

BIPOLAR ANALOG INTEGRATED CIRCUIT

 μ PC1316

DUAL AUDIO POWER AMPLIFIER

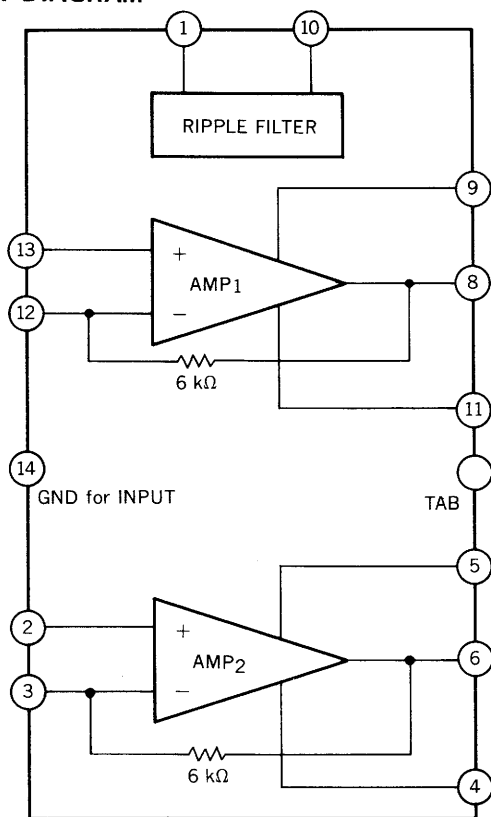
DESCRIPTION

The μ 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 / 8Ω / 10 %
 $P_O = 1.6$ W TYP. @ 9 V / 4Ω / 10 %
 $P_O = 1.2$ W TYP. @ 9 V / 8Ω / 10 %
 $P_O = 0.7$ W TYP. @ 6 V / 4Ω / 10 %
 $P_O = 0.5$ W TYP. @ 6 V / 8Ω / 10 %
 $P_O = 80$ mW @ 4.5 V / 32Ω / 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_a = 25 °C)

| | | | |
|----------------------------|------------------|-------------|----|
| Supply Voltage (No Signal) | V _{CC1} | 18 | V |
| Supply Voltage (Operating) | V _{CC2} | 16 | V |
| Power Dissipation | P _D | 2.4 * | W |
| Operating Temperature | T _{opt} | -20 to +70 | °C |
| Storage Temperature | T _{stg} | -40 to +150 | °C |

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

RECOMMENDED OPERATING CONDITIONS (T_a = 25 °C)

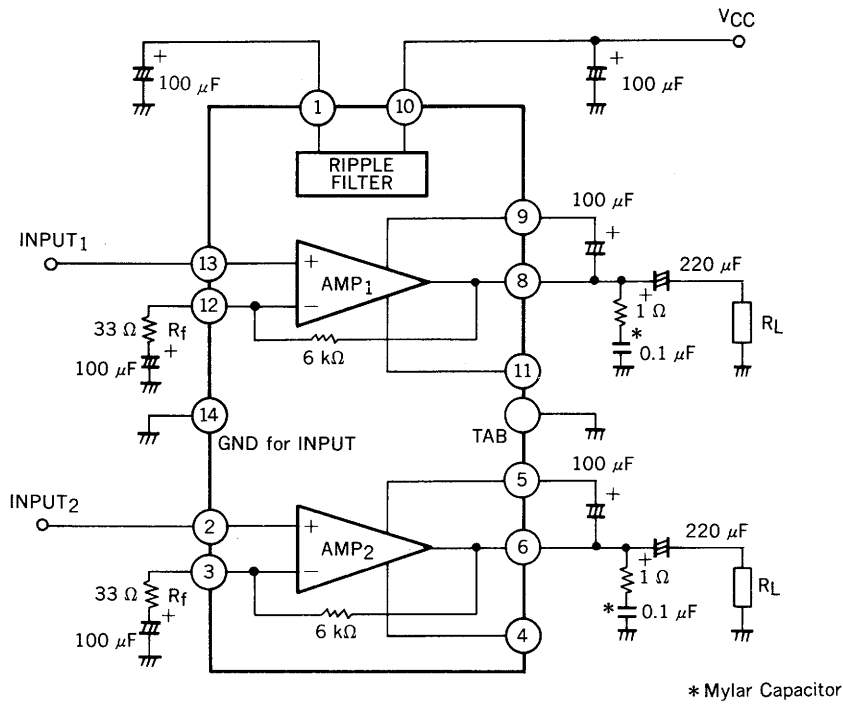
| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------------------|----------------------|------|------|------|------|
| Supply Voltage (R _L =16 Ω) | V _{CC} (16) | 3 | | 16 | V |
| Supply Voltage (R _L =8 Ω) | V _{CC} (8) | 3 | | 13 | V |
| Supply Voltage (R _L =4 Ω) | V _{CC} (4) | 3 | | 9 | V |
| Load Impedance | R _L | 4 | 8 | | Ω |
| Voltage Gain | A _v | 34 | 44 | | dB |

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

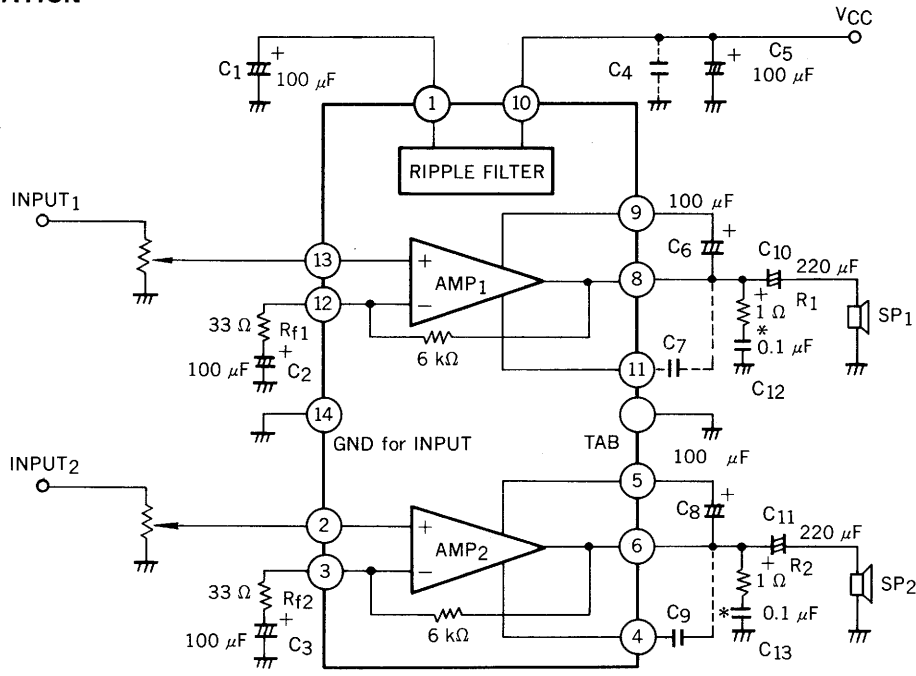
(V_{CC}=9 V, R_f=33 Ω, f=1 kHz, R_L=8 Ω)

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

TEST CIRCUIT



TYPICAL APPLICATION

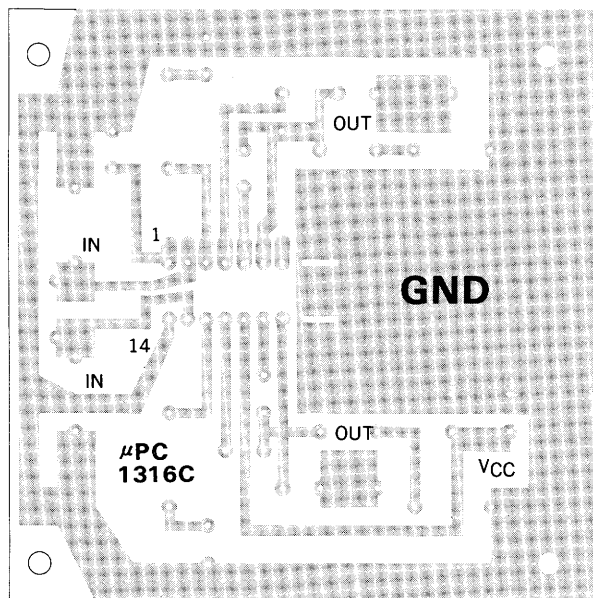


* Mylar Capacitor

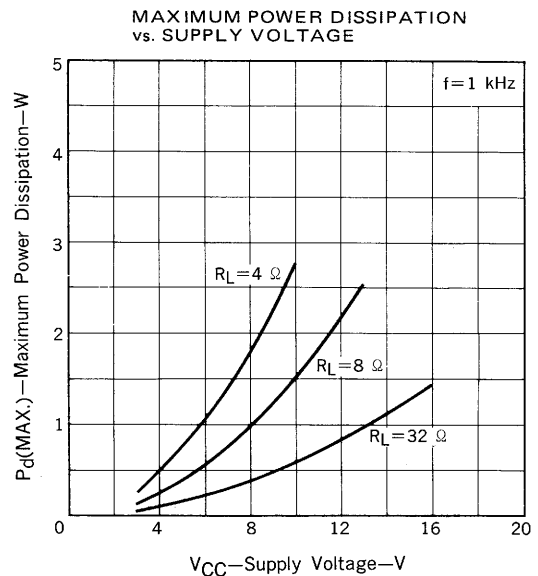
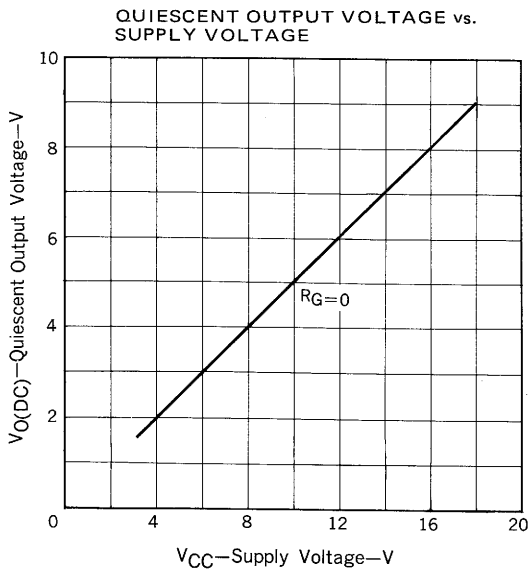
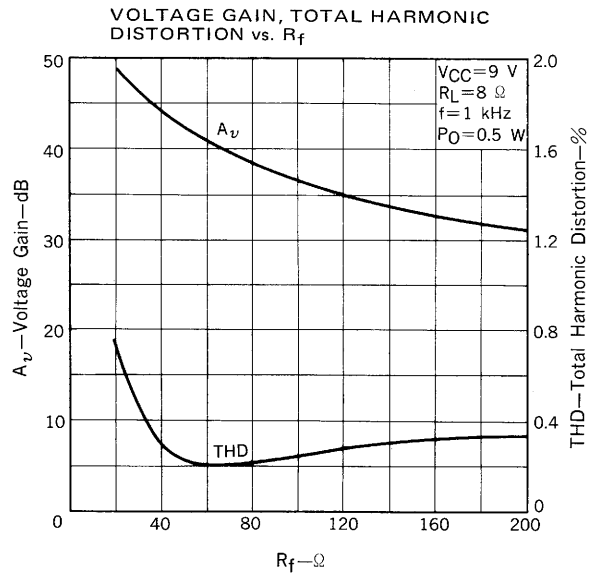
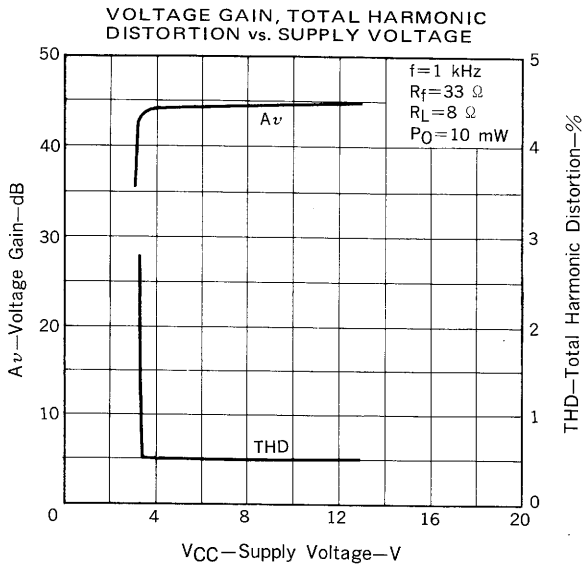
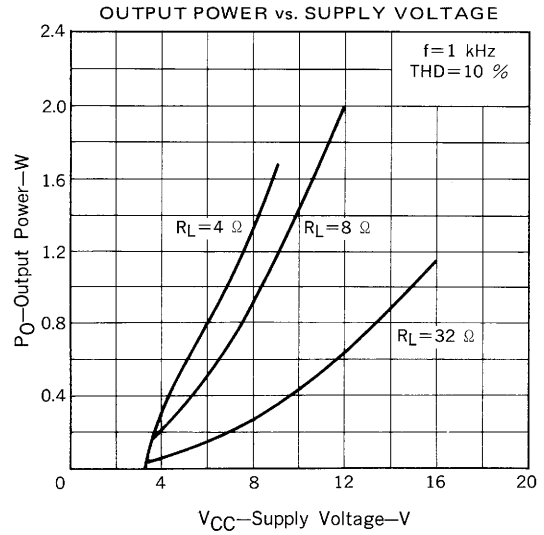
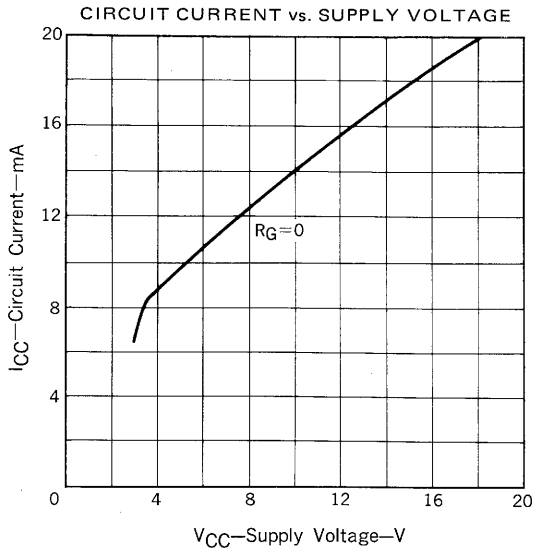
NOTE FOR USE

- (1) Mylar capacitor is recommended as C₁₂, C₁₃.
- (2) Add C₇, C₉, in the case of reducing voltage gain at high frequency.
- (3) Add C₄ or increase capacitance of C₁₂, C₁₃ when a oscillation may occur due to the pattern layout on PCB.
- (4) Voltage gain can be changed by value of R_{f1}, R_{f2}. 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.

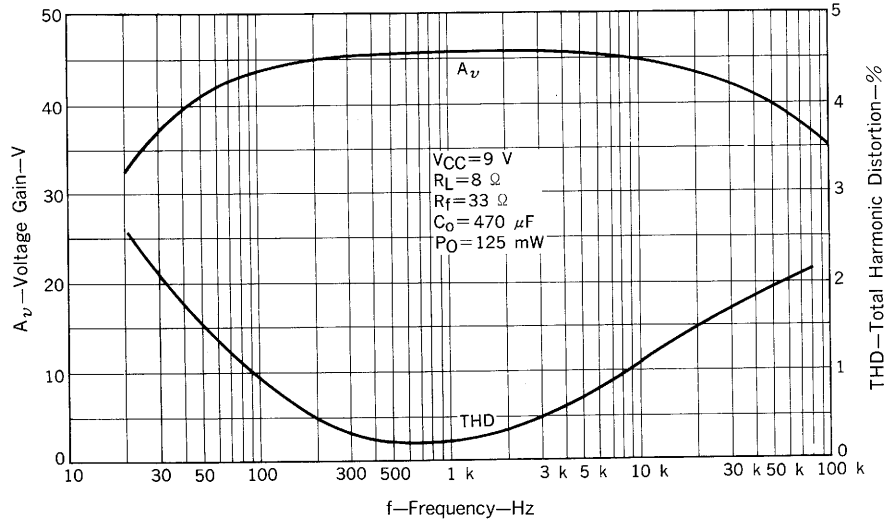
EXAMPLE FOR PRINTED CIRCUIT BOARD (Copper foil side)



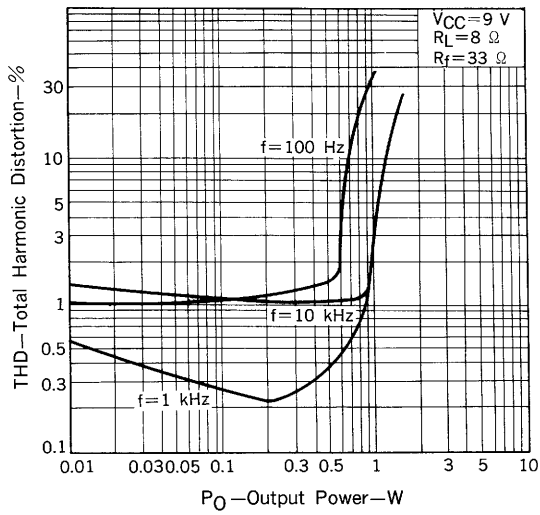
TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



VOLTAGE GAIN, TOTAL HARMONIC DISTORTION vs. FREQUENCY



TOTAL HARMONIC DISTORTION vs. OUTPUT POWER



PACKAGE DISSIPATION vs. AMBIENT TEMPERATURE

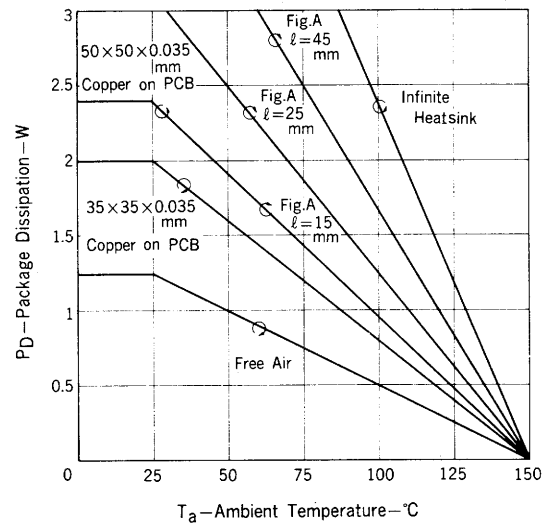
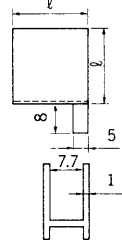
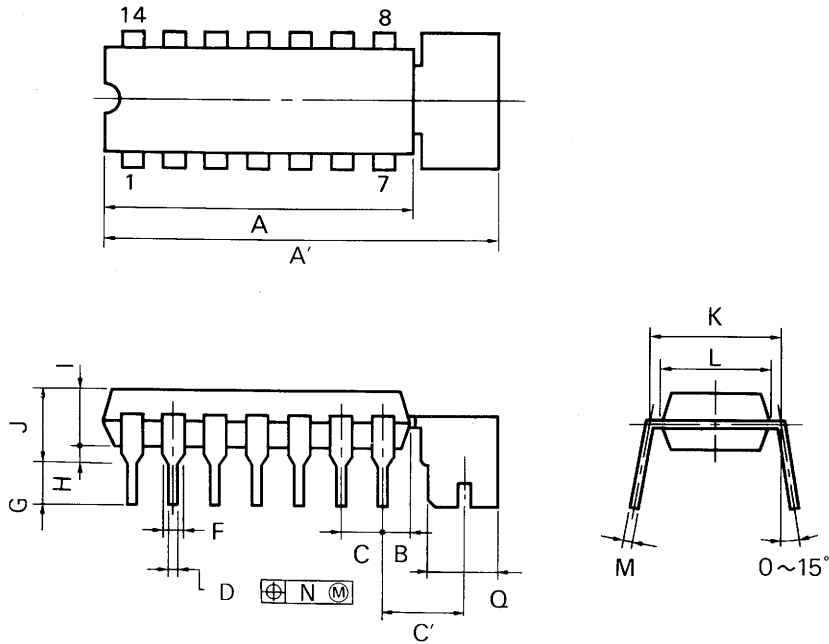


Fig.A



UNIT : mm

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 ^{-0.10} | 0.020 ^{+0.004} _{-0.005} |
| F | 1.1 MIN. | 0.043 MIN. |
| G | 3.4 ^{±0.3} | 0.134 ^{±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 ^{+0.10} _{-0.05} | 0.012 ^{+0.004} _{-0.003} |
| N | 0.25 | 0.01 |
| Q | 4.40 ^{±0.50} | 0.173 ^{±0.020} |

[MEMO]

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation. NEC Corporation assumes no responsibility for any errors which may appear in this document.

NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.

The devices listed in this document are not suitable for use in the field where very high reliability is required including, but not limited to, aerospace equipment, submarine cables, nuclear reactor control systems and life support systems. If customers intend to use NEC devices for above applications or those intend to use "Standard" quality grade NEC devices for the application not intended by NEC, please contact our sales people in advance.

Application examples recommended by NEC Corporation

Standard: Data processing and office equipment, Communication equipment (terminal, mobile), Test and Measurement equipment, Audio and Video equipment, Other consumer products, Industrial robots, etc.

Special: Automotive and Transportation equipment, Communication equipment (trunk line), Train and Traffic control devices, Burning control systems, antidisaster systems, anticrime systems etc.