Semiconductors - ICs

LM741 – Single Operational Amplifier

Order Code	Manufacturers Code
82-0458	LM741

Rapid Electronics Ltd, *Severalls Lane, Colchester, Essex, England, CO4 5JS*
Telephone 01206 751166 *Fax 01206 751188* *e-mail sales@rapidelec.co.uk*

LM741

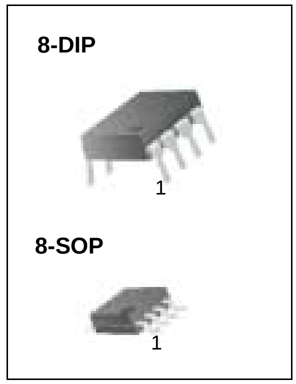
Single Operational Amplifier

Features

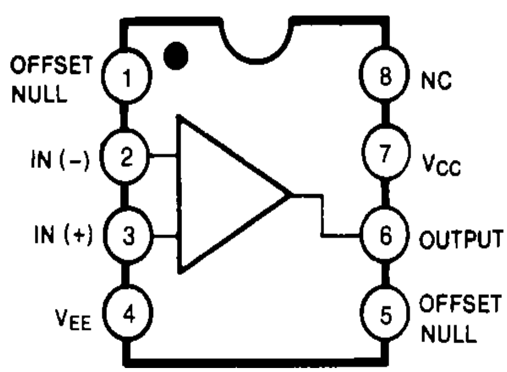
- Short circuit protection
- Excellent temperature stability
- Internal frequency compensation
- High Input voltage range
- Null of offset

Description

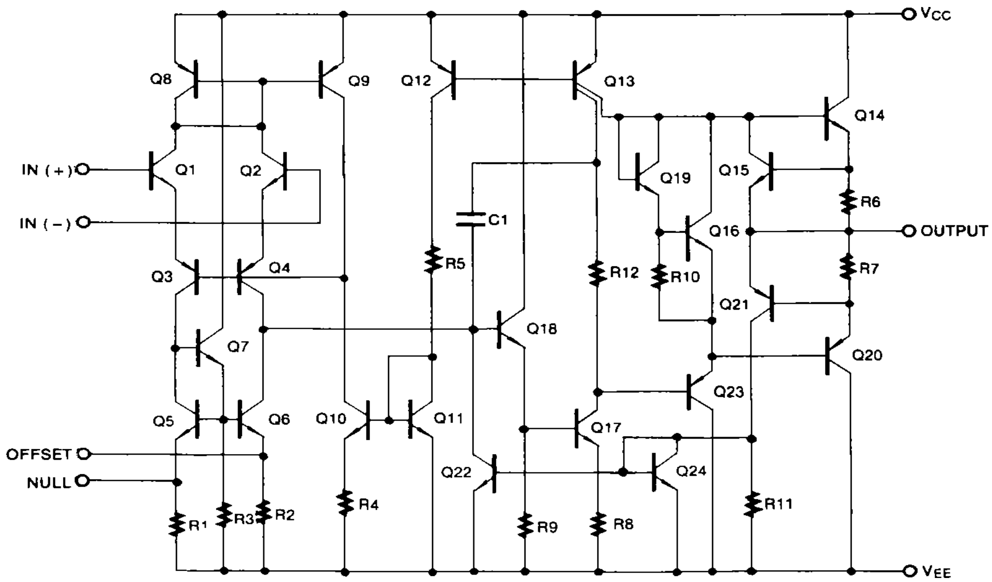
The LM741 series are general purpose operational amplifiers. It is intended for a wide range of analog applications. The high gain and wide range of operating voltage provide superior performance in intergrator, summing amplifier, and general feedback applications.



Internal Block Diagram



Schematic Diagram



Absolute Maximum Ratings (T_A = 25°C)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	±18	V
Differential Input Voltage	$V_{I(DIFF)}$	30	V
Input Voltage	V_I	±15	V
Output Short Circuit Duration	-	Indefinite	-
Power Dissipation	P_D	500	mW
Operating Temperature Range LM741C LM741I	T_{OPR}	 0 ~ + 70 -40 ~ +85	°C
Storage Temperature Range	T_{STG}	-65 ~ + 150	°C

Electrical Characteristics

(V_{CC} = 15V, V_{EE} = - 15V. T_A = 25 °C, unless otherwise specified)

Parameter		Symbol	Conditions		LM741C/LM741I Min.	Typ.	Max.	Unit
Input Offset Voltage		V_{IO}	R_S≤10KΩ		-	2.0	6.0	mV
			R_S≤50Ω		-	-	-	
Input Offset Voltage Adjustment Range		$V_{IO(R)}$	V_{CC} = ±20V		-	±15	-	mV
Input Offset Current		I_{IO}	-		-	20	200	nA
Input Bias Current		I_{BIAS}	-		-	80	500	nA
Input Resistance (Note1)		R_I	V_{CC} =±20V		0.3	2.0	-	MΩ
Input Voltage Range		$V_{I(R)}$	-		±12	±13	-	V
Large Signal Voltage Gain		G_V	R_L≥2KΩ	V_{CC} =±20V, $V_{O(P-P)}$ =±15V	-	-	-	V/mV
				V_{CC} =±15V, $V_{O(P-P)}$ =±10V	20	200	-	
Output Short Circuit Current		I_{SC}	-		-	25	-	mA
Output Voltage Swing		$V_{O(P-P)}$	V_{CC} = ±20V	R_L≥10KΩ	-	-	-	V
				R_L≥2KΩ	-	-	-	
			V_{CC} = ±15V	R_L≥10KΩ	±12	±14	-	
				R_L≥2KΩ	±10	±13	-	
Common Mode Rejection Ratio		CMRR	R_S≤10KΩ, V_{CM} = ±12V		70	90	-	dB
			R_S≤50Ω, V_{CM} = ±12V		-	-	-	
Power Supply Rejection Ratio		PSRR	V_{CC} = ±15V to V_{CC} = ±15V R_S≤50Ω		-	-	-	dB
			V_{CC} = ±15V to V_{CC} = ±15V R_S≤10KΩ		77	96	-	
Transient Response	Rise Time	T_R	Unity Gain		-	0.3	-	μs
	Overshoot	OS			-	10	-	%
Bandwidth		BW	-		-	-	-	MHz
Slew Rate		SR	Unity Gain		-	0.5	-	V/μs
Supply Current		I_{CC}	R_L= ∞Ω		-	1.5	2.8	mA
Power Consumption		P_C	V_{CC} = ±20V		-	-	-	mW
			V_{CC} = ±15V		-	50	85	

Note:
1. Guaranteed by design.

Electrical Characteristics

(0°C ≤T_A≤70 °C V_{CC} = ±15V, unless otherwise specified)
The following specification apply over the range of 0°C ≤ T_A ≤ +70 °C for the LM741C; and the -40°C ≤ T_A ≤ +85 °C for the LM741I

Parameter	Symbol	Conditions		LM741C/LM741I Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{IO}	R_S≤50Ω		-	-	-	mV
		R_S≤10KΩ		-	-	7.5	
Input Offset Voltage Drift	$\Delta V_{IO}/\Delta T$	-		-	-		µV/ °C
Input Offset Current	I_{IO}	-		-	-	300	nA
Input Offset Current Drift	$\Delta I_{IO}/\Delta T$	-		-	-		nA/ °C
Input Bias Current	I_{BIAS}	-		-	-	0.8	µA
Input Resistance (Note1)	R_I	V_{CC} = ±20V		-	-	-	MΩ
Input Voltage Range	$V_{I(R)}$	-		±12	±13	-	V
Output Voltage Swing	$V_{O(P-P)}$	V_{CC} =±20V	R_S≥10KΩ	-	-	-	V
			R_S≥2KΩ	-	-	-	
		V_{CC} =±15V	R_S≥10KΩ	±12	±14	-	
			R_S≥2KΩ	±10	±13	-	
Output Short Circuit Current	I_{SC}	-		10	-	40	mA
Common Mode Rejection Ratio	CMRR	R_S≤10KΩ, V_{CM} = ±12V		70	90	-	dB
		R_S≤50Ω, V_{CM} = ±12V		-	-	-	
Power Supply Rejection Ratio	PSRR	V_{CC} = ±20V to ±5V	R_S≤50Ω	-	-	-	dB
			R_S≤10KΩ	77	96	-	
Large Signal Voltage Gain	G_V	R_S≥2KΩ	V_{CC} = ±20V, $V_{O(P-P)}$ = ±15V	-	-	-	V/mV
			V_{CC} = ±15V, $V_{O(P.P)}$ = ±10V	15	-	-	
			V_{CC} = ±15V, $V_{O(P-P)}$ = ±2V	-	-	-	

Note :
1. Guaranteed by design.

Typical Performance Characteristics

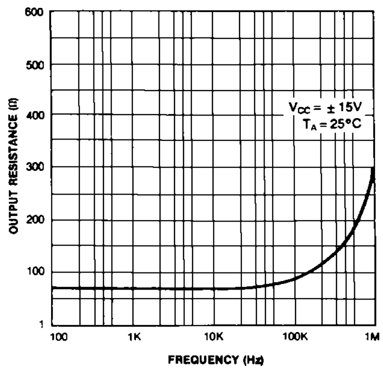


Figure 1. Output Resistance vs Frequency

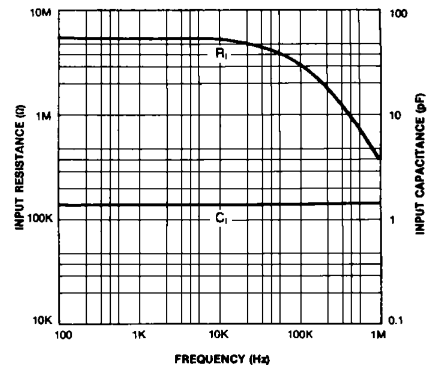


Figure 2. Input Resistance and Input Capacitance vs Frequency

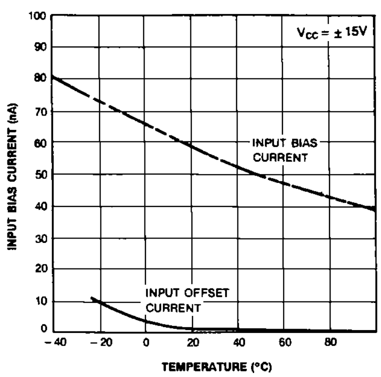


Figure 3. Input Bias Current vs Ambient Temperature

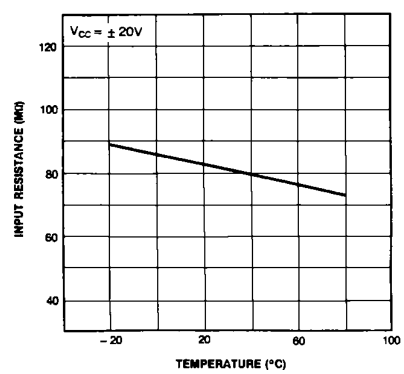


Figure 4. Power Consumption vs Ambient Temperature

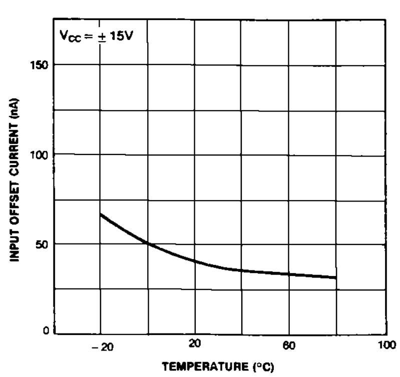


Figure 5. Input Offset Current vs Ambient Temperature

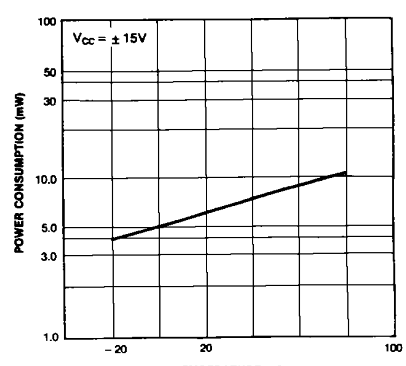


Figure 6. Input Resistance vs Ambient Temperature

Typical Performance Characteristics (continued)

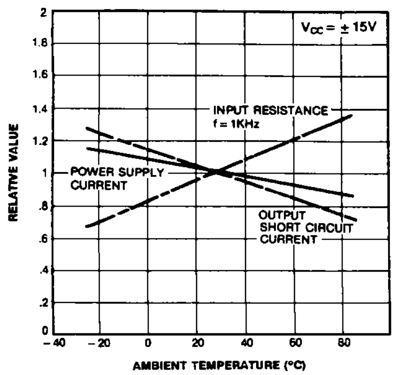


Figure 7. Normalized DC Parameters vs Ambient Temperature

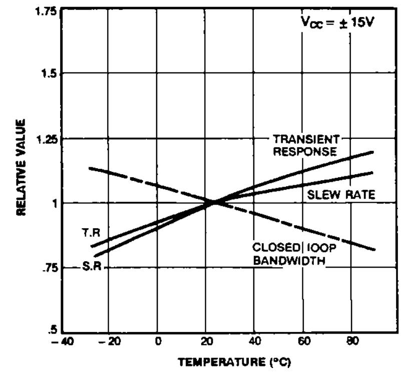


Figure 8. Frequency Characteristics vs Ambient Temperature

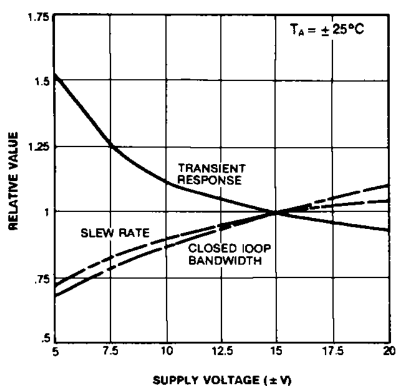


Figure 9. Frequency Characteristics vs Supply Voltage

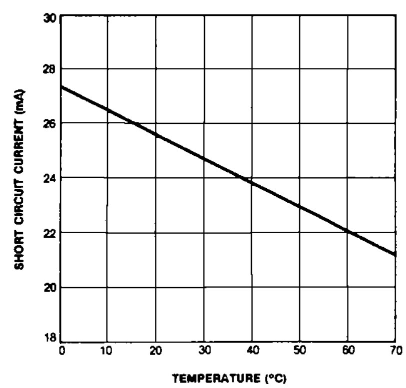


Figure 10. Output Short Circuit Current vs Ambient Temperature

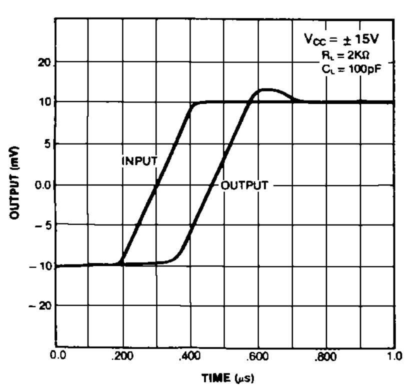


Figure 11. Transient Response

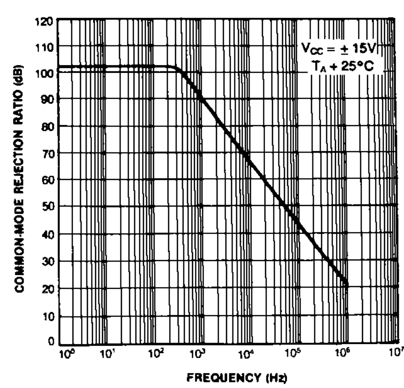


Figure 12. Common-Mode Rejection Ratio vs Frequency

Typical Performance Characteristics (continued)

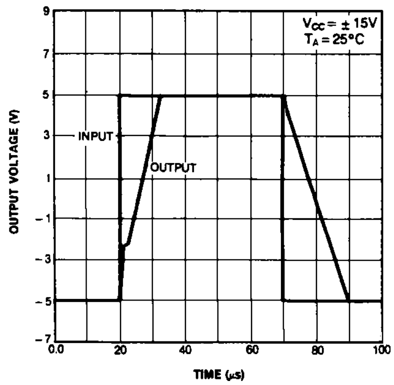


Figure 13. Voltage Follower Large Signal Pulse Response

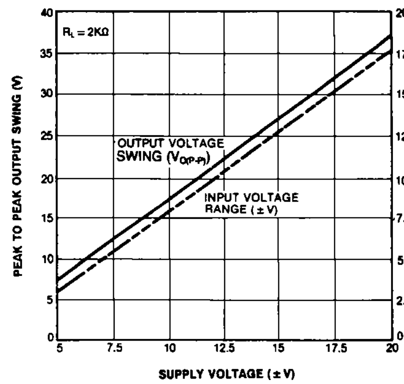
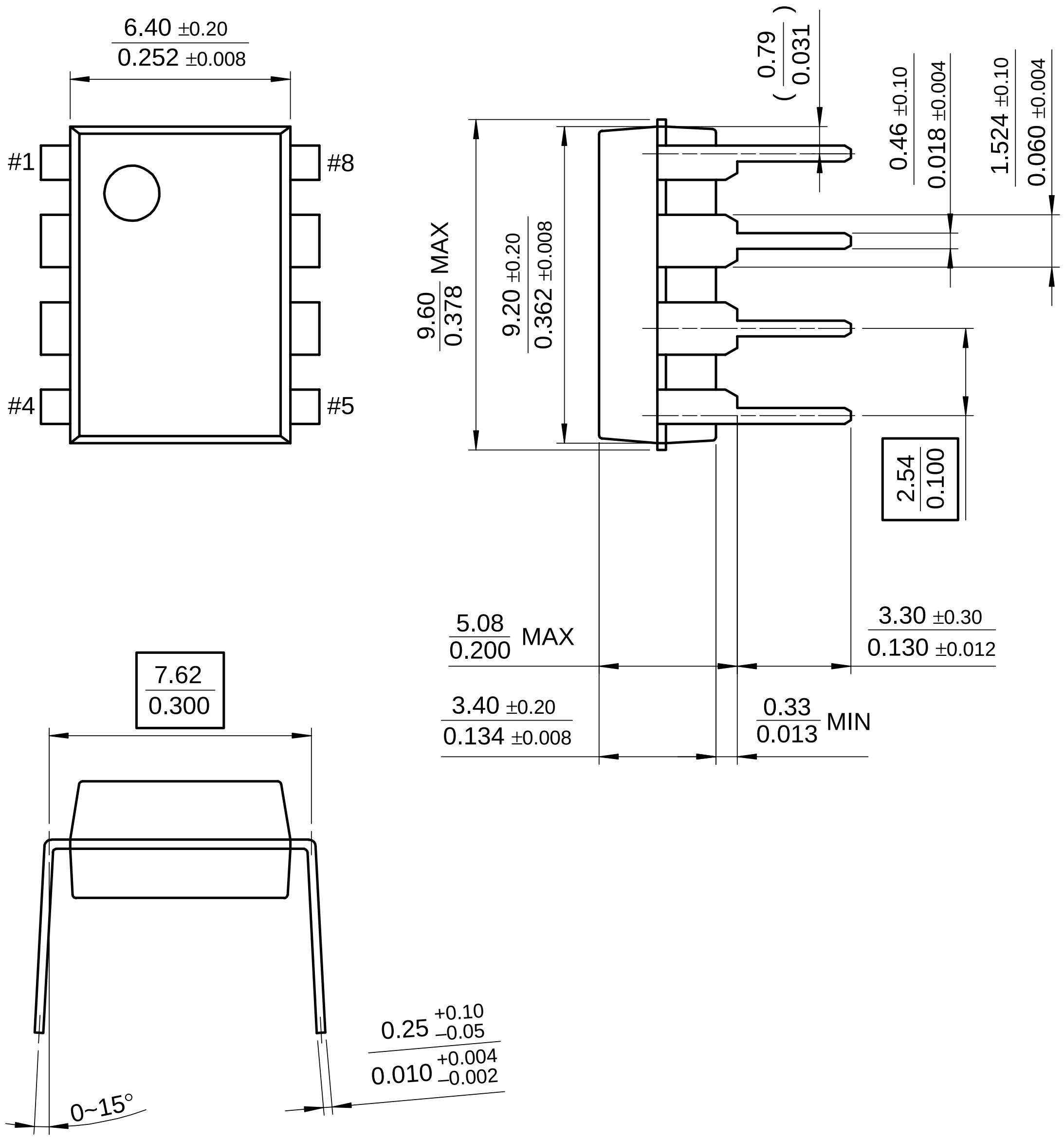


Figure 14. Output Swing and Input Range vs Supply Voltage

Mechanical Dimensions

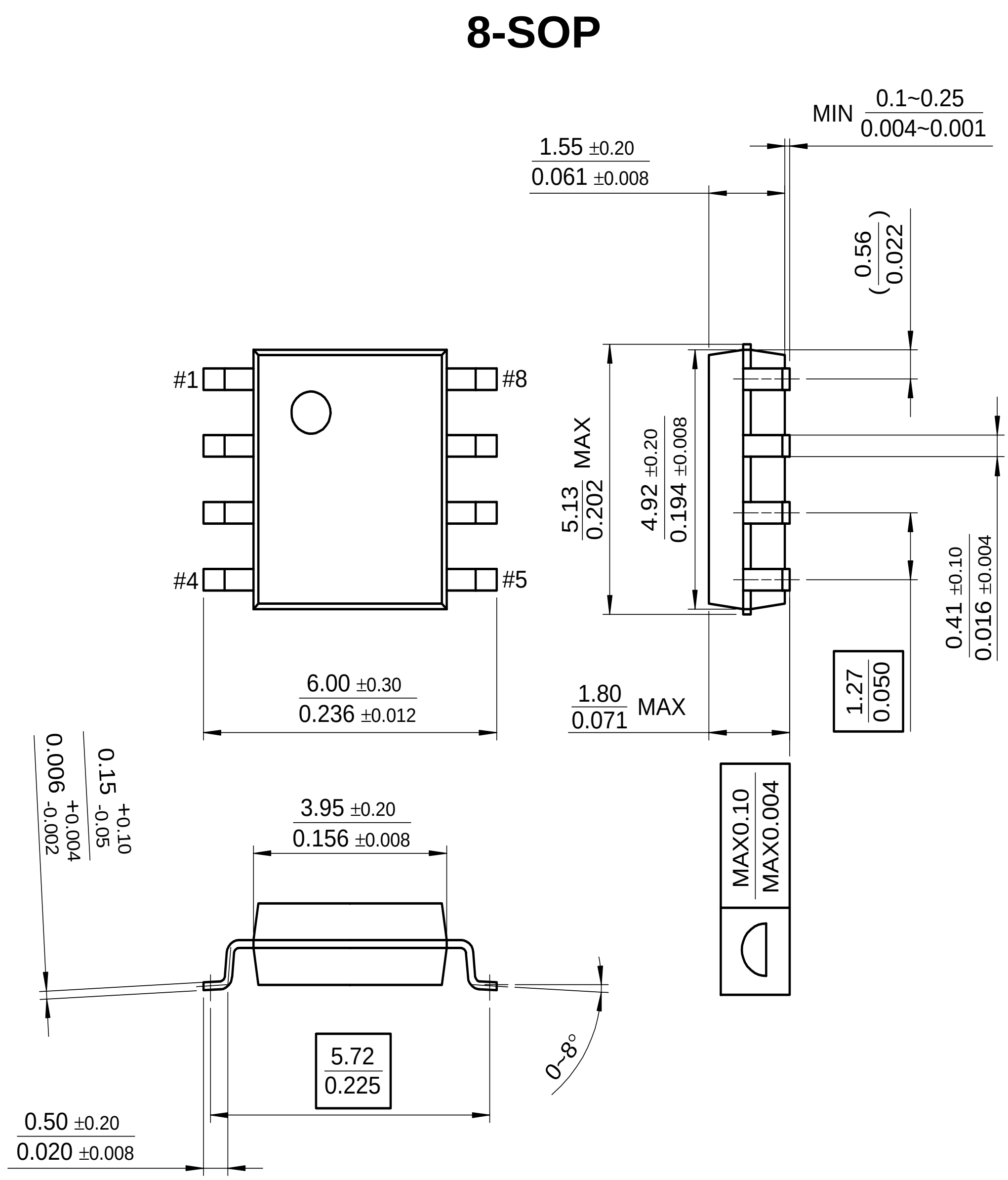
Package

8-DIP



Mechanical Dimensions (Continued)

Package



Ordering Information

Product Number	Package	Operating Temperature
LM741CN	8-DIP	0 ~ + 70°C
LM741CM	8-SOP	
LM741IN	8-DIP	-40 ~ + 85°C

6/1/01 0.0m 001
Stock#DSxxxxxxxx