

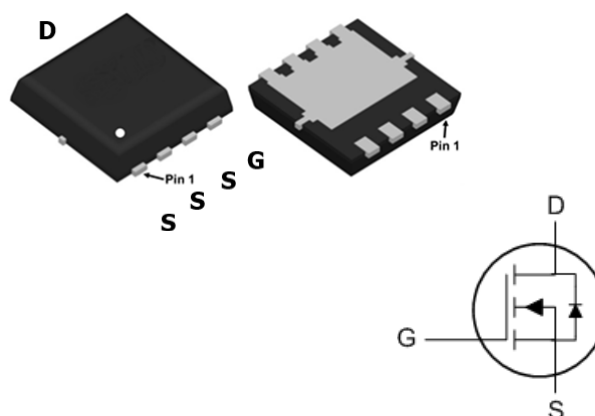
### Features

- Advanced Trench MOS Technology
- Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available

### Product Summary

| BVDSS | RDSON | ID  |
|-------|-------|-----|
| 60V   | 15mΩ  | 29A |

### DFN 3x3 Pin Configuration



### Applications

- Motor Control.
- DC/DC Converter.
- Synchronous Rectifier Applications.

### Absolute Maximum Ratings

| Symbol                      | Parameter                                  | Rating     | Units            |
|-----------------------------|--------------------------------------------|------------|------------------|
| $V_{DS}$                    | Drain-Source Voltage                       | 60         | V                |
| $V_{GS}$                    | Gate-Source Voltage                        | $\pm 20$   | V                |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 29         | A                |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 18         | A                |
| $I_{DM}$                    | Pulsed Drain Current <sup>2</sup>          | 58         | A                |
| EAS                         | Single Pulse Avalanche Energy <sup>3</sup> | 31         | mJ               |
| $I_{AS}$                    | Avalanche Current                          | 25         | A                |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>       | 20.8       | W                |
| $T_{STG}$                   | Storage Temperature Range                  | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                       | Operating Junction Temperature Range       | -55 to 150 | $^\circ\text{C}$ |

### Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit               |
|-----------------|--------------------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> | ---  | 62   | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 6    | $^\circ\text{C/W}$ |

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

| Symbol                | Parameter                                      | Conditions                                                                              | Min. | Typ. | Max. | Unit |
|-----------------------|------------------------------------------------|-----------------------------------------------------------------------------------------|------|------|------|------|
| BV <sub>DSS</sub>     | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V , I <sub>D</sub> =250uA                                             | 60   | ---  | ---  | V    |
| R <sub>DS(ON)</sub>   | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V , I <sub>D</sub> =8A                                               | ---  | 12   | 15   | mΩ   |
|                       |                                                | V <sub>GS</sub> =4.5V , I <sub>D</sub> =8A                                              | ---  | 20   | 25   |      |
| V <sub>GS(th)</sub>   | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                                | 1.2  | ---  | 2.3  | V    |
| I <sub>DSS</sub>      | Drain-Source Leakage Current                   | V <sub>DS</sub> =48V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C                       | ---  | ---  | 1    | uA   |
|                       |                                                | V <sub>DS</sub> =48V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C                       | ---  | ---  | 5    |      |
| I <sub>GSS</sub>      | Gate-Source Leakage Current                    | V <sub>GS</sub> =± 20V , V <sub>DS</sub> =0V                                            | ---  | ---  | ±100 | nA   |
| R <sub>g</sub>        | Gate Resistance                                | V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz                                      | ---  | 0.8  | ---  | Ω    |
| Q <sub>g</sub>        | Total Gate Charge                              | V <sub>DS</sub> =30V , V <sub>GS</sub> =10V , I <sub>D</sub> =8A                        | ---  | 11.7 | ---  | nC   |
| Q <sub>gs</sub>       | Gate-Source Charge                             |                                                                                         | ---  | 2    | ---  |      |
| Q <sub>gd</sub>       | Gate-Drain Charge                              |                                                                                         | ---  | 3.5  | ---  |      |
| T <sub>d(on)</sub>    | Turn-On Delay Time                             | V <sub>DD</sub> =30V , V <sub>GS</sub> =10V , R <sub>G</sub> =3Ω,<br>I <sub>D</sub> =8A | ---  | 6    | ---  | ns   |
| T <sub>r</sub>        | Rise Time                                      |                                                                                         | ---  | 4    | ---  |      |
| T <sub>d(off)</sub>   | Turn-Off Delay Time                            |                                                                                         | ---  | 25   | ---  |      |
| T <sub>f</sub>        | Fall Time                                      |                                                                                         | ---  | 3    | ---  |      |
| C <sub>iss</sub>      | Input Capacitance                              | V <sub>DS</sub> =30V , V <sub>GS</sub> =0V , f=1MHz                                     | ---  | 512  | ---  | pF   |
| C <sub>oss</sub>      | Output Capacitance                             |                                                                                         | ---  | 171  | ---  |      |
| C <sub>rss</sub>      | Reverse Transfer Capacitance                   |                                                                                         | ---  | 20   | ---  |      |
| Diode Characteristics |                                                |                                                                                         |      |      |      |      |
| I <sub>S</sub>        | Continuous Source Current <sup>1,5</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current                                      | ---  | ---  | 29   | A    |
| V <sub>SD</sub>       | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C                         | ---  | ---  | 1.2  | V    |

Note :

1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%

3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=25A

4.The power dissipation is limited by 150°C junction temperature

5.The data is theoretically the same as I<sub>D</sub> and I<sub>S</sub> , in real applications , should be limited by total power dissipation.

## Typical Characteristics

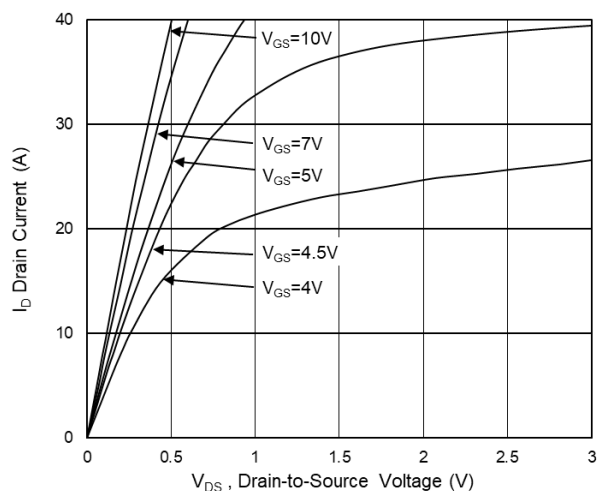


Fig.1 Typical Output Characteristics

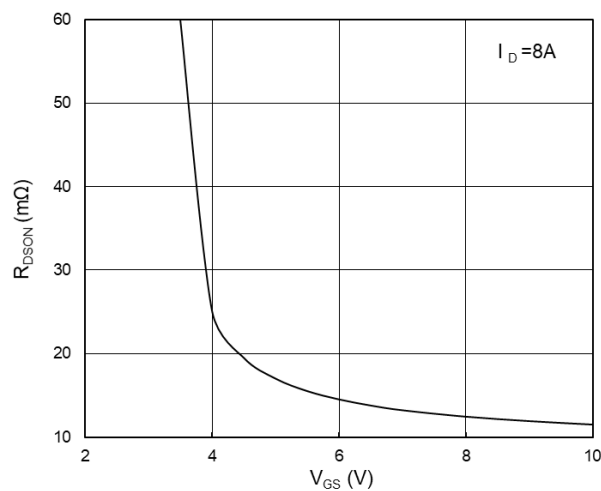


Fig.2 On-Resistance vs G-S Voltage

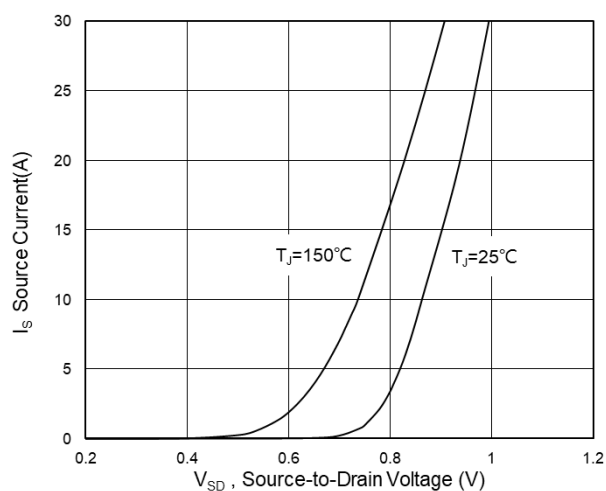


Fig.3 Source Drain Forward Characteristics

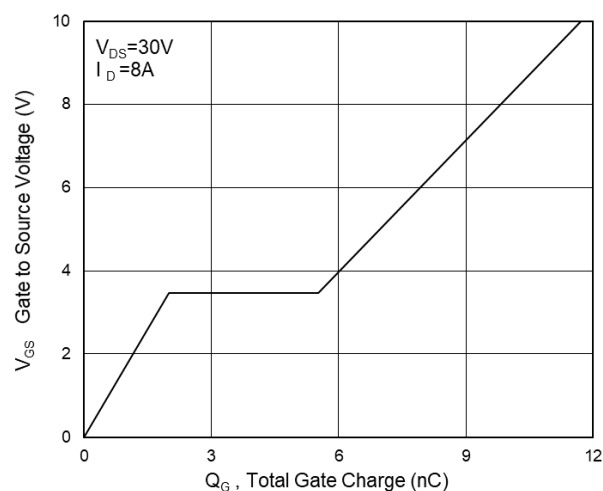


Fig.4 Gate-Charge Characteristics

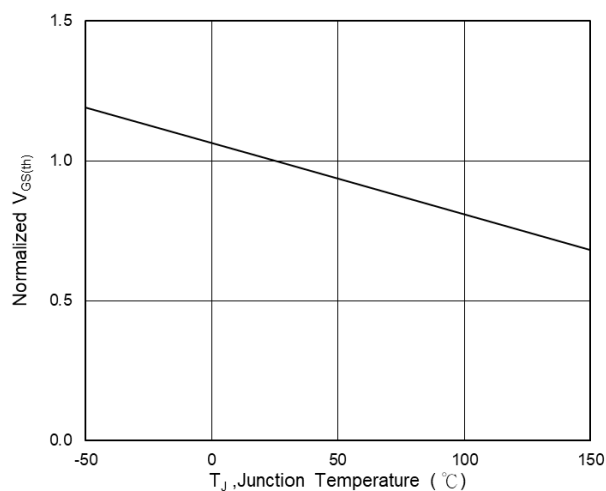


Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$

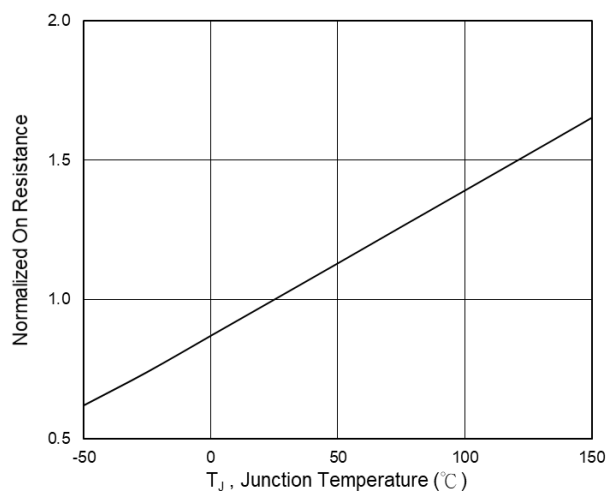


Fig.6 Normalized  $R_{DS(on)}$  vs  $T_J$

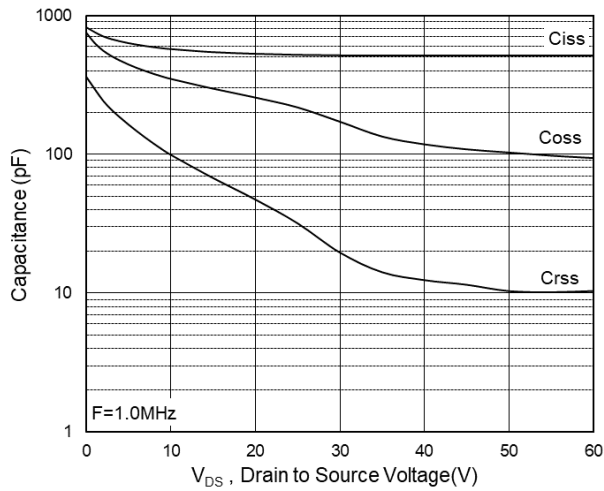


Fig.7 Capacitance

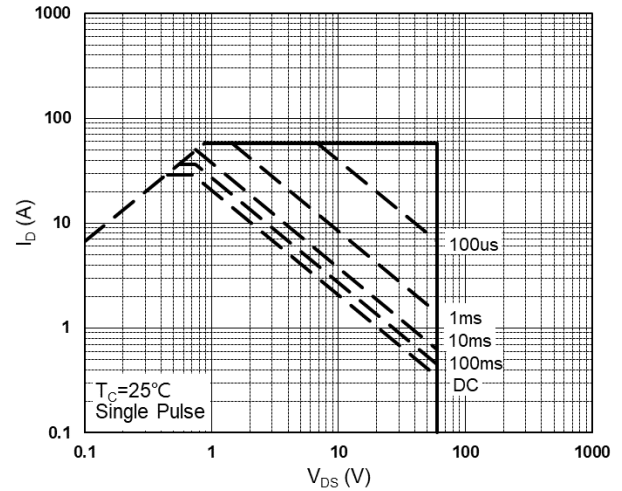


Fig.8 Safe Operating Area

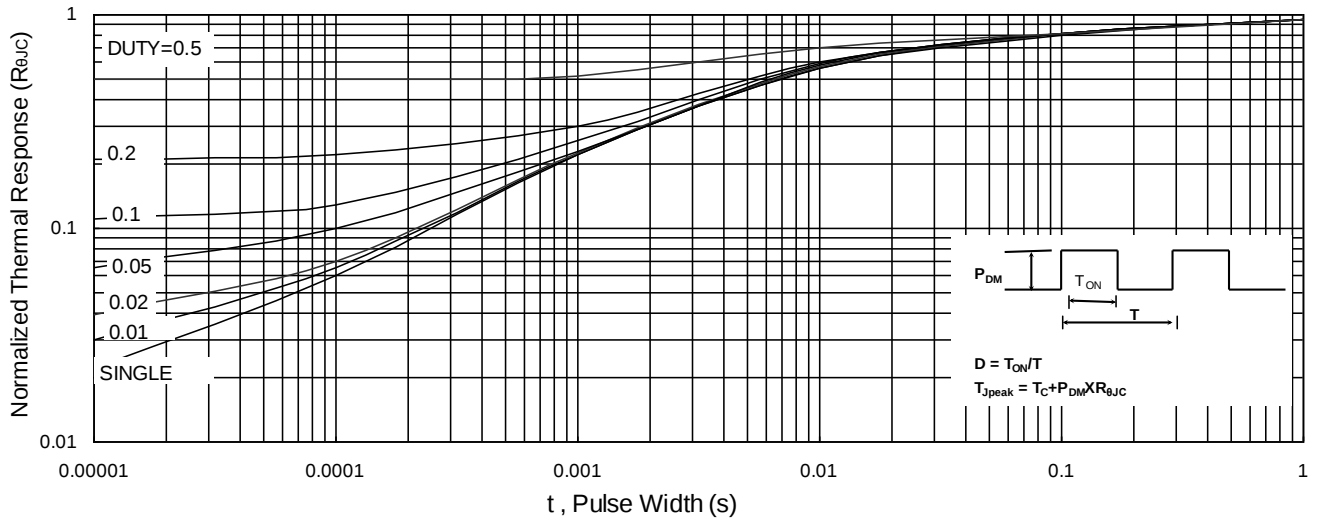


Fig.9 Normalized Maximum Transient Thermal Impedance

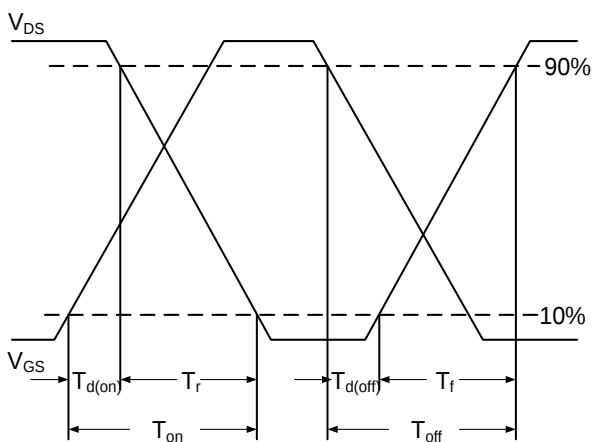


Fig.10 Switching Time Waveform

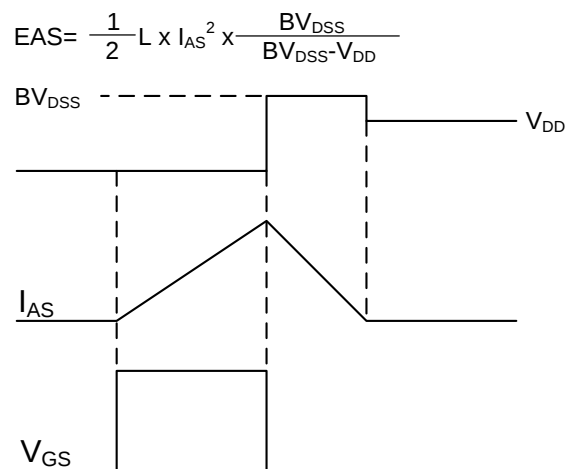
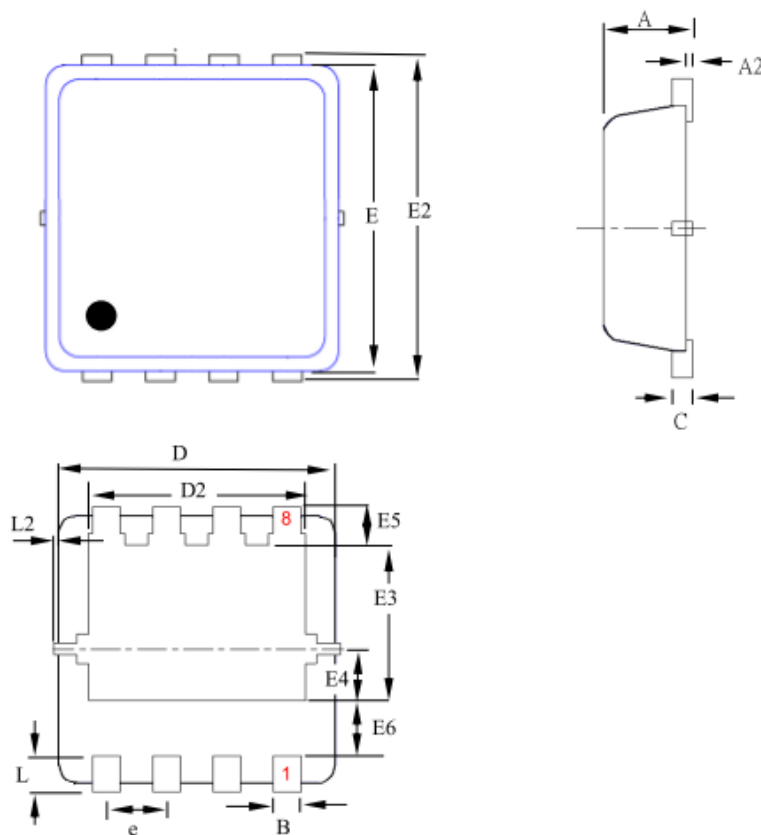


Fig.11 Unclamped Inductive Waveform

## DFN3\*3 Package Outline Dimensions



| SYMBOLS | MILLIMETERS |      |      | INCHES |       |       |
|---------|-------------|------|------|--------|-------|-------|
|         | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A       | 0.70        | 0.80 | 0.90 | 0.028  | 0.031 | 0.035 |
| A2      | 0.00        | --   | 0.05 | 0.000  | --    | 0.002 |
| B       | 0.24        | 0.30 | 0.35 | 0.009  | 0.012 | 0.014 |
| C       | 0.10        | 0.15 | 0.25 | 0.004  | 0.006 | 0.010 |
| D       | 2.90        | 3.00 | 3.20 | 0.114  | 0.118 | 0.126 |
| D2      | 2.15        | 2.35 | 2.59 | 0.085  | 0.093 | 0.102 |
| E       | 2.90        | 3.00 | 3.12 | 0.114  | 0.118 | 0.123 |
| E2      | 3.05        | 3.20 | 3.45 | 0.120  | 0.126 | 0.136 |
| E3      | 1.55        | 1.75 | 1.95 | 0.061  | 0.069 | 0.077 |
| E4      | 0.48        | 0.58 | 0.68 | 0.019  | 0.023 | 0.027 |
| E5      | 0.28        | 0.43 | 0.58 | 0.011  | 0.017 | 0.023 |
| E6      | 0.43        | 0.63 | 0.87 | 0.017  | 0.025 | 0.034 |
| L       | 0.30        | 0.40 | 0.50 | 0.012  | 0.016 | 0.020 |
| L2      | 0.00        | --   | 0.10 | 0.000  | --    | 0.004 |
| e       | --          | 0.65 | --   | --     | 0.026 | --    |

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