

### General Description

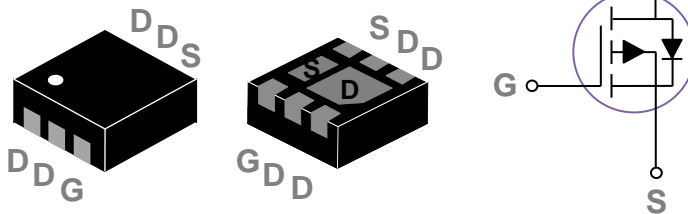
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

|       |       |       |
|-------|-------|-------|
| BVDSS | RDSON | ID    |
| -30V  | 55mΩ  | -4.7A |

### Features

- -30V, -4.7A,  $R_{DS(ON)} = 55m\Omega @ V_{GS} = -10V$
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

### DFN2x2-6L 2EP Pin Configuration



### Applications

- Notebook
- Load Switch
- Battery Protection
- Hand-held Instruments

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

| Symbol    | Parameter   | Rating     | Units               |
|-----------|---|------------|---------------------|
| $V_{DS}$  | Drain-Source Voltage                                  | -30        | V                   |
| $V_{GS}$  | Gate-Source Voltage                                   | $\pm 20$   | V                   |
| $I_D$     | Drain Current – Continuous ( $T_A=25^\circ\text{C}$ ) | -4.7       | A                   |
|           | Drain Current – Continuous ( $T_A=70^\circ\text{C}$ ) | -3.8       | A                   |
| $I_{DM}$  | Drain Current – Pulsed <sup>1</sup>                   | -18.8      | A                   |
| $P_D$     | Power Dissipation ( $T_A=25^\circ\text{C}$ )          | 2.01       | W                   |
|           | Power Dissipation – Derate above $25^\circ\text{C}$   | 0.055      | 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<sub>J</sub>=25 °C, unless otherwise noted)**
**Off Characteristics**

| Symbol                              | Parameter                                 | Conditions  | Min. | Typ.  | Max. | Unit |
|-------------------------------------|---|---|------|-------|------|------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage            | V <sub>GS</sub> =0V , I <sub>D</sub> =-250uA                        | -30  | ---   | ---  | V    |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient | Reference to 25°C , I <sub>D</sub> =-1mA                            | ---  | -0.03 | ---  | V/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current              | V <sub>DS</sub> =-30V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C  | ---  | ---   | -1   | uA   |
|                                     |   | V <sub>DS</sub> =-24V , V <sub>GS</sub> =0V , T <sub>J</sub> =125°C | ---  | ---   | -10  | uA   |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current               | V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V                         | ---  | ---   | ±100 | nA   |

**On Characteristics**

|                      |   |   |      |      |      |       |
|----------------------|---|---|------|------|------|-------|
| R <sub>DS(ON)</sub>  | Static Drain-Source On-Resistance           | V <sub>GS</sub> =-10V , I <sub>D</sub> =-4A               | ---  | 45   | 55   | mΩ    |
|                      |   | V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-3A              | ---  | 65   | 85   | mΩ    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                      | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA | -1.2 | -1.6 | -2.2 | V     |
| ΔV <sub>GS(th)</sub> | V <sub>GS(th)</sub> Temperature Coefficient |   | ---  | 4    | ---  | mV/°C |
| g <sub>fs</sub>      | Forward Transconductance                    | V <sub>DS</sub> =-10V , I <sub>D</sub> =-3A               | ---  | 3.5  | ---  | S     |

**Dynamic and switching Characteristics**

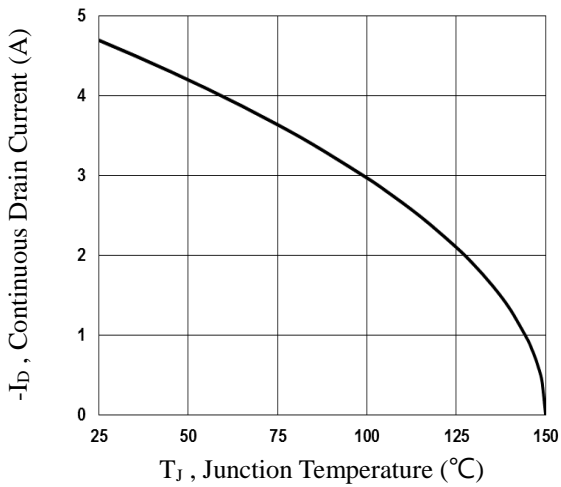
|                     |                                     |   |     |      |     |    |
|---------------------|-------------------------------------|---|-----|------|-----|----|
| Q <sub>g</sub>      | Total Gate Charge <sup>2, 3</sup>   | V <sub>DS</sub> =-15V , V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-3A                      | --- | 5.1  | 7   | nC |
| Q <sub>gs</sub>     | Gate-Source Charge <sup>2, 3</sup>  |   | --- | 2    | 3   |    |
| Q <sub>gd</sub>     | Gate-Drain Charge <sup>2, 3</sup>   |   | --- | 2.2  | 4   |    |
| T <sub>d(on)</sub>  | Turn-On Delay Time <sup>2, 3</sup>  | V <sub>DD</sub> =-15V , V <sub>GS</sub> =-10V , R <sub>G</sub> =6Ω<br>I <sub>D</sub> =-1A | --- | 3.4  | 6   | ns |
| T <sub>r</sub>      | Rise Time <sup>2, 3</sup>           |   | --- | 10.8 | 21  |    |
| T <sub>d(off)</sub> | Turn-Off Delay Time <sup>2, 3</sup> |   | --- | 26.9 | 51  |    |
| T <sub>f</sub>      | Fall Time <sup>2, 3</sup>           |   | --- | 6.9  | 13  |    |
| C <sub>iss</sub>    | Input Capacitance                   | V <sub>DS</sub> =-15V , V <sub>GS</sub> =0V , F=1MHz                                      | --- | 560  | 810 | pF |
| C <sub>oss</sub>    | Output Capacitance                  |   | --- | 55   | 80  |    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance        |   | --- | 40   | 60  |    |

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

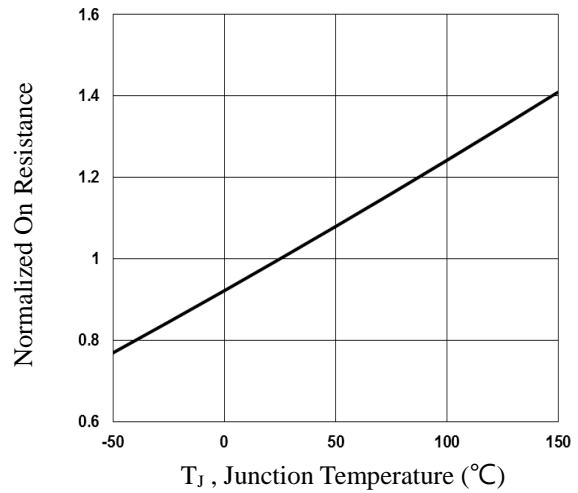
| Symbol          | Parameter                 | Conditions   | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|--|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current               | ---  | ---  | -4.7 | A    |
| I <sub>SM</sub> | Pulsed Source Current     |  | ---  | ---  | -9.4 | A    |
| V <sub>SD</sub> | Diode Forward Voltage     | V <sub>GS</sub> =0V , I <sub>S</sub> =-1A , T <sub>J</sub> =25°C | ---  | ---  | -1   | V    |

Note :

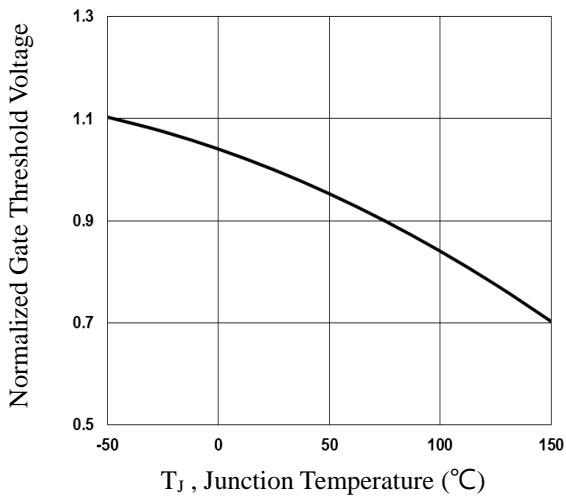
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
3. Essentially independent of operating temperature.



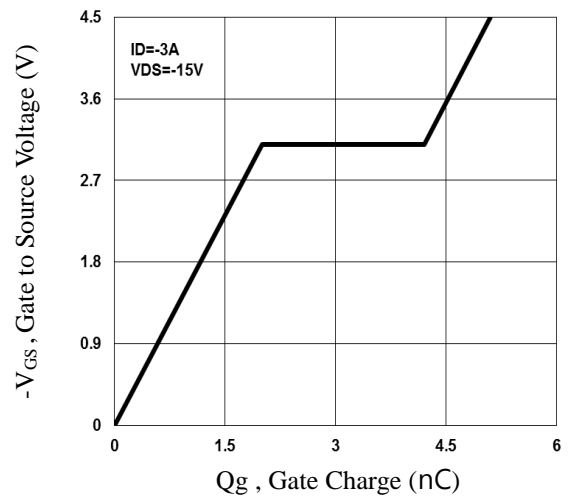
**Fig.1 Continuous Drain Current vs.  $T_j$**



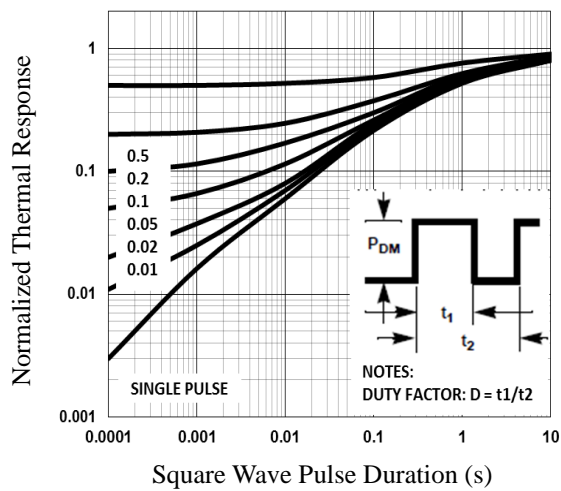
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



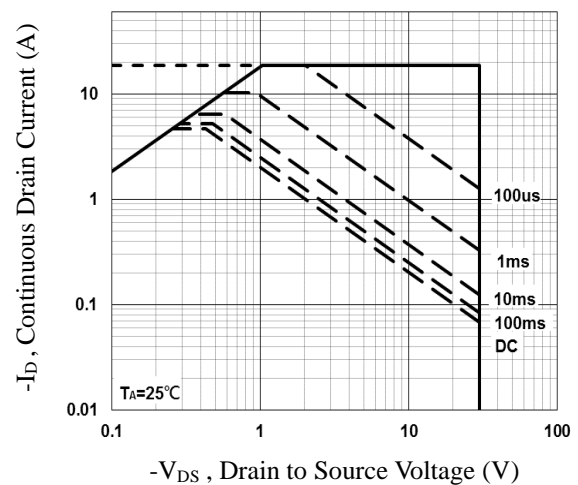
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



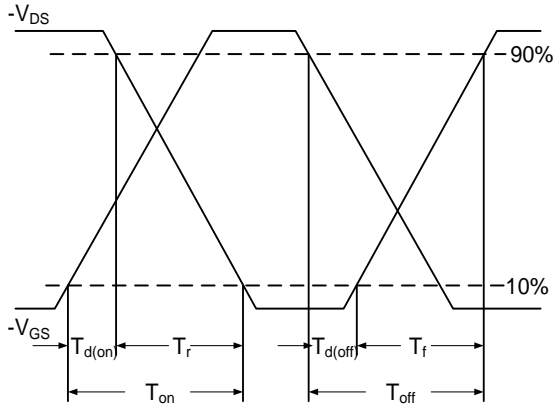
**Fig.4 Gate Charge Waveform**



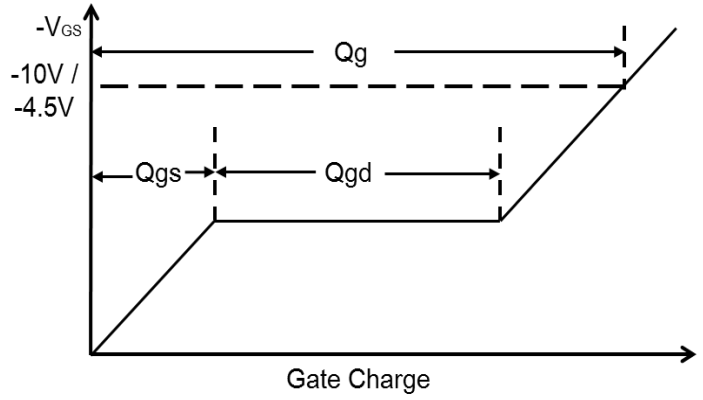
**Fig.5 Normalized Transient Impedance**



**Fig.6 Maximum Safe Operation Area**

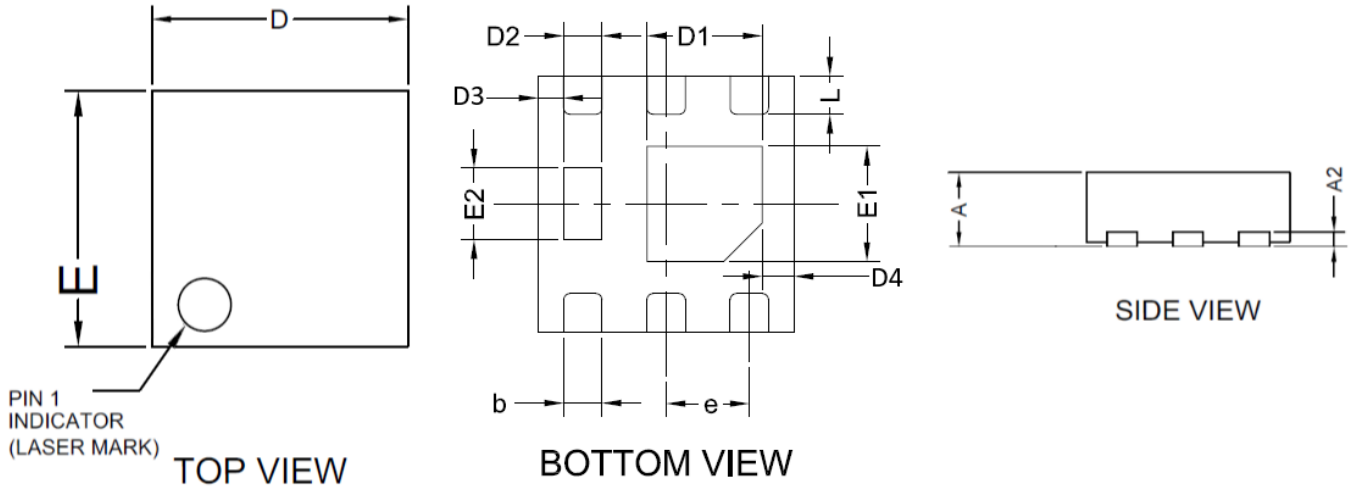


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

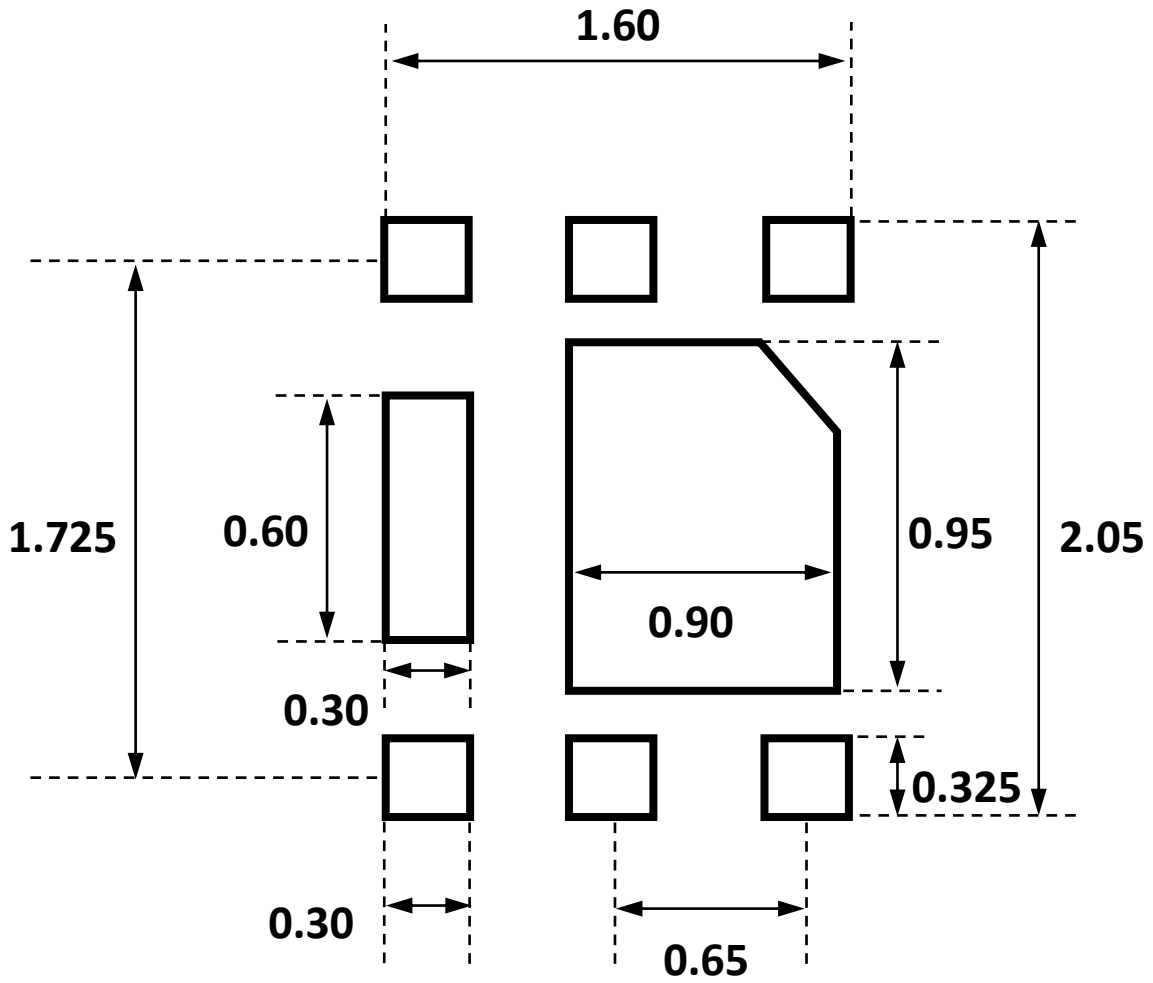
## DFN2x2-6L 2EP PACKAGE INFORMATION



| 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     | 1.000                     | 0.800 | 0.040                | 0.031 |
| D2     | 0.350                     | 0.250 | 0.014                | 0.010 |
| D3     | 0.200BSC                  |       | 0.008BSC             |       |
| D4     | 0.200BSC                  |       | 0.008BSC             |       |
| E      | 2.100                     | 1.900 | 0.083                | 0.075 |
| E1     | 1.050                     | 0.800 | 0.041                | 0.031 |
| E2     | 0.66                      | 0.46  | 0.026                | 0.018 |
| e      | 0.650BSC                  |       | 0.026BSC             |       |
| L      | 0.350                     | 0.250 | 0.014                | 0.010 |

RECOMMENDED LAND PATTERN

DFN2X2-6L 2EP



unit : mm