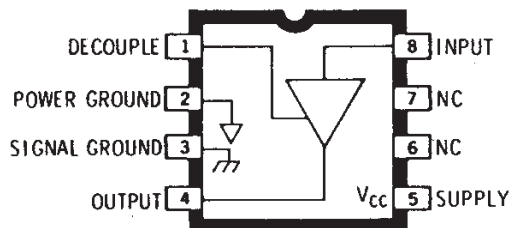


LOW-VOLTAGE AUDIO POWER AMPLIFIER



Dwg. No. A-11,715

Providing a low-cost, compact alternative to discrete transistor amplifiers, the ULN3718M integrated circuit is ideal for application as a headphone driver in portable radios, tape players, and other battery-operated equipment. The low-power audio amplifier's wide frequency response and low noise ensure premium performance.

The amplifier will operate (at reduced volume) with supply voltages as low as 1.8 V without a significant increase in distortion. This feature allows operation with a 3 V battery supply and minimizes concern about weak batteries. The class-AB audio amplifier has low quiescent current drain for maximum battery life. This device is rated for operation with supply voltages up to 9 V.

The ULN3718M audio amplifier is supplied in an 8-pin mini-DIP plastic package. A copper alloy lead frame gives the amplifier enhanced power dissipation ratings.

FEATURES

- Wide Operating Voltage Range 1.8 - 9.0 V
- Low Quiescent Current
- AC Short-Circuit Protection
- Low External Parts Count
- Low Distortion
- 40 dB Voltage Gain
- Low Noise

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC} 10 V

Package Power Dissipation,

 P_D See Graph

Operating Temperature Range,

 T_A -20°C to +85°C

Storage Temperature Range,

 T_S -65°C to +150°CAlways order by complete part number: **ULN3718M**.

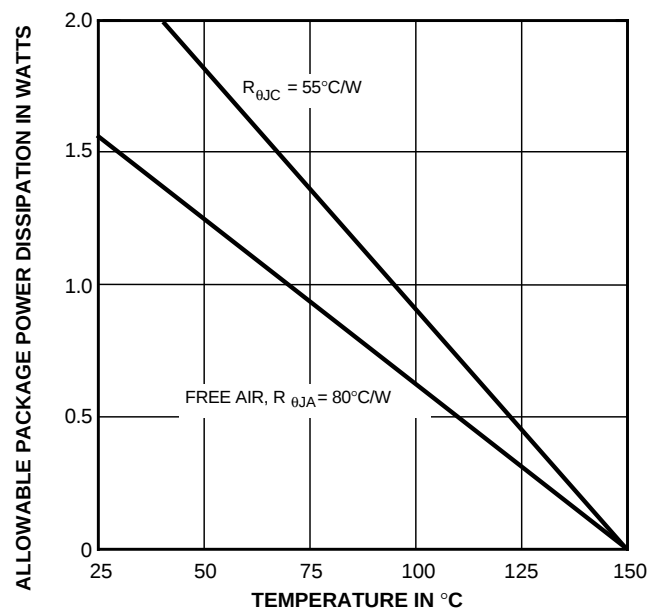
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LOW-VOLTAGE AUDIO POWER AMPLIFIER

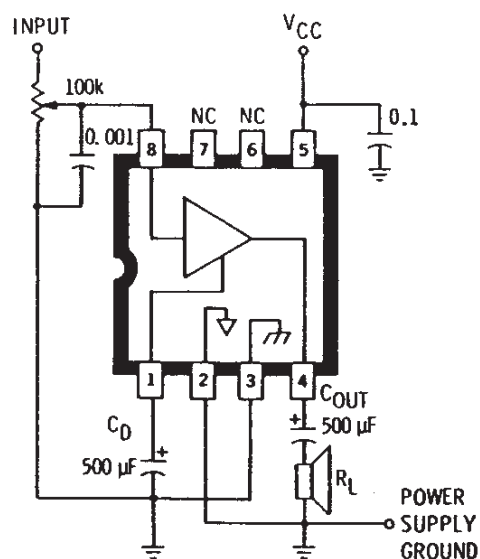
ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$, $V_{CC} = 3\text{ V}$, $R_L = 32\Omega$, $f_{in} = 400\text{ Hz}$ (unless otherwise noted).

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Supply Voltage Range	V_{CC}		1.8	3.0	9.0	V
Quiescent Supply Current	I_{CC}	$V_{CC} = 3.0\text{ V}$	—	6.0	10	mA
		$V_{CC} = 6.0\text{ V}$	—	9.0	15	mA
		$V_{CC} = 9.0\text{ V}$	—	12	20	mA
Voltage Gain	A_V		36	40	44	dB
Audio Power Output	P_{OUT}	$R_L = 8\Omega$, $V_{CC} = 3.0\text{ V}$, THD = 10%	—	80	—	mW
		$R_L = 8\Omega$, $V_{CC} = 6.0\text{ V}$, THD = 10%	250	430	—	mW
		$R_L = 32\Omega$, $V_{CC} = 3.0\text{ V}$, THD = 10%	15	25	—	mW
		$R_L = 32\Omega$, $V_{CC} = 6.0\text{ V}$, THD = 10%	—	125	—	mW
Distortion	THD	$P_{OUT} = 10\text{ mW}$	—	0.3	1.0	%
		$P_{OUT} = 1.0\text{ mW}$, $V_{CC} = 1.8\text{ V}$	—	1.5	3.0	%
Output Noise	V_{out}	Input Shorted, BW = 80 kHz	—	200	500	μV
Input Resistance	R_{IN}	Pin 8	—	250	—	k Ω
Power Supply Rejection	PSRR	C_D (Pin 1) = 500 μF , $f = 120\text{ Hz}$	—	28	—	dB

TEST CIRCUIT AND TYPICAL APPLICATION



Dwg. GP-009-1B



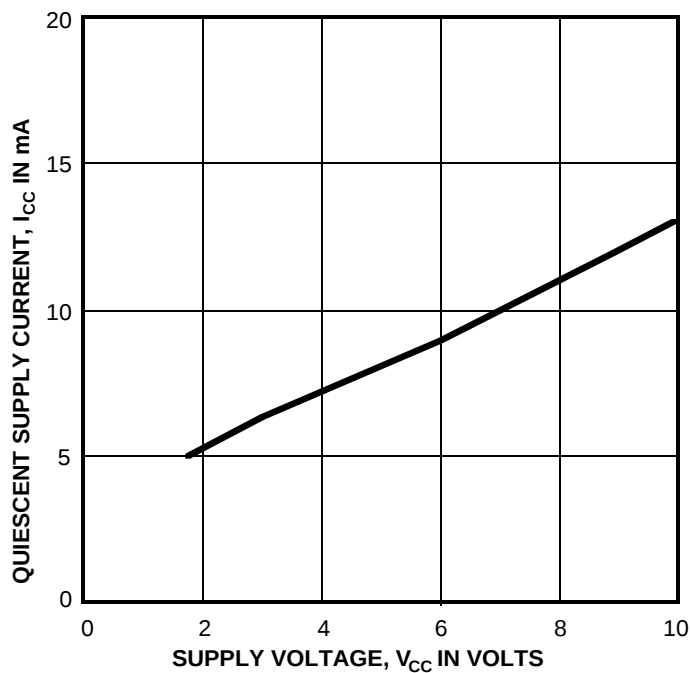
Dwg. No. A-11,716A

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LOW-VOLTAGE AUDIO POWER AMPLIFIER

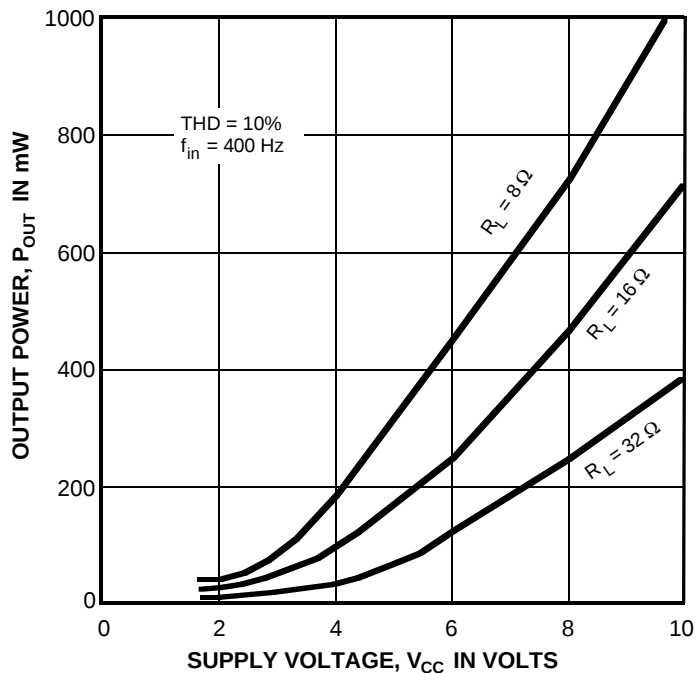
TYPICAL CHARACTERISTICS

**QUIESCENT SUPPLY CURRENT AS A
FUNCTION OF SUPPLY VOLTAGE**



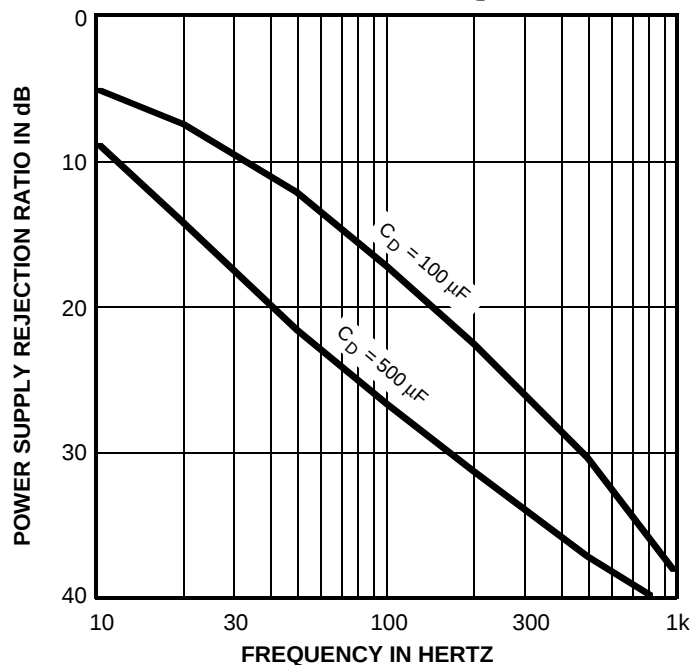
Dwg. GS-011

**OUTPUT POWER AS A
FUNCTION OF SUPPLY VOLTAGE**



Dwg. GS-010

**POWER SUPPLY REJECTION RATIO
AS A FUNCTION OF FREQUENCY**



Dwg. GS-012

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LOW-VOLTAGE AUDIO POWER AMPLIFIER

APPLICATIONS INFORMATION

Selection of power-supply voltage and speaker impedance allows a designer to choose audio power levels within the allowable package power dissipation rating for any maximum operating temperature. No unique precautions are necessary when designing with this device. It is stable and ac short-circuit immune.

External component selection for this low-power amplifier involves only two capacitors — one for output coupling and one for feedback and ripple decoupling. The coupling capacitor value should be selected to provide the desired low-frequency cutoff with the chosen load impedance. The decoupling capacitor should be chosen for both low-frequency audio rolloff and supply-ripple rejection.

Ripple rejection is not practical to calculate due to the large number of mechanisms involved. A 500 μF capacitor achieves typically 25 dB rejection at 120 Hz.

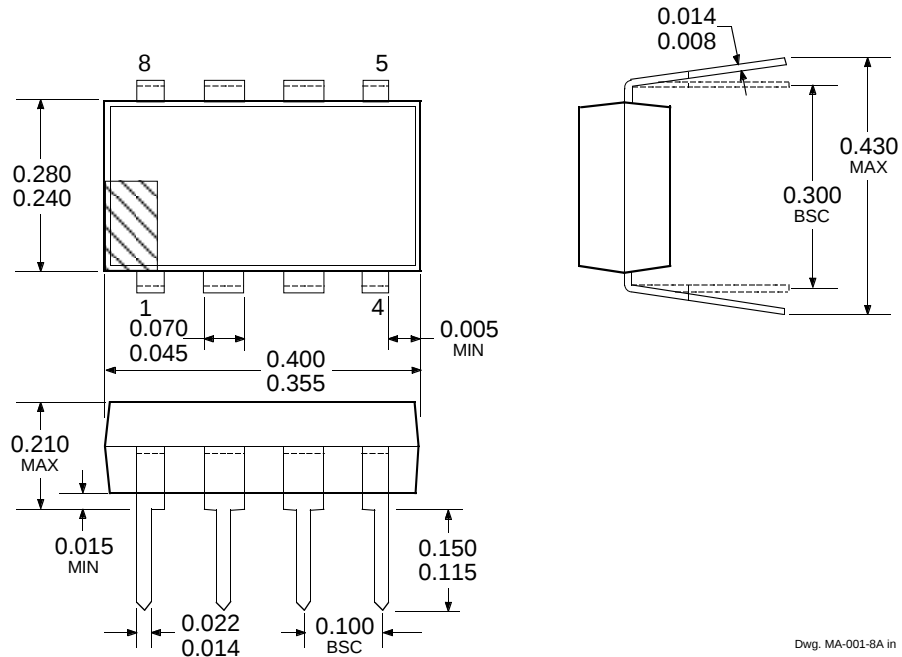
The high gain and the high input impedance of the power amplifier recommend use of this device in many diverse applications. However, the input stage does have other characteristics that should be taken into account for best results. The input is referenced to ground for internal biasing and must be provided with a dc path to ground. A current of typically 1 μA flows from the input through the volume control. This produces an IR drop that is multiplied by the closed loop dc gain of the amplifier and appears as an error in output centering. This recommends a value of 200 k Ω or less for the volume control; values of less than 100 k Ω are preferred.

The selection of amplifier load impedance involves more than just consideration of the desired power output. A low load impedance will produce the highest power output for any given supply voltage. Higher impedances will furnish significant reduction in harmonic distortion and improvement in overall repeatability in power output capacity.

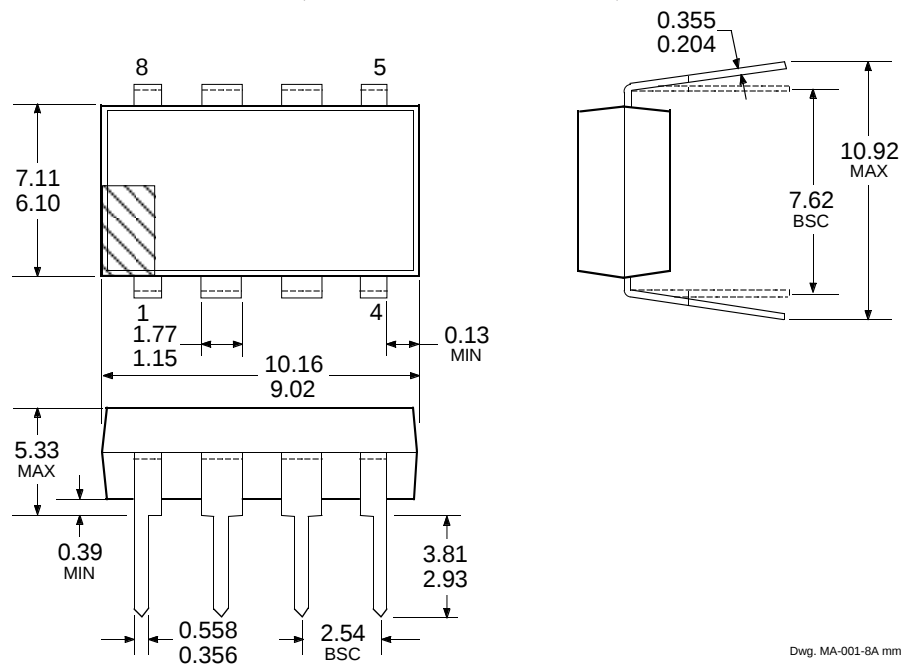
Special steps toward minimizing tendencies towards instabilities of all types were taken in the design of this device. However, as with all high-gain circuits, care should be given to printed wiring board layout to avoid undesirable effects. Inputs and outputs should be well separated and should avoid common-mode impedances wherever possible. For best performance, connect low-level input-signal ground terminals and the decoupling capacitor ground terminal together at pin 3 (signal ground); connect the high-level speaker ground terminal and the power supply ground terminal together at pin 2 (power ground). The signal ground and the power ground should be interconnected at only one point.

LOW-VOLTAGE AUDIO POWER AMPLIFIER

Dimensions in Inches



**Dimensions in Millimeters
(Based on 1" = 25.4 mm)**



NOTES: 1. Lead thickness is measured at seating plane or below.
2. Lead spacing tolerance is non-cumulative.
3. Exact body and lead configuration at vendor's option within limits shown.

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LOW-VOLTAGE AUDIO POWER AMPLIFIER

Allegro MicroSystems, Inc. reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the design of its products. Components made under military approvals will be in accordance with the approval requirements.

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