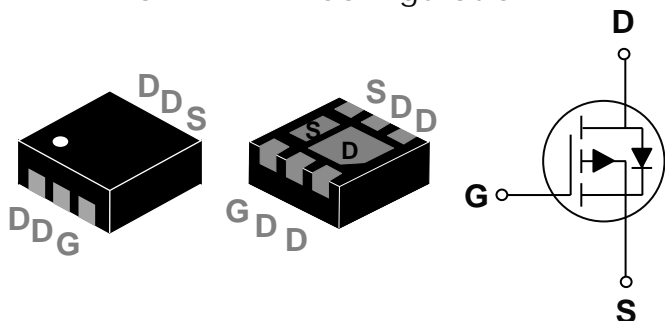


20V P-Channel MOSFETs

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.

DFN2x2-6L 2EP Pin Configuration



| | | |
|-------|---------------------|----------------|
| BVDSS | R _{DS(ON)} | I _D |
| -20V | 28mΩ | -8.5A |

Features

- -20V, -8.5A, R_{DS(ON)} = 28mΩ @ V_{GS} = -4.5V
- Improved dv/dt capability
- Fast switching
- Green Device Available
- Suit for -1.8V Gate Drive Applications

Applications

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

Absolute Maximum Ratings T_c=25°C unless otherwise noted

| Symbol | Parameter | Rating | Units |
|------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | -20 | V |
| V _{GS} | Gate-Source Voltage | ±10 | V |
| I _D | Drain Current – Continuous (T _c =25°C) | -8.5 | A |
| | Drain Current – Continuous (T _c =100°C) | -5.4 | A |
| I _{DM} | Drain Current – Pulsed ¹ | -34 | A |
| P _D | Power Dissipation (T _c =25°C) | 3.3 | W |
| | Power Dissipation – Derate above 25°C | 0.026 | W/°C |
| T _{STG} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R _{θJA} | Thermal Resistance Junction to ambient | --- | 62 | °C/W |
| R _{θJC} | Thermal Resistance Junction to Case | --- | 38 | °C/W |



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Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)

Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|------------------------------------|---|------|-------|-----------|--------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=-250\mu A$ | -20 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BV_{DSS} Temperature Coefficient | Reference to 25°C , $I_D=-1\text{mA}$ | --- | -0.02 | --- | $V/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | -1 | μA |
| | | $V_{DS}=-16V, V_{GS}=0V, T_J=125^\circ\text{C}$ | --- | --- | -10 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 10V, V_{DS}=0V$ | --- | --- | ± 100 | nA |

On Characteristics

| | | | | | | |
|---------------------|--------------------------------------|--------------------------------|------|------|-----|----------------------------|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=-4.5V, I_D=-4A$ | --- | 22 | 28 | m Ω |
| | | $V_{GS}=-2.5V, I_D=-3A$ | --- | 27 | 37 | |
| | | $V_{GS}=-1.8V, I_D=-2A$ | --- | 33 | 45 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -0.3 | -0.6 | -1 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | 2 | --- | $\text{mV}/^\circ\text{C}$ |
| g_{fs} | Forward Transconductance | $V_{DS}=-10V, I_S=-3A$ | --- | 8.4 | --- | S |

Dynamic and switching Characteristics

| | | | | | | |
|--------------|------------------------------------|--|-----|------|------|----|
| Q_g | Total Gate Charge ^{2,3} | $V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4A$ | --- | 16.1 | 25 | nC |
| Q_{gs} | Gate-Source Charge ^{2,3} | | --- | 1.8 | 3 | |
| Q_{gd} | Gate-Drain Charge ^{2,3} | | --- | 3.8 | 7 | |
| $T_{d(on)}$ | Turn-On Delay Time ^{2,3} | $V_{DD}=-10V, V_{GS}=-4.5V, R_G=25\Omega$ $I_D=-1A$ | --- | 8.2 | 16 | nS |
| T_r | Rise Time ^{2,3} | | --- | 30 | 57 | |
| $T_{d(off)}$ | Turn-Off Delay Time ^{2,3} | | --- | 71.1 | 135 | |
| T_f | Fall Time ^{2,3} | | --- | 19.8 | 38 | |
| C_{iss} | Input Capacitance | $V_{DS}=-15V, V_{GS}=0V, F=1\text{MHz}$ | --- | 1440 | 2100 | pF |
| C_{oss} | Output Capacitance | | --- | 155 | 230 | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 115 | 170 | |

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 | --- | --- | -8.5 | A |
| I_{SM} | Pulsed Source Current | | --- | --- | -17 | A |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$ | --- | --- | -1 | V |

Note :

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

20V P-Channel MOSFETs

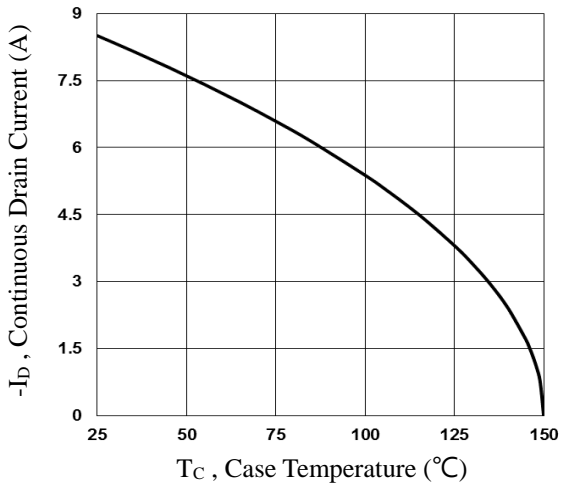


Fig.1 Continuous Drain Current vs. T_C

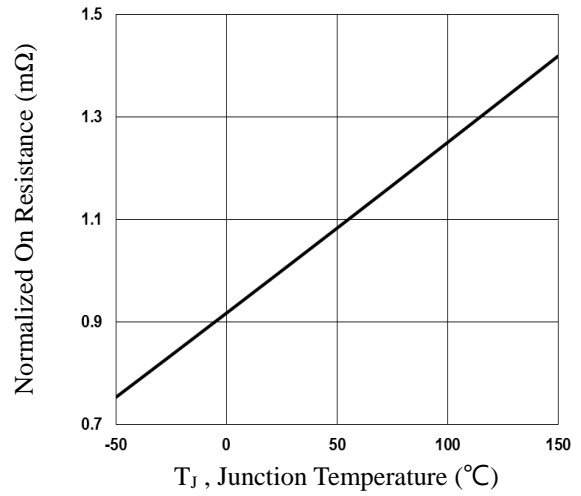


Fig.2 Normalized R_{DS(on)} vs. T_J

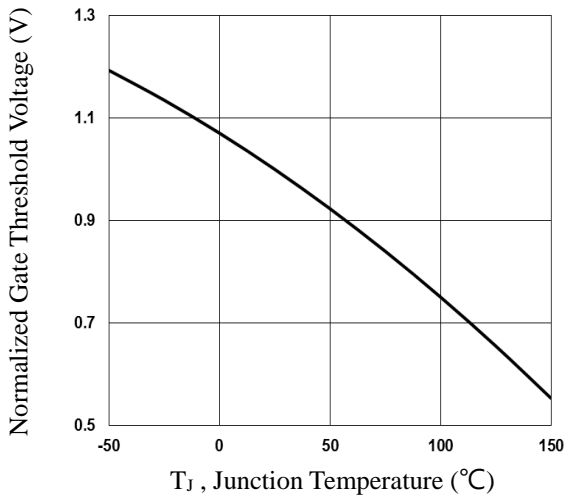


Fig.3 Normalized V_{th} vs. T_J

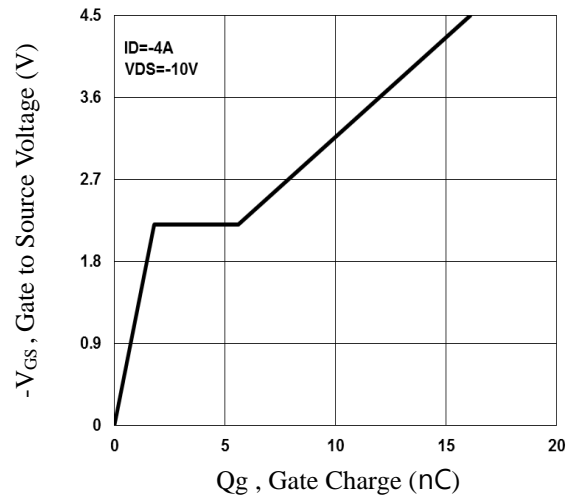


Fig.4 Gate Charge Waveform

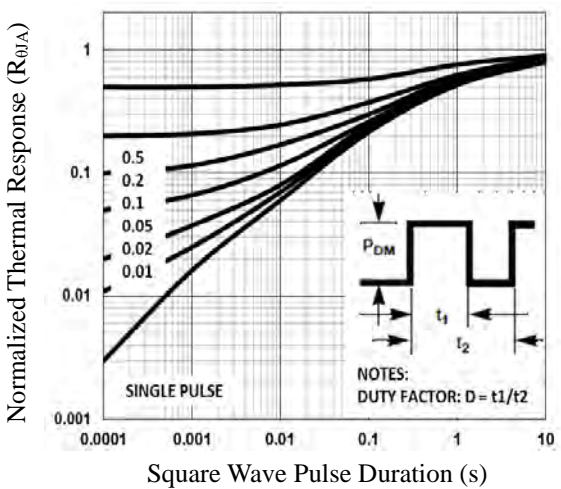


Fig.5 Normalized Transient Impedance

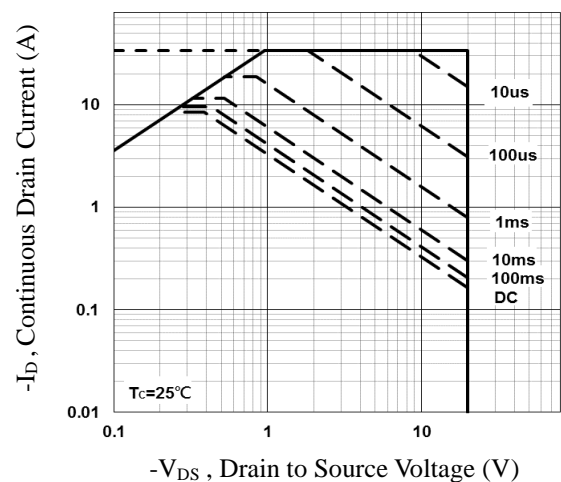


Fig.6 Maximum Safe Operation Area



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20V P-Channel MOSFETs

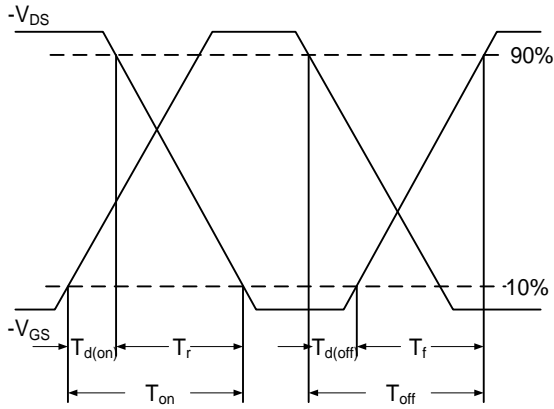


Fig.7 Switching Time Waveform

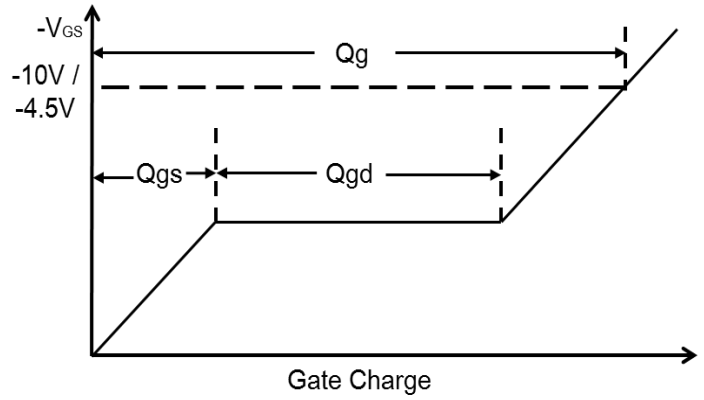
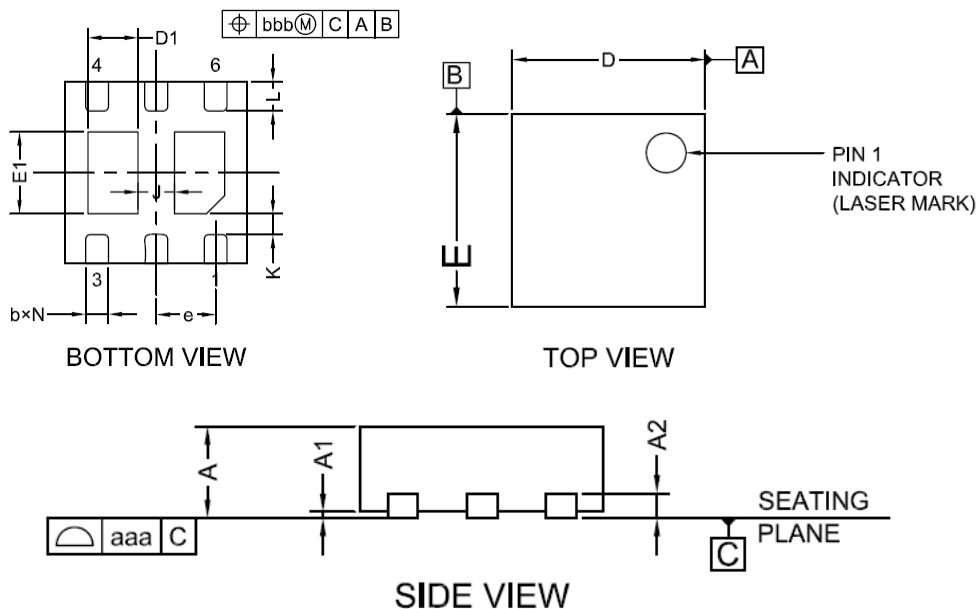


Fig.8 Gate Charge Waveform

DFN2x2-6L 2EP PACKAGE INFORMATION



COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | TYP | MAX |
|--------|---------|------|------|
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | 0.02 | 0.05 |
| A2 | 0.203 | | |
| b | 0.20 | 0.25 | 0.30 |
| D | 1.95 | 2.00 | 2.05 |
| D1 | 0.50 | 0.55 | 0.60 |
| E | 1.95 | 2.00 | 2.05 |
| E1 | 0.85 | 0.90 | 0.95 |
| e | 0.65BSC | | |
| L | 0.27 | 0.32 | 0.37 |
| J | 0.40BSC | | |
| K | 0.20MIN | | |
| N | 6 | | |
| aaa | 0.08 | | |
| bbb | 0.10 | | |