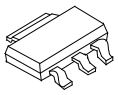
LD1117AH

LINEAR INTEGRATED CIRCUIT

LOW DROP FIXED AND ADJUSTABLE POSITIVE VOLTAGE REGULATORS



SOT-223

SOT- 89

■ DESCRIPTION

The UTC **LD1117AH** is a low dropout, 3-terminal positive voltage regulator designed to provide output current up to 1A, There are adjustable version (V_{REF}=1.25V) and various fixed versions.

■ FEATURES

* Low dropout voltage
* Suitable for SCSI-2 active termination if V_{OUT} set to 2.85V
* Output current up to 1A
* Built-in current limit and over temperature protection
* Low current consumption
* Support MLCC

■ ORDERING INFORMATION

Ordering Number		Package	① Pin Assignment	② Packing
Lead Free	Halogen Free			
LD1117AHL-xx-AA3-①-R	LD1117AHG-xx-AA3-①-R	SOT-223	See below	R: Tape Reel
LD1117AHL-xx-AB3-①-R	LD1117AHG-xx-AB3-①-R	SOT-89		

Pin Code	1	2	3
A	G	O	I
B	O	G	I
C	G	I	O
D	I	G	O

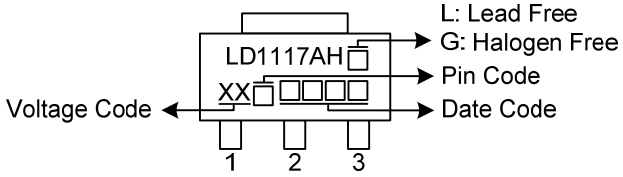
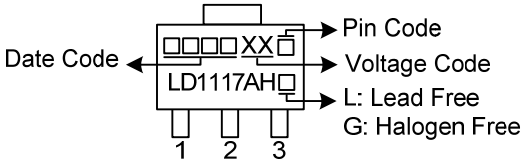
Notes: 1. Pin Assignment: I: V_{IN} O: V_{OUT} G: GND
2. xx: Output Voltage.

LD1117AHG-xx-AA3-①-②

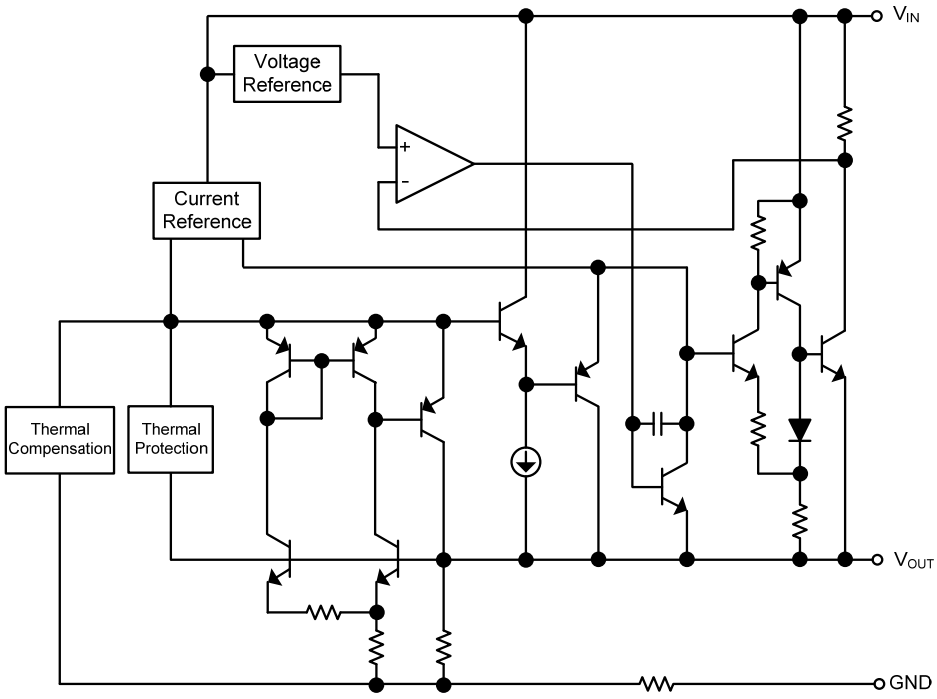
(1)Packing Type
(2)Pin Assignment
(3)Package Type
(4)Output Voltage Code
(5)Green Package

(1) R: Tape Reel
(2) refer to Pin Assignment
(3) AA3: SOT-223, AB3: SOT-89
(4) xx: refer to Marking Information
(5) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-223	18: 1.8V 33 :3.3V 50: 5.0V AD:ADJ	
SOT-89		

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
DC Input Voltage	V_{IN}	20	V
Power Dissipation	P_D	Internally limited	
Junction Temperature	T_J	+150	°C
Operating Temperature (Note 2)	T_{OPR}	-20 ~ +125	°C
Storage temperature	T_{STG}	-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. This condition is only determined from design. It can't be 100% tested in mass production.

■ RECOMMENDED OPERATING RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	15	V
Operating Junction Temperature	T_J	-20 ~ +125	°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	165	°C/W
	SOT-89		180	°C/W
Junction to Case	SOT-223	θ_{JC}	15	°C/W
	SOT-89		50	°C/W

■ ELECTRICAL CHARACTERISTICS

(T_A=25°C, refer to the test circuits, C_O=10μF, unless otherwise specified)

For LD1117AH-1.8

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN}=3.8V, I_{OUT}=10mA, T_J=25°C	1.764	1.800	1.836	V
Output Voltage	V_{OUT}	V_{IN}=3.3 to 8V, I_{OUT}=0~1A	1.764	1.800	1.836	V
Line Regulation	ΔV_{OUT}	V_{IN}=3.3 to 8V, I_{OUT}=0mA		1	6	mV
Load Regulation	ΔV_{OUT}	V_{IN}=3.3V, I_{OUT}=0~1A		1	10	mV
Temperature stability	ΔV_{OUT}			0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, T_J=125°C		0.3		%
Operating Input Voltage	V_{IN}	I_{OUT}=100mA			15	V
Quiescent Current	I_Q	V_{IN}≤10V		5	10	mA
Current Limit	I_{LIMIT}	V_{IN}=6.8V, T_J=25°C	1			A
Output Noise Voltage	e_N	B=10Hz to 10KHz, T_J=25°C		100		μV
Supply Voltage Rejection	SVR	I_{OUT}=40mA, f=120Hz, T_J=25°C, V_{IN}=5.5V, V_{RIPPLE}=1V_{PP}	60	75		dB
Dropout Voltage	V_D	I_{OUT}=100mA		1.00	1.10	V
		I_{OUT}=500mA		1.15	1.25	V
		I_{OUT}=800mA		1.20	1.30	V
		I_{OUT}=1A		1.20	1.30	V
Thermal Regulation		T_A=25°C, 30ms Pulse		0.01	0.10	%/W

■ ELECTRICAL CHARACTERISTICS (Cont.)

For LD1117AH-3.3

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN}=5.3V, I_{OUT}=10mA, T_J=25°C	3.234	3.300	3.366	V
Output Voltage	V_{OUT}	V_{IN}=4.75 to 10V, I_{OUT}=0~1A	3.234	3.300	3.366	V
Line Regulation	ΔV_{OUT}	V_{IN}=4.75 to 15V, I_{OUT}=0mA		1	6	mV
Load Regulation	ΔV_{OUT}	V_{IN}=4.75V, I_{OUT}=0~1A		1	10	mV
Temperature stability	ΔV_{OUT}			0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, T_J=125°C		0.3		%
Operating Input Voltage	V_{IN}	I_{OUT}=100mA			15	V
Quiescent Current	I_Q	V_{IN}≤15V		5	10	mA
Current Limit	I_{LIMIT}	V_{IN}=8.3V, T_J=25°C	1			A
Output Noise Voltage	e_N	B=10Hz to 10KHz, T_J=25°C		100		μV
Supply Voltage Rejection	SVR	I_{OUT}=40mA, f=120Hz, T_J=25°C, V_{IN}=6.3V, V_{RIPPLE}=1V_{PP}	60	75		dB
Dropout Voltage	V_D	I_{OUT}=100mA		1.00	1.10	V
		I_{OUT}=500mA		1.15	1.25	V
		I_{OUT}=800mA		1.20	1.30	V
		I_{OUT}=1A		1.20	1.30	V
Thermal Regulation		T_A=25°C, 30ms Pulse		0.01	0.10	%/W

For LD1117AH-5.0

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN}=7V, I_{OUT}=10mA, T_J=25°C	4.900	5.000	5.100	V
Output Voltage	V_{OUT}	V_{IN}=6.5 to 15V, I_{OUT}=0~1A	4.900	5.000	5.100	V
Line Regulation	ΔV_{OUT}	V_{IN}=6.5 to 15V, I_{OUT}=0mA		1	10	mV
Load Regulation	ΔV_{OUT}	V_{IN}=6.5V, I_{OUT}=0~1A		1	15	mV
Temperature stability	ΔV_{OUT}			0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, T_J=125°C		0.3		%
Operating Input Voltage	V_{IN}	I_{OUT}=100mA			15	V
Quiescent Current	I_Q	V_{IN}≤15V		5	10	mA
Current Limit	I_{LIMIT}	V_{IN}=10V, T_J=25°C	1			A
Output Noise Voltage	e_N	B=10Hz to 10KHz, T_J=25°C		100		μV
Supply Voltage Rejection	SVR	I_{OUT}=40mA, f=120Hz, T_J=25°C, V_{IN}=8V, V_{RIPPLE}=1V_{PP}	60	75		dB
Dropout Voltage	V_D	I_{OUT}=100mA		1.00	1.10	V
		I_{OUT}=500mA		1.15	1.25	V
		I_{OUT}=800mA		1.20	1.30	V
		I_{OUT}=1A		1.20	1.30	V
Thermal Regulation		T_A=25°C, 30ms Pulse		0.01	0.10	%/W

■ ELECTRICAL CHARACTERISTICS (Cont.)

For LD1117AH-ADJ

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Voltage	V_{REF}	V_{IN}-V_{OUT}=2V, I_{OUT}=10mA, T_J=25°C	1.225	1.25	1.275	V
Reference Voltage	V_{REF}	V_{IN}-V_{OUT}=1.4 to 10V, I_{OUT}=10~1A	1.225	1.25	1.275	V
Line Regulation	ΔV_{OUT}	V_{IN}-V_{OUT}=1.5 to 13.75V, I_{OUT}=10mA		0.035	0.2	%
Load Regulation	ΔV_{OUT}	V_{IN}-V_{OUT}=3V, I_{OUT}=10~1A		0.1	0.4	%
Temperature stability	ΔV_{OUT}			0.50		%
Long Term Stability	ΔV_{OUT}	1000 hrs, T_J=125°C		0.3		%
Operating Input Voltage	V_{IN}				15	V
Adjustment Pin Current	I_{ADJ}	V_{IN}≤15V		60	120	μA
Adjustment Pin Current Change	ΔI_{ADJ}	V_{IN}-V_{OUT}=1.4 to 10V, I_{OUT}=10 ~ 1A		1	5	μA
Minimum Load Current	$I_{O(MIN)}$	V_{IN}=15V		2	5	mA
Current Limit	I_{LIMIT}	V_{IN}-V_{OUT}=5V, T_J=25°C	1			A
Output Noise (%V_O)	e_N	B=10Hz to 10KHz, T_J=25°C		0.003		%
Supply Voltage Rejection	SVR	I_{OUT}=40mA, f=120Hz, T_J=25°C, V_{IN}-V_{OUT}=3V, V_{RIPPLE}=1V_{PP}	60	75		dB
Dropout Voltage	V_D	I_{OUT}=100mA		1.00	1.10	V
		I_{OUT}=500mA		1.15	1.25	V
		I_{OUT}=800mA		1.20	1.30	V
		I_{OUT}=1A		1.20	1.30	V
Thermal Regulation		T_A=25°C, 30ms Pulse		0.01	0.10	%/W

■ TYPICAL APPLICATIONS

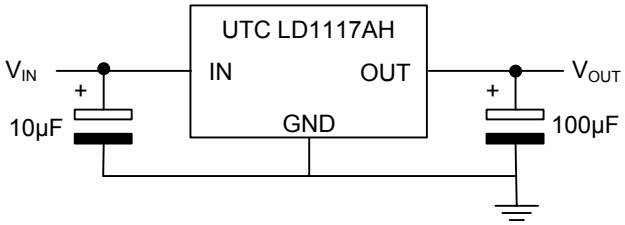


Fig.1 Tyncal Application Circuit

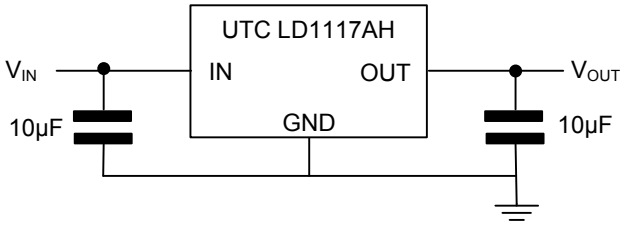


Fig.2 Tyncal Application Circuit (FOR MLCC)

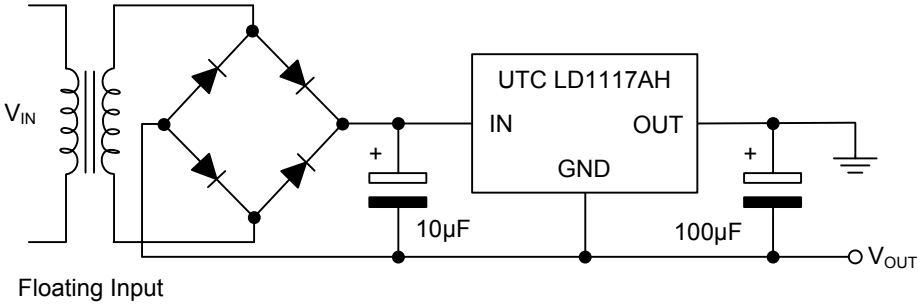


Fig.3 Negative Supply

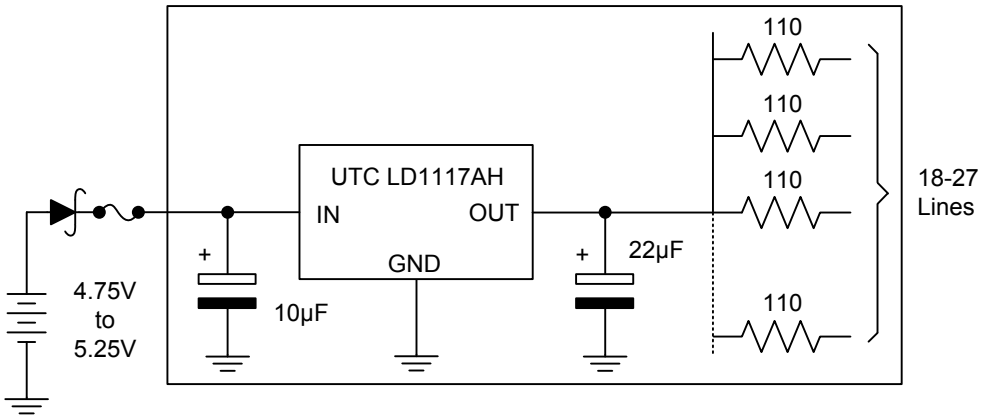


Fig.4 Active Terminator for SCSI-2 BUS

■ TYPICAL APPLICATIONS (Cont.)

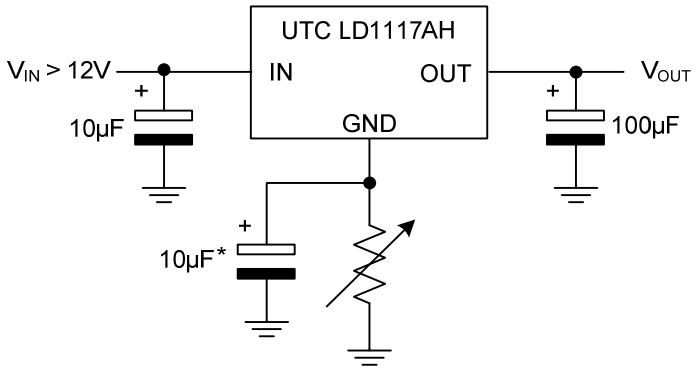


Fig.5 Circuit for Increasing Output Voltage

■ APPLICATION NOTE of LD1117AH ADJUSTABLE

The UTC **LD1117AH** adjustable has a reference voltage of between the OUT and ADJ/GND pins. I_{ADJ} is 60μA typ. (120μA max.) and ΔI_{ADJ} is 1μA typ. (5μA max.).

R_1 is normally fixed to 120Ω.

From figure 6 we obtain:

$V_{OUT}=V_{REF}+R_2(I_{ADJ}+I_{R1})=V_{REF} + R_2(I_{ADJ}+V_{REF}/R_1)=V_{REF}(1+R_2/R_1) + R_2 \times I_{ADJ}$.

Usually R_2 value is in the range of few KΩ, so the R_2 X I_{ADJ} product could be neglected; then the above expression becomes: $V_{OUT}=V_{REF}(1+R_2/R_1)$

For better load regulation, realize a good Kelvin connection of R_1 and R_2 is important. Particularly R_1 connection must be realized very close to OUT and ADJ/GND pin, while R_2 ground connection must be placed as near as possible to the negative Load pin. Ripple rejection can be improved by introducing a 10μF electrolytic capacitor placed in parallel to the R_2 resistor (See Fig. 8)

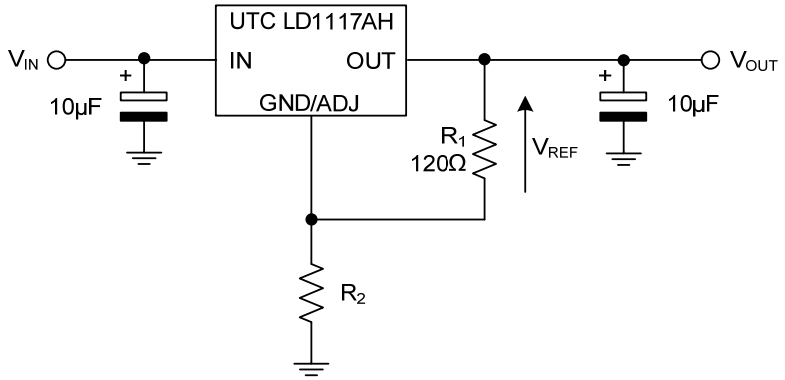


Fig.6 Adjustable Output Voltage Application Circuit

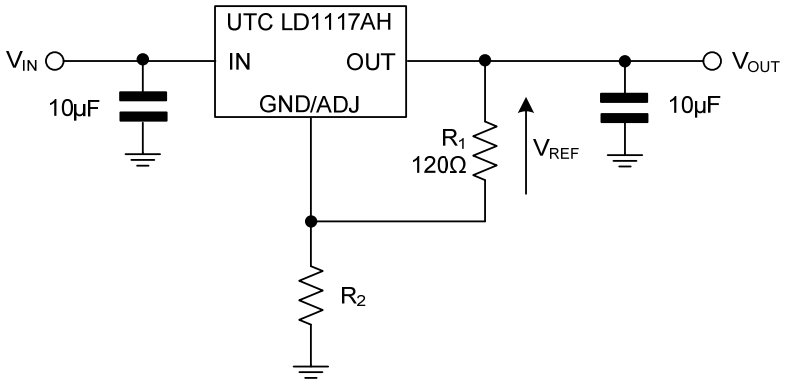


Fig.7 Adjustable Output Voltage Application Circuit (FOR MLCC)

■ APPLICATION NOTE of LD1117AH ADJUSTABLE (Cont.)

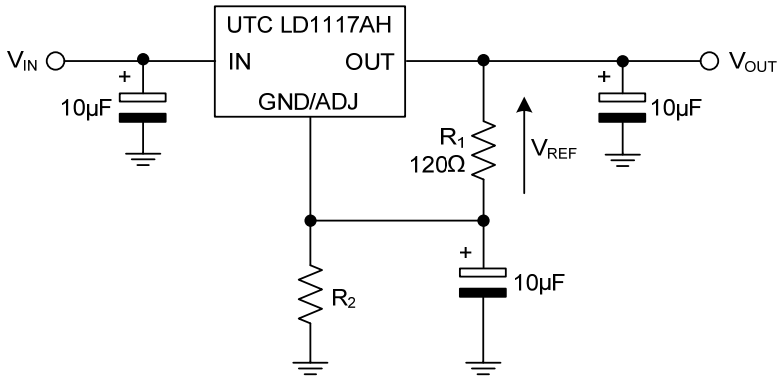
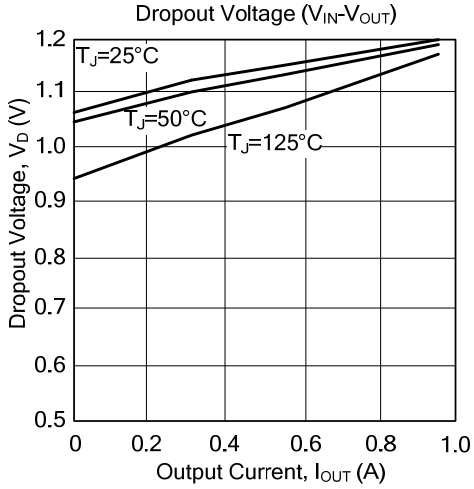


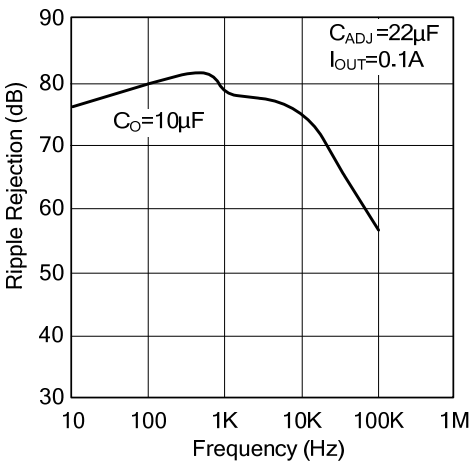
Fig.8 Adjustable Output Voltage Application with improved Ripple Rejection.

■ TYPICAL CHARACTERISTICS

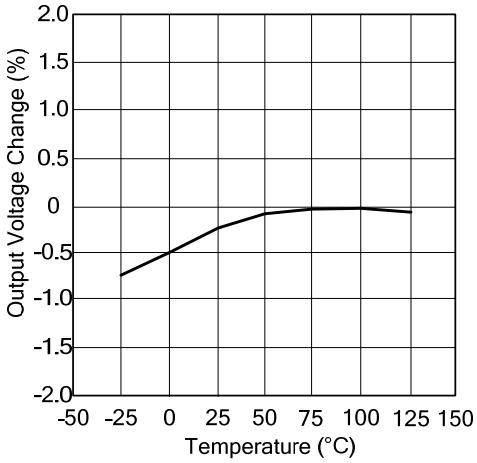
Dropout Voltage (V_{IN}-V_{OUT})



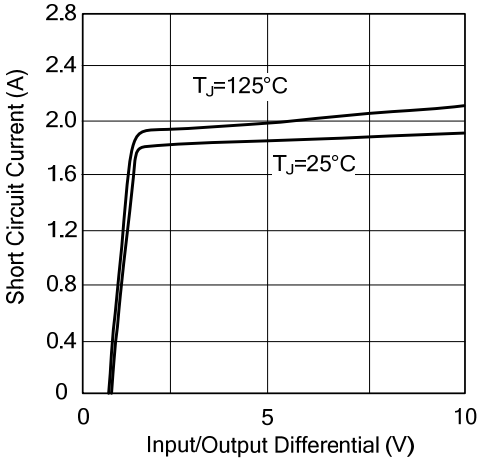
Ripple Rejection



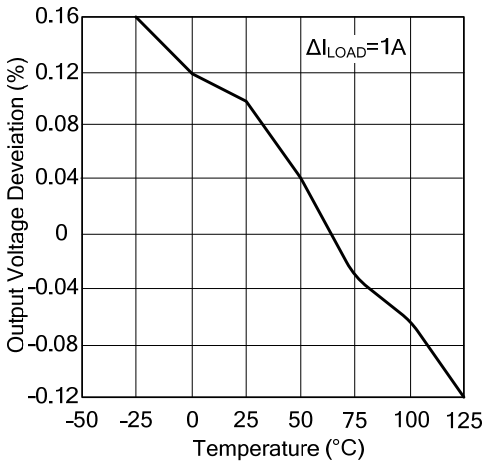
Temperature Stability



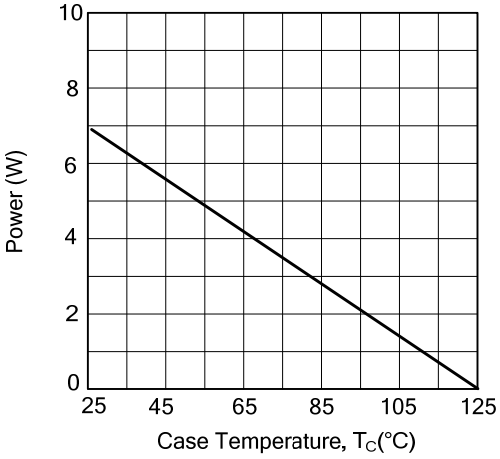
Short-Circuit Current



Load Regulation



Maximum Power Dissipation



■ TYPICAL CHARACTERISTICS (Cont.)