

## N-Channel 30 V (D-S) MOSFET

### PRODUCT SUMMARY

| $V_{DS}$ (V) | $R_{DS(on)}$ (m $\Omega$ )(Typ.) | $I_D$ (A) <sup>a</sup> | $Q_g$ (Typ.) |
|--------------|----------------------------------|------------------------|--------------|
| 30           | 7.3 at $V_{GS} = 10$ V           | 45                     | 23 nC        |
|              | 10.2 at $V_{GS} = 4.5$ V         |                        |              |

### FEATURES

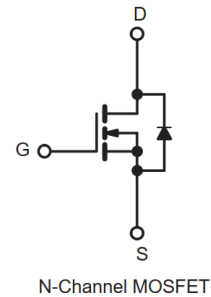
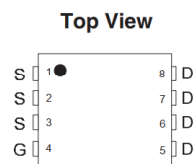
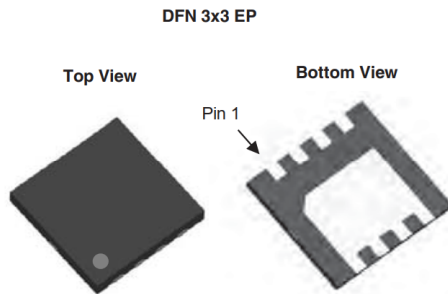
- DT-Trench Power MOSFET
- 100 %  $R_g$  and UIS Tested

### APPLICATIONS

- Notebook PC Core
- VRM/POL



**RoHS**  
COMPLIANT



### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °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 ( $T_J = 150$ °C)       | $T_C = 25$ °C  | $I_D$       | 45                  |
|                                                  | $T_C = 70$ °C  |             | 37                  |
| Pulsed Drain Current                             | $I_{DM}$       | 135         | A                   |
| Single-Pulse Avalanche Energy                    | $L = 0.1$ mH   | $E_{AS}$    | 49                  |
| Maximum Power Dissipation                        | $T_C = 25$ °C  | $P_D$       | 28.5                |
|                                                  | $T_C = 70$ °C  |             | 19.95               |
|                                                  | $T_A = 25$ °C  |             | 3.15 <sup>b,c</sup> |
|                                                  | $T_A = 70$ °C  |             | 2.2 <sup>b,c</sup>  |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | - 55 to 175 | °C                  |

### THERMAL RESISTANCE RATINGS

| Parameter                                  | Symbol        | Typical    | Maximum | Unit |
|--------------------------------------------|---------------|------------|---------|------|
| Maximum Junction-to-Ambient <sup>b,d</sup> | $t \leq 10$ s | $R_{thJA}$ | 40      | 48   |
| Maximum Junction-to-Case                   | Steady State  | $R_{thJC}$ | 4.5     | 5.3  |

Notes:

- Based on  $T_C = 25$  °C.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$  s.
- Maximum under steady state conditions is 50 °C/W.

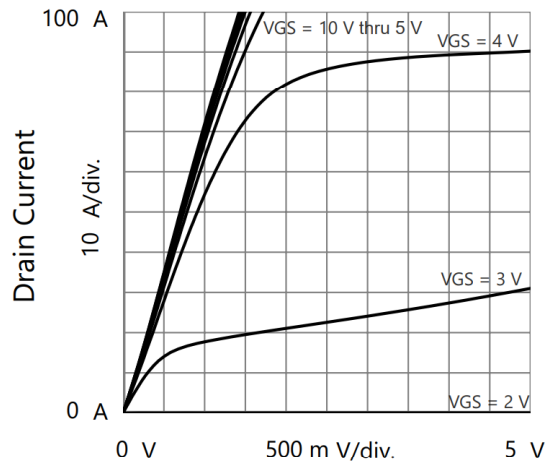
| SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted) |                     |                                                                                                                        |      |      |       |      |
|-----------------------------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------|------|------|-------|------|
| Parameter                                                       | Symbol              | Test Conditions                                                                                                        | Min. | Typ. | Max.  | Unit |
| Static                                                          |                     |                                                                                                                        |      |      |       |      |
| Drain-Source Breakdown Voltage                                  | V <sub>DS</sub>     | V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA                                                                           | 30   |      |       | V    |
| Gate-Source Threshold Voltage                                   | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                                            | 1    |      | 3     | V    |
| Gate-Source Leakage                                             | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V                                                                        |      |      | ± 100 | nA   |
| Zero Gate Voltage Drain Current                                 | I <sub>DSS</sub>    | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V                                                                          |      |      | 1     | μA   |
|                                                                 |                     | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C                                                  |      |      | 10    |      |
| On-State Drain Current <sup>a</sup>                             | I <sub>D(on)</sub>  | V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V                                                                          | 45   |      |       | A    |
| Drain-Source On-State Resistance <sup>a</sup>                   | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A                                                                          |      | 7.3  | 8.1   | mΩ   |
|                                                                 |                     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 9 A                                                                          |      | 10.2 | 12    |      |
| Forward Transconductance <sup>a</sup>                           | g <sub>fs</sub>     | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 12 A                                                                          |      | 90   |       | S    |
| Dynamic <sup>b</sup>                                            |                     |                                                                                                                        |      |      |       |      |
| Input Capacitance                                               | C <sub>iss</sub>    | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz                                                               |      | 1170 |       | pF   |
| Output Capacitance                                              | C <sub>oss</sub>    |                                                                                                                        |      | 184  |       |      |
| Reverse Transfer Capacitance                                    | C <sub>rss</sub>    |                                                                                                                        |      | 140  |       |      |
| Total Gate Charge                                               | Q <sub>g</sub>      | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 12 A                                                  |      | 23   |       | nC   |
| Gate-Source Charge                                              | Q <sub>gs</sub>     |                                                                                                                        |      | 2.3  |       |      |
| Gate-Drain Charge                                               | Q <sub>gd</sub>     |                                                                                                                        |      | 4.3  |       |      |
| Gate Resistance                                                 | R <sub>g</sub>      | f = 1 MHz                                                                                                              |      | 3    |       | Ω    |
| Turn-On Delay Time                                              | t <sub>d(on)</sub>  | V <sub>DD</sub> = 15 V, R <sub>L</sub> = 0.5 Ω<br>I <sub>D</sub> ≅ 12 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω |      | 17   |       | ns   |
| Rise Time                                                       | t <sub>r</sub>      |                                                                                                                        |      | 13   |       |      |
| Turn-Off DelayTime                                              | t <sub>d(off)</sub> |                                                                                                                        |      | 72   |       |      |
| Fall Time                                                       | t <sub>f</sub>      |                                                                                                                        |      | 11   |       |      |
| Drain-Source Body Diode Characteristics                         |                     |                                                                                                                        |      |      |       |      |
| Continous Source-Drain Diode Current                            | I <sub>S</sub>      | T <sub>C</sub> = 25 °C                                                                                                 |      |      | 45    | A    |
| Pulse Diode Forward Current (100 μs)                            | I <sub>SM</sub>     |                                                                                                                        |      |      | 135   |      |
| Body Diode Voltage                                              | V <sub>SD</sub>     | I <sub>S</sub> = 1 A                                                                                                   |      |      | 1.2   | V    |
| Body Diode Reverse Recovery Time                                | t <sub>rr</sub>     | I <sub>F</sub> = 12 A, dI/dt = 100 A/μs, T <sub>J</sub> = 25 °C                                                        |      | 55   | 82    | ns   |
| Body Diode Reverse Recovery Charge                              | Q <sub>rr</sub>     |                                                                                                                        |      | 75   | 105   | nC   |
| Reverse Recovery Fall Time                                      | t <sub>a</sub>      |                                                                                                                        |      | 28   |       | ns   |
| Reverse Recovery Rise Time                                      | t <sub>b</sub>      |                                                                                                                        |      | 25   |       |      |

**Notes:**

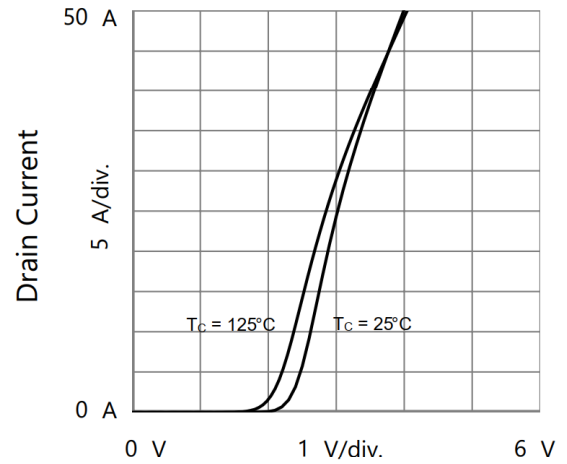
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

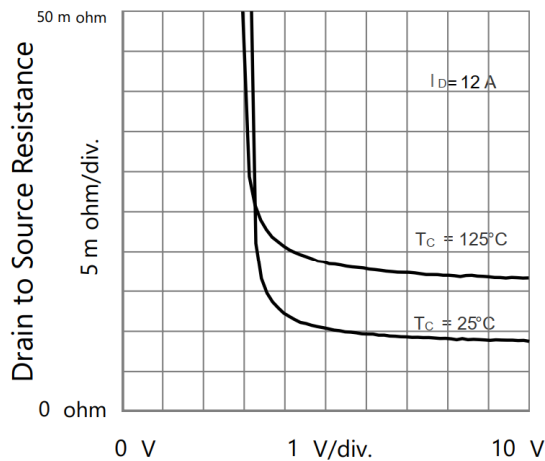
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



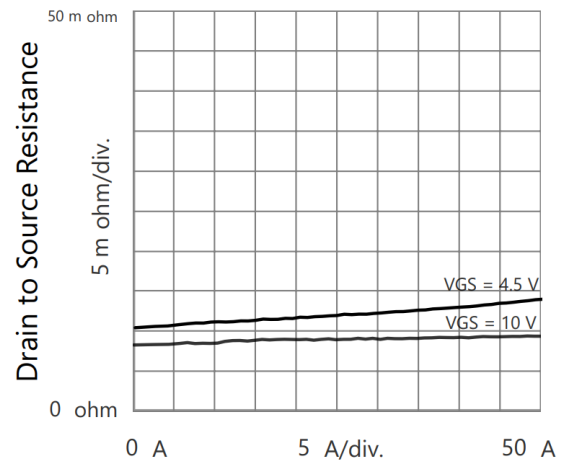
Drain to Source Voltage  
Output Characteristics



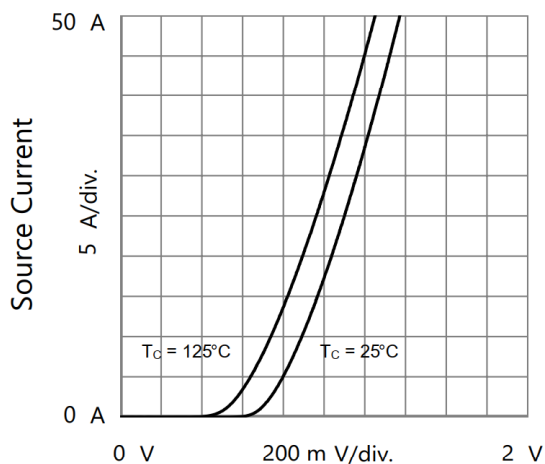
Gate to Source Voltage  
Transfer Characteristics



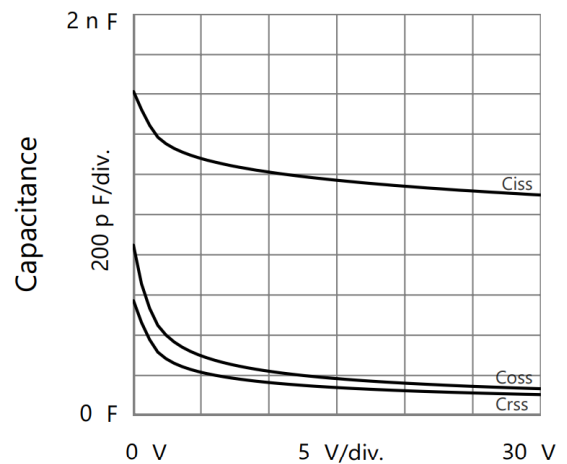
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

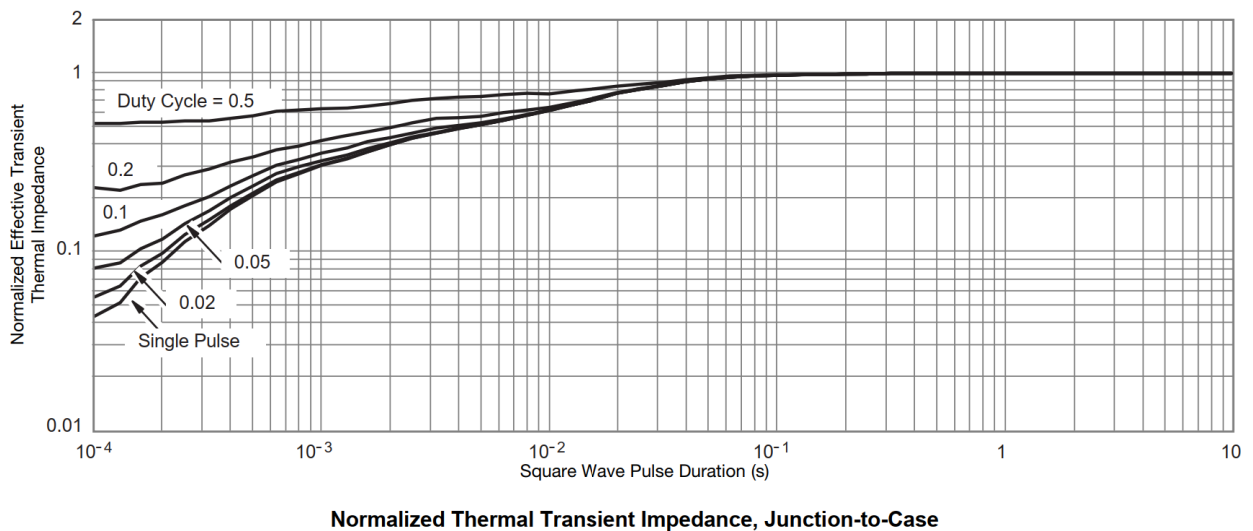
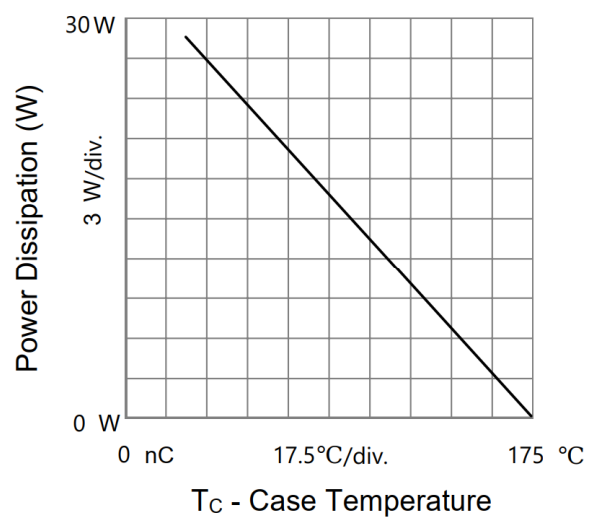
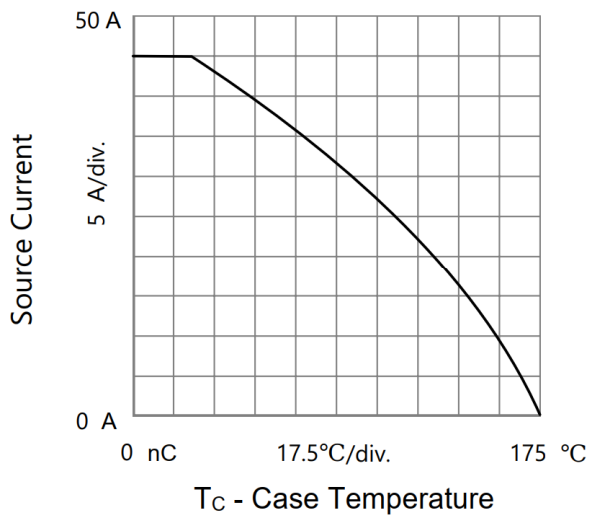
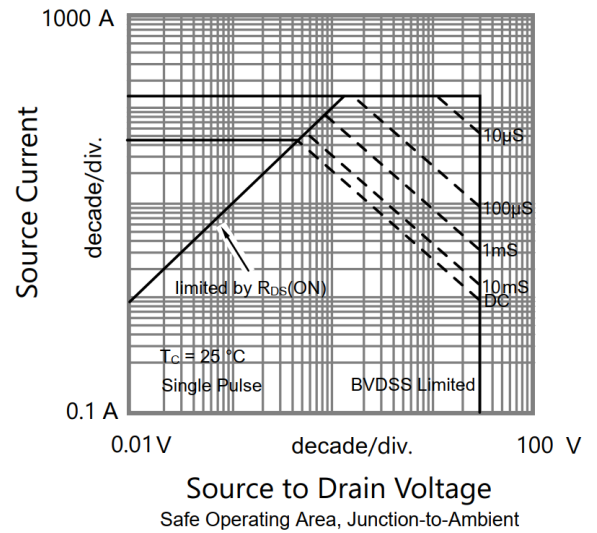
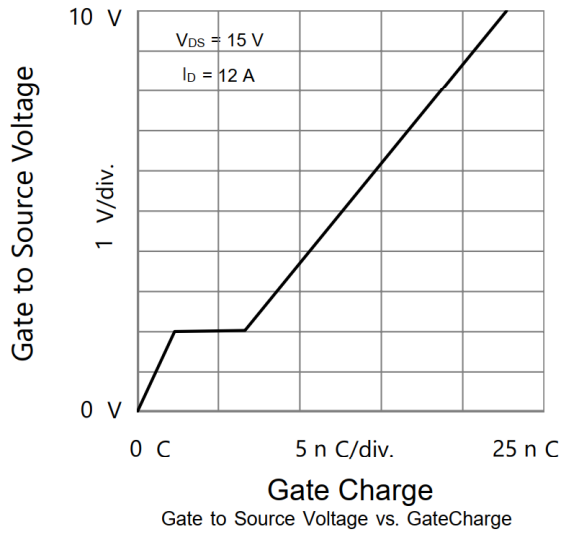


Source to Drain Voltage  
Body Diode Forward Characteristics

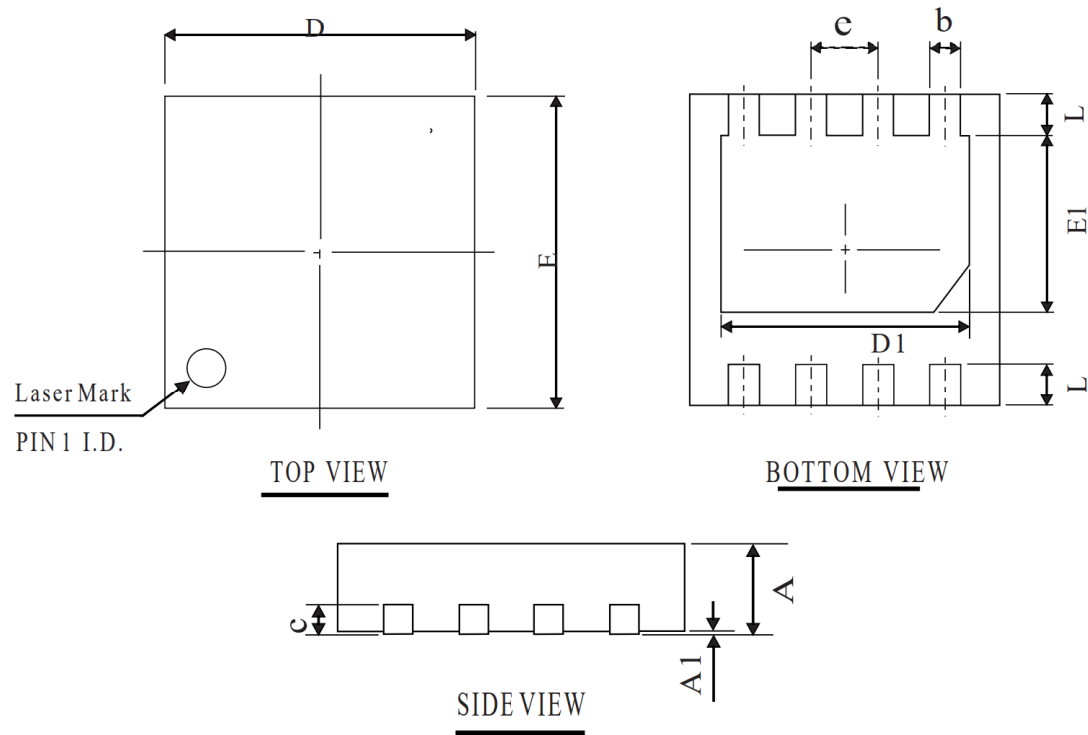


Drain to Source Voltage  
Capacitances

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



# DFN3\*3-8L PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

| SYMBOL    | MIN       | NOM  | MAX  |
|-----------|-----------|------|------|
| <b>A</b>  | 0.60      | 0.75 | 0.90 |
| <b>A1</b> | 0.00      | 0.02 | 0.08 |
| <b>b</b>  | 0.20      | 0.30 | 0.45 |
| <b>D</b>  | 2.85      | 3.00 | 3.15 |
| <b>E</b>  | 2.85      | 3.00 | 3.15 |
| <b>D1</b> | 2.10      | 2.40 | 2.70 |
| <b>E1</b> | 1.50      | 1.70 | 2.00 |
| <b>L</b>  | 0.20      | 0.40 | 0.60 |
| <b>c</b>  | 0.203 REF |      |      |
| <b>e</b>  | 0.65 BSC  |      |      |

OTHER DIMENSIONS

|          |      |      |      |
|----------|------|------|------|
| <b>A</b> | 0.50 | 0.55 | 0.60 |
| <b>A</b> | 0.40 | 0.45 | 0.50 |

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