



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

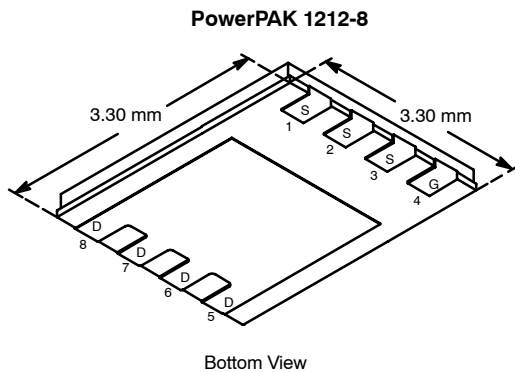
| PRODUCT SUMMARY |                           |           |
|-----------------|---------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
| -30             | 0.025 @ $V_{GS} = -10$ V  | -9.8      |
|                 | 0.043 @ $V_{GS} = -4.5$ V | -7.4      |

### FEATURES

- TrenchFET® Power MOSFET
- New PowerPAK® Package
  - Low Thermal Resistance,  $R_{thJC}$
  - Low 1.07-mm Profile

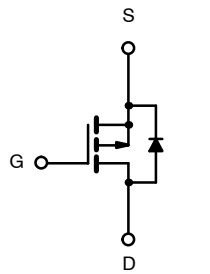
### APPLICATIONS

- Battery Switch



Bottom View

Ordering Information: Si7421DN-T1—E3



P-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                |                          |              |                  |   |
|---|----------------|--------------------------|--------------|------------------|---|
| Parameter   | Symbol         | 10 secs                  | Steady State | 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>         | $I_D$          | $T_A = 25^\circ\text{C}$ | -9.8         | -6.4             | A |
|   |                | $T_A = 85^\circ\text{C}$ | -7           | -4.6             |   |
| Pulsed Drain Current  | $I_{DM}$       | -30                      |              |                  |   |
| continuous Source Current (Diode Conduction) <sup>a</sup>                   | $I_S$          | -3                       | -1.3         |                  |   |
| Maximum Power Dissipation <sup>a</sup>                                      | $P_D$          | $T_A = 25^\circ\text{C}$ | 3.6          | 1.5              | W |
|   |                | $T_A = 85^\circ\text{C}$ | 1.9          | 0.8              |   |
| Operating Junction and Storage Temperature Range                            | $T_J, T_{stg}$ | -55 to 150               |              | $^\circ\text{C}$ |   |

| THERMAL RESISTANCE RATINGS               |            |                 |         |      |                    |
|--|------------|-----------------|---------|------|--------------------|
| Parameter                                | Symbol     | Typical         | Maximum | Unit |                    |
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{thJA}$ | $t \leq 10$ sec | 28      | 35   | $^\circ\text{C/W}$ |
|  |            | Steady State    | 65      | 81   |                    |
| Maximum Junction-to-Case                 | $R_{thJC}$ | 2.9             | 3.8     |      |                    |

Notes

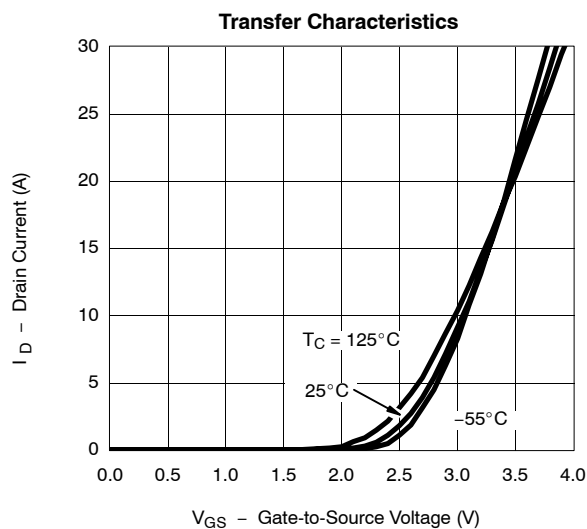
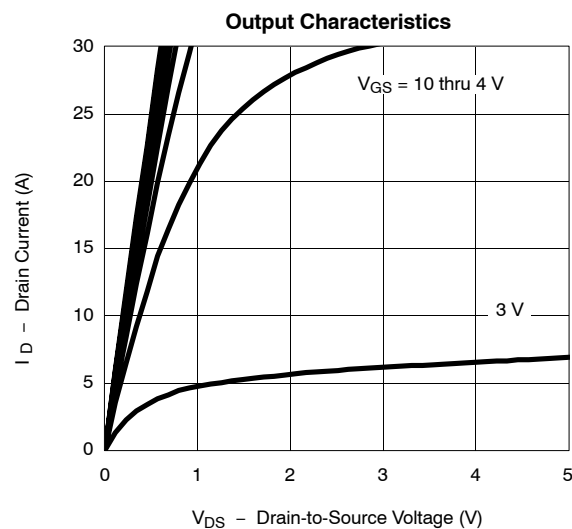
a. Surface Mounted on 1" x 1" FR4 Board.

**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

| Parameter                                     | Symbol              | Test Condition  | Min | Typ   | 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> = -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> = 85 °C  |     |       | -5    |      |
| On-State Drain Current <sup>a</sup>           | I <sub>D(on)</sub>  | V <sub>DS</sub> ≤ -5 V, V <sub>GS</sub> = -10 V   | -30 |       |       | A    |
| Drain-Source On-State Resistance <sup>a</sup> | r <sub>DS(on)</sub> | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -9.8 A  |     | 0.020 | 0.025 | Ω    |
|   |                     | V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -7.4 A   |     | 0.034 | 0.043 |      |
| Forward Transconductance <sup>a</sup>         | g <sub>fs</sub>     | V <sub>DS</sub> = -15 V, I <sub>D</sub> = -9.8 A  |     | 20    |       | S    |
| Diode Forward Voltage <sup>a</sup>            | V <sub>SD</sub>     | I <sub>S</sub> = -3.0 A, V <sub>GS</sub> = 0 V  |     | -0.8  | -1.2  | V    |
| <b>Dynamic<sup>b</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> = -9.8 A   |     | 26.2  | 40    | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>     |   |     | 4.5   |       |      |
| Gate-Drain Charge                             | Q <sub>gd</sub>     |   |     | 6     |       |      |
| Gate Resistance                               | R <sub>g</sub>      | f = 1 MHz   |     | 6.5   |       | 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 |     | 10    | 15    | ns   |
| Rise Time                                     | t <sub>r</sub>      |   |     | 13    | 20    |      |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> |   |     | 57    | 90    |      |
| Fall Time                                     | t <sub>f</sub>      |   |     | 42    | 65    |      |
| Source-Drain Reverse Recovery Time            | t <sub>rr</sub>     | I <sub>F</sub> = -3.0 A, di/dt = 100 A/μs   |     | 30    | 50    |      |

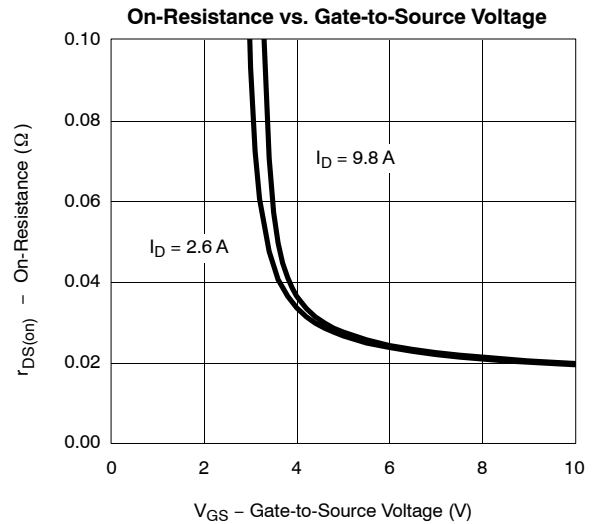
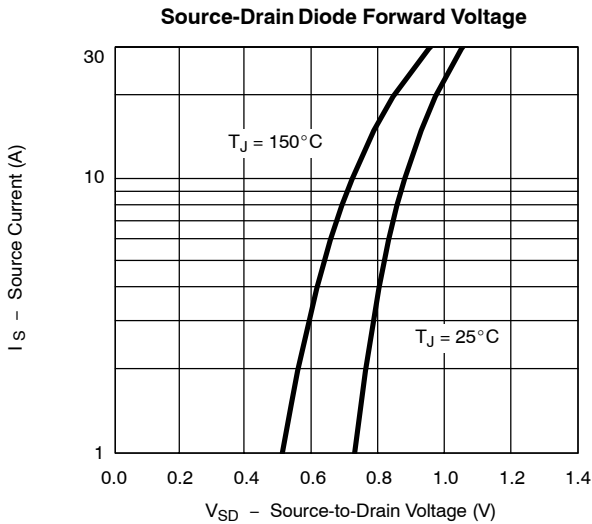
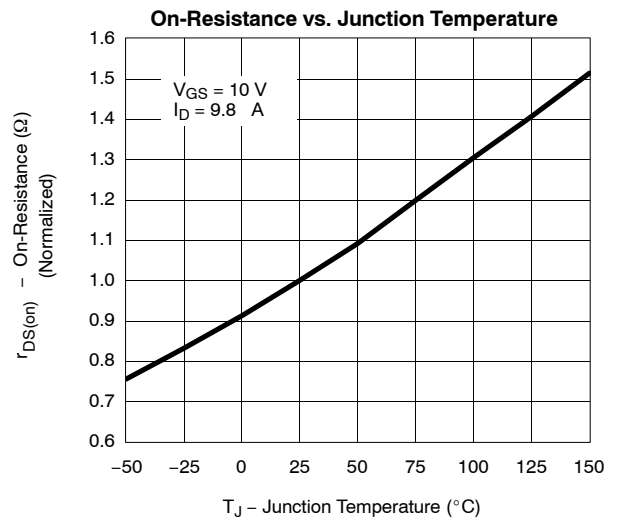
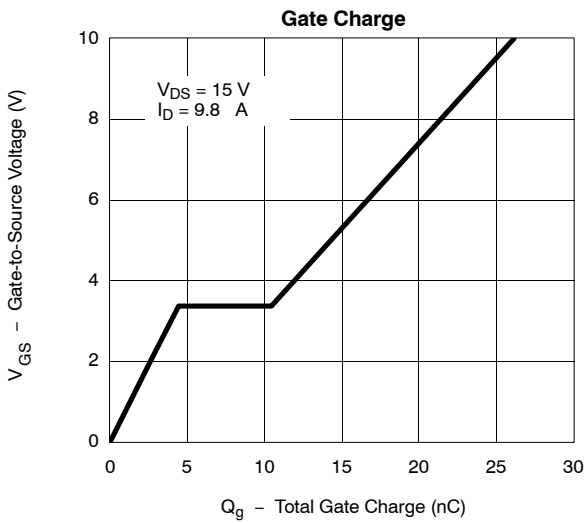
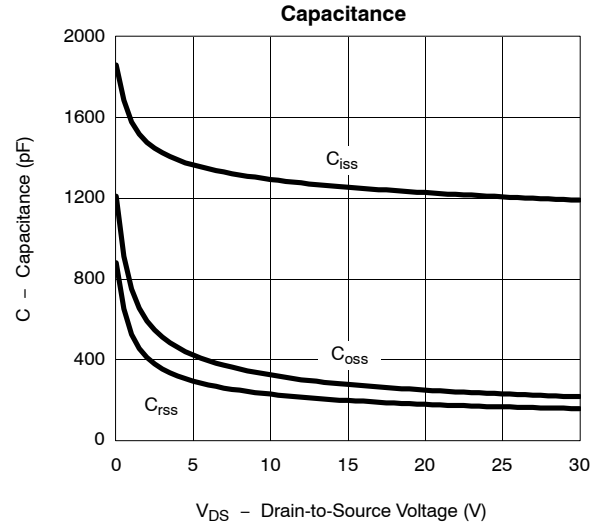
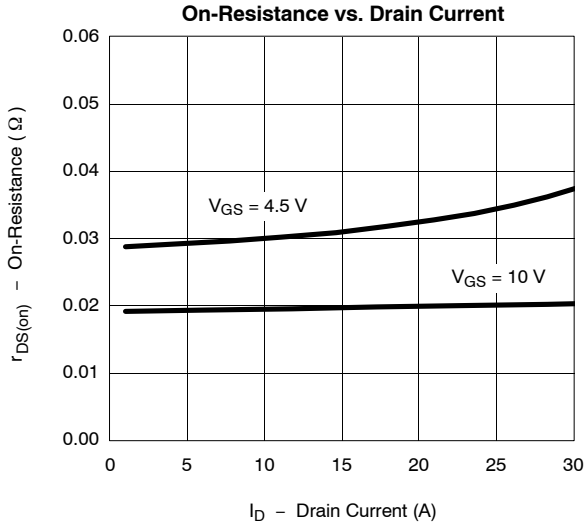
## Notes

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

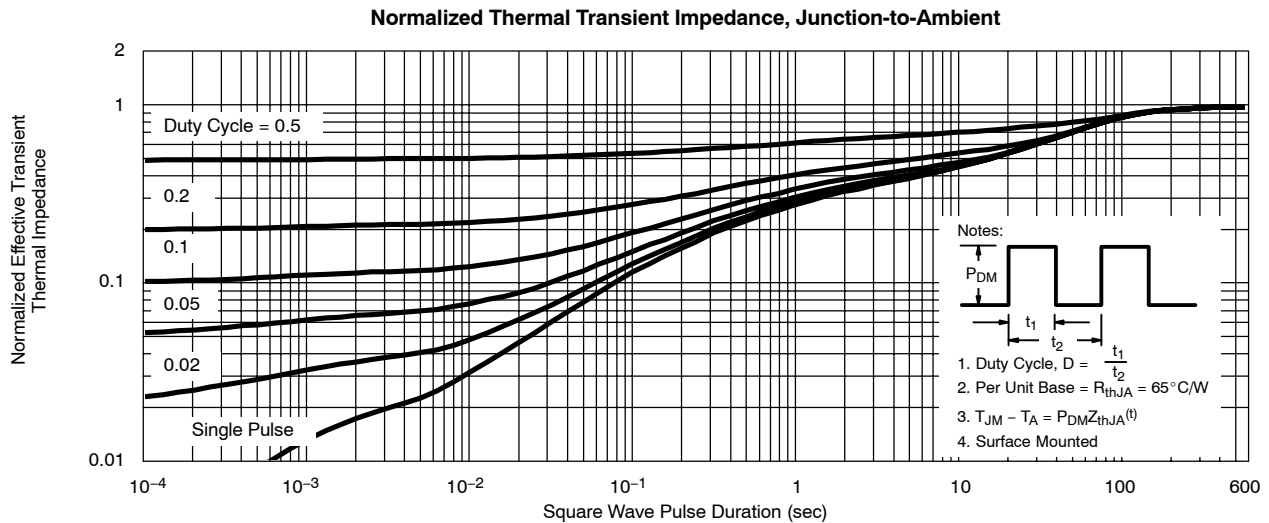
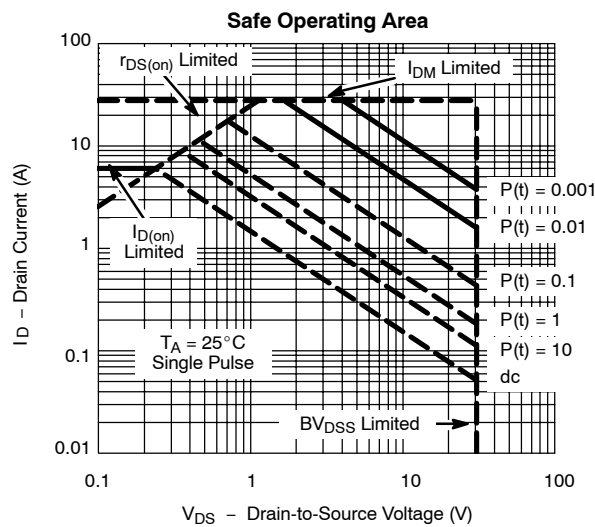
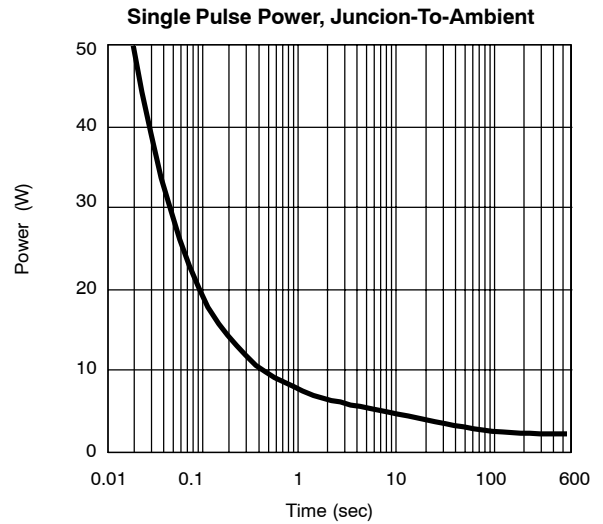
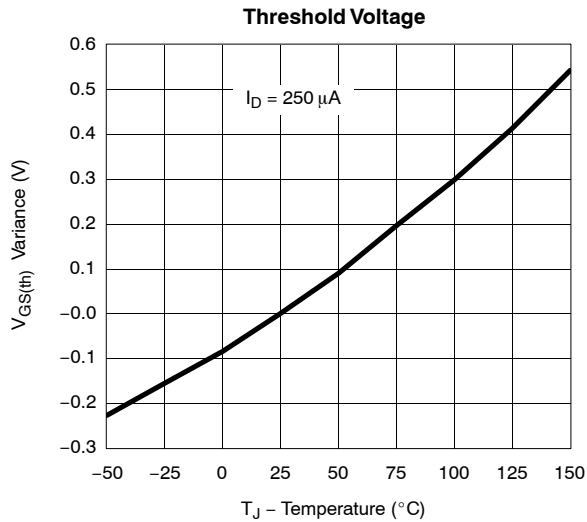
**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**



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