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ALPHA & OMEGA
SEMICONDUCTOR

AON6510

30V N-Channel AlphaMOS

General Description

- Trench Power AlphaMOS (αMOS LV) technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- RoHS and Halogen-Free Compliant

Application

- DC/DC Converters in Computing, Servers, and POL
- Isolated DC/DC Converters in Telecom and Industrial

Product Summary

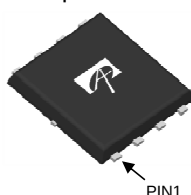
V_{DS}	30V
I_D (at $V_{GS}=10V$)	32A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 4.4mΩ
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 5.9mΩ

100% UIS Tested
100% Rg Tested

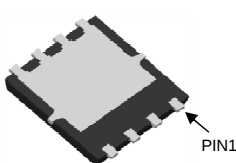


DFN5X6

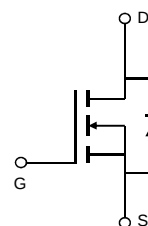
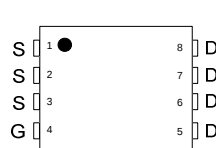
Top View



Bottom View



Top View



Orderable Part Number

AON6510

Package Type

DFN 5x6

Form

Tape & Reel

Minimum Order Quantity

3000

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^G	I_D	32	A
		25	A
Pulsed Drain Current ^C	I_{DM}	128	A
Continuous Drain Current	I_{DSM}	28	A
		22	A
Avalanche Current ^C	I_{AS}	46	A
Avalanche energy $L=0.05\text{mH}$ ^C	E_{AS}	53	mJ
V_{DS} Spike	V_{SPIKE}	36	V
		46	V
Power Dissipation ^B	P_D	18.5	W
		5	W
Power Dissipation ^A	P_{DSM}	3.2	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	20	25	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A, D}		45	55	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	2.2	2.7	$^\circ\text{C/W}$


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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	ID=250μA, VGS=0V	30			V
IDSS	Zero Gate Voltage Drain Current	VDS=30V, VGS=0V TJ=55°C			1 5	μA
IGSS	Gate-Body leakage current	VDS=0V, VGS=±20V			±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=250μA	1.4	1.8	2.2	V
RDS(on)	Static Drain-Source On-Resistance	VGS=10V, ID=20A TJ=125°C		3.6 4.9	4.4 6	mΩ
		VGS=4.5V, ID=20A		4.7	5.9	mΩ
gFS	Forward Transconductance	VDS=5V, ID=20A		91		S
VSD	Diode Forward Voltage	IS=1A, VGS=0V		0.7	1	V
IS	Maximum Body-Diode Continuous Current ^G				32	A
DYNAMIC PARAMETERS						
Ciss	Input Capacitance	VGS=0V, VDS=15V, f=1MHz		2160		pF
Coss	Output Capacitance			915		pF
Crss	Reverse Transfer Capacitance			115		pF
Rg	Gate resistance	f=1MHz	0.9	1.8	2.7	Ω
SWITCHING PARAMETERS						
Qg(10V)	Total Gate Charge	VGS=10V, VDS=15V, ID=20A		30	42	nC
Qg(4.5V)	Total Gate Charge			14	20	nC
Qgs	Gate Source Charge			5.1		nC
Qgd	Gate Drain Charge			6.3		nC
tD(on)	Turn-On DelayTime	VGS=10V, VDS=15V, RL=0.75Ω, RGEN=3Ω		8		ns
tr	Turn-On Rise Time			4		ns
tD(off)	Turn-Off DelayTime			29		ns
tf	Turn-Off Fall Time			5.5		ns
trr	Body Diode Reverse Recovery Time	IF=20A, dI/dt=500A/μs		16.5		ns
Qrr	Body Diode Reverse Recovery Charge	IF=20A, dI/dt=500A/μs		34.2		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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

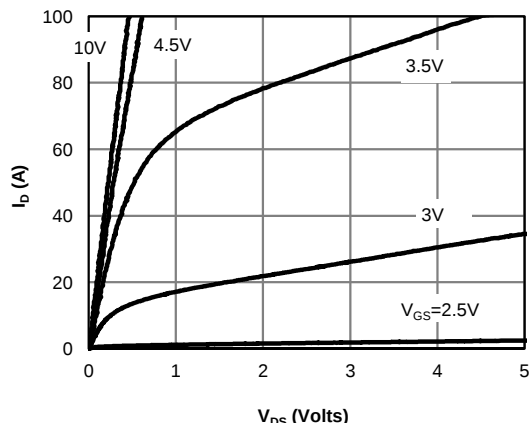


Figure 1: On-Region Characteristics (Note E)

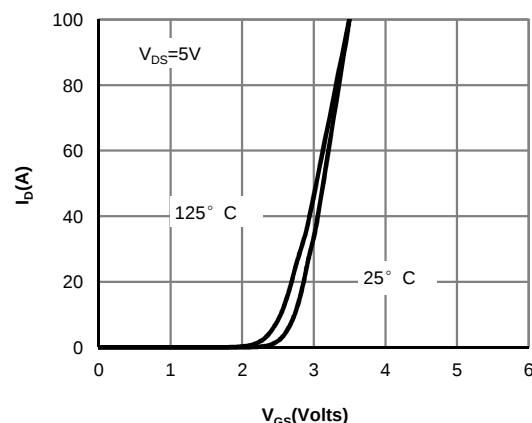


Figure 2: Transfer Characteristics (Note E)

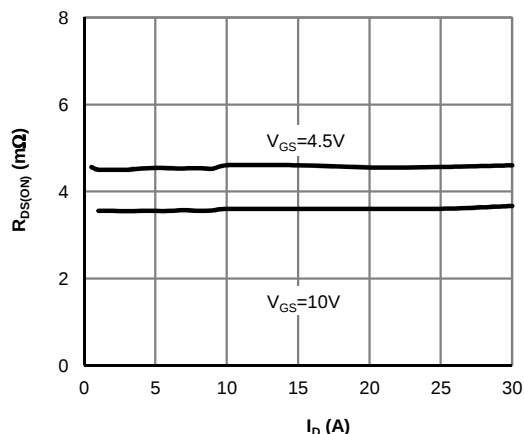


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

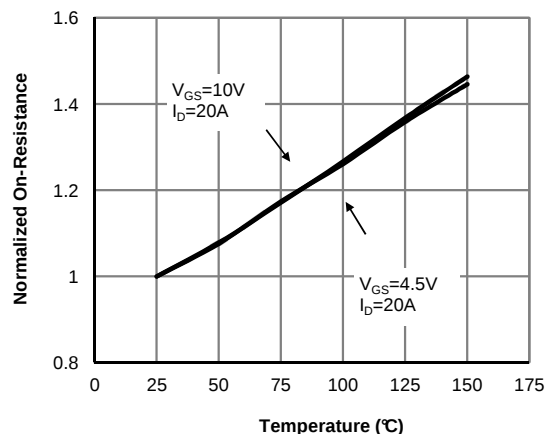


Figure 4: On-Resistance vs. Junction Temperature (Note E)

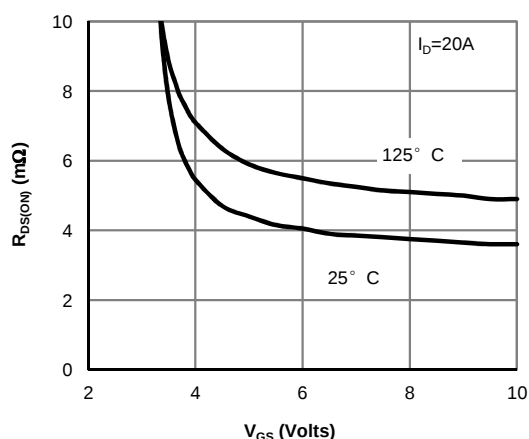


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

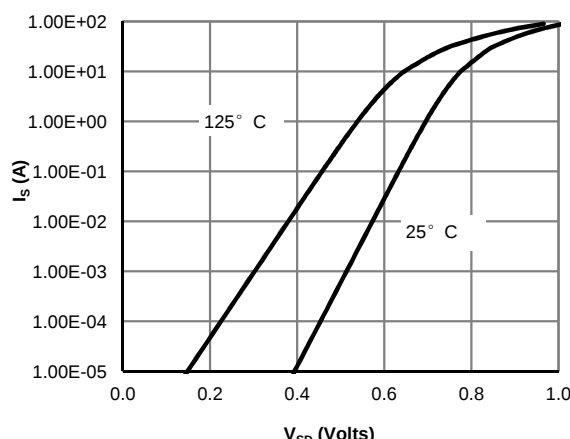


Figure 6: Body-Diode Characteristics (Note E)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

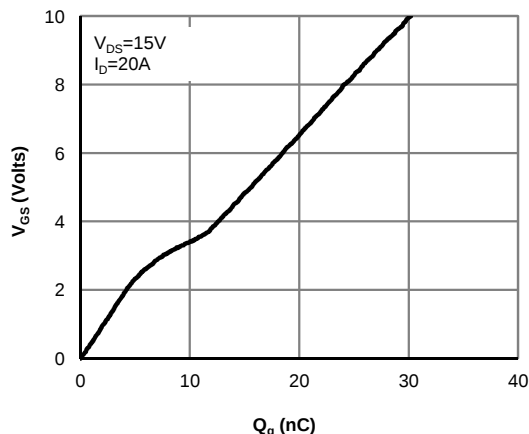


Figure 7: Gate-Charge Characteristics

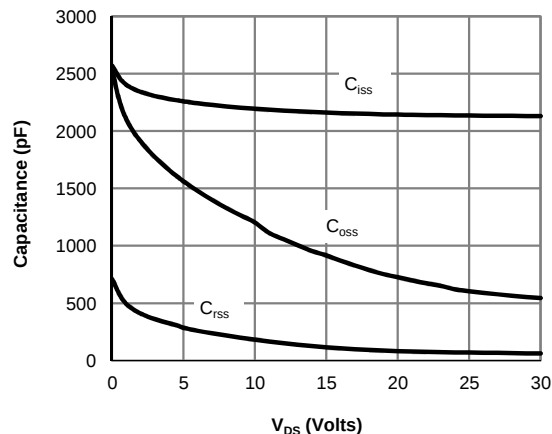


Figure 8: Capacitance Characteristics

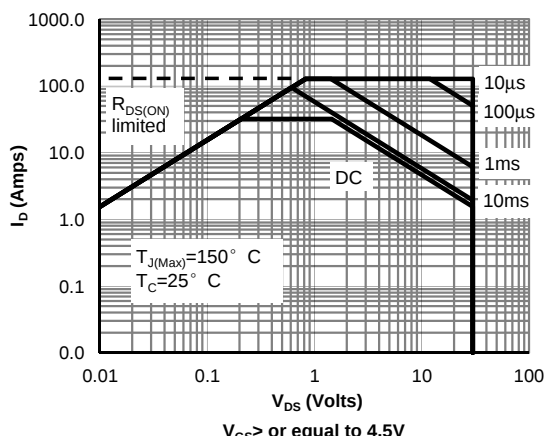


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

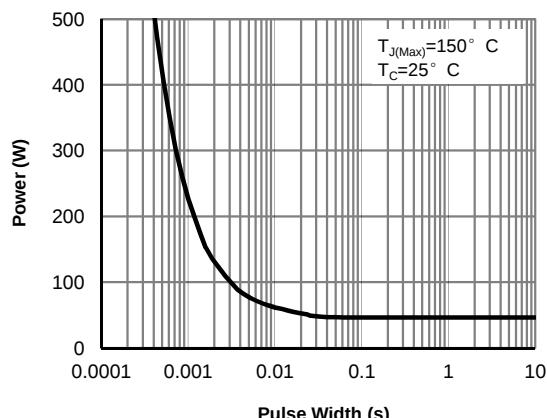


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

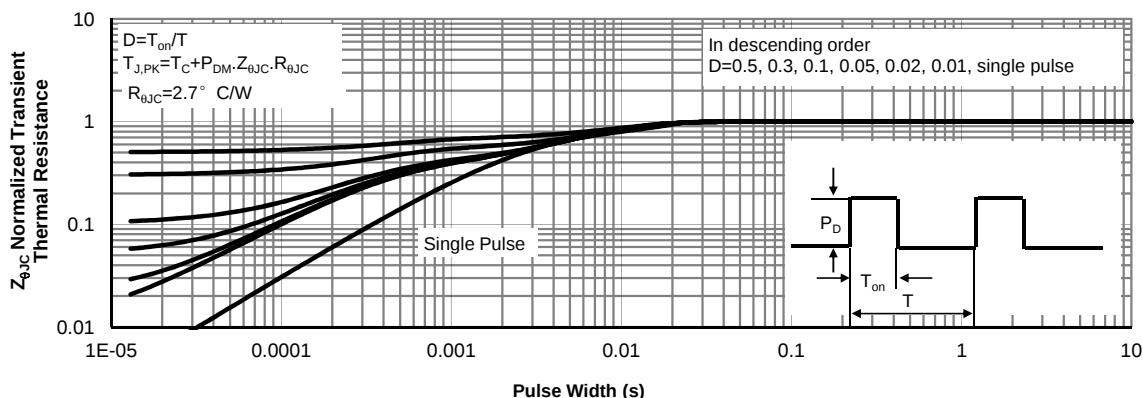


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

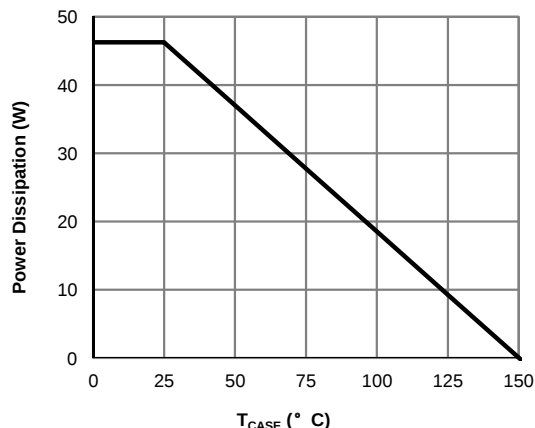


Figure 12: Power De-rating (Note F)

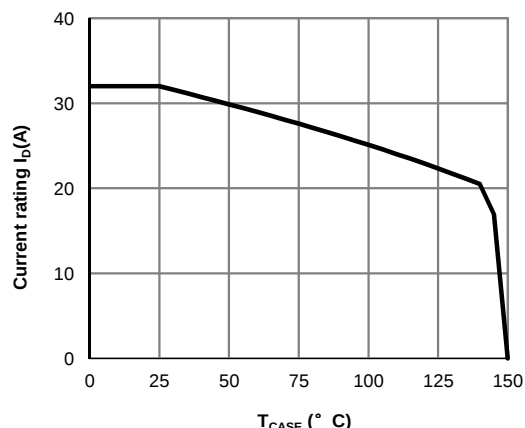


Figure 13: Current De-rating (Note F)

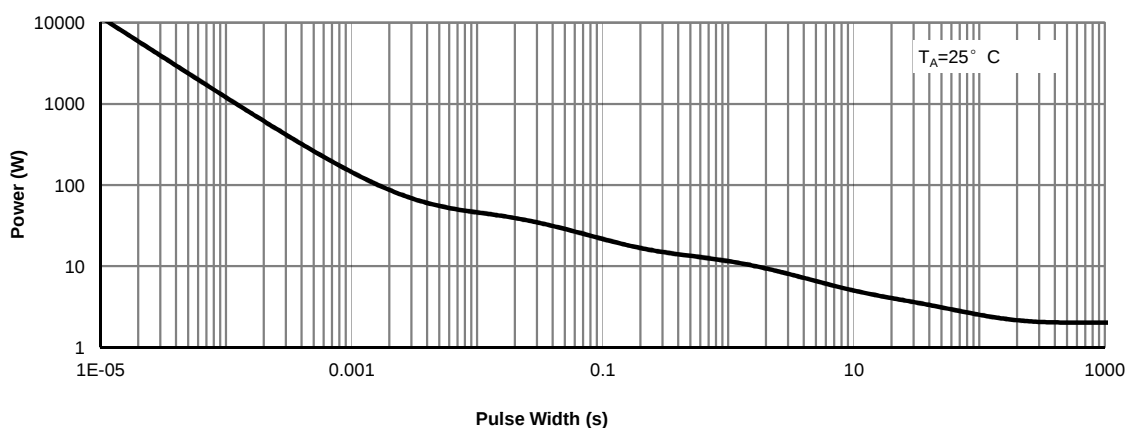


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

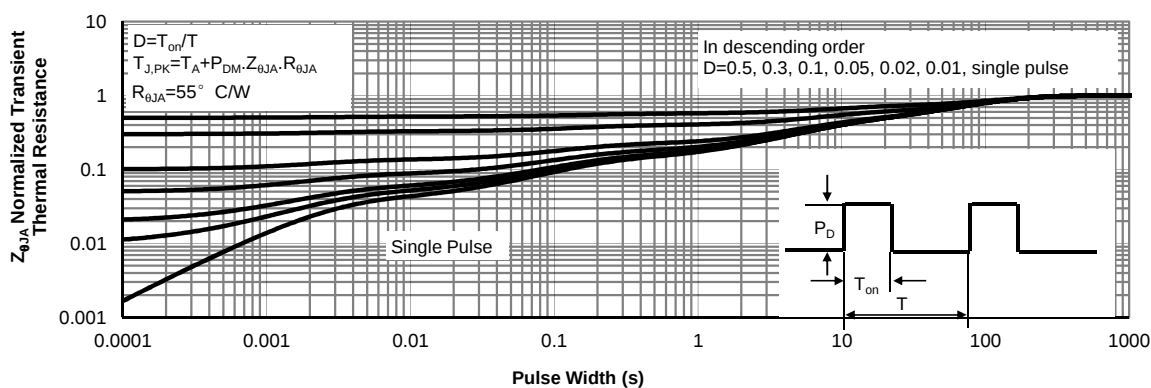
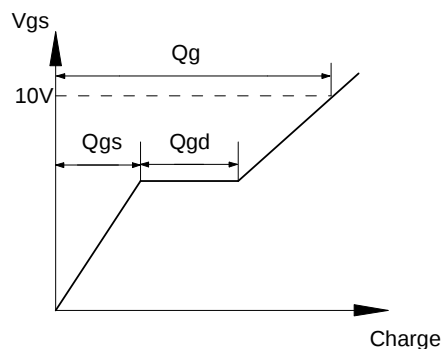
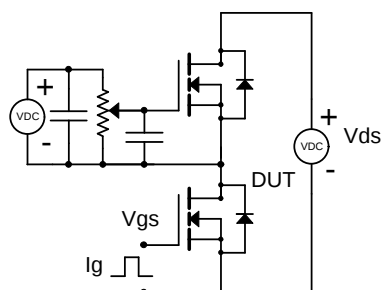


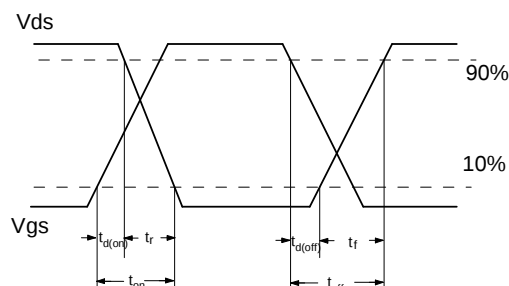
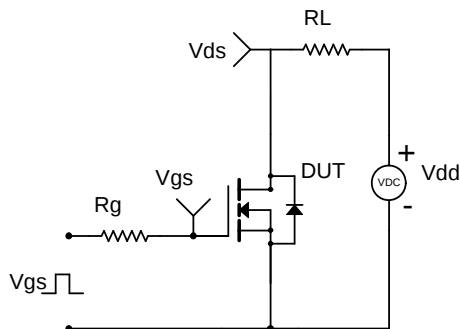
Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)



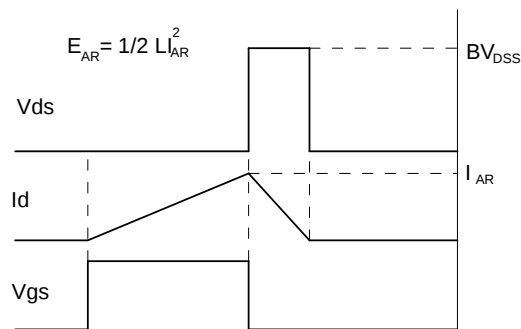
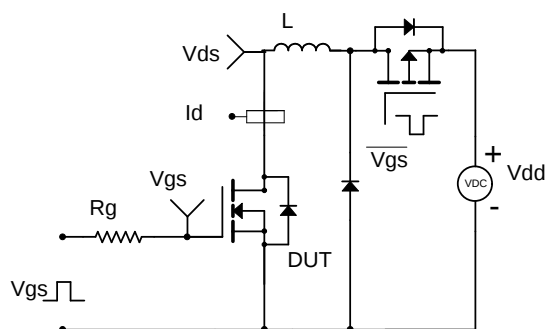
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

