# Dual P-Channel 12-V (D-S) MOSFET

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A) |
| -12 | 0.018 @ $V_{GS}$ = -4.5 V | -11.7 |
| | 0.022 @ $V_{GS}$ = -2.5 V | -10.6 |
| | 0.029 @ $V_{GS}$ = -1.8 V | -3.5 |

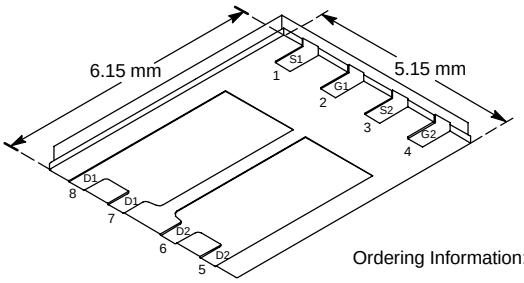
## FEATURES

- TrenchFET® Power MOSFET
- New Low Thermal Resistance PowerPAK® Package with Low 1.07-mm Profile

## APPLICATIONS

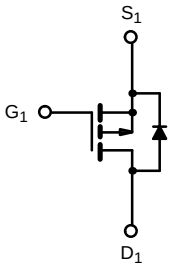
- Load Switch

**PowerPAK SO-8**

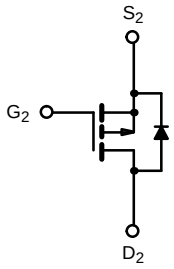



Bottom View

Ordering Information: Si7971DP-T1




P-Channel MOSFET




P-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C UNLESS OTHERWISE NOTED) | | | | | |
|---|---|---|---|---|---|
| Parameter | | Symbol | 10 secs | Steady State | Unit |
| Drain-Source Voltage | | $V_{DS}$ | -12 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±8 | | |
| Continuous Drain Current ($T_J$ = 150°C)[a] | $T_A$ = 25°C | $I_D$ | -11.7 | -7.5 | A |
| | $T_A$ = 70°C | | -9.4 | -6.0 | |
| Pulsed Drain Current | | $I_{DM}$ | -30 | | |
| continuous Source Current (Diode Conduction)[a] | | $I_S$ | -2.9 | -1.2 | |
| Maximum Power Dissipation[a] | $T_A$ = 25°C | $P_D$ | 3.5 | 1.4 | W |
| | $T_A$ = 70°C | | 2.2 | 0.9 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to 150 | | °C |

| THERMAL RESISTANCE RATINGS | | | | | |
|---|---|---|---|---|---|
| Parameter | | Symbol | Typical | Maximum | Unit |
| Maximum Junction-to-Ambient[a] | t ≤ 10 sec | $R_{thJA}$ | 26 | 35 | °C/W |
| | Steady State | | 60 | 85 | |
| Maximum Junction-to-Case (Drain) | Steady State | $R_{thJC}$ | 3 | 3.7 | |

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

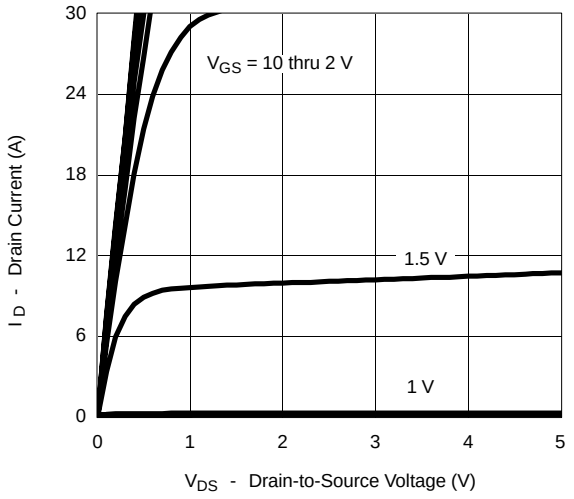
## SPECIFICATIONS ($T_J$ = 25°C UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = -450 µA | -0.40 | | -1.0 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±8 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = -9.6 V, $V_{GS}$ = 0 V | | | -1 | µA |
| | | $V_{DS}$ = -9.6 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | -5 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ ≤ -5 V, $V_{GS}$ = -4.5 V | -30 | | | A |
| Drain-Source On-State Resistance[a] | $r_{DS(on)}$ | $V_{GS}$ = -4.5 V, $I_D$ = -11.7 A | | 0.014 | 0.018 | Ω |
| | | $V_{GS}$ = -2.5 V, $I_D$ = -10.6 A | | 0.018 | 0.022 | |
| | | $V_{GS}$ = -1.8 V, $I_D$ = -3.5 A | | 0.023 | 0.029 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = -15 V, $I_D$ = -11.7 A | | 37 | | S |
| Diode Forward Voltage[a] | $V_{SD}$ | $I_S$ = -2.9 A, $V_{GS}$ = 0 V | | -0.7 | -1.2 | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = -6 V, $V_{GS}$ = -4.5 V, $I_D$ = -11.7 A | | 39 | 60 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 6.5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 10 | | |
| Gate Resistance | $R_g$ | | | 9.4 | | Ω |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = -6 V, $R_L$ = 6 Ω<br>$I_D$ ≅ -1 A, $V_{GEN}$ = -4.5 V, $R_G$ = 6 Ω | | 38 | 60 | ns |
| Rise Time | $t_r$ | | | 60 | 90 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 280 | 420 | |
| Fall Time | $t_f$ | | | 210 | 320 | |
| Source-Drain Reverse Recovery Time | $t_{rr}$ | $I_F$ = -2.9 A, di/dt = 100 A/µs | | 120 | 180 | |

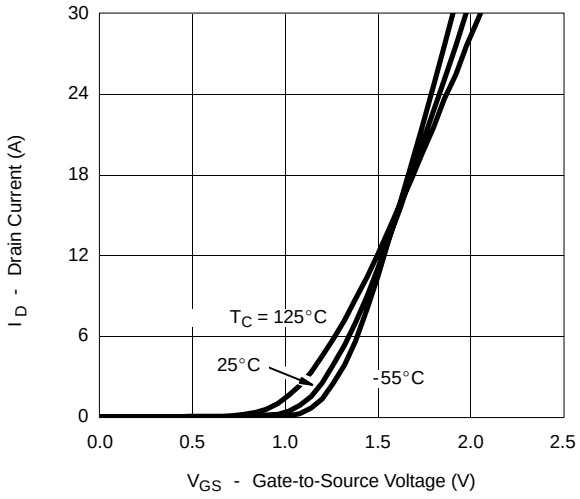
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

**Output Characteristics**

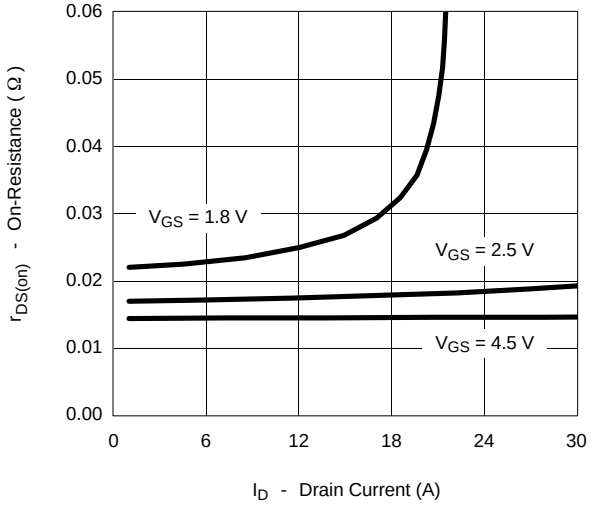



**Transfer Characteristics**

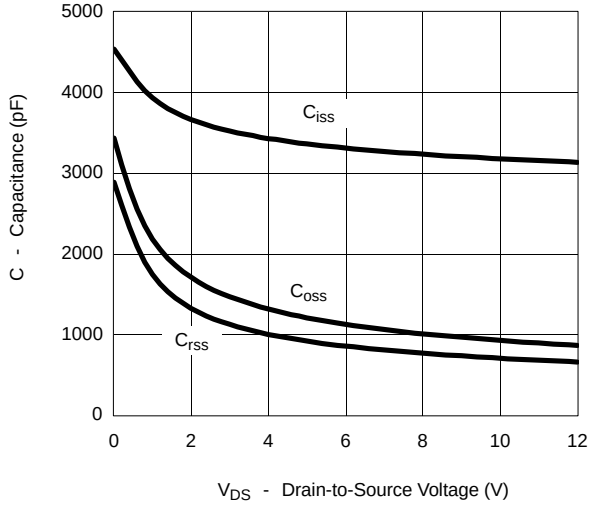


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

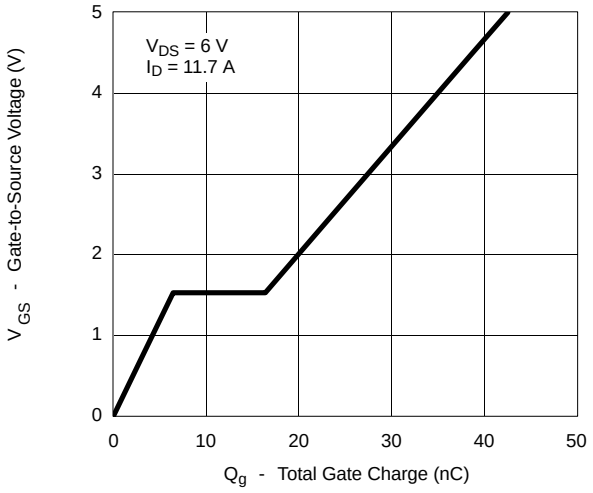
**On-Resistance vs. Drain Current**



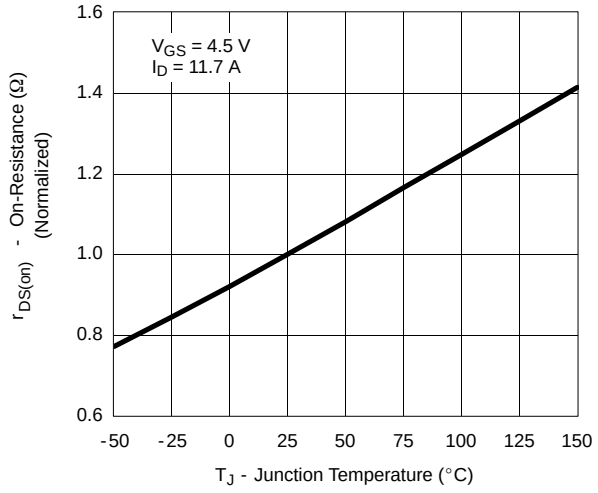

**Capacitance**



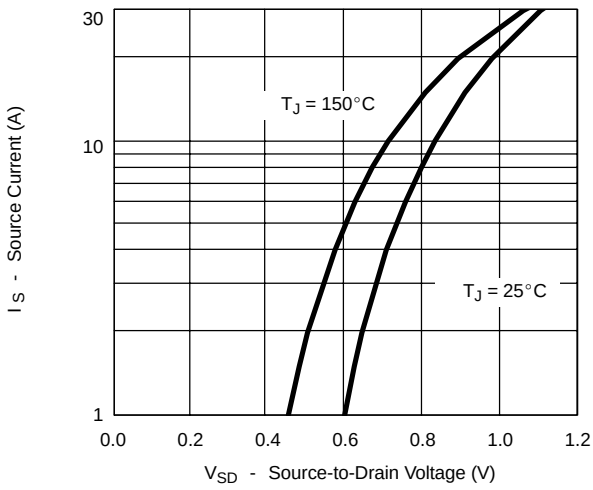

**Gate Charge**



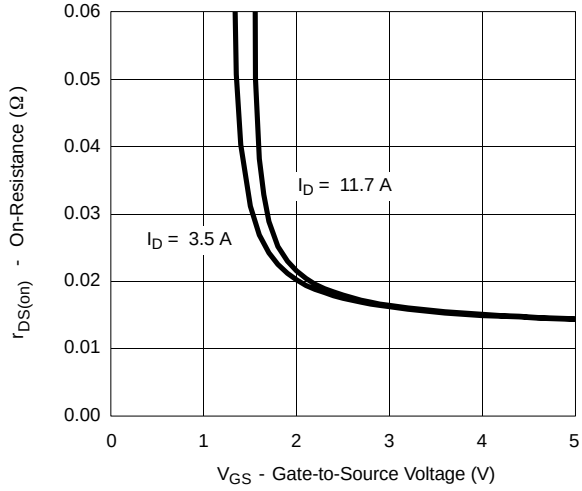

**On-Resistance vs. Junction Temperature**




**Source-Drain Diode Forward Voltage**

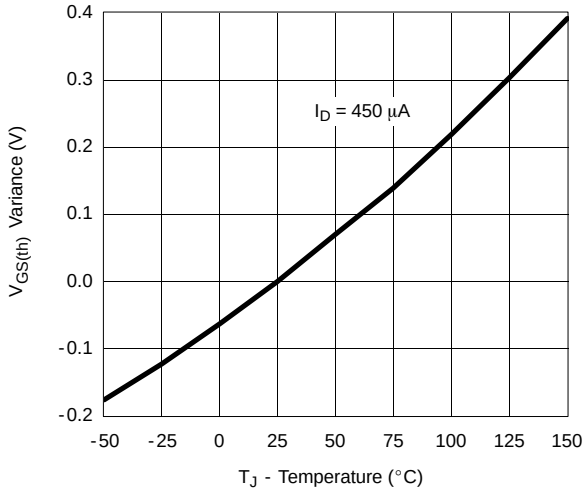



**On-Resistance vs. Gate-to-Source Voltage**

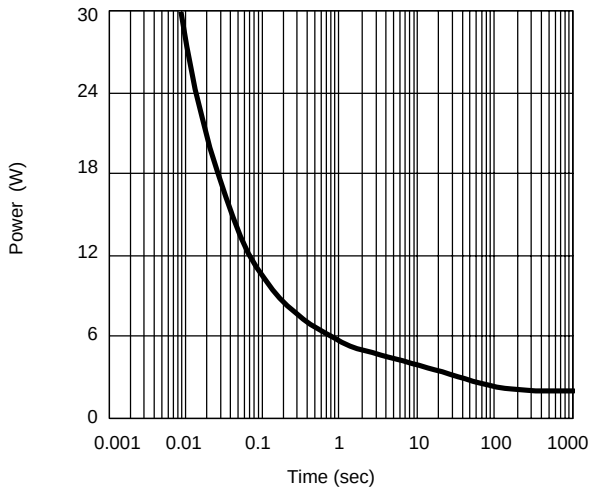


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

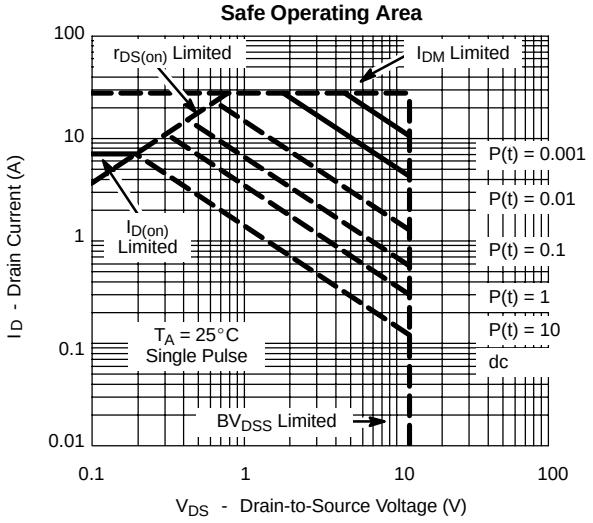
**Threshold Voltage**



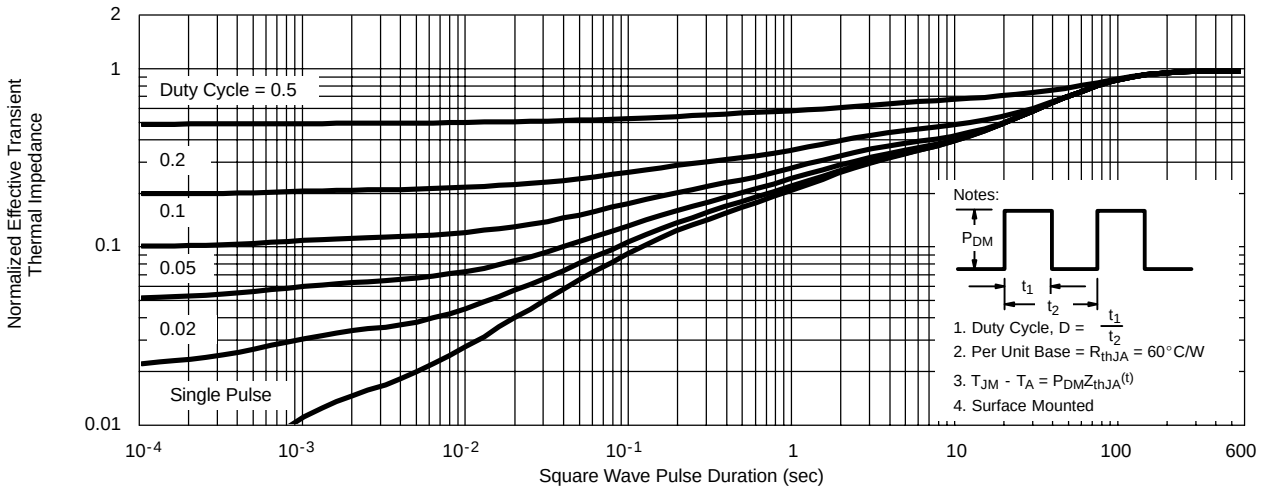

**Single Pulse Power, Junction-to-Ambient**




**Safe Operating Area**




**Normalized Thermal Transient Impedance, Junction-to-Ambient**








Document Number: 72357
S-31610—Rev. A, 11-Aug-03

## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)