

N-Channel Reduced Q_g , Fast Switching MOSFET

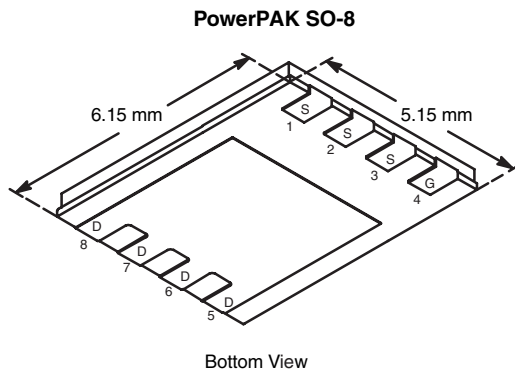
PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
30	0.008 at $V_{GS} = 10$ V	18
	0.011 at $V_{GS} = 4.5$ V	15

FEATURES

- TrenchFET[®] Power MOSFET
- PWM Optimized for High Efficiency
- New Low Thermal Resistance PowerPAK[®] Package with Low 1.07 mm Profile
- 100 % Rg Tested



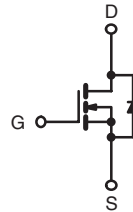
Available
RoHS*
COMPLIANT



Ordering Information: Si7860DP-T1
Si7860DP-T1-E3 (Lead (Pb)-free)

APPLICATIONS

- Buck Converter
 - High Side or Low Side
- Synchronous Rectifier
 - Secondary 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}	30		V	
Gate-Source Voltage	V_{GS}	± 20			
Continuous Drain Current ($T_J = 150$ °C) ^a	I_D	$T_A = 25$ °C	18	11	A
		$T_A = 70$ °C	15	8	
Pulsed Drain Current	I_{DM}	± 50			
Continuous Source Current (Diode Continuous) ^a	I_S	4.1	1.5		
Avalanche Current	I_{AS}	30		mJ	
Single Pulse Avalanche Energy		E_{AS}	45		
Maximum Power Dissipation ^a	P_D	$T_A = 25$ °C	5	1.8	W
		$T_A = 70$ °C	3.2	1.1	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150		°C	
Soldering Recommendations (Peak Temperature) ^{b,c}		260			

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET) ^a	$t \leq 10$ sec	R_{thJA}	20	25	°C/W
	Steady State		56	70	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.8	2.3	

Notes:

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

b. See Solder Profile (<http://www.vishay.com/ppg?73257>). The PowerPAK SO-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

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



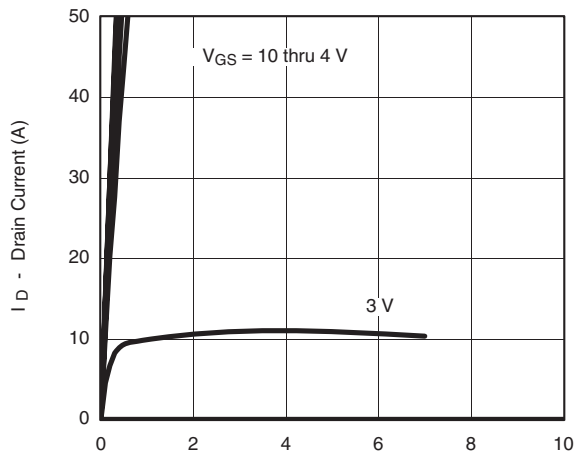
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			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	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 18\text{ A}$		0.0066	0.008	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$		0.0090	0.011	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 18\text{ A}$		60		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 3\text{ A}, V_{GS} = 0\text{ V}$		0.70	1.1	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 18\text{ A}$		13	18	nC
Gate-Source Charge	Q_{gs}		5			
Gate-Drain Charge	Q_{gd}		4.0			
Gate Resistance	R_g		0.5	1.7	3.2	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_G = 6\text{ }\Omega$		18	27	ns
Rise Time	t_r		12	18		
Turn-Off Delay Time	$t_{d(off)}$		46	70		
Fall Time	t_f		19	30		
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 3\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		40	70	

Notes:

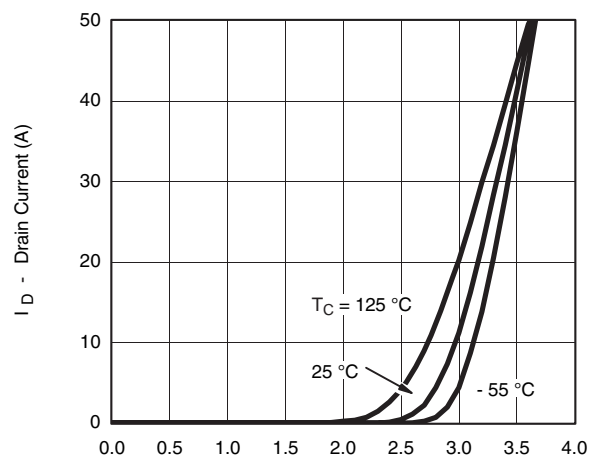
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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

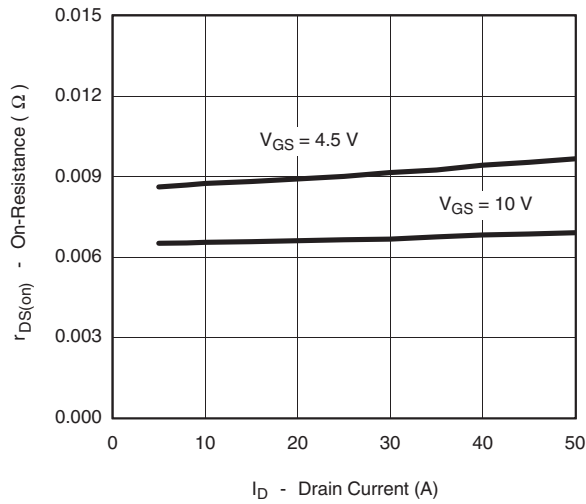


Output Characteristics

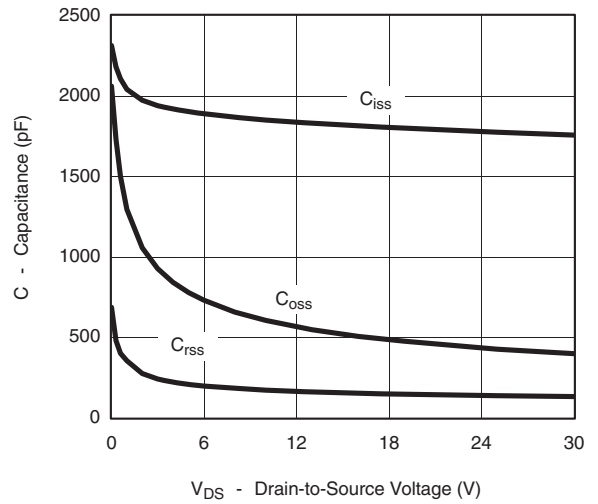


Transfer Characteristics

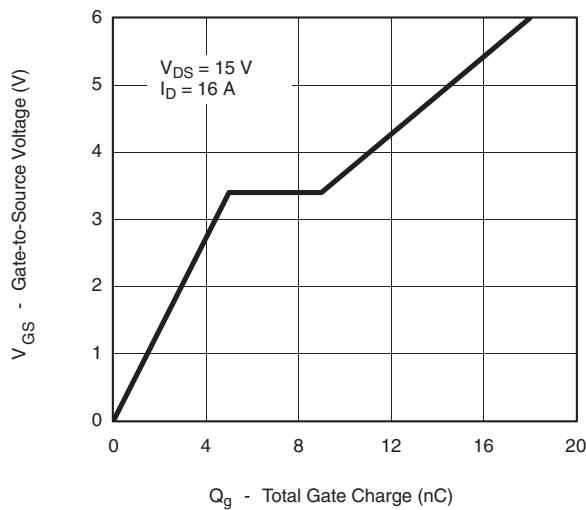
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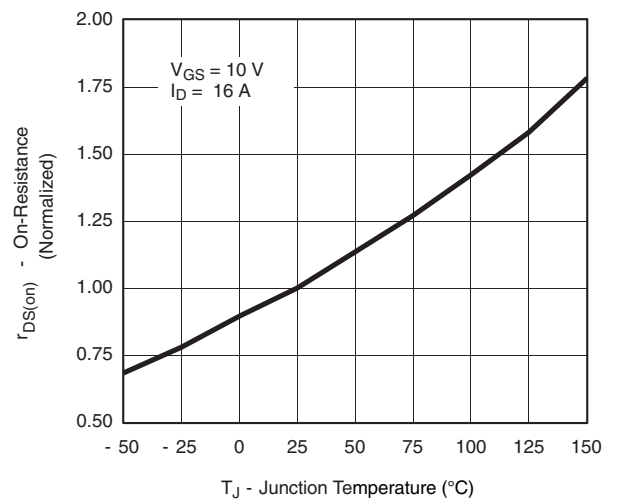
On-Resistance vs. Drain Current



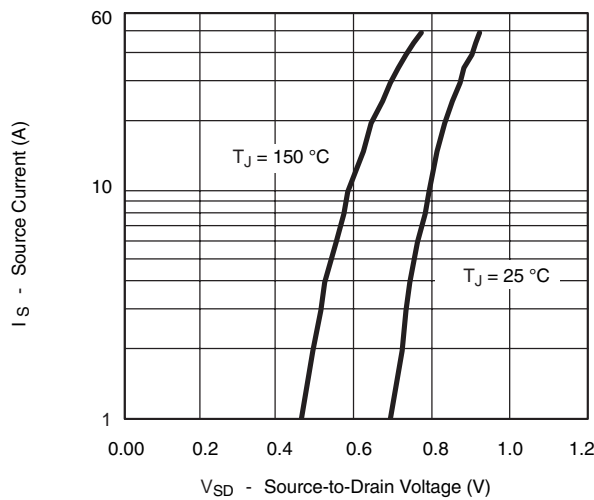
Capacitance



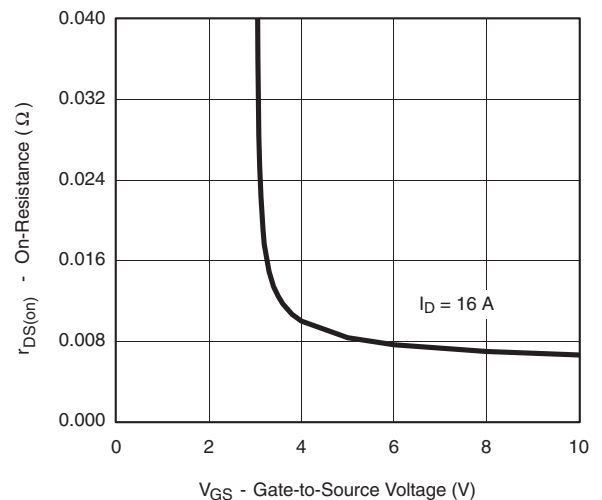
Gate Charge



On-Resistance vs. Junction Temperature

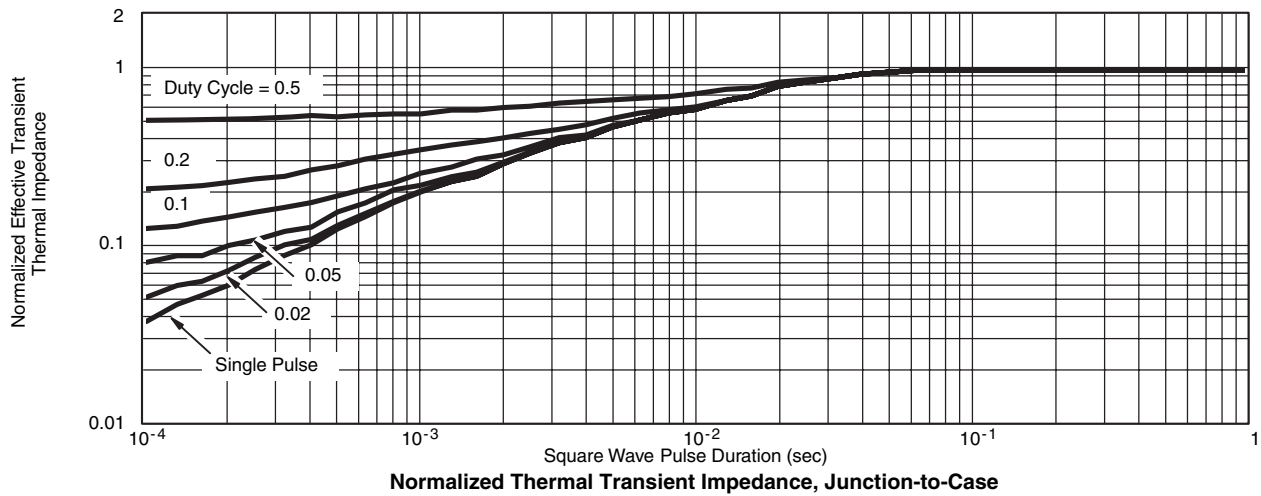
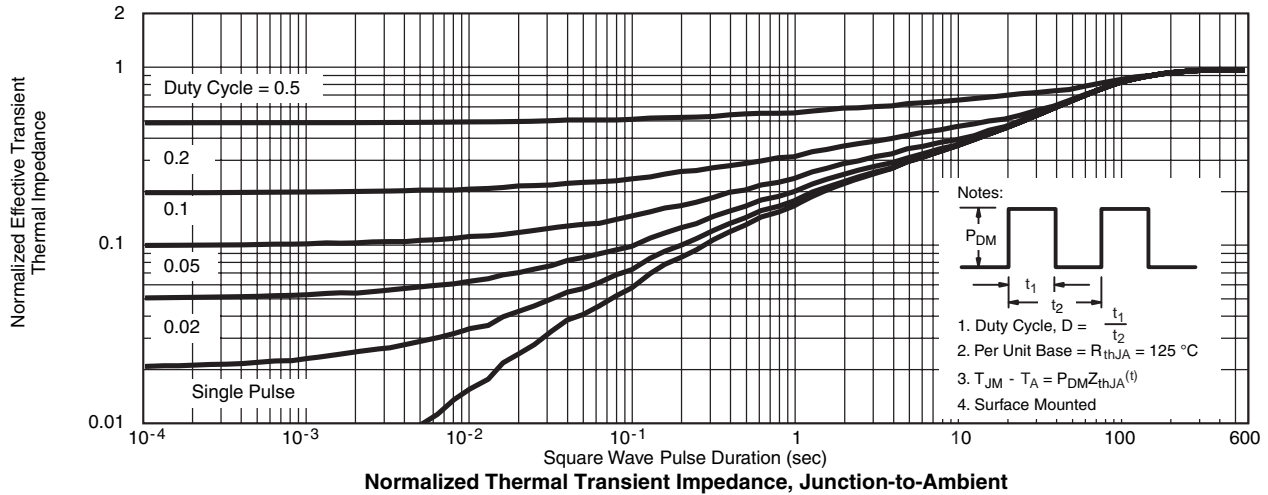
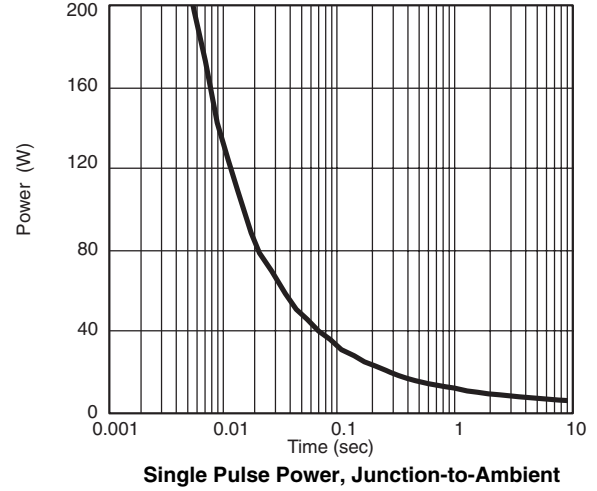
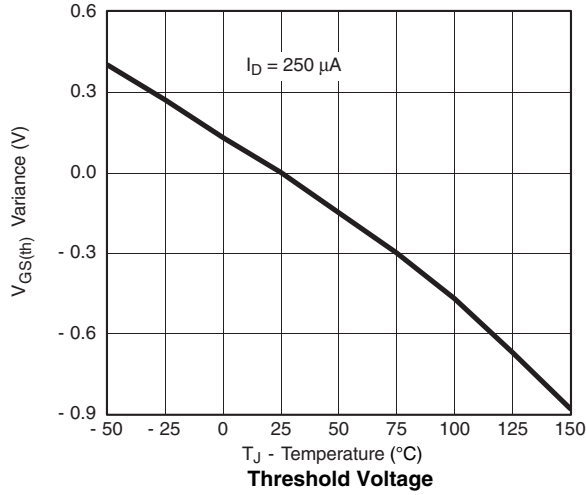


Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless noted



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