

1 Watt CLASS-AB Audio Power Amplifier

● Features

- PSRR at 217Hz, VDD = 5V (Fig. 1) 62dB(typ.)
- Power Output at 5.0V & 1% THD 1W(typ.)
- Power Output at 3.3V & 1% THD 400mW(typ.)
- Shutdown Current 0.1μA(typ.)

● General Description

PT 4890 is an audio power amplifier primarily designed for demanding applications in mobile phones and other portable communication device applications. It is capable of delivering 1 watt of continuous average power to an 8Ω BTL load with less than 1% distortion (THD+N) from a 5V DC power supply. Boomer audio power amplifiers were designed specifically to provide high quality output power with a minimal amount of external components. PT 4890 does not require output coupling capacitors or bootstrap capacitors, and therefore is ideally suited for mobile phone and other low voltage applications where minimal power

consumption is a primary requirement.

The PT 4890 features a low-power consumption shutdown mode, which is achieved by driving the shutdown pin with logic low. Additionally, the PT 4890 features an internal thermal shutdown protection mechanism.

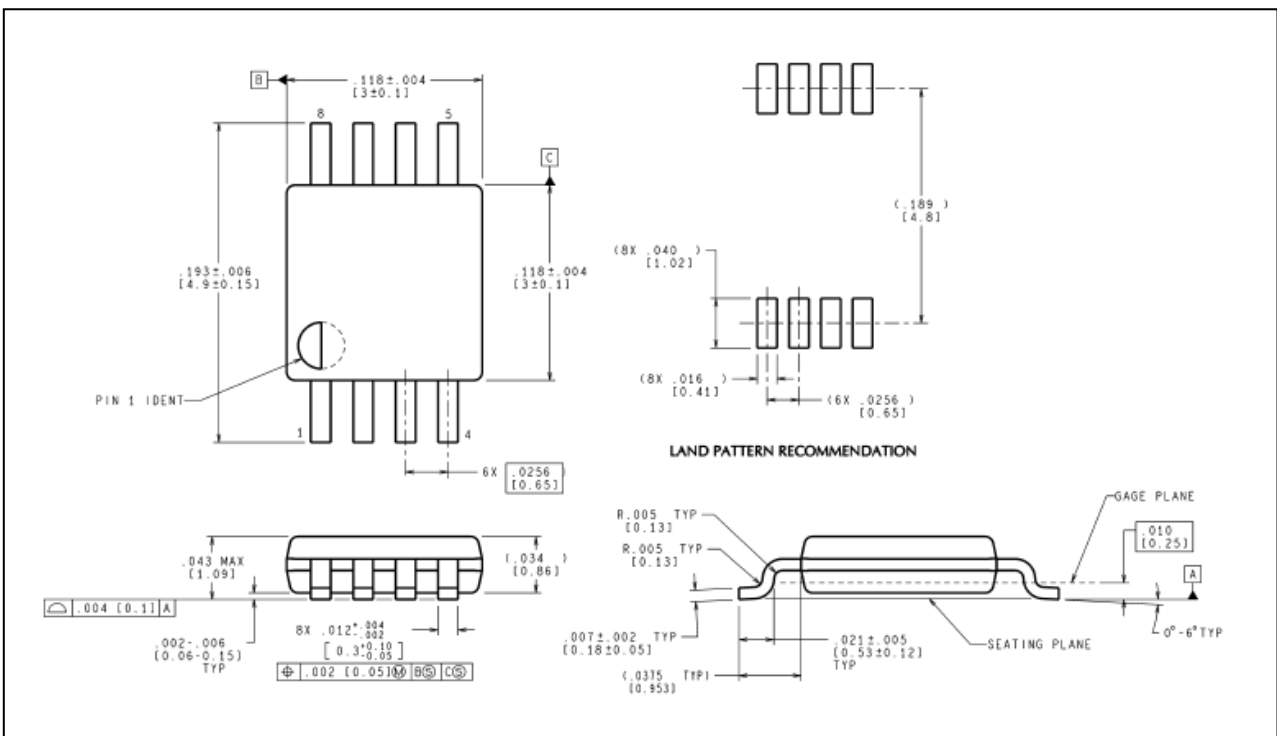
The 4890 contains advanced pop & click circuitry which eliminates noises which would otherwise occur during turn-on and turn-off transitions.

PT 4890 is unity-gain stable and can be configured by external gain-setting resistors.

● Applications

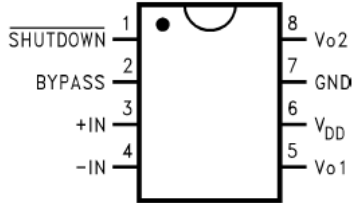
- Mobile Phones
- PDA's
- Portable electronic devices

● Package Information



● PIN CONFIGURATION

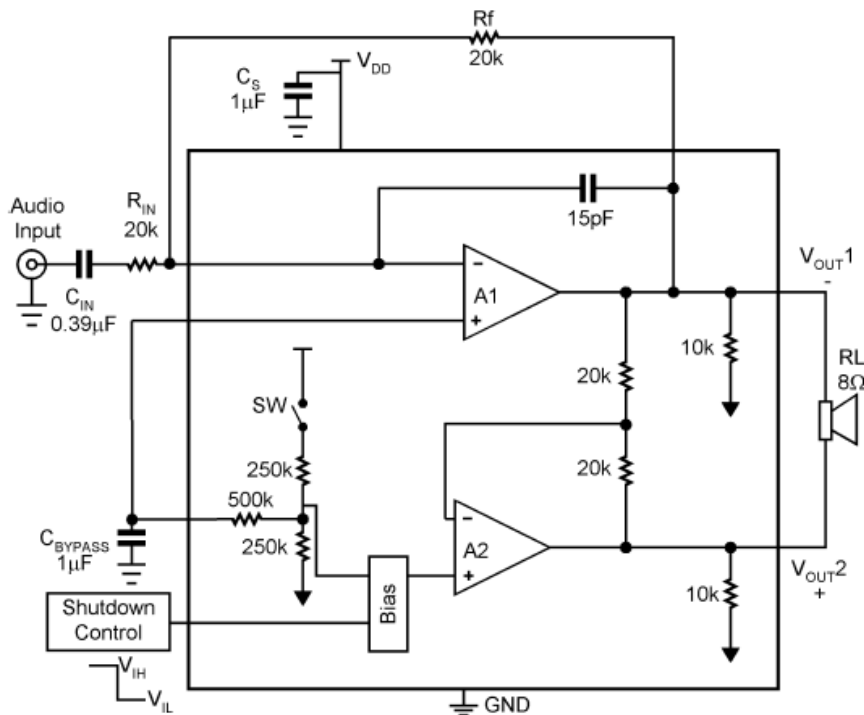
Mini Small Outline (MSOP) Package



● PIN ASSIGNMENT

PIN NUMBER	NAME	FUNCTION
MSOP8		
1	Shutdown	Shutdown
2	Bypass	Bypass
3	+IN	Input 1
4	-IN	Input 2
5	Vo1	Output 1
6	VDD	VDD
7	GND	Ground
8	Vo2	Output 2

● Functional Block Diagram



● **Absolute Maximum Ratings** @ $T_A = 25^\circ\text{C}$ unless otherwise noted

Supply Voltage -----6.0V
 Storage Temperature ----- -65°C to $+150^\circ\text{C}$
 Input Voltage ----- -0.3V to $V_{DD} + 0.3\text{V}$
 Power Dissipation ----- Internally Limited
 ESD Susceptibility-----2000V
 Junction Temperature ----- 150°C

● **Electrical Characteristics** $V_{DD} = 5\text{V}$ Unless otherwise specified. Limits apply for $T_A = 25^\circ\text{C}$.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
IDD	Quiescent Power	$V_{in}=0\text{V}$, $I_O=0\text{A}$, No Load	—	4	8	mA
	Supply Current	$V_{in}=0\text{V}$, $I_O=0\text{A}$, 8Ω Load	—	5	10	
ISD	Shutdown Current	VSHUTDOWN = 0V	—	0.1	2	μA
VSDIH	Shutdown Voltage Input High		1.2	—	—	V
VSDIL	Shutdown Voltage Input Low		—	—	0.4	V
VOS	Output Offset Voltage		—	7	50	mV
ROUT-GND	Resistor Output to GND		7.0	8.5	9.7	$\text{k}\Omega$
PO	Output Power (8Ω)	THD = 2% (max); $f = 1\text{kHz}$ 8Ω Load	0.8	1.0	—	W
TWU	Wake-up time		—	50	70	ms
TSD	Thermal Shutdown Temperature		150	170	190	$^\circ\text{C}$
THD+N	Total Harmonic Distortion+Noise	$P_o = 0.4\text{Wrms}$; $f = 1\text{kHz}$	—	0.1	—	%
PSRR	Power Supply Rejection Ratio	Vripple = 200mVsine p-p $f=217\text{Hz}$	55	62	—	dB
		Vripple = 200mVsine p-p $f=1\text{kHz}$		66		
TSDT	Shut Down Time	8Ω Load	—	1.0	—	ms

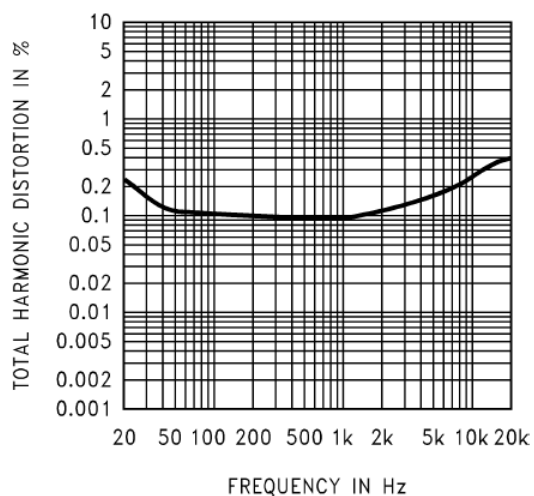
$V_{DD} = 3\text{V}$ Unless otherwise specified. Limits apply for $T_A = 25^\circ\text{C}$.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
IDD	Quiescent Power	$V_{in}=0\text{V}$, $I_O=0\text{A}$, No Load	—	3.5	7	mA
	Supply Current	$V_{in}=0\text{V}$, $I_O=0\text{A}$, 8Ω Load	—	4.5	9	
ISD	Shutdown Current	VSHUTDOWN = 0V	—	0.1	2	μA
VSDIH	Shutdown		1.2	—	—	V

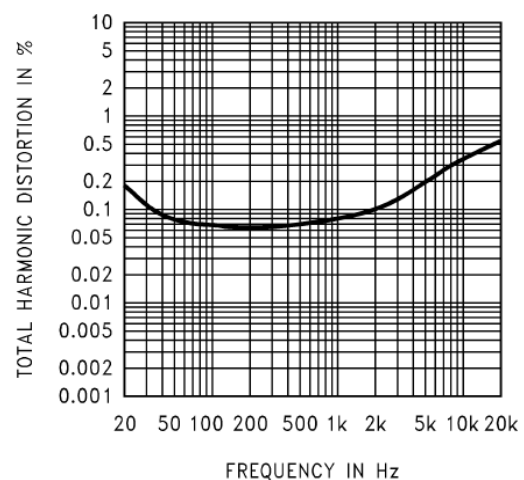
	Voltage Input High					
VSDIL	Shutdown Voltage Input Low		—	—	0.4	V
VOS	Output Offset Voltage		—	7	50	mV
ROUT-GND	Resistor Output to GND		7.0	8.5	9.7	kΩ
PO	Output Power (8Ω)	THD = 2% (max); f = 1 kHz 8Ω Load	0.28	0.31	—	W
TWU	Wake-up time		—	50	70	ms
TSD	Thermal Shutdown Temperature		150	170	190	°C
THD+N	Total Harmonic Distortion+Noise	Po = 0.4 Wrms; f = 1kHz	—	0.1	—	%
PSRR	Power Supply Rejection Ratio	Vripple = 200mVsine p-p f=217Hz	45	56	—	dB
		Vripple = 200mVsine p-p f=1kHz		62		
TSDT	Shut Down Time	8Ω Load	—	1.0	—	ms

● **Typical Performance Characteristics**

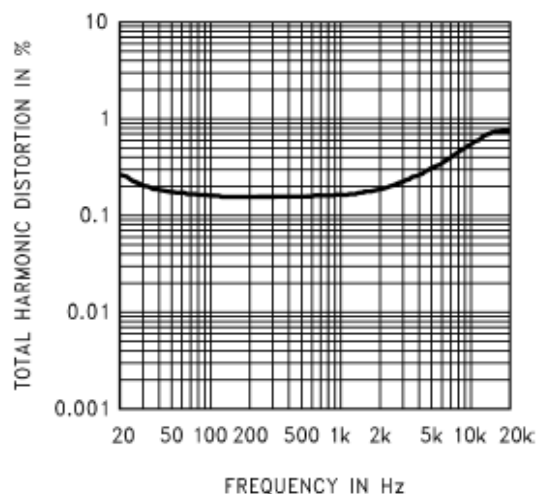
THD+N vs Frequency
 at $V_{DD} = 5V$, $8\Omega R_L$, and $PWR = 250mW$, $A_V = 2$



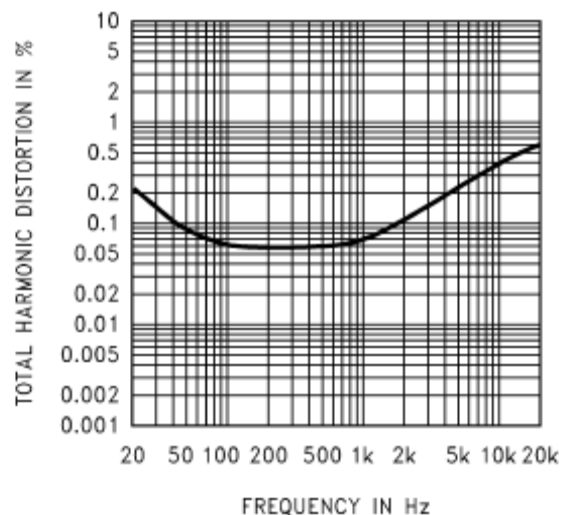
THD+N vs Frequency
 at $V_{DD} = 3.3V$, $8\Omega R_L$, and $PWR = 150mW$, $A_V = 2$



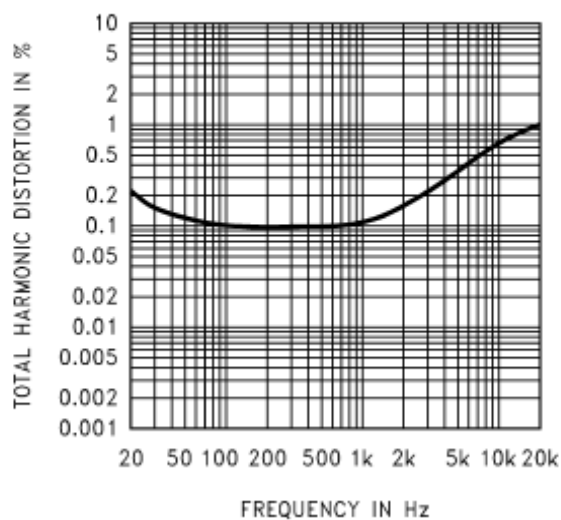
THD+N vs Frequency
 at $V_{DD} = 3V$, $R_L = 8\Omega$, $PWR = 250mW$, $A_V = 2$



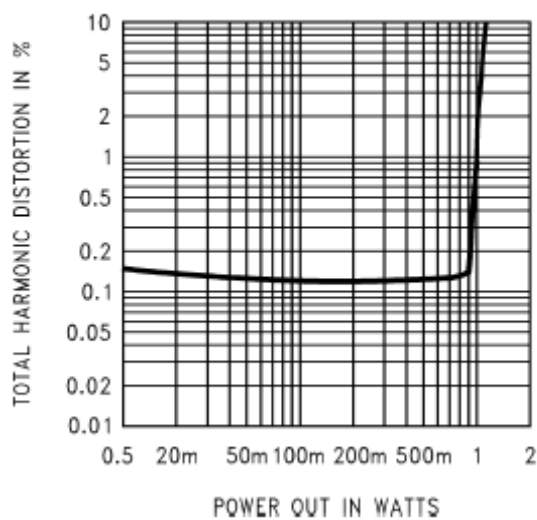
THD+N vs Frequency
 @ $V_{DD} = 2.6V$, $R_L = 8\Omega$, $PWR = 100mW$, $A_V = 2$

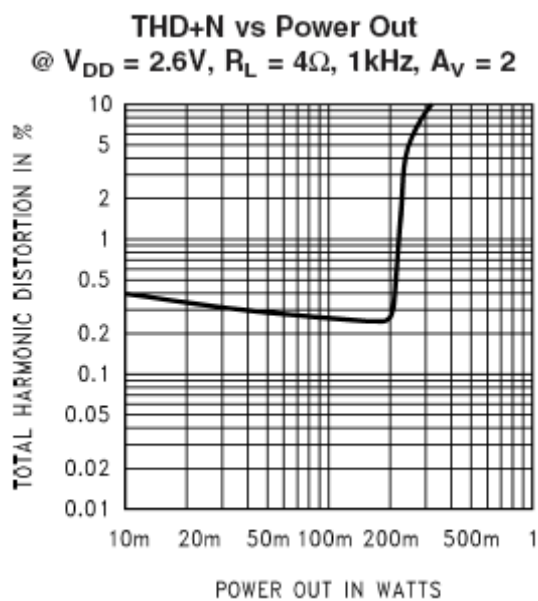
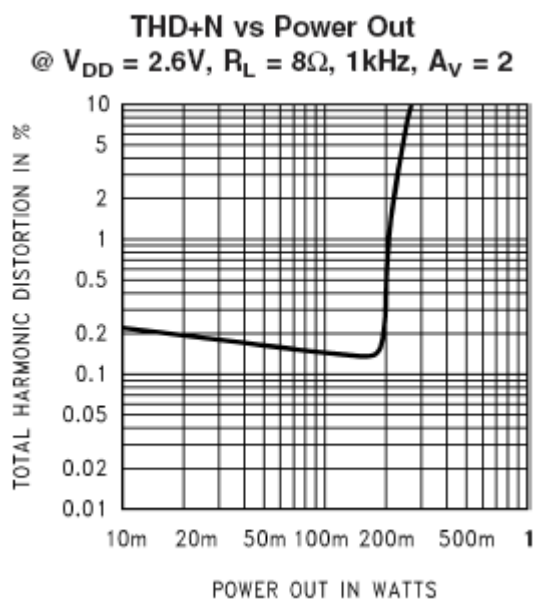
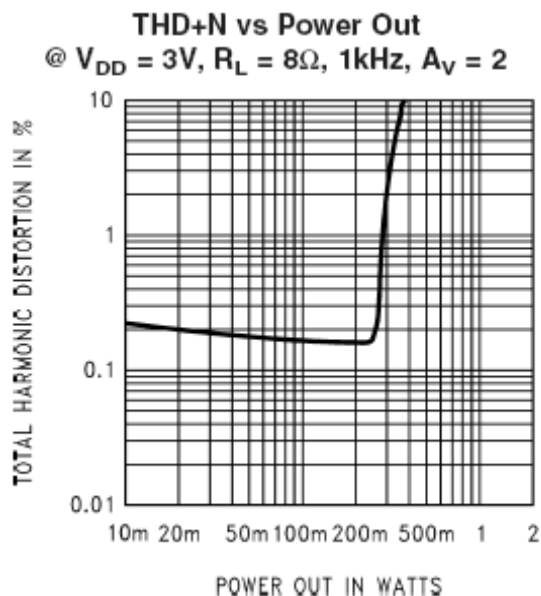


THD+N vs Frequency
 @ $V_{DD} = 2.6V$, $R_L = 4\Omega$, $PWR = 100mW$, $A_V = 2$

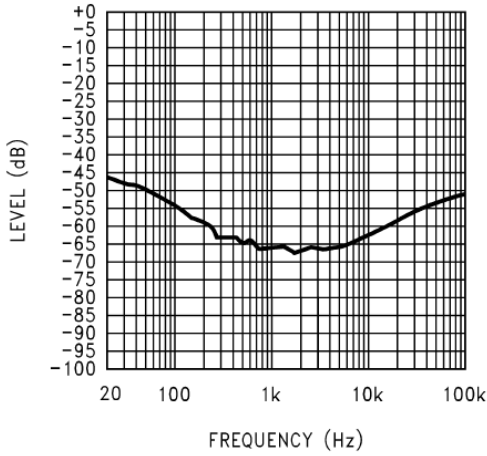


THD+N vs Power Out
 @ $V_{DD} = 5V$, $R_L = 8\Omega$, 1kHz, $A_V = 2$

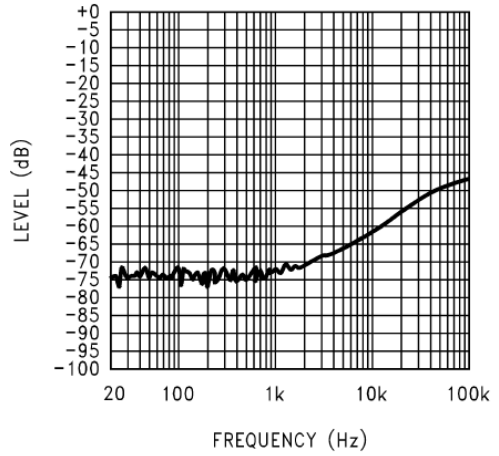




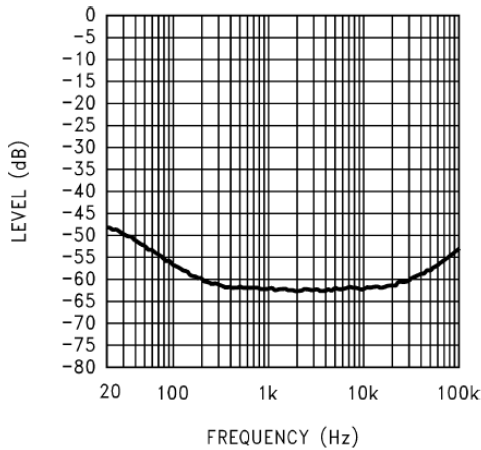
Power Supply Rejection Ratio (PSRR) @ $A_V = 2$
 $V_{DD} = 5V, V_{ripple} = 200mvp-p$
 $R_L = 8\Omega, R_{IN} = 10\Omega$



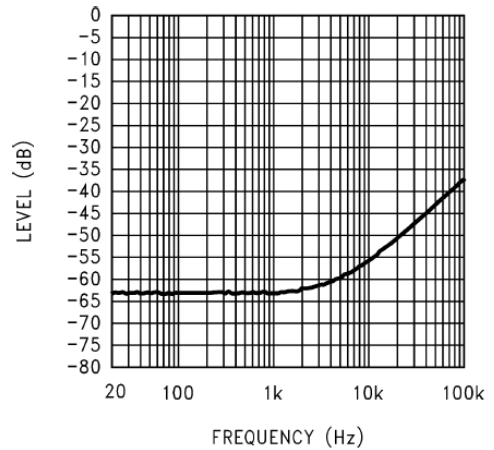
Power Supply Rejection Ratio (PSRR) @ $A_V = 2$
 $V_{DD} = 5V, V_{ripple} = 200mvp-p$
 $R_L = 8\Omega, R_{IN} = Float$



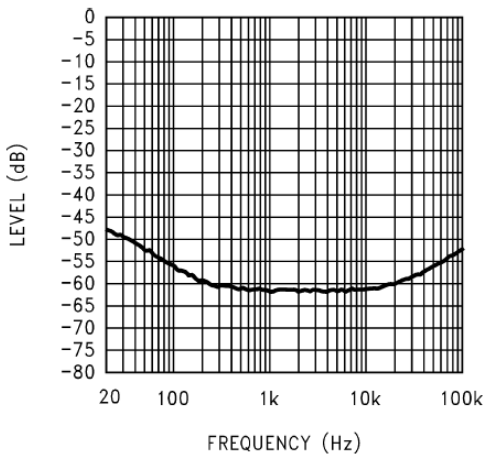
Power Supply Rejection Ratio (PSRR) @ $A_V = 4$
 $V_{DD} = 5V, V_{ripple} = 200mvp-p$
 $R_L = 8\Omega, R_{IN} = 10\Omega$



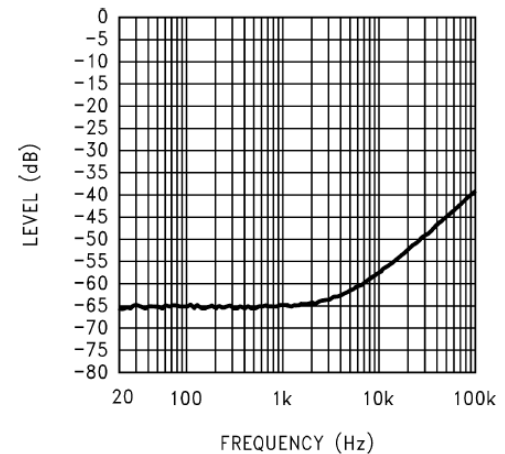
Power Supply Rejection Ratio (PSRR) @ $A_V = 4$
 $V_{DD} = 5V, V_{ripple} = 200mvp-p$
 $R_L = 8\Omega, R_{IN} = Float$



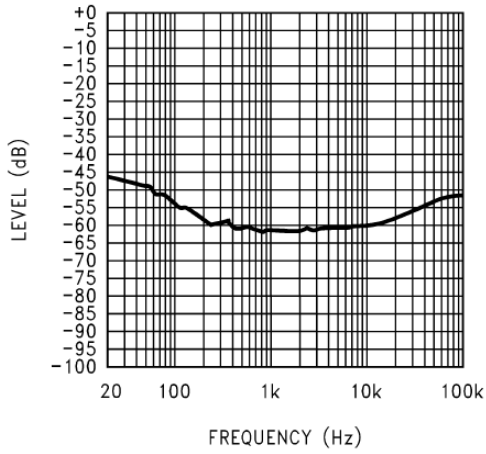
Power Supply Rejection Ratio (PSRR) @ $A_V = 4$
 $V_{DD} = 3V, V_{ripple} = 200mvp-p,$
 $R_L = 8\Omega, R_{IN} = 10\Omega$



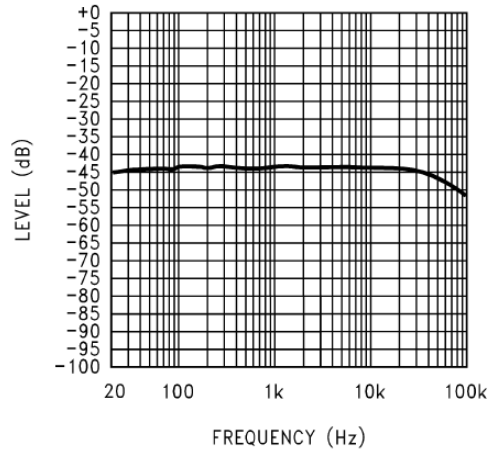
Power Supply Rejection Ratio (PSRR) @ $A_V = 4$
 $V_{DD} = 3V, V_{ripple} = 200mvp-p,$
 $R_L = 8\Omega, R_{IN} = Float$



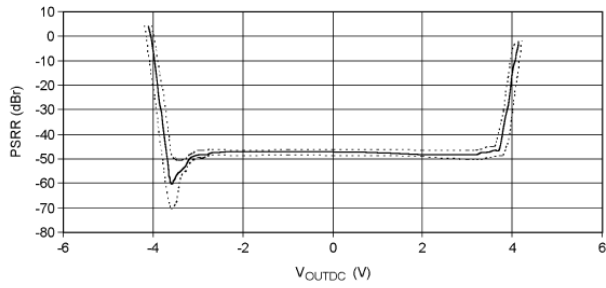
Power Supply Rejection Ratio (PSRR) @ $A_V = 2$
 $V_{DD} = 3.3V$, $V_{ripple} = 200mvp-p$,
 $R_L = 8\Omega$, $R_{IN} = 10\Omega$



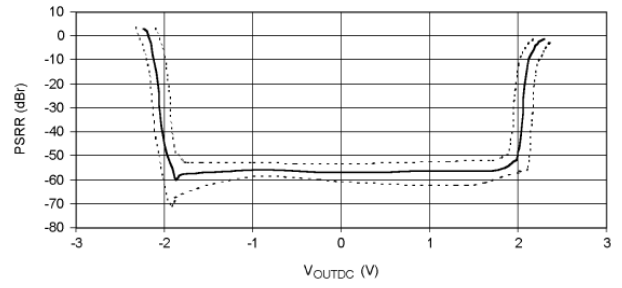
Power Supply Rejection Ratio (PSRR) @ $A_V = 2$
 $V_{DD} = 2.6V$, $V_{ripple} = 200mvp-p$,
 $R_L = 8\Omega$, $R_{IN} = 10\Omega$



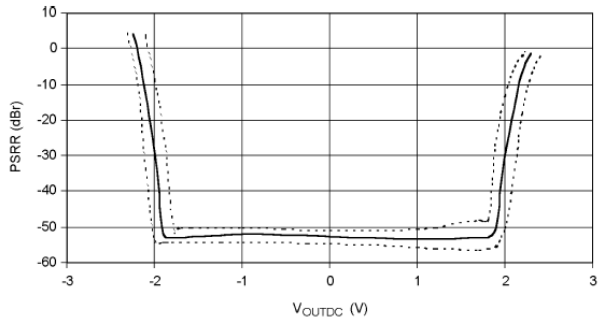
PSRR vs DC Output Voltage
 $V_{DD} = 5V$, $A_V = 10$



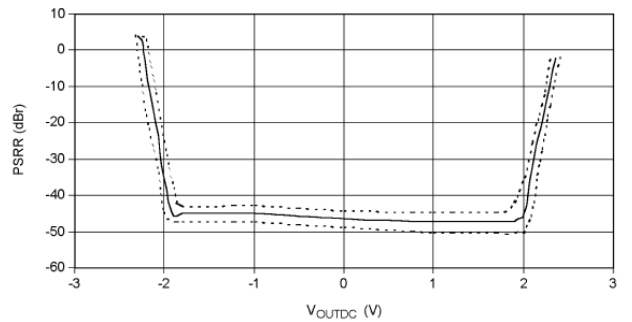
PSRR vs DC Output Voltage
 $V_{DD} = 3V$, $A_V = 2$



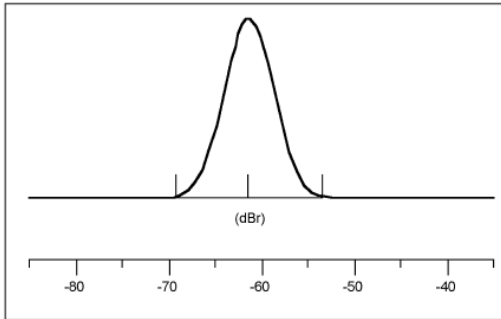
PSRR vs DC Output Voltage
 $V_{DD} = 3V$, $A_V = 4$



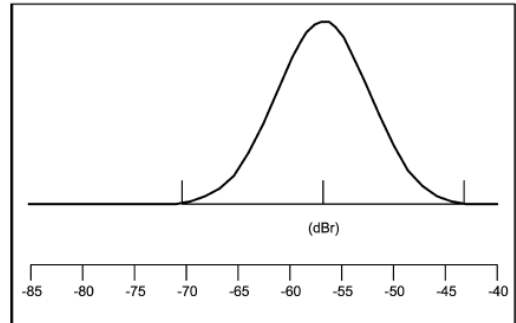
PSRR vs DC Output Voltage
 $V_{DD} = 3V$, $A_V = 10$



PSRR Distribution $V_{DD} = 5V$
 217Hz, 200mvp-p,
 -30, +25, and +80°C

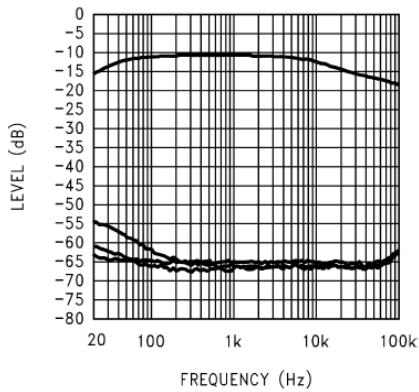


PSRR Distribution $V_{DD} = 3V$
 217Hz, 200mvp-p,
 -30, +25, and +80°C



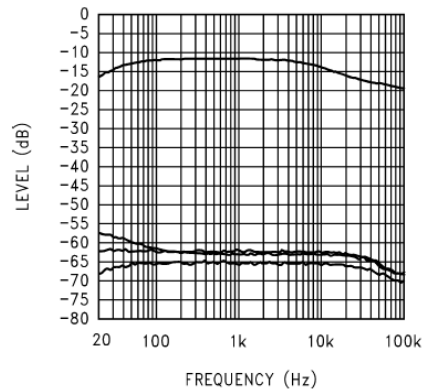
Power Supply Rejection Ratio vs Bypass Capacitor Size

$V_{DD} = 5V$, Input Grounded = 10Ω , Output Load = 8Ω

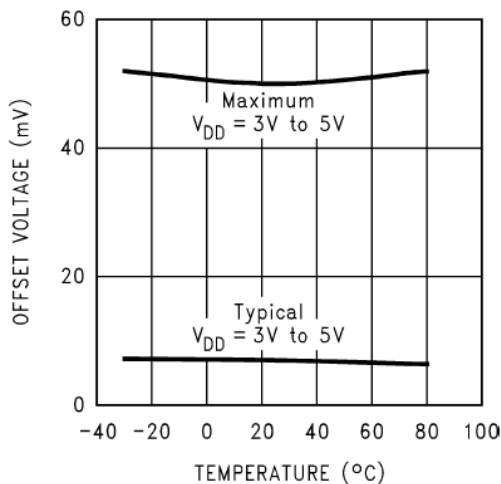


Power Supply Rejection Ratio vs Bypass Capacitor Size

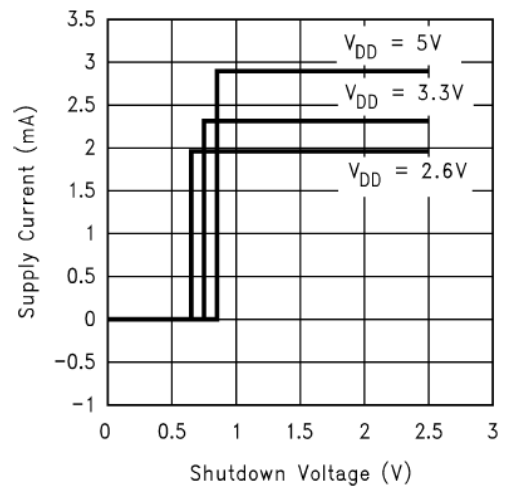
$V_{DD} = 3V$, Input Grounded = 10Ω , Output Load = 8Ω



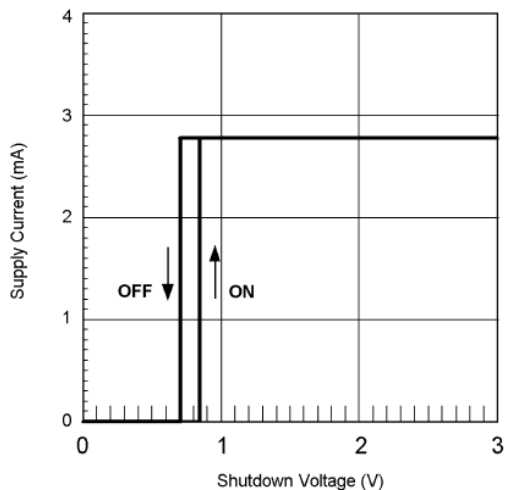
Output Offset Voltage



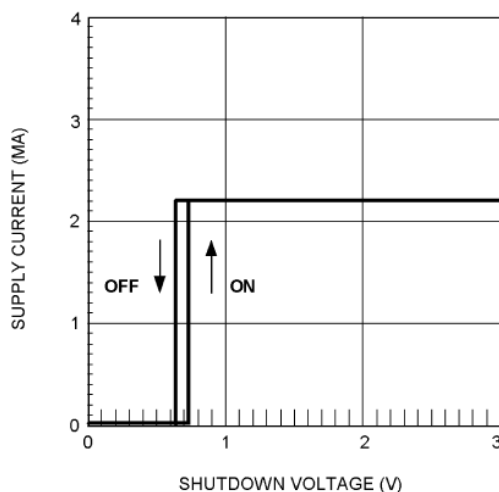
Supply Current vs Shutdown Voltage



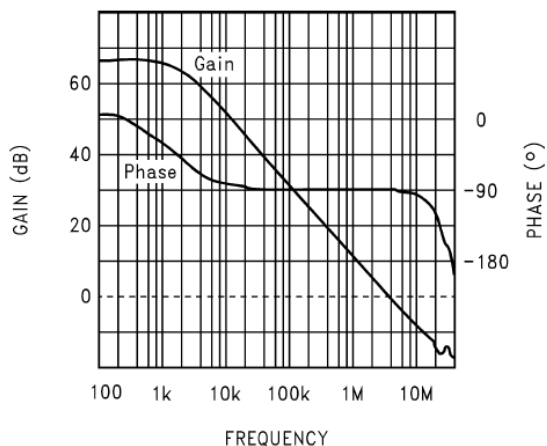
Shutdown Hysteresis Voltage
 $V_{DD} = 5V$



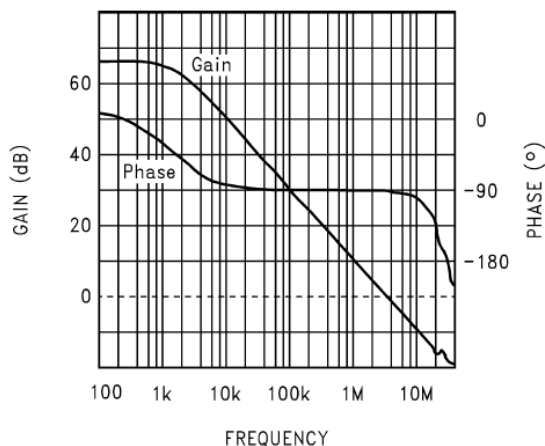
Shutdown Hysteresis Voltage
 $V_{DD} = 3V$



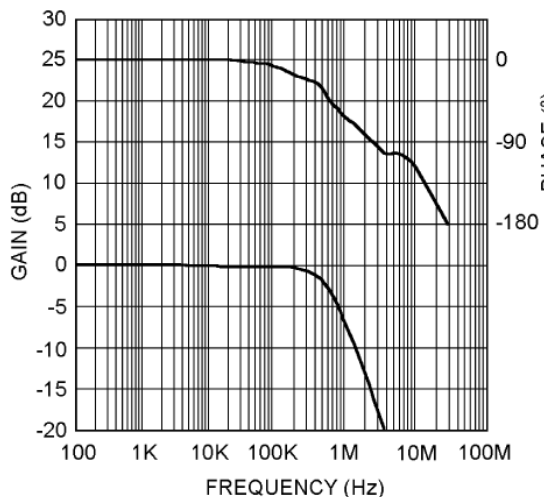
Open Loop Frequency Response
 $V_{DD} = 5V$, No Load



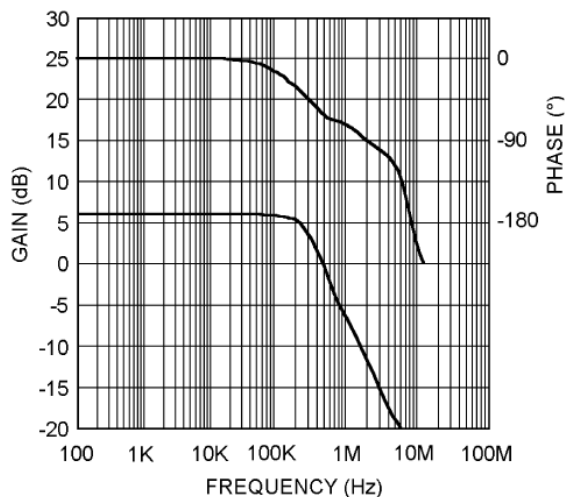
Open Loop Frequency Response
 $V_{DD} = 3V$, No Load



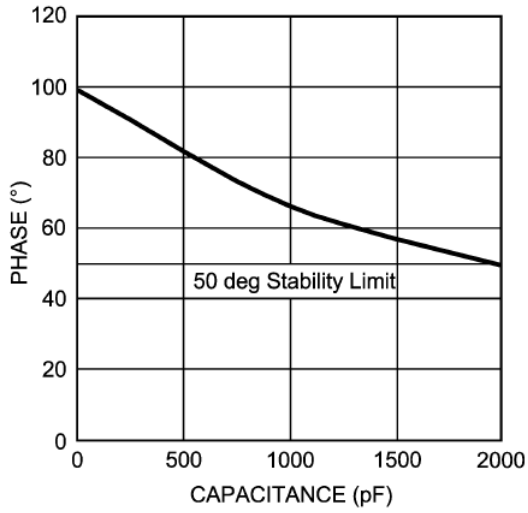
Gain / Phase Response, $A_V = 2$
 $V_{DD} = 5V$, 8Ω Load, $C_{LOAD} = 500pF$



Gain / Phase Response, $A_V = 4$
 $V_{DD} = 5V$, 8Ω Load, $C_{LOAD} = 500pF$



Phase Margin vs C_{LOAD} , $A_V = 2$
 $V_{DD} = 5V$, 8Ω Load
 Capacitance to gnd on each output



Phase Margin vs C_{LOAD} , $A_V = 4$
 $V_{DD} = 5V$, 8Ω Load
 Capacitance to gnd on each output

