

# WL2836E

**Low noise, High PSRR, High speed, CMOS LDO**

## Descriptions

The WL2836E series is a high accuracy, low noise, high speed, high PSRR, low dropout CMOS Linear regulator with high ripple rejection. The devices offer a new level of cost effective performance in cellular phones, laptop and notebook computers, and other portable devices.

The WL2836E has the fold-back maximum output current which depends on the output voltage. So the current limit functions both as a short circuit protection and as an output current limiter.

The WL2836E regulators are available in standard SOT-23-5L Package. Standard products are Pb-free and Halogen-free.

## Features

- Input Voltage Range : 1.4V~5.5V
- Output Voltage Range : 0.8V~3.3V
- Output current : 300mA
- Quiescent current : 50µA Typ.
- Shut-down current : < 1µA
- Dropout voltage : 140mV @ I<sub>OUT</sub>=0.3A
- PSRR : 78dB @ 1kHz, V<sub>OUT</sub>=1.8V
- Low Output Voltage Noise : 20µV<sub>RMS</sub> Typ.
- Output Voltage Tolerance : ±2% @ V<sub>OUT</sub>>2V
- Recommend capacitor : 1µF
- Thermal-Overload and Short-Circuit Protection

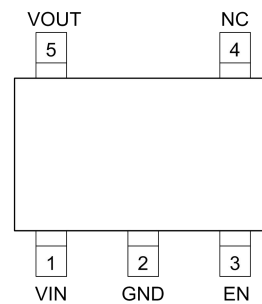
## Applications

- MP3/MP4 Players
- Cellphones, radiophone, digital cameras
- Bluetooth, wireless handsets
- Others portable electronics device

[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

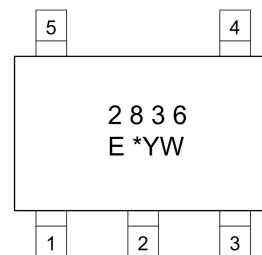


**SOT-23-5L**



**SOT-23-5L**

## Pin Configuration (Top View)



**SOT-23-5L**

**2836 : Device Code**

**E : Package Code**

**\* : Voltage Code**

**Y : Year code**

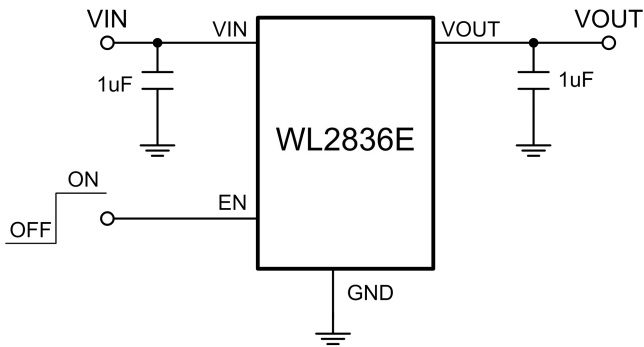
**W: Week code**

For detail marking information, please see page 15.

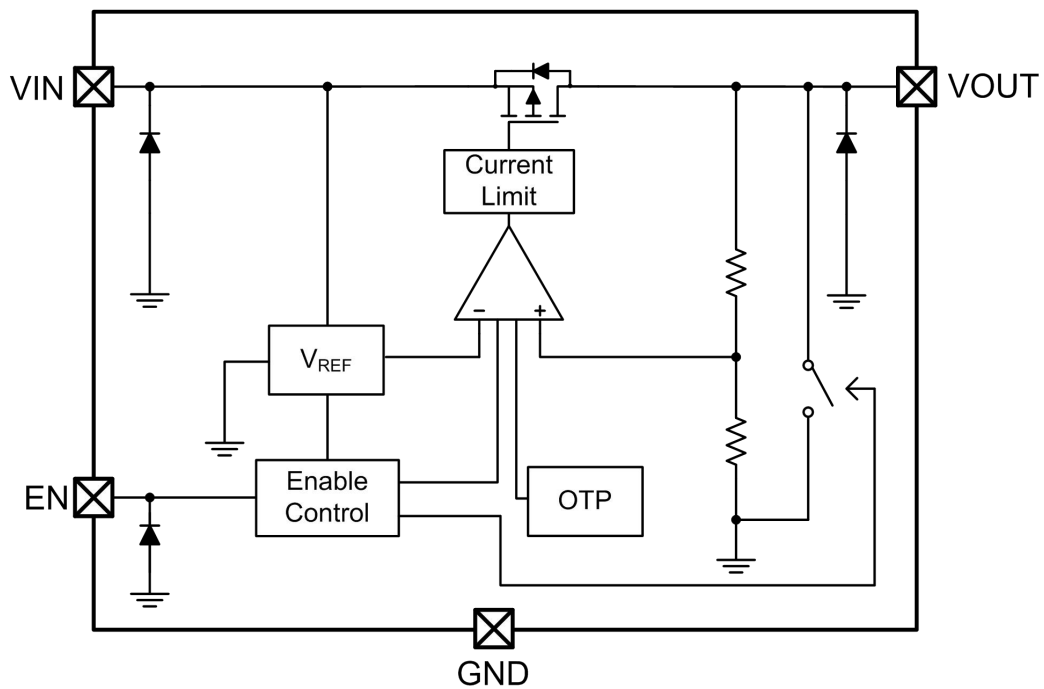
## Marking

## Order information

For detail order information, please see page 15.

**Typical Application**

**Pin Description**
**SOT-23-5L**

| PIN | Symbol           | Description          |
|-----|------------------|----------------------|
| 1   | V <sub>IN</sub>  | Input                |
| 2   | GND              | Ground               |
| 3   | EN               | Enable (Active high) |
| 4   | NC               | No connection        |
| 5   | V <sub>OUT</sub> | Output               |

**Block Diagram**


**Absolute Maximum Ratings**

| Parameter                                     | Value          | Unit             |   |
|---|----------------|------------------|---|
| Power Dissipation, $P_D@T_A=25^\circ\text{C}$ | 400            | mW               |   |
| $V_{IN}$ Range                                | -0.3~6.5       | V                |   |
| $V_{EN}$ Range                                | -0.3~ $V_{IN}$ | V                |   |
| $V_{OUT}$ Range                               | -0.3~ $V_{IN}$ | V                |   |
| $I_{OUT}$                                     | 400            | mA               |   |
| Lead Temperature Range                        | 260            | $^\circ\text{C}$ |   |
| Storage Temperature Range                     | -55 ~ 150      | $^\circ\text{C}$ |   |
| Operating Junction Temperature Range          | 150            | $^\circ\text{C}$ |   |
| MSL   | Level-3        |                  |   |
| ESD Ratings                                   | HBM            | 7500             | V |
|   | MM             | 300              | V |

**Recommend Operating Ratings**

| Parameter                                       | Value   | Unit               |
|---|---------|--------------------|
| Operating Supply voltage                        | 1.4~5.5 | V                  |
| Operating Temperature Range                     | -40~85  | $^\circ\text{C}$   |
| Thermal Resistance, $R_{\theta JA}$ (SOT-23-5L) | 250     | $^\circ\text{C/W}$ |

**Electronics Characteristics**

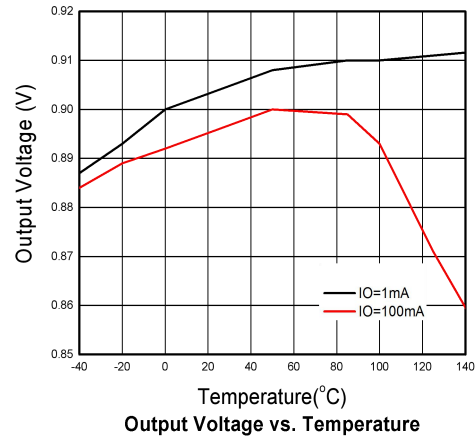
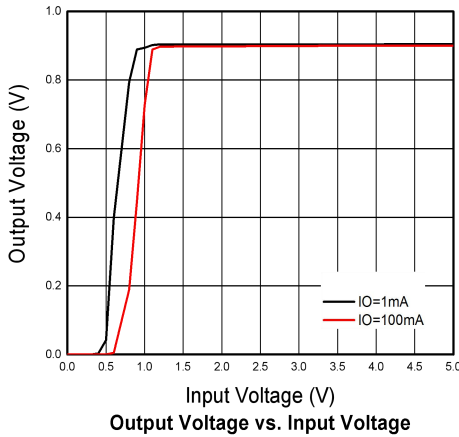
 (Ta=25°C, V<sub>IN</sub>=V<sub>OUT</sub>+1V, C<sub>IN</sub>=C<sub>OUT</sub>=1 μ F, I<sub>OUT</sub>=1mA, unless otherwise noted)

| Parameter                            | Symbol             | Condition  | Min.                      | Typ.                    | Max.                      | Unit              |    |
|--------------------------------------|--------------------|--|---------------------------|-------------------------|---------------------------|-------------------|----|
| Output Voltage                       | V <sub>OUT</sub>   | V <sub>OUT</sub> ≤ 2V  | -30                       | V <sub>OUT</sub>        | +30                       | mV                |    |
|                                      |                    | V <sub>OUT</sub> > 2V  | 0.98×<br>V <sub>OUT</sub> | V <sub>OUT</sub>        | 1.02×<br>V <sub>OUT</sub> | V                 |    |
| Input Voltage                        | V <sub>IN</sub>    |  | 1.4                       |                         | 5.5                       | V                 |    |
| Current Limit                        | I <sub>LIM</sub>   | V <sub>EN</sub> =V <sub>IN</sub>   | 300                       |                         |                           | mA                |    |
| Dropout Voltage                      | V <sub>DROP</sub>  | V <sub>OUT</sub> =3.3V, I <sub>OUT</sub> =300mA  |                           | 118                     | 185                       | mV                |    |
|                                      |                    | V <sub>OUT</sub> =3V, I <sub>OUT</sub> =300mA  |                           | 122                     | 192                       |                   |    |
|                                      |                    | V <sub>OUT</sub> =2.8V, I <sub>OUT</sub> =300mA  |                           | 130                     | 204                       |                   |    |
|                                      |                    | V <sub>OUT</sub> =2.5V, I <sub>OUT</sub> =300mA  |                           | 140                     | 220                       |                   |    |
|                                      |                    | V <sub>OUT</sub> =1.6V, I <sub>OUT</sub> =300mA  |                           | 205                     | 320                       |                   |    |
|                                      |                    | V <sub>OUT</sub> =1V, I <sub>OUT</sub> =300mA  |                           | 370                     | 555                       |                   |    |
| Line Regulation                      | ΔV <sub>LINE</sub> | V <sub>IN</sub> =V <sub>OUT</sub> +0.5V~5.5V   |                           | 1                       | 5                         | mV                |    |
| Load Regulation                      | ΔV <sub>Load</sub> | V <sub>OUT</sub> =2.8V, I <sub>OUT</sub> =1~300mA  |                           | 22                      | 40                        | mV                |    |
| Quiescent Current                    | I <sub>Q</sub>     | V <sub>OUT</sub> =2.8V, I <sub>OUT</sub> =0  |                           | 50                      | 90                        | μA                |    |
| Short Current                        | I <sub>SHORT</sub> | V <sub>EN</sub> =V <sub>IN</sub> , V <sub>OUT</sub> Short to GND with 1 Ω  |                           | 120                     |                           | mA                |    |
| Shut-down Current                    | I <sub>SHDN</sub>  | V <sub>EN</sub> =0V  |                           |                         | 1.0                       | μA                |    |
| Power Supply Rejection Rate          | PSRR               | V <sub>IN</sub> =(V <sub>OUT</sub> +1V) <sub>DC</sub> +<br>0.5V <sub>P-P</sub><br>I <sub>OUT</sub> =10mA,<br>V <sub>OSET</sub> =1.8V | f=100Hz                   |                         | 80                        |                   | dB |
|                                      |                    |  | f=1kHz                    |                         | 78                        |                   | dB |
|                                      |                    |  | f=10kHz                   |                         | 65                        |                   | dB |
|                                      |                    |  | f=100kHz                  |                         | 56                        |                   | dB |
|                                      |                    |  | f=1MHz                    |                         | 43                        |                   | dB |
| EN logic high voltage                | V <sub>ENH</sub>   | V <sub>IN</sub> =5.5V, I <sub>OUT</sub> =1mA   | 1                         |                         |                           | V                 |    |
| EN logic low voltage                 | V <sub>ENL</sub>   | V <sub>IN</sub> =5.5V, V <sub>OUT</sub> =0V  |                           |                         | 0.4                       | V                 |    |
| EN Input Current                     | I <sub>EN</sub>    | V <sub>EN</sub> = 0 to 5.5V  |                           | 120                     |                           | nA                |    |
| Output Noise Voltage                 | e <sub>NO</sub>    | 10Hz to 100KHz, C <sub>OUT</sub> =1μF  |                           | 13×<br>V <sub>OUT</sub> |                           | μV <sub>RMS</sub> |    |
| Thermal shutdown threshold           | T <sub>SD</sub>    |  |                           | 160                     |                           | °C                |    |
| Thermal shutdown hysteresis          | Δ T <sub>SD</sub>  |  |                           | 30                      |                           | °C                |    |
| Auto-discharge Nch Tr, ON Resistance | R <sub>LOW</sub>   | V <sub>IN</sub> =4V, V <sub>CE</sub> =0V, V <sub>OUT</sub> =2.8V   |                           | 120                     |                           | Ω                 |    |

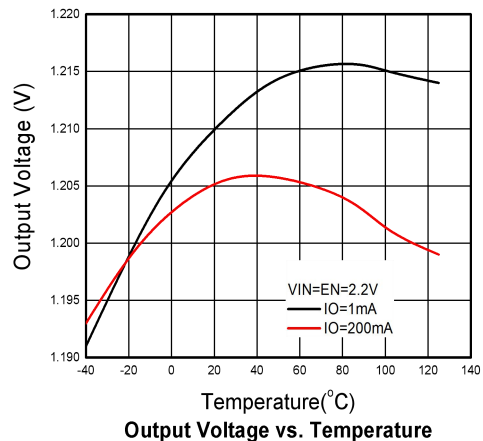
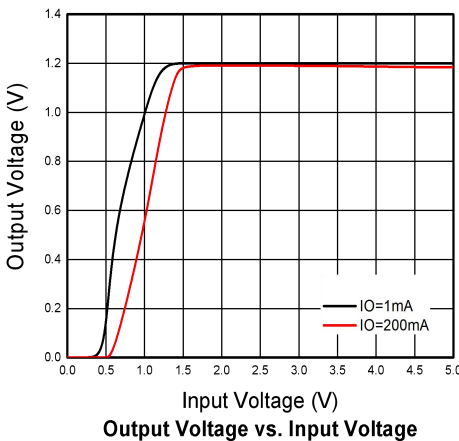
**Typical characteristics (Ta=25°C, VIN=VOUT+1V, IOUT=1mA, CIN=COUT=1 μ F, unless otherwise noted)**

(1) EN is driven by square pulse, the duty cycle is less than 20%

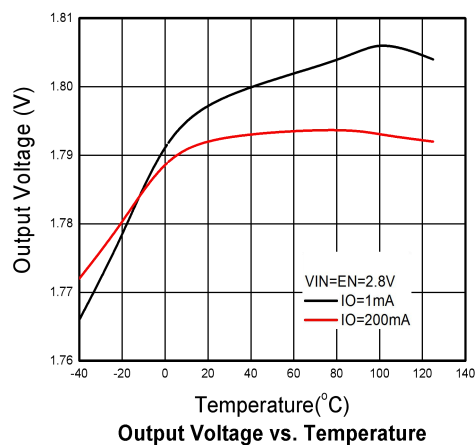
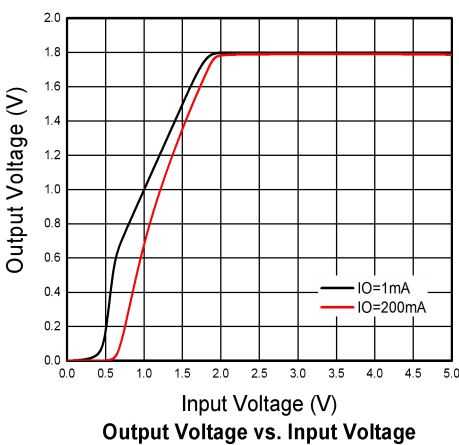
**VOUT=0.9V**

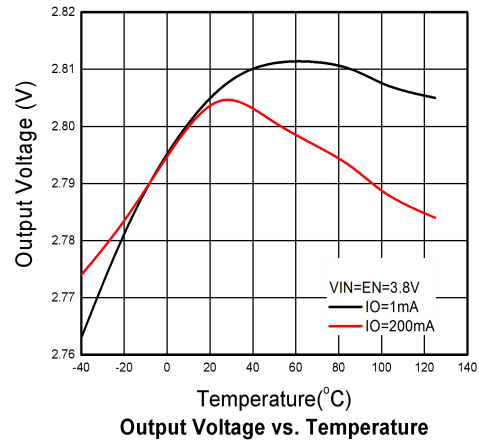
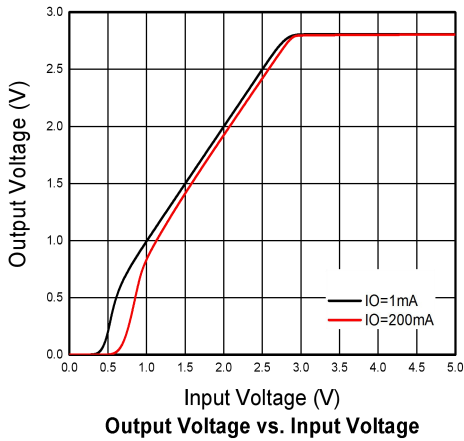
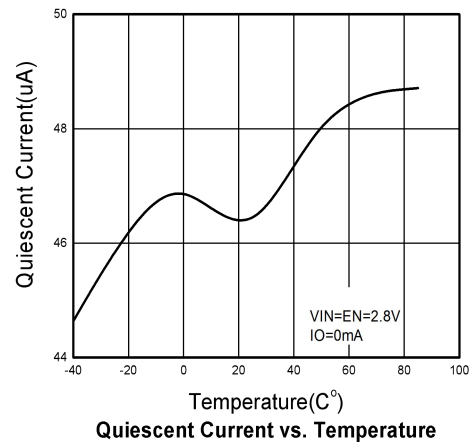
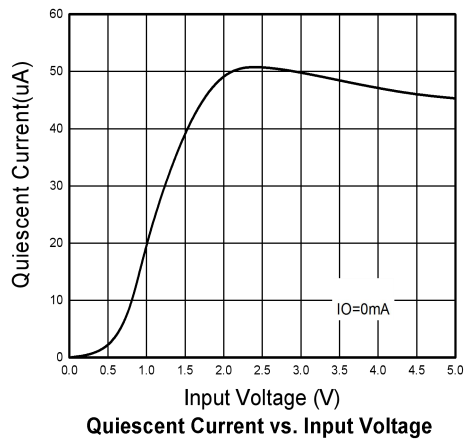
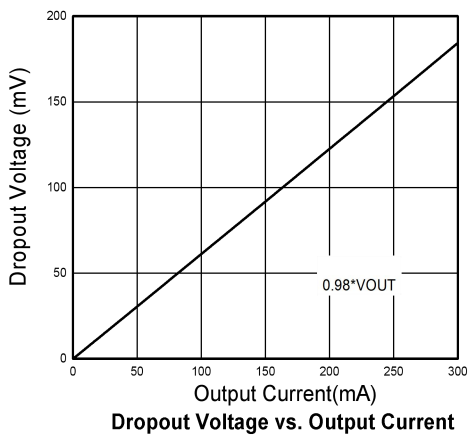
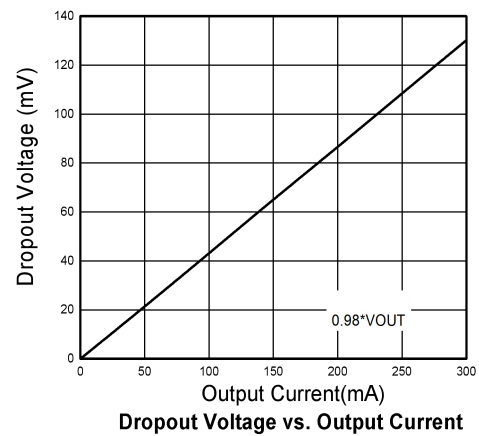


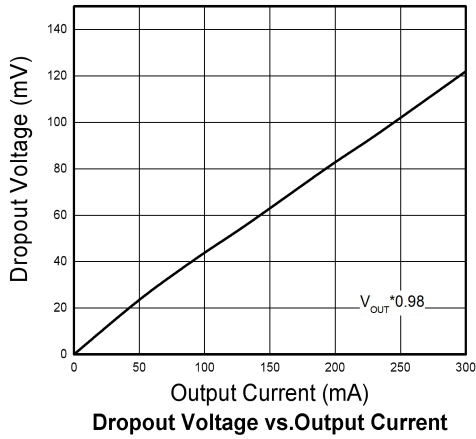
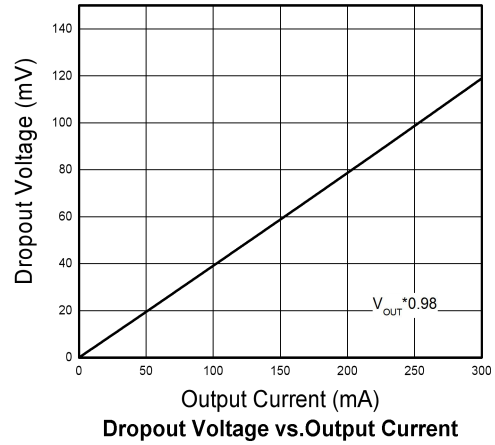
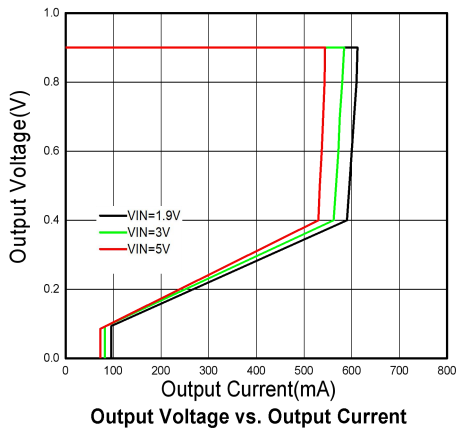
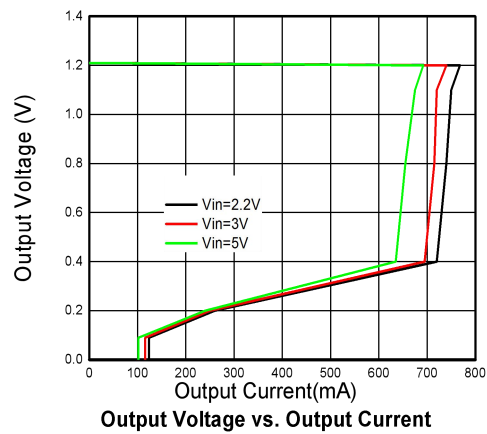
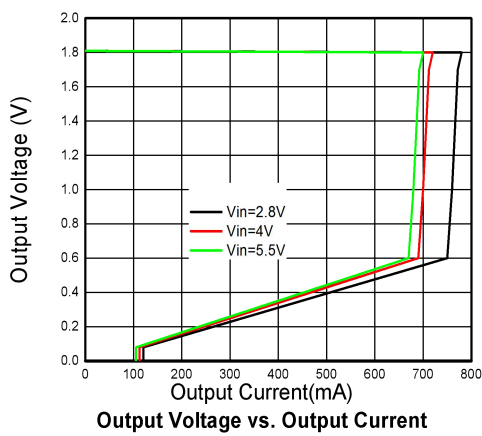
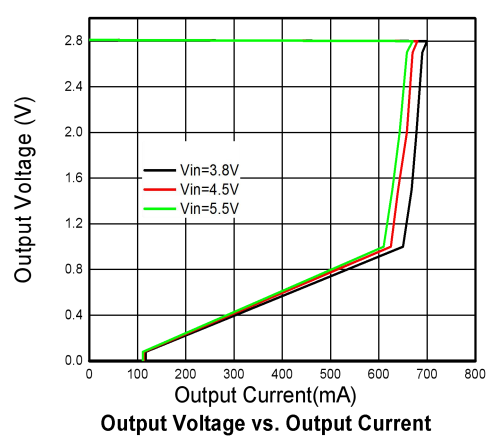
**VOUT=1.2V**

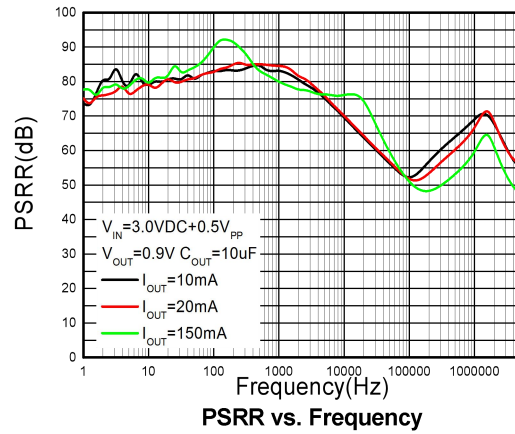
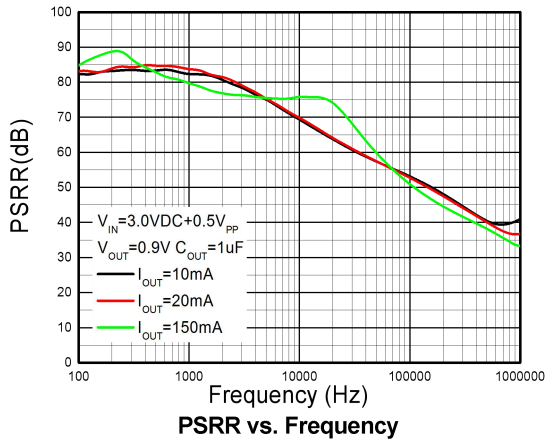
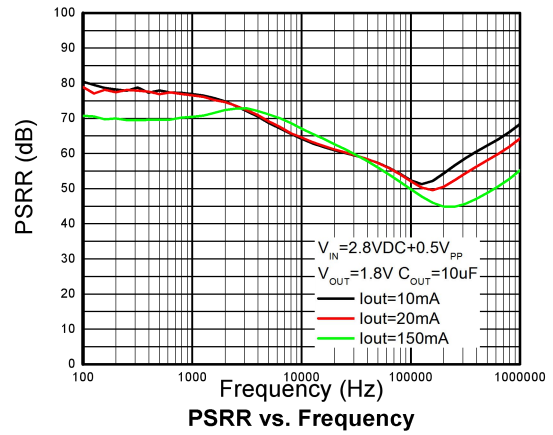
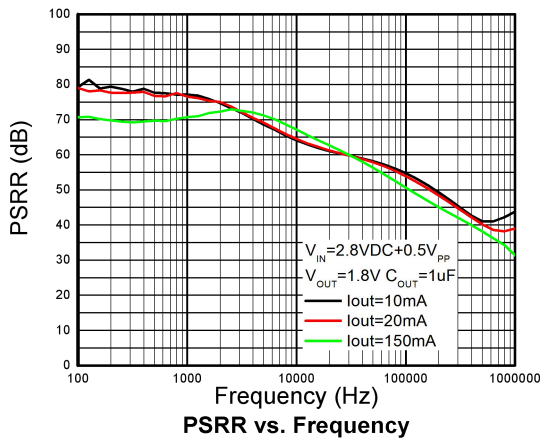
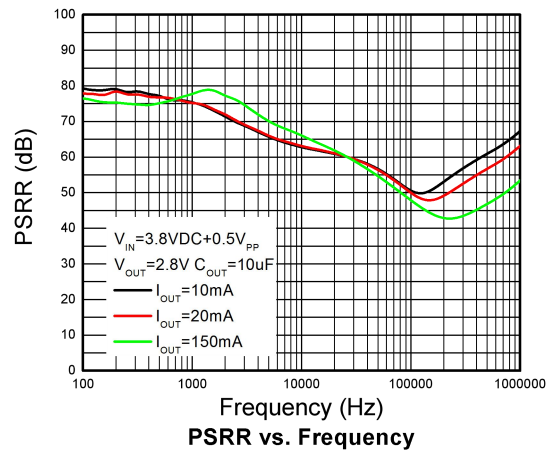
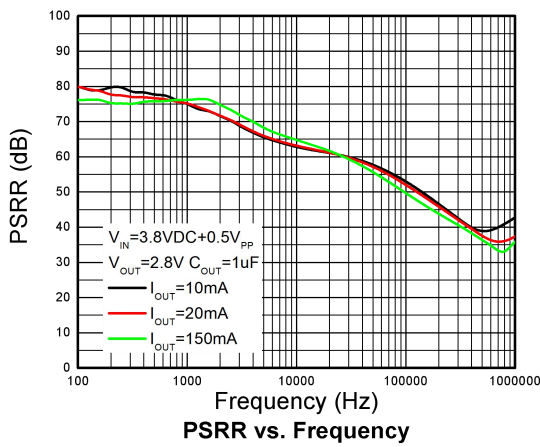


**VOUT=1.8V**



**V<sub>OUT</sub>=2.8V**

**V<sub>OUT</sub>=1.8V**

**V<sub>OUT</sub>=1.8V**

**V<sub>OUT</sub>=2.8V**


**V<sub>out</sub>=3.0V**

**V<sub>out</sub>=3.3V**

**V<sub>out</sub>=0.9V<sup>(1)</sup>**

**V<sub>out</sub>=1.2V<sup>(1)</sup>**

**V<sub>out</sub>=1.8V<sup>(1)</sup>**

**V<sub>out</sub>=2.8V<sup>(1)</sup>**


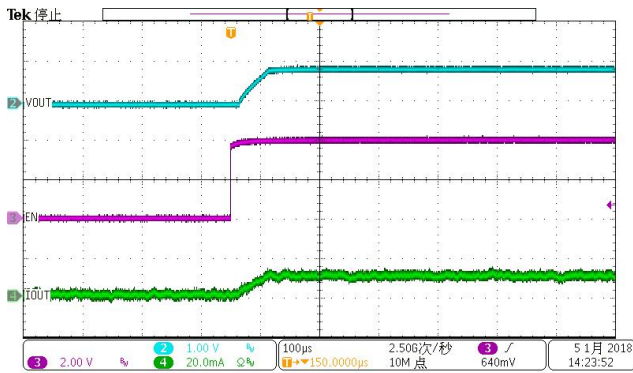
**$V_{OUT}=0.9V$** 

 **$V_{OUT}=1.8V$** 

 **$V_{OUT}=2.8V$** 




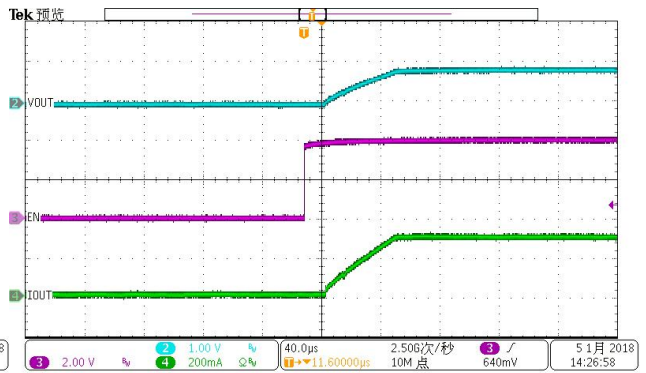
### 1.Start up (Soft Start from EN)

V<sub>OUT</sub>=0.9V

V<sub>IN</sub>=1.9V,C<sub>OUT</sub>=1μF,I<sub>OUT</sub>=10mA

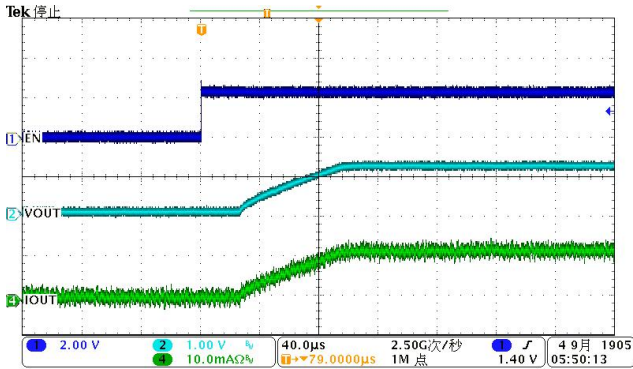


V<sub>IN</sub>=1.9V,C<sub>OUT</sub>=1μF,I<sub>OUT</sub>=300mA

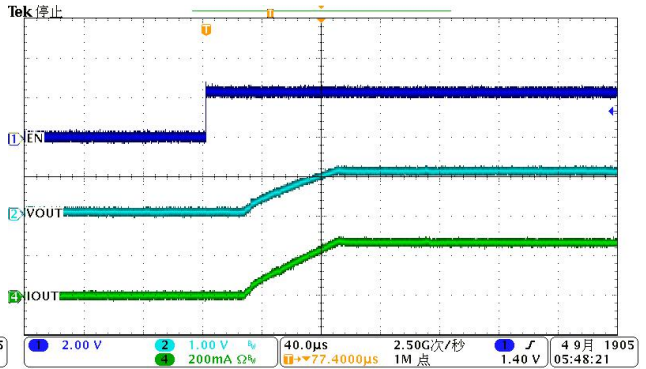


V<sub>OUT</sub>=1.2V

V<sub>IN</sub>=2.2V,C<sub>OUT</sub>=1μF,I<sub>OUT</sub>=10mA

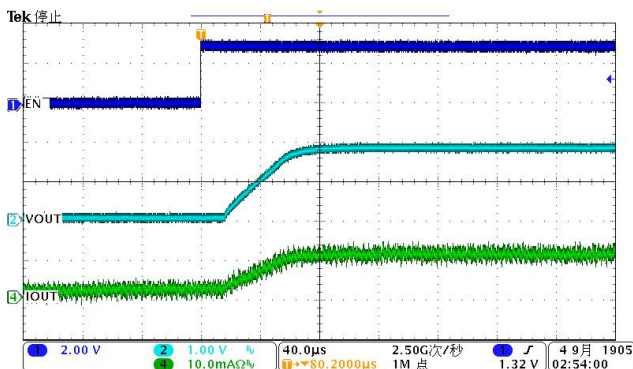


V<sub>IN</sub>=2.2V,C<sub>OUT</sub>=1μF,I<sub>OUT</sub>=300mA

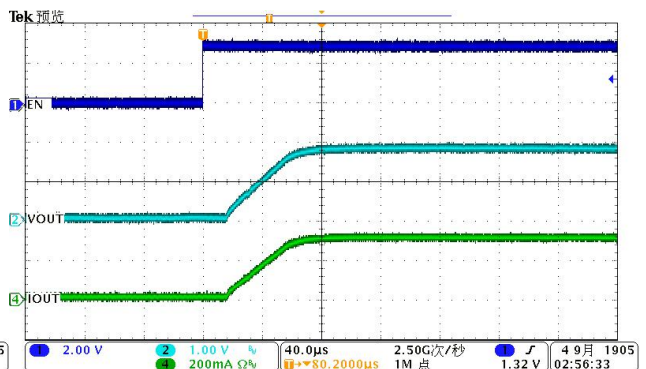


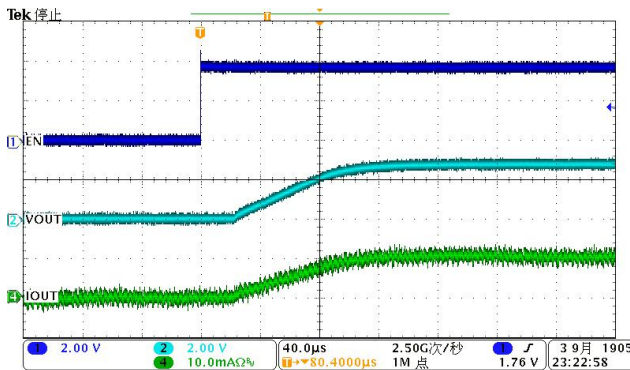
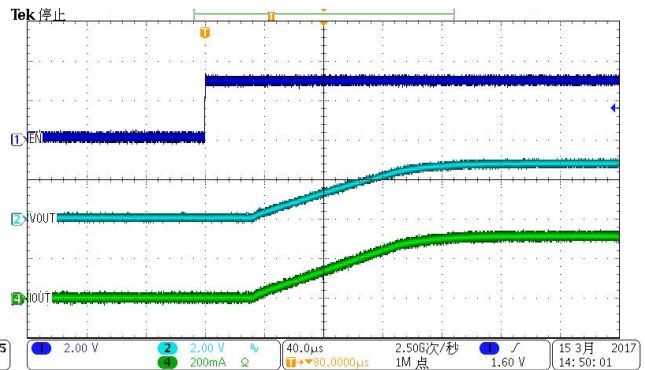
V<sub>OUT</sub>=1.8V

V<sub>IN</sub>=2.8V,C<sub>OUT</sub>=1μF,I<sub>OUT</sub>=10mA

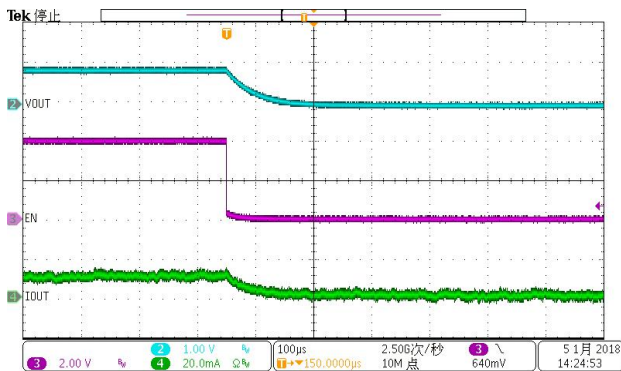
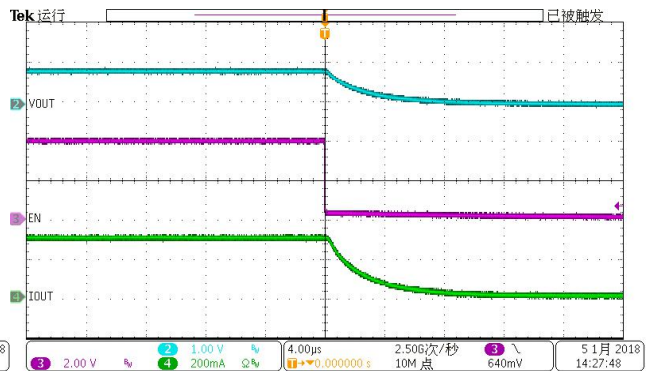
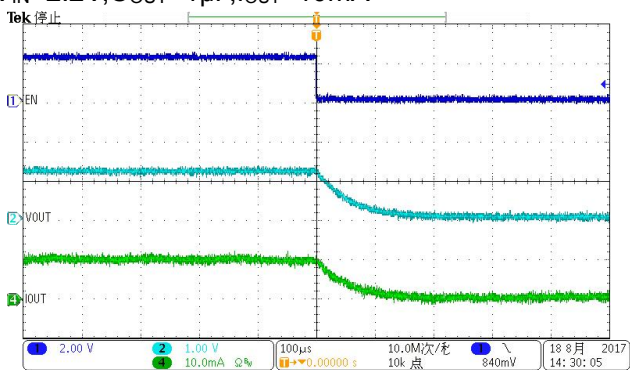
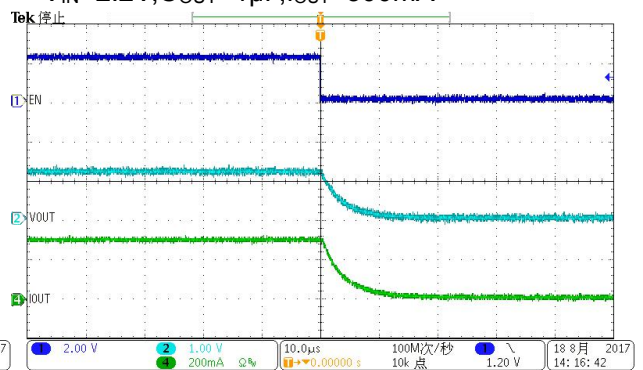


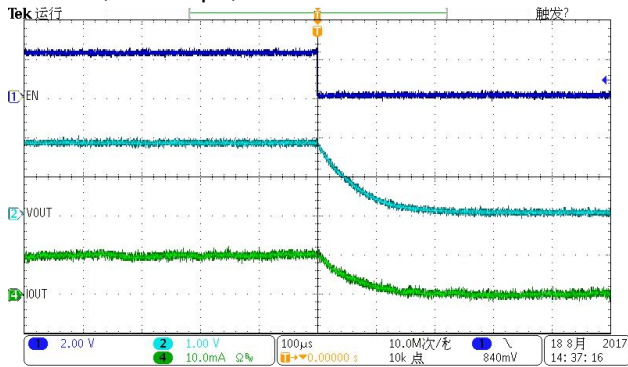
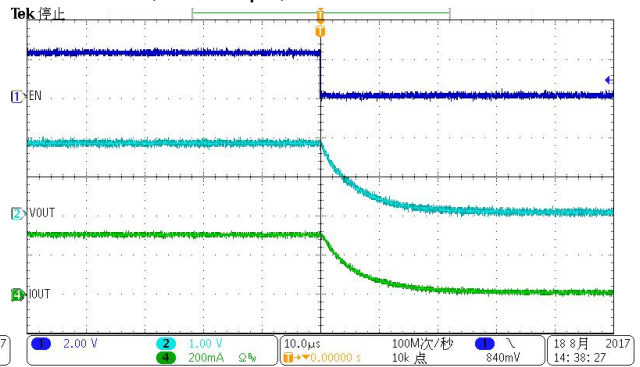
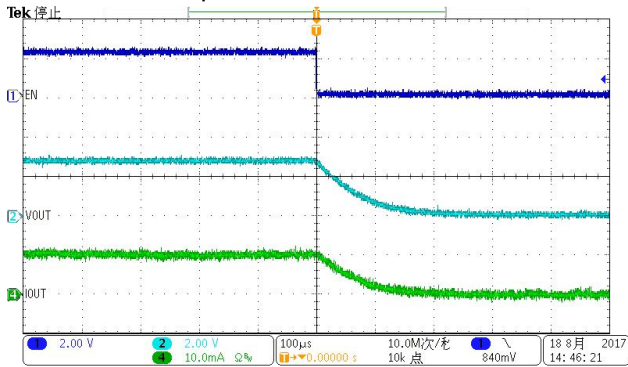
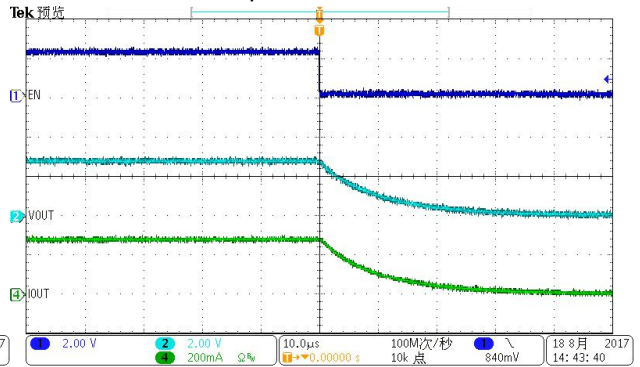
V<sub>IN</sub>=2.8V,C<sub>OUT</sub>=1μF,I<sub>OUT</sub>=300mA



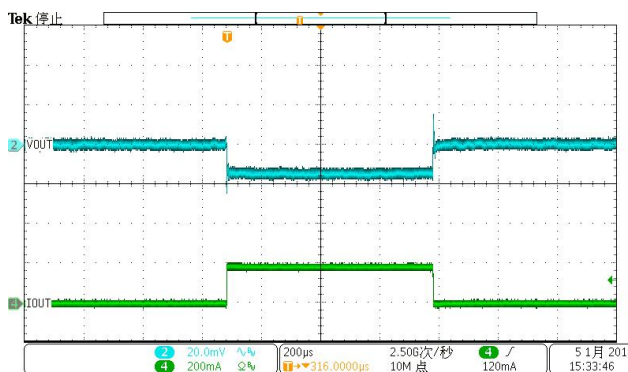
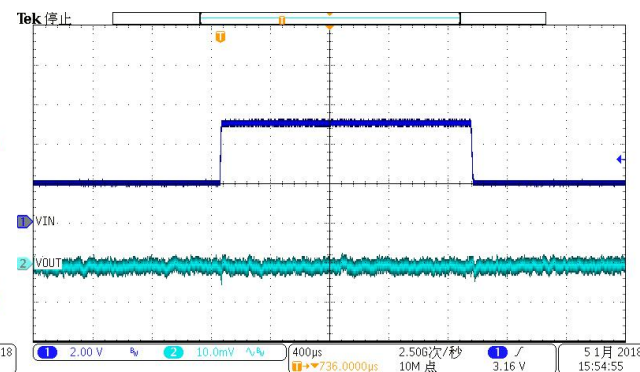
**$V_{OUT}=2.8V$** 
 $V_{IN}=3.8V, C_{OUT}=1\mu F, I_{OUT}=10mA$ 

 $V_{IN}=3.8V, C_{OUT}=1\mu F, I_{OUT}=300mA$ 


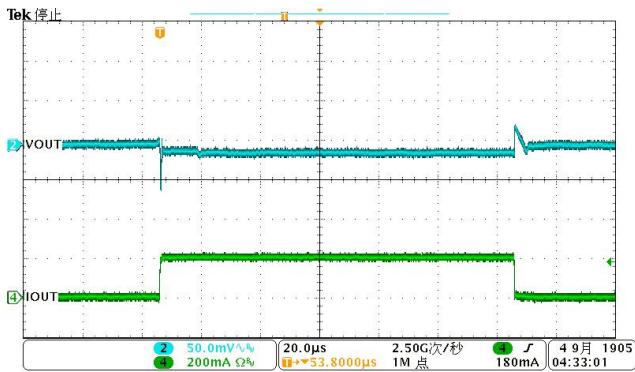
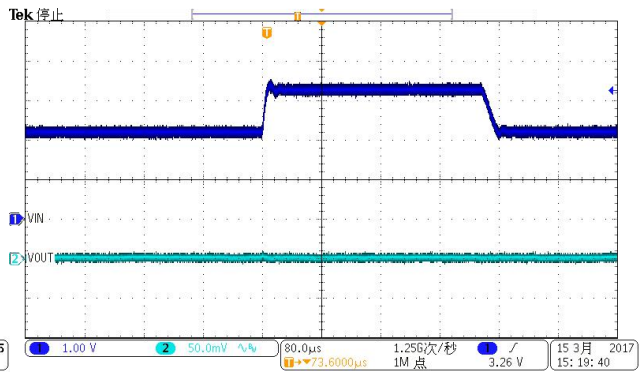
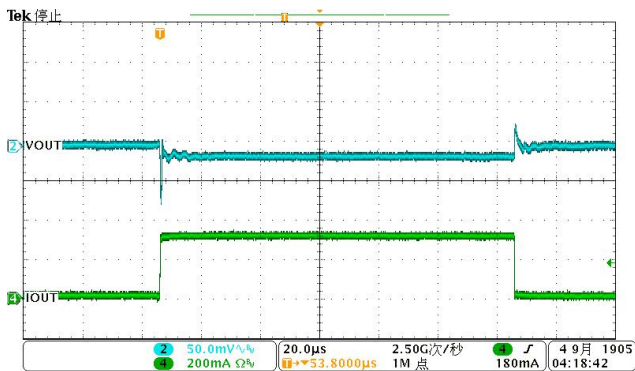
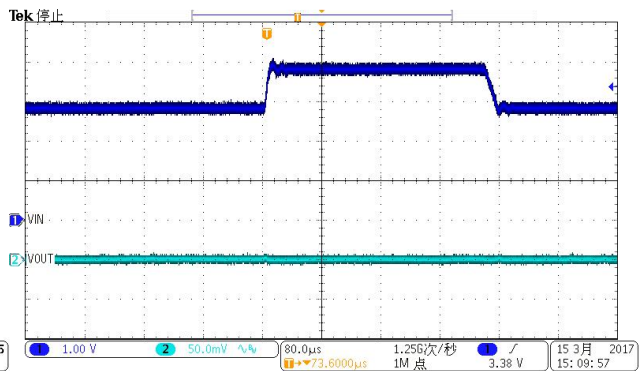
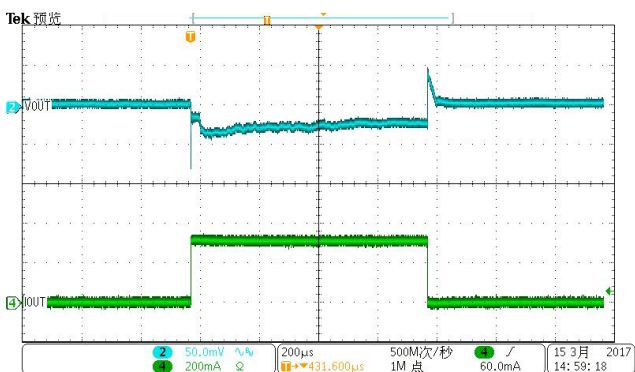
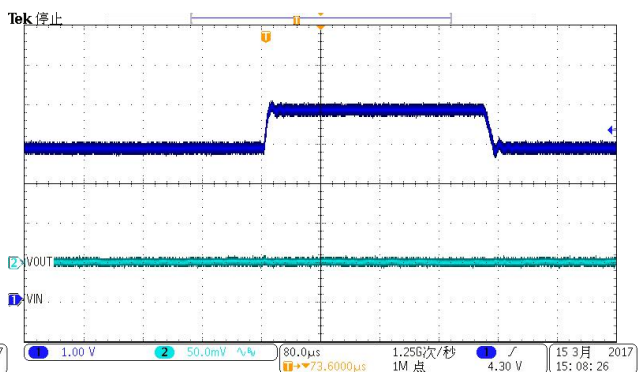
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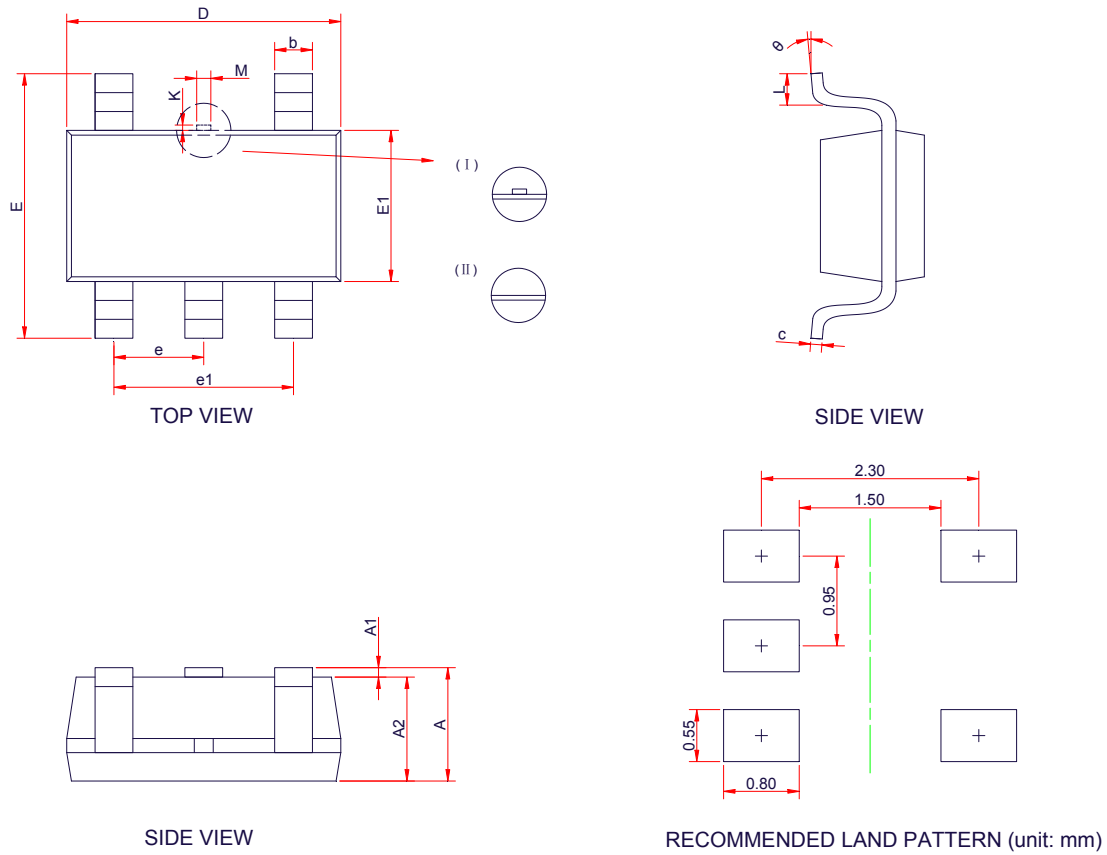
 **$V_{OUT}=0.9V$** 
 $V_{IN}=1.9V, C_{OUT}=1\mu F, I_{OUT}=10mA$ 

 $V_{IN}=1.9V, C_{OUT}=1\mu F, I_{OUT}=300mA$ 

 **$V_{OUT}=1.2V$** 
 $V_{IN}=2.2V, C_{OUT}=1\mu F, I_{OUT}=10mA$ 

 $V_{IN}=2.2V, C_{OUT}=1\mu F, I_{OUT}=300mA$ 


**$V_{OUT}=1.8V$** 
 **$V_{IN}=2.8V, C_{OUT}=1\mu F, I_{OUT}=10mA$** 

 **$V_{IN}=2.8V, C_{OUT}=1\mu F, I_{OUT}=300mA$** 

 **$V_{OUT}=2.8V$** 
 **$V_{IN}=3.8V, C_{OUT}=1\mu F, I_{OUT}=10mA$** 

 **$V_{IN}=3.8V, C_{OUT}=1\mu F, I_{OUT}=300mA$** 


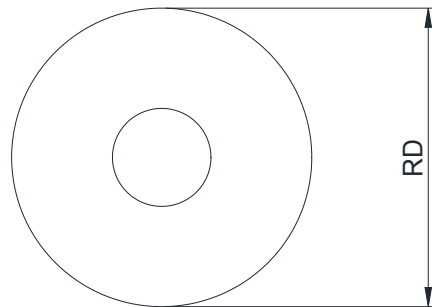
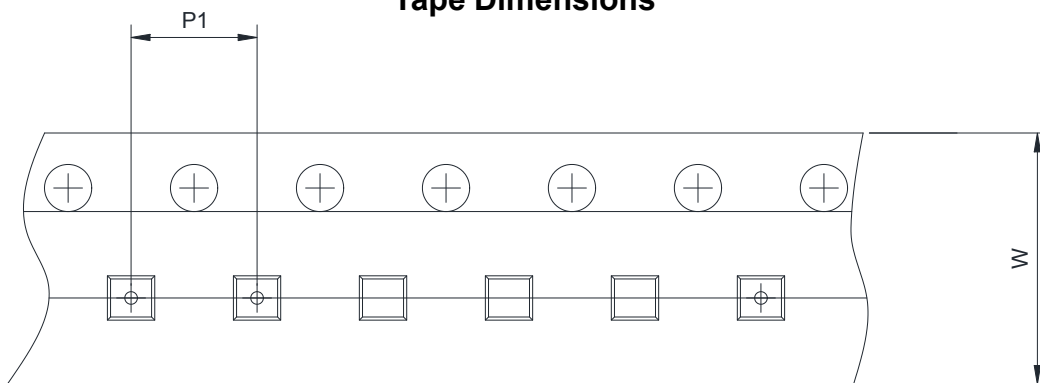
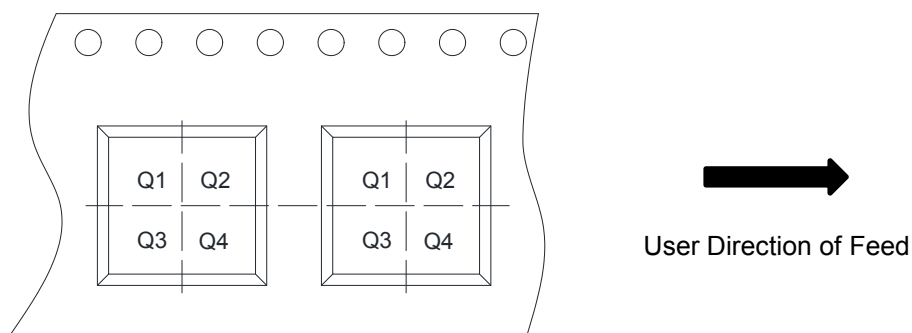
### 3. Load & Line Transient

**Load step**
 **$V_{OUT}=0.9V$** 
 **$V_{IN}=1.9V, C_{OUT}=1\mu F, I_{OUT}=1mA-200mA$  in  $1\mu s$** 

**Line Step**
 **$V_{IN}=2.2V-3.2V$  in  $20\mu s, C_{OUT}=1\mu F, I_{OUT}=1mA$** 


**$V_{OUT}=1.2V$** 
 $V_{IN}=2.2V, C_{OUT}=1\mu F, I_{OUT}=1mA-200mA$  in 1 $\mu s$ 

 $V_{IN}=2.2V-3.2V$  in 20 $\mu s, C_{OUT}=1\mu F, I_{OUT}=1mA$ 

 **$V_{OUT}=1.8V$** 
 $V_{IN}=2.8V, C_{OUT}=1\mu F, I_{OUT}=1mA-300mA$  in 1 $\mu s$ 

 $V_{IN}=2.8V-3.8V$  in 20 $\mu s, C_{OUT}=1\mu F, I_{OUT}=1mA$ 

 **$V_{OUT}=2.8V$** 
 $V_{IN}=3.8V, C_{OUT}=1\mu F, I_{OUT}=1mA-300mA$  in 1 $\mu s$ 

 $V_{IN}=3.8V-4.8V$  in 20 $\mu s, C_{OUT}=1\mu F, I_{OUT}=1mA$ 


**PACKAGE OUTLINE DIMENSIONS**
**SOT-23-5L**


| Symbol   | Dimensions in Millimeters |      |      |
|----------|---------------------------|------|------|
|          | Min.                      | Typ. | Max. |
| A        | -                         | -    | 1.25 |
| A1       | 0.00                      | -    | 0.15 |
| A2       | 0.90                      | 1.00 | 1.10 |
| b        | 0.30                      | 0.40 | 0.50 |
| c        | 0.10                      | -    | 0.21 |
| D        | 2.72                      | 2.92 | 3.12 |
| E        | 2.60                      | 2.80 | 3.00 |
| E1       | 1.40                      | 1.60 | 1.80 |
| e        | 0.95 BSC                  |      |      |
| e1       | 1.90 BSC                  |      |      |
| L        | 0.30                      | 0.45 | 0.60 |
| M        | 0.10                      | 0.15 | 0.25 |
| K        | 0.00                      | -    | 0.25 |
| $\theta$ | 0°                        | -    | 8°   |

**TAPE AND REEL INFORMATION**
**Reel Dimensions**

**Tape Dimensions**

**Quadrant Assignments For PIN1 Orientation In Tape**


|      |   |   |  |
|------|---|---|--|
| RD   | Reel Dimension                          | <input checked="" type="checkbox"/> 7inch | <input type="checkbox"/> 13inch  |
| W    | Overall width of the carrier tape       | <input checked="" type="checkbox"/> 8mm   | <input type="checkbox"/> 12mm <input type="checkbox"/> 16mm                                    |
| P1   | Pitch between successive cavity centers | <input type="checkbox"/> 2mm              | <input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm                           |
| Pin1 | Pin1 Quadrant                           | <input type="checkbox"/> Q1               | <input type="checkbox"/> Q2 <input checked="" type="checkbox"/> Q3 <input type="checkbox"/> Q4 |

## ORDER INFORMATION

| Ordering No.   | Vout (V) | Package   | Operating Temperature | Marking      | Shipping               |
|----------------|----------|-----------|-----------------------|--------------|------------------------|
| WL2836E08-5/TR | 0.8      | SOT-23-5L | -40~+85°C             | 2836<br>EhYW | Tape and Reel,<br>3000 |
| WL2836E09-5/TR | 0.9      | SOT-23-5L | -40~+85°C             | 2836<br>EAYW | Tape and Reel,<br>3000 |
| WL2836E10-5/TR | 1.0      | SOT-23-5L | -40~+85°C             | 2836<br>EBYW | Tape and Reel,<br>3000 |
| WL2836E11-5/TR | 1.1      | SOT-23-5L | -40~+85°C             | 2836<br>EDYW | Tape and Reel,<br>3000 |
| WL2836E12-5/TR | 1.2      | SOT-23-5L | -40~+85°C             | 2836<br>EEYW | Tape and Reel,<br>3000 |
| WL2836E13-5/TR | 1.3      | SOT-23-5L | -40~+85°C             | 2836<br>EFYW | Tape and Reel,<br>3000 |
| WL2836E15-5/TR | 1.5      | SOT-23-5L | -40~+85°C             | 2836<br>EGYW | Tape and Reel,<br>3000 |
| WL2836E18-5/TR | 1.8      | SOT-23-5L | -40~+85°C             | 2836<br>EHYW | Tape and Reel,<br>3000 |
| WL2836E25-5/TR | 2.5      | SOT-23-5L | -40~+85°C             | 2836<br>EKYW | Tape and Reel,<br>3000 |
| WL2836E27-5/TR | 2.7      | SOT-23-5L | -40~+85°C             | 2836<br>EYYW | Tape and Reel,<br>3000 |
| WL2836E28-5/TR | 2.8      | SOT-23-5L | -40~+85°C             | 2836<br>ELYW | Tape and Reel,<br>3000 |
| WL2836E29-5/TR | 2.9      | SOT-23-5L | -40~+85°C             | 2836<br>EgYW | Tape and Reel,<br>3000 |
| WL2836E30-5/TR | 3.0      | SOT-23-5L | -40~+85°C             | 2836<br>EMYW | Tape and Reel,<br>3000 |
| WL2836E33-5/TR | 3.3      | SOT-23-5L | -40~+85°C             | 2836<br>ENYW | Tape and Reel,<br>3000 |