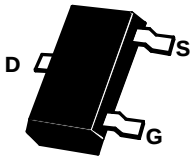
# SOT23 N-CHANNEL ENHANCEMENT MODE VERTICAL DMOS FET

**ISSUE 3 – MARCH 1996** ✪

# BSS138

PARTMARKING DETAIL – SS




SOT23

## ABSOLUTE MAXIMUM RATINGS.

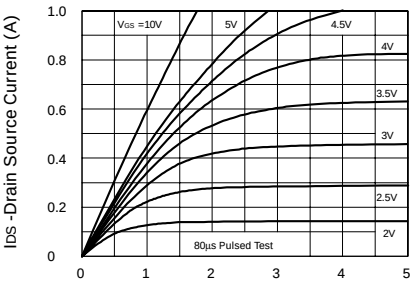
| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 50 | V |
| Continuous Drain Current at $T_{amb}$=25°C | $I_D$ | 200 | mA |
| Pulsed Drain Current | $I_{DM}$ | 800 | mA |
| Gate-Source Voltage | $V_{GS}$ | ± 20 | V |
| Power Dissipation at $T_{amb}$=25°C | $P_{tot}$ | 360 | mW |
| Operating and Storage Temperature Range | $T_j$:$T_{stg}$ | -55 to +150 | °C |

## ELECTRICAL CHARACTERISTICS (at $T_{amb}$ = 25°C unless otherwise stated).

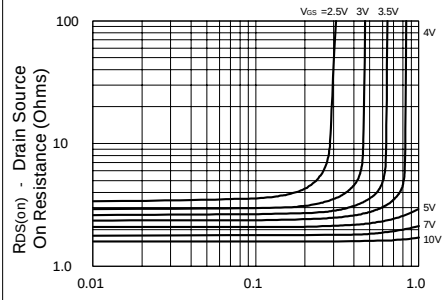
| PARAMETER | SYMBOL | MIN. | MIN. | MAX. | UNIT | CONDITIONS. |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 50 | | | V | $I_D$=0.25mA, $V_{GS}$=0V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | 0.5 | | 1.5 | V | $I_D$=1mA, $V_{DS}$= $V_{GS}$ |
| Gate-Body Leakage | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=± 20V, $V_{DS}$=0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | 0.5<br>5<br>100 | µA<br>µA<br>nA | $V_{DS}$=50V, $V_{GS}$=0<br>$V_{DS}$=50V, $V_{GS}$=0V, T=125°C(2)<br>$V_{DS}$=20V, $V_{GS}$=0 |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ | | | 3.5 | Ω | $V_{GS}$=5V,$I_D$=200mA |
| Forward Transconductance(1)(2) | $g_{fs}$ | 120 | | | mS | $V_{DS}$=25V,$I_D$=200mA |
| Input Capacitance (2) | $C_{iss}$ | | | 50 | pF | $V_{DS}$=25V, $V_{GS}$=0V, f=1MHz |
| Common Source Output Capacitance (2) | $C_{oss}$ | | | 25 | pF | |
| Reverse Transfer Capacitance (2) | $C_{rss}$ | | | 8 | pF | |
| Turn-On Delay Time (2)(3) | $t_{d(on)}$ | | 10 | | ns | $V_{DD}$≈30V, $I_D$=280mA |
| Rise Time (2)(3) | $t_r$ | | 10 | | ns | |
| Turn-Off Delay Time (2)(3) | $t_{d(off)}$ | | 15 | | ns | |
| Fall Time (2)(3) | $t_f$ | | 25 | | ns | |

(1) Measured under pulsed conditions. Width=300µs. Duty cycle ≤2% (2) Sample test.
(3) Switching times measured with 50Ω source impedance and <5ns rise time on a pulse generator

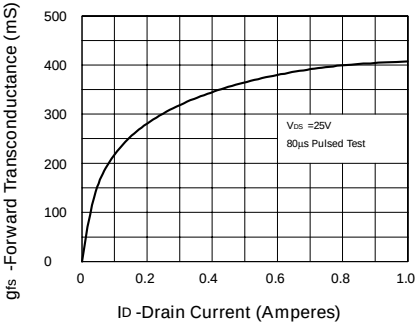
## TYPICAL CHARACTERISTICS



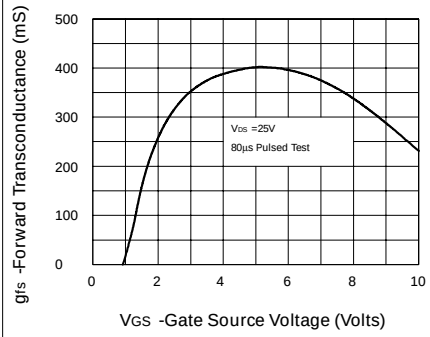

**Saturation Characteristics**



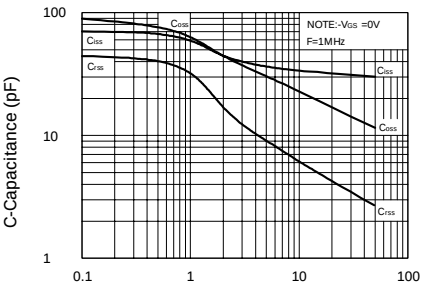

**Typical On Resistance vs. Drain Current**



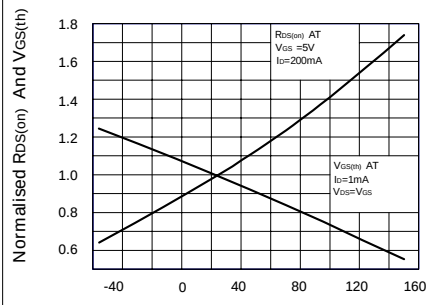

**Typical Transconductance vs. Drain Current**




**Typical Transconductance vs. Gate - Source Voltage**




**Typical Capacitance vs. Drain - Source Voltage**




**Normalised RDS(on) And VGS(th) vs. Temperature**

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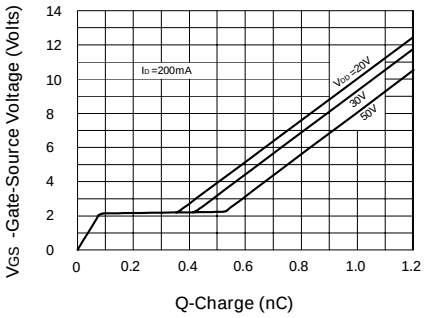
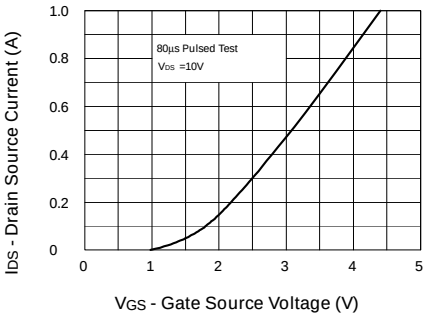
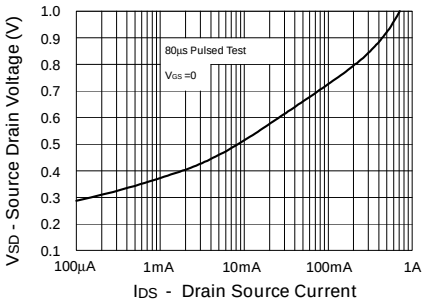
## TYPICAL CHARACTERISTICS




**Typical Gate Charge vs. Gate-Source Voltage**




**Typical Transfer Characteristics**




**Typical Diode Forward Voltage**