



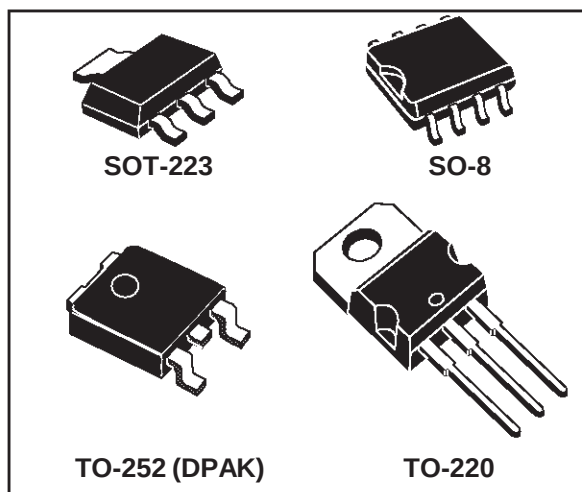
## LD1117 SERIES

### LOW DROP FIXED AND ADJUSTABLE POSITIVE VOLTAGE REGULATORS

- LOW DROPOUT VOLTAGE (1V TYP)
- 2.85V DEVICE PERFORMANCES ARE SUITABLE FOR SCSI-2 ACTIVE TERMINATION
- OUTPUT CURRENT UP TO 800mA
- FIXED OUTPUT VOLTAGE OF: 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, 5.0V
- ADJUSTABLE VERSION AVAILABILITY ( $V_{ref}=1.25V$ )
- INTERNAL CURRENT AND THERMAL LIMIT
- AVAILABLE IN  $\pm 1\%$  (AT 25°C) AND 2% IN FULL TEMPERATURE RANGE
- SUPPLY VOLTAGE REJECTION : 75 dB (TYP)
- TEMPERATURE RANGE : 0°C TO 125°C

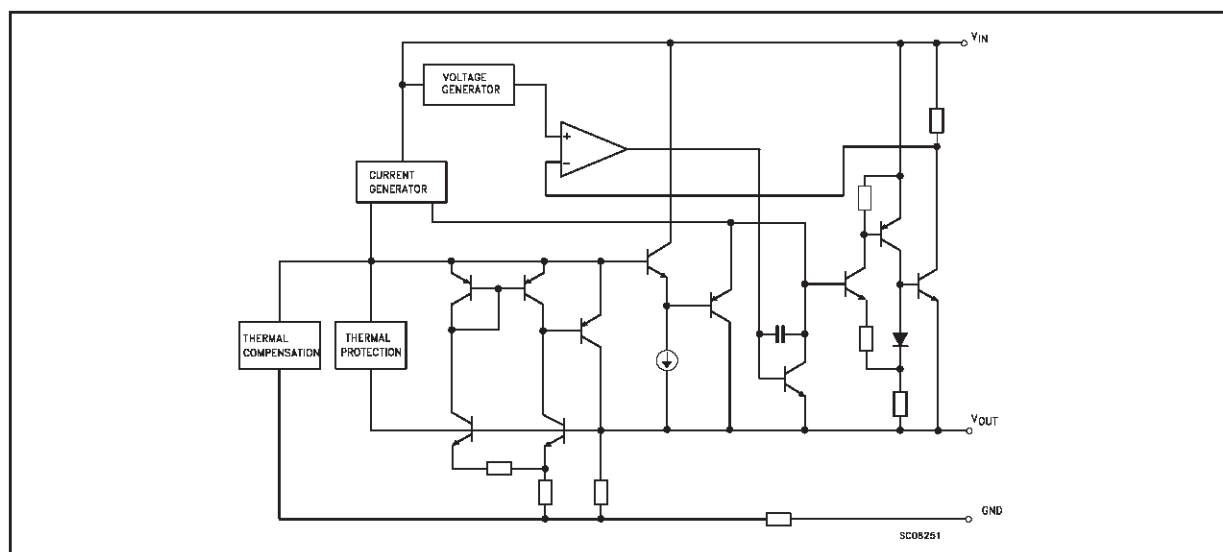
#### DESCRIPTION

The LD1117 is a LOW DROP Voltage Regulator able to provide up to 800mA of Output Current, available even in adjustable version ( $V_{ref}=1.25V$ ). Concerning fixed versions, are offered the following Output Voltages: 2.5V, 2.85V, 3.0V, 3.3V and 5.0V. The 2.85V type is ideal for SCSI-2 lines active termination. The device is supplied in: SOT-223, DPAK, SO-8 and TO-220. The SOT-223 and DPAK surface mount packages optimize the thermal characteristics even offering a relevant space saving effect. High efficiency is assured by NPN



pass transistor. In fact in this case, unlike than PNP one, the Quiescent Current flows mostly into the load. Only a very common 10 $\mu$ F minimum capacitor is needed for stability. On chip trimming allows the regulator to reach a very tight output voltage tolerance, within  $\pm 1\%$  at 25 °C. The ADJUSTABLE LD1117 is pin to pin compatible with the other standard Adjustable voltage regulators maintaining the better performances in terms of Drop and Tolerance.

#### BLOCK DIAGRAM



# LD1117 SERIES

## ABSOLUTE MAXIMUM RATINGS

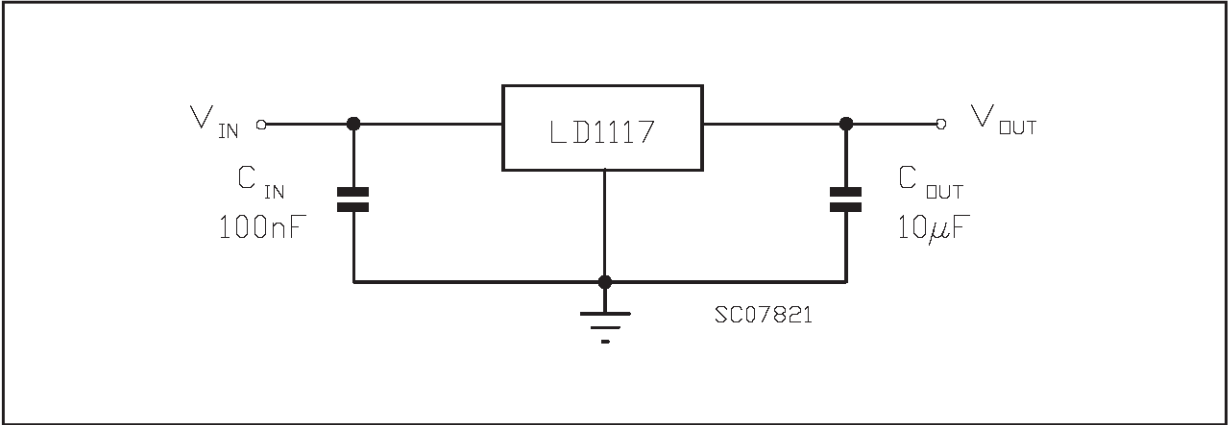
| Symbol    | Parameter                            | Value      | Unit |
|-----------|--------------------------------------|------------|------|
| $V_{IN}$  | DC Input Voltage                     | 15         | V    |
| $P_{tot}$ | Power Dissipation                    | 12         | W    |
| $T_{stg}$ | Storage Temperature Range            | -40 to 150 | °C   |
| $T_{op}$  | Operating Junction Temperature Range | 0 to 125   | °C   |

Absolute Maximum Ratings are those value beyond which damage to the device may occur. Functional operation under these condition is not implied. Over the above suggested Max Power Dissipation a Short Circuit could definitively damage the device.

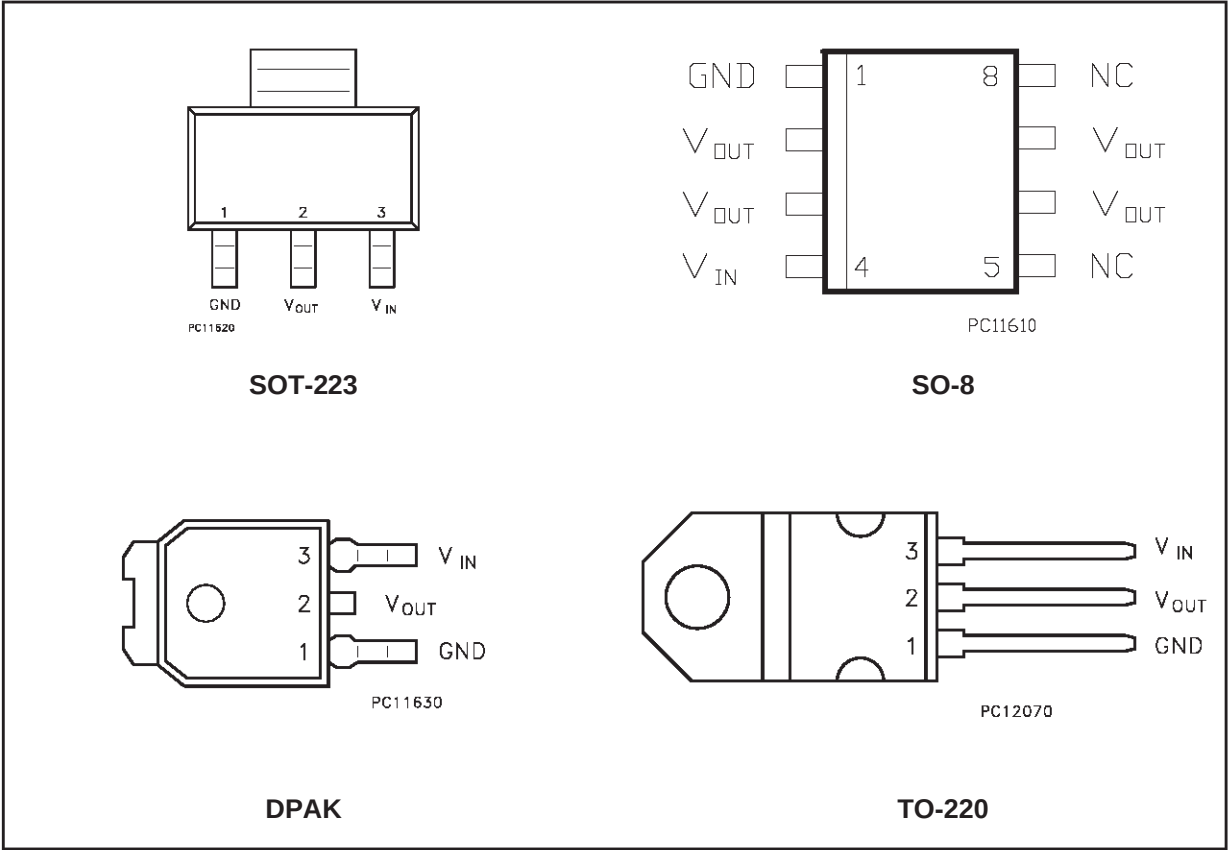
## THERMAL DATA

| Symbol         | Parameter                           | SOT-223 | SO-8 | DPAK | TO-220 | Unit |
|----------------|-------------------------------------|---------|------|------|--------|------|
| $R_{thj-case}$ | Thermal Resistance Junction-case    | 15      | 20   | 8    | 3      | °C/W |
| $R_{thj-amb}$  | Thermal Resistance Junction-ambient |         |      |      | 50     | °C/W |

## APPLICATION CIRCUIT



CONNECTION DIAGRAM AND ORDERING NUMBERS (top view)



| SOT-223    | SO-8       | DPAK        | TO-220     | Output Voltage                 |
|------------|------------|-------------|------------|--------------------------------|
| LD1117S18  | LD1117D18  | LD1117DT18  | LD1117V18  | 1.8V                           |
| LD1117S18C | LD1117D18C | LD1117DT18C | LD1117V18C | 1.8V                           |
| LD1117S25  | LD1117D25  | LD1117DT25  | LD1117V25  | 2.5V                           |
| LD1117S25C | LD1117D25C | LD1117DT25C | LD1117V25C | 2.5V                           |
| LD1117S28  | LD1117D28  | LD1117DT28  | LD1117V28  | 2.85V                          |
| LD1117S30  | LD1117D30  | LD1117DT30  | LD1117V30  | 3V                             |
| LD1117S30C | LD1117D30C | LD1117DT30C | LD1117V30C | 3V                             |
| LD1117S33  | LD1117D33  | LD1117DT33  | LD1117V33  | 3.3V                           |
| LD1117S33C | LD1117D33C | LD1117DT33C | LD1117V33C | 3.3V                           |
| LD1117S50  | LD1117D50  | LD1117DT50  | LD1117V50  | 5V                             |
| LD1117S50C | LD1117D50C | LD1117DT50C | LD1117V50C | 5V                             |
| LD1117S    | LD1117D    | LD1117DT    | LD1117V    | ADJUSTABLE<br>FROM 1.25 TO 15V |

## LD1117 SERIES

**ELECTRICAL CHARACTERISTICS FOR LD1117#18** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                                 | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 3.8\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                           | 1.78 | 1.8  | 1.82 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 3.3$ to $8\text{ V}$                                                                     | 1.76 |      | 1.84 | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 3.3$ to $8\text{ V}$ $I_o = 0\text{ mA}$                                                                              |      | 1    | 6    | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 3.3\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                            |      | 1    | 10   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                                 |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                              |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                           |      |      | 10   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 8\text{ V}$                                                                                                        |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 6.8\text{ V}$ $T_j = 25^\circ\text{C}$                                                                                | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to $10\text{KHz}$ $T_j = 25^\circ\text{C}$                                                                    |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 5.5\text{ V}$ $V_{\text{ripple}} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                           |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                           |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                           |      | 1.10 | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                             |      | 0.01 | 0.1  | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#25** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                                 | Min.  | Typ. | Max.  | Unit          |
|--------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------|------|-------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 4.5\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                           | 2.475 | 2.5  | 2.525 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 3.9$ to $10\text{ V}$                                                                    | 2.45  |      | 2.55  | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 3.9$ to $10\text{ V}$ $I_o = 0\text{ mA}$                                                                             |       | 1    | 6     | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 3.9\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                            |       | 1    | 10    | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                                 |       | 0.5  |       | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                              |       | 0.3  |       | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                           |       |      | 15    | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 10\text{ V}$                                                                                                       |       | 5    | 10    | mA            |
| $I_o$        | Output Current           | $V_{in} = 7.5\text{ V}$ $T_j = 25^\circ\text{C}$                                                                                | 800   | 950  | 1200  | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{Hz}$ to $10\text{KHz}$ $T_j = 25^\circ\text{C}$                                                                    |       | 100  |       | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 5.5\text{ V}$ $V_{\text{ripple}} = 1\text{ Vpp}$ | 60    | 75   |       | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                           |       | 1    | 1.1   | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                           |       | 1.05 | 1.15  | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                           |       | 1.10 | 1.2   | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                             |       | 0.01 | 0.1   | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#28** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                                  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 4.85\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                           | 2.82 | 2.85 | 2.88 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 4.25$ to $10\text{ V}$                                                                    | 2.79 |      | 2.91 | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 4.25$ to $10\text{ V}$ $I_o = 0\text{ mA}$                                                                             |      | 1    | 6    | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 4.25\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                            |      | 1    | 10   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                                  |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                               |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                            |      |      | 15   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 10\text{ V}$                                                                                                        |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 7.85\text{ V}$ $T_j = 25^\circ\text{C}$                                                                                | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25^\circ\text{C}$                                                                   |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 5.85\text{ V}$ $V_{\text{ripple}} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                            |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                            |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                            |      | 1.1  | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                              |      | 0.01 | 0.1  | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#30** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                               | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 5\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                           | 2.97 | 3    | 3.03 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 4.5$ to $10\text{ V}$                                                                  | 2.94 |      | 3.06 | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 4.5$ to $12\text{ V}$ $I_o = 0\text{ mA}$                                                                           |      | 1    | 6    | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 4.5\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                          |      | 1    | 10   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                               |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                            |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                         |      |      | 15   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 12\text{ V}$                                                                                                     |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 8\text{ V}$ $T_j = 25^\circ\text{C}$                                                                                | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25^\circ\text{C}$                                                                |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 6\text{ V}$ $V_{\text{ripple}} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                         |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                         |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                         |      | 1.1  | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                           |      | 0.01 | 0.1  | %/W           |

## LD1117 SERIES

**ELECTRICAL CHARACTERISTICS FOR LD1117#33** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                                 | Min.  | Typ. | Max.  | Unit          |
|--------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------|------|-------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 5.3\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                           | 3.267 | 3.3  | 3.333 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 4.75$ to $10\text{ V}$                                                                   | 3.235 |      | 3.365 | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 4.75$ to $15\text{ V}$ $I_o = 0\text{ mA}$                                                                            |       | 1    | 6     | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 4.75\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                           |       | 1    | 10    | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                                 |       | 0.5  |       | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                              |       | 0.3  |       | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                           |       |      | 15    | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 15\text{ V}$                                                                                                       |       | 5    | 10    | mA            |
| $I_o$        | Output Current           | $V_{in} = 8.3\text{ V}$ $T_j = 25^\circ\text{C}$                                                                                | 800   | 950  | 1200  | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25^\circ\text{C}$                                                                  |       | 100  |       | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 6.3\text{ V}$ $V_{\text{ripple}} = 1\text{ Vpp}$ | 60    | 75   |       | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                           |       | 1    | 1.1   | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                           |       | 1.05 | 1.15  | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                           |       | 1.1  | 1.2   | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                             |       | 0.01 | 0.1   | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#50** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                               | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 7\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                           | 4.95 | 5    | 5.05 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 6.5$ to $15\text{ V}$                                                                  | 4.9  |      | 5.1  | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 6.5$ to $15\text{ V}$ $I_o = 0\text{ mA}$                                                                           |      | 1    | 10   | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 6.5\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                          |      | 1    | 15   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                               |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                            |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                         |      |      | 15   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 15\text{ V}$                                                                                                     |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 10\text{ V}$ $T_j = 25^\circ\text{C}$                                                                               | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25^\circ\text{C}$                                                                |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 8\text{ V}$ $V_{\text{ripple}} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                         |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                         |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                         |      | 1.1  | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                           |      | 0.01 | 0.1  | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117(ADJUSTABLE)** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol                  | Parameter                     | Test Conditions                                                                                                                                | Min.  | Typ.             | Max.               | Unit          |
|-------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------|--------------------|---------------|
| $V_{\text{ref}}$        | Reference Voltage             | $V_{\text{in}} - V_o = 2\ \text{V}$ $I_o = 10\ \text{mA}$<br>$T_j = 25^\circ\text{C}$                                                          | 1.238 | 1.25             | 1.262              | V             |
| $V_{\text{ref}}$        | Reference Voltage             | $I_o = 10$ to $800\ \text{mA}$<br>$V_{\text{in}} - V_o = 1.4$ to $10\ \text{V}$                                                                | 1.225 |                  | 1.275              | V             |
| $\Delta V_o$            | Line Regulation               | $V_{\text{in}} - V_o = 1.5$ to $13.75\ \text{V}$ $I_o = 10\ \text{mA}$                                                                         |       | 0.035            | 0.2                | %             |
| $\Delta V_o$            | Load Regulation               | $V_{\text{in}} - V_o = 3\ \text{V}$ $I_o = 10$ to $800\ \text{mA}$                                                                             |       | 0.1              | 0.4                | %             |
| $\Delta V_o$            | Temperature Stability         |                                                                                                                                                |       | 0.5              |                    | %             |
| $\Delta V_o$            | Long Term Stability           | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                                             |       | 0.3              |                    | %             |
| $V_{\text{in}}$         | Operating Input Voltage       |                                                                                                                                                |       |                  | 15                 | V             |
| $I_{\text{adj}}$        | Adjustment Pin Current        | $V_{\text{in}} \leq 15\ \text{V}$                                                                                                              |       | 60               | 120                | $\mu\text{A}$ |
| $\Delta I_{\text{adj}}$ | Adjustment Pin Current Change | $V_{\text{in}} - V_o = 1.4$ to $10\ \text{V}$<br>$I_o = 10$ to $800\ \text{mA}$                                                                |       | 1                | 5                  | $\mu\text{A}$ |
| $I_{o(\text{min})}$     | Minimum Load Current          | $V_{\text{in}} = 15\ \text{V}$                                                                                                                 |       | 2                | 5                  | mA            |
| $I_o$                   | Output Current                | $V_{\text{in}} - V_o = 5\ \text{V}$ $T_j = 25^\circ\text{C}$                                                                                   | 800   | 950              | 1200               | mA            |
| eN                      | Output Noise (% $V_o$ )       | $B = 10\text{Hz}$ to $10\text{KHz}$ $T_j = 25^\circ\text{C}$                                                                                   |       | 0.003            |                    | %             |
| SVR                     | Supply Voltage Rejection      | $I_o = 40\ \text{mA}$ $f = 120\ \text{Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{\text{in}} - V_o = 3\ \text{V}$ $V_{\text{ripple}} = 1\ \text{Vpp}$ | 60    | 75               |                    | dB            |
| $V_d$                   | Dropout Voltage               | $I_o = 100\ \text{mA}$<br>$I_o = 500\ \text{mA}$<br>$I_o = 800\ \text{mA}$                                                                     |       | 1<br>1.05<br>1.1 | 1.1<br>1.15<br>1.2 | V<br>V<br>V   |
|                         | Thermal Regulation            | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                                            |       | 0.01             | 0.1                | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#18C** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol          | Parameter                | Test Conditions                                                                                                                            | Min. | Typ.             | Max.               | Unit          |
|-----------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|--------------------|---------------|
| $V_o$           | Output Voltage           | $V_{\text{in}} = 3.8\ \text{V}$ $I_o = 10\ \text{mA}$ $T_j = 25^\circ\text{C}$                                                             | 1.76 | 1.8              | 1.84               | V             |
| $V_o$           | Output Voltage           | $I_o = 0$ to $800\ \text{mA}$ $V_{\text{in}} = 3.9$ to $10\ \text{V}$                                                                      | 1.73 |                  | 1.87               | V             |
| $\Delta V_o$    | Line Regulation          | $V_{\text{in}} = 3.3$ to $8\ \text{V}$ $I_o = 0\ \text{mA}$                                                                                |      | 1                | 30                 | mV            |
| $\Delta V_o$    | Load Regulation          | $V_{\text{in}} = 3.3\ \text{V}$ $I_o = 0$ to $800\ \text{mA}$                                                                              |      | 1                | 30                 | mV            |
| $\Delta V_o$    | Temperature Stability    |                                                                                                                                            |      | 0.5              |                    | %             |
| $\Delta V_o$    | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                                         |      | 0.3              |                    | %             |
| $V_{\text{in}}$ | Operating Input Voltage  | $I_o = 100\ \text{mA}$                                                                                                                     |      |                  | 10                 | V             |
| $I_d$           | Quiescent Current        | $V_{\text{in}} \leq 8\ \text{V}$                                                                                                           |      | 5                | 10                 | mA            |
| $I_o$           | Output Current           | $V_{\text{in}} = 6.8\ \text{V}$ $T_j = 25^\circ\text{C}$                                                                                   | 800  | 950              | 1200               | mA            |
| eN              | Output Noise Voltage     | $B = 10\text{Hz}$ to $10\text{KHz}$ $T_j = 25^\circ\text{C}$                                                                               |      | 100              |                    | $\mu\text{V}$ |
| SVR             | Supply Voltage Rejection | $I_o = 40\ \text{mA}$ $f = 120\ \text{Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{\text{in}} = 5.5\ \text{V}$ $V_{\text{ripple}} = 1\ \text{Vpp}$ | 60   | 75               |                    | dB            |
| $V_d$           | Dropout Voltage          | $I_o = 100\ \text{mA}$<br>$I_o = 500\ \text{mA}$<br>$I_o = 800\ \text{mA}$                                                                 |      | 1<br>1.05<br>1.1 | 1.1<br>1.15<br>1.2 | V<br>V<br>V   |
|                 | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                                        |      | 0.01             | 0.1                | %/W           |

## LD1117 SERIES

**ELECTRICAL CHARACTERISTICS FOR LD1117#25C** (refer to the test circuits,  
 $T_j = 0$  to  $125\text{ }^{\circ}\text{C}$ ,  $C_o = 10\text{ }\mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                                    | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 4.5\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25\text{ }^{\circ}\text{C}$                                                    | 2.45 | 2.5  | 2.55 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 3.9$ to $10\text{ V}$                                                                       | 2.4  |      | 2.6  | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 3.9$ to $10\text{ V}$ $I_o = 0\text{ mA}$                                                                                |      | 1    | 30   | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 3.9\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                               |      | 1    | 30   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                                    |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125\text{ }^{\circ}\text{C}$                                                                                       |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                              |      |      | 15   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 10\text{ V}$                                                                                                          |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 7.5\text{ V}$ $T_j = 25\text{ }^{\circ}\text{C}$                                                                         | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25\text{ }^{\circ}\text{C}$                                                           |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25\text{ }^{\circ}\text{C}$<br>$V_{in} = 5.5\text{ V}$ $V_{ripple} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                              |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                              |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                              |      | 1.1  | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25\text{ }^{\circ}\text{C}$ 30ms Pulse                                                                                      |      | 0.01 | 0.1  | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#30C** (refer to the test circuits,  
 $T_j = 0$  to  $125\text{ }^{\circ}\text{C}$ ,  $C_o = 10\text{ }\mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                                  | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 5\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25\text{ }^{\circ}\text{C}$                                                    | 2.94 | 3    | 3.06 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 4.5$ to $10\text{ V}$                                                                     | 2.88 |      | 3.12 | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 4.5$ to $12\text{ V}$ $I_o = 0\text{ mA}$                                                                              |      | 1    | 30   | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 4.5\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                             |      | 1    | 30   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                                  |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125\text{ }^{\circ}\text{C}$                                                                                     |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                            |      |      | 15   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 12\text{ V}$                                                                                                        |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 8\text{ V}$ $T_j = 25\text{ }^{\circ}\text{C}$                                                                         | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25\text{ }^{\circ}\text{C}$                                                         |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25\text{ }^{\circ}\text{C}$<br>$V_{in} = 6\text{ V}$ $V_{ripple} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                            |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                            |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                            |      | 1.1  | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25\text{ }^{\circ}\text{C}$ 30ms Pulse                                                                                    |      | 0.01 | 0.1  | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#33C** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                          | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 5.3\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                    | 3.24 | 3.3  | 3.36 | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 4.75$ to $10\text{ V}$                                                            | 3.16 |      | 3.44 | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 4.75$ to $15\text{ V}$ $I_o = 0\text{ mA}$                                                                     |      | 1    | 30   | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 4.75\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                    |      | 1    | 30   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                          |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                       |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                    |      |      | 15   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 15\text{ V}$                                                                                                |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 8.3\text{ V}$ $T_j = 25^\circ\text{C}$                                                                         | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25^\circ\text{C}$                                                           |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 6.3\text{ V}$ $V_{ripple} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                    |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                    |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                    |      | 1.1  | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                      |      | 0.01 | 0.1  | %/W           |

**ELECTRICAL CHARACTERISTICS FOR LD1117#50C** (refer to the test circuits,  
 $T_j = 0$  to  $125^\circ\text{C}$ ,  $C_o = 10\ \mu\text{F}$  unless otherwise specified)

| Symbol       | Parameter                | Test Conditions                                                                                                        | Min. | Typ. | Max. | Unit          |
|--------------|--------------------------|------------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $V_o$        | Output Voltage           | $V_{in} = 7\text{ V}$ $I_o = 10\text{ mA}$ $T_j = 25^\circ\text{C}$                                                    | 4.9  | 5    | 5.1  | V             |
| $V_o$        | Output Voltage           | $I_o = 0$ to $800\text{ mA}$ $V_{in} = 6.5$ to $15\text{ V}$                                                           | 4.8  |      | 5.2  | V             |
| $\Delta V_o$ | Line Regulation          | $V_{in} = 6.5$ to $15\text{ V}$ $I_o = 0\text{ mA}$                                                                    |      | 1    | 50   | mV            |
| $\Delta V_o$ | Load Regulation          | $V_{in} = 6.5\text{ V}$ $I_o = 0$ to $800\text{ mA}$                                                                   |      | 1    | 50   | mV            |
| $\Delta V_o$ | Temperature Stability    |                                                                                                                        |      | 0.5  |      | %             |
| $\Delta V_o$ | Long Term Stability      | 1000 hrs $T_j = 125^\circ\text{C}$                                                                                     |      | 0.3  |      | %             |
| $V_{in}$     | Operating Input Voltage  | $I_o = 100\text{ mA}$                                                                                                  |      |      | 15   | V             |
| $I_d$        | Quiescent Current        | $V_{in} \leq 15\text{ V}$                                                                                              |      | 5    | 10   | mA            |
| $I_o$        | Output Current           | $V_{in} = 10\text{ V}$ $T_j = 25^\circ\text{C}$                                                                        | 800  | 950  | 1200 | mA            |
| eN           | Output Noise Voltage     | $B = 10\text{ Hz}$ to $10\text{ KHz}$ $T_j = 25^\circ\text{C}$                                                         |      | 100  |      | $\mu\text{V}$ |
| SVR          | Supply Voltage Rejection | $I_o = 40\text{ mA}$ $f = 120\text{ Hz}$ $T_j = 25^\circ\text{C}$<br>$V_{in} = 8\text{ V}$ $V_{ripple} = 1\text{ Vpp}$ | 60   | 75   |      | dB            |
| $V_d$        | Dropout Voltage          | $I_o = 100\text{ mA}$                                                                                                  |      | 1    | 1.1  | V             |
|              |                          | $I_o = 500\text{ mA}$                                                                                                  |      | 1.05 | 1.15 | V             |
|              |                          | $I_o = 800\text{ mA}$                                                                                                  |      | 1.1  | 1.2  | V             |
|              | Thermal Regulation       | $T_a = 25^\circ\text{C}$ 30ms Pulse                                                                                    |      | 0.01 | 0.1  | %/W           |

TYPICAL APPLICATIONS:

FIGURE 1: Negative Supply

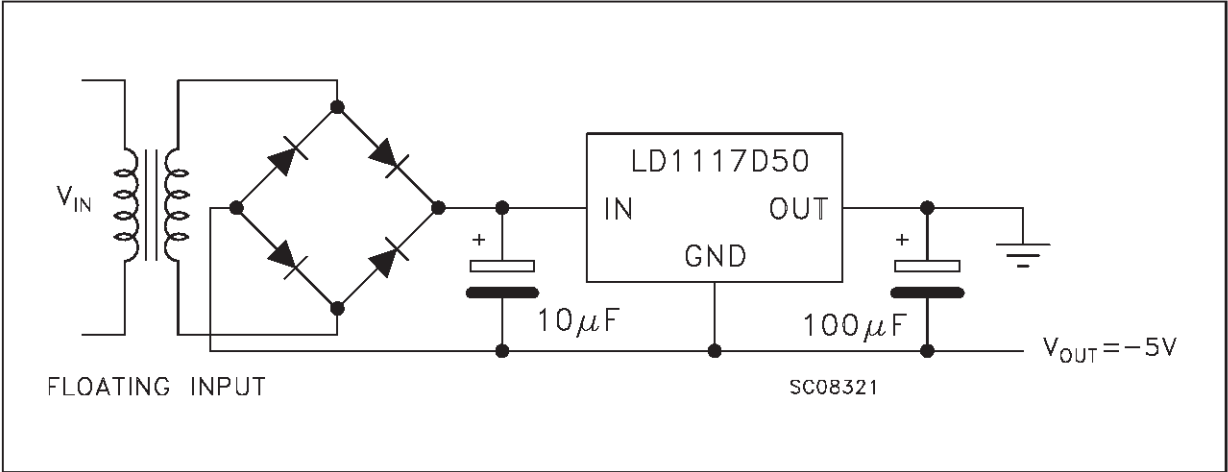


FIGURE 2: Active Terminator for SCSI-2 BUS

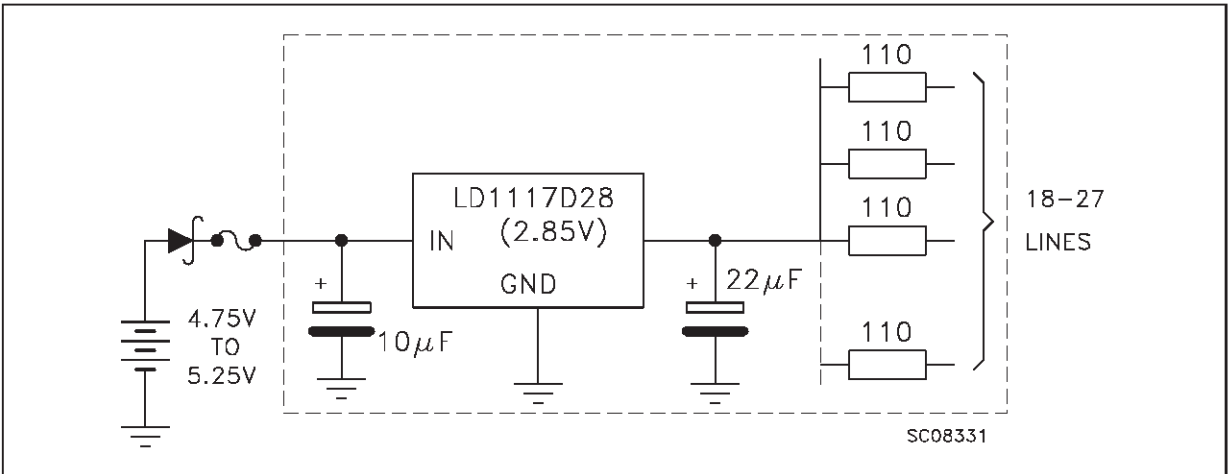
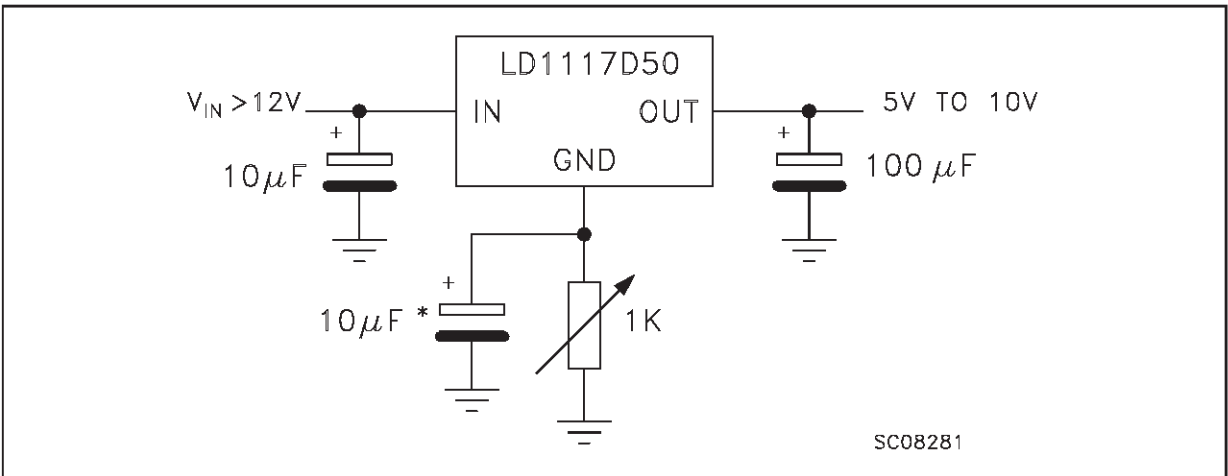


FIGURE 3: Circuit for Increasing Output Voltage



TYPICAL APPLICATIONS (continued):

FIGURE 4: Voltage Regulator With Reference

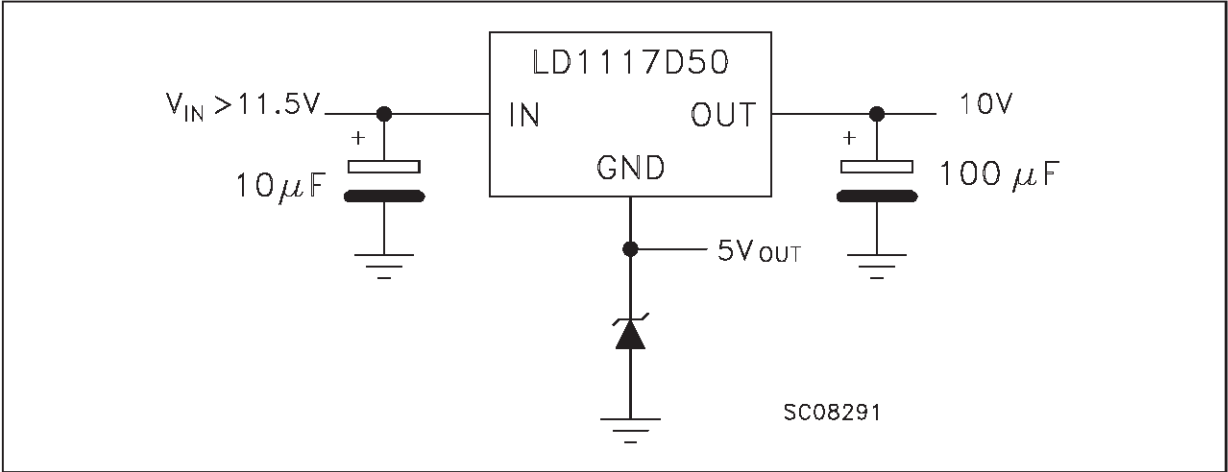
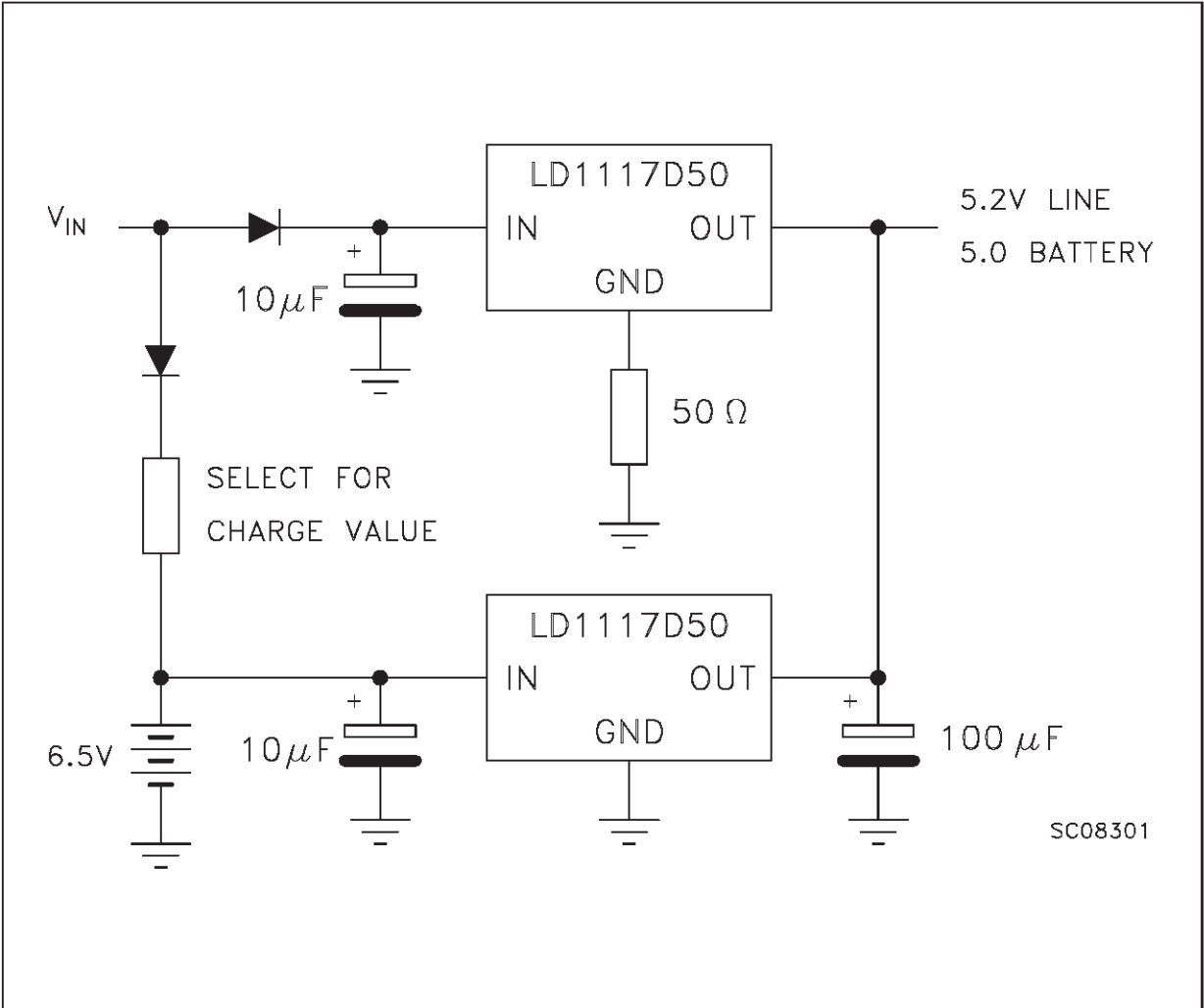
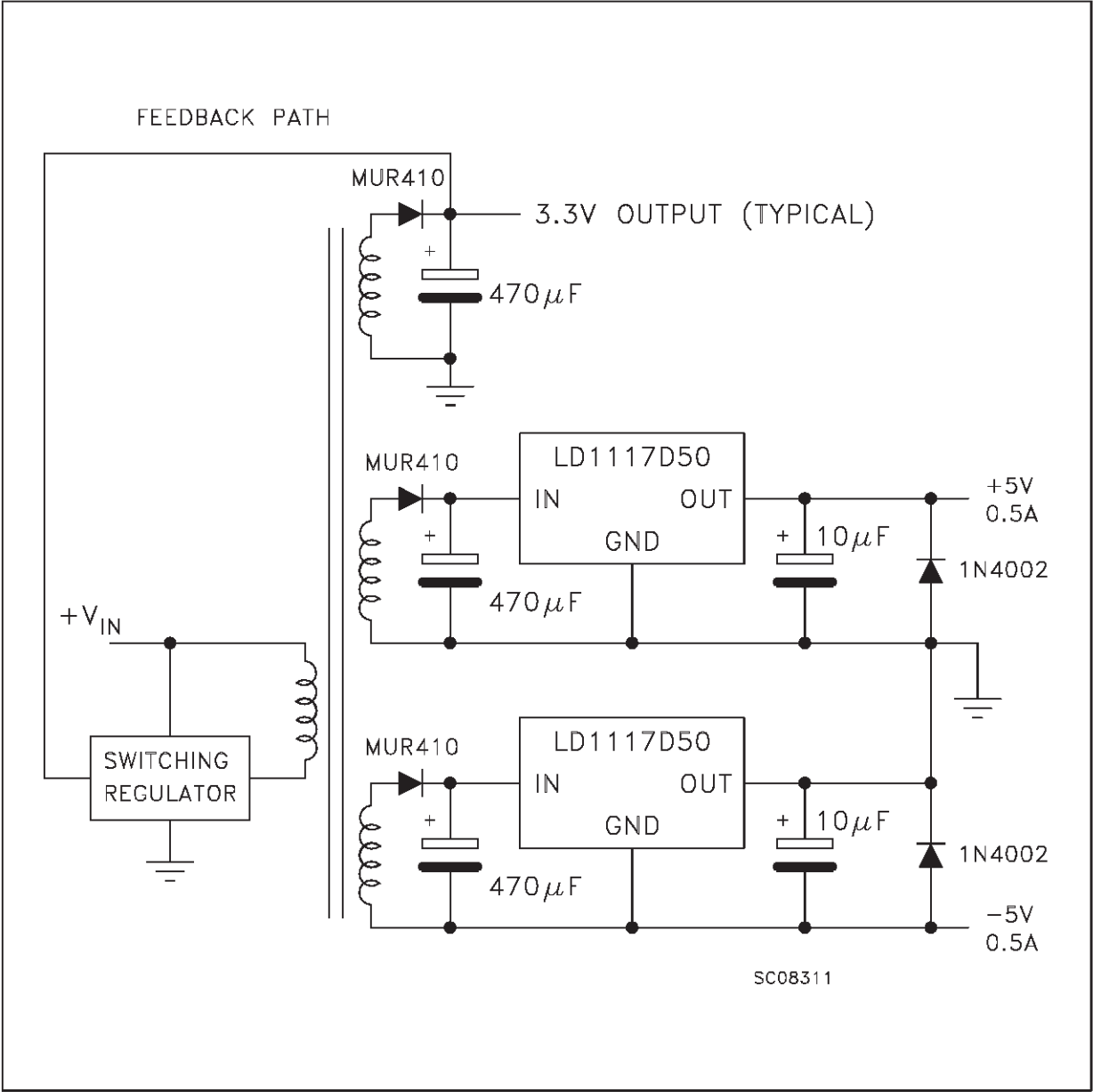


FIGURE 5: Battery Backed-up Regulated Supply



TYPICAL APPLICATIONS (continued):

FIGURE 6: Post-Regulated Dual Supply



**LD1117 ADJUSTABLE: APPLICATION NOTE**

The LD1117 ADJUSTABLE has a thermal stabilized  $1.25 \pm 0.012\text{V}$  reference voltage between the OUT and ADJ pins.  $I_{\text{ADJ}}$  is  $60\mu\text{A}$  typ. ( $120\mu\text{A}$  max.) and  $\Delta I_{\text{ADJ}}$  is  $1\mu\text{A}$  typ. ( $5\mu\text{A}$  max.).

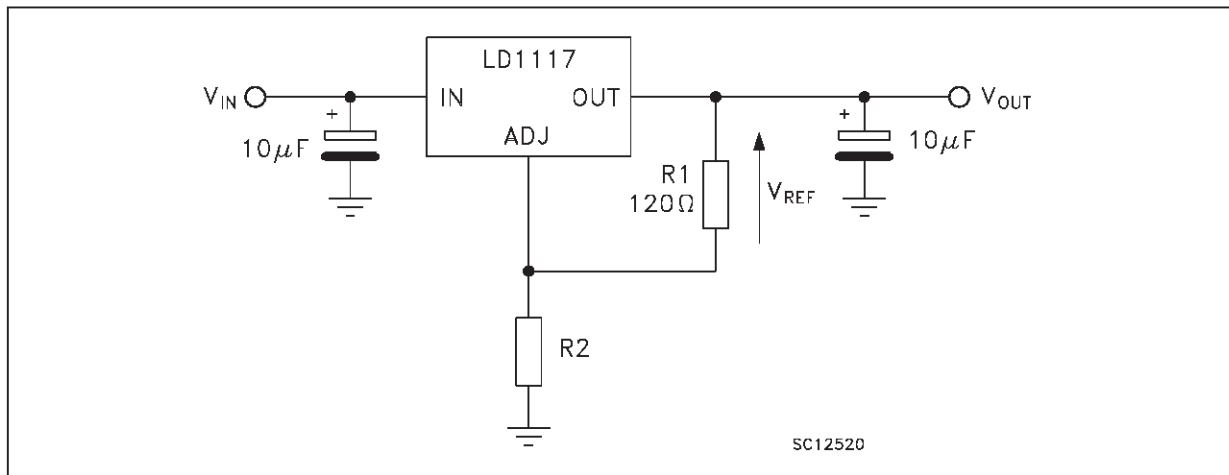
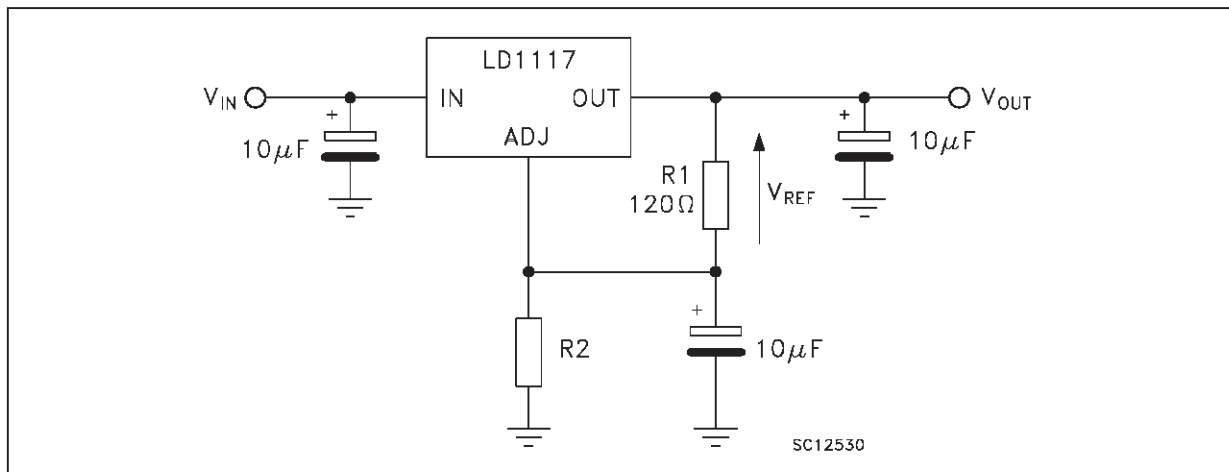
$R_1$  is normally fixed to  $120\Omega$ . From figure 7 we obtain:

$$V_{\text{OUT}} = V_{\text{REF}} + R_2 (I_{\text{ADJ}} + I_{R1}) = V_{\text{REF}} + R_2 (I_{\text{ADJ}} + V_{\text{REF}} / R_1) = V_{\text{REF}} (1 + R_2 / R_1) + R_2 \times I_{\text{ADJ}}.$$

In normal application  $R_2$  value is in the range of few Kohm, so the  $R_2 \times I_{\text{ADJ}}$  product could not be considered in the  $V_{\text{OUT}}$  calculation; then the above expression becomes:

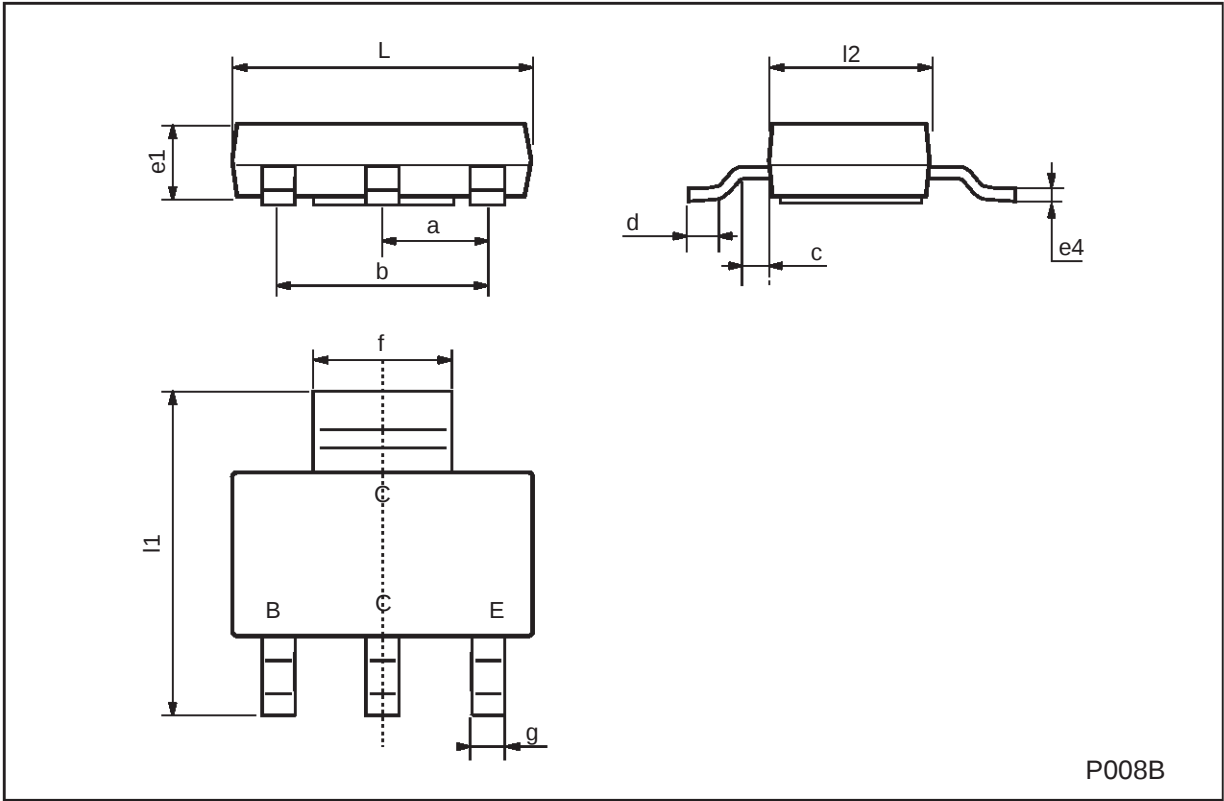
$$V_{\text{OUT}} = V_{\text{REF}} (1 + R_2 / R_1).$$

In order to have the better load regulation it is important to realize a good Kelvin connection of  $R_1$  and  $R_2$  resistors. In particular  $R_1$  connection must be realized very close to OUT and ADJ pin, while  $R_2$  ground connection must be placed as near as possible to the negative Load pin. Ripple rejection can be improved by introducing a  $10\mu\text{F}$  electrolytic capacitor placed in parallel to the  $R_2$  resistor (see Fig.8)

**FIGURE 7:** Adjustable Output Voltage Application Circuit**FIGURE 8:** Adjustable Output Voltage Application with improved Ripple Rejection

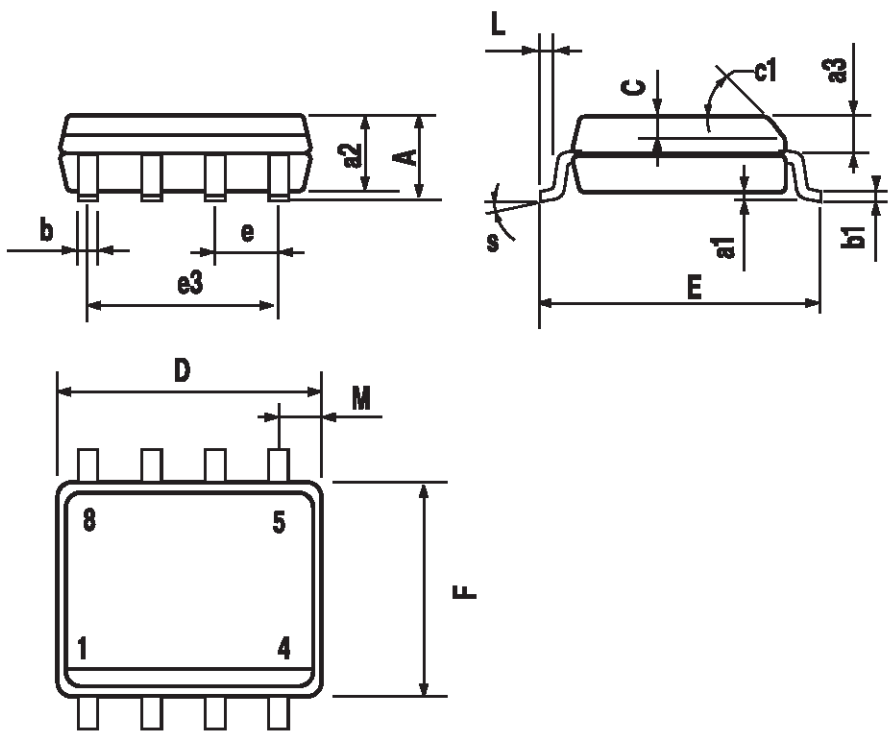
SOT-223 MECHANICAL DATA

| DIM. | mm   |      |      | mils  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| a    | 2.27 | 2.3  | 2.33 | 89.4  | 90.6  | 91.7  |
| b    | 4.57 | 4.6  | 4.63 | 179.9 | 181.1 | 182.3 |
| c    | 0.2  | 0.4  | 0.6  | 7.9   | 15.7  | 23.6  |
| d    | 0.63 | 0.65 | 0.67 | 24.8  | 25.6  | 26.4  |
| e1   | 1.5  | 1.6  | 1.7  | 59.1  | 63    | 66.9  |
| e4   |      |      | 0.32 |       |       | 12.6  |
| f    | 2.9  | 3    | 3.1  | 114.2 | 118.1 | 122.1 |
| g    | 0.67 | 0.7  | 0.73 | 26.4  | 27.6  | 28.7  |
| l1   | 6.7  | 7    | 7.3  | 263.8 | 275.6 | 287.4 |
| l2   | 3.5  | 3.5  | 3.7  | 137.8 | 137.8 | 145.7 |
| L    | 6.3  | 6.5  | 6.7  | 248   | 255.9 | 263.8 |



SO-8 MECHANICAL DATA

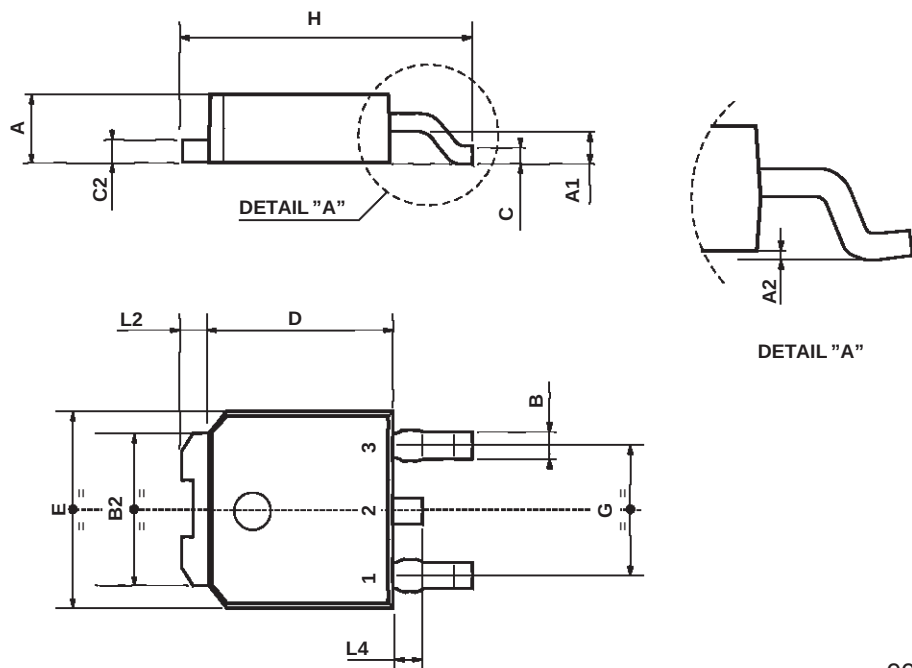
| DIM. | mm        |      |      | inch  |       |       |
|------|-----------|------|------|-------|-------|-------|
|      | MIN.      | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    |           |      | 1.75 |       |       | 0.068 |
| a1   | 0.1       |      | 0.25 | 0.003 |       | 0.009 |
| a2   |           |      | 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-252 (DPAK) MECHANICAL DATA

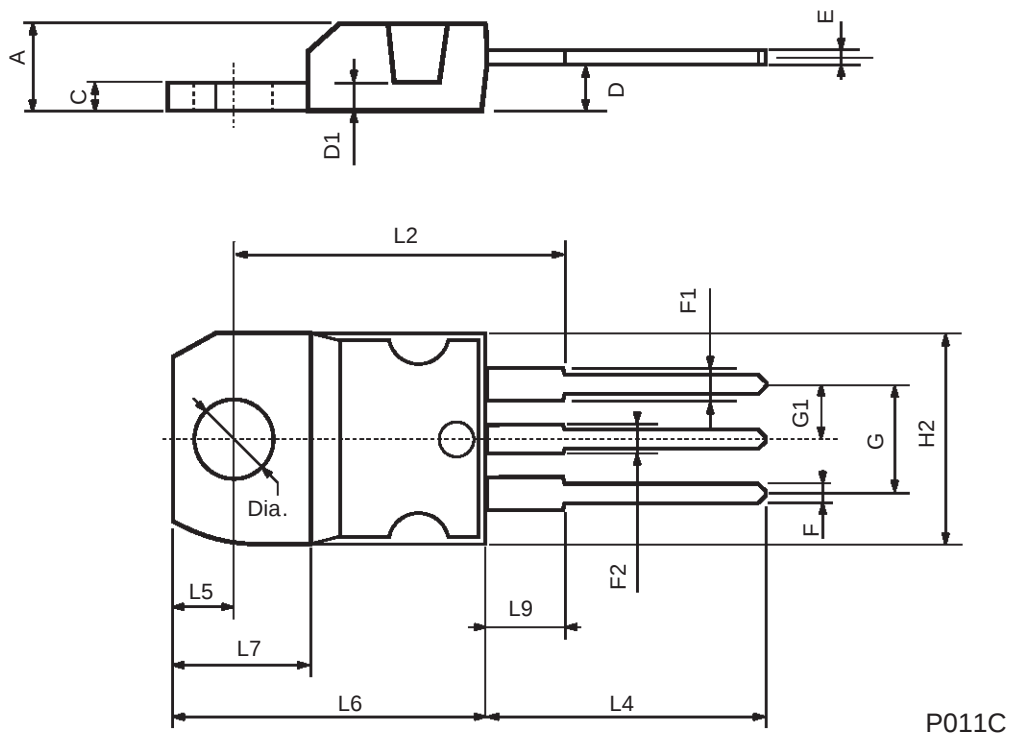
| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 2.2  |      | 2.4  | 0.086 |       | 0.094 |
| A1   | 0.9  |      | 1.1  | 0.035 |       | 0.043 |
| A2   | 0.03 |      | 0.23 | 0.001 |       | 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

## 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 |



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 2001 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco  
Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>