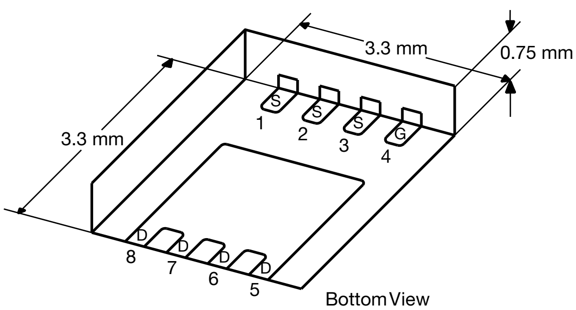
P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A)	Q_g (Typ.)
- 20	0.0045 at V_{GS} = - 4.5 V	- 50[e]	93 nC
	0.0063 at V_{GS} = - 2.5 V	- 50[e]	
	0.0115 at V_{GS} = - 1.8 V	- 50[e]	

PowerPAK 1212-8S



Ordering Information:
SiSS23DN-T1-GE3 (Lead (Pb)-free and Halogen-free)

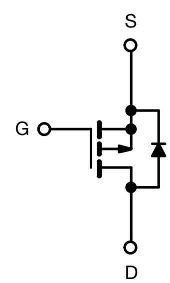
FEATURES

- TrenchFET® Power MOSFET
- Low Thermal Resistance PowerPAK® Package with Small Size and Low 0.75 mm Profile
- 100 % R_g and UIS Tested
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Smart Phones, Tablet PCs, Mobile Computing
  - Battery Switch
  - Load Switch
  - Power Management
  - Battery Management



P-Channel MOSFET

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}	± 8	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 50[e]	A
	T_C = 70 °C		- 50[e]	
	T_A = 25 °C		- 27[a, b]	
	T_A = 70 °C		- 21[a, b]	
Pulsed Drain Current (t = 100 µs)		I_{DM}	- 200	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 47.5	
	T_A = 25 °C		- 4[a, b]	
Avalanche Current	L = 0.1 mH	I_{AS}	- 23	
Single-Pulse Avalanche Energy		E_{AS}	26	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	57	W
	T_C = 70 °C		36	
	T_A = 25 °C		4.8[a, b]	
	T_A = 70 °C		3[a, b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 50 to 150	°C
Soldering Recommendations (Peak Temperature)[c, d]			260	

Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 10 s.
c. See solder profile (www.vishay.com/doc?73257). The PowerPAK 1212-8S 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.
d. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
e. Package limited.

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a, b]	t ≤ 10 s	R_{thJA}	21	26	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.7	2.2	

Notes:
a.Surface mounted on 1" x 1" FR4 board.
b.Maximum under steady state conditions is 63 °C/W.

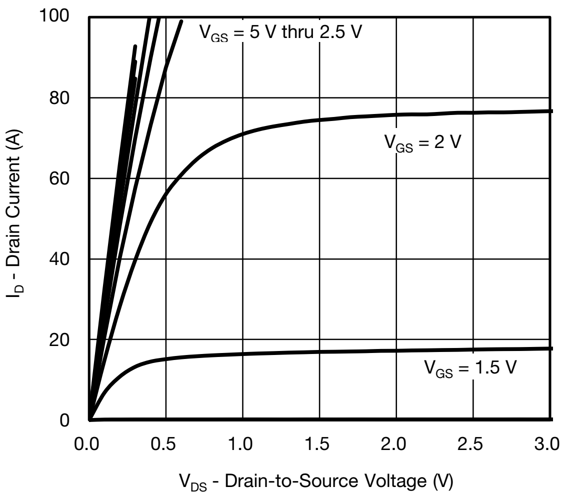
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

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	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 12		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			3.4		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 0.4		- 0.9	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 100	nA
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 = 55 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} ≤ - 5 V, V_{GS} = - 4.5 V	- 20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 20 A		0.0035	0.0045	Ω
		V_{GS} = - 2.5 V, I_D = - 10 A		0.0051	0.0063	
		V_{GS} = - 1.8 V, I_D = - 10 A		0.0081	0.0115	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 20 A		44		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 15 V, V_{GS} = 0 V, f = 1 MHz		8840		pF
Output Capacitance	C_{oss}			835		
Reverse Transfer Capacitance	C_{rss}			900		
Total Gate Charge	Q_g	V_{DS} = - 15 V, V_{GS} = - 10 V, I_D = - 20 A		195	300	nC
		V_{DS} = - 15 V, V_{GS} = - 4.5 V, I_D = - 20 A		93	140	
Gate-Source Charge	Q_{gs}			12		
Gate-Drain Charge	Q_{gd}			21		
Gate Resistance	R_g	f = 1 MHz	0.5	2.6	5.2	Ω
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		45	90	ns
Rise Time	t_r			50	100	
Turn-Off DelayTime	$t_{d(off)}$			140	280	
Fall Time	t_f			50	100	
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		15	30	
Rise Time	t_r			5	10	
Turn-Off DelayTime	$t_{d(off)}$			150	300	
Fall Time	t_f			40	80	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 50[c]	A
Pulse Diode Forward Current[d]	I_{SM}				- 200	
Body Diode Voltage	V_{SD}	I_F = - 10 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 10 A, dI/dt = 100 A/µs, T_J = 25 °C		30	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			15	30	nC
Reverse Recovery Fall Time	t_a			16		ns
Reverse Recovery Rise Time	t_b			14		

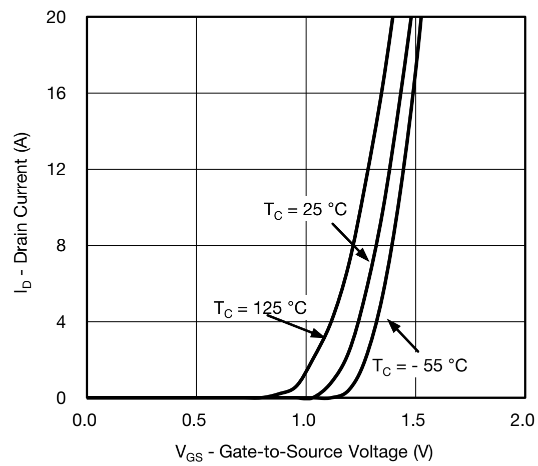
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Package limited.
d. t = 100 µs.

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.

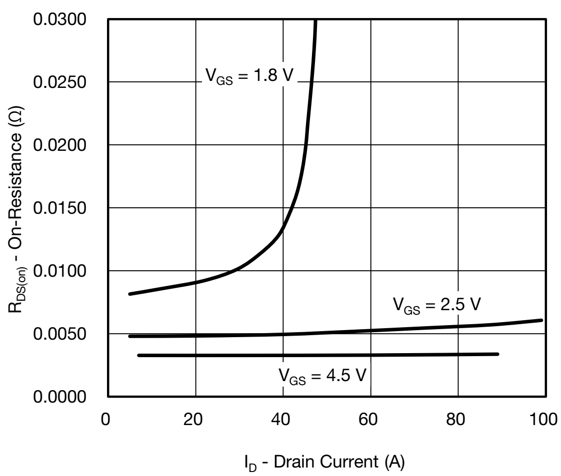
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



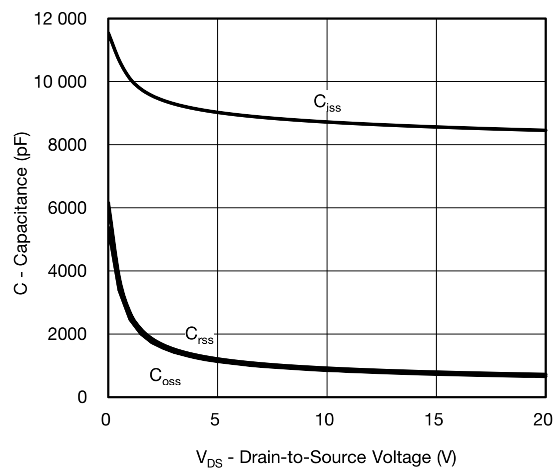
Output Characteristics



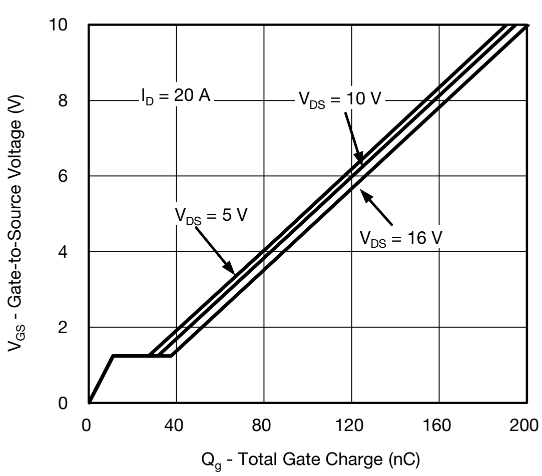
Transfer Characteristics



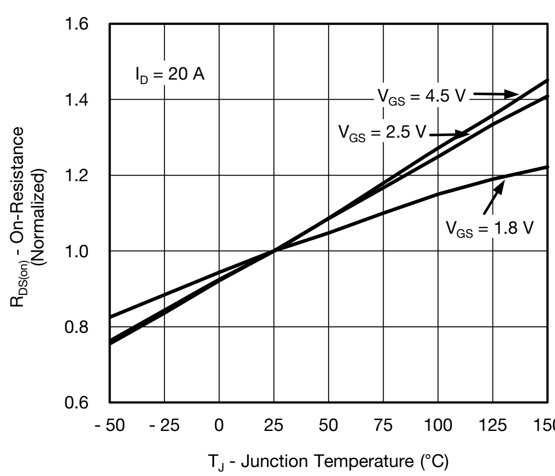
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

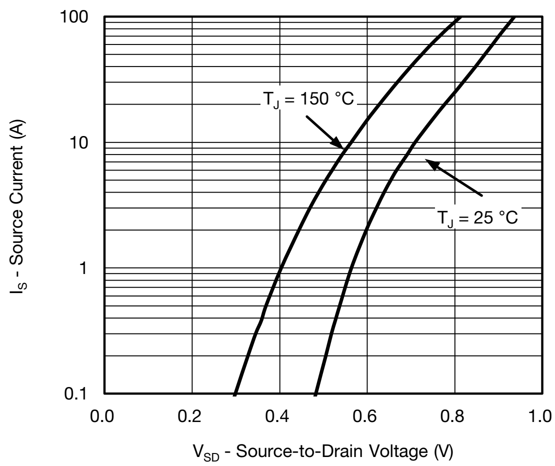


Gate Charge

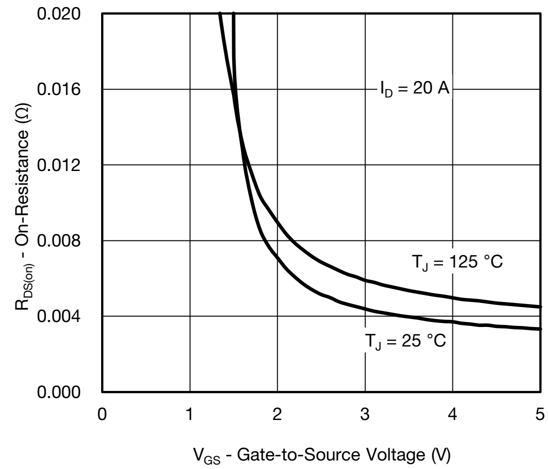


On-Resistance vs. Junction Temperature

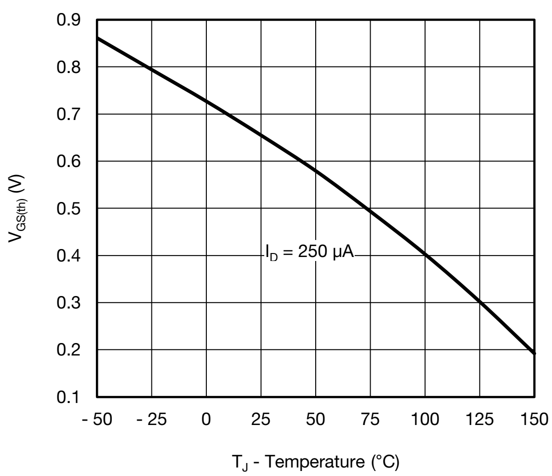
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



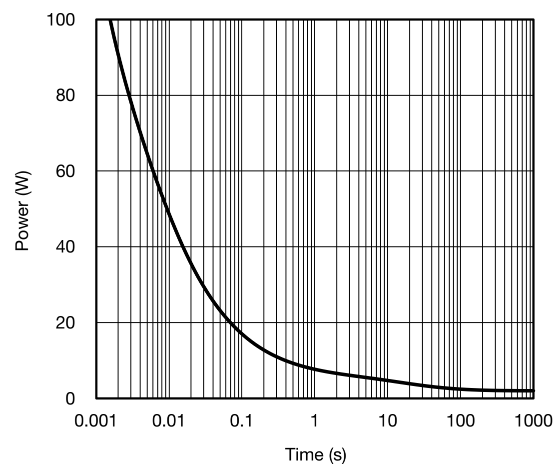
Source-Drain Diode Forward Voltage



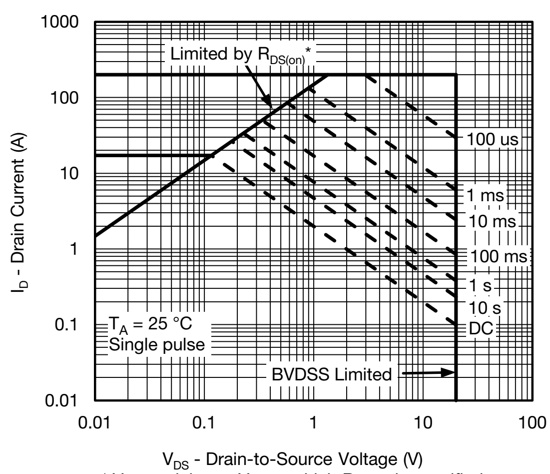
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



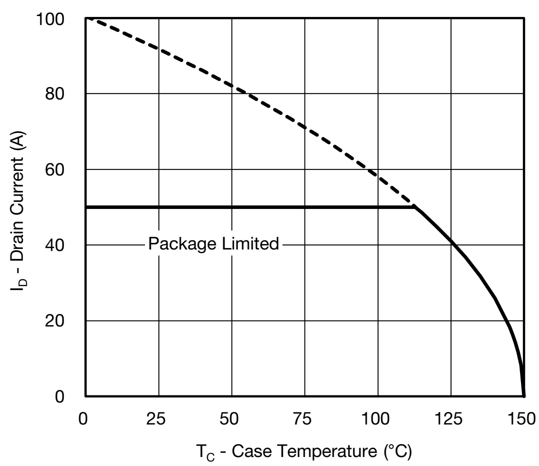
Single Pulse Power, Junction-to-Ambient



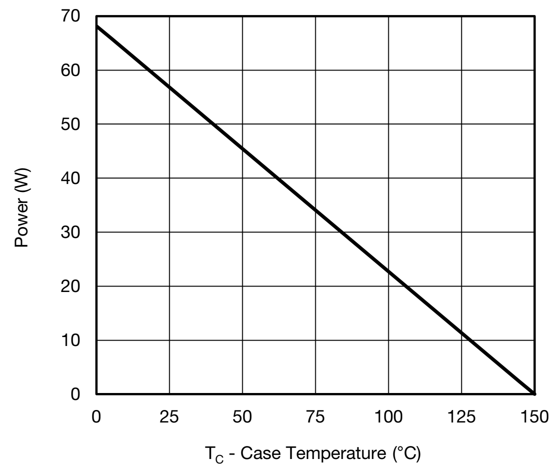
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

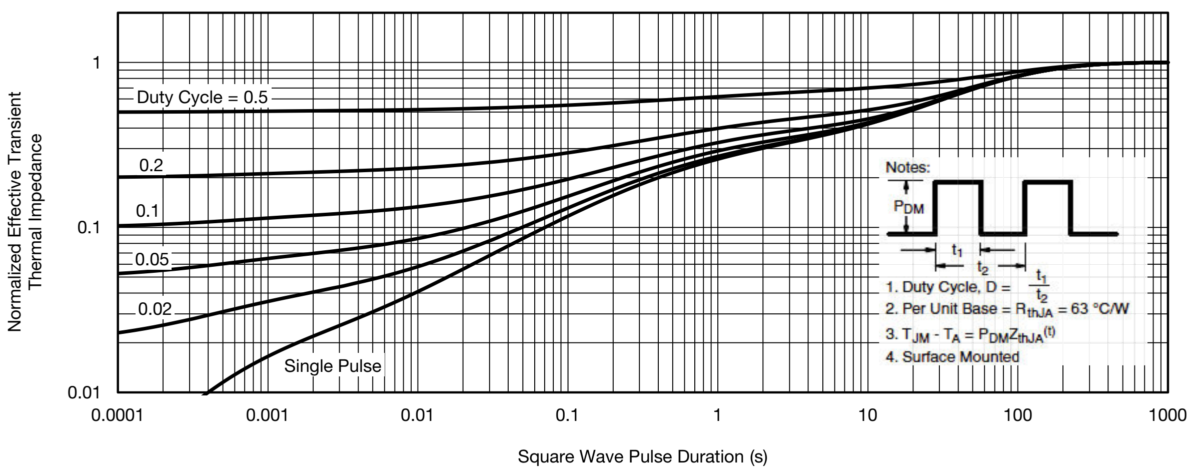


Current Derating*



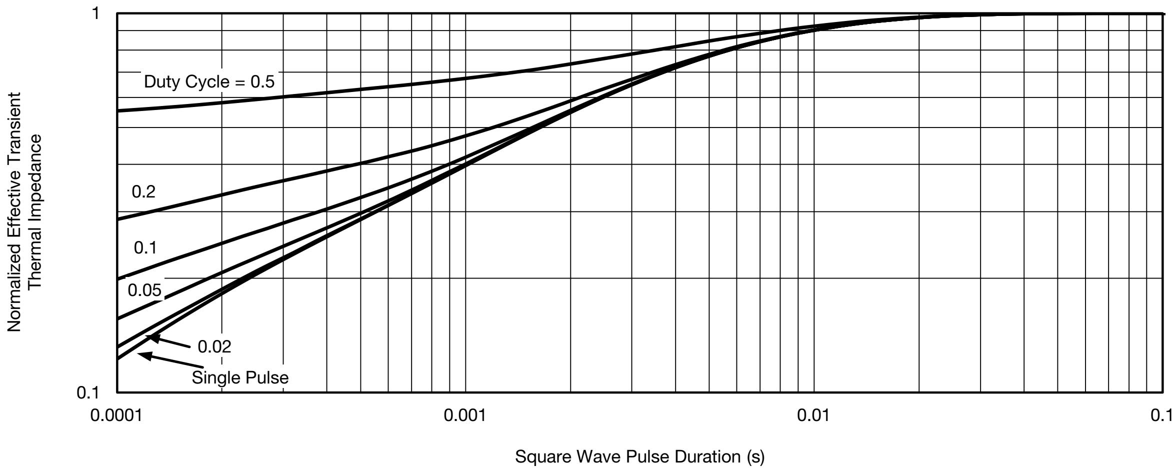
Power, Junction-to-Case

* 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.



Normalized Thermal Transient Impedance, Junction-to-Ambient

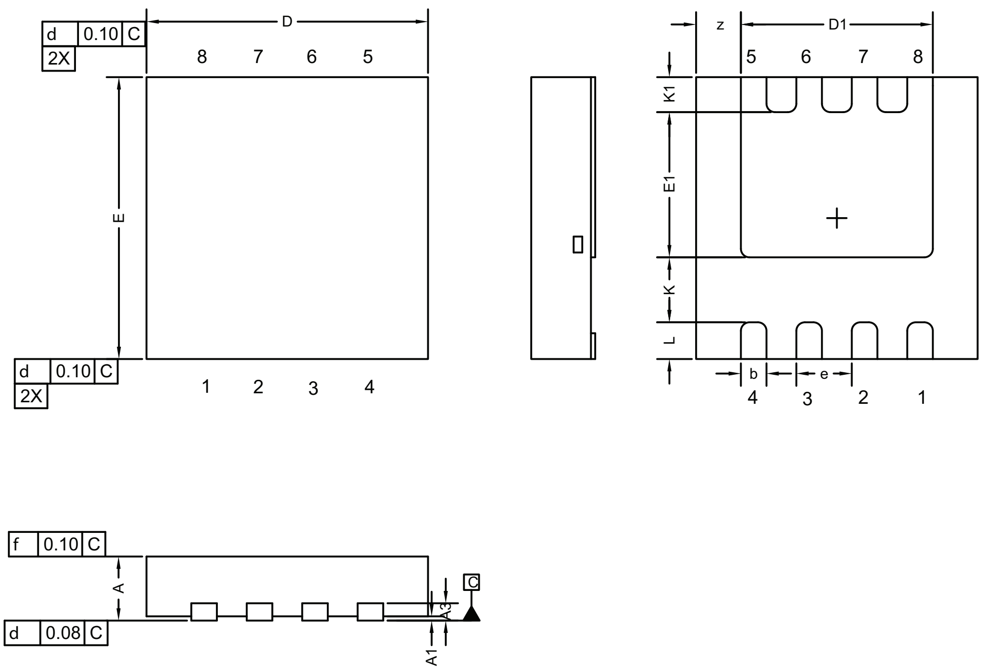
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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?62852.

Case Outline for PowerPAK® 1212-8S

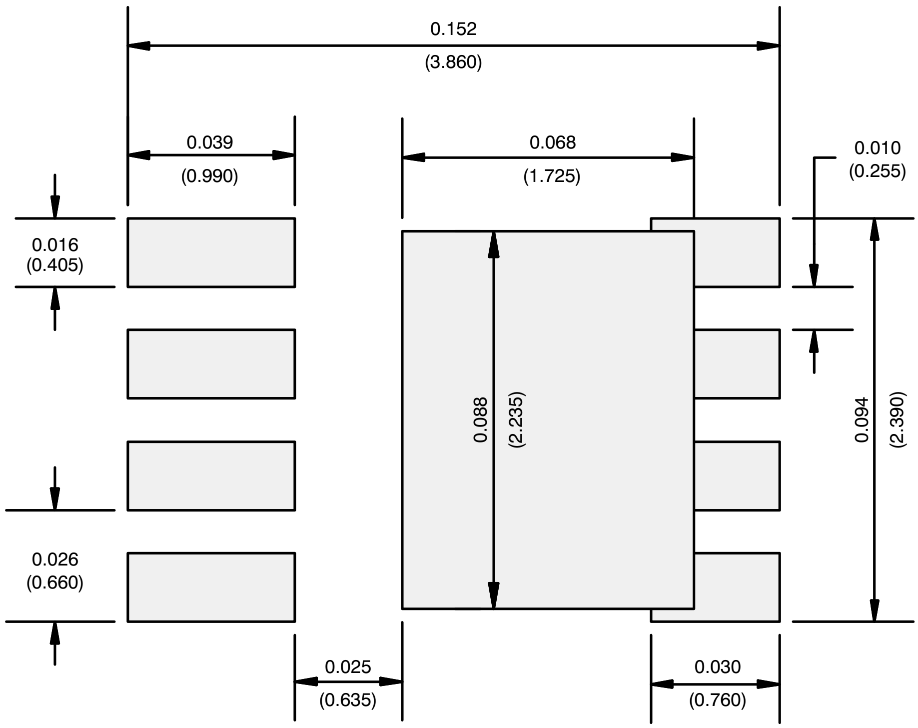


DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.67	0.75	0.83	0.027	0.030	0.033
A1	0	-	0.05	0	-	0.002
A3	0.20 REF			0.008 REF		
b	0.30 BSC			0.012 BSC		
D	3.30 BSC			0.130 BSC		
D1	2.15	2.25	2.35	0.084	0.088	0.092
E	3.30 BSC			0.130 BSC		
E1	1.60	1.70	1.80	0.063	0.067	0.071
e	0.65 BSC			0.026 BSC		
K	0.76 TYP			0.030 TYP		
K1	0.41 TYP			0.016 TYP		
L	0.43 BSC			0.017 BSC		
z	0.525 TYP			0.021 TYP		
ECN: C12-0200-Rev. A, 12-Mar-12 DWG: 6008						

Note

- Millimeters will govern.

RECOMMENDED MINIMUM PADS FOR PowerPAK® 1212-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

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