SEMTECH

POWER MANAGEMENT

Description

The SC1118 family of low dropout regulators has the unique capability of maintaining output regulation while sourcing or sinking current. The 2.85V output voltage option is ideal for use as a Boulay termination of up to 27 SCSI data lines. The regulator maintains regulation while both sourcing and sinking current, enabling the use of active negation drivers for improved noise immunity on the data lines. Regulation of output voltage is maintained for TERMPWR voltages as low as 4.0V. When unloaded, quiescent supply current is a low 2mA, allowing continuous connection to the TERMPWR lines.

An ultra low power shutdown mode is also available on the SO-8 version. In shutdown the output is high impedance and supply current drops to 100μA (typ.).

Current limits in both sourcing and sinking modes, plus on-chip thermal shutdown make the circuit tolerant of output fault conditions.

The SC1118 is available in the 3-lead SOT-223 and 8-lead SO-8 packages.

Features

◆ Regulates while sourcing or sinking current
◆ Provides termination for up to 27 SCSI lines
◆ 2mA quiescent current
◆ Ultra low power shutdown mode
◆ Current limit and thermal shutdown protection
◆ Stable for any $C_{LOAD} \geq 0.22\mu F$
◆ Fast settling time
◆ SOT-223 and SO-8 surface mount packages

Applications

◆ Active negation SCSI terminations
◆ Computers
◆ Disk drives
◆ CD-ROM drives
◆ Supply splitter

Typical Application Circuits

$$V_{OUT} = V_{FB} \bullet \left(1 + \frac{R1}{R2}\right) + I_{FB} \bullet R1$$
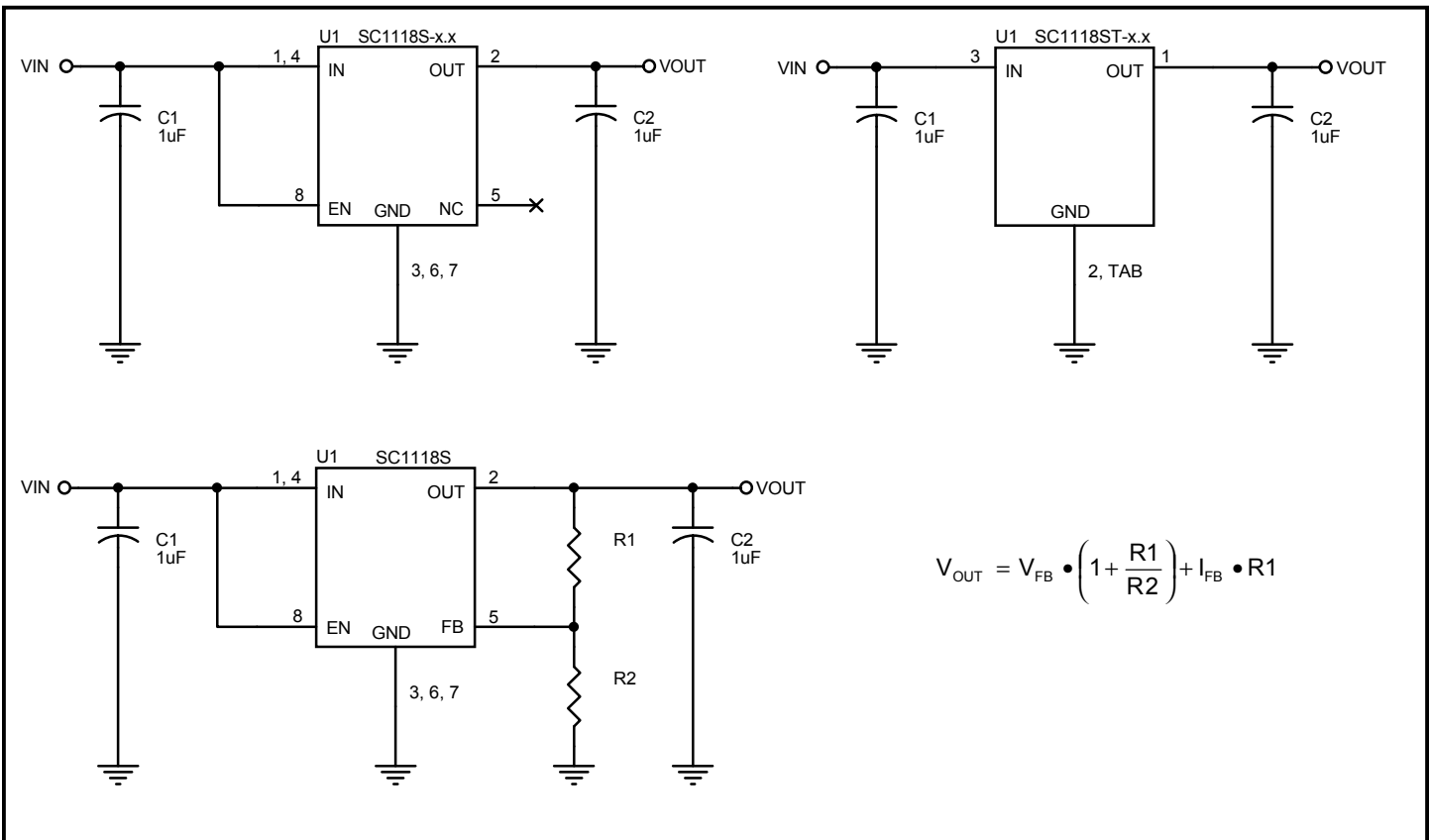
POWER MANAGEMENT

Absolute Maximum Ratings

Exceeding the specifications below may result in permanent damage to the device, or device malfunction. Operation outside of the parameters specified in the Electrical Characteristics section is not implied.

Parameter	Symbol	Maximum	Units
Supply Voltage	V_{IN}	17	V
Power Dissipation	P_D	Internally Limited	W
Thermal Resistance Junction to Case SOT-223 SO-8	θ_{JC}	16 39	°C/W
Thermal Resistance Junction to Ambient SOT-223 SO-8	θ_{JA}	57 163	°C/W
Operating Temperature Range	T_A	0 to +85	°C
Junction Temperature Range	T_J	-40 to +150	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Lead Temperature (Soldering) 10 Sec.	T_{LEAD}	300	°C
ESD Rating (Human Body Model)	V_{ESD}	2	kV

Electrical Characteristics

Unless otherwise specified: T_A = 25°C, V_{IN} = V_{EN} = 5V (2.5V, 2.85V and adjustable options, adjustable option set to 2V out), V_{IN} = V_{EN} = 7V (5V option), I_{OUT} = 0mA, C_{IN} = C_{OUT} = 1µF. Values in **bold** apply over operating temperature range: 0 ≤ T_J = T_A ≤ 85°C.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage Range	V_{IN}		$V_{IN(min)}$[2]		**15**	V
Quiescent Current	I_Q	V_{EN} = 5V		2	**5**	mA
		V_{EN} = 0V		100	**250**	µA
Output Voltage[1]	V_{OUT}		-1%	V_{OUT}	+1%	V
Fixed output options		-1A ≤ I_{OUT} ≤ 1A, V_{IN} = $V_{IN(MIN)}$[2] to 15V	**-2%**		**+2%**	
Feedback Voltage[1][5]	V_{FB}		0.99	1.00	1.01	V
Adjustable output option		-1A ≤ I_{OUT} ≤ 1A, V_{IN} = 3.7V to 15V	**0.98**		**1.02**	
Feedback Bias Current	I_{FB}	V_O = V_{FB}		16	**25**	µA
Line Regulation[1][5]	$REG_{(LINE)}$	ADJ, 2.5V, 2.85V: V_{IN} = $V_{IN(MIN)}$[2] to 15V			**8**	mV
		5V: V_{IN} = 6.5V to 15V			**10**	
Load Regulation[1][5] ADJ, 2.5V, 2.85V 5V	$REG_{(LOAD)}$	I_{OUT} = -1A to 0A or 0A to 1A			**10** **20**	mV

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Electrical Characteristics

Unless otherwise specified: T_A = 25°C, V_{IN} = V_{EN} = 5V (2.5V, 2.85V and adjustable options, adjustable option set to 2V out), V_{IN} = V_{EN} = 7V (5V option), I_{OUT} = 0mA, C_{IN} = C_{OUT} = 1μF. Values in **bold** apply over operating temperature range: $0 \le T_J = T_A \le 85°C$.

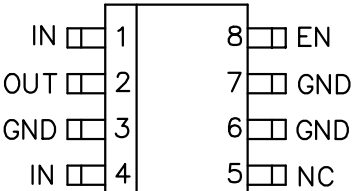| Parameter	Symbol	Conditions	Min	Typ	Max	Units
Dropout Voltage [1][3] For Adjustable option V_O = 3.3V, V_{EN} = V_{IN}	V_D	I_{OUT} = 100mA		0.85	1.10	V
		I_{OUT} = 800mA		1.0	1.3	
		I_{OUT} = 1A			**1.5**	
Minimum Output Voltage	$V_{OUT(MIN)}$	ADJ version	V_{FB}			V
Maximum Output Voltage	$V_{OUT(MAX)}$	ADJ version			**5.5**	V
Output Current Limit[4]	$I_{CL(+)}$	V_{OUT} = ($V_{OUT(NOM)}$ - 100mV)	**1**	1.5		A
	$I_{CL(-)}$	V_{OUT} = ($V_{OUT(NOM)}$ + 100mV)	**-1**	-1.5		
Load Transient Settling Time, ΔV_{OUT} = 1%	t_S	I_{OUT} = -1A to 0A or 0A to 1A		5		μs
Ripple Rejection	R_A	f = 120Hz, (V_{IN} - V_{OUT}) = 2V, V_{AC} = 0.5V_{P-P}		65		dB
Enable Input Threshold	V_{IH}	Output ON	**1.8**	1.5		V
	V_{IL}	Output OFF		1.5	**0.4**	
Enable Input Bias Current	I_{EN}	V_{EN} = V_{IN} = 7V (EN sinking)		25	**60**	μA
		V_{EN} = 0V, V_{IN} = 7V (EN sourcing)		-25	**-60**	
Thermal Shutdown Junction Temperature	T_{HI}			155		°C
Thermal Shutdown Hysteresis	T_{HYST}			15		°C

Notes:

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

(2) $V_{IN(MIN)}$ for each voltage option is as follows:

Voltage Option	$V_{IN(MIN)}$
ADJ	3.7V
2.5V	4.2V
2.85V	4.5V
5V	6.5V

(3) Defined as the input to output differential at which the output voltage drops 1% below the value measured at a differential of 2V.

(4) As V_{OUT} increases further towards GND or $V_{IN,}$ the current limit will fold back.

(5) Adjustable option: for 3.7V $\le V_{IN} \le$ 5V, V_{EN} = V_{IN},
for 5V $\le V_{IN} \le$ 15V, V_{EN} = 5V

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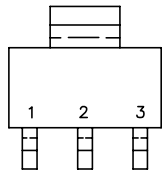
Pin Configurations

Top Views

IN — 1 ... 8 — EN
OUT — 2 ... 7 — GND
GND — 3 ... 6 — GND
IN — 4 ... 5 — NC

Fixed Output Voltage

SOT-223

IN — 1 ... 8 — EN
OUT — 2 ... 7 — GND
GND — 3 ... 6 — GND
IN — 4 ... 5 — FB

Adjustable Output Voltage

SO-8

SOT-223	
Pin	Function
1	OUT
2	GND
3	IN
TAB is GND	

Ordering Information

| Device[1]	Package
SC1118S-X.XTR[2] SC1118STR[3]	SO-8
SC1118ST-X.XTR[2]	SOT-223

Notes:
(1) Only available in tape and reel packaging. A reel contains 2500 devices (both packages).
(2) Where X.X denotes voltage options. Available voltages are: 2.5V (-2.5), 2.85V (-2.85) and 5V (-5.0). Contact factory for additional voltage options.
(3) Adjustable output voltage version (SO-8 only).

Block Diagram

* R1 and R2 are only in fixed voltage parts. FB pin is only present in adjustable part.
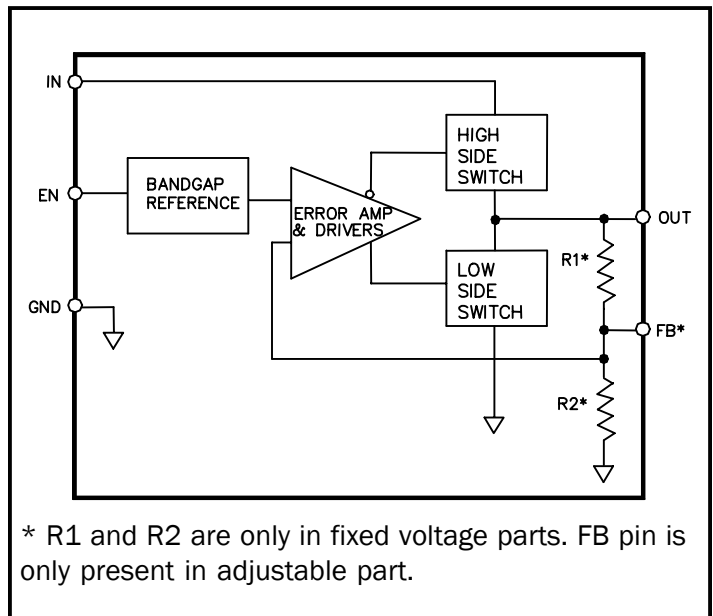
Pin Descriptions

Pin Name	Pin Number			Pin Function
	Fixed SO-8	Adj. SO-8	SOT-223	
EN	8	8	-	Active high enable input. CMOS/TTL compatible. Pulling this pin low shuts the device down. Connected internally to IN in the SOT-223 package.
FB	-	5	-	Feedback input. Connects to the inverting input of the error amplifier. Use this pin to adjust the output voltage of the adjustable SO-8 parts (see Application Circuit on page 1).
GND	3, 6, 7	3, 6, 7	2/TAB	Ground pin(s). Connect all ground connections to ground.
IN	1, 4	1, 4	3	Input pin(s). Connect all pins to positive supply and to each other, decouple with 1µF minimum.
NC	5	-	-	Not connected. Leave this pin floating.
OUT	2	2	1	Output pin. Connect a ≥ 0.22µF capacitor for stability.

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Outline Drawing - SOT-223
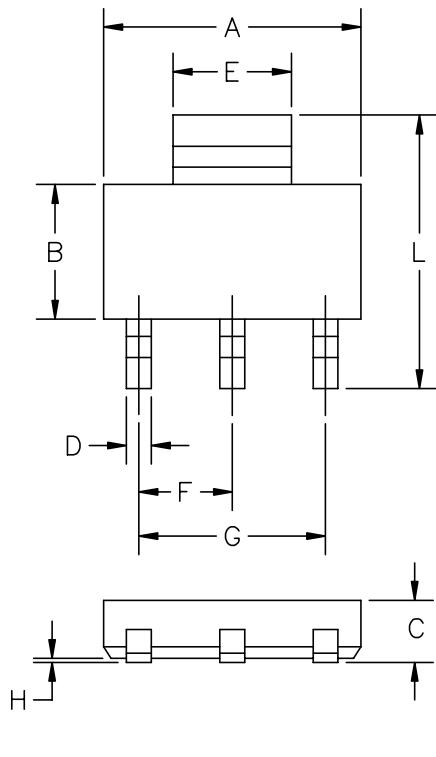
DIMENSIONS					
DIMᴺ	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.248	.264	6.30	6.70	–
B	.13	.146	3.30	3.70	–
C	.060	.071	1.52	1.80	–
D	.024	.031	.60	.80	–
E	.114	.122	2.90	3.10	–
F	–	.090	–	2.30	BSC
G	–	.181	–	4.60	BSC
H	.001	.004	.020	.100	–
J	.164	.215	4.16	5.46	–
K	.036	.05	.91	1.27	–
L	.264	.287	6.70	7.30	–
M	.009	.013	.24	.32	–

CONTROLLING DIMENSIONS: MILLIMETERS.

Land Pattern - SOT-223
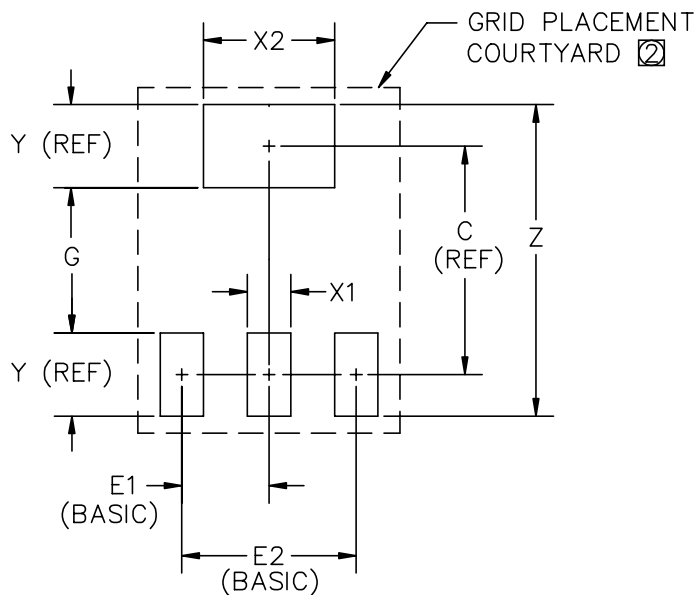
DIMENSIONS ①					
DIMᴺ	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
C	–	.24	–	6.20	–
E1	–	.09	–	2.30	–
E2	–	.18	–	4.60	–
G	.15	.16	4.00	4.20	–
X1	.03	.04	1.00	1.20	–
X2	.13	.14	3.40	3.60	–
Y	–	.09	–	2.20	–
Z	.32	.33	8.20	8.40	–

② GRID PLACEMENT COURTYARD IS 18 x 14 ELEMENTS (9 mm X 7mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

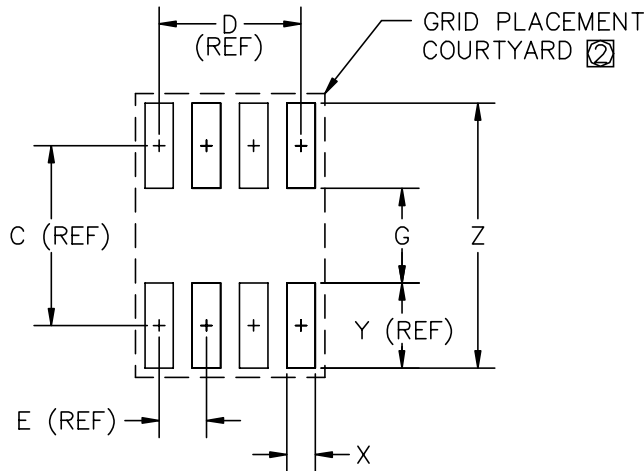① CONTROLLING DIMENSION: MILLIMETERS

POWER MANAGEMENT

Outline Drawing - SO-8
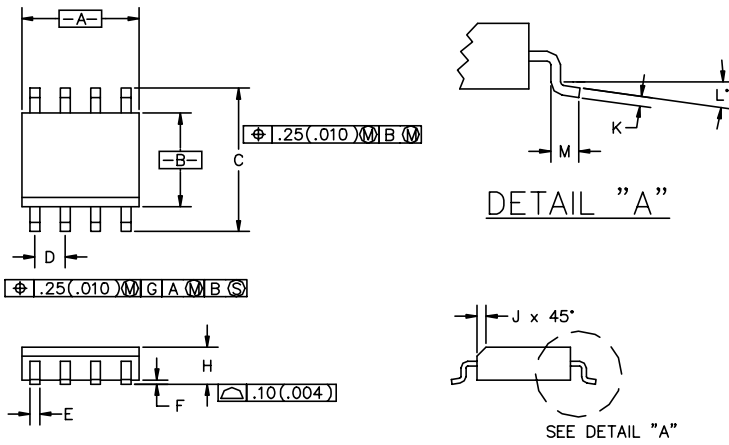
DIMENSIONS					
DIMᴺ	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.188	.197	4.80	5.00	
B	.149	.158	3.80	4.00	
C	.228	.244	5.80	6.20	
D	.050	BSC	1.27	BSC	
E	.013	.020	0.33	0.51	
F	.004	.010	0.10	0.25	
H	.053	.069	1.35	1.75	
J	.011	.019	0.28	0.48	
K	.007	.010	.19	.25	
L	0°	8°	0°	8°	
M	.016	.050	0.40	1.27	

DETAIL "A"

Land Pattern - SO-8

DIMENSIONS ①					
DIMᴺ	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
C	–	.19	–	5.00	–
D	–	.15	–	3.81	–
E	–	.05	–	1.27	–
G	.10	.11	2.60	2.80	–
X	.02	.03	.60	.80	–
Y	–	.09	–	2.40	–
Z	–	.29	7.20	7.40	–

② GRID PLACEMENT COURTYARD IS 12x16 ELEMENTS (6 mm X 8mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

① CONTROLLING DIMENSION: MILLIMETERS

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