

## N-Channel 100 V (D-S) MOSFET

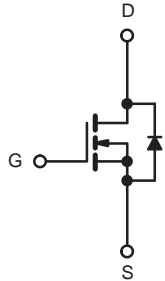
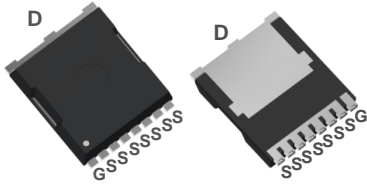


**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

| V <sub>DS</sub> (V) | R <sub>DS(on)</sub> (mΩ) TYP. | I <sub>D</sub> (A) | Q <sub>g</sub> (TYP.) |
|---------------------|-------------------------------|--------------------|-----------------------|
| 100                 | 1.1 at V <sub>GS</sub> = 10 V | 320                | 183 nC                |

### TOLL Pin Configuration



N-Channel MOSFET

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS tested

### APPLICATIONS

- Power supplies:
  - Uninterruptible power supplies
  - AC/DC switch-mode power supplies
  - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Battery management

### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C, unless otherwise noted)

| PARAMETER  | SYMBOL                            | LIMIT                   | UNIT             |
|--|-----------------------------------|-------------------------|------------------|
| Drain-Source Voltage                               | V <sub>DS</sub>                   | 100                     | V                |
| Gate-Source Voltage                                | V <sub>GS</sub>                   | ± 20                    |                  |
| Continuous Drain Current (T <sub>J</sub> = 150 °C) | I <sub>D</sub>                    | T <sub>C</sub> = 25 °C  | 320              |
|  |                                   | T <sub>C</sub> = 100 °C | 205              |
| Pulsed Drain Current (t = 100 μs)                  | I <sub>DM</sub>                   | 1280                    | A                |
| Avalanche Current                                  | I <sub>AS</sub>                   | 90                      | mJ               |
| Single Avalanche Energy <sup>a</sup>               | E <sub>AS</sub>                   | 3200                    |                  |
| Maximum Power Dissipation <sup>a</sup>             | P <sub>D</sub>                    | T <sub>C</sub> = 25 °C  | 490 <sup>b</sup> |
|  |                                   | T <sub>C</sub> = 100 °C | 4.6 <sup>b</sup> |
| Operating Junction and Storage Temperature Range   | T <sub>J</sub> , T <sub>stg</sub> | -55 to +150             | °C               |

### THERMAL RESISTANCE RATINGS

| PARAMETER                                    | SYMBOL            | LIMIT | UNIT |
|--|-------------------|-------|------|
| Junction-to-Ambient (PCB Mount) <sup>c</sup> | R <sub>thJA</sub> | 12    | °C/W |
| Junction-to-Case (Drain)                     | R <sub>thJC</sub> | 0.26  |      |

#### Notes

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

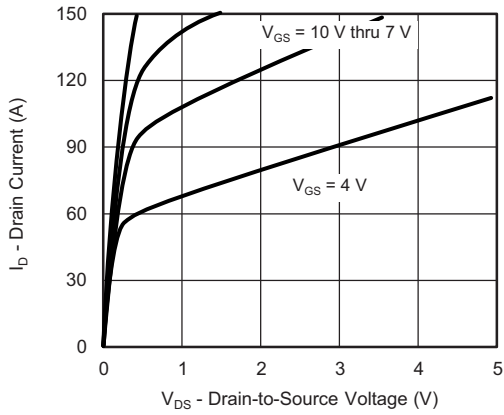
| SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)                                 |                     |  |      |       |       |      |
|---|---------------------|--|------|-------|-------|------|
| PARAMETER   | SYMBOL              | TEST CONDITIONS  | MIN. | TYP.  | MAX.  | UNIT |
| <b>Static</b>   |                     |  |      |       |       |      |
| Drain-Source Breakdown Voltage  | V <sub>DS</sub>     | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA   | 100  | -     | -     | V    |
| Gate Threshold Voltage  | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                    | 2    | -     | 4     |      |
| Gate-Body 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> = 100 V, V <sub>GS</sub> = 0 V   | -    | -     | 1     | μA   |
|   |                     | V <sub>DS</sub> = 80 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85 °C                          | -    | -     | 30    |      |
| On-State Drain Current <sup>a</sup>   | I <sub>D(on)</sub>  | V <sub>DS</sub> ≥ 10 V, V <sub>GS</sub> = 10 V   | 320  | -     | -     | A    |
| Drain-Source On-State Resistance <sup>a</sup>   | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A  | -    | 1.1   | 1.5   | mΩ   |
| Forward Transconductance <sup>a</sup>   | g <sub>fs</sub>     | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 3 A   | -    | 22    | -     | S    |
| <b>Dynamic <sup>b</sup></b>   |                     |  |      |       |       |      |
| Input Capacitance   | C <sub>iss</sub>    | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 50 V, f = 1 MHz                                       | -    | 12300 | -     | pF   |
| Output Capacitance  | C <sub>oss</sub>    |  | -    | 3290  | -     |      |
| Reverse Transfer Capacitance  | C <sub>rss</sub>    |  | -    | 42    | -     |      |
| Total Gate Charge <sup>c</sup>  | Q <sub>g</sub>      | V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 100 A                         | -    | 183   | -     | nC   |
| Gate-Source Charge <sup>c</sup>   | Q <sub>gs</sub>     |  | -    | 46    | -     |      |
| Gate-Drain Charge <sup>c</sup>  | Q <sub>gd</sub>     |  | -    | 52    | -     |      |
| Gate Resistance   | R <sub>g</sub>      | f = 1 MHz  | -    | 2.0   | -     | Ω    |
| Turn-On Delay Time <sup>c</sup>   | t <sub>d(on)</sub>  | V <sub>DD</sub> = 50 V, I <sub>D</sub> = 100 A, R <sub>g</sub> = 6Ω<br>V <sub>GEN</sub> = 10 V | -    | 42    | -     | ns   |
| Rise Time <sup>c</sup>  | t <sub>r</sub>      |  | -    | 55    | -     |      |
| Turn-Off Delay Time <sup>c</sup>  | t <sub>d(off)</sub> |  | -    | 47    | -     |      |
| Fall Time <sup>c</sup>  | t <sub>f</sub>      |  | -    | 78    | -     |      |
| <b>Drain-Source Body Diode Ratings and Characteristics <sup>b</sup> (T<sub>C</sub> = 25 °C)</b> |                     |  |      |       |       |      |
| Continuous Source-Drain Diode Current   | I <sub>S</sub>      | T <sub>C</sub> = 25 °C   | -    | -     | 320   | A    |
| Pulsed Current (t = 100 μs)   | I <sub>SM</sub>     |  | -    | -     | 1280  | A    |
| Forward Voltage <sup>a</sup>  | V <sub>SD</sub>     | I <sub>F</sub> = 1 A, V <sub>GS</sub> = 0 V  | -    | -     | 1     | V    |
| Reverse Recovery Time   | t <sub>rr</sub>     | I <sub>F</sub> = 10 A, di/dt = 100 A/μs  | -    | 408   | -     | ns   |
| Reverse Recovery Charge   | Q <sub>rr</sub>     |  | -    | 1.6   | -     | μC   |

**Notes**

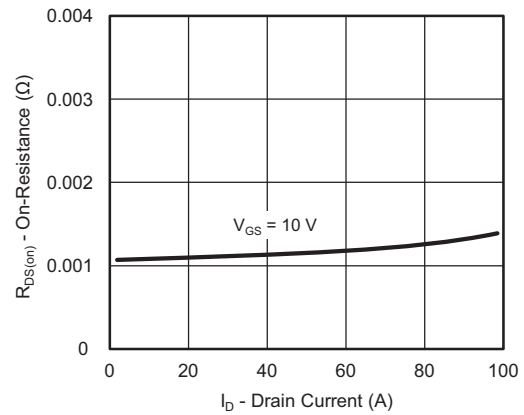
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

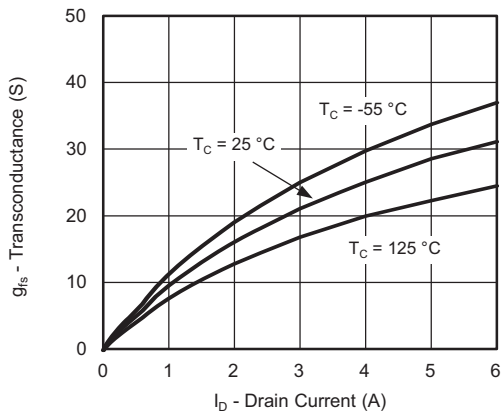
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



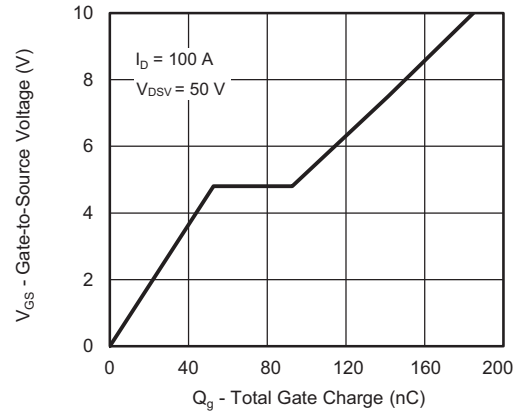
**Output Characteristics**



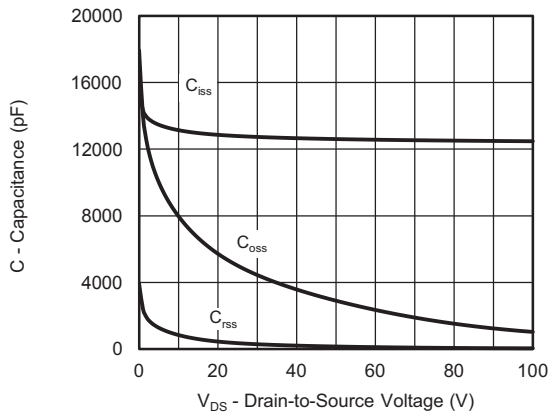
**On-Resistance vs. Drain Current**



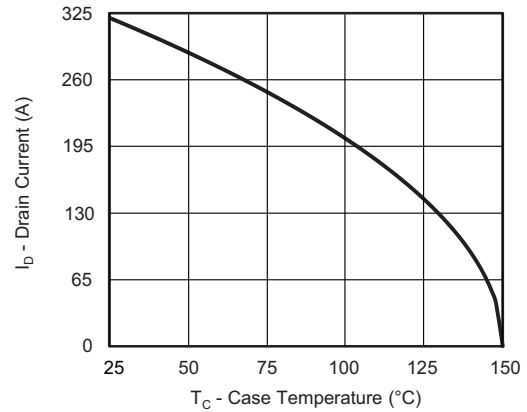
**Transconductance**



**Gate Charge**

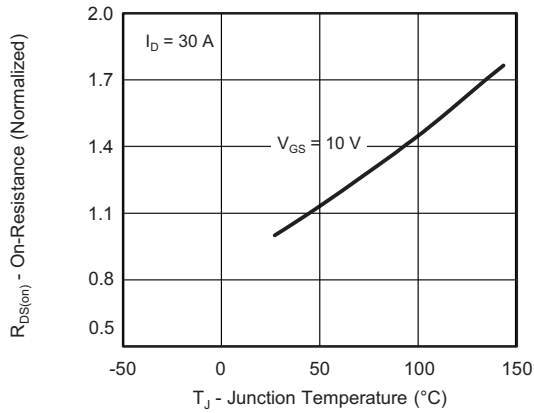


**Capacitance**

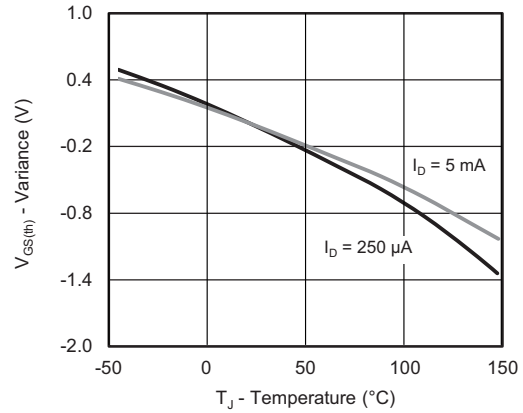


**Current De-Rating**

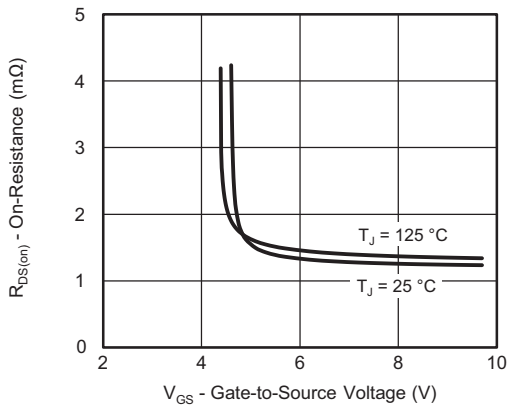
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



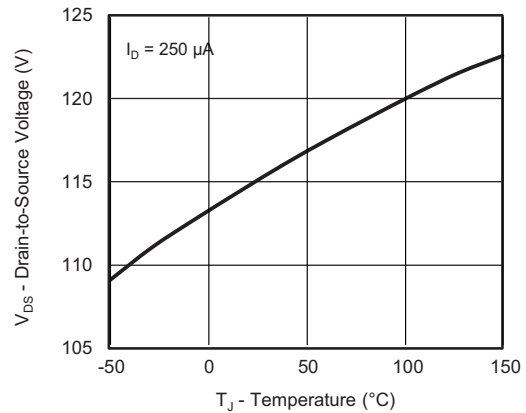
**On-Resistance vs. Junction Temperature**



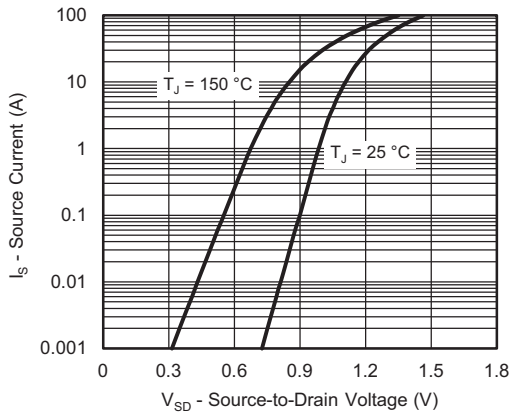
**Threshold Voltage**



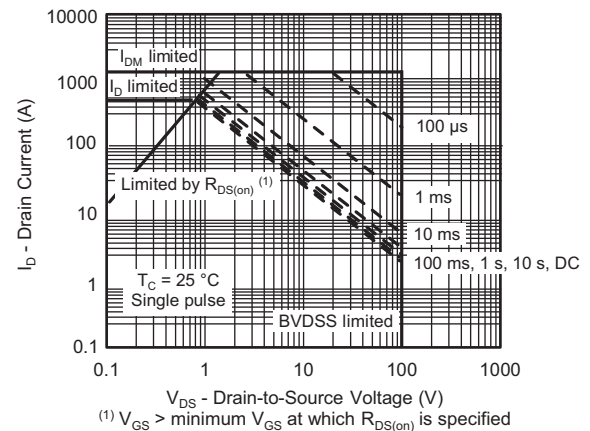
**On-Resistance vs. Gate-to-Source Voltage**



**Drain Source Breakdown vs. Junction Temperature**



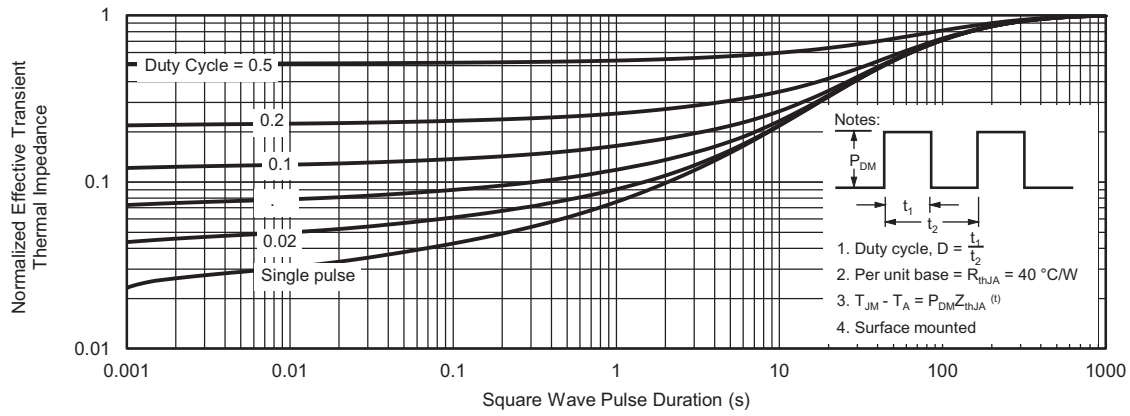
**Source Drain Diode Forward Voltage**



**Safe Operating Area**

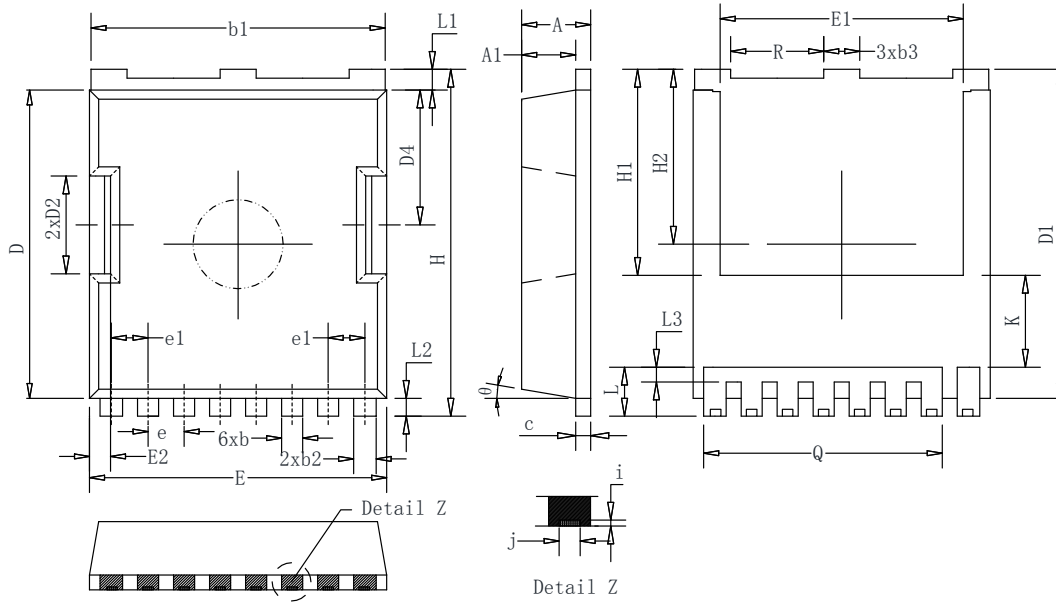
(1)  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**THERMAL RATINGS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

# TOLL PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

| Symbol | Min       | Typ   | Max   | Symbol   | Min      | Typ   | Max   |
|--------|-----------|-------|-------|----------|----------|-------|-------|
| A      | 2.05      | 2.30  | 2.65  | E2       | 0.40     | 0.70  | 0.90  |
| A1     | 1.50      | 1.80  | 2.10  | H        | 11.30    | 11.70 | 12.10 |
| b      | 0.50      | 0.70  | 0.90  | H1       | 6.95 BSC |       |       |
| $b_1$  | 9.50      | 9.80  | 10.05 | H2       | 5.90 BSC |       |       |
| $b_2$  | 0.50      | 0.75  | 1.00  | i        | 0.10 REF |       |       |
| $b_3$  | 1.00      | 1.20  | 1.45  | j        | 0.35 REF |       |       |
| c      | 0.30      | 0.50  | 0.75  | K        | 3.10 REF |       |       |
| D      | 10.10     | 10.40 | 10.70 | L        | 1.45     | 1.65  | 1.85  |
| $D_1$  | 10.80     | 11.10 | 11.40 | L1       | 0.50     | 0.70  | 0.90  |
| $D_2$  | 3.10      | 3.30  | 3.50  | L2       | 0.40     | 0.60  | 0.80  |
| $D_4$  | 4.35      | 4.55  | 4.80  | L3       | 0.30     | 0.50  | 0.70  |
| e      | 1.20 BSC  |       |       | Q        | 7.95 REF |       |       |
| $e_1$  | 1.225 BSC |       |       | R        | 2.80     | 3.10  | 3.35  |
| E      | 9.65      | 9.90  | 10.15 | $\theta$ | 10°REF   |       |       |
| $E_1$  | 7.80      | 8.10  | 8.50  |          |          |       |       |

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