## GENERAL DESCRIPTION

The LW58XX Series is a Sub-μA power consumption, high accuracy, low drop-out voltage regulator with Chip Enable Pin, high ripple rejection and fast discharge function.

The current limiter's fold-back circuit operates as a short circuit protection as well as the output current limiter for the output pin.

Output voltage is selectable from 1.0V to 5.0V which fixed by laser trimming technologies, Step=100mV.

The LW58XX is available in SOT23, SOT23-3L, SOT23-5L and DFN1x1-4L packages.

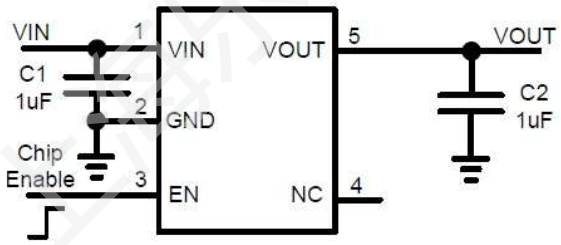
## FEATURES

- Ultra-Low Power Consumption: 0.7μA(Typ.)
- Operating Voltage Range: from 1.5V to 6.0V
- Output Voltage Range: from 1.0V to 5.0V
- Maximum Output Current: 500mA
- Output Accuracy: ±1.5% @+25℃
- Low Dropout Voltage:450mV@500mA/3.3V
- High PSRR: 80dB@1KHz, 10mA
- Current Limiting Protection
- Output Short-Circuit Protection
- Over-Temperature Protection
- Fast Discharge Function
- Stable with 1μF Output Capacitor

## APPLICATIONS

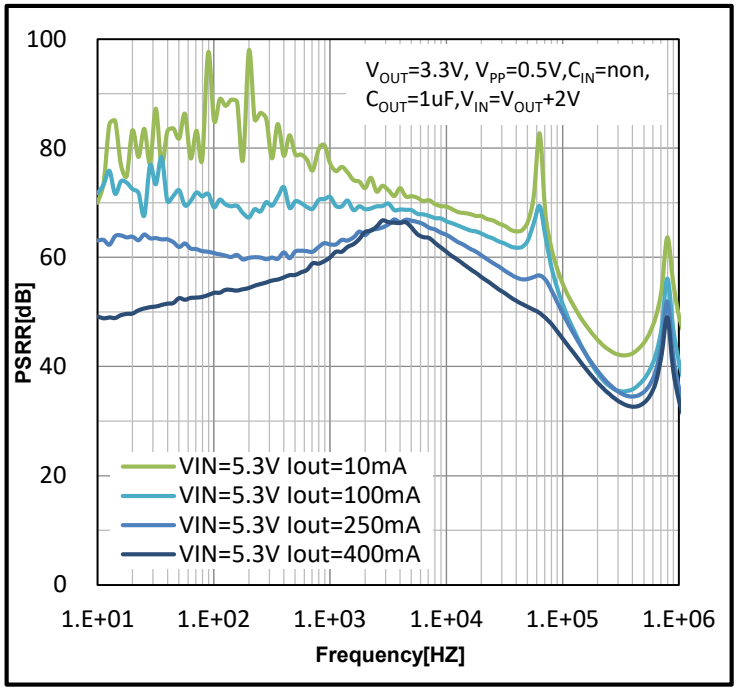
- Battery-Powered Devices
- Portable Consumer Equipment
- Ultra Low Power Applications

## TYPICAL APPLICATION CIRCUIT




**Note: EN must NOT be left floating.**

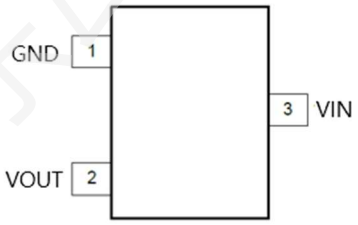
## TYPICAL PERFORMANCE CHARACTERISTCS



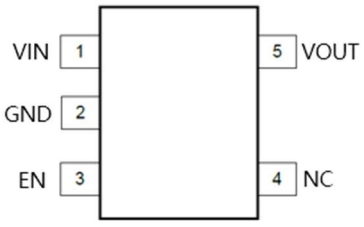
## PIN DESCRIPTION:

| PIN No | | | SYMBOL | DESCRIPTTION |
|---|---|---|---|---|
| SOT23/ SOT23-3L | SOT23-5L | DFN1x1-4L | | |
| 3 | 1 | 4 | VIN | Input pin. For best transient response and to minimize input impedance, use the recommended value or larger ceramic capacitor from IN to ground as listed in the Recommended Operating Conditions table and the Input and Output Capacitor Requirements section. Place the input capacitor as close to the output of the device as possible. |
| 1 | 2 | 2 | GND | Ground pin. |
| -- | 3 | 3 | EN | Enable pin. Drive EN greater than $V_{EN(HI)}$ to turn on the regulator. Drive EN less than $V_{EN(LO)}$ to put the low-dropout regulator (LDO) into shutdown mode. |
| -- | 4 | -- | NC | No internal connection. Ground this pin for better thermal performance. |
| 2 | 5 | 1 | VOUT | Regulated output voltage pin. Connect a low-equivalent series resistance (ESR) capacitor to this pin. For best transient response, use the nominal recommended value or larger capacitor from OUT to GND. An internal pulldown resistor prevents a charge from remaining on OUT when the regulator is in shutdown mode ($V_{EN} < V_{EN\ (LOW)}$). |
| -- | -- | Thermal Pad | Pad | The thermal pad is electrically connected to the GND node. Connect to the GND plane for improved thermal performance. |

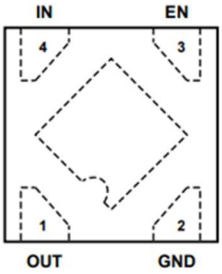
## PIN ASSIGNMENT




SOT23/SOT23-3L




SOT23-5L




DFN1x1-4L

## MARK INFORMATION:

**SOT23/ SOT23-3L**

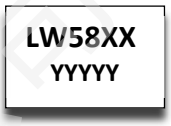
**XX: VOLTAGE**

**YY: DATE CODE**


**SOT23-5L**

**XX: VOLTAGE**

**YY: DATE CODE**




**DFN1x1-4L**

**X: VOLTAGE**


| 1.0V | 1.2V | 1.5V | 1.8V | 2.5V | 2.8V | 3.0V | 3.3V | 3.6V | 4.2V | 5.0V |
|---|---|---|---|---|---|---|---|---|---|---|
| B | C | D | G | H | J | L | M | P | S | T |

## ABSOLUTE MAXIMUM RATINGS (1):

($T_A$ =25℃, unless otherwise specified.)

| SYMBOL | ITEM | | RATING | UNIT |
|---|---|---|---|---|
| $V_{IN}$ | Supply Voltage | | -0.3~7.0 | V |
| $V_{EN}$ | EN Pin Voltage | | -0.3~7.0 | V |
| $V_{OUT}$ | $V_{OUT}$ Pin Voltage | | -0.3~ ($V_{IN}$+0.3) | V |
| $V_{(ESD)}$ | ESD Susceptibility, HBM(2) | | ±4000 | V |
| $R_{\theta JA}$ | Junction-to-ambient Thermal Resistance(3) | SOT23 | 255 | ℃/W |
| | | SOT23-3L | 240 | |
| | | SOT23-5L | 230 | |
| | | DFN1x1-4L | 226 | |
| $T_J$ | Junction Temperature Range | | -40~150 | ℃ |
| $T_{STG}$ | Storage Temperature Range | | -40~150 | ℃ |
| $T_{SOLDER}$ | Lead Temperature (Soldering) | | 260℃, 10s | |

**Note**:

1. Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability

2. per ANSI/ESDA/JEDEC JS-001

3. Device mounted on FR-4 PCB, Refer to JESD51-3 for detailed information on the board construction

## RECOMMENDED OPERATING RANGE:

| SYMBOL | ITEM | VALUE | UNIT |
|---|---|---|---|
| $V_{IN}$ | $V_{IN}$ Supply Voltage | 1.5~6.0 | V |
| $V_{EN}$ | EN Pin Voltage | 0~6.0 | V |
| $V_{OUT}$ | $V_{OUT}$ Pin Voltage | 1.0~5.0 | V |
| $I_{OUT}$ | Output Current | 0~500 | mA |
| $T_J$ | Junction Temperature Range | -40~125 | ℃ |

## ELECTRICAL CHARACTERISTICS:

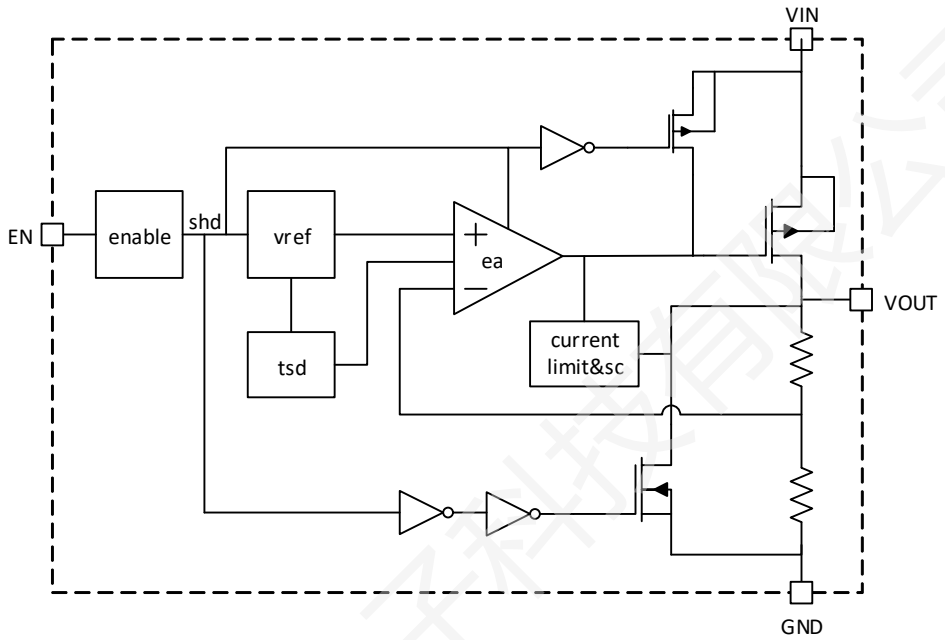
($V_{IN}$=$V_{OUT(NOM)}$+1V or 2V, whichever is greater, $C_{IN}$= $C_{OUT}$=1μF, unless otherwise specified, typical values are at $T_A$ = 25℃. )

| Symbol | Parameter | Test Conditions | | MIN | TYP | MAX | Unit |
|---|---|---|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | | | 1.5 | | 6.0 | V |
| $V_{OUT}$ | Output Accuracy | $I_{OUT}$= 1mA | | -1.5 | | +1.5 | % |
| $I_{LIM}$ | Current Limit(1) | | | 530 | 750 | | mA |
| $I_Q$ | Quiescent Current | $V_{IN}$=$V_{EN}$=$V_{OUT}$ +1V, No Load | | | 0.7 | 1.0 | μA |
| $I_{SHD}$ | Shutdown Current | $V_{IN}$=6.0V, $V_{EN}$=0V | | | | 0.1 | μA |
| $V_{DROP}$ | Dropout Voltage(1) (2) | $I_{OUT}$=100mA | $V_{OUT}$ =3.3V | | 80 | | mV |
| | | $I_{OUT}$=300mA | | | 255 | | |
| | | $I_{OUT}$=500mA | | | 450 | | |
| | | $I_{OUT}$=100mA | $V_{OUT}$ =5.0V | | 65 | | |
| | | $I_{OUT}$=300mA | | | 200 | | |
| | | $I_{OUT}$=500mA | | | 360 | | |
| $\Delta V_{OUT}$/ ($\Delta V_{IN}$*$V_{OUT(NOM)}$) | Line Regulation | $V_{IN}$= $V_{OUT}$ +1.0V to 6.0V, $I_{OUT}$=1mA | | | 0.1 | 0.25 | %/V |
| $\Delta V_{OUT}$ | Load Regulation | 1mA≤$I_{OUT}$≤500mA | | | 50 | 100 | mV |
| $I_{SHORT}$ | Short Current(1) | $V_{OUT}$=0V | LW5812 | | 50 | | mA |
| | | | LW5833 | | 80 | | |
| | | | LW5850 | | 80 | | |
| $V_{ENH}$ | EN High Voltage | $V_{IN}$=1.5V to 6.0V, $I_{OUT}$=1mA | | 1.5 | | | V |
| $V_{ENL}$ | EN Low Voltage | | | | | 0.5 | V |
| $T_{STR}$ | Startup Time | From $V_{EN}$ 'L'→'H' to 95%*$V_{OUT}$, $C_{OUT}$=1uF, No Load | | | 400 | | μs |
| PSRR | Power Supply Rejection Ratio | $V_{IN}$= 4.3V, $V_{OUT}$=3.3V $V_{PP}$=0.5V, $C_{IN}$=None, $I_{OUT}$=10mA | f=217Hz | | 83 | | dB |
| | | | f=1KHz | | 80 | | |
| | | | f=10KHz | | 69 | | |
| $T_{SD}$ | Thermal Shutdown | Temperature rising | | | 165 | | ℃ |
| △$T_{SD}$ | TSD Hysteresis | Temperature falling | | | 30 | | ℃ |
| $R_{DSCHG}$ | Output Discharge Resistance | $V_{IN}$=6.0V, $V_{EN}$=0V | | | 100 | | Ω |

**NOTES:**

1. Guaranteed by design
2. The dropout voltage is defined as $V_{IN}$ - $V_{OUT}$, when $V_{OUT}$ =95%*$V_{OUT(NOM)}$

## SIMPLIFIED BLOCK DIAGRAM:




## DETAIL OPERATION DESCRIPTION:

The LW58XX Series is a low power consumption low drop-out voltage regulator. It consists of a current limiter circuit, a driver transistor, a precision voltage reference and an error correction circuit, and is compatible with low ESR ceramic capacitors. The current limiter's fold-back circuit operates as a short circuit protection as well as the output current limiter.

***Current Limiting and Short-Circuit Protection***

The current limit circuitry prevents damage to the MOSFET switch and the hub downstream port but can deliver load current up to the current limit threshold through the switch. When a heavy load or short circuit is applied to an enabled switch, a large transient current may flow until the current limit circuitry responds. Once this current limit threshold is exceeded the device enters constant current mode until the thermal shutdown occurs or the fault is removed.

## TYPICAL OPERATING CHARACTERISTICS:

（*Tested under* $T_A$ *=25*°C, $C_{IN}$=$C_{OUT}$=1μF, unless otherwise specified）

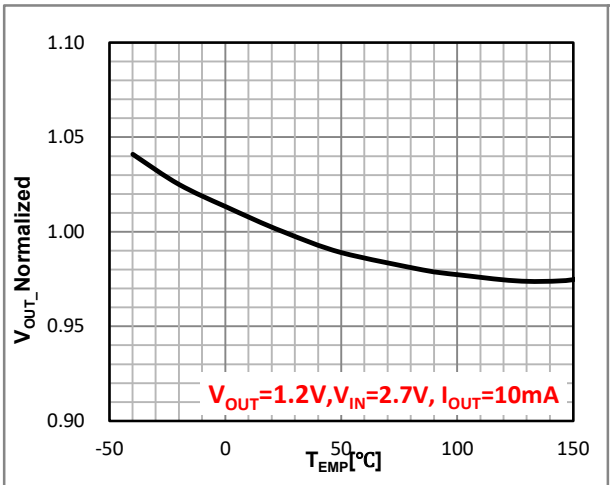



Figure 1. $V_{OUT}$ vs Temperature

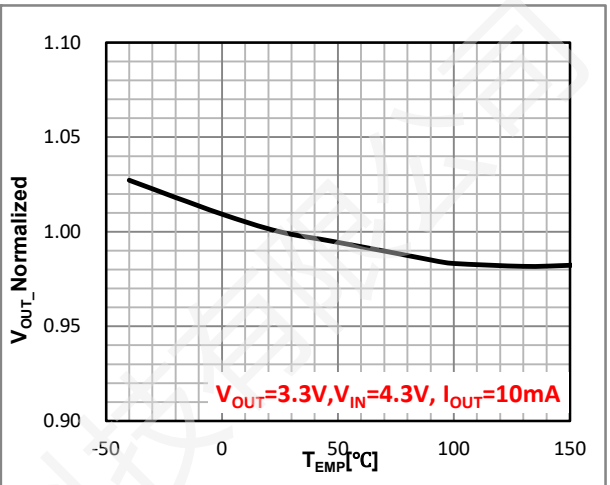



Figure 2. $V_{OUT}$ vs Temperature

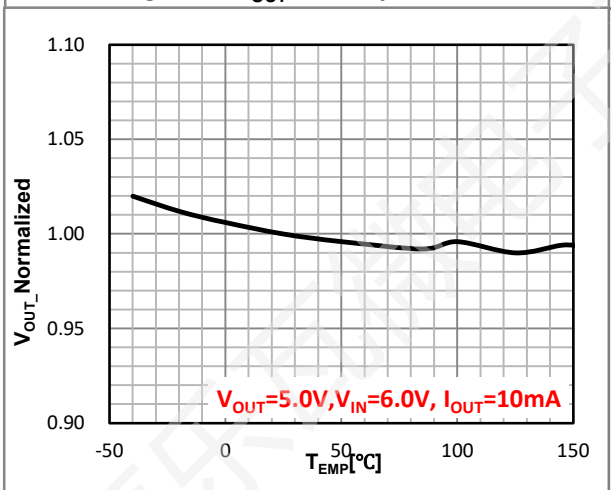



Figure 3. $V_{OUT}$ vs Temperature

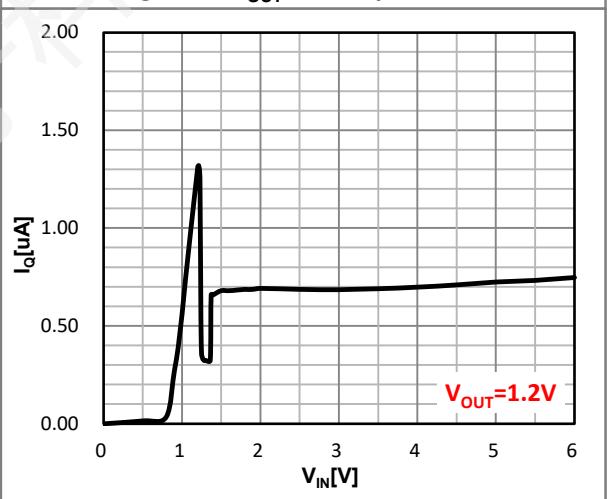



Figure 4. $I_Q$ vs $V_{IN}$

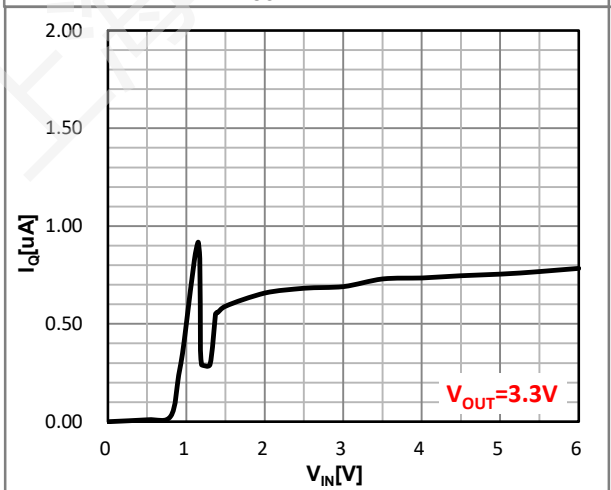



Figure 5. $I_Q$ vs $V_{IN}$

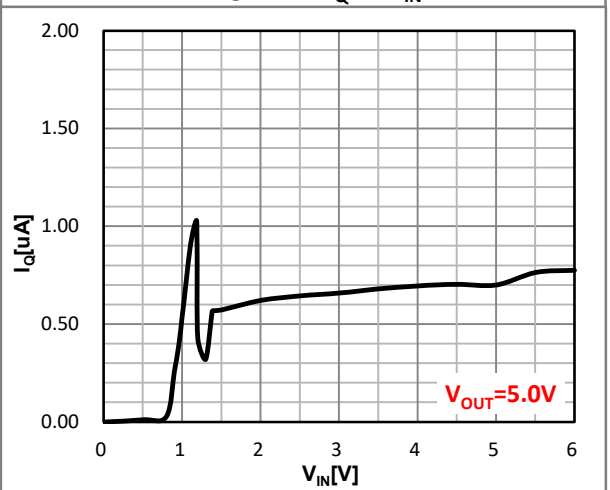



Figure 6. $I_Q$ vs $V_{IN}$

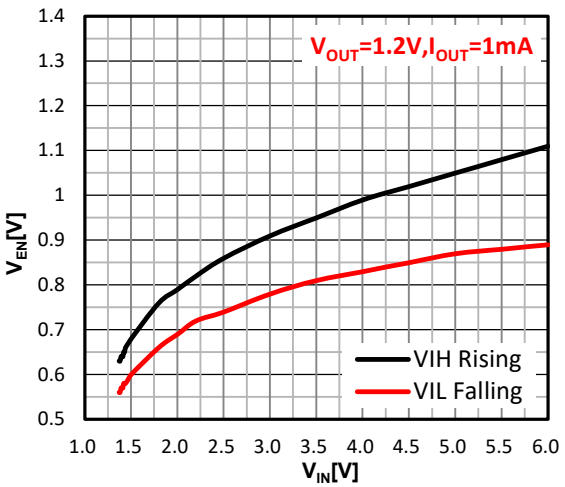



Figure 7. $V_{EN}$ VS $V_{IN}$

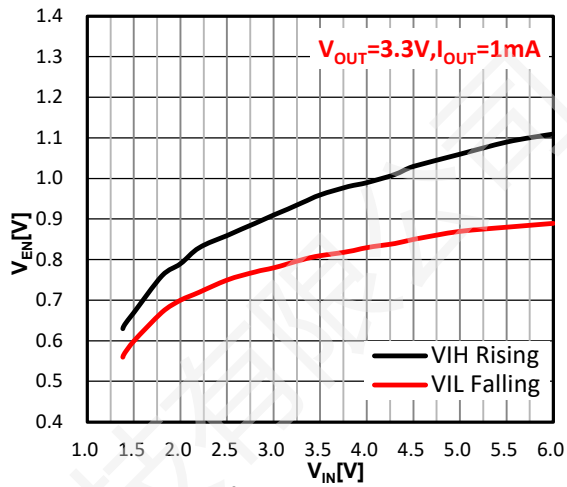



Figure 8. $V_{EN}$ VS $V_{IN}$

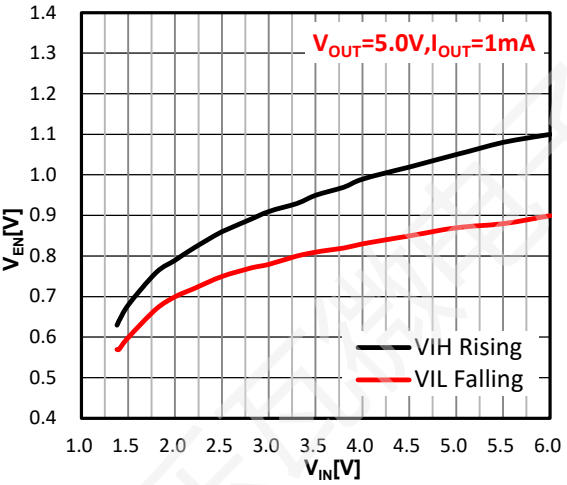



Figure 9. $V_{EN}$ VS $V_{IN}$

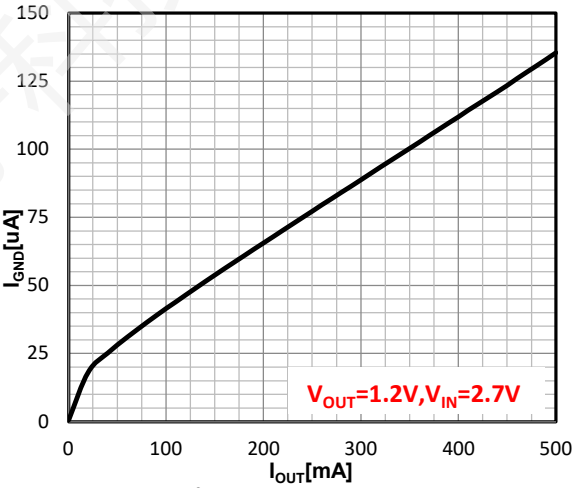



Figure 10. $I_{GND}$ vs $I_{OUT}$

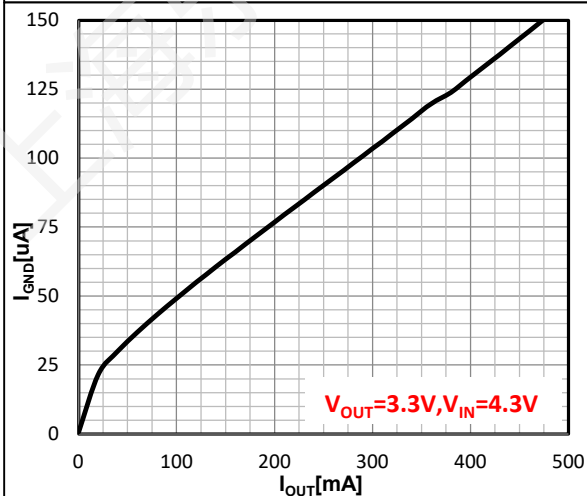



Figure 11. $I_{GND}$ vs $I_{OUT}$

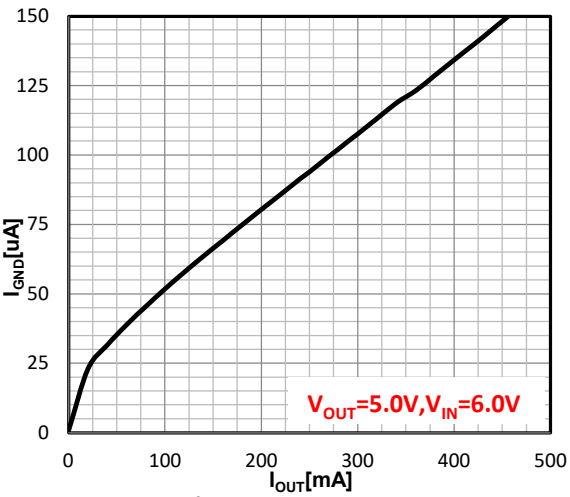



Figure 12. $I_{GND}$ vs $I_{OUT}$

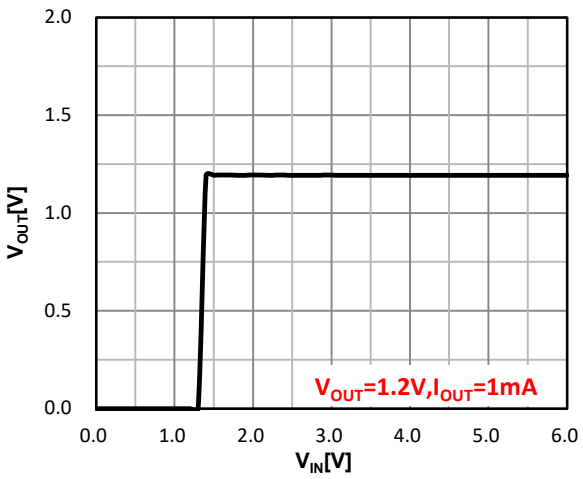



Figure 13. $V_{OUT}$ vs $V_{IN}$

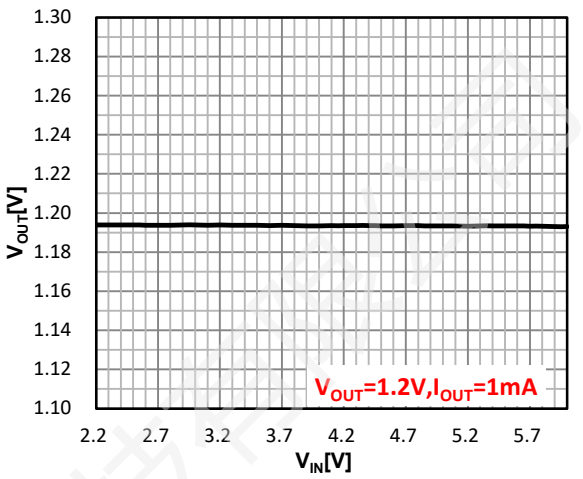



Figure 14. Line Regulation

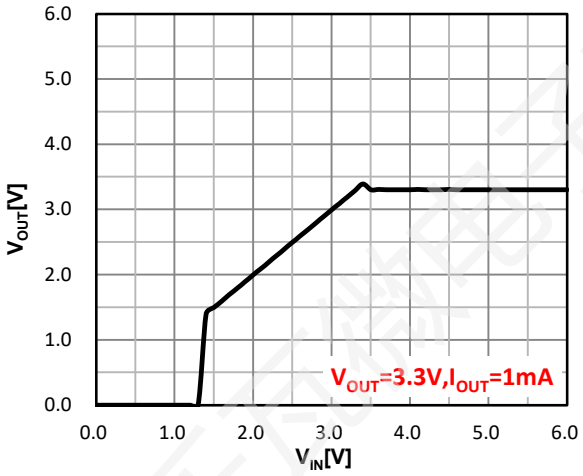



Figure 15. $V_{OUT}$ vs $V_{IN}$

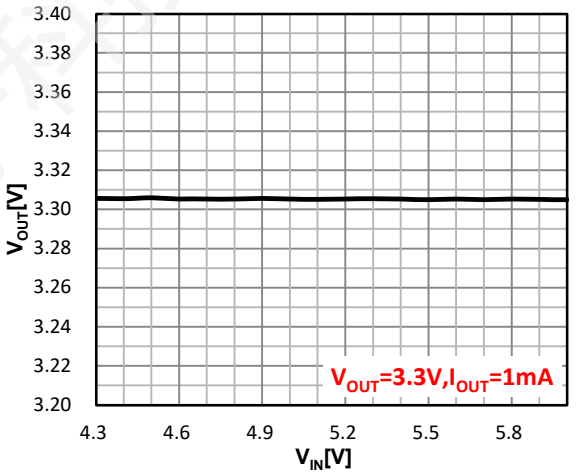



Figure 16. Line Regulation

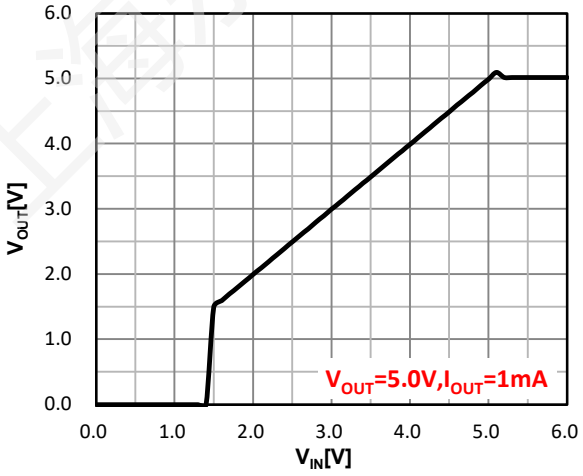



Figure 17. $V_{OUT}$ vs $V_{IN}$

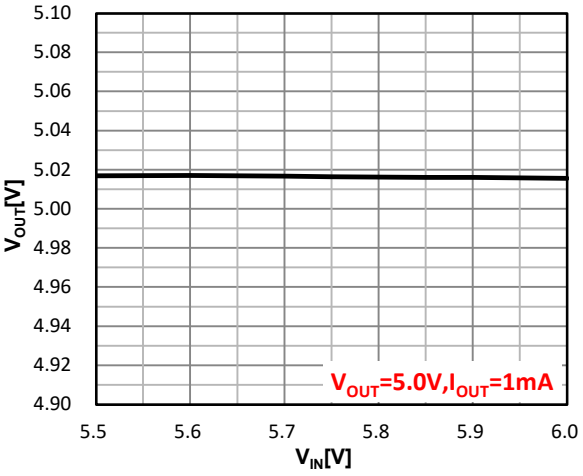



Figure 18. Line Regulation

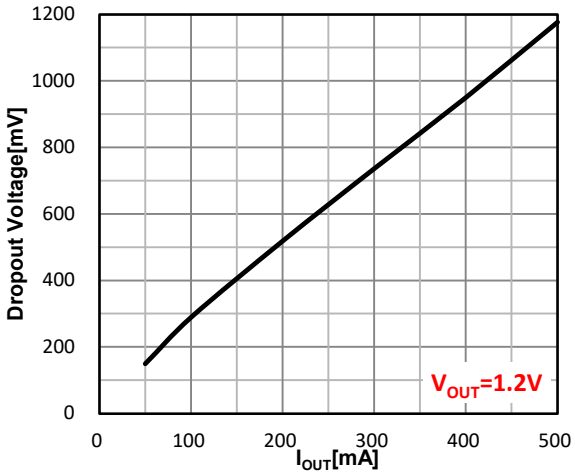



Figure 19. Dropout Voltage VS $I_{OUT}$

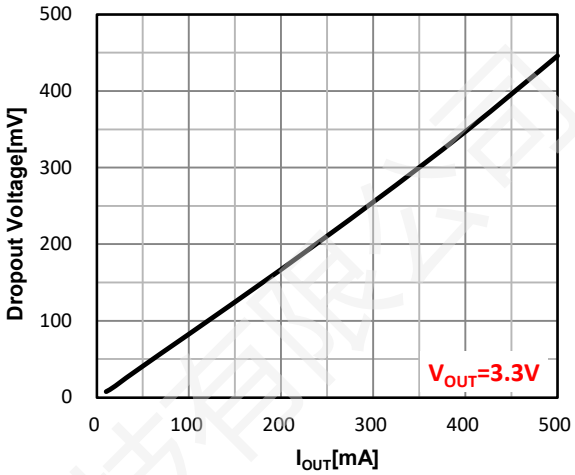



Figure 20. Dropout Voltage VS $I_{OUT}$

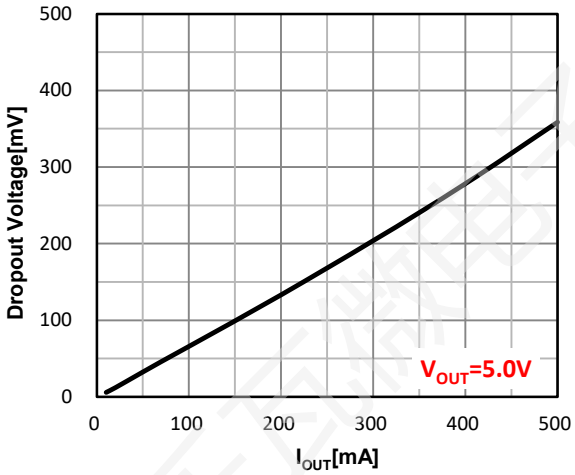



Figure 21. Dropout Voltage VS $I_{OUT}$

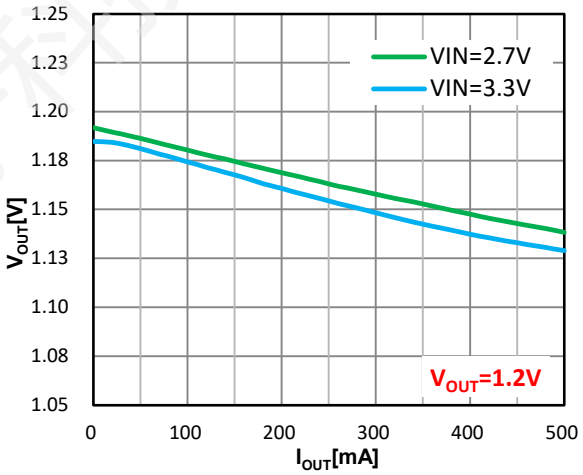



Figure 22. Load Regulation

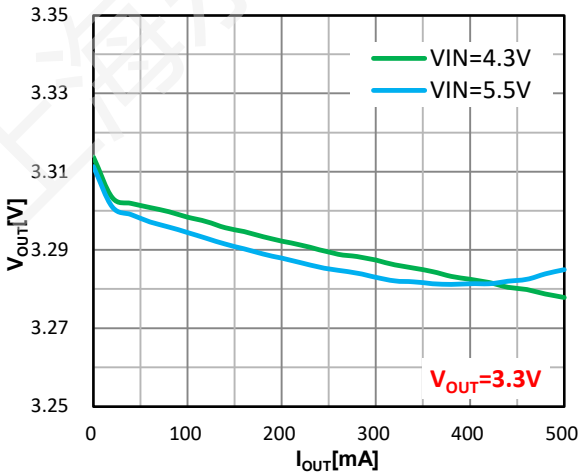



Figure 23. Load Regulation

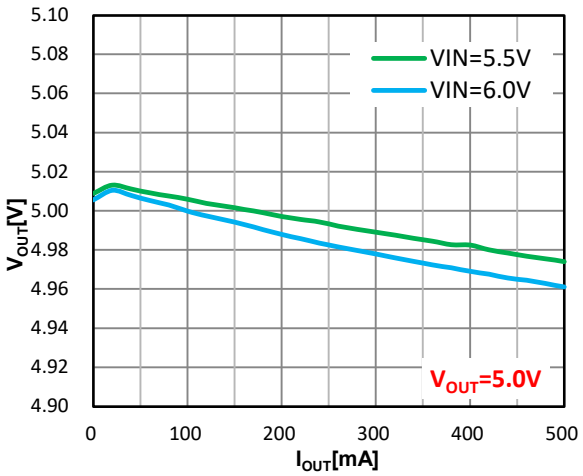
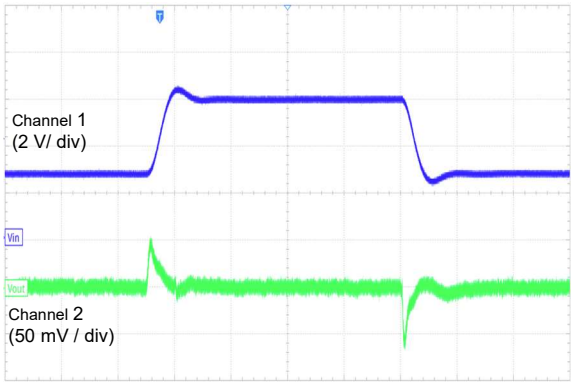


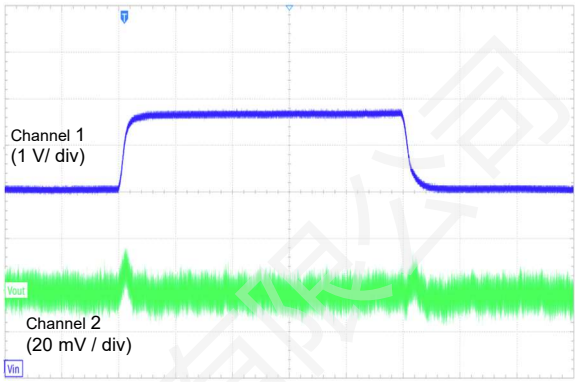

Figure 24. Load Regulation




Time (10 us / div)

Channel 1 = $V_{IN}$, Channel 2 =$V_{OUT}$, $V_{IN}$=2.7V→6.0V,
Tr=Tf=1us, $V_{OUT}$=1.2V, $I_{OUT}$=10mA

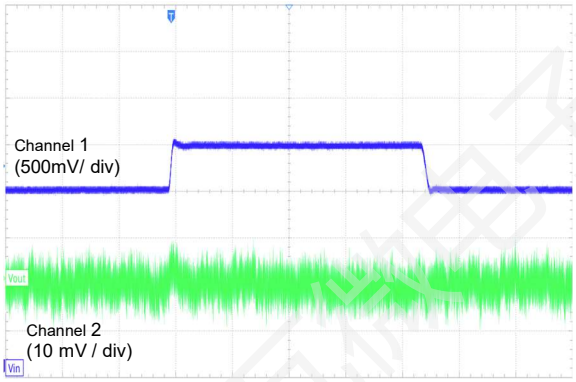
**Figure 25. Line Transient**




Time (10 us / div)

Channel 1 = $V_{IN}$, Channel 2 =$V_{OUT}$, $V_{IN}$=4.3V→6.0V,
Tr=Tf=1us, $V_{OUT}$=3.3V, $I_{OUT}$=10mA

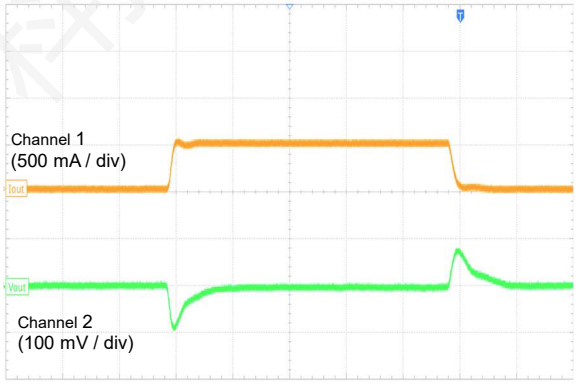
**Figure 26. Line Transient**




Time (10 us / div)

Channel 1 = $V_{IN}$, Channel 2 =$V_{OUT}$, $V_{IN}$=5.5V→6.0V,
Tr=Tf=1us, $V_{OUT}$=5.0V, $I_{OUT}$=10mA

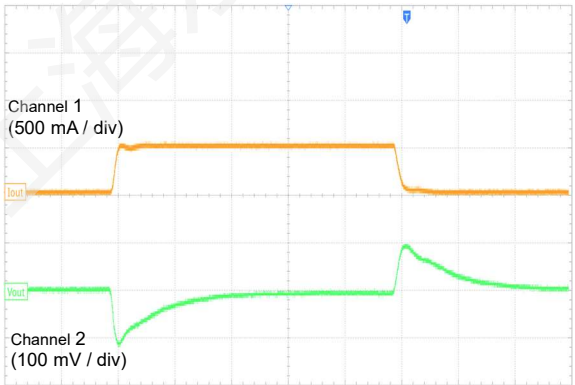
**Figure 27. Line Transient**




Time (100 us / div)

Channel 1 = $I_{OUT}$, Channel 2 =$V_{OUT}$, $V_{IN}$=2.7V, $V_{OUT}$=1.2V,
$C_{IN}$=$C_{OUT}$=1μF

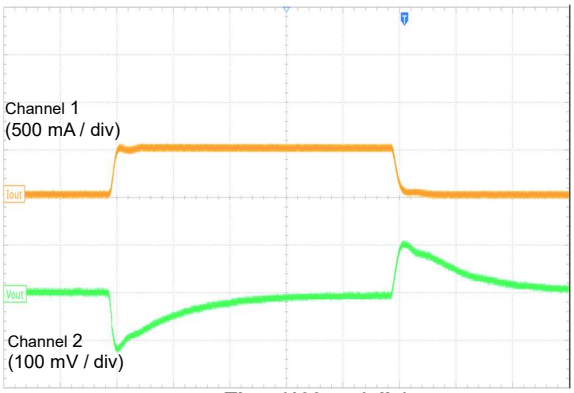
**Figure 28. Load Transient (1 mA → 500 mA)**




Time (100 us / div)

Channel 1 = $I_{OUT}$, Channel 2 =$V_{OUT}$, $V_{IN}$=4.3V, $V_{OUT}$=3.3V,
$C_{IN}$=$C_{OUT}$=1μF

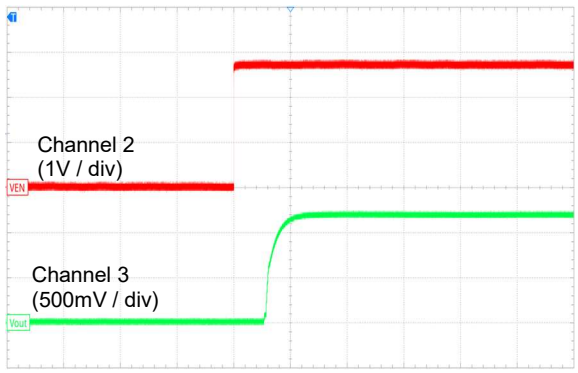
**Figure 29. Load Transient (1 mA → 500 mA)**




Time (100 us / div)

Channel 1 = $I_{OUT}$, Channel 2 =$V_{OUT}$, $V_{IN}$=6.0V, $V_{OUT}$=5.0V,
$C_{IN}$=$C_{OUT}$=1μF

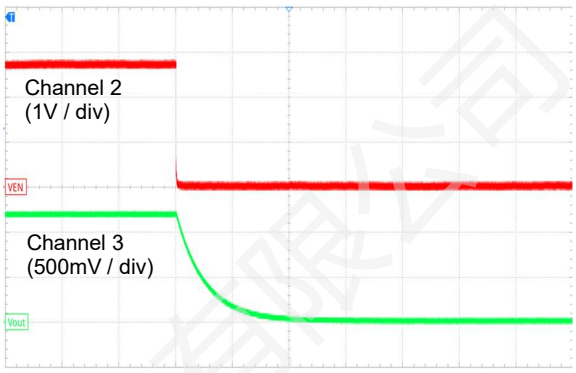
**Figure 30. Load Transient (1 mA → 500 mA)**




Time (200 us / div)

Channel 2 =EN, Channel 3 =$V_{OUT}$ ,$V_{IN}$=2.7V, EN=0→2.7V, $V_{OUT}$=1.2V, $C_{IN}$=$C_{OUT}$=1μF, No Load

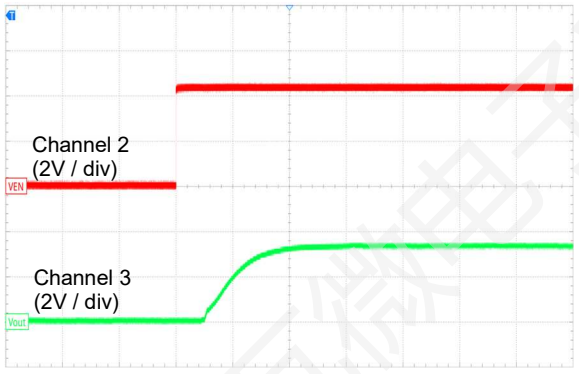
**Figure 31. Start-Up with Enable**




Time (200 us / div)

Channel 2 =EN, Channel 3 =$V_{OUT}$, $V_{IN}$=2.7V, EN=2.7→0V, $V_{OUT}$=1.2V, $C_{IN}$=$C_{OUT}$=1μF, No Load

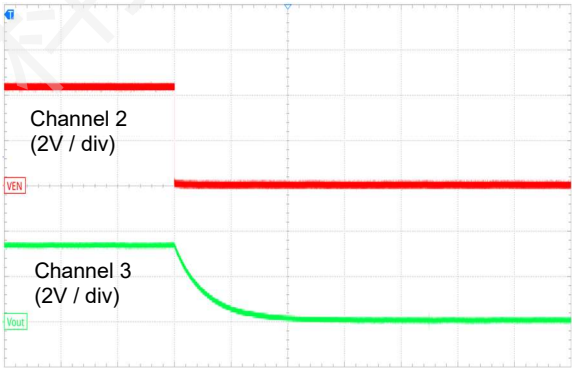
**Figure 32. Shut-Down with Enable**




Time (200 us / div)

Channel 2 =EN, Channel 3 =$V_{OUT}$, $V_{IN}$=4.3V, EN=0→4.3V, $V_{OUT}$=3.3V, $C_{IN}$=$C_{OUT}$=1μF, No Load

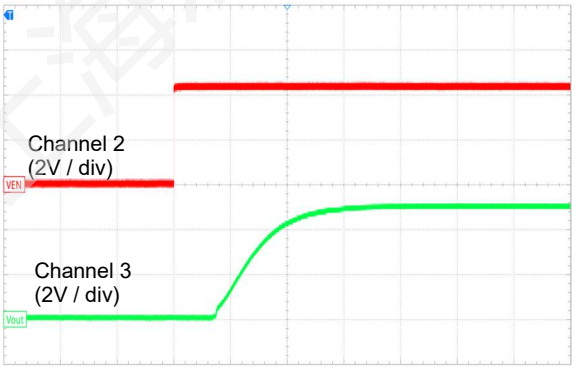
**Figure 33. Start-Up with Enable**




Time (200 us / div)

Channel 2 =EN, Channel 3 =$V_{OUT}$, $V_{IN}$=4.3V, EN=4.3→0V, $V_{OUT}$=3.3V, $C_{IN}$=$C_{OUT}$=1μF, No Load

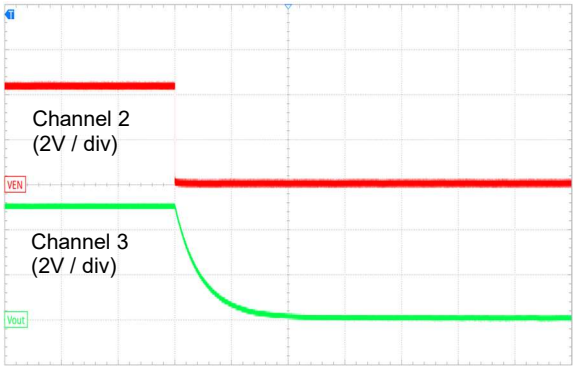
**Figure 34. Shut-Down with Enable**




Time (200 us / div)

Channel 2 =EN, Channel 3 =$V_{OUT}$, $V_{IN}$=6.0V, EN=0→6.0V, $V_{OUT}$=5.0V, $C_{IN}$=$C_{OUT}$=1μF, No Load

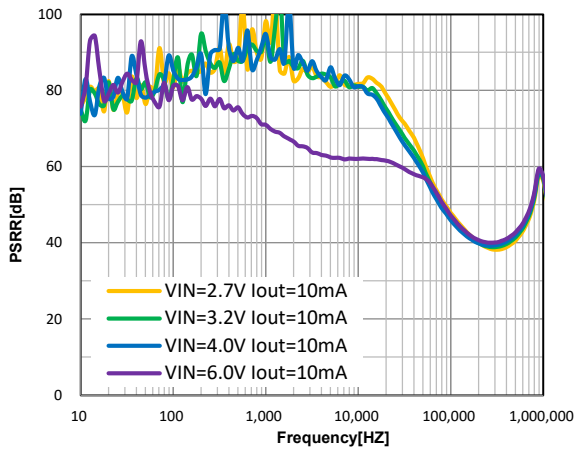
**Figure 35. Start-Up with Enable**




Time (200 us / div)

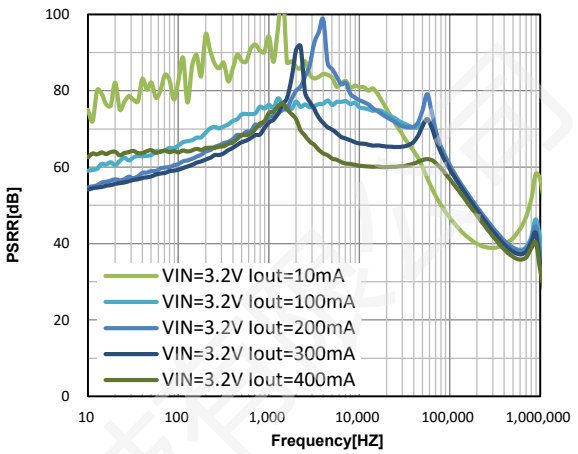
Channel 2 =EN, Channel 3 =$V_{OUT}$, $V_{IN}$=6.0V, EN=6.0→0V, $V_{OUT}$=5.0V, $C_{IN}$=$C_{OUT}$=1μF, No Load

**Figure 36. Shut-Down with Enable**



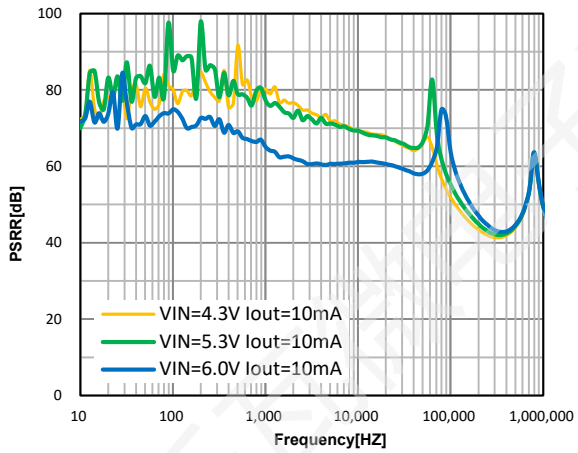

$V_{OUT}$=1.2V,$V_{PP}$=0.5V,$C_{IN}$=non,$C_{OUT}$=1uF,$I_{OUT}$=10mA

**Figure 37. PSRR vs Frequency**



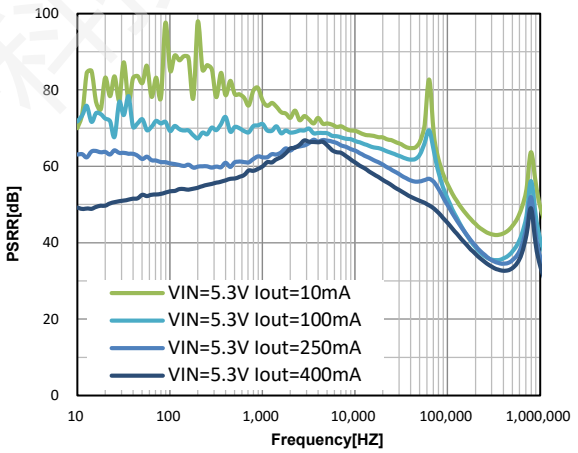

$V_{OUT}$=1.2V, $V_{PP}$=0.5V,$C_{IN}$=non,$C_{OUT}$=1uF,$V_{IN}$=$V_{OUT}$+2V

**Figure 38. PSRR vs Frequency**



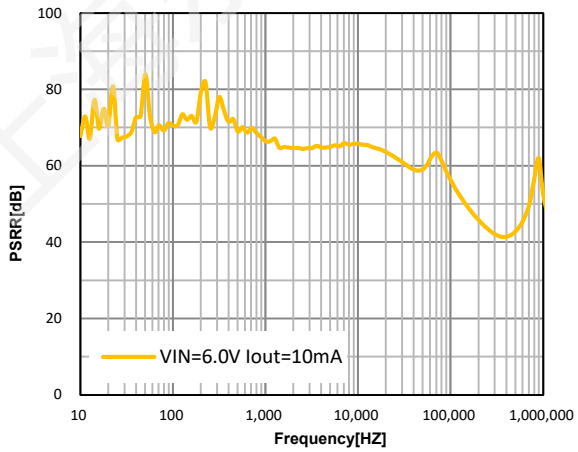

$V_{OUT}$=3.3V, $V_{PP}$=0.5V,$C_{IN}$=non, $C_{OUT}$=1uF,$I_{OUT}$=10mA

**Figure 39. PSRR vs Frequency**



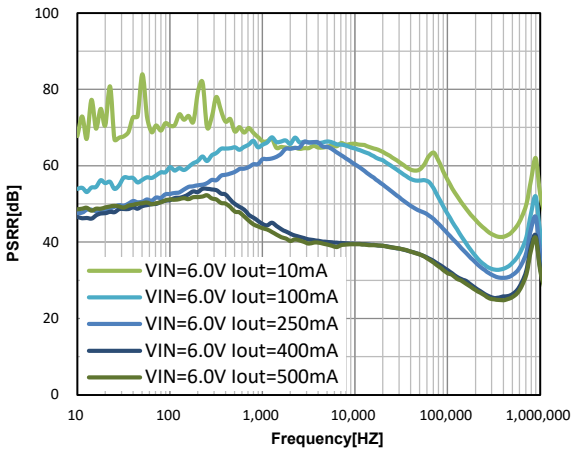

$V_{OUT}$=3.3V, $V_{PP}$=0.5V,$C_{IN}$=non, $C_{OUT}$=1uF,$V_{IN}$=$V_{OUT}$+2V

**Figure 40. PSRR vs Frequency**




$V_{OUT}$=5.0V, $V_{PP}$=0.5V,$C_{IN}$=non, $C_{OUT}$=1uF,$I_{OUT}$=10mA

**Figure 41. PSRR vs Frequency**




$V_{OUT}$=5.0V, $V_{PP}$=0.5V,$C_{IN}$=non, $C_{OUT}$=1uF,$V_{IN}$=$V_{OUT}$+1V

**Figure 42. PSRR vs Frequency**

## APPLICATION INFORMATION:

- **Input Capacitor Selection**

Like any low-dropout regulator, the external capacitors used with the LW58XX Series must be carefully selected for regulator stability and performance. Using a capacitor whose value is >=1μF on the LW58XX Series input and the amount of capacitance can be increased without limit. The input capacitor must be located a distance less than 0.5 inch from the input pin of the IC and returned to a clean analog ground. Any good quality ceramic or tantalum can be used for this capacitor. The capacitor with larger value and lower ESR (equivalent series resistance) provides better PSRR and line-transient response.

- **Output Capacitor Selection**

The output capacitor must meet both requirements for minimum amount of capacitance and ESR in all LDOs application. The LW58XX Series is designed specifically to work with low ESR ceramic output capacitor in space-saving and performance consideration. Using a ceramic capacitor whose value is at least 1μF on the LW58XX Series output ensures stability. An appropriate output capacitor can reduce noise and improve load transient response and PSRR. The output capacitor should be located not more than 0.5 inch from the VOUT pin of the LW58XX Series and returned to a clean analog ground.

- **Layout considerations**

To improve ac performance such as PSRR, output noise, and transient response, it is recommended that the PCB be designed with separate ground planes for VIN and VOUT, with each ground plane connected only at the GND pin of the device.

## ORDER INFORMATION:

LW58①②③④⑤⑥

| Designator | Item | Symbol | Description |
|---|---|---|---|
| ①② | Output Voltage | 10~50 | e.g.2.8V→①=2,②=8 |
| ③④⑤⑥ | Packages | N23C | SOT23 |
| | | N23D | SOT23-3L |
| | | A23E | SOT23-5L |
| | | N11E | DFN1x1-4L |

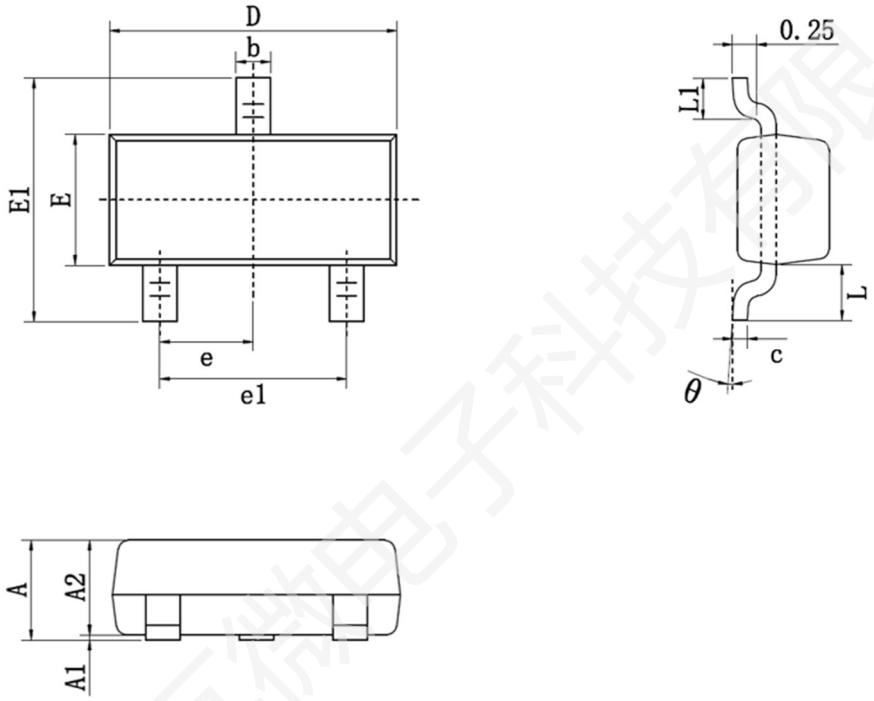
| Part # | Output Voltage | Package | Shipping |
|---|---|---|---|
| LW5810N23C | 1.0V | SOT23 | 3000 Pcs/ Tape & Reel |
| LW5812N23C | 1.2V | | |
| LW5815N23C | 1.5V | | |
| LW5818N23C | 1.8V | | |
| LW5825N23C | 2.5V | | |
| LW5828N23C | 2.8V | | |
| LW5830N23C | 3.0V | | |
| LW5833N23C | 3.3V | | |
| LW5836N23C | 3.6V | | |
| LW5842N23C | 4.2V | | |
| LW5850N23C | 5.0V | | |
| LW5810N23D | 1.0V | SOT23-3L | 3000 Pcs/ Tape & Reel |
| LW5812N23D | 1.2V | | |
| LW5815N23D | 1.5V | | |
| LW5818N23D | 1.8V | | |
| LW5825N23D | 2.5V | | |
| LW5828N23D | 2.8V | | |
| LW5830N23D | 3.0V | | |
| LW5833N23D | 3.3V | | |
| LW5836N23D | 3.6V | | |
| LW5842N23D | 4.2V | | |
| LW5850N23D | 5.0V | | |

| Part # | Output Voltage | Package | **Shipping** |
|---|---|---|---|
| LW5810A23E | 1.0V | SOT23-5L | 3000 Pcs/ Tape & Reel |
| LW5812A23E | 1.2V | | |
| LW5815A23E | 1.5V | | |
| LW5818A23E | 1.8V | | |
| LW5825A23E | 2.5V | | |
| LW5828A23E | 2.8V | | |
| LW5830A23E | 3.0V | | |
| LW5833A23E | 3.3V | | |
| LW5836A23E | 3.6V | | |
| LW5842A23E | 4.2V | | |
| LW5850A23E | 5.0V | | |
| LW5810N11E | 1.0V | DFN1x1-4L | 10000 Pcs/ Tape & Reel |
| LW5812N11E | 1.2V | | |
| LW5815N11E | 1.5V | | |
| LW5818N11E | 1.8V | | |
| LW5825N11E | 2.5V | | |
| LW5828N11E | 2.8V | | |
| LW5830N11E | 3.0V | | |
| LW5833N11E | 3.3V | | |
| LW5836N11E | 3.6V | | |
| LW5842N11E | 4.2V | | |
| LW5850N11E | 5.0V | | |

If customers have special output voltage requirements, please contact us.

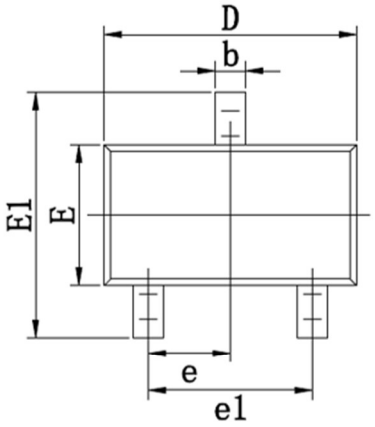
## PACKAGE OUTLINE:

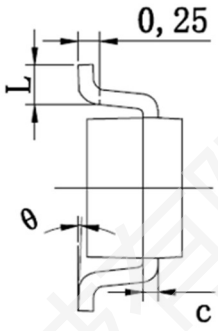
### SOT23 Package

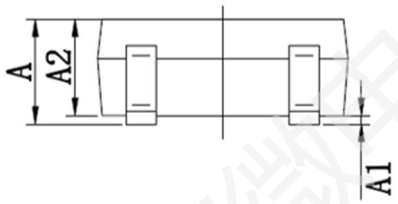



| COMMON IN DIMENSION (MM) | | | |
|---|---|---|---|
| Symbol | Min. | Nom. | Max. |
| A | — | — | 1.150 |
| A1 | 0.000 | — | 0.100 |
| A2 | 0.900 | 0.950 | 1.050 |
| b | 0.300 | 0.400 | 0.500 |
| c | 0.100 | 0.150 | 0.200 |
| D | 2.800 | 2.900 | 3.000 |
| E | 1.200 | 1.300 | 1.400 |
| E1 | 2.250 | 2.400 | 2.550 |
| e | 0.950 TYP | | |
| e1 | 1.800 | 1.900 | 2.000 |
| L | 0.550 REF | | |
| L1 | 0.290 | — | 0.500 |

## SOT23-3L Package

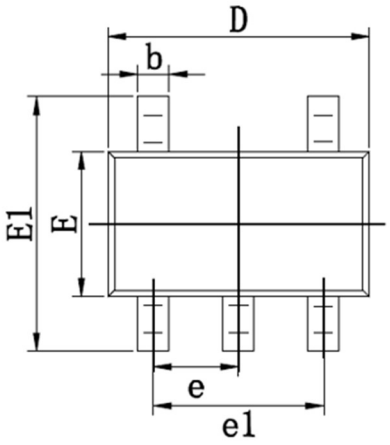


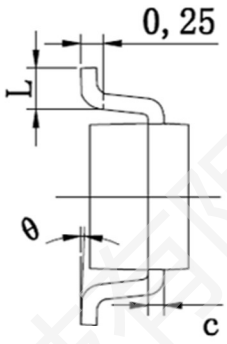



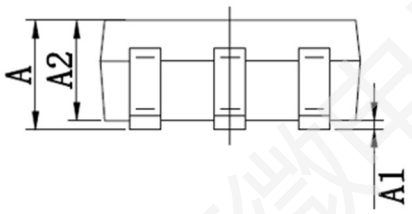




| COMMON DIMENSION (MM) | | | |
|---|---|---|---|
| PKG | SOT23-3L | | |
| Symbol | MIN | NOM | MAX |
| A | — | — | 1.300 |
| A1 | 0.010 | — | 0.150 |
| A2 | 1.050 | 1.100 | 1.150 |
| b | 0.300 | 0.350 | 0.400 |
| c | 0.125 | 0.150 | 0.175 |
| D | 2.870 | 2.920 | 2.980 |
| E | 1.550 | 1.610 | 1.670 |
| E1 | 2.650 | 2.850 | 3.000 |
| e | 0.95 BSC | | |
| e1 | 1.800 | 1.900 | 2.000 |
| L | 0.300 | 0.450 | 0.600 |
| θ | 0° | 4° | 8° |

## SOT23-5L Package

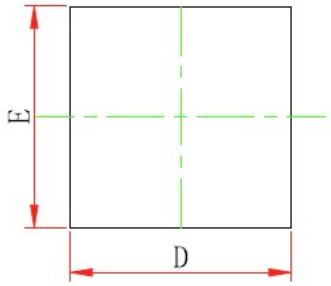


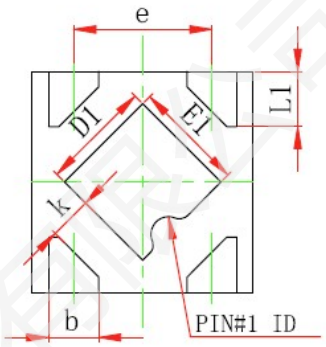




| COMMON DIMENSION (MM) | | | |
|---|---|---|---|
| PKG | SOT23-5L | | |
| Symbol | MIN | NOM | MAX |
| A | — | — | 1.300 |
| A1 | 0.010 | — | 0.150 |
| A2 | 1.050 | 1.100 | 1.150 |
| b | 0.300 | 0.350 | 0.400 |
| c | 0.125 | 0.150 | 0.175 |
| D | 2.870 | 2.920 | 2.980 |
| E | 1.550 | 1.610 | 1.670 |
| E1 | 2.650 | 2.850 | 3.000 |
| e | 0.95 BSC | | |
| e1 | 1.800 | 1.900 | 2.000 |
| L | 0.300 | 0.450 | 0.600 |
| θ | 0° | 4° | 8° |

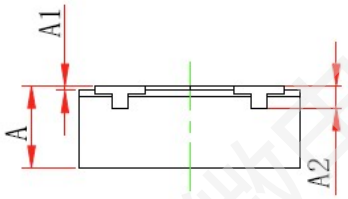
## DFN1x1-4L Package




TOP VIEW
[顶视图]




BOTTOM VIEW
[背视图]




SIDE VIEW
[侧视图]

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.335 | 0.405 | 0.013 | 0.016 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A2 | 0.100REF. | | 0.004REF. | |
| D | 0.950 | 1.050 | 0.037 | 0.041 |
| E | 0.950 | 1.050 | 0.037 | 0.041 |
| D1 | 0.450 | 0.550 | 0.018 | 0.022 |
| E1 | 0.450 | 0.550 | 0.018 | 0.022 |
| k | 0.195REF. | | 0.0077REF. | |
| b | 0.175 | 0.275 | 0.007 | 0.011 |
| e | 0.575 | 0.675 | 0.023 | 0.027 |
| L1 | 0.200 | 0.300 | 0.008 | 0.012 |

## Revision History:

| Revision | Date | Descriptions |
|---|---|---|
| Rev 0.1 | Dec.2022 | Initial Version |
| Rev 0.2 | Feb.2023 | Adjust characteristic |
| Rev 1.0 | May.2023 | Release Version |
| Rev 1.1 | Jun.2023 | Update Eletrical Characteristcs |
| Rev 1.2 | Feb.2026 | Update Eletrical Characteristcs |
| Rev 1.3 | Feb.2026 | Update Eletrical Characteristcs & Package Outline |
| Rev 1.4 | Mar.2026 | Add New Package |

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