

N-Channel 60-V (D-S) Fast Switching MOSFET

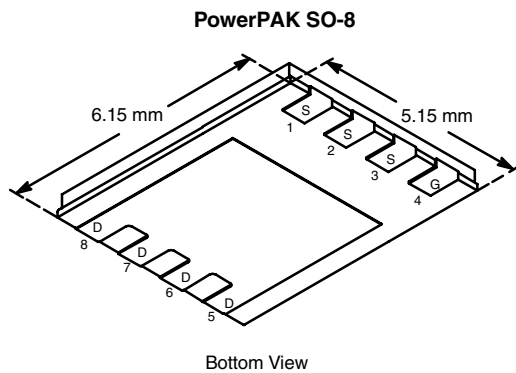
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
60	0.022 at $V_{GS} = 10$ V	10.3
	0.031 at $V_{GS} = 4.5$ V	8.7

FEATURES

- TrenchFET[®] Power MOSFET
- New Low Thermal Resistance PowerPAK[®] Package with Low 1.07-mm Profile
- PWM Optimized for Fast Switching
- 100 % R_g Tested
- Lead (Pb)-free Version is RoHS Compliant



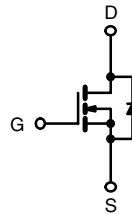
RoHS*
COMPLIANT



Ordering Information: Si7850DP-T1
Si7850DP-T1—E3 (Lead (Pb)-free)

APPLICATIONS

- Primary Side Switch for 24-V DC/DC Applications
- Secondary Synchronous Rectifier



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted					
Parameter	Symbol	10 secs	Steady State	Unit	
Drain-Source Voltage	V_{DS}	60		V	
Gate-Source Voltage	V_{GS}	± 20			
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	$T_A = 25$ °C	10.3	6.2	A
		$T_A = 85$ °C	7.5	4.5	
Continuous Source Current	I_S	3.7	1.5		
Pulsed Drain Current	I_{DM}	40			
Avalanche Current ^b	I_{AS}	15			
Single Avalanche Energy ^b	E_{AS}	11		mJ	
Maximum Power Dissipation ^a	P_D	$T_A = 25$ °C	4.5	1.8	W
		$T_A = 85$ °C	2.3	0.9	
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}	$t \leq 10$ sec	22	28	°C/W
		Steady State	58	70	
Maximum Junction-to-Case (Drain)	R_{thJC}	2.6	3.3		

Notes

- a. Surface Mounted on 1" x 1" FR4 Board.
b. Guaranteed by design, not subject to production testing.

* Pb containing terminations are not RoHS compliant, exemptions may apply.



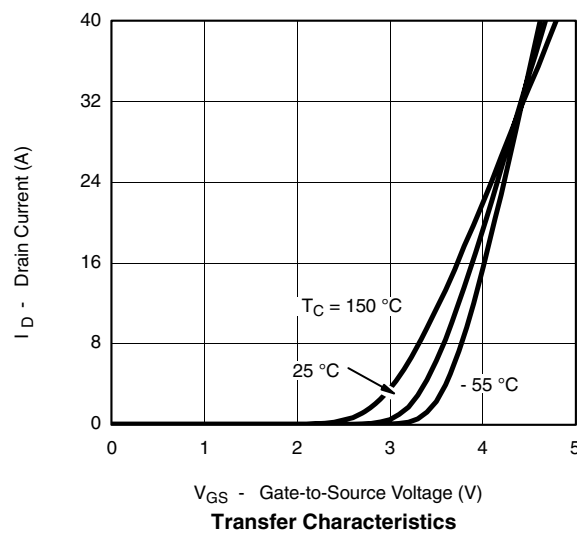
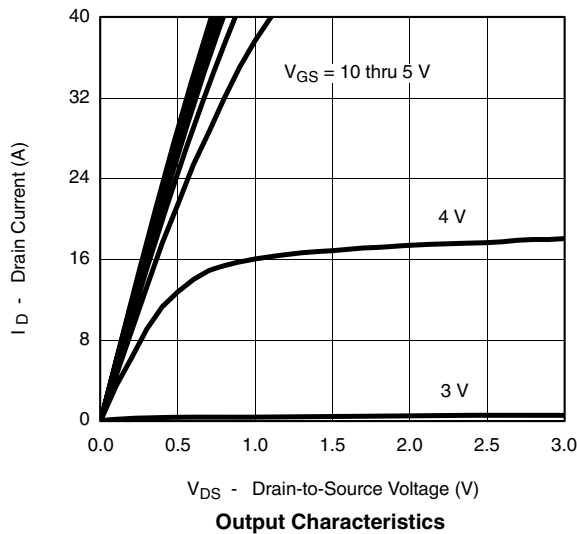
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	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}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			20	
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	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10.3\text{ A}$		0.018	0.022	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 8.7\text{ A}$		0.025	0.031	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 10.3\text{ A}$		26		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 3.8\text{ A}, V_{GS} = 0\text{ V}$		0.85	1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 10.3\text{ A}$		18	27	nC
Gate-Source Charge	Q_{gs}		3.4			
Gate-Drain Charge	Q_{gd}		5.3			
Gate Resistance	R_G		0.5	1.4	2.2	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, R_L = 30\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_G = 6\text{ }\Omega$		10	20	ns
Rise Time	t_r		10	20		
Turn-Off Delay Time	$t_{d(off)}$		25	50		
Fall Time	t_f		12	24		
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 3.8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		50	80	

Notes

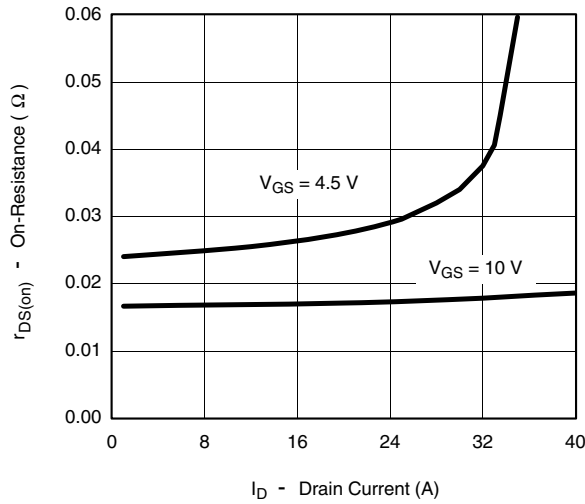
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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.

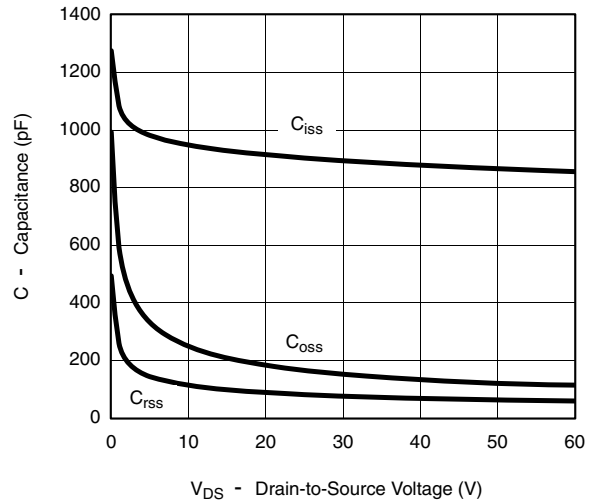
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless noted



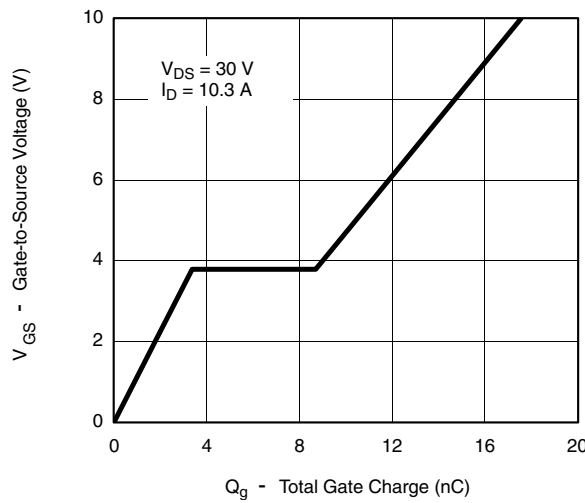
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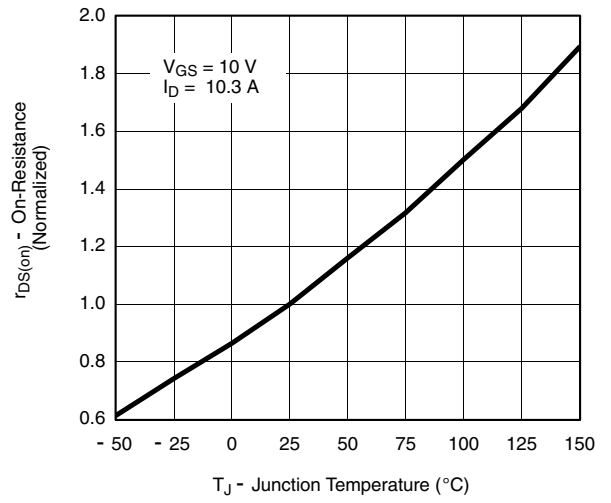
On-Resistance vs. Drain Current



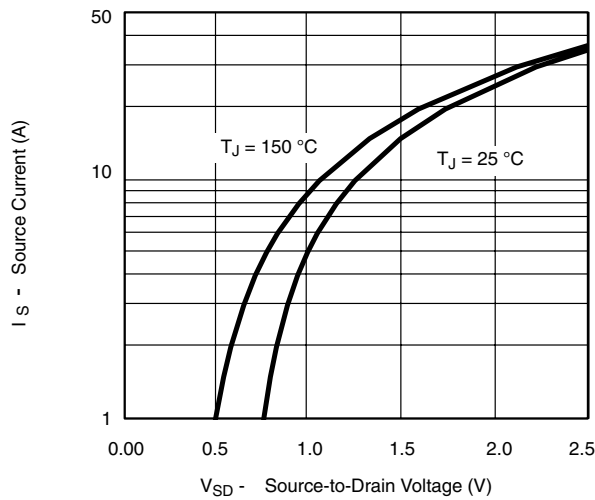
Capacitance



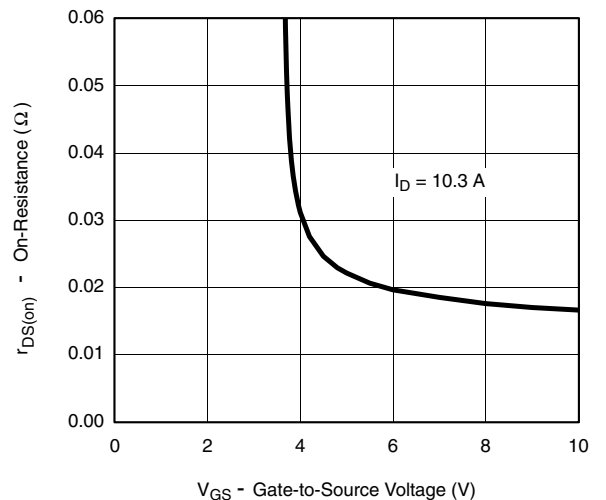
Gate Charge



On-Resistance vs. Junction Temperature

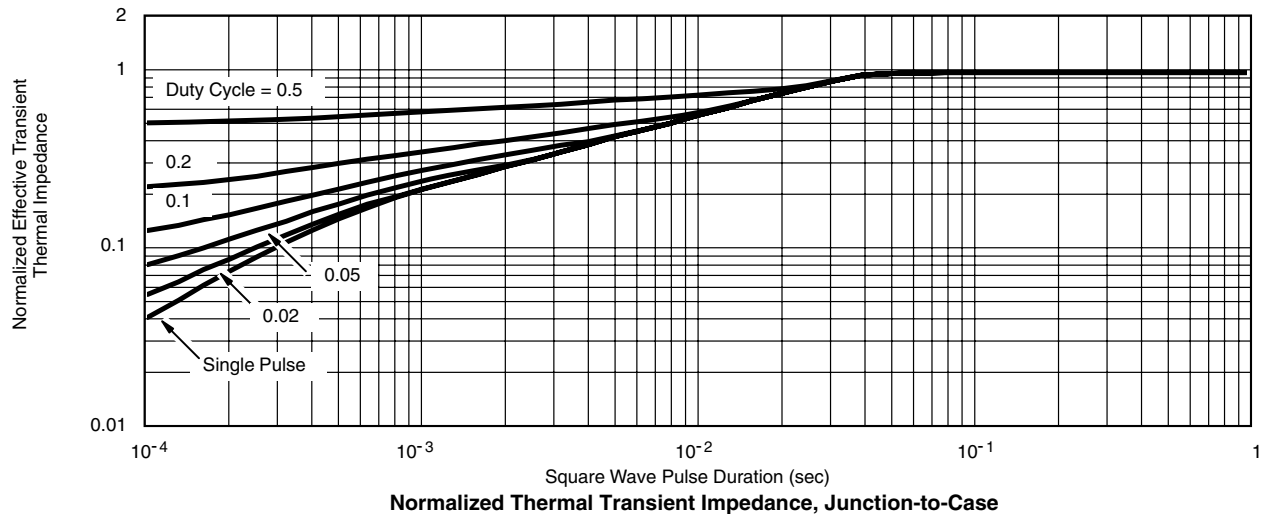
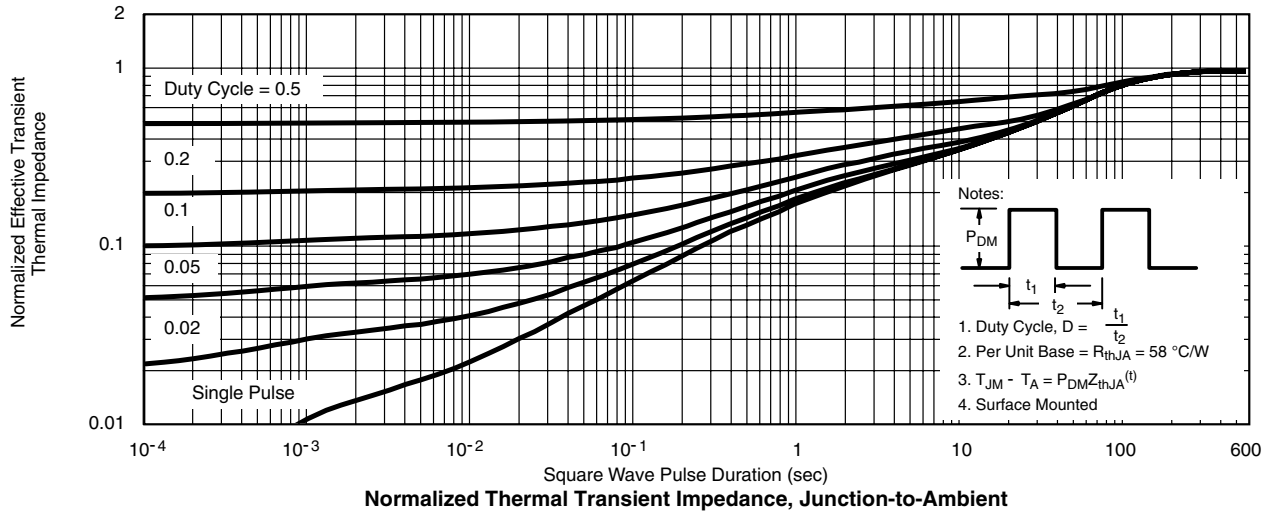
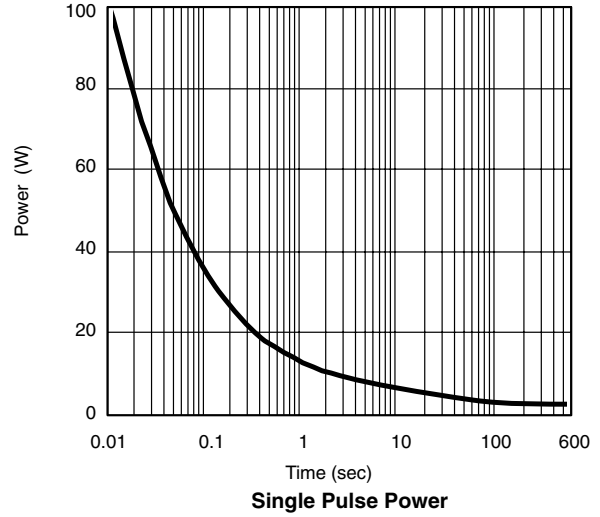
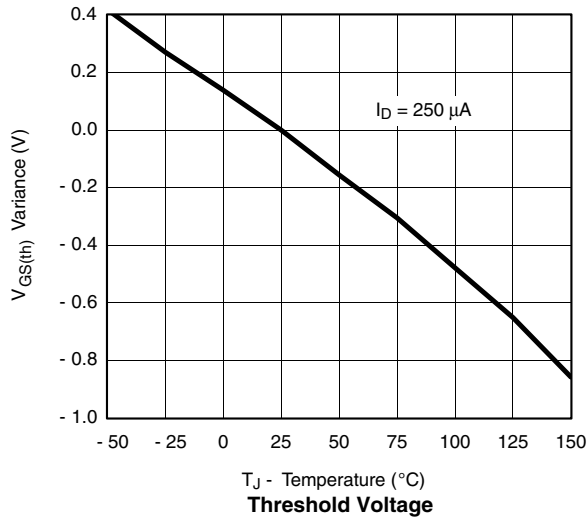


Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless noted



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