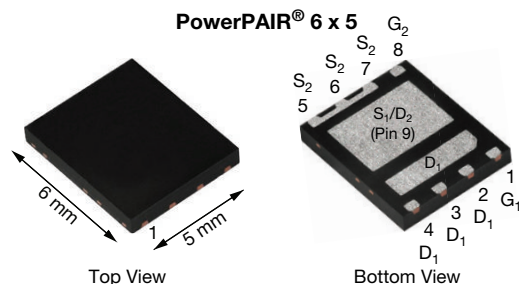


Dual N-Channel 30 V (D-S) MOSFET With Schottky Diode



PRODUCT SUMMARY		
	CHANNEL-1	CHANNEL-2
V_{DS} (V)	30	30
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.00439	0.0024
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 4.5$ V	0.00712	0.0038
Q_g typ. (nC)	5.7	14.6
I_D (A) ^a	54.8	94.6
Configuration	Dual plus integrated Schottky (SkyFET)	

FEATURES

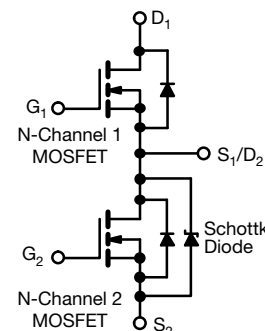
- TrenchFET® Gen IV power MOSFET
- SkyFET® low side MOSFET with integrated Schottky
- Very low R_{DS} x Q_g FOM improves efficiency
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

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



ORDERING INFORMATION	
Package	PowerPAIR 6 x 5
Lead (Pb)-free and halogen-free	SiZ998BDT-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	54.8	94.6	A	
	T _C = 70 °C		43.8	75.7		
	T _A = 25 °C		23.7 ^{b, c}	36.2 ^{b, c}		
	T _A = 70 °C		19 ^{b, c}	28.9 ^{b, c}		
Pulsed drain current (t = 100 μs)		I _{DM}	90	130		
Continuous source-drain diode current	T _C = 25 °C	I _S	16.7	27.4		
	T _A = 25 °C		3.2 ^{b, c}	4 ^{b, c}		
Single pulse avalanche current		L = 0.1 mH	I _{AS}	15		20
Single pulse avalanche energy			E _{AS}	11.2	20	mJ
Maximum power dissipation	T _C = 25 °C	P _D	20	32.9	W	
	T _C = 70 °C		12.9	21.1		
	T _A = 25 °C		3.8 ^{b, c}	4.8 ^{b, c}		
	T _A = 70 °C		2.4 ^{b, c}	3.1 ^{b, c}		
Operating junction and storage temperature range		T _J , T _{stg}	-55 to +150		°C	
Soldering recommendations (peak temperature) ^{c, d}			260			

THERMAL RESISTANCE RATINGS							
PARAMETER		SYMBOL	CHANNEL-1		CHANNEL-2		UNIT
			TYP.	MAX.	TYP.	MAX.	
Maximum junction-to-ambient ^{b, f}	$t \leq 10$ s	R_{thJA}	26	33	21	26	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	4.7	6.2	3	3.8	

Notes

- $T_C = 25$ °C
- 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 68 °C/W for channel-1 and 57 °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 = 5 mA	Ch-1	30	-	-	V	
			Ch-2	30	-	-		
Drain-source breakdown voltage (transient) ^c	V _{DS(t)}	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	1.2	-	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	-	40	200		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C	Ch-1	-	-	5		
			Ch-2	-	200	2000		
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	-	0.00338	0.00439	Ω	
		V _{GS} = 10 V, I _D = 19 A	Ch-2	-	0.0018	0.0024		
		V _{GS} = 4.5 V, I _D = 12 A	Ch-1	-	0.00547	0.00712		
		V _{GS} = 4.5 V, I _D = 15 A	Ch-2	-	0.0026	0.0038		
Forward transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 15 A	Ch-1	-	55	-	S	
		V _{DS} = 10 V, I _D = 19 A	Ch-2		230	-		
Dynamic ^a								
Input capacitance	C _{iss}	Channel-1 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	-	790	-	pF	
			Ch-2	-	2130	-		
Output capacitance	C _{oss}		Ch-1	-	390	-		
			Ch-2	-	1050	-		
Reverse transfer capacitance	C _{rss}	Channel-2 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	-	38	-		
			Ch-2	-	40	-		
C _{rss} /C _{iss} ratio			Ch-1	-	0.046	0.092		
			Ch-2		0.019	0.038		
Total gate charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 19 A	Ch-1	-	12	18	nC	
		V _{DS} = 15 V, V _{GS} = 10 V, I _D = 19 A	Ch-2	-	31.1	46.7		
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 19 A	Ch-1		5.7	8.6		
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 19 A	Ch-2	-	14.6	21.9		
Gate-source charge	Q _{gs}	Channel-1 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 19 A	Ch-1	-	3	-		
			Ch-2	-	7.1	-		
Gate-drain charge	Q _{gd}	Channel-2 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 19 A	Ch-1	-	1.4	-		
			Ch-2	-	3.4	-		
Output charge	Q _{oss}	V _{DS} = 15 V, V _{GS} = 0 V	Ch-1	-	10	-		
			Ch-2	-	30	-		
Gate resistance	R _g	f = 1 MHz	Ch-1	0.2	1.1	2.2	Ω	
			Ch-2	0.16	0.8	1.6		

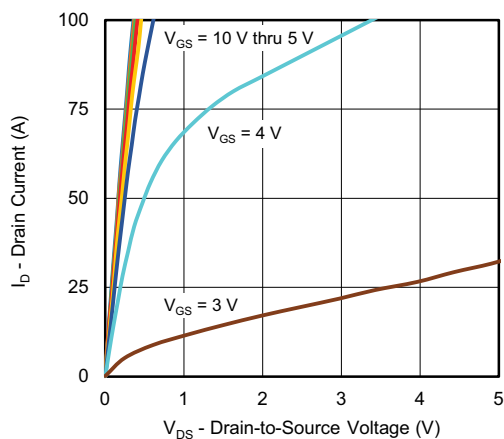
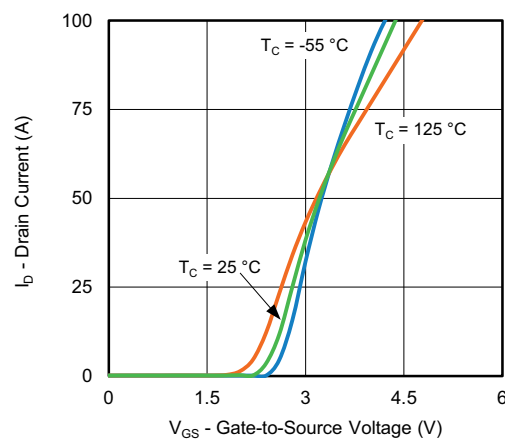
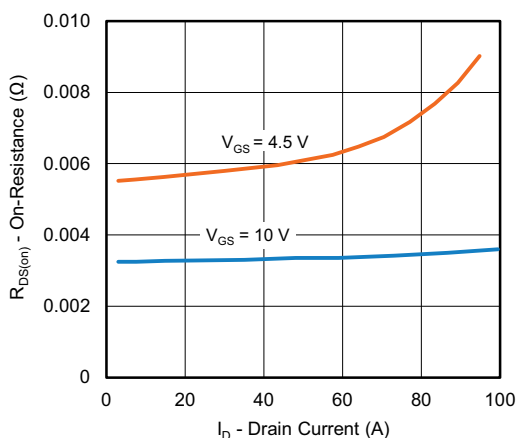
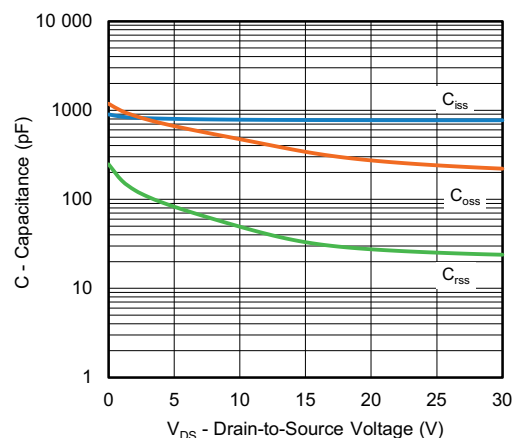
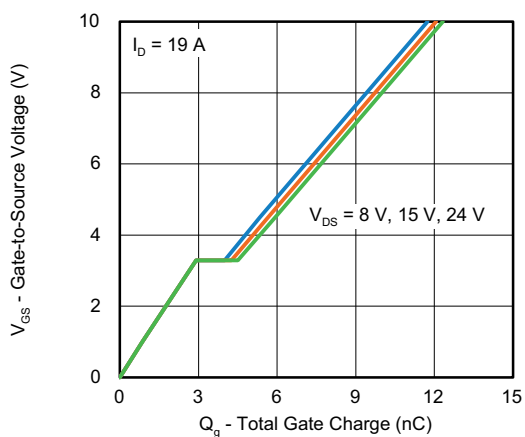
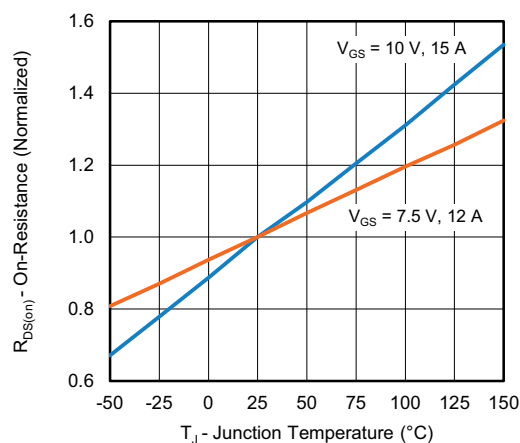


SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Dynamic ^a								
Turn-on delay time	t _{d(on)}	Channel-1 V _{DD} = 15 V, R _L = 1.5 Ω, I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω	Ch-1	-	20	40	ns	
			Ch-2	-	30	60		
Rise time	t _r		Ch-1	-	100	200		
			Ch-2	-	120	240		
Turn-off delay time	t _{d(off)}	Channel-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	-	15	30		
			Ch-2	-	40	80		
Fall time	t _f		Ch-1	-	12	24		
			Ch-2	-	18	36		
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	-	20	40		
			Ch-2	-	10	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	-	20	40		
			Ch-2	-	30	60		
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	-	-	16.7	A	
			Ch-2	-	-	27.4		
Pulse diode forward current ^a	I _{SM}		Ch-1	-	-	90		
			Ch-2	-	-	130		
Body diode voltage	V _{SD}	I _S = 10 A, V _{GS} = 0 V	Ch-1	-	0.8	1.2	V	
			Ch-2	-	0.47	0.71		
Body diode reverse recovery time	t _{rr}	Channel-1 I _F = 10 A, di/dt = 100 A/μs, T _J = 25 °C	Ch-1	-	18	36	ns	
			Ch-2	-	27	54		
Body diode reverse recovery charge	Q _{rr}		Channel-2 I _F = 10 A, di/dt = 100 A/μs, T _J = 25 °C	Ch-1	-	18	36	nC
				Ch-2	-	17	34	
Reverse recovery fall time	t _a			Ch-1	-	10	-	ns
				Ch-2	-	15	-	
Reverse recovery Rise time	t _b			Ch-1	-	8	-	
				Ch-2	-	12	-	

Notes

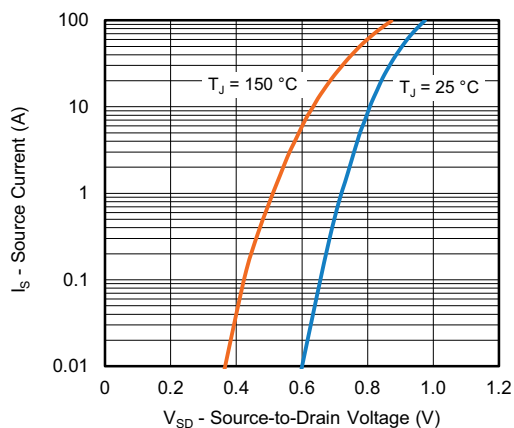
- a. Guaranteed by design, not subject to production testing
b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
c. Derived from UIS characterization data at time of product release. Production data log is not available

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.

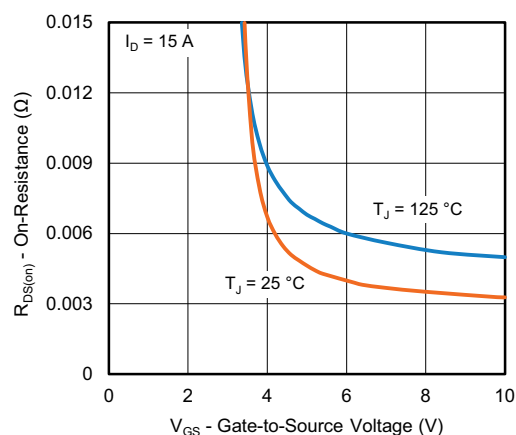
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature



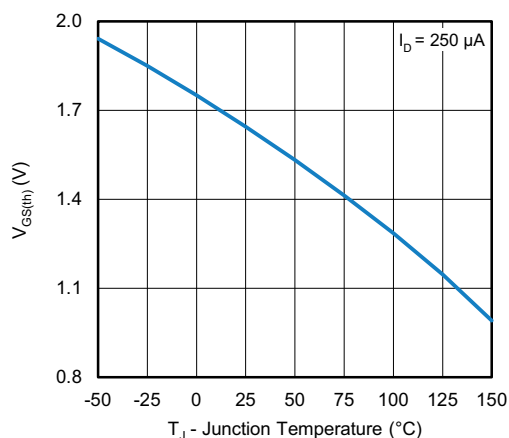
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



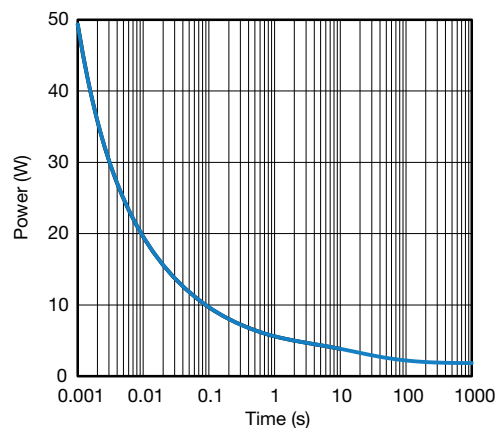
Source-Drain Diode Forward Voltage



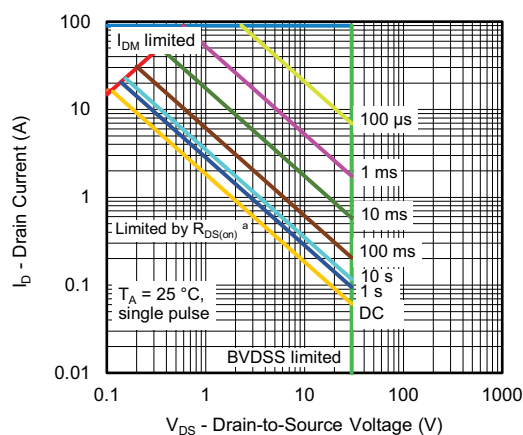
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



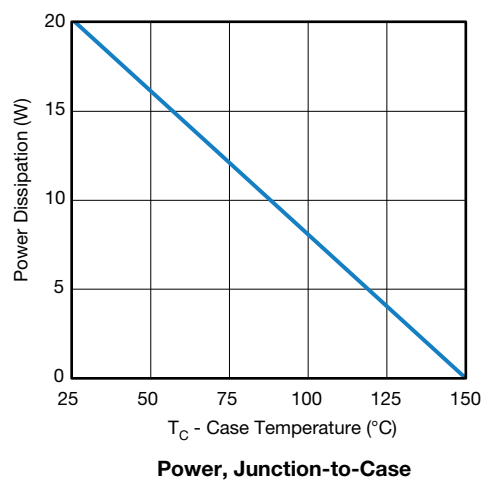
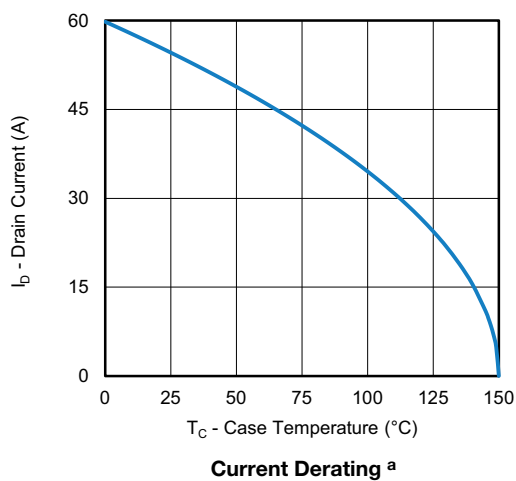
Safe Operating Area, Junction-to-Ambient

Note

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

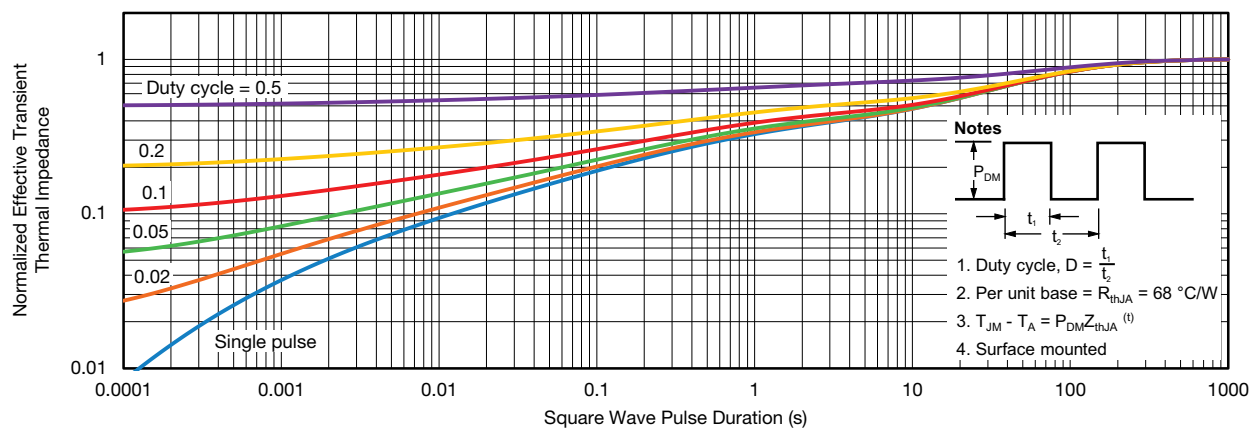
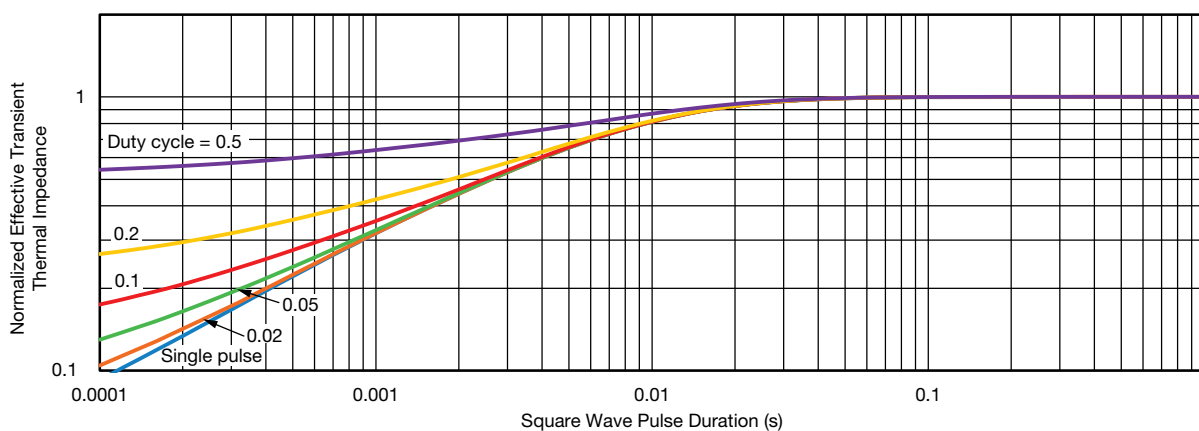


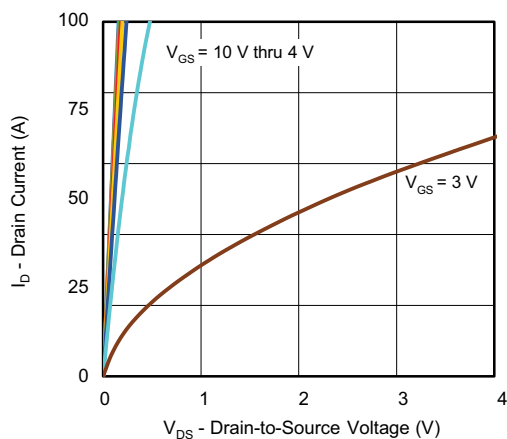
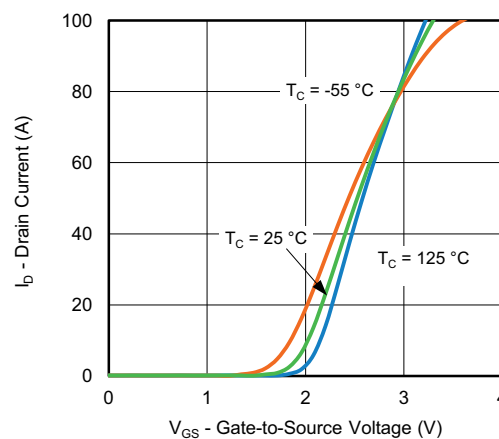
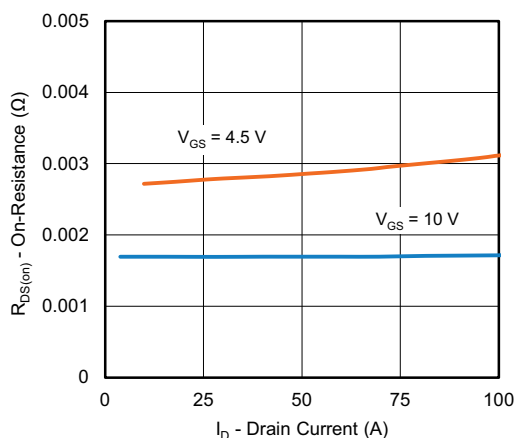
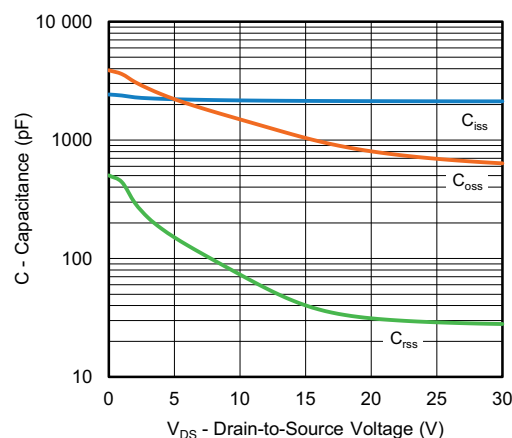
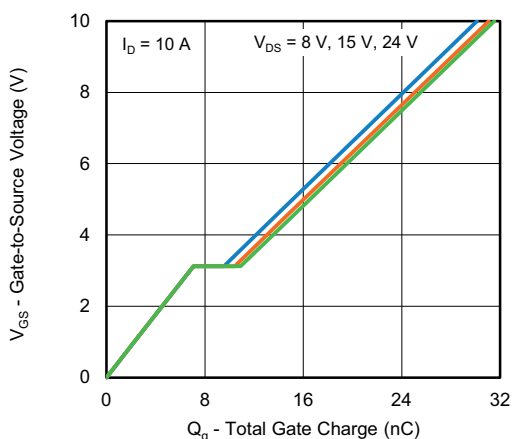
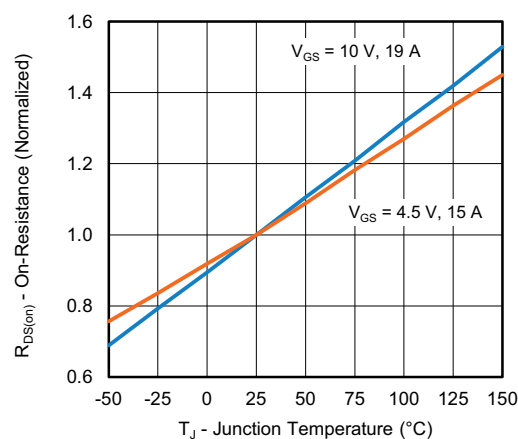
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

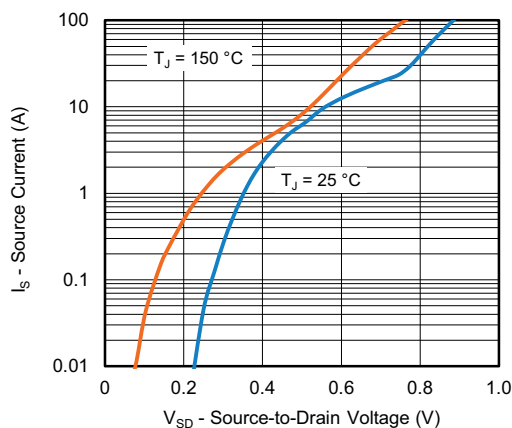
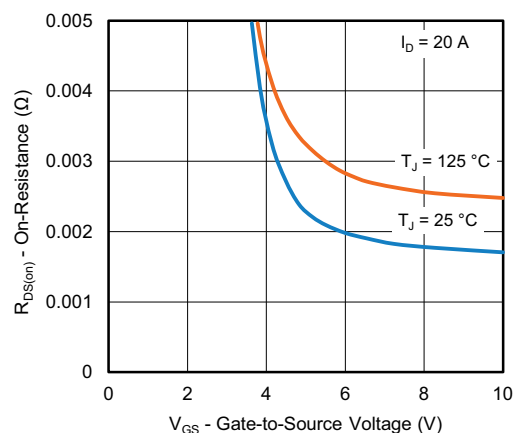
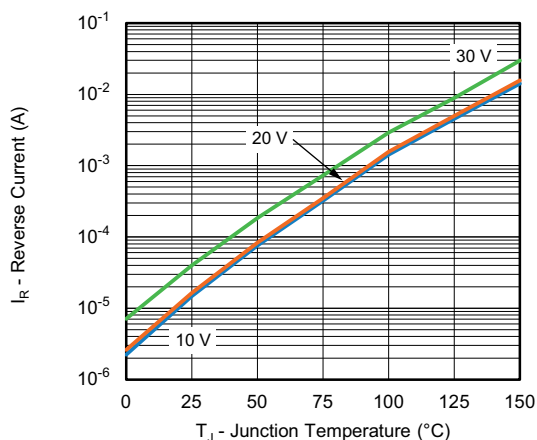
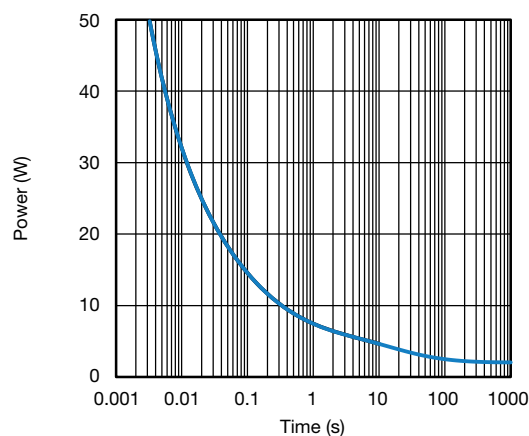
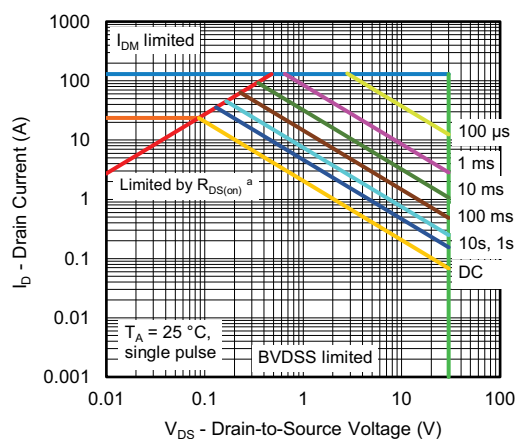


Note

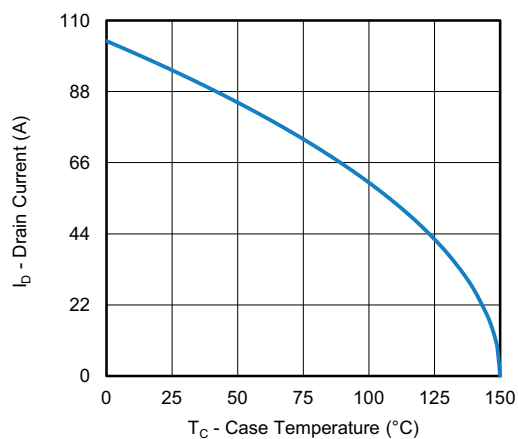
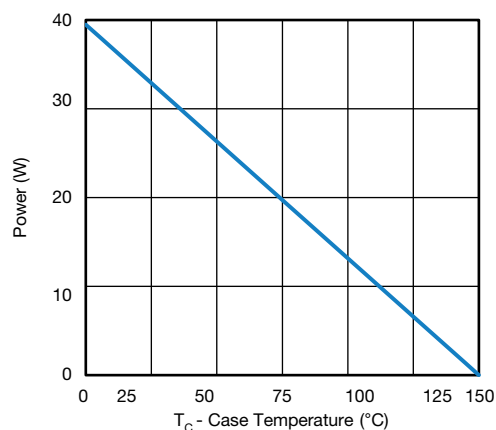
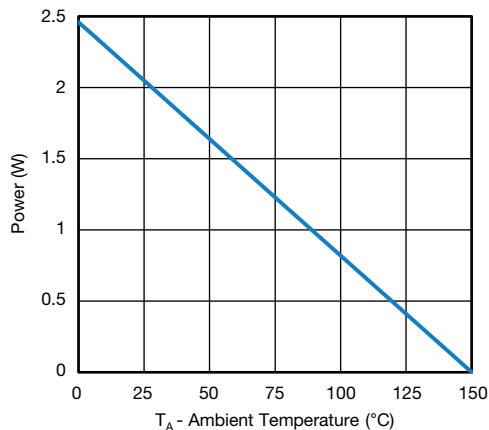
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit

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
Note

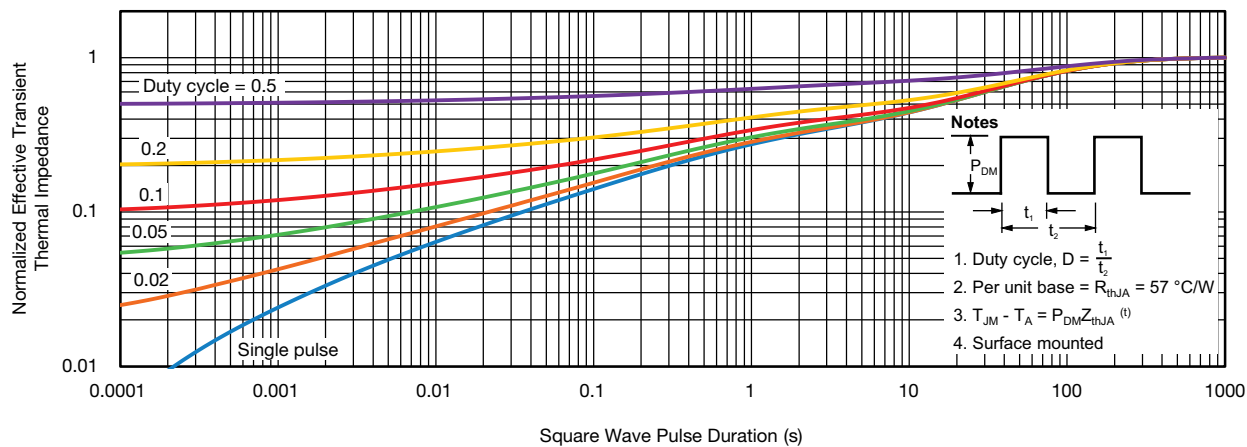
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

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

Current Derating ^a

Power, Junction-to-Case

Power, Junction-to-Ambient
Note

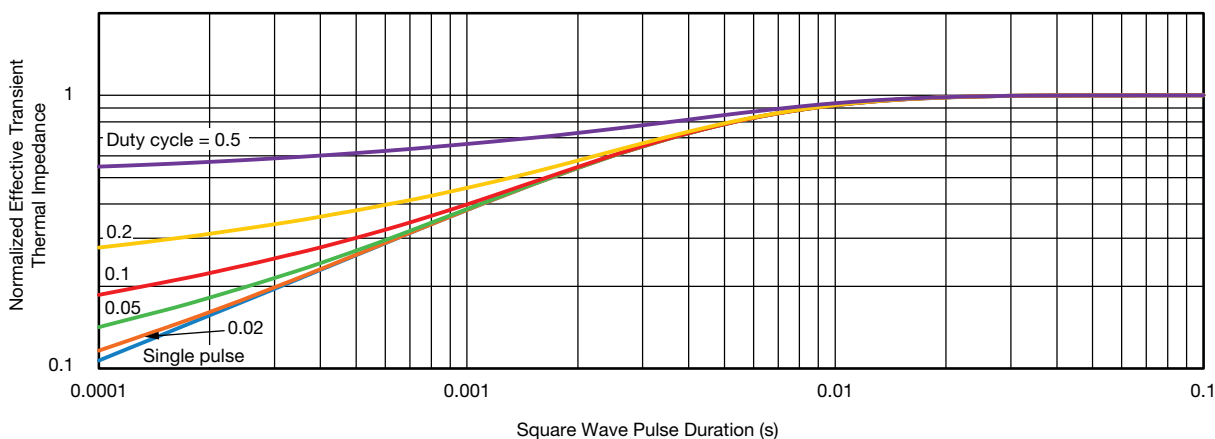
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



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



Normalized Thermal Transient Impedance, Junction-to-Ambient

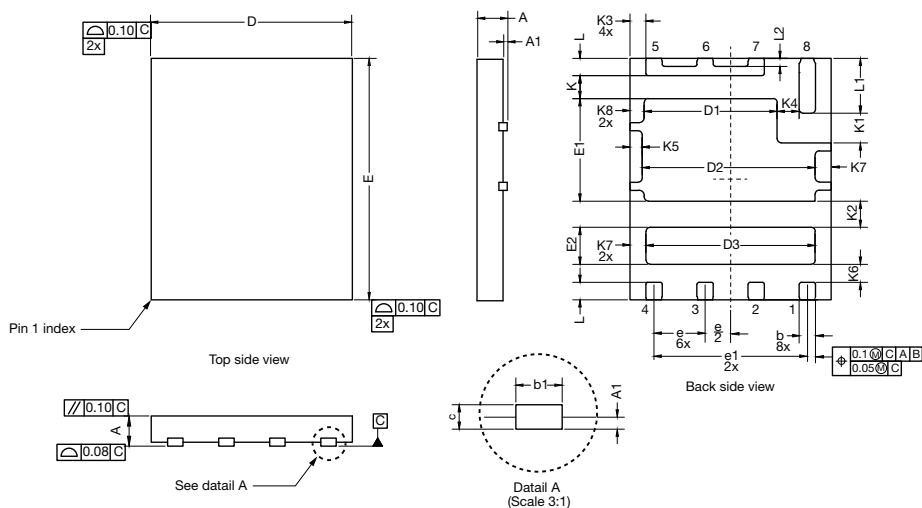


Normalized Thermal Transient Impedance, Junction-to-Case

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?77875.



PowerPAIR® 6 x 5 F Case Outline

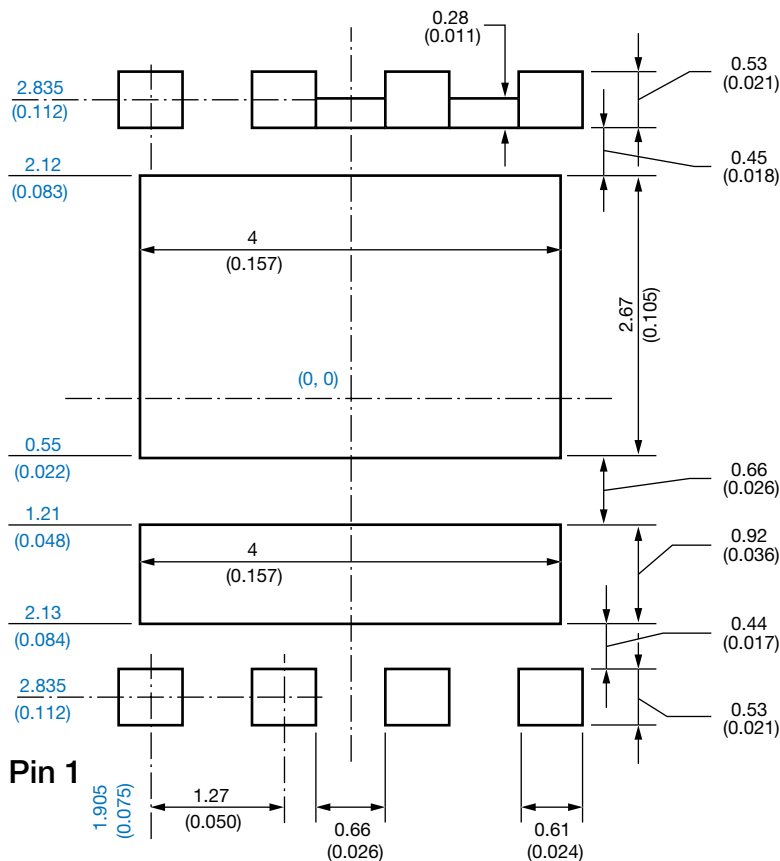


DIMENSION	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	-	0.10	0.000	-	0.004
b	0.35	0.41	0.46	0.014	0.016	0.018
b1	0.38 ref.			0.015 ref.		
c	0.15	0.20	0.25	0.006	0.008	0.010
D	4.90	5.00	5.10	0.193	0.197	0.201
D1	3.26	3.31	3.36	0.128	0.130	0.132
D2	4.20	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 PAD for PowerPAIR® 6 x 5



Dimensions in millimeters (inch)

Note

- Linear dimensions are in black, the same information is provided in ordinate dimensions which are in blue.



Disclaimer

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