

General Description

- Trench Power AlphaSGT™ technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications
- RoHS and Halogen-Free Compliant

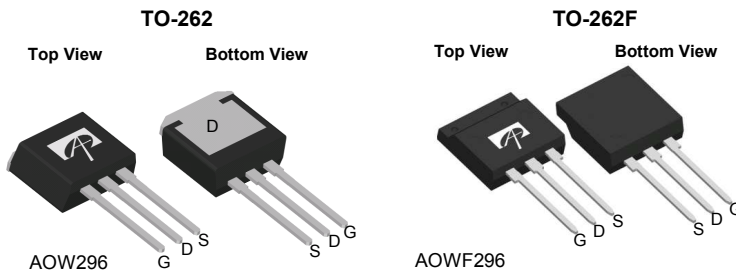
Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Industrial and Motor Drive applications

Product Summary

V_{DS}	100V
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 9.7m Ω
$R_{DS(ON)}$ (at $V_{GS}=6V$)	< 12.2m Ω

100% UIS Tested
 100% Rg Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOW296	TO-262	Tube	1000
AOWF296	TO-262F	Tube	1000

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	AOW296 (Max)	AOWF296 (Max)	Units	
Drain-Source Voltage	V_{DS}	100		V	
Gate-Source Voltage	V_{GS}	± 20		V	
Continuous Drain Current ^{G(AOW)}	I_D	$T_C=25^\circ\text{C}$	70	37	A
		$T_C=100^\circ\text{C}$	46.5	23.5	
Pulsed Drain Current ^C	I_{DM}	180	150		
Continuous Drain Current	I_{DSM}	$T_A=25^\circ\text{C}$	18	21	A
		$T_A=70^\circ\text{C}$	14.5	16.5	
Avalanche Current ^C	I_{AS}	40		A	
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}	80		mJ	
V_{DS} Spike ^I	V_{SPIKE}	120		V	
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	104	26	W
		$T_C=100^\circ\text{C}$	41.5	10.5	
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ\text{C}$	6.2	8.3	W
		$T_A=70^\circ\text{C}$	4.0	5.3	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		$^\circ\text{C}$	

Thermal Characteristics

Parameter	Symbol	AOW296 (Max)	AOWF296 (Max)	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	20	15	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A,D}		Steady-State	65	55
Maximum Junction-to-Case	$R_{\theta JC}$	1.2	4.8	$^\circ\text{C/W}$

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
STATIC PARAMETERS							
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	100			V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =100V, V _{GS} =0V T _J =55°C			1 5	μA	
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.3	2.9	3.4	V	
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125°C		7.9	9.7	mΩ	
		V _{GS} =6V, I _D =20A		13.6	16.6		
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		62		S	
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V	
I _S	Maximum Body-Diode Continuous Current ^G	AOW296			70	A	
I _S	Maximum Body-Diode Continuous Current	AOWF296			30	A	
DYNAMIC PARAMETERS							
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, f=1MHz		2785		pF	
C _{oss}	Output Capacitance				238		pF
C _{riss}	Reverse Transfer Capacitance				12		pF
R _g	Gate resistance	f=1MHz	0.25	0.55	0.85	Ω	
SWITCHING PARAMETERS							
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, I _D =20A		37	52	nC	
Q _{gs}	Gate Source Charge				11.5		nC
Q _{gd}	Gate Drain Charge				5		nC
Q _{oss}	Output Charge	V _{GS} =0V, V _{DS} =50V		37		nC	
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =50V, R _L =2.5Ω, R _{GEN} =3Ω		13		ns	
t _r	Turn-On Rise Time				8.5		ns
t _{D(off)}	Turn-Off DelayTime				29		ns
t _f	Turn-Off Fall Time				4		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs		35		ns	
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs		210		nC	

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The Power dissipation P_{DSM} is based on R_{θJA} ≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Single pulse width limited by junction temperature T_{J(MAX)}=150° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

I. The spike duty cycle 5% max, limited by junction temperature T_{J(MAX)}=125° C.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

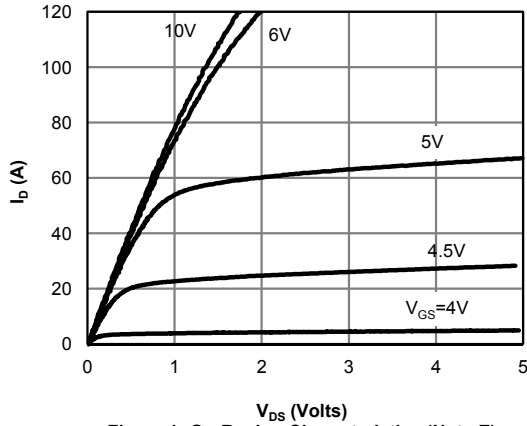


Figure 1: On-Region Characteristics (Note E)

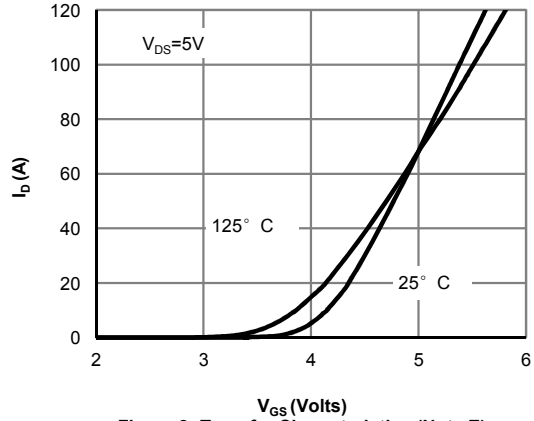


Figure 2: Transfer Characteristics (Note E)

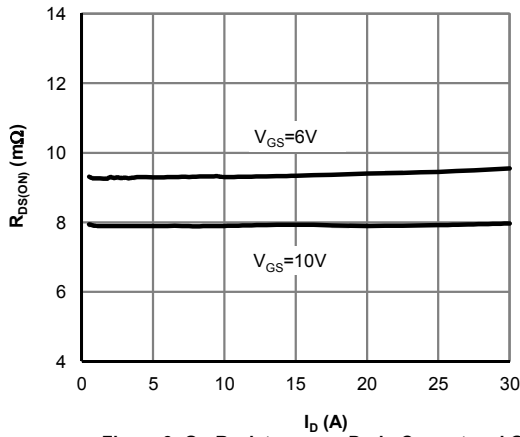


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

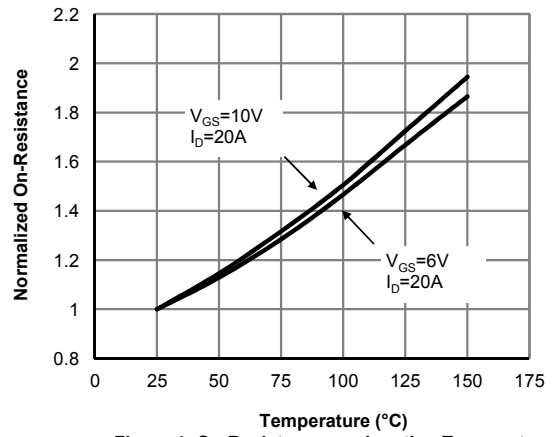


Figure 4: On-Resistance vs. Junction Temperature (Note E)

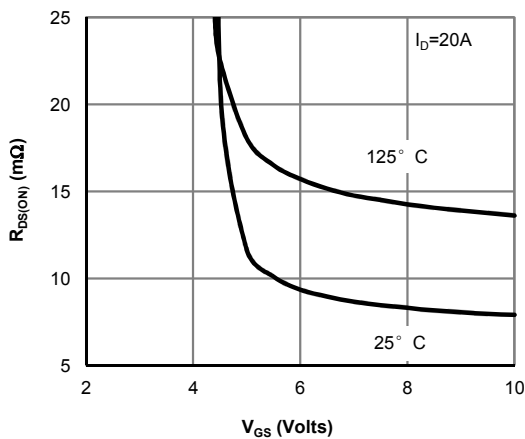


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

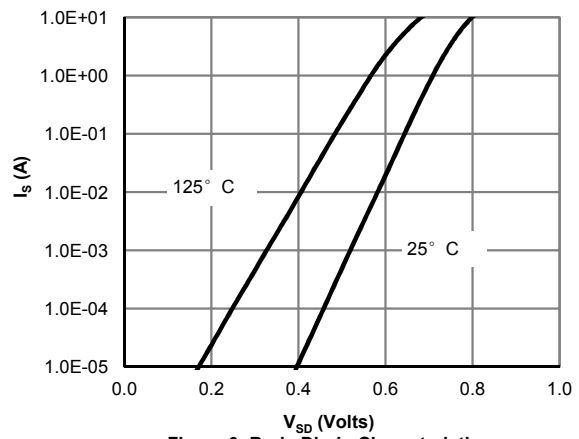


Figure 6: Body-Diode Characteristics (Note E)

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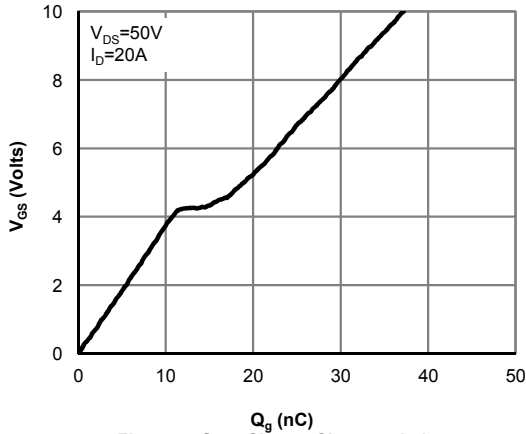


Figure 7: Gate-Charge Characteristics

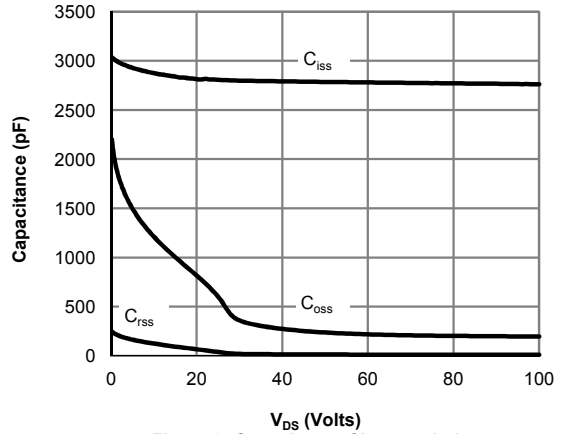


Figure 8: Capacitance Characteristics

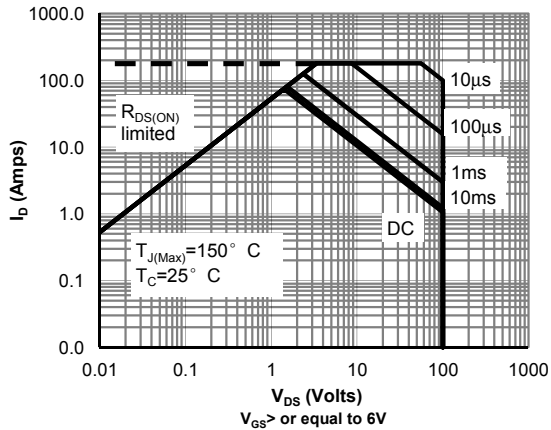


Figure 9: Maximum Forward Biased Safe Operating Area (Note F) - AOW296

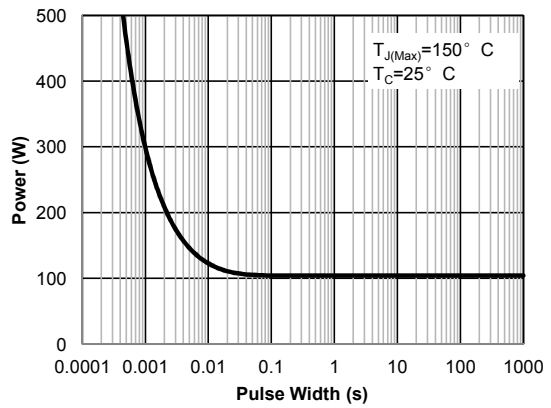


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F) - AOW296

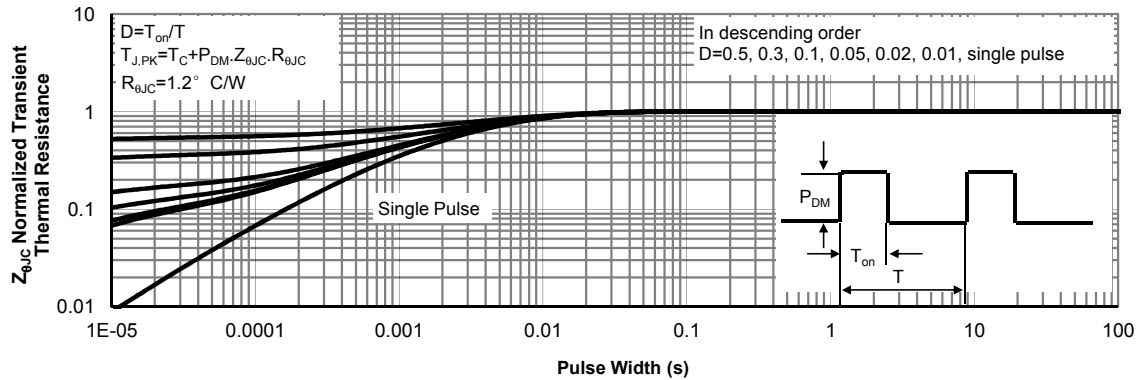


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F) - AOW296

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

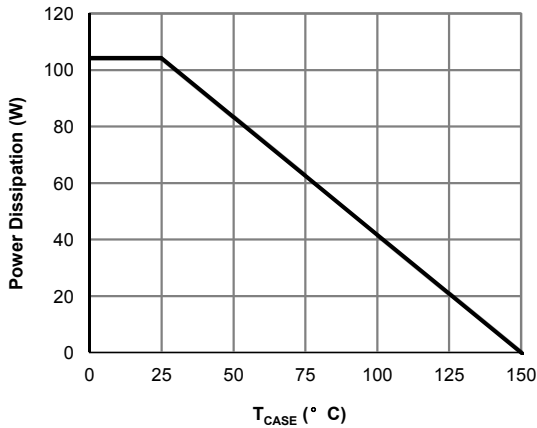


Figure 12: Power De-rating (Note F) - AOW296

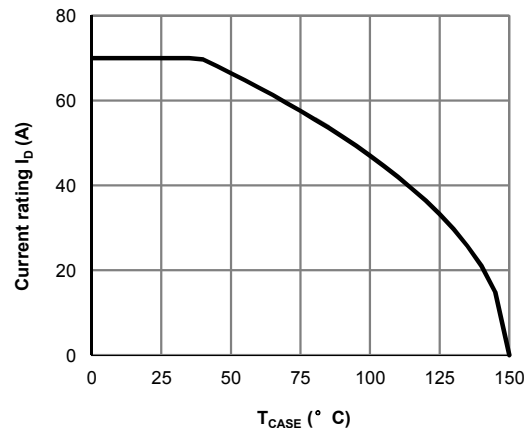


Figure 13: Current De-rating (Note F) - AOW296

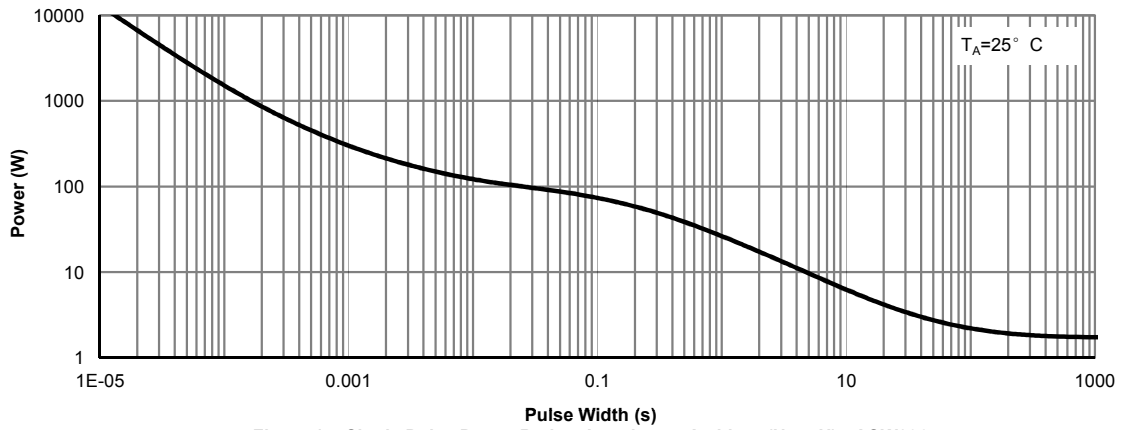


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H) - AOW296

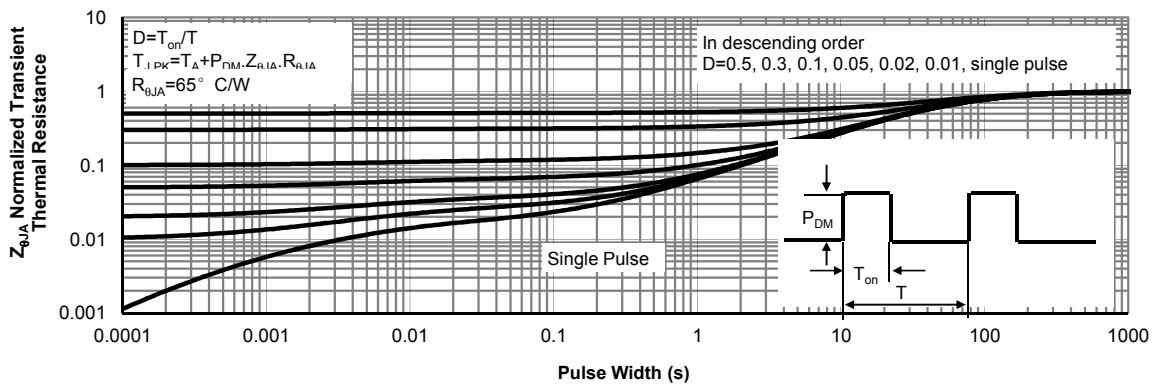
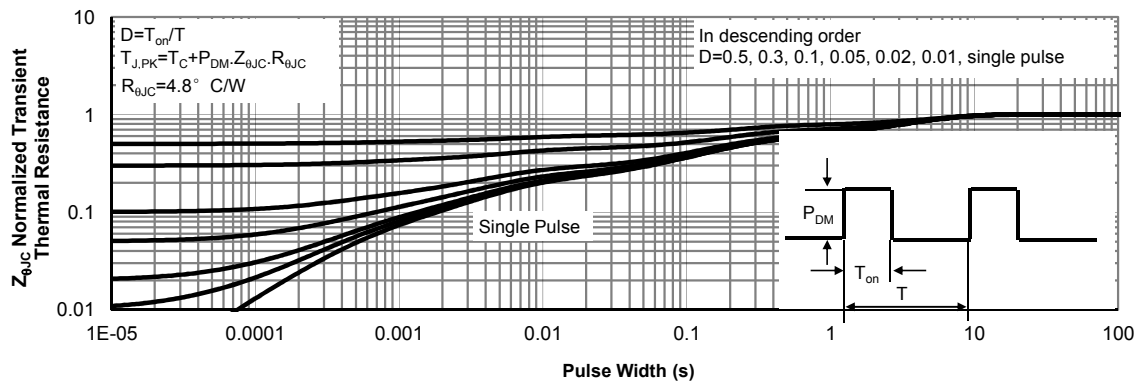
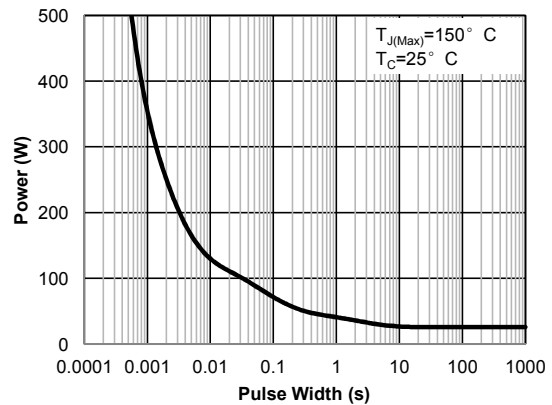
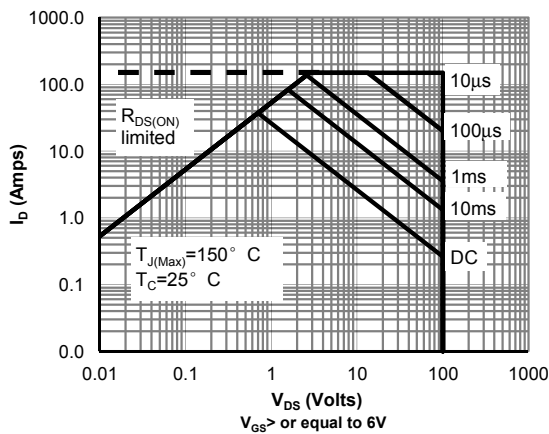


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H) - AOW296

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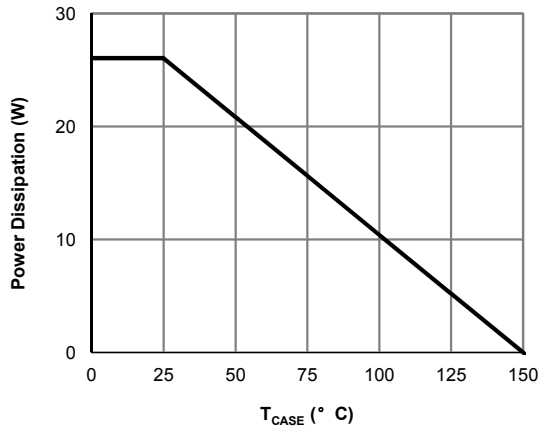


Figure 12: Power De-rating (Note F) - AOWF296

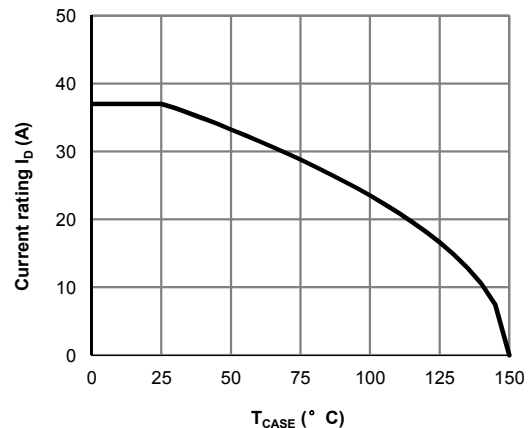


Figure 13: Current De-rating (Note F) - AOWF296

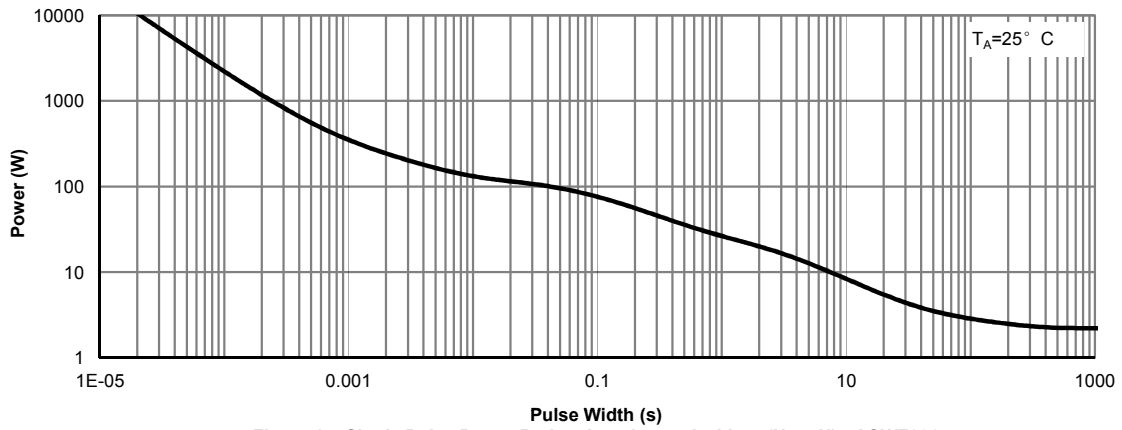


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H) - AOWF296

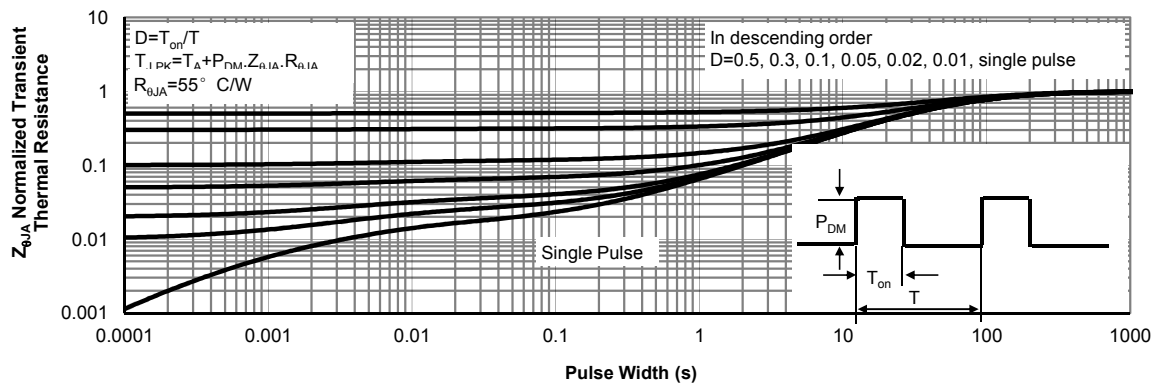


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H) - AOWF296

Figure A: Gate Charge Test Circuit & Waveforms

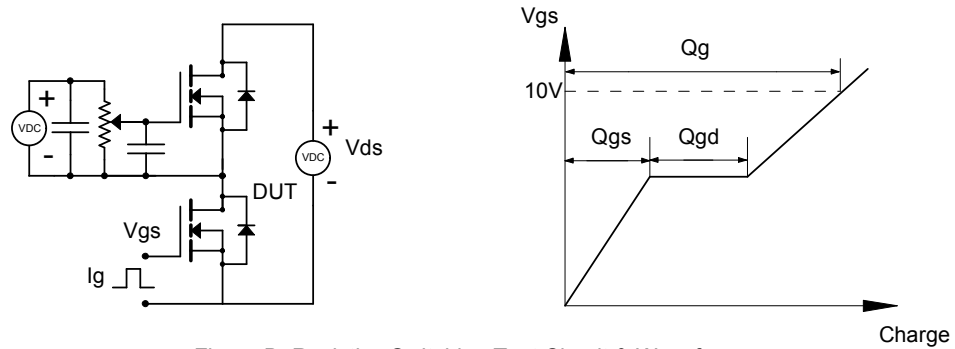


Figure B: Resistive Switching Test Circuit & Waveforms

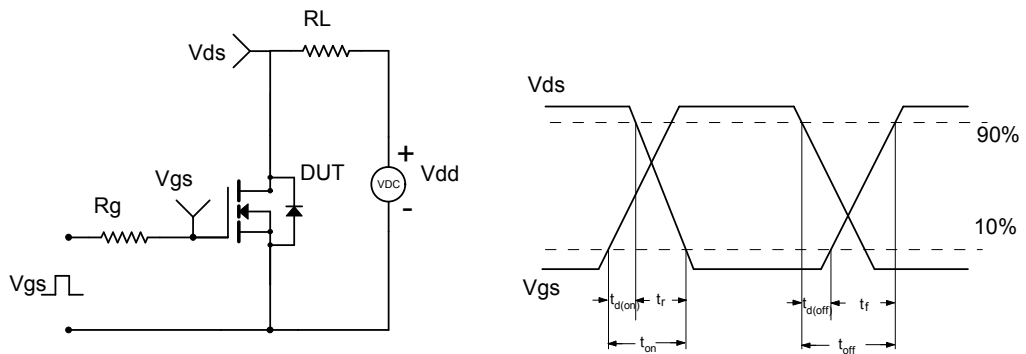


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

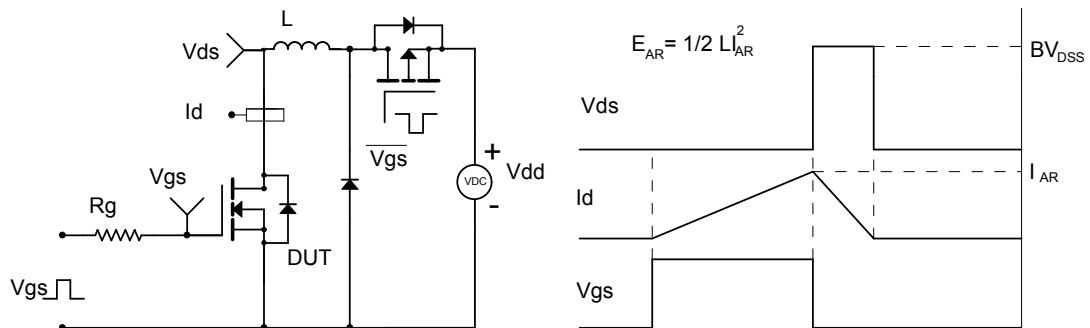
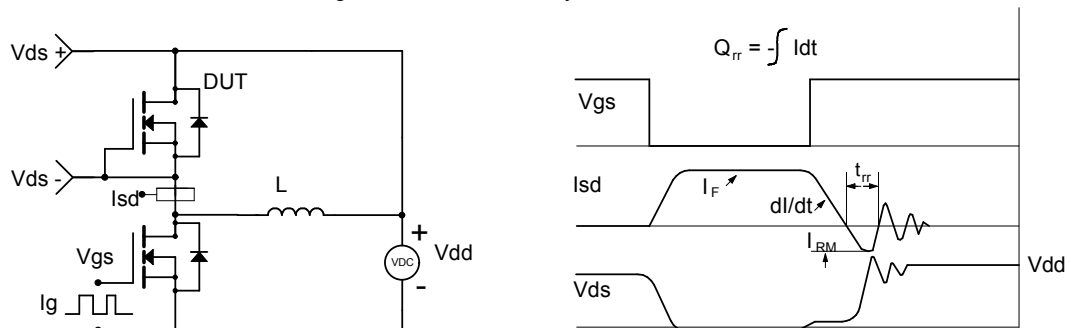


Figure D: Diode Recovery Test Circuit & Waveforms



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