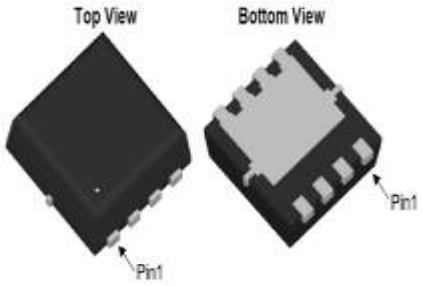
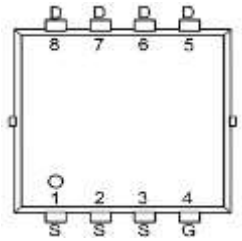
# -60$V_{DS}$/±20$V_{GS}$ P-Channel Enhancement Mode MOSFET

## Features

- $V_{DS}$=-60V,$I_D$=-50A
- $R_{DS(ON)}$=20mΩ（TYP.）$V_{GS}$=-10V
- Reliable and Rugged
- Avalanche Rated
- Low On-Resistance
- High Current Capability

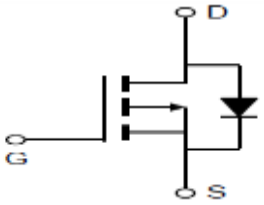
**PDFN5060**




## Applications

- Load Switch
- Power management in portable/desktop PCs
- DC/DC conversion s




## Ordering Information

| Device | package | Device Marking | Package Qty. |
|---|---|---|---|
| HM60P50D5 | PDFN5060 | ** | 5000/PCS |

## Absolute Maximum Ratings ($T_C$=25℃,unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage ($V_{GS}$=0V) | $V_{DS}$ | -60 | V |
| Gate-Source Voltage ($V_{GS}$=0V,static) | $V_{GS}$ | ±20 | V |
| Continuous Drain Current ($T_C$=25℃) | $I_D$ | -50 | A |
| Continuous Drain Current ($T_C$=100℃) | | -35 | A |
| Pulesd Drain Current | $I_{DM}$ | -260 | A |
| Avalanche Energy, Single Pulsed | $E_{AS}$ | 650 | mJ |
| Maximum Power Dissipation ($T_C$=25℃) | $P_D$ | 240 | W |
| Operating,Storage Temperature Range | $T_J$,$T_{STG}$ | -55~150 | ℃ |

## Electrical Characteristics

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=-250μA | -60 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | - | - | -1 | μA |
| Gate -Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$,$I_D$=-250μA | -1.1 | - | -2.52 | V |
| Drain-Source On-stage Resistance | $R_{DS(ON)}$ | $V_{GS}$=-10V,$I_D$=-1A | - | - | 20 | mΩ |
| | | $V_{GS}$=-4.5V,$I_D$=-1A | - | - | 25 | |

## Thermal Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Thermal Resistance,Junction-to-Case | $R_{\theta JC}$ | - | 0.52 | - | ℃/ W |
| Thermal Resistance,Junction-to-Ambient | $R_{\theta JA}$ | - | - | - | ℃/ W |

## Dynamic Characteristics

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | $V_{DS}$=-15V | - | 4399 | - | pF |
| Output capacitance | $C_{oss}$ | $V_{GS}$=0V | - | 258 | - | |
| Reverse transfer capacitance | $C_{rss}$ | f=1MHz | - | 211 | - | |
| Gate Resistance | $R_g$ | f=1MHz | - | 6 | - | Ω |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-15V | - | 114 | - | nC |
| Gate Source Charge | $Q_{gs}$ | $V_{GS}$=-10V | - | 27 | - | |
| Gate Drain Charge | $Q_{gd}$ | $I_D$=-15A | - | 49 | - | |
| Turn-on delay Time | $t_{d(on)}$ | $V_{GS}$=-10V | - | 23 | - | ns |
| Rise time | $t_r$ | $V_{DS}$=-15V | - | 17 | - | |
| Turn-off delay Time | $t_{d(off)}$ | $R_L$=1Ω | - | 55 | - | |
| Fall time | $t_f$ | $R_G$=3Ω | - | 29 | - | |

## Reverse Diode Characteristics

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Body Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V,$I_{SD}$=-1A | - | - | -1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $V_{GS}$=0V,$I_{SD}$=-15A | - | 117 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | $d_i/d_t$=100A/μs | - | 420 | - | nC |

## Electrical Characteristics Diagrames

**Figure 1. On-Regin Characteristics**

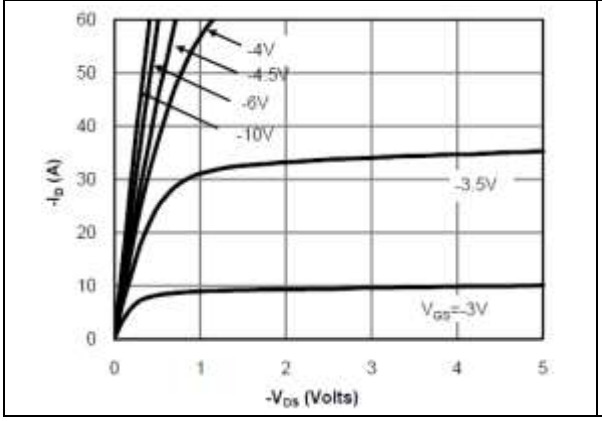



**Figure 2. Transfer Characteristics**

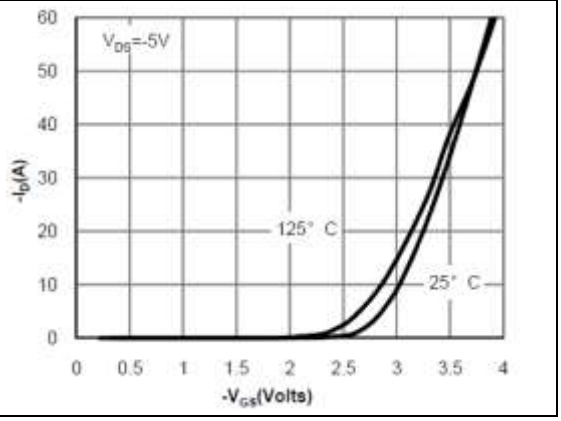


**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**

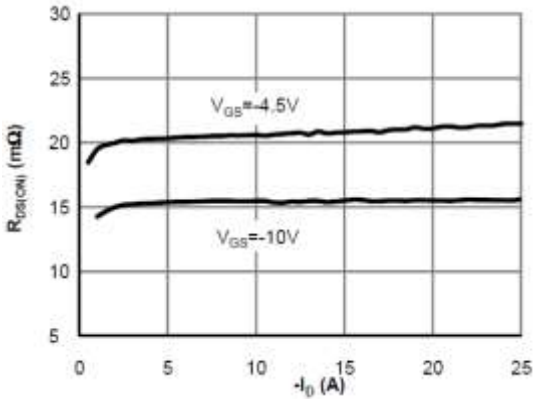



**Figure 4. On-Resistance vs. Junction Temperature**

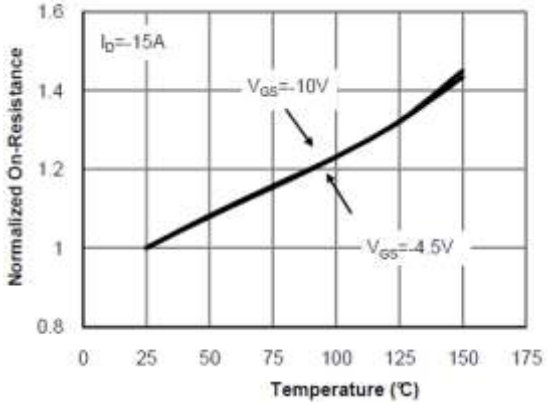



**Figure 5. On-Resistance vs. Gate-Source Voltage**

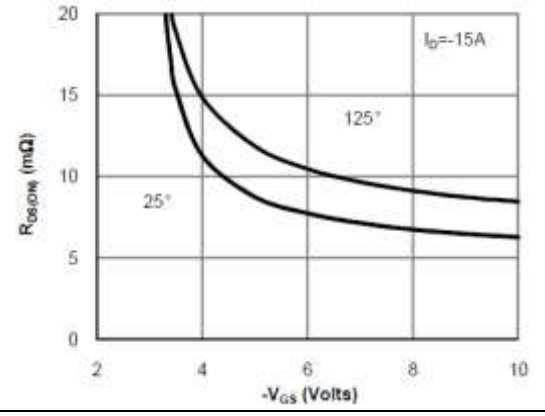



**Figure 6. Body-Diode Characteristics**

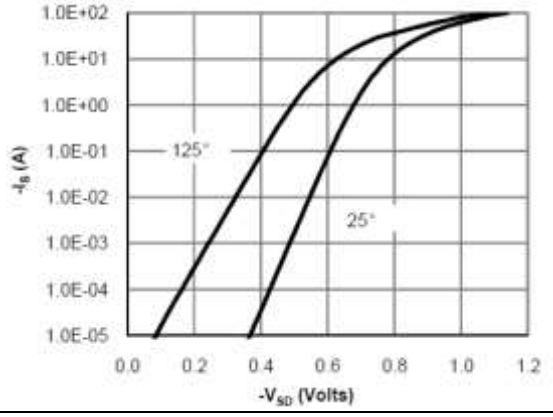



**Figure 7. Gate-Charge Characteristics**

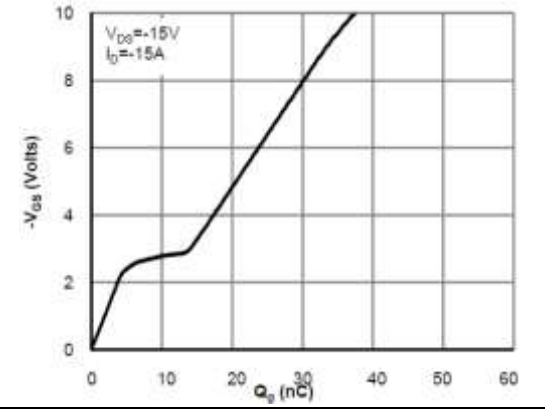



**Figure 8. Capacitance Characteristics**

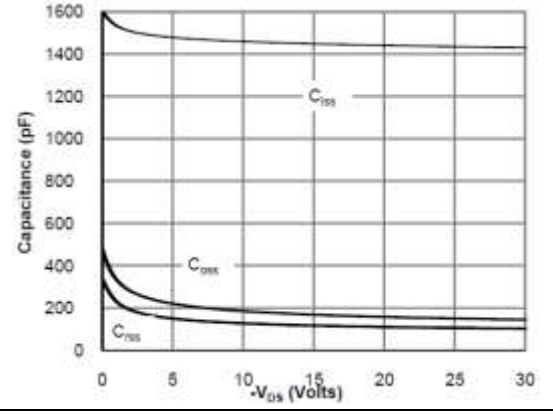


**Figure 9. Maximum Forward Biased Safe Operating Area**

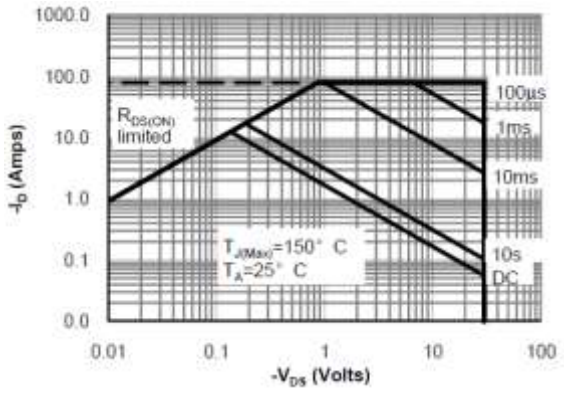



**Figure 10. Single Pulse Power Rating Junction-to-Ambient**

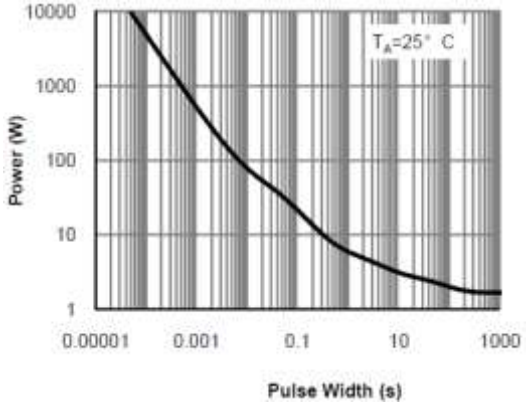
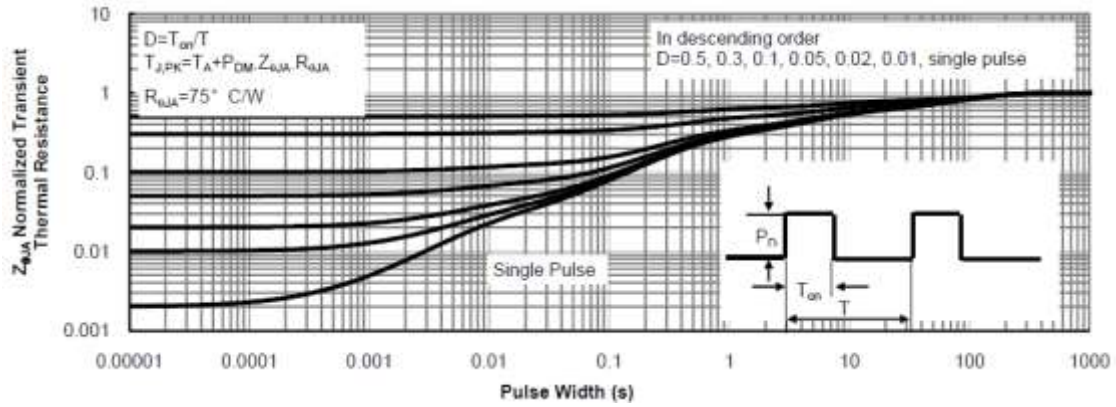



**Figure 11. Normalized Maximum Transient Thermal Impedance**




## Physical Dimensions

### PDFN5060

| 符号 | 尺寸（mm） | | | 符号 | 尺寸（mm） | | |
|---|---|---|---|---|---|---|---|
| | 最小值 | 典型值 | 最大值 | | 最小值 | 典型值 | 最大值 |
| A | 0.90 | 1.00 | 1.10 | E1 | 5.70 | 5.75 | 5.80 |
| b | 0.33 | 0.41 | 0.51 | E2 | 3.38 | 3.58 | 3.78 |
| c | 0.20 | 0.25 | 0.30 | H | 0.41 | 0.51 | 0.61 |
| D | 4.80 | 4.90 | 5.00 | K | 1.10 | - | - |
| D1 | 3.61 | 3.81 | 3.96 | L | 0.51 | 0.61 | 0.71 |
| e | 1.27BSC | | | L1 | 0.06 | 0.13 | 0.20 |
| E | 5.90 | 6.00 | 6.10 | θ | 0° | - | 12° |