# Low Dropout Linear Voltage Regulator

## Features

- Output Voltage selectable in 100mV steps ( 1.2V to 5.0V )
- Highly Accurate
- Low Dropout Voltage
- .Low Power Consumption
- Internal current limiting and short protecting
- Small packages

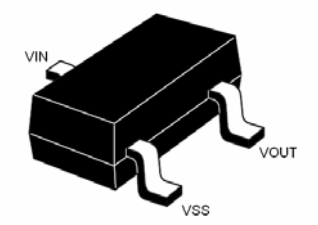
## Applications

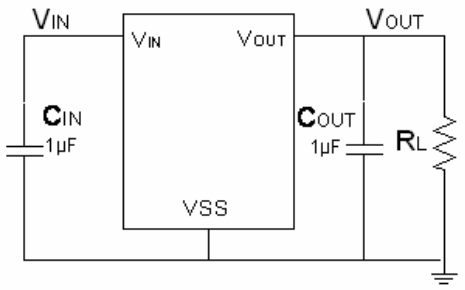
- Battery powered equipment
- Reference voltage sources
- Cameras, Video cameras
- Mobile phones
- Communication tools

## General Description

The FS3302 series are precise, low power consumption, positive voltage regulators manufactured using CMOS and laser trimming technologies. The series provides large currents with a significantly small dropout voltage. The FS3302 consists of a current limit circuit, a driver transistor, a precision reference voltage and an error correction circuit. The series is compatible with low ESR ceramic capacitors. The current limiter's foldback circuit also operates as a short protect for the output current limiter and the output pin. Output voltage can be set internally by laser trimming technologies. It is selectable in 100mV increments within a range of 1.2V to 5.0V. SOT23 packages are available.

## Pin Configurations (SOT23)




## Absolute Maximum Ratings

( Operating temperature range applies unless otherwise specified. )

| Parameter | Symbol | | Maximum | Units |
|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | | -0.3 to 6.5 | V |
| Output Current | $V_{OUT}$ | | $V_{SS}$-0.3 to $V_{IN}$+0.3 | |
| Power Dissipation($T_A$=25℃) | $P_D$ | SOT23 | 150 | mW |
| Operating Temperature Range | $T_{OPR}$ | | -40 to +125 | ℃ |
| Storage Temperature Range | $T_{STG}$ | | -65 to +150 | ℃ |

## ● Ordering Information

**FS3302-①②③④**

| DESIGNATOR | SYMBOL | DESCRIPTION |
|---|---|---|
| ①② | Output Detection Voltage | … 15=1.5V, 18=1.8V, 25=2.5V,28=2.8V, 30=3.0V, 33=3.3V |
| ③④ | Package Type: | SI: SOT23 |

## ● Electrical Characteristics

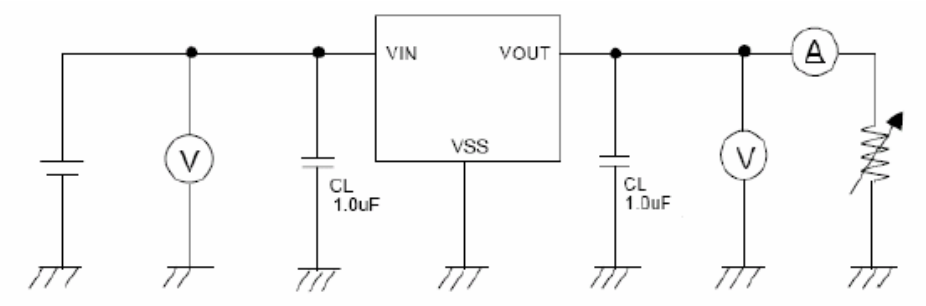
$V_{IN}$ = $V_{OUT}$ + 1V, $V_{EN}$ = $V_{IN}$, $C_{IN}$ = $C_{OUT}$ = 1μF, $T_J$ = 25°C unless otherwise specified

| Item | Symbol | Condition | | Test Circuit | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | -- | | -- | 1.8 | -- | 6.5 | V |
| Supply Current | $I_{SS}$ | $V_{IN}$ = $V_{OUT}$ + 1.0 V | | 2 | -- | 4 | -- | μA |
| Output Voltage | $V_{OUT}$ | $V_{IN}$ = $V_{OUT}$ + 1.0 V, $I_{OUT}$ = 40 mA | | 1 | $V_{OUT(T)}$× 0.98 | $V_{OUT(T)}$ | $V_{OUT(T)}$× 1.02 | V |
| Output Current | $I_{OUT}$ | $V_{IN}$ ≥ $V_{OUT}$ + 1.0 V | | 1 | 300 | -- | -- | mA |
| Dropout Voltage | $V_{DROP}$ | $I_{OUT}$= 100mA | 1.5 V ≤ $V_{OUT}$ ≤ 2.5 V | 1 | -- | 0.20 | 0.28 | V |
| | | | 2.6 V ≤ $V_{OUT}$ ≤ 3.3 V | | -- | 0.16 | 0.24 | |
| | | | 3.4 V ≤ $V_{OUT}$ ≤ 5.0 V | | -- | 0.12 | 0.20 | |
| Line Regulations | $\frac{\triangle V_{OUT}}{\triangle V_{IN} \cdot V_{OUT}}$ | $V_{OUT}$ + 0.5 V ≤ $V_{IN}$ ≤ 5.5 V<br>$I_{OUT}$ =80 mA | | | -- | 0.05 | 0.3 | %/V |
| Load Regulations | $\triangle V_{OUT}$ | $V_{IN}$ = $V_{OUT}$+1.0 V<br>1.0 mA ≤ $I_{OUT}$ ≤ 80 mA | | | -- | 20 | 40 | mV |
| Output Voltage Temperature Characteristics | $\frac{\triangle V_{OUT}}{\triangle T_A \cdot V_{OUT}}$ | $V_{IN}$ = $V_{OUT}$ + 1.0 V,<br>$I_{OUT}$ = 10 mA<br>-40°C ≤$T_A$ ≤ 85°C | | | -- | ±100 | -- | ppm/℃ |
| Ripple Rejection | \|PSRR\| | $V_{IN}$=$V_{OUT}$ +1.0 V， f= 1.0 kHz<br>$V_{drip}$=0.5 $V_{rms}$, $I_{OUT}$ = 80 mA | | 1 | -- | 40 | -- | dB |
| Short current | $I_{SHORT}$ | $V_{IN}$ = $V_{OUT}$ +1.5 V | | 1 | -- | 30 | -- | mA |
| Maximum Output Current | $I_{OUT}$ | $V_{IN}$ = $V_{OUT}$+1V | | 1 | 380 | -- | -- | mA |

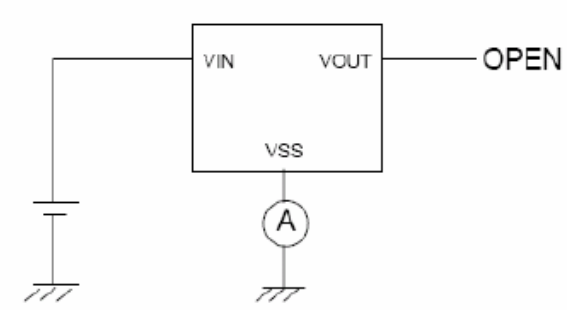
Note:

1. $V_{out\,(T)}$ = Specified output Voltage
2. $V_{out\,(E)}$ = Effective output Voltage ( i.e. the output voltage when "$V_{out\,(T)}$+1.0V" is provided at the $V_{IN}$ pin while maintaining a certain Iout value )
3. $V_{drop}$ = { $V_{IN1}$ ( note5 ) - $V_{OUT1}$ ( note4 ) }
4. $V_{out1}$ = A voltage equal to 98% of the output voltage whenever an amply stabilized $I_{out}$ ( $V_{out\,(T)}$ +1.0V ) is input.
5. $V_{IN1}$ = The input voltage when $V_{out}$ = $V_{OUT1}$

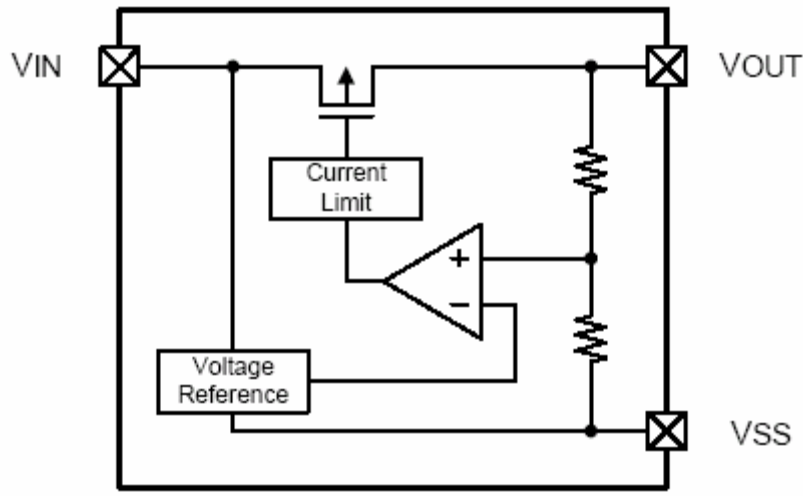
Test Circuit 1:




Test Circuit 2

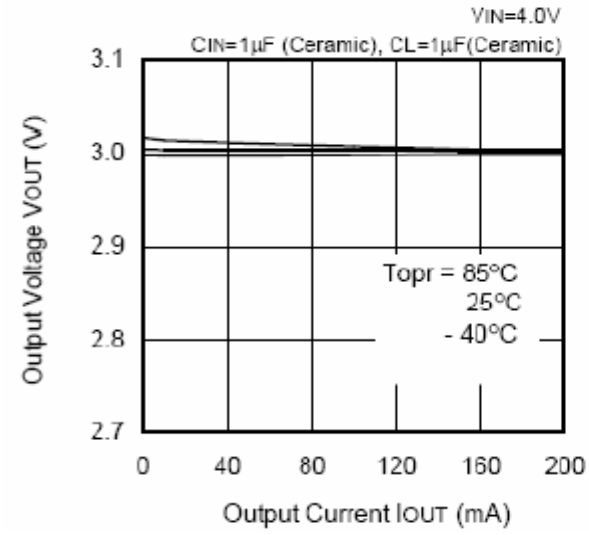



- **Typical Block Diagram**

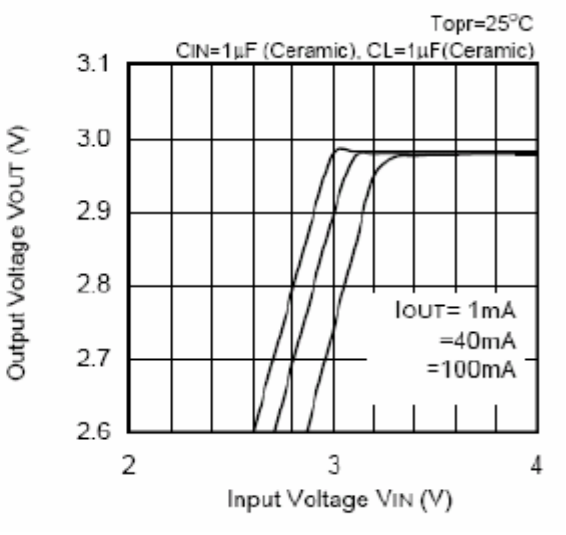


- **Typical Performance Characteristics** (3.0V Out unless otherwise specified)

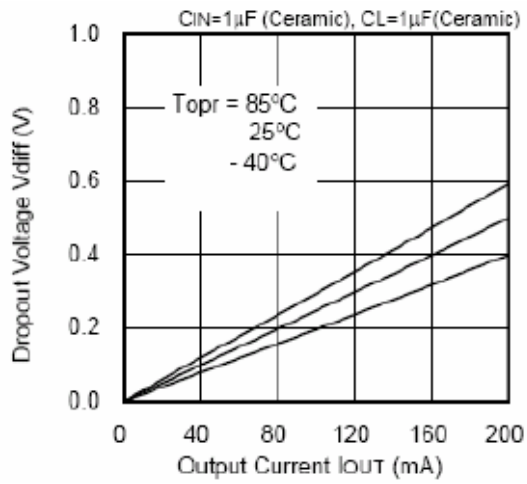
1. Output Voltage vs. Output Current



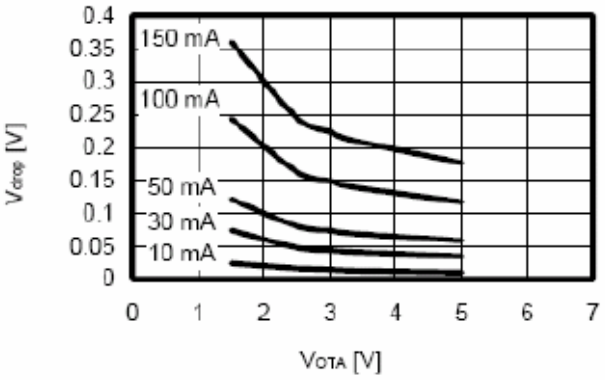

2. Output Voltage vs. Input Voltage



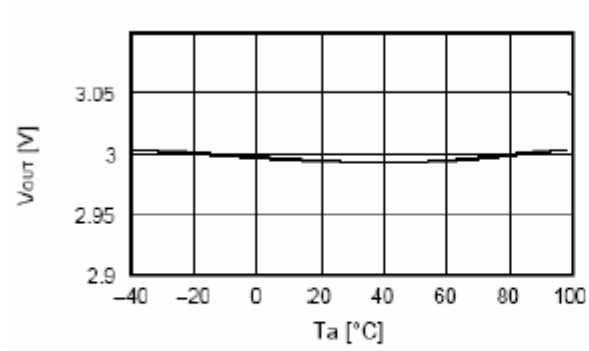

3. Dropout Voltage vs. Output Current



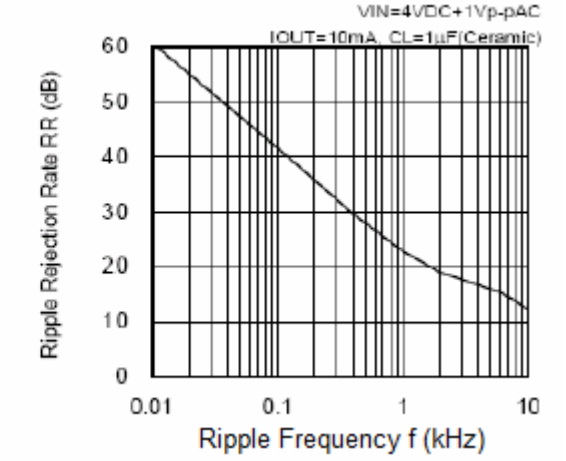

4、Dropout Voltage vs. Output Voltage




5. Output Voltage vs. Ambient Temperature

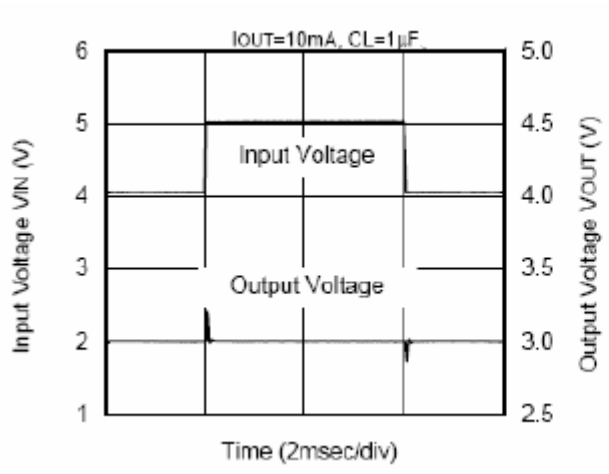



6. Ripple Rejection Rate

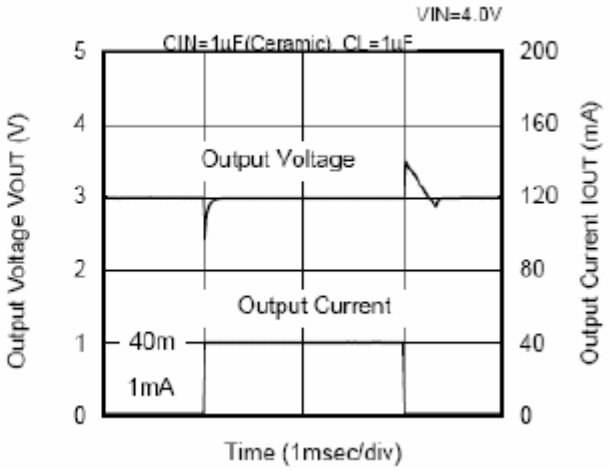


- **Typical Performance Characteristics** (3.0V Out unless otherwise specified)

7. Input Transient Response

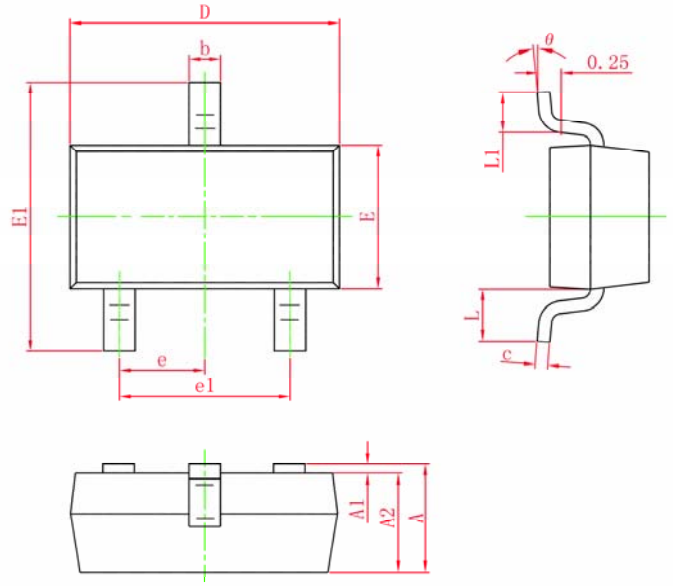



8. Load Transient Response




- **Package Information**

**SOT-23 PACKAGE OUTLINE DIMENSIONS**




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP. | | 0.037 TYP. | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF. | | 0.022 REF. | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |