

POWER MANAGEMENT
PRELIMINARY
Description

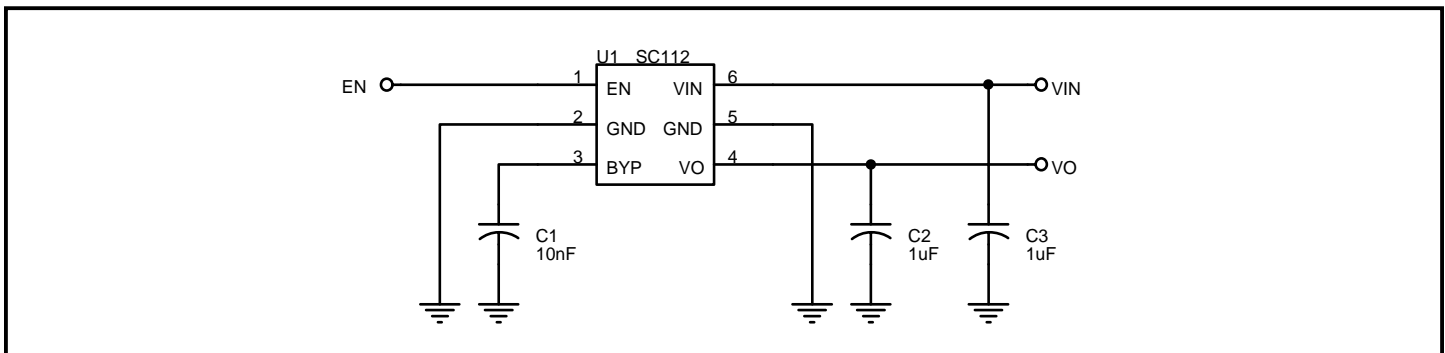
The SC112 is a 150mA ultra low dropout linear regulator with a built in CMOS/TTL logic level enable, designed specifically for battery powered applications where low quiescent current and low dropout are critical for battery longevity.

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

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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

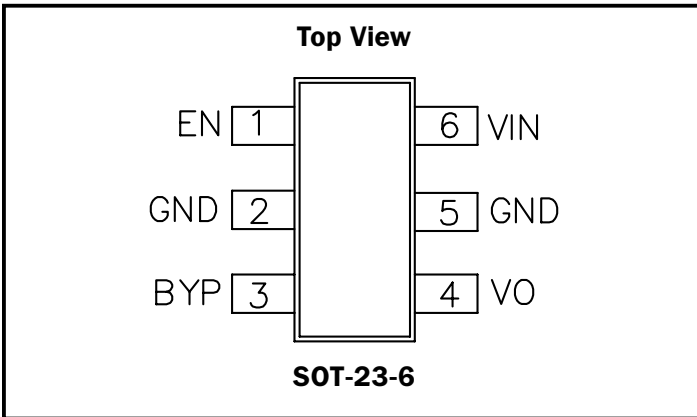
Note:

 (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

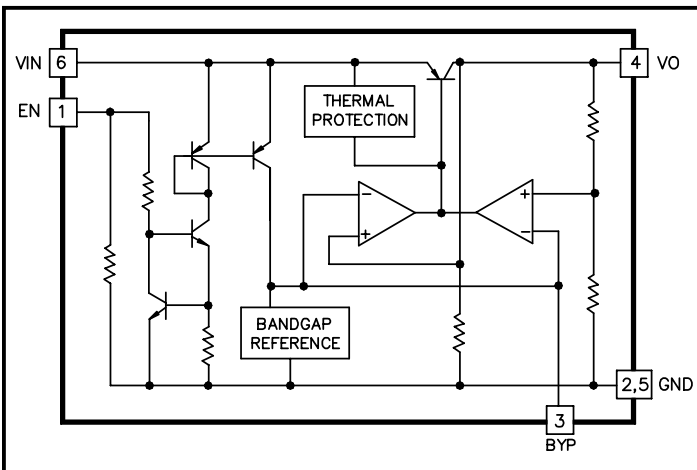
Device ⁽¹⁾⁽²⁾	Package
SC112XXCSK.TR	SOT-23-6

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



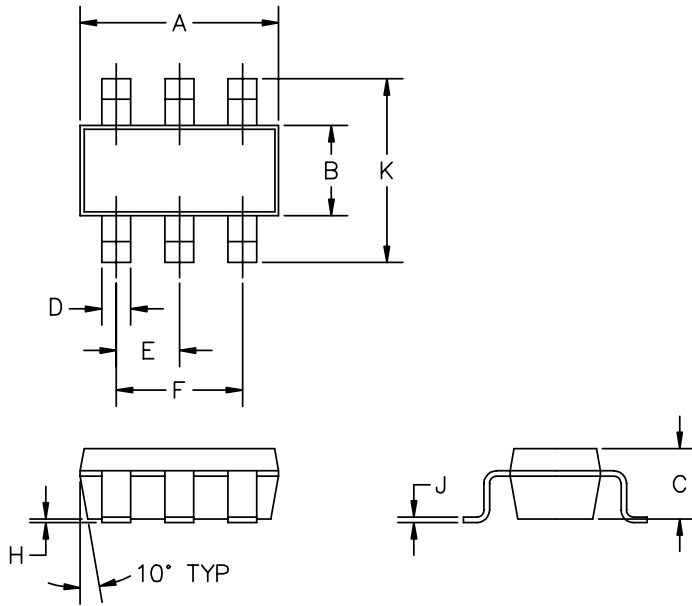
Pin Descriptions

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.

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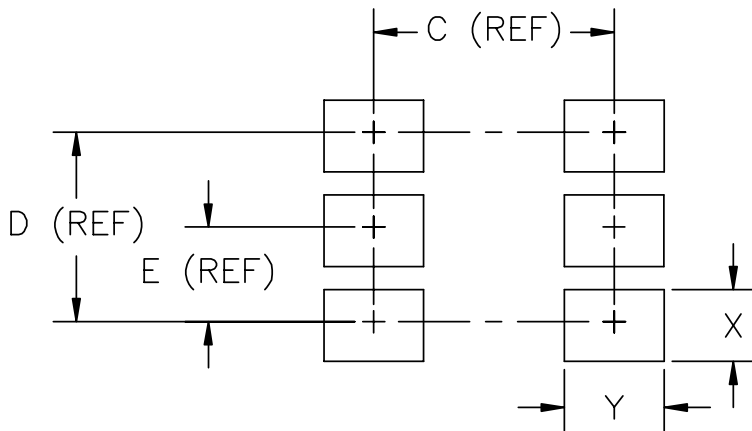
Outline Drawing - SOT23-6



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



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

Contact Information

Semtech Corporation
 Power Management Products Division
 652 Mitchell Rd., Newbury Park, CA 91320
 Phone: (805)498-2111 FAX (805)498-3804