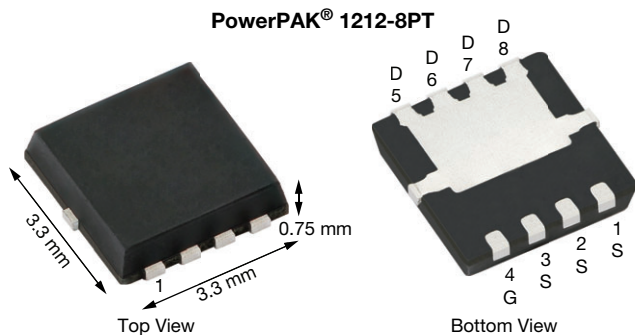


# N-Channel 30 V (D-S) MOSFET



## FEATURES

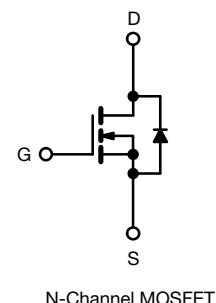
- TrenchFET® Gen IV power MOSFET
- 100 %  $R_g$  and UIS tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

## APPLICATIONS

- High power density DC/DC
- Synchronous rectification
- VRMs and embedded DC/DC
- Battery protection



N-Channel MOSFET

## PRODUCT SUMMARY

$V_{DS}$ (V)	30
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 10$ V	0.0036
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 4.5$ V	0.0050
$Q_g$ typ. (nC)	11.7
$I_D$ (A)	104 <sup>a</sup>
Configuration	Single

## ORDERING INFORMATION

Package	PowerPAK 1212-8PT
Lead (Pb)-free and halogen-free	SiSA10BDN-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	V
Continuous drain current ( $T_J = 150$ °C)	$T_C = 25$ °C	104	A
	$T_C = 70$ °C	83	
	$T_A = 25$ °C	26 <sup>b, c</sup>	
	$T_A = 70$ °C	21 <sup>b, c</sup>	
Pulsed drain current ( $t = 100$ $\mu$ s)	$I_{DM}$	150	A
Continuous source-drain diode current	$T_C = 25$ °C	57	A
	$T_A = 25$ °C	3.4 <sup>b, c</sup>	
Single pulse avalanche current	$I_{AS}$	20	mJ
Single pulse avalanche energy	$E_{AS}$	20	
Maximum power dissipation	$T_C = 25$ °C	63	W
	$T_C = 70$ °C	40	
	$T_A = 25$ °C	3.8 <sup>b, c</sup>	
	$T_A = 70$ °C	2.4 <sup>b, c</sup>	
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to +150	°C
Soldering recommendations (peak temperature) <sup>d, e</sup>		260	°C

## Notes

- Based on  $T_C = 25$  °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$  s
- See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). The PowerPAK 1212-8PT 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

**THERMAL RESISTANCE RATINGS**

PARAMETER		SMYBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient <sup>a, b</sup>	$t \leq 10$ s	$R_{thJA}$	26	33	°C/W
Maximum junction-to-case (drain)	Steady state	$R_{thJC}$	1.6	2	

**Notes**

- a. Surface mounted on 1" x 1" FR4 board  
b. Maximum under steady state conditions is 67 °C/W

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-source breakdown voltage	$V_{DS}$	$V_{GS} = 0$ V, $I_D = 250$ $\mu$ A	30	-	-	V
Drain-source breakdown voltage <sup>(c)</sup> (transient)	$V_{DS(t)}$	$V_{GS} = 0$ V, $I_{D(avail)} = 70$ A, $t_{transient} \leq 50$ ns	36	-	-	
$V_{DS}$ temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = 250$ $\mu$ A	-	18	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	-3.8	-	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250$ $\mu$ A	1.2	-	2.4	V
Gate-source leakage	$I_{GSS}$	$V_{DS} = 0$ V, $V_{GS} = +20, -16$ V	-	-	$\pm 100$	nA
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 30$ V, $V_{GS} = 0$ V	-	-	1	$\mu$ A
		$V_{DS} = 30$ V, $V_{GS} = 0$ V, $T_J = 55$ °C	-	-	10	
On-state drain current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5$ V, $V_{GS} = 10$ V	25	-	-	A
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 10$ A	-	0.0023	0.0036	$\Omega$
		$V_{GS} = 4.5$ V, $I_D = 7$ A	-	0.0035	0.0050	
Forward transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10$ V, $I_D = 20$ A	-	68	-	S
<b>Dynamic <sup>b</sup></b>						
Input capacitance	$C_{iss}$	$V_{DS} = 15$ V, $V_{GS} = 0$ V, $f = 1$ MHz	-	1710	-	pF
Output capacitance	$C_{oss}$		-	655	-	
Reverse transfer capacitance	$C_{rss}$		-	68	-	
$C_{rss}/C_{iss}$ ratio			-	0.040	0.080	
Total gate charge	$Q_g$	$V_{DS} = 15$ V, $V_{GS} = 10$ V, $I_D = 10$ A	-	24.1	36.2	nC
		$V_{DS} = 15$ V, $V_{GS} = 4.5$ V, $I_D = 10$ A	-	11.7	17.6	
Gate-source charge	$Q_{gs}$		-	4.2	-	
Gate-drain charge	$Q_{gd}$		-	2.8	-	
Output charge	$Q_{oss}$	$V_{DS} = 15$ V, $V_{GS} = 0$ V	-	18	-	
Gate resistance	$R_g$	$f = 1$ MHz	0.3	1.3	2.6	$\Omega$
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15$ V, $R_L = 1.5$ $\Omega$ $I_D \cong 10$ A, $V_{GEN} = 10$ V, $R_g = 1$ $\Omega$	-	7	15	ns
Rise time	$t_r$		-	20	40	
Turn-off delay time	$t_{d(off)}$		-	25	50	
Fall time	$t_f$		-	10	20	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15$ V, $R_L = 1.5$ $\Omega$ $I_D \cong 10$ A, $V_{GEN} = 4.5$ V, $R_g = 1$ $\Omega$	-	17	35	
Rise time	$t_r$		-	35	70	
Turn-off delay time	$t_{d(off)}$		-	30	60	
Fall time	$t_f$		-	15	30	

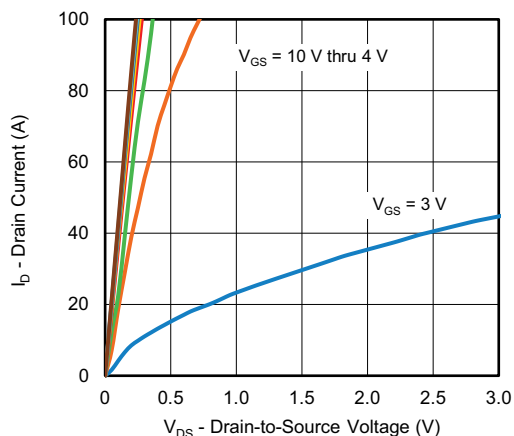
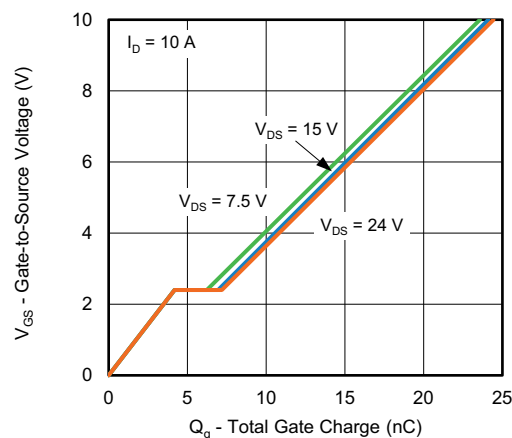
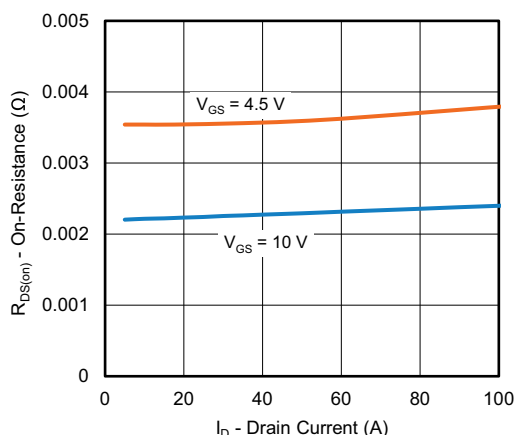
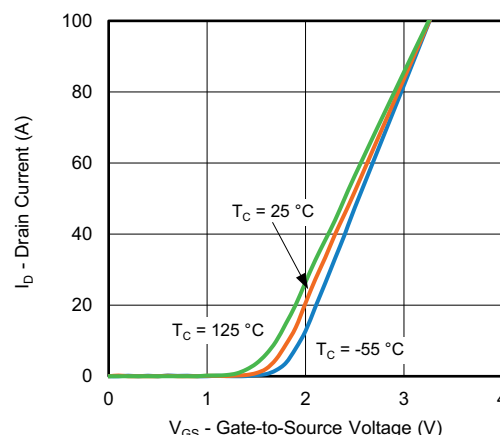
**SPECIFICATIONS** ( $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Drain-Source Body Diode Characteristics</b>						
Continuous source-drain diode current	$I_S$	$T_C = 25\text{ }^{\circ}\text{C}$	-	-	57	A
Pulse diode forward current <sup>a</sup>	$I_{SM}$		-	-	150	
Body diode voltage	$V_{SD}$	$I_S = 10\text{ A}$	-	0.75	1.1	V
Body diode reverse recovery time	$t_{rr}$	$I_F = 10\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^{\circ}\text{C}$	-	38	70	ns
Body diode reverse recovery charge	$Q_{rr}$		-	36	70	nC
Reverse recovery fall time	$t_a$		-	20	-	ns
Reverse recovery rise time	$t_b$		-	18	-	

**Notes**

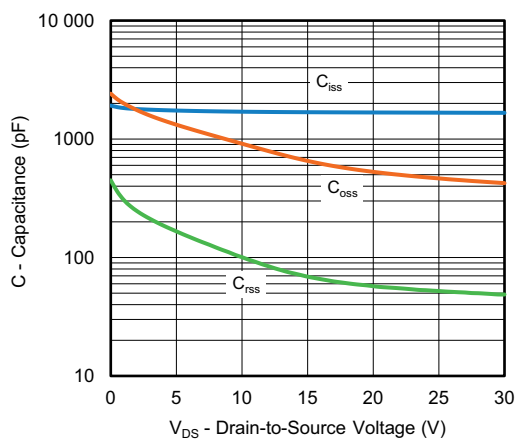
- a. Pulse test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$   
b. Guaranteed by design, not subject to production testing  
c. Based on characterization, not subject to production testing

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.

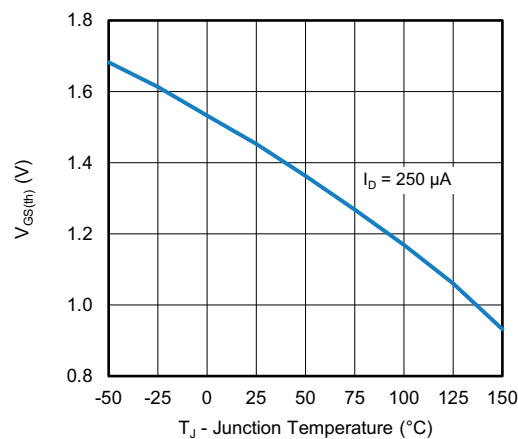
**TYPICAL CHARACTERISTICS** ( $25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**Output Characteristics****Gate Charge****On-Resistance vs. Drain Current****Transfer Characteristics**



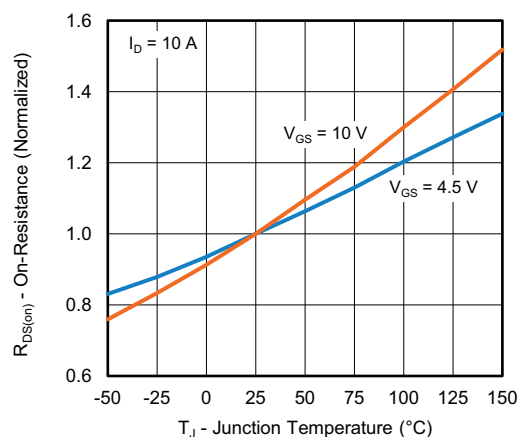
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



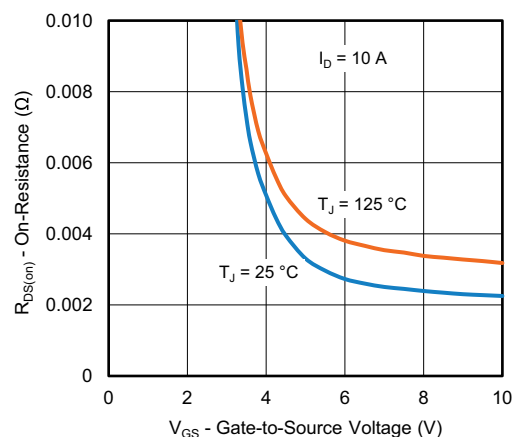
**Capacitance**



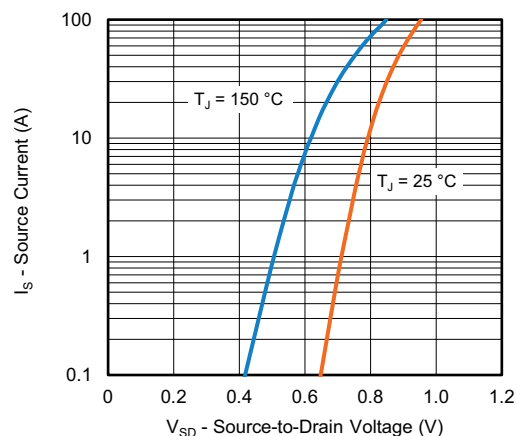
**Threshold Voltage**



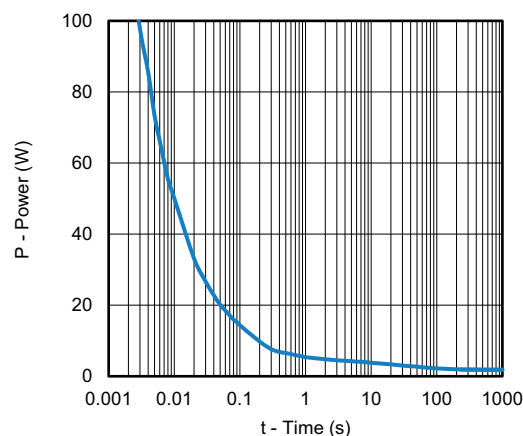
**On-Resistance vs. Junction Temperature**



**On-Resistance vs. Gate-to-Source Voltage**



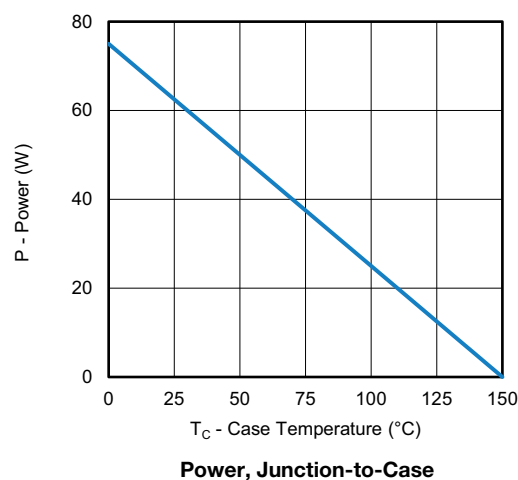
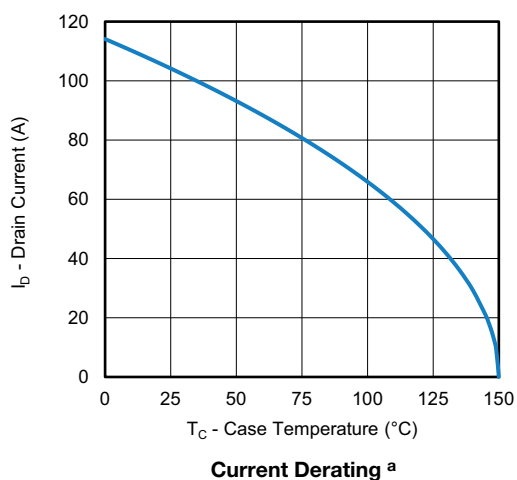
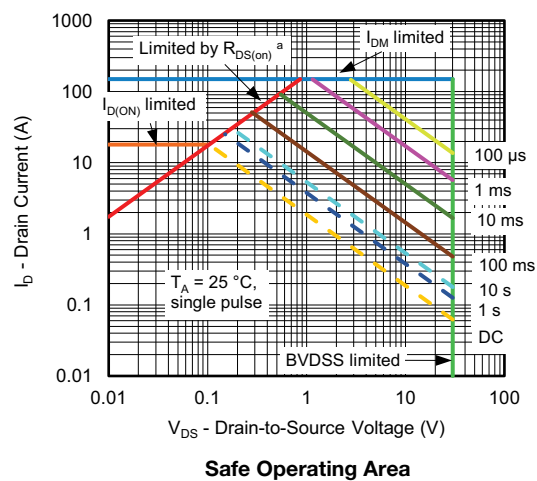
**Source-Drain Diode Forward Voltage**



**Single Pulse Power, Junction-to-Ambient**



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

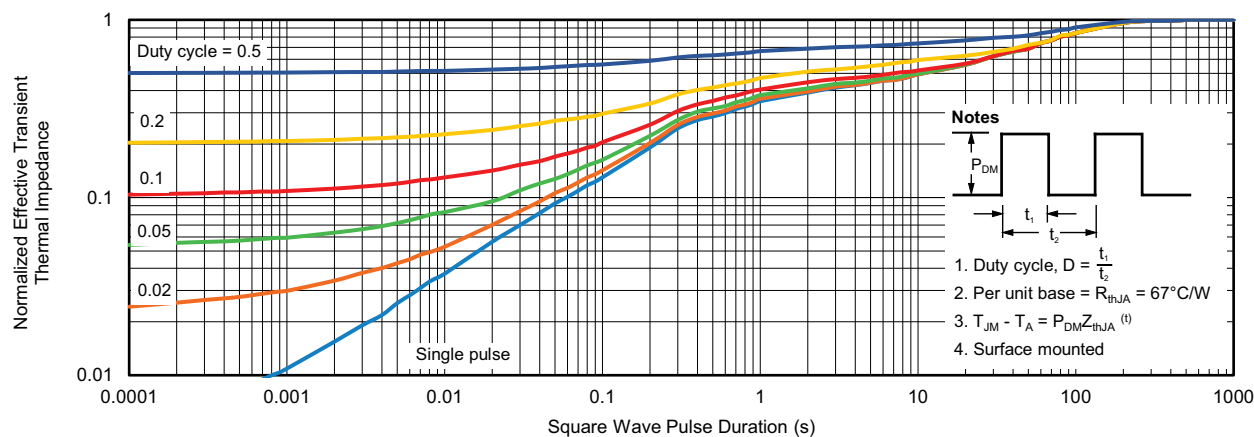


**Note**

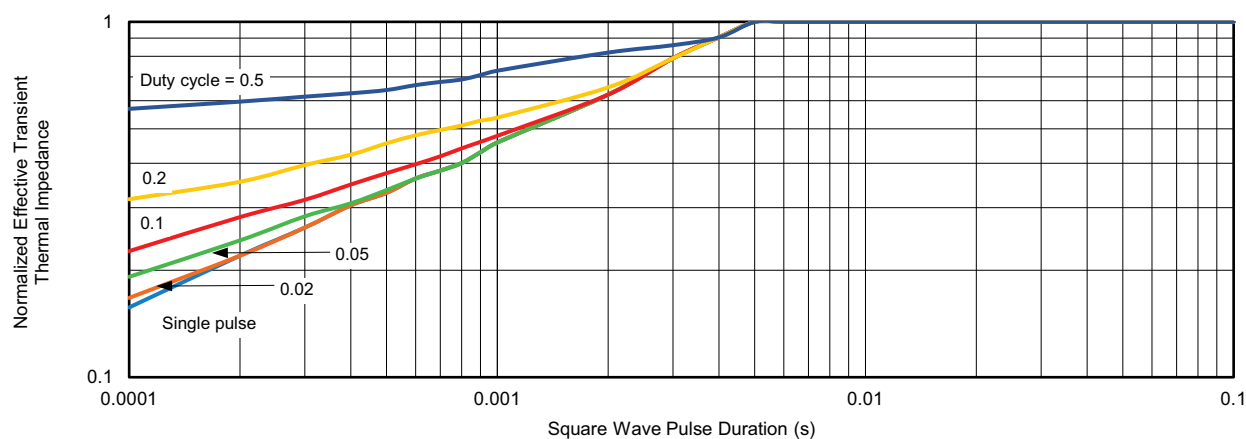
- a. The power dissipation  $P_D$  is based on  $T_J$  max. =  $150^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls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



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



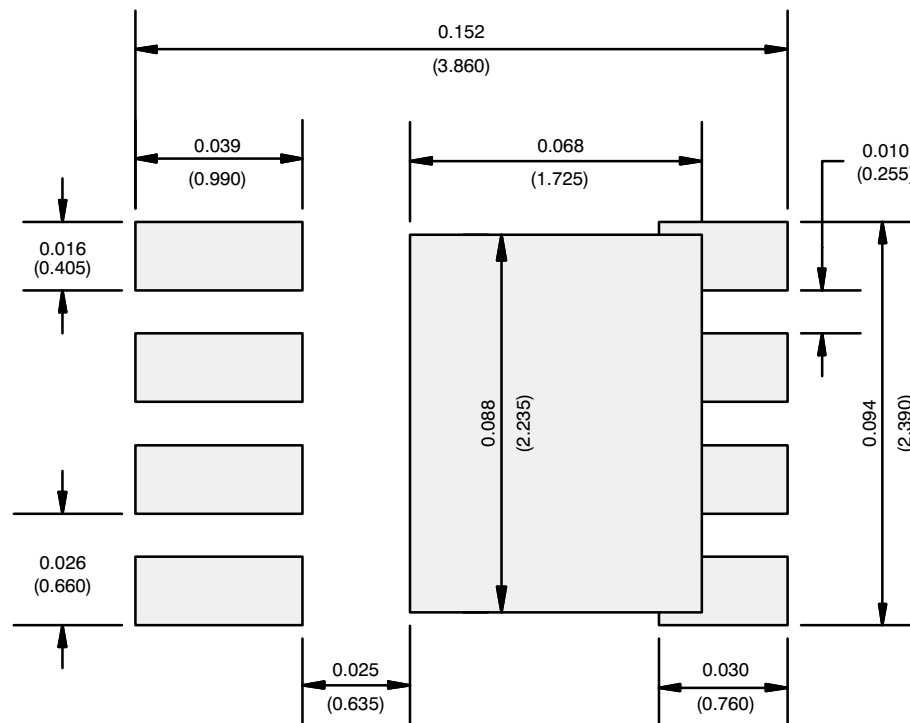
**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Case**

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## RECOMMENDED MINIMUM PADS FOR PowerPAK® 1212-8 Single



Recommended Minimum Pads  
Dimensions in Inches/(mm)

[Return to Index](#)



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