

## 500mA High PSRR, Fast Response Linear Regulator

### DESCRIPTION

BL8565G series is a group of positive voltage output, low power consumption, low dropout voltage regulators.

BL8565G can provide output value in the range of 0.9V~3.6V every 0.1V step. It also can be customized on command.

BL8565G includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

BL8565G 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  $\pm 2\%$ .

BL8565G is available in SOT89-3 package which is lead-free.

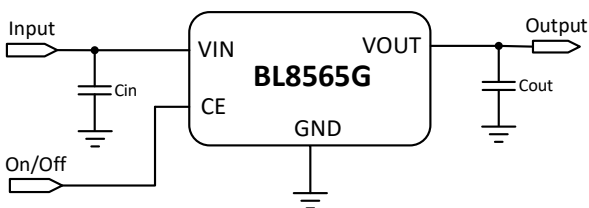
### FEATURES

- Low power consumption: 60uA (Typ.)
- Standby mode: 0.1uA
- Low dropout voltage:  
330mV @ $I_{OUT}=500mA$ ,  $V_{OUT}=3.3V$  (Typ.)
- High PSRR: 70dB@1KHz (Typ.)
- Low temperature coefficient:  $\pm 100ppm/^{\circ}C$
- Excellent line regulation: 0.05%/V
- Output voltage range: 0.9V~3.6V
- Highly accurate:  $\pm 2\%$
- Build-in chip enable and discharge circuit
- Thermal shutdown
- Overcurrent protection

### APPLICATIONS

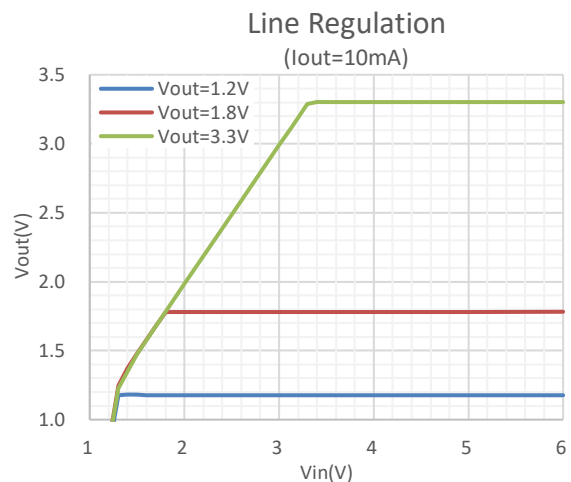
- Power source for cellular phones and various kinds of PCSs
- Battery powered equipment
- Power management of MP3, PDA, DSC, mouse, PS2 games
- Reference voltage source
- Regulation after switching power

### TYPICAL APPLICATION



**Note:** Input capacitor ( $C_{IN}=1\mu F$ ) and output capacitor ( $C_{OUT}=1\mu F$ ) are recommended in all application circuit.

### ELECTRICAL CHARACTERISTICS



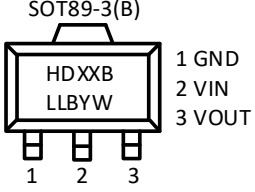
# BL8565G

## ORDERING INFORMATION

BL8565G [1](#) [2](#) [3](#) [4](#)

| Code              | Description                                            |
|-------------------|--------------------------------------------------------|
| <a href="#">1</a> | Temperature&Rohs:<br>C: -40~85°C, Pb Free Rohs Std.    |
| <a href="#">2</a> | Package type:<br>C3B: SOT89-3(B)                       |
| <a href="#">3</a> | Packing type:<br>TR: Tape&Reel (Standard)              |
| <a href="#">4</a> | Output voltage:<br>e.g., 30=3.0V<br>33=3.3V<br>36=3.6V |

## PIN CONFIGURATION

|                        |                                                                                     |
|------------------------|-------------------------------------------------------------------------------------|
| Product classification | BL8565GCC3BTR <input type="checkbox"/> <input type="checkbox"/>                     |
| HD: Product code       |  |
| XX: Output voltage     |                                                                                     |
| LL: Lot No.            |                                                                                     |
| B: Fab code            |                                                                                     |
| YW: Date code          |                                                                                     |
| <b>GND</b>             | Ground pin                                                                          |
| <b>VIN</b>             | Supply voltage input                                                                |
| <b>VOUT</b>            | Output voltage                                                                      |

*Y: The Year of manufacturing, "1" stands for year 20X1, "2" stands for year 20X2, and "8" stands for year 20X8. (X=0,1,2,....,9)*

*W: The week of manufacturing. "A" stands for week 1, "Z" stands for week 26, "Ā" stands for week 27, "Z̄" stands for week 52.*

*The date code of the 53rd week is the same as that of the first week of the next year. For example, the date code of the 53rd week of 2017 is the same as that of the first week of 2018, which are 1801 and 8A.*

## ABSOLUTE MAXIMUM RATING

| Parameter                                        |         | Value          |
|--------------------------------------------------|---------|----------------|
| Max input voltage                                |         | 8V             |
| Operating junction temperature (T <sub>J</sub> ) |         | 125°C          |
| Output current                                   |         | 500mA          |
| Ambient temperature (T <sub>A</sub> )            |         | -40°C to 85°C  |
| Power dissipation                                | SOT89-3 | 1W             |
| Package thermal resistance (θ <sub>JA</sub> )    |         | 100°C/W        |
| Storage temperature (T <sub>S</sub> )            |         | -40°C to 150°C |
| Lead temperature & time                          |         | 260°C, 10s     |
| ESD (HBM)                                        |         | >2000V         |

### Note:

- 1) Package Thermal Resistance value can be affected by PCB design, external heat sink, ambient airflow, operating power, etc. The value shown here is for reference only.
- 2) Exceed these limits to damage to the device.
- 3) Exposure to absolute maximum rating conditions may affect device reliability.

## RECOMMENDED WORK CONDITIONS

| Item                | Min              | Recommended | Max | Units |
|---------------------|------------------|-------------|-----|-------|
| Input voltage range | 1.5 <sup>1</sup> |             | 6   | V     |
| Ambient temperature | -40              |             | 85  | °C    |

### Note:

- 1) The output current capability depends on the input voltage and the minimum dropout voltage.

## ELECTRICAL CHARACTERISTICS

Test condition: C<sub>IN</sub>=1μF, C<sub>OUT</sub>=1μF, T<sub>A</sub>=25°C, unless otherwise specified.

| Symbol                                               | Parameter                              | Conditions                                                             | Min                                                                   | Typ                       | Max              | Units                     |   |
|------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------|------------------|---------------------------|---|
| V <sub>IN</sub>                                      | Input voltage                          |                                                                        | 1.5 <sup>1</sup>                                                      |                           | 6                | V                         |   |
| V <sub>OUT</sub>                                     | Output voltage                         | V <sub>OUT</sub> >1.5V                                                 | V <sub>IN</sub> =Set V <sub>OUT</sub> +1V, 1mA≤I <sub>OUT</sub> ≤30mA | V <sub>OUT</sub><br>x0.98 | V <sub>OUT</sub> | V <sub>OUT</sub><br>X1.02 | V |
|                                                      |                                        | V <sub>OUT</sub> ≤1.5V                                                 |                                                                       | V <sub>OUT</sub><br>-0.03 |                  | V <sub>OUT</sub><br>+0.03 |   |
| I <sub>OUT (Max.)</sub>                              | Maximum output current                 | V <sub>IN</sub> -V <sub>OUT</sub> =1V                                  | 500                                                                   |                           |                  | mA                        |   |
| V <sub>DROP</sub> <sup>2</sup>                       | Dropout voltage                        | V <sub>OUT</sub> =1.2V, I <sub>OUT</sub> =500mA                        |                                                                       | 938                       | 1400             | mV                        |   |
|                                                      |                                        | V <sub>OUT</sub> =1.8V, I <sub>OUT</sub> =500mA                        |                                                                       | 650                       | 975              | mV                        |   |
|                                                      |                                        | V <sub>OUT</sub> =3.3V, I <sub>OUT</sub> =500mA                        |                                                                       | 330                       | 500              | mV                        |   |
| $\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$ | Line regulation                        | I <sub>OUT</sub> =10mA, Set V <sub>OUT</sub> +1V≤V <sub>IN</sub> ≤6V   |                                                                       | 0.05                      | 0.2              | %/V                       |   |
| $\frac{\Delta V_{out}}{\Delta V_{in}}$               | Load regulation                        | V <sub>IN</sub> =Set V <sub>OUT</sub> +1V, 1mA≤I <sub>OUT</sub> ≤500mA |                                                                       | 50                        | 80               | mV                        |   |
| I <sub>Q</sub>                                       | Supply current                         | V <sub>IN</sub> =Set V <sub>OUT</sub> +1V                              |                                                                       | 60                        |                  | μA                        |   |
| I <sub>STANDBY</sub>                                 | Supply current (Standby)               | V <sub>IN</sub> =Set V <sub>OUT</sub> +1V, V <sub>CE</sub> =GND        |                                                                       | 0.1                       | 1.0              | μA                        |   |
| $\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$      | Output voltage temperature coefficient | I <sub>OUT</sub> =10mA                                                 |                                                                       | ±100                      |                  | ppm/°C                    |   |
| PSRR                                                 | Ripple rejection                       | F=1KHz, Ripple=0.5Vp-p<br>V <sub>IN</sub> =Set V <sub>OUT</sub> +1V    |                                                                       | 70                        |                  | dB                        |   |
| I <sub>LIM</sub>                                     | Current limit                          | V <sub>IN</sub> =4.3V, V <sub>OUT</sub> =3.3V                          | 550                                                                   |                           |                  | mA                        |   |
| I <sub>SHORT</sub>                                   | Short current limit                    | V <sub>IN</sub> =5V, V <sub>OUT</sub> =0V                              |                                                                       | 100                       |                  | mA                        |   |
| R <sub>PD</sub>                                      | CE pull down resistance                |                                                                        |                                                                       | 500K                      |                  | Ω                         |   |
| R <sub>DIS</sub>                                     | Discharge resistor                     | V <sub>CE</sub> =GND, V <sub>OUT</sub> =3.0V                           |                                                                       | 1.5K                      |                  | Ω                         |   |

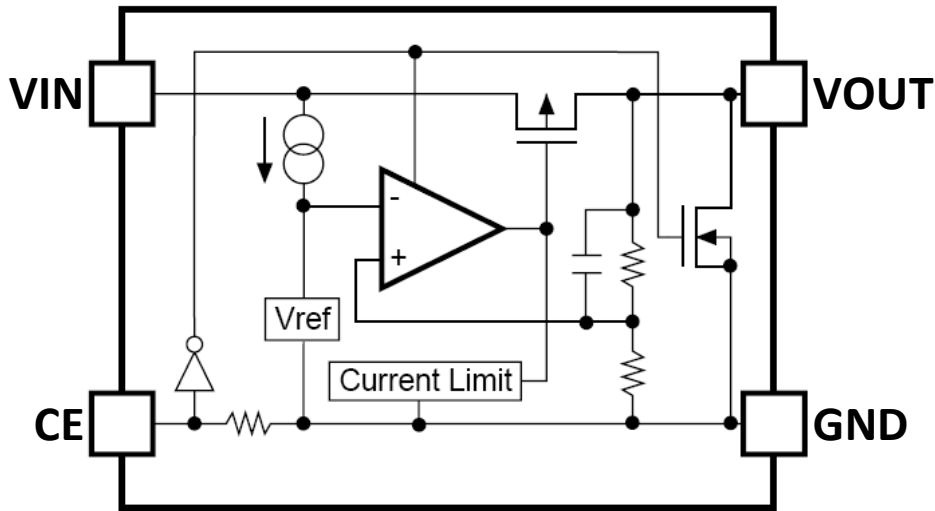
# BL8565G

|             |                             |                                               |   |     |          |    |
|-------------|-----------------------------|-----------------------------------------------|---|-----|----------|----|
| $T_{SD}$    | Thermal shutdown temp       | $V_{IN}=\text{Set } V_{OUT}+1V, I_{OUT}=10mA$ |   | 160 |          | °C |
| $T_{SH}$    | Thermal shutdown hysteresis | $V_{IN}=\text{Set } V_{OUT}+1V, I_{OUT}=10mA$ |   | 30  |          | °C |
| $V_{CE\_H}$ | CE input voltage "H"        |                                               | 1 |     | $V_{IN}$ | V  |
| $V_{CE\_L}$ | CE input voltage "L"        |                                               | 0 |     | 0.5      | V  |

**Note:**

- 1) The output current capability depends on the input voltage and the minimum dropout voltage.
- 2)  $V_{DROP}=V_{IN}-V_{OUT}$  when  $V_{OUT}$  drops below 98% of the normal  $V_{OUT}$ .

## BLOCK DIAGRAM



## EXPLANATION

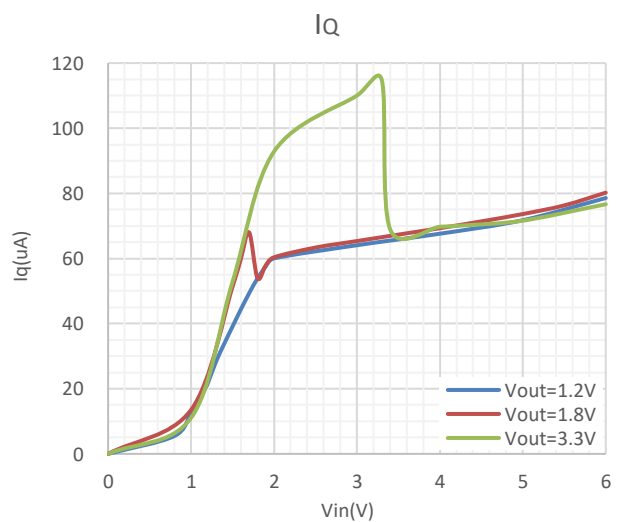
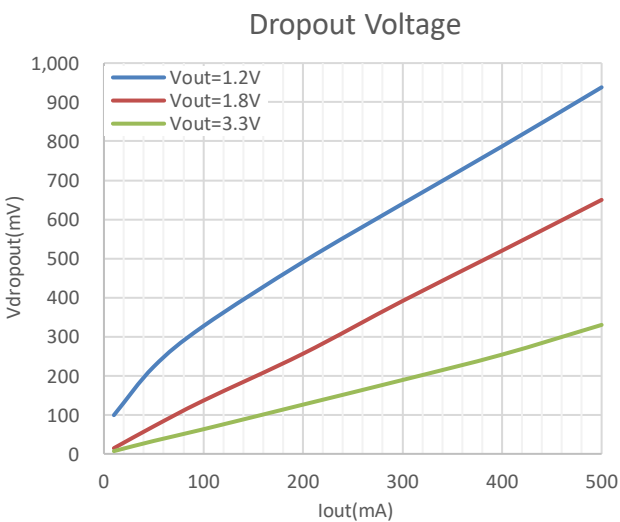
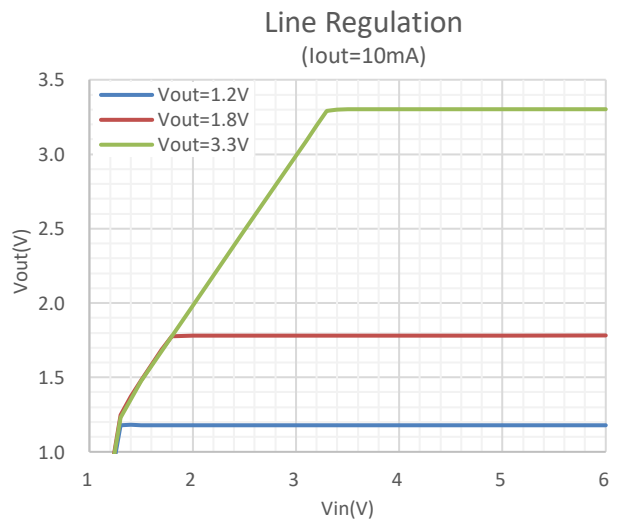
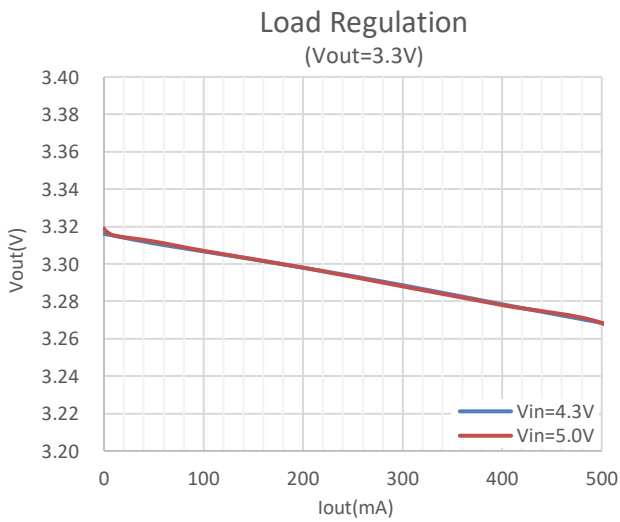
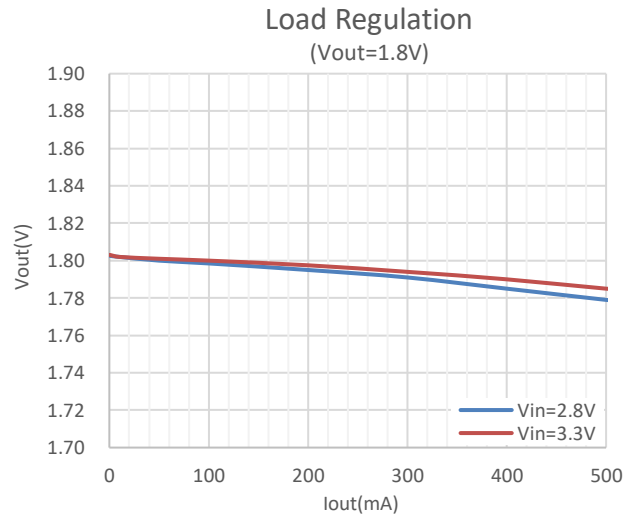
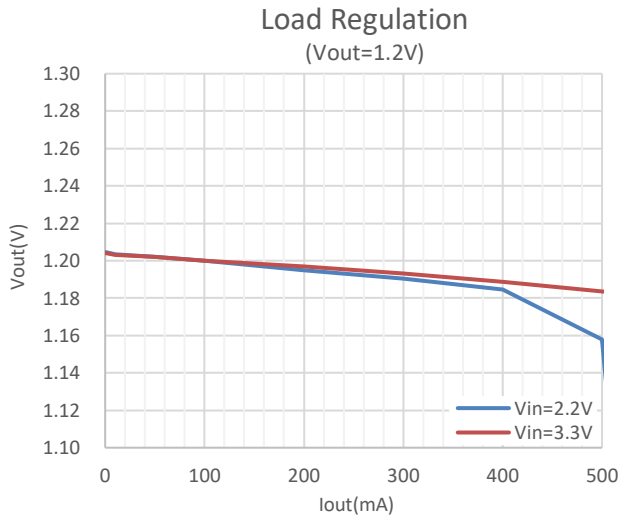
BL8565G series is a group of positive voltage output, low noise, low power consumption, low dropout voltage regulator.

BL8565G can provide output value in the range of 0.9V~3.6V every 0.1V step. It also can be customized on command.

BL8565G includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module.

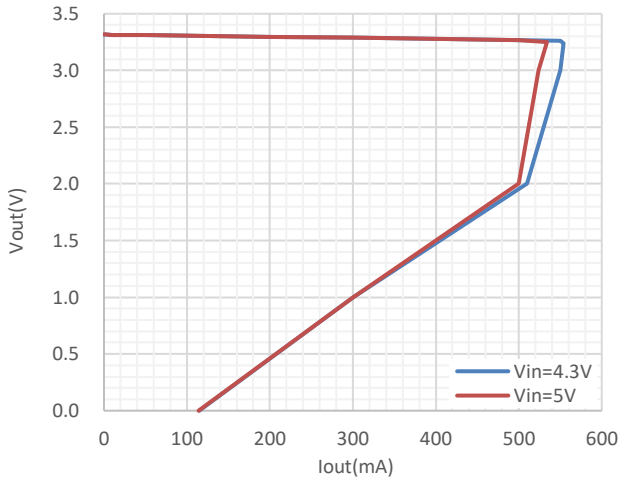
BL8565G has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within  $\pm 2\%$ .

## TYPICAL PERFORMANCE CHARACTERISTICS

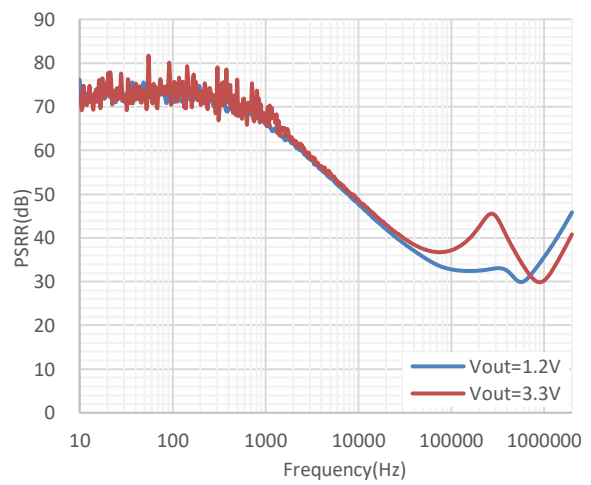


# BL8565G

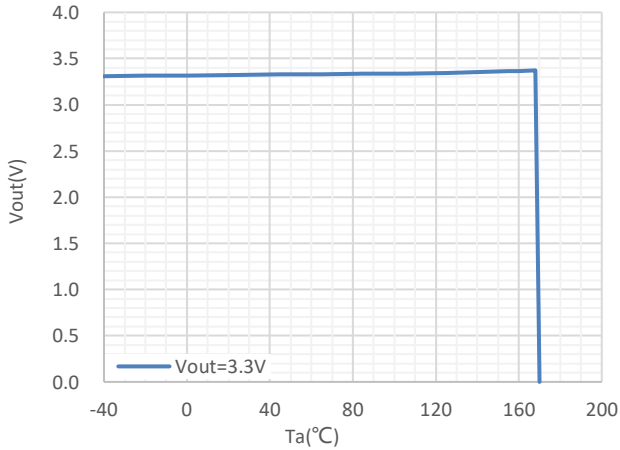
Current Limit



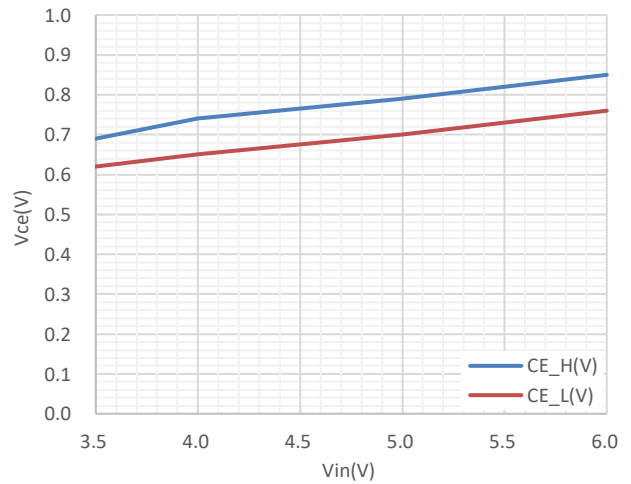
PSRR



Vout vs. Temp  
( $V_{in}=5V, I_{out}=10mA$ )

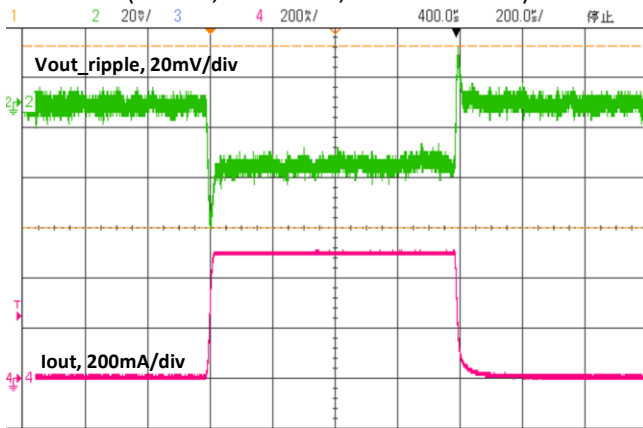


CE Threshold



Load Transient Response

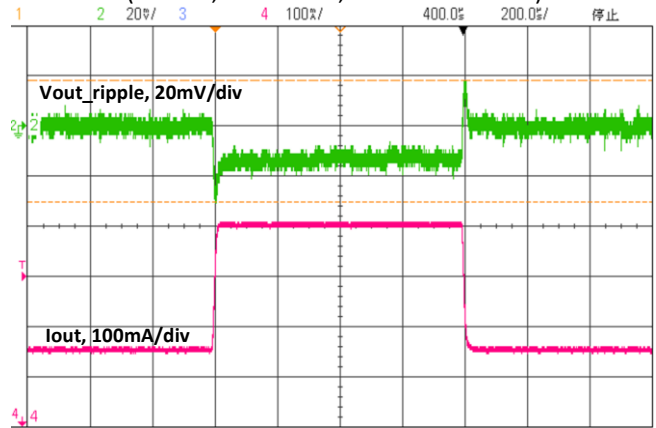
( $V_{in}=5V, V_{out}=3.3V, I_{out}=10-500mA$ )



CH2:  $V_{out\_ripple}$ , CH4:  $I_{out}$

Load Transient Response

( $V_{in}=5V, V_{out}=3.3V, I_{out}=250-500mA$ )

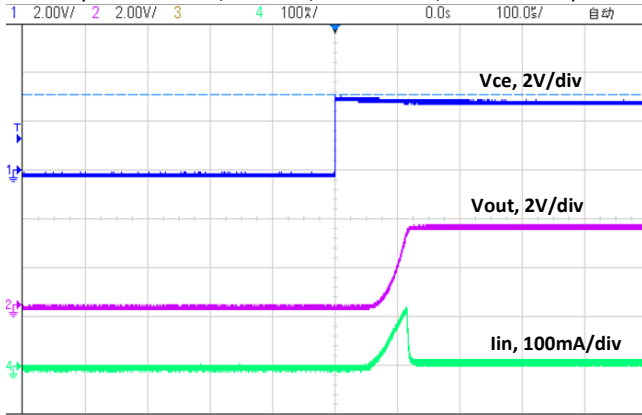


CH2:  $V_{out\_ripple}$ , CH4:  $I_{out}$

# BL8565G

## CE Chip Enable Response

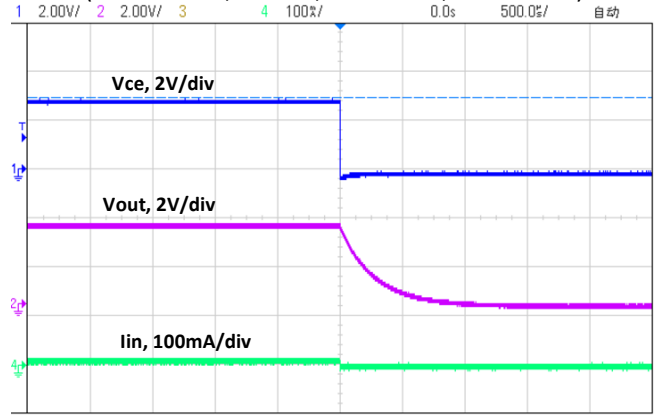
(CE=0V to 3V, Vin=5V, Vout=3.3V, Iout=10mA)



CH1: CE, CH2: Vout, CH4: Iin

## CE Chip Enable Response

(CE=3V to 0V, Vin=5V, Vout=3.3V, Iout=10mA)



CH1: CE, CH2: Vout, CH4: Iin

## PACKAGE OUTLINE

| Package                                                                                                                                                                                                                                     | SOT89-3 | Devices per reel | 1000pcs |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------|---------|
| Package dimension:                                                                                                                                                                                                                          |         |                  |         |
| <p>4.5±0.1</p> <p>1.6±0.2</p> <p>0.4</p> <p>2.5±0.1</p> <p>4.25MAX.</p> <p>0.8 MIN.</p> <p>∅1.0</p> <p>1 2 3</p> <p>1.5±0.1</p> <p>0.4±0.1</p> <p>0.4±0.1</p> <p>0.42±0.2</p> <p>0.47±0.1</p> <p>1.5±0.1</p> <p>1.5±0.1</p> <p>0.42±0.2</p> |         |                  |         |
| Unit: mm                                                                                                                                                                                                                                    |         |                  |         |