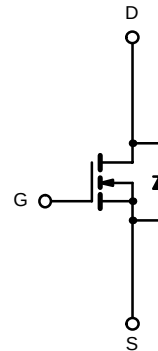
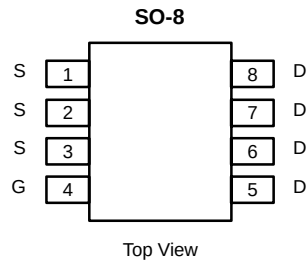




## N-Channel 20-V (D-S) MOSFET

## 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        |



N-Channel MOSFET

## 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 <sub>DS</sub>                   | 20         |              | V    |
| Gate-Source Voltage                                            |                       | V <sub>GS</sub>                   | ± 20       |              |      |
| Continuous Drain Current (T <sub>J</sub> = 150°C) <sup>a</sup> | T <sub>A</sub> = 25°C | I <sub>D</sub>                    | 21         | 14           | A    |
|                                                                | T <sub>A</sub> = 70°C |                                   | 17         | 11           |      |
| Pulsed Drain Current (10 μs Pulse Width)                       |                       | I <sub>DM</sub>                   | 60         |              |      |
| Continuous Source Current (Diode Conduction) <sup>a</sup>      |                       | I <sub>S</sub>                    | 2.9        | 1.3          |      |
| Maximum Power Dissipation <sup>a</sup>                         | T <sub>A</sub> = 25°C | P <sub>D</sub>                    | 3.5        | 1.6          | W    |
|                                                                | T <sub>A</sub> = 70°C |                                   | 2.2        | 1            |      |
| Operating Junction and Storage Temperature Range               |                       | T <sub>J</sub> , T <sub>stg</sub> | -55 to 150 |              | °C   |

## THERMAL RESISTANCE RATINGS

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

Notes

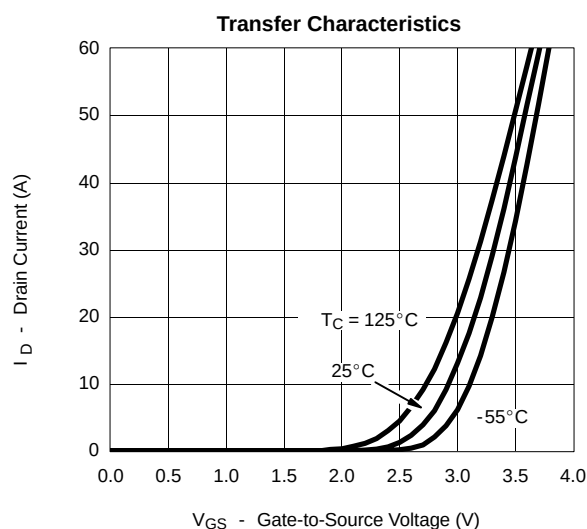
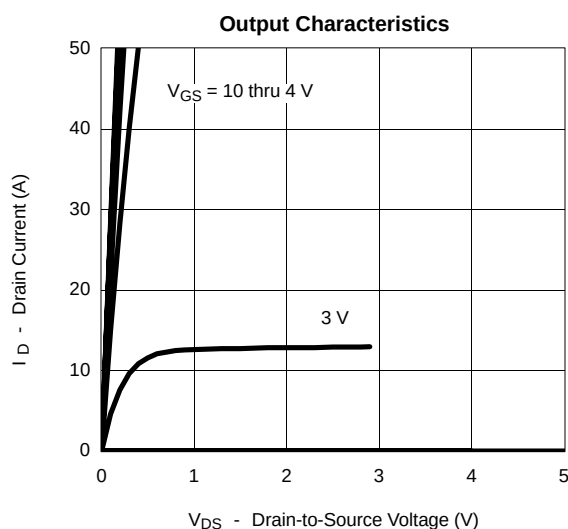
a. Surface Mounted on 1" x 1" FR4 Board.

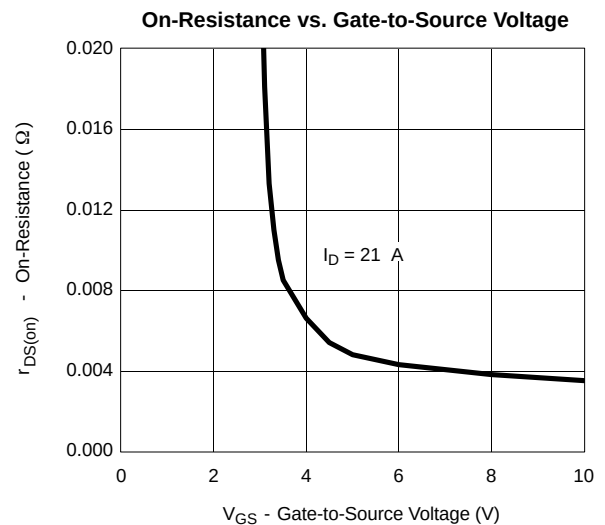
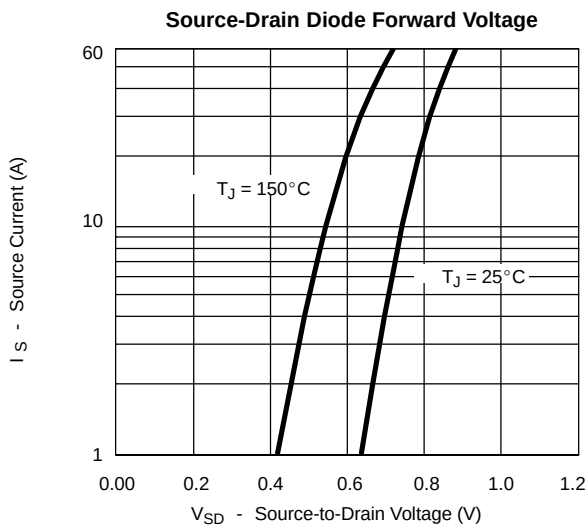
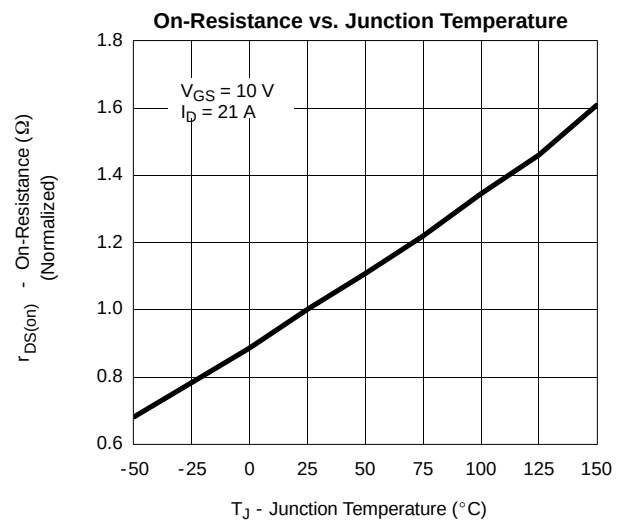
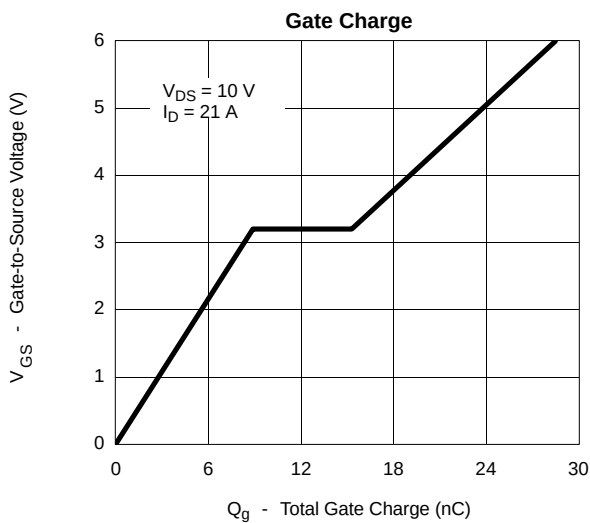
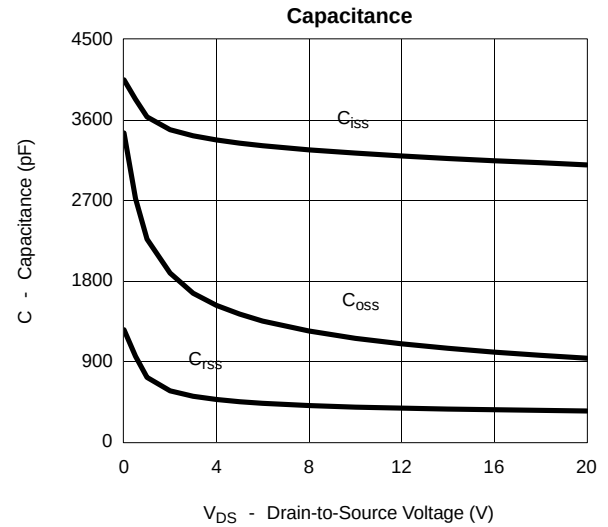
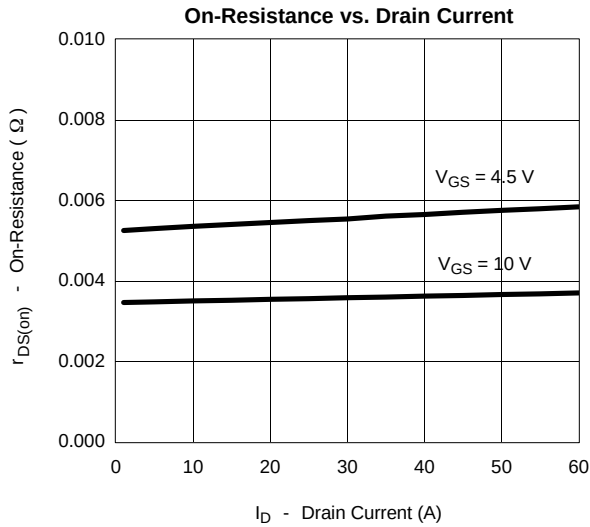
**SPECIFICATIONS ( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

| Parameter                                     | Symbol       | Test Condition                                                                                                            | Min | Typ    | Max       | Unit          |
|-----------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------|-----|--------|-----------|---------------|
| <b>Static</b>                                 |              |                                                                                                                           |     |        |           |               |
| Gate Threshold Voltage                        | $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$                                                                              | 1.0 |        |           | V             |
| Gate-Body Leakage                             | $I_{GSS}$    | $V_{DS} = 0\ \text{V}$ , $V_{GS} = \pm 20\ \text{V}$                                                                      |     |        | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current               | $I_{DSS}$    | $V_{DS} = 16\ \text{V}$ , $V_{GS} = 0\ \text{V}$                                                                          |     |        | 1         | $\mu\text{A}$ |
|                                               |              | $V_{DS} = 16\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $T_J = 55^\circ\text{C}$                                               |     |        | 5         |               |
| On-State Drain Current <sup>a</sup>           | $I_{D(on)}$  | $V_{DS} \geq 5\ \text{V}$ , $V_{GS} = 10\ \text{V}$                                                                       | 30  |        |           | A             |
| Drain-Source On-State Resistance <sup>a</sup> | $r_{DS(on)}$ | $V_{GS} = 10\ \text{V}$ , $I_D = 21\ \text{A}$                                                                            |     | 0.0035 | 0.0045    | $\Omega$      |
|                                               |              | $V_{GS} = 4.5\ \text{V}$ , $I_D = 17\ \text{A}$                                                                           |     | 0.0054 | 0.0068    |               |
| Forward Transconductance <sup>a</sup>         | $g_{fs}$     | $V_{DS} = 6\ \text{V}$ , $I_D = 21\ \text{A}$                                                                             |     | 60     |           | S             |
| Diode Forward Voltage <sup>a</sup>            | $V_{SD}$     | $I_S = 2.9\ \text{A}$ , $V_{GS} = 0\ \text{V}$                                                                            |     | 0.75   | 1.1       | V             |
| <b>Dynamic<sup>b</sup></b>                    |              |                                                                                                                           |     |        |           |               |
| Total Gate Charge                             | $Q_g$        | $V_{DS} = 10\ \text{V}$ , $V_{GS} = 4.5\ \text{V}$ , $I_D = 21\ \text{A}$                                                 |     | 21     | 32        | nC            |
| Gate-Source Charge                            | $Q_{gs}$     |                                                                                                                           |     | 8.9    |           |               |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                                                                                           |     | 6.4    |           |               |
| Gate Resistance                               | $R_G$        |                                                                                                                           | 0.5 | 1.40   | 2.4       | $\Omega$      |
| Turn-On Delay Time                            | $t_{d(on)}$  | $V_{DD} = 10\ \text{V}$ , $R_L = 10\ \Omega$<br>$I_D \approx 1\ \text{A}$ , $V_{GEN} = 4.5\ \text{V}$ , $R_G = 6\ \Omega$ |     | 42     | 65        | ns            |
| Rise Time                                     | $t_r$        |                                                                                                                           |     | 42     | 65        |               |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                                                                                           |     | 60     | 90        |               |
| Fall Time                                     | $t_f$        |                                                                                                                           |     | 26     | 40        |               |
| Source-Drain Reverse Recovery Time            | $t_{rr}$     | $I_F = 2.9\ \text{A}$ , $di/dt = 100\ \text{A}/\mu\text{s}$                                                               |     | 55     | 80        | ns            |

## Notes

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

**TYPICAL CHARACTERISTICS ( $25^\circ\text{C}$  UNLESS NOTED)**

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

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