

## -20V<sub>DS</sub>/±12V<sub>GS</sub> P-Channel Enhancement Mode MOSFET

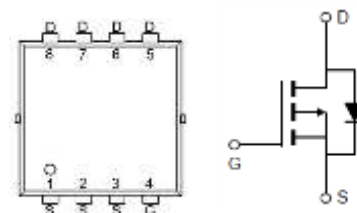
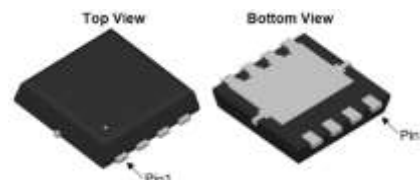
### Features

- V<sub>DS</sub>=-20V, I<sub>D</sub>=-45A
- R<sub>DS(ON)</sub>=7.5mΩ (TYP.) V<sub>GS</sub>=-4.5V
- Reliable and Rugged
- Avalanche Rated
- Low On-Resistance

### Applications

- Portable device
- Switch switching
- Load Switch
- Power management in portable/desktop PCs
- DC/DC conversion

### PDFN5060



### Ordering Information

| Device    | package  | Device Marking | Package Qty. |
|-----------|----------|----------------|--------------|
| HM20P45D5 | PDFN5060 | **             | 5000/PCS     |

### Absolute Maximum Ratings (T<sub>C</sub>=25°C, unless otherwise noted)

| Parameter                                         | Symbol                            | Value   | Unit |
|---------------------------------------------------|-----------------------------------|---------|------|
| Drain-Source Voltage (V <sub>GS</sub> =0V)        | V <sub>DS</sub>                   | -20     | V    |
| Gate-Source Voltage (V <sub>GS</sub> =0V, static) | V <sub>GS</sub>                   | ±12     | V    |
| Continuous Drain Current (T <sub>C</sub> =25°C)   | I <sub>D</sub>                    | -45     | A    |
| Continuous Drain Current (T <sub>C</sub> =100°C)  |                                   | -25     | A    |
| Pulsed Drain Current                              | I <sub>DM</sub>                   | -180    | A    |
| Avalanche Energy, Single Pulsed                   | E <sub>AS</sub>                   | 102     | mJ   |
| Maximum Power Dissipation (T <sub>C</sub> =25°C)  | P <sub>D</sub>                    | 102     | W    |
| Operating, Storage Temperature Range              | T <sub>J</sub> , T <sub>STG</sub> | -55~150 | °C   |

### Electrical Characteristics

| Parameter                        | Symbol              | Test Conditions                                            | Min. | Typ. | Max. | Unit |
|----------------------------------|---------------------|------------------------------------------------------------|------|------|------|------|
| Drain-Source Breakdown Voltage   | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                | -20  | -    | -    | V    |
| Zero Gate Voltage Drain Current  | I <sub>DSS</sub>    | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V                 | -    | -    | -1   | μA   |
| Gate -Source Leakage Current     | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                 | -    | -    | ±100 | nA   |
| Gate Threshold Voltage           | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA | -0.5 | -0.7 | -1.0 | V    |
| Drain-Source On-stage Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1A                | -    | -    | 7    | mΩ   |
|                                  |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1A                | -    | -    | 12   |      |

## Thermal Characteristics

| Parameter                              | Symbol          | Min. | Typ. | Max. | Unit          |
|----------------------------------------|-----------------|------|------|------|---------------|
| Thermal Resistance,Junction-to-Case    | $R_{\theta JC}$ | -    | 3.8  | -    | $^{\circ}C/W$ |
| Thermal Resistance,Junction-to-Ambient | $R_{\theta JA}$ | -    | 59   | -    | $^{\circ}C/W$ |

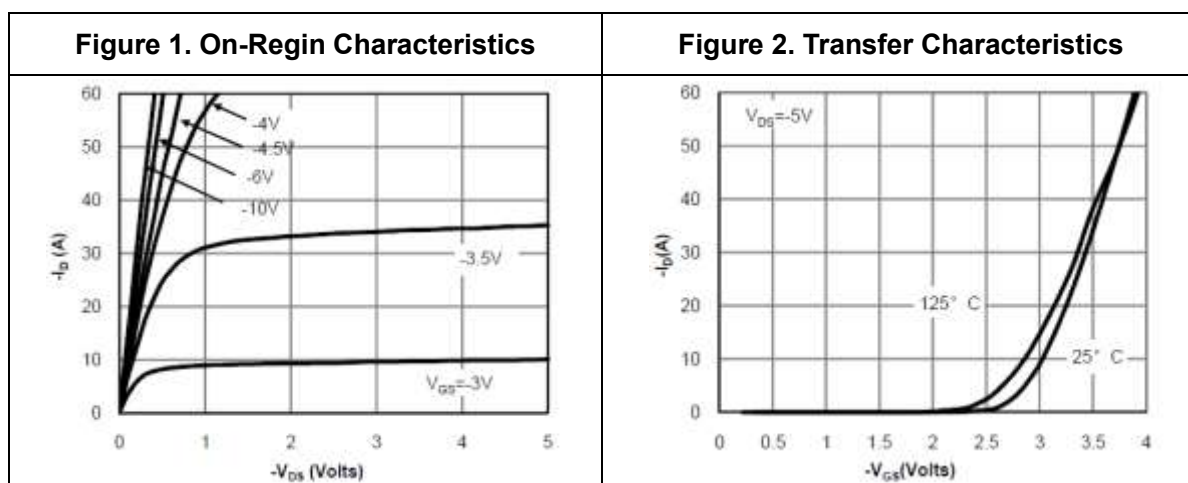
## Dynamic Characteristics

| Parameter                    | Symbol       | Test Conditions | Min. | Typ. | Max. | Unit     |
|------------------------------|--------------|-----------------|------|------|------|----------|
| Input capacitance            | $C_{iss}$    | $V_{DS}=-15V$   | -    | 9500 | -    | pF       |
| Output capacitance           | $C_{oss}$    | $V_{GS}=0V$     | -    | 1830 | -    |          |
| Reverse transfer capacitance | $C_{rss}$    | $f=1MHz$        | -    | 1730 | -    |          |
| Gate Resistance              | $R_g$        | $f=1MHz$        | -    | -    | -    | $\Omega$ |
| Total Gate Charge            | $Q_g$        | $V_{DS}=-15V$   | -    | 85   | -    | nC       |
| Gate Source Charge           | $Q_{gs}$     | $V_{GS}=-10V$   | -    | 25   | -    |          |
| Gate Drain Charge            | $Q_{gd}$     | $I_D=-15A$      | -    | 37   | -    |          |
| Turn-on delay Time           | $t_{d(on)}$  | $V_{GS}=-10V$   | -    | 12   | -    | ns       |
| Rise time                    | $t_r$        | $V_{DS}=-15V$   | -    | 21   | -    |          |
| Turn-off delay Time          | $t_{d(off)}$ | $R_L=1\Omega$   | -    | 100  | -    |          |
| Fall time                    | $t_f$        | $R_G=3\Omega$   | -    | 25   | -    |          |

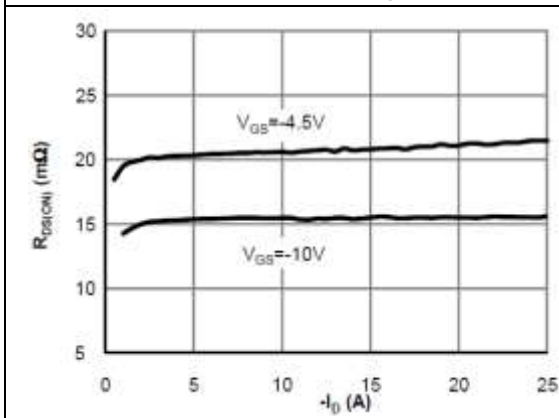
## Reverse Diode Characteristics

| 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      | $t_{rr}$ | $V_{GS}=0V, I_{SD}=-15A$ | -    | -    | -    | ns   |
| Reverse Recovery Charge    | $Q_{rr}$ | $dI/dt=100A/\mu s$       | -    | -    | -    | nC   |

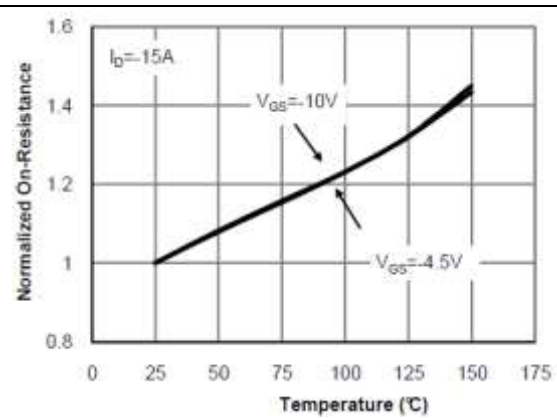
## Electrical Characteristics Diagrames



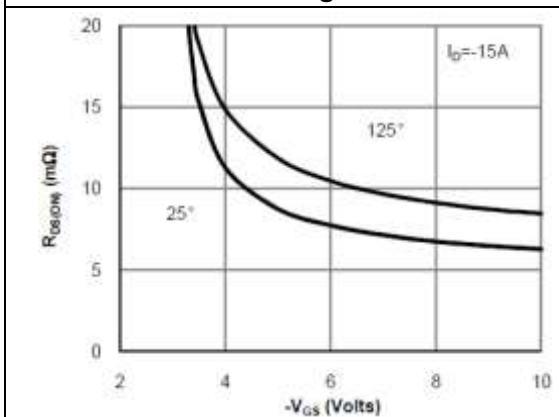
**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**



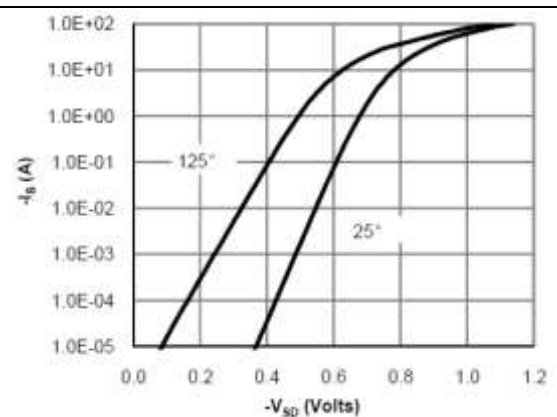
**Figure 4. On-Resistance vs. Junction Temperature**



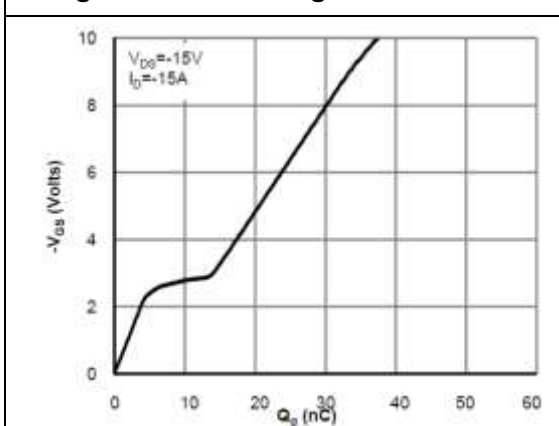
**Figure 5. On-Resistance vs. Gate-Source Voltage**



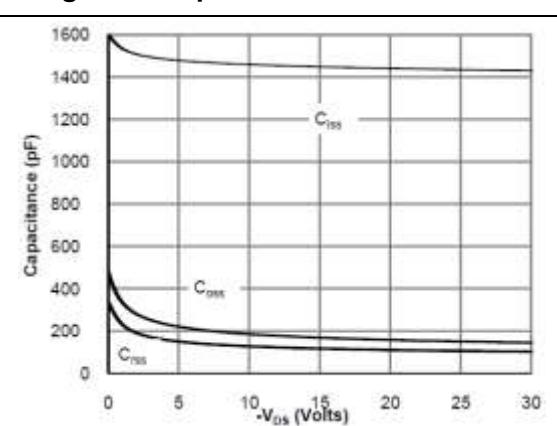
**Figure 6. Body-Diode Characteristics**



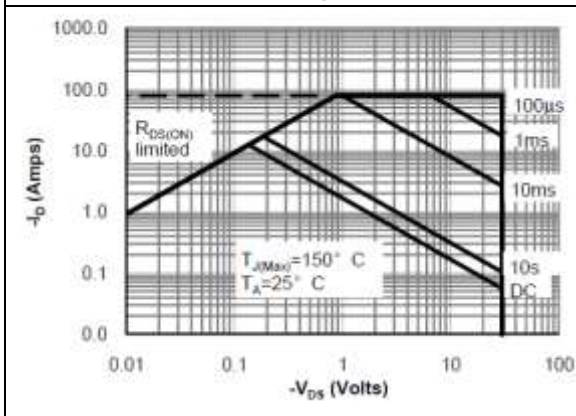
**Figure 7. Gate-Charge Characteristics**



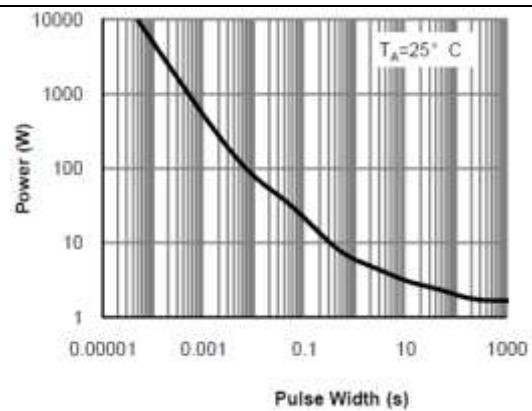
**Figure 8. Capacitance Characteristics**



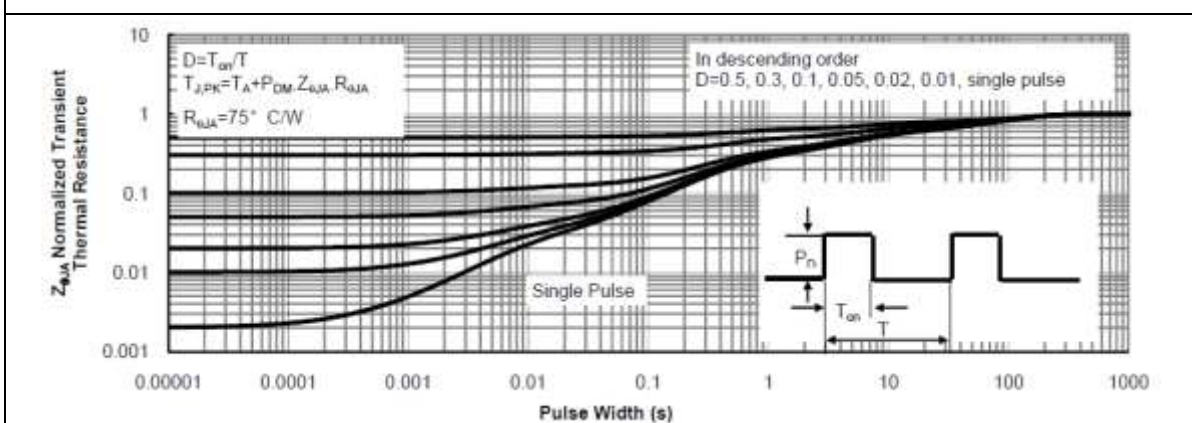
**Figure 9. Maximum Forward Biased Safe Operating Area**



**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°  |

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