

## N-channel Enhancement Mode Power MOSFET

### Features

- $V_{DS} = 150V$ ,  $I_D = 20 A$   
 $R_{DS(ON)} < 70 m\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)} < 80 m\Omega$  @  $V_{GS} = 4.5V$

### General Features

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

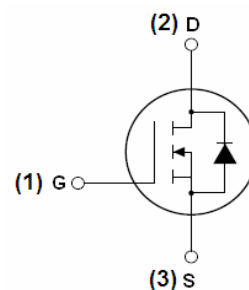
100% UIS TESTED!  
 100%  $\Delta V_{ds}$  TESTED!



TO-252-2L Top View



Pin Assignment



Schematic Diagram

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

| Symbol                   | Parameter                                             | Limit      | Unit                |
|--------------------------|-------------------------------------------------------|------------|---------------------|
| $V_{DS}$                 | Drain-Source Voltage                                  | 150        | V                   |
| $V_{GS}$                 | Gate-Source Voltage                                   | $\pm 20$   | V                   |
| $I_D$                    | Drain Current-Continuous                              | 20         | A                   |
| $I_D(100^\circ\text{C})$ | Drain Current-Continuous( $T_C = 100^\circ\text{C}$ ) | 14         | A                   |
| $I_{DM}$                 | Pulsed Drain Current                                  | 40         | A                   |
| $P_D$                    | Maximum Power Dissipation                             | 90         | W                   |
|                          | Derating factor                                       | 0.6        | W/ $^\circ\text{C}$ |
| $E_{AS}$                 | Single pulse avalanche energy <sup>(Note 5)</sup>     | 80         | mJ                  |
| $T_J, T_{STG}$           | Operating Junction and Storage Temperature Range      | -55 To 175 | $^\circ\text{C}$    |

### Thermal Characteristic

|                 |                                                          |     |                           |
|-----------------|----------------------------------------------------------|-----|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup> | 1.7 | $^\circ\text{C}/\text{W}$ |
|-----------------|----------------------------------------------------------|-----|---------------------------|

# Electrical Characteristics ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Symbol                             |                                  | Parameter                                 | Condition                                                                              | Min | Typ  | Max  | Unit |
|------------------------------------|----------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                |                                  |                                           |                                                                                        |     |      |      |      |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage   |                                           | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                              | 150 | 165  | -    | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current  |                                           | V <sub>DS</sub> =150V, V <sub>GS</sub> =0V                                             | -   | -    | 1    | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current        |                                           | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                             | -   | -    | ±100 | nA   |
| On Characteristics (Note 3)        |                                  |                                           |                                                                                        |     |      |      |      |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage           |                                           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 2   |      | 4    | V    |
| R <sub>DS(ON)</sub>                | Drain-Source On-State Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =10A | -                                                                                      |     | 70   | mΩ   |      |
|                                    |                                  | V <sub>GS</sub> =7V, I <sub>D</sub> =10A  |                                                                                        |     | 80   |      |      |
| g <sub>FS</sub>                    | Forward Transconductance         |                                           | V <sub>DS</sub> =5V, I <sub>D</sub> =10A                                               | -   | 20   | -    | S    |
| Dynamic Characteristics (Note4)    |                                  |                                           |                                                                                        |     |      |      |      |
| C <sub>iss</sub>                   | Input Capacitance                |                                           | V <sub>DS</sub> =75V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                 | -   | 1810 | -    | PF   |
| C <sub>oss</sub>                   | Output Capacitance               |                                           |                                                                                        | -   | 61   | -    | PF   |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance     |                                           |                                                                                        | -   | 45   | -    | PF   |
| Switching Characteristics (Note 4) |                                  |                                           |                                                                                        |     |      |      |      |
| t <sub>d(on)</sub>                 | Turn-on Delay Time               |                                           | V <sub>DD</sub> =75V, R <sub>L</sub> =5Ω<br>V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω | -   | 15.5 | -    | nS   |
| t <sub>r</sub>                     | Turn-on Rise Time                |                                           |                                                                                        | -   | 8.5  | -    | nS   |
| t <sub>d(off)</sub>                | Turn-Off Delay Time              |                                           |                                                                                        | -   | 19.5 | -    | nS   |
| t <sub>f</sub>                     | Turn-Off Fall Time               |                                           |                                                                                        | -   | 7    | -    | nS   |
| Q <sub>g</sub>                     | Total Gate Charge                |                                           | V <sub>DS</sub> =75V, I <sub>D</sub> =10A,<br>V <sub>GS</sub> =10V                     | -   | 45   | -    | nC   |
| Q <sub>gs</sub>                    | Gate-Source Charge               |                                           |                                                                                        | -   | 9    | -    | nC   |
| Q <sub>gd</sub>                    | Gate-Drain Charge                |                                           |                                                                                        | -   | 12   | -    | nC   |
| Drain-Source Diode Characteristics |                                  |                                           |                                                                                        |     |      |      |      |
| V <sub>SD</sub>                    | Diode Forward Voltage (Note 3)   |                                           | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                               | -   | -    | 1.2  | V    |
| I <sub>S</sub>                     | Diode Forward Current (Note 2)   |                                           | -                                                                                      | -   | -    | 20   | A    |
| t <sub>rr</sub>                    | Reverse Recovery Time            |                                           | T <sub>J</sub> = 25°C, I <sub>F</sub> = 10A<br>di/dt = 100A/μs (Note3)                 | -   | 32   | -    | nS   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge          |                                           |                                                                                        | -   | 53   | -    | nC   |
| t <sub>on</sub>                    | Forward Turn-On Time             |                                           | 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,  $t \leq 10$  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:  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

## Typical Electrical and Thermal Characteristics (Curves)

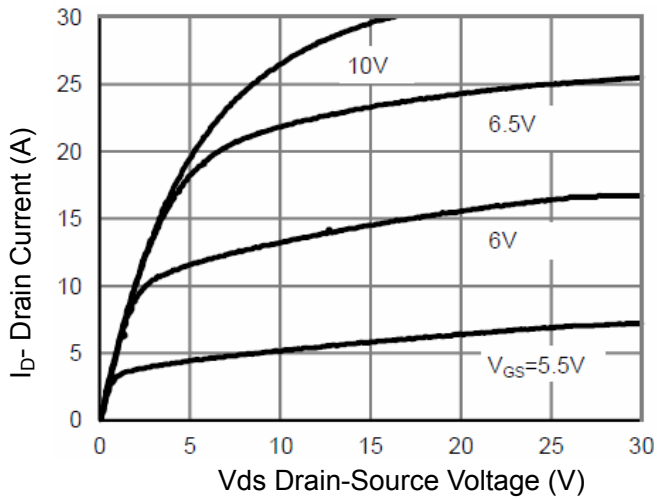


Figure 1 Output Characteristics

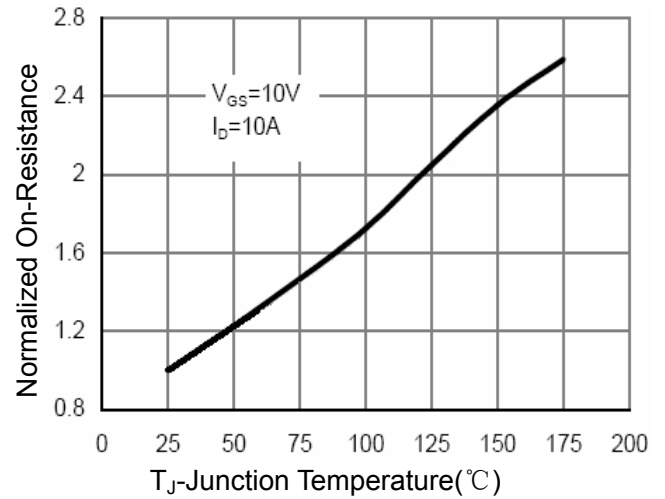


Figure 4  $R_{DS(on)}$ -Junction Temperature

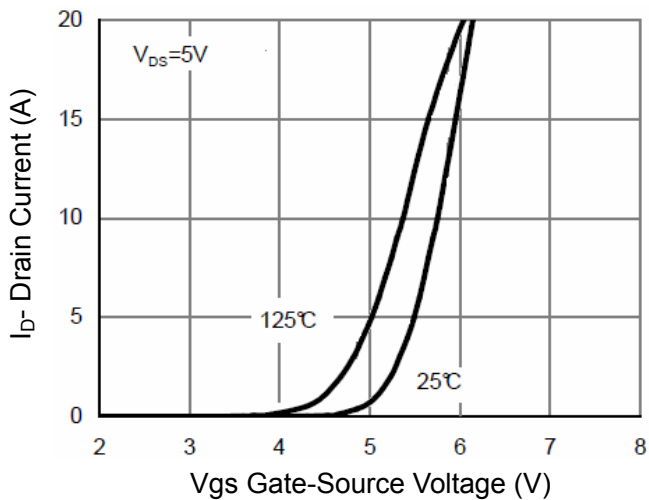


Figure 2 Transfer Characteristics

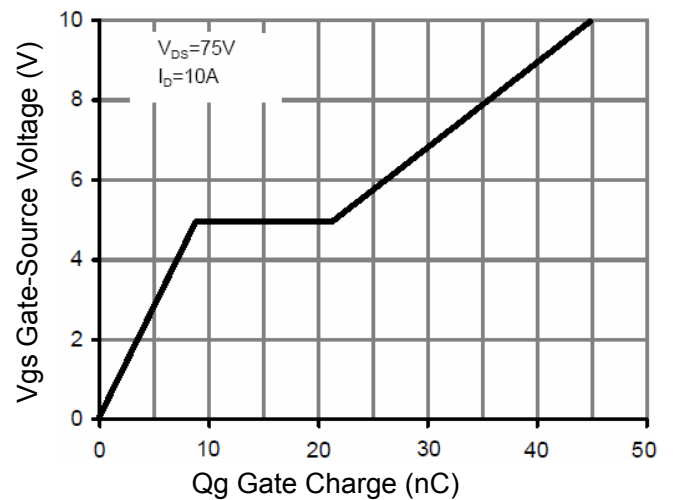


Figure 5 Gate Charge

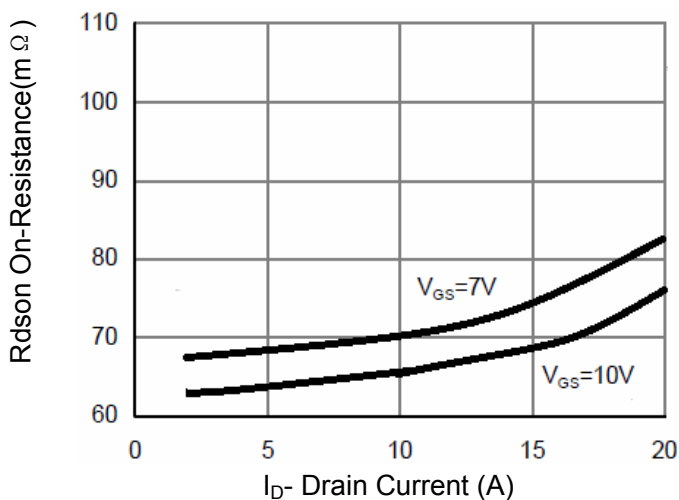


Figure 3  $R_{DS(on)}$ - Drain Current

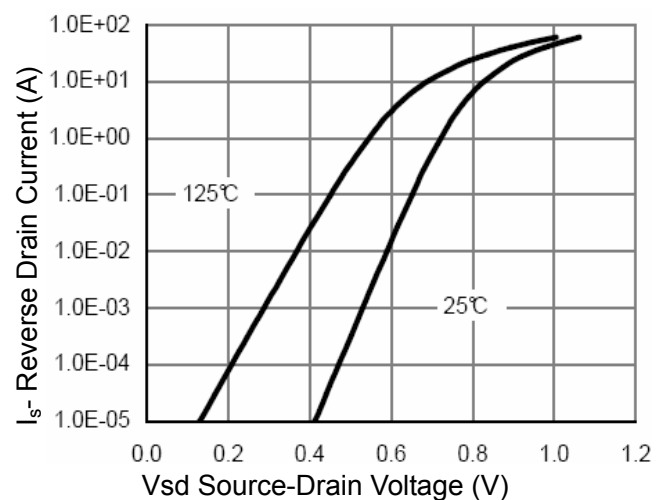


Figure 6 Source- Drain Diode Forward

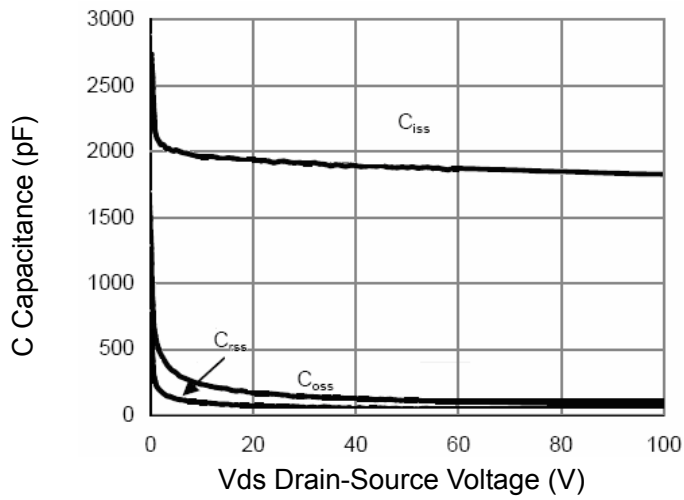


Figure 7 Capacitance vs Vds

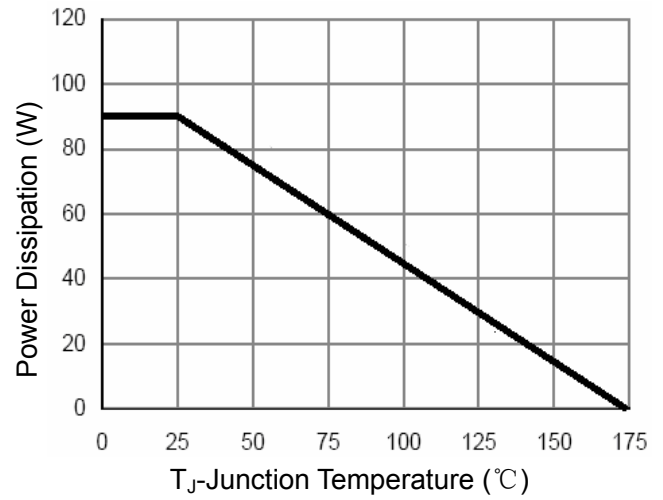


Figure 9 Power De-rating

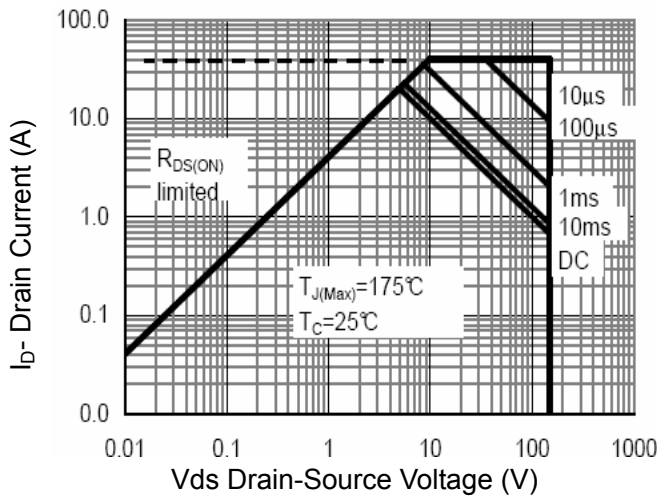


Figure 8 Safe Operation Area

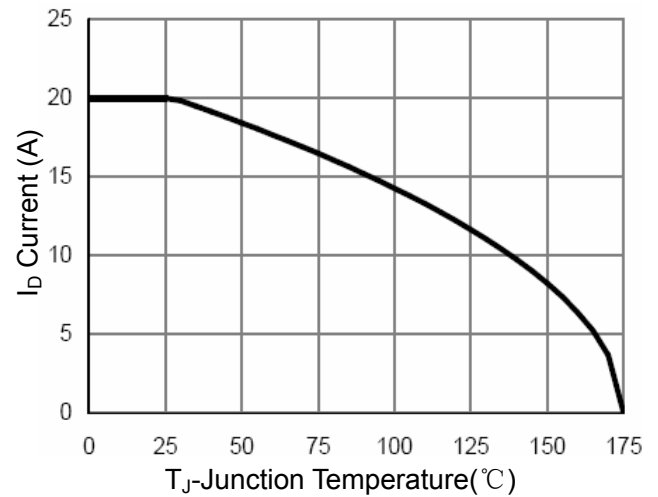


Figure 10 ID Current- Junction Temperature

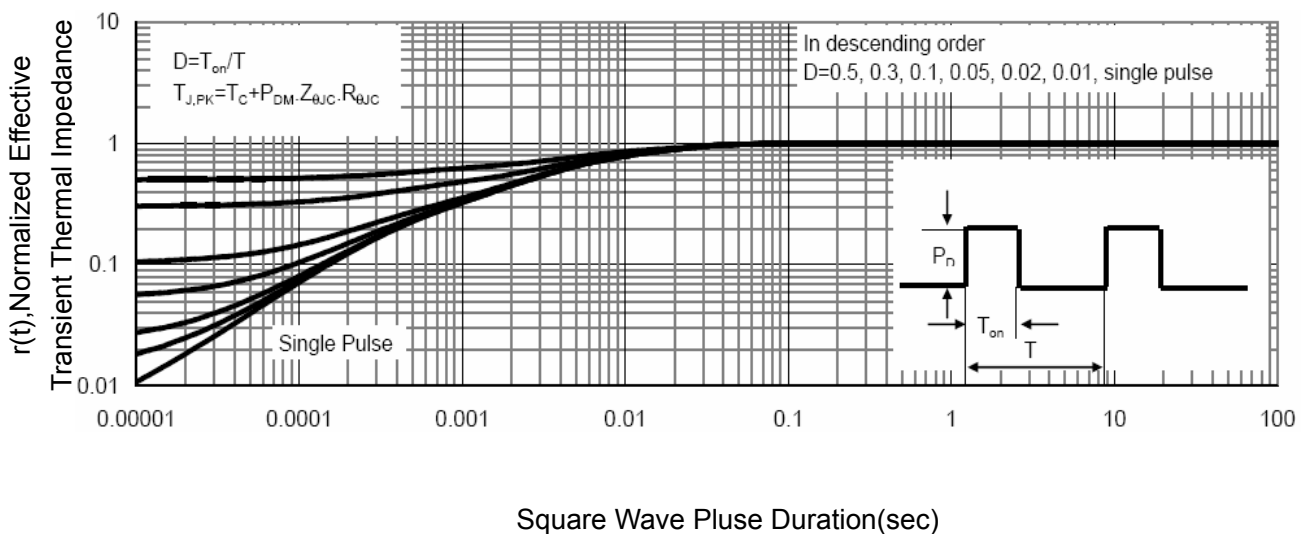


Figure 11 Normalized Maximum Transient Thermal Impedance