

TM015P02DF

P -Channel Enhancement Mosfet

**General Description**

- Low  $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

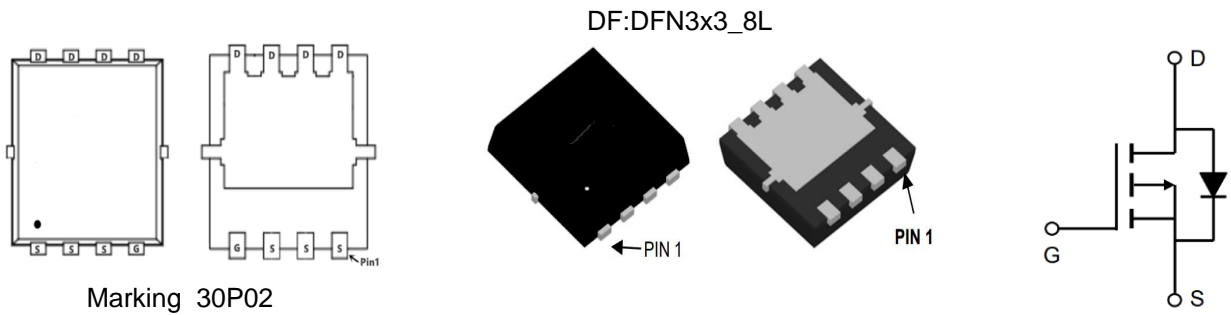
**Applications**

- Load switch
- PWM

**General Features**

$V_{DS} = -20V$   $I_D = -30A$   
 $R_{DS(ON)} = 15m\Omega$ (typ.) @  $V_{GS} = -4.5V$

- 100% UIS Tested
- 100%  $R_g$  Tested



**Absolute Maximum Ratings ( $T_C=25^\circ C$  unless otherwise noted)**

| Symbol          | Parameter                               | Max.                | Units        |
|-----------------|---|---------------------|--------------|
| $V_{DSS}$       | Drain-Source Voltage                    | -20                 | V            |
| $V_{GSS}$       | Gate-Source Voltage                     | $\pm 12$            | V            |
| $I_D$           | Continuous Drain Current                | $T_A = 25^\circ C$  | -30          |
|                 |   | $T_A = 100^\circ C$ | -12          |
| $I_{DM}$        | Pulsed Drain Current <sup>note1</sup>   | -28                 | A            |
| $P_D$           | Power Dissipation                       | 5                   | W            |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 62.5                | $^\circ C/W$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range | -55 to +150         | $^\circ C$   |

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

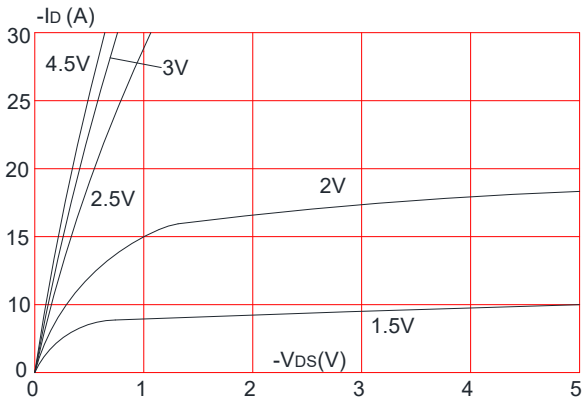
| Symbol  | Parameter   | Test Condition  | Min. | Typ. | Max.      | Units      |
|---|---|---|------|------|-----------|------------|
| <b>Off Characteristic</b>                                     |   |   |      |      |           |            |
| $V_{(BR)DSS}$   | Drain-Source Breakdown Voltage                            | $V_{GS}=0V, I_D=-250\mu A$  | -20  | -    | -         | V          |
| $I_{DSS}$   | Zero Gate Voltage Drain Current                           | $V_{DS}=-20V, V_{GS}=0V,$   | -    | -    | -1        | $\mu A$    |
| $I_{GSS}$   | Gate to Body Leakage Current                              | $V_{DS}=0V, V_{GS}=\pm 12V$                                       | -    | -    | $\pm 100$ | nA         |
| <b>On Characteristics</b>                                     |   |   |      |      |           |            |
| $V_{GS(th)}$  | Gate Threshold Voltage                                    | $V_{DS}=V_{GS}, I_D=-250\mu A$                                    | -0.4 | -0.7 | -1.0      | V          |
| $R_{DS(on)}$  | Static Drain-Source on-Resistance<br><small>note2</small> | $V_{GS}=-4.5V, I_D=-7A$   | -    | 15   | 20        | m $\Omega$ |
|   |   | $V_{GS}=-2.5V, I_D=-5A$   | -    | 21.  | 32        |            |
| <b>Dynamic Characteristics</b>                                |   |   |      |      |           |            |
| $C_{iss}$   | Input Capacitance   | $V_{DS}=-10V, V_{GS}=0V,$<br>$f=1.0MHz$                           | -    | 2000 | -         | pF         |
| $C_{oss}$   | Output Capacitance  |   | -    | 242  | -         | pF         |
| $C_{rss}$   | Reverse Transfer Capacitance                              |   | -    | 231  | -         | pF         |
| $Q_g$   | Total Gate Charge   | $V_{DS}=-10V, I_D=-3A,$<br>$V_{GS}=-4.5V$                         | -    | 15.3 | -         | nC         |
| $Q_{gs}$  | Gate-Source Charge  |   | -    | 2.2  | -         | nC         |
| $Q_{gd}$  | Gate-Drain("Miller") Charge                               |   | -    | 4.4  | -         | nC         |
| <b>Switching Characteristics</b>                              |   |   |      |      |           |            |
| $t_{d(on)}$   | Turn-on Delay Time  | $V_{DD}=-10V, I_D=-7A,$<br>$V_{GS}=-4.5V,$<br>$R_{GEN}=2.5\Omega$ | -    | 10   | -         | ns         |
| $t_r$   | Turn-on Rise Time   |   | -    | 31   | -         | ns         |
| $t_{d(off)}$  | Turn-off Delay Time                                       |   | -    | 28   | -         | ns         |
| $t_f$   | Turn-off Fall Time  |   | -    | 8    | -         | ns         |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |   |   |      |      |           |            |
| $I_S$   | Maximum Continuous Drain to Source Diode Forward Current  |   | -    | -    | -30       | A          |
| $I_{SM}$  | Maximum Pulsed Drain to Source Diode Forward Current      |   | -    | -    | -28       | A          |
| $V_{SD}$  | Drain to Source Diode Forward Voltage                     | $V_{GS}=0V, I_S=-7A$  | -    | -0.8 | -1.2      | V          |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

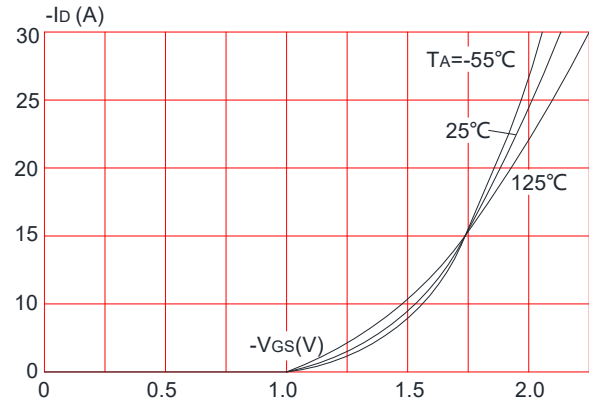
 2. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$

## Typical Performance Characteristics

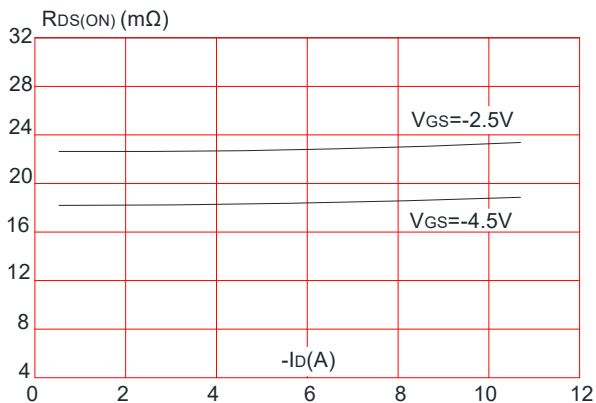
**Figure 1: Output Characteristics**



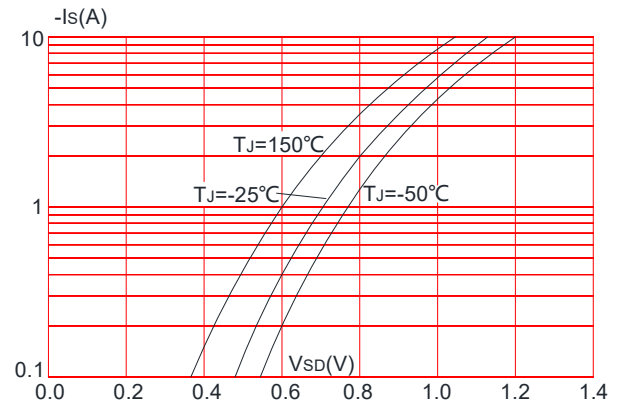
**Figure 2: Typical Transfer Characteristics**



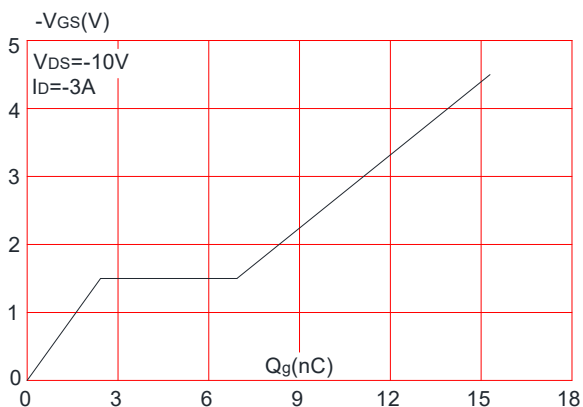
**Figure 3: On-resistance vs. Drain Current**



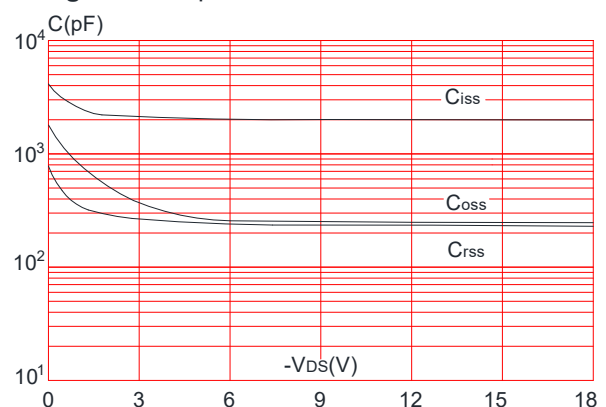
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



**Figure 6: Capacitance Characteristics**



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

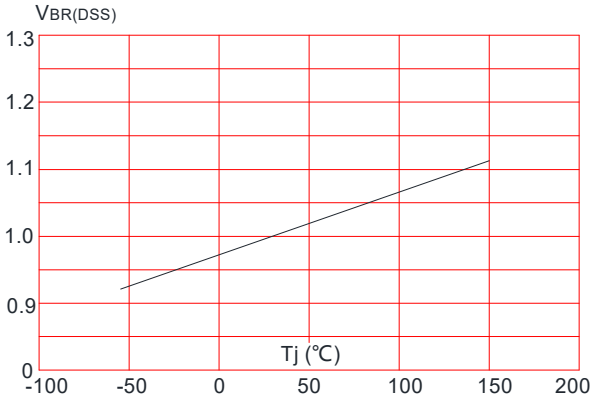


Figure 8: Normalized on Resistance vs. Junction Temperature

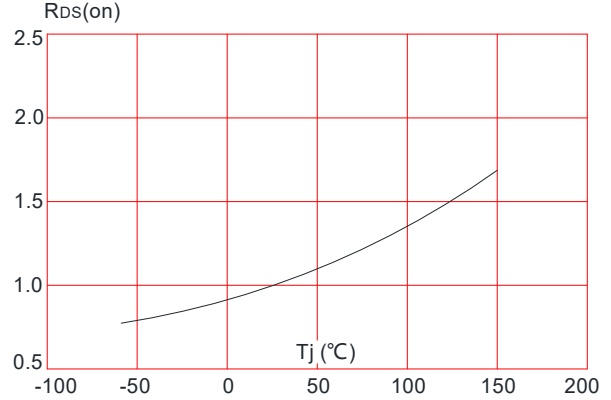


Figure 9: Maximum Safe Operating Area

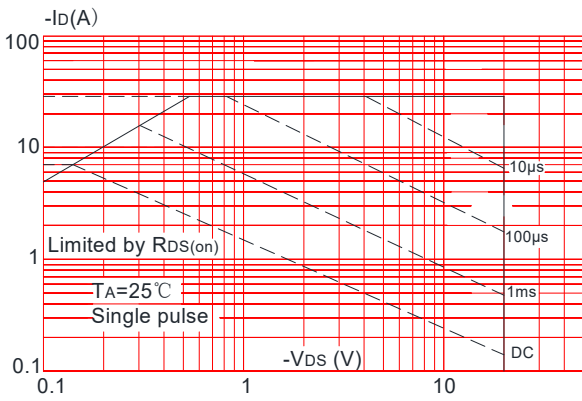


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

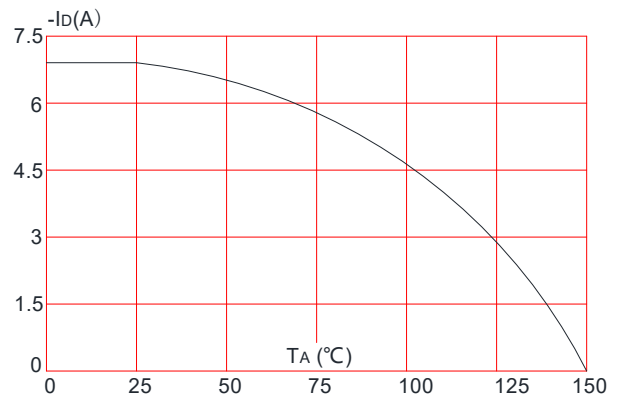
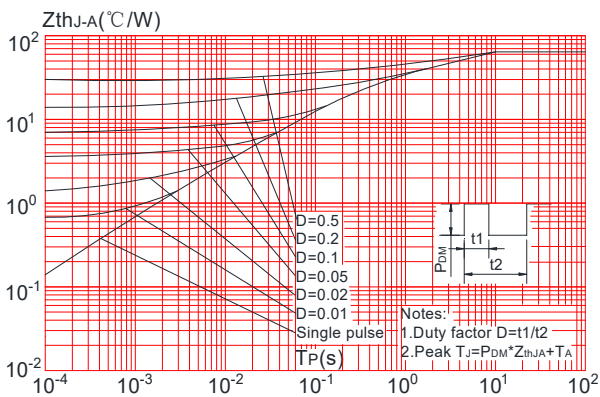
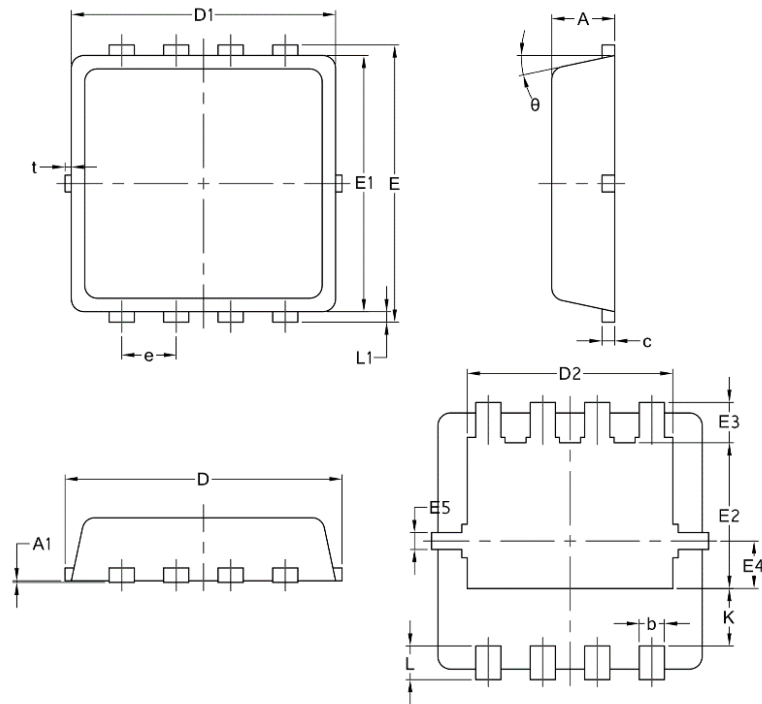


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## Package Mechanical Data:DFN3x3-8L



| 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   |

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