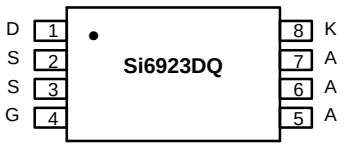
# P-Channel 2.5-V (G-S) MOSFET with Schottky Diode

| MOSFET PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A) |
| –20 | 0.050 @ $V_{GS}$ = –4.5 V | ±3.5 |
| | 0.085 @ $V_{GS}$ = –2.5 V | ±2.7 |

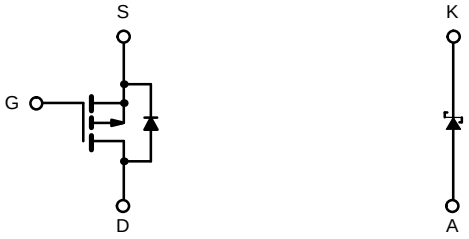
| SCHOTTKY PRODUCT SUMMARY | | |
|---|---|---|
| $V_{KA}$ (V) | $V_f$ (V) Diode Forward Voltage | $I_F$ (A) |
| 20 | 0.5 V @ 1 A | 1.5 |

LITTLE FOOT Plus™

**TSSOP-8**




Top View




| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C UNLESS OTHERWISE NOTED) | | | | |
|---|---|---|---|---|
| Parameter | | Symbol | Limit | Unit |
| Drain-Source Voltage (MOSFET and Schottky) | | $V_{DS}$ | –20 | V |
| Reverse Voltage (Schottky) | | $V_{KA}$ | 20 | |
| Gate-Source Voltage (MOSFET) | | $V_{GS}$ | ±12 | |
| Continuous Drain Current ($T_J$ = 150°C) (MOSFET)[a, b] | $T_A$ = 25°C | $I_D$ | ±3.5 | A |
| | $T_A$ = 70°C | | ±2.8 | |
| Pulsed Drain Current (MOSFET) | | $I_{DM}$ | ±30 | |
| Continuous Source Current (MOSFET Diode Conduction)[a, b] | | $I_S$ | –1.25 | |
| Average Foward Current (Schottky) | | $I_F$ | 1.5 | |
| Pulsed Foward Current (Schottky) | | $I_{FM}$ | 30 | |
| Maximum Power Dissipation (MOSFET)[a, b] | $T_A$ = 25°C | $P_D$ | 1.2 | W |
| | $T_A$ = 70°C | | 0.76 | |
| Maximum Power Dissipation (Schottky)[a, b] | $T_A$ = 25°C | | 1.0 | |
| | $T_A$ = 70°C | | 0.64 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | –55 to 150 | °C |

| THERMAL RESISTANCE RATINGS | | | | | |
|---|---|---|---|---|---|
| Parameter | Device | Symbol | Typical | Maximum | Unit |
| Maximum Junction-to-Ambient (t ≤ 10 sec)[a] | MOSFET | $R_{thJA}$ | | 105 | °C/W |
| | Schottky | | | 125 | |
| Maximum Junction-to-Ambient (t = steady state)[a] | MOSFET | | 115 | | |
| | Schottky | | 130 | | |

Notes
a. Surface Mounted on FR4 Board.
b. t ≤ 10 sec.

## MOSFET 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 | –0.6 | | | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±12 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = –20 V, $V_{GS}$ = 0 V | | | –1 | µA |
| | | $V_{DS}$ = –20 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | –25 | |
| 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, $I_D$ = –3.5 A | | 0.040 | 0.050 | Ω |
| | | $V_{GS}$ = –2.5 V, $I_D$ = –2.7 A | | 0.06 | 0.085 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = –10 V, $I_D$ = –3.5 A | | 10 | | S |
| Diode Forward Voltage[a] | $V_{SD}$ | $I_S$ = –1.25 A, $V_{GS}$ = 0 V | | –0.72 | –1.2 | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = –10 V, $V_{GS}$ = –10 V, $I_D$ = –3.5 A | | 14.5 | 25 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 3.5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 3.5 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = –10 V, $R_L$ = 10 Ω<br>$I_D$ ≅ –1 A, $V_{GEN}$ = –4.5 V, $R_G$ = 6 Ω | | 27 | 50 | ns |
| Rise Time | $t_r$ | | | 30 | 60 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 57 | 100 | |
| Fall Time | $t_f$ | | | 21 | 40 | |
| Source-Drain Reverse Recovery Time | $t_{rr}$ | $I_F$ = –1.25 A, di/dt = 100 A/µs | | 60 | 100 | |

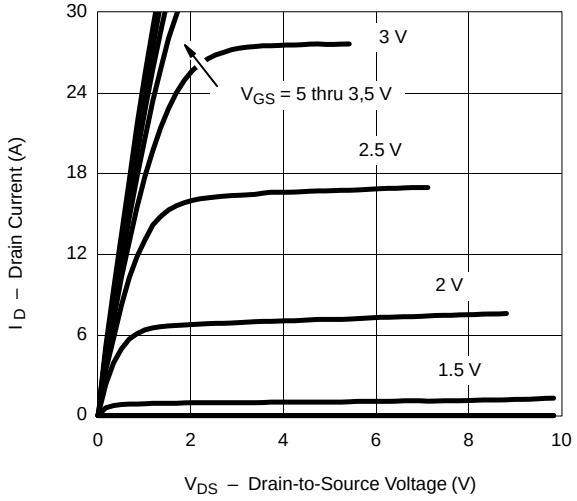
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

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

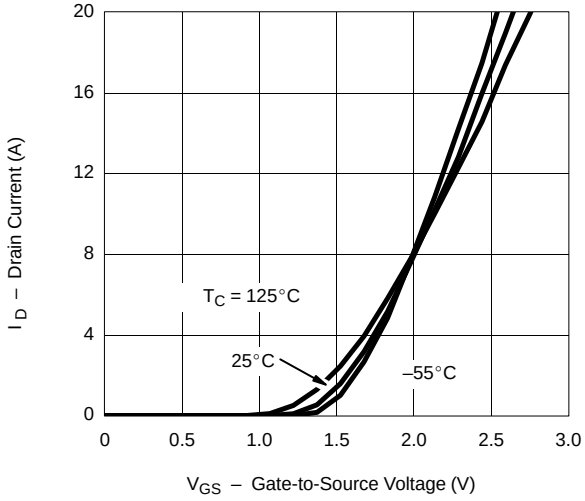
| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Forward Voltage Drop | $V_F$ | $I_F$ = 1 A | | 0.45 | 0.5 | V |
| | | $I_F$ = 1 A, $T_J$ = 125°C | | 0.36 | 0.42 | |
| Maximum Reverse Leakage Current | $I_{rm}$ | $V_r$ = 20 V | | 0.003 | 0.100 | mA |
| | | $V_r$ = 20 V, $T_J$ = 75°C | | 0.1 | 1 | |
| | | $V_r$ = 20 V, $T_J$ = 125°C | | 2 | 10 | |
| Junction Capacitance | $C_T$ | $V_r$ = 10 V | | 62 | | pF |

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

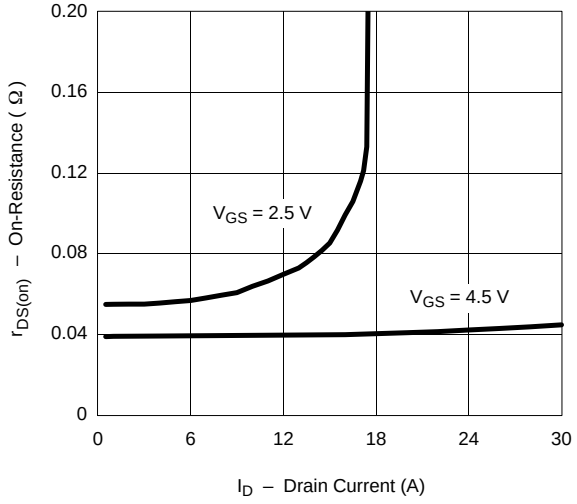
**Output Characteristics**



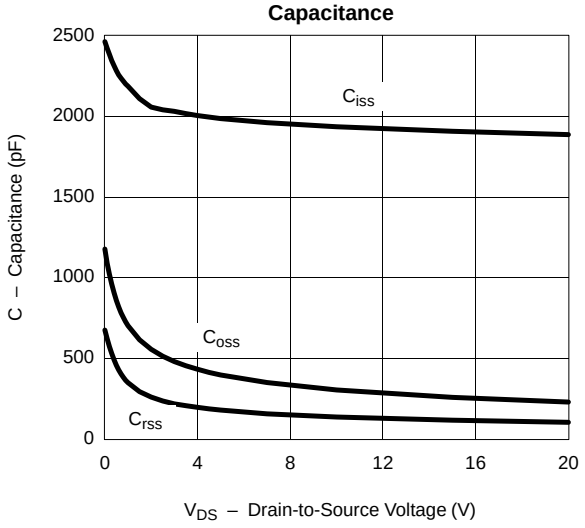

**Transfer Characteristics**



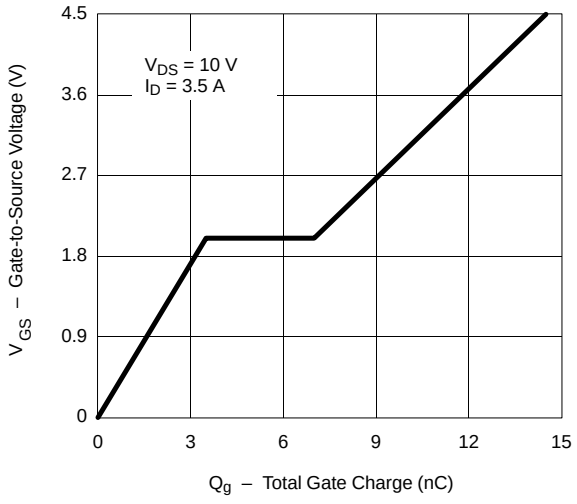

**On-Resistance vs. Drain Current**



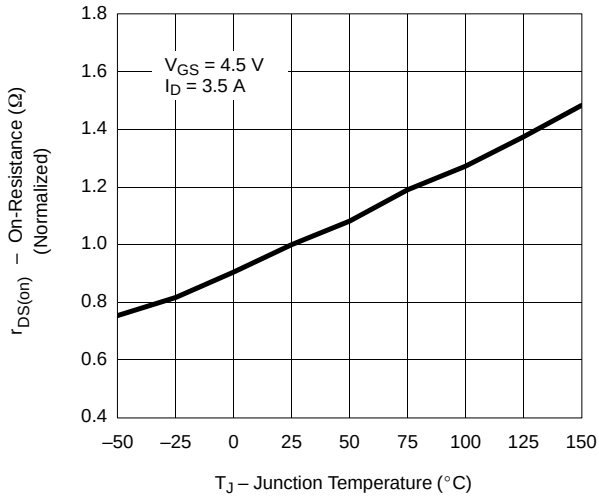

**Capacitance**




**Gate Charge**

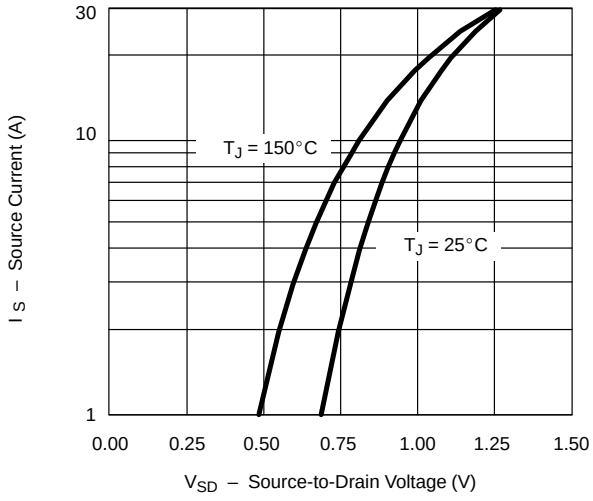



**On-Resistance vs. Junction Temperature**

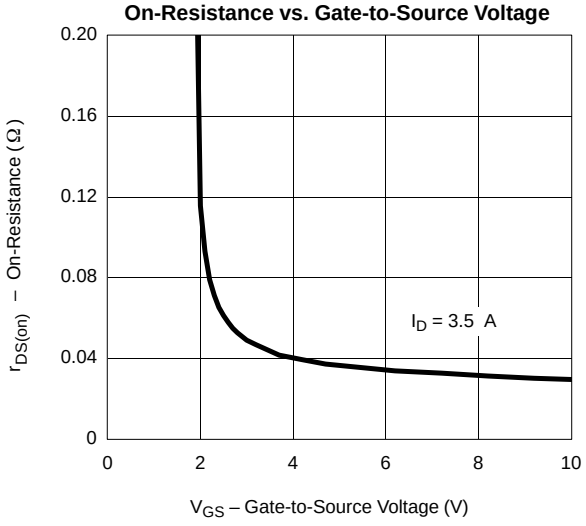


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) MOSFET

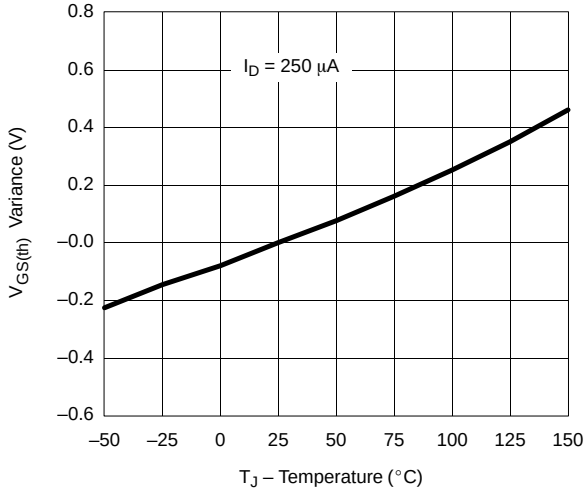
**Source-Drain Diode Forward Voltage**



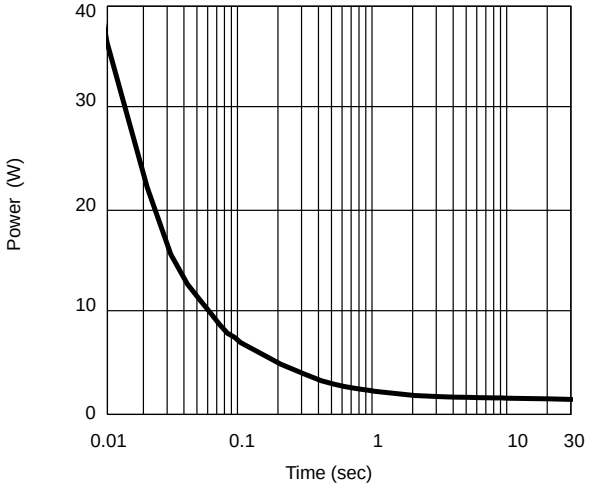

**On-Resistance vs. Gate-to-Source Voltage**



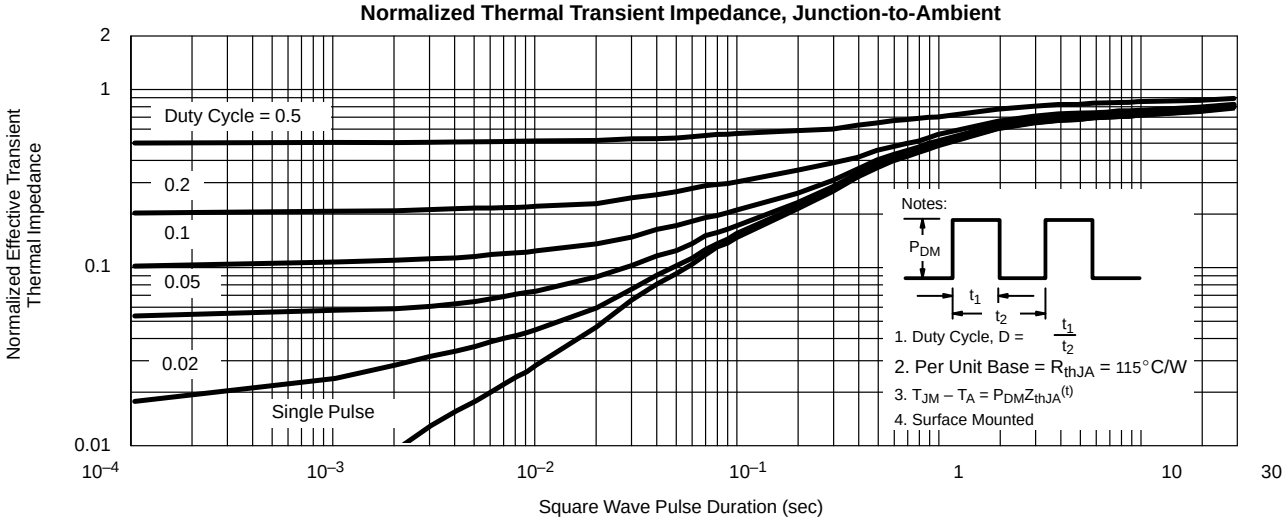

**Threshold Voltage**




**Single Pulse Power**

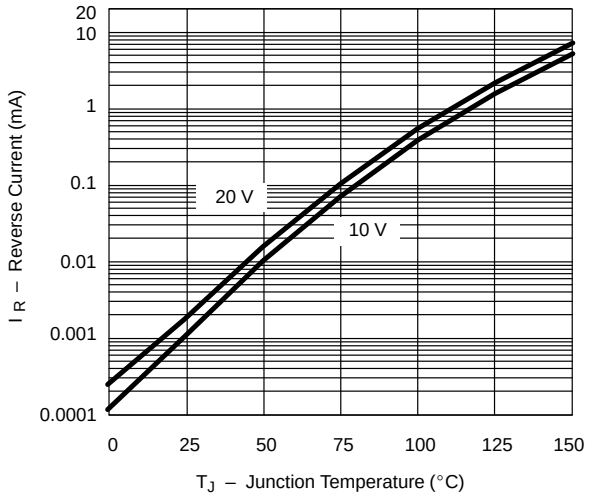



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

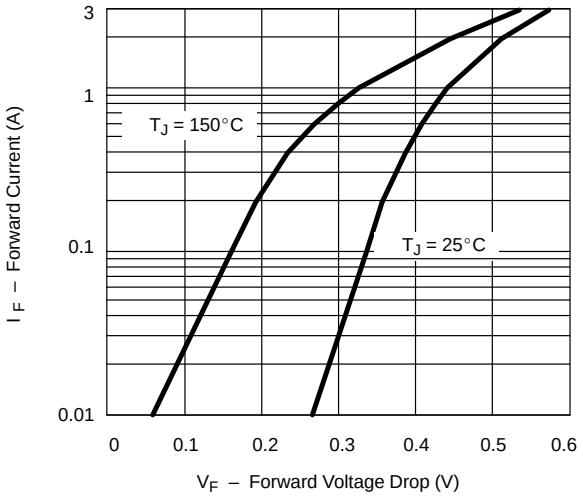


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED) SCHOTTKY

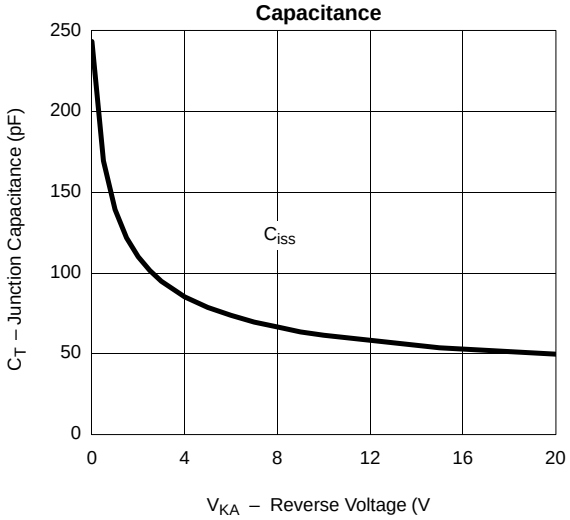
**Reverse Current vs. Junction Temperature**




**Forward Voltage Drop**




**Capacitance**




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