

PTD3006
30V/80A N-Channel Advanced Power MOSFET

Features

- ◆ Low On-Resistance
- ◆ Fast Switching
- ◆ 100% Avalanche Tested
- ◆ Repetitive Avalanche Allowed up to Tjmax
- ◆ Lead-Free, RoHS Compliant

| | | |
|------------------|-----|----|
| V_{DS} | 30 | V |
| $R_{DS(on),Typ}$ | 4.5 | mΩ |
| I_D | 80 | A |

Description

PTD3006 designed by the trench process techniques to achieve extremely low on-resistance. Additional features of this design can operate at high junction temperature, fast switching speed and improved repetitive avalanche rating . These features combine to make this design an extremely efficient and reliable device for use in Motor applications and a wide variety of other applications.



Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (Ta) is 25°C, unless otherwise specified.

| Symbol | Parameter | Rating | Unit |
|--|---|---------------------------|------|
| Common Ratings (Tc=25°C Unless Otherwise Noted) | | | |
| V_{GS} | Gate-Source Voltage | ±20 | V |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | 30 | V |
| T_J | Maximum Junction Temperature | 150 | °C |
| T_{STG} | Storage Temperature Range | -55 to 150 | °C |
| I_S | Diode Continuous Forward Current | $T_C = 25^\circ C$ 80 | A |
| Mounted on Large Heat Sink | | | |
| I_{DM} | Pulse Drain Current Tested (Silicon Limit) | $T_C = 25^\circ C$ 320 | A |
| I_D | Continuous Drain current@ $V_{GS}=10V$ (See Fig2) | $T_C = 25^\circ C$ 80 | A |
| P_D | Maximum Power Dissipation | $T_C = 25^\circ C$ 58 | W |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 1.98 | °C/W |
| Drain-Source Avalanche Ratings | | | |
| EAS | Avalanche Energy, Single Pulsed ② | 225 | mJ |

| Symbol | Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|--|------|------|------|------|
| Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated) | | | | | | |
| V _{(BR)DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250μA | 30 | -- | -- | V |
| I _{DSS} | Zero Gate Voltage Drain Current(Tc=25°C) | V _{DS} =24V, V _{GS} =0V | -- | -- | 1 | μA |
| | Zero Gate Voltage Drain Current(Tc=125°C) | V _{DS} =24V, V _{GS} =0V | -- | -- | 100 | μA |
| I _{GSS} | Gate-Body Leakage Current | V _{GS} =±20V, V _{DS} =0V | -- | -- | ±100 | nA |
| V _{GS(TH)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 1.0 | 1.6 | 2.5 | V |
| R _{DS(ON)} | Drain-Source On-State Resistance① | V _{GS} =10V, I _D =40A | -- | 4.5 | 6.0 | mΩ |
| R _{DS(ON)} | Drain-Source On-State Resistance① | V _{GS} =4.5V, I _D =20A | -- | 5.5 | 7.5 | mΩ |
| Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated) | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | -- | 1350 | -- | pF |
| C _{oss} | Output Capacitance | | -- | 190 | -- | pF |
| C _{rss} | Reverse Transfer Capacitance | | -- | 115 | -- | pF |
| Q _g | Total Gate Charge | V _{GS} =10V | -- | 38 | -- | nC |
| | | V _{GS} =4.5V | -- | 15 | -- | nC |
| Q _{gs} | Gate-Source Charge | V _{DS} =15V, I _D =18A, V _{GS} =10V | -- | 8 | -- | nC |
| Q _{gd} | Gate-Drain Charge | | -- | 7 | -- | nC |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-on Delay Time | V _{DD} =15V, I _D =10A, R _G =4.7Ω, V _{GS} =10V | -- | 13 | -- | nS |
| t _r | Turn-on Rise Time | | -- | 12 | -- | nS |
| t _{d(off)} | Turn-Off Delay Time | | -- | 19 | -- | nS |
| t _f | Turn-Off Fall Time | | -- | 12 | -- | nS |
| Source- Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated) | | | | | | |
| I _{SD} | Source-drain current(Body Diode) | T _c =25°C | -- | -- | 80 | A |
| V _{SD} | Forward on voltage | I _S =40A, V _{GS} =0V | -- | -- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | T _J =25°C, I _{sd} =40A, V _{GS} =0V di/dt=100A/μs | -- | 22 | -- | nS |
| Q _{rr} | Reverse Recovery Charge | | -- | 11 | -- | nC |

Note:

① Pulse width ≤ 300μs; duty cycles ≤ 2%.

 ② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 30A, V_{GS} = 10V. Part not recommended for use above this value

③ Repetitive rating; pulse width limited by max. junction temperature.

Typical Characteristics

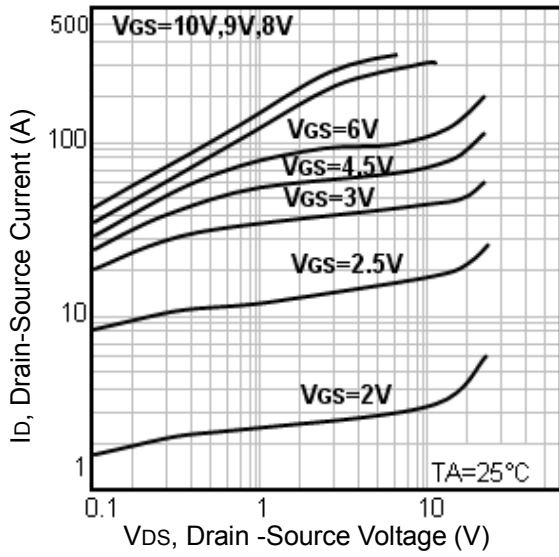


Fig1. Typical Output Characteristics

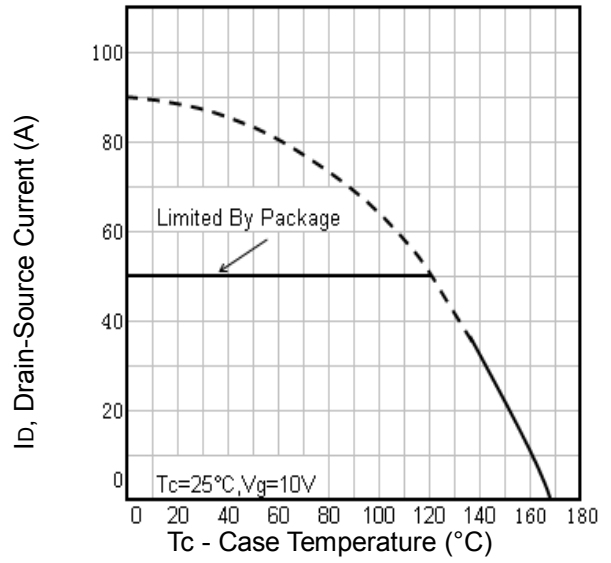


Fig2. Maximum Drain Current Vs. Case Temperature

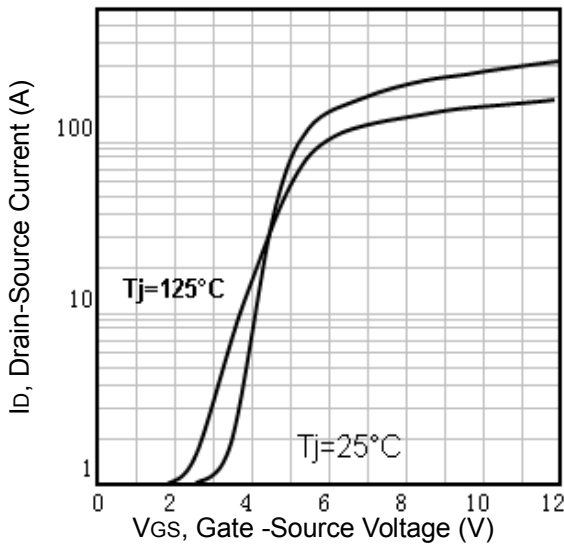


Fig3. Typical Transfer Characteristics

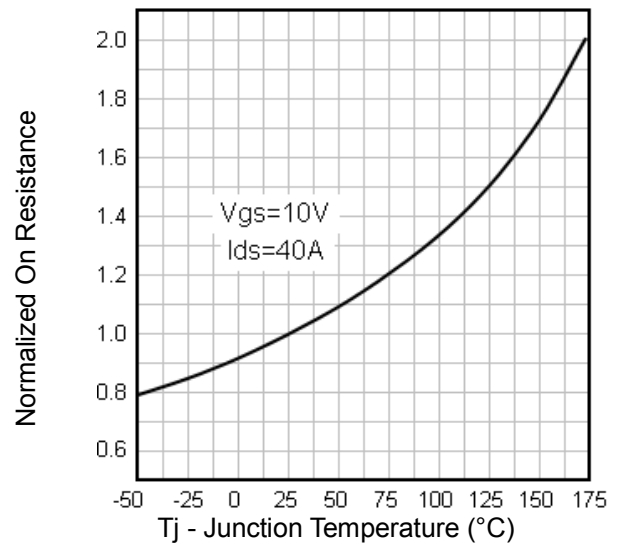


Fig4. Normalized On-Resistance Vs. Temperature

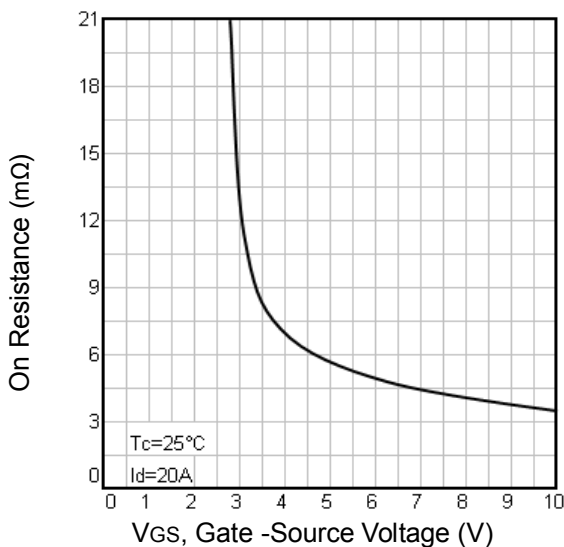


Fig5. On Resistance Vs. Gate-Source Voltage

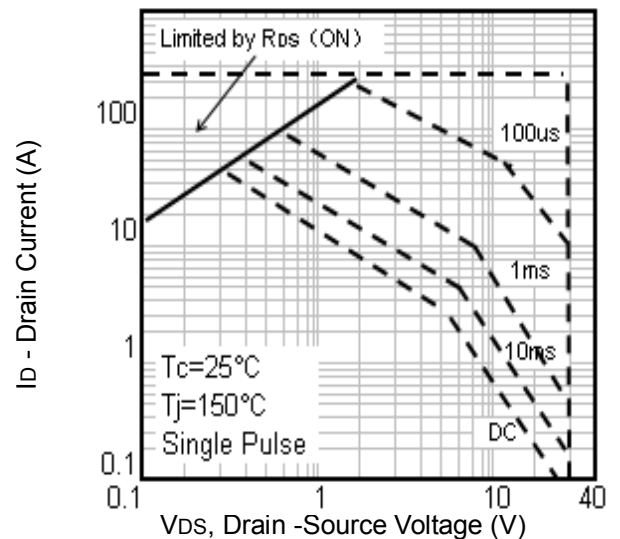


Fig6. Maximum Safe Operating Area

Typical Characteristics

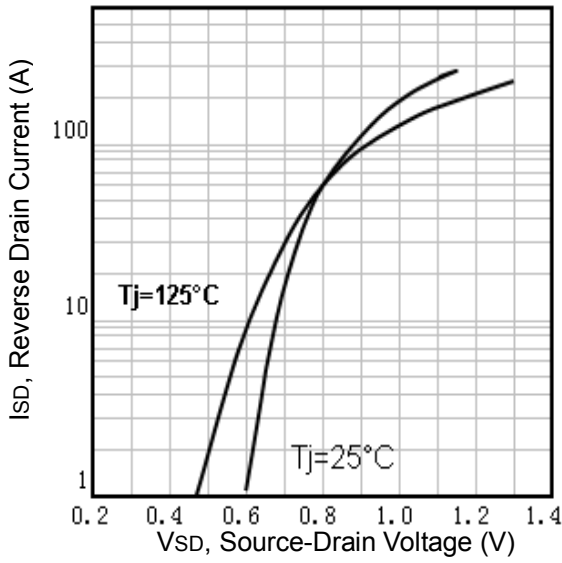


Fig7. Typical Source-Drain Diode Forward Voltage

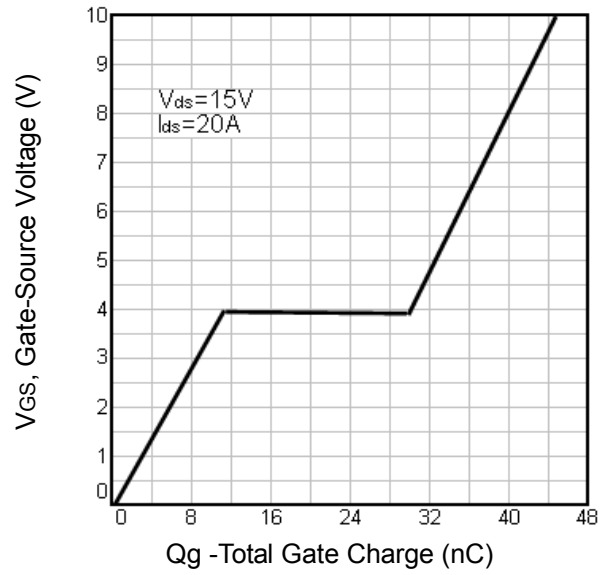


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

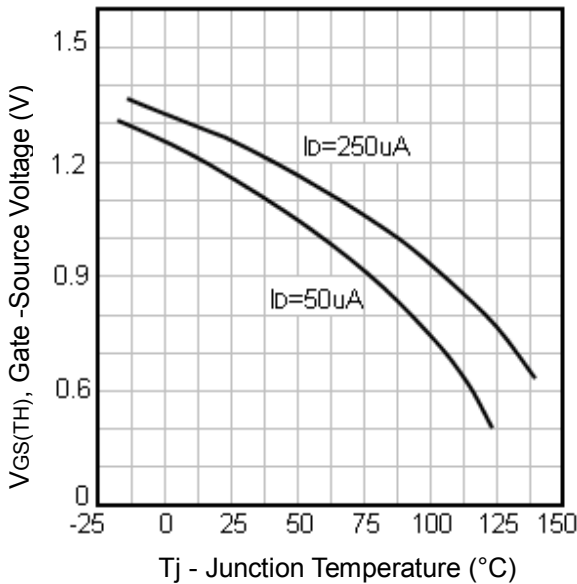


Fig9. Threshold Voltage Vs. Temperature

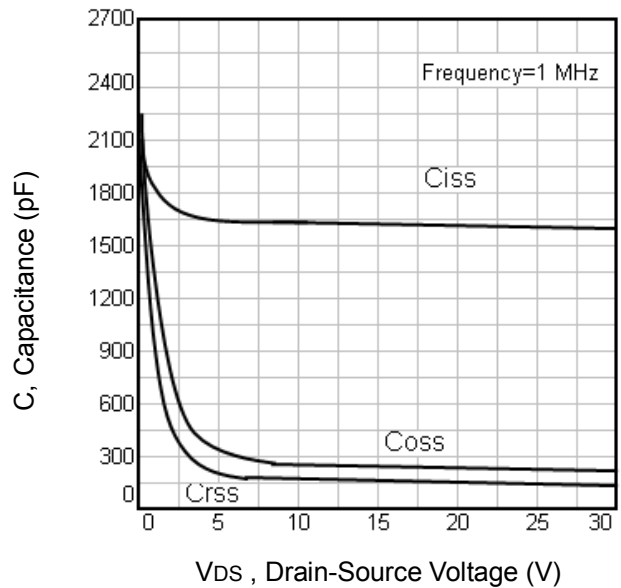


Fig10. Typical Capacitance Vs. Drain-Source Voltage

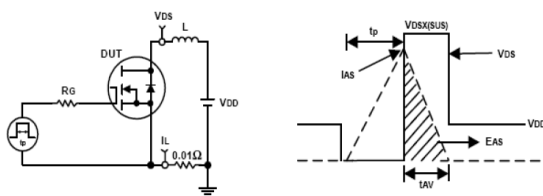


Fig11. Unclamped Inductive Test Circuit and waveforms

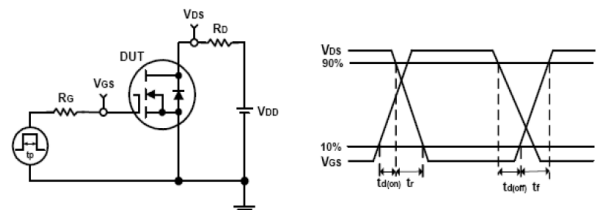


Fig12. Switching Time Test Circuit and waveforms