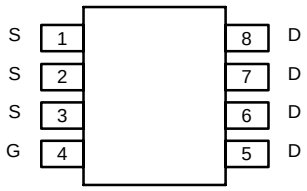
# N-Channel Reduced $Q_g$, Fast Switching MOSFET

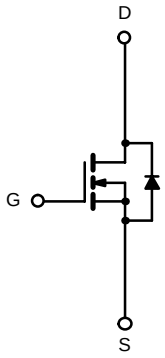
| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A) |
| 60 | 0.022 @ $V_{GS}$ = 10 V | 8.5 |
| | 0.031 @ $V_{GS}$ = 4.5 V | 7.2 |

175°C Rated Maximum Junction Temperature
TrenchFET® Power MOSFETs

**SO-8**




Top View




N-Channel MOSFET

Ordering Information: Si4850EY
Si4850EY-T1 (with Tape and Reel)

| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C UNLESS OTHERWISE NOTED) | | | | | |
|---|---|---|---|---|---|
| Parameter | | Symbol | 10 secs | Steady State | Unit |
| Drain-Source Voltage | | $V_{DS}$ | 60 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | | |
| Continuous Drain Current ($T_J$ = 175°C)[a] | $T_A$ = 25°C | $I_D$ | 8.5 | 6.0 | A |
| | $T_A$ = 70°C | | 7.1 | 5.0 | |
| Pulsed Drain Current | | $I_{DM}$ | 40 | | |
| Avalanche Current[b] | | $I_{AS}$ | 15 | | |
| Repetitive Avalanche Energy[b] | | $E_{AS}$ | 11 | | mJ |
| Maximum Power Dissipation[a] | $T_A$ = 25°C | $P_D$ | 3.3 | 1.7 | W |
| | $T_A$ = 70°C | | 2.3 | 1.2 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55 to 175 | | °C |

| THERMAL RESISTANCE RATINGS | | | | | |
|---|---|---|---|---|---|
| Parameter | | Symbol | Typical | Maximum | Unit |
| Maximum Junction-to-Ambient[a] | t ≤ 10 sec | $R_{thJA}$ | 36 | 45 | °C/W |
| | Steady State | | 75 | 90 | |
| Maximum Junction-to-Foot (Drain) | Steady State | $R_{thJF}$ | 17 | 20 | |

Notes
a. Surface Mounted on 1" x 1" FR4 Board.
b. Guaranteed by design, not subject to production testing.

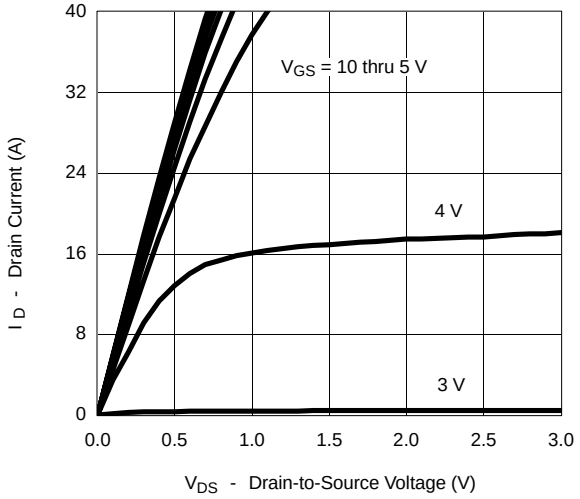
## SPECIFICATIONS ($T_J$ = 25°C UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 60 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 μA | 1 | | | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V | | | 1 | μA |
| | | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V, $T_J$ = 55°C | | | 20 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ ≥ 5 V, $V_{GS}$ = 10 V | 40 | | | A |
| Drain-Source On-State Resistance[a] | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 6.0 A | | 0.018 | 0.022 | Ω |
| | | $V_{GS}$ = 10 V, $I_D$ = 6.0 A, $T_J$ = 125°C | | 0.031 | 0.037 | |
| | | $V_{GS}$ = 10 V, $I_D$ = 6.0 A, $T_J$ = 175°C | | 0.039 | 0.047 | |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 5.1 A | | 0.025 | 0.031 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 6.0 A | | 25 | | S |
| Diode Forward Voltage[a] | $V_{SD}$ | $I_S$ = 1.7 A, $V_{GS}$ = 0 V | | 0.8 | 1.2 | V |
| **Dynamic[b]** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 30 V, $V_{GS}$ = 10 V, $I_D$ = 6.0 A | | 18 | 27 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 3.4 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 5.3 | | |
| Gate Resistance | $R_g$ | $V_{GS}$ =0.1 V, f = 5 MHz | 0.5 | 1.4 | 2.4 | Ω |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 30 V, $R_L$ = 30 Ω<br>$I_D$ ≅ 1 A, $V_{GEN}$ = 10 V, $R_G$ = 6 Ω | | 10 | 20 | ns |
| Rise Time | $t_r$ | | | 10 | 20 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 25 | 50 | |
| Fall Time | $t_f$ | | | 12 | 24 | |
| Source-Drain Reverse Recovery Time | $t_{rr}$ | $I_F$ = 1.7 A, di/dt = 100 A/μs | | 50 | 80 | |

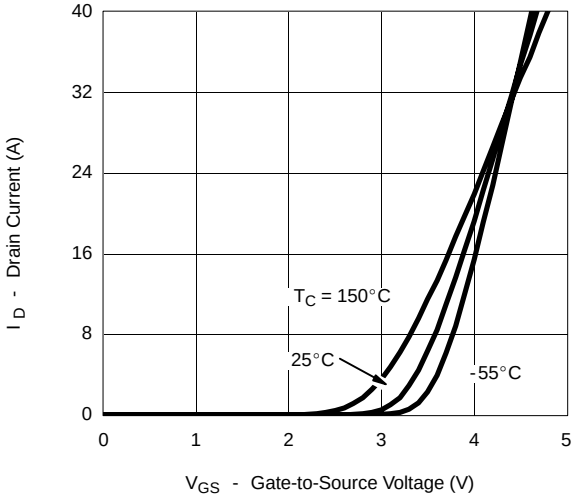
Notes
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

**Output Characteristics**

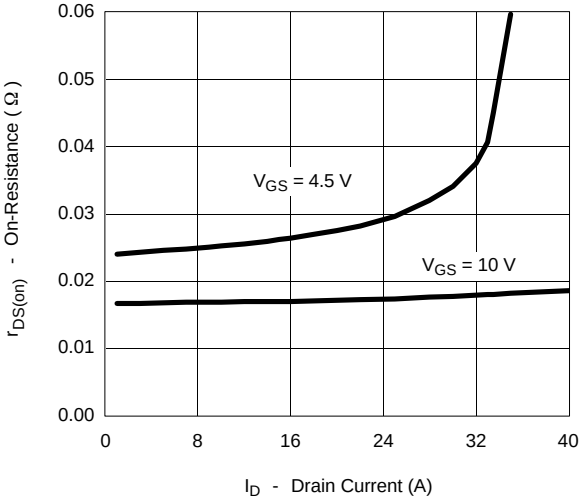



**Transfer Characteristics**

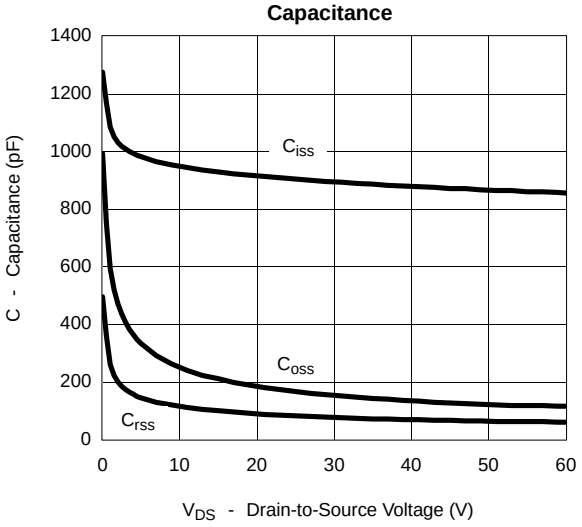


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

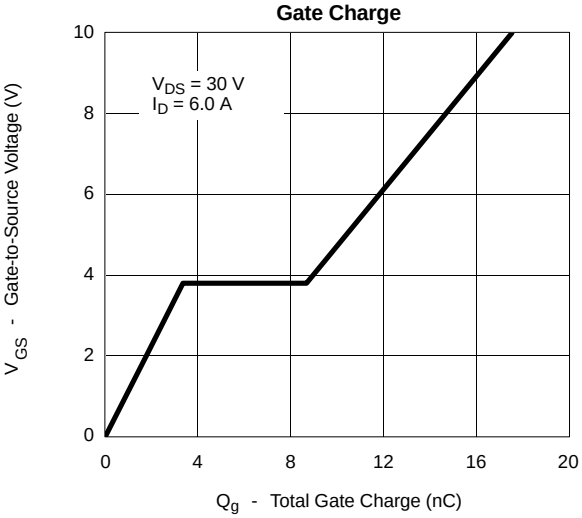
**On-Resistance vs. Drain Current**



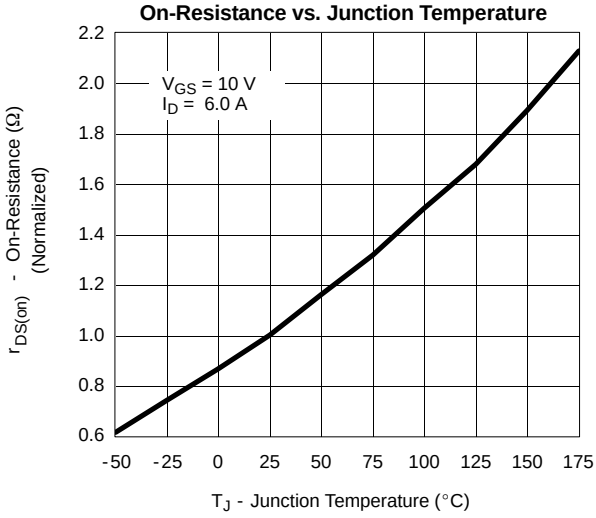

**Capacitance**



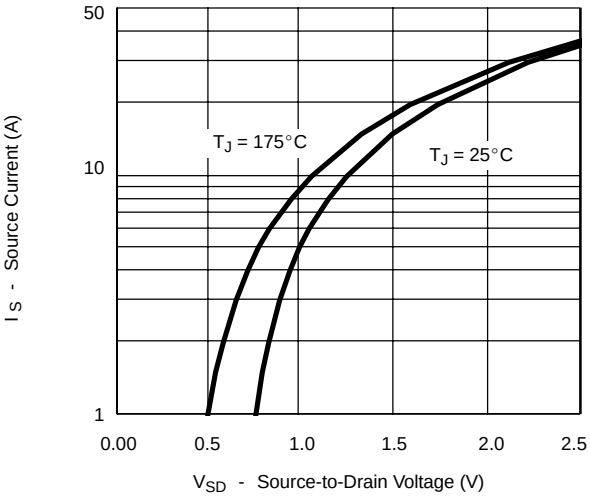

**Gate Charge**



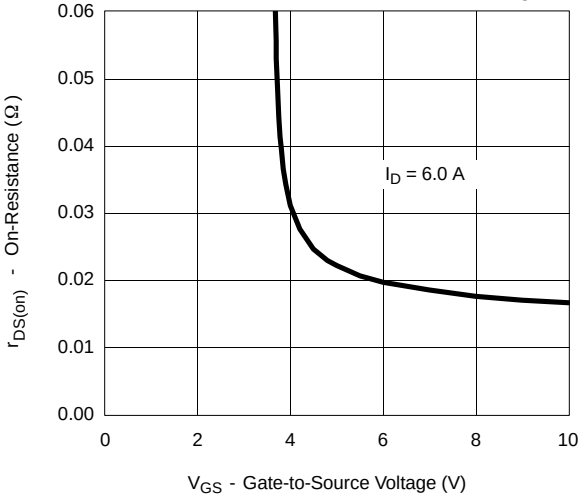

**On-Resistance vs. Junction Temperature**




**Source-Drain Diode Forward Voltage**

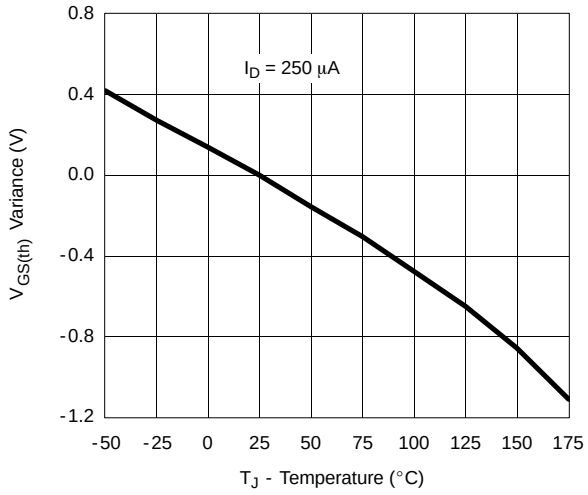



**On-Resistance vs. Gate-to-Source Voltage**

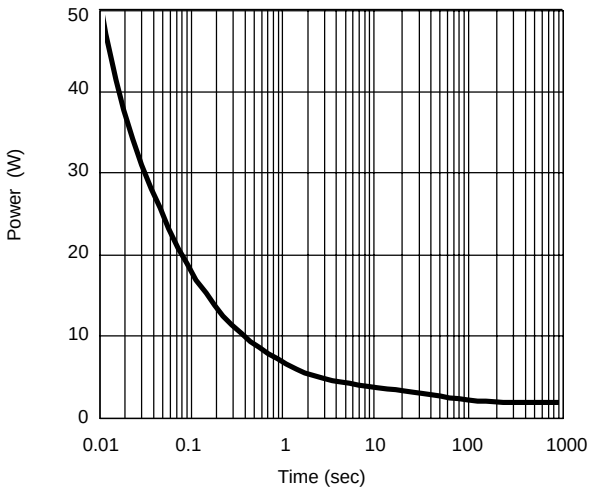


## TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

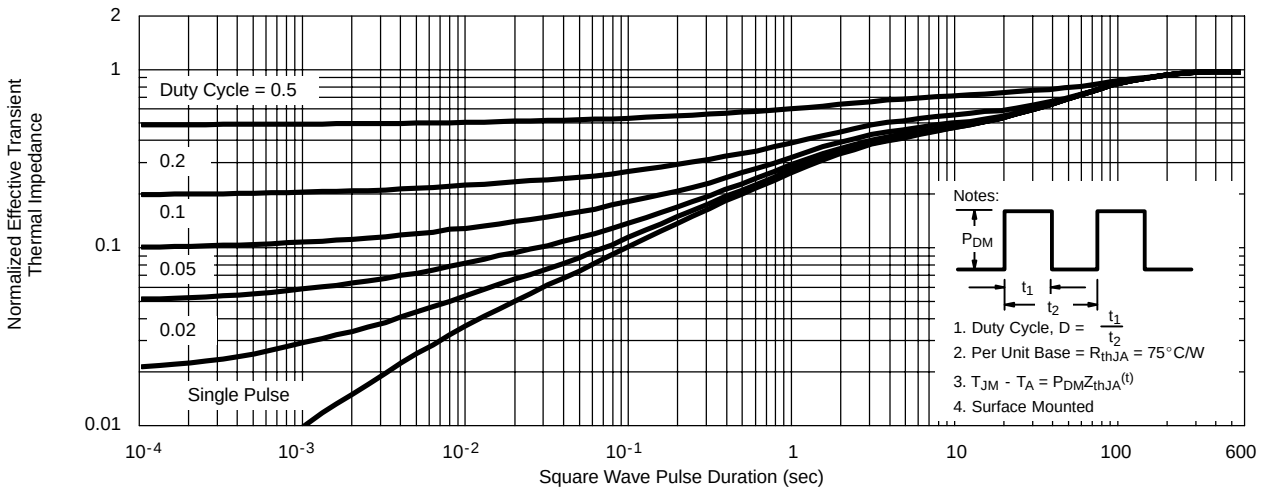
**Threshold Voltage**



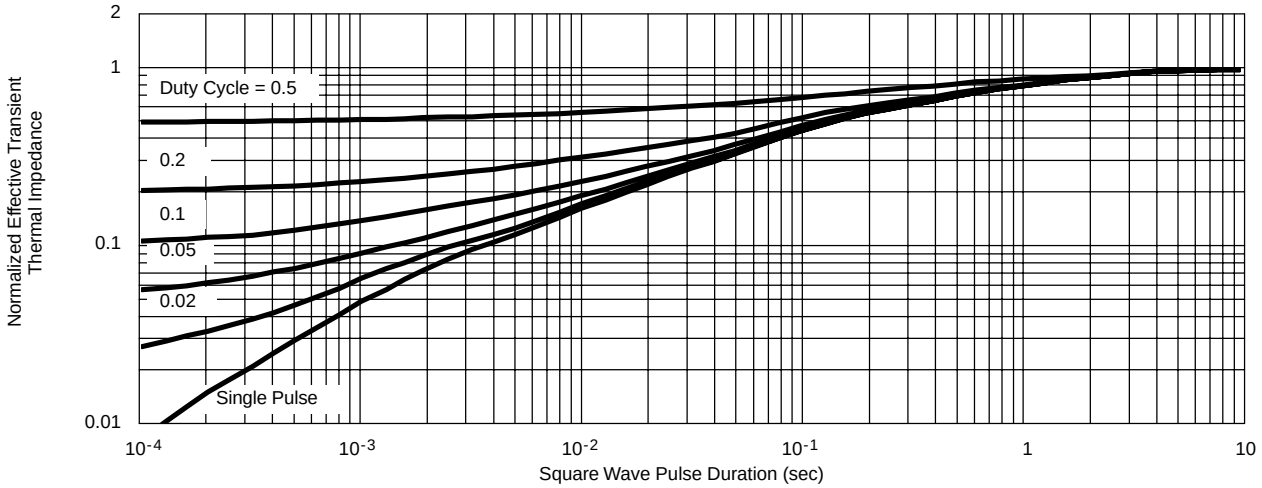

**Single Pulse Power**




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




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



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