# 80V High Input Voltage LDO Linear Regulators

## GENERAL DESCRIPTION

PW8600 series is designed for power sensitive applications. It includes a precision and high voltage input stage, an ultracurrent branch, and results in a ultra and low-dropout linear regulator. The PW8600 operates from an input volta of VOUT+1V to 65V, consumes only 1.8uA quiescent current, and offers 1% initial accuracy and low dropout voltage, 70mV typical at 10mA.

PW8600 is a fixed output LDO with available has available voltages at 3V to 5.0V. Other features include short-circuit protection and thermal shutdown.

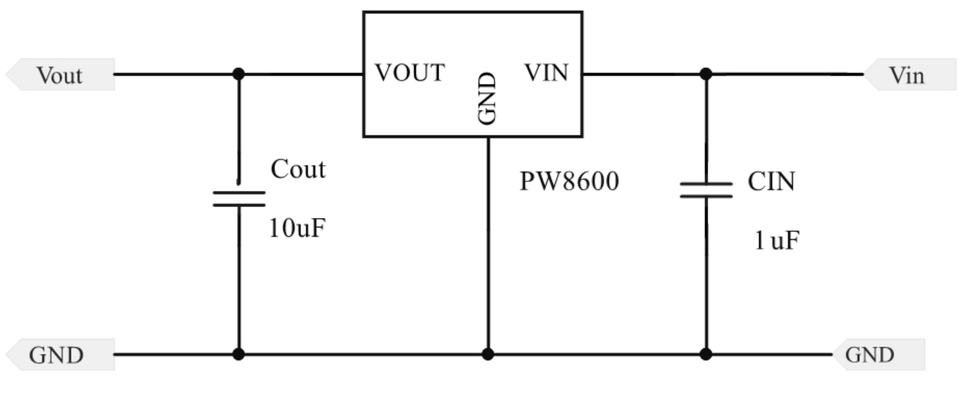
## FEATURES

- Wide Operating Voltage: VOUT+1V to 65V ( max Vin can be up to 80V)
- Ultra Low Quiescent Current : 1.8uA(Typ.)
- Output accuracy: ±2%
- High output current: ⩾200mA
- Low Dropout Voltages: 70mV@10mA, 700mV@100mA
- System startup with no overshoot
- Short circuit protection is designed with no overshoot
- Excellent power / load transient response
- Low temperature coefficient :100ppm/℃
- Packages： SOT23-3

## APPLICATIONS

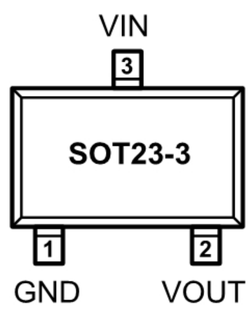
- Battery-powered equipment
- Smoke detector and sensor
- Microcontroller Applications
- Smart electric meter

## TYPICAL APPLICATION CIRCUIT



## PIN ASSIGNMENT/DESCRIPTION

(TOP VIEW)




| Product Series | Package | Pin Number | Pin Name | Functions |
|---|---|---|---|---|
| PW8600AXXHV | SOT23-3 | 1 | GND | Ground |
| | | 2 | VOUT | Output |
| | | 3 | VIN | Input |
| Marking: 86XX . | | | | |

XX : Output Voltage. ( PW8600A50HV, VOUT:5.0V , PW8600A33HV, VOUT:3.3V)

## Absolute Maximum Ratings (note)

| SYMBOL | ITEMS | VALUE | UNIT |
|---|---|---|---|
| $V_{IN}$ | Input Supply Voltage | 80 | V |
| $V_{OUT}$-GND | Output Voltage TO GND | 6 | V |
| $V_{out}$ - $V_{IN}$ | Output Voltage TO $V_{IN}$ | -75 | V |
| $T_A$ | Operating Temperature | -40~105 | ℃ |
| $T_J$ | Maximum Junction Temperature | 150 | ℃ |
| $T_{stg}$ | Storage Temperature | -40 to 150 | ℃ |
| $T_{solder}$ | Package Lead Soldering Temperature (10s) | 260 | ℃ |
| $\theta_{JA}$ | Thermal Resistance,Junction to Ambient | 280 | ℃/W |
| $P_D$ | Power Consumption | 446 | m/W |

**Note:** Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

## RECOMMANDED OPERATING Conditions

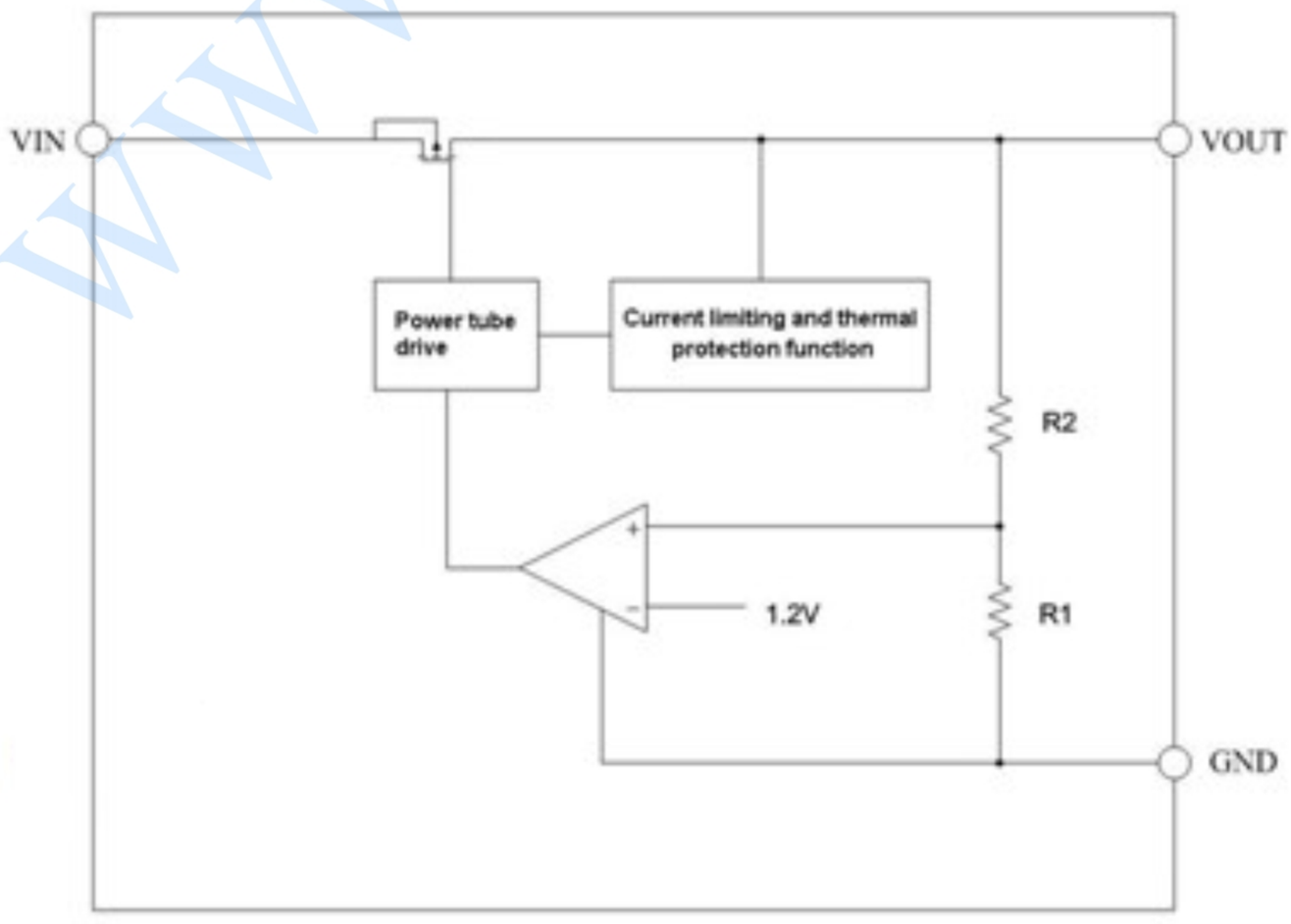
| SYMBOL | ITEMS | VALUE | UNIT |
|---|---|---|---|
| $V_{IN}$ | VIN Supply Voltage | 60 | V |
| $T_{LEAD}$ | Lead Temperature (Soldering) 10 seconds | 230 | ℃ |
| $T_A$ | Operating Temperature | -20 to +85 | ℃ |

## ELECTRICAL CHARACTERISTICS

(TA=25°C, CIN=1uF, VIN=VOUT+1.0V, COUT=10μF, unless otherwise noted)

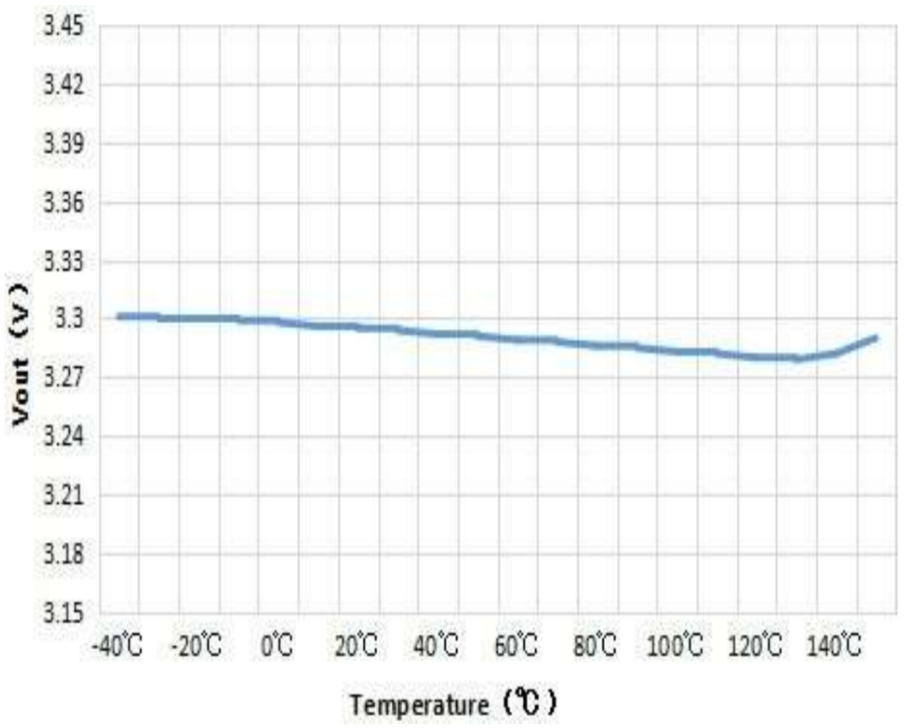
| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Input Voltage Range | $V_{IN}$ | | 2.8 | | 60 | V |
| Output Voltage Accuracy | $V_{OUT}$ | $I_{OUT}$=10mA | -2% | | 2% | |
| Quiescent Current | $I_Q$ | $V_{IN}$=6V~60V | | 1.8 | 4 | μA |
| Output Current | $I_{OUT}$ | | | 200 | | mA |
| Dropout Voltage | $V_{DROP}$ | $I_{OUT}$=10mA<br>$\Delta V_{OUT}$= - $V_{OUT}$ *2% | | 70 | | mV |
| | | $I_{OUT}$=100mA<br>$\Delta V_{OUT}$= - $V_{OUT}$ *2% | | 700 | | mV |
| Load Regulation | $V_{LR}$ | 1mA ≤ $I_{OUT}$≤ 100mA | | 20 | | mV |
| Line Regulation | $V_{SR}$ | $I_{OUT}$=1mA,$V_{IN}$=($V_{OUT}$ +1V) to 30V | | 0.2 | | %/V |
| Power Supply Rejection Ratio | PSRR | Vin=12V ,Iout=10mA<br>F=1Khz,Vout=3.3V | | 70 | | dB |
| Current Limit | $I_{LIMIT}$ | VIN=(VOUT +1V) to 60V | | 400 | | mA |
| Thermal Protection | $T_{SHDN}$ | | | 125 | | ℃ |
| Output Voltage Temperature Coefficient | $T_{CVOUT}$ | IOUT=10mA<br>-40℃≤$T_{AMB}$≤100℃ | | -17 | | ppm/℃ |

## Functional Block Diagram

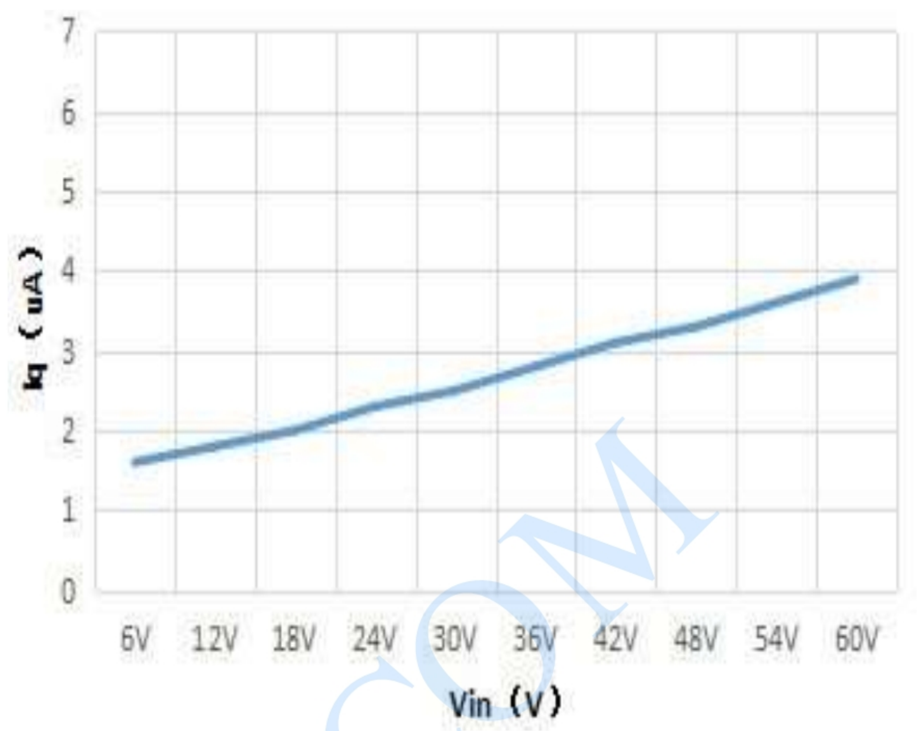


# TYPICAL PERFORMANCE CHARACTERISTICS

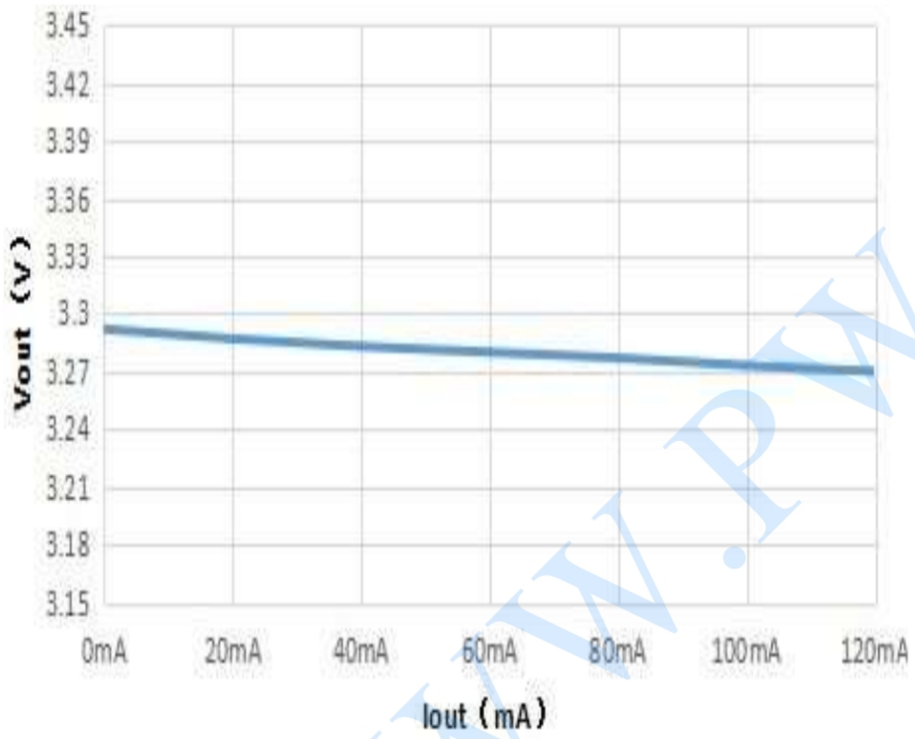
(TA=25°C, CIN=1uF, VIN=VOUT(3.3V)+1.0V, COUT=10μF, unless otherwise noted)



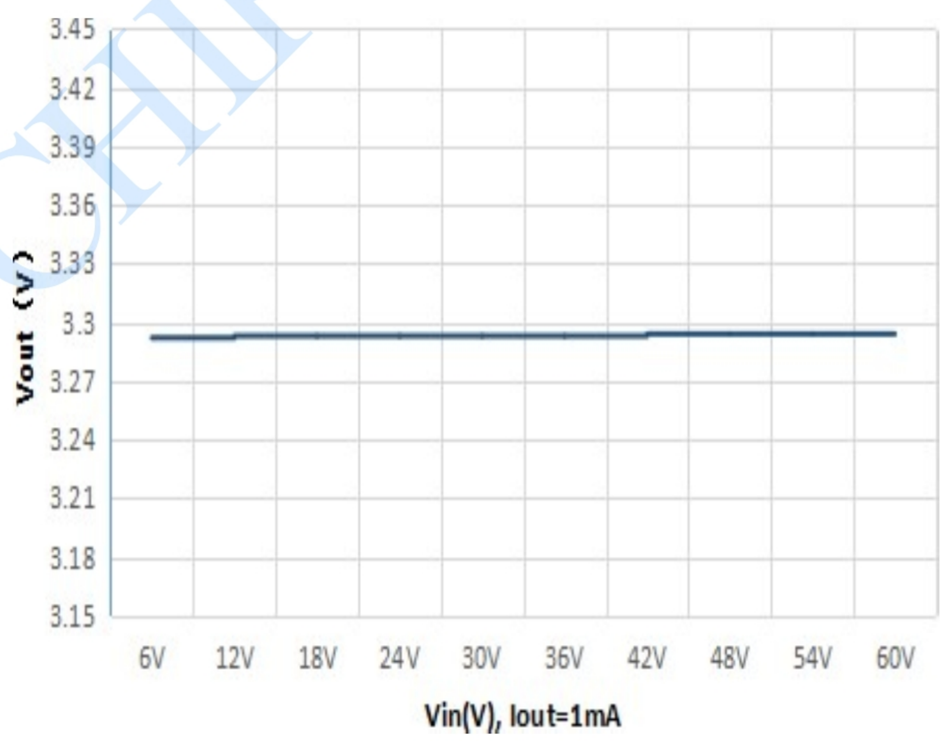

Output Voltage vs Temperature



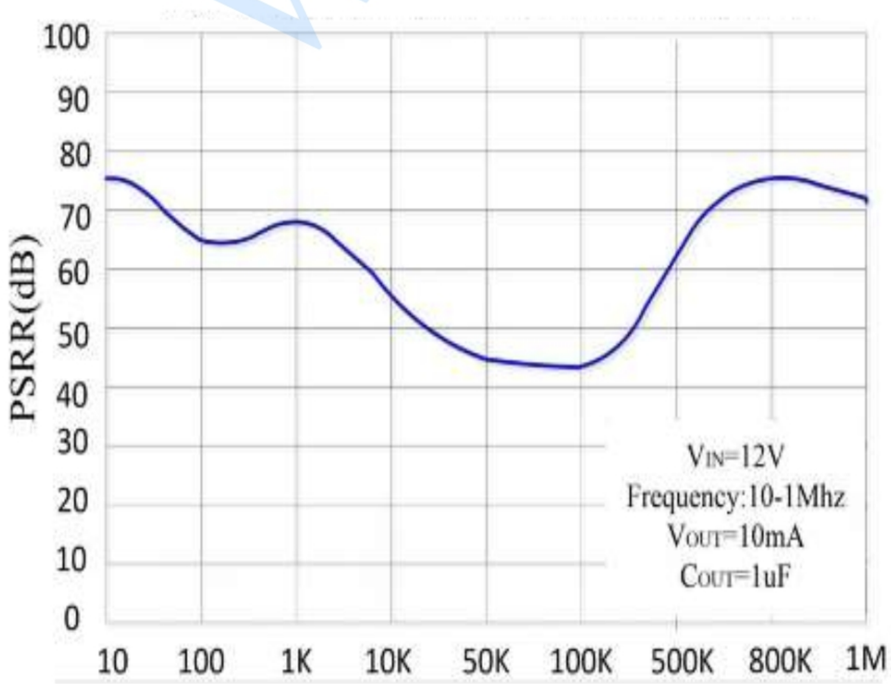

Quiescent current vs Input Voltage



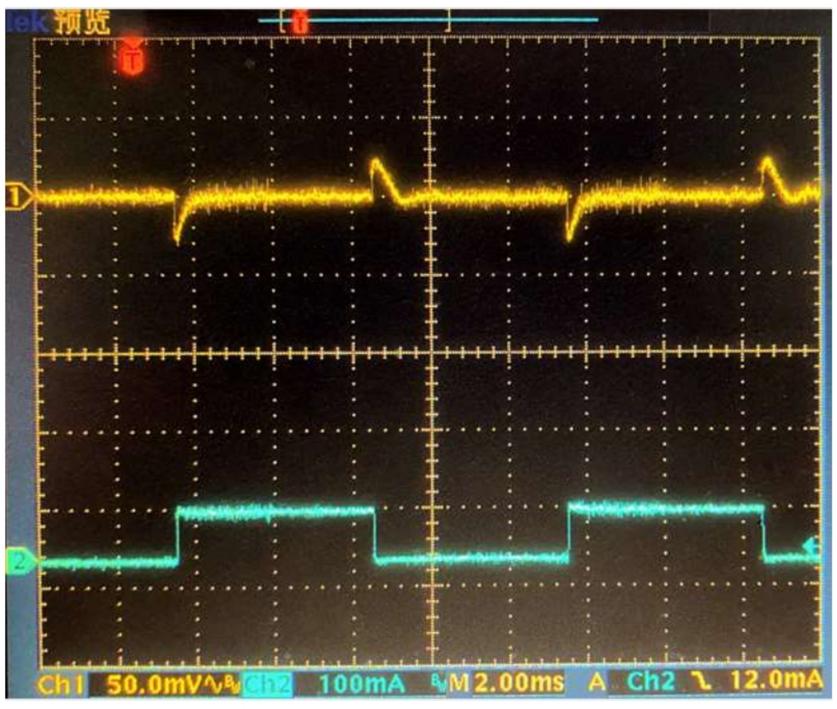

Load Regulation (Vin=30V)



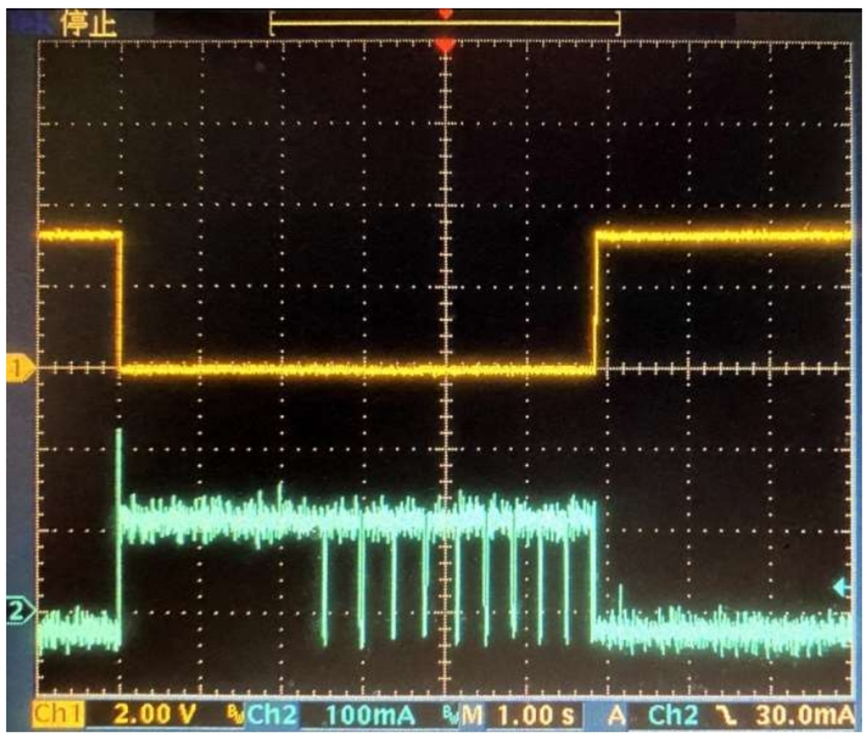

Line Regulation



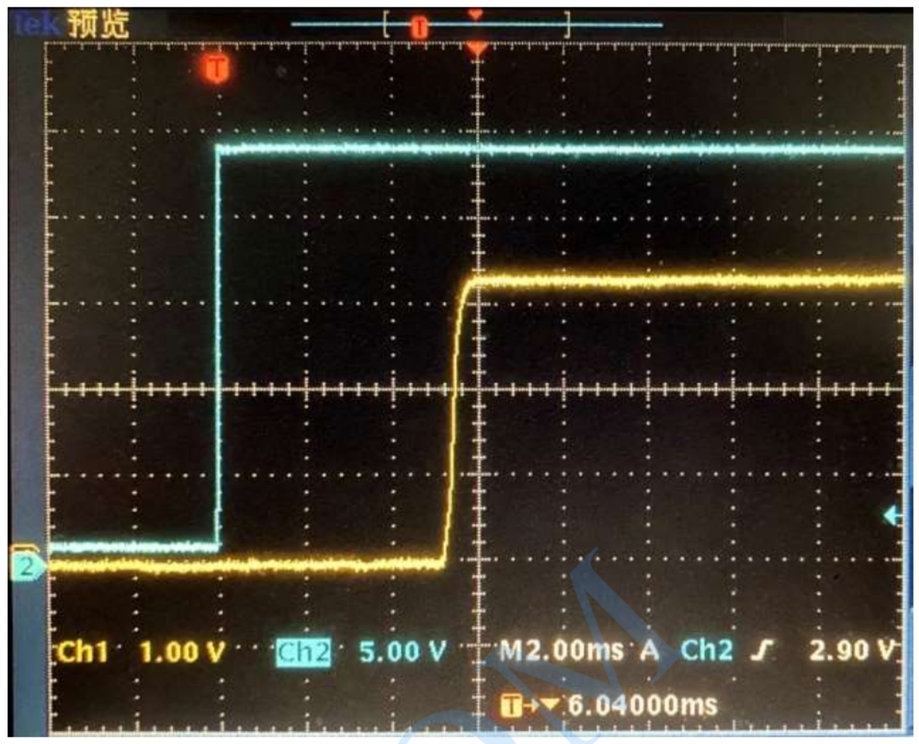

Power-Supply Rejection Ratio vs Frequency




Load Transient (Vin=12V) 10mA~100mA




Short-Circuit and OTP (Vin=24V)




VCC Power ON

## APPLICATION INFORMATION

### INPUT CAPACITOR

An input capacitor of 1μF is required between the VIN and GND pin. The capacitor shall be placed as close as possible to VIN pin, and the wide copper trace is also recommended.

### OUTPUT CAPACITOR

The recommended is 10uF ceramic capacitor. The minimum capacitance for stable and correct operation is 1μF. The higher the value of this output capacitor, the lower the ripple during the operations. The output capacitor should be placed as close to the Output Pin as possible. The wide copper trace is recommended.

### NO-LOAD STABILITY

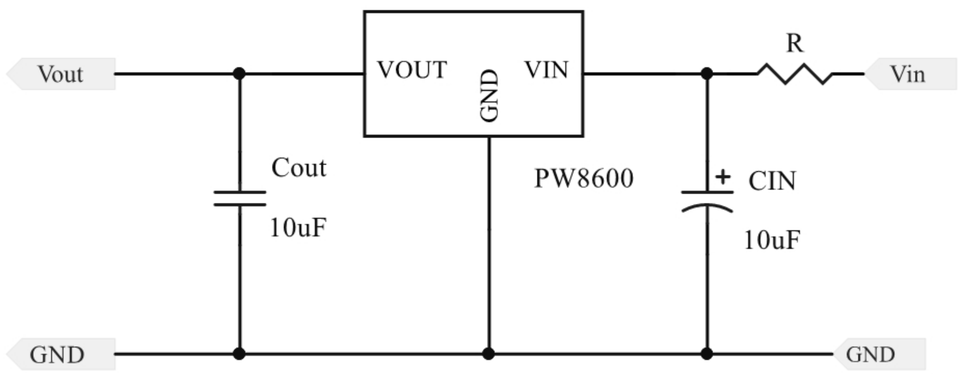
The PW8600 will remain stable and in regulation with no external load.

### FOLD-BACK SHORT-CIRCUIT PROTECTION

When short-circuit occurs, PW8600 will fold back the short-circuit currents to a pre-determined lower level, This will reduce excessive heat in otherwise large current conditions. This feature provides another level of protection to IC itself and also the whole system.

### IN-RUSH CURRENT AND VOLTAGE

The following figure shows a typical application circuit for the PW8600 devices. Please keep in mind that in- rush current can push up the Vin overshoot by as much as 50%. For example, when Vin=50V, the in-rush caused spike voltage can be as high as 75V . Therefore the voltage rating of Cin needs to be higher than 50% of the application.

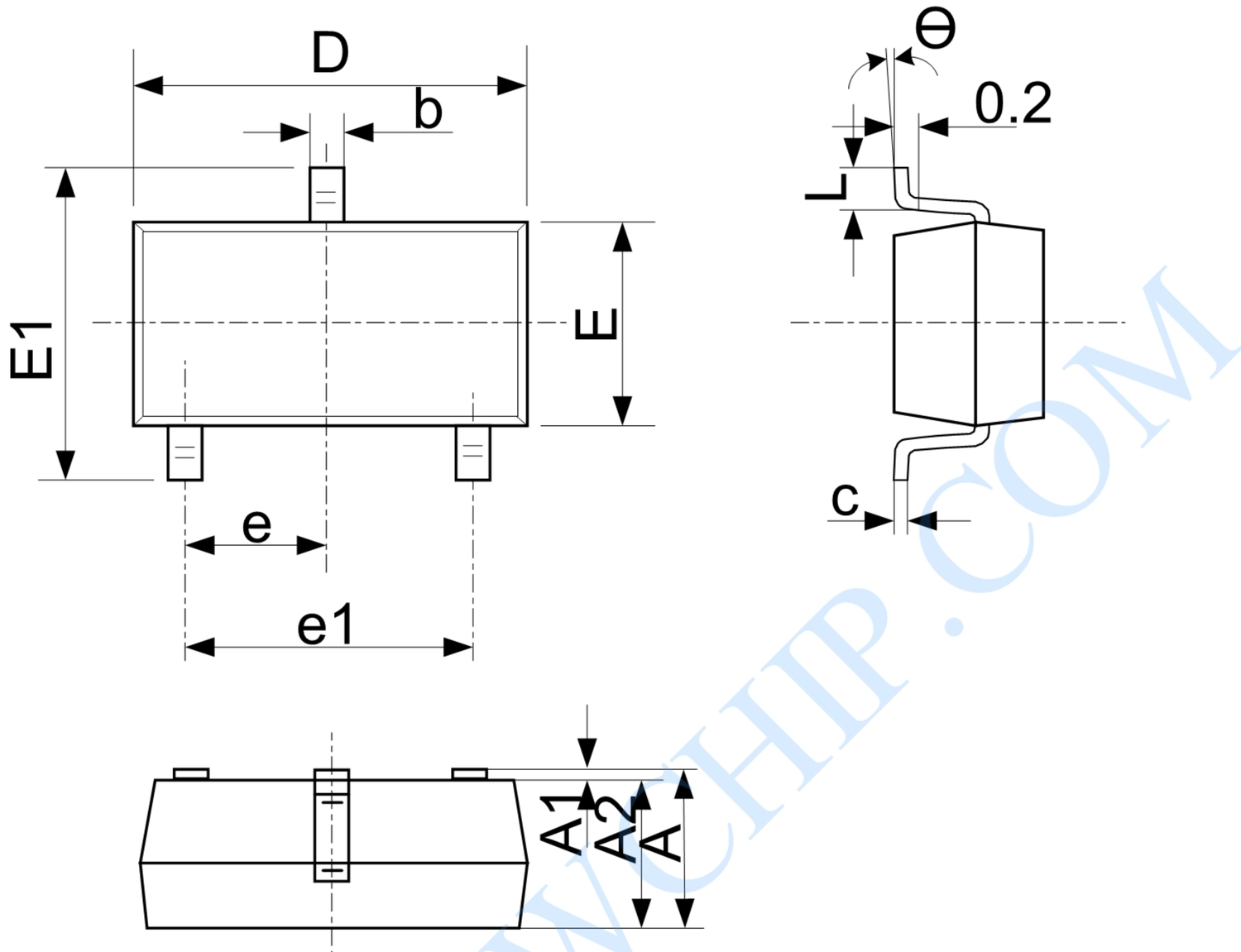



In live insertion application, it is suggested that R, CIN are selected as following

1. CIN=10μF ~ 100μF ceramic or electrolytic capacitor with maximum voltage greater than 80V, R=0;
2. CIN=1μF ~ 10μF ceramic or electrolytic with maximum voltage greater than 80V and R=2Ω in the type of 1206.

# PACKAGE DESCRIPTION

## SOT23-3




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0℃ | 8℃ | 0℃ | 8℃ |

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