

Dual 2.7W Stereo Audio Amplifier Plus Headphone Driver

General Description

The LN4088 is a dual bridge-connected audio power amplifier which, when connected to a 5V supply, will deliver 2.7W to a 4Ω load. To simplify audio system design, the LN4088 combines dual bridge speaker amplifiers and stereo headphone amplifiers on one chip.

The LN4088 features a low-power consumption shutdown mode and thermal shutdown protection. It also utilizes circuitry to reduce “clicks and pops” during device turn-on.

Key Specifications

- Power Output @1% THD+N & VDD=5V

LN4088	RL=4Ω	2.2W (TYP)
	RL=8Ω	1.4W (TYP)
- Power Output @10% THD+N & VDD=5V

LN4088	RL=4Ω	2.7W (TYP)
	RL=8Ω	1.7W (TYP)
- Power Output @1% THD+N & VDD=4V

LN4088	RL=4Ω	1.4W (TYP)
	RL=8Ω	0.88W (TYP)
- Shutdown current 0.04uA(TYP.)
- Supply voltage 2.0V~5.5V

Operating Ratings

Temperature Range

TMIN ≤ TA ≤ TMAX----- -40°C ≤ TA ≤ 85°C

Supply Voltage ----- 2.0V ≤ VDD ≤ 5.5V

Features

- Stereo headphone amplifier mode
- “Click and pop” suppression circuitry
- Unity-gain stable
- Thermal shutdown protection circuitry
- Exposed-DAP: QFN-16 packaging available

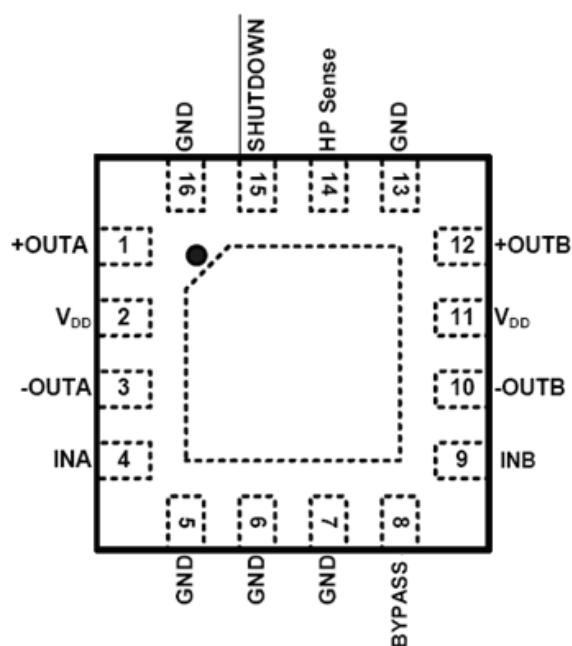
Applications

- Multimedia monitors
- Portable and desktop computers
- Portable televisions

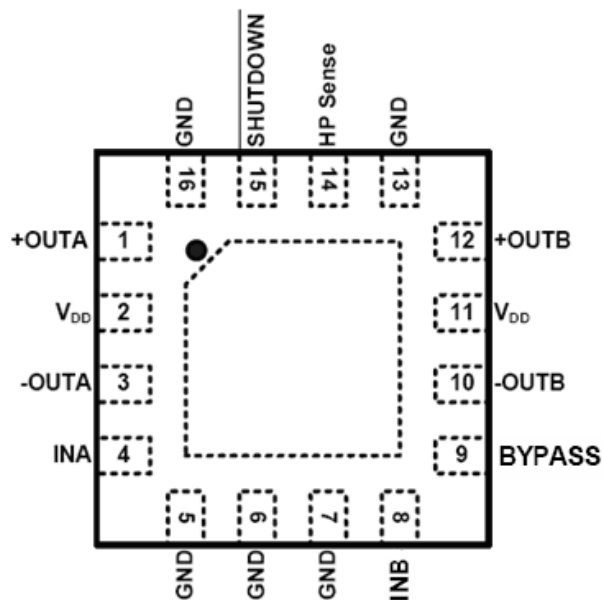
Package

- QFN4×4-16

Pin Configuration



Ordering Number: LN4088SQ

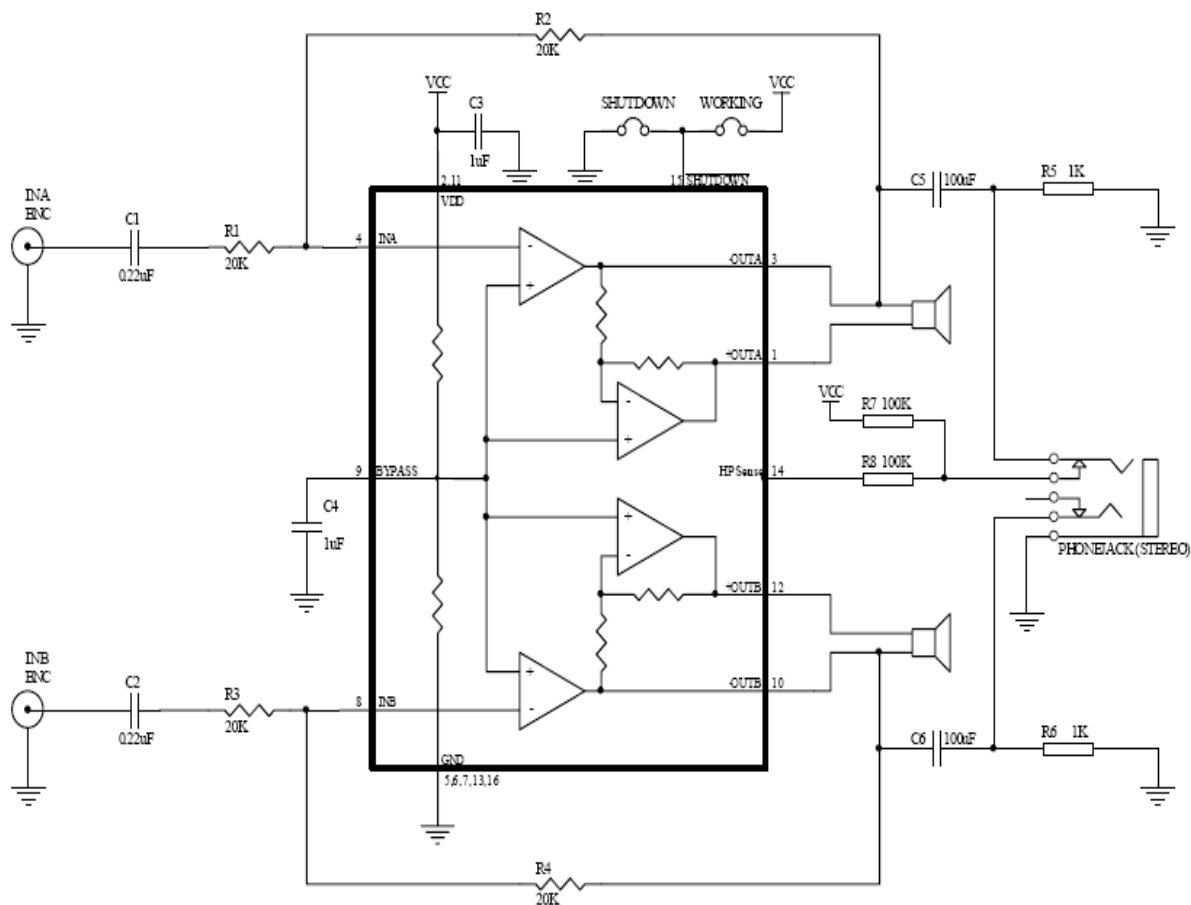


Ordering Number: LN4088SQA

Pin Function Description

Pin Name	DRB	I/O	Function Description
INA	4	I	Left channel input
INB	8 (9)	I	Right channel input
-OUTA	3	O	Left channel negative output
+OUTA	1	O	Left channel positive output
-OUTB	10	O	Right channel negative output
+OUTB	12	O	Right channel positive output
VDD	2, 11		Power supply
HP Sense	14	I	Headphone control terminal
Shutdown	15	I	Shutdown terminal (active low logic)
Bypass	9 (8)		Adding a bypass capacitor
GND	5, 6, 7, 13, 16		High-current ground

Function Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V_{DD}	-0.3—6.0	V
Input Voltage	V_{IN}	-0.3— $V_{DD}+0.3$	V
Power Output	—	Internal limit	
Junction Temperature	—	-150	°C
Storage Temperature	T_{stg}	-65—150	°C
ESD Susceptibility	-	2000	V

■ Electrical Characteristics

(VDD = 5V Unless otherwise specified. Limits apply for TA = 25°C.)

Symbol	Parameters	Test Conditions	Min.	Typ.	Max.	Unit
VDD	Supply voltage	—	2.0	—	5.5	V
IDD	Quiescent Power Supply Current	VIN = 0V, IO = 0A, BTL	1	4	7.5	mA
		VIN = 0V, IO = 0A, SE	—	2	—	mA
ISD	Shutdown Current	VSHUTDOWN = 5V	—	0.04	1	μA
VIH	HP, Shutdown Voltage Input High	—	1.4	—	—	V
VIL	HP, Shutdown Voltage Input Low	—	—	—	0.4	V
TWU	Wake up time	1uF Bypass capacitor		100		ms

■ Electrical Characteristics For Bridged-Mode Operation

(VDD = 5V Unless otherwise specified. Limits apply for TA = 25°C.)

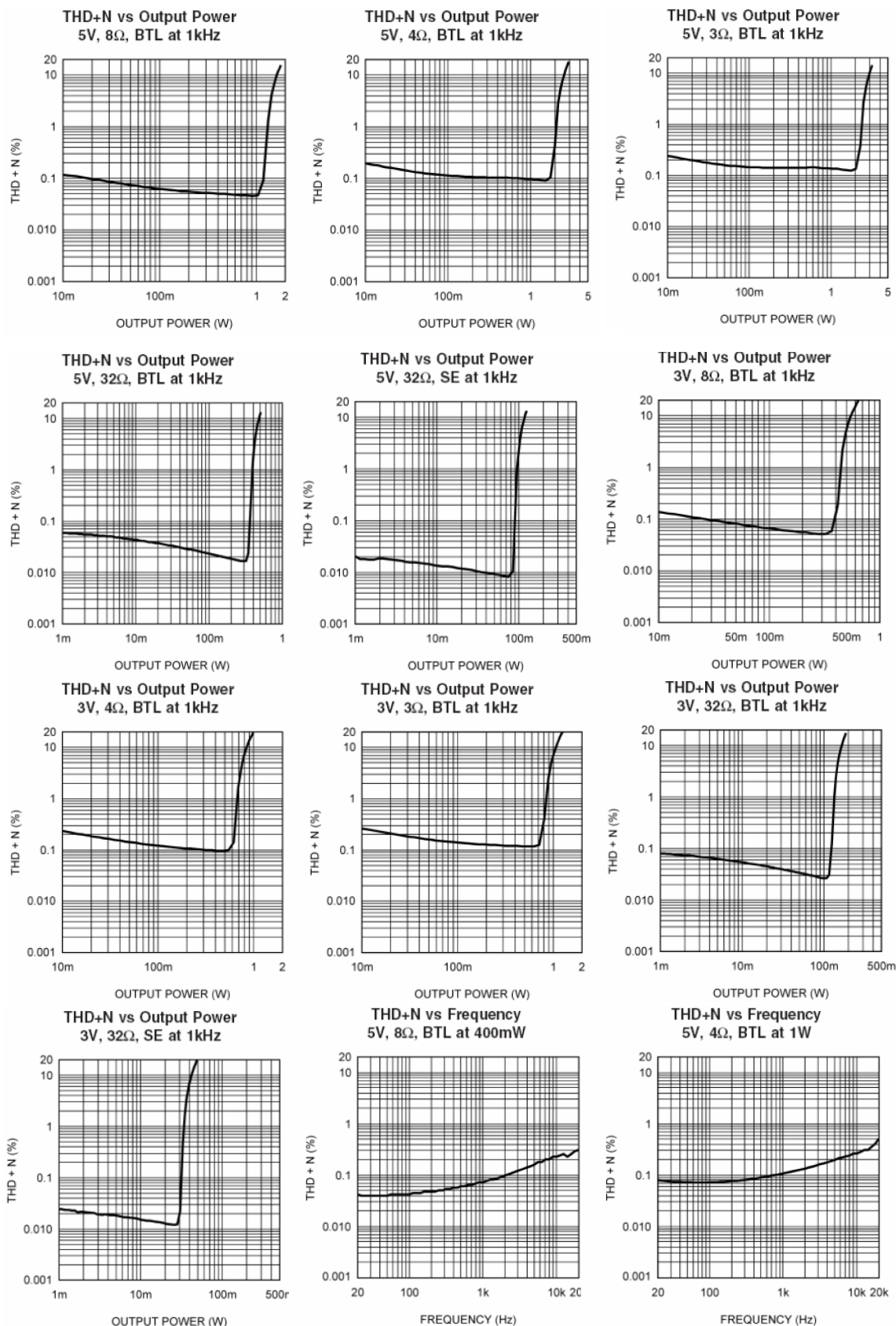
Symbol	Parameters	Test Conditions	Min.	Typ.	Max.	Unit
VOS	Output Offset Voltage	VIN = 0V	—	5	50	mV
PO	Output Power	THD+N = 1%; f = 1 kHz RL=8Ω	1.2	1.4	—	W
		RL=4Ω	2.0	2.2	—	
		THD+N = 10%; f = 1 kHz RL=8Ω	1.7	1.5	—	W
		RL=4Ω	2.7	2.5	—	
THD+N	Total Harmonic Distortion+Noise	AVD=2; f=1kHz RL=8Ω, PO=0.4W	—	0.05	—	%
PSRR	Power Supply Rejection Ratio	VDD=5V, Vripple = 200mVp-p, CBP=1μF, RL=8Ω	—	80	—	dB
XTALK	Channel Separation	f=1kHz, CBP=1μF	—	100	—	dB
SNR	Signal To Noise Ratio	VDD=5V, RL=8Ω, PO=1.1mW	—	98	—	dB

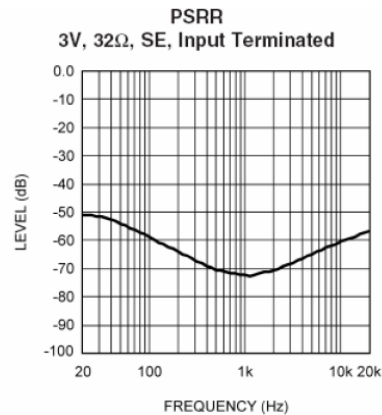
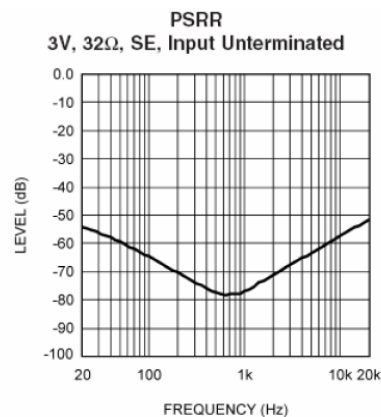
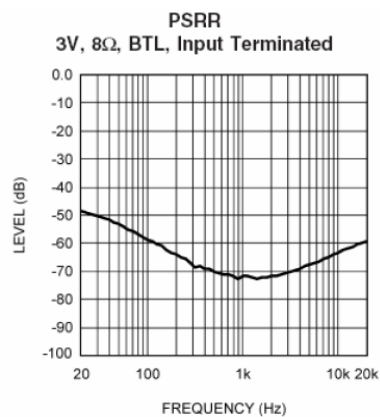
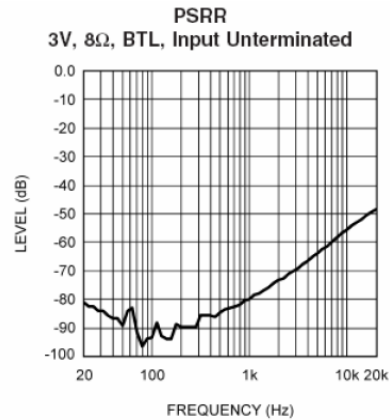
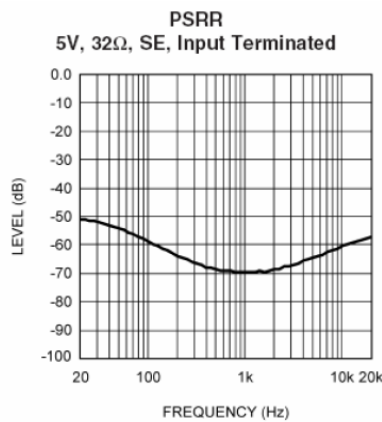
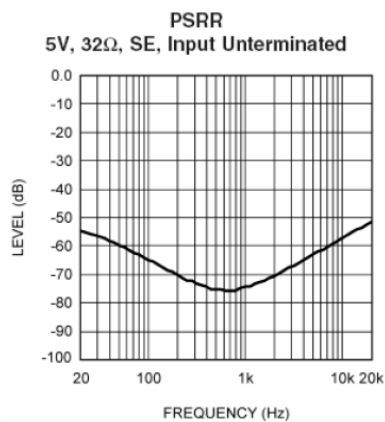
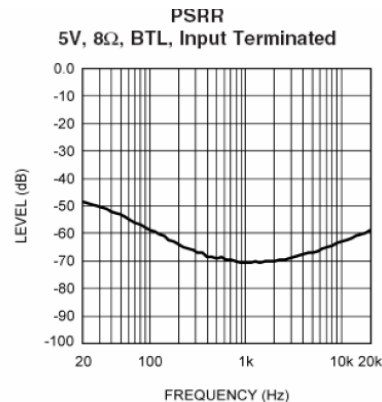
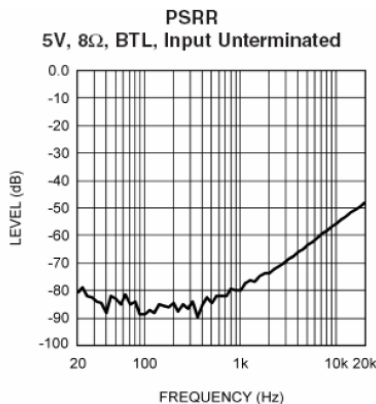
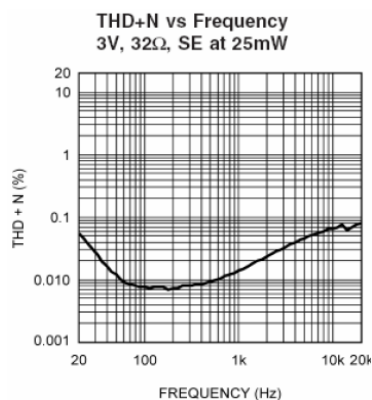
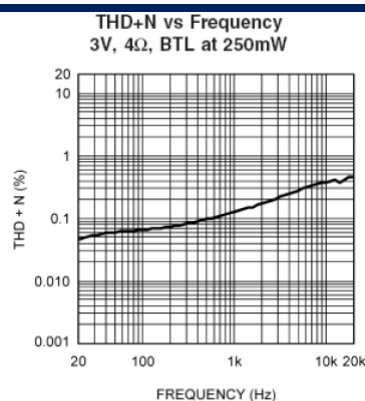
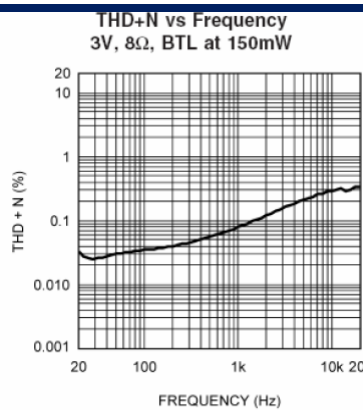
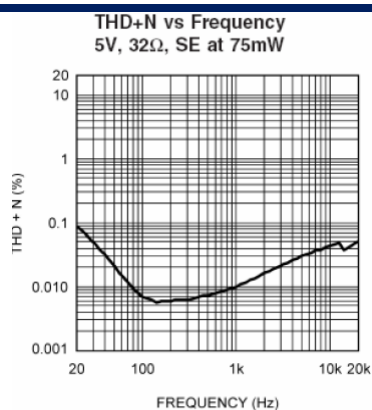
■ Electrical Characteristics For Single-Ended Operation

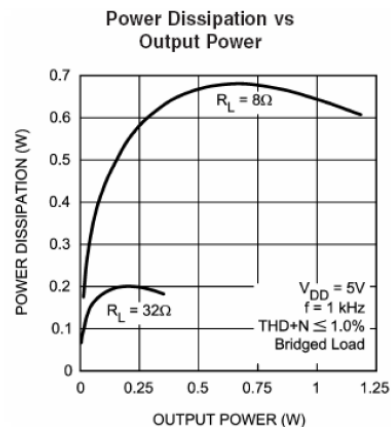
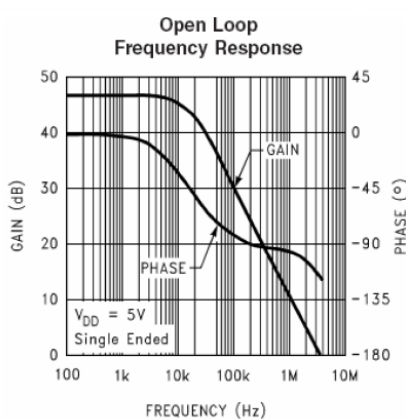
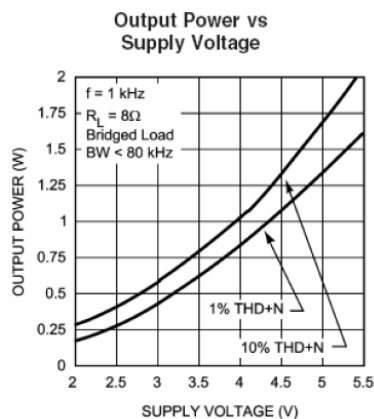
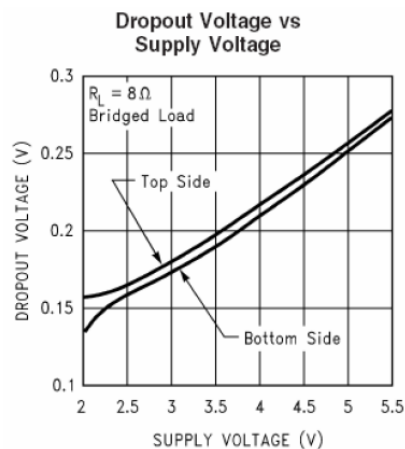
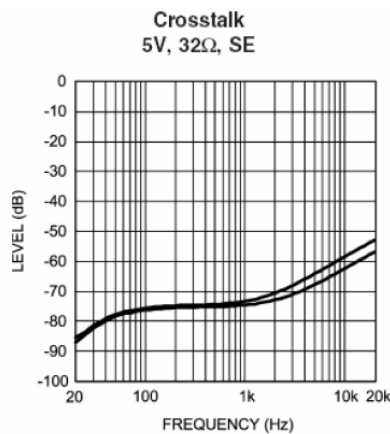
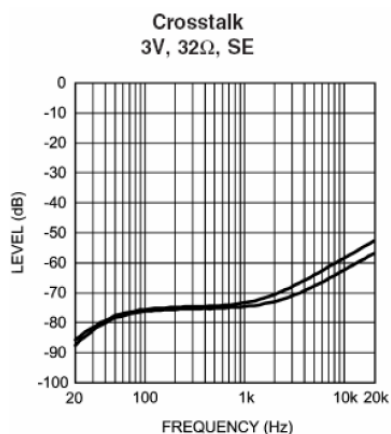
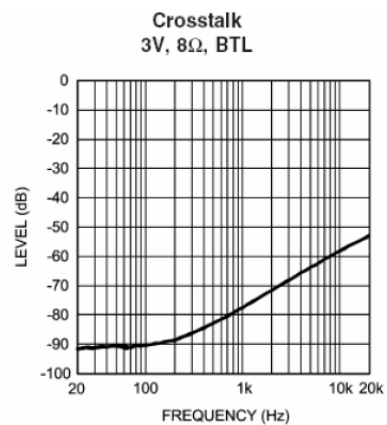
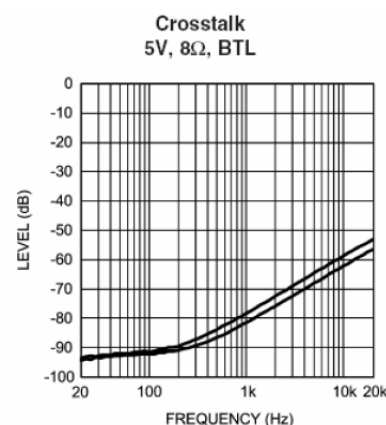
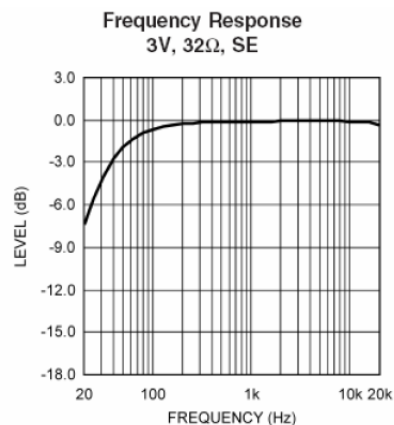
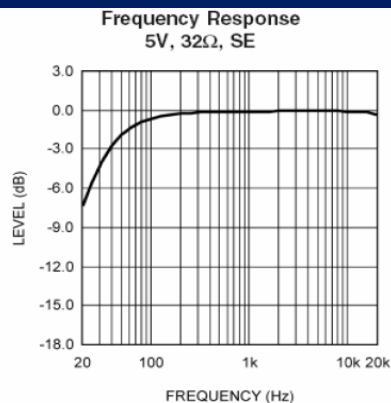
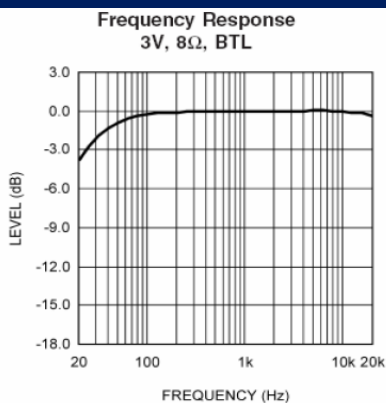
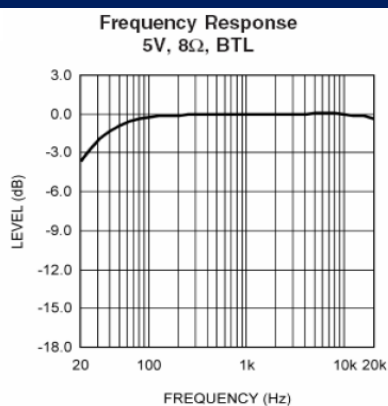
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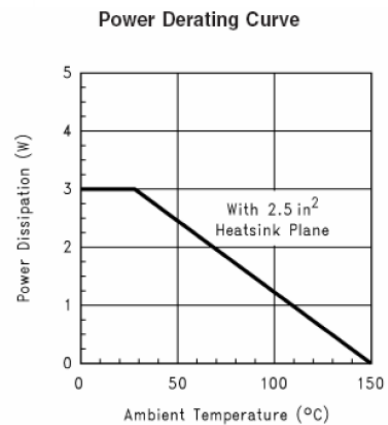
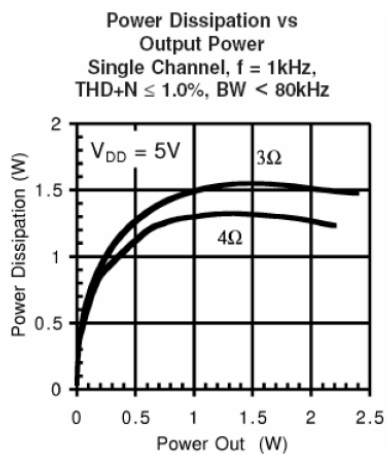
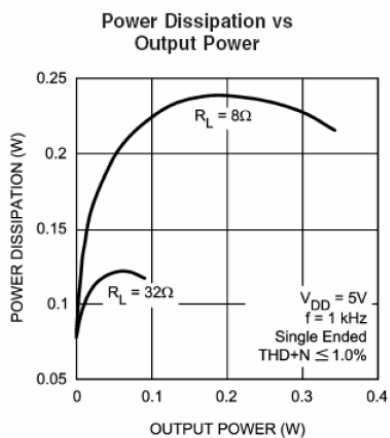
Symbol	Parameters	Test Conditions	Min.	Typ.	Max.	Unit
P _O	Output Power	THD+N = 0.5%; f = 1 kHz, RL=32Ω	80	93	—	mW
V _{OS}	Output Offset Voltage	V _{in} =0V	5	50		mV
THD+N	Total Harmonic Distortion+Noise	A _v =-1, f=1kHz, RL=32Ω, PO=20mW	—	0.015	—	%
PSRR	Power Supply Rejection Ratio	f =1kHz, V _{ripple} = 200mV _{RMS} , C _B =1μF	—	80	—	dB
XTALK	Channel Separation	f=1kHz, CBP=1μF	—	90	—	dB
SNR	Signal To Noise Ratio	VDD=5V, RL=8Ω, PO=340mW	—	95	—	dB

Typical Performance Characteristics



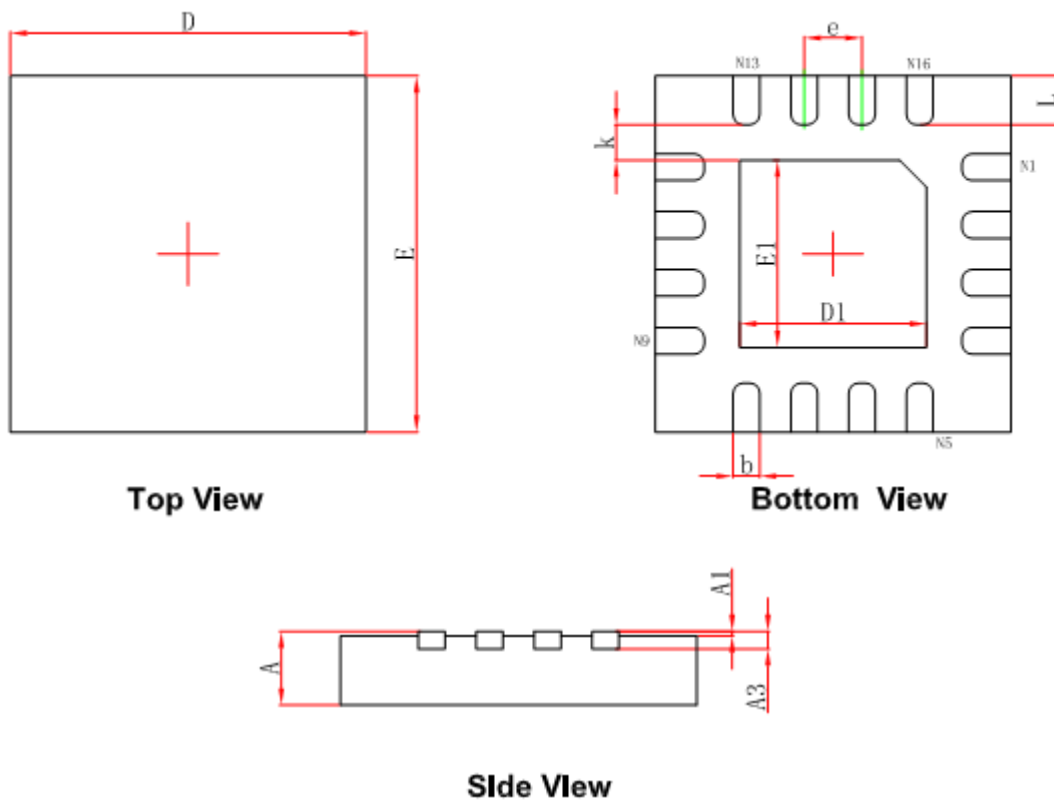






Package Information

- QFN4×4-16



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	3.900	4.100	0.154	0.161
E	3.900	4.100	0.154	0.161
D1	2.000	2.200	0.079	0.087
E1	2.000	2.200	0.079	0.087
k	0.200MIN.		0.008MIN.	
b	0.250	0.350	0.010	0.014
e	0.650TYP.		0.026TYP.	
L	0.450	0.650	0.018	0.026