ALPHA & OMEGA SEMICONDUCTOR

# AOT260L/AOB260L
60V N-Channel MOSFET

General Description

The AOT(B)260L uses Trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Crss.In addition, switching behavior is well controlled with a "Schottky style" soft recovery body diode.This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

Product Summary

V_{DS}	60V
I_D (at V_{GS}=10V)	140A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 2.5mΩ
$R_{DS(ON)}$ (at V_{GS} =6V)	< 2.9mΩ

100% UIS Tested

100% R_g Tested

Green Product

TO220 Top View / Bottom View — AOT260L

TO-263 D²PAK Top View / Bottom View — AOB260L
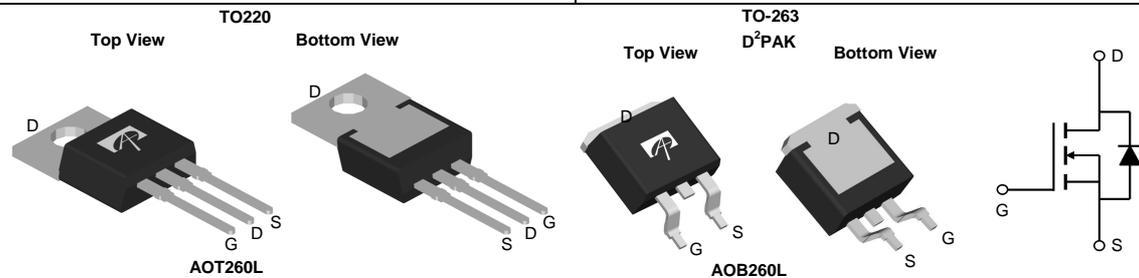
Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [G]	T_C=25℃	I_D	140	A
	T_C=100℃		110	
Pulsed Drain Current [C]		I_{DM}	500	
Continuous Drain Current	T_A=25℃	I_{DSM}	20	A
	T_A=70℃		16	
Avalanche Current [C]		I_{AS}, I_{AR}	128	A
Avalanche energy L=0.1mH [C]		E_{AS}, E_{AR}	819	mJ
Power Dissipation [B]	T_C=25℃	P_D	330	W
	T_C=100℃		165	
Power Dissipation [A]	T_A=25℃	P_{DSM}	1.9	W
	T_A=70℃		1.2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	12	15	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		54	65	℃/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.35	0.45	℃/W

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Electrical Characteristics (T$_J$=25℃ unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV$_{DSS}$	Drain-Source Breakdown Voltage	I$_D$=250μA, V$_{GS}$=0V		60			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=60V, V$_{GS}$=0V				1	μA
			T$_J$=55℃			5	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$=0V, V$_{GS}$= ±20V				100	nA
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$ I$_D$=250μA		2.2	2.7	3.2	V
I$_{D(ON)}$	On state drain current	V$_{GS}$=10V, V$_{DS}$=5V		500			A
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=20A TO220			2	2.5	mΩ
			T$_J$=125℃		3.1	3.9	
		V$_{GS}$=6V, I$_D$=20A TO220			2.2	2.9	mΩ
		V$_{GS}$=10V, I$_D$=20A TO263			1.7	2.2	mΩ
		V$_{GS}$=6V, I$_D$=20A TO263			1.9	2.5	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=20A			68		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.65	1	V
I$_S$	Maximum Body-Diode Continuous Current^G					140	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=30V, f=1MHz		9400	11800	14200	pF
C$_{oss}$	Output Capacitance			1090	1360	1770	pF
C$_{rss}$	Reverse Transfer Capacitance			32	40	68	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$_{DS}$=30V, I$_D$=20A		120	150	180	nC
Q$_{gs}$	Gate Source Charge			28	40	52	nC
Q$_{gd}$	Gate Drain Charge			9	15	25	nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=30V, R$_L$=1.5Ω, R$_{GEN}$=3Ω			30		ns
t$_r$	Turn-On Rise Time				27		ns
t$_{D(off)}$	Turn-Off DelayTime				74		ns
t$_f$	Turn-Off Fall Time				12		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=20A, dI/dt=500A/μs		22	32	42	ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=20A, dI/dt=500A/μs		140	200	260	nC

A. The value of R$_{θJA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T$_A$ =25℃. The Power dissipation P$_{DSM}$ is based on R$_{θJA}$ and the maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design, and the maximum temperature of 175℃ may be used if the PCB allow s it.

B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=175℃, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature T$_{J(MAX)}$=175℃. Ratings are based on low frequency and duty cycles to keep initial T$_J$ =25℃.

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$_{J(MAX)}$=175℃. The SOA curve provides a single pulse ratin g.

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℃.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 1: On-Region Characteristics (Note E)
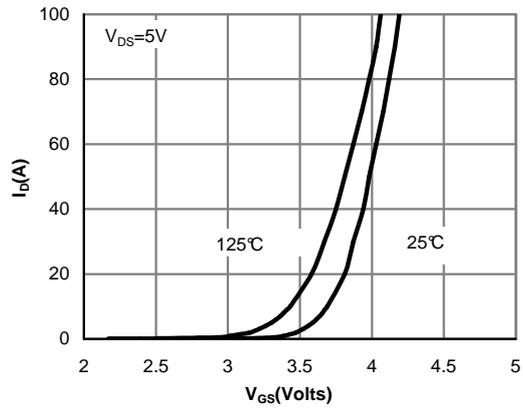
Figure 2: Transfer Characteristics (Note E)
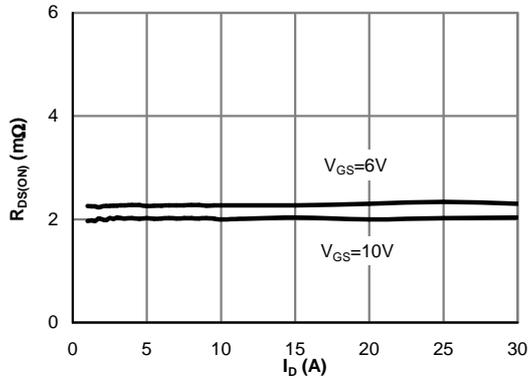
Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)
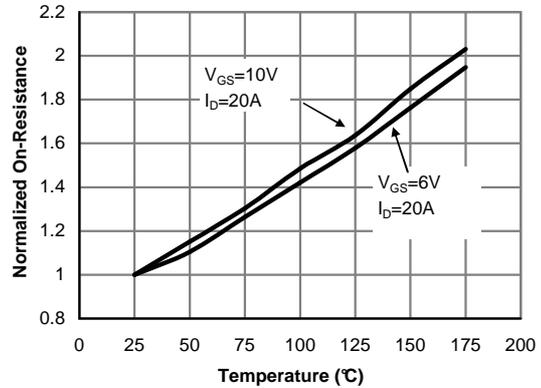

Figure 4: On-Resistance vs. Junction Temperature (Note E)
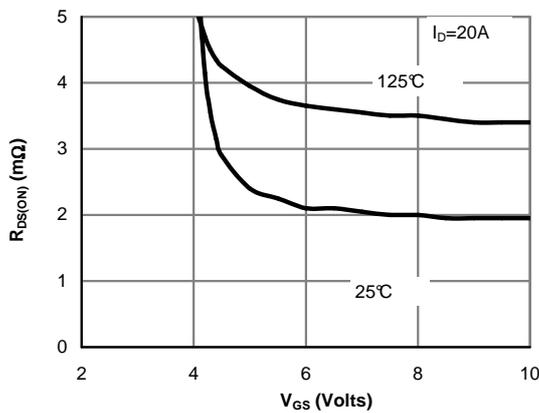
Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)
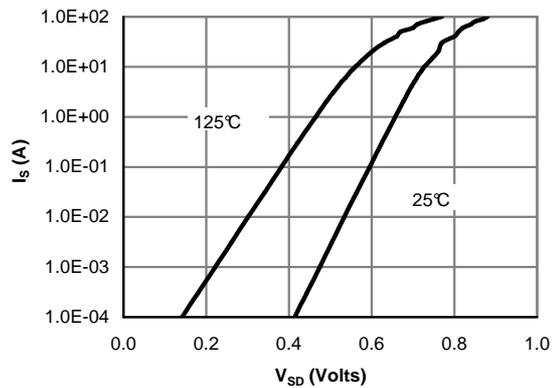
Figure 6: Body-Diode Characteristics (Note E)

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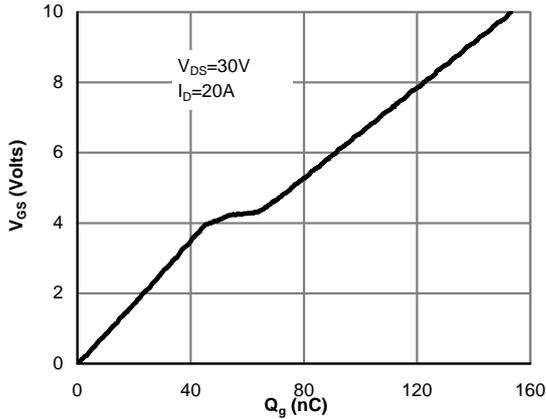
Figure 7: Gate-Charge Characteristics
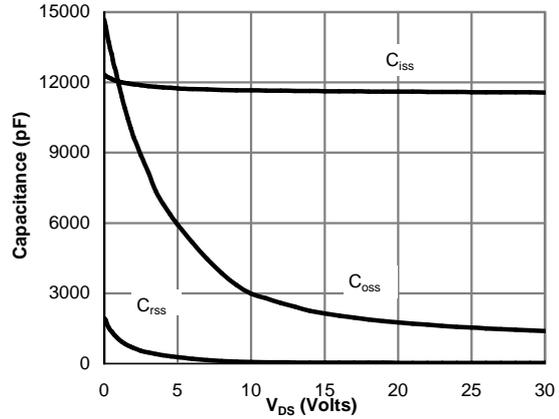
Figure 8: Capacitance Characteristics
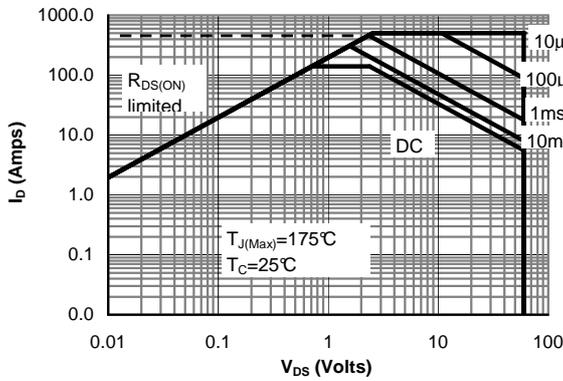
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)
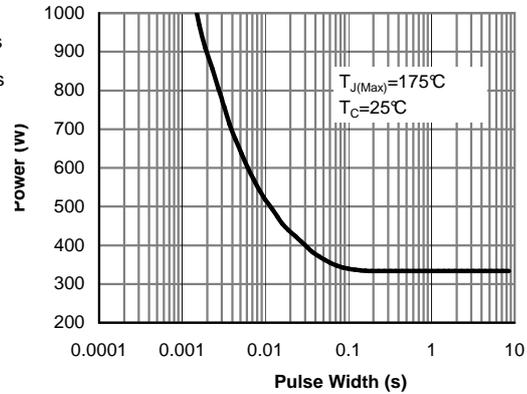
Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)
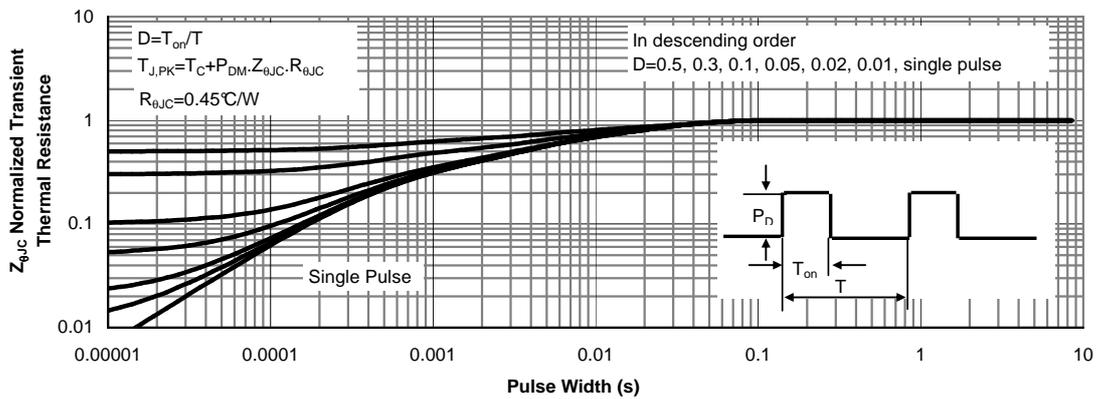
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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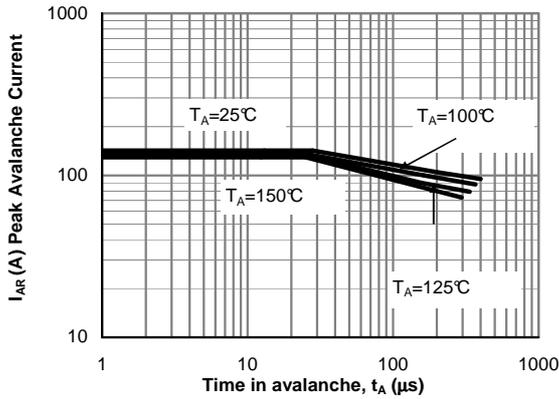
Figure 12: Single Pulse Avalanche capability (Note C)
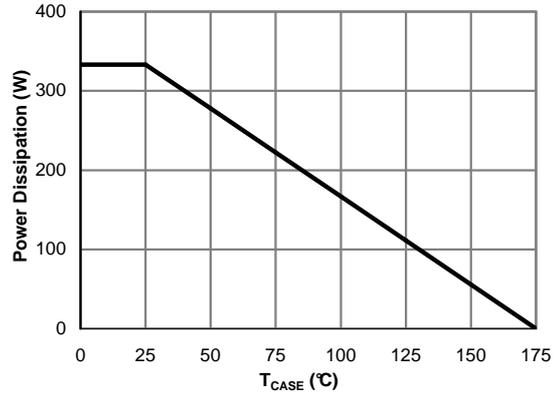

Figure 13: Power De-rating (Note F)
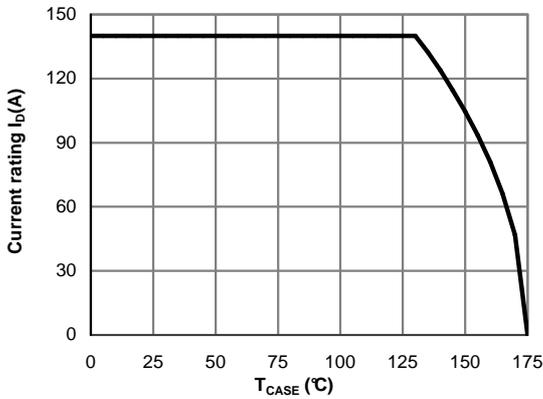
Figure 14: Current De-rating (Note F)
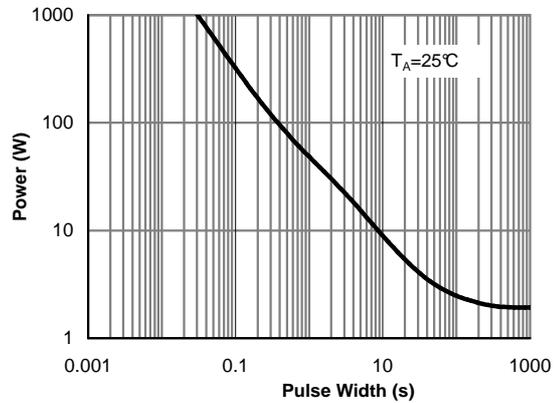

Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)
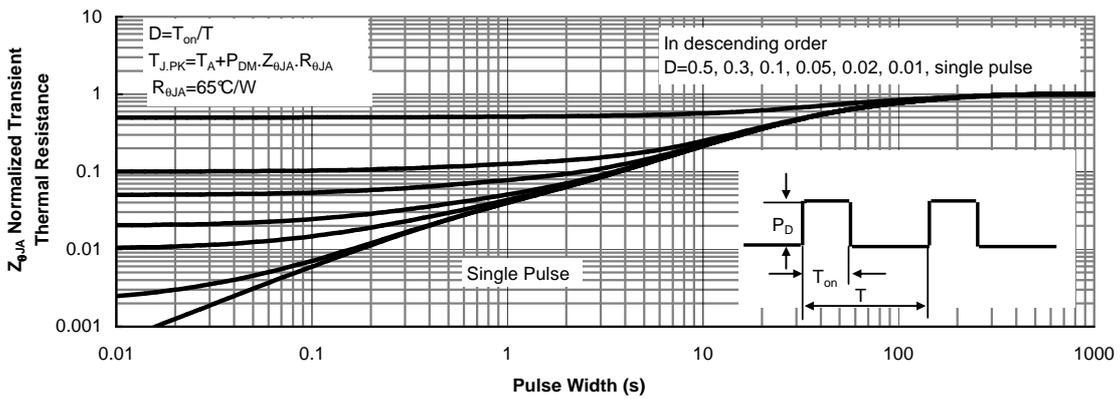
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

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Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms
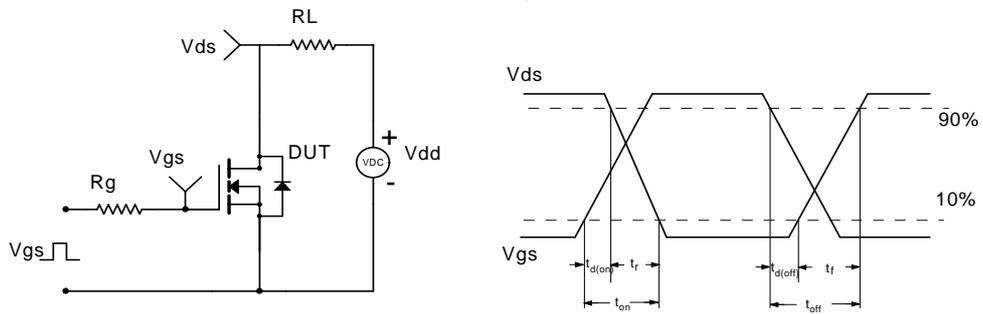
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \ LI_{AR}^2$$
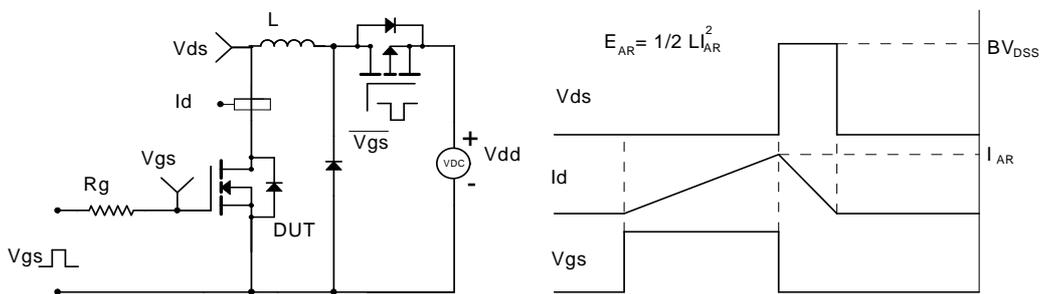
Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$