

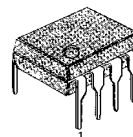
SINGLE OPERATIONAL AMPLIFIERS

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.

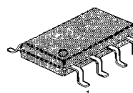
FEATURES

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

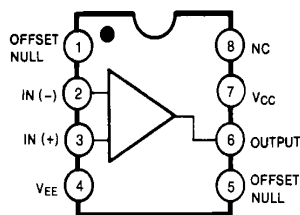
8 DIP



8 SOP



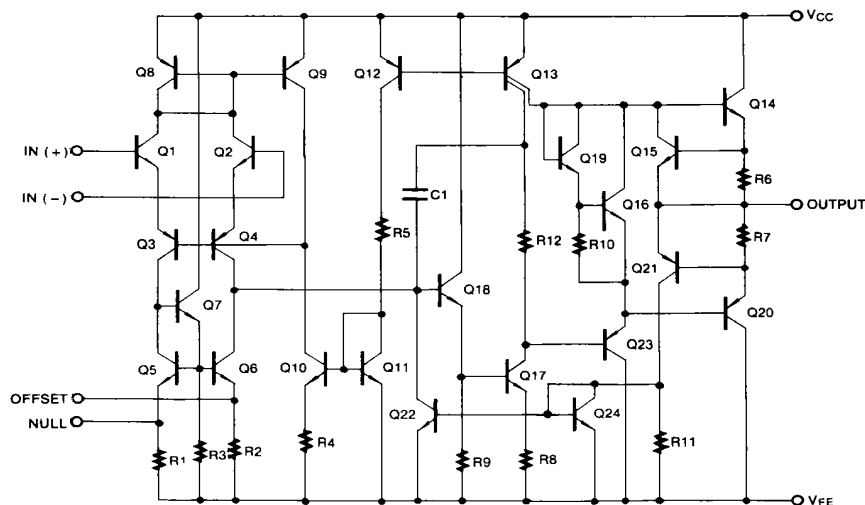
BLOCK DIAGRAM



ORDERING INFORMATION

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

SCHEMATIC DIAGRAM



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

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

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	$V_{IO(R)}$	$V_{CC} = \pm 20\text{V}$	± 10				± 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		$\text{M}\Omega$
Input Voltage Range	$V_{I(R)}$		± 12	± 13		± 12	± 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	$V_{O(P,P)}$	$V_{CC} = \pm 20\text{V}$	$R_L \geq 10\text{K}\Omega$	± 16					V
			$R_L \geq 10\text{K}\Omega$	± 15					
		$V_{CC} = \pm 15\text{V}$	$R_L \geq 10\text{K}\Omega$			± 12	± 14		
			$R_L \geq 10\text{K}\Omega$			± 10	± 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		0.25	0.8		0.3		μs
	Overshoot	OS			6.0	20		10		%
Bandwidth		BW		0.43	1.5					MHz
Slew Rate		SR	Unity Gain	0.3	0.7			0.5		V/ μs
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	μA
Input Resistance	R_I	$V_{CC} = \pm 20V$		0.5						M Ω
Input Voltage Range	$V_{I(R)}$			± 12	± 13		± 12	± 13		V
Output Voltage Swing	$V_{O(P-P)}$	$V_{CC} = \pm 20V$	$R_S \geq 10K\Omega$	± 16						V
			$R_S \geq 2K\Omega$	± 15						
		$V_{CC} = \pm 15V$	$R_S \geq 10K\Omega$				± 12	± 14		
			$R_S \geq 2K\Omega$				± 10	± 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

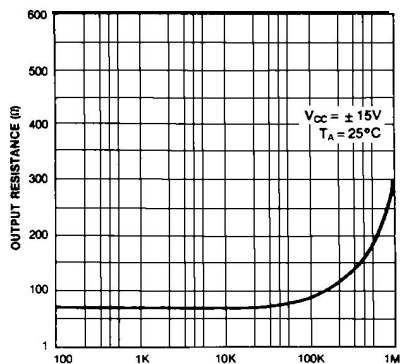


Fig. 8 INPUT RESISTANCE AND INPUT CAPACITANCE vs FREQUENCY

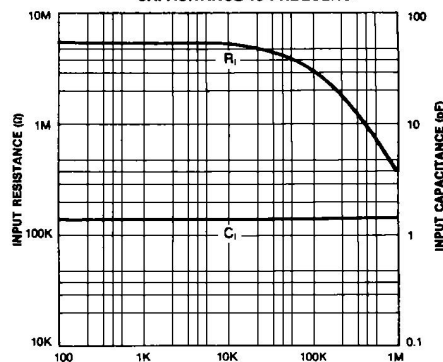


Fig. 9 INPUT BIAS CURRENT vs AMBIENT TEMPERATURE

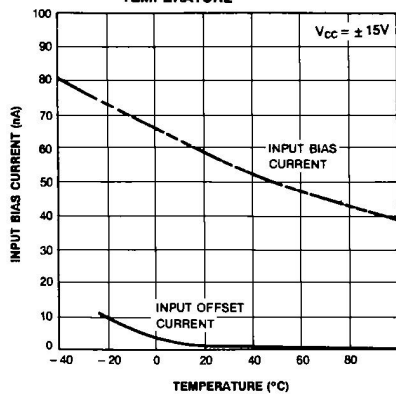


Fig. 10 POWER CONSUMPTION vs AMBIENT TEMPERATURE

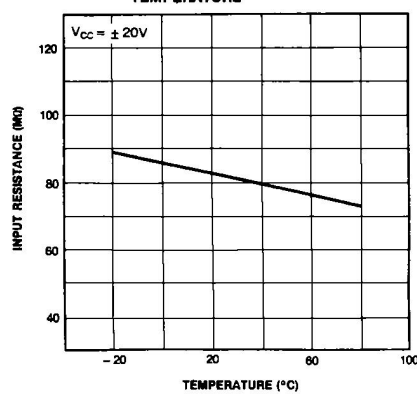


Fig. 11 INPUT OFFSET CURRENT vs AMBIENT TEMPERATURE

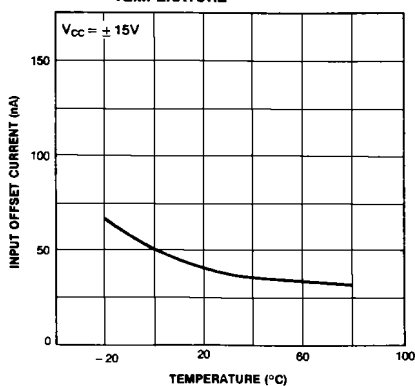


Fig. 12 INPUT RESISTANCE vs AMBIENT TEMPERATURE

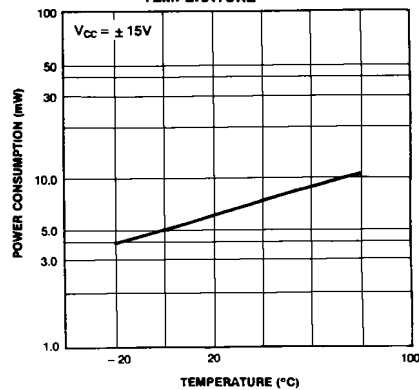


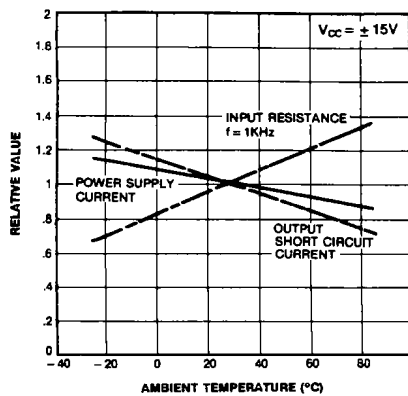
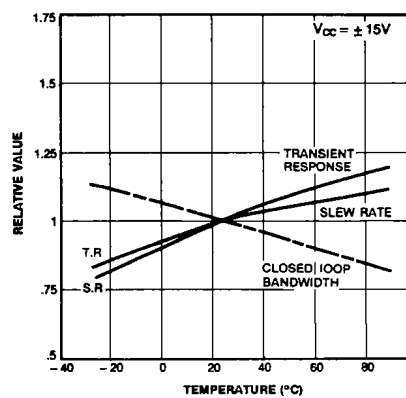
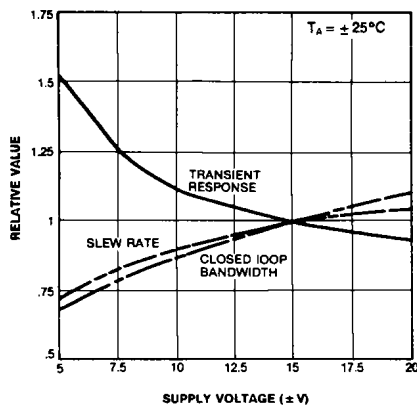
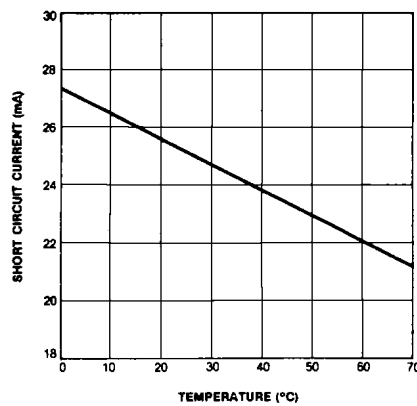
Fig. 13 NORMALIZED DC PARAMETERS
vs AMBIENT TEMPERATUREFig. 14 FREQUENCY CHARACTERISTICS
vs AMBIENT TEMPERATUREFig. 15 FREQUENCY CHARACTERISTICS
vs SUPPLY VOLTAGEFig. 16 OUTPUT SHORT CIRCUIT CURRENT
vs AMBIENT TEMPERATURE

Fig. 17 TRANSIENT RESPONSE

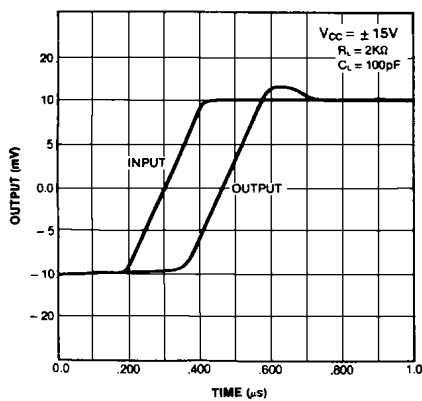
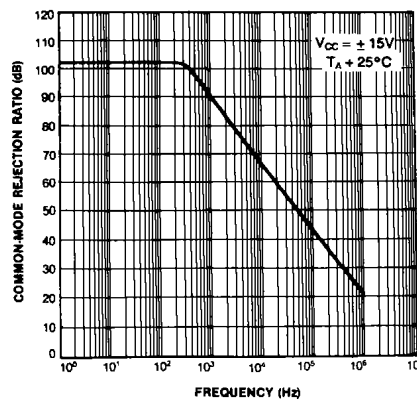
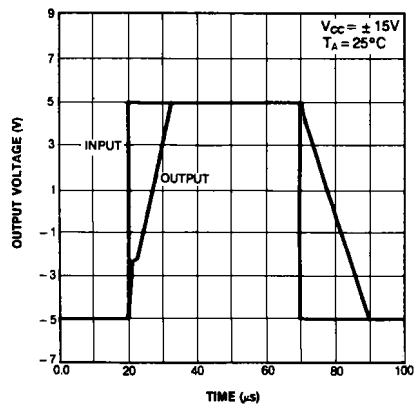
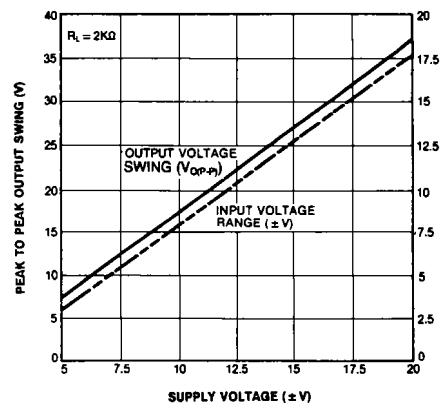
Fig. 18 COMMON-MODE REJECTION RATIO
vs FREQUENCY

Fig. 18 VOLTAGE FOLLOWER LARGE
SIGNAL PULSE RESPONSEFig. 19 OUTPUT SWING AND INPUT RANGE
vs SUPPLY VOLTAGE

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