



**MOTOROLA**

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# MC4741C

## Differential Input Operational Amplifier

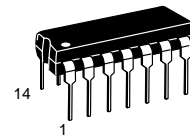
The MC4741C is a true quad MC1741. Integrated on a single monolithic chip are four independent, low power operational amplifiers which have been designed to provide operating characteristics identical to those of the industry standard MC1741, and can be applied with no change in circuit performance.

The MC4741C can be used in applications where amplifier matching or high packing density is important. Other applications include high impedance buffer amplifiers and active filter amplifiers.

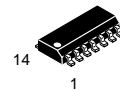
- Each Amplifier is Functionally Equivalent to the MC1741
- Class AB Output Stage Eliminates Crossover Distortion
- True Differential Inputs
- Internally Frequency Compensated
- Short Circuit Protection
- Low Power Supply Current (0.6 mA/Amplifier)

### DIFFERENTIAL INPUT OPERATIONAL AMPLIFIER (QUAD MC1741)

#### SEMICONDUCTOR TECHNICAL DATA

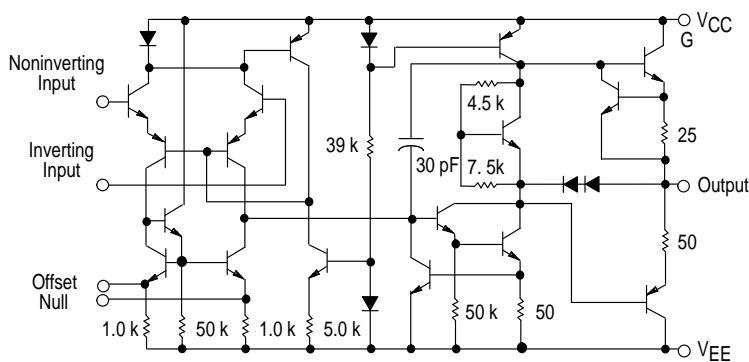


**P SUFFIX**  
PLASTIC PACKAGE  
CASE 646

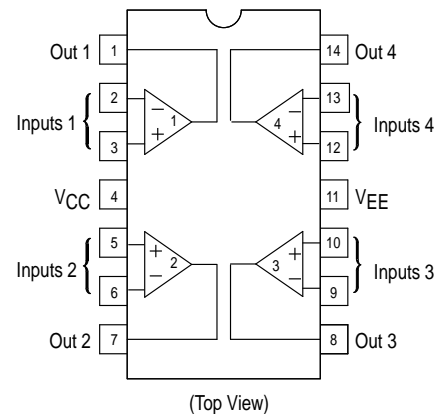


**D SUFFIX**  
PLASTIC PACKAGE  
CASE 751A  
(SO-14)

**Representative Schematic Diagram**  
(1/4 of Circuit Shown)



#### PIN CONNECTIONS



#### ORDERING INFORMATION

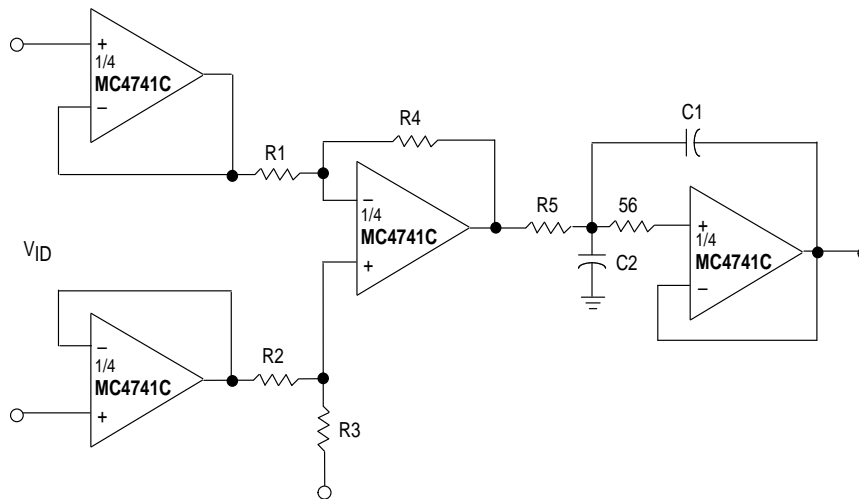
| Device   | Operating Temperature Range                   | Package     |
|----------|---|-------------|
| MC4741CD | $T_A = 0^\circ \text{ to } +70^\circ\text{C}$ | SO-14       |
| MC4741CP |   | Plastic DIP |

## MC4741C

**MAXIMUM RATINGS** ( $T_A = +25^\circ\text{C}$ , unless otherwise noted.)

| Rating                              | Symbol               | Value       | Unit             |
|-------------------------------------|----------------------|-------------|------------------|
| Power Supply Voltage                | $V_{CC}$<br>$V_{EE}$ | +18<br>-18  | Vdc              |
| Input Differential Voltage          | $V_{ID}$             | $\pm 36$    | V                |
| Input Common Mode Voltage           | $V_{ICM}$            | $\pm 18$    | V                |
| Output Short Circuit Duration       | $t_{SC}$             | Continuous  |                  |
| Operating Ambient Temperature Range | $T_A$                | 0 to +70    | $^\circ\text{C}$ |
| Storage Temperature Range           | $T_{stg}$            | -55 to +125 | $^\circ\text{C}$ |
| Junction Temperature                | $T_J$                | 150         | $^\circ\text{C}$ |

### High Impedance Instrumentation Buffer/Filter



## MC4741C

### ELECTRICAL CHARACTERISTICS ( $V_{CC} = +15\text{ V}$ , $V_{EE} = -15\text{ V}$ , $T_A = 25^\circ\text{C}$ , unless otherwise noted.)

| Characteristic   | Symbol    | Min                  | Typ                  | Max    | Unit             |
|--|-----------|----------------------|----------------------|--------|------------------|
| Input Offset Voltage ( $R_S \leq 10\text{ k}$ )  | $V_{IO}$  | –                    | 2.0                  | 6.0    | mV               |
| Input Offset Current   | $I_{IO}$  | –                    | 20                   | 200    | nA               |
| Input Bias Current   | $I_{IB}$  | –                    | 80                   | 500    | nA               |
| Input Resistance   | $r_i$     | 0.3                  | 2.0                  | –      | M $\Omega$       |
| Input Capacitance  | $C_i$     | –                    | 1.4                  | –      | pF               |
| Offset Voltage Adjustment Range  | $V_{IOR}$ | –                    | $\pm 15$             | –      | mV               |
| Common Mode Input Voltage Range  | $V_{ICR}$ | $\pm 12$             | $\pm 13$             | –      | V                |
| Large Signal Voltage Gain ( $V_O = \pm 10\text{ V}$ , $R_L \geq 2.0\text{ k}$ )  | $A_V$     | 20                   | 200                  | –      | V/mV             |
| Output Resistance  | $r_o$     | –                    | 75                   | –      | $\Omega$         |
| Common Mode Rejection ( $R_S \leq 10\text{ k}$ )   | CMR       | 70                   | 90                   | –      | dB               |
| Supply Voltage Rejection Ratio ( $R_S \leq 10\text{ k}$ )  | PSRR      | –                    | 30                   | 150    | $\mu\text{V/V}$  |
| Output Voltage Swing<br>( $R_L \geq 10\text{ k}$ )<br>( $R_L \geq 2\text{ k}$ )  | $V_O$     | $\pm 12$<br>$\pm 10$ | $\pm 14$<br>$\pm 13$ | –<br>– | V                |
| Output Short Circuit Current   | $I_{SC}$  | –                    | 20                   | –      | mA               |
| Supply Current – (All Amplifiers)  | $I_D$     | –                    | 3.5                  | 7.0    | mA               |
| Power Consumption (All Amplifiers)   | $P_C$     | –                    | 105                  | 210    | mW               |
| Transient Response (Unity Gain – Non-Inverting)<br>( $V_I = 20\text{ mV}$ , $R_L \geq 2\text{ k}\Omega$ , $C_L \leq 100\text{ pF}$ ) Rise Time | $t_{TLH}$ | –                    | 0.3                  | –      | $\mu\text{s}$    |
| ( $V_I = 20\text{ mV}$ , $R_L \geq 2\text{ k}\Omega$ , $C_L \leq 100\text{ pF}$ ) Overshoot  | os        | –                    | 15                   | –      | %                |
| ( $V_I = 10\text{ V}$ , $R_L \geq 2\text{ k}\Omega$ , $C_L \leq 100\text{ pF}$ ) Slew Rate   | SR        | –                    | 0.5                  | –      | V/ $\mu\text{s}$ |

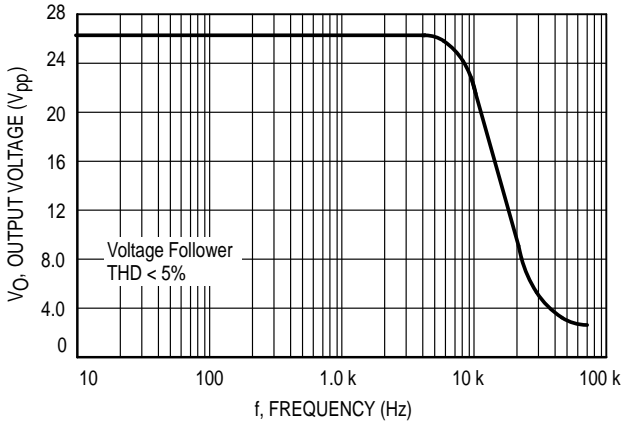
### ELECTRICAL CHARACTERISTICS ( $V_{CC} = +15\text{ V}$ , $V_{EE} = -15\text{ V}$ , $T_A = * T_{high}$ to $T_{low}$ , unless otherwise noted.)

| Characteristic  | Symbol   | Min      | Typ      | Max | Unit |
|---|----------|----------|----------|-----|------|
| Input Offset Voltage ( $R_S \leq 10\text{ k}\Omega$ )                             | $V_{IO}$ | –        | –        | 7.5 | mV   |
| Input Offset Current ( $T_A = 0^\circ$ to $+70^\circ\text{C}$ )                   | $I_{IO}$ | –        | –        | 300 | nA   |
| Input Bias Current ( $T_A = 0^\circ$ to $+70^\circ\text{C}$ )                     | $I_{IB}$ | –        | –        | 800 | nA   |
| Large Signal Voltage Gain ( $R_L \geq 2\text{ k}$ , $V_{OUT} = \pm 10\text{ V}$ ) | $A_V$    | 15       | –        | –   | V/mV |
| Output Voltage Swing ( $R_L \geq 2\text{ k}$ )                                    | $V_O$    | $\pm 10$ | $\pm 13$ | –   | V    |

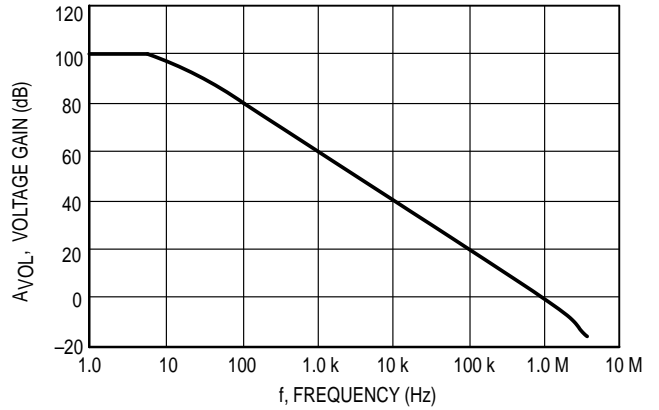
\*  $T_{high} = 70^\circ\text{C}$       $T_{low} = -0^\circ\text{C}$

# MC4741C

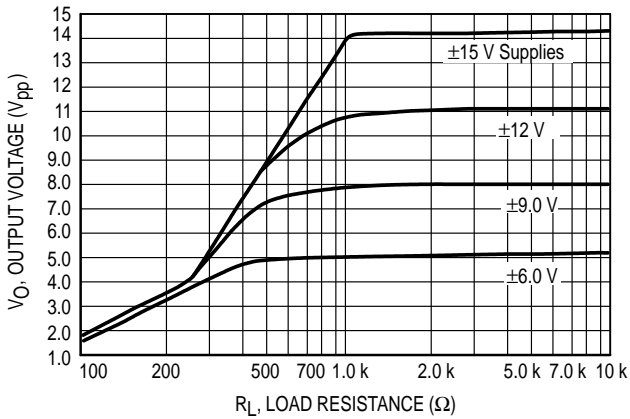
**Figure 1. Power Bandwidth  
(Large Signal Swing versus Frequency)**



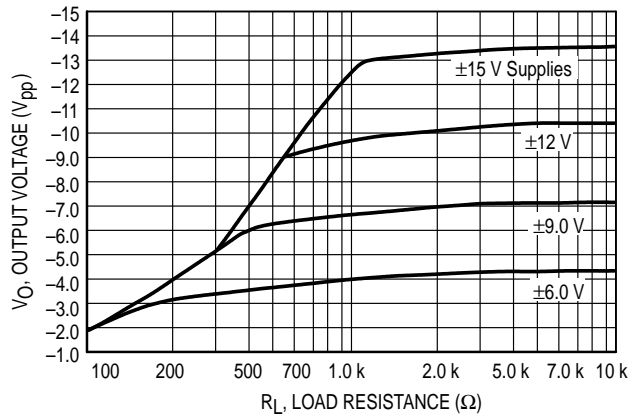
**Figure 2. Open Loop Frequency Response**



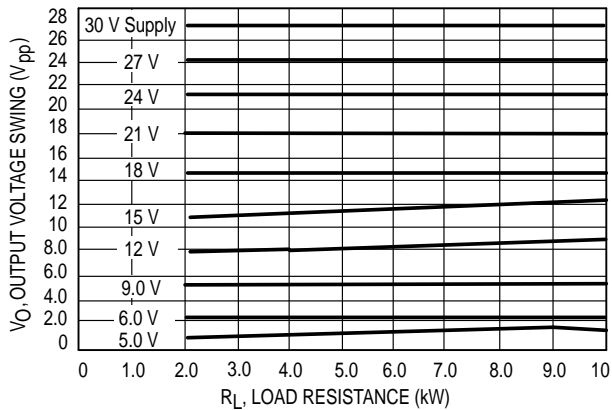
**Figure 3. Positive Output Voltage Swing  
versus Load Resistance**



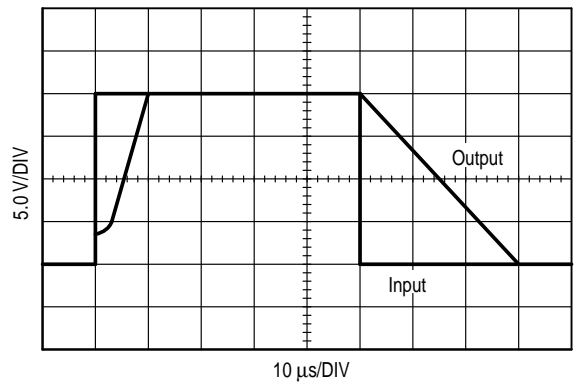
**Figure 4. Negative Output Voltage Swing  
versus Load Resistance**



**Figure 5. Output Voltage Swing versus  
Load Resistance (Single Supply Operation)**



**Figure 6. Noninverting Pulse Response**



# MC4741C

Figure 7. Bi-Quad Filter

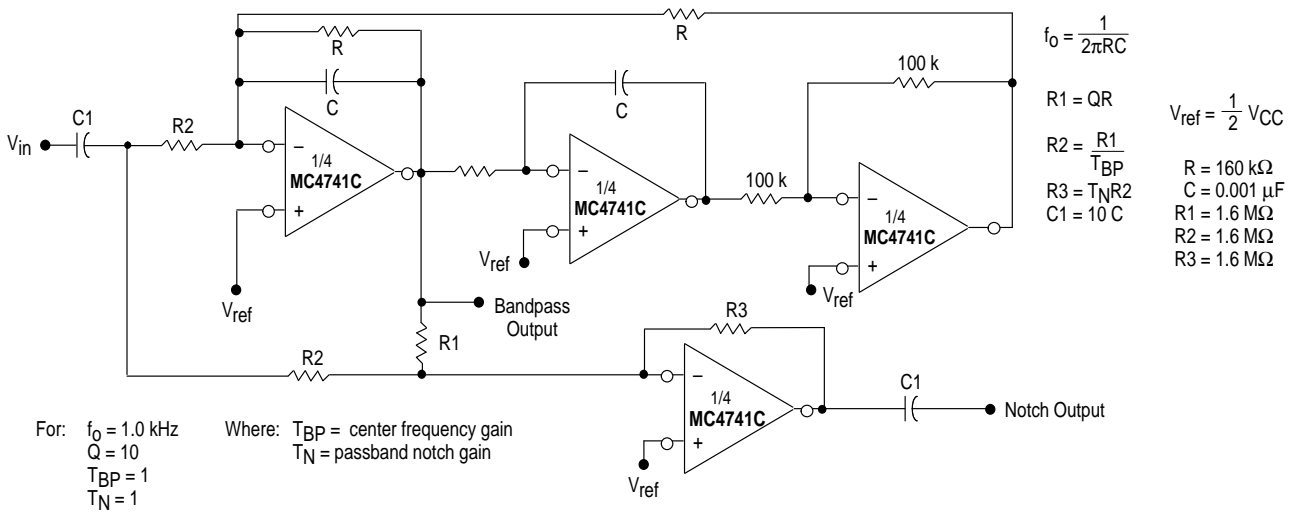


Figure 8. Open Loop Voltage Gain versus Supply Voltage

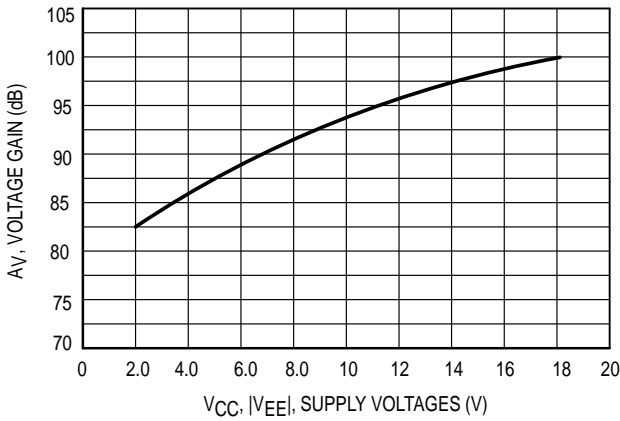


Figure 9. Transient Response Test Circuit

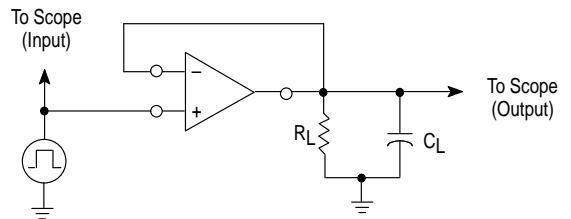
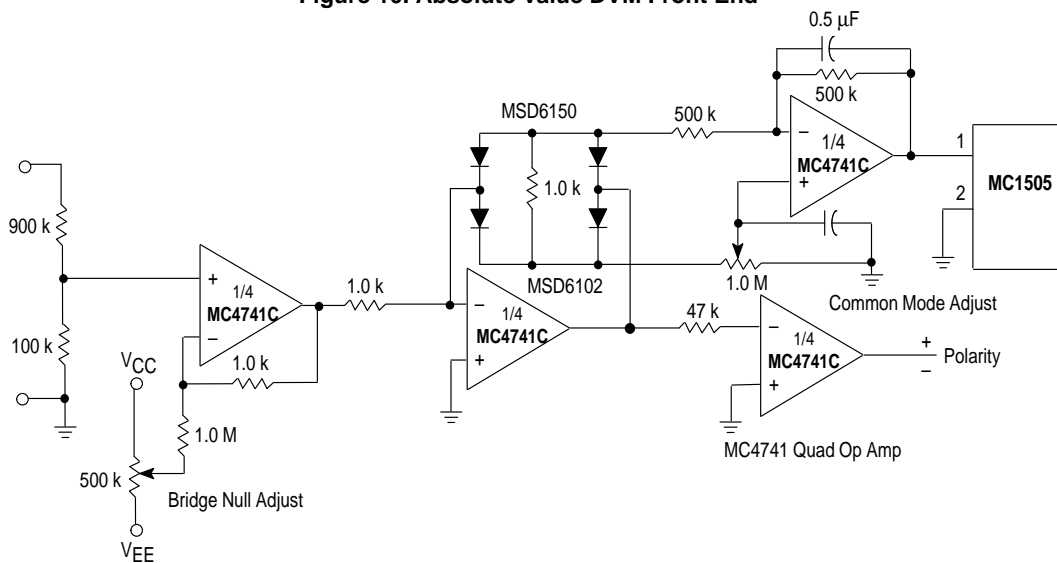


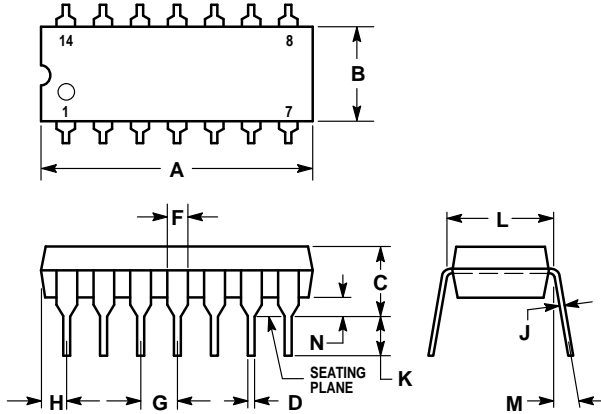
Figure 10. Absolute Value DVM Front End



# MC4741C

## OUTLINE DIMENSIONS

### P SUFFIX PLASTIC PACKAGE CASE 646-06 ISSUE L

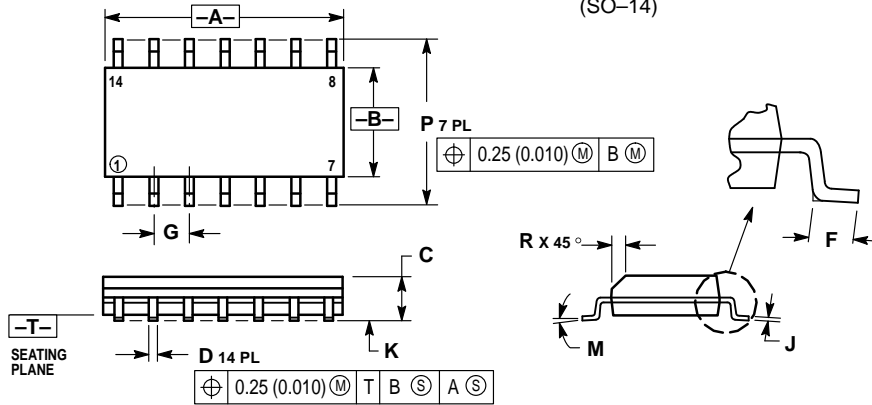


NOTES:

- LEADS WITHIN 0.13 (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
- DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
- DIMENSION B DOES NOT INCLUDE MOLD FLASH.
- ROUNDED CORNERS OPTIONAL.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.715     | 0.770 | 18.16       | 19.56 |
| B   | 0.240     | 0.260 | 6.10        | 6.60  |
| C   | 0.145     | 0.185 | 3.69        | 4.69  |
| D   | 0.015     | 0.021 | 0.38        | 0.53  |
| F   | 0.040     | 0.070 | 1.02        | 1.78  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.052     | 0.095 | 1.32        | 2.41  |
| J   | 0.008     | 0.015 | 0.20        | 0.38  |
| K   | 0.115     | 0.135 | 2.92        | 3.43  |
| L   | 0.300 BSC |       | 7.62 BSC    |       |
| M   | 0°        | 10°   | 0°          | 10°   |
| N   | 0.015     | 0.039 | 0.39        | 1.01  |


### D SUFFIX PLASTIC PACKAGE CASE 751A-03 ISSUE F (SO-14)



NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
- DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 8.55        | 8.75 | 0.337     | 0.344 |
| B   | 3.80        | 4.00 | 0.150     | 0.157 |
| C   | 1.35        | 1.75 | 0.054     | 0.068 |
| D   | 0.35        | 0.49 | 0.014     | 0.019 |
| F   | 0.40        | 1.25 | 0.016     | 0.049 |
| G   | 1.27 BSC    |      | 0.050 BSC |       |
| J   | 0.19        | 0.25 | 0.008     | 0.009 |
| K   | 0.10        | 0.25 | 0.004     | 0.009 |
| M   | 0°          | 7°   | 0°        | 7°    |
| P   | 5.80        | 6.20 | 0.228     | 0.244 |
| R   | 0.25        | 0.50 | 0.010     | 0.019 |

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