

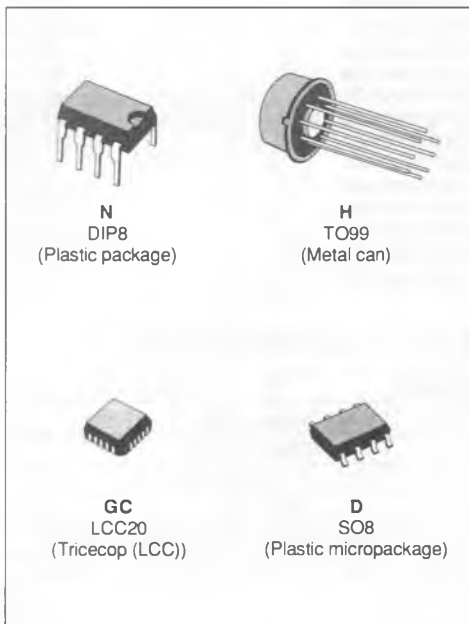
J-FET INPUT SINGLE OP-AMPS

- LOW POWER CONSUMPTION
- WIDE COMMON-MODE AND DIFFERENTIAL VOLTAGE RANGE
- LOW INPUT BIAS AND OFFSET CURRENT
- OUTPUT SHORT-CIRCUIT PROTECTION
- HIGH INPUT IMPEDANCE J-FET INPUT STAGE
- INTERNAL FREQUENCY COMPENSATION
- LATCH UP FREE OPERATION
- HIGH SLEW RATE : 13 V/ μ s (typ)

DESCRIPTION

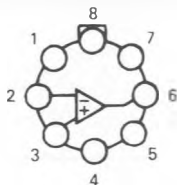
These circuits are high speed J-FET input single operational amplifiers incorporating well matched, high voltage J-FET and bipolar transistors in a monolithic integrated circuit.

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



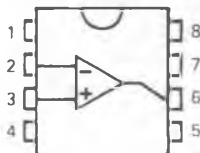
PIN CONNECTIONS (Top views)

TO99

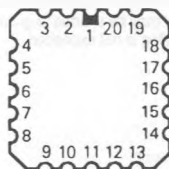


- 1 - Balance
- 2 - Inverting input
- 3 - Non-inverting input
- 4 - V_{CC}
- 5 - Balance
- 6 - Output
- 7 - V_{CC}
- 8 - NC

**DIP
SO8**



LCC20



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

ORDER CODES

Part Number	Temperature	Package
MC35001GC	- 55 °C to + 125 °C	LCC
MC35001AGC	- 55 °C to + 125 °C	LCC
MC35001BGC	- 55 °C to + 125 °C	LCC
MC35001H	- 55 °C to + 125 °C	METAL CAN
MC35001AH	- 55 °C to + 125 °C	METAL CAN
MC35001BH	- 55 °C to + 125 °C	METAL CAN
MC33001N	- 40 °C to + 105 °C	DIP8
MC33001AN	- 40 °C to + 105 °C	DIP8
MC33001BN	- 40 °C to + 105 °C	DIP8
MC33001D	- 40 °C to + 105 °C	SO8
MC33001AD	- 40 °C to + 105 °C	SO8
MC33001BD	- 40 °C to + 105 °C	SO8
MC34001N	0 °C to + 70 °C	DIP8
MC34001AN	0 °C to + 70 °C	DIP8
MC34001BN	0 °C to + 70 °C	DIP8
MC34001D	0 °C to + 70 °C	SO8
MC34001AD	0 °C to + 70 °C	SO8
MC34001BD	0 °C to + 70 °C	SO8

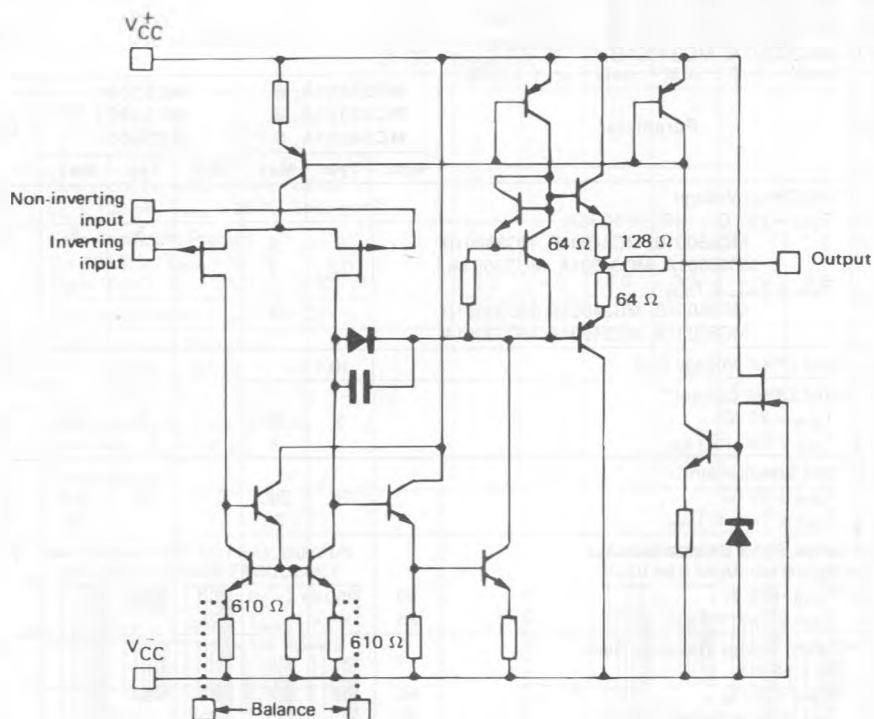
ABSOLUTE MAXIMUM RATINGS

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)	Infinite	
T_{oper}	Operating Free Air Temperature Range MC34001, A, B MC33001, A, B MC35001, A, B	0 to 70 - 40 to 105 - 55 to 125	°C
T_{stg}	Storage Temperature Range	- 65 to 150	°C

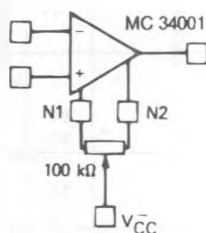
Notes : 1. All voltage values, except differential voltage, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between V_{CC} and V_{CC} .

- Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
- The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
- 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



INPUT OFFSET VOLTAGE NULL CIRCUITS



E88MC34001-01

Case	Balance	Inverting Input	Non-inverting Input	Output	V _{CC}	V _{CC}	N.C.
DIP8 SO8 TO99	1, 5	2	3	6	7	4	8
LCC20	2, 12	5	7	15	17	10	*

* LCC20 : Other pins are not connected.

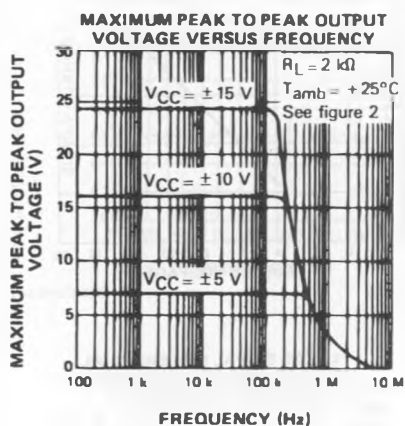
ELECTRICAL CHARACTERISTICS $V_{CC} = \pm 15$ V (unless otherwise specified)MC35001, MC35001A, MC35001B $-55 \leq T_{amb} \leq +125$ °CMC33001, MC33001A, MC33001B $-40 \leq T_{amb} \leq +105$ °CMC34001, MC34001A, MC34001B $0 \leq T_{amb} \leq +70$ °C

Symbol	Parameter	MC35001A, B MC33001A, B MC34001A, B			MC35001 MC33001 MC34001			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{IO}	Input Offset Voltage $T_{amb} = 25$ °C ($R_S < 10$ k Ω) MC35001B, MC34001B, MC33001B MC35001A, MC34001A, MC33001A $T_{min} \leq T_{amb} \leq T_{max}$ MC35001B, MC34001B, MC33001B MC35001A, MC34001A, MC33001A		3 0.2	5 1		3 0.2	8 13	mV
DV_{IO}	Input Offset Voltage Drift		10			10		μ V/°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 ($R_L > 2$ k Ω , $V_o = \pm 10$ 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 ($R_S < 10$ k Ω) $T_{amb} = 25$ °C $T_{min} \leq T_{amb} \leq T_{max}$	80 80	86		80 80	86		dB
I_{CC}	Supply Current, 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 $T_{amb} = 25$ °C $T_{min} \leq T_{amb} \leq T_{max}$	- 11		+ 11	- 11		+ 11	V
CMR	Common Mode Rejection Ratio ($R_S < 10$ k Ω) $T_{amb} = 25$ °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 $R_L \geq 2$ k Ω $R_L \geq 10$ k Ω $T_{min} \leq T_{amb} \leq T_{max}$ $R_L \geq 2$ k Ω $R_L \geq 10$ k Ω	11 12 11 12	12 13.5		11 12 11 12	12 13.5		V
S_{VO}	Slew-rate ($V_I = 10$ V, $R_L = 2$ k Ω) $C_L \leq 100$ pF, $T_{amb} = 25$ °C, unity gain	12	16		12	16		V/ μ s

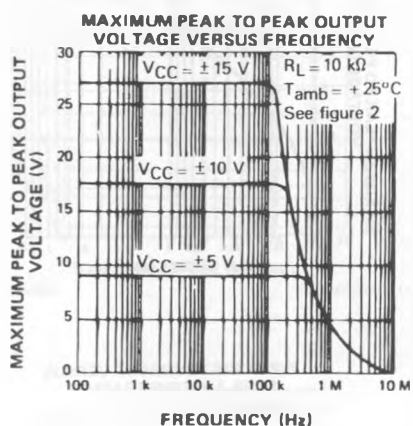
* The input bias currents are junction leakage currents which approximately double for every 10 °C increase in the junction temperature.

ELECTRICAL CHARACTERISTICS (continued)

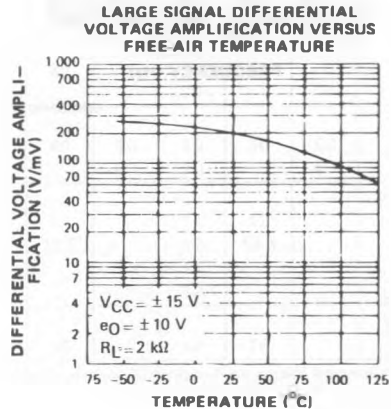
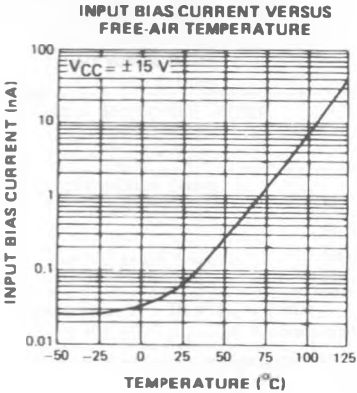
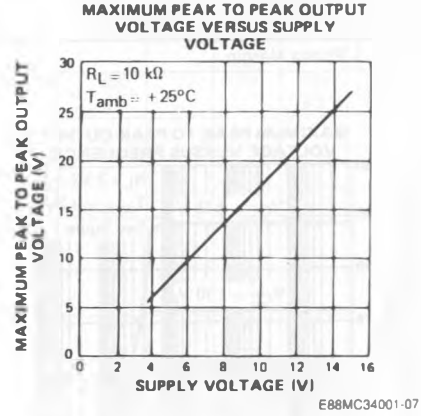
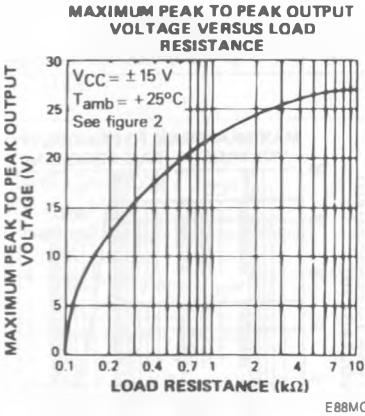
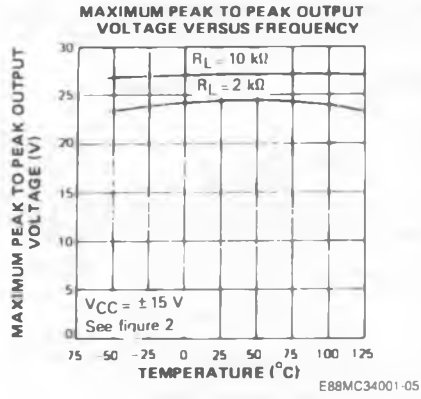
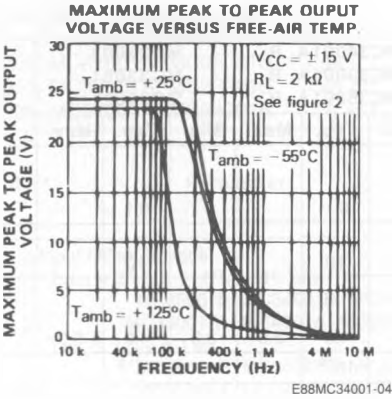
Symbol	Parameter	MC34001A, B MC33001A, B MC35001A, B			MC34001 MC33001 MC35001			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
t_r	Rise Time ($V_I = 20$ mV, $R_L = 2$ k Ω) $C_L = 100$ pF, $T_{amb} = 25$ °C, unity gain)		0.1			0.1		μ s
K_{OV}	Overshoot ($V_I = 20$ mV, $R_L = 2$ k Ω) $C_L \leq 100$ pF, $T_{amb} = 25$ °C, unity gain)		10			10		%
GBP	Gain Bandwidth Product ($f = 100$ kHz, $T_{amb} = 25$ °C $V_{IN} = 10$ mV, $R_L = 2$ k Ω , $C_L = 100$ pF)	3.3	4.0	5.0	3.3	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, $R_L = 2$ k Ω) $C_L \leq 100$ 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/ $\sqrt{Hz}$
ϕ_m	Phase Margin		45			45		Degrees



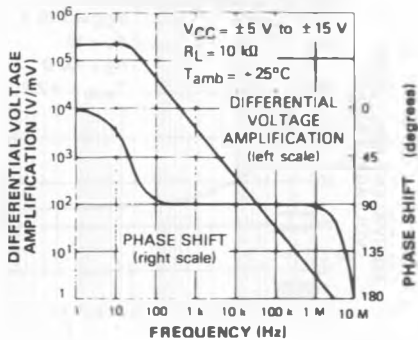
E88MC34001-02



E88MC34001-03

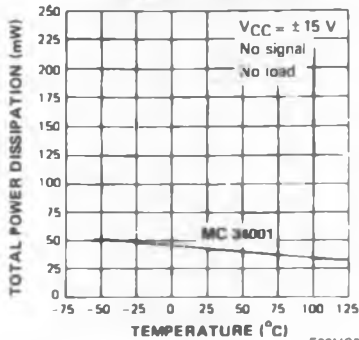


LARGE SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT VERSUS FREQUENCY



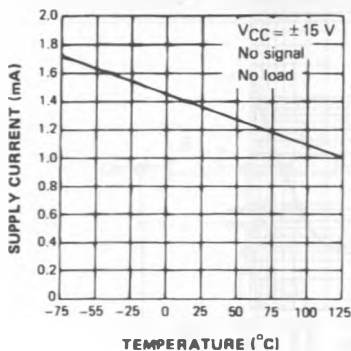
E88MC34001-10

TOTAL POWER DISSIPATION VERSUS FREE AIR TEMPERATURE



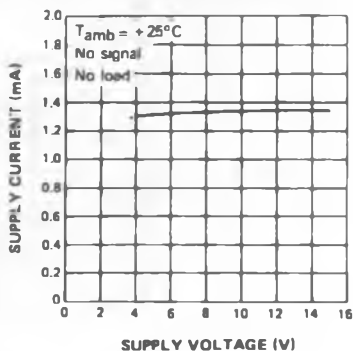
E88MC34001-11

SUPPLY CURRENT PER AMPLIFIER VERSUS FREE-AIR TEMPERATURE



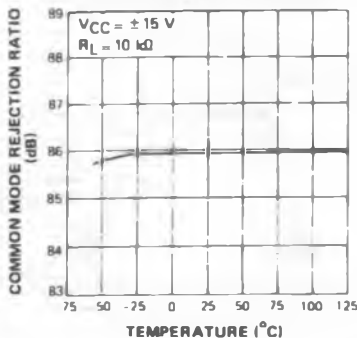
E88MC34001-12

SUPPLY CURRENT PER AMPLIFIER VERSUS SUPPLY VOLTAGE



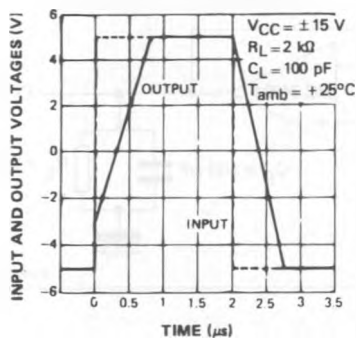
E88MC34001-13

COMMON MODE REJECTION RATIO VERSUS FREE-AIR TEMPERATURE

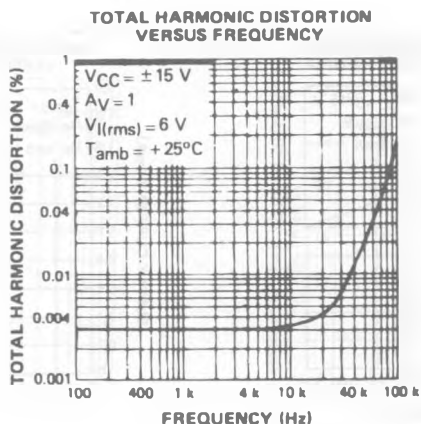
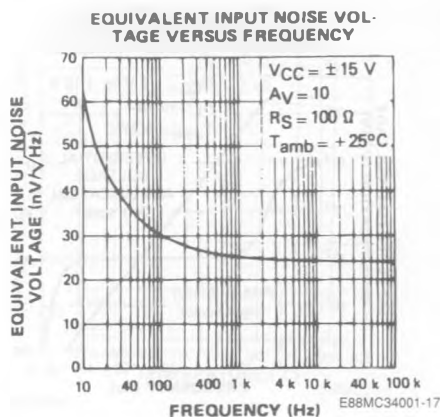
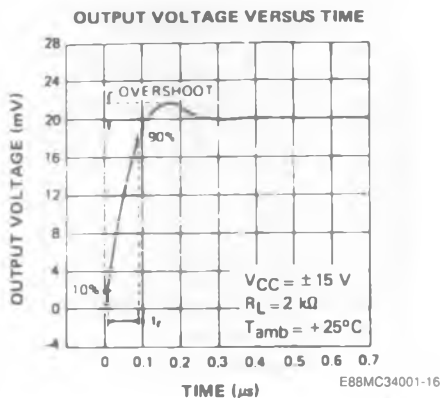


E88MC34001-14

VOLTAGE FOLLOWER LARGE SIGNAL PULSE RESPONSE



E88MC34001-15



E88MC34001-18

PARAMETER MEASUREMENT INFORMATION

Figure 1 : Voltage Follower.

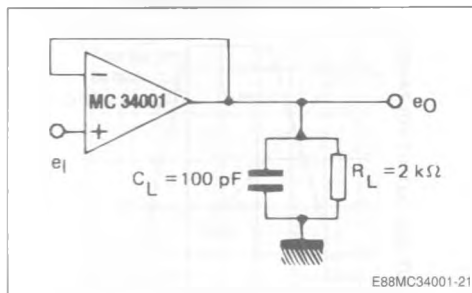
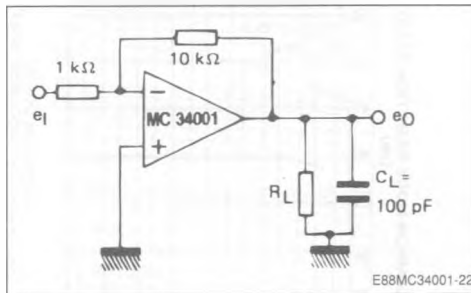
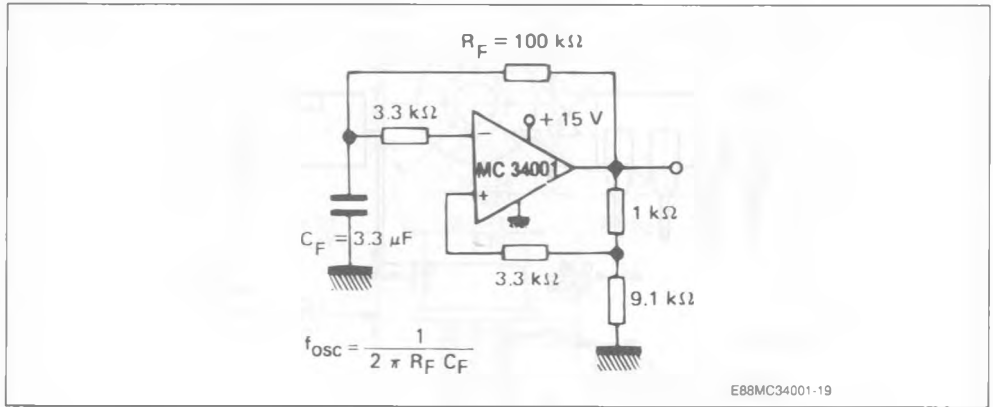


Figure 2 : Gain-of-10 Inverting Amplifier.

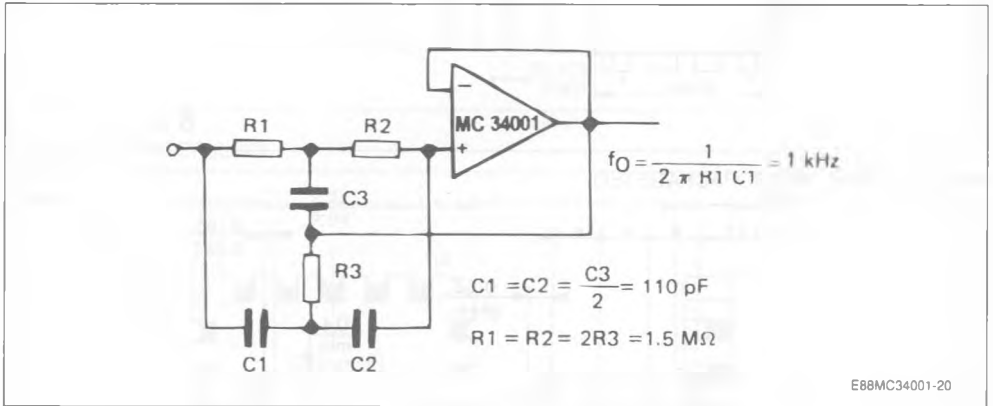


TYPICAL APPLICATIONS

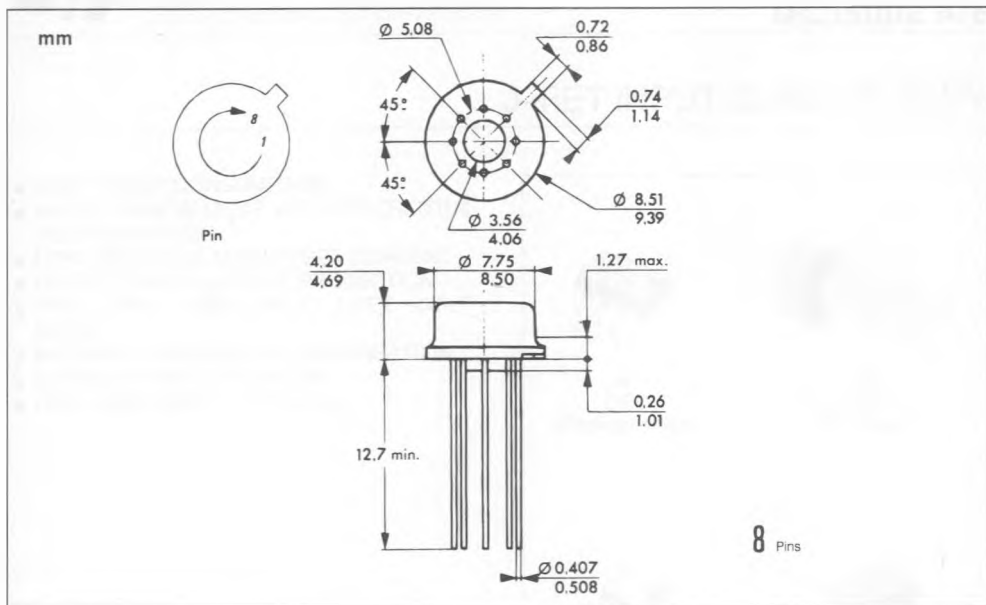
(0.5 Hz) SQUARE WAVE OSCILLATOR



HIGH Q NOTCH FILTER



TO99 – METAL CAN



20 PINS – TRICECOP (LCC)

