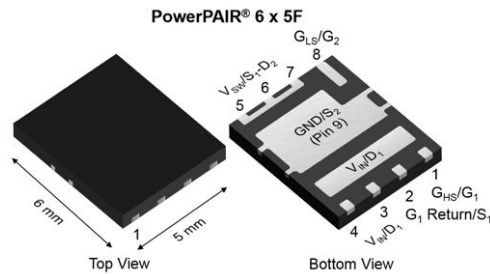


Dual N-Channel 30 V (D-S) MOSFET with Schottky Diode



FEATURES

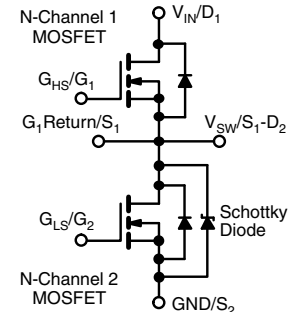
- TrenchFET® Gen IV power MOSFET
- SkyFET® low side MOSFET with integrated Schottky
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

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	V	
Continuous drain current (T _J = 150 °C)	I _D	T _C = 25 °C	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	A	
Continuous source-drain diode current	I _S	T _C = 25 °C	34	141 ^a	A
		T _A = 25 °C	4.1 ^{b, c}	8.5 ^{b, c}	
Single pulse avalanche current	I _{AS}	23	40	A	
Single pulse avalanche energy	E _{AS}	26.5	80	mJ	
Maximum power dissipation	P _D	T _C = 25 °C	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		°C	

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	°C/W

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 ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT		
Static								
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	Ch-1	30	-	-	V	
		$V_{GS} = 0\text{ V}, I_D = 5\text{ mA}$	Ch-2	30	-	-		
Drain-source breakdown voltage ^c (transient)	V_{DSt}	$V_{GS} = 0\text{ V}, t_{(transient)} \leq 1\text{ }\mu\text{s}$	Ch-1	36	-	-		
			Ch-2	36	-	-		
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	Ch-1	1.1	-	2.2		
			Ch-2	1.1	-	2.2		
Gate-source leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = +20\text{ V}, -16\text{ V}$	Ch-1	-	-	± 100	nA	
			Ch-2	-	-	± 100		
Zero Gate voltage drain current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	Ch-1	-	-	1	μA	
			Ch-2	-	100	1000		
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	Ch-1	-	-	5		
			Ch-2	-	500	5000		
On-state drain current ^b	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-1	20	-	-	A	
			Ch-2	20	-	-		
Drain-source on-state resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$	Ch-1	-	0.00150	0.00210	Ω	
			Ch-2	-	0.00045	0.00068		
			$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$	Ch-1	-	0.00250		0.00370
				Ch-2	-	0.00085		0.00130
Forward transconductance ^b	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 40\text{ A}$	Ch-1	-	93	-	S	
		$V_{DS} = 10\text{ V}, I_D = 30\text{ A}$	Ch-2	-	170	-		
Dynamic ^a								
Input capacitance	C_{iss}	Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1	-	1630	-	pF	
Output capacitance	C_{oss}		Ch-2	-	5550	-		
			Ch-1	-	690	-		
Reverse transfer capacitance	C_{rss}		Ch-2	-	2320	-		
			Ch-1	-	50	-		
C_{rss}/C_{iss} ratio			Ch-1	-	0.030	0.060		
		Ch-2	-	0.037	0.080			
Total gate charge	Q_g	$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	Ch-1	-	25	49	nC	
			Ch-2	-	81	165		
Gate-source charge	Q_{gs}	Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	Ch-1	-	11.7	22		
			Ch-2	-	38	80		
Gate-drain charge	Q_{gd}	Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	Ch-1	-	5.8	-		
			Ch-2	-	17.8	-		
Output charge	Q_{oss}	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}$	Ch-1	-	2.9	-		
			Ch-2	-	8.4	-		
Gate resistance	R_g	$f = 1\text{ MHz}$	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
Rise time	t _r		Ch-2	-	40	80	
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	-	75	150	
			Ch-2	-	130	260	
Fall time	t _f	Channel-1	Ch-1	-	21	40	
			Ch-2	-	41	80	
Turn-on delay time	t _{d(on)}	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	-	10	20	
			Ch-2	-	20	40	
Rise time	t _r	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	
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	-	5	10	
			Ch-2	-	30	60	
Fall time	t _f	Channel-1	Ch-1	-	22	40	
			Ch-2	-	40	80	
Turn-on delay time	t _{d(on)}	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	-	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-1	Ch-1	-	17	35	nC
			Ch-2	-	65	130	
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	-	31	-	
Reverse recovery rise time	t _b	Channel-2	Ch-1	-	12	-	
			Ch-2	-	24	-	

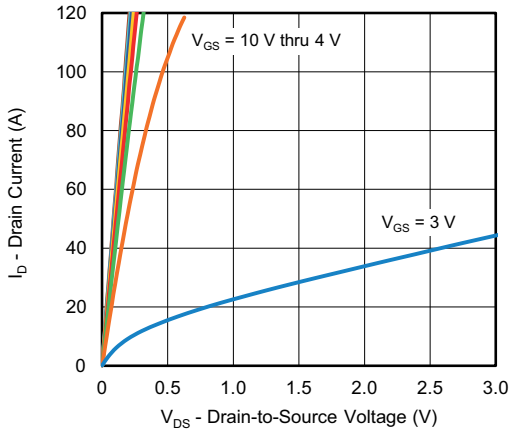
Notes

- a. Guaranteed by design, not subject to production testing
- b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- c. Based on characterization, not subject to production testing

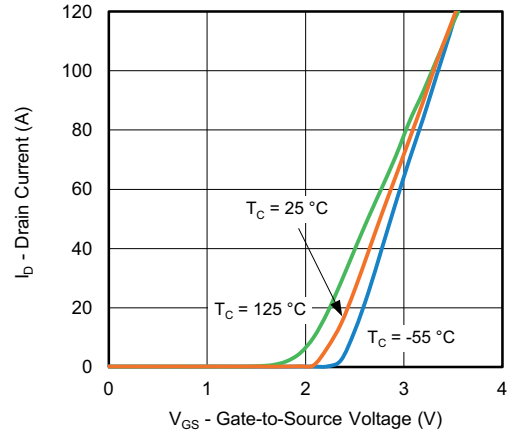
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



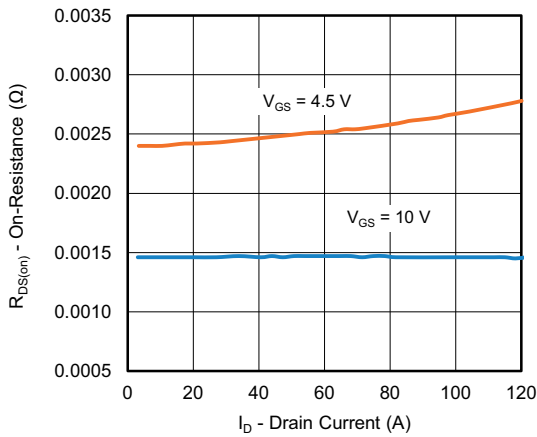
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



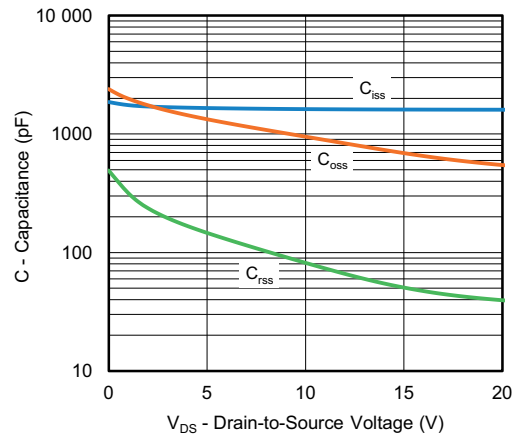
Output Characteristics



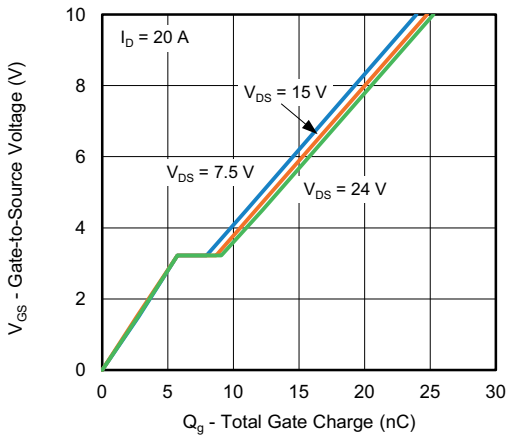
Transfer Characteristics



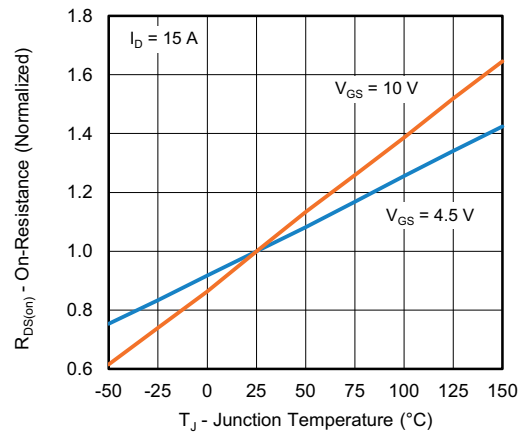
On-Resistance vs. Drain Current



Capacitance

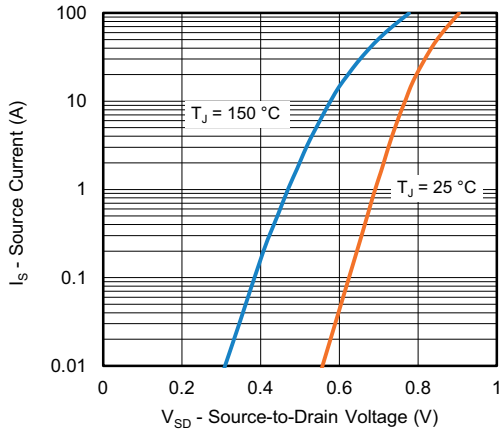


Gate Charge

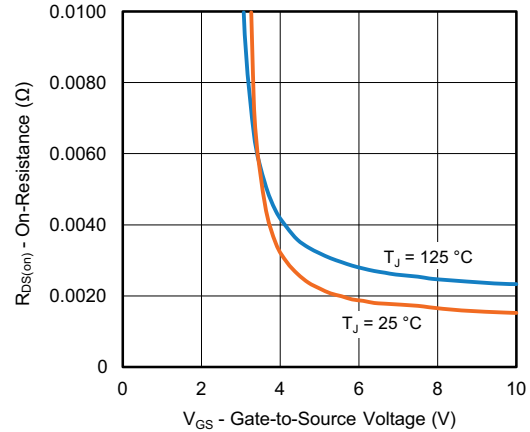


On-Resistance vs. Junction Temperature

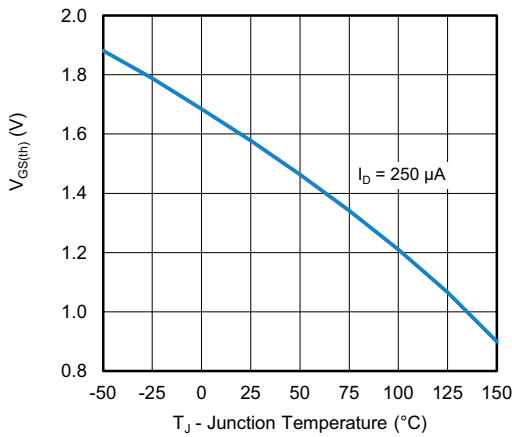
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



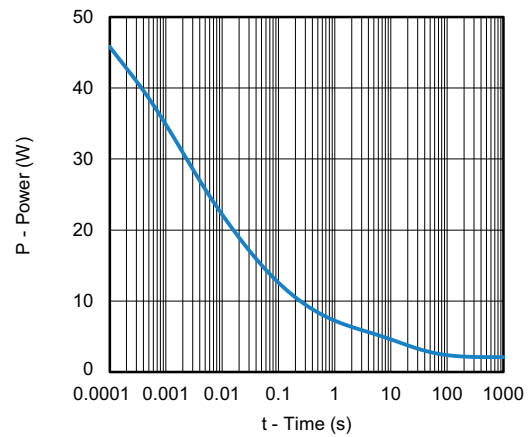
Source-Drain Diode Forward Voltage



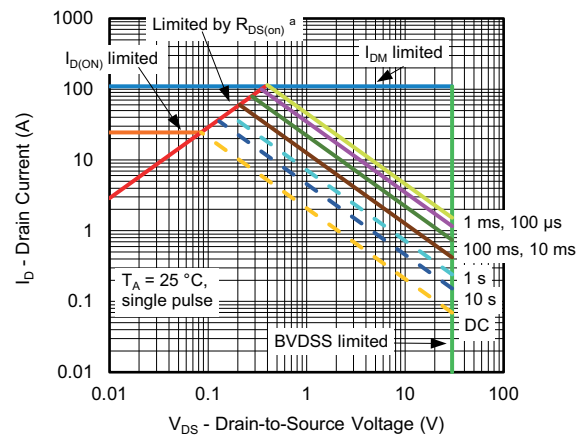
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



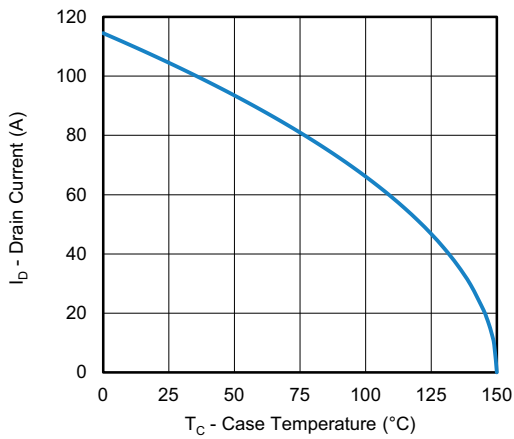
Safe Operating Area, Junction-to-Ambient

Note

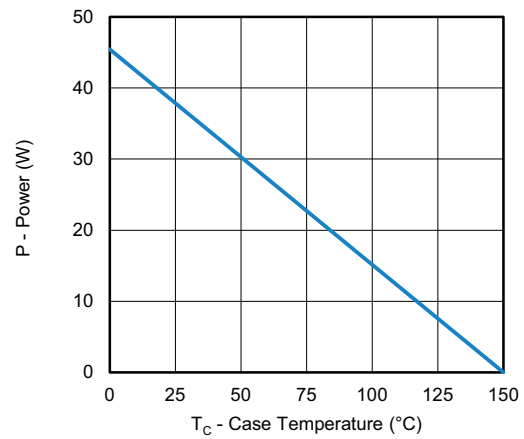
- a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Current Derating ^a



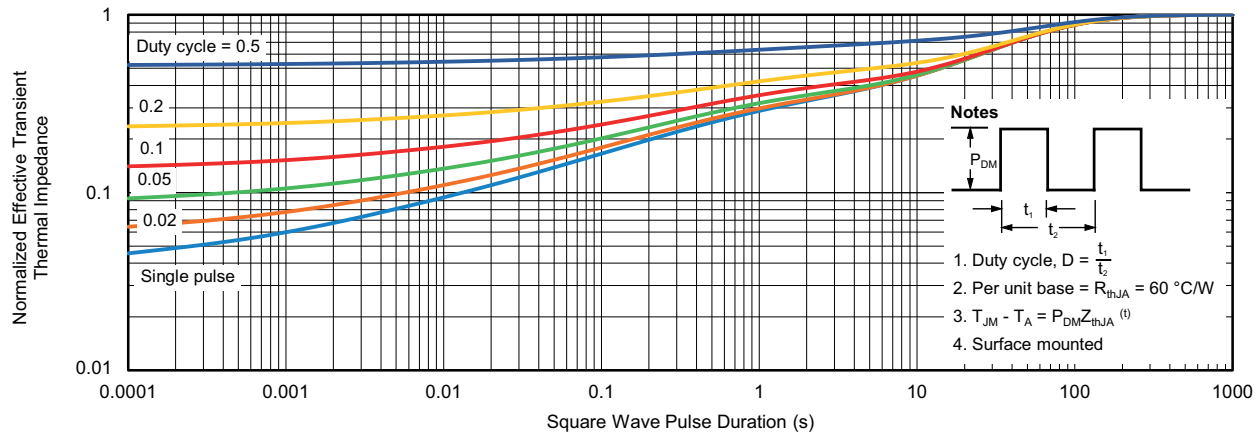
Power, Junction-to-Case

Note

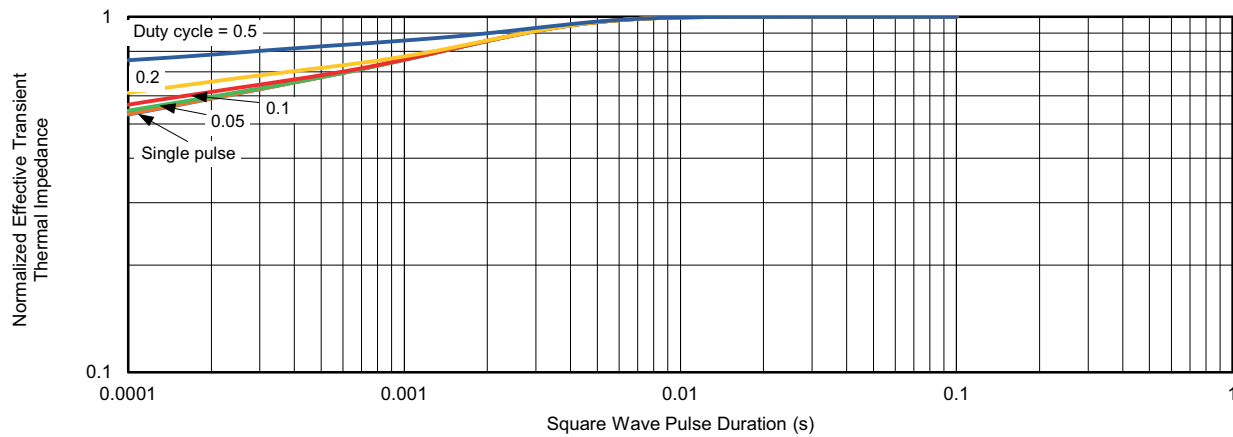
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



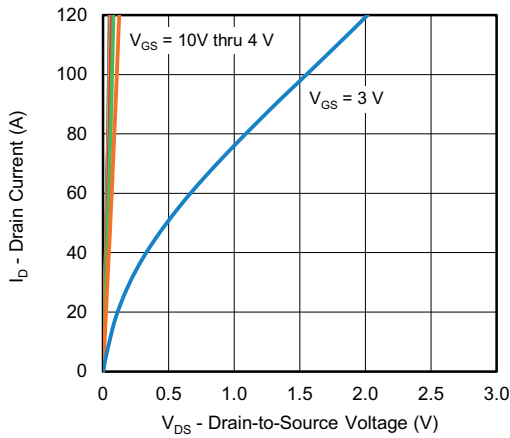
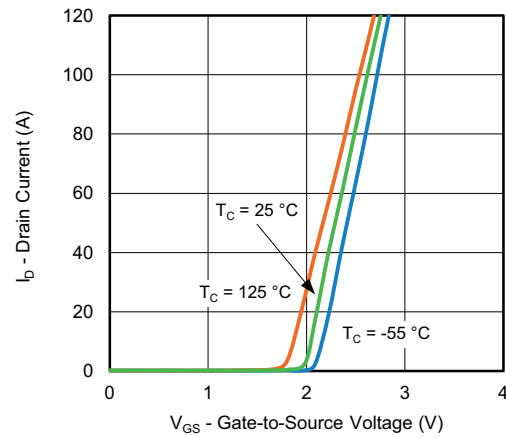
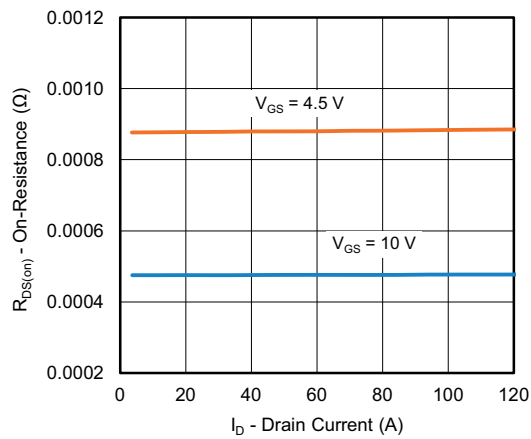
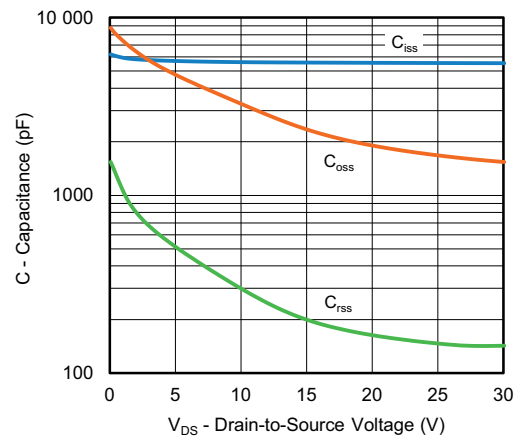
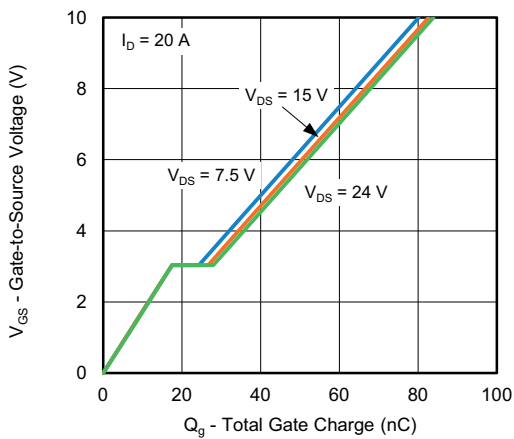
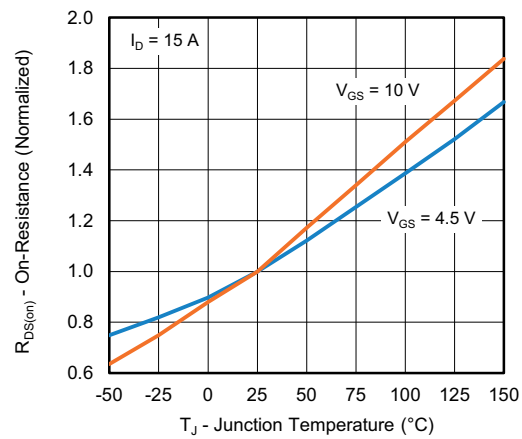
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



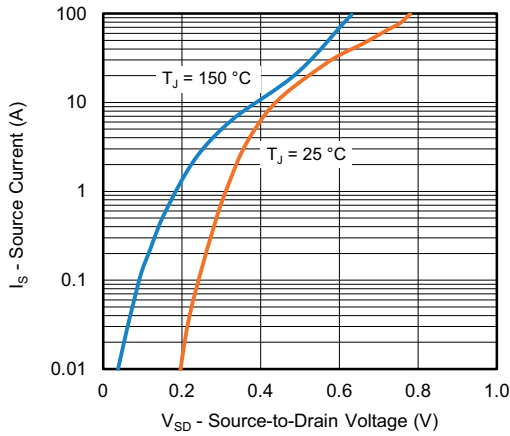
Normalized Thermal Transient Impedance, Junction-to-Ambient



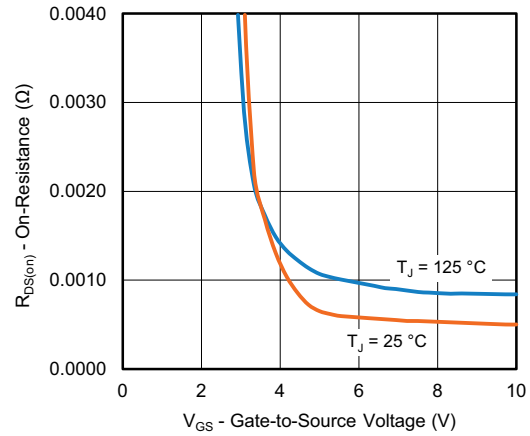
Normalized Thermal Transient Impedance, Junction-to-Case

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

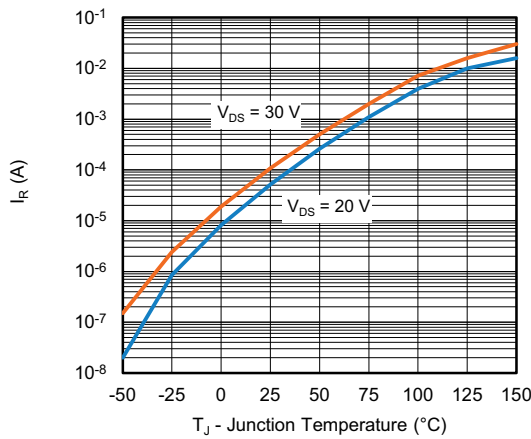
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



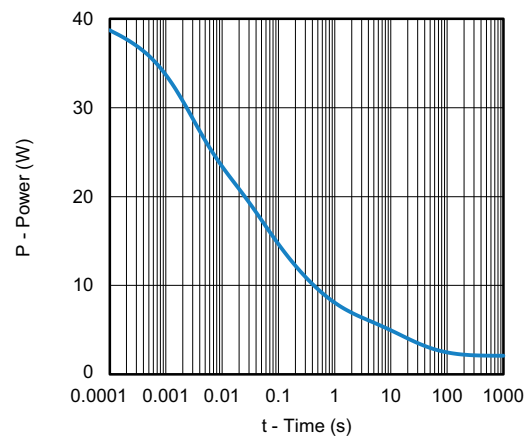
Source-Drain Diode Forward Voltage



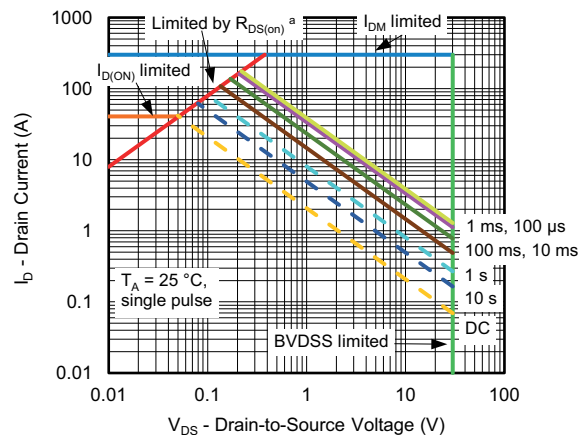
On-Resistance vs. Gate-to-Source Voltage



Reverse Current (Schottky)



Single Pulse Power, Junction-to-Ambient



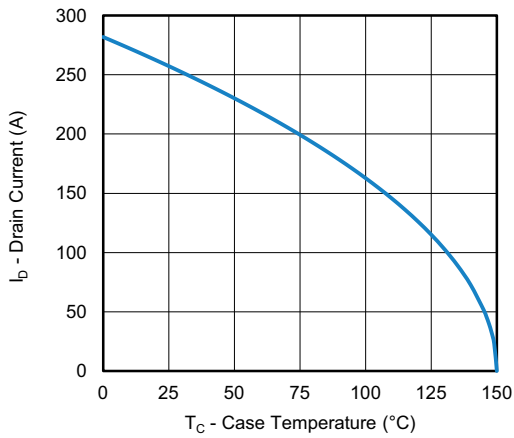
Safe Operating Area, Junction-to-Ambient

Note

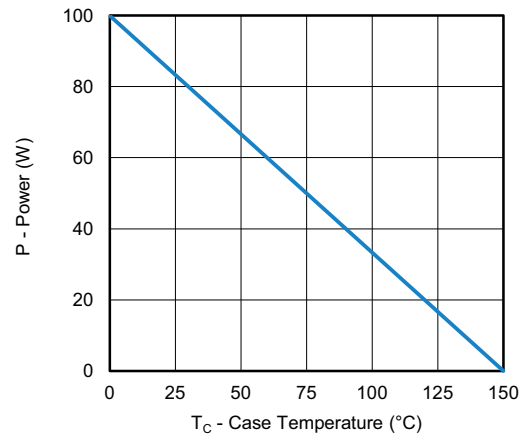
- a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Current Derating ^a



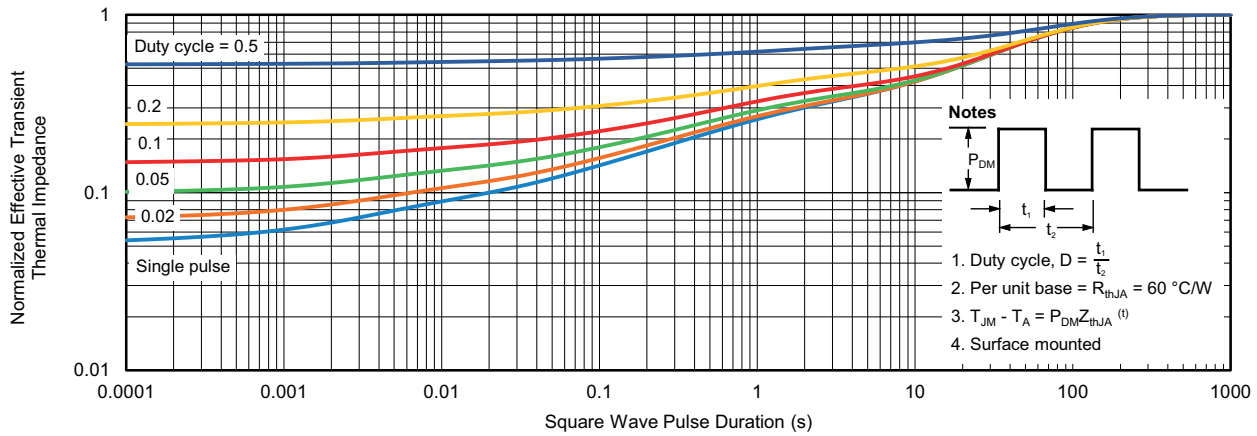
Power, Junction-to-Case

Note

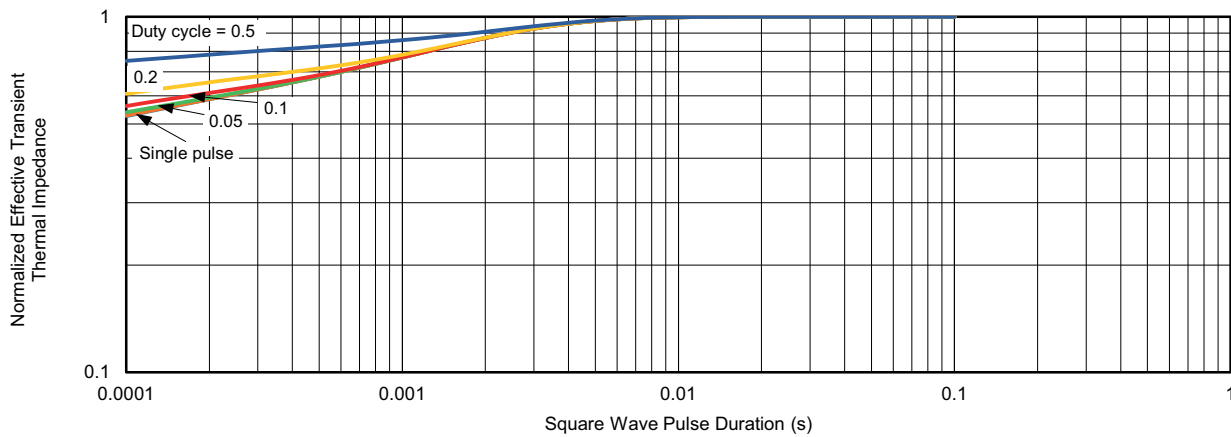
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



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



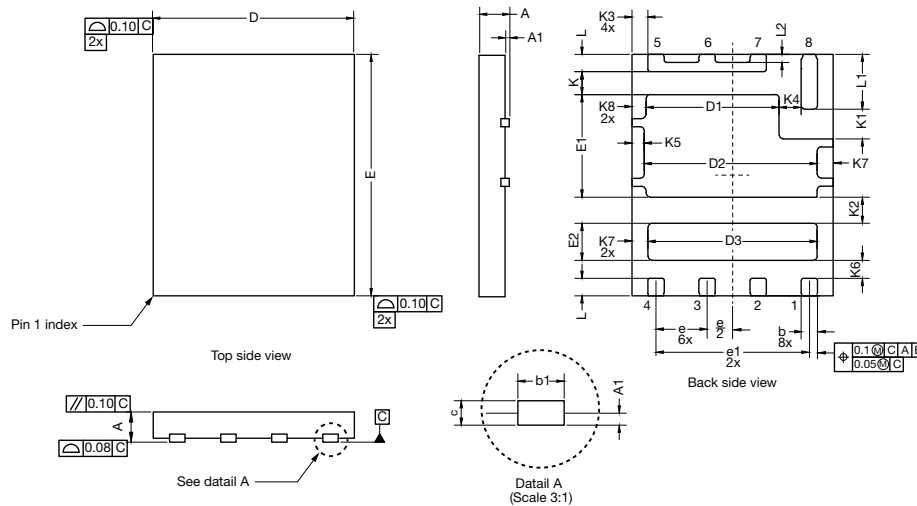
Normalized Thermal Transient Impedance, Junction-to-Ambient



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



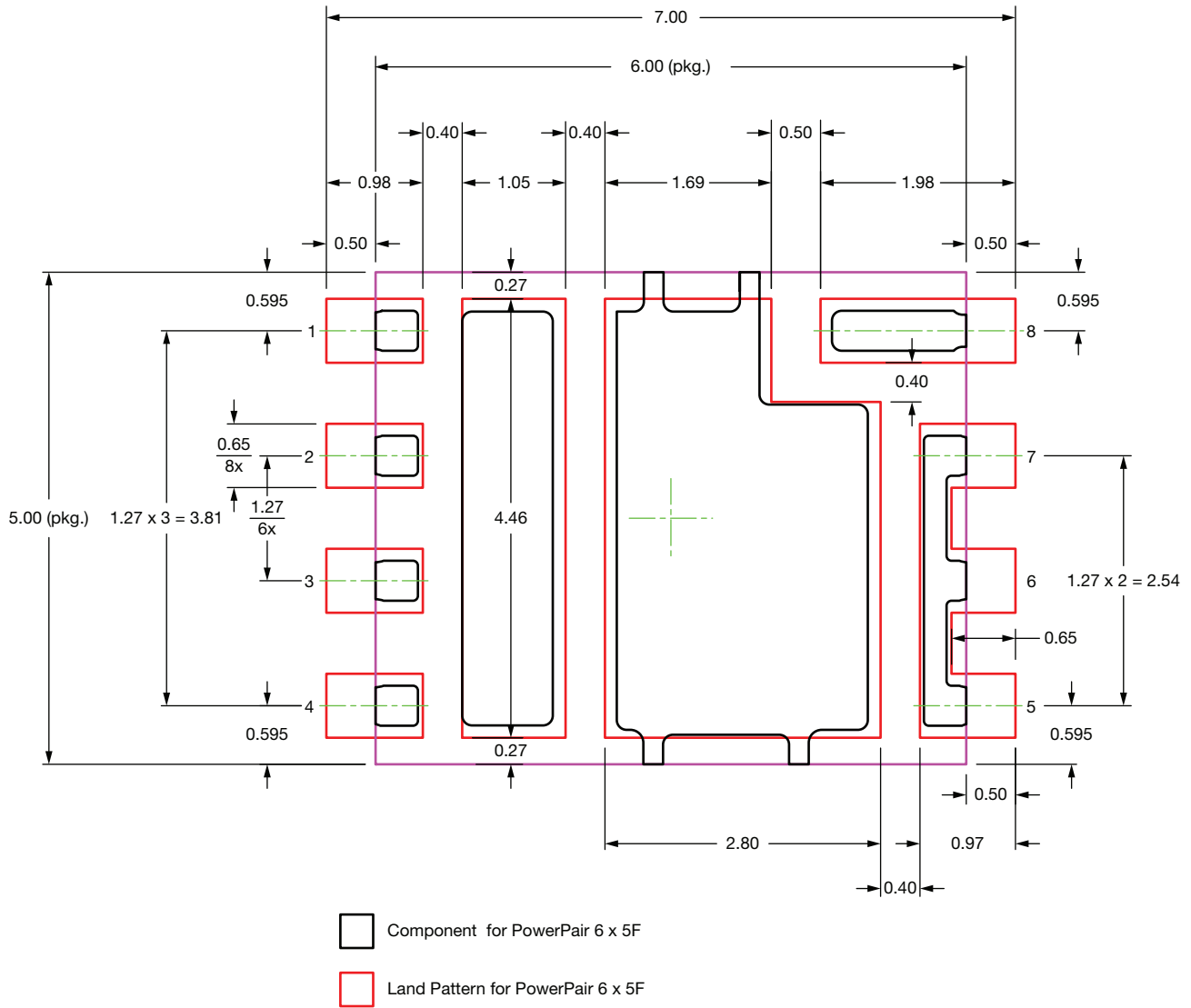
DIMENSION	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	-	0.10	0.000	-	0.004
b	0.35	0.41	0.46	0.014	0.016	0.018
b1	0.38 ref.			0.015 ref.		
c	0.15	0.20	0.25	0.006	0.008	0.010
D	4.90	5.00	5.10	0.193	0.197	0.201
D1	3.26	3.31	3.36	0.128	0.130	0.132
D2	4.20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



Disclaimer

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