60V N-Channel MOSFETs

# PDEU69A8W

## General Description

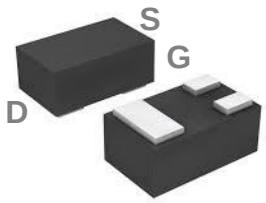
*These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

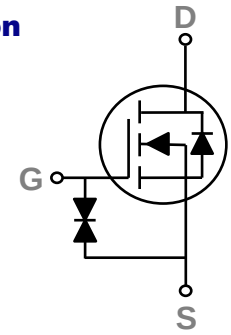
| BVDSS | RDSON | ID |
|---|---|---|
| 60V | 3Ω | 200mA |

## Features

- *60V,200mA, RDS(ON) =3Ω@VGS = 10V*
- *Worldwide Smallest Package : 1x0.6x0.45 mm*
- *Fast switching*
- *Green Device Available*
- *2KV HBM ESD Capability*

## SOT883 Pin Configuration




## Applications

- *Notebook*
- *Smartphone*
- *Battery Protection*
- *Hand-held Instruments*

## Absolute Maximum Ratings Tc=25℃ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 60 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current – Continuous ($T_A$=25℃) | 200 | mA |
| | Drain Current – Continuous ($T_A$=70℃) | 160 | mA |
| $I_{DM}$ | Drain Current – Pulsed[1] | 800 | mA |
| $P_D$ | Power Dissipation ($T_A$=25℃) | 156 | mW |
| | Power Dissipation – Derate above 25℃ | 1.25 | mW/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 800 | ℃/W |

## Electrical Characteristics ($T_J$=25 ℃, unless otherwise noted)

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 60 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=60V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=48V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | 10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±20 | uA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=0.15A | --- | 1.4 | 3 | Ω |
| | | $V_{GS}$=4.5V , $I_D$=0.1A | --- | 1.6 | 4 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.2 | 2 | 2.5 | V |
| gfs | Forward Transconductance | $V_{DS}$=10V , $I_D$=0.1A | --- | 0.3 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge[2,3] | $V_{DS}$=30V , $V_{GS}$=10V , $I_D$=0.1A | --- | 2 | 3 | nC |
| $Q_{gs}$ | Gate-Source Charge[2,3] | | --- | 0.9 | 1.4 | |
| $Q_{gd}$ | Gate-Drain Charge[2,3] | | --- | 0.4 | 0.6 | |
| $T_{d(on)}$ | Turn-On Delay Time[2,3] | $V_{DD}$=30V , $V_{GS}$=10V , $R_G$=6Ω $I_D$=0.1A | --- | 3 | 6 | ns |
| $T_r$ | Rise Time[2,3] | | --- | 5 | 10 | |
| $T_{d(off)}$ | Turn-Off Delay Time[2,3] | | --- | 14 | 27 | |
| $T_f$ | Fall Time[2,3] | | --- | 9 | 17 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=30V , $V_{GS}$=0V , F=1MHz | --- | 25 | 38 | pF |
| $C_{oss}$ | Output Capacitance | | --- | 15 | 23 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 6.8 | 10 | |

### Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 200 | mA |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 400 | mA |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=0.1A , $T_J$=25℃ | --- | --- | 1 | V |
| $T_{rr}$ | Reverse Recovery Time | $V_R$=50V, $I_S$=0.1A , dI/dt=100A/μs, $T_J$=25℃ | | 18 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 6 | | nC |

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.

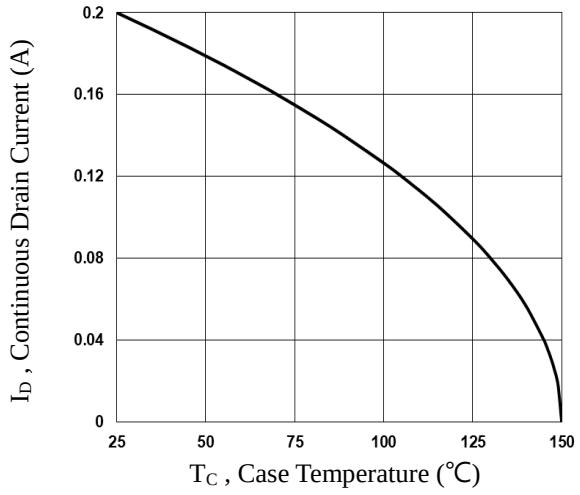



**Fig.1 Continuous Drain Current vs. $T_C$**

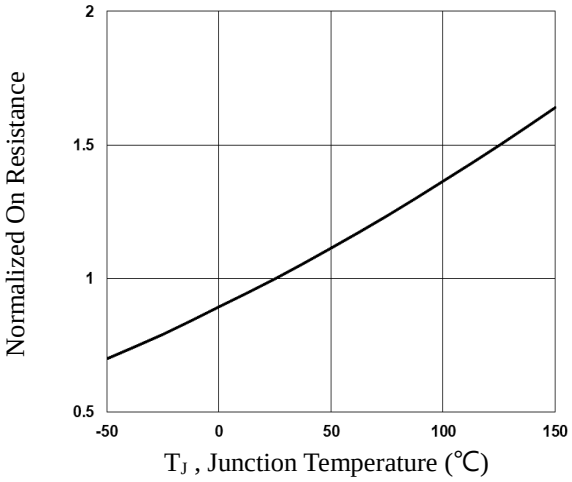



**Fig.2 Normalized RDSON vs. $T_J$**

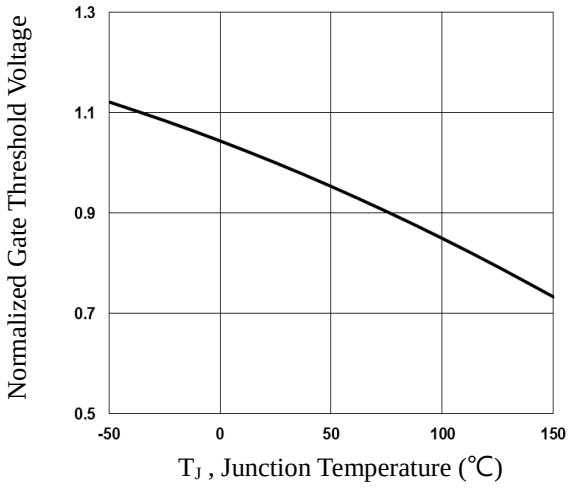



**Fig.3 Normalized $V_{th}$ vs. $T_J$**

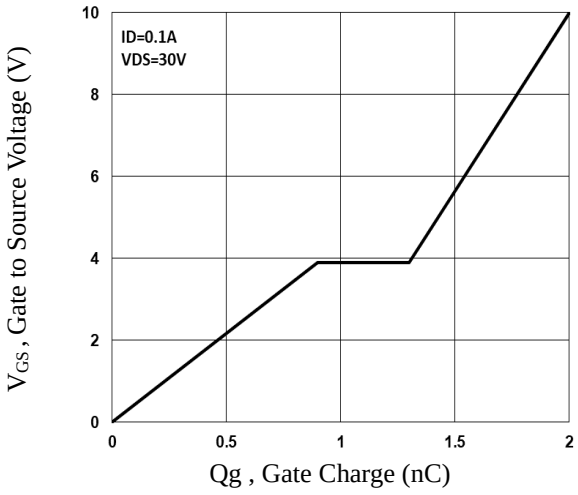



**Fig.4 Gate Charge Waveform**

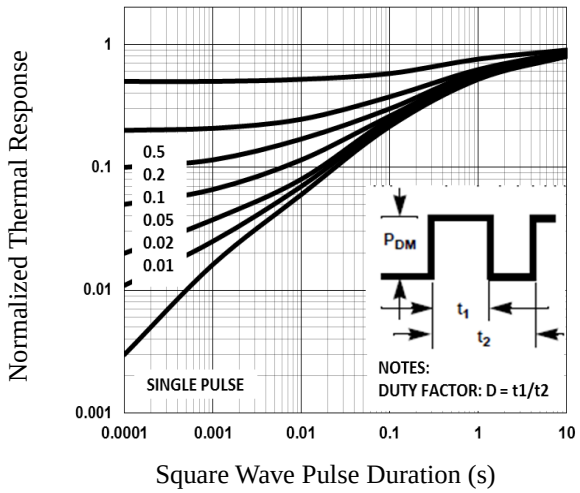



**Fig.5 Normalized Transient Response**

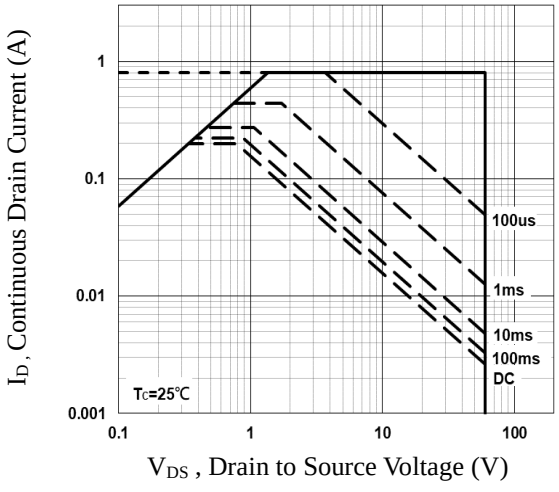



**Fig.6 Maximum Safe Operation Area**

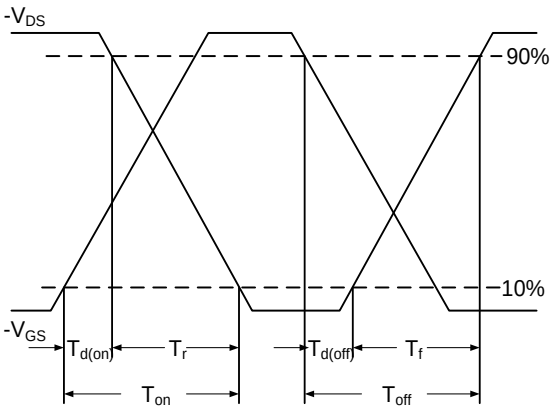



**Fig.7 Switching Time Waveform**

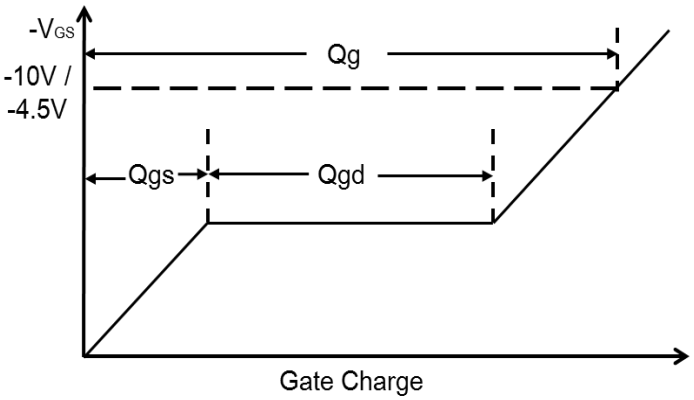
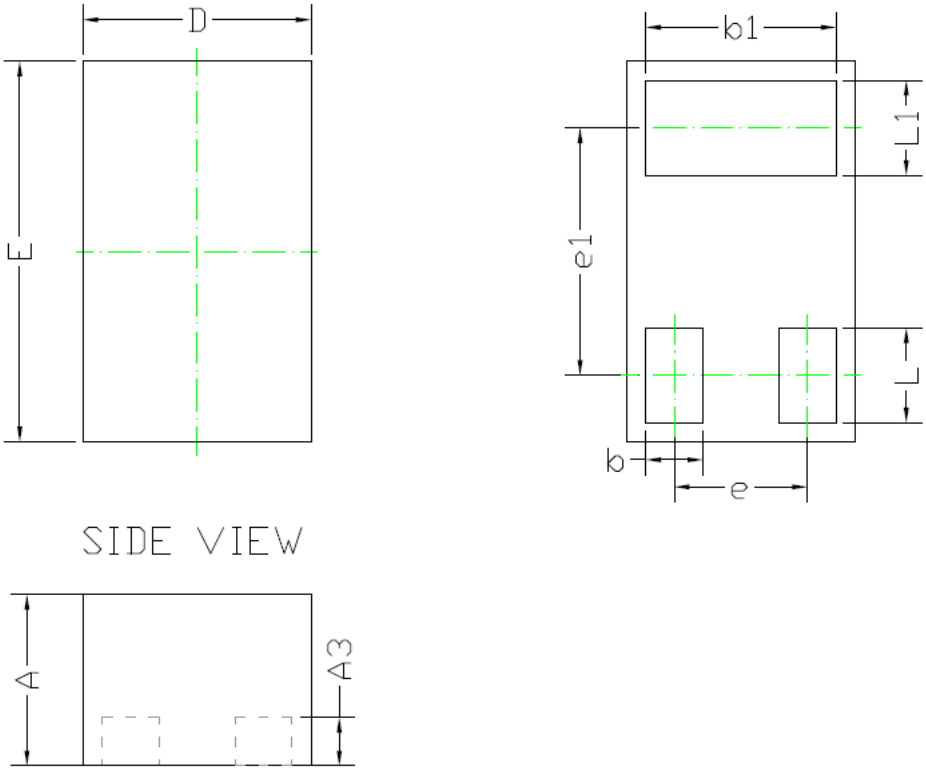



**Fig.8 Gate Charge Waveform**

# SOT883 PACKAGE INFORMATION




| SYMBOL | COMMON DIMENSIONS MILLIMETER | | |
|---|---|---|---|
| | MIN | NOM. | MAX |
| A | 0.40 | 0.45 | 0.50 |
| A3 | 0.127 BSC | | |
| D | 0.55 | 0.60 | 0.65 |
| E | 0.95 | 1.00 | 1.05 |
| e | 0.35 BSC | | |
| e1 | 0.65 BSC | | |
| b | 0.13 | 0.15 | 0.18 |
| b1 | 0.45 | 0.50 | 0.55 |
| L | 0.20 | 0.25 | 0.30 |
| L1 | 0.20 | 0.25 | 0.30 |