

## GENERAL PURPOSE SINGLE OPERATIONAL AMPLIFIERS

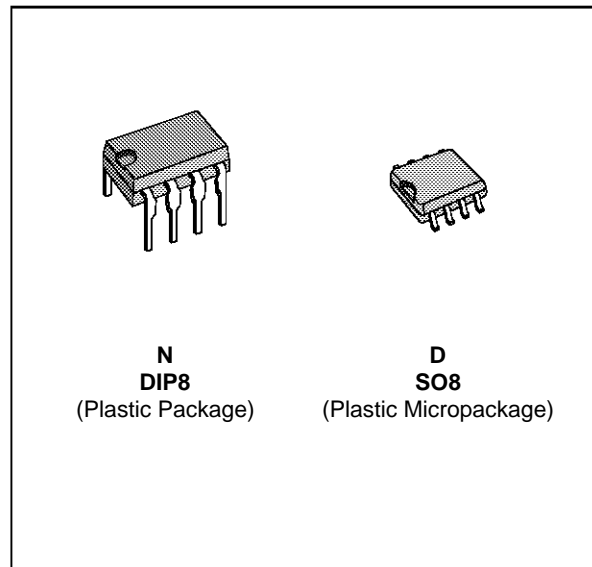
- LARGE INPUT VOLTAGE RANGE
- NO LATCH-UP
- HIGH GAIN
- SHORT-CIRCUIT PROTECTION
- NO FREQUENCY COMPENSATION REQUIRED
- SAME PIN CONFIGURATION AS THE UA709
- ESD INTERNAL PROTECTION

### 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.



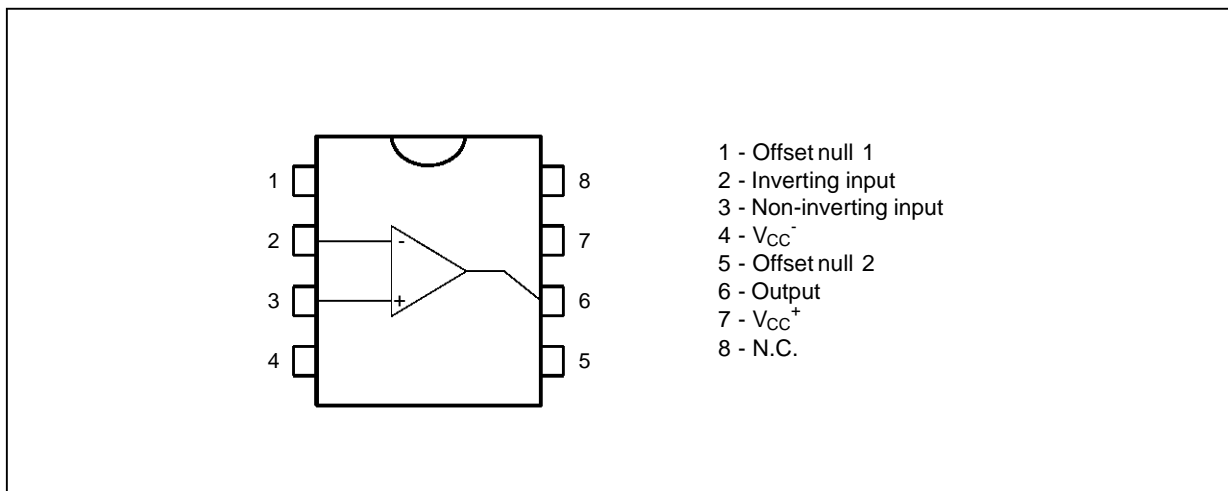
### ORDER CODES

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

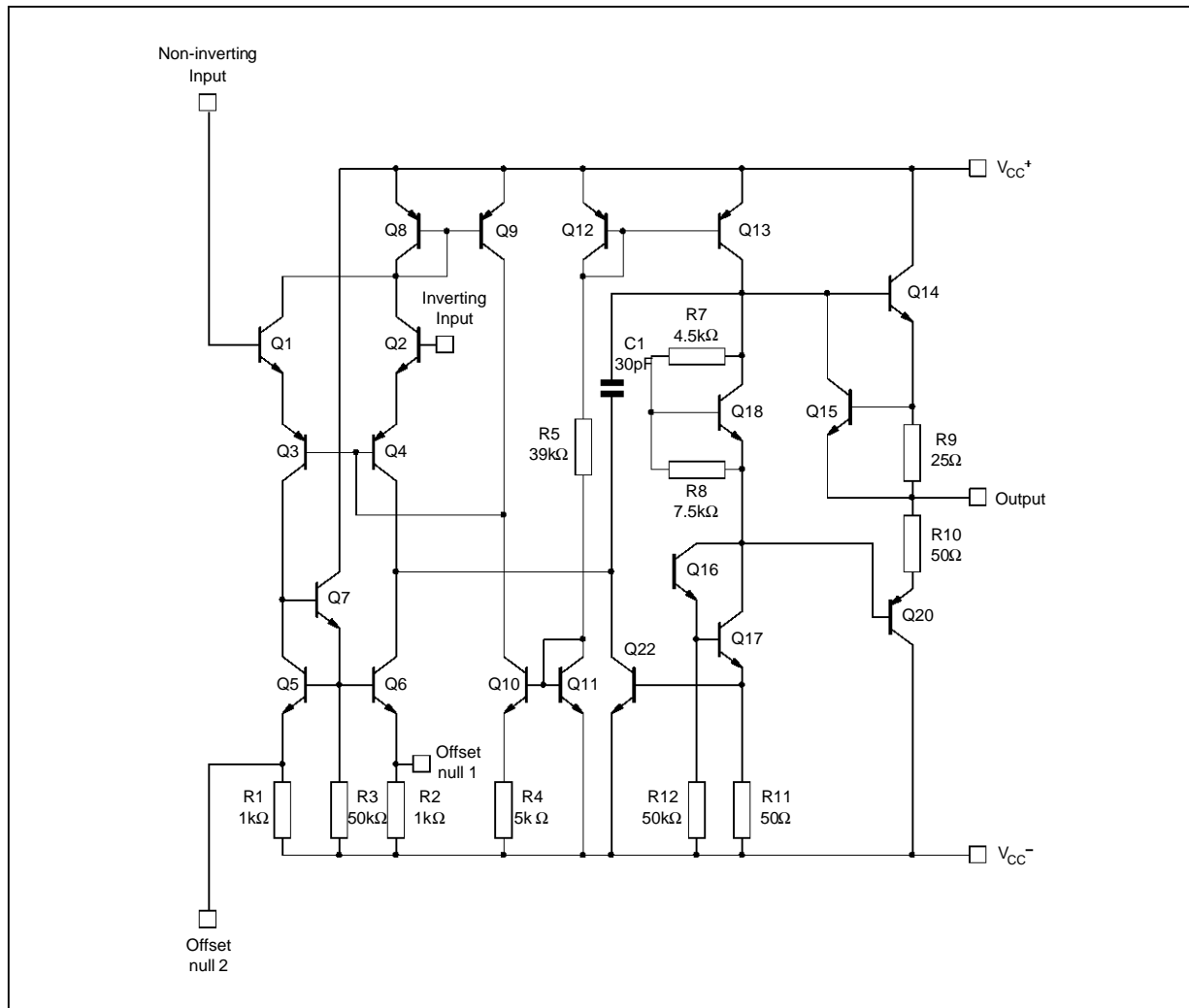
**Example :** UA741CN

741-01.TBL

### PIN CONNECTIONS (top view)



**SCHEMATIC DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

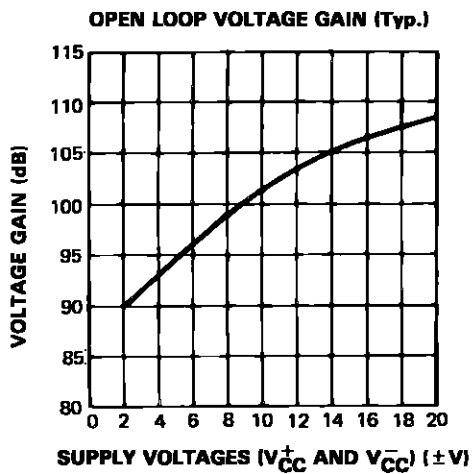
Symbol	Parameter	UA741M-A	UA741I	UA741C-E	Unit
V <sub>CC</sub>	Supply Voltage	±22	±22	±22	V
V <sub>i</sub>	Input Voltage - (note1)	±15	±15	±15	V
V <sub>id</sub>	Differential Input Voltage	±30	±30	±30	V
P <sub>tot</sub>	Power Dissipation	500	500	500	mW
	Output Short-circuit Duration	Infinite			
T <sub>oper</sub>	Operating Free Air Temperature Range	-55 to +125	-40 to +105	0 to +70	°C
T <sub>stg</sub>	Storage Temperature Range	-65 to +150	-65 to +150	-65 to +150	°C

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

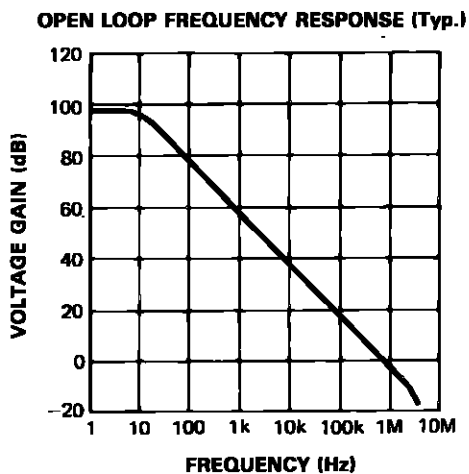
**ELECTRICAL CHARACTERISTICS**V<sub>CC</sub> = ±15V, T<sub>amb</sub> = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>io</sub>	Input Offset Voltage (R <sub>s</sub> ≤ 10kΩ) T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub> UA741E,A T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>		1  1	5 6  2 4	mV
I <sub>io</sub>	Input Offset Current T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>		2	30 70	nA
I <sub>ib</sub>	Input Bias Current T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>		10	100 200	nA
A <sub>vd</sub>	Large Signal Voltage Gain (V <sub>o</sub> = ±10V, R <sub>L</sub> = 2kΩ) T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>	50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio (R <sub>s</sub> ≤ 10kΩ) T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>	77 77	90		dB
I <sub>CC</sub>	Supply Current, no load T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>		1	2.8 3.3	mA
V <sub>icm</sub>	Input Common Mode Voltage Range T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>	±12 ±12			V
CMR	Common Mode Rejection Ratio (R <sub>s</sub> ≤ 10kΩ) T <sub>amb</sub> = 25°C T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>	70 70	90		dB
I <sub>os</sub>	Output Short-circuit Current	10	35		mA
±V <sub>OPP</sub>	Output Voltage Swing T <sub>amb</sub> = 25°C  T <sub>min.</sub> ≤ T <sub>amb</sub> ≤ T <sub>max.</sub>				V
		12 10 12 10	14 13		
SR	Slew Rate (V <sub>i</sub> = ±10V, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C, unity gain)	0.25	0.5		V/μs
t <sub>r</sub>	Rise Time (V <sub>i</sub> = ±20mV, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C, unity gain)		0.3		μs
K <sub>OV</sub>	Overshoot (V <sub>i</sub> = ±20mV, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C, unity gain)		5		%
R <sub>i</sub>	Input Resistance	0.3	2		MΩ
GBP	Gain Bandwidth Product (V <sub>i</sub> = 10mV, R <sub>L</sub> = 2kΩ, C <sub>L</sub> = 100pF, f = 100kHz)	0.7	1		MHz
THD	Total Harmonic Distortion (f = 1kHz, A <sub>v</sub> = 20dB, R <sub>L</sub> = 2kΩ, V <sub>o</sub> = 2V <sub>PP</sub> , C <sub>L</sub> = 100pF, T <sub>amb</sub> = 25°C)		0.06		%
e <sub>n</sub>	Equivalent Input Noise Voltage (f = 1kHz, R <sub>s</sub> = 100Ω)		23		$\frac{nV}{\sqrt{Hz}}$
∅ <sub>m</sub>	Phase Margin		70		Degrees

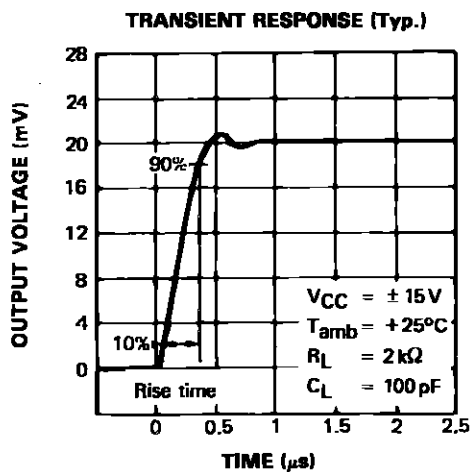
741-03.TBL



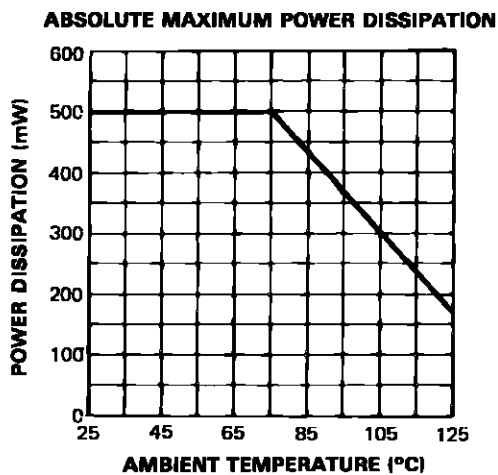
741-04.EPS



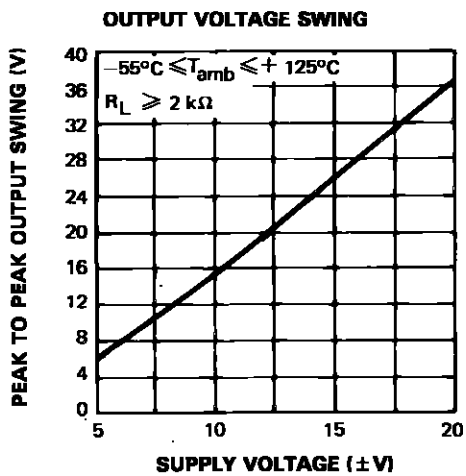
741-05.EPS



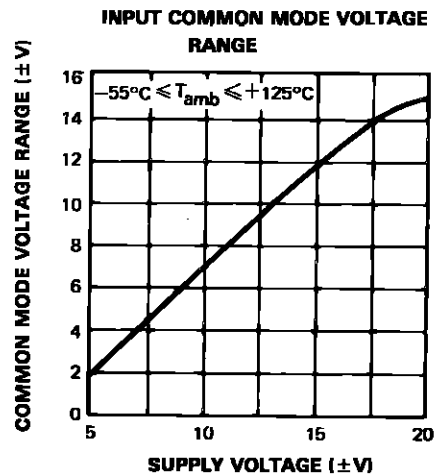
741-06.EPS



741-07.EPS

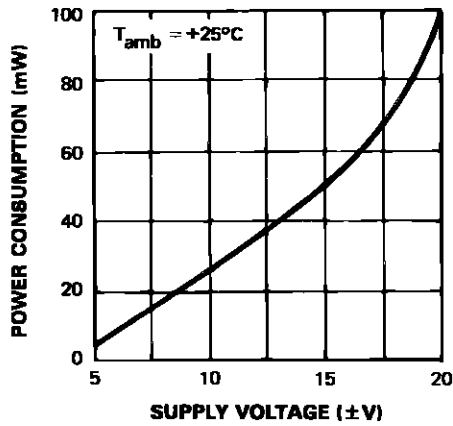


741-08.EPS



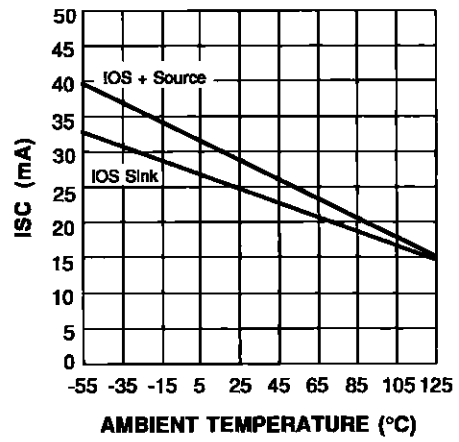
741-09.EPS

POWER CONSUMPTION



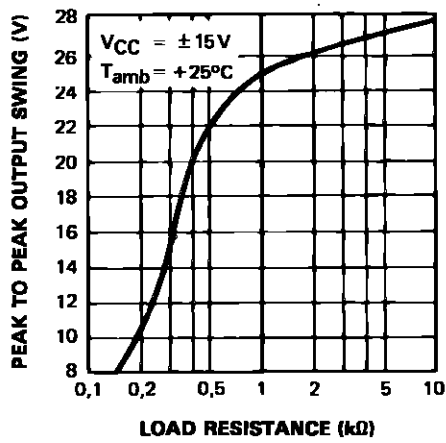
741-10.EPS

OUTPUT CURRENT vs AMBIENT TEMPERATURE



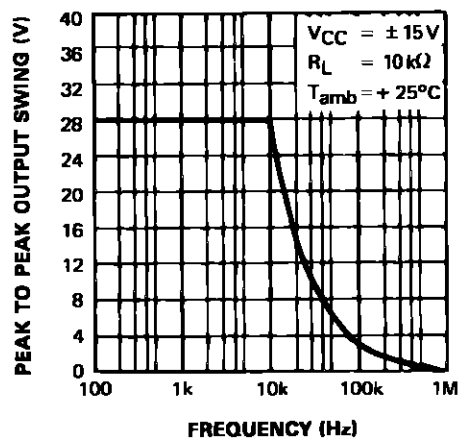
741-11.EPS

OUTPUT VOLTAGE SWING



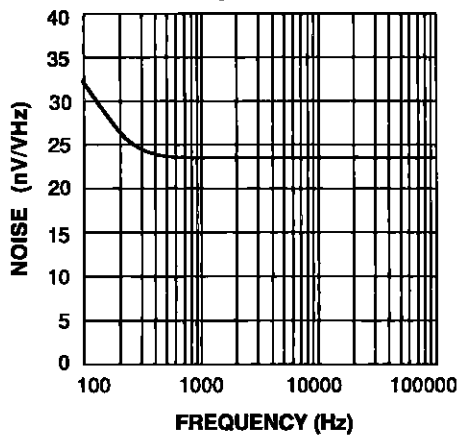
741-12.EPS

OUTPUT VOLTAGE SWING



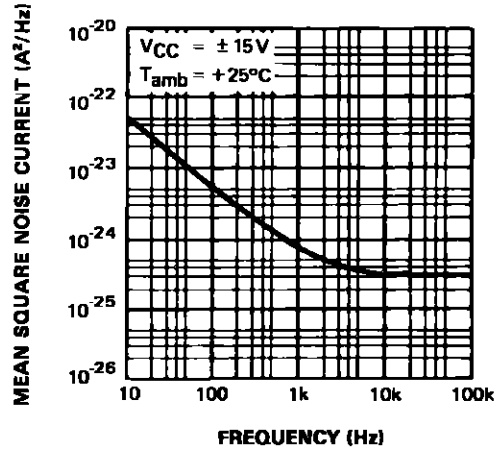
741-13.EPS

EQUIVALENT INPUT NOISE vs FREQUENCY  
Rg = 100 Ω



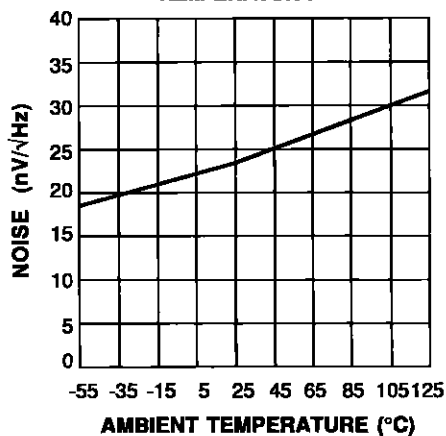
741-14.EPS

INPUT NOISE CURRENT



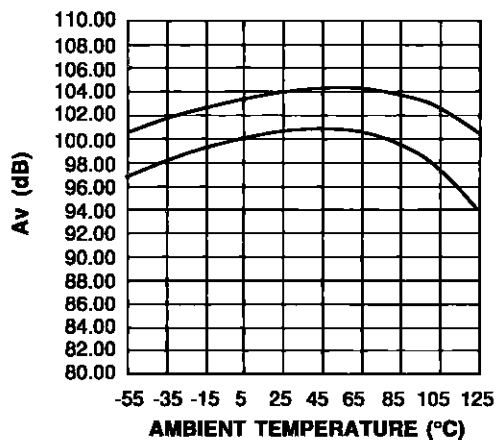
741-15.EPS

**EQUIVALENT INPUT NOISE vs AMBIENT TEMPERATURE**



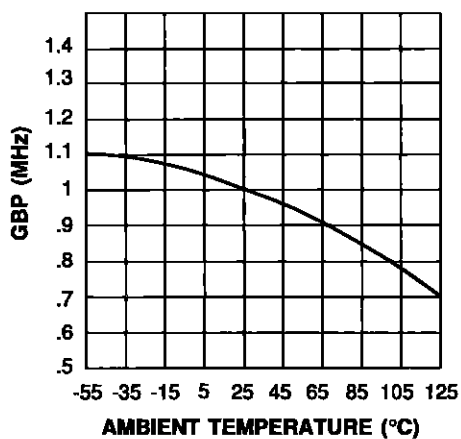
741-16.EPS

**LARGE SIGNAL VOLTAGE GAIN vs AMBIENT TEMPERATURE**



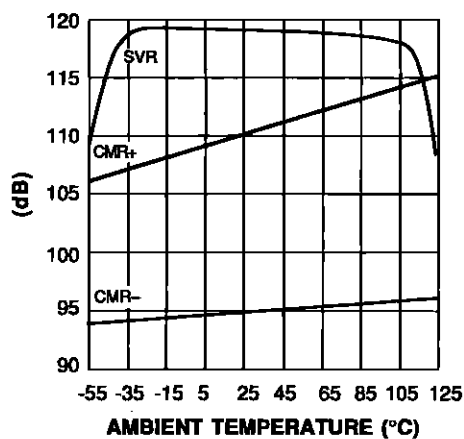
741-17.EPS

**GAIN BANDWIDTH PRODUCT vs AMBIENT TEMPERATURE**



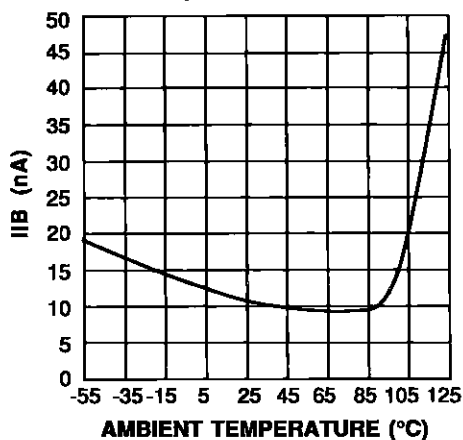
741-18.EPS

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



741-19.EPS

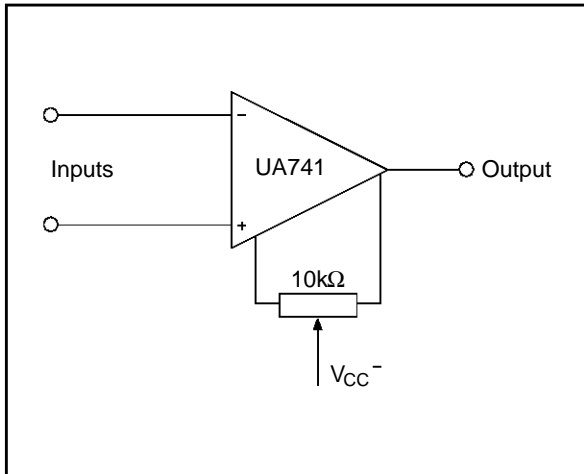
**INPUT BIAS CURRENT vs AMBIENT TEMPERATURE**



741-20.EPS

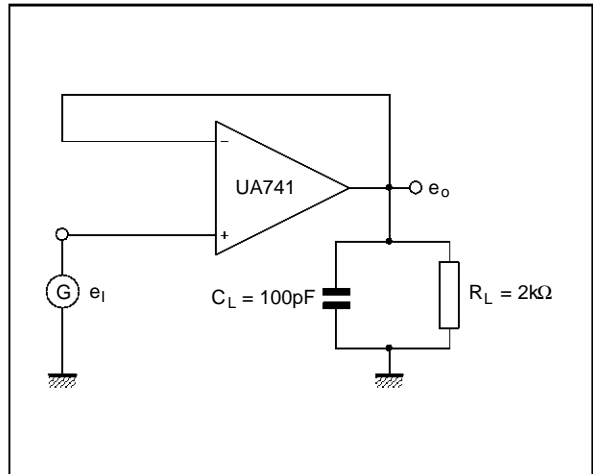
MEASUREMENT DIAGRAMS

OFFSET VOLTAGE NULL CIRCUIT



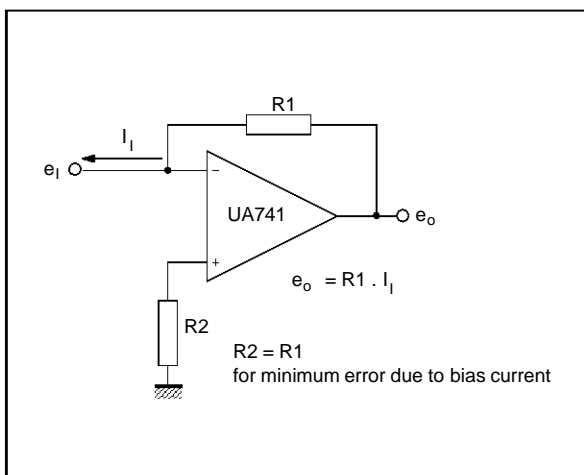
741-21.EPS

TRANSIENT RESPONSE TEST CIRCUIT



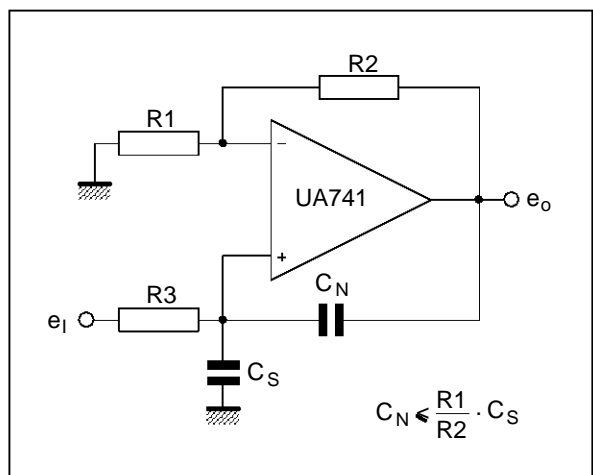
741-22.EPS

CURRENT TO VOLTAGE CONVERTER



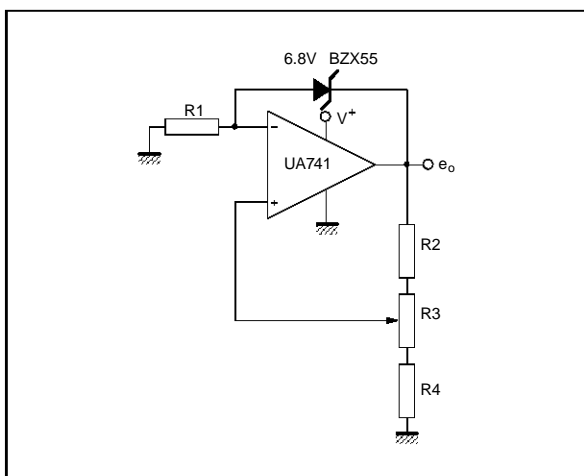
741-23.EPS

NEUTRALIZING INPUT CAPACITANCE TO OPTIMIZE RESPONSE TIME



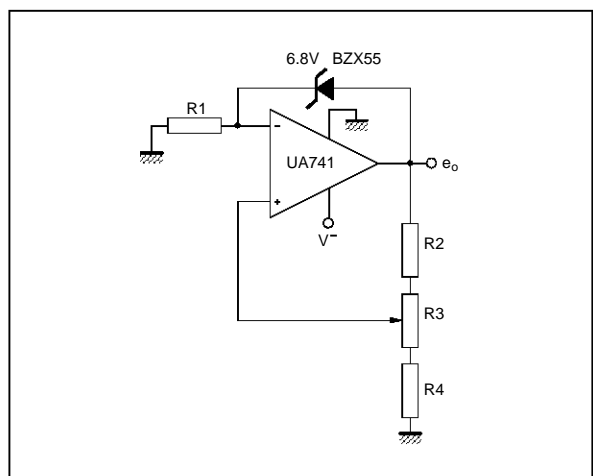
741-24.EPS

POSITIVE VOLTAGE REFERENCE



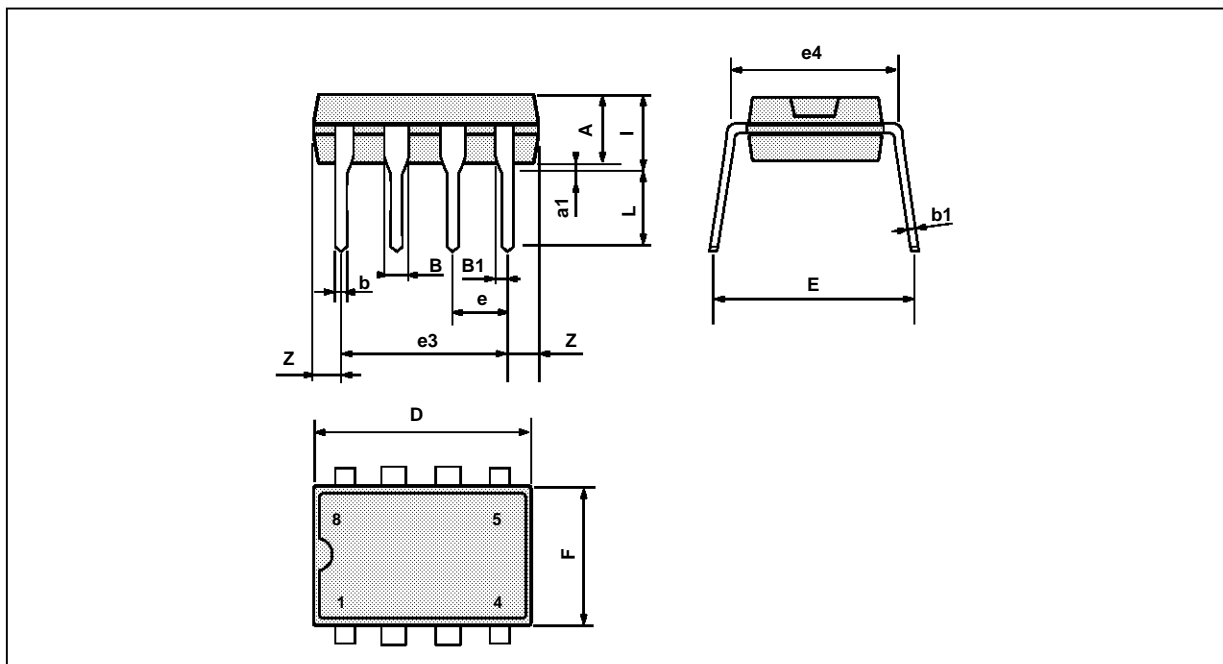
741-25.EPS

NEGATIVE VOLTAGE REFERENCE



741-26.EPS

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



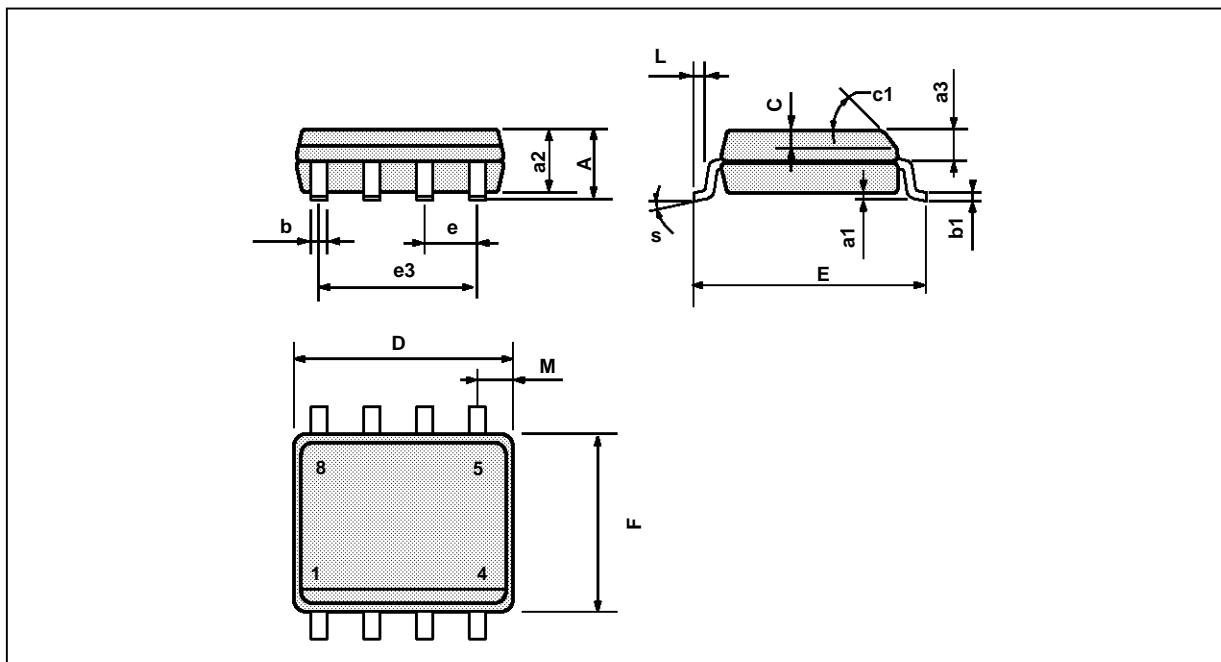
PW-DIP8.EPS

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.TBL



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



PM-S08.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.)					

S08.TBL

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