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

The AF4890 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.

The AF4890 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 AF4890 features a low-power consumption shutdown mode, which is achieved by driving the shutdown pin with logic low. Additionally, the AF4890 features an internal thermal shutdown protection mechanism.

The AF4890 contains advanced pop & click circuitry which eliminates noises which would otherwise occur during turn-on and turn-off transitions.

The AF4890 is unity-gain stable and can be configured by external gain-setting resistors.

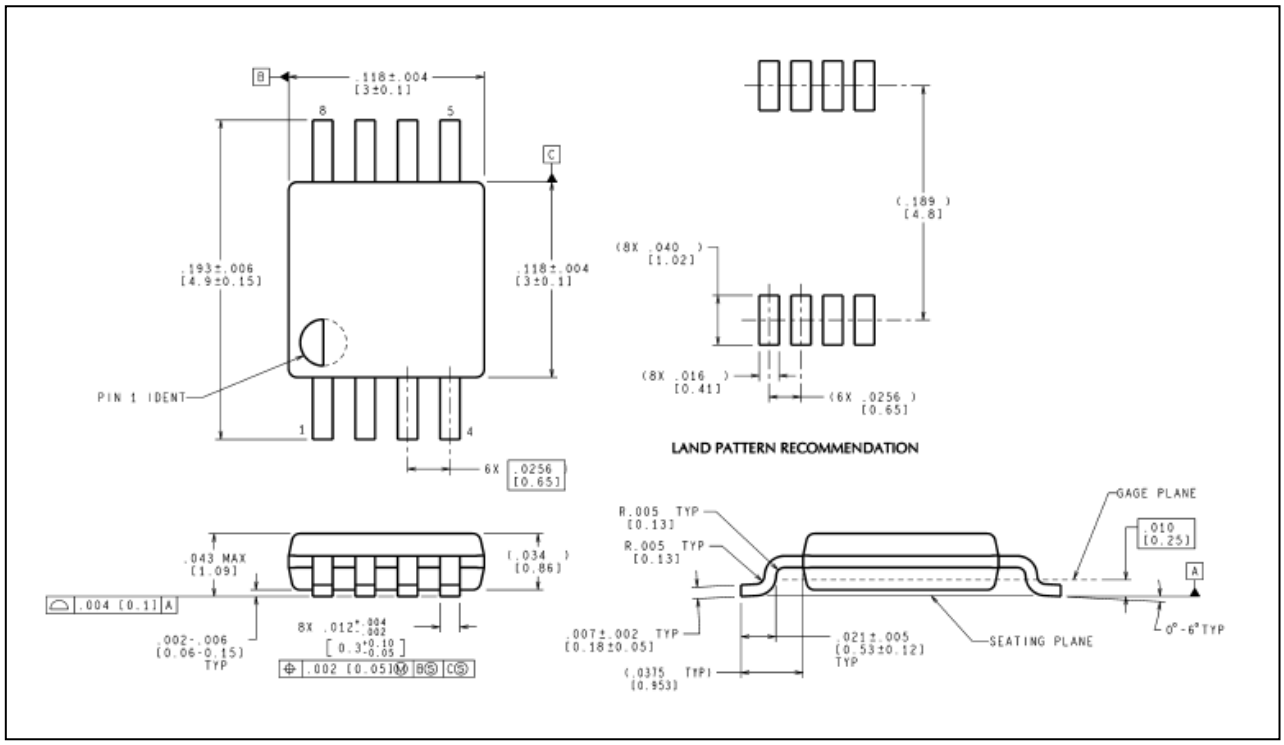
● Applications

Mobile Phones

PDAs

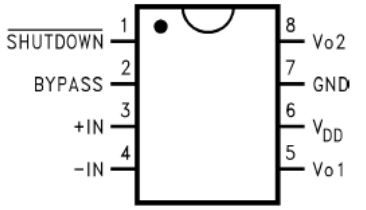
Portable electronic devices

● Package Information



PIN CONFIGURATION

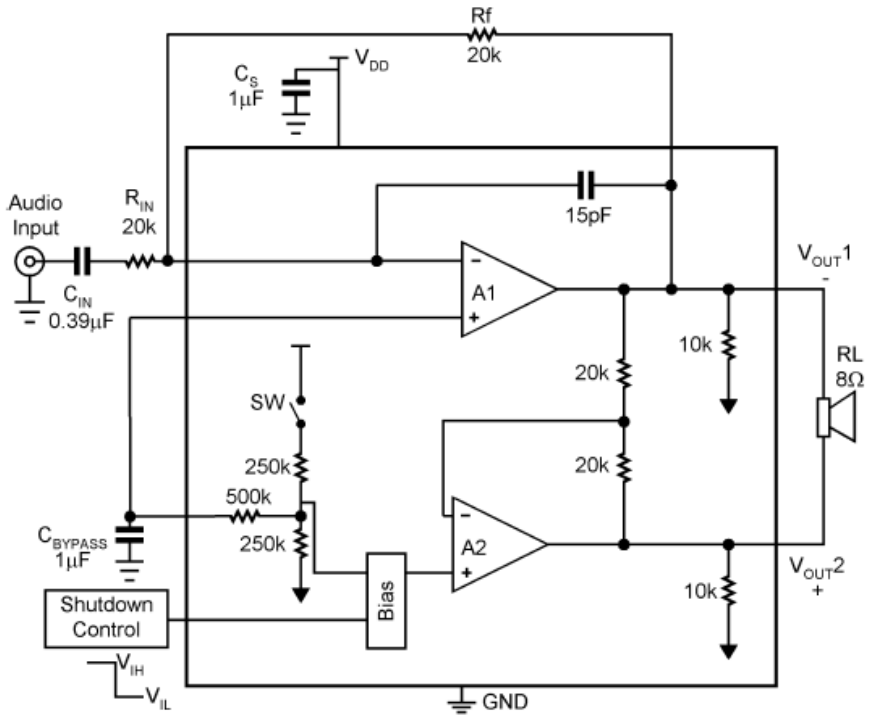
Mini Small Outline (MSOP) Package



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°C unless otherwise noted

Supply Voltage ---------- ---------6.0V

Storage Temperature ----------−65°C to +150°C

Input Voltage ----------−0.3V to V_{DD} +0.3V

Power Dissipation ---------- Internally Limited

ESD Susceptibility----------2000V

Junction Temperature ----------150°C

- **Electrical Characteristics** VDD = 5V Unless otherwise specified. Limits apply for TA = 25°C.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
IDD	Quiescent Power Supply Current	Vin=0V，IO=0A，No Load	—	4	8	mA
		Vin=0V，IO=0A，8Ω Load	—	5	10	
ISD	Shutdown Current	VSHUTDOWN = 0V	—	0.1	2	μA
VSDIH (1)	Shutdown Voltage Input High		1.2	2.5	—	V
VSDIL	Shutdown Voltage Input Low		—	—	0.4	V
VOS	Output Ofsett 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	0.8	1.0	—	W
TWU	Wake-up time		—	170	220	ms
TSD	Thermal Shutdown Temperature		150	170	190	℃
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	55	62	—	dB
		Vripple = 200mVsine p-p f=1kHz		66		
TSDT	Shut Down Time	8Ω Load	—	1.0	—	ms

VDD = 3V Unless otherwise specified. Limits apply for TA = 25°C.)

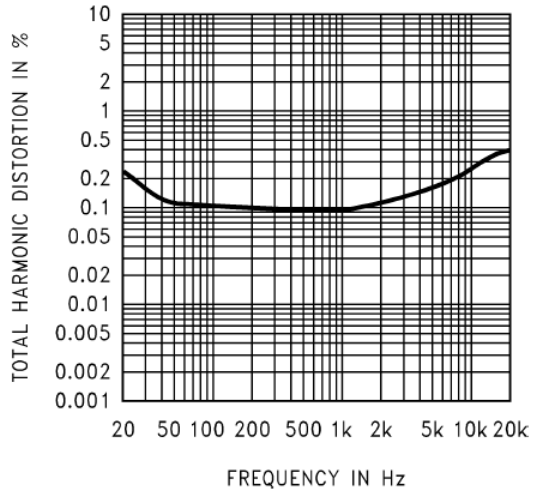
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
IDD	Quiescent Power Supply Current	Vin=0V，IO=0A，No Load	—	3.5	7	mA
		Vin=0V，IO=0A，8Ω Load		4.5	9	
ISD	Shutdown Current	VSHUTDOWN = 0V	—	0.1	2	μA
VSDIH (1)	Shutdown		1.2	1.5	—	V

	Voltage Input High					
VSDIL	Shutdown Voltage Input Low		—	—	0.4	V
VOS	Output Ofsett 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		—	170	220	ms
TSD	Thermal Shutdown Temperature		150	170	190	℃
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

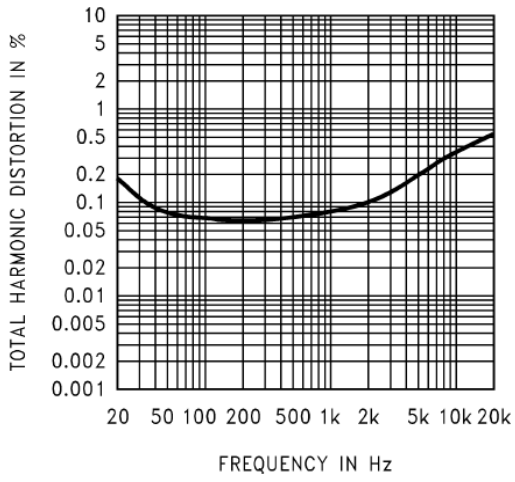
Note: (1) Enable the device,the shutdown pin voltages should be higher than 0.5VDD.

- **Typical Performance Characteristics**

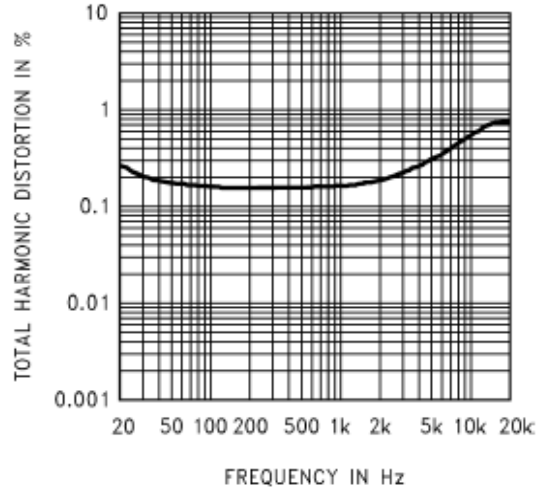
THD+N vs Frequency
at V_{DD} = 5V, 8Ω R_L, and PWR = 250mW, A_V = 2



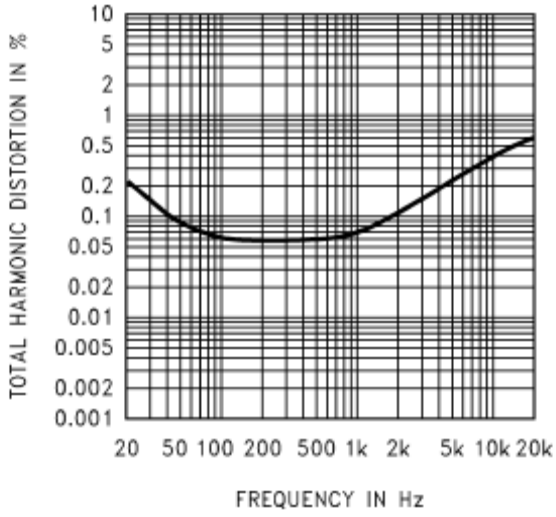
THD+N vs Frequency
at V_{DD} = 3.3V, 8Ω R_L, and PWR = 150mW, A_V = 2



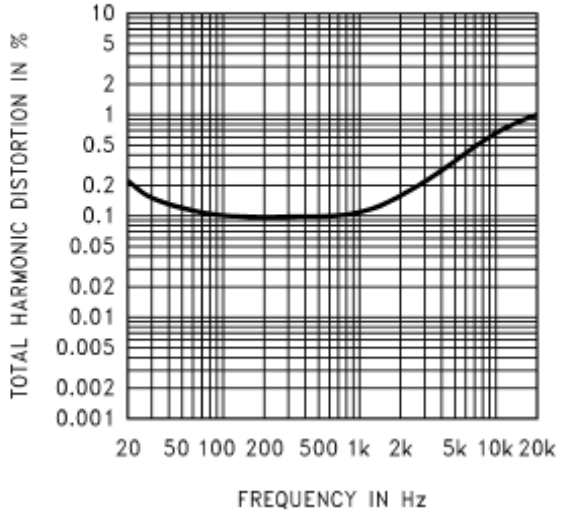
THD+N vs Frequency
at V_{DD} = 3V, R_L = 8Ω, PWR = 250mW, A_V = 2



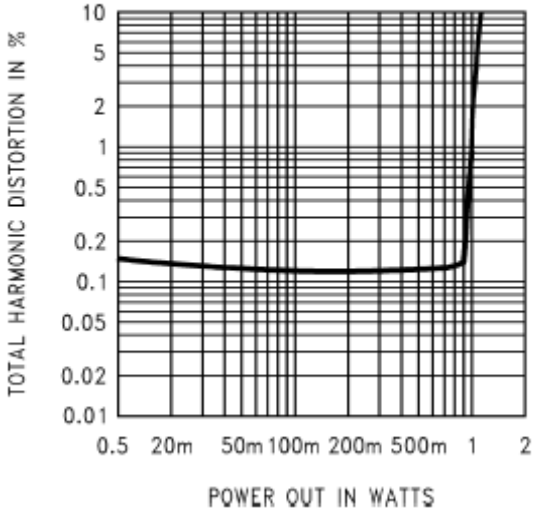
THD+N vs Frequency
@ V_{DD} = 2.6V, R_L = 8Ω, PWR = 100mW, A_V = 2



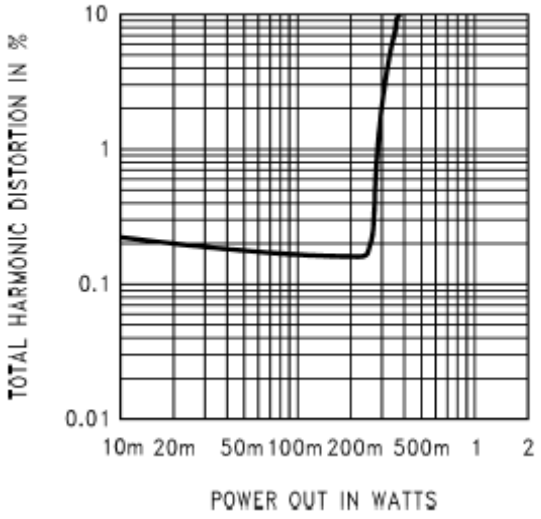
THD+N vs Frequency
@ V_{DD} = 2.6V, R_L = 4Ω, PWR = 100mW, A_V = 2



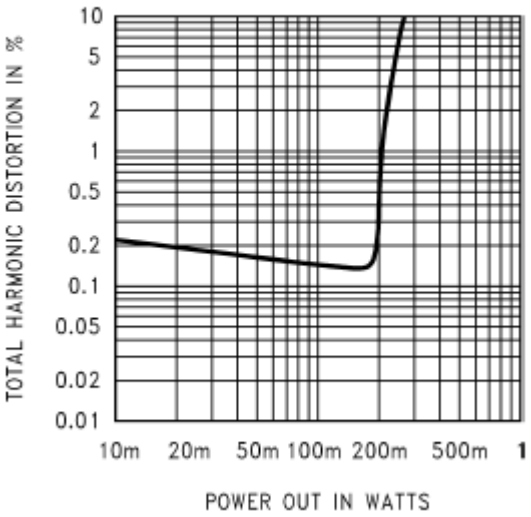
THD+N vs Power Out
@ V_{DD} = 5V, R_L = 8Ω, 1kHz, A_V = 2



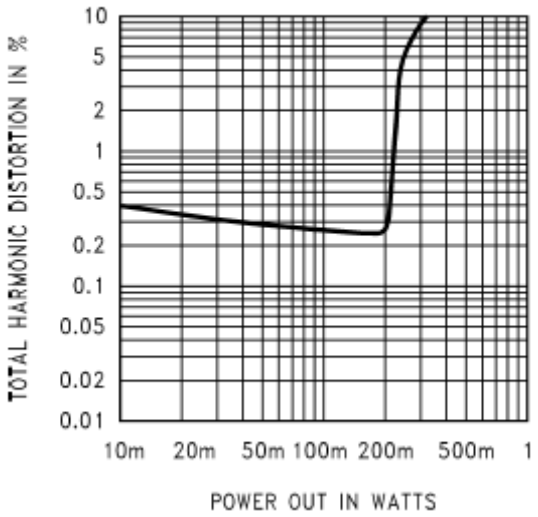
THD+N vs Power Out
@ V_{DD} = 3V, R_L = 8Ω, 1kHz, A_V = 2



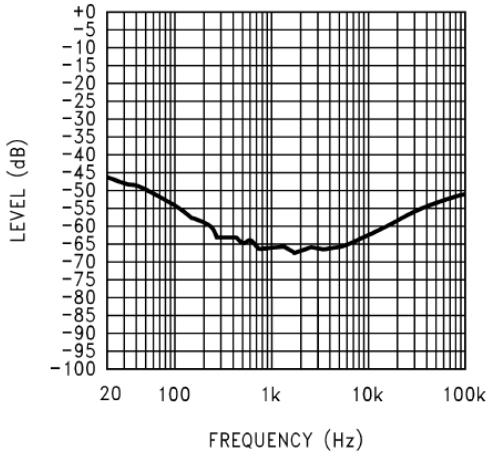
THD+N vs Power Out
@ V_{DD} = 2.6V, R_L = 8Ω, 1kHz, A_V = 2



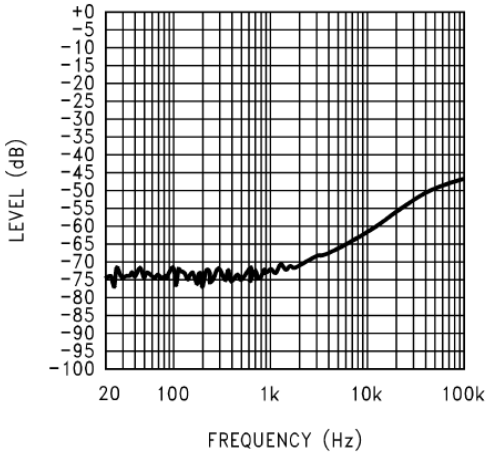
THD+N vs Power Out
@ V_{DD} = 2.6V, R_L = 4Ω, 1kHz, A_V = 2



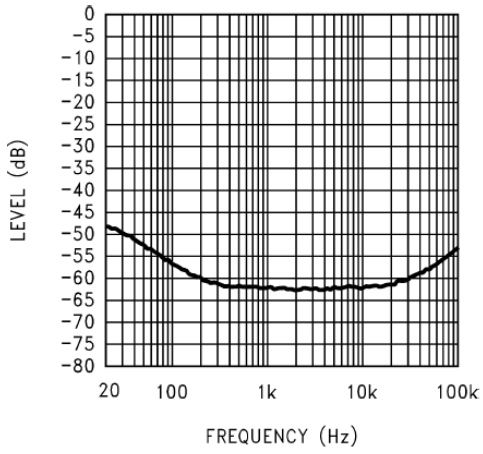
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = 10Ω



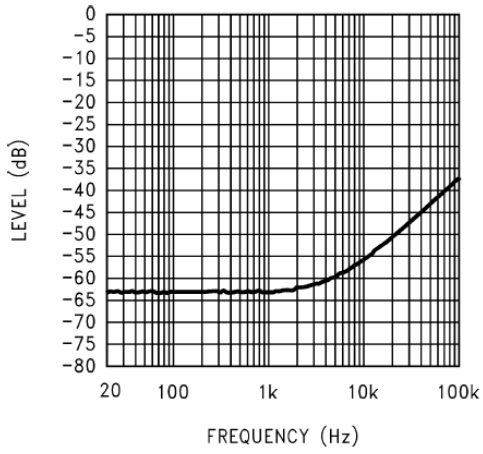
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = Float



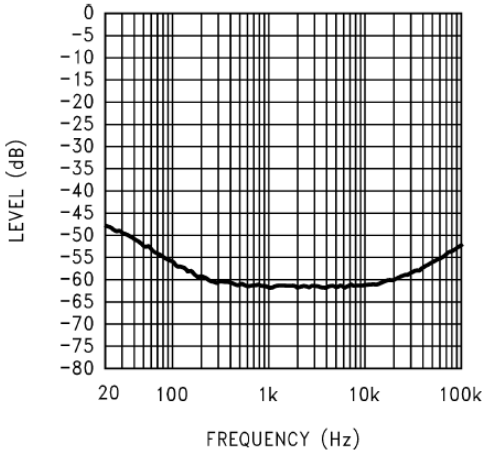
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = 10Ω



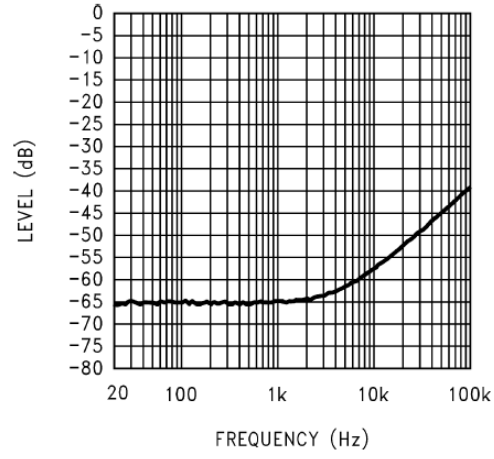
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 5V, V_{ripple} = 200mvp-p
R_L = 8Ω, R_{IN} = Float



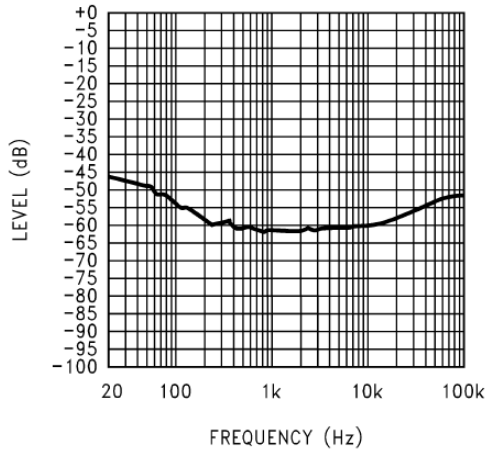
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = 10Ω



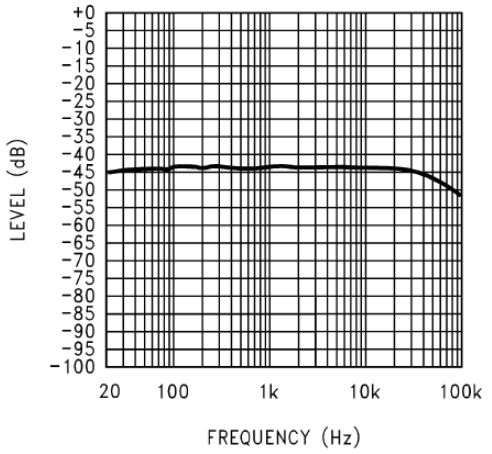
Power Supply Rejection Ratio (PSRR) @ A_V = 4
V_{DD} = 3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = Float



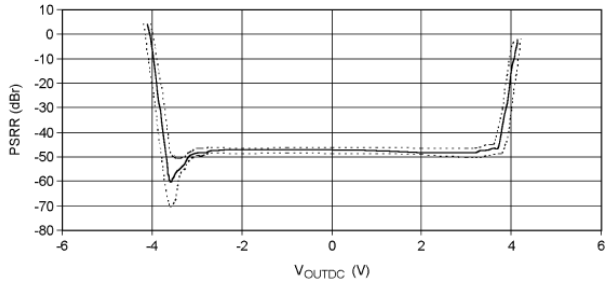
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 3.3V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = 10Ω



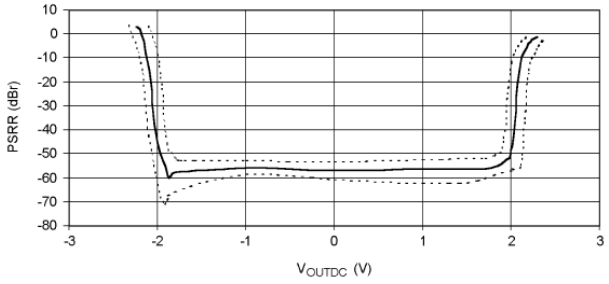
Power Supply Rejection Ratio (PSRR) @ A_V = 2
V_{DD} = 2.6V, V_{ripple} = 200mvp-p,
R_L = 8Ω, R_{IN} = 10Ω



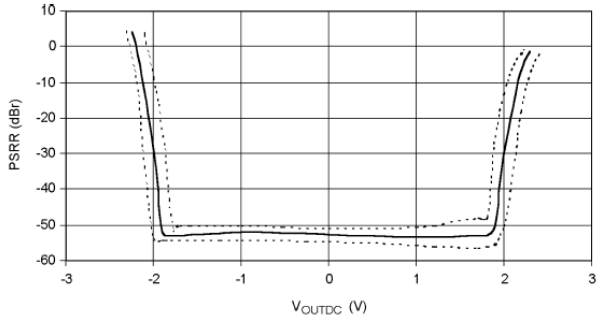
PSRR vs DC Output Voltage
V_{DD} = 5V, A_V = 10



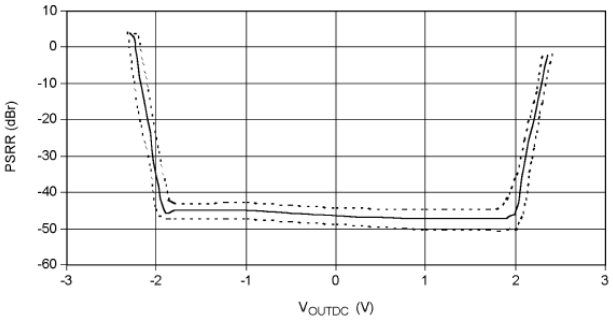
PSRR vs DC Output Voltage
V_{DD} = 3V, A_V = 2



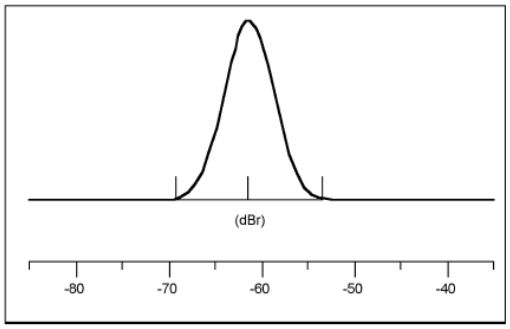
PSRR vs DC Output Voltage
V_{DD} = 3V, A_V = 4



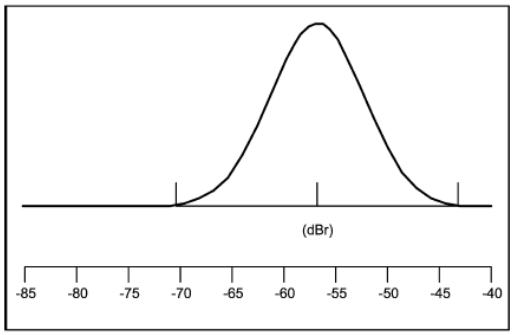
PSRR vs DC Output Voltage
V_{DD} = 3V, A_V = 10



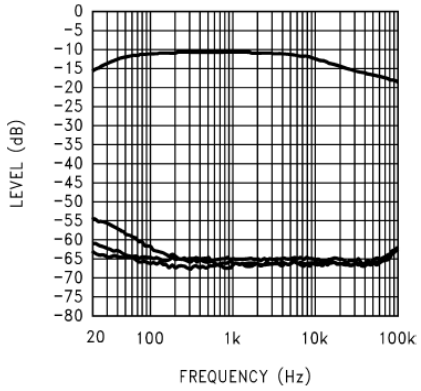
PSRR Distribution V_{DD} = 5V
217Hz, 200mvp-p,
-30, +25, and +80˚C



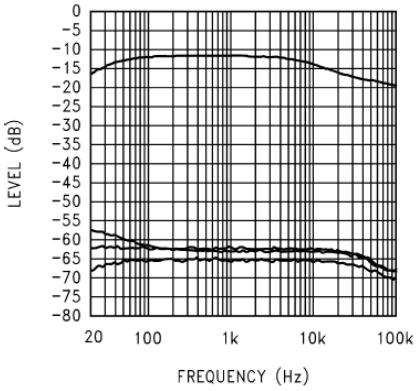
PSRR Distribution V_{DD} = 3V
217Hz, 200mvp-p,
-30, +25, and +80˚C



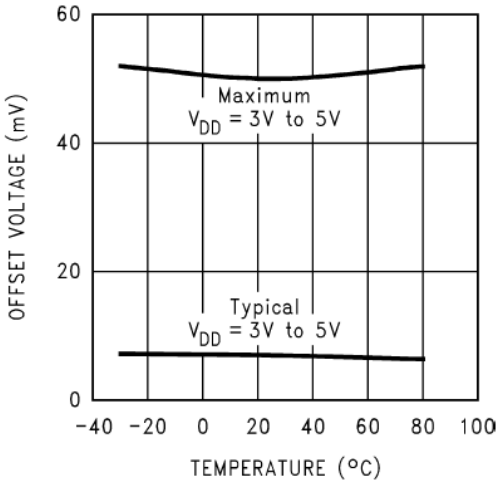
Power Supply Rejection Ration vs
Bypass Capacitor Size
V_{DD} = 5V, Input Grounded = 10Ω, Output Load = 8Ω



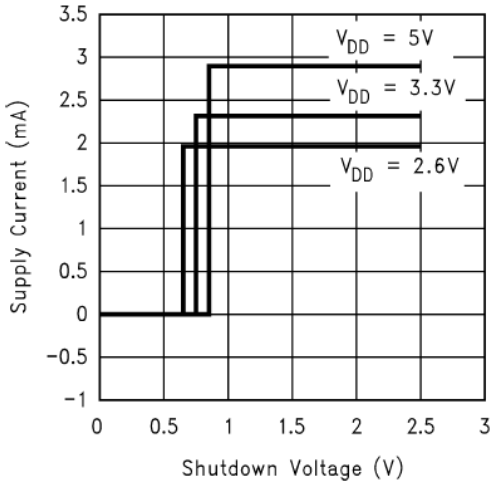
Power Supply Rejection Ration vs
Bypass Capacitor Size
V_{DD} = 3V, Input Grounded = 10Ω, Output Load = 8Ω



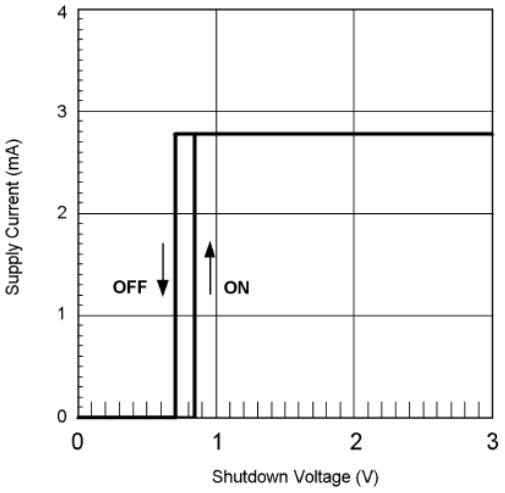
Output Offset Voltage



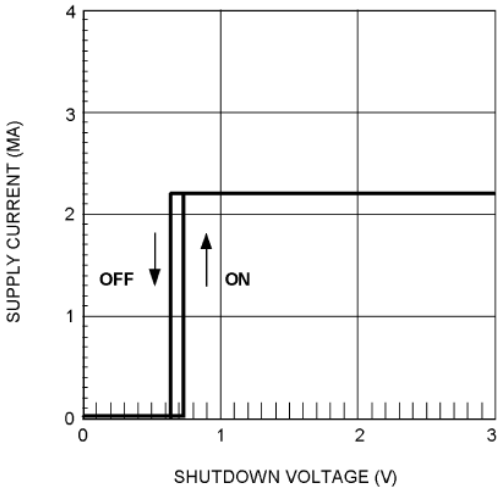
Supply Current
vs Shutdown Voltage



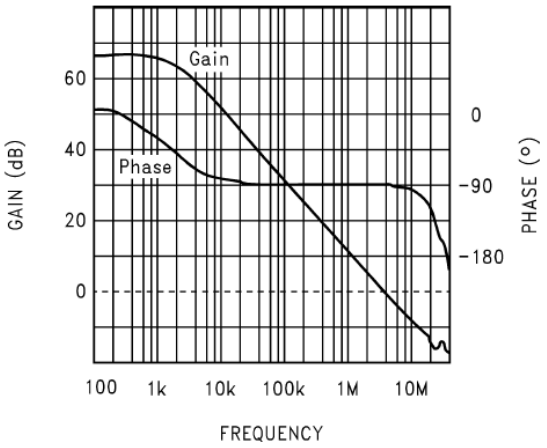
Shutdown Hysterisis Voltage
V_{DD} = 5V



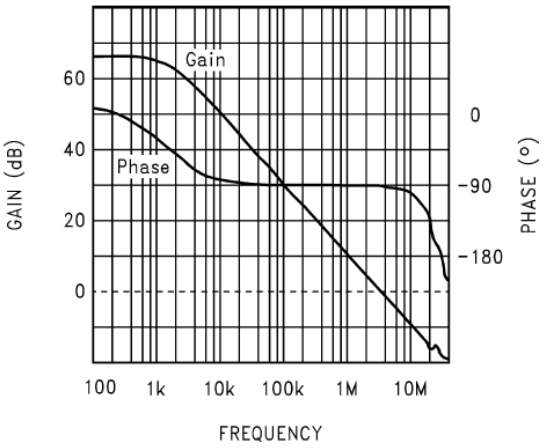
Shutdown Hysterisis Voltage
V_{DD} = 3V



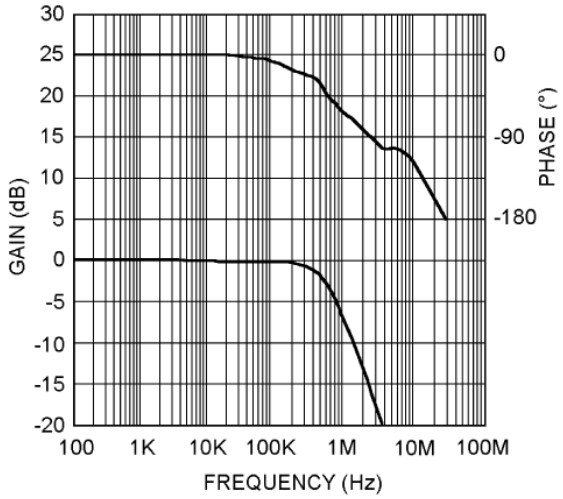
Open Loop Frequency Response
V_{DD} = 5V, No Load



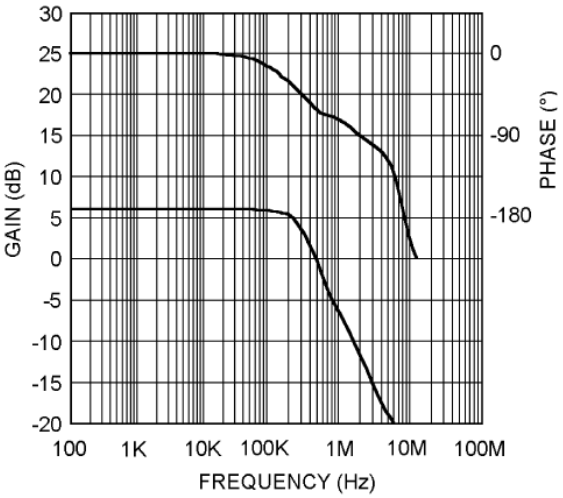
Open Loop Frequency Response
V_{DD} = 3V, No Load



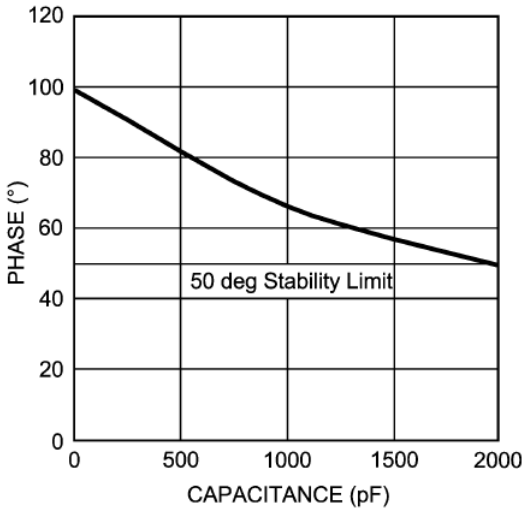
Gain / Phase Response, A_V = 2
V_{DD} = 5V, 8Ω Load, C_{LOAD} = 500pF



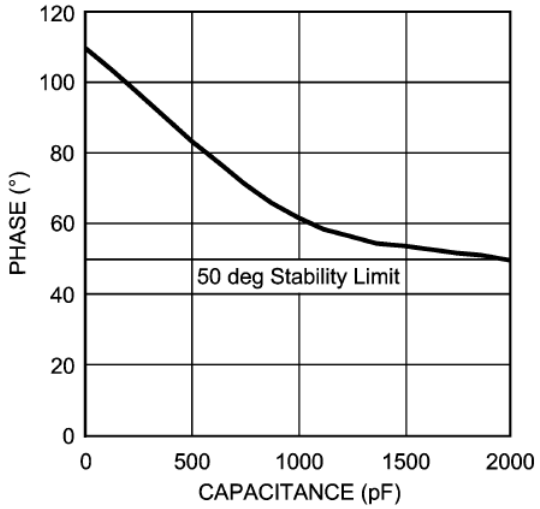
Gain / Phase Response, A_V = 4
V_{DD} = 5V, 8Ω Load, C_{LOAD} = 500pF



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



DISCLAIMER

ANALOG FUTURE COMPANY RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. ANALOG FUTURE DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICIENCE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

THE GRAPHS PROVIDED IN THIS DOCUMENT ARE A STATISTICAL SUMMARY BASED ON A LIMITED NUMBER OF SAMPLES AND ARE PROVIDE FOR INFORMATIONAL PURPOSE ONLY. THE PERFORMANCE CHARACTERISTICS LISTED IN THEM ARE NOT TESTED OR GUARANTEED. IN SOME GRAPHS, THE DATA PRESENTED MAY BE OUTSIDE THE SPECIFIED OPERATING RANGE (E.G,. OUTSIDE SPECIFIED POWER SUPPLY RANGE) AND THEREFORE OUTSIDE THE WARRANTED RANGE.