

## FEATURES

- Output Current up to 1 A
- Low Dropout Voltage (1.2V at 1A Output current)
- Three Terminal Adjustable(ADJ) or Fixed 1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.3V, 5.0V
- Line Regulation typically at 0.1% max.
- Load Regulation typically at 0.2% max.
- Internal Current and Terminal Protection
- Maximum Input Voltage 15V
- Surface Mount Package SOT-223, TO-252, SOT-89
- 100% Thermal Limit Burn-In
- Moisture Sensitivity Level 3

## APPLICATION

- Active SCSI Terminators
- Portable/ Plan Top/ Notebook Computers
- High Efficiency Linear Regulators
- SMPS Post Regulators
- Mother B/D Clock Supplies
- Disk Drives
- Battery Chargers

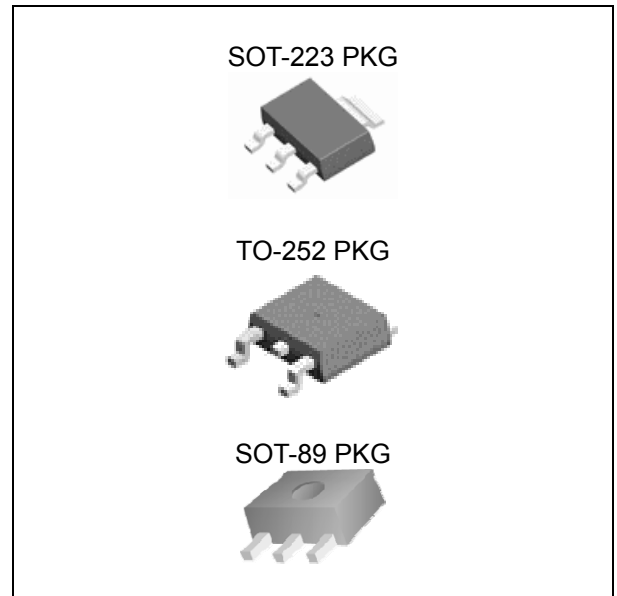
## DESCRIPTION

The LM1117 is a low power positive-voltage regulator designed to meet 1A output current and comply with SCSI-II specifications with a fixed output voltage of 2.85V. This device is an excellent choice for use in battery-powered applications, as active terminators for the SCSI bus, and portable computers. The LM1117 features very low quiescent current and very low dropout voltage of 1V at a full load and lower as output current decreases. LM1117 is available as an adjustable or fixed 1.2V, 1.5V, 1.8V, 2.5V, 2.85, 3.3V, and 5.0V output voltages. The LM1117 is offered in a 3-pin surface mount package SOT-223, TO-252 & SOT-89. The output capacitor of 10 $\mu$ F or larger is needed for output stability of LM1117 as required by most of the other regulator circuits.

## Absolute Maximum Ratings

(T<sub>A</sub> = 25°C, unless otherwise specified)

| CHARACTERISTIC                          | SYMBOL           | MIN. | MAX. | UNIT |
|-----------------------------------------|------------------|------|------|------|
| DC Input Voltage                        | V <sub>IN</sub>  | -    | 15   | V    |
| Lead Temperature (Soldering, 5 seconds) | T <sub>SOL</sub> | -    | 260  | °C   |
| Operating Junction Temperature Range    | T <sub>OPR</sub> | -40  | 125  | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -65  | 150  | °C   |



## ORDERING INFORMATION

| Device        | Package    |
|---------------|------------|
| LM1117S-ADJ   | SOT-223 3L |
| LM1117S-X.X   |            |
| LM1117GS-ADJ  |            |
| LM1117GS-X.X  |            |
| LM1117RS-ADJ  | TO-252 3L  |
| LM1117RS-X.X  |            |
| LM1117GRS-ADJ |            |
| LM1117GRS-X.X |            |
| LM1117F-ADJ   | SOT-89 3L  |
| LM1117F-X.X   |            |

X.X = Output Voltage = 1.2V, 1.5V, 1.8V, 2.5V, 2.85V, 3.3V, 5.0V

## Ordering Information

| V <sub>OUT</sub> | Package | Order No.       | Package Marking | Supplied As | Status     |
|------------------|---------|-----------------|-----------------|-------------|------------|
| ADJ              | SOT-223 | LM1117S-ADJ     | 1117S ADJ       | Reel        | Active     |
|                  | SOT-223 | LM1117GS-ADJ    | 1117GS ADJ      | Reel        | Contact us |
|                  | TO-252  | LM1117RS-ADJ    | LM1117 ADJ      | Reel        | Active     |
|                  | TO-252  | LM1117GRS-ADJ   | LM1117G ADJ     | Reel        | Contact us |
|                  | SOT-89  | LM1117F-ADJ     | 1117 ADJ        | Reel        | Active     |
| 1.2V             | SOT-223 | LM1117S-1.2V    | 1117S 1.2       | Reel        | Active     |
|                  | SOT-223 | LM1117GS-1.2V   | 1117GS 1.2      | Reel        | Contact us |
|                  | TO-252  | LM1117RS-1.2V   | LM1117 1.2      | Reel        | Active     |
|                  | TO-252  | LM1117GRS-1.2V  | LM1117G 1.2     | Reel        | Contact us |
|                  | SOT-89  | LM1117F-1.2V    | 1117 1.2        | Reel        | Active     |
| 1.5V             | SOT-223 | LM1117S-1.5V    | 1117S 1.5       | Reel        | Active     |
|                  | SOT-223 | LM1117GS-1.5V   | 1117GS 1.5      | Reel        | Contact us |
|                  | TO-252  | LM1117RS-1.5V   | LM1117 1.5      | Reel        | Active     |
|                  | TO-252  | LM1117GRS-1.5V  | LM1117G 1.5     | Reel        | Contact us |
|                  | SOT-89  | LM1117F-1.5V    | 1117 1.5        | Reel        | Active     |
| 1.8V             | SOT-223 | LM1117S-1.8V    | 1117S 1.8       | Reel        | Active     |
|                  | SOT-223 | LM1117GS-1.8V   | 1117GS 1.8      | Reel        | Contact us |
|                  | TO-252  | LM1117RS-1.8V   | LM1117 1.8      | Reel        | Active     |
|                  | TO-252  | LM1117GRS-1.8V  | LM1117G 1.8     | Reel        | Contact us |
|                  | SOT-89  | LM1117F-1.8V    | 1117 1.8        | Reel        | Active     |
| 2.5V             | SOT-223 | LM1117S-2.5V    | 1117S 2.5       | Reel        | Active     |
|                  | SOT-223 | LM1117GS-2.5V   | 1117GS 2.5      | Reel        | Contact us |
|                  | TO-252  | LM1117RS-2.5V   | LM1117 2.5      | Reel        | Active     |
|                  | TO-252  | LM1117GRS-2.5V  | LM1117G 2.5     | Reel        | Contact us |
|                  | SOT-89  | LM1117F-2.5V    | 1117 2.5        | Reel        | Active     |
| 2.85V            | SOT-223 | LM1117S-2.85V   | 1117S 2.85      | Reel        | Active     |
|                  | SOT-223 | LM1117GS-2.85V  | 1117GS 2.85     | Reel        | Contact us |
|                  | TO-252  | LM1117RS-2.85V  | LM1117 2.85     | Reel        | Active     |
|                  | TO-252  | LM1117GRS-2.85V | LM1117G 2.85    | Reel        | Contact us |
|                  | SOT-89  | LM1117F-2.85V   | 1117 2.85       | Reel        | Active     |
| 3.3V             | SOT-223 | LM1117S-3.3V    | 1117S 3.3       | Reel        | Active     |
|                  | SOT-223 | LM1117GS-3.3V   | 1117GS 3.3      | Reel        | Contact us |
|                  | TO-252  | LM1117RS-3.3V   | LM1117 3.3      | Reel        | Active     |
|                  | TO-252  | LM1117GRS-3.3V  | LM1117G 3.3     | Reel        | Contact us |
|                  | SOT-89  | LM1117F-3.3V    | 1117 3.3        | Reel        | Active     |

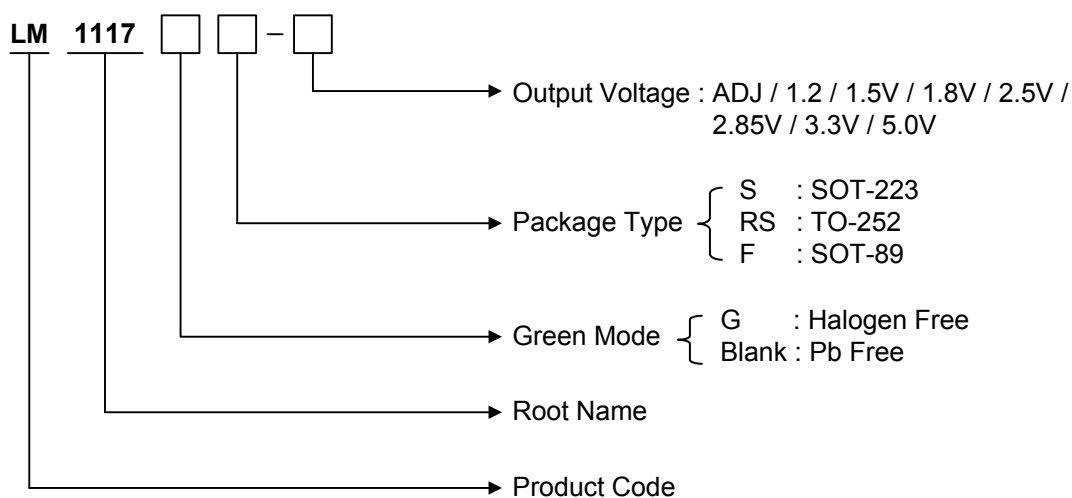
# 1A L.D.O VOLTAGE REGULATOR

LM1117

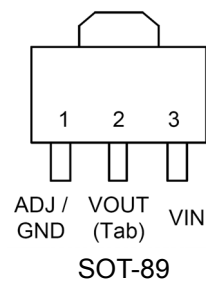
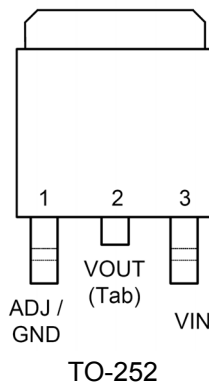
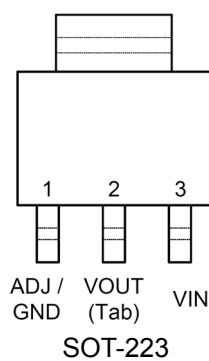
## Ordering Information

(Continued)

| V <sub>OUT</sub> | Package | Order No.      | Package Marking | Supplied As | Status     |
|------------------|---------|----------------|-----------------|-------------|------------|
| 5.0V             | SOT-223 | LM1117S-5.0V   | 1117S 5.0       | Reel        | Active     |
|                  | SOT-223 | LM1117GS-5.0V  | 1117GS 5.0      | Reel        | Contact us |
|                  | TO-252  | LM1117RS-5.0V  | LM1117 5.0      | Reel        | Active     |
|                  | TO-252  | LM1117GRS-5.0V | LM1117G 5.0     | Reel        | Contact us |
|                  | SOT-89  | LM1117F-5.0V   | 1117 5.0        | Reel        | Active     |



## PIN CONFIGURATION



## PIN DESCRIPTION

| Pin No. | SOT-223 / TO-252 / SOT-89 |                     |
|---------|---------------------------|---------------------|
|         | Name                      | Function            |
| 1       | ADJ/GND                   | Adjustable / Ground |
| 2       | V <sub>OUT</sub>          | Output Voltage      |
| 3       | V <sub>IN</sub>           | Input Voltage       |

## ELECTRICAL CHARACTERISTICS

## For ADJ Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol              | Parameters                     | Condition                                                                                                       | Min.  | Typ.  | Max.  | Unit |
|---------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------|-------|-------|-------|------|
| V <sub>REF</sub>    | Reference Voltage              | V <sub>IN</sub> =5V, I <sub>O</sub> =10mA                                                                       | 1.238 | 1.250 | 1.262 | V    |
| V <sub>REF</sub>    | Reference Voltage              | I <sub>O</sub> = 10mA to 1A, V <sub>IN</sub> - V <sub>REF</sub> = 1.5V to 13.75V (T <sub>J</sub> = 0 ~ 125°C)   | 1.219 |       | 1.281 | V    |
| ΔV <sub>LINE</sub>  | Line Regulation                | I <sub>O</sub> = 10mA, V <sub>IN</sub> - V <sub>REF</sub> = 1.5V to 12V                                         |       | 0.1   | 0.2   | %    |
| ΔV <sub>LOAD</sub>  | Load Regulation                | I <sub>O</sub> = 10mA to 1A, V <sub>IN</sub> - V <sub>REF</sub> = 2 V                                           |       | 0.2   | 0.4   | %    |
| V <sub>IN</sub>     | Operating Input Voltage        |                                                                                                                 |       |       | 15    | V    |
| I <sub>ADJ</sub>    | Adjustment pin Current         | V <sub>IN</sub> - V <sub>REF</sub> = 1.5V to 12V, I <sub>O</sub> = 100mA                                        |       | 50    | 120   | uA   |
| ΔI <sub>ADJ</sub>   | Adjustment Pin Current Change  | V <sub>IN</sub> - V <sub>REF</sub> = 1.5V to 12V, I <sub>O</sub> = 100mA to 1A                                  |       | 0.5   | 5     | uA   |
| I <sub>O(MIN)</sub> | Minimum Load Current           | V <sub>IN</sub> =5V, V <sub>REF</sub> =0V                                                                       |       | 5     | 10    | mA   |
| I <sub>O</sub>      | Current Limit                  | V <sub>IN</sub> - V <sub>REF</sub> = 5V                                                                         | 1000  | 1250  | 1600  | mA   |
| ε <sub>N</sub>      | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                        |       | 0.003 |       | %    |
| SVR                 | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz, V <sub>IN</sub> - V <sub>REF</sub> = 3V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75    |       | dB   |

## For 1.2V Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol             | Parameters                     | Condition                                                                                                       | Min.  | Typ.  | Max.  | Unit |
|--------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------|-------|-------|-------|------|
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 2.7V, I <sub>O</sub> = 10mA                                                                   | 1.176 | 1.200 | 1.224 | V    |
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 2.7V to 12V, I <sub>O</sub> = 0mA to 1A (T <sub>J</sub> = 0 ~ 125°C)                          | 1.152 |       | 1.248 | V    |
| ΔV <sub>LINE</sub> | Line Regulation                | I <sub>O</sub> = 0mA, V <sub>IN</sub> = 2.7V to 12V                                                             |       | 0.1   | 0.2   | %    |
| ΔV <sub>LOAD</sub> | Load Regulation                | I <sub>O</sub> = 10mA to 1A, V <sub>IN</sub> = 3.2V                                                             |       | 0.2   | 0.4   | %    |
| V <sub>IN</sub>    | Operating Input Voltage        |                                                                                                                 |       |       | 15    | V    |
| I <sub>D</sub>     | Quiescent Current              | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                           |       | 5     | 10    | mA   |
| I <sub>O</sub>     | Current Limit                  | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                           | 1000  | 1250  | 1600  | mA   |
| ε <sub>N</sub>     | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                        |       | 0.003 |       | %    |
| SVR                | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz, V <sub>IN</sub> - V <sub>O</sub> = 1.5V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75    |       | dB   |

## For 1.5V Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol             | Parameters                     | Condition                                                                                                        | Min.  | Typ. | Max.  | Unit |
|--------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|-------|------|-------|------|
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 3.0V , I <sub>O</sub> = 10mA                                                                   | 1.485 | 1.5  | 1.515 | V    |
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 3.0V to 12V, I <sub>O</sub> = 0mA to 1A<br>(T <sub>J</sub> = 0 ~ 125°C)                        | 1.470 |      | 1.530 | V    |
| ΔV <sub>LINE</sub> | Line Regulation                | I <sub>O</sub> = 0mA , V <sub>IN</sub> = 3.0V to 12V                                                             |       | 0.1  | 0.2   | %    |
| ΔV <sub>LOAD</sub> | Load Regulation                | I <sub>O</sub> = 0mA to 1A, V <sub>IN</sub> = 3.5 V                                                              |       | 0.2  | 0.4   | %    |
| V <sub>IN</sub>    | Operating Input Voltage        | I <sub>O</sub> = 100mA                                                                                           |       |      | 12    | V    |
| I <sub>D</sub>     | Quiescent Current              | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            |       | 5    | 10    | mA   |
| I <sub>O</sub>     | Current Limit                  | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            | 1000  | 1250 | 1600  | mA   |
| εN                 | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                         |       | 100  |       | uV   |
| SVR                | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz,<br>V <sub>IN</sub> - V <sub>O</sub> = 3V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75   |       | dB   |

## For 1.8V Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol             | Parameters                     | Condition                                                                                                        | Min.  | Typ. | Max.  | Unit |
|--------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|-------|------|-------|------|
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 3.3V, I <sub>O</sub> = 10mA                                                                    | 1.782 | 1.8  | 1.818 | V    |
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 3.3V to 12V, I <sub>O</sub> = 0mA to 1A<br>(T <sub>J</sub> = 0 ~ 125°C)                        | 1.764 |      | 1.836 | V    |
| ΔV <sub>LINE</sub> | Line Regulation                | I <sub>O</sub> = 0mA , V <sub>IN</sub> = 3.3V to 12V                                                             |       | 0.1  | 0.2   | %    |
| ΔV <sub>LOAD</sub> | Load Regulation                | I <sub>O</sub> = 0mA to 1A, V <sub>IN</sub> = 3.8 V                                                              |       | 0.2  | 0.4   | %    |
| V <sub>IN</sub>    | Operating Input Voltage        | I <sub>O</sub> = 100mA                                                                                           |       |      | 12    | V    |
| I <sub>D</sub>     | Quiescent Current              | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            |       | 5    | 10    | mA   |
| I <sub>O</sub>     | Current Limit                  | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            | 1000  | 1250 | 1600  | mA   |
| εN                 | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                         |       | 100  |       | uV   |
| SVR                | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz,<br>V <sub>IN</sub> - V <sub>O</sub> = 3V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75   |       | dB   |

## For 2.5V Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol             | Parameters                     | Condition                                                                                                        | Min.  | Typ. | Max.  | Unit |
|--------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|-------|------|-------|------|
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 4.0V, I <sub>O</sub> = 10mA                                                                    | 2.475 | 2.5  | 2.525 | V    |
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 4.0V to 12V, I <sub>O</sub> = 0mA to 1A<br>(T <sub>J</sub> = 0 ~ 125°C)                        | 2.450 |      | 2.550 | V    |
| ΔV <sub>LINE</sub> | Line Regulation                | I <sub>O</sub> = 0mA, V <sub>IN</sub> = 4.0V to 12V                                                              |       | 0.1  | 0.2   | %    |
| ΔV <sub>LOAD</sub> | Load Regulation                | I <sub>O</sub> = 0mA to 1A, V <sub>IN</sub> = 4.5 V                                                              |       | 0.2  | 0.4   | %    |
| V <sub>IN</sub>    | Operating Input Voltage        | I <sub>O</sub> = 100mA                                                                                           |       |      | 12    | V    |
| I <sub>D</sub>     | Quiescent Current              | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            |       | 5    | 10    | mA   |
| I <sub>O</sub>     | Current Limit                  | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            | 1000  | 1250 | 1600  | mA   |
| εN                 | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                         |       | 100  |       | uV   |
| SVR                | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz,<br>V <sub>IN</sub> - V <sub>O</sub> = 3V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75   |       | dB   |

## For 2.85V Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol             | Parameters                     | Condition                                                                                                        | Min.  | Typ. | Max.  | Unit |
|--------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|-------|------|-------|------|
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 4.4V, I <sub>O</sub> = 10mA                                                                    | 2.821 | 2.85 | 2.878 | V    |
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 4.4V to 12V, I <sub>O</sub> = 0mA to 1A<br>(T <sub>J</sub> = 0 ~ 125°C)                        | 2.793 |      | 2.907 | V    |
| ΔV <sub>LINE</sub> | Line Regulation                | I <sub>O</sub> = 0mA, V <sub>IN</sub> = 4.4 to 12V                                                               |       | 0.1  | 0.2   | %    |
| ΔV <sub>LOAD</sub> | Load Regulation                | I <sub>O</sub> = 0mA to 1A, V <sub>IN</sub> = 4.85 V                                                             |       | 0.2  | 0.4   | %    |
| V <sub>IN</sub>    | Operating Input Voltage        | I <sub>O</sub> = 100mA                                                                                           |       |      | 12    | V    |
| I <sub>D</sub>     | Quiescent Current              | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            |       | 5    | 10    | mA   |
| I <sub>O</sub>     | Current Limit                  | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            | 1000  | 1250 | 1600  | mA   |
| εN                 | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                         |       | 100  |       | uV   |
| SVR                | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz,<br>V <sub>IN</sub> - V <sub>O</sub> = 3V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75   |       | dB   |

## For 3.3V Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol             | Parameters                     | Condition                                                                                                        | Min.  | Typ. | Max.  | Unit |
|--------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|-------|------|-------|------|
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 4.8V, I <sub>O</sub> = 10mA                                                                    | 3.267 | 3.3  | 3.333 | V    |
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 4.8V to 12V, I <sub>O</sub> = 0mA to 1A<br>(T <sub>J</sub> = 0 ~ 125°C)                        | 3.234 |      | 3.366 | V    |
| ΔV <sub>LINE</sub> | Line Regulation                | I <sub>O</sub> = 0mA, V <sub>IN</sub> = 4.8V to 12V                                                              |       | 0.1  | 0.2   | %    |
| ΔV <sub>LOAD</sub> | Load Regulation                | I <sub>O</sub> = 0mA to 1A, V <sub>IN</sub> = 5.3 V                                                              |       | 0.2  | 0.4   | %    |
| V <sub>IN</sub>    | Operating Input Voltage        | I <sub>O</sub> = 100mA                                                                                           |       |      | 12    | V    |
| I <sub>D</sub>     | Quiescent Current              | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            |       | 5    | 10    | mA   |
| I <sub>O</sub>     | Current Limit                  | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            | 1000  | 1250 | 1600  | mA   |
| εN                 | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                         |       | 100  |       | uV   |
| SVR                | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz,<br>V <sub>IN</sub> - V <sub>O</sub> = 3V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75   |       | dB   |

## For 5.0V Output Voltage

(T<sub>A</sub>=25°C, C<sub>O</sub> = 10uF unless otherwise specified)

| Symbol             | Parameters                     | Condition                                                                                                        | Min.  | Typ. | Max.  | Unit |
|--------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------|-------|------|-------|------|
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 6.5V, I <sub>O</sub> = 10mA                                                                    | 4.950 | 5.0  | 5.050 | V    |
| V <sub>O</sub>     | Output Voltage                 | V <sub>IN</sub> = 6.5V to 15V, I <sub>O</sub> = 0mA to 1A<br>(T <sub>J</sub> = 0 ~ 125°C)                        | 4.900 |      | 5.100 | V    |
| ΔV <sub>LINE</sub> | Line Regulation                | I <sub>O</sub> = 0mA, V <sub>IN</sub> = 6.5V to 15V                                                              |       | 0.1  | 0.2   | %    |
| ΔV <sub>LOAD</sub> | Load Regulation                | I <sub>O</sub> = 0mA to 1A, V <sub>IN</sub> = 7.0 V                                                              |       | 0.2  | 0.4   | %    |
| V <sub>IN</sub>    | Operating Input Voltage        | I <sub>O</sub> = 100mA                                                                                           |       |      | 15    | V    |
| I <sub>D</sub>     | Quiescent Current              | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            |       | 5    | 10    | mA   |
| I <sub>O</sub>     | Current Limit                  | V <sub>IN</sub> - V <sub>O</sub> = 5V                                                                            | 1000  | 1250 | 1600  | mA   |
| εN                 | Output Noise(%V <sub>O</sub> ) | B = 10Hz to 10kHz, T <sub>J</sub> = 25°C                                                                         |       | 100  |       | uV   |
| SVR                | Supply Voltage Rejection       | I <sub>O</sub> = 1A, f = 120Hz,<br>V <sub>IN</sub> - V <sub>O</sub> = 3V, V <sub>RIPPLE</sub> = 1V <sub>PP</sub> | 60    | 75   |       | dB   |

For All Output Voltage

( $T_A=25^{\circ}\text{C}$ ,  $C_O = 10\mu\text{F}$  unless otherwise specified)

| Symbol | Parameters            | Condition                             | Min. | Typ.  | Max. | Unit |
|--------|-----------------------|---------------------------------------|------|-------|------|------|
| $V_D$  | Dropout Voltage       | $I_O = 100\text{mA}$                  |      | 1.0   | 1.1  | V    |
|        |                       | $I_O = 500\text{mA}$                  |      | 1.1   | 1.2  | V    |
|        |                       | $I_O = 1\text{A}$                     |      | 1.2   | 1.3  | V    |
|        | Temperature Stability |                                       |      | 0.5   |      | %    |
|        | Long Term Stability   | 1000 hrs, $T_J = 125^{\circ}\text{C}$ |      | 0.3   |      | %    |
|        | Thermal Regulation    | $T_A = 25^{\circ}\text{C}$ 30ms Pulse |      | 0.003 |      | %/W  |

## TYPICAL APPLICATION CIRCUIT

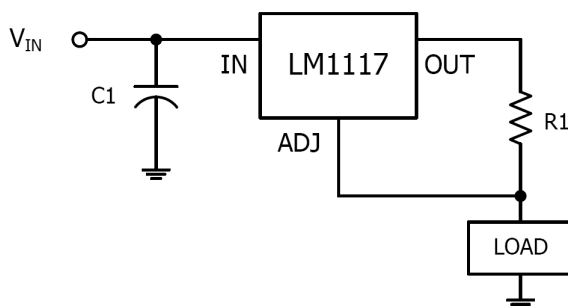


Fig.1 1A Current Output

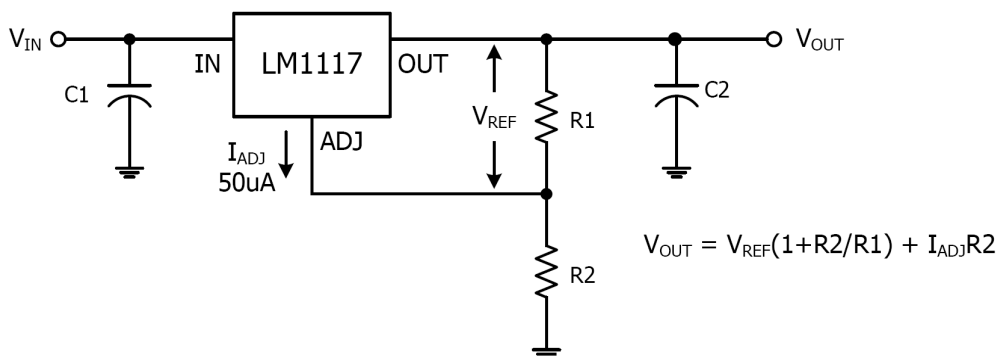
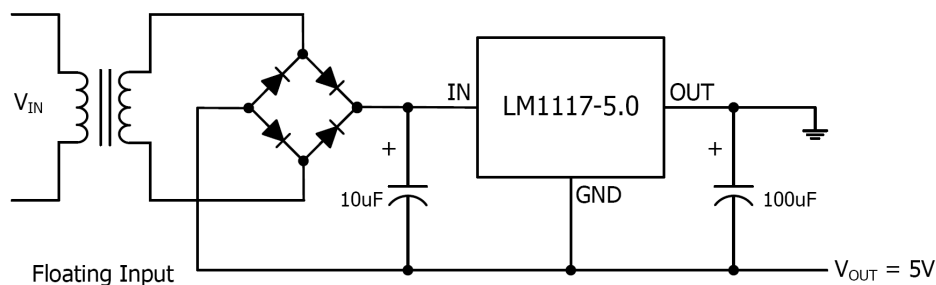
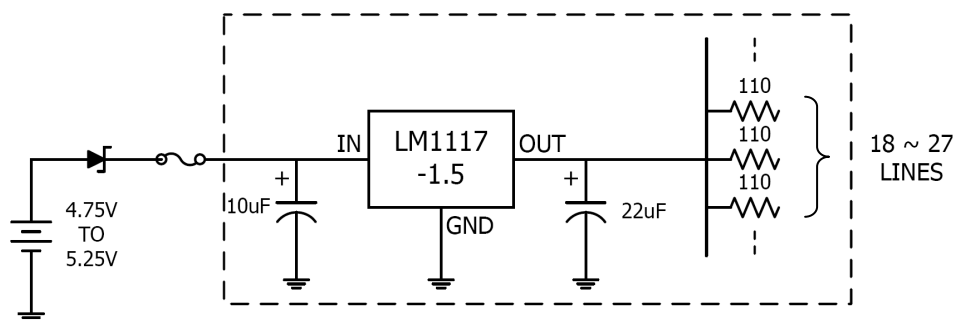


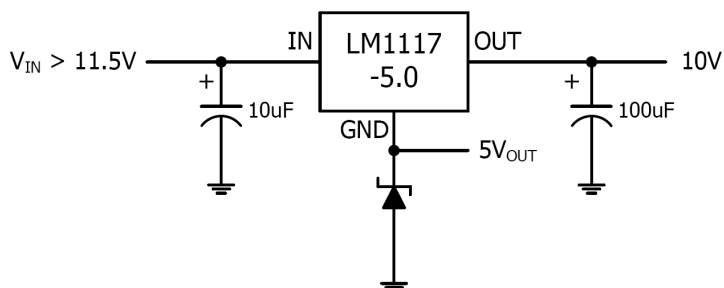
Fig.2 Typical Adjustable Regulator



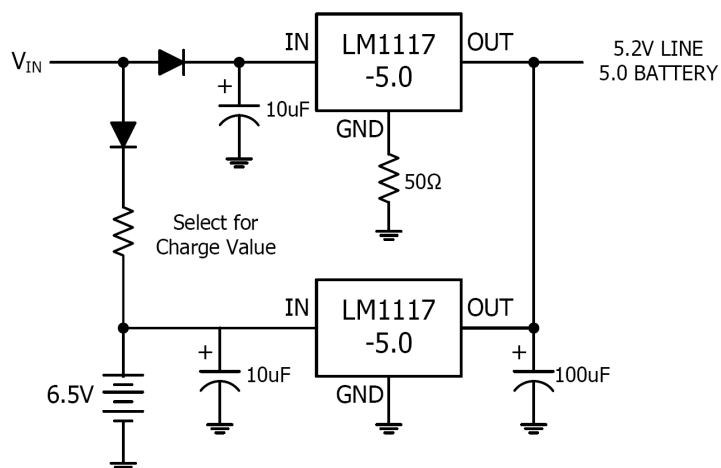
**Fig.3 Negative Supply**



**Fig.4 Active Terminator for SCSI-2BUS**

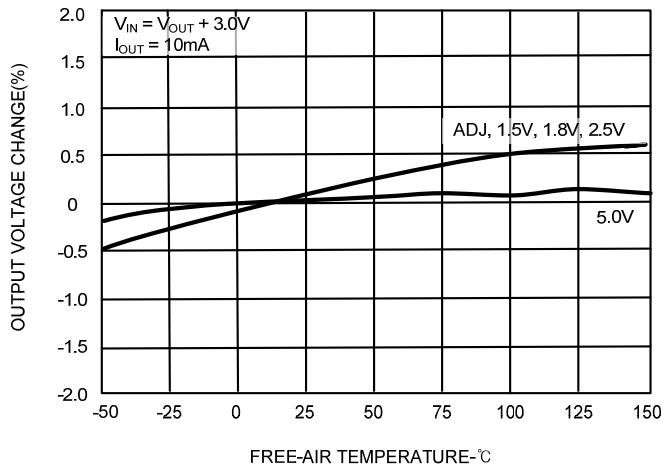


**Fig.5 Voltage Regulator with Reference**

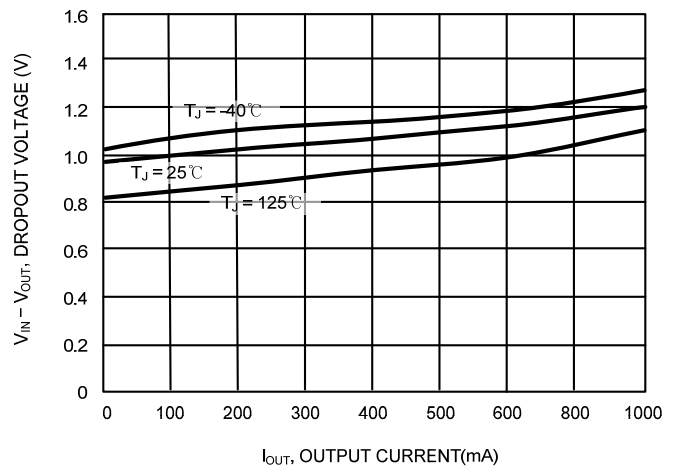


**Fig.6 Battery Backed-up Regulated Supply**

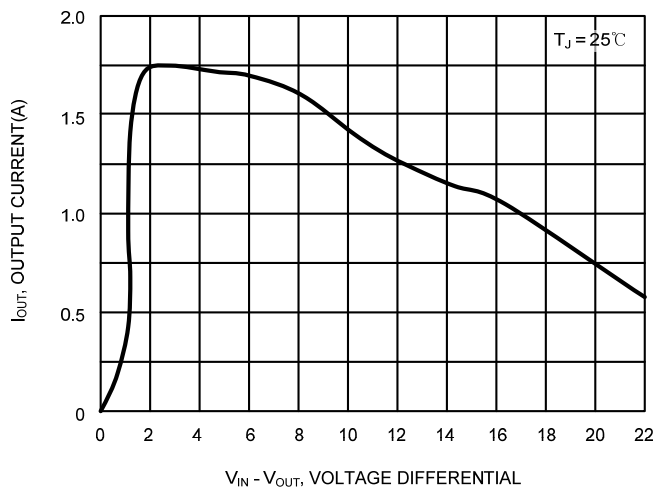
## TYPICAL OPERATING CHARACTERISTICS



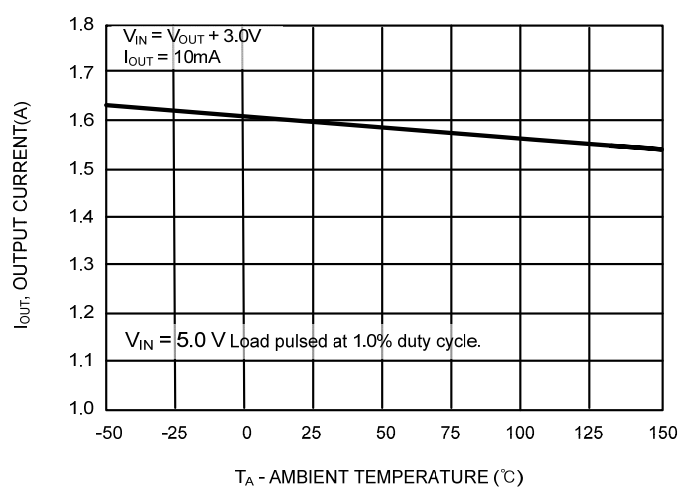
**Fig.7 OUTPUT VOLTAGE CHANGE VS TEMPERATURE**



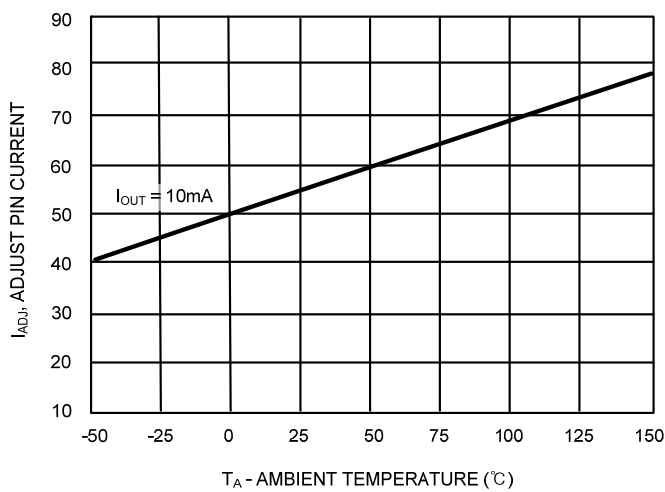
**Fig.8 DROPOUT VOLTAGE VS OUTPUT CURRENT**



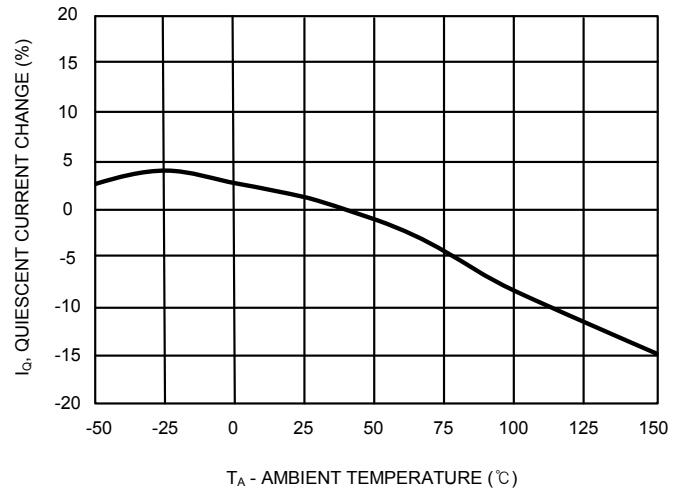
**Fig.9 OUTPUT SHORT CIRCUIT CURRENT VS DIFFERENTIAL VOLTAGE**



**Fig.10 OUTPUT SHORT CIRCUIT CURRENT VS TEMPERATURE**



**Fig.11 ADJ PIN CURRENT VS TEMPERATURE**



**Fig.12 QUIESCENT CURRENT CHANGE VS TEMPERATURE**

## APPLICATION INFORMATION

## Maximum Output Current Capability

The LM1117 can deliver a continuous current of 1A over the full operating junction temperature range. However, the output current is limited by the restriction of power dissipation which differs from packages. A heat sink may be required depending on the maximum power dissipation and maximum ambient temperature of application. With respect to the applied package, the maximum output current of 1A may be still undeliverable due to the restriction of the power dissipation of LM1117. Under all possible conditions, the junction temperature must be within the range specified under operating conditions. The temperatures over the device are given by:

$$T_C = T_A + P_D \times \theta_{CA} / \quad T_J = T_C + P_D \times \theta_{JC} / \quad T_J = T_A + P_D \times \theta_{JA}$$

where  $T_J$  is the junction temperature,  $T_C$  is the case temperature,  $T_A$  is the ambient temperature,  $P_D$  is the total power dissipation of the device,  $\theta_{CA}$  is the thermal resistance of case-to-ambient,  $\theta_{JC}$  is the thermal resistance of junction-to-case, and  $\theta_{JA}$  is the thermal resistance of junction to ambient. The total power dissipation of the device is given by:

$$P_D = P_{IN} - P_{OUT} = (V_{IN} \times I_{IN}) - (V_{OUT} \times I_{OUT}) \\ = (V_{IN} \times (I_{OUT} + I_{GND})) - (V_{OUT} \times I_{OUT}) = (V_{IN} - V_{OUT}) \times I_{OUT} + V_{IN} \times I_{GND}$$

where  $I_{GND}$  is the operating ground current of the device which is specified at the Electrical Characteristics. The maximum allowable temperature rise ( $T_{Rmax}$ ) depends on the maximum ambient temperature ( $T_{Amax}$ ) of the application, and the maximum allowable junction temperature ( $T_{Jmax}$ ):

$$T_{Rmax} = T_{Jmax} - T_{Amax}$$

The maximum allowable value for junction-to-ambient thermal resistance,  $\theta_{JA}$ , can be calculated using the formula:

$$\theta_{JA} = T_{Rmax} / P_D = (T_{Jmax} - T_{Amax}) / P_D$$

LM1117 is available in SOT223, TO252 and SOT89 packages. The thermal resistance depends on amount of copper area or heat sink, and on air flow. If the maximum allowable value of  $\theta_{JA}$  calculated above is over 137°C/W for SOT-223 package, over 105 °C/W for TO252 package, over 315 °C/W for SOT-89 package, no heat sink is needed since the package can dissipate enough heat to satisfy these requirements. If the value for allowable  $\theta_{JA}$  falls near or below these limits, a heat sink or proper area of copper plane is required. In summary, the absolute maximum ratings of thermal resistances are as follow:

## Absolute Maximum Ratings of Thermal Resistance

| Characteristic                                   | Symbol                | Rating | Unit |
|--------------------------------------------------|-----------------------|--------|------|
| Thermal Resistance Junction-To-Ambient / SOT-223 | $\theta_{JA-SOT-223}$ | 137    | °C/W |
| Thermal Resistance Junction-To-Ambient / TO-252  | $\theta_{JA-TO-252}$  | 105    | °C/W |
| Thermal Resistance Junction-To-Ambient / SOT-89  | $\theta_{JA-SOT-89}$  | 315    | °C/W |

No heat sink / No air flow / No adjacent heat source / 0.066 inch<sup>2</sup> copper area. ( $T_A=25^\circ\text{C}$ )