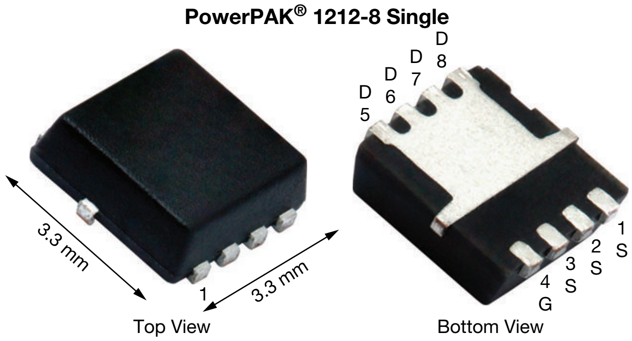
N-Channel 30 V (D-S) MOSFET

PowerPAK® 1212-8 Single



PRODUCT SUMMARY

V_{DS} (V)	30
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.0088
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.0120
Q_g typ. (nC)	9.9
I_D (A)	16 [a, g]
Configuration	Single

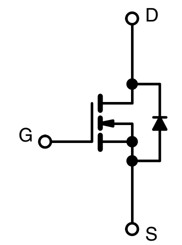
FEATURES

- TrenchFET® Gen IV power MOSFET
- Tuned for reducing transient spikes
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Synchronous buck converter
- High power density DC/DC
- Motor drive control
- Battery management
- Load switch



N-Channel MOSFET

ORDERING INFORMATION

Package	PowerPAK 1212-Single
Lead (Pb)-free and halogen-free	SiSA96DN-T1-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GS}	+20 / -16	
Continuous drain current (T_J = 150 °C)	T_C = 25 °C	I_D	16 [a]	A
	T_C = 70 °C		12 [a]	
	T_A = 25 °C		14.8 [b, c]	
	T_A = 70 °C		12 [b, c]	
Pulsed drain current (t = 100 μs)		I_{DM}	65	
Continuous source-drain diode current	T_C = 25 °C	I_S	16 [a]	
	T_A = 25 °C		3.2 [b, c]	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	15	
Single pulse avalanche energy		E_{AS}	11.25	mJ
Maximum power dissipation	T_C = 25 °C	P_D	26.5	W
	T_C = 70 °C		17	
	T_A = 25 °C		3.5, [c]	
	T_A = 70 °C		2.3 [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 ≤ 10 s	R_{thJA}	28	35	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	3.8	4.7	

Notes

a. Package limited.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. 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.
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under steady state conditions is 70 °C/W.
g. T_C = 25 °C.

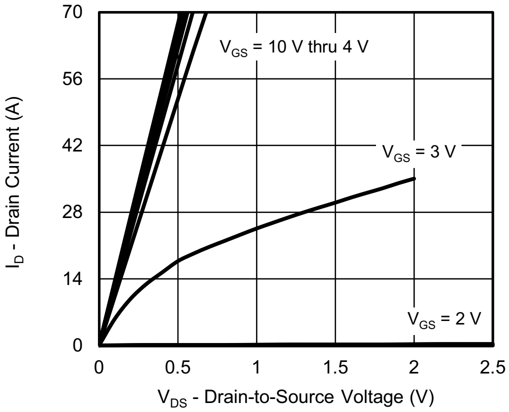
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	30	-	-	V
Drain-source breakdown voltage (transient) [c]	V_{DSt}	V_{GS} = 0 V, $I_{D(aval)}$ = 15 A, $t_{transient}$ = 50 ns	36	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	I_D =10 mA	-	13	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$	I_D = 250 μA	-	-4.7	-	mV/°C
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D =250 μA	1	-	2.2	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = +20 / -16 V	-	-	100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 70 °C	-	-	15	
On-state drain current [a]	$I_{D(on)}$	$V_{DS} \geq$ 10 V, V_{GS} = 10 V	30	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10 A	-	0.0073	0.0088	Ω
		V_{GS} = 4.5 V, I_D = 10 A	-	0.0092	0.0120	
Forward transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 10 A	-	70	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	-	1385	-	pF
Output capacitance	C_{oss}		-	478	-	
Reverse transfer capacitance	C_{rss}		-	37	-	
Total gate charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 10 A	-	20.5	31	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 10 A	-	9.9	15	
Gate-source charge	Q_{gs}		-	4.2	-	
Gate-drain charge	Q_{gd}		-	2.5	-	
Gate resistance	R_g	f = 1 MHz	0.2	0.73	1.4	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 1.5 Ω, $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	8	16	ns
Rise time	t_r		-	25	50	
Turn-off delay time	$t_{d(off)}$		-	13	26	
Fall time	t_f		-	9	18	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 1.5 Ω, $I_D \cong$ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω	-	12	24	
Rise time	t_r		-	47	94	
Turn-off delay time	$t_{d(off)}$		-	15	30	
Fall time	t_f		-	25	50	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	16	A
Pulse diode forward current	I_{SM}		-	-	50	
Body diode voltage	V_{SD}	I_S = 5 A, V_{GS} = 0 V	-	0.77	1.1	V
Body diode reverse recovery time	t_{rr}	I_F = 10 A, dI/dt = 100 A/μs, T_J = 25 °C	-	50	100	ns
Body diode reverse recovery charge	Q_{rr}		-	75	150	nC
Reverse recovery fall time	t_a		-	43	-	ns
Reverse recovery rise time	t_b		-	7	-	

Notes

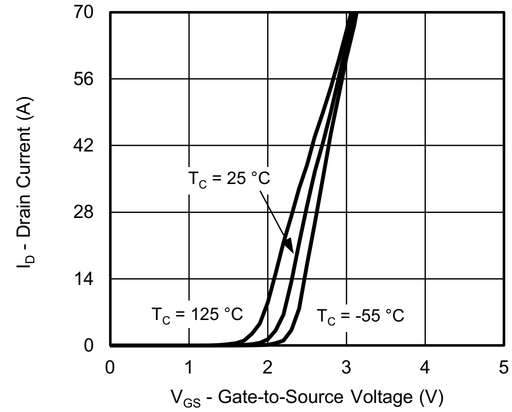
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. T_{CASE} = 25 °C. Expected voltage stress during 100 % UIS test. Production datalog is not available.

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.

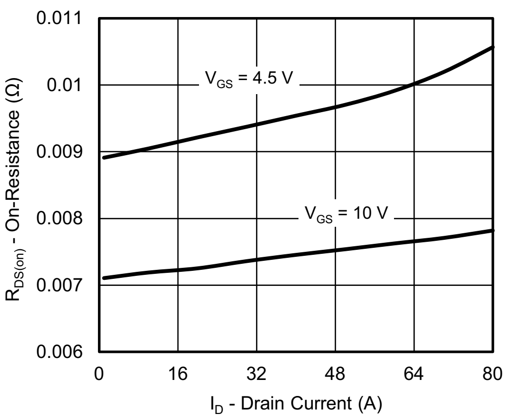
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



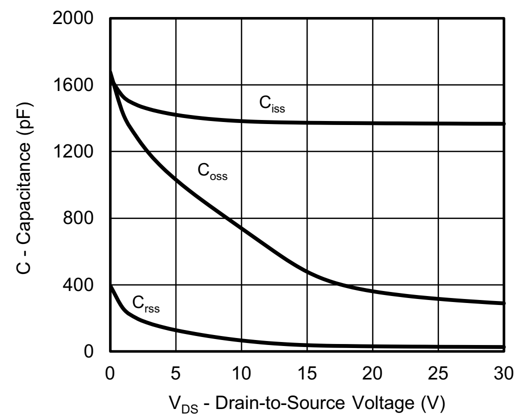
Output Characteristics



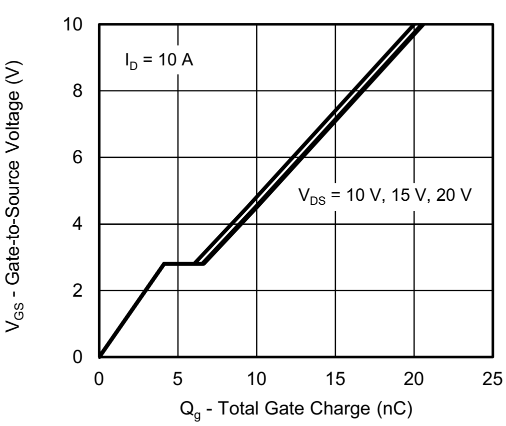
Transfer Characteristics



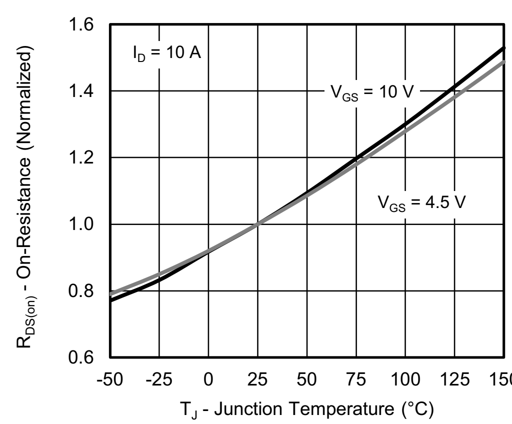
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

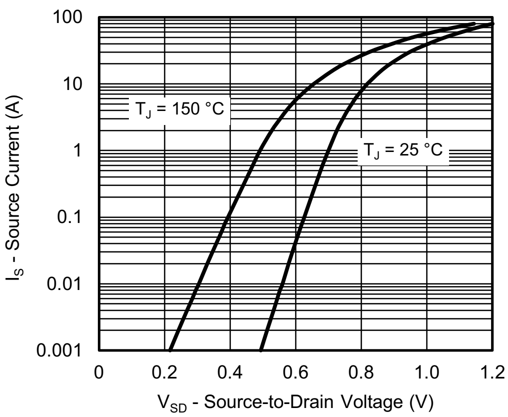


Gate Charge

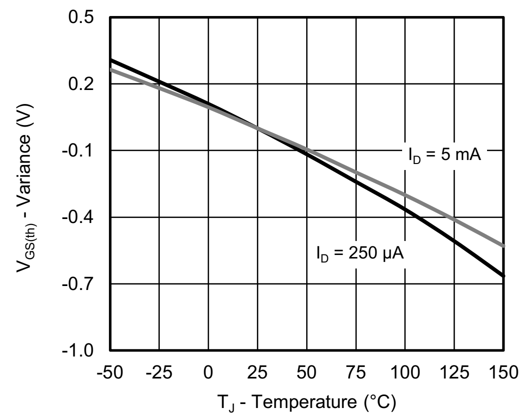


On-Resistance vs. Junction Temperature

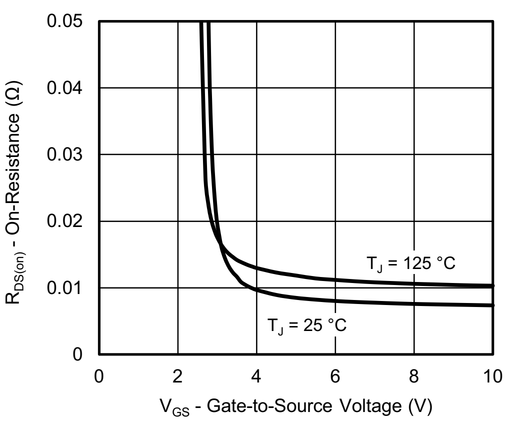
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



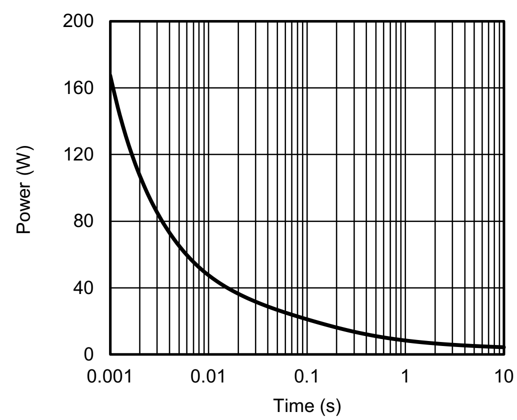
Source-Drain Diode Forward Voltage



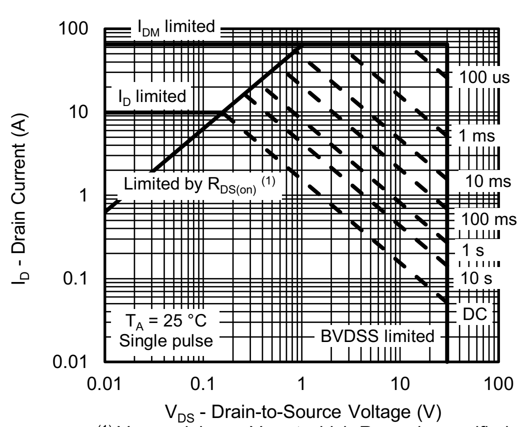
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



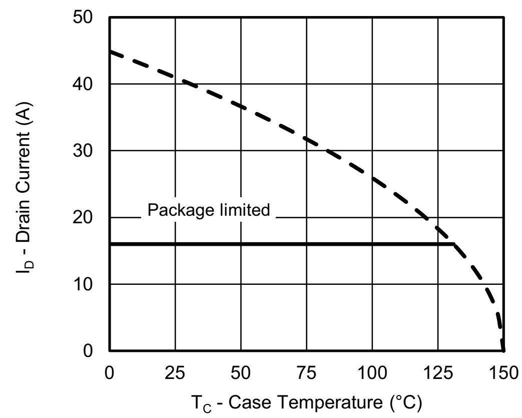
Single Pulse Power, Junction-to-Ambient



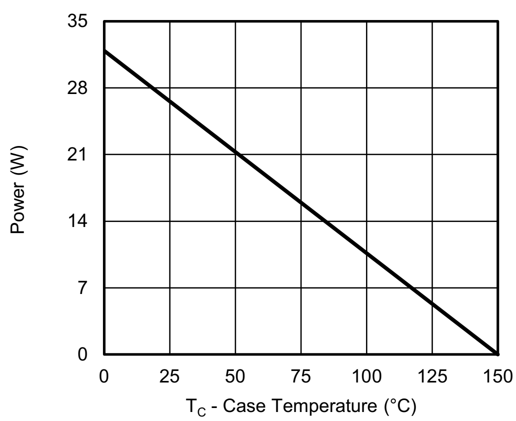
(1) V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

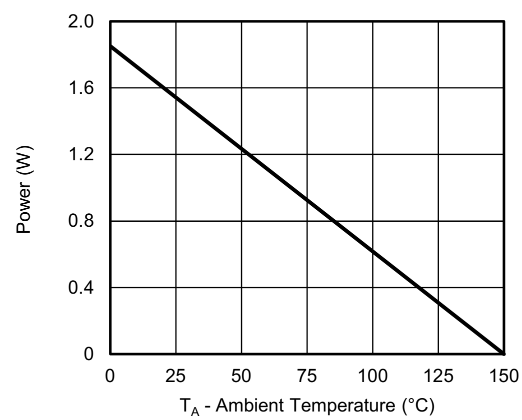
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]



Power, Junction-to-Case

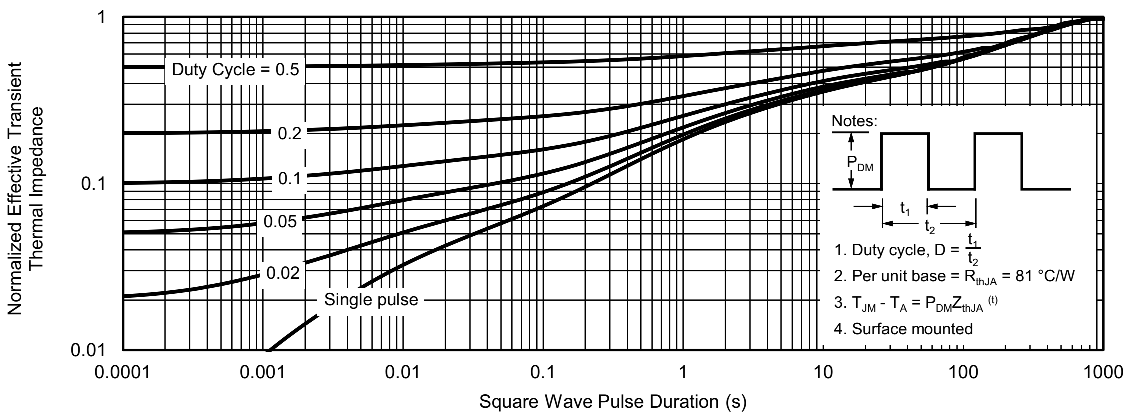


Power, Junction-to-Ambient

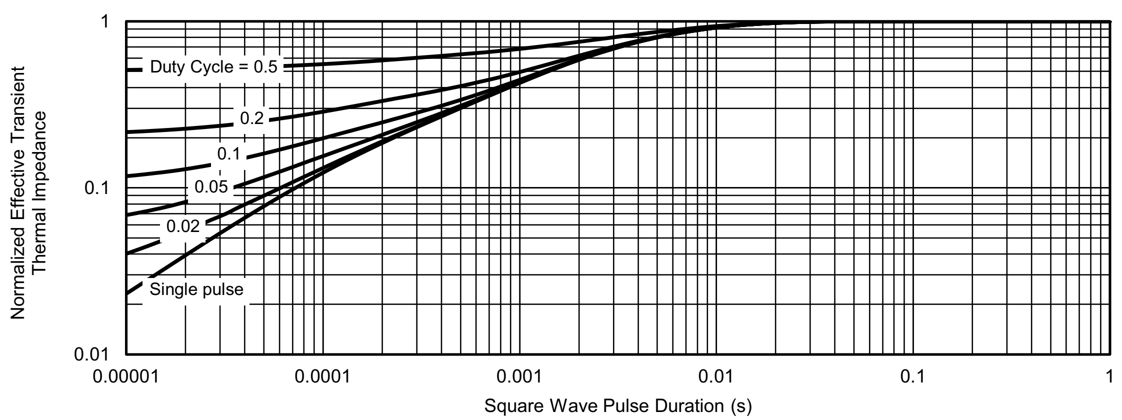
Note

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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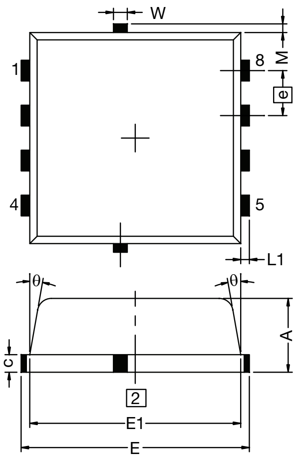
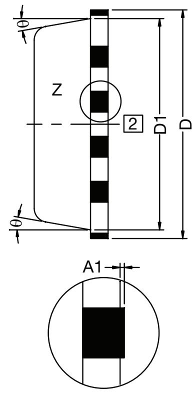
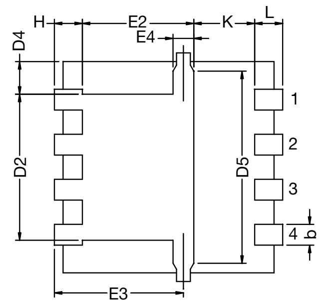
PowerPAK® 1212-8, (Single / Dual)

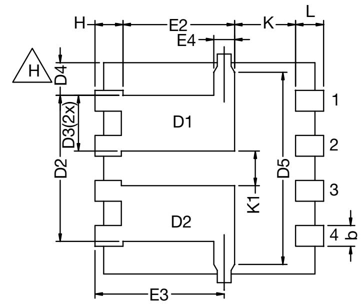




Detail Z



Backside view of single pad



Backside view of dual pad

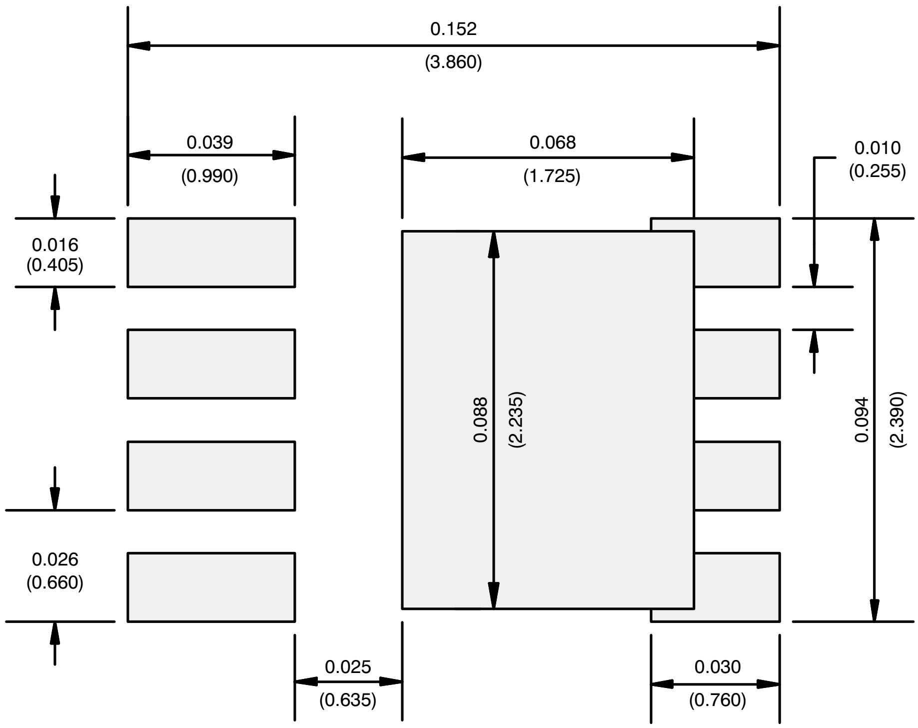
Notes

1. Inch will govern
2. Dimensions exclusive of mold gate burrs
3. Dimensions exclusive of mold flash and cutting burrs

DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.97	1.04	1.12	0.038	0.041	0.044
A1	0.00	-	0.05	0.000	-	0.002
b	0.23	0.30	0.41	0.009	0.012	0.016
c	0.23	0.28	0.33	0.009	0.011	0.013
D	3.20	3.30	3.40	0.126	0.130	0.134
D1	2.95	3.05	3.15	0.116	0.120	0.124
D2	1.98	2.11	2.24	0.078	0.083	0.088
D3	0.48	-	0.89	0.019	-	0.035
D4	0.47 typ.			0.0185 typ		
D5	2.3 typ.			0.090 typ		
E	3.20	3.30	3.40	0.126	0.130	0.134
E1	2.95	3.05	3.15	0.116	0.120	0.124
E2	1.47	1.60	1.73	0.058	0.063	0.068
E3	1.75	1.85	1.98	0.069	0.073	0.078
E4	0.034 typ.			0.013 typ.		
e	0.65 BSC			0.026 BSC		
K	0.86 typ.			0.034 typ.		
K1	0.35	-	-	0.014	-	-
H	0.30	0.41	0.51	0.012	0.016	0.020
L	0.30	0.43	0.56	0.012	0.017	0.022
L1	0.06	0.13	0.20	0.002	0.005	0.008
θ	0°	-	12°	0°	-	12°
W	0.15	0.25	0.36	0.006	0.010	0.014
M	0.125 typ.			0.005 typ.		

ECN: S16-2667-Rev. M, 09-Jan-17
DWG: 5882

RECOMMENDED MINIMUM PADS FOR PowerPAK® 1212-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

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