



## LD1117AH

## LINEAR INTEGRATED CIRCUIT

LOW DROP FIXED AND  
ADJUSTABLE POSITIVE  
VOLTAGE REGULATORS

## ■ 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 1.0A
- \* 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	<table border="1"><tr><th>Pin Code</th><th>1</th><th>2</th><th>3</th></tr><tr><td>A</td><td>G</td><td>O</td><td>I</td></tr><tr><td>B</td><td>O</td><td>G</td><td>I</td></tr><tr><td>C</td><td>G</td><td>I</td><td>O</td></tr><tr><td>D</td><td>I</td><td>G</td><td>O</td></tr></table>	Pin Code	1	2	3	A	G	O	I	B	O	G	I	C	G	I	O	D	I	G	O	R: Tape Reel
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

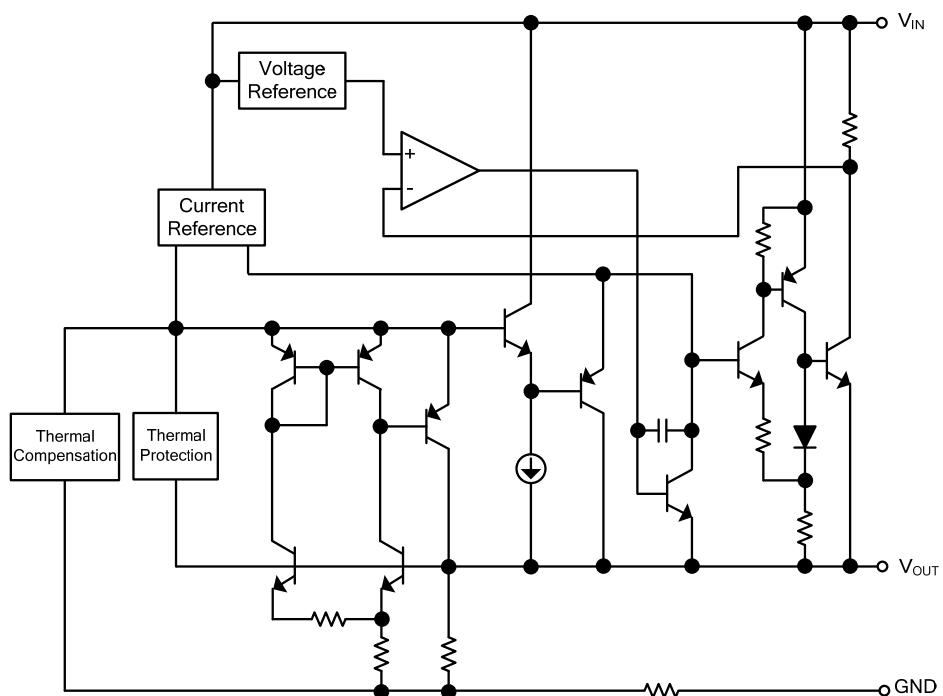
2. xx: Output Voltage, Refer to Marking Information.

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 (4) xx: refer to Marking Information (5) G: Halogen Free and Lead Free, L: Lead Free
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## ■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-223	33 :3.3V AD:ADJ	<p>L: Lead Free G: Halogen Free Pin Code Date Code</p>

## ■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

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

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	$^\circ\text{C}$

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	165	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	15	$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS

( $T_A=25^\circ\text{C}$ , refer to the test circuits,  $T_J=0 \sim 125^\circ\text{C}$ ,  $C_o=10\mu\text{F}$  unless otherwise specified)

For LD1117AH-3.3

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

## ■ ELECTRICAL CHARACTERISTICS (Cont.)

For LD1117AH-ADJ

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Voltage	$V_{REF}$	$V_{IN}-V_{OUT}=2V$ , $I_{OUT}=10mA$ , $T_J=25^\circ C$	1.225	1.25	1.275	V
Reference Voltage	$V_{REF}$	$V_{IN}-V_{OUT}=1.4$ to $10V$ , $I_{OUT}=10\sim1000mA$	1.225	1.25	1.275	V
Line Regulation	$\Delta V_{OUT}$	$V_{IN}-V_{OUT}=1.5$ to $13.75V$ , $I_{OUT}=10mA$		0.035	0.2	%
Load Regulation	$\Delta V_{OUT}$	$V_{IN}-V_{OUT}=3V$ , $I_{OUT}=10\sim1000mA$		0.1	0.4	%
Temperature stability	$\Delta V_{OUT}$			0.50		%
Long Term Stability	$\Delta V_{OUT}$	1000 hrs, $T_J=125^\circ C$		0.3		%
Operating Input Voltage	$V_{IN}$				15	V
Adjustment Pin Current	$I_{ADJ}$	$V_{IN}\leq 15V$		60	120	$\mu A$
Adjustment Pin Current Change	$\Delta I_{ADJ}$	$V_{IN}-V_{OUT}=1.4$ to $10V$ , $I_{OUT}=10 \sim 1000mA$		1	5	$\mu A$
Minimum Load Current	$I_{O(MIN)}$	$V_{IN}=15V$		2	5	mA
Current Limit	$I_{LIMIT}$	$V_{IN}-V_{OUT}=5V$ , $T_J=25^\circ C$	1000			mA
Output Noise (% $V_O$ )	$e_N$	$B=10Hz$ to $10KHz$ , $T_J=25^\circ C$		0.003		%
Supply Voltage Rejection	SVR	$I_{OUT}=40mA$ , $f=120Hz$ , $T_J=25^\circ C$ , $V_{IN}-V_{OUT}=3V$ , $V_{RIPPLE}=1V_{PP}$	60	75		dB
Dropout Voltage	$V_D$	$I_{OUT}=100mA$		1.00	1.10	V
		$I_{OUT}=500mA$		1.15	1.25	
		$I_{OUT}=800mA$		1.20	1.30	
		$I_{OUT}=1A$		1.20	1.30	
Thermal Regulation		$T_A=25^\circ C$ , 30ms Pulse		0.01	0.10	%/W

### ■ TYPICAL APPLICATIONS

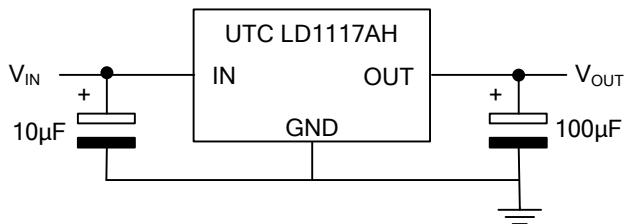


Fig.1 Tyncal Application Circuit

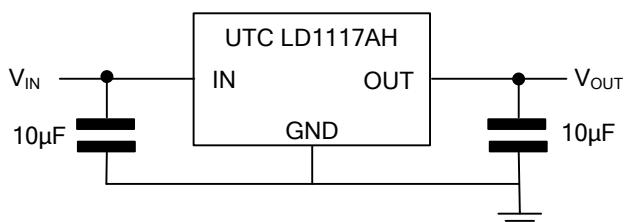


Fig.2 Tyncal Application Circuit (FOR MLCC)

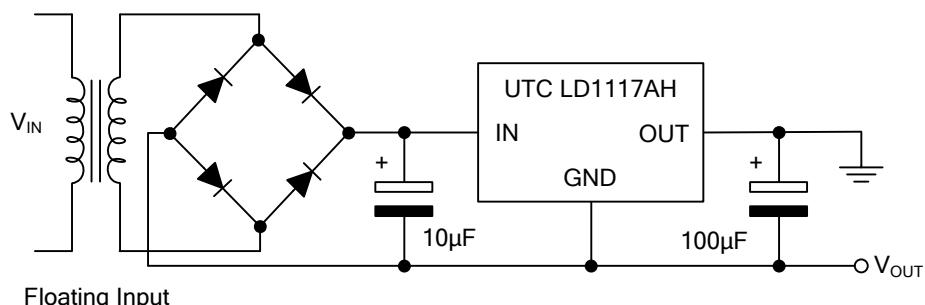


Fig.3 Negative Supply

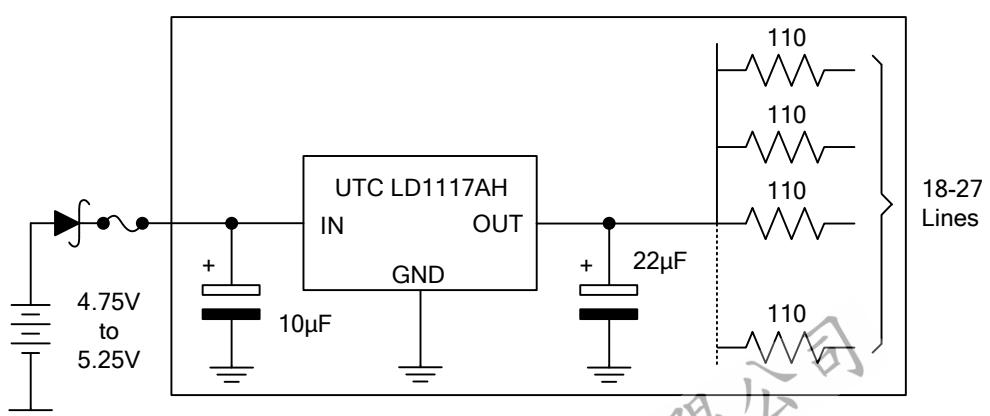


Fig.4 Active Terminator for SCSI-2 BUS

- TYPICAL APPLICATIONS (Cont.)

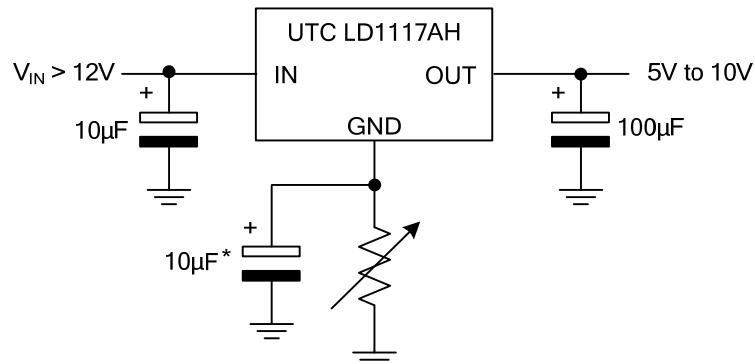


Fig.5 Circuit for Increasing Output Voltage

■ APPLICATION NOTE of LD1117AH ADJUSTABLE

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

$R_1$  is normally fixed to 120 $\Omega$ .

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 K $\Omega$ , so the  $R_2 \times I_{ADJ}$  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 10 $\mu F$  electrolytic capacitor placed in parallel to the  $R_2$  resistor (See Fig. 8)

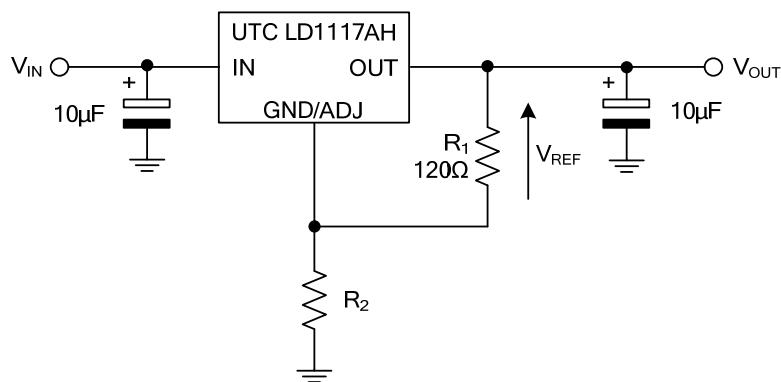


Fig.6 Adjustable Output Voltage Application Circuit

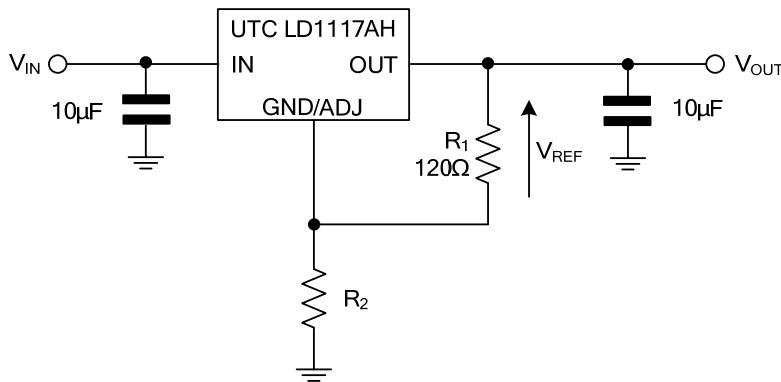


Fig.7 Adjustable Output Voltage Application Circuit (FOR MLCC)

- APPLICATION NOTE of LD1117AH ADJUSTABLE (Cont.)

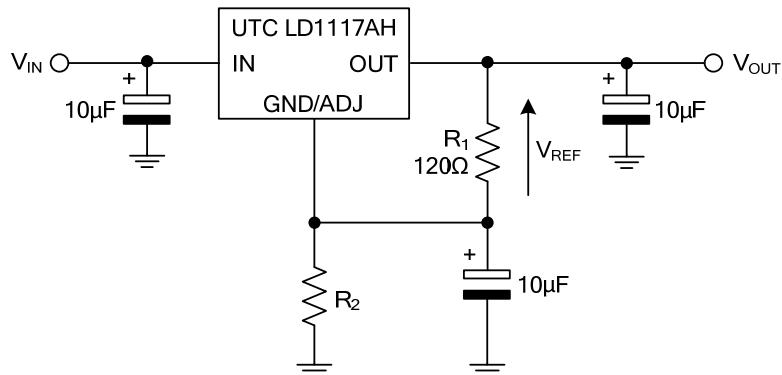
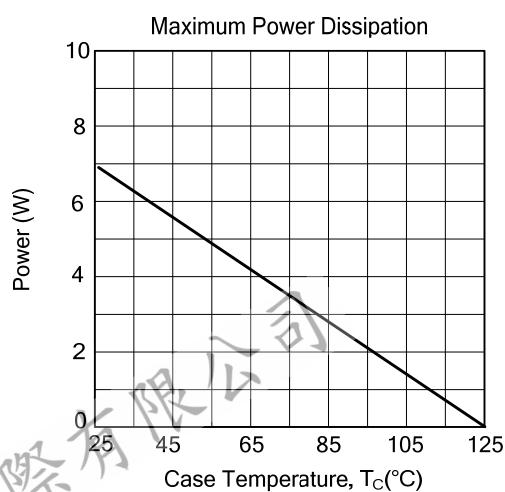
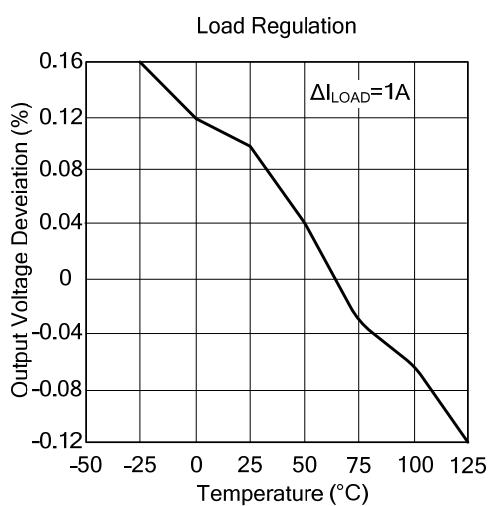
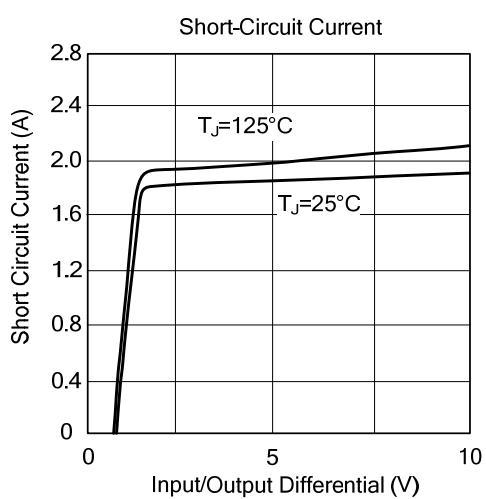
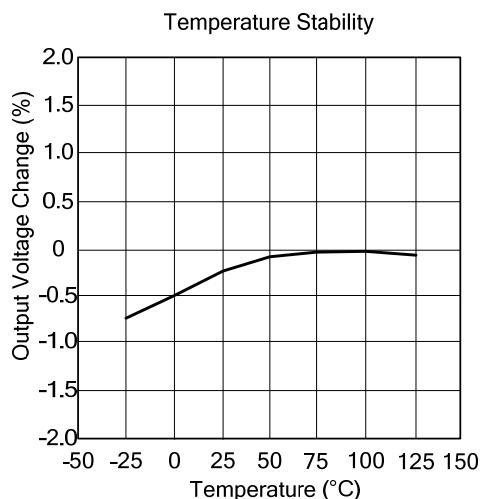
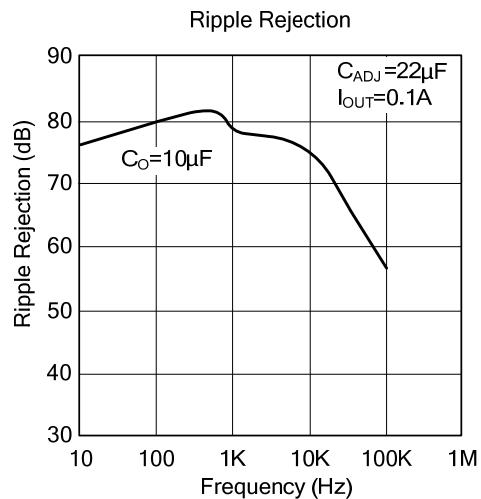
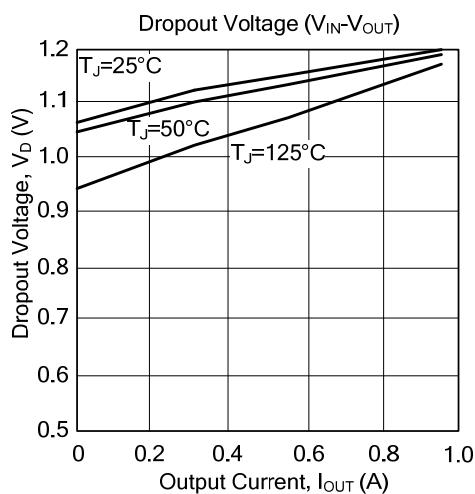
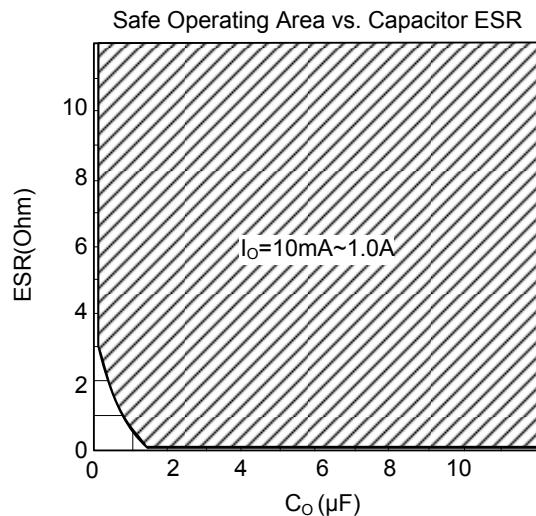


Fig.8 Adjustable Output Voltage Application with improved Ripple Rejection.

## ■ TYPICAL CHARACTERISTICS



- TYPICAL CHARACTERISTICS (Cont.)



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