

AOT66920L/AOB66920L

100V N-Channel AlphaSGT™

General Description

- Trench Power MOSFET AlphaSGT[™] technology
- Low $R_{DS(ON)}$
- Logic Level Driving
- Excellent Q_G x R_{DS(ON)} Product (FOM)
- RoHS and Halogen-Free Compliant

Applications

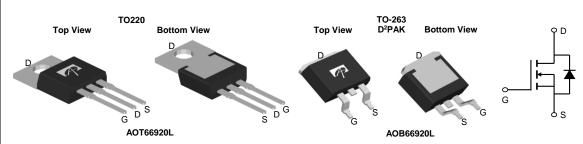
• High Frequency Switching and Synchronous Rectification

Product Summary

 $\begin{array}{lll} V_{DS} & 100V \\ I_{D} \; (at \; V_{GS} \! = \! 10V) & 80A \\ R_{DS(ON)} \; (at \; V_{GS} \! = \! 10V) & < 8m\Omega \\ R_{DS(ON)} \; (at \; V_{GS} \! = \! 4.5V) & < 10.5m\Omega \end{array}$

100% UIS Tested 100% Rg Tested





Orderable Part Number	Package Type	Form	Minimum Order Quantity		
AOT66920L	TO-220	Tube	1000		
AOB66920L	TO-263	Tape & Reel	800		

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain	T _C =25°C		80	
Current	T _C =100°C	I _D	50	А
Pulsed Drain Current ^C		I _{DM}	180	
Continuous Drain	T _A =25°C		22.5	Δ.
Current	T _A =70°C	I _{DSM}	18	A
Avalanche Current ^C		I _{AS}	38	A
Avalanche energy	L=0.1mH	E _{AS}	72	mJ
	T _C =25°C	Б	100	W
Power Dissipation B	T _C =100°C	P _D	40	VV
	T _A =25°C	В	8.3	10/
Power Dissipation A	T _A =70°C	P _{DSM}	5.3	W
Junction and Storage Temperature Range		T_J , T_{STG}	-55 to 150	°C

Thermal Characteristics						
Parameter		Symbol	Тур	Max	Units	
Maximum Junction-to-Ambient A	t ≤ 10s	D	12	15	°C/W	
Maximum Junction-to-Ambient AD	Steady-State	$R_{\theta JA}$	50	60	°C/W	
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.0	1.25	°C/W	



Electrical Characteristics (T_{.I}=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Conditions		Тур	Max	Units
STATIC F	PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V		100			V
ı	Zero Gate Voltage Drain Current	V _{DS} =100V, V _{GS} =0V	_			1	μA
I _{DSS}	Zelo Gale Voltage Dialii Current		T _J =55°C			5	μΛ
I_{GSS}	Gate-Body leakage current	V_{DS} =0V, V_{GS} =±20V	V _{DS} =0V, V _{GS} =±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_{D}=250\mu A$		1.5	2.0	2.5	V
		V_{GS} =10V, I_D =20A			6.5	8.0	mΩ
$R_{DS(ON)}$	Static Drain-Source On-Resistance		T _J =125°C		11.3	13.8	11177
		V_{GS} =4.5V, I_{D} =20A			8.3	10.5	mΩ
g _{FS}	Forward Transconductance	V_{DS} =5V, I_{D} =20A			65		S
V_{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V			0.7	1	V
Is	Maximum Body-Diode Continuous Current					80	Α
DYNAMIC	PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, f=1MHz			2500		pF
Coss	Output Capacitance				485		pF
C _{rss}	Reverse Transfer Capacitance				13		pF
R_g	Gate resistance	f=1MHz		0.5	1.1	1.8	Ω
SWITCHI	NG PARAMETERS						
Q _g (10V)	Total Gate Charge				35	50	nC
Q _g (4.5V)	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, I	-204		16.7	25	nC
Q_{gs}	Gate Source Charge	V _{GS} -10V, V _{DS} -30V, 1	D-20A		8		nC
Q_{gd}	Gate Drain Charge				5		nC
Q _{oss}	Output Charge	$V_{GS}=0V$, $V_{DS}=50V$	$V_{GS}=0V$, $V_{DS}=50V$		44		nC
t _{D(on)}	Turn-On DelayTime				10		ns
t _r	Turn-On Rise Time	V _{GS} =10V, V _{DS} =50V, I	V_{GS} =10V, V_{DS} =50V, R_{L} =2.5 Ω ,		4		ns
t _{D(off)}	Turn-Off DelayTime	R _{GEN} =3Ω			31		ns
t _f	Turn-Off Fall Time				6		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs			34		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs			170		nC

A. The value of $R_{\theta JA}$ 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_{0JA} 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.

- C. Single pulse width limited by junction temperature $T_{J(MAX)}$ =150 $^{\circ}$ C.

- G. The maximum current rating is package limited.
- H. These tests are performed with the device mounted on 1 in FR-4 board with 2oz. Copper, in a still air environment with TA=25° C.

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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.

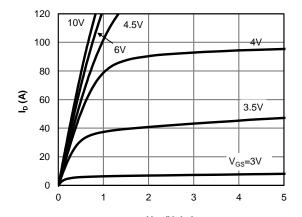
D. The R_{0,JA} is the sum of the thermal impedance from junction to case R_{0,JC} and case to ambient.

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

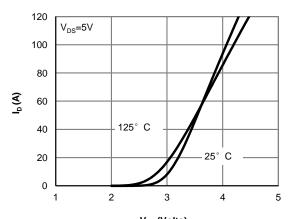
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsirk, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.



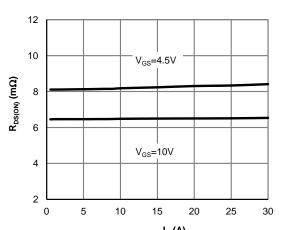
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



 V_{DS} (Volts) Figure 1: On-Region Characteristics (Note E)



V_{GS} (Volts) Figure 2: Transfer Characteristics (Note E)



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m I_D}\left({
m A}\right)$ Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

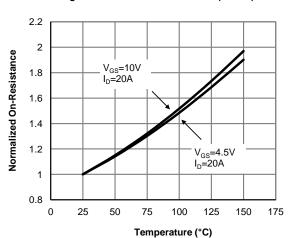
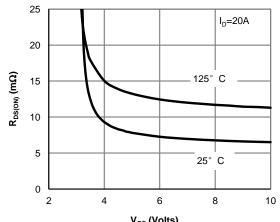
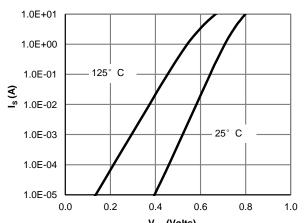


Figure 4: On-Resistance vs. Junction Temperature (Note E)



V_{GS} (Volts) Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)



V_{SD} (Volts) Figure 6: Body-Diode Characteristics (Note E)

1000

10

100



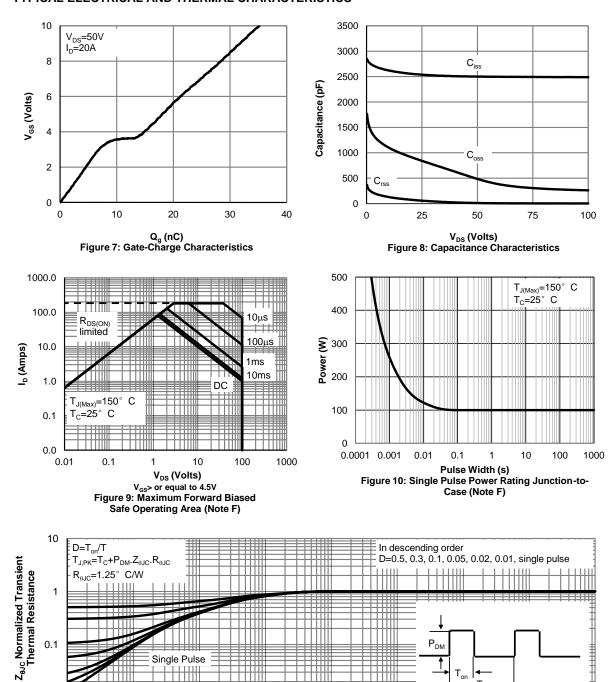
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Single Pulse

0.001

0.0001

0.01 1E-05



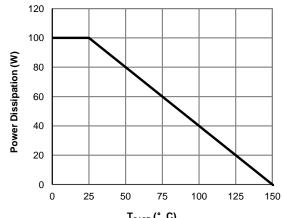
Pulse Width (s)
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

0.1

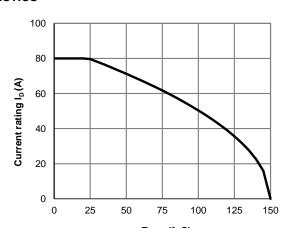
0.01



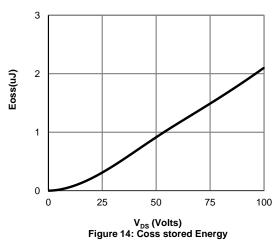
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

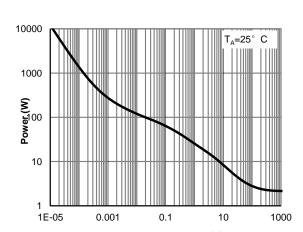


T_{CASE} (° C)
Figure 12: Power De-rating (Note F)

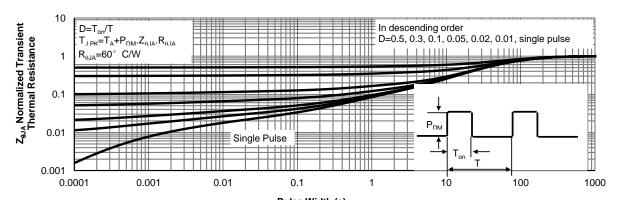


T_{CASE} (° C)
Figure 13: Current De-rating (Note F)





Pulse Width (s)
Figure 15: Single Pulse Power Rating Junctionto-Ambient (Note H)



Pulse Width (s)
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)



Figure A: Gate Charge Test Circuit & Waveforms

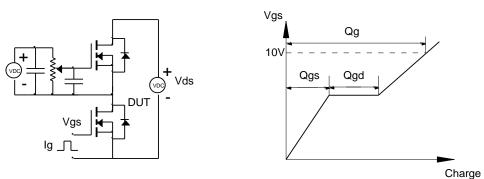


Figure B: Resistive Switching Test Circuit & Waveforms

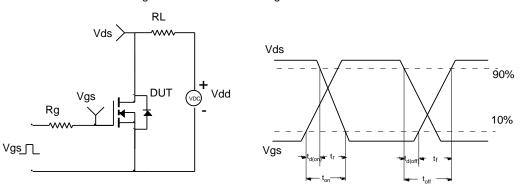


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

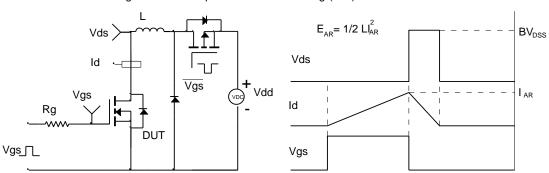
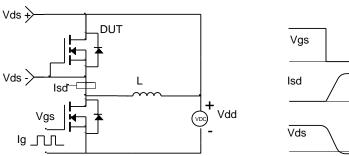
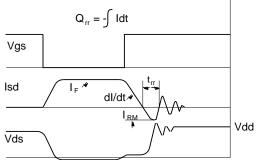


Figure D: Diode Recovery Test Circuit & Waveforms





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