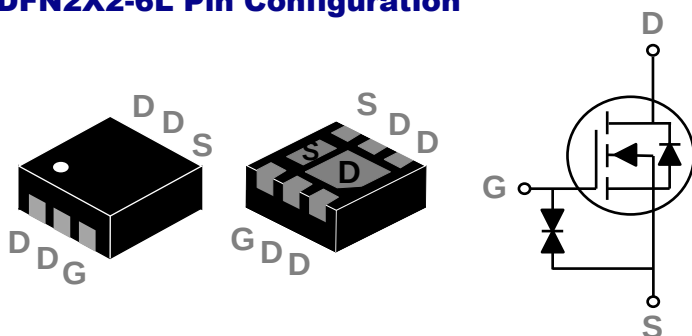


## General Description

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.

## DFN2X2-6L Pin Configuration



| BVDSS | RDS(ON) | ID |
|-------|---------|----|
| 100V  | 43mΩ    | 4A |

## Features

- 100V,4A,  $R_{DS(ON)} = 43m\Omega$  @  $V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available
- ESD Protection Diode Embedded

## Applications

- Networking
- Load Switch
- LED applications

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

| Symbol    | Parameter                                             | Rating     | Units               |
|-----------|-------------------------------------------------------|------------|---------------------|
| $V_{DS}$  | Drain-Source Voltage                                  | 100        | V                   |
| $V_{GS}$  | Gate-Source Voltage                                   | $\pm 20$   | V                   |
| $I_D$     | Drain Current – Continuous ( $T_A=25^\circ\text{C}$ ) | 4          | A                   |
|           | Drain Current – Continuous ( $T_A=70^\circ\text{C}$ ) | 3.2        | A                   |
| $I_{DM}$  | Drain Current – Pulsed <sup>1</sup>                   | 16         | A                   |
| EAS       | Single Pulse Avalanche Energy <sup>2</sup>            | 20         | mJ                  |
| IAS       | Single Pulse Avalanche Current <sup>2</sup>           | 20         | A                   |
| $P_D$     | Power Dissipation ( $T_A=25^\circ\text{C}$ )          | 2          | W                   |
|           | Power Dissipation – Derate above $25^\circ\text{C}$   | 0.02       | W/ $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature Range                             | -55 to 150 | $^\circ\text{C}$    |
| $T_J$     | Operating Junction Temperature Range                  | -55 to 150 | $^\circ\text{C}$    |

## Thermal Characteristics

| Symbol          | Parameter                              | Typ. | Max. | Unit               |
|-----------------|----------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | ---  | 62   | $^\circ\text{C/W}$ |

**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 | $V_{GS}=0V$ , $I_D=250\mu A$                         | 100  | ---  | ---      | V       |
| $I_{DSS}$  | Drain-Source Leakage Current   | $V_{DS}=100V$ , $V_{GS}=0V$ , $T_J=25^\circ\text{C}$ | ---  | ---  | 1        | $\mu A$ |
|            |                                | $V_{DS}=80V$ , $V_{GS}=0V$ , $T_J=85^\circ\text{C}$  | ---  | ---  | 10       | $\mu A$ |
| $I_{GSS}$  | Gate-Source Leakage Current    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                       | ---  | ---  | $\pm 20$ | $\mu A$ |

**On Characteristics**

|              |                                   |                                  |     |     |     |           |
|--------------|-----------------------------------|----------------------------------|-----|-----|-----|-----------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V$ , $I_D=4A$          | --- | 36  | 43  | $m\Omega$ |
|              |                                   | $V_{GS}=4.5V$ , $I_D=3A$         | --- | 48  | 62  | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{GS}=V_{DS}$ , $I_D=250\mu A$ | 1.2 | 1.6 | 2.5 | V         |

**Dynamic and switching Characteristics<sup>3</sup>**

|              |                              |                                                         |     |     |     |          |
|--------------|------------------------------|---------------------------------------------------------|-----|-----|-----|----------|
| $Q_g$        | Total Gate Charge            | $V_{DS}=50V$ , $V_{GS}=10V$ , $I_D=2A$                  | --- | 7   | 14  | nC       |
|              |                              |                                                         | --- | 4   | 8   |          |
| $Q_{gs}$     | Gate-Source Charge           | $V_{DS}=50V$ , $V_{GS}=4.5V$ , $I_D=2A$                 | --- | 0.7 | 1.5 |          |
| $Q_{gd}$     | Gate-Drain Charge            |                                                         | --- | 2   | 4   |          |
| $T_{d(on)}$  | Turn-On Delay Time           | $V_{DD}=50V$ , $V_{GS}=10V$ , $R_G=6\Omega$<br>$I_D=2A$ | --- | 6   | 12  | ns       |
| $T_r$        | Rise Time                    |                                                         | --- | 10  | 20  |          |
| $T_{d(off)}$ | Turn-Off Delay Time          |                                                         | --- | 20  | 40  |          |
| $T_f$        | Fall Time                    |                                                         | --- | 13  | 25  |          |
| $C_{iss}$    | Input Capacitance            | $V_{DS}=50V$ , $V_{GS}=0V$ , $F=1\text{MHz}$            | --- | 360 | 700 | pF       |
| $C_{oss}$    | Output Capacitance           |                                                         | --- | 80  | 150 |          |
| $C_{rss}$    | Reverse Transfer Capacitance |                                                         | --- | 6   | 12  |          |
| $R_g$        | Gate resistance              | $V_{GS}=0V$ , $V_{DS}=0V$ , $F=1\text{MHz}$             | --- | 0.4 | --- | $\Omega$ |

**Guaranteed Avalanche Energy**

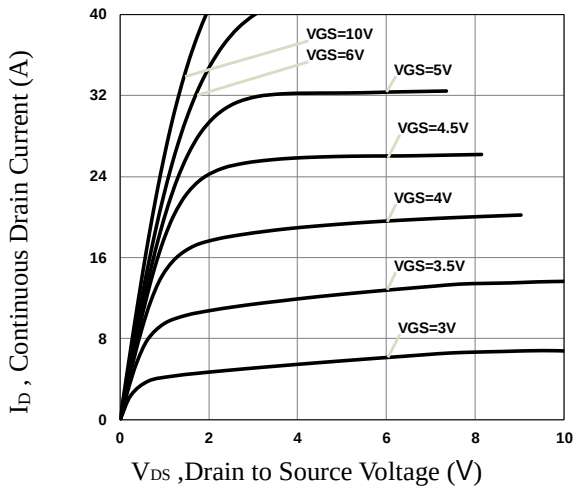
| Symbol | Parameter                     | Conditions                                     | Min. | Typ. | Max. | Unit |
|--------|-------------------------------|------------------------------------------------|------|------|------|------|
| EAS    | Single Pulse Avalanche Energy | $V_{DD}=50V$ , $L=0.1\text{mH}$ , $I_{AS}=14A$ | 9.8  | ---  | ---  | mJ   |

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

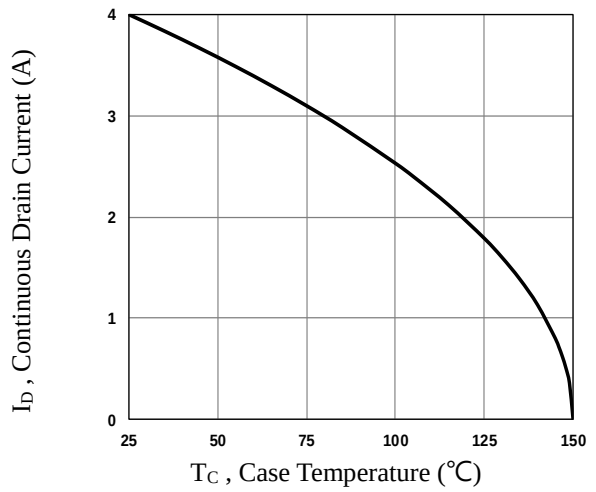
| Symbol   | Parameter                 | Conditions                                      | Min. | Typ. | Max. | Unit |
|----------|---------------------------|-------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current | $V_G=V_D=0V$ , Force Current                    | ---  | ---  | 4    | A    |
| $I_{SM}$ | Pulsed Source Current     |                                                 | ---  | ---  | 8    | A    |
| $V_{SD}$ | Diode Forward Voltage     | $V_{GS}=0V$ , $I_S=1A$ , $T_J=25^\circ\text{C}$ | ---  | ---  | 1    | V    |
| $T_{rr}$ | Reverse Recovery Time     | $V_R=50V$ , $I_S=10A$                           | ---  | 40   | ---  | ns   |
| $Q_{rr}$ | Reverse Recovery Charge   | $di/dt=100A/\mu s$ , $T_J=25^\circ\text{C}$     | ---  | 50   | ---  | nC   |

Note :

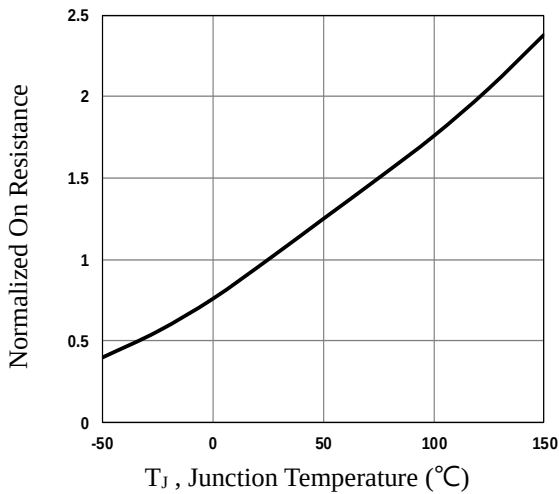
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=50V$ ,  $V_{GS}=10V$ ,  $L=0.1\text{mH}$ ,  $I_{AS}=20A$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .
3. Essentially independent of operating temperature.



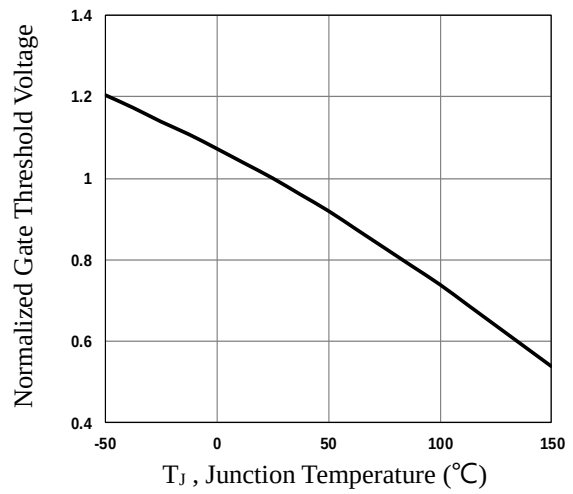
**Fig.1 Typical Output Characteristics**



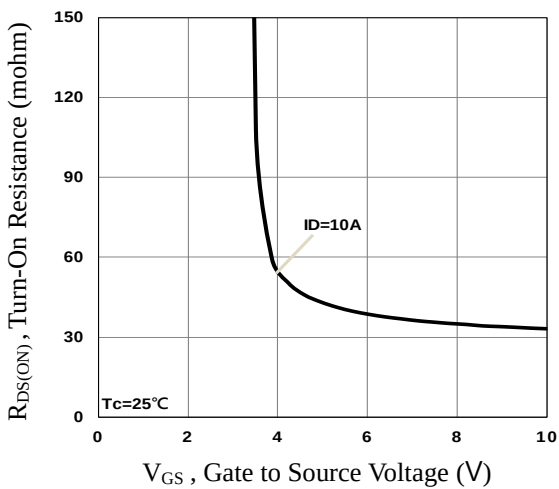
**Fig.2 Continuous Drain Current vs. T<sub>C</sub>**



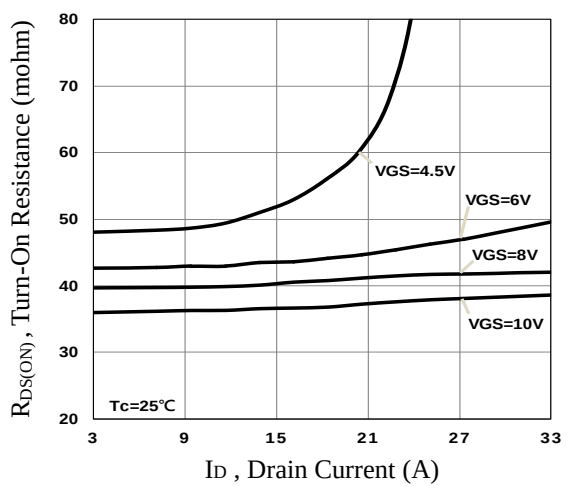
**Fig.3 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**



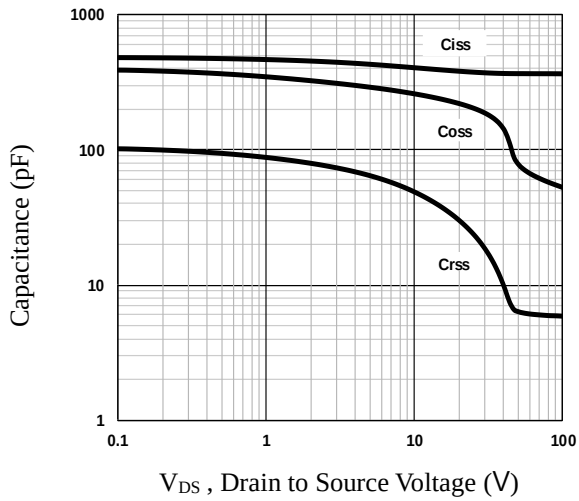
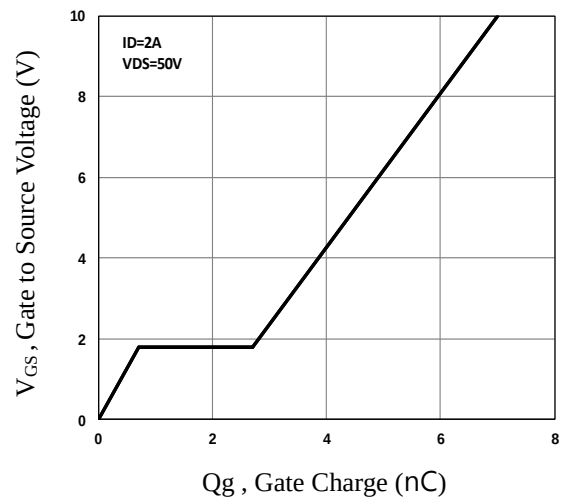
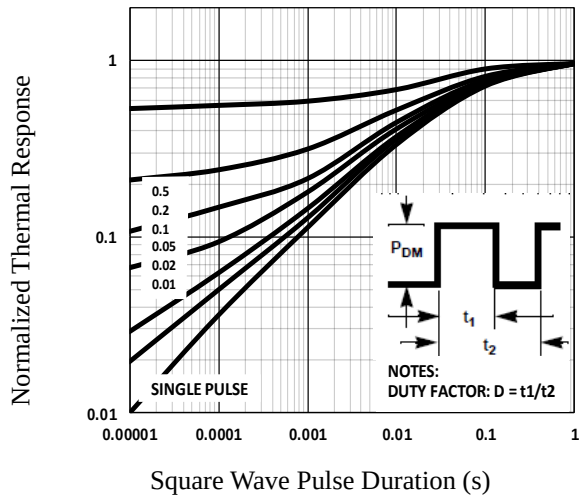
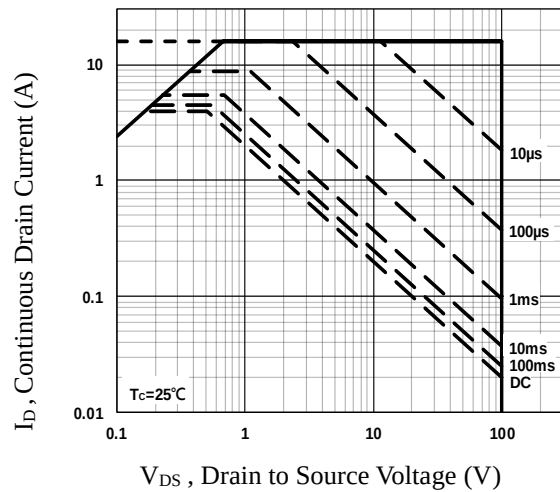
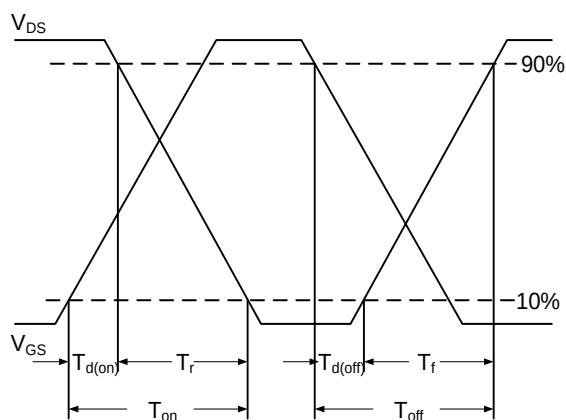
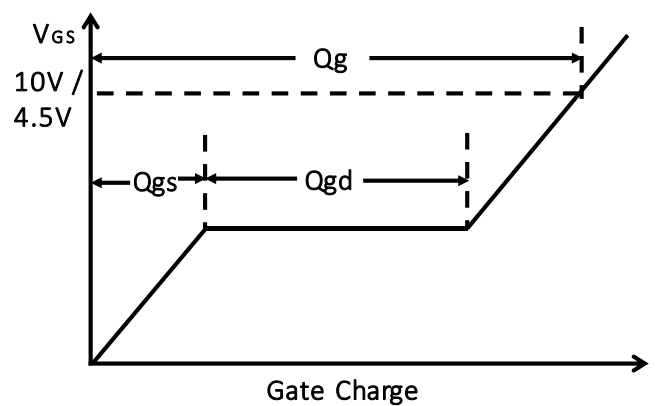
**Fig.4 Normalized V<sub>th</sub> vs. T<sub>J</sub>**



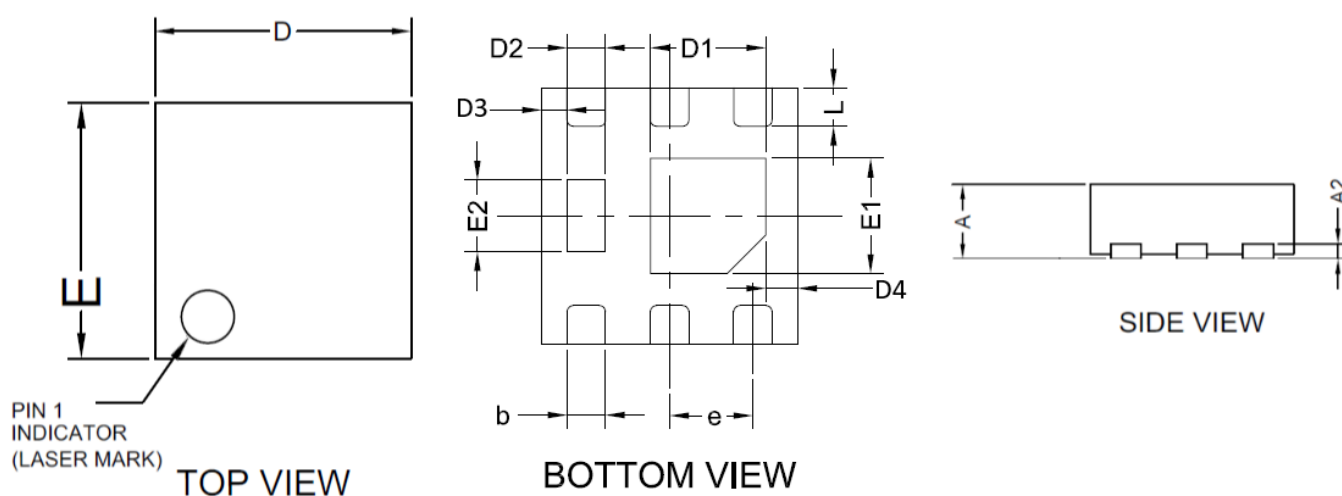
**Fig.5 Turn-On Resistance vs. V<sub>GS</sub>**



**Fig.6 Turn-On Resistance vs. I<sub>D</sub>**


**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 PACKAGE INFORMATION



| 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

