

N-Channel 20 V (D-S) Fast Switching MOSFET

PowerPAK® 1212-8SH


PRODUCT SUMMARY	
V_{DS} (V)	20
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0053
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.0078
Q_g typ. (nC)	14
I_D (A)	21.1
Configuration	Single

FEATURES

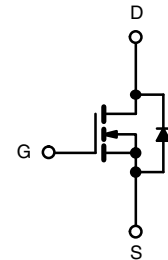
- TrenchFET® Gen II power MOSFET
- PWM optimized
- 100 % R_g tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Synchronous rectification
- Synchronous buck



N-Channel MOSFET

ORDERING INFORMATION

Package	PowerPAK 1212-8
Lead (Pb)-free and halogen-free	SiSH110DN-T1-GE3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	10 s	STEADY STATE	UNIT	
Drain-source voltage	V_{DS}	20	20	V	
Gate-source voltage	V_{GS}	± 20	± 20		
Continuous drain current ($T_J = 150$ °C) ^a	I_D	$T_A = 25$ °C	21.1	13.5	A
		$T_A = 70$ °C	16.9	10.8	
Pulsed drain current	I_{DM}	60	60		
Continuous source current (diode conduction) ^a	I_S	3.2	1.3		
Single avalanche current	I_{AS}	35	35		
Single avalanche energy	E_{AS}	61	61	mJ	
Maximum power dissipation ^a	P_D	$T_A = 25$ °C	3.8	1.5	W
		$T_A = 70$ °C	2	0.8	
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	R_{thJA}	$t \leq 10$ s	24	33	°C/W
		Steady state	65	81	
Maximum junction-to-case (drain)	R_{thJC}	1.9	2.4		

Notes

- Surface mounted on 1" x 1" FR4 board
- See solder profile (www.vishay.com/doc?73257). The PowerPAK 1212-8SH is a leadless package within the PowerPAK 1212-8 package family. 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
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components



SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.5	-	2.5	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}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	-	-	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	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 21.1\text{ A}$	-	0.0044	0.0053	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 17.4\text{ A}$	-	0.0064	0.0078	
Forward transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 21.1\text{ A}$	-	71	-	S
Diode forward voltage ^a	V_{SD}	$I_S = 3.2\text{ A}, V_{GS} = 0\text{ V}$	-	0.8	1.2	V
Dynamic ^b						
Total gate charge	Q_g	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 21.1\text{ A}$	-	14	21	nC
Gate-source charge	Q_{gs}		-	7	-	
Gate-drain charge	Q_{gd}		-	4.5	-	
Gate resistance	R_g	$f = 1\text{ MHz}$	0.7	1.4	2.1	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$	-	12	20	ns
Rise time	t_r		-	10	15	
Turn-off delay time	$t_{d(off)}$		-	36	55	
Fall time	t_f		-	10	15	
Body diode reverse recovery time	t_{rr}	$I_F = 3.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	30	60	nC
Body diode reverse recovery charge	Q_{rr}		-	25	50	
Reverse recovery fall time	t_a		-	14	-	
Reverse recovery rise time	t_b		-	16	-	

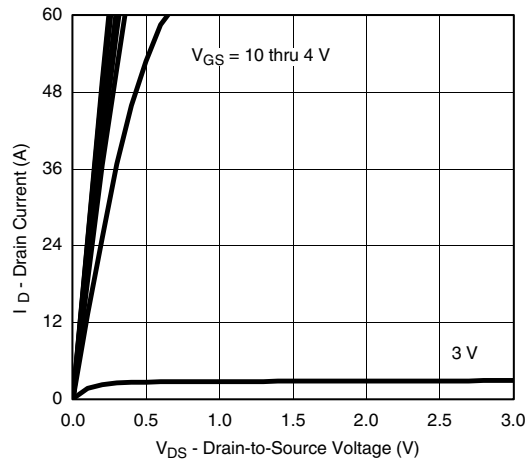
Notes

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

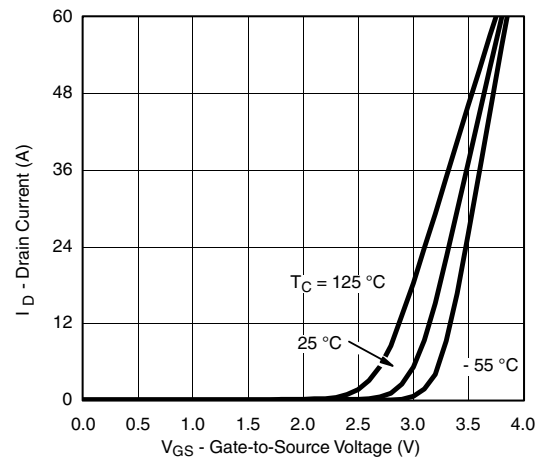
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



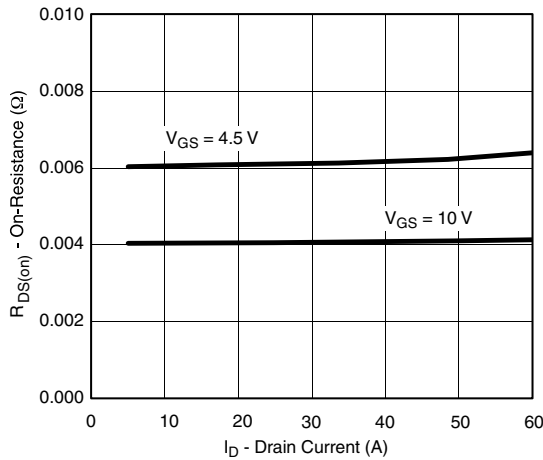
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



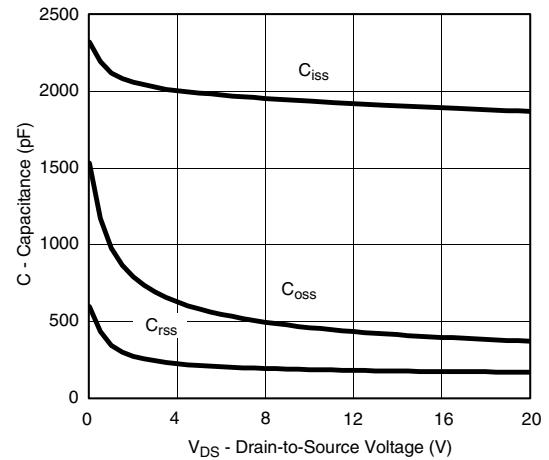
Output Characteristics



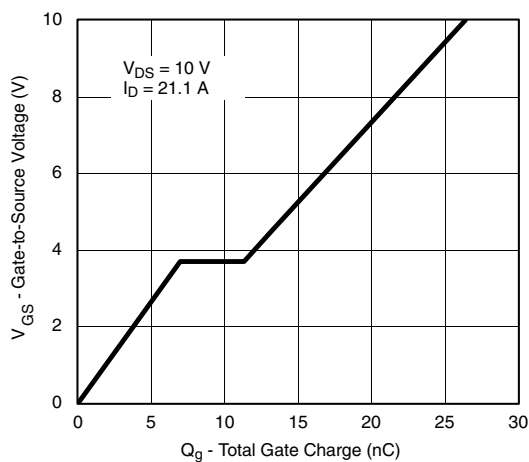
Transfer Characteristics



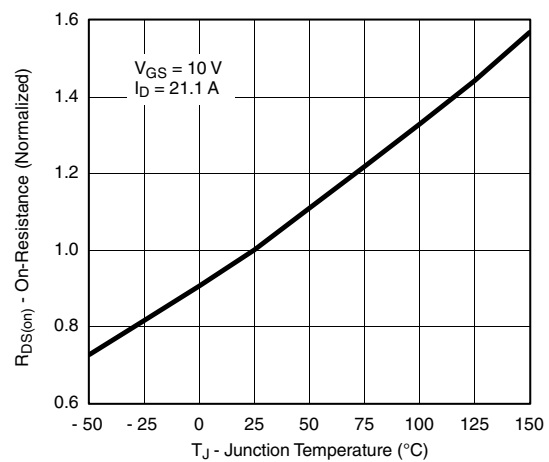
On-Resistance vs. Drain Current



Capacitance



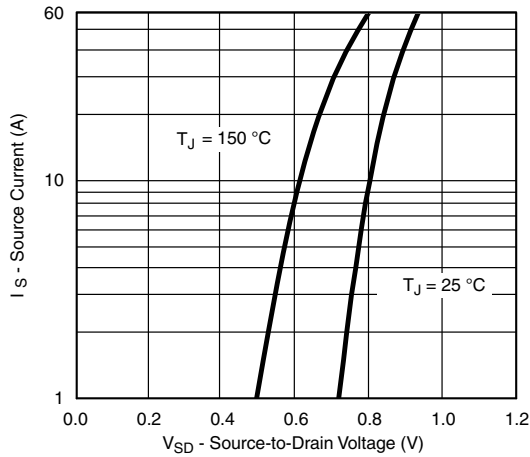
Gate Charge



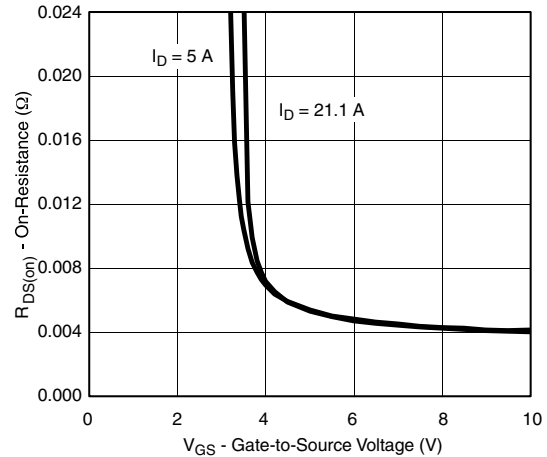
On-Resistance vs. Junction Temperature



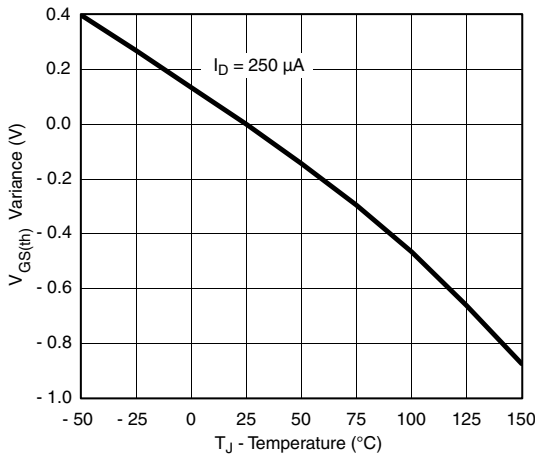
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



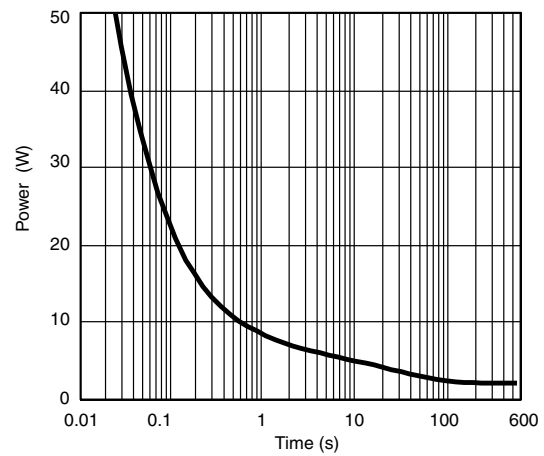
Source-Drain Diode Forward Voltage



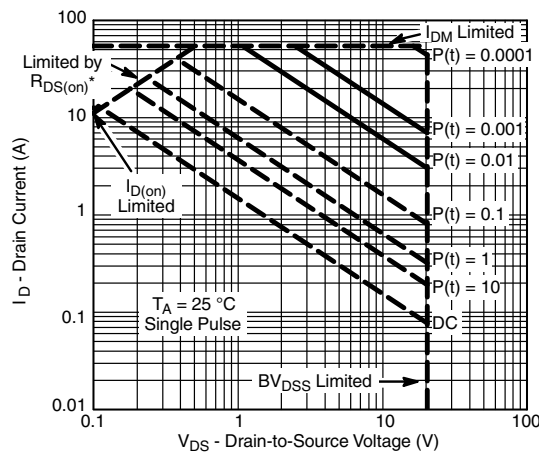
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



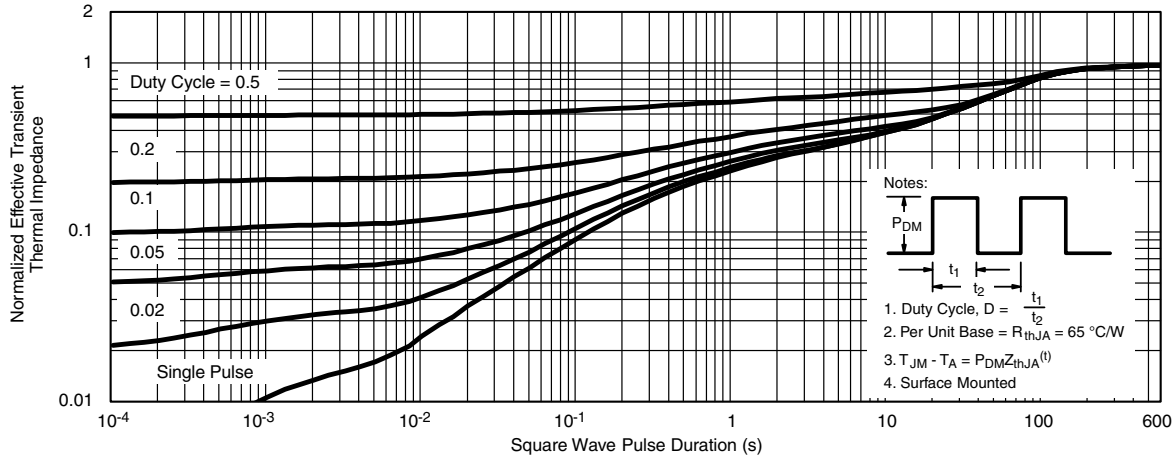
Single Pulse Power, Junction-to-Ambient



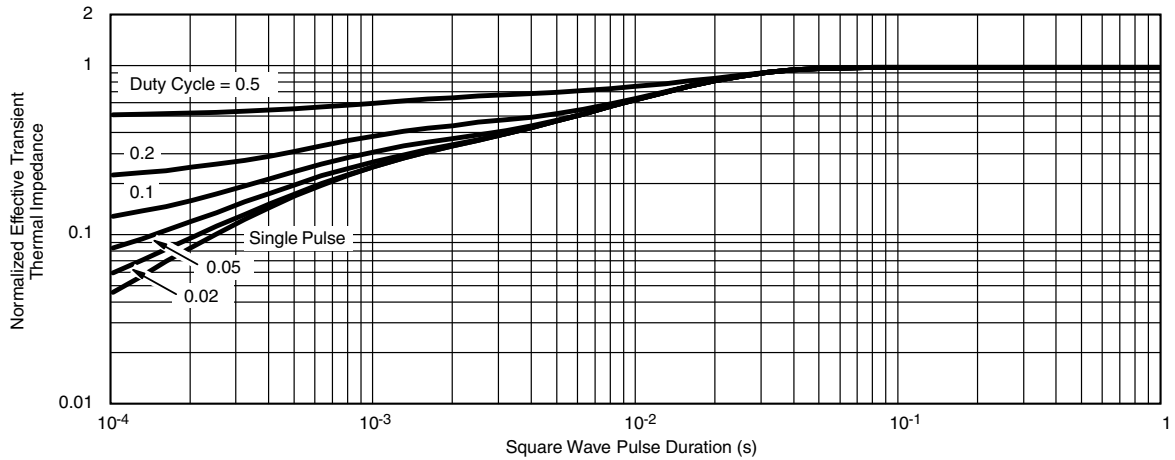
Safe Operating Area



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



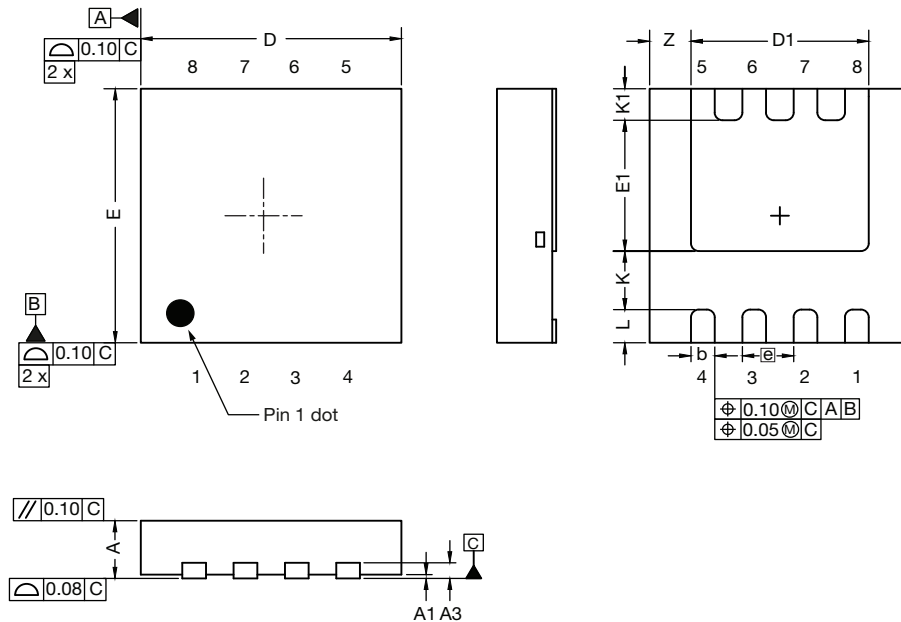
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

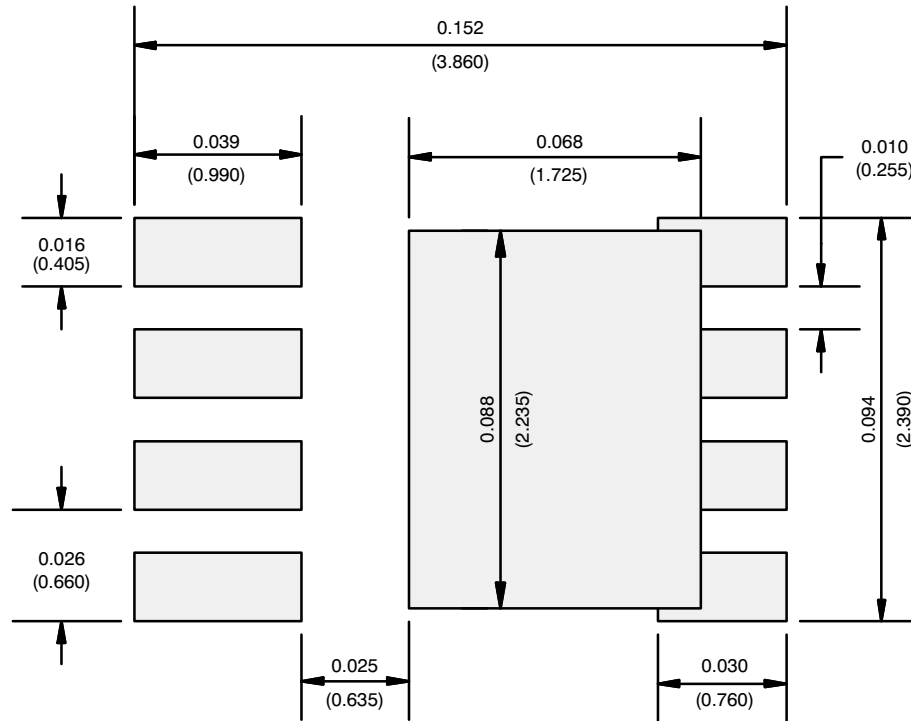
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Case Outline for PowerPAK[®] 1212-SWLH and PowerPAK[®] 1212-8SH



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.82	0.90	0.98	0.032	0.035	0.038
A1	0.00	-	0.05	0.000	-	0.002
A3	0.20 ref.			0.008 ref.		
b	0.25	0.30	0.35	0.010	0.012	0.014
D	3.20	3.30	3.40	0.126	0.130	0.134
D1	2.15	2.25	2.35	0.085	0.089	0.093
E	3.20	3.30	3.40	0.126	0.130	0.134
E1	1.60	1.70	1.80	0.063	0.067	0.071
e	0.65 bsc.			0.026 bsc.		
K	0.76 ref.			0.030 ref.		
K1	0.41 ref.			0.016 ref.		
L	0.33	0.43	0.53	0.013	0.017	0.021
Z	0.525 ref.			0.021 ref.		
ECN: S20-0930-Rev. C, 07-Dec-2020						
DWG: 6062						

RECOMMENDED MINIMUM PADS FOR PowerPAK® 1212-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

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