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.

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

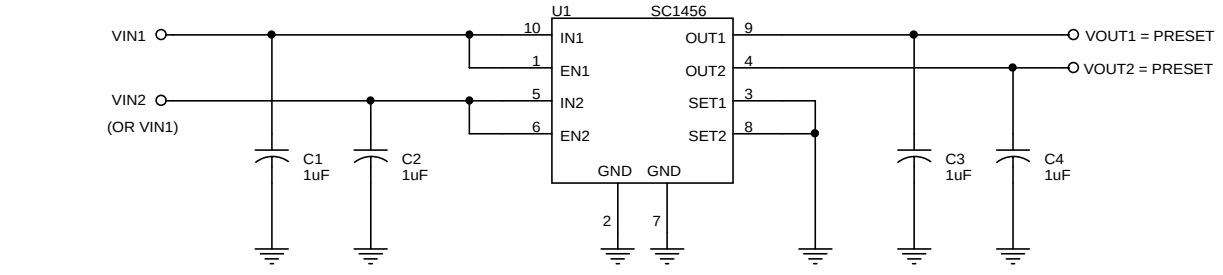
- Battery Powered Systems
- Cellular Telephones
- Cordless Telephones
- Personal Digital Assistants
- Portable Instrumentation
- Modems
- PCMCIA cards

ORDERING INFORMATION

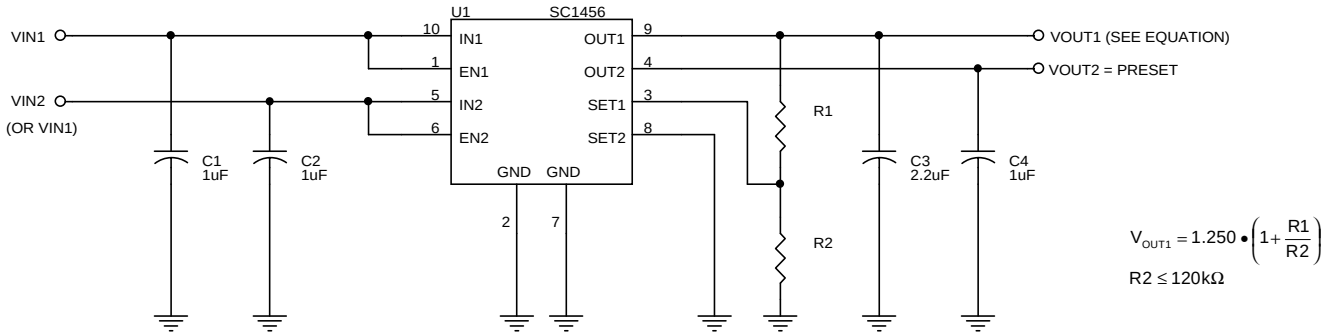
Part Number	Package
SC1456XIMSTR(1)(2)	MSOP-10

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.

TYPICAL APPLICATIONS



Output Voltages Set Internally



Output 1 Set Externally and Output 2 Set Internally

 652 MITCHELL ROAD NEWBURY PARK CA 91320

PRELIMINARY - June 15, 2000

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	T_J	-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°C. Values in **bold** apply over full operating ambient temperature range.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
IN1, IN2						
Supply Voltage Range	V_{IN}		**2.5**		**6.0**	V
Supply Current	I_Q	I_{OUT} = 0mA		90	130	µA
					160	
		50mA ≤ I_{OUT} ≤ 150mA		110	160	µA
					200	
		V_{EN} = 0V		0.0001	1	µA
					2	
OUT1, OUT2						
Output Voltage(2)	V_{OUT}	I_{OUT} = 1mA	-2.0%	V_{OUT}	+2.0%	V
		1mA ≤ I_{OUT} ≤ 150mA, V_{OUT}+1V ≤ V_{IN} ≤ 5.5V	**-3.5%**		**+3.5%**	
Line Regulation(2)	$REG_{(LINE)}$	2.5V ≤ V_{IN} ≤ 5.5V, V_{SET} = V_{OUT}, I_{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} = 0mA 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	

PRELIMINARY - June 15, 2000

ELECTRICAL CHARACTERISTICS [1](Cont.)

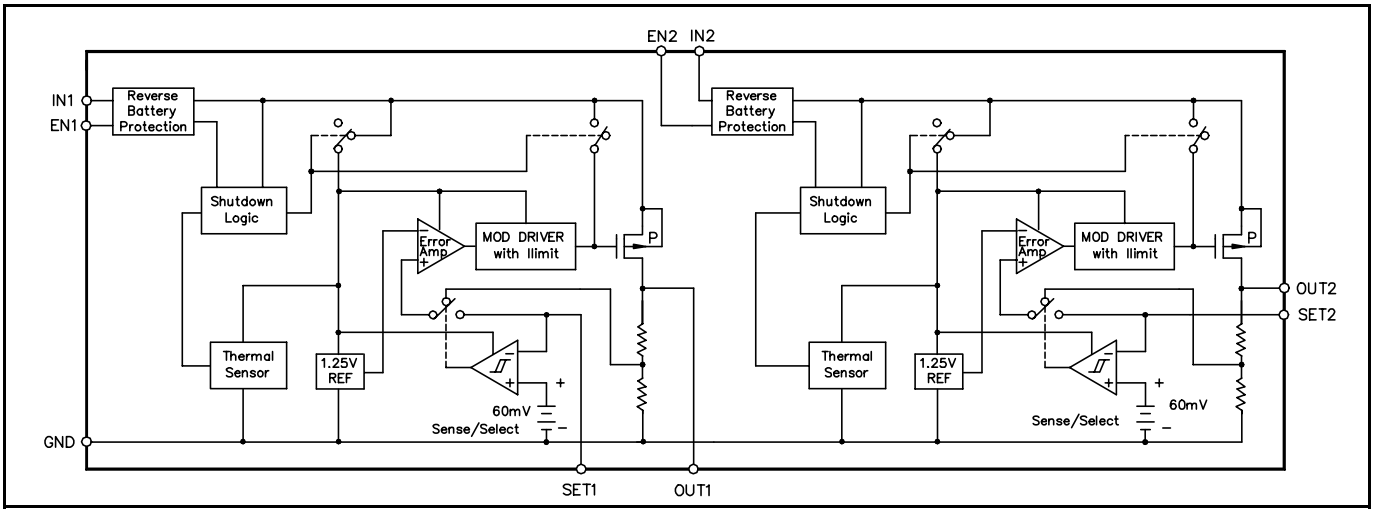
Unless specified: V_{IN} = 3.6V, V_{SET} = GND, V_{EN} = V_{IN}, T_A = 25°C. Values in **bold** apply over full operating ambient temperature range.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OUT1, OUT2 (Cont.)						
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						
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						
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 ≤ I_{OUT} ≤ 150mA, 2.5V ≤ V_{IN} ≤ 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 PROTECTION						
High Trip Level	T_{HI}			170		°C
Hysteresis	T_{HYST}			10		°C

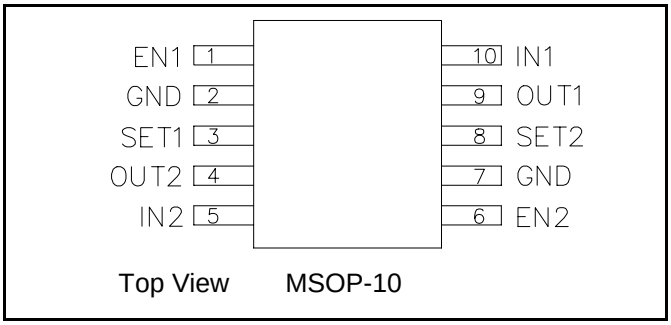
NOTE:
(1) This device is ESD sensitive. Use of standard ESD handling precautions is required.
(2) Low duty cycle pulse testing with Kelvin connections required.
(3) Defined as the input to output differential at which the output voltage drops 100mV below the value measured at a differential of 2V.
(4) Guaranteed by design.

PRELIMINARY - June 15, 2000

BLOCK DIAGRAM



PIN CONFIGURATION



Top View MSOP-10

VOLTAGE OPTIONS

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

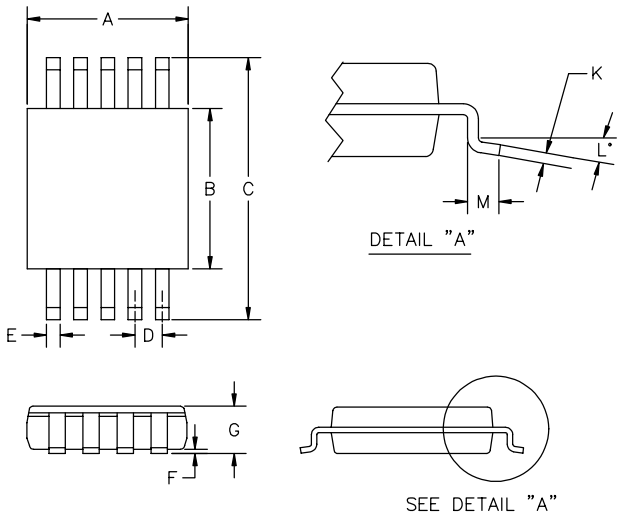
X	V_{OUTA} (V)	V_{OUTB} (V)
A	2.5	2.5
B	2.8	2.8
C	3.0	3.0
D	3.3	3.3

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: $V_{OUT1} = 1.250 \bullet \left(1 + \frac{R1}{R2}\right)$
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: $V_{OUT2} = 1.250 \bullet \left(1 + \frac{R1}{R2}\right)$
9	OUT1	Regulator output for device 1, sourcing up to 150mA
10	IN1	Supply input pin for device 1.

PRELIMINARY - June 15, 2000

DEVICE OUTLINE - MSOP-10



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.114	.122	2.90	3.10	
B	.114	.122	2.90	3.10	
C	.187	.199	4.75	5.05	
D	.020 BSC		.50 BSC		
E	.006	.012	.15	.30	
F	.002	.006	.05	.15	
G	–	.043	–	1.10	
K	.005	.009	.13	.23	
L	0°	6°	0°	6°	
M	.016	.028	.40	.70	

[2] PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH AND METAL BURR.

[1] CONTROLLING DIMENSIONS: MILLIMETERS.

ECN 00-1167