



N-Channel 30-V (D-S) Fast Switching MOSFET

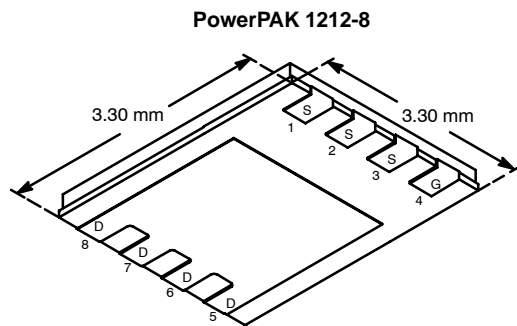
| PRODUCT SUMMARY | | |
|-----------------|---------------------------|-----------|
| V_{DS} (V) | $r_{DS(on)}$ (Ω) | I_D (A) |
| 30 | 0.0185 @ $V_{GS} = 10$ V | 10 |
| | 0.030 @ $V_{GS} = 4.5$ V | 8 |

FEATURES

- TrenchFET® Power MOSFET
- New Low Thermal Resistance PowerPAK® Package with Low 1.07-mm Profile
- 100% R_g Tested

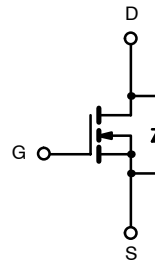
APPLICATIONS

- DC/DC Conversion



Bottom View

Ordering Information: Si7804DN-T1—E3



N-Channel MOSFET

| 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} | ± 20 | | |
| Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a | $T_A = 25^\circ\text{C}$ | I_D | 10 | 6.5 | A |
| | $T_A = 70^\circ\text{C}$ | | 7.5 | 5.0 | |
| Pulsed Drain Current | | I_{DM} | 40 | | |
| Continuous Source Current (Diode Conduction) ^a | | I_S | 2.9 | 1.2 | |
| Maximum Power Dissipation ^a | $T_A = 25^\circ\text{C}$ | P_D | 3.5 | 1.5 | W |
| | $T_A = 70^\circ\text{C}$ | | 1.9 | 0.8 | |
| 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 ^a | $t \leq 10$ sec | R_{thJA} | 28 | 35 | $^\circ\text{C}/\text{W}$ |
| | Steady State | | 65 | 81 | |
| Maximum Junction-to-Case (Drain) | Steady State | R_{thJC} | 4.5 | 6.0 | |

Notes

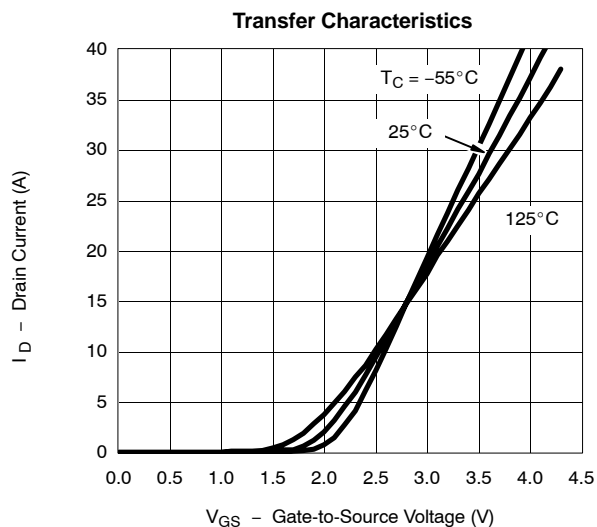
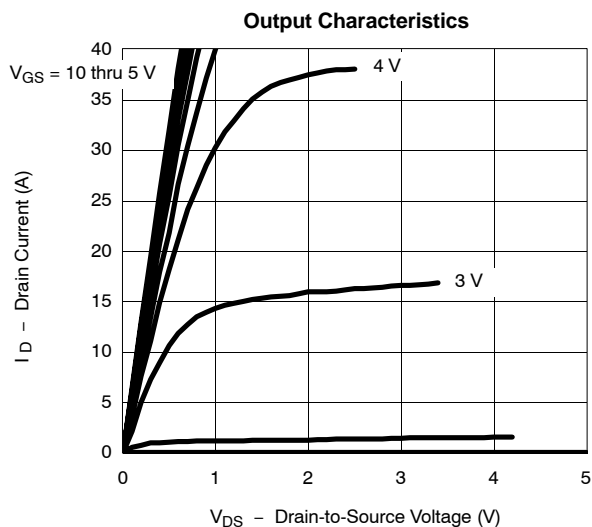
a. Surface Mounted on 1" x 1" FR4 Board.

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

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|--------------|---|-----|-------|-----------|---------------|
| Static | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$ | 0.8 | | 1.8 | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$ | | | 1 | μA |
| | | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^\circ\text{C}$ | | | 5 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} \geq 5 \text{ V}, V_{GS} = 10 \text{ V}$ | 30 | | | A |
| Drain-Source On-State Resistance ^a | $r_{DS(on)}$ | $V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$ | | 0.015 | 0.0185 | Ω |
| | | $V_{GS} = 4.5 \text{ V}, I_D = 8 \text{ A}$ | | 0.022 | 0.030 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 15 \text{ V}, I_D = 10 \text{ A}$ | | 16 | | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 2.9 \text{ A}, V_{GS} = 0 \text{ V}$ | | 0.75 | 1.2 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 15 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 10 \text{ A}$ | | 8.7 | 13 | nC |
| Gate-Source Charge | Q_{gs} | | | 1.5 | | |
| Gate-Drain Charge | Q_{gd} | | | 3.5 | | |
| Gate Resistance | R_g | | 0.5 | 1.4 | 2.2 | Ω |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 15 \text{ V}, R_L = 15 \Omega$ $I_D \cong 1 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 6 \Omega$ | | 8 | 15 | ns |
| Rise Time | t_r | | | 12 | 20 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 32 | 50 | |
| Fall Time | t_f | | | 14 | 25 | |
| Source-Drain Reverse Recovery Time | t_{rr} | $I_F = 2.9 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$ | | 30 | 60 | |

Notes

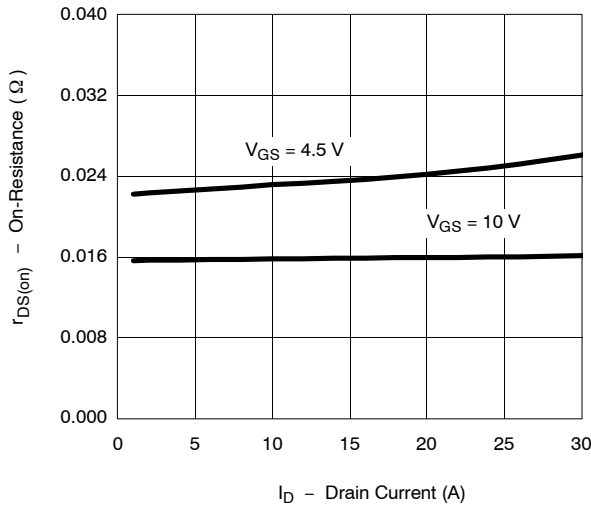
- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

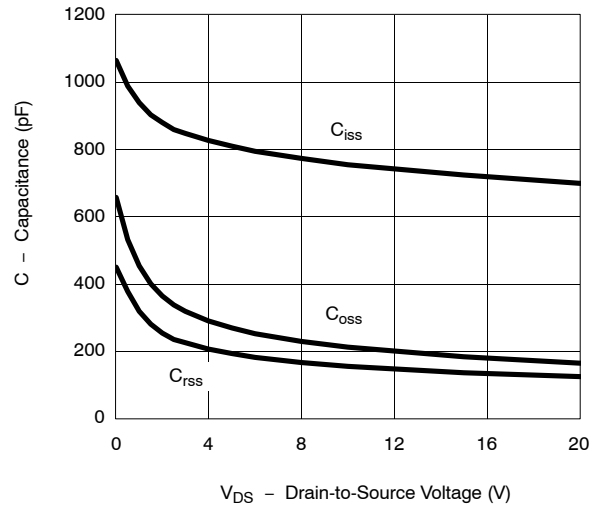


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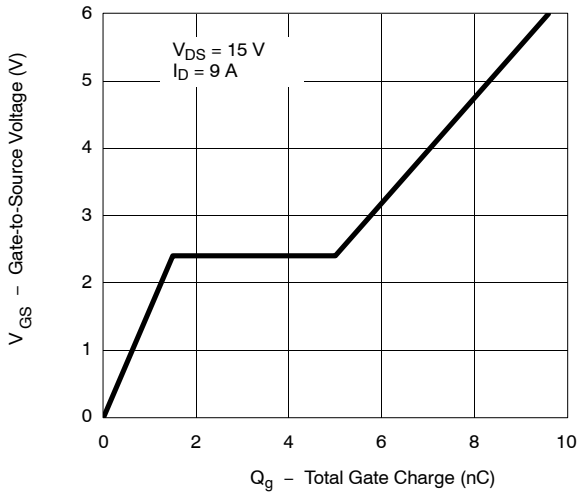
On-Resistance vs. Drain Current



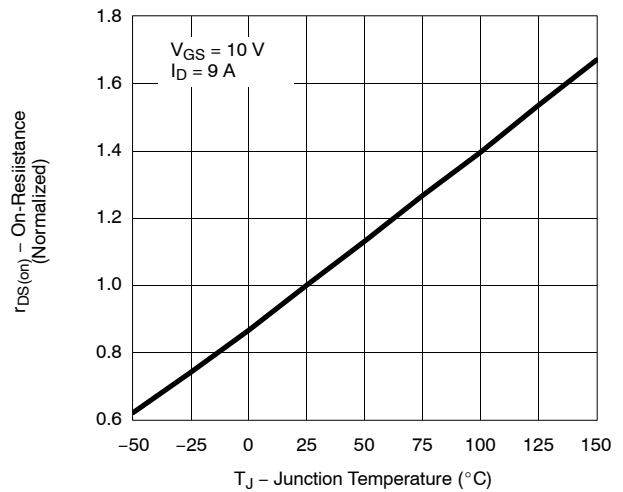
Capacitance



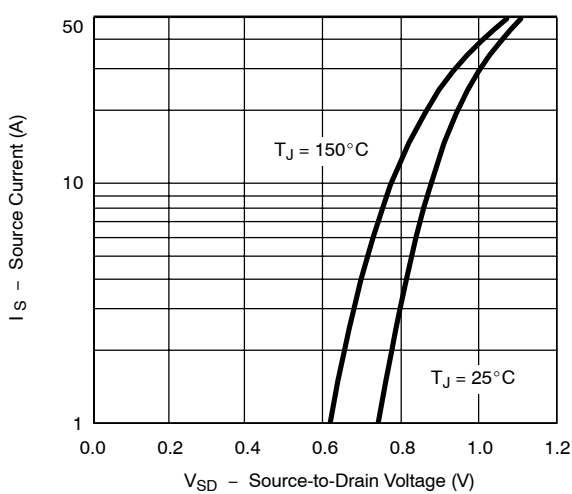
Gate Charge



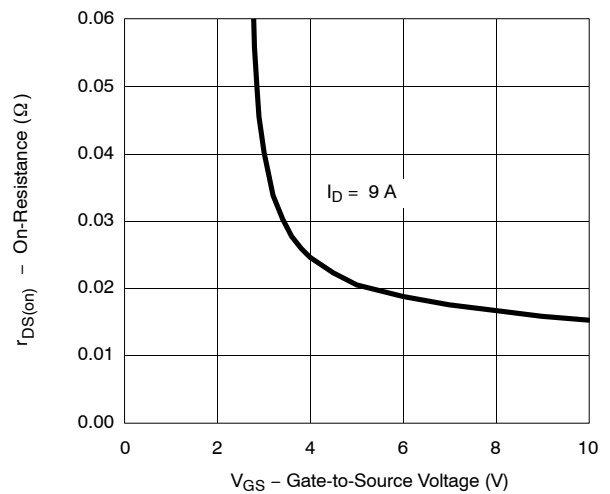
On-Resistance vs. Junction Temperature



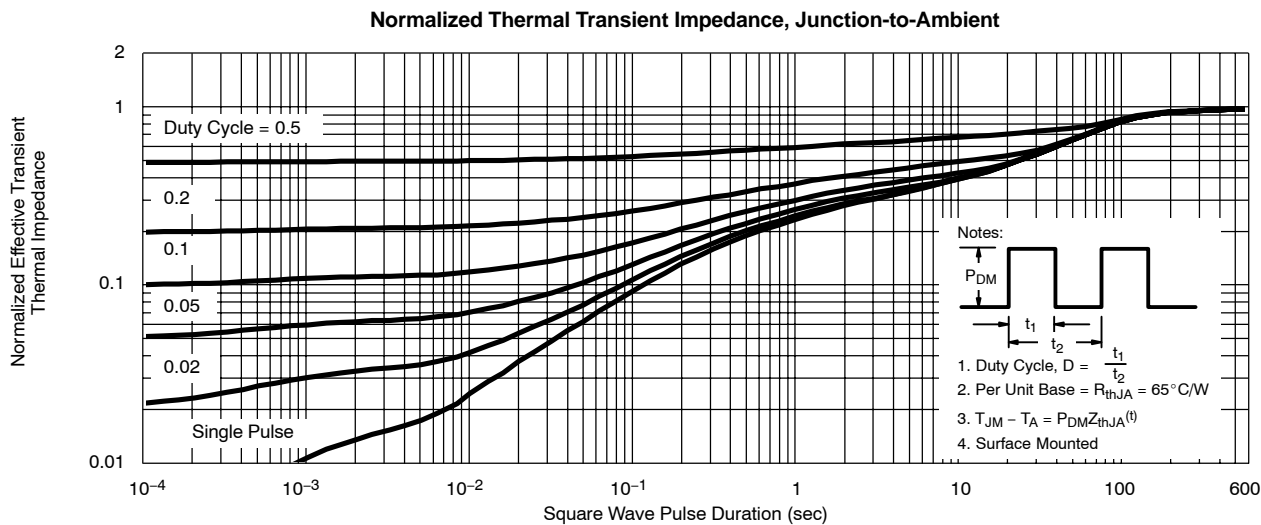
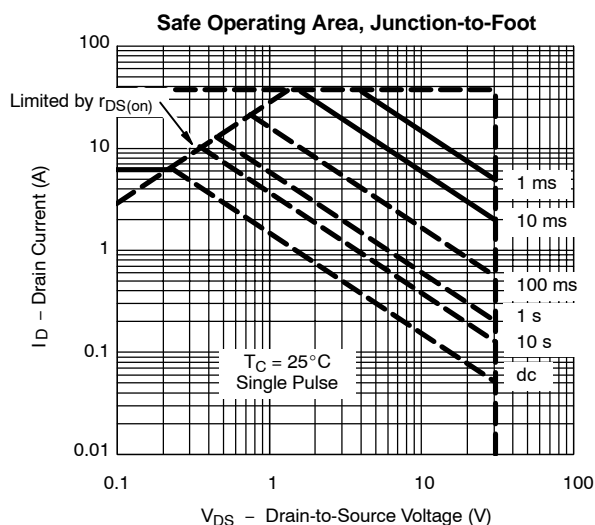
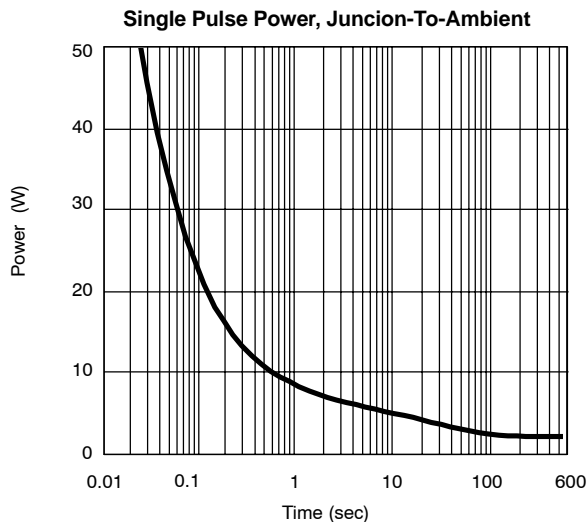
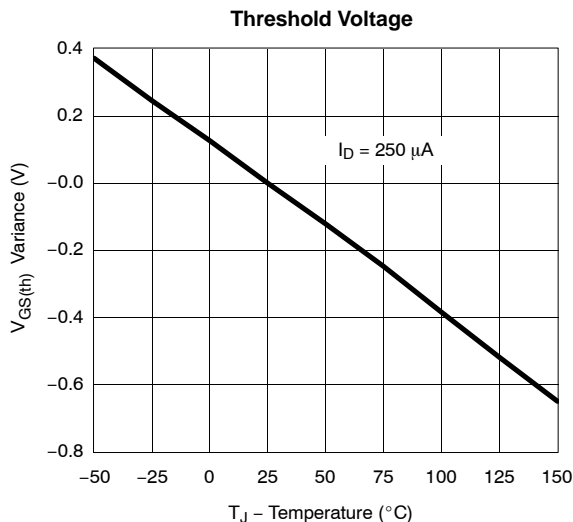
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

