# BSS139

## 50V/0.2A N Channel Advanced Power MOSFET

**Features**

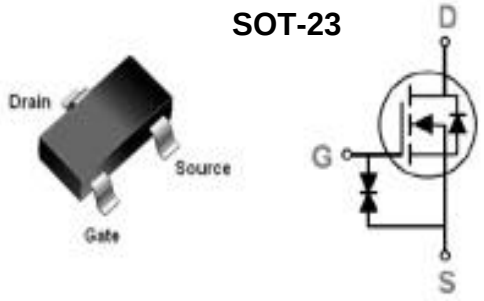
- *Low $R_{DS(on)}$ @$V_{GS}$=10V*
- *3.3V Logic Level Control*
- *N Channel SOT23 Package*
- *Pb−Free, RoHS Compliant*

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ Typ | $I_D$ Max |
|---|---|---|
| 50V | 1.3Ω @ 10V | 0.2A |
| | 1.5Ω @ 5.0V | |

**Applications**

- *LED Lighting Application,*
- *ON/OFF switch*
- *Networking*
- *ESD Protected：2000V*

**SOT-23**




**Absolute Maximum Ratings**

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| **Common Ratings ($T_A$=25°C Unless Otherwise Noted)** | | | | |
| $V_{GS}$ | Gate-Source Voltage | | ±20 | V |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | | 50 | V |
| $T_J$ | Maximum Junction Temperature | | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -50 to 150 | °C |
| Mounted on Large Heat Sink | | | | |
| $I_{DM}$ | Pulse Drain Current Tested① | $T_A$=25°C | 0.8 | A |
| $I_D$ | Continuous Drain Current | $T_A$=25°C | 0.2 | A |
| | | $T_A$=70°C | 0.12 | |
| $P_D$ | Maximum Power Dissipation | $T_A$=25°C | 0.225 | W |
| | | $T_A$=70°C | 0.15 | |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | | 550 | °C/W |

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## 50V/0.2A N Channel Advanced Power MOSFET

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V $I_D$=250μA | 50 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current($T_A$=25℃) | $V_{DS}$=25V, $V_{GS}$=0V | -- | -- | 0.1 | μA |
| | Zero Gate Voltage Drain Current($T_A$=25℃) | $V_{DS}$=50V, $V_{GS}$=0V | -- | -- | 0.5 | uA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | -- | -- | ±10 | uA |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.5 | 1.0 | 1.5 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance② | $V_{GS}$=10V, $I_D$=0.5A | -- | 1.3 | 2 | Ω |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance② | $V_{GS}$=5.0V, $I_D$=0.2A | -- | 1.5 | 3.5 | Ω |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance② | $V_{GS}$=2.7V, $I_D$=0.2A | -- | 5.0 | 10 | Ω |
| **Dynamic Electrical Characteristics @ $T_J$ = 25°C (unless otherwise stated)** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=25V, $V_{GS}$=0V, f=1MHz | -- | 22.8 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 3.5 | -- | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 2.9 | -- | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=25V $I_D$=0.5A, $V_{GS}$=10V | -- | 0.91 | -- | nC |
| $Q_{gs}$ | Gate Source Charge | | -- | 0.18 | -- | nC |
| $Q_{gd}$ | Gate Drain Charge | | -- | 0.3 | -- | nC |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn on Delay Time | $V_{DD}$=30V, $I_D$=0.5A, $R_G$=25Ω, $V_{GS}$=10V | -- | 3.8 | -- | ns |
| $t_r$ | Turn on Rise Time | | -- | 2.5 | -- | ns |
| $t_{d(off)}$ | Turn Off Delay Time | | - | 19 | -- | ns |
| $t_f$ | Turn Off Fall Time | | -- | 3.9 | -- | ns |
| **Source Drain Diode Characteristics** | | | | | | |
| $I_{SD}$ | Source drain current(Body Diode) | $T_A$=25℃ | -- | -- | 0.2 | A |
| $V_{SD}$ | Forward on voltage② | $T_j$=25℃, $I_{SD}$=0.5A, $V_{GS}$=0V | -- | 0.78 | 1.2 | V |

Notes:

① Pulse width limited by maximum allowable junction temperature

②Pulse test ; Pulse width≤300μs, duty cycle≤2%.

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**50V/0.2A N Channel Advanced Power MOSFET**

## Typical Characteristics

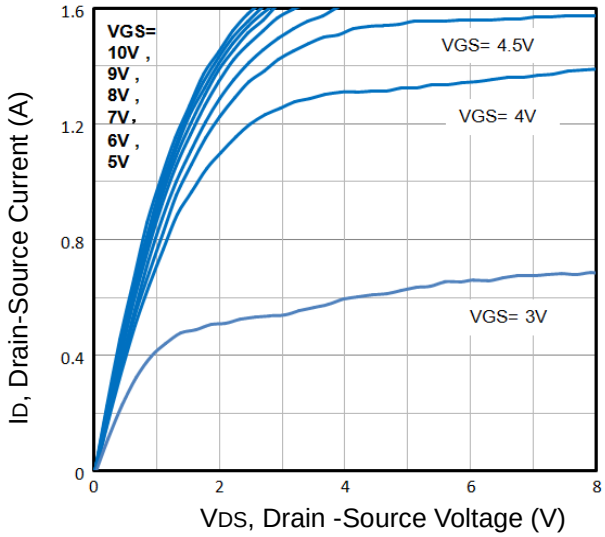


**Fig1.** Typical Output Characteristics

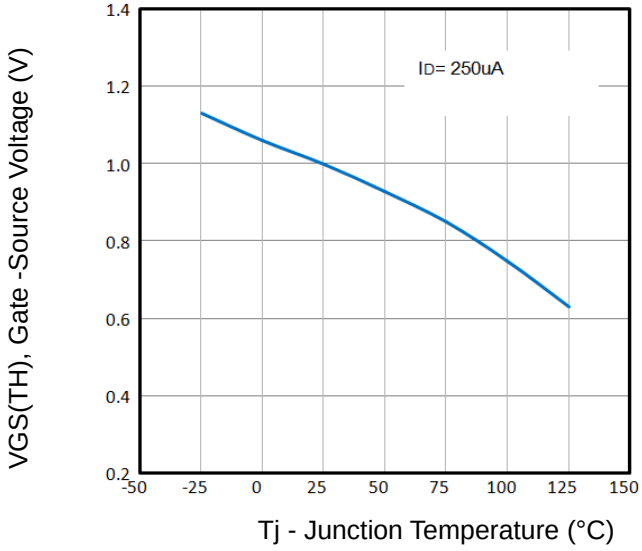


**Fig2.** Normalized Threshold Voltage Vs. Temperature

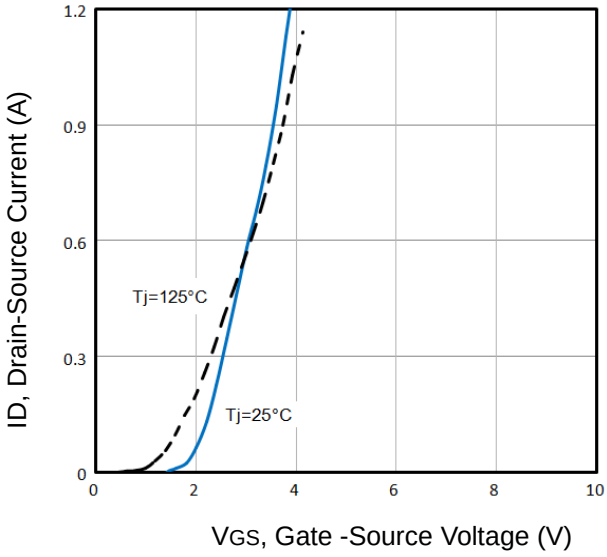


**Fig3.** Typical Transfer Characteristics

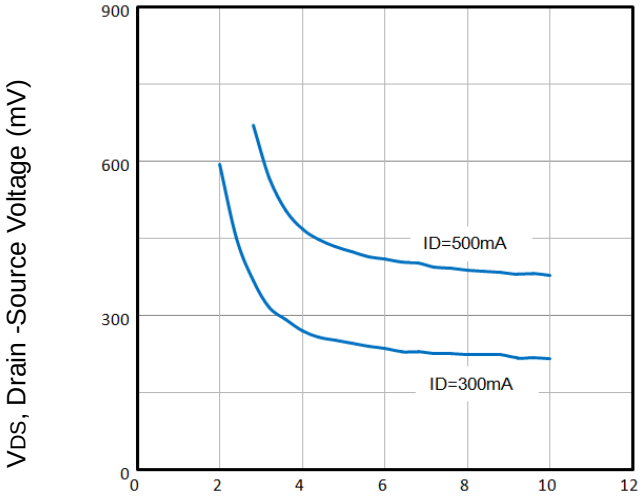


**Fig4.** Drain -Source Voltage vs Gate -Source Voltage

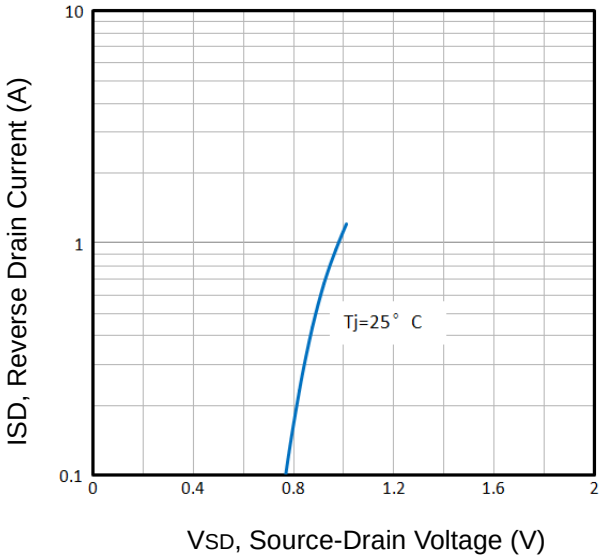


**Fig5.** Typical Source-Drain Diode Forward Voltage

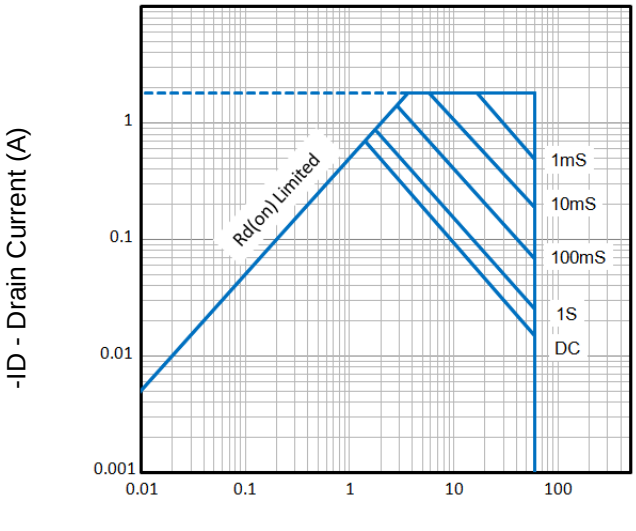


**Fig6.** Maximum Safe Operating Area

## Typical Characteristics

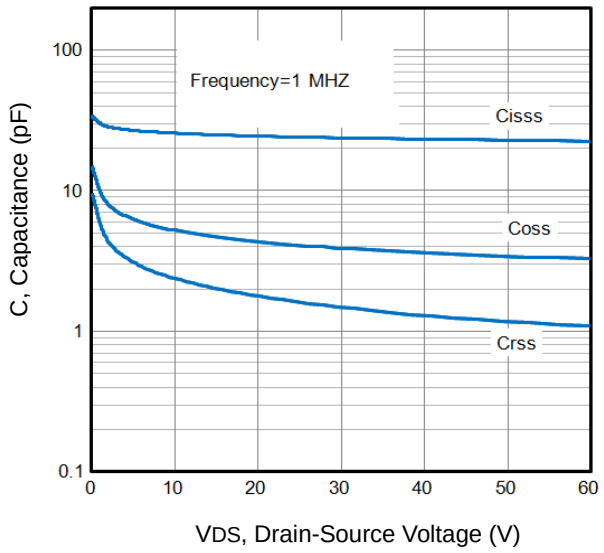


**Fig7.** Typical Capacitance Vs. Drain-Source Voltage

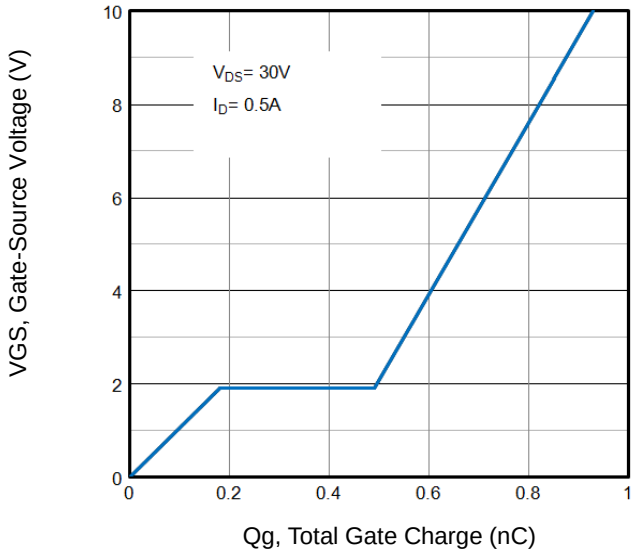


**Fig8.** Typical Gate Charge Vs. Gate-Source Voltage

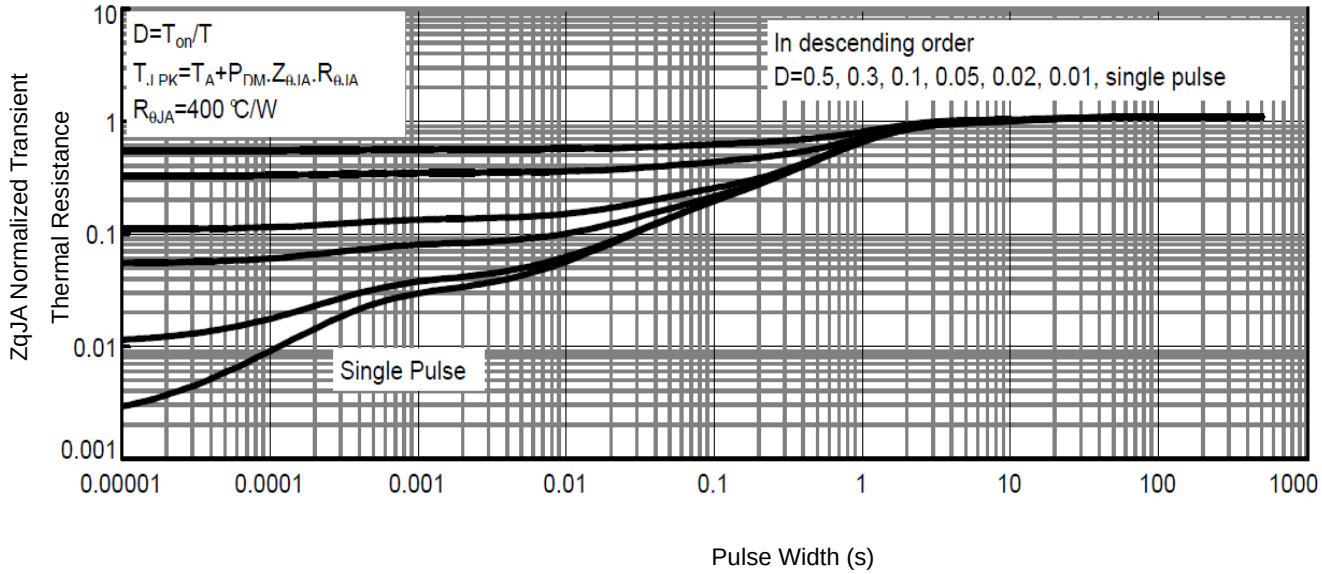


**Fig9.** Normalized Maximum Transient Thermal Impedance

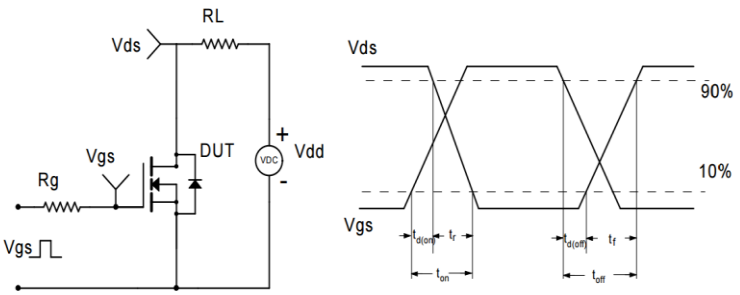


**Fig10.** Switching Time Test Circuit and waveforms

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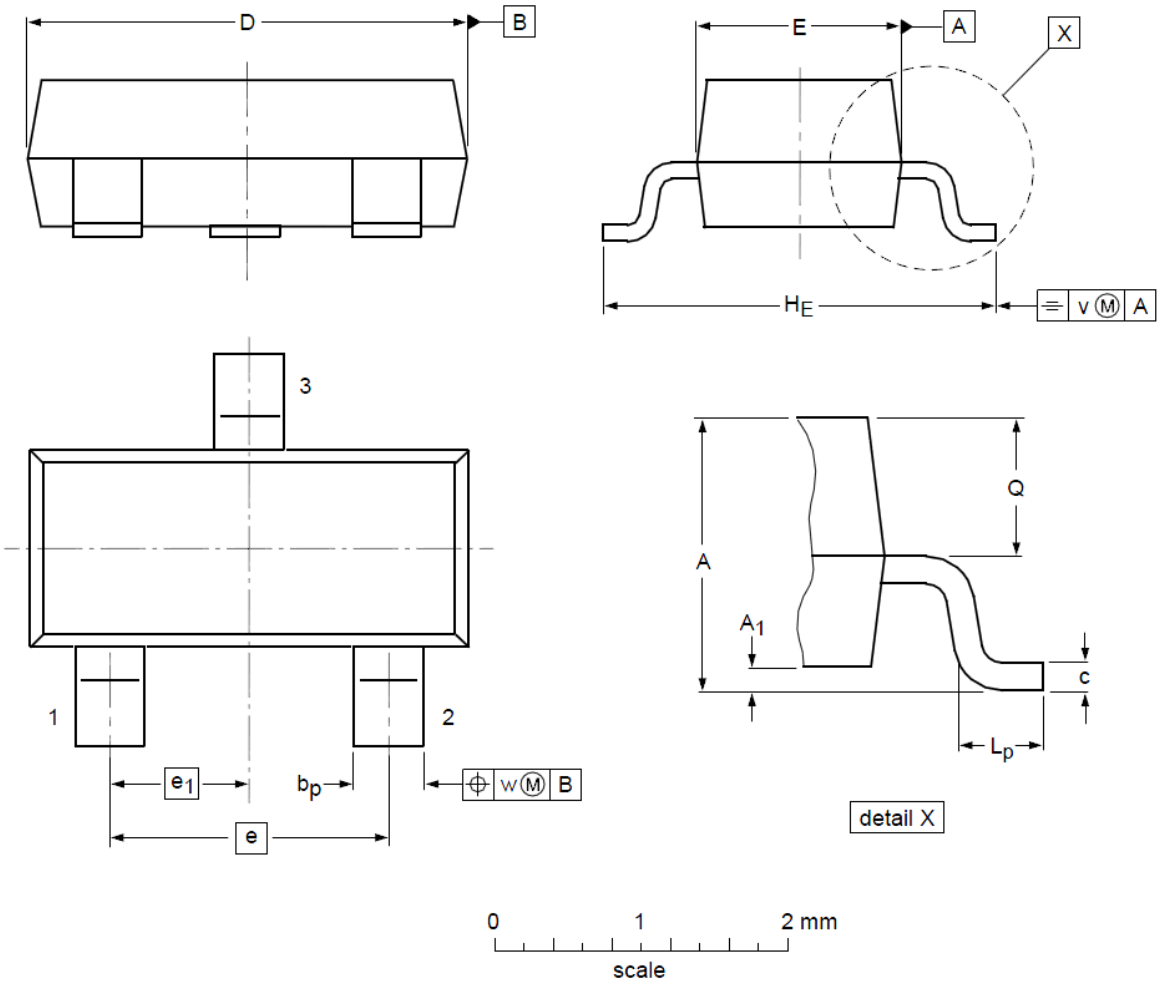
## SOT23 Mechanical Data




**DIMENSIONS** ( unit : mm )

| Symbol | Min | Typ | Max | Symbol | Min | Typ | Max |
|---|---|---|---|---|---|---|---|
| **A** | 0.90 | 1.01 | 1.15 | **$A_1$** | 0.01 | 0.05 | 0.10 |
| **$b_p$** | 0.30 | 0.42 | 0.50 | **c** | 0.08 | 0.13 | 0.15 |
| **D** | 2.80 | 2.92 | 3.00 | **E** | 1.20 | 1.33 | 1.40 |
| **e** | -- | 1.90 | -- | **$e_1$** | -- | 0.95 | -- |
| **$H_E$** | 2.25 | 2.40 | 2.55 | **$L_p$** | 0.30 | 0.42 | 0.50 |
| **Q** | 0.45 | 0.49 | 0.55 | **v** | -- | 0.20 | -- |
| **w** | -- | 0.10 | -- | | | | |

## Order Information

| Product | Package | Marking | Packing | Min Unit Quantity |
|---|---|---|---|---|
| BSS139 | SOT23 | J2 | 3000PCS/Reel | 3000PCS |