

## Low noise, fast response 500mA LDO regulator

### Features:

- Low Power Consumption: 75uA (Typ.)
- Low output noise (47uVRMS)
- Standby Mode: 0.1uA
- Low dropout Voltage: 0.46V@500mA (Typ.)
- High Ripple Rejection: 66dB@100Hz (Typ.)
- Low Temperature Coefficient:  $\pm 100\text{ppm}/^\circ\text{C}$
- Excellent Line regulation: 0.05%/V
- Build-in chip enable and discharge circuit
- Output Voltage Range: 1.2V~4.5V (customized on command every 0.1V step)
- Highly Accurate:  $\pm 2\%$  ( $\pm 1\%$  customized)
- Output Current Limit

### Applications:

- Power source for cellular phones and various kind of PCs
- Battery Powered equipment
- Power Management of MP3, PDA, DSC, Mouse, PS2 Games
- Reference Voltage Source
- Regulation after Switching Power

### General Description:

BL8558 series is a group of positive voltage output, low power consumption, low dropout voltage regulator.

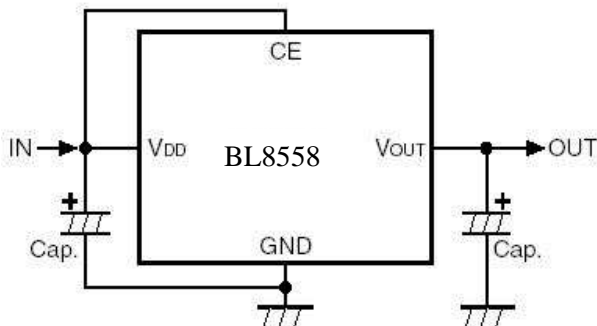
BL8558 can provide output value in the range of 1.2V~4.5V every 0.1V step. It also can be customized on command.

BL8558 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

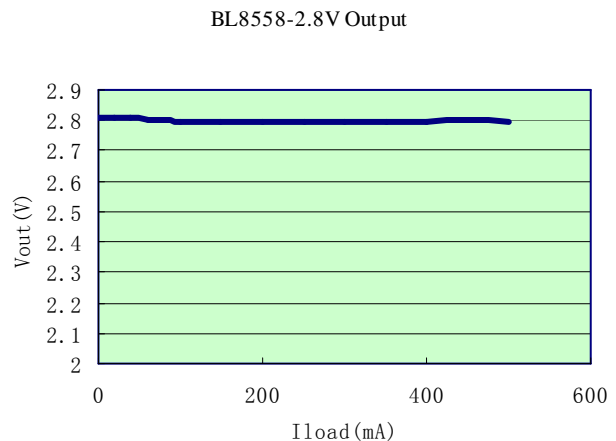
BL8558 has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within  $\pm 2\%$ .

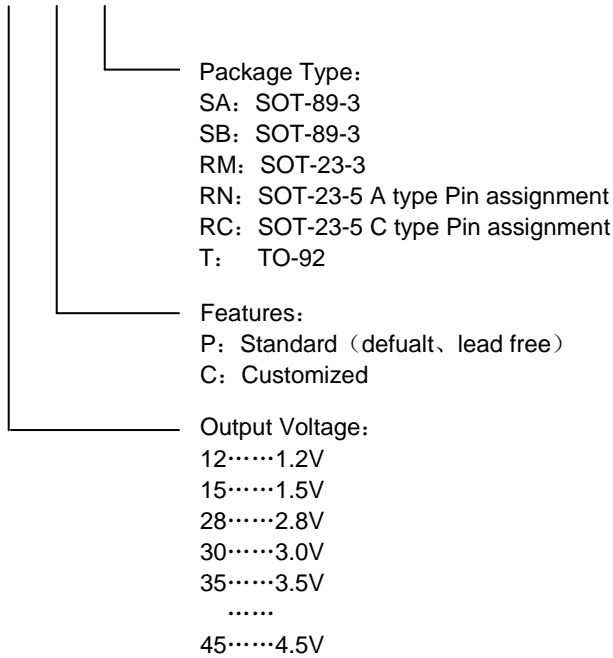
BL8558 is available in SOT-23-5, SOT89-3, SOT23-3, TO92 packages which are lead free.



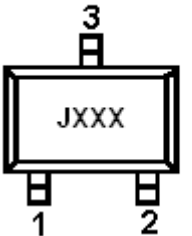
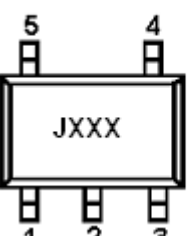
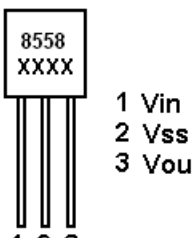
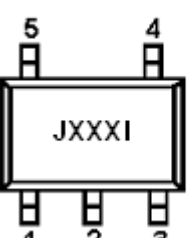
### BL8558 Typical Application Circuit



### BL8558 Typical Performance Characteristics:



**Selection Guide:**
**BL8558-XX X X**

**Pin Assignment:**

|              |  |              |   |
|--------------|--|--------------|---|
| BL8558-XXPSA | <p><b>SOT-89-3</b></p>  <p>1 Vout<br/>2 Vss<br/>3 Vin</p> | BL8558-XXPSB | <p><b>SOT-89-3</b></p>  <p>1 Vss<br/>2 Vin<br/>3 Vout</p>                          |
| BL8558-XXPRM | <p><b>SOT-23-3</b></p>  <p>1 Vss<br/>2 Vout<br/>3 Vin</p> | BL8558-XXPRN | <p><b>SOT-23-5 A type</b></p>  <p>1.Vin<br/>2.Vss<br/>3.CE<br/>4.NC<br/>5.Vout</p> |
| BL8558-XXPT  | <p><b>TO-92</b></p>  <p>1 Vin<br/>2 Vss<br/>3 Vout</p>    | BL8558-XXPRC | <p><b>SOT-23-5 C type</b></p>  <p>1.CE<br/>2.Vss<br/>3.NC<br/>4.Vout<br/>5.Vin</p> |

**Pin Description:**

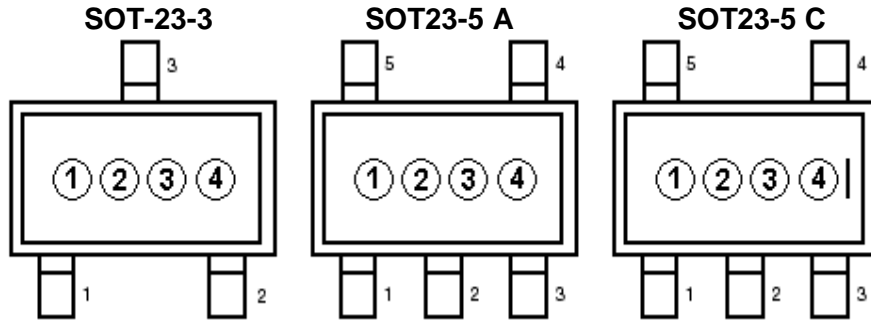
| SOT-89-3<br>(A) | Pin Number      |                   |                   |         |       | Symbol | Function        |
|-----------------|-----------------|-------------------|-------------------|---------|-------|--------|-----------------|
|                 | SOT-89-3<br>(B) | SOT-23-5<br>(PRN) | SOT-23-5<br>(PRC) | SOT23-3 | TO-92 |        |                 |
| 1               | 3               | 5                 | 4                 | 2       | 3     | Vout   | Output pin      |
| 3               | 2               | 1                 | 5                 | 3       | 1     | Vin    | Input Pin       |
| 2               | 1               | 2                 | 2                 | 1       | 2     | Vss    | Ground Pin      |
|                 |                 | 3                 | 1                 |         |       | CE     | Chip Enable Pin |
|                 |                 | 4                 | 3                 |         |       | NC     | No Connection   |

**Product Classification:**

| Output Voltage | Package Type | Product Name | Package Type | Product Name | Package Type | Product Name  |
|----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 1.2V           | SOT-89-3A    | BL8558-12PSA | SOT-89-3B    | BL8558-12PSB | SOT-23-5 A   | BL8558-12PRN  |
| 1.5V           | SOT-89-3A    | BL8558-15PSA | SOT-89-3B    | BL8558-15PSB | SOT-23-5 A   | BL8558-15PRN  |
| 1.8V           | SOT-89-3A    | BL8558-18PSA | SOT-89-3B    | BL8558-18PSB | SOT-23-5 A   | BL8558-18PRN  |
| 2.1V           | SOT-89-3A    | BL8558-21PSA | SOT-89-3B    | BL8558-21PSB | SOT-23-5 A   | BL8558-21PRN  |
| 2.5V           | SOT-89-3A    | BL8558-25PSA | SOT-89-3B    | BL8558-25PSB | SOT-23-5 A   | BL8558-25PRN  |
| 2.8V           | SOT-89-3A    | BL8558-28PSA | SOT-89-3B    | BL8558-28PSB | SOT-23-5 A   | BL8558-28PRN  |
| 2.85V          |              |              |              |              | SOT-23-5 A   | BL8558-285PRN |
| 3.0V           | SOT-89-3A    | BL8558-30PSA | SOT-89-3B    | BL8558-30PSB | SOT-23-5 A   | BL8558-30PRN  |
| 3.2V           | SOT-89-3A    | BL8558-32PSA | SOT-89-3B    | BL8558-32PSB | SOT-23-5 A   | BL8558-32PRN  |
| 3.3V           | SOT-89-3A    | BL8558-33PSA | SOT-89-3B    | BL8558-33PSB | SOT-23-5 A   | BL8558-33PRN  |
| 3.5V           | SOT-89-3A    | BL8558-35PSA | SOT-89-3B    | BL8558-35PSB | SOT-23-5 A   | BL8558-35PRN  |
| ⋮              | ⋮            | ⋮            | ⋮            | ⋮            | ⋮            | ⋮             |
| 4.5V           | SOT-89-3A    | BL8558-45PSA | SOT-89-3B    | BL8558-45PSB | SOT-23-5 A   | BL8558-45PRN  |

| Output Voltage | Package Type | Product Name | Package Type | Product Name | Package Type | Product Name  |
|----------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 1.2V           | SOT-23-3     | BL8558-12PRM | TO-92        | BL8558-12PT  | SOT-23-5 C   | BL8558-12PRC  |
| 1.5V           | SOT-23-3     | BL8558-15PRM | TO-92        | BL8558-15PT  | SOT-23-5 C   | BL8558-15PRC  |
| 1.8V           | SOT-23-3     | BL8558-18PRM | TO-92        | BL8558-18PT  | SOT-23-5 C   | BL8558-18PRC  |
| 2.1V           | SOT-23-3     | BL8558-21PRM | TO-92        | BL8558-21PT  | SOT-23-5 C   | BL8558-21PRC  |
| 2.5V           | SOT-23-3     | BL8558-25PRM | TO-92        | BL8558-25PT  | SOT-23-5 C   | BL8558-25PRC  |
| 2.8V           | SOT-23-3     | BL8558-28PRM | TO-92        | BL8558-28PT  | SOT-23-5 C   | BL8558-28PRC  |
| 3.0V           | SOT-23-3     | BL8558-30PRM | TO-92        | BL8558-30PT  | SOT-23-5 C   | BL8558-285PRC |
| 3.2V           | SOT-23-3     | BL8558-32PRM | TO-92        | BL8558-32PT  | SOT-23-5 C   | BL8558-30PRC  |
| 3.3V           | SOT-23-3     | BL8558-33PRM | TO-92        | BL8558-33PT  | SOT-23-5 C   | BL8558-32PRC  |
| 3.5V           | SOT-23-3     | BL8558-35PRM | TO-92        | BL8558-35PT  | SOT-23-5 C   | BL8558-33PRC  |
| ⋮              | ⋮            | ⋮            | ⋮            | ⋮            | ⋮            | ⋮             |
| 4.5V           | SOT-23-3     | BL8558-45PRM | TO-92        | BL8558-45PT  | SOT-23-5 C   | BL8558-35PRC  |

## Product Marking information:



- ① : Output current & EN availability
- ② : Output voltage
- ③ : Year of manufacturing
- ④ : Week of manufacturing

① BL8558 with output current 500mA, SOT-23-3 & SOT-23-5 package, its position ① is J

②

| Code | Vout  | Code | Vout | Code | Vout  |
|------|-------|------|------|------|-------|
| 2    | 1.2V  | 7    | 2.7V | 2    | 4.2V  |
| 3    | 1.3V  | 8    | 2.8V | 3    | 4.3V  |
| 4    | 1.4V  | 9    | 2.9V | 4    | 4.4V  |
| 5    | 1.5V  | 0    | 3.0V | 5    | 4.5V  |
| 6    | 1.6V  | 1    | 3.1V | 8    | 2.85V |
| 7    | 1.7V  | 2    | 3.2V |      |       |
| 8    | 1.8V  | 3    | 3.3V |      |       |
| 9    | 1.9V  | 4    | 3.4V |      |       |
| 0    | 2.0V  | 5    | 3.5V |      |       |
| 1    | 2.1V  | 6    | 3.6V |      |       |
| 2    | 2.12V | 7    | 3.7V |      |       |
| 3    | 2.3V  | 8    | 3.8V |      |       |
| 4    | 2.4V  | 9    | 3.9V |      |       |
| 5    | 2.5V  | 0    | 4.0V |      |       |
| 6    | 2.6V  | 1    | 4.1V |      |       |

③ The year of manufacturing. "5" stands for year 2005, "6" stands for year 2006, and "0" for year 2010.

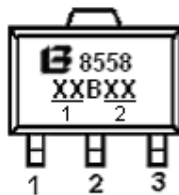
④

| Code | Week of Mfg | Code | Week of Mfg | Code | Week of Mfg | Code | Week of Mfg | Code | Week of Mfg |
|------|-------------|------|-------------|------|-------------|------|-------------|------|-------------|
| A    | 1           | L    | 12          | W    | 23          | H    | 34          | S    | 45          |
| B    | 2           | M    | 13          | X    | 24          | T    | 35          | 7    | 46          |
| C    | 3           | N    | 14          | Y    | 25          | J    | 36          | U    | 47          |
| D    | 4           | O    | 15          | Z    | 26          | K    | 37          | V    | 48          |
| E    | 5           | P    | 16          | A    | 27          | L    | 38          | W    | 49          |
| F    | 6           | Q    | 17          | B    | 28          | M    | 39          | X    | 50          |
| G    | 7           | R    | 18          | C    | 29          | N    | 40          | Y    | 51          |
| H    | 8           | S    | 19          | D    | 30          | O    | 41          | Z    | 52          |
| I    | 9           | T    | 20          | E    | 31          | P    | 42          |      |             |
| J    | 10          | U    | 21          | F    | 32          | Q    | 43          |      |             |
| K    | 11          | V    | 22          | G    | 33          | R    | 44          |      |             |

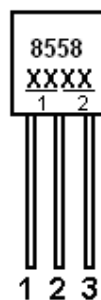
### SOT-89-3(A)



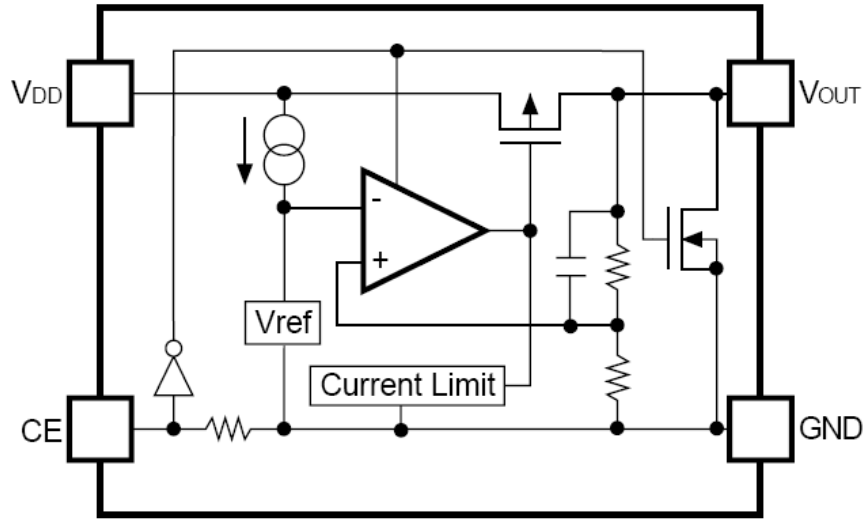
### SOT-89-3(B)



### TO-92



- 1.: Output voltage
- 2.: Lot NO.

**Block Diagram:**

**Absolute Maximum Ratings:**

|  |               |
|--|---------------|
| Max input voltage -----                      | 10V           |
| Junction Temperature (T <sub>J</sub> ) ----- | 125°C         |
| Output Current -----                         | 500mA         |
| Power Dissipation                            |               |
| SOT-23-5 -----                               | 250mW         |
| SOT-23-3 -----                               | 200mW         |
| SOT-89-3 -----                               | 500mW         |
| TO-92 -----                                  | 350mW         |
| Storage Temperature (T <sub>S</sub> ) -----  | -45°C ~ 150°C |

**Recommended Work Conditions:**

| Item                | Min | Recommended | Max | unit |
|---------------------|-----|-------------|-----|------|
| Input Voltage Range |     |             | 8   | V    |
| Ambient Temperature | -40 |             | 85  | °C   |

**Electrical Characteristics:**

( Test Conditions: C<sub>in</sub>=1uF, C<sub>out</sub>=3.4uF, T<sub>A</sub>=25°C, unless otherwise specified. )

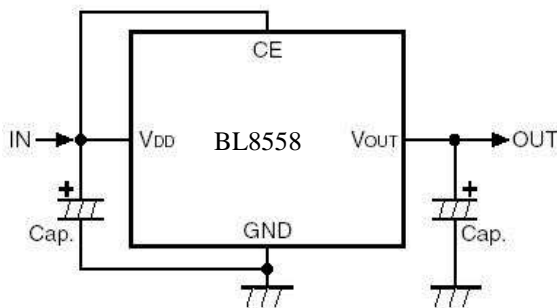
**BL8558, for arbitrary output voltage**

| Symbol                  | Parameter              | Conditions   | Min                       | Typ                | Max                       | Units |
|-------------------------|------------------------|--|---------------------------|--------------------|---------------------------|-------|
| V <sub>in</sub>         | Input Voltage          |  |                           |                    | 8                         | V     |
| V <sub>out</sub>        | Output Voltage         | V <sub>in</sub> =Set V <sub>out</sub> +1V<br>1mA ≤ I <sub>out</sub> ≤ 30mA | V <sub>out</sub><br>x0.98 | V <sub>out</sub> 1 | V <sub>out</sub><br>X1.02 | V     |
| I <sub>out</sub> (Max.) | Maximun Output Current | V <sub>in</sub> -V <sub>out</sub> =1V                                      | 500                       |                    |                           | mA    |

|  |   |   |      |     |        |    |
|--|---|---|------|-----|--------|----|
| Vdrop <sup>1</sup>                                   | Dropout Voltage, Vout≥2.8V              | Iout=100mA                                    | 88   | 120 | mV     |    |
|  |   | Iout=300mA                                    | 270  | 350 | mV     |    |
|  |   | Iout=500mA                                    | 460  | 600 | mV     |    |
| $\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$ | Line Regulation                         | Iout=40mA<br>2.8V≤Vin≤8V                      | 0.05 | 0.2 | %/V    |    |
| $\Delta V_{out} / \Delta I_{out}$                    | Load Regulation                         | Vin=Set Vout+1V<br>1mA≤Iout≤500mA             | 20   | 40  | mV     |    |
| I <sub>ss</sub>                                      | Supply Current                          | Vin=Set Vout+1V                               | 75   | 90  | uA     |    |
| I <sub>standby</sub>                                 | Supply Current (Standby)                | Vin=Set Vout+1V<br>Vce=GND                    | 0.1  | 1.0 | uA     |    |
| $\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$      | Output Voltage Temperature Coefficiency | Iout=30mA                                     | ±100 |     | ppm/°C |    |
| PSRR   | Ripple Rejection                        | F=100Hz,<br>Ripple=0.5Vp-p<br>Vin=Set Vout+1V | 65   |     | dB     |    |
| I <sub>lim</sub>                                     | Short Current Limit                     | Vout=0V                                       | 200  |     | mA     |    |
| R <sub>pd</sub>                                      | CE Pull down Resistance                 |   | 2.0  | 5.0 | 10.0   | MΩ |
| V <sub>ceh</sub>                                     | CE Input Voltage "H"                    |   | 1.5  |     | Vin    | V  |
| V <sub>cel</sub>                                     | CE Input Voltage "L"                    |   | 0    |     | 0.25   | V  |
| en   | Output Noise                            | BW=10Hz~100kHz                                | 47   |     | uVrms  |    |

1. Vdrop=Vin1-(Vout2\*0.98) Vout2 is the output voltage when Vin=Vout1+1.0V and Iout=300mA or Iout=500mA. Vin1 is the input voltage at which the output voltage becomes 98% of Vout1 after gradually decreasing the input voltage.

### Typical Application Circuit:



### Application hints:

NOTE1: Input capacitor (C<sub>in</sub>=1uF) is recommended in all application circuit.

NOTE2: Output capacitor (C<sub>out</sub>=3.3uF/4.7uF) is recommended in all application to assure the stability of circuit.

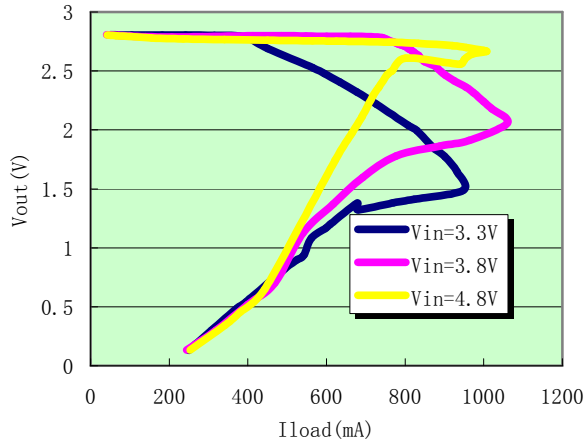
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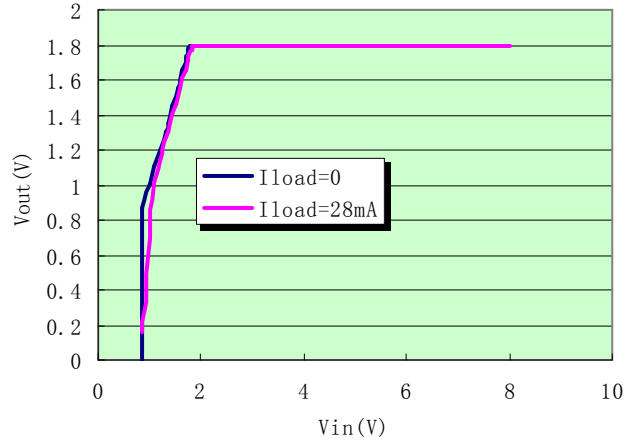
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**Typical Performance Characteristics:**

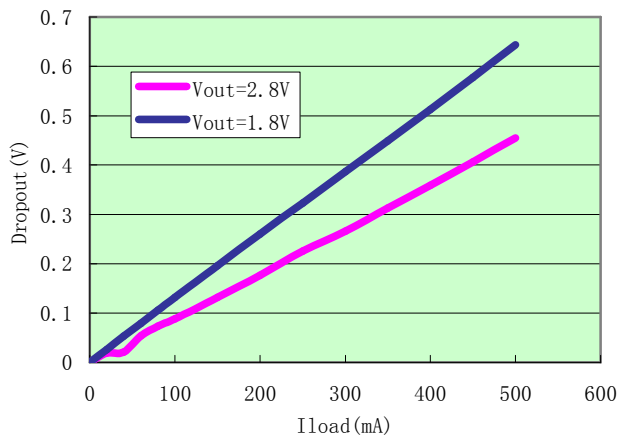
1) Output Voltage vs. Output Current (with output short protection)



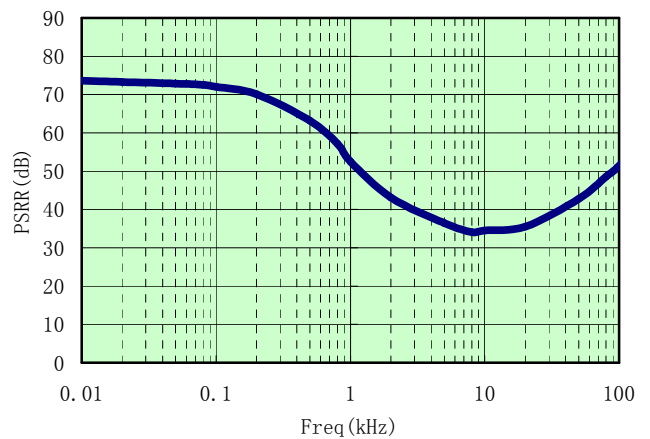
2) Output Voltage vs. Input Voltage



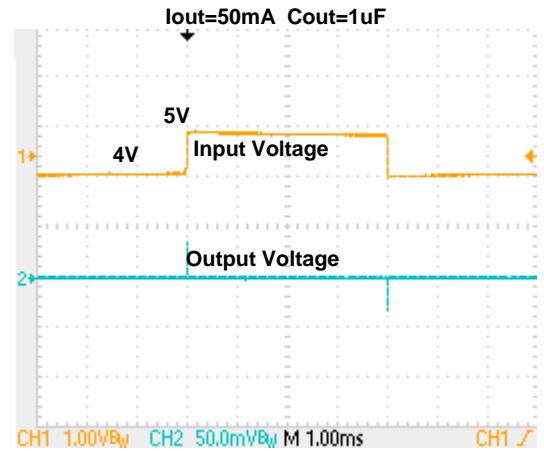
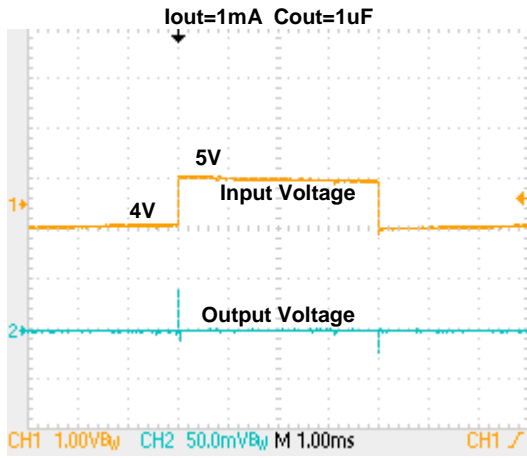
3) Dropout Voltage vs. Output Current



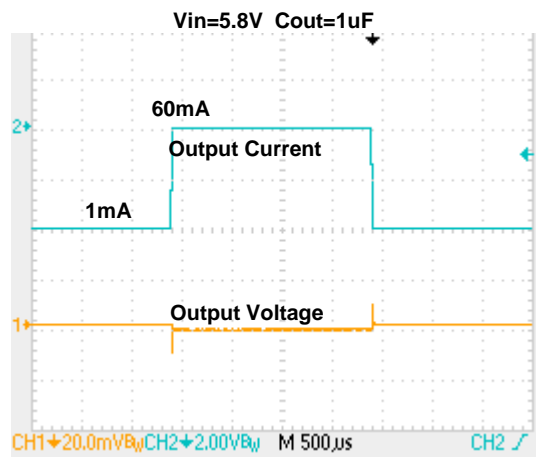
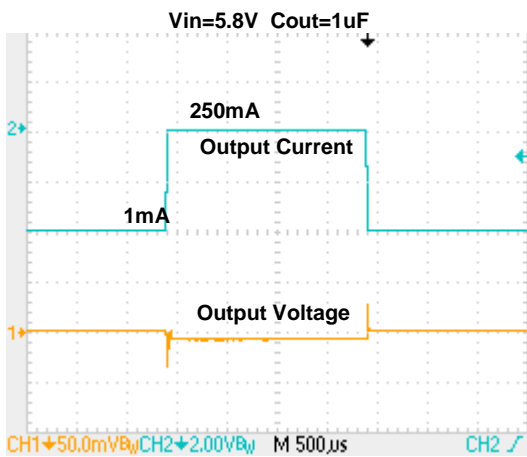
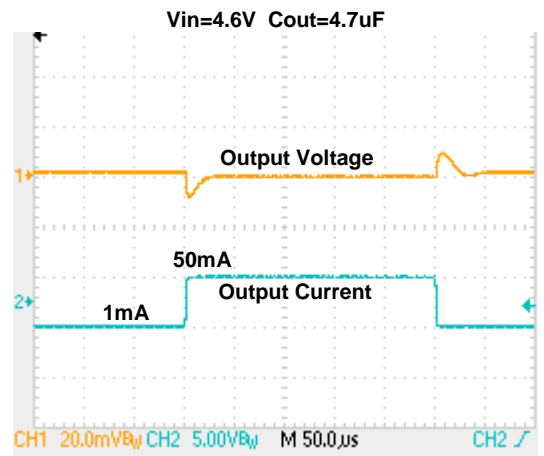
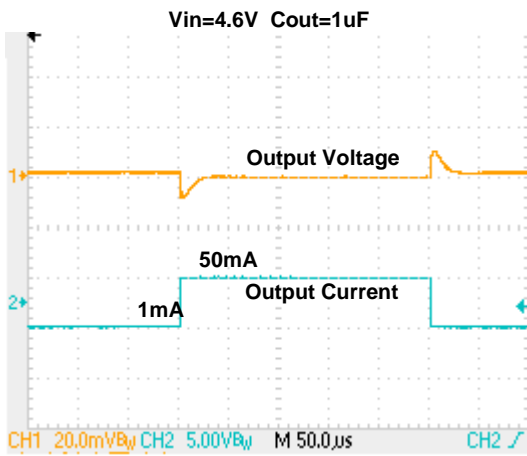
4) Ripple rejection vs. Frequency



5) Line transient response

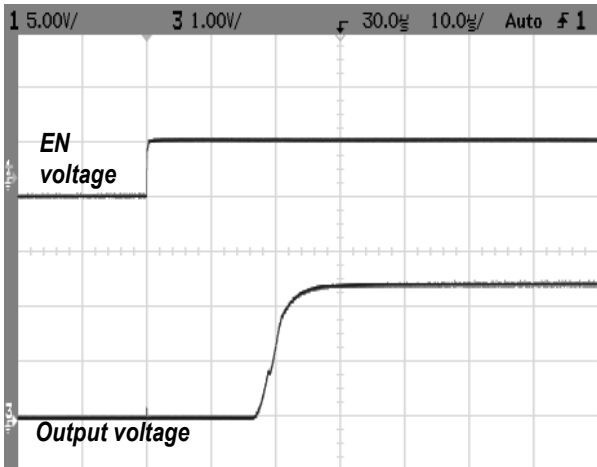


6) Load transient response





7) Startup response



8) Shutdown response

