

GENERAL PURPOSE SINGLE OPERATIONAL AMPLIFIERS

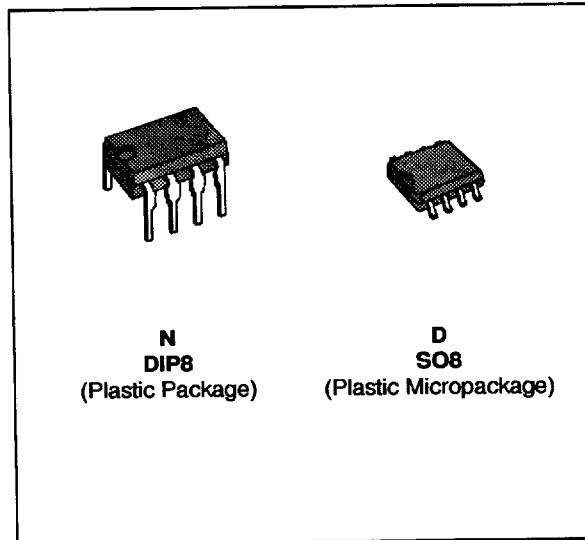
- LARGE INPUT VOLTAGE RANGE
- NO LATCH-UP
- HIGH GAIN
- SHORT-CIRCUIT PROTECTION
- NO FREQUENCY COMPENSATION REQUIRED
- SAME PIN CONFIGURATION AS THE UA709
- ESD INTERNAL PROTECTION

**DESCRIPTION**

The UA741 is a high performance monolithic operational amplifier constructed on a single silicon chip. It is intended for a wide range of analog applications.

- Summing amplifier
- Voltage follower
- Integrator
- Active filter
- Function generator

The high gain and wide range of operating voltages provide superior performances in integrator, summing amplifier and general feedback applications. The internal compensation network (6dB / octave) insures stability in closed loop circuits.

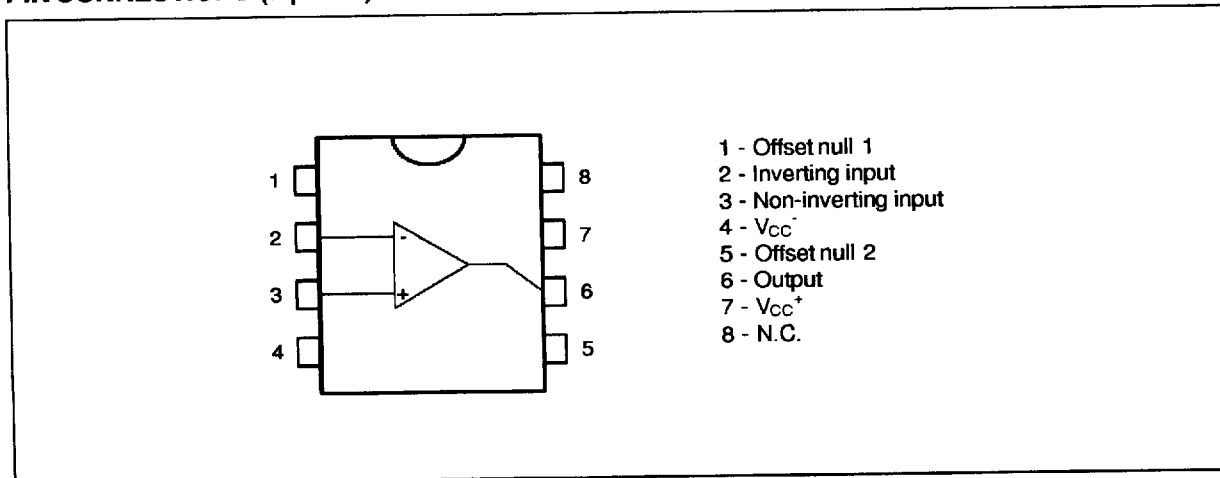


**ORDER CODES**

Part Number	Temperature Range	Package	
		N	D
UA741C/E	0°C, +70°C	•	•
UA741I	-40°C, +105°C	•	•
UA741M/A	-55°C, +125°C	•	•
<b>Example : UA741CN</b>			

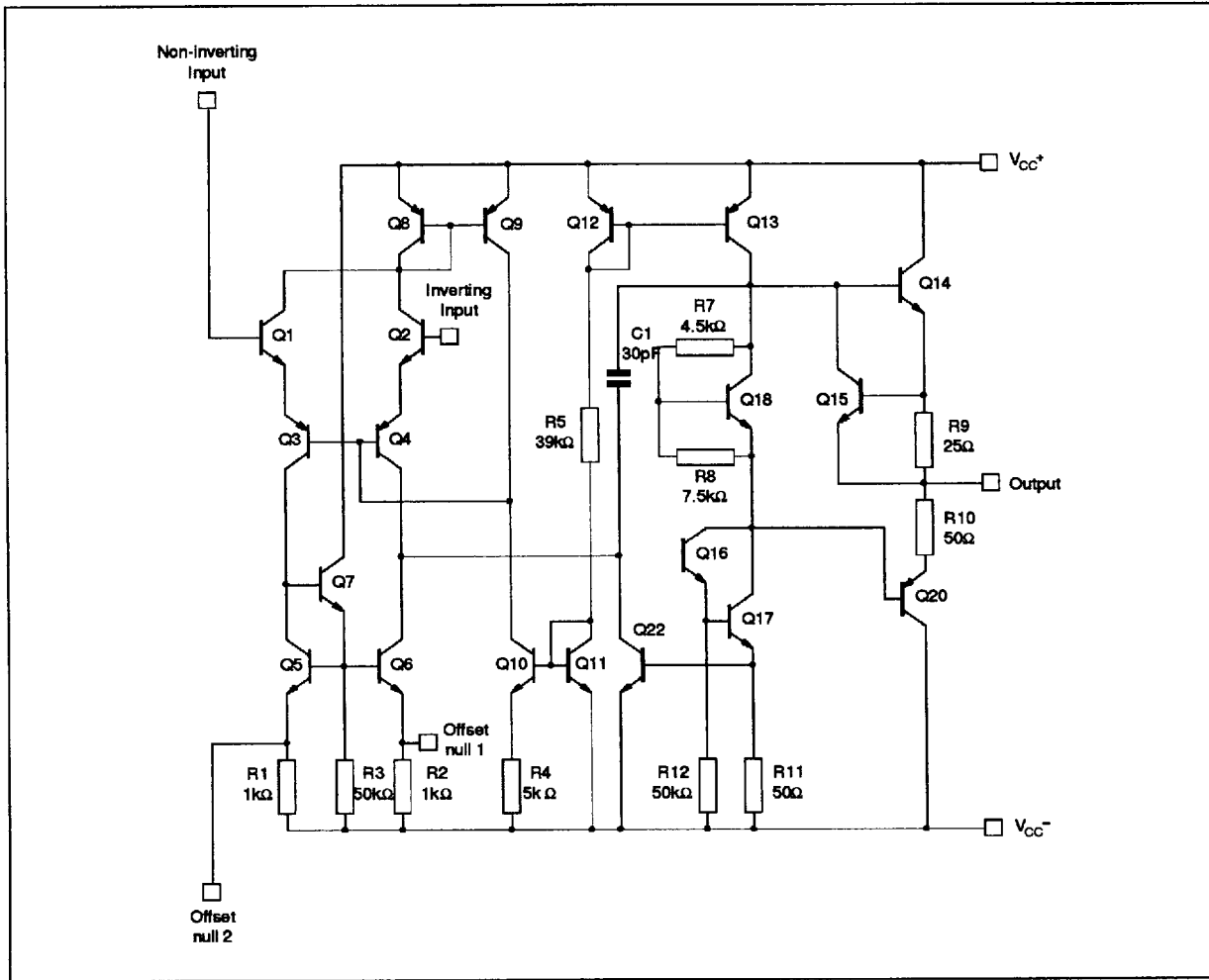
741-01 TBL

**PIN CONNECTIONS (top view)**



- 1 - Offset null 1
- 2 - Inverting input
- 3 - Non-inverting input
- 4 -  $V_{CC}^-$
- 5 - Offset null 2
- 6 - Output
- 7 -  $V_{CC}^+$
- 8 - N.C.

**SCHEMATIC DIAGRAM**



741-08 EPS

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	UA741M-A	UA741I	UA741C-E	Unit
$V_{CC}$	Supply Voltage	$\pm 22$	$\pm 22$	$\pm 22$	V
$V_i$	Input Voltage - (note1)	$\pm 15$	$\pm 15$	$\pm 15$	V
$V_{id}$	Differential Input Voltage	$\pm 30$	$\pm 30$	$\pm 30$	V
$P_{tot}$	Power Dissipation	500	500	500	mW
	Output Short-circuit Duration	Infinite			
$T_{oper}$	Operating Free Air Temperature Range	-55 to +125	-40 to +105	0 to +70	$^{\circ}C$
$T_{stg}$	Storage Temperature Range	-65 to +150	-65 to +150	-65 to +150	$^{\circ}C$

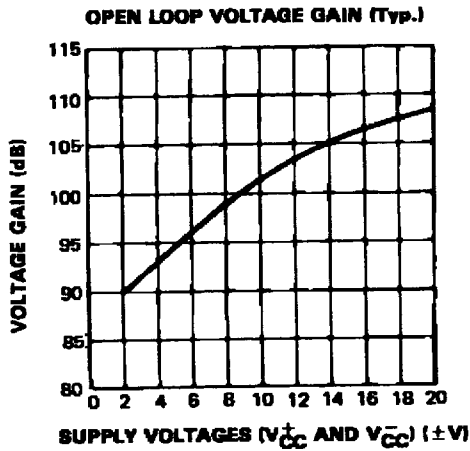
741-02 TB

Note : 1. The magnitude of the input voltage must never exceed the magnitude of the positive and negative supply voltage.

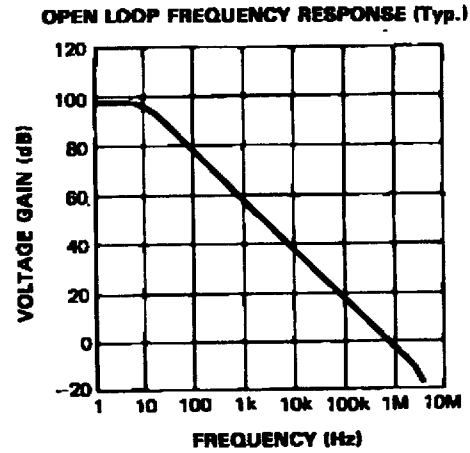
**ELECTRICAL CHARACTERISTICS** $V_{CC} = \pm 15V$ ,  $T_{amb} = 25^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_{io}$	Input Offset Voltage ( $R_s \leq 10k\Omega$ ) $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$ UA741E,A $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$		1	5 6	mV
$I_{io}$	Input Offset Current $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$		2	30 70	nA
$I_{ib}$	Input Bias Current $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$		10	100 200	nA
$A_{vd}$	Large Signal Voltage Gain ( $V_o = \pm 10V$ , $R_L = 2k\Omega$ ) $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$	50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio ( $R_s \leq 10k\Omega$ ) $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$	77 77	90		dB
$I_{CC}$	Supply Current, no load $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$		1	2.8 3.3	mA
$V_{icm}$	Input Common Mode Voltage Range $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$	$\pm 12$ $\pm 12$			V
CMR	Common Mode Rejection Ratio ( $R_s \leq 10k\Omega$ ) $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$	70 70	90		dB
$I_{os}$	Output Short-circuit Current	10	35		mA
$\pm V_{OPP}$	Output Voltage Swing $T_{amb} = 25^{\circ}C$ $T_{min} \leq T_{amb} \leq T_{max}$	$R_L = 10k\Omega$ $R_L = 2k\Omega$ $R_L = 10k\Omega$ $R_L = 2k\Omega$	12 14 10 13 12 10		V
SR	Slew Rate ( $V_i = \pm 10V$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^{\circ}C$ , unity gain)	0.25	0.5		V/ $\mu s$
$t_r$	Rise Time ( $V_i = \pm 20mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^{\circ}C$ , unity gain)		0.3		$\mu s$
$K_{OV}$	Overshoot ( $V_i = \pm 20mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^{\circ}C$ , unity gain)		5		%
$R_i$	Input Resistance	0.3	2		M $\Omega$
GBP	Gain Bandwidth Product ( $V_i = 10mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $f = 100kHz$ )	0.7	1		MHz
THD	Total Harmonic Distortion ( $f = 1kHz$ , $A_V = 20dB$ , $R_L = 2k\Omega$ , $V_o = 2V_{PP}$ , $C_L = 100pF$ , $T_{amb} = 25^{\circ}C$ )		0.06		%
$e_n$	Equivalent Input Noise Voltage ( $f = 1kHz$ , $R_s = 100\Omega$ )		23		$\frac{nV}{\sqrt{Hz}}$
$\phi_m$	Phase Margin		70		Degrees

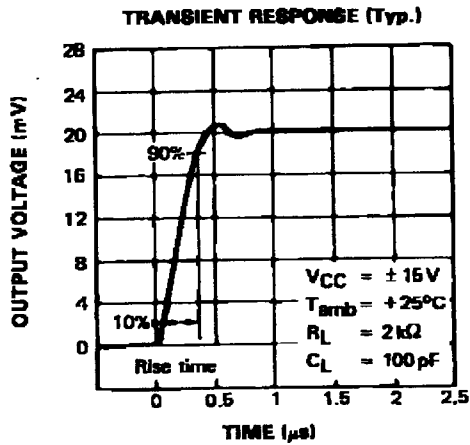
741-03 TBL



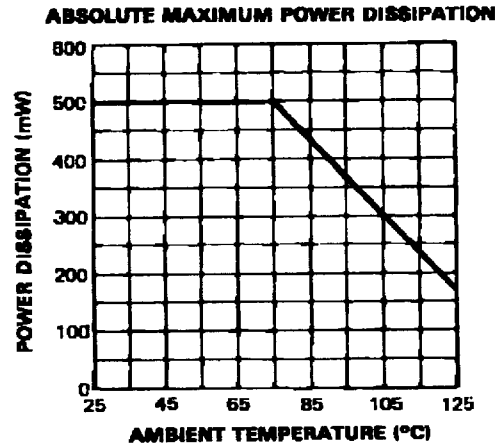
741-04 EPS



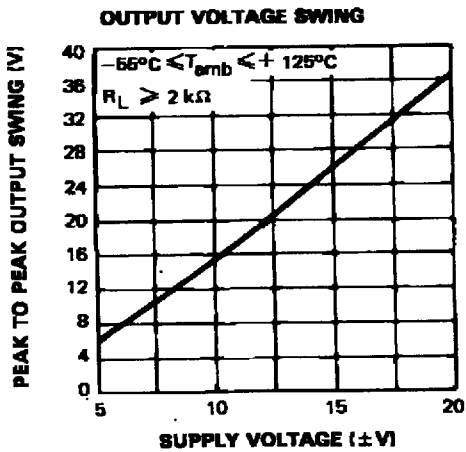
741-05 EPS



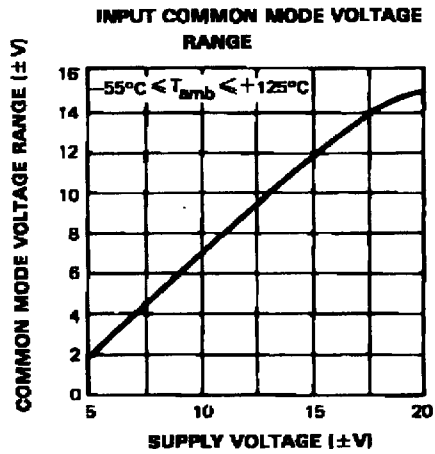
741-06 EPS



741-07 EPS

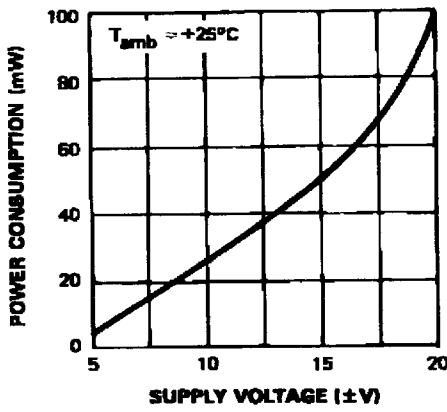


741-08 EPS



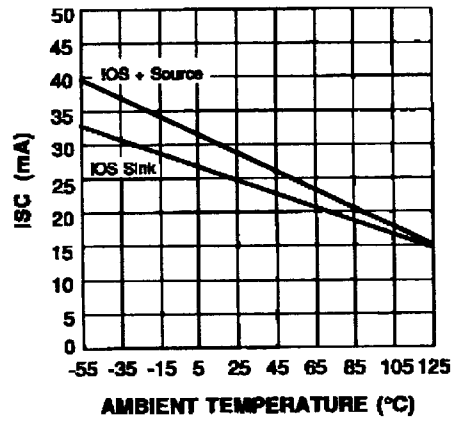
741-09 EPS

POWER CONSUMPTION



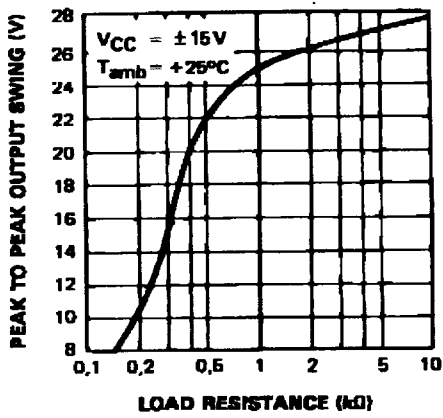
741-10 EPS

OUTPUT CURRENT vs AMBIENT TEMPERATURE



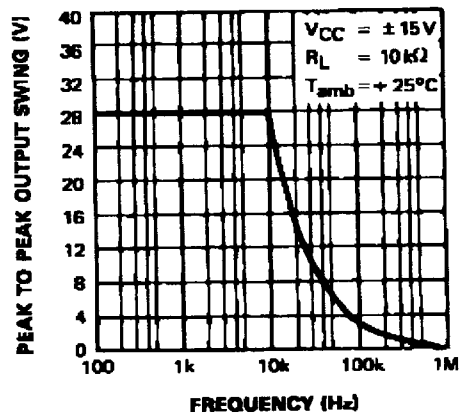
741-11 EPS

OUTPUT VOLTAGE SWING



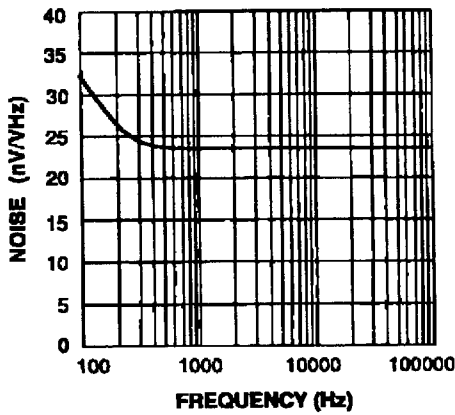
741-12 EPS

OUTPUT VOLTAGE SWING



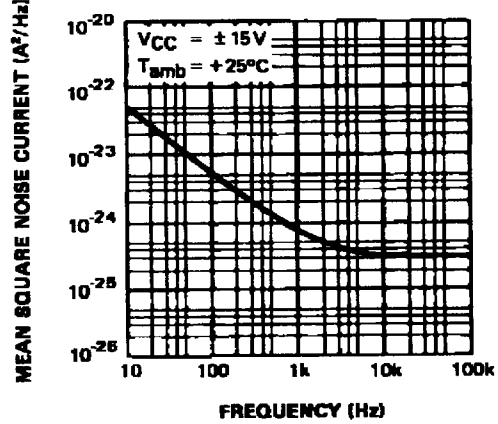
741-13 EPS

EQUIVALENT INPUT NOISE vs FREQUENCY  
Rg = 100 Ω



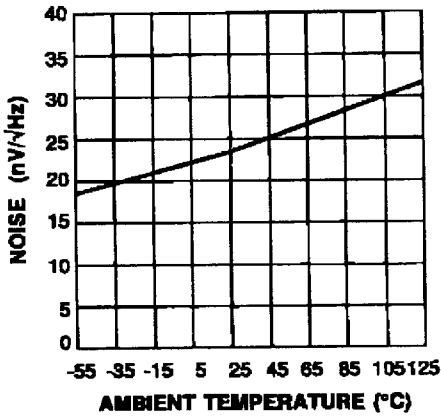
741-14 EPS

INPUT NOISE CURRENT



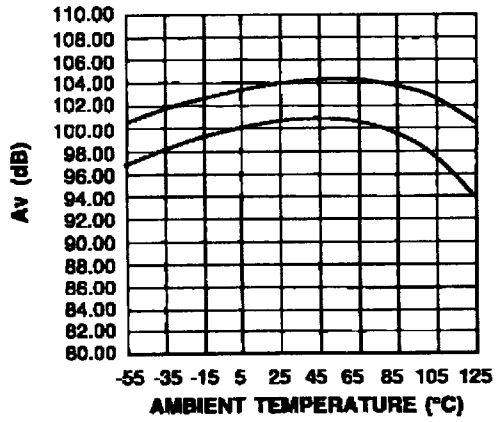
741-15 EPS

**EQUIVALENT INPUT NOISE vs AMBIENT TEMPERATURE**



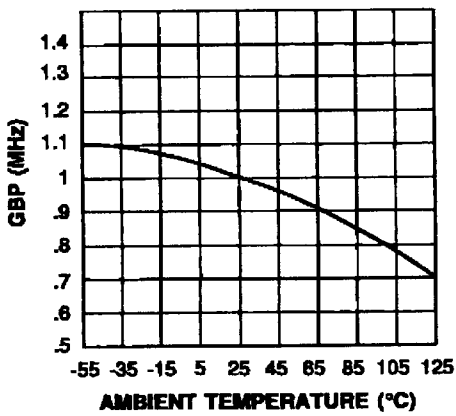
741-16.EPS

**LARGE SIGNAL VOLTAGE GAIN vs AMBIENT TEMPERATURE**



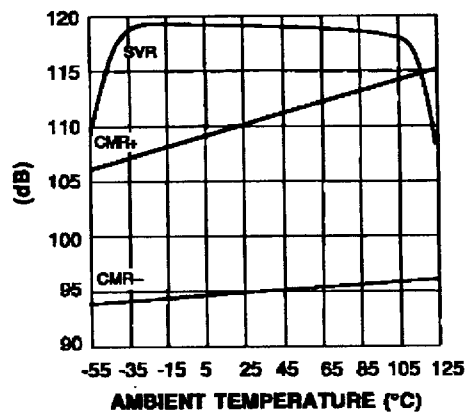
741-17.EPS

**GAIN BANDWIDTH PRODUCT vs AMBIENT TEMPERATURE**



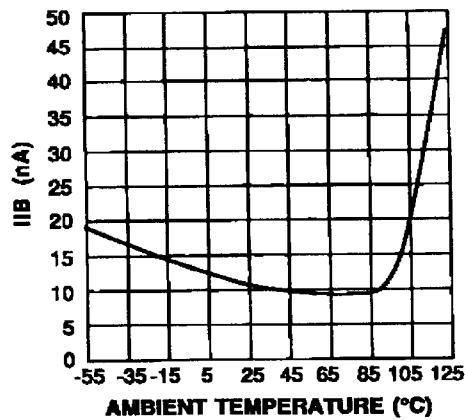
741-18.EPS

**POWER SUPPLY & COMMON MODE REJECTION RATIO vs AMBIENT TEMPERATURE**



741-19.EPS

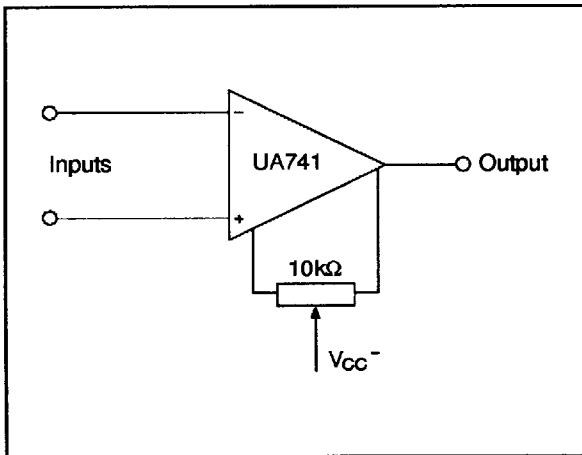
**INPUT BIAS CURRENT vs AMBIENT TEMPERATURE**



741-20.EPS

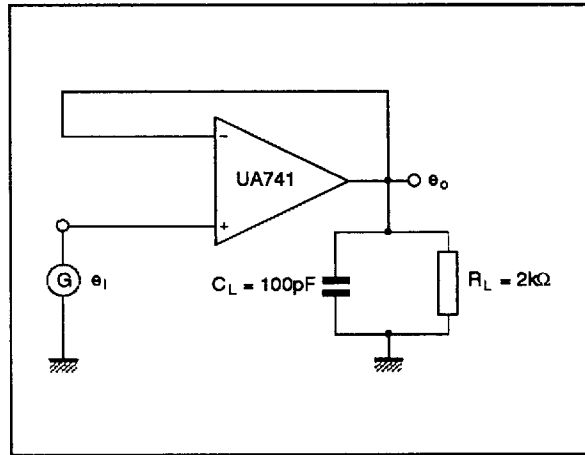
MEASUREMENT DIAGRAMS

OFFSET VOLTAGE NULL CIRCUIT



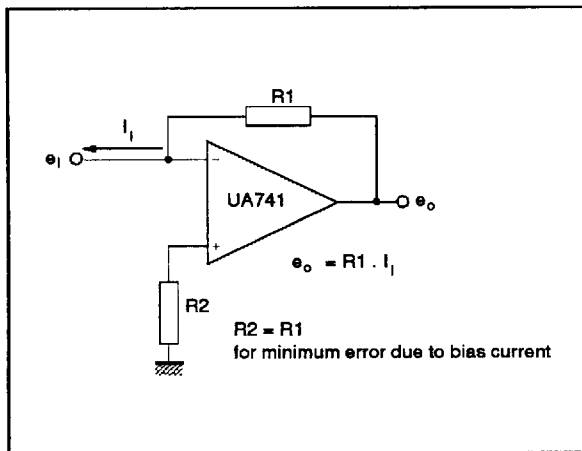
741-21 EPS

TRANSIENT RESPONSE TEST CIRCUIT



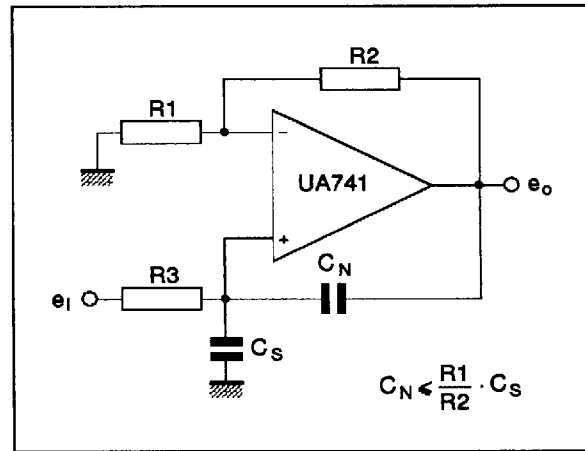
741-22 EPS

CURRENT TO VOLTAGE CONVERTER



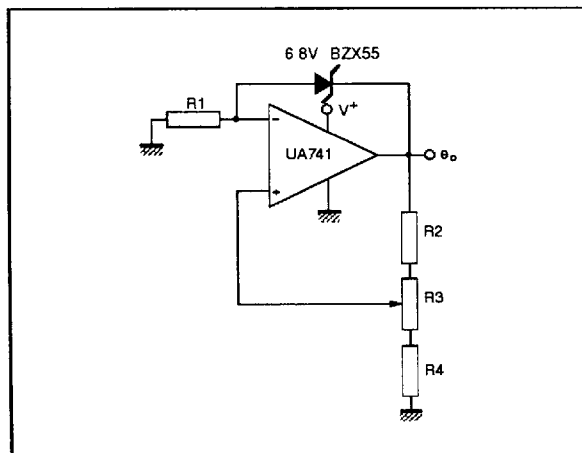
741-23 EPS

NEUTRALIZING INPUT CAPACITANCE TO OPTIMIZE RESPONSE TIME



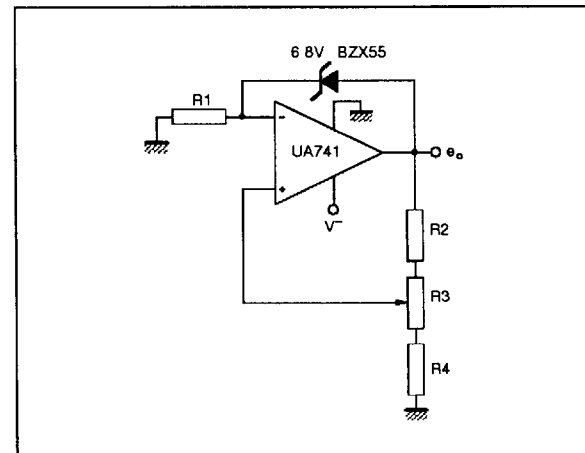
741-24 EPS

POSITIVE VOLTAGE REFERENCE



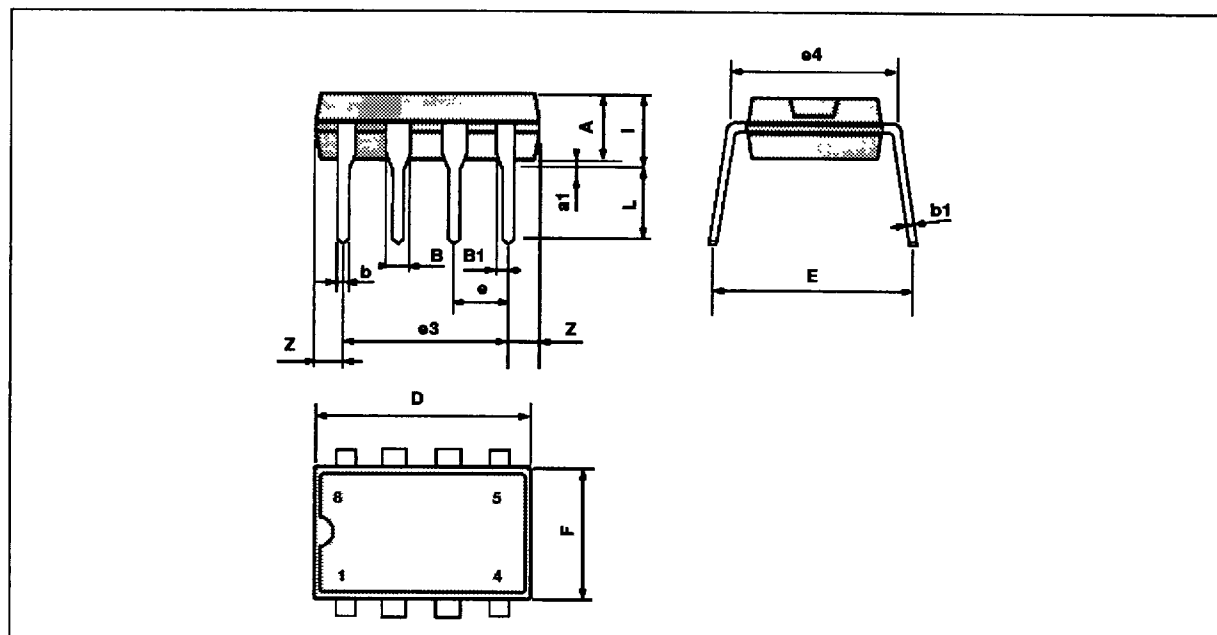
741-25 EPS

NEGATIVE VOLTAGE REFERENCE



741-26 EPS

**PACKAGE MECHANICAL DATA**  
8 PINS - PLASTIC DIP OR CERDIP



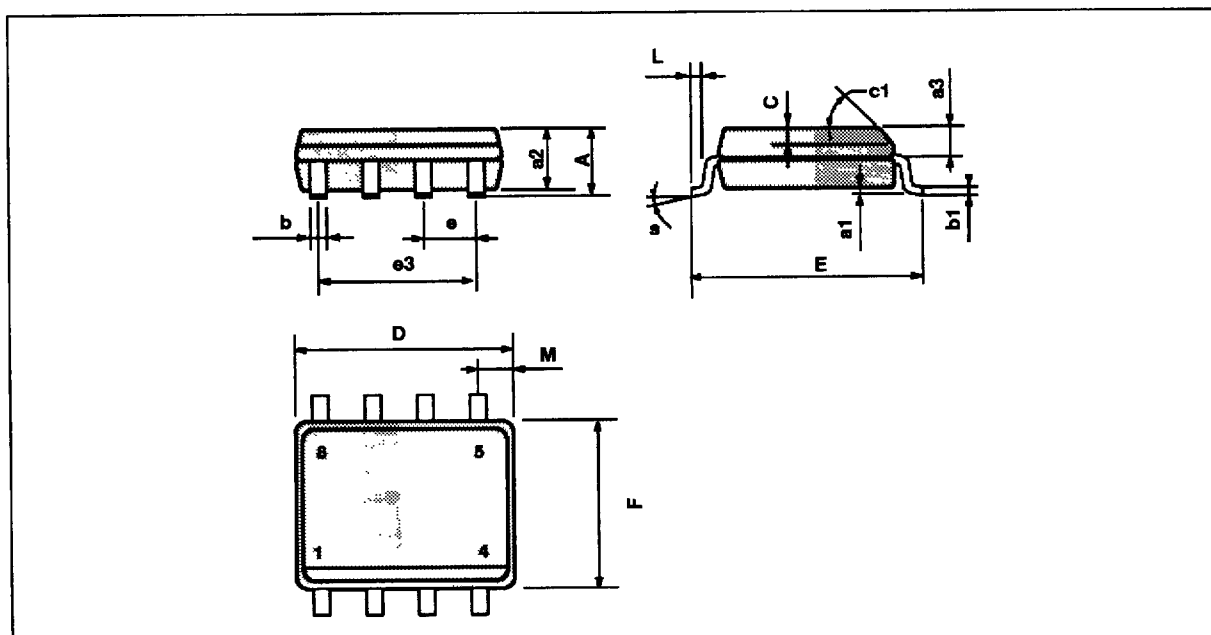
PM-DIP8 EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

DIP8 TEL



**PACKAGE MECHANICAL DATA**  
**8 PINS - PLASTIC MICROPACKAGE (SO)**



PM-SOS EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

SC08 TBL

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