



THE DATASHEET OF BSS138A-TP



Features

- ESD protected:1500V
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device^(Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

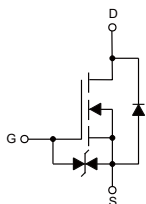
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature: -55°C to +150°C
- Thermal Resistance: 202°C/W Junction to Ambient^(Note2)

| Parameter | Symbol | Rating | Unit |
|--|----------|-------------------------|------|
| Drain-Source Voltage | V_{DS} | 50 | V |
| Gate-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current | I_D | $T_A=25^\circ\text{C}$ | 0.22 |
| | | $T_A=100^\circ\text{C}$ | 0.14 |
| Pulsed Drain Current ^(Note3) | I_{DM} | 1 | A |
| Total Power Dissipation ^(Note4) | P_D | 0.62 | W |

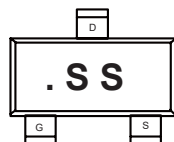
Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. P_D is based on max. junction temperature, using junction-ambient thermal resistance.

Internal Structure and Marking code

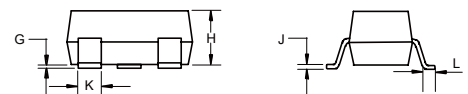
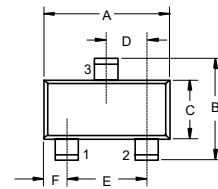


1. GATE
2. SOURCE
3. DRAIN



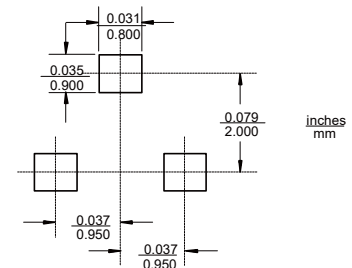
N-Channel MOSFET

SOT-23



| DIM | INCHES | | MM | | NOTE |
|-----|--------|-------|------|------|------|
| | MIN | MAX | MIN | MAX | |
| A | 0.110 | 0.120 | 2.80 | 3.04 | |
| B | 0.083 | 0.104 | 2.10 | 2.64 | |
| C | 0.047 | 0.055 | 1.20 | 1.40 | |
| D | 0.034 | 0.041 | 0.85 | 1.05 | |
| E | 0.067 | 0.083 | 1.70 | 2.10 | |
| F | 0.018 | 0.024 | 0.45 | 0.60 | |
| G | 0.0004 | 0.006 | 0.01 | 0.15 | |
| H | 0.035 | 0.043 | 0.90 | 1.10 | |
| J | 0.003 | 0.007 | 0.08 | 0.18 | |
| K | 0.012 | 0.020 | 0.30 | 0.51 | |
| L | 0.007 | 0.020 | 0.20 | 0.50 | |

Suggested Solder Pad Layout



Electrical Characteristics @ 25°C (Unless Otherwise Specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---------------------------------|---------------|--|-----|------|----------|----------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$ | 50 | | | V |
| Gate-Source Leakage Current | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 20V$ | | | ± 10 | μA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=48V, V_{GS}=0V$ | | | 1 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 0.8 | 1 | 1.45 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=0.5A$ | | 1.0 | 1.6 | Ω |
| | | $V_{GS}=4.5V, I_D=0.1A$ | | 1.1 | 2.5 | |
| | | $V_{GS}=2.5V, I_D=0.1A$ | | 1.7 | 3.8 | |
| Forward Transconductance | g_{FS} | $V_{DS}=10V, I_D=0.2A$ | | 333 | | mS |
| Gate Resistance | R_g | f=1 MHz, Open drain | | 75 | | Ω |
| Diode Characteristics | | | | | | |
| Continuous Body Diode Current | I_S | | | | 0.22 | A |
| Diode Forward Voltage | V_{SD} | $V_{GS}=0V, I_S=0.5A$ | 0.5 | | 1.3 | V |
| Reverse Recovery Time | t_{rr} | $I_F=0.5A, dI_F/dt=100A/\mu s$ | | 9.2 | | ns |
| Reverse Recovery Charge | Q_{rr} | | | 2.1 | | nC |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=25V, V_{GS}=0V, f=1MHz$ | | 29 | | pF |
| Output Capacitance | C_{oss} | | | 4.3 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 2.7 | | |
| Total Gate Charge | Q_g | $V_{DS}=25V, V_{GS}=10V, I_D=0.5A$ | | 1.2 | | nC |
| Gate-Source Charge | Q_{gs} | | | 0.15 | | |
| Gate-Drain Charge | Q_{gd} | | | 0.31 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}=25V, V_{GS}=10V, R_G=25\Omega, I_D=0.5A$ | | 3 | | ns |
| Turn-On Rise Time | t_r | | | 2.7 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 11 | | |
| Turn-Off Fall Time | t_f | | | 8.1 | | |

Curve Characteristics

Fig. 1 - Typical Output Characteristics

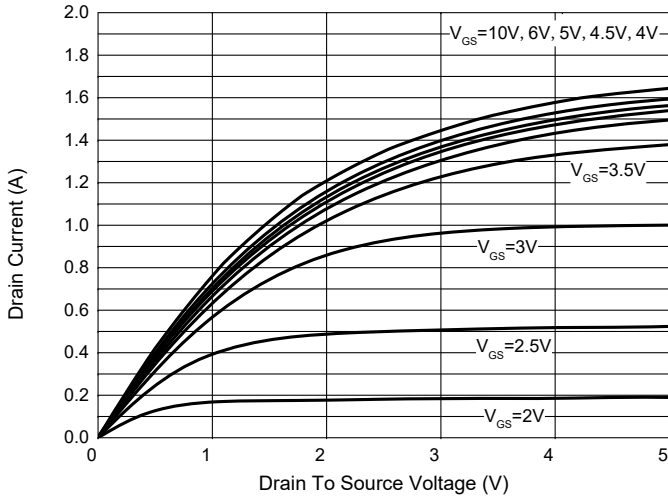


Fig. 2 - Transfer Characteristics

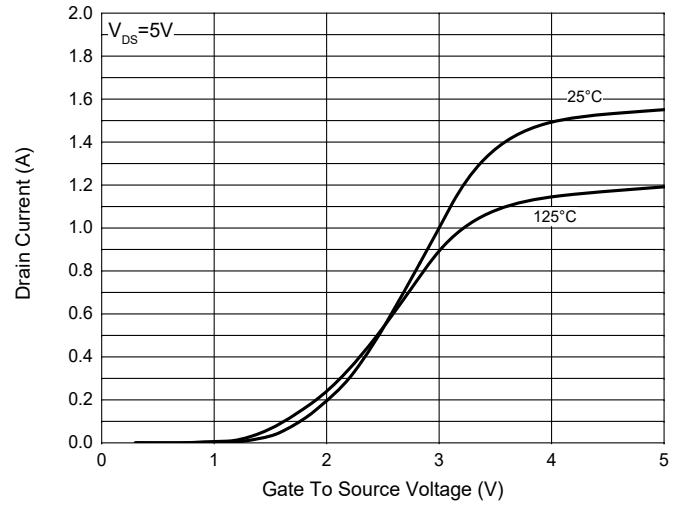


Fig. 3 - $R_{DS(ON)} - V_{GS}$

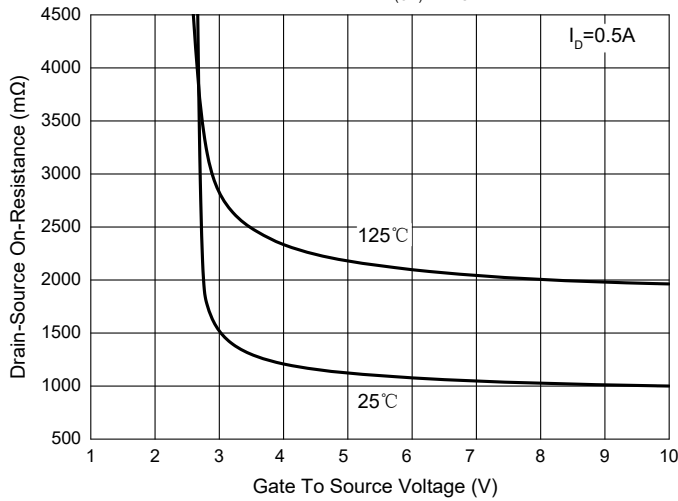


Fig. 4 - $R_{DS(ON)} - I_D$

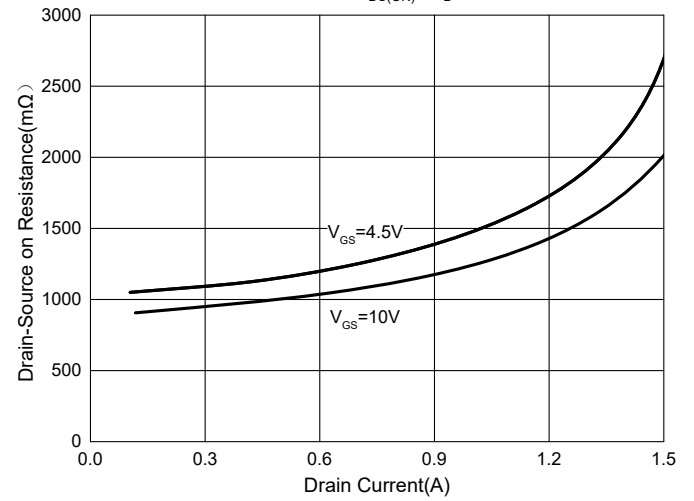


Fig. 5 - Capacitance Characteristics

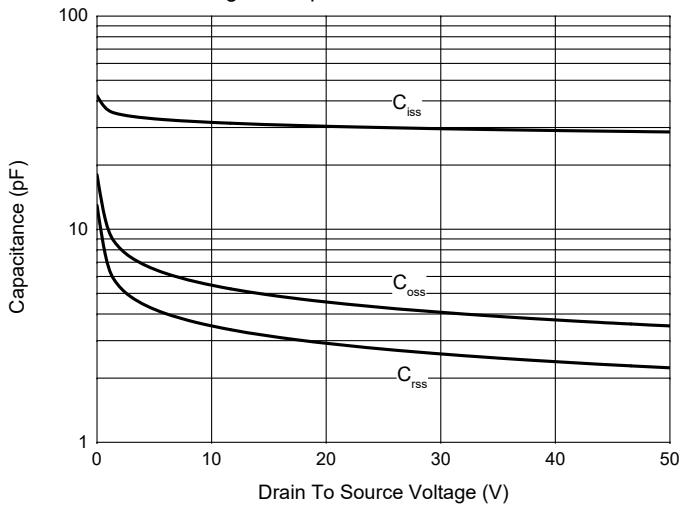
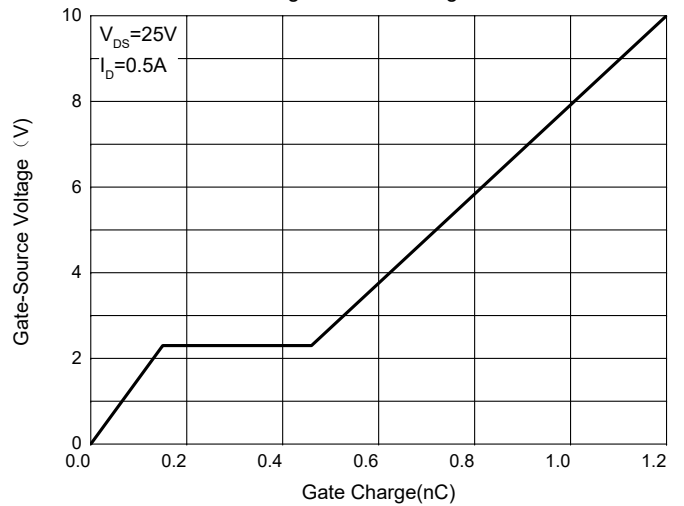


Fig. 6 - Gate Charge



Curve Characteristics

Fig. 7 - Normalized Threshold Voltage

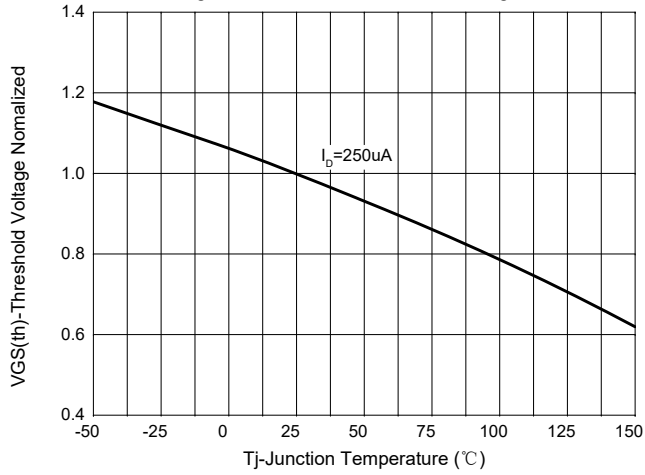


Fig.8-Normalized On Resistance Characteristics

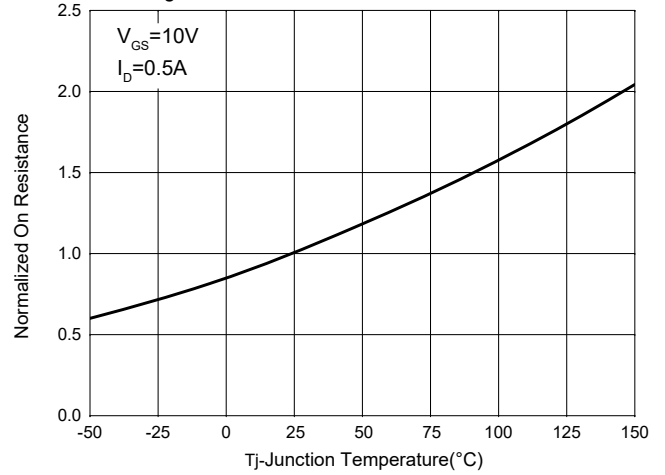


Fig.9 - I_s—V_{SD}

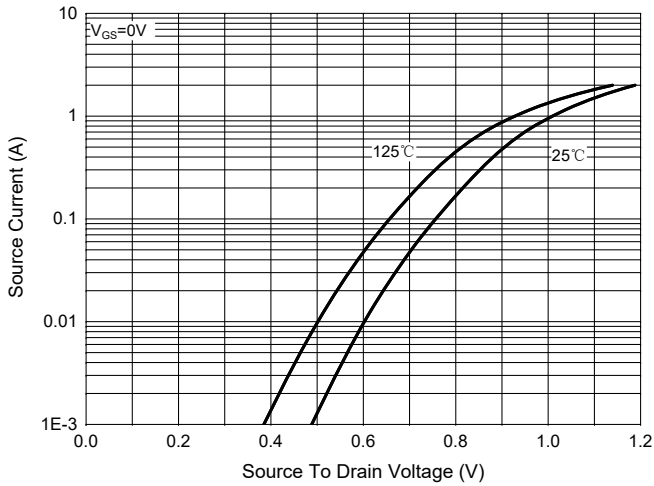


Fig.10 - Drain Current

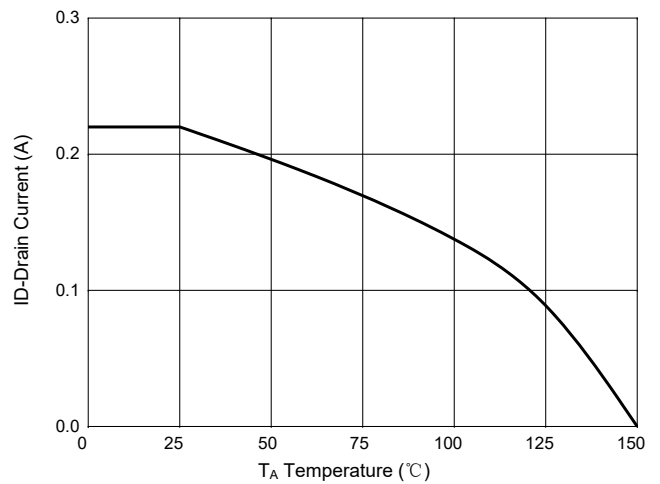
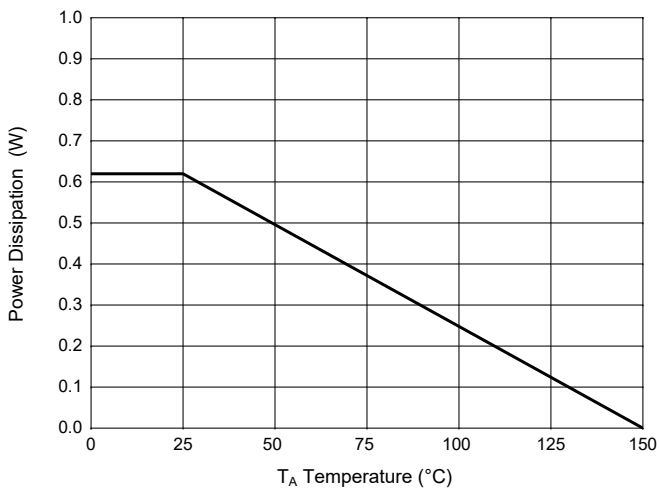


Fig.11-PD Dissipation



Curve Characteristics

Fig. 12 - Safe Operation Area

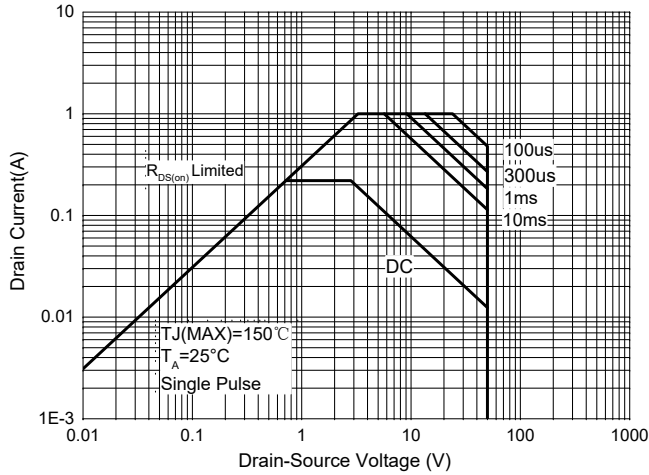
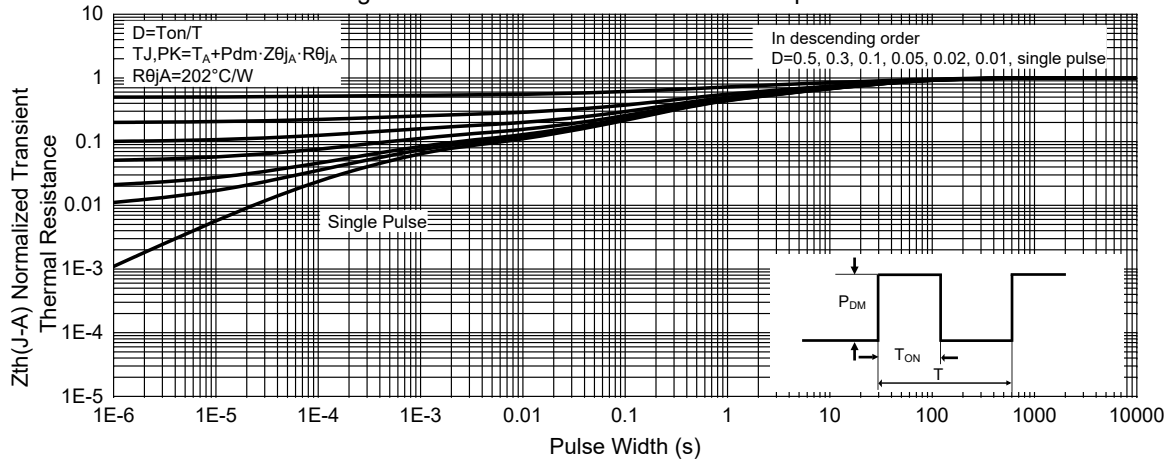


Fig. 13 - Normalized Transient Thermal Impedance



Ordering Information

| Device | Packing |
|----------------|----------------------|
| Part Number-TP | Tape&Reel:3Kpcs/Reel |

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