PRELIMINARY - September 11, 2000 TEL:805-498-2111 FAX:805-498-3804 WEB:http://www.semtech.com

DESCRIPTION

The SC4431 is a four terminal device for regulating an isolated power supply with very low output voltage.

It is intended to be used as a replacement for three terminal shunt regulators such as SC431L where the output voltage is too low for them to function in conjunction with an opto-isolator. It achieves this by having seperate supply and output pins, allowing the output to sink current at voltages as low as 0.2V, while the supply pin still has sufficient voltage for the device to function. In this way, allowing for a 1.6V drop through an opto-isolator diode, regulation down to 1.8V out can be achieved.

The SC4431 shunt regulator is available with three initial reference voltage accuracies (0.5%, 1.0% and 2.0%) in the space saving 5-lead SOT-23 package. The three voltage tolerances allow the designer the opportunity to select the proper cost/tolerance for their application.

FEATURES

- Trimmed bandgap design - initial accuracies to ± 0.5%
- 40mA drive capability
- Wide supply voltage range - 1.5V to 15V
- Low supply current - typically 110µA
- Full industrial temperature range

APPLICATIONS

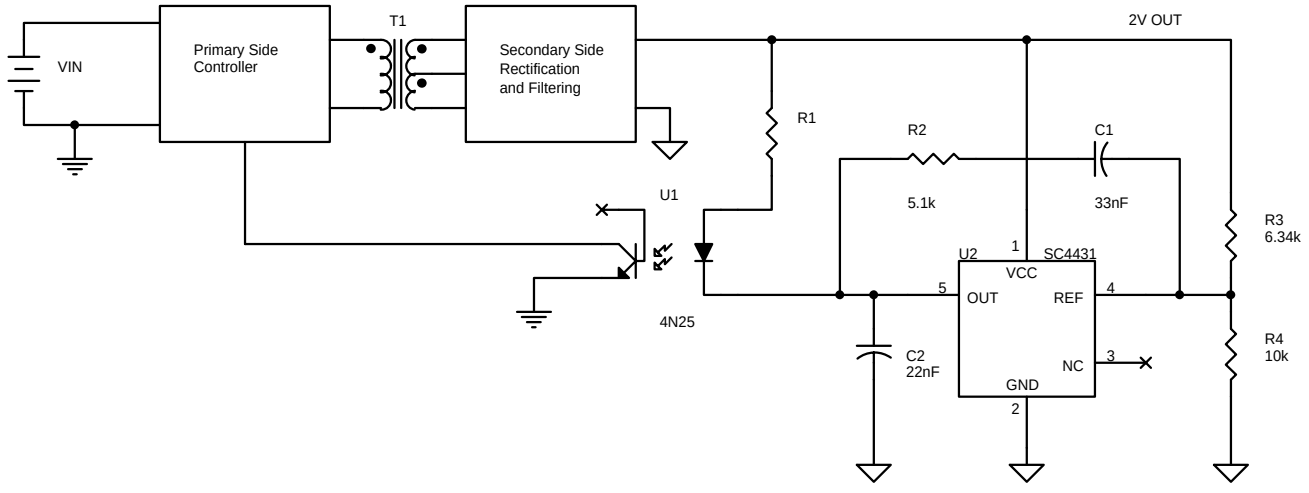
- Opto driver for very low output voltage isolated power supplies

ORDERING INFORMATION

Part Number(1)(2)	Package
SC4431CSK-X.TR	SOT-23-5

Notes:
(1) Where "-X" denotes initial reference voltage tolerance. Available options are ±0.5% (-.5), ±1% (-1) and ±2% (-2).
(2) Only available in tape and reel packaging. A reel contains 3000 devices.

TYPICAL APPLICATION CIRCUIT



2V Output Isolated Power Supply

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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Maximum	Units
Input Supply Voltage	V_{CC}	-0.5 to +16	V
Output Voltage	V_{OUT}	-0.5 to V_{CC}	V
Reference Voltage	V_{REF}	-0.5 to +4	V
Continuous Output Current	I_{OUT}	40	mA
Reference Input Current	I_{REF}	5	mA
Operating Ambient Temperature Range	T_A	-40 to +85	°C
Operating Junction Temperature Range	T_J	-40 to +150	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Thermal Impedance Junction to Ambient	θ_{JA}	256	°C/W
Thermal Impedance Junction to Case	θ_{JC}	81	°C/W
Power Dissipation at T_A = 25°C	P_D	475	mW
Lead Temperature (Soldering) 10 seconds	T_{LEAD}	300	°C
ESD Rating (Human Body Model)	ESD	2	kV

ELECTRICAL CHARACTERISTICS

Unless specified, T_A = 25°C, V_{CC} = 2V, I_{OUT} = 2mA. Values in **bold** apply over full operating temperature range.

Parameter	Symbol	Test Conditions	MIN	TYP	MAX	Units
VCC						
Input Supply Voltage	V_{CC}		**1.5**		**15**	V
Input Supply Current	I_{CC}	$V_{REF} = V_{OUT}$		110	**200**	µA
Off State Input Supply Current	$I_{CC(OFF)}$	V_{REF} = 1.187V, V_{OUT} = 2V		65	100	µA
					150	
REF						
Reference Voltage	V_{REF}	SC4431-.5, $V_{REF} = V_{OUT}$	1.219	1.224	1.231	V
			1.207		**1.243**	
		SC4431-1, $V_{REF} = V_{OUT}$	1.212	1.224	1.236	V
			1.200		**1.250**	
		SC4431-2, $V_{REF} = V_{OUT}$	1.200	1.224	1.250	V
			1.187		**1.261**	
Change in V_{REF} due to change in V_{CC}	$\frac{dV_{REF}}{dV_{CC}}$	V_{CC} = 1.5V to 15V		8	15	mV
					20	
Change in V_{REF} due to change in I_{OUT}	$\frac{dV_{REF}}{dI_{OUT}}$	I_{OUT} = 0.1mA to 40mA		8	28	mV
					36	

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ELECTRICAL CHARACTERISTICS (Cont.)

Unless specified, T_A = 25°C, V_{CC} = 2V, I_{OUT} = 2mA. Values in **bold** apply over full operating temperature range.

Parameter	Symbol	Test Conditions	MIN	TYP	MAX	Units
REF (Cont.)						
Reference Input Current	I_{REF}	0.1mA ≤ I_{OUT} ≤ 10mA		0.3	0.5	µA
					1.0	
OUT						
Saturation Voltage	$V_{OUT(SAT)}$	I_{OUT} = 5mA, I_{CC} = 500µA		50	75	mV
					100	
		V_{REF} = 1.261V, I_{OUT} = 40mA		275	300	mV
					400	
Off State Output Current	$I_{OUT(OFF)}$	V_{REF} = 1.187V, V_{OUT} = 2V		0.5	1	µA
					10	

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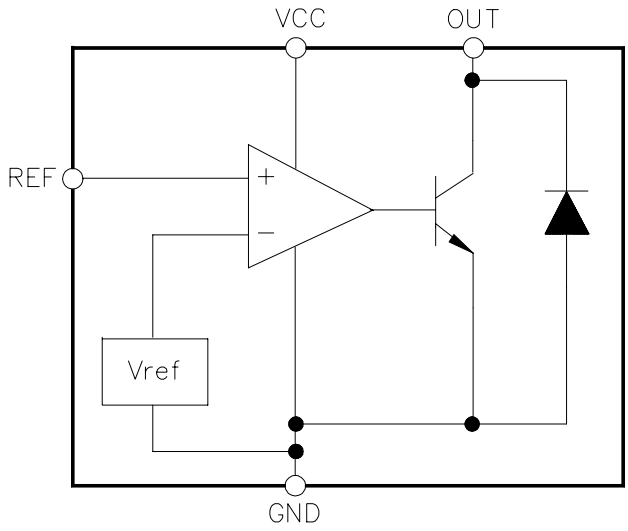
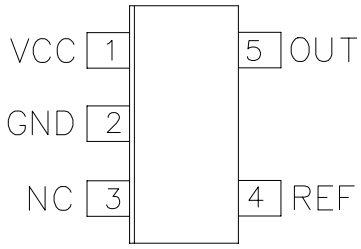
BLOCK DIAGRAM



PIN CONFIGURATION

SOT-23 -5 Lead (Top View)



PIN DESCRIPTION

Pin	Pin Name	Pin Function
1	VCC	This is the input supply pin for the IC.
2	GND	Logic and power ground.
3	NC	No connection.
4	REF	This is connected to the non-inverting input of the error amplifier.
5	OUT	This is the output pin of the device, essentially an open collector.

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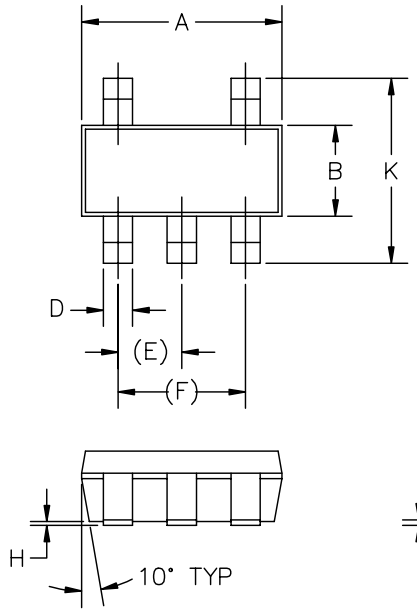
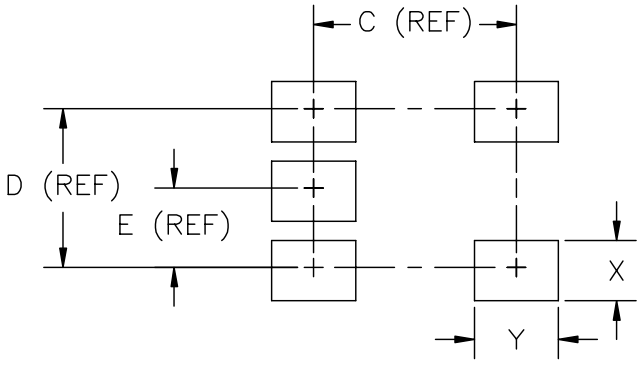
DEVICE OUTLINE - SOT-23-5



DIMENSIONS					
DIMᴺ	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			
DIMᴺ	INCHES	MM	NOTE
C	.094	2.4	–
D	.074	1.9	–
E	.037	.95	–
X	.028	.7	–
Y	.039	1.0	–

ECN 00-1315