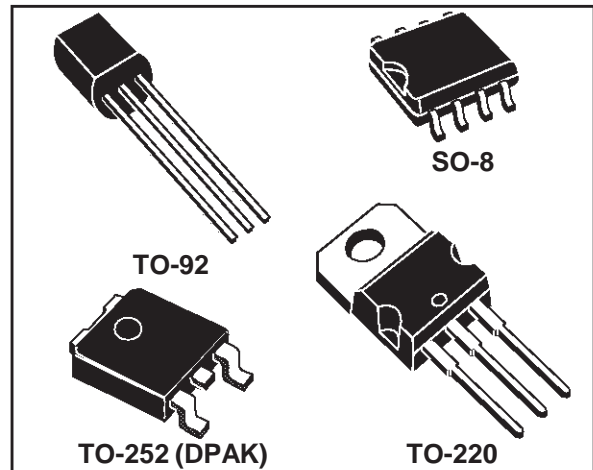




LM2931 SERIES

VERY LOW DROP VOLTAGE REGULATOR WITH INHIBIT FUNCTION

- VERY LOW DROPOUT VOLTAGE (0.15V TYP. AT 10mA LOAD)
- LOW QUIESCENT CURRENT (TYP 2.5mA, AT 100mA LOAD)
- OUTPUT CURRENT UP TO 100mA
- ADJUSTABLE (FROM $V_{OUT}=2.5V$ ONLY SO-8) AND FIXED (3.3V & 5V) OUTPUT VOLTAGE VERSION
- INTERNAL CURRENT AND THERMAL LIMIT
- LOAD DUMP PROTECTION UP TO 60V
- REVERSE TRANSIENT PROTECTION UP TO -50V
- TEMPERATURE RANGE: -40 TO 125 °C
- PACKAGE AVAILABLE: TO-92, DPAK, TO-220, SO-8 (WITH INHIBIT CONTROL)

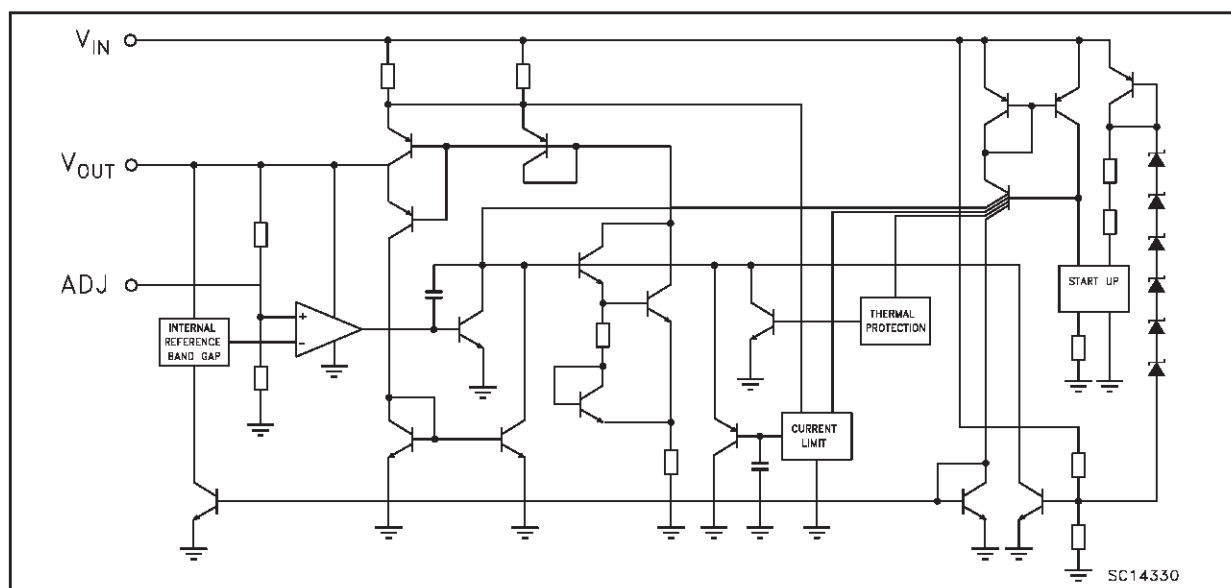


DESCRIPTION

The LM2931 series are very low drop regulators. The very low drop voltage and the low quiescent current make them particular suitable for low noise, low power applications and in battery powered systems. In the 8 pin configuration (SO-8), fully compatible to the older L78L00 family, a shut down Logic Control function is available. This means that when the device is used as a

local regulator is possible to put a part of the board in stand-by decreasing the total power consumption. Ideal for automotive application the LM2931 is protected from reverse battery installations or 2 battery jumps. During the transient, such as a load dump (60V) when the input voltage can exceed the specified maximum operating input voltage (26V), the regulator will automatically shut down to protect both internal circuit and the load.

BLOCK DIAGRAM



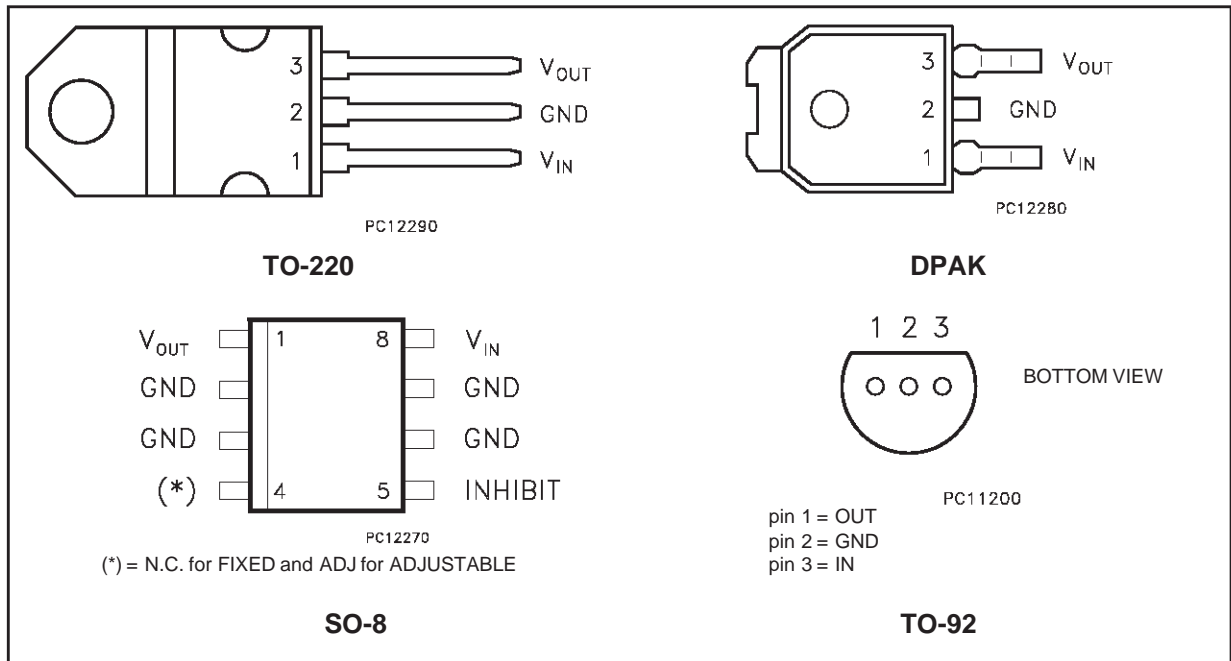
LM2931 SERIES

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|---|--------------------|--------------------|
| V_{IN} | DC Positive Input Voltage | 40 | V |
| V_{IN} | DC Reverse Input Voltage | -15 | V |
| V_{IN} | Transient Input Voltage ($\tau < 100\text{ms}$) | 60 | V |
| V_{IN} | Transient Reverse Input Voltage ($\tau < 100\text{ms}$) | -50 | V |
| V_{INH} | Inhibit Input Voltage | 40 | V |
| I_{OUT} | Output Current | Internally Limited | mA |
| T_{stg} | Storage Temperature Range | -65 to 150 | $^{\circ}\text{C}$ |
| T_{op} | Operating Junction Temperature Range | -40 to 125 | $^{\circ}\text{C}$ |

Absolute Maximum Ratings are those value beyond which damage to the device may occur. Functional operation under these condition is not implied.

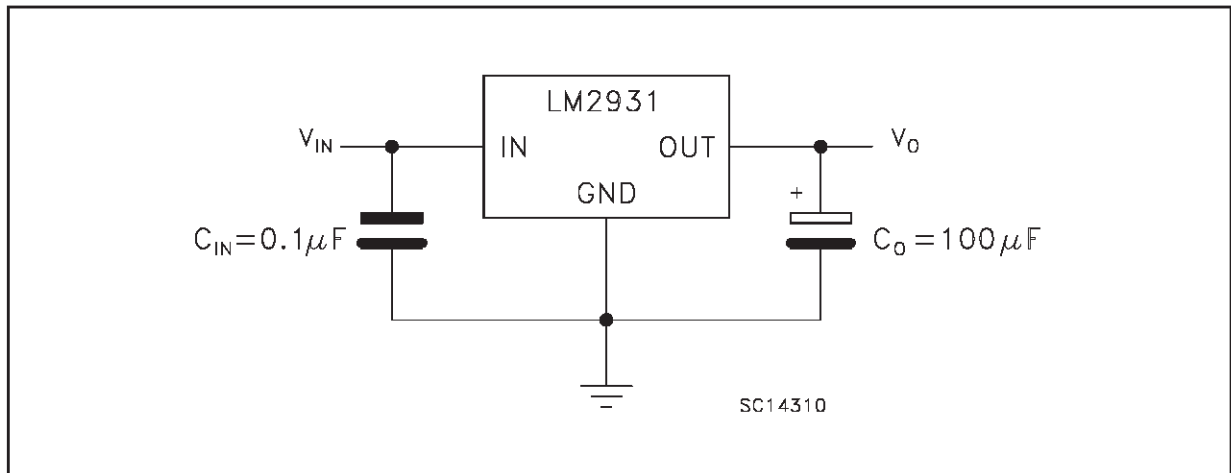
CONNECTION DIAGRAM AND ORDERING NUMBERS (top view)



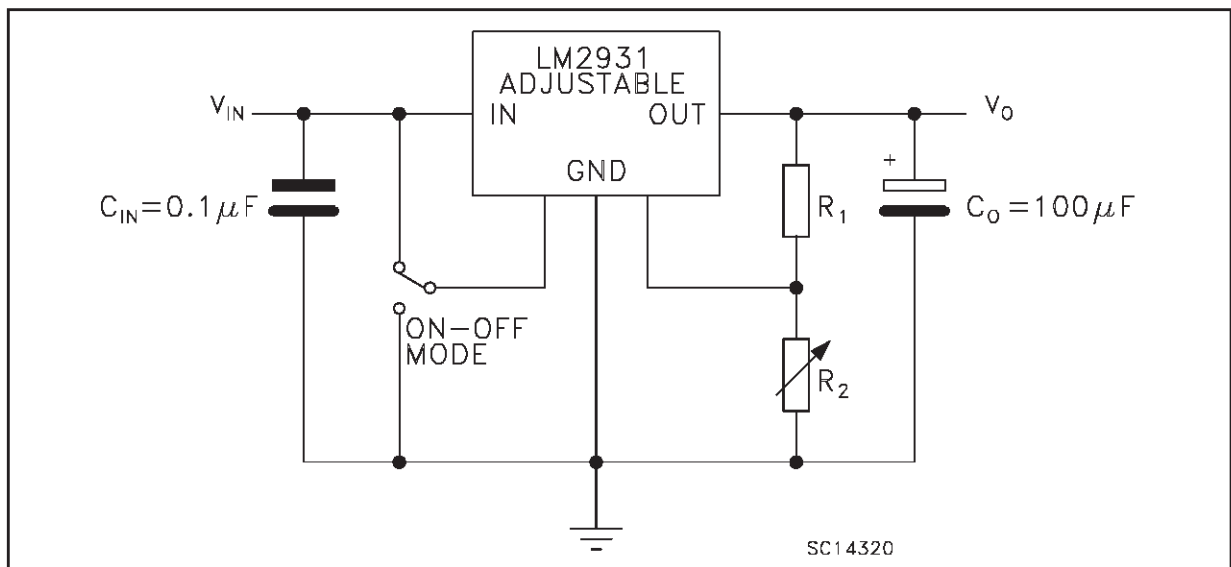
| TO-220 | DPAK (*) | TO-92 (*) | SO-8 (*) | Output Voltage |
|------------|-------------|------------|------------|----------------|
| LM2931AV33 | LM2931ADT33 | LM2931AZ33 | LM2931AD33 | 3.3V |
| LM2931BV33 | LM2931BDT33 | LM2931BZ33 | LM2931BD33 | 3.3V |
| LM2931AV50 | LM2931ADT50 | LM2931AZ50 | LM2931AD50 | 5V |
| LM2931BV50 | LM2931BDT50 | LM2931BZ50 | LM2931BD50 | 5V |
| | | | LM2931D | 2.5V to 26V |

(*) Available in Tape & Reel with the suffix "R" for fixed version and "-R" for adjustable version.

APPLICATION CIRCUIT FOR FIXED OUTPUT (Figure 1)



APPLICATION CIRCUIT FOR ADJUSTABLE OUTPUT (Figure 2)



R_1 suggested Value = 27K Ω

$$V_O = V_{REF} \times \frac{R_1 + R_2}{R_1}$$

LM2931 SERIES

ELECTRICAL CHARACTERISTICS FOR LM2931A 3.3V (refer to the test circuits,

$T_j = 25\text{ }^\circ\text{C}$, $V_{IN} = 14\text{ V}$, $C_{IN} = 0.1\text{ }\mu\text{F}$, $C_O = 100\text{ }\mu\text{F}$, $I_O = 10\text{ mA}$, $V_{INH} = 0\text{ V}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--|---|-------|------|-------|---------------------|
| V_I | Maximum Operating Input Voltage | $I_O = 10\text{ mA}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 26 | 37 | | V |
| V_O | Output Voltage | | 3.175 | 3.3 | 3.425 | V |
| V_O | Output Voltage | $I_O = 100\text{ mA}$ $V_{IN} = 6\text{ to }26\text{ V}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 3.135 | 3.3 | 3.465 | V |
| ΔV_O | Line Regulation | $V_{IN} = 9\text{ to }16\text{ V}$ | | 2 | 10 | mV |
| ΔV_O | Line Regulation | $V_{IN} = 6\text{ to }26\text{ V}$ | | 4 | 33 | mV |
| ΔV_O | Load Regulation | $I_O = 5\text{ to }100\text{ mA}$ | | 10 | 33 | mV |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 10\text{ mA}$ | | 90 | 250 | V |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 100\text{ mA}$ | | 250 | 600 | V |
| I_d | Quiescent Current | ON Mode: $I_{OUT} = 100\text{ mA}$ | | 2.5 | 30 | mA |
| I_d | Quiescent Current | OFF Mode: $V_{INH} = 2.5\text{ V}$ $R_{LOAD} = 330\Omega$ | | 0.3 | 1 | mA |
| I_{SC} | Short Circuit Current | | 100 | 300 | | mA |
| SVR | Supply Voltage Rejection | $I_O = 100\text{ mA}$ $V_{IN} = 14 \pm 2\text{ V}$ $f = 120\text{ Hz}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 55 | 78 | | dB |
| V_{IL} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | | 2 | 1.2 | V |
| V_{IH} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 3.25 | 2 | | V |
| I_{INH} | Inhibit Input Current | $V_{INH} = 2.5\text{ V}$ | | 22 | 50 | μA |
| V_{IN} | Transient Input Voltage | $R_{LOAD} = 330\Omega$ $\tau < 100\text{ ms}$ | 60 | 70 | | V |
| V_{IN} | Reverse Polarity Input Voltage | $V_O \pm 0.3\text{ V}$ $R_{LOAD} = 330\Omega$ | -15 | -50 | | V |
| V_{IN} | Reverse Polarity Input Voltage Transient | $R_{LOAD} = 330\Omega$ $\tau < 100\text{ ms}$ | -50 | | | V |
| eN | Output Noise Voltage | $B = 10\text{ Hz to }100\text{ KHz}$ | | 330 | | μV_{RMS} |

Note 1: Reference Voltage is measured from V_{OUT} to AJD pin.

Note 2: V_d measured when the output voltage has dropped 100mV from the nominal value obtained at 14V.

ELECTRICAL CHARACTERISTICS FOR LM2931B 3.3V (refer to the test circuits,
 $T_j = 25\text{ }^\circ\text{C}$, $V_{IN} = 14\text{ V}$, $C_{IN} = 0.1\text{ }\mu\text{F}$, $C_O = 100\text{ }\mu\text{F}$, $I_O = 10\text{ mA}$, $V_{INH} = 0\text{ V}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--|---|-------|------|-------|---------------------|
| V_I | Maximum Operating Input Voltage | $I_O = 10\text{ mA}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 26 | 37 | | V |
| V_O | Output Voltage | | 3.135 | 3.3 | 3.465 | V |
| V_O | Output Voltage | $I_O = 100\text{ mA}$ $V_{IN} = 6\text{ to }26\text{ V}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 2.97 | 3.3 | 3.63 | V |
| ΔV_O | Line Regulation | $V_{IN} = 9\text{ to }16\text{ V}$ | | 2 | 10 | mV |
| ΔV_O | Line Regulation | $V_{IN} = 6\text{ to }26\text{ V}$ | | 4 | 33 | mV |
| ΔV_O | Load Regulation | $I_O = 5\text{ to }100\text{ mA}$ | | 10 | 33 | mV |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 10\text{ mA}$ | | 90 | 200 | V |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 100\text{ mA}$ | | 250 | 600 | V |
| I_d | Quiescent Current | ON Mode: $I_{OUT} = 100\text{ mA}$ | | 2.5 | 30 | mA |
| I_d | Quiescent Current | OFF Mode: $V_{INH} = 2.5\text{ V}$ $R_{LOAD} = 330\Omega$ | | 0.3 | 1 | mA |
| I_{SC} | Short Circuit Current | | 100 | 300 | | mA |
| SVR | Supply Voltage Rejection | $I_O = 100\text{ mA}$ $V_{IN} = 14 \pm 2\text{ V}$ $f = 120\text{ Hz}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 55 | 78 | | dB |
| V_{IL} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | | 2 | 1.2 | V |
| V_{IH} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 3.25 | 2 | | V |
| I_{INH} | Inhibit Input Current | $V_{INH} = 2.5\text{ V}$ | | 22 | 50 | μA |
| V_{IN} | Transient Input Voltage | $R_{LOAD} = 330\Omega$ $\tau < 100\text{ ms}$ | 60 | 70 | | V |
| V_{IN} | Reverse Polarity Input Voltage | $V_O \pm 0.3\text{ V}$ $R_{LOAD} = 330\Omega$ | -15 | -50 | | V |
| V_{IN} | Reverse Polarity Input Voltage Transient | $R_{LOAD} = 330\Omega$ $\tau < 100\text{ ms}$ | -50 | | | V |
| eN | Output Noise Voltage | $B = 10\text{ Hz to }100\text{ KHz}$ | | 330 | | μV_{RMS} |

Note 1: Reference Voltage is measured from V_{OUT} to AJD pin.

Note 2: V_d measured when the output voltage has dropped 100mV from the nominal value obtained at 14V.

LM2931 SERIES

ELECTRICAL CHARACTERISTICS FOR LM2931A 5V (refer to the test circuits,

$T_j = 25\text{ }^\circ\text{C}$, $V_{IN} = 14\text{ V}$, $C_{IN} = 0.1\text{ }\mu\text{F}$, $C_O = 100\text{ }\mu\text{F}$, $I_O = 10\text{ mA}$, $V_{INH} = 0\text{ V}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--|---|------|------|------|---------------------|
| V_I | Maximum Operating Input Voltage | $I_O = 10\text{ mA}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 26 | 37 | | V |
| V_O | Output Voltage | | 4.81 | 5 | 5.19 | V |
| V_O | Output Voltage | $I_O = 100\text{ mA}$ $V_{IN} = 6\text{ to }26\text{ V}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 4.75 | 5 | 5.25 | V |
| ΔV_O | Line Regulation | $V_{IN} = 9\text{ to }16\text{ V}$ | | 2 | 10 | mV |
| ΔV_O | Line Regulation | $V_{IN} = 6\text{ to }26\text{ V}$ | | 4 | 30 | mV |
| ΔV_O | Load Regulation | $I_O = 5\text{ to }100\text{ mA}$ | | 15 | 50 | mV |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 10\text{ mA}$ | | 90 | 200 | V |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 100\text{ mA}$ | | 250 | 600 | V |
| I_d | Quiescent Current | ON Mode: $I_{OUT} = 100\text{ mA}$ | | 2.5 | 30 | mA |
| I_d | Quiescent Current | OFF Mode: $V_{INH} = 2.5\text{ V}$ $R_{LOAD} = 500\Omega$ | | 0.3 | 1 | mA |
| I_{SC} | Short Circuit Current | | 100 | 300 | | mA |
| SVR | Supply Voltage Rejection | $I_O = 100\text{ mA}$ $V_{IN} = 14 \pm 2\text{ V}$ $f = 120\text{ Hz}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 55 | 75 | | dB |
| V_{IL} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | | 2 | 1.2 | V |
| V_{IH} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 3.25 | 2 | | V |
| I_{INH} | Inhibit Input Current | $V_{INH} = 2.5\text{ V}$ | | 22 | 50 | μA |
| V_{IN} | Transient Input Voltage | $R_{LOAD} = 500\Omega$ $\tau < 100\text{ ms}$ | 60 | 70 | | V |
| V_{IN} | Reverse Polarity Input Voltage | $V_O \pm 0.3\text{ V}$ $R_{LOAD} = 500\Omega$ | -15 | -50 | | V |
| V_{IN} | Reverse Polarity Input Voltage Transient | $R_{LOAD} = 500\Omega$ $\tau < 100\text{ ms}$ | -50 | | | V |
| eN | Output Noise Voltage | $B = 10\text{ Hz to }100\text{ KHz}$ | | 500 | | μV_{RMS} |

Note 1: Reference Voltage is measured from V_{OUT} to AJD pin.

Note 2: V_d measured when the output voltage has dropped 100mV from the nominal value obtained at 14V.

ELECTRICAL CHARACTERISTICS FOR LM2931B 5V (refer to the test circuits, $T_j = 25\text{ }^\circ\text{C}$, $V_{IN} = 14\text{ V}$, $C_{IN} = 0.1\text{ }\mu\text{F}$, $C_O = 100\text{ }\mu\text{F}$, $I_O = 10\text{ mA}$, $V_{INH} = 0\text{ V}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--|---|------|------|------|---------------------|
| V_I | Maximum Operating Input Voltage | $I_O = 10\text{ mA}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 26 | 37 | | V |
| V_O | Output Voltage | | 4.75 | 5 | 5.25 | V |
| V_O | Output Voltage | $I_O = 100\text{ mA}$ $V_{IN} = 6\text{ to }26\text{ V}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 4.5 | 5 | 5.5 | V |
| ΔV_O | Line Regulation | $V_{IN} = 9\text{ to }16\text{ V}$ | | 2 | 10 | mV |
| ΔV_O | Line Regulation | $V_{IN} = 6\text{ to }26\text{ V}$ | | 4 | 30 | mV |
| ΔV_O | Load Regulation | $I_O = 5\text{ to }100\text{ mA}$ | | 15 | 50 | mV |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 10\text{ mA}$ | | 90 | 200 | V |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 100\text{ mA}$ | | 250 | 600 | V |
| I_d | Quiescent Current | ON Mode: $I_{OUT} = 100\text{ mA}$ | | 2.5 | 30 | mA |
| I_d | Quiescent Current | OFF Mode: $V_{INH} = 2.5\text{ V}$ $R_{LOAD} = 330\Omega$ | | 0.3 | 1 | mA |
| I_{SC} | Short Circuit Current | | 100 | 300 | | mA |
| SVR | Supply Voltage Rejection | $I_O = 100\text{ mA}$ $V_{IN} = 14 \pm 2\text{ V}$ $f = 120\text{ Hz}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 55 | 75 | | dB |
| V_{IL} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | | 2 | 1.2 | V |
| V_{IH} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 3.25 | 2 | | V |
| I_{INH} | Inhibit Input Current | $V_{INH} = 2.5\text{ V}$ | | 22 | 50 | μA |
| V_{IN} | Transient Input Voltage | $R_{LOAD} = 500\Omega$ $\tau < 100\text{ ms}$ | 60 | 70 | | V |
| V_{IN} | Reverse Polarity Input Voltage | $V_O \pm 0.3\text{ V}$ $R_{LOAD} = 500\Omega$ | -15 | -50 | | V |
| V_{IN} | Reverse Polarity Input Voltage Transient | $R_{LOAD} = 500\Omega$ $\tau < 100\text{ ms}$ | -50 | | | V |
| eN | Output Noise Voltage | $B = 10\text{ Hz to }100\text{ KHz}$ | | 500 | | μV_{RMS} |

Note 1: Reference Voltage is measured from V_{OUT} to AJD pin.**Note 2:** V_d measured when the output voltage has dropped 100mV from the nominal value obtained at 14V.

LM2931 SERIES

ELECTRICAL CHARACTERISTICS FOR LM2931ADJ (refer to the test circuits figure 2 with $R_1 = 27K\Omega$ and $R_2 = 40.5K\Omega$, $T_j = 25\text{ }^\circ\text{C}$, $V_{IN} = 14\text{ V}$, $C_{IN} = 0.1\text{ }\mu\text{F}$, $C_O = 100\text{ }\mu\text{F}$, $I_O = 10\text{ mA}$, $V_{INH} = 0\text{ V}$ unless otherwise specified)

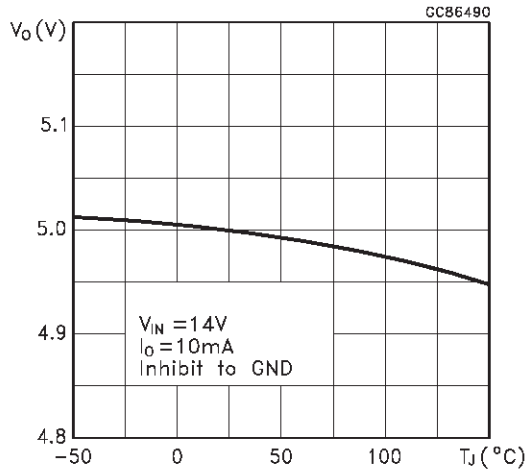
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--|---|------|------|------|---------------------|
| V_I | Maximum Operating Input Voltage | $I_O = 10\text{ mA}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 26 | 37 | | V |
| V_{REF} | Reference Voltage(Note 1) | | 1.14 | 1.2 | 1.26 | V |
| V_{REF} | Reference Voltage(Note 1) | $I_O = 100\text{ mA}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 1.08 | 1.2 | 1.32 | V |
| ΔV_O | Line Regulation | $V_{IN} = 3.6\text{ to }26\text{ V}$ | | 0.6 | 4.5 | mV |
| ΔV_O | Load Regulation | $I_O = 5\text{ to }100\text{ mA}$ | | 9 | 30 | mV |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 10\text{ mA}$ | | 90 | 200 | V |
| V_d | Dropout Voltage (Note 1, 2) | $I_O = 100\text{ mA}$ | | 250 | 600 | V |
| I_d | Quiescent Current | ON Mode: $I_{OUT} = 100\text{ mA}$ | | 2.5 | 30 | mA |
| I_d | Quiescent Current | OFF Mode: $V_{INH} = 2.5\text{ V}$ $R_{LOAD} = 300\Omega$ | | 0.3 | 1 | mA |
| I_{SC} | Short Circuit Current | | 100 | 300 | | mA |
| SVR | Supply Voltage Rejection | $I_O = 100\text{ mA}$ $V_{IN} = 14 \pm 2\text{ V}$ $f = 120\text{ Hz}$ $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 55 | 80 | | dB |
| V_{IL} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | | 2 | 1.2 | V |
| V_{IH} | Control Input Voltage | $T_j = -40\text{ to }125\text{ }^\circ\text{C}$ | 3.25 | 2 | | V |
| I_{INH} | Inhibit Input Current | $V_{INH} = 2.5\text{ V}$ | | 22 | 50 | μA |
| V_{IN} | Transient Input Voltage | $R_{LOAD} = 300\Omega$ $\tau < 100\text{ ms}$ | 60 | 70 | | V |
| V_{IN} | Reverse Polarity Input Voltage | $V_O \pm 0.3\text{ V}$ $R_{LOAD} = 300\Omega$ | -15 | -50 | | V |
| V_{IN} | Reverse Polarity Input Voltage Transient | $R_{LOAD} = 300\Omega$ $\tau < 100\text{ ms}$ | -50 | | | V |
| eN | Output Noise Voltage | $B = 10\text{ Hz to }100\text{ KHz}$ | | 330 | | μV_{RMS} |

Note 1: Reference Voltage is measured from V_{OUT} to AJD pin.

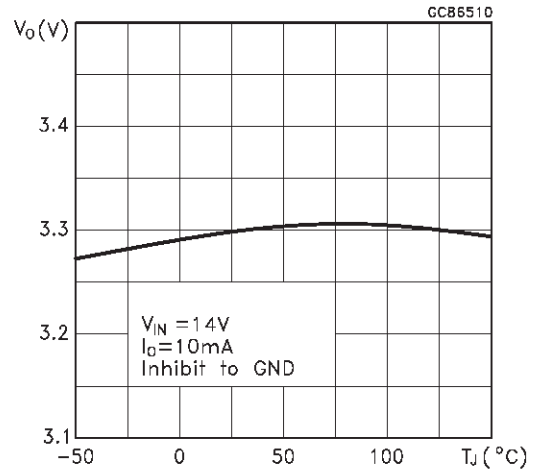
Note 2: V_d measured when the output voltage has dropped 100mV from the nominal value obtained at 14V.

TYPICAL CHARACTERISTICS (unless otherwise specified $C_{IN}=0.1\mu F$, $C_O=100\mu F$)

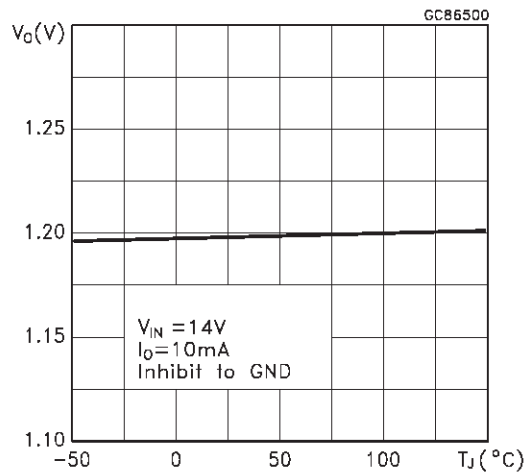
Output Voltage vs Temperature



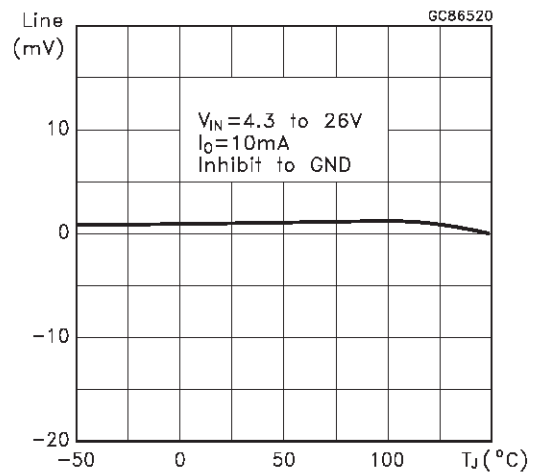
Output Voltage vs Temperature



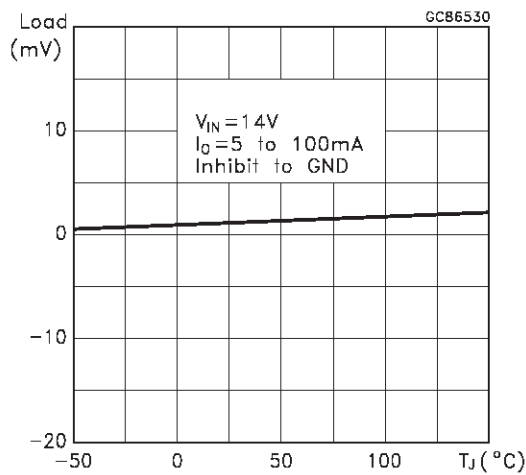
Reference Voltage vs Temperature



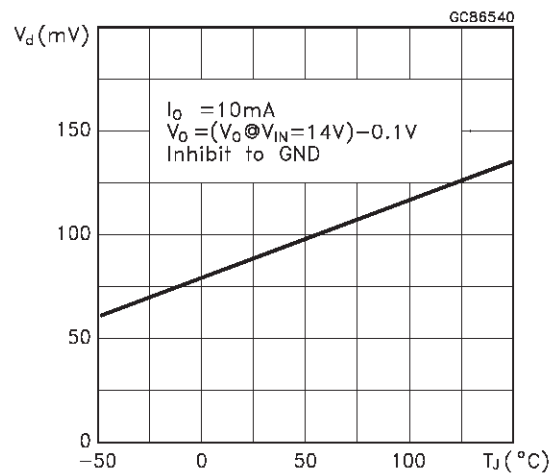
Line Regulation vs Temperature



Load Regulation vs Temperature

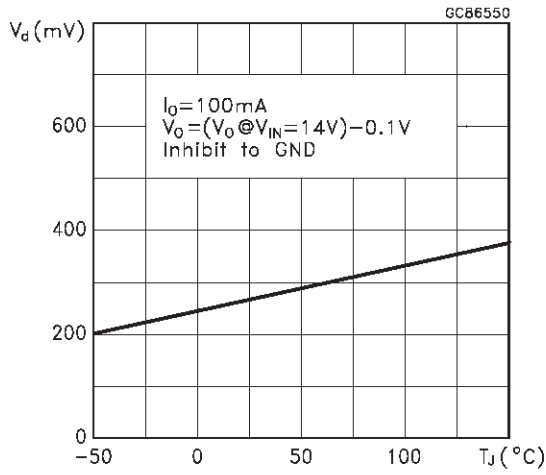


Dropout Voltage vs Temperature

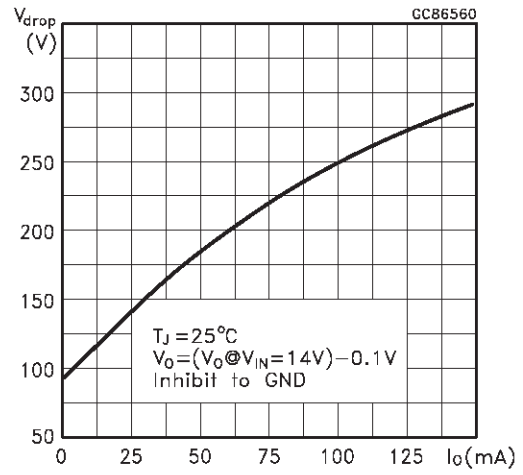


TYPICAL CHARACTERISTICS (Continued)

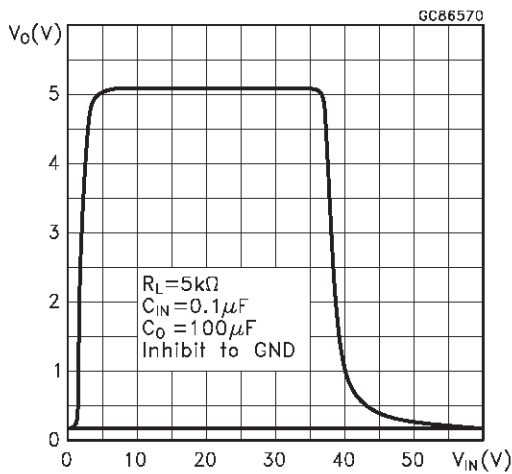
Dropout Voltage vs Temperature



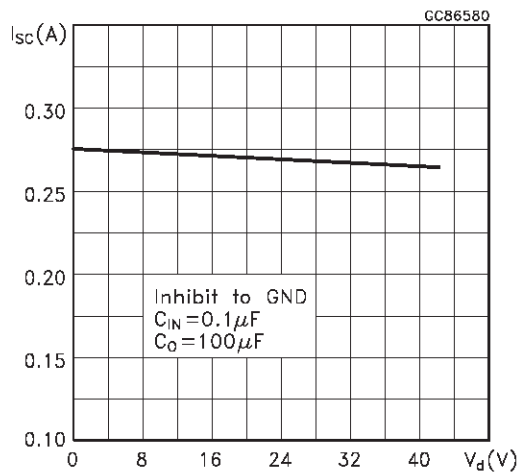
Dropout Voltage vs Output Current



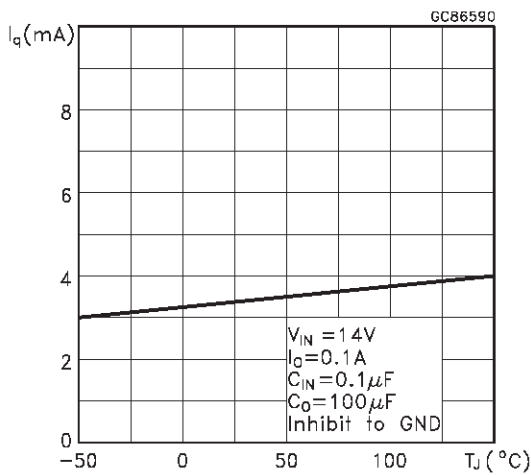
Output Voltage vs Input Voltage



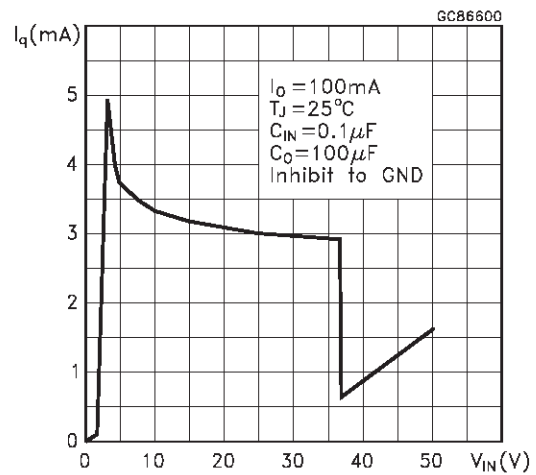
Short Circuit Current vs Drop Voltage



Quiescent Current vs Temperature

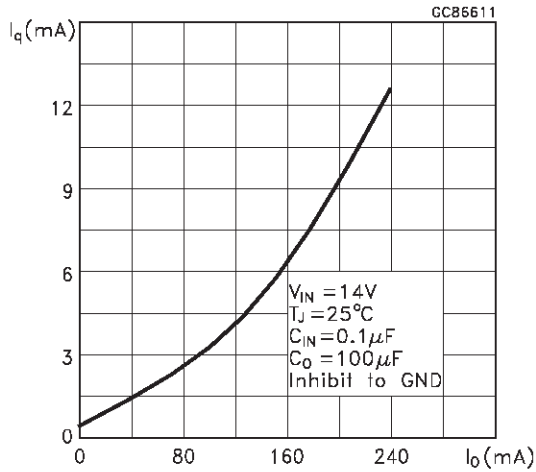


Quiescent Current vs Input Voltage

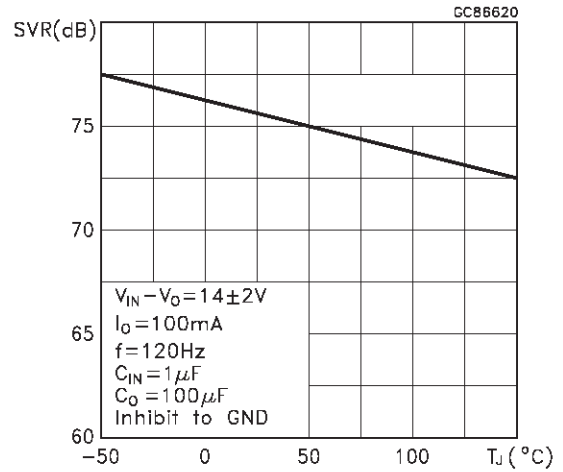


TYPICAL CHARACTERISTICS (Continued)

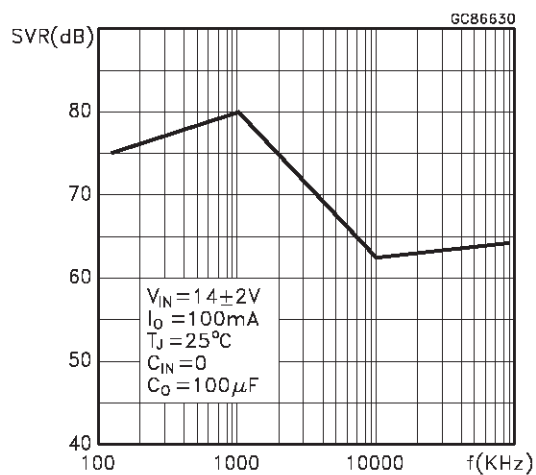
Quiescent Current vs Output Current



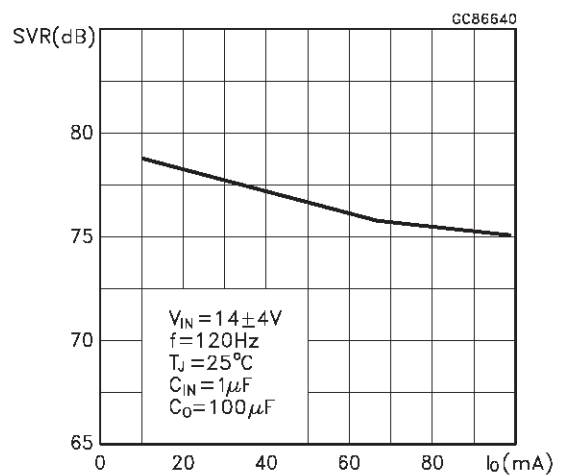
Supply Voltage Rejection vs Temperature



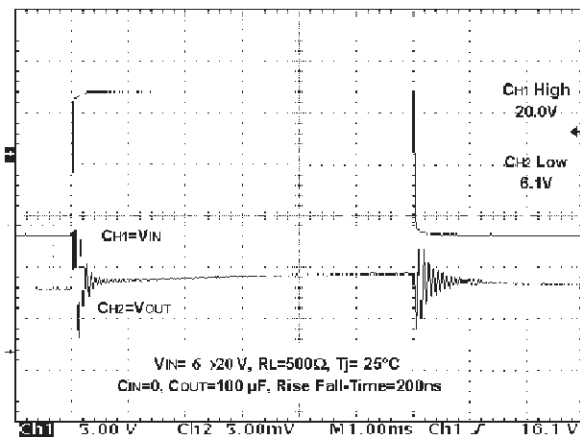
Supply Voltage Rejection vs Frequency



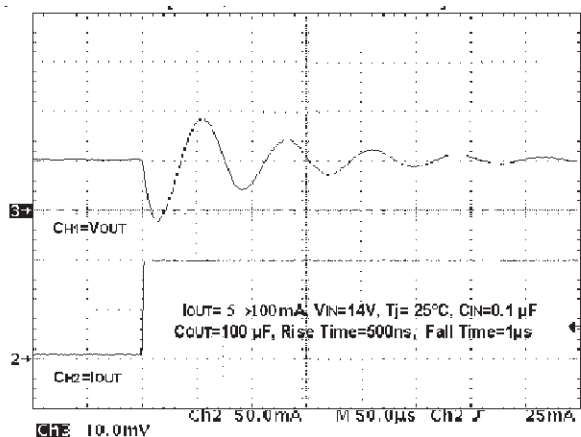
Supply Voltage Rejection vs Output Current



Line Transient

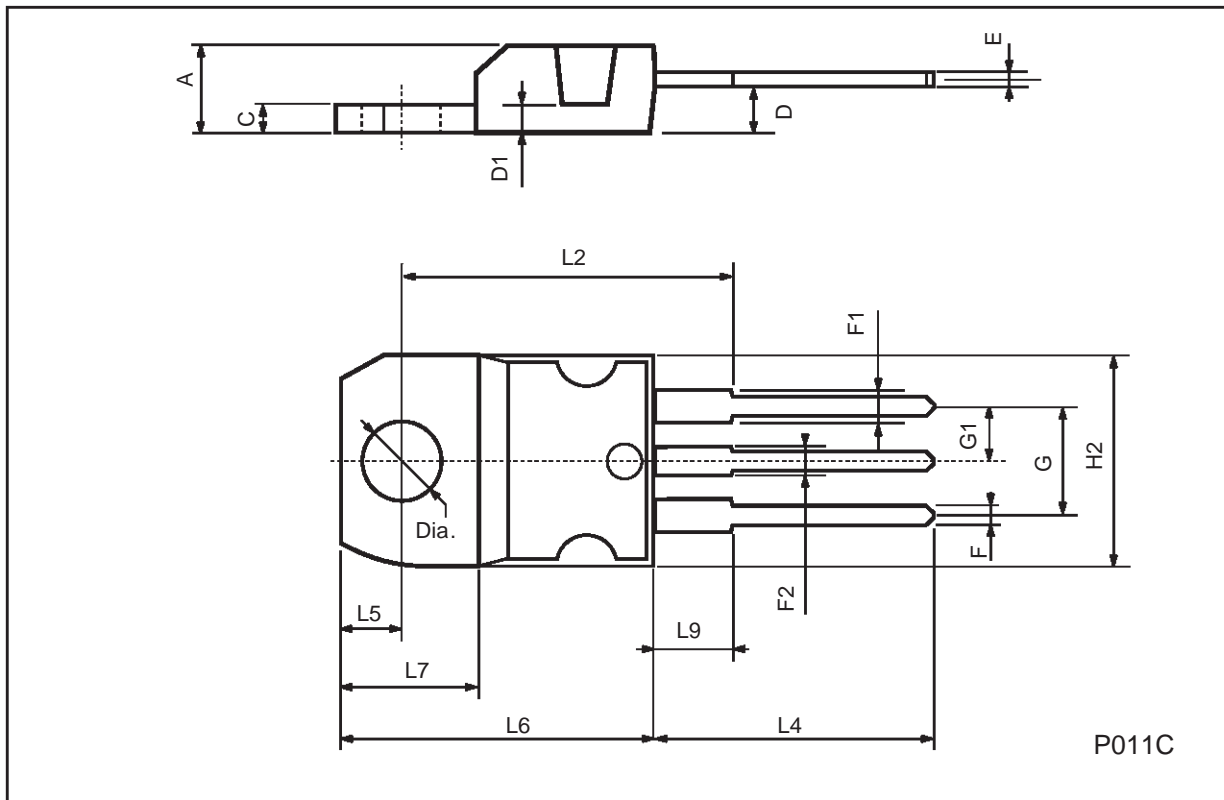


Load Transient



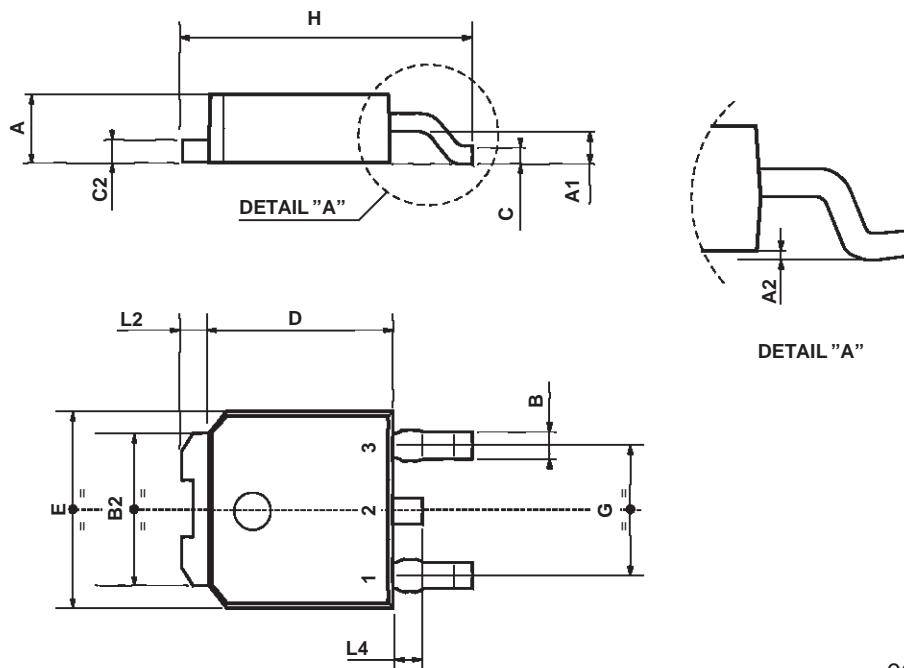
TO-220 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|-------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| C | 1.23 | | 1.32 | 0.048 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| D1 | | 1.27 | | | 0.050 | |
| E | 0.49 | | 0.70 | 0.019 | | 0.027 |
| F | 0.61 | | 0.88 | 0.024 | | 0.034 |
| F1 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| F2 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| G | 4.95 | | 5.15 | 0.194 | | 0.203 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H2 | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 | | | 0.645 | |
| L4 | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| L9 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| DIA. | 3.75 | | 3.85 | 0.147 | | 0.151 |



TO-252 (DPAK) MECHANICAL DATA

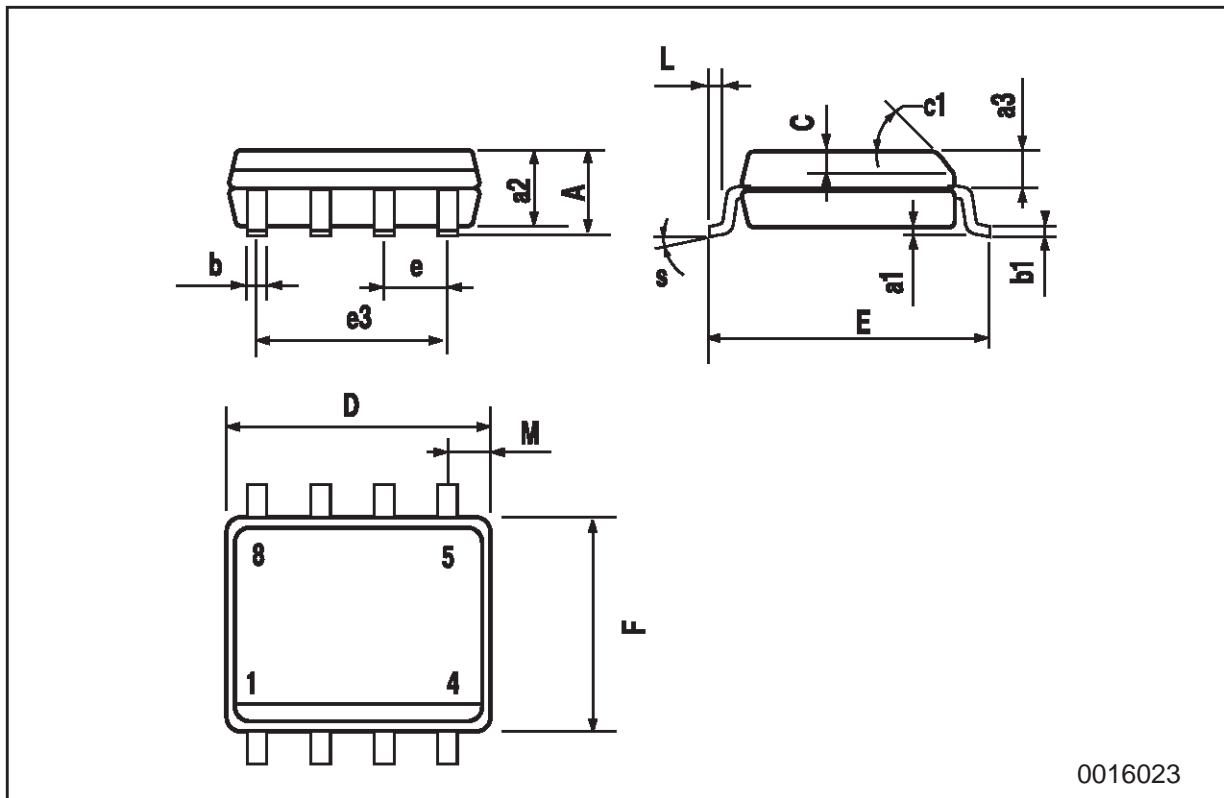
| DIM. | mm | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.9 | 0.025 | | 0.035 |
| B2 | 5.2 | | 5.4 | 0.204 | | 0.212 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 0.48 | | 0.6 | 0.019 | | 0.023 |
| D | 6 | | 6.2 | 0.236 | | 0.244 |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| G | 4.4 | | 4.6 | 0.173 | | 0.181 |
| H | 9.35 | | 10.1 | 0.368 | | 0.397 |
| L2 | | 0.8 | | | 0.031 | |
| L4 | 0.6 | | 1 | 0.023 | | 0.039 |



0068772-B

SO-8 MECHANICAL DATA

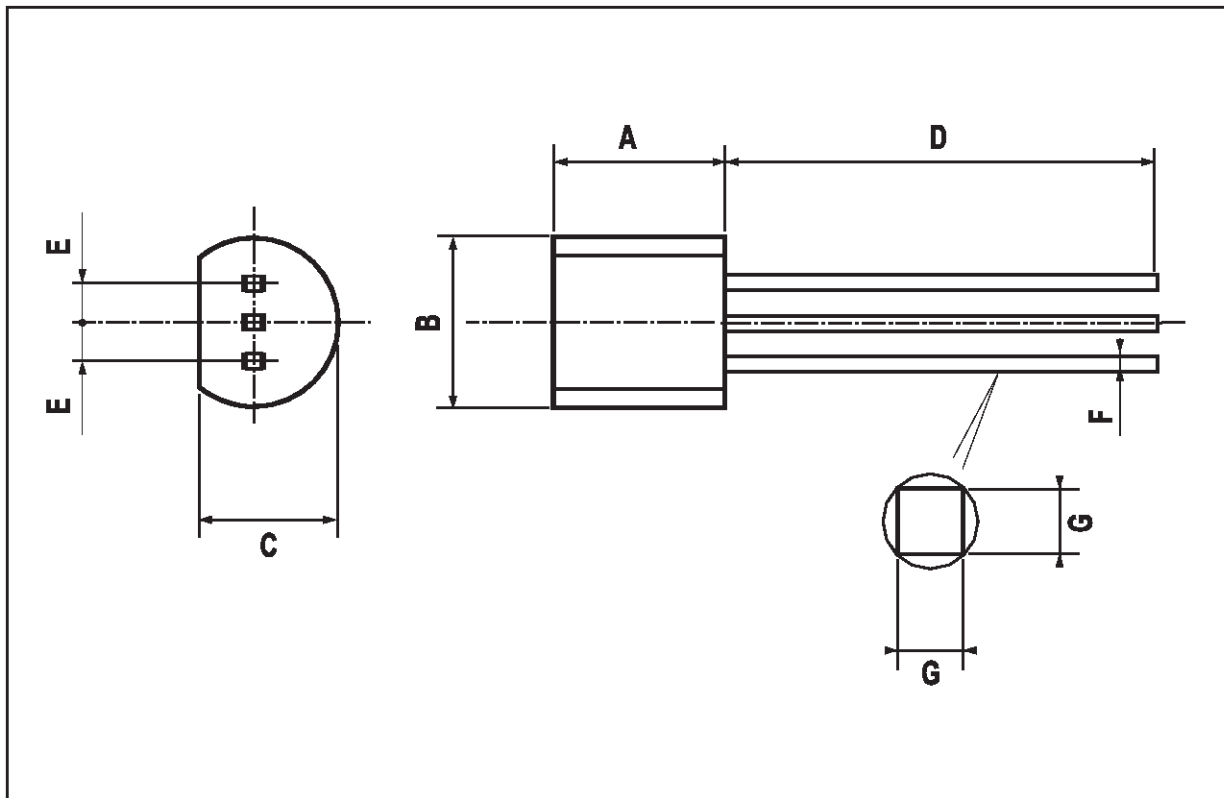
| DIM. | mm | | | inch | | |
|------|-----------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.75 | | | 0.068 |
| a1 | 0.1 | | 0.25 | 0.003 | | 0.009 |
| a2 | | | 1.65 | | | 0.064 |
| a3 | 0.65 | | 0.85 | 0.025 | | 0.033 |
| b | 0.35 | | 0.48 | 0.013 | | 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.) | | | | | |



0016023

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 | | |



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