

Class AB Stereo Headphone Drive with Mute

General Description

The RT9131 is an integrated class AB stereo headphone driver contained in a SOP-8 or DIP-8 plastic package with Mute feature. A class AB output stage bias control circuit is employed to maintain low audio signal distortion and power consumption. The RT9131 further integrates a voltage divider inside the chip. Thus, the external resistors can be eliminated. The device is fabricated in a CMOS process and has been primarily developed for portable digital audio applications.

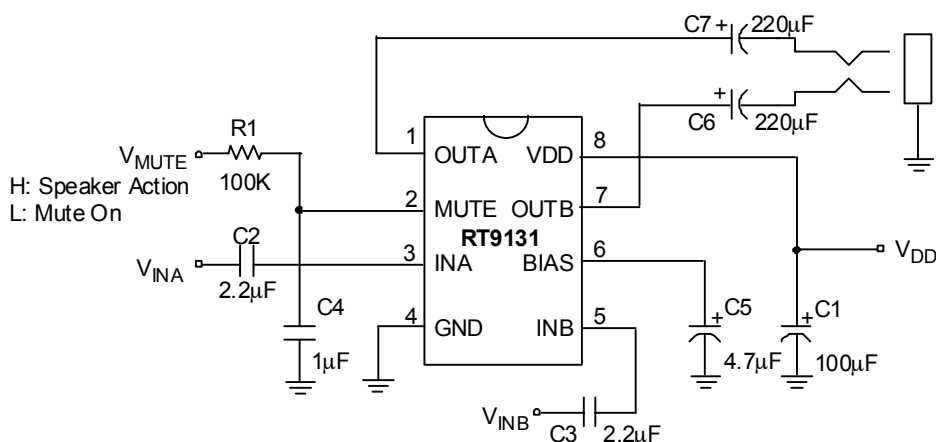
Ordering Information

RT9131	□ □
	PackageType
	N : DIP-8
	S : SOP-8
	Operating Temperature Rnge
	C: Commercial Standard

Marking Information

Part Number	Marking
RT9131CN	RT9131CN
RT9131CS	RT9131CS

Typical Application Circuit



Features

- High Signal-to-Noise Ratio
- High Slew Rate
- Low Distortion
- Large Output Voltage Swing
- Flexible Mute Function
- Excellent Power Supply Ripple Rejection
- Low Power Consumption
- Short-circuit Elimination
- Wide Temperature Range
- No Switch ON/OFF Clicks
- Integrated Voltage Divider ($V_{DD}/2$) to Eliminate External Resistors

Applications

- Portable Digital Audio

Pin Configurations

Part Number	Pin Configurations
RT9131CN (Plastic DIP-8)	TOP VIEW
RT9131CS (Plastic SOP-8)	

Absolute Maximum Ratings

- Supply Voltage 7V
- Operating Ambient Temperature Range -40°C to 85°C
- Maximum Junction Temperature 150°C
- Storage Temperature Range -60°C to 150°C
- Power Dissipation, P_D @ $T_A = 25^\circ\text{C}$
 - DIP-8 1.25W
 - SOP-8 0.625W
- Package Thermal Resistance
 - DIP-8, θ_{JA} 100°C/W
 - SOP-8, θ_{JA} 160°C/W
- Electrostatic Discharge -3000 to 3000V ⁽¹⁾
 -200 to 200V ⁽²⁾

Notes: (1) Human body mode: C = 100pF, R = 1500Ω, 3 positive pulses plus 3 negative pulses

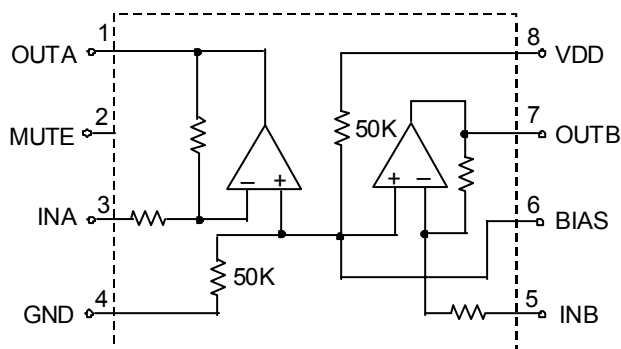
(2) Machine mode: C = 200pF, L = 0.5mH, R = 0Ω, 3 positive pulses plus 3 negative pulses

Electrical Characteristics

($V_{IN} = 0\text{dBV}$, $V_{CC} = 5\text{V}$, $T_A = 25^\circ\text{C}$, $f = 1\text{kHz}$, $R_L = 32\Omega$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating V_{DD} Range	V_{DD}		3	--	6	V
Quiescent Current	I_Q	$V_{IN} = 0\text{Vms}$	--	3.6	6	mA
Mute Terminal Voltage	V_{MUTE}		0.3	0.7	1.6	V
Voltage Gain	A_V		-2	--	2	dB
Differential Channel Voltage Gain	ΔA_V		-0.5	--	0.5	dB
Total Harmonic Channel Distortion Factor	THD	$R_W = 20 \sim 20\text{kHz}$	--	0.02	0.1	%
Rated Output Power 1	P_O	$R_L = 32\Omega$, THD < 0.1%	25	31	--	mW
Rated Output Power 2	P_O	$R_L = 16\Omega$, THD < 0.1%	50	62	--	mW
Output Noise Voltage		$BW = 20 \sim 20\text{kHz}$, $R_G = 0\Omega$	--	-93	--	dBv
Channel Separation		$R_G = 0\Omega$	--	75	--	dB
Mute Attenuation		$R_G = 0\Omega$	--	60	--	dB
Ripple Rejection	PSRR	$f_{RR} = 100\text{Hz}$, $f_{RR} = -20\text{dBv}$	--	-57	--	dB

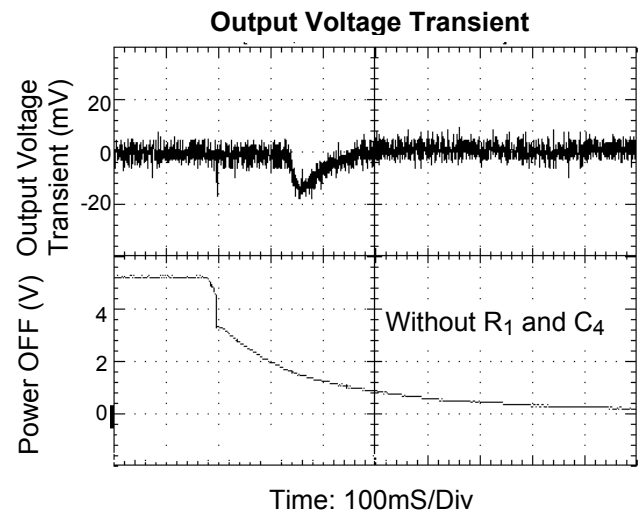
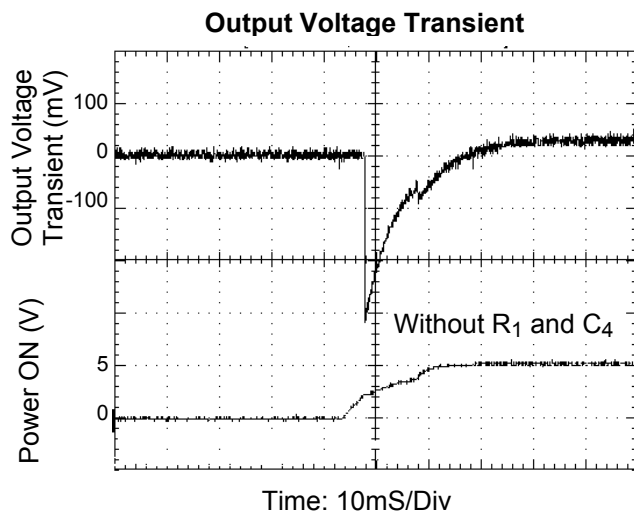
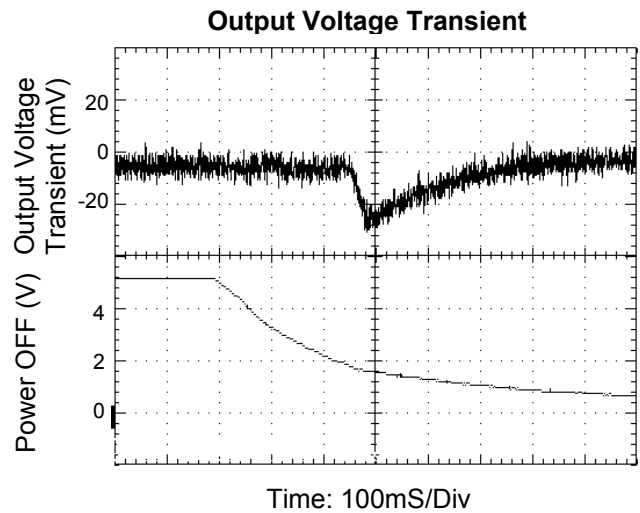
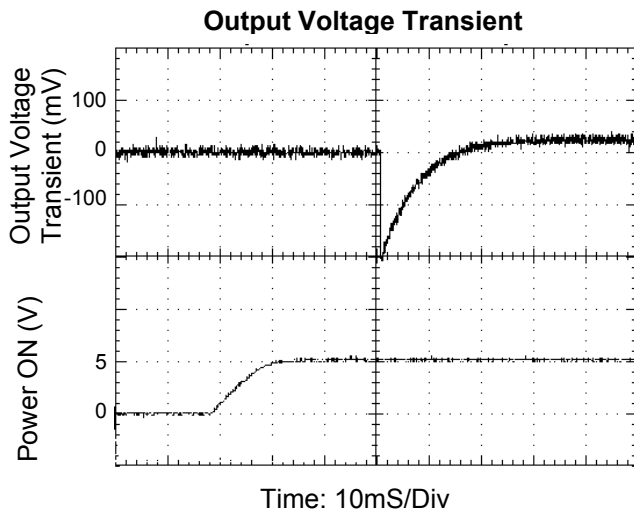
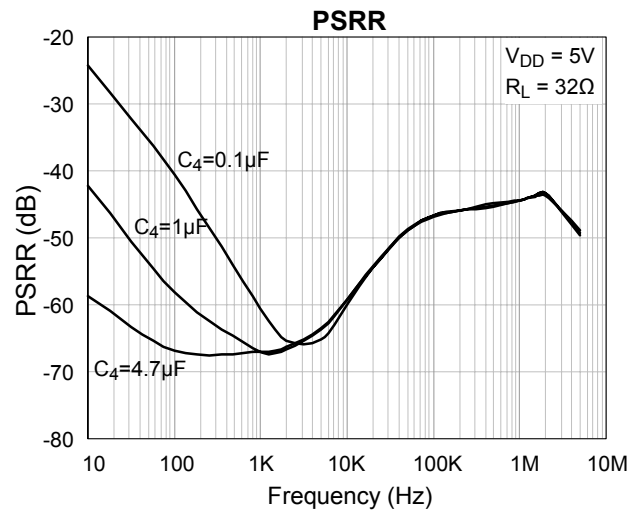
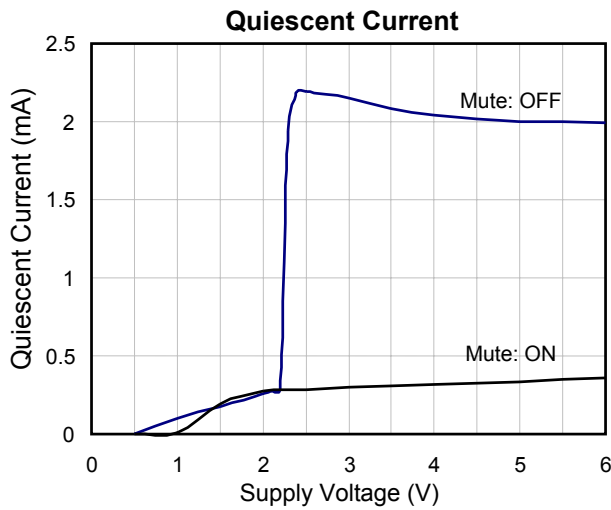
Function Block Diagram



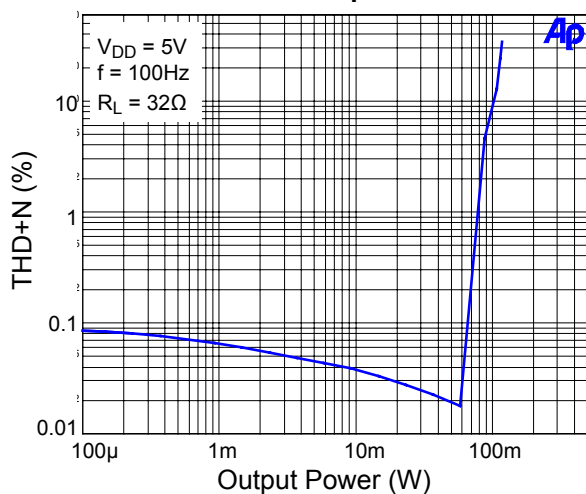
Pin Description

Pin No.	Pin Name	Pin Function
1	OUTA	Channel A Output
2	MUTE	Mute Control Input
3	INA	Channel A Input
4	GND	Ground
5	INB	Channel B Input
6	BIAS	VDD/2 Connected a Capacitor to GND to Reduce Power On/Off Clicks
7	OUTB	Channel B Output
8	VDD	Power Supply Input

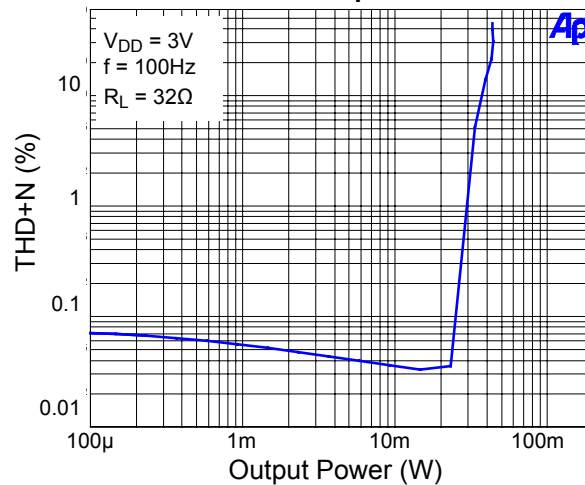
Typical Operating Characteristics



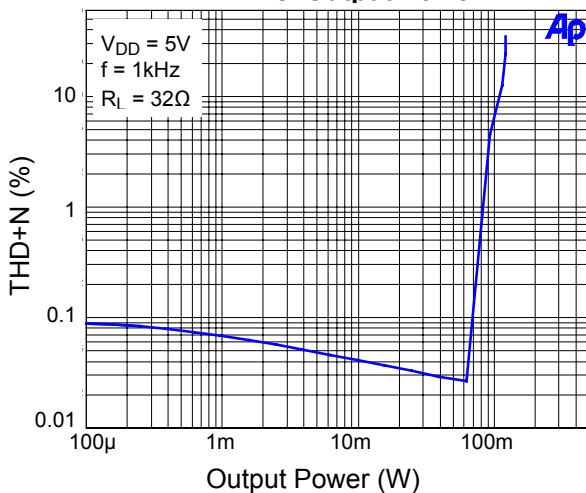
THD+N vs. Output Power



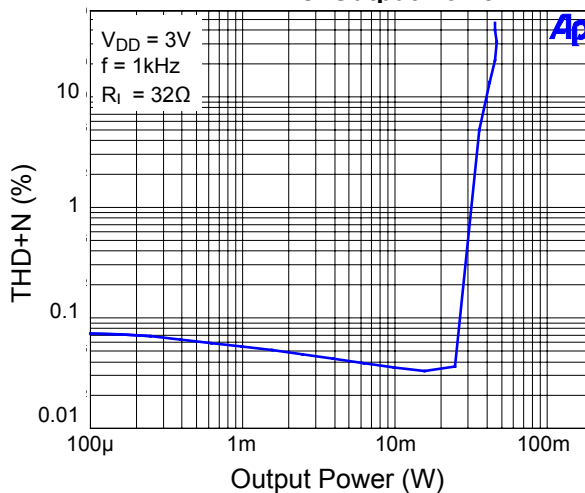
THD+N vs. Output Power



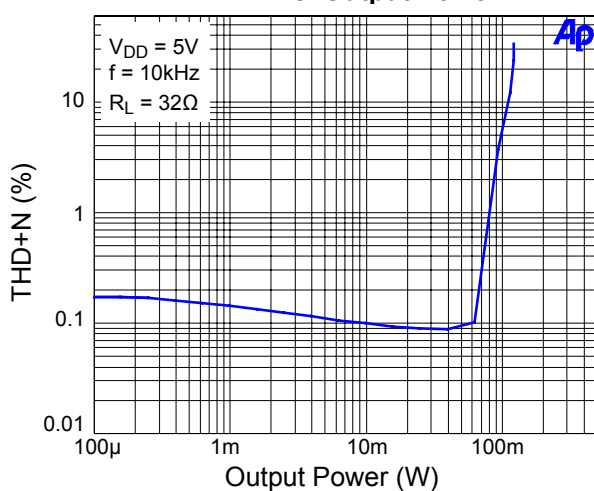
THD+N vs. Output Power



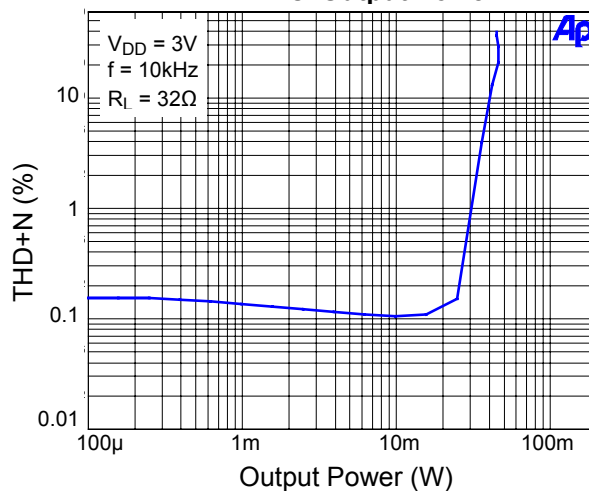
THD+N vs. Output Power



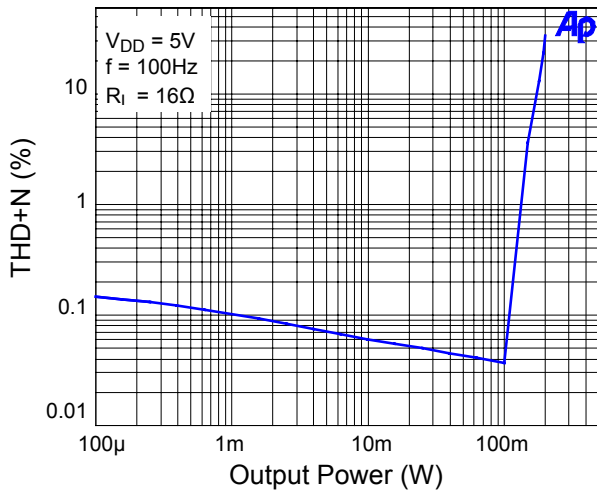
THD+N vs. Output Power



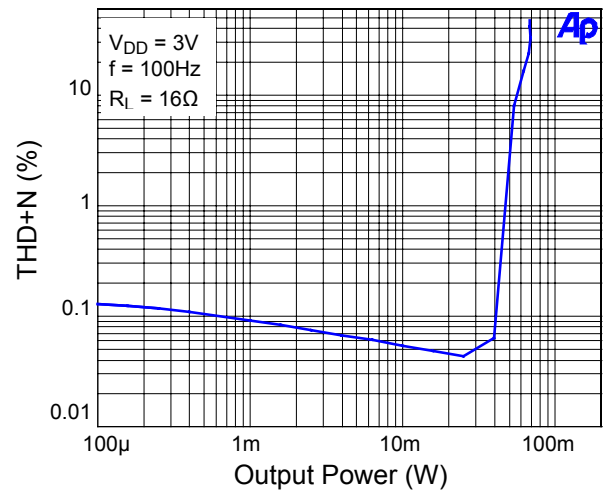
THD+N vs. Output Power



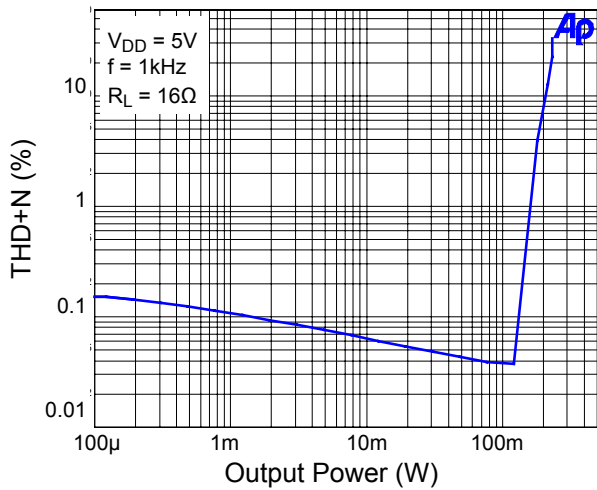
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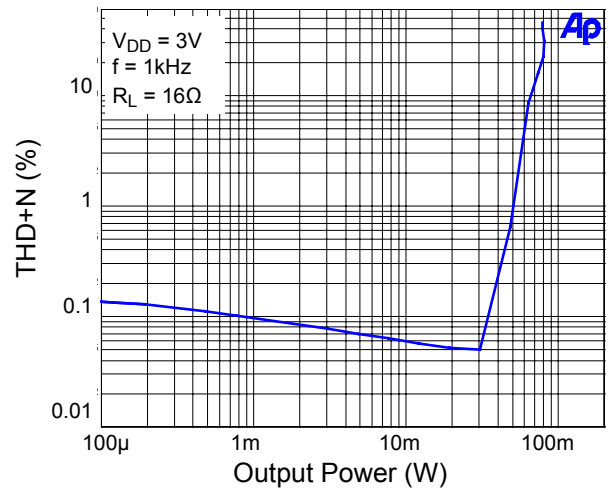
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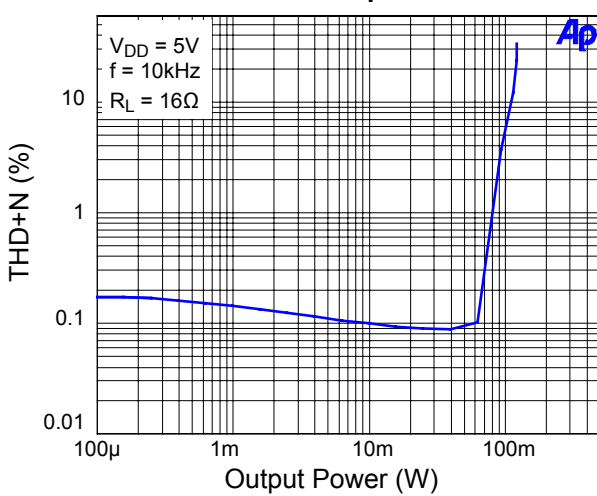
THD+N vs. Output Power



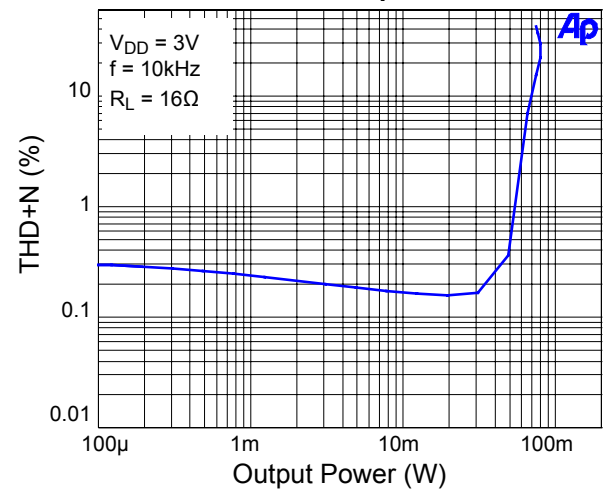
THD+N vs. Output Power

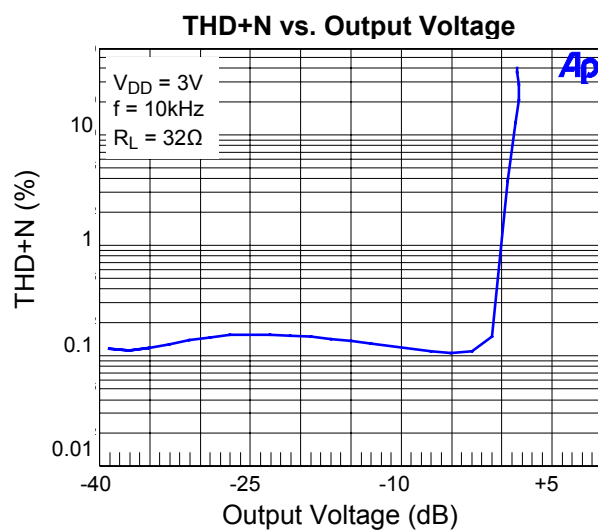
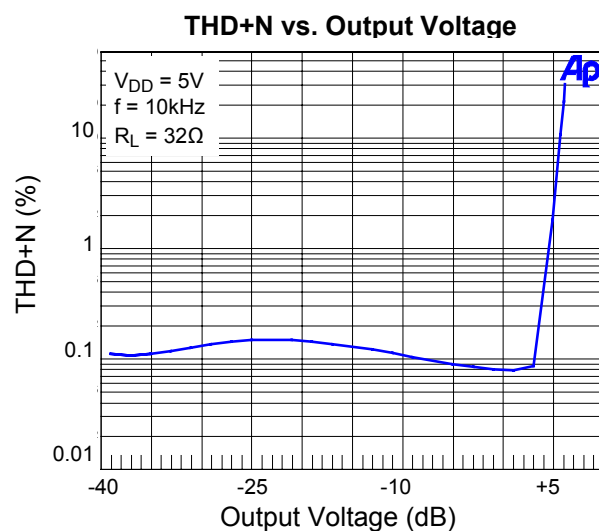
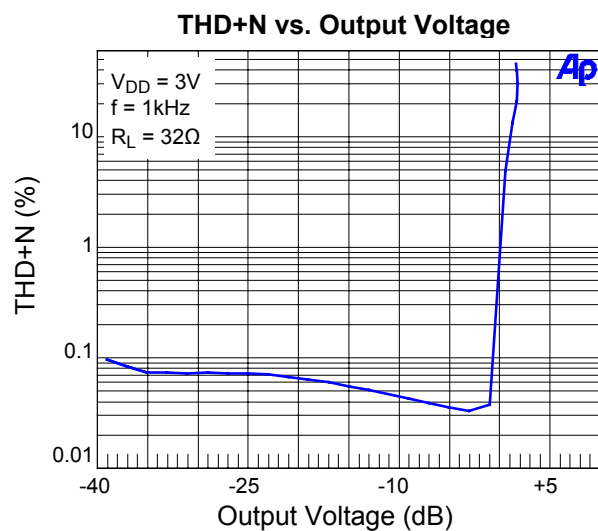
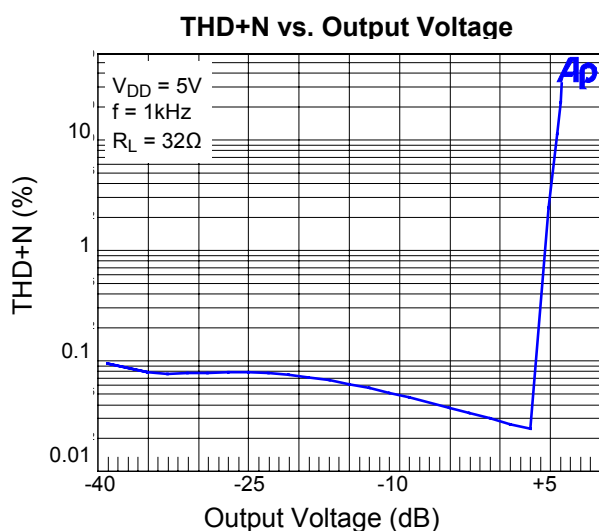
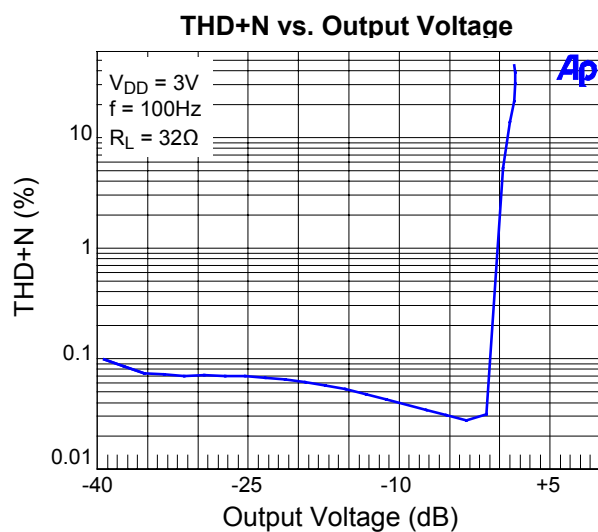
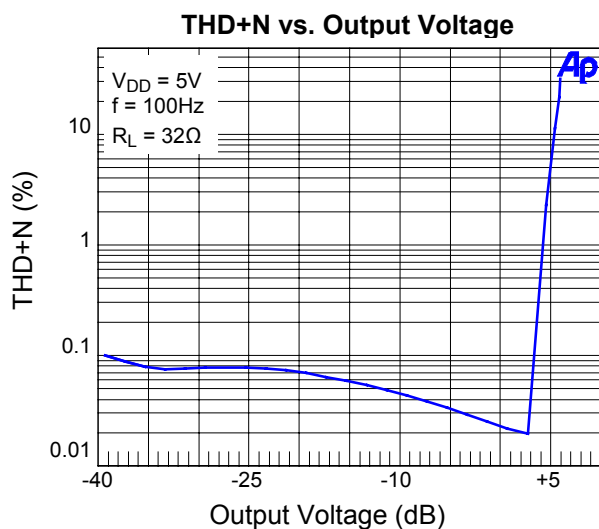


THD+N vs. Output Power

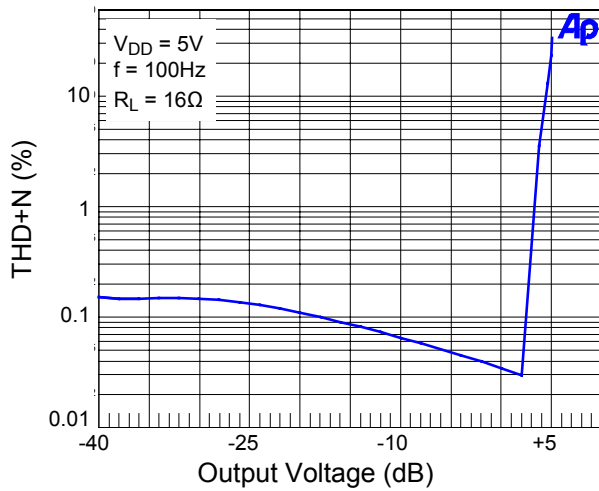


THD+N vs. Output Power

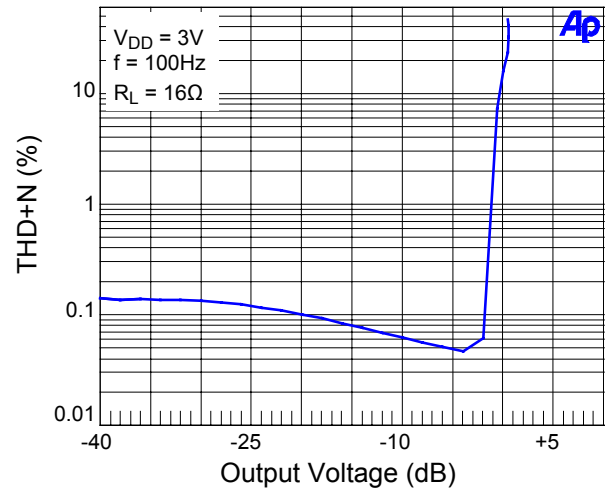




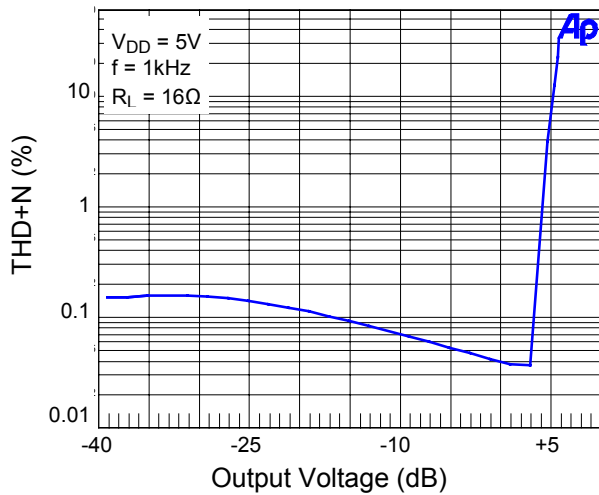
THD+N vs. Output Voltage



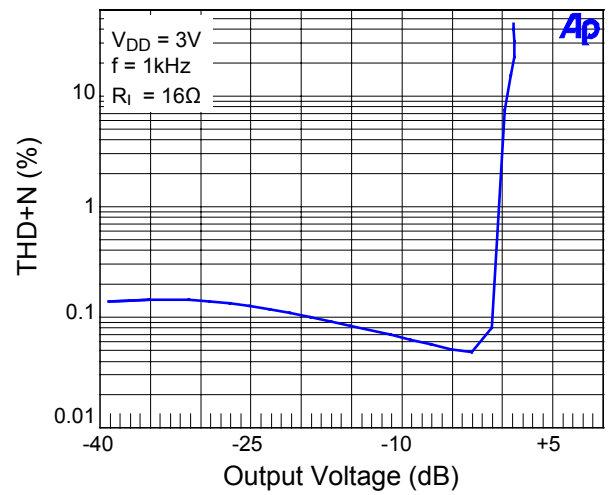
THD+N vs. Output Voltage



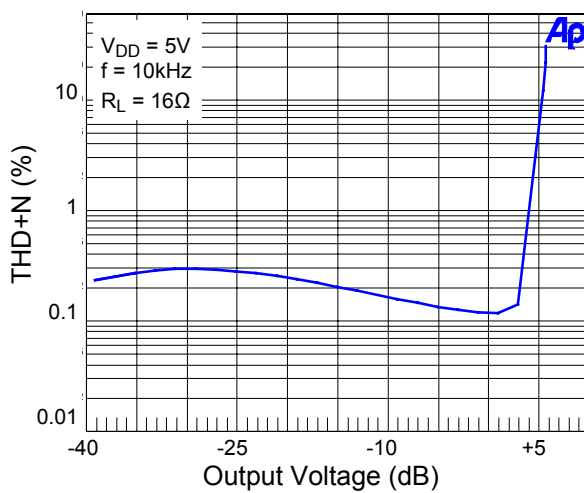
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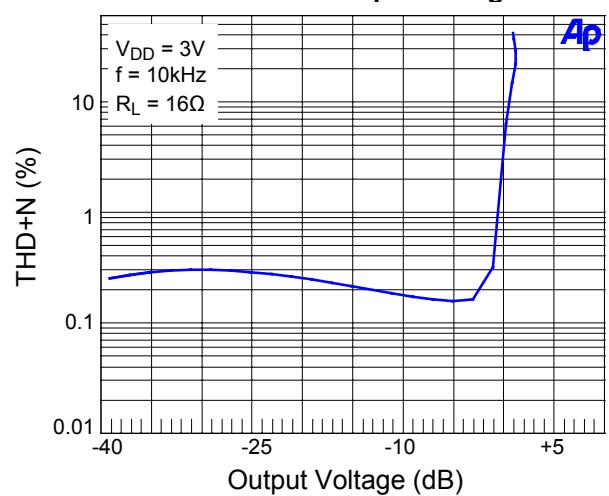
THD+N vs. Output Voltage



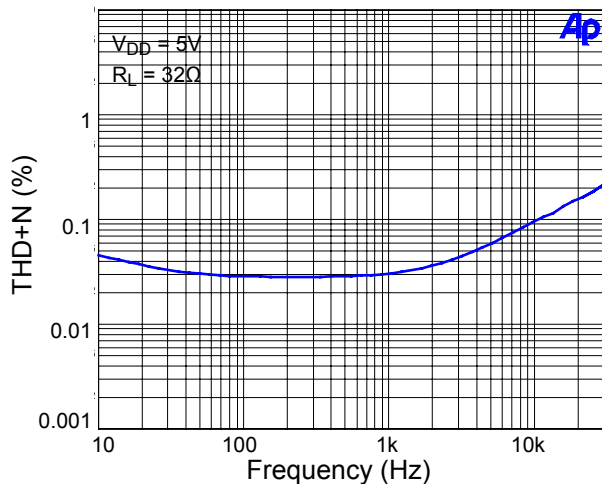
THD+N vs. Output Voltage



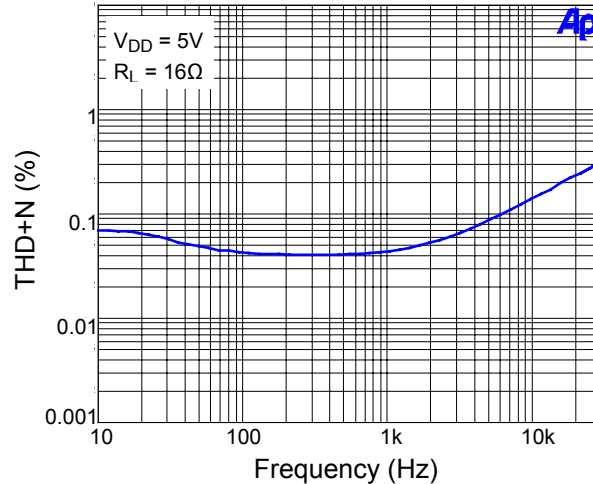
THD+N vs. Output Voltage



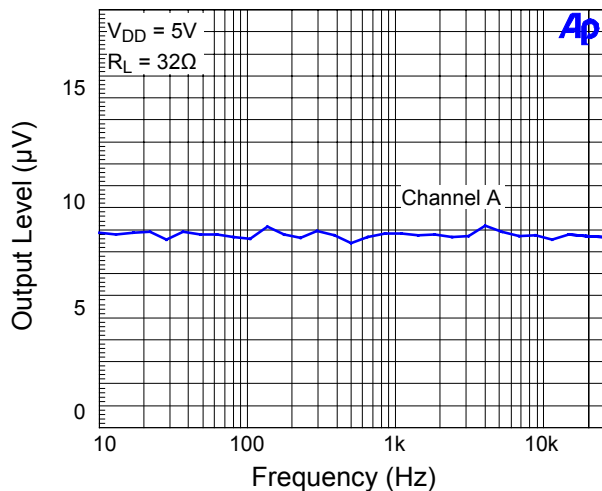
THD+N vs. Frequency



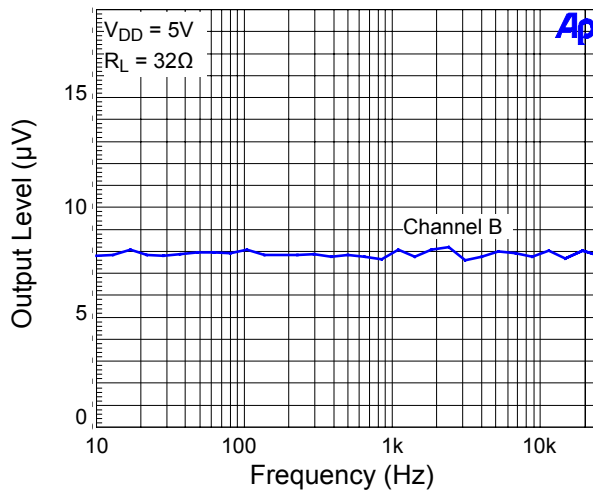
THD+N vs. Frequency



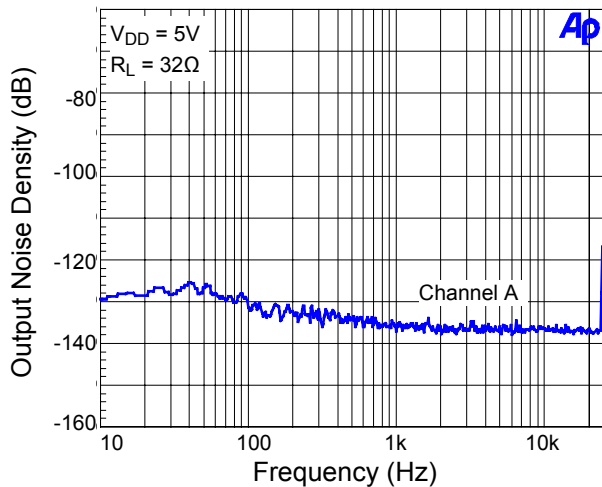
Noise



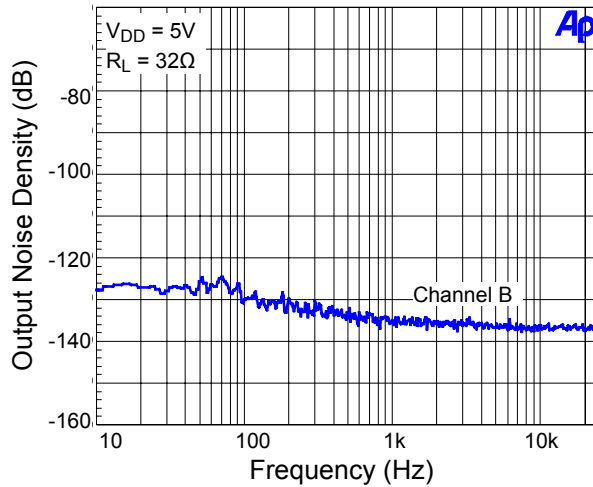
Noise



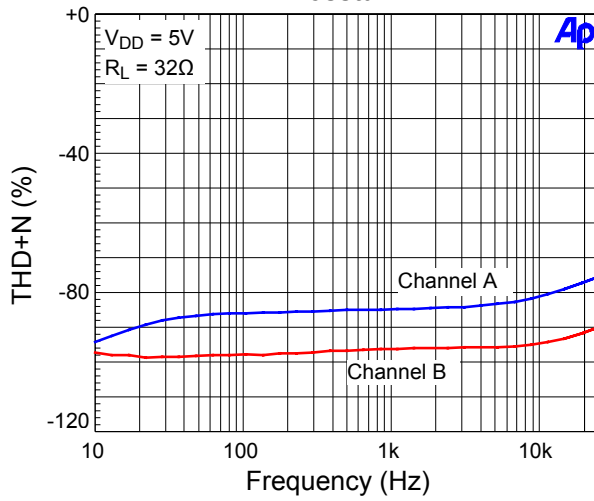
Noise



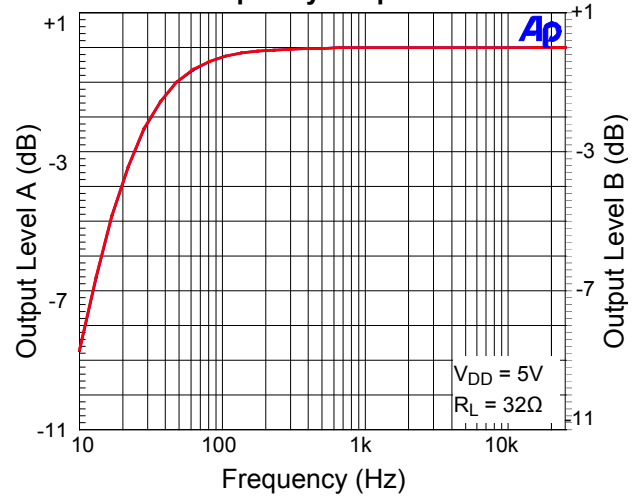
Noise



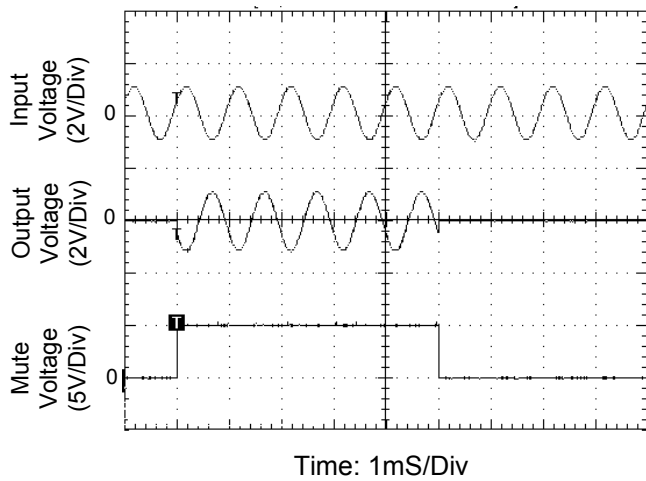
Crosstalk



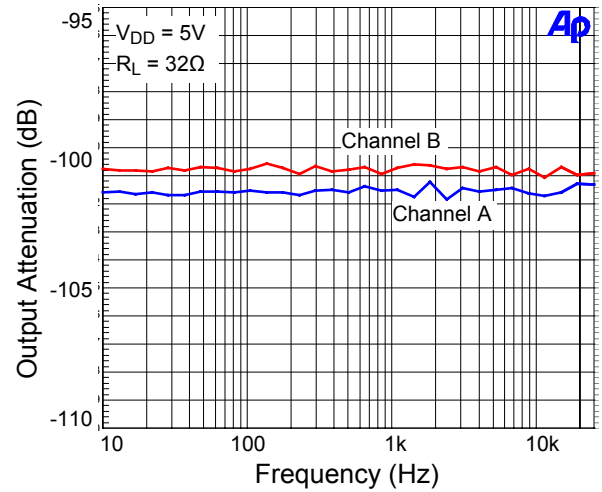
Frequency Response

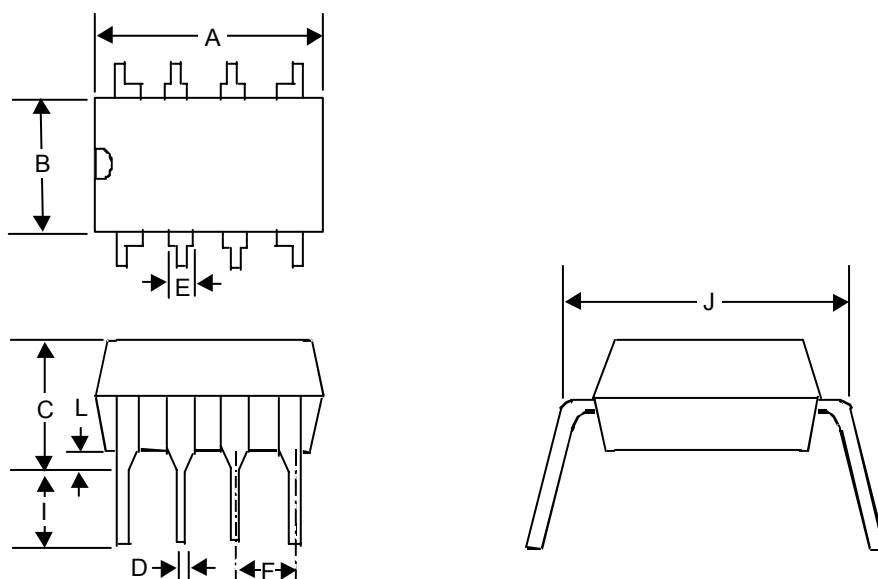


Mute Function



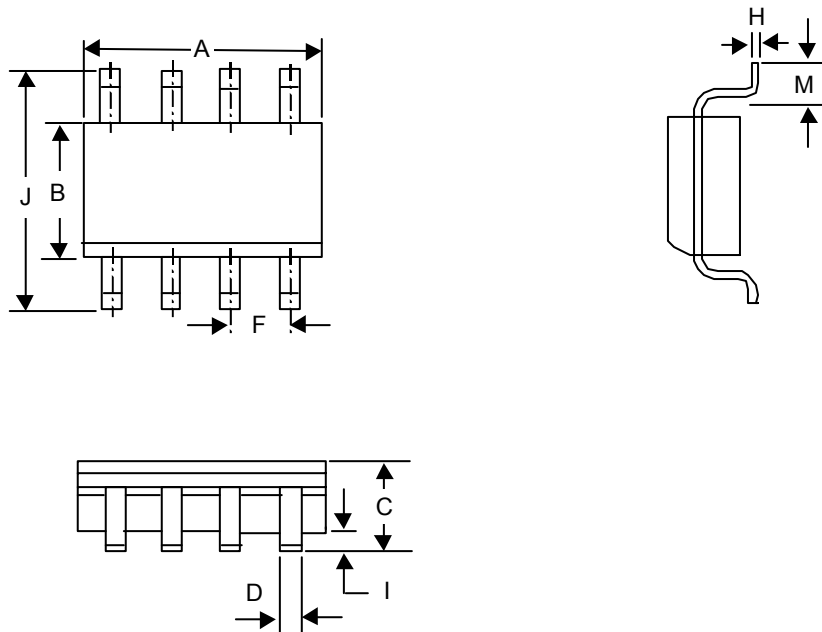
Mute Attenuation



Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	9.068	9.627	0.357	0.379
B	6.198	6.604	0.244	0.260
C		4.318		0.170
D	0.356	0.559	0.014	0.022
E	1.397	1.651	0.055	0.065
F	2.337	2.743	0.092	0.108
I	3.048	3.556	0.120	0.140
J	7.366	8.255	0.290	0.325
L	0.381		0.015	

8-Lead DIP Plastic Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.801	5.004	0.189	0.197
B	3.810	3.988	0.150	0.157
C	1.346	1.753	0.053	0.069
D	0.330	0.508	0.013	0.020
F	1.194	1.346	0.047	0.053
H	0.178	0.254	0.007	0.010
I	0.102	0.254	0.004	0.010
J	5.791	6.198	0.228	0.244
M	0.406	1.270	0.016	0.050

8-Lead SOP Plastic Package

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