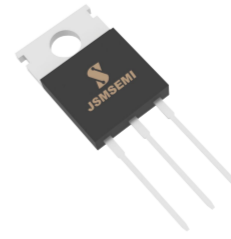


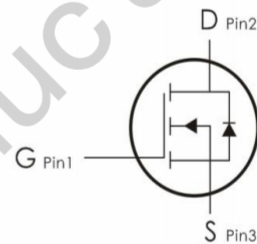
Description:

This N-Channel MOSFET uses advanced SGT technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety of applications.


TO-220

Features:

- 1) $V_{DS}=100V, I_D=40A, R_{DS(ON)}<20m\ \Omega$ @ $V_{GS}=10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low $R_{DS(ON)}$.
- 5) Excellent package for good heat dissipation.



Absolute Maximum Ratings: ($T_C=25^\circ C$ unless otherwise noted)

| Symbol | Parameter | Ratings | Units |
|----------------|---|-------------|------------|
| V_{DS} | Drain-Source Voltage | 100 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current ¹⁾ , $T_C=25^\circ C$ | 40 | A |
| $I_{D, pulse}$ | Pulsed drain current ²⁾ , $T_C=25^\circ C$ | 98 | A |
| P_D | Power dissipation ³⁾ , $T_C=25^\circ C$ | 96 | W |
| E_{AS} | Single pulsed avalanche energy ⁵⁾ | 65 | mJ |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to +150 | $^\circ C$ |

Thermal Characteristics:

| Symbol | Parameter | Max | Units |
|-----------------|---|-----|--------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 1.3 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient ⁴⁾ | 62 | |

Electrical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|------------------------------------|---|-----|------|-----------|---------------|
| Off Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\ \mu\text{A}$ | 100 | --- | --- | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{GS}=0V, V_{DS}=100V$ | --- | --- | 1 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0A$ | --- | --- | ± 100 | nA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | GATE-Source Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$ | 1.4 | --- | 2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance | $V_{GS}=10V, I_D=10A$ | --- | 13.8 | 20 | m Ω |
| | | $V_{GS}=4.5V, I_D=7A$ | --- | 17.4 | 26 | |
| Dynamic Characteristics | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=50V, V_{GS}=0V,$ $f=100\text{KHz}$ | --- | 1000 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 180 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 9.5 | --- | |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS}=50V, I_D=5A,$ $V_{GS}=10V, R_G=10\Omega$ | --- | 16.6 | -- | ns |
| t_r | Rise Time | | --- | 3.8 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 75.5 | --- | ns |
| t_f | Fall Time | | --- | 46 | --- | ns |
| Q_g | Total Gate Charge | $V_{GS}=10V, V_{DS}=50V,$ $I_D=5A$ | --- | 16.2 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 2.8 | --- | nC |
| Q_{gd} | Gate-Drain Charge | | --- | 4.1 | --- | nC |
| $V_{plateau}$ | Gate plateau voltage | | --- | 3 | --- | V |
| Drain-Source Diode Characteristics | | | | | | |
| V_{SD} | Source-Drain Diode Forward Voltage | $V_{GS}=0V, I_S=12A$ | --- | --- | 1.3 | V |
| t_{rr} | Reverse Recovery Time | $V_R=50V, I_S=5A,$ $di/dt=100\text{A}/\mu\text{s}$ | --- | 49 | --- | Ns |
| q_{rr} | Reverse Recovery Charge | | --- | 61.8 | --- | nc |
| I_{rmm} | Peak reverse recovery current | | --- | 2.4 | --- | A |

Notes:

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a=25^\circ\text{C}$.
- 5) $V_{DD}=50\text{ V}, V_{GS}=10\text{ V}, L=0.3\text{ mH}$, starting $T_j=25^\circ\text{C}$.

Typical Characteristics: ($T_c=25^\circ\text{C}$ unless otherwise noted)

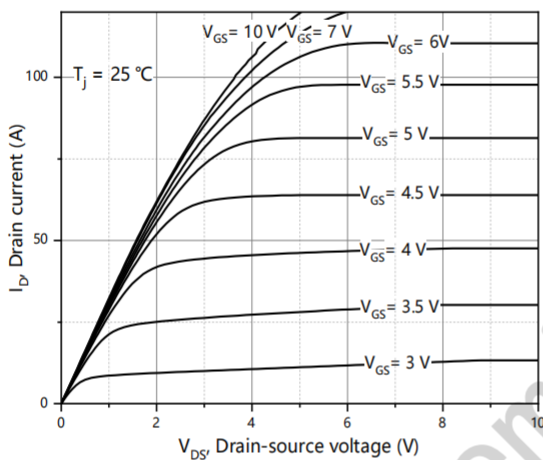


Figure 1. Typ. output characteristics

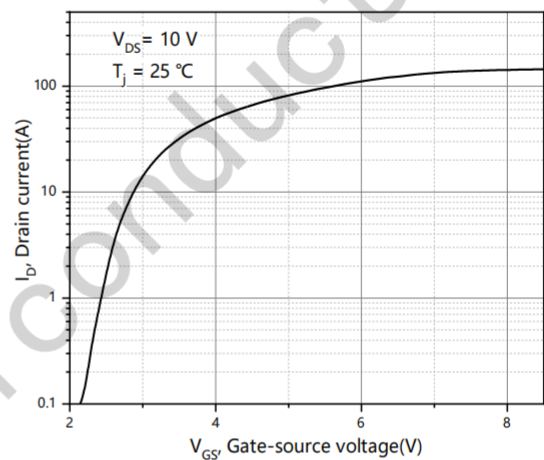


Figure 2. Typ. transfer characteristics

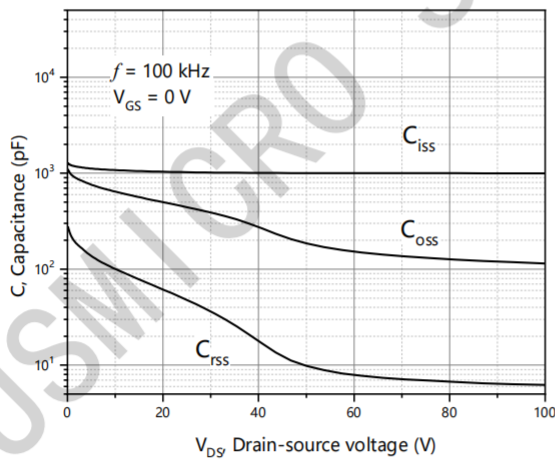


Figure 3. Typ. capacitances

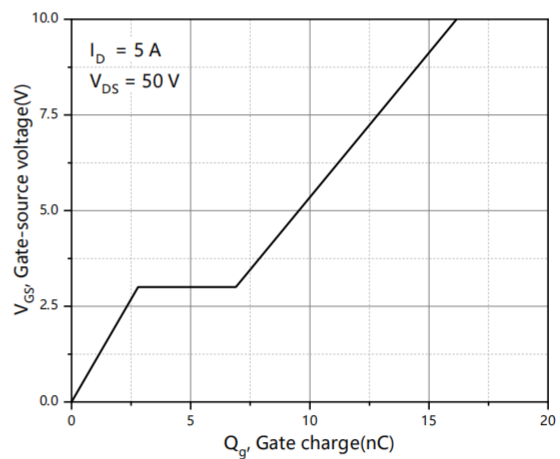


Figure 4. Typ. gate charge

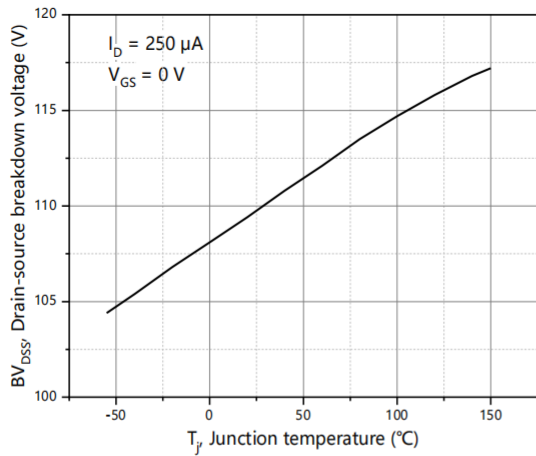


Figure 5. Drain-source breakdown voltage

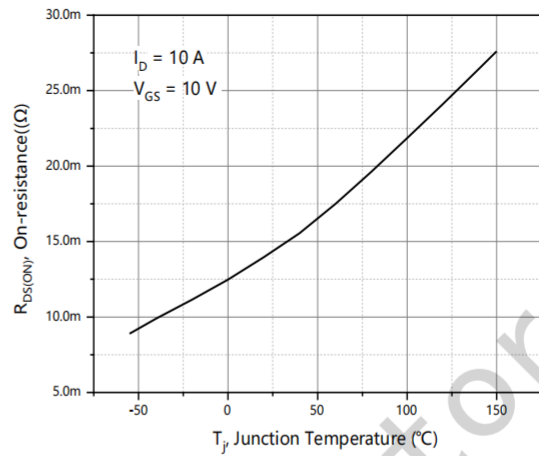


Figure 6. Drain-source on-state resistance

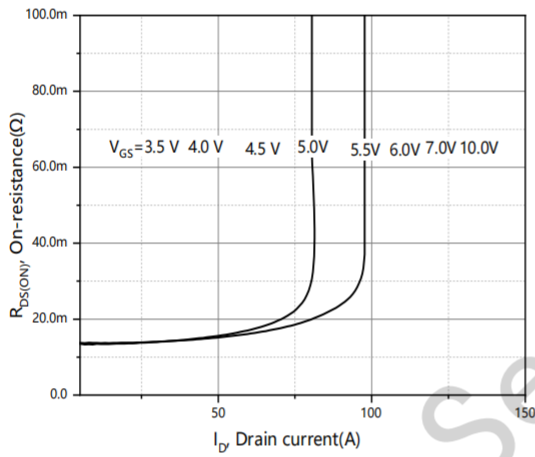


Figure 7. Drain-source on-state resistance

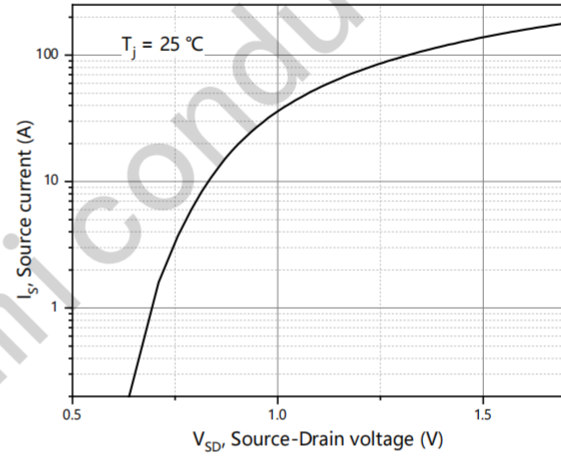


Figure 8. Forward characteristic of body diode

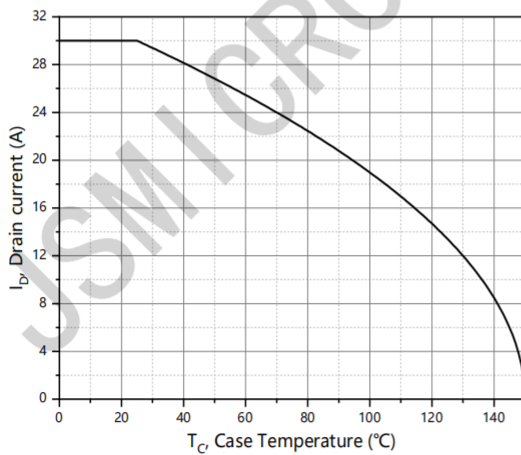


Figure 9. Drain current

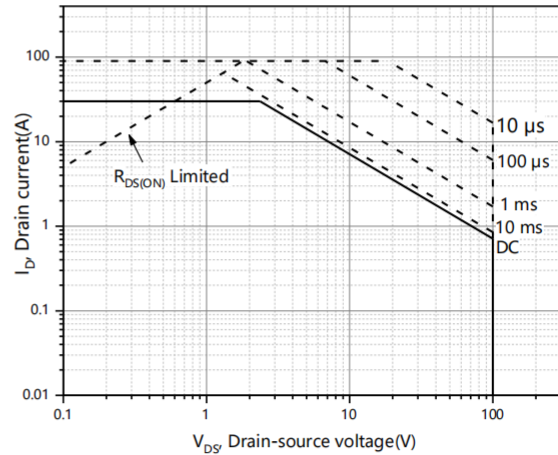
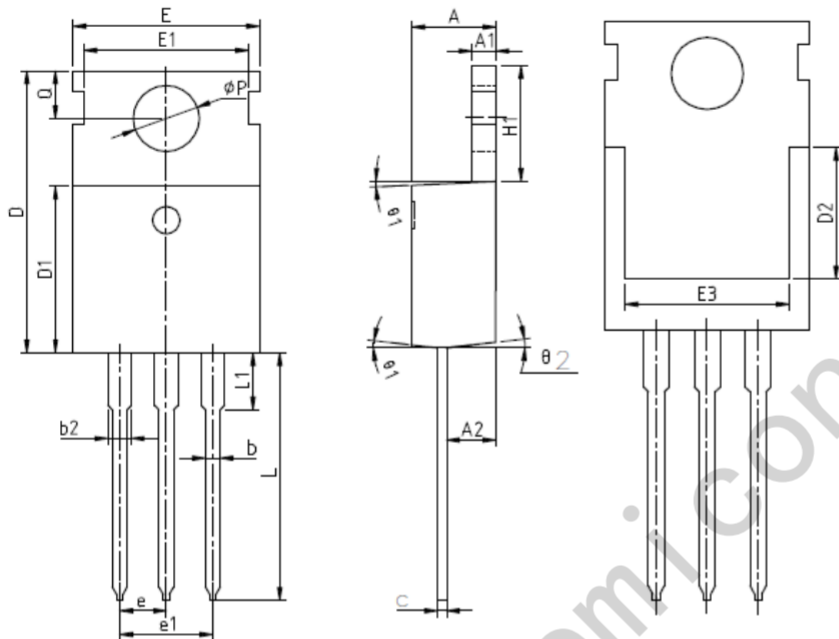


Figure 10. Safe operation area $T_C=25\text{ }^\circ\text{C}$

Package Information

TO-220



| SYMBOL | MIN | NOM | MAX |
|------------|----------|-------|-------|
| A | 4.27 | 4.57 | 4.87 |
| A1 | 1.15 | 1.30 | 1.45 |
| A2 | 2.10 | 2.40 | 2.70 |
| b | 0.70 | 0.80 | 1.00 |
| b2 | 1.17 | 1.27 | 1.50 |
| c | 0.40 | 0.50 | 0.65 |
| D | 15.10 | 15.60 | 16.10 |
| D1 | 8.80 | 9.10 | 9.40 |
| D2 | 5.70 | 6.70 | 7.00 |
| E | 9.70 | 10.00 | 10.30 |
| E1 | - | 8.70 | - |
| E2 | 9.65 | 10.00 | 10.35 |
| E3 | 7.00 | 8.00 | 8.40 |
| e | 2.54 BSC | | |
| e1 | 5.08 BSC | | |
| H1 | 6.00 | 6.50 | 6.85 |
| L | 12.75 | 13.50 | 13.90 |
| L1 | - | 3.10 | 3.40 |
| ϕP | 3.45 | 3.60 | 3.75 |
| Q | 2.60 | 2.80 | 3.00 |
| $\theta 1$ | 4° | 7° | 10° |
| $\theta 2$ | 0° | 3° | 6° |

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