80 mA ULTRA LOW DROPOUT VOLTAGE REGULATOR

SC5203

PRELIMINARY - April 13, 1998
TEL:805-498-2111 FAX:805-498-3804 WEB:http://www.semtech.com

DESCRIPTION

The SC5203 is an 80 mA ultra low dropout linear regulator with a built in CMOS/TTL logic level Enable switch, designed specifically for battery powered applications where low quiescent current and low dropout are critical for battery longevity.

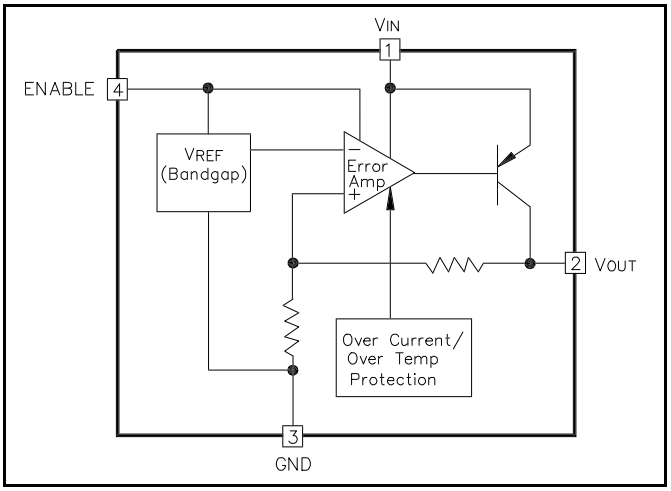
The SC5203 uses a Semtech proprietary internal vertical PNP device for the pass element, providing a low dropout voltage of 300 mV at a load of 80 mA, while maintaining a low ground pin current.

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

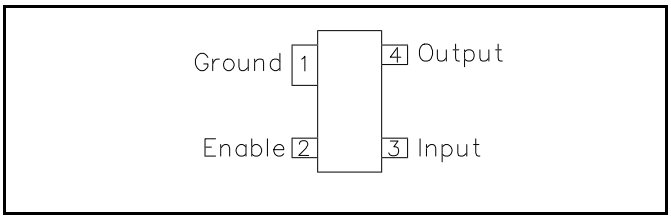
The SC5203 is packaged in a 4 pin SOT-143 surface mount package providing a very small footprint and requires only a 1µF capacitor on the output for a minimum amount of external components.

Available with adjustable and fixed output voltages, the SC5203 is ideally suited for cellular telephone, pager and laptop/palmtop computer applications.

BLOCK DIAGRAM



PIN CONFIGURATION



FEATURES

- Low dropout voltage - 300 mV @ 80 mA load
- Guaranteed 80 mA output current
- Low ground pin current
- Reversed input polarity protection
- Wide supply voltage range
- Wide output voltage range
- Logic controlled enable
- Surface mount packaging (SOT-143)

APPLICATIONS

- Battery Powered Systems
- Cellular Telephones
- Laptop, Notebook and Palmtop Computers
- Bar Code Scanners
- High Efficiency Linear Power Supplies

ORDERING INFORMATION

DEVICE	PACKAGE	TEMP RANGE
SC5203-X.XCSK[(1)(2)]	SOT-143	-40° to +125°C

Notes:
(1) Where -X.X denotes voltage options. Available voltages are: 3.0V, 3.3V, 3.6V, 3.8V, 4.0V, 4.75V (4.7) and 5.0V. Contact factory for additional voltage options.
(2) Add suffix 'TR' for tape and reel.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Maximum	Units
Input Supply Voltage	V_{IN}	-0.3 to +20	V
Power Dissipation	P_D	Internally Limited	W
Thermal Resistance	θ_{JA}	410	°C/W
Operating Junction Temperature Range	T_J	-40 to +125	°C
Storage Temperature Range	T_{STG}	-60 to +150	°C
Lead Temperature (Soldering) 5 seconds	T_{LEAD}	260	°C
ESD Rating	ESD	1.5	kV

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ELECTRICAL CHARACTERISTICS

Unless specified, $V_{IN} = V_O + 1V$, $I_L = 1mA$, $C_L = 1\mu F$, $V_{EN} \geq 2V$

		Test Conditions		Test Limits			
Parameter	**Symbol**		**T_J**	**Min**	**Typ**	**Max**	**Units**
Supply Voltage Range	V_{IN}		-40 to 125°C	2.5		16	V
Output Voltage Accuracy	V_o		25°C	-3		3	%
			-40 to 125°C	-4		4	
Output Voltage Temperature Coefficient(1)	$\frac{\Delta V_O}{\Delta T}$				50	200	ppm/°C
Line Regulation	REG_{LINE}	$V_{IN} = (V_{OUT} + 1V)$ to 16V	25°C		.008	0.3	%
			-40 to 125°C			0.5	
Load Regulation	REG_{LOAD}	$I_L = 0.1mA$ to 80mA	25°C		0.6		%
Dropout Voltage(2)	$V_{in} - V_o$	I_L=100µA	25°C		20		mV
		I_L=20mA	25°C		200		
			-40 to 125°C			350	
		I_L=50mA	25°C		250		
		I_L=80mA	25°C		300		
			-40 to 125°C			600	
Quiescent Current	I_Q	$V_{EN} \leq 0.4V$	25°C		0.01	10	µA
Ground Pin Current	I_{GND}	$V_{EN} \geq 2V$, I_L=100µA	25°C		180		µA
		$V_{EN} \geq 2V$, I_L=20mA	25°C		225		
		$V_{EN} \geq 2V$, I_L=50mA	25°C		1100		
		$V_{EN} \geq 2V$, I_L=80mA	25°C		1800		
Ground Pin Current at Dropout	I_{GNDDO}	V_{IN} = 0.5V less than $V_{O(nom)}$	25°C		400		µA
Current Limit	I_{LIMIT}	$V_{OUT} = 0V$	25°C		180		mA
			-40 to 125°C			250	
Thermal Regulation	$\frac{\Delta V_O}{\Delta P_D}$				.05		%/W

NOTES:
(1) Defined as the worst case output voltage change divided by the operating temperature range.
(2) Defined as the input to output differential at which the output voltage drops to 2% below the value measured at a differential of 1V.

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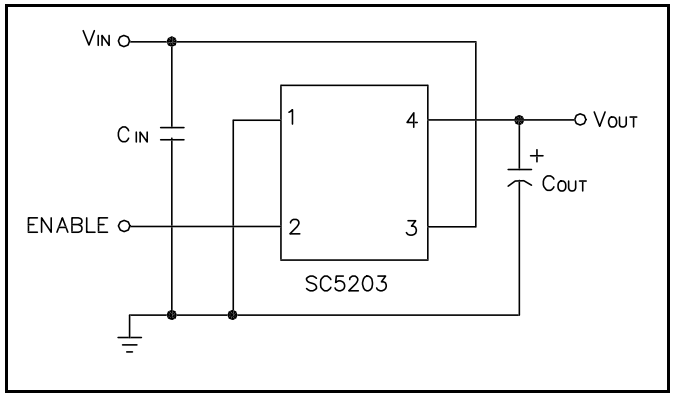
ELECTRICAL CHARACTERISTICS (Cont.)

Unless specified, $V_{IN} = V_O + 1V$, $I_L = 1mA$, $C_L = 1\mu F$, $V_{EN} \geq 2V$

		Test Conditions		Test Limits			
Parameter	**Symbol**		**T_J**	**Min**	**Typ**	**Max**	**Units**
Enable Input							
Enable Input Voltage	V_{EN}	High = O/P On	-40 to 125°C	2.0			V
		Low = O/P Off	-40 to 125°C			0.6	
Enable Input Current	I_{EN}	$V_{EN} \leq 0.6V$	25°C		0.01	1	µA
		$V_{EN} \geq 2.0V$	25°C		15		
			-40 to 125°C			50	

APPLICATION CIRCUIT



NOTES FOR APPLICATION CIRCUIT:

(1) C_{IN} is needed if the device is far from the supply's filter capacitors, or for operation from a battery. A value of 0.1µF or greater should be used.

(2) For full current operation, C_{OUT} should be 1µF or greater, low ESR, such as tantalum or aluminum electrolytic. Larger value capacitors will improve the overall transient response.

(3) ENABLE may be tied to V_{IN} if the shutdown feature is not required. Maximum ENABLE voltage = V_{IN}.

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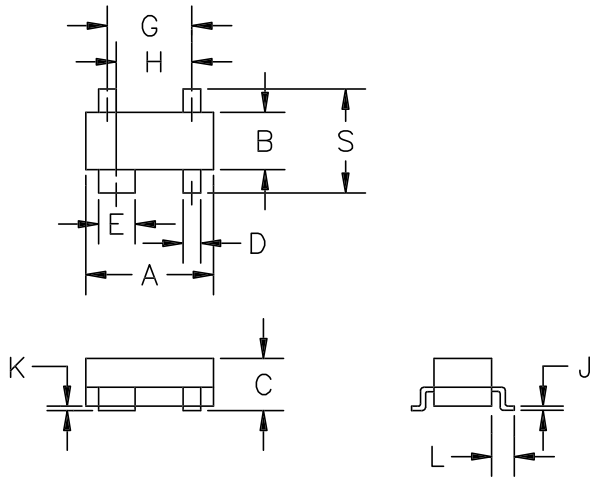
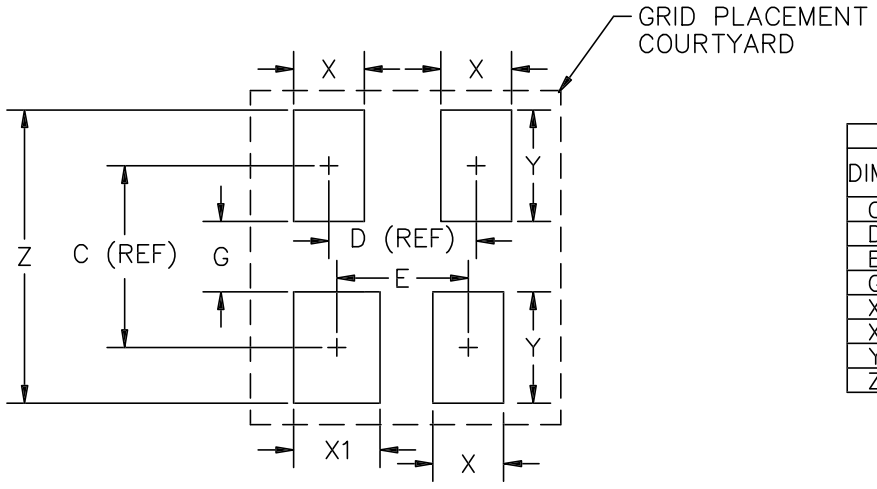
OUTLINE DRAWING - SOT-143



DIMENSIONS					
DIMN	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.04	–
B	.047	.055	1.20	1.40	–
C	.031	.047	.800	1.20	–
D	.014	.018	.370	.460	–
E	.030	.035	.760	.890	–
G	.076 BSC		1.92 BSC		–
H	.068 BSC		1.72 BSC		–
J	.003	.007	.085	.180	–
K	.001	.004	.013	0.10	–
L	–	.022	–	.55	REF
S	.082	.104	2.10	2.64	–

Notes:
(1) Controlling dimension: Millimeters.
(2) Dimension A and B do not include mold protrusions. Mold protrusions are .006" max.

LAND PATTERN - SOT-143



DIMENSIONS					
DIMN	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
C	–	.087	–	2.20	–
D	.075 BSC		1.90 BSC		–
E	.067 BSC		1.70 BSC		–
G	.032	.040	.80	1.00	–
X	.032	.040	.80	1.00	–
X1	.040	.048	1.00	1.20	–
Y	–	.057	–	1.44	–
Z	.134	.140	3.40	3.60	–

Notes:
(1) Controlling dimension is millimeters.
(2) Grid placement courtyard is 8 x 8 elements (4mm x 4mm) in accordance with the international grid detailed in IEC publication 97.