

## PRODUCT CHARACTERISTICS

|                                    |               |
|------------------------------------|---------------|
| $V_{DS}$                           | 20V           |
| $R_{DS(ON)}$ Typ(@ $V_{GS}=4.5V$ ) | 6.3m $\Omega$ |
| $R_{DS(ON)}$ Typ(@ $V_{GS}=2.5V$ ) | 7.7m $\Omega$ |
| ID                                 | 25A           |

## APPLICATIONS

- Portable Equipment and Battery Powered systems.
- Power Management in Notebook Computer

## FEATURES

- Lower  $R_{DS(ON)}$  to Minimize Conduction Losses
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS and Rg Tested

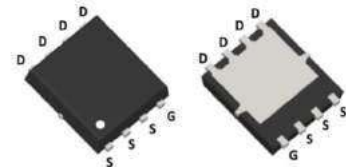
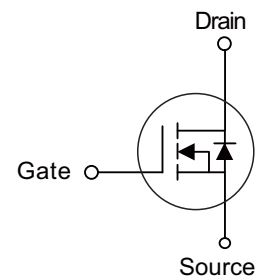
## ORDER INFORMATION

| Order codes  |          | Package    | Packing          |
|--------------|----------|------------|------------------|
| Halogen-free | Halogen  |            |                  |
| N/A          | MOT2176J | PDFN3X3-8L | 5000 pieces/Reel |

## ABSOLUTE MAXIMUM RATINGS ( $T_J=25^{\circ}C$ Unless Otherwise Noted)

| PARAMETER                 | SYMBOL             | RATINGS    | UNIT        |
|---------------------------|--------------------|------------|-------------|
| Drain-Source Voltage      | $V_{DS}$           | 20         | V           |
| Gate-Source Voltage       | $V_{GS}$           | $\pm 12$   | V           |
| Drain Current             | $T_C=25^{\circ}C$  | $I_D$      | 25          |
|                           | $T_C=100^{\circ}C$ | $I_D$      | 16          |
| Plused Drain Current      | $I_{DM}$           | 100        | A           |
| Avalanche Energy          | $E_{AS}$           | 49         | mJ          |
| Power Dissipation         | $P_D$              | 13         | W           |
| Junction Temperature      | $T_J$              | +150       | $^{\circ}C$ |
| Storage Temperature Range | $T_{STG}$          | -55 ~ +150 | $^{\circ}C$ |

## Symbol



PDFN3X3-8L

**■ ELECTRICAL CHARACTERISTICS (T =25°C unless otherwise specified)**

| Parameter                          | Symbol       | Condition                                          | Min | Typ  | Max       | Unit       |
|------------------------------------|--------------|----------------------------------------------------|-----|------|-----------|------------|
| Off characteristics                |              |                                                    |     |      |           |            |
| Drain-Source Breakdown Voltage     | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                          | 20  | -    | -         | V          |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS}=20V, V_{GS}=0V$                            | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current          | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$                        | -   | -    | $\pm 100$ | nA         |
| On characteristics                 |              |                                                    |     |      |           |            |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                      | 0.4 |      | 1.0       | V          |
| Drain-Source On-State Resistance   | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=15A$                             | -   | 6.3  | 7.2       | m $\Omega$ |
|                                    |              | $V_{GS}=2.5V, I_D=15A$                             | -   | 7.7  | 8.5       | m $\Omega$ |
| Forward Transconductance           | $g_{FS}$     | $V_{DS}=5V, I_D=25A$                               | 10  | -    | -         | S          |
| Dynamic characteristics            |              |                                                    |     |      |           |            |
| Input Capacitance                  | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$F=1.0MHz$             | -   | 1567 | -         | PF         |
| Output Capacitance                 | $C_{oss}$    |                                                    | -   | 281  | -         | PF         |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                                    | -   | 239  | -         | PF         |
| Switching characteristics          |              |                                                    |     |      |           |            |
| Turn-on Delay Time                 | $t_{d(on)}$  | $V_{DD}=10V, I_D=5A$<br>$V_{GS}=4.5V, R_G=3\Omega$ | -   | 13   | -         | nS         |
| Turn-on Rise Time                  | $t_r$        |                                                    | -   | 45   | -         | nS         |
| Turn-Off Delay Time                | $t_{d(off)}$ |                                                    | -   | 49   | -         | nS         |
| Turn-Off Fall Time                 | $t_f$        |                                                    | -   | 59   | -         | nS         |
| Total Gate Charge                  | $Q_g$        | $V_{DS}=10V, I_D=5A,$<br>$V_{GS}=4.5V$             | -   | 19   | -         | nC         |
| Gate-Source Charge                 | $Q_{gs}$     |                                                    | -   | 3    | -         | nC         |
| Gate-Drain Charge                  | $Q_{gd}$     |                                                    | -   | 5.5  | -         | nC         |
| Drain-source diode characteristics |              |                                                    |     |      |           |            |
| Diode Forward Voltage              | $V_{SD}$     | $V_{GS}=0V, I_S=25A$                               | -   | -    | 1.2       | V          |
| Diode Forward Current              | $I_S$        |                                                    | -   | -    | 25        | A          |
| Reverse Recovery Time              | $t_{rr}$     | $T_J=25^{\circ}C, I_F=5A$<br>$di/dt=100A/\mu s$    | -   | 25   | -         | nS         |
| Reverse Recovery Charge            | $Q_{rr}$     |                                                    | -   | 6    | -         | nC         |

■ TYPICAL CHARACTERISTICS

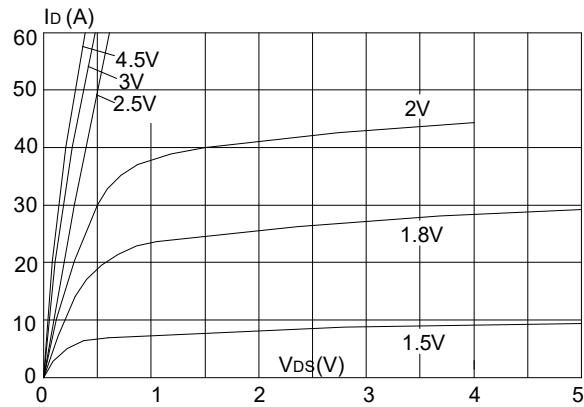


Figure 3: Output Characteristics

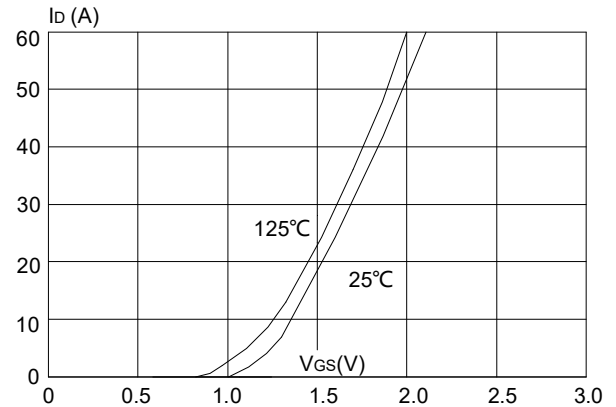


Figure 4: Typical Transfer Characteristics

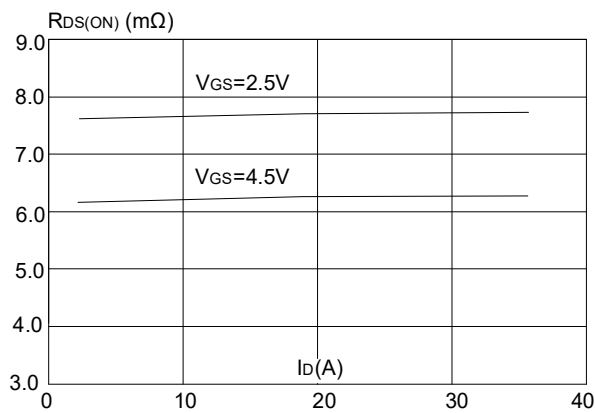


Figure 3: On-resistance vs. Drain Current

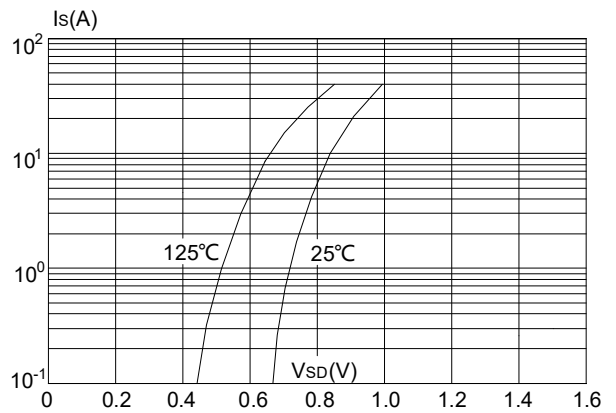


Figure 4: Body Diode Characteristics

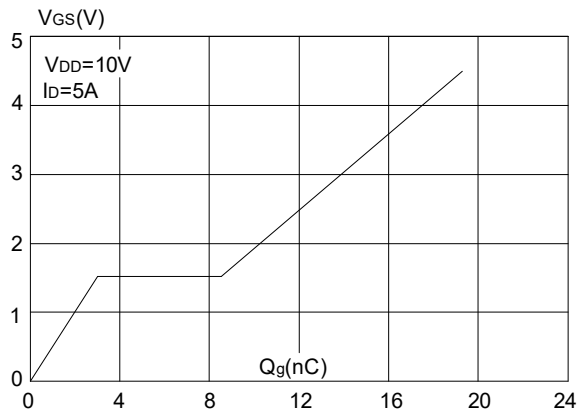


Figure 5: Gate Charge Characteristics

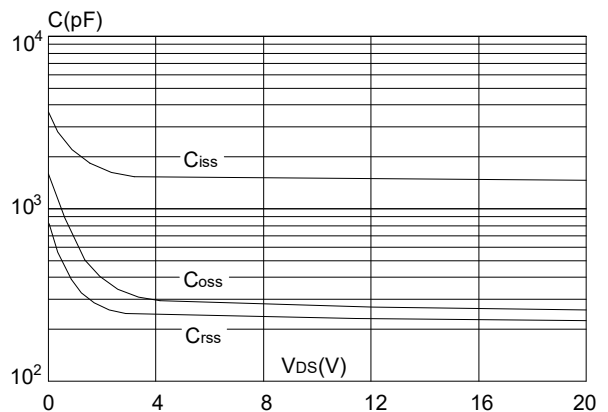


Figure 6: Capacitance Characteristics

■ TYPICAL CHARACTERISTICS(Cont.)

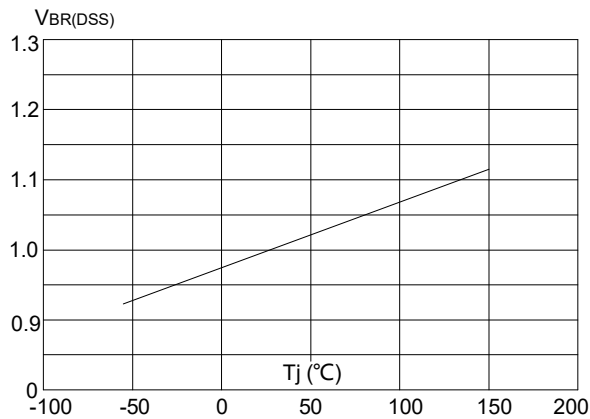


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

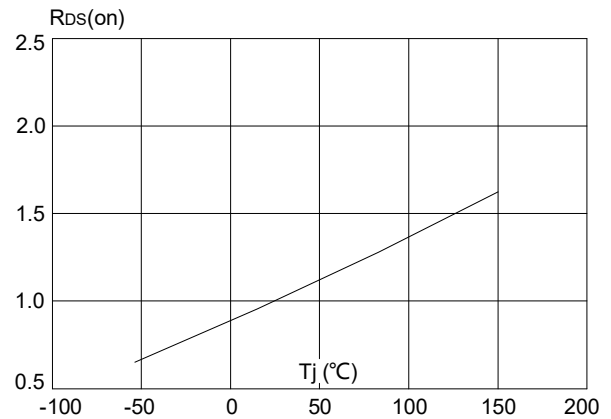


Figure 8: Normalized on Resistance vs. Junction Temperature

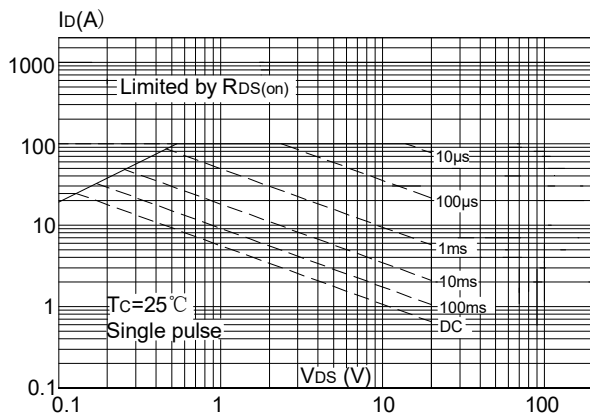


Figure 7: Maximum Safe Operating Area

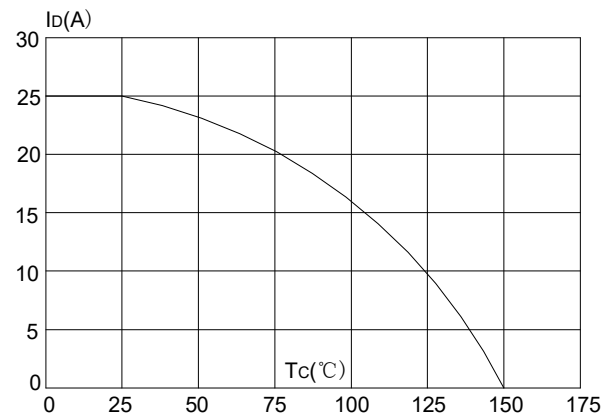


Figure 8: Maximum Continuous Drain Current vs. Case Temperature

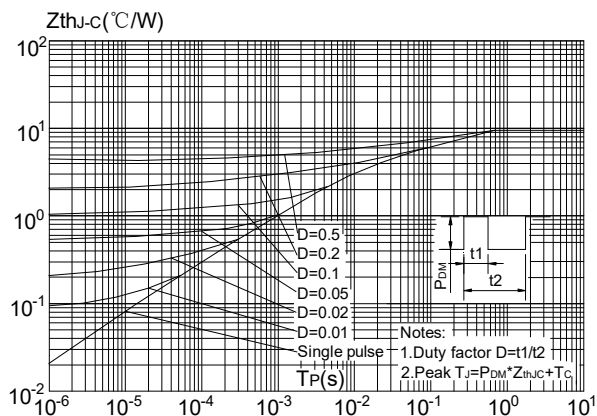
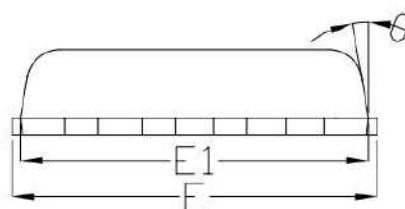
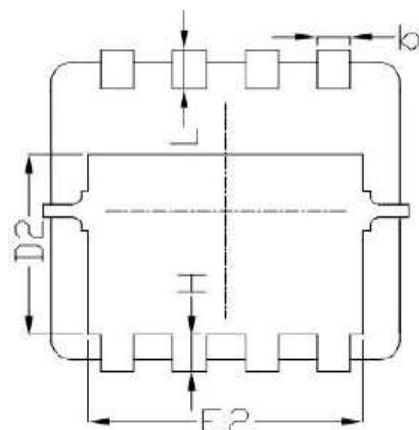
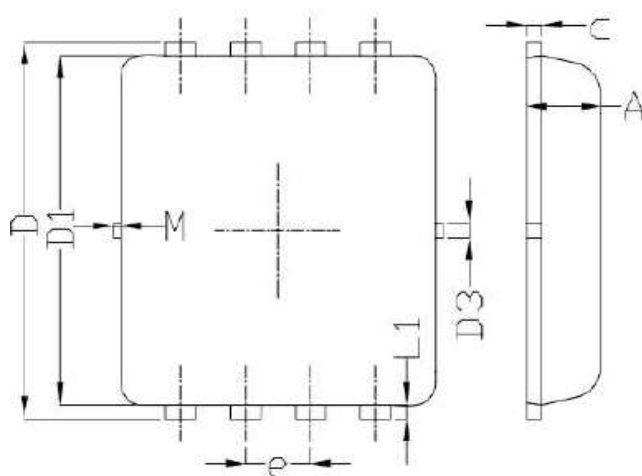
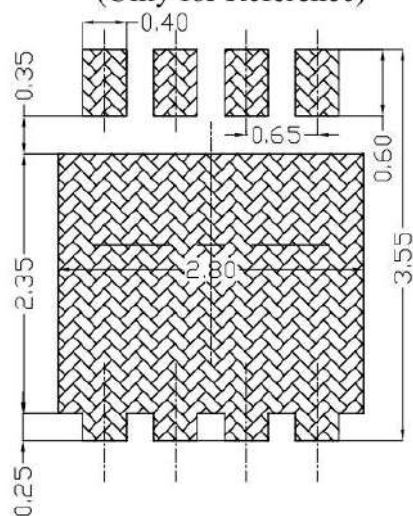


Figure 7: Maximum Effective Transient Thermal Impedance, Junction-to-Case

## ■ PDFN3X3-8L Package Mechanical Data



Land Pattern  
(Only for Reference)



| SYMBOL          | DIMENSIONAL REOMTS |      |      |
|-----------------|--------------------|------|------|
|                 | MIN                | NOM  | MAX  |
| <i>A</i>        | 0.70               | 0.75 | 0.80 |
| <i>b</i>        | 0.25               | 0.30 | 0.35 |
| <i>c</i>        | 0.10               | 0.15 | 0.25 |
| <i>D</i>        | 3.25               | 3.35 | 3.45 |
| <i>D1</i>       | 3.00               | 3.10 | 3.20 |
| <i>D2</i>       | 1.78               | 1.88 | 1.98 |
| <i>D3</i>       | ---                | 0.13 | ---  |
| <i>E</i>        | 3.20               | 3.30 | 3.40 |
| <i>E1</i>       | 3.00               | 3.15 | 3.20 |
| <i>E2</i>       | 2.39               | 2.49 | 2.59 |
| <i>e</i>        | 0.65BSC            |      |      |
| <i>H</i>        | 0.30               | 0.39 | 0.50 |
| <i>L</i>        | 0.30               | 0.40 | 0.50 |
| <i>L1</i>       | ---                | 0.13 | ---  |
| $\theta$        | ---                | 10°  | 12°  |
| <i>M</i>        | *                  | *    | 0.15 |
| * Not specified |                    |      |      |