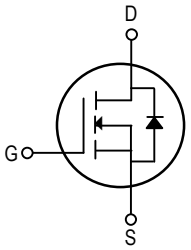
# PTP12HN06/PTY12HN06

**60V/120A N-Chnnel MOSFET**

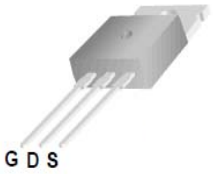
## Features

- 60V/120A
  RDS(ON)=4.2m**Ω(typ.)**@ VGS=10V
- Lead free and Green Device Available
- Low Rds-on to Minimize Conductive Loss
- High avalanche Current
- 100% Avalanche Tested

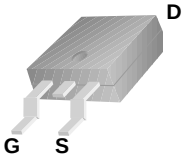



## Application

- Power Supply
- DC-DC Converters
- UPS
- Battery Management System




TO-220




TO-263

## Absolute Maximum Ratings ($T_A$=25°C unless otherwise noted)

| Symbol | Parameter | | Maximum | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | | 60 | V |
| $V_{GSS}$ | Gate-to-Source Voltage | | ±25 | V |
| $I_D$[3] | Continuous Drain Current | $T_C$=25°C | 120 | A |
| | | $T_C$=100°C | 80 | |
| $I_{DP}$[4] | Pulsed Drain Current | $T_C$=25°C | 480 | |
| EAS[5] | Avalanche energy | | 684 | mJ |
| PD | Maximum Power Dissipation | $T_C$=25°C | 188 | W |
| $T_J$, $T_{STG}$ | Junction & Storage Temperature Range | | -55~175 | °C |

## Thermal Characteristics

| Symbol | Parameter | Typical | Unit |
|---|---|---|---|
| Rθjc | Thermal Resistance-Junction to Case | 0.67 | ℃/W |
| Rθja | Thermal Resistance-Junction to Ambient | 62.5 | |

## Electrical Characteristics (TA=25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V,$I_D$=250uA | 60 | — | — | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=60V,$V_{GS}$=0V | — | — | 1 | uA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 2 | 3 | 4 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±25V, $V_{DS}$=0V | — | — | ±100 | nA |
| $R_{DS(on)}$[1] | Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=60A | — | 4.2 | 5.6 | mΩ |
| | | | — | — | — | |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$[1] | Diode Forward Voltage | $I_{SD}$=60A,$V_{GS}$=0V | — | 0.8 | 1.3 | V |
| $I_S$[3] | Diode Continuous Forward Current | | — | — | 60 | A |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=60A,dI/dt=100A/u | — | 32 | — | nS |
| $Q_{rr}$ | Reverse Recovery Charge | s | — | 60 | — | nC |
| **Dynamic Characteristics[2]** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$30 V Frequency=1MHz | — | 3130 | — | pF |
| $C_{oss}$ | Output Capacitance | | — | 521 | — | |
| $C_{rss}$ | Reverse Transfer Capacitance | | — | 304 | — | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=30V,$I_D$=60A, $V_{GS}$=10V,$R_G$=5Ω | — | 21 | — | nS |
| $t_r$ | Rise Time | | — | 56 | — | |
| $t_{d(off)}$ | Turn-Off Delay Time | | — | 53 | — | |
| $t_f$ | Fall Time | | — | 27 | — | |
| **Gate Charge Characteristics[2]** | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=48V,$V_{GS}$=10V $I_D$=60A | — | 76 | — | nC |
| $Q_{gs}$ | Gate-to-Source Charge | | — | 18 | — | |
| $Q_{gd}$ | Gate-to-Drain Charge | | — | 31 | — | |

Note: 1: Pulse test; pulse width ≦ 300us, duty cycle ≦ 2%.
2: Guaranteed by design, not subject to production testing.
3: Package limitation current is 60A.Calculated continuous current based on maximum allowable junction temperature.
4: Repetitive rating, pulse width limited by max junction temperature.
5: Starting TJ = 25°C,L = 0.5mH,IAS = 37A.

## Typical Characteristics

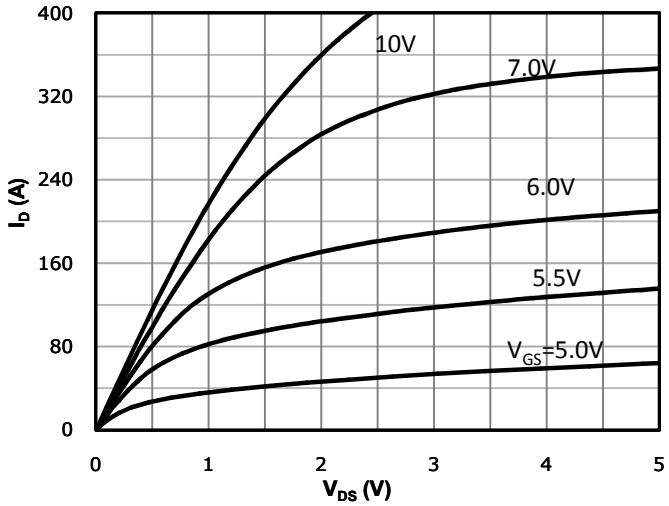



Fig 1: Output Characteristics

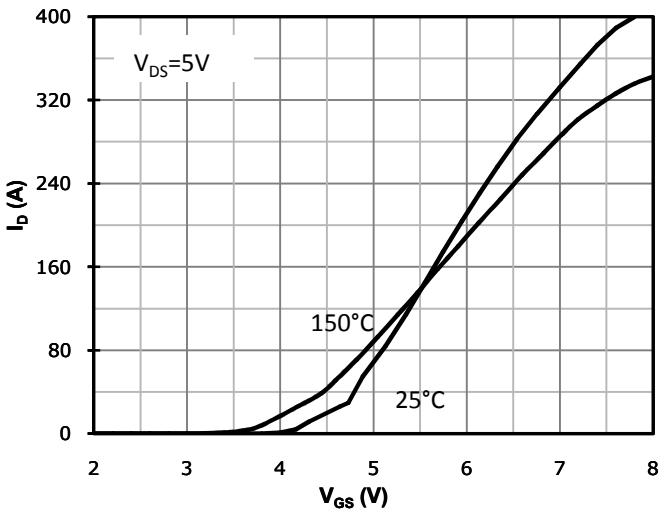



Fig 2: Transfer Characteristics

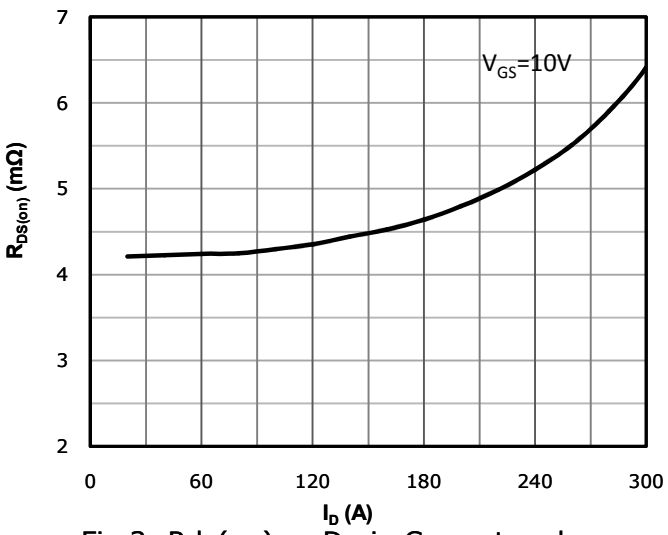



Fig 3: Rds(on) vs Drain Current and Gate Voltage

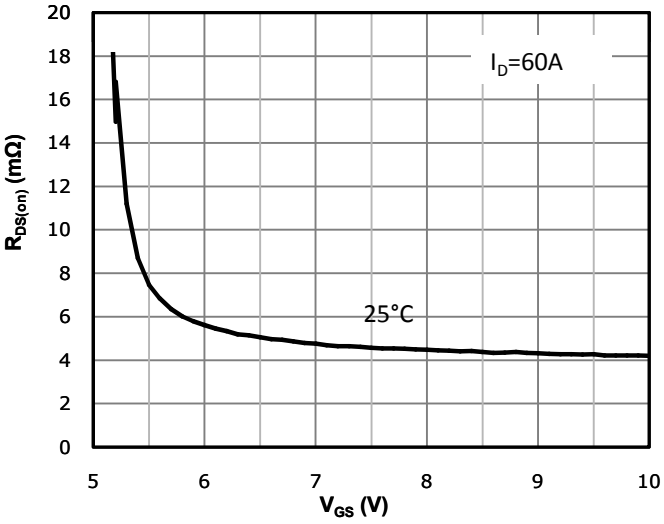



Fig 4: Rds(on) vs Gate Voltage

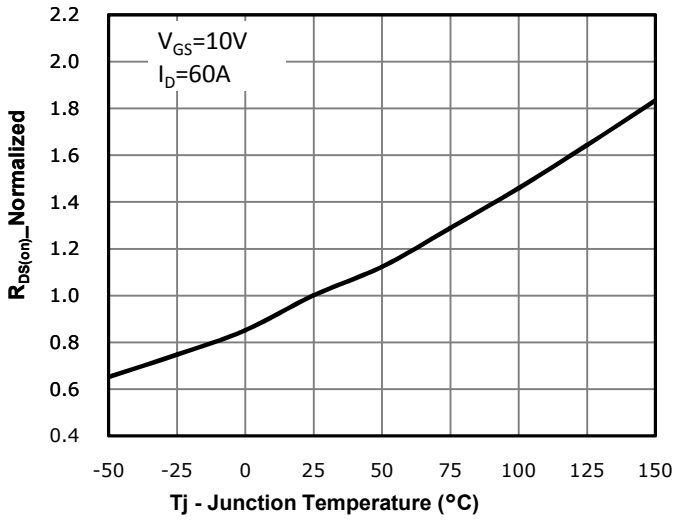



Fig 5: Rds(on) vs. Temperature

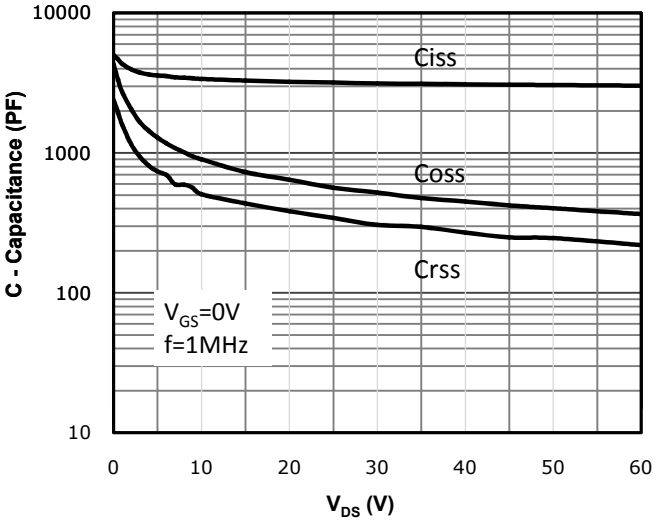



Fig 6: Capacitance Characteristics

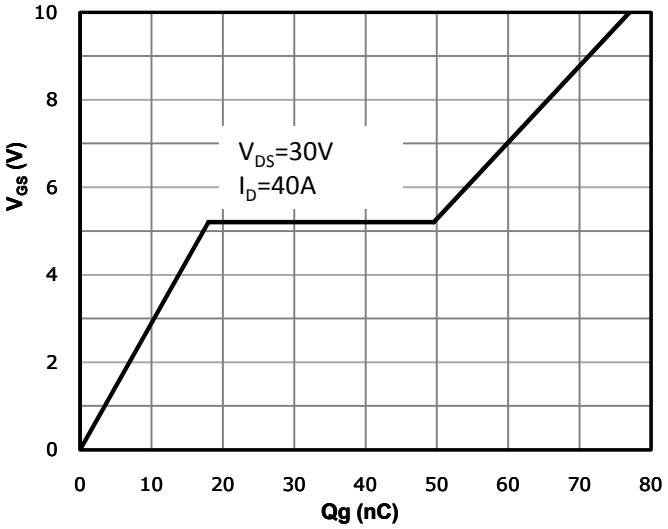



Fig 7: Gate Charge Characteristics

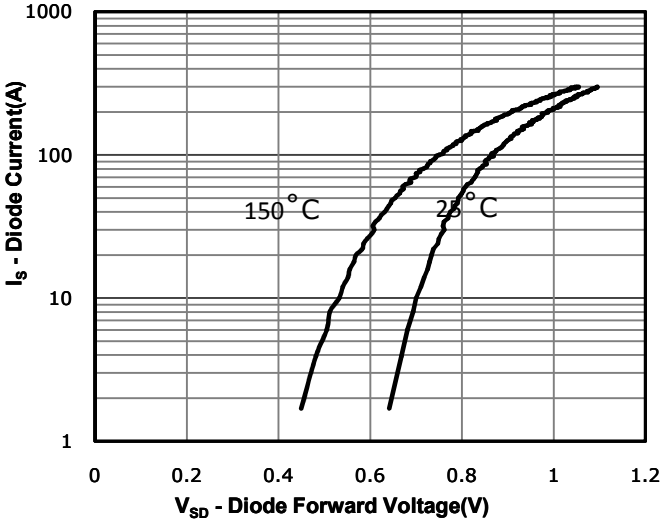



Fig 8: Body-diode Forward Characteristics

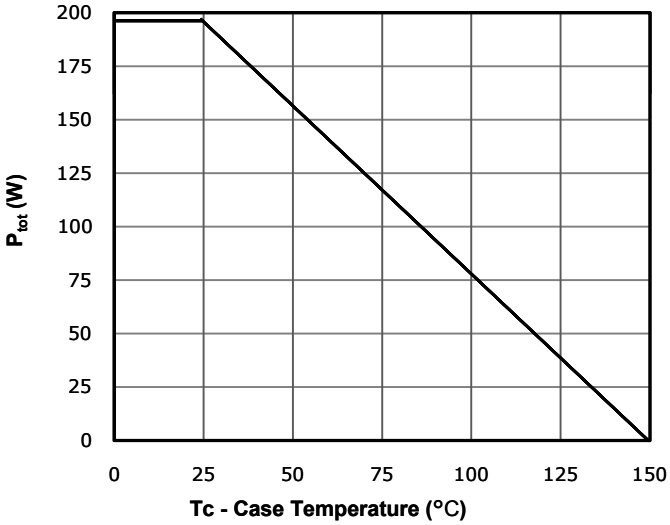



Fig 9: Power Dissipation

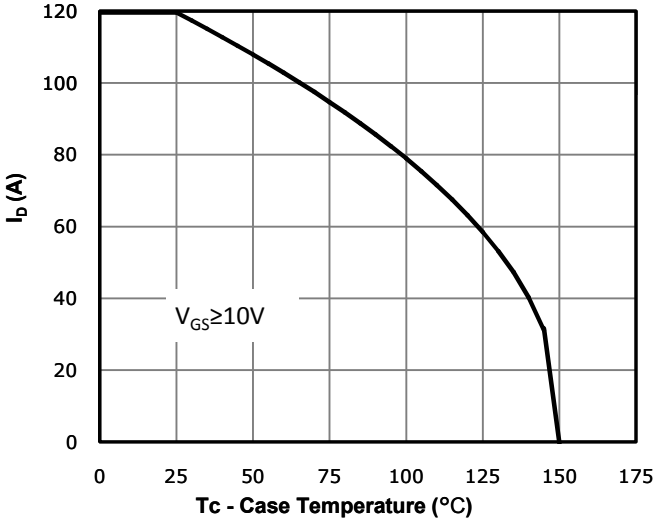



Fig 10: Drain Current Derating

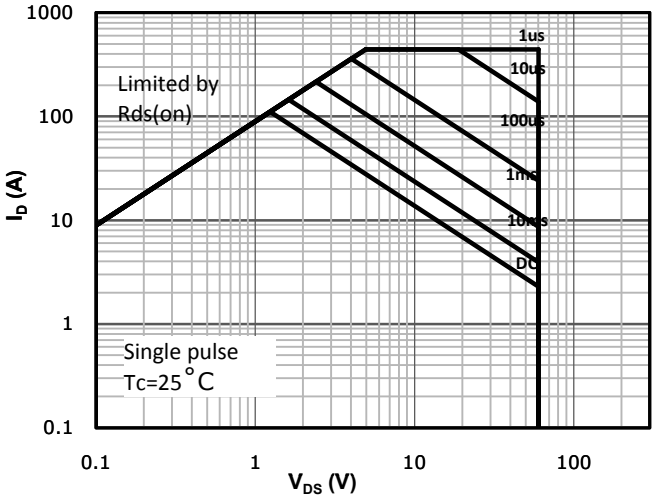
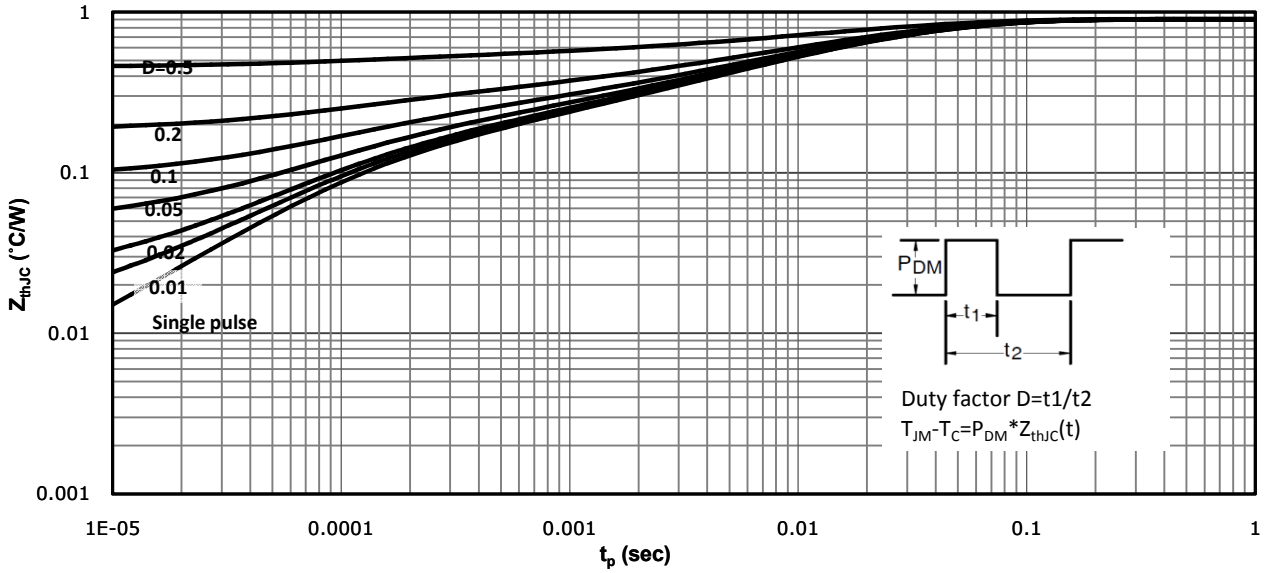


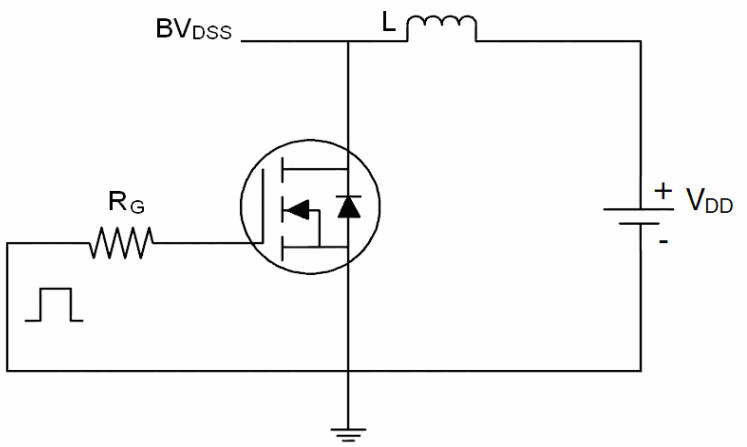

Fig 11: Safe Operating Area

Fig 12: Max. Transient Thermal Impedance

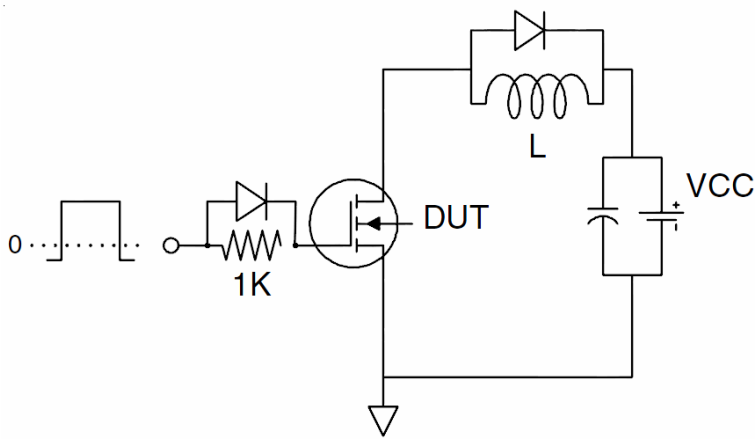


## Test Circuit

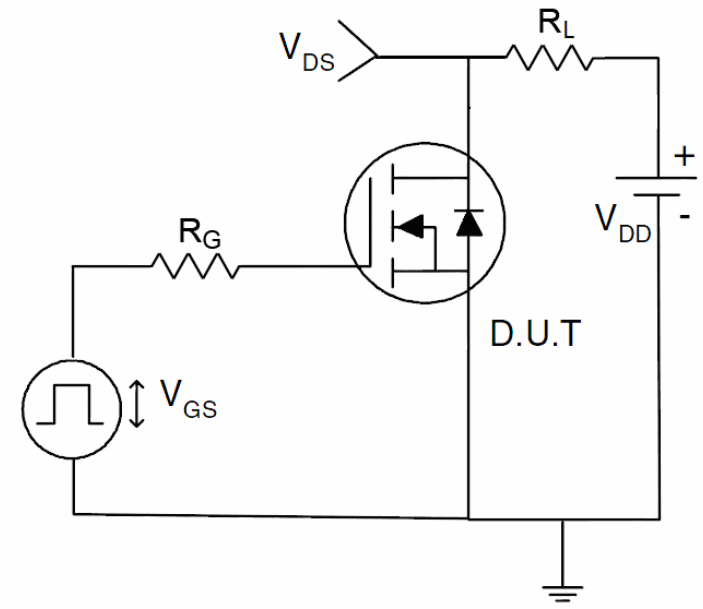
**1) $E_{AS}$ test Circuit**




**2) Gate charge test Circuit**




**3) Switch Time Test Circuit**



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