

POWER MANAGEMENT

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 2750 μ A.

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 1 μ F capacitor on the output and a 0.01 μ F on the bypass pin for a minimum amount of external components.

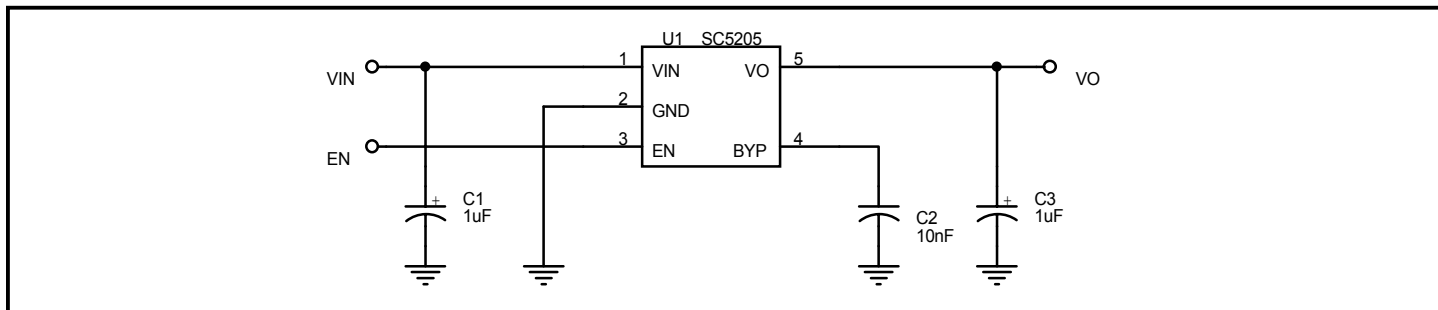
Features

- ◆ Ultra low dropout voltage - 165mV @ 150mA
- ◆ Guaranteed 150mA output current
- ◆ Low ground pin current at all loads
- ◆ <5 μ A 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)
- ◆ Lead-free packaging available, fully WEEE and RoHS compliant

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 1.0 μ F or greater should be used. C_{IN} may be tantalum or aluminum electrolytic.
- (2) C_O (C3) should be a 1 μ F 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

Exceeding the specifications below may result in permanent damage to the device or device malfunction. Operation outside of the parameters specified in the Electrical Characteristics section is not implied. Exposure to Absolute Maximum rated conditions for extended periods of time may affect device reliability.

Parameter	Symbol	Limits	Units
Input Supply Voltage	V _{IN}	-0.3 to +20	V
Power Dissipation	P _D	Internally Limited	W
Thermal Resistance Junction to Ambient	θ_{JA}	256	°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: V_{IN} = V_{O(NOM)} + 1V, I_O = 100μA, C_{BYP} = 10nF, C_O = 1μF, V_{ENABLE} ≥ 1.8V. Values in **bold** apply over the full operating temperature range.

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

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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	μA
					150	
		$I_O = 50mA$		600	1000	μA
					1500	
		$I_O = 100mA$		1600	2100	μA
					2600	
		$I_O = 150mA$		2750	3300	μA
					4000	
		$V_{EN} < 0.4V$ (shutdown)		0.01	5	μA
Current Limit ⁽²⁾	I_{LIM}	$VO > (V_{O(NOM)} - 5\%)$		300	500	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			0.4	V
		High = O/P ON	2.0			
Enable Input Current	I_{EN}	$V_{EN} \leq 0.4V$		-0.01	-1	μA
		$V_{EN} \geq 1.8V$		5	10	μA
					20	

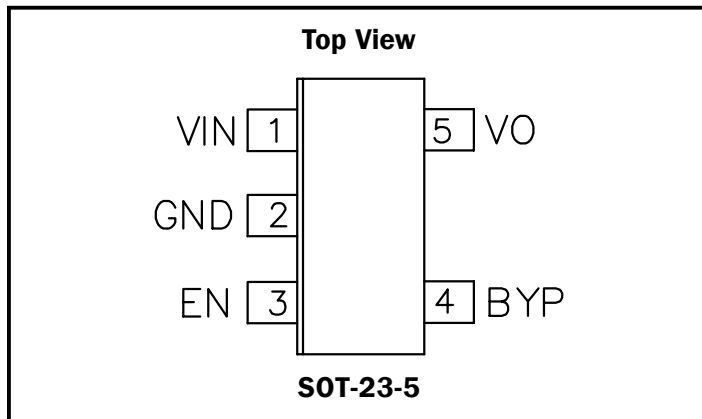
Notes:

(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 $V_O = 0V$.

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Pin Configuration



Ordering Information

Device ⁽¹⁾⁽²⁾	Package
SC5205-X.XCSKTR	5 pin SOT-23
SC5205-X.XCSKTRT ⁽³⁾	

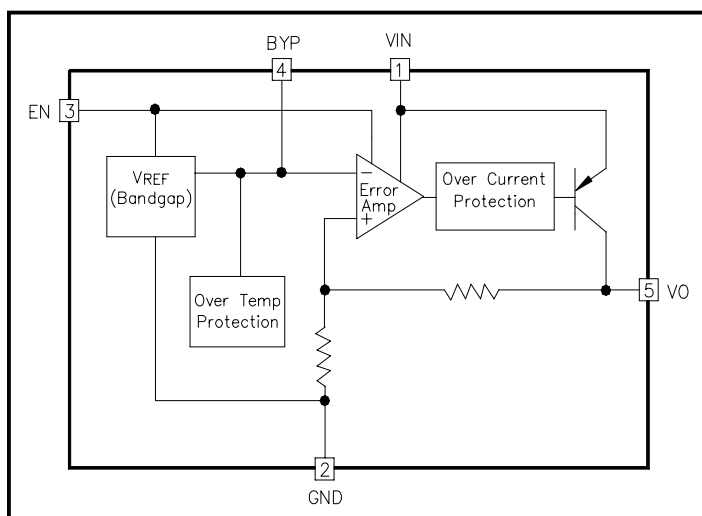
Notes:

(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.

(3) Lead free packaging. This product is fully WEEE and RoHS compliant.

Block Diagram

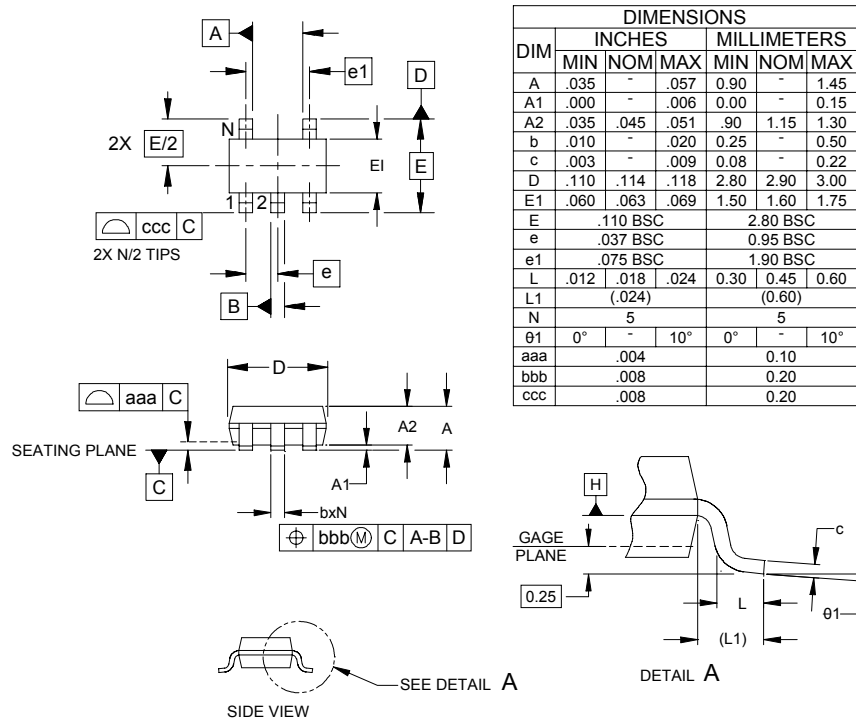


Pin Descriptions

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.

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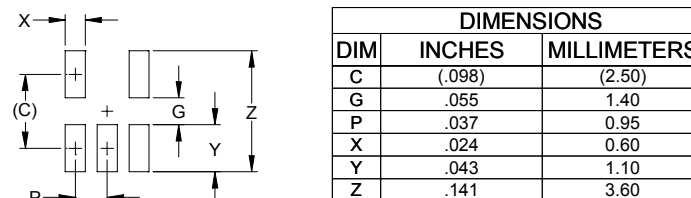
Outline Drawing - SOT-23-5



NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS $\boxed{A}$ AND $\boxed{B}$ TO BE DETERMINED AT DATUM PLANE $\boxed{H}$.
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

Land Pattern - SOT-23-5



NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

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