

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

PRODUCT SUMMARY				
	V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ.)
Channel-1	30	0.0072 at V <sub>GS</sub> = 10 V	24 <sup>a</sup>	13.5 nC
		0.0092 at V <sub>GS</sub> = 4.5 V	24 <sup>a</sup>	
Channel-2	30	0.0039 at V <sub>GS</sub> = 10 V	28 <sup>a</sup>	34 nC
		0.0047 at V <sub>GS</sub> = 4.5 V	28 <sup>a</sup>	

### FEATURES

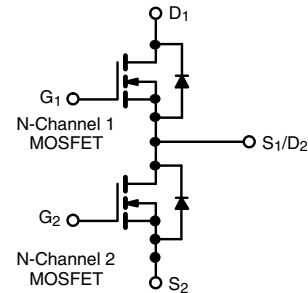
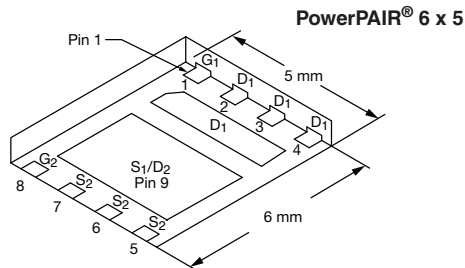
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- 100 % R<sub>g</sub> and UIS Tested
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Notebook System Power
- POL
- Synchronous Buck Converter



Ordering Information: SiZ900DT-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25 °C, unless otherwise noted)					
Parameter	Symbol	Channel-1	Channel-2	Unit	
Drain-Source Voltage	V <sub>DS</sub>	30		V	
Gate-Source Voltage	V <sub>GS</sub>	± 20			
Continuous Drain Current (T <sub>J</sub> = 150 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	24 <sup>a</sup>	28 <sup>a</sup>	
		T <sub>C</sub> = 70 °C	24 <sup>a</sup>	28 <sup>a</sup>	
		T <sub>A</sub> = 25 °C	19 <sup>b, c</sup>	28 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	15.5 <sup>b, c</sup>	22 <sup>b, c</sup>	
Pulsed Drain Current	I <sub>DM</sub>	90	110	A	
Continuous Source Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	24 <sup>a</sup>		28 <sup>a</sup>
		T <sub>A</sub> = 25 °C	3.8 <sup>b, c</sup>	4.3 <sup>b, c</sup>	
Single Pulse Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	20	35	
Single Pulse Avalanche Energy		E <sub>AS</sub>	20	61	mJ
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	48	100	W
		T <sub>C</sub> = 70 °C	31	64	
		T <sub>A</sub> = 25 °C	4.6 <sup>b, c</sup>	5.2 <sup>b, c</sup>	
		T <sub>A</sub> = 70 °C	3 <sup>b, c</sup>	3.3 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C	
Soldering Recommendations (Peak Temperature) <sup>d, e</sup>		260			

THERMAL RESISTANCE RATINGS							
Parameter		Symbol	Channel-1		Channel-2		Unit
			Typ.	Max.	Typ.	Max.	
Maximum Junction-to-Ambient <sup>b, f</sup>	t ≤ 10 s	R <sub>thJA</sub>	22	27	19	24	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R <sub>thJC</sub>	2.1	2.6	1	1.25	

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- See solder profile ([www.vishay.com/doc?73257](http://www.vishay.com/doc?73257)). The PowerPAIR is a leadless package. The end of the lead terminal is exposed copper (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 62 °C/W for channel-1 and 55 °C/W for channel-2.

SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)								
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit		
<b>Static</b>								
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	Ch-1	30			V	
		$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	Ch-2	30				
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$	Ch-1		32		mV/ $^\circ\text{C}$	
		$I_D = 250\text{ }\mu\text{A}$	Ch-2		32			
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	$I_D = 250\text{ }\mu\text{A}$	Ch-1		-6			
		$I_D = 250\text{ }\mu\text{A}$	Ch-2		-6.5			
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	Ch-1	1.2		2.4	V	
		$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	Ch-2	1		2.2		
Gate Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	Ch-1			$\pm 100$	nA	
			Ch-2			$\pm 100$		
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	Ch-1			1	$\mu\text{A}$	
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	Ch-2			1		
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	Ch-1			5		
		$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$	Ch-2			5		
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-1	20			A	
		$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	Ch-2	25				
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 19.4\text{ A}$	Ch-1		0.0059	0.0072	$\Omega$	
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	Ch-2		0.0032	0.0039		
		$V_{GS} = 4.5\text{ V}, I_D = 17.2\text{ A}$	Ch-1		0.0075	0.0092		
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	Ch-2		0.0038	0.0047		
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 19.4\text{ A}$	Ch-1		76		S	
		$V_{DS} = 10\text{ V}, I_D = 20\text{ A}$	Ch-2		120			
<b>Dynamic<sup>a</sup></b>								
Input Capacitance	$C_{iss}$	Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1		1830		pF	
			Ch-2		4900			
Output Capacitance	$C_{oss}$		Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	Ch-1		300		
				Ch-2		710		
Reverse Transfer Capacitance	$C_{rss}$	Channel-1 $V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		Ch-1		120		
				Ch-2		280		
Total Gate Charge	$Q_g$		$V_{DS} = 15\text{ V}, V_{GS} = 10\text{ V}, I_D = 19.4\text{ A}$	Ch-1		29	45	nC
				Ch-2		73	110	
		$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 19.4\text{ A}$	Ch-1		13.5	21		
			Ch-2		34	51		
Gate-Source Charge	$Q_{gs}$	Channel-2 $V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	Ch-1		5.8			
			Ch-2		15			
Gate-Drain Charge	$Q_{gd}$		Ch-1		3.1			
			Ch-2		7.3			
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	Ch-1	0.5	2.4	4.8	$\Omega$	
			Ch-2	0.2	0.9	1.8		

## Notes:

- a. Guaranteed by design, not subject to production testing.  
b. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .



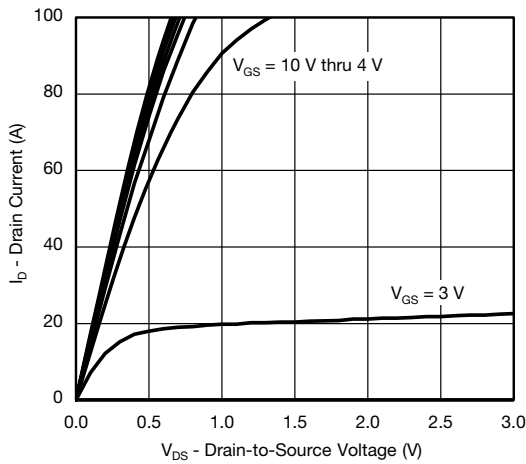
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
<b>Dynamic<sup>a</sup></b>							
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}$ , $R_L = 1.5\ \Omega$ $I_D \cong 10\text{ A}$ , $V_{GEN} = 4.5\text{ V}$ , $R_g = 1\ \Omega$	Ch-1		20	40	ns
Rise Time	$t_r$		Ch-2		35	70	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = 15\text{ V}$ , $R_L = 1.5\ \Omega$ $I_D \cong 10\text{ A}$ , $V_{GEN} = 4.5\text{ V}$ , $R_g = 1\ \Omega$	Ch-1		10	20	
Fall Time	$t_f$		Ch-2		10	20	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}$ , $R_L = 1.5\ \Omega$ $I_D \cong 10\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\ \Omega$	Ch-1		25	50	
Rise Time	$t_r$		Ch-2		35	70	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = 15\text{ V}$ , $R_L = 1.5\ \Omega$ $I_D \cong 10\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\ \Omega$	Ch-1		10	20	
Fall Time	$t_f$		Ch-2		10	20	
Turn-On Delay Time	$t_{d(on)}$	Channel-1 $V_{DD} = 15\text{ V}$ , $R_L = 1.5\ \Omega$ $I_D \cong 10\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\ \Omega$	Ch-1		15	30	
Rise Time	$t_r$		Ch-2		15	30	
Turn-Off Delay Time	$t_{d(off)}$	Channel-2 $V_{DD} = 15\text{ V}$ , $R_L = 1.5\ \Omega$ $I_D \cong 10\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\ \Omega$	Ch-1		10	20	
Fall Time	$t_f$		Ch-2		7	15	
			Ch-1		30	60	
			Ch-2		40	80	
			Ch-1		10	20	
			Ch-2		10	20	
<b>Drain-Source Body Diode Characteristics</b>							
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$	Ch-1			24	A
			Ch-2			28	
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$		Ch-1			90	A
			Ch-2			110	
Body Diode Voltage	$V_{SD}$	$I_S = 10\text{ A}$ , $V_{GS} = 0\text{ V}$	Ch-1		0.8	1.2	V
		$I_S = 10\text{ A}$ , $V_{GS} = 0\text{ V}$	Ch-2		0.8	1.2	
Body Diode Reverse Recovery Time	$t_{rr}$	Channel-1 $I_F = 10\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^\circ\text{C}$	Ch-1		16	30	ns
			Ch-2		30	60	
Body Diode Reverse Recovery Charge	$Q_{rr}$	Channel-2 $I_F = 10\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^\circ\text{C}$	Ch-1		6	12	nC
			Ch-2		21	40	
Reverse Recovery Fall Time	$t_a$	Channel-2 $I_F = 10\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^\circ\text{C}$	Ch-1		9		ns
			Ch-2		17		
Reverse Recovery Rise Time	$t_b$	Channel-2 $I_F = 10\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25\text{ }^\circ\text{C}$	Ch-1		7		
			Ch-2		13		

Notes:

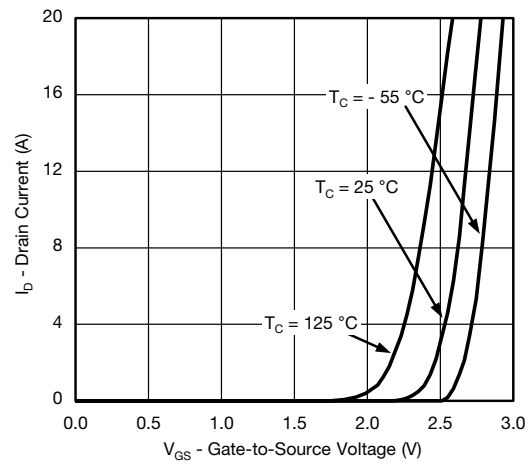
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

*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.*

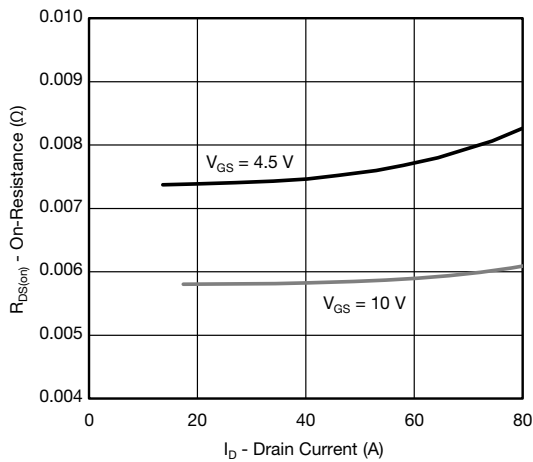
## CHANNEL-1 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



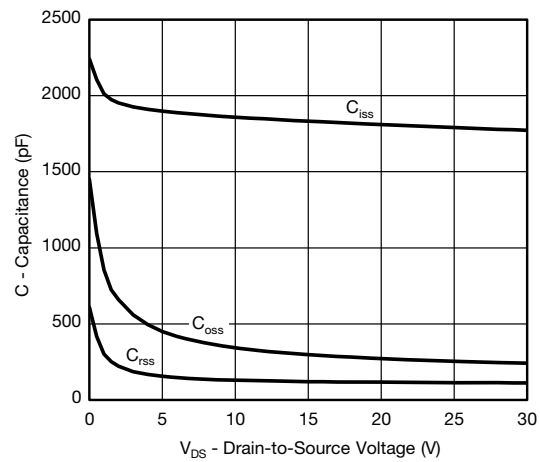
**Output Characteristics**



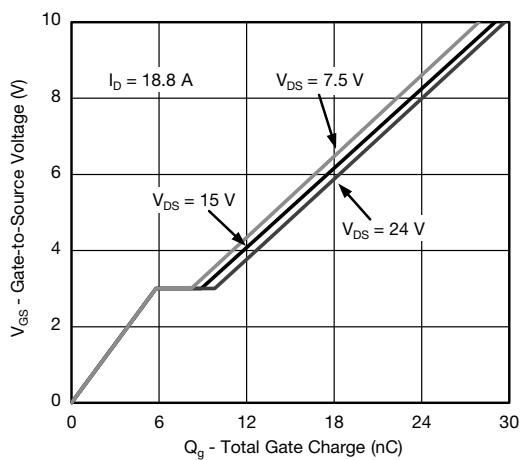
**Transfer Characteristics**



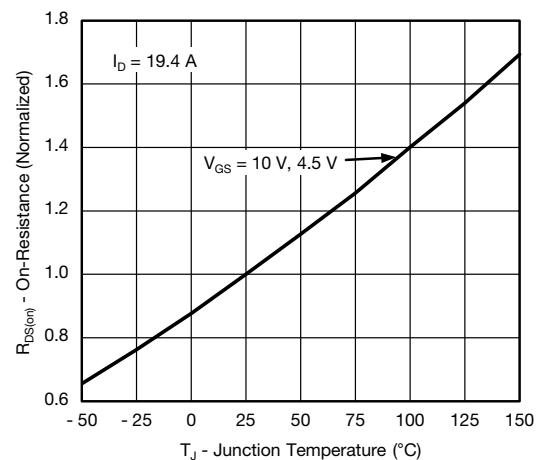
**On-Resistance vs. Drain Current**



**Capacitance**

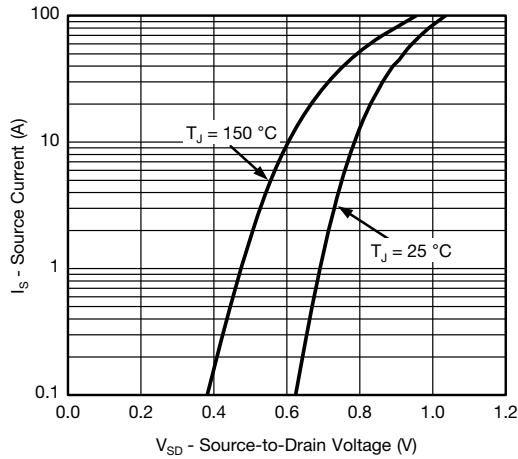


**Gate Charge**

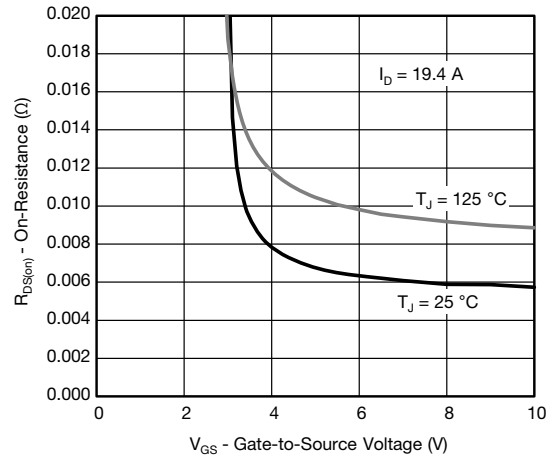


**On-Resistance vs. Junction Temperature**

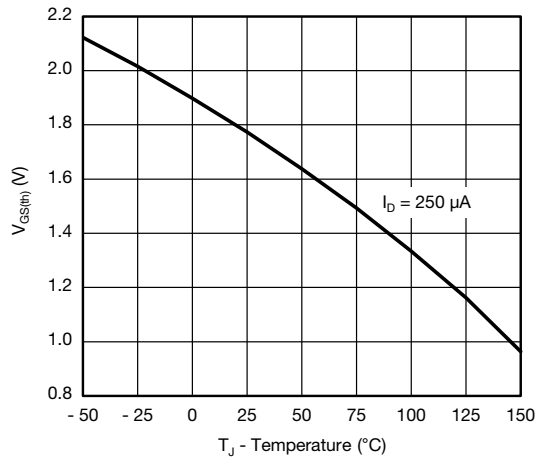
**CHANNEL-1 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



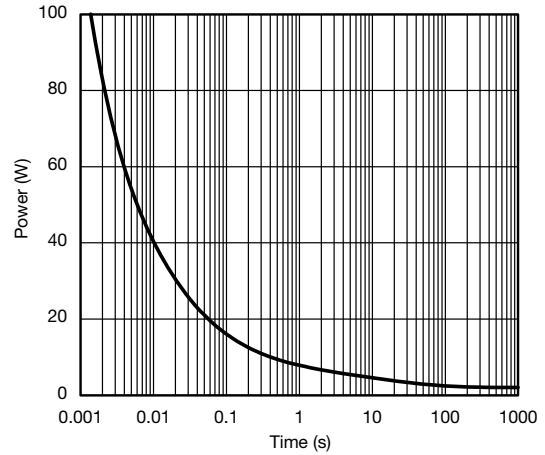
**Source-Drain Diode Forward Voltage**



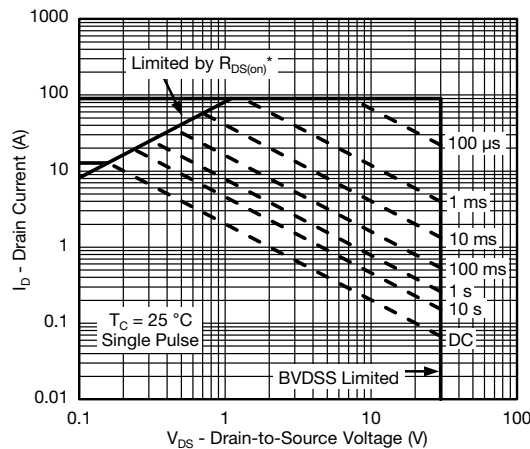
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

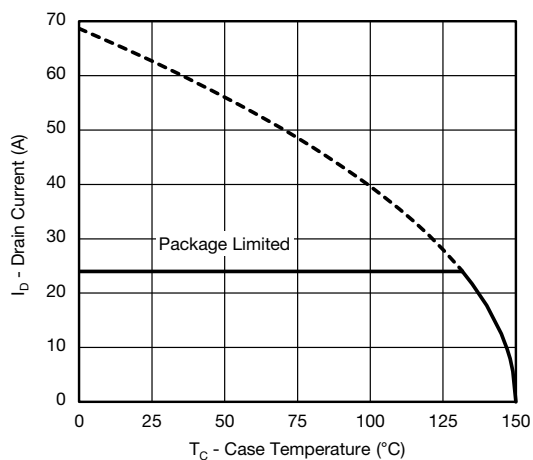


**Single Pulse Power**

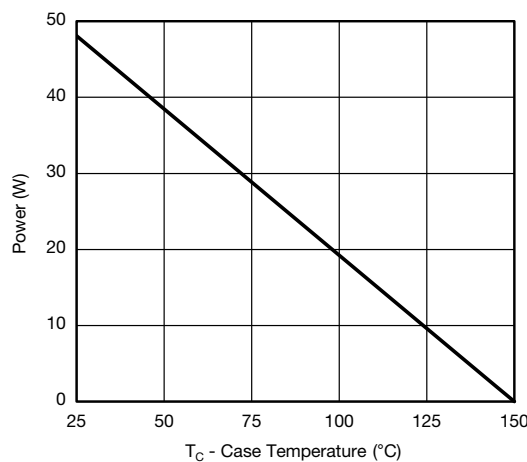


**Safe Operating Area, Junction-to-Ambient**  
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

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



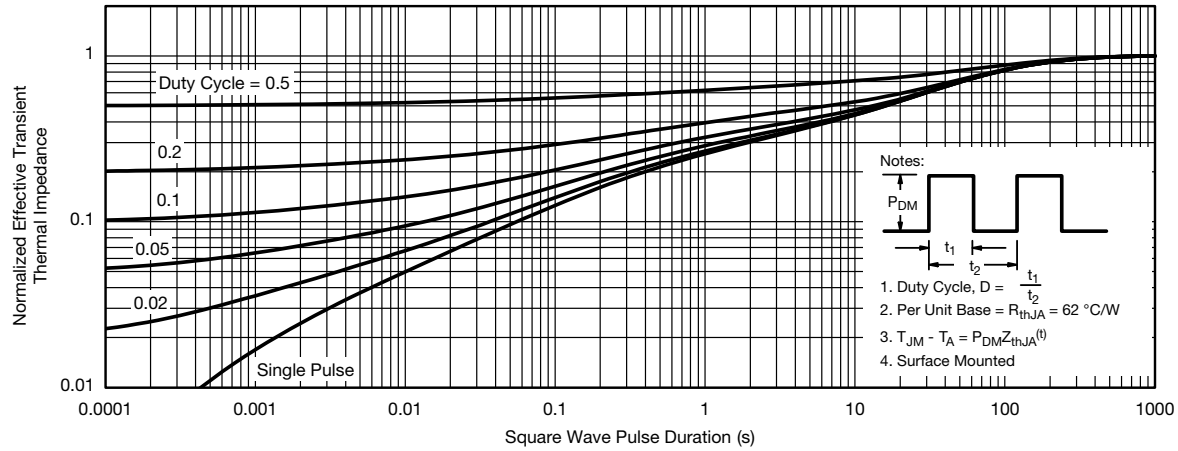
**Current Derating\***



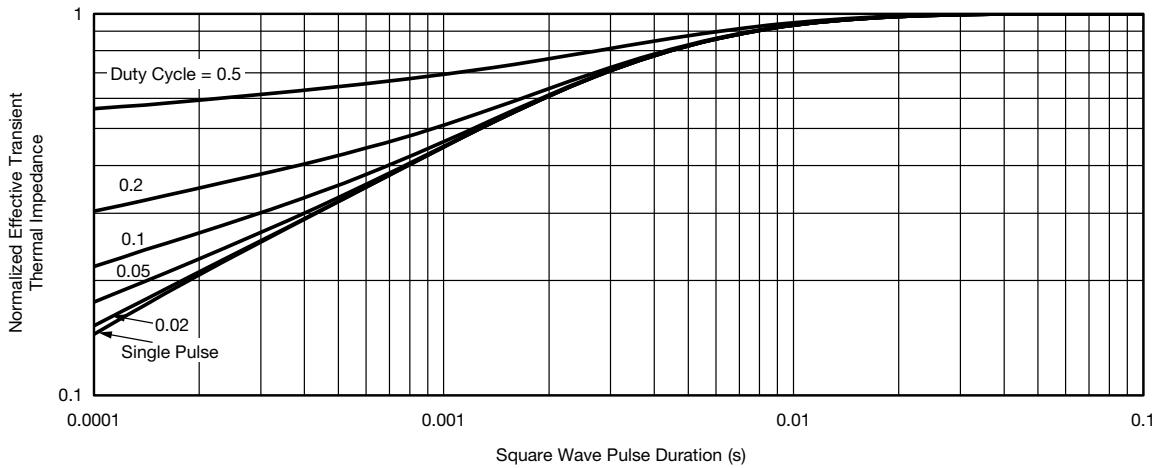
**Power, Junction-to-Case**

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

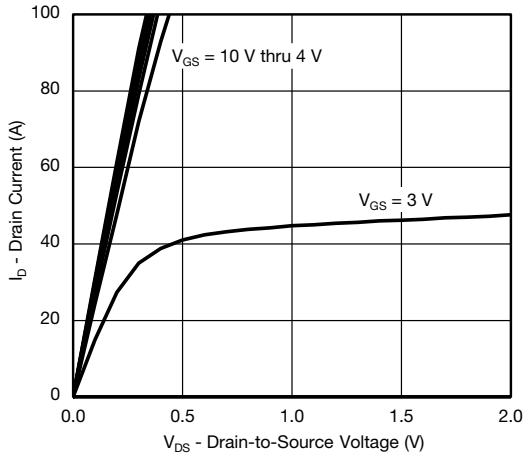


**Normalized Thermal Transient Impedance, Junction-to-Ambient**

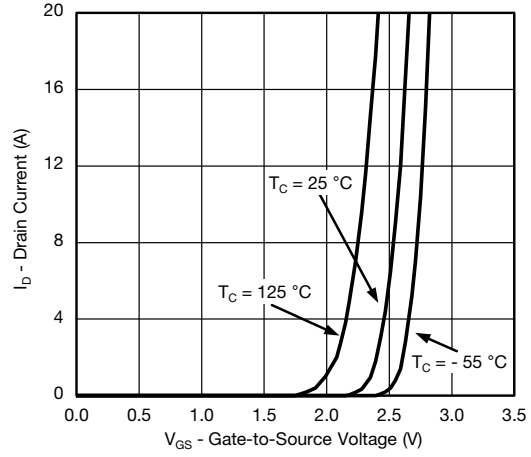


**Normalized Thermal Transient Impedance, Junction-to-Case**

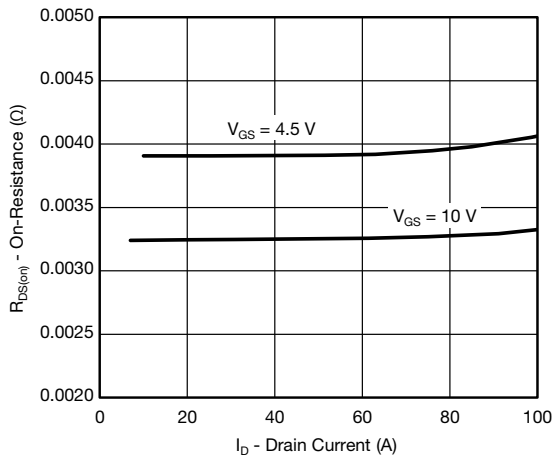
## CHANNEL-2 TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



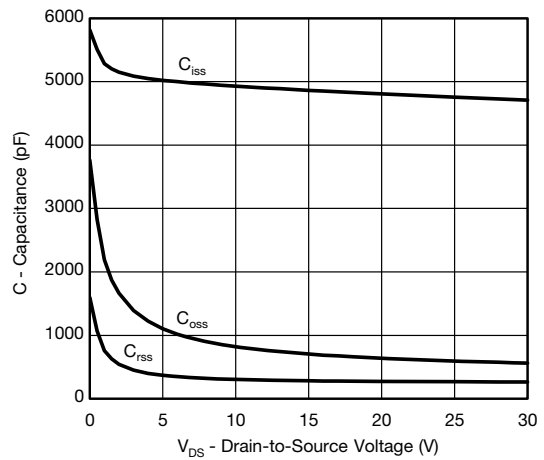
**Output Characteristics**



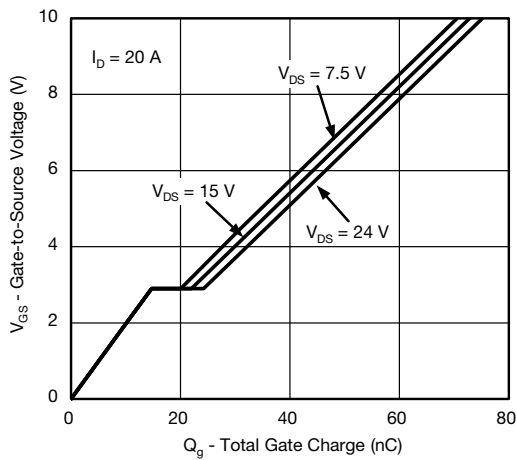
**Transfer Characteristics**



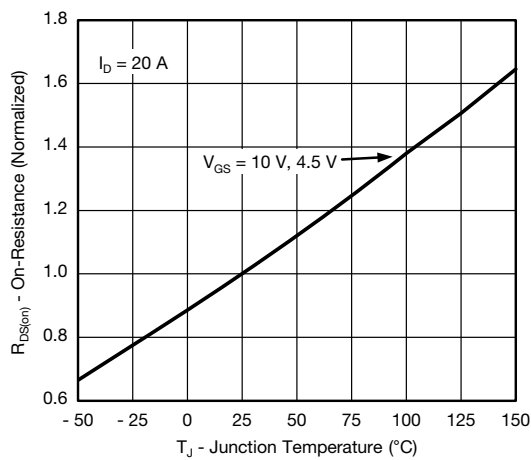
**On-Resistance vs. Drain Current**



**Capacitance**



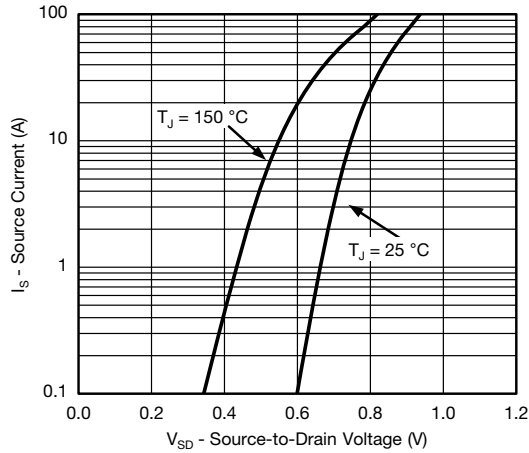
**Gate Charge**



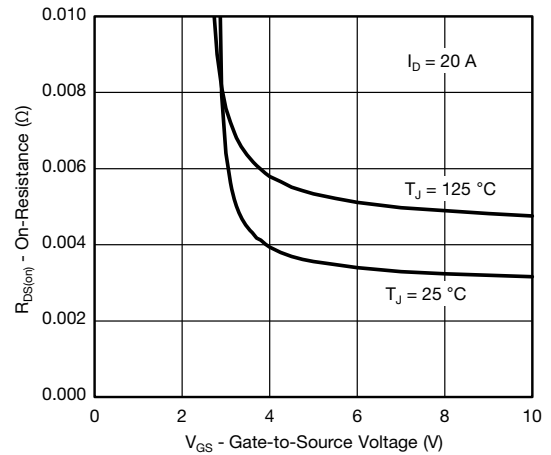
**On-Resistance vs. Junction Temperature**



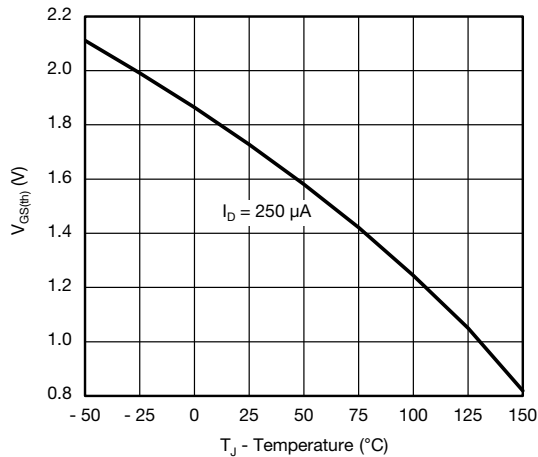
**CHANNEL-2 TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



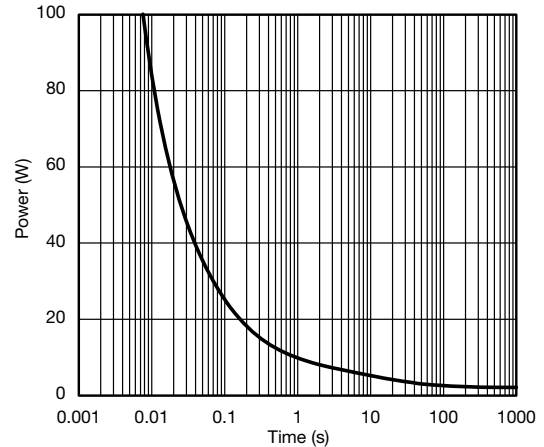
**Source-Drain Diode Forward Voltage**



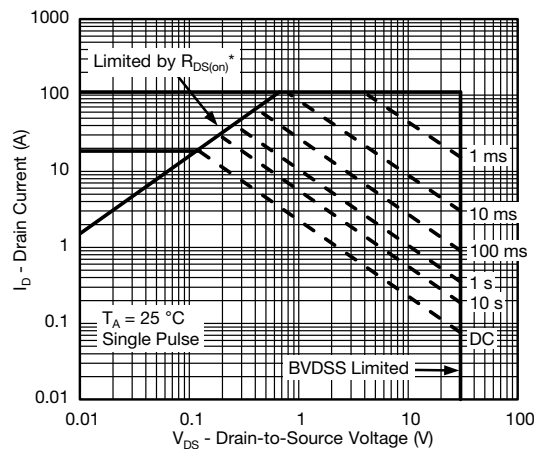
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**

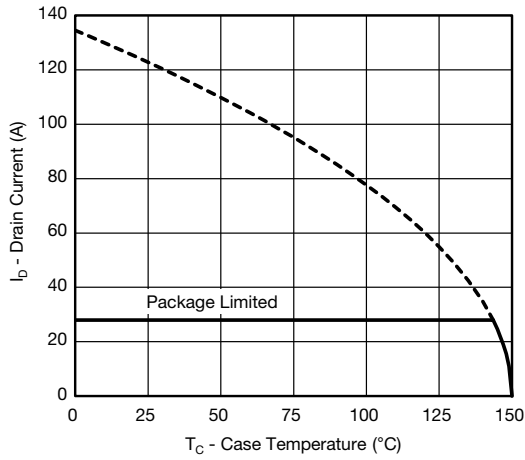


**Single Pulse Power**

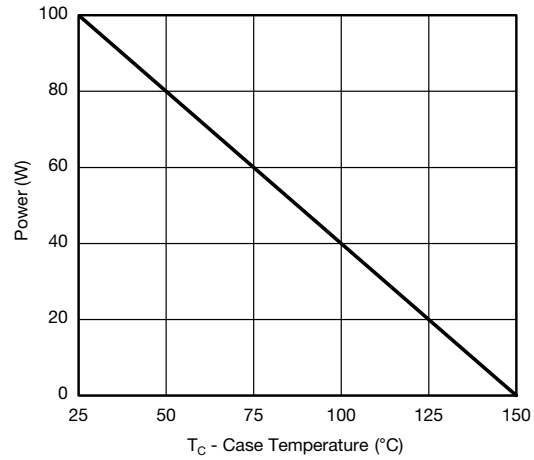


**Safe Operating Area, Junction-to-Ambient**

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



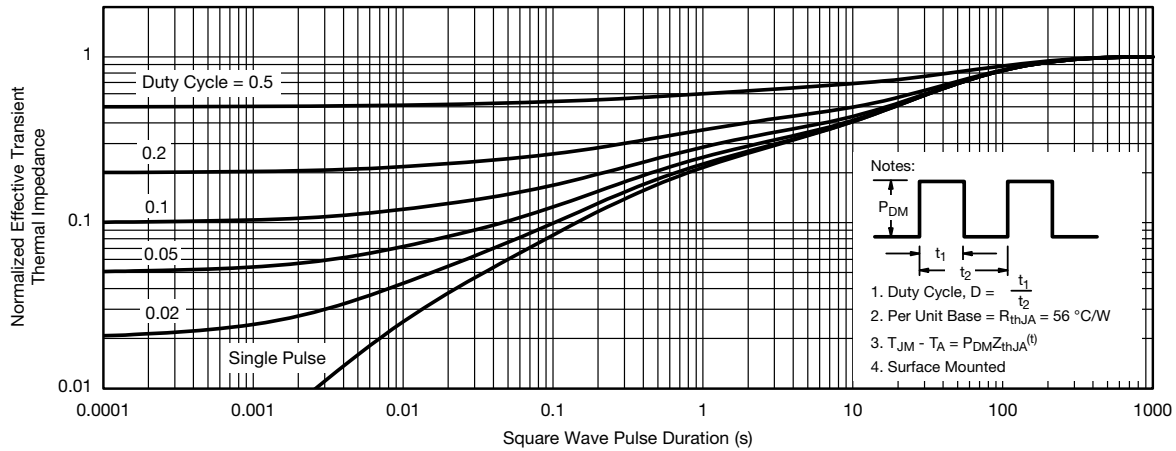
**Current Derating\***



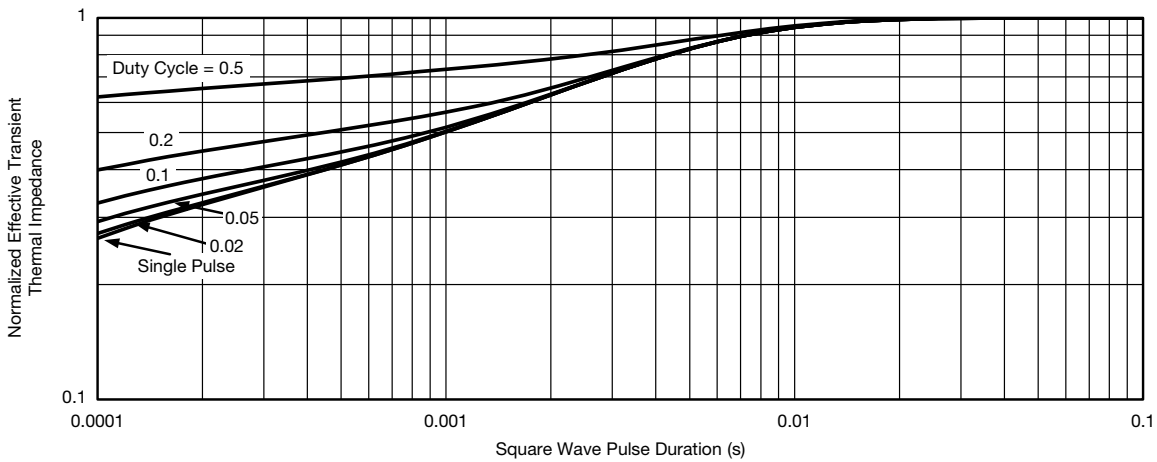
**Power, Junction-to-Case**

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



**Normalized Thermal Transient Impedance, Junction-to-Ambient**



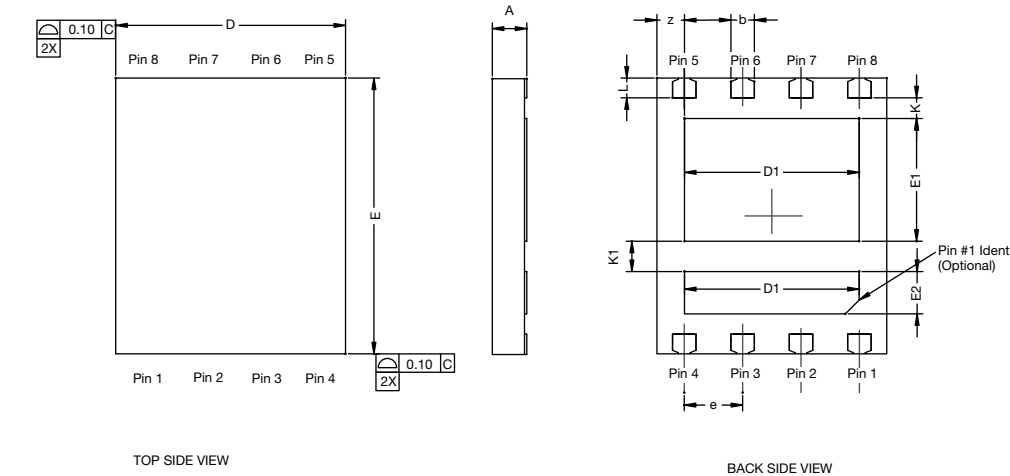
**Normalized Thermal Transient Impedance, Junction-to-Case**

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?67344](http://www.vishay.com/ppg?67344).



# PowerPAIR® 6 x 5 BW Case Outline

(for SiZ900DT only)



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		
z	0.34 BSC			0.013 BSC		

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DWG: 5978

**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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