

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1316

DUAL AUDIO POWER AMPLIFIER

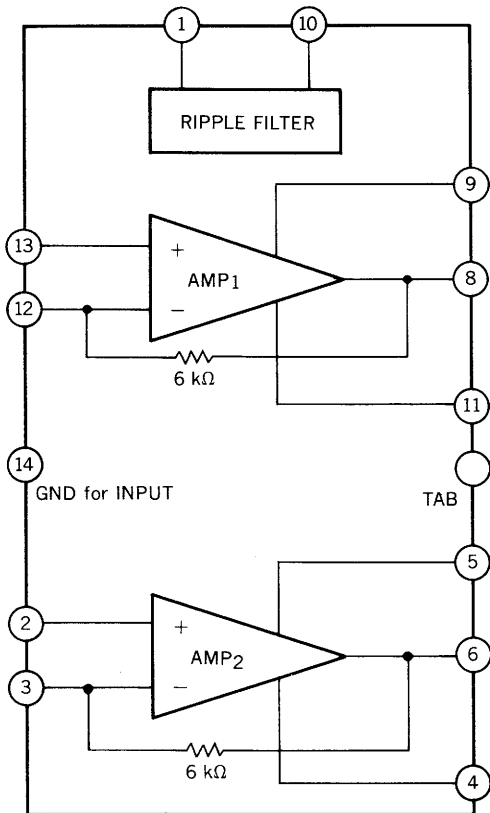
DESCRIPTION

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)

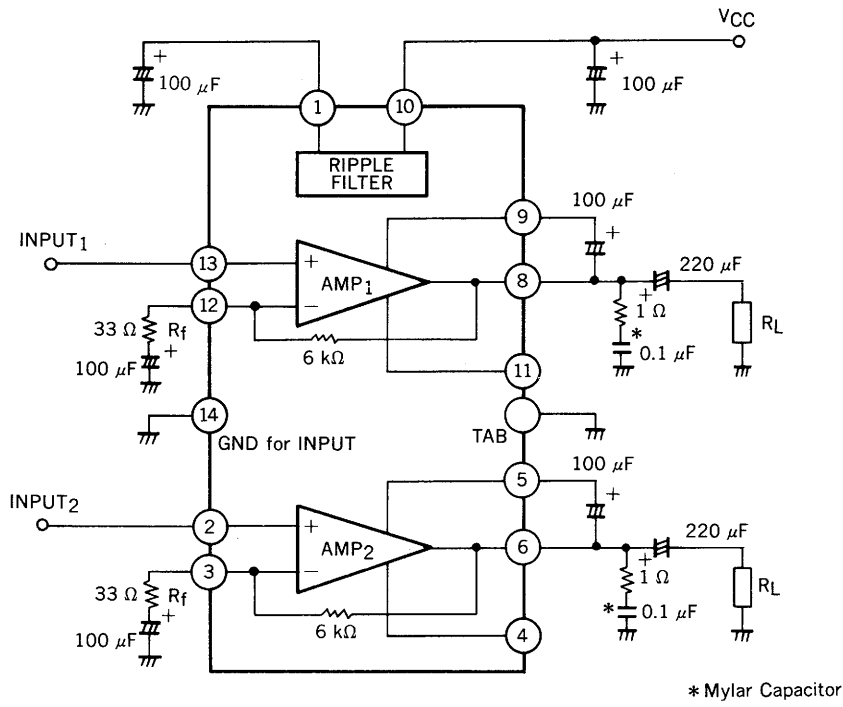
| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------------------|----------------------|------|------|------|------|
| Supply Voltage (R _L =16 Ω) | V _{CC} (16) | 3 | | 16 | V |
| Supply Voltage (R _L =8 Ω) | V _{CC} (8) | 3 | | 13 | V |
| Supply Voltage (R _L =4 Ω) | 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)

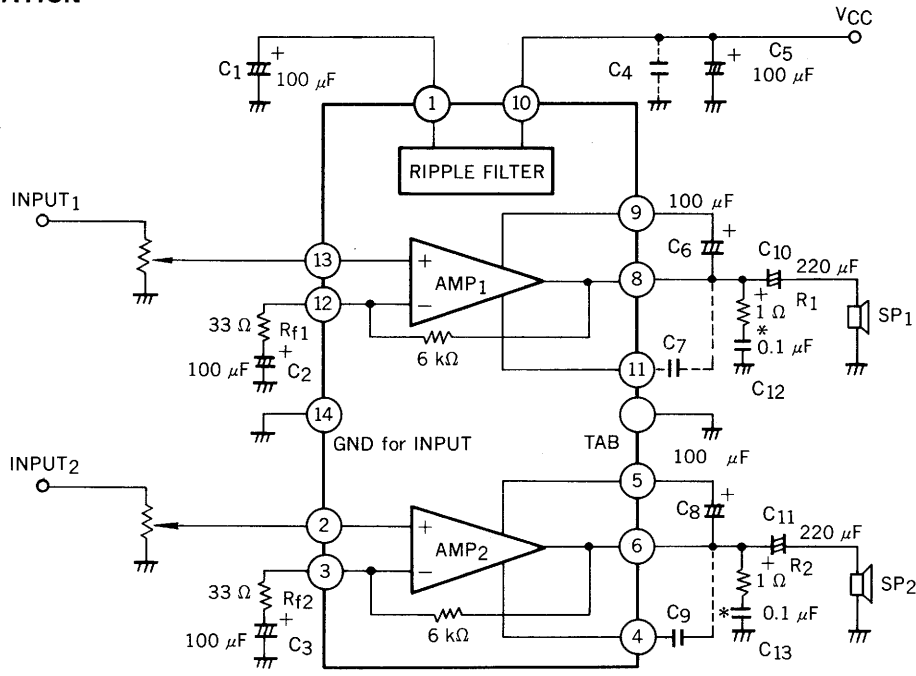
(V_{CC}=9 V, R_f=33 Ω, f=1 kHz, R_L=8 Ω)

| 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

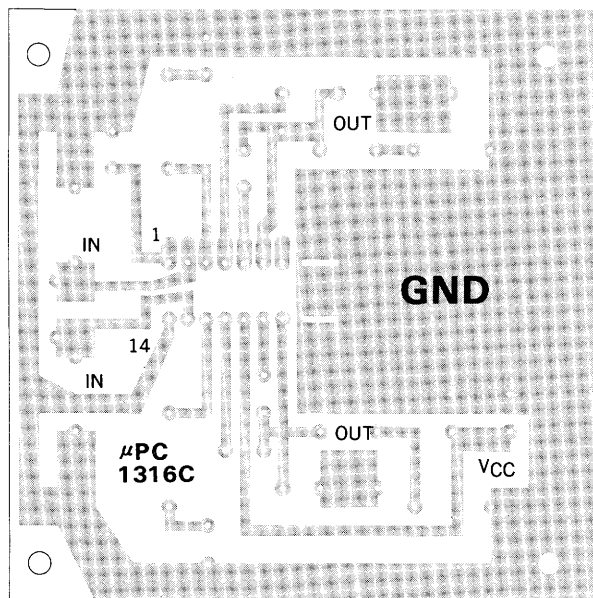


* Mylar Capacitor

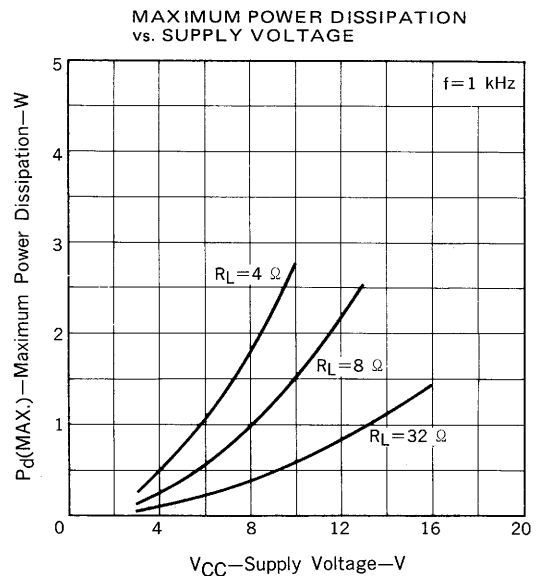
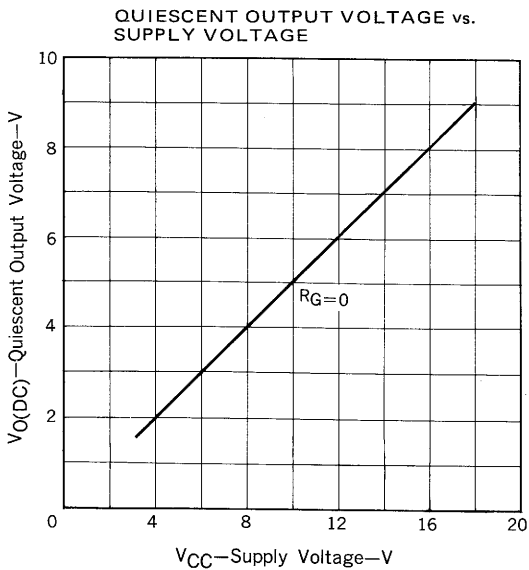
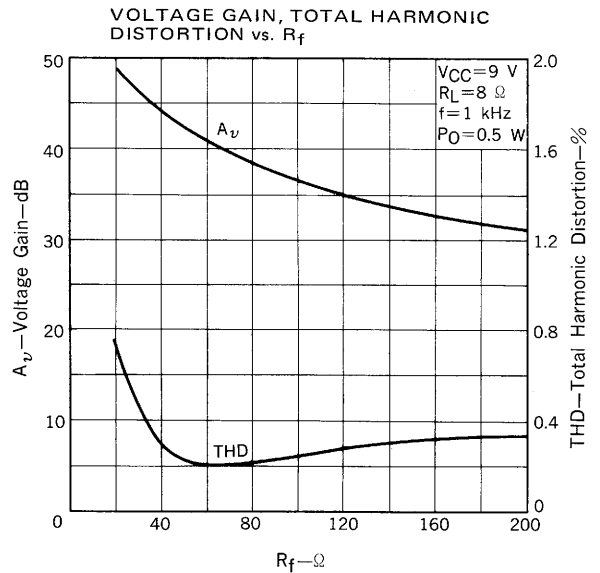
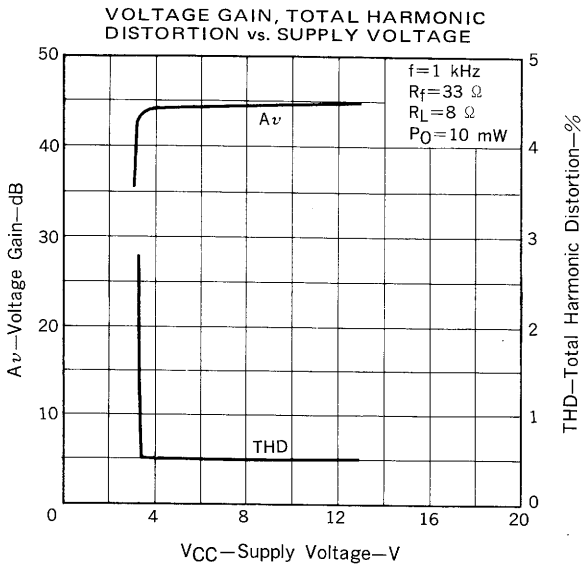
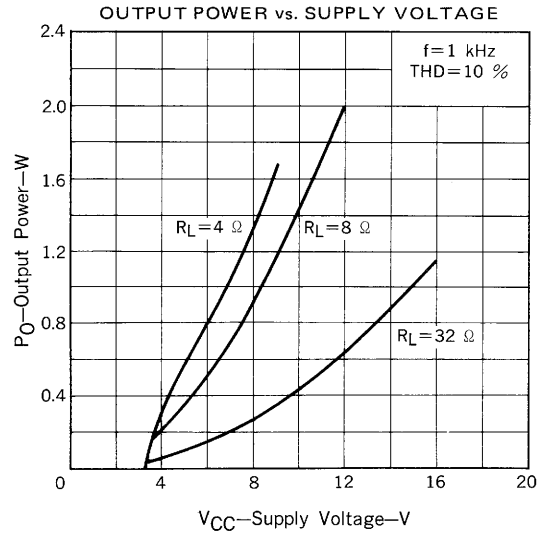
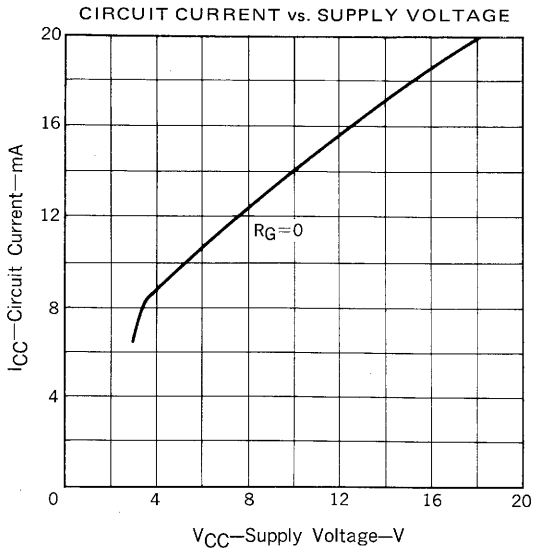
NOTE FOR USE

- (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.

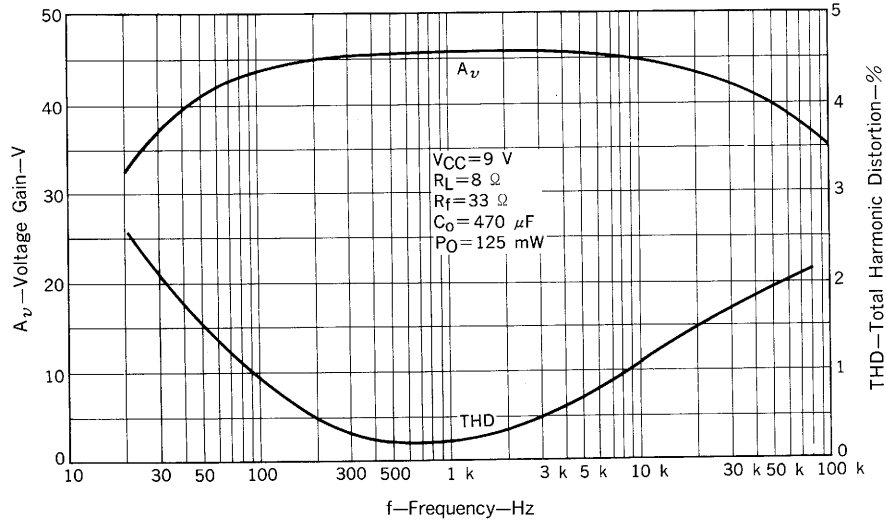
EXAMPLE FOR PRINTED CIRCUIT BOARD (Copper foil side)



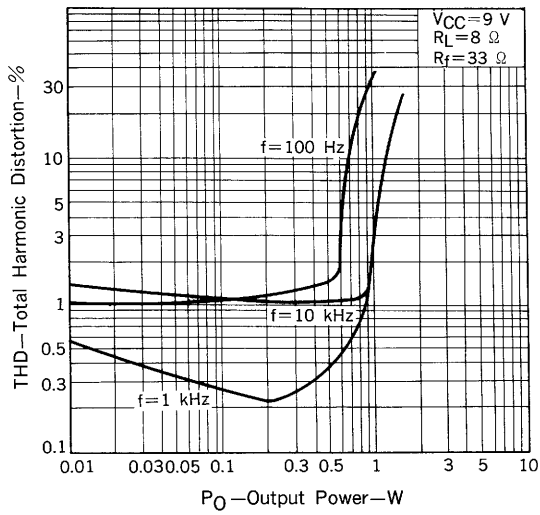
TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



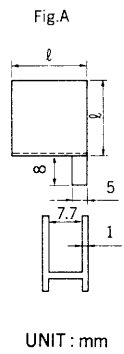
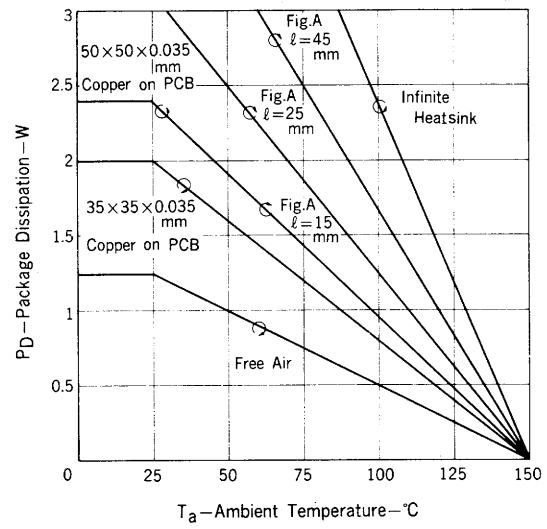
VOLTAGE GAIN, TOTAL HARMONIC DISTORTION vs. FREQUENCY



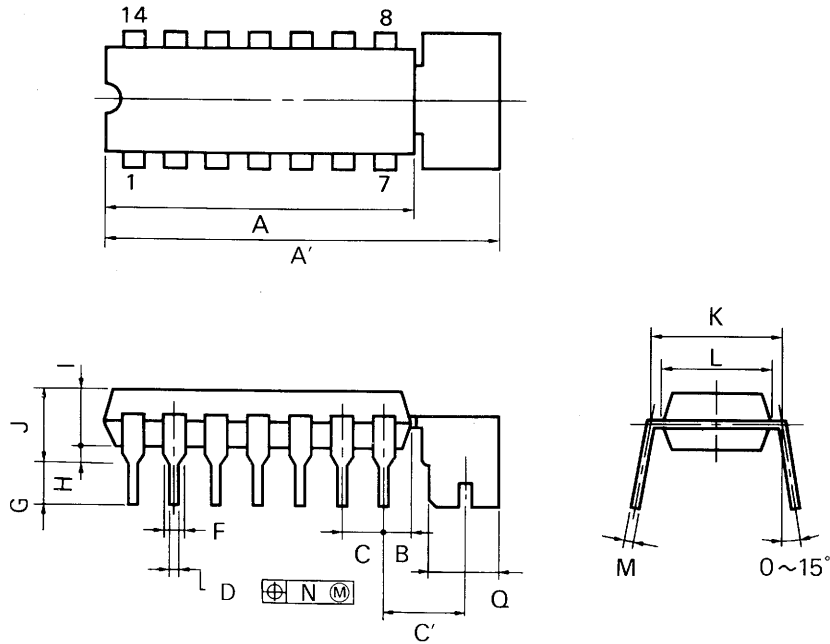
TOTAL HARMONIC DISTORTION vs. OUTPUT POWER



PACKAGE DISSIPATION vs. AMBIENT TEMPERATURE



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} |

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