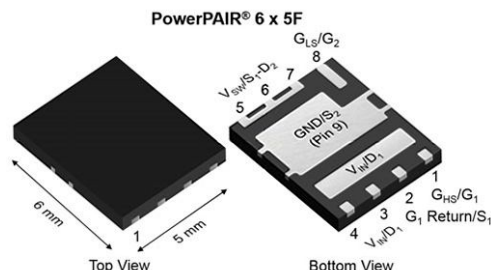


Dual N-Channel 30 V (D-S) MOSFET with Schottky Diode



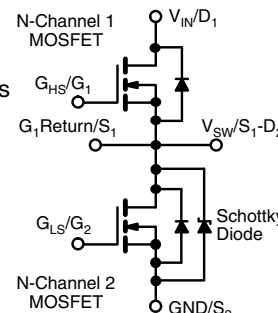
RoHS
COMPLIANT
HALOGEN
FREE

FEATURES

- TrenchFET® Gen IV power MOSFET
- SkyFET® low-side MOSFET with integrated Schottky
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- CPU core power
- Computer / server peripherals
- POL
- Synchronous buck converter
- Telecom DC/DC



PRODUCT SUMMARY		
	CHANNEL-1	CHANNEL-2
V_{DS} (V)	30	30
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.00380	0.00117
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.00530	0.00158
Q_g typ. (nC)	11	46
I_D (A) ^a	60	60
Configuration	Dual	

ORDERING INFORMATION

Package	PowerPAIR 6 x 5F
Lead (Pb)-free and halogen-free	SiZF906DT-T1-GE3

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

PARAMETER		SYMBOL	CHANNEL-1	CHANNEL-2	UNIT
Drain-source voltage		V _{DS}	30	30	V
Gate-source voltage		V _{GS}	+20, -16	+20, -16	
Continuous drain current (T _J = 150 °C)	T _C = 25 °C	I _D	60 ^a	60 ^a	A
	T _C = 70 °C		60 ^a	60 ^a	
	T _A = 25 °C		27 ^{b, c}	52 ^{b, c}	
	T _A = 70 °C		21.7 ^{b, c}	41 ^{b, c}	
Pulsed drain current (t = 100 μs)		I _{DM}	80	100	
Continuous source-drain diode current	T _C = 25 °C	I _S	31.6	60 ^a	
	T _A = 25 °C		3.7 ^{b, c}	4.1 ^{b, c}	
Single pulse avalanche current	L = 0.1 mH	I _{AS}	18	19	
Single pulse avalanche energy		E _{AS}	16	18	
Maximum power dissipation	T _C = 25 °C	P _D	38	83	W
	T _C = 70 °C		24	53	
	T _A = 25 °C		4.5 ^{b, c}	5 ^{b, c}	
	T _A = 70 °C		2.9 ^{b, c}	3.2 ^{b, c}	
Operating junction and storage temperature range		T _J , T _{stg}	-55 to +150		°C
Soldering recommendations (peak temperature) ^{d, e}			260		

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	CHANNEL-1		CHANNEL-2		UNIT
			TYP.	MAX.	TYP.	MAX.	
Maximum junction-to-ambient ^{b, f}	t ≤ 10 s	R _{thJA}	22	28	20	25	°C/W
Maximum junction-to-case (source)	Steady state	R _{thJC}	2.6	3.3	1.2	1.5	

Notes

- Package limited
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- See solder profile (www.vishay.com/doc?73257). The PowerPAIR 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 60 °C/W for channel-1 and 60 °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	-	-		
Drain-source breakdown voltage ^c (transient)	V _{DSt}	V _{GS} = 0 V, t _(transient) ≤ 1 μs	Ch-1	36	-	-		
			Ch-2	36	-	-		
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	Ch-1	1.1	-	2.2		
			Ch-2	1.1	-	2.2		
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	-	50	250		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C	Ch-1	-	-	5		
			Ch-2	-	300	3000		
On-state drain current ^b	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	Ch-1	20	-	-	A	
			Ch-2	20	-	-		
Drain-source on-state resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 15 A	Ch-1	-	0.00300	0.00380	Ω	
		V _{GS} = 10 V, I _D = 20 A	Ch-2	-	0.00090	0.00117		
		V _{GS} = 4.5 V, I _D = 10 A	Ch-1	-	0.00400	0.00530		
		V _{GS} = 4.5 V, I _D = 15 A	Ch-2	-	0.00120	0.00158		
Forward transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 15 A	Ch-1	-	130	-	S	
		V _{DS} = 10 V, I _D = 20 A	Ch-2		130	-		
Dynamic ^a								
Input capacitance	C _{iss}	Channel-1 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz Channel-2 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	-	2000	-	pF	
			Ch-2	-	8200	-		
Output capacitance	C _{oss}		Ch-1	-	680	-		
			Ch-2	-	3700	-		
Reverse transfer capacitance	C _{rss}		Ch-1	-	50	-		
			Ch-2	-	260	-		
C _{rss} /C _{iss} ratio			Ch-1	-	0.025	0.050		
			Ch-2		0.033	0.070		
Total gate charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 20 A	Ch-1	-	24.5	49	nC	
			Ch-2	-	100	200		
Gate-source charge	Q _{gs}	Channel-1 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A	Ch-1		11	22		
			Ch-2	-	46	92		
Gate-drain charge	Q _{gd}	Channel-2 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A	Ch-1	-	5.1	-		
			Ch-2	-	17.1	-		
Output charge	Q _{oss}	V _{DS} = 15 V, V _{GS} = 0 V	Ch-1	-	1.3	-		
			Ch-2	-	7.2	-		
Gate resistance	R _g	f = 1 MHz	Ch-1	-	21	-	Ω	
			Ch-2	-	96	-		
			Ch-1	0.2	1	2		
			Ch-2	0.12	0.6	1.2		

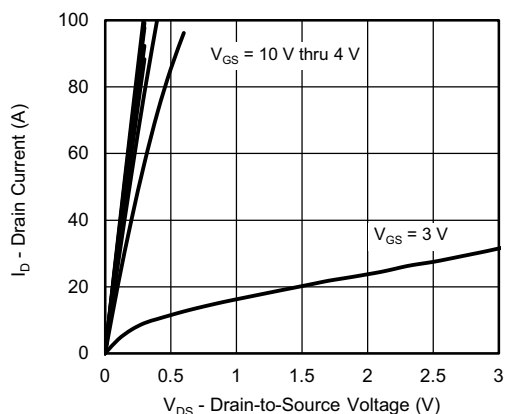
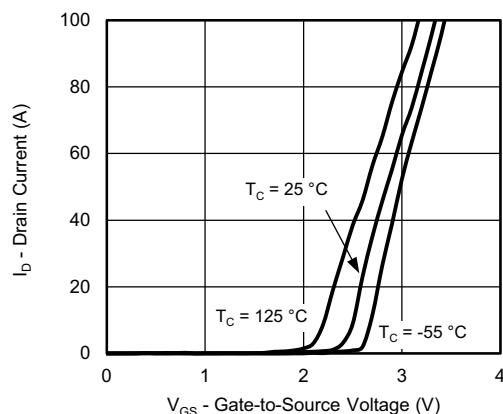
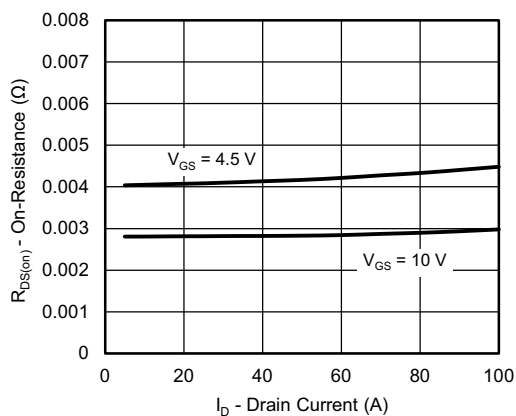
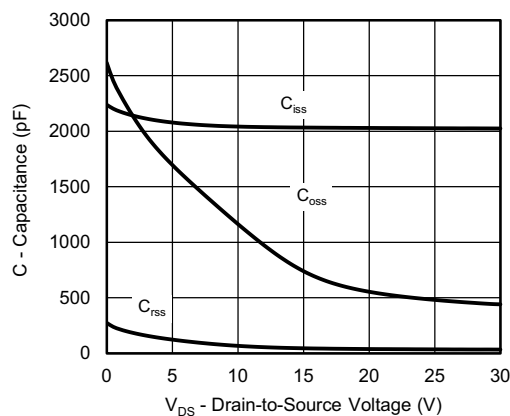
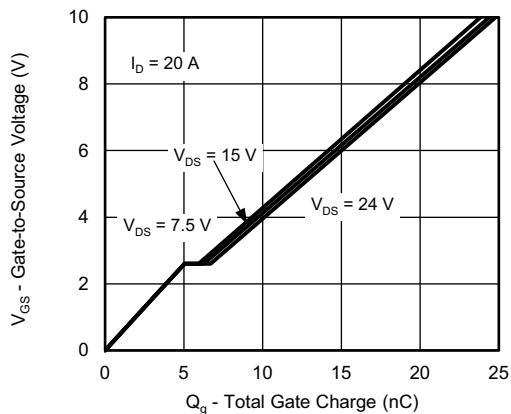
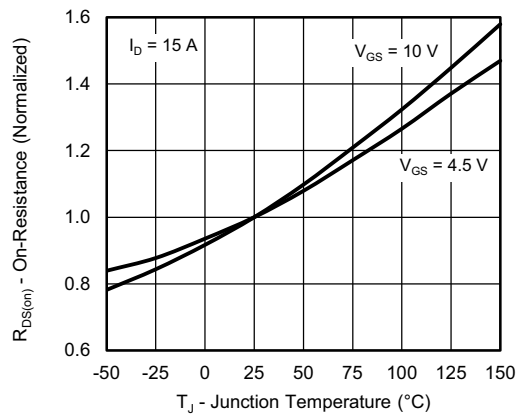


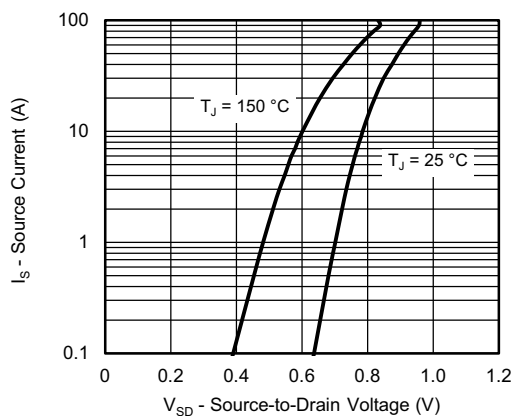
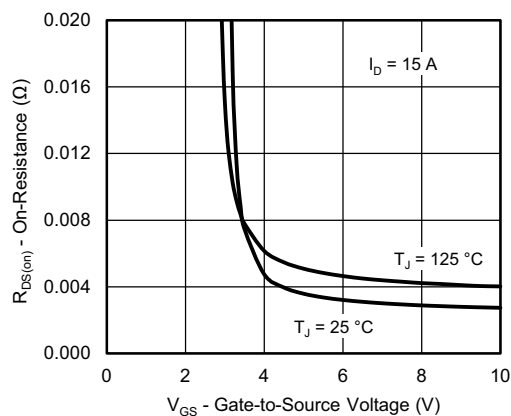
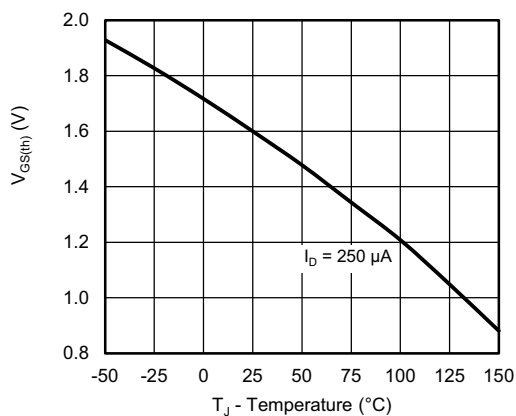
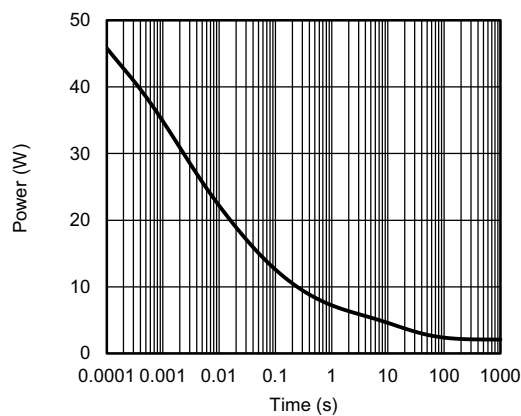
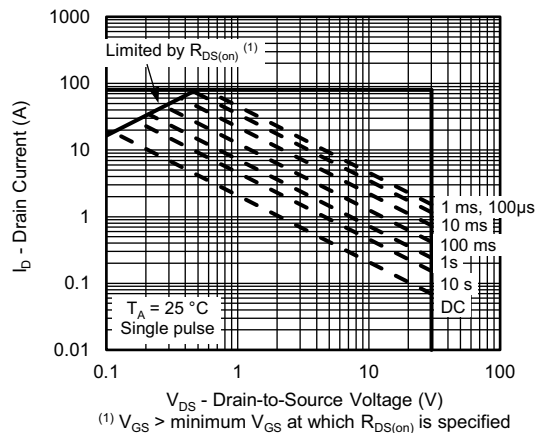
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Dynamic ^a							
Turn-on delay time	t _{d(on)}	Channel-1 V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch-1	-	20	40	ns
			Ch-2	-	45	90	
Rise time	t _r		Ch-1	-	80	160	
			Ch-2	-	60	120	
Turn-off delay time	t _{d(off)}	Ch-1	-	20	40		
		Ch-2	-	65	130		
Fall time	t _f	Ch-1	-	40	80		
		Ch-2	-	30	60		
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	-	10	20	
			Ch-2	-	15	30	
Rise time	t _r		Ch-1	-	35	70	
			Ch-2	-	20	40	
Turn-off delay time	t _{d(off)}		Ch-1	-	20	40	
			Ch-2	-	40	80	
Fall time	t _f		Ch-1	-	10	20	
			Ch-2	-	10	20	
Drain-Source Body Diode Characteristics							
Continuous source-drain diode current	I _S	T _C = 25 °C	Ch-1	-	-	31.6	A
			Ch-2	-	-	60	
Pulse diode forward current ^a	I _{SM}		Ch-1	-	-	80	
			Ch-2	-	-	100	
Body diode voltage	V _{SD}	I _S = 10 A, V _{GS} = 0 V	Ch-1	-	0.8	1.2	V
		I _S = 3 A, V _{GS} = 0 V	Ch-2	-	0.39	0.59	
Body diode reverse recovery time	t _{rr}	Channel-1 I _F = 10 A, di/dt = 100 A/μs, T _J = 25 °C	Ch-1	-	35	90	ns
			Ch-2	-	70	140	
Body diode reverse recovery charge	Q _{rr}		Ch-1	-	20	40	nC
			Ch-2	-	105	210	
Reverse recovery fall time	t _a	Channel-2 I _F = 10 A, di/dt = 100 A/μs, T _J = 25 °C	Ch-1	-	15	-	ns
			Ch-2	-	37	-	
Reverse recovery rise time	t _b		Ch-1	-	20	-	
			Ch-2	-	33	-	

Notes

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

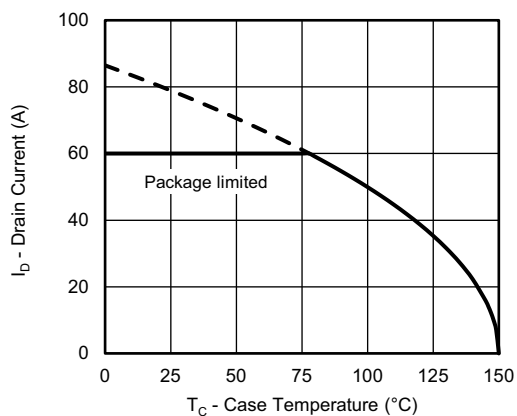
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

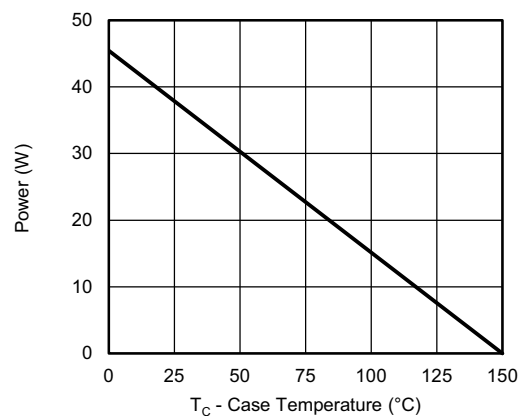
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power, Junction-to-Ambient

Safe Operating Area, Junction-to-Ambient



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



Current Derating ^a



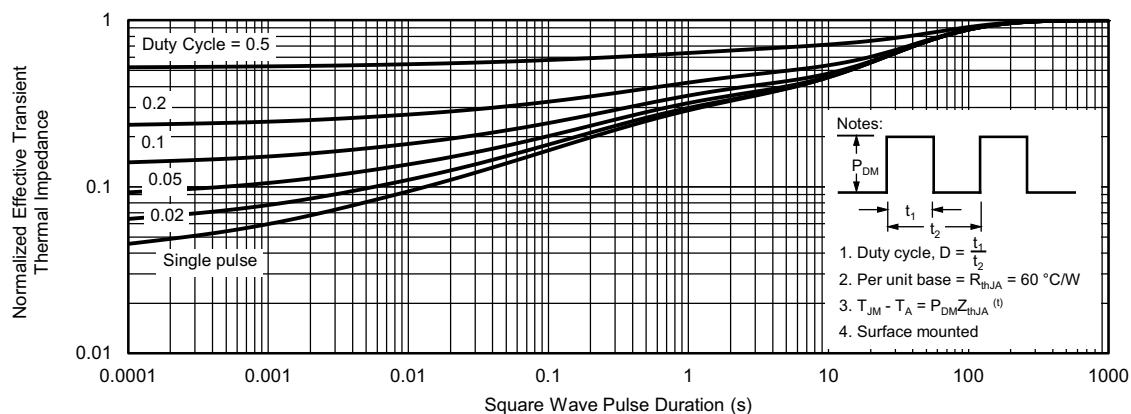
Power, Junction-to-Case

Note

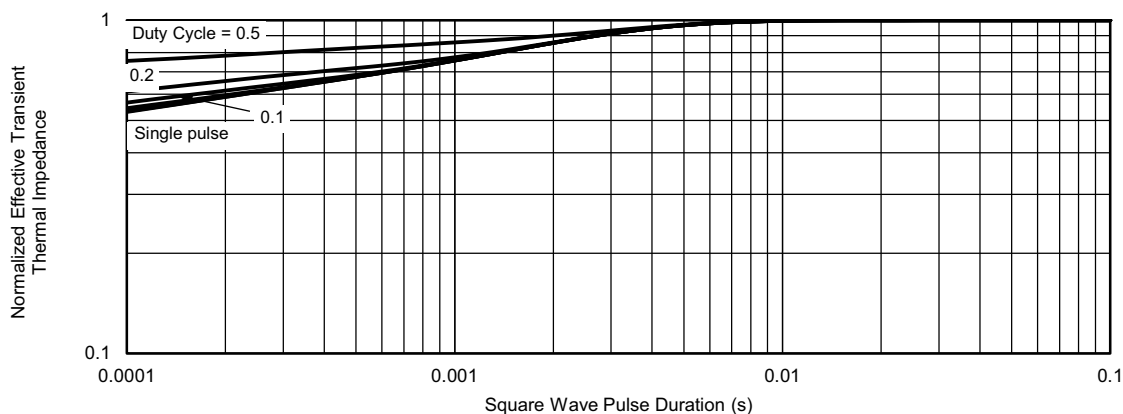
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



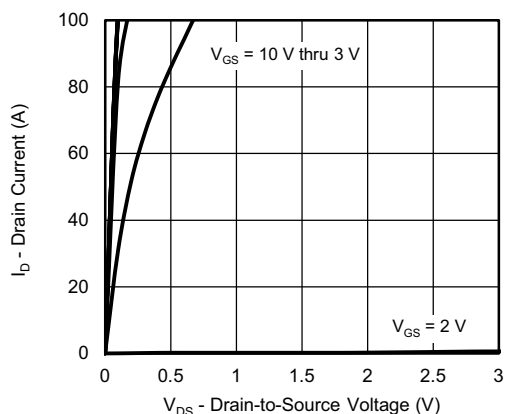
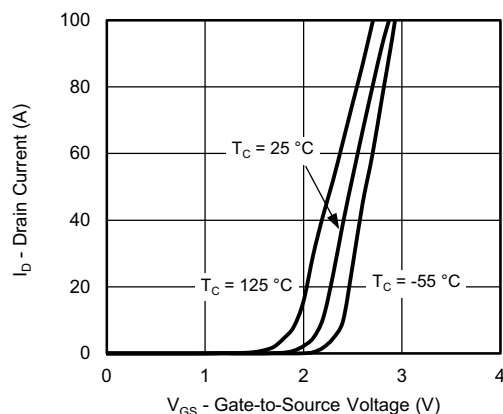
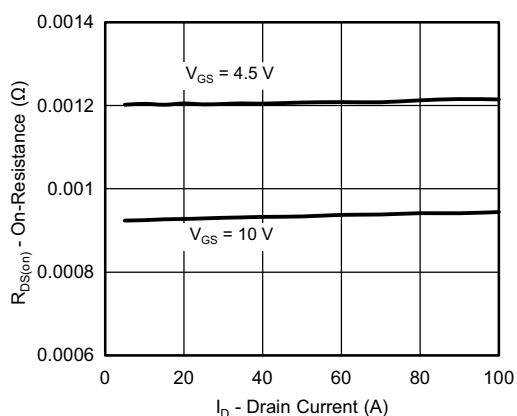
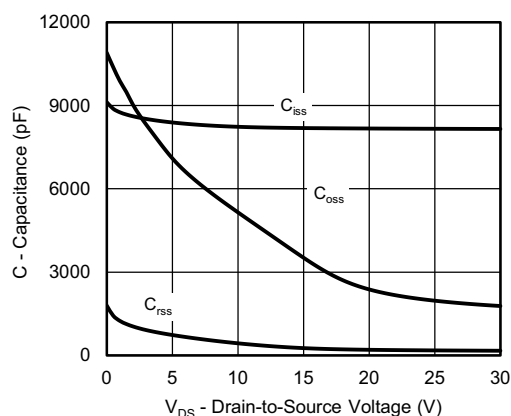
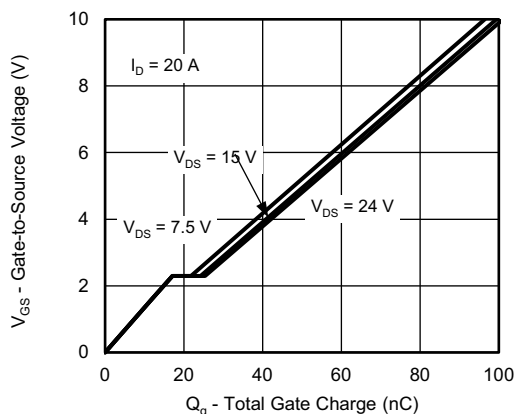
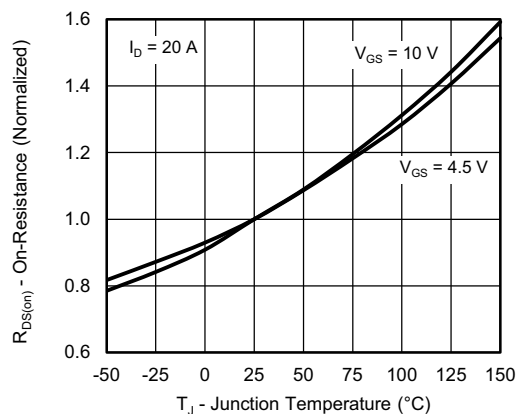
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

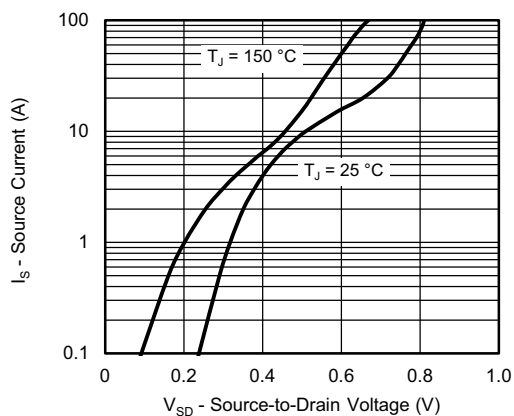
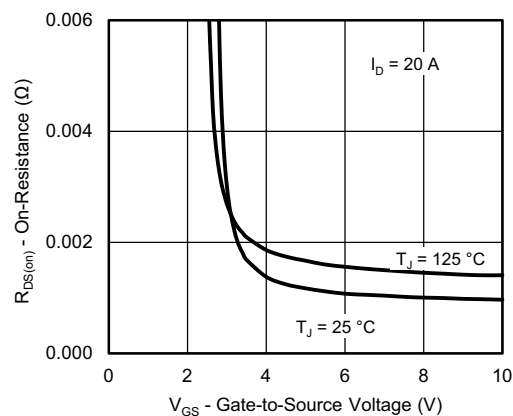
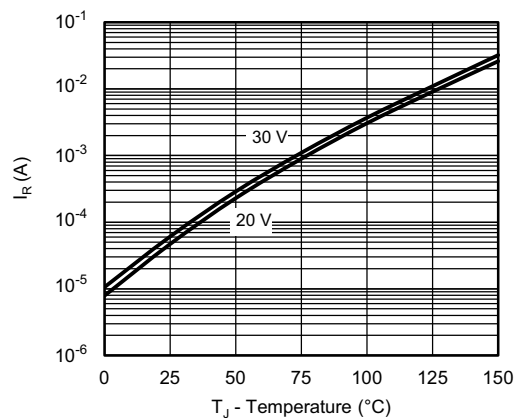
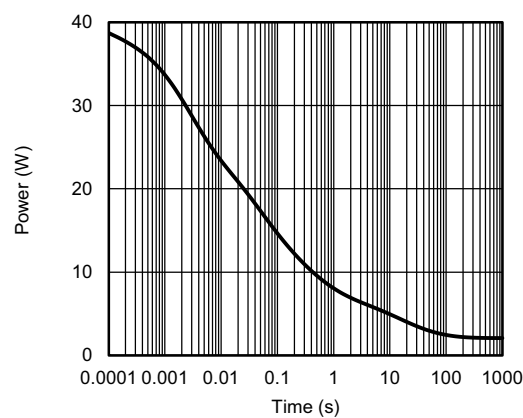
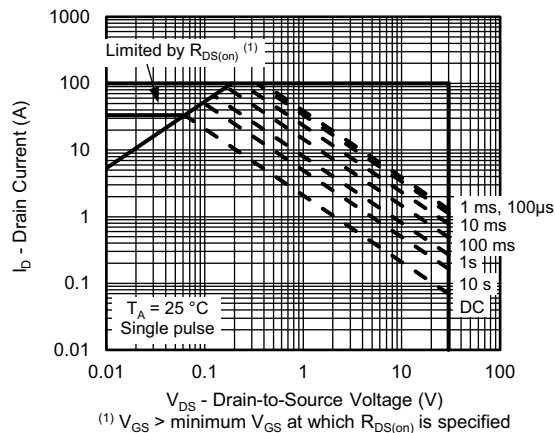


Normalized Thermal Transient Impedance, Junction-to-Ambient



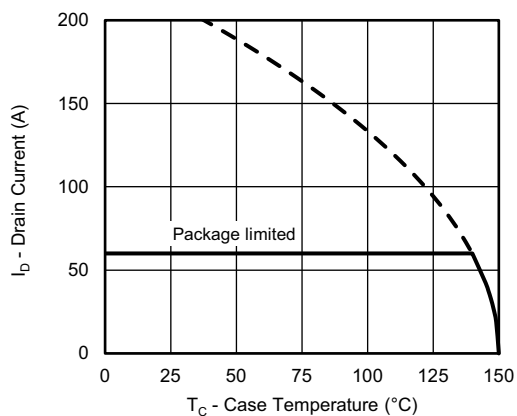
Normalized Thermal Transient Impedance, Junction-to-Case

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

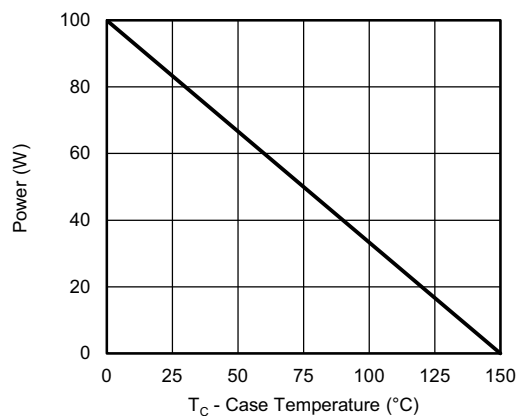
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Reverse Current (Schottky)

Single Pulse Power, Junction-to-Ambient

Safe Operating Area, Junction-to-Ambient



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



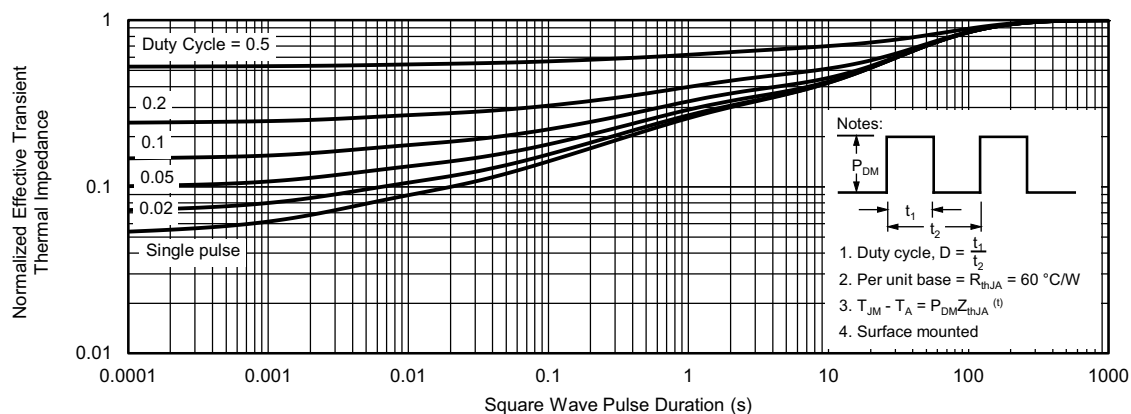
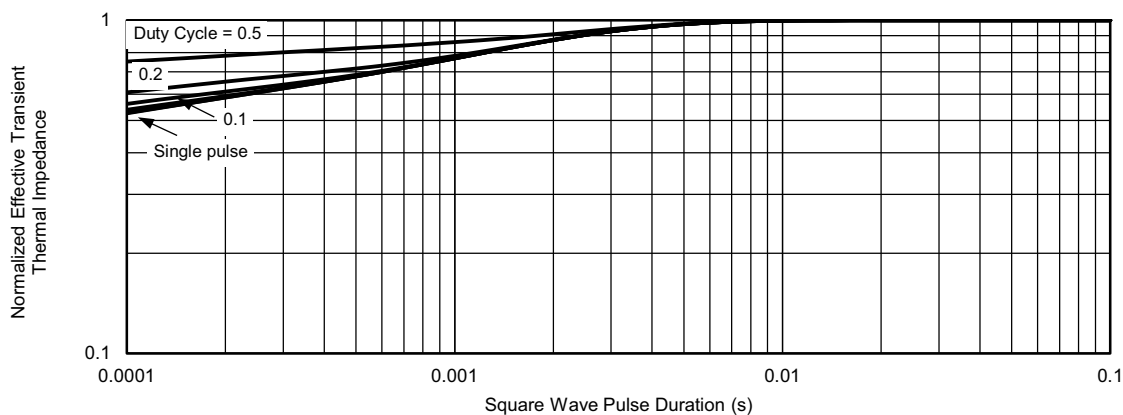
Current Derating ^a



Power, Junction-to-Case

Note

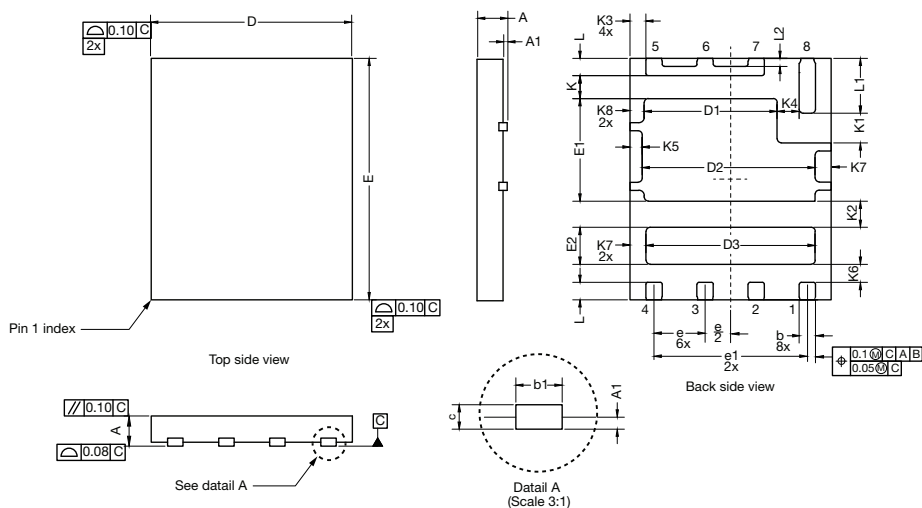
- a. The power dissipation P_D is based on $T_J \text{ max.} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package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

CHANNEL-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?67547.



PowerPAIR® 6 x 5 F Case Outline

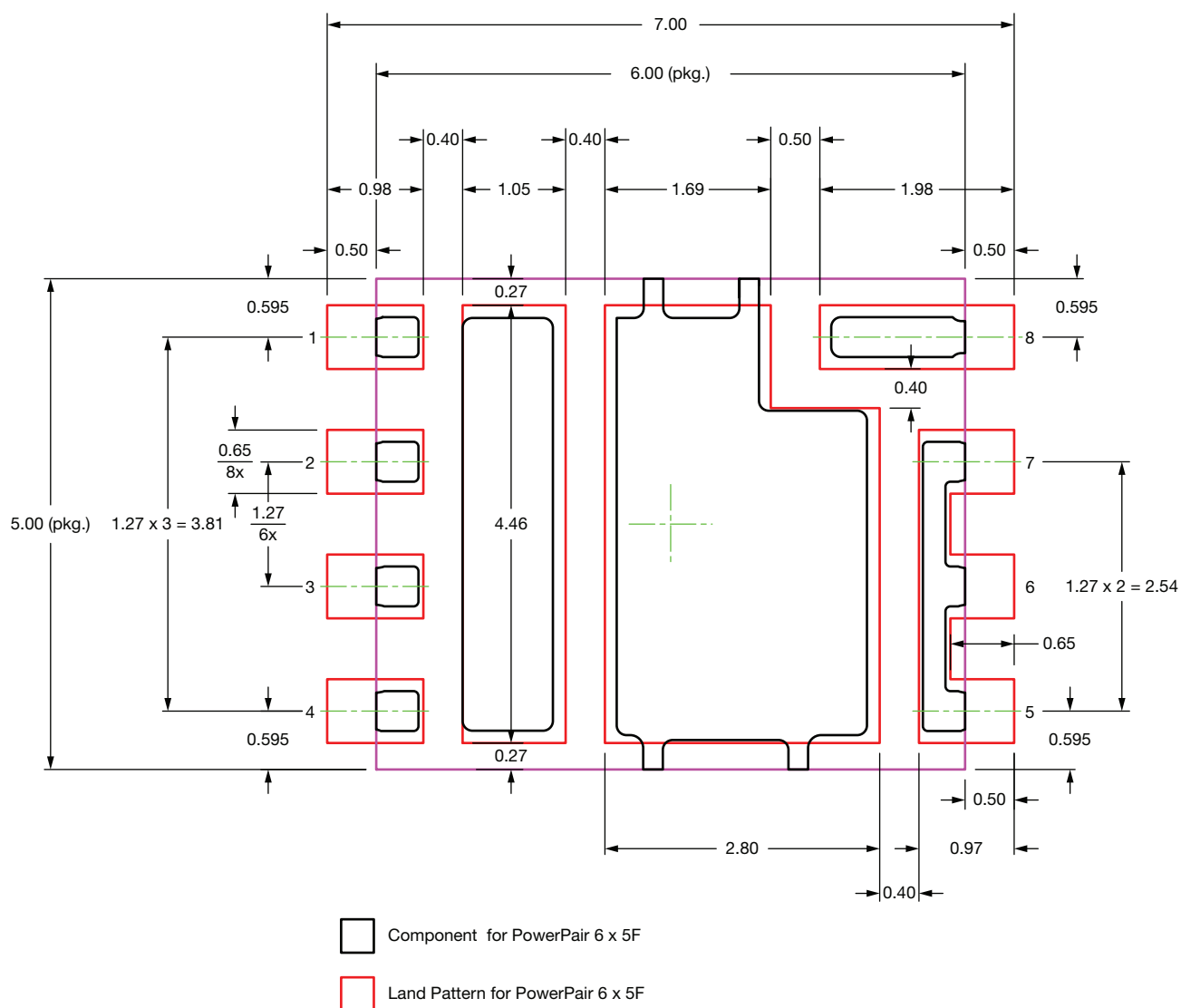


DIMENSION	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	-	0.10	0.000	-	0.004
b	0.35	0.41	0.46	0.014	0.016	0.018
b1	0.38 ref.			0.015 ref.		
c	0.15	0.20	0.25	0.006	0.008	0.010
D	4.90	5.00	5.10	0.193	0.197	0.201
D1	3.26	3.31	3.36	0.128	0.130	0.132
D2	4.20	4.30	4.40	0.165	0.169	0.173
D3	4.15	4.20	4.25	0.163	0.165	0.167
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	2.50	2.55	2.60	0.098	0.100	0.102
E2	0.87	0.92	0.97	0.034	0.036	0.038
e	1.27 BSC			0.050 BSC		
e1	3.81 BSC			0.150 BSC		
K	0.52	0.57	0.62	0.020	0.022	0.024
K1	0.69	0.74	0.79	0.027	0.029	0.031
K2	0.60	0.65	0.70	0.024	0.026	0.028
K3	0.39 BSC			0.015 BSC		
K4	0.50	0.55	0.60	0.020	0.022	0.024
K5	0.25	0.30	0.35	0.010	0.012	0.014
K6	0.40	0.45	0.50	0.016	0.018	0.020
K7	0.35	0.40	0.45	0.014	0.016	0.018
K8	0.30	0.35	0.40	0.012	0.014	0.016
L	0.33	0.43	0.53	0.013	0.017	0.021
L1	1.31	1.36	1.41	0.052	0.054	0.056
L2	0.20 ref.			0.008 ref.		
ECN: T20-0097-Rev. C, 25-Feb-2020						
DWG: 6043						

Note

- Millimeters will govern

Recommended Minimum PADs for PowerPAIR® 6 x 5F



Note

- Dimensions in millimeters



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.