

### Product Summary

- $V_{DS}$  -30 V
- $I_{DS}$  (at  $V_{GS}=-10V$ ) -40A
- $R_{DS(ON)}$  (at  $V_{GS}=-10V$ )  $\leq 13m\Omega$

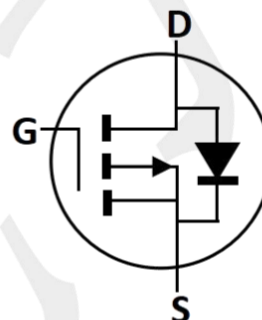
### Application

- Reverse Battery protection
- Load switch
- Power management
- PWM Application

### Package and Pin Configuration



### Circuit diagram



Equivalent Circuit

PDFN3X3-8

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

| PARAMETER                            | SYMBOL    | LIMIT       | UNIT |
|--------------------------------------|-----------|-------------|------|
| Drain-Source Voltage                 | $V_{DS}$  | -30         | V    |
| Gate-Source Voltage                  | $V_{GS}$  | $\pm 20$    | V    |
| Continuous Drain Current             | $I_D$     | -40         | A    |
|                                      |           | -30         |      |
| Pulsed Drain Current                 | $I_{DM}$  | -128        | A    |
| Single Pulse Avalanche Energy        | EAS       | 132         | mJ   |
| Total Power Dissipation              | $P_{TOT}$ | 20          | W    |
| Operating Junction Temperature Range | $T_J$     | -55 to +150 | °C   |
| Storage Temperature Range            | $T_{stg}$ | -55 to +150 | °C   |

### Thermal Characteristic

| PARAMETER                              | Symbol          | Value | Unit |
|----------------------------------------|-----------------|-------|------|
| Junction-to-Ambient Thermal Resistance | $R_{\theta JA}$ | 63    | °C/W |
| Thermal Resistance Junction-Case       | $R_{\theta JC}$ | 3.2   | °C/W |

Note : The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

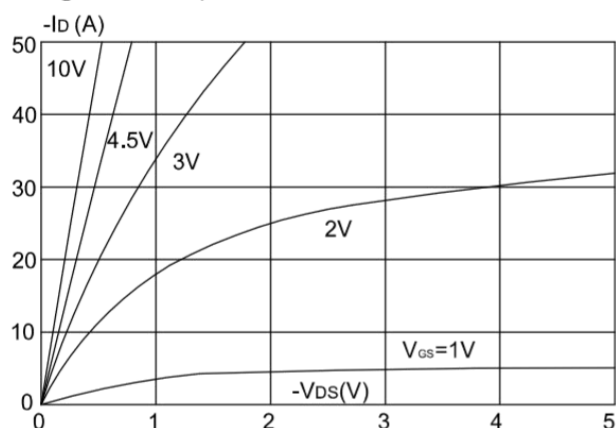
| PARAMETER                                               | CONDITIONS                                              | SYMBOL       | MIN  | TYP  | MAX       | UNIT       |
|---------------------------------------------------------|---------------------------------------------------------|--------------|------|------|-----------|------------|
| Static                                                  |                                                         |              |      |      |           |            |
| Drain-Source Breakdown Voltage                          | $V_{GS}=0V, I_D=-250\mu A$                              | $BV_{DSS}$   | -30  | --   | --        | V          |
| Gate-Source Threshold Voltage                           | $V_{DS}=V_{GS}, I_D=-250\mu A$                          | $V_{GS(th)}$ | -1.0 | -1.6 | -2.4      | V          |
| Gate-Source Leakage                                     | $V_{DS}=0V, V_{GS}= \pm 20V$                            | $I_{GSS}$    | --   | --   | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current                         | $V_{DS}= -30V, V_{GS}=0V$                               | $I_{DSS}$    | --   | -0.1 | -1.0      | $\mu A$    |
|                                                         | $V_{DS}=-30V, T_J=55^{\circ}C$                          |              | --   | -1.0 | -5.0      | $\mu A$    |
| Drain-Source On-State Resistance (Note 1)               | $V_{GS}= -10V, I_D= -20A$                               | $R_{DS(on)}$ | --   | 12   | 17        | m $\Omega$ |
|                                                         | $V_{GS}=-4.5V, I_D= -10A$                               |              | --   | 18   | 25        |            |
| Gate Resistance                                         | $V_{DS}=0V, V_{GS}=0V, f=1MHz$                          | $R_g$        | --   | 2.2  | --        | $\Omega$   |
| Dynamic (Note 2)                                        |                                                         |              |      |      |           |            |
| Total Gate Charge (Note 3)                              | $V_{DS}= -20V, I_D= -20A, V_{GS}= -10V$                 | $Q_g$        | --   | 42   | --        | nC         |
| Gate-Source Charge (Note 3)                             |                                                         | $Q_{gs}$     | --   | 7.3  | --        |            |
| Gate-Drain Charge (Note 3)                              |                                                         | $Q_{gd}$     | --   | 8.5  | --        |            |
| Input Capacitance                                       | $V_{DS}= -20V, V_{GS}= 0V, F= 1.0MHz$                   | $C_{iss}$    | --   | 2700 | --        | pF         |
| Output Capacitance                                      |                                                         | $C_{oss}$    | --   | 350  | --        |            |
| Reverse Transfer Capacitance                            |                                                         | $C_{rss}$    | --   | 265  | --        |            |
| Switching                                               |                                                         |              |      |      |           |            |
| Turn-On Delay Time (Note 3)                             | $V_{DD}= -20V, I_D= -20A, V_{GS}= -10V, R_G= 3.3\Omega$ | $t_{d(on)}$  | --   | 10   | --        | nS         |
| Rise Time (Note 3)                                      |                                                         | $t_r$        | --   | 21   | --        |            |
| Turn-Off Delay Time (Note 3)                            |                                                         | $t_{d(off)}$ | --   | 53   | --        |            |
| Fall Time (Note 3)                                      |                                                         | $t_f$        | --   | 29   | --        |            |
| Source-Drain Diode Ratings and Characteristics (Note 2) |                                                         |              |      |      |           |            |
| Forward Voltage                                         | $V_{GS}= 0V, I_F= -1A$                                  | $V_{SD}$     | --   | -0.7 | -1.2      | V          |
| Continuous Source Current                               | Integral reverse diode in the MOSFET                    | $I_S$        | --   | --   | -40       | A          |
| Pulsed Current (Note 1)                                 |                                                         | $I_{SM}$     | --   | --   | -128      | A          |

Notes:

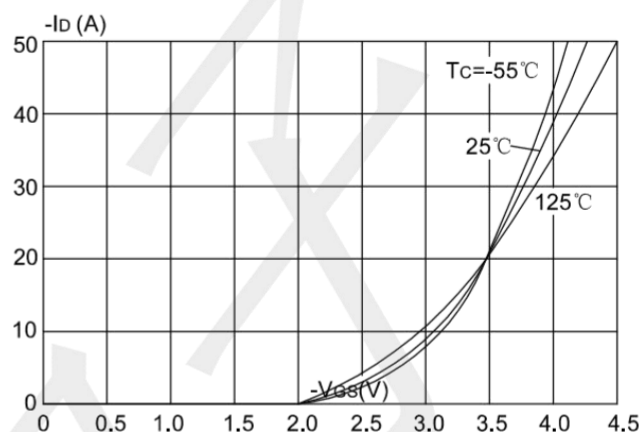
1. Pulse test; pulse width ≤ 300 μS, duty cycle ≤ 2%.
2. Guaranteed by design, not subject to production testing.
3. Independent of operating temperature

### Typical Electrical and Thermal Characteristics (Curves)

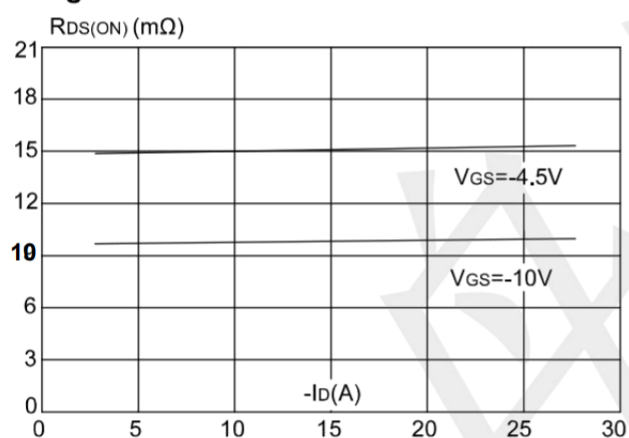
**Figure 1: Output Characteristics**



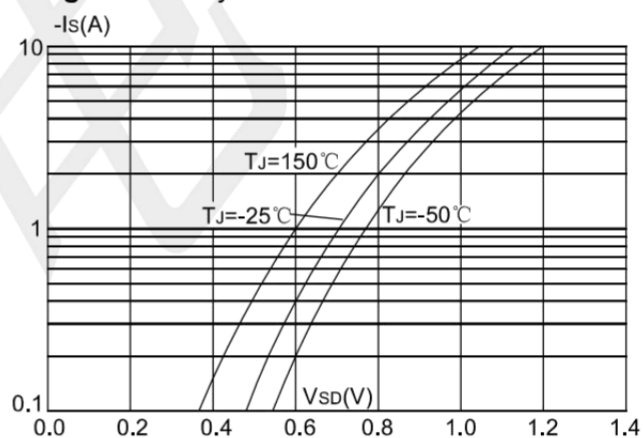
**Figure 2: Typical Transfer Characteristics**



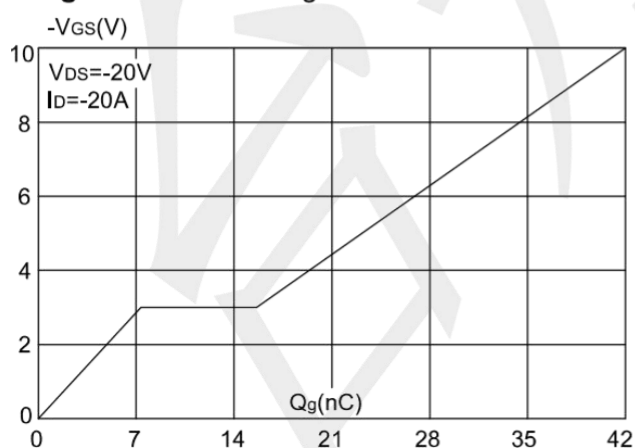
**Figure 3: On-resistance vs. Drain Current**



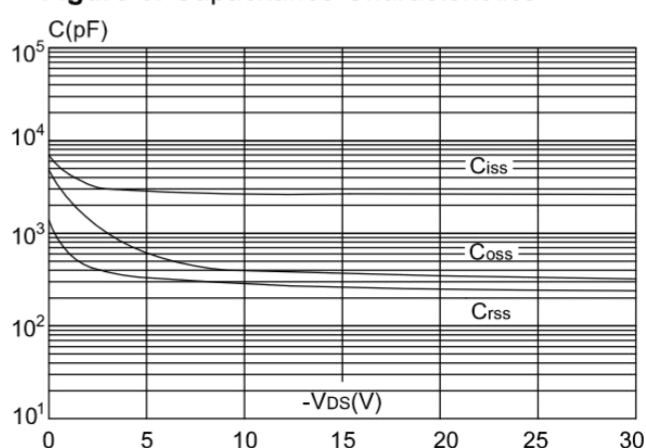
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

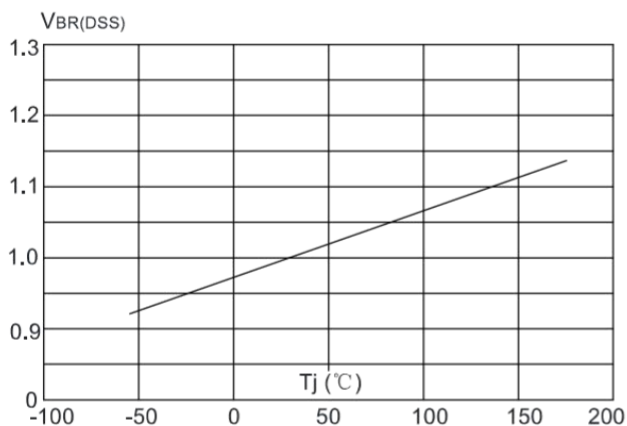


**Figure 6: Capacitance Characteristics**

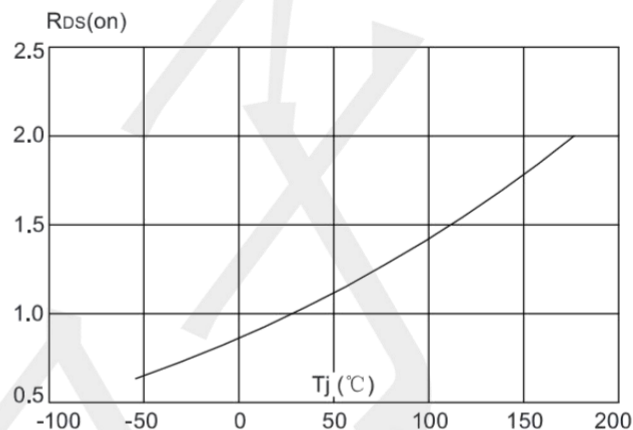


### Typical Performance Characteristics

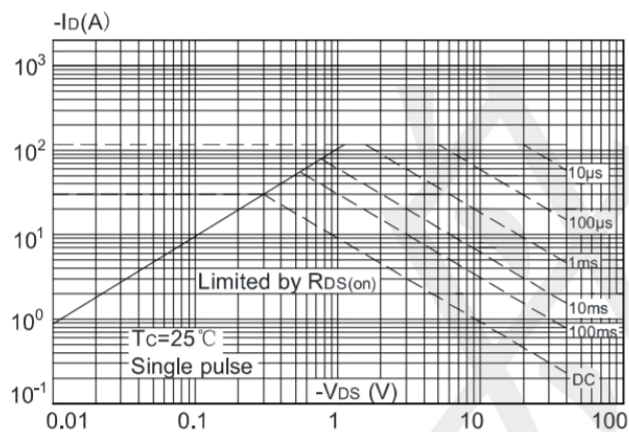
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



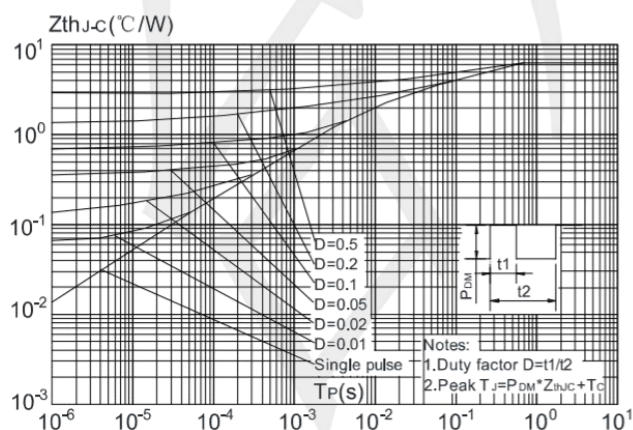
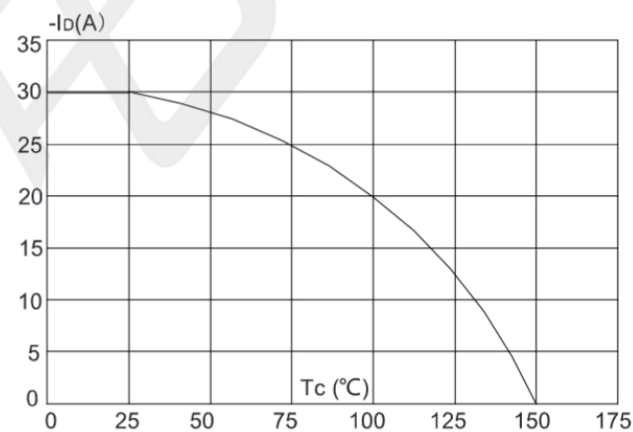
**Figure 8:** Normalized on Resistance vs. Junction Temperature



**Figure 9:** Maximum Safe Operating Area



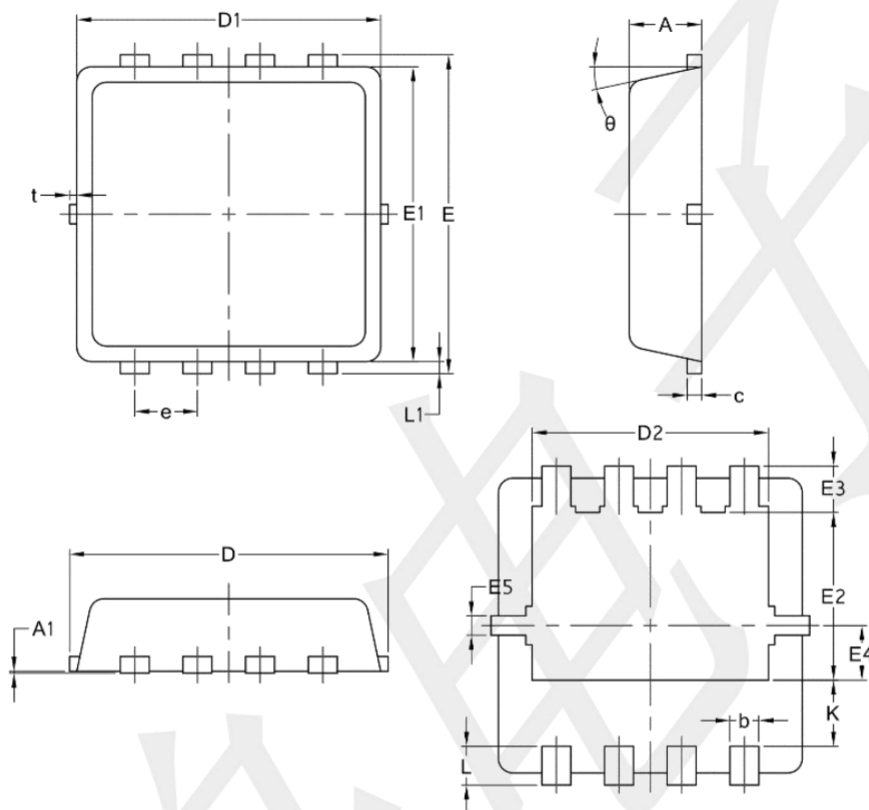
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case

## Package Information

PDFN3X3-8



| Symbol | Common |       |      |
|--------|--------|-------|------|
|        | mm     |       |      |
|        | Mim    | Nom   | Max  |
| A      | 0.70   | 0.75  | 0.85 |
| A1     | /      | /     | 0.05 |
| b      | 0.20   | 0.30  | 0.40 |
| c      | 0.10   | 0.152 | 0.25 |
| D      | 3.15   | 3.30  | 3.45 |
| D1     | 3.00   | 3.15  | 3.25 |
| D2     | 2.29   | 2.45  | 2.65 |
| E      | 3.15   | 3.30  | 3.45 |
| E1     | 2.90   | 3.05  | 3.20 |
| E2     | 1.54   | 1.74  | 1.94 |
| E3     | 0.28   | 0.48  | 0.65 |
| E4     | 0.37   | 0.57  | 0.77 |
| E5     | 0.10   | 0.20  | 0.30 |
| e      | 0.60   | 0.65  | 0.70 |
| K      | 0.59   | 0.69  | 0.89 |
| L      | 0.30   | 0.40  | 0.50 |
| L1     | 0.06   | 0.125 | 0.20 |
| t      | 0      | 0.075 | 0.13 |
| Φ      | 10     | 12    | 14   |