



LD1117AH

LINEAR INTEGRATED CIRCUIT

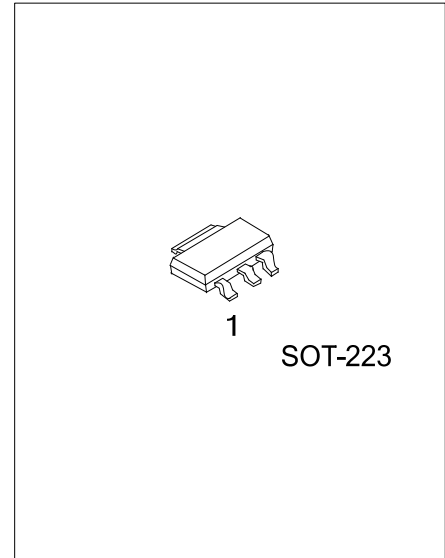
LOW DROP FIXED AND ADJUSTABLE POSITIVE VOLTAGE REGULATORS

■ 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 | | Pin Code | 1 | 2 | 3 | |
| LD1117AHL-xx-AA3-①-R | LD1117AHG-xx-AA3-①-R | SOT-223 | A | G | O | I | R: Tape Reel |
| | | | 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.

| | | |
|-----------------------------|---|---|
| <p>LD1117AHG-xx-AA3-①-②</p> | <p>(1) Packing Type</p> <p>(2) Pin Assignment</p> <p>(3) Package Type</p> <p>(4) Output Voltage Code</p> <p>(5) Green Package</p> | <p>(1) R: Tape Reel</p> <p>(2) refer to Pin Assignment</p> <p>(3) AA3: SOT-223</p> <p>(4) xx: refer to Marking Information</p> <p>(5) G: Halogen Free and Lead Free, L: Lead Free</p> |
|-----------------------------|---|---|

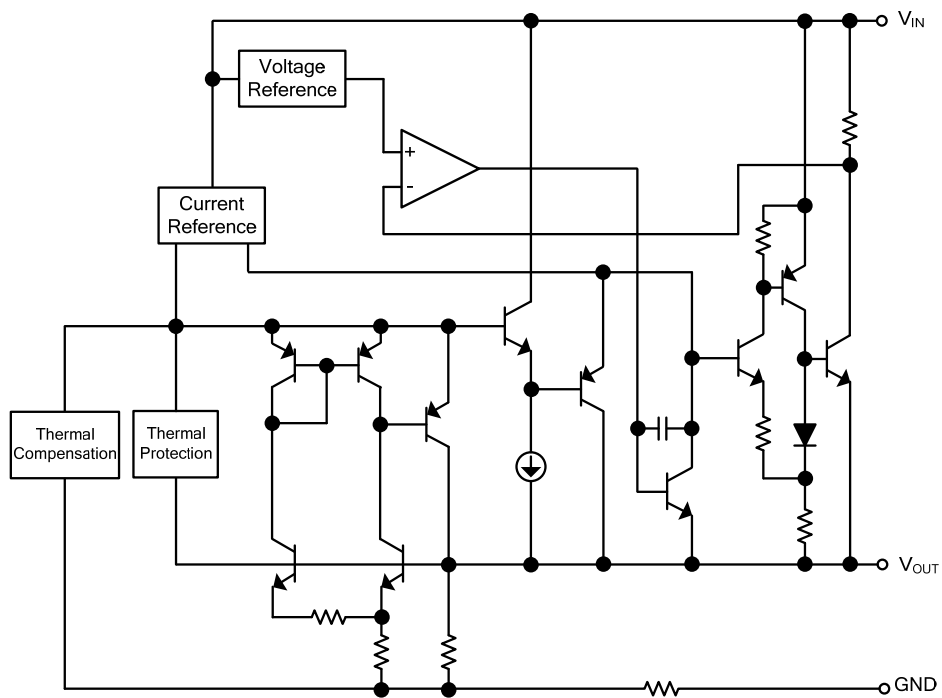
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MARKING INFORMATION

| PACKAGE | VOLTAGE CODE | MARKING |
|---------|--------------------|---------|
| SOT-223 | 33 :3.3V AD:ADJ | |

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C)

| 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 CHARACTERISTICS

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|-----------------|---------|------|
| Junction to Ambient | θ _{JA} | 165 | °C/W |
| Junction to Case | θ _{JC} | 15 | °C/W |

■ ELECTRICAL CHARACTERISTICS

(T_A=25°C, refer to the test circuits, T_J=0 ~ 125°C, C_O=10μF unless otherwise specified)

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} =0~1000mA | 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} =0~1000mA | | 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 | 1000 | | | mA |
| 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 | |
| | | I _{OUT} =800mA | | 1.20 | 1.30 | |
| | | I _{OUT} =1A | | 1.20 | 1.30 | |
| 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} | $V_{IN}-V_{OUT}=2V, I_{OUT}=10mA, T_J=25^{\circ}C$ | 1.225 | 1.25 | 1.275 | V |
| Reference Voltage | V_{REF} | $V_{IN}-V_{OUT}=1.4$ to 10V, $I_{OUT}=10\sim 1000mA$ | 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} | $V_{IN}-V_{OUT}=3V, I_{OUT}=10\sim 1000mA$ | | 0.1 | 0.4 | % |
| Temperature stability | ΔV_{OUT} | | | 0.50 | | % |
| Long Term Stability | ΔV_{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 | μA |
| Adjustment Pin Current Change | ΔI_{ADJ} | $V_{IN}-V_{OUT}=1.4$ to 10V, $I_{OUT}=10\sim 1000mA$ | | 1 | 5 | μA |
| Minimum Load Current | $I_{O(MIN)}$ | $V_{IN}=15V$ | | 2 | 5 | mA |
| Current Limit | I_{LIMIT} | $V_{IN}-V_{OUT}=5V, T_J=25^{\circ}C$ | 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

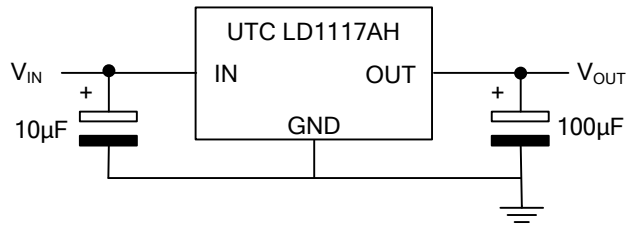


Fig.1 Tynca Application Circuit

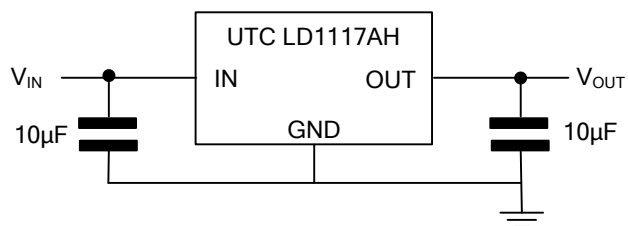
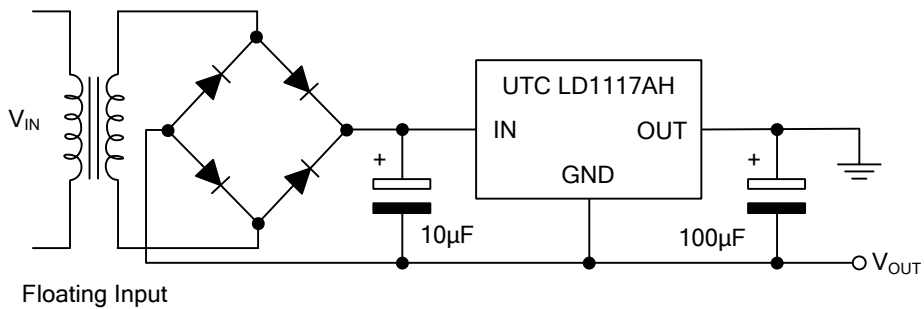


Fig.2 Tynca Application Circuit (FOR MLCC)



Floating Input

Fig.3 Negative Supply

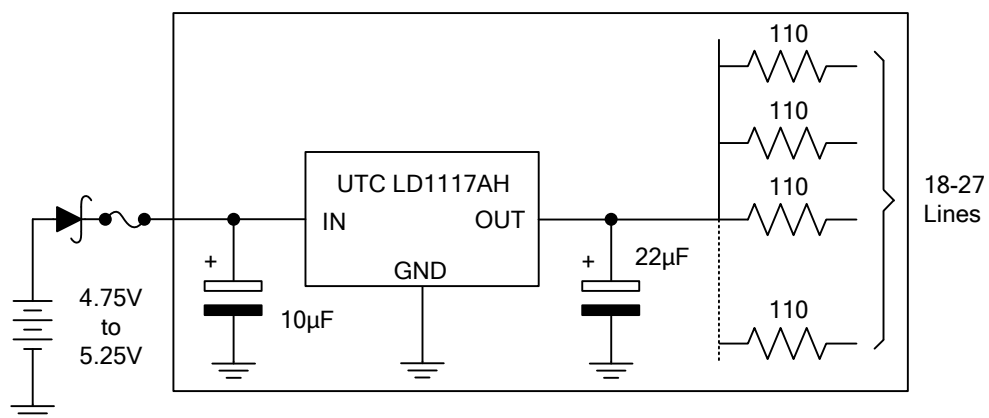


Fig.4 Active Terminator for SCSI-2 BUS

■ TYPICAL APPLICATIONS (Cont.)

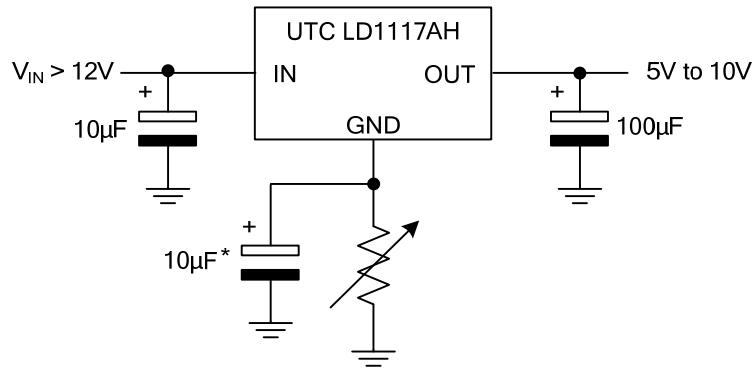


Fig.5 Circuit for Increasing Output Voltage

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 μ A typ. (120 μ A max.) and ΔI_{ADJ} is 1 μ A typ. (5 μ A max.).

R_1 is normally fixed to 120 Ω .

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 Ω , 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 μ F electrolytic capacitor placed in parallel to the R_2 resistor (See Fig. 8)

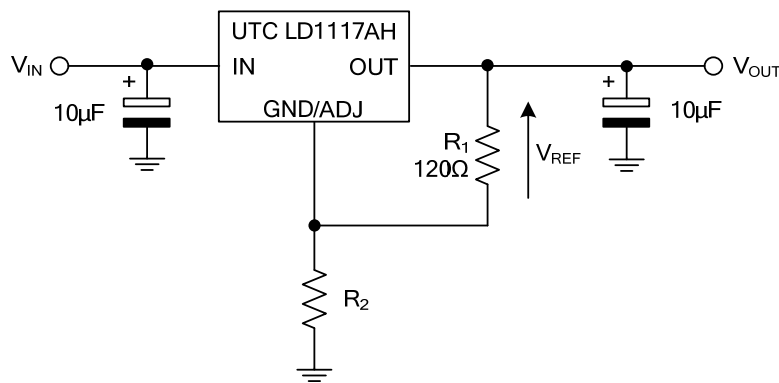


Fig.6 Adjustable Output Voltage Application Circuit

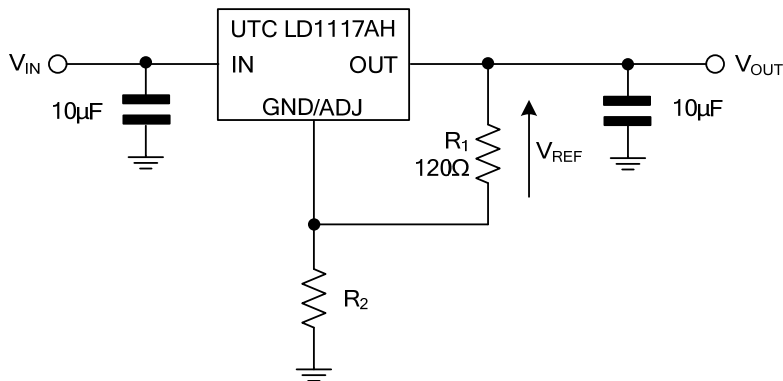


Fig.7 Adjustable Output Voltage Application Circuit (FOR MLCC)

■ APPLICATION NOTE of LD1117AH ADJUSTABLE (Cont.)

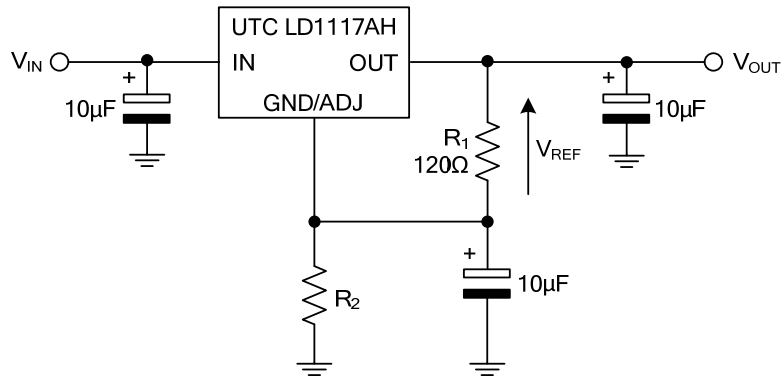
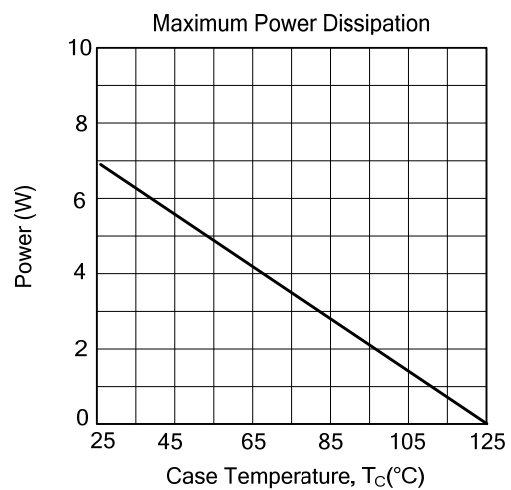
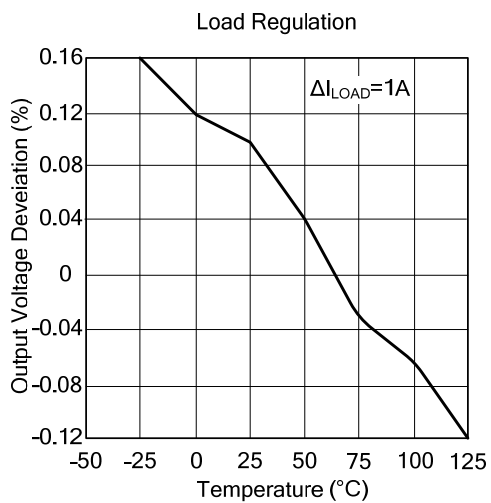
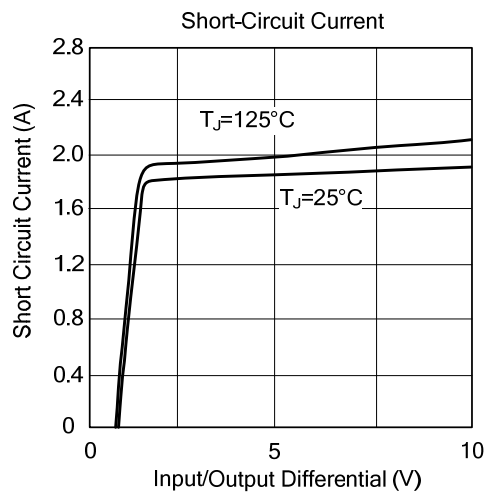
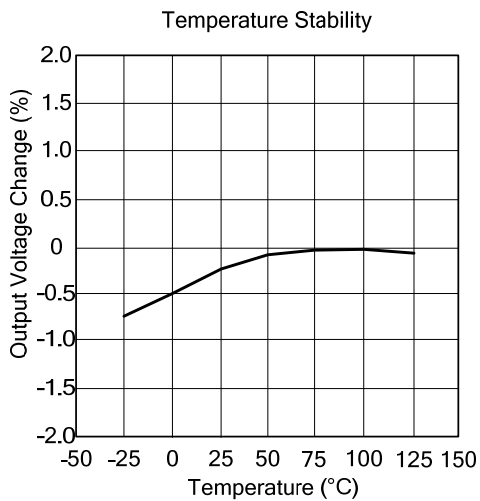
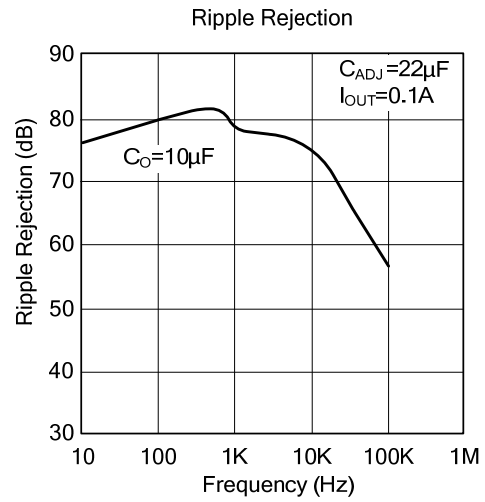
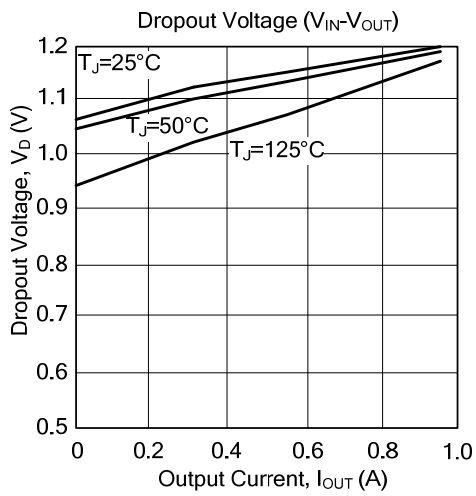
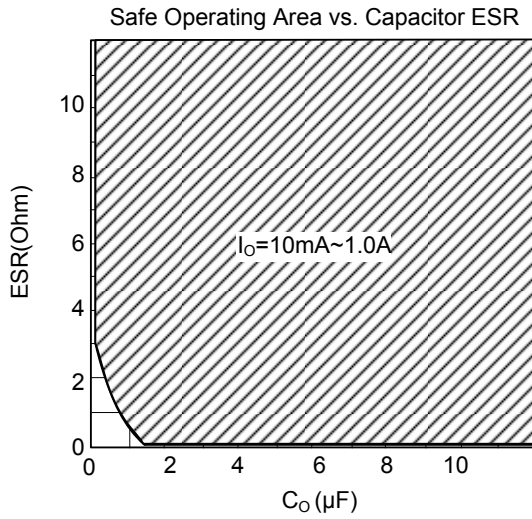


Fig.8 Adjustable Output Voltage Application with improved Ripple Rejection.

TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



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