



## Description

The BSS138LT1G uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 50V$   $I_D = 0.22A$

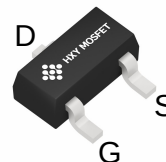
$R_{DS(ON)} < 2.0\Omega @ V_{GS}=10V$

## Application

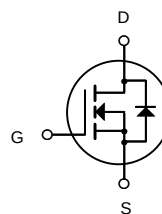
Battery protection

Load switch

Uninterruptible power supply



SOT-23



N-Channel MOSFET

## Ordering Information

| Product ID | Pack   | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| BSS138LT1G | SOT-23 | SS      | 3000     |

## Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

| Symbol          | Parameter                                              |                           | Limit      | Unit               |
|-----------------|--------------------------------------------------------|---------------------------|------------|--------------------|
| $V_{DS}$        | Drain-Source Voltage                                   |                           | 50         | V                  |
| $V_{GS}$        | Gate-Source Voltage                                    |                           | $\pm 20$   | V                  |
| $I_D$           | Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) | $T_A = 25^\circ\text{C}$  | 0.22       | A                  |
|                 |                                                        | $T_A = 100^\circ\text{C}$ | 0.13       |                    |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                          |                           | 0.88       | A                  |
| $P_D$           | Maximum Power Dissipation                              |                           | 0.35       | W                  |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range       |                           | -55 To 150 | $^\circ\text{C}$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2)       |                           | 357        | $^\circ\text{C/W}$ |



**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**

| Parameter                                  | Symbol               | Test Condition                                                                            | Min  | Typ | Max  | Units |
|--------------------------------------------|----------------------|-------------------------------------------------------------------------------------------|------|-----|------|-------|
| Off characteristics                        |                      |                                                                                           |      |     |      |       |
| Drain-source breakdown voltage             | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                               | 50   |     |      | V     |
| Gate-body leakage                          | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                |      |     | ±100 | nA    |
| Zero gate voltage drain current            | I <sub>DSS</sub>     | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V                                                 |      |     | 0.5  | μA    |
|                                            |                      | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                                                 |      |     | 100  | nA    |
| On characteristics                         |                      |                                                                                           |      |     |      |       |
| Gate-threshold voltage (note 1)            | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =1mA                                    | 0.8  |     | 1.5  | V     |
| Static drain-source on-resistance (note 1) | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =0.22A                                               |      | 1.1 | 2.0  | Ω     |
|                                            |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.22A                                              |      | 1.5 | 3    |       |
| Forward transconductance (note 1)          | g <sub>FS</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =0.22A                                               | 0.12 |     |      | S     |
| Dynamic characteristics (note 2)           |                      |                                                                                           |      |     |      |       |
| Input capacitance                          | C <sub>iss</sub>     | V <sub>DS</sub> =25V,V <sub>GS</sub> =0V, f=1MHz                                          |      | 27  |      | pF    |
| Output capacitance                         | C <sub>oss</sub>     |                                                                                           |      | 13  |      |       |
| Reverse transfer capacitance               | C <sub>rss</sub>     |                                                                                           |      | 6   |      |       |
| Switching characteristics                  |                      |                                                                                           |      |     |      |       |
| Turn-on delay time (note 1,2)              | t <sub>d(on)</sub>   | V <sub>DD</sub> =30V, V <sub>DS</sub> =10V,<br>I <sub>D</sub> =0.29A,R <sub>GEN</sub> =6Ω |      |     | 5    | ns    |
| Rise time (note 1,2)                       | t <sub>r</sub>       |                                                                                           |      |     | 18   |       |
| Turn-off delay time (note 1,2)             | t <sub>d(off)</sub>  |                                                                                           |      |     | 36   |       |
| Fall time (note 1,2)                       | t <sub>f</sub>       |                                                                                           |      |     | 14   |       |
| Drain-source body diode characteristics    |                      |                                                                                           |      |     |      |       |
| Body diode forward voltage (note 1)        | V <sub>SD</sub>      | I <sub>S</sub> =0.44A, V <sub>GS</sub> = 0V                                               |      |     | 1.4  | V     |

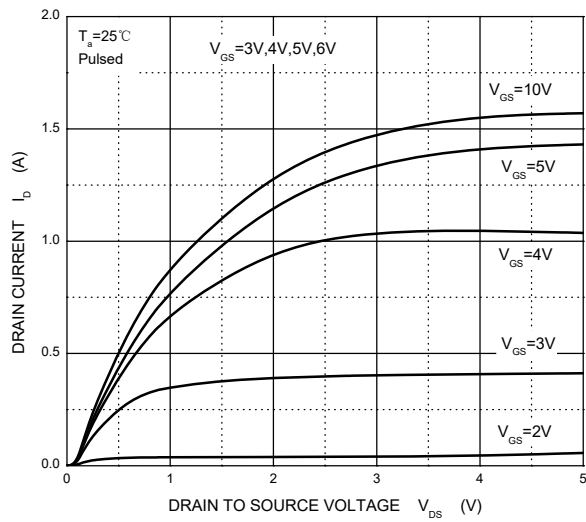
**Notes:**

1. Pulse Test ; Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
2. These parameters have no way to verify.

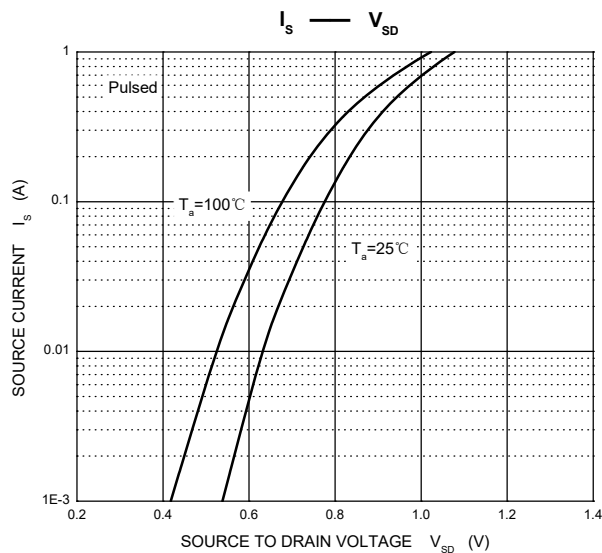
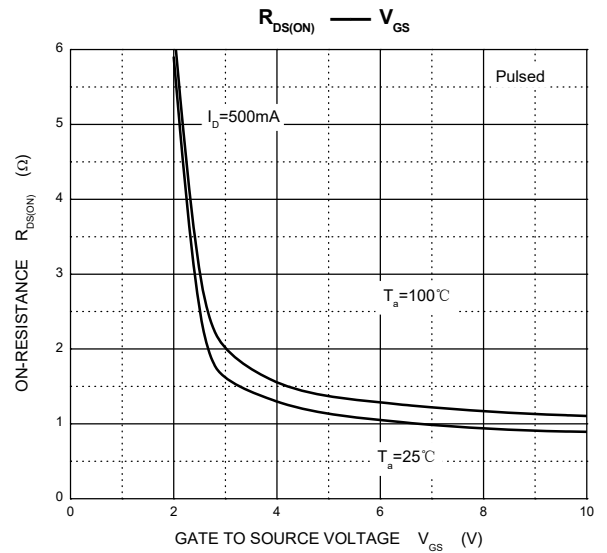
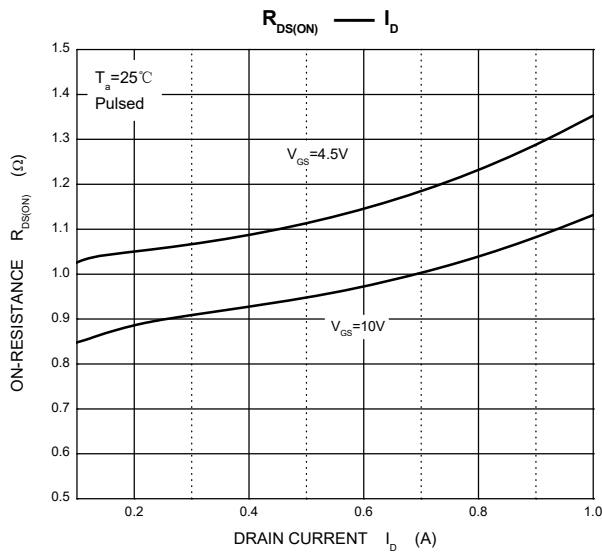
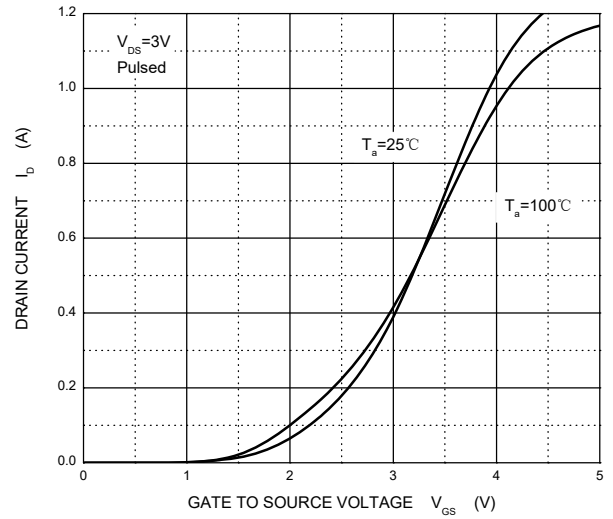


## Typical Characteristics

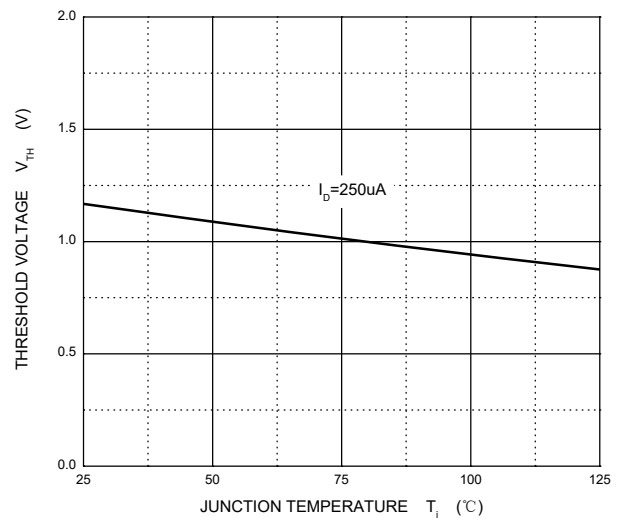
Output Characteristics



Transfer Characteristics

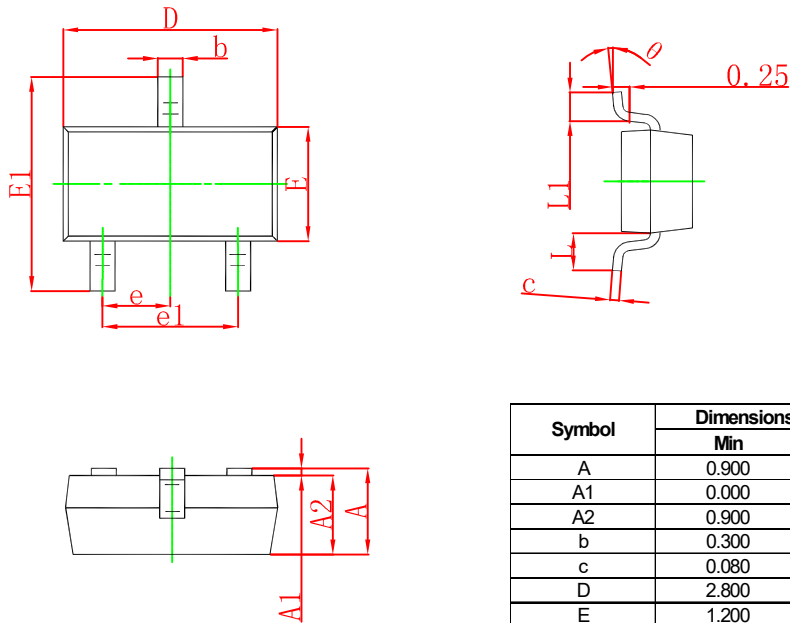


Threshold Voltage



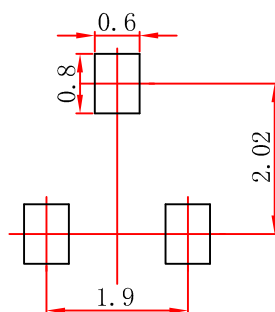


## SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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