

General Description

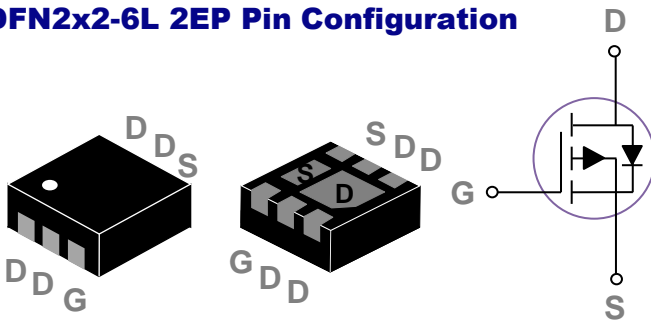
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

| | | |
|-------|-------|-----|
| BVDSS | RDSON | ID |
| -40V | 48mΩ | -5A |

Features

- -40V,-5A, $R_{DS(ON)} = 48m\Omega @ V_{GS} = -10V$
- 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 | -40 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_A=25^\circ\text{C}$) | -5 | A |
| | Drain Current – Continuous ($T_A=70^\circ\text{C}$) | -3.2 | A |
| I_{DM} | Drain Current – Pulsed ¹ | -20 | A |
| EAS | Single Pulse Avalanche Energy ² | 31 | mJ |
| IAS | Single Pulse Avalanche Current ² | 25 | A |
| P_D | Power Dissipation ($T_A=25^\circ\text{C}$) | 2 | W |
| | Power Dissipation – Derate above 25°C | 16.1 | mW/ $^\circ\text{C}$ |
| 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 °C, 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 |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.03 | --- | V/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-40V, V _{GS} =0V, T _J =25°C | --- | --- | -1 | uA |
| | | V _{DS} =-32V, V _{GS} =0V, T _J =125°C | --- | --- | -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 =-2A | --- | 40 | 48 | mΩ |
| | | V _{GS} =-4.5V, I _D =-1.5A | --- | 60 | 78 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -1.2 | -1.6 | -2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 4 | --- | mV/°C |
| g _{fs} | Forward Transconductance | V _{DS} =-10V, I _D =-3A | --- | 5 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|---------------------|-------------------------------------|---|-----|-----|------|----|
| Q _g | Total Gate Charge ^{2, 3} | V _{DS} =-20V, V _{GS} =-10V, I _D =-2A | --- | 13 | 19 | nC |
| Q _{gs} | Gate-Source Charge ^{2, 3} | | --- | 1.5 | 2.3 | |
| Q _{gd} | Gate-Drain Charge ^{2, 3} | | --- | 3.1 | 4.6 | |
| T _{d(on)} | Turn-On Delay Time ^{2, 3} | V _{DD} =-20V, V _{GS} =-10V, R _G =6Ω I _D =-2A | --- | 6.3 | 10 | ns |
| T _r | Rise Time ^{2, 3} | | --- | 7.2 | 11 | |
| T _{d(off)} | Turn-Off Delay Time ^{2, 3} | | --- | 46 | 69 | |
| T _f | Fall Time ^{2, 3} | | --- | 14 | 21 | |
| C _{iss} | Input Capacitance | V _{DS} =-20V, V _{GS} =0V, F=1MHz | --- | 825 | 1240 | pF |
| C _{oss} | Output Capacitance | | --- | 68 | 102 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 50 | 75 | |

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 | --- | --- | -5 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | -10 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1 | V |
| t _{rr} | Reverse Recovery Time | V _R =-30V, I _S =-2A | --- | 30 | --- | ns |
| Q _{rr} | Reverse Recovery Charge | di/dt=100A/μs, T _J =25°C | --- | 15 | --- | nC |

Note :

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

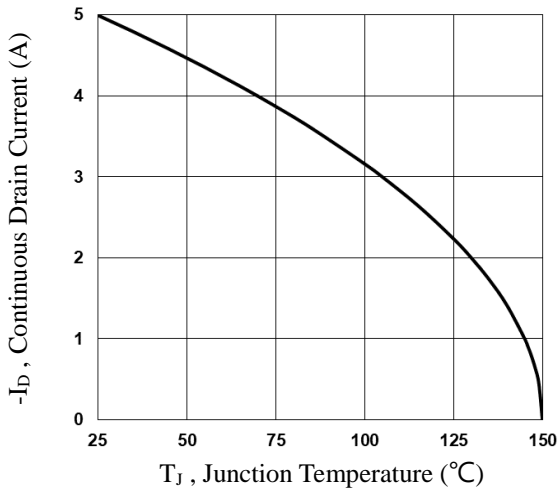


Fig.1 Continuous Drain Current vs. T_c

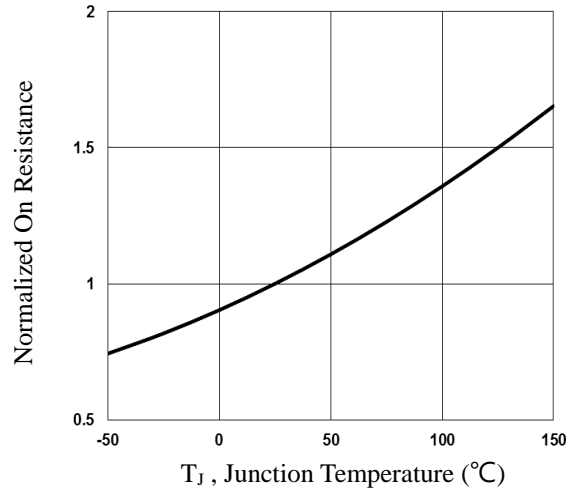


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

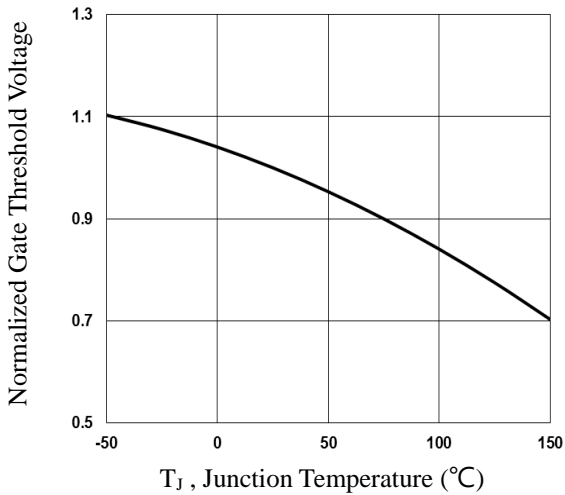


Fig.3 Normalized V_{th} vs. T_J

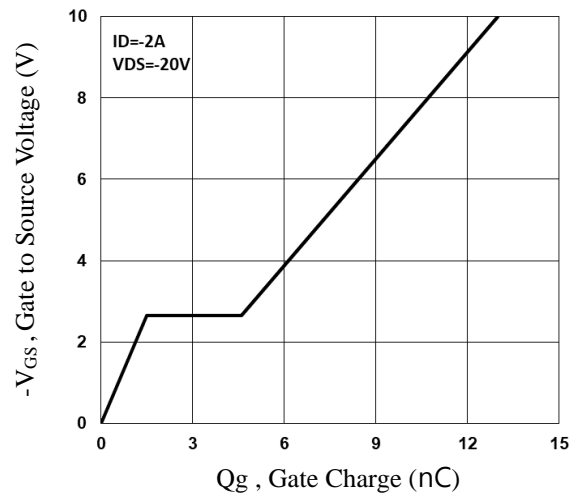


Fig.4 Gate Charge Waveform

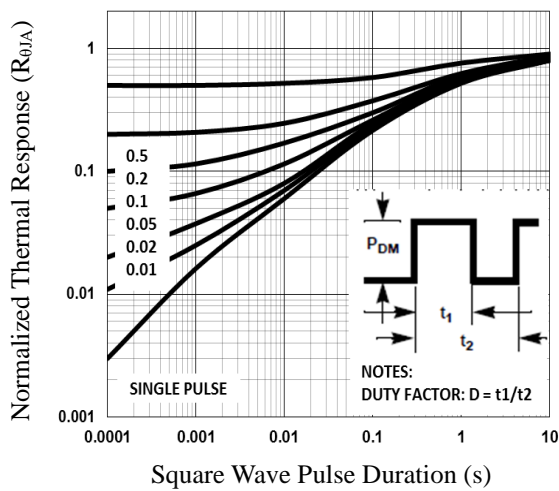


Fig.5 Normalized Transient Impedance

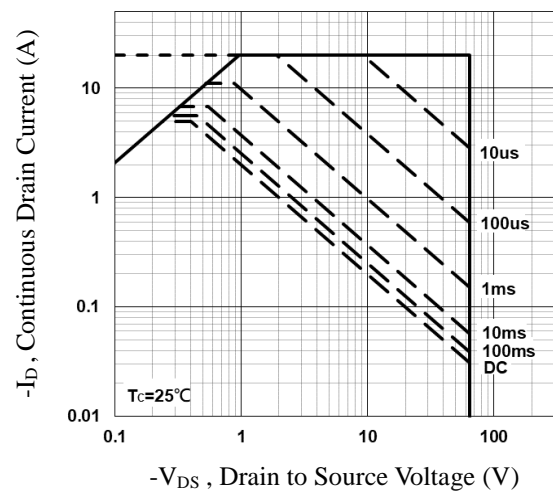


Fig.6 Maximum Safe Operation Area

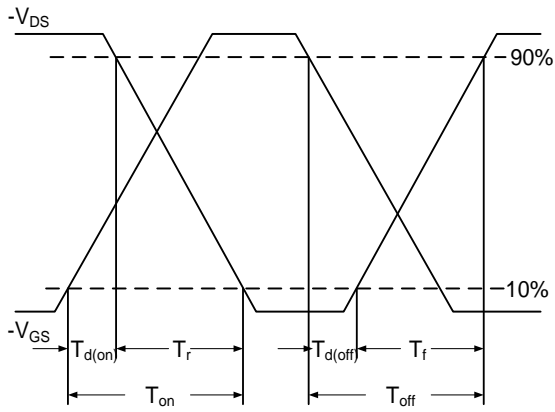


Fig.7 Switching Time Waveform

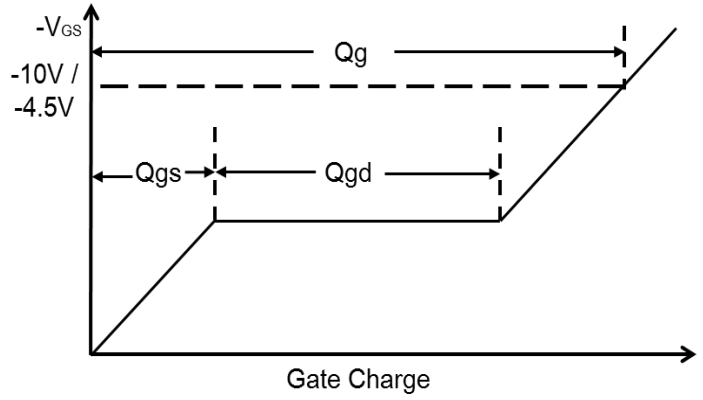
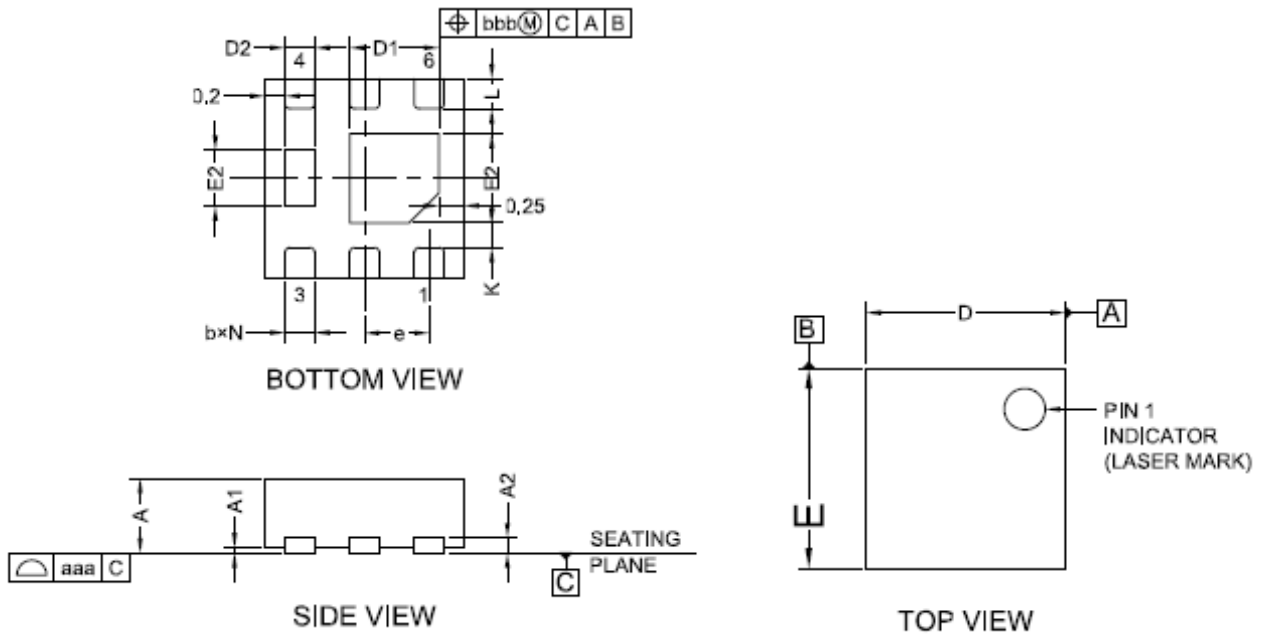


Fig.8 Gate Charge Waveform

DFN2X2-6L 2EP PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | |
|--------|---------------------------|------|------|
| | Min | Typ | Max |
| A | 0.50 | 0.55 | 0.60 |
| A1 | 0.00 | 0.02 | 0.05 |
| A2 | 0.152REF | | |
| b | 0.25 | 0.30 | 0.35 |
| D | 1.95 | 2.00 | 2.05 |
| D1 | 0.80 | 0.90 | 1.00 |
| D2 | 0.25 | 0.30 | 0.35 |
| E | 1.95 | 2.00 | 2.05 |
| E1 | 0.80 | 0.90 | 1.00 |
| E2 | 0.46 | 0.56 | 0.66 |
| e | 0.65BSC | | |
| L | 0.25 | 0.30 | 0.35 |
| J | 0.40BSC | | |
| K | 0.20MIN | | |
| N | 6.00 | | |
| aaa | 0.08 | | |
| bbb | 0.10 | | |