



## Bi-Directional N-Channel 20-V (D-S) MOSFET

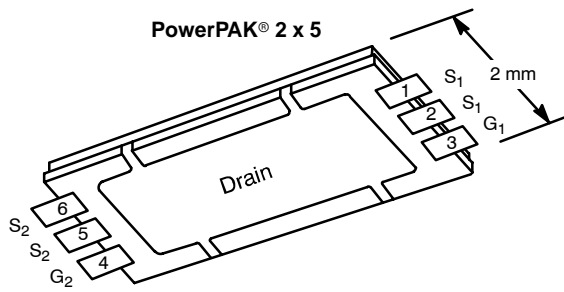
PRODUCT SUMMARY			
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ)
20	0.022 @ $V_{GS} = 4.5$ V	10.3	9.1
	0.023 @ $V_{GS} = 4.0$ V	10.0	
	0.026 @ $V_{GS} = 3.1$ V	9.4	
	0.028 @ $V_{GS} = 2.5$ V	9.0	

### FEATURES

- TrenchFET® Power MOSFET: 2.5-V Rated
- ESD Protected: 4000 V

### APPLICATIONS

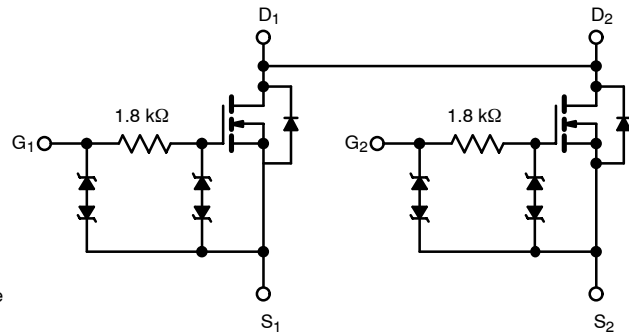
- Battery Protection Circuitry
  - Cell Li-Ion LIB/LIP Battery Packs



Ordering Information: SiF902EDZ-T1—E3

Marking Code  
MAXYZ

MA: Part # Code  
XYZ: Lot Traceability and Date Code



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter		Symbol	10 secs	Steady State	Unit
Drain-Source Voltage		$V_{DS}$	20		V
Gate-Source Voltage		$V_{GS}$	$\pm 12$		
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$T_A = 25^\circ\text{C}$	$I_D$	10.3	7.0	A
	$T_A = 85^\circ\text{C}$		7.4	5.1	
Pulsed Drain Current ( $V_{GS} = 8$ V)		$I_{DM}$	40		
Continuous Diode Current (Diode Conduction) <sup>a</sup>		$I_S$	3.1	1.5	
Maximum Power Dissipation <sup>a</sup>	$T_A = 25^\circ\text{C}$	$P_D$	3.5	1.6	W
	$T_A = 85^\circ\text{C}$		1.8	0.86	
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>	$t \leq 10$ sec	$R_{thJA}$	30	36	$^\circ\text{C}/\text{W}$
	Steady State		61	76	
Maximum Junction-to-Case (Drain)		$R_{thJC}$	4.8	6.0	

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

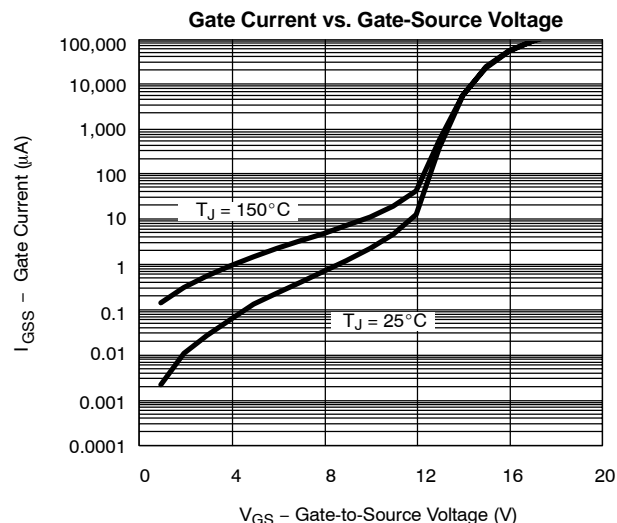
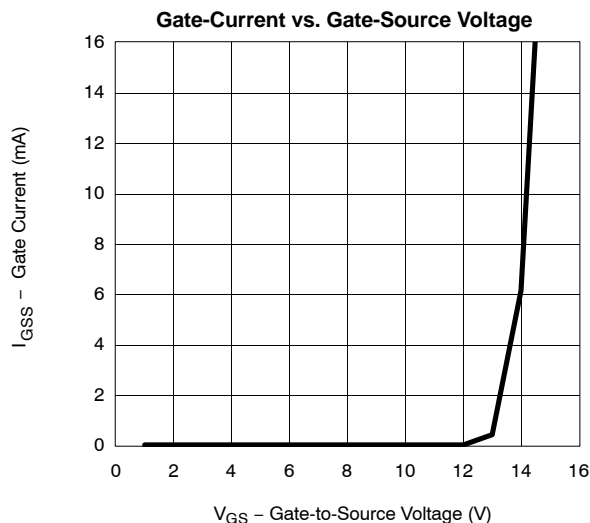
**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

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	0.6		1.5	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±4.5 V			±10	μA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V			±500	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 20 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> = 4.5 V	40			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 7.0 A		0.018	0.022	Ω
		V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 6.5 A		0.019	0.023	
		V <sub>GS</sub> = 3.1 V, I <sub>D</sub> = 4.0 A		0.021	0.026	
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 3.5 A		0.023	0.028	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 7.0 A		38		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = 3.1 A, V <sub>GS</sub> = 0 V		0.76	1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 7.0 A		9.1	14	nC
Gate-Source Charge	Q <sub>gs</sub>			1.9		
Gate-Drain Charge	Q <sub>gd</sub>			2.7		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 10 Ω I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 6 Ω		1.7	2.6	μs
Rise Time	t <sub>r</sub>			2.3	3.5	
Turn-Off Delay Time	t <sub>d(off)</sub>			1.1	1.7	
Fall Time	t <sub>f</sub>			4.4	6.6	

## Notes

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

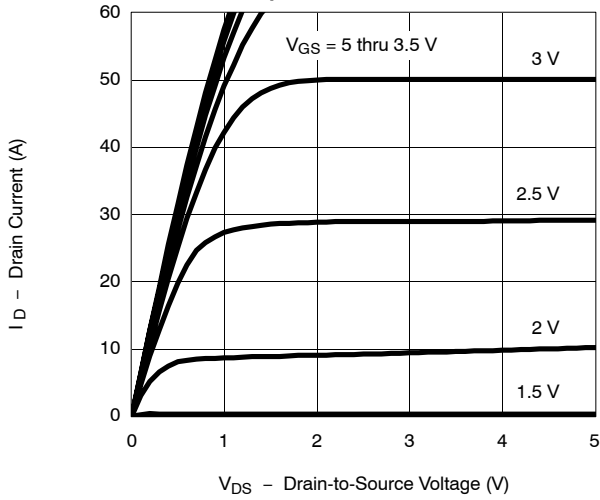
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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

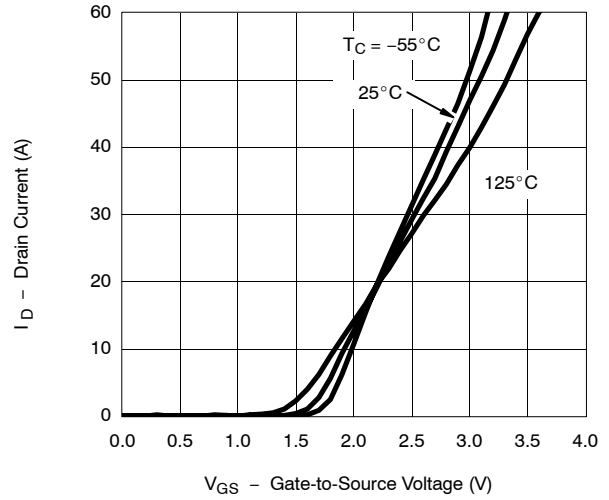


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

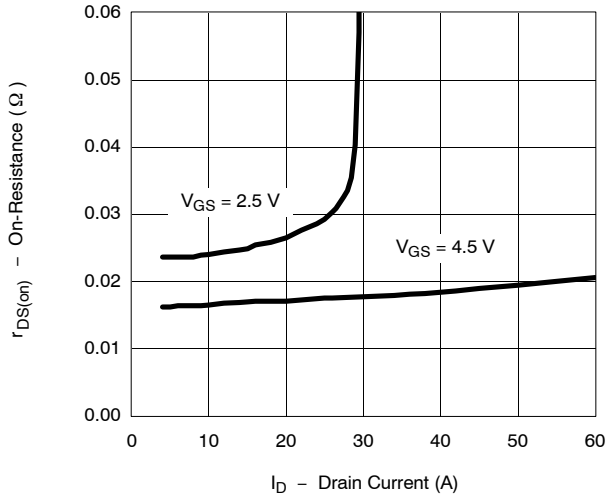
**Output Characteristics**



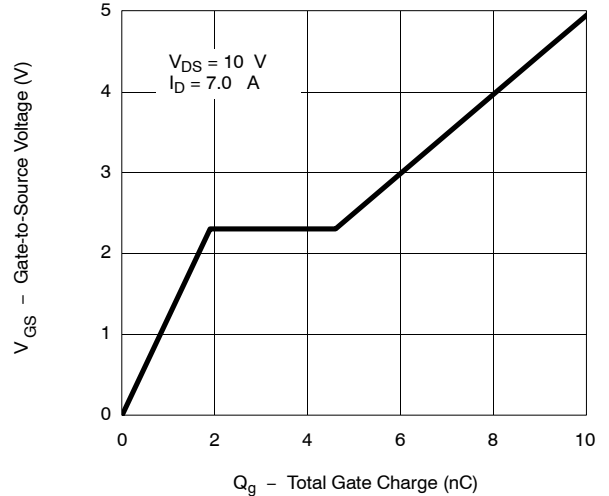
**Transfer Characteristics**



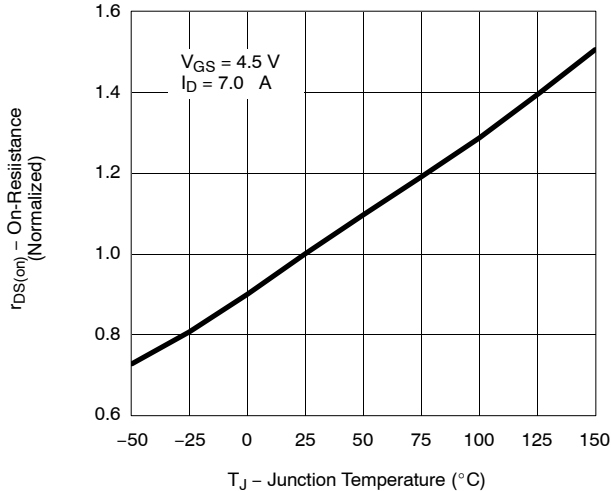
**On-Resistance vs. Drain Current**



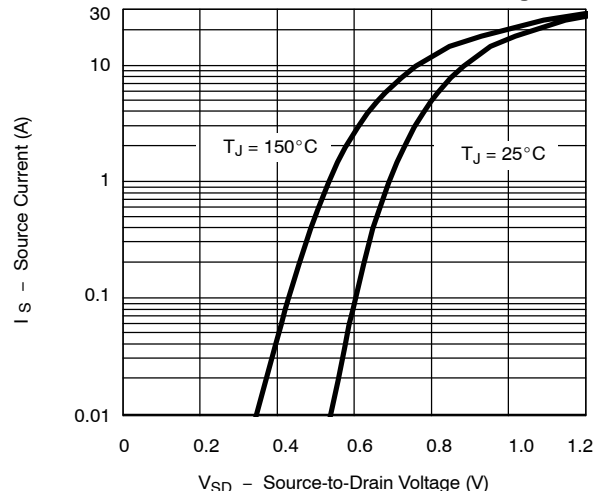
**Gate Charge**



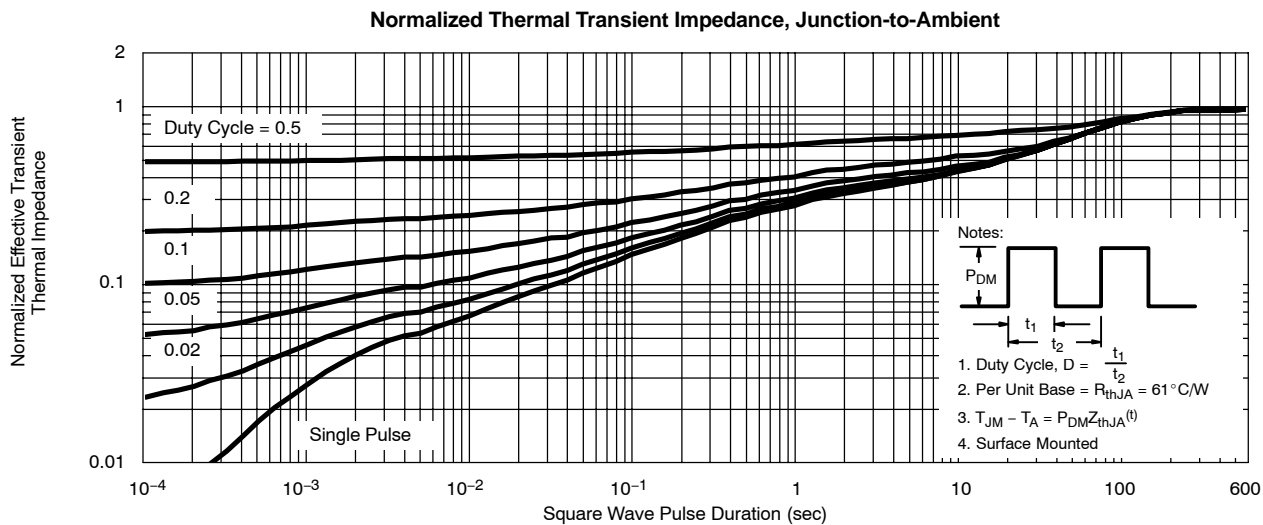
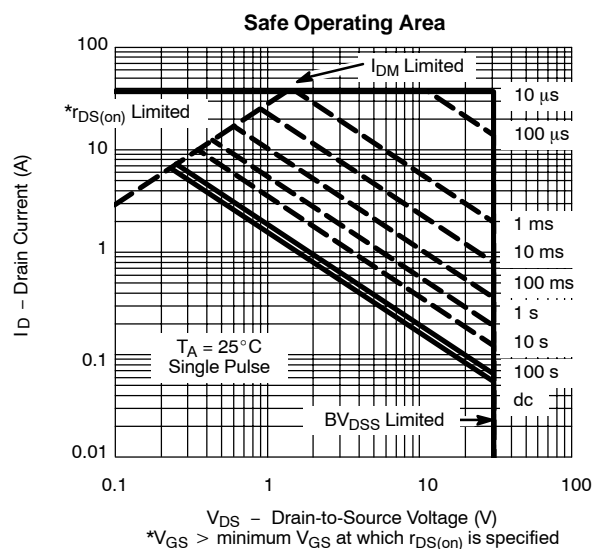
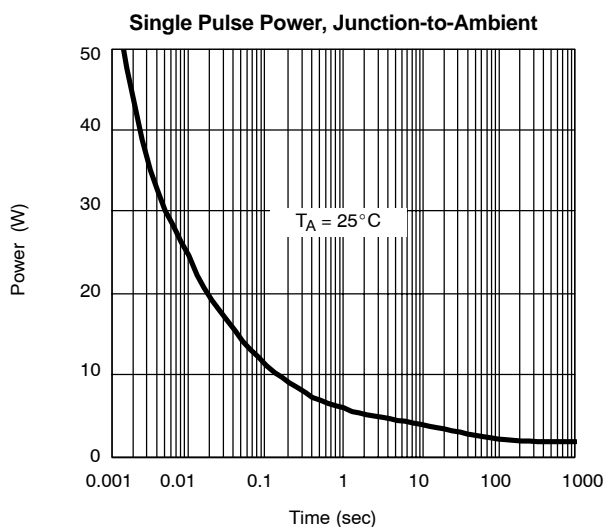
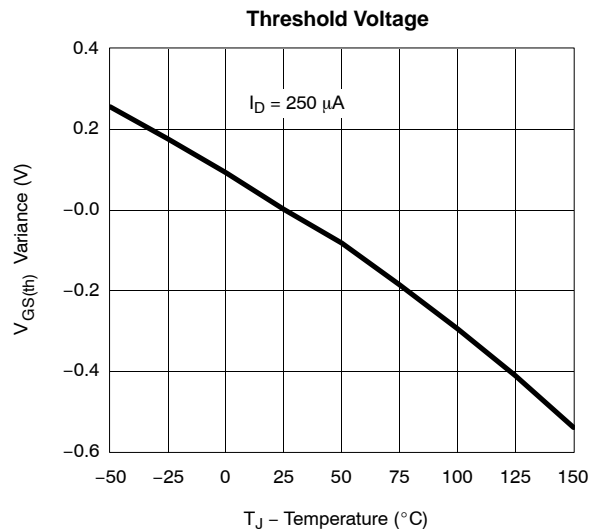
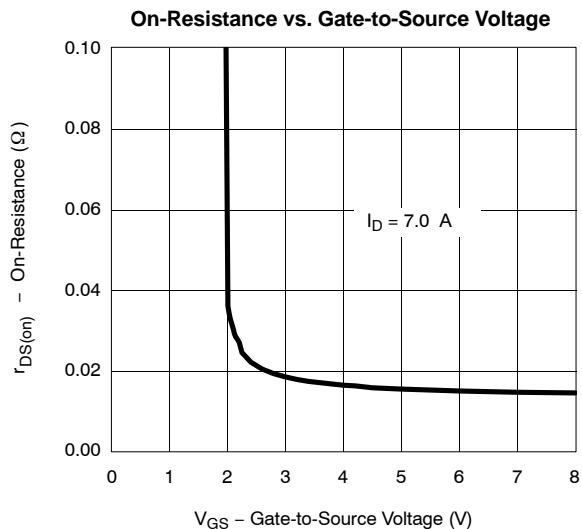
**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**

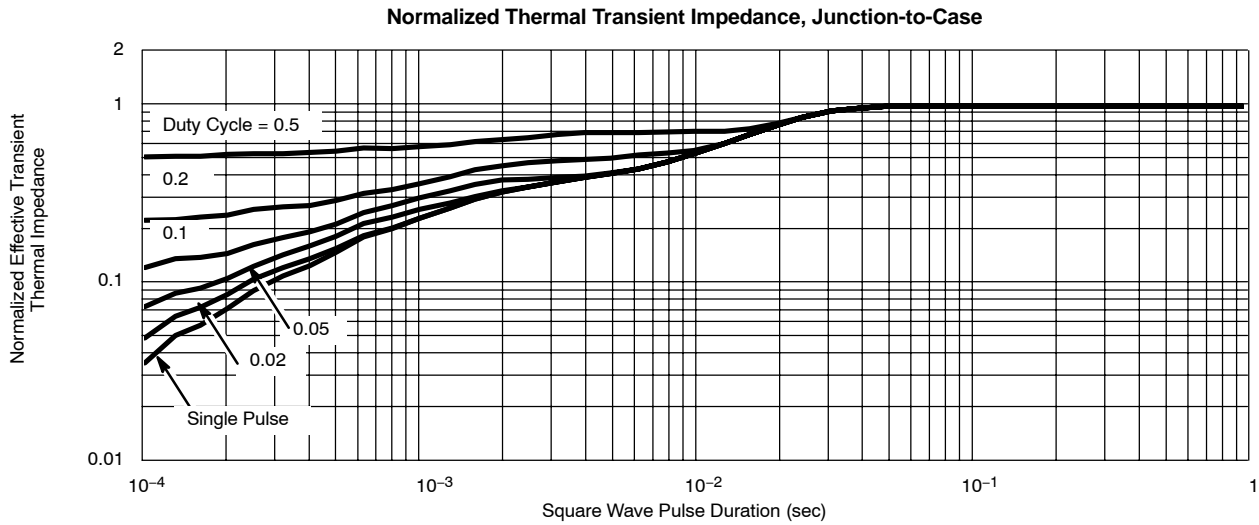


### TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)





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



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