

## P-channel Enhancement Mode Power MOSFET

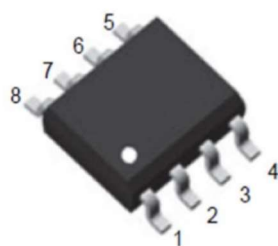
### Features

- $V_{DS} = -40V$ ,  $I_D = -13A$   
 $R_{DS(ON)} < 12m\Omega$  @  $V_{GS} = -10V$   
 $R_{DS(ON)} < 14m\Omega$  @  $V_{GS} = -4.5V$

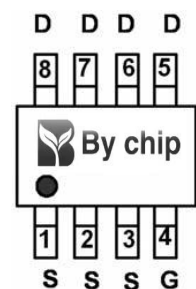
### General Features

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

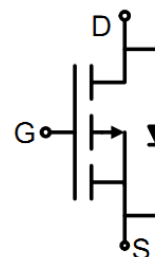
100% UIS TESTED!  
100%  $\Delta V_{ds}$  TESTED!



SOP-8



pin assignment



Schematic diagram

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

| Parameter                                        | Symbol             | Limit      | Unit       |
|--------------------------------------------------|--------------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$           | -40        | V          |
| Gate-Source Voltage                              | $V_{GS}$           | $\pm 20$   | V          |
| Drain Current-Continuous                         | $I_D$              | -13        | A          |
| Drain Current-Continuous( $T_C = 100^\circ C$ )  | $I_D(100^\circ C)$ | -9         | A          |
| Pulsed Drain Current                             | $I_{DM}$           | 50         | 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(Note 2) | $R_{\theta JA}$ | 50 | $^\circ C/W$ |
|-------------------------------------------------|-----------------|----|--------------|

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

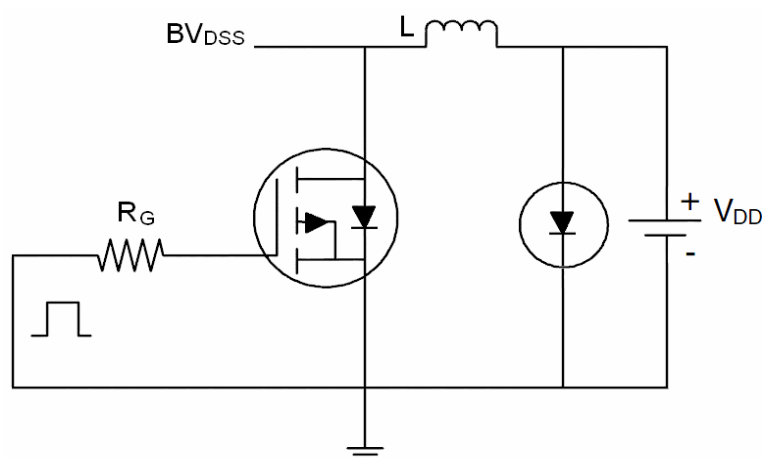
| Parameter                          | Symbol              | Condition                                                                                 | Min  | Typ  | Max  | Unit |
|------------------------------------|---------------------|-------------------------------------------------------------------------------------------|------|------|------|------|
| Off Characteristics                |                     |                                                                                           |      |      |      |      |
| Drain-Source Breakdown Voltage     | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =-250μA                                                | -40  | -    | -    | V    |
| Zero Gate Voltage Drain Current    | I <sub>DSS</sub>    | V <sub>DS</sub> =-40V, 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> =-12A                                               | -    |      | 12   | mΩ   |
| Forward Transconductance           | g <sub>FS</sub>     | V <sub>DS</sub> =-15V, I <sub>D</sub> =-10A                                               | 35   | -    | -    | S    |
| Dynamic Characteristics (Note4)    |                     |                                                                                           |      |      |      |      |
| Input Capacitance                  | C <sub>iss</sub>    | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                   | -    | 2800 | -    | PF   |
| Output Capacitance                 | C <sub>oss</sub>    |                                                                                           | -    | 320  | -    | PF   |
| Reverse Transfer Capacitance       | C <sub>rss</sub>    |                                                                                           | -    | 220  | -    | PF   |
| Switching Characteristics (Note 4) |                     |                                                                                           |      |      |      |      |
| Turn-on Delay Time                 | t <sub>d(on)</sub>  | V <sub>DD</sub> =-20V, ,R <sub>L</sub> =2Ω<br>V <sub>GS</sub> =-10V, R <sub>GEN</sub> =6Ω | -    | 11   | -    | nS   |
| Turn-on Rise Time                  | t <sub>r</sub>      |                                                                                           | -    | 75   | -    | nS   |
| Turn-Off Delay Time                | t <sub>d(off)</sub> |                                                                                           | -    | 89   | -    | nS   |
| Turn-Off Fall Time                 | t <sub>f</sub>      |                                                                                           | -    | 35   | -    | nS   |
| Total Gate Charge                  | Q <sub>g</sub>      | V <sub>DS</sub> =-20V, I <sub>D</sub> =-12A,<br>V <sub>GS</sub> =-10V                     | -    | 40   | -    | nC   |
| Gate-Source Charge                 | Q <sub>gs</sub>     |                                                                                           | -    | 6    | -    | nC   |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |                                                                                           | -    | 12   | -    | nC   |
| Drain-Source Diode Characteristics |                     |                                                                                           |      |      |      |      |
| Diode Forward Voltage (Note 3)     | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =-12A                                                 | -    | -    | 1.2  | V    |
| Diode Forward Current (Note 2)     | I <sub>S</sub>      |                                                                                           | -    | -    | -13  | A    |

### Notes:

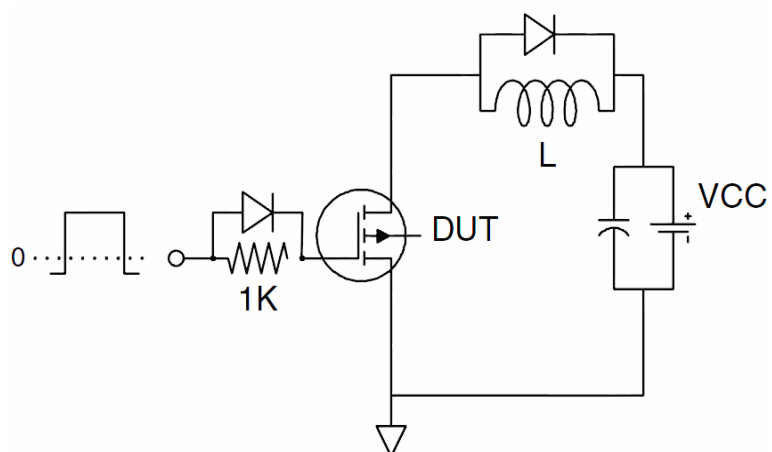
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

## Test Circuit

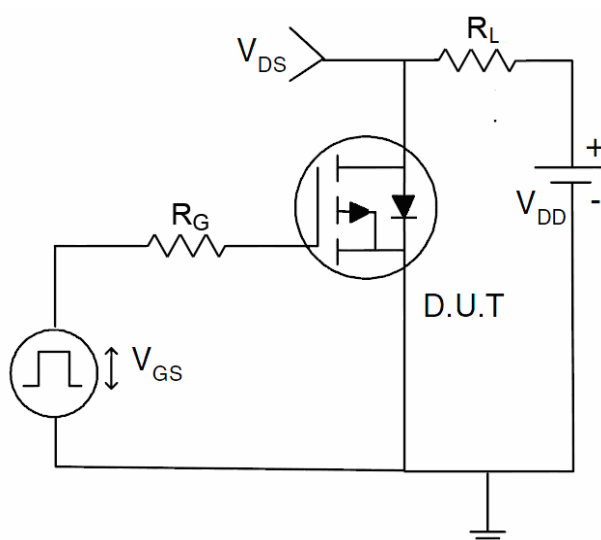
### 1) $E_{AS}$ Test Circuit



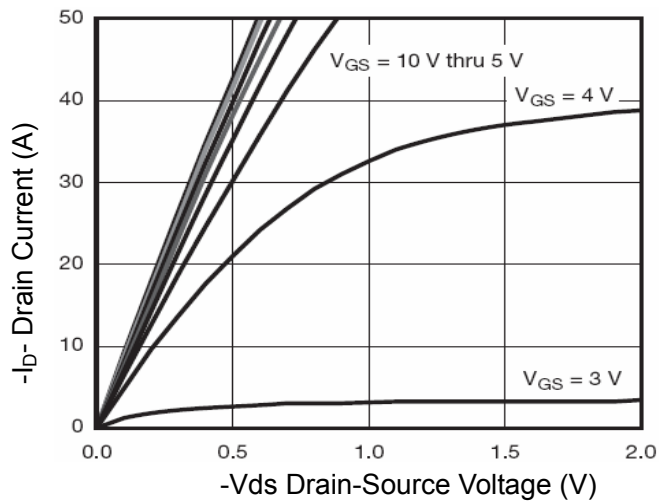
### 2) Gate Charge Test Circuit



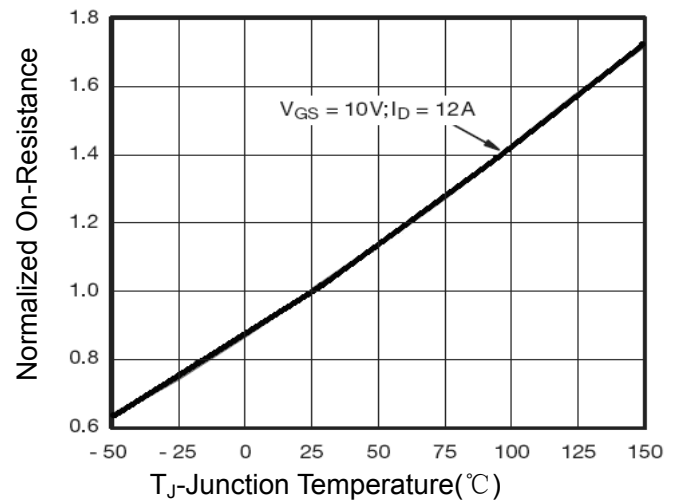
### 3) Switch Time Test Circuit



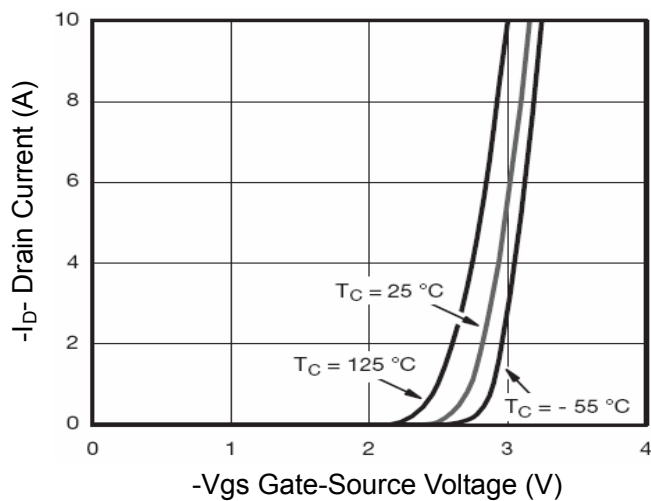
## Typical Electrical and Thermal Characteristics (Curves)



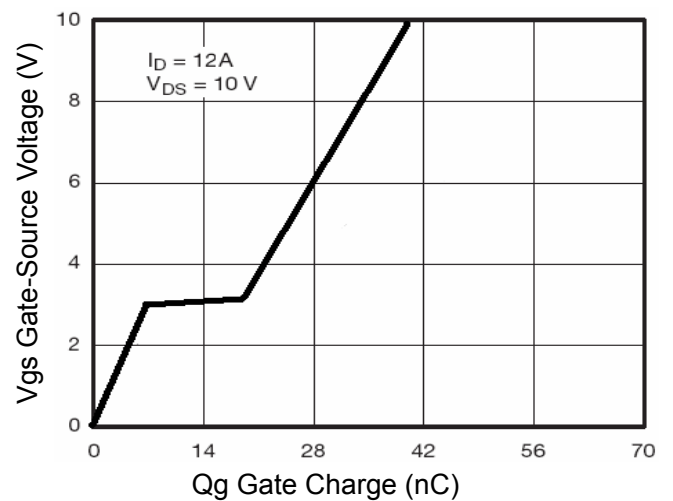
**Figure 1 Output Characteristics**



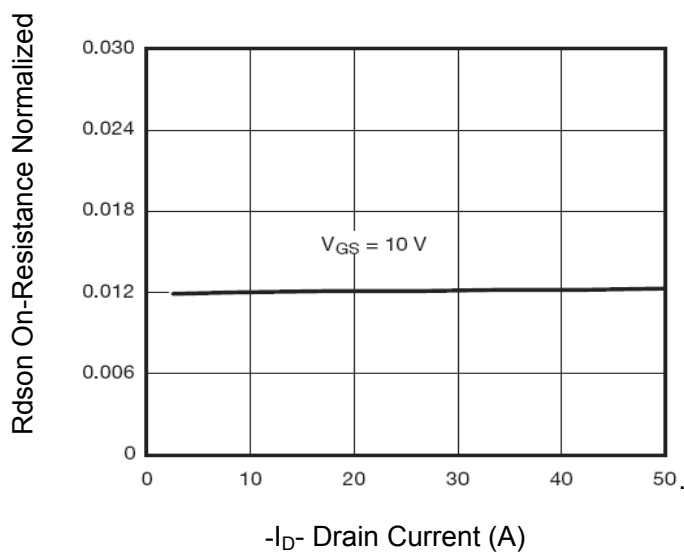
**Figure 4 R<sub>DS(on)</sub>-Junction Temperature**



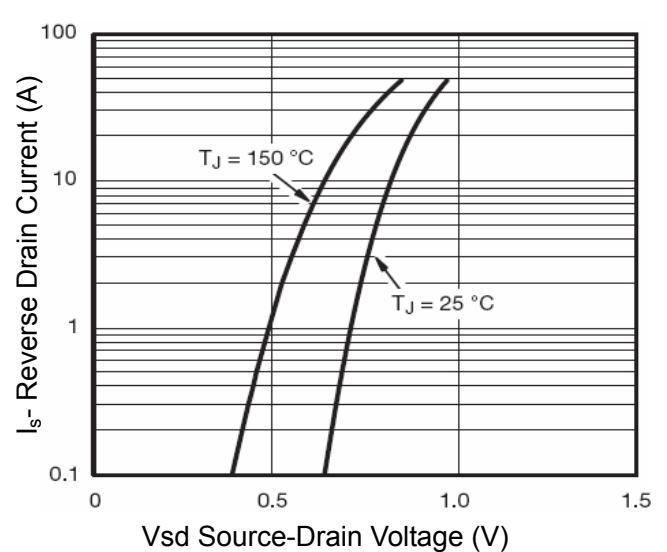
**Figure 2 Transfer Characteristics**



**Figure 5 Gate Charge**



**Figure 3 R<sub>DS(on)</sub>- Drain Current**



**Figure 6 Source- Drain Diode Forward**

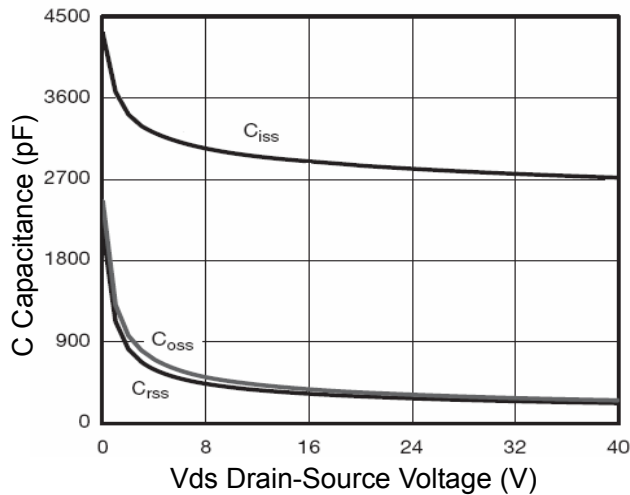


Figure 7 Capacitance vs Vds

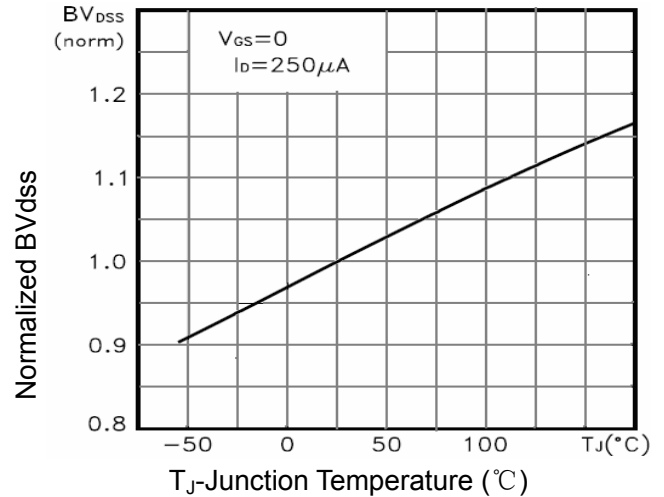


Figure 9 BV<sub>DSS</sub> vs Junction Temperature

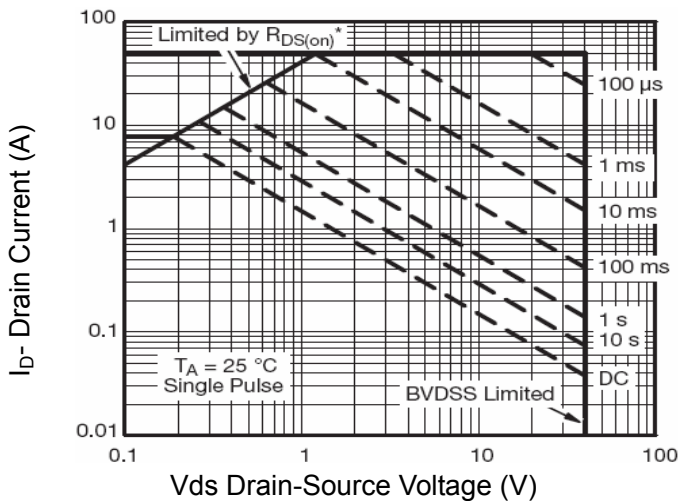


Figure 8 Safe Operation Area

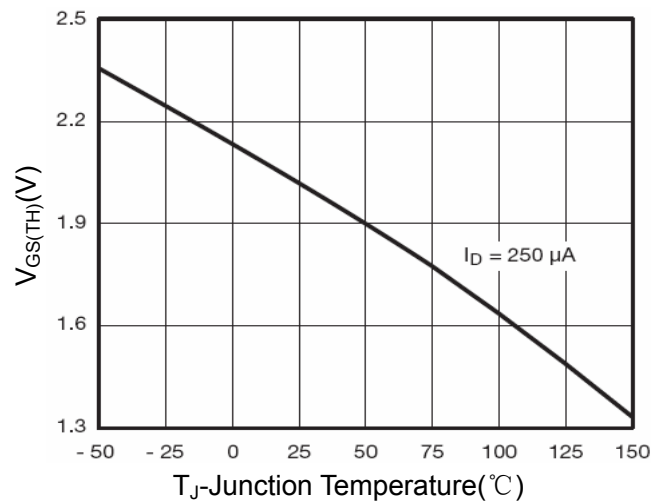


Figure 10 V<sub>GS(th)</sub> vs Junction Temperature

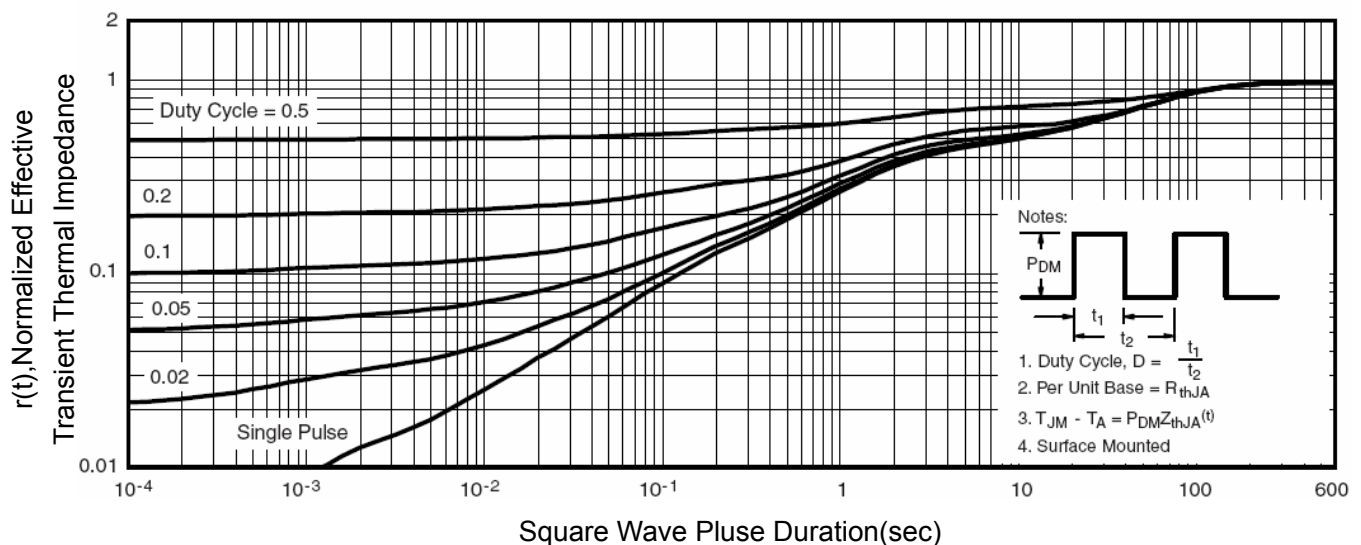


Figure 11 Normalized Maximum Transient Thermal Impedance