



## PRODUCT DATA SHEET

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Datasheet



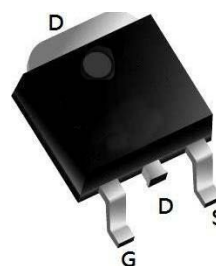
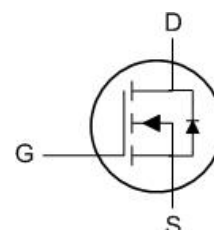
Resources



Samples

Please note: Please check the JINGAO Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at [www.jg-semi.cn](http://www.jg-semi.cn). Please email any questions regarding the system integration to [JINGAO\\_questions@jgsemi.com](mailto:JINGAO_questions@jgsemi.com).

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology


**TO252-3L**


### Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise specified)

| Symbol                            | Parameter                                       |                        | Max.        | Units |
|-----------------------------------|-------------------------------------------------|------------------------|-------------|-------|
| V <sub>DSS</sub>                  | Drain-Source Voltage                            |                        | 30          | V     |
| V <sub>GSS</sub>                  | Gate-Source Voltage                             |                        | ±20         | V     |
| I <sub>D</sub>                    | Continuous Drain Current                        | T <sub>C</sub> = 25°C  | 80          | A     |
|                                   |                                                 | T <sub>C</sub> = 100°C | 46          | A     |
| I <sub>DM</sub>                   | Pulsed Drain Current <sup>note1</sup>           |                        | 280         | A     |
| E <sub>AS</sub>                   | Single Pulsed Avalanche Energy <sup>note2</sup> |                        | 56          | mJ    |
| P <sub>D</sub>                    | Power Dissipation                               | T <sub>C</sub> = 25°C  | 42          | W     |
| R <sub>θJC</sub>                  | Thermal Resistance, Junction to Case            |                        | 2.98        | °C/W  |
| T <sub>J</sub> , T <sub>STG</sub> | Operating and Storage Temperature Range         |                        | -55 to +150 | °C    |

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

| Symbol                                                 | Parameter                                                 | Test Condition                                                                              | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                           |                                                                                             |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V,I <sub>D</sub> =250μA                                                   | 30   | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =30V, V <sub>GS</sub> = 0V,                                                 | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V,V <sub>GS</sub> = ±20V                                                  | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                             |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 1.0  | 1.5  | 2.5  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                                   | -    | 4.0  | 5.3  | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                                  | -    | 6.7  | 9.4  |       |
| Dynamic Characteristics                                |                                                           |                                                                                             |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f = 1.0MHz                                    | -    | 1614 | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                             | -    | 245  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                             | -    | 215  | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =15V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V                          | -    | 33.7 | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                             | -    | 8.5  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                             | -    | 7.5  | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                             |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DS</sub> =15V,<br>I <sub>D</sub> =30A, R <sub>GEN</sub> =3Ω,<br>V <sub>GS</sub> =10V | -    | 7.5  | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                             | -    | 14.5 | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                             | -    | 35.2 | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                             | -    | 9.6  | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                             |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                             | -    | -    | 80   | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                             | -    | -    | 280  | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> = 0V, I <sub>S</sub> =30A                                                   | -    | -    | 1.2  | V     |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition:  $T_J=25^{\circ}\text{C}, V_{DD}=15V, V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=15A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

**Notes:**

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

2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

4. Guaranteed by design, not subject to production

5. EAS condition:  $T_J=25^{\circ}\text{C}, V_{DD}=15V, V_G=10V, L=0.5mH, R_G=25\Omega, I_{AS}=35A$

## Typical Performance Characteristics

**Figure 1:** Output Characteristics

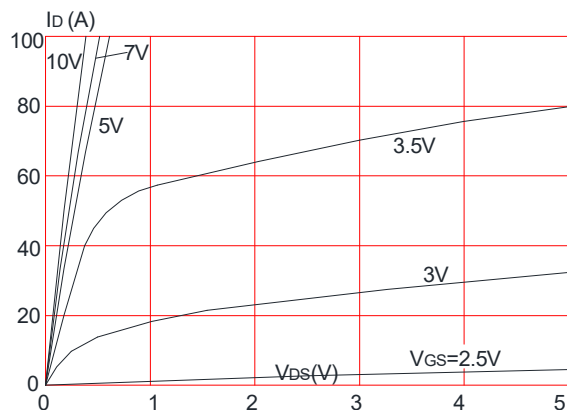


**Figure 2:** Typical Transfer Characteristics

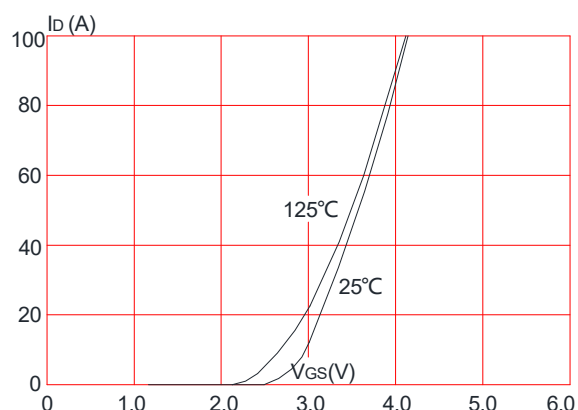


**Figure 3:** On-resistance vs. Drain Current

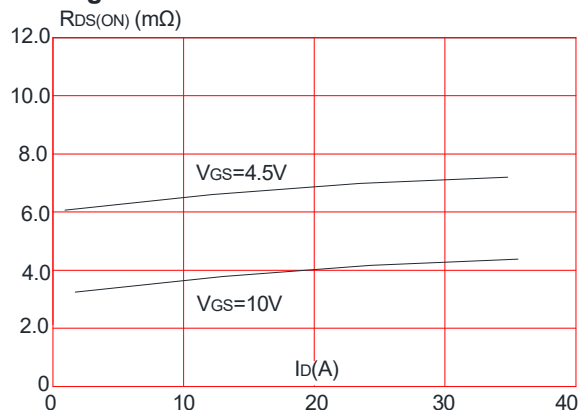


**Figure 4:** Body Diode Characteristics

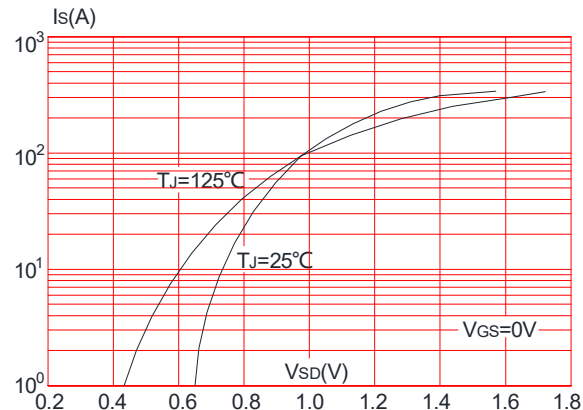


**Figure 5:** Gate Charge Characteristics

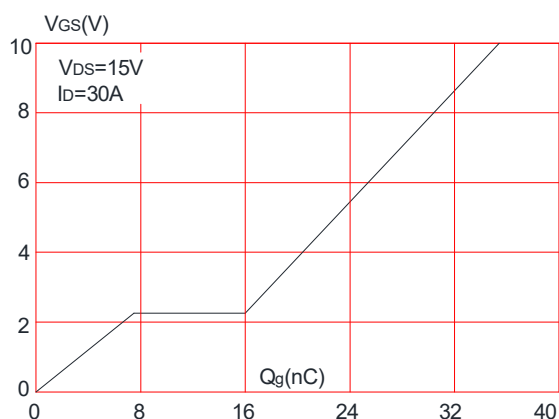


**Figure 6:** Capacitance Characteristics

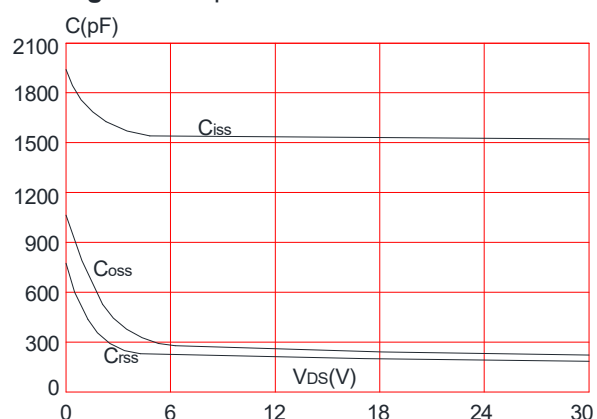


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

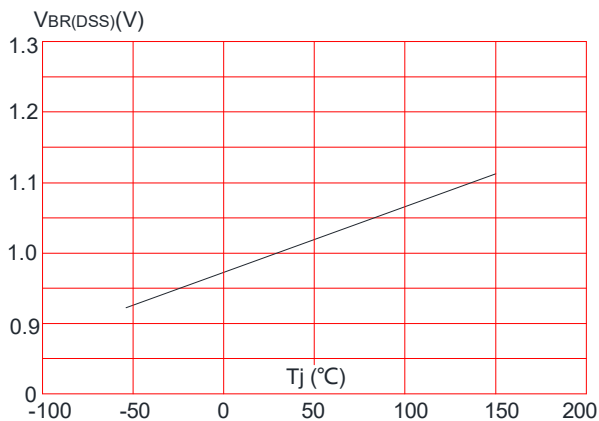


**Figure 8:** Normalized on Resistance vs. Junction Temperature

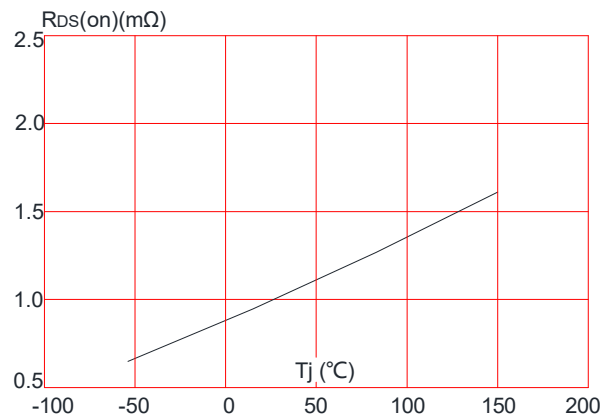


**Figure 9:** Maximum Safe Operating Area

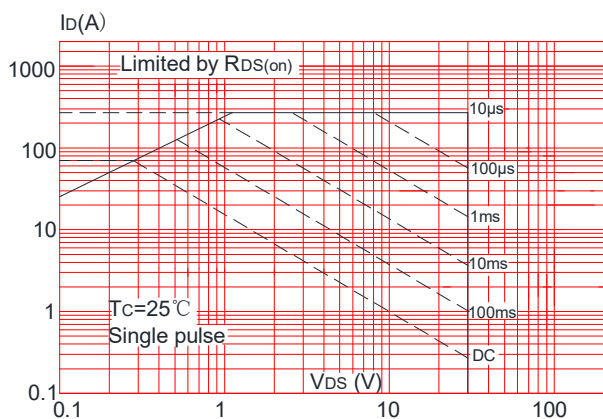


**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

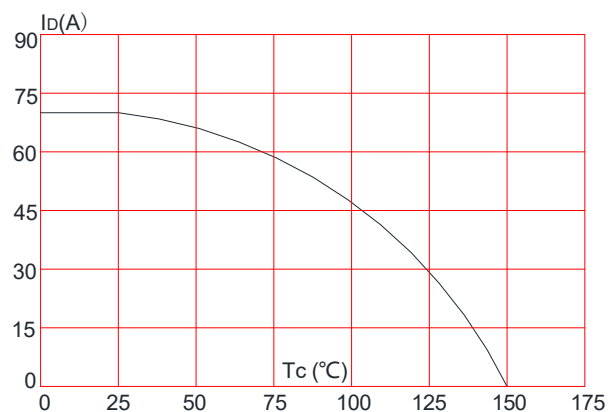
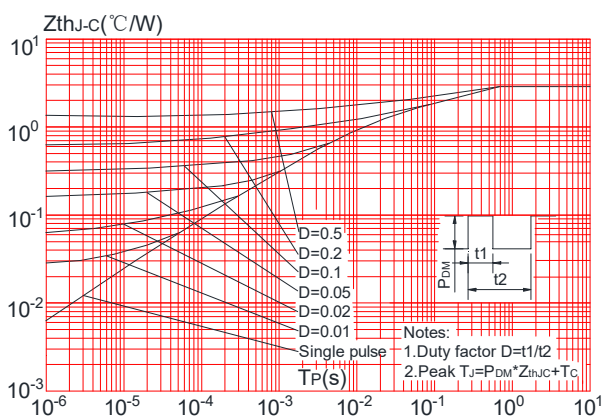


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



## Test Circuit

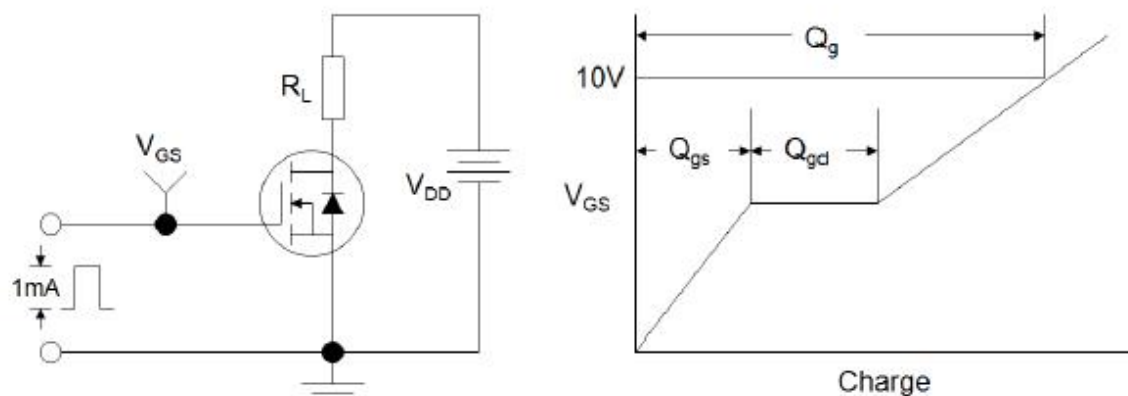


Figure1:Gate Charge Test Circuit & Waveform

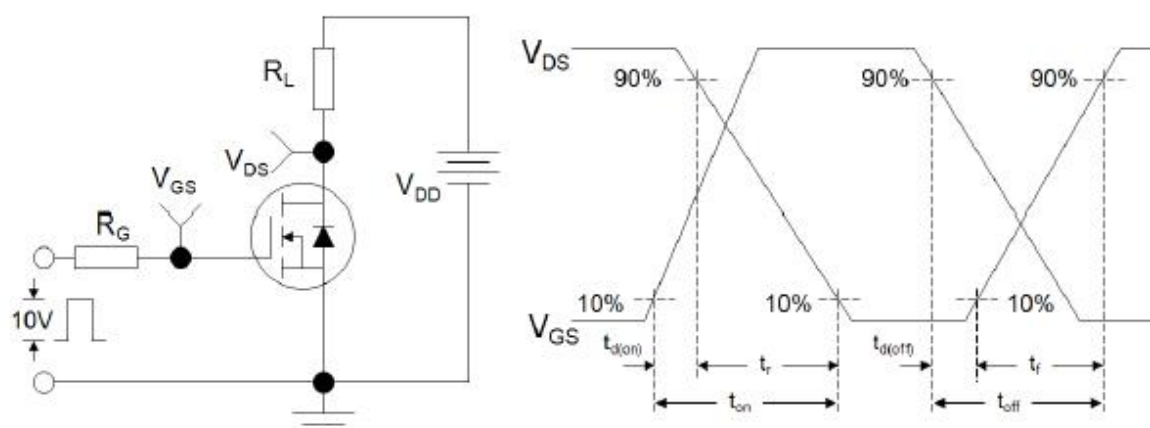


Figure 2: Resistive Switching Test Circuit & Waveforms

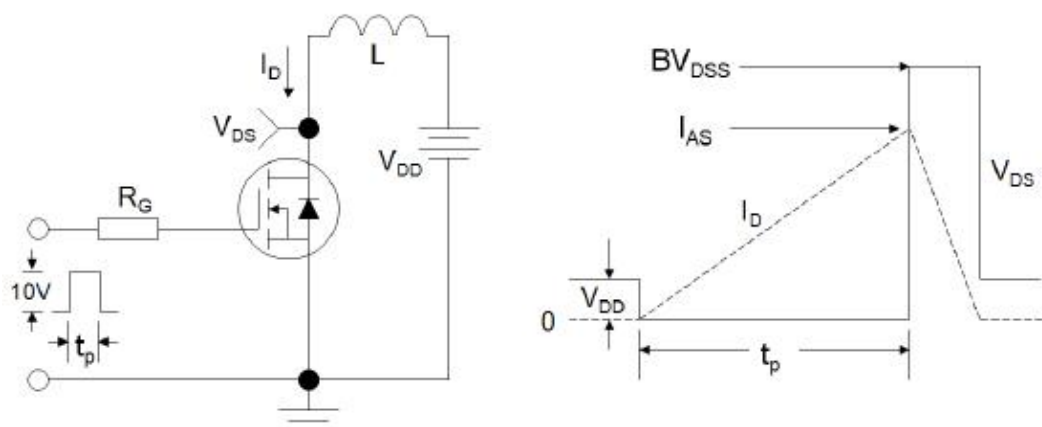
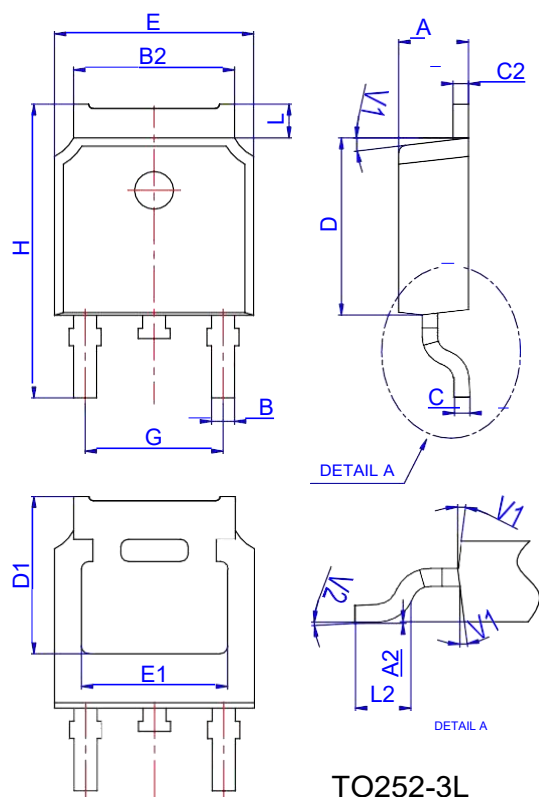


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

## Package Mechanical Data TO252-3L



| Ref. | Dimensions  |      |       |          |      |       |
|------|-------------|------|-------|----------|------|-------|
|      | Millimeters |      |       | Inches   |      |       |
|      | Min.        | Typ. | Max.  | Min.     | Typ. | Max.  |
| A    | 2.10        |      | 2.50  | 0.083    |      | 0.098 |
| A2   | 0           |      | 0.10  | 0        |      | 0.004 |
| B    | 0.66        |      | 0.86  | 0.026    |      | 0.034 |
| B2   | 5.18        |      | 5.48  | 0.202    |      | 0.216 |
| C    | 0.40        |      | 0.60  | 0.016    |      | 0.024 |
| C2   | 0.44        |      | 0.58  | 0.017    |      | 0.023 |
| D    | 5.90        |      | 6.30  | 0.232    |      | 0.248 |
| D1   | 5.30REF     |      |       | 0.209REF |      |       |
| E    | 6.40        |      | 6.80  | 0.252    |      | 0.268 |
| E1   | 4.63        |      |       | 0.182    |      |       |
| G    | 4.47        |      | 4.67  | 0.176    |      | 0.184 |
| H    | 9.50        |      | 10.70 | 0.374    |      | 0.421 |
| L    | 1.09        |      | 1.21  | 0.043    |      | 0.048 |
| L2   | 1.35        |      | 1.65  | 0.053    |      | 0.065 |
| V1   |             | 7°   |       |          | 7°   |       |
| V2   | 0°          |      | 6°    | 0°       |      | 6°    |

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