30V N-Channel MOSFETs

# PDEB39G2BL

## General Description

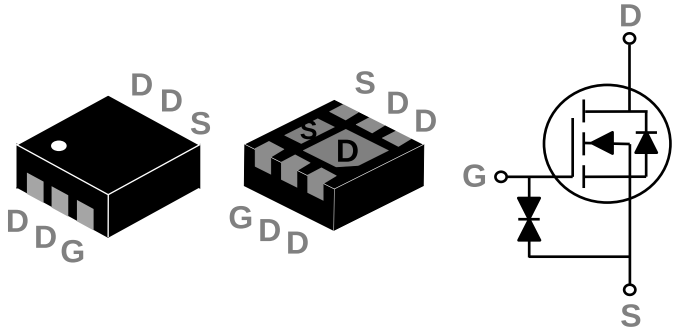
*These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| BVDSS | RDSON | ID |
|---|---|---|
| 30V | 8.5mΩ | 11A |

## Features

- *30V,11A, RDS(ON) =8.5mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *Green Device Available*
- *1.5kV HBM ESD Capability*

## DFN2x2-6L 2EP Pin Configuration



## Applications

- *Networking*
- *Load Switch*
- *LED applications*

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current – Continuous ($T_A$=25℃) | 11 | A |
|  | Drain Current – Continuous ($T_A$=70℃) | 8.8 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | 44 | A |
| $P_D$ | Power Dissipation ($T_A$=25℃) | 2 | W |
|  | Power Dissipation – Derate above 25℃ | 0.016 | W/℃ |
| $T_{STG}$ | 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 | --- | 62 | ℃/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 , $I_D$=250µA | 30 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=27V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | µA |
| | | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=85℃ | --- | --- | 10 | µA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±20 | µA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=8A | --- | 7.1 | 8.5 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=6A | --- | 10 | 13 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250µA | 1.2 | 1.6 | 2.5 | V |

### Dynamic and switching Characteristics$^2$

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V , $V_{GS}$=10V , $I_D$=6A | --- | 13 | 25 | nC |
| | | $V_{DS}$=15V , $V_{GS}$=4.5V , $I_D$=6A | --- | 6.3 | 12 | |
| $Q_{gs}$ | Gate-Source Charge | | --- | 1.1 | 3 | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 2.2 | 5 | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=15V , $V_{GS}$=10V , $R_G$=6Ω<br>$I_D$=6A | --- | 2.5 | 5 | ns |
| $T_r$ | Rise Time | | --- | 3 | 6 | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 5 | 10 | |
| $T_f$ | Fall Time | | --- | 8 | 16 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , F=1MHz | --- | 680 | 1400 | pF |
| $C_{oss}$ | Output Capacitance | | --- | 507 | 1000 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 27 | 60 | |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, F=1MHz | --- | 1.5 | --- | 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 | --- | --- | 11 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 22 | 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. Essentially independent of operating temperature.

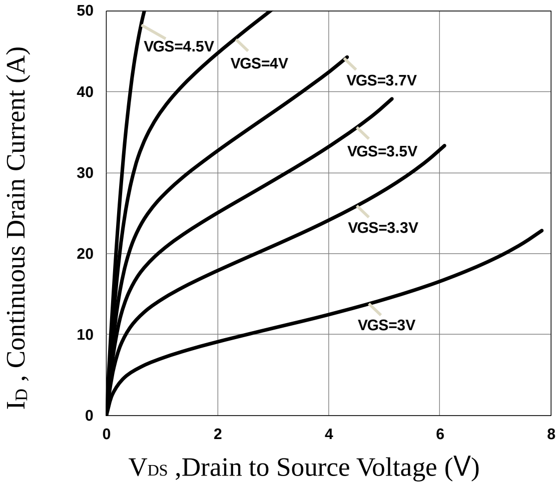


**Fig.1 Typical Output Characteristics**

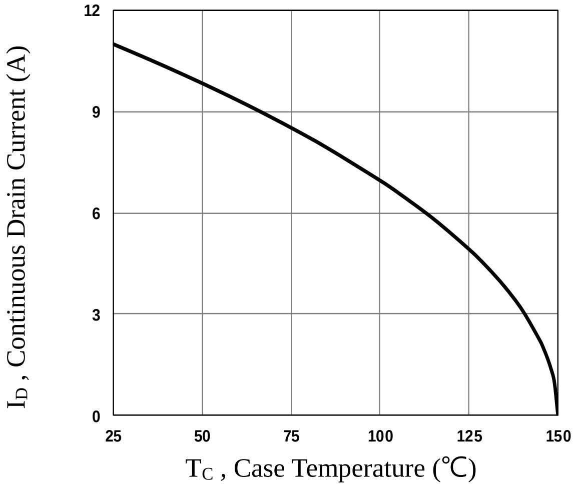


**Fig.2 Continuous Drain Current vs. $T_C$**

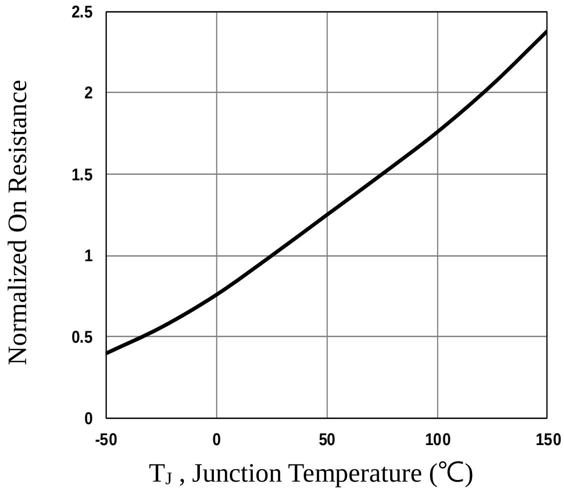


**Fig.3 Normalized RDSON vs. $T_J$**

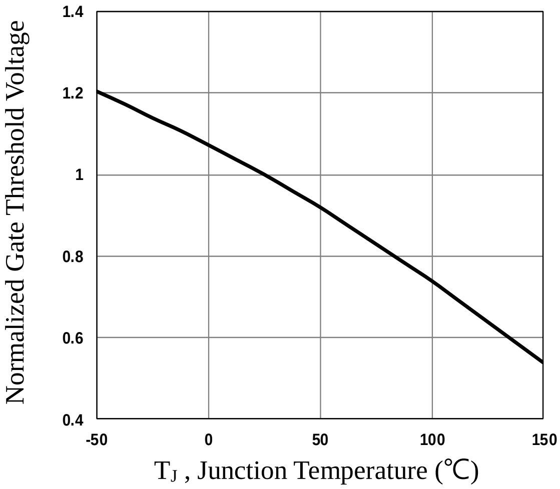


**Fig.4 Normalized $V_{th}$ vs. $T_J$**

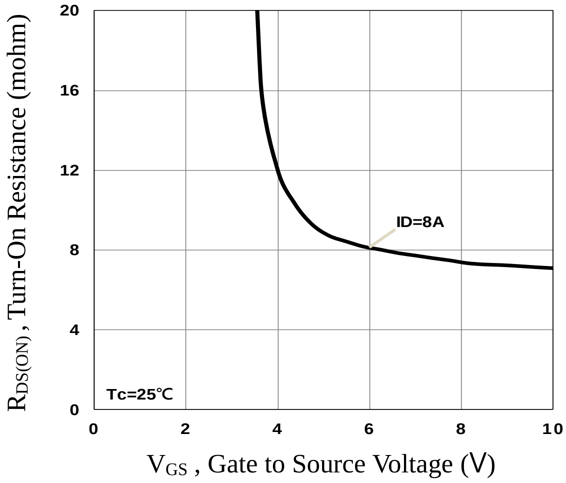


**Fig.5 Turn-On Resistance vs. $V_{GS}$**

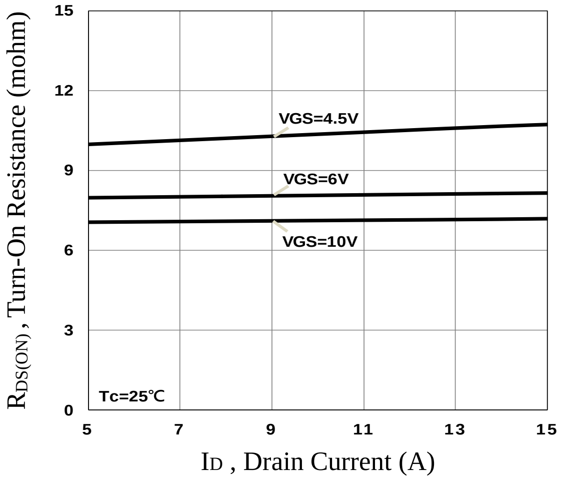


**Fig.6 Turn-On Resistance vs. $I_D$**

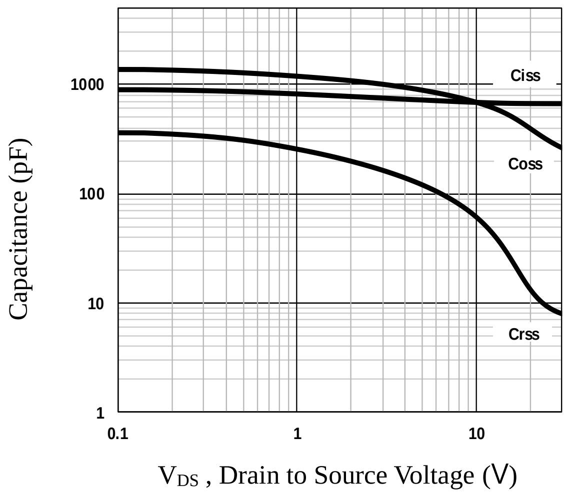


**Fig.7 Capacitance Characteristics**

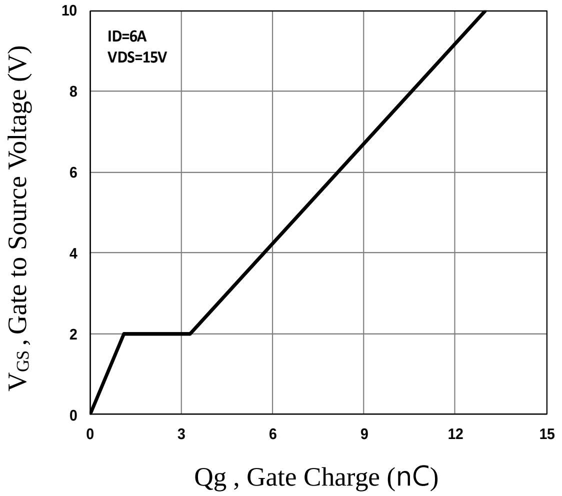


**Fig.8 Gate Charge Characteristics**

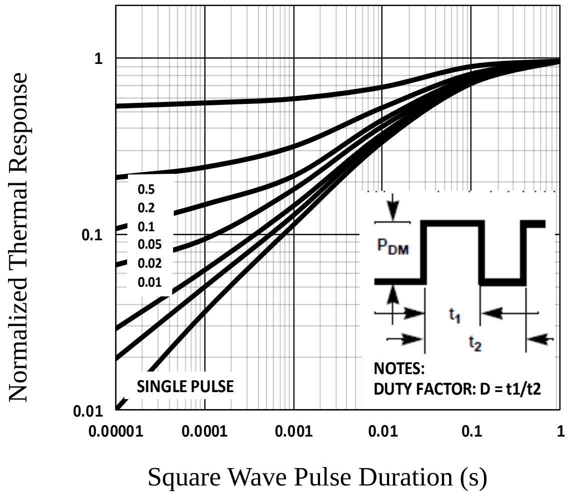


**Fig.9 Normalized Transient Impedance**

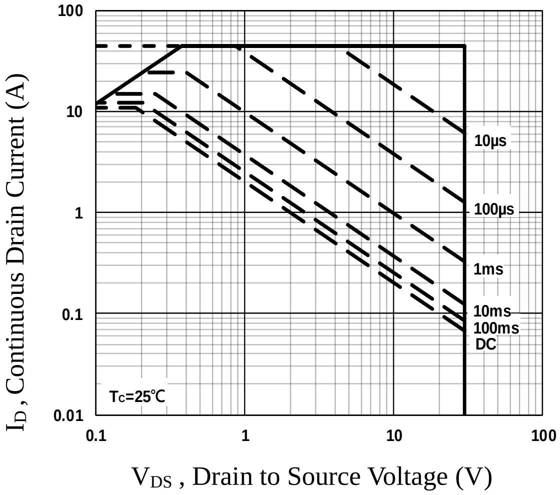


**Fig.10 Maximum Safe Operation Area**

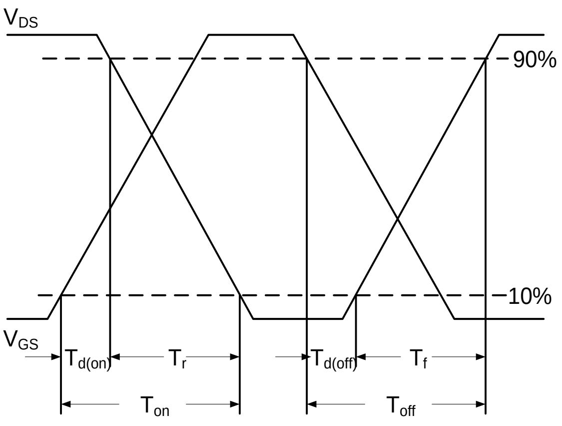


**Fig.11 Switching Time Waveform**

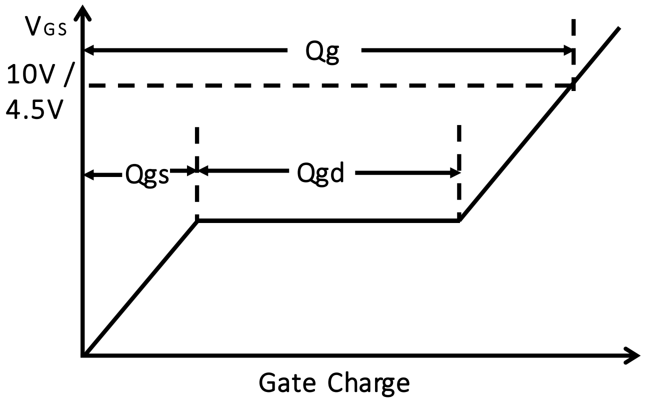
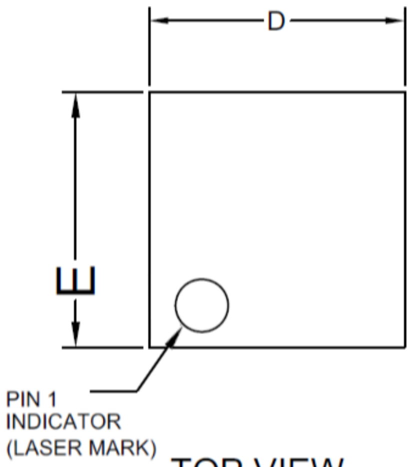
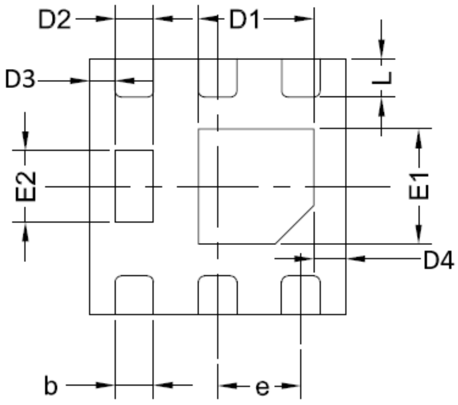


**Fig.12 Gate Charge Waveform**

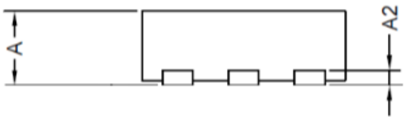
# DFN2x2-6L 2EP PACKAGE INFORMATION



TOP VIEW



BOTTOM VIEW

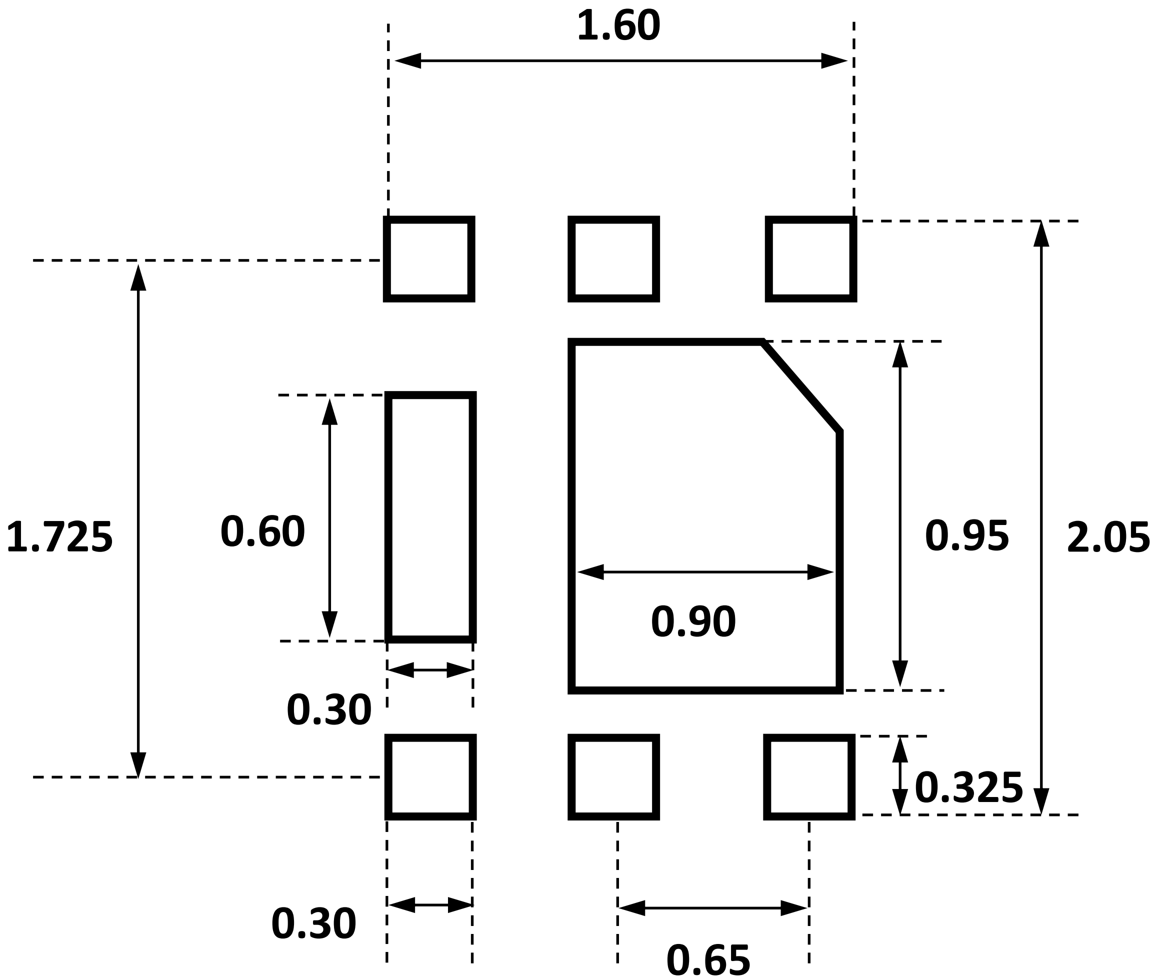


SIDE VIEW

| Symbol | Dimensions In Millimeters |  | Dimensions In Inches |  |
|---|---|---|---|---|
|  | MAX | MIN | MAX | MIN |
| A | 0.800 | 0.500 | 0.031 | 0.019 |
| A2 | 0.250 | 0.145 | 0.010 | 0.006 |
| b | 0.350 | 0.250 | 0.014 | 0.010 |
| D | 2.100 | 1.900 | 0.083 | 0.075 |
| D1 | 1.050 | 0.800 | 0.041 | 0.031 |
| D2 | 0.430 | 0.250 | 0.017 | 0.010 |
| D3 | 0.200BSC |  | 0.008BSC |  |
| D4 | 0.200BSC |  | 0.008BSC |  |
| E | 2.100 | 1.900 | 0.083 | 0.075 |
| E1 | 1.250 | 0.800 | 0.049 | 0.031 |
| E2 | 0.750 | 0.460 | 0.029 | 0.018 |
| e | 0.650BSC |  | 0.026BSC |  |
| L | 0.350 | 0.225 | 0.014 | 0.009 |

# RECOMMENDED LAND PATTERN

## DFN2X2-6L 2EP



unit : mm