

CMOS POSITIVE VOLTAGE REGULATORS
VERY LOW DROP - VERY LOW QUIESCENT

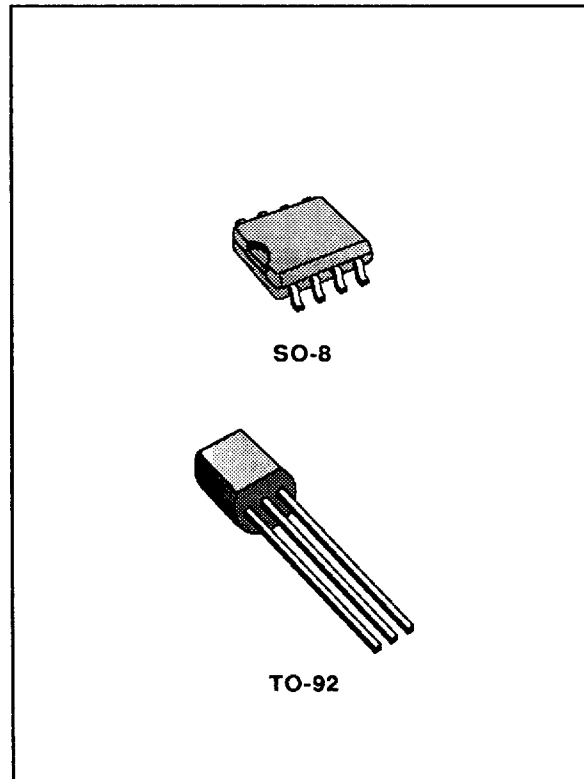
- LOW CURRENT CONSUMPTION (TYP. 19 μ A)
- WIDE OPERATING VOLTAGE RANGE
- VERY LOW DROP OUT VOLTAGE
($V_i - V_o < 0.2$ V, $I_o = 40$ mA)
- CMOS TECHNOLOGY

DESCRIPTION

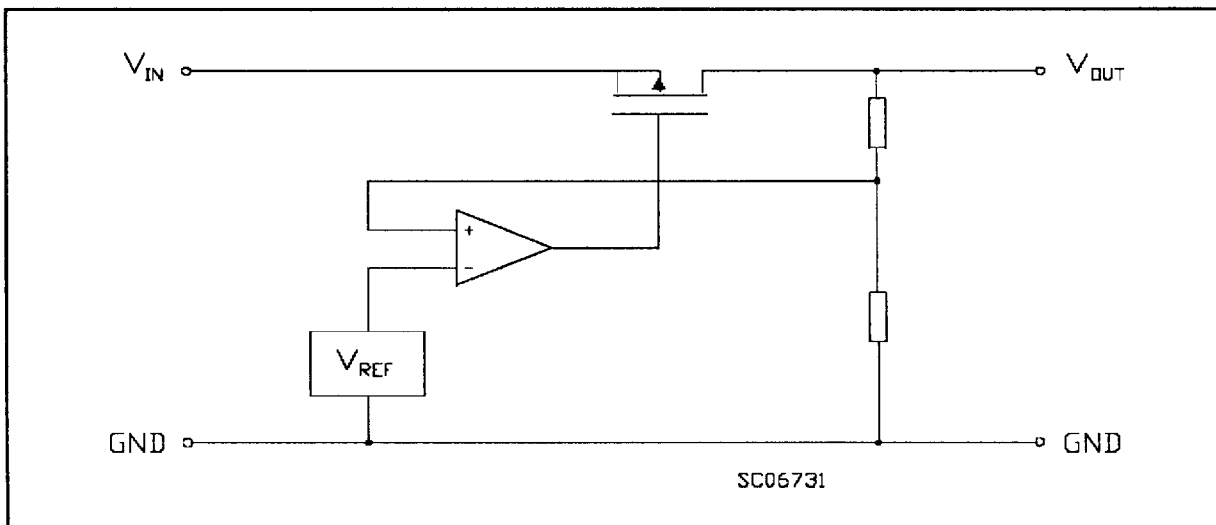
The C78L00 series is a CMOS Positive Voltage Regulators. These regulators contains internal precision voltage reference, error amplifier, control transistor and output voltage setting resistor.

The regulation voltage is fixed by internal circuits and the following lines of different output voltages are available.

This series is suitable for battery operated items and battery back-up systems because of low current consumption and low drop out voltage.



SCHEMATIC DIAGRAM



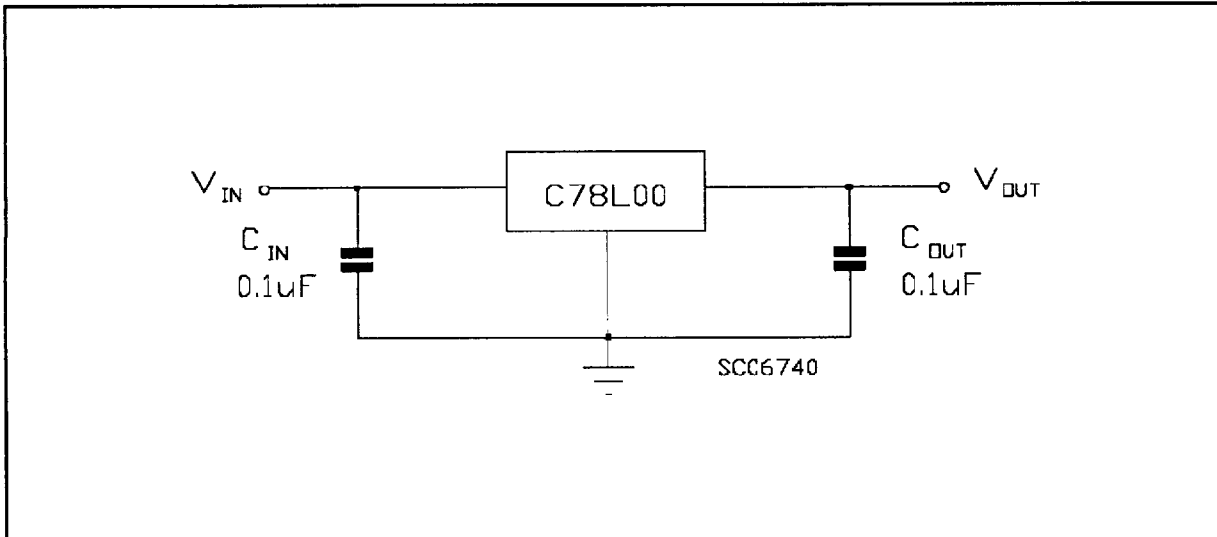
C78L00 SERIES

ABSOLUTE MAXIMUM RATING

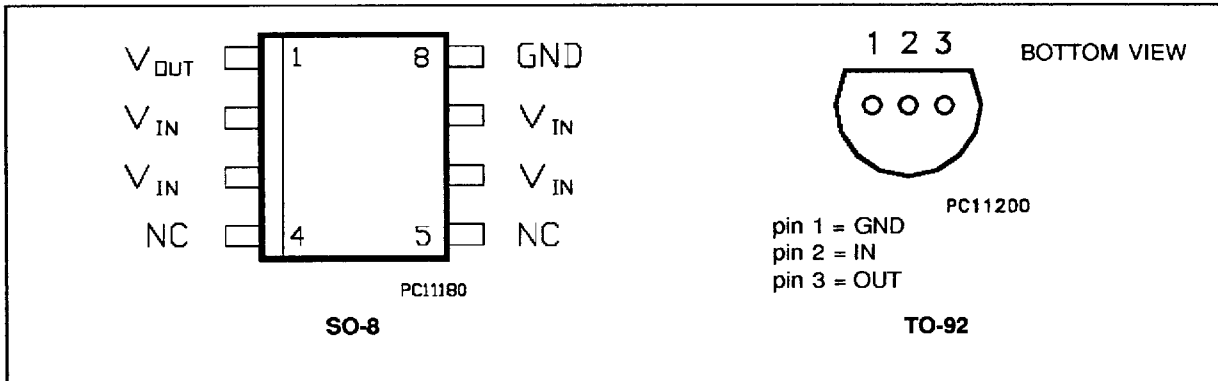
| Symbol | Parameter | Value | Unit |
|------------|--------------------------------------|----------------------------|-------------------------------|
| V_i | DC Input Voltage | 14 | V |
| V_o | Maximum Output Voltage | 5.5 | V |
| I_o | Output Current | 100 | mA |
| P_{tot} | Power Dissipation | Internally limited (*) | |
| T_{stg} | Storage Temperature Range | - 40 to 150 | °C |
| T_{op} | Operating Junction Temperature Range | For C78L00B For C78L00C | - 40 to 150 0 to 125 °C |
| T_{sold} | Soldering Temperature | 260 | °C |
| t_{sold} | Soldering Time | 10 | sec |

(*) Our SO-8 package used for Voltage Regulators is modified internally to have pins 2, 3, 6 and 7 electrically commoned to the die attach flag. This particular frame decreases the total thermal resistance of the package and increases its ability to dissipate power when an appropriate area of copper on the printed circuit board is available for the heatsinking. The external dimensions are the same as for the standard SO-8

TEST CIRCUITS



CONNECTION DIAGRAM AND ORDERING NUMBERS (top view)



| Type | SO-8 | TO-92 | Output Voltage | Note |
|---------|----------|----------|----------------|------------|
| C78L03B | C78L03BD | C78L03BZ | 3 V | Available |
| C78L03C | C78L03CD | C78L03CZ | 3 V | Available |
| C78L05B | C78L05BD | C78L05BZ | 5 V | Available |
| C78L05C | C78L05CD | C78L05CZ | 5 V | Available |
| C78L12B | C78L12BD | C78L12BZ | 1.2 V | On Request |
| C78L12C | C78L12CD | C78L12CZ | 1.2 V | On Request |
| C78L15B | C78L15BD | C78L15BZ | 1.5 V | On Request |
| C78L15C | C78L15CD | C78L15CZ | 1.5 V | On Request |
| C78L25B | C78L25BD | C78L25BZ | 2.5 V | On Request |
| C78L25C | C78L25CD | C78L25CZ | 2.5 V | On Request |
| C78L27B | C78L27BD | C78L27BZ | 2.7 V | On Request |
| C78L27C | C78L27CD | C78L27CZ | 2.7 V | On Request |
| C78L32B | C78L32BD | C78L32BZ | 3.2 V | On Request |
| C78L32C | C78L32CD | C78L32CZ | 3.2 V | On Request |
| C78L35B | C78L35BD | C78L35BZ | 3.5 V | On Request |
| C78L35C | C78L35CD | C78L35CZ | 3.5 V | On Request |
| C78L40B | C78L40BD | C78L40BZ | 4 V | On Request |
| C78L40C | C78L40CD | C78L40CZ | 4 V | On Request |
| C78L45B | C78L45BD | C78L45BZ | 4.5 V | On Request |
| C78L45C | C78L45CD | C78L45CZ | 4.5 V | On Request |
| C78L52B | C78L52BD | C78L52BZ | 5.2 V | On Request |
| C78L52C | C78L52CD | C78L52CZ | 5.2 V | On Request |
| C78L55B | C78L55BD | C78L55BZ | 5.5 V | On Request |
| C78L55C | C78L55CD | C78L55CZ | 5.5 V | On Request |

C78L00 SERIES

ELECTRICAL CHARACTERISTICS FOR C78L12 (refer to the test circuits, $T_a = 25\text{ }^\circ\text{C}$,
 $V_i = 3\text{V}$, $C_i = 0.1\text{ }\mu\text{F}$, $C_o = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|--|------|------|------|---------------|
| V_o | Output Voltage | $I_o = 5\text{ mA}$ | 1.1 | 1.2 | 1.3 | V |
| V_i | Input Voltage | | | | 12 | V |
| ΔV_o | Line Regulation | $V_i = 1.5\text{ to }12\text{ V}$ $I_o = 5\text{ mA}$ | | 0.1 | | %/V |
| ΔV_o | Load Regulation | $I_o = 1\text{ to }15\text{ mA}$ | | 10 | 180 | mV |
| I_d | Quiescent Current | | | 14 | 30 | μA |
| eN | Output Noise Voltage | $B = 10\text{Hz to }100\text{kHz}$ $T_j = 25\text{ }^\circ\text{C}$ | | 30 | | μV |
| SVR | Supply Voltage Rejection | $I_o = 5\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25\text{ }^\circ\text{C}$ $V_i = 2.5\text{ to }3.5\text{ V}$ | | 45 | | dB |
| V_d | Dropout Voltage | $I_o = 0.5\text{ mA}$ | | 0.02 | 0.3 | V |

ELECTRICAL CHARACTERISTICS FOR C78L03 (refer to the test circuits, $T_a = 25\text{ }^\circ\text{C}$,
 $V_i = 5\text{V}$, $C_i = 0.1\text{ }\mu\text{F}$, $C_o = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|--|------|------|------|---------------|
| V_o | Output Voltage | $I_o = 10\text{ mA}$ | 2.85 | 3 | 3.15 | V |
| V_i | Input Voltage | | | | 12 | V |
| ΔV_o | Line Regulation | $V_i = 4\text{ to }12\text{ V}$ $I_o = 5\text{ mA}$ | | 0.1 | | %/V |
| ΔV_o | Load Regulation | $I_o = 1\text{ to }20\text{ mA}$ | | 15 | 180 | mV |
| I_d | Quiescent Current | | | 16 | 30 | μA |
| eN | Output Noise Voltage | $B = 10\text{Hz to }100\text{kHz}$ $T_j = 25\text{ }^\circ\text{C}$ | | 35 | | μV |
| SVR | Supply Voltage Rejection | $I_o = 5\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25\text{ }^\circ\text{C}$ $V_i = 4.5\text{ to }5.5\text{ V}$ | | 43 | | dB |
| V_d | Dropout Voltage | $I_o = 20\text{ mA}$ | | 0.2 | 0.6 | V |

ELECTRICAL CHARACTERISTICS FOR C78L05 (refer to the test circuits, $T_a = 25\text{ }^\circ\text{C}$,
 $V_i = 7\text{V}$, $C_i = 0.1\text{ }\mu\text{F}$, $C_o = 0.1\text{ }\mu\text{F}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|--|------|------|------|---------------|
| V_o | Output Voltage | $I_o = 30\text{ mA}$ | 4.75 | 5 | 5.25 | V |
| V_i | Input Voltage | | | | 12 | V |
| ΔV_o | Line Regulation | $V_i = 6\text{ to }12\text{ V}$ $I_o = 5\text{ mA}$ | | 0.1 | | %/V |
| ΔV_o | Load Regulation | $I_o = 1\text{ to }40\text{ mA}$ | | 35 | 120 | mV |
| I_d | Quiescent Current | | | 19 | 30 | μA |
| eN | Output Noise Voltage | $B = 10\text{Hz to }100\text{kHz}$ $T_j = 25\text{ }^\circ\text{C}$ | | 50 | | μV |
| SVR | Supply Voltage Rejection | $I_o = 5\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25\text{ }^\circ\text{C}$ $V_i = 6.5\text{ to }7.5\text{ V}$ | | 40 | | dB |
| V_d | Dropout Voltage | $I_o = 40\text{ mA}$ | | 0.3 | 0.6 | V |

Figure 1: Output Voltage vs Input Voltage

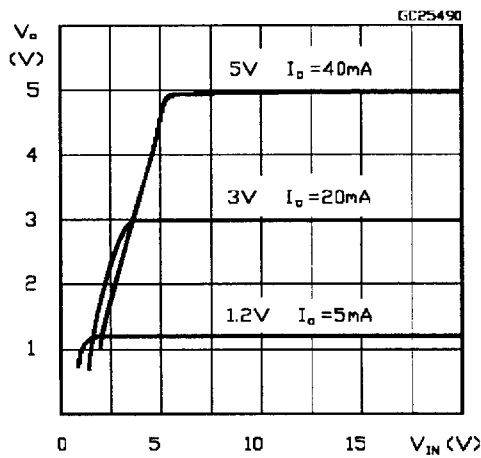


Figure 2: Output Voltage vs Output Current

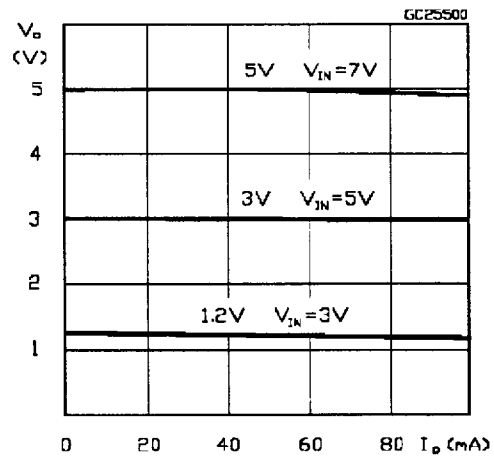


Figure 3: Quiescent Current

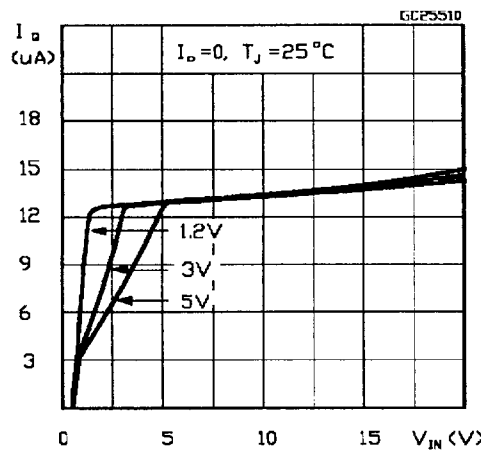


Figure 4: Dropout Voltage

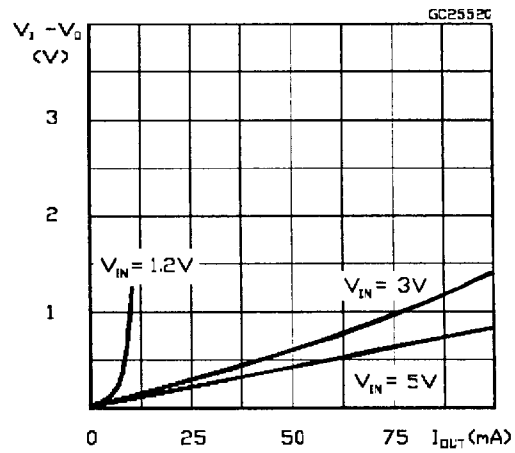


Figure 5: Quiescent Current

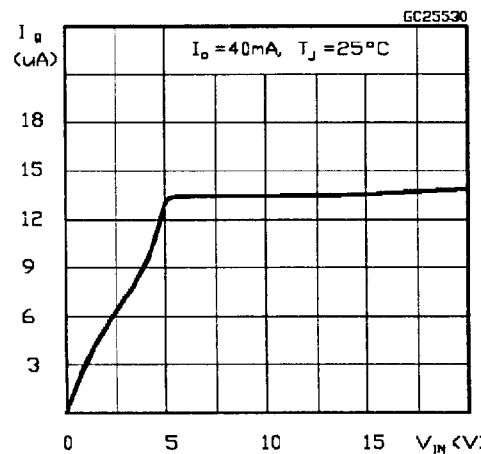
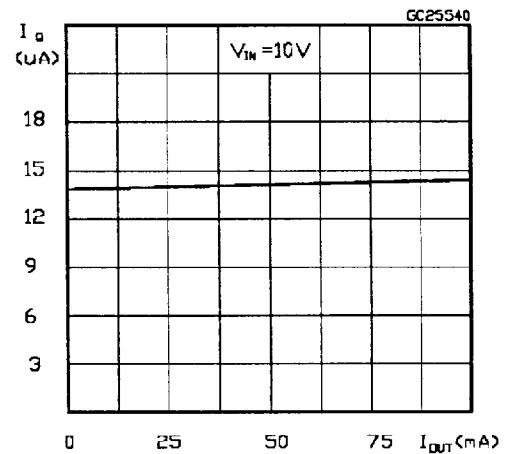
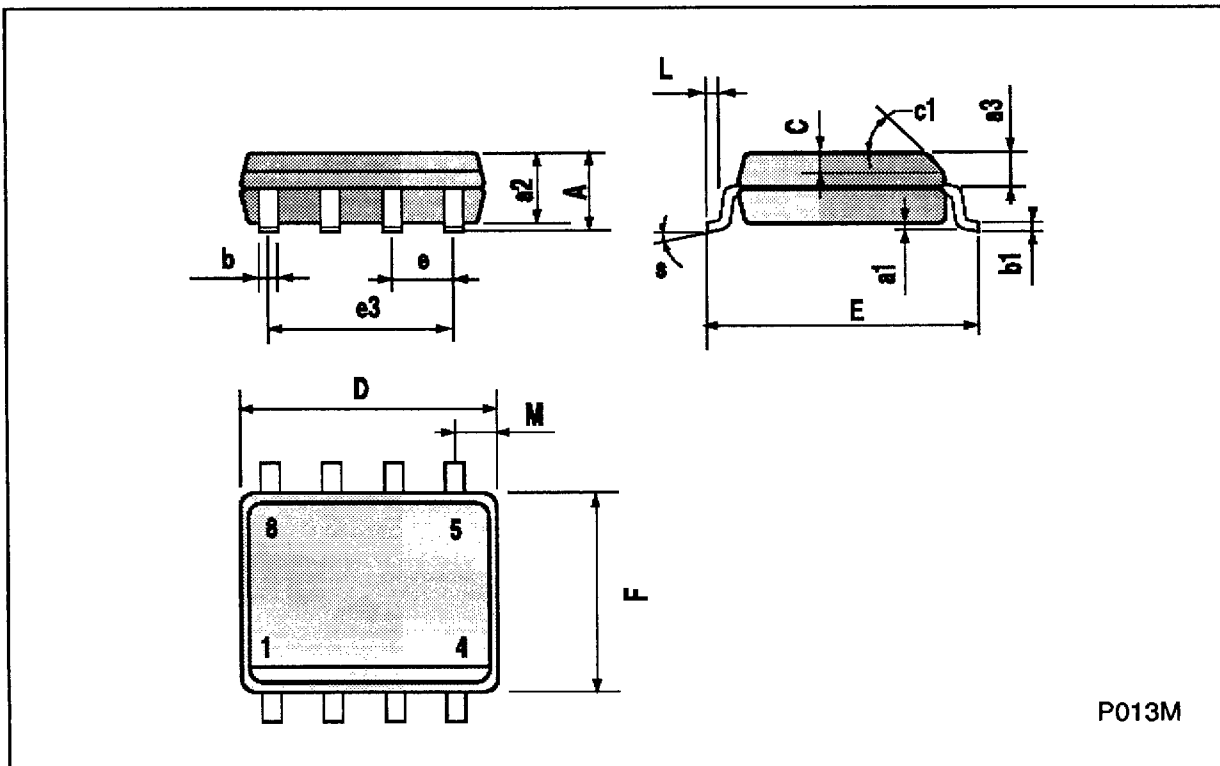


Figure 6: Quiescent Current



SO8 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.75 | | | 0.068 |
| a1 | 0.1 | | 0.25 | 0.003 | | 0.009 |
| a2 | | | 1.65 | | | 0.064 |
| a3 | 0.65 | | 0.85 | 0.025 | | 0.033 |
| b | 0.35 | | 0.48 | 0.013 | | 0.018 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | 0.25 | | 0.5 | 0.010 | | 0.019 |
| c1 | 45° (typ.) | | | | | |
| D | 4.8 | | 5.0 | 0.188 | | 0.196 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 3.81 | | | 0.150 | |
| F | 3.8 | | 4.0 | 0.14 | | 0.157 |
| L | 0.4 | | 1.27 | 0.015 | | 0.050 |
| M | | | 0.6 | | | 0.023 |
| S | 8° (max.) | | | | | |



TO-92 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.58 | | 5.33 | 0.180 | | 0.210 |
| B | 4.45 | | 5.2 | 0.175 | | 0.204 |
| C | 3.2 | | 4.2 | 0.126 | | 0.165 |
| D | 12.7 | | | 0.500 | | |
| E | | 1.27 | | | 0.050 | |
| F | 0.4 | | 0.51 | 0.016 | | 0.020 |
| G | 0.35 | | | 0.14 | | |

