

## Power MOSFET 200 mAmps, 50 Volts N-Channel SOT-23

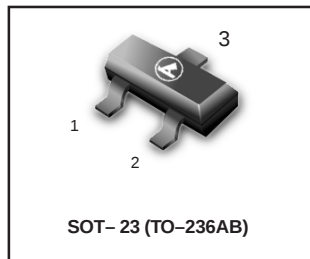
Typical applications are dc-dc converters, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- 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

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

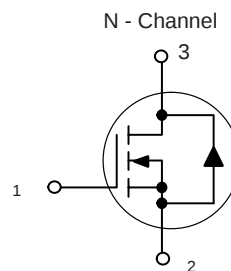
| Rating                                                          | Symbol          | Value      | Unit               |
|-----------------------------------------------------------------|-----------------|------------|--------------------|
| Drain-to-Source Voltage                                         | $V_{DSS}$       | 50         | Vdc                |
| Gate-to-Source Voltage – Continuous                             | $V_{GS}$        | $\pm 20$   | 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        | $^\circ\text{C}$   |

## LBSS138LT1

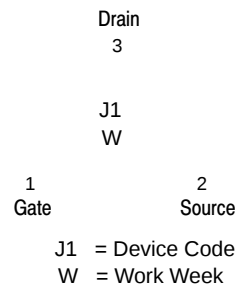


**200 mAMPS  
50 VOLTS**

**$R_{DS(on)} = 3.5 \Omega$**



### MARKING DIAGRAM & PIN ASSIGNMENT



### ORDERING INFORMATION

| Device      | Package | Shipping         |
|-------------|---------|------------------|
| LBSS138LT1  | SOT-23  | 3000 Tape & Reel |
| LBSS138LT1G | SOT-23  | 3000 Tape & Reel |

## LBSS138LT1

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

| Characteristic                                                                                                                                      | Symbol        | Min    | Typ    | Max        | Unit            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|--------|------------|-----------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                          |               |        |        |            |                 |
| Drain-to-Source Breakdown Voltage<br>( $V_{GS} = 0\text{ Vdc}$ , $I_D = 250\text{ }\mu\text{Adc}$ )                                                 | $V_{(BR)DSS}$ | 50     | —      | —          | Vdc             |
| Zero Gate Voltage Drain Current<br>( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )<br>( $V_{DS} = 50\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ ) | $I_{DSS}$     | —<br>— | —<br>— | 0.1<br>0.5 | $\mu\text{Adc}$ |
| Gate-Source Leakage Current ( $V_{GS} = \pm 20\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )                                                              | $I_{GSS}$     | —      | —      | $\pm 0.1$  | $\mu\text{Adc}$ |

### ON CHARACTERISTICS (Note 1.)

|                                                                                                                                                                                                                |              |        |          |           |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------|----------|-----------|-------|
| Gate-Source Threshold Voltage<br>( $V_{DS} = V_{GS}$ , $I_D = 1.0\text{ mAdc}$ )                                                                                                                               | $V_{GS(th)}$ | 0.5    | —        | 1.5       | Vdc   |
| Static Drain-to-Source On-Resistance<br>( $V_{GS} = 2.75\text{ Vdc}$ , $I_D < 200\text{ mAdc}$ , $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ )<br>( $V_{GS} = 5.0\text{ Vdc}$ , $I_D = 200\text{ mAdc}$ ) | $r_{DS(on)}$ | —<br>— | 5.6<br>— | 10<br>3.5 | Ohms  |
| Forward Transconductance<br>( $V_{DS} = 25\text{ Vdc}$ , $I_D = 200\text{ mAdc}$ , $f = 1.0\text{ kHz}$ )                                                                                                      | $g_{fs}$     | 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  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
2. Switching characteristics are independent of operating junction temperature.

# TYPICAL ELECTRICAL CHARACTERISTICS

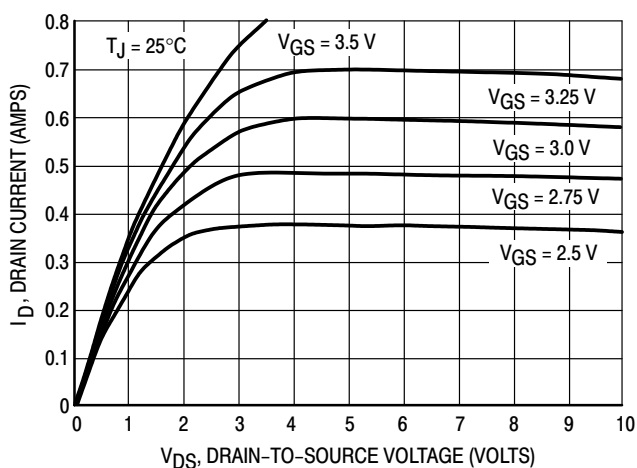


Figure 1. On-Region Characteristics

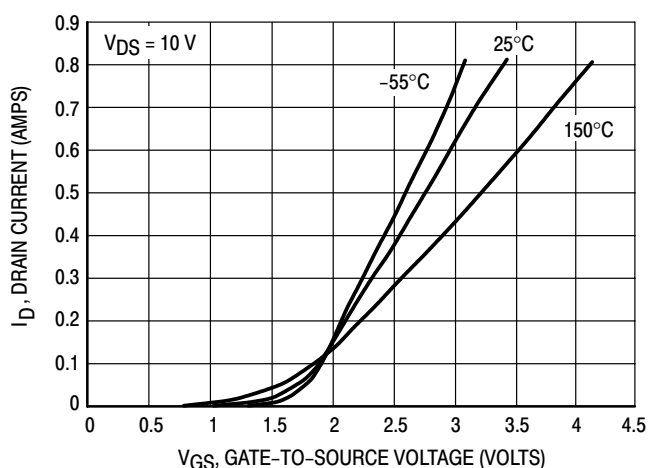


Figure 2. Transfer Characteristics

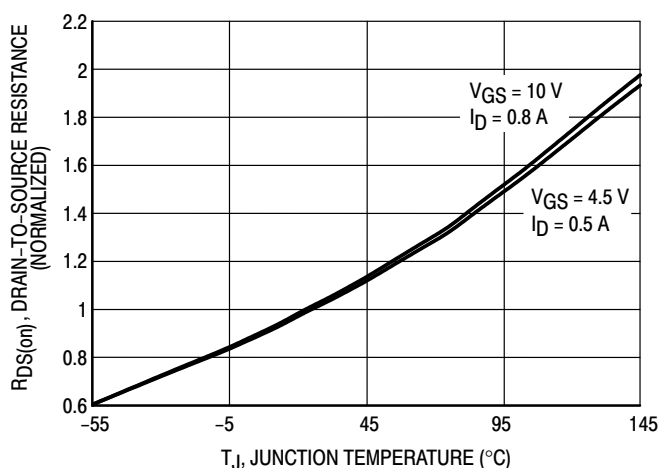


Figure 3. On-Resistance Variation with Temperature

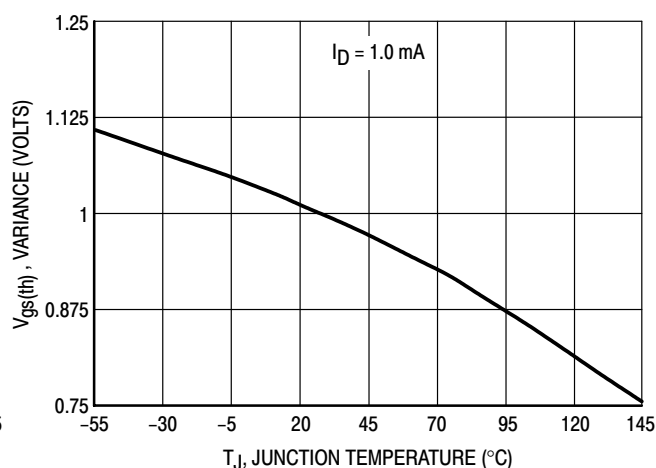


Figure 4. Threshold Voltage Variation with Temperature

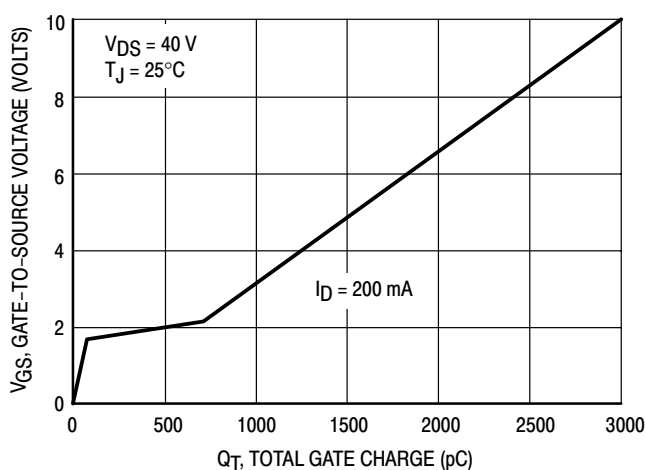


Figure 5. Gate Charge

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TYPICAL ELECTRICAL CHARACTERISTICS

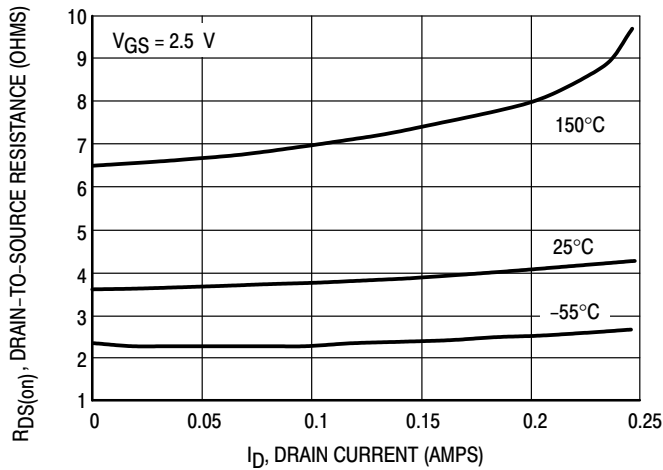


Figure 6. On-Resistance versus Drain Current

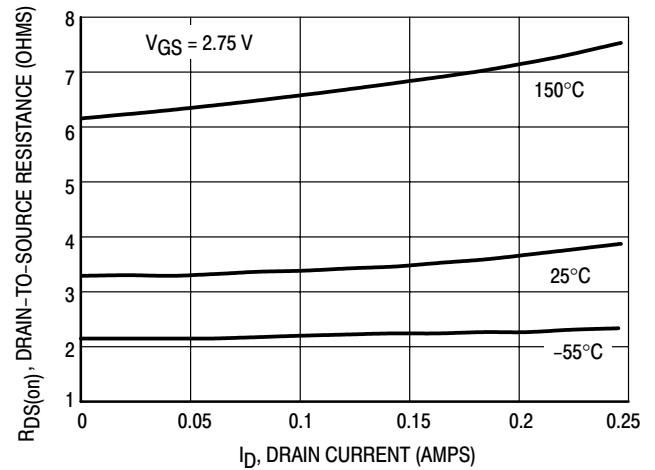


Figure 7. On-Resistance versus Drain Current

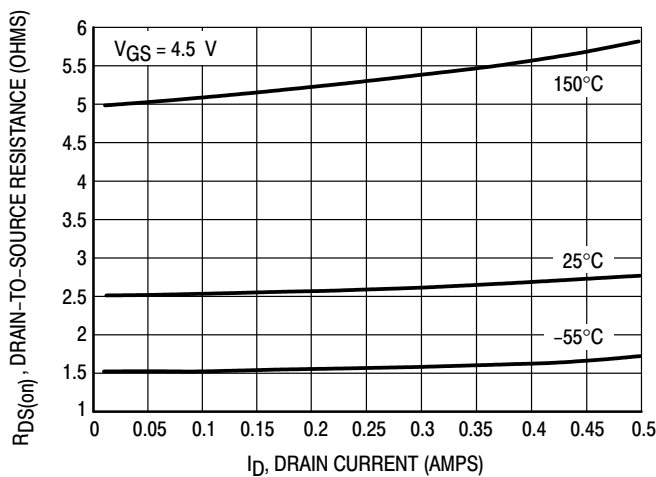


Figure 8. On-Resistance versus Drain Current

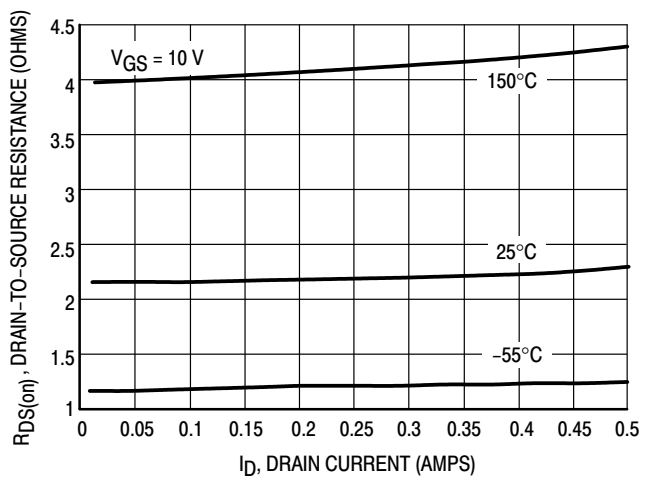


Figure 9. On-Resistance versus Drain Current

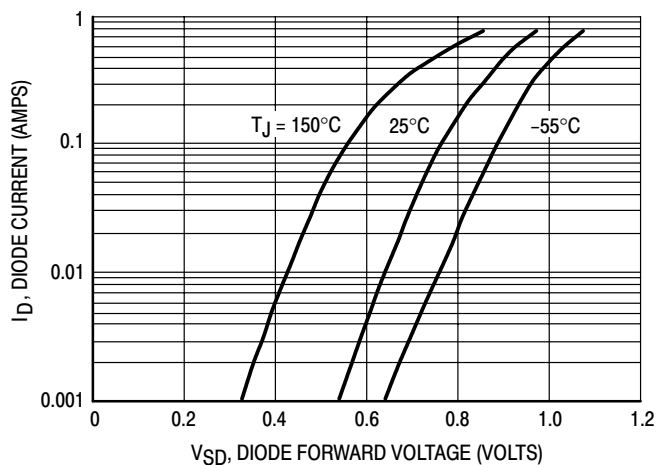


Figure 10. Body Diode Forward Voltage

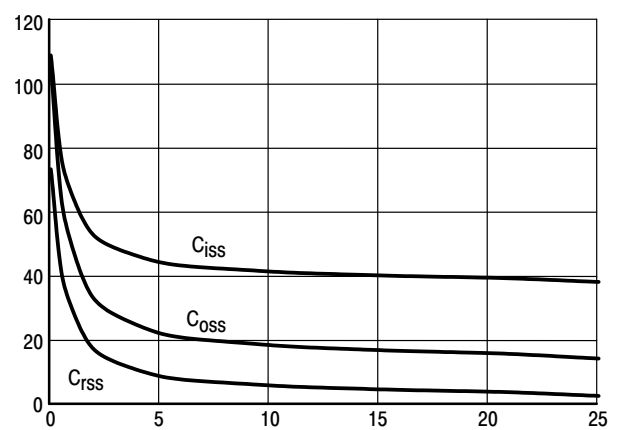
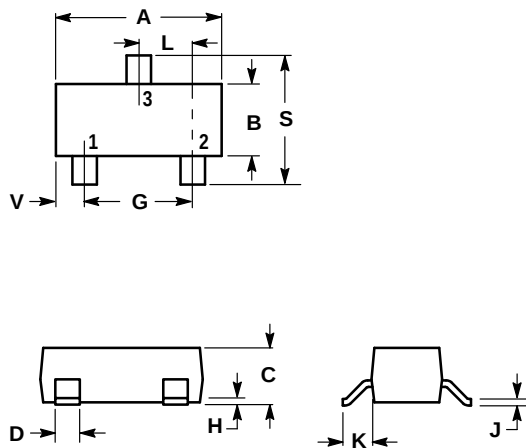


Figure 11. Capacitance



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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

