

Dual 150mA ULTRA LOW DROPOUT, SC1456 LOW NOISE REGULATOR

PRELIMINARY - June 15, 2000

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

DESCRIPTION

The SC1456 contains two low dropout linear regulators that operate from a +2.5V to +6V input range and deliver up to 150mA. PMOS pass transistors allow a low 110µA supply current per device to remain independent of load, making these devices ideal for battery operated portable equipment such as cellular phones, cordless phones and personal digital assistants.

Each device can be powered from a separate supply voltage or the same supply voltage for maximum flexibility. The output voltage of each device can be preset or adjusted with an external resistor divider. Other features include independant low powered shutdown, short circuit protection, thermal shutdown protection and reverse battery protection for each regulator. The SC1456 comes in the tiny 10 lead MSOP package.

ORDERING INFORMATION

Part Number	Package
SC1456XIMSTR ⁽¹⁾⁽²⁾	MSOP-10

FEATURES

- Two guaranteed 150 mA outputs •
- Designed to operate with ceramic capacitors
 - Fixed or adjustable outputs
- Very small external components
- Low 75µV_{RMS} output noise
- Very low supply currents •
- Thermal overload protection •
- Reverse battery protection
- Individual low power shutdown
- Surface mount packaging (10 pin MSOP) •
- Full industrial temperature range

APPLICATIONS

- **Battery Powered Systems** •
- Cellular Telephones
- Cordless Telephones •
- Personal Digital Assistants •
- Portable Instrumentation
- Modems
- PCMCIA cards

Notes:

- (1) Where X denotes voltage options see table on page 4. Consult factory for other voltage options.
- (2) Only available in tape and reel packaging. A reel contains 2500 devices.

SC1456 U1 10 VIN1 O -O VOUT1 = PRESET IN1 OUT1 EN1 OUT2 -O VOUT2 = PRESET 5 VIN2 O IN2 SET (OR VIN1) 6 FN2 SET2 C1 1uF C2 1uF C3 1uF C4 1uF GND GND 2 Output Voltages Set Internally SC1456 -O VOLIT1 (SEE EQUATION) VIN1 O IN1 EN1 -O VOLIT2 = PRESET OUT2 VIN2 O-IN2 SET1 R1 (OR VIN1) 6 FN2 SET2 C1 1uF C2 1uF C3 2.2uF C4 GND GND 2 R1 V_{OUT1} = 1.250 • (1+ R2 R2 R2 < 120kO Output 1 Set Externally and Output 2 Set Internally 1

TYPICAL APPLICATIONS



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ABSOLUTE MAXIMUM RATINGS			
Parameter	Symbol	Maximum	Units
Input Supply Voltage	V _{IN}	-0.3 to +7	V
Thermal Resistance Junction to Ambient	θ_{JA}	113	°C/W
Operating Ambient Temperature Range	T _A	-40 to +85	°C
Operating Junction Temperature Range	TJ	-40 to +125	°C
Storage Temperature Range	T _{STG}	-65 to +150	°C
Lead Temperature (Soldering) 10 seconds	T _{LEAD}	300	°C
ESD Rating (Human Body Model)	ESD	1.25	kV

ELECTRICAL CHARACTERISTICS⁽¹⁾

Unless specified: $V_{IN} = 3.6V$, $V_{SET} = GND$, $V_{EN} = V_{IN}$, $T_A = 25^{\circ}C$. Values in **bold** apply over full operating ambient temperature range.

Parameter	Symbol	Conditions	Min	Тур	Мах	Units
IN1, IN2			1			1
Supply Voltage Range	V _{IN}		2.5		6.0	V
Supply Current	Ι _Q	I _{OUT} = 0mA		90	130	μA
					160	
		$50mA \le I_{OUT} \le 150mA$		110	160	μA
					200	
		$V_{EN} = 0V$		0.0001	1	μA
					2	
OUT1, OUT2			1			1
Output Voltage ⁽²⁾	V _{OUT}	I _{OUT} = 1mA	-2.0%	V _{OUT}	+2.0%	V
		$1mA \le I_{OUT} \le 150mA, V_{OUT}+1V \le V_{IN} \le 5.5V$	-3.5%	-	+3.5%	_
Line Regulation ⁽²⁾	REG _(LINE)	$2.5V \leq V_{\text{IN}} \leq 5.5V, \ V_{\text{SET}} = V_{\text{OUT}}, \ I_{\text{OUT}} = 1mA$		5	10	mV
					12	
Load Regulation ⁽²⁾	REG _(LOAD)	$I_{OUT} = 0mA$ to $50mA$		-10	-15	mV
					-20	
		$I_{OUT} = 0mA$ to 100mA		-15	-20	mV
					-25	
		$I_{OUT} = 0$ mA to 50mA, $V_{SET} = V_{OUT}$		-2.5	-7.5	mV
					-15.0	
		I_{OUT} = 0mA to 100mA, V_{SET} = V_{OUT}		-5	-15	mV
					-30	1



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ELECTRICAL CHARACTERISTICS ⁽¹⁾(Cont.)

Unless specified: $V_{IN} = 3.6V$, $V_{SET} = GND$, $V_{EN} = V_{IN}$, $T_A = 25^{\circ}C$. Values in **bold** apply over full operating ambient temperature range.

Parameter	Symbol	Conditions	Min	Тур	Max	Units
OUT1, OUT2 (Cont.)	1	·		1		1
Dropout Voltage ⁽²⁾⁽³⁾	V _D	I _{OUT} = 1mA		1.1		mV
		I _{OUT} = 50mA		55	90	mV
					120	-
		I _{OUT} = 100mA		110	180	mV
					240	-
Current Limit	I _{LIM}		150	240	350	mA
Output Voltage Noise	e _n	10Hz to 99kHz, I_{OUT} = 50mA, C_{OUT} = 1µF		90		μV_{RMS}
		C _{OUT} = 100μF		75		-
Power Supply Rejection Ratio	PSRR	f = 120Hz		55		dB
EN1, EN2	ľ			I		
EN Input Threshold	V _{IH}		1.8			V
	V _{IL}				0.4	
EN Input Bias Current ⁽⁴⁾	I _{EN}	$V_{EN} = V_{IN}$		0	100	nA
					200	-
SET1, SET2	1			I		.1
Sense/Select Threshold	V _{TH}		20	55	80	mV
SET Reference Voltage ⁽²⁾	V _{SET}	I _{OUT} = 1mA	1.225	1.250	1.275	V
		$1mA \leq I_{OUT} \leq 150mA, 2.5V \leq V_{IN} \leq 5.5V$	1.206		1.294	-
SET Input Leakage Current ⁽⁴⁾	I _{SET}	V _{SET} = 1.3V		0.015	2.500	nA
					5.000	-
OVER TEMPERATURE PRO	TECTION	1	1	1	1	1
High Trip Level	Т _{ні}			170		°C
Hysteresis	T _{HYST}			10		°C

NOTE:

(1) This device is ESD sensitive. Use of standard ESD handling precautions is required.

(2) Low duty cycle pulse testing with Kelvin connections required.

(3) Defined as the input to output differential at which the output voltage drops 100mV below the value measured at a differential of 2V.

(4) Guaranteed by design.

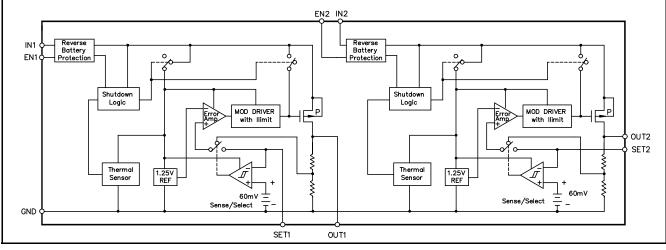


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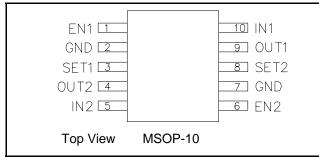
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BLOCK DIAGRAM



PIN CONFIGURATION



VOLTAGE OPTIONS

Replace X in the part number (SC1456XIMS) by the letter shown below for the corresponding voltage option:

Х	V_{OUTA} (V)	V _{оитв} (V)
А	2.5	2.5
В	2.8	2.8
С	3.0	3.0
D	3.3	3.3

PIN DESCRIPTIONS

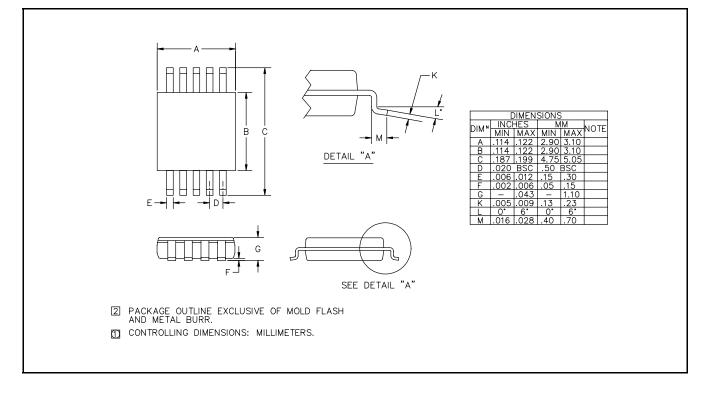
Pin #	Pin Name	Description		
1	EN1	Active high enable pin for device 1. Connect to VIN1 if not being used.		
2	GND	Ground pin. Can be used for heatsinking if needed. Electrically connected to pin 7.		
3	SET1	Connecting this pin to ground results in the internally preset value for V _{OUT1} . Connecting to an external resistor divider changes V _{OUT1} to: $V_{OUT1} = 1.250 \cdot \left(1 + \frac{R1}{R2}\right)$		
4	OUT2	Regulator output for device 2, sourcing up to 150mA		
5	IN2	Supply input pin for device 2.		
6	EN2	Active high enable pin for device 2. Connect to VIN2 if not being used.		
7	GND	Ground pin. Can be used for heatsinking if needed. Electrically connected to pin 2.		
8	SET2	Connecting this pin to ground results in the internally preset value for V _{OUT2} . Connecting to an external resistor divider changes V _{OUT2} to: $V_{OUT2} = 1.250 \cdot \left(1 + \frac{R1}{R2}\right)$		
9	OUT1	Regulator output for device 1, sourcing up to 150mA		
10	IN1	Supply input pin for device 1.		



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DEVICE OUTLINE - MSOP-10



ECN 00-1167