

N-Channel 30-V (D-S) Fast Switching WFET™

PRODUCT SUMMARY

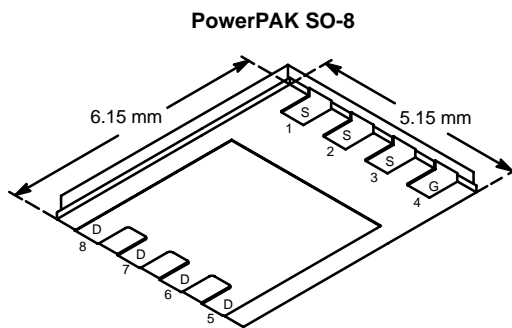
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.0095 @ $V_{GS} = 10$ V	15
	0.0135 @ $V_{GS} = 4.5$ V	13

FEATURES

- Extremely Low Q_{gd} WFET Technology for Low Switching Losses
- TrenchFET® Power MOSFET
- New Low Thermal Resistance PowerPAK® Package with Low 1.07-mm Profile
- 100% R_g Tested

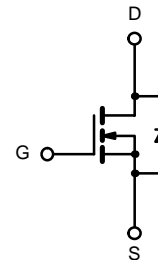
APPLICATIONS

- High-Side DC/DC Conversion
 - Notebook
 - Server
 - Workstation
- Point-of-Load Conversion



Bottom View

Ordering Information: Si7390DP-T1



N-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}	± 20			
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	I_D	$T_A = 25^\circ\text{C}$	15	9	A
		$T_A = 70^\circ\text{C}$	12	7	
Pulsed Drain Current	I_{DM}	± 50			
Continuous Source Current (Diode Conduction) ^a	I_S	4.1	1.5		
Maximum Power Dissipation ^a	P_D	$T_A = 25^\circ\text{C}$	5	1.8	W
		$T_A = 70^\circ\text{C}$	3.2	1.1	
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 (MOSFET) ^a	R_{thJA}	$t \leq 10$ sec	20	25	$^\circ\text{C/W}$
		Steady State	53	70	
Maximum Junction-to-Case (Drain)	R_{thJC}	2.1	3.2		

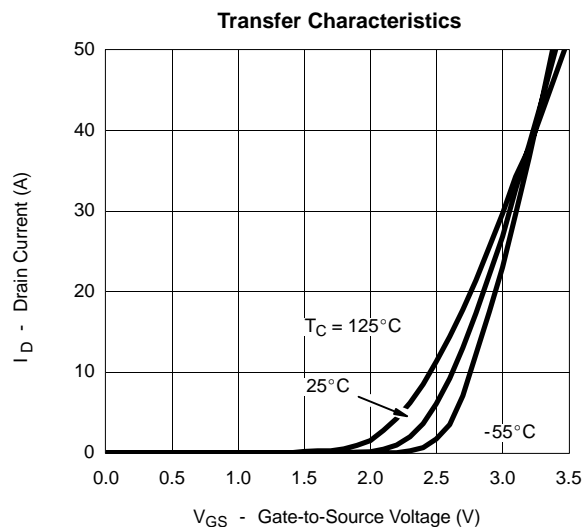
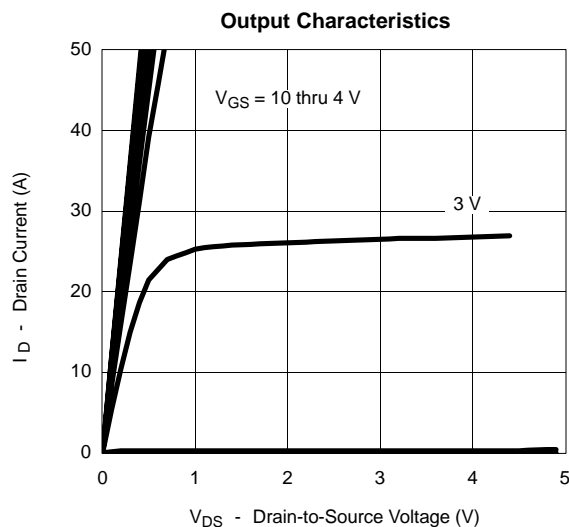
Notes

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

MOSFET SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.8		3.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 20\ \text{V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 24\ \text{V}, V_{GS} = 0\ \text{V}$			1	μA
		$V_{DS} = 24\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70^\circ\text{C}$			5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\ \text{V}, V_{GS} = 10\ \text{V}$	40			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\ \text{V}, I_D = 15$		0.0075	0.0095	Ω
		$V_{GS} = 4.5\ \text{V}, I_D = 13$		0.0105	0.0135	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\ \text{V}, I_D = 15$		45		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 4.1\ \text{A}, V_{GS} = 0\ \text{V}$		0.7	1.1	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 15\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 15\ \text{A}$		10	15	nC
Gate-Source Charge	Q_{gs}			3.5		
Gate-Drain Charge	Q_{gd}			2.1		
Gate-Resistance	R_g		0.2	0.8	1.4	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\ \text{V}, R_L = 15\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 10\ \text{V}, R_G = 6\ \Omega$		16	30	ns
Rise Time	t_r			7	12	
Turn-Off Delay Time	$t_{d(off)}$			43	70	
Fall Time	t_f			14	25	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 2.7\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$		35	60	

Notes

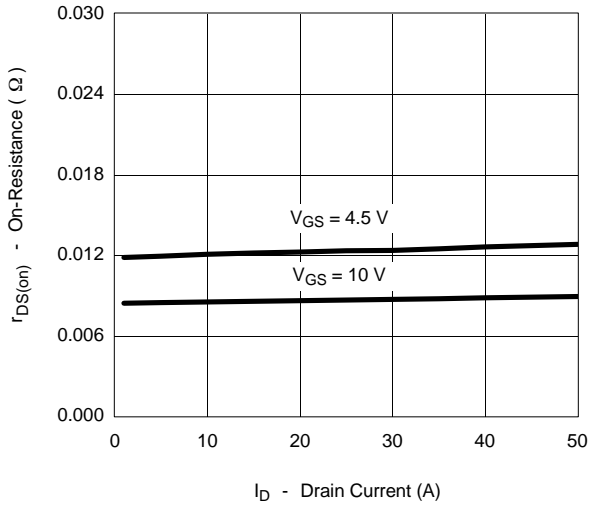
- a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)


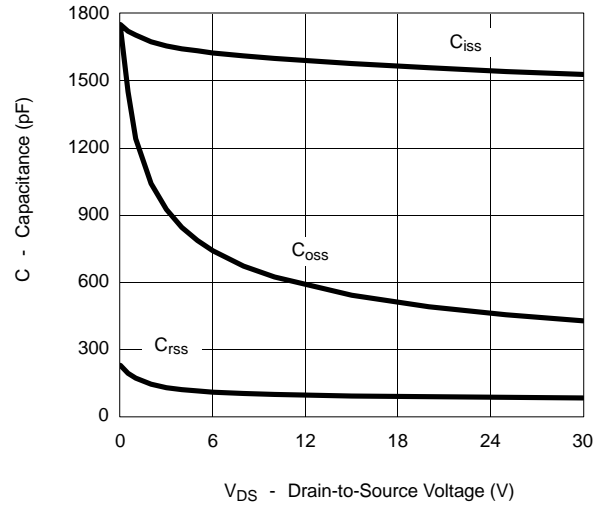


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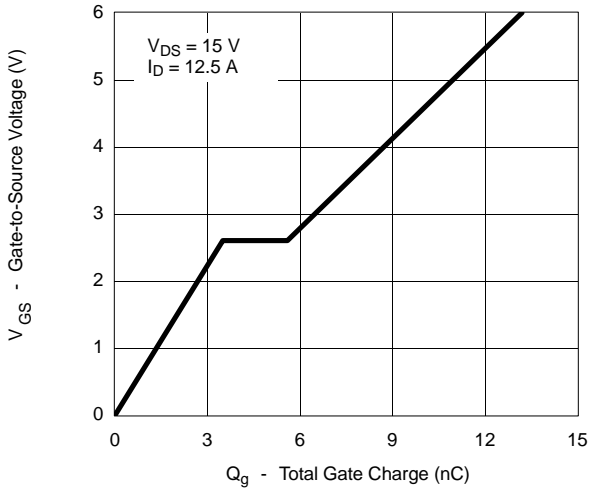
On-Resistance vs. Drain Current



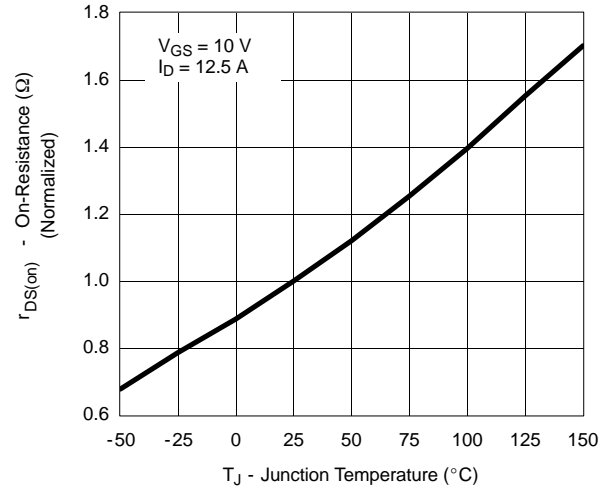
Capacitance



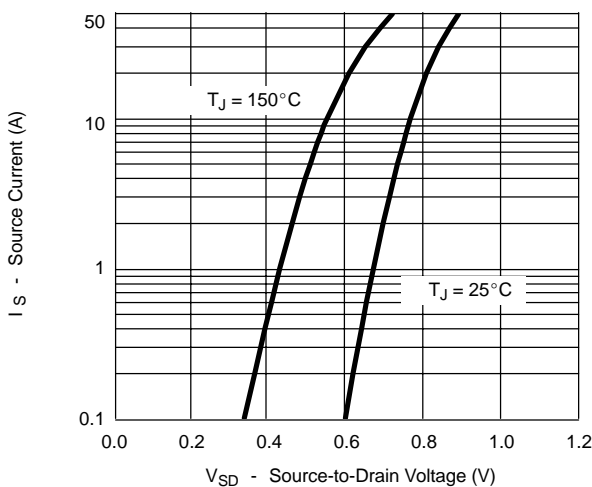
Gate Charge



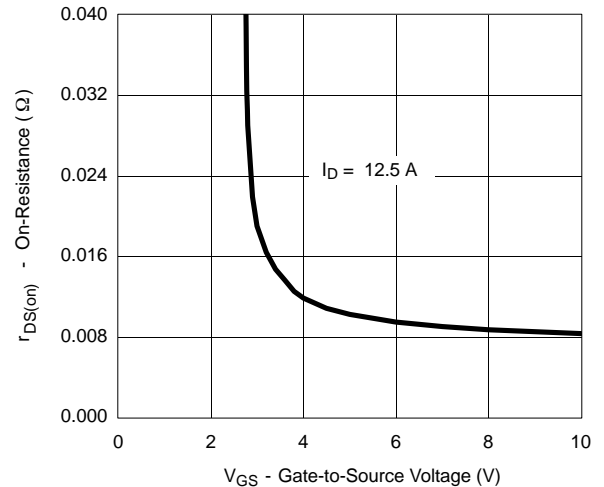
On-Resistance vs. Junction Temperature



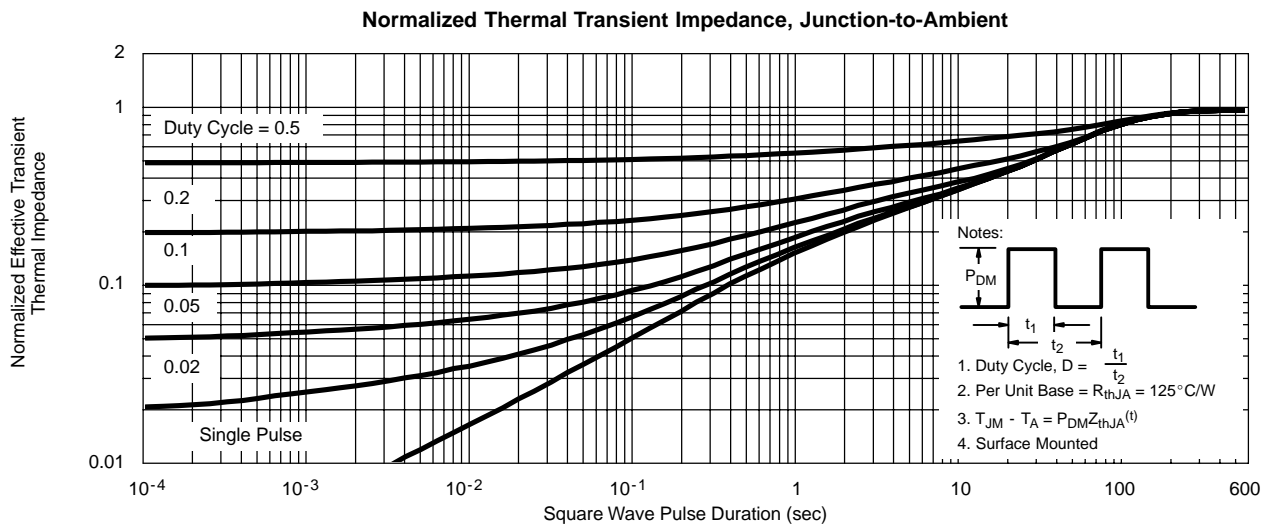
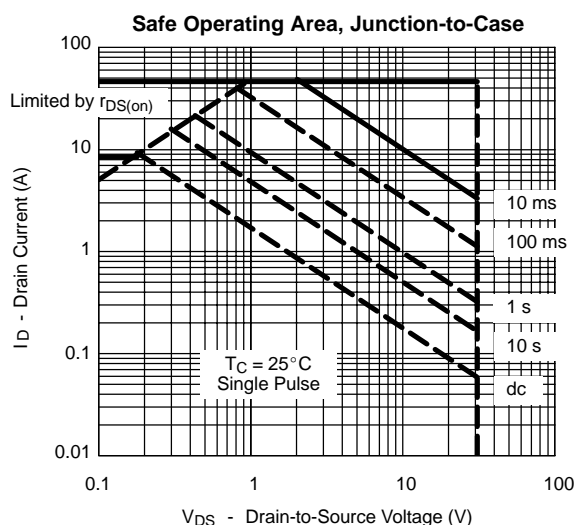
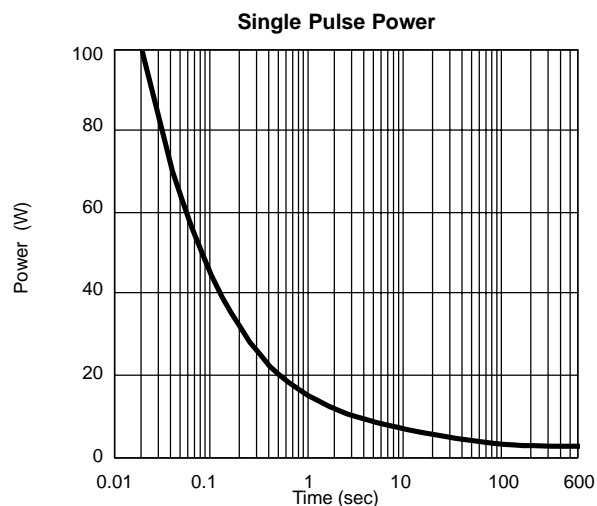
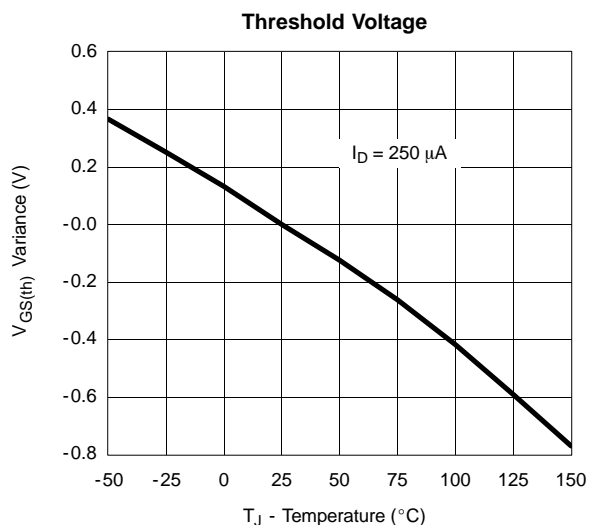
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)





TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

