

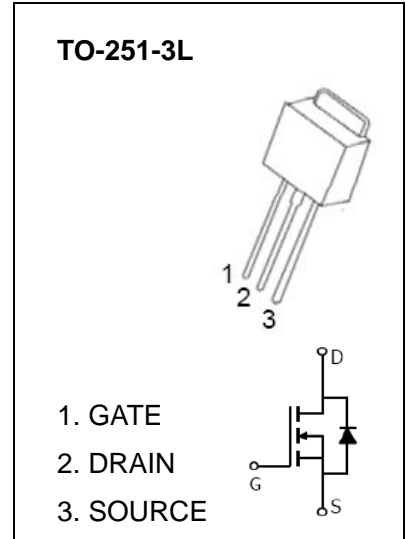


**TO-251-3L Plastic-Encapsulate MOSFETS**

**CJD02N60** N-Channel Power MOSFET

**General Description**

The high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition , this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes . The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power suppliers, converters and PWM motor controls , these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.



**FEATURE**

- Robust High Voltage Termination
- Avalanche Energy Specified
- Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Diode is Characterized for Use in Bridge Circuits
- $I_{DSS}$  and  $V_{DS(on)}$  Specified at Elevated Temperature

**Maximum ratings ( $T_a=25^{\circ}C$  unless otherwise noted)**

| Parameter                                   | Symbol          | Value     | Unit          |
|---|-----------------|-----------|---------------|
| Drain-Source Voltage                        | $V_{DS}$        | 600       | V             |
| Gate-Source Voltage                         | $V_{GS}$        | $\pm 20$  |               |
| Continuous Drain Current                    | $I_D$           | 2         | A             |
| Pulsed Drain Current                        | $I_{DM}$        | 8         |               |
| Single Pulsed Avalanche Energy*             | $E_{AS}$        | 128       | mJ            |
| Power Dissipation                           | $P_D$           | 1.25      | W             |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 100       | $^{\circ}C/W$ |
| Junction Temperature                        | $T_J$           | 150       | $^{\circ}C$   |
| Storage Temperature                         | $T_{stg}$       | -50 ~+150 |               |

\* $E_{AS}$  condition:  $T_J=25^{\circ}C, V_{DD}=50V, L=64mH, I_{AS}=2A, R_G=25\Omega$ , Starting  $T_J = 25^{\circ}C$

**Electrical characteristics (T<sub>a</sub>=25°C unless otherwise noted)**

| Parameter                                     | Symbol               | Test Condition  | Min | Typ | Max  | Unit |
|---|----------------------|---|-----|-----|------|------|
| <b>Off characteristics</b>                    |                      |   |     |     |      |      |
| Drain-source breakdown voltage                | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA   | 600 |     |      | V    |
| Zero gate voltage drain current               | I <sub>DSS</sub>     | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V  |     |     | 25   | μA   |
|   |                      | V <sub>DS</sub> =480V, V <sub>GS</sub> =0V,<br>T <sub>j</sub> =125°C                    |     |     | 100  |      |
| Gate-body leakage current                     | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V  |     |     | ±100 | nA   |
| <b>On characteristics (note1)</b>             |                      |   |     |     |      |      |
| Gate-threshold voltage                        | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 2.0 |     | 4.0  | V    |
| Static drain-source on-resistance             | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =1A  |     | 3.6 | 4.4  | Ω    |
| Forward transconductance                      | g <sub>FS</sub>      | V <sub>DS</sub> =50V, I <sub>D</sub> =1A  | 1   |     |      | S    |
| <b>Dynamic characteristics (note 2)</b>       |                      |   |     |     |      |      |
| Input capacitance                             | C <sub>iss</sub>     | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f =1MHz                                   |     | 435 |      | pF   |
| Output capacitance                            | C <sub>oss</sub>     |   |     | 56  |      |      |
| Reverse transfer capacitance                  | C <sub>rss</sub>     |   |     | 9.2 |      |      |
| <b>Switching characteristics (note 2)</b>     |                      |   |     |     |      |      |
| Total gate charge                             | Q <sub>g</sub>       | V <sub>DS</sub> =480V, V <sub>GS</sub> =10V,<br>I <sub>D</sub> =2.4A                    |     | 40  | 50   | nC   |
| Gate-source charge                            | Q <sub>gs</sub>      |   |     | 4.2 |      |      |
| Gate-drain charge                             | Q <sub>gd</sub>      |   |     | 8.4 |      |      |
| Turn-on delay time                            | t <sub>d(on)</sub>   | V <sub>DD</sub> =300V, I <sub>D</sub> =2A,<br>V <sub>GS</sub> =10V, R <sub>G</sub> =18Ω |     | 12  |      | ns   |
| Turn-on rise time                             | t <sub>r</sub>       |   |     | 21  |      |      |
| Turn-off delay time                           | t <sub>d(off)</sub>  |   |     | 30  |      |      |
| Turn-off fall time                            | t <sub>f</sub>       |   |     | 24  |      |      |
| <b>Drain-Source Diode Characteristics</b>     |                      |   |     |     |      |      |
| Drain-source diode forward voltage(note1)     | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =2A   |     |     | 1.6  | V    |
| Continuous drain-source diode forward current | I <sub>S</sub>       |   |     |     | 2    | A    |
| Pulsed drain-source diode forward current     | I <sub>SM</sub>      |   |     |     | 8    | A    |

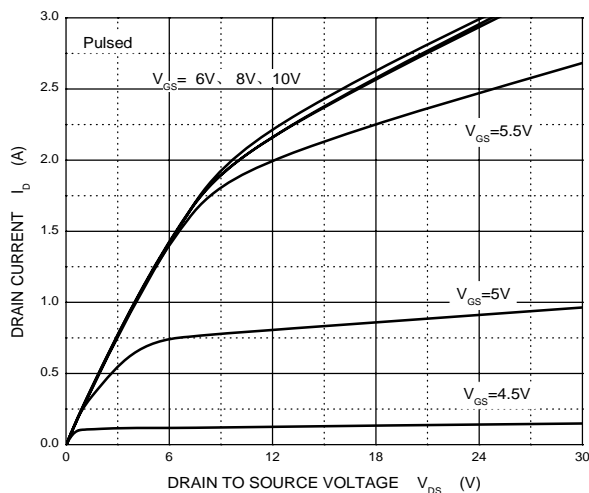
Notes:

1. Pulse Test : Pulse Width≤300μs, duty cycle ≤2%.
2. Guaranteed by design, not subject to production.

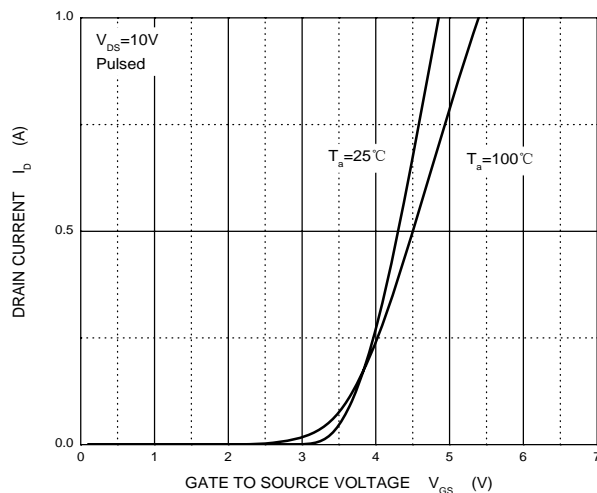
# Typical Characteristics

# CJD02N60

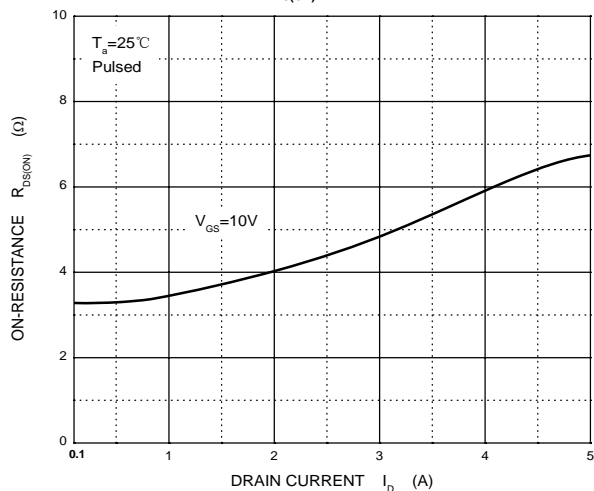
Output Characteristics



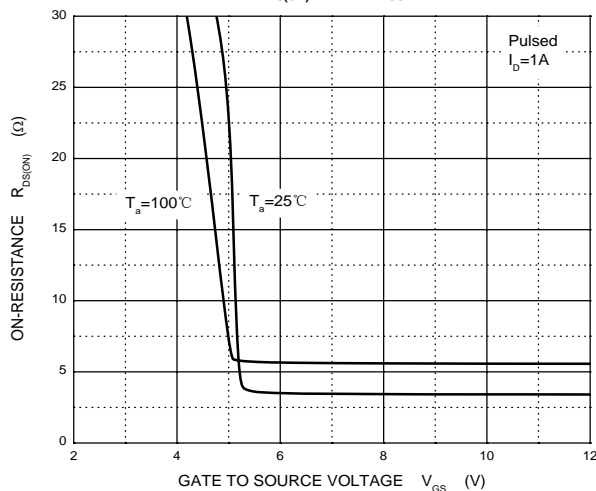
Transfer Characteristics



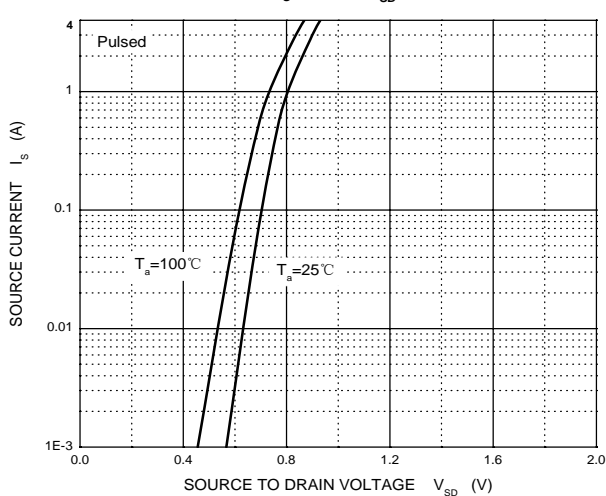
$R_{DS(ON)}$  —  $I_D$



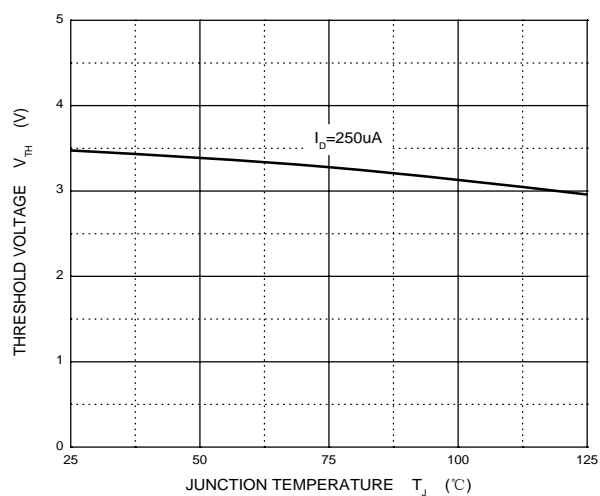
$R_{DS(ON)}$  —  $V_{GS}$



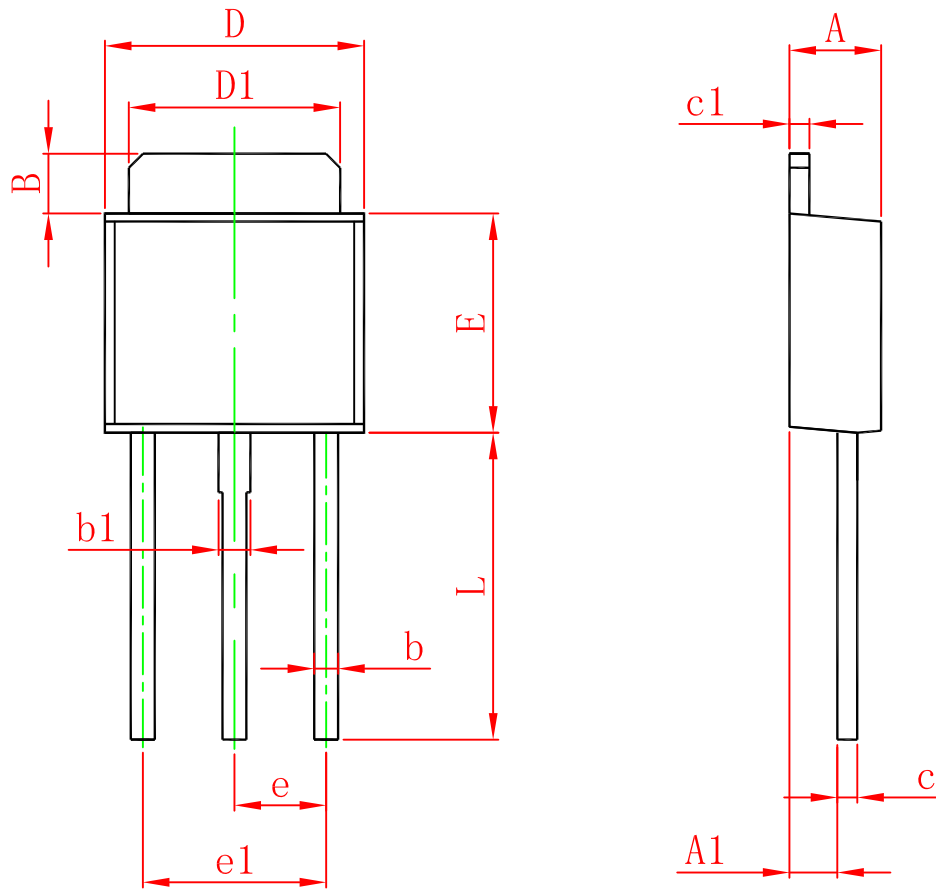
$I_S$  —  $V_{SD}$



Threshold Voltage



# TO-251-3L Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 2.200                     | 2.400 | 0.087                | 0.094 |
| A1     | 1.050                     | 1.350 | 0.042                | 0.054 |
| B      | 1.350                     | 1.650 | 0.053                | 0.065 |
| b      | 0.500                     | 0.700 | 0.020                | 0.028 |
| b1     | 0.700                     | 0.900 | 0.028                | 0.035 |
| c      | 0.430                     | 0.580 | 0.017                | 0.023 |
| c1     | 0.430                     | 0.580 | 0.017                | 0.023 |
| D      | 6.350                     | 6.650 | 0.250                | 0.262 |
| D1     | 5.200                     | 5.400 | 0.205                | 0.213 |
| E      | 5.400                     | 5.700 | 0.213                | 0.224 |
| e      | 2.300 TYP.                |       | 0.091 TYP.           |       |
| e1     | 4.500                     | 4.700 | 0.177                | 0.185 |
| L      | 7.500                     | 7.900 | 0.295                | 0.311 |