

# N-Channel 2.5-V (G-S) Battery Switch

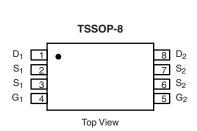
| PRODUCT SUMMARY     |   |                    |  |  |  |
|---------------------|---|--------------------|--|--|--|
| V <sub>DS</sub> (V) | $R_{DS(on)}(\Omega)$                      | I <sub>D</sub> (A) |  |  |  |
| 30                  | 0.053 at V <sub>GS</sub> = 10 V           | 3.4                |  |  |  |
|                     | $0.075 \text{ at V}_{GS} = 4.5 \text{ V}$ | 2.9                |  |  |  |

#### **FEATURES**

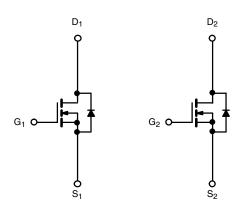
- · Halogen-free
- TrenchFET® Power MOSFETs: 2.5 V Rated



RoHS COMPLIANT



Ordering Information: Si6954ADQ-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET

N-Channel MOSFET

| Parameter   |                        | Symbol                            | 10 s        | Steady State | Unit |  |
|---|------------------------|-----------------------------------|-------------|--------------|------|--|
| Drain-Source Voltage  |                        | V <sub>DS</sub>                   | 30          |              | V    |  |
| Gate-Source Voltage   |                        | V <sub>GS</sub> ± 20              |             | V            |      |  |
| Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup> | T <sub>A</sub> = 25 °C | - I <sub>D</sub>                  | 3.4         | 3.1          | Δ    |  |
|   | T <sub>A</sub> = 70 °C |                                   | 2.7         | 2.5          |      |  |
| Pulsed Drain Current (10 μs Pulse Width)                        |                        | I <sub>DM</sub>                   | 20          |              | Α    |  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>       |                        | I <sub>S</sub>                    | 0.83        | 0.69         |      |  |
| Maximum Power Dissipation <sup>a</sup>                          | T <sub>A</sub> = 25 °C | - P <sub>D</sub>                  | 1.0         | 0.83         | W    |  |
|   | T <sub>A</sub> = 70 °C |                                   | 0.96        | 0.53         | VV   |  |
| Operating Junction and Storage Temperature Range                |                        | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 150 |              | °C   |  |

| THERMAL RESISTANCE RATINGS               |              |                     |         |         |      |
|--|--------------|---------------------|---------|---------|------|
| Parameter                                |              | Symbol              | Typical | Maximum | Unit |
| Manipulation to Applicant                | t ≤ 10 s     | - R <sub>thJA</sub> | 90      | 125     | °C/W |
| Maximum Junction-to-Ambient <sup>a</sup> | Steady State |                     | 126     | 150     |      |
| Maximum Junction-to-Foot (Drain)         | Steady State | $R_{thJF}$          | 65      | 80      |      |

#### Notes:

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

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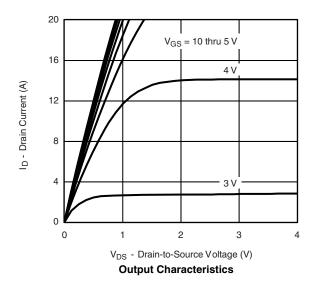
| <b>SPECIFICATIONS</b> $T_J = 25$ °C           | C, unless c         | therwise noted   |           |       |       |      |  |
|---|---------------------|--|-----------|-------|-------|------|--|
| Parameter                                     | Symbol              | Test Conditions  | Min. Typ. |       | Max.  | Unit |  |
| Static  |                     |  |           |       |       |      |  |
| Gate Threshold Voltage                        | $V_{GS(th)}$        | $V_{DS} = V_{GS}$ , $I_D = 250 \mu A$                                | 1         |       |       | V    |  |
| Gate-Body Leakage                             | $I_{GSS}$           | $V_{DS} = 0 V$ , $V_{GS} = \pm 20 V$                                 |           |       | 100   | nA   |  |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>    | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$                        |           |       | 1     |      |  |
|   |                     | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 \text{ °C}$ |           |       | 10    | μΑ   |  |
| On-State Drain Current <sup>a</sup>           | I <sub>D(on)</sub>  | $V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$                      | 20        |       |       | Α    |  |
|   | D                   | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.4 A                       |           | 0.044 | 0.053 | Ω    |  |
| Drain-Source On-State Resistance <sup>a</sup> | R <sub>DS(on)</sub> | $V_{GS} = 4.5 \text{ V}, I_D = 2.9 \text{ A}$                        |           | 0.062 | 0.075 |      |  |
| Forward Transconductance <sup>a</sup>         | 9 <sub>fs</sub>     | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 3.4 A                       |           | 10    |       | S    |  |
| Diode Forward Voltage <sup>a</sup>            | $V_{SD}$            | I <sub>S</sub> = 0.83 A, V <sub>GS</sub> = 0 V                       |           | 0.8   | 1.2   | V    |  |
| Dynamic <sup>b</sup>                          |                     |  |           |       |       |      |  |
| Total Gate Charge                             | $Q_g$               |  |           | 8     | 16    |      |  |
| Gate-Source Charge                            | Q <sub>gs</sub>     | $V_{DS} = 10 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 3.4 \text{ A}$  |           | 1.4   |       | nC   |  |
| Gate-Drain Charge                             | $Q_{gd}$            |  |           | 1.2   |       |      |  |
| Turn-On Delay Time                            | t <sub>d(on)</sub>  |  |           | 12    | 20    |      |  |
| Rise Time                                     | t <sub>r</sub>      | $V_{DD}$ = 10 V, $R_L$ = 10 $\Omega$                                 |           | 10    | 20    |      |  |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> | $I_D\cong$ 1 A, $V_{GEN}$ = 10 V, $R_G$ = 6 $\Omega$                 |           | 23    | 45    | ns   |  |
| Fall Time                                     | t <sub>f</sub>      |  |           | 8     | 15    |      |  |
| Source-Drain Reverse Recovery Time            | t <sub>rr</sub>     | I <sub>F</sub> = 0.83 A, dl/dt = 100 A/μs                            |           | 25    | 40    |      |  |

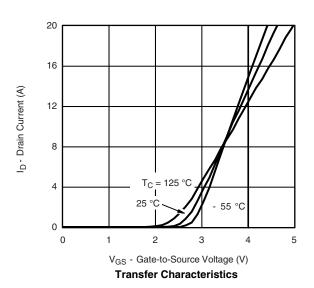
#### Notes:

- a. Pulse test; pulse width  $\leq$  300  $\mu$ 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 °C, unless otherwise noted



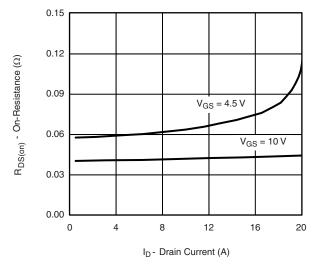




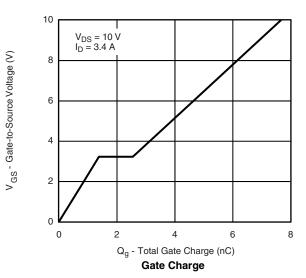


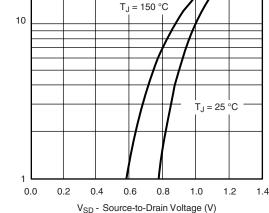


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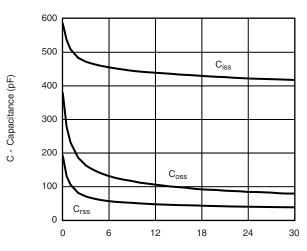


#### On-Resistance vs. Drain Current



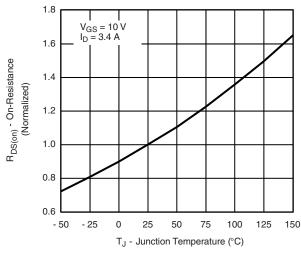


V<sub>SD</sub> - Source-to-Drain Voltage (V) Source-Drain Diode Forward Voltage

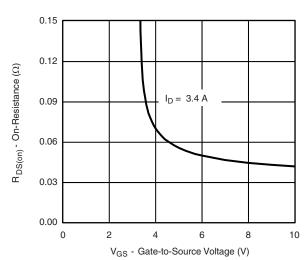


V<sub>DS</sub> - Drain-to-Source Voltage (V)





On-Resistance vs. Junction Temperature



On-Resistance vs. Gate-to-Source Voltage

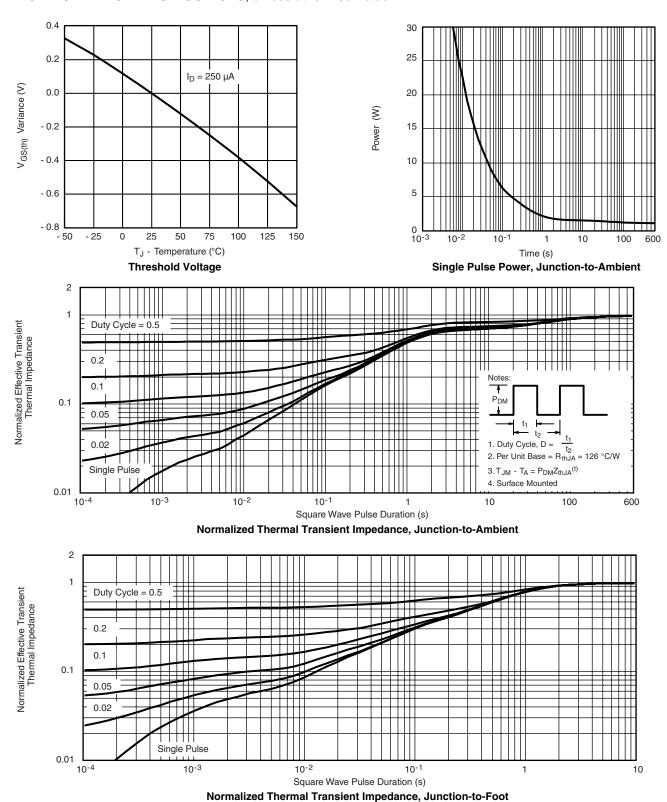
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Source Current (A)

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