

POWER MANAGEMENT

Description

The SC1118 family of low dropout regulators has the unique capability of maintaining output regulation while sourcing or sinking current. The 2.85V output voltage option is ideal for use as a Boulay termination of up to 27 SCSI data lines. The regulator maintains regulation while both sourcing and sinking current, enabling the use of active negation drivers for improved noise immunity on the data lines. Regulation of output voltage is maintained for TERMPWR voltages as low as 4.0V. When unloaded, quiescent supply current is a low 2mA, allowing continuous connection to the TERMPWR lines.

An ultra low power shutdown mode is also available on the SO-8 version. In shutdown the output is high impedance and supply current drops to 100µA (typ.).

Current limits in both sourcing and sinking modes, plus on-chip thermal shutdown make the circuit tolerant of output fault conditions.

The SC1118 is available in the 3-lead SOT-223 and 8-lead SO-8 packages.

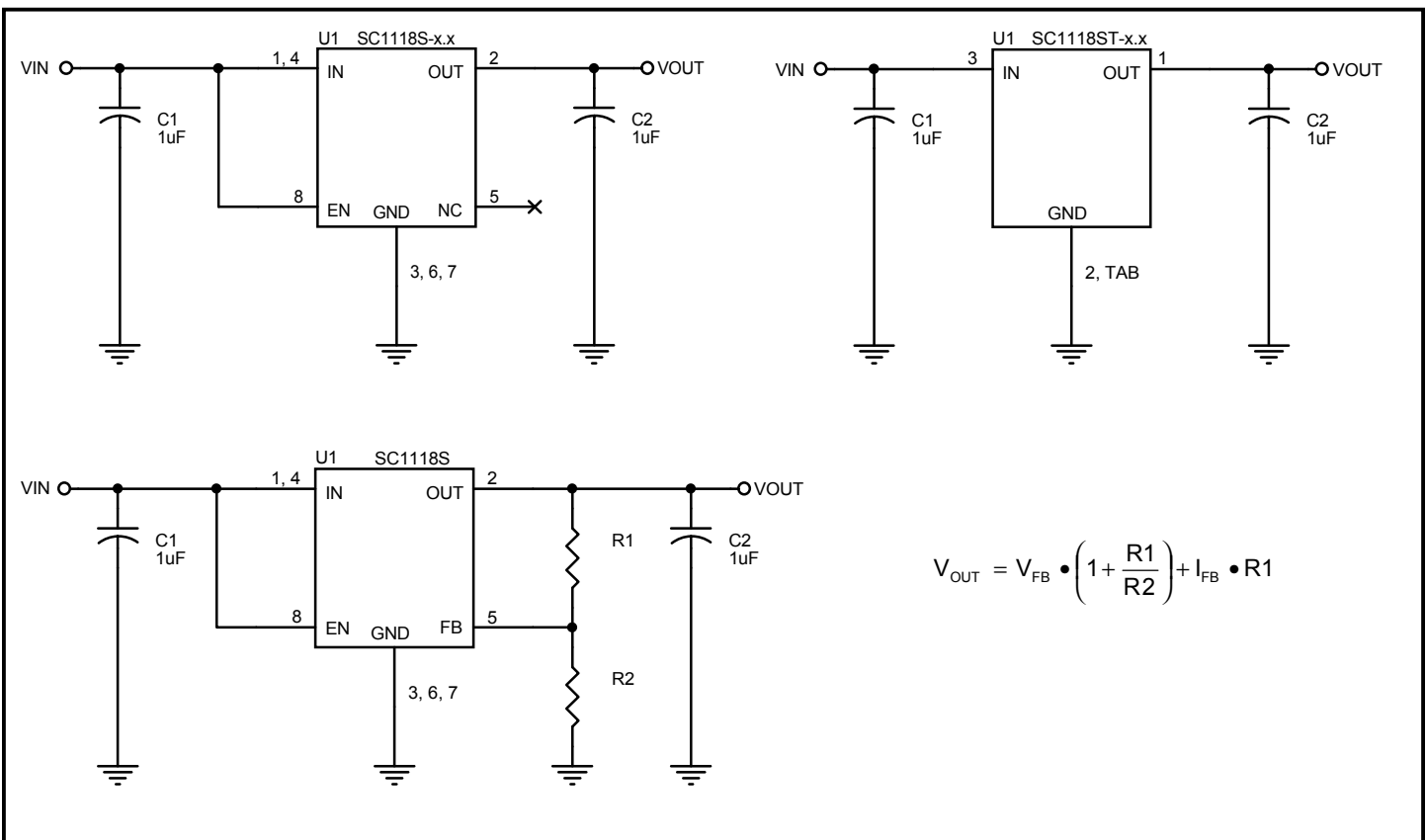
Features

- ◆ Regulates while sourcing or sinking current
- ◆ Provides termination for up to 27 SCSI lines
- ◆ 2mA quiescent current
- ◆ Ultra low power shutdown mode
- ◆ Current limit and thermal shutdown protection
- ◆ Stable for any $C_{LOAD} \geq 0.22\mu F$
- ◆ Fast settling time
- ◆ SOT-223 and SO-8 surface mount packages

Applications

- ◆ Active negation SCSI terminations
- ◆ Computers
- ◆ Disk drives
- ◆ CD-ROM drives
- ◆ Supply splitter

Typical Application Circuits



POWER MANAGEMENT
Absolute Maximum Ratings

Exceeding the specifications below may result in permanent damage to the device, or device malfunction. Operation outside of the parameters specified in the Electrical Characteristics section is not implied.

| Parameter | Symbol | Maximum | Units |
|---|---------------|--------------------|-------|
| Supply Voltage | V_{IN} | 17 | V |
| Power Dissipation | P_D | Internally Limited | W |
| Thermal Resistance Junction to Case SOT-223 SO-8 | θ_{JC} | 16 39 | °C/W |
| Thermal Resistance Junction to Ambient SOT-223 SO-8 | θ_{JA} | 57 163 | °C/W |
| Operating Temperature Range | T_A | 0 to +85 | °C |
| Junction Temperature Range | T_J | -40 to +150 | °C |
| Storage Temperature Range | T_{STG} | -65 to +150 | °C |
| Lead Temperature (Soldering) 10 Sec. | T_{LEAD} | 300 | °C |
| ESD Rating (Human Body Model) | V_{ESD} | 2 | kV |

Electrical Characteristics

Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_{IN} = V_{EN} = 5\text{V}$ (2.5V, 2.85V and adjustable options, adjustable option set to 2V out), $V_{IN} = V_{EN} = 7\text{V}$ (5V option), $I_{OUT} = 0\text{mA}$, $C_{IN} = C_{OUT} = 1\mu\text{F}$. Values in **bold** apply over operating temperature range: $0 \leq T_J = T_A \leq 85^\circ\text{C}$.

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|----------------|--|---------------------|-----------|------------------------|---------------|
| Supply Voltage Range | V_{IN} | | $V_{IN(min)}^{(2)}$ | | 15 | V |
| Quiescent Current | I_Q | $V_{EN} = 5\text{V}$ | | 2 | 5 | mA |
| | | $V_{EN} = 0\text{V}$ | | 100 | 250 | μA |
| Output Voltage ⁽¹⁾ | V_{OUT} | | -1% | V_{OUT} | +1% | V |
| Fixed output options | | $-1\text{A} \leq I_{OUT} \leq 1\text{A}$, $V_{IN} = V_{IN(MIN)}^{(2)}$ to 15V | -2% | | +2% | |
| Feedback Voltage ⁽¹⁾⁽⁵⁾ | V_{FB} | | 0.99 | 1.00 | 1.01 | V |
| Adjustable output option | | $-1\text{A} \leq I_{OUT} \leq 1\text{A}$, $V_{IN} = 3.7\text{V}$ to 15V | 0.98 | | 1.02 | |
| Feedback Bias Current | I_{FB} | $V_O = V_{FB}$ | | 16 | 25 | μA |
| Line Regulation ⁽¹⁾⁽⁵⁾ | $REG_{(LINE)}$ | ADJ, 2.5V, 2.85V: $V_{IN} = V_{IN(MIN)}^{(2)}$ to 15V | | | 8 | mV |
| | | 5V: $V_{IN} = 6.5\text{V}$ to 15V | | | 10 | |
| Load Regulation ⁽¹⁾⁽⁵⁾ ADJ, 2.5V, 2.85V 5V | $REG_{(LOAD)}$ | $I_{OUT} = -1\text{A}$ to 0A or 0A to 1A | | | 10 20 | mV |

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| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|----------------|---|------------|----------|------------|------------------|
| Dropout Voltage ⁽¹⁾⁽³⁾ For Adjustable option $V_O = 3.3\text{V}$, $V_{EN} = V_{IN}$ | V_D | $I_{OUT} = 100\text{mA}$ | | 0.85 | 1.10 | V |
| | | $I_{OUT} = 800\text{mA}$ | | 1.0 | 1.3 | |
| | | $I_{OUT} = 1\text{A}$ | | | 1.5 | |
| Minimum Output Voltage | $V_{OUT(MIN)}$ | ADJ version | | V_{FB} | | V |
| Maximum Output Voltage | $V_{OUT(MAX)}$ | ADJ version | | | 5.5 | V |
| Output Current Limit ⁽⁴⁾ | $I_{CL(+)}$ | $V_{OUT} = (V_{OUT(NOM)} - 100\text{mV})$ | 1 | 1.5 | | A |
| | $I_{CL(-)}$ | $V_{OUT} = (V_{OUT(NOM)} + 100\text{mV})$ | -1 | -1.5 | | |
| Load Transient Settling Time, $\Delta V_{OUT} = 1\%$ | t_S | $I_{OUT} = -1\text{A to } 0\text{A or } 0\text{A to } 1\text{A}$ | | 5 | | μs |
| Ripple Rejection | R_A | $f = 120\text{Hz}$, $(V_{IN} - V_{OUT}) = 2\text{V}$, $V_{AC} = 0.5V_{P-P}$ | | 65 | | dB |
| Enable Input Threshold | V_{IH} | Output ON | 1.8 | 1.5 | | V |
| | V_{IL} | Output OFF | | 1.5 | 0.4 | |
| Enable Input Bias Current | I_{EN} | $V_{EN} = V_{IN} = 7\text{V}$ (EN sinking) | | 25 | 60 | μA |
| | | $V_{EN} = 0\text{V}$, $V_{IN} = 7\text{V}$ (EN sourcing) | | -25 | -60 | |
| Thermal Shutdown Junction Temperature | T_{HI} | | | 155 | | $^\circ\text{C}$ |
| Thermal Shutdown Hysteresis | T_{HYST} | | | 15 | | $^\circ\text{C}$ |

Notes:

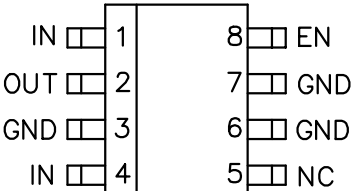
- (1) Low duty cycle pulse testing with Kelvin connections required.
- (2) $V_{IN(MIN)}$ for each voltage option is as follows:

| Voltage Option | $V_{IN(MIN)}$ |
|----------------|---------------|
| ADJ | 3.7V |
| 2.5V | 4.2V |
| 2.85V | 4.5V |
| 5V | 6.5V |

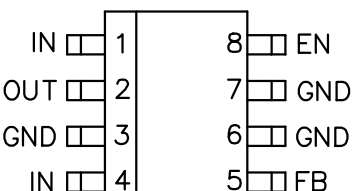
- (3) Defined as the input to output differential at which the output voltage drops 1% below the value measured at a differential of 2V.
- (4) As V_{OUT} increases further towards GND or V_{IN} , the current limit will fold back.
- (5) Adjustable option: for $3.7\text{V} \leq V_{IN} \leq 5\text{V}$, $V_{EN} = V_{IN}$,
for $5\text{V} \leq V_{IN} \leq 15\text{V}$, $V_{EN} = 5\text{V}$

POWER MANAGEMENT
Pin Configurations

Top Views

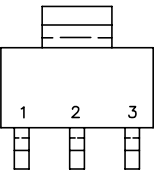


Fixed Output Voltage



Adjustable Output Voltage

SO-8



SOT-223

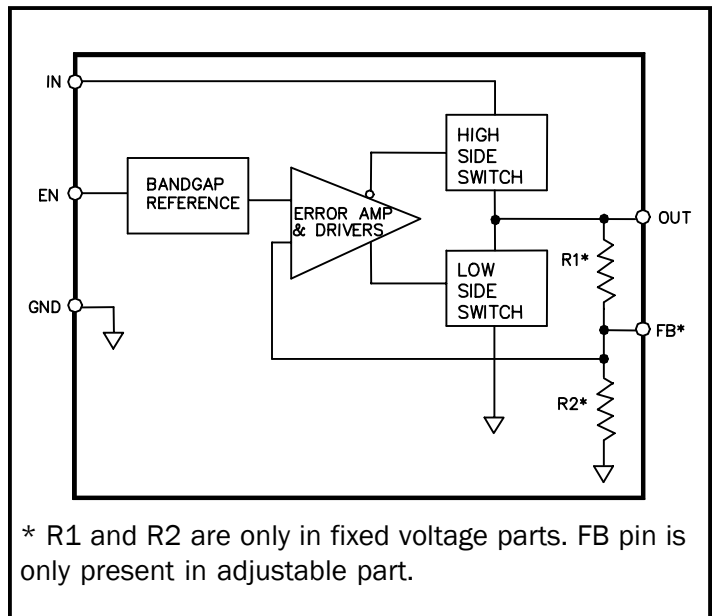
| Pin | Function |
|------------|----------|
| 1 | OUT |
| 2 | GND |
| 3 | IN |
| TAB is GND | |

Ordering Information

| Device ⁽¹⁾ | Package |
|--|---------|
| SC1118S-X.XTR ⁽²⁾ SC1118STR ⁽³⁾ | SO-8 |
| SC1118ST-X.XTR ⁽²⁾ | SOT-223 |

Notes:

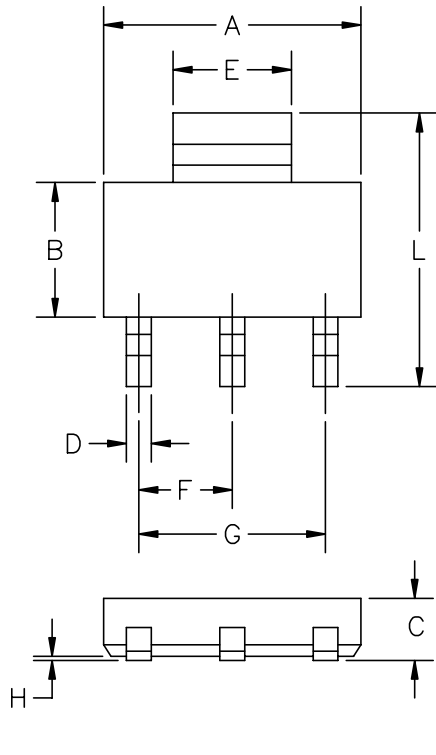
- (1) Only available in tape and reel packaging. A reel contains 2500 devices (both packages).
- (2) Where X.X denotes voltage options. Available voltages are: 2.5V (-2.5), 2.85V (-2.85) and 5V (-5.0). Contact factory for additional voltage options.
- (3) Adjustable output voltage version (SO-8 only).

Block Diagram

Pin Descriptions

| Pin Name | Pin Number | | | Pin Function |
|----------|------------|-----------|---------|---|
| | Fixed SO-8 | Adj. SO-8 | SOT-223 | |
| EN | 8 | 8 | - | Active high enable input. CMOS/TTL compatible. Pulling this pin low shuts the device down. Connected internally to IN in the SOT-223 package. |
| FB | - | 5 | - | Feedback input. Connects to the inverting input of the error amplifier. Use this pin to adjust the output voltage of the adjustable SO-8 parts (see Application Circuit on page 1). |
| GND | 3, 6, 7 | 3, 6, 7 | 2/TAB | Ground pin(s). Connect all ground connections to ground. |
| IN | 1, 4 | 1, 4 | 3 | Input pin(s). Connect all pins to positive supply and to each other, decouple with 1 μ F minimum. |
| NC | 5 | - | - | Not connected. Leave this pin floating. |
| OUT | 2 | 2 | 1 | Output pin. Connect a $\geq 0.22\mu$ F capacitor for stability. |

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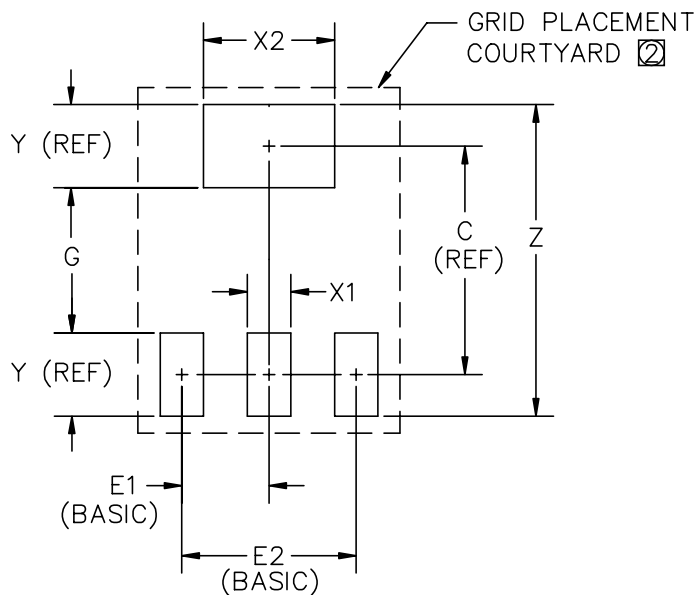
Outline Drawing - SOT-223



| DIM ^N | INCHES | | MM | | NOTE |
|------------------|--------|------|------|------|------|
| | MIN | MAX | MIN | MAX | |
| A | .248 | .264 | 6.30 | 6.70 | — |
| B | .13 | .146 | 3.30 | 3.70 | — |
| C | .060 | .071 | 1.52 | 1.80 | — |
| D | .024 | .031 | .60 | .80 | — |
| E | .114 | .122 | 2.90 | 3.10 | — |
| F | — | .090 | — | 2.30 | BSC |
| G | — | .181 | — | 4.60 | BSC |
| H | .001 | .004 | .020 | .100 | — |
| J | .164 | .215 | 4.16 | 5.46 | — |
| K | .036 | .05 | .91 | 1.27 | — |
| L | .264 | .287 | 6.70 | 7.30 | — |
| M | .009 | .013 | .24 | .32 | — |

CONTROLLING DIMENSIONS: MILLIMETERS.

Land Pattern - SOT-223



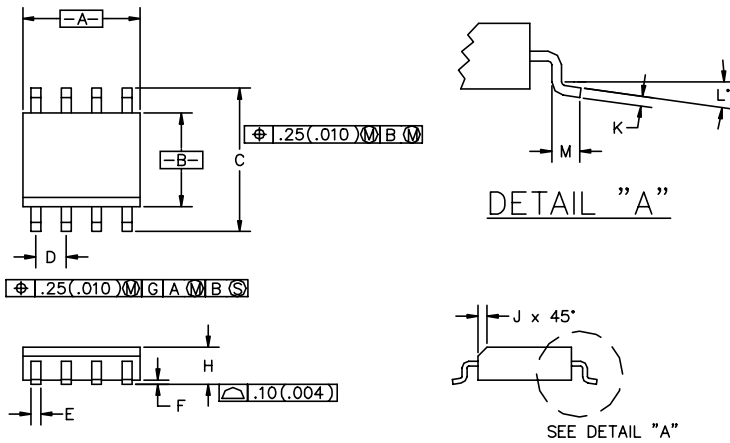
| DIM ^N | INCHES | | MM | | NOTE |
|------------------|--------|-----|------|------|------|
| | MIN | MAX | MIN | MAX | |
| C | — | .24 | — | 6.20 | — |
| E1 | — | .09 | — | 2.30 | — |
| E2 | — | .18 | — | 4.60 | — |
| G | .15 | .16 | 4.00 | 4.20 | — |
| X1 | .03 | .04 | 1.00 | 1.20 | — |
| X2 | .13 | .14 | 3.40 | 3.60 | — |
| Y | — | .09 | — | 2.20 | — |
| Z | .32 | .33 | 8.20 | 8.40 | — |

② GRID PLACEMENT COURTYARD IS 18 x 14 ELEMENTS (9 mm X 7mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

① CONTROLLING DIMENSION: MILLIMETERS

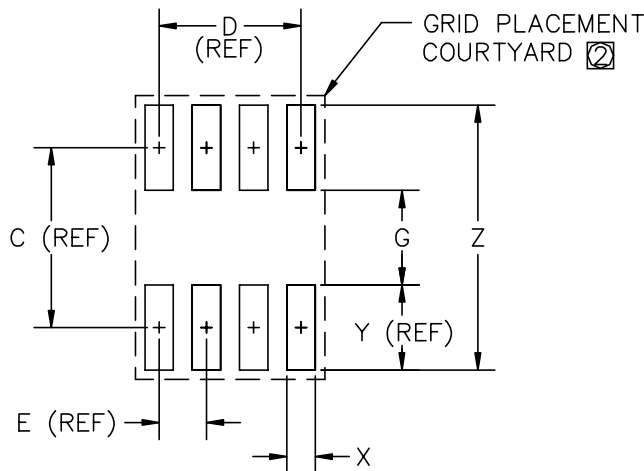
POWER MANAGEMENT

Outline Drawing - SO-8



| DIM ^N | INCHES | | MM | | NOTE |
|------------------|--------|------|------|------|------|
| | MIN | MAX | MIN | MAX | |
| A | .188 | .197 | 4.80 | 5.00 | |
| B | .149 | .158 | 3.80 | 4.00 | |
| C | .228 | .244 | 5.80 | 6.20 | |
| D | .050 | BSC | 1.27 | BSC | |
| E | .013 | .020 | 0.33 | 0.51 | |
| F | .004 | .010 | 0.10 | 0.25 | |
| H | .053 | .069 | 1.35 | 1.75 | |
| J | .011 | .019 | 0.28 | 0.48 | |
| K | .007 | .010 | .19 | .25 | |
| L | 0° | 8° | 0° | 8° | |
| M | .016 | .050 | 0.40 | 1.27 | |

Land Pattern - SO-8



| DIM ^N | INCHES | | MM | | NOTE |
|------------------|--------|-----|------|------|------|
| | MIN | MAX | MIN | MAX | |
| C | - | .19 | - | 5.00 | - |
| D | - | .15 | - | 3.81 | - |
| E | - | .05 | - | 1.27 | - |
| G | .10 | .11 | 2.60 | 2.80 | - |
| X | .02 | .03 | .60 | .80 | - |
| Y | - | .09 | - | 2.40 | - |
| Z | - | .29 | 7.20 | 7.40 | - |

② GRID PLACEMENT COURTYARD IS 12x16 ELEMENTS (6 mm X 8mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

① CONTROLLING DIMENSION: MILLIMETERS

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