

## N-channel Enhancement Mode Power MOSFET

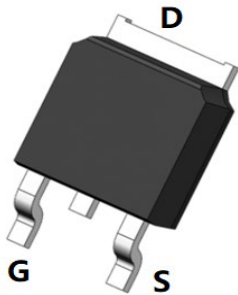
### Features

- $V_{DS} = 60V$ ,  $I_D = 30A$   
 $R_{DS(ON)} < 27\text{ m}\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)} < 33\text{ m}\Omega$  @  $V_{GS} = 4.5V$

### General Features

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

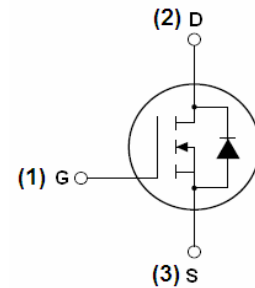
100% UIS TESTED!  
100%  $\Delta V_{ds}$  TESTED!



TO-252-2L Top View



Pin Assignment



Schematic Diagram

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

| Parameter                                             | Symbol                   | Limit      | Unit                |
|-------------------------------------------------------|--------------------------|------------|---------------------|
| Drain-Source Voltage                                  | $V_{DS}$                 | 60         | V                   |
| Gate-Source Voltage                                   | $V_{GS}$                 | $\pm 20$   | V                   |
| Drain Current-Continuous                              | $I_D$                    | 30         | A                   |
| Drain Current-Continuous( $T_C = 100^\circ\text{C}$ ) | $I_D(100^\circ\text{C})$ | 20         | A                   |
| Pulsed Drain Current                                  | $I_{DM}$                 | 74         | A                   |
| Maximum Power Dissipation                             | $P_D$                    | 50         | W                   |
| Derating factor                                       |                          | 0.33       | W/ $^\circ\text{C}$ |
| Single pulse avalanche energy <sup>(Note 5)</sup>     | $E_{AS}$                 | 144        | mJ                  |
| Operating Junction and Storage Temperature Range      | $T_J, T_{STG}$           | -55 To 175 | $^\circ\text{C}$    |

### Thermal Characteristic

|                                                          |                 |   |                           |
|----------------------------------------------------------|-----------------|---|---------------------------|
| Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | $R_{\theta JC}$ | 3 | $^\circ\text{C}/\text{W}$ |
|----------------------------------------------------------|-----------------|---|---------------------------|

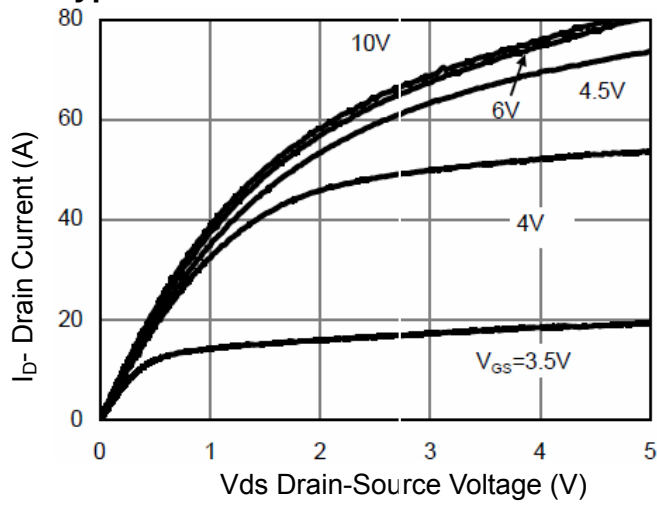
### Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

| Parameter                          |  | Symbol              | Condition                                                                              | Min | Typ  | Max  | Unit |
|------------------------------------|--|---------------------|----------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                |  |                     |                                                                                        |     |      |      |      |
| Drain-Source Breakdown Voltage     |  | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                              | 60  | -    | -    | V    |
| Zero Gate Voltage Drain Current    |  | I <sub>DSS</sub>    | V <sub>DS</sub> =60V, 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   |
| On Characteristics (Note 3)        |  |                     |                                                                                        |     |      |      |      |
| Gate Threshold Voltage             |  | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 1.0 |      | 3.0  | V    |
| Drain-Source On-State Resistance   |  | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                              | -   | 27   |      | mΩ   |
| Forward Transconductance           |  | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =20A                                               | -   | 30   | -    | S    |
| Dynamic Characteristics (Note4)    |  |                     |                                                                                        |     |      |      |      |
| Input Capacitance                  |  | C <sub>ISS</sub>    | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                 | -   | 1900 | -    | PF   |
| Output Capacitance                 |  | C <sub>OSS</sub>    |                                                                                        | -   | 130  | -    | PF   |
| Reverse Transfer Capacitance       |  | C <sub>RSS</sub>    |                                                                                        | -   | 95   | -    | PF   |
| Switching Characteristics (Note 4) |  |                     |                                                                                        |     |      |      |      |
| Turn-on Delay Time                 |  | t <sub>d(on)</sub>  | V <sub>DS</sub> =30V, R <sub>L</sub> =1.5Ω<br>V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω | -   | 5    | -    | nS   |
| Turn-on Rise Time                  |  | t <sub>r</sub>      |                                                                                        | -   | 2.6  | -    | nS   |
| Turn-Off Delay Time                |  | t <sub>d(off)</sub> |                                                                                        | -   | 16.1 | -    | nS   |
| Turn-Off Fall Time                 |  | t <sub>f</sub>      |                                                                                        | -   | 2.3  | -    | nS   |
| Total Gate Charge                  |  | Q <sub>g</sub>      | V <sub>DS</sub> =30V, I <sub>D</sub> =20A,<br>V <sub>GS</sub> =10V                     | -   | 30   |      | nC   |
| Gate-Source Charge                 |  | Q <sub>gs</sub>     |                                                                                        | -   | 4.5  |      | nC   |
| Gate-Drain Charge                  |  | Q <sub>gd</sub>     |                                                                                        | -   | 7.5  |      | nC   |
| Drain-Source Diode Characteristics |  |                     |                                                                                        |     |      |      |      |
| Diode Forward Voltage (Note 3)     |  | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =30A                                               | -   |      | 1.2  | V    |
| Diode Forward Current (Note 2)     |  | I <sub>S</sub>      |                                                                                        | -   | -    | 30   | A    |
| Reverse Recovery Time              |  | t <sub>rr</sub>     | TJ = 25°C, IF =20A                                                                     | -   | 35   | -    | nS   |
| Reverse Recovery Charge            |  | Q <sub>rr</sub>     | di/dt = 100A/μs (Note3)                                                                | -   | 53   | -    | nC   |
| Forward Turn-On Time               |  | t <sub>on</sub>     | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)                   |     |      |      |      |

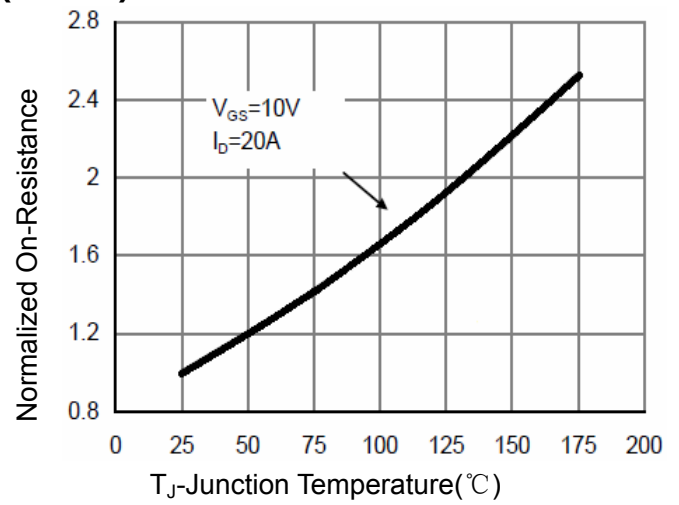
### Notes:

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>=30V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω

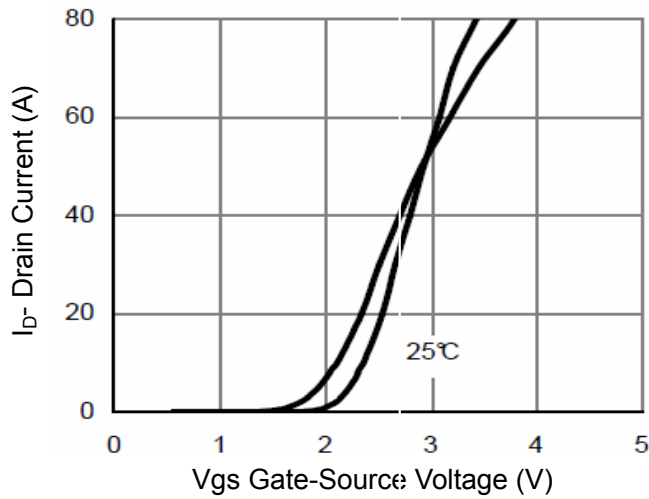
### Typical Electrical and Thermal Characteristics (Curves)



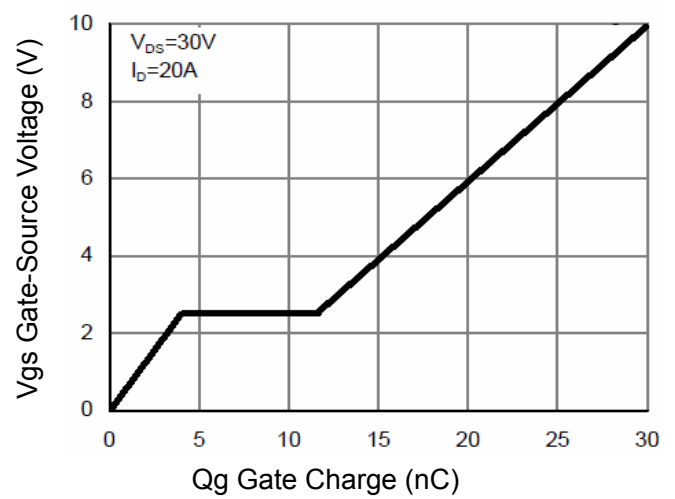
**Figure 1 Output Characteristics**



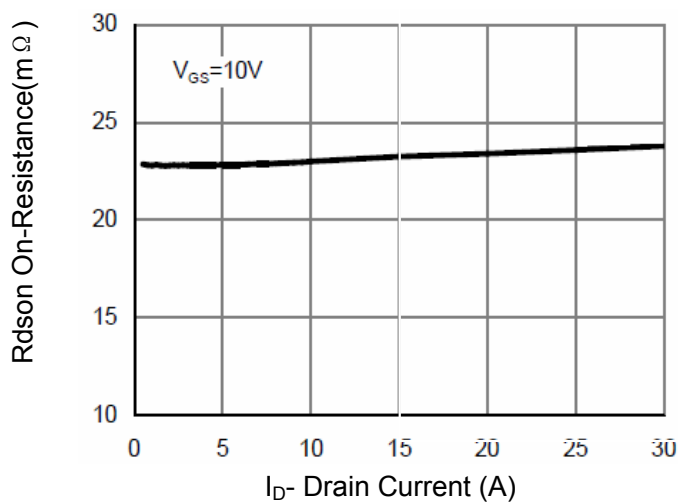
**Figure 4 Rdson-Junction Temperature**



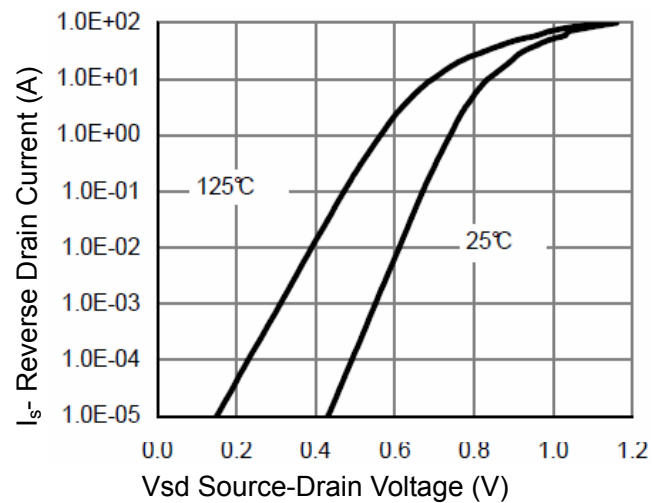
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**



**Figure 3 Rdson- Drain Current**



**Figure 6 Source- Drain Diode Forward**

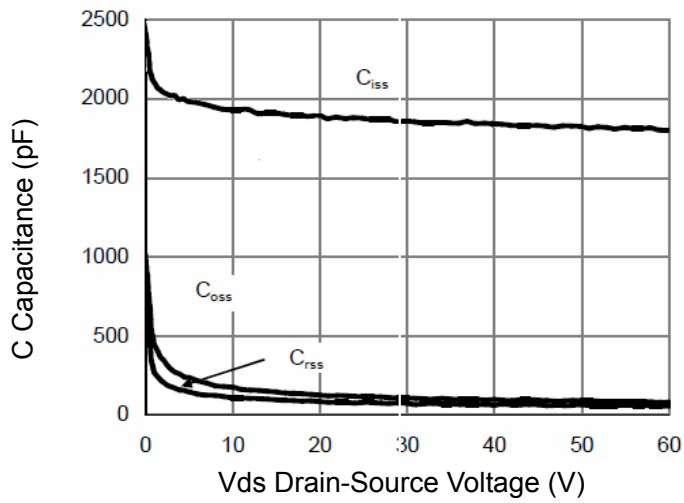


Figure 7 Capacitance vs Vds

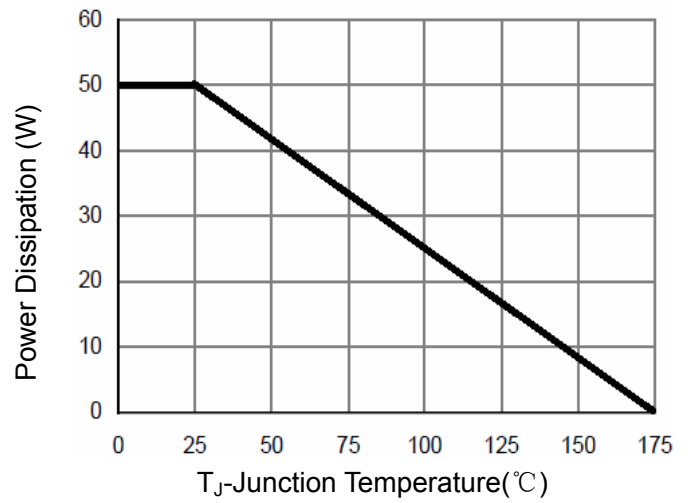


Figure 9 Power De-rating

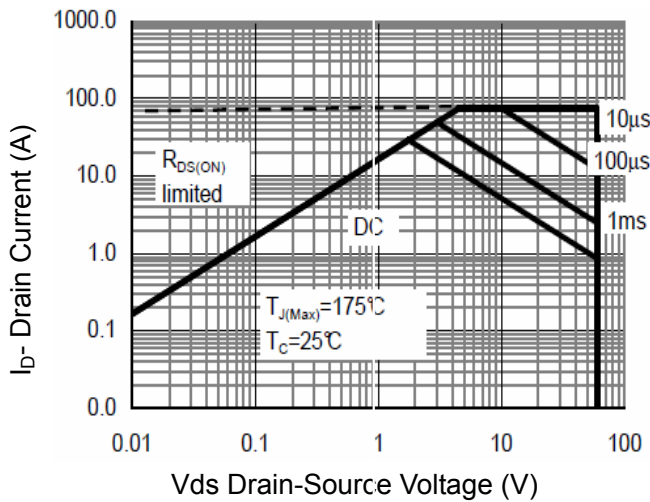


Figure 8 Safe Operation Area

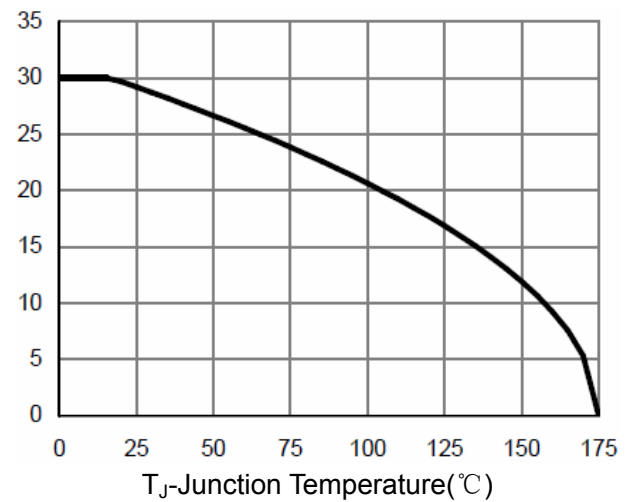


Figure 10  $V_{GS(th)}$  vs Junction Temperature

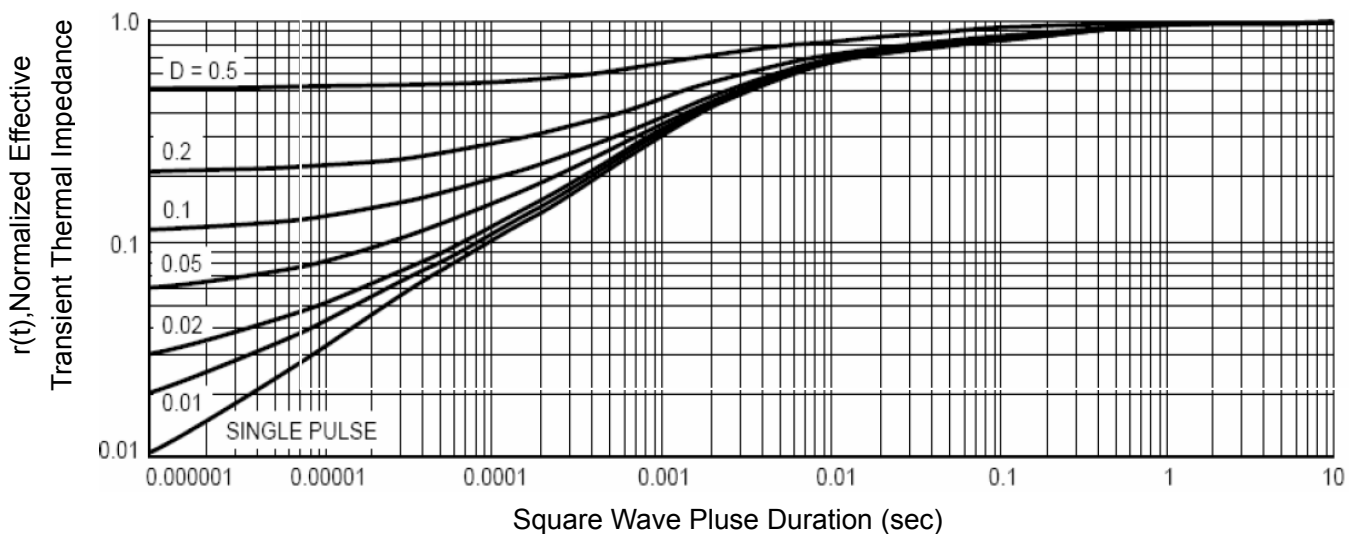


Figure 11 Normalized Maximum Transient Thermal Impedance