

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

PRODUCT SUMMARY

	V _{DS} (V)	R _{DS(on)} (Ω) MAX.	I _D (A)	Q _g (Typ.)
Channel-1	30	0.0095 at V _{GS} = 10 V	30 ^a	5.6 nC
		0.0137 at V _{GS} = 4.5 V	22	
Channel-2	30	0.0051 at V _{GS} = 10 V	40 ^a	10.1 nC
		0.0070 at V _{GS} = 4.5 V	40 ^a	

FEATURES

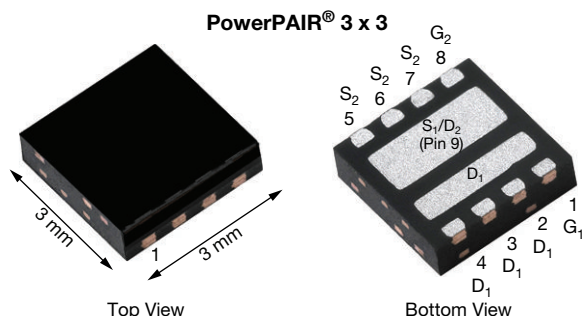
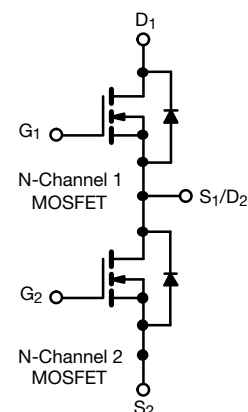
- PowerPAIR® Optimizes high-side and low-side MOSFETs for synchronous buck converters
- TrenchFET® power Mosfets
- 100 % R_g and UIS tested
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Synchronous buck
 - Battery charging
 - Computer system power
 - Graphic cards
- POL



Ordering Information:

SiZ340DT-T1-GE3 (lead (Pb)-free and halogen-free)

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

Parameter		Symbol	Channel-1	Channel-2	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	30 ^a	40 ^a	A
	T _C = 70 °C		26.5	40 ^a	
	T _A = 25 °C		15.6 ^{b,c}	22.6 ^{b,c}	
	T _A = 70 °C		12.4 ^{b,c}	18.1 ^{b,c}	
Pulsed Drain Current (t = 100 μs)		I _{DM}	100	150	
Continuous Source Drain Diode Current	T _C = 25 °C	I _S	13.9	26	
	T _A = 25 °C		3.1 ^{b,c}	3.5 ^{b,c}	
Avalanche Current	L = 0.1 mH	I _{AS}	10	15	
Single Pulse Avalanche Energy		E _{AS}	5	11	mJ
Maximum Power Dissipation	T _C = 25 °C	P _D	16.7	31	W
	T _C = 70 °C		10.7	20	
	T _A = 25 °C		3.7 ^{b,c}	4.2 ^{b,c}	
	T _A = 70 °C		2.4 ^{b,c}	2.7 ^{b,c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to 150		°C
Soldering Recommendations (Peak Temperature) ^{d,e}			260		

Notes

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- See solder profile (www.vishay.com/doc?73257). The PowerPAIR 3 x 3 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		Symbol	Channel-1		Channel-2		Unit
			Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient ^{a,b}	$t \leq 10$ s	R_{thJA}	27	34	24	30	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	6	7.5	3.2	4	

Notes

a. Surface mounted on 1" x 1" FR4 board.

b. Maximum under steady state conditions is 69 °C/W for channel-1 and 64 °C/W for channel-2.

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	Ch-1	30	-	-	V
			Ch-2	30	-	-	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	Ch-1	-	18.4	-	mV/°C
			Ch-2	-	30	-	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	Ch-1	-	-4.3	-	mV/°C
			Ch-2	-	-5	-	
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch-1	1	-	2.4	V
			Ch-2	1	-	2.4	
Gate Source Leakage	I _{GSS}	V _{DS} =0 V, V _{GS} = +20 V, -16 V	Ch-1	-	-	± 100	nA
			Ch-2	-	-	± 100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V	Ch-1	-	-	1	μA
			Ch-2	-	-	1	
		V _{DS} = 30 V, V _{GS} =0 V, T _J = 55 °C	Ch-1	-	-	5	
			Ch-2	-	-	5	
On-State Drain Current ^b	I _{D(on)}	V _{DS} ≥ 5 V,V _{GS} = 10 V	Ch-1	10	-	-	A
			Ch-2	10	-	-	
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 15.6 A	Ch-1	-	0.0079	0.0095	Ω
		V _{GS} = 10 V, I _D = 20 A	Ch-2	-	0.0042	0.0051	
		V _{GS} = 4.5 V, I _D = 13 A	Ch-1	-	0.0110	0.0137	
		V _{GS} = 4.5 V, I _D = 20 A	Ch-2	-	0.0058	0.0070	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 15.6 A	Ch-1	-	37	-	S
		V _{DS} = 15 V, I _D = 20 A	Ch-2	-	60	-	
Dynamic ^a							
Input Capacitance	C _{iss}	Channel-1 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	-	760	-	pF
Output Capacitance	C _{oss}		Ch-2	-	1552	-	
		Reverse Transfer Capacitance	C _{rss}	Channel-2 V _{DS} =15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	-	
Ch-2	-				450	-	
C _{rss} / C _{iss} Ratio			Ch-1	0.042	-	0.084	-
			Ch-2	0.025	-	0.050	
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 15.6 A	Ch-1	-	12.3	19	nC
		V _{DS} = 15 V, V _{GS} = 10 V, I _D = 20 A	Ch-2	-	22.6	35	
			Ch-1	-	5.6	9	
			Ch-2	-	10.1	16	
Gate-Source Charge	Q _{gs}	Channel-1 V _{DS} = 15 V,V _{GS} = 4.5 V, I _D = 15.6 A	Ch-1	-	2.3	-	
			Ch-2	-	4.2	-	
Gate-Drain Charge	Q _{gd}	Channel-2 V _{DS} = 15 V,V _{GS} = 4.5 V, I _D = 20 A	Ch-1	-	1	-	
			Ch-2	-	1.8	-	
Output Charge	Q _{oss}		Ch-1	-	6.6	-	
			Ch-2	-	12.4	-	
Gate Resistance	R _g	f = 1 MHz	Ch-1	0.3	1.7	3.4	Ω
			Ch-2	0.3	1.3	2.6	



SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
Parameter	Symbol	TEST CONDITIONS	Min.	Typ.	Max.	Unit	
Dynamic ^a							
Turn-On Delay Time	t _{d(on)}	Channel-1 V _{DD} = 15 V, R _L = 1.5 Ω I _D ≡ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch-1	-	13	20	ns
			Ch-2	-	22	33	
Rise Time	t _r		Ch-1	-	55	85	
			Ch-2	-	82	123	
Turn-Off Delay Time	t _{d(off)}	Chan nel-2 V _{DD} =15 V, R _L = 1.5 Ω I _D ≡ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch-1	-	16	25	
			Ch-2	-	20	30	
Fall Time	t _f		Ch-1	-	7	14	
			Ch-2	-	7	14	
Turn-On Delay Time	t _{d(on)}	Channel-1 V _{DD} = 15 V, R _L = 1.5 Ω I _D ≡ 10 A, V _{GEN} = 10 V, R _g = 1 Ω	Ch-1	-	8	16	
			Ch-2	-	10	20	
Rise Time	t _r		Ch-1	-	11	20	
			Ch-2	-	12	20	
Turn-Off Delay Time	t _{d(off)}	Channel-2 V _{DD} =15 V, R _L = 1.5 Ω I _D ≡ 10 A, V _{GEN} = 10 V, R _g = 1 Ω	Ch-1	-	12	20	
			Ch-2	-	16	30	
Fall Time	t _f		Ch-1	-	7	15	
			Ch-2	-	7	12	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	Ch-1	-	-	13.9	A
			Ch-2	-	-	25.8	
Pulse Diode Forward Current (t = 100 μs)	I _{SM}		Ch-1	-	-	100	
			Ch-2	-	-	150	
Body Diode Voltage	V _{SD}	I _S = 10 A, V _{GS} = 0 V	Ch-1	-	0.8	1.2	V
			Ch-2	-	0.82	1.2	
Body Diode Reverse Recovery Time	t _{rr}	Channel-1 I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C	Ch-1	-	20	35	ns
			Ch-2	-	26	40	
Body Diode Reverse Recovery Charge	Q _{rr}		Ch-1	-	9	20	nC
			Ch-2	-	20	30	
Reverse Recovery Fall Time	t _a	Channel-2 I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C	Ch-1	-	11.5	-	ns
			Ch-2	-	18.1	-	
Reverse Recovery Rise Time	t _b		Ch-1	-	8.5	-	
			Ch-2	-	7.9	-	

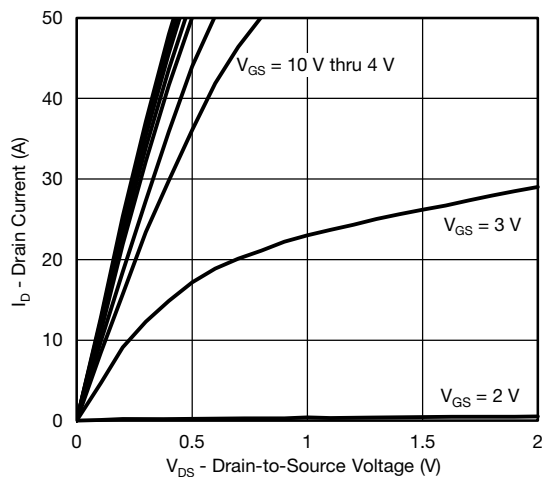
Notes

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

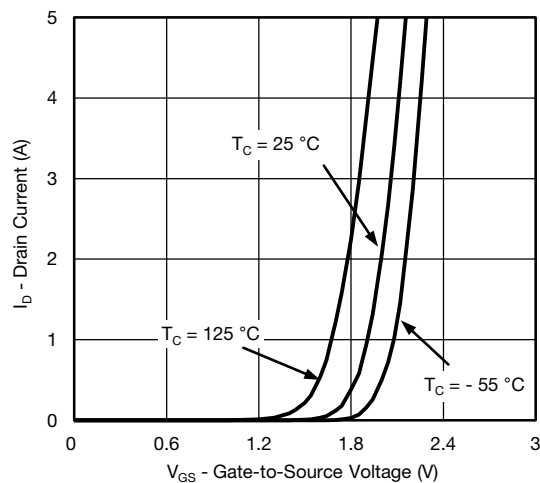
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



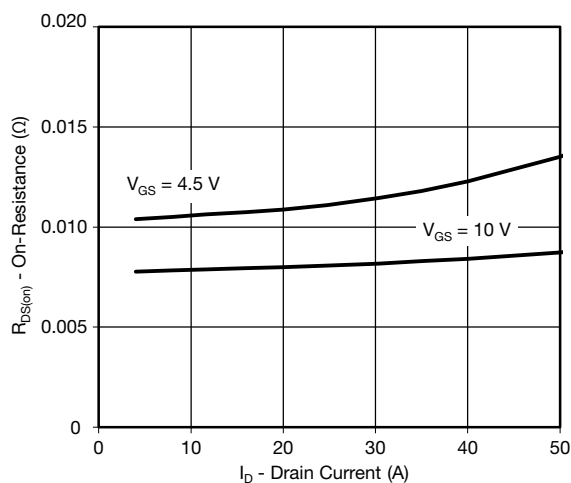
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



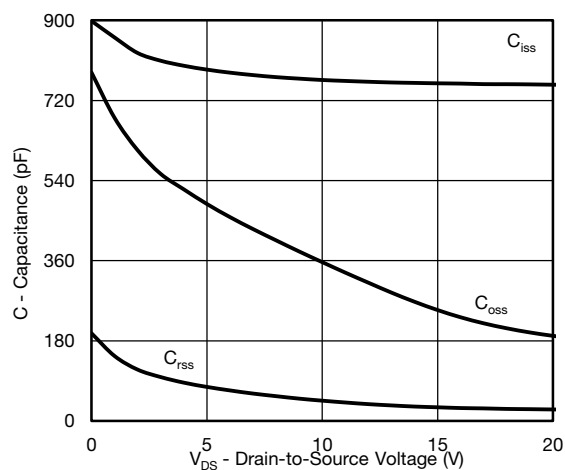
Output Characteristics



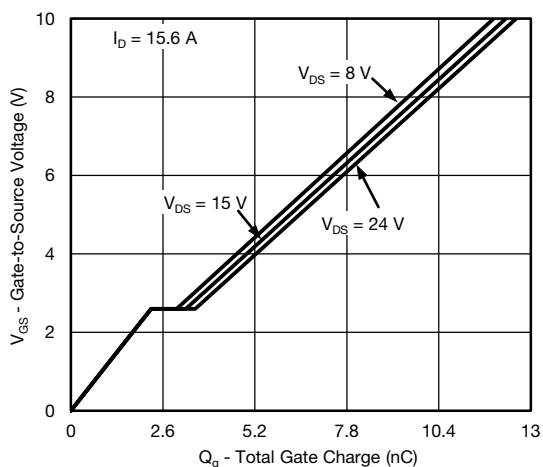
Transfer Characteristics



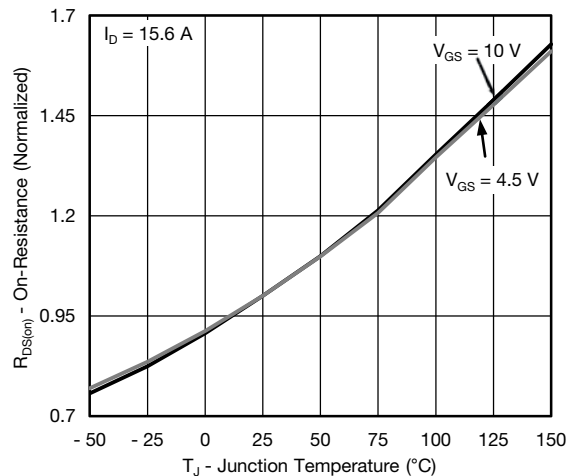
On-Resistance vs. Drain Current



Capacitance



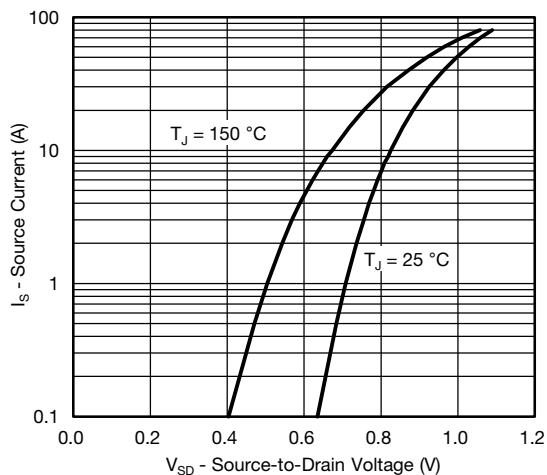
Gate Charge



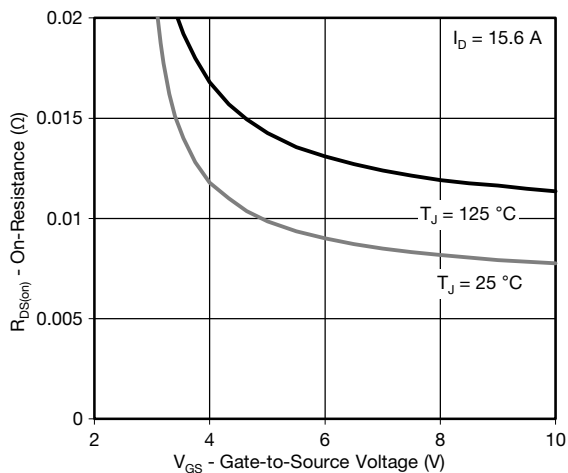
On-Resistance vs. Junction Temperature



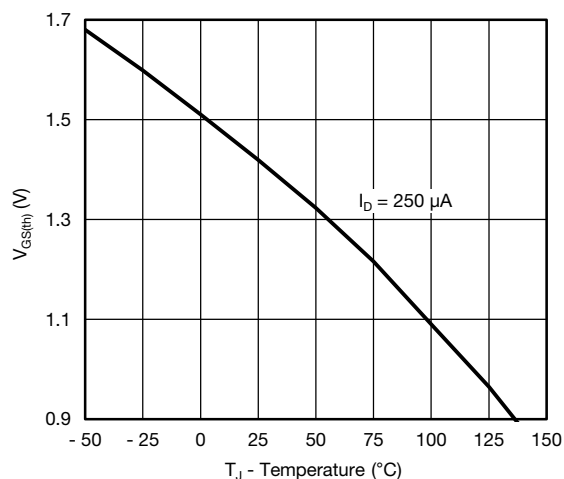
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



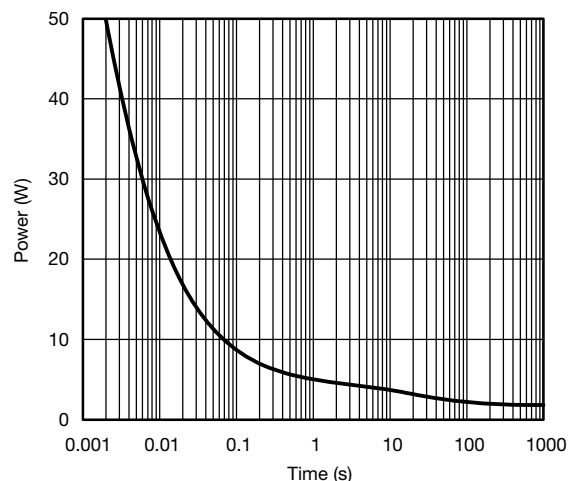
Source-Drain Diode Forward Voltage



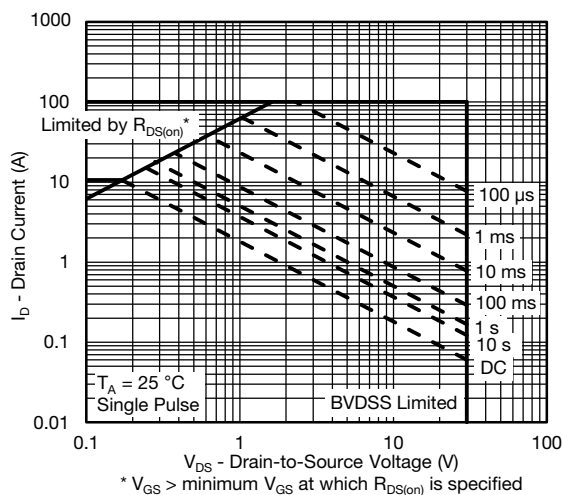
On-Resistance vs. Gate-to-Source Voltage



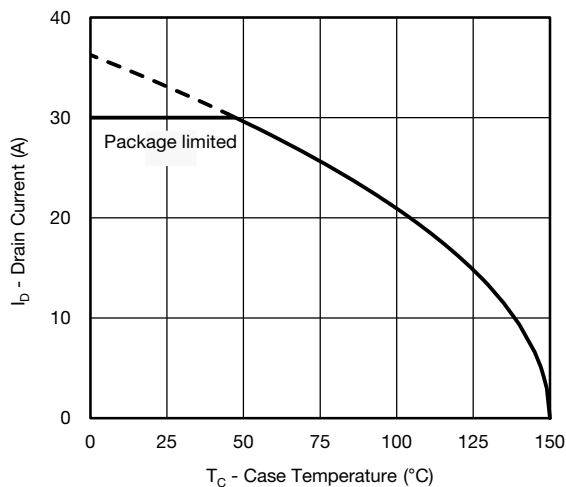
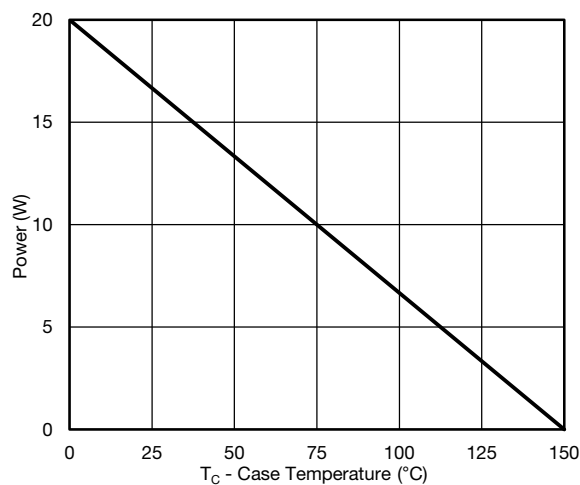
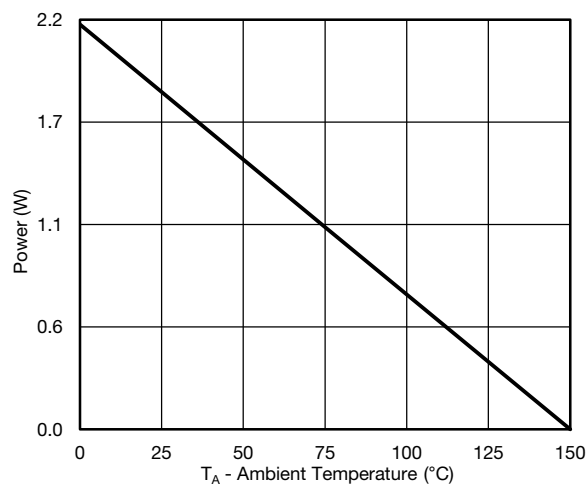
Threshold Voltage



Single Pulse Power



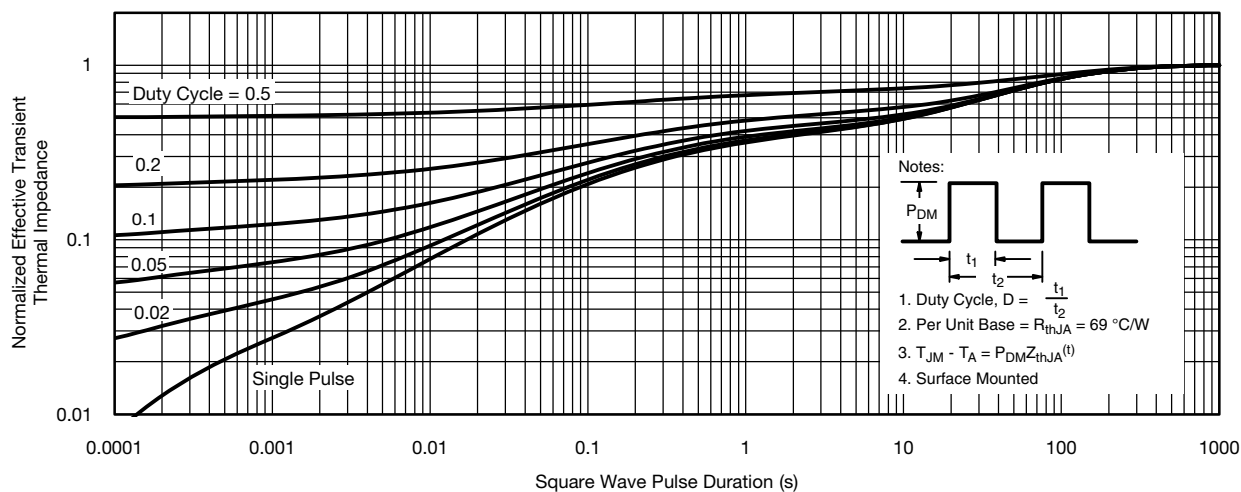
Safe Operating Area, Junction-to-Ambient

CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power, Junction-to-Case

Power, Junction-to-Ambient

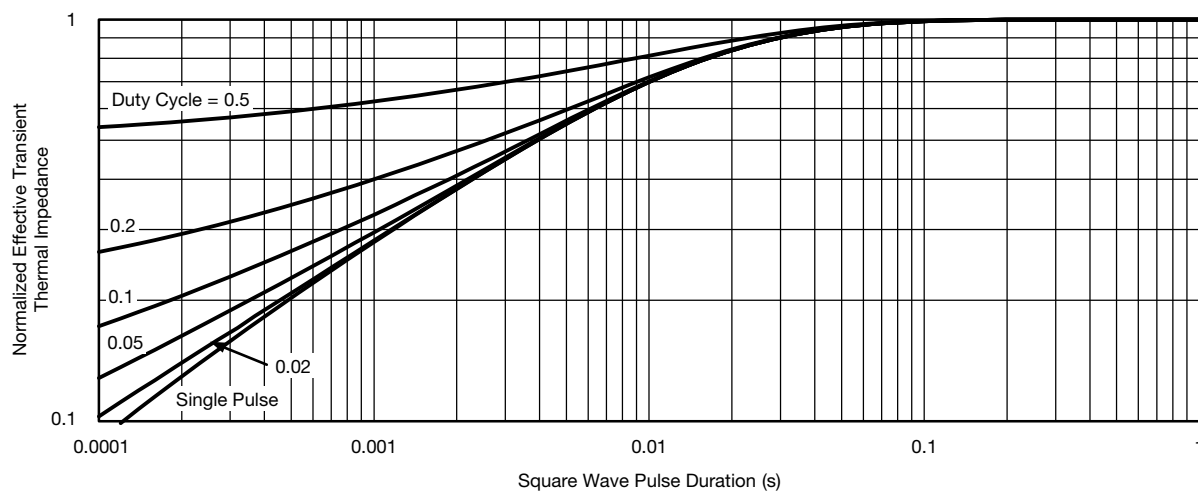
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



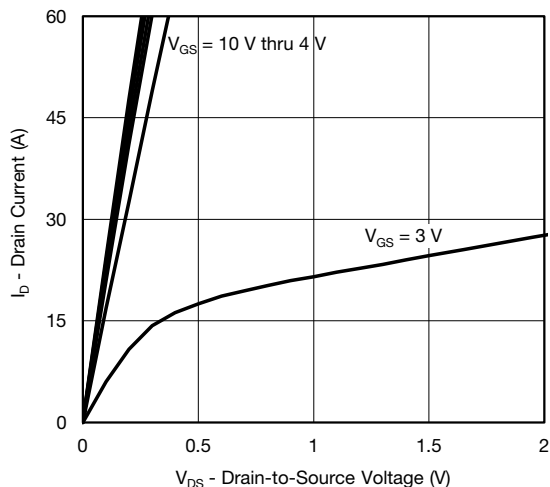
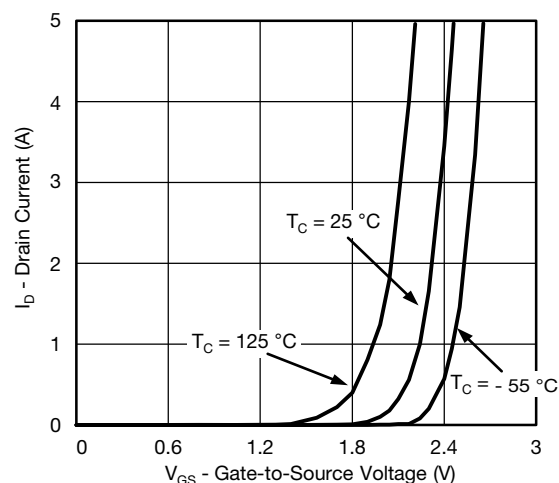
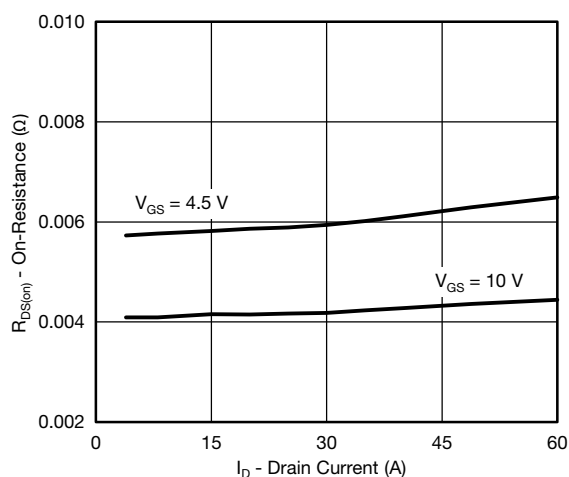
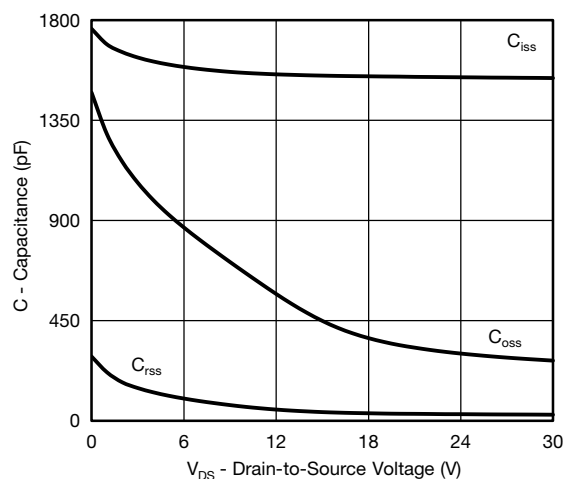
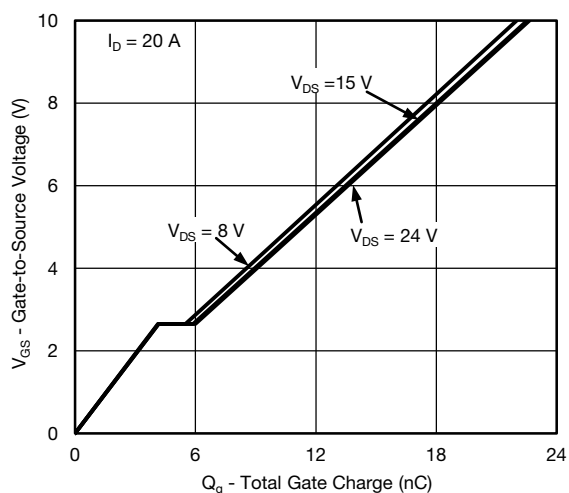
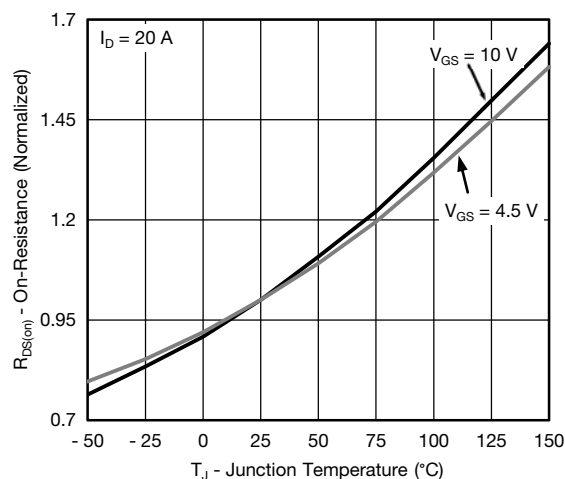
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

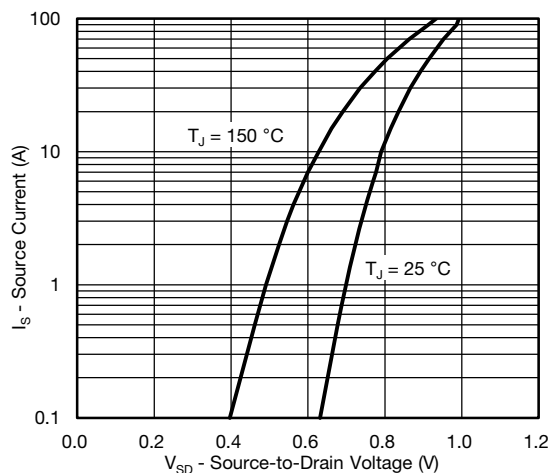
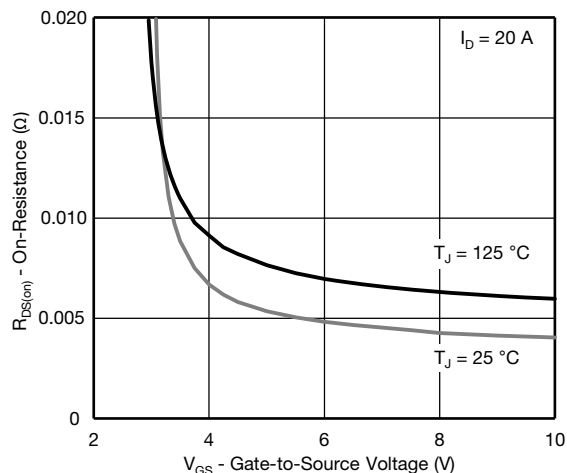
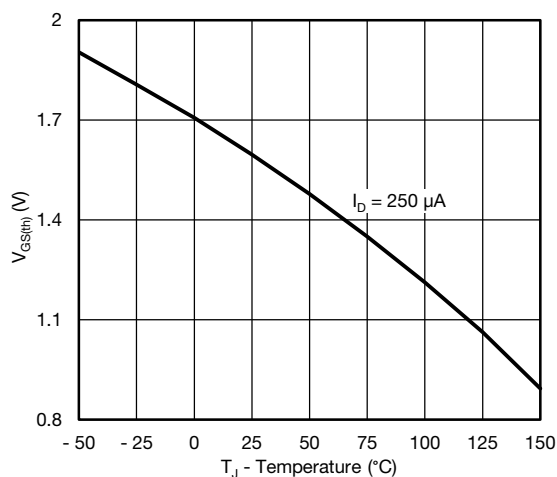
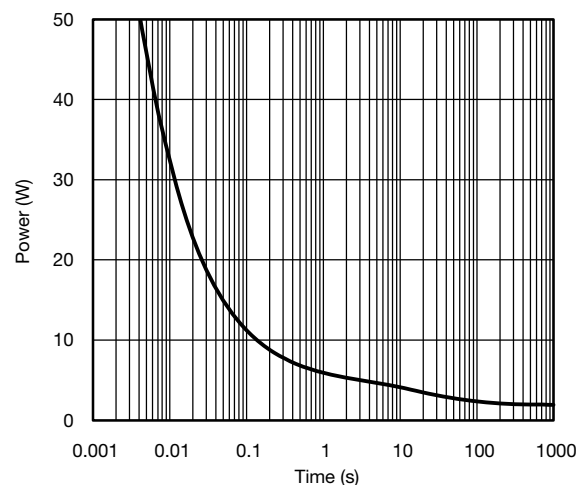
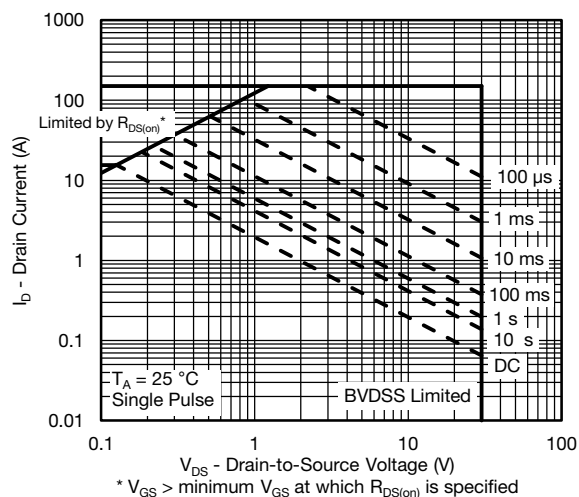


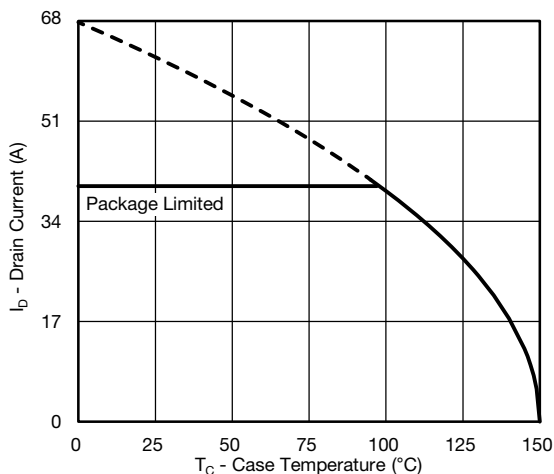
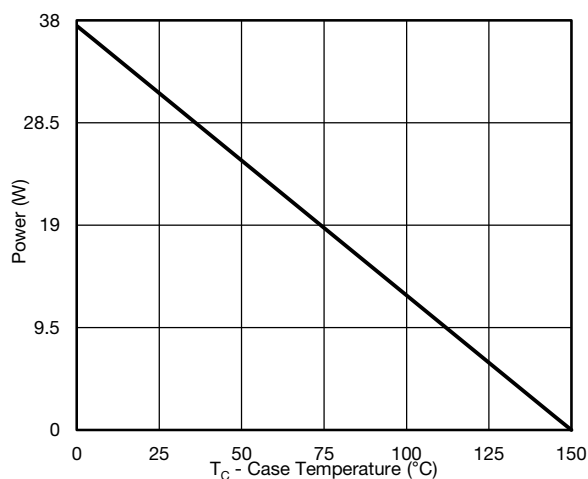
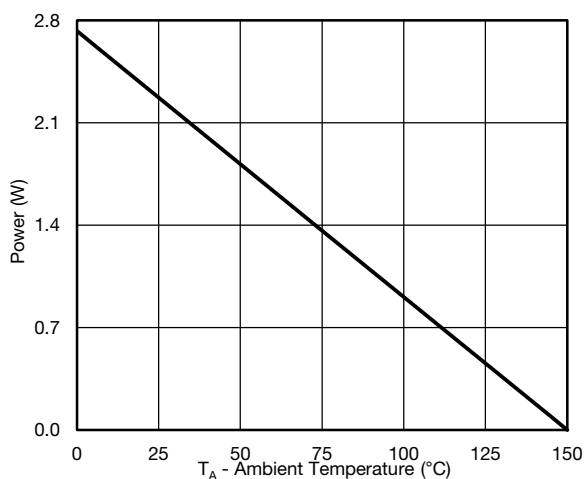
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

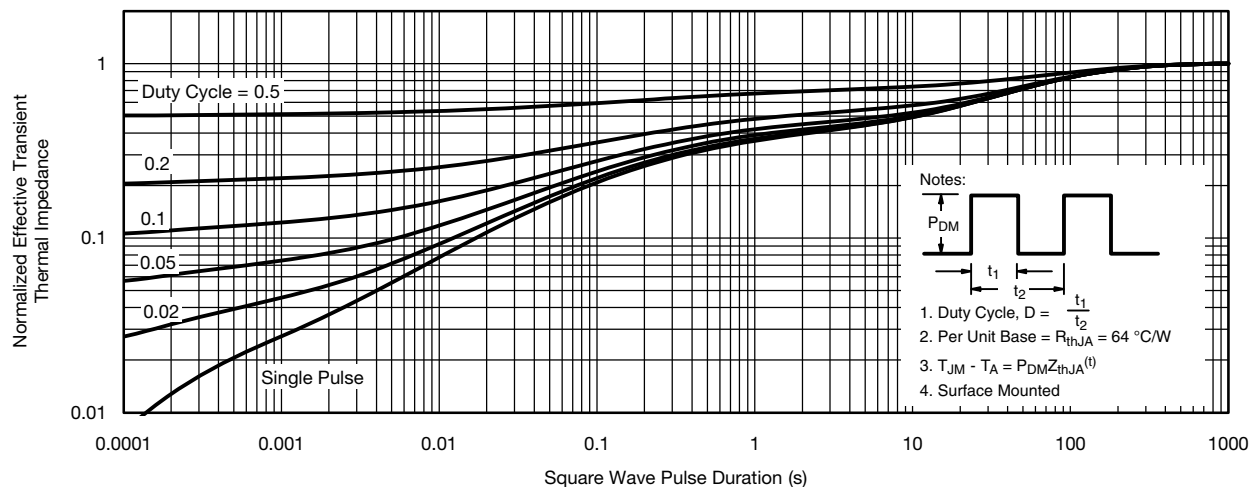
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power

Safe Operating Area, Junction-to-Ambient

CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power, Junction-to-Case

Power, Junction-to-Ambient

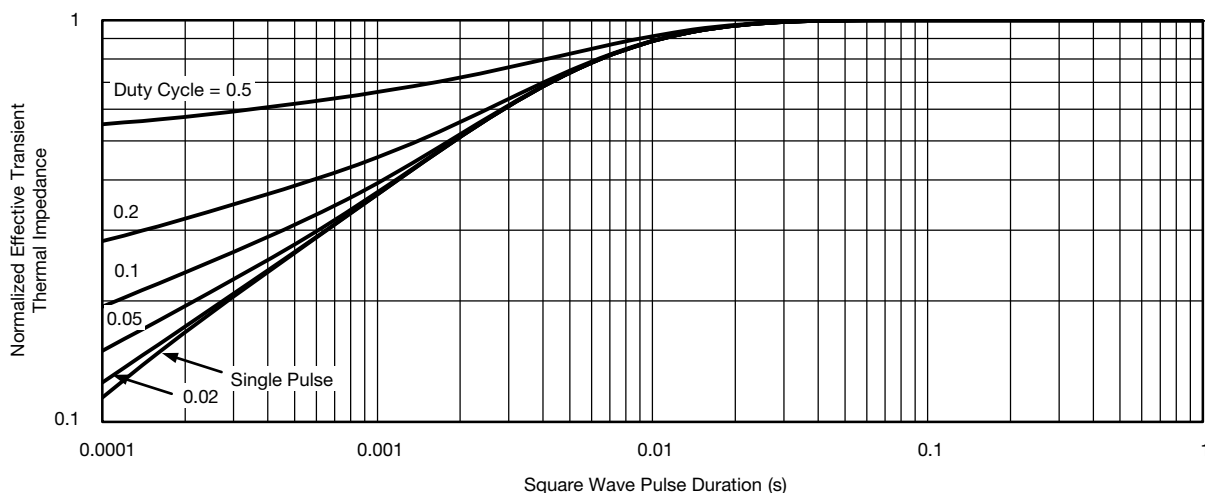
* The power dissipation P_D is based on $T_{J(max.)} = 150\text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package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



CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient

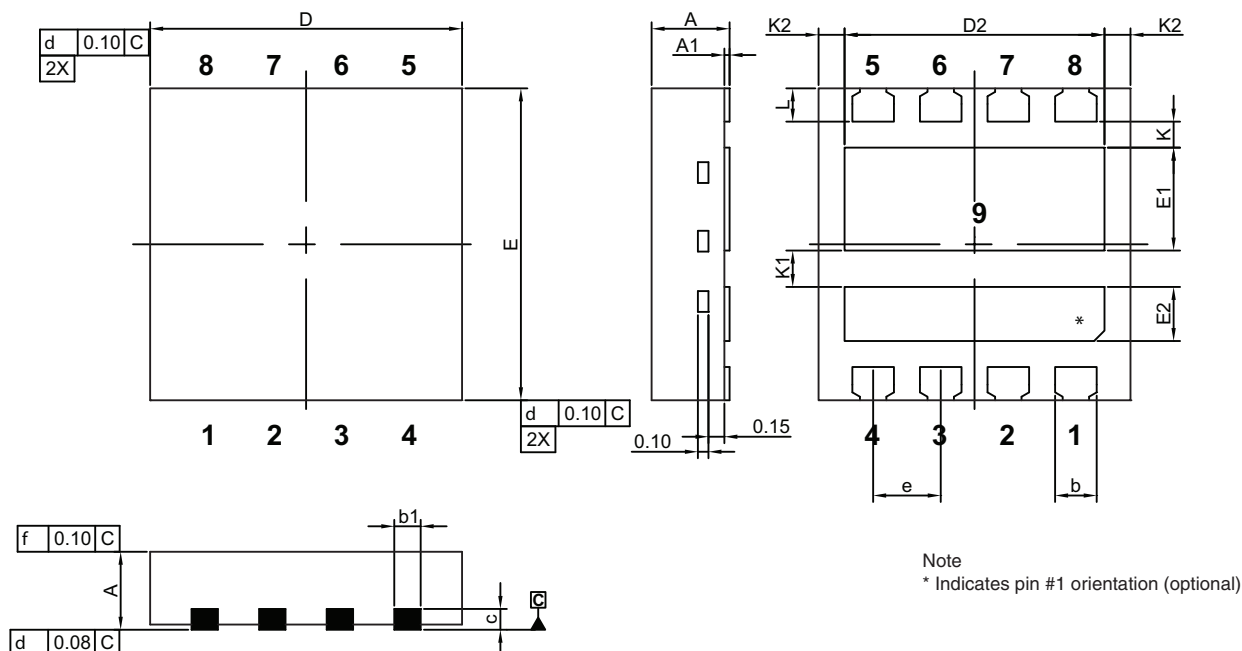


Normalized Thermal Transient Impedance, Junction-to-Case

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?62877.

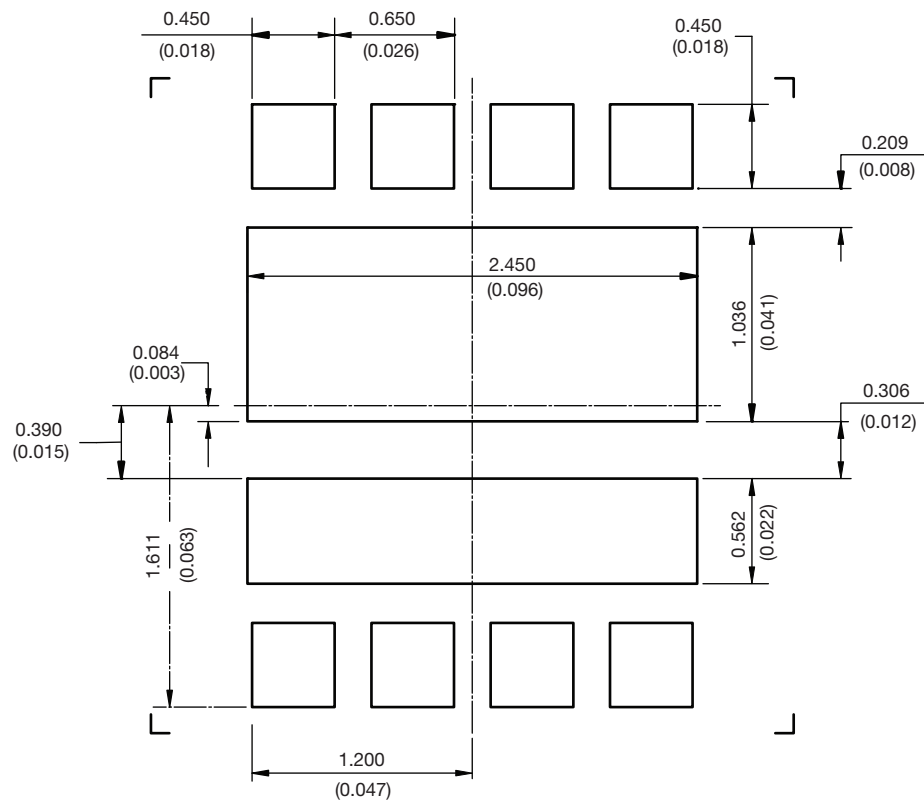


PowerPAIR® 3 x 3 Case Outline



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00		0.05	0.000		0.002
b	0.35	0.40	0.45	0.014	0.016	0.018
b1	0.20	0.25	0.38	0.008	0.010	0.015
C	0.18	0.20	0.23	0.007	0.008	0.009
D	2.90	3.00	3.10	0.114	0.118	0.122
D2	2.35	2.40	2.45	0.093	0.094	0.096
E	2.90	3.00	3.10	0.114	0.118	0.122
E1	0.94	0.99	1.04	0.037	0.039	0.041
E2	0.47	0.52	0.57	0.019	0.020	0.022
e	0.65 BSC			0.026 BSC		
K	0.25 typ.			0.010 typ.		
K1	0.35 typ.			0.014 typ.		
K2	0.30 typ.			0.012 typ.		
L	0.27	0.32	0.37	0.011	0.013	0.015
ECN: T12-0347-Rev. C, 18-Jun-12						
DWG: 5998						

RECOMMENDED MINIMUM PAD FOR PowerPAIR® 3 x 3



Recommended PAD for PowerPAIR 3 x 3

Dimensions in millimeters (inches)

Keep-Out 3.5 mm x 3.5 mm for non terminating traces



Disclaimer

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