

### General Description

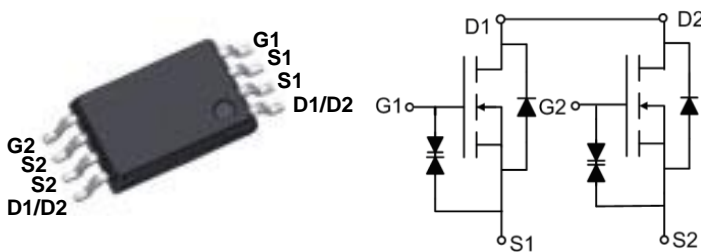
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

|       |       |      |
|-------|-------|------|
| BVDSS | RDSON | ID   |
| 20V   | 20mΩ  | 6.3A |

### Features

- 20V,6.3A,  $R_{DS(ON)} 20m\Omega @ V_{GS} = 4.5V$
- G-S ESD Diode Embedded
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available

### TSSOP8 Dual Pin Configuration



### Applications

- Notebook
- Load Switch
- LED applications



### Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

| Symbol    | Parameter                                       | Rating     | Units         |
|-----------|---|------------|---------------|
| $V_{DS}$  | Drain-Source Voltage                            | 20         | V             |
| $V_{GS}$  | Gate-Source Voltage                             | $\pm 12$   | V             |
| $I_D$     | Drain Current – Continuous ( $T_A=25^\circ C$ ) | 6.3        | A             |
|           | Drain Current – Continuous ( $T_A=70^\circ C$ ) | 5.0        | A             |
| $I_{DM}$  | Drain Current – Pulsed <sup>1</sup>             | 25.2       | A             |
| $P_D$     | Power Dissipation ( $T_A=25^\circ C$ )          | 1.25       | W             |
|           | Power Dissipation – Derate above $25^\circ C$   | 0.01       | W/ $^\circ C$ |
| $T_{STG}$ | Storage Temperature Range                       | -55 to 150 | $^\circ C$    |
| $T_J$     | Operating Junction Temperature Range            | -55 to 150 | $^\circ C$    |

### Thermal Characteristics

| Symbol          | Parameter                              | Typ. | Max. | Unit         |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | ---  | 100  | $^\circ C/W$ |

**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**
**Off Characteristics**

| Symbol                       | Parameter                          | Conditions                                      | Min. | Typ. | Max.     | Unit               |
|------------------------------|------------------------------------|---|------|------|----------|--------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage     | $V_{GS}=0V, I_D=250\mu A$                       | 20   | ---  | ---      | V                  |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to $25^\circ\text{C}, I_D=1\text{mA}$ | ---  | 0.02 | ---      | $V/^\circ\text{C}$ |
| $I_{DSS}$                    | Drain-Source Leakage Current       | $V_{DS}=16V, V_{GS}=0V, T_J=25^\circ\text{C}$   | ---  | ---  | 1        | $\mu A$            |
|                              |                                    | $V_{DS}=16V, V_{GS}=0V, T_J=85^\circ\text{C}$   | ---  | ---  | 30       | $\mu A$            |
| $I_{GSS}$                    | Gate-Source Leakage Current        | $V_{GS}=\pm 10V, V_{DS}=0V$                     | ---  | ---  | $\pm 10$ | $\mu A$            |

**On Characteristics**

|                     |                                      |                               |      |      |     |                     |
|---------------------|--------------------------------------|-------------------------------|------|------|-----|---------------------|
| $R_{DS(ON)}$        | Static Drain-Source On-Resistance    | $V_{GS}=4.5V, I_D=0.5A$       | ---  | 16   | 20  | $m\Omega$           |
|                     |                                      | $V_{GS}=2.5V, I_D=0.5A$       | ---  | 19   | 25  | $m\Omega$           |
| $V_{GS(th)}$        | Gate Threshold Voltage               | $V_{GS}=V_{DS}, I_D=250\mu A$ | 0.45 | 0.7  | 1   | V                   |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient |                               | ---  | -2.7 | --- | $mV/^\circ\text{C}$ |

**Dynamic and switching Characteristics**

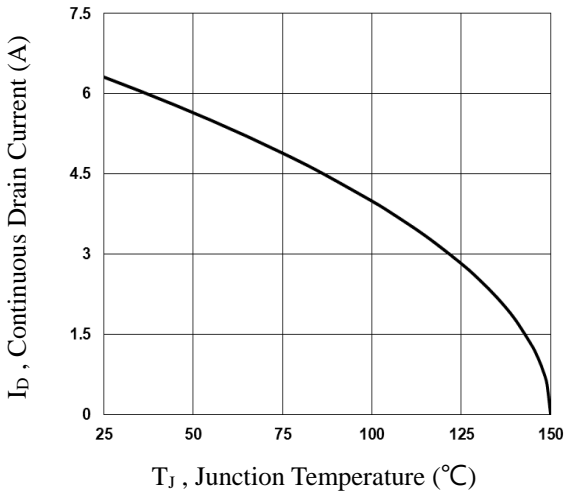
|              |                                    |  |     |      |     |    |
|--------------|------------------------------------|--|-----|------|-----|----|
| $Q_g$        | Total Gate Charge <sup>2,3</sup>   | $V_{DS}=16V, V_{GS}=4.5V, I_D=1A$              | --- | 9.3  | 20  | nC |
| $Q_{gs}$     | Gate-Source Charge <sup>2,3</sup>  |  | --- | 0.6  | 2   |    |
| $Q_{gd}$     | Gate-Drain Charge <sup>2,3</sup>   |  | --- | 3.1  | 6   |    |
| $T_{d(on)}$  | Turn-On Delay Time <sup>2,3</sup>  | $V_{DD}=10V, V_{GS}=4.5V, R_G=6\Omega, I_D=1A$ | --- | 4.6  | 9   | ns |
| $T_r$        | Rise Time <sup>2,3</sup>           |  | --- | 13.4 | 26  |    |
| $T_{d(off)}$ | Turn-Off Delay Time <sup>2,3</sup> |  | --- | 28   | 56  |    |
| $T_f$        | Fall Time <sup>2,3</sup>           |  | --- | 8.7  | 18  |    |
| $C_{iss}$    | Input Capacitance                  | $V_{DS}=15V, V_{GS}=0V, F=1\text{MHz}$         | --- | 118  | 330 | pF |
| $C_{oss}$    | Output Capacitance                 |  | --- | 88   | 180 |    |
| $C_{rss}$    | Reverse Transfer Capacitance       |  | --- | 17   | 40  |    |

**Drain-Source Diode Characteristics and Maximum Ratings**

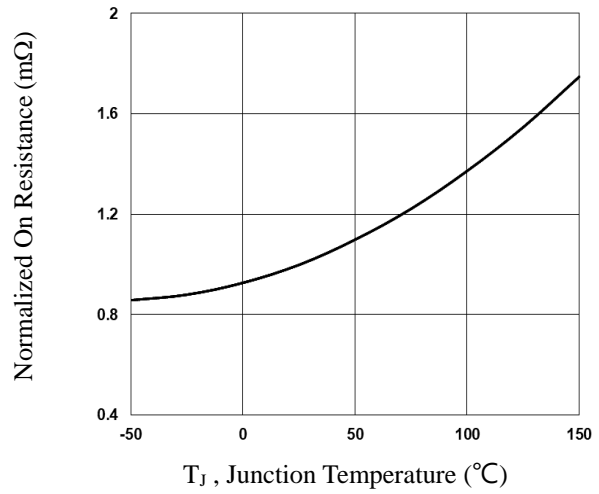
| Symbol   | Parameter                 | Conditions                                | Min. | Typ. | Max. | Unit |
|----------|---------------------------|---|------|------|------|------|
| $I_S$    | Continuous Source Current | $V_G=V_D=0V, \text{Force Current}$        | ---  | ---  | 6.3  | A    |
| $I_{SM}$ | Pulsed Source Current     |   | ---  | ---  | 12.6 | A    |
| $V_{SD}$ | Diode Forward Voltage     | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | ---  | ---  | 1.3  | V    |

Note :

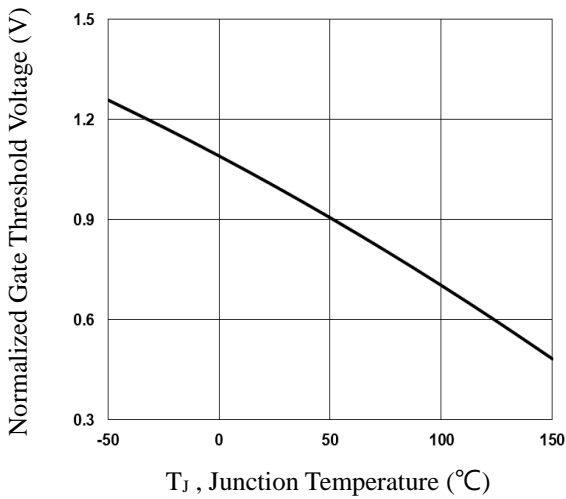
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.



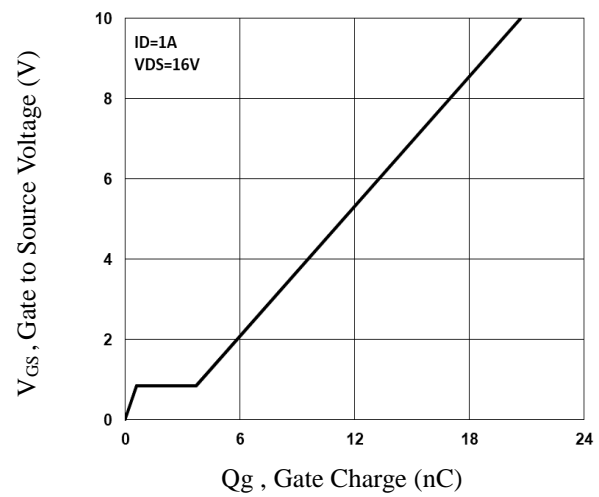
**Fig.1 Continuous Drain Current vs. T<sub>J</sub>**



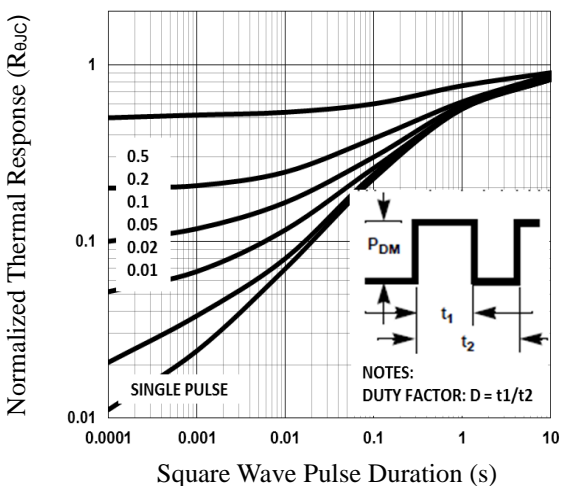
**Fig.2 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**



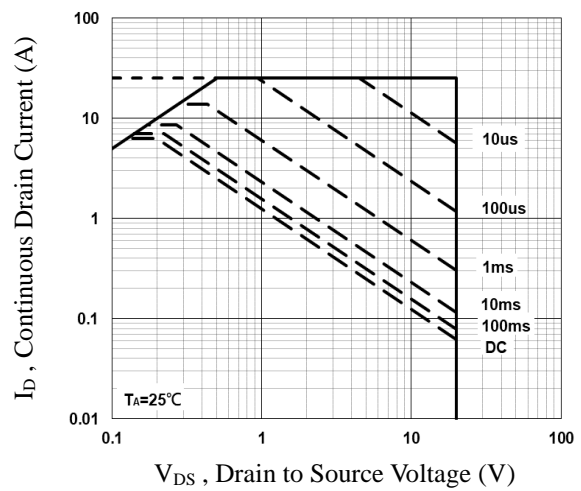
**Fig.3 Normalized V<sub>th</sub> vs. T<sub>J</sub>**



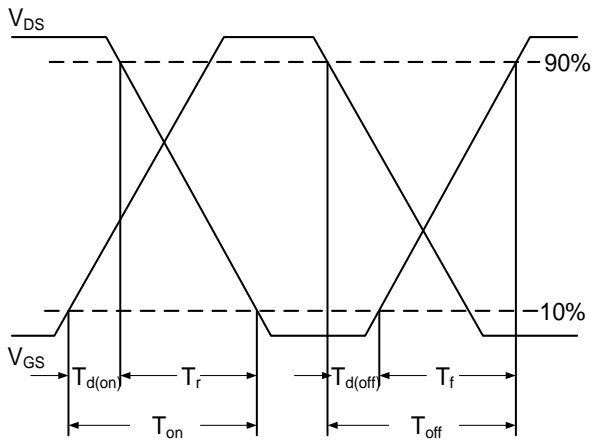
**Fig.4 Gate Charge Characteristics**



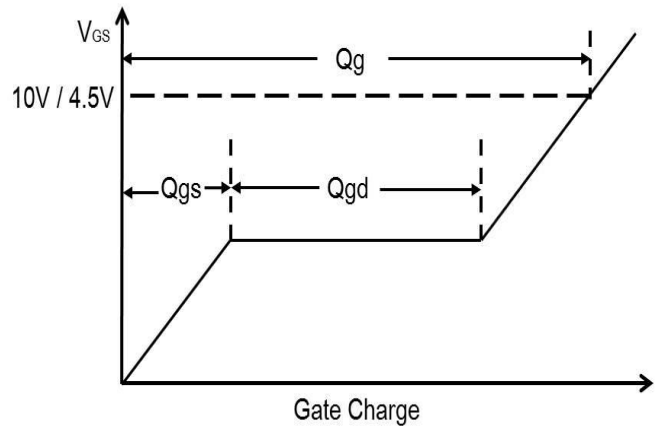
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**



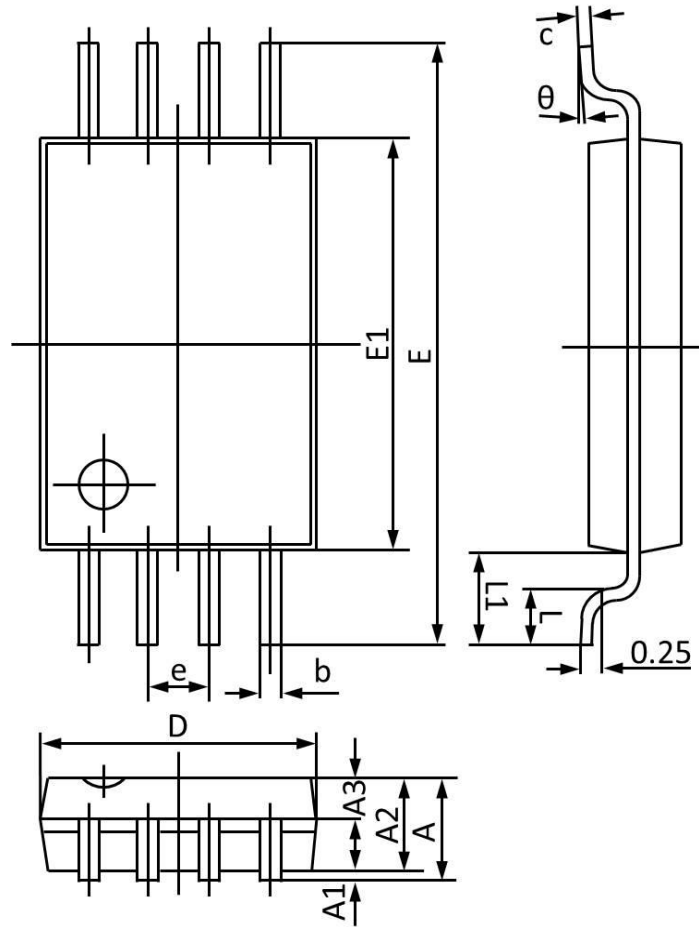
**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**



TSSOP8 PACKAGE INFORMATION



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.100                     | 1.200 | 0.044                | 0.047 |
| A1       | 0.050                     | 0.150 | 0.002                | 0.006 |
| A2       | 0.900                     | 1.050 | 0.036                | 0.041 |
| A3       | 0.390                     | 0.490 | 0.016                | 0.019 |
| b        | 0.210                     | 0.300 | 0.009                | 0.011 |
| c        | 0.130                     | 0.190 | 0.006                | 0.007 |
| D        | 0.120                     | 0.140 | 0.004                | 0.006 |
| E        | 6.200                     | 6.600 | 0.244                | 0.260 |
| E1       | 4.300                     | 4.500 | 0.169                | 0.177 |
| e        | 0.650(BSC)                |       | 0.025(BSC)           |       |
| L        | 0.450                     | 0.750 | 0.018                | 0.029 |
| L1       | 1.000(BSC)                |       | 0.039(BSC)           |       |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |