



## N-Channel 20-V (D-S) MOSFET

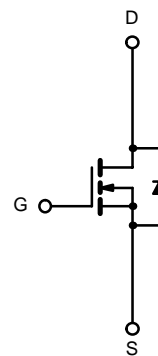
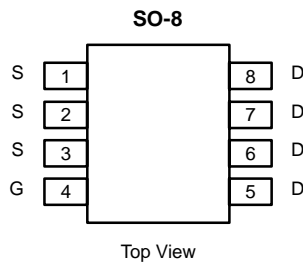
| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| 20              | 0.0045 @ $V_{GS} = 10$ V  | 21        |
|                 | 0.0068 @ $V_{GS} = 4.5$ V | 17        |

### FEATURES

- TrenchFET® Power MOSFET
- PWM Optimized for Fast Switching
- Low Switching Losses
- Low Gate Drive Losses
- 100%  $R_G$  Tested

### APPLICATIONS

- Self-Driven Synchronous Rectification



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                |                          |              |                  |     |
|---|----------------|--------------------------|--------------|------------------|-----|
| Parameter   | Symbol         | 10 secs                  | Steady State | Unit             |     |
| Drain-Source Voltage  | $V_{DS}$       | 20                       |              | V                |     |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$                 |              |                  |     |
| Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>         | $I_D$          | $T_A = 25^\circ\text{C}$ | 21           | 14               | A   |
|   |                | $T_A = 70^\circ\text{C}$ | 17           | 11               |     |
| Pulsed Drain Current (10 $\mu\text{s}$ Pulse Width)                         | $I_{DM}$       | 60                       |              |                  |     |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   | $I_S$          | 2.9                      | 1.3          | W                |     |
| Maximum Power Dissipation <sup>a</sup>                                      | $P_D$          | $T_A = 25^\circ\text{C}$ | 3.5          |                  | 1.6 |
|   |                | $T_A = 70^\circ\text{C}$ | 2.2          | 1                |     |
| Operating Junction and Storage Temperature Range                            | $T_J, T_{stg}$ | -55 to 150               |              | $^\circ\text{C}$ |     |

| THERMAL RESISTANCE RATINGS               |            |                 |         |      |                    |
|--|------------|-----------------|---------|------|--------------------|
| Parameter                                | Symbol     | Typical         | Maximum | Unit |                    |
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{thJA}$ | $t \leq 10$ sec | 29      | 35   | $^\circ\text{C/W}$ |
|  |            | Steady State    | 67      | 80   |                    |
| Maximum Junction-to-Foot (Drain)         | $R_{thJF}$ | 13              | 16      |      |                    |

Notes

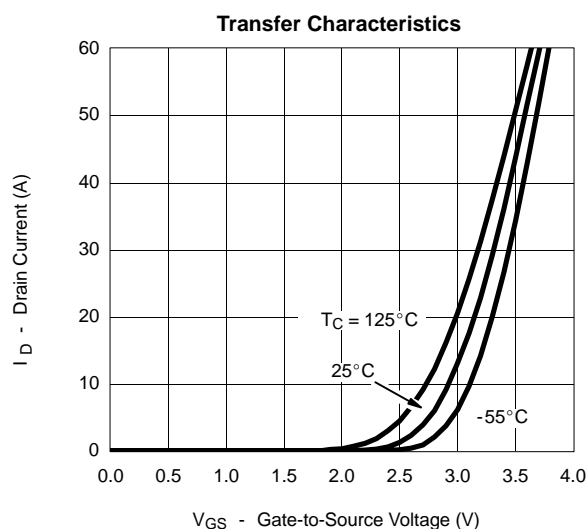
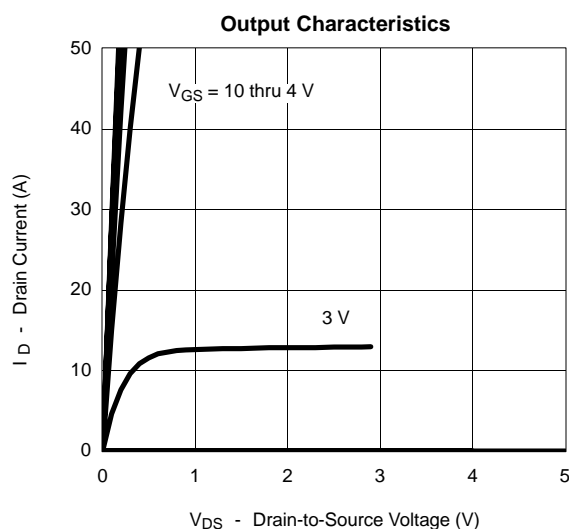
a. Surface Mounted on 1" x 1" FR4 Board.

**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

| Parameter                                     | Symbol              | Test Condition  | Min | Typ    | Max    | Unit |
|---|---------------------|---|-----|--------|--------|------|
| <b>Static</b>                                 |                     |   |     |        |        |      |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA   | 1.0 |        |        | V    |
| 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> = 16 V, V <sub>GS</sub> = 0 V   |     |        | 1      | μA   |
|   |                     | V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C   |     |        | 5      |      |
| On-State Drain Current <sup>a</sup>           | I <sub>D(on)</sub>  | V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V   | 30  |        |        | A    |
| Drain-Source On-State Resistance <sup>a</sup> | r <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 21 A   |     | 0.0035 | 0.0045 | Ω    |
|   |                     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 17 A  |     | 0.0054 | 0.0068 |      |
| Forward Transconductance <sup>a</sup>         | g <sub>fs</sub>     | V <sub>DS</sub> = 6 V, I <sub>D</sub> = 21 A  |     | 60     |        | S    |
| Diode Forward Voltage <sup>a</sup>            | V <sub>SD</sub>     | I <sub>S</sub> = 2.9 A, V <sub>GS</sub> = 0 V   |     | 0.75   | 1.1    | V    |
| <b>Dynamic<sup>b</sup></b>                    |                     |   |     |        |        |      |
| Total Gate Charge                             | Q <sub>g</sub>      | V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 21 A  |     | 21     | 32     | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>     |   |     | 8.9    |        |      |
| Gate-Drain Charge                             | Q <sub>gd</sub>     |   |     | 6.4    |        |      |
| Gate Resistance                               | R <sub>G</sub>      |   | 0.5 | 1.40   | 2.4    | Ω    |
| Turn-On Delay Time                            | t <sub>d(on)</sub>  | V <sub>DD</sub> = 10 V, R <sub>L</sub> = 10 Ω<br>I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 6 Ω |     | 42     | 65     | ns   |
| Rise Time                                     | t <sub>r</sub>      |   |     | 42     | 65     |      |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> |   |     | 60     | 90     |      |
| Fall Time                                     | t <sub>f</sub>      |   |     | 26     | 40     |      |
| Source-Drain Reverse Recovery Time            | t <sub>rr</sub>     | I <sub>F</sub> = 2.9 A, di/dt = 100 A/μs  |     | 55     | 80     | ns   |

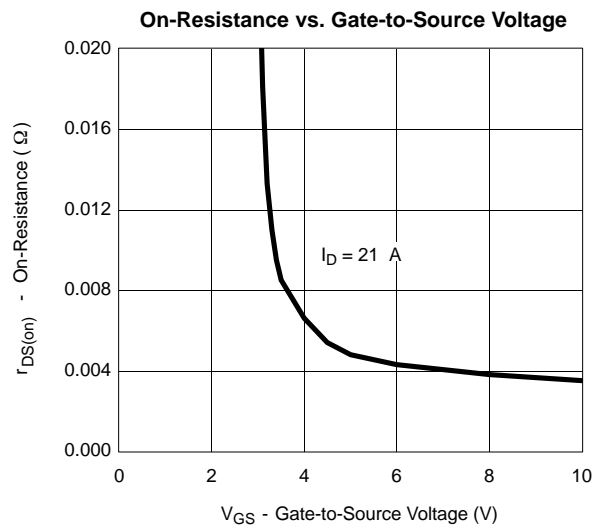
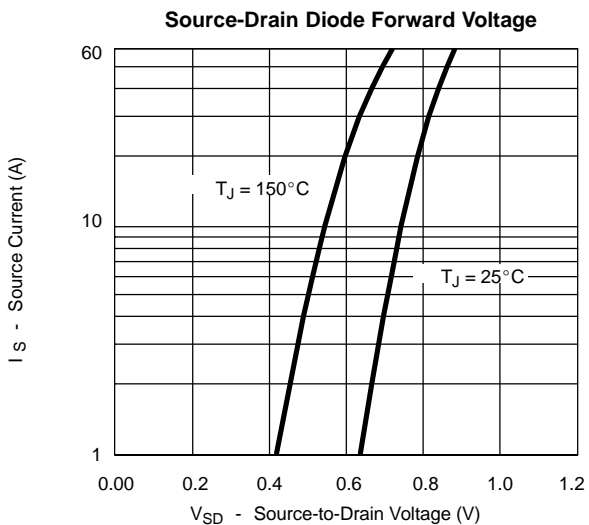
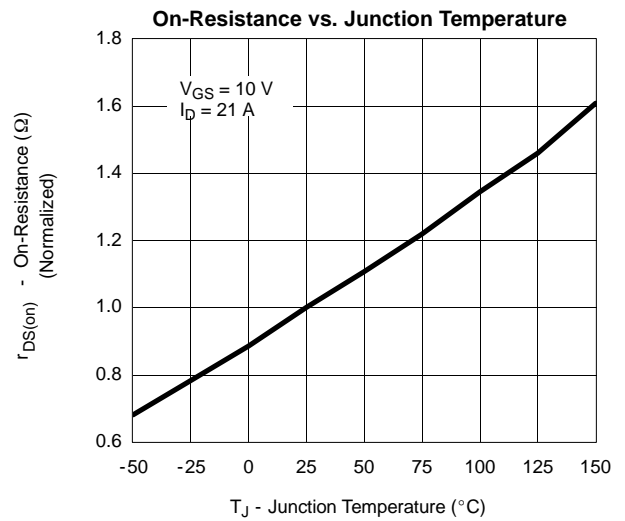
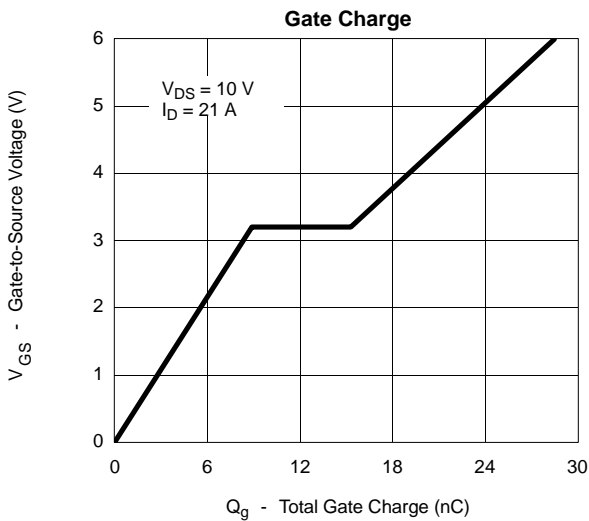
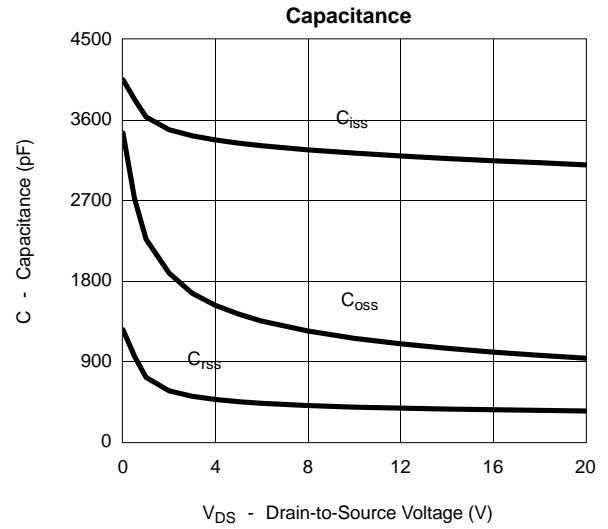
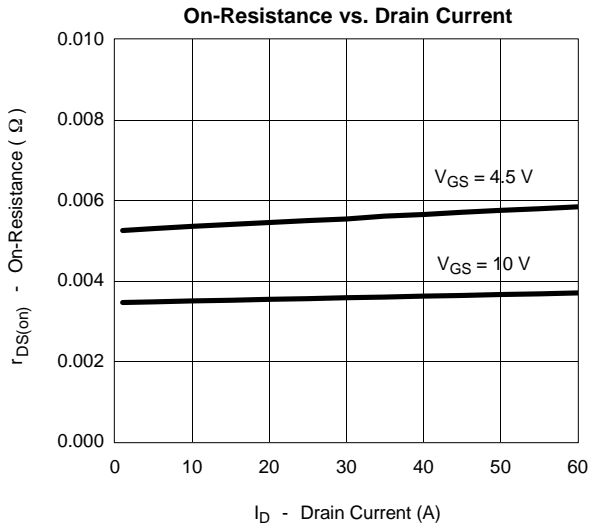
## Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.  
b. Guaranteed by design, not subject to production testing.

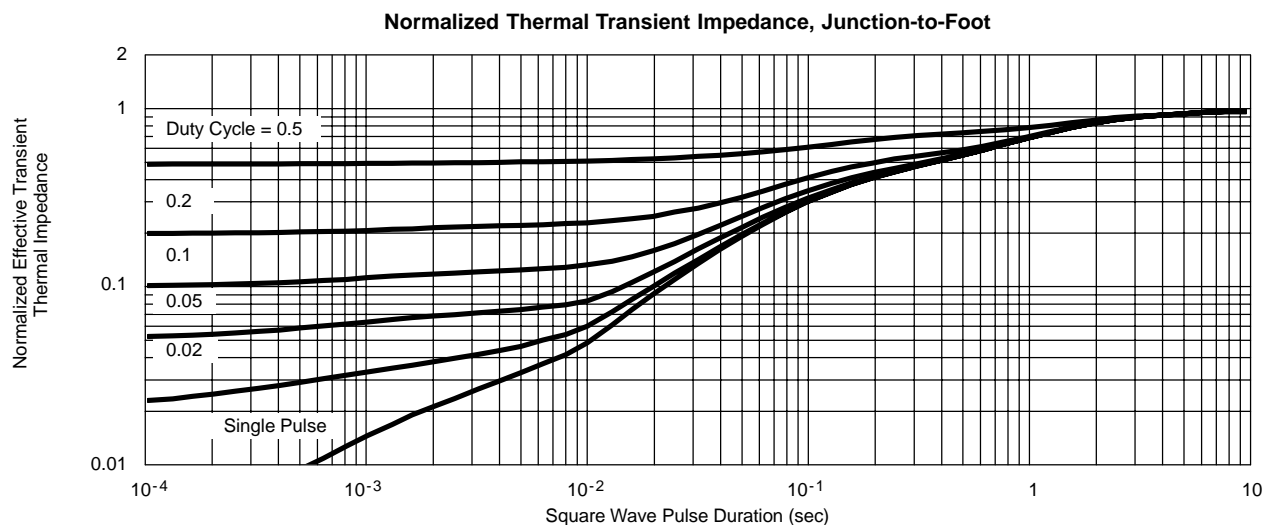
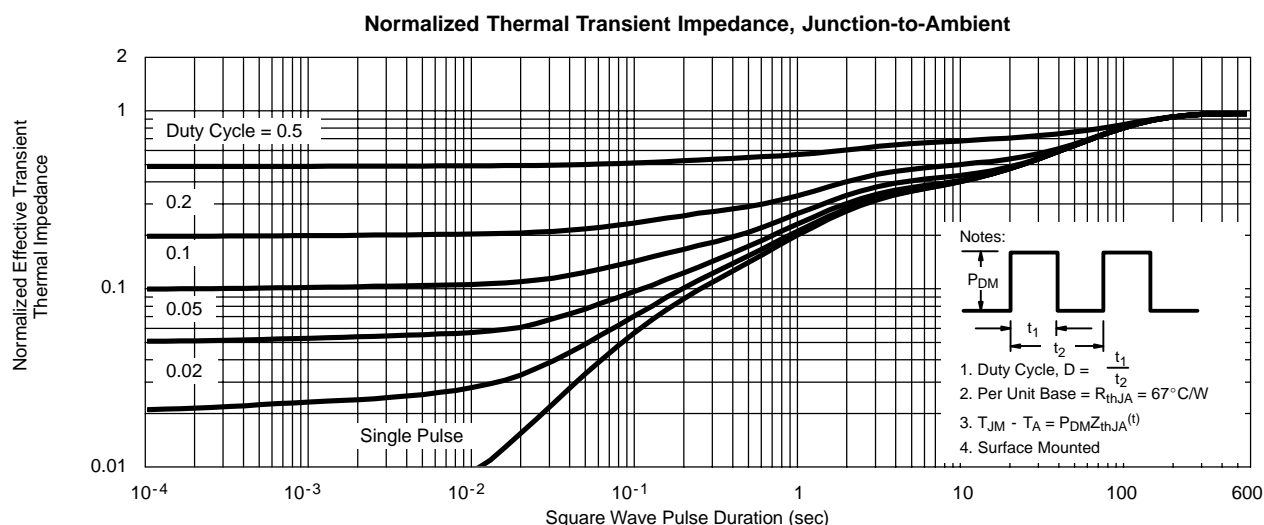
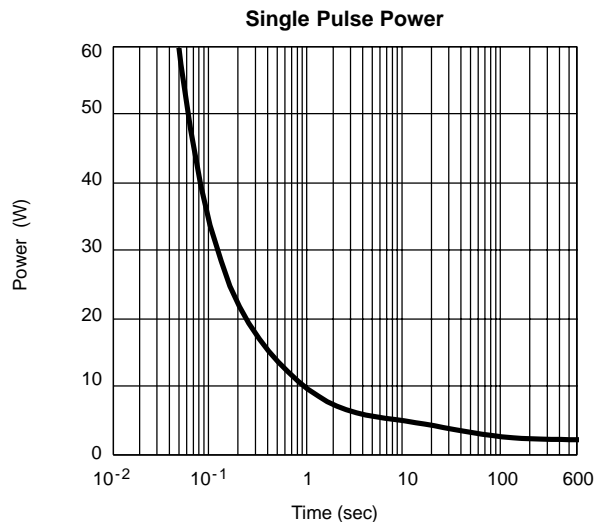
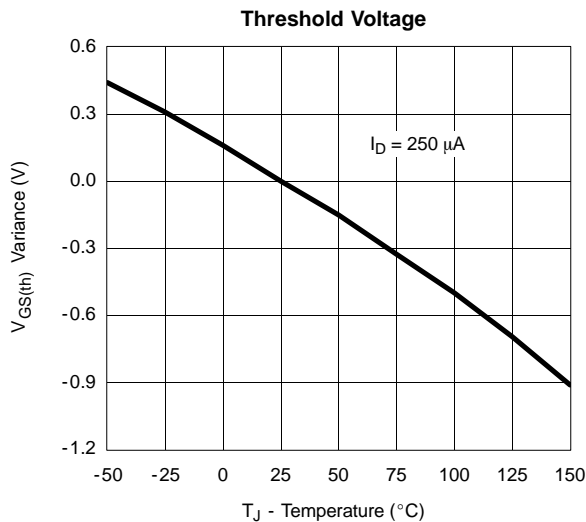
**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**



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