



## Dual N-Channel 60-V (D-S), 175°C MOSFET

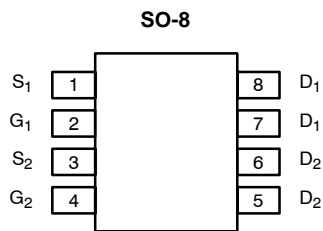
| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| 60              | 0.055 @ $V_{GS} = 10$ V   | 4.5       |
|                 | 0.075 @ $V_{GS} = 4.5$ V  | 3.9       |

### FEATURES

- TrenchFET® Power MOSFET
- 175°C Maximum Junction Temperature
- 100%  $R_g$  Tested

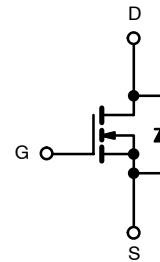


Pb-free  
Available



Top View

Ordering Information: Si4946EY  
Si4946EY-T1 (with Tape and Reel)  
Si4946EY—E3 (Lead (Pb)-Free)  
Si4946EY-T1—E3 (Lead (Pb)-Free with Tape and Reel)



N-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                |                          |                  |
|---|----------------|--------------------------|------------------|
| Parameter   | Symbol         | Limit                    | Unit             |
| Drain-Source Voltage  | $V_{DS}$       | 60                       | V                |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$                 |                  |
| Continuous Drain Current ( $T_J = 175^\circ\text{C}$ ) <sup>a</sup>         | $I_D$          | $T_A = 25^\circ\text{C}$ | 4.5              |
|   |                | $T_A = 70^\circ\text{C}$ | 3.8              |
| Pulsed Drain Current  | $I_{DM}$       | 30                       | A                |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   | $I_S$          | 2                        |                  |
| Single Avalanche Current  | $L = 0.1$ mH   | $I_{AS}$                 | 12               |
| Single Avalanche Energy   |                |                          | $E_{AS}$         |
| Maximum Power Dissipation <sup>a</sup>                                      | $P_D$          | $T_A = 25^\circ\text{C}$ | 2.4              |
|   |                | $T_A = 70^\circ\text{C}$ | 1.7              |
| Operating Junction and Storage Temperature Range                            | $T_J, T_{stg}$ | -55 to 175               | $^\circ\text{C}$ |

| THERMAL RESISTANCE RATINGS               |            |       |                           |
|--|------------|-------|---------------------------|
| Parameter                                | Symbol     | Limit | Unit                      |
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{thJA}$ | 62.5  | $^\circ\text{C}/\text{W}$ |

**Notes**

a. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

| SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED) |                     |  |     |                  |       |      |
|--|---------------------|--|-----|------------------|-------|------|
| Parameter  | Symbol              | Test Condition   | Min | Typ <sup>a</sup> | Max   | Unit |
| <b>Static</b>  |                     |  |     |                  |       |      |
| Gate Threshold Voltage   | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA  | 1   |                  | 3     | V    |
| Gate-Body Leakage  | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±20 V   |     |                  | ±100  | nA   |
| Zero Gate Voltage Drain Current                                | I <sub>DSS</sub>    | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V  |     |                  | 2     | μA   |
|  |                     | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C  |     |                  | 25    |      |
| On-State Drain Current <sup>b</sup>                            | I <sub>D(on)</sub>  | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V  | 20  |                  |       | A    |
| Drain-Source On-State Resistance <sup>b</sup>                  | r <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.5 A   |     | 0.045            | 0.055 | Ω    |
|  |                     | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 3.9 A  |     | 0.055            | 0.075 |      |
| Forward Transconductance <sup>b</sup>                          | g <sub>fs</sub>     | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 4.5 A   |     | 13               |       | S    |
| Diode Forward Voltage <sup>b</sup>                             | V <sub>SD</sub>     | I <sub>S</sub> = 2 A, V <sub>GS</sub> = 0 V  |     | 0.9              | 1.2   | V    |
| <b>Dynamic<sup>a</sup></b>                                     |                     |  |     |                  |       |      |
| Total Gate Charge  | Q <sub>g</sub>      | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.5 A   |     | 19               | 30    | nC   |
| Gate-Source Charge   | Q <sub>gs</sub>     |  |     | 4                |       |      |
| Gate-Drain Charge  | Q <sub>gd</sub>     |  |     | 3                |       |      |
| Gate Resistance  | R <sub>g</sub>      |  | 1   |                  | 3.6   | Ω    |
| Turn-On Delay Time   | t <sub>d(on)</sub>  | V <sub>DD</sub> = 30 V, R <sub>L</sub> = 30 Ω<br>I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 6 Ω |     | 13               | 20    | ns   |
| Rise Time  | t <sub>r</sub>      |  |     | 11               | 20    |      |
| Turn-Off Delay Time  | t <sub>d(off)</sub> |  |     | 36               | 60    |      |
| Fall Time  | t <sub>f</sub>      |  |     | 11               | 20    |      |
| Source-Drain Reverse Recovery Time                             | t <sub>rr</sub>     | I <sub>F</sub> = 2 A, di/dt = 100 A/μs   |     | 35               | 60    |      |

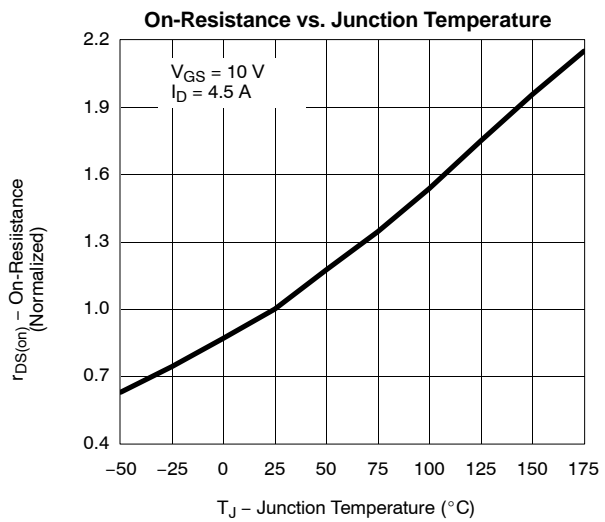
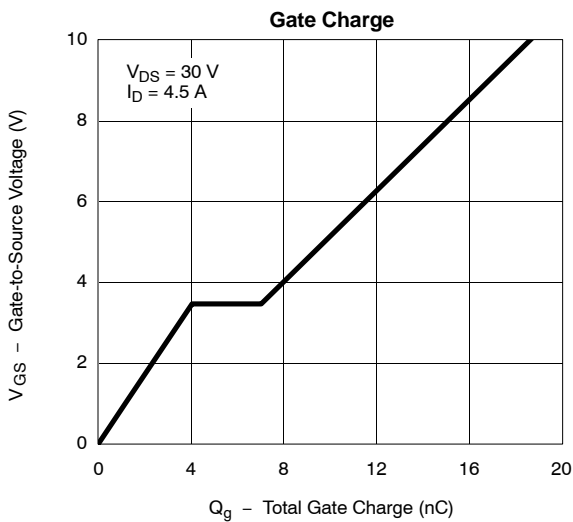
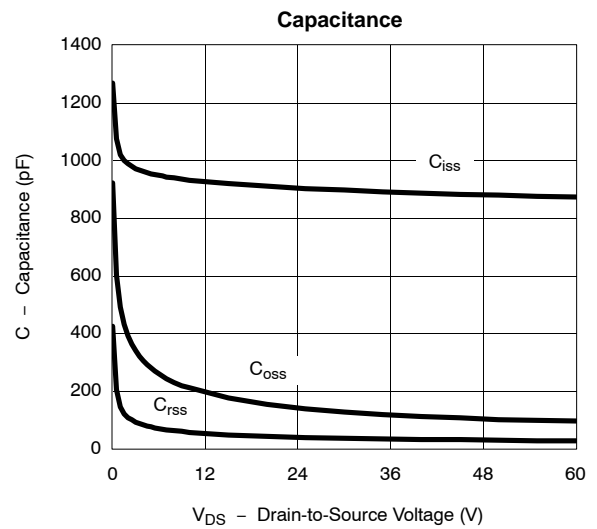
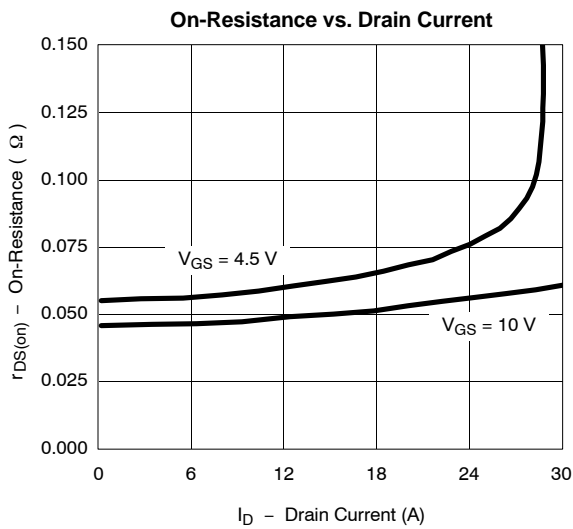
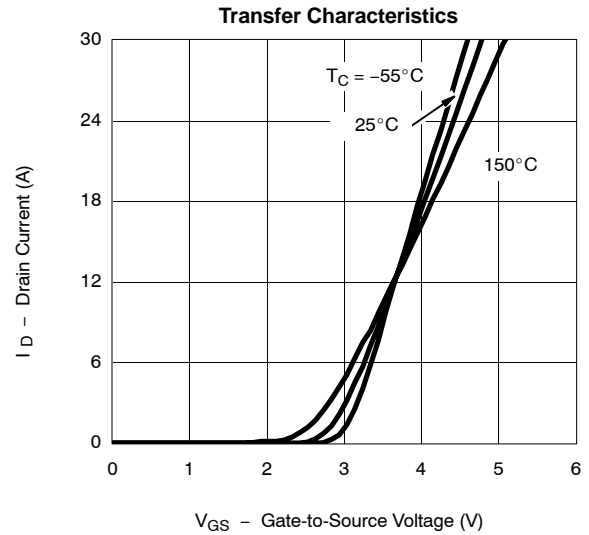
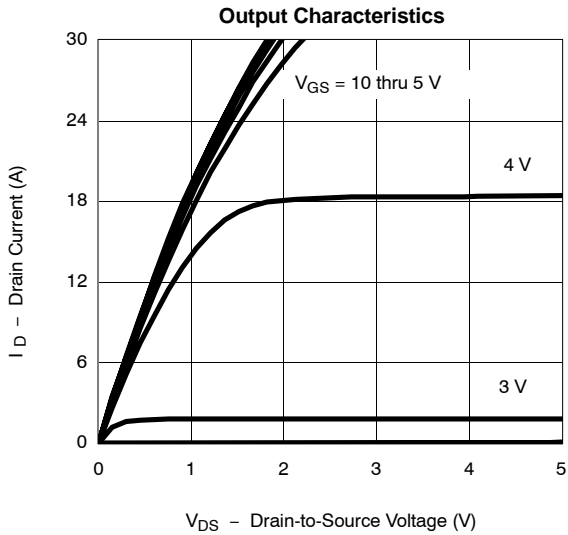
## Notes

- a. For design aid only; not subject to production testing.  
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.

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.

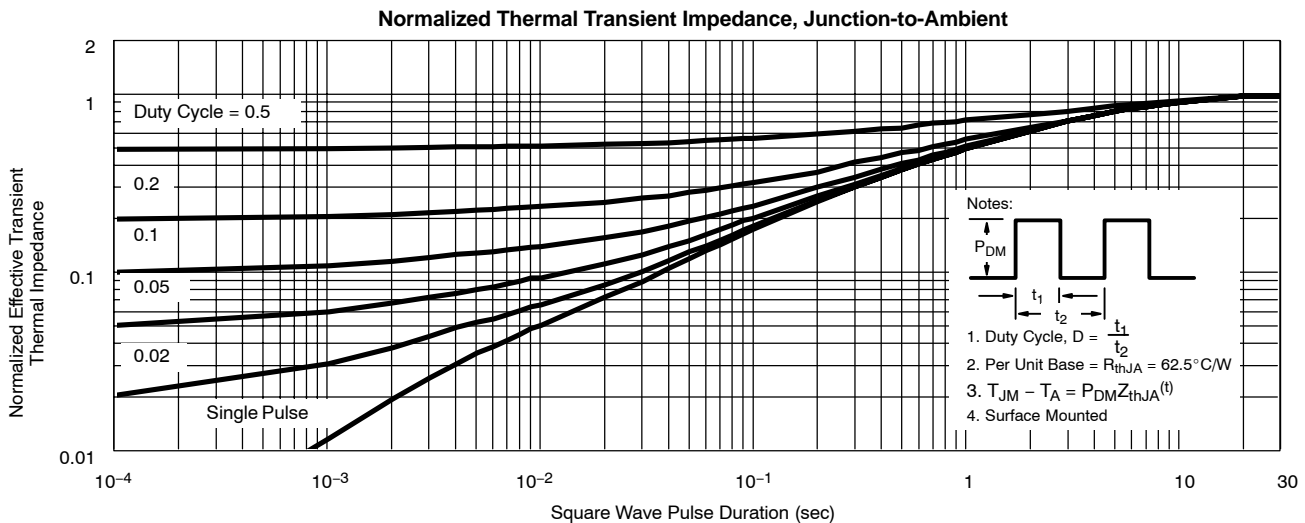
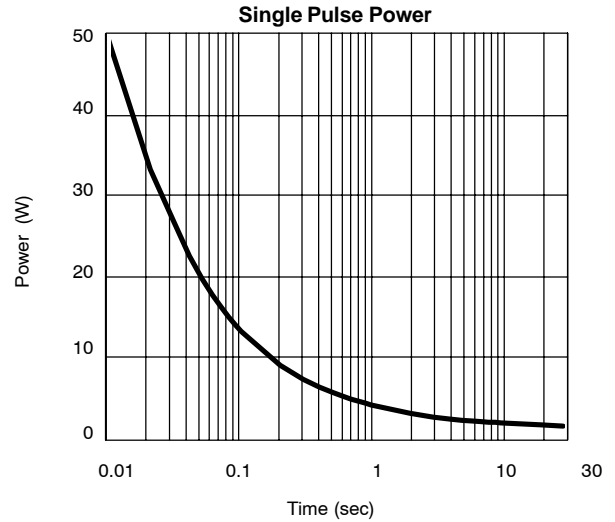
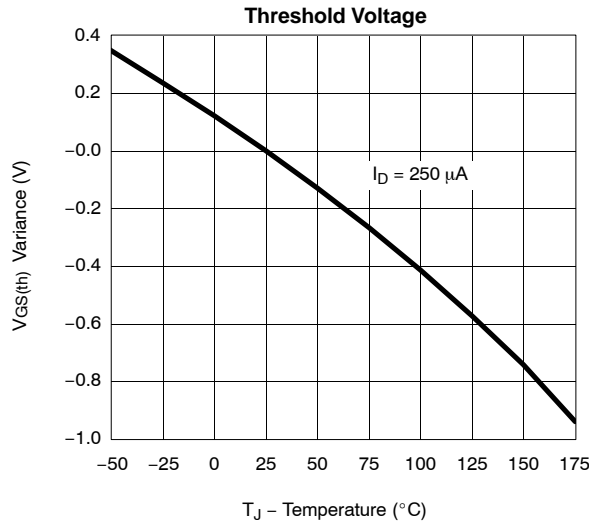
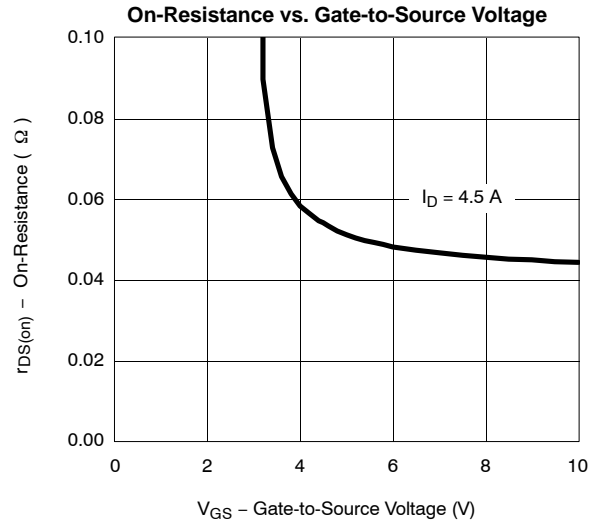
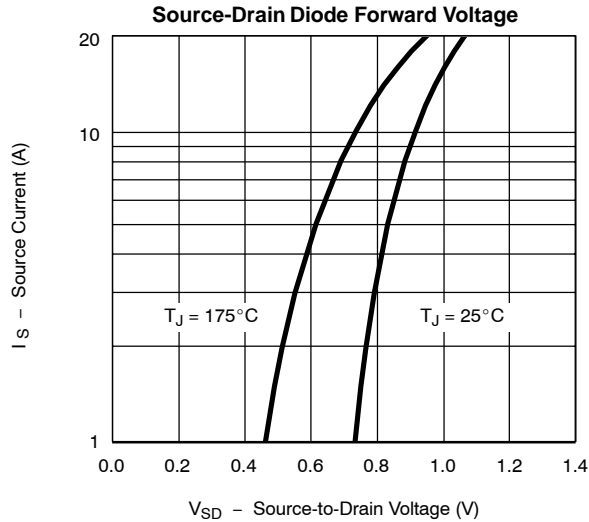


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**





**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



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