



# N-Channel Reduced $Q_g$ , Fast Switching MOSFET

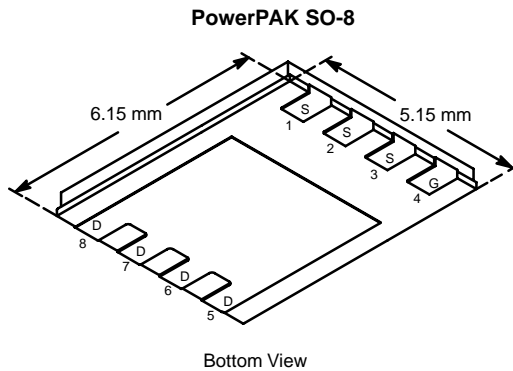
| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| 30              | 0.0095 @ $V_{GS} = 10$ V  | 16        |
|                 | 0.0125 @ $V_{GS} = 4.5$ V | 16        |

## FEATURES

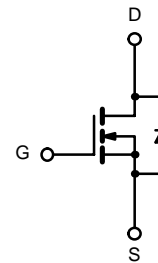
- TrenchFET® Power MOSFET
- PWM Optimized for High Efficiency
- New Low Thermal Resistance PowerPAK® Package with Low 1.07-mm Profile
- 100%  $R_g$  Tested

## APPLICATIONS

- Buck Converter
  - High Side or Low Side
- Synchronous Rectifier
  - Secondary Rectifier



Ordering Information: Si7860ADP-T1-E3



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                |                          |              |                  |   |
|---|----------------|--------------------------|--------------|------------------|---|
| Parameter   | Symbol         | 10 secs                  | Steady State | Unit             |   |
| Drain-Source Voltage  | $V_{DS}$       | 30                       |              | V                |   |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$                 |              |                  |   |
| Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>         | $I_D$          | $T_A = 25^\circ\text{C}$ | 16           | 11               | A |
|   |                | $T_A = 70^\circ\text{C}$ | 13           | 8                |   |
| Pulsed Drain Current  | $I_{DM}$       | $\pm 50$                 |              |                  |   |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   | $I_S$          | 4.1                      | 1.5          |                  |   |
| Maximum Power Dissipation <sup>a</sup>                                      | $P_D$          | $T_A = 25^\circ\text{C}$ | 4.8          | 1.8              | W |
|   |                | $T_A = 70^\circ\text{C}$ | 3.1          | 1.1              |   |
| 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 (MOSFET) <sup>a</sup> | $R_{thJA}$ | $t \leq 10$ sec | 21      | 26   | $^\circ\text{C/W}$ |
|   |            | Steady State    | 56      | 70   |                    |
| Maximum Junction-to-Case (Drain)                  | $R_{thJC}$ | 1.9             | 2.5     |      |                    |

Notes

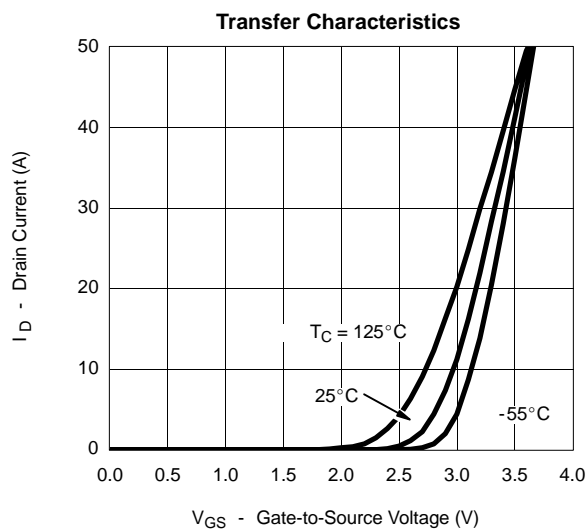
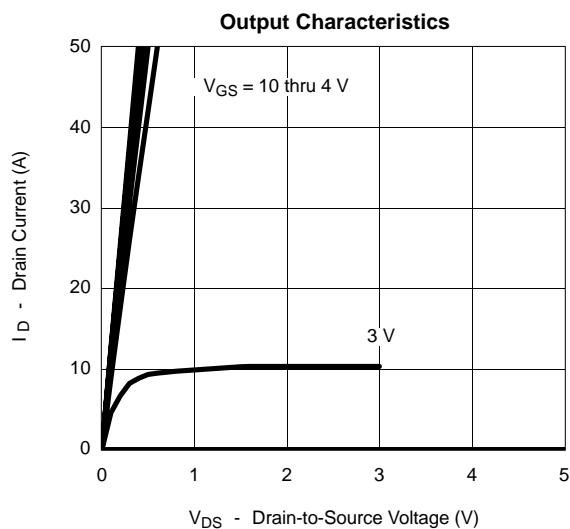
a. Surface Mounted on 1" x 1" FR4 Board.

| MOSFET 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 |        | 3.0    | 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> = 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> = 70 °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  | 40  |        |        | A    |
| Drain-Source On-State Resistance <sup>a</sup>                         | r <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 16 A  |     | 0.0079 | 0.0095 | Ω    |
|   |                     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 14 A   |     | 0.0105 | 0.0125 |      |
| Forward Transconductance <sup>a</sup>                                 | g <sub>fs</sub>     | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 16 A  |     | 60     |        | S    |
| Diode Forward Voltage <sup>a</sup>                                    | V <sub>SD</sub>     | I <sub>S</sub> = 3 A, V <sub>GS</sub> = 0 V  |     | 0.70   | 1.1    | V    |
| <b>Dynamic<sup>b</sup></b>  |                     |  |     |        |        |      |
| Total Gate Charge   | Q <sub>g</sub>      | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 16 A   |     | 13     | 18     | nC   |
| Gate-Source Charge  | Q <sub>gs</sub>     |  |     | 5      |        |      |
| Gate-Drain Charge   | Q <sub>gd</sub>     |  |     | 4.0    |        |      |
| Gate-Resistance   | R <sub>g</sub>      |  | 0.5 | 1.7    | 3.2    | Ω    |
| Turn-On Delay Time  | t <sub>d(on)</sub>  | V <sub>DD</sub> = 15 V, R <sub>L</sub> = 15 Ω<br>I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 6 Ω |     | 18     | 27     | ns   |
| Rise Time   | t <sub>r</sub>      |  |     | 12     | 18     |      |
| Turn-Off Delay Time   | t <sub>d(off)</sub> |  |     | 46     | 70     |      |
| Fall Time   | t <sub>f</sub>      |  |     | 19     | 30     |      |
| Source-Drain Reverse Recovery Time                                    | t <sub>rr</sub>     | I <sub>F</sub> = 3 A, di/dt = 100 A/μs   |     | 40     | 70     |      |

**Notes**

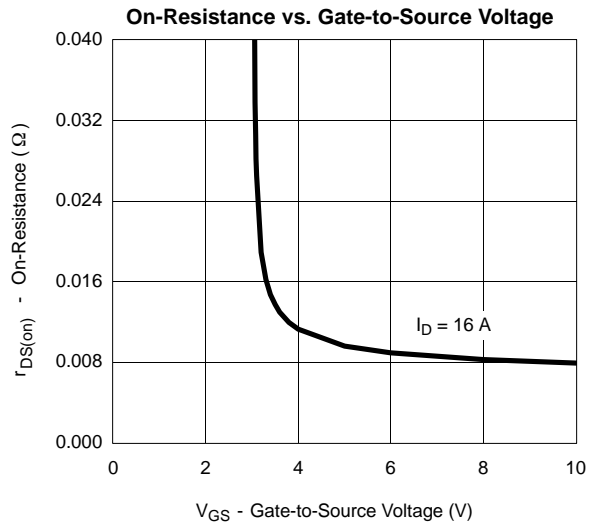
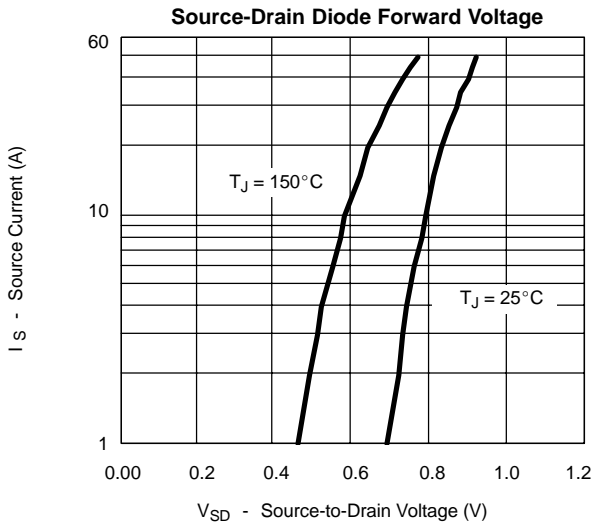
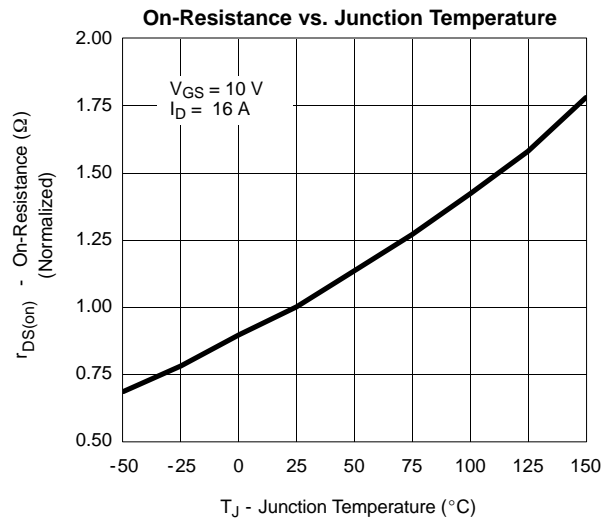
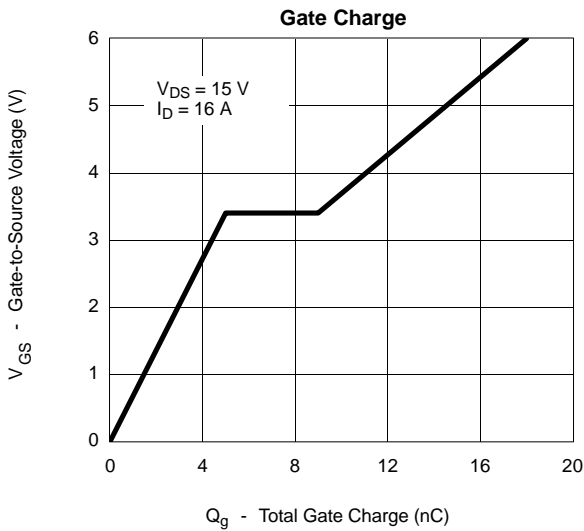
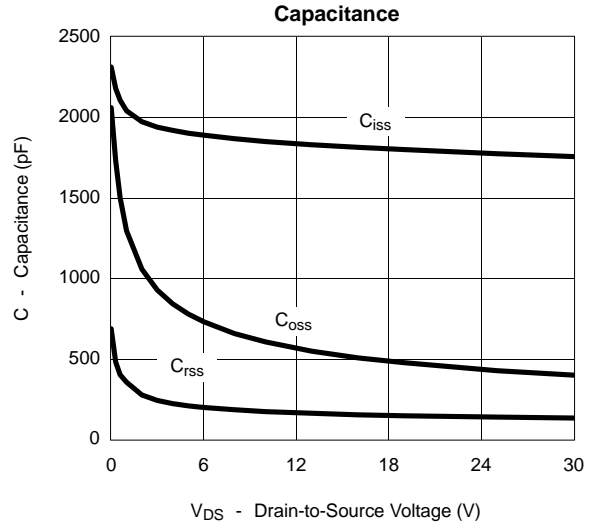
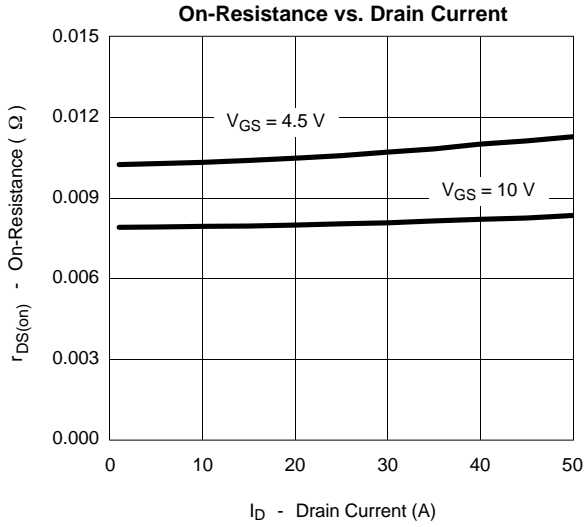
- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- b. Guaranteed by design, not subject to production testing.

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

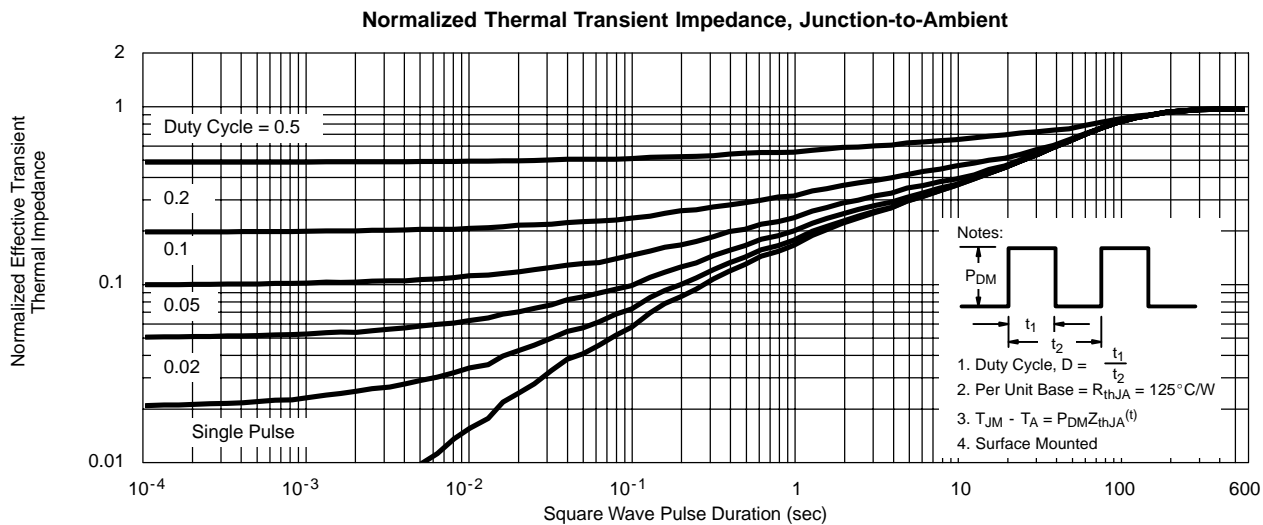
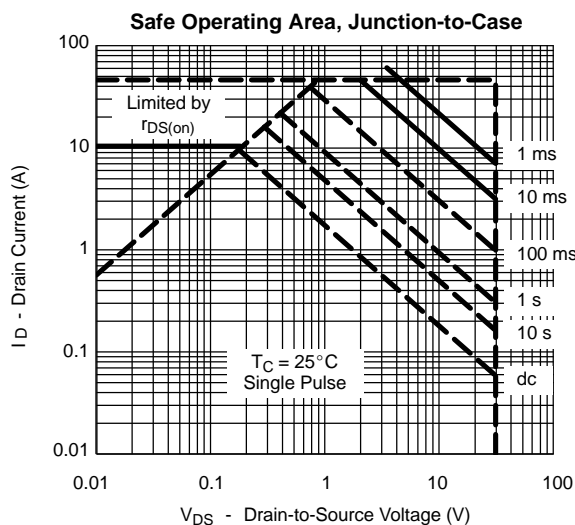
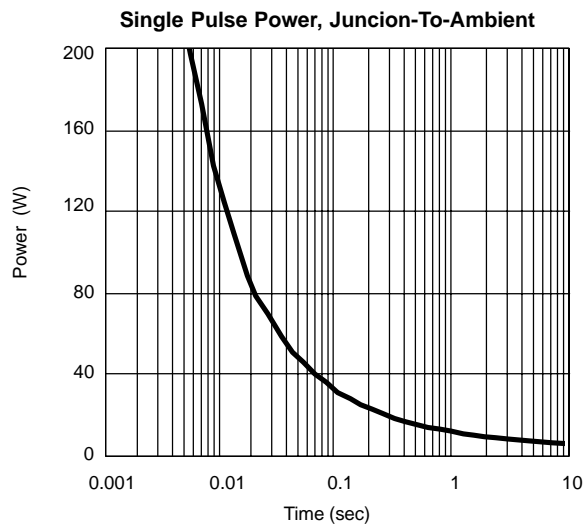
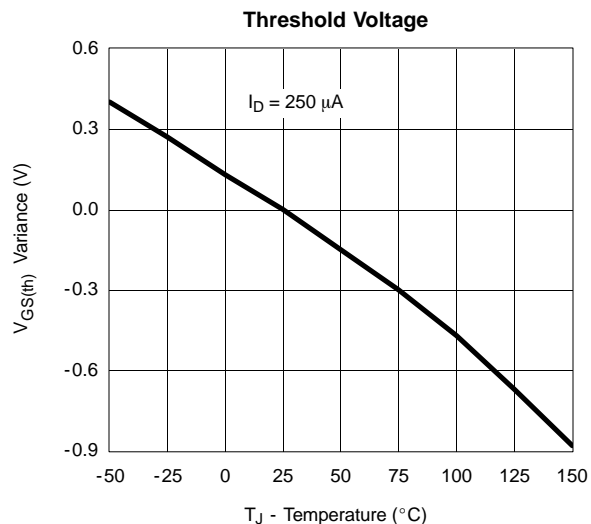




**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



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





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

