

Bi-Directional N-Channel 30-V (D-S) MOSFET

| PRODUCT SUMMARY | | |
|---------------------|-----------------------------------|--------------------|
| V _{DS} (V) | R _{DS(on)} (Ω) | I _D (A) |
| 30 | 0.019 at V _{GS} = 4.5 V | 10.7 |
| | 0.0195 at V _{GS} = 4.0 V | 10.5 |
| | 0.022 at V _{GS} = 3.1 V | 9.9 |
| | 0.027 at V _{GS} = 2.5 V | 9.0 |

FEATURES

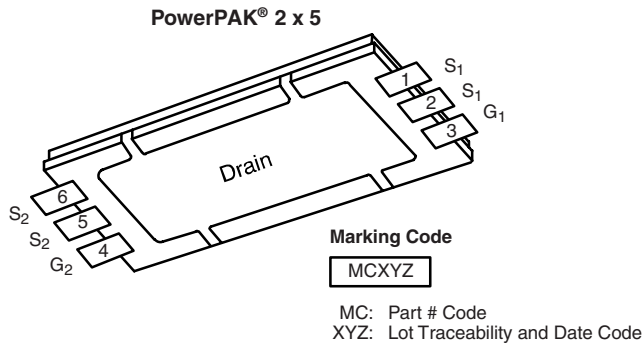
- Halogen-free
- TrenchFET[®] Power MOSFET: 2.5 V Rated
- ESD Protected: 3000 V



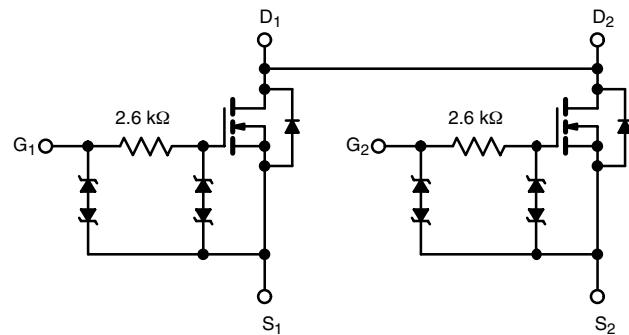
RoHS
COMPLIANT

APPLICATIONS

- Battery Protection Circuitry
- 1-Cell Li-Ion Battery Pack
 - LiB/LiP
 - Lithium-Polymer



Ordering Information: SiF912EDZ-T1-GE3 (Lead (Pb)-free and Halogen-free)



| ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted | | | | | |
|---|-----------------------------------|------------------------|--------------|------|-----|
| Parameter | Symbol | 10 s | Steady State | Unit | |
| Drain-Source Voltage | V _{DS} | 30 | | V | |
| Gate-Source Voltage | V _{GS} | ± 12 | | | |
| Continuous Drain Current (T _J = 150 °C) ^a | I _D | T _A = 25 °C | 10.7 | 7.4 | A |
| | | T _A = 85 °C | 7.7 | 5.3 | |
| Pulsed Drain Current (V _{GS} = 8 V, 10 μs) | I _{DM} | 80 | | | |
| Continuous Diode Current (Diode Conduction) ^a | I _S | 2.9 | 1.3 | W | |
| Maximum Power Dissipation ^a | P _D | T _A = 25 °C | 3.5 | | 1.6 |
| | | T _A = 85 °C | 1.8 | 0.86 | |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | - 55 to 150 | | °C | |

| THERMAL RESISTANCE RATINGS | | | | | |
|--|-------------------|--------------|---------|------|------|
| Parameter | Symbol | Typical | Maximum | Unit | |
| Maximum Junction-to-Ambient ^a | R _{thJA} | t ≤ 10 s | 30 | 36 | °C/W |
| | | Steady State | 61 | 76 | |
| Maximum Junction-to-Case (Drain) | R _{thJC} | 4.5 | 5.6 | | |

Notes:

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



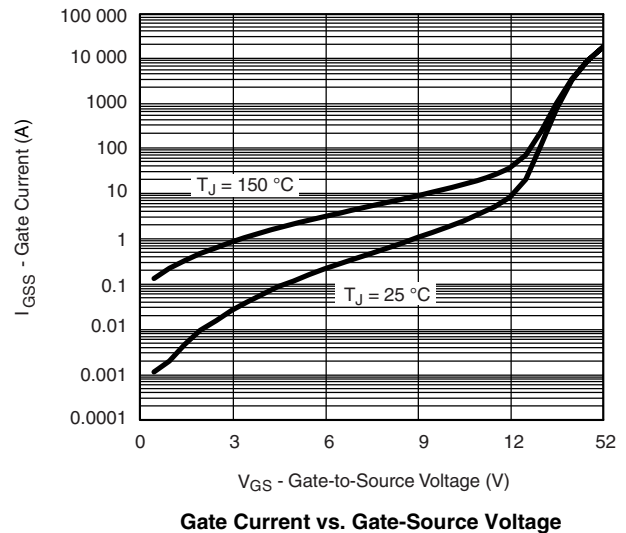
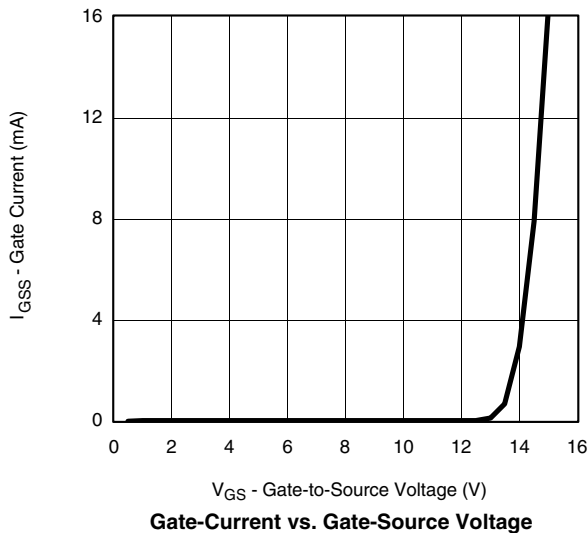
| SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted | | | | | | |
|---|--------------|--|------|--------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 0.6 | | 1.5 | V |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$ | | | ± 10 | μA |
| | | $V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$ | | | ± 500 | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$ | | | 1 | |
| | | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$ | | | 5 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} = 5\text{ V}, V_{GS} = 4.5\text{ V}$ | 40 | | | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}, I_D = 7.4\text{ A}$ | | 0.0155 | 0.019 | Ω |
| | | $V_{GS} = 4.0\text{ V}, I_D = 7.3\text{ A}$ | | 0.016 | 0.0195 | |
| | | $V_{GS} = 3.1\text{ V}, I_D = 6.8\text{ A}$ | | 0.018 | 0.022 | |
| | | $V_{GS} = 2.5\text{ V}, I_D = 3.5\text{ A}$ | | 0.022 | 0.027 | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = 10\text{ V}, I_D = 7.4\text{ A}$ | | 37 | | S |
| Diode Forward Voltage ^a | V_{SD} | $I_S = 2.9\text{ A}, V_{GS} = 0\text{ V}$ | | 0.75 | 1.1 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | Q_g | $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 7.4\text{ A}$ | | 9.8 | 15 | nC |
| Gate-Source Charge | Q_{gs} | | | 2.5 | | |
| Gate-Drain Charge | Q_{gd} | | | 2.9 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$ | | 0.53 | 0.8 | μs |
| Rise Time | t_r | | | 0.70 | 1.1 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 8.0 | 12 | |
| Fall Time | t_f | | | 3.4 | 5 | |

Notes:

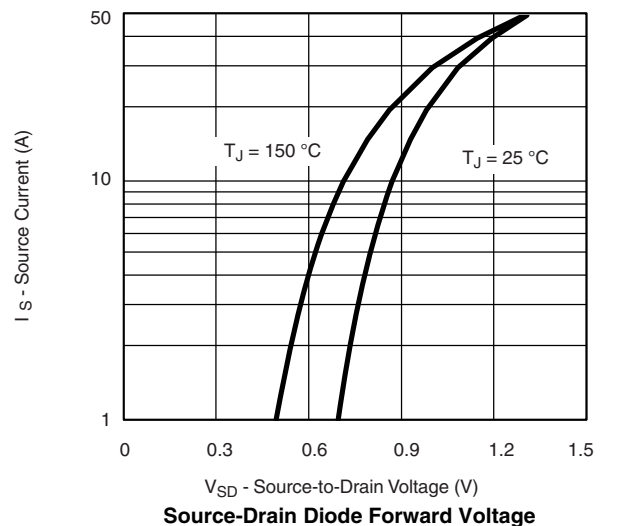
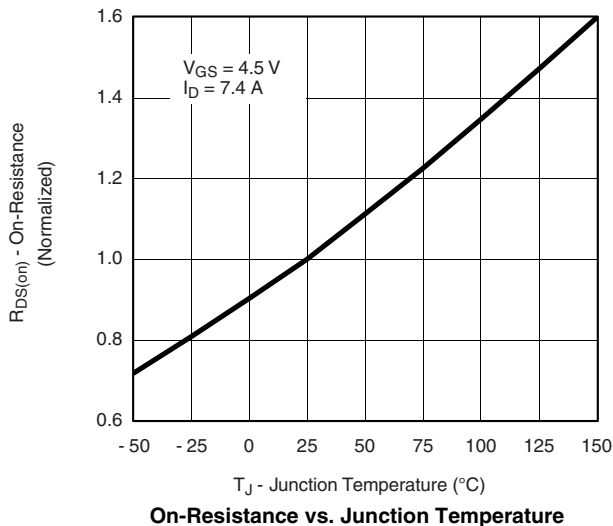
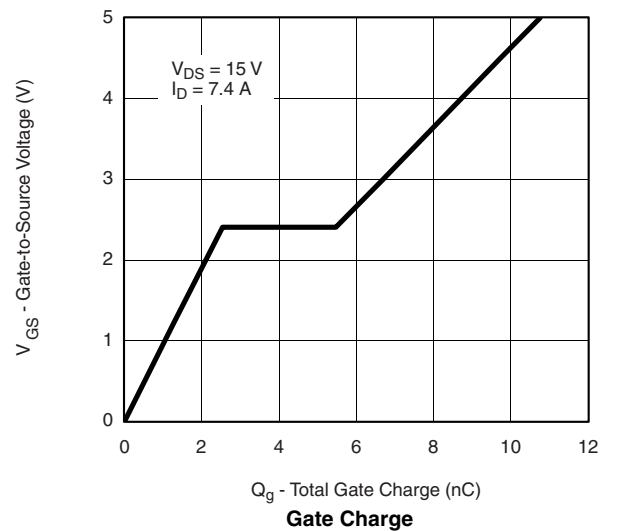
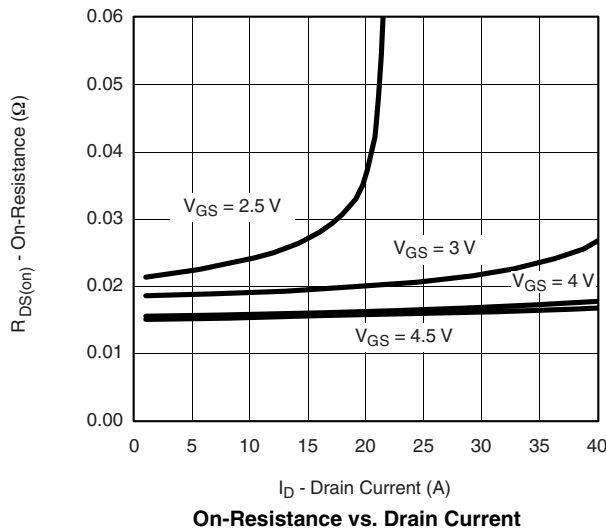
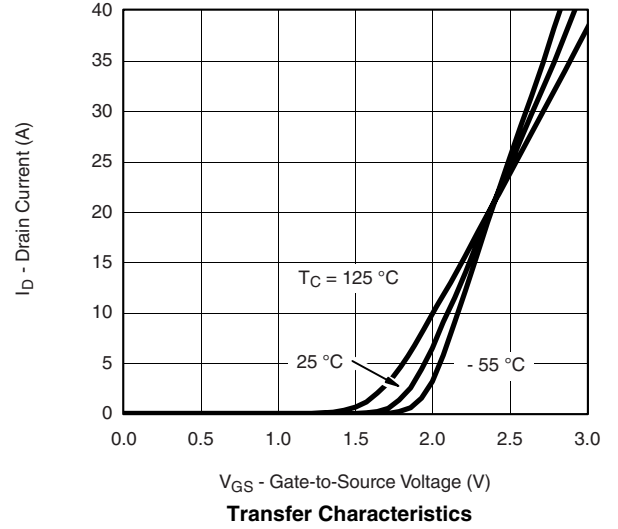
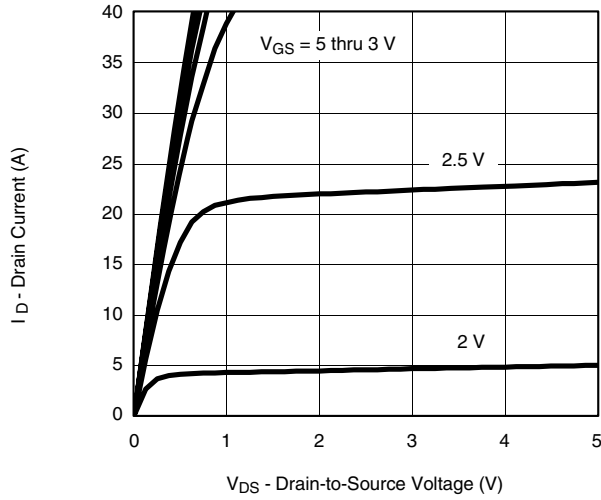
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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.

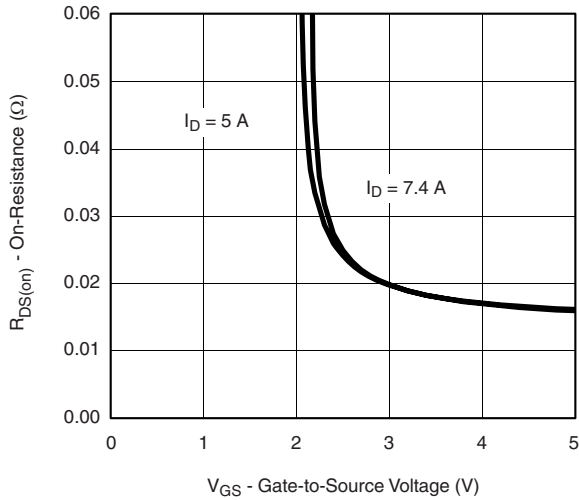
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



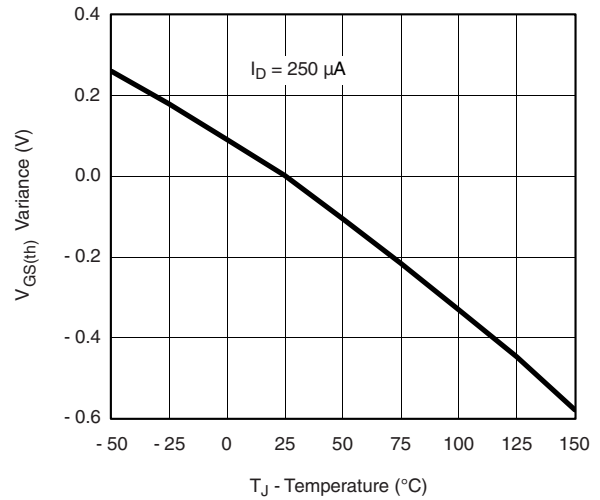
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



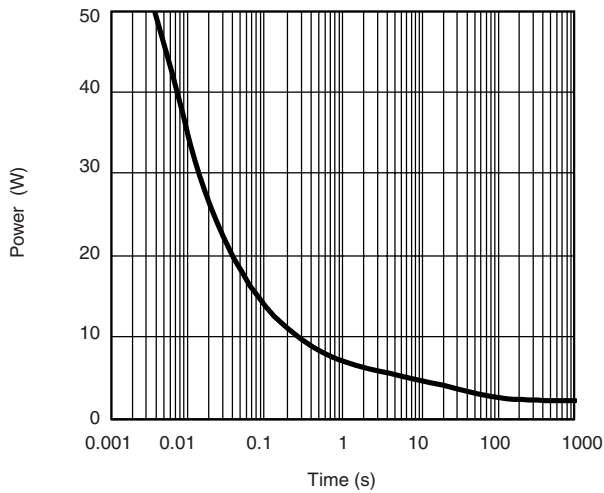
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



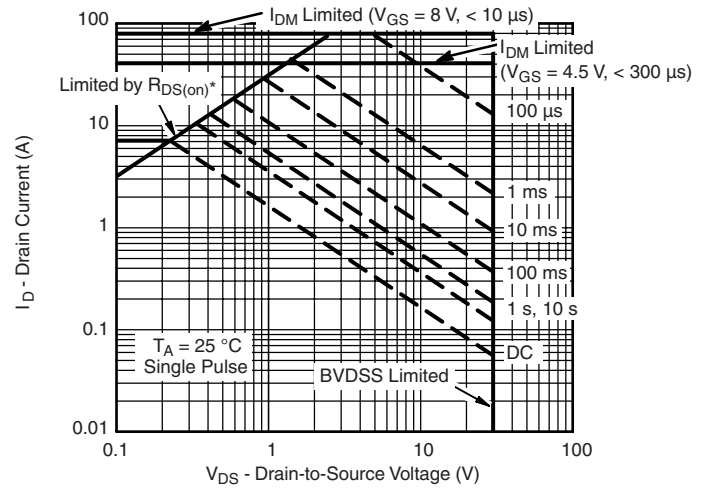
On-Resistance vs. Gate-to-Source Voltage



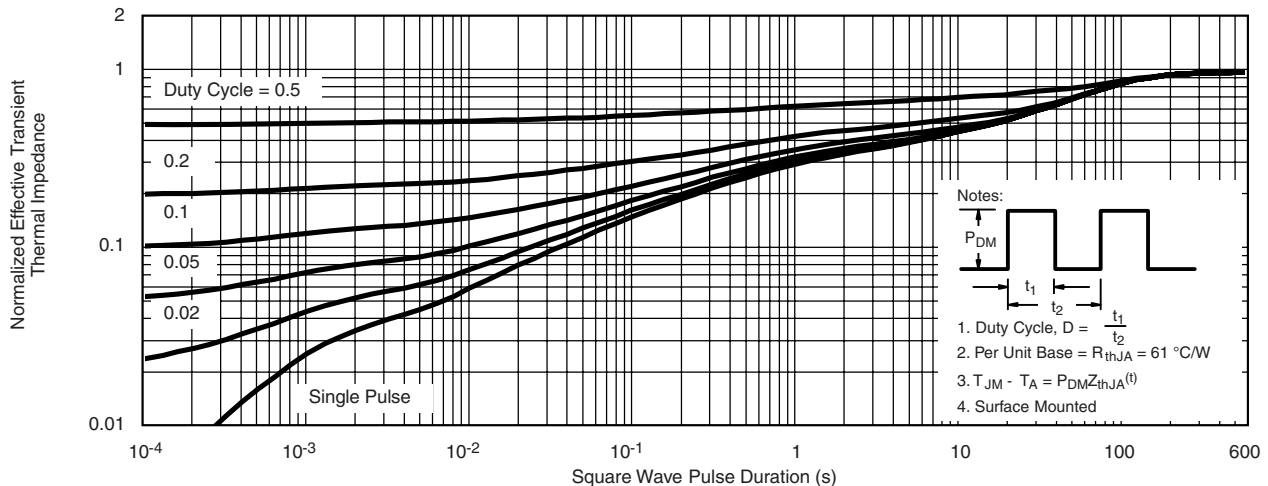
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



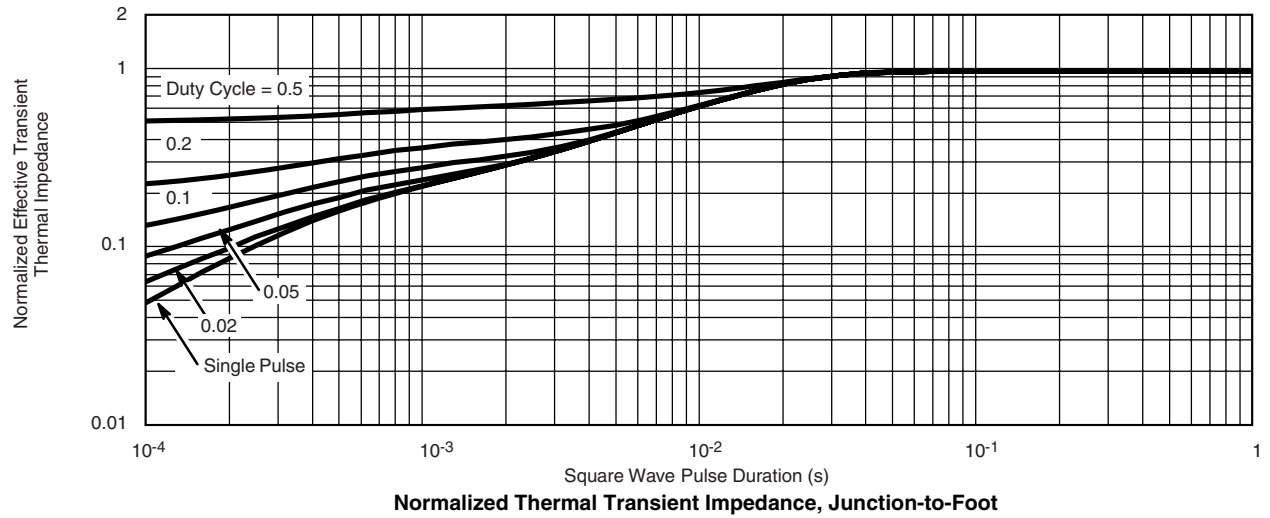
Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Ambient



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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