

1.5A, VERY LOW DROP VOLTAGE REGULATORS

- VERY LOW DROPOUT VOLTAGE (TYP. 0.4 AT 1.5A)
- GUARANTEED OUTPUT CURRENT UP TO 1.5A
- FIXED AND ADJUSTABLE OUTPUT VOLTAGE ($\pm 1\%$ AT 25°C)
- INTERNAL CURRENT AND THERMAL LIMIT
- LOGIC CONTROLLED ELECTRONIC SHUTDOWN AVAILABLE IN PPAK

DESCRIPTION

The LD29150 is a high current, high accuracy, low-dropout voltage regulator series. These regulators feature 400mV dropout voltage and very low ground current. Designed for high current loads, these devices are also used in lower current, extremely low dropout-critical systems, where their tiny dropout voltage and ground current values are important attributes. Typical applications are in Power supply switching post regulation, Series power supply for monitors, Series power supply for VCRs and TVs, Computer Systems and Battery powered systems.

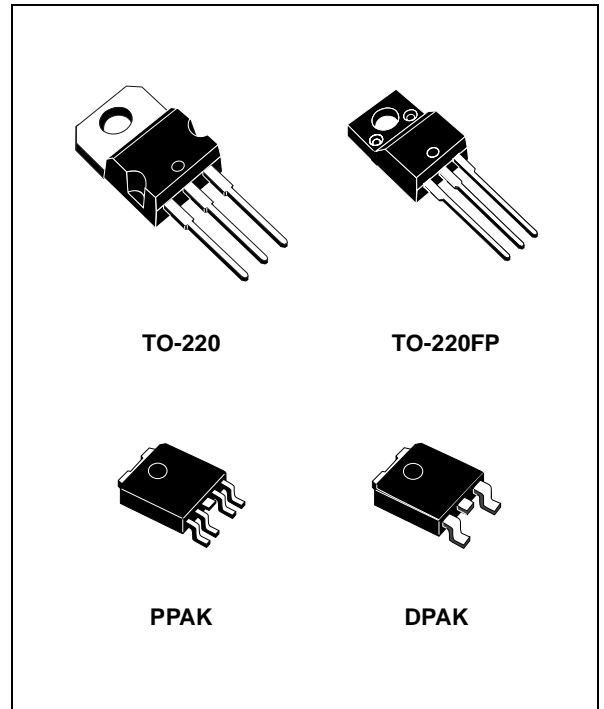


Figure 1: Schematic Diagram For Adjustable Version

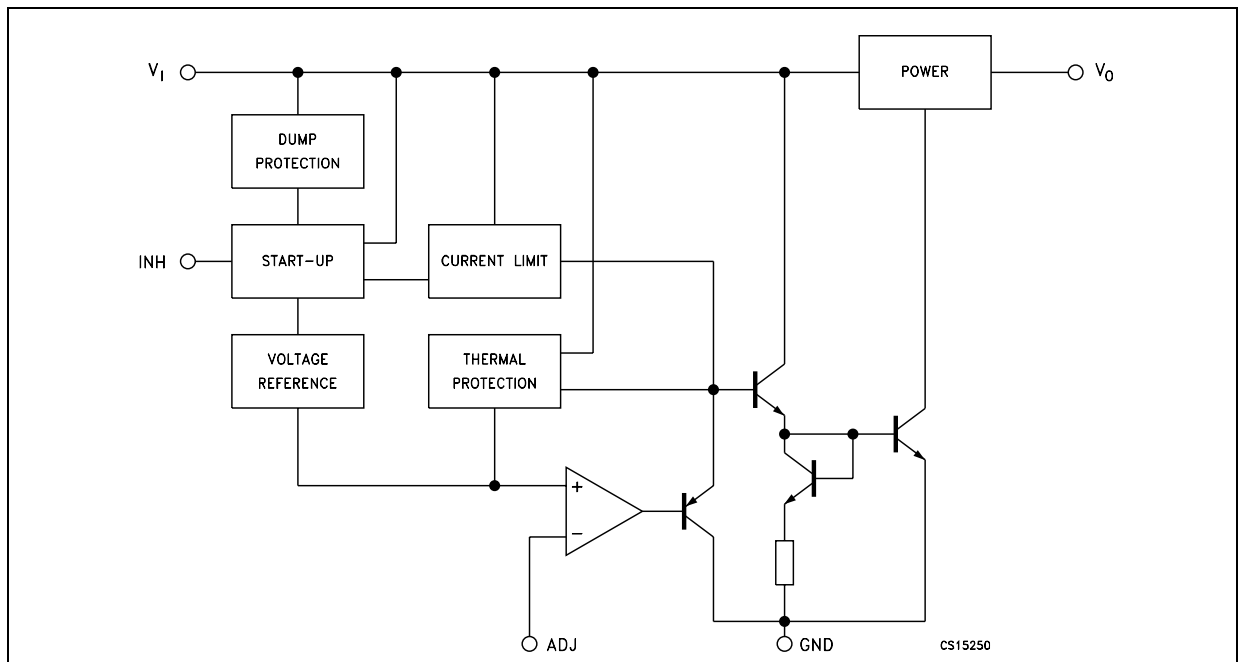
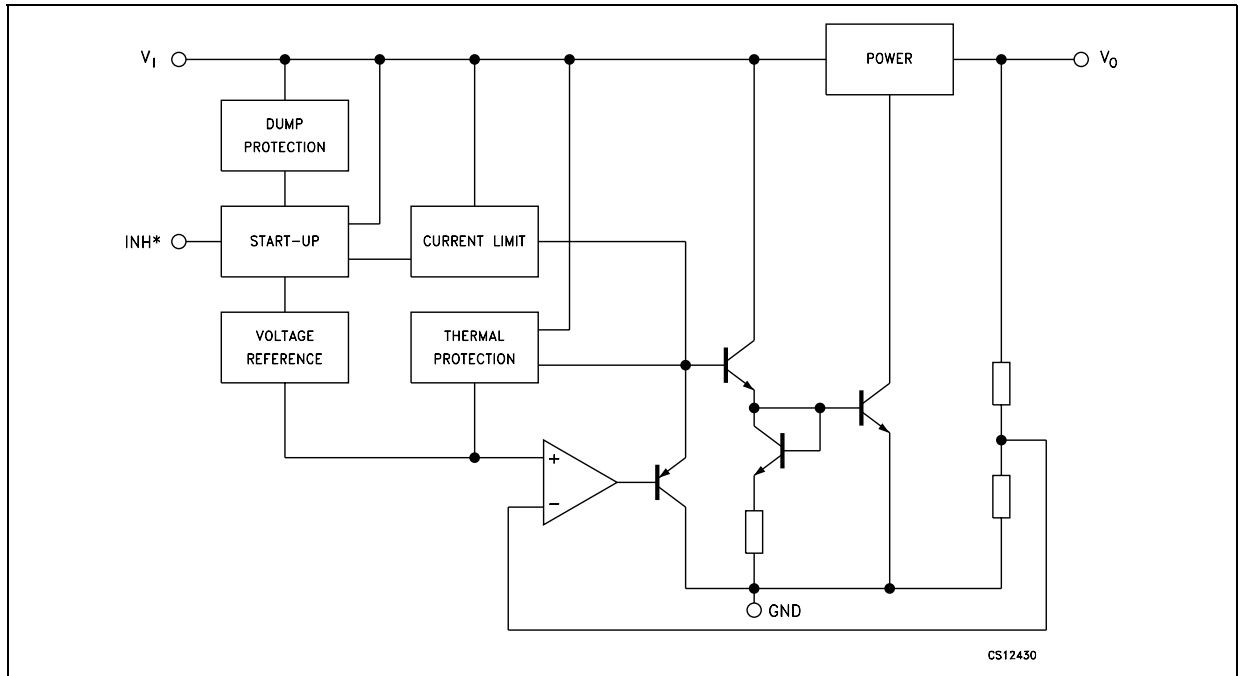


Figure 2: Schematic Diagram For Fixed Version



* Only for version with inhibit function.

Table 1: Ordering Codes

| TO-220 (#) | TO-220FP (#) | DPAK (*) | PPAK (*) | OUTPUT VOLTAGE |
|------------|--------------|-------------|-------------|----------------|
| LD29150V15 | LD29150P15 | LD29150DT15 | LD29150PT15 | 1.5 V |
| LD29150V18 | LD29150P18 | LD29150DT18 | LD29150PT18 | 1.8 V |
| LD29150V25 | LD29150P25 | LD29150DT25 | LD29150PT25 | 2.5 V |
| LD29150V33 | LD29150P33 | LD29150DT33 | LD29150PT33 | 3.3 V |
| LD29150V50 | LD29150P50 | LD29150DT50 | LD29150PT50 | 5.0 V |
| LD29150V80 | LD29150P80 | LD29150DT80 | LD29150PT80 | 8.0 V |
| | | | LD29150PT | ADJ |

(*) Available in Tape & Reel with the suffix "R".

(#) Available on request.

Table 2: Absolute Maximum Ratings

| Symbol | Parameter | Value | Unit |
|-----------|--------------------------------------|--------------------|------|
| V_I | DC Input Voltage | 30 (*) | V |
| I_O | Output Current | Internally Limited | mA |
| P_D | Power Dissipation | Internally Limited | mW |
| T_{stg} | Storage Temperature Range | -55 to 150 | °C |
| T_{op} | Operating Junction Temperature Range | -40 to 125 | °C |

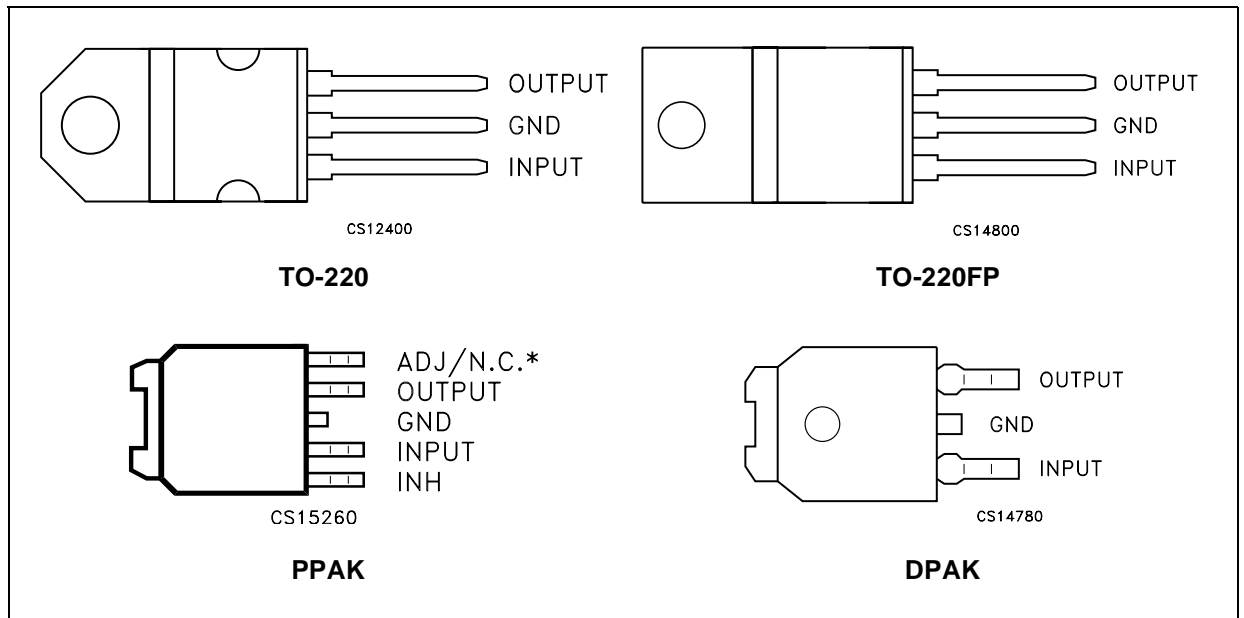
(*) Above 14V the device is automatically in shut-down.

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

Table 3: Thermal Data

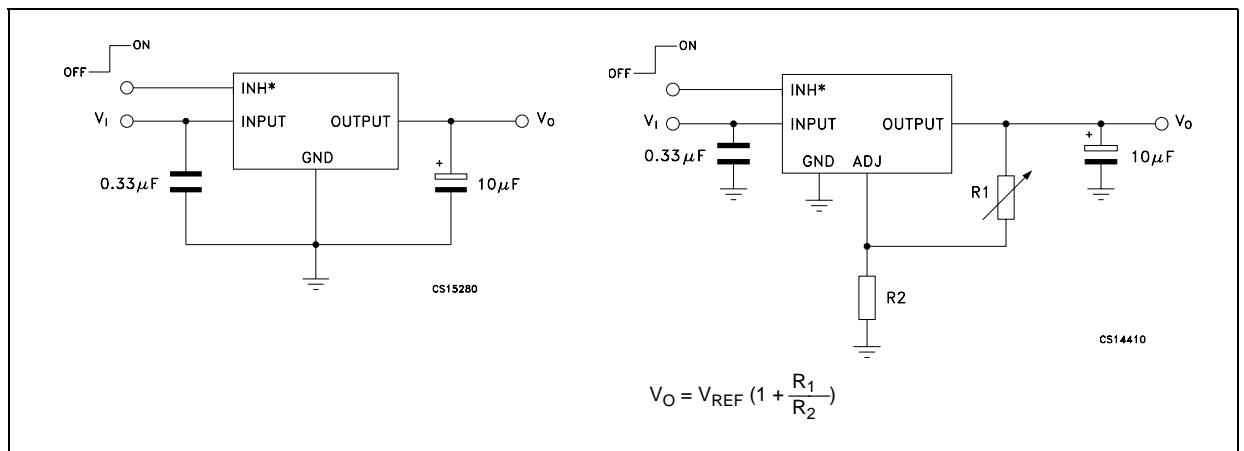
| Symbol | Parameter | DPAK | PPAK | TO-220 | TO-220FP | Unit |
|----------------|-------------------------------------|------|------|--------|----------|------|
| $R_{thj-case}$ | Thermal Resistance Junction-case | 8 | 8 | 3 | 4 | °C/W |
| $R_{thj-amb}$ | Thermal Resistance Junction-ambient | 100 | 100 | 50 | 60 | °C/W |

Figure 3: Pin Connection (top view)



* Not connected for fixed version.

Figure 4: Application Circuit



* Only for version with inhibit function.

Table 4: Electrical Characteristics Of LD29150#15

($I_O = 10\text{mA}$, $T_J = 25^\circ\text{C}$, $V_I = 3.5\text{V}$, $V_{INH} = 2\text{V}$ (Note 2), $C_I = 330\text{nF}$, $C_O = 10\mu\text{F}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------------|--|---------------|------|---------------|----------------------------|
| V_I | Minimum Operating Input Voltage | $I_O = 10\text{mA}$ to 1.5A $T_J = -40$ to 125°C | 2.5 | | | V |
| V_O | Output Voltage | $I_O = 10\text{mA}$ to 1.5A, $V_I = 3$ to 7V $T_J = -40$ to 125°C | 1.485 1.47 | 1.5 | 1.515 1.53 | V |
| ΔV_O | Load Regulation | $I_O = 10\text{mA}$ to 1.5A | | 0.2 | 1.0 | % |
| ΔV_O | Line Regulation | $V_I = 3$ to 13V | | 0.06 | 0.5 | % |
| SVR | Supply Voltage Rejection | $f = 120\text{Hz}$, $V_I = 3.5 \pm 1\text{V}$, $I_O = 0.75\text{A}$ (Note 1) | 65 | 75 | | dB |
| I_q | Quiescent Current | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C | | 15 | 40 | mA |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C | | 30 | 80 | |
| | | $V_I = 13\text{V}$, $V_{INH} = \text{GND}$ $T_J = -40$ to 125°C | | 130 | 180 | μA |
| I_{sc} | Short Circuit Current | $V_I - V_O = 5.5\text{V}$ | | 2.2 | | A |
| V_{IL} | Control Input Logic Low | OFF MODE, (NOTE 2) $T_J = -40$ to 125°C | | | 0.8 | V |
| V_{IH} | Control Input Logic High | ON MODE, (NOTE 2) $T_J = -40$ to 125°C | 2 | | | V |
| I_{INH} | Control Input Current | $T_J = -40$ to 125°C $V_{INH} = 13\text{V}$ | | 5 | 10 | μA |
| eN | Output Noise Voltage | $B_P = 10\text{Hz}$ to 100KHz $I_O = 100\text{mA}$ | | 60 | | μV_{RMS} |

NOTE 1: Guaranteed by design.

NOTE 2: Only for version with Inhibit function.

Table 5: Electrical Characteristics Of LD29150#18

($I_O = 10\text{mA}$, $T_J = 25^\circ\text{C}$, $V_I = 3.8\text{V}$, $V_{INH} = 2\text{V}$ (Note 3), $C_I = 330\text{nF}$, $C_O = 10\mu\text{F}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------|--------------------------|--|-------|------|-------|----------------------------|
| V_O | Output Voltage | $I_O = 10\text{mA}$ to 1.5A, $V_I = 3$ to 7.3V $T_J = -40$ to 125°C | 1.782 | 1.8 | 1.818 | V |
| | | | 1.764 | | 1.836 | |
| ΔV_O | Load Regulation | $I_O = 10\text{mA}$ to 1.5A | | 0.2 | 1.0 | % |
| ΔV_O | Line Regulation | $V_I = 3$ to 13V | | 0.06 | 0.5 | % |
| SVR | Supply Voltage Rejection | $f = 120\text{Hz}$, $V_I = 3.8 \pm 1\text{V}$, $I_O = 0.75\text{A}$ (Note 1) | 62 | 72 | | dB |
| V_{DROPP} | Dropout Voltage | $I_O = 250\text{mA}$, $T_J = -40$ to 125°C (Note 2) | | 0.1 | | V |
| | | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C (Note 2) | | 0.2 | | |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C (Note 2) | | 0.4 | 0.7 | |
| I_q | Quiescent Current | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C | | 15 | 40 | mA |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C | | 30 | 80 | |
| | | $V_I = 13\text{V}$, $V_{INH} = \text{GND}$ $T_J = -40$ to 125°C | | 130 | 180 | μA |
| I_{sc} | Short Circuit Current | $V_I - V_O = 5.5\text{V}$ | | 2.2 | | A |
| V_{IL} | Control Input Logic Low | OFF MODE, (NOTE 3) $T_J = -40$ to 125°C | | | 0.8 | V |
| V_{IH} | Control Input Logic High | ON MODE, (NOTE 3) $T_J = -40$ to 125°C | 2 | | | V |
| I_{INH} | Control Input Current | $T_J = -40$ to 125°C $V_{INH} = 13\text{V}$ | | 5 | 10 | μA |
| eN | Output Noise Voltage | $B_P = 10\text{Hz}$ to 100KHz $I_O = 100\text{mA}$ | | 72 | | μV_{RMS} |

NOTE 1: Guaranteed by design.

NOTE 2: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with $V_{O+1\text{V}}$ applied to V_I .

NOTE 3: Only for version with Inhibit function.

Table 6: Electrical Characteristics Of LD29150#25(I_O = 10mA, T_J = 25°C, V_I = 4.5V, V_{INH} = 2V (Note 3), C₁ = 330nF, C_O = 10μF, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------|--------------------------|--|-------|------|-------|-------------------|
| V _O | Output Voltage | I _O = 10mA to 1.5A, V _I = 3.5 to 8V T _J = -40 to 125°C | 2.475 | 2.5 | 2.525 | V |
| | | | 2.45 | | 2.55 | |
| ΔV _O | Load Regulation | I _O = 10mA to 1.5A | | 0.2 | 1.0 | % |
| ΔV _O | Line Regulation | V _I = 3.5 to 13V | | 0.06 | 0.5 | % |
| SVR | Supply Voltage Rejection | f = 120 Hz, V _I = 4.5 ± 1V, I _O = 0.75A (Note 1) | 55 | 70 | | dB |
| V _{DROP} | Dropout Voltage | I _O = 250mA, T _J = -40 to 125°C (Note 2) | | 0.1 | | V |
| | | I _O = 0.75A, T _J = -40 to 125°C (Note 2) | | 0.2 | | |
| | | I _O = 1.5A, T _J = -40 to 125°C (Note 2) | | 0.4 | 0.7 | |
| I _q | Quiescent Current | I _O = 0.75A, T _J = -40 to 125°C | | 15 | 40 | mA |
| | | I _O = 1.5A, T _J = -40 to 125°C | | 30 | 80 | |
| | | V _I = 13V, V _{INH} = GND T _J = -40 to 125°C | | 130 | 180 | μA |
| I _{sc} | Short Circuit Current | V _I - V _O = 5.5V | | 2.2 | | A |
| V _{IL} | Control Input Logic Low | OFF MODE, (NOTE 3) T _J = -40 to 125°C | | | 0.8 | V |
| V _{IH} | Control Input Logic High | ON MODE, (NOTE 3) T _J = -40 to 125°C | 2 | | | V |
| I _{INH} | Control Input Current | T _J = -40 to 125°C V _{INH} = 13V | | 5 | 10 | μA |
| eN | Output Noise Voltage | B _P = 10Hz to 100KHz I _O = 100mA | | 100 | | μV _{RMS} |

NOTE 1: Guaranteed by design.

NOTE 2: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

NOTE 3: Only for version with Inhibit function.

Table 7: Electrical Characteristics Of LD29150#33(I_O = 10mA, T_J = 25°C, V_I = 5.3V, V_{INH} = 2V (Note 3), C₁ = 330nF, C_O = 10μF, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------|--------------------------|--|-------|------|-------|-------------------|
| V _O | Output Voltage | I _O = 10mA to 1.5A, V _I = 4.3 to 8.8V T _J = -40 to 125°C | 3.267 | 3.3 | 3.333 | V |
| | | | 3.234 | | 3.366 | |
| ΔV _O | Load Regulation | I _O = 10mA to 1.5A | | 0.2 | 1.0 | % |
| ΔV _O | Line Regulation | V _I = 4.3 to 13V | | 0.06 | 0.5 | % |
| SVR | Supply Voltage Rejection | f = 120 Hz, V _I = 5.3 ± 1V, I _O = 0.75A (Note 1) | 52 | 67 | | dB |
| V _{DROP} | Dropout Voltage | I _O = 250mA, T _J = -40 to 125°C (Note 2) | | 0.1 | | V |
| | | I _O = 0.75A, T _J = -40 to 125°C (Note 2) | | 0.2 | | |
| | | I _O = 1.5A, T _J = -40 to 125°C (Note 2) | | 0.4 | 0.7 | |
| I _q | Quiescent Current | I _O = 0.75A, T _J = -40 to 125°C | | 15 | 40 | mA |
| | | I _O = 1.5A, T _J = -40 to 125°C | | 30 | 80 | |
| | | V _I = 13V, V _{INH} = GND T _J = -40 to 125°C | | 130 | 180 | μA |
| I _{sc} | Short Circuit Current | V _I - V _O = 5.5V | | 2.2 | | A |
| V _{IL} | Control Input Logic Low | OFF MODE, (NOTE 3) T _J = -40 to 125°C | | | 0.8 | V |
| V _{IH} | Control Input Logic High | ON MODE, (NOTE 3) T _J = -40 to 125°C | 2 | | | V |
| I _{INH} | Control Input Current | T _J = -40 to 125°C V _{INH} = 13V | | 5 | 10 | μA |
| eN | Output Noise Voltage | B _P = 10Hz to 100KHz I _O = 100mA | | 132 | | μV _{RMS} |

NOTE 1: Guaranteed by design.

NOTE 2: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

NOTE 3: Only for version with Inhibit function.

Table 8: Electrical Characteristics Of LD29150#50

($I_O = 10\text{mA}$, $T_J = 25^\circ\text{C}$, $V_I = 7\text{V}$, $V_{INH} = 2\text{V}$ (Note 3), $C_I = 330\text{nF}$, $C_O = 10\mu\text{F}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|---|------|------|------|---------------------|
| V_O | Output Voltage | $I_O = 10\text{mA}$ to 1.5A, $V_I = 6$ to 10.5V $T_J = -40$ to 125°C | 4.95 | 5 | 5.05 | V |
| | | | 4.9 | | 5.1 | |
| ΔV_O | Load Regulation | $I_O = 10\text{mA}$ to 1.5A | | 0.2 | 1.0 | % |
| ΔV_O | Line Regulation | $V_I = 6$ to 13V | | 0.06 | 0.5 | % |
| SVR | Supply Voltage Rejection | $f = 120\text{Hz}$, $V_I = 7 \pm 1\text{V}$, $I_O = 0.75\text{A}$ (Note 1) | 49 | 64 | | dB |
| V_{DROP} | Dropout Voltage | $I_O = 250\text{mA}$, $T_J = -40$ to 125°C (Note 2) | | 0.1 | | V |
| | | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C (Note 2) | | 0.2 | | |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C (Note 2) | | 0.4 | 0.7 | |
| I_q | Quiescent Current | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C | | 15 | 40 | mA |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C | | 30 | 80 | |
| | | $V_I = 13\text{V}$, $V_{INH} = \text{GND}$ $T_J = -40$ to 125°C | | 130 | 180 | μA |
| I_{SC} | Short Circuit Current | $V_I - V_O = 5.5\text{V}$ | | 2.2 | | A |
| V_{IL} | Control Input Logic Low | OFF MODE, (NOTE 3) $T_J = -40$ to 125°C | | | 0.8 | V |
| V_{IH} | Control Input Logic High | ON MODE, (NOTE 3) $T_J = -40$ to 125°C | 2 | | | V |
| I_{INH} | Control Input Current | $T_J = -40$ to 125°C $V_{INH} = 13\text{V}$ | | 5 | 10 | μA |
| eN | Output Noise Voltage | $B_P = 10\text{Hz}$ to 100KHz $I_O = 100\text{mA}$ | | 200 | | μV_{RMS} |

NOTE 1: Guaranteed by design.

NOTE 2: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with $V_O + 1\text{V}$ applied to V_I .

NOTE 3: Only for version with Inhibit function.

Table 9: Electrical Characteristics Of LD29150#80

($I_O = 10\text{mA}$, $T_J = 25^\circ\text{C}$, $V_I = 10\text{V}$, $V_{INH} = 2\text{V}$ (Note 3), $C_I = 330\text{nF}$, $C_O = 10\mu\text{F}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|--------------------------|---|------|------|------|---------------------|
| V_O | Output Voltage | $I_O = 10\text{mA}$ to 1.5A, $V_I = 9$ to 13V $T_J = -40$ to 125°C | 7.92 | 8 | 8.08 | V |
| | | | 7.84 | | 8.16 | |
| ΔV_O | Load Regulation | $I_O = 10\text{mA}$ to 1.5A | | 0.2 | 1.0 | % |
| ΔV_O | Line Regulation | $V_I = 9$ to 13V | | 0.06 | 0.5 | % |
| SVR | Supply Voltage Rejection | $f = 120\text{Hz}$, $V_I = 9 \pm 1\text{V}$, $I_O = 0.75\text{A}$ (Note 1) | 45 | 59 | | dB |
| V_{DROP} | Dropout Voltage | $I_O = 250\text{mA}$, $T_J = -40$ to 125°C (Note 2) | | 0.1 | | V |
| | | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C (Note 2) | | 0.2 | | |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C (Note 2) | | 0.4 | 0.7 | |
| I_q | Quiescent Current | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C | | 15 | 40 | mA |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C | | 30 | 80 | |
| | | $V_I = 13\text{V}$, $V_{INH} = \text{GND}$ $T_J = -40$ to 125°C | | 130 | 180 | μA |
| I_{SC} | Short Circuit Current | $V_I - V_O = 5.5\text{V}$ | | 2.2 | | A |
| V_{IL} | Control Input Logic Low | OFF MODE, (NOTE 3) $T_J = -40$ to 125°C | | | 0.8 | V |
| V_{IH} | Control Input Logic High | ON MODE, (NOTE 3) $T_J = -40$ to 125°C | 2 | | | V |
| I_{INH} | Control Input Current | $T_J = -40$ to 125°C $V_{INH} = 13\text{V}$ | | 5 | 10 | μA |
| eN | Output Noise Voltage | $B_P = 10\text{Hz}$ to 100KHz $I_O = 100\text{mA}$ | | 320 | | μV_{RMS} |

NOTE 1: Guaranteed by design.

NOTE 2: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with $V_O + 1\text{V}$ applied to V_I .

NOTE 3: Only for version with Inhibit function.

Table 10: Electrical Characteristics Of LD29150#ADJ

($I_O = 10\text{mA}$, $T_J = 25^\circ\text{C}$, $V_I = 3.23\text{V}$, $V_{INH} = 2\text{V}$ (Note 3), $C_1 = 330\text{nF}$, $C_O = 10\mu\text{F}$ adjust pin tied to output pin)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------------------|--|------|------|------|---------------------|
| V_I | Minimum Operating Input Voltage | $I_O = 10\text{mA}$ to 1.5A $T_J = -40$ to 125°C | 2.5 | | | V |
| ΔV_O | Load Regulation | $I_O = 10\text{mA}$ to 1.5A | | 0.2 | 1.0 | % |
| ΔV_O | Line Regulation | $V_I = 2.5\text{V}$ to 13V $I_O = 10\text{mA}$ | | 0.06 | 0.5 | % |
| V_{REF} | Reference Voltage | $I_O = 10\text{mA}$ to 1.5A , $V_I = 2.5$ to 4.5V $T_J = -40$ to 125°C (Note 2) | -1% | 1.23 | +1% | V |
| | | | -2% | | +2% | |
| SVR | Supply Voltage Rejection | $f = 120\text{Hz}$, $V_I = 3.23 \pm 1\text{V}$, $I_O = 0.75\text{A}$ (Note 1) | 45 | 75 | | dB |
| I_q | Quiescent Current | $I_O = 0.75\text{A}$, $T_J = -40$ to 125°C | | 15 | 40 | mA |
| | | $I_O = 1.5\text{A}$, $T_J = -40$ to 125°C | | 30 | 80 | |
| | | $V_I = 13\text{V}$, $V_{INH} = \text{GND}$ $T_J = -40$ to 125°C | | 130 | 180 | μA |
| I_{ADJ} | Adjust Pin Current | $T_J = -40$ to 125°C (Note 1) | | | 1 | μA |
| I_{sc} | Short Circuit Current | $V_I - V_O = 5.5\text{V}$ | | 2.2 | | A |
| V_{IL} | Control Input Logic Low | OFF MODE, (NOTE 3) $T_J = -40$ to 125°C | | | 0.8 | V |
| V_{IH} | Control Input Logic High | ON MODE, (NOTE 3) $T_J = -40$ to 125°C | 2 | | | V |
| I_{INH} | Control Input Current | $T_J = -40$ to 125°C $V_{INH} = 13\text{V}$ | | 5 | 10 | μA |
| eN | Output Noise Voltage | $B_p = 10\text{Hz}$ to 100KHz $I_O = 100\text{mA}$ | | 50 | | μV_{RMS} |

NOTE 1: Guaranteed by design.

NOTE 2: reference Voltage is measured between output and GND pin, with ADJ PIN tied to V_{OUT} .

NOTE 3: Only for version with Inhibit function.

TYPICAL CHARACTERISTICS

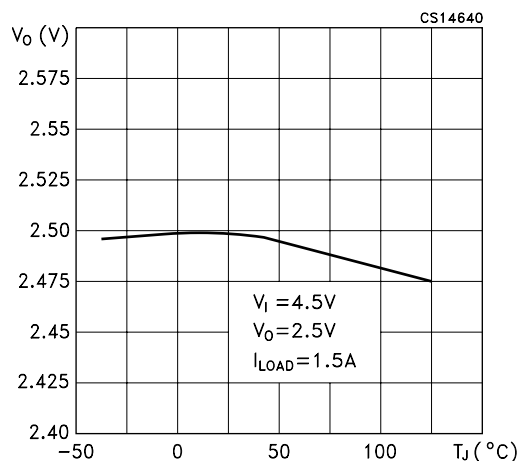
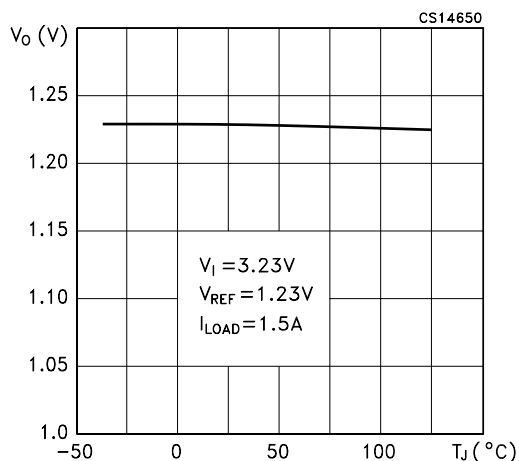
Figure 5: Output Voltage vs Temperature**Figure 6: Reference Voltage vs Temperature**

Figure 7: Dropout Voltage vs Temperature

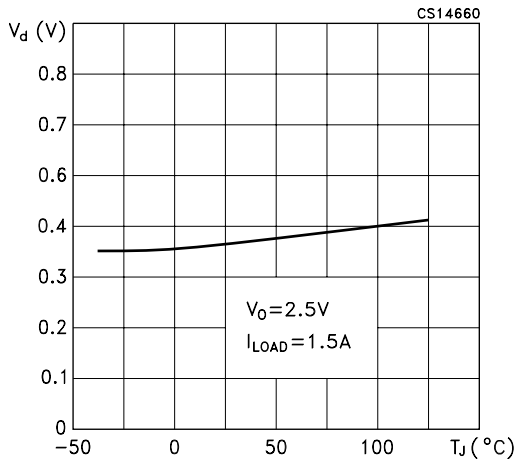


Figure 8: Dropout Voltage vs Output Current

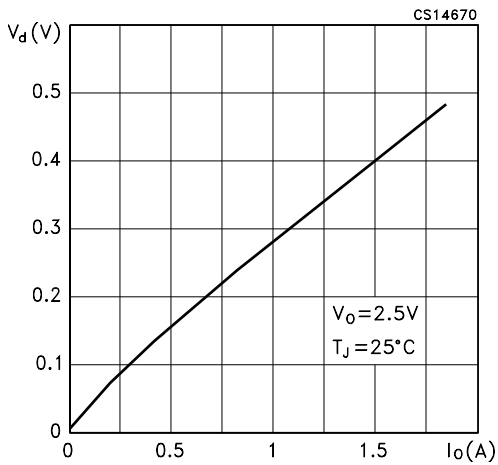


Figure 9: Quiescent Current vs Output Current

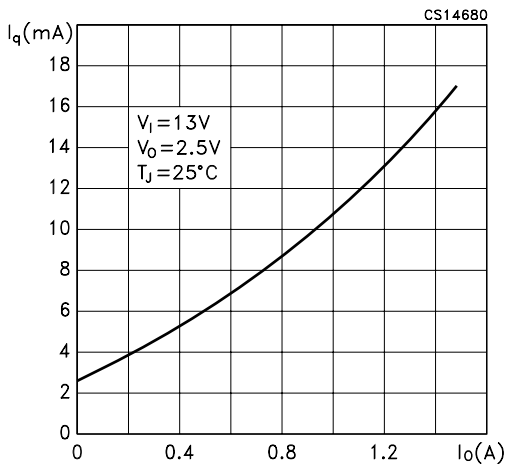


Figure 10: Quiescent Current vs Output Current

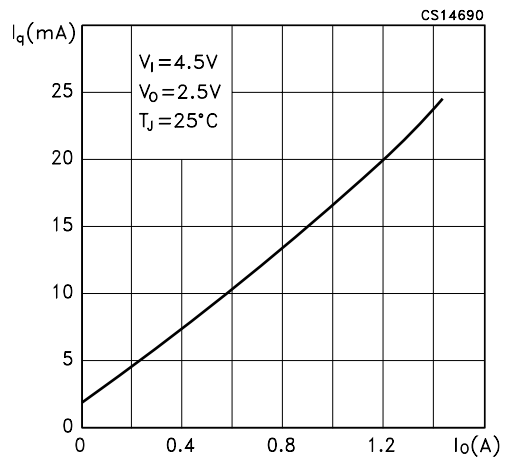


Figure 11: Quiescent Current vs Supply Voltage

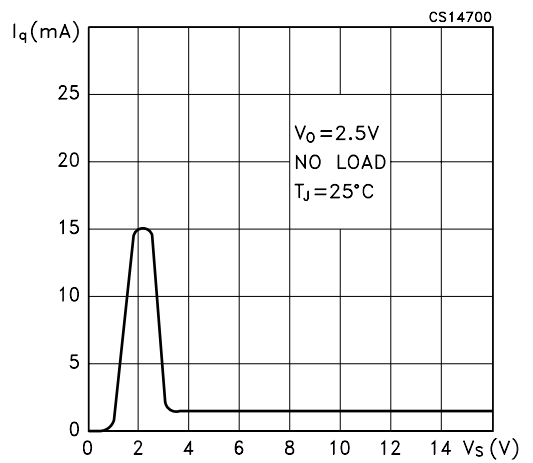


Figure 12: Quiescent Current vs Temperature

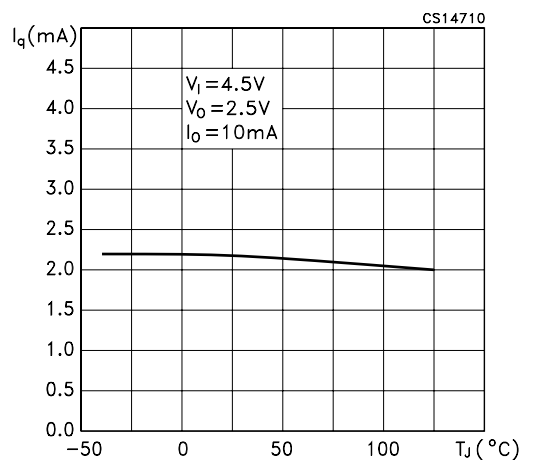


Figure 13: Quiescent Current vs Temperature

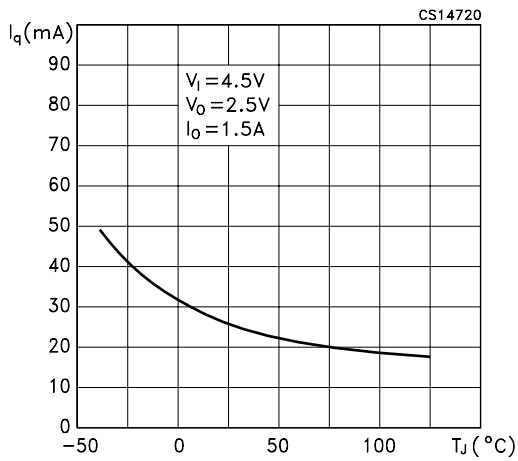


Figure 16: Supply Voltage Rejection vs Temperature

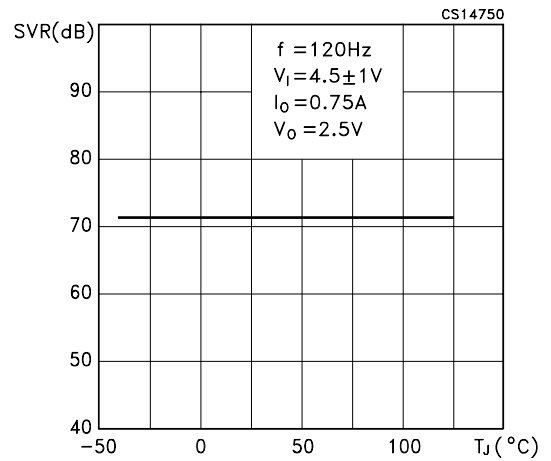


Figure 14: Short Circuit Current vs Temperature

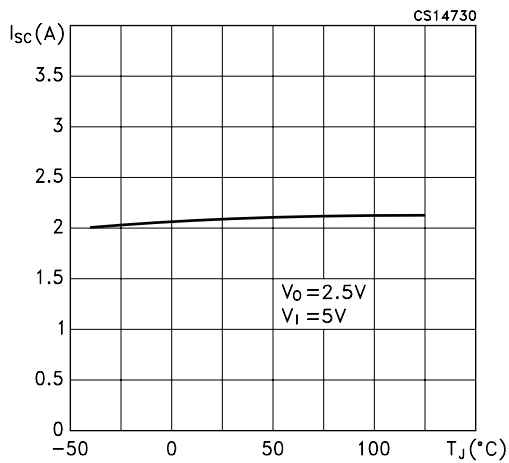


Figure 17: Output Voltage vs Input Voltage

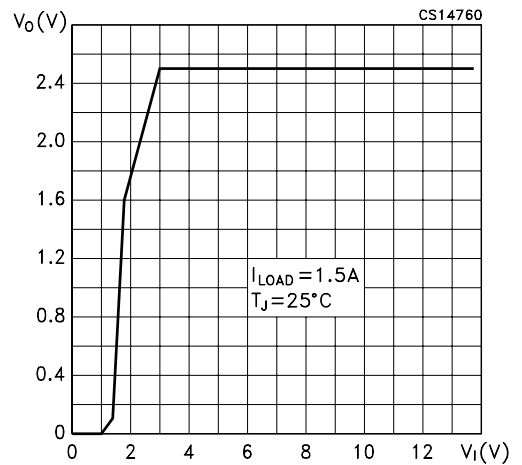


Figure 15: Adjust Pin Current vs Temperature

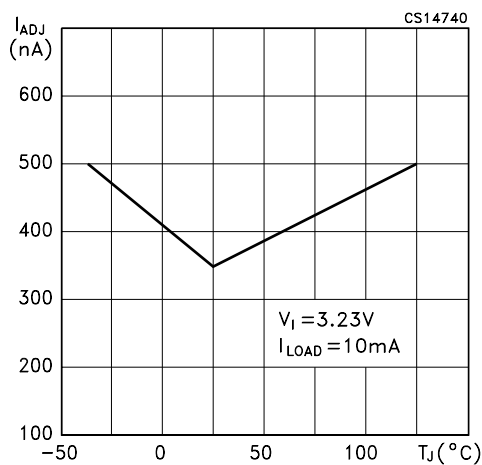


Figure 18: Stability vs Co

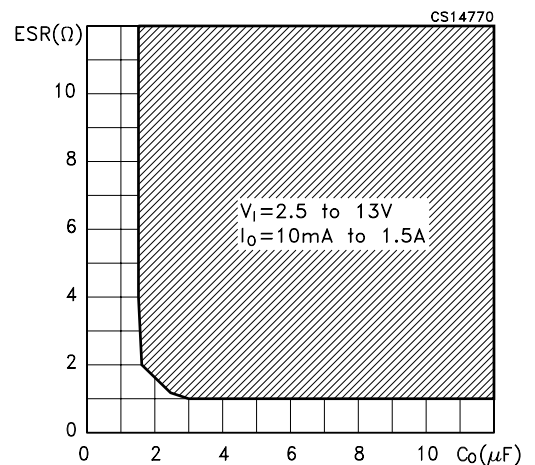
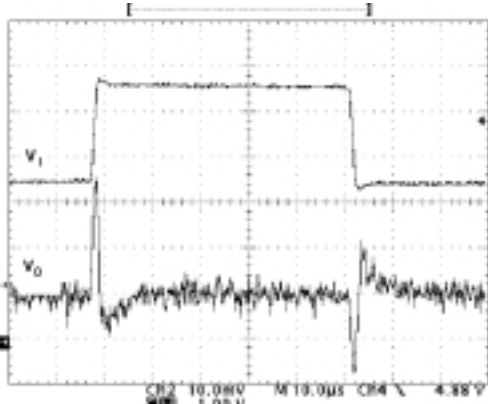
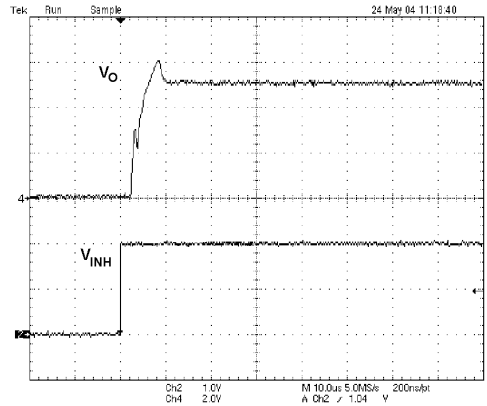


Figure 19: Line Transient



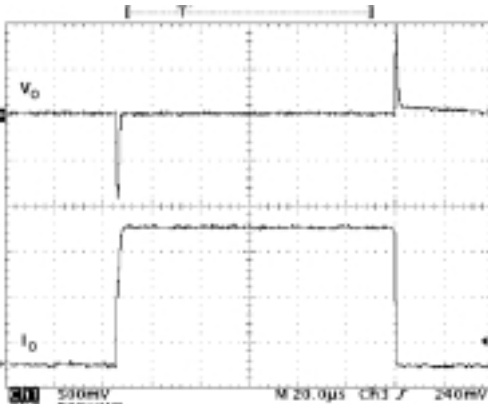
$V_I=3.5$ to $5.5V$, $I_O=10mA$, $V_O=2.5V$, $C_O=10\mu F$

Figure 21: Start-Up Time 10mA



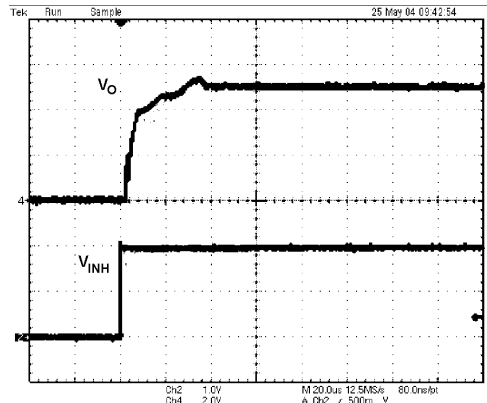
$C_O=10\mu F$, $I_O=10mA$, $V_{INH}=2V$, $V_O=5V$, $V_I=7V$

Figure 20: Load Transient



$V_I=5V$, $I_O=10mA$ to $1.5A$, $V_O=2.5V$, $C_O=10\mu F$

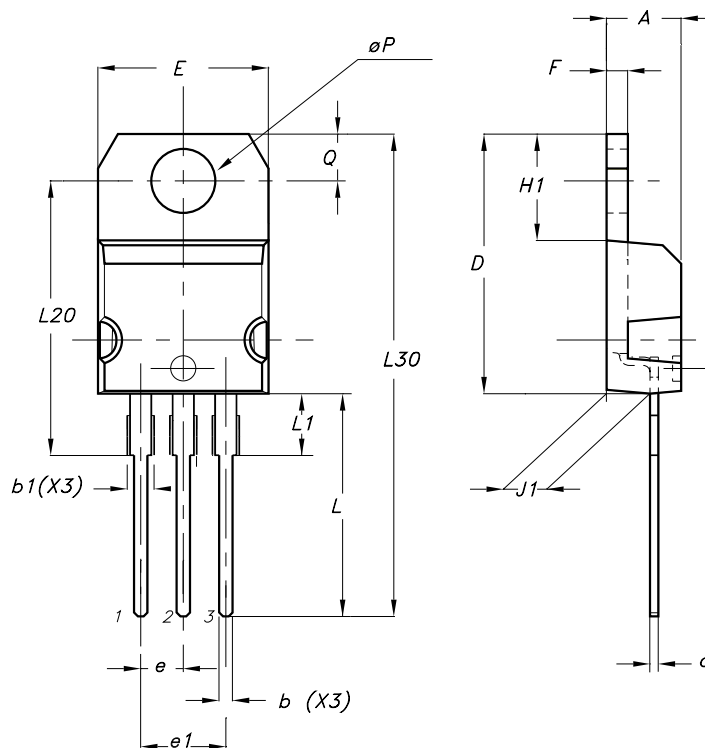
Figure 22: Start-Up Time 1.5A



$C_O=10\mu F$, $I_O=1.5A$, $V_{INH}=2V$, $V_O=5V$, $V_I=7V$

TO-220 (A TYPE) MECHANICAL DATA

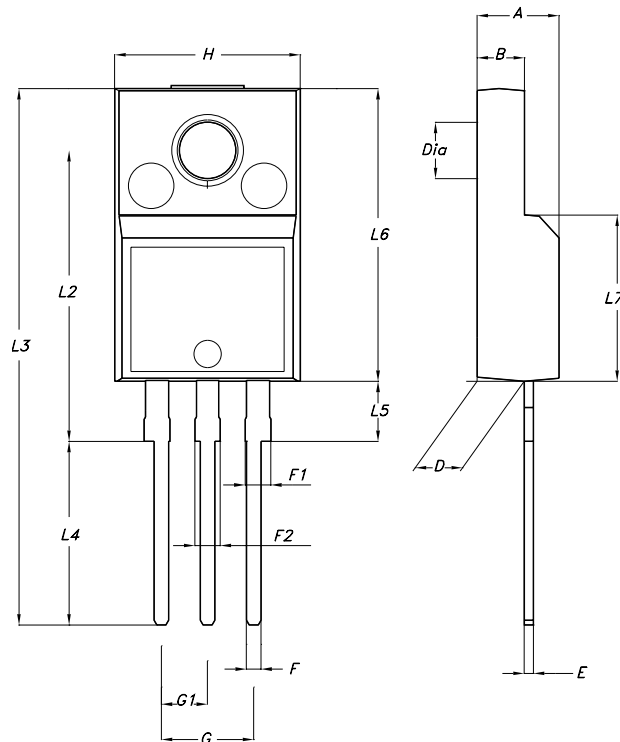
| DIM. | mm. | | | inch | | |
|----------|-------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| b | 0.61 | | 0.88 | 0.024 | | 0.034 |
| b1 | 1.15 | | 1.70 | 0.045 | | 0.067 |
| c | 0.49 | | 0.70 | 0.019 | | 0.027 |
| D | 15.25 | | 15.75 | 0.600 | | 0.620 |
| E | 10.0 | | 10.40 | 0.393 | | 0.409 |
| e | 2.4 | | 2.7 | 0.094 | | 0.106 |
| e1 | 4.95 | | 5.15 | 0.194 | | 0.203 |
| F | 1.23 | | 1.32 | 0.048 | | 0.051 |
| H1 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| J1 | 2.40 | | 2.72 | 0.094 | | 0.107 |
| L | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L1 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| L20 | | 16.4 | | | 0.645 | |
| L30 | | 28.9 | | | 1.138 | |
| ϕP | 3.75 | | 3.85 | 0.147 | | 0.151 |
| Q | 2.65 | | 2.95 | 0.104 | | 0.116 |



0015988/N

TO-220FP MECHANICAL DATA

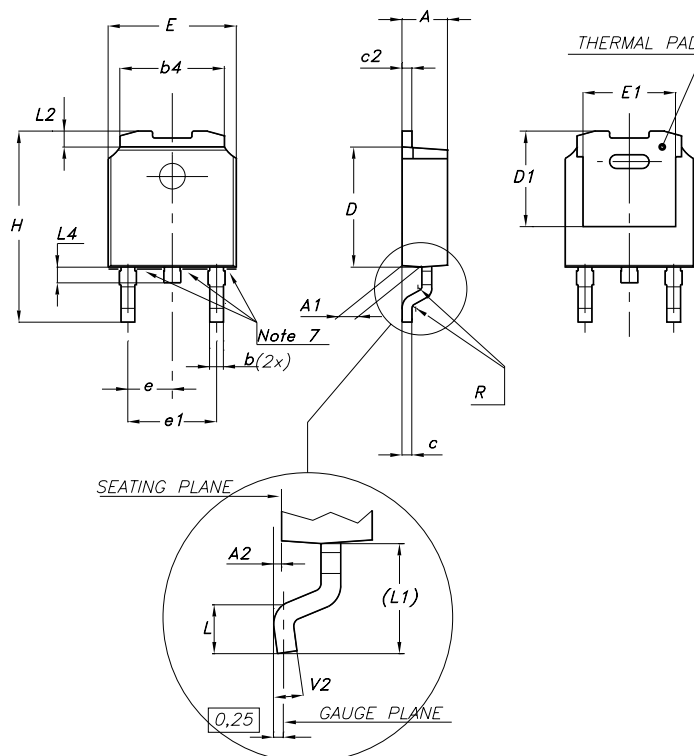
| DIM. | mm. | | | inch | | |
|------|------|-----|-------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| B | 2.5 | | 2.7 | 0.098 | | 0.106 |
| D | 2.5 | | 2.75 | 0.098 | | 0.108 |
| E | 0.45 | | 0.70 | 0.017 | | 0.027 |
| F | 0.75 | | 1 | 0.030 | | 0.039 |
| F1 | 1.15 | | 1.50 | 0.045 | | 0.059 |
| F2 | 1.15 | | 1.50 | 0.045 | | 0.059 |
| G | 4.95 | | 5.2 | 0.194 | | 0.204 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16 | | | 0.630 | |
| L3 | 28.6 | | 30.6 | 1.126 | | 1.204 |
| L4 | 9.8 | | 10.6 | 0.385 | | 0.417 |
| L5 | 2.9 | | 3.6 | 0.114 | | 0.142 |
| L6 | 15.9 | | 16.4 | 0.626 | | 0.645 |
| L7 | 9 | | 9.3 | 0.354 | | 0.366 |
| DIA. | 3 | | 3.2 | 0.118 | | 0.126 |



7012510A-H

DPAK MECHANICAL DATA

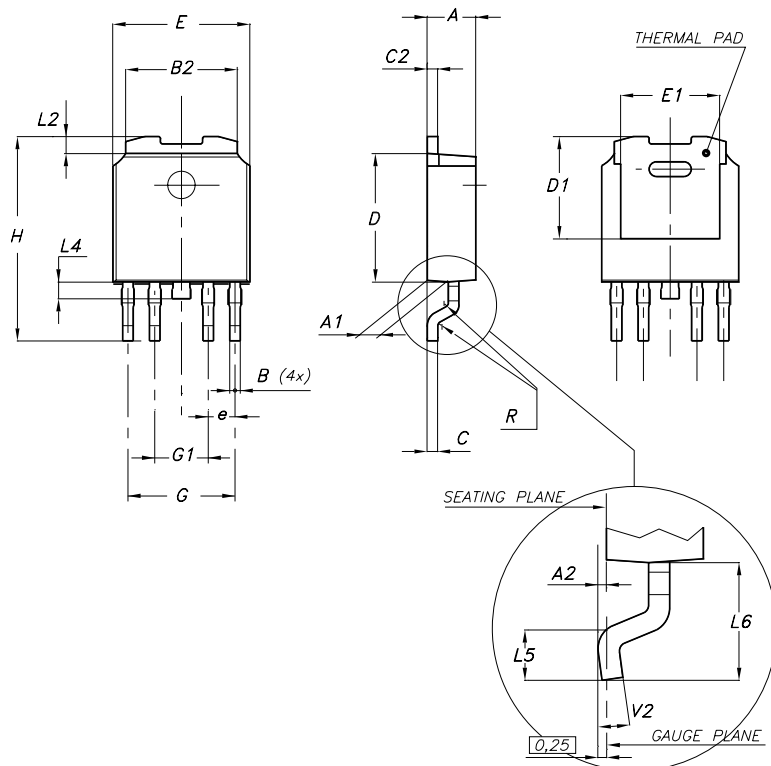
| DIM. | mm. | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.9 | 0.025 | | 0.035 |
| B2 | 5.2 | | 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 |
| D1 | | 5.1 | | | 0.200 | |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| E1 | | 4.7 | | | 0.185 | |
| e | | 2.28 | | | 0.090 | |
| e1 | 4.4 | | 4.6 | 0.173 | | 0.181 |
| H | 9.35 | | 10.1 | 0.368 | | 0.397 |
| L | 1 | | | 0.039 | | |
| (L1) | | 2.8 | | | 0.110 | |
| L2 | | 0.8 | | | 0.031 | |
| L4 | 0.6 | | 1 | 0.023 | | 0.039 |



0068772-F

PPAK 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 | 0.4 | | 0.6 | 0.015 | | 0.023 |
| 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 |
| D1 | | 5.1 | | | 0.201 | |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| E1 | | 4.7 | | | 0.185 | |
| e | | 1.27 | | | 0.050 | |
| G | 4.9 | | 5.25 | 0.193 | | 0.206 |
| G1 | 2.38 | | 2.7 | 0.093 | | 0.106 |
| H | 9.35 | | 10.1 | 0.368 | | 0.397 |
| L2 | | 0.8 | 1 | | 0.031 | 0.039 |
| L4 | 0.6 | | 1 | 0.023 | | 0.039 |
| L5 | 1 | | | 0.039 | | |
| L6 | | 2.8 | | | 0.110 | |



0078180-E

Tape & Reel DPAK-PPAK MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|-------|-------|-------|-------|-------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 330 | | | 12.992 |
| C | 12.8 | 13.0 | 13.2 | 0.504 | 0.512 | 0.519 |
| D | 20.2 | | | 0.795 | | |
| N | 60 | | | 2.362 | | |
| T | | | 22.4 | | | 0.882 |
| Ao | 6.80 | 6.90 | 7.00 | 0.268 | 0.272 | 0.276 |
| Bo | 10.40 | 10.50 | 10.60 | 0.409 | 0.413 | 0.417 |
| Ko | 2.55 | 2.65 | 2.75 | 0.100 | 0.104 | 0.105 |
| Po | 3.9 | 4.0 | 4.1 | 0.153 | 0.157 | 0.161 |
| P | 7.9 | 8.0 | 8.1 | 0.311 | 0.315 | 0.319 |

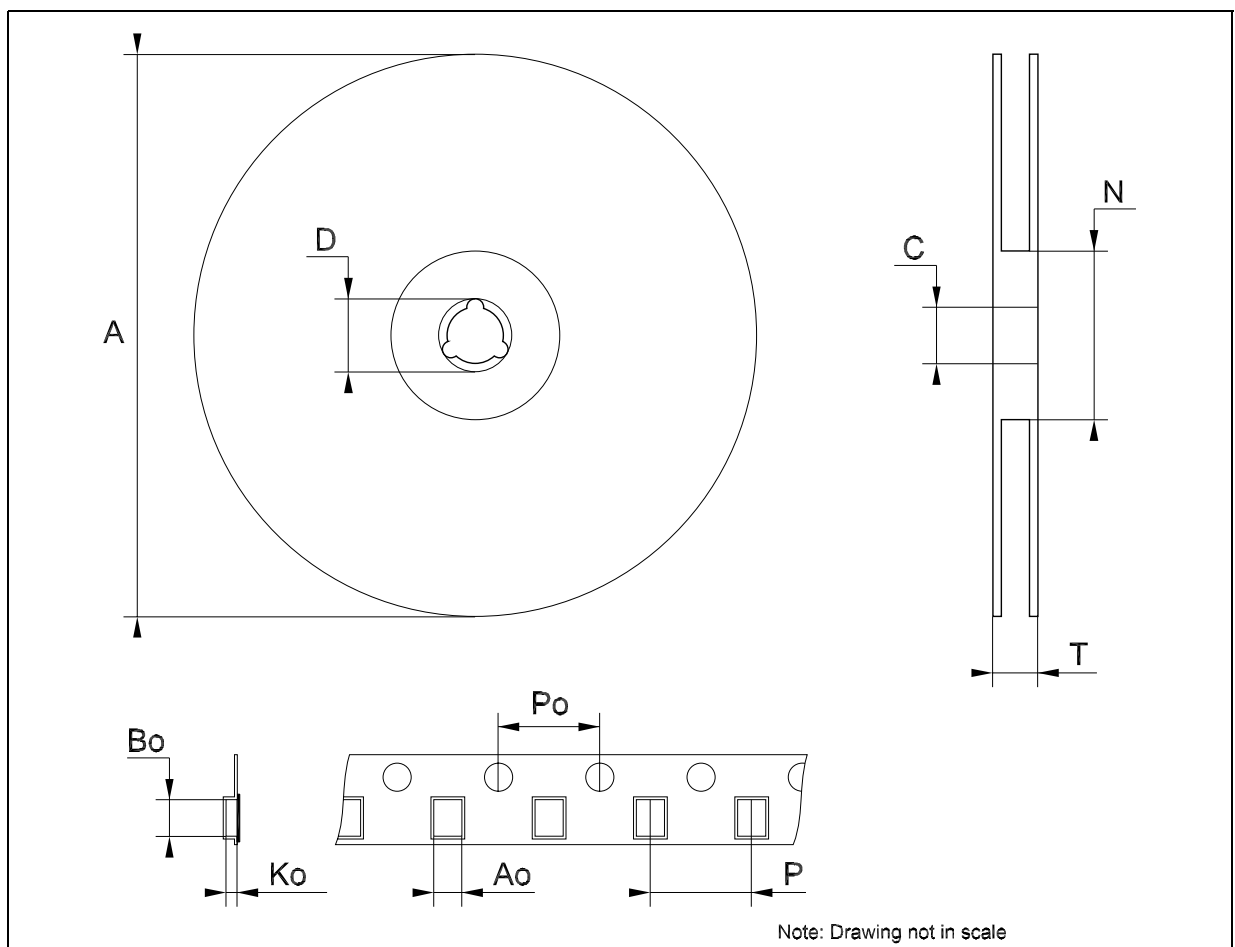


Table 11: Revision History

| Date | Revision | Description of Changes |
|-------------|-----------------|---|
| 17-Jun-2004 | 5 | Add figures 20 and 21, PPAK, TO-220 and TO-220FP mechanical data updated. |
| 19-Jul-2004 | 6 | Remove Package TO-220FP4. |
| 08-Nov-2004 | 7 | Mistake Figure 7. |

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