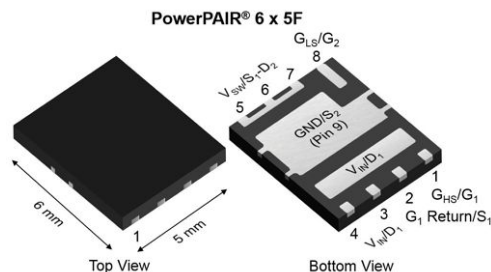


Dual N-Channel 30 V (D-S) MOSFET with Schottky Diode



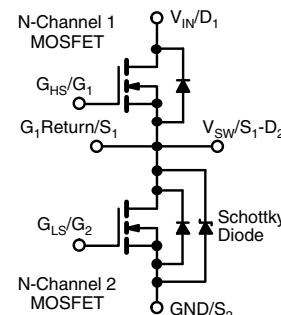
RoHS
COMPLIANT
HALOGEN
FREE

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	0.00210	0.00068
R _{DS(on)} max. (Ω) at V _{GS} = 4.5 V	0.00370	0.00130
Q _g typ. (nC)	11.7	38
I _D (A) ^a	105	257
Configuration	Dual	

ORDERING INFORMATION	
Package	PowerPAIR 6 x 5F
Lead (Pb)-free and halogen-free	SiZF906BDT-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	105	257	A
	T _C = 70 °C		84	206	
	T _A = 25 °C		36 ^{b, c}	63 ^{b, c}	
	T _A = 70 °C		29 ^{b, c}	50 ^{b, c}	
Pulsed drain current (t = 100 μs)		I _{DM}	120	350	
Continuous source-drain diode current	T _C = 25 °C	I _S	34	141 ^a	
	T _A = 25 °C		4.1 ^{b, c}	8.5 ^{b, c}	
Single pulse avalanche current		I _{AS}	23	40	
Single pulse avalanche energy			E _{AS}	26.5	80
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

- T_C = 25 °C
- Surface mounted on 1" x 1" FR4 board
- t = 20 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	
		V _{GS} = 0 V, I _D = 5 mA	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	-	100	1000		
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C	Ch-1	-	-	5		
			Ch-2	-	500	5000		
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	-	0.00150	0.00210	Ω	
		V _{GS} = 10 V, I _D = 20 A	Ch-2	-	0.00045	0.00068		
		V _{GS} = 4.5 V, I _D = 10 A	Ch-1	-	0.00250	0.00370		
		V _{GS} = 4.5 V, I _D = 15 A	Ch-2	-	0.00085	0.00130		
Forward transconductance ^b	g _{fs}	V _{DS} = 10 V, I _D = 40 A	Ch-1	-	93	-	S	
		V _{DS} = 10 V, I _D = 30 A	Ch-2		170	-		
Dynamic ^a								
Input capacitance	C _{iss}	Channel-1 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	-	1630	-	pF	
			Ch-2	-	5550	-		
Output capacitance	C _{oss}		Ch-1	-	690	-		
			Ch-2	-	2320	-		
Reverse transfer capacitance	C _{rss}		Channel-2 V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz	Ch-1	-	50	-	
				Ch-2	-	205	-	
C _{rss} /C _{iss} ratio		Ch-1		-	0.030	0.060		
		Ch-2			0.037	0.080		
Total gate charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 20 A		Ch-1	-	25	49	nC
				Ch-2	-	81	165	
		Channel-1 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A	Ch-1		11.7	22		
			Ch-2	-	38	80		
Gate-source charge	Q _{gs}	Channel-1 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A	Ch-1	-	5.8	-		
			Ch-2	-	17.8	-		
Gate-drain charge	Q _{gd}	Channel-2 V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 20 A	Ch-1	-	2.9	-		
			Ch-2	-	8.4	-		
Output charge	Q _{oss}	V _{DS} = 15 V, V _{GS} = 0 V	Ch-1	-	18	-		
			Ch-2	-	65	-		
Gate resistance	R _g	f = 1 MHz	Ch-1	0.2	1.2	2	Ω	
			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	-	22	40	ns	
			Ch-2	-	40	80		
Rise time	t _r		Ch-1	-	75	150		
			Ch-2	-	130	260		
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	-	21	40		
			Ch-2	-	41	80		
Fall time	t _f		Ch-1	-	10	20		
			Ch-2	-	20	40		
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	-	12	20		
			Ch-2	-	20	40		
Rise time	t _r		Ch-1	-	5	10		
			Ch-2	-	30	60		
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	-	22	40		
			Ch-2	-	40	80		
Fall time	t _f		Ch-1	-	5	10		
			Ch-2	-	10	20		
Drain-Source Body Diode Characteristics								
Continuous source-drain diode current	I _S	T _C = 25 °C	Ch-1	-	-	34	A	
			Ch-2	-	-	141		
Pulse diode forward current ^a	I _{SM}		Ch-1	-	-	120		
			Ch-2	-	-	350		
Body diode voltage	V _{SD}	I _S = 10 A, V _{GS} = 0 V	Ch-1	-	0.8	1.1	V	
		I _S = 5 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	-	27	55	ns	
			Ch-2	-	55	110		
Body diode reverse recovery charge	Q _{rr}		Channel-2 I _F = 10 A, di/dt = 100 A/μs, T _J = 25 °C	Ch-1	-	17	35	nC
				Ch-2	-	65	130	
Reverse recovery fall time	t _a			Ch-1	-	15	-	ns
				Ch-2	-	31	-	
Reverse recovery rise time	t _b			Ch-1	-	12	-	
				Ch-2	-	24	-	

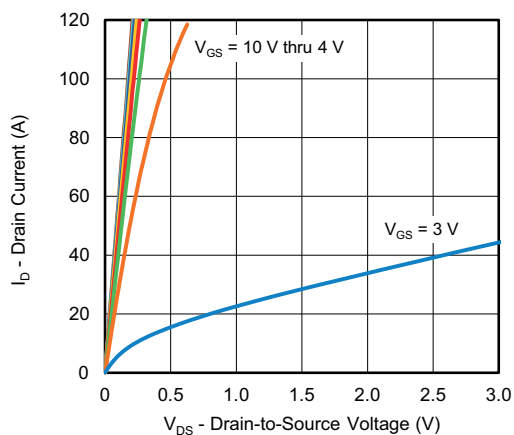
Notes

- 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

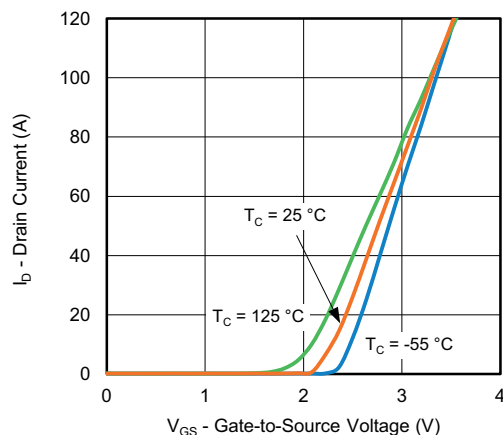
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



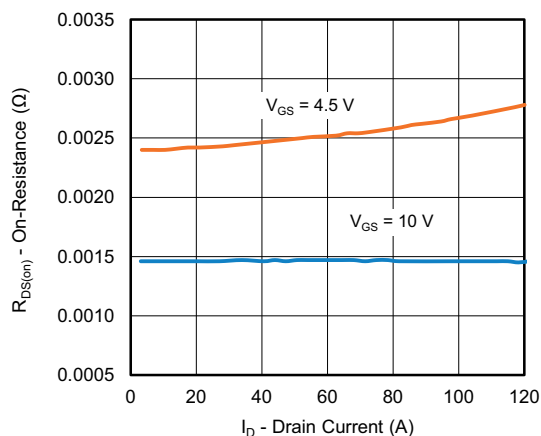
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



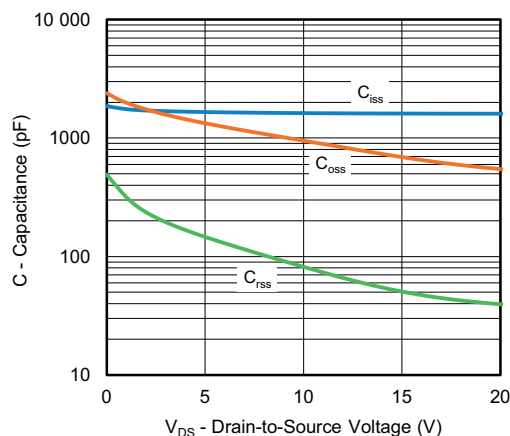
Output Characteristics



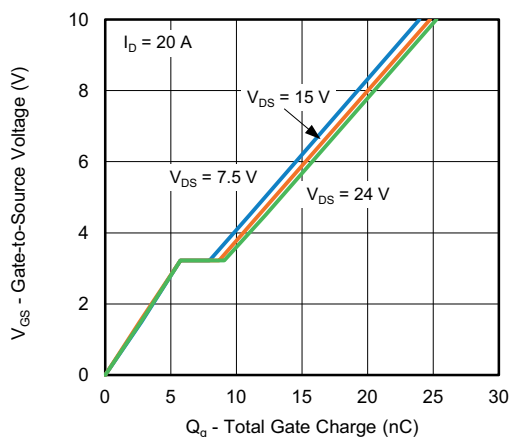
Transfer Characteristics



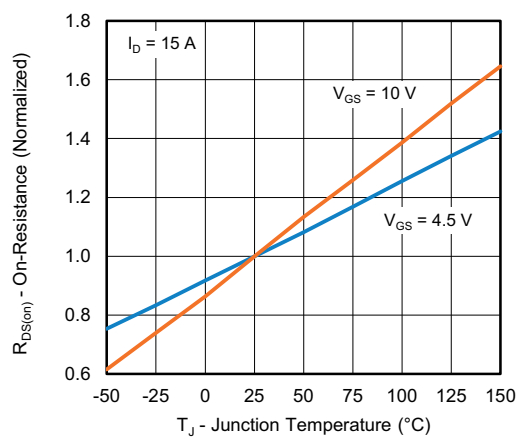
On-Resistance vs. Drain Current



Capacitance



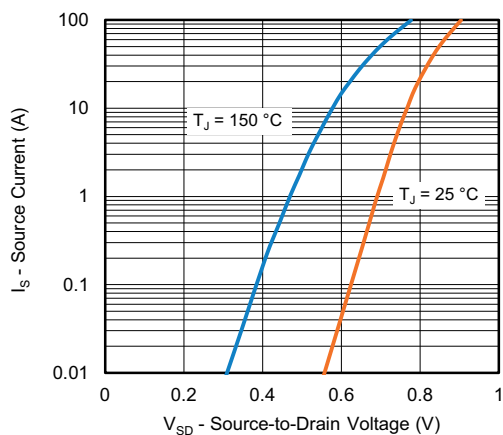
Gate Charge



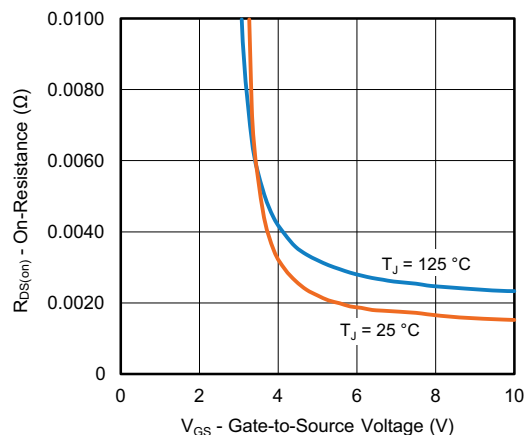
On-Resistance vs. Junction Temperature



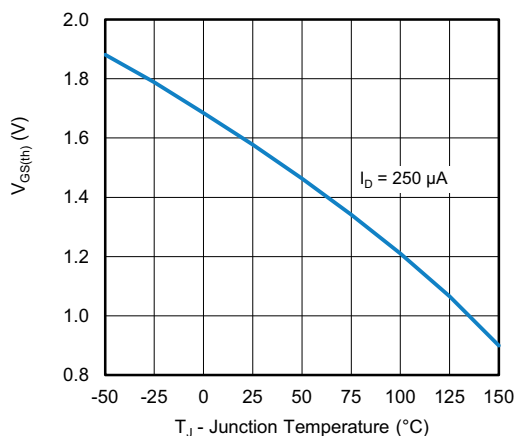
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



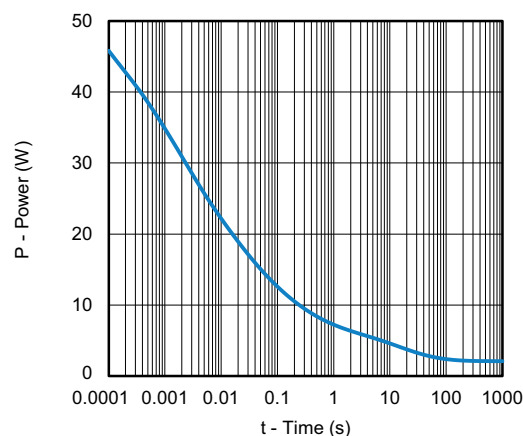
Source-Drain Diode Forward Voltage



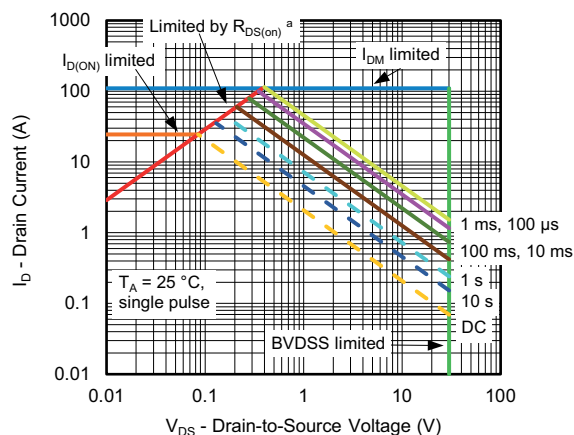
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



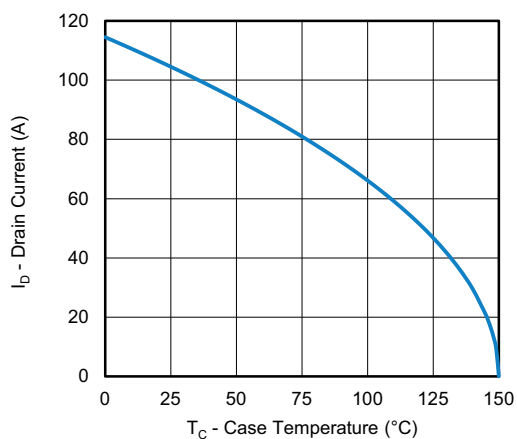
Safe Operating Area, Junction-to-Ambient

Note

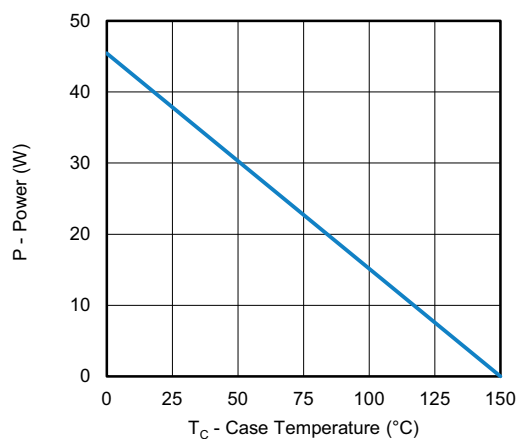
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Current Derating ^a



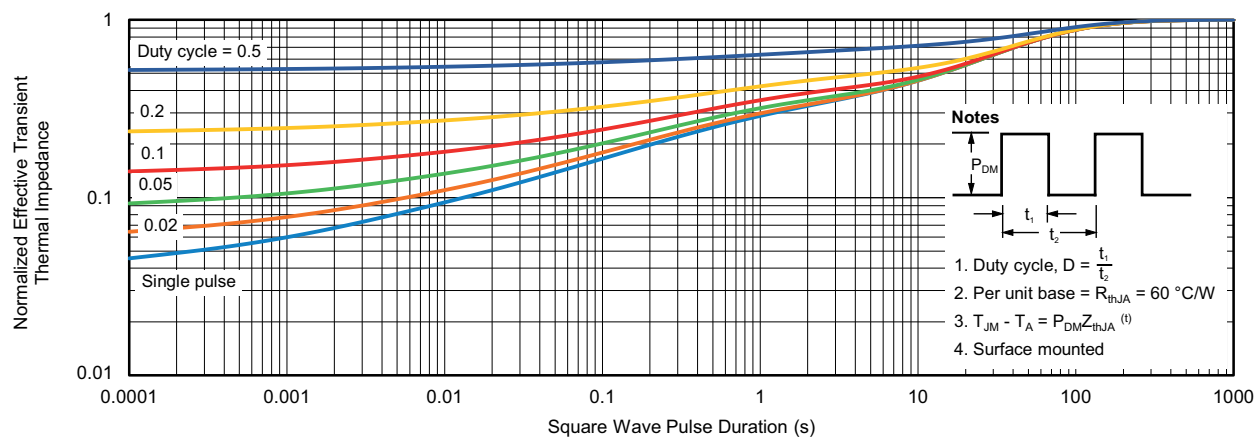
Power, Junction-to-Case

Note

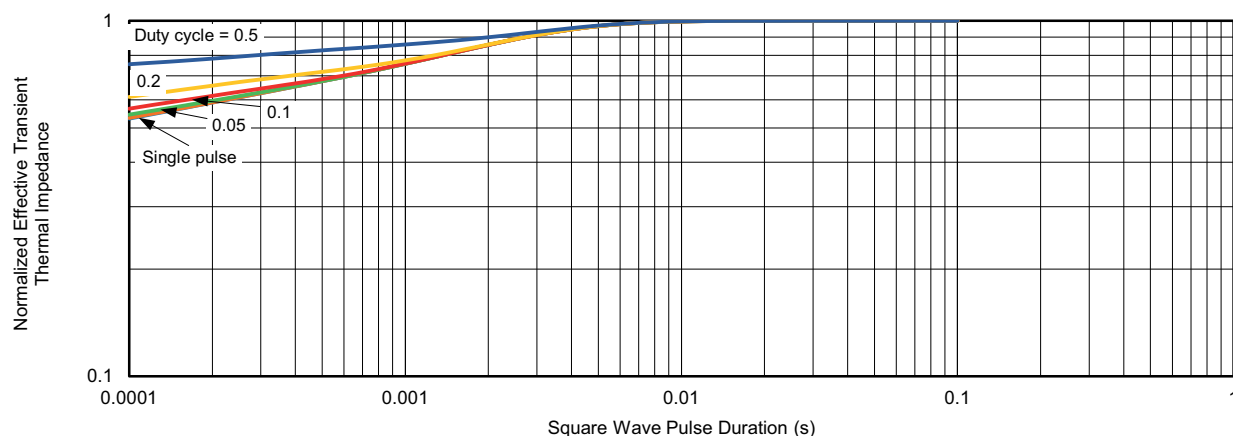
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



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



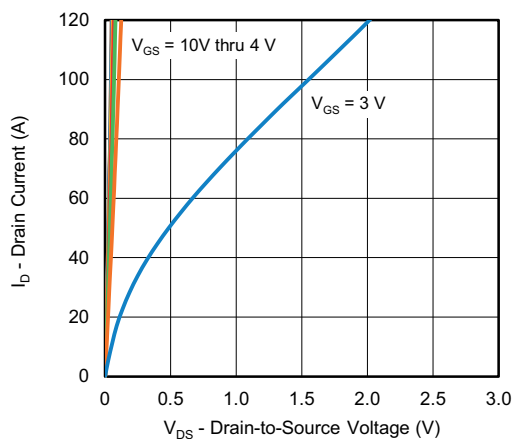
Normalized Thermal Transient Impedance, Junction-to-Ambient



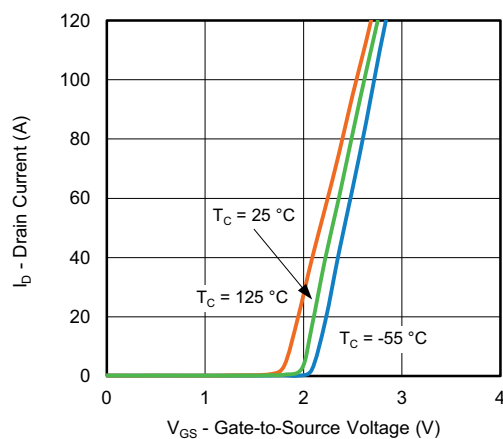
Normalized Thermal Transient Impedance, Junction-to-Case



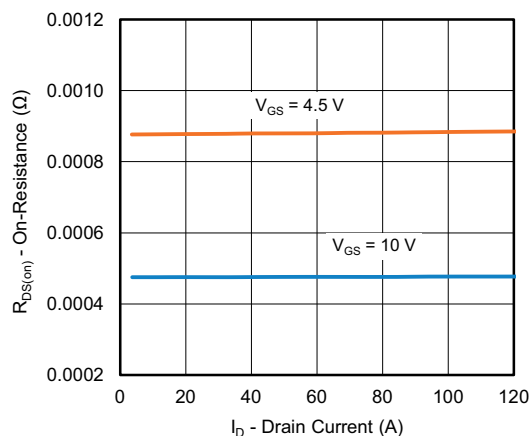
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



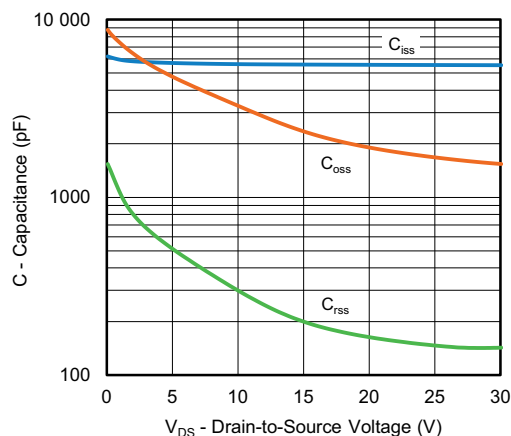
Output Characteristics



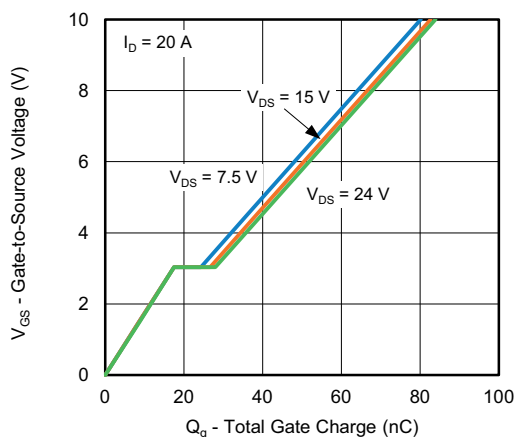
Transfer Characteristics



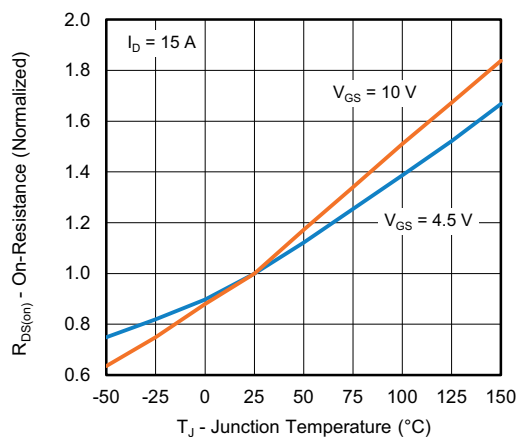
On-Resistance vs. Drain Current



Capacitance



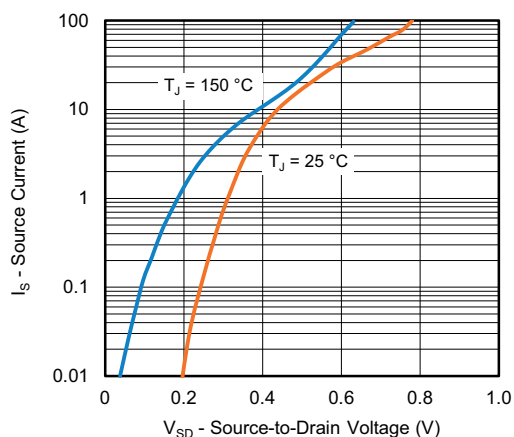
Gate Charge



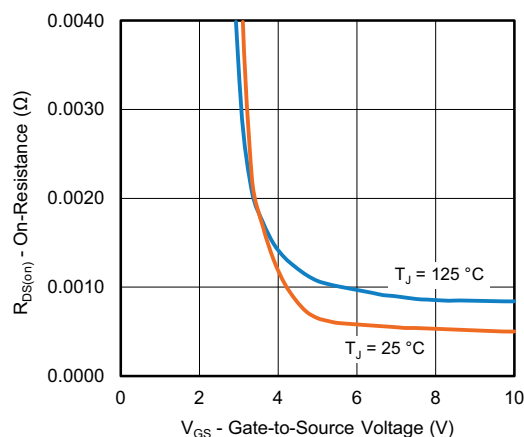
On-Resistance vs. Junction Temperature



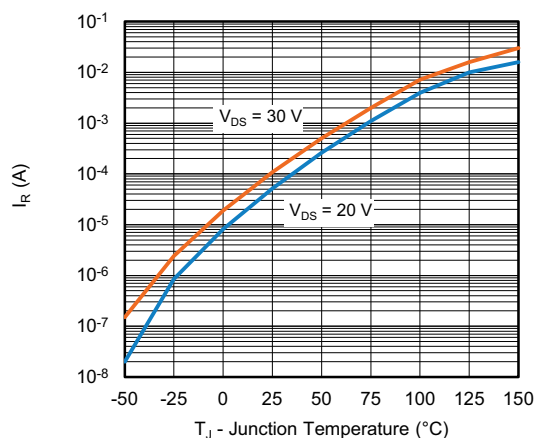
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



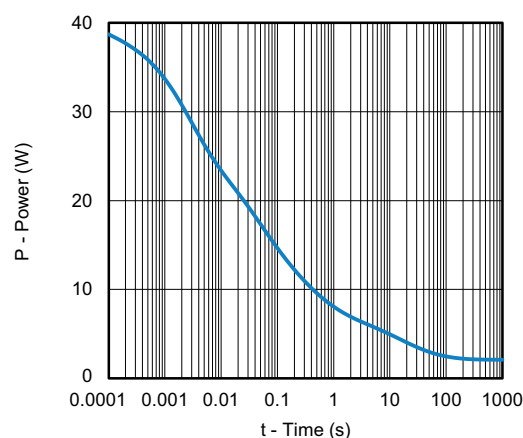
Source-Drain Diode Forward Voltage



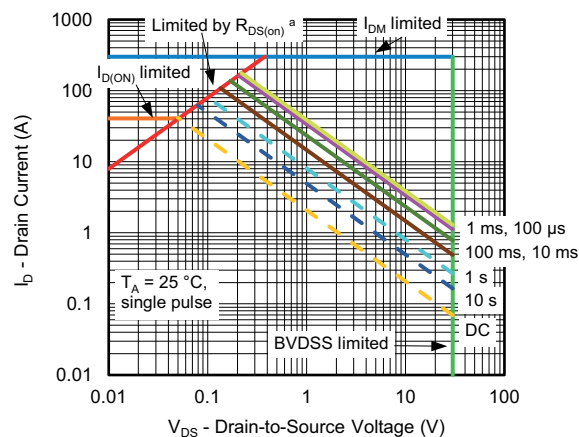
On-Resistance vs. Gate-to-Source Voltage



Reverse Current (Schottky)



Single Pulse Power, Junction-to-Ambient



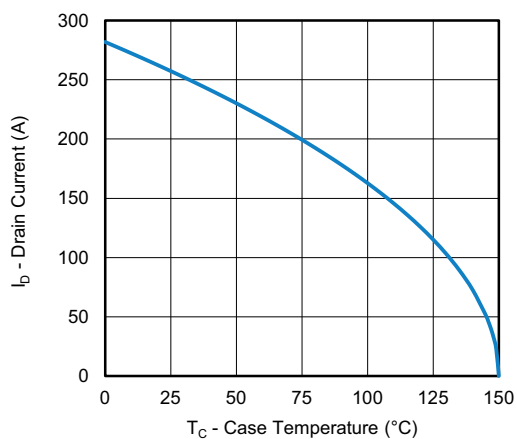
Safe Operating Area, Junction-to-Ambient

Note

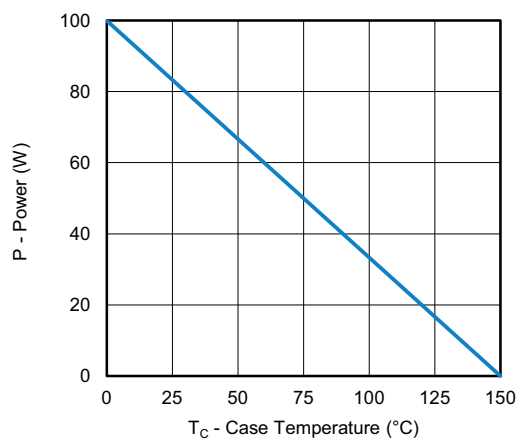
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Current Derating ^a



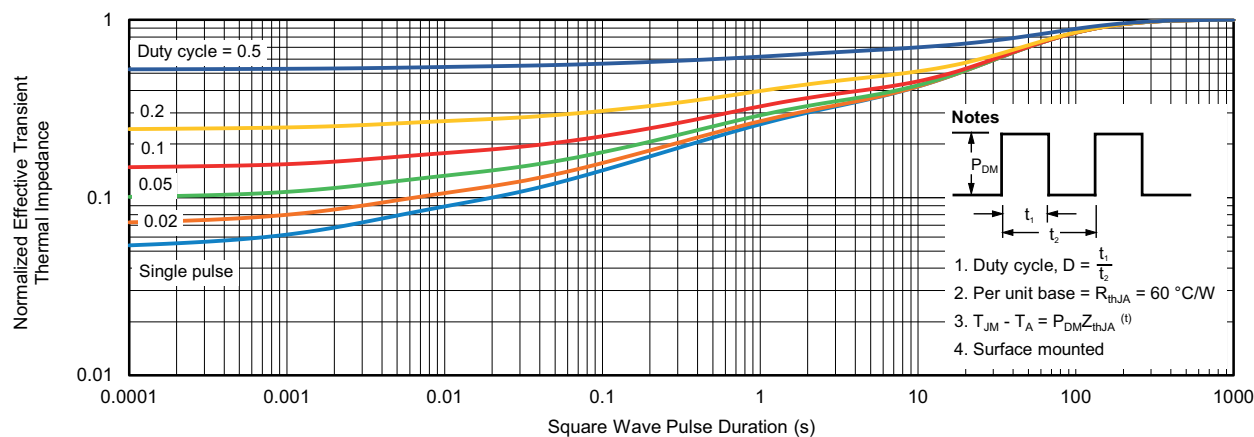
Power, Junction-to-Case

Note

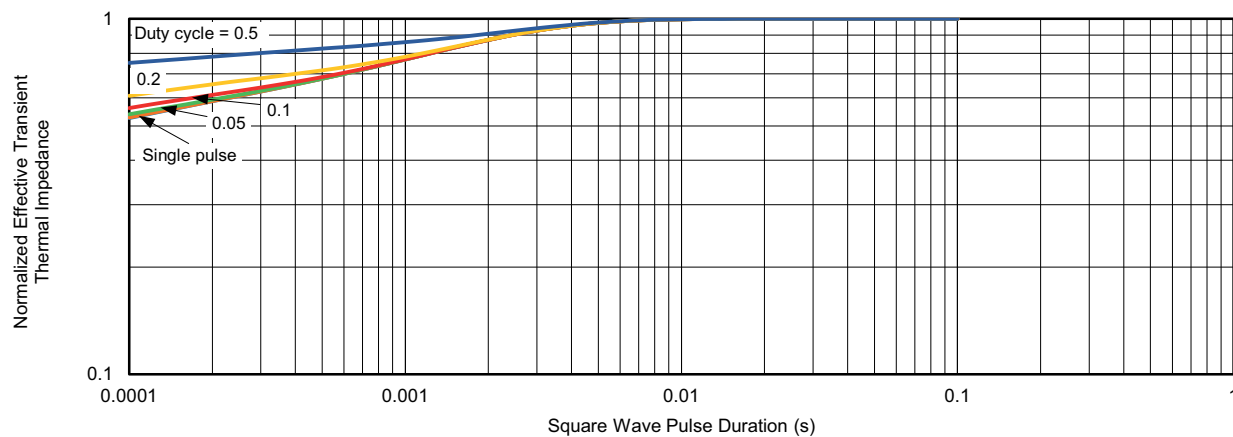
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



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



Normalized Thermal Transient Impedance, Junction-to-Ambient

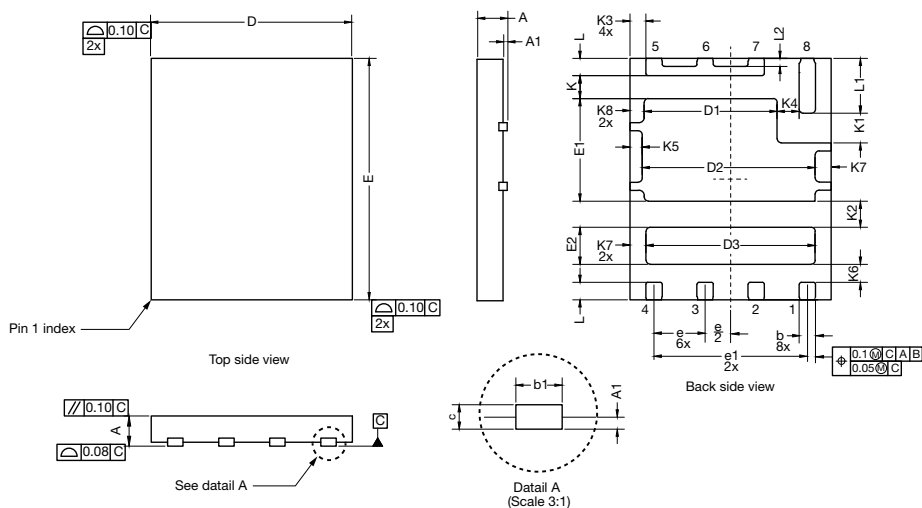


Normalized Thermal Transient Impedance, Junction-to-Case

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?77619.



PowerPAIR® 6 x 5 F Case Outline

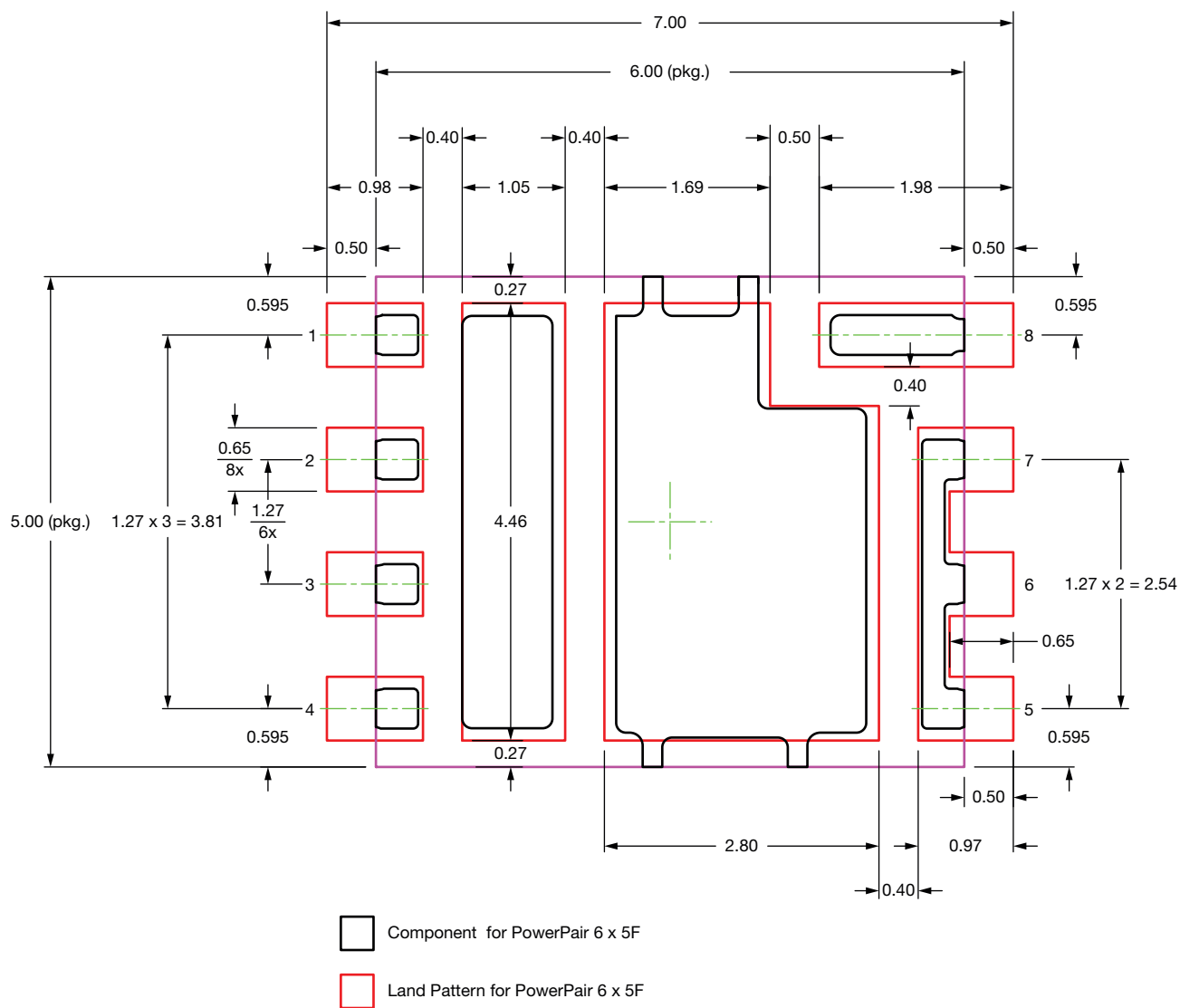


DIMENSION	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	-	0.10	0.000	-	0.004
b	0.35	0.41	0.46	0.014	0.016	0.018
b1	0.38 ref.			0.015 ref.		
c	0.15	0.20	0.25	0.006	0.008	0.010
D	4.90	5.00	5.10	0.193	0.197	0.201
D1	3.26	3.31	3.36	0.128	0.130	0.132
D2	4.20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



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