FAIRCHILD

A Schlumberger Company

μA739 • μA749 Dual Audio Operational Amplifier/Preamplifier

Linear Products

Description

The μA739 and μA749 consist of two identical High-Gain Operational Amplifiers constructed on a single silcon chip using the Fairchild Planar epitaxial process. These 3-stage amplifiers use Class A PNP transistor output stages with uncommitted collectors. This enables a variety of loads to be employed for general purpose applications from dc to 10 MHz, where two high performance operational amplifiers are required. In addition, the outputs may be wired-OR for use as a dual comparator or they may function as diodes in low threshold rectifying circuits such as absolute value amplifiers, peak detectors, etc.

- **SINGLE OR DUAL SUPPLY OPERATION**
- **LOW POWER CONSUMPTION**
- **HIGH GAIN, 25,000 V/V**
- **LARGE COMMON MODE RANGE, +11 V, −13 V**
- **EXCELLENT GAIN STABILITY VS. SUPPLY VOLTAGE**
- **NO LATCH-UP**
- **OUTPUT SHORT CIRCUIT PROTECTED**

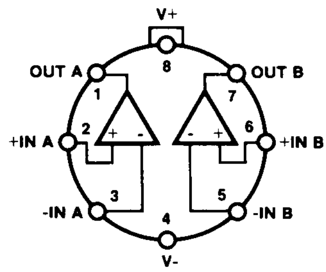
Absolute Maximum Ratings

Supply Voltage	
(μA749, μA749C, μA739)	± 18 V
(μ749D)	± 12 V
Internal Power Dissipation (Note 1)	
Metal Package	500 mW
DIP	650 mW
Differential Input Voltage	± 5 V
Input Voltage (Note 2)	
(μA749, μA749C, μA739)	± 15 V
(μA749D)	± 12 V
Storage Temperature Range	
Metal Package and Ceramic DIP	−65°C to +150°C
Molded DIP	−55°C to +125°C
Operating Temperature Range	0°C to +70°C
Pin Temperature	
Metal Package, Ceramic DIP (Soldering, 60 s)	300°C
Molded DIP (Soldering, 10 s)	260°C
Output Short Circuit Duration, T_A = 25°C (Note 3)	30 seconds

Notes

1. Rating applies to ambient temperatures up to 70°C. Above 70°C ambient derate linearly at 8.3 mW/°C for the Ceramic DIP.
2. For supply voltages less than ± 15 V, the absolute maximum input voltage is equal to the supply voltage.
3. Short circuit may be to ground or either supply.

Connection Diagram 8-Pin Metal Package



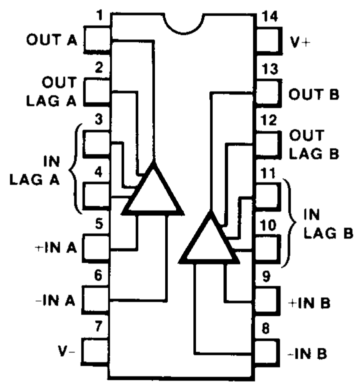
(Top View)

Pin 4 is connected to case.

Order Information

Type	Package	Code	Part No.
μA749D	Metal	5W	μA749DHC

Connection Diagram 14-Pin DIP

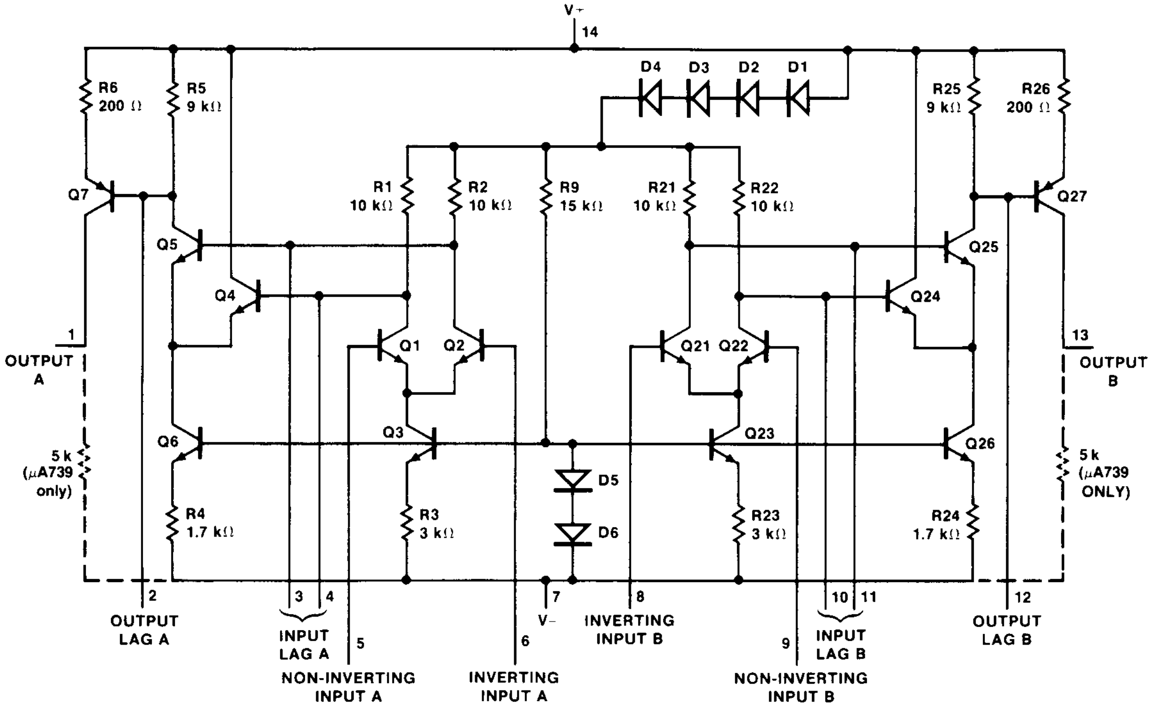


(Top View)

Order Information

Type	Package	Code	Part No.
μA739C	Ceramic DIP	6A	μA739DC
μA739C	Molded DIP	9A	μA739PC
μA749C	Ceramic DIP	6A	μA749DC
μA749C	Molded DIP	9A	μA749PC

Equivalent Circuit



Pin numbers for DIP only.

μA749C, μA749D and μA739E

Electrical Characteristics $V+ = \pm 15$ V, $R_L = 5$ kΩ to Pin 7, $T_A = 25°C$ unless otherwise specified

Characteristic	Condition
Input Offset Voltage	$R_S = 200\ \Omega$
Input Offset Current	
Input Bias Current	
Input Resistance	
Large Signal Voltage Gain	$V_{OUT} = \pm 10$ V
Positive Output Voltage Swing	
Negative Output Voltage Swing	
Output Resistance	f = 1.0 kHz
Common Mode Rejection Ratio	$R_S = 200\ \Omega$, $V_{IN} = +11.5$ V to -13.5 V
Supply Voltage Rejection Ratio	$R_S = 200\ \Omega$
Input Voltage Range	
Internal Power Dissipation	$V_{OUT} = 0$
Supply Current	$V_{OUT} = 0$
Broadband Noise Figure	$R_S = 10$ kΩ, BW = 10 Hz to 10 kHz
Turn On Delay (See *Figure 3*)	Open Loop, $V_{IN} = \pm 20$ mV
Turn Off Delay (See *Figure 3*)	Open Loop, $V_{IN} = \pm 20$ mV
Slew Rate (unity gain) (See *Figure 2*)	$C_1 = 0.02\ \mu F$, $R_1 = 33\ \Omega$, $C_2 = 10$ pF
Channel Separation (See *Figure 4*)	$R_S = 1$ kΩ, f = 10 kHz
The following specifications apply for $V+ = \pm 4.0$ V, $R_L = 10$ kΩ to Pin 7, $T_A = 25°C$	
Input Offset Voltage	$R_S = 200\ \Omega$
Input Offset Current	
Input Bias Current	
Supply Current	$V_{OUT} = 0$
Internal Power Dissipation	$V_{OUT} = 0$
Large Signal Voltage Gain	$V_{OUT} = \pm 2.0$ V
Positive Output Voltage Swing	
Negative Output Voltage Swing	
The following specifications apply for $T_A = T_{HIGH}$ to T_{LOW}, $V_S = \pm 15$ V, $R_L = 5$ kΩ to Pin 7.	
Large Signal Voltage Gain	$V_{OUT} = \pm 10$ V, T_A = HIGH
	$V_{OUT} = \pm 10$ V, T_A = LOW
Positive Output Voltage Swing	
Negative Output Voltage Swing	
Input Offset Voltage	$R_S = 200\ \Omega$
Input Offset Current	T_A = HIGH
	T_A = LOW
Input Bias Current	T_A = HIGH
	T_A = LOW
Input Offset Voltage Drift	$R_S = 200\ \Omega$, $+25°C \leq T_A \leq$ HIGH
	$R_S = 200\ \Omega$, LOW $\leq T_A \leq +25°C$

μA749C			μA749D $V_{CC} = \pm 6$ V R_L = 10 K			μA739C			
Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
	1.0	6.0		1.0	10		1.0	6.0	mV
	50	750		50	600		50	1000	nA
	0.3	1.5		0.3	1.5		0.3	2.0	μA
50	150		50	150		37	150		kΩ
15,000	50,000		10,000	20,000		6,500	20,000		V/V
+12	+13		+4.5	+5.0		+12	+13		V
−14	−15		−5.5	−6.0		−14	−15		V
	5.0			10			5.0		kΩ
70	90		70	90		70	90		dB
	50	350		50	100		50		μV/V
−13		+11	−4		+2.5	−10		+11	V
	180	330							mW
	9.0	14	2.0	3.0	4.5		9.0	14	mA
	2.5			2.5			2.0		dB
	.2			.2			.2		μs
	.3			.3			.3		μs
	1.0			1.0			1.0		V/μs
	140			140			140		dB
		6.0					1.0	6.0	mV
	50	600					50	1000	nA
	.3	1.5					300		μA
	2.5						2.5		mA
	20						20		mW
15,000	60,000					2,500	15,000		V/V
+2.5	+2.8					+2.5	+2.8		V
−3.6	−4.0					−3.6	−4.0		V
8,000	40,000								V/V
15,000	50,000								V/V
+12	+13								V
−14	−15								V
	1.0	9.0							mV
	.05	1.5							μA
	.05	1.5							μA
	.3	3.0							μA
	.3	3.0							μA
	3.0								μV/°C
	3.0								μV/°C

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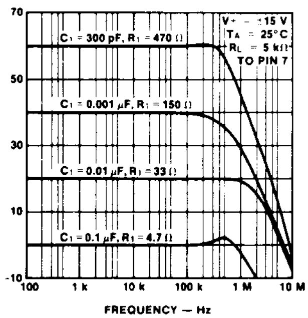
μA749C, μA749D and μA739C
Electrical Characteristics (Cont.) V+ = ±15 V, R_L = 5 kΩ to Pin 7, T_A = 25°C unless otherwise specified

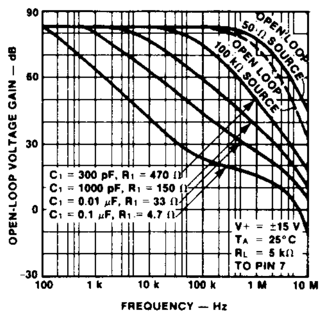
Characteristics	Condition
Input Offset Current Drift	+25°C ≤ T_A
	LOW ≤ T_A ≤ +25°C
Input Bias Current Drift	LOW ≤ T_A ≤ HIGH
Supply Current	V_{OUT} = 0, T_A =HIGH
	V_{OUT} = 0, T_A = LOW
Internal Power Dissipation	V_{OUT} = 0, T_A = HIGH
	V_{OUT} = 0, T_A = LOW
The following specifications apply for T_{HIGH} to T_{LOW}, V_S = ±4.5 V, R_L = 10 kΩ to Pin 7.	
Input Offset Voltage	R_S = 200 Ω
Input Offset Current	
Large Signal Voltage Gain	V_{OUT} = ±2.0 V, T_A =
	V_{OUT} = ±2.0 V, T_A =
Positive Output Voltage Swing	
Negative Output Voltage Swing	

Typical Performance Curves for μA749C and μA739C

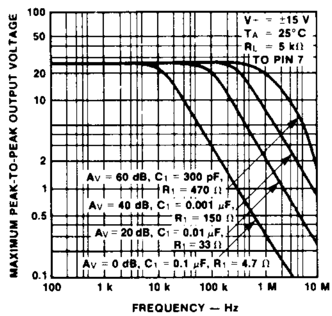
Closed Loop Gain as a Function of Frequency



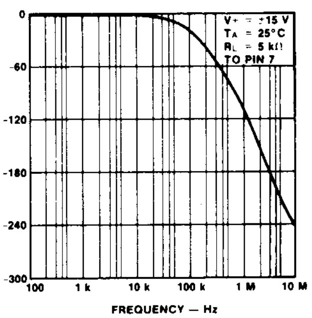
Open Loop Frequency Response Using Recommended Compensation Networks



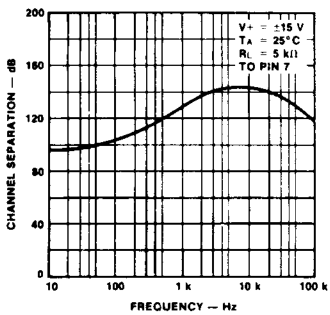
Output Capability as a Function of Frequency and Compensation



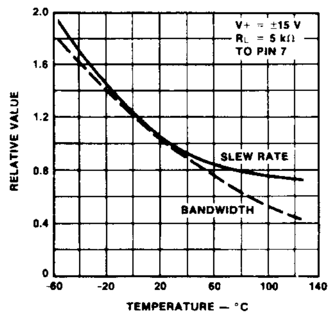
Open Loop Phase Shift Without Compensation



Channel Separation as Function of Frequency



Change of AC Characteristics With Temperature



µA749C			µA749D $V_{CC} = \pm 6$ V $R_L = 10$ K			µA739C			
Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
	.5								nA / °C
	2.0								nA / °C
	4.0								nA / °C
	10								mA
	10								mA
	100								mW
	200								mW
	1.5	7.0							mV
	50	1,000							nA
8,000									V / V
15,000									V / V
+2.5	+2.8								V
−3.6	−4.0								V

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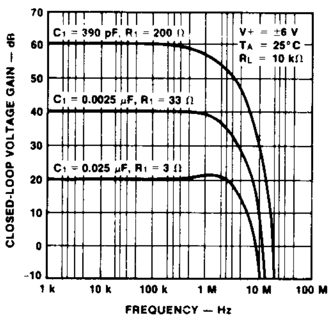
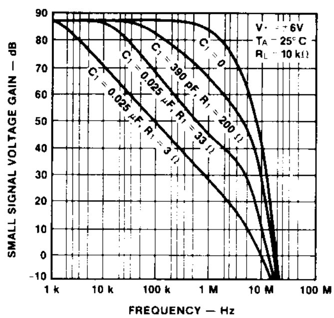
Typical Performance Curves for µA749D

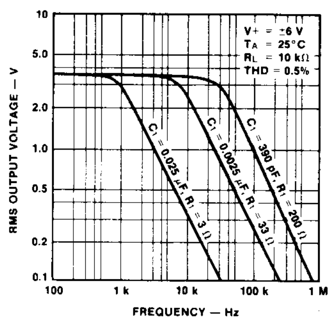
Closed Loop Gain as a Function of Frequency



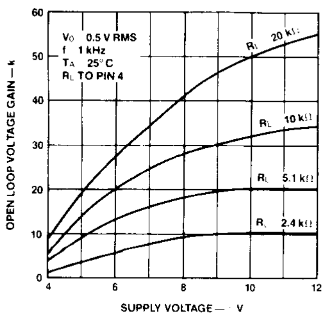
Open Loop Frequency Response Using Recommended Compensation Networks



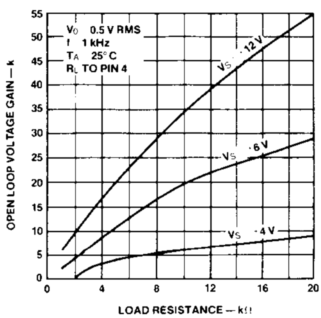
Output Voltage Swing as a Function of Frequency for Various Compensation Networks



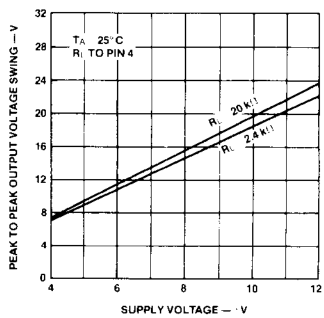
Open Loop Voltage Gain As a Function of Supply Voltage



Open Loop Voltage Gain As a Function of Load Resistance

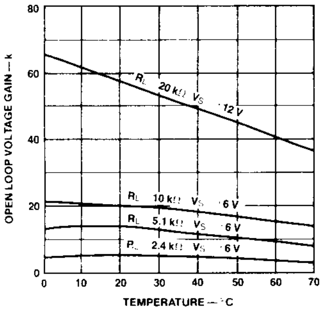


Typical Output Voltage As a Function of Supply Voltage

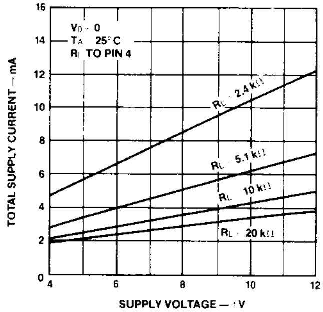


Typical Performance Curves for μA749D (Cont.)

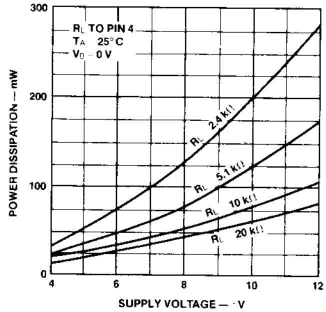
Open Loop Gain As a Function of Temperature



Total Supply Current As a Function of Supply Voltage

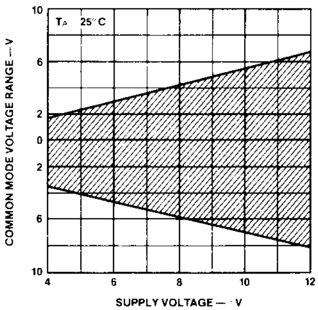


Total Power Dissipation As a Function of Supply Voltage and Load

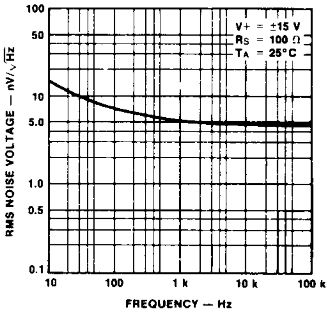


Typical Performance Curves for μA749 and μA749C

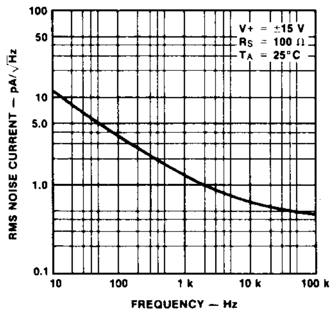
Common Mode Range As a Function of Supply Voltage



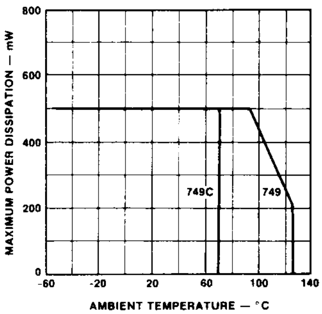
Input Noise Voltage as a Function of Frequency



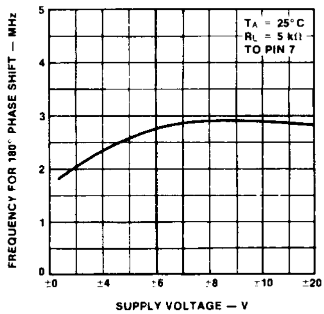
Input Noise Current as a Function of Frequency



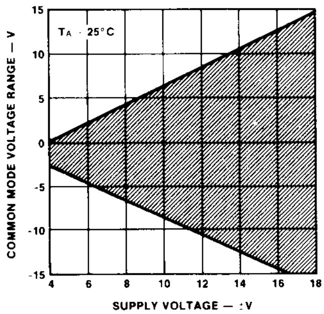
Absolute Maximum Power Dissipation as a Function of Temperature



Open Loop 180° Phase Shift Frequency as a Function of Supply Voltage

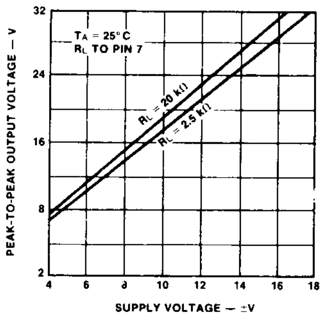


Common Mode Range as a Function of Supply Voltage

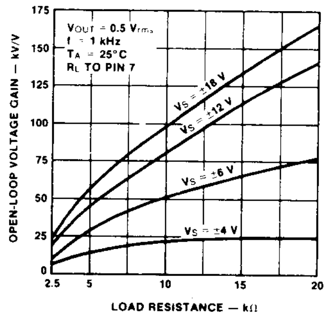


Typical Performance Curves for μA749 and μA749C (Cont.)

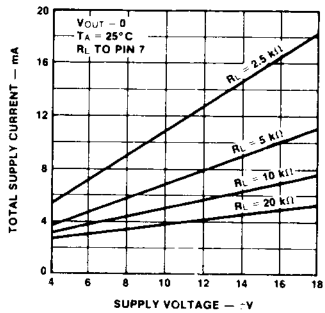
Typical Output Voltage as a Function of Supply Voltage



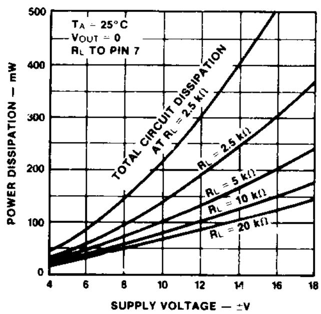
Open Loop Voltage Gain as a Function of Load Resistance



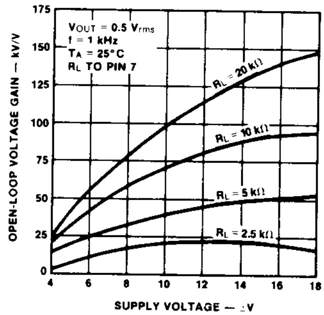
Total Supply Current as a Function of Supply Voltage



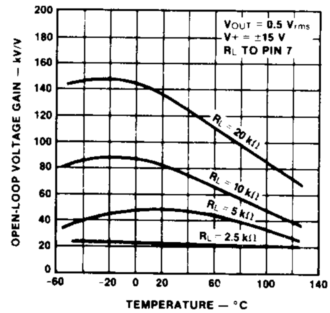
Total Power Dissipation as a Function of Supply Voltage and Load



Open Loop Voltage Gain as a Function of Supply Voltage

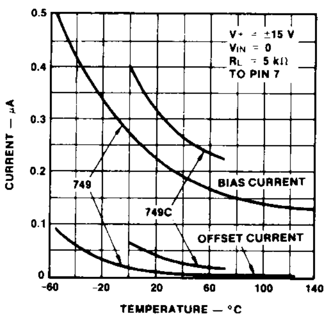


Open Loop Gain as a Function of Temperature

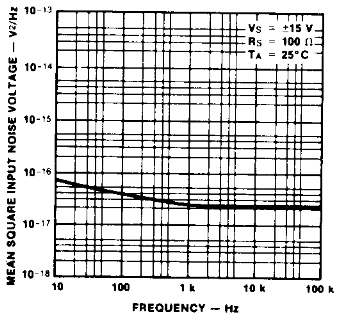


Typical Performance Curves for μA739C

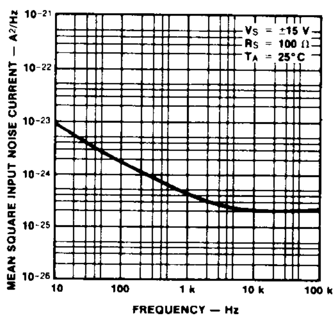
Input Offset Current and Bias Current as Functions of Temperature



Input Noise Voltage as a Function of Frequency



Input Noise Current as a Function of Frequency



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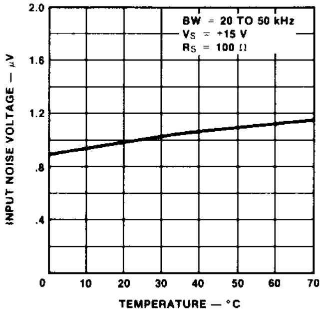
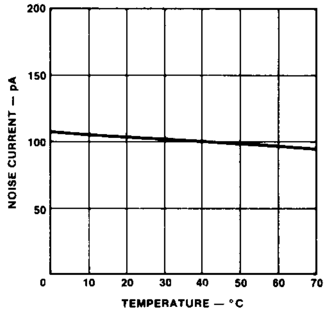
Typical Performance Curves for μA739C (Cont.)

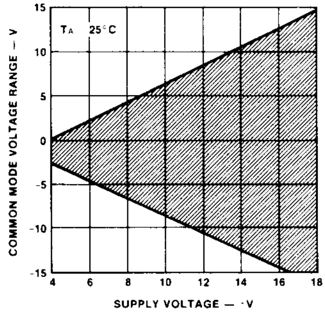
Wide Band Input Noise Voltage as a Function of Temperature



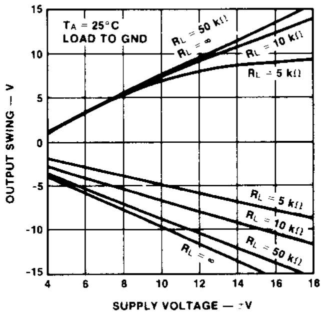
Wide Band Input Noise Current as a Function of Temperature



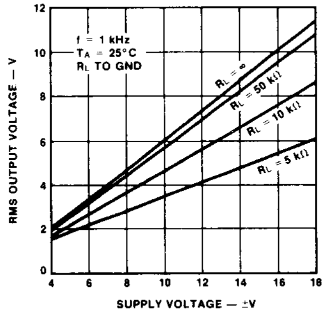
Common Mode Range as a Function of Supply Voltage



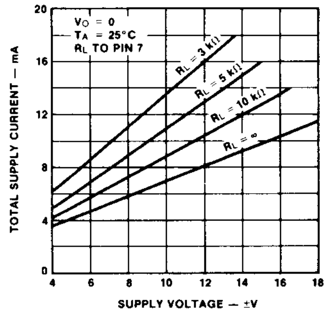
Typical Output Voltage as a Function of Supply Voltage



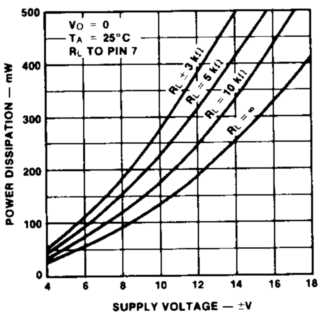
Output Capability as a Function of Supply Voltage



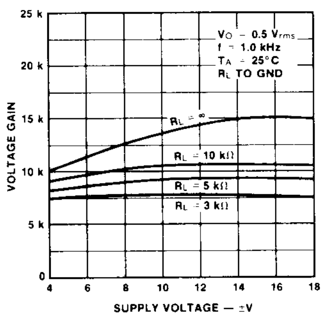
Total Supply Current as a Function of Supply Voltage



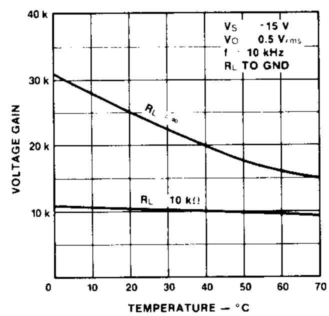
Total Power Dissipation as a Function of Supply Voltage and Load



Open Loop Voltage Gain as a Function of Supply Voltage

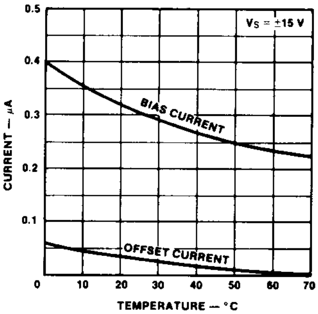


Open Loop Gain as a Function of Temperature



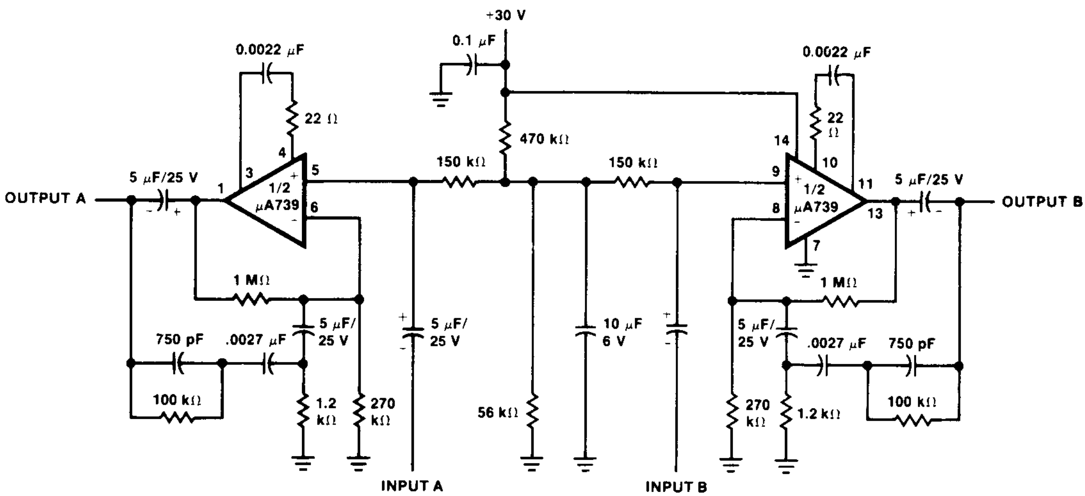
Typical Performance Curves for μA739C (Cont.)

Input Offset Current and Bias Current as a Function of Temperature



Typical Applications

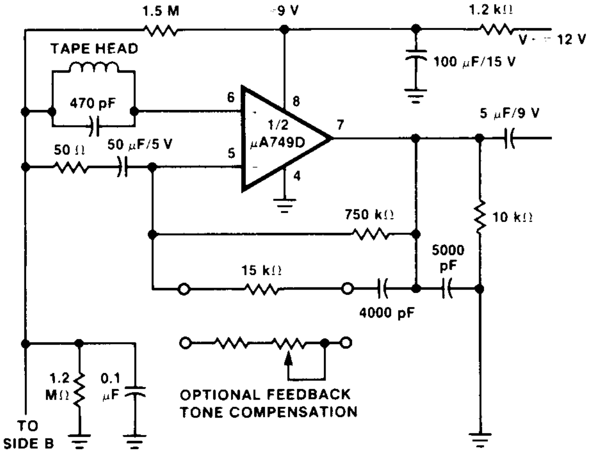
Stereo Phono Preamplifier—RIAA Equalized

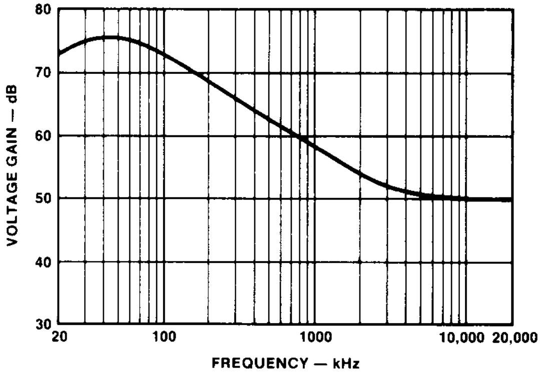


Typical Performance
Gain 40 dB at 1 kHz, RIAA equalized
Input overload point, 80 mV rms
Noise Level, 2 μV referred to input
Signal to noise ratio, 74 dB below 10 mW
Channel separation @ 1 kHz, 80 dB

Typical Applications (Cont.)

Stereo Tape Preamplifier





Typical Performance	
Gain at 1 kHz	60 dB
Output Voltage Swing	2.8 V rms
Power Consumption	30 mW