

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
20	0.022 at $V_{GS} = 4.5$ V	10.3	9.1
	0.023 at $V_{GS} = 4.0$ V	10.0	
	0.026 at $V_{GS} = 3.1$ V	9.4	
	0.028 at $V_{GS} = 2.5$ V	9.0	

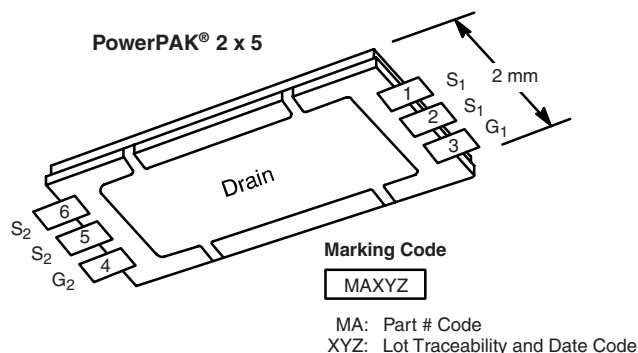
FEATURES

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

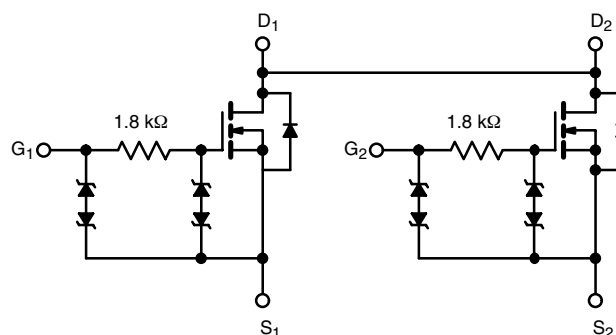

RoHS
COMPLIANT

APPLICATIONS

- Battery Protection Circuitry
- Cell Li-Ion LiB/LiP Battery Packs



Ordering Information: SiF902EDZ-T1-GE3 (Lead (Pb)-free and Halogen-free)



ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

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

Notes:

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

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, 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}	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$			1	
		$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 85\text{ }^{\circ}\text{C}$			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	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}$, $I_D = 7.0\text{ A}$		0.018	0.022	Ω
		$V_{GS} = 4.0\text{ V}$, $I_D = 6.5\text{ A}$		0.019	0.023	
		$V_{GS} = 3.1\text{ V}$, $I_D = 4.0\text{ A}$		0.021	0.026	
		$V_{GS} = 2.5\text{ V}$, $I_D = 3.5\text{ A}$		0.023	0.028	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 10\text{ V}$, $I_D = 7.0\text{ A}$		38		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 3.1\text{ A}$, $V_{GS} = 0\text{ V}$		0.76	1.1	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 10\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 7.0\text{ A}$		9.1	14	nC
Gate-Source Charge	Q_{gs}			1.9		
Gate-Drain Charge	Q_{gd}			2.7		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}$, $R_L = 10\text{ }\Omega$ $I_D \cong 1\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 6\text{ }\Omega$		1.7	2.6	μs
Rise Time	t_r			2.3	3.5	
Turn-Off Delay Time	$t_{d(off)}$			1.1	1.7	
Fall Time	t_f			4.4	6.6	

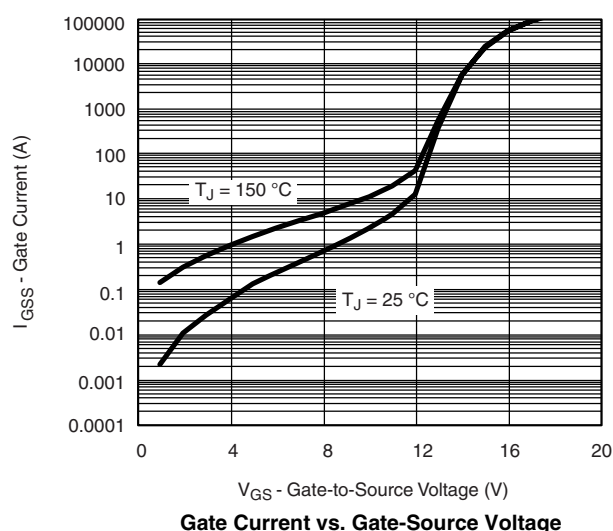
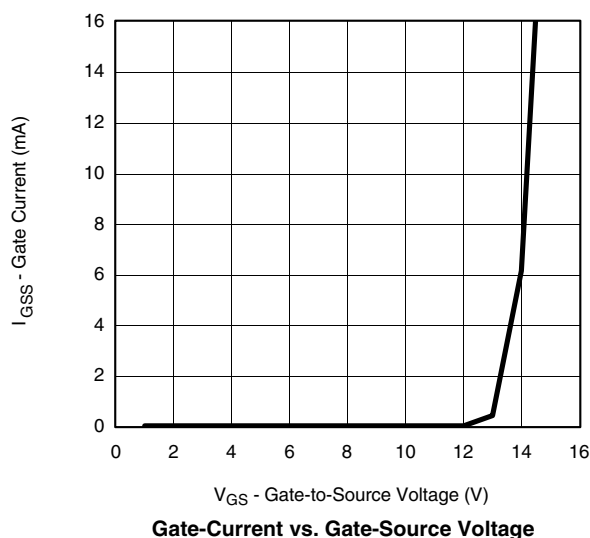
Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

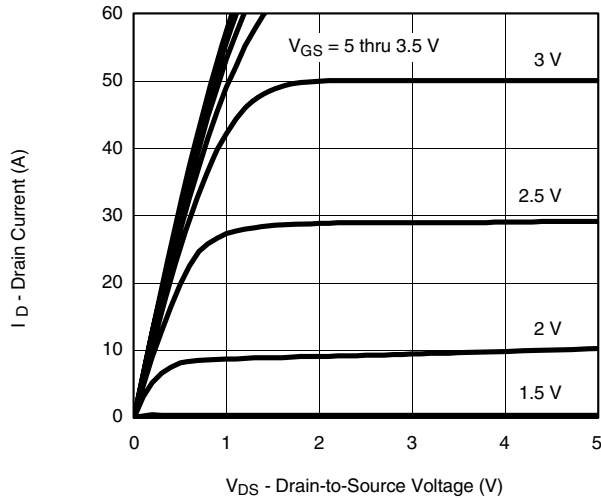
b. Guaranteed by design, not subject to production testing.

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.

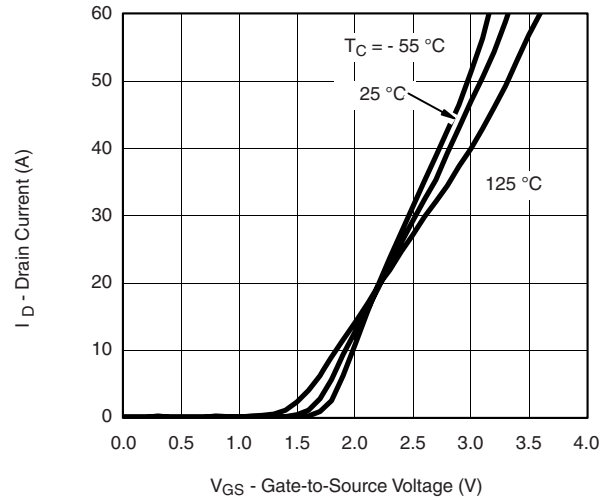
TYPICAL CHARACTERISTICS $25\text{ }^{\circ}\text{C}$, unless otherwise noted



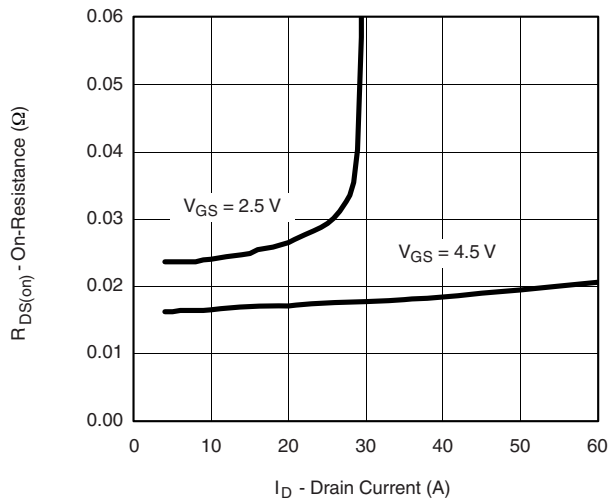
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



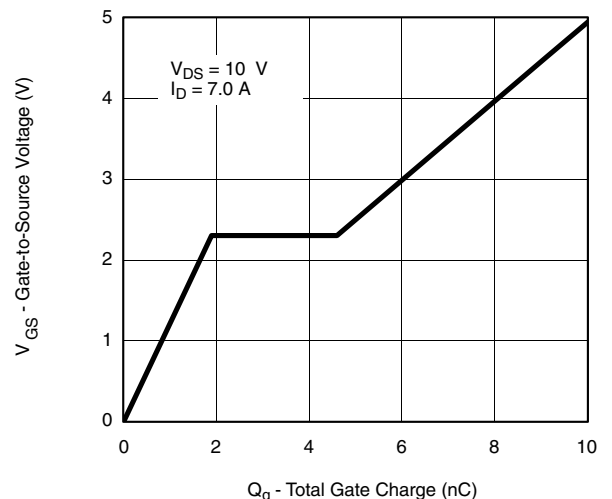
Output Characteristics



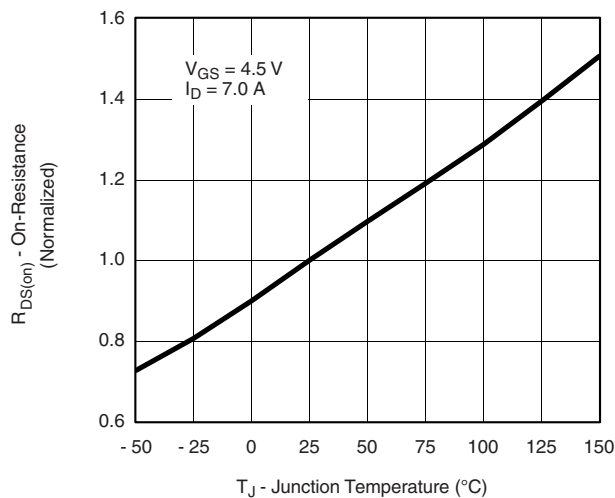
Transfer Characteristics



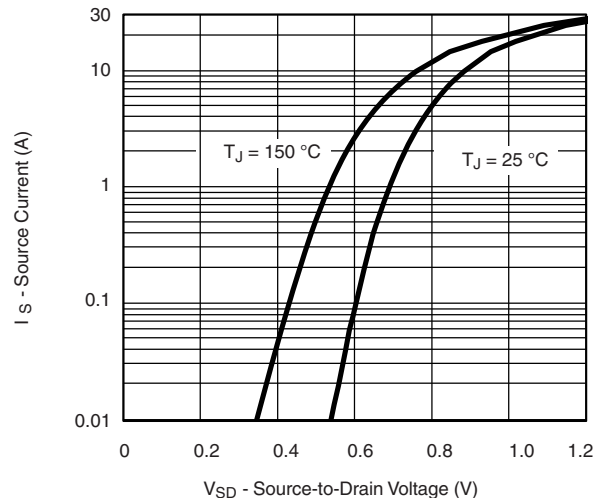
On-Resistance vs. Drain Current



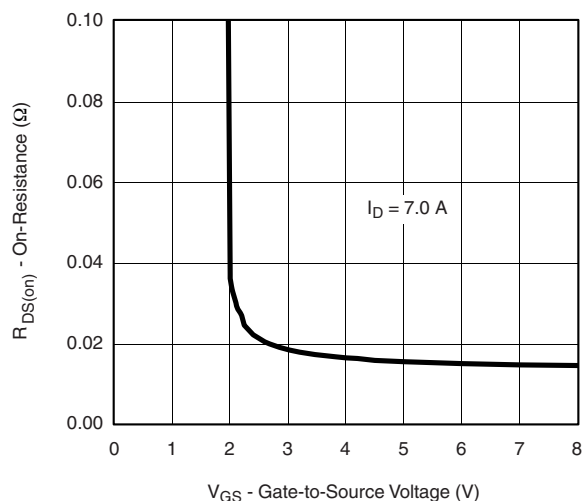
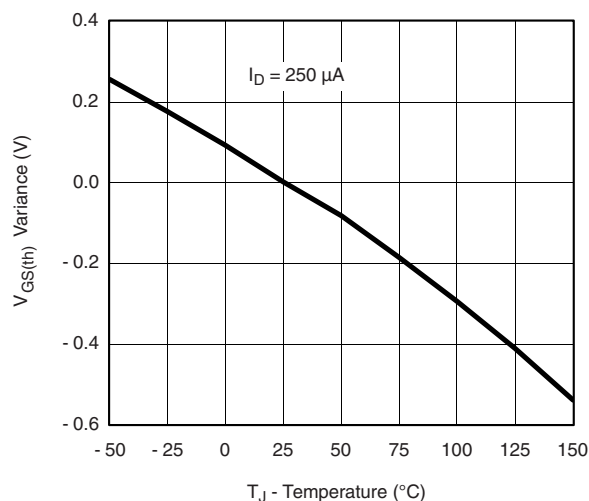
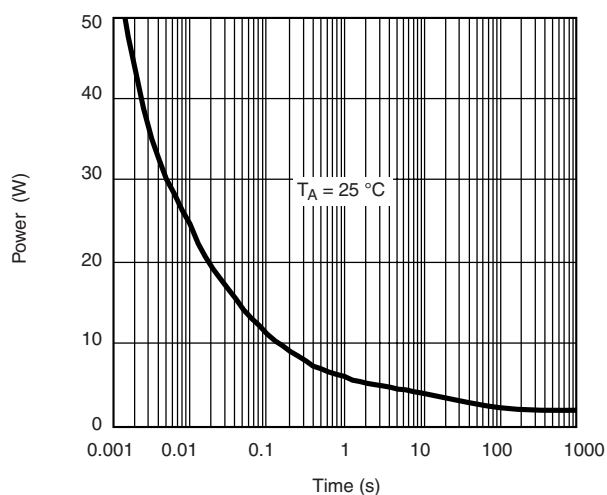
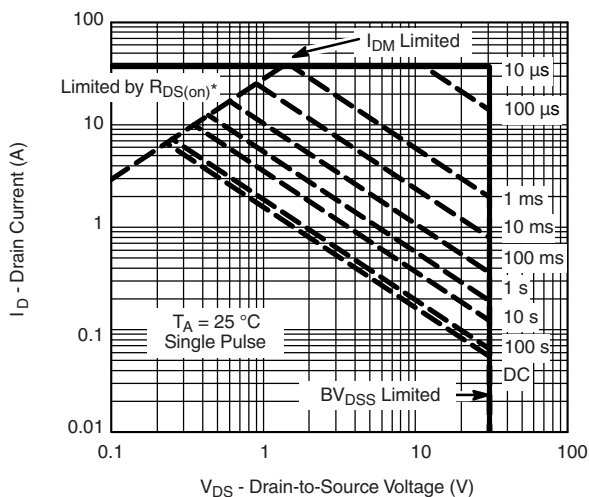
Gate Charge



On-Resistance vs. Junction Temperature

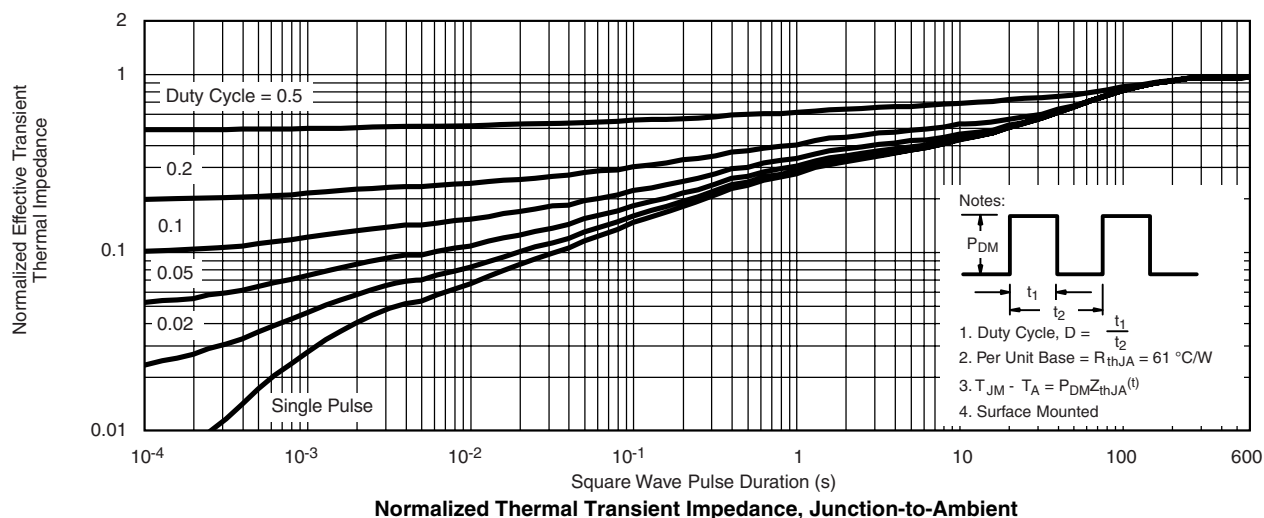


Source-Drain Diode Forward Voltage

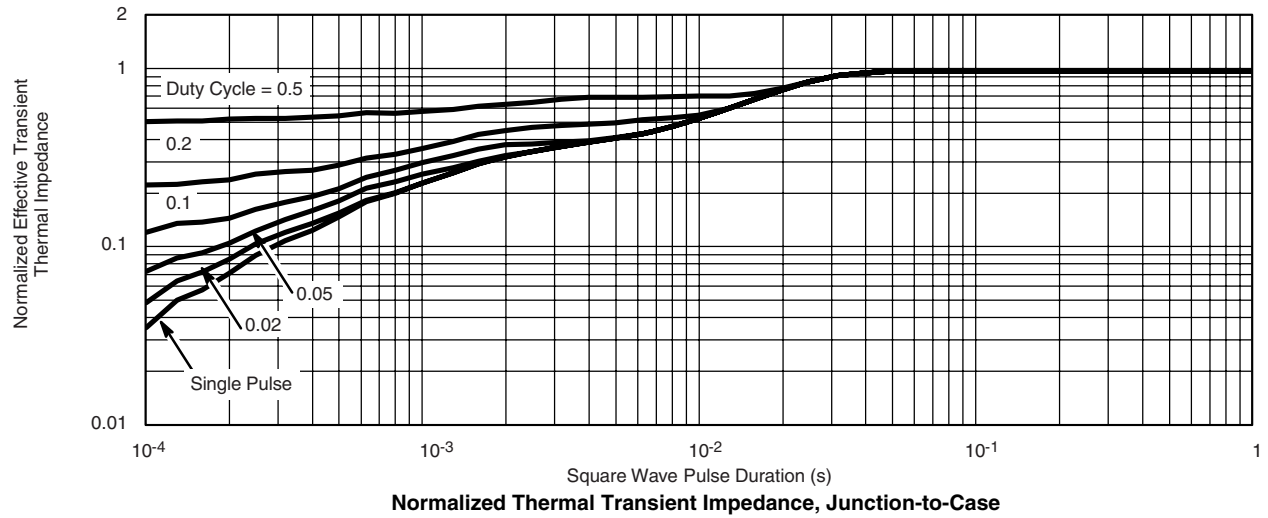
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power, Junction-to-Ambient**

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

Safe Operating Area



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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