

## N-Channel Enhancement Mode Power MOSFET

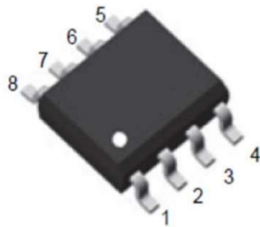
### Features

- $V_{DS} = 20V$ ,  $I_D = 12A$   
 $R_{DS(ON)} < 6 m\Omega$  @  $V_{GS} = 4.5V$   
 $R_{DS(ON)} < 8 m\Omega$  @  $V_{GS} = 2.5V$

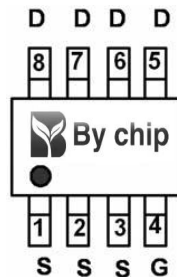
### General Features

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

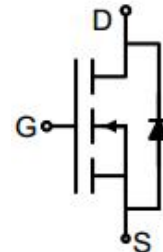
100% UIS TESTED!  
 100%  $\Delta V_{ds}$  TESTED!



SOP-8



pin assignment



Schematic diagram

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

| Parameter  | Symbol             | Limit      | Unit       |
|--|--------------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$           | 20         | V          |
| Gate-Source Voltage                              | $V_{GS}$           | $\pm 12$   | V          |
| Drain Current-Continuous                         | $I_D$              | 12         | A          |
| Drain Current-Continuous( $T_A = 100^\circ C$ )  | $I_D(100^\circ C)$ | 8          | A          |
| Pulsed Drain Current                             | $I_{DM}$           | 40         | A          |
| Maximum Power Dissipation                        | $P_D$              | 2.5        | W          |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$     | -55 To 150 | $^\circ C$ |

### Thermal Characteristic

|   |                 |    |              |
|---|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | $R_{\theta JA}$ | 50 | $^\circ C/W$ |
|---|-----------------|----|--------------|

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

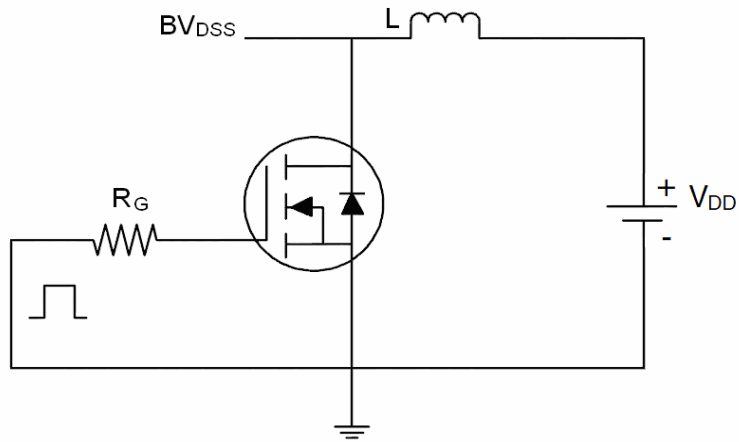
| Parameter                                 | Symbol       | Condition  | Min | Typ  | Max       | Unit       |
|---|--------------|--|-----|------|-----------|------------|
| <b>Off Characteristics</b>                |              |  |     |      |           |            |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                              | 20  | -    | -         | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=20V, V_{GS}=0V$                                | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$                            | -   | -    | $\pm 100$ | nA         |
| <b>On Characteristics</b> (Note 3)        |              |  |     |      |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                          | 0.5 |      | 2.0       | V          |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=6A$                                  | -   |      | 6         | m $\Omega$ |
|   |              | $V_{GS}=2.5V, I_D=5A$                                  |     |      | 8         | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=10V, I_D=6A$                                   | 20  | -    | -         | S          |
| <b>Dynamic Characteristics</b> (Note 4)   |              |  |     |      |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0\text{MHz}$          | -   | 2000 | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |  | -   | 402  | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |  | -   | 170  | -         | PF         |
| <b>Switching Characteristics</b> (Note 4) |              |  |     |      |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=10V, I_D=6A$<br>$V_{GS}=4.5V, R_{GEN}=1\Omega$ | -   | 25   | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |  | -   | 15   | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |  | -   | 25   | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |  | -   | 15   | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=6A,$<br>$V_{GS}=10V$                  | -   | 42   | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |  | -   | 10.8 | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |  | -   | 9.2  | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |  |     |      |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=6A$                                    | -   | -    | 1.2       | V          |
| Diode Forward Current (Note 2)            | $I_S$        |  | -   | -    | 12        | A          |

**Notes:**

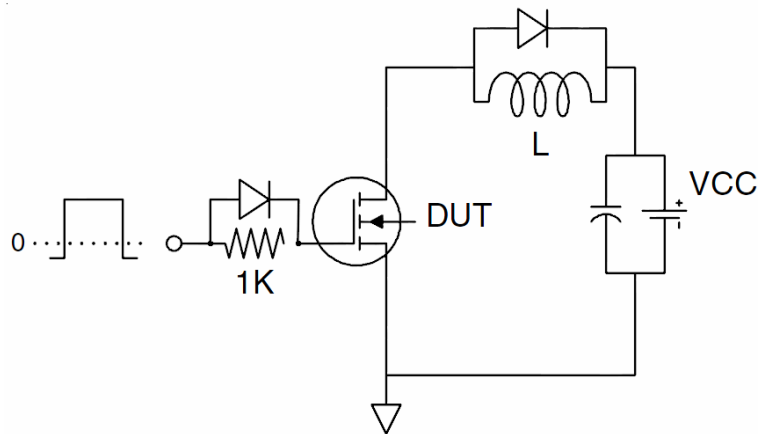
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

**Test Circuit**

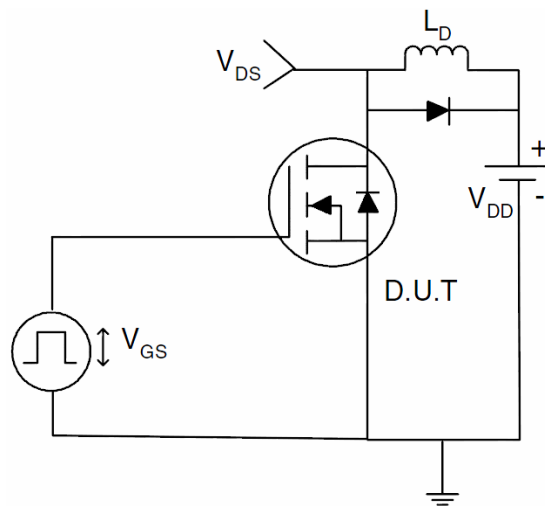
**1) E<sub>AS</sub> Test Circuits**



**2) Gate Charge Test Circuit**



**3) Switch Time Test Circuit**



Typical Electrical and Thermal Characteristics (Curves)

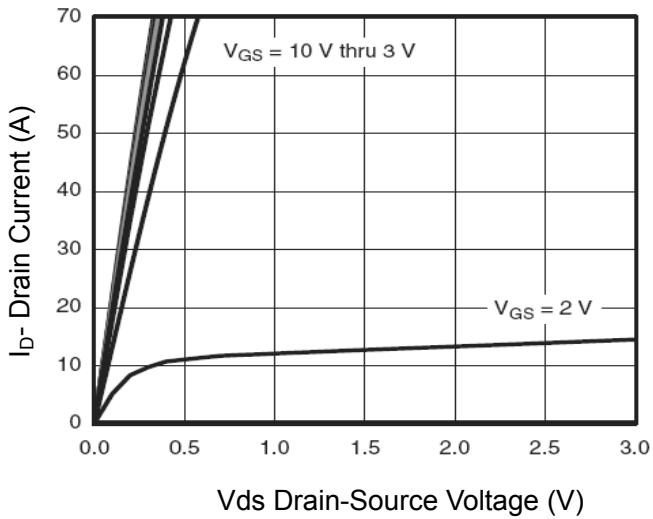


Figure 1 Output Characteristics

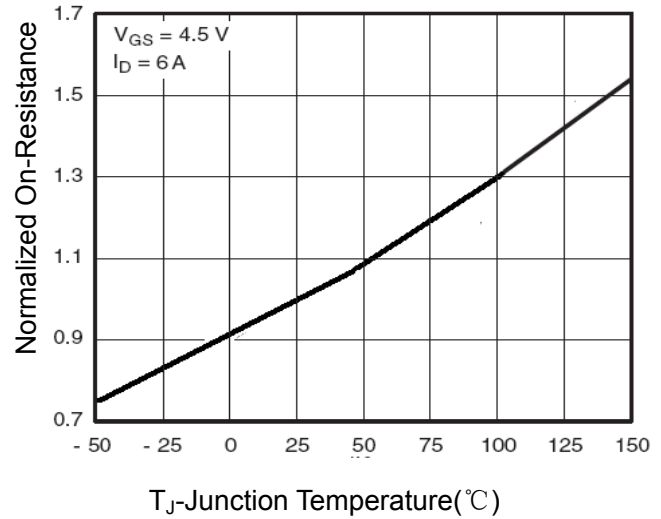


Figure 4  $R_{dson}$ -Junction Temperature

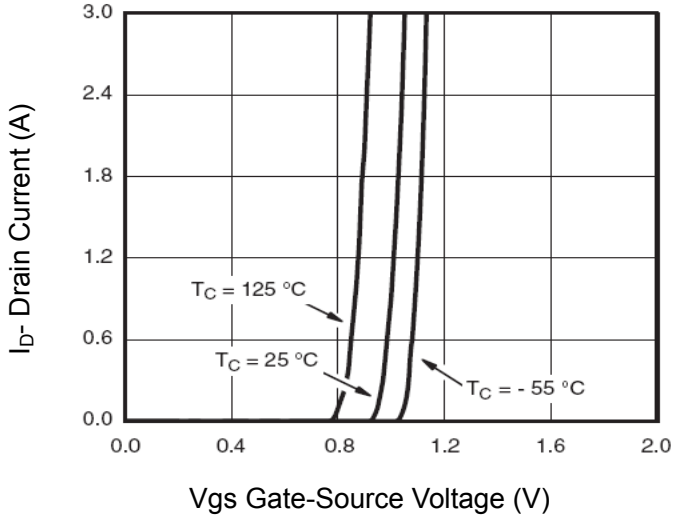


Figure 2 Transfer Characteristics

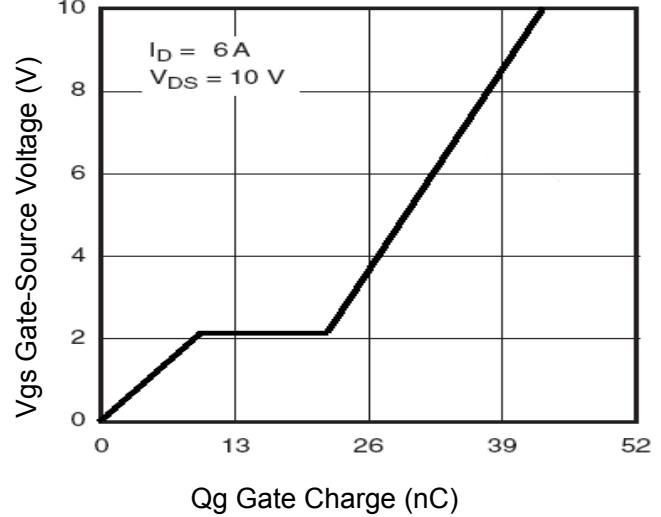


Figure 5 Gate Charge

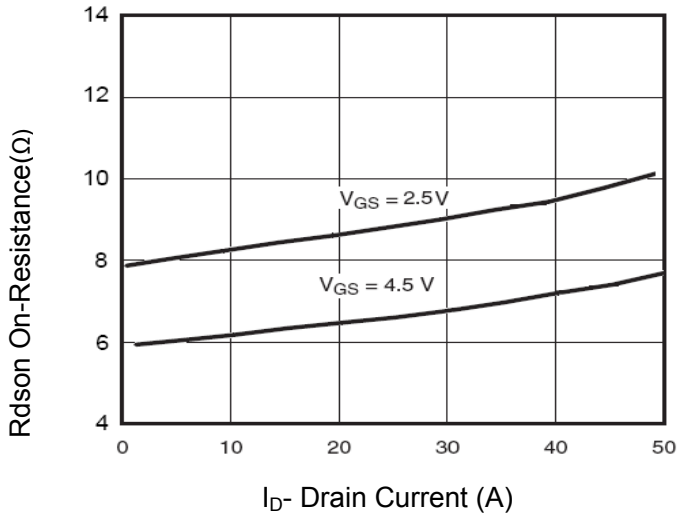


Figure 3  $R_{dson}$ - Drain Current

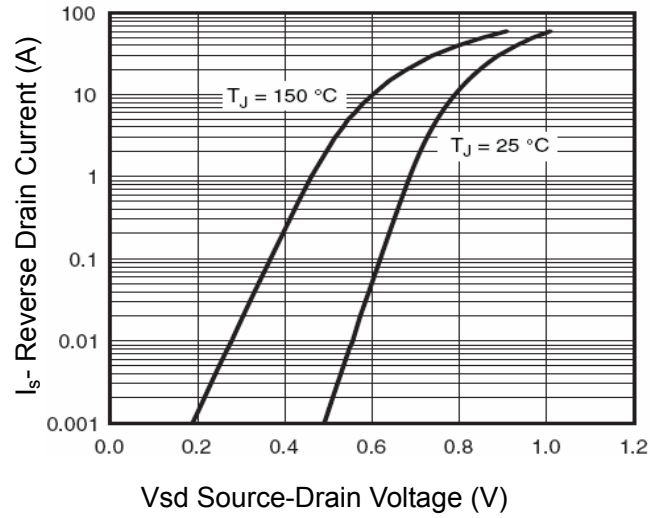


Figure 6 Source- Drain Diode Forward

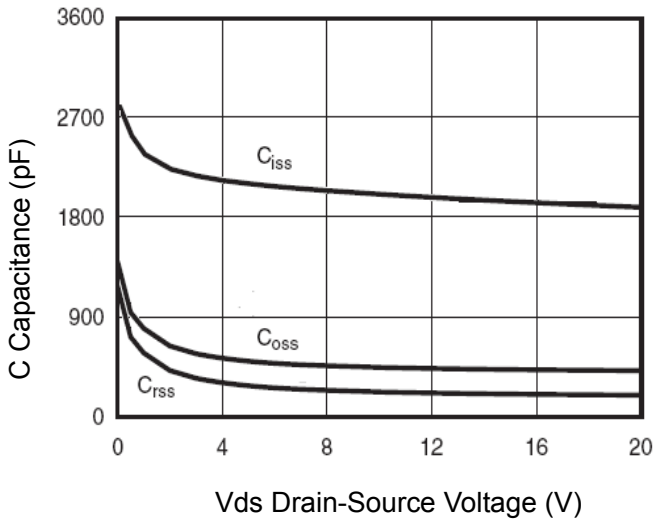


Figure 7 Capacitance vs Vds

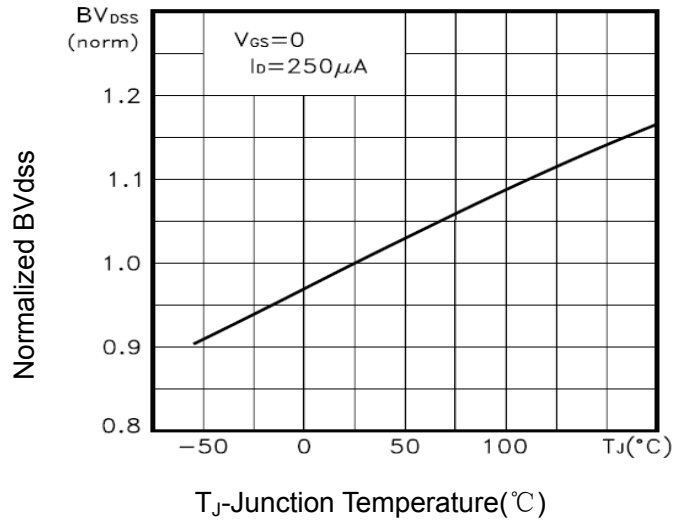


Figure 9  $BV_{DSS}$  vs Junction Temperature

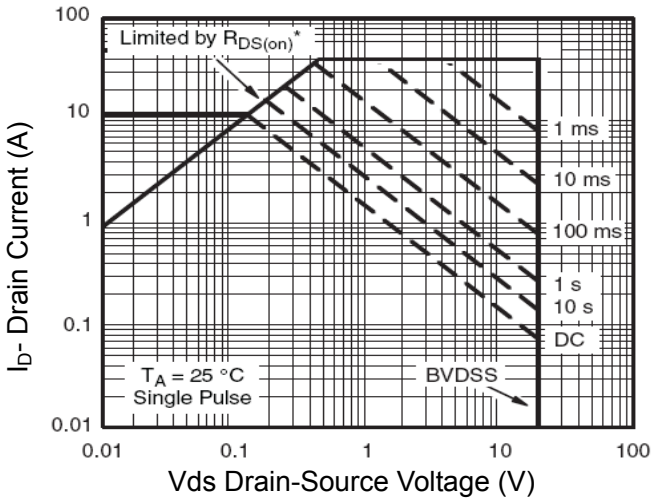


Figure 8 Safe Operation Area

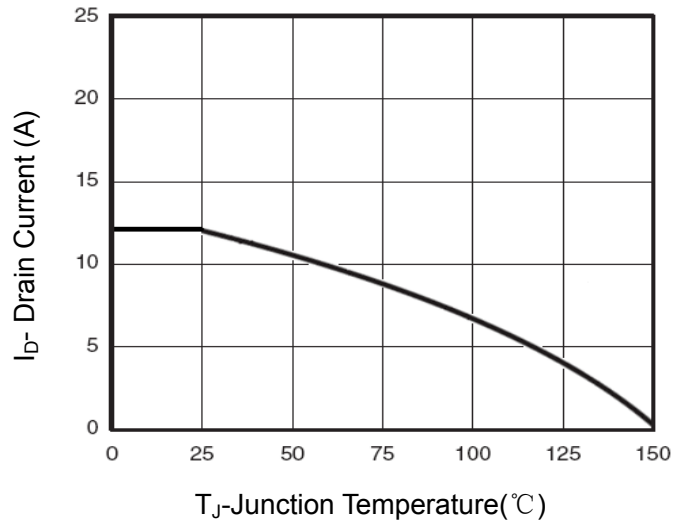


Figure 10 Current vs Junction Temperature

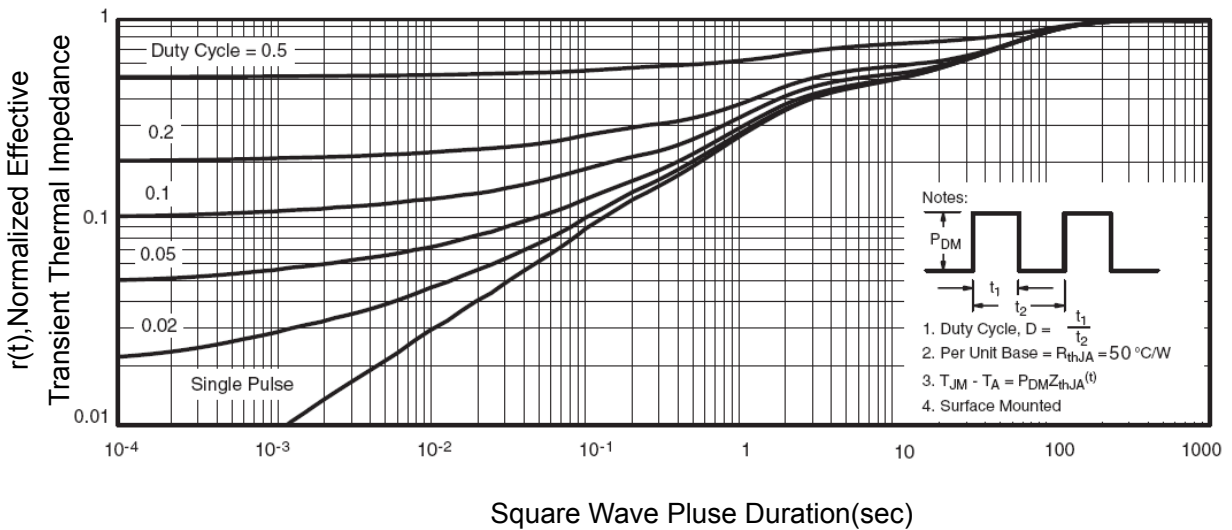


Figure 11 Normalized Maximum Transient Thermal Impedance