ALPHA & OMEGA SEMICONDUCTOR

AON7520

30V N-Channel AlphaMOS

General Description

- Latest Trench Power AlphaMOS (αMOS LV) technology
- Very Low $R_{DS(ON)}$ at 2.5V V_{GS}
- Low Gate Charge
- ESD protection
- RoHS and Halogen-Free Compliant

Application

- Load switch, battery switch in portable devices

Product Summary

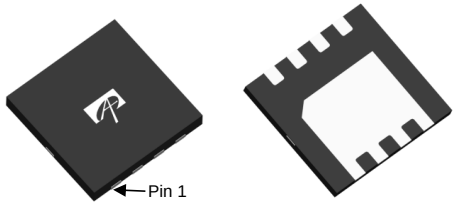
V_{DS}	30V
I_D (at V_{GS}=10V)	50A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 1.8mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 2.1mΩ
$R_{DS(ON)}$ (at V_{GS}=2.5V)	< 3.1mΩ
Typical ESD protection	**HBM Class 2**

100% UIS Tested
100% R_g Tested

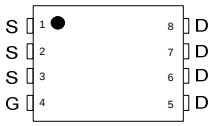
Green Product

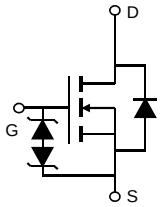
DFN 3.3x3.3 EP

Top View **Bottom View**



Top View





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current[G]	T_C=25°C	I_D	50	A
	T_C=100°C		39	
Pulsed Drain Current [C]		I_{DM}	200	
Continuous Drain Current	T_A=25°C	I_{DSM}	48	A
	T_A=70°C		38	
Avalanche Current [C]		I_{AS}	60	A
Avalanche energy L=0.05mH [C]		E_{AS}	90	mJ
V_{DS} Spike	100ns	V_{SPIKE}	36	V
Power Dissipation [B]	T_C=25°C	P_D	83.3	W
	T_C=100°C		33.3	
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	$R_{\theta JA}$	16	20	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		45	55	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.1	1.5	°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, V_{GS}=0V	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V, V_{GS}=0V			1	µA
		T_J=125°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±10V			±10	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250µA	0.5	0.85	1.2	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=20A		1.45	1.8	mΩ
		T_J=125°C		2.05	2.6	
		V_{GS}=4.5V, I_D=20A		1.66	2.1	
		V_{GS}=2.5V, I_D=20A		2.35	3.1	
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A		125		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.61	1	V
I_S	Maximum Body-Diode Continuous Current G				50	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		4175		pF
C_{oss}	Output Capacitance			1505		pF
C_{rss}	Reverse Transfer Capacitance			300		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.5	1	1.5	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=15V, I_D=20A		77.5	105	nC
Q_g(4.5V)	Total Gate Charge			37	50	nC
Q_{gs}	Gate Source Charge			6		nC
Q_{gd}	Gate Drain Charge			12.5		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=0.75Ω, R_{GEN}=3Ω		6.5		ns
t_r	Turn-On Rise Time			7		ns
$t_{D(off)}$	Turn-Off DelayTime			58.5		ns
t_f	Turn-Off Fall Time			17.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=500A/µs		20.3		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=500A/µs		40.7		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

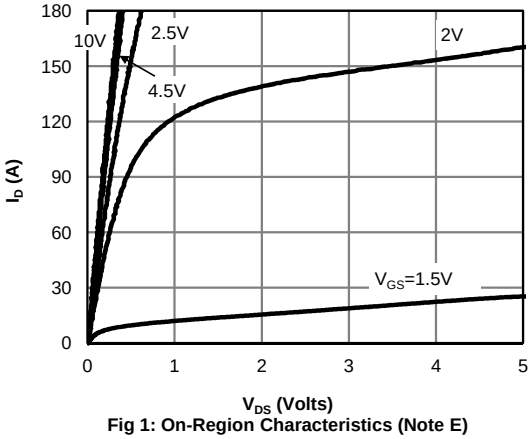


Fig 1: On-Region Characteristics (Note E)

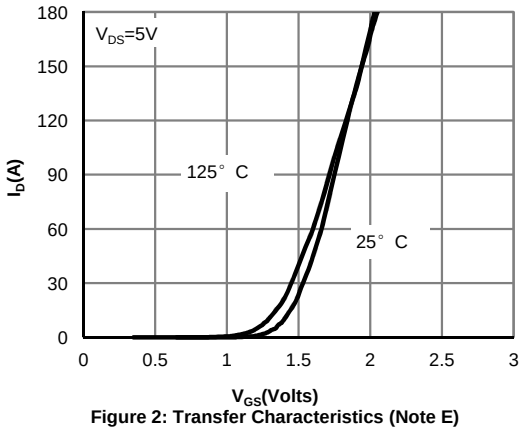


Figure 2: Transfer Characteristics (Note E)

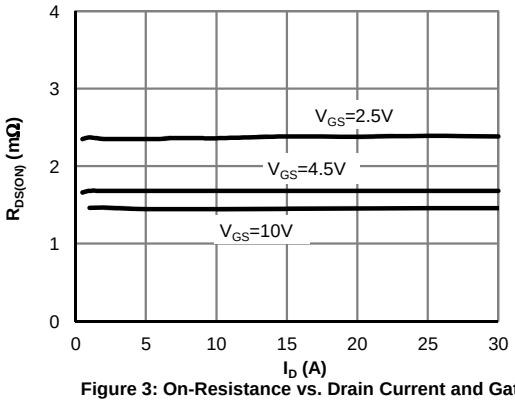


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

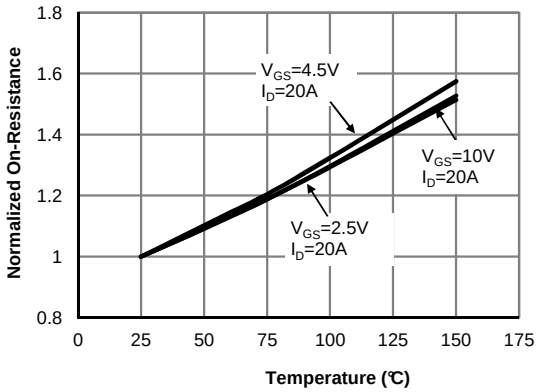


Figure 4: On-Resistance vs. Junction Temperature (Note E)

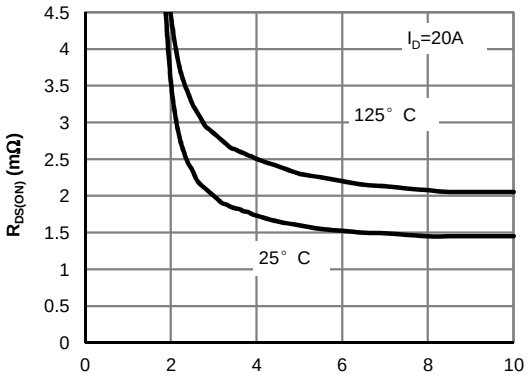


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

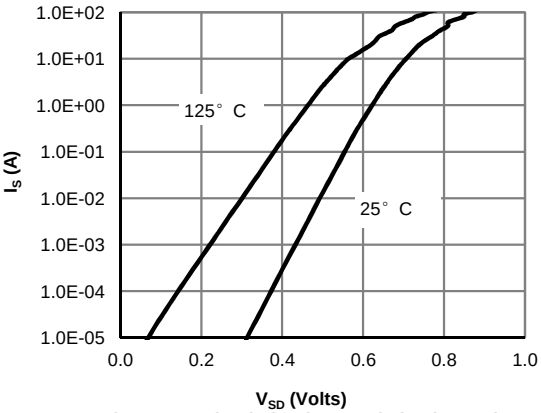


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

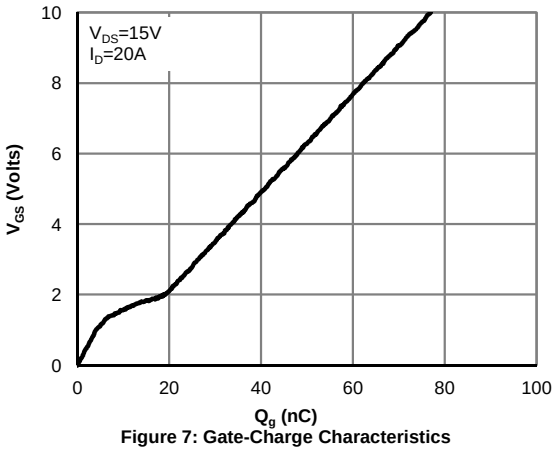


Figure 7: Gate-Charge Characteristics

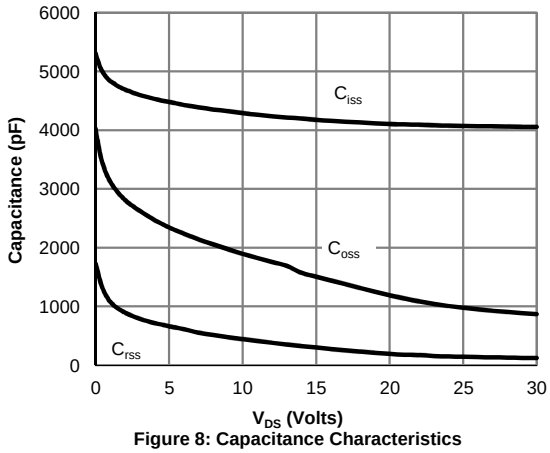


Figure 8: Capacitance Characteristics

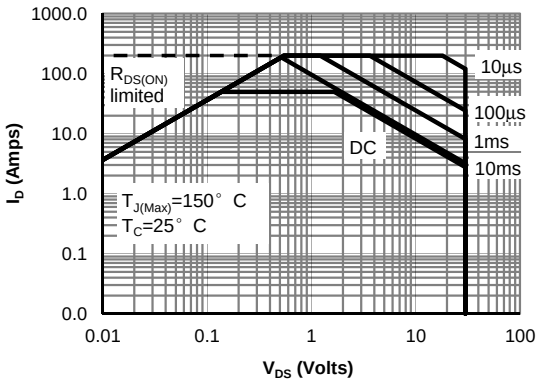


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

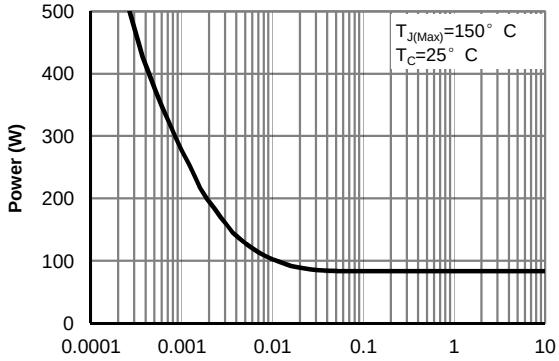


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

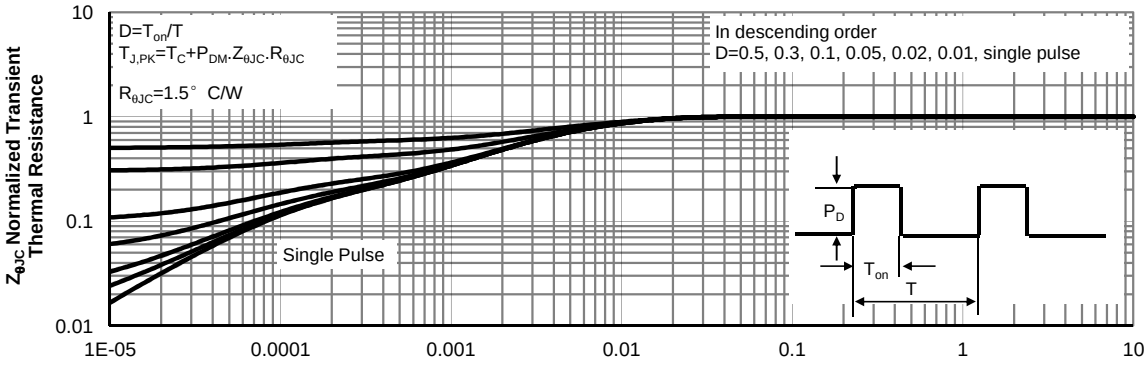


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

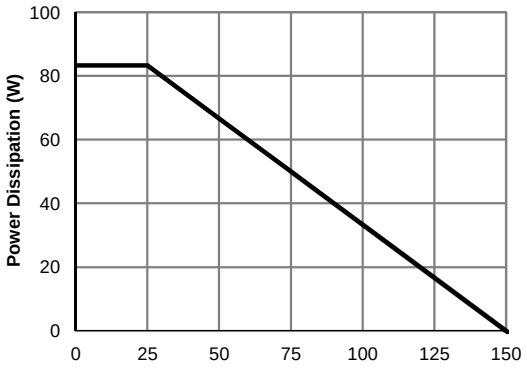


Figure 12: Power De-rating (Note F)

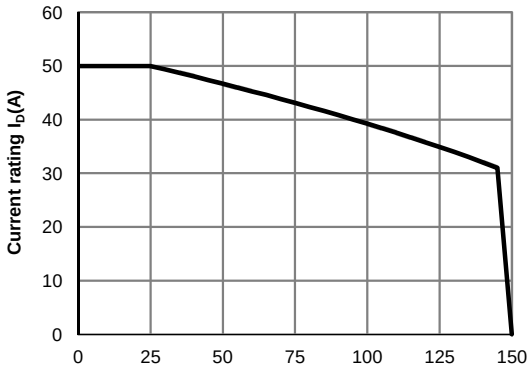


Figure 13: Current De-rating (Note F)

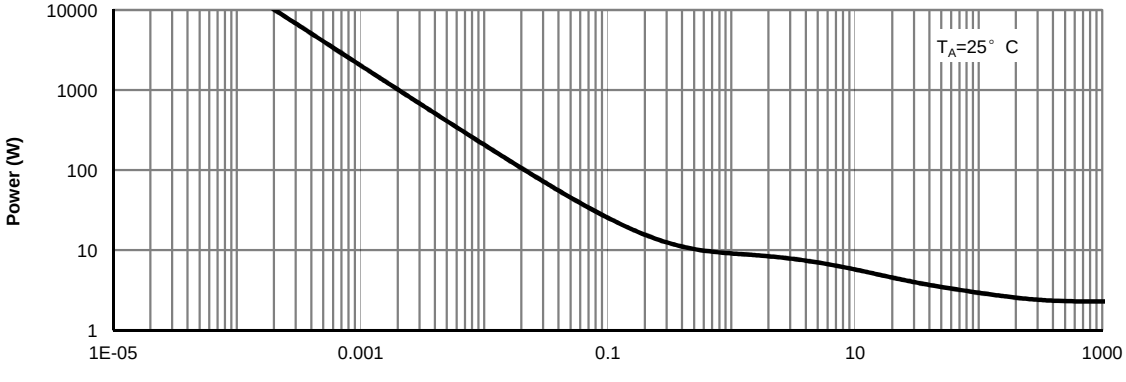


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

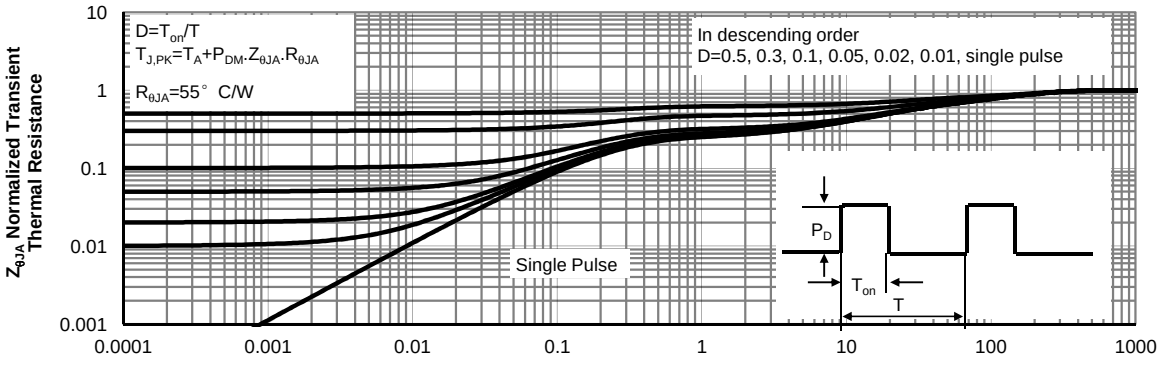
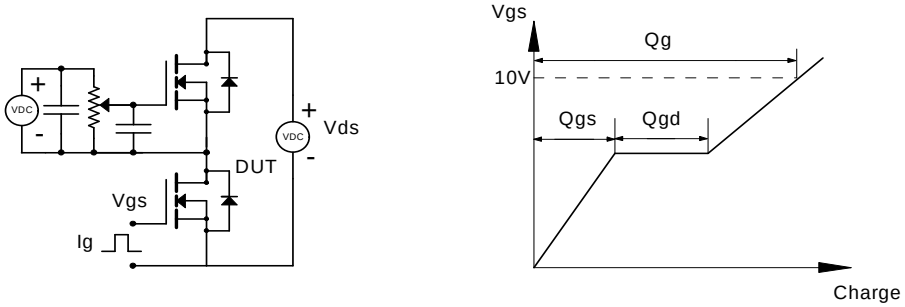
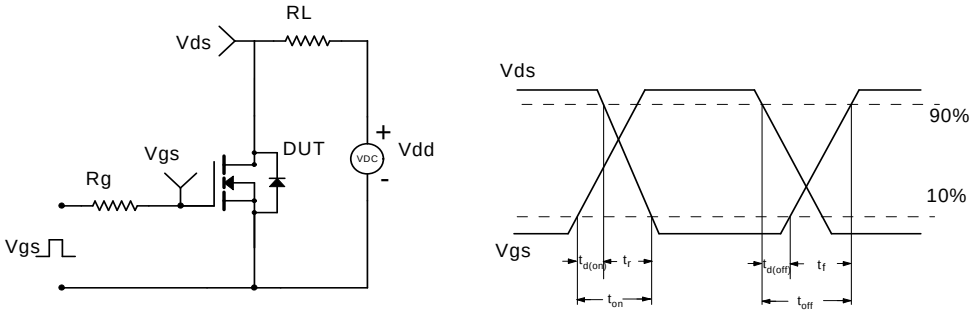


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

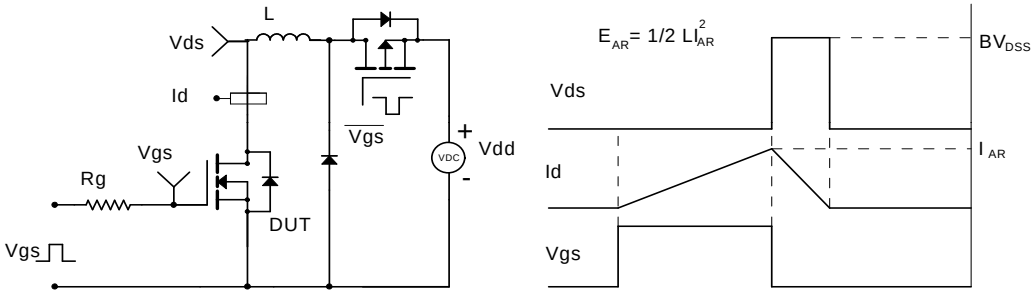
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms