

## 40T10GR-VB Datasheet

### N-Channel 100-V (D-S) 175 °C MOSFET

| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| 100             | 0.0085 at $V_{GS} = 10$ V | 100       |
|                 | 0.010 at $V_{GS} = 6$ V   | 85        |

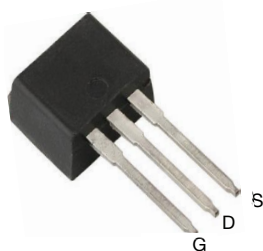
#### FEATURES

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC

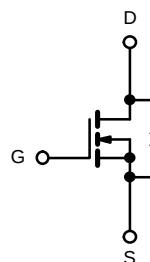


**RoHS**  
COMPLIANT

TO-262



Top View



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted |                                     |                |                  |      |
|----------------------------------------------------------------|-------------------------------------|----------------|------------------|------|
| Parameter                                                      |                                     | Symbol         | Limit            | Unit |
| Drain-Source Voltage                                           |                                     | $V_{DS}$       | 100              | V    |
| Gate-Source Voltage                                            |                                     | $V_{GS}$       | $\pm 20$         |      |
| Continuous Drain Current ( $T_J = 150$ °C)                     | $T_C = 25$ °C                       | $I_D$          | 100              | A    |
|                                                                | $T_C = 125$ °C                      |                | 75 <sup>a</sup>  |      |
| Pulsed Drain Current                                           |                                     | $I_{DM}$       | 300              |      |
| Avalanche Current                                              |                                     | $I_{AS}$       | 75               |      |
| Single Pulse Avalanche Energy <sup>b</sup>                     |                                     | $E_{AS}$       | 280              | mJ   |
| Maximum Power Dissipation <sup>b</sup>                         | $T_C = 25$ °C (TO-220AB and TO-263) | $P_D$          | 250 <sup>c</sup> | W    |
|                                                                | $T_A = 25$ °C (TO-263) <sup>d</sup> |                | 3.75             |      |
| Operating Junction and Storage Temperature Range               |                                     | $T_J, T_{stg}$ | - 55 to 175      | °C   |

| THERMAL RESISTANCE RATINGS |                                 |            |       |      |
|----------------------------|---------------------------------|------------|-------|------|
| Parameter                  |                                 | Symbol     | Limit | Unit |
| Junction-to-Ambient        | PCB Mount (TO-263) <sup>d</sup> | $R_{thJA}$ | 40    | °C/W |
|                            | Free Air (TO-220AB)             |            | 62.5  |      |
| Junction-to-Case           |                                 | $R_{thJC}$ | 0.6   |      |

Notes:

- a. Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.  
 b. Guaranteed by design, not subject to production testing.  
 c. Independent of operating temperature.

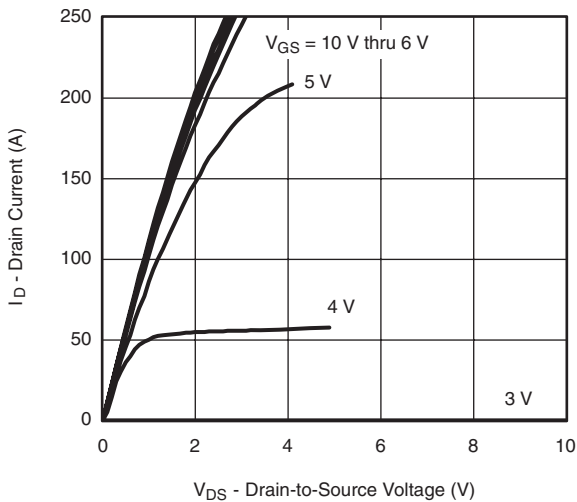
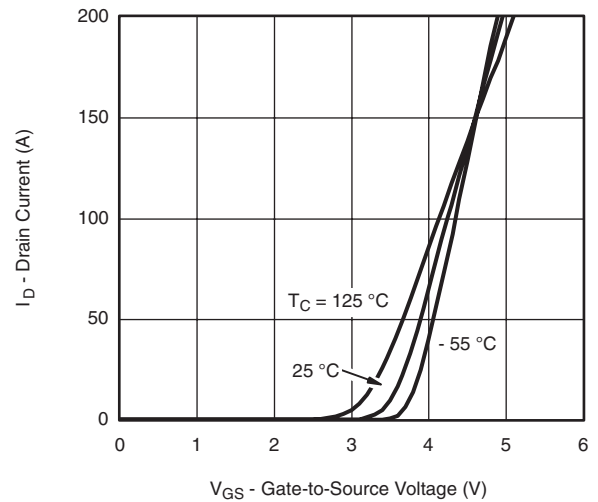
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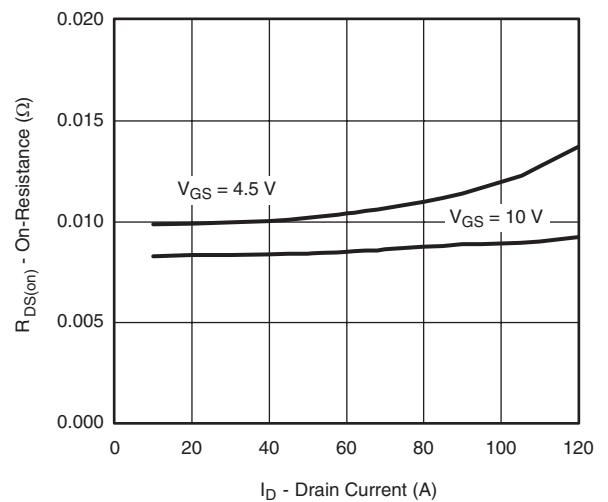
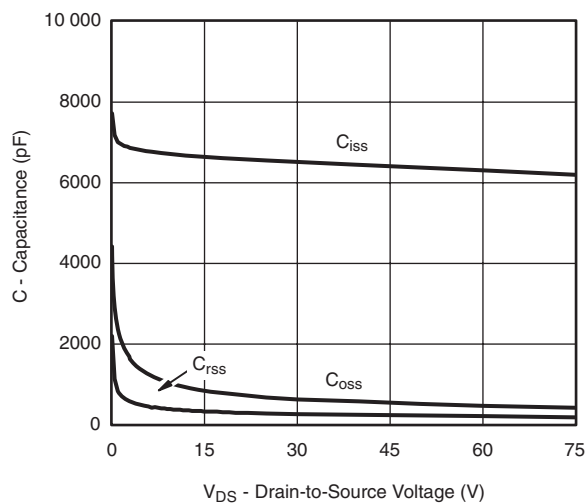
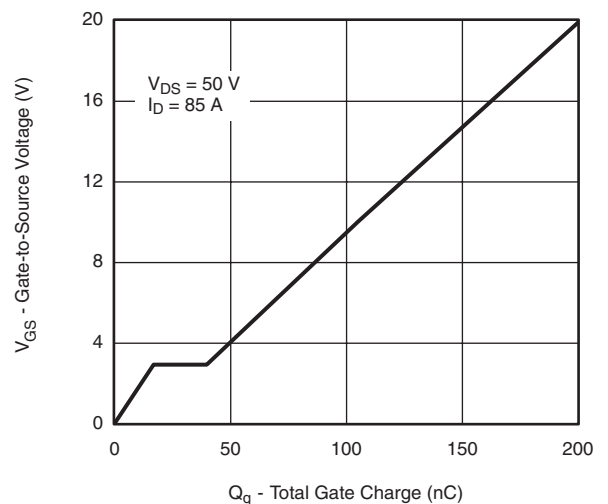
| SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted                      |                      |                                                                                                                          |      |        |       |      |
|------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------|------|--------|-------|------|
| Parameter                                                                          | Symbol               | Test Conditions                                                                                                          | Min. | Typ.   | Max.  | Unit |
| Static                                                                             |                      |                                                                                                                          |      |        |       |      |
| Drain-Source Breakdown Voltage                                                     | V <sub>DS</sub>      | V <sub>GS</sub> = 0 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                                                              | 1    |        | 3     |      |
| 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> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C                                                  |      |        | 50    |      |
|                                                                                    |                      | V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C                                                  |      |        | 250   |      |
| On-State Drain Current <sup>a</sup>                                                | I <sub>D(on)</sub>   | V <sub>DS</sub> = ≥ 5 V, V <sub>GS</sub> = 10 V                                                                          | 120  |        |       | 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                                                                            |      | 0.0085 |       | Ω    |
|                                                                                    |                      | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A                                                                           |      | 0.010  |       |      |
|                                                                                    |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C                                                   |      | 0.017  |       |      |
|                                                                                    |                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C                                                   |      | 0.022  |       |      |
| Forward Transconductance <sup>a</sup>                                              | g <sub>fs</sub>      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A                                                                            | 25   |        |       | S    |
| Dynamic <sup>b</sup>                                                               |                      |                                                                                                                          |      |        |       |      |
| Input Capacitance                                                                  | C <sub>iss</sub>     | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz                                                                 |      | 6550   |       | pF   |
| Output Capacitance                                                                 | C <sub>oss</sub>     |                                                                                                                          |      | 665    |       |      |
| Reverse Transfer Capacitance                                                       | C <sub>rss</sub>     |                                                                                                                          |      | 265    |       |      |
| 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> = 85 A                                                    |      | 105    | 160   | nC   |
| Gate-Source Charge <sup>c</sup>                                                    | Q <sub>gs</sub>      |                                                                                                                          |      | 17     |       |      |
| Gate-Drain Charge <sup>c</sup>                                                     | Q <sub>gd</sub>      |                                                                                                                          |      | 23     |       |      |
| Turn-On Delay Time <sup>c</sup>                                                    | t <sub>d(on)</sub>   | V <sub>DD</sub> = 50 V, R <sub>L</sub> = 0.6 Ω<br>I <sub>D</sub> ≅ 85 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω |      | 12     | 25    | ns   |
| Rise Time <sup>c</sup>                                                             | t <sub>r</sub>       |                                                                                                                          |      | 90     | 135   |      |
| Turn-Off DelayTime <sup>c</sup>                                                    | t <sub>d(off)</sub>  |                                                                                                                          |      | 55     | 85    |      |
| Fall Time <sup>c</sup>                                                             | t <sub>f</sub>       |                                                                                                                          |      | 130    | 195   |      |
| Source-Drain Diode Ratings and Characteristics T <sub>C</sub> = 25 °C <sup>b</sup> |                      |                                                                                                                          |      |        |       |      |
| Continuous Current                                                                 | I <sub>S</sub>       |                                                                                                                          |      |        | 85    | A    |
| Pulsed Current                                                                     | I <sub>SM</sub>      |                                                                                                                          |      |        | 240   |      |
| Forward Voltage <sup>a</sup>                                                       | V <sub>SD</sub>      | I <sub>F</sub> = 85 A, V <sub>GS</sub> = 0 V                                                                             |      | 1.0    | 1.5   | V    |
| Reverse Recovery Time                                                              | t <sub>rr</sub>      | I <sub>F</sub> = 50 A, dI/dt = 100 A/μs                                                                                  |      | 85     | 140   | ns   |
| Peak Reverse Recovery Current                                                      | I <sub>RM(REC)</sub> |                                                                                                                          |      | 4.5    | 7     | A    |
| Reverse Recovery Charge                                                            | Q <sub>rr</sub>      |                                                                                                                          |      | 0.17   | 0.35  | μC   |

Notes:

- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
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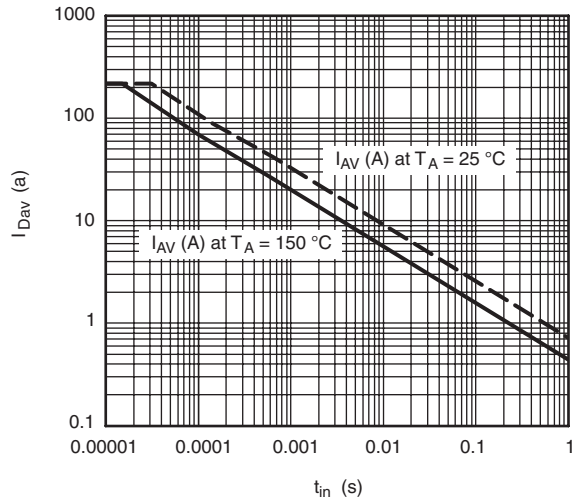
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**TYPICAL CHARACTERISTICS**  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted

**Output Characteristics**

**Transfer Characteristics**

**Transconductance**

**On-Resistance vs. Drain Current**

**Capacitance**

**Gate Charge**

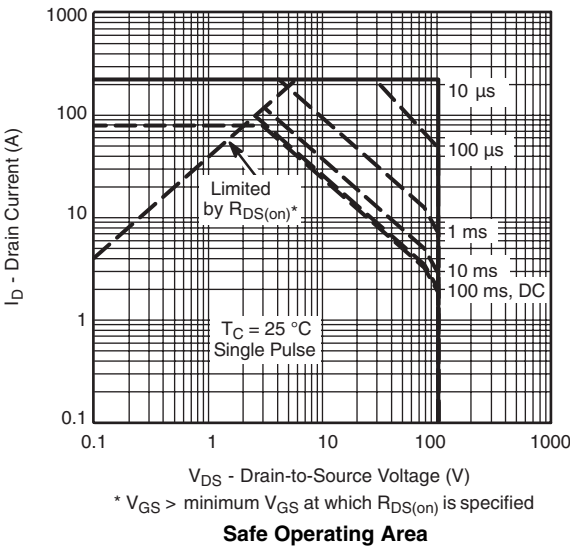
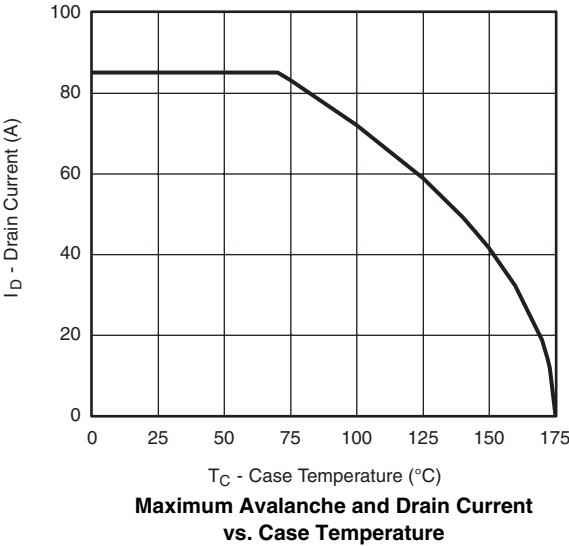
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**On-Resistance vs. Junction Temperature**

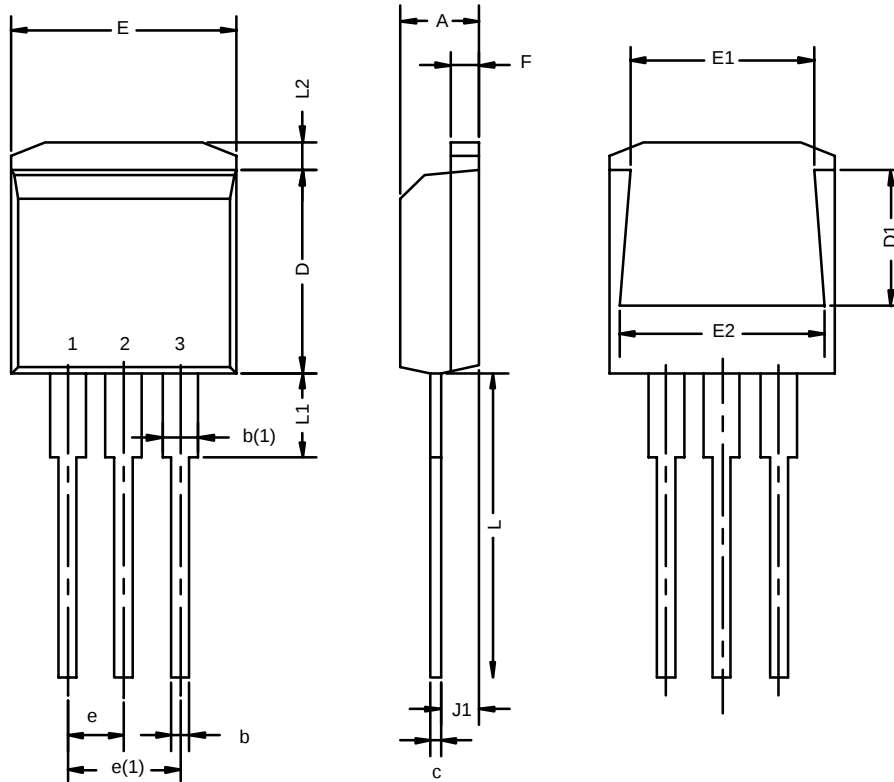
**Source-Drain Diode Forward Voltage**

**Avalanche Current vs. Time**

 **$T_J$  - Drain-Source Breakdown vs. Junction-Temperature**

**THERMAL RATINGS**



TO-262: 3-LEAD



| Dim                                         | MILLIMETERS* |       | INCHES |       |
|---------------------------------------------|--------------|-------|--------|-------|
|                                             | Min          | Max   | Min    | Max   |
| A                                           | 4.32         | 4.70  | 0.170  | 0.185 |
| b                                           | 0.64         | 1.00  | 0.025  | 0.039 |
| b(1)                                        | 1.14         | 1.40  | 0.045  | 0.055 |
| c                                           | 0.36         | 0.50  | 0.014  | 0.020 |
| D                                           | 8.64         | 9.65  | 0.340  | 0.380 |
| D1                                          | 5.59         | 6.10  | 0.220  | 0.240 |
| e                                           | 2.41         | 2.67  | 0.095  | 0.105 |
| e(1)                                        | 4.95         | 5.33  | 0.195  | 0.210 |
| E                                           | 10.03        | 10.41 | 0.395  | 0.410 |
| E1                                          | 7.87         | 8.64  | 0.310  | 0.340 |
| E2                                          | 9.02         | 9.53  | 0.355  | 0.375 |
| F                                           | 1.14         | 1.40  | 0.045  | 0.055 |
| J1                                          | 2.41         | 2.79  | 0.095  | 0.110 |
| L                                           | 13.08        | 14.22 | 0.515  | 0.560 |
| L1                                          | -            | 3.81  | -      | 0.150 |
| L2                                          | 1.02         | 1.40  | 0.040  | 0.055 |
| ECN: T-02234—Rev. C, 14-Oct-02<br>DWG: 5855 |              |       |        |       |

\*Use millimeters as the primary measurement

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