# 60V N-Channel Trench Power MOSFET

## General Description

The SJD60N235 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a wide variety of applications.

## Features

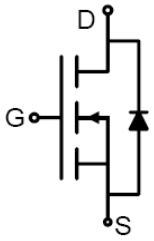
- Low Gate Charge
- 100% UIS Tested, 100% DVDS Tested
- High Power and current handing capability
- Lead free product is acquired

## Application

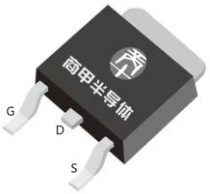
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

## Key Performance Parametes

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 60 | V |
| $R_{DS(ON)\_TYP}$ | 25.7 | mΩ |
| $I_D$ | 21 | A |
| $Q_G$ | 28 | nC |




Schematic Diagram




TO-252(DPAK) top view

RoHS

## Package Marking and Ordering Information

| Device/Ordering Code | Marking | Package | Packing | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|---|
| SJD60N235 | SJD60N235 | TO-252 | Tape | \ | \ | 2500 Pcs |

## Table 1. Absolute Maximum Ratings ($T_C$=25℃ unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage ($V_{GS}$=0V) | 60 | V |
| $V_{GS}$ | Gate-Source Voltage ($V_{DS}$=0V) | ±20 | V |
| $I_D$ | Drain Current-Continuous($T_C$=25℃) | 21 | A |
| | Drain Current-Continuous($T_C$=100℃) | 13 | A |
| $I_{DM\ (pluse)}$ | Drain Current-Continuous@ Current-Pulsed (Note 1) | 84 | A |
| $P_D$ | Maximum Power Dissipation($T_C$=25℃) | 32 | W |
| | Maximum Power Dissipation($T_C$=100℃) | 13 | W |
| $E_{AS}$ | Avalanche energy (Note 2) | 56 | mJ |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 To 150 | ℃ |

## Table 2. Thermal Characteristic

| Symbol | Parameter | Typ | Max | Unit |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | | 3.9 | ℃/W |

## Table 3. Electrical Characteristics ($T_J$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **On/Off States** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V $I_D$=250μA | 60 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=60V, $V_{GS}$=0V $T_J$=25℃ | | | 1 | μA |
| | | $V_{DS}$=60V, $V_{GS}$=0V $T_J$=125℃ | | | 100 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1 | | 2.5 | V |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=20A | | 21.8 | | S |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=10V, $I_D$=20A $T_J$=25℃ | | 25.7 | 33.4 | mΩ |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=4.5V, $I_D$=15A $T_J$=25℃ | | 30.5 | 40.5 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=30V,$V_{GS}$=0V, f=1.0MHz | | 1010 | | pF |
| $C_{oss}$ | Output Capacitance | | | 622 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 531 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1.0MHz | | 1 | | Ω |
| **Switching Parameters** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{GS}$=10V, $V_{DS}$=30V, $R_L$=1.5Ω, $R_{GEN}$=3Ω | | 6 | | nS |
| $t_r$ | Turn-on Rise Time | | | 14 | | nS |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 26 | | nS |
| $t_f$ | Turn-Off Fall Time | | | 4 | | nS |
| $Q_g$ | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=30V, $I_D$=20A | | 28 | | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 6 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 5 | | nC |
| **Source-Drain Diode Characteristics** | | | | | | |
| $I_{SD}$ | Source-Drain Current (Body Diode) | | | | 21 | A |
| $V_{SD}$ | Forward on Voltage (Note 3) | $V_{GS}$=0V, $I_S$=20A | | | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=20A, dI/dt=100A/μs | | 22 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | $I_F$=20A, dI/dt=100A/μs | | 28 | | nC |

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.$E_{AS}$ condition: $T_J$=25℃,$V_{DD}$=40V,$V_G$=10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

## Typical Electrical And Thermal Characteristics (Curves)

**Figure 1. Output Characteristics**

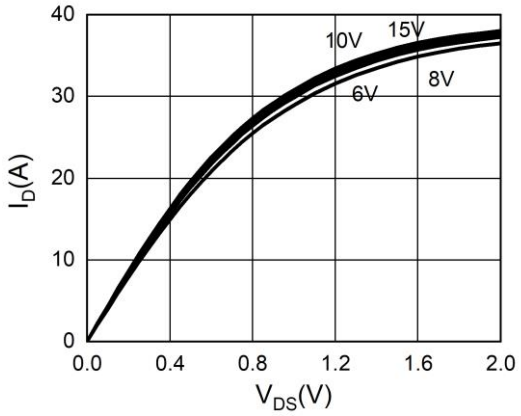



**Figure 2. Transfer Characteristics**

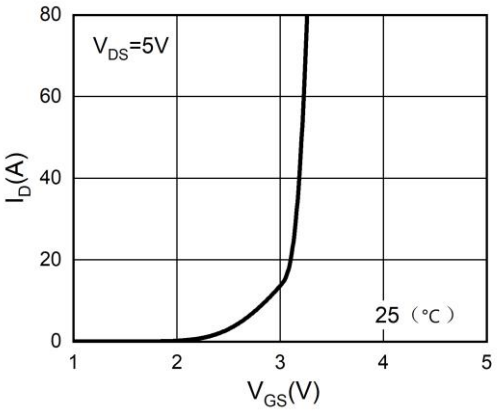



**Figure 3. Power Dissipation**

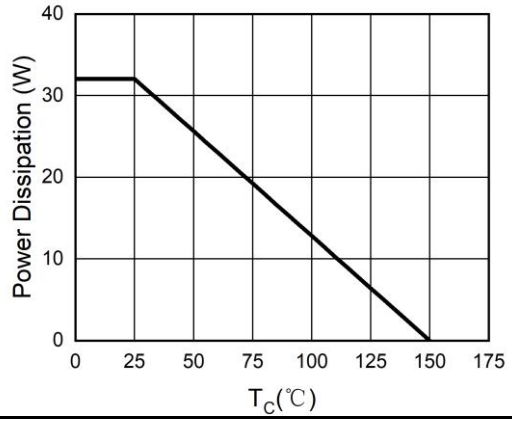



**Figure 4. Drain Current**

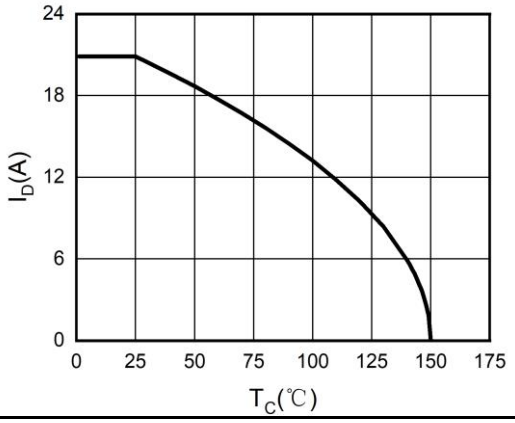



**Figure 5. $BV_{DSS}$ vs Junction Temperature**

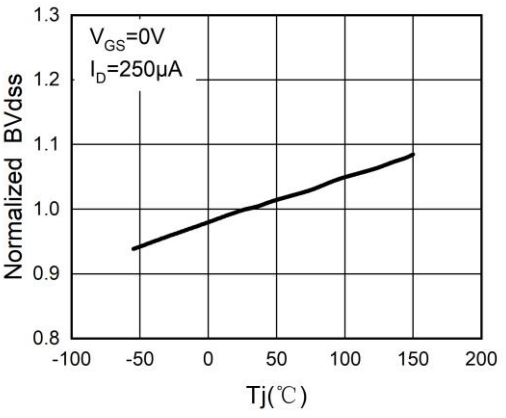
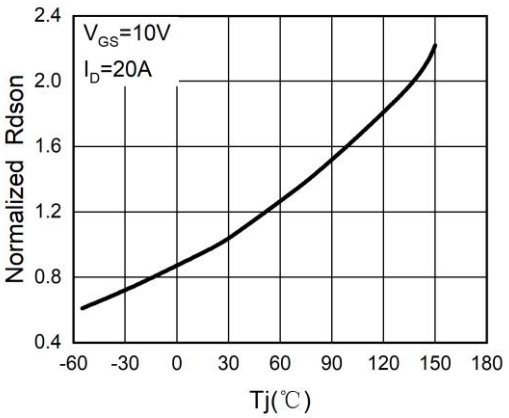



**Figure 6. $R_{DS(ON)}$ vs Junction Temperature**



## Typical Electrical And Thermal Characteristics (Curves)

**Figure 7. Gate Charge Waveforms**

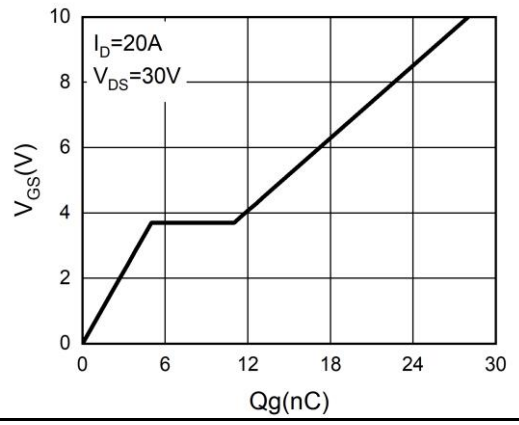



**Figure 8. Capacitance**

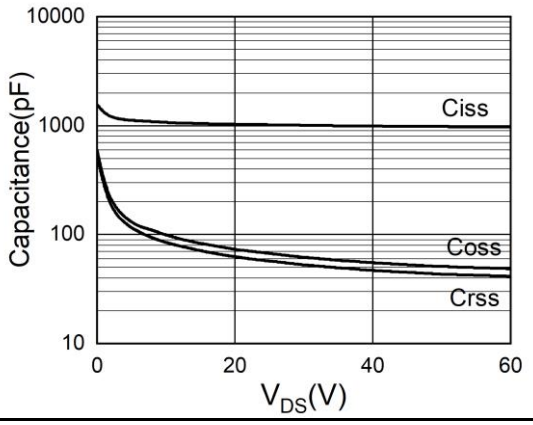



**Figure 9. Body-Diode Characteristics**

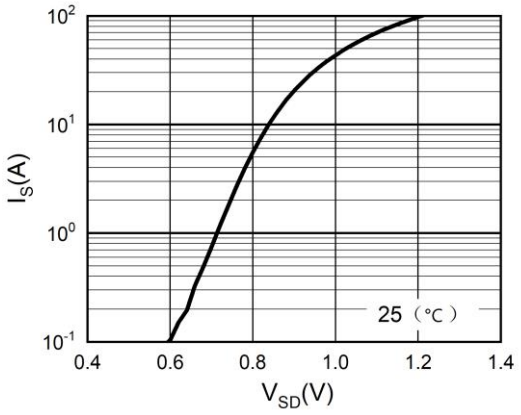
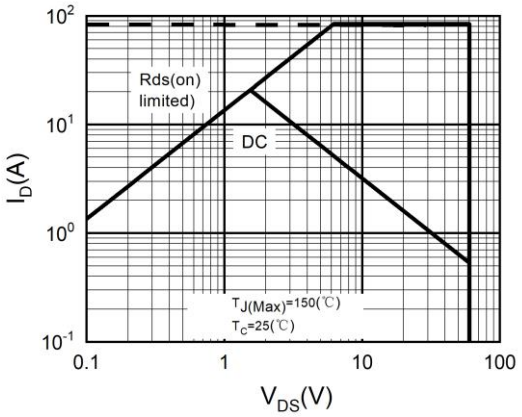
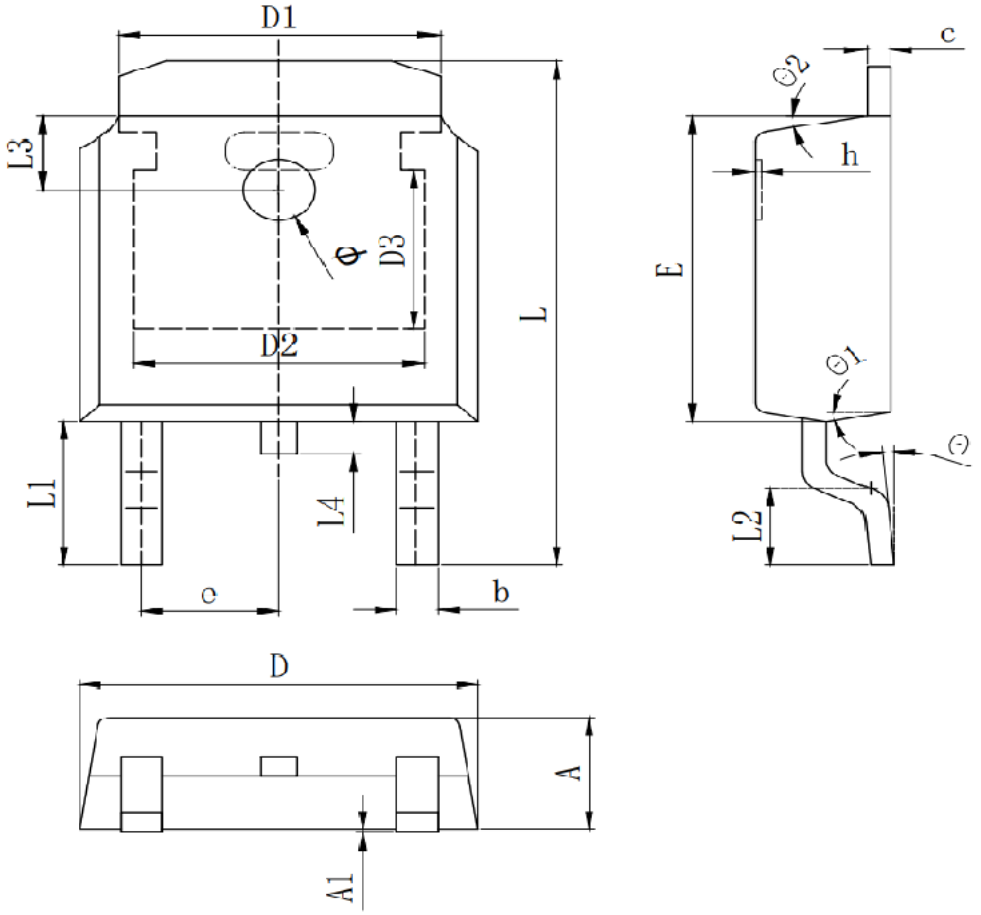



**Figure 10. Maximum Safe Operating Area**



## TO-252 Package Information




| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 2.200 | 2.300 | 2.400 |
| A1 | 0.000 | | 0.127 |
| b | 0.640 | 0.690 | 0.740 |
| c(电镀后) | 0.460 | 0.520 | 0.580 |
| D | 6.500 | 6.600 | 6.700 |
| D1 | 5.334 REF | | |
| D2 | 4.826 REF | | |
| D3 | 3.166 REF | | |
| E | 6.000 | 6.100 | 6.200 |
| e | 2.286 TYP | | |
| h | 0.000 | 0.100 | 0.200 |
| L | 9.900 | 10.100 | 10.300 |
| L1 | 2.888 REF | | |
| L2 | 1.400 | 1.550 | 1.700 |
| L3 | 1.600 REF | | |
| L4 | 0.600 | 0.800 | 1.000 |
| Φ | 1.100 | 1.200 | 1.300 |
| θ | 0° | | 8° |
| θ1 | 9° TYP | | |
| θ2 | 9° TYP | | |

## Attention

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