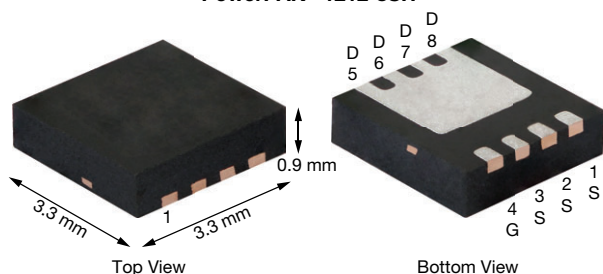


P-Channel 30 V (D-S) MOSFET

PowerPAK® 1212-8SH


FEATURES

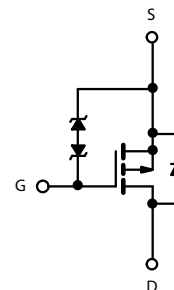
- TrenchFET® Gen V p-channel power MOSFET
- 100 % R_g and UIS tested
- Typical ESD (HBM) protection: 2000 V
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load switch
- Battery management
- Motor drive control



P-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	-20
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -10$ V	0.0030
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -4.5$ V	0.0038
$R_{DS(on)}$ max. (Ω) at $V_{GS} = -2.5$ V	0.0060
Q_g typ. (nC) at $V_{GS} = -4.5$ V	49.5
I_D (A) ^d	-104
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK 1212-8SH
Lead (Pb)-free and halogen-free	SiSH521EDN-T1-GE3

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	-20	V
Gate-source voltage	V_{GS}	± 12	V
Continuous drain current ($V_{GS} = -10$ V, $T_J = 150$ °C)	I_D	$T_C = 25$ °C	-104
		$T_C = 70$ °C	-83
		$T_A = 25$ °C	-28 ^{a, b}
		$T_A = 70$ °C	-22.4 ^{a, b}
Pulsed drain current ($t = 100$ μ s)	I_{DM}	-150	A
Continuous source-drain diode current	I_S	$T_C = 25$ °C	-47.3 ^d
		$T_A = 25$ °C	-3.4 ^{a, b}
Avalanche current	I_{AS}	-20	A
Single-pulse avalanche energy	E_{AS}	20	mJ
Maximum power dissipation	P_D	$T_C = 25$ °C	52
		$T_C = 70$ °C	33.3
		$T_A = 25$ °C	3.8 ^{a, b}
		$T_A = 70$ °C	2.4 ^{a, b}
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{a, c}	R_{thJA}	24	33	°C/W
Maximum junction-to-case	R_{thJC}	1.9	2.4	°C/W

Notes

- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- Maximum under steady state conditions is 81 °C/W
- See solder profile (www.vishay.com/doc?73257). The PowerPAK 1212-8 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
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components



SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = -250 μA	-20	-	-	V
V _{DS} temperature coefficient	ΔV _{DS} /T _J	I _D = -1 mA	-	-11.5	-	mV/°C
V _{GS(th)} temperature coefficient	ΔV _{GS(th)} /T _J	I _D = -250 μA	-	3.7	-	
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA	-0.5	-	-1.5	V
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V	-	-	± 30	μA
Zero gate voltage drain current	I _{DSS}	V _{DS} = -20 V, V _{GS} = 0 V	-	-	-1	μA
		V _{DS} = -20 V, V _{GS} = 0 V, T _J = 75 °C	-	-	-10	
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = -10 V, I _D = -10 A	-	0.0024	0.0030	Ω
		V _{GS} = -4.5 V, I _D = -10 A	-	0.0029	0.0038	
		V _{GS} = -2.5 V, I _D = -10 A	-	0.0044	0.0060	
Forward transconductance ^a	g _{fs}	V _{DS} = -0 V, I _D = -10 A	-	40	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	-	6600	-	pF
Output capacitance	C _{oss}		-	745	-	
Reverse transfer capacitance	C _{rss}		-	700	-	
Total gate charge	Q _g	V _{DS} = -10 V, V _{GS} = -10 V, I _D = -10 A	-	102	153	nC
		V _{DS} = -10 V, V _{GS} = -4.5 V, I _D = -10 A	-	47	71	
Gate-source charge	Q _{gs}		-	11.5	-	
Gate-drain charge	Q _{gd}		-	11	-	
Gate resistance	R _g	f = 1 MHz	1.2	2.5	4.3	Ω
Turn-on delay time	t _{d(on)}	V _{DD} = -10 V, R _L = 1 Ω I _D ≡ -10 A, V _{GEN} = -10 V, R _g = 1 Ω	-	12	24	ns
Rise time	t _r		-	5	10	
Turn-off delay time	t _{d(off)}		-	80	160	
Fall time	t _f		-	66	132	
Turn-on delay time	t _{d(on)}	V _{DD} = -10 V, R _L = 1 Ω I _D ≡ -10 A, V _{GEN} = -4.5 V, R _g = 1 Ω	-	26	52	
Rise time	t _r		-	40	80	
Turn-off delay time	t _{d(off)}		-	87	174	
Fall time	t _f		-	60	120	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	-47.3	A
Pulse diode forward current	I _{SM}		-	-	-150	
Body diode voltage	V _{SD}	I _S = -5 A, V _{GS} = 0 V	-	-0.66	-1.1	V
Body diode reverse recovery time	t _{rr}	I _F = -10 A, di/dt = 100 A/μs, T _J = 25 °C	-	23	46	ns
Body diode reverse recovery charge	Q _{rr}		-	12	24	nC
Reverse recovery fall time	t _a		-	11	-	ns
Reverse recovery rise time	t _b		-	12	-	

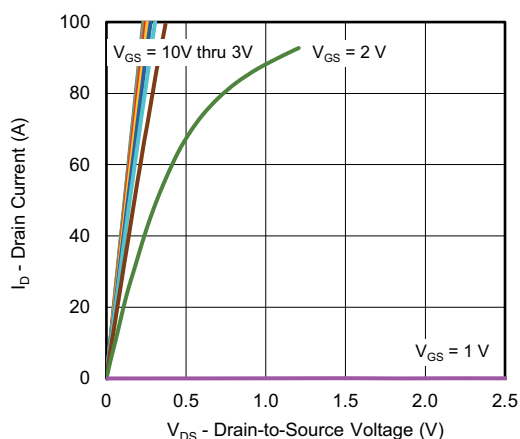
Notes

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

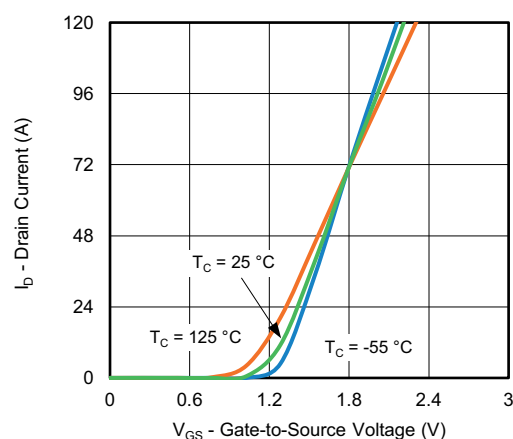
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



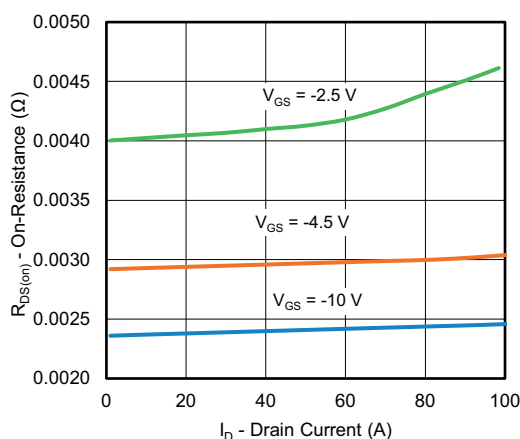
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



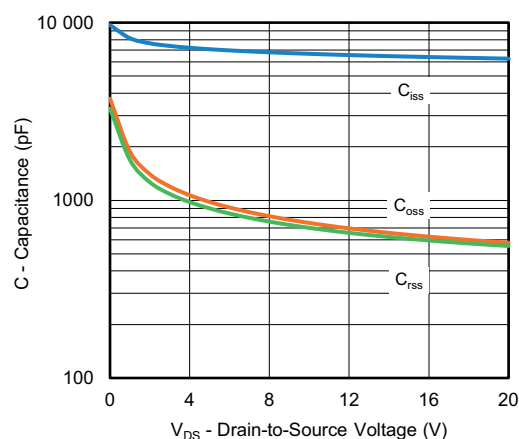
Output Characteristics



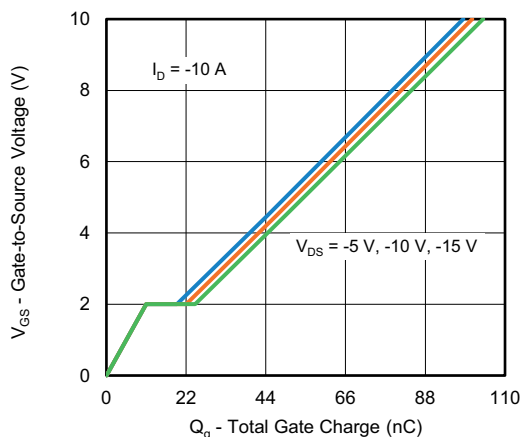
Transfer Characteristics



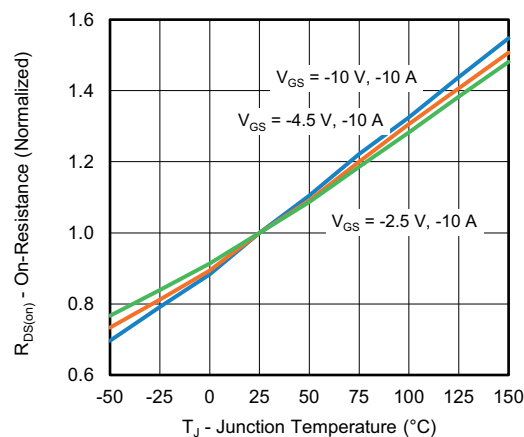
On-Resistance vs. Drain Current



Capacitance



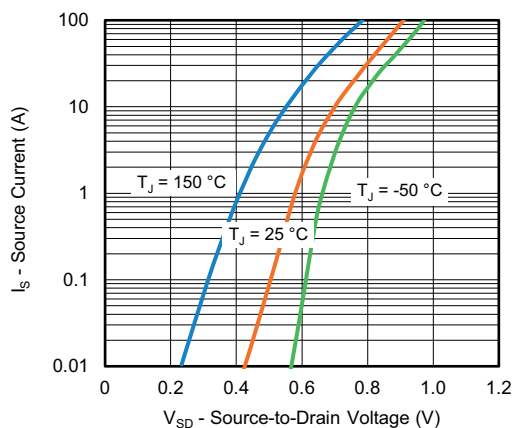
Gate Charge



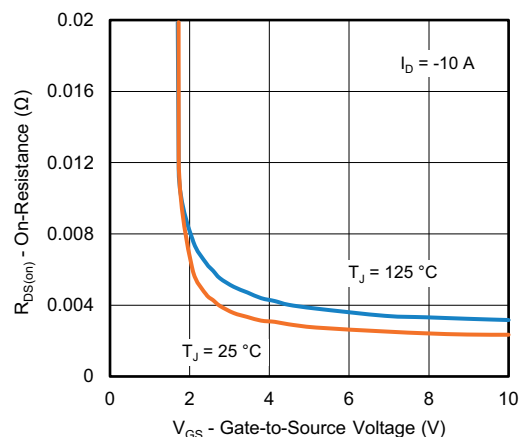
On-Resistance vs. Junction Temperature



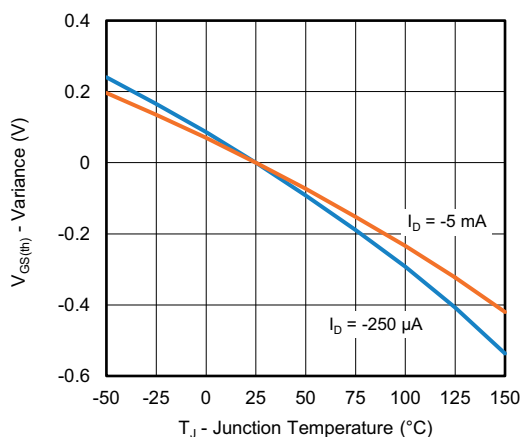
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



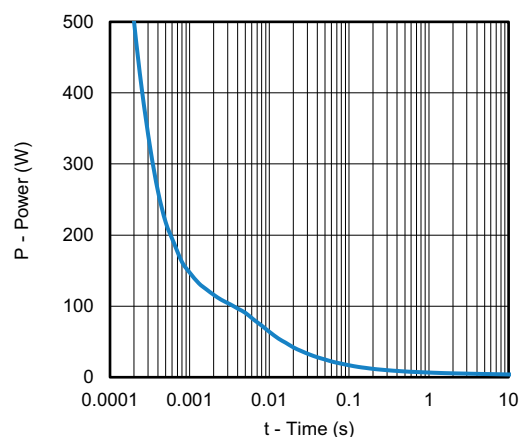
Source-Drain Diode Forward Voltage



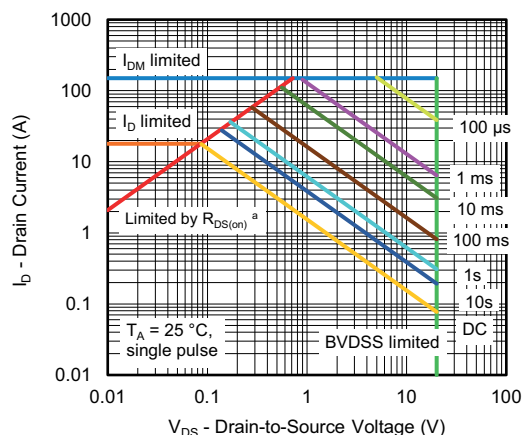
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



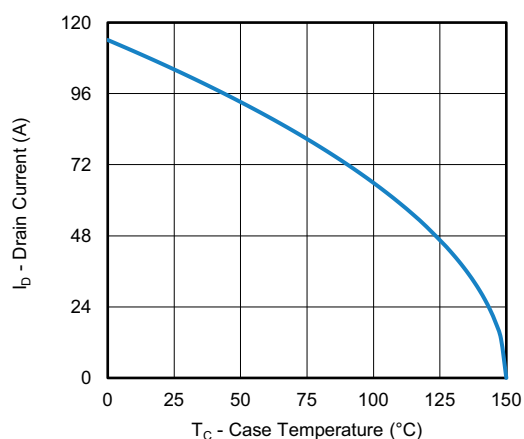
Single Pulse Power, Junction-to-Ambient



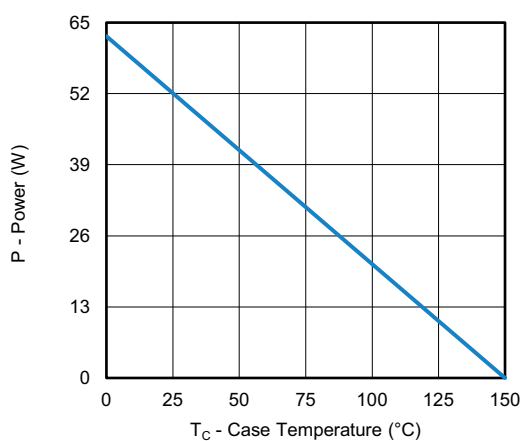
Safe Operating Area



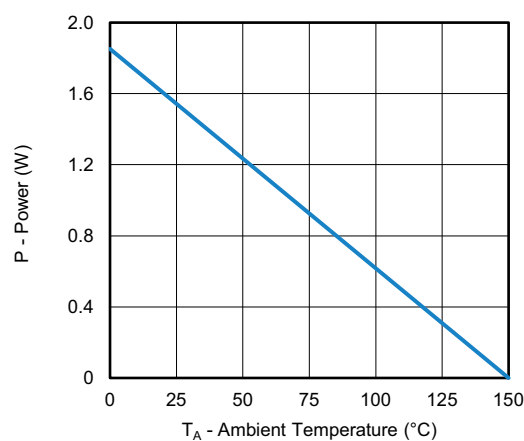
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Power, Junction-to-Case



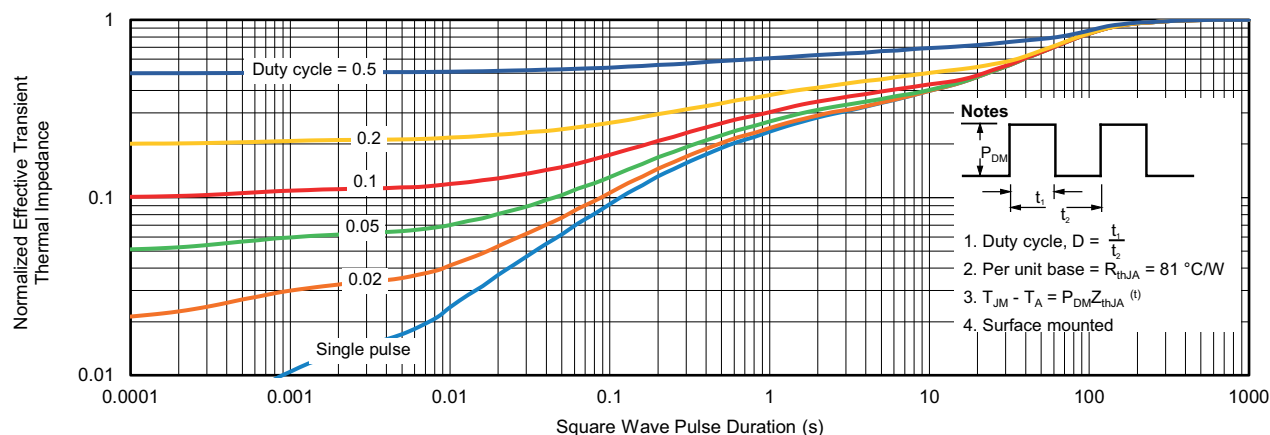
Power, Junction-to-Ambient

Note

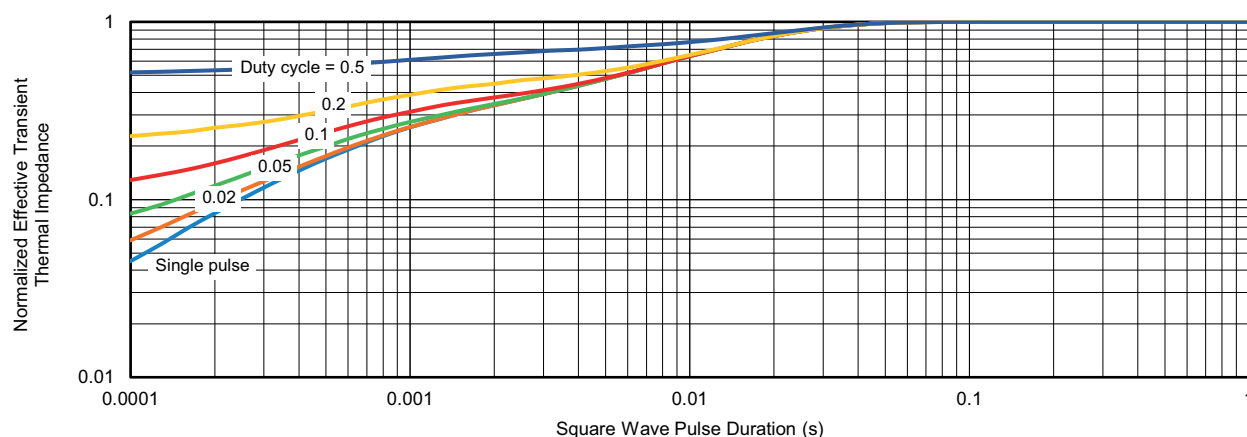
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



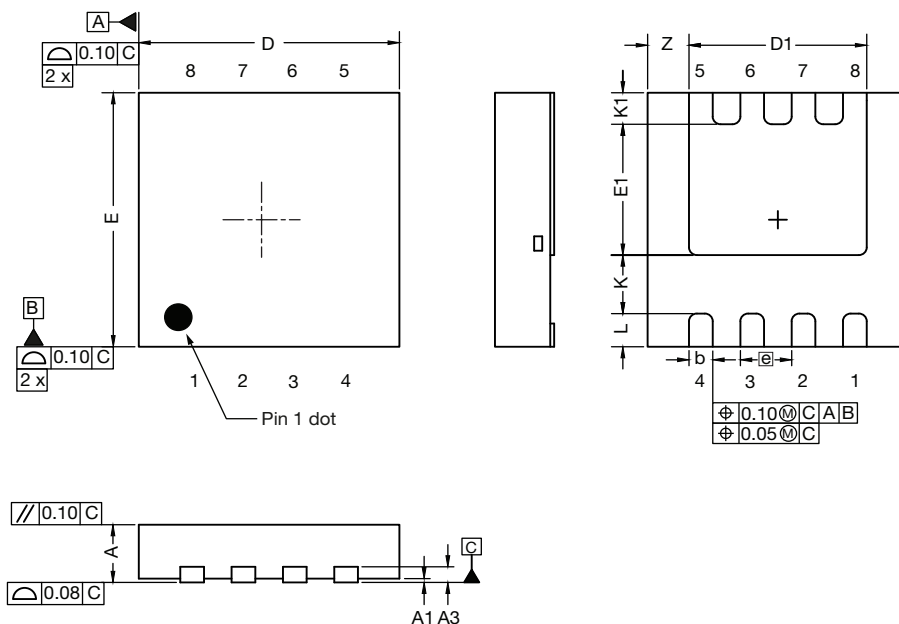
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

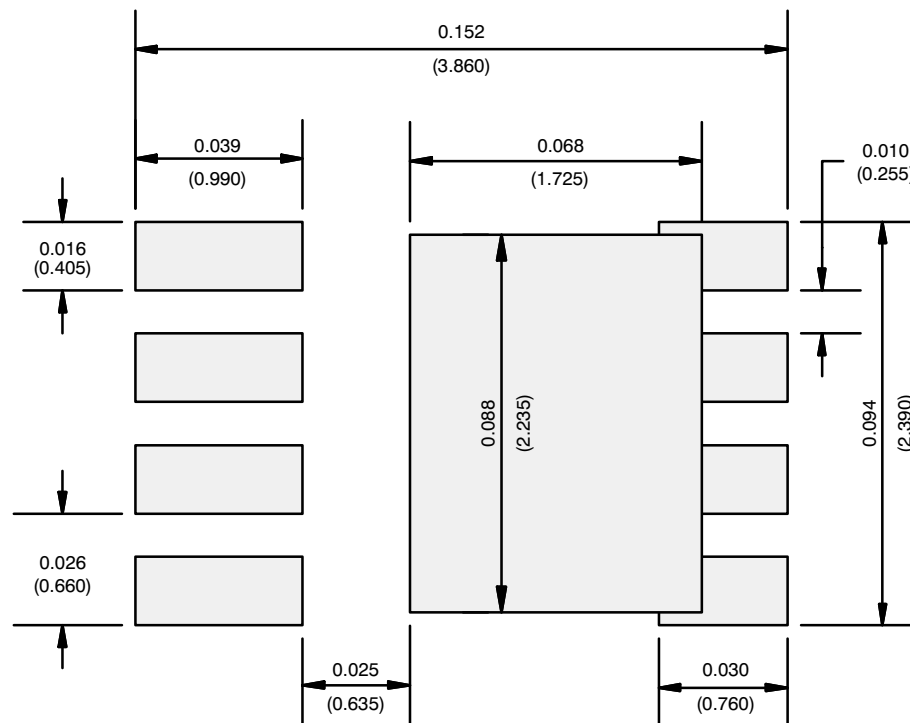
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Case Outline for PowerPAK® 1212-SWLH and PowerPAK® 1212-8SH



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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