FAIRCHILD
A Schlumberger Company

μA774
Quad
Operational Amplifier

Linear Division Operational Amplifiers

Description

This monolithic JFET Input Operational Amplifier incorporates well matched ion implanted JFET on the same chip with standard bipolar transistors. The key features of this op amp are low input bias current in the sub nanoamp range plus high slew rate (13 V/μs typically) and wide bandwidth (3.0 MHz typically).

- **Low Input Bias Current — 200 pA**
- **Low Input Offset Current — 100 pA**
- **High Slew Rate — 13 V/μs Typically**
- **Wide Bandwidth — 3.0 MHz Typically**

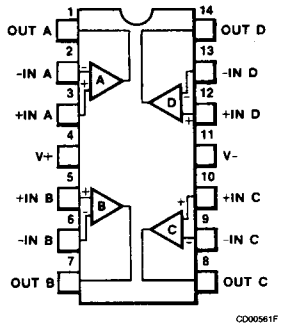
Absolute Maximum Ratings

Storage Temperature Range	
Ceramic DIP	−65°C to +175°C
Molded DIP and SO-14	−65°C to +150°C
Operating Temperature Range	
Extended (μA774M, μA774BM)	−55°C to +125°C
Commercial (μA774C, μA774BC, μA774LC)	0°C to +70°C
Lead Temperature	
Ceramic DIP (soldering, 60 s)	300°C
Molded DIP and SO-14 (soldering 10 s)	265°C
Internal Power Dissipation[1, 2]	
14L-Ceramic DIP	1.36 W
14L-Molded DIP	1.04 W
SO-14	0.93 W
Supply Voltage	±18 V
Differential Input Voltage	30 V
Input Voltage[3]	±16 V
Output Short Circuit Duration	Indefinite

Notes

1. $T_{J\ Max}$ = 150°C for the Molded DIP and SO-14, and 175°C for the Ceramic DIP.
2. Ratings apply to ambient temperature at 25°C. Above this temperature, derate the 14L-Ceramic DIP at 9.1 mW/°C, the 14L-Molded DIP at 8.3 mW/°C, and the SO-14 at 7.5 mW/°C.
3. Unless otherwise specified the absolute maximum negative input voltage is equal to the negative power supply voltage.

Connection Diagram
4-Lead DIP and SO-14 Package
(Top View)



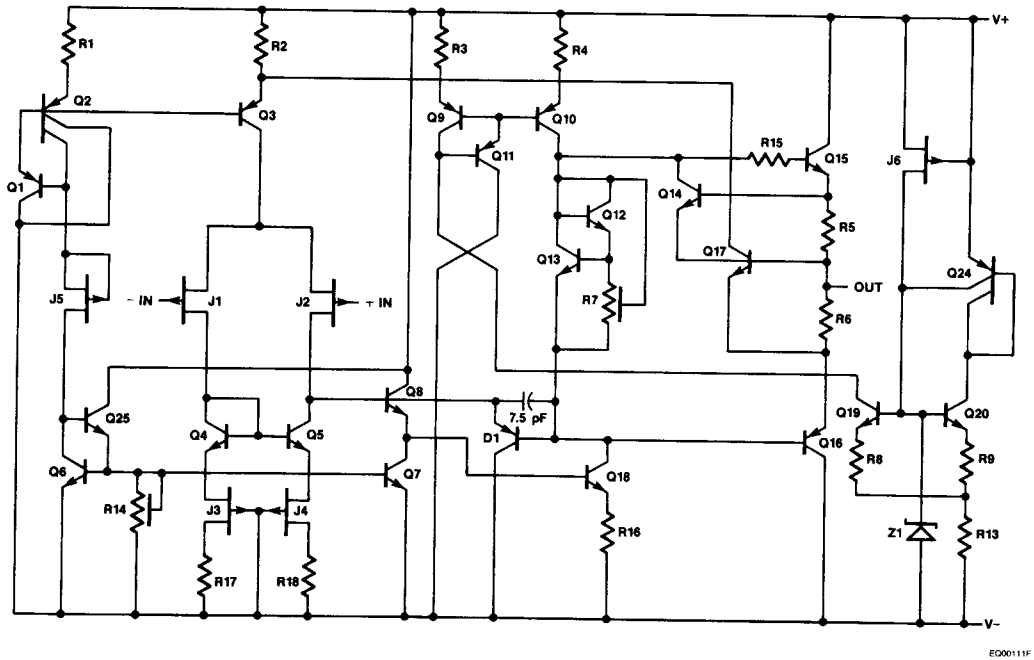
CD00561F

Order Information

Device Code	Package Code	Package Description
μA774DM	7A	Ceramic DIP
μA774DC	7A	Ceramic DIP
μA774PC	9A	Molded DIP
μA774SC	KD	Molded Surface Mount
μA774BDM	7A	Ceramic DIP
μA774BDC	7A	Ceramic DIP
μA774BPC	9A	Molded DIP
μA774LDC	7A	Ceramic DIP
μA774LPC	9A	Molded DIP

7

Equivalent Circuit (1/4 of Circuit)



μA774, μA774L
Electrical Characteristics $T_A = 25°C$, $V_{CC} = \pm 15$ V, unless otherwise specified.

DC Characteristics

Symbol	Characteristic	Condition	μA774			μA774L			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{IO}	Input Offset Voltage	$V_{CM} = 0$ V, $R_S = 50\ \Omega$			10.0			15.0	mV
I_{IO}	Input Offset Current[1]	$V_{CM} = 0$ V, $T_J = 25°C$			100			100	pA
I_{IB}	Input Bias Current[1]	$V_{CM} = 0$ V, $T_J = 25°C$		50	200		50	200	pA
Z_I	Input Impedance			10^{12}			10^{12}		Ω
I_{CC}	Supply Current (Per Amplifier)				2.8			2.8	mA
I_{OS}	Output Short Circuit Current			25			25		mA
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10$ V, $R_L = 2.0$ kΩ	50	100		50	100		V/mV
The following specifications apply for $0°C \leq T_A \leq +70°C$, $V_{CC} = \pm 15$ V									
V_{IO}	Input Offset Voltage	$V_{CM} = 0$ V, $R_S = 50\ \Omega$			13			20	mV
$\Delta V_{IO}/\Delta T$	Input Offset Voltage Temperature Sensitivity	$R_S = 50\ \Omega$		10			10		μV/°C
I_{IO}	Input Offset Current[1]	$V_{CM} = 0$ V			4.0			4.0	nA
I_{IB}	Input Bias Current[1]	$V_{CM} = 0$ V			8.0			8.0	nA
I_{CC}	Supply Current (Per Amplifier)				3.0			3.0	mA
CMR	Common Mode Rejection	$V_{CM} = \pm 11$ V, $R_S = 50\ \Omega$	70			70			dB
V_{IR}	Input Voltage Range		±11	+15 −12		±11	+15 −12		V
PSRR	Power Supply Rejection Ratio	$V_{CC} = \pm 10$ V to ±18 V, $R_S = 50\ \Omega$	70			70			dB
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10$ V, $R_L \geq 2.0$ kΩ	25			25			V/mV
V_{OP}	Output Voltage Swing	$R_L = 10$ kΩ	±12			±12			V
		$R_L = 2.0$ kΩ	±10			±10			

μA774A, μA774B
Electrical Characteristics $T_A = 25°C$, $V_{CC} = \pm 15$ V, unless otherwise specified.

DC Characteristics

Symbol	Characteristic	Condition	μA774A			μA774B			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{IO}	Input Offset Voltage	$V_{CM} = 0$ V, $R_S = 50$ kΩ			2.0			5.0	mV
I_{IO}	Input Offset Current[1]	$V_{CM} = 0$ V, $T_J = 25°C$			50			50	pA
I_{IB}	Input Bias Current[1]	$V_{CM} = 0$ V, $T_J = 25°C$		50	100		50	100	pA
Z_I	Input Impedance			10^{12}			10^{12}		Ω
I_{CC}	Supply Current (Per Amplifier)				2.8			2.8	mA
I_{OS}	Output Short Circuit Current			25			25		mA
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10$ V, $R_L \geq 2.0$ kΩ	50	100		50	100		V/mV
The following specifications apply for $V_{CC} = \pm 15$ V, $0°C \leq T_A \leq +70°C$									
V_{IO}	Input Offset Voltage	$V_{CM} = 0$ V, $R_S = 50$ Ω			4.0			7.0	mV
$\Delta V_{IO}/\Delta T$	Input Offset Voltage Temperature Sensitivity	$R_S = 50$ Ω		10			10		μV/°C
I_{IO}	Input Offset Current[1]	$V_{CM} = 0$ V			2.0			2.0	nA
I_{IB}	Input Bias Current[1]	$V_{CM} = 0$ V			4.0			4.0	nA
I_{CC}	Supply Current (Per Amplifier)				3.0			3.0	mA
CMR	Common Mode Rejection	$V_{CM} = \pm 11$ V, $R_S = 50$ Ω	80			80			dB
V_{IR}	Input Voltage Range		±11	+15 −12		±11	+15 −12		V
PSRR	Power Supply Rejection Ratio	$V_{CC} = \pm 10$ V to ± 18 V, $R_S = 50$ Ω	80			80			dB
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10$ V, $R_L \geq 2.0$ kΩ	25			25			V/mV
V_{OP}	Output Voltage Swing	$R_L = 10$ kΩ	±12			±12			V
		$R_L = 2.0$ kΩ	±10			±10			

μA774AM, μA774BM
Electrical Characteristics $T_A = 25°C$, $V_{CC} = \pm 15$ V, unless otherwise specified.

DC Characteristics

Symbol	Characteristic	Condition	μA774AM			μA774BM			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{IO}	Input Offset Voltage	$V_{CM} = 0$ V, $R_S = 50\ \Omega$			2.0			5.0	mV
I_{IO}	Input Offset Current[1]	$V_{CM} = 0$ V, $T_J = 25°C$			50			50	pA
I_{IB}	Input Bias Current[1]	$V_{CM} = 0$ V, $T_J = 25°C$		50	100		50	100	pA
Z_I	Input Impedance			10^{12}			10^{12}		Ω
I_{CC}	Supply Current (Per Amplifier)				2.8			2.8	mA
V_{IR}	Input Voltage Range		±11	+15 −12		±11	+15 −12		V
CMR	Common Mode Rejection	$V_{CM} = \pm 11$ V, $R_S = 50\ \Omega$	80			80			dB
PSRR	Power Supply Rejection Ratio	$V_{CC} = \pm 10$ V to ± 18 V, $R_S = 50\ \Omega$	80			80			dB
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10$ V, $R_L \geq 2.0$ kΩ	50			50			V/mV
V_{OP}	Output Voltage Swing	$R_L = 10$ kΩ	±12			±12			V
		$R_L = 2.0$ kΩ	±10			±10			

The following specifications apply for $-55°C \leq T_A \leq +125°C$, $V_{CC} = \pm 15$ V

V_{IO}	Input Offset Voltage	$V_{CM} = 0$ V, $R_S \leq 50\ \Omega$			5.0			8.0	mV
$\Delta V_{IO}/\Delta T$	Input Offset Voltage Temperature Sensitivity	$R_S = 50\ \Omega$		10			10		μV°/C
I_{IO}	Input Offset Current[1]	$V_{CM} = 0$ V			20			20	nA
I_{IB}	Input Bias Current[1]	$V_{CM} = 0$ V			50			50	nA
I_{CC}	Supply Current (Per Amplifier)				3.4			3.4	mA
CMR	Common Mode Rejection	$V_{CM} = \pm 11$ V, $R_S = 50\ \Omega$	80			80			dB
PSRR	Power Supply Rejection Ratio	$V_{CC} = \pm 10$ V to ± 18 V, $R_S = 50\ \Omega$	80			80			dB
A_{VS}	Large Signal Voltage Gain	$V_O = \pm 10$ V, $R_L \geq 2.0$ kΩ	25			25			V/mV
V_{OP}	Output Voltage Swing	$R_L = 10$ kΩ	±12			±12			V
		$R_L = 2.0$ kΩ	±10			±10			

Electrical Characteristics (Cont.) $T_A = 25°C$, $V_{CC} = \pm 15$ V

AC Characteristics

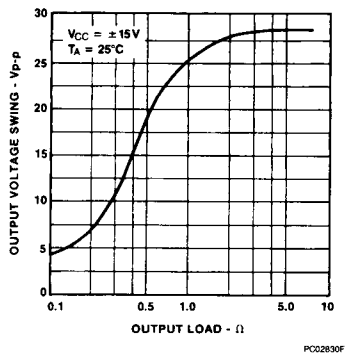
Symbol	Characteristic	Condition	All Grades			Unit
			Min	Typ	Max	
BW	Bandwidth	*(Figure 2)* $A_V = -10$		3.0		MHz
SR	Slew Rate	*(Figure 1)*		13		V/μs
e_n	Input Noise Voltage	$R_S = 100\ \Omega$, f = 1000 Hz		16		$nV/\sqrt{Hz}$
i_n	Input Noise Current	f = 1000 Hz		0.01		$pA/\sqrt{Hz}$

Note

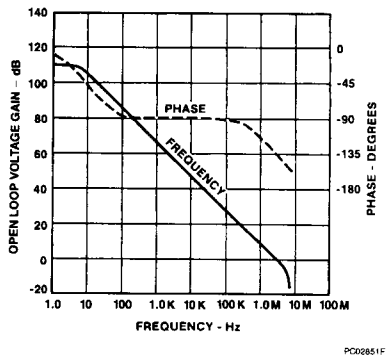
1. The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature, T_J. Due to limited production test time, the input bias currents measured are correlated to junction temperature. In normal operation the junction temperature rises above the ambient temperature as a result of internal power dissipation, P_D. $T_J = T_A + \theta_{JA}P_D$ where θ_{JA} is the thermal resistance from junction to ambient. Use of a heat sink is recommended if input bias current is to be kept to a minimum.

Typical Performance Curves

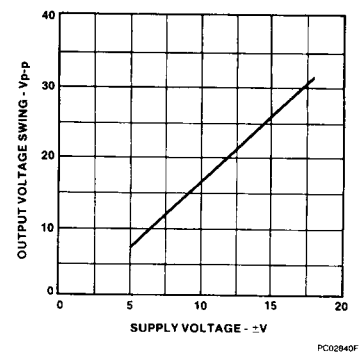
Output Voltage Swing vs Load Resistance



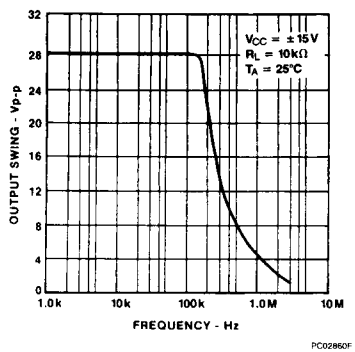
Open Loop Frequency Response



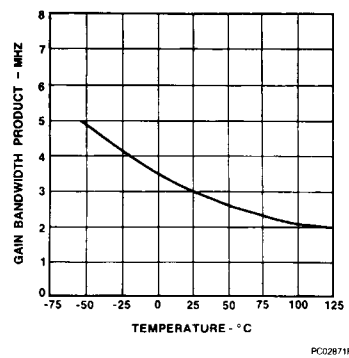
Output Voltage Swing vs Supply Voltage



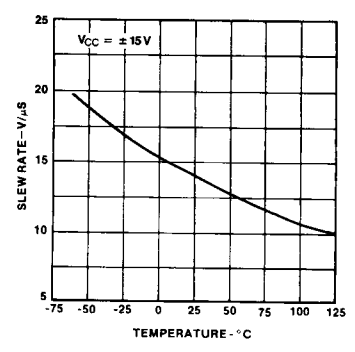
Maximum Undistorted Output vs Frequency



Gain Bandwidth Product vs Temperature

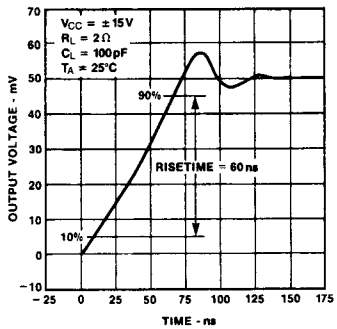


Slew Rate vs Temperature

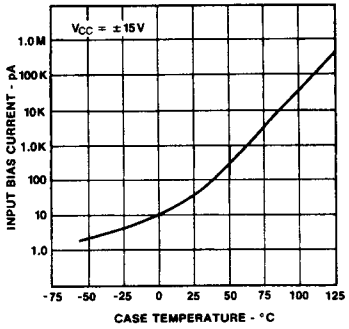


Typical Performance Curves (Cont.)

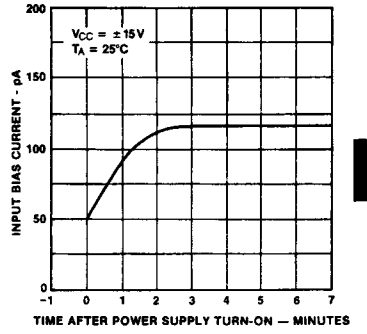
Small Signal Pulse Response



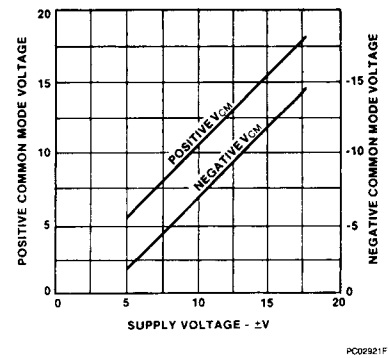
Input Bias Current vs Case Temperature



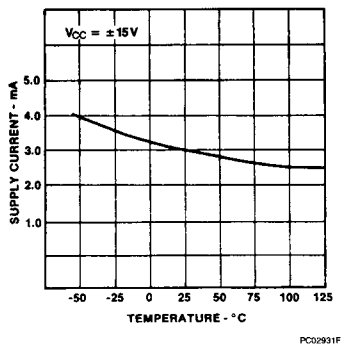
Bias Current Warm Up Change



Maximum Common Mode Input Voltage vs Supply Voltage



Supply Current vs Temperature



Typical Applications

Figure 1 Unity Gain Amplifier

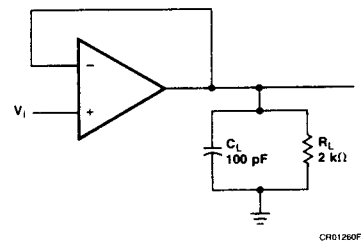


Figure 2 Gain-of-10 Inverting Amplifier