

Power MOSFET

200 mAmps, 50 Volts

N-Channel SOT-23

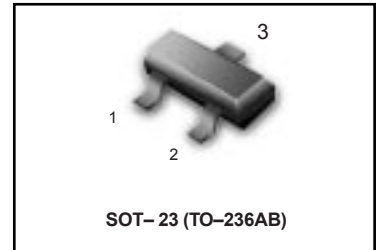
Typical applications are dc-dc converters, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low Threshold Voltage ($V_{GS(th)}$: 0.5V...1.5V) makes it ideal for low voltage applications
- Miniature SOT-23 Surface Mount Package saves board space
- Pb-Free Package May be Available. The G-Suffix Denotes a Pb-Free Lead Finish
- We declare that the material of product are Halogen Free and compliance with RoHS requirements.

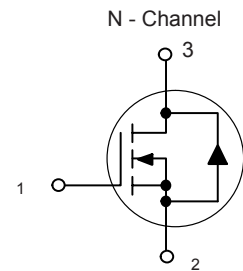
MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|-----------------|-------------|--------------------|
| Drain-to-Source Voltage | V_{DSS} | 50 | Vdc |
| Gate-to-Source Voltage – Continuous | V_{GS} | ± 20 | Vdc |
| Drain Current | | | mA |
| – Continuous @ $T_A = 25^\circ\text{C}$ | I_D | 200 | |
| – Pulsed Drain Current ($t_p \leq 10 \mu\text{s}$) | I_{DM} | 800 | |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ | P_D | 225 | mW |
| Operating and Storage Temperature Range | T_J, T_{stg} | - 55 to 150 | $^\circ\text{C}$ |
| Thermal Resistance – Junction-to-Ambient | $R_{\theta JA}$ | 556 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes, for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

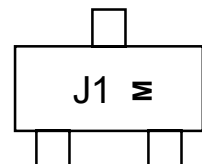
BSS138LT1G



200 mAmps
50 Volts
 $R_{DS(on)} = 3.5 \Omega$



MARKING DIAGRAM & PIN ASSIGNMENT



J1 = Device Code
M = Month Code

ORDERING INFORMATION

| Device | Package | Shipping |
|------------|---------|-------------------|
| BSS138LT1G | SOT-23 | 3000 Tape & Reel |
| BSS138LT3G | SOT-23 | 10000 Tape & Reel |



BSS138LT1G

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|---|---------------|--------|--------|------------|-----------------|
| Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\ \mu\text{Adc}$) | $V_{(BR)DSS}$ | 50 | – | – | Vdc |
| Zero Gate Voltage Drain Current ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 50\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) | I_{DSS} | – – | – – | 0.1 0.5 | μAdc |
| Gate-Source Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$) | I_{GSS} | – | – | ± 0.1 | μAdc |

ON CHARACTERISTICS (Note 1.)

| | | | | | |
|--|--------------|--------|----------|-----------|-------|
| Gate-Source Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 1.0\text{ mAdc}$) | $V_{GS(th)}$ | 0.5 | – | 1.5 | Vdc |
| Static Drain-to-Source On-Resistance ($V_{GS} = 2.75\text{ Vdc}$, $I_D < 200\text{ mAdc}$, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 200\text{ mAdc}$) | $r_{DS(on)}$ | – – | 5.6 – | 10 3.5 | Ohms |
| Forward Transconductance ($V_{DS} = 25\text{ Vdc}$, $I_D = 200\text{ mAdc}$, $f = 1.0\text{ kHz}$) | g_{fs} | 100 | – | – | mmhos |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|----------------------|--|-----------|---|-----|-----|----|
| Input Capacitance | ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0$, $f = 1\text{ MHz}$) | C_{iss} | – | 40 | 50 | pF |
| Output Capacitance | ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0$, $f = 1\text{ MHz}$) | C_{oss} | – | 12 | 25 | |
| Transfer Capacitance | ($V_{DG} = 25\text{ Vdc}$, $V_{GS} = 0$, $f = 1\text{ MHz}$) | C_{rss} | – | 3.5 | 5.0 | |

SWITCHING CHARACTERISTICS (Note 2.)

| | | | | | | |
|---------------------|--|--------------|---|---|----|----|
| Turn-On Delay Time | ($V_{DD} = 30\text{ Vdc}$, $I_D = 0.2\text{ Adc}$,) | $t_{d(on)}$ | – | – | 20 | ns |
| Turn-Off Delay Time | | $t_{d(off)}$ | – | – | 20 | |

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.
2. Switching characteristics are independent of operating junction temperature.



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TYPICAL ELECTRICAL CHARACTERISTICS

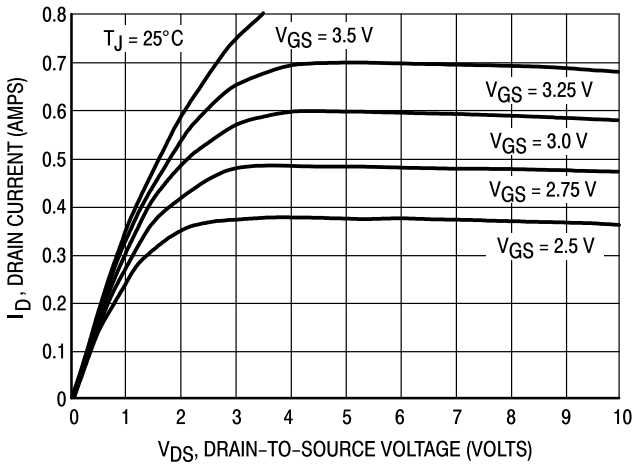


Figure 1. On-Region Characteristics

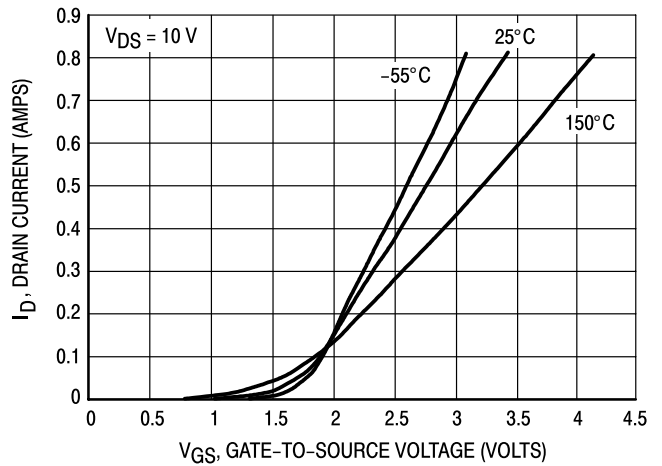


Figure 2. Transfer Characteristics

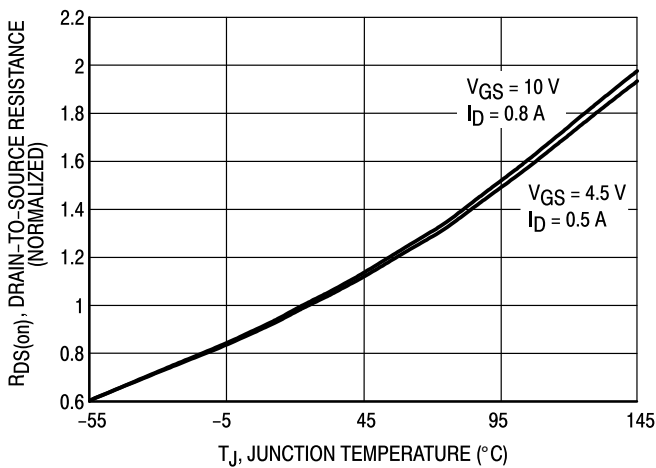


Figure 3. On-Resistance Variation with Temperature

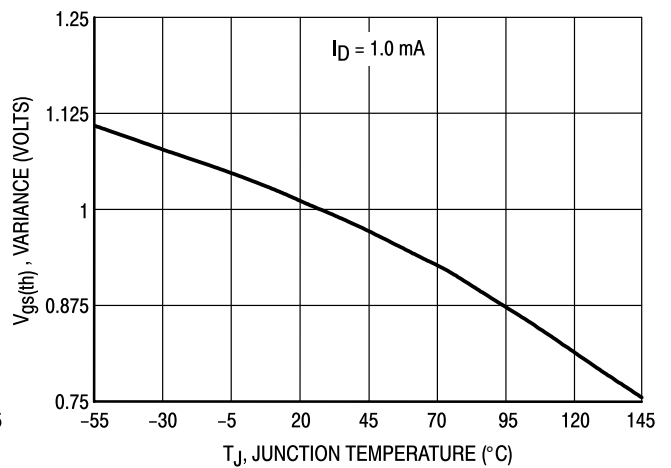


Figure 4. Threshold Voltage Variation with Temperature

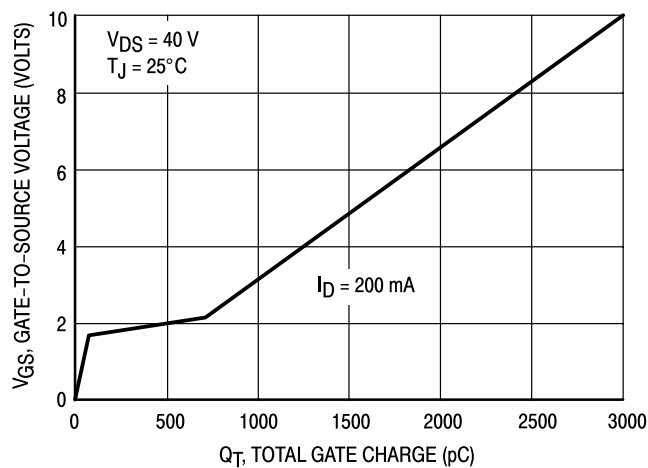


Figure 5. Gate Charge



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TYPICAL ELECTRICAL CHARACTERISTICS

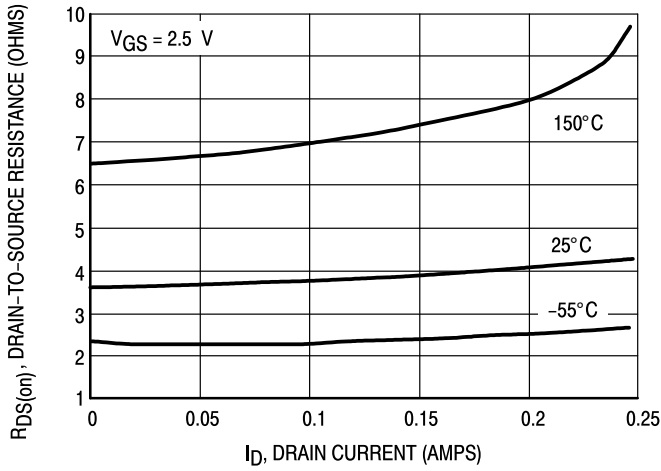


Figure 6. On-Resistance versus Drain Current

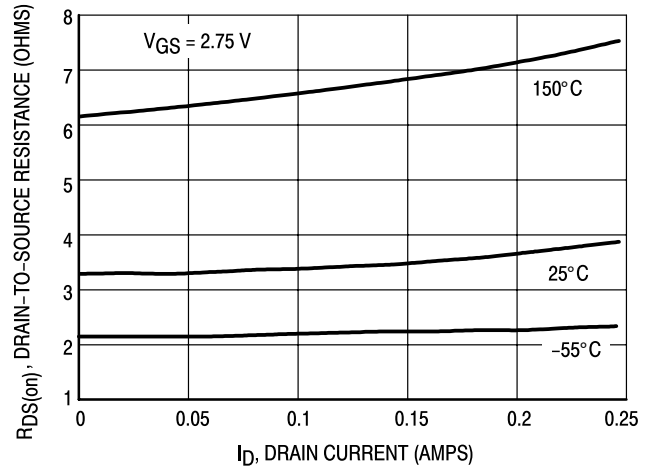


Figure 7. On-Resistance versus Drain Current

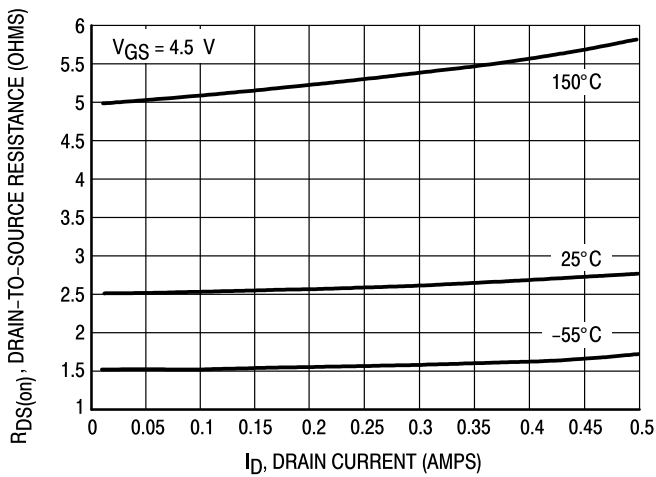


Figure 8. On-Resistance versus Drain Current

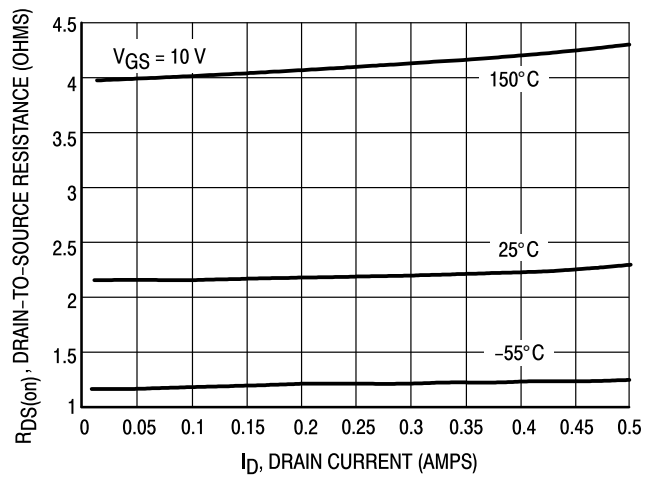


Figure 9. On-Resistance versus Drain Current

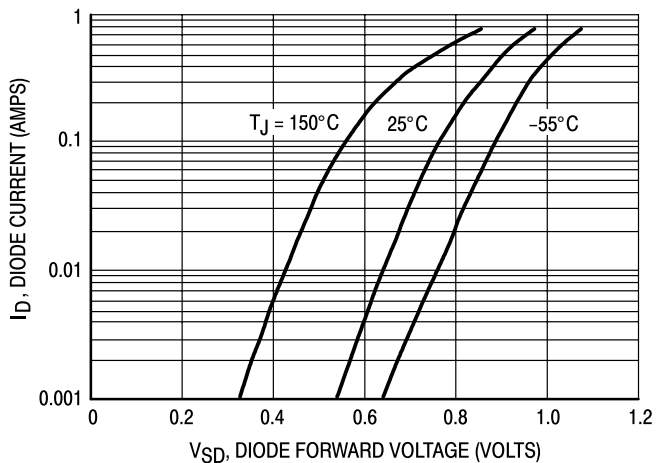


Figure 10. Body Diode Forward Voltage

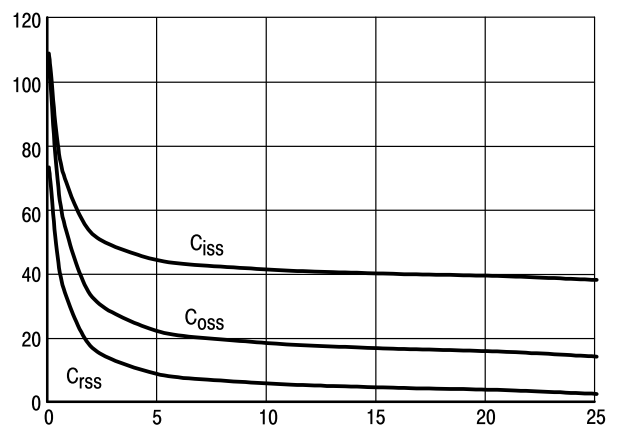
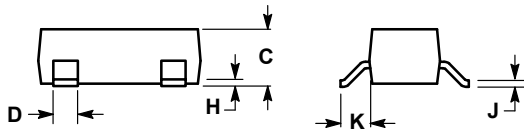
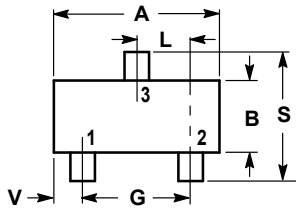


Figure 11. Capacitance

SOT-23

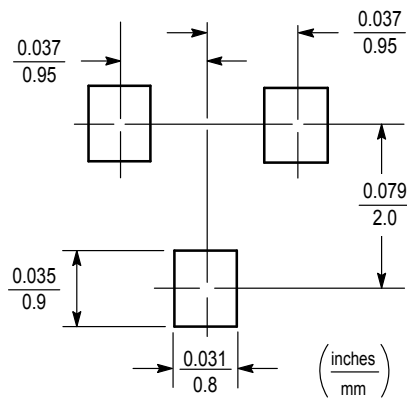


NOTES:

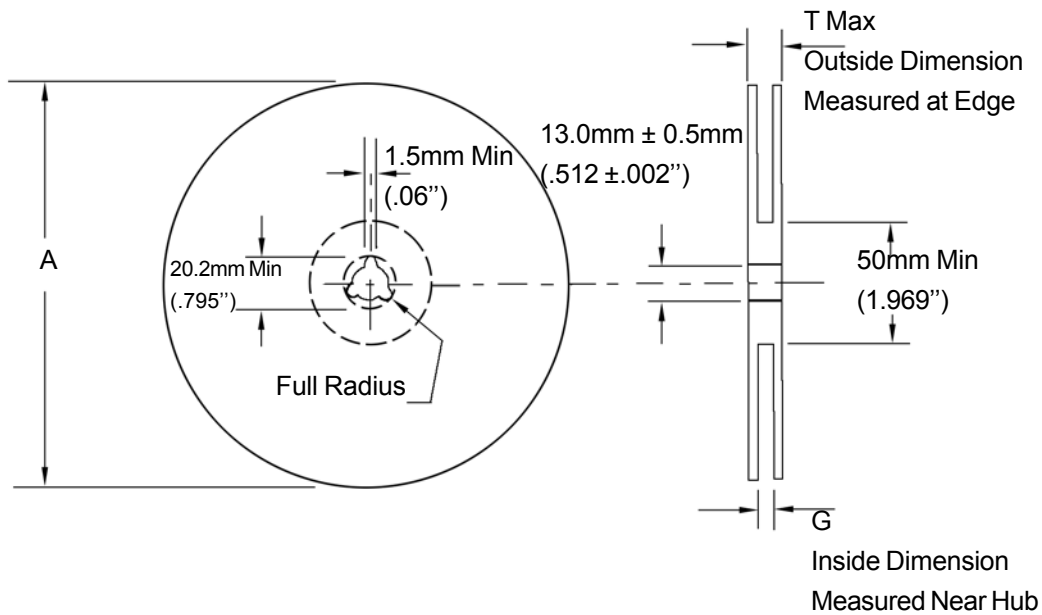
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|----------|--------|--------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.1102 | 0.1197 | 2.80 | 3.04 |
| B | 0.0472 | 0.0551 | 1.20 | 1.40 |
| C | 0.0350 | 0.0440 | 0.89 | 1.11 |
| D | 0.0150 | 0.0200 | 0.37 | 0.50 |
| G | 0.0701 | 0.0807 | 1.78 | 2.04 |
| H | 0.0005 | 0.0040 | 0.013 | 0.100 |
| J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| K | 0.0140 | 0.0285 | 0.35 | 0.69 |
| L | 0.0350 | 0.0401 | 0.89 | 1.02 |
| S | 0.0830 | 0.1039 | 2.10 | 2.64 |
| V | 0.0177 | 0.0236 | 0.45 | 0.60 |

- PIN 1. BASE
 2. EMITTER
 3. COLLECTOR



EMBOSSED TAPE AND REEL DATA FOR DISCRETES



| Size | A Max | G | T Max |
|------|-------------------|--|------------------|
| 8 mm | 178.0mm (7.0") | 8.4mm+1.5mm, -0.0 (.33"+.039", -0.00) | 10.9mm (.43") |

Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

Storage Conditions

Temperature: 5 to 40 Deg.C (20 to 30 Deg. C is preferred)

Humidity: 30 to 80 RH (40 to 60 is preferred)

Recommended Period: One year after manufacturing

(This recommended period is for the soldering condition only. The characteristics and reliabilities of the products are not restricted to this limitation)



Shipment Specification

