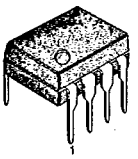
T-79-05-10

LM741C/LM741E/LM741I LINEAR INTEGRATED CIRCUIT

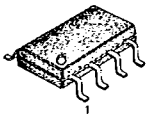
SINGLE OPERATIONAL AMPLIFIERS

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 intergrator, summing amplifier, and general feedback applications.

8 DIP



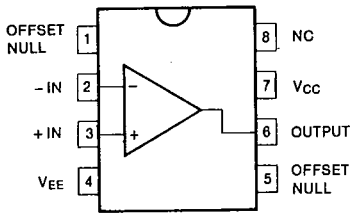
8 SOP



FEATURES

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

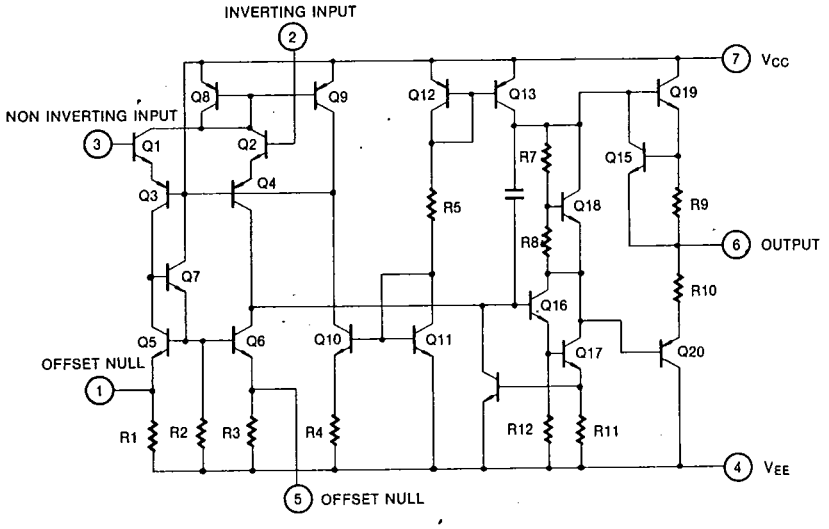
BLOCK DIAGRAM



ORDERING INFORMATION

Device	Package	Operating Temperature
LM741EN LM741CN	8 DIP	0 ~ +70°C
LM741ED LM741CD	8 SOP	
LM741IN	8 DIP	-40 ~ +85°C
LM741ID	8 SOP	

SCHEMATIC DIAGRAM



LM741C/LM741E/LM741I LINEAR INTEGRATED CIRCUIT

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	LM741C	LM741E	LM741I	Unit
Power Supply Voltage	V_S	±18	±22	±18	V
Differential Input Voltage	V_{ID}	±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 ~ +70	0 ~ +70	−40 ~ +85	°C
Storage Temperature Range	T_{stg}	−65 ~ +150	−65 ~ +150	−65 ~ +150	°C

ELECTRICAL CHARACTERISTICS

(V_{CC} = 15V, V_{EE} = −15V, Ta = 25°C, unless otherwise specified)

Characteristic	Symbol	Test Conditions		LM741E			LM741C/LM741I			Unit
				Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	V_{IO}	$R_S \leq 10K\Omega$						2.0	6.0	mV
		$R_S \leq 50\Omega$			0.8	3.0				
Input Offset Voltage Adjustment Range	V_{IOR}	$V_S = \pm 20V$		±10				±15		mV
Input Offset Current	I_{IO}				3.0	30		20	200	nA
Input Bias Current	I_{IB}				30	80		80	500	nA
Input Resistance	R_I	$V_S = \pm 20V$		1.0	6.0		0.3	2.0		MΩ
Input Voltage Range	V_{ICR}			±12	±13		±12	±13		V
Large Signal Voltage Gain	A_V	$R_L \geq 2K\Omega$	$V_S = \pm 20V$, $V_O = \pm 15V$	50						V/mV
			$V_S = \pm 15V$, $V_O = \pm 10V$				20	200		
Output Short Circuit Current	I_{OS}			10	25	35		25		mA
Output Voltage Swing	V_{OUT}	$V_S = \pm 20V$	$R_L \geq 10K\Omega$	±16						V
			$R_L \geq 2K\Omega$	±15						
		$V_S = \pm 15V$	$R_L \geq 10K\Omega$				±12	±14		
			$R_L \geq 2K\Omega$				±10	±13		
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	$V_S = \pm 20V$ to $V_S = \pm 5V$, $R_S \leq 50\Omega$		80	96					dB
		$V_S = \pm 15V$ to $V_S = \pm 5V$, $R_S \leq 10K\Omega$					77	96		

ELECTRICAL CHARACTERISTICS (Continued)

Characteristic		Symbol	Test Conditions	LM741E			LM741C/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		5		%
Bandwidth		BW		0.43	1.5					MHz
Slew Rate		SR	Unity Gain	0.3	0.7			0.5		V/μs
Supply Current		I_S	$R_L = \infty\ \Omega$					1.7	2.8	mA
Power Consumption		P_C	$V_S = \pm 20V$		80	150				mW
			$V_S = \pm 15V$					50	85	

ELECTRICAL CHARACTERISTICS

($-25°C \leq Ta \leq 85°C$ for the LM741I, $0°C \leq Ta \leq 70°C$ for the LM741C, LM741E, $V_{CC} = \pm 15V$, unless otherwise specified)

Characteristic	Symbol	Test Conditions		LM741E			LM741C/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					μV/°C
Input Offset Current	I_{IO}					70			300	nA
Input Offset Current Drift	$\Delta I_{IO}/\Delta T$					0.5				nA/°C
Input Bias Current	I_{IB}					0.21			0.8	nA
Input Resistance	R_i	$V_S = \pm 20V$		0.5						MΩ
Input Voltage Range	V_{ICR}			±12	±13		±12	±13		V
Output Voltage Swing	V_{OUT}	$V_S = \pm 20V$	$R_L \geq 10K\Omega$	±16						V
			$R_L \geq 2K\Omega$	±15						
		$V_S = \pm 15V$	$R_L \geq 10K\Omega$				±12	±14		
			$R_L \geq 2K\Omega$				±10	±13		
Output Short Circuit Current	I_{OS}			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	$V_S = \pm 20V$ to $\pm 5V$	$R_S \leq 50\Omega$	86	96					dB
			$R_S \leq 10K\Omega$				77	96		
Large Signal Voltage Gain	A_V	$R_L \geq 2K\Omega$	$V_S = \pm 20V$, $V_o = \pm 15V$	32						V/mV
			$V_S = \pm 15V$, $V_O = \pm 10V$					15		
			$V_S = \pm 15$, $V_O = 2V$	10						

TYPICAL PERFORMANCE CHARACTERISTICS

INPUT OFFSET CURRENT vs SUPPLY VOLTAGE

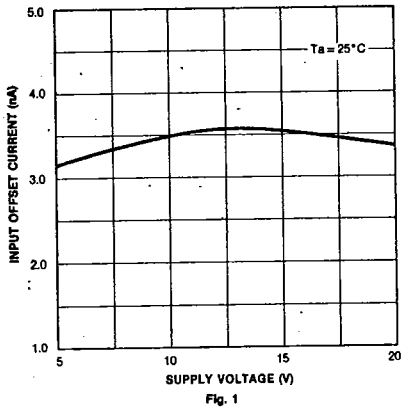


Fig. 1

POWER CONSUMPTION vs SUPPLY VOLTAGE

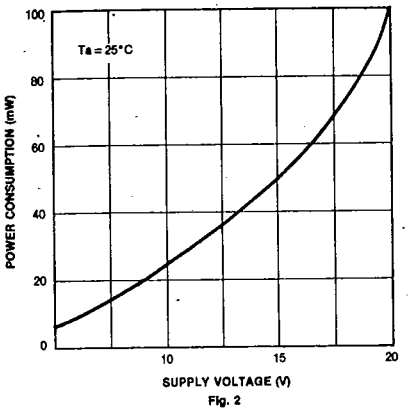


Fig. 2

OPEN LOOP VOLTAGE GAIN vs FREQUENCY

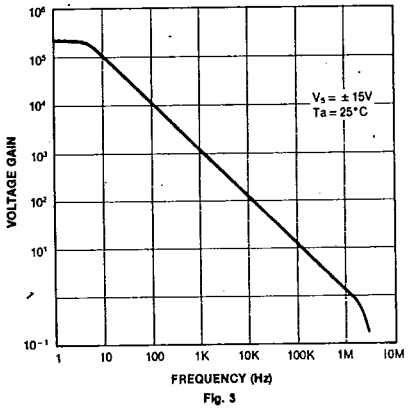


Fig. 3

OPEN LOOP PHASE RESPONSE vs FREQUENCY

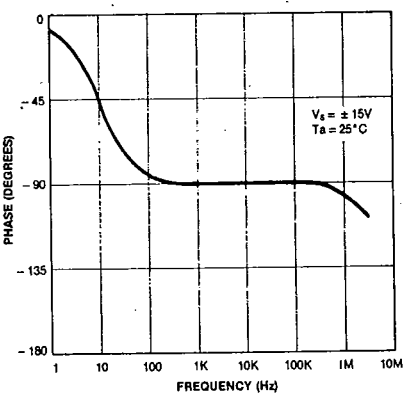


Fig. 4

OUTPUT VOLTAGE SWING vs LOAD RESISTANCE

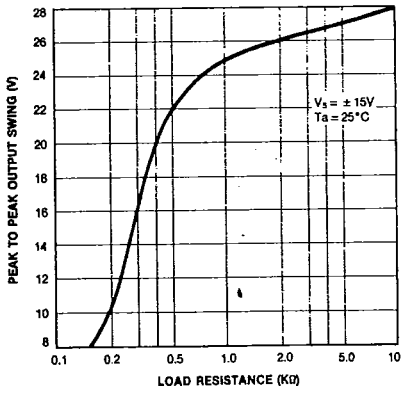


Fig. 5

OUTPUT VOLTAGE SWING vs FREQUENCY

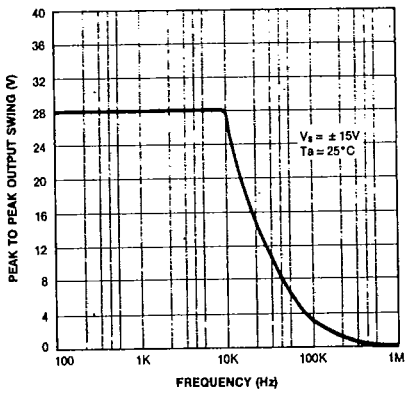


Fig. 6

LM741C/LM741E/LM741I LINEAR INTEGRATED CIRCUIT

OUTPUT RESISTANCE vs FREQUENCY

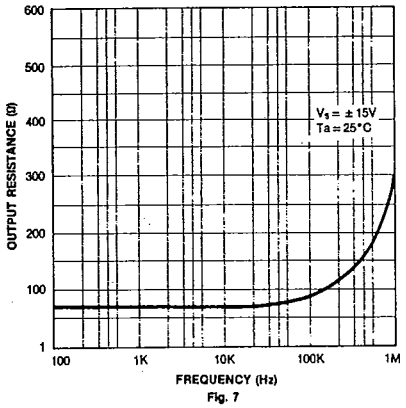


Fig. 7

INPUT RESISTANCE AND INPUT CAPACITANCE vs FREQUENCY

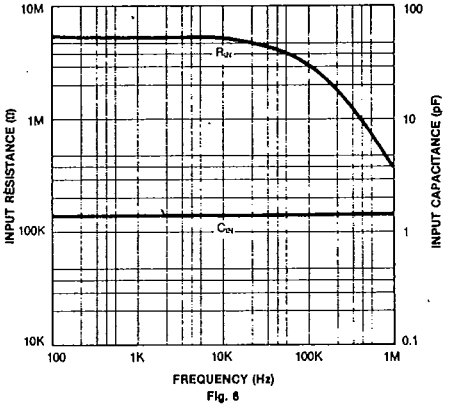


Fig. 8

INPUT BIAS CURRENT vs AMBIENT TEMPERATURE

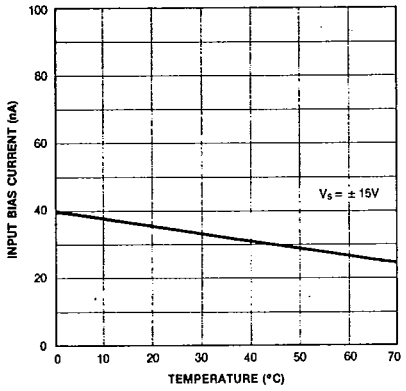


Fig. 9

INPUT RESISTANCE vs AMBIENT TEMPERATURE

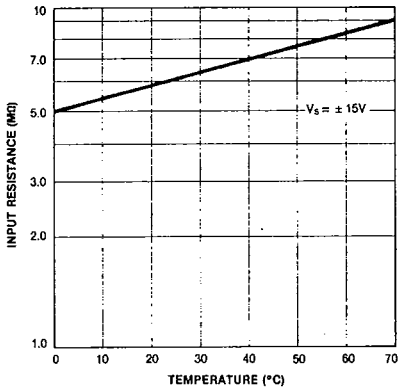


Fig. 10

INPUT OFFSET CURRENT vs AMBIENT TEMPERATURE

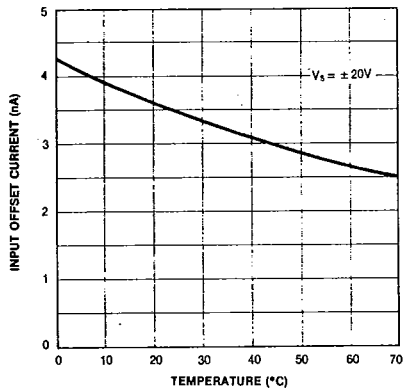


Fig. 11

POWER CONSUMPTION vs AMBIENT TEMPERATURE

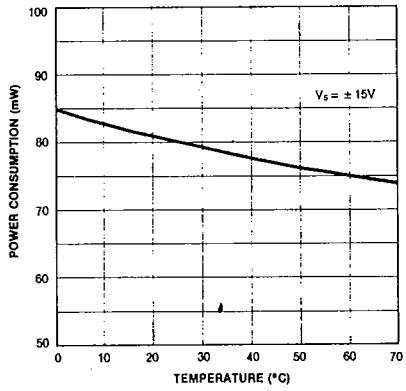


Fig. 12

OUTPUT SHORT CIRCUIT CURRENT
vs AMBIENT TEMPERATURE

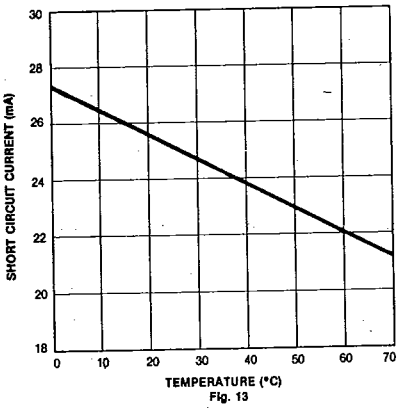


Fig. 13

TRANSIENT RESPONSE

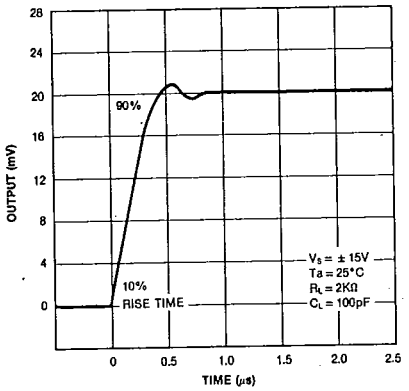


Fig. 14

VOLTAGE FOLLOWER LARGE SIGNAL
PULSE RESPONSE

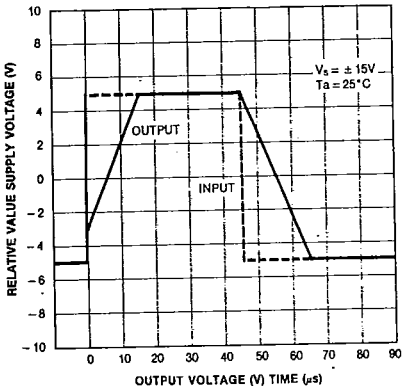


Fig. 15

COMMON MODE REJECTION RATIO
vs FREQUENCY

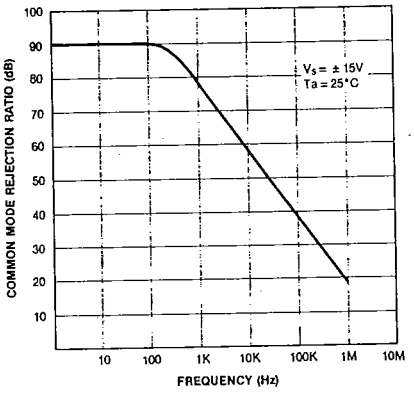


Fig. 16