



## 20V N-Channel Trench Power MOSFET

### General Description

The SJD20N061 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a wide variety of applications.

### Features

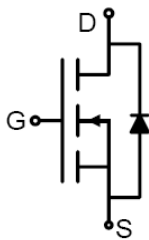
- Low Gate Charge
- 100% UIS Tested, 100% DVDS Tested
- High Power and current handling capability
- Lead free product is acquired

### Application

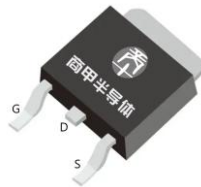
- PWM Applications
- Load Switch
- Power Management

### Key Performance Parameters

| Parameter         | Value | Unit       |
|-------------------|-------|------------|
| $V_{DS}$          | 20    | V          |
| $R_{DS(ON\_TYP)}$ | 6.4   | m $\Omega$ |
| $I_D$             | 48    | A          |
| $Q_G$             | 33    | nC         |



Schematic Diagram



TO-252(DPAK) top view



### Package Marking and Ordering Information

| Device/Ordering Code | Marking   | Package | Packing | Reel Size | Tape width | Quantity |
|----------------------|-----------|---------|---------|-----------|------------|----------|
| SJD20N061            | SJD20N061 | TO-252  | Tape    | \         | \          | 2500 Pcs |

Table 1. Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$  unless otherwise noted)

| Symbol                   | Parameter                                            | Limit      | Unit             |
|--------------------------|------------------------------------------------------|------------|------------------|
| $V_{DS}$                 | Drain-Source Voltage ( $V_{GS}=0V$ )                 | 20         | V                |
| $V_{GS}$                 | Gate-Source Voltage ( $V_{DS}=0V$ )                  | $\pm 12$   | V                |
| $I_D$                    | Drain Current-Continuous( $T_C=25^\circ\text{C}$ )   | 48         | A                |
|                          | Drain Current-Continuous( $T_C=100^\circ\text{C}$ )  | 30         | A                |
| $I_{DM} \text{ (pluse)}$ | Drain Current-Continuous@ Current-Pulsed (Note 1)    | 192        | A                |
| $P_D$                    | Maximum Power Dissipation( $T_C=25^\circ\text{C}$ )  | 27         | W                |
|                          | Maximum Power Dissipation( $T_C=100^\circ\text{C}$ ) | 11         | W                |
| $E_{AS}$                 | Avalanche energy (Note 2)                            | 72         | mJ               |
| $T_J, T_{STG}$           | Operating Junction and Storage Temperature Range     | -55 To 150 | $^\circ\text{C}$ |

Table 2. Thermal Characteristic

| Symbol          | Parameter                            | Typ | Max | Unit               |
|-----------------|--------------------------------------|-----|-----|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case |     | 4.7 | $^\circ\text{C/W}$ |



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**Table 3. Electrical Characteristics ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)**

| Symbol                             | Parameter                              | Conditions                                                                                  | Min | Typ  | Max  | Unit |
|------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------|-----|------|------|------|
| On/Off States                      |                                        |                                                                                             |     |      |      |      |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage         | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                                   | 20  |      |      | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current        | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V T <sub>J</sub> =25℃                               |     |      | 1    | μA   |
|                                    |                                        | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V T <sub>J</sub> =125℃                              |     |      | 100  | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current              | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                                                  |     |      | ±100 | nA   |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage                 | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                    | 0.5 |      | 1    | V    |
| g <sub>FS</sub>                    | Forward Transconductance               | V <sub>DS</sub> =5V, I <sub>D</sub> =15A                                                    |     | 61   |      | S    |
| R <sub>DS(ON)</sub>                | Drain-Source On-State Resistance       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A T <sub>J</sub> =25℃                              |     | 6.4  | 8    | mΩ   |
| R <sub>DS(ON)</sub>                | Drain-Source On-State Resistance       | V <sub>GS</sub> =2.5V, I <sub>D</sub> =10A T <sub>J</sub> =25℃                              |     | 7.8  | 10.4 | mΩ   |
| Dynamic Characteristics            |                                        |                                                                                             |     |      |      |      |
| C <sub>iss</sub>                   | Input Capacitance                      | V <sub>DS</sub> =10V,V <sub>GS</sub> =0V,<br>f=1.0MHz                                       |     | 1590 |      | pF   |
| C <sub>oss</sub>                   | Output Capacitance                     |                                                                                             |     | 153  |      | pF   |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance           |                                                                                             |     | 138  |      | pF   |
| R <sub>g</sub>                     | Gate resistance                        | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1.0MHz                                          |     | 0.9  |      | Ω    |
| Switching Parameters               |                                        |                                                                                             |     |      |      |      |
| t <sub>d(on)</sub>                 | Turn-on Delay Time                     | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V,<br>R <sub>L</sub> =0.67Ω, R <sub>GEN</sub> =3Ω |     | 11   |      | nS   |
| t <sub>r</sub>                     | Turn-on Rise Time                      |                                                                                             |     | 2.4  |      | nS   |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                    |                                                                                             |     | 52   |      | nS   |
| t <sub>f</sub>                     | Turn-Off Fall Time                     |                                                                                             |     | 5.6  |      | nS   |
| Q <sub>g</sub>                     | Total Gate Charge                      | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =15A                            |     | 16.8 |      | nC   |
| Q <sub>gs</sub>                    | Gate-Source Charge                     |                                                                                             |     | 2.4  |      | nC   |
| Q <sub>gd</sub>                    | Gate-Drain Charge                      |                                                                                             |     | 3.2  |      | nC   |
| Source-Drain Diode Characteristics |                                        |                                                                                             |     |      |      |      |
| I <sub>SD</sub>                    | Source-Drain Current (Body Diode)      |                                                                                             |     |      | 48   | A    |
| V <sub>SD</sub>                    | Forward on Voltage <sup>(Note 3)</sup> | V <sub>GS</sub> =0V, I <sub>S</sub> =15A                                                    |     |      | 1    | V    |
| t <sub>rr</sub>                    | Reverse Recovery Time                  | I <sub>F</sub> =15A, dI/dt=100A/μs                                                          |     | 15.8 |      | ns   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge                | I <sub>F</sub> =15A, dI/dt=100A/μs                                                          |     | 6.3  |      | nC   |

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

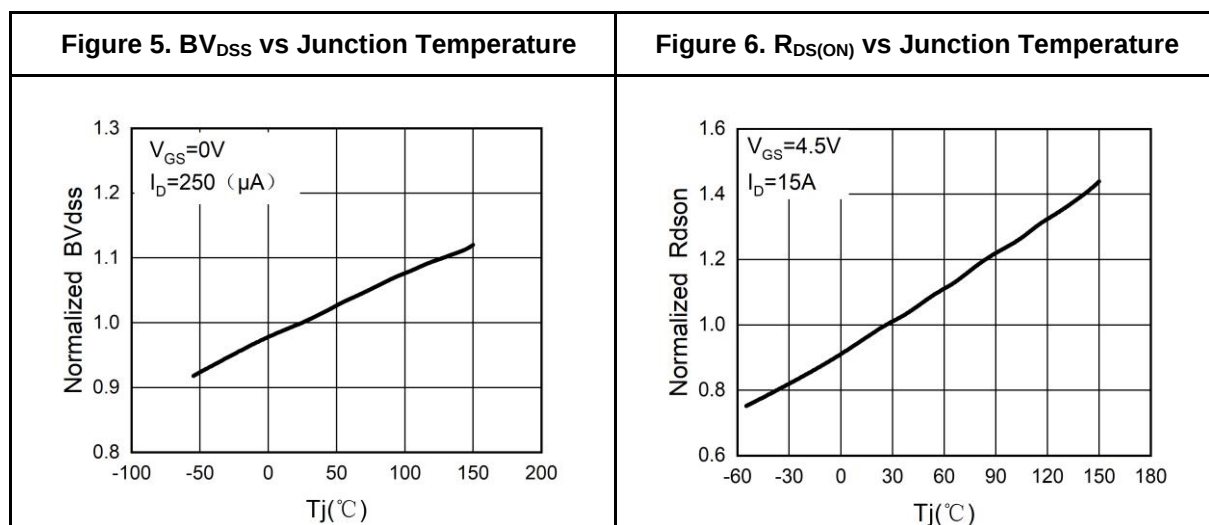
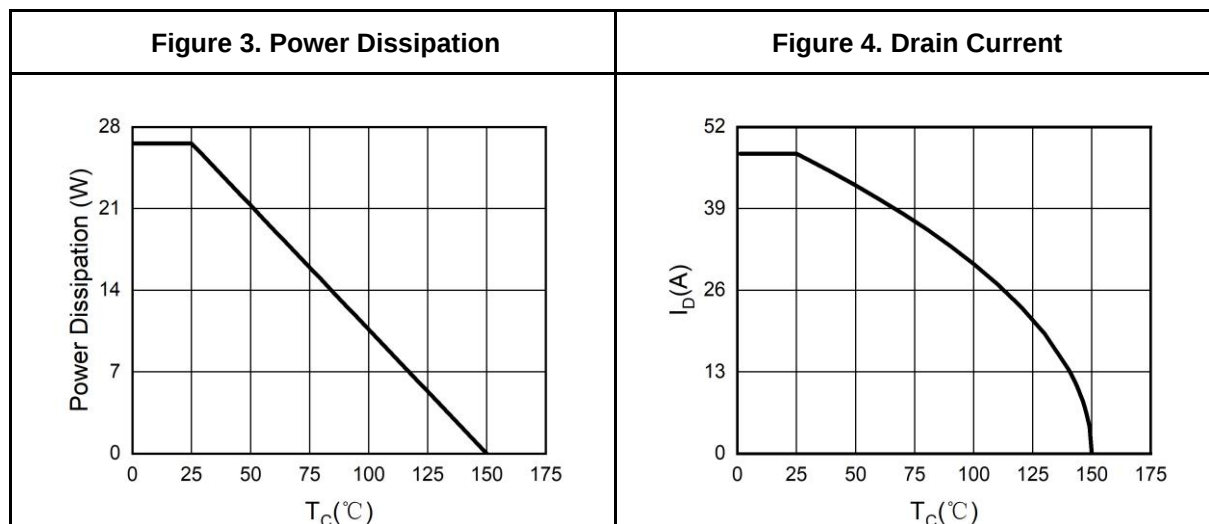
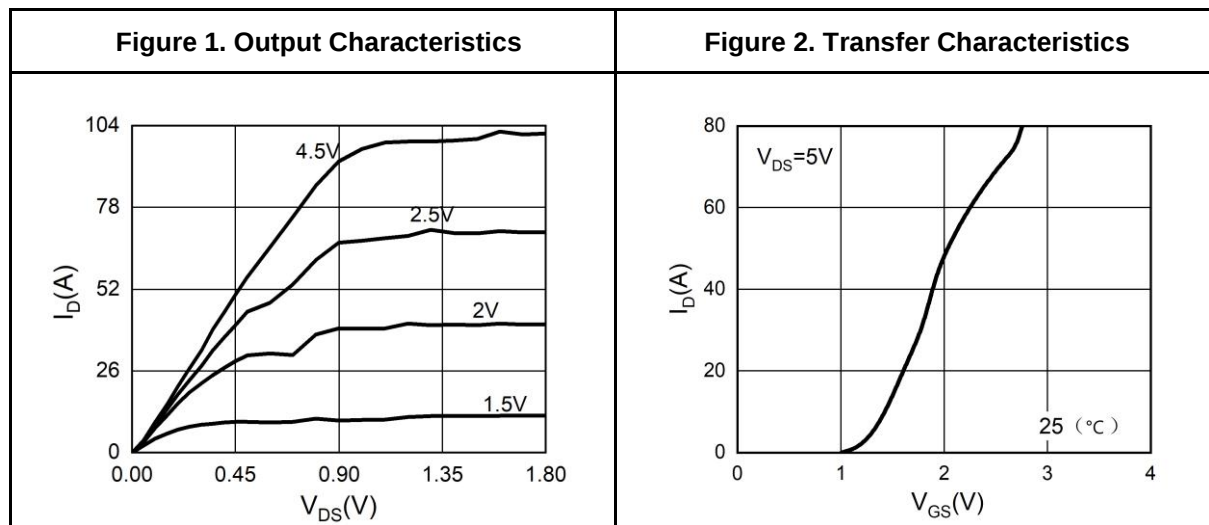
Notes 2.EAS condition:  $T_J=25^{\circ}\text{C}, V_{DD}=20V, V_G=10V, R_g=25\Omega, L=0.5\text{mH}$ .

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.



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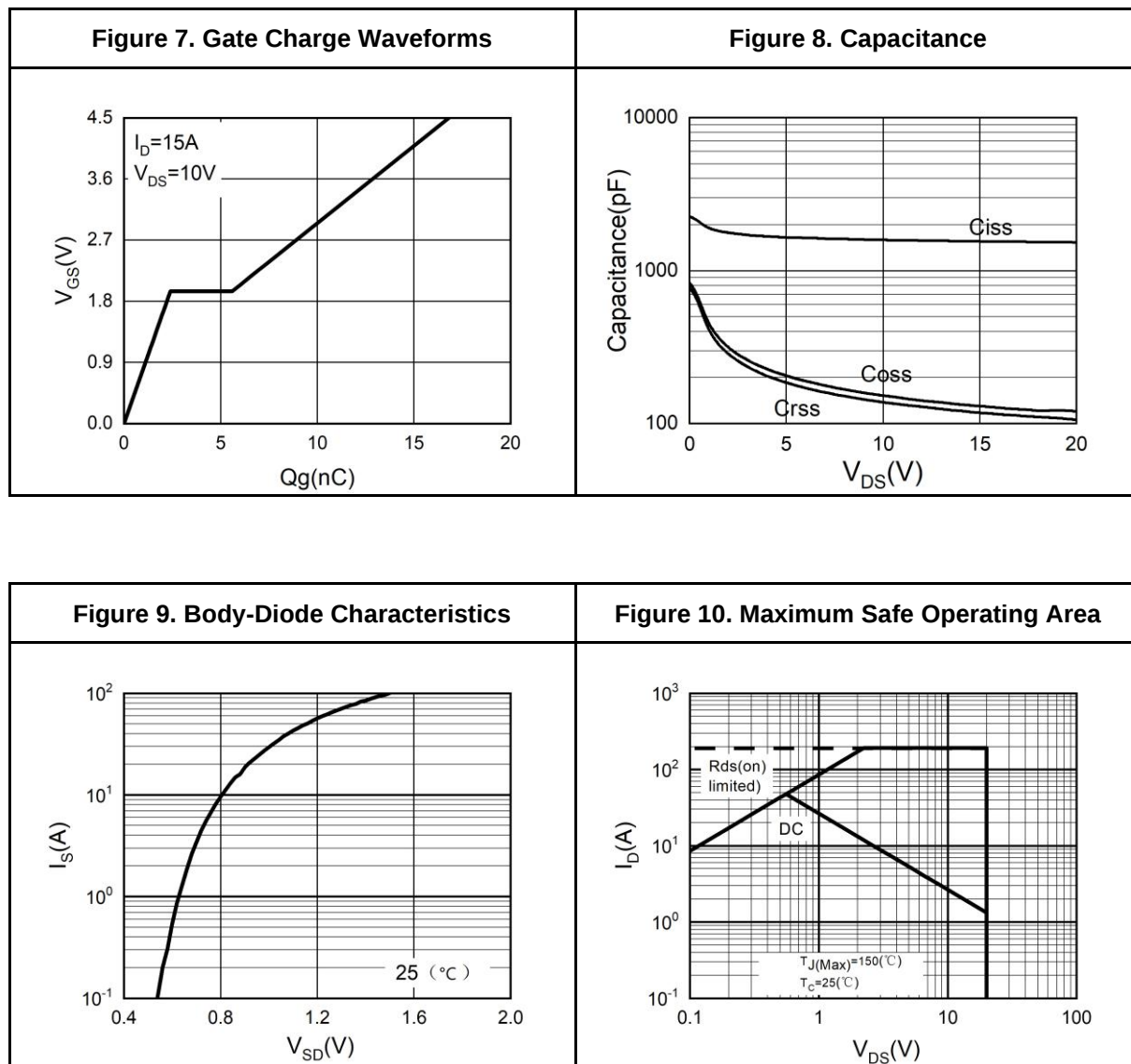
### Typical Electrical And Thermal Characteristics (Curves)





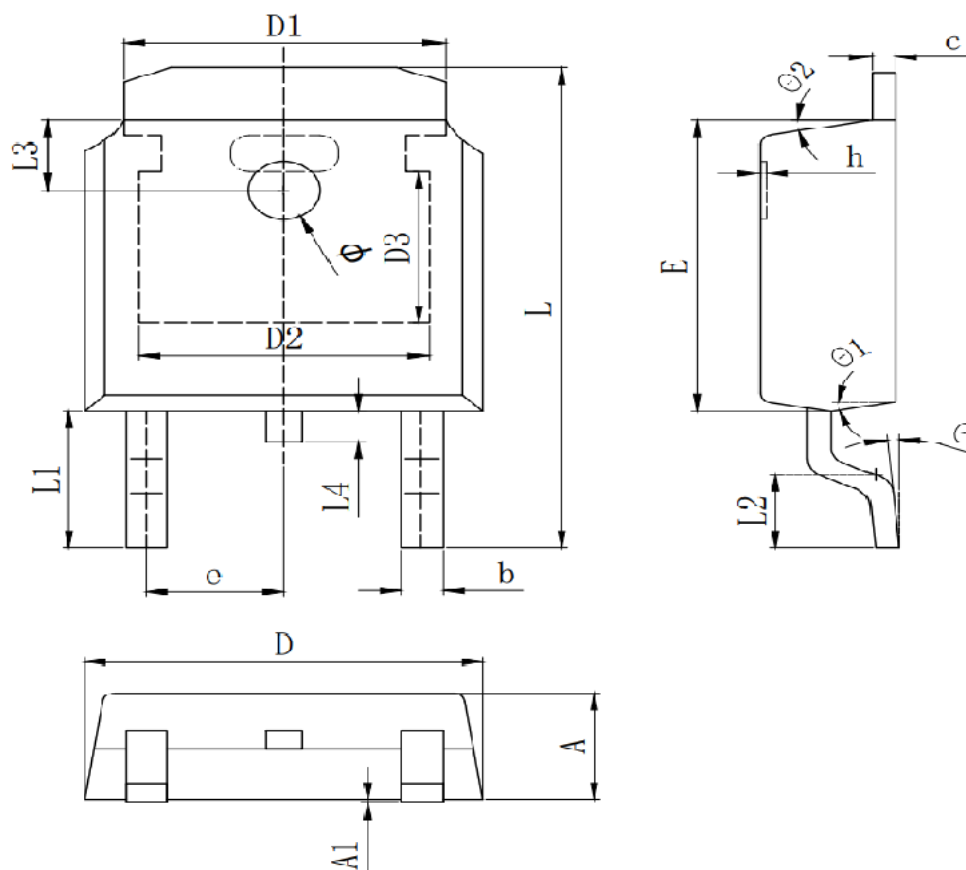
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### Typical Electrical And Thermal Characteristics (Curves)





## 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                    |        |        |



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