

## Dual N-channel Enhancement Mode Power MOSFET

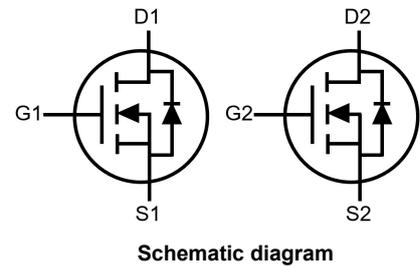
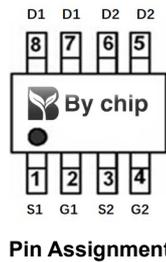
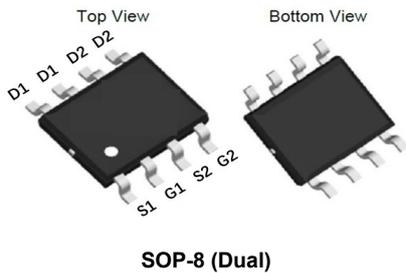
### Features

- $V_{DS} = 30V$ ,  $I_D = 9A$   
 $R_{DS(ON)} < 16\text{ m}\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)} < 24\text{ m}\Omega$  @  $V_{GS} = 4.5V$

### 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!



### Maximum ratings, at $T_J = 25^\circ\text{C}$ , unless otherwise specified

| Symbol        | Parameter                                 | Rating                           | Unit             |
|---------------|---|----------------------------------|------------------|
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage            | 30                               | V                |
| $I_S$         | Diode continuous forward current          | $T_A = 25^\circ\text{C}$<br>2.3  | A                |
| $I_D$         | Continuous drain current @ $V_{GS} = 10V$ | $T_A = 25^\circ\text{C}$<br>9    | A                |
|               |   | $T_A = 100^\circ\text{C}$<br>5.7 | A                |
| $I_{DM}$      | Pulse drain current tested ①              | $T_A = 25^\circ\text{C}$<br>36   | A                |
| EAS           | Avalanche energy, single pulsed ②         | 9                                | mJ               |
| $P_D$         | Maximum power dissipation                 | $T_A = 25^\circ\text{C}$<br>2    | W                |
| $V_{GS}$      | Gate-Source voltage                       | $\pm 20$                         | V                |
| MSL           |   | Level 3                          |                  |
| $T_{STG} T_J$ | Storage and operating temperature range   | -55 to 150                       | $^\circ\text{C}$ |

### Thermal Characteristics

| Symbol          | Parameter                              | Typical | Unit               |
|-----------------|--|---------|--------------------|
| $R_{\theta JL}$ | Thermal Resistance-Junction to Lead    | 40      | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient | 62.5    | $^\circ\text{C/W}$ |

**Electrical Characteristics**

| Symbol  | Parameter                                 | Condition   | Min. | Typ. | Max. | Unit |
|---|---|---|------|------|------|------|
| <b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>   |   |   |      |      |      |      |
| V <sub>(BR)DSS</sub>  | Drain-Source Breakdown Voltage            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA  | 30   | --   | --   | V    |
| I <sub>DSS</sub>  | Zero Gate Voltage Drain Current(Tc=25°C)  | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V   | --   | --   | 1    | μA   |
|   | Zero Gate Voltage Drain Current(Tc=125°C) | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V   | --   | --   | 100  | μA   |
| I <sub>GSS</sub>  | Gate-Body Leakage Current                 | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V  | --   | --   | ±100 | nA   |
| V <sub>GS(TH)</sub>   | Gate Threshold Voltage                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                    | 1    |      | 2.5  | V    |
| R <sub>DS(ON)</sub>   | Drain-Source On-State Resistance ②        | V <sub>GS</sub> =10V, I <sub>D</sub> =8A  | --   |      | 16   | mΩ   |
| R <sub>DS(ON)</sub>   | Drain-Source On-State Resistance ②        | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A   | --   |      | 24   | mΩ   |
| <b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>  |   |   |      |      |      |      |
| C <sub>iss</sub>  | Input Capacitance                         | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f=1MHz  | --   | 455  | --   | pF   |
| C <sub>oss</sub>  | Output Capacitance                        |   | --   | 75   | --   | pF   |
| C <sub>rss</sub>  | Reverse Transfer Capacitance              |   | --   | 60   | --   | pF   |
| R <sub>g</sub>  | Gate Resistance                           | f=1MHz  | --   | 3.3  | --   | Ω    |
| Q <sub>g</sub>  | Total Gate Charge                         | V <sub>DS</sub> =15V, I <sub>D</sub> =8A,<br>V <sub>GS</sub> =10V                           | --   | 11   | --   | nC   |
| Q <sub>gs</sub>   | Gate-Source Charge                        |   | --   | 3    | --   | nC   |
| Q <sub>gd</sub>   | Gate-Drain Charge                         |   | --   | 4    | --   | nC   |
| <b>Switching Characteristics</b>  |   |   |      |      |      |      |
| t <sub>d(on)</sub>  | Turn-on Delay Time                        | V <sub>DD</sub> =15V,<br>I <sub>D</sub> =8A,<br>R <sub>G</sub> =3Ω,<br>V <sub>GS</sub> =10V | --   | 7    | --   | ns   |
| t <sub>r</sub>  | Turn-on Rise Time                         |   | --   | 10   | --   | ns   |
| t <sub>d(off)</sub>   | Turn-Off Delay Time                       |   | --   | 22   | --   | ns   |
| t <sub>f</sub>  | Turn-Off Fall Time                        |   | --   | 7    | --   | ns   |
| <b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b> |   |   |      |      |      |      |
| V <sub>SD</sub>   | Forward on voltage                        | I <sub>SD</sub> =8A, V <sub>GS</sub> =0V  | --   | 0.9  | 1.2  | V    |
| t <sub>rr</sub>   | Reverse Recovery Time                     | T <sub>J</sub> =25°C, I <sub>sd</sub> =8A,<br>V <sub>GS</sub> =0V                           | --   | 9.5  | --   | ns   |
| Q <sub>rr</sub>   | Reverse Recovery Charge                   | di/dt=500A/μs   | --   | 11.8 | --   | nC   |

**NOTE:**

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.5mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 6A, V<sub>GS</sub> = 10V. Part not recommended for use above this value
- ③ Pulse width ≤ 300μs; duty cycle ≤ 2%.

Typical Characteristics

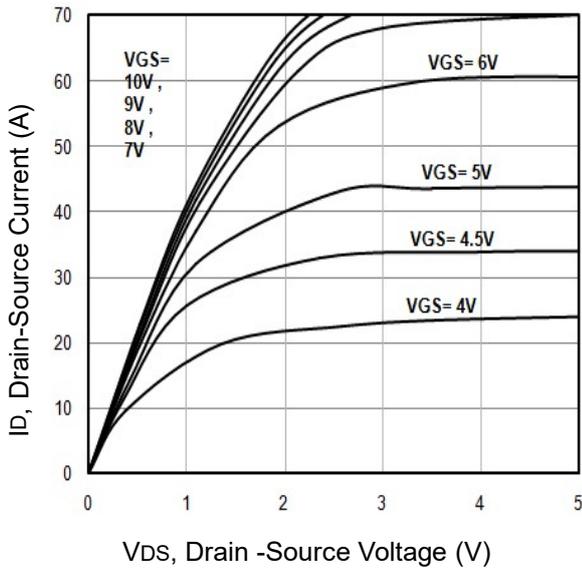


Fig1. Typical Output Characteristics

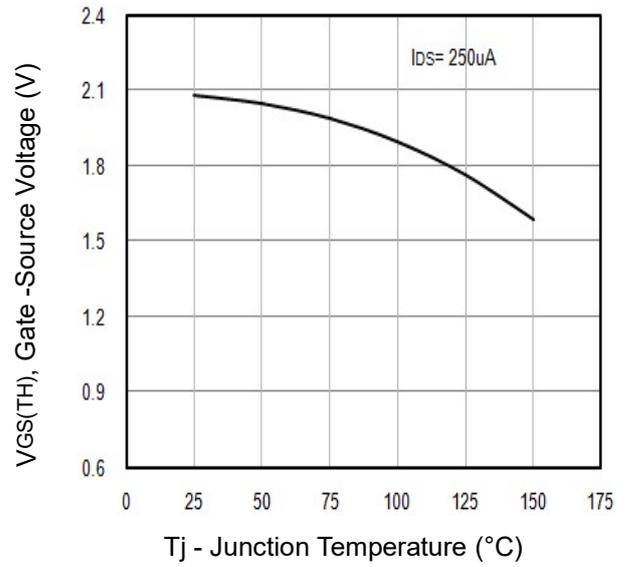


Fig2. Threshold Voltage Vs. Temperature

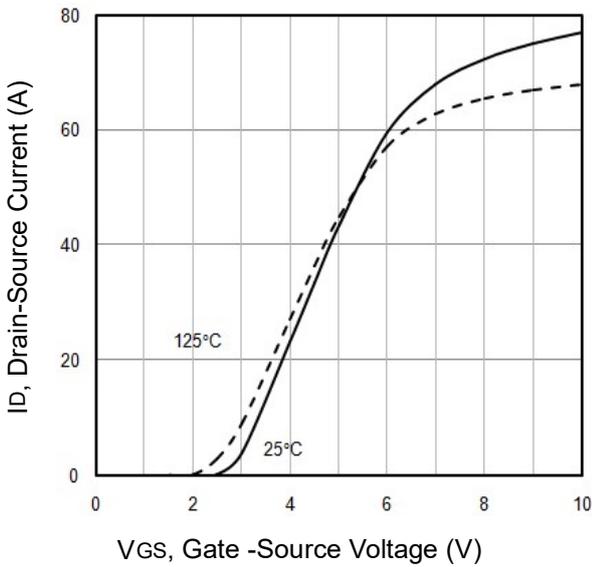


Fig3. Typical Transfer Characteristics

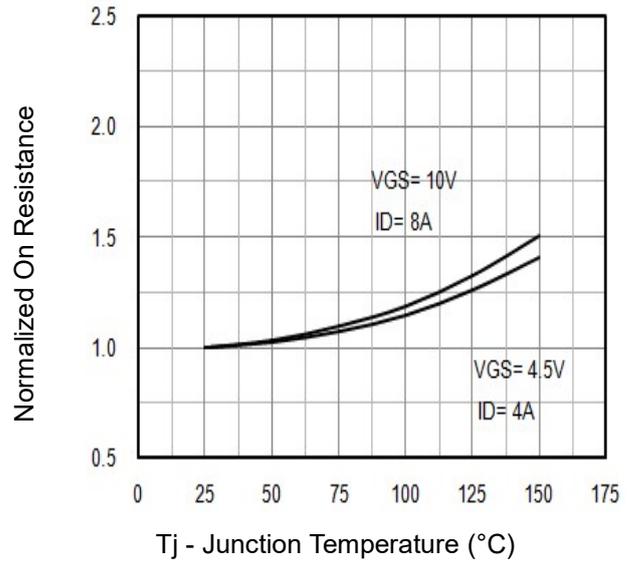


Fig4. Normalized On-Resistance Vs. Temperature

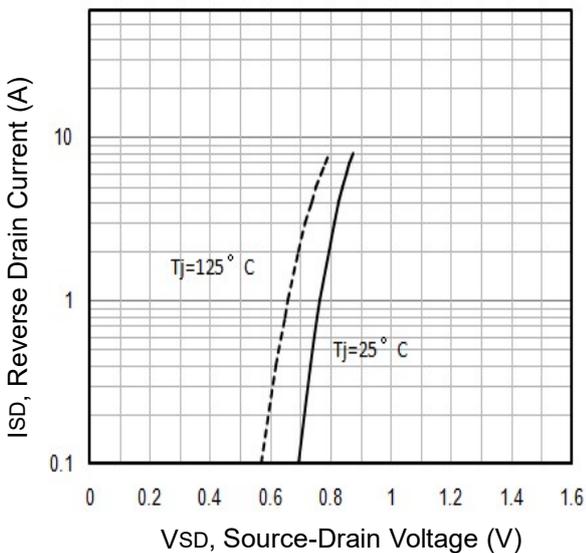


Fig5. Typical Source-Drain Diode Forward Voltage

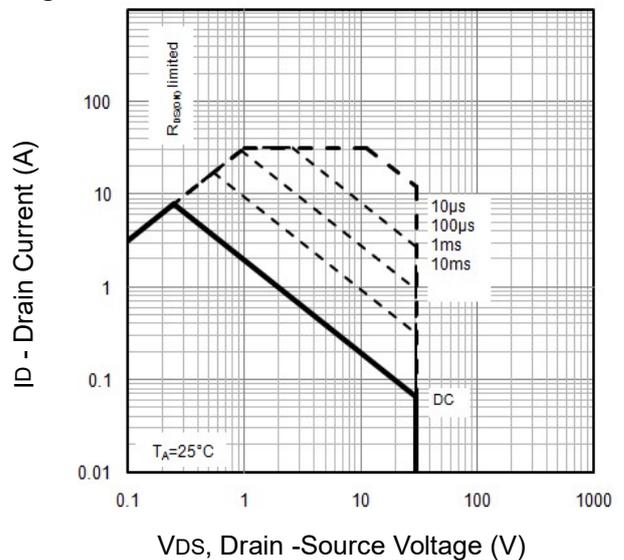


Fig6. Maximum Safe Operating Area

Typical Characteristics

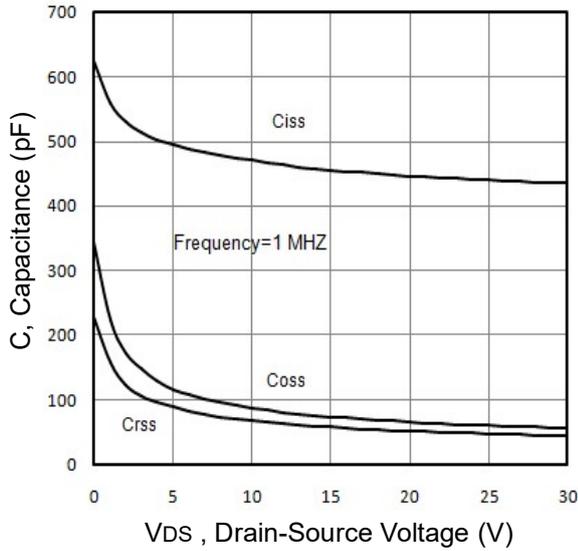


Fig7. Typical Capacitance Vs.Drain-Source Voltage

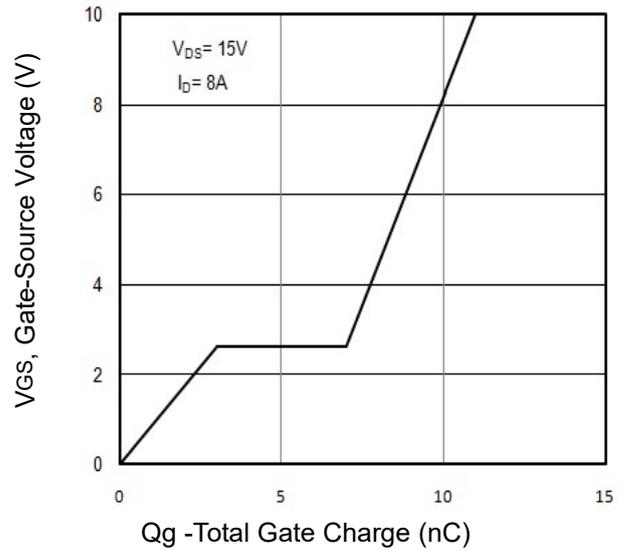
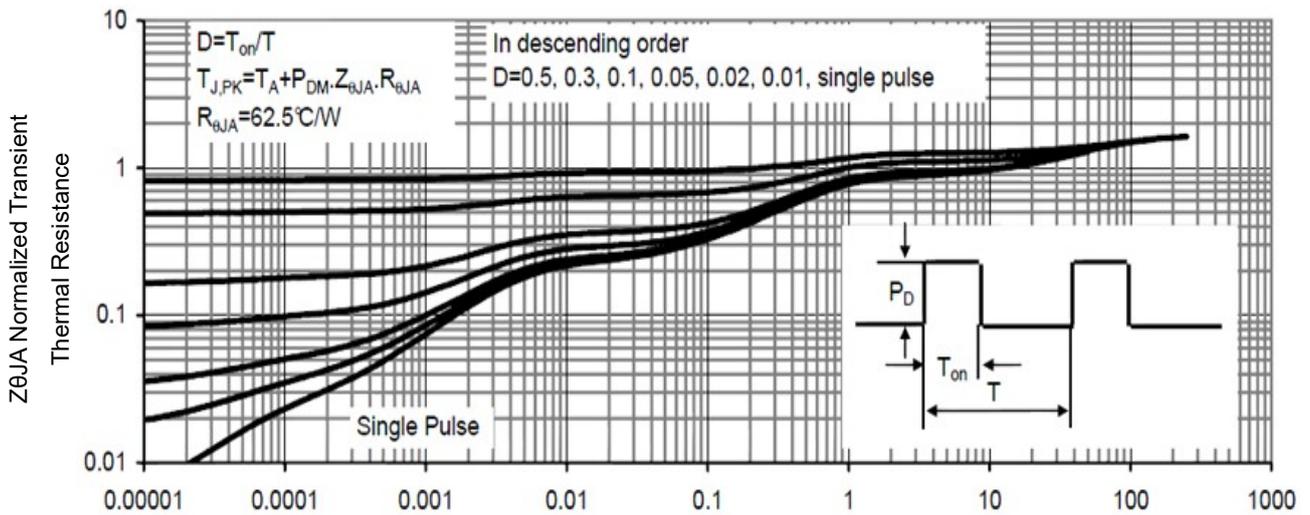


Fig8. Typical Gate Charge Vs.Gate-Source Voltage



T1, Square Wave Pulse Duration(sec)

Fig9. T1, Transient Thermal Response Curve

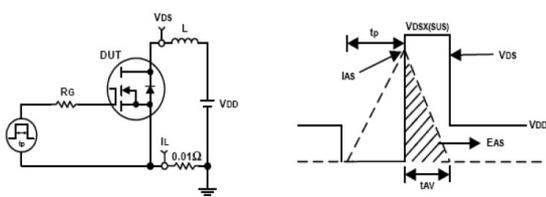


Fig10. Unclamped Inductive Test Circuit and waveforms

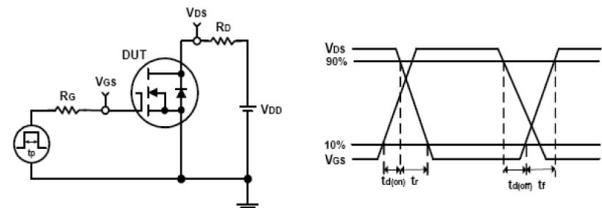


Fig11. Switching Time Test Circuit and waveforms