

N-Channel 12-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ)
12	0.0026 @ $V_{GS} = 4.5$ V	29	54
	0.0037 @ $V_{GS} = 2.5$ V	23	

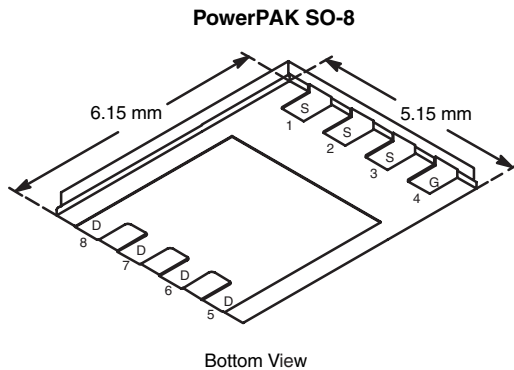
FEATURES

- TrenchFET[®] Power MOSFET
- New Low Thermal Resistance PowerPAK[®] Package with Low 1.07-mm Profile
- 100 % R_g Tested

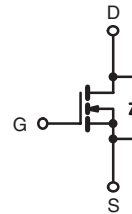


APPLICATIONS

- Low Output Voltage, High Current Synchronous Rectifiers



Ordering Information: Si7858ADP-T1—E3 (Lead (Pb)-Free)



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}	12		V
Gate-Source Voltage		V_{GS}	± 8		
Continuous Drain Current ($T_J = 150$ °C) ^a	$T_A = 25$ °C	I_D	29	20	A
	$T_A = 70$ °C		23	16	
Pulsed Drain Current (10 μ s Pulse Width)		I_{DM}	60		
Continuous Source Current (Diode Conduction) ^a		I_S	4.5	1.6	
Maximum Power Dissipation ^a	$T_A = 25$ °C	P_D	5.4	1.9	W
	$T_A = 70$ °C		3.4	1.2	
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 ^a	$t \leq 10$ sec	R_{thJA}	18	23	°C/W
	Steady State		50	65	
Maximum Junction-to-Case (Drain)		R_{thJC}	1.0	1.5	

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.

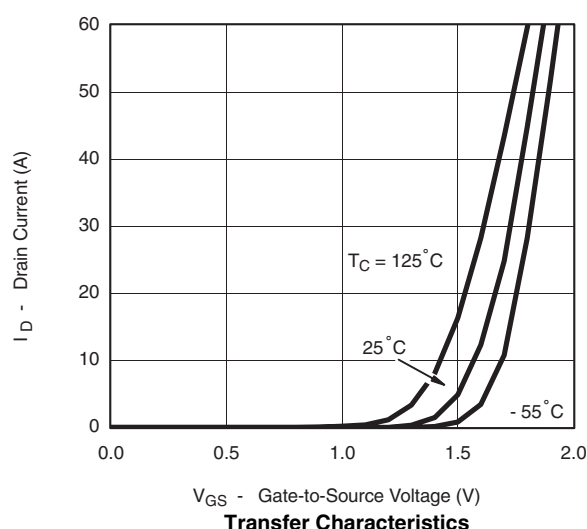
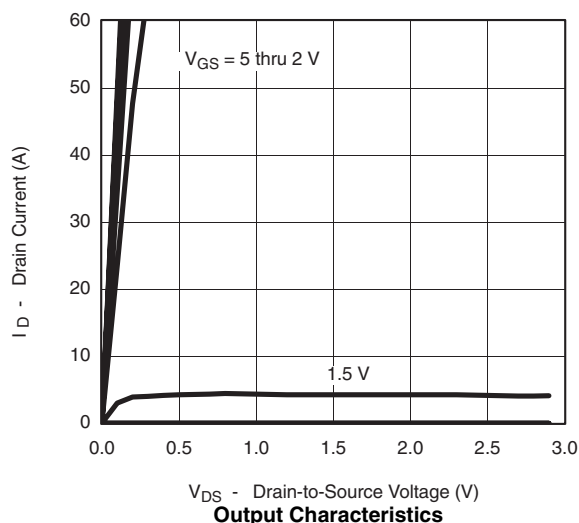
c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.6	0.95	1.5	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}, V_{GS} = \pm 8\ \text{V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 12\ \text{V}, V_{GS} = 0\ \text{V}$			1	μA
		$V_{DS} = 12\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 55^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\ \text{V}, V_{GS} = 4.5\ \text{V}$	30			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 4.5\ \text{V}, I_D = 29\ \text{A}$		0.0020	0.0026	Ω
		$V_{GS} = 2.5\ \text{V}, I_D = 23\ \text{A}$		0.0029	0.0037	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 6\ \text{V}, I_D = 29\ \text{A}$		130		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 2.9\ \text{A}, V_{GS} = 0\ \text{V}$		0.75	1.1	V
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 6\ \text{V}, V_{SS} = 0\ \text{V}, f = 1\ \text{MHz}$		5700		μF
Output Capacitance	C_{oss}			2680		
Reverse Transfer Capacitance	C_{rss}			1280		
Total Gate Charge	Q_g	$V_{DS} = 6\ \text{V}, V_{GS} = 4.5\ \text{V}, I_D = 29\ \text{A}$		54	80	nC
Gate-Source Charge	Q_{gs}			10		
Gate-Drain Charge	Q_{gd}			16		
Gate Resistance	R_g		0.5	1.2	2.0	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 6\ \text{V}, R_L = 6\ \Omega$ $I_D \cong 1\ \text{A}, V_{GEN} = 4.5\ \text{V}, R_G = 6\ \Omega$		40	60	ns
Rise Time	t_r			40	60	
Turn-Off Delay Time	$t_{d(off)}$			140	210	
Fall Time	t_f			70	100	
Source-Drain Reverse Recovery Time	t_{rr}		$I_F = 2.9\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$		50	

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

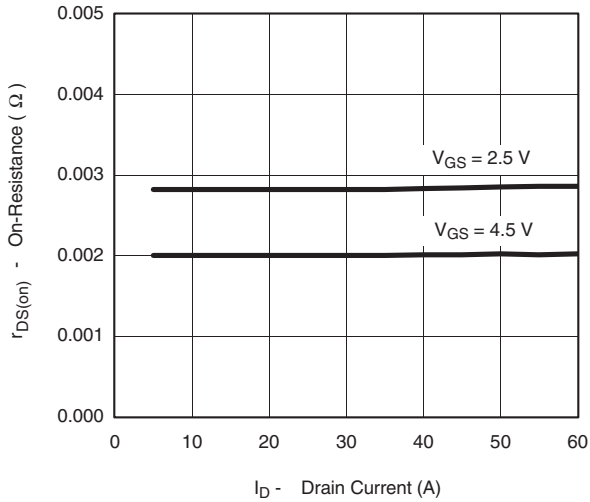
b. Guaranteed by design, not subject to production testing.

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.

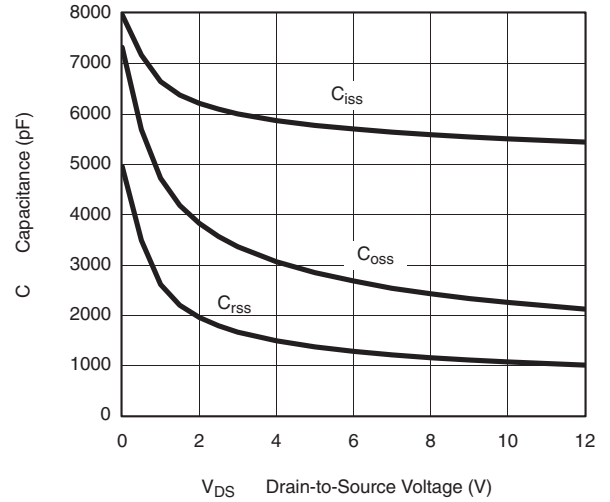
TYPICAL CHARACTERISTICS 25°C , unless noted



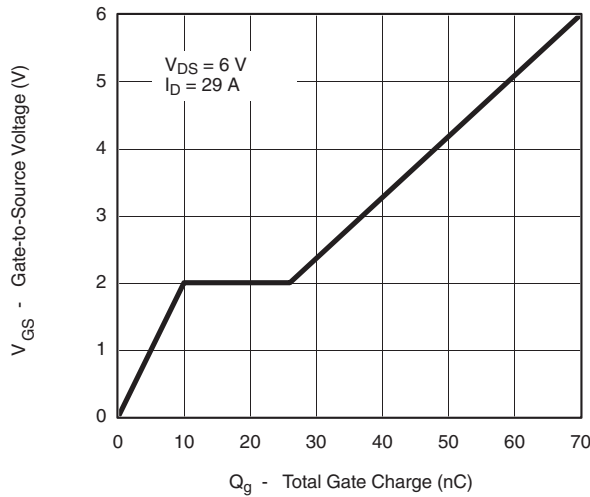
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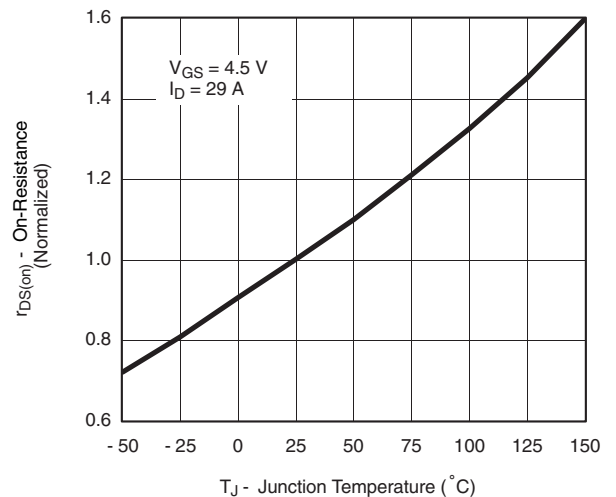
On-Resistance vs. Drain Current



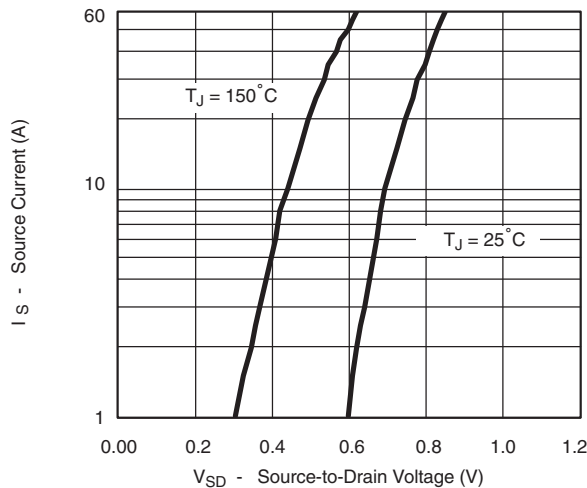
Capacitance



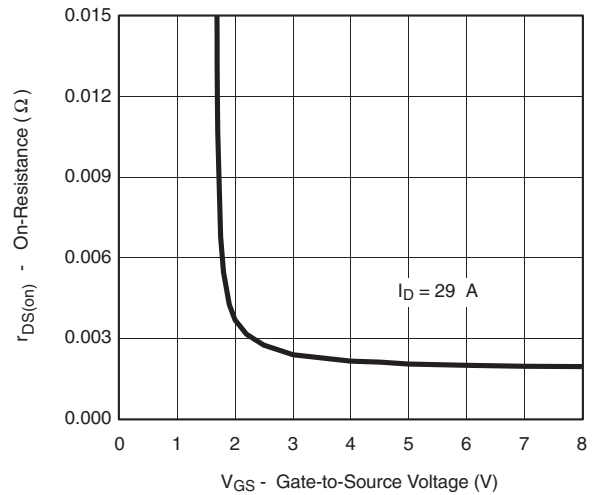
Gate Charge



On-Resistance vs. Junction Temperature

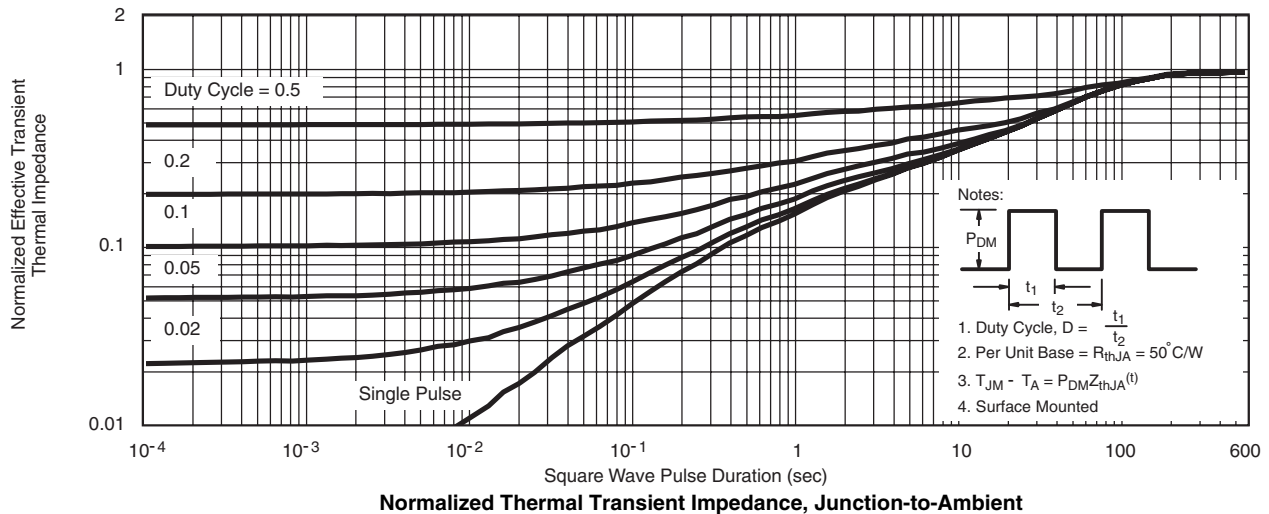
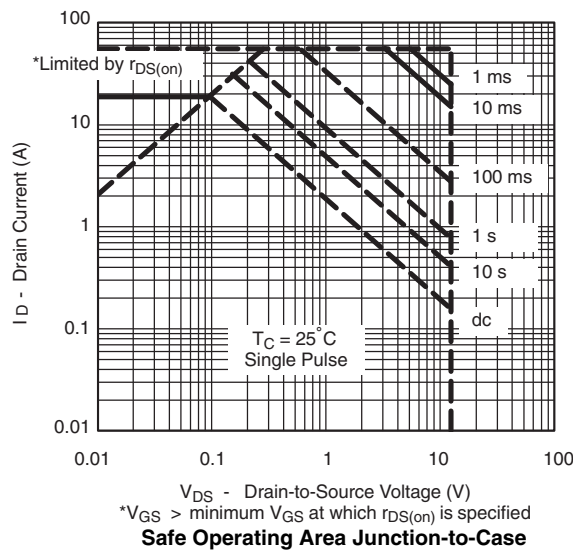
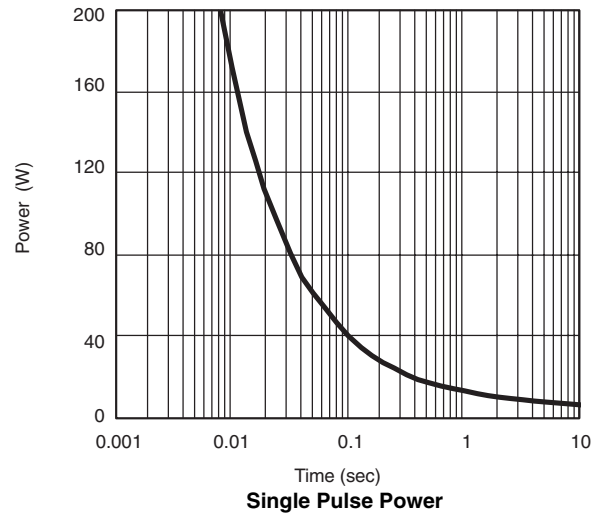
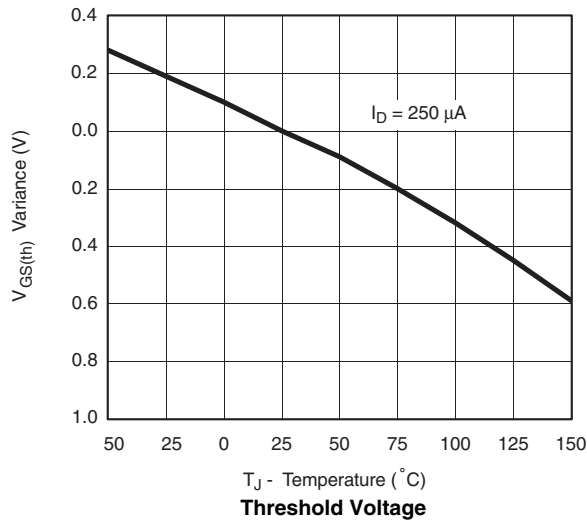


Source-Drain Diode Forward Voltage



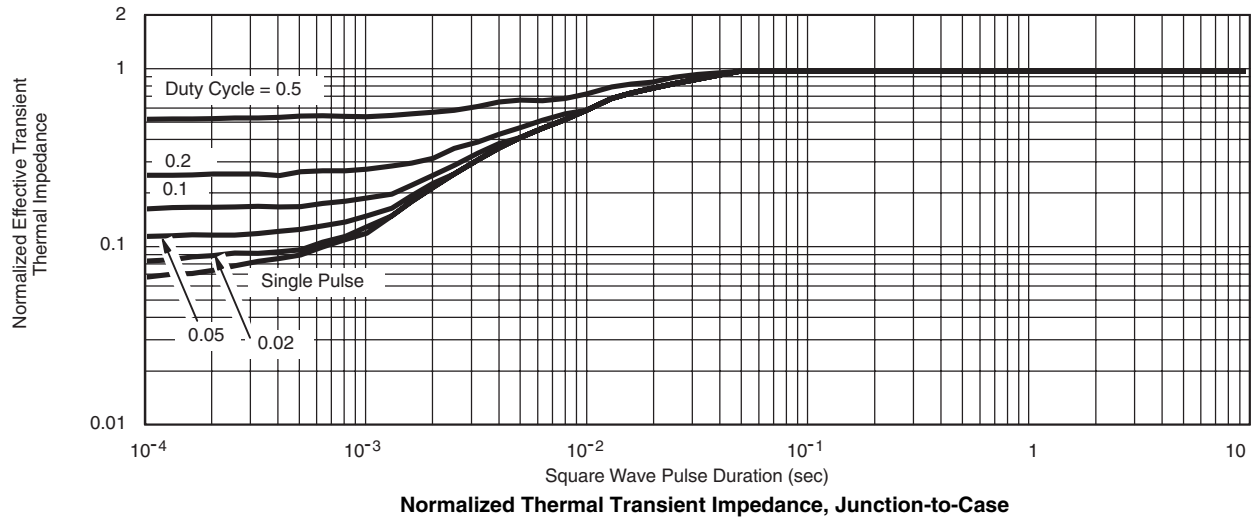
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless noted





TYPICAL CHARACTERISTICS 25 °C, unless noted



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