SC5205
150mA Ultra Low Dropout, Low Noise Micropower Linear Regulator

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.

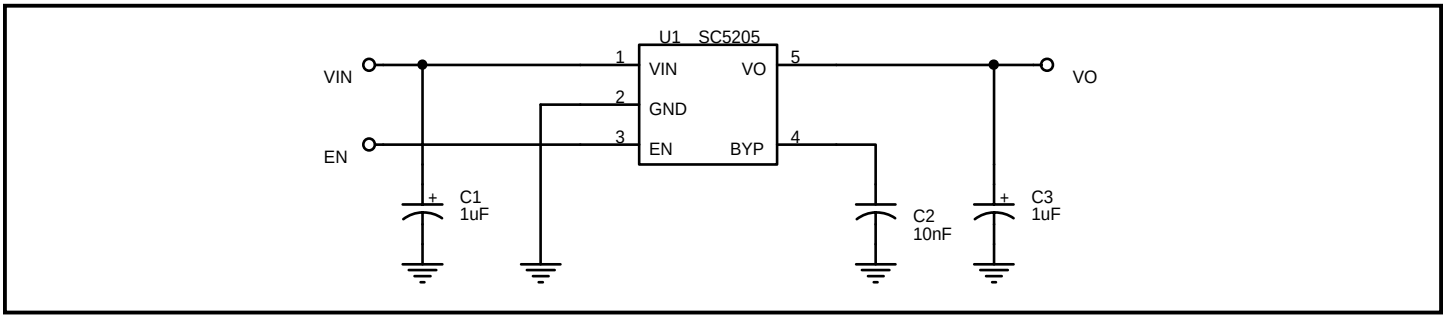
Features

- 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}.

Absolute Maximum Ratings

Parameter	Symbol	Limits	Units
Input Supply Voltage	VIN	-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: VIN = $VO_{(NOM)}$ + 1V, I_O = 100µA, C_{BYP} = 10nF, C_O = 1µF, $V_{ENABLE} \geq$ 1.8V. Values in **bold** apply over the full operating temperature range.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage Range	VIN		**2.5**		**16**	V
Output Voltage	VO		-1%	VO	+1%	V
			-3%		**+3%**	
Output Voltage Temperature Coefficient	TC			40		ppm/°C
Line Regulation	$REG_{(LINE)}$	VIN = ($VO_{(NOM)}$ + 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	

Electrical Characteristics (Cont.)

Unless specified: VIN = $VO_{(NOM)}$ + 1V, I_O = 100µA, C_{BYP} = 10nF, C_O = 1µF, $V_{ENABLE} \geq$ 1.8V. Values in **bold** apply over the full operating temperature range.

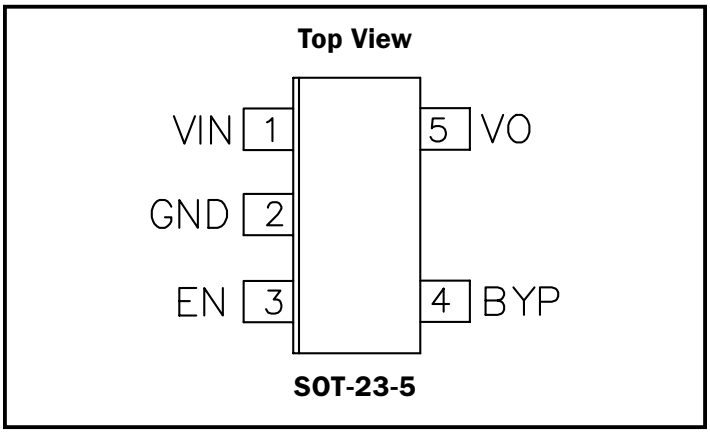
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Ground Pin Current	I_{GND}	I_O = 100µA		80	125	µA
					150	
		I_O = 50mA		600	1000	µA
					1500	
		I_O = 100mA		1600	2100	µA
					2600	
		I_O = 150mA		2750	3300	µA
					4000	
		V_{EN} < 0.4V (shutdown)		0.01	**5**	µA
Current Limit(2)	I_{LIM}	VO > ($VO_{(NOM)}$ - 5%)		300	**500**	mA
Ripple Rejection Ratio	PSRR	I_O = 100µA, 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 = 2.2µF, 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	**1.8**			
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.

Pin Configuration

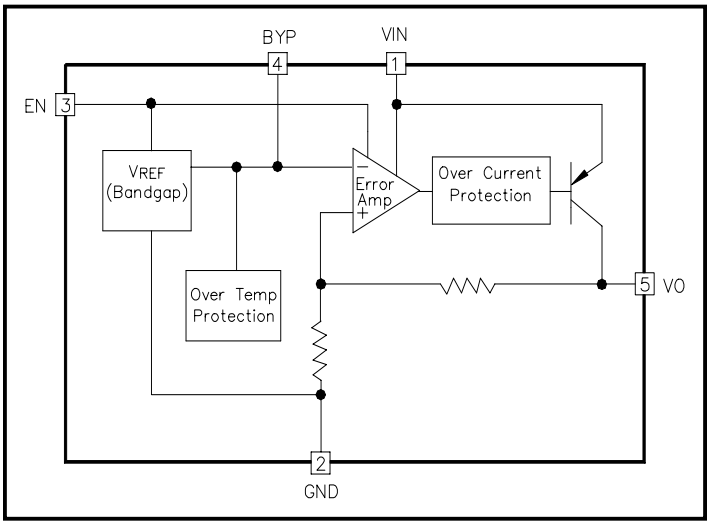


Ordering Information

Device	Package
SC5205-X.XCSKTR(1)(2)	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.

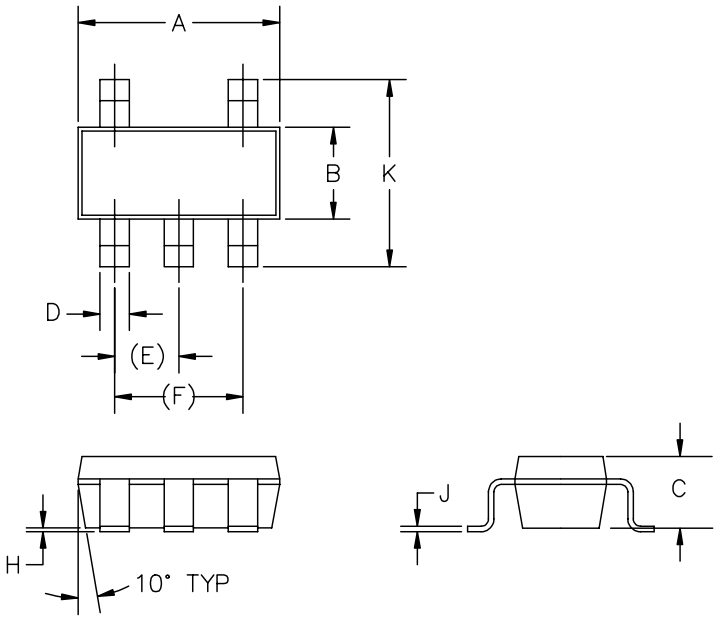
Block Diagram



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.

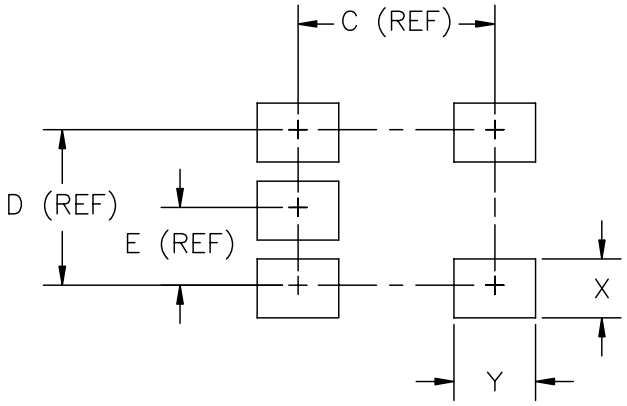
Outline Drawing - SOT-23-5



DIMENSIONS					
DIM	INCHES		MM [1]		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	–	.037	–	0.95	REF
F	–	.075	–	1.90	REF
H	–	.006	–	.150	–
J	.0035	.008	.090	.20	–
K	.102	.118	2.6	3.00	–

[1] CONTROLLING DIMENSIONS: MILLIMETERS.

Land Pattern - SOT-23-5



DIMENSIONS			
DIM	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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