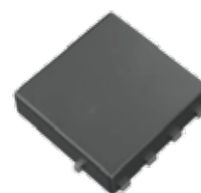


## FEATURES

- Advanced trench cell design
- Low Thermal Resistance



PDFN3×3-8L

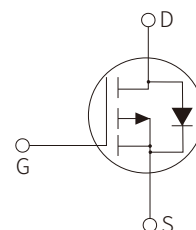
## APPLICATION

- Motor Drivers
- DC - DC Converter



## APPROVALS

|      |                                    |
|------|------------------------------------|
| RoHS | Compliance with 2011/65/EU         |
| HF   | Compliance with IEC61249-2-21:2003 |



Schematic Symbol

## ABSOLUTE MAXIMUM RATINGS

| Parameter                                                        | Symbol            | Value      | Unit               |
|------------------------------------------------------------------|-------------------|------------|--------------------|
| Drain-Source Voltage $T_c=25^\circ\text{C}$                      | $V_{DS}$          | -30        | V                  |
| Pulsed Source Current $T_c=25^\circ\text{C}, V_{GS}=-10\text{V}$ | $I_{DM}^{*,**,*}$ | -96        | A                  |
| Drain Current $T_c=25^\circ\text{C}, V_{GS}=-10\text{V}$         | $I_D^*$           | -30        | A                  |
| Gate-Source Voltage $T_c=25^\circ\text{C}$                       | $V_{GS}$          | $\pm 20$   | V                  |
| Total Power Dissipation $T_c=25^\circ\text{C}$                   | $P_{tot}^*$       | 20         | W                  |
| Diode Forward Current $T_c=25^\circ\text{C}$                     | $I_S$             | -30        | A                  |
| Junction Temperature                                             | $T_J$             | 150        | $^\circ\text{C}$   |
| Storage Temperature                                              | $T_{STG}$         | -55 to 150 | $^\circ\text{C}$   |
| Thermal Resistance – Junction to Ambient                         | $R_{\theta JC}^*$ | 6          | $^\circ\text{C/W}$ |

Notes:

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10$  sec

\*\* Pulse width  $\leq 10$   $\mu\text{s}$ , duty cycle  $\leq 1\%$

\*\*\* Limited by bonding wire

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

| Parameter                                | Symbol                           | Test Conditions                                                                                                        | Min. | Typ. | Max. | Unit |
|------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                   |                                  |                                                                                                                        |      |      |      |      |
| Drain-Source Breakdown Voltage           | BV <sub>DSS</sub>                | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                                                            | -30  |      |      | V    |
| Gate Threshold Voltage                   | V <sub>GS(th)</sub>              | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =-250μA                                                             | -1.0 |      | -2.0 | V    |
| Zero Gate Voltage Source Current         | I <sub>DSS</sub>                 | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V                                                                             |      |      | -1   | μA   |
|                                          |                                  | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =85°C                                                       |      |      | -30  | μA   |
| Gate Leakage Current                     | I <sub>GSS</sub>                 | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                             |      |      | ±100 | nA   |
| Drain-Source On-State Resistance         | R <sub>DS(on)</sub> <sup>a</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A                                                                            |      | 16   | 20   | mΩ   |
|                                          |                                  | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A                                                                           |      | 26   | 30   | mΩ   |
| Diode Characteristics                    |                                  |                                                                                                                        |      |      |      |      |
| Diode Forward Voltage                    | V <sub>SD</sub> <sup>a</sup>     | I <sub>SD</sub> =-20A, V <sub>GS</sub> =0V                                                                             |      |      | -1.3 | V    |
| Reverse Recovery Time                    | t <sub>rr</sub>                  | I <sub>SD</sub> =-20A,<br>dI <sub>SD</sub> /dt=100A/μs                                                                 |      | 8.3  |      | nS   |
| Reverse Recovery Charge                  | Q <sub>rr</sub>                  |                                                                                                                        |      | 0.6  |      | nC   |
| Dynamic Characteristics <sup>b</sup>     |                                  |                                                                                                                        |      |      |      |      |
| Input capacitance                        | C <sub>iss</sub>                 | V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V,<br>Frequency = 1 MHz                                                       |      | 1811 |      | pF   |
| Output capacitance                       | C <sub>oss</sub>                 |                                                                                                                        |      | 172  |      | pF   |
| Reverse transfer capacitance             | C <sub>rss</sub>                 |                                                                                                                        |      | 134  |      | pF   |
| Turn-on Delay Time                       | t <sub>d(on)</sub>               | V <sub>DS</sub> =-15V, V <sub>GEN</sub> =-10V<br>R <sub>G</sub> = 4.5Ω, R <sub>L</sub> =0.75Ω,<br>I <sub>D</sub> =-20A |      | 18   |      | nS   |
| Turn-on Rise Time                        | t <sub>r</sub>                   |                                                                                                                        |      | 86   |      | nS   |
| Turn-Off Delay Time                      | t <sub>d(off)</sub>              |                                                                                                                        |      | 231  |      | nS   |
| Turn-Off Fall Time                       | t <sub>f</sub>                   |                                                                                                                        |      | 127  |      | nS   |
| Gate Charge Characteristics <sup>b</sup> |                                  |                                                                                                                        |      |      |      |      |
| Total Gate Charge                        | Q <sub>g</sub>                   | V <sub>DS</sub> =-15V, V <sub>GS</sub> =-10V, I <sub>DS</sub> =-20A                                                    |      | 31   |      | nC   |
| Gate-Source Charge                       | Q <sub>gs</sub>                  |                                                                                                                        |      | 8.6  |      | nC   |
| Gate-Drain Charge                        | Q <sub>gd</sub>                  |                                                                                                                        |      | 4.8  |      | nC   |

Notes:

a : Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2 %

b : Guaranteed by design, not subject to production testing

## PARAMETER CHARACTERISTIC CURVE

Figure1: Power Capability

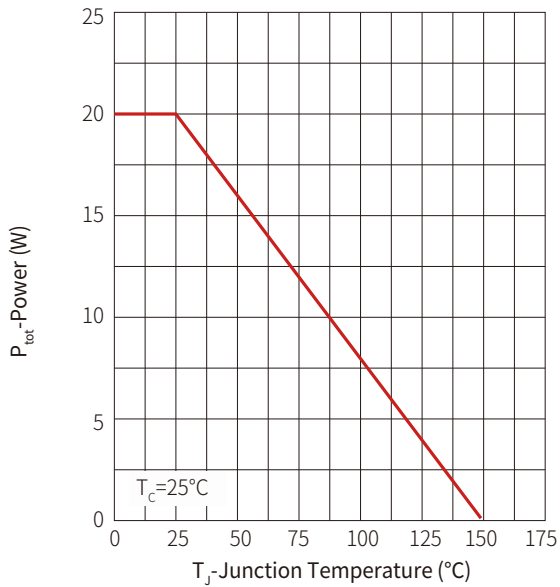


Figure2: Current Capability

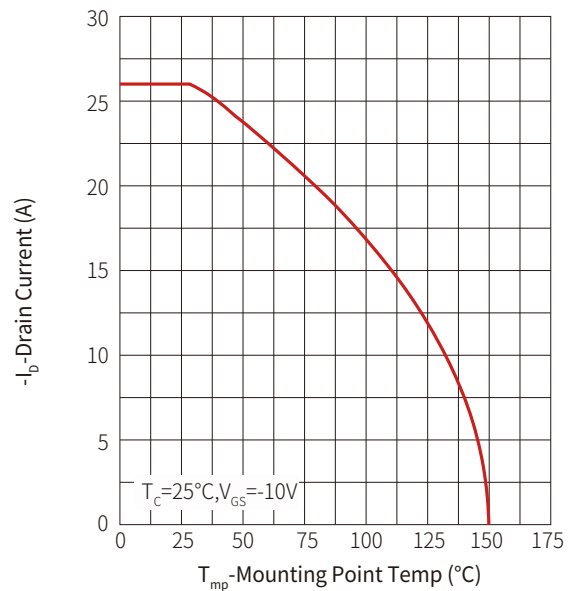


Figure3: Safe operating Area

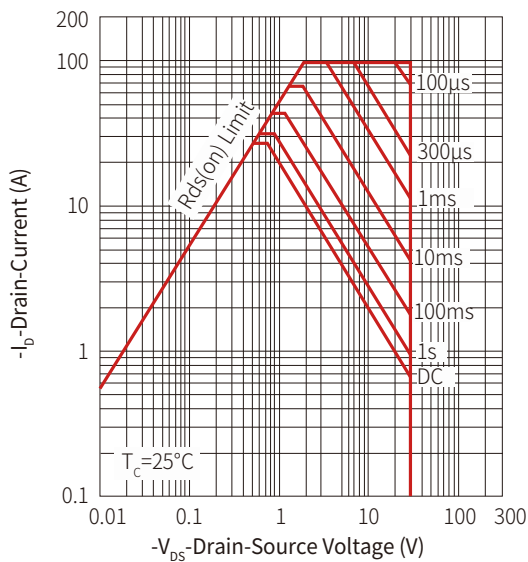
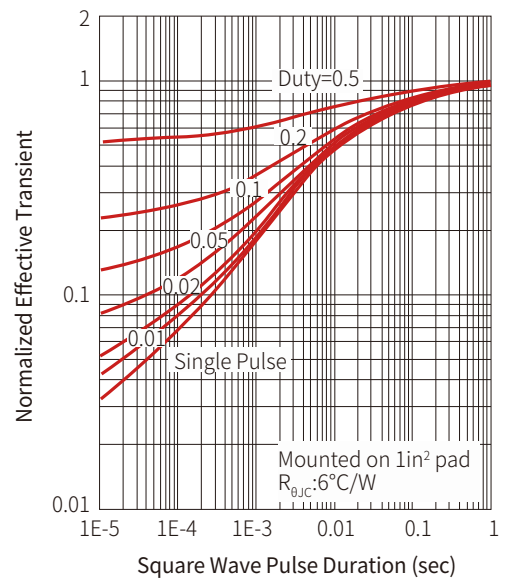
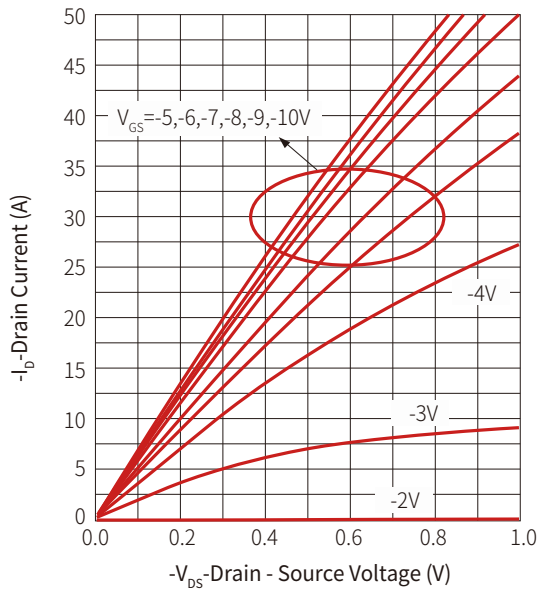


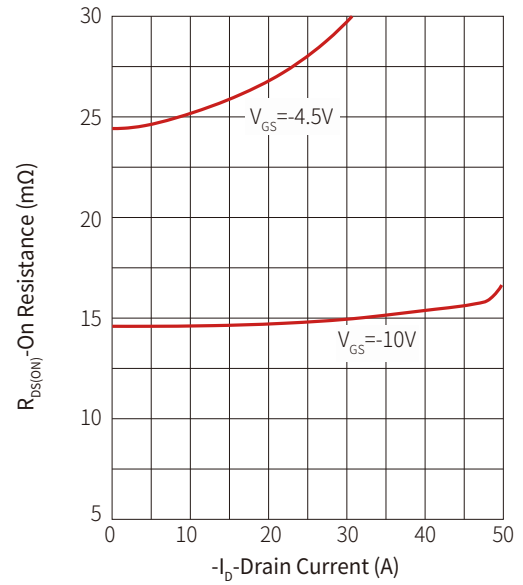
Figure 4: Transient Thermal Impedance



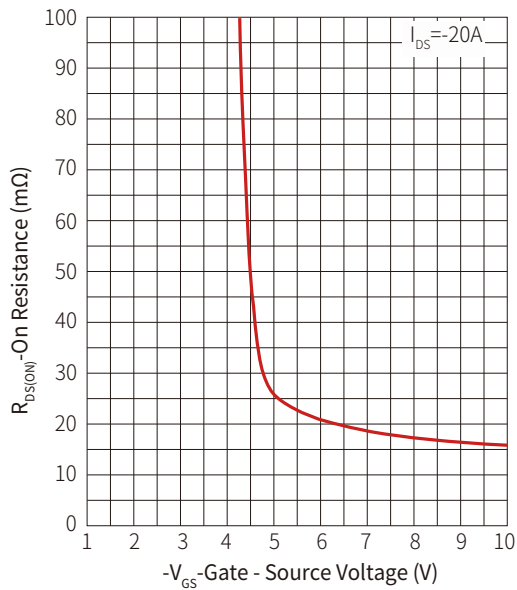
**Figure 5: Output Characteristics**



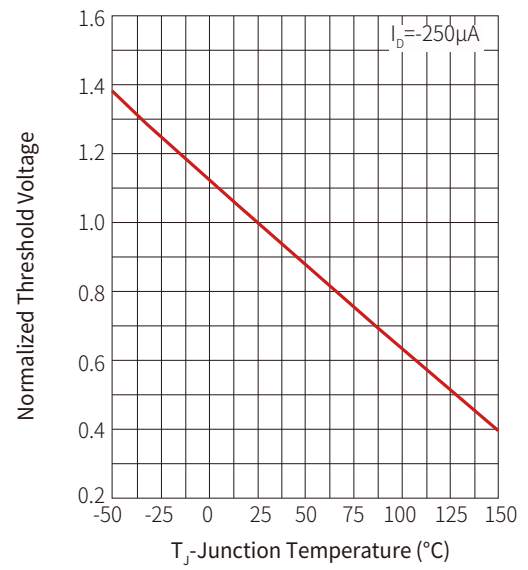
**Figure 6: On Resistance**

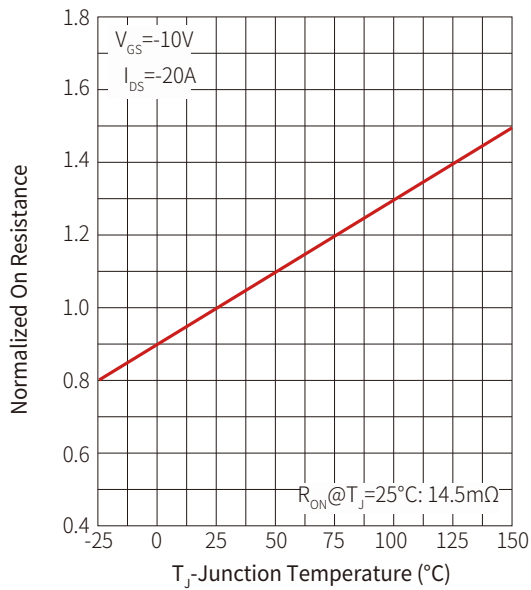
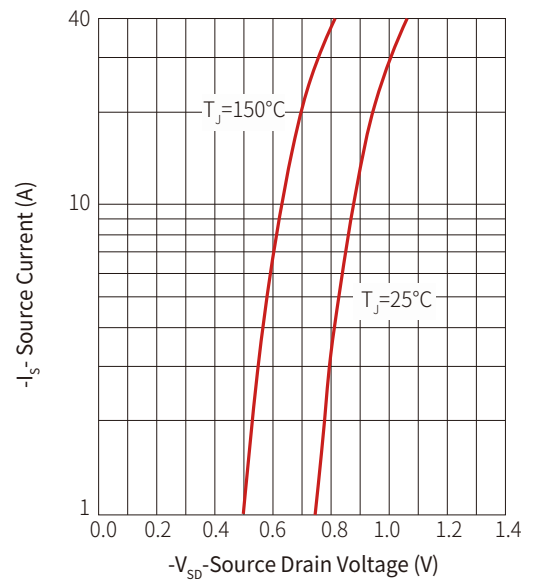
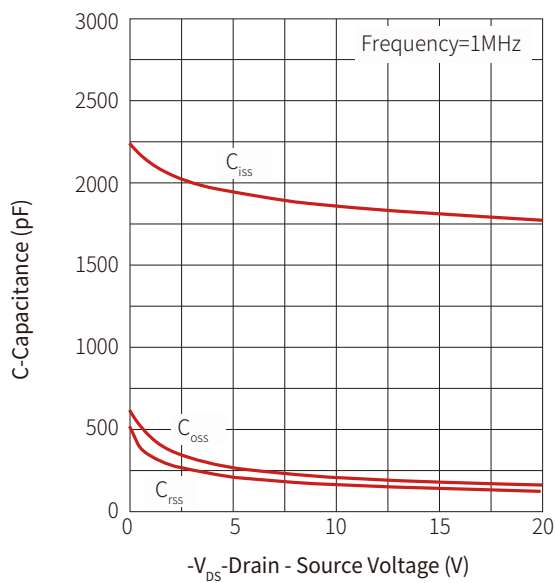
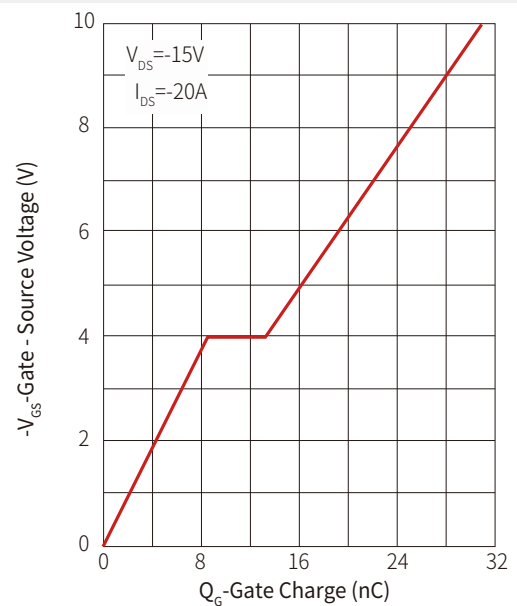


**Figure 7: Transfer Characteristics**

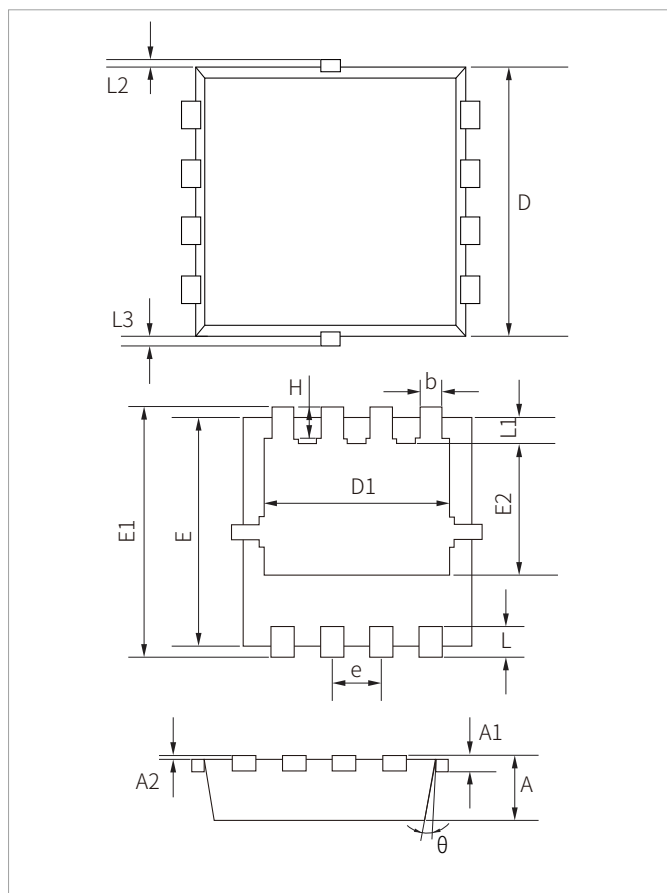


**Figure 8: Normalized Threshold Voltage**



**Figure 9: Normalized On Resistance**

**Figure 10: Diode Forward Current**

**Figure 11: Capacitance**

**Figure 12: Gate Charge**


## PDFN3x3-8L PACKAGE INFORMATION



| Ref. | Millimeters |       | Inches   |       |
|------|-------------|-------|----------|-------|
|      | Min.        | Max.  | Min.     | Max.  |
| A    | 0.650       | 0.850 | 0.026    | 0.033 |
| A1   | 0.152REF    |       | 0.006REF |       |
| A2   | 0~0.05      |       | 0~0.002  |       |
| D    | 2.900       | 3.100 | 0.114    | 0.122 |
| D1   | 2.300       | 2.600 | 0.091    | 0.102 |
| E    | 2.900       | 3.100 | 0.114    | 0.122 |
| E1   | 3.150       | 3.450 | 0.124    | 0.136 |
| E2   | 1.535       | 1.935 | 0.060    | 0.076 |
| b    | 0.200       | 0.400 | 0.008    | 0.016 |
| e    | 0.550       | 0.750 | 0.022    | 0.030 |
| L    | 0.300       | 0.500 | 0.012    | 0.020 |
| L1   | 0.180       | 0.480 | 0.007    | 0.019 |
| L2   | 0~0.100     |       | 0~0.004  |       |
| L3   | 0~0.100     |       | 0~0.004  |       |
| H    | 0.315       | 0.515 | 0.012    | 0.020 |
| θ    | 9°          | 13°   | 9°       | 13°   |

## ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SPM15P03QX  | PDFN3x3-8L        | 5000PCS  | 13"       |

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