

# MOSFET – Power

## 170 mAmps, 100 Volts

N-Channel SOT-23

### BSS123LT1G, BVSS123LT1G

#### Features

- BVSS Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

#### MAXIMUM RATINGS

| Rating                                   | Symbol    | Value    | Unit |
|--|-----------|----------|------|
| Drain-Source Voltage                     | $V_{DSS}$ | 100      | Vdc  |
| Gate-Source Voltage                      | $V_{GS}$  | $\pm 20$ | Vdc  |
| – Continuous                             | $V_{GSM}$ | $\pm 40$ | Vpk  |
| – Non-repetitive ( $t_p \leq 50 \mu s$ ) |           |          |      |
| Drain Current                            | $I_D$     | 0.17     | Adc  |
| – Continuous (Note 1)                    | $I_{DM}$  | 0.68     |      |
| – Pulsed (Note 2)                        |           |          |      |

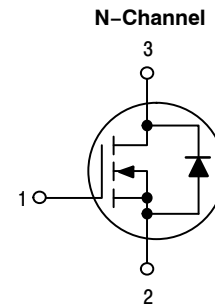
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

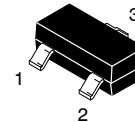
| Characteristic  | Symbol          | Max         | Unit                 |
|---|-----------------|-------------|----------------------|
| Total Device Dissipation FR-5 Board<br>(Note 3) $T_A = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$           | 225<br>1.8  | mW<br>mW/ $^\circ C$ |
| Thermal Resistance,<br>Junction-to-Ambient  | $R_{\theta JA}$ | 556         | $^\circ C/W$         |
| Junction and Storage Temperature  | $T_J, T_{stg}$  | -55 to +150 | $^\circ C$           |

1. The Power Dissipation of the package may result in a lower continuous drain current.
2. Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2.0\%$ .
3. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.

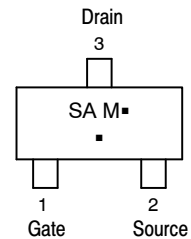
170 mAmps  
100 VOLTS  
 $R_{DS(on)} = 6 \Omega$



#### MARKING DIAGRAM & PIN ASSIGNMENT



SOT-23  
CASE 318  
STYLE 21



- SA = Device Code
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)  
\*Date Code orientation and/or position may vary depending upon manufacturing location.

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# BSS123LT1G, BVSS123LT1G

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic  | Symbol               | Min | Typ | Max      | Unit |
|---|----------------------|-----|-----|----------|------|
| <b>OFF CHARACTERISTICS</b>  |                      |     |     |          |      |
| Drain-Source Breakdown Voltage<br>(V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μAdc)  | V <sub>(BR)DSS</sub> | 100 | -   | -        | Vdc  |
| Zero Gate Voltage Drain Current<br>(V <sub>GS</sub> = 0, V <sub>DS</sub> = 100 Vdc) T <sub>J</sub> = 25°C<br>T <sub>J</sub> = 125°C | I <sub>DSS</sub>     | -   | -   | 15<br>60 | μAdc |
| Gate-Body Leakage Current<br>(V <sub>GS</sub> = 20 Vdc, V <sub>DS</sub> = 0)  | I <sub>GSS</sub>     | -   | -   | 50       | nAdc |

## ON CHARACTERISTICS (Note 4)

|  |                     |     |   |     |       |
|--|---------------------|-----|---|-----|-------|
| Gate Threshold Voltage<br>(V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1.0 mAdc)  | V <sub>GS(th)</sub> | 1.6 | - | 2.6 | Vdc   |
| Static Drain-Source On-Resistance<br>(V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 100 mAdc) | r <sub>DS(on)</sub> | -   | - | 6.0 | Ω     |
| Forward Transconductance<br>(V <sub>DS</sub> = 25 Vdc, I <sub>D</sub> = 100 mAdc)          | g <sub>fs</sub>     | 80  | - | -   | mmhos |

## DYNAMIC CHARACTERISTICS

|  |                  |   |     |   |    |
|--|------------------|---|-----|---|----|
| Input Capacitance<br>(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)            | C <sub>iss</sub> | - | 20  | - | pF |
| Output Capacitance<br>(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)           | C <sub>oss</sub> | - | 9.0 | - | pF |
| Reverse Transfer Capacitance<br>(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz) | C <sub>rss</sub> | - | 4.0 | - | pF |

## SWITCHING CHARACTERISTICS<sup>(4)</sup>

|                     |  |                     |   |    |   |    |
|---------------------|--|---------------------|---|----|---|----|
| Turn-On Delay Time  | (V <sub>CC</sub> = 30 Vdc, I <sub>C</sub> = 0.28 Adc,<br>V <sub>GS</sub> = 10 Vdc, R <sub>GS</sub> = 50 Ω) | t <sub>d(on)</sub>  | - | 20 | - | ns |
| Turn-Off Delay Time |  | t <sub>d(off)</sub> | - | 40 | - | ns |

## REVERSE DIODE

|  |                 |   |   |     |   |
|--|-----------------|---|---|-----|---|
| Diode Forward On-Voltage<br>(I <sub>D</sub> = 0.34 Adc, V <sub>GS</sub> = 0 Vdc) | V <sub>SD</sub> | - | - | 1.3 | V |
|--|-----------------|---|---|-----|---|

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## ORDERING INFORMATION

| Device       | Package             | Shipping <sup>†</sup> |
|--------------|---------------------|-----------------------|
| BSS123LT1G   | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel   |
| BVSS123LT1G* | SOT-23<br>(Pb-Free) | 3,000 / Tape & Reel   |
| BSS123LT7G   | SOT-23<br>(Pb-Free) | 3,500 / Tape & Reel   |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*BVSS Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

# BSS123LT1G, BVSS123LT1G

## TYPICAL ELECTRICAL CHARACTERISTICS

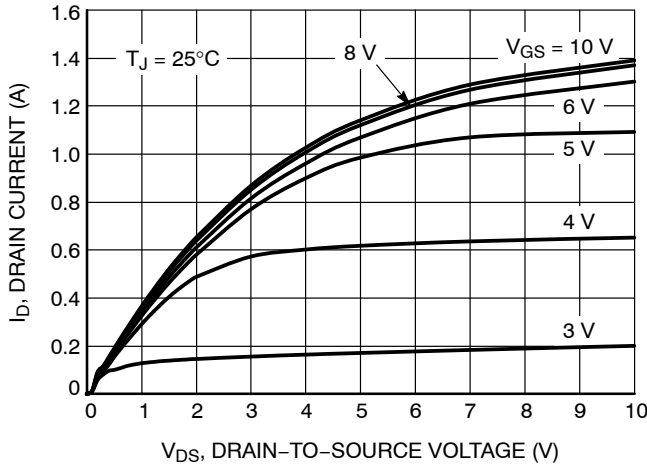


Figure 1. On-Region Characteristics

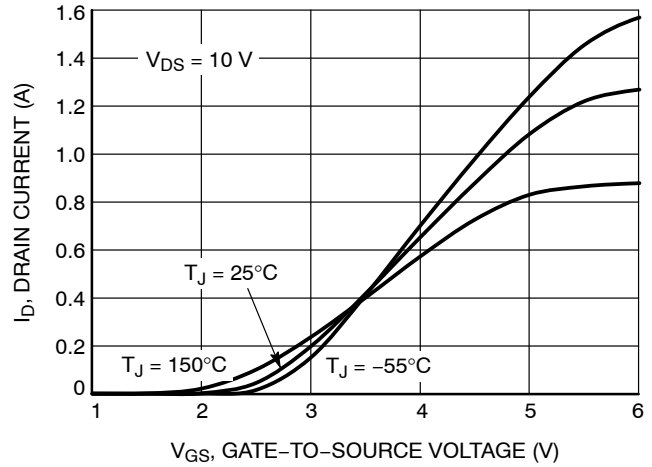


Figure 2. Transfer Characteristics

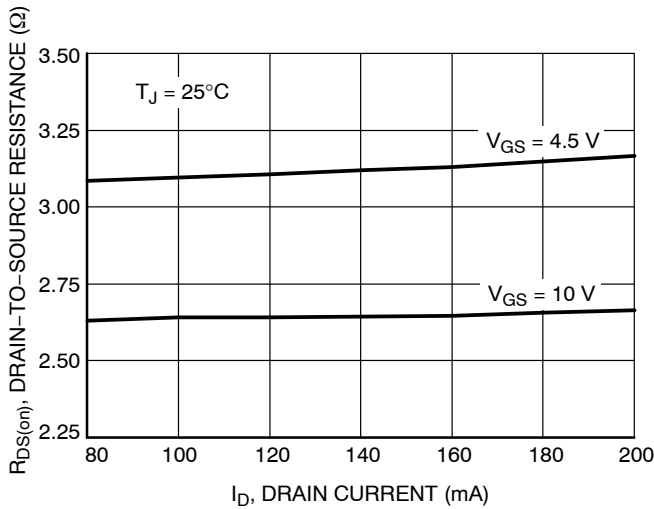


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

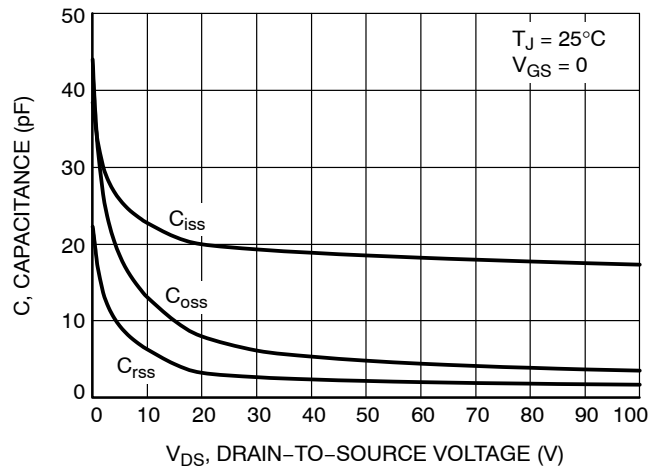


Figure 4. Capacitance Variation

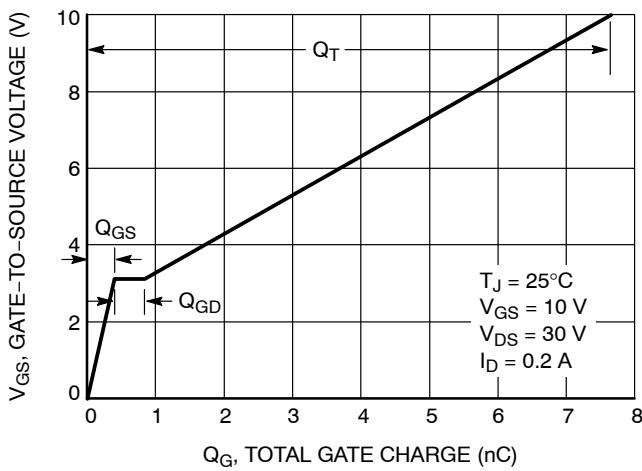


Figure 5. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

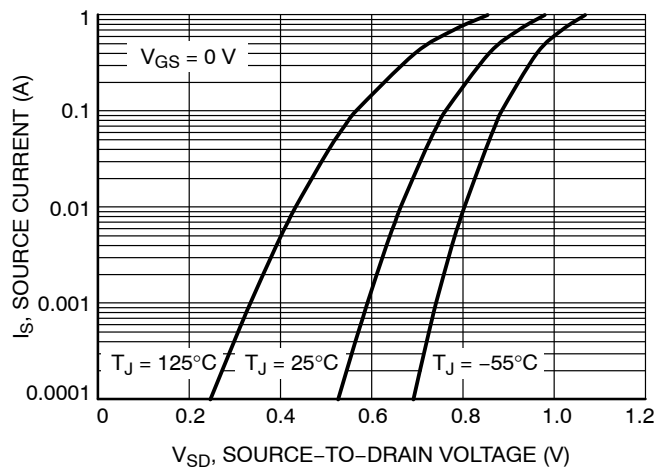
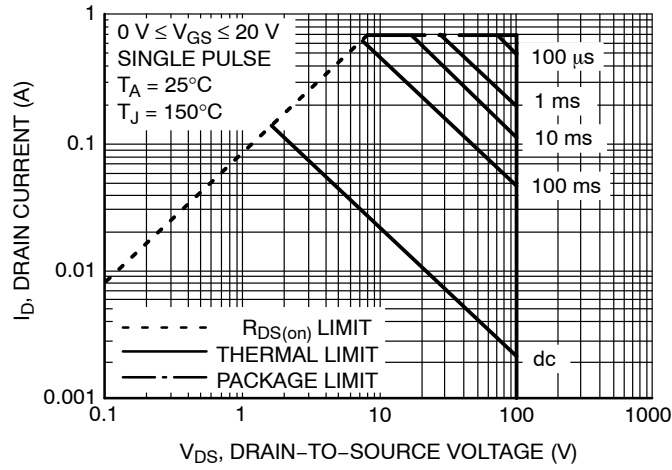


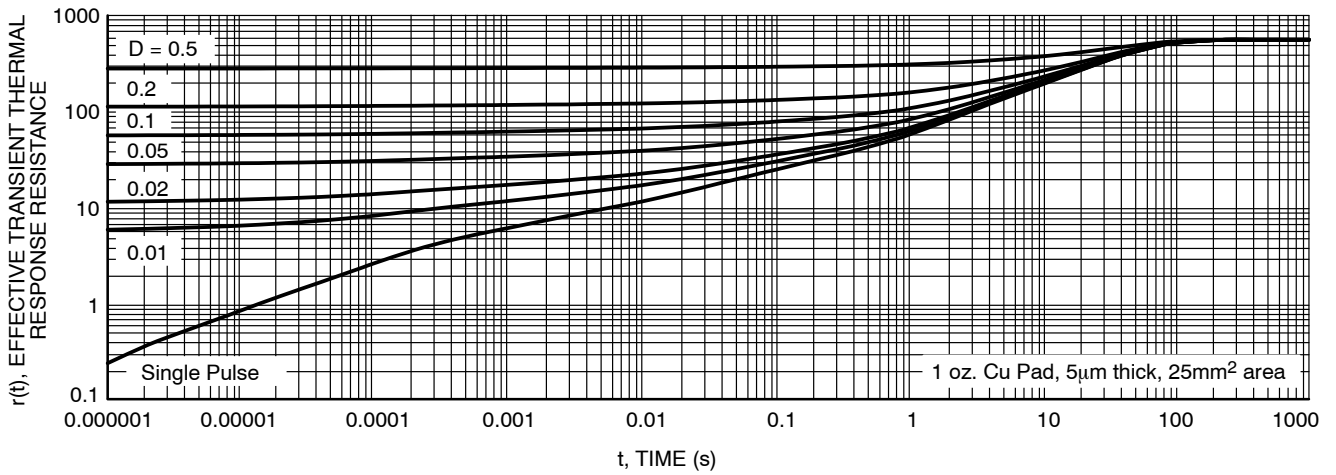
Figure 6. Diode Forward Voltage vs. Current

# BSS123LT1G, BVSS123LT1G

## TYPICAL ELECTRICAL CHARACTERISTICS

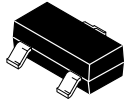


**Figure 7. Maximum Rated Forward Biased Safe Operating Area**



**Figure 8. Thermal Response**

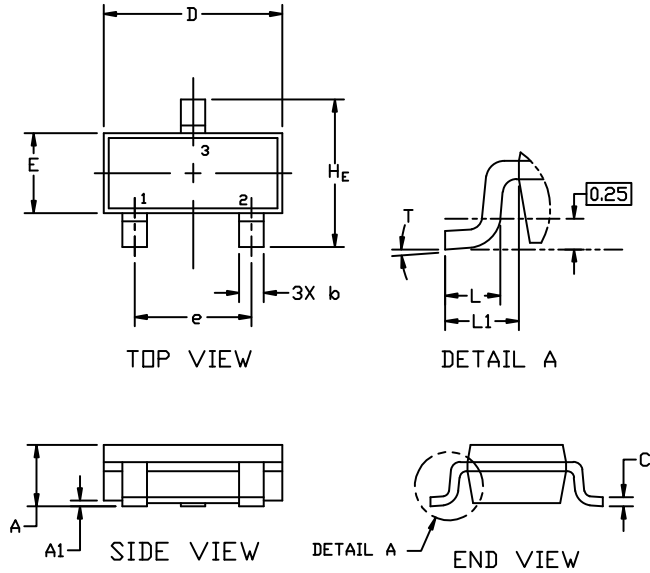
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



**SOT-23 (TO-236)**  
CASE 318  
ISSUE AT

DATE 01 MAR 2023

SCALE 4:1



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

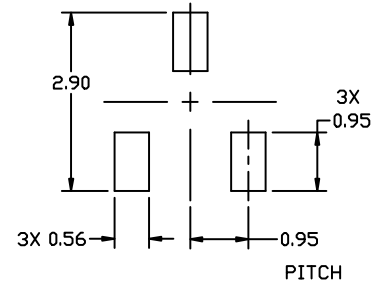
| DIM            | MILLIMETERS |      |      | INCHES |       |       |
|----------------|-------------|------|------|--------|-------|-------|
|                | MIN.        | NOM. | MAX. | MIN.   | NOM.  | MAX.  |
| A              | 0.89        | 1.00 | 1.11 | 0.035  | 0.039 | 0.044 |
| A1             | 0.01        | 0.06 | 0.10 | 0.000  | 0.002 | 0.004 |
| b              | 0.37        | 0.44 | 0.50 | 0.015  | 0.017 | 0.020 |
| c              | 0.08        | 0.14 | 0.20 | 0.003  | 0.006 | 0.008 |
| D              | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E              | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e              | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.080 |
| L              | 0.30        | 0.43 | 0.55 | 0.012  | 0.017 | 0.022 |
| L1             | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.027 |
| H <sub>E</sub> | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| T              | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

**GENERIC MARKING DIAGRAM\***



- XXX = Specific Device Code
- M = Date Code
- = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



**RECOMMENDED MOUNTING FOOTPRINT**

\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**STYLES ON PAGE 2**

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**MECHANICAL CASE OUTLINE  
PACKAGE DIMENSIONS**



**SOT-23 (TO-236)  
CASE 318  
ISSUE AT**

DATE 01 MAR 2023

- STYLE 1 THRU 5:  
CANCELLED
- STYLE 6:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR
- STYLE 7:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR
- STYLE 8:  
PIN 1. ANODE  
2. NO CONNECTION  
3. CATHODE
- STYLE 9:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE
- STYLE 10:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE
- STYLE 11:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE
- STYLE 12:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE
- STYLE 13:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE
- STYLE 14:  
PIN 1. CATHODE  
2. GATE  
3. ANODE
- STYLE 15:  
PIN 1. GATE  
2. CATHODE  
3. ANODE
- STYLE 16:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE
- STYLE 17:  
PIN 1. NO CONNECTION  
2. ANODE  
3. CATHODE
- STYLE 18:  
PIN 1. NO CONNECTION  
2. CATHODE  
3. ANODE
- STYLE 19:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE-ANODE
- STYLE 20:  
PIN 1. CATHODE  
2. ANODE  
3. GATE
- STYLE 21:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN
- STYLE 22:  
PIN 1. RETURN  
2. OUTPUT  
3. INPUT
- STYLE 23:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE
- STYLE 24:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE
- STYLE 25:  
PIN 1. ANODE  
2. CATHODE  
3. GATE
- STYLE 26:  
PIN 1. CATHODE  
2. ANODE  
3. NO CONNECTION
- STYLE 27:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE
- STYLE 28:  
PIN 1. ANODE  
2. ANODE  
3. ANODE

|                         |                        |   |
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