MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MC1741
MC1741C

2

OPERATIONAL AMPLIFIERS

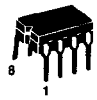
SILICON MONOLITHIC INTEGRATED CIRCUIT

Internally Compensated, High Performance Operational Amplifiers

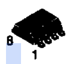
The MC1741 and MC1741C were designed for use as summing amplifiers, integrators, or amplifiers with operating characteristics as a function of the external feedback components.

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

P1 SUFFIX
PLASTIC PACKAGE
CASE 626



U SUFFIX
CERAMIC PACKAGE
CASE 693



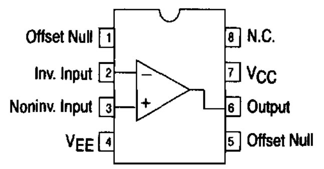
D SUFFIX
PLASTIC PACKAGE
CASE 751
(SO-8)

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

Rating	Symbol	MC1741C	MC1741	Unit
Power Supply Voltage	V_{CC}, V_{EE}	±18	±22	V_{dc}
Input Differential Voltage	V_{ID}	±30		V
Input Common Mode Voltage (Note 1)	V_{ICM}	±15		V
Output Short Circuit Duration (Note 2)	t_{SC}	Continuous		
Operating Ambient Temperature Range	T_A	0 to +70	–55 to +125	°C
Storage Temperature Range Ceramic Package Plastic Package	T_{stg}	 –65 to +150 –55 to +125		°C

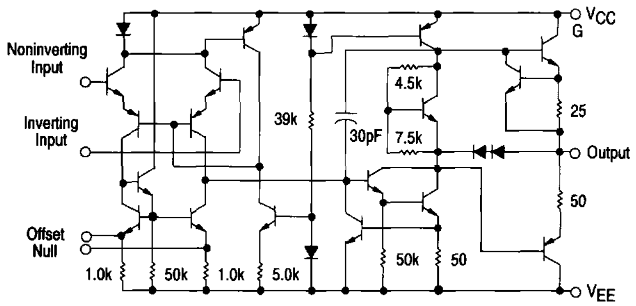
NOTES: 1. For supply voltages less than +15 V, the absolute maximum input voltage is equal to the supply voltage.
2. Supply voltage equal to or less than 15 V.

PIN CONNECTIONS



(Top View)

Equivalent Circuit Schematic
(1/4 of Circuit Shown)



ORDERING INFORMATION

Device	Alternate	Temperature Range	Package
MC1741CD	—	0° to +70°C	SO-8
MC1741CP1	LM741CN, µA741TC		Plastic DIP
MC1741CU	—		Ceramic DIP
MC1741U	—	–55° to +125°C	Ceramic DIP

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

Characteristics	Symbol	MC1741 Min	MC1741 Typ	MC1741 Max	MC1741C Min	MC1741C Typ	MC1741C Max	Unit
Input Offset Voltage (R_S ≤ 10 k)	V_{IO}	—	1.0	5.0	—	2.0	6.0	mV
Input Offset Current	I_{IO}	—	20	200	—	20	200	nA
Input Bias Current	I_{IB}	—	80	500	—	80	500	nA
Input Resistance	r_i	0.3	2.0	—	0.3	2.0	—	MΩ
Input Capacitance	C_i	—	1.4	—	—	1.4	—	pF
Offset Voltage Adjustment Range	V_{IOR}	—	±15	—	—	±15	—	mV
Common Mode Input Voltage Range	V_{ICR}	±12	±13	—	±12	±13	—	V
Large Signal Voltage Gain (V_O = ±10 V, R_L ≥ 2.0 k)	A_{VOL}	50	200	—	20	200	—	V/mV
Output Resistance	r_o	—	75	—	—	75	—	Ω
Common Mode Rejection (R_S ≤ 10 k)	CMR	70	90	—	70	90	—	dB
Supply Voltage Rejection (R_S ≤ 10 k)	PSR	75	—	—	75	—	—	dB
Output Voltage Swing (R_L ≥ 10 k) (R_L ≥ 2.0 k)	V_O	 ±12 ±10	 ±14 ±13	 — —	 ±12 ±10	 ±14 ±13	 — —	V
Output Short Circuit Current	I_{SC}	—	20	—	—	20	—	mA
Supply Current	I_D	—	1.7	2.8	—	1.7	2.8	mA
Power Consumption	P_C	—	50	85	—	50	85	mW
Transient Response (Unity Gain, Noninverting) (V_I = 20 mV, R_L ≥ 2.0 k, C_L ≤ 100 pF) Rise Time (V_I = 20 mV, R_L ≥ 2.0 k, C_L ≤ 100 pF) Overshoot (V_I = 10 V, R_L ≥ 2.0 k, C_L ≤ 100 pF) Slew Rate	 t_{TLH} os SR	 — — —	 0.3 15 0.5	 — — —	 — — —	 0.3 15 0.5	 — — —	 µs % V/µs

ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, T_A = T_{low} to T_{high}, unless otherwise noted.)*

Characteristics	Symbol	MC1741 Min	MC1741 Typ	MC1741 Max	MC1741C Min	MC1741C Typ	MC1741C Max	Unit
Input Offset Voltage (R_S ≤ 10 kΩ)	V_{IO}	—	1.0	6.0	—	—	7.5	mV
Input Offset Current (T_A = +125°C) (T_A = –55°C) (T_A = 0° to +70°C)	I_{IO}	 — — —	 7.0 85 —	 200 500 —	 — — —	 — — —	 — — 300	nA
Input Bias Current (T_A = +125°C) (T_A = –55°C) (T_A = 0° to +70°C)	I_{IB}	 — — —	 30 300 —	 500 1500 —	 — — —	 — — —	 — — 800	nA
Common Mode Input Voltage Range	V_{ICR}	±12	±13	—	—	—	—	V
Common Mode Rejection (R_S ≤ 10 k)	CMR	70	90	—	—	—	—	dB
Supply Voltage Rejection (R_S ≤ 10 k)	PSR	75	—	—	75	—	—	dB
Output Voltage Swing (R_L ≥ 10 k) (R_L ≥ 2.0 k)	V_O	 ±12 ±10	 ±14 ±13	 — —	 — ±10	 — ±13	 — —	V
Large Signal Voltage Gain (R_L ≥ 2.0 k, V_O = ±10 V)	A_{VOL}	25	—	—	15	—	—	V/mV
Supply Currents (T_A = +125°C) (T_A = –55°C)	I_D	 — —	 1.5 2.0	 2.5 3.3	 — —	 — —		mA
Power Consumption (T_A = +125°C) (T_A = –55°C)	P_C	— —	45 60	75 100	— —	— —	— —	mW

T_{high} = 125°C for MC1741
70°C for MC1741C

* T_{low} = –55°C for MC1741
0°C for MC1741C

Figure 1. Burst Noise versus Source Resistance

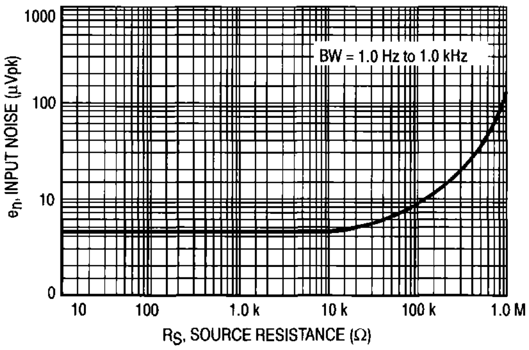


Figure 2. RMS Noise versus Source Resistance

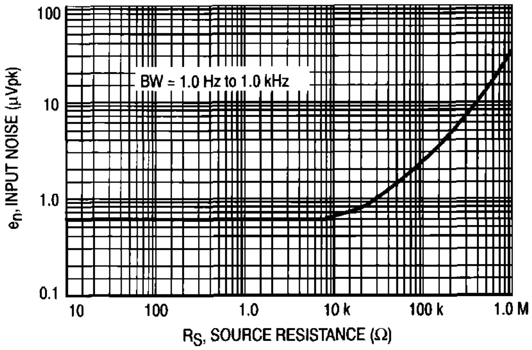


Figure 3. Output Noise versus Source Resistance

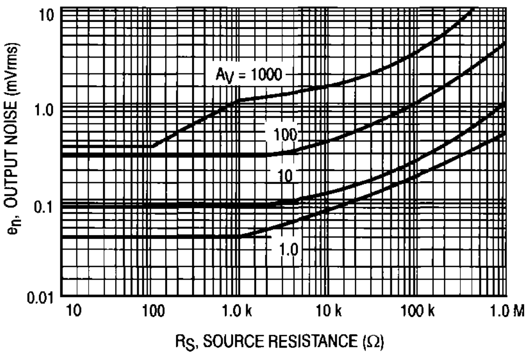


Figure 4. Spectral Noise Density

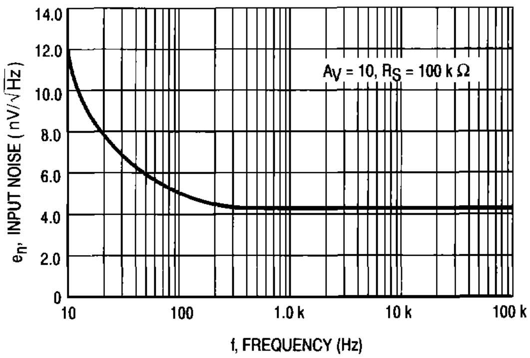
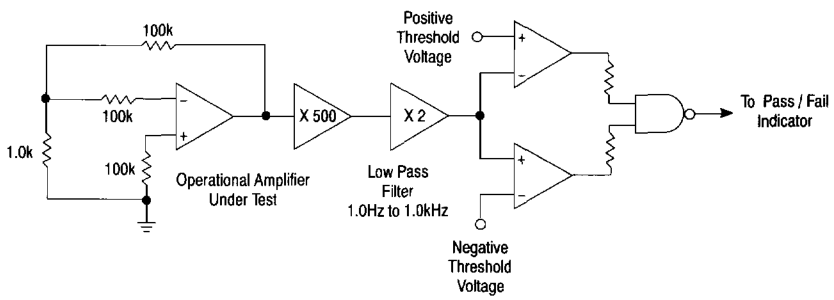


Figure 5. Burst Noise Test Circuit



Unlike conventional peak reading or RMS meters, this system was especially designed to provide the quick response time essential to burst (popcorn) noise testing.

The test time employed is 10 sec and the 20 mV peak limit refers to the operational amplifier input thus eliminating errors in the closed-loop gain factor of the operational amplifier.

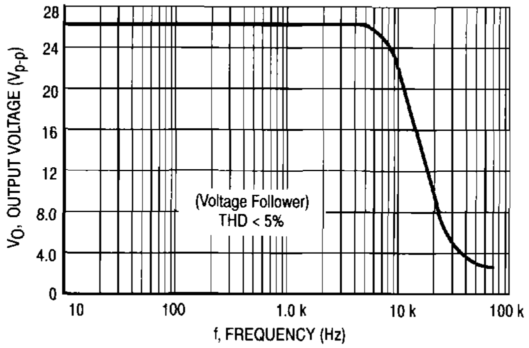


Figure 6. Power Bandwidth (Large Signal Swing versus Frequency)

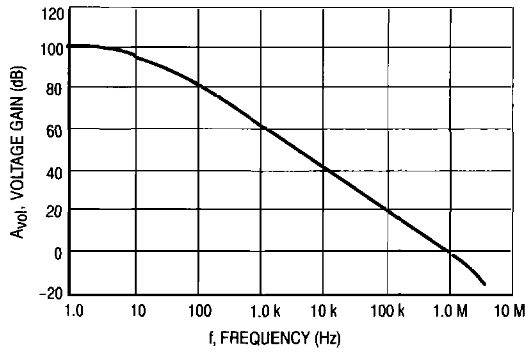


Figure 7. Open-Loop Freuqncy Response

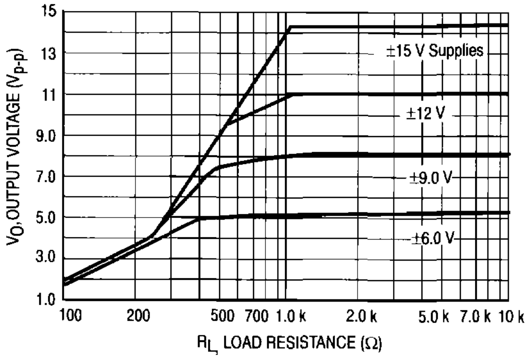


Figure 8. Positive Output Voltage Swing versus Load Resistance

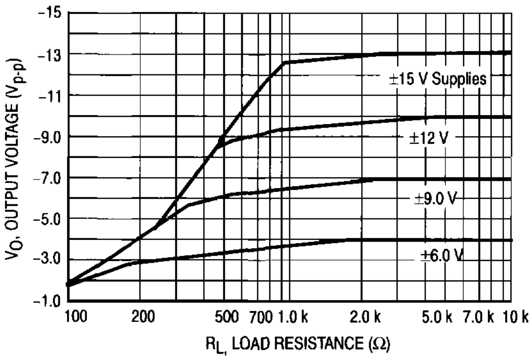


Figure 9. Negative Output Voltage Swing versus Load Resistance

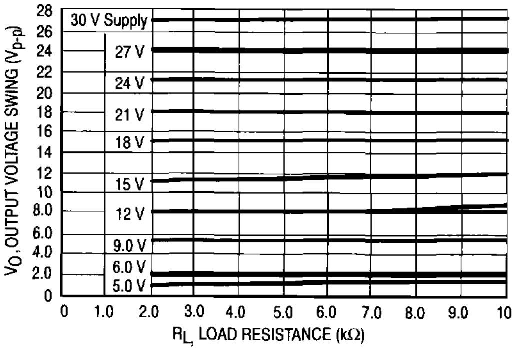


Figure 10. Output Voltage Swing versus Load Resistance (Single Supply Operation)

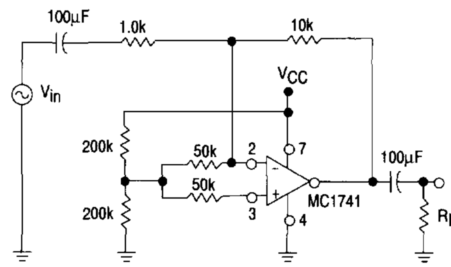


Figure 11. Single Supply Inverting Amplifier

Figure 12. Noninverting Pulse Response

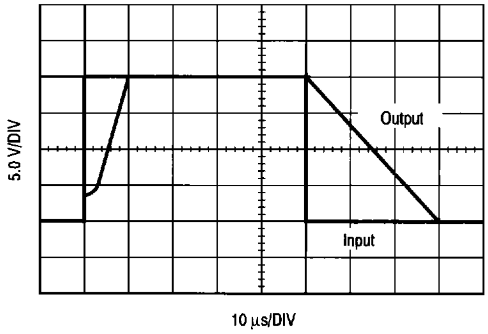


Figure 13. Transient Response Test Circuit

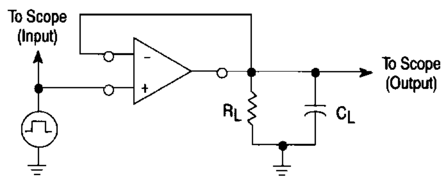


Figure 14. Open-Loop Voltage Gain versus Supply Voltage