

PRELIMINARY - October 8, 1999

TEL:805-498-2111 FAX:805-498-3804 WEB:http://www.semtech.com

DESCRIPTION

The SC5205 is a 150mA 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 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 2150μA.

The output noise is reduced by placing a 10nF capacitor on pin 4 (bypass).

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 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 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
- <1μA quiescent current in shutdown
- Wide supply voltage range 2.5V to 16V in
- Wide output voltage range
- Excellent line regulation
- 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 V_{CC} & V_{PP} Regulation/Switching

ORDERING INFORMATION

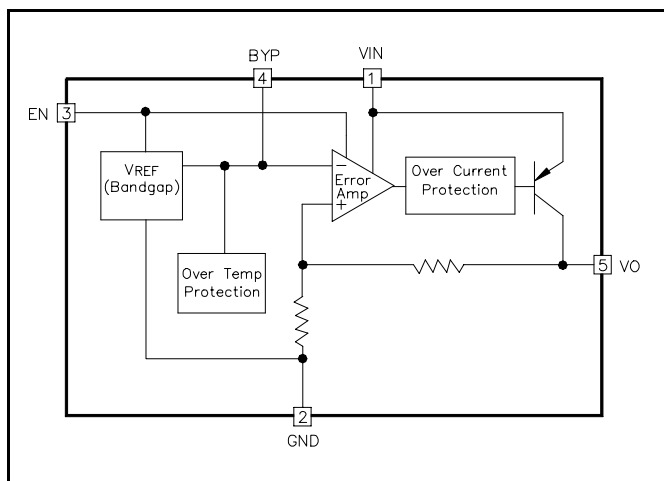
DEVICE	PACKAGE
SC5205-X.XCSK ⁽¹⁾⁽²⁾	5 pin SOT-23

Notes:

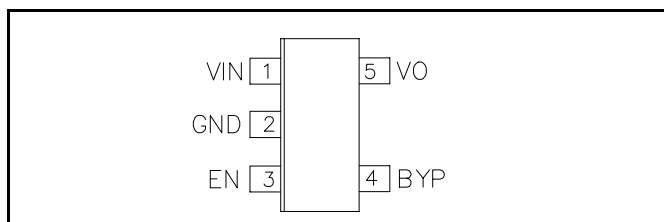
(1) Where -X.X denotes voltage options. Available voltages are: 2.5V, 2.8V, 3.0V, 3.3V, 3.6V, 3.8V, 4.0V and 5.0V.

(2) Add suffix 'TR' for tape and reel.

BLOCK DIAGRAM



PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Maximum	Units
Input Supply Voltage	VIN	-0.3 to +20	V
Power Dissipation	P _D	Internally Limited	W
Thermal Resistance	θ _{JA}	256	°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}	260	°C
ESD Rating (Human Body Model)	ESD	2	kV

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ELECTRICAL CHARACTERISTICS

Unless specified: $V_{IN} = V_O(NOM) + 1V$, $I_O = 100\mu A$, $C_O = 1\mu F$, $V_{ENABLE} \geq 1.8V$. Values in **bold** apply over the full operating temperature range.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage Range	V_{IN}		2.5		16	V
Output Voltage	V_O		-1		1	%
			-3		3	
Output Voltage Temperature Coefficient	$\frac{\Delta V_O}{\Delta T}$			40		ppm/°C
Line Regulation	$REG_{(LINE)}$	$V_{IN} = (V_O(NOM) + 1V) \text{ to } 16V$		0.06	0.12	%/V
					0.15	
Load Regulation	$REG_{(LOAD)}$	$I_O = 0.1mA \text{ to } 150mA$		0.001	0.004	%/mA
					0.007	
Dropout Voltage	V_D	$I_O = 100\mu A$		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	
Ground Pin Current	I_{GND}	$I_O = 100\mu A$		75	100	μA
					125	
		$I_O = 50mA$		450	600	μA
					800	
		$I_O = 100mA$		1100	1500	μA
					1750	
		$I_O = 150mA$		2150	2600	μA
					3000	
		$V_{EN} < 0.4V$ (shutdown)		0.01	5	μA
Current Limit	I_{CL}			300	500	mA
Ripple Rejection Ratio	PSRR	$I_O = 100\mu A$, $f = 100Hz$		75		dB
Thermal Regulation	$\frac{\Delta V_O}{P_D}$			0.05		%/W
RMS Output Noise	e_{no}	$I_L = 50mA$, $C_{BYP} = 10nF$		30		μV

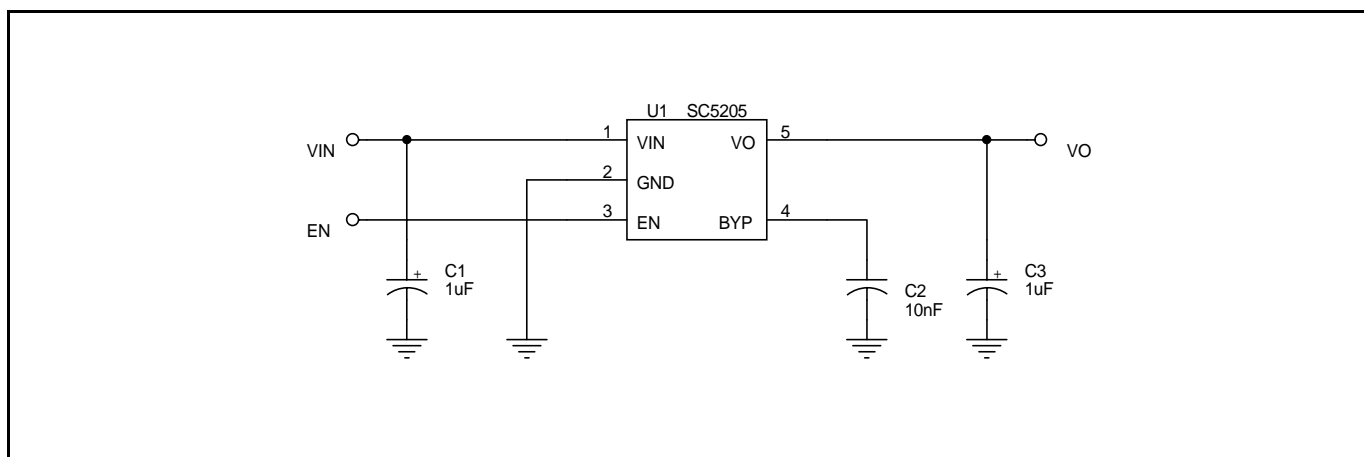
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ELECTRICAL CHARACTERISTICS

Unless specified: $V_{IN} = V_O(NOM) + 1V$, $I_O = 100\mu A$, $C_O = 1\mu F$, $V_{ENABLE} \geq 1.8V$. Values in **bold** apply over the full operating temperature range.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Enable Input Voltage	V_{EN}	Low = O/P OFF			0.4	V
		High = O/P ON	1.8			V
Enable Input Current	I_{EN}	$V_{EN} \leq 0.4V$		-0.01	-1	μA
		$V_{EN} \geq 1.8V$		5	10	μA
					20	

TYPICAL APPLICATIONS



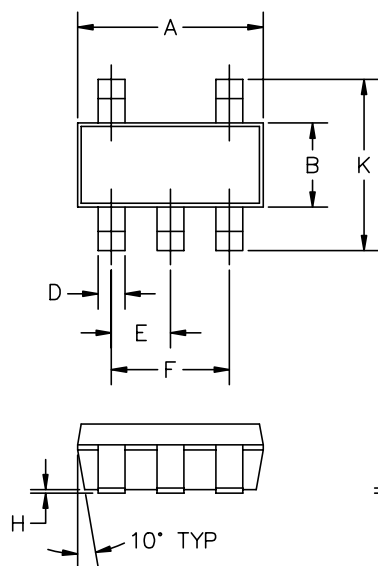
NOTES FOR APPLICATION CIRCUIT:

- (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 $1.0\mu F$ or greater should be used.
- (2) For full current operation, C_O should be $1\mu F$ or greater, low ESR, such as tantalum or aluminum electrolytic. Larger value capacitors will improve the overall transient response. Due to their very low ESR, ceramic capacitors should not be used.
- (3) C_{BYP} , (required) should be placed as close as possible to pin 4 and ground. A $10nF$ capacitor is recommended.
- (4) EN may be tied to VIN if the shutdown feature is not required. Maximum EN voltage = VIN.

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	VO	Voltage output.
5	BYP	Reference bypass. Connect a $10nF$ capacitor between this pin and GND to reduce output noise.

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DEVICE OUTLINE - SOT-23-5L

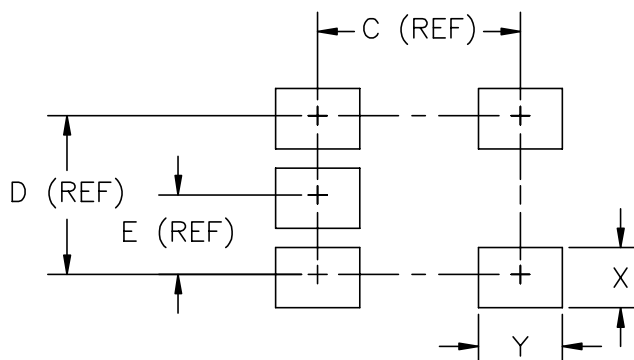


DIMENSIONS ①					
DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.05	—
B	.059	.070	1.50	1.75	—
C	.036	.051	.90	1.30	—
D	.014	.020	.35	.50	—
E	.033	.040	.85	1.05	—
F	.067	.083	1.7	2.1	—
H	.0004	.006	.010	.150	—
J	.0035	.008	.090	.20	—
K	.102	.118	2.6	3.00	—

② PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH
AND METAL BURR.

① CONTROLLING DIMENSIONS: MILLIMETERS.

MINIMUM LAND PATTERN - SOT-23-5L



DIM ^N	DIMENSIONS			NOTE
	INCHES	MM		
C	.094	2.4	—	—
D	.074	1.9	—	—
E	.037	.95	—	—
X	.028	.7	—	—
Y	.039	1.0	—	—