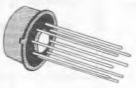
SGS-THOMSON MICROELECTRONICS

TL072
TL072A-TL072B

LOW NOISE J-FET INPUT DUAL OP–AMPs

- LOW POWER CONSUMPTION
- WIDE COMMON-MODE AND DIFFERENTIAL VOLTAGE RANGE
- LOW INPUT BIAS AND OFFSET CURRENT
- LOW NOISE V_n = 18 nV /$\sqrt{Hz}$ (typ)
- OUTPUT SHORT-CIRCUIT PROTECTION
- HIGH INPUT IMPEDANCE J–FET INPUT STAGE
- LOW HARMONIC DISTORTION : 0.01 % (typ)
- INTERNAL FREQUENCY COMPENSATION
- LATCH UP FREE OPERATION
- HIGH SLEW RATE : 13 V/µs (typ)

N
DIP8
(Plastic package)



H
TO-99
(Metal can)

D
SO8
(Plastic micropackage)

GC
LCC20
(Tricecop LCC)

ORDER CODES

Part Number	Temperature Range	Package			
		N	H	D	GC
TL072M	– 55 °C to + 125 °C		•		•
TL072I	– 40 °C to + 105 °C	•		•	
TL072C	0 °C to + 70 °C	•		•	
TL072AC	0 °C to + 70 °C	•		•	
TL072BC	0 °C to + 70 °C	•		•	

Note : Hi-Rel Versions Available
Examples : TL072 MH, TL072 CN

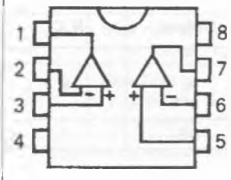
DESCRIPTION

The TL072, TL072A and TL072B are high speed J–FET input dual operational amplifiers incorporating well matched, high voltage J–FET and bipolar transistors in a monolithic integrated circuit.

The devices feature high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

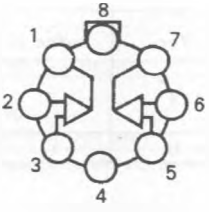
PIN CONNECTIONS (Top views)

DIP8
SO8



1 - Output
2 - Inverting input
3 - Non-inverting input
4 - V_{cc}^-

TO-99



5 - Non-inverting input
6 - Inverting input
7 - Output
8 - V_{cc}^+

LCC20

1 - NC
2 - Output
3 - NC
4 - NC
5 - Inverting input
6 - NC
7 - Non-inverting input
8 - NC
9 - NC
10 - V_{cc}^-
11 - NC
12 - Non-inverting input
13 - NC
14 - NC
15 - Inverting input
16 - NC
17 - Output
18 - NC
19 - NC
20 - V_{cc}^+

MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage (note 1)	± 18	V
V_i	Input Voltage (note 3)	± 15	V
V_{CC}	Diff. Input Voltage (note 2)	± 30	V
P_{tot}	Power Dissipation	680	mW
	Output Short-circuit Duration (note 4)	Indefinite	
T_{oper}	Operating Free-air Temperature Range TL072C, AC, BC TL072I, BI TL072M	 0 to 70 – 40 to 105 – 55 to 125	°C
T_{stg}	Storage Temperature Range	– 65 to 150	°C

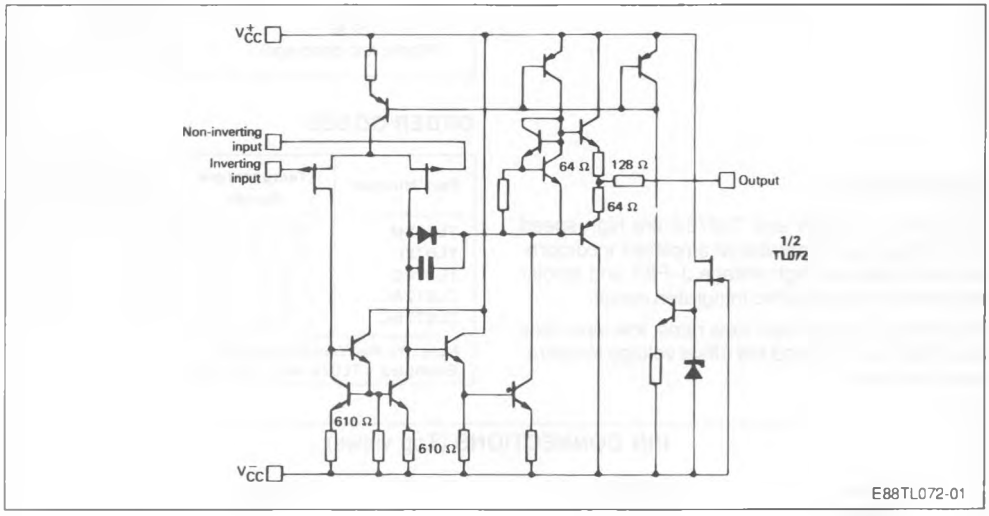
Notes : 1. All voltage values, except differential voltage, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between V_{CC}^+ and V_{CC}^-.

2. Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.

3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.

4. The output may be shorted to ground or to either supply. Temperature and /or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

SCHEMATIC DIAGRAM



Case	Balance	Inverting Input	Non-inverting Input	V_{CC}^-	V_{CC}^+	Output	N.C.
DIP8 SO8 TO-99	1, 5	2	3	4	7	6	8
LCC20	2, 12	5	7	10	17	15	*

* **LCC20** : Other pins are not connected.

ELECTRICAL CHARACTERISTICS

$V_{CC} = \pm 15$ V (unless otherwise specified)
TL072M : $-55\ ^{\circ}C \leq T_{amb} \leq +125\ ^{\circ}C$
TL072I, BI : $-40\ ^{\circ}C \leq T_{amb} \leq +105\ ^{\circ}C$
TL072C, AC, BC: $0\ ^{\circ}C \leq T_{amb} \leq +70\ ^{\circ}C$

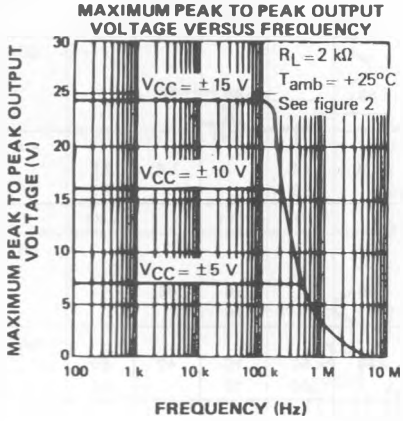
Symbol	Parameter	TL072M, I, BI TL072BC, AC			TL072C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input Offset Voltage T_{amb} = 25 °C ($R_S \leq 10$ kΩ) TL072BI, BC $T_{min} \leq T_{amb} \leq T_{max}$ TL072BI, BC		3 1	5 3 9 5		3	8 13	mV
DV_{io}	Input Offset Voltage Drift		10			10		µV/°C
I_{io}	Input Offset Current * T_{amb} = 25 °C $T_{min} \leq T_{amb} \leq T_{max}$		5	50 4		5	50 4	pA nA
I_{ib}	Input Bias Current * T_{amb} = 25 °C $T_{min} \leq T_{amb} \leq T_{max}$		20	200 20		20	200 20	pA nA
A_{vd}	Large Signal Voltage Gain ($R_L \geq 2$ kΩ, $V_o = \pm 10$ V) T_{amb} = 25 °C $T_{min} \leq T_{amb} \leq T_{max}$	50 25	200		50 25	200		V/mV
SVR	Supply Voltage Rejection Ratio ($R_S \leq 10$ kΩ) T_{amb} = 25 °C $T_{min} \leq T_{amb} \leq T_{max}$	80 80	86		80 80	86		dB
I_{cc}	Supply Current, per Amp. no Load T_{amb} = 25 °C $T_{min} \leq T_{amb} \leq T_{max}$		1.4	2.5 2.5		1.4	2.5 2.5	mA
V_i	Input Voltage Range	−11		+11	−11		+11	V
CMR	Common Mode Rejection Ratio ($R_S \leq 10$ kΩ) T_{amb} = 25 °C $T_{min} \leq T_{amb} \leq T_{max}$	80 80	86		70 70	86		dB
I_{os}	Output Short-circuit Current T_{amb} = 25 °C $T_{min} \leq T_{amb} \leq T_{max}$	10 10	40	60 60	10 10	40	60 60	mA
$\pm V_{opp}$	Output Voltage Swing T_{amb} = 25 °C $R_L \geq 2$ kΩ $R_L \geq 10$ kΩ $T_{min} \leq T_{amb} \leq T_{max}$ $R_L \geq 2$ kΩ $R_L \geq 10$ kΩ	11 12 11 12	12 13.5		11 12 11 12	12 13.5		V
S_{vo}	Slew-rate (V_i = 10 V, R_L = 2 kΩ $C_L \leq 100$ pF, T_{amb} = 25 °C, unity gain)	12	16		8	16		V/µs
t_r	Rise Time (V_i = 20 mV, R_L = 2 kΩ C_L = 100 pF, T_{amb} = 25 °C, unity gain)		0.1			0.1		µs

* The input bias currents are junction leakage currents wich approximatevely double for every 10 °C increase in the junction temperature.

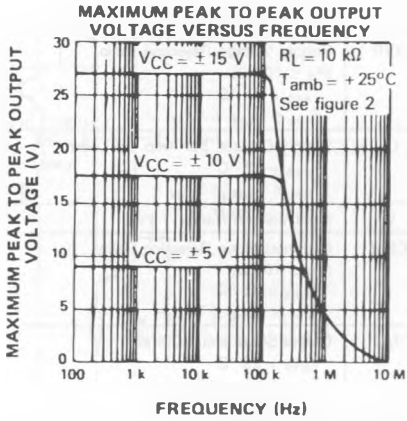
ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	TL072M, I, BI TL072BC, AC			TL072C			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
K_{ov}	Overshoot (V_i = 20 mV, R_L = 2 kΩ $C_L \leq 100$ pF, T_{amb} = 25 °C, unity gain)		10			10		%
GBP	Gain Bandwidth Product (f = 100 kHz, T_{amb} = 25 °C V_{in} = 10 mV, R_L = 2 kΩ, C_L = 100 pF) TL082BI, BC	2.5 3.3	4.0 4.0	5.0 5.0	2.5	4.0	5.0	MHz
R_i	Input Resistance (T_{amb} = 25 °C)		10^{12}			10^{12}		Ω
THD	Total Harmonic Distortion (f = 1 kHz, A_v = 20 dB, R_L = 2 kΩ $C_L \leq 100$ pF, T_{amb} = 25 °C, V_o = 2 V_{pp})		0.01			0.01		%
V_n	Equivalent Input Noise Voltage (f = 1 kHz, R_g = 100 Ω)		15			15		$nV/\sqrt{Hz}$
Øm	Phase Margin		45			45		Degrees
V_{o1}/V_{o2}	Channel Separation A_{vd} = 100, T_{amb} = 25 °C		120			120		dB

TYPICAL CHARACTERISTICS



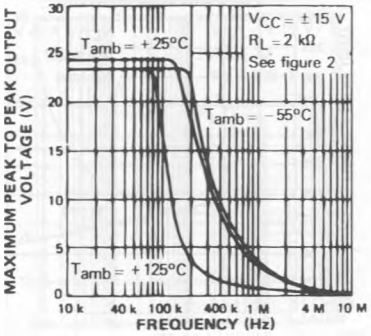
E88TL072-02



E88TL072-03

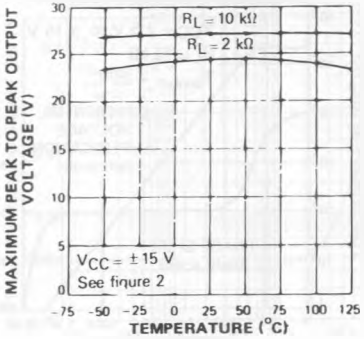
TYPICAL CHARACTERISTICS (continued)

MAXIMUM PEAK TO PEAK OUPUT VOLTAGE VERSUS FREE-AIR TEMP



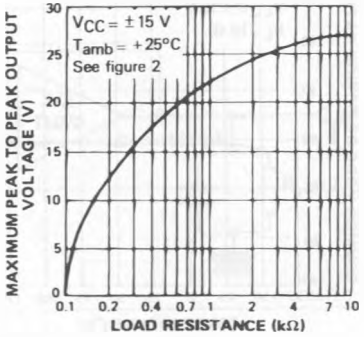
E88TL072-04

MAXIMUM PEAK TO PEAK OUTPUT VOLTAGE VERSUS FREQUENCY



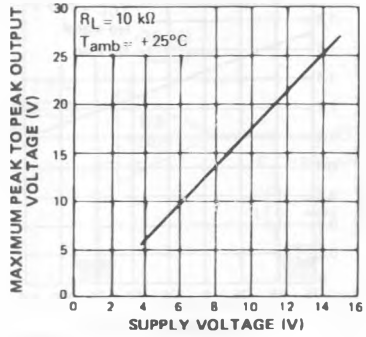
E88TL072-05

MAXIMUM PEAK TO PEAK OUTPUT VOLTAGE VERSUS LOAD RESISTANCE



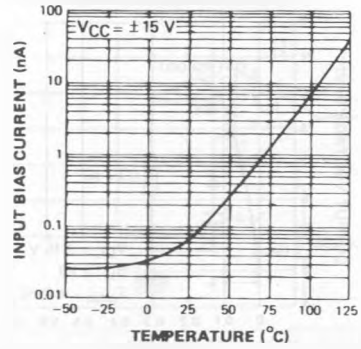
E88TL072-06

MAXIMUM PEAK TO PEAK OUTPUT VOLTAGE VERSUS SUPPLY VOLTAGE



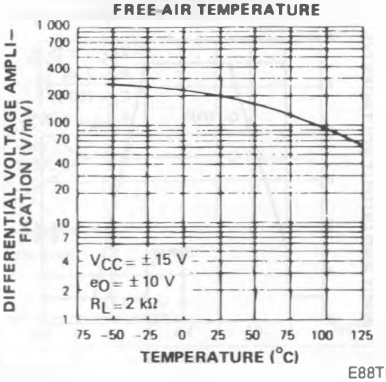
E88TL072-07

INPUT BIAS CURRENT VERSUS FREE-AIR TEMPERATURE



E88TL072-08

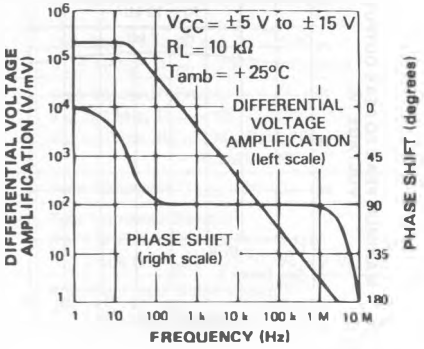
LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION VERSUS FREE-AIR TEMPERATURE



E88TL072-09

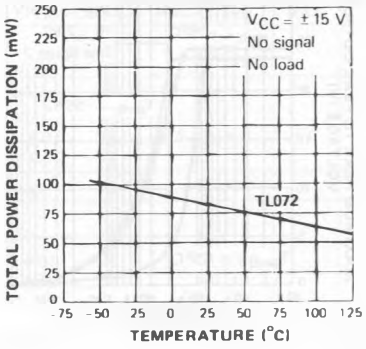
TYPICAL CHARACTERISTICS (continued)

LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



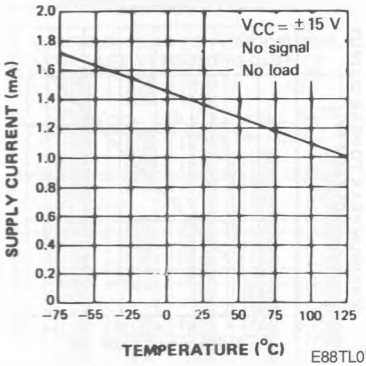
E88TL072-10

TOTAL POWER DISSIPATION VERSUS FREE-AIR TEMPERATURE



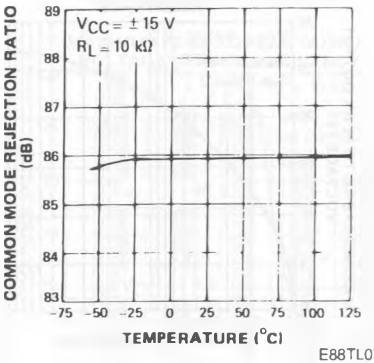
E88TL072-11

SUPPLY CURRENT PER AMPLIFIER VERSUS FREE-AIR TEMPERATURE



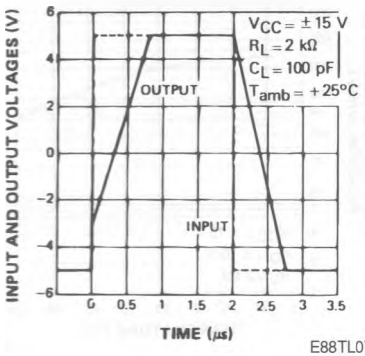
E88TL072-12

COMMON MODE REJECTION RATIO VERSUS FREE-AIR TEMPERATURE



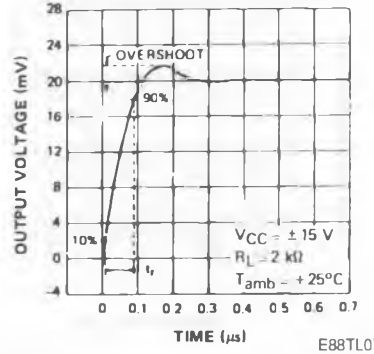
E88TL072-13

VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



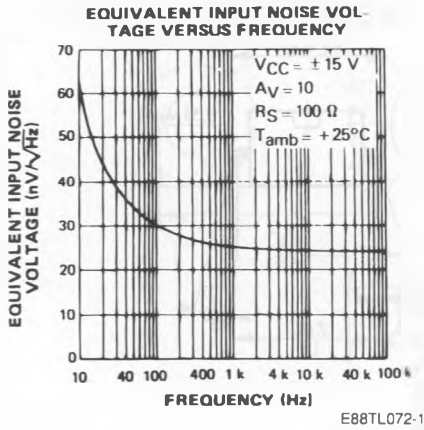
E88TL072-14

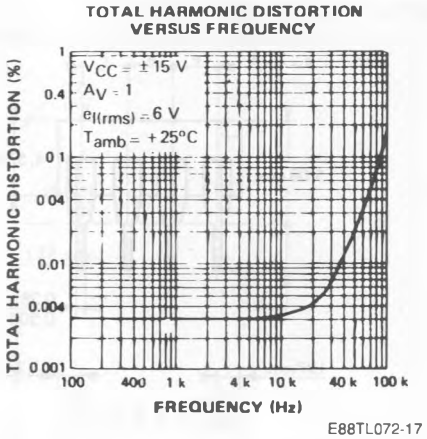
OUTPUT VOLTAGE VERSUS TIME



E88TL072-15

TYPICAL CHARACTERISTICS (continued)





PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage follower.

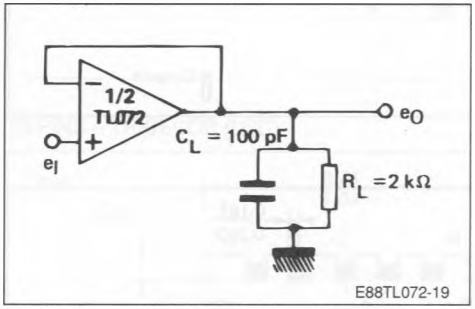
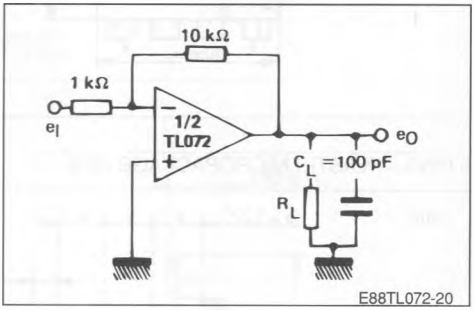
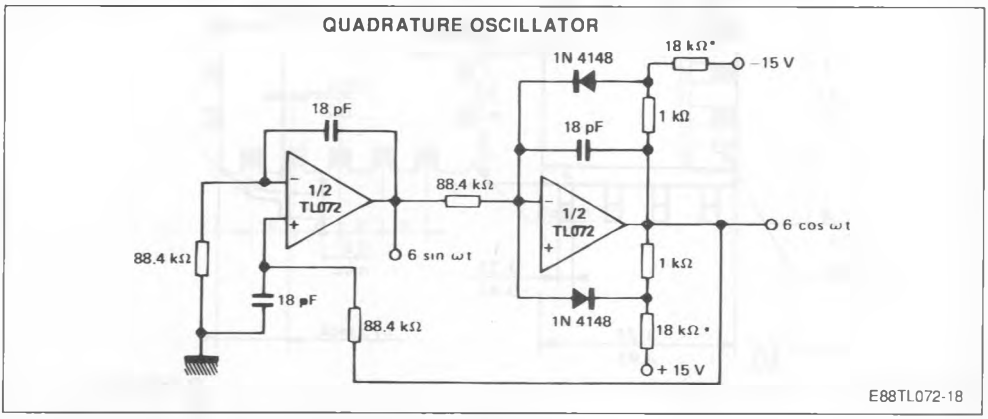


Figure 2 : Gain-of-10 inverting amplifier.



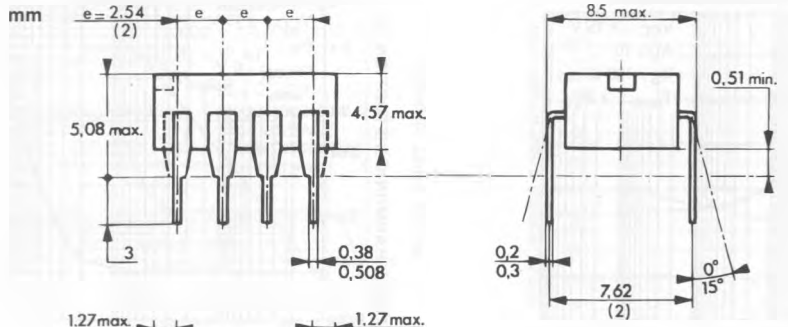
TYPICAL APPLICATION



* These resistor values may be adjusted for a symmetrical output.

PACKAGE MECHANICAL DATA

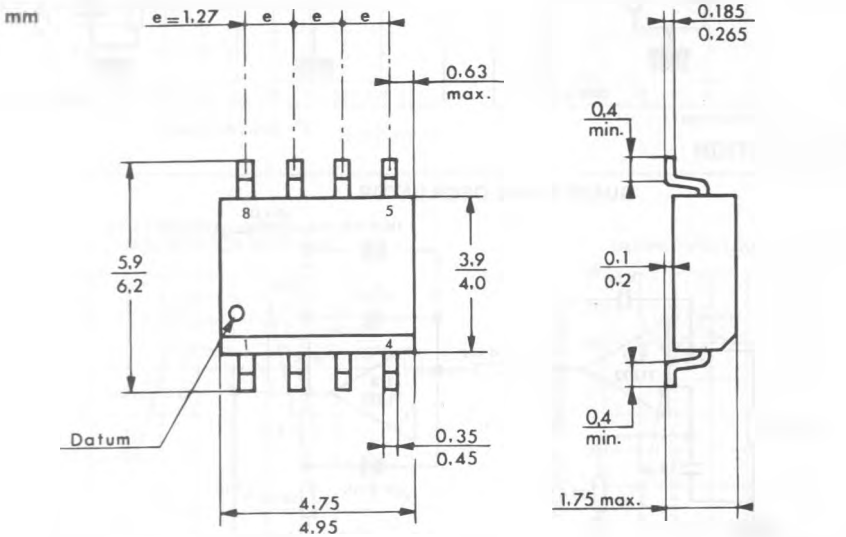
8 PINS – PLASTIC DIP



(1) Nominal dimension
(2) Exact geometrical dimension

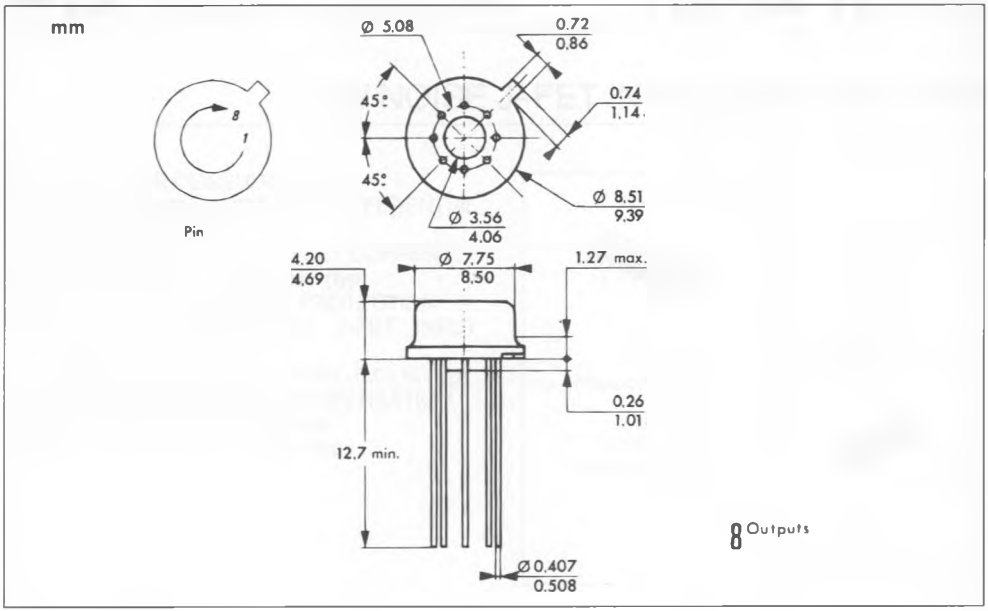
8 Outputs

8 PINS – PLASTIC MICROPACKAGE (SO)



8 Outputs

T0-99 – METAL CAN



20 PINS – TRICECOP (LCC)