

# N-Channel Enhancement Mode Power MOSFET

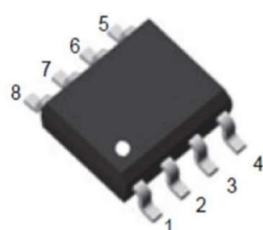
## Features

- $V_{DS} = 20V$ ,  $I_D = 10A$   
 $R_{DS(ON)} < 11 m\Omega$  @  $V_{GS} = 4.5V$   
 $R_{DS(ON)} < 14 m\Omega$  @  $V_{GS} = 2.5V$

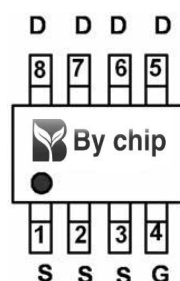
## General Features

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

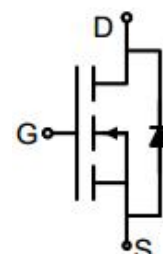
100% UIS TESTED!  
100%  $\Delta V_{ds}$  TESTED!



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                                 |                    | $V_{GS}$        | $\pm 10$        | V            |
| Drain Current                                       | $T_A = 25^\circ C$ | $I_D$           | 10              | A            |
|                                                     | $T_A = 70^\circ C$ |                 | 8               |              |
| Pulsed Drain Current <sup>A</sup>                   |                    | $I_{DM}$        | 45              | A            |
| Total Power Dissipation                             | $T_A = 25^\circ C$ | $P_D$           | 1.9             | W            |
|                                                     | $T_A = 70^\circ C$ |                 | 1.2             | W            |
| Thermal Resistance Junction-to-Ambient <sup>B</sup> |                    | $R_{\theta JA}$ | 66              | $^\circ C/W$ |
| Junction and Storage Temperature Range              |                    | $T_J, T_{STG}$  | $-55 \sim +150$ | $^\circ C$   |

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

| Parameter                         | Symbol              | Conditions                                                                                | Min | Typ   | Max  | Units |
|-----------------------------------|---------------------|-------------------------------------------------------------------------------------------|-----|-------|------|-------|
| Static Parameter                  |                     |                                                                                           |     |       |      |       |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                | 20  |       |      | V     |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V                                                 |     |       | 1    | μA    |
| Gate-Body Leakage Current         | I <sub>GSS</sub>    | V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V                                                |     |       | ±100 | nA    |
| Gate Threshold Voltage            | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                 | 0.5 |       | 2.0  | V     |
| Static Drain-Source On-Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                                |     |       | 11   | mΩ    |
|                                   |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =4A                                                 |     |       | 14   |       |
|                                   |                     | V <sub>GS</sub> =1.8V, I <sub>D</sub> =2A                                                 |     |       | 18.2 |       |
| Diode Forward Voltage             | V <sub>SD</sub>     | I <sub>S</sub> =10A, V <sub>GS</sub> =0V                                                  |     |       | 1.2  | V     |
| Dynamic Parameters                |                     |                                                                                           |     |       |      |       |
| Input Capacitance                 | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHZ                                         |     | 888   |      | pF    |
| Output Capacitance                | C <sub>oss</sub>    |                                                                                           |     | 133   |      |       |
| Reverse Transfer Capacitance      | C <sub>rss</sub>    |                                                                                           |     | 117   |      |       |
| Switching Parameters              |                     |                                                                                           |     |       |      |       |
| Total Gate Charge                 | Q <sub>g</sub>      | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =6.8A                         |     | 11.05 |      | nC    |
| Gate-Source Charge                | Q <sub>gs</sub>     |                                                                                           |     | 1.73  |      |       |
| Gate-Drain Charge                 | Q <sub>gd</sub>     |                                                                                           |     | 3.1   |      |       |
| Turn-on Delay Time                | t <sub>D(on)</sub>  | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =6.8A<br>R <sub>GEN</sub> =3Ω |     | 7     |      | ns    |
| Turn-on Rise Time                 | t <sub>r</sub>      |                                                                                           |     | 46    |      |       |
| Turn-off Delay Time               | t <sub>D(off)</sub> |                                                                                           |     | 30    |      |       |
| Turn-off fall Time                | t <sub>f</sub>      |                                                                                           |     | 52    |      |       |

A. Pulse Test: Pulse Width≤300us, Duty cycle ≤2%.

B. R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design, while R<sub>θJA</sub> is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.

## ■ Typical Performance Characteristics

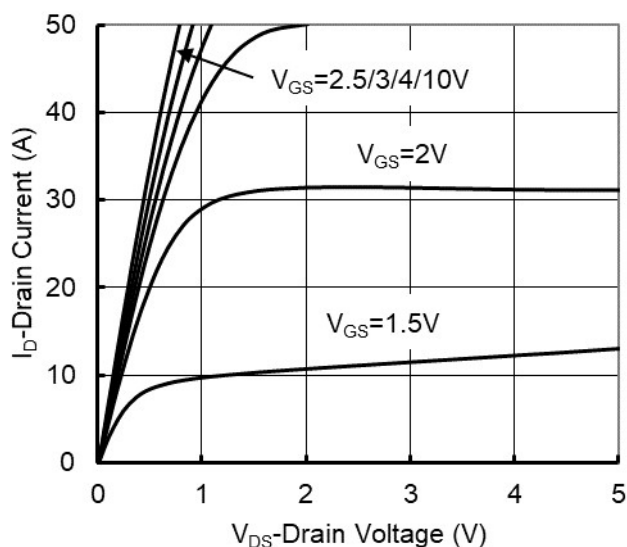


Figure1. Output Characteristics

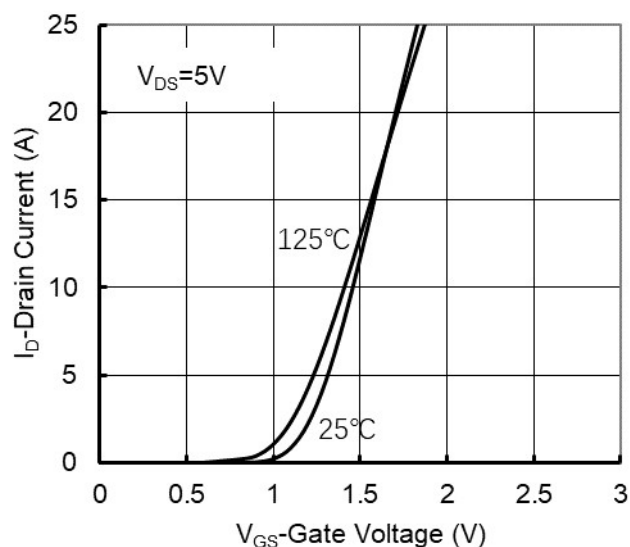


Figure2. Transfer Characteristics

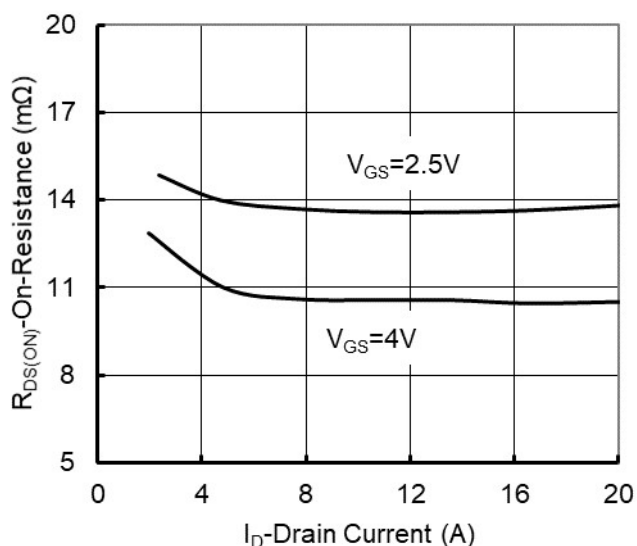


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

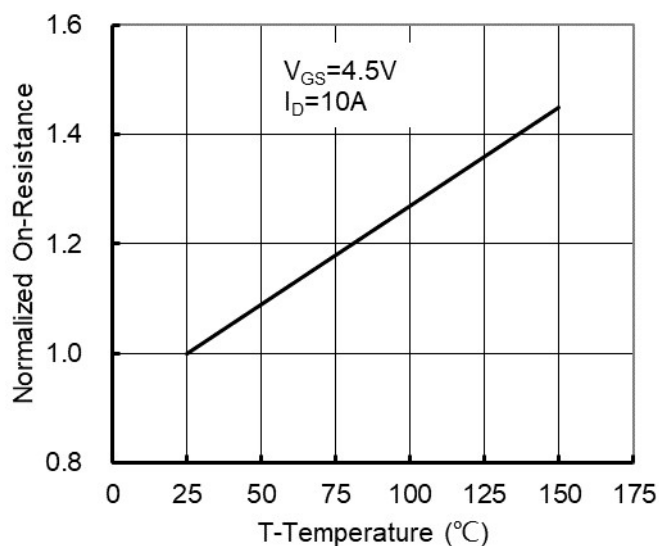


Figure 4: On-Resistance vs. Junction Temperature

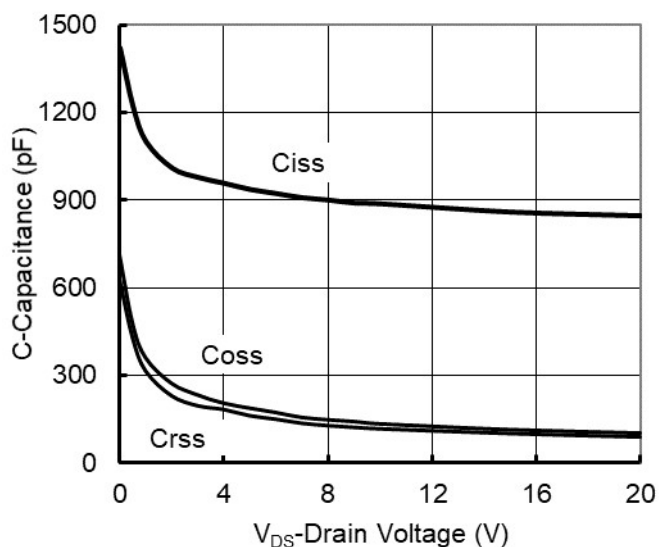


Figure5. Capacitance Characteristics

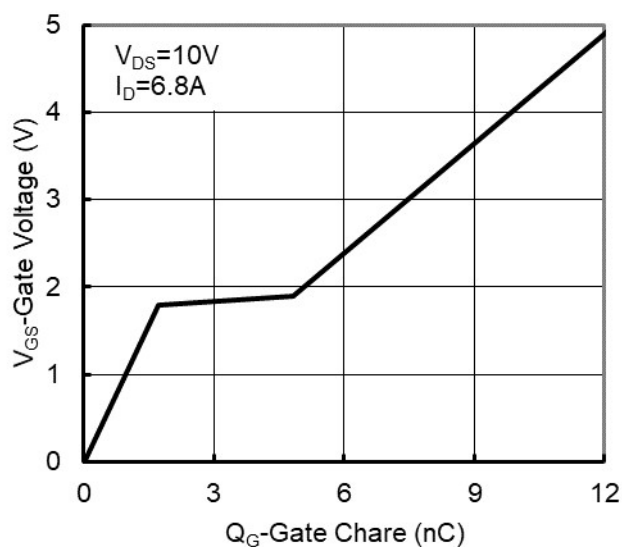


Figure6. Gate Charge

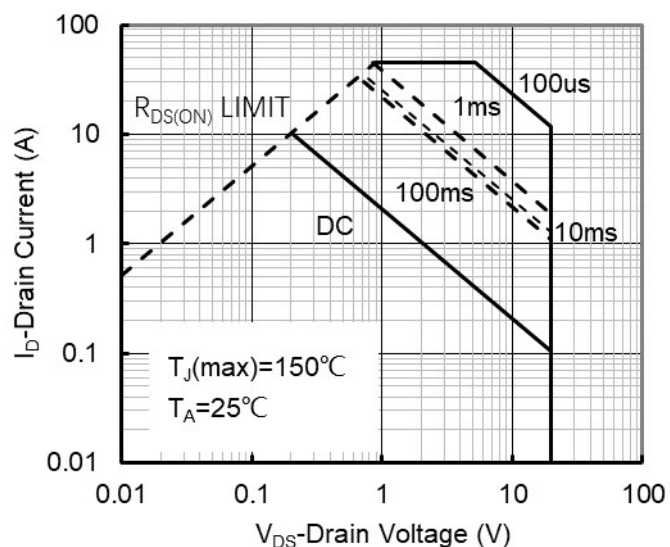


Figure7. Safe Operation Area

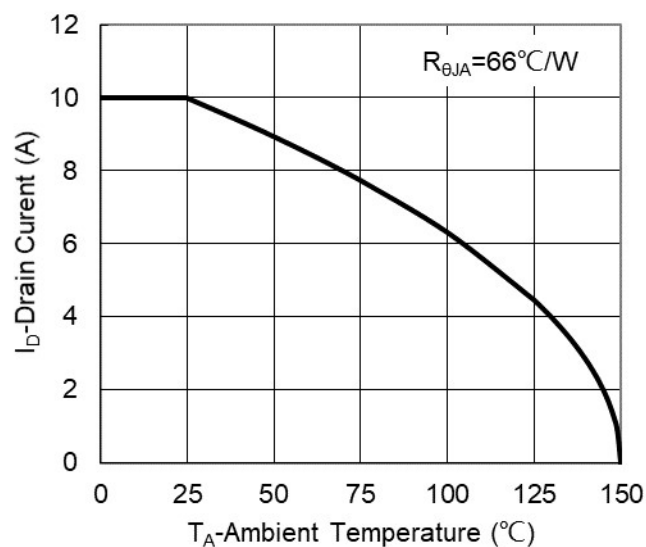


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

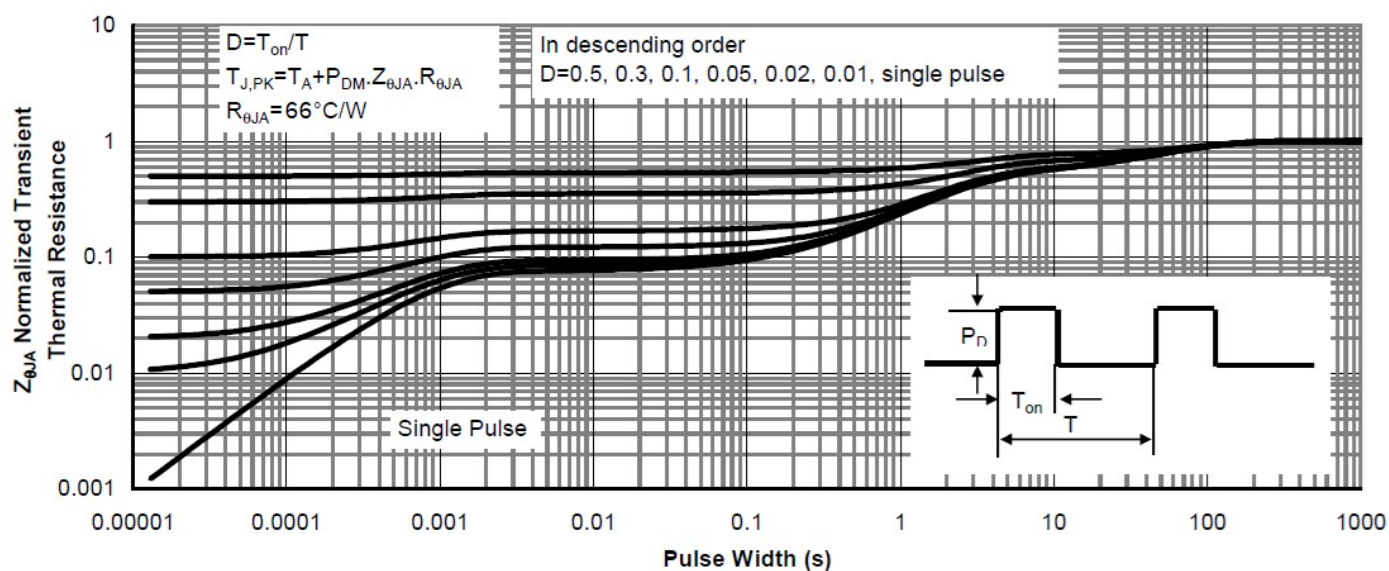
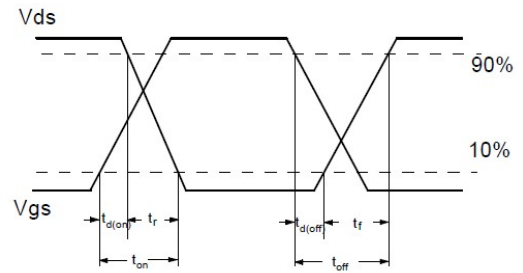
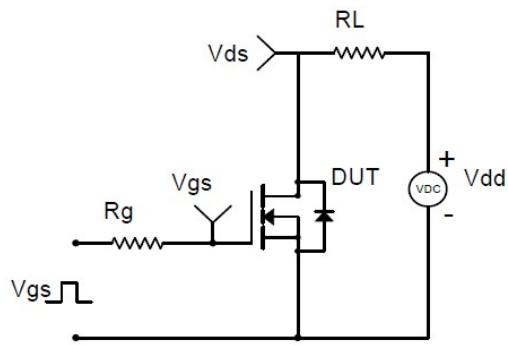
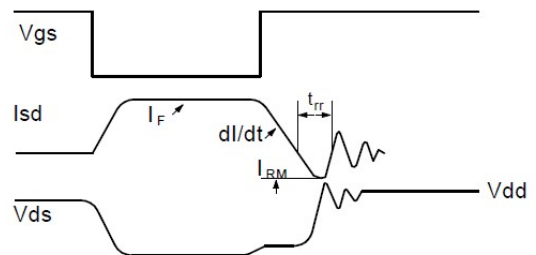
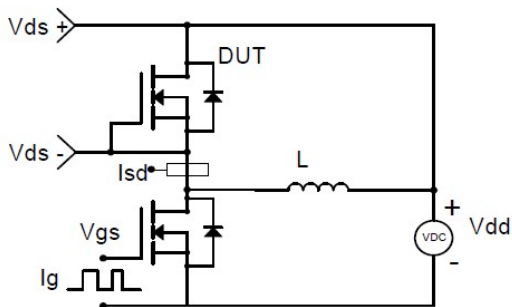


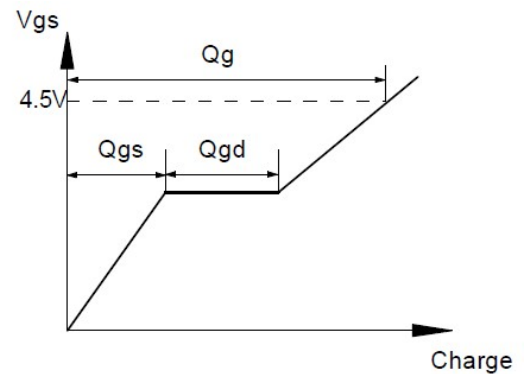
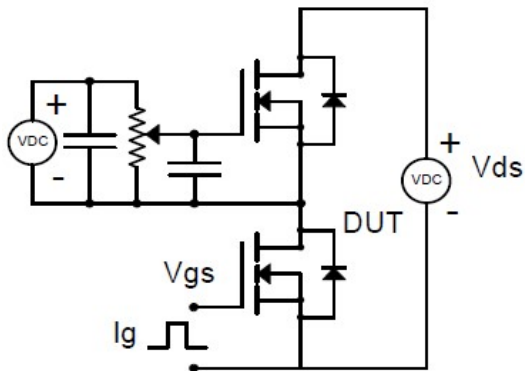
Figure9. Normalized Maximum Transient Thermal Impedance



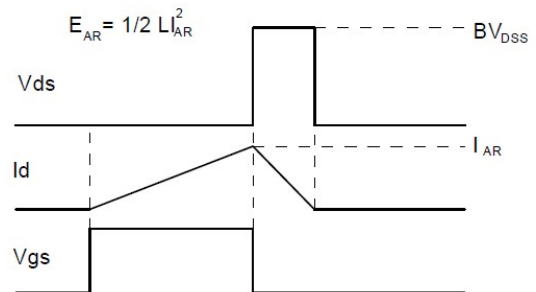
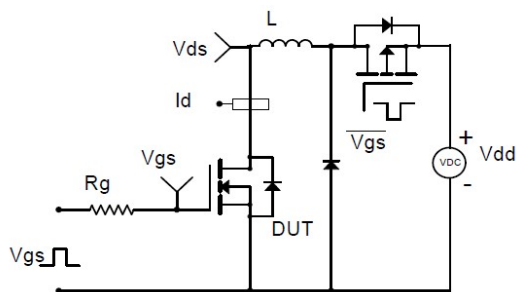
**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**



**Gate Charge Test Circuit & Waveform**



**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**