

## P-Channel 30-V (D-S) MOSFET

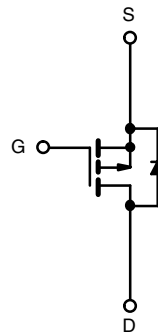
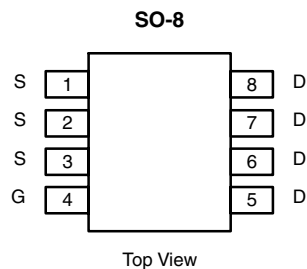
| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| -30             | 0.040 @ $V_{GS} = -10$ V  | $\pm 5.8$ |
|                 | 0.070 @ $V_{GS} = -4.5$ V | $\pm 4.5$ |

### FEATURES

- TrenchFET® Power MOSFET
- 100% UIS Tested



**RoHS**  
COMPLIANT



Ordering Information: Si4431DY-T1  
Si4431DY-T1—E3 (Lead (Pb)-Free)

P-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                |                          |                  |    |
|---|----------------|--------------------------|------------------|----|
| Parameter   | Symbol         | Limit                    | Unit             |    |
| Drain-Source Voltage  | $V_{DS}$       | -30                      | V                |    |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$                 |                  |    |
| Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>         | $I_D$          | $T_A = 25^\circ\text{C}$ | $\pm 5.8$        | A  |
|   |                | $T_A = 70^\circ\text{C}$ | $\pm 4.6$        |    |
| Pulsed Drain Current  | $I_{DM}$       | $\pm 30$                 |                  |    |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   | $I_S$          | -2.3                     |                  |    |
| Avalanche Current   | $I_{AS}$       | L = 0.1 mH               | 20               | mJ |
| Single-Pulse Avalanche Energy   |                |                          | $E_{AS}$         |    |
| Maximum Power Dissipation <sup>a</sup>                                      | $P_D$          | $T_A = 25^\circ\text{C}$ | 2.5              | W  |
|   |                | $T_A = 70^\circ\text{C}$ | 1.6              |    |
| Operating Junction and Storage Temperature Range                            | $T_J, T_{stg}$ | -55 to 150               | $^\circ\text{C}$ |    |

| THERMAL RESISTANCE RATINGS               |            |       |                    |
|--|------------|-------|--------------------|
| Parameter                                | Symbol     | Limit | Unit               |
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{thJA}$ | 50    | $^\circ\text{C/W}$ |

Notes

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

For SPICE model information via the Worldwide Web: <http://www.siliconix.com/www/product/spice.htm>

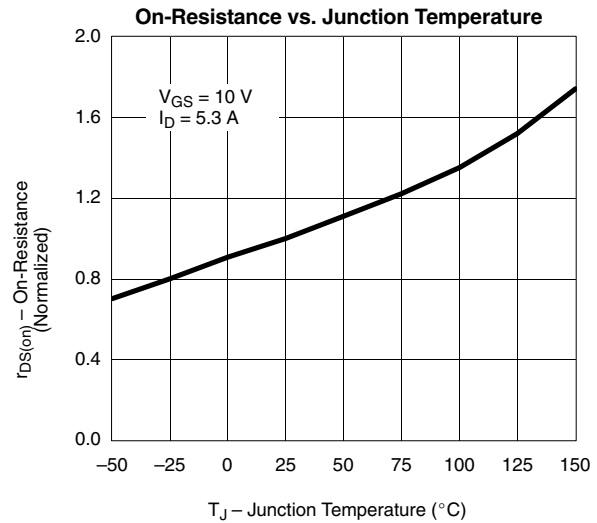
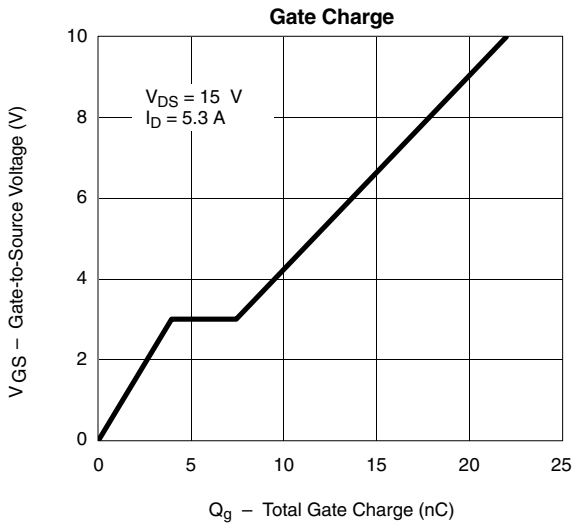
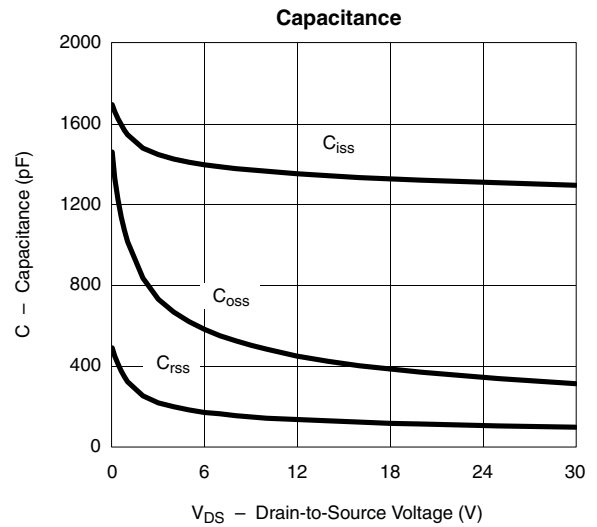
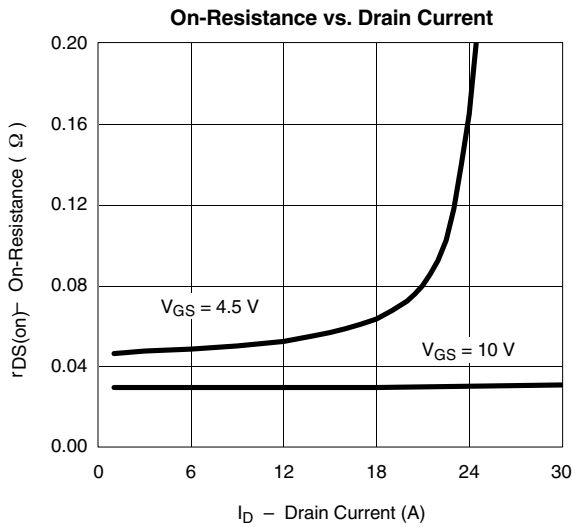
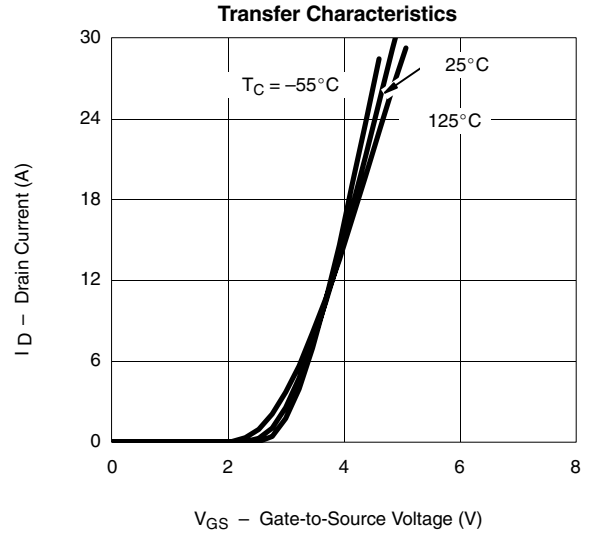
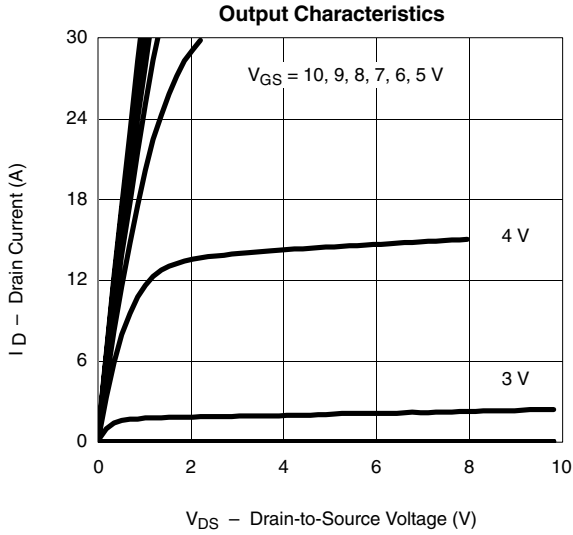
| SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED) |                     |   |      |                  |       |      |
|--|---------------------|---|------|------------------|-------|------|
| Parameter  | Symbol              | Test Condition  | Min  | Typ <sup>A</sup> | Max   | Unit |
| <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  | -1.0 |                  |       | 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> = -30 V, V <sub>GS</sub> = 0 V  |      |                  | -1    | μA   |
|  |                     | V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70 °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   | -30  |                  |       | A    |
|  |                     | V <sub>DS</sub> ≤ -5 V, V <sub>GS</sub> = -4.5 V  | -7   |                  |       |      |
| Drain-Source On-State Resistance <sup>b</sup>                  | r <sub>DS(on)</sub> | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -5.3 A  |      | 0.029            | 0.040 | Ω    |
|  |                     | V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.0 A   |      | 0.047            | 0.070 |      |
| Forward Transconductance <sup>b</sup>                          | g <sub>fs</sub>     | V <sub>DS</sub> = -15 V, I <sub>D</sub> = -5.3 A  |      | 9.3              |       | S    |
| Diode Forward Voltage <sup>b</sup>                             | V <sub>SD</sub>     | I <sub>S</sub> = -2.3 A, V <sub>GS</sub> = 0 V  |      | -0.78            | -1.2  | V    |
| <b>Dynamic<sup>a</sup></b>                                     |                     |   |      |                  |       |      |
| Total Gate Charge  | Q <sub>g</sub>      | V <sub>DS</sub> = -15 V, V <sub>GS</sub> = -10 V, I <sub>D</sub> = -5.3 A   |      | 22               | 35    | nC   |
| Gate-Source Charge   | Q <sub>gs</sub>     |   |      | 3.95             |       |      |
| Gate-Drain Charge  | Q <sub>gd</sub>     |   |      | 3.5              |       |      |
| Gate Resistance  | R <sub>g</sub>      |   |      | 4.5              | 6.1   | Ω    |
| Turn-On Delay Time   | t <sub>d(on)</sub>  | V <sub>DD</sub> = -15 V, R <sub>L</sub> = 15 Ω<br>I <sub>D</sub> ≅ -1 A, V <sub>GEN</sub> = -10 V, R <sub>G</sub> = 6 Ω |      | 11.5             | 20    | ns   |
| Rise Time  | t <sub>r</sub>      |   |      | 12               | 20    |      |
| Turn-Off Delay Time  | t <sub>d(off)</sub> |   |      | 38               | 55    |      |
| Fall Time  | t <sub>f</sub>      |   |      | 15               | 25    |      |
| Source-Drain Reverse Recovery Time                             | t <sub>rr</sub>     | I <sub>F</sub> = -2.3 A, di/dt = 100 A/μs   |      | 50               | 80    |      |

Notes

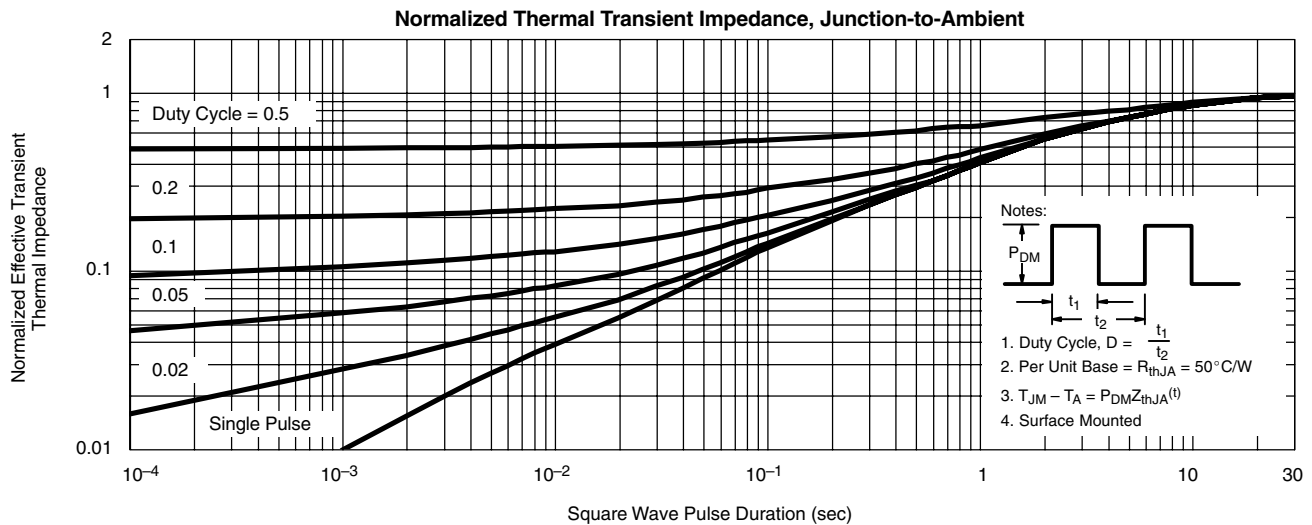
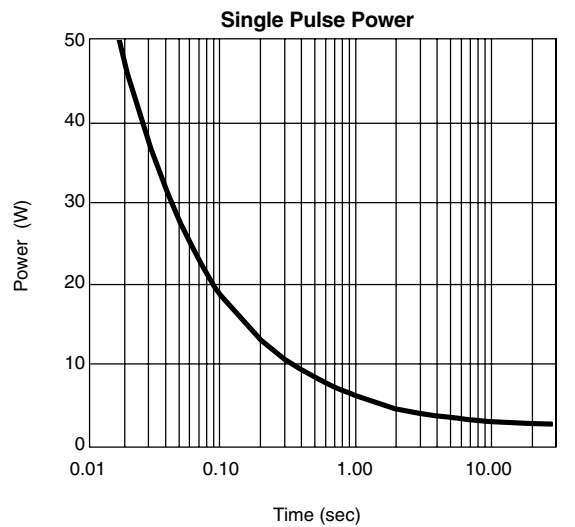
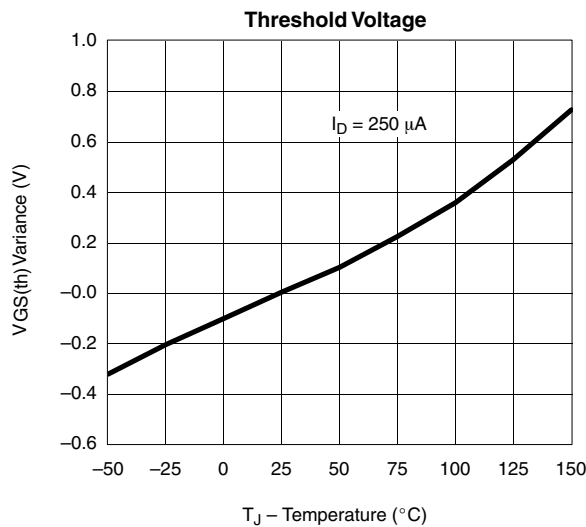
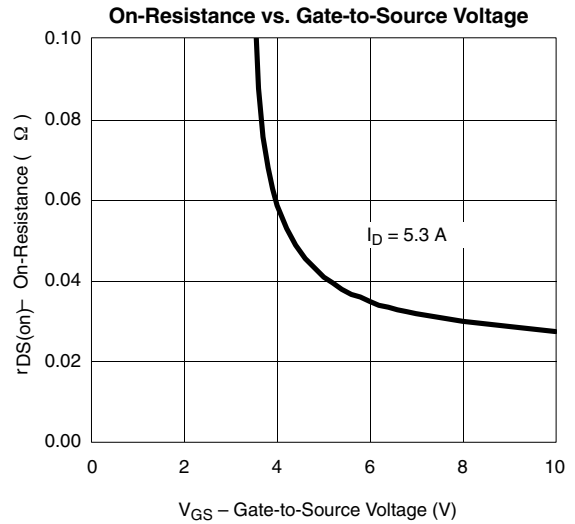
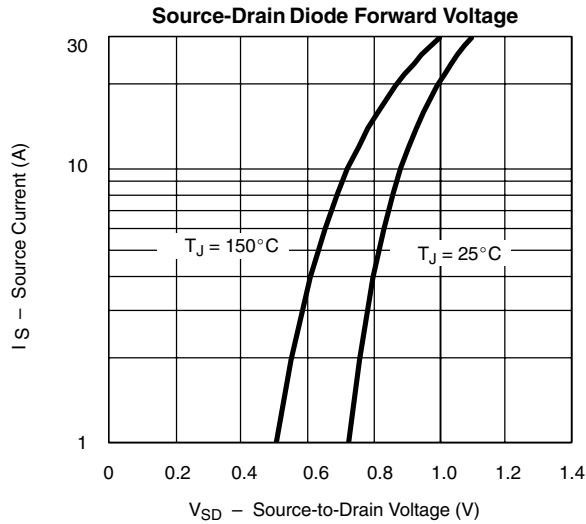
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.



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



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