**40V N-Channel MOSFETs**

# PDS4856

## General Description

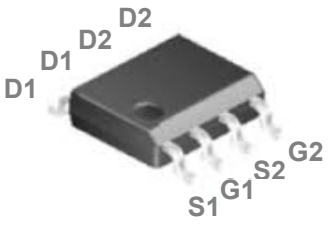
*These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

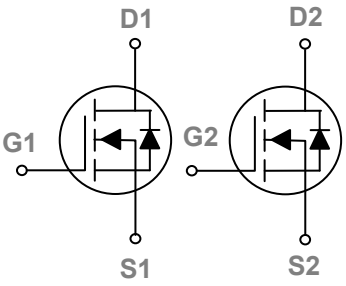
| BVDSS | RDSON | ID |
|---|---|---|
| 40V | 15mΩ | 10A |

## Features

- *40V,10A,RDS(ON) =15mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

## SOP8 Dual Pin Configuration




## Applications

- *Motor Drive*
- *Power Tools*
- *LED Lighting*

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 40 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current – Continuous ($T_C$=25˚C) | 10 | A |
| | Drain Current – Continuous ($T_C$=100˚C) | 6.3 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | 40 | A |
| EAS | Single Pulse Avalanche Energy[2] | 76 | mJ |
| IAS | Single Pulse Avalanche Current[2] | 39 | A |
| $P_D$ | Power Dissipation ($T_C$=25˚C) | 2.1 | W |
| | Power Dissipation – Derate above 25˚C | 0.017 | W/˚C |
| $T_{STG}$ | Storage Temperature Range | -50 to 150 | ˚C |
| $T_J$ | Operating Junction Temperature Range | -50 to 150 | ˚C |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 60 | ˚C/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 | 40 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=40V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=32V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | 10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=8A | --- | 12 | 15 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=6A | --- | 15 | 20 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 1.2 | 1.8 | 2.5 | V |
| gfs | Forward Transconductance | $V_{DS}$=10V , $I_D$=1A | --- | 5 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge[3,4] | $V_{DS}$=20V , $V_{GS}$=4.5V , $I_D$=10A | --- | 13 | 26 | nC |
| $Q_{gs}$ | Gate-Source Charge[3,4] | | --- | 4 | 8 | |
| $Q_{gd}$ | Gate-Drain Charge[3,4] | | --- | 5.3 | 10 | |
| $T_{d(on)}$ | Turn-On Delay Time[3,4] | $V_{DD}$=20V , $V_{GS}$=10V , $R_G$=6Ω $I_D$=1A | --- | 8 | 16 | ns |
| $T_r$ | Rise Time[3,4] | | --- | 3.2 | 8 | |
| $T_{d(off)}$ | Turn-Off Delay Time[3,4] | | --- | 26.4 | 52 | |
| $T_f$ | Fall Time[3,4] | | --- | 3.8 | 8 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=20V , $V_{GS}$=0V , F=1MHz | --- | 1088 | 2000 | pF |
| $C_{oss}$ | Output Capacitance | | --- | 110 | 200 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 80 | 160 | |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, F=1MHz | --- | 3 | 6 | Ω |

### 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 | --- | --- | 10 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 20 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | --- | --- | 1 | V |

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH,$I_{AS}$=39A.,$R_G$=25Ω, Starting $T_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

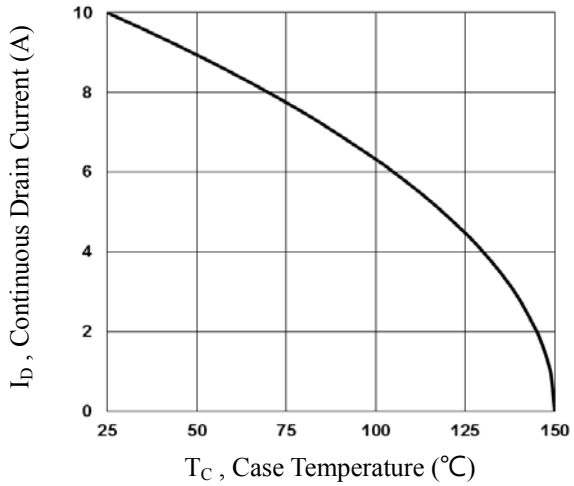



Fig.1 Continuous Drain Current vs. $T_C$

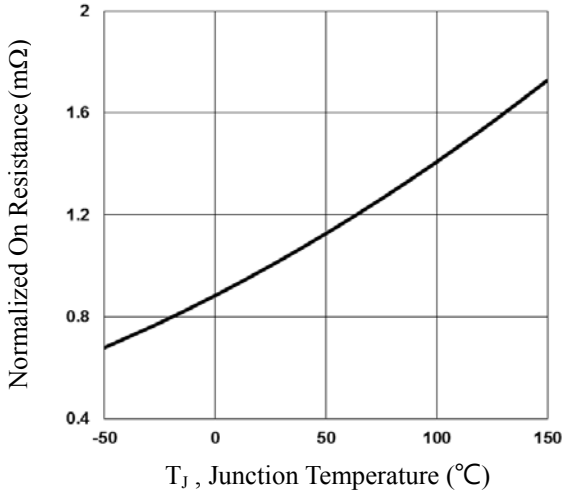



Fig.2 Normalized RDSON vs. $T_J$

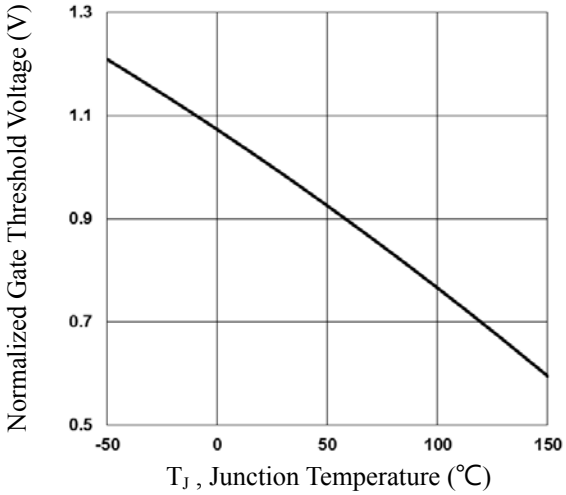



Fig.3 Normalized $V_{th}$ vs. $T_J$

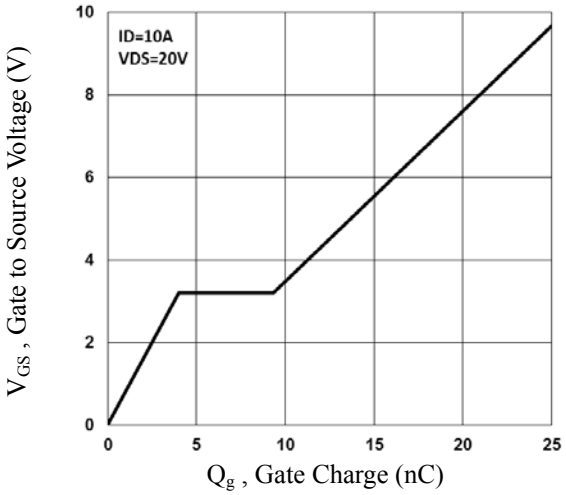



Fig.4 Gate Charge Waveform

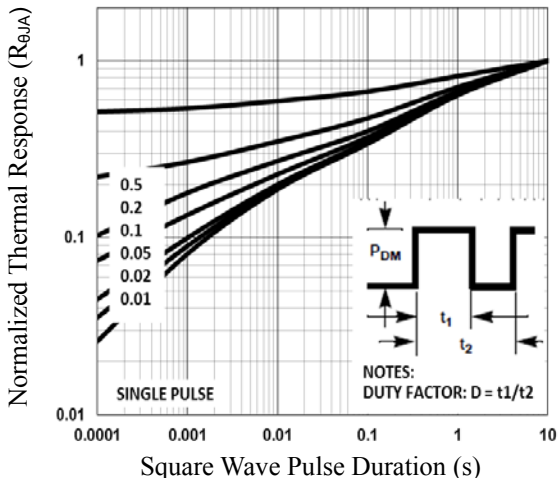



Fig.5 Normalized Transient Impedance

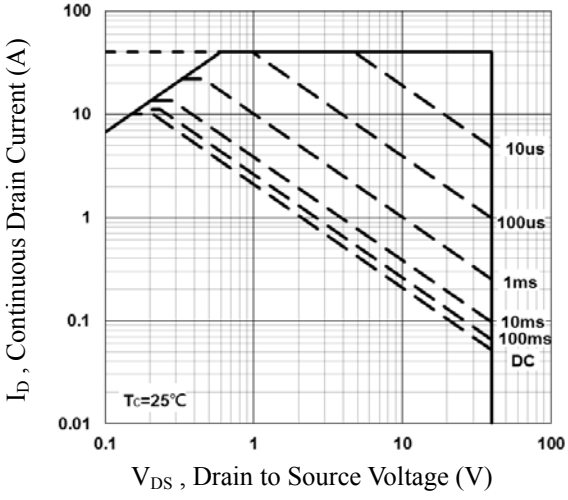



Fig.6 Maximum Safe Operation Area

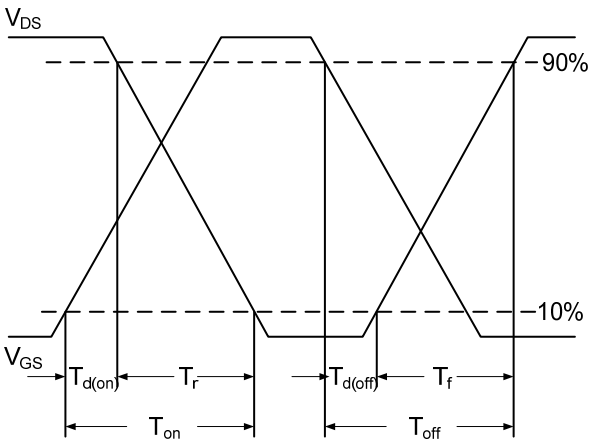



Fig.7 Switching Time Waveform

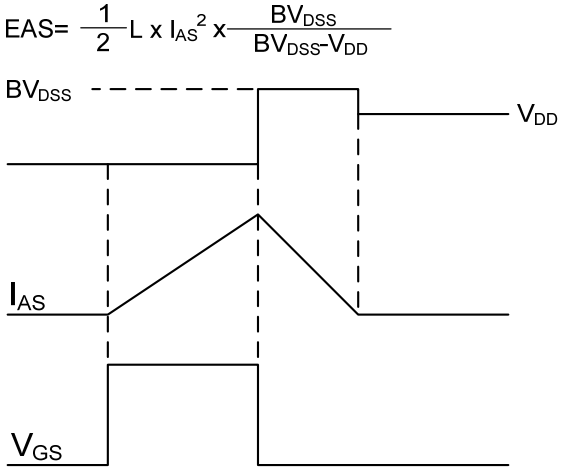
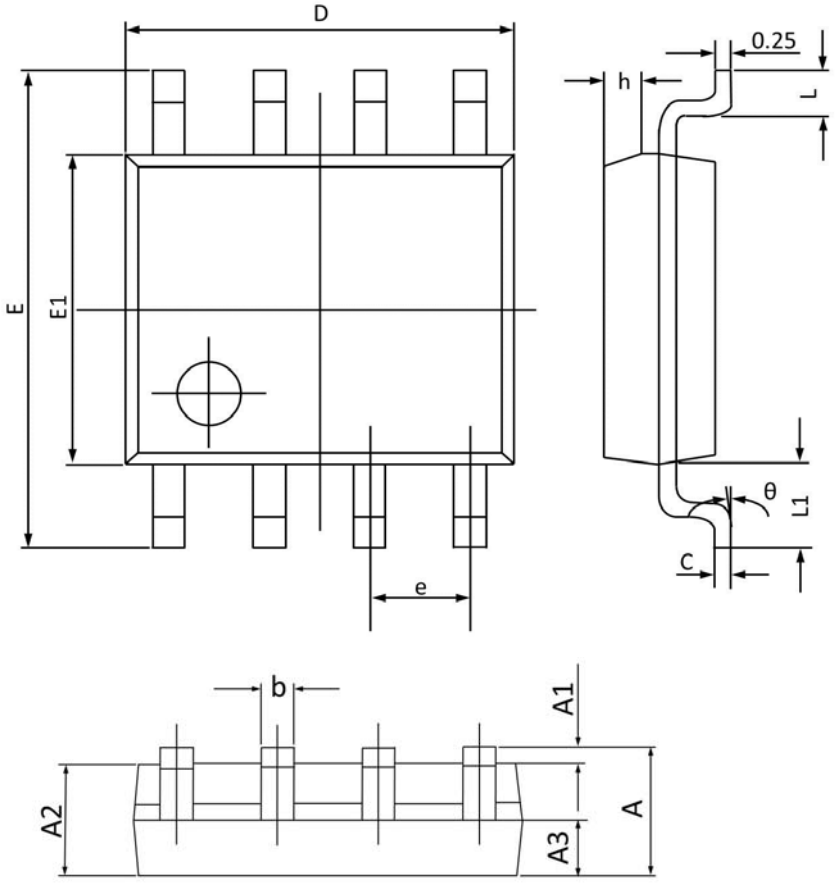



Fig.8 EAS Waveform

# SOP8 PACKAGE INFORMATION




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.068 |
| A1 | 0.100 | 0.250 | 0.004 | 0.009 |
| A2 | 1.300 | 1.500 | 0.052 | 0.059 |
| A3 | 0.600 | 0.700 | 0.024 | 0.027 |
| b | 0.390 | 0.480 | 0.016 | 0.018 |
| c | 0.210 | 0.260 | 0.009 | 0.010 |
| D | 4.700 | 5.100 | 0.186 | 0.200 |
| E | 5.800 | 6.200 | 0.229 | 0.244 |
| E1 | 3.700 | 4.100 | 0.146 | 0.161 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| h | 0.250 | 0.500 | 0.010 | 0.019 |
| L | 0.500 | 0.800 | 0.019 | 0.031 |
| L1 | 1.050(BSC) | | 0.041(BSC) | |
| $\theta$ | 0° | 8° | 0° | 8° |