



# MC1741C

## Internally Compensated, High Performance Operational Amplifier

The MC1741C was designed for use as a summing amplifier, integrator, or amplifier 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

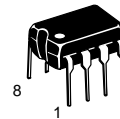
### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Power Supply Voltage	$V_{CC}, V_{EE}$	$\pm 18$	Vdc
Input Differential Voltage	$V_{ID}$	$\pm 30$	V
Input Common Mode Voltage (Note 1)	$V_{ICM}$	$\pm 15$	V
Output Short Circuit Duration (Note 2)	$t_{SC}$	Continuous	
Operating Ambient Temperature Range	$T_A$	0 to +70	°C
Storage Temperature Range	$T_{stg}$	-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.

### OPERATIONAL AMPLIFIER

### SEMICONDUCTOR TECHNICAL DATA

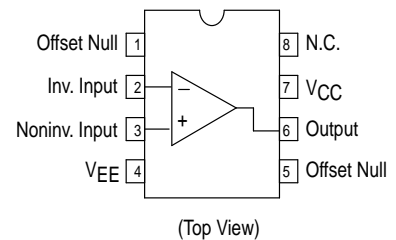


**P1 SUFFIX**  
PLASTIC PACKAGE  
CASE 626

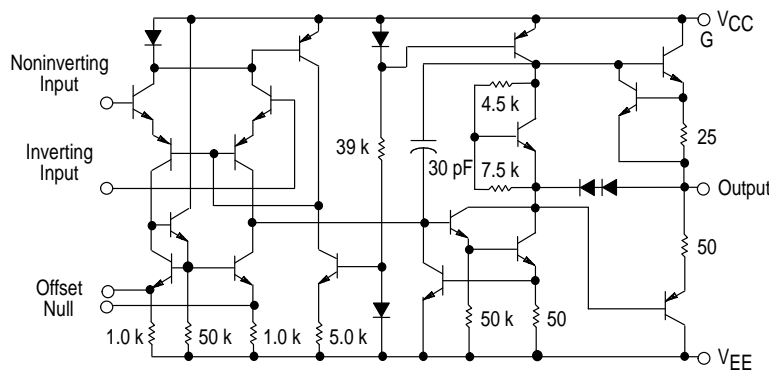


**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751  
(SO-8)

### PIN CONNECTIONS



### Equivalent Circuit Schematic (1/4 of Circuit Shown)



### ORDERING INFORMATION

Device	Alternate	Operating Temperature Range	Package
MC1741CD	-	$T_A = 0^\circ \text{ to } +70^\circ \text{C}$	SO-8
MC1741CP1	LM741CN $\mu$ A741TC		Plastic DIP

# MC1741C

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

Characteristic	Symbol	Min	Typ	Max	Unit
Input Offset Voltage ( $R_S \leq 10\text{ k}$ )	$V_{IO}$	–	2.0	6.0	mV
Input Offset Current	$I_{IO}$	–	20	200	nA
Input Bias Current	$I_{IB}$	–	80	500	nA
Input Resistance	$r_i$	0.3	2.0	–	$M\Omega$
Input Capacitance	$C_i$	–	1.4	–	pF
Offset Voltage Adjustment Range	$V_{IOR}$	–	$\pm 15$	–	mV
Common Mode Input Voltage Range	$V_{ICR}$	$\pm 12$	$\pm 13$	–	V
Large Signal Voltage Gain ( $V_O = \pm 10\text{ V}$ , $R_L \geq 2.0\text{ k}$ )	$A_{VOL}$	20	200	–	V/mV
Output Resistance	$r_o$	–	75	–	$\Omega$
Common Mode Rejection ( $R_S \leq 10\text{ k}$ )	CMR	70	90	–	dB
Supply Voltage Rejection ( $R_S \leq 10\text{ k}$ )	PSR	75	–	–	dB
Output Voltage Swing ( $R_L \geq 10\text{ k}$ ) ( $R_L \geq 2.0\text{ k}$ )	$V_O$	$\pm 12$ $\pm 10$	$\pm 14$ $\pm 13$	– –	V
Output Short Circuit Current	$I_{SC}$	–	20	–	mA
Supply Current	$I_D$	–	1.7	2.8	mA
Power Consumption	$P_C$	–	50	85	mW
Transient Response (Unity Gain, Noninverting) ( $V_I = 20\text{ mV}$ , $R_L \geq 2.0\text{ k}$ , $C_L \leq 100\text{ pF}$ ) Rise Time ( $V_I = 20\text{ mV}$ , $R_L \geq 2.0\text{ k}$ , $C_L \leq 100\text{ pF}$ ) Overshoot ( $V_I = 10\text{ V}$ , $R_L \geq 2.0\text{ k}$ , $C_L \leq 100\text{ pF}$ ) Slew Rate	$t_{LH}$ os SR	– – –	0.3 15 0.5	– – –	$\mu\text{s}$ % V/ $\mu\text{s}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
Input Offset Voltage ( $R_S \leq 10\text{ k}\Omega$ )	$V_{IO}$	–	–	7.5	mV
Input Offset Current ( $T_A = 0^\circ$ to $+70^\circ\text{C}$ )	$I_{IO}$	–	–	300	nA
Input Bias Current ( $T_A = 0^\circ$ to $+70^\circ\text{C}$ )	$I_{IB}$	–	–	800	nA
Supply Voltage Rejection ( $R_S \leq 10\text{ k}$ )	PSR	75	–	–	dB
Output Voltage Swing ( $R_L \geq 2.0\text{ k}$ )	$V_O$	$\pm 10$	$\pm 13$	–	V
Large Signal Voltage Gain ( $R_L \geq 2.0\text{ k}$ , $V_O = \pm 10\text{ V}$ )	$A_{VOL}$	15	–	–	V/mV

\*  $T_{low} = 0^\circ\text{C}$      $T_{high} = 70^\circ\text{C}$

Figure 1. Burst Noise versus Source Resistance

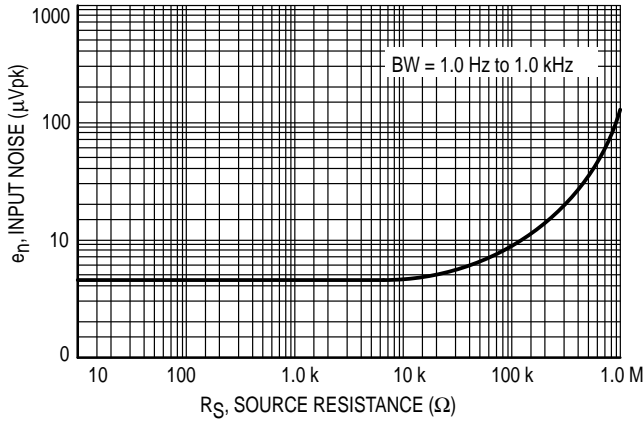


Figure 2. RMS Noise versus Source Resistance

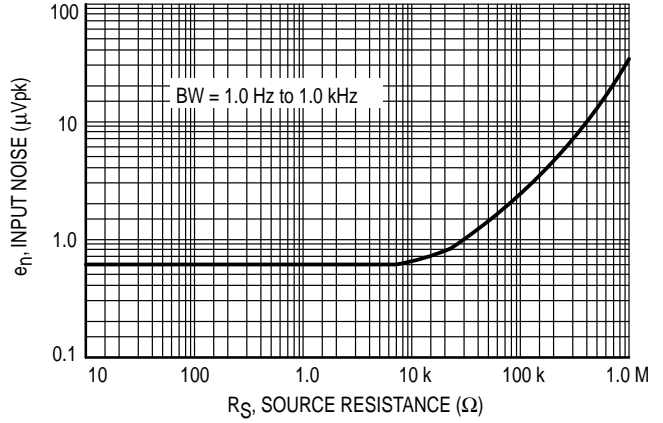


Figure 3. Output Noise versus Source Resistance

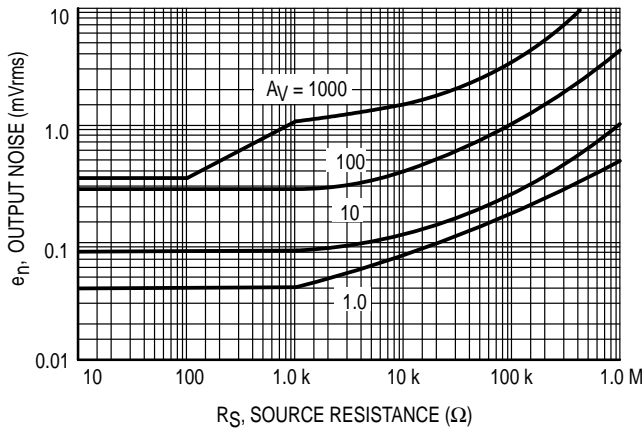


Figure 4. Spectral Noise Density

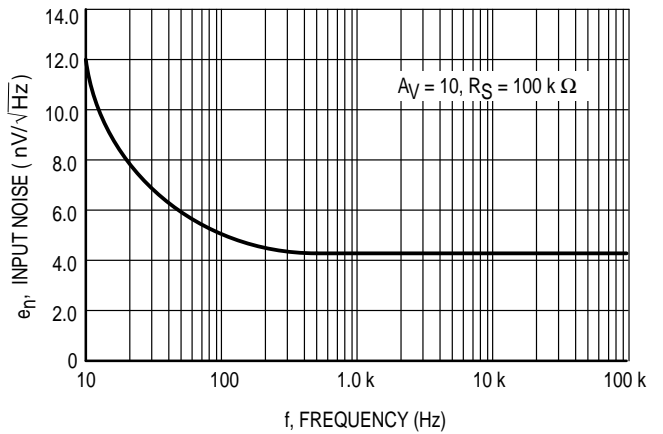
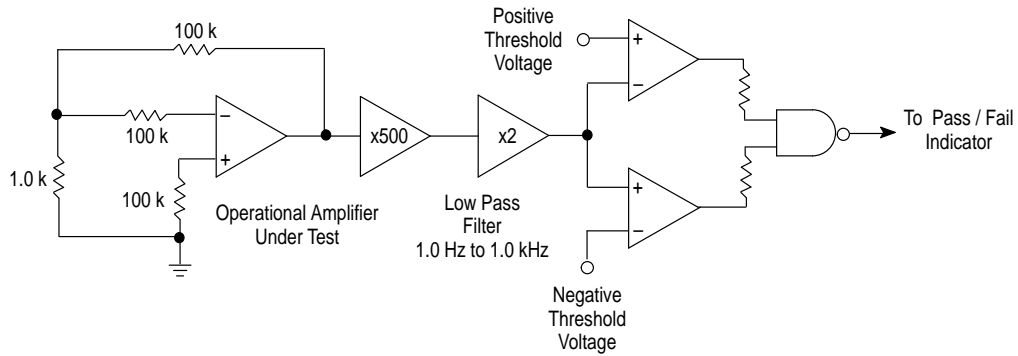


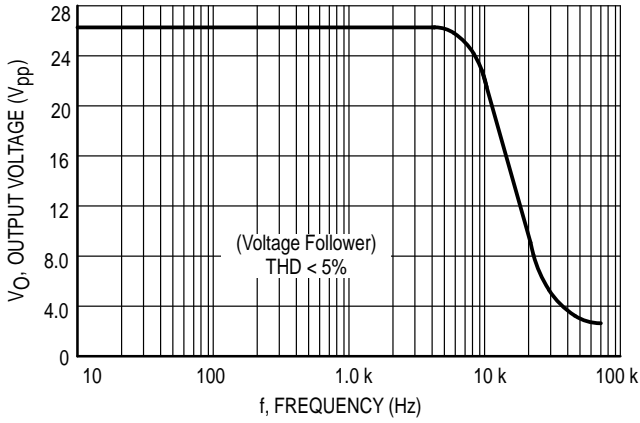
Figure 5. Burst Noise Test Circuit



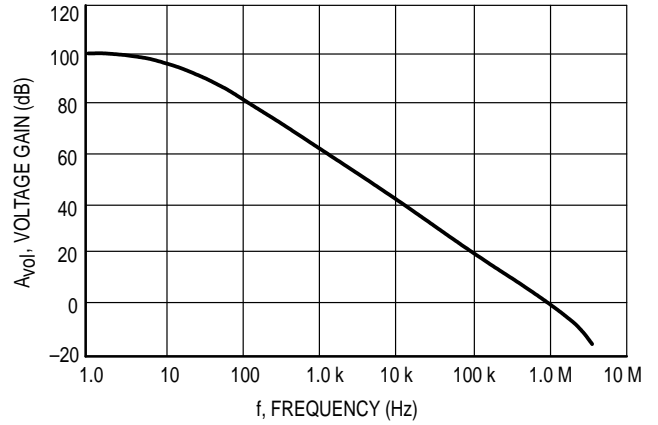
Unlike conventional peak reading or RMS meters, this system was especially designed to provide the quick response time essential to burst (popcorn) noise testing.

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.

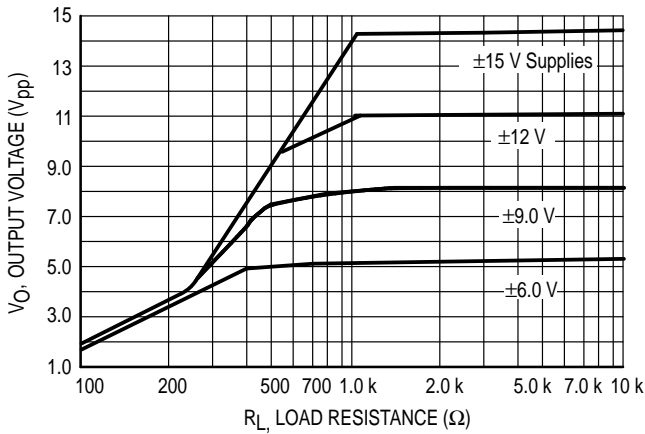
**Figure 6. Power Bandwidth  
(Large Signal Swing versus Frequency)**



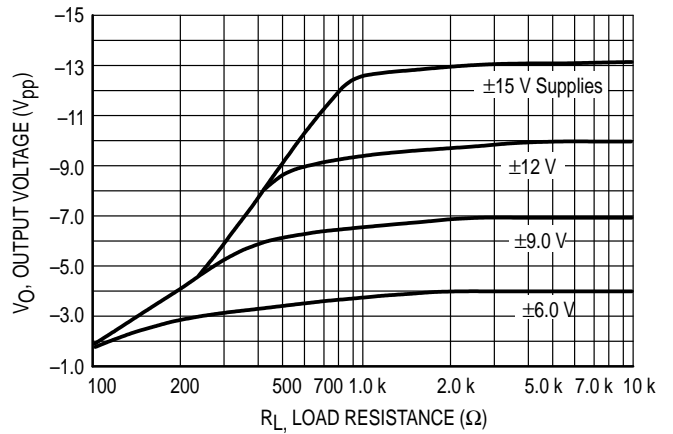
**Figure 7. Open Loop Frequency Response**



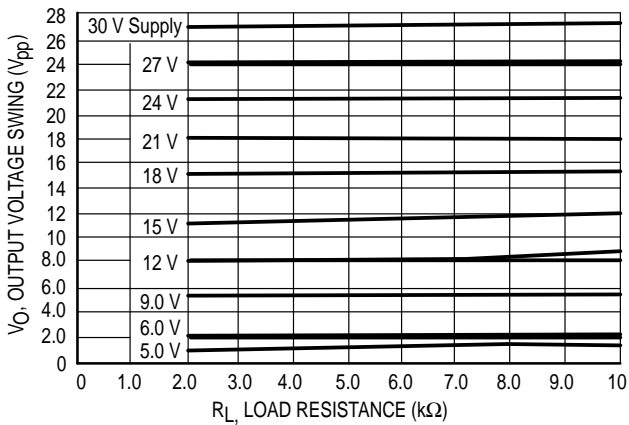
**Figure 8. Positive Output Voltage Swing  
versus Load Resistance**



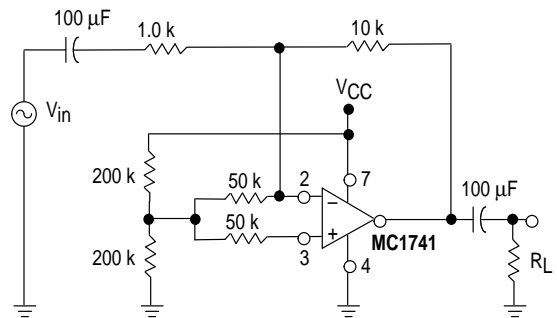
**Figure 9. Negative Output Voltage Swing  
versus Load Resistance**



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

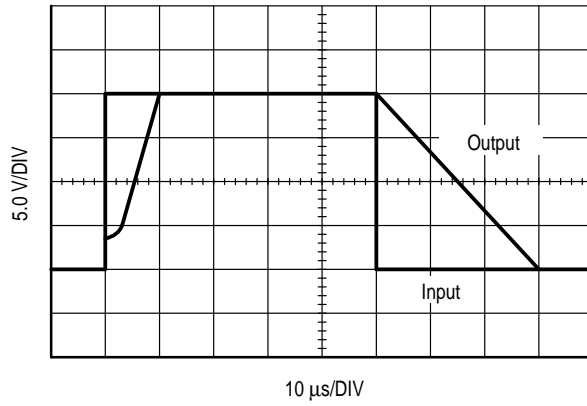


**Figure 11. Single Supply Inverting Amplifier**

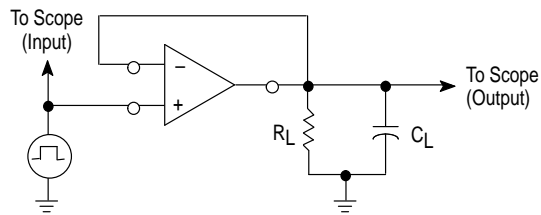


# MC1741C

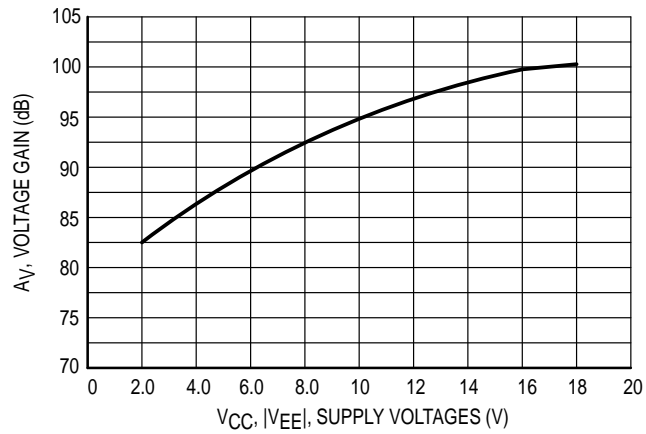
## Figure 12. Noninverting Pulse Response




## Figure 13. Transient Response Test Circuit



## Figure 14. Open Loop Voltage Gain versus Supply Voltage





Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

# MC1741C

**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447 or 602-303-5454

**MFAX:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
**INTERNET:** <http://Design-NET.com>

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-81-3521-8315

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



**MOTOROLA**



MC1741C/D

