# N-Channel 100 V (D-S) MOSFET

## PRODUCT SUMMARY

| | |
|---|---|
| $BV_{DSS}$ | 100V |
| $R_{DSON(MAX.)}$ | 0.0115Ω |
| $I_D$ | 70A |

### FEATURES

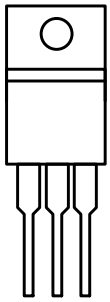
- SGT technology power supply Power MOSFET
- 100 % $R_g$ and UIS Tested

RoHS COMPLIANT

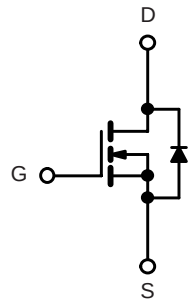
### APPLICATIONS

- Battery protection
- Load switch
- Uninterruptible power supply

**TO-220AB**



G D S
Top View




N-Channel MOSFET

## Absolute Maximum Ratings ($T_C$ = 25 °C, unless otherwise noted)

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current@10V | $T_C$ = 25 °C | $I_D$ | 70 | A |
| | $T_C$ = 100 °C | | 45 | |
| Pulsed Drain Current | | $I_{DM}$ | 280 | A |
| Single Pulse Avalanche Energy | L = 0.1 mH | $E_{AS}$ | 110 | mJ |
| Total Power Dissipation | $T_C$ = 25 °C | $P_D$ | 100 | W |
| Operating Junction and Storage Temperature Range | | $T_J$ , $T_{STG}$ | -55 to +150 | °C |

## Thermal Characteristics

| Parameter | Symbol | TYP. | MAX. | Unit |
|---|---|---|---|---|
| Thermal resistance, junction-to-ambient | $R_{\theta JA}$ | - | 64 | °C / W |
| Thermal resistance, junction-to-case | $R_{\theta JC}$ | - | 1.25 | |

## Electrical Characteristics $T_J$ = 25°C, unless otherwise noted

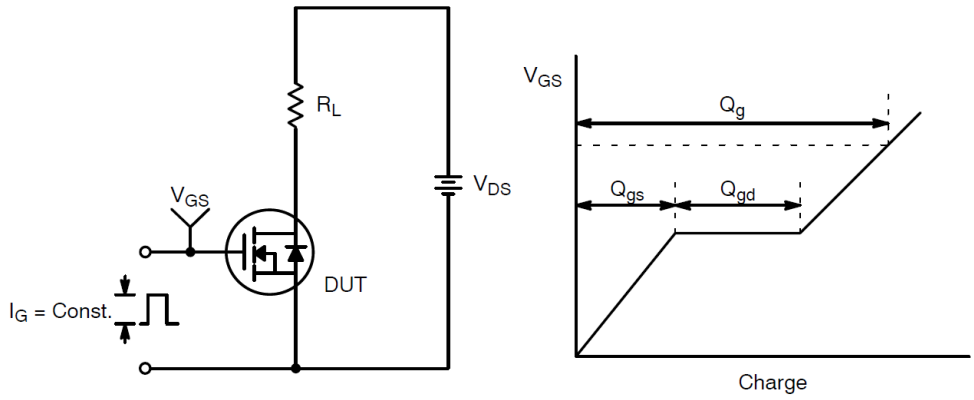
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V , $I_D$ = 250 µA | 100 | - | - | V |
| Gate-body Leakage current | $I_{GSS}$ | $V_{DS}$ = 0 V , $V_{GS}$ = ± 20 V | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 100 V , $V_{GS}$ = 0 V , $T_J$ = 25 °C | - | - | 1 | µA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$ , $I_D$ = 250 µA | 1.2 | | 2.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10 V , $I_D$ = 20 A | - | 0.0095 | 0.0105 | Ω |
| | | $V_{GS}$ = 4.5 V , $I_D$ = 15 A | - | 0.012 | 0.016 | |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 50 V , $V_{GS}$ = 0 V , f = 1 MHz | - | 1370 | - | pF |
| Output Capacitance | **Coss** | | - | 453 | - | |
| Reverse Transfer Capacitance | **Crss** | | - | 13.1 | - | |
| **Switching Characteristics** | | | | | | |
| Gate Resistance | $R_g$ | f = 1 MHz | - | 0.48 | - | Ω |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 50 V , $V_{GS}$ = 10 V , $I_D$ = 10 A | - | 31.5 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 3.51 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 7.65 | - | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 50 V , $I_D$ ≅ 50 A , $V_{GEN}$ = 10 V , $R_G$ = 4 Ω | - | 18 | - | nS |
| Rise Time | $t_r$ | | - | 12 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 42 | - | |
| Fall Time | $t_f$ | | - | 8 | - | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = 10 A , $V_{GS}$ = 0 V | - | - | 1.2 | V |
| Continuous Source-Dranin Diode Current | $I_S$ | $T_J$ = 25 °C | - | - | 70 | A |
| Reverse Recovery Charge | $Q_{rr}$ | $T_J$ = 25 °C , $I_F$ = 10 A , dI/dt = 100 A/µs | - | 189 | - | nC |
| Reverse Recovery Time | $t_{rr}$ | | - | 105 | - | ns |

**Notes:**

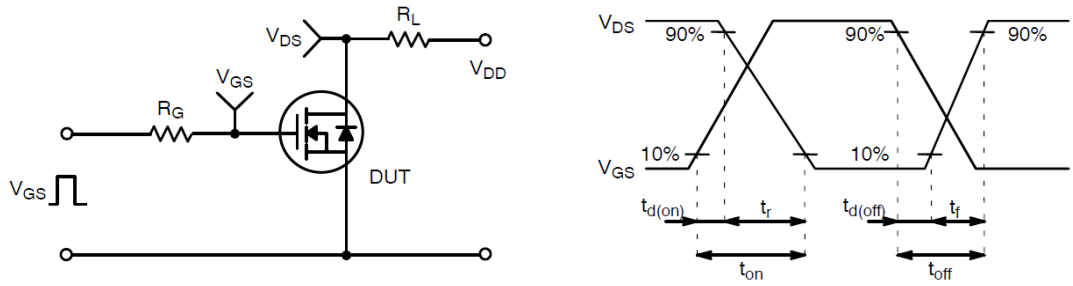
a. Repetitive rating; pulse width limited by maximum junction temperature

b. $V_{DD}$=50V, L=0.3mH, $R_G$=25Ω, Starting $T_J$=25 °C

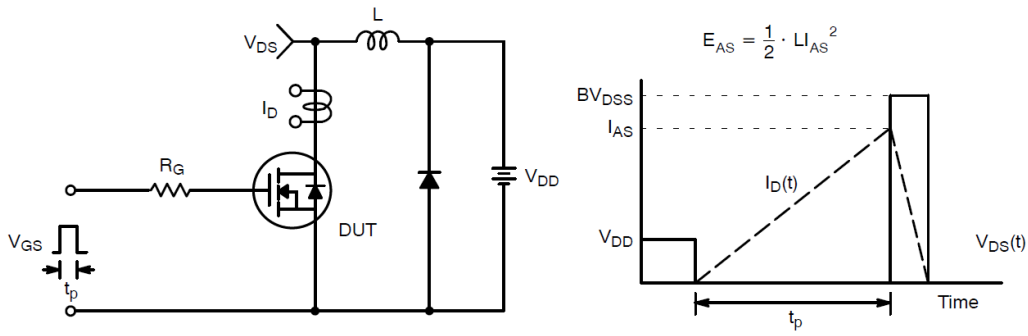
**Test circuit and Waveform**




**Gate Charge Test Circuit & Waveform**

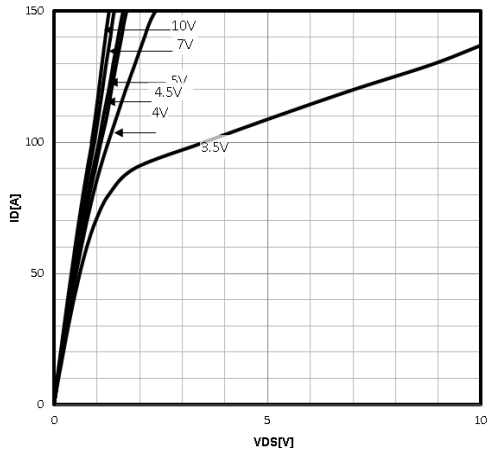



**Resistive Switching Test Circuit & Waveforms**



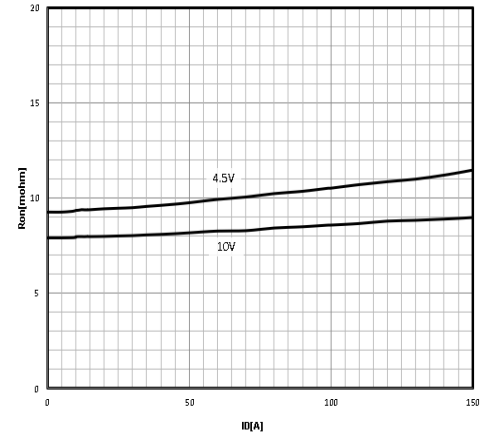

**Unclamped Inductive Switching Test Circuit & Waveforms**

**TYPICAL CHARACTERISTICS** (25 °C unless noted)



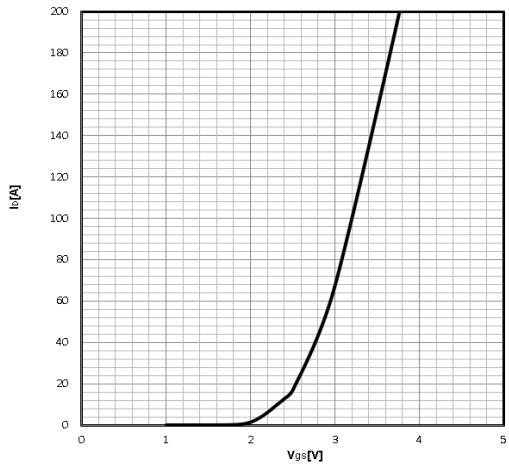

$I_D=f(V_{DS})$

**Typ. output characteristics**



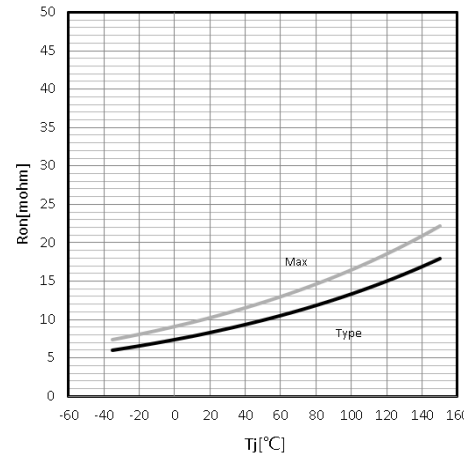

$R_{DS(on)}=f(I_D)$

**Typ. drain-source on resistance**



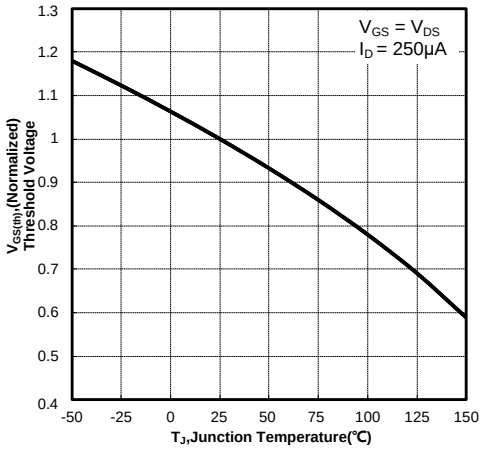

$I_D=f(V_{GS})$

**Typ. transfer characteristics**



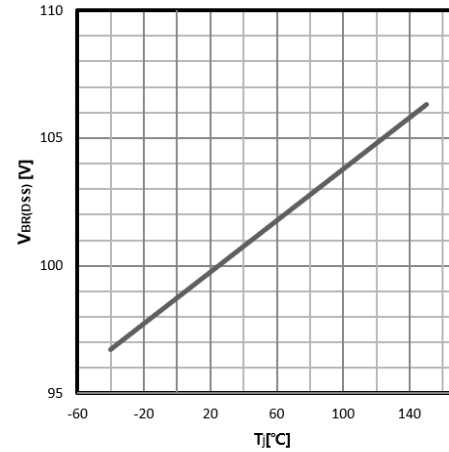

$R_{DS(on)}=f(T_J;I_D=20A;\ V_{GS}=10V$

**Drain-source on-state resistance**




$V_{TH}=f(T_J);\ I_D=250uA$

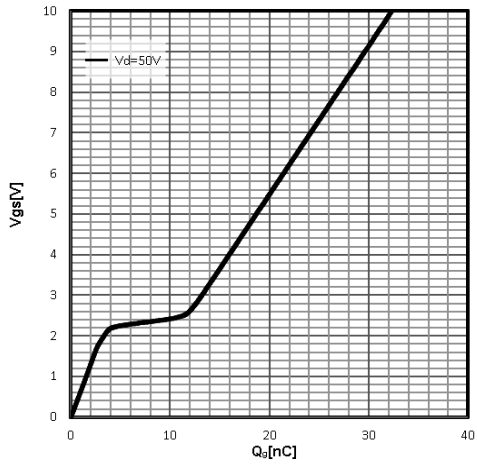
**Gate Threshold Voltage**




$V_{BR(DSS)}=f(T_J);\ I_D=250uA$

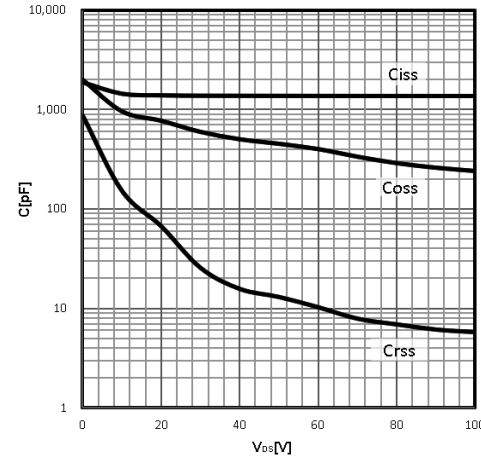
**Drain-source breakdown voltage**

**TYPICAL CHARACTERISTICS** (25 °C unless noted)



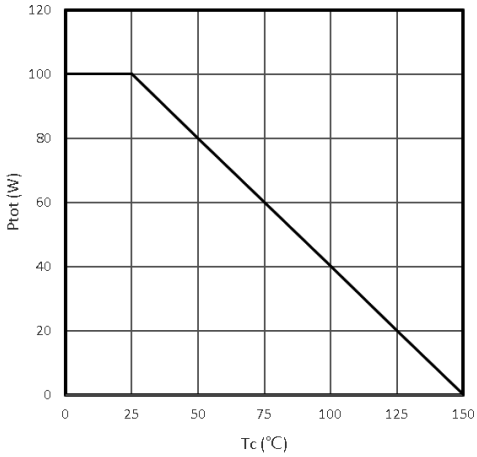

$V_{GS}$=f(Qg) ; $I_D$=10A

**Typ. gate charge**



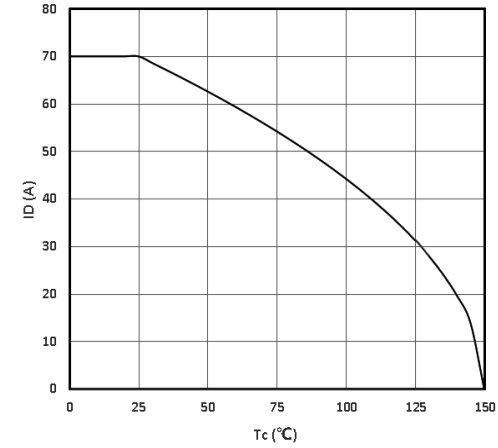

C =f($V_{DS}$); $V_{GS}$=0V; f =1MHz

**Typ. capacitances**



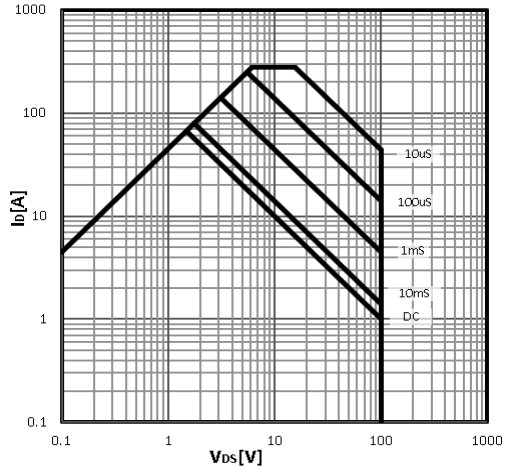

$P_{tot}$=f($T_C$)

**Power Dissipation**



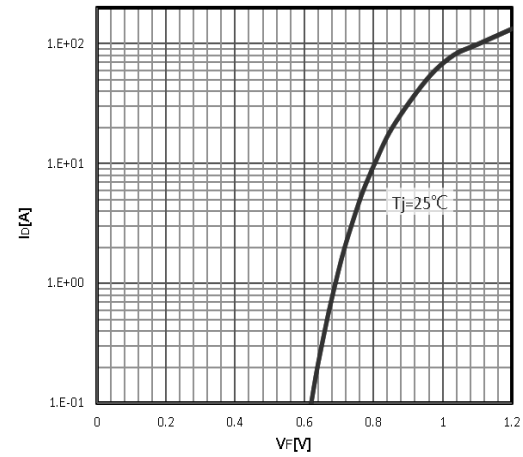

$I_D$=f($T_C$)

**Maximum Drain Current**




$I_D$=f($V_{DS}$)

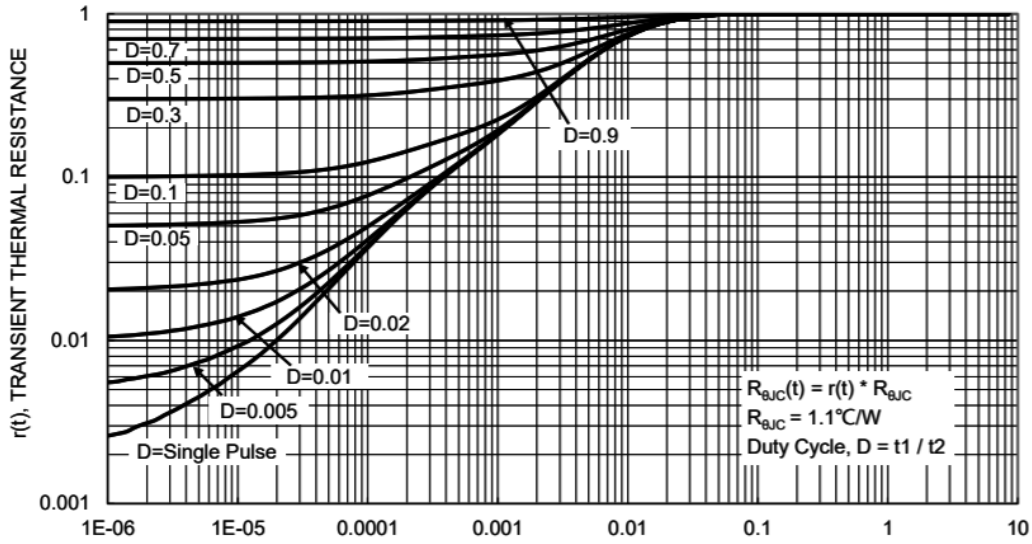
**Safe operating area**




$I_F$=f($V_{GS}$)

**Body Diode Forward Voltage Variation**

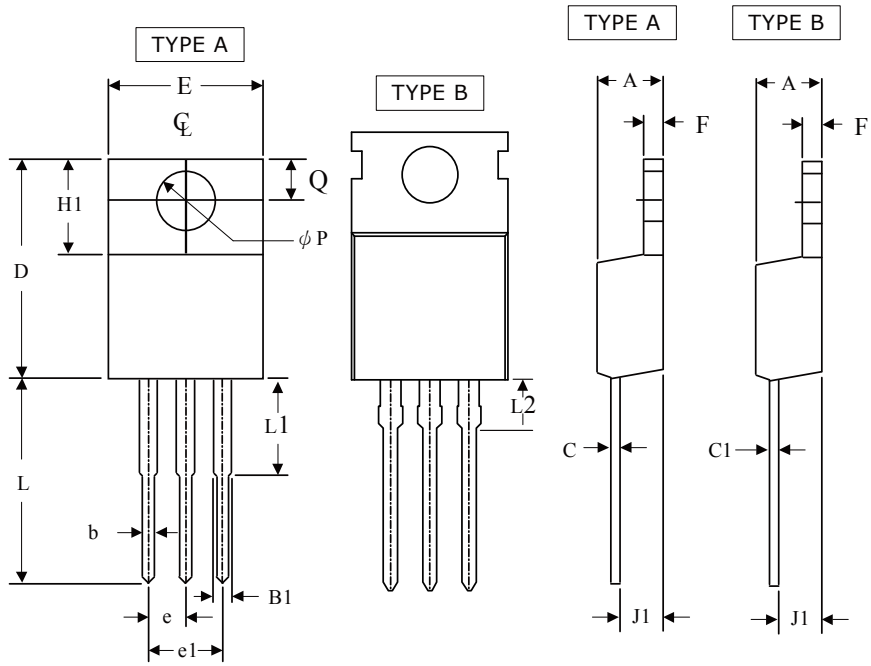
**TYPICAL CHARACTERISTICS** (25 °C unless noted)




$Z_{thJC}=f(t_p)$

**Max. transient thermal impedance**

**TO-220 _ PACKGE OUTLIN**




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 4.320 | 4.826 | 0.170 | 0.190 |
| B1 | 1.143 | 1.778 | 0.045 | 0.070 |
| b | 0.610 | 0.910 | 0.024 | 0.036 |
| c | 0.356 | 0.530 | 0.014 | 0.021 |
| c1 | 0.45 | 0.61 | 0.018 | 0.024 |
| D | 14.224 | 16.510 | 0.560 | 0.650 |
| E | 9.652 | 10.668 | 0.380 | 0.420 |
| e | 2.540 BSC | | 0.100 BSC | |
| e1 | 5.080 BSC | | 0.200 BSC | |
| F | 1.220 | 1.397 | 0.048 | 0.055 |
| H1 | 5.842 | 6.858 | 0.230 | 0.270 |
| J1 | 2.032 | 2.921 | 0.080 | 0.115 |
| L | 12.700 | 14.732 | 0.500 | 0.580 |
| L1 | 3.400 | 4.000 | 0.134 | 0.150 |
| L2 | 2.70 | 3.20 | 0.106 | 0.126 |
| ϕ P | 3.530 | 4.090 | 0.139 | 0.161 |
| Q | 2.540 | 3.429 | 0.100 | 0.135 |