

General Description

- Bottom source technology
- Very Low $R_{DS(ON)}$ at V_{GS} 4.5V
- Low Gate Charge
- High Current Capability
- RoHS 2.0 and Halogen-Free Compliant

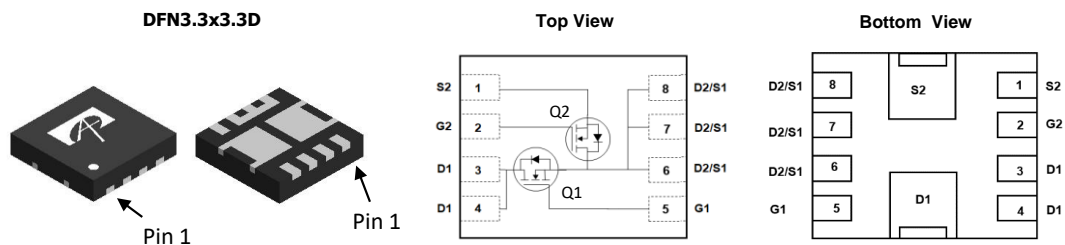
Applications

- Buck-boost Converters in Computing
- Point of Load Converter

Product Summary

	Q1	Q2
V_{DS}	30V	30V
I_D (at $V_{GS}=10V$)	155A	118A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 2.4m Ω	< 2.3m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 3m Ω	< 2.9m Ω

100% UIS Tested
 100% Rg Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AONP38324U	DFN3.3x3.3D	Tape & Reel	3000

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

Parameter	Symbol	Max Q1	Max Q2	Units	
Drain-Source Voltage	V_{DS}	30	30	V	
Gate-Source Voltage	V_{GS}	± 12	± 12	V	
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	155	118	A
		$T_C=100^\circ\text{C}$	97	75	
Pulsed Drain Current ^C	I_{DM}	620	472		
Continuous Drain Current	I_{DSM}	$T_A=25^\circ\text{C}$	29	29	A
		$T_A=70^\circ\text{C}$	23	23	
Avalanche Current ^C	I_{AS}	60	55	A	
Avalanche energy	E_{AS}	18	15	mJ	
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	89	50	W
		$T_C=100^\circ\text{C}$	35	20	
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ\text{C}$	3.2	3.2	W
		$T_A=70^\circ\text{C}$	2	2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		$^\circ\text{C}$	

Thermal Characteristics

Parameter	Symbol	Typ Q1	Typ Q2	Max Q1	Max Q2	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	$t \leq 10s$	32	32	39	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^{A D}		Steady-State	58	58	73	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case	$R_{\theta JC}$	1.1	2	1.4	2.5	$^\circ\text{C}/\text{W}$

Q1 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	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±12V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.2	1.6	2	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125°C		2 2.8	2.4 3.4	mΩ
		V _{GS} =4.5V, I _D =20A		2.4	3	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		135		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				100	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		2050		pF
C _{oss}	Output Capacitance			500		pF
C _{riss}	Reverse Transfer Capacitance			50		pF
R _g	Gate resistance	f=1MHz	0.5	1.2	1.8	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A		27	38	nC
Q _{g(4.5V)}	Total Gate Charge			12	17	nC
Q _{gs}	Gate Source Charge			5.2		nC
Q _{gd}	Gate Drain Charge			2.1		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		6		ns
t _r	Turn-On Rise Time			3.5		ns
t _{D(off)}	Turn-Off DelayTime			30		ns
t _f	Turn-Off Fall Time			4.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs		15		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs		32		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. 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.

APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO MAKE CHANGES TO PRODUCT SPECIFICATIONS WITHOUT NOTICE. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO EVALUATE SUITABILITY OF THE PRODUCT FOR THEIR INTENDED APPLICATION. CUSTOMER SHALL COMPLY WITH APPLICABLE LEGAL REQUIREMENTS, INCLUDING ALL APPLICABLE EXPORT CONTROL RULES, REGULATIONS AND LIMITATIONS.

AOS' products are provided subject to AOS' terms and conditions of sale which are set forth at:

http://www.aosmd.com/terms_and_conditions_of_sale

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

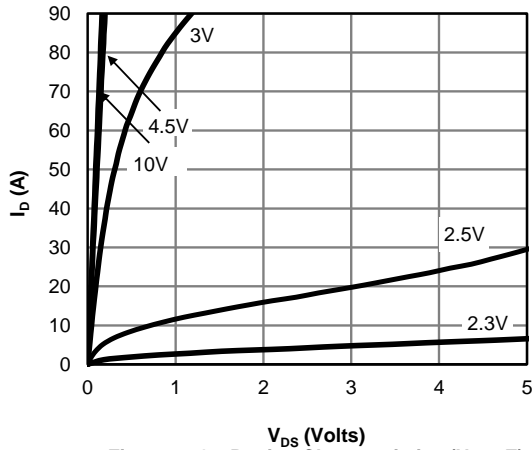


Figure 1: On-Region Characteristics (Note E)

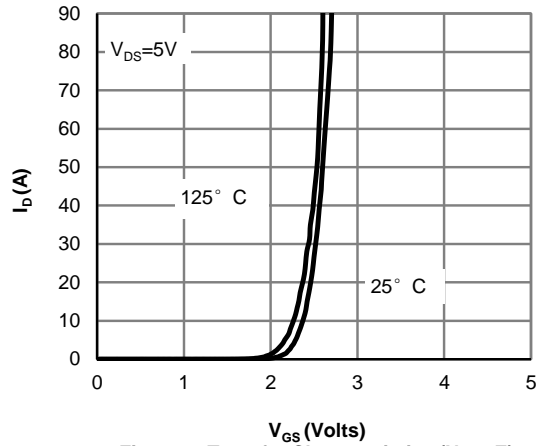


Figure 2: Transfer Characteristics (Note E)

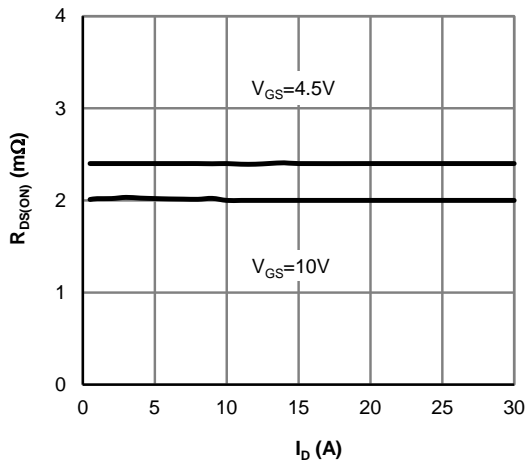


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

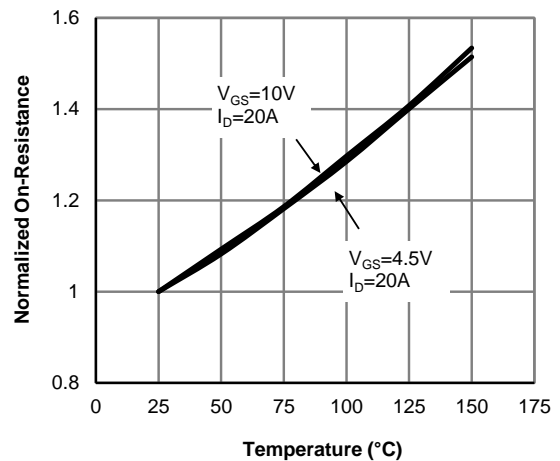


Figure 4: On-Resistance vs. Junction Temperature (Note E)

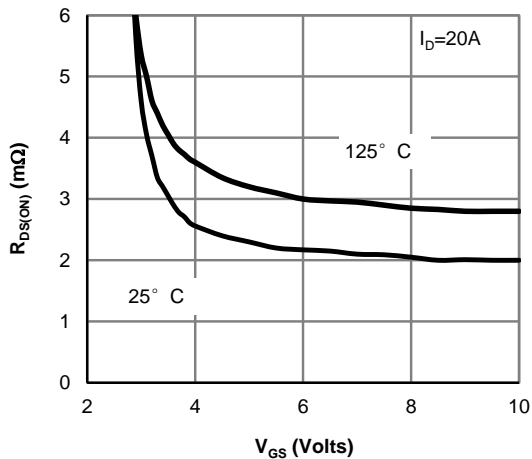


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

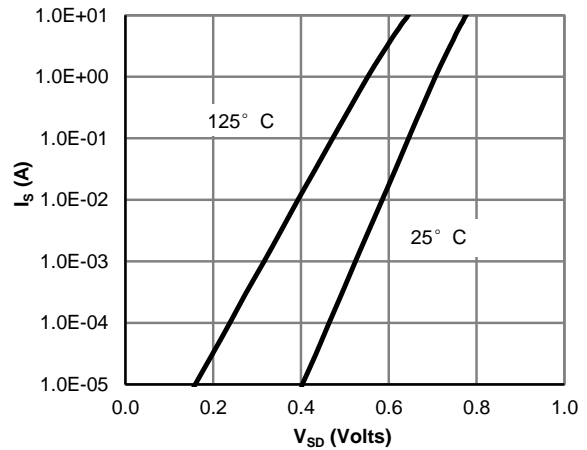


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

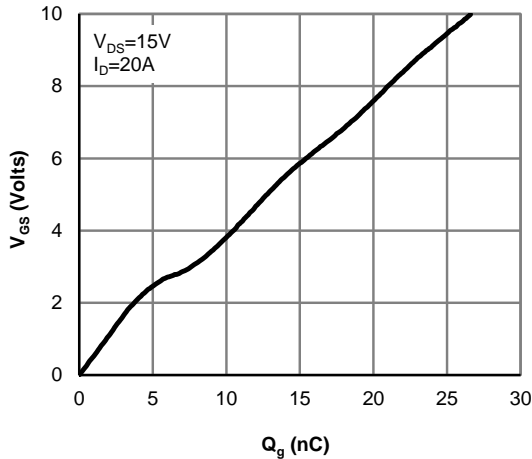


Figure 7: Gate-Charge Characteristics

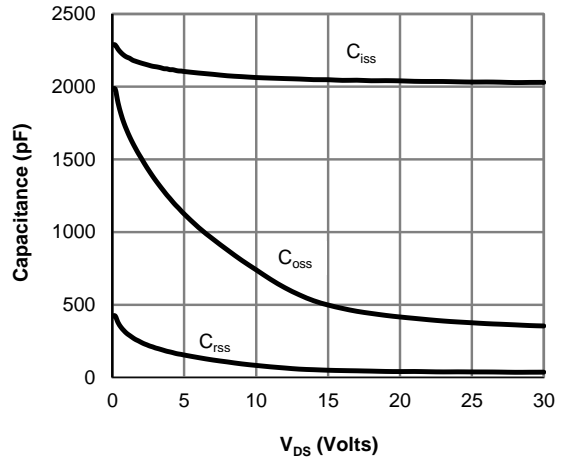


Figure 8: Capacitance Characteristics

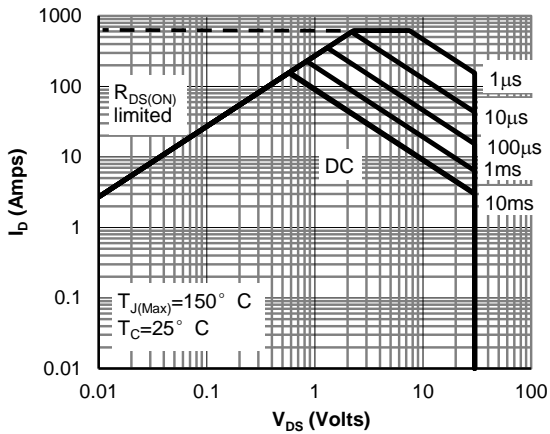


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

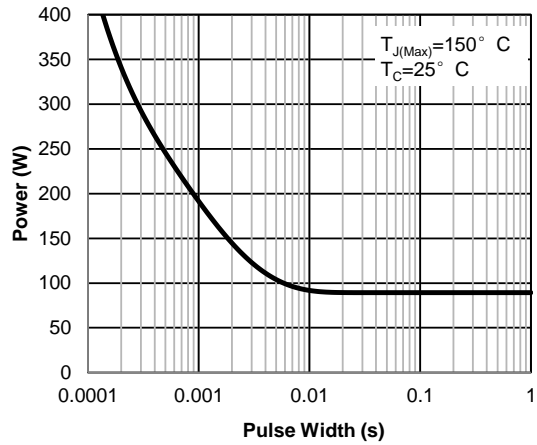


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

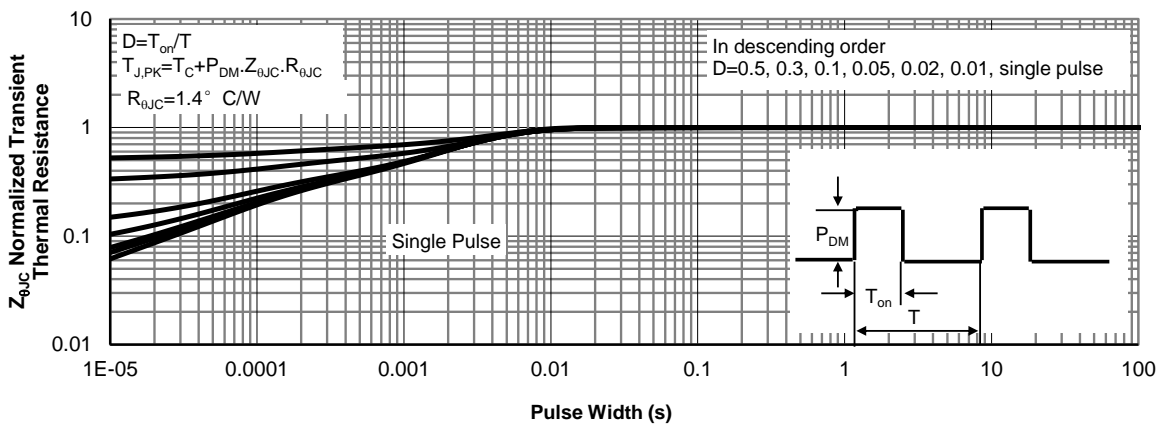


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

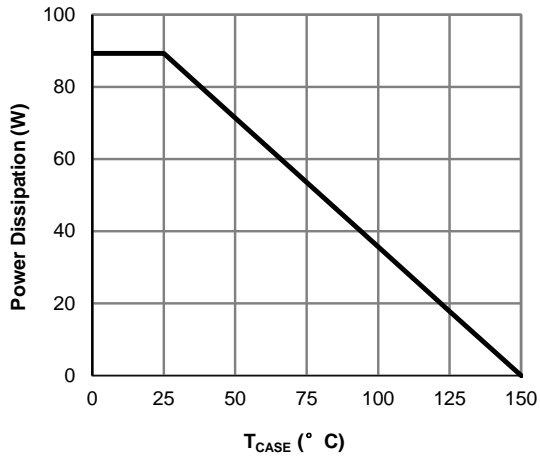


Figure 12: Power De-rating (Note F)

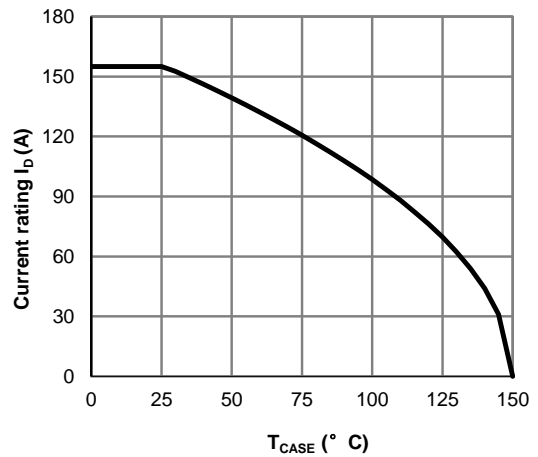


Figure 13: Current De-rating (Note F)

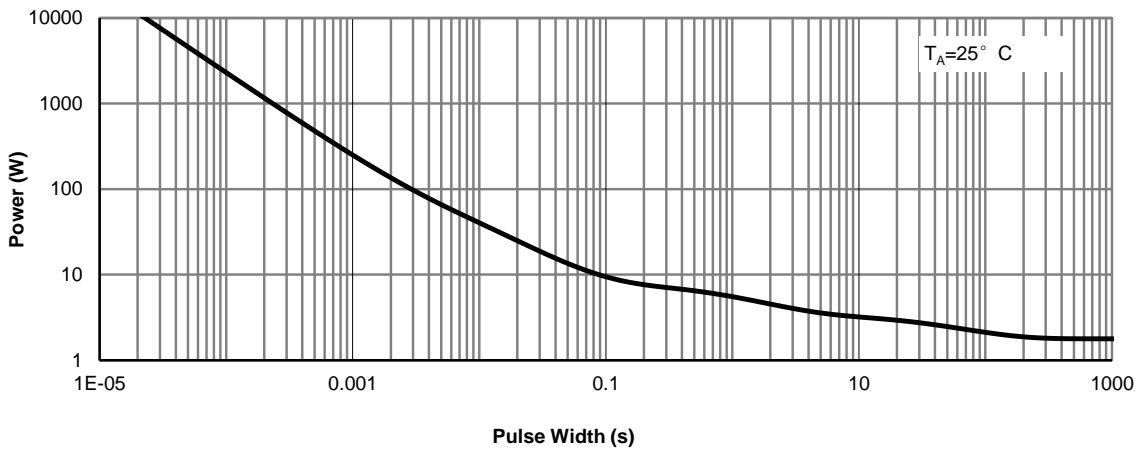


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

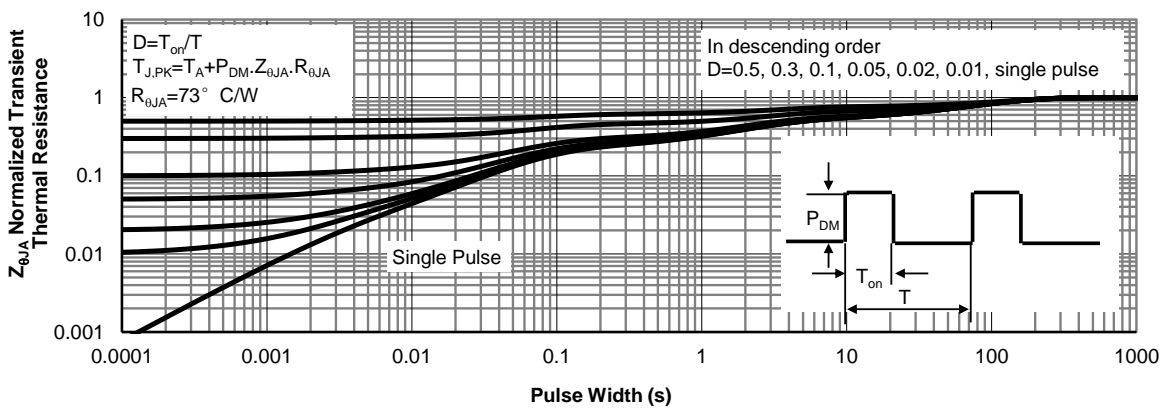


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

Q2 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	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±12V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.3	1.7	2.1	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A T _J =125°C		1.9	2.3	mΩ
		V _{GS} =4.5V, I _D =20A		2.7	3.3	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		150		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				60	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		1960		pF
C _{oss}	Output Capacitance			470		pF
C _{riss}	Reverse Transfer Capacitance			55		pF
R _g	Gate resistance	f=1MHz	0.6	1.2	1.8	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A		28	40	nC
Q _{g(4.5V)}	Total Gate Charge			12.5	18	nC
Q _{gs}	Gate Source Charge			5.5		nC
Q _{gd}	Gate Drain Charge			2.2		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		5.8		ns
t _r	Turn-On Rise Time			5		ns
t _{D(off)}	Turn-Off DelayTime			27		ns
t _f	Turn-Off Fall Time			4.4		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs		13		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs		24		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. 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.

H. For application requiring slow >1ms turn-on/turn-off, please consult AOS FAE for proper product selection.

APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO MAKE CHANGES TO PRODUCT SPECIFICATIONS WITHOUT NOTICE. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO EVALUATE SUITABILITY OF THE PRODUCT FOR THEIR INTENDED APPLICATION. CUSTOMER SHALL COMPLY WITH APPLICABLE LEGAL REQUIREMENTS, INCLUDING ALL APPLICABLE EXPORT CONTROL RULES, REGULATIONS AND LIMITATIONS.

AOS' products are provided subject to AOS' terms and conditions of sale which are set forth at:

http://www.aosmd.com/terms_and_conditions_of_sale

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

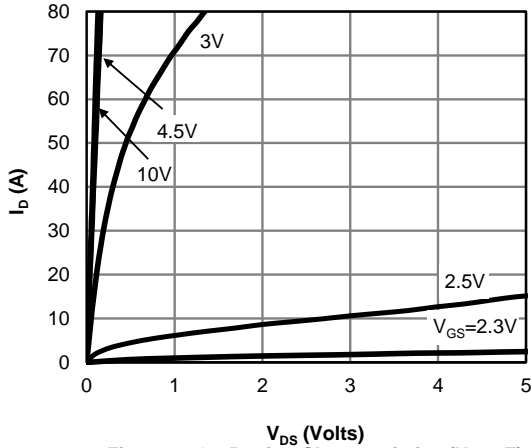


Figure 1: On-Region Characteristics (Note E)

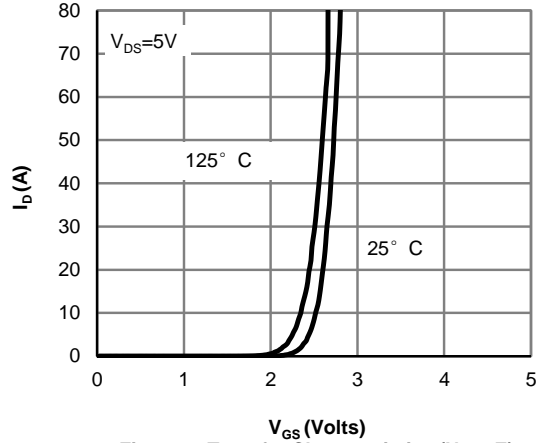


Figure 2: Transfer Characteristics (Note E)

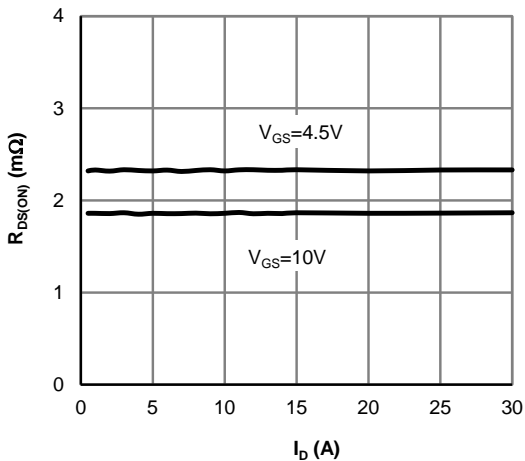


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

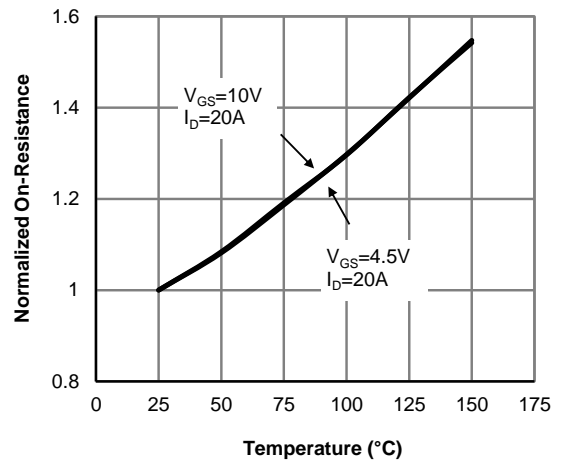


Figure 4: On-Resistance vs. Junction Temperature (Note E)

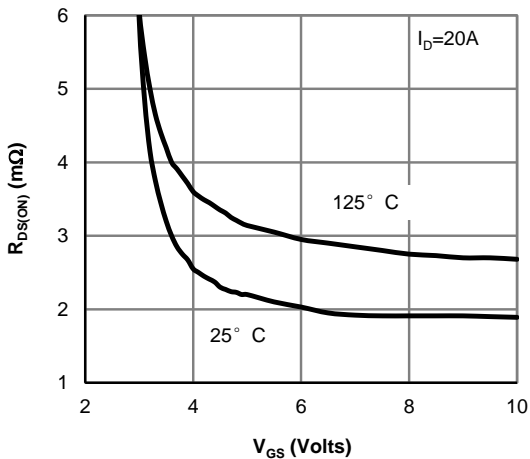


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

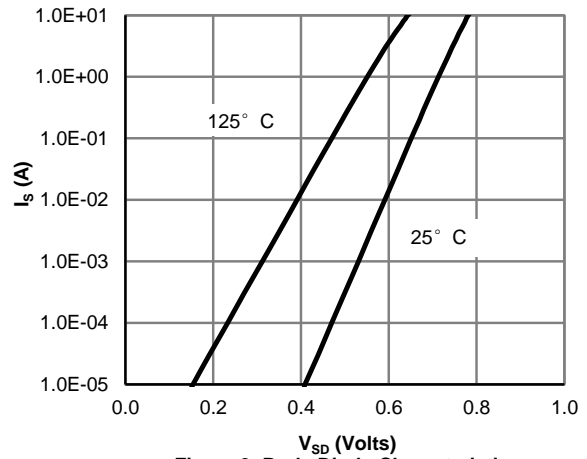


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

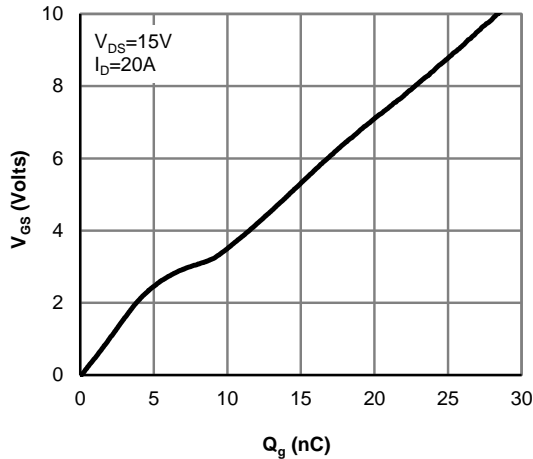


Figure 7: Gate-Charge Characteristics

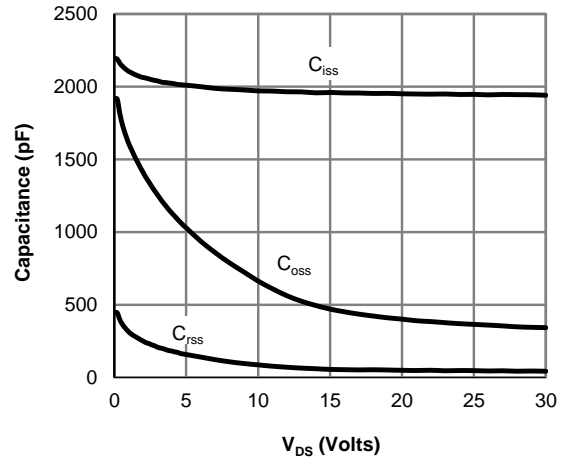


Figure 8: Capacitance Characteristics

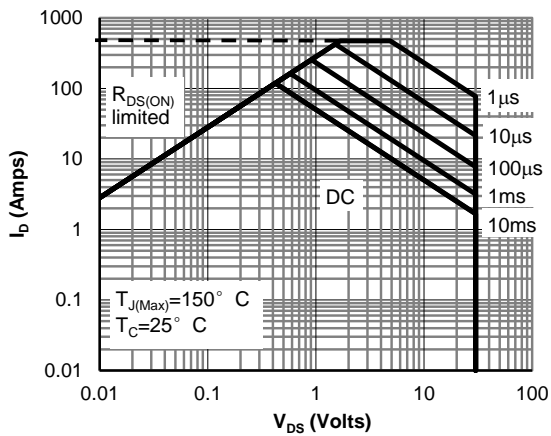


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

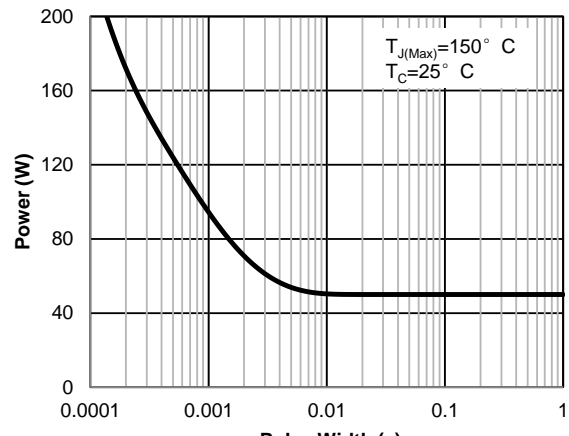


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

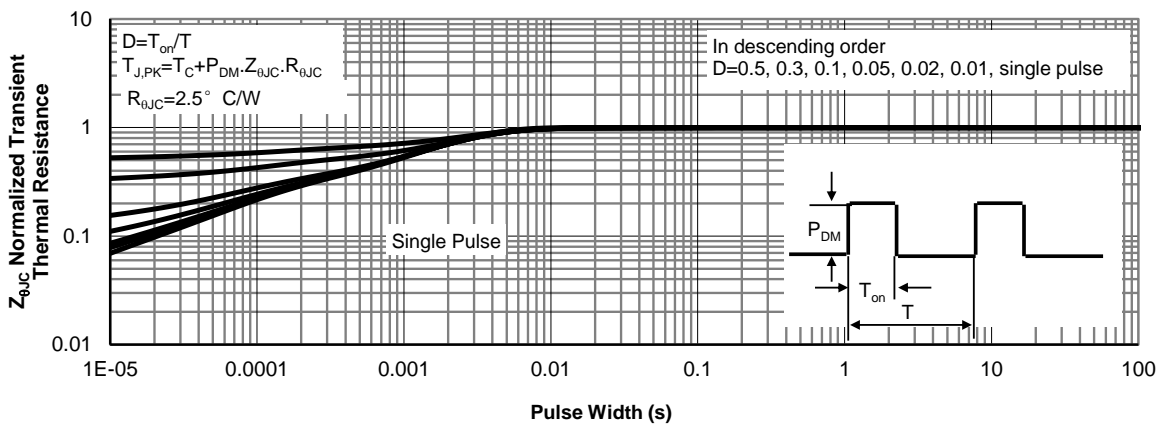


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

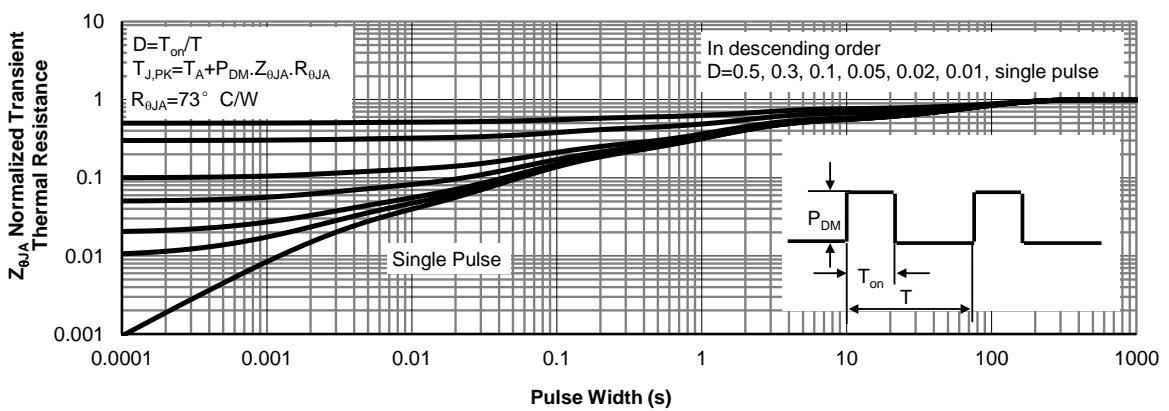
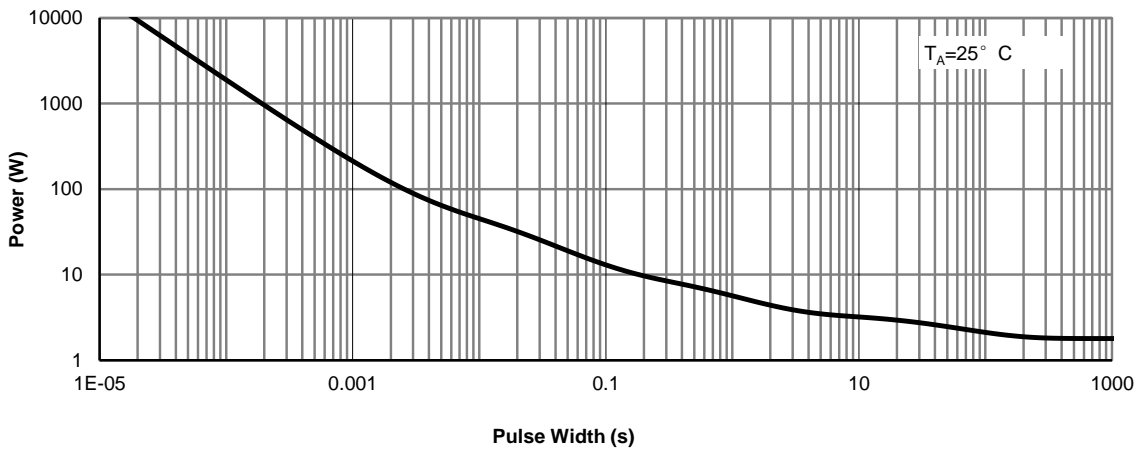
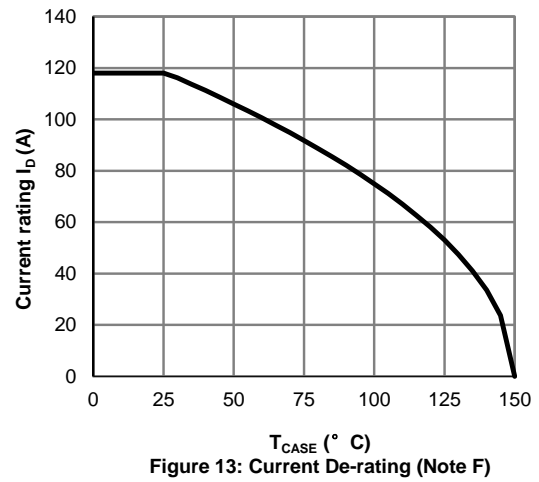
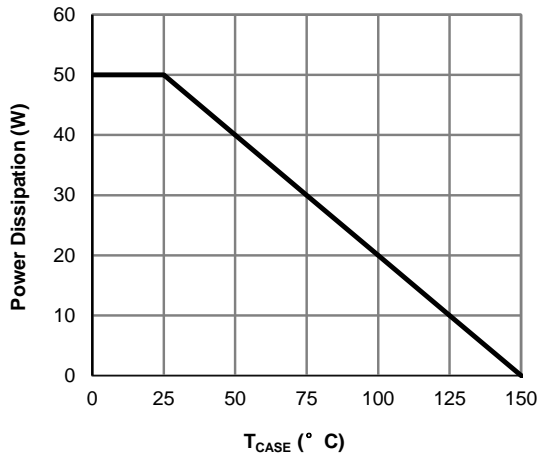


Figure A: Gate Charge Test Circuit & Waveforms

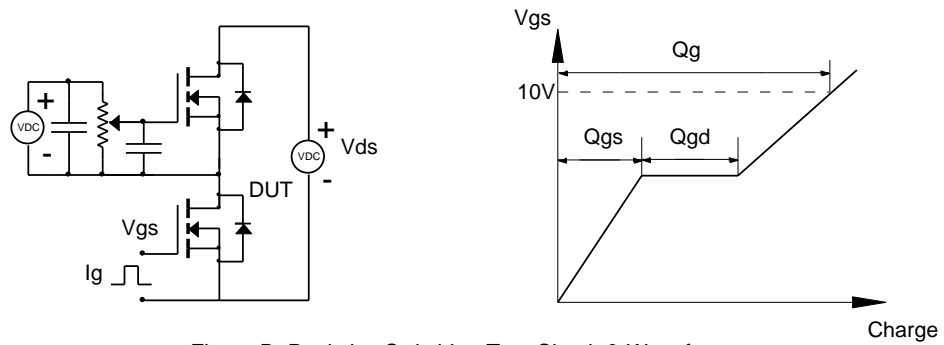


Figure B: Resistive Switching Test Circuit & Waveforms

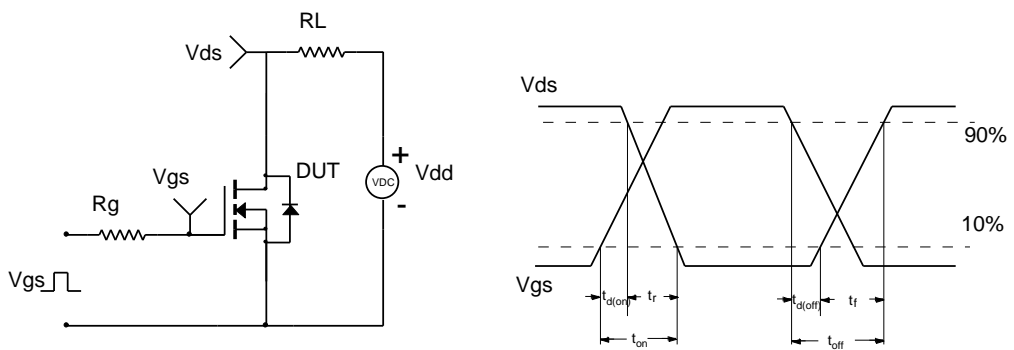


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

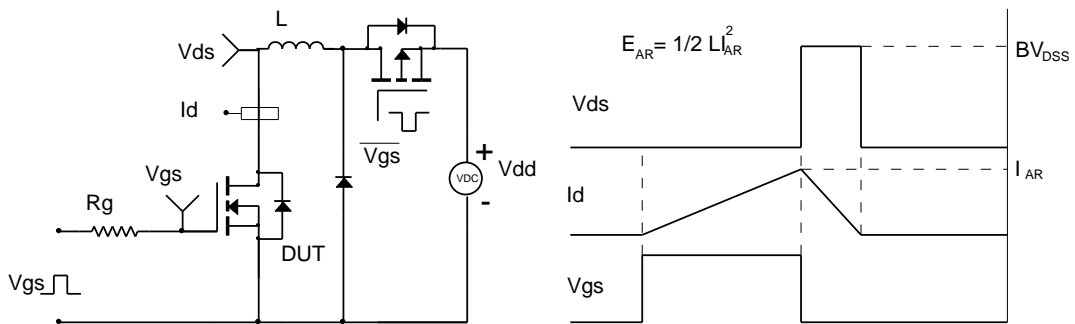


Figure D: Diode Recovery Test Circuit & Waveforms

