



N-Channel 150-V (D-S) MOSFET

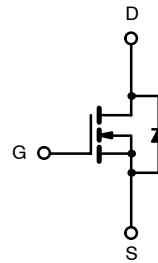
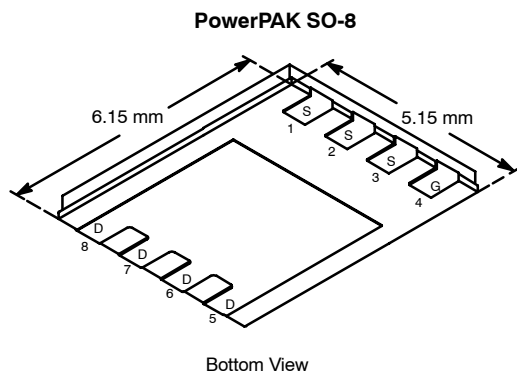
| PRODUCT SUMMARY | | |
|------------------------|---------------------------|-----------|
| V_{DS} (V) | $r_{DS(on)}$ (Ω) | I_D (A) |
| 150 | 0.050 @ $V_{GS} = 10$ V | 6.7 |

FEATURES

- TrenchFET® Power MOSFETS
- New Low Thermal Resistance PowerPAK® Package with Low 1.07-mm Profile
- PWM Optimized for Fast Switching
- 100% R_g Tested

APPLICATIONS

- Primary Side Switch for High Density DC/DC
- Telecom/Server 48-V DC/DC
- Industrial and 42-V Automotive



N-Channel MOSFET

Ordering Information: Si7846DP-T1

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) | | | | | |
|--|--------------------------|----------------|------------|--------------|------------------|
| Parameter | | Symbol | 10 secs | Steady State | Unit |
| Drain-Source Voltage | | V_{DS} | 150 | | 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 | 6.7 | 4.0 | A |
| | $T_A = 70^\circ\text{C}$ | | 5.4 | 3.3 | |
| Pulsed Drain Current | | I_{DM} | 50 | | |
| Avalanch Current | | I_{AS} | 25 | | |
| Continuous Source Current (Diode Conduction) ^a | | I_S | 4.3 | 1.6 | |
| Maximum Power Dissipation ^a | $T_A = 25^\circ\text{C}$ | P_D | 5.2 | 1.9 | W |
| | $T_A = 70^\circ\text{C}$ | | 3.3 | 1.2 | |
| 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} | 19 | 24 | $^\circ\text{C/W}$ |
| | Steady State | | 52 | 65 | |
| Maximum Junction-to-Foot (Drain) | Steady State | R_{thJF} | 1.5 | 1.8 | |

Notes

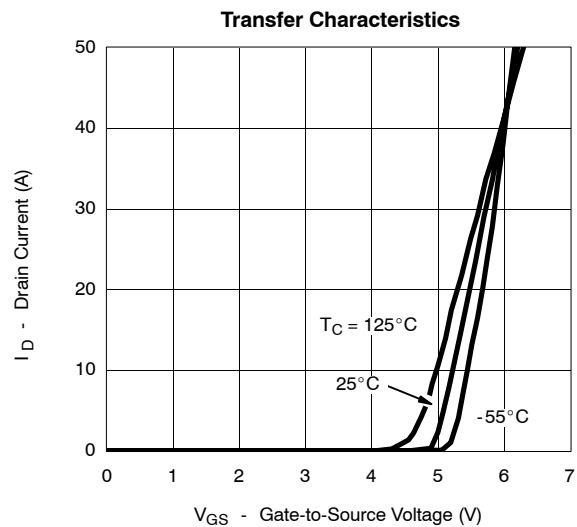
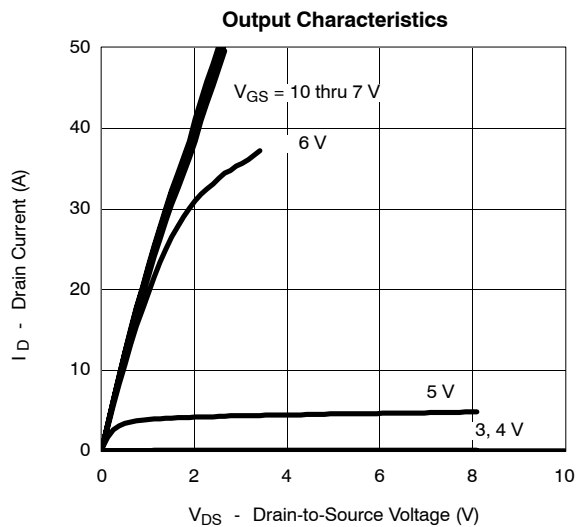
a. Surface Mounted on 1" x 1" FR4 Board.

| SPECIFICATIONS (T _J = 25 °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 μA | 2.0 | | | V |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±20 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 120 V, V _{GS} = 0 V | | | 1 | μA |
| | | V _{DS} = 120 V, V _{GS} = 0 V, T _J = 55 °C | | | 5 | |
| On-State Drain Current ^a | I _{D(on)} | V _{DS} ≥ 5 V, V _{GS} = 10 V | 50 | | | A |
| Drain-Source On-State Resistance ^a | r _{DS(on)} | V _{GS} = 10 V, I _D = 5 A | | 0.041 | 0.050 | Ω |
| Forward Transconductance ^a | g _{fs} | V _{DS} = 15 V, I _D = 5 A | | 18 | | S |
| Diode Forward Voltage ^a | V _{SD} | I _S = 2.8 A, V _{GS} = 0 V | | 0.75 | 1.1 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q _g | V _{DS} = 75 V, V _{GS} = 10 V, I _D = 5 A | | 30 | 36 | nC |
| Gate-Source Charge | Q _{gs} | | | 8.5 | | |
| Gate-Drain Charge | Q _{gd} | | | 8.5 | | |
| Gate Resistance | R _g | | 0.2 | 0.85 | 1.4 | Ω |
| Turn-On Delay Time | t _{d(on)} | V _{DD} = 75 V, R _L = 15 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _G = 6 Ω | | 12 | 18 | ns |
| Rise Time | t _r | | | 7 | 11 | |
| Turn-Off Delay Time | t _{d(off)} | | | 22 | 33 | |
| Fall Time | t _f | | | 10 | 15 | |
| Source-Drain Reverse Recovery Time | t _{rr} | I _F = 2.8 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.

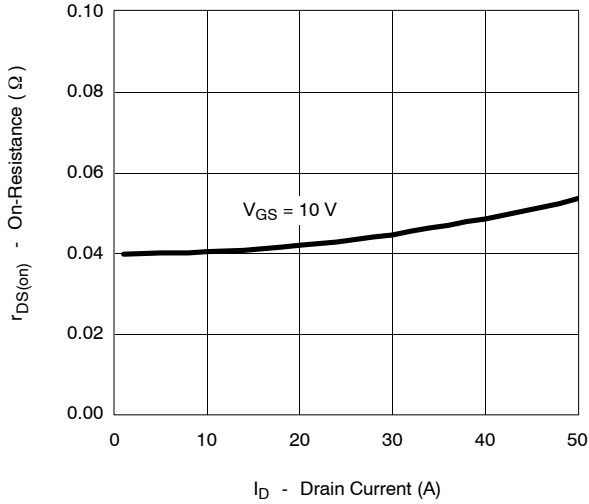
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



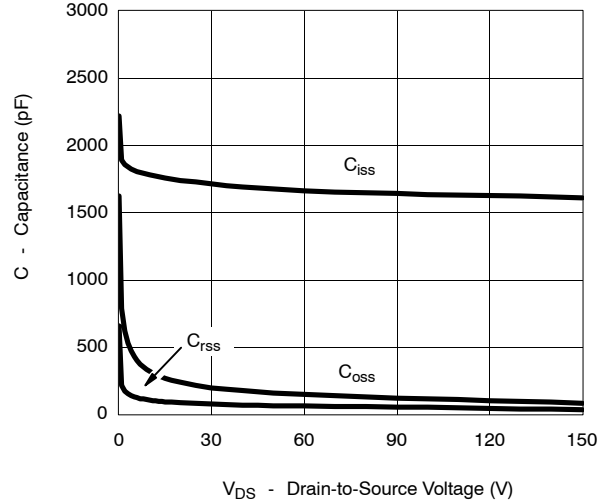


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

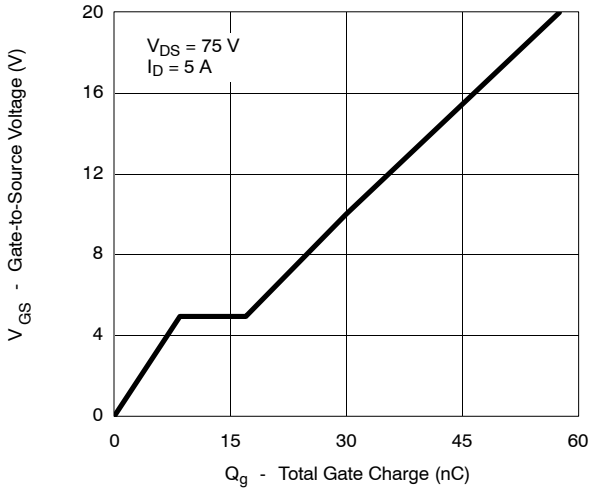
On-Resistance vs. Drain Current



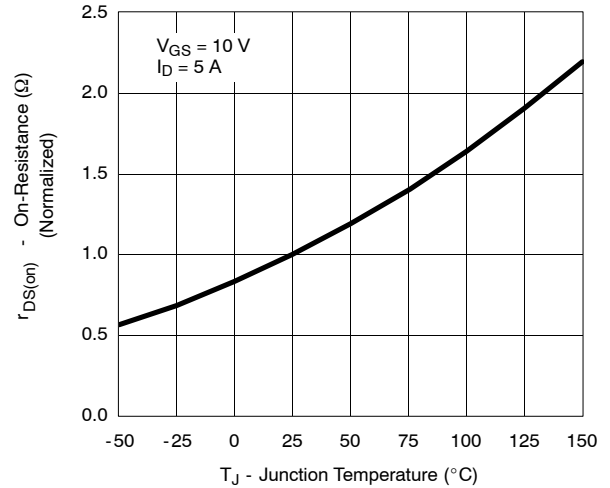
Capacitance



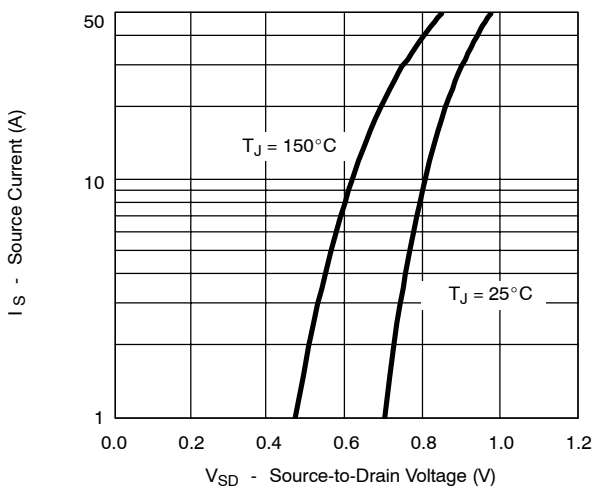
Gate Charge



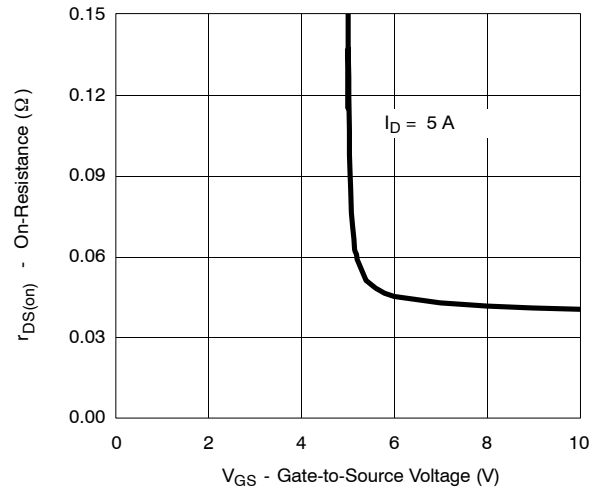
On-Resistance vs. Junction Temperature



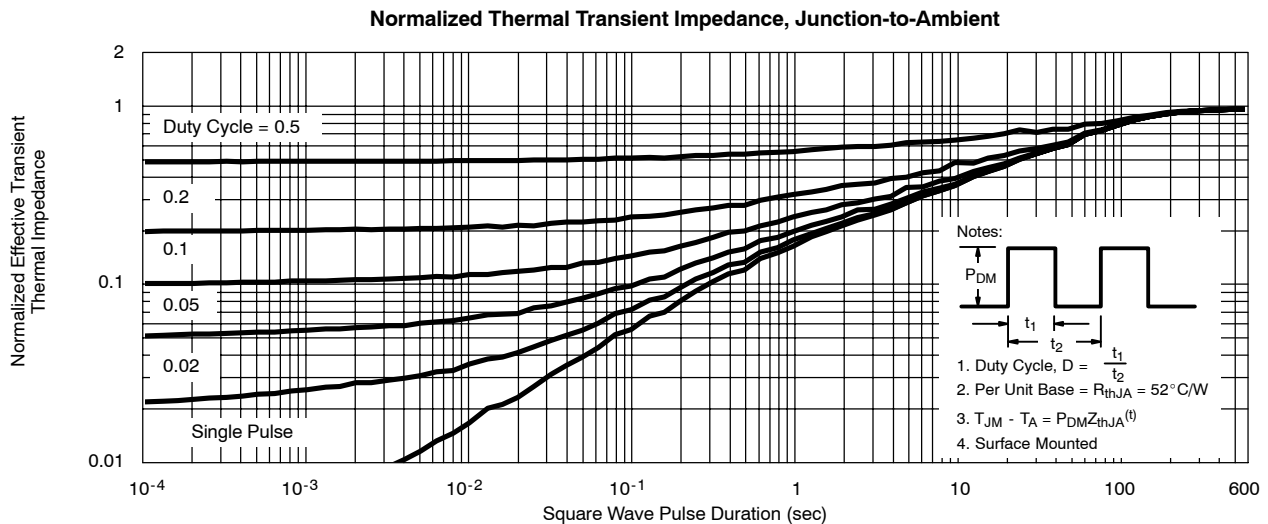
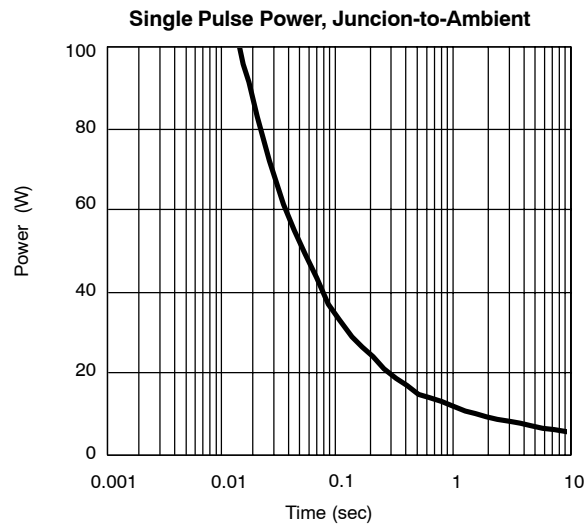
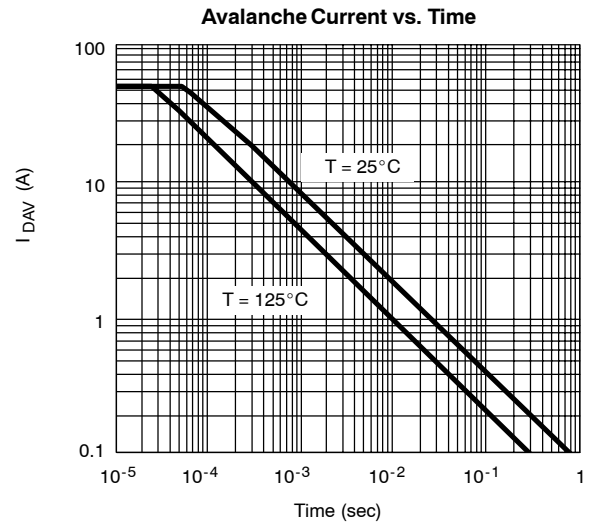
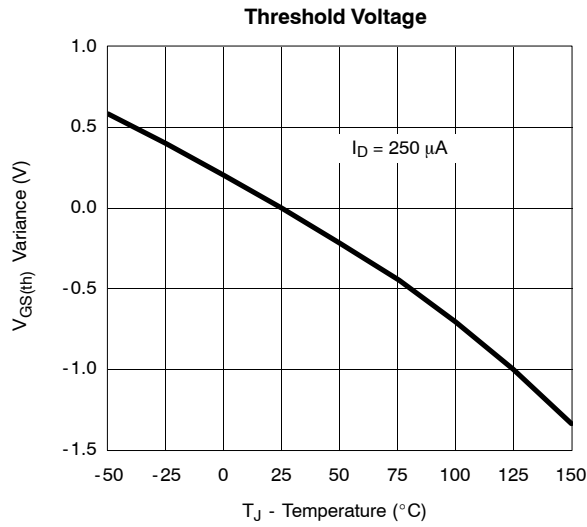
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

