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

PRODUCT SUMMARY

	V_{DS} (V)	$R_{DS(on)}$ (Ω) (Max.)	I_D (A)[g]	Q_g (Typ.)
Channel-1	30	0.00640 at V_{GS} = 10 V	16[a]	7.2 nC
		0.01000 at V_{GS} = 4.5 V	16[a]	
Channel-2	30	0.00137 at V_{GS} = 10 V	40[a]	30.1 nC
		0.00194 at V_{GS} = 4.5 V	40[a]	

PowerPAIR® 6 x 5
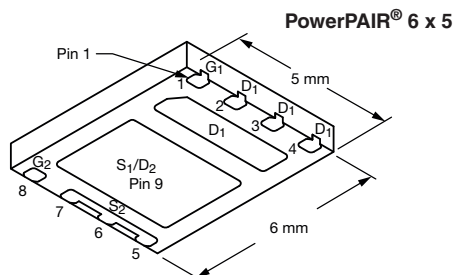
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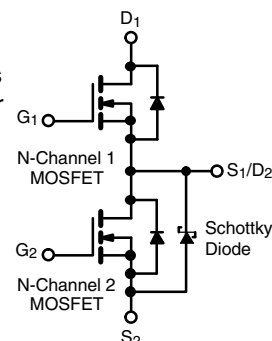SiZ914DT-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES
- TrenchFET® Gen IV Power MOSFETs
- 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
- Synchronous Buck Converter
- POL
- Telecom DC/DC

RoHS COMPLIANT

HALOGEN FREE

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, - 16		
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	16[a]	40[a]	A
	T_C = 70 °C		16[a]	40[a]	
	T_A = 25 °C		16[a, b, c]	40[a, b, c]	
	T_A = 70 °C		15.5[b, c]	38.8[b, c]	
Pulsed Drain Current (t = 100 µs)		I_{DM}	80	100	
Continuous Source Drain Diode Current	T_C = 25 °C	I_S	19	28	
	T_A = 25 °C		3.25[b, c]	4.3[b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	10	20	
Single Pulse Avalanche Energy		E_{AS}	5	20	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	22.7	100	W
	T_C = 70 °C		14.5	64	
	T_A = 25 °C		3.9[b, c]	5.2[b, c]	
	T_A = 70 °C		2.5[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 Typ.	Channel-1 Max.	Channel-2 Typ.	Channel-2 Max.	Unit
Maximum Junction-to-Ambient[b, f]	t ≤ 10 s	R_{thJA}	25	32	19	24	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	4.4	5.5	1	1.25	

Notes:
a. Package limited
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 62 °C/W for channel-1 and 55 °C/W for channel-2.
g. T_C = 25 °C.

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			
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$ = V$_{GS}$, I$_D$ = 250 µA	Ch-1	1.2		2.4	V
		V$_{DS}$ = V$_{GS}$, I$_D$ = 250 µA	Ch-2	1		2.4	
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
		V$_{DS}$ = 30 V, V$_{GS}$ = 0 V	Ch-2		60	240	
		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		0.5	5	mA
On-State Drain Current[b]	I$_{D(on)}$	V$_{DS}$ ≥ 5 V, V$_{GS}$ = 10 V	Ch-1	20			A
		V$_{DS}$ ≥ 5 V, V$_{GS}$ = 10 V	Ch-2	25			
Drain-Source On-State Resistance[b]	R$_{DS(on)}$	V$_{GS}$ = 10 V, I$_D$ = 19 A	Ch-1		0.00530	0.00640	Ω
		V$_{GS}$ = 10 V, I$_D$ = 20 A	Ch-2		0.00114	0.00137	
		V$_{GS}$ = 4.5 V, I$_D$ = 15 A	Ch-1		0.00800	0.01000	
		V$_{GS}$ = 4.5 V, I$_D$ = 20 A	Ch-2		0.00155	0.00194	
Forward Transconductance[b]	g$_{fs}$	V$_{DS}$ = 10 V, I$_D$ = 19 A	Ch-1		55		S
		V$_{DS}$ = 10 V, I$_D$ = 20 A	Ch-2		68		
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		1208		pF
			Ch-2		5603		
Output Capacitance	C$_{oss}$		Ch-1		375		
			Ch-2		2202		
Reverse Transfer Capacitance	C$_{rss}$		Ch-1		30		
			Ch-2		168		
C$_{rss}$/C$_{iss}$ Ratio			Ch-1		0.025	0.050	
			Ch-2		0.032	0.064	
Total Gate Charge	Q$_g$	V$_{DS}$ = 15 V, V$_{GS}$ = 10 V, I$_D$ = 20 A	Ch-1		17	26	nC
		V$_{DS}$ = 15 V, V$_{GS}$ = 10 V, I$_D$ = 20 A	Ch-2		66	99	
		Channel-1 V$_{DS}$ = 15 V, V$_{GS}$ = 4.5 V, I$_D$ = 20 A Channel-2 V$_{DS}$ = 15 V, V$_{GS}$ = 4.5 V, I$_D$ = 20 A	Ch-1		7.2	11	
			Ch-2		30.1	45.2	
Gate-Source Charge	Q$_{gs}$		Ch-1		3.6		
			Ch-2		10.9		
Gate-Drain Charge	Q$_{gd}$		Ch-1		0.94		
			Ch-2		3.8		
Output Charge	Q$_{oss}$	V$_{DS}$ = 15 V, V$_{GS}$ = 0 V	Ch-1		10		
			Ch-2		60		
Gate Resistance	R$_g$	f = 1 MHz	Ch-1	0.5	2.5	5	Ω
			Ch-2	0.2	1	2	

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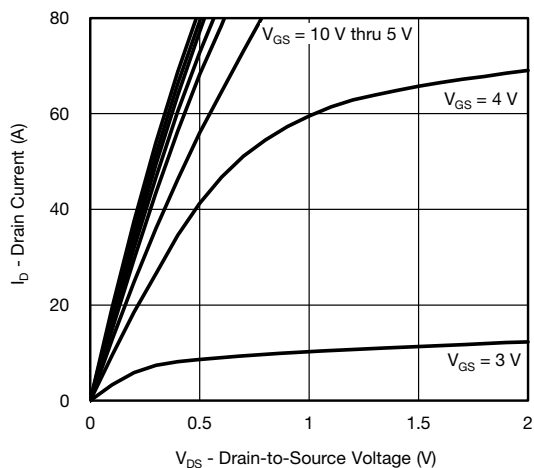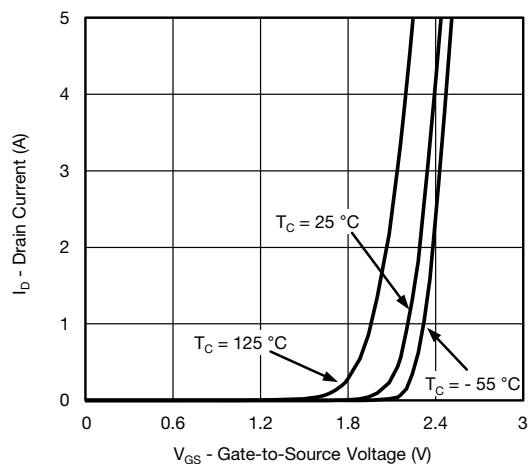b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

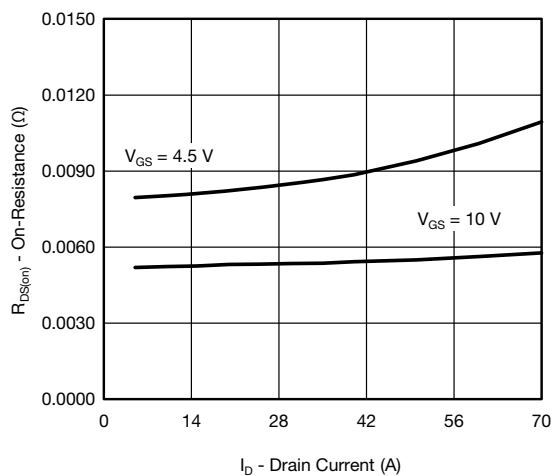This document is subject to change without notice.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)

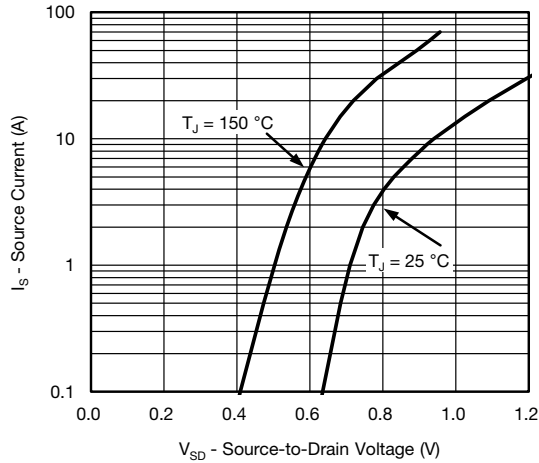| Parameter	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Dynamic[a]							
Turn-On Delay Time	$t_{d(on)}$	Channel-1 V_{DD} = 15 V, R_L = 1.5 Ω $I_D \cong$ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω	Ch-1		16	24	ns
			Ch-2		40	60	
Rise Time	t_r		Ch-1		11	20	
			Ch-2		127	190	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 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	
			Ch-2		40	60	
Fall Time	t_f		Ch-1		5	10	
			Ch-2		19	29	
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	Ch-1		10	20	
			Ch-2		12	20	
Rise Time	t_r		Ch-1		10	20	
			Ch-2		30	45	
Turn-Off Delay Time	$t_{d(off)}$	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		20	30	
			Ch-2		35	53	
Fall Time	t_f		Ch-1		5	10	
			Ch-2		7	14	
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 (t = 100 µs)	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 = 2 A, V_{GS} = 0 V	Ch-2		0.33	0.42	
Body Diode Reverse Recovery Time	t_{rr}	Channel-1 I_F = 10 A, dI/dt = 100 A/µs, T_J = 25 °C	Ch-1		15	23	ns
			Ch-2		62	93	
Body Diode Reverse Recovery Charge	Q_{rr}		Ch-1		4	8	nC
			Ch-2		96	144	
Reverse Recovery Fall Time	t_a	Channel-2 I_F = 10 A, dI/dt = 100 A/µs, T_J = 25 °C	Ch-1		9		ns
			Ch-2		30.5		
Reverse Recovery Rise Time	t_b		Ch-1		6		
			Ch-2		31.5		

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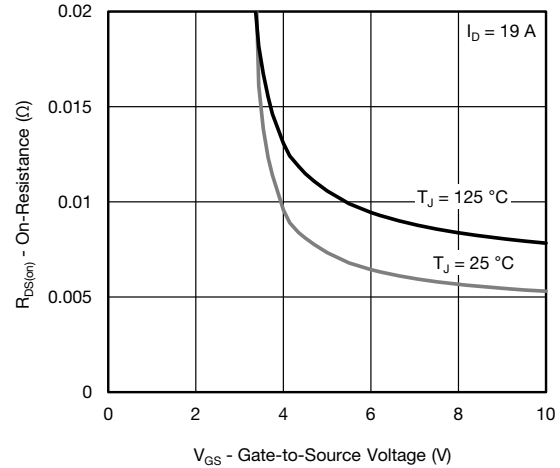b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

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.

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

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance
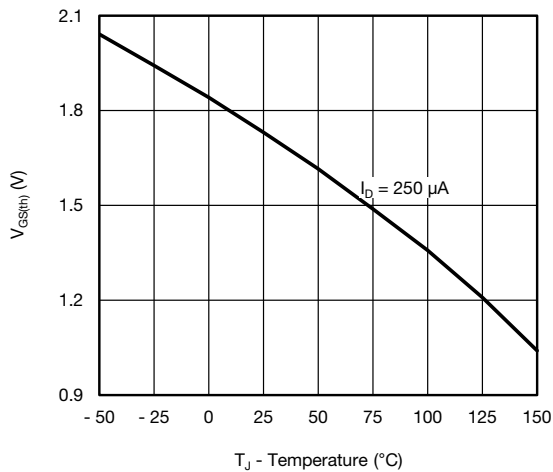
Gate Charge

On-Resistance vs. Junction Temperature

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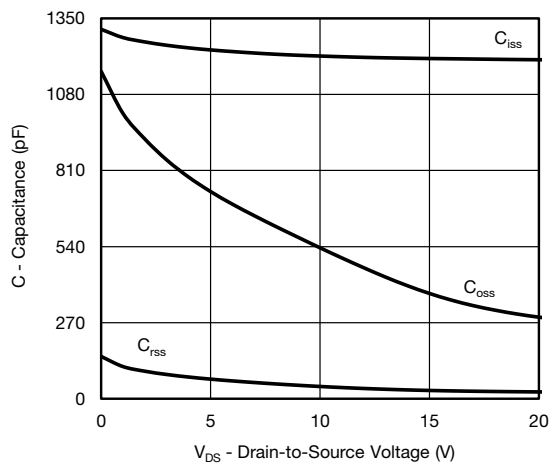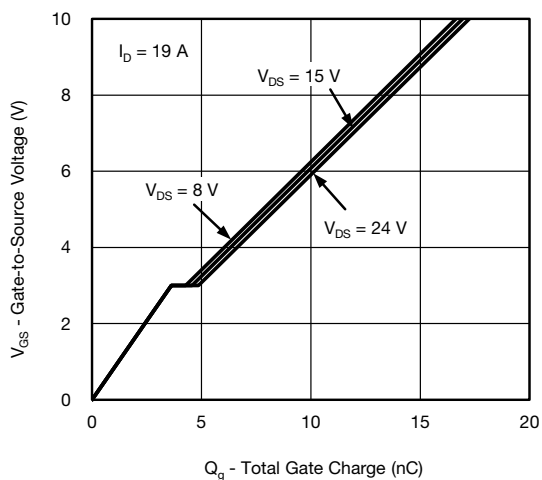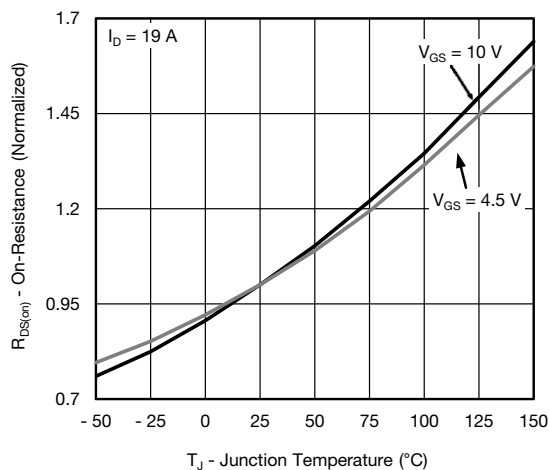
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

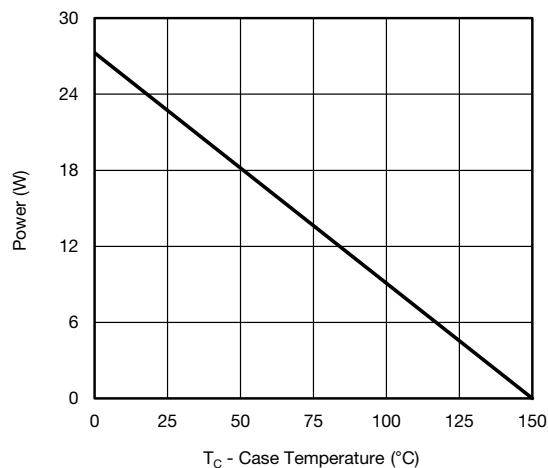On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage
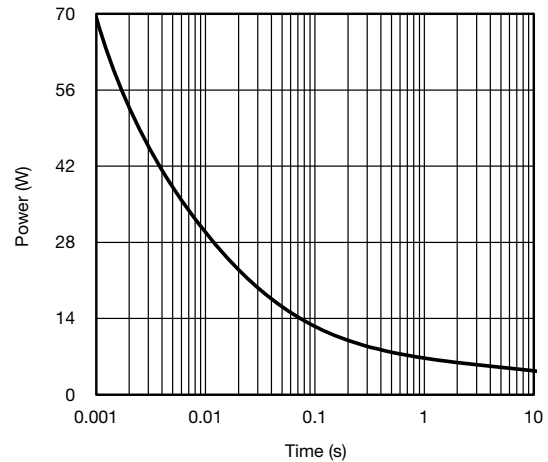
Single Pulse Power, Junction-to-Ambient
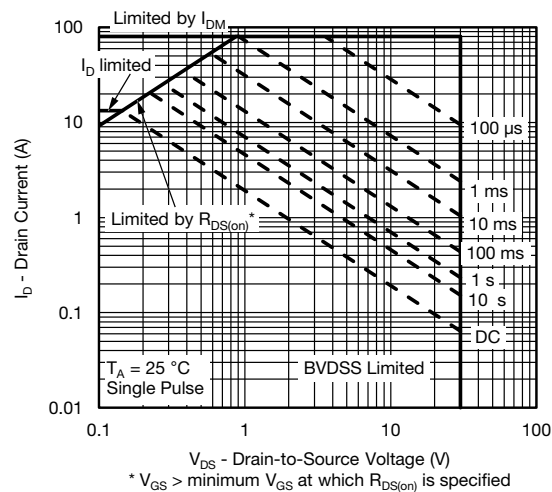
Safe Operating Area, Junction-to-Ambient

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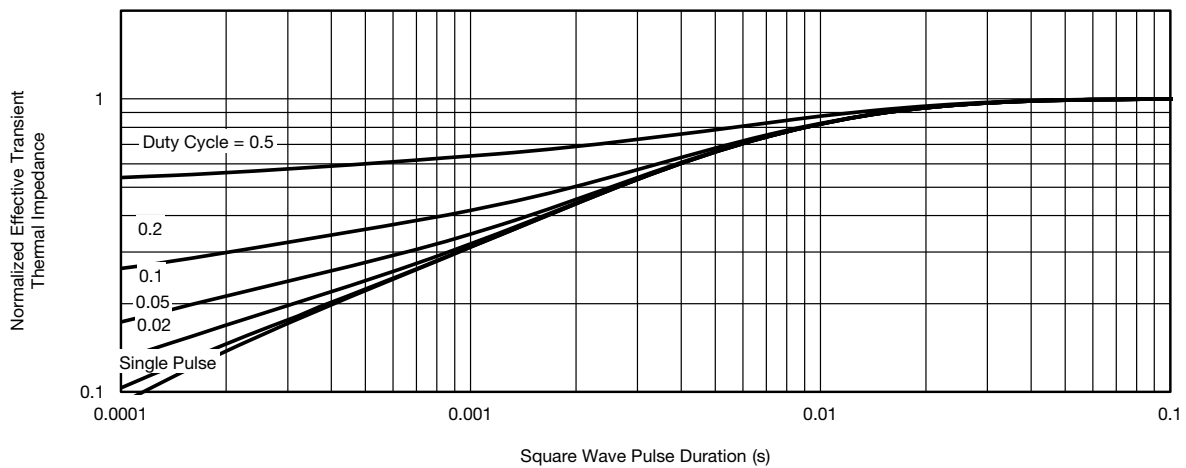
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)
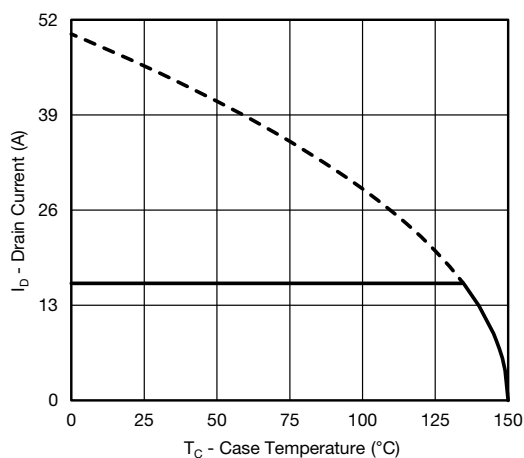
Current Derating*

Power, Junction-to-Case
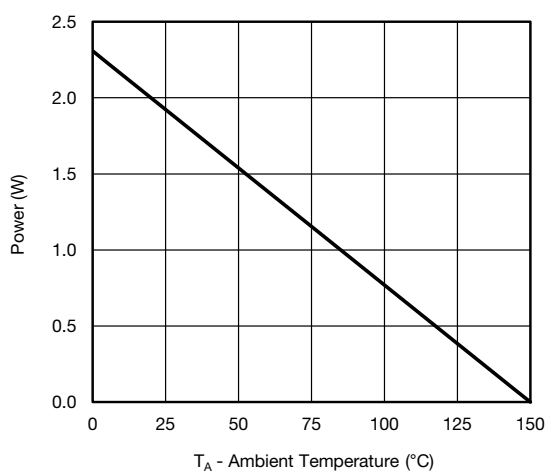
Power, Junction-to-Ambient

* 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.
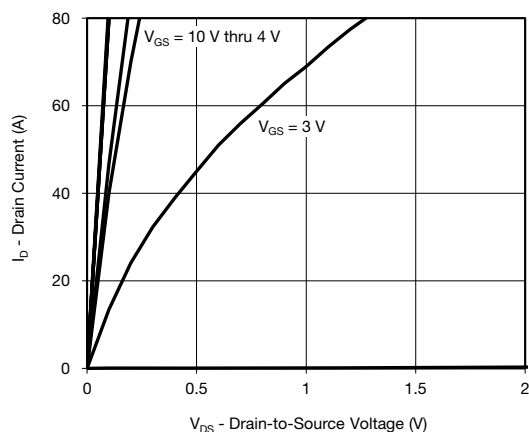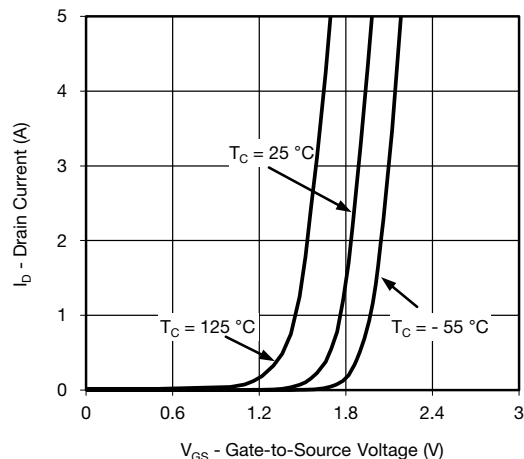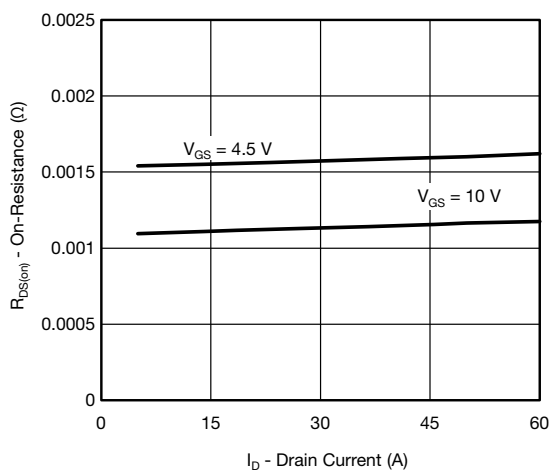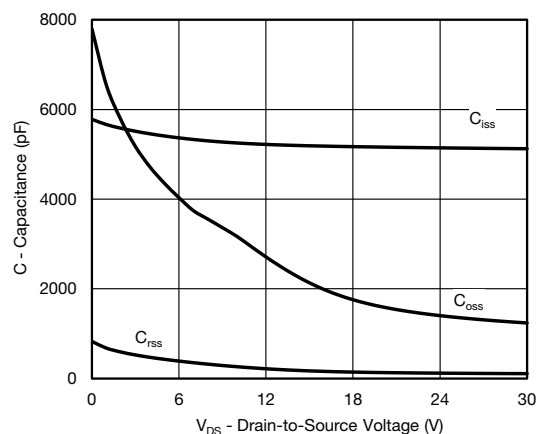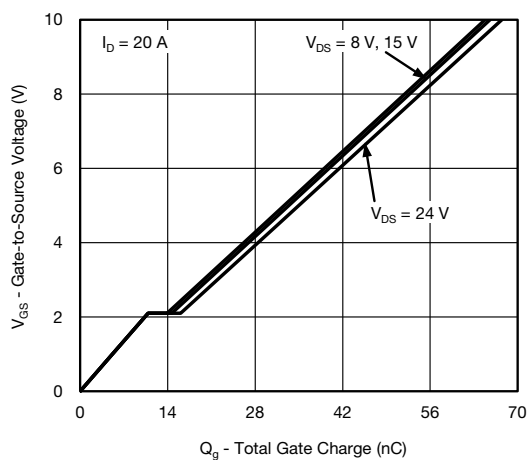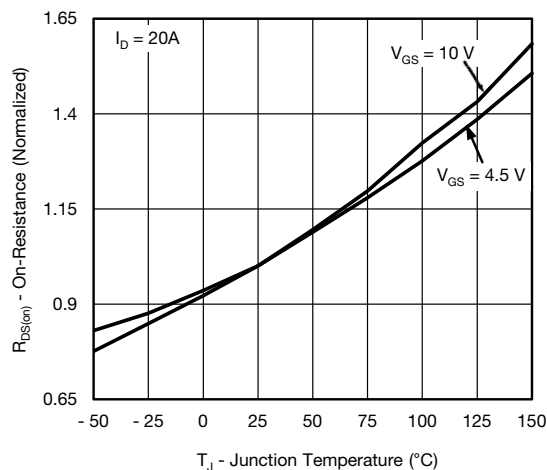
CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)
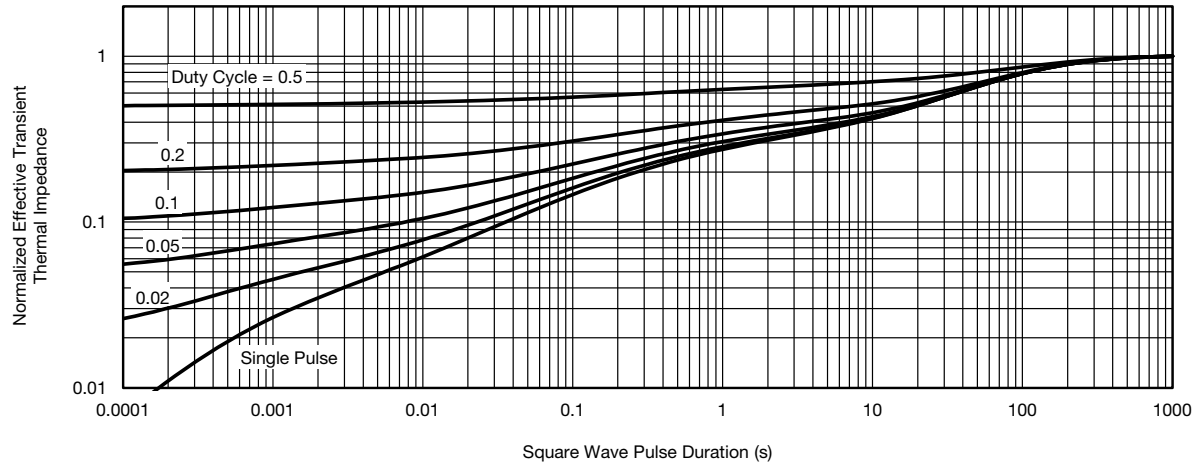
Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case

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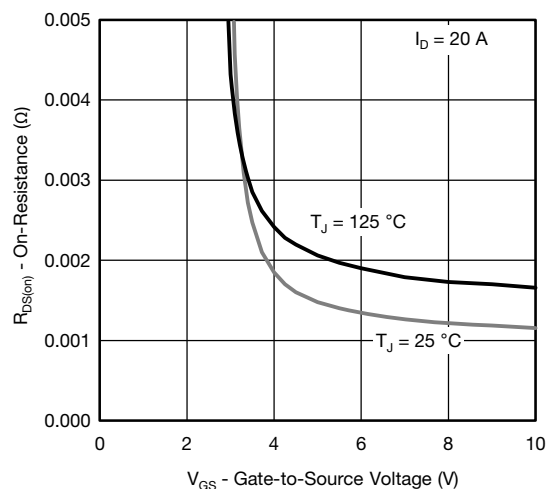
CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

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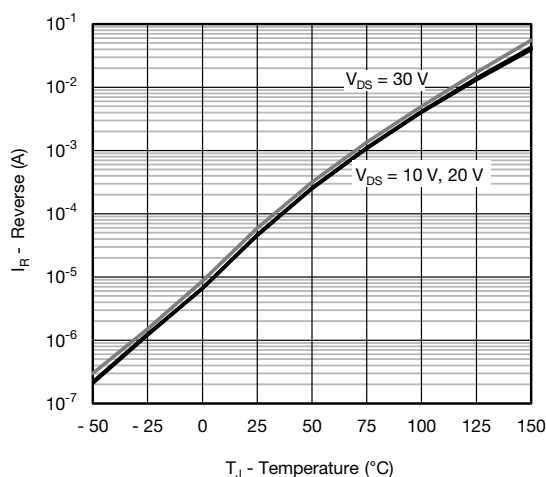
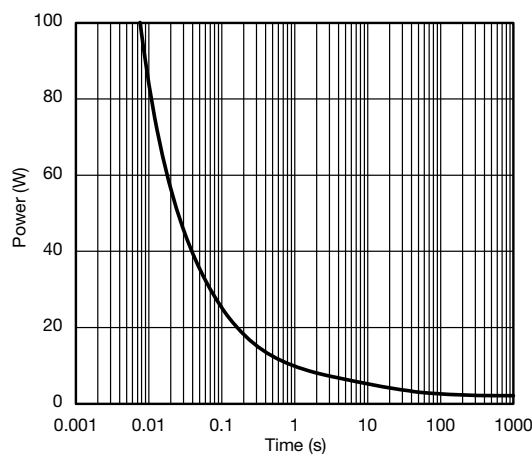## CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)
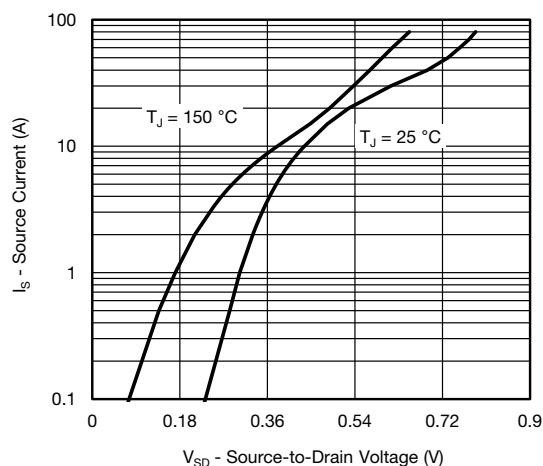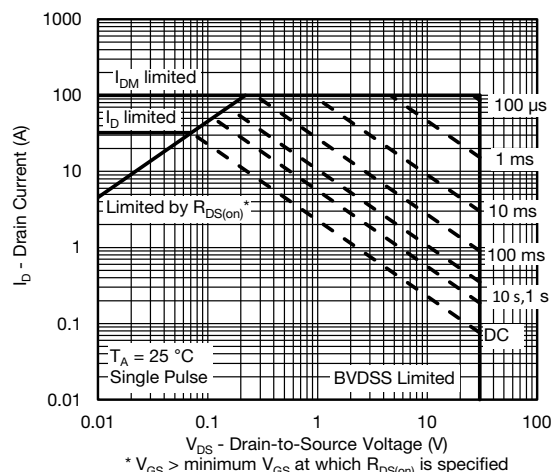
Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Reverse Current (Schottky)
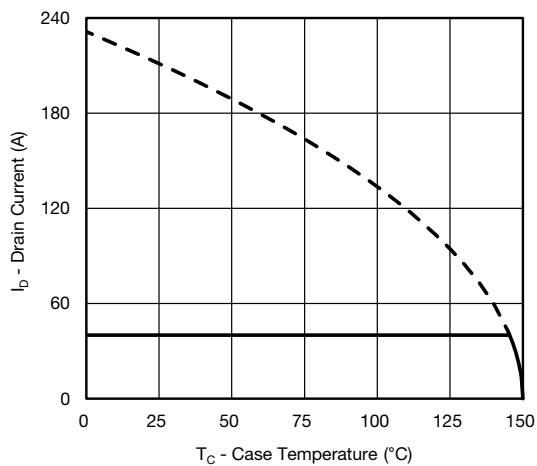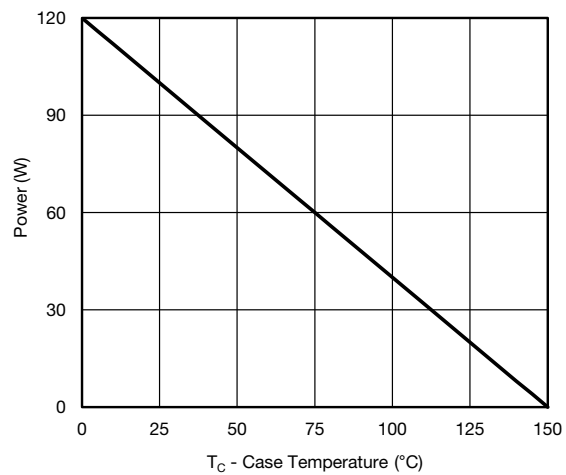
Single Pulse Power, Junction-to-Ambient

Safe Operating Area, Junction-to-Ambient

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

Current Derating*

Power, Junction-to-Case
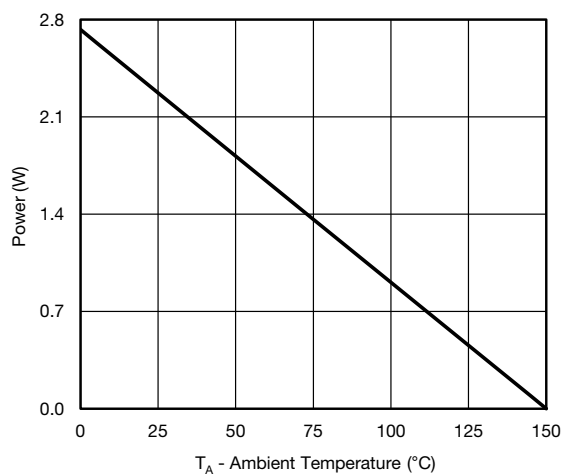
Power, Junction-to-Ambient

* 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-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)
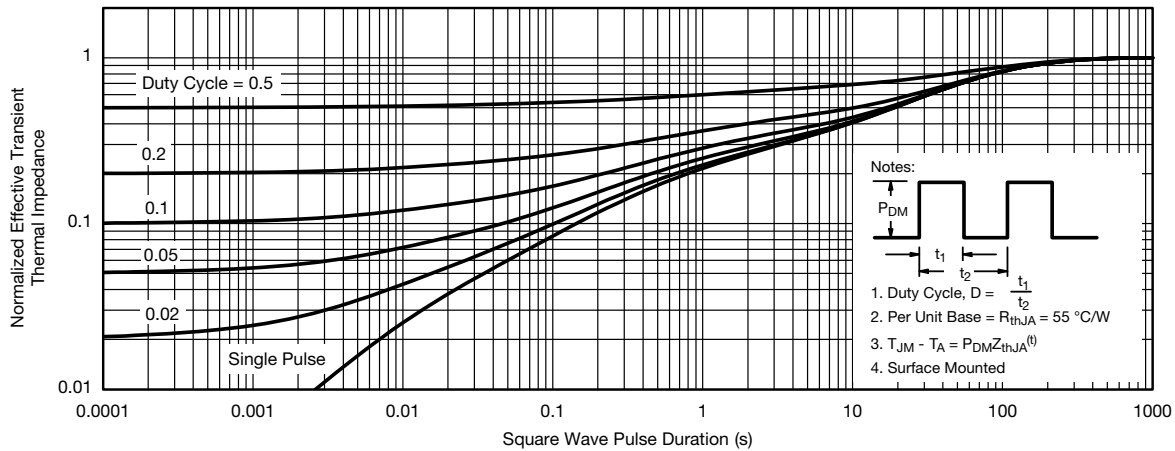
Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case

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PowerPAIR® 6 x 5 Case Outline

Top side view

Back side view
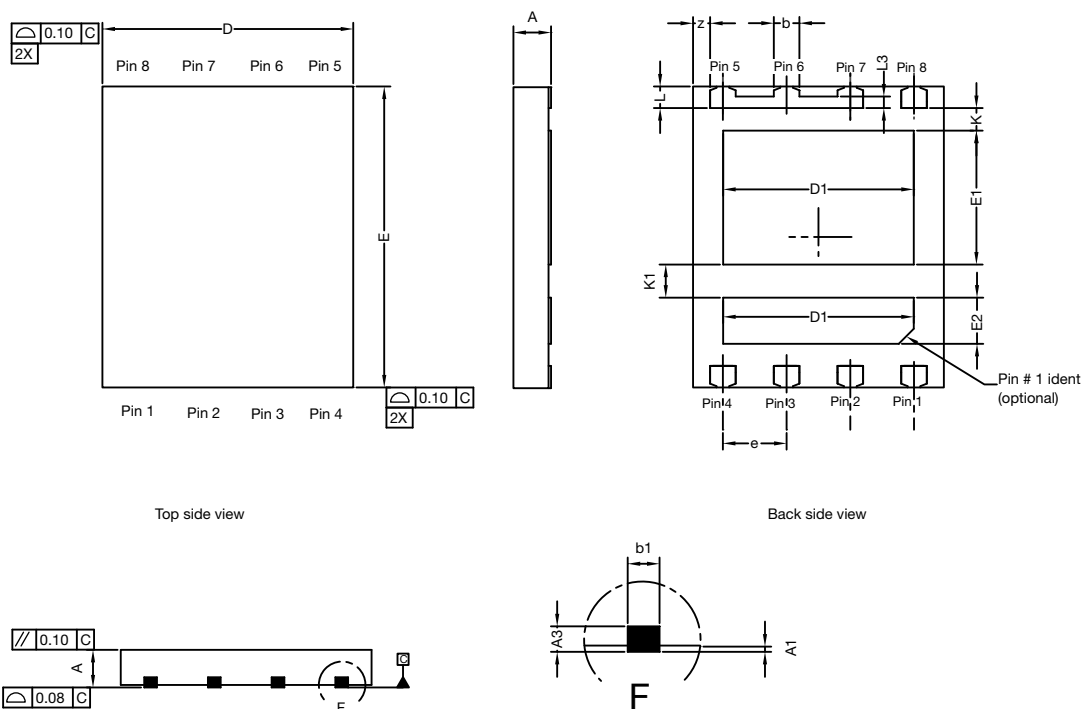
DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.028	0.030	0.032
A1	0.00	-	0.10	0.000	-	0.004
A3	0.15	0.20	0.25	0.006	0.007	0.009
b	0.43	0.51	0.61	0.017	0.020	0.024
b1	0.25 BSC			0.010 BSC		
D	4.90	5.00	5.10	0.192	0.196	0.200
D1	3.75	3.80	3.85	0.148	0.150	0.152
E	5.90	6.00	6.10	0.232	0.236	0.240
E1 Option AA (for W/B)	2.62	2.67	2.72	0.103	0.105	0.107
E1 Option AB (for BWL)	2.42	2.47	2.52	0.095	0.097	0.099
E2	0.87	0.92	0.97	0.034	0.036	0.038
e	1.27 BSC			0.050 BSC		
K Option AA (for W/B)	0.45 typ.			0.018 typ.		
K Option AB (for BWL)	0.65 typ.			0.025 typ.		
K1	0.66 typ.			0.025 typ.		
L	0.33	0.43	0.53	0.013	0.017	0.020
L3	0.23 BSC			0.009 BSC		
z	0.34 BSC			0.013 BSC		

ECN: T14-0782-Rev. C, 22-Dec-14
DWG: 6005

Recommended Minimum PAD for PowerPAIR® 6 x 5
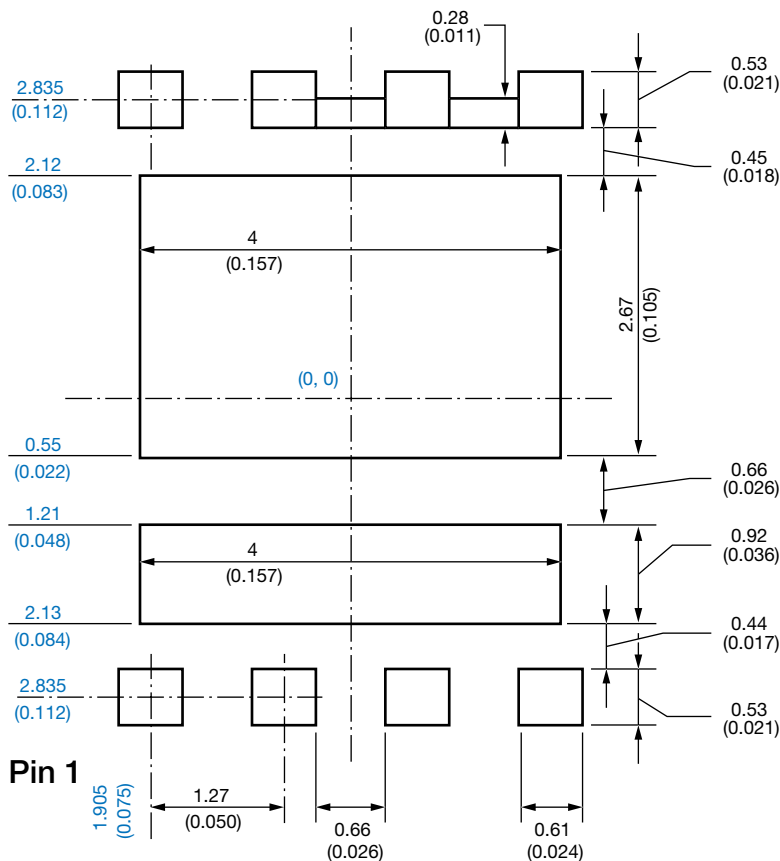
Dimensions in millimeters (inch)

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

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