

## N-channel Enhancement Mode Power MOSFET

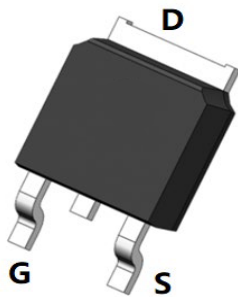
### Features

- $V_{DS} = 150V$ ,  $I_D = 40 A$   
 $R_{DS(ON)} < 45 m\Omega @ V_{GS} = 10V$   
 $R_{DS(ON)} < 50 m\Omega @ V_{GS} = 4.5V$

### General Features

- Advanced Trench Technology
- Provide Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free and Green Available

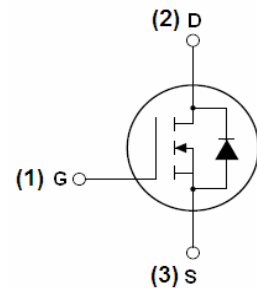
100% UIS TESTED!  
 100%  $\Delta V_{ds}$  TESTED!



TO-252-2L Top View



Pin Assignment



Schematic Diagram

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

| Parameter   | Symbol             | Limit      | Unit          |
|---|--------------------|------------|---------------|
| Drain-Source Voltage                              | $V_{DS}$           | 150        | V             |
| Gate-Source Voltage                               | $V_{GS}$           | $\pm 20$   | V             |
| Drain Current-Continuous                          | $I_D$              | 40         | A             |
| Drain Current-Continuous( $T_C = 100^\circ C$ )   | $I_D(100^\circ C)$ | 29         | A             |
| Pulsed Drain Current                              | $I_{DM}$           | 164        | A             |
| Maximum Power Dissipation                         | $P_D$              | 140        | W             |
| Derating factor                                   |                    | 0.93       | W/ $^\circ C$ |
| Single pulse avalanche energy <sup>(Note 5)</sup> | $E_{AS}$           | 310        | mJ            |
| Operating Junction and Storage Temperature Range  | $T_J, T_{STG}$     | -55 To 175 | $^\circ C$    |

### Thermal Characteristic

|  |                 |      |              |
|--|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | $R_{\theta JC}$ | 1.07 | $^\circ C/W$ |
|--|-----------------|------|--------------|

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

| Parameter                                 | Symbol              | Condition   | Min | Typ  | Max  | Unit |
|---|---------------------|---|-----|------|------|------|
| <b>Off Characteristics</b>                |                     |   |     |      |      |      |
| Drain-Source Breakdown Voltage            | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA   | 150 | 170  | -    | V    |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>    | V <sub>DS</sub> =150V, V <sub>GS</sub> =0V  | -   | -    | 1    | μA   |
| Gate-Body Leakage Current                 | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V  | -   | -    | ±100 | nA   |
| <b>On Characteristics</b> (Note 3)        |                     |   |     |      |      |      |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA  | 2.5 |      | 4.5  | V    |
| Drain-Source On-State Resistance          | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =18A   | -   |      | 45   | mΩ   |
| Forward Transconductance                  | g <sub>FS</sub>     | V <sub>DS</sub> =15V, I <sub>D</sub> =18A   | 38  | -    | -    | S    |
| <b>Dynamic Characteristics</b> (Note 4)   |                     |   |     |      |      |      |
| Input Capacitance                         | C <sub>ISS</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>F=1.0MHz  | -   | 4200 | -    | PF   |
| Output Capacitance                        | C <sub>OSS</sub>    |   | -   | 203  | -    | PF   |
| Reverse Transfer Capacitance              | C <sub>rss</sub>    |   | -   | 96   | -    | PF   |
| <b>Switching Characteristics</b> (Note 4) |                     |   |     |      |      |      |
| Turn-on Delay Time                        | t <sub>d(on)</sub>  | V <sub>DD</sub> =30V, I <sub>D</sub> =2A, R <sub>L</sub> =15Ω<br>V <sub>GS</sub> =10V, R <sub>G</sub> =2.5Ω | -   | 17.8 | -    | nS   |
| Turn-on Rise Time                         | t <sub>r</sub>      |   | -   | 11.8 | -    | nS   |
| Turn-Off Delay Time                       | t <sub>d(off)</sub> |   | -   | 56   | -    | nS   |
| Turn-Off Fall Time                        | t <sub>f</sub>      |   | -   | 14.6 | -    | nS   |
| Total Gate Charge                         | Q <sub>g</sub>      | V <sub>DS</sub> =30V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V  |     | 105  | -    | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>     |   |     | 21   | -    | nC   |
| Gate-Drain Charge                         | Q <sub>gd</sub>     |   |     | 31.5 | -    | nC   |
| <b>Drain-Source Diode Characteristics</b> |                     |   |     |      |      |      |
| Diode Forward Voltage (Note 3)            | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =18A  | -   | 0.82 | 1.2  | V    |
| Diode Forward Current (Note 2)            | I <sub>S</sub>      |   | -   | -    | 40   | A    |
| Reverse Recovery Time                     | t <sub>rr</sub>     | T <sub>J</sub> = 25°C, I <sub>F</sub> = 18A<br>di/dt = 100A/μs (Note 3)                                     | -   | 70   | -    | nS   |
| Reverse Recovery Charge                   | Q <sub>rr</sub>     |   | -   | 230  | -    | nC   |
| Forward Turn-On Time                      | t <sub>on</sub>     | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)  |     |      |      |      |

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω

Typical Electrical and Thermal Characteristics (Curves)

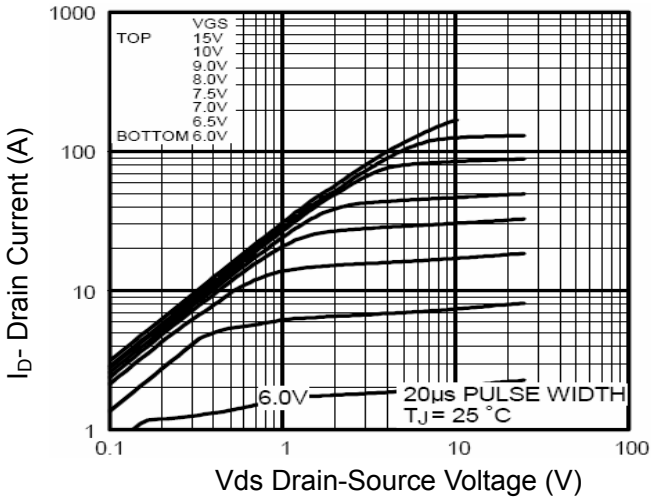


Figure 1 Output Characteristics

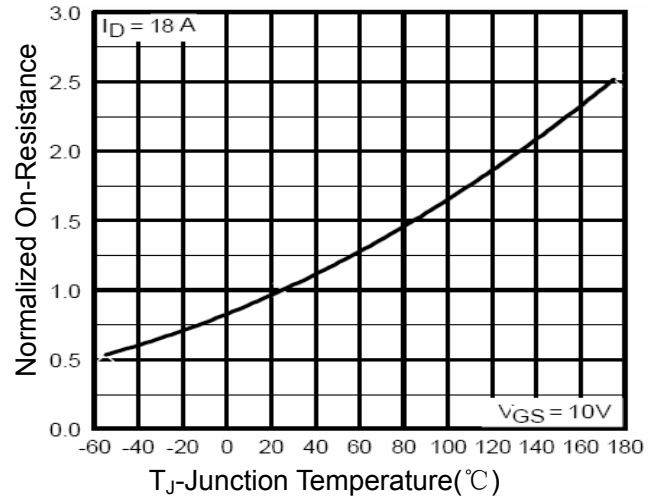


Figure 4  $R_{dson}$ -Junction Temperature

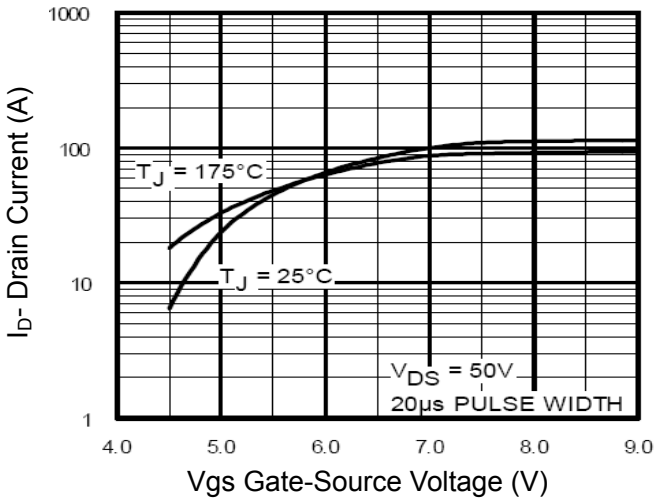


Figure 2 Transfer Characteristics

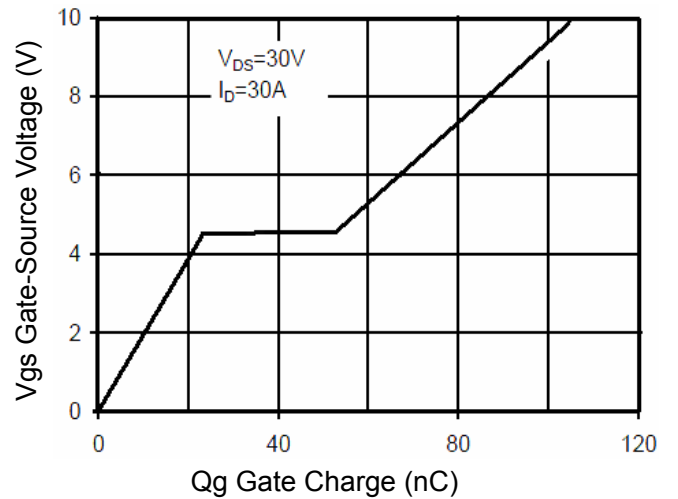


Figure 5 Gate Charge

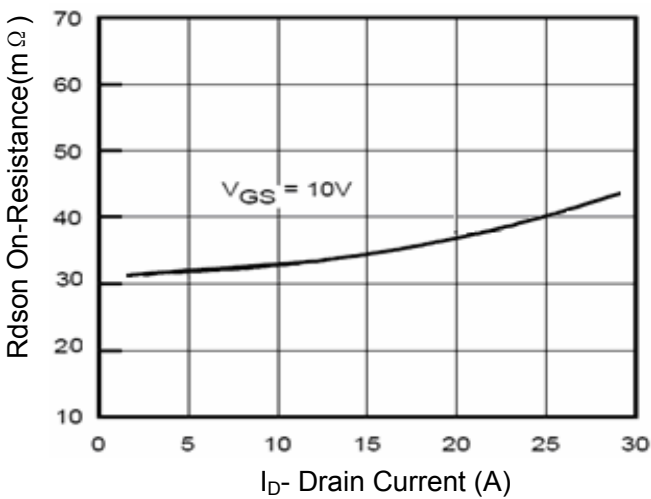


Figure 3  $R_{dson}$ - Drain Current

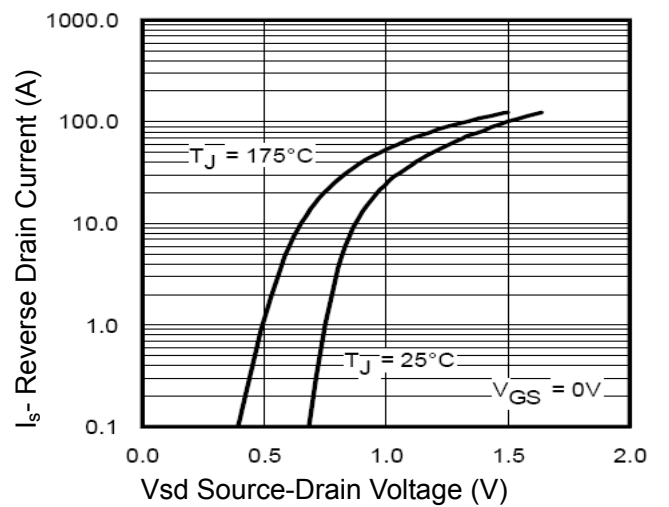


Figure 6 Source- Drain Diode Forward

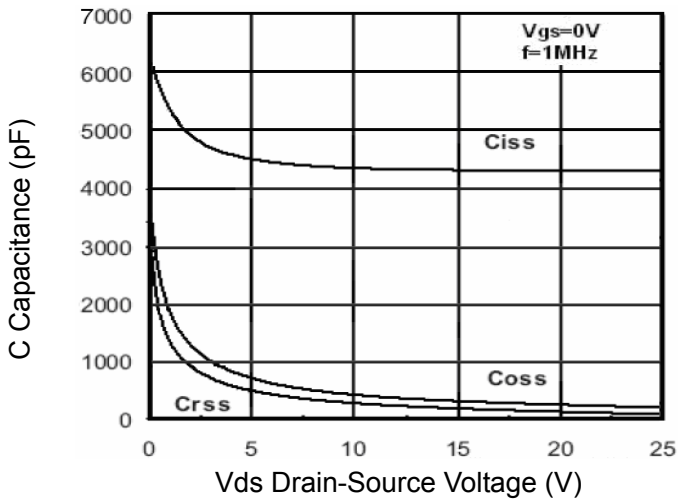


Figure 7 Capacitance vs Vds

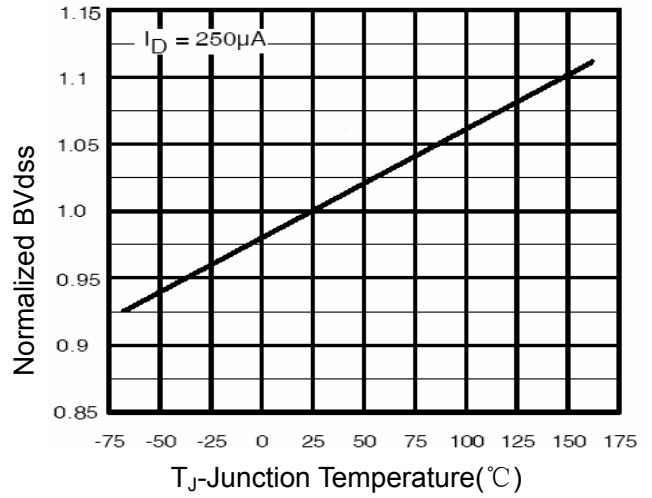


Figure 9  $BV_{DSS}$  vs Junction Temperature

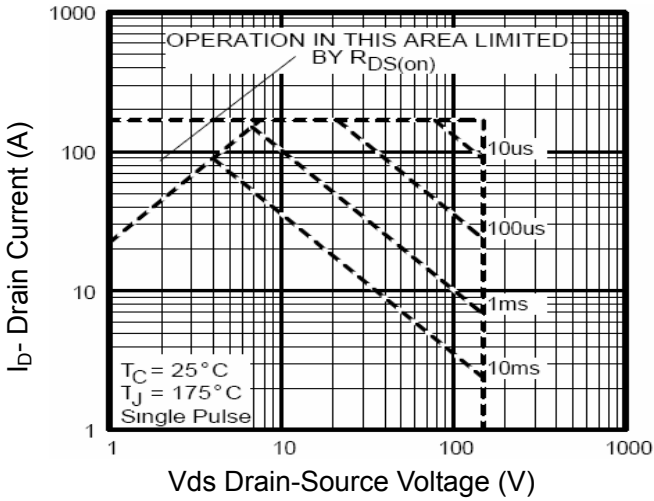


Figure 8 Safe Operation Area

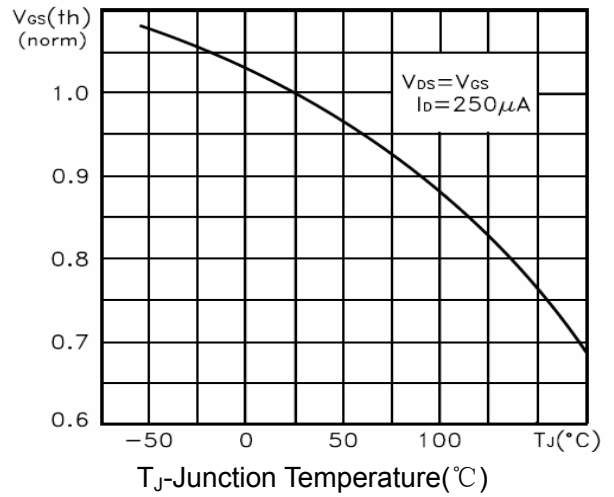


Figure 10  $V_{GS(th)}$  vs Junction Temperature

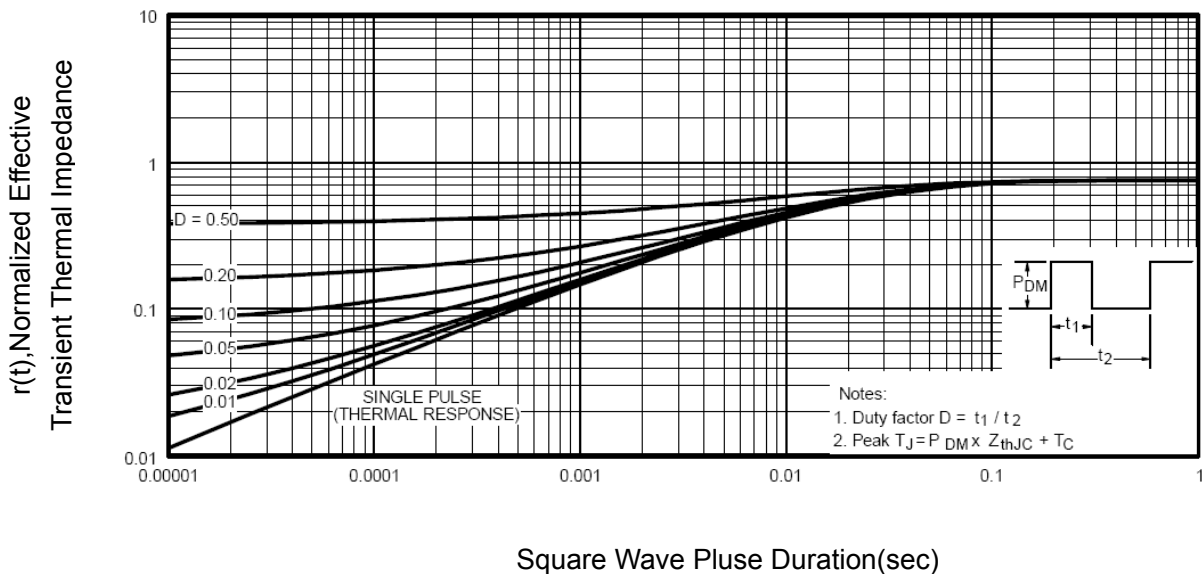


Figure 11 Normalized Maximum Transient Thermal Impedance