# N-Ch 40V Fast Switching MOSFETs

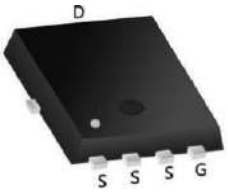
## Features

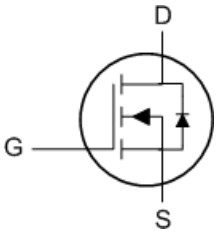
- Advanced Trench MOS Technology
- 100% EAS Guaranteed
- High Current Capability
- Green Device Available

## Applications

- SMPS Synchronous Rectification
- DC/DC Converters
- Or-ing

**PRPAK5X6 Pin Configuration**




## Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 40V | 1.1mΩ | 255A |

## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 40 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | 255 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | 180 | A |
| $I_D$@$T_A$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 37 | A |
| $I_D$@$T_A$=70℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 31 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 400 | A |
| EAS | Single Pulse Avalanche Energy[3] | 245 | mJ |
| $I_{AS}$ | Avalanche Current | 70 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 107 | W |
| $P_D$@$T_A$=25℃ | Total Power Dissipation[4] | 2.4 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ℃ |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | --- | 62 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 1.4 | ℃/W |

## Electrical Characteristics ($T_J$=25 ℃, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 40 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V , $I_D$=20A | --- | 0.9 | 1.1 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 2 | 2.8 | 4 | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=32V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=32V , $V_{GS}$=0V , $T_J$=55℃ | --- | --- | 5 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 1.2 | --- | Ω |
| $Q_g$ | Total Gate Charge | $V_{DS}$=20V , $V_{GS}$=10V , $I_D$=20A | --- | 108 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 25.4 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 26.8 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=20V , $V_{GS}$=10V , $R_G$=1.5Ω, $I_D$=20A | --- | 20 | --- | ns |
| $T_r$ | Rise Time | | --- | 145 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 55 | --- | |
| $T_f$ | Fall Time | | --- | 18 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=20V , $V_{GS}$=0V , f=1MHz | --- | 6601 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 2073 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 248 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,6] | $V_G$=$V_D$=0V , Force Current | --- | --- | 100 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | --- | --- | 1.2 | V |

Note :
1.The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH,$I_{AS}$=70A
4.The power dissipation is limited by 150℃ junction temperature
5.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.
6.Package limitation current is 100A.

## Typical Characteristics

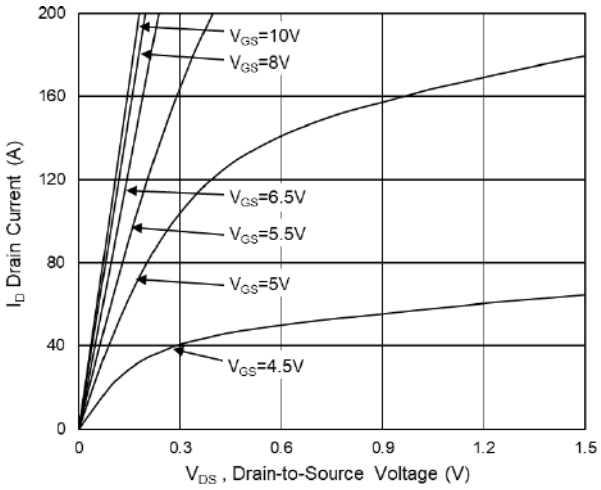



Fig.1 Typical Output Characteristics

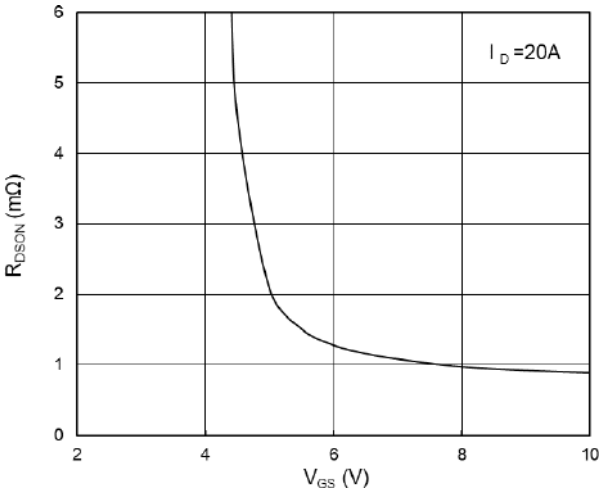



Fig.2 On-Resistance vs G-S Voltage

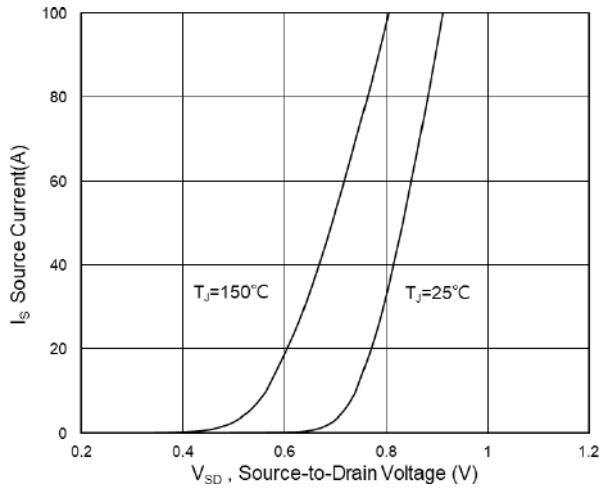



Fig.3 Source Drain Forward Characteristics

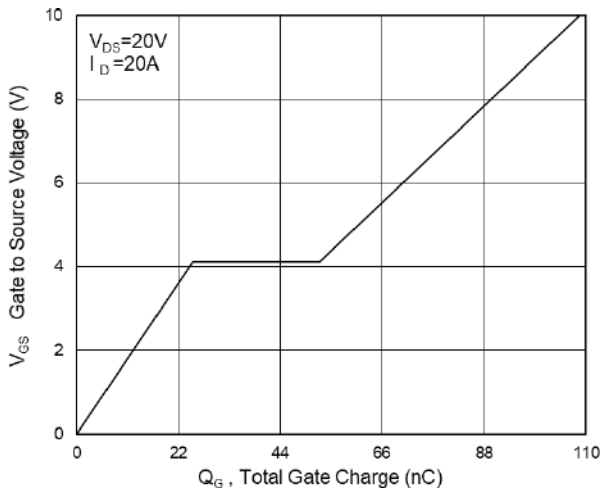



Fig.4 Gate-Charge Characteristics

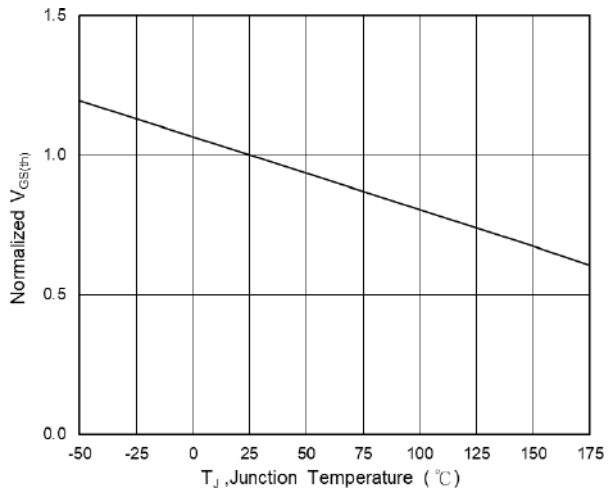



Fig.5 Normalized $V_{GS(th)}$ vs $T_J$

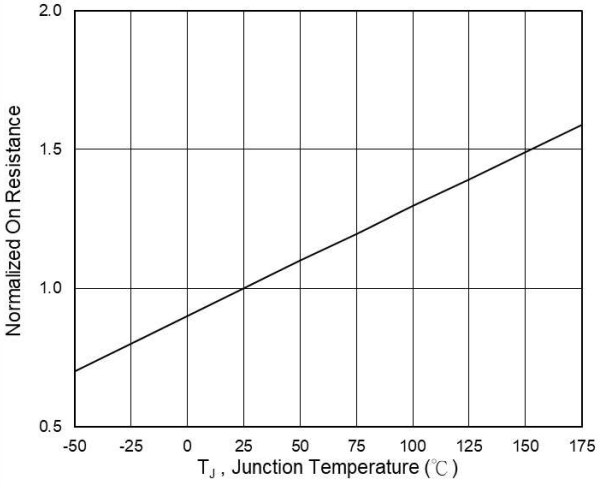



Fig.6 Normalized $R_{DSON}$ vs $T_J$

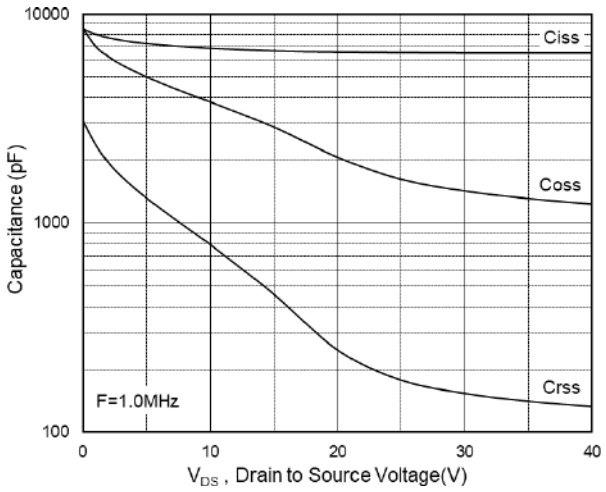



Fig.7 Capacitance

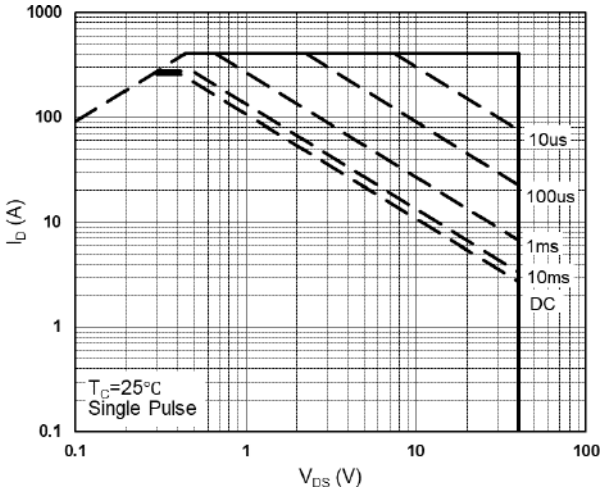



Fig.8 Safe Operating Area

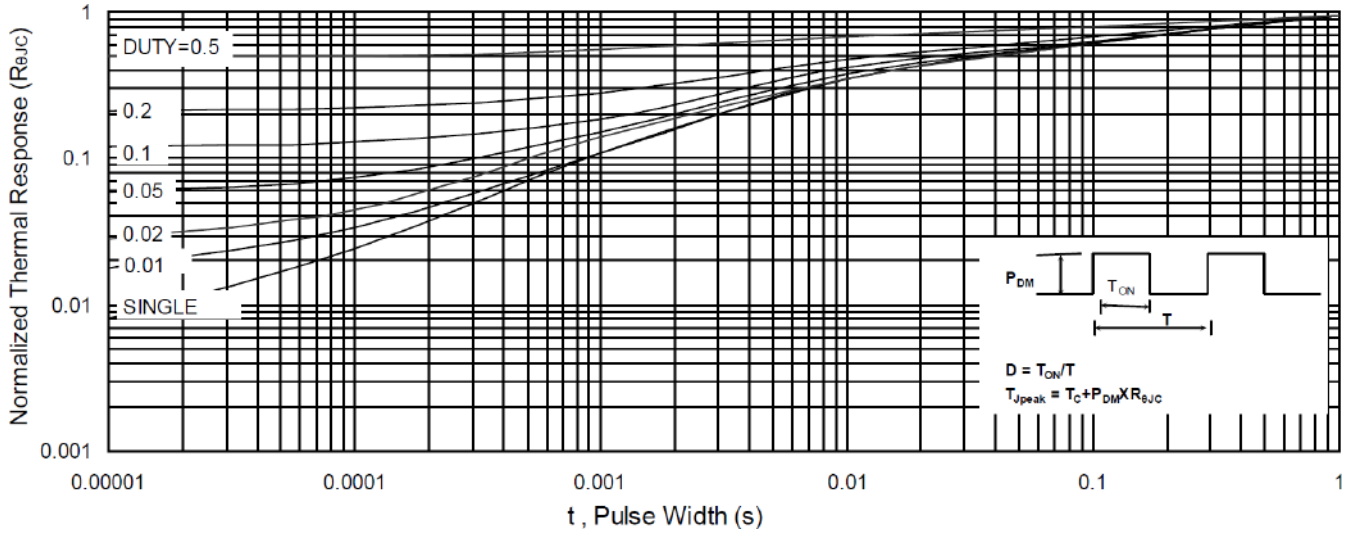



Fig.9 Normalized Maximum Transient Thermal Impedance

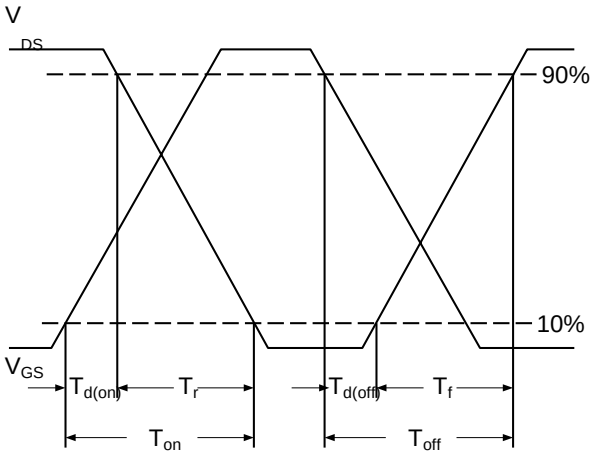



Fig.10 Switching Time Waveform

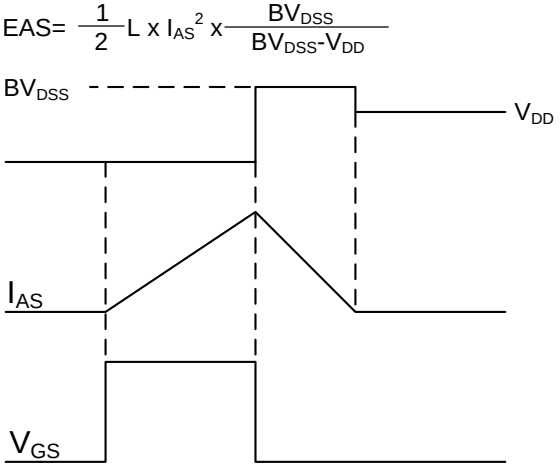



Fig.11 Unclamped Inductive Switching Waveform