



7929237 0023607 6 T-79-05-10
SGS-THOMSON
 MICROELECTRONICS

UA741

S G S-THOMSON

30E D

GENERAL-PURPOSE SINGLE OP-AMPS

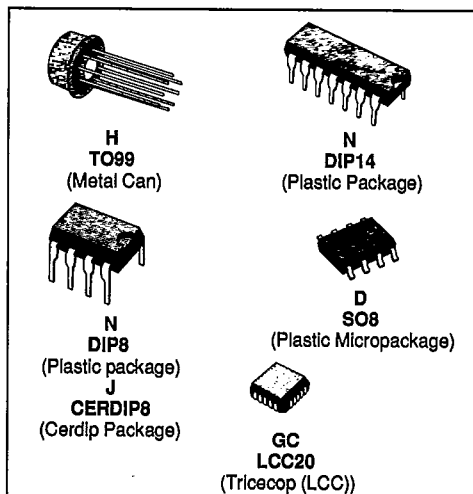
- LARGE INPUT VOLTAGE RANGE
- NO LATCH-UP
- HIGH GAIN
- SHORT-CIRCUIT PROTECTION
- NO FREQUENCY COMPENSATION REQUIRED
- SAME PIN CONFIGURATION AS THE UA709

DESCRIPTION

The UA741 is a high performance monolithic operational 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 provides superior performance integrator, summing amplifier, and general feedback applications. the internal compensation network (6 dB/octave) insures stability in closed loop applications.

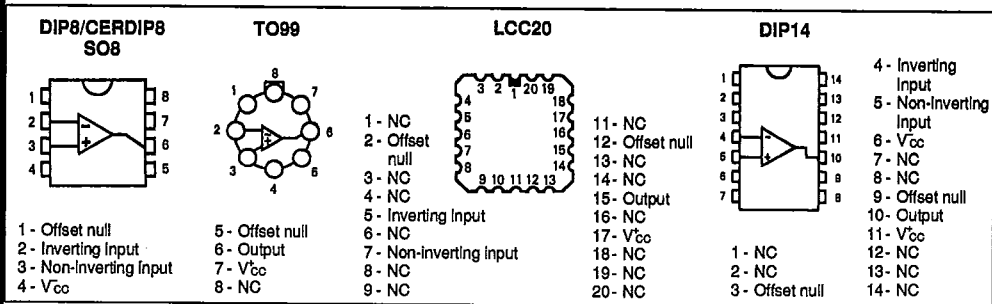


ORDER CODES

Part Number	Temperature Range	Package					
		H	J	GC	N	14	D
UA741C/E	0 °C to + 70 °C	•	•		•	•	•
UA741I	-40 °C to + 105 °C	•			•	•	
UA741M/A	-55 °C to + 125 °C	•	•	•			

Note : Hi-Rel Versions Available
Examples : UA741CN, UA741IH

PIN CONNECTIONS (top views)

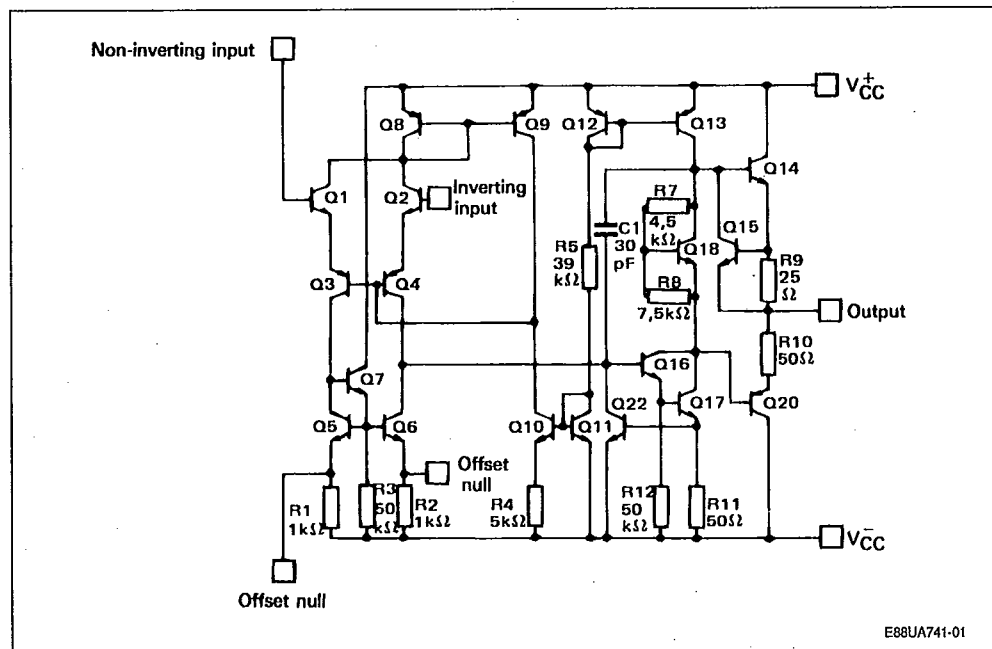


ABSOLUTE MAXIMUM RATINGS S G S-THOMSON

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Symbol	Parameter	Value			Unit
		UA741M, A	UA741I	UA741C, E	
V_{CC}	Supply Voltage	± 22	± 22	± 22	V
V_I	Input Voltage	± 15	± 15	± 15	V
V_{id}	Differential Input Voltage	± 30	± 30	± 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	°C
T_{stg}	Storage Temperature Range	-65 to 150	-65 to 150	-65 to 150	°C

SCHEMATIC DIAGRAM



Case	Offset Null	Inverting Input	Non-Inverting Input	V_{CC}	V_{EE}	Output	N.C.
TO99/DIP8/CERDIP8/SO8	1, 5	2	3	4	7	6	8
DIP14	3, 9	4	5	6	11	10	*
LCC20	2, 12	5	7	10	17	15	*

* TO116, LCC20 : Other pins are not connected.

ELECTRICAL CHARACTERISTICS S G S-THOMSON

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UA741M/A : $-55^{\circ}\text{C} \leq T_{\text{amb}} \leq +125^{\circ}\text{C}$, $V_{\text{CC}} = \pm 15\text{ V}$ UA741I : $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +105^{\circ}\text{C}$, $V_{\text{CC}} = \pm 15\text{ V}$ UA741C/E : $0^{\circ}\text{C} \leq T_{\text{amb}} \leq +70^{\circ}\text{C}$, $V_{\text{CC}} = \pm 15\text{ V}$

(unless otherwise specified)

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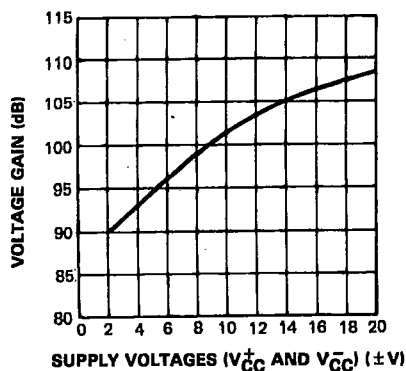
Symbol	Parameter	UA741C, E, I, M, A			Unit
		Min.	Typ.	Max.	
V_{IO}	Input Offset Voltage $R_S \leq 10\text{ k}\Omega$ $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$ UA741E, A $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$		1 1	5 6 2 4	mV
I_{IO}	Input Offset Current $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$		2	20 40	nA
I_{IB}	Input Bias Current $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$		10	100 200	nA
A_{VD}	Large Signal Voltage Gain ($V_O = \pm 10\text{ V}$, $R_L = 2\text{ k}\Omega$) $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$	50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio ($R_S \leq 10\text{ k}\Omega$) $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$	77 77	90		dB
I_{CC}	Supply Current, no Load $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$		1.7	2.8 3.3	mA
V_{I}	Input Voltage Range $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$	- 12 - 12		+ 12 + 12	V
CMR	Common Mode Rejection Ratio ($R_S \leq 10\text{ k}\Omega$) $T_{\text{amb}} = 25^{\circ}\text{C}$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$	70 70	90		dB
I_{OS}	Output Short-circuit Current $T_{\text{amb}} = 25^{\circ}\text{C}$	10	25	40	mA
$\pm V_{\text{OPP}}$	Output Voltage Swing $T_{\text{amb}} = 25^{\circ}\text{C}$ $R_L = 10\text{ k}\Omega$ $R_L = 2\text{ k}\Omega$ $T_{\text{min}} \leq T_{\text{amb}} \leq T_{\text{max}}$ $R_L = 10\text{ k}\Omega$ $R_L = 2\text{ k}\Omega$	12 10 12 10	14 13		V
S_{VO}	Slew-rate ($V_{\text{I}} = \pm 10\text{ V}$, $R_L = 2\text{ k}\Omega$, $C_L \leq 100\text{ pF}$, $T_{\text{amb}} = 25^{\circ}\text{C}$, unity gain)	0.25	0.5		V/ μs
t_r	Rise Time ($V_{\text{I}} = \pm 20\text{ mV}$, $R_L = 2\text{ k}\Omega$, $C_L \leq 100\text{ pF}$, $T_{\text{amb}} = 25^{\circ}\text{C}$, unity gain)		0.3		μs
K_{OV}	Overshoot ($V_{\text{I}} = \pm 20\text{ mV}$, $R_L = 2\text{ k}\Omega$, $C_L \leq 100\text{ pF}$, $T_{\text{amb}} = 25^{\circ}\text{C}$, unity gain)		5		%
R_{I}	Input Resistance, $T_{\text{amb}} = 25^{\circ}\text{C}$	0.3	2		$\text{m}\Omega$

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	UA741C, E, I, M, A			Unit
		Min.	Typ.	Max.	
GPB	Gain Bandwidth Product ($V_i = 10$ mV, $R_L = 2$ k Ω , $C_L \leq 100$ pF $f = 100$ kHz, $T_{amb} = 25$ °C)	0.7	1	1.6	MHz
THD	Total Harmonic Distortion ($f = 1$ kHz, $A_v = 20$ dB, $R_L = 2$ k Ω , $V_O = 2$ V _{pp} $C_L \leq 100$ pF, $T_{amb} = 25$ °C)		0.06		%
V_N	Equivalent Input Noise Voltage ($f = 1$ kHz, $R_G = 100$ Ω)		23		nV/ $\sqrt{Hz}$
	Phase Margin		50		Degrees

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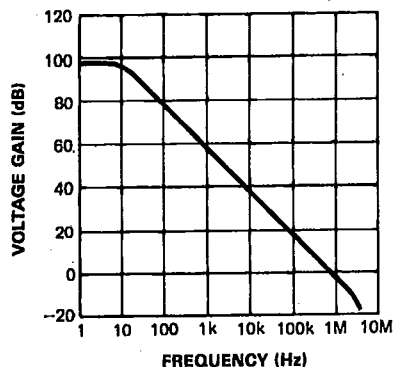
OPEN LOOP VOLTAGE GAIN (Typ.)



E88UA741-02

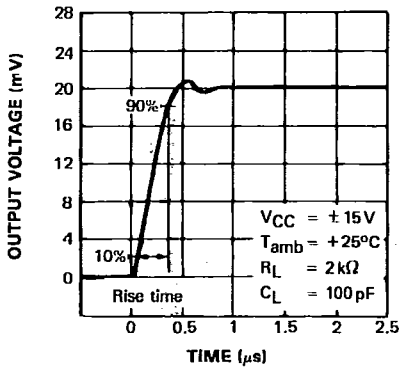
30E D

OPEN LOOP FREQUENCY RESPONSE (Typ.)



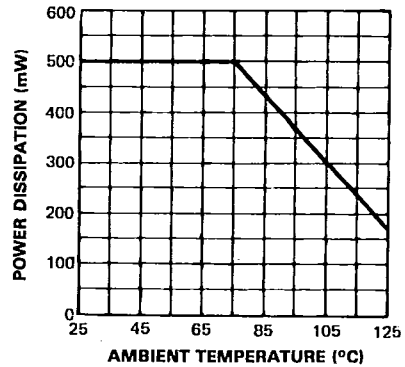
E88UA741-03

TRANSIENT RESPONSE (Typ.)



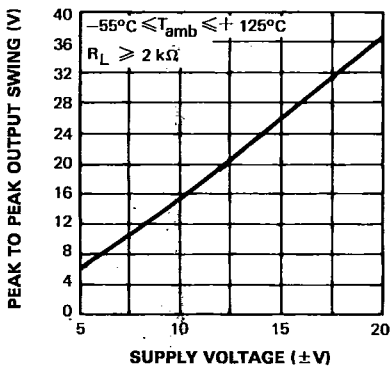
E88UA741-04

ABSOLUTE MAXIMUM POWER DISSIPATION



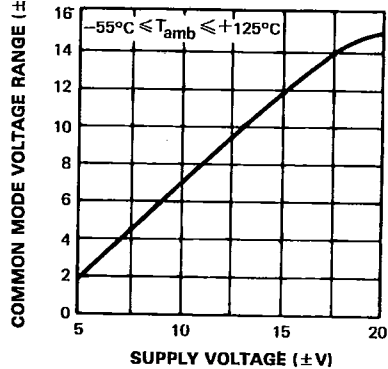
E88UA741-05

OUTPUT VOLTAGE SWING



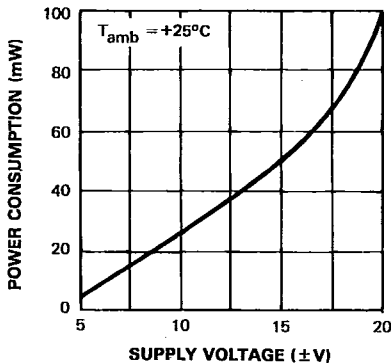
E88UA741-06

INPUT COMMON MODE VOLTAGE RANGE



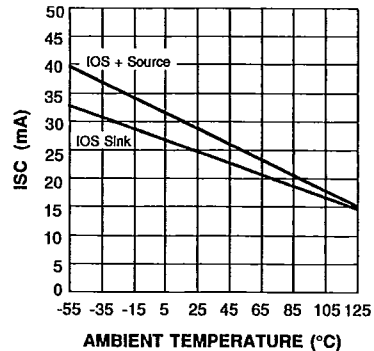
E88UA741-07

POWER CONSUMPTION



E88UA741-08

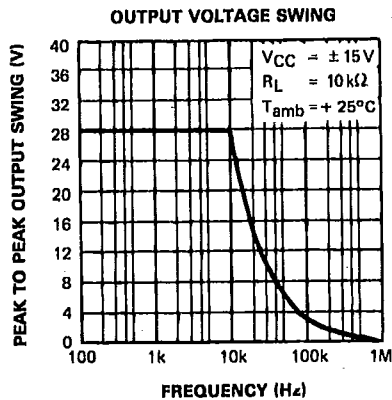
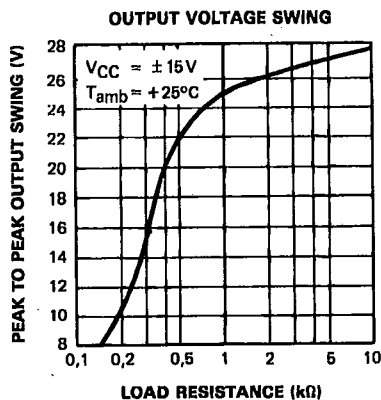
OUTPUT CURRENT vs AMBIENT TEMPERATURE



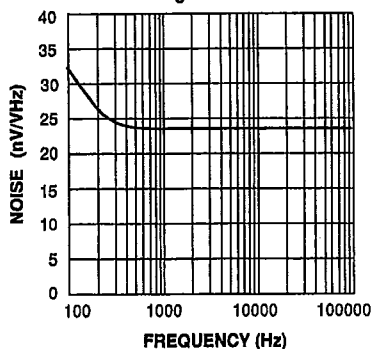
E88UA741-09

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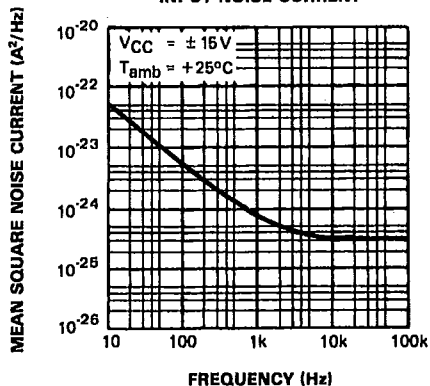


E88UA741-10
EQUIVALENT INPUT NOISE vs FREQUENCY
 $R_g = 100 \Omega$



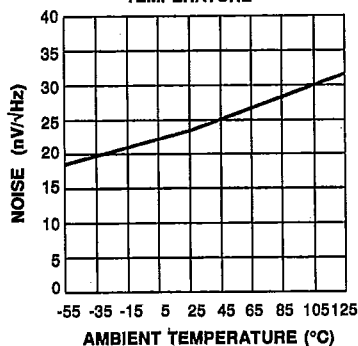
E88UA741-12

E88UA741-11
INPUT NOISE CURRENT



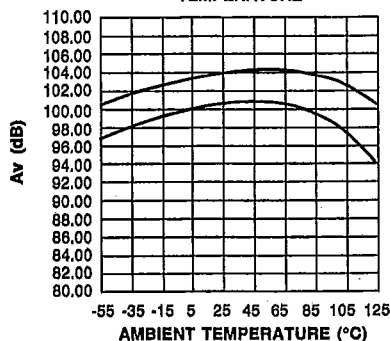
E88UA741-13

EQUIVALENT INPUT NOISE vs AMBIENT TEMPERATURE



E88UA741-14

LARGE SIGNAL VOLTAGE GAIN vs AMBIENT TEMPERATURE

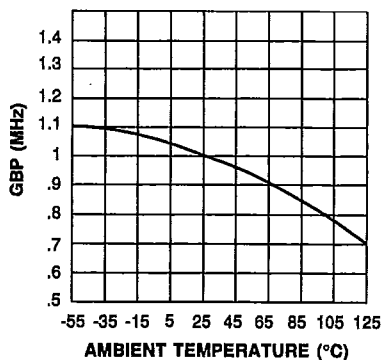


E88UA741-15

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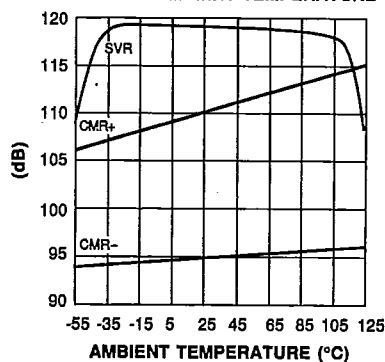
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GAIN BANDWIDTH PRODUCT vs AMBIENT TEMPERATURE



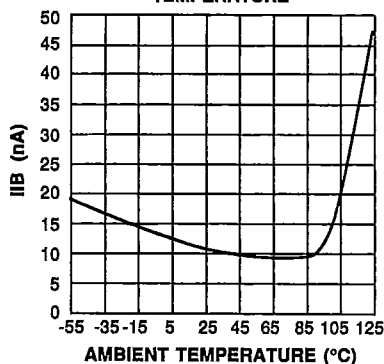
E88UA741-16

POWER SUPPLY & COMMON MODE REJECTION RATIO vs AMBIENT TEMPERATURE



E88UA741-17

INPUT BIAS CURRENT vs AMBIENT TEMPERATURE

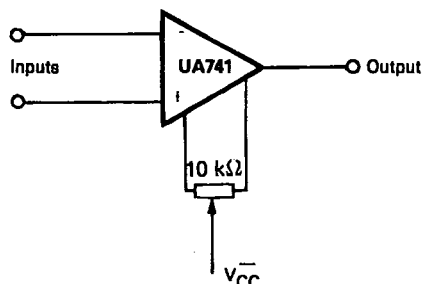


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MEASUREMENT DIAGRAMS

VOLTAGE OFFSET NULL CIRCUIT

TO99 - DIP8 - Cerdip8

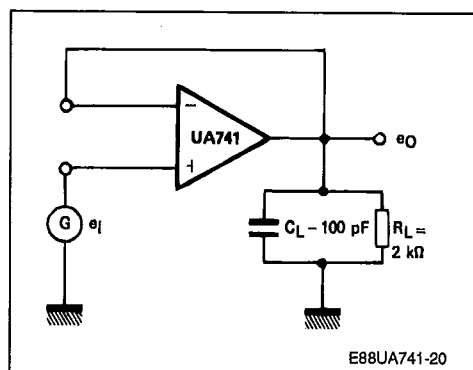


E88UA741-19

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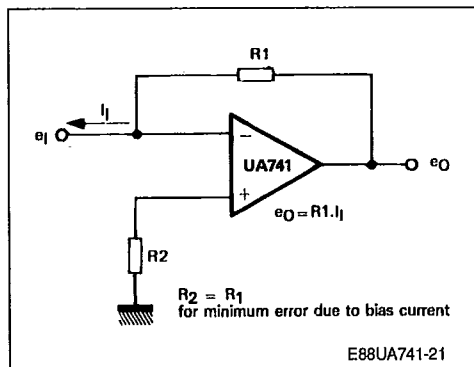
TRANSIENT RESPONSE TEST CIRCUIT



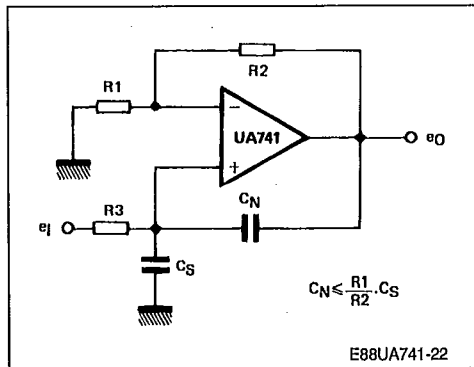
E88UA741-20

MEASUREMENT DIAGRAMS (continued)

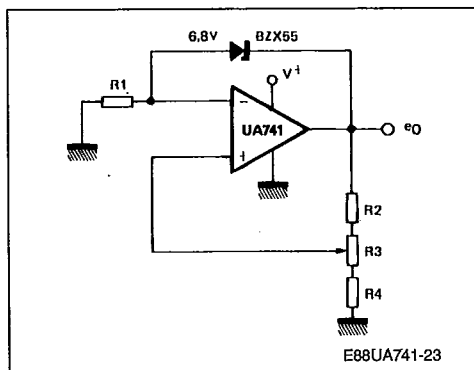
CURRENT TO VOLTAGE CONVERTER



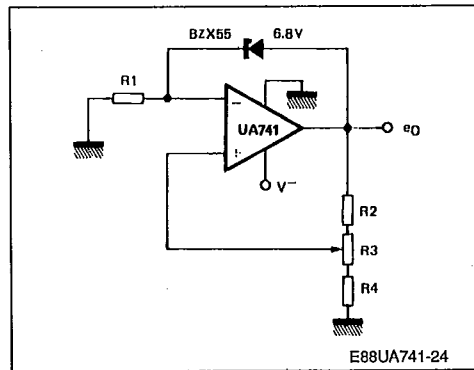
NEUTRALIZING INPUT CAPACITANCE TO OPTIMIZE RESPONSE TIME



POSITIVE VOLTAGE REFERENCE



NEGATIVE VOLTAGE REFERENCE



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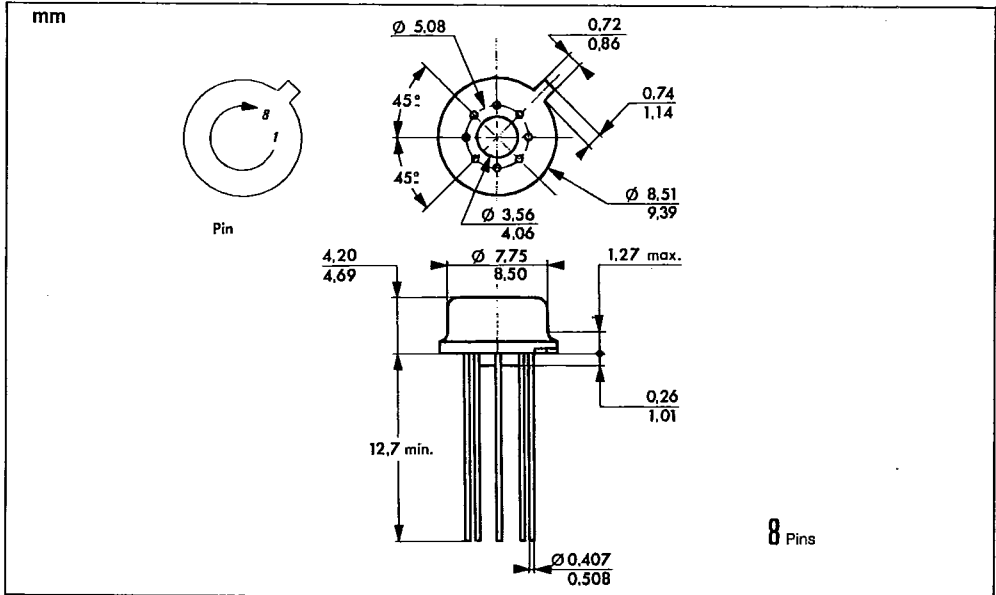
30E D

PACKAGE MECHANICAL DATA

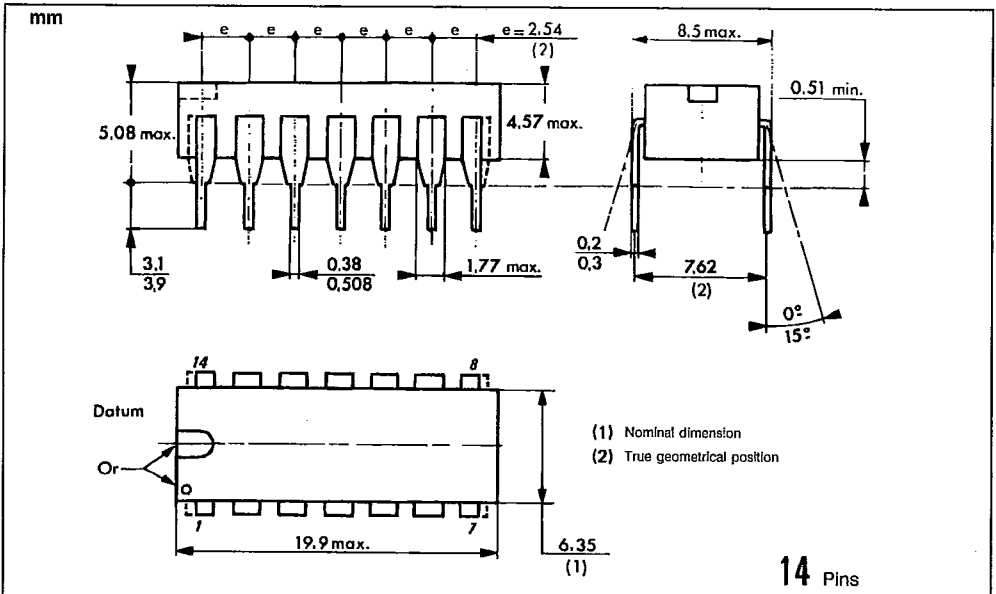
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8 PINS - TO99 - METAL CAN



14 PINS - PLASTIC DIP



30E D



20 PINS

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PACKAGE MECHANICAL DATA (continued)

8 PINS - PLASTIC MICROPACKAGE (SO) S G S-THOMSON

30E D

