

## FEATURES

- Output Current up to 1 A
- **Low Dropout Voltage ( 700mV at 1A Output Current )**
- Three Terminal Adjustable or Fixed 1.5V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, 5.0V
- 2.85V Device for SCSI-II Active Terminator
- **0.04% Line Regulation, 0.1% Load Regulation**
- Very Low Quiescent Current
- Internal Current and Terminal Limit
- Logic-Controlled Electronics Shutdown
- Surface Mount Package SOT-223 & TO-263 (D2-Pack)
- 100% Thermal Limit Burn-In

## APPLICATION

- Active SCSI Terminators
- Portable/Plan Top/Notebook Computers
- High Efficiency Linear Regulators
- SMPS Post Regulators
- Mother B/D Clock Supplies
- Disk Drives
- Battery Chargers

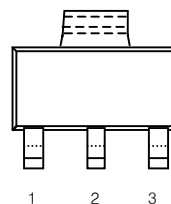
## DESCRIPTION

The LM1117 is a low power positive-voltage regulator designed to meet 1A output current and comply with SCSI-II specifications with a fixed output voltage of 2.85V. This device is an excellent choice for use in battery-powered applications, as active terminators for the SCSI bus, and portable computers.

The LM1117 features very low quiescent current and very **low dropout voltage of 700mV at a full load** and lower as output current decreases. LM1117 is available as an adjustable or fixed 1.5V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, and 5.0V output voltages.

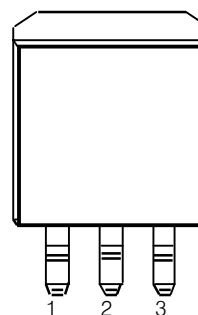
The LM1117 is offered in a 3-pin surface mount package SOT-223 & TO-263. The output capacitor of 10 $\mu$ F or larger is needed for output stability of LM1117 as required by most of the other regulator circuits.

SOT-223 PKG (FRONT VIEW)



PIN FUNCTION  
1. Adj/Gnd  
2. Vout  
3. Vin

TO-263 (D2 PKG, FRONT VIEW)



PIN FUNCTION  
1. Adj/Gnd  
2. Vout  
3. Vin

## ORDERING INFORMATION

Device (Marking)	Package
LM1117S	SOT-223
LM1117S-XX	
LM1117T	TO-263 (D2)
LM1117T-XX	

(X=Output Voltage=1.5V, 1.8V, 2.5V, 2.85V, 3.0V, 3.3V, 5.0V, Adjustable=AD)

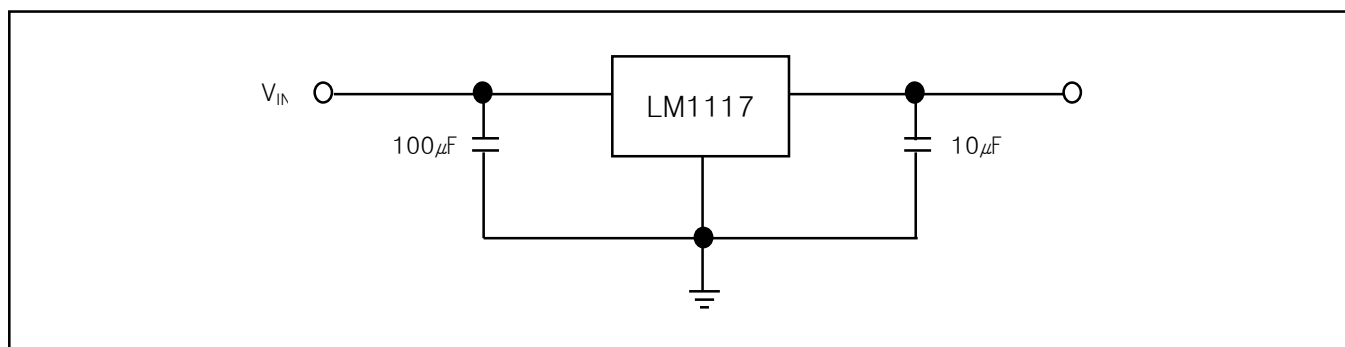
## ABSOLUTE MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
DC Input Voltage	$V_{IN}$		7	V
Lead Temperature (Soldering, 5 Seconds)	$T_{SOL}$		260	°C
Storage Temperature Range	$T_{STG}$	-65	150	°C
Operating Junction Temperature Range	$T_{OPR}$	0	125	°C

## THERMAL DATA

PARAMETER	SYMBOL	SOT-223	TO-263	UNIT
Thermal Resistance Junction-Case	$R_{THJ-CASE}$	15	3	$^{\circ}\text{C}$

## TYPICAL APPLICATION



## ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-AD(ADJUSTABLE)

(Refer to the test circuits,  $T_J=0$  to  $125^{\circ}\text{C}$   $C_O=10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage	$V_{REF}$	$V_{IN} - V_O = 2\text{V}$ , $I_O = 100\text{mA}$ , $T_J = 25^{\circ}\text{C}$	1.238	1.25	1.262	V
Reference Voltage	$V_{REF}$	$I_O = 10$ to $1\text{A}$ , $V_{IN} - V_O = 1.4$ to $10\text{V}$	1.230		1.270	V
Line Regulation	$\Delta V_O$	$V_{IN} - V_O = 1.5$ to $13.75\text{V}$ , $I_O = 10\text{mA}$		0.035	0.2	%
Load Regulation	$\Delta V_O$	$V_{IN} - V_O = 3\text{V}$ , $I_O = 10\text{mA}$ to $1\text{A}$		0.1	0.4	%
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J = 125^{\circ}\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$				7	V
Adjustment Pin Current	$I_{ADJ}$	$V_{IN} \leq 15\text{V}$ , $I_{Load} = 10\text{mA}$		50	120	$\mu\text{A}$
Adjustment Pin Current Change	$\Delta I_{ADJ}$	$V_{IN} - V_O = 1.4$ to $10\text{V}$ , $I_O = 10\text{mA}$ to $1\text{A}$		1	5	$\mu\text{A}$
Minimum Load Current	$I_{O(MIN)}$	$V_{IN} = 15\text{V}$		1.7	5	mA
Output Current	$I_O$	$V_{IN} - V_O = 5\text{V}$ , $T_J = 25^{\circ}\text{C}$	800	950	1200	mA
Output Noise ( $\%V_O$ )	$e_N$	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^{\circ}\text{C}$		0.003		%
Supply Voltage Rejection	SVR	$I_O = 40\text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^{\circ}\text{C}$ $V_{IN} - V_O = 3\text{V}$ , $V_{NIPPLE} = 1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O = 100\text{mA}$ , $V_{IN} = V_{OUT} + 0.8\text{V}$		1	1.1	V
		$I_O = 500\text{mA}$ , $V_{IN} = V_{OUT} + 0.8\text{V}$		1.00	1.15	V
		$I_O = 1\text{A}$ , $V_{IN} = V_{OUT} + 0.8\text{V}$		1.0	1.3	V
Thermal Regulation		$T_A = 25^{\circ}\text{C}$ 30ms Pulse		0.003		%/W

**ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-1.5**(Refer to the test circuits,  $T_J=0$  to  $125^\circ\text{C}$   $C_O=10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$V_{IN} = 4.5\text{V}$ , $I_O = 10\text{mA}$ , $T_J = 25^\circ\text{C}$	1.485	1.5	1.515	V
Output Voltage	$V_O$	$I_O = 0$ to $1\text{A}$ , $V_{IN} = 3.9$ to $10\text{V}$	1.475		1.525	V
Line Regulation	$\Delta V_O$	$V_{IN} = 3.9$ to $10\text{V}$ , $I_O = 0\text{mA}$		0.04	0.2	mV
Load Regulation	$\Delta V_O$	$V_{IN} = 3.9\text{V}$ , $I_O = 0$ to $1\text{A}$		0.08	0.4	mV
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J = 125^\circ\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$	$I_O = 100\text{mA}$			7	V
Quiescent Current	$I_D$	$V_{IN} \leq 10\text{V}$		5	10	mA
Output Current	$I_O$	$V_{IN} = 7.5\text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1200	mA
Output Noise Voltage	$e_N$	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
Supply Voltage Rejection	SVR	$I_O = 40\text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{IN} = 5.5\text{V}$ , $V_{NIPPLE} = 1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O = 100\text{mA}$		1	1.1	V
		$I_O = 500\text{mA}$		1.05	1.15	V
		$I_O = 800\text{mA}$		1.1	1.2	V
Thermal Regulation		$T_A = 25^\circ\text{C}$ 30ms Pulse		0.003		%/W

**ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-1.8**(Refer to the test circuits,  $T_J=0$  to  $125^\circ\text{C}$   $C_O=10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$V_{IN} = 4.5\text{V}$ , $I_O = 10\text{mA}$ , $T_J = 25^\circ\text{C}$	1.782	1.8	1.818	V
Output Voltage	$V_O$	$I_O = 0$ to $1\text{A}$ , $V_{IN} = 3.9$ to $10\text{V}$	1.772		1.828	V
Line Regulation	$\Delta V_O$	$V_{IN} = 3.9$ to $10\text{V}$ , $I_O = 0\text{mA}$		0.04	0.2	mV
Load Regulation	$\Delta V_O$	$V_{IN} = 3.9\text{V}$ , $I_O = 0$ to $1\text{A}$		0.08	0.4	mV
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J = 125^\circ\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$	$I_O = 100\text{mA}$			7	V
Quiescent Current	$I_D$	$V_{IN} \leq 10\text{V}$		5	10	mA
Output Current	$I_O$	$V_{IN} = 7.5\text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1200	mA
Output Noise Voltage	$e_N$	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
Supply Voltage Rejection	SVR	$I_O = 40\text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{IN} = 5.5\text{V}$ , $V_{NIPPLE} = 1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O = 100\text{mA}$		1	1.1	V
		$I_O = 500\text{mA}$		1.05	1.15	V
		$I_O = 800\text{mA}$		1.1	1.2	V
Thermal Regulation		$T_A = 25^\circ\text{C}$ 30ms Pulse		0.003		%/W

**ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-2.5**(Refer to the test circuits,  $T_J=0$  to  $125^\circ\text{C}$   $C_O=10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$V_{IN} = 4.5\text{V}$ , $I_O = 10\text{mA}$ , $T_J = 25^\circ\text{C}$	2.475	2.5	2.525	V
Output Voltage	$V_O$	$I_O = 0$ to $1\text{A}$ , $V_{IN} = 3.9$ to $10\text{V}$	2.46		2.54	V
Line Regulation	$\Delta V_O$	$V_{IN} = 3.9$ to $10\text{V}$ , $I_O = 0\text{mA}$		0.04	0.2	mV
Load Regulation	$\Delta V_O$	$V_{IN} = 3.9\text{V}$ , $I_O = 0$ to $1\text{A}$		0.08	0.4	mV
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J = 125^\circ\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$	$I_O = 100\text{mA}$			7	V
Quiescent Current	$I_D$	$V_{IN} \leq 10\text{V}$		5	10	mA
Output Current	$I_O$	$V_{IN} = 7.5\text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1200	mA
Output Noise Voltage	$e_N$	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
Supply Voltage Rejection	SVR	$I_O = 40\text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{IN} = 5.5\text{V}$ , $V_{NIPPLE} = 1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O = 100\text{mA}$		1	1.1	V
		$I_O = 500\text{mA}$		1.05	1.15	V
		$I_O = 800\text{mA}$		1.1	1.2	V
Thermal Regulation		$T_A = 25^\circ\text{C}$ 30ms Pulse		0.01	0.1	%/W

**ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-2.85**(Refer to the test circuits,  $T_J=0$  to  $125^\circ\text{C}$   $C_O=10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$V_{IN} = 4.85\text{V}$ , $I_O = 10\text{mA}$ , $T_J = 25^\circ\text{C}$	2.821	2.85	2.879	V
Output Voltage	$V_O$	$I_O = 0$ to $1\text{A}$ , $V_{IN} = 4.25$ to $10\text{V}$	2.805		2.895	V
Line Regulation	$\Delta V_O$	$V_{IN} = 4.25$ to $10\text{V}$ , $I_O = 0\text{mA}$		0.004	0.2	mV
Load Regulation	$\Delta V_O$	$V_{IN} = 4.25\text{V}$ , $I_O = 0$ to $1\text{A}$		0.08	0.4	mV
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J = 125^\circ\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$	$I_O = 100\text{mA}$			7	V
Quiescent Current	$I_D$	$V_{IN} \leq 10\text{V}$		5	10	mA
Output Current	$I_O$	$V_{IN} = 7.85\text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1200	mA
Output Noise Voltage	$e_N$	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
Supply Voltage Rejection	SVR	$I_O = 40\text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{IN} = 5.85\text{V}$ , $V_{NIPPLE} = 1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O = 100\text{mA}$		1	1.1	V
		$I_O = 500\text{mA}$		1.05	1.15	V
		$I_O = 800\text{mA}$		1.1	1.2	V
Thermal Regulation		$T_A = 25^\circ\text{C}$ 30ms Pulse		0.003		%/W

**ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-3.0**(Refer to the test circuits,  $T_J=0$  to  $125^\circ\text{C}$   $C_O=10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$V_{IN}=5\text{V}$ , $I_O=10\text{mA}$ , $T_J=25^\circ\text{C}$	2.97	3	3.03	V
Output Voltage	$V_O$	$I_O=0$ to $1\text{A}$ , $V_{IN}=4.5$ to $10\text{V}$	2.95		3.05	V
Line Regulation	$\Delta V_O$	$V_{IN}=4.5$ to $12\text{V}$ , $I_O=0\text{mA}$		0.04	0.2	mV
Load Regulation	$\Delta V_O$	$V_{IN}=4.5\text{V}$ , $I_O=0$ to $1\text{A}$		0.08	0.4	mV
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J=125^\circ\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$	$I_O=100\text{mA}$			7	V
Quiescent Current	$I_D$	$V_{IN}\leq 12\text{V}$		5	10	mA
Output Current	$I_O$	$V_{IN}=8\text{V}$ , $T_J=25^\circ\text{C}$	800	950	1200	mA
Output Noise Voltage	$e_N$	$B=10\text{Hz}$ to $10\text{kHz}$ , $T_J=25^\circ\text{C}$		100		$\mu\text{V}$
Supply Voltage Rejection	SVR	$I_O=40\text{mA}$ , $f=120\text{Hz}$ , $T_J=25^\circ\text{C}$ $V_{IN}=6\text{V}$ , $V_{NIPPLE}=1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O=100\text{mA}$		1	1.1	V
		$I_O=500\text{mA}$		1.05	1.15	V
		$I_O=800\text{mA}$		1.1	1.2	V
Thermal Regulation		$T_A=25^\circ\text{C}$ 30ms Pulse		0.003	0.1	%/W

**ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-3.3**(Refer to the test circuits,  $T_J=0$  to  $125^\circ\text{C}$   $C_O=10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$V_{IN}=5.3\text{V}$ , $I_O=10\text{mA}$ , $T_J=25^\circ\text{C}$	3.267	3.3	3.333	V
Output Voltage	$V_O$	$I_O=0$ to $1\text{A}$ , $V_{IN}=4.75$ to $10\text{V}$	3.247		3.353	V
Line Regulation	$\Delta V_O$	$V_{IN}=4.75$ to $15\text{V}$ , $I_O=0\text{mA}$		0.04	0.2	mV
Load Regulation	$\Delta V_O$	$V_{IN}=4.75\text{V}$ , $I_O=0$ to $1\text{A}$		0.08	0.4	mV
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J=125^\circ\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$	$I_O=100\text{mA}$			7	V
Quiescent Current	$I_D$	$V_{IN}\leq 15\text{V}$		5	10	mA
Output Current	$I_O$	$V_{IN}=8.3\text{V}$ , $T_J=25^\circ\text{C}$	800	950	1200	mA
Output Noise Voltage	$e_N$	$B=10\text{Hz}$ to $10\text{kHz}$ , $T_J=25^\circ\text{C}$		100		$\mu\text{V}$
Supply Voltage Rejection	SVR	$I_O=40\text{mA}$ , $f=120\text{Hz}$ , $T_J=25^\circ\text{C}$ $V_{IN}=6.3\text{V}$ , $V_{NIPPLE}=1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O=100\text{mA}$		1	1.1	V
		$I_O=500\text{mA}$		1.05	1.15	V
		$I_O=800\text{mA}$		1.1	1.2	V
Thermal Regulation		$T_A=25^\circ\text{C}$ 30ms Pulse		0.003		%/W

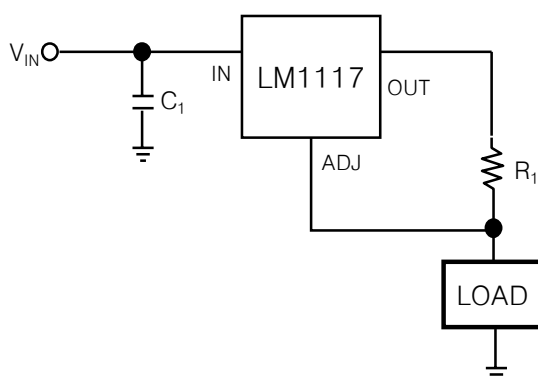
## ELECTRICAL CHARACTERISTICS FOR LM1117 S/T-5.0

(Refer to the test circuits,  $T_J = 0$  to  $125^\circ\text{C}$   $C_O = 10\mu\text{F}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$V_{IN} = 7\text{V}$ , $I_O = 10\text{mA}$ , $T_J = 25^\circ\text{C}$	4.95	5	5.05	V
Output Voltage	$V_O$	$I_O = 0$ to $1\text{A}$ , $V_{IN} = 6.5$ to $15\text{V}$	4.92		5.08	V
Line Regulation	$\Delta V_O$	$V_{IN} = 6.5$ to $15\text{V}$ , $I_O = 0\text{mA}$		0.04	0.2	mV
Load Regulation	$\Delta V_O$	$V_{IN} = 6.5\text{V}$ , $I_O = 0$ to $1\text{A}$		0.08	0.4	mV
Temperature Stability	$\Delta V_O$			0.5		%
Long Term Stability	$\Delta V_O$	1000 hrs, $T_J = 125^\circ\text{C}$		0.3		%
Operating Input Voltage	$V_{IN}$	$I_O = 100\text{mA}$			7	V
Quiescent Current	$I_D$	$V_{IN} \leq 15\text{V}$		5	10	mA
Output Current	$I_O$	$V_{IN} = 8.3\text{V}$ , $T_J = 25^\circ\text{C}$	800	950	1200	mA
Output Noise Voltage	$e_N$	$B = 10\text{Hz}$ to $10\text{kHz}$ , $T_J = 25^\circ\text{C}$		100		$\mu\text{V}$
Supply Voltage Rejection	SVR	$I_O = 40\text{mA}$ , $f = 120\text{Hz}$ , $T_J = 25^\circ\text{C}$ $V_{IN} = 6.3\text{V}$ , $V_{NIPPLE} = 1\text{V}_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_O = 100\text{mA}$		1	1.1	V
		$I_O = 500\text{mA}$		1.05	1.15	V
		$I_O = 800\text{mA}$		1.1	1.2	V
Thermal Regulation		$T_A = 25^\circ\text{C}$ 30ms Pulse		0.003		%/W

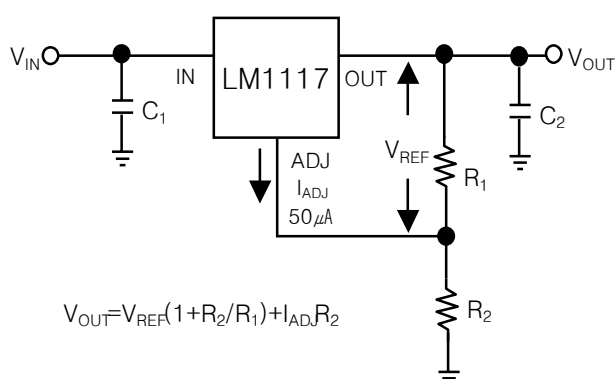
## LM1117 (ADJUSTABLE) ELECTRICAL CHARACTERISTICS

Figure 1.



1A Current Output

Figure 2.



$$V_{OUT} = V_{REF}(1 + R_2/R_1) + I_{ADJ}R_2$$

Typical Adjustable Regulator

Figure 3. Negative Supply

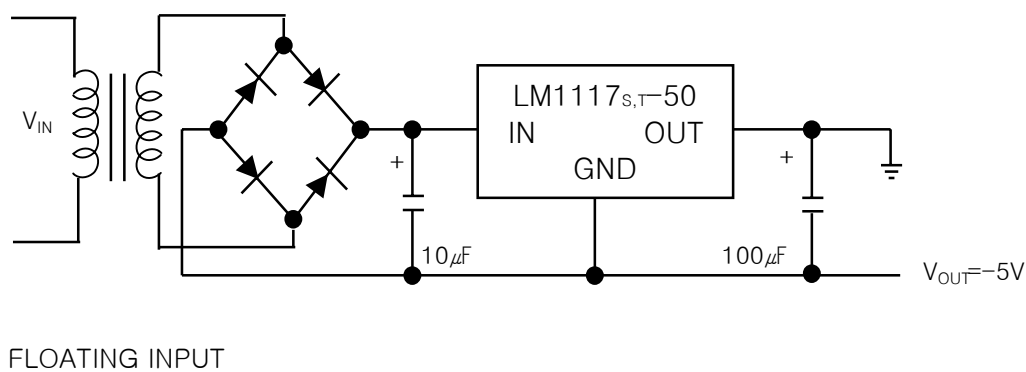


Figure 4. Active Terminator for SCSI-2 BUS

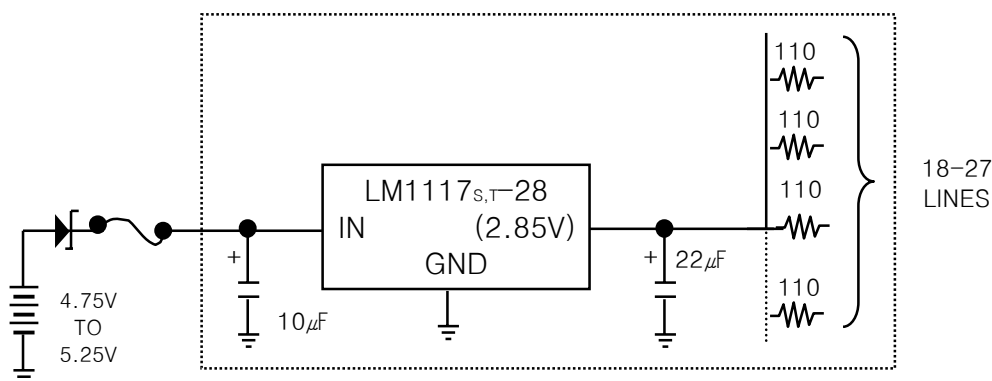


Figure 5. Voltage Regulator With Reference

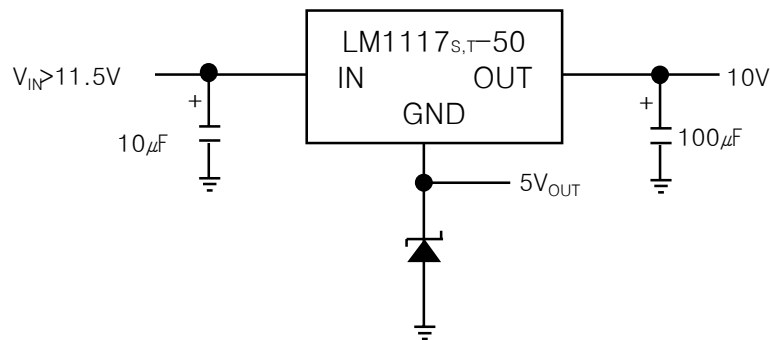


Figure 6. Battery Backed-up Regulated Supply

