

## 300mA High PSRR, Fast Response Linear Regulator

### DESCRIPTION

BL8563G series is a group of positive voltage output, low power consumption, low dropout voltage regulator.

BL8563G can provide output value in the range of 0.9V~3.6V every 0.1V step. It also can be customized on command.

BL8563G includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

BL8563G 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  $\pm 2\%$ .

BL8563G is available in SC70-5, SOT23-3, TSOT-23, SOT23-5 and DFN1x1-4 packages which are lead free.

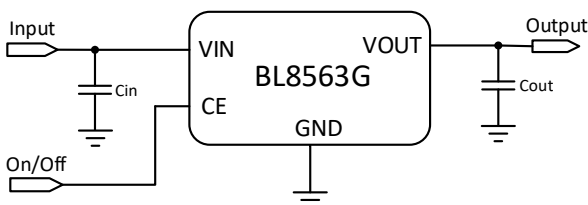
### FEATURES

- Low power consumption: 60uA (Typ.)
- Standby mode: 0.1uA
- Low dropout voltage:  
195mV @  $I_{OUT}=300mA$ ,  $V_{OUT}=3.3V$  (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

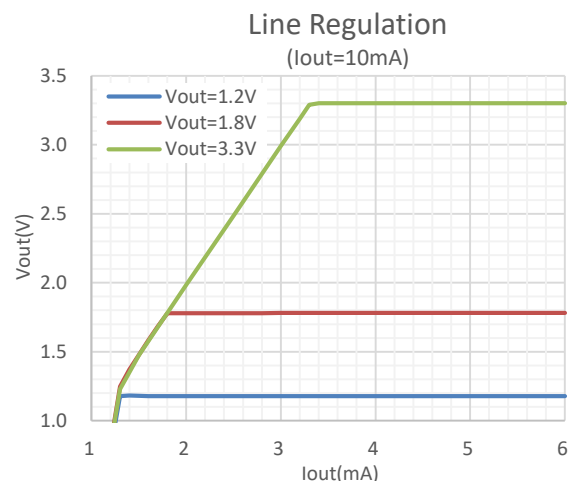
- Power source for cellular phones and various kind of PCSs
- Battery powered equipment
- Power management of MP3, PDA, DSC, mouse, PS2 games
- Reference voltage source
- Regulation after switching power

### 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



## ORDERING INFORMATION

BL8563G ①②③

| Code | Description                                                                |
|------|----------------------------------------------------------------------------|
| ①    | Output voltage:<br>e.g. 10=1.0V<br>18=1.8V<br>36=3.6V                      |
| ②    | Temperature&Rohs:<br>P:-40~85°C, Pb Free Rohs Std.                         |
| ③    | Package type:<br>Q: SC70-5<br>RM: SOT23-3<br>RO: TSOT-23<br>RA: SOT23-5(A) |

BL8563G ①②③④

| Code | Description                                           |
|------|-------------------------------------------------------|
| ①    | Temperature&Rohs:<br>C:-40~85°C, Pb Free Rohs Std.    |
| ②    | Package type:<br>KE:DFN1x1-4                          |
| ③    | Packing type:<br>TR: Tape&Reel (Standard)             |
| ④    | Output voltage:<br>e.g. 10=1.0V<br>18=1.8V<br>36=3.6V |

## MARKING DESRIPTON

X: Output Voltage (for SC70-5, SOT23-3, TSOT-23, SOT23-5)

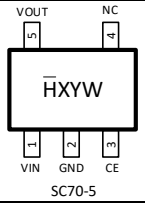
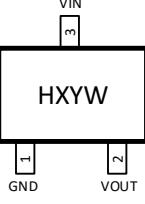
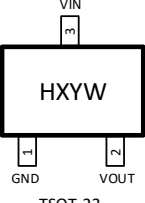
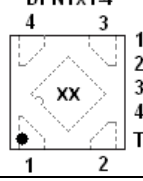
| Vout | Code | Vout | Code | Vout | Code |
|------|------|------|------|------|------|
| 0.9V | 9    | 1.9V | 9    | 2.9V | 9    |
| 1.0V | 0    | 2.0V | 0    | 3.0V | 0    |
| 1.1V | 1    | 2.1V | 1    | 3.1V | 1    |
| 1.2V | 2    | 2.2V | 2    | 3.2V | 2    |
| 1.3V | 3    | 2.3V | 3    | 3.3V | 3    |
| 1.4V | 4    | 2.4V | 4    | 3.4V | 4    |
| 1.5V | 5    | 2.5V | 5    | 3.5V | 5    |
| 1.6V | 6    | 2.6V | 6    | 3.6V | 6    |
| 1.7V | 7    | 2.7V | 7    |      |      |
| 1.8V | 8    | 2.8V | 8    |      |      |

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, "A" stands for week 27, "Z" 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.

## PIN CONFIGURATION

|                        |                                                                                       |
|------------------------|---------------------------------------------------------------------------------------|
| Product classification | BL8563G-□□PQ                                                                          |
| H: Product code        |    |
| X: Output voltage      |                                                                                       |
| YW: Date code          |                                                                                       |
| Product classification | BL8563G-□□PRM                                                                         |
| H: Product code        |    |
| X: Output voltage      |                                                                                       |
| YW: Date code          |                                                                                       |
| Product classification | BL8563G-□□PRO                                                                         |
| H: Product code        |   |
| X: Output voltage      |                                                                                       |
| YW: Date code          |                                                                                       |
| Product classification | BL8563G-□□PRA                                                                         |
| H: Product code        |  |
| X: Output voltage      |                                                                                       |
| YW: Date code          |                                                                                       |
| Product classification | BL8563GCKETR□□                                                                        |
| XX: Output voltage     |  |
| VIN                    | Supply voltage input                                                                  |
| GND                    | Ground pin                                                                            |
| CE                     | Chip enable                                                                           |
| NC                     | No connection                                                                         |
| VOUT                   | Output voltage                                                                        |

## ABSOLUTE MAXIMUM RATING

| Parameter                                    |          | Value        |
|----------------------------------------------|----------|--------------|
| Max input voltage                            |          | 8V           |
| Operating junction temperature( $T_J$ )      |          | 125°C        |
| Output current                               |          | 300mA        |
| Power dissipation                            | SC70-5   | 400mW        |
|                                              | SOT23-3  | 500mW        |
|                                              | TSOT-23  | 500mW        |
|                                              | SOT23-5  | 600mW        |
|                                              | DFN1x1-4 | 500mW        |
| Package thermal resistance ( $\theta_{JA}$ ) | SC70-5   | 300°C / W    |
|                                              | SOT23-3  | 220°C / W    |
|                                              | TSOT-23  | 250°C / W    |
|                                              | SOT23-5  | 200°C / W    |
|                                              | DFN1x1-4 | 250°C / W    |
| Storage temperature( $T_S$ )                 |          | -40°C -150°C |
| Lead temperature & time                      |          | 260°C,10S    |
| ESD (HBM)                                    |          | >2000V       |

### Note:

- 1) Package Thermal Resistance value can be affected by PCB design, outside radiator, ambient airflow, operating power, it just shows for reference.
- 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. | Unit |
|---------------------|------------------|-------------|------|------|
| 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 Conditions:  $C_{IN}=1\mu F$ ,  $C_{OUT}=1\mu F$ ,  $T_A=25^\circ C$ , unless otherwise specified. )

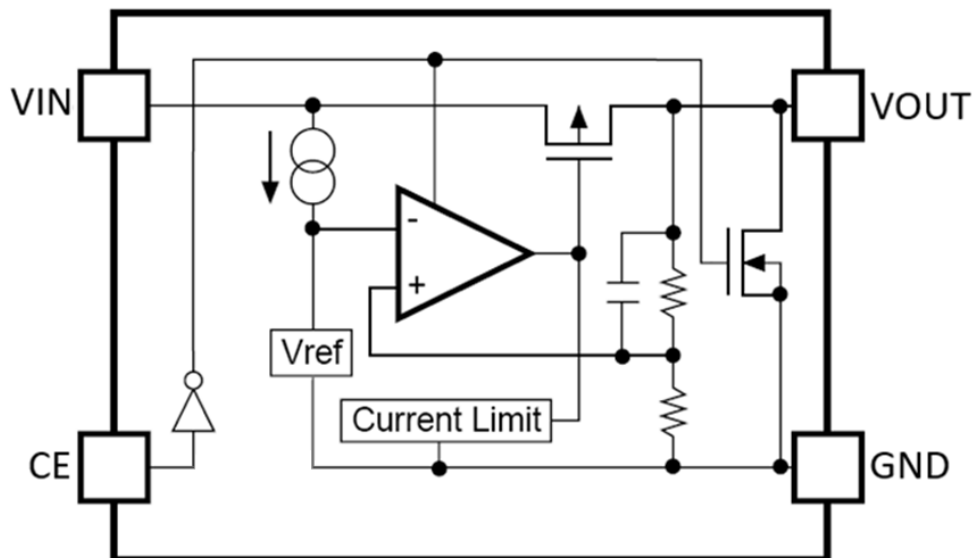
| Symbol                                               | Parameter                |                     | Conditions                                                      | Min                   | Typ       | Max                   | Units |
|------------------------------------------------------|--------------------------|---------------------|-----------------------------------------------------------------|-----------------------|-----------|-----------------------|-------|
| $V_{IN}$                                             | Input voltage            |                     |                                                                 | 1.5 <sup>1</sup>      |           | 6                     | V     |
| $V_{OUT}$                                            | Output voltage           | $V_{OUT}>1.5V$      | $V_{IN}=\text{Set } V_{OUT}+1V$ , $1mA \leq I_{OUT} \leq 30mA$  | $V_{OUT} \times 0.98$ | $V_{OUT}$ | $V_{OUT} \times 1.02$ | V     |
|                                                      |                          | $V_{OUT} \leq 1.5V$ |                                                                 | $V_{OUT} - 0.03$      |           | $V_{OUT} + 0.03$      |       |
| $I_{OUT (Max.)}$                                     | Maximum output current   |                     | $V_{IN}-V_{OUT}=1V$                                             | 300                   |           |                       | mA    |
| $V_{DROP}^2$                                         | Dropout voltage          |                     | $V_{OUT}=1.2V$ , $I_{OUT}=300mA$                                |                       | 640       | 960                   | mV    |
|                                                      |                          |                     | $V_{OUT}=1.8V$ , $I_{OUT}=300mA$                                |                       | 395       | 600                   | mV    |
|                                                      |                          |                     | $V_{OUT}=3.3V$ , $I_{OUT}=300mA$                                |                       | 195       | 300                   | mV    |
| $\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$ | Line regulation          |                     | $I_{OUT}=10mA$ , Set $V_{OUT}+1V \leq V_{IN} \leq 6V$           |                       | 0.05      | 0.2                   | %/V   |
| $\Delta V_{out}$                                     | Load regulation          |                     | $V_{IN}=\text{Set } V_{OUT}+1V$ , $1mA \leq I_{OUT} \leq 300mA$ |                       | 50        | 80                    | mV    |
| $I_Q$                                                | Supply current           |                     | $V_{IN}=\text{Set } V_{OUT}+1V$                                 |                       | 60        |                       | uA    |
| $I_{STANDBY}$                                        | Supply current (Standby) |                     | $V_{IN}=\text{Set } V_{OUT}+1V$ , $V_{CE}=\text{GND}$           |                       | 0.1       | 1.0                   | uA    |

|                                                 |                                        |                                                              |   |           |          |          |
|-------------------------------------------------|----------------------------------------|--------------------------------------------------------------|---|-----------|----------|----------|
| $\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$ | Output voltage temperature coefficient | $I_{OUT}=10mA$                                               |   | $\pm 100$ |          | ppm/°C   |
| PSRR                                            | Ripple rejection                       | $F=1KHz$ , Ripple=0.5Vp-p<br>$V_{IN}=\text{Set } V_{OUT}+1V$ |   | 70        |          | dB       |
| $I_{SHORT}$                                     | Short current limit                    | $V_{IN}=5V$ , $V_{OUT}=0V$                                   |   | 100       |          | mA       |
| $R_{PD}$                                        | CE pull down resistance                |                                                              |   | 500K      |          | $\Omega$ |
| $R_{DISCHARGE}$                                 | Discharge resistor                     | $V_{CE}=GND$ , $V_{OUT}=3.0V$                                |   | 1.5K      |          | $\Omega$ |
| $T_{SD}$                                        | 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       |
| $V_{CEH}$                                       | CE input voltage "H"                   |                                                              | 1 |           | $V_{IN}$ | V        |
| $V_{CEL}$                                       | 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

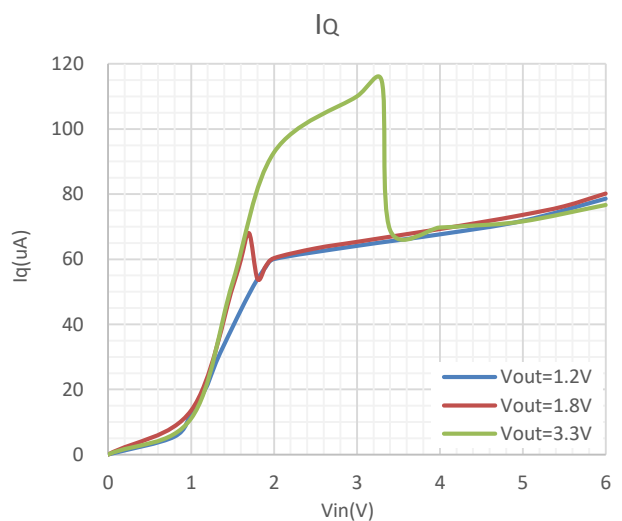
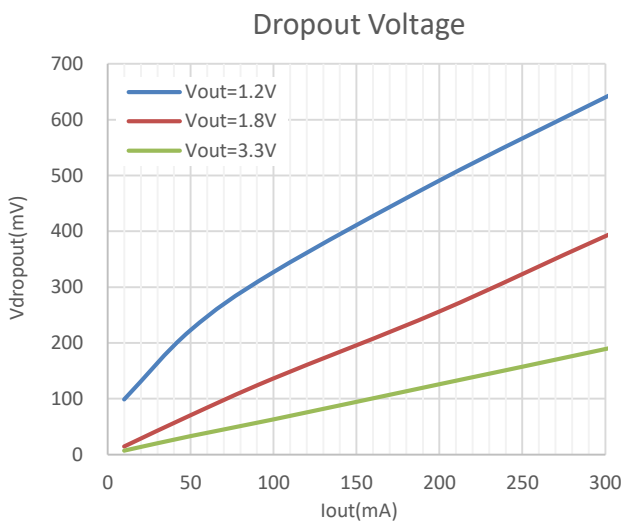
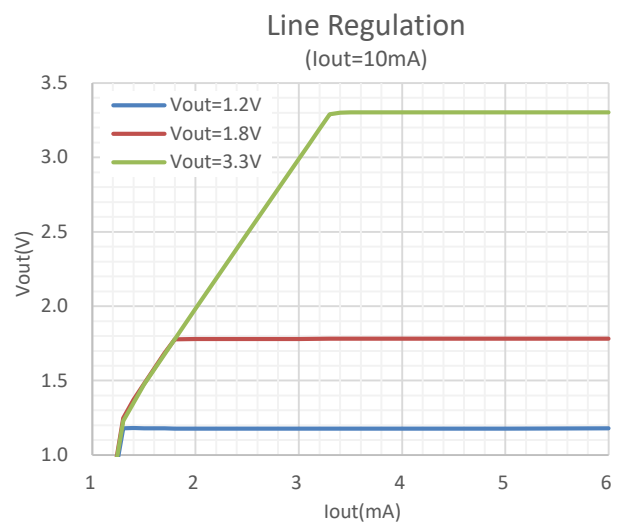
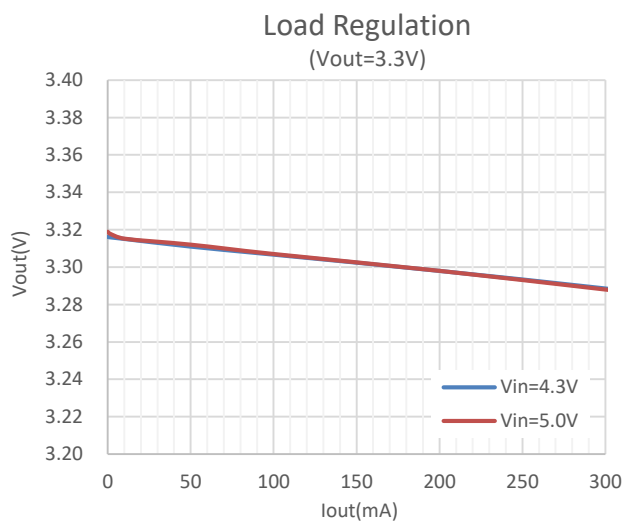
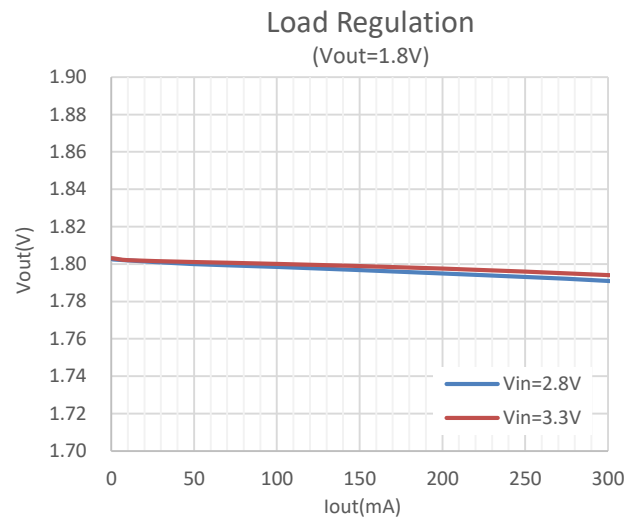
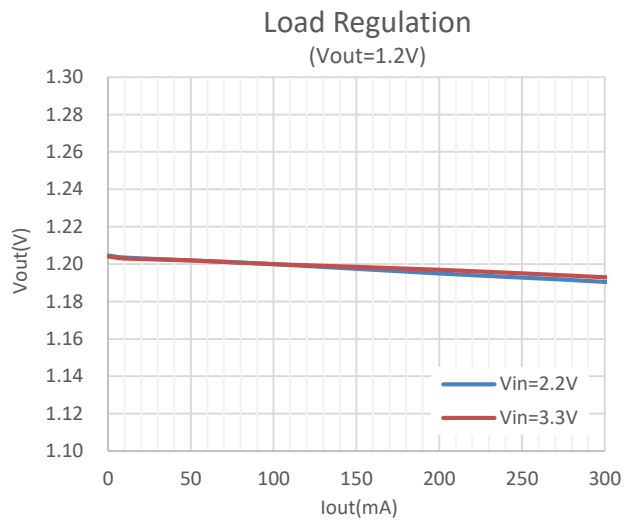
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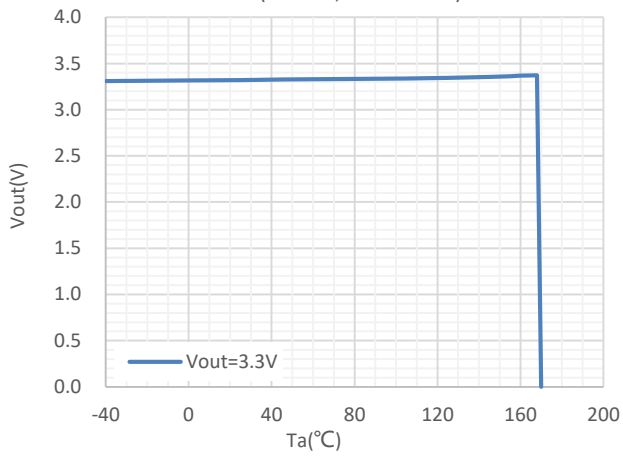
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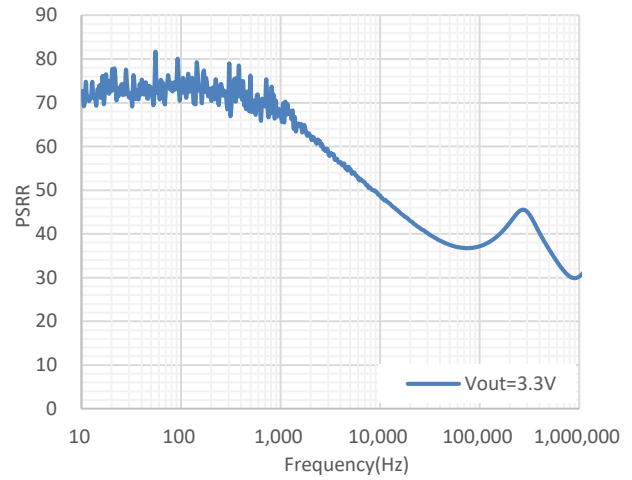
## TYPICAL PERFORMANCE CHARACTERISTICS



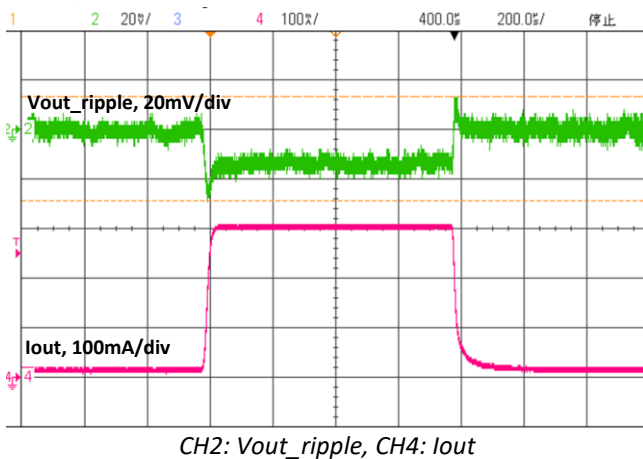
Vout vs. Temp  
(Vin=5V, Iout=10mA)



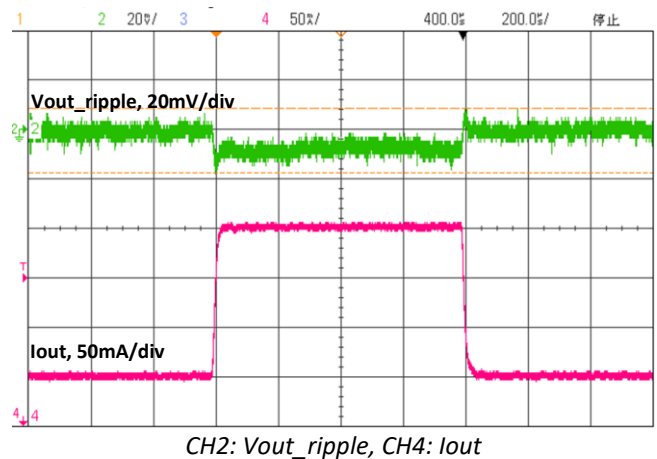
PSRR



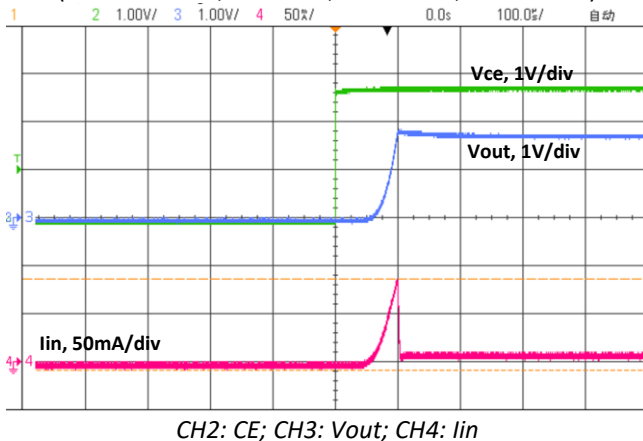
Load Transient Response  
(Vin=5V, Vout=3.3V, Iout=10-300mA)



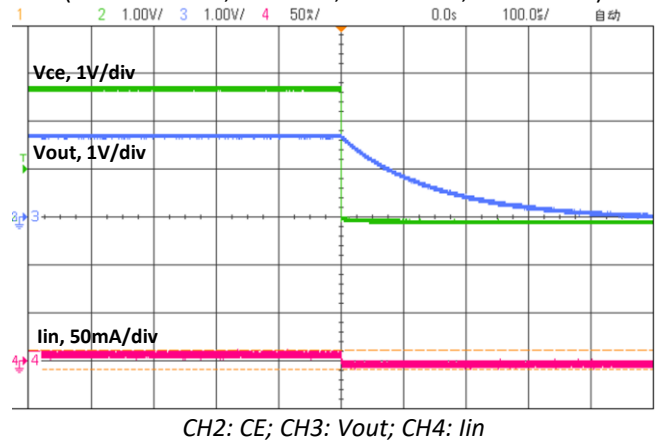
Load Transient Response  
(Vin=5V, Vout=3.3V, Iout=150-300mA)



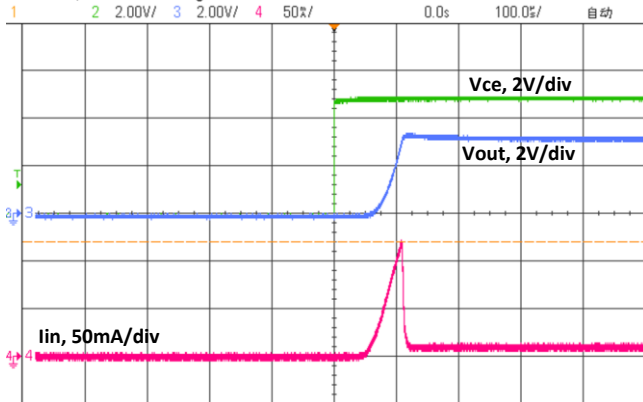
CE Chip Enable Response  
(CE=0V to 2.8V, Vin=2.8V, Vout=1.8V, Iout=10mA)



CE Chip Enable Response  
(CE=2.8V to 0V, Vin=2.8V, Vout=1.8V, Iout=10mA)

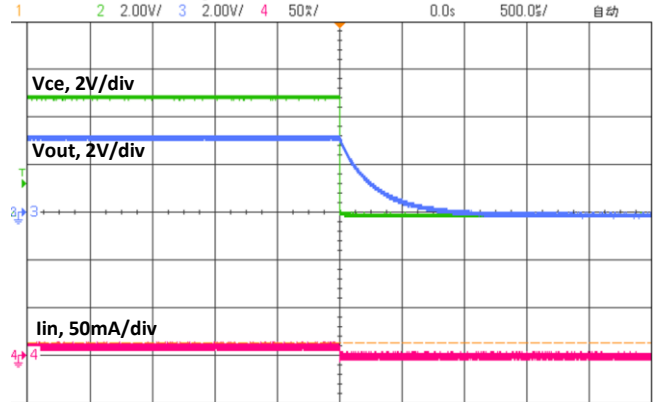


**CE Chip Enable Response**  
(CE=0V to 5V, Vin=5V, Vout=3.3V, Iout=10mA)



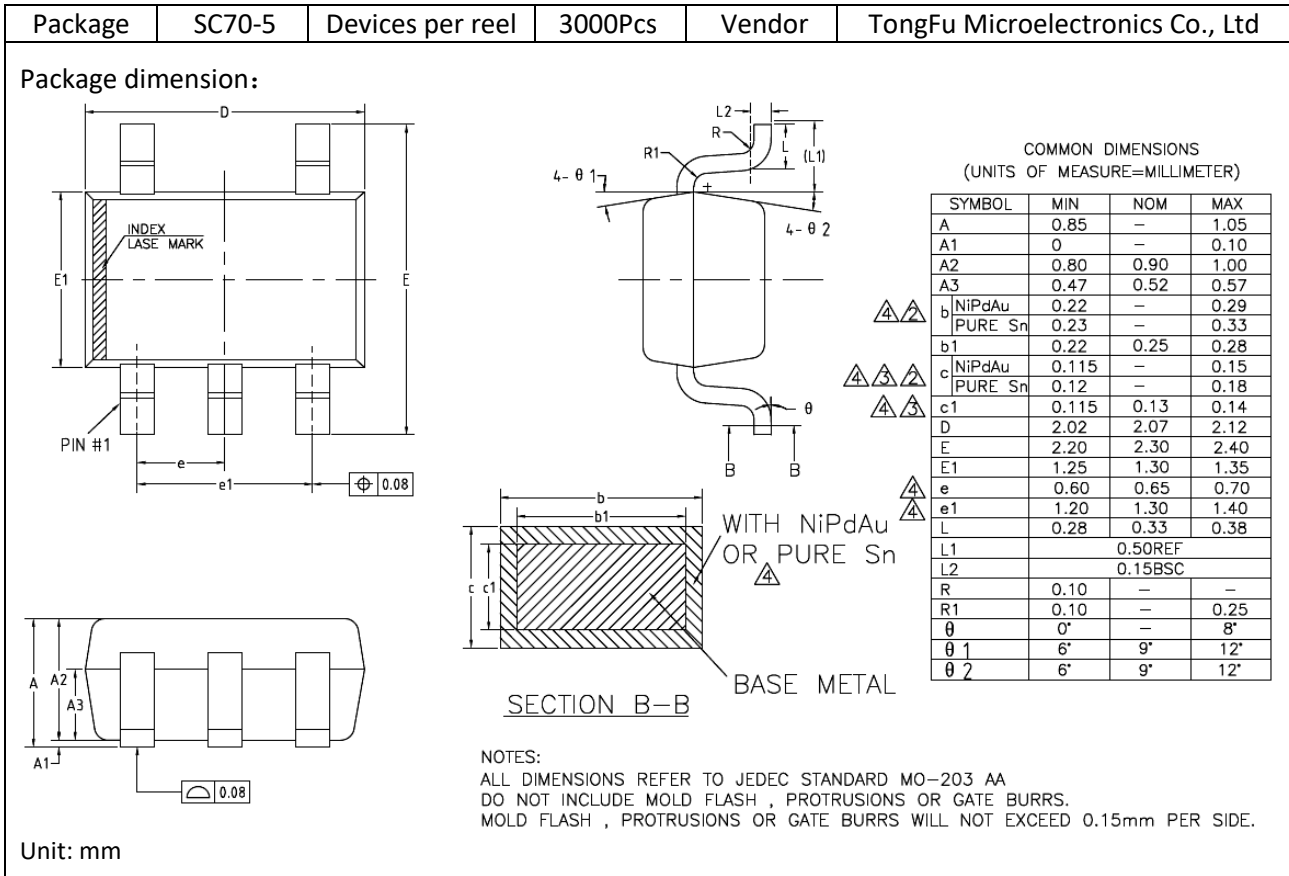
CH2: CE; CH3: Vout; CH4: Iin

**CE Chip Enable Response**  
(CE=5V to 0V, Vin=5V, Vout=3.3V, Iout=10mA)



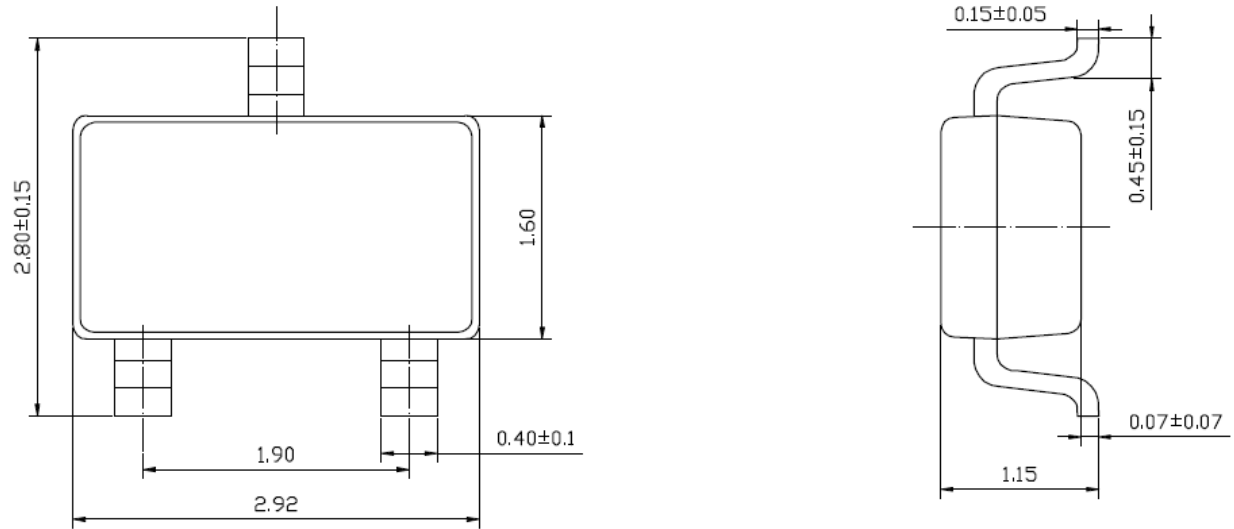
CH2: CE; CH3: Vout; CH4: Iin

## PACKAGE OUTLINE



|         |         |                  |         |        |                                       |
|---------|---------|------------------|---------|--------|---------------------------------------|
| Package | SOT23-3 | Devices per reel | 3000Pcs | Vendor | Qingdao TRS Microelectronics Co., Ltd |
|---------|---------|------------------|---------|--------|---------------------------------------|

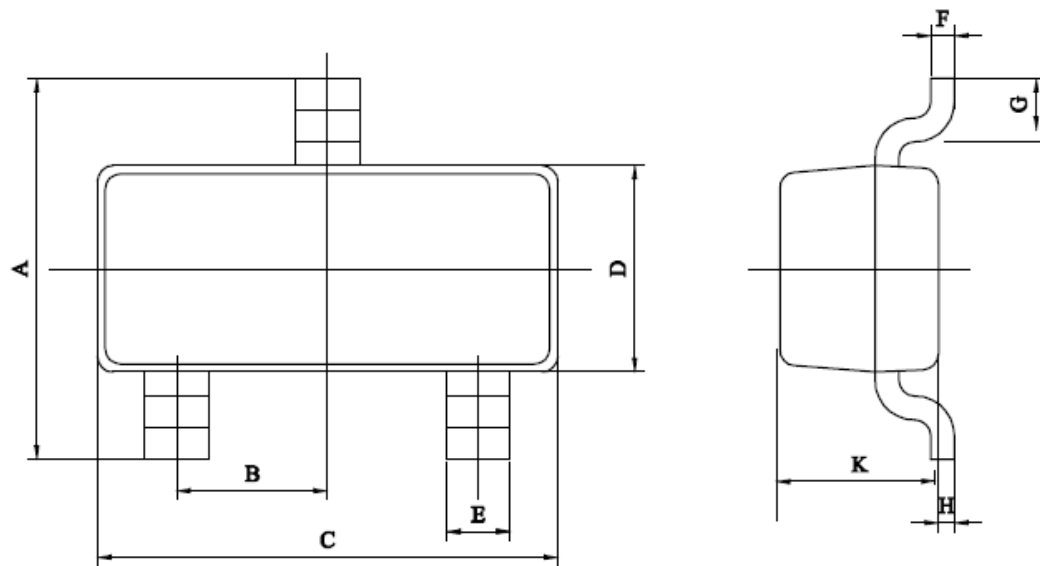
Package dimension:



Unit: mm

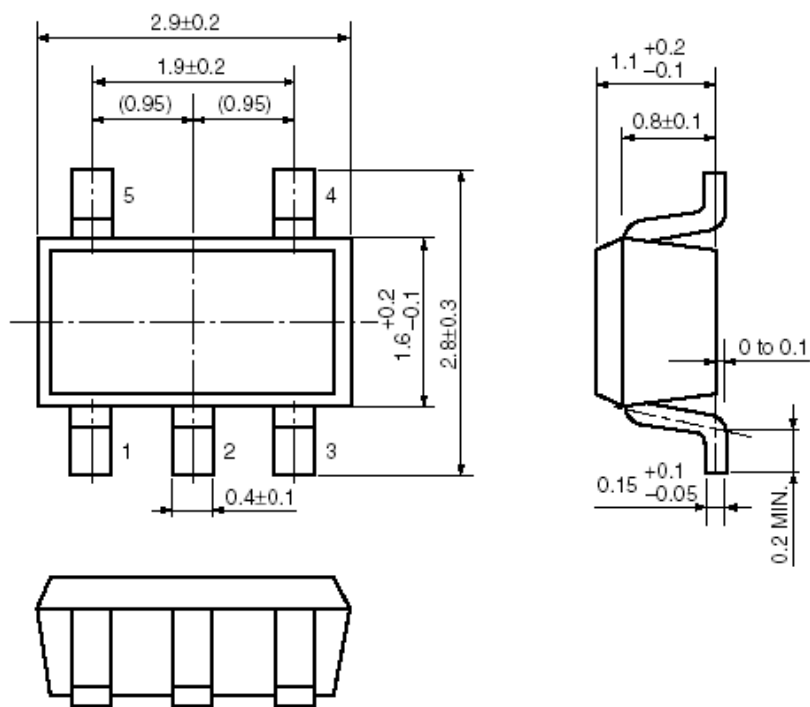
|         |         |                  |         |        |                                       |
|---------|---------|------------------|---------|--------|---------------------------------------|
| Package | TSOT-23 | Devices per reel | 3000Pcs | Vendor | Qingdao TRS Microelectronics Co., Ltd |
|---------|---------|------------------|---------|--------|---------------------------------------|

Package dimension:



|      | A        | B         | C       | D       | E        | F         | G       | H         | K         |
|------|----------|-----------|---------|---------|----------|-----------|---------|-----------|-----------|
| 出厂标准 | 2.4±0.15 | 0.95±0.05 | 2.9±0.1 | 1.3±0.1 | 0.40±0.1 | 0.15±0.08 | 0.4±0.1 | 0.07±0.07 | 1.00±0.05 |

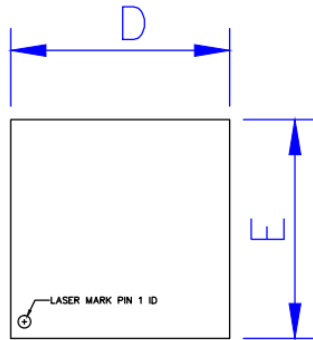
Unit: mm

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |                  |         |        |                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------|---------|--------|---------------------------------------|
| Package                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | SOT23-5 | Devices per reel | 3000Pcs | Vendor | Qingdao TRS Microelectronics Co., Ltd |
| Package dimension:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |                  |         |        |                                       |
|  <p>The technical drawing illustrates the dimensions of the BL8563G package in millimeters. It includes three views: a top view, a side view, and an isometric view. The top view shows a central rectangular body with a width of <math>2.9 \pm 0.2</math> mm and a length of <math>1.9 \pm 0.2</math> mm. The distance between the two side pins (4 and 5) is <math>0.95</math> mm, and the distance between the two bottom pins (1 and 2) is <math>0.4 \pm 0.1</math> mm. The side view shows a height of <math>1.6 \pm 0.1</math> mm and a total height of <math>2.8 \pm 0.3</math> mm. The isometric view shows a width of <math>1.1 \pm 0.2</math> mm and a height of <math>0.8 \pm 0.1</math> mm. The bottom view shows a width of <math>0.15 \pm 0.1</math> mm and a height of <math>0.2</math> mm. The distance between the two side pins is <math>0</math> to <math>0.1</math> mm.</p> |         |                  |         |        |                                       |
| Unit: mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |                  |         |        |                                       |

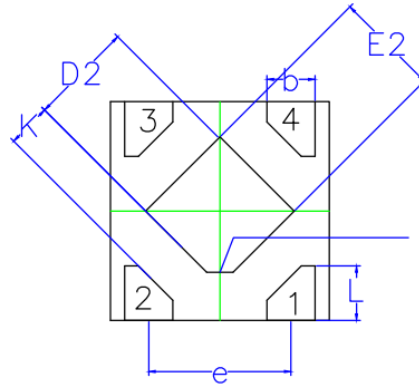
|         |          |                  |         |        |                                      |
|---------|----------|------------------|---------|--------|--------------------------------------|
| Package | DFN1x1-4 | Devices per reel | 5000Pcs | Vendor | Ningbo TRS Microelectronics Co., Ltd |
|---------|----------|------------------|---------|--------|--------------------------------------|

Package dimension:

## DFN1010-4L-0.5mm PACKAGE OUTLINE

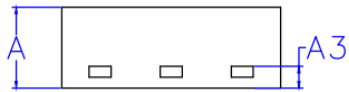


TOP VIEW



BOTTOM VIEW

C0.12



SIDE VIEW



SIDE VIEW

| COMMON DIMENSION (MM) |         |         |      | DIMENSION In Inches |          |       |
|-----------------------|---------|---------|------|---------------------|----------|-------|
| PKG                   | DFN1010 |         |      | DFN1010             |          |       |
| REF.                  | MIN.    | NOM.    | MAX  | MIN.                | NOM.     | MAX   |
| A                     | 0.45    | 0.50    | 0.55 | 0.013               | 0.015    | 0.016 |
| A1                    | 0.00    | —       | 0.05 | 0.000               | —        | 0.002 |
| A3                    | —       | 0.10REF | —    | —                   | 0.004REF | —     |
| b                     | 0.17    | 0.22    | 0.27 | 0.007               | 0.009    | 0.011 |
| D                     | 0.95    | 1.00    | 1.05 | 0.037               | 0.039    | 0.041 |
| E                     | 0.95    | 1.00    | 1.05 | 0.037               | 0.039    | 0.041 |
| D2                    | 0.43    | 0.48    | 0.53 | 0.017               | 0.019    | 0.021 |
| E2                    | 0.43    | 0.48    | 0.53 | 0.017               | 0.019    | 0.021 |
| L                     | 0.20    | 0.25    | 0.30 | 0.008               | 0.010    | 0.012 |
| e                     | 0.60    | 0.65    | 0.70 | 0.024               | 0.026    | 0.028 |
| K                     | 0.15    | —       | —    | 0.006               | —        | —     |

Unit: mm