

## Dual N-Channel Advanced Power MOSFET

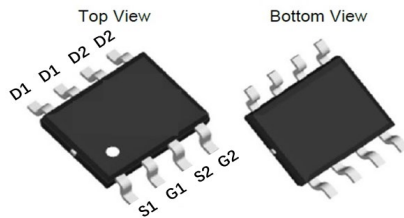
### Features

- $V_{DS} = 60V$ ,  $I_D = 5A$   
 $R_{DS(ON)} < 30 m\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)} < 36 m\Omega$  @  $V_{GS} = 4.5V$

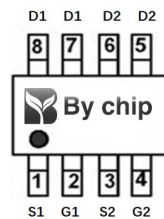
### General Features

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

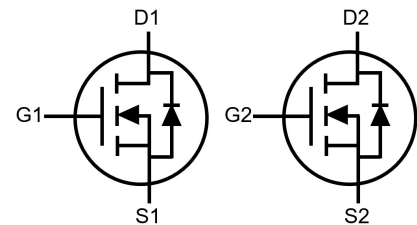
100% UIS TESTED!  
100%  $\Delta V_{ds}$  TESTED!



SOP-8 (Dual)



Pin Assignment



Schematic diagram

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

| Symbol          | Parameter                                       |                     | Max.        | Units        |
|-----------------|-------------------------------------------------|---------------------|-------------|--------------|
| $V_{DSS}$       | Drain-Source Voltage                            |                     | 60          | V            |
| $V_{GSS}$       | Gate-Source Voltage                             |                     | $\pm 20$    | V            |
| $I_D$           | Continuous Drain Current                        | $T_A = 25^\circ C$  | 5           | A            |
|                 |                                                 | $T_A = 100^\circ C$ | 3.3         | A            |
| $I_{DM}$        | Pulsed Drain Current <sup>note1</sup>           |                     | 20          | A            |
| EAS             | Single Pulsed Avalanche Energy <sup>note2</sup> |                     | 20          | mJ           |
| $P_D$           | Power Dissipation                               | $T_A = 25^\circ C$  | 1.74        | W            |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient         |                     | 72          | $^\circ C/W$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range         |                     | -55 to +150 | $^\circ C$   |

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

| Symbol                                                 | Parameter                                                 | Test Condition                                                                            | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristics                                    |                                                           |                                                                                           |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                | 60   | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =60V, V <sub>GS</sub> = 0V,                                               | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                               | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                           |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 1.0  |      | 2.5  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =5A                                                  | -    |      | 30   | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A                                                 | -    |      | 36   |       |
| Dynamic Characteristics                                |                                                           |                                                                                           |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                    | -    | 853  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                           | -    | 60   | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                           | -    | 29   | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DD</sub> =30V, I <sub>D</sub> =2.5A,<br>V <sub>GS</sub> =10V                       | -    | 20   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                           | -    | 3    | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                           | -    | 4.5  | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                           |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DD</sub> =30V, I <sub>D</sub> =5A,<br>R <sub>GEN</sub> =1.8Ω, V <sub>GS</sub> =10V | -    | 6    | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                           | -    | 6    | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                           | -    | 19   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                           | -    | 2.5  | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                           |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                           | -    | -    | 5    | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                           | -    | -    | 20   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =5A                                                   | -    | -    | 1.2  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =5A, dI/dt=100A/μs                                                         | -    | 13   | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Charge                        |                                                                                           | -    | 9    | -    | nC    |

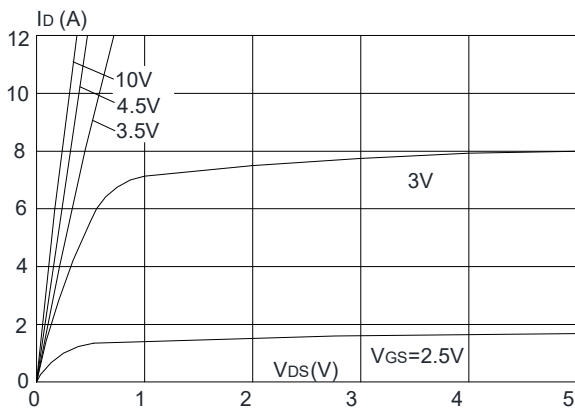
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition :Starting T<sub>J</sub>=25°C, V<sub>DD</sub>=30V, V<sub>GS</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω, I<sub>AS</sub>=9A

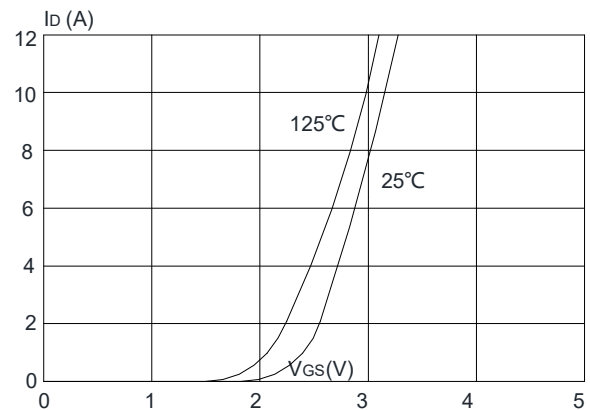
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Performance Characteristics

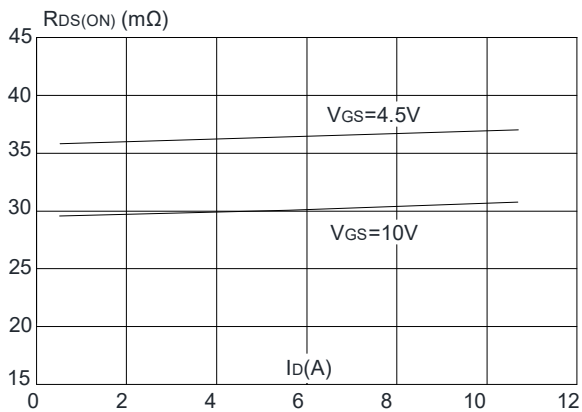
**Figure 1: Output Characteristics**



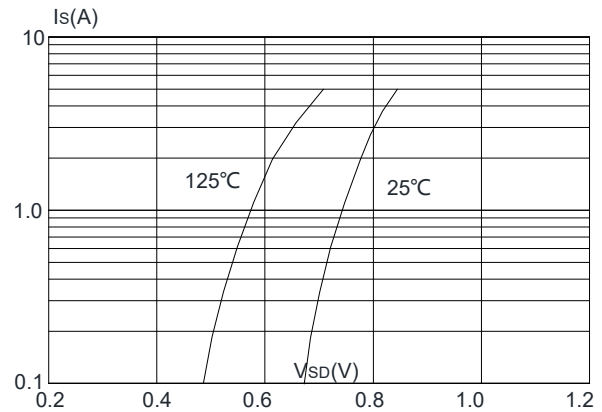
**Figure 2: Typical Transfer Characteristics**



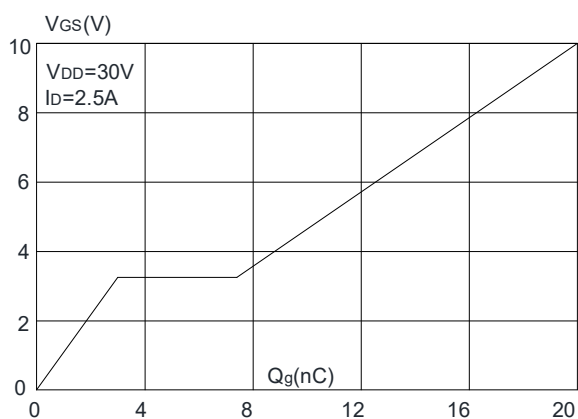
**Figure 3: On-resistance vs. Drain Current**



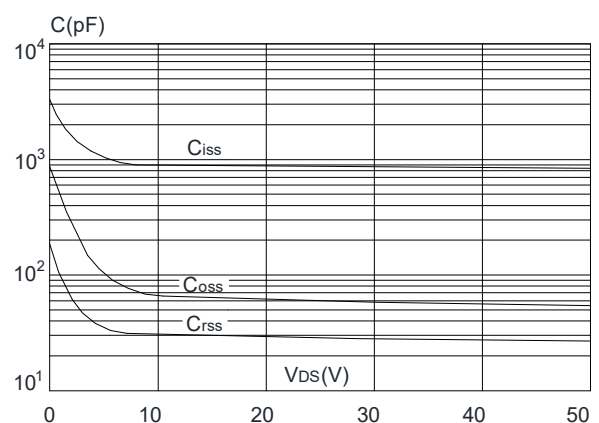
**Figure 4: Body Diode Characteristics**



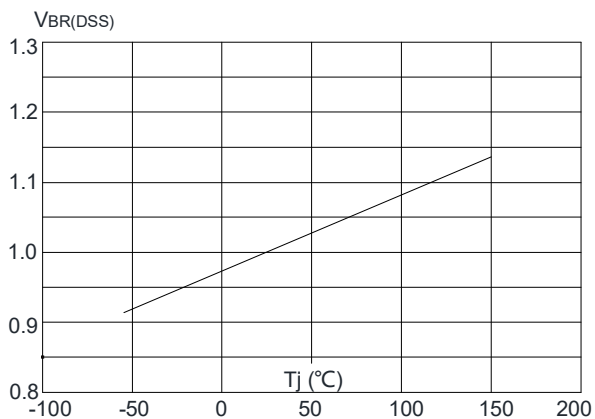
**Figure 5: Gate Charge Characteristics**



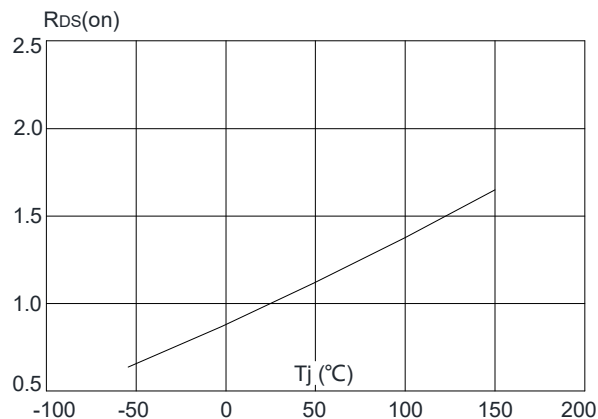
**Figure 6: Capacitance Characteristics**



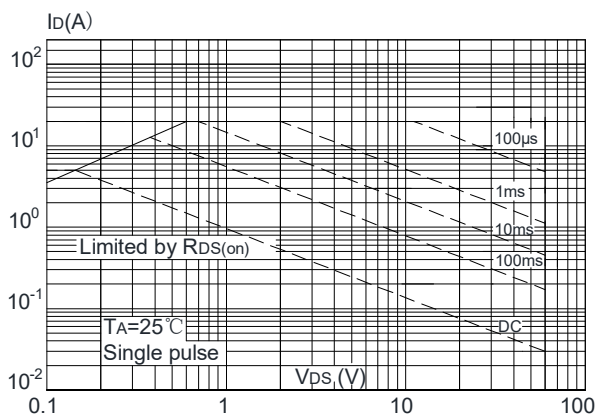
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



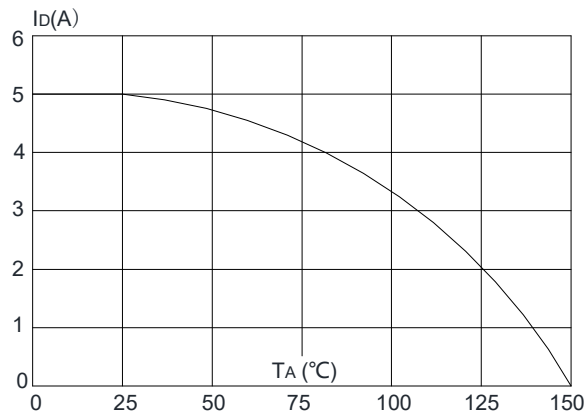
**Figure 8:** Normalized on Resistance vs. Junction Temperature



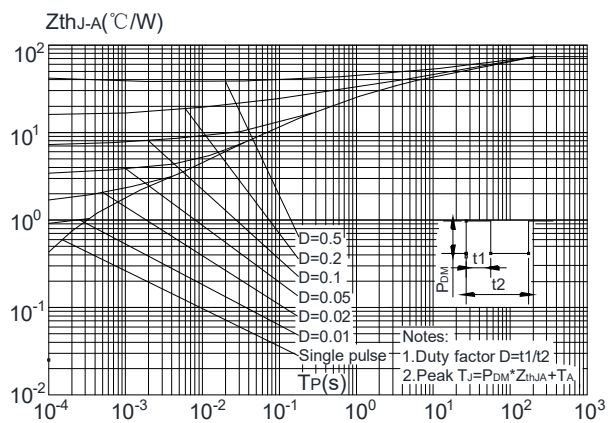
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature



**Figure 11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## Test Circuit

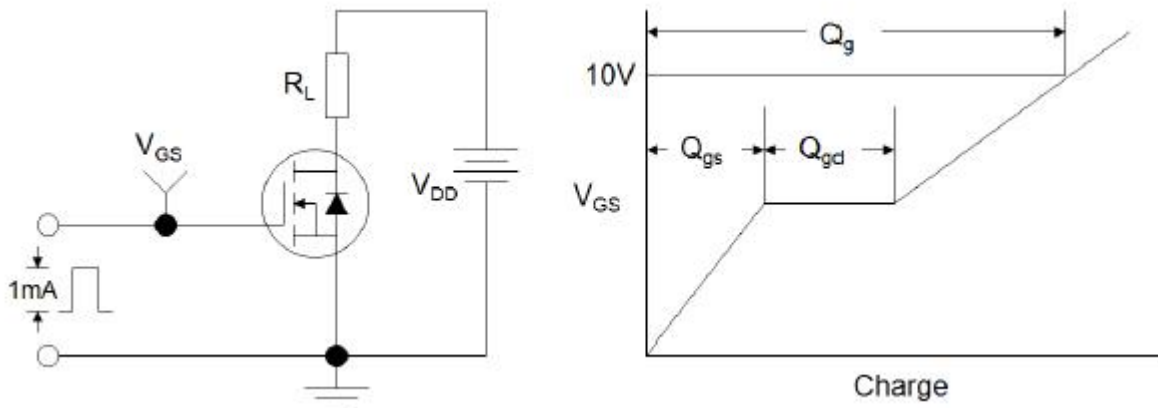


Figure1:Gate Charge Test Circuit & Waveform

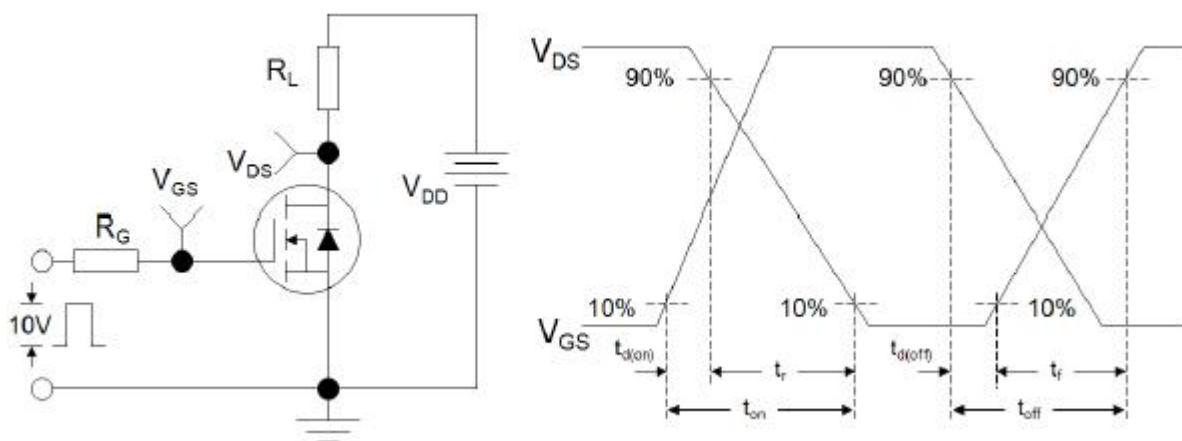


Figure 2: Resistive Switching Test Circuit & Waveforms

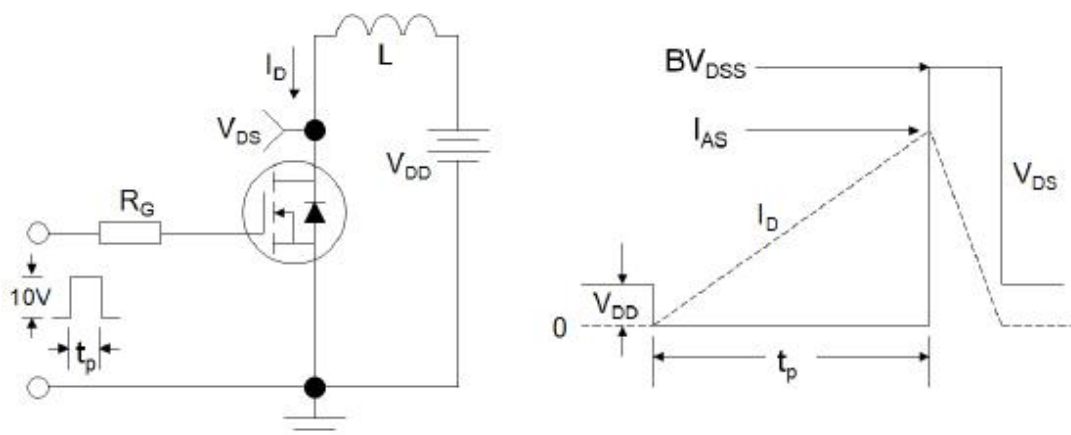


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms