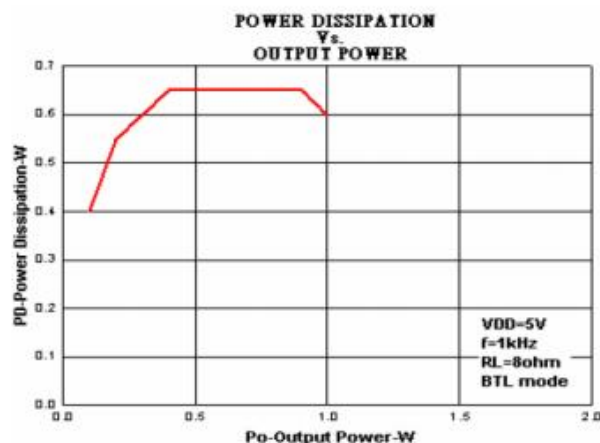


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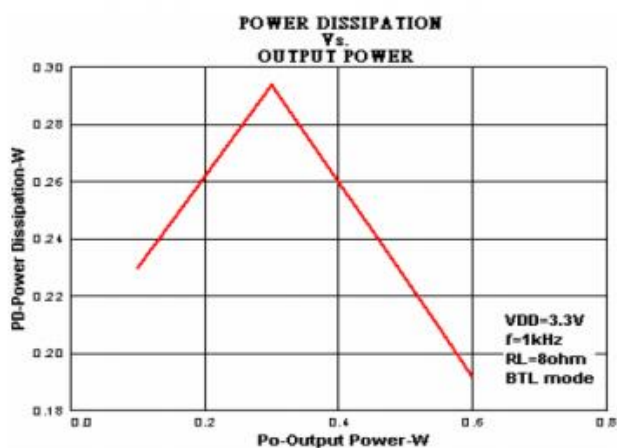


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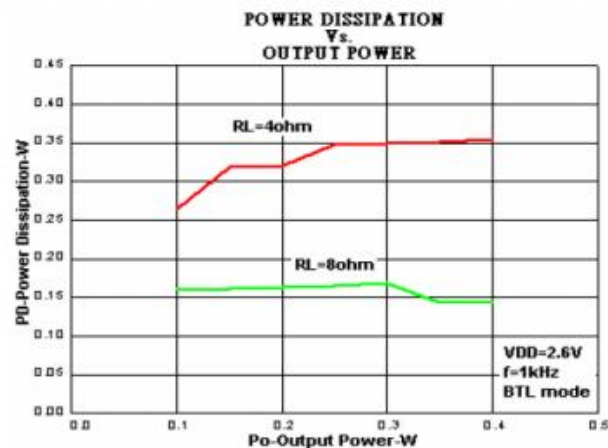


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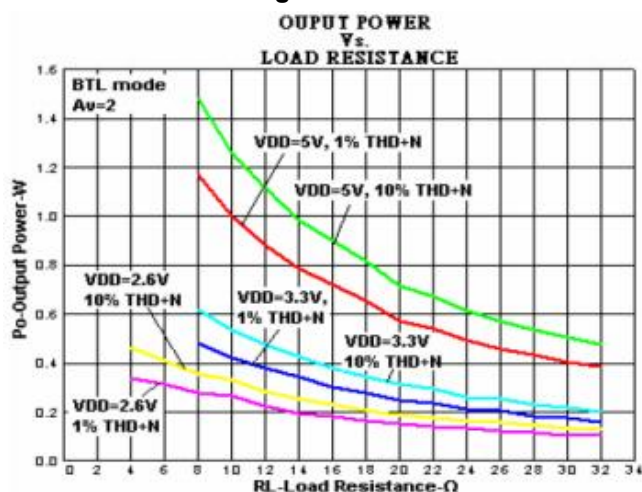


Figure 31.

Layout Considerations

As output power increases, interconnect resistance (PCB traces and wires) between the amplifier, load and power supply create a voltage drop. The voltage loss on the traces between the LM4890A and the load results in lower output power and decreased efficiency. Higher trace resistance between the supply and the LM4890A has the same effect as a poorly regulated supply, increase ripple on the supply line also reducing the peak output power. The effects of residual trace resistance increases as output current increases due to higher output power, decreased load impedance or both. To maintain the highest output voltage swing and corresponding peak output power, the PCB traces that connect the output pins to the load and the supply pins to the power supply should be as wide as possible to minimize trace resistance.

The use of power and ground planes will give the best THD+N performance. While reducing trace resistance, the use of power planes also creates parasite capacitors that help to filter the power supply line.

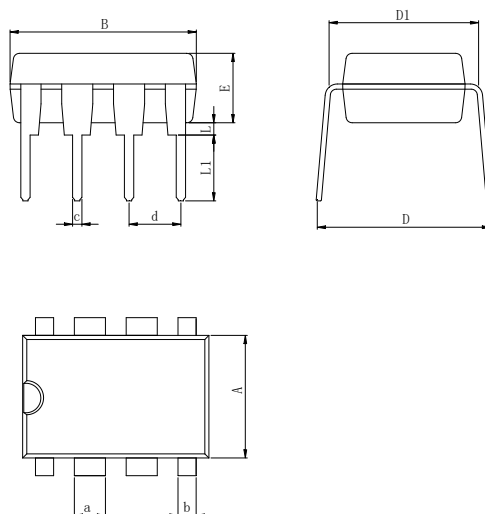
The inductive nature of the transducer load can also result in overshoot on one or both edges, clamped by the parasitic diodes to GND and VDD in each case. From an EMI standpoint, this is an aggressive waveform that can radiate or conduct to other components in the system and cause interference. It is essential to keep the power and output traces short and well shielded if possible. Use of ground planes, beads, and micro-strip layout techniques are all useful in preventing unwanted interference.

As the distance from the LM4890A and the speaker increase, the amount of EMI radiation will increase since the output wires or traces acting as antenna become more efficient with length. What is acceptable EMI is highly application specific.

Ferrite chip inductors placed close to the LM4890A may be needed to reduce EMI radiation. The value of the ferrite chip is very application specific.

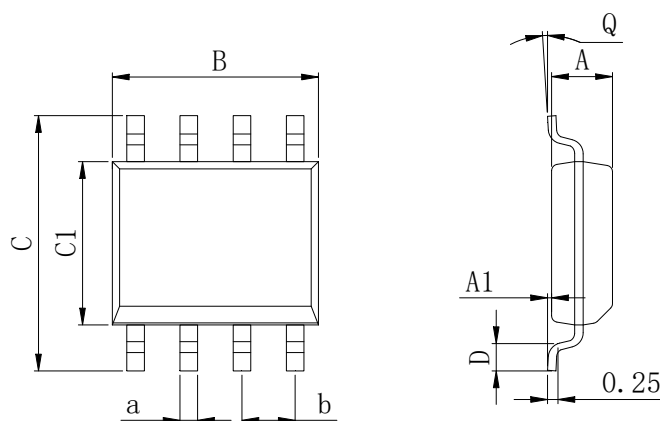
Physical Dimensions

DIP-8



Dimensions In Millimeters(DIP-8)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

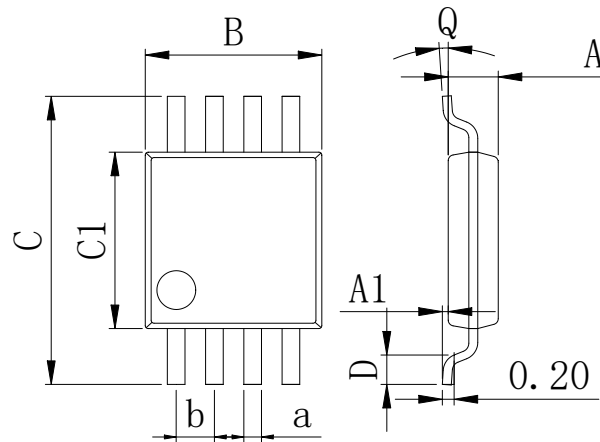
SOP-8 (150mil)



Dimensions In Millimeters(SOP-8)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

Physical Dimensions

MSOP-8



Dimensions In Millimeters(MSOP-8)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.80	0.05	2.90	4.75	2.90	0.35	0°	0.25	0.65 BSC
Max:	0.90	0.20	3.10	5.05	3.10	0.75	8°	0.35	

Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2014-6	New	1-13
V1.1	2018-9	Add annotation for Maximum Ratings.	3
V1.2	2024-10	Update Lead Temperature	3

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