

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

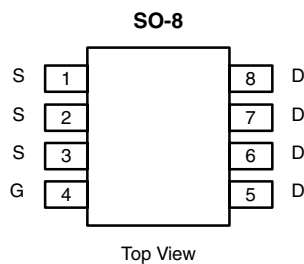
| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| 60              | 0.022 at $V_{GS} = 10$ V  | 8.5       |
|                 | 0.031 at $V_{GS} = 4.5$ V | 7.2       |

**FEATURES**

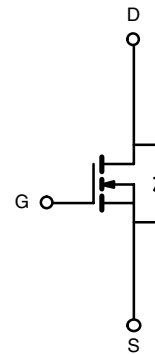
- 175 °C Rated Maximum Junction Temperature
- TrenchFET® Power MOSFETs



Available  
**RoHS\***  
COMPLIANT



Ordering Information: Si4850EY-T1  
Si4850EY-T1-E3 (Lead (Pb)-free)



N-Channel MOSFET

| 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   | $V_{GS}$       | $\pm 20$      |              |      |   |
| Continuous Drain Current ( $T_J = 175$ °C) <sup>a</sup>       | $I_D$          | $T_A = 25$ °C | 8.5          | 6.0  | A |
|   |                | $T_A = 70$ °C | 7.1          | 5.0  |   |
| Pulsed Drain Current  | $I_{DM}$       | 40            |              | A    |   |
| Avalanche Current   | $I_{AS}$       | 15            |              |      |   |
| Single Pulse Avalanche Energy                                 | $E_{AS}$       | 11            |              | mJ   |   |
| Maximum Power Dissipation <sup>a</sup>                        | $P_D$          | $T_A = 25$ °C | 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 <sup>a</sup> | $t \leq 10$ 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.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

| <b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted |               |  |     |       |           |               |
|---|---------------|--|-----|-------|-----------|---------------|
| Parameter   | Symbol        | Test Conditions  | Min | Typ   | Max       | Unit          |
| <b>Static</b>   |               |  |     |       |           |               |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$  | 60  |       |           | V             |
| Gate Threshold Voltage  | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$  | 1   |       | 3         |               |
| Gate-Body Leakage   | $I_{GSS}$     | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$  |     |       | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$  |     |       | 1         | $\mu\text{A}$ |
|   |               | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$  |     |       | 20        |               |
| On-State Drain Current <sup>a</sup>   | $I_{D(on)}$   | $V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$   | 40  |       |           | A             |
| Drain-Source On-State Resistance <sup>a</sup>                                 | $r_{DS(on)}$  | $V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}$   |     | 0.018 | 0.022     | $\Omega$      |
|   |               | $V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}, T_J = 125\text{ }^\circ\text{C}$  |     | 0.031 | 0.037     |               |
|   |               | $V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}, T_J = 175\text{ }^\circ\text{C}$  |     | 0.039 | 0.047     |               |
|   |               | $V_{GS} = 4.5\text{ V}, I_D = 5.1\text{ A}$  |     | 0.025 | 0.031     |               |
| Forward Transconductance <sup>a</sup>   | $g_{fs}$      | $V_{DS} = 15\text{ V}, I_D = 6.0\text{ A}$   |     | 25    |           | S             |
| Diode Forward Voltage <sup>a</sup>  | $V_{SD}$      | $I_S = 1.7\text{ A}, V_{GS} = 0\text{ V}$  |     | 0.8   | 1.2       | V             |
| <b>Dynamic<sup>b</sup></b>  |               |  |     |       |           |               |
| Total Gate Charge   | $Q_g$         | $V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}$   |     | 18    | 27        | nC            |
| Gate-Source Charge  | $Q_{gs}$      |  |     | 3.4   |           |               |
| Gate-Drain Charge   | $Q_{gd}$      |  |     | 5.3   |           |               |
| Gate Resistance   | $R_g$         | $V_{GS} = 0.1\text{ V}, f = 5\text{ MHz}$  | 0.5 | 1.4   | 2.4       | $\Omega$      |
| Turn-On Delay Time  | $t_{d(on)}$   | $V_{DD} = 30\text{ V}, R_L = 30\text{ }\Omega$<br>$I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$ |     | 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  | $t_{rr}$      | $I_F = 1.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$   |     | 50    | 80        |               |

Notes:

a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$ unless noted

