

## P-Ch 30V Fast Switching MOSFETs

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Product Summary



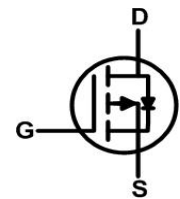
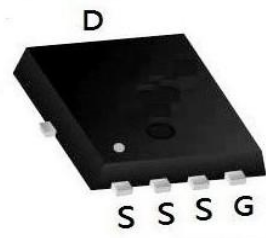
| BVDSS | RDSON | ID    |
|-------|-------|-------|
| -30V  | 2.5mΩ | -110A |

### Description

The UD110P03F is the highest performance trench P-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The UD110P03F meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### PDFN5060-8L Pin Configuration



### Absolute Maximum Ratings

| Symbol                      | Parameter                                       | Rating     | Units            |
|-----------------------------|-------------------------------------------------|------------|------------------|
| $V_{DS}$                    | Drain-Source Voltage                            | -30        | V                |
| $V_{GS}$                    | Gate-Source Voltage                             | $\pm 20$   | V                |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ -10V^{1,6}$ | -110       | A                |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ -10V^{1,6}$ | -70        | A                |
| $I_{DM}$                    | Pulsed Drain Current <sup>2</sup>               | -450       | A                |
| EAS                         | Single Pulse Avalanche Energy <sup>3</sup>      | 576        | mJ               |
| $I_{AS}$                    | Avalanche Current                               | -70        | A                |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>            | 6.0        | W                |
| $T_{STG}$                   | Storage Temperature Range                       | -55 to 175 | $^\circ\text{C}$ |
| $T_J$                       | Operating Junction Temperature Range            | -55 to 175 | $^\circ\text{C}$ |

### Thermal Data

| Symbol          | Parameter                                                         | Typ. | Max. | Unit               |
|-----------------|-------------------------------------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> ( $t \leq 10S$ ) | ---  | 20   | $^\circ\text{C/W}$ |
|                 | Thermal Resistance Junction-ambient <sup>1</sup> (Steady State)   | ---  | 50   | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-case <sup>1</sup>                     | ---  | 3.6  | $^\circ\text{C/W}$ |

**P-Ch 30V Fast Switching MOSFETs**
**Table 3. Electrical Characteristics ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)**

| Symbol                             | Parameter                              | Conditions                                                                                | Min | Typ  | Max  | Unit |
|------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------|-----|------|------|------|
| On/Off States                      |                                        |                                                                                           |     |      |      |      |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage         | V <sub>GS</sub> =0V I <sub>D</sub> =-250μA                                                | -30 |      |      | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current        | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V                                                |     |      | -1   | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current              | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                |     |      | ±100 | nA   |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage                 | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                 | -1  | -1.7 | -2.5 | V    |
| g <sub>FS</sub>                    | Forward Transconductance               | V <sub>DS</sub> =-5V, I <sub>D</sub> =-20A                                                |     | 65   |      | S    |
| R <sub>DS(ON)</sub>                | Drain-Source On-State Resistance       | V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A                                               |     | 2.5  | 3.1  | mΩ   |
|                                    |                                        | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A                                              |     | 4    | 5.2  | mΩ   |
| Dynamic Characteristics            |                                        |                                                                                           |     |      |      |      |
| C <sub>iss</sub>                   | Input Capacitance                      | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1.0MHz                                      |     | 7000 |      | pF   |
| C <sub>oss</sub>                   | Output Capacitance                     |                                                                                           |     | 820  |      | pF   |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance           |                                                                                           |     | 540  |      | pF   |
| R <sub>g</sub>                     | Gate resistance                        | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1.0MHz                                        |     | 2.2  |      | Ω    |
| Switching Parameters               |                                        |                                                                                           |     |      |      |      |
| t <sub>d(on)</sub>                 | Turn-on Delay Time                     | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3Ω |     | 14   |      | nS   |
| t <sub>r</sub>                     | Turn-on Rise Time                      |                                                                                           |     | 13   |      | nS   |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                    |                                                                                           |     | 65   |      | nS   |
| t <sub>f</sub>                     | Turn-Off Fall Time                     |                                                                                           |     | 37   |      | nS   |
| Q <sub>g</sub>                     | Total Gate Charge                      | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-20A                        |     | 130  |      | nC   |
| Q <sub>gs</sub>                    | Gate-Source Charge                     |                                                                                           |     | 12   |      | nC   |
| Q <sub>gd</sub>                    | Gate-Drain Charge                      |                                                                                           |     | 31   |      | nC   |
| Source-Drain Diode Characteristics |                                        |                                                                                           |     |      |      |      |
| I <sub>SD</sub>                    | Source-Drain Current (Body Diode)      |                                                                                           |     |      | -108 | A    |
| V <sub>SD</sub>                    | Forward on Voltage <sup>(Note 3)</sup> | V <sub>GS</sub> =0V, I <sub>S</sub> =-20A                                                 |     |      | -1.2 | V    |
| t <sub>rr</sub>                    | Reverse Recovery Time                  | I <sub>F</sub> =-20A, di/dt=100A/μs                                                       |     | 30   |      | ns   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge                | I <sub>F</sub> =-20A, di/dt=100A/μs                                                       |     | 40   |      | nC   |

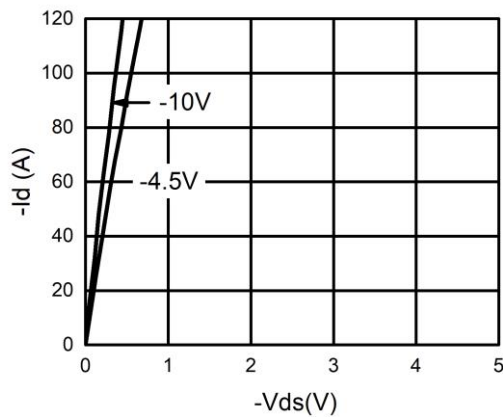
Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

Notes 2. $E_{AS}$  condition:  $T_J=25^{\circ}\text{C}, V_{DD}=15V, V_G=-10V, R_g=25\Omega, L=0.5mH$ .

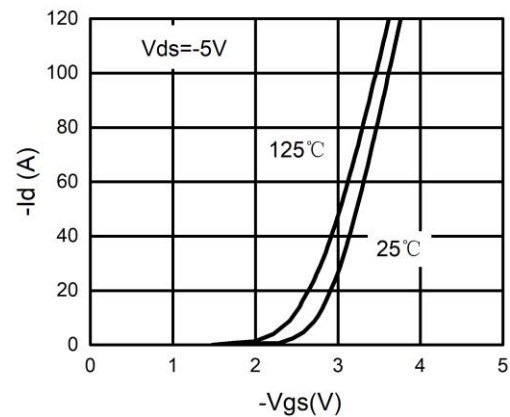
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

## Typical Electrical And Thermal Characteristics (Curves)

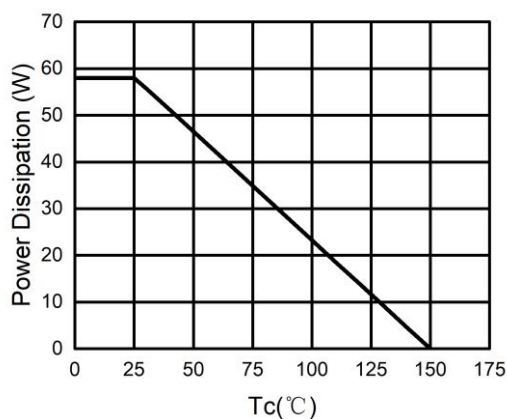
**Figure 1. Output Characteristics**



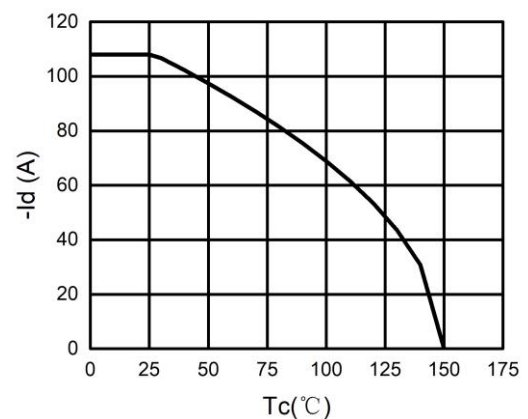
**Figure 2. Transfer Characteristics**



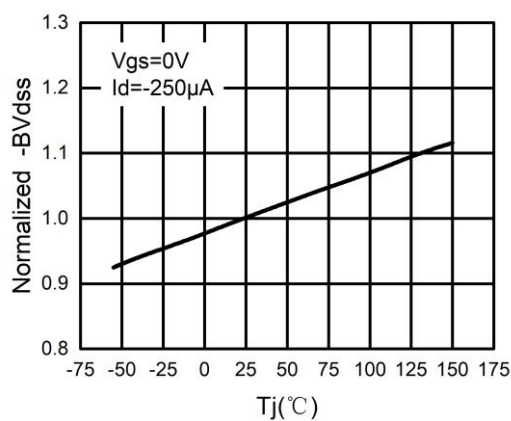
**Figure 3. Power Dissipation**



**Figure 4. Drain Current**



**Figure 5.  $BV_{DSS}$  vs Junction Temperature**



**Figure 6.  $R_{DS(ON)}$  vs Junction Temperature**

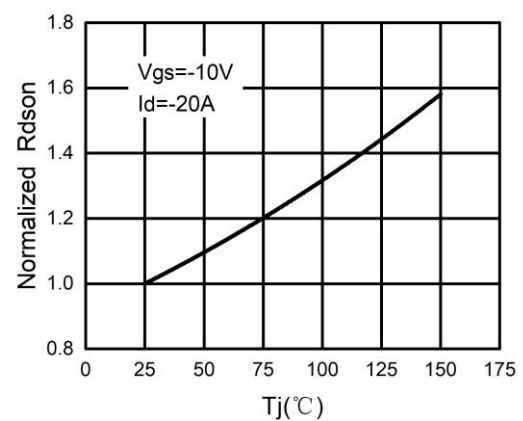


Figure 7. Gate Charge Waveforms

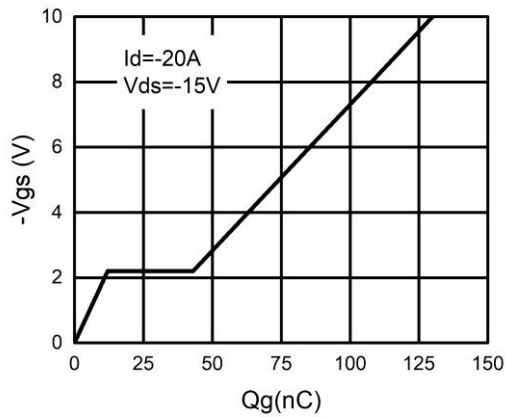


Figure 8. Capacitance

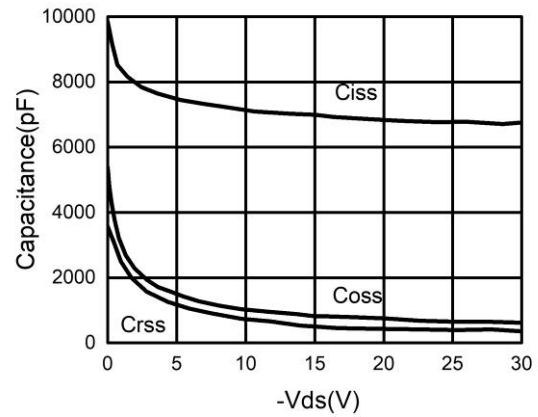


Figure 9. Body-Diode Characteristics

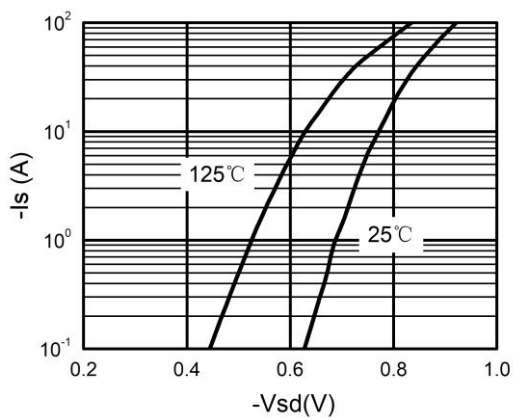
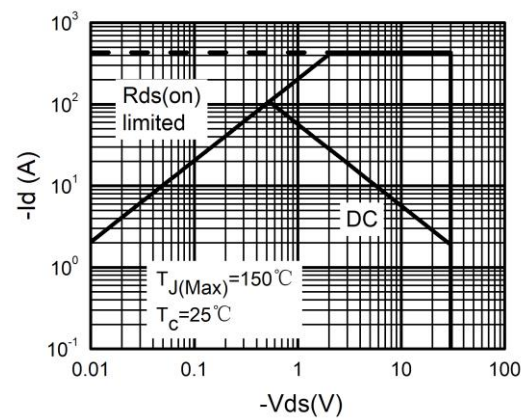
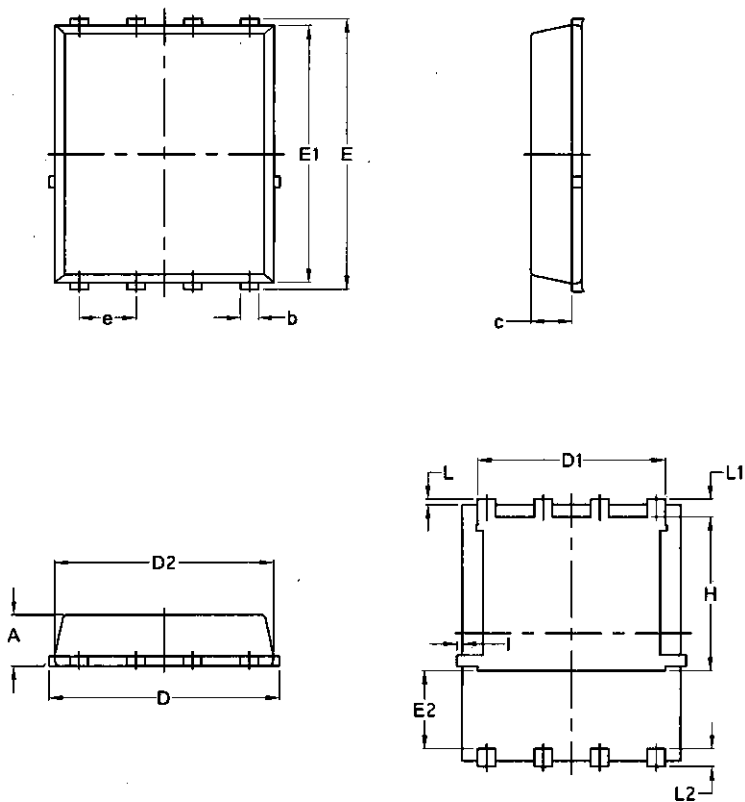


Figure 10. Maximum Safe Operating Area



# Package Mechanical Data-PDFN5060-8L-Single



| Symbol | Common   |        |          |        |
|--------|----------|--------|----------|--------|
|        | mm       |        | Inch     |        |
|        | Mim      | Max    | Min      | Max    |
| A      | 1.03     | 1.17   | 0.0406   | 0.0461 |
| b      | 0.34     | 0.48   | 0.0134   | 0.0189 |
| c      | 0.824    | 0.0970 | 0.0324   | 0.082  |
| D      | 4.80     | 5.40   | 0.1890   | 0.2126 |
| D1     | 4.11     | 4.31   | 0.1618   | 0.1697 |
| D2     | 4.80     | 5.00   | 0.1890   | 0.1969 |
| E      | 5.95     | 6.15   | 0.2343   | 0.2421 |
| E1     | 5.65     | 5.85   | 0.2224   | 0.2303 |
| E2     | 1.60     | /      | 0.0630   | /      |
| e      | 1.27 BSC |        | 0.05 BSC |        |
| L      | 0.05     | 0.25   | 0.0020   | 0.0098 |
| L1     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| L2     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| H      | 3.30     | 3.50   | 0.1299   | 0.1378 |
| I      | /        | 0.18   | /        | 0.0070 |