AONS21113

20V P-Channel MOSFET

ALPHA & OMEGA SEMICONDUCTOR

General Description

- Latest advanced trench technology
- Low $R_{DS(ON)}$
- High Current Capability
- RoHS and Halogen-Free Compliant

Product Summary

V_{DS}	-20V
I_D (at V_{GS}=-10V)	-70A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 2.2mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 2.5mΩ
$R_{DS(ON)}$ (at V_{GS}=-2.5V)	< 3.6mΩ

100% UIS Tested
100% Rg Tested

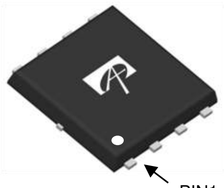
Green Product

Applications

- Notebook AC-in load switch
- Battery protection charge/discharge

DFN5X6

Top View

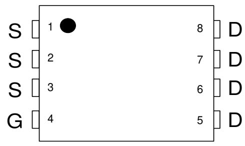


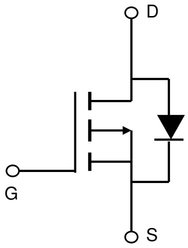
PIN1

Bottom View

PIN1

Top View





Orderable Part Number	Package Type	Form	Minimum Order Quantity
AONS21113	DFN 5x6	Tape & Reel	3000

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [G]	T_C=25°C	I_D	-70	A
	T_C=100°C		-70	
Pulsed Drain Current [C]		I_{DM}	-280	
Continuous Drain Current [G]	T_A=25°C	I_{DSM}	-44	A
	T_A=70°C		-35	
Avalanche Current [C]		I_{AS}	-75	A
Avalanche energy	L=0.1mH [C]	E_{AS}	281	mJ
Power Dissipation [B]	T_C=25°C	P_D	138	W
	T_C=100°C		55	
Power Dissipation [A]	T_A=25°C	P_{DSM}	6.2	W
	T_A=70°C		4	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	15	20	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		40	50	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.6	0.9	°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		-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-20V, V_{GS}=0V				-1	µA
			T_J=55°C			-5	
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		-0.3	-0.7	-1.1	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-20A			1.7	2.2	mΩ
			T_J=125°C		2.2	2.8	
		V_{GS}=-4.5V, I_D=-20A			1.9	2.5	mΩ
		V_{GS}=-2.5V, I_D=-20A			2.5	3.6	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-20A			150		S
V_{SD}	Diode Forward Voltage	I_S=-1A, V_{GS}=0V			-0.6	-1	V
I_S	Maximum Body-Diode Continuous Current [G]					-70	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-10V, f=1MHz			18700		pF
C_{oss}	Output Capacitance				2050		pF
C_{rss}	Reverse Transfer Capacitance				1880		pF
R_g	Gate resistance	f=1MHz			2.6	5.2	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=-10V, V_{DS}=-10V, I_D=-20A			390	550	nC
Q_g(4.5V)	Total Gate Charge				180	260	nC
Q_{gs}	Gate Source Charge				26		nC
Q_{gd}	Gate Drain Charge				48		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-10V, R_L=0.75Ω, R_{GEN}=3Ω			12		ns
t_r	Turn-On Rise Time				45		ns
$t_{D(off)}$	Turn-Off DelayTime				530		ns
t_f	Turn-Off Fall Time				125		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-20A, di/dt=500A/µs			68		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-20A, di/dt=500A/µs			280		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 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 $_{\theta JA}$ t≤ 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 $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ 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 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

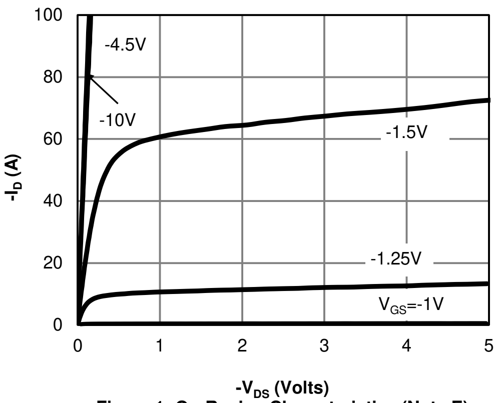


Figure 1: On-Region Characteristics (Note E)

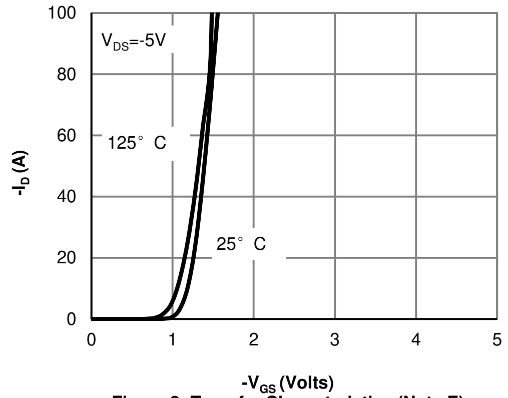


Figure 2: Transfer Characteristics (Note E)

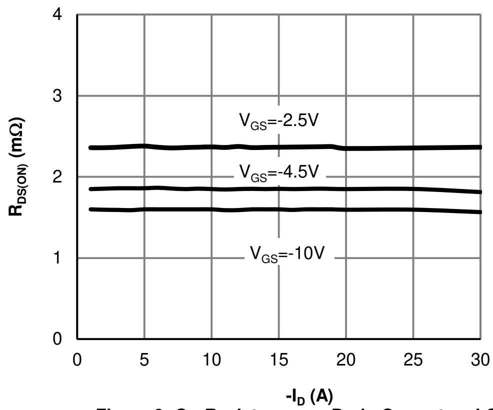


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

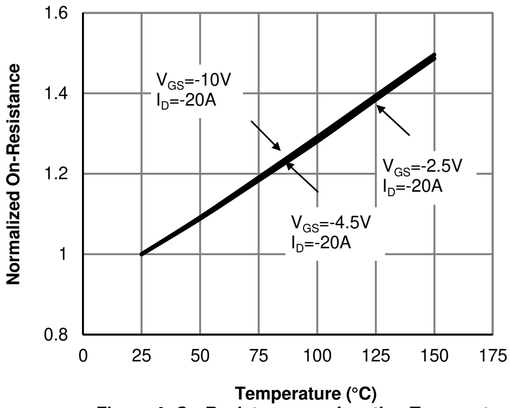


Figure 4: On-Resistance vs. Junction Temperature (Note E)

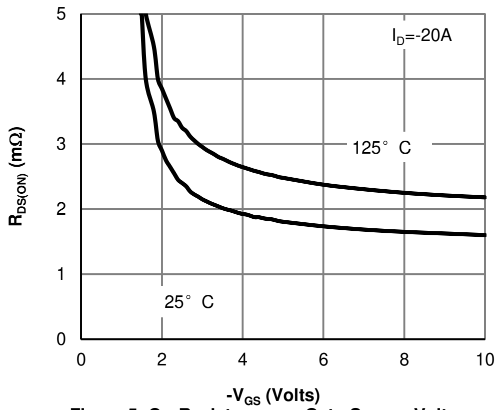


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

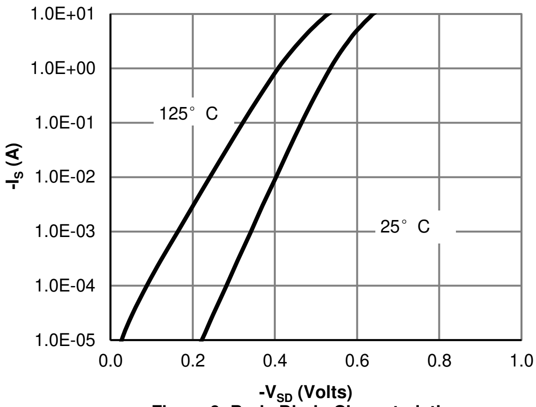


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

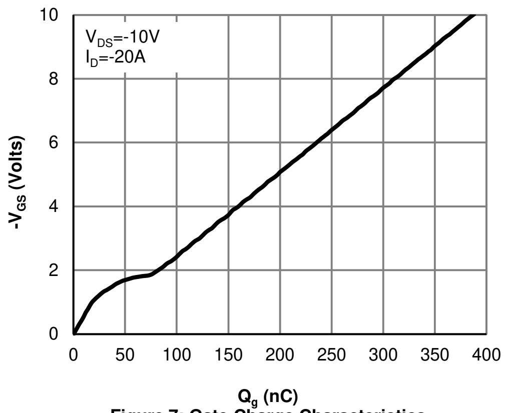


Figure 7: Gate-Charge Characteristics

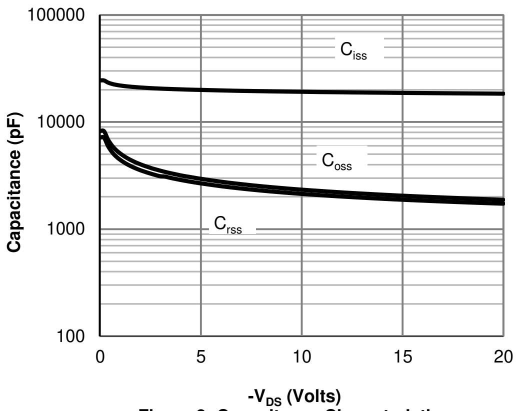
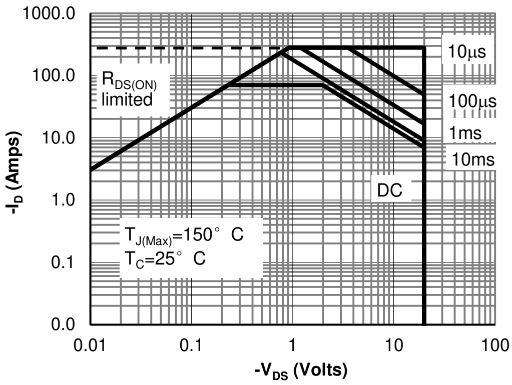


Figure 8: Capacitance Characteristics



-V_{GS}> or equal to -2.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

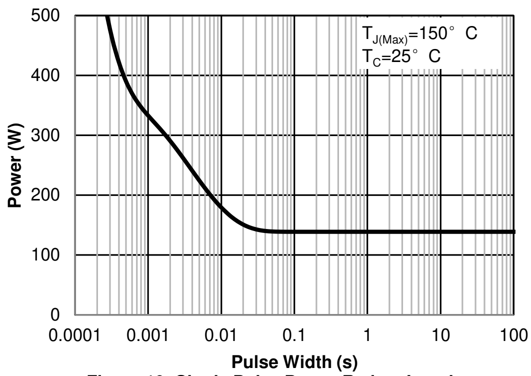


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

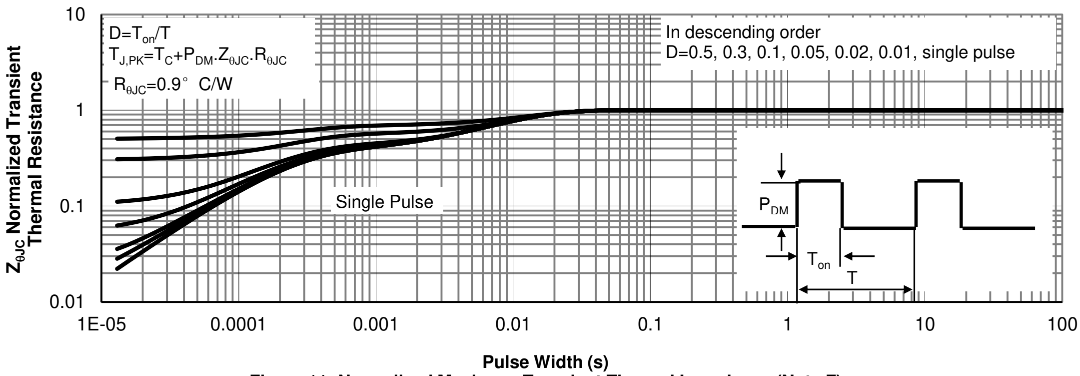


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

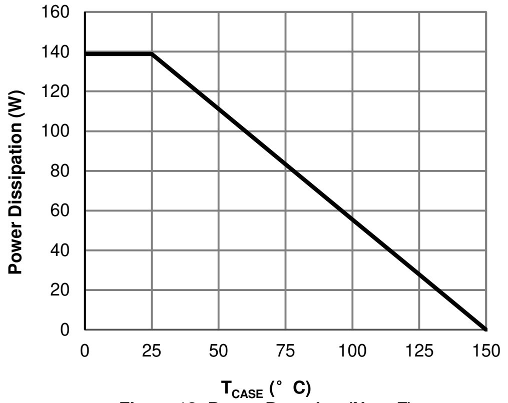


Figure 12: Power De-rating (Note F)

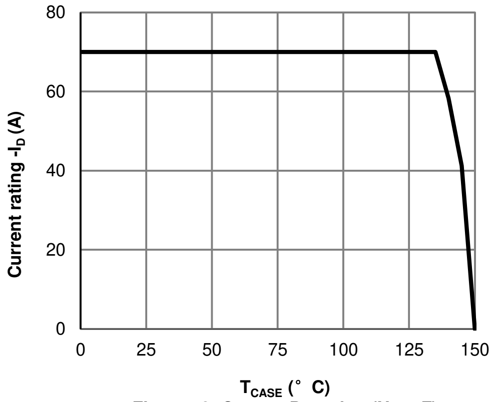


Figure 13: Current De-rating (Note F)

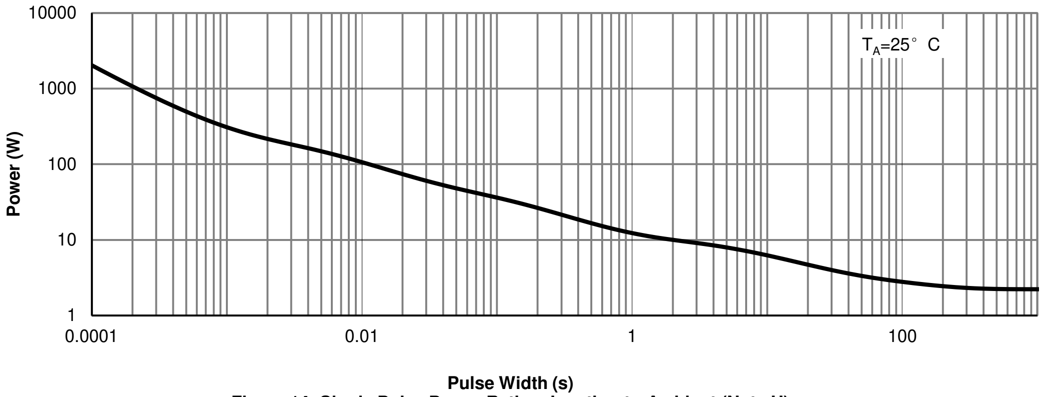


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

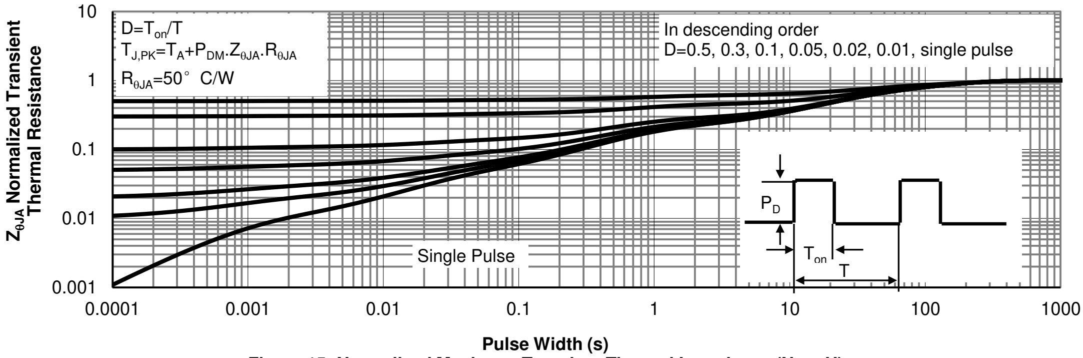
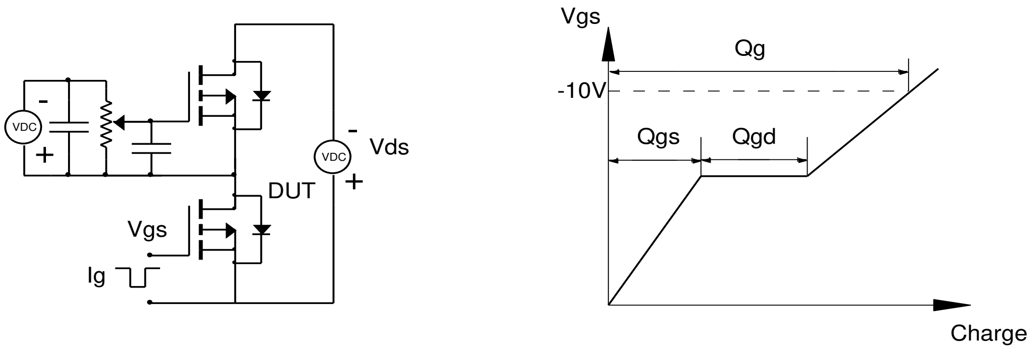
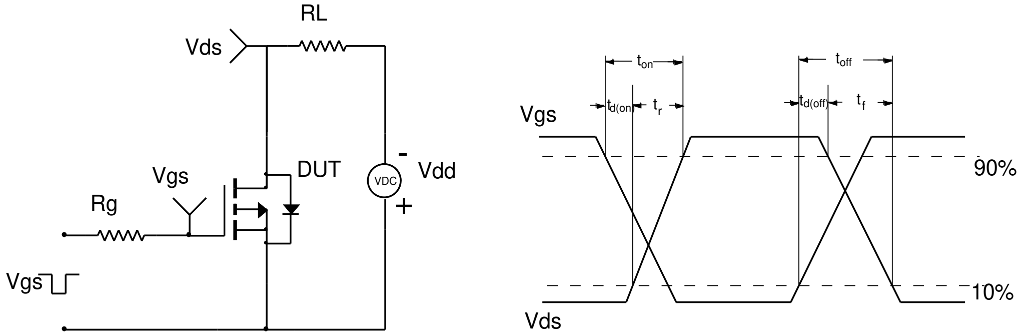


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

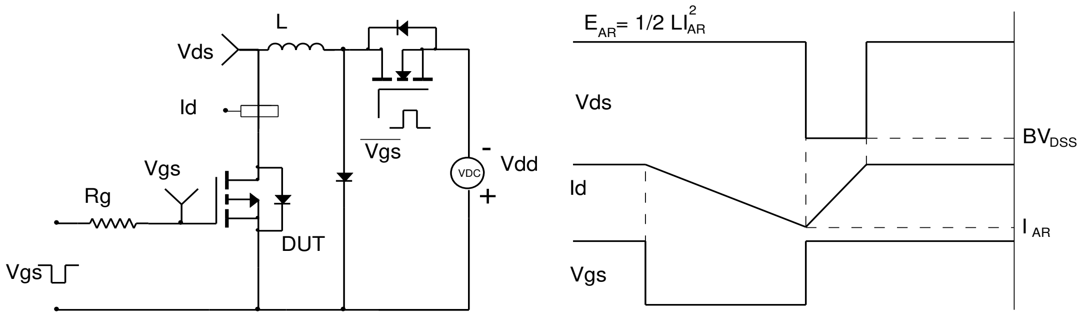
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms