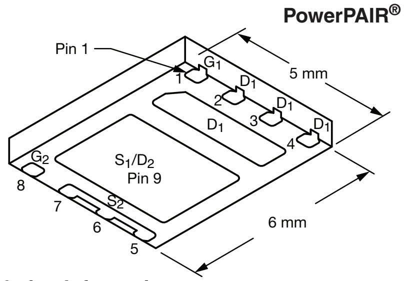
Dual N-Channel 30 V (D-S) MOSFETs

PRODUCT SUMMARY

	V_{DS} (V)	$R_{DS(on)}$ (Ω) (Max.)	I_D (A)	Q_g (Typ.)
Channel-1	30	0.0071 at V_{GS} = 10 V	40[a]	10.5 nC
		0.0089 at V_{GS} = 4.5 V	40[a]	
Channel-2	30	0.0030 at V_{GS} = 10 V	40[a]	29 nC
		0.0035 at V_{GS} = 4.5 V	40[a]	

PowerPAIR® 6 x 5



Ordering Information:
SiZ920DT-T1-GE3 (Lead (Pb)-free and Halogen-free)

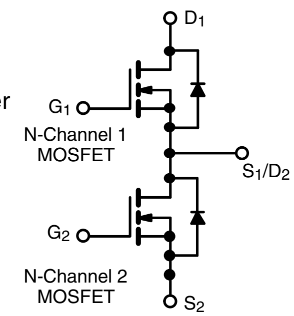
FEATURES

- 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

- CPU Core Power
- Computer Peripherals
- POL
- Synchronous Buck Converter



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		
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	40[a]	40[a]	A
	T_C = 70 °C		40[a]	40[a]	
	T_A = 25 °C		22[b, c]	32[b, c]	
	T_A = 70 °C		17[b, c]	26[b, c]	
Pulsed Drain Current (t = 300 µs)		I_{DM}	70	120	
Continuous Source Drain Diode Current	T_C = 25 °C	I_S	28[a]	28[a]	
	T_A = 25 °C		3.6[b, c]	4.3[b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	25	40	
Single Pulse Avalanche Energy		E_{AS}	31	80	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	39	100	W
	T_C = 70 °C		25	64	
	T_A = 25 °C		4.3[b, c]	5.2[b, c]	
	T_A = 70 °C		2.8[b, c]	3.3[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}	23	29	19	24	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	2.5	3.2	1	1.25	

Notes:
a. Package limited - T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. 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.
e. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under steady state conditions is 65 °C/W for channel-1 and 55 °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 = 250 µA	Ch-2	30			
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA	Ch-1		34		mV/°C
		I_D = 250 µA	Ch-2		31		
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I_D = 250 µA	Ch-1		- 5.2		
		I_D = 250 µA	Ch-2		- 6.1		
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	Ch-1	1.2		2.5	V
		V_{DS} = V_{GS}, I_D = 250 µA	Ch-2	1		2.2	
Gate Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 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
		V_{DS} = 30 V, V_{GS} = 0 V	Ch-2			1	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C	Ch-1			5	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C	Ch-2			5	
On-State Drain Current[b]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	Ch-1	20			A
		$V_{DS} \geq$ 5 V, V_{GS} = 10 V	Ch-2	25			
Drain-Source On-State Resistance[b]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 18.9 A	Ch-1		0.0059	0.0071	Ω
		V_{GS} = 10 V, I_D = 20 A	Ch-2		0.0025	0.0030	
		V_{GS} = 4.5 V, I_D = 16.9 A	Ch-1		0.0074	0.0089	
		V_{GS} = 4.5 V, I_D = 20 A	Ch-2		0.0029	0.0035	
Forward Transconductance[b]	g_{fs}	V_{DS} = 10 V, I_D = 18.9 A	Ch-1		66		S
		V_{DS} = 10 V, I_D = 20 A	Ch-2		140		
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		1260		pF
			Ch-2		3600		
Output Capacitance	C_{oss}		Ch-1		260		
			Ch-2		660		
Reverse Transfer Capacitance	C_{rss}		Ch-1		115		
			Ch-2		305		
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 18.9 A	Ch-1		22.3	35	nC
		V_{DS} = 15 V, V_{GS} = 10 V, I_D = 20 A	Ch-2		60	110	
		Channel-1 V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 18.9 A Channel-2 V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 20 A	Ch-1		10.5	16	
			Ch-2		29	51	
Gate-Source Charge	Q_{gs}		Ch-1		5.1		
			Ch-2		10		
Gate-Drain Charge	Q_{gd}		Ch-1		2.8		
			Ch-2		9.5		
Gate Resistance	R_g	f = 1 MHz	Ch-1	0.3	1.6	3.2	Ω
			Ch-2	0.1	0.6	1.2	

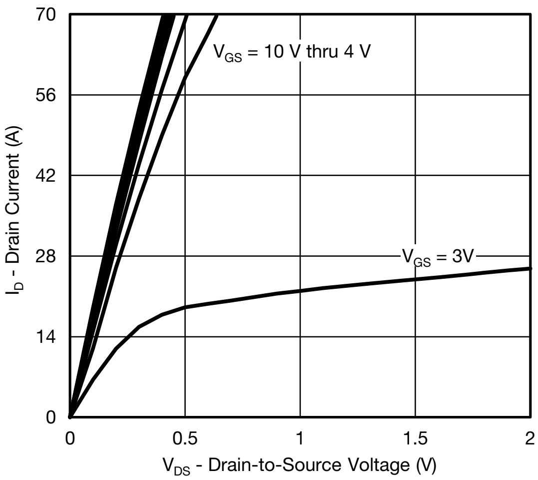
Notes:
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

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 $I_D \cong$ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω Channel-2 V_{DD} = 15 V, R_L = 1.5 Ω $I_D \cong$ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω	Ch-1		15	23	ns
			Ch-2		30	60	
Rise Time	t_r		Ch-1		18	30	
			Ch-2		35	70	
Turn-Off Delay Time	$t_{d(off)}$		Ch-1		15	23	
			Ch-2		35	70	
Fall Time	t_f		Ch-1		10	20	
			Ch-2		12	25	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 V_{DD} = 15 V, R_L = 1.5 Ω $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω Channel-2 V_{DD} = 15 V, R_L = 1.5 Ω $I_D \cong$ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	Ch-1		4	8	
			Ch-2		12	25	
Rise Time	t_r		Ch-1		11	25	
			Ch-2		12	25	
Turn-Off Delay Time	$t_{d(off)}$		Ch-1		18	30	
			Ch-2		35	70	
Fall Time	t_f		Ch-1		8	16	
			Ch-2		10	20	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C	Ch-1			40	A
			Ch-2			40	
Pulse Diode Forward Current[a]	I_{SM}		Ch-1			70	
			Ch-2			120	
Body Diode Voltage	V_{SD}	I_S = 10 A, V_{GS} = 0 V	Ch-1		0.8	1.2	V
		I_S = 10 A, V_{GS} = 0 V	Ch-2		0.8	1.2	
Body Diode Reverse Recovery Time	t_{rr}	Channel-1 I_F = 10 A, dI/dt = 100 A/µs, T_J = 25 °C Channel-2 I_F = 10 A, dI/dt = 100 A/µs, T_J = 25 °C	Ch-1		17	30	ns
			Ch-2		36	70	
Body Diode Reverse Recovery Charge	Q_{rr}		Ch-1		10	20	nC
			Ch-2		36	70	
Reverse Recovery Fall Time	t_a		Ch-1		10		ns
			Ch-2		20		
Reverse Recovery Rise Time	t_b		Ch-1		7		
			Ch-2		16		

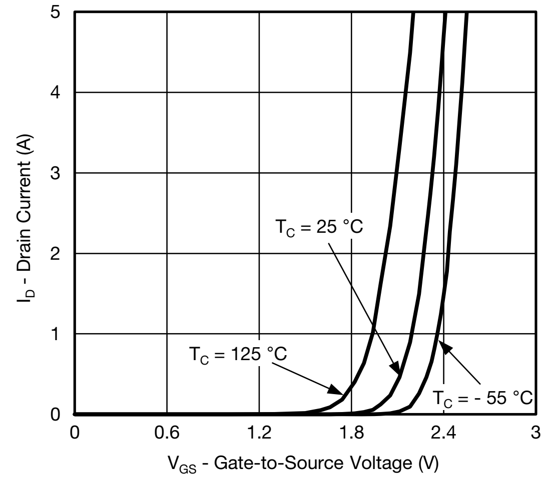
Notes:
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

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.

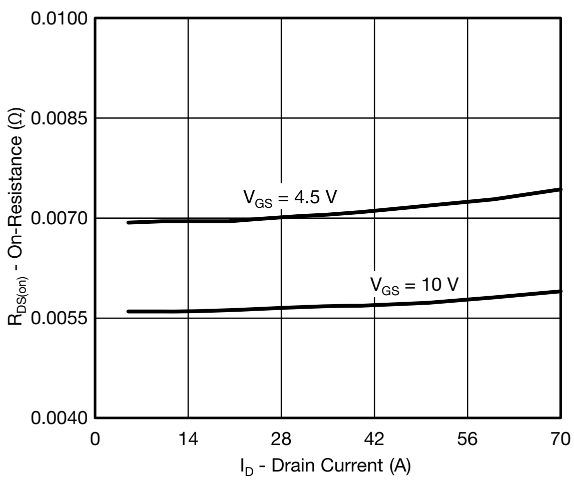
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



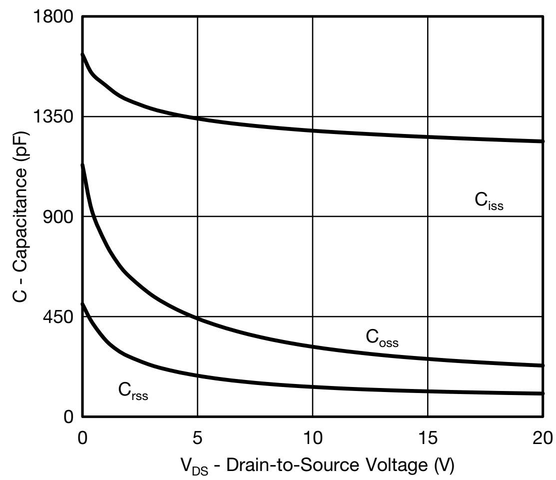
Output Characteristics



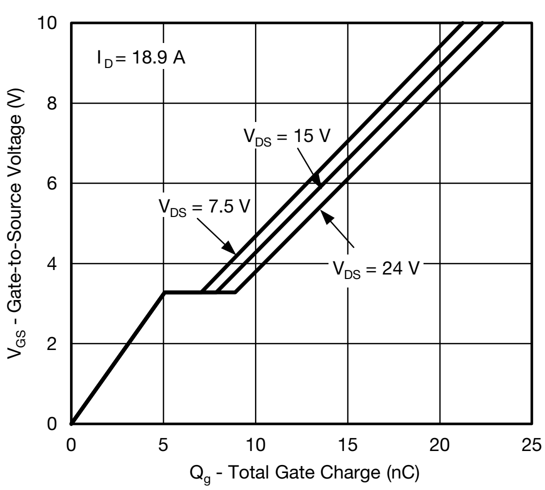
Transfer Characteristics



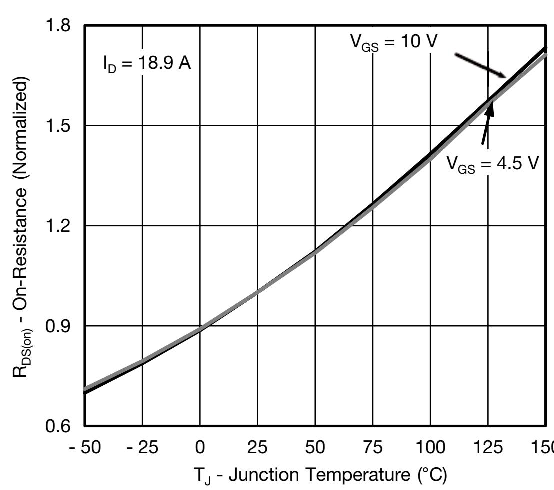
On-Resistance vs. Drain Current



Capacitance

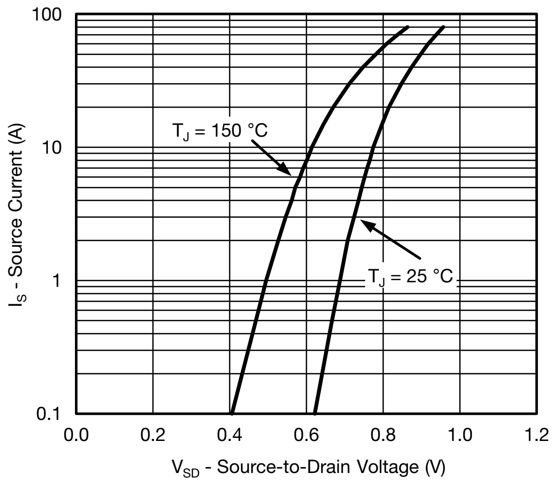


Gate Charge

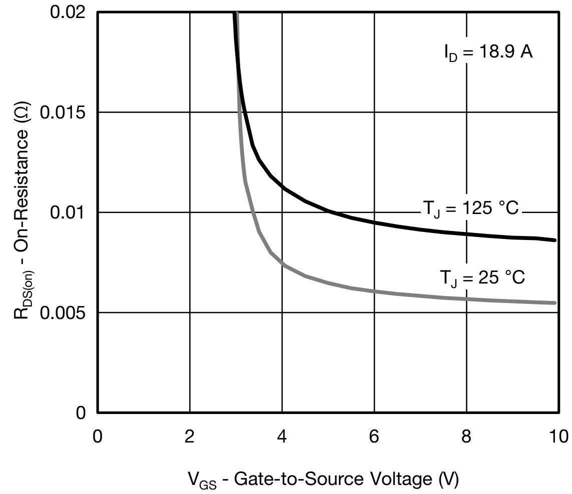


On-Resistance vs. Junction Temperature

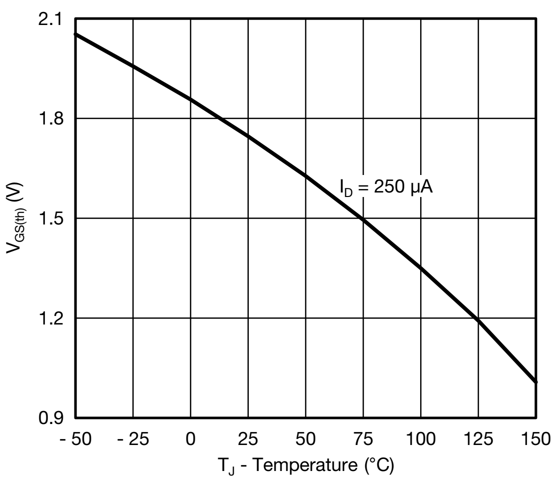
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



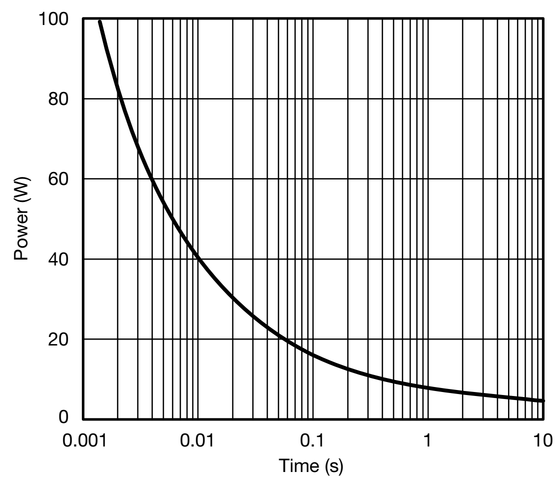
Source-Drain Diode Forward Voltage



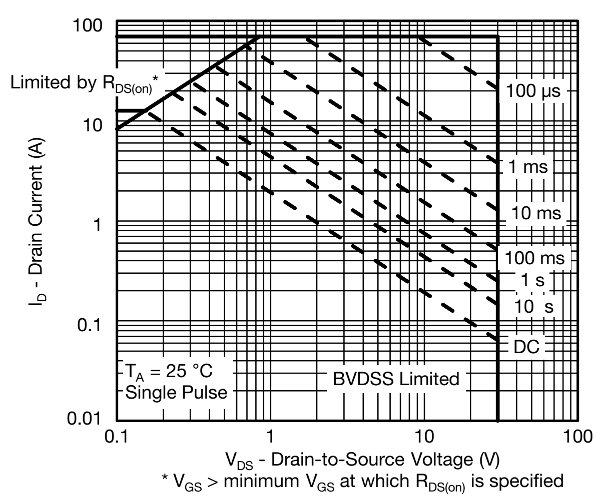
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



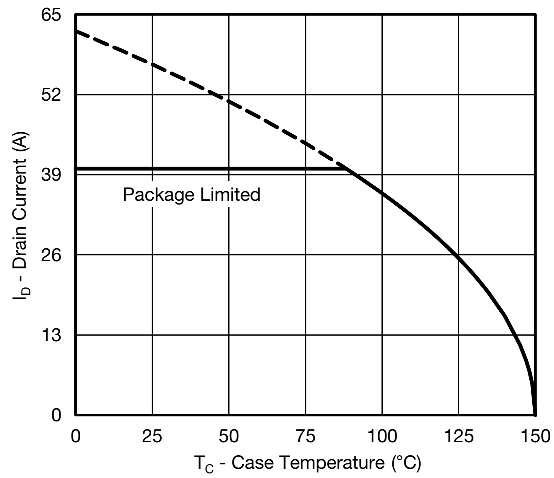
Single Pulse Power



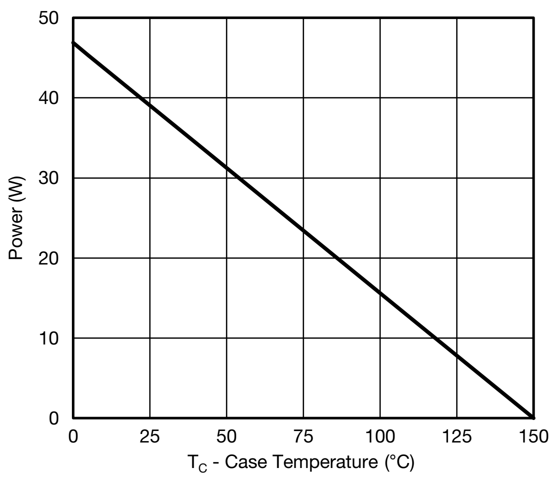
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

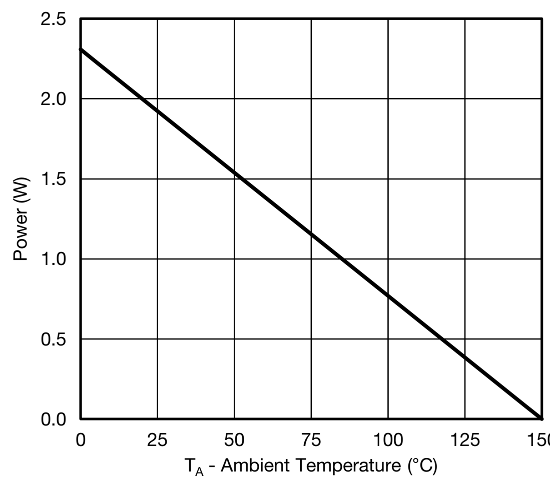
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



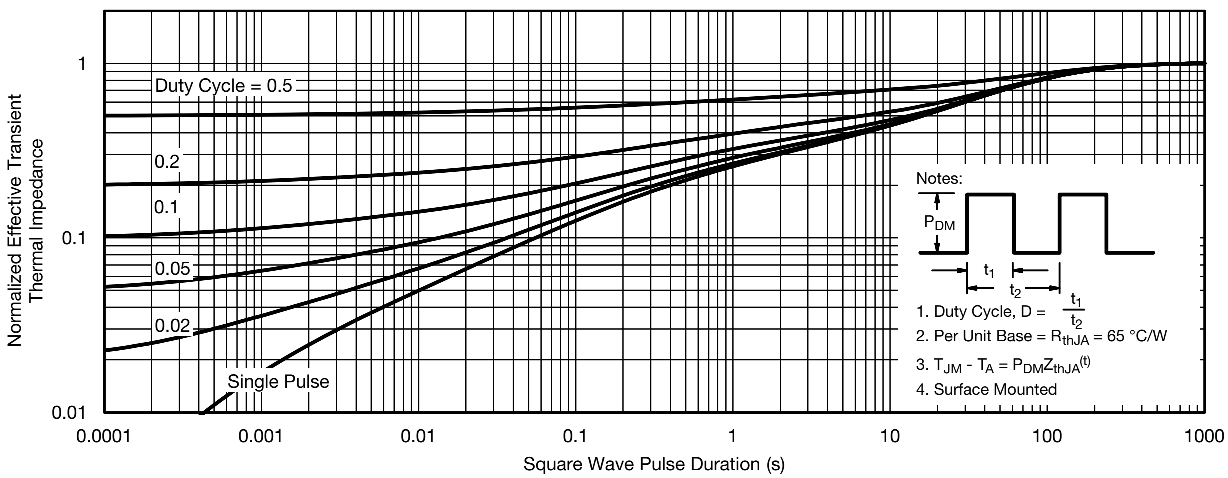
Power, Junction-to-Case



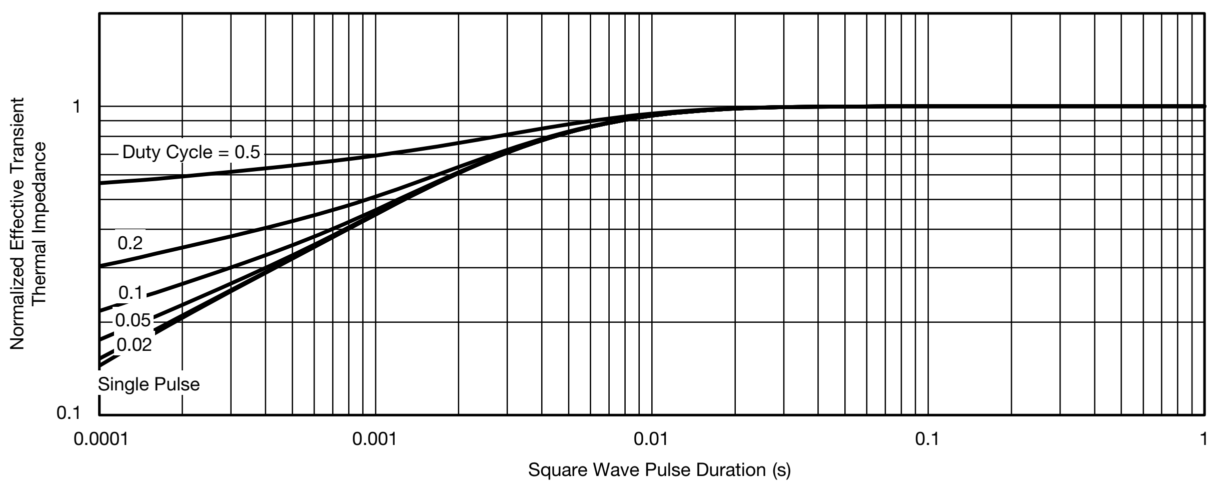
Power, Junction-to-Ambient

* 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)

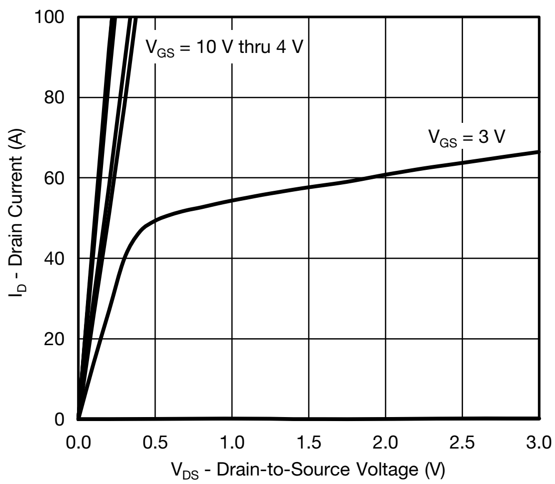


Normalized Thermal Transient Impedance, Junction-to-Ambient

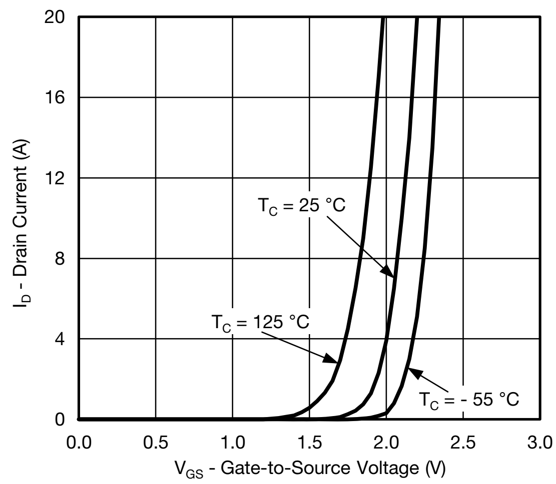


Normalized Thermal Transient Impedance, Junction-to-Case

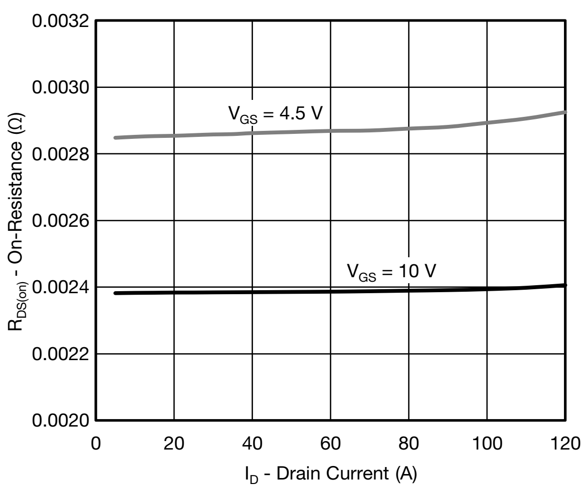
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



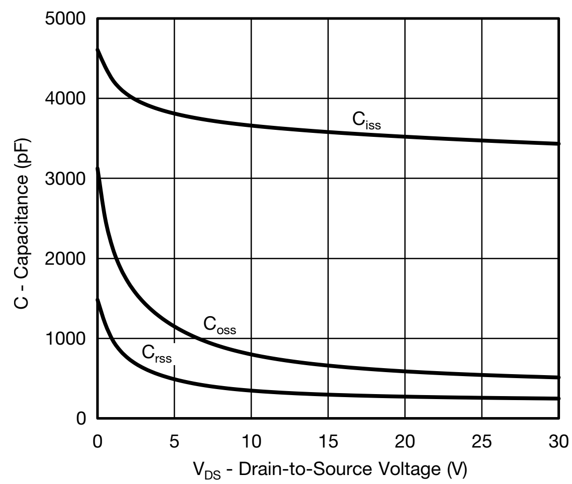
Output Characteristics



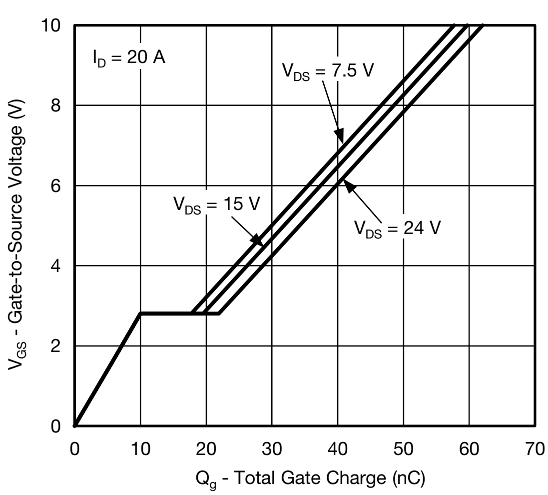
Transfer Characteristics



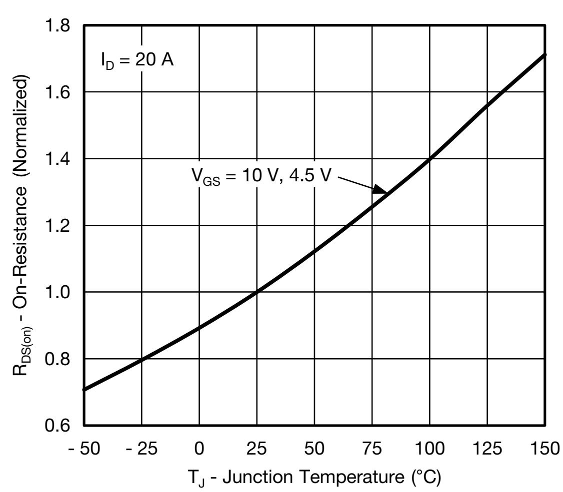
On-Resistance vs. Drain Current



Capacitance

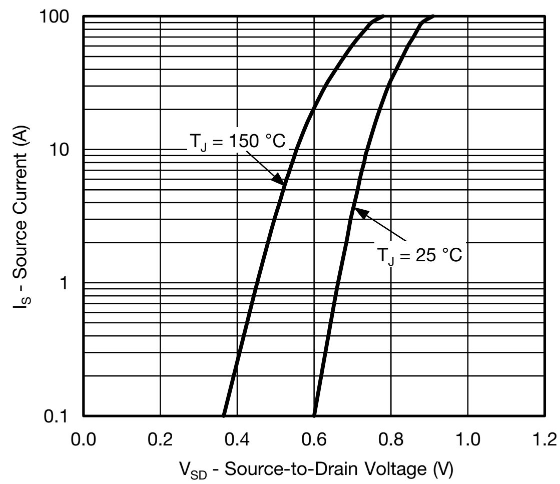


Gate Charge

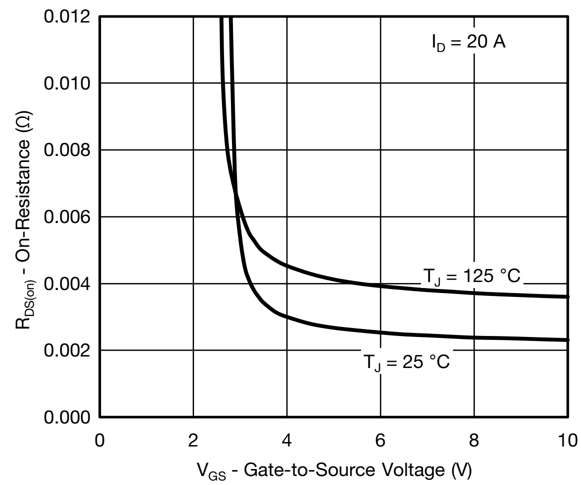


On-Resistance vs. Junction Temperature

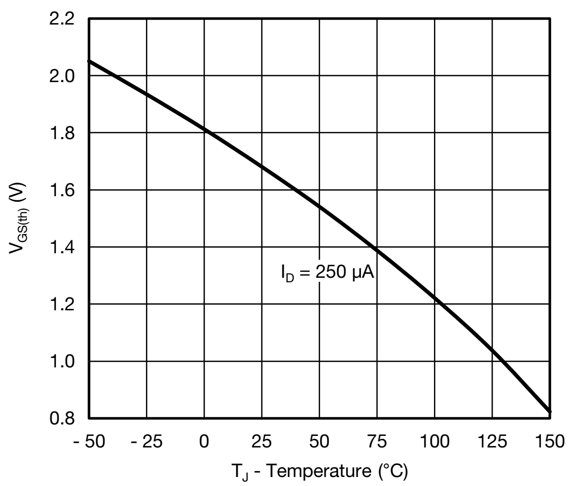
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



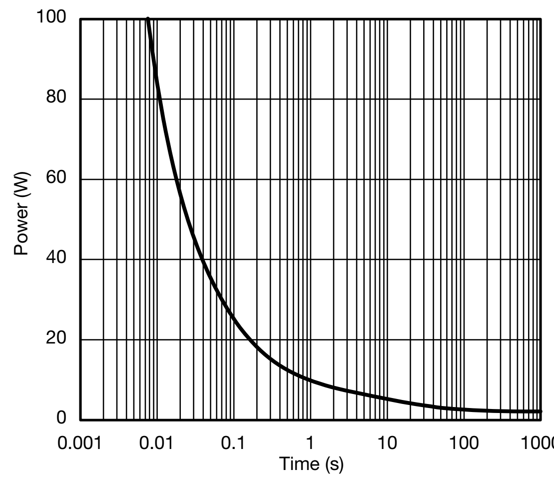
Source-Drain Diode Forward Voltage



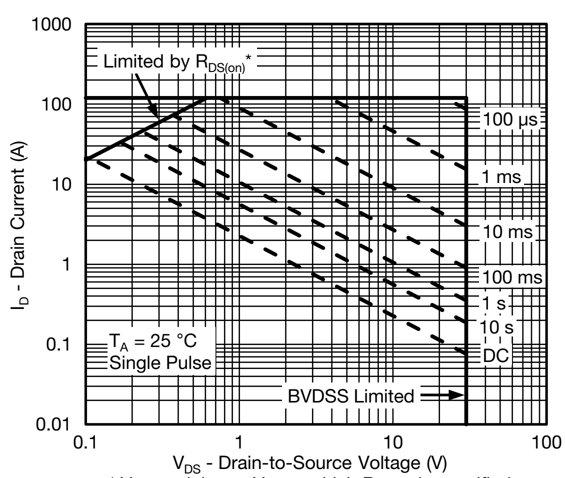
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



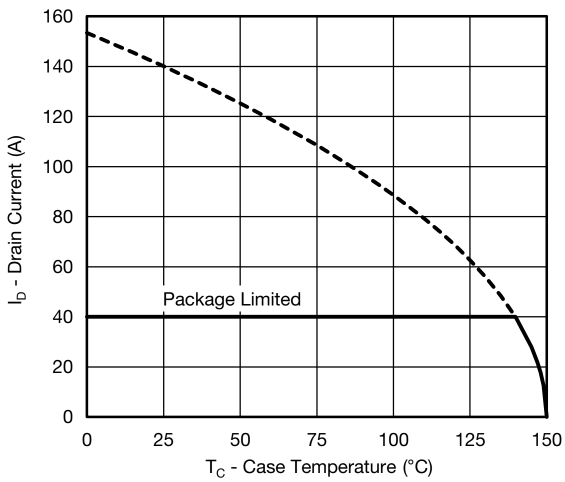
Single Pulse Power



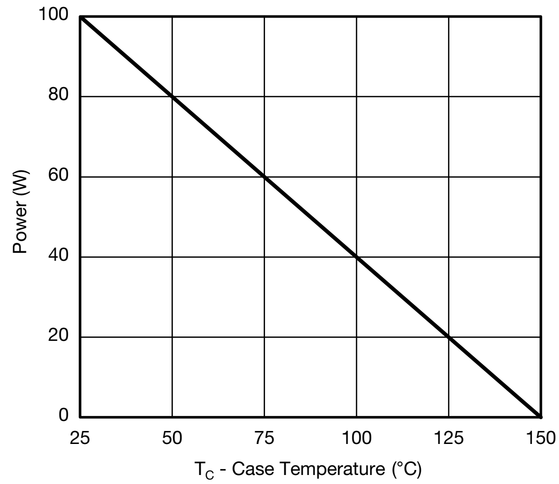
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

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



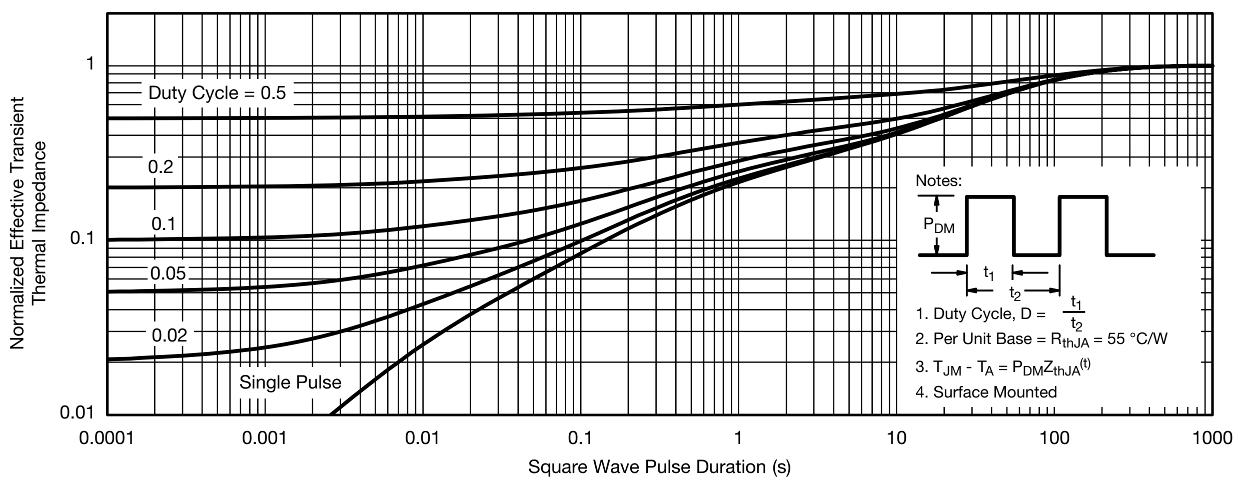
Current Derating*



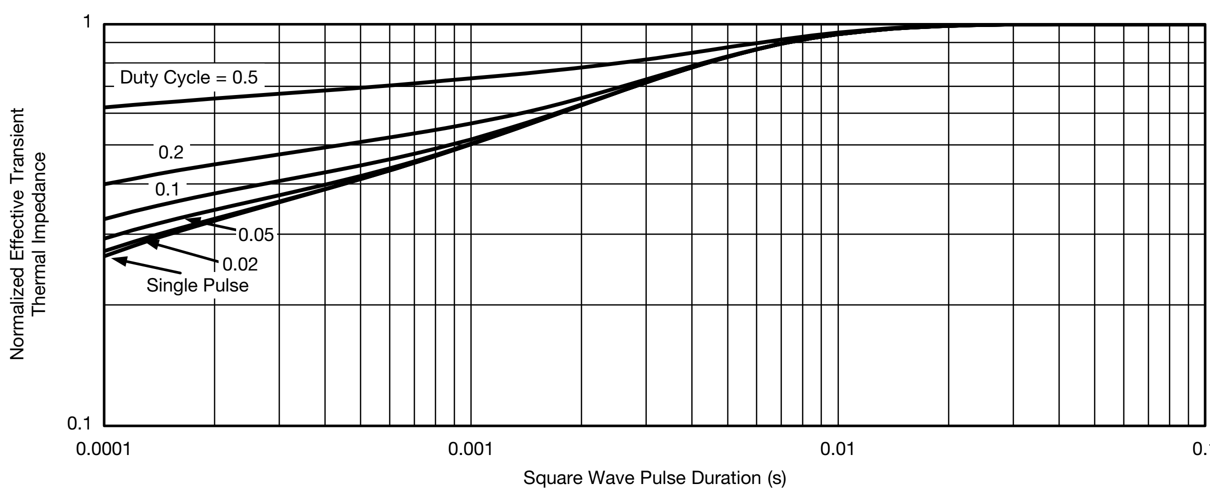
Power, Junction-to-Case

* 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)



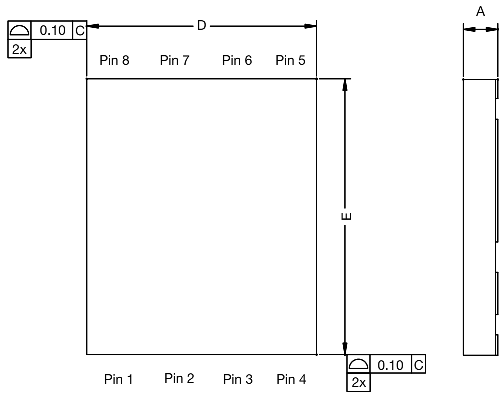
Normalized Thermal Transient Impedance, Junction-to-Ambient



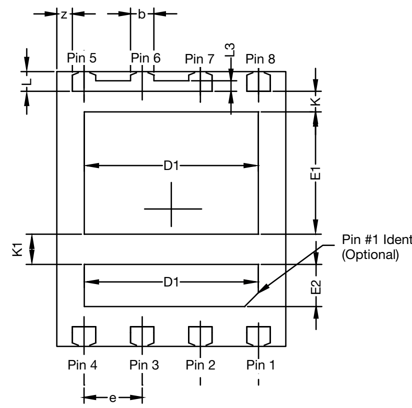
Normalized Thermal Transient Impedance, Junction-to-Case

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?63916.

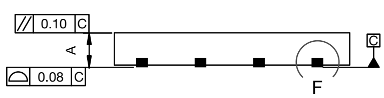
PowerPAIR® 6 x 5 Case Outline

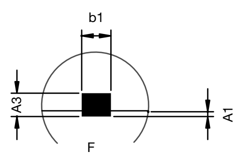


TOP SIDE VIEW



BACK SIDE VIEW

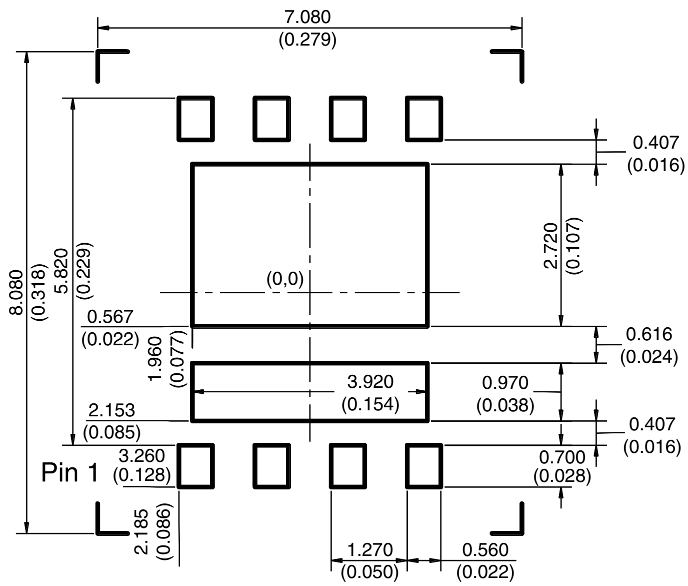




DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.032
A1	0.00	-	0.10	0.000	-	0.004
A3	0.20 REF			0.008 REF		
b	0.51 BSC			0.020 BSC		
b1	0.25 BSC			0.010 BSC		
D	5.00 BSC			0.197 BSC		
D1	3.75	3.80	3.85	0.148	0.150	0.152
E	6.00 BSC			0.236 BSC		
E1	2.62	2.67	2.72	0.103	0.105	0.107
E2	0.87	0.92	0.97	0.034	0.036	0.038
e	1.27 BSC			0.005 BSC		
K	0.45 TYP.			0.018 TYP.		
K1	0.66 TYP.			0.026 TYP.		
L	0.43 BSC			0.017 BSC		
L3	0.23 BSC			0.009 BSC		
z	0.34 BSC			0.013 BSC		

ECN: C11-1242-Rev. A, 07-Nov-11
DWG: 6005

RECOMMENDED MINIMUM PAD FOR PowerPAIR® 6 x 5



Recommended Minimum Pad
Dimensions in mm (inches)

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