

## BIPOLAR ANALOG INTEGRATED CIRCUIT

 $\mu$ PC1316

## DUAL AUDIO POWER AMPLIFIER

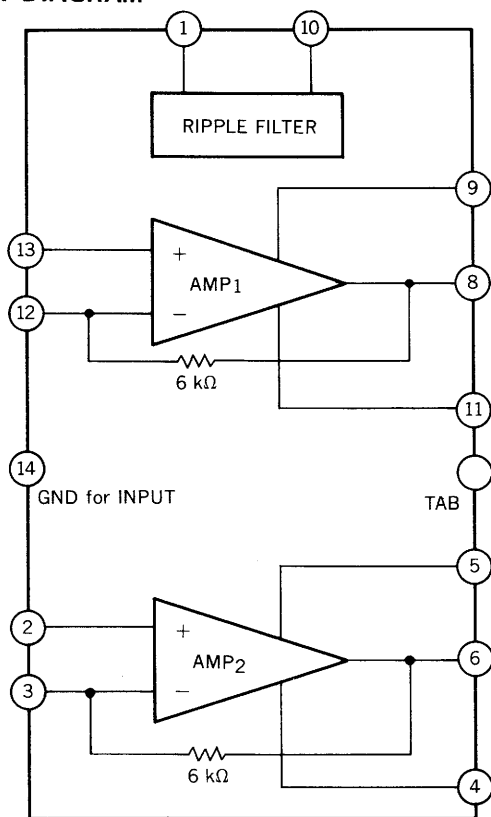
## DESCRIPTION

The  $\mu$ PC1316 is a dual audio power amplifier designed for portable audio sets.

## FEATURES

- Wide operating voltage range.  $V_{CC} = 3$  to  $16$  V
- High output power.  $P_O = 2$  W TYP. @  $12$  V /  $8\ \Omega$  / 10 %  
 $P_O = 1.6$  W TYP. @  $9$  V /  $4\ \Omega$  / 10 %  
 $P_O = 1.2$  W TYP. @  $9$  V /  $8\ \Omega$  / 10 %  
 $P_O = 0.7$  W TYP. @  $6$  V /  $4\ \Omega$  / 10 %  
 $P_O = 0.5$  W TYP. @  $6$  V /  $8\ \Omega$  / 10 %  
 $P_O = 80$  mW @  $4.5$  V /  $32\ \Omega$  / 10 %  
 ( $V_{CC}$  /  $R_L$  / THD)
- High supply voltage rejection. SVR = 45 dB
- Low quiescent current.  $I_{CC} = 12$  mA
- Low pop noise at power switch on and off.

## BLOCK DIAGRAM



## CONNECTION DIAGRAM

| PIN NO | CONNECTION     |
|--------|----------------|
| 1      | Filter         |
| 2      | Input 2        |
| 3      | NFB 2          |
| 4      | Compensation 2 |
| 5      | Bootstrap 2    |
| 6      | Output 2       |
| 7      | NC             |
| TAB    | GND            |
| 8      | Output 1       |
| 9      | Bootstrap 1    |
| 10     | $V_{CC}$       |
| 11     | Compensation 1 |
| 12     | NFB 1          |
| 13     | Input 1        |
| 14     | GND            |

# ORDERING INFORMATION

| PART NUMBER | PACKAGE                               | QUALITY GRADE |
|-------------|---------------------------------------|---------------|
| μPC1316C    | 14 PIN PLASTIC DIP WITH TAB (300 mil) | Standard      |

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

## ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub> = 25 °C)

|                            |                  |             |    |
|----------------------------|------------------|-------------|----|
| Supply Voltage (No Signal) | V <sub>CC1</sub> | 18          | V  |
| Supply Voltage (Operating) | V <sub>CC2</sub> | 16          | V  |
| Power Dissipation          | P <sub>D</sub>   | 2.4 *       | W  |
| Operating Temperature      | T <sub>opt</sub> | −20 to +70  | °C |
| Storage Temperature        | T <sub>stg</sub> | −40 to +150 | °C |

\* 50 x 50 x 0.035 mm Copper heat sink on PCB

## RECOMMENDED OPERATING CONDITIONS (T<sub>a</sub> = 25 °C)

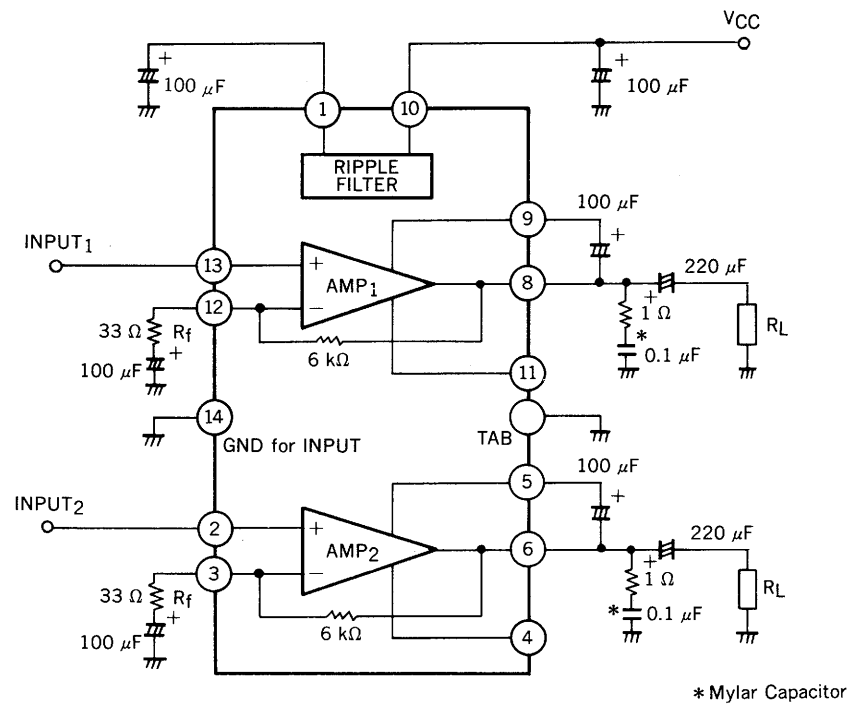
| CHARACTERISTIC                        | SYMBOL               | MIN. | TYP. | MAX. | UNIT |
|---------------------------------------|----------------------|------|------|------|------|
| Supply Voltage (R <sub>L</sub> =16 Ω) | V <sub>CC</sub> (16) | 3    |      | 16   | V    |
| Supply Voltage (R <sub>L</sub> =8 Ω)  | V <sub>CC</sub> (8)  | 3    |      | 13   | V    |
| Supply Voltage (R <sub>L</sub> =4 Ω)  | V <sub>CC</sub> (4)  | 3    |      | 9    | V    |
| Load Impedance                        | R <sub>L</sub>       | 4    | 8    |      | Ω    |
| Voltage Gain                          | A <sub>v</sub>       | 34   | 44   |      | dB   |

## ELECTRICAL CHARACTERISTICS (T<sub>a</sub> = 25 °C)

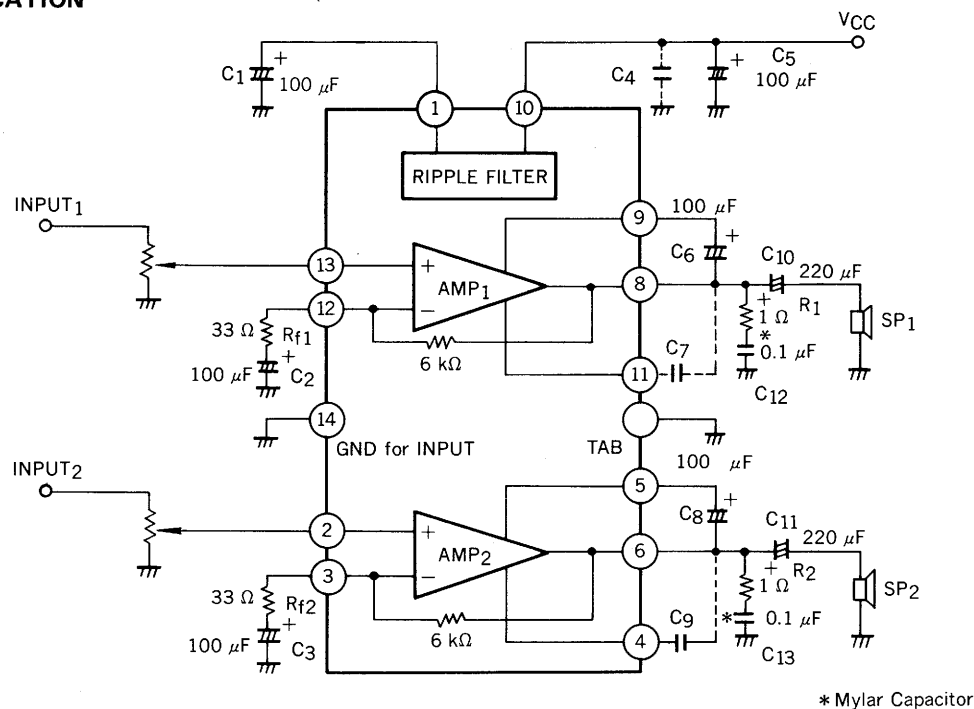
(V<sub>CC</sub>=9 V, R<sub>f</sub>=33 Ω, f=1 kHz, R<sub>L</sub>=8 Ω)

| CHARACTERISTIC            | SYMBOL          | MIN. | TYP. | MAX. | UNIT                 | CONDITION                                                              |
|---------------------------|-----------------|------|------|------|----------------------|------------------------------------------------------------------------|
| Circuit Current           | I <sub>CC</sub> |      | 12   | 25   | mA                   | No Signal                                                              |
| Voltage Gain              | A <sub>v1</sub> | 41   | 44   | 47   | dB                   | P <sub>O</sub> =0.25 W, R <sub>f</sub> =33 Ω                           |
|                           | A <sub>v2</sub> |      | 34   |      | dB                   | P <sub>O</sub> =0.25 W, R <sub>f</sub> =120 Ω                          |
| Output Power              | P <sub>O1</sub> |      | 2    |      | W                    | V <sub>CC</sub> =12 V, R <sub>L</sub> =8 Ω, THD = 10 %                 |
|                           | P <sub>O2</sub> |      | 1.6  |      | W                    | V <sub>CC</sub> =9 V, R <sub>L</sub> =4 Ω, THD = 10 %                  |
|                           | P <sub>O3</sub> | 0.9  | 1.2  |      | W                    | V <sub>CC</sub> =9 V, R <sub>L</sub> =8 Ω, THD = 10 %                  |
|                           | P <sub>O4</sub> |      | 0.7  |      | W                    | V <sub>CC</sub> =6 V, R <sub>L</sub> =4 Ω, THD = 10 %                  |
|                           | P <sub>O5</sub> |      | 0.5  |      | W                    | V <sub>CC</sub> =6 V, R <sub>L</sub> =8 Ω, THD = 10 %                  |
|                           | P <sub>O6</sub> |      | 80   |      | mW                   | V <sub>CC</sub> =4.5 V, R <sub>L</sub> =32 Ω, THD = 10 %               |
| Total Harmonic Distortion | THD1            |      | 0.4  | 1.6  | %                    | P <sub>O</sub> =0.5 W, R <sub>f</sub> =33 Ω                            |
|                           | THD2            |      | 0.3  |      | %                    | P <sub>O</sub> =0.5 W, R <sub>f</sub> =120 Ω                           |
| Output Noise Voltage      | NL              |      | 0.9  | 1.5  | mV <sub>r.m.s.</sub> | R <sub>G</sub> =10 kΩ                                                  |
| Supply Voltage Rejection  | SVR             | 36   | 45   |      | dB                   | R <sub>G</sub> =0, f(ripple)=100 Hz, V(ripple)=0.3 V <sub>r.m.s.</sub> |
| Cross Talk                | CT              | 40   | 55   |      | dB                   | R <sub>G</sub> =0, P <sub>O</sub> =0.25 W                              |
| Channel Balance           | ChB             | −2   | 0    | 2    | dB                   | P <sub>O</sub> =0.25 W                                                 |
| Input Impedance           | Z <sub>in</sub> |      | 5    |      | MΩ                   |                                                                        |

TEST CIRCUIT



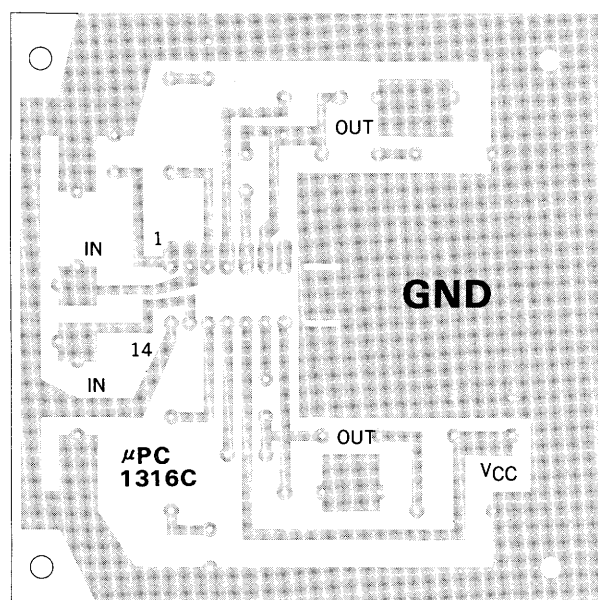
# TYPICAL APPLICATION



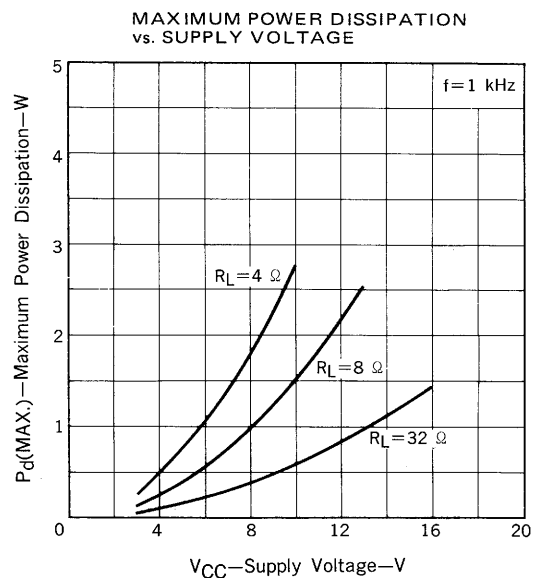
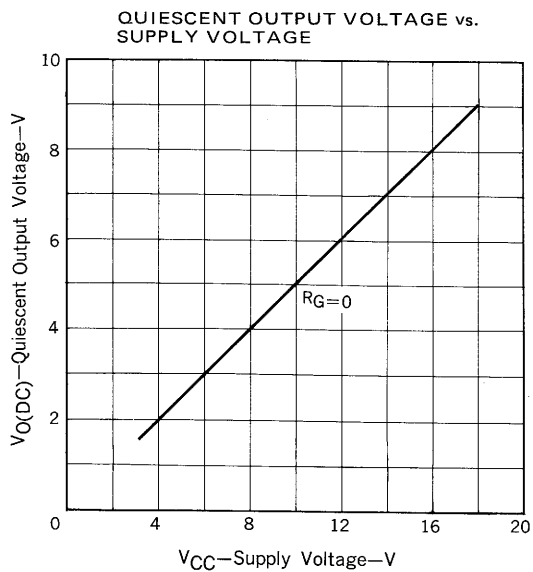
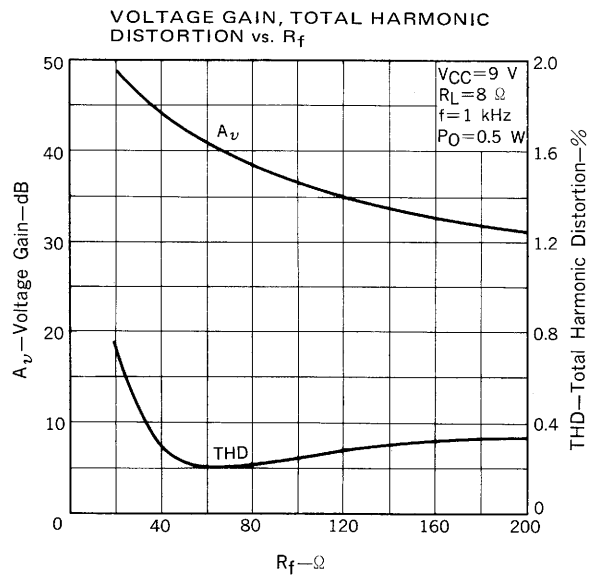
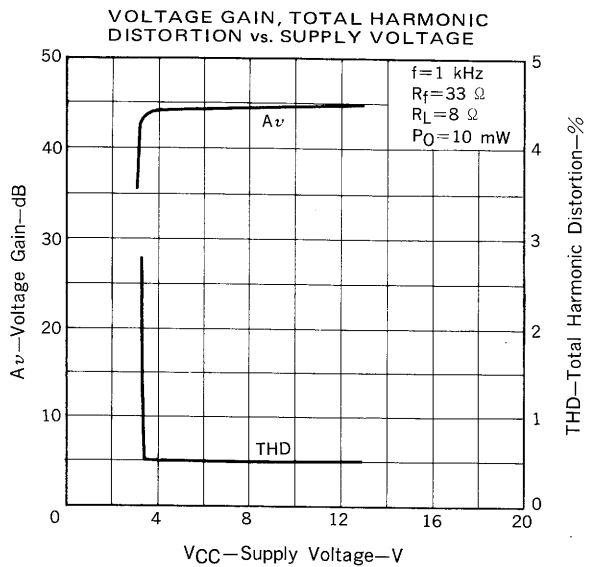
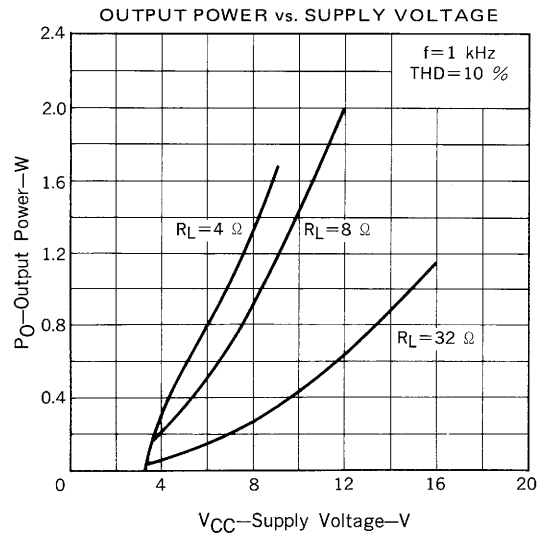
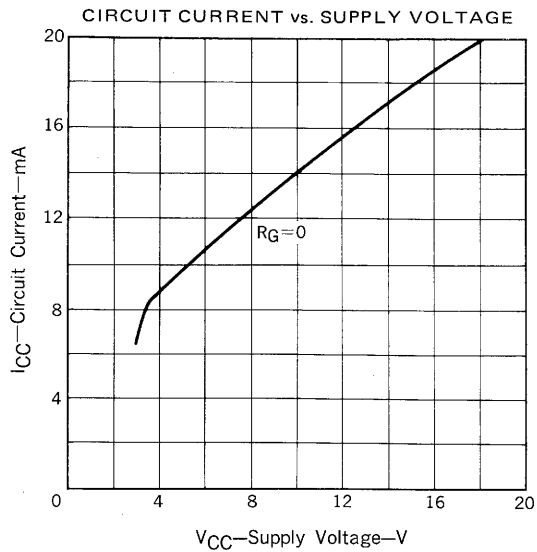
## NOTE FOR USE

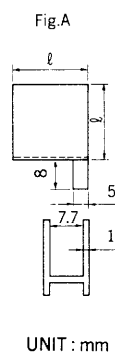
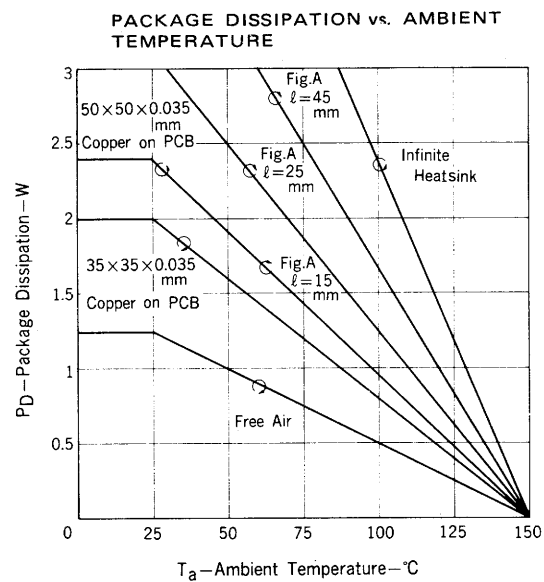
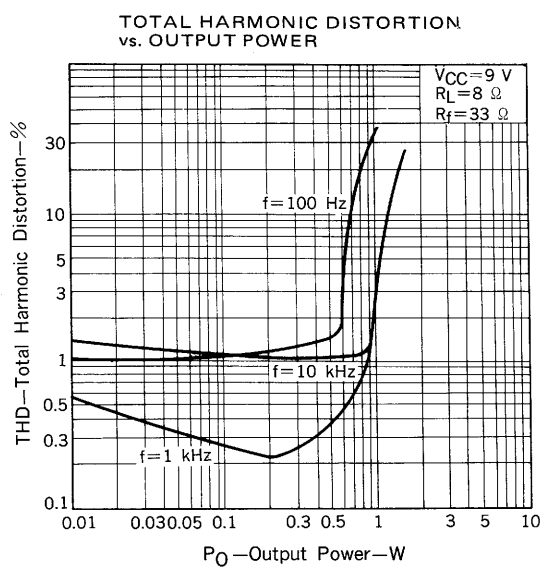
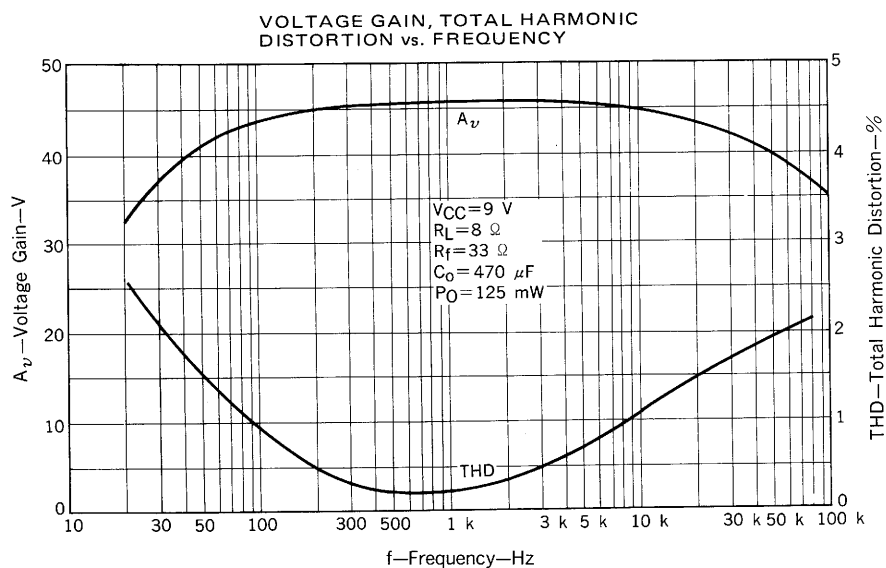
- (1) Mylar capacitor is recommended as C<sub>12</sub>, C<sub>13</sub>.
- (2) Add C<sub>7</sub>, C<sub>9</sub>, in the case of reducing voltage gain at high frequency.
- (3) Add C<sub>4</sub> or increase capacitance of C<sub>12</sub>, C<sub>13</sub> when a oscillation may occur due to the pattern layout on PCB.
- (4) Voltage gain can be changed by value of R<sub>f1</sub>, R<sub>f2</sub>. The voltage gain should be set more than 34 dB.
- (5) When a input capacitor is connected the input terminal, a bias resistor should be connected between its terminal and GND.

## EXAMPLE FOR PRINTED CIRCUIT BOARD (Copper foil side)

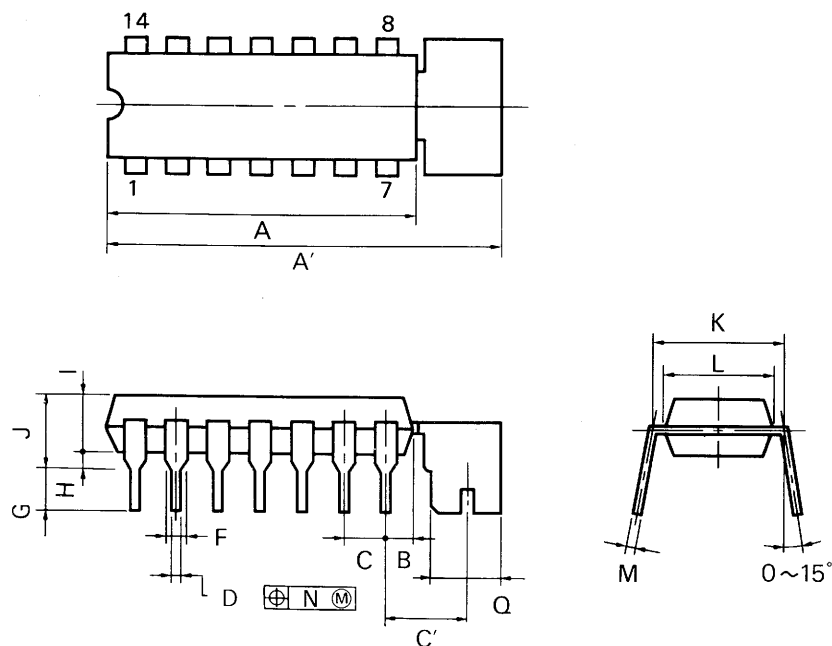


TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )





# 14PIN PLASTIC DIP WITH TAB (300 mil)



P14CT-100-300B

## NOTES

- 1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.
- 2) Item "K" to center of leads when formed parallel.

| ITEM | MILLIMETERS              | INCHES                      |
|------|--------------------------|-----------------------------|
| A    | 20.32 MAX.               | 0.800 MAX.                  |
| A'   | 24.60 MAX.               | 0.969 MAX.                  |
| B    | 2.54 MAX.                | 0.100 MAX.                  |
| C    | 2.54 (T.P.)              | 0.100 (T.P.)                |
| C'   | 4.74                     | 0.187                       |
| D    | 0.50 $\pm 0.10$          | 0.020 $\pm 0.004$<br>-0.005 |
| F    | 1.1 MIN.                 | 0.043 MIN.                  |
| G    | 3.4 $\pm 0.3$            | 0.134 $\pm 0.012$           |
| H    | 0.51 MIN.                | 0.020 MIN.                  |
| I    | 4.31 MAX.                | 0.170 MAX.                  |
| J    | 5.08 MAX.                | 0.200 MAX.                  |
| K    | 7.62 (T.P.)              | 0.300 (T.P.)                |
| L    | 6.4                      | 0.252                       |
| M    | 0.30 $\pm 0.10$<br>-0.05 | 0.012 $\pm 0.004$<br>-0.003 |
| N    | 0.25                     | 0.01                        |
| Q    | 4.40 $\pm 0.50$          | 0.173 $\pm 0.020$           |

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