MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MC1747
MC1747C

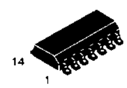
(Dual MC1741)
Internally Compensated, High Performance Operational Amplifiers

The MC1747 and MC1747C were designed for use as summing amplifiers, integrators, or amplifiers with operating characteristics as a function of the external feedback components. The MC1747L and MC1747CL are functionally and electrically equivalent to the µA747 and µA747C respectively.

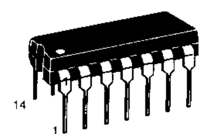
- No Frequency Compensation Required
- Short Circuit Protection
- Wide Common Mode and Differential Voltage Ranges
- Low-Power Consumption
- No Latch Up
- Offset Voltage Null Capability

(DUAL MC1741)
DUAL OPERATIONAL AMPLIFIERS

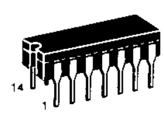
SILICON MONOLITHIC INTEGRATED CIRCUIT



D SUFFIX
PLASTIC PACKAGE
CASE 751A
(SO-14)

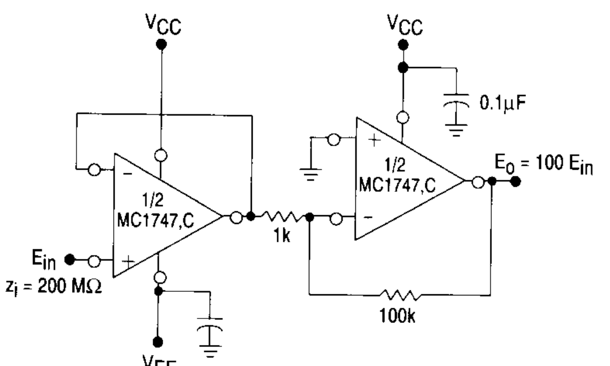


P2 SUFFIX
PLASTIC PACKAGE
CASE 646



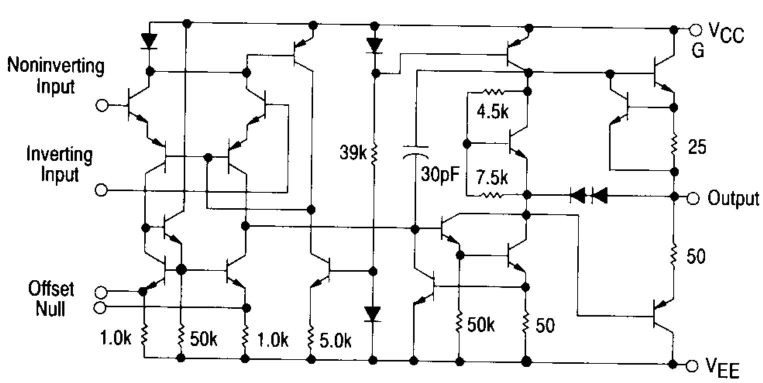
L SUFFIX
CERAMIC PACKAGE
CASE 632

Figure 1. High-Impedance, High-Gain Inverting Amplifier

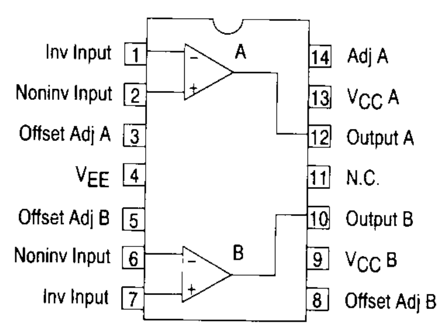


Terminals not shown are not connected

Figure 2. Circuit Schematic



PIN CONNECTIONS



$V_{CC}A$ and $V_{CC}B$ are not connected internally

ORDERING INFORMATION

Device	Temperature Range	Package
MC1747L	−55° to +125°C	Ceramic DIP
MC1747CD	0° to +70°C	SO-14
MC1747CL		Ceramic DIP
MC1747CP2		Plastic DIP

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MAXIMUM RATINGS (T_A = +25°C, unless otherwise noted.)

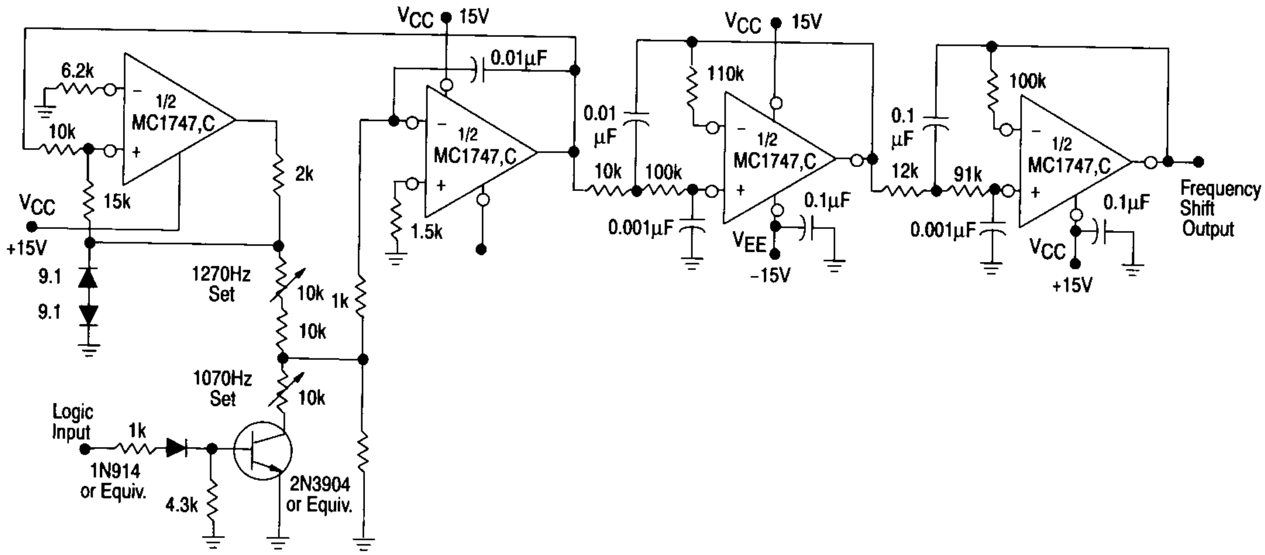
Rating	Symbol	MC1747	MC1747C	Unit
Power Supply Voltages	V_{CC} V_{EE}	+22 –22	+18 –18	Vdc
Differential Input Signal Voltages (Note 1)	V_{ID}	±30		V
Common Mode Input Swing Voltage (Note 2)	V_{ICR}	±15		V
Output Short Circuit Duration	t_{SC}	Continuous		
Voltage (Measurement between Offset Null and V_{EE})		±0.5		V
Operating Ambient Temperature Range	T_A	–55 to +125	0 to +70	°C
Storage Temperature Range	T_{stg}	–65 to +150	–65 to +150	°C
Junction Temperature Ceramic Package Plastic Package	T_J	 175 150		°C

ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, T_A = +25°C, unless otherwise noted.)

Characteristics	Symbol	MC1747			MC1747C			Unit
		Min	Typ	Max	Min	Typ	Max	
Input Bias Current	I_{IB}							nAdc
T_A = +25°C		—	80	500	—	80	500	
$T_A = T_{high}$ (Note 3)		—	30	500	—	30	800	
$T_A = T_{low}$ (Note 3)		—	300	1500	—	30	800	
Input Offset Current	I_{IO}							nAdc
T_A = +25°C		—	20	200	—	20	200	
$T_A = T_{high}$		—	7.0	200	—	7.0	300	
$T_A = T_{low}$		—	85	500	—	7.0	300	
Input Offset Current	V_{IO}							mVdc
T_A = +25°C		—	1.0	5.0	—	1.0	6.0	
$T_A = T_{low}$ to $T_A = T_{high}$		—	1.0	6.0	—	1.0	7.5	
Offset Voltage Adjustment Range		—	±15	—	—	±15	—	mV
Differential Input Impedance (Open-loop, f = 20 Hz)								
Parallel Input Resistance	r_i	0.3	2.0	—	0.3	2.0	—	MΩ
Parallel Input Capacitance	C_i	—	1.4	—	—	1.4	—	pF
Common Mode Input Voltage Swing $T_{low} \le T_A \le T_{high}$	V_{ICR}	±12	±13	—	±12	±13	—	V
Common Mode Rejection (R_S = 10 kΩ) $T_{low} \le T_A \le T_{high}$	CMR	70	90	—	70	90	—	dB
Open-Loop Voltage Gain (V_O = ±10 V, R_L = 2.0 kΩ)	A_{VOL}							V
T_A = +25°C		50,000	200,000	—	25,000	200,000	—	
$T_A = T_{low}$ to $T_A = T_{high}$		25,000	—	—	15,000	—	—	
Transient Response (Unity Gain) (V_{in} = 20 mV, R_L = 2.0 kΩ, $C_L \le$ 100 pF)								
Rise Time	t_{PLH}	—	0.3	—	—	0.3	—	µs
Overshoot Percentage		—	5.0	—	—	5.0	—	%
Slew Rate (Unity Gain)	SR	—	0.5	—	—	0.5	—	V/µs
Output Impedance	z_o	—	75	—	—	75	—	Ω
Short Circuit Output Current	I_{SC}	—	25	—	—	25	—	mAdc
Channel Separation		—	120	—	—	120	—	dB
Output Voltage Swing ($T_{low} \le T_A \le T_{high}$)	V_{OR}							Vpk
R_L = 10 kΩ		±12	±14	—	±12	±14	—	
R_L = 2.0 kΩ		±10	±13	—	±10	±13	—	
Power Supply Rejection (T_{low} to T_{high})								dB
V_{EE} = Constant, $R_S \le$ 10 kΩ	PSR+	75	—	—	75	—	—	
V_{CC} = Constant, $R_S \le$ 10 kΩ	PSR–	75	—	—	75	—	—	
Power Supply Current (each amplifier)	I_{CC}, I_{EE}							mAdc
T_A = +25°C		—	1.7	2.8	—	1.7	2.8	
$T_A = T_{low}$		—	2.0	3.3	—	2.0	3.3	
$T_A = T_{high}$		—	1.5	2.5	—	2.0	3.3	
DC Power Consumption (each amplifier)	P_C							mW
T_A = +25°C		—	50	85	—	50	85	
$T_A = T_{low}$		—	60	100	—	60	100	
$T_A = T_{high}$		—	45	75	—	60	100	

NOTES:
1. For supply voltages of less than ±15 V, the maximum differential input voltage is equal to ±(V_{CC} +|V_{EE}|).
2. For supply voltages of less than ±15 V, the maximum input voltage is equal to the supply voltage (+V_{CC}, –|V_{EE}|).
3. T_{low} = 0°C for MC1747CL; –55°C for MC1747L. T_{high} = +70°C for MC1747CL; +125°C for MC1747L.

Figure 3. Typical Frequency Shift Keyer Tone Generator Test Circuit



Terminals not shown are not connected.

Figure 4. Typical Frequency Shift Keyer Tone Generator

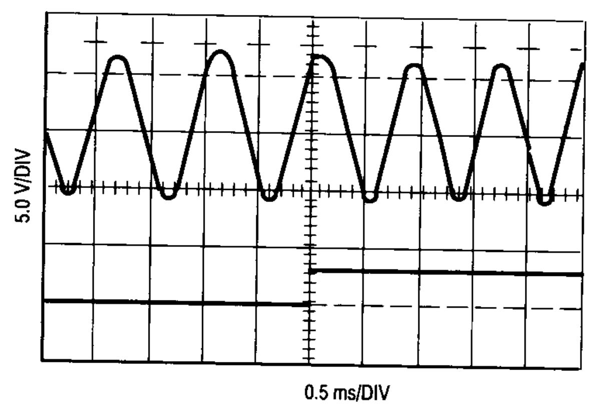


Figure 5. Open-Loop Voltage Gain versus Power-Supply Voltage

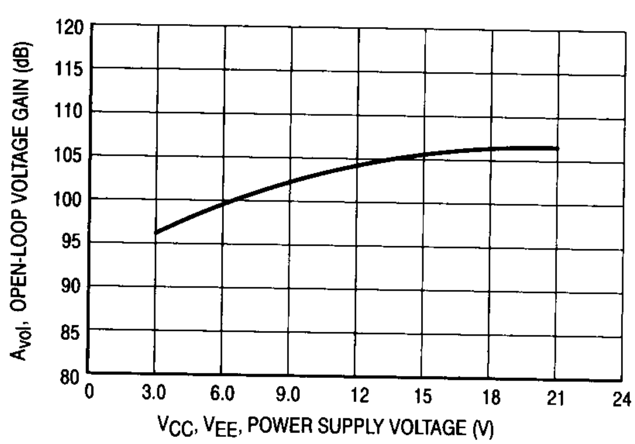


Figure 6. Open-Loop Frequency Response

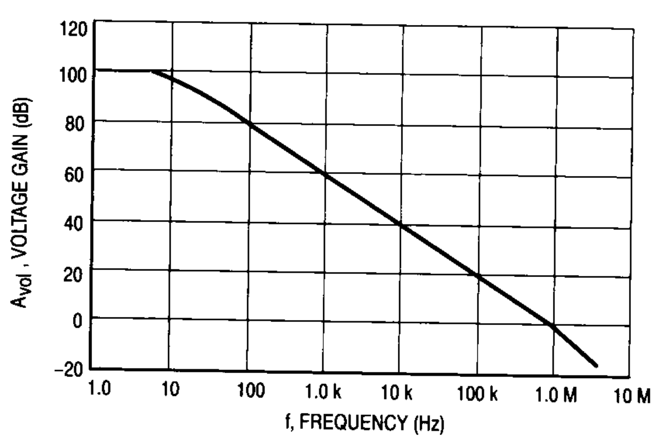


Figure 7. Power Bandwidth (Large Signal Swing versus Frequency)

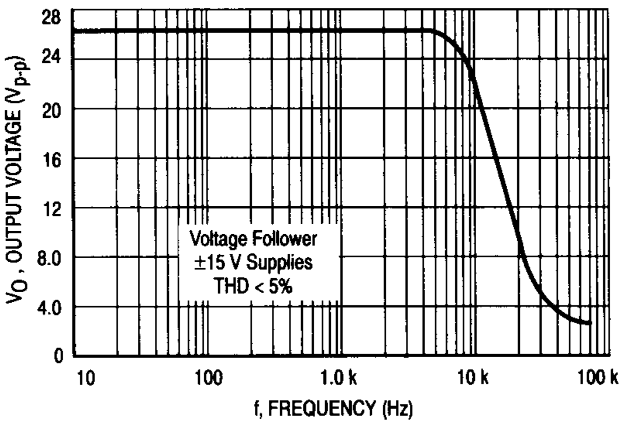


Figure 8. Power Consumption versus Power Supply Voltage

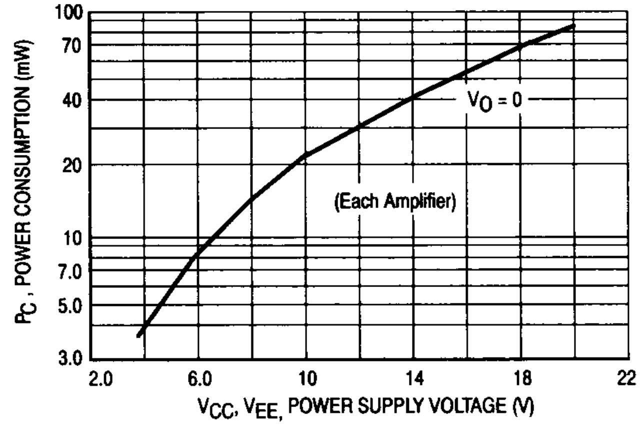


Figure 9. Output Voltage Swing versus Load Resistance

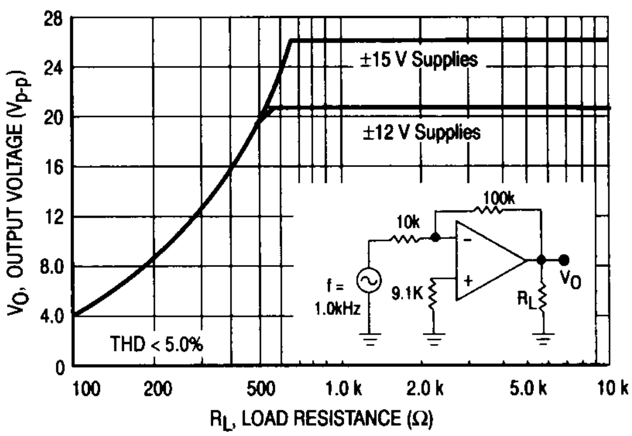


Figure 10. Output Noise versus Source Resistance