

# ORDERING INFORMATION

Device	Temperature Range	Package
MC1748G	-55°C to +125°C	Metal Can
MC1748U	-55°C to +125°C	Ceramic DIP
MC1748CG	0°C to +70°C	Metal Can
MC1748CP1	0°C to +70°C	Plastic DIP
MC1748CU	0°C to +70°C	Ceramic DIP

T-79-05-10

# MC1748 MC1748C

## HIGH PERFORMANCE OPERATIONAL AMPLIFIER

... designed for use as a summing amplifier, integrator, or amplifier with operating characteristics as a function of the external feedback components.

- Noncompensated MC1741
- Single 30 pF Capacitor Compensation Required For Unity Gain
- Short-Circuit Protection
- Offset Voltage Null Capability
- Wide Common-Mode and Differential Voltage Ranges
- Low-Power Consumption
- No Latch Up

## OPERATIONAL AMPLIFIER

### SILICON MONOLITHIC INTEGRATED CIRCUIT

**P1 SUFFIX**  
PLASTIC PACKAGE  
CASE 626-05  
(MC1748C Only)

**U SUFFIX**  
CERAMIC PACKAGE  
CASE 693-02

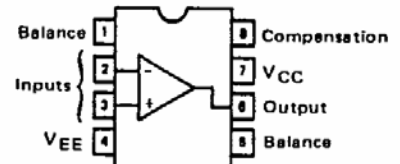
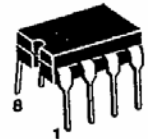
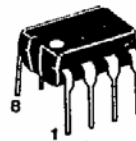
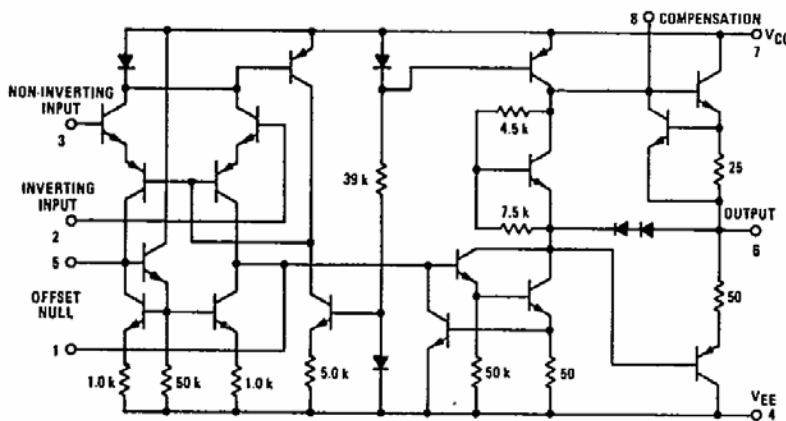
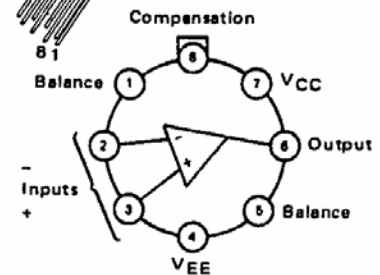


FIGURE 1 - CIRCUIT SCHEMATIC



**G SUFFIX**  
METAL PACKAGE  
CASE 601-04



## TYPICAL COMPENSATION CIRCUITS

FIGURE 2 - OFFSET ADJUST AND FREQUENCY COMPENSATION

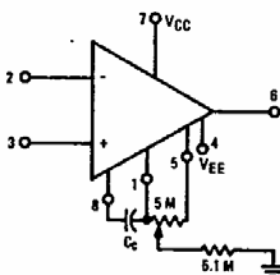


FIGURE 3 - SINGLE-POLE COMPENSATION

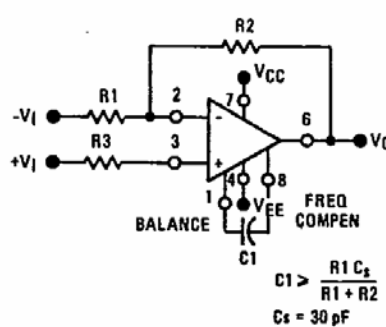
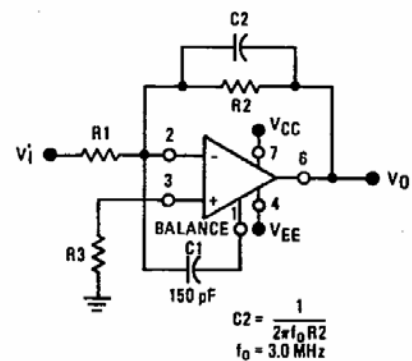


FIGURE 4 - FEEDFORWARD COMPENSATION



**MAXIMUM RATINGS** ( $T_A = +25^\circ\text{C}$  unless otherwise noted)

Rating	Symbol	MC1748	MC1748C	Unit
Power Supply Voltage	V <sub>CC</sub>	+22	+18	Vdc
	V <sub>EE</sub>	-22	-18	
Differential Input Signal	V <sub>in</sub>	±30		Volts
Common-Mode Input Swing <sup>①</sup>	V <sub>ICR</sub>	±15		Volts
Output Short Circuit Duration	t <sub>s</sub>	Continuous		
Power Dissipation (Package Limitation) Derate above T <sub>A</sub> = +25°C	P <sub>D</sub>	680		mW
		4.6		
Operating Temperature Range	T <sub>A</sub>	-55 to +125	0 to +70	°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +150	-65 to +150	°C

**ELECTRICAL CHARACTERISTICS** (V<sub>CC</sub> = +15 Vdc, V<sub>EE</sub> = -15 Vdc, T<sub>A</sub> = +25°C unless otherwise noted.)

Characteristics	Symbol	MC1748			MC1748C			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Bias Current T <sub>A</sub> = +25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub> <sup>②</sup>	I <sub>IB</sub>	-	0.08	0.5	-	0.08	0.5	μA <sub>dc</sub>
		-	0.3	1.5	-	-	0.8	
Input Offset Current T <sub>A</sub> = +25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub>	I <sub>IO</sub>	-	0.02	0.2	-	0.02	0.2	μA <sub>dc</sub>
		-	0.08	0.5	-	-	0.3	
Input Offset Voltage (R <sub>S</sub> ≤ 10 k Ω) T <sub>A</sub> = +25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub>	V <sub>IO</sub>	-	1.0	5.0	-	1.0	6.0	mV <sub>dc</sub>
		-	-	6.0	-	-	7.5	
Differential Input Impedance (Open-Loop, f = 20 Hz) Parallel Input Resistance Parallel Input Capacitance	R <sub>p</sub>	0.3	2.0	-	0.3	2.0	-	Megohm pF
	C <sub>p</sub>	-	1.4	-	-	1.4	-	
Common-Mode Input Impedance (f = 20 Hz)	z <sub>in</sub>	-	200	-	-	200	-	Megohms
Common-Mode Input Voltage Swing	V <sub>ICR</sub>	±12	±13	-	±12	±13	-	V <sub>pk</sub>
Common-Mode Rejection Ratio (f = 100 Hz)	CMRR	70	90	-	70	90	-	dB
Open-Loop Voltage Gain, (V <sub>O</sub> = ±10 V, R <sub>L</sub> = 2.0 k ohms) T <sub>A</sub> = +25°C T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub>	A <sub>vol</sub>	50,000	200,000	-	20,000	200,000	-	V/V
		25,000	-	-	15,000	-	-	
Step Response (V <sub>in</sub> = 20 mV, C <sub>c</sub> = 30 pF, R <sub>L</sub> = 2 k Ω, C <sub>L</sub> = 100 pF) Rise Time Overshoot Percentage Slew Rate	t <sub>r</sub>	-	0.3	-	-	0.3	-	μs
		-	5.0	-	-	5.0	-	%
	dV <sub>OUT</sub> /dt	-	0.8	-	-	0.8	-	V/μs
Output Impedance (f = 20 Hz)	z <sub>o</sub>	-	75	-	-	75	-	ohms
Short-Circuit Output Current	I <sub>sc</sub>	-	25	-	-	25	-	mA <sub>dc</sub>
Output Voltage Swing (R <sub>L</sub> = 10 k ohms) R <sub>L</sub> = 2 k ohms (T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub> )	V <sub>O</sub>	±12	±14	-	±12	±14	-	V <sub>pk</sub>
		±10	±13	-	±10	±13	-	
Power Supply Sensitivity V <sub>EE</sub> = constant, R <sub>S</sub> < 10 k ohms V <sub>CC</sub> = constant, R <sub>S</sub> < 10 k ohms	S+	-	30	150	-	30	150	μV/V
	S-	-	30	150	-	30	150	
Power Supply Current	I <sub>D</sub> <sup>+</sup>	-	1.67	2.83	-	1.67	2.83	mA <sub>dc</sub>
	I <sub>D</sub> <sup>-</sup>	-	1.67	2.83	-	1.67	2.83	
DC Quiescent Power Dissipation (V <sub>O</sub> = 0)	P <sub>D</sub>	-	60	85	-	60	85	mW

<sup>①</sup> For supply voltages less than ±15 V, the Maximum Input Voltage is equal to the Supply Voltage.

<sup>②</sup> T<sub>low</sub>: 0°C for MC1748C  
-55°C for MC1748  
T<sub>high</sub>: +70°C for MC1748C  
+125°C for MC1748

### TYPICAL CHARACTERISTICS

( $V_{CC} = +15\text{ V}$ ,  $V_{EE} = -15\text{ V}$ ,  $T_A = +25^\circ\text{C}$  unless otherwise noted.)

FIGURE 5 – MINIMUM INPUT VOLTAGE RANGE

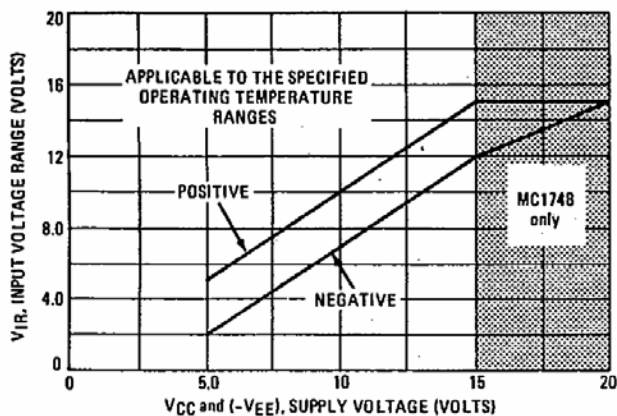


FIGURE 6 – MINIMUM OUTPUT VOLTAGE SWING

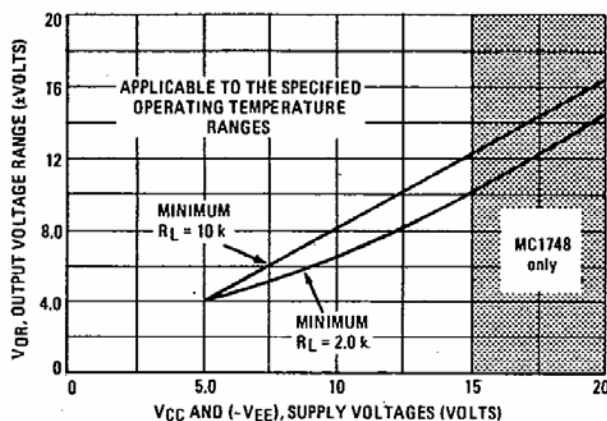


FIGURE 7 – MINIMUM VOLTAGE GAIN

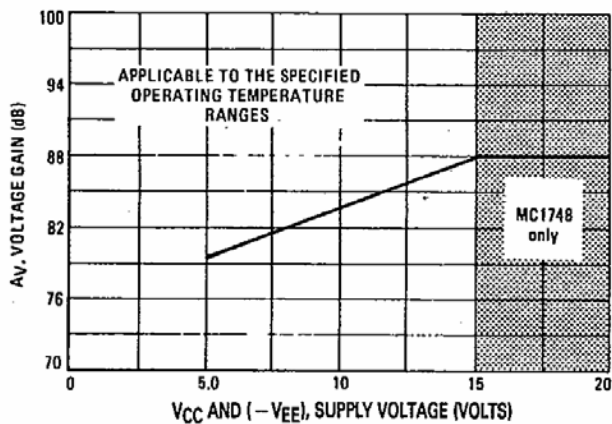


FIGURE 8 – TYPICAL SUPPLY CURRENTS

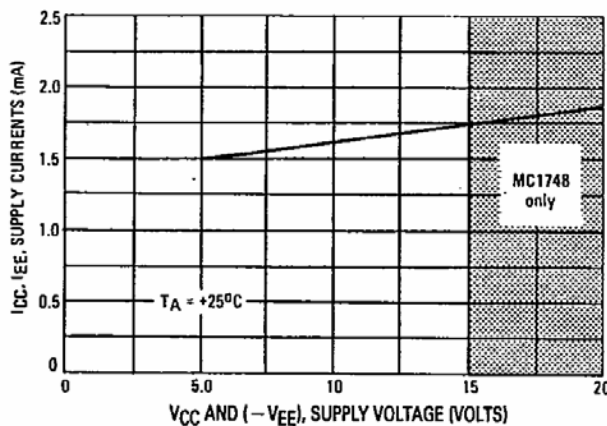


FIGURE 9 – OPEN-LOOP FREQUENCY RESPONSE

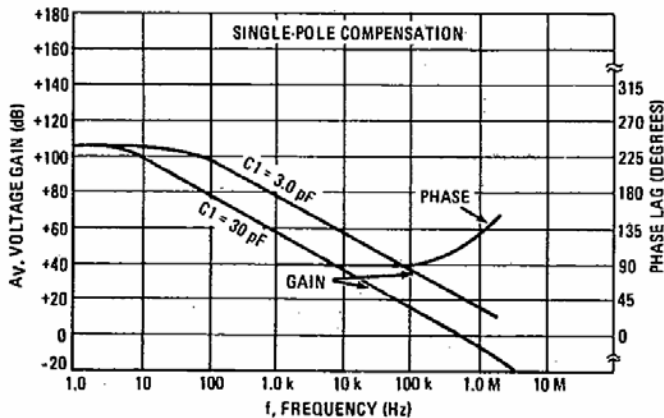
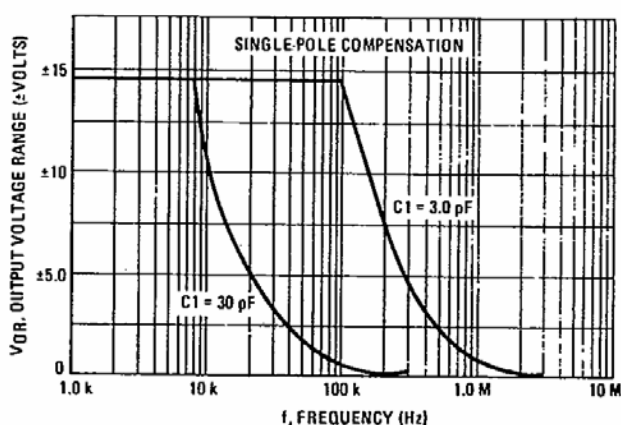


FIGURE 10 – LARGE-SIGNAL FREQUENCY RESPONSE



TYPICAL CHARACTERISTICS (continued)

( $V_{CC} = +15\text{ V}$ ,  $V_{EE} = -15\text{ V}$ ,  $T_A = +25^\circ\text{C}$  unless otherwise noted.)

FIGURE 11 – VOLTAGE FOLLOWER PULSE RESPONSE

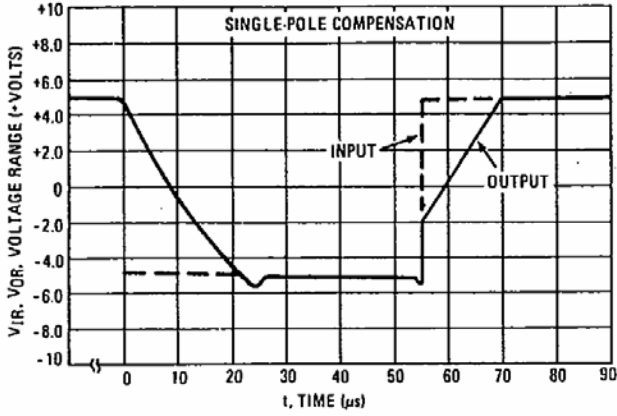


FIGURE 12 – OPEN-LOOP FREQUENCY RESPONSE

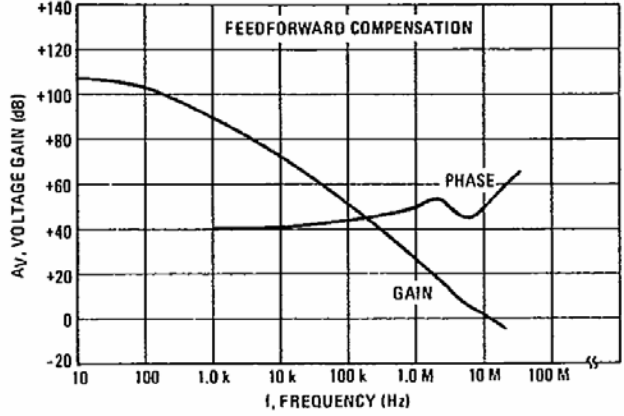


FIGURE 13 – LARGE-SIGNAL FREQUENCY RESPONSE

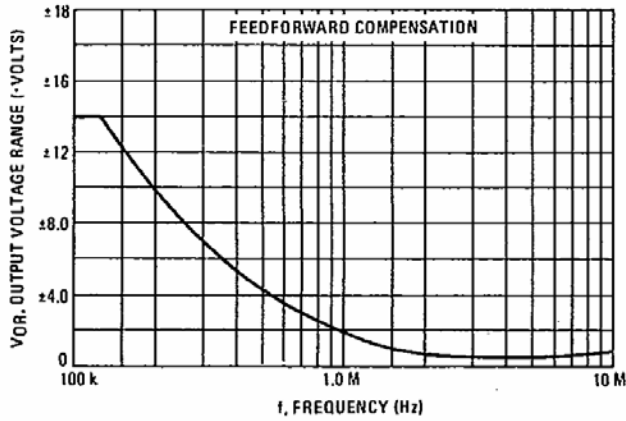


FIGURE 14 – INVERTER PULSE RESPONSE

