# 100V P-Channel MOSFETs

# PDP0905

## 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 |
|-------|-------|-----|
| -100V | 210mΩ | -10A |

## Features

- *-100V,-10A, RDS(ON) 210mΩ@VGS = -10V*
- *Improved dv/dt capability*
- *Fast switching*
- *Green Device Available*

## TO220 Pin Configuration
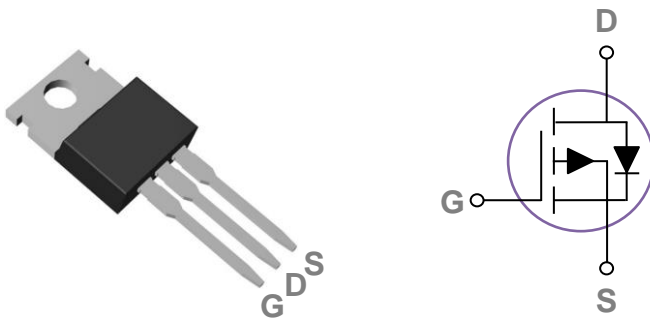


## Applications

- *Networking*
- *Load Switch*
- *LED applications*

## Absolute Maximum Ratings (Tc=25℃ unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|--------|-----------|--------|-------|
| $V_{DS}$ | Drain-Source Voltage | -100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current – Continuous (T$_C$=25℃) | -10 | A |
| | Drain Current – Continuous (T$_C$=100℃) | -6.3 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | -40 | A |
| EAS | Single Pulse Avalanche Energy[2] | 24.2 | mJ |
| IAS | Single Pulse Avalanche Current[2] | -22 | A |
| $P_D$ | Power Dissipation (T$_C$=25℃) | 89 | W |
| | Power Dissipation – Derate above 25℃ | 0.71 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|--------|-----------|------|------|------|
| $R_{θJC}$ | Thermal Resistance Junction to Case | --- | 1.4 | ℃/W |
| $R_{θJA}$ | Thermal Resistance Junction to ambient | --- | 62 | ℃/W |

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

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| BV$_{DSS}$ | Drain-Source Breakdown Voltage | V$_{GS}$=0V , I$_D$=-250uA | -100 | --- | --- | V |
| △BV$_{DSS}$/△T$_J$ | BV$_{DSS}$ Temperature Coefficient | Reference to 25℃ , I$_D$=-1mA | --- | --- | --- | V/℃ |
| I$_{DSS}$ | Drain-Source Leakage Current | V$_{DS}$=-100V , V$_{GS}$=0V , T$_J$=25℃ | --- | --- | -1 | uA |
| | | V$_{DS}$=-80V , V$_{GS}$=0V , T$_J$=125℃ | --- | --- | -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$_D$=-5A | --- | 170 | 210 | mΩ |
| | | V$_{GS}$=-4.5V , I$_D$=-2A | --- | 190 | 230 | mΩ |
| V$_{GS(th)}$ | Gate Threshold Voltage | V$_{GS}$=V$_{DS}$ , I$_D$ =-250uA | -1 | --- | -3 | V |
| gfs | Forward Transconductance | V$_{DS}$=10V , I$_D$=3A | --- | 7 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| Q$_g$ | Total Gate Charge[3,4] | V$_{DS}$=-80V , V$_{GS}$=-10V , I$_D$=-5A | --- | 20 | 40 | nC |
| Q$_{gs}$ | Gate-Source Charge[3,4] | | --- | 3.5 | 7 | |
| Q$_{gd}$ | Gate-Drain Charge[3,4] | | --- | 4.6 | 9 | |
| T$_{d(on)}$ | Turn-On Delay Time[3,4] | V$_{DD}$=-50V , V$_{GS}$=-10V , R$_G$=25Ω I$_D$=-5A | --- | 18 | 36 | ns |
| T$_r$ | Rise Time[3,4] | | --- | 8 | 16 | |
| T$_{d(off)}$ | Turn-Off Delay Time[3,4] | | --- | 100 | 200 | |
| T$_f$ | Fall Time[3,4] | | --- | 30 | 60 | |
| C$_{iss}$ | Input Capacitance | V$_{DS}$=-25V , V$_{GS}$=0V , F=1MHz | --- | 1419 | 2500 | pF |
| C$_{oss}$ | Output Capacitance | | --- | 89 | 170 | |
| C$_{rss}$ | Reverse Transfer Capacitance | | --- | 45 | 90 | |
| R$_g$ | Gate resistance | V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz | --- | 16 | --- | Ω |

### 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 | --- | --- | -10 | A |
| I$_{SM}$ | Pulsed Source Current | | --- | --- | -20 | A |
| V$_{SD}$ | Diode Forward Voltage | V$_{GS}$=0V , I$_S$=-1A , T$_J$=25℃ | --- | --- | -1 | V |
| t$_{rr}$ | Reverse Recovery Time[2] | V$_{GS}$=0V,I$_S$=-5A , dI/dt=100A/μs | --- | 26.6 | --- | ns |
| Q$_{rr}$ | Reverse Recovery Charge[2] | T$_J$=25℃ | --- | 24.2 | --- | nC |

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=-22A.,Starting T$_J$=25℃
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
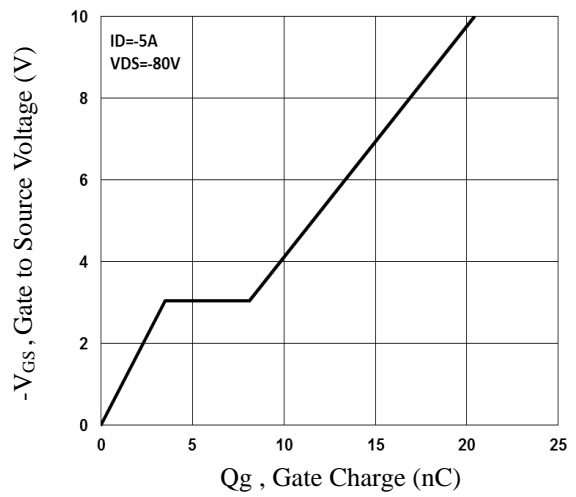4. Essentially independent of operating temperature.
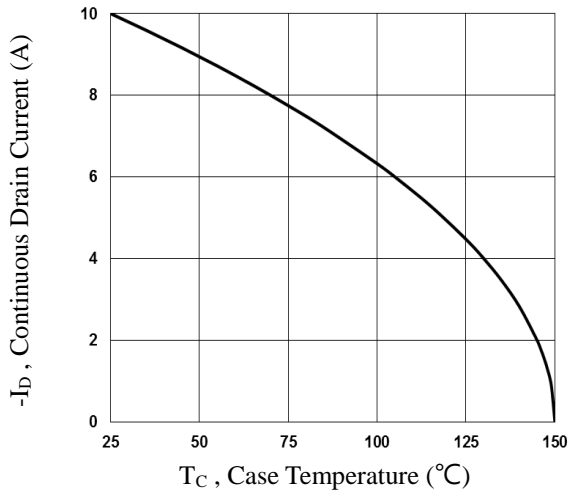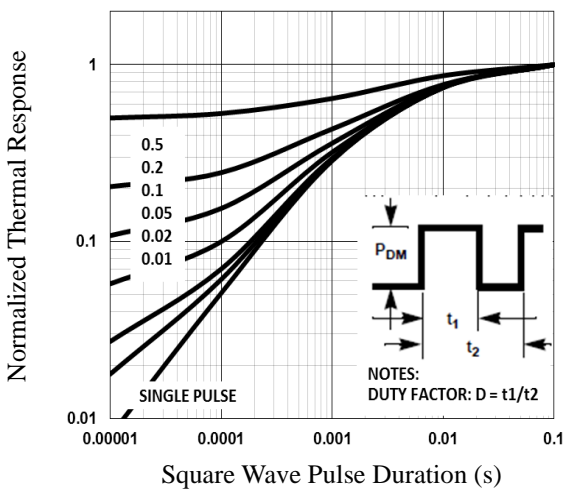
Fig.1  **Continuous Drain Current vs. T$_C$**
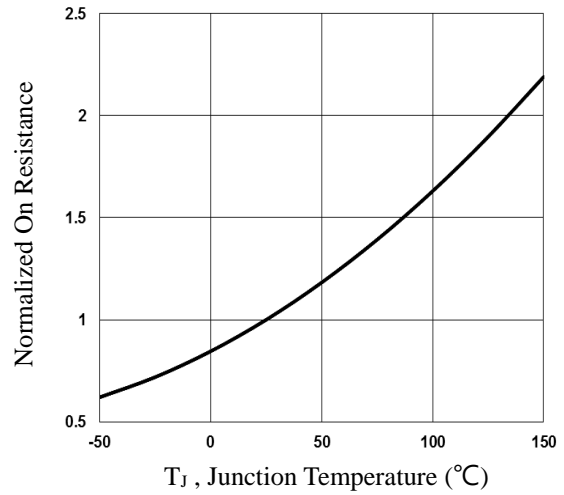
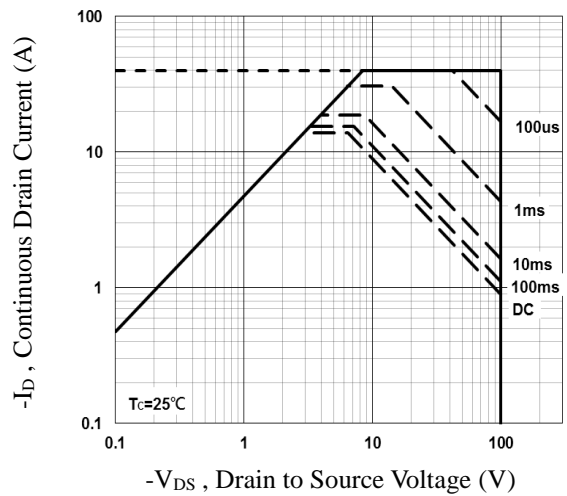Fig.2  **Normalized RDSON vs. T$_J$**
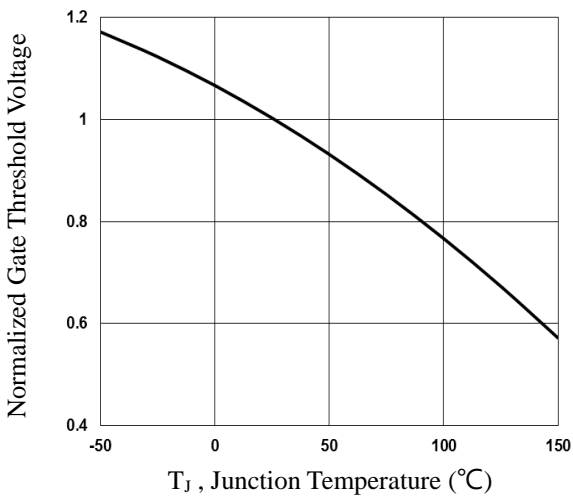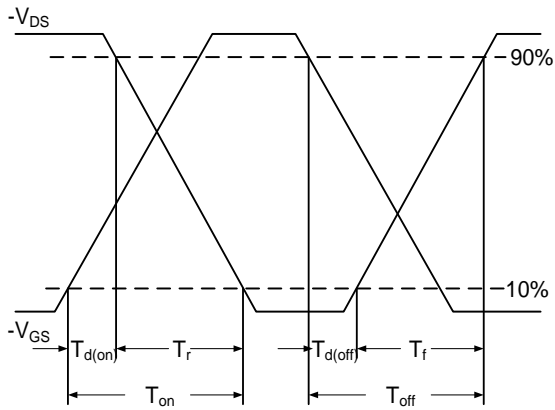
Fig.3  **Normalized V$_{th}$ vs. T$_J$**

Fig.4  **Gate Charge Waveform**
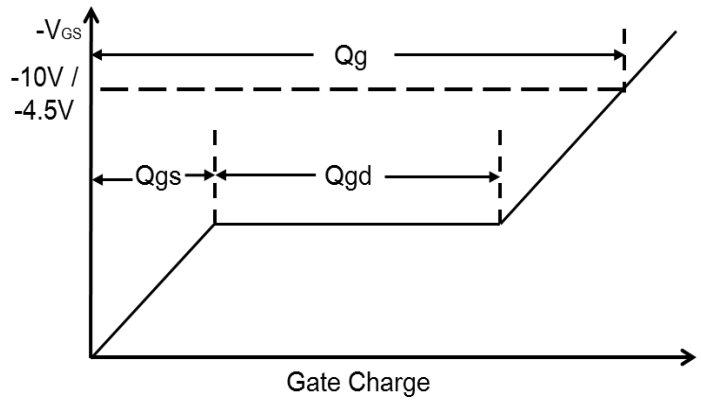
Fig.5  **Normalized Transient Impedance**
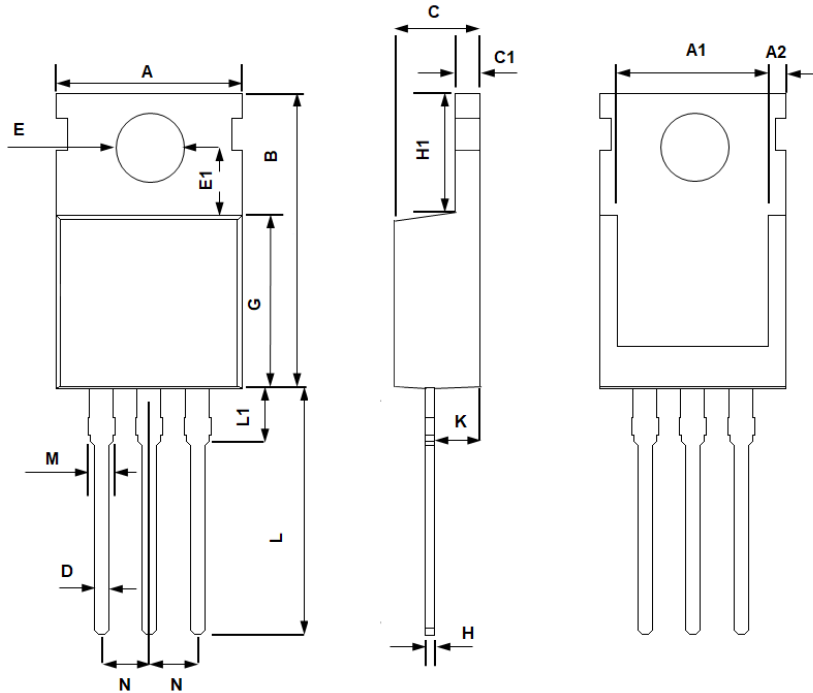
Fig.6  **Maximum Safe Operation Area**

**Fig.7   Switching Time Waveform**



Gate Charge

**Fig.8   Gate Charge Waveform**

# TO220 PACKAGE INFORMATION



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MAX | MIN | MAX | MIN |
| A | 10.400 | 9.700 | 0.409 | 0.382 |
| A1 | 8.900 | 7.400 | 0.350 | 0.291 |
| A2 | 1.400 | 0.800 | 0.055 | 0.031 |
| B | 16.500 | 14.500 | 0.650 | 0.571 |
| C | 4.750 | 4.200 | 0.187 | 0.165 |
| C1 | 1.500 | 1.100 | 0.059 | 0.043 |
| D | 1.000 | 0.600 | 0.039 | 0.024 |
| E | 4.000 | 3.300 | 0.157 | 0.130 |
| E1 | 3.800 | 3.400 | 0.150 | 0.134 |
| G | 9.400 | 8.400 | 0.370 | 0.331 |
| H | 0.600 | 0.200 | 0.024 | 0.008 |
| H1 | 6.850 | 6.200 | 0.270 | 0.244 |
| K | 2.850 | 2.100 | 0.112 | 0.083 |
| L | 14.000 | 12.500 | 0.551 | 0.492 |
| L1 | 4.000 | 2.700 | 0.157 | 0.106 |
| M | 1.750 | 1.100 | 0.069 | 0.043 |
| N | 2.640 | 2.440 | 0.104 | 0.096 |