SC112
150mA Ultra Low Dropout Micropower Linear Regulator

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 30µV (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 1µF capacitor on the output and a 0.01µF on the bypass pin for a minimum number of external components.

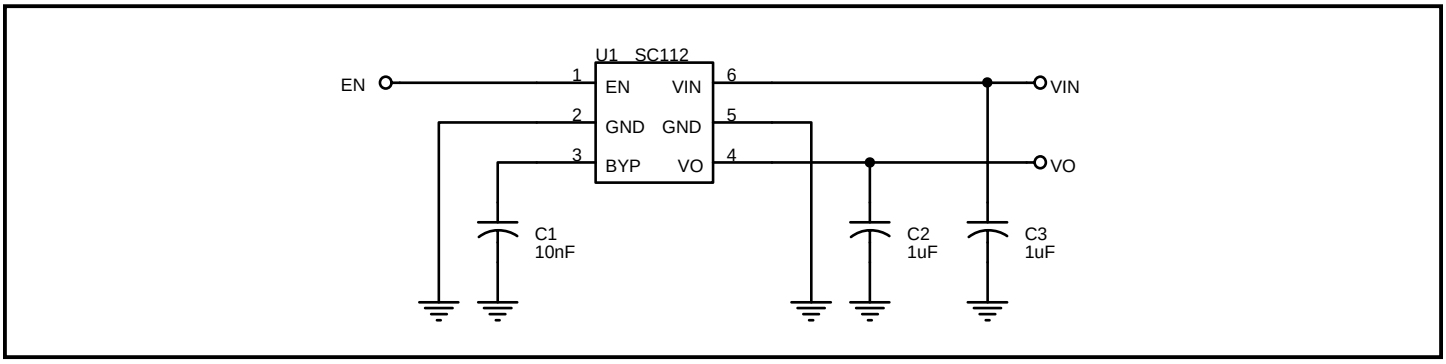
Features

- Low dropout voltage
- CMOS/TTL compatible control switch
- Very low quiescent current 60µA (ON, no load)
- Internal thermal shutdown
- Short circuit protection
- Very low standby current 0.1µA 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

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 1.0µF or greater should be used. C_{IN} may be tantalum or ceramic.

(2) C_O (C2) should be a 1µF or greater tantalum or ceramic capacitor, with an Equivalent Series Resistance (ESR) between 10mΩ and 1Ω 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.

Absolute Maximum Ratings

Parameter	Symbol	Maximum	Units
Input Supply Voltage	VIN	-0.3 to +16	V
Enable Input Voltage	V_{EN}	-0.3 to VIN	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, VIN = ($VO_{(NOM)}$ + 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	VIN		**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	
		VIN = 8V, Output OFF			**0.1**	µA
VO						
Output Voltage	VO	I_O = 30mA	-2.5	VO	+2.5	%
			-3.0		**+3.0**	
Line Regulation	$REG_{(LINE)}$	VIN = ($VO_{(NOM)}$ + 1V) to ($VO_{(NOM)}$ + 6V),		5	10	mV
		I_O = 1mA			**20**	

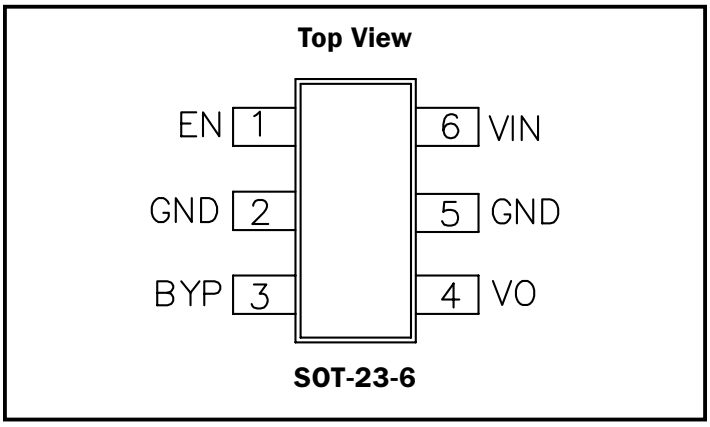
Electrical Characteristics (Cont.)

Unless specified: T_A = 25°C, VIN = ($VO_{(NOM)}$ + 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
VO (Cont.)						
Load Regulation	$REG_{(LOAD)}$	I_O = 1mA to 60mA		7.5	**35**	mV
		I_O = 1mA to 100mA		20	**65**	
		I_O = 1mA to 150mA		35	**110**	
Temperature Coefficient	$\Delta VO/\Delta T$	I_O = 10mA		40		ppm/°C
Current Limit(1)	I_{LIM}		**180**	200		mA
Dropout Voltage	V_D	I_O = 60mA		130	150	mV
					180	
		I_O = 100mA		165	195	
					225	
		I_O = 150mA		200	245	
					275	
Power Supply Rejection Ratio	PSRR	V_{AC} = 100mV_{RMS}, f = 400Hz, I_O = 30mA		60		dB
Output Noise Voltage	e_n	10Hz ≤ f ≤ 80kHz, I_O = 60mA		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} = 1.8V, Output ON		6	**10**	µA

Note:
(1) As the load resistance further decreases, the SC112 folds back the output current to approximately 100mA at VO = 0V.

Pin Configuration

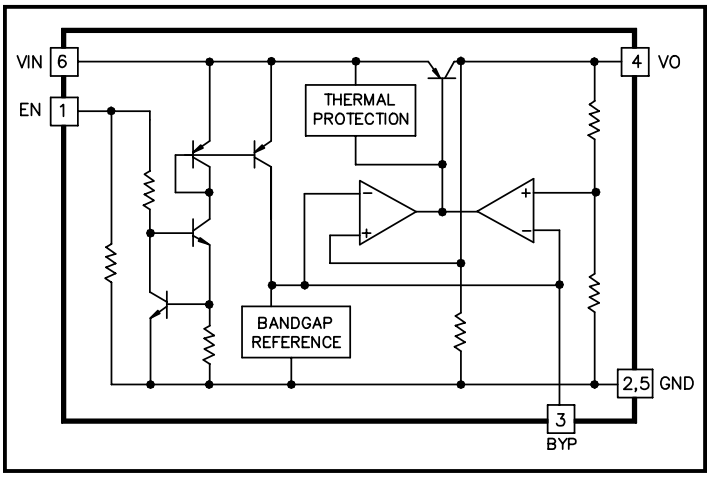


Ordering Information

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.

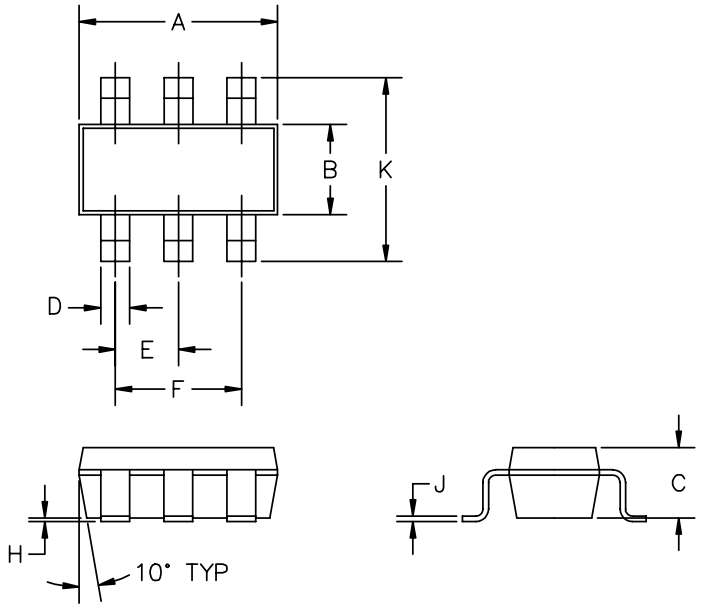
Block Diagram



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

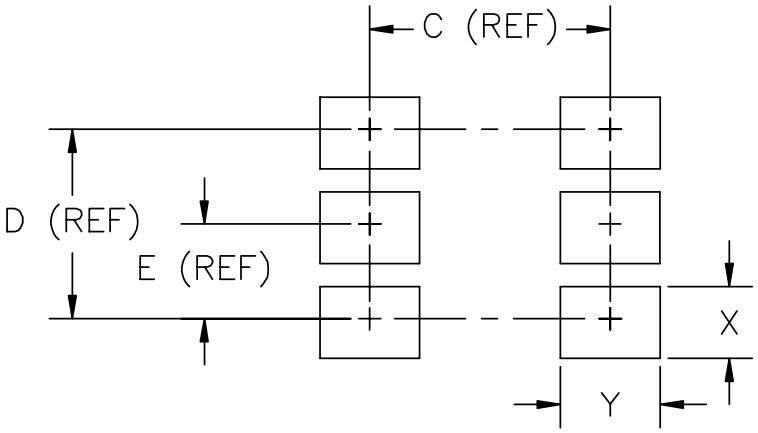


DIMENSIONS (1)					
DIMN	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.05	–
B	.059	.070	1.50	1.75	–
C	.036	.051	.90	1.30	–
D	.014	.020	.35	.50	–
E	.033	.040	.85	1.05	–
F	.067	.083	1.7	2.1	–
H	.0004	.006	.010	.150	–
J	.0035	.008	.090	.20	–
K	.102	.118	2.6	3.00	–

[2] PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH AND METAL BURR.

[1] CONTROLLING DIMENSIONS: MILLIMETERS.

Minimum Land Pattern -SOT23-6



DIMENSIONS			
DIMN	INCHES	MM	NOTE
C	.094	2.4	–
D	.074	1.9	–
E	.037	.95	–
X	.028	.7	–
Y	.039	1.0	–

Contact Information

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