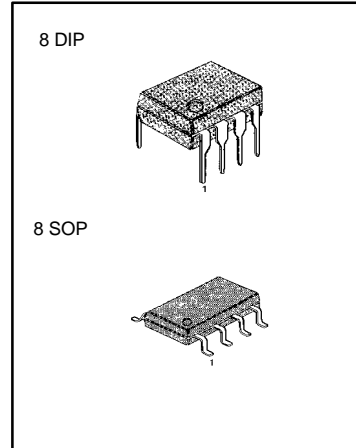


**SINGLE OPERATIONAL AMPLIFIERS**

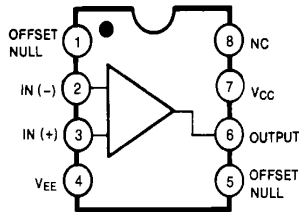
The LM741 series are general purpose operational amplifiers which feature improved performance over industry standards like the LM709. It is intended for a wide range of analog applications. The high gain and wide range of operating voltage provide superior performance in integrator, summing amplifier, and general feedback applications.

**FEATURES**

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



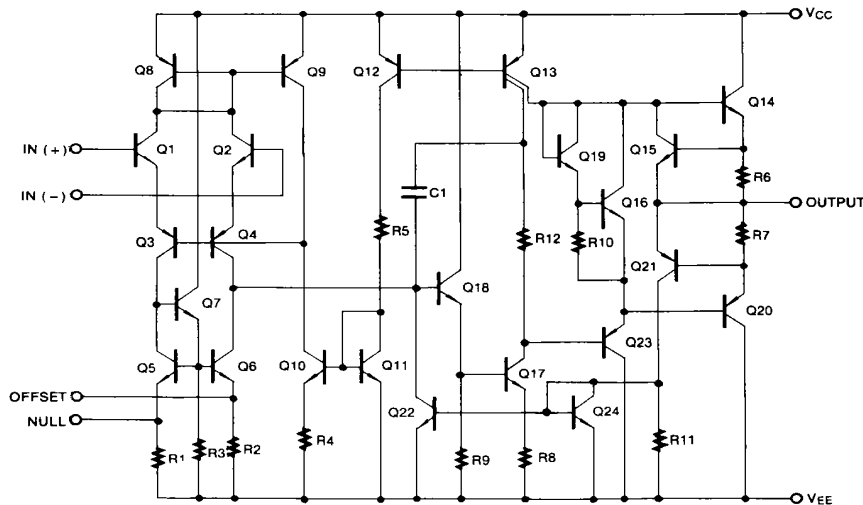
**BLOCK DIAGRAM**



**ORDERING INFORMATION**

Device	Package	Operating Temperature
LM741N LM741EN	8 DIP	0 ~ +70°C
LM741M LM741EM	8 SOP	
LM741IN LM741EIN	8 DIP	-40 ~ +85 °C
LM741IM LM741EIM	8 SOP	

**SCHEMATIC DIAGRAM**



ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

Characteristic	Symbol	LM741	LM741E	LM741I	Unit
Supply Voltage	$V_{CC}$	$\pm 18$	$\pm 22$	$\pm 18$	V
Differential Input Voltage	$V_{I(DIFF)}$	30	30	30	V
Input Voltage	$V_I$	$\pm 15$	$\pm 15$	$\pm 15$	V
Output Short Circuit Duration		Indefinite	Indefinite	Indefinite	
Power Dissipation	$P_D$	500	500	500	mW
Operating Temperature Range	$T_{OPR}$	0 ~ + 70	0 ~ + 70	-40 ~ + 85	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-65 ~ + 150	-65 ~ + 150	-65 ~ + 150	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	Test Conditions	LM741E			LM741/LM741I			Unit
			Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$V_{IO}$	$R_S \leq 10\text{K}\Omega$					2.0	6.0	mV
		$R_S \leq 50\Omega$		0.8	3.0				
Input Offset Voltage Adjustment Range	$V_{IO(R)}$	$V_{CC} = \pm 20\text{V}$	$\pm 10$				$\pm 15$		mV
Input Offset Current	$I_{IO}$			3.0	30		20	200	nA
Input Bias Current	$I_{BIAS}$			30	80		80	500	nA
Input Resistance	$R_I$	$V_{CC} = \pm 20\text{V}$	1.0	6.0		0.3	2.0		M $\Omega$
Input Voltage Range	$V_{I(R)}$		$\pm 12$	$\pm 13$		$\pm 12$	$\pm 13$		V
Large Signal Voltage Gain	$G_V$	$R_L \geq 2\text{K}\Omega$	$V_{CC} = \pm 20\text{V}$ , $V_{O(P,P)} = \pm 15\text{V}$	50					V/mV
			$V_{CC} = \pm 15\text{V}$ , $V_{O(P,P)} = \pm 10\text{V}$				20	200	
Output Short Circuit Current	$I_{SC}$		10	25	35		25		mA
Output Voltage Swing	$V_{O(P,P)}$	$V_{CC} = \pm 20\text{V}$	$R_L \geq 10\text{K}\Omega$	$\pm 16$					V
			$R_L \geq 10\text{K}\Omega$	$\pm 15$					
		$V_{CC} = \pm 15\text{V}$	$R_L \geq 10\text{K}\Omega$				$\pm 12$	$\pm 14$	
			$R_L \geq 10\text{K}\Omega$				$\pm 10$	$\pm 13$	
Common Mode Rejection Ratio	CMRR	$R_S \leq 10\text{K}\Omega$ , $V_{CM} = \pm 12\text{V}$				70	90	dB	
		$R_S \leq 50\text{K}\Omega$ , $V_{CM} = \pm 12\text{V}$	80	95					
Power Supply Rejection Ratio	PSRR	$V_{CC} = \pm 15\text{V}$ to $V_{CC} = \pm 15\text{V}$ $R_S \leq 50\Omega$	86	96				dB	
		$V_{CC} = \pm 15\text{V}$ to $V_{CC} = \pm 15\text{V}$ $R_S \leq 10\text{K}\Omega$				77	96		

## ELECTRICAL CHARACTERISTICS (Continued)

Characteristic	Symbol	Test Conditions	LM741E			LM741/LM741I			Unit
			Min	Typ	Max	Min	Typ	Max	
Transient Response	Rise Time	$t_R$	Unity Gain						$\mu s$
	Overshoot	OS		0.25	0.8		0.3		%
Bandwidth	BW		0.43	1.5				MHz	
Slew Rate	SR	Unity Gain	0.3	0.7		0.5		V/ $\mu s$	
Supply Current	$I_{CC}$	$R_L = \infty \Omega$				1.5	2.8	mA	
Power Consumption	$P_C$	$V_{CC} = \pm 20V$		80	150			mW	
		$V_{CC} = \pm 15V$				50	85		

## ELECTRICAL CHARACTERISTICS

( $-40^\circ C \leq T_A \leq 85^\circ C$  for the KA741I  $^\circ C \leq T_A \leq 70^\circ C$  for the LM741 and LM741E.  $V_{CC} = \pm 15V$ , unless otherwise specified)

Characteristic	Symbol	Test Conditions	LM741E			LM741/LM741I			Unit
			Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	$V_{IO}$	$R_S \leq 50\Omega$			4.0				mV
		$R_S \leq 10K\Omega$					7.5		
Input Offset Voltage Drift	$\Delta V_{IO}/\Delta T$			15				$\mu V/^\circ C$	
Input Offset Current	$I_{IO}$				70		300	nA	
Input Offset Current Drift	$\Delta I_{IO}/\Delta T$				0.5			nA/ $^\circ C$	
Input Bias Current	$I_{BIAS}$				0.21		0.8	$\mu A$	
Input Resistance	$R_I$	$V_{CC} = \pm 20V$	0.5					M $\Omega$	
Input Voltage Range	$V_{I(R)}$		$\pm 12$	$\pm 13$		$\pm 12$	$\pm 13$	V	
Output Voltage Swing	$V_{O(P,P)}$	$V_{CC} = \pm 20V$	$R_S \geq 10K\Omega$	$\pm 16$					V
			$R_S \geq 2K\Omega$	$\pm 15$					
		$V_{CC} = \pm 15V$	$R_S \geq 10K\Omega$			$\pm 12$	$\pm 14$		
			$R_S \geq 2K\Omega$			$\pm 10$	$\pm 13$		
Output Short Circuit Current	$I_{SC}$		10	40	10	40	mA		
Common Mode Rejection Ratio	CMRR	$R_S \leq 10K\Omega, V_{CM} = \pm 12V$				70	90	dB	
		$R_S \leq 50K\Omega, V_{CM} = \pm 12V$	80	95					
Power Supply Rejection Ratio	PSRR	$V_{CC} = \pm 20V$ to $\pm 5V$	$R_S \leq 50\Omega$	86	96			dB	
			$R_S \leq 10K\Omega$			77	96		
Large Signal Voltage Gain	$G_V$	$R_S \geq 2K\Omega$	$V_{CC} = \pm 20V,$ $V_{O(P,P)} = \pm 15V$	32				V/mV	
			$V_{CC} = \pm 15V,$ $V_{O(P,P)} = \pm 10V$			15			
			$V_{CC} = \pm 15V,$ $V_{O(P,P)} = \pm 2V$	10					

TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 7 OUTPUT RESISTANCE vs FREQUENCY

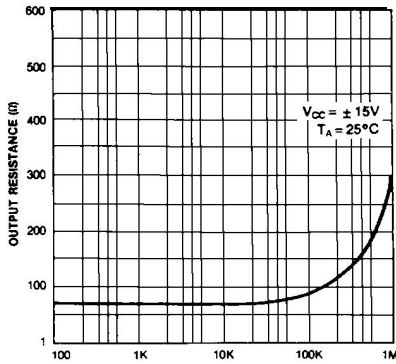


Fig. 8 INPUT RESISTANCE AND INPUT CAPACITANCE vs FREQUENCY

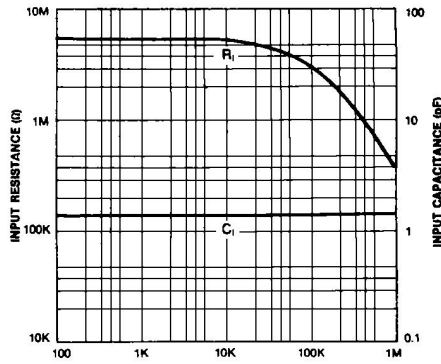


Fig. 9 INPUT BIAS CURRENT vs AMBIENT TEMPERATURE

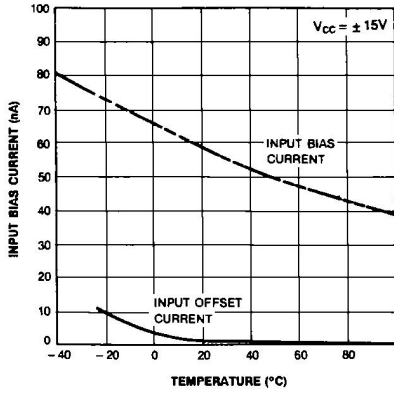


Fig. 10 POWER CONSUMPTION vs AMBIENT TEMPERATURE

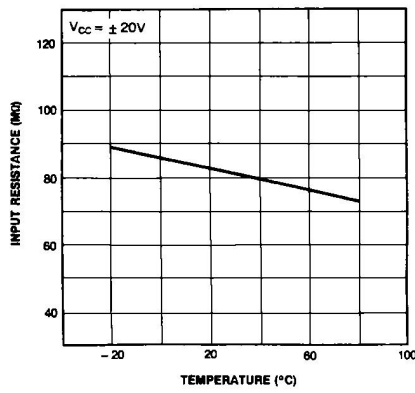


Fig. 11 INPUT OFFSET CURRENT vs AMBIENT TEMPERATURE

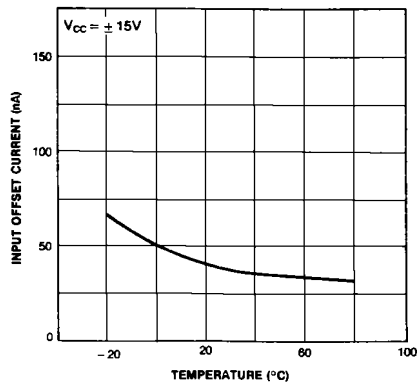


Fig. 12 INPUT RESISTANCE vs AMBIENT TEMPERATURE

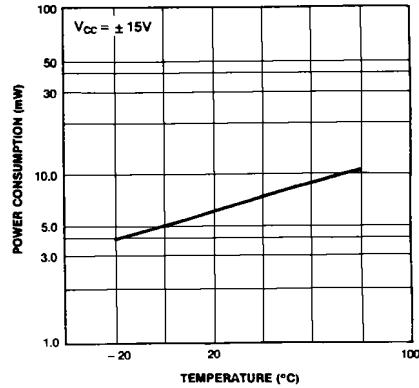


Fig. 13 NORMALIZED DC PARAMETERS vs AMBIENT TEMPERATURE

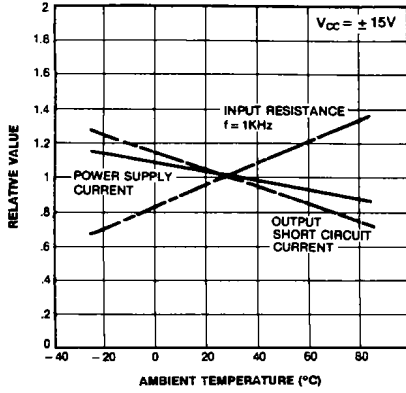


Fig. 14 FREQUENCY CHARACTERISTICS vs AMBIENT TEMPERATURE

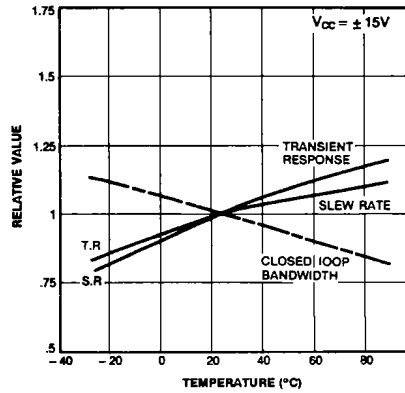


Fig. 15 FREQUENCY CHARACTERISTICS vs SUPPLY VOLTAGE

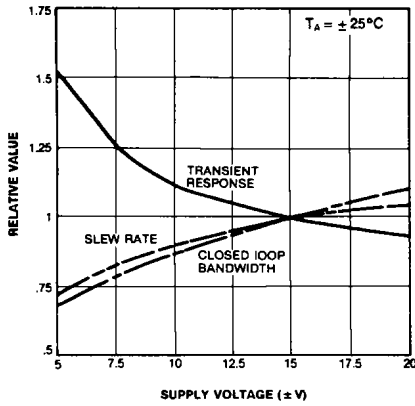


Fig. 16 OUTPUT SHORT CIRCUIT CURRENT vs AMBIENT TEMPERATURE

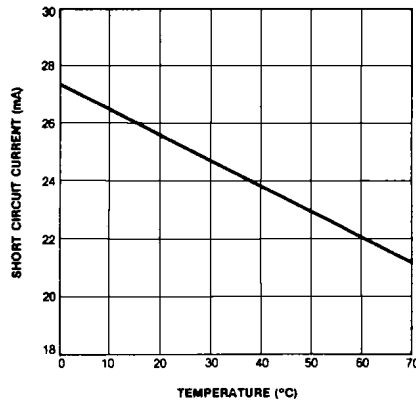


Fig. 17 TRANSIENT RESPONSE

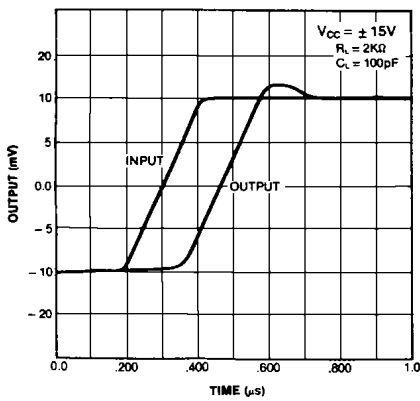


Fig. 18 COMMON-MODE REJECTION RATIO vs FREQUENCY

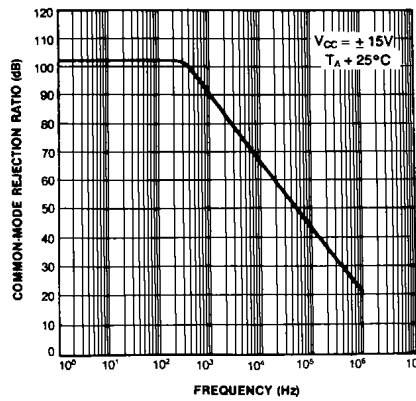


Fig. 18 VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE

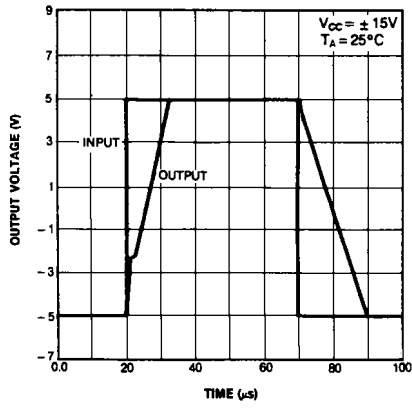
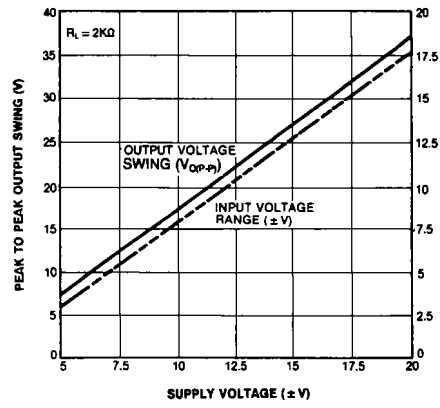


Fig. 19 OUTPUT SWING AND INPUT RANGE vs SUPPLY VOLTAGE



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