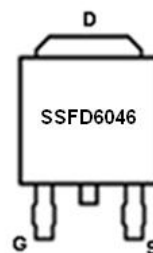


Main Product Characteristics:

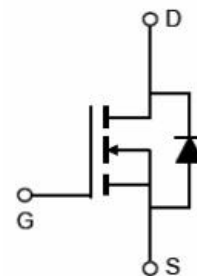
| | |
|--------------|---------------------|
| V_{DSS} | 60V |
| $R_{DS(on)}$ | 25m Ω (typ.) |
| I_D | 20A |



TO-252 (DPAK)



Marking and Pin Assignments



Schematic Diagram

Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- AEC-Q101 qualified


Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute Max Rating:

| Symbol | Parameter | Max. | Units |
|--------------------------------|---|-------------|------------------|
| $I_D @ T_C = 25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10\text{V}$ ① | 20 | A |
| I_{DM} | Pulsed Drain Current② | 80 | |
| $P_D @ T_C = 25^\circ\text{C}$ | Power Dissipation③ | 23 | W |
| V_{DS} | Drain-Source Voltage | 60 | V |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulse Avalanche Energy @ $L=0.5\text{mH}$ | 34 | mJ |
| $T_J \quad T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |

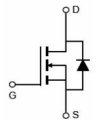
Thermal Resistance

| Symbol | Characteristics | Typ. | Max. | Units |
|-----------------|-------------------------------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-case ^③ | — | 5.4 | °C/W |

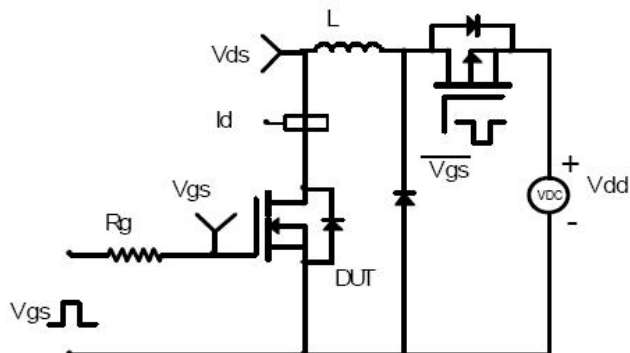
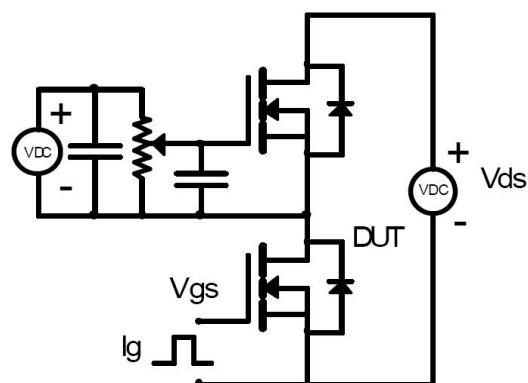
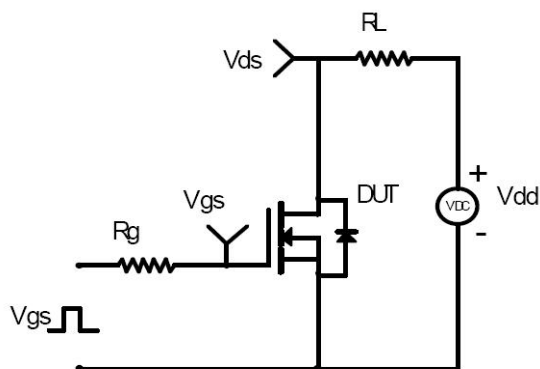
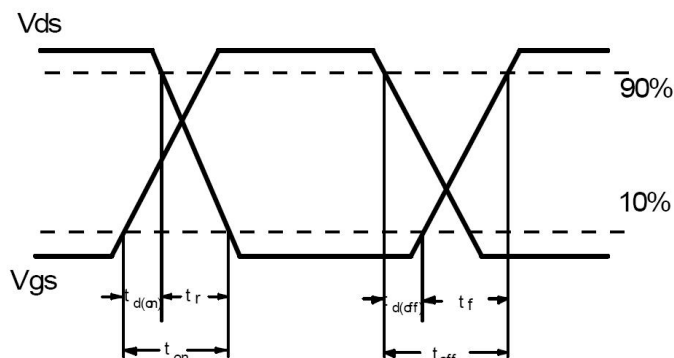
Electrical Characteristics @ $T_A=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------|--------------------------------------|------|------|------|------------|---|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | 60 | — | — | V | $V_{GS} = 0V, I_D = 250\mu A$ |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 25 | 35 | m Ω | $V_{GS}=10V, I_D=4.5A$ |
| | | — | 31 | 45 | | $V_{GS}=4.5V, I_D=3A$ |
| $V_{GS(th)}$ | Gate threshold voltage | 1 | — | 3 | V | $V_{DS} = V_{GS}, I_D = 250\mu A$ |
| I_{DSS} | Drain-to-Source leakage current | — | — | 1 | μA | $V_{DS} = 60V, V_{GS} = 0V$ |
| I_{GSS} | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS} = 20V$ |
| | | — | — | -100 | | $V_{GS} = -20V$ |
| Q_g | Total gate charge | — | 20 | — | nC | $I_D = 10A,$ $V_{DS}=30V,$ $V_{GS} = 10V$ |
| Q_{gs} | Gate-to-Source charge | — | 3.5 | — | | |
| Q_{gd} | Gate-to-Drain("Miller") charge | — | 5 | — | | |
| $t_{d(on)}$ | Turn-on delay time | — | 7.6 | — | ns | $V_{GS}=10V, V_{DS}=30V,$ $R_{GEN}=3\Omega$ $I_D = 20A$ |
| t_r | Rise time | — | 22 | — | | |
| $t_{d(off)}$ | Turn-Off delay time | — | 21 | — | | |
| t_f | Fall time | — | 3 | — | | |
| C_{iss} | Input capacitance | — | 818 | — | pF | $V_{GS} = 0V$ $V_{DS} = 50V$ $f = 1MHz$ |
| C_{oss} | Output capacitance | — | 45 | — | | |
| C_{riss} | Reverse transfer capacitance | — | 36 | — | | |

Source-Drain Ratings and Characteristics

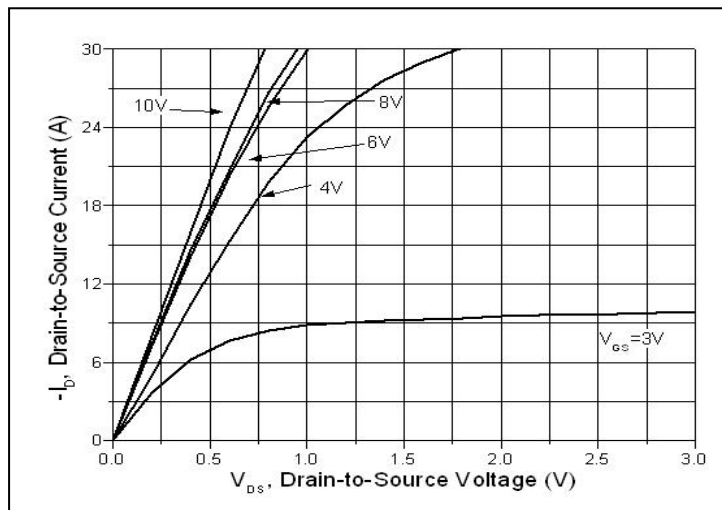
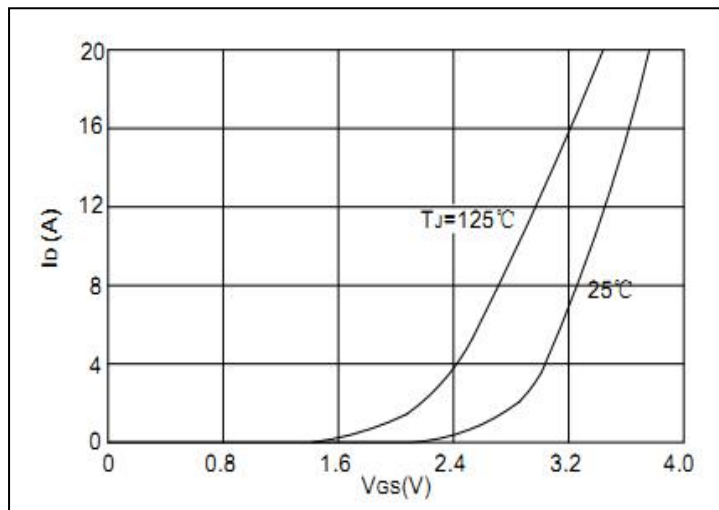
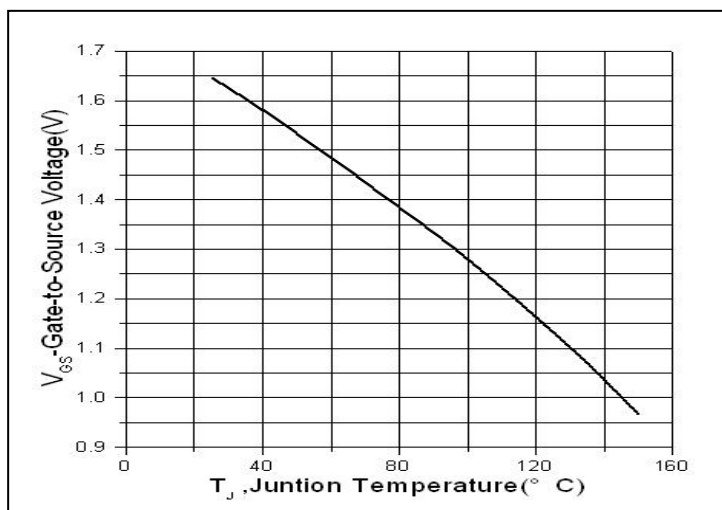
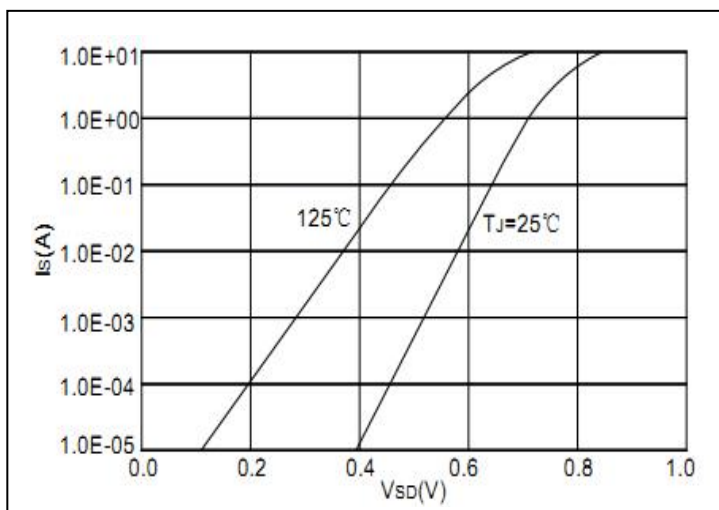
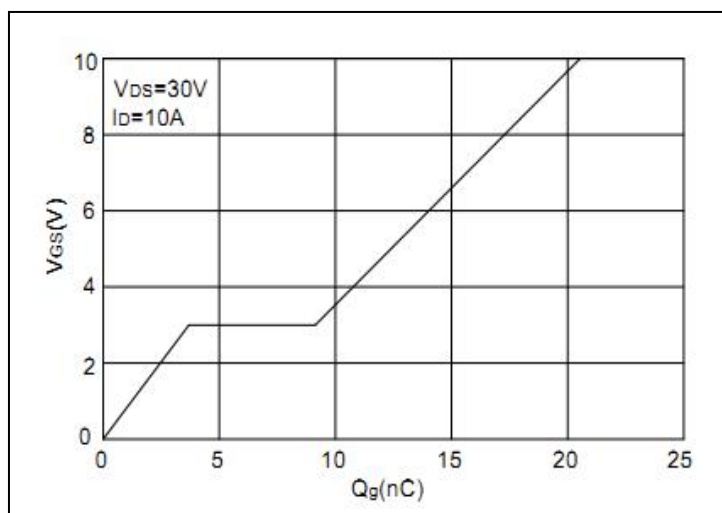
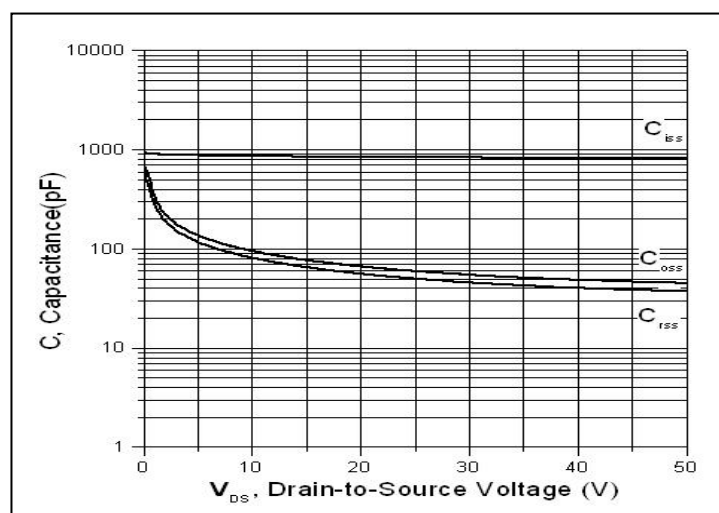
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|----------|---|------|------|------|-------|---|
| I_S | Continuous Source Current (Body Diode) | — | — | 20 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| I_{SM} | Pulsed Source Current (Body Diode) | — | — | 80 | A | |
| V_{SD} | Diode Forward Voltage | — | — | 1.2 | V | $I_S=1.7A, V_{GS}=0V$ |
| t_{rr} | Reverse Recovery Time | — | 30 | — | ns | $I_S=20A, di/dt=100A/us$ |
| Q_{rr} | Reverse Recovery Charge | — | 40 | — | nC | |

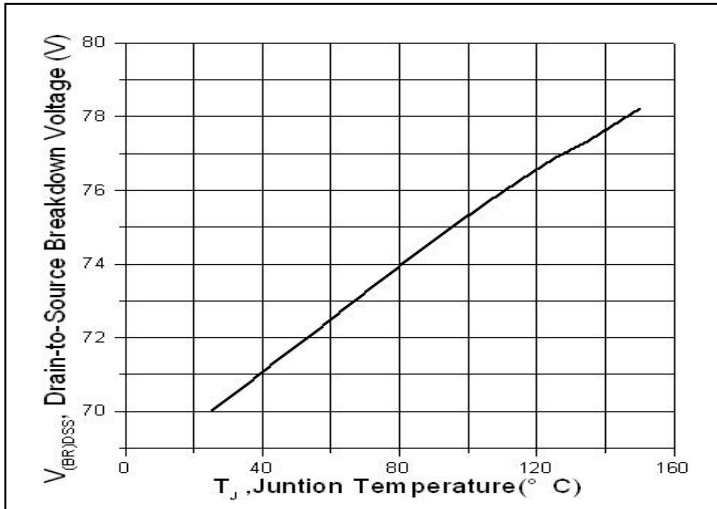
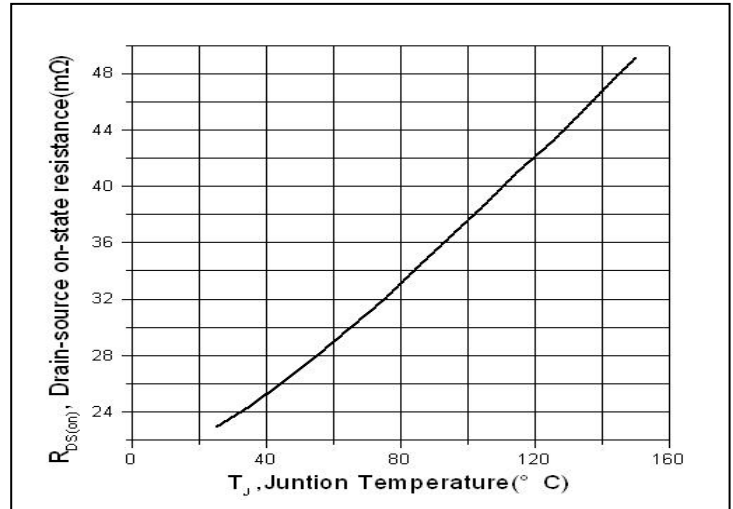
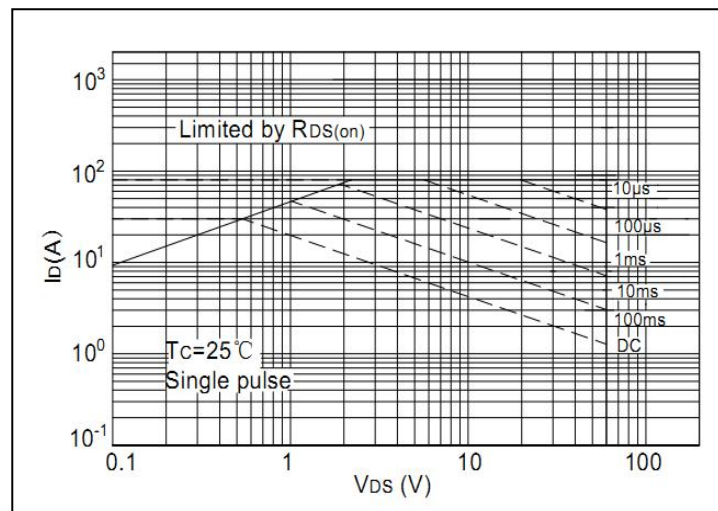
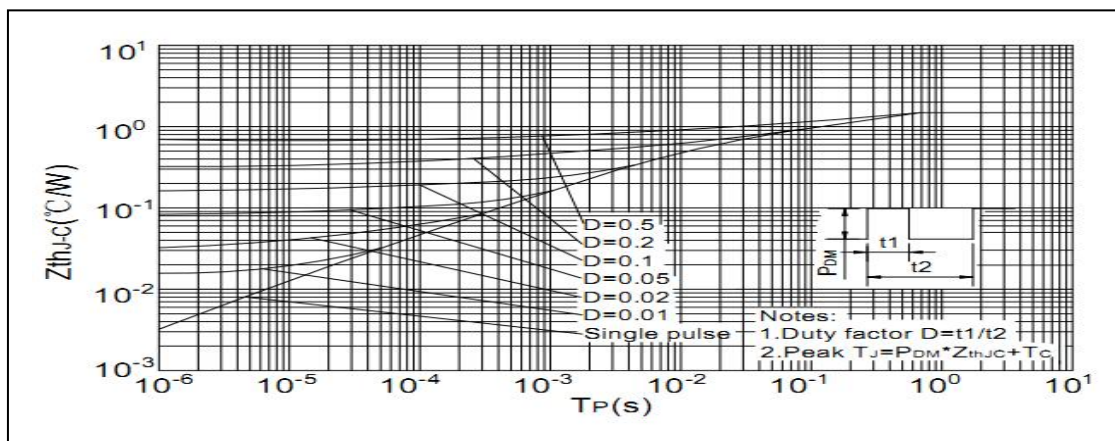
Test Circuits and Waveforms

EAS Test Circuit:

Gate Charge Test Circuit:

Switching Time Test Circuit:

Switching Waveforms:


Notes:

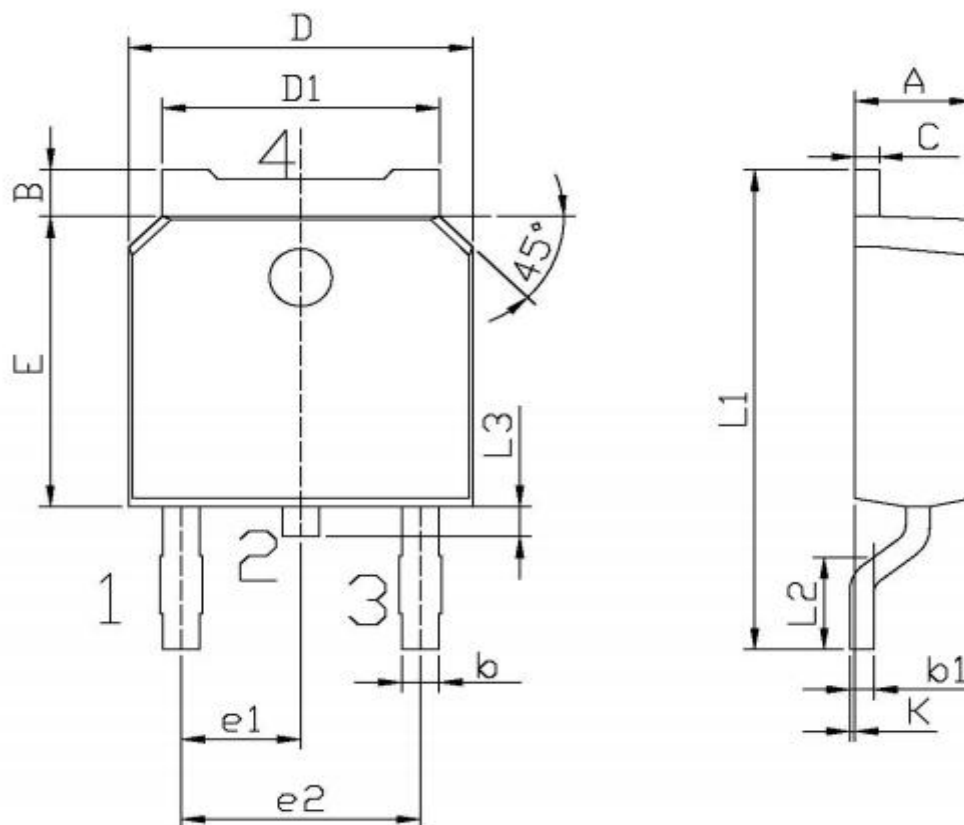
- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation P_D is based on max. junction temperature, using junction-to-case thermal resistance.

Typical Electrical and Thermal Characteristics

Figure1. Typical Output Characteristics

Figure2. Transfer Characteristics

Figure3. Gate to Source Cut-off Voltage

Figure4. Body Diode Characteristics

Figure5. Gate Charge

Figure6. Capacitance

Typical Electrical and Thermal Characteristics

Figure7.Drain-to-Source Breakdown Voltage vs. Temperature

Figure8.Normalized On-Resistance vs. Junction Temperature

Figure9.Safe Operating Area

Figure10.Normalized Maximum Transient Thermal Impedance

Mechanical Data:

TO-252 Package Outline (Unit : mm)



单位: mm

| Symbol | Dimensions In Millimeters | | Symbol | Dimensions In Millimeters | |
|--------|---------------------------|------|--------|---------------------------|-------|
| | Min | Max | | Min | Max |
| A | 2.20 | 2.40 | E | 5.95 | 6.25 |
| B | 0.95 | 1.25 | e1 | 2.24 | 2.34 |
| b | 0.70 | 0.90 | e2 | 4.43 | 4.73 |
| b1 | 0.45 | 0.55 | L1 | 9.85 | 10.35 |
| C | 0.45 | 0.55 | L2 | 1.70 | 2.00 |
| D | 6.45 | 6.75 | L3 | 0.60 | 0.90 |
| D1 | 5.10 | 5.50 | K | 0.00 | 0.10 |

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