

## PRODUCT CHARACTERISTICS

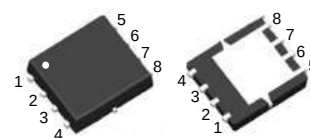
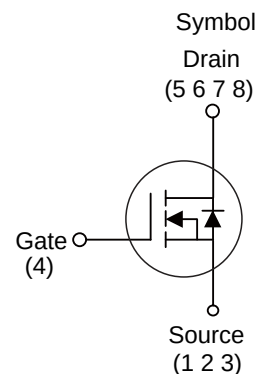
|                                    |               |
|------------------------------------|---------------|
| $V_{DS}$                           | 20V           |
| $R_{DS(ON)}$ Typ(@ $V_{GS}=4.5V$ ) | 3.3m $\Omega$ |
| $R_{DS(ON)}$ Typ(@ $V_{GS}=2.5V$ ) | 4.2m $\Omega$ |
| $I_D$                              | 100A          |

## APPLICATIONS

- \* Electronic lamp ballasts based on half bridge
- \* Load Switching, Quick/Wireless Charge.
- \* Motor Driving

## FEATURE

- \* Low Gate Charge
- \* Pb-Free Lead Plating



PDFN3X3

## ORDER INFORMATION

| Order Codes  |          | Package | Packing          |
|--------------|----------|---------|------------------|
| Halogen-Free | Halogen  |         |                  |
| N/A          | MOT2128J | PDFN3X3 | 5000 pieces/Reel |

## ABSOLUTE MAXIMUM RATINGS( $T_A=25^{\circ}C$ , unless otherwise specified)

| Parameter                                                   | Symbol    | Ratings   | Unit        |
|-------------------------------------------------------------|-----------|-----------|-------------|
| Drain-Source Voltage                                        | $V_{DS}$  | 20        | V           |
| Gate-Source Voltage                                         | $V_{GS}$  | $\pm 12$  | V           |
| Drain Current Continuous(@ $V_{GS}=10V, T_A=25^{\circ}C$ )  | $I_D$     | 100       | A           |
| Drain Current Continuous(@ $V_{GS}=10V, T_A=100^{\circ}C$ ) | $I_D$     | 59        | A           |
| Drain Current Pulsed                                        | $I_{DM}$  | 400       | A           |
| Avalanche Energy *                                          | $E_{AS}$  | 200       | mJ          |
| Power Dissipation                                           | $P_D$     | 69        | W           |
| Junction Temperature                                        | $T_J$     | +150      | $^{\circ}C$ |
| Storage Temperature                                         | $T_{STG}$ | -55~ +150 | $^{\circ}C$ |

## THERMAL CHARACTERISTICS

| Parameter        | Symbol     | Typ | Unit          |
|------------------|------------|-----|---------------|
| Junction to Case | $R_{thJC}$ | 1.8 | $^{\circ}C/W$ |

Note: \* EAS condition:  $T_J=25^{\circ}C, V_{DD}=12V, V_G=10V, L=0.5mH, R_g=25\Omega$

**■ ELECTRICAL CHARACTERISTICS** ( $T_C=25^{\circ}\text{C}$ , unless otherwise noted)

| Parameter                             | Symbol              | Test Conditions                                                                           | Min            | Typ  | Max  | Unit |
|---------------------------------------|---------------------|-------------------------------------------------------------------------------------------|----------------|------|------|------|
| Off characteristics                   |                     |                                                                                           |                |      |      |      |
| Drain to Source Breakdown Voltage     | V <sub>DSS</sub>    | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                | 20             | -    | -    | V    |
| Drain to Source Leakage Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V                                                 | -              | -    | 1    | μA   |
| Gate to Source Forward Leakage        | I <sub>GSS(F)</sub> | V <sub>DS</sub> =0V, V <sub>GS</sub> =+12V                                                | -              | -    | 100  | nA   |
| Gate to Source Reverse Leakage        | I <sub>GSS(R)</sub> | V <sub>DS</sub> =0V, V <sub>GS</sub> =-12V                                                | -              | -    | -100 | nA   |
| On characteristics                    |                     |                                                                                           |                |      |      |      |
| Drain to Source On-Resistance         | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =30 A                                               | -              | 3.3  | 4.5  | mΩ   |
|                                       |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =20 A                                               | -              | 4.2  | 6    | mΩ   |
| Gate Threshold Voltage                | V <sub>GS(TH)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 0.3            | 0.66 | 1.5  | V    |
| Dynamic characteristics               |                     |                                                                                           |                |      |      |      |
| Gate capacitance                      | R <sub>g</sub>      | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V ,f=1.0MHz                                        | -              | 2.4  | -    | Ω    |
| Forward Transconductance              | g <sub>fs</sub>     | V <sub>DS</sub> =10V, I <sub>D</sub> =3A                                                  | -              | 16   | -    | S    |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =12V, V <sub>GS</sub> =0V<br>f=1.0MHz                                     | -              | 2800 | -    | pF   |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                           | -              | 332  | -    | pF   |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |                                                                                           | -              | 327  | -    | pF   |
| Resistive Switching Characteristics   |                     |                                                                                           |                |      |      |      |
| Turn-on Delay Time                    | t <sub>d(ON)</sub>  | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V<br>I <sub>D</sub> =30 A ,R <sub>G</sub> =1.8Ω | -              | 12   | -    | ns   |
| Rise Time                             | t <sub>r</sub>      |                                                                                           | -              | 28   | -    | ns   |
| Turn-off Delay Time                   | t <sub>d(OFF)</sub> |                                                                                           | -              | 29   | -    | ns   |
| Fall Time                             | t <sub>f</sub>      |                                                                                           | -              | 11   | -    | ns   |
| Total Gate Charge                     | Q <sub>g</sub>      | I <sub>D</sub> =30 A, V <sub>DS</sub> =10V<br>V <sub>GS</sub> =4.5V                       | -              | 48   | -    | nC   |
| Gate to Source Charge                 | Q <sub>gs</sub>     |                                                                                           | -              | 13   | -    | nC   |
| Gate to Drain("Miller") Charge        | Q <sub>gd</sub>     |                                                                                           | -              | 18   | -    | nC   |
| Source-Drain Diode Characteristics    |                     |                                                                                           |                |      |      |      |
| Continuous Source Current(Body Diode) | I <sub>s</sub>      |                                                                                           | -              | -    | 100  | A    |
| Maximum Pulsed Current(Body Diode)    | I <sub>SM</sub>     |                                                                                           | -              | -    | 400  | A    |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>SD</sub> =1A, V <sub>GS</sub> =0V                                                  | -              | 0.71 | 1.2  | V    |
| Reverse Recovery Time                 | t <sub>rr</sub>     | I <sub>SD</sub> =30 A, T <sub>J</sub> =25 °C                                              | -              | 23   | -    | ns   |
| Reverse Recovery Charge               | Q <sub>rr</sub>     |                                                                                           | dI /dt=100A/μs | -    | 10   | -    |

■ TYPICAL CHARACTERISTICS

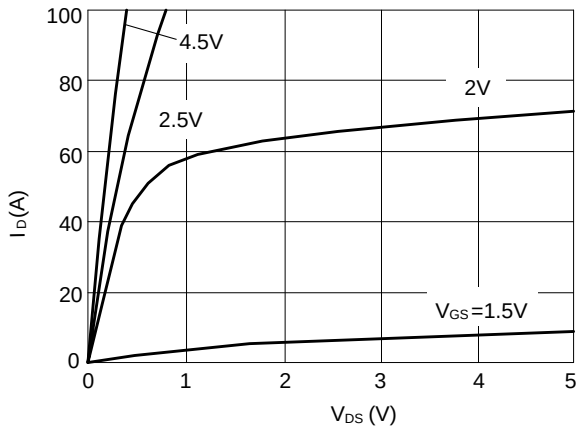


Figure 1: Output Characteristics

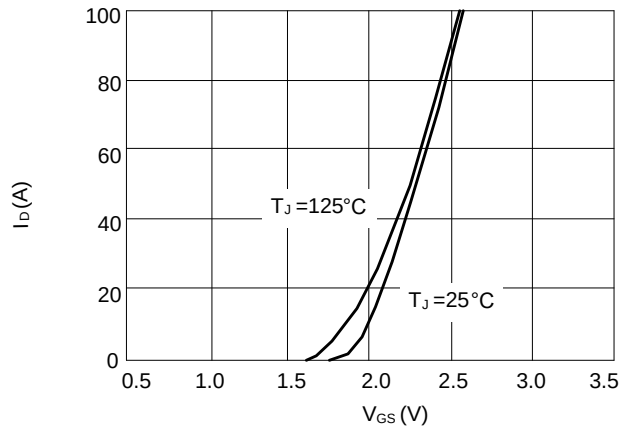


Figure 2: Typical Transfer Characteristics

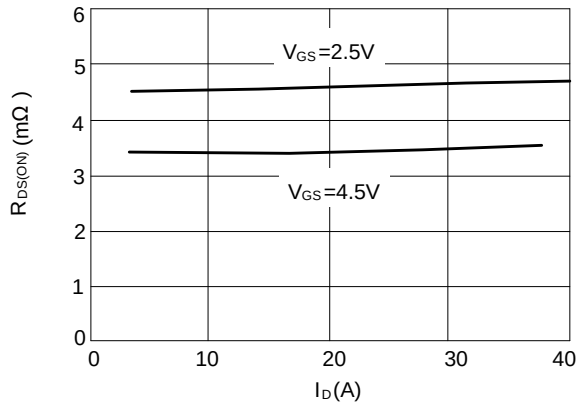


Figure 3: On-Resistance vs. Drain current

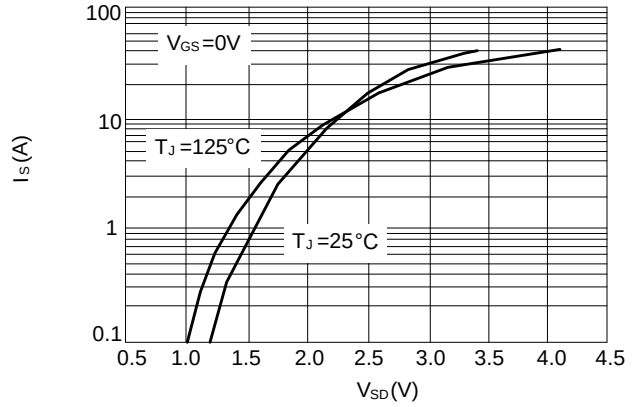


Figure 4: Body Diode Characteristics

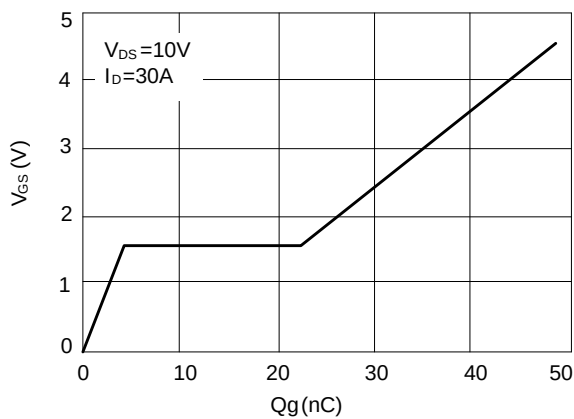


Figure 5: Gate Charge Characteristics

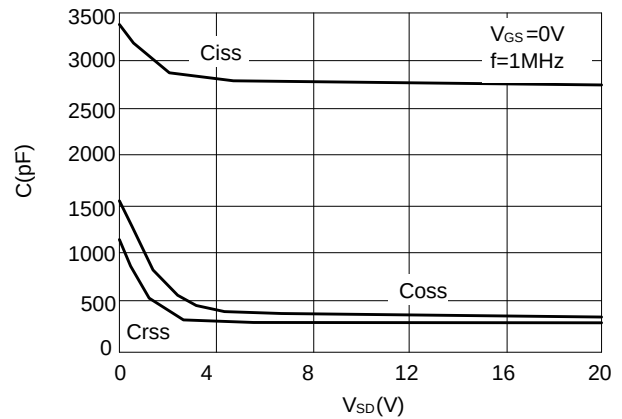


Figure 6: Capacitance Characteristics

■ TYPICAL CHARACTERISTICS(Cont.)

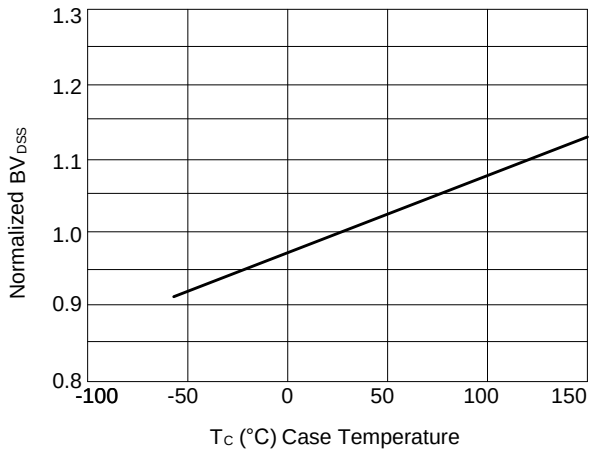


Figure 7: Normalized Breakdown Voltage vs. junction temperature

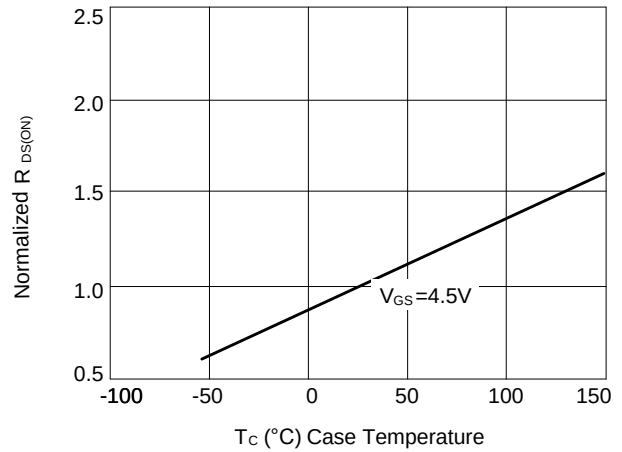


Figure 8: Normalized on-Resistance vs. junction temperature

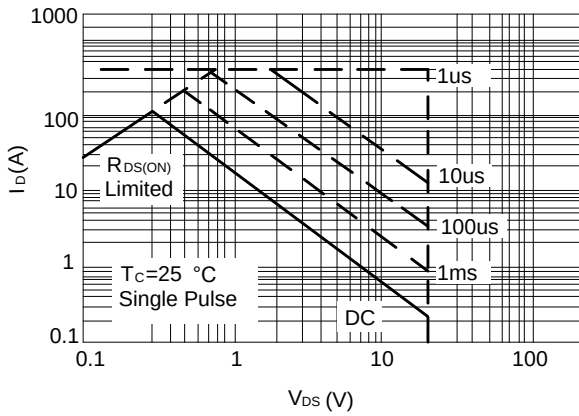


Figure 9: Maximum Safe Operating Area

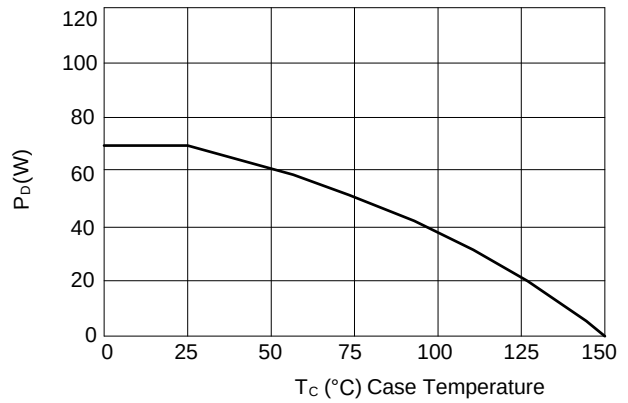
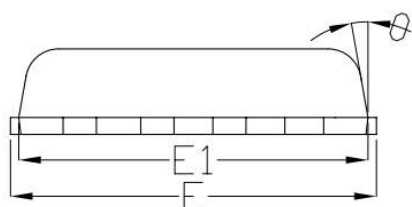
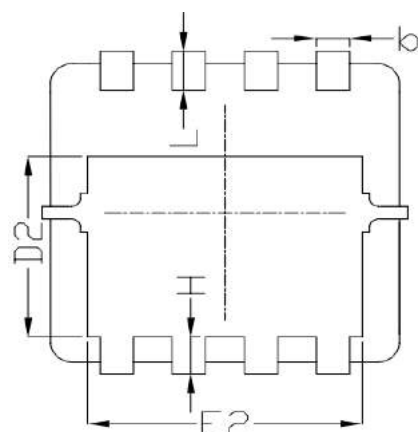
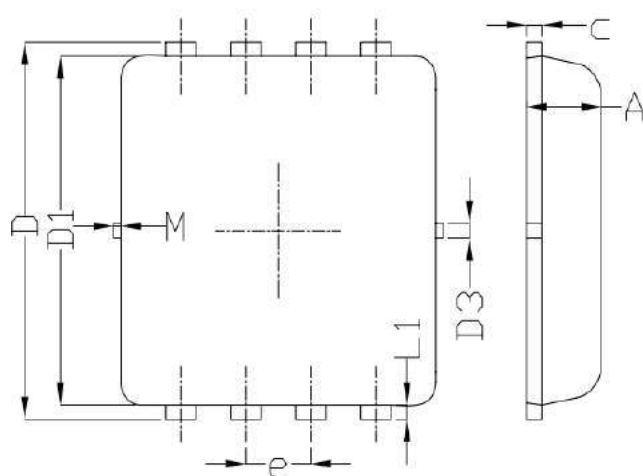
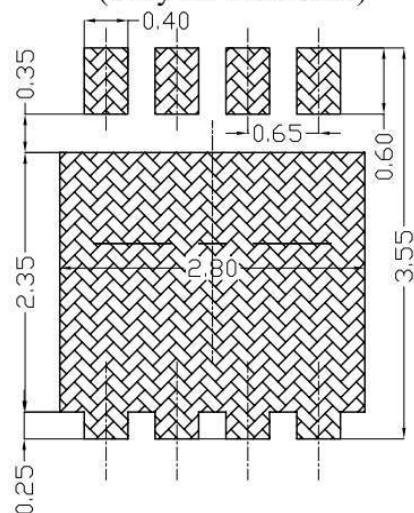


Figure 10: Power De-rating

■ PDFN3X3 PACKAGE OUTLINE DIMENSIONS



Land Pattern  
(Only for Reference)



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