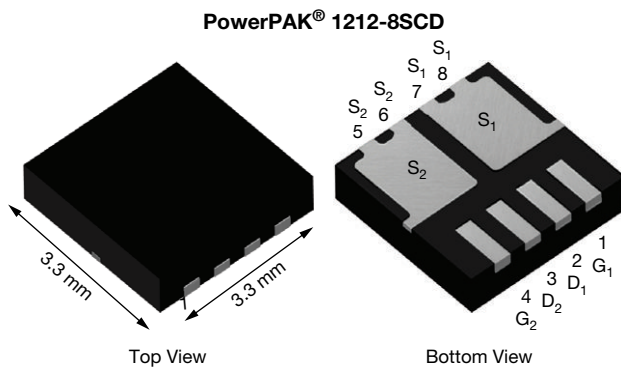


Common - Drain Dual N-Channel 60 V (S1-S2) MOSFET



PRODUCT SUMMARY	
V_{S1S2} (V)	60
$R_{S1S2(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0130
$R_{S1S2(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.0185
Q_g typ. (nC)	10.2 ^g
I_{S1S2} (A)	52 ^a
Configuration	Common - Drain

FEATURES

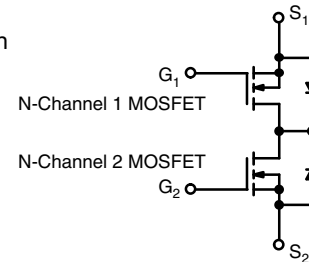
- TrenchFET® Gen IV power MOSFET
- Very low source-to-source on resistance
- Integrated common-drain n-channel MOSFETs in a compact and thermally enhanced package
- 100 % R_g and UIS tested
- Optimizes circuit layout for bi-directional current flow
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Battery protection switch
- Bi-directional switch
- Load switch
- 24 V systems



ORDERING INFORMATION	
Package	PowerPAK 1212-8SCD
Lead (Pb)-free and halogen-free	SiSF20DN-T1-GE3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V_{S1S2}	60	V	
Gate-source voltage	V_{GS}	± 20		
Continuous drain current ($T_J = 150$ °C)	I_{S1S2}	$T_C = 25$ °C	52	A
		$T_C = 70$ °C	41	
		$T_A = 25$ °C	14 ^{b, c}	
		$T_A = 70$ °C	11 ^{b, c}	
Pulsed drain current ($t = 100$ μ s)	I_{S1S2M}	100		
Maximum power dissipation	P_{S1S2}	$T_C = 25$ °C	69.4	W
		$T_C = 70$ °C	44.4	
		$T_A = 25$ °C	5.2 ^{b, c}	
		$T_A = 70$ °C	3.3 ^{b, c}	
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C	
Soldering recommendations (peak temperature) ^c		260		

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^b	$t \leq 10$ s	R_{thJA}	19	24	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	1.4	1.8	

Notes

- $T_C = 25$ °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- See solder profile (www.vishay.com/doc?73257). The PowerPAK 1212-8SCD 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
- Maximum under steady state conditions is 63 °C/W
- Single MOSFET



SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	60	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	$V_{S1S2} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1	-	3	
Gate-source leakage	I_{GSS}	$V_{S1S2} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{S1S2} = 60\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{S1S2} = 60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 70\text{ }^\circ\text{C}$	-	-	15	
On-state drain current ^a	$I_{S1S2(on)}$	$V_{S1S2} \geq 10\text{ V}$, $V_{GS} = 10\text{ V}$	20	-	-	A
Drain-source on-state resistance ^a	$R_{S1S2(on)}$	$V_{GS} = 10\text{ V}$, $I_{S1S2} = 7\text{ A}$	-	0.0100	0.0130	Ω
		$V_{GS} = 4.5\text{ V}$, $I_{S1S2} = 5\text{ A}$	-	0.0140	0.0185	
Forward transconductance ^a	g_{fs}	$V_{S1S2} = 10\text{ V}$, $I_{S1S2} = 25\text{ A}$	-	75	-	S
Dynamic ^{b, c}						
Input capacitance	C_{ISS}	$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	-	1290	-	μF
Output capacitance	C_{OSS}		-	340	-	
Reverse transfer capacitance	C_{RSS}		-	8	-	
Total gate charge	Q_g	$V_{DS} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$	-	22	33	nC
		$V_{DS} = 30\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 5\text{ A}$	-	10.2	16	
Gate-source charge	Q_{gs}	$V_{DS} = 30\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 5\text{ A}$	-	3.9	-	
Gate-drain charge	Q_{gd}		-	2.9	-	
Gate resistance	R_g	$f = 1\text{ MHz}$	0.14	0.7	1.4	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 6\text{ }\Omega$, $I_{S1S2} \cong 5\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	-	10	20	ns
Rise time	t_r		-	5	10	
Turn-off delay time	$t_{d(off)}$		-	19	40	
Fall time	t_f		-	5	10	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 6\text{ }\Omega$, $I_D \cong 5\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$	-	15	30	ns
Rise time	t_r		-	50	100	
Turn-off delay time	$t_{d(off)}$		-	24	50	
Fall time	t_f		-	7	15	
Drain-Source Body Diode Characteristics ^c						
Continuous source-drain diode current	I_{S1S2}	$T_C = 25\text{ }^\circ\text{C}$	-	-	52	A
Pulse diode forward current	I_{S1S2M}		-	-	100	
Body diode reverse recovery time	t_{rr}	$I_F = 5\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$	-	30	60	ns
Body diode reverse recovery charge	Q_{rr}		-	18	35	nC
Reverse recovery fall time	t_a		-	15	-	ns
Reverse recovery rise time	t_b		-	15	-	

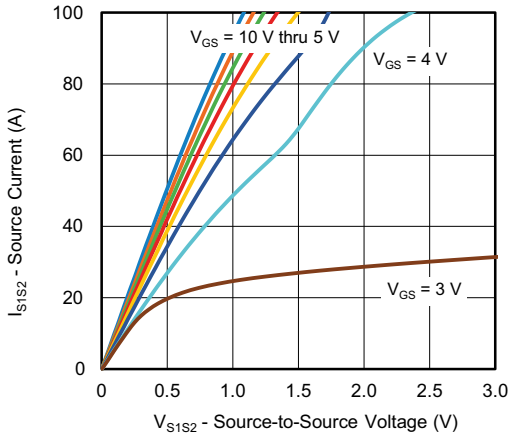
Notes

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

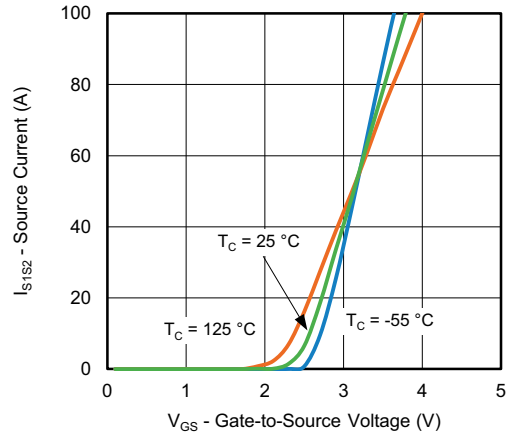
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



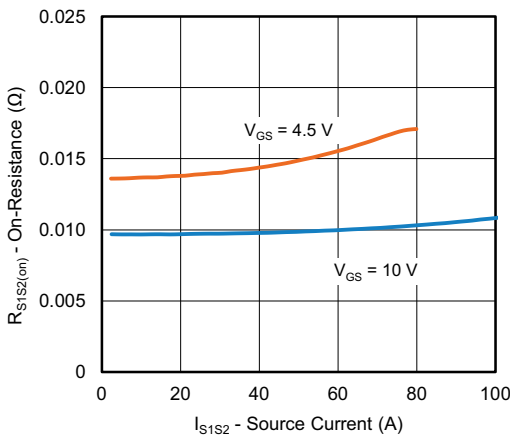
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



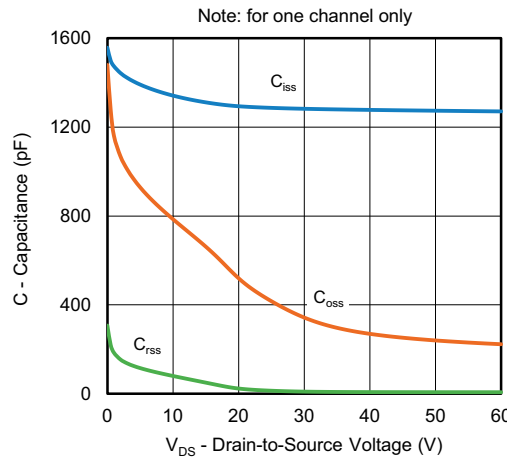
Output Characteristics



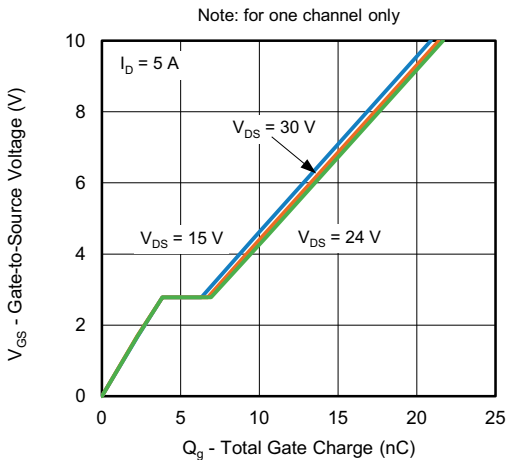
Transfer Characteristics



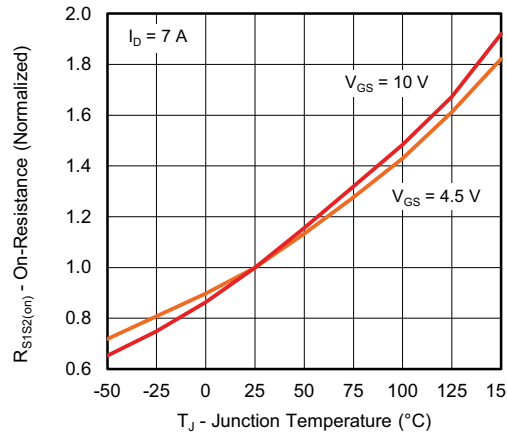
On-Resistance vs. Source Current and Gate Voltage



Capacitance



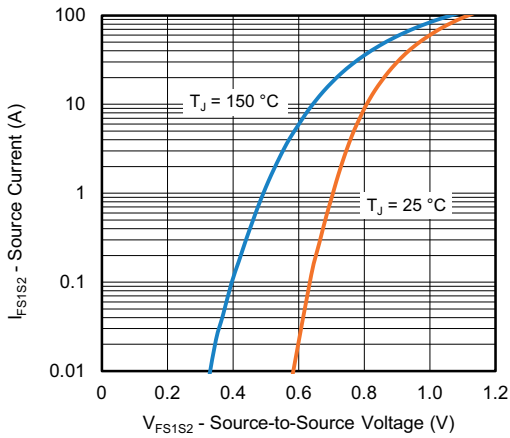
Gate Charge



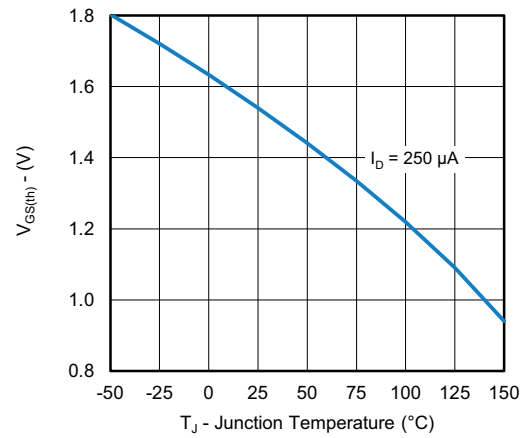
On-Resistance vs. Junction Temperature



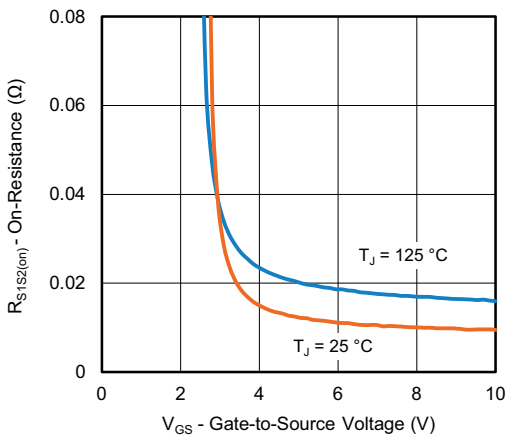
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



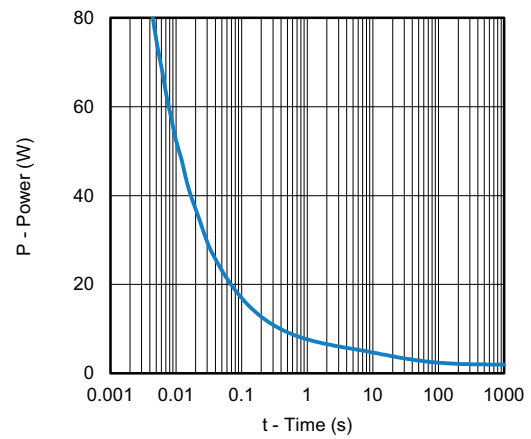
Source-Drain Diode Forward Voltage



Threshold Voltage

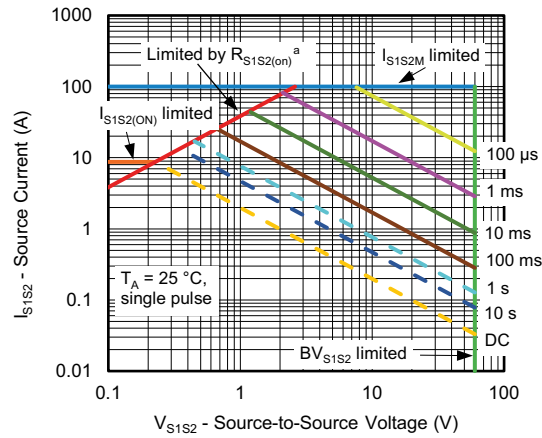


On-Resistance vs. Gate-to-Source Voltage

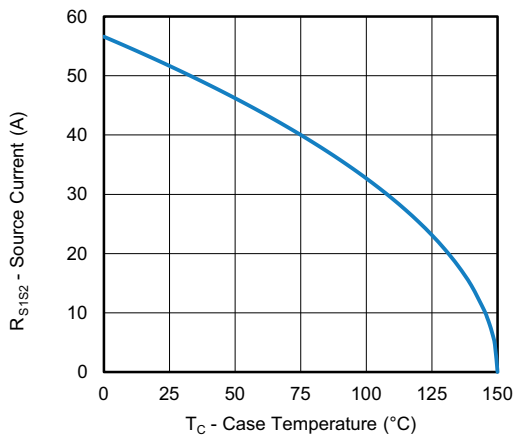


Single Pulse Power, Junction-to-Ambient

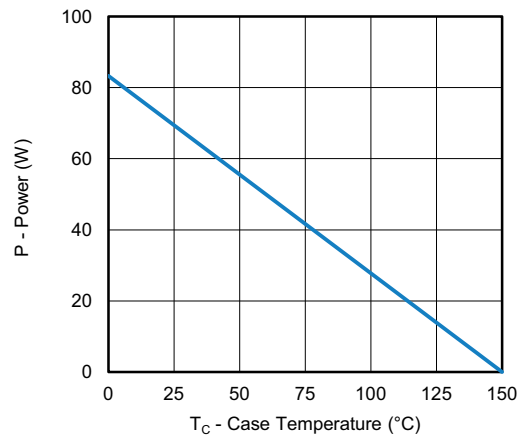
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Safe Operating Area, Junction-to-Ambient



Current Derating ^b



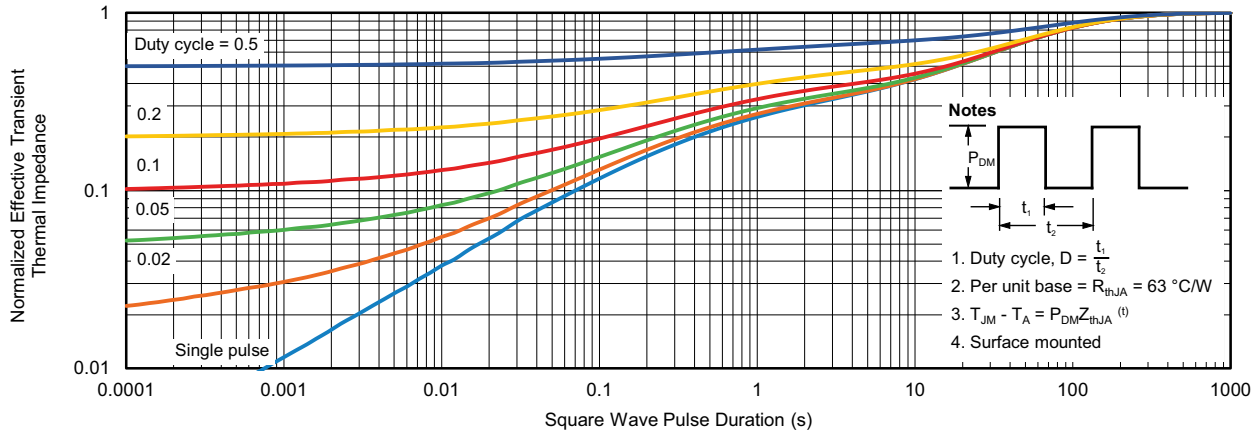
Power, Junction-to-Case

Notes

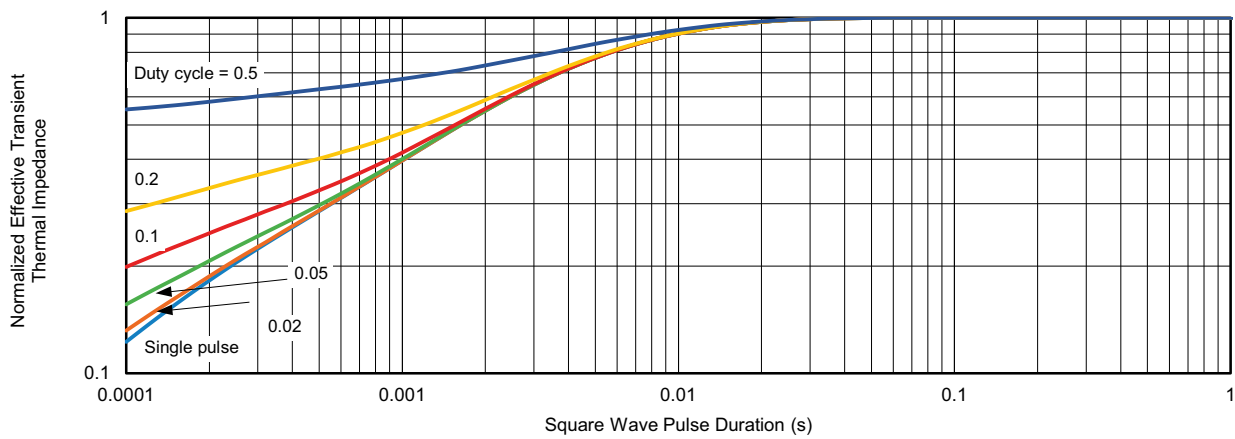
- a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
- b. The power dissipation P_D is based on $T_J \text{ max.} = 150 \text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is 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

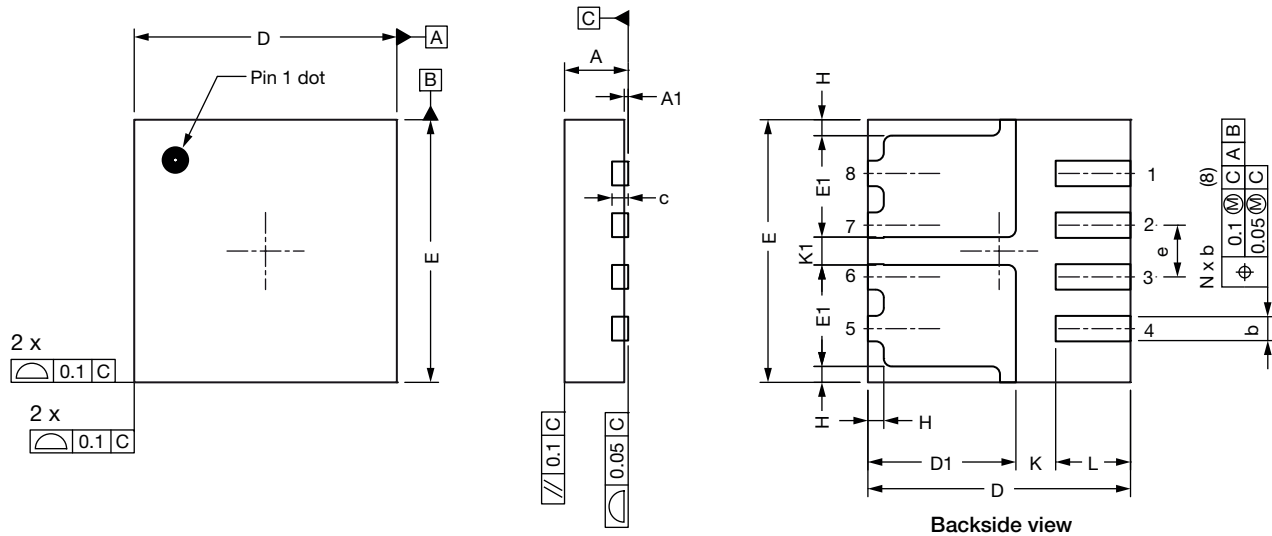


Normalized Thermal Transient Impedance, Junction-to-Case

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?76915.



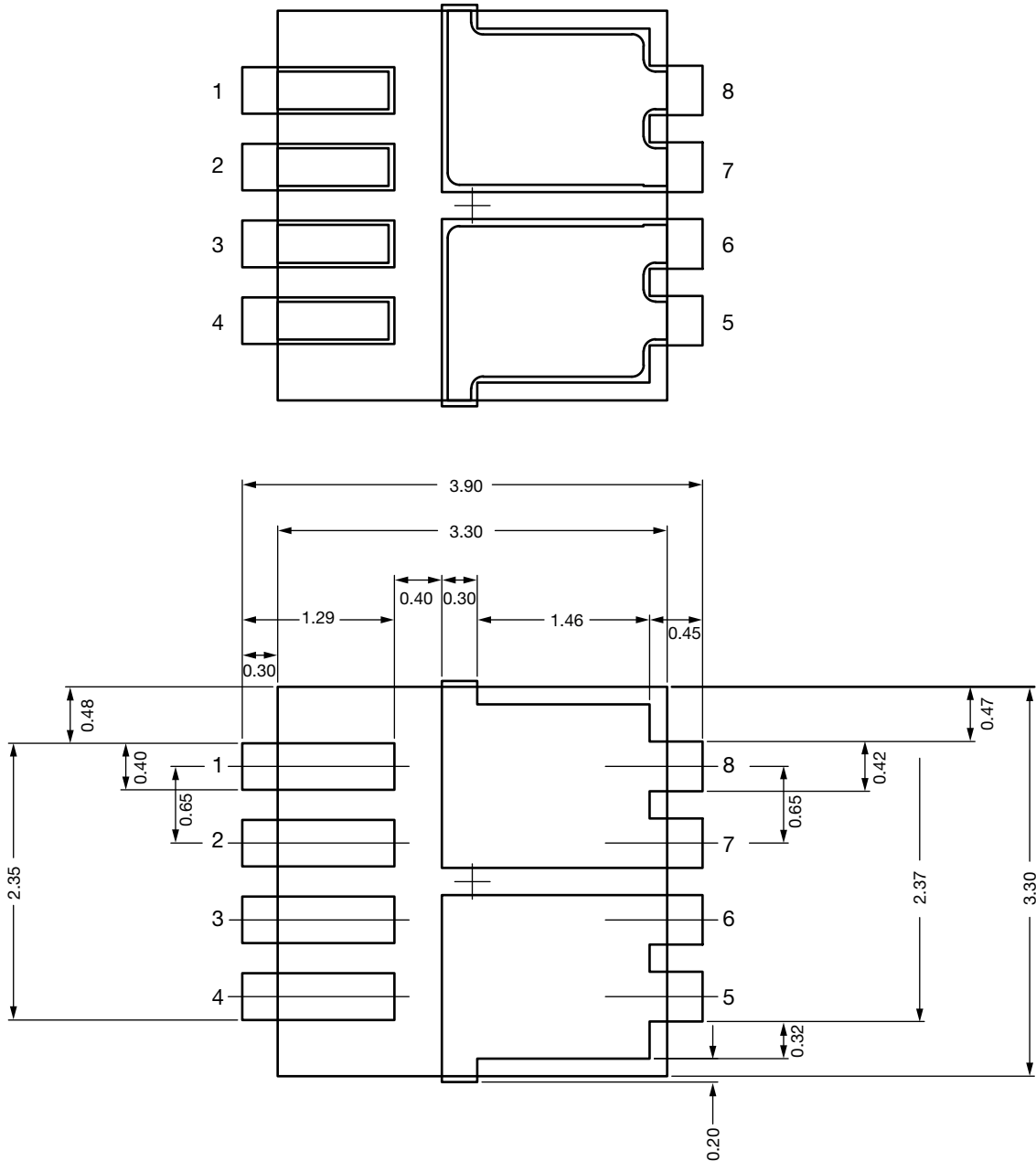
PowerPAK® 1212-8S CD with Flip Chip



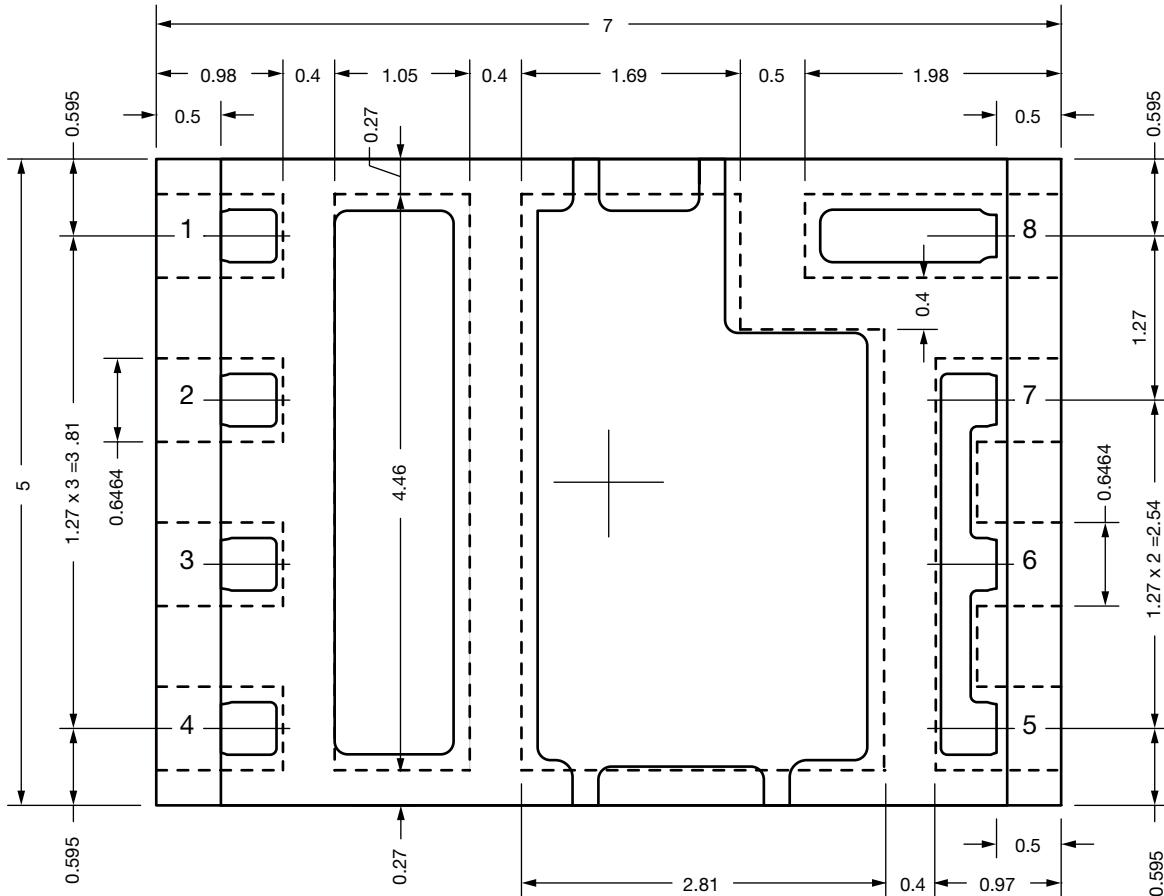
DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.027	0.029	0.031
A1	0	0.02	0.05	0	0.001	0.002
b	0.27	0.32	0.37	0.011	0.013	0.015
c	-	0.20 ref.	-	-	0.008 ref.	-
D	3.20	3.30	3.40	0.126	0.130	0.134
D1	1.76	1.86	1.96	0.069	0.073	0.077
E	3.20	3.30	3.40	0.126	0.130	0.134
E1	1.18	1.28	1.38	0.046	0.050	0.054
e	0.60	0.65	0.70	0.024	0.026	0.028
K	0.50 typ.			0.020 typ.		
K1	0.35 typ.			0.014 typ.		
H	0.10	0.20	0.30	0.006	0.008	0.010
L	0.84	0.94	1.04	0.033	0.037	0.041

ECN: C17-1732-Rev. A, 18-Dec-17
DWG: 6061

Recommended Land Pattern PowerPAK® 1212-8S CD



Recommended Minimum PADS for PowerPAIR® 6 x 5F



- Component for PowerPair 6 x 5F
- Land Pattern for PowerPair 6 x 5F

Note

- Dimensions in millimeters



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