

PRELIMINARY - February 7, 2000

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 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 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

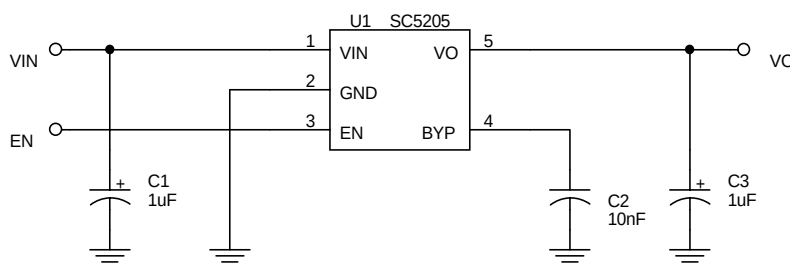
DEVICE	PACKAGE
SC5205-X.XCSK ⁽¹⁾⁽²⁾	5 pin SOT-23

Notes:

(1) Where -X.X denotes voltage options. Available voltages are: 1.8V, 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.

TYPICAL APPLICATION CIRCUIT



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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}	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

ELECTRICAL CHARACTERISTICS

Unless specified: V_{IN} = V_{O(NOM)} + 1V, I_O = 100μA, 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		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) 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

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
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	$I_L = 50mA$, $C_{BYP} = 10nF$, $C_O = 2.2\mu F$, $BW = 10Hz$ to $99kHz$		210		$\frac{nV}{\sqrt{Hz}}$
Enable Input Voltage	V_{EN}	Low = O/P OFF			0.4	V
		High = O/P ON	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	

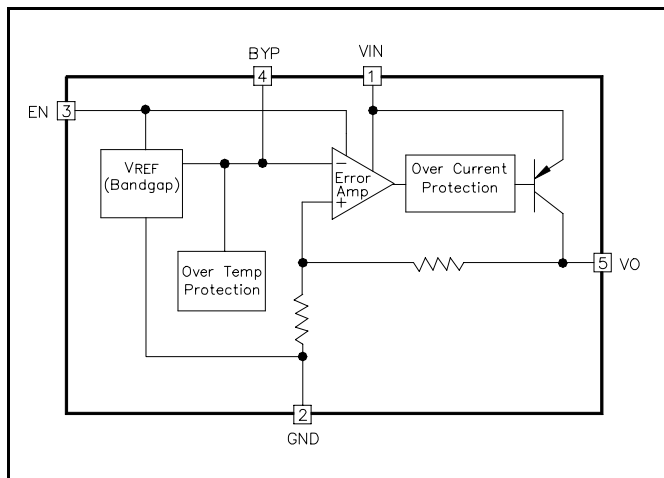
NOTES:

(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 $VO = 0V$.

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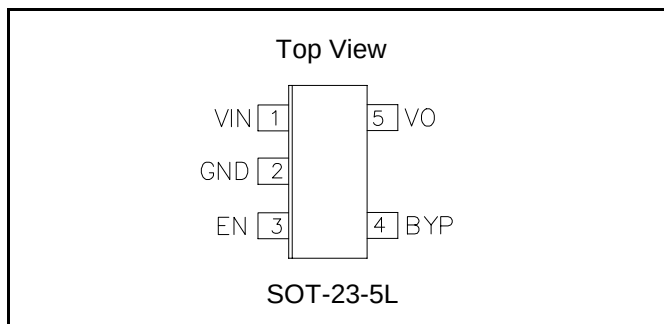
BLOCK DIAGRAM



APPLICATION HINTS (Refer to Sheet 1):

- (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 should be tied to V_{IN} if the shutdown feature is not required. Maximum EN voltage = V_{IN} .

PIN CONFIGURATION

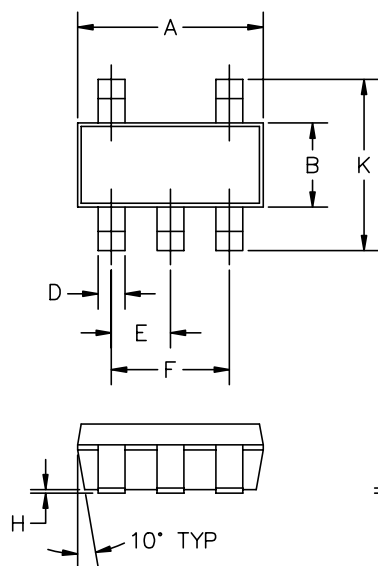


PIN DESCRIPTION

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 (required) between this pin and GND to reduce output noise.

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DEVICE OUTLINE - SOT-23-5L

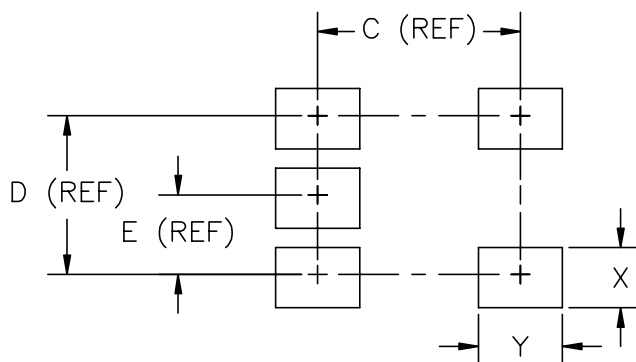


DIMENSIONS ①					NOTE
DIM ^N	INCHES		MM		
A	.110	.120	2.80	3.05	—
B	.059	.070	1.50	1.75	—
C	.036	.051	.90	1.30	—
D	.014	.020	.35	.50	—
E	.033	.040	.85	1.05	—
F	.067	.083	1.7	2.1	—
H	.0004	.006	.010	.150	—
J	.0035	.008	.090	.20	—
K	.102	.118	2.6	3.00	—

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		—

ECN 00-850