

### POWER MANAGEMENT

**PRELIMINARY**

#### Description

The SC5205 is a 150mA ultra low dropout linear regulator with a built in CMOS/TTL logic level enable switch. It is designed specifically for battery powered applications where low quiescent current and low dropout are critical for battery longevity.

The SC5205 uses a Semtech proprietary internal PNP device for the pass element, providing a low dropout voltage of 165mV at a load of 150mA, while maintaining a ground pin current of 2750µA.

The output noise is reduced by placing a 10nF capacitor on pin 4 (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 SC5205 is packaged in a 5 pin 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 amount of external components.

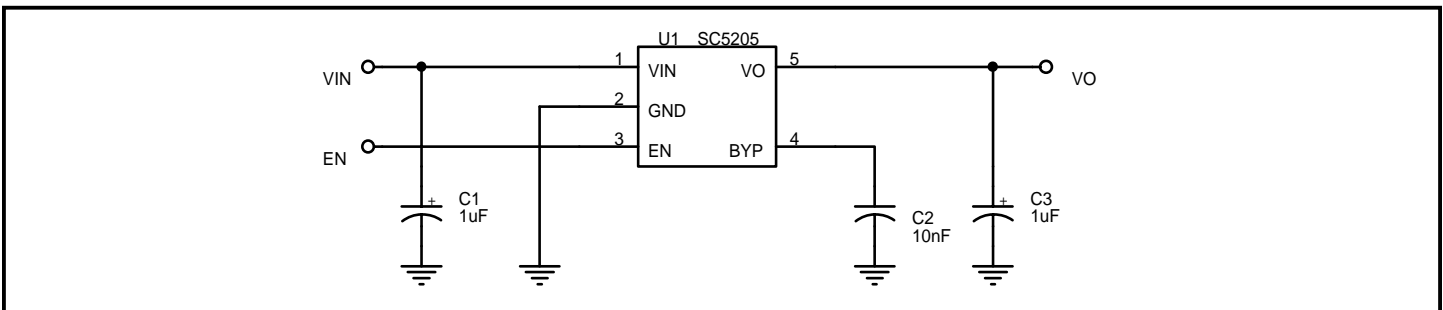
#### Features

- ◆ Ultra low dropout voltage - 165mV @ 150mA
- ◆ Guaranteed 150mA output current
- ◆ Low ground pin current at all loads
- ◆ <5µA quiescent current in shutdown
- ◆ Wide input supply voltage range 2.5V to 16V in
- ◆ Wide output voltage range
- ◆ Excellent line regulation
- ◆ Industrial temperature range
- ◆ Surface mount packaging (5 pin SOT-23)

#### Applications

- ◆ Battery Powered Systems
- ◆ Cellular Telephones
- ◆ Cordless Telephones
- ◆ Pagers
- ◆ Personal Digital Assistants
- ◆ Portable Instrumentation
- ◆ Cameras
- ◆ Portable Consumer Equipment
- ◆ PCMCIA cards

#### Typical Application Circuit



#### Notes:

- (1)  $C_{IN}$  (C1) 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 aluminum electrolytic.
- (2)  $C_O$  (C3) should be a 1µF or greater tantalum or aluminum electrolytic capacitor. Larger value capacitors will improve the overall transient response.
- (3)  $C_{BYP}$  (C2 - required) should be placed as close as possible to pin 4 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 =  $V_{IN}$ .

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**Absolute Maximum Ratings**

Parameter	Symbol	Limits	Units
Input Supply Voltage	V <sub>IN</sub>	-0.3 to +20	V
Power Dissipation	P <sub>D</sub>	Internally Limited	W
Thermal Resistance Junction to Ambient	θ <sub>JA</sub>	256	°C/W
Thermal Resistance Junction to Case	θ <sub>JC</sub>	81	°C/W
Operating Ambient Temperature Range	T <sub>A</sub>	-40 to +85	°C
Operating Junction Temperature Range	T <sub>J</sub>	-40 to +125	°C
Storage Temperature Range	T <sub>STG</sub>	-65 to +150	°C
Lead Temperature (Soldering) 10 sec	T <sub>LEAD</sub>	300	°C
ESD Rating (Human Body Model)	V <sub>ESD</sub>	2	kV

**Electrical Characteristics**

Unless specified: V<sub>IN</sub> = V<sub>O(NOM)</sub> + 1V, I<sub>O</sub> = 100μA, C<sub>BYP</sub> = 10nF, C<sub>O</sub> = 1μF, V<sub>ENABLE</sub> ≥ 1.8V. Values in **bold** apply over the full operating temperature range.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage Range	V <sub>IN</sub>		<b>2.5</b>		<b>16</b>	V
Output Voltage	V <sub>O</sub>		-1%	V <sub>O</sub>	+1%	V
			<b>-3%</b>		<b>+3%</b>	
Output Voltage Temperature Coefficient	TC			40		ppm/°C
Line Regulation	REG <sub>(LINE)</sub>	V <sub>IN</sub> = (V <sub>O(NOM)</sub> + 1V) to 16V		0.06	0.12	%/V
					<b>0.15</b>	
Load Regulation	REG <sub>(LOAD)</sub>	I <sub>O</sub> = 0.1mA to 150mA		0.001	0.004	%mA
					<b>0.007</b>	
Dropout Voltage <sup>(1)</sup>	V <sub>D</sub>	I <sub>O</sub> = 100μA		5	10	mV
					<b>25</b>	
		I <sub>O</sub> = 50mA		100	150	mV
					<b>200</b>	
		I <sub>O</sub> = 100mA		140	200	mV
					<b>250</b>	
I <sub>O</sub> = 150mA		165	250	mV		
			<b>300</b>			

**Electrical Characteristics (Cont.)**

Unless specified:  $V_{IN} = V_{O(NOM)} + 1V$ ,  $I_o = 100\mu A$ ,  $C_{BYP} = 10nF$ ,  $C_o = 1\mu F$ ,  $V_{ENABLE} \geq 1.8V$ . Values in **bold** apply over the full operating temperature range.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Ground Pin Current	$I_{GND}$	$I_o = 100\mu A$		80	125	$\mu A$
					<b>150</b>	
		$I_o = 50mA$		600	1000	$\mu A$
					<b>1500</b>	
		$I_o = 100mA$		1600	2100	$\mu A$
					<b>2600</b>	
$I_o = 150mA$		2750	3300	$\mu A$		
			<b>4000</b>			
		$V_{EN} < 0.4V$ (shutdown)		0.01	<b>5</b>	$\mu A$
Current Limit <sup>(2)</sup>	$I_{LIM}$	$VO > (VO_{(NOM)} - 5\%)$		300	<b>500</b>	mA
Ripple Rejection Ratio	PSRR	$I_o = 100\mu A$ , $f = 100Hz$		50		dB
Thermal Regulation	$\frac{\Delta VO}{P_D}$			0.05		%/W
RMS Output Noise	$e_n$	$I_o = 50mA$ , $C_{BYP} = 10nF$ , $C_o = 2.2\mu F$ , $BW = 10Hz$ to $99kHz$		210		$\frac{nV}{\sqrt{Hz}}$
Enable Input Voltage	$V_{EN}$	Low = O/P OFF			<b>0.4</b>	V
		High = O/P ON	<b>1.8</b>			
Enable Input Current	$I_{EN}$	$V_{EN} \leq 0.4V$		-0.01	<b>-1</b>	$\mu A$
		$V_{EN} \geq 1.8V$		5	10	
						<b>20</b>

**Notes:**

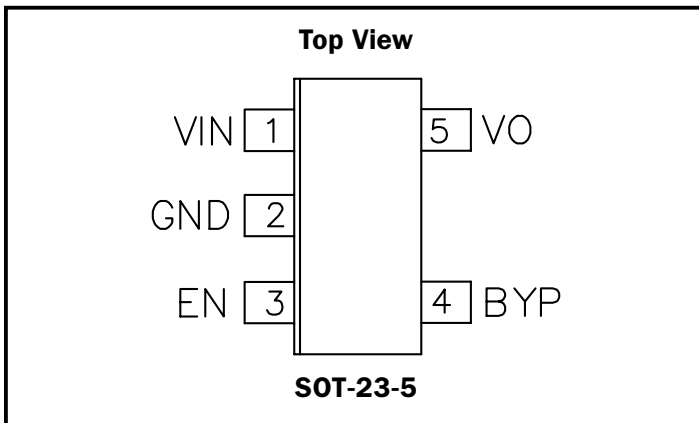
(1) Defined as the input to output differential at which the output voltage drops to 2% below the value measured at a differential of 1V.

(2) As the load resistance further decreases, the SC5205 folds back the output current to approximately 150mA at  $V_o = 0V$ .

**POWER MANAGEMENT**

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**Pin Configuration**



**Ordering Information**

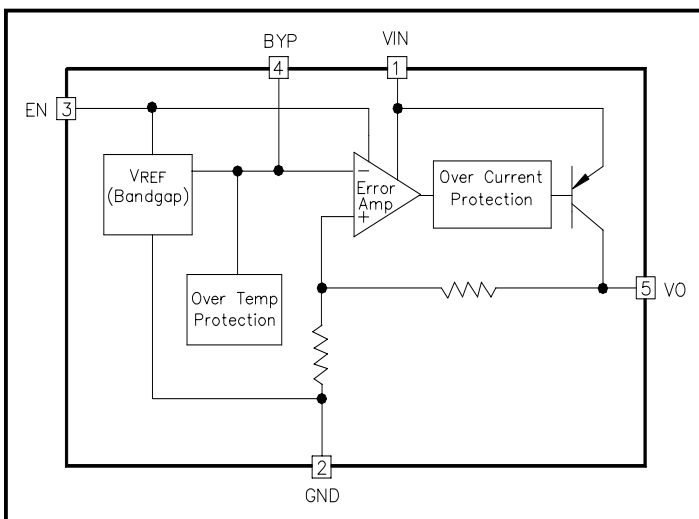
Device	Package
SC5205-X.XCSKTR <sup>(1)(2)</sup>	5 pin SOT-23

**Notes:**

(1) Where -X.X denotes voltage options. Available voltages are: 1.8V, 2.5V, 2.8V, 3.0V, 3.3V, 3.6V, 3.8V, 4.0V and 5.0V.

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

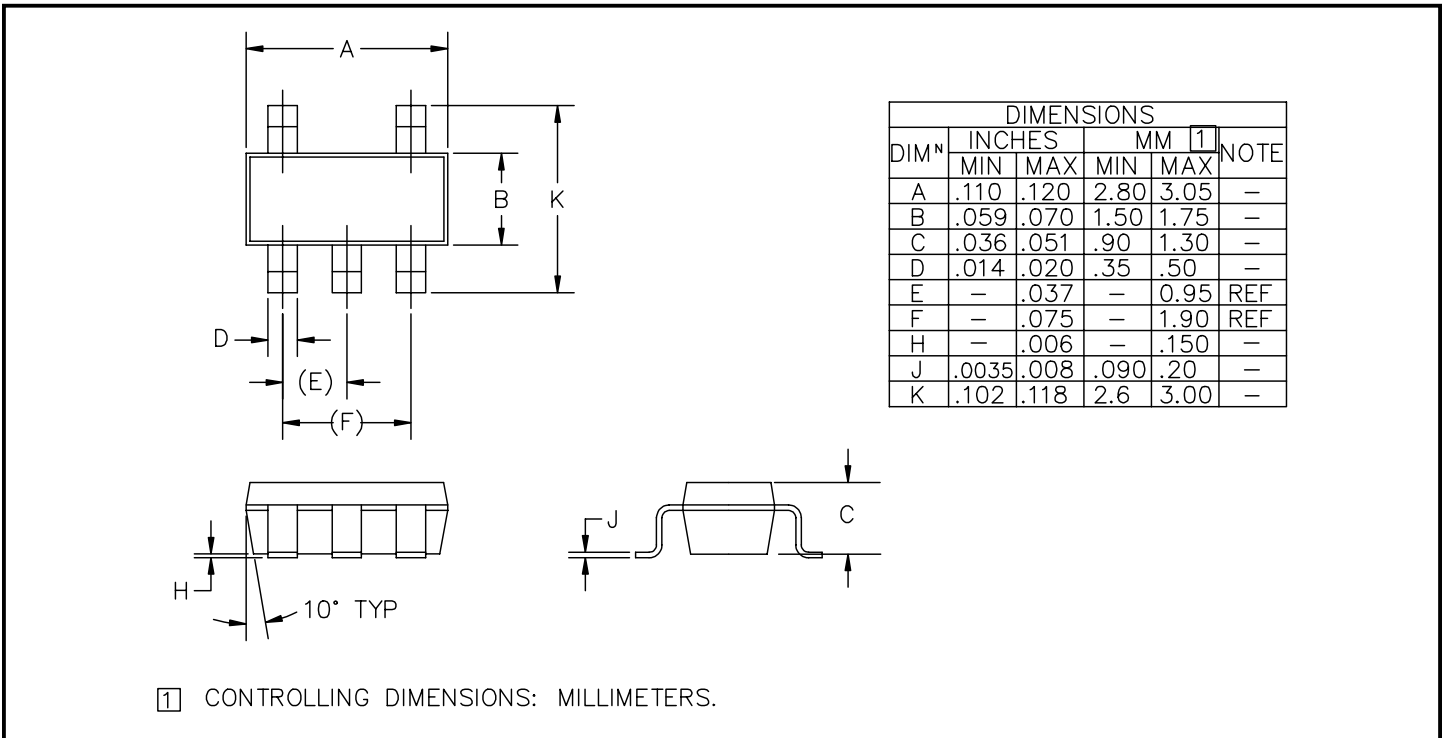
**Block Diagram**



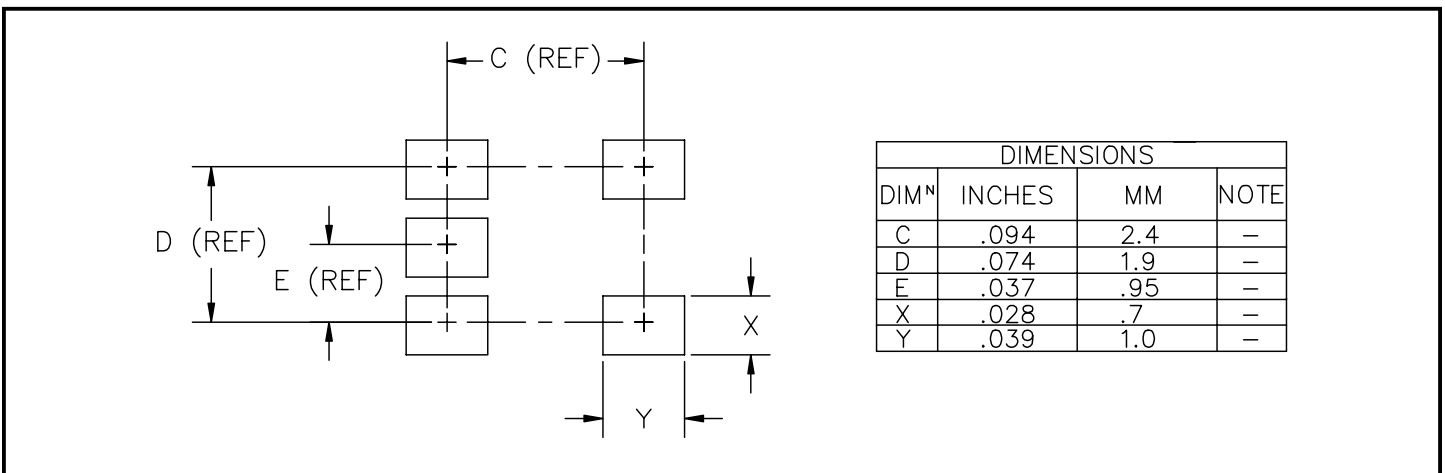
**Pin Descriptions**

Pin	Pin Name	Pin Function
1	VIN	Supply voltage input.
2	GND	Ground.
3	EN	Active high enable input. Connect to VIN if not being used.
4	BYP	Reference bypass. Connect a 10nF capacitor (required) between this pin and GND to reduce output noise
5	VO	Voltage output.

Outline Drawing - SOT-23-5



Land Pattern - SOT-23-5



Contact Information

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