

POWER MANAGEMENT
PRELIMINARY
Description

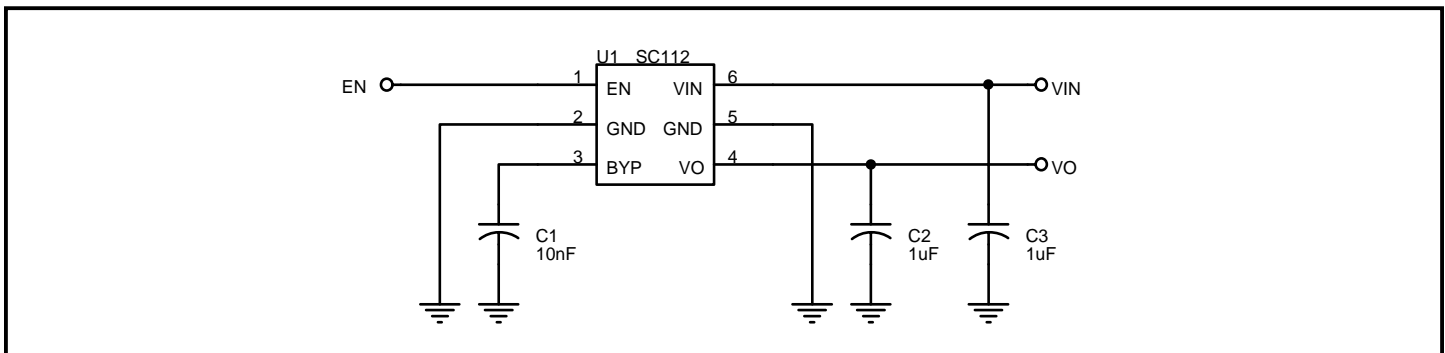
The SC112 is a 150mA ultra low dropout linear regulator with a built in CMOS/TTL logic level enable, designed specifically for battery powered applications where low quiescent current and low dropout are critical for battery longevity.

The SC112 uses a Semtech proprietary internal PNP device for the pass element, providing a low dropout voltage of 130mV at a load of 60mA.

The output noise is reduced to 30 μ V (typical) by placing a very low leakage 10nF capacitor on pin 3 (noise bypass).

Each device contains a bandgap reference, error amplifier, PNP pass element, thermal and current limiting circuitry and resistor divider network for setting output voltage.

The SC112 is packaged in a six lead SOT-23 surface mount package for a very small footprint and it requires only a 1 μ F capacitor on the output and a 0.01 μ F on the bypass pin for a minimum number of external components.

Typical Application Circuit

Notes:

- (1) C_{IN} (C3) is needed if the device is far from the supply's filter capacitors, or for operation from a battery. A value of 1.0 μ F or greater should be used. C_{IN} may be tantalum or ceramic.
- (2) C_O (C2) should be a 1 μ F or greater tantalum or ceramic capacitor, with an Equivalent Series Resistance (ESR) between 10m Ω and 1 Ω over temperature. Larger value capacitors will improve the overall transient response.
- (3) C_{BYP} (C1 - required) should be placed as close as possible to pin 3 and ground. A 10nF ceramic capacitor is recommended.
- (4) EN may be tied to V_{IN} if the shutdown feature is not required. Maximum EN voltage = V_{IN} .
- (5) Connect both ground pins (2 and 5) to ground to maximize heat conduction.

Features

- ◆ Low dropout voltage
- ◆ CMOS/TTL compatible control switch
- ◆ Very low quiescent current 60 μ A (ON, no load)
- ◆ Internal thermal shutdown
- ◆ Short circuit protection
- ◆ Very low standby current 0.1 μ A maximum (OFF)
- ◆ Low noise with external bypass capacitor
- ◆ Industrial temperature range
- ◆ SOT-23-6 package

Applications

- ◆ Battery powered systems
- ◆ Cellular telephones
- ◆ Cordless telephones
- ◆ Pagers
- ◆ Personal digital assistants
- ◆ Portable instrumentation
- ◆ Low voltage systems

POWER MANAGEMENT
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Absolute Maximum Ratings

| Parameter | Symbol | Maximum | Units |
|--|-------------------|-------------------------|-------|
| Input Supply Voltage | V _{IN} | -0.3 to +16 | V |
| Enable Input Voltage | V _{EN} | -0.3 to V _{IN} | V |
| Power Dissipation | P _D | Internally Limited | W |
| Thermal Resistance Junction to Ambient | θ _{JA} | 230 | °C/W |
| Thermal Resistance Junction to Case | θ _{JC} | 81 | °C/W |
| Operating Ambient Temperature Range | T _A | -40 to +85 | °C |
| Operating Junction Temperature Range | T _J | -40 to +125 | °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 specified: T_A = 25°C, V_{IN} = (V_{O(NOM)} + 1V), C_{IN} = 1μF, C_{BYP} = 10nF, C_O = 1μF. Values in **bold** apply over full operating temperature range.

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|------------------------|-----------------------|---|-------------|----------------|-------------|-------|
| VIN | | | | | | |
| Supply Voltage Range | V _{IN} | | 2.5 | | 14.5 | V |
| Ground Pin Current | I _{GND} | I _o = 0mA | | 60 | 75 | μA |
| | | | 90 | | | |
| | | I _o = 60mA | | 1.00 | 1.25 | mA |
| | | | 1.50 | | | |
| | | I _o = 100mA | | 2.1 | 2.5 | |
| | | | 3.0 | | | |
| I _o = 150mA | | 4.20 | 4.75 | | | |
| | 5.25 | | | | | |
| | | V _{IN} = 8V, Output OFF | | | 0.1 | μA |
| VO | | | | | | |
| Output Voltage | V _O | I _o = 30mA | -2.5 | V _O | +2.5 | % |
| | | | -3.0 | | +3.0 | |
| Line Regulation | REG _(LINE) | V _{IN} = (V _{O(NOM)} + 1V) to (V _{O(NOM)} + 6V), I _o = 1mA | | 5 | 10 | mV |
| | | | | | 20 | |

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Electrical Characteristics (Cont.)

 Unless specified: $T_A = 25^\circ\text{C}$, $V_{IN} = (V_{O(NOM)} + 1\text{V})$, $C_{IN} = 1\mu\text{F}$, $C_{BYP} = 10\text{nF}$, $C_O = 1\mu\text{F}$. Values in **bold** apply over full operating temperature range.

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|--------------------------------|----------------------|--|------------|-------|------------|-----------------------|
| VO (Cont.) | | | | | | |
| Load Regulation | $REG_{(LOAD)}$ | $I_o = 1\text{mA to } 60\text{mA}$ | | 7.5 | 35 | mV |
| | | $I_o = 1\text{mA to } 100\text{mA}$ | | 20 | 65 | |
| | | $I_o = 1\text{mA to } 150\text{mA}$ | | 35 | 110 | |
| Temperature Coefficient | $\Delta VO/\Delta T$ | $I_o = 10\text{mA}$ | | 40 | | ppm/ $^\circ\text{C}$ |
| Current Limit ⁽¹⁾ | I_{LIM} | | 180 | 200 | | mA |
| Dropout Voltage | V_D | $I_o = 60\text{mA}$ | | 130 | 150 | mV |
| | | | | | 180 | |
| | | $I_o = 100\text{mA}$ | | 165 | 195 | |
| | | | | | 225 | |
| | | $I_o = 150\text{mA}$ | | 200 | 245 | |
| | | | | | 275 | |
| Power Supply Rejection Ratio | PSRR | $V_{AC} = 100\text{mV}_{RMS}$, $f = 400\text{Hz}$, $I_o = 30\text{mA}$ | | 60 | | dB |
| Output Noise Voltage | e_n | $10\text{Hz} \leq f \leq 80\text{kHz}$, $I_o = 60\text{mA}$ | | 30 | | μV_{RMS} |
| BYP | | | | | | |
| Noise Bypass Terminal Voltage | V_{BYP} | | | 1.250 | | V |
| EN | | | | | | |
| Enable Input Threshold Voltage | V_{IH} | Output ON | 1.8 | | | V |
| | V_{IL} | Output OFF | | | 0.5 | |
| Enable Input Bias Current | I_{EN} | $V_{EN} = 1.8\text{V}$, Output ON | | 6 | 10 | μA |

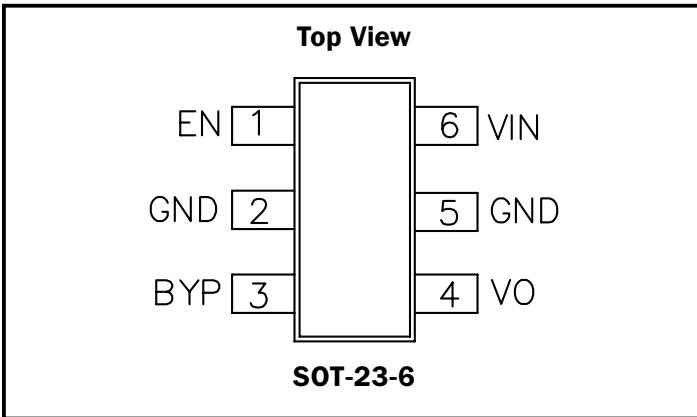
Note:

 (1) As the load resistance further decreases, the SC112 folds back the output current to approximately 100mA at $V_O = 0\text{V}$.

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Pin Configuration



Ordering Information

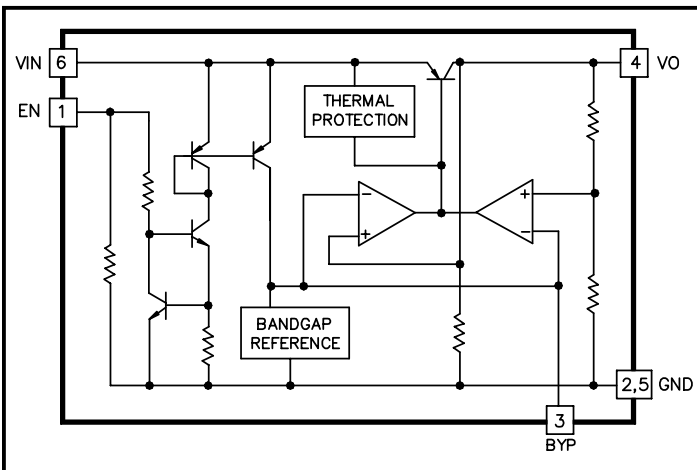
| Device ⁽¹⁾⁽²⁾ | Package |
|--------------------------|----------|
| SC112XXCSK.TR | SOT-23-6 |

Notes:

(1) Where XX denotes voltage options. Available voltages are: 2.2V (22), 2.5V (25), 2.8V (28), 3.0V (30), 3.3V (33), 3.6V (36), 3.8V (38), 4.0V (40) and 5.0V (50). Contact factory for additional voltage options.

(2) Only available in tape and reel packaging. A reel contains 3000 devices.

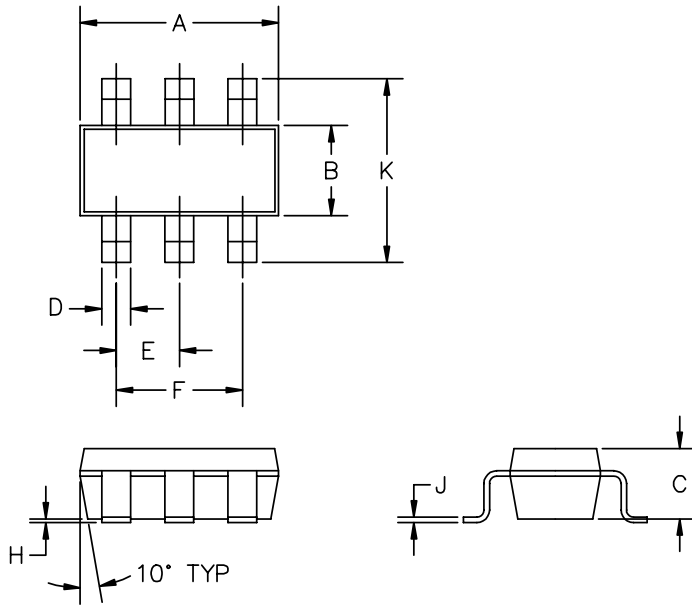
Block Diagram



Pin Descriptions

| Pin | Pin Name | Pin Function |
|-----|----------|---|
| 1 | EN | Active high enable pin. Connect to VIN if not being used. |
| 2 | GND | Ground pin. Use for heatsinking along with Pin #5. |
| 3 | BYP | Noise bypass pin. Connect a 10nF capacitor (required) between this pin and GND. |
| 4 | VO | Regulator output, supplying a guaranteed 150 mA. |
| 5 | GND | Ground pin. Use for heatsinking along with Pin #2. |
| 6 | VIN | Power input pin. |

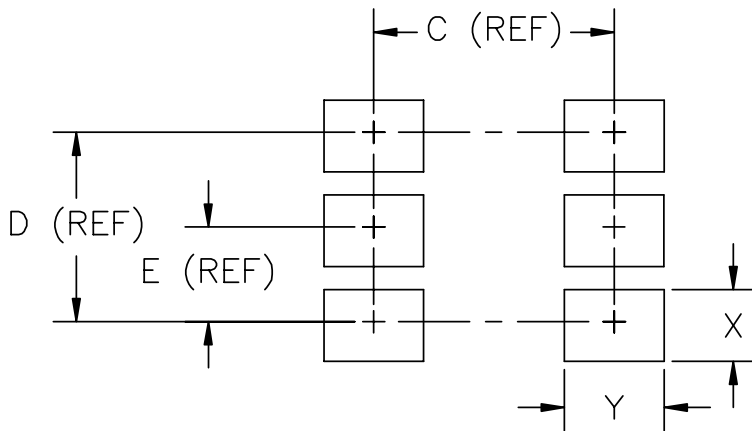
Outline Drawing - SOT23-6



| DIM ^N | DIMENSIONS ① | | | | NOTE |
|------------------|--------------|------|------|------|------|
| | INCHES | | MM | | |
| A | .110 | .120 | 2.80 | 3.05 | — |
| B | .059 | .070 | 1.50 | 1.75 | — |
| C | .036 | .051 | .90 | 1.30 | — |
| D | .014 | .020 | .35 | .50 | — |
| E | .033 | .040 | .85 | 1.05 | — |
| F | .067 | .083 | 1.7 | 2.1 | — |
| H | .0004 | .006 | .010 | .150 | — |
| J | .0035 | .008 | .090 | .20 | — |
| K | .102 | .118 | 2.6 | 3.00 | — |

- ② PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH AND METAL BURR.
- ① CONTROLLING DIMENSIONS: MILLIMETERS.

Minimum Land Pattern -SOT23-6



| DIM ^N | DIMENSIONS | | NOTE |
|------------------|------------|-----|------|
| | INCHES | MM | |
| C | .094 | 2.4 | — |
| D | .074 | 1.9 | — |
| E | .037 | .95 | — |
| X | .028 | .7 | — |
| Y | .039 | 1.0 | — |

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