![Alpha & Omega Semiconductor]

AOK60N30L

300V,60A N-Channel MOSFET

General Description

The AOK60N30L is fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications.By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability this part can be adopted quickly into new and existing offline power supply designs.

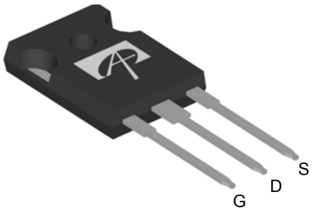
Product Summary

V_{DS}	350@150℃
I_D (at V_{GS}=10V)	60A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 0.056Ω

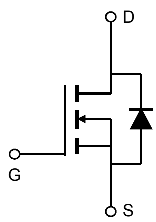
100% UIS Tested
100% R_g Tested

Top View

TO-247



AOK60N30L



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	AOK60N30L	Units
Drain-Source Voltage		V_{DS}	300	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	60	A
	T_C=100°C		40	
Pulsed Drain Current [C]		I_{DM}	200	
Avalanche Current [C]		I_{AR}	9.5	A
Repetitive avalanche energy [C]		E_{AR}	1353	mJ
Single plused avalanche energy [G]		E_{AS}	2707	mJ
Peak diode recovery dv/dt		dv/dt	5	V/ns
Power Dissipation [B]	T_C=25°C	P_D	658	W
	Derate above 25°C		5.3	W/ °C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	°C

Thermal Characteristics

Parameter	Symbol	AOK60N30L	Units
Maximum Junction-to-Ambient [A,D]	$R_{\theta JA}$	40	°C/W
Maximum Case-to-sink [A]	$R_{\theta CS}$	0.5	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.19	°C/W

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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, T_J=25°C	300			V
		I_D=250µA, V_{GS}=0V, T_J=150°C		350		V
BV_{DSS} /ΔTJ	Zero Gate Voltage Drain Current	ID=250µA, VGS=0V		0.26		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=300V, V_{GS}=0V			1	µA
		V_{DS}=240V, T_J=125°C			10	µA
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±30V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=5V, I_D=250µA	2.9	3.5	4.1	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=30A		0.042	0.056	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=30A		52		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.68	1	V
I_S	Maximum Body-Diode Continuous Current				60	A
I_{SM}	Maximum Body-Diode Pulsed Current				200	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	3550	4438	5330	pF
C_{oss}	Output Capacitance		410	593	770	pF
C_{rss}	Reverse Transfer Capacitance		22	38	54	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.8	1.7	2.6	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=240V, I_D=60A	70	88	106	nC
Q_{gs}	Gate Source Charge			21		nC
Q_{gd}	Gate Drain Charge			28		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=150V, I_D=60A, R_G=25Ω		88		ns
t_r	Turn-On Rise Time			222		ns
$t_{D(off)}$	Turn-Off DelayTime			224		ns
t_f	Turn-Off Fall Time			132		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=60A,dI/dt=100A/µs,V_{DS}=100V	250	320	390	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=60A,dI/dt=100A/µs,V_{DS}=100V	11	14.5	18	µC

A. The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A =25° C.
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. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150° C, Ratings are based on low frequency and duty cycles to keep initial T_J =25° 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 <300 µs 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. L=60mH, I_{AS}=9.5A, V_{DD}=150V, R_G=25Ω, Starting T_J=25° C

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

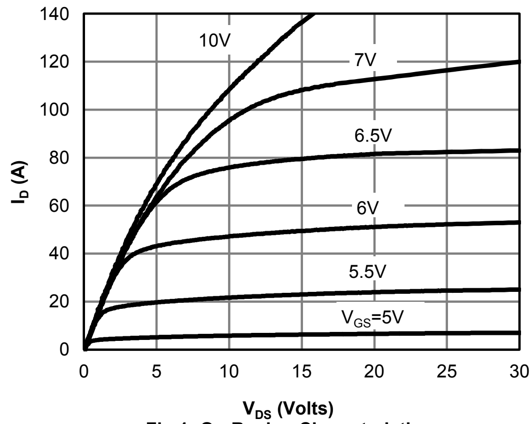


Fig 1: On-Region Characteristics

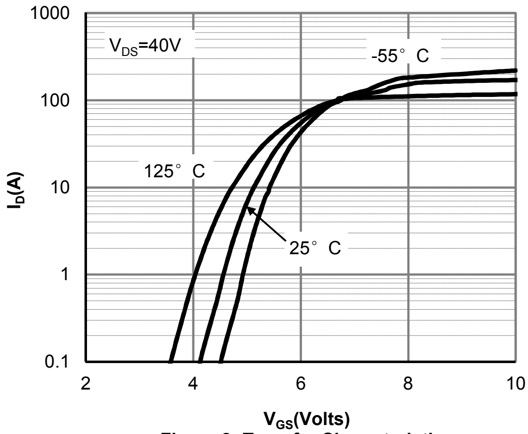


Figure 2: Transfer Characteristics

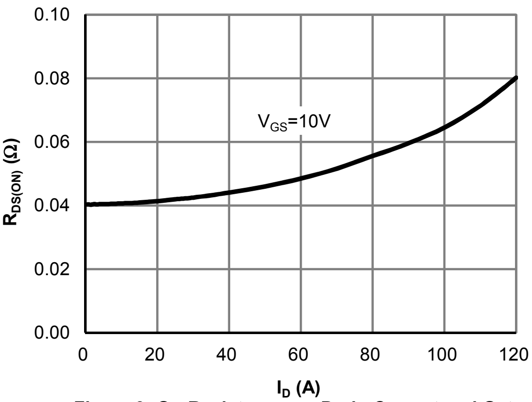


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

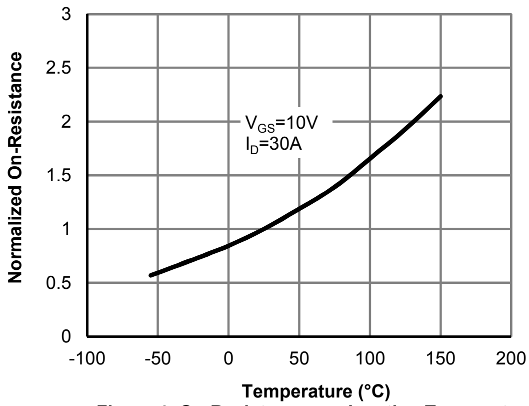


Figure 4: On-Resistance vs. Junction Temperature

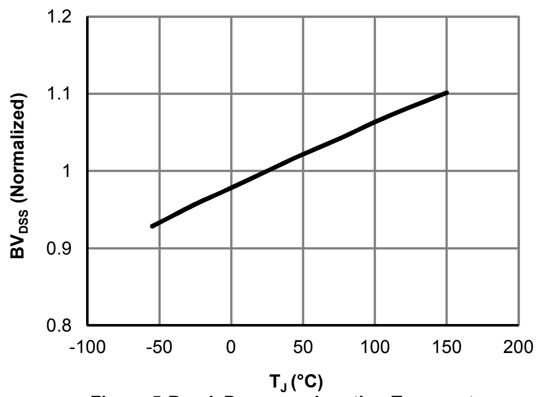


Figure 5:Break Down vs. Junction Temperature

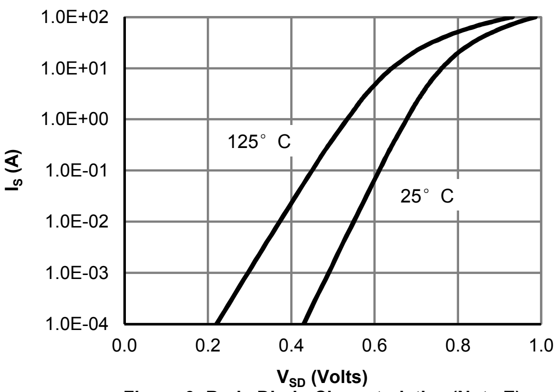


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

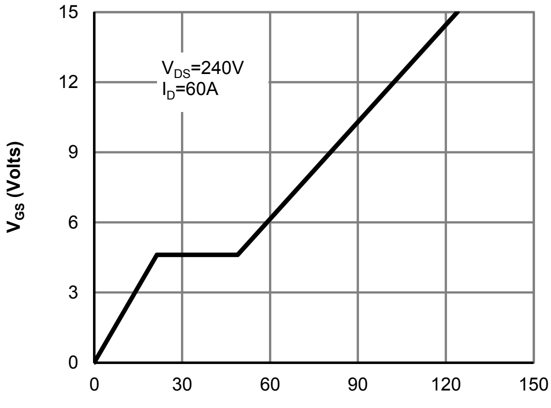


Figure 7: Gate-Charge Characteristics

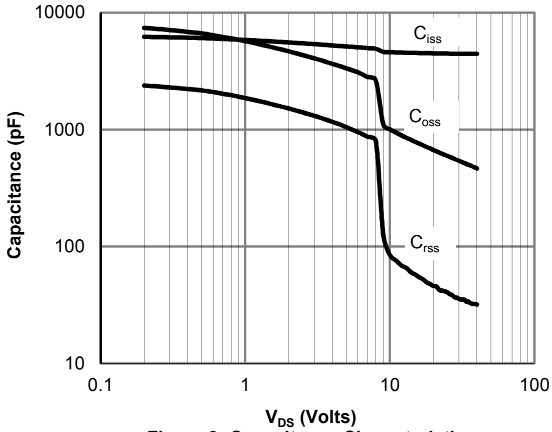


Figure 8: Capacitance Characteristics

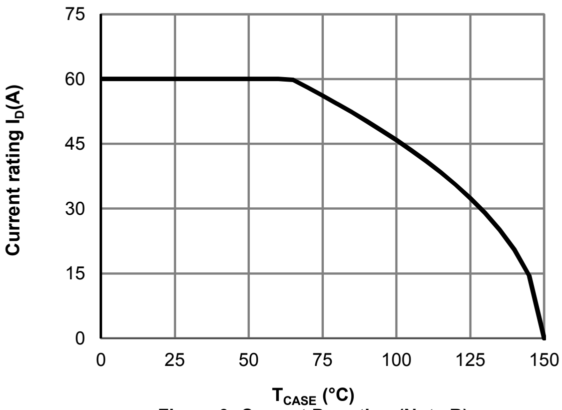


Figure 9: Current De-rating (Note B)

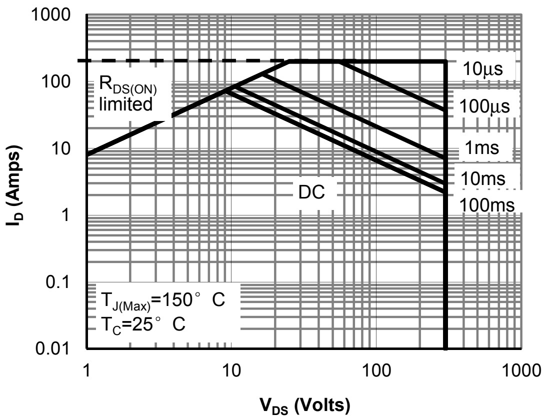


Figure 10: Maximum Forward Biased Safe Operating Area for AOK60N30L (Note F)

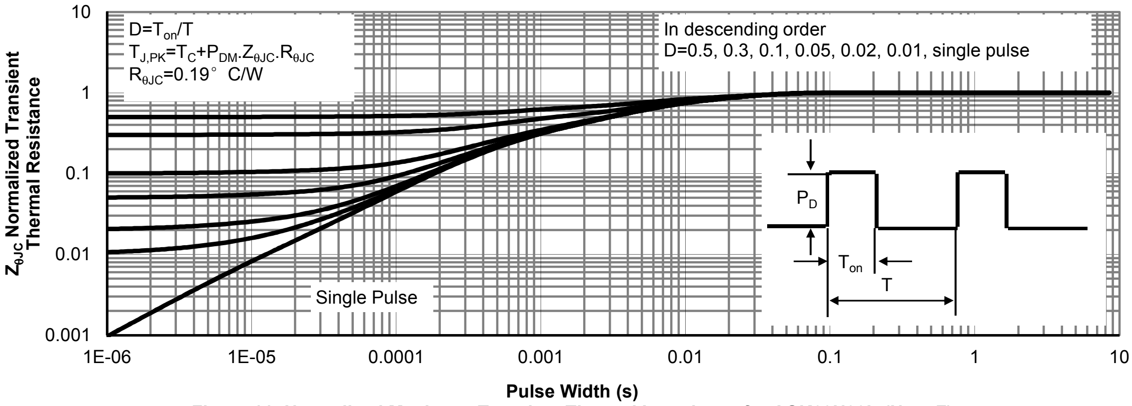
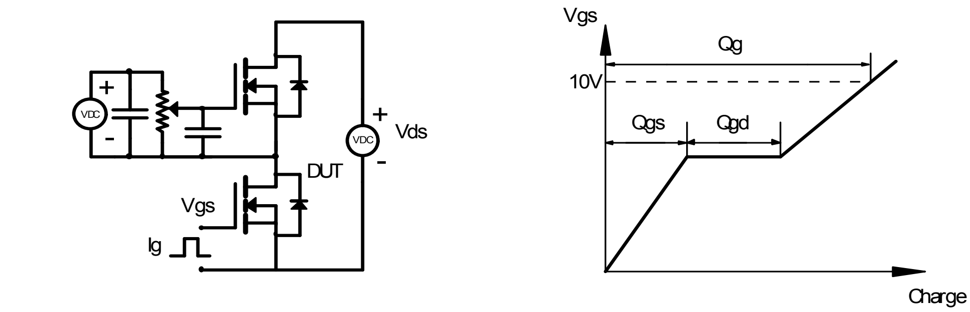
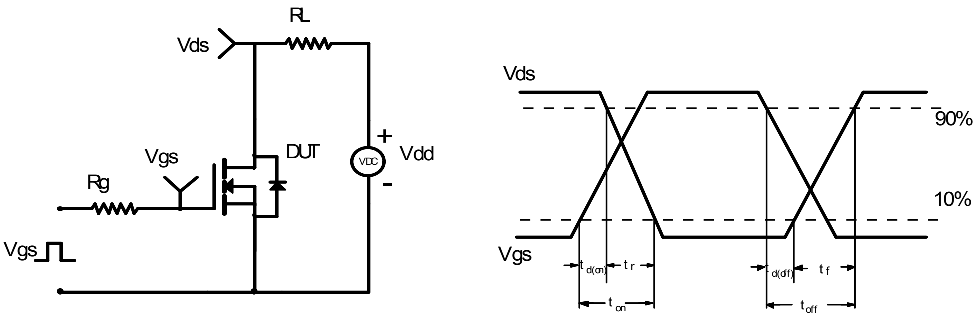


Figure 11: Normalized Maximum Transient Thermal Impedance for AOK60N30L (Note F)

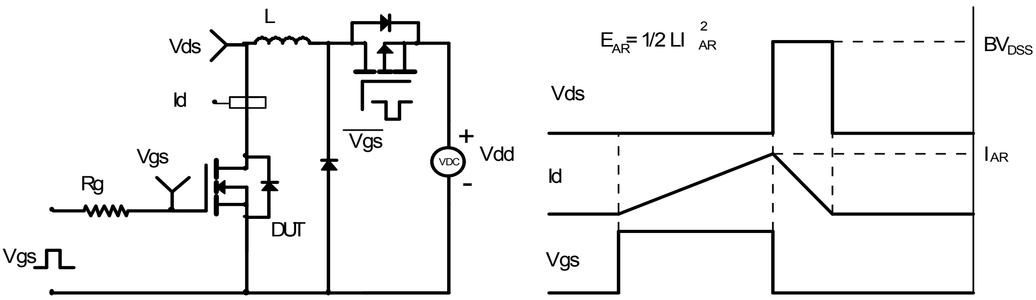
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms