AOK20N60

600V,20A N-Channel MOSFET

General Description

The AOK20N60 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 parts can be adopted quickly into new and existing offline power supply designs.

For Halogen Free add "L" suffix to part number: AOK20N60L

Product Summary

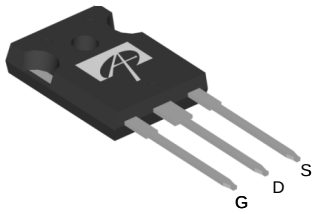
V_{DS}	700V@150℃
I_D (at V_{GS}=10V)	20A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 0.37Ω

100% UIS Tested
100% R_g Tested

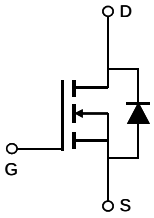
RoHS Compliant

Top View

TO-247



AOK20N60



Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	AOK20N60	Units
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25℃	I_D	20	A
	T_C=100℃		12	
Pulsed Drain Current [C]		I_{DM}	80	
Avalanche Current [C]		I_{AR}	6.5	A
Repetitive avalanche energy [C]		E_{AR}	630	mJ
Single plused avalanche energy [G]		E_{AS}	1260	mJ
Peak diode recovery dv/dt		dv/dt	5	V/ns
Power Dissipation [B]	T_C=25℃	P_D	417	W
	Derate above 25°C		3.3	W/ °C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	℃

Thermal Characteristics

Parameter	Symbol	AOK20N60	Units
Maximum Junction-to-Ambient [A,D]	$R_{\theta JA}$	40	℃/W
Maximum Case-to-sink [A]	$R_{\theta CS}$	0.5	℃/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.3	℃/W

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, T_J=25℃	600			V
		I_D=250µA, V_{GS}=0V, T_J=150℃		700		
BV_{DSS} /ΔTJ	Zero Gate Voltage Drain Current	ID=250µA, VGS=0V		0.8		V/ °C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V, V_{GS}=0V			1	µA
		V_{DS}=480V, T_J=125℃			10	
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	3.2	3.8	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=10A		0.29	0.37	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=10A		25		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.69	1	V
I_S	Maximum Body-Diode Continuous Current				20	A
I_{SM}	Maximum Body-Diode Pulsed Current				80	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	2448	3061	3680	pF
C_{oss}	Output Capacitance		190	273	360	pF
C_{rss}	Reverse Transfer Capacitance		13	22.8	35	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	0.7	1.4	2.1	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=480V, I_D=20A	48	61	74	nC
Q_{gs}	Gate Source Charge		14	18	22	nC
Q_{gd}	Gate Drain Charge		12	24	36	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=300V, I_D=20A, R_G=25Ω		57		ns
t_r	Turn-On Rise Time			125		ns
$t_{D(off)}$	Turn-Off DelayTime			128		ns
t_f	Turn-Off Fall Time			88		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A,dI/dt=100A/µs,V_{DS}=100V	384	480	580	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A,dI/dt=100A/µs,V_{DS}=100V	8	10.5	13	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}=6.5A, V_{DD}=150V, R_G=25Ω, Starting T_J=25° C

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

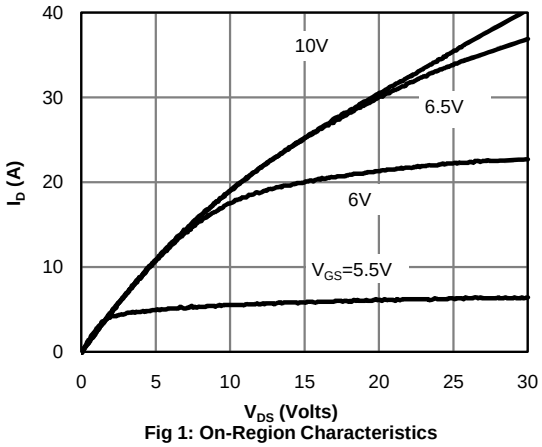


Fig 1: On-Region Characteristics

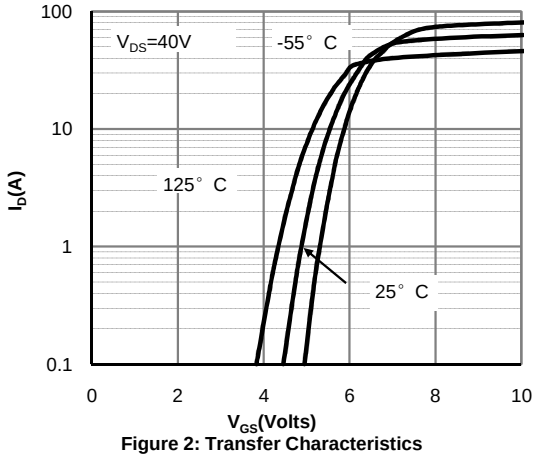


Figure 2: Transfer Characteristics

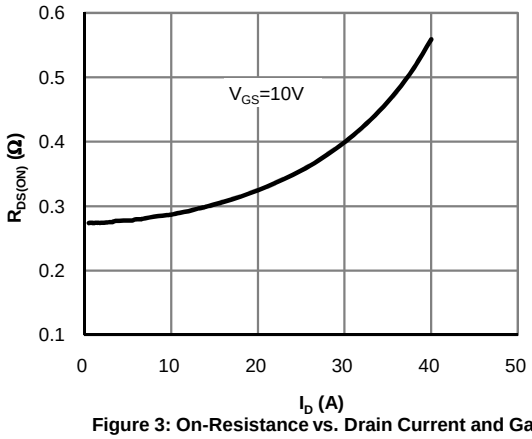


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

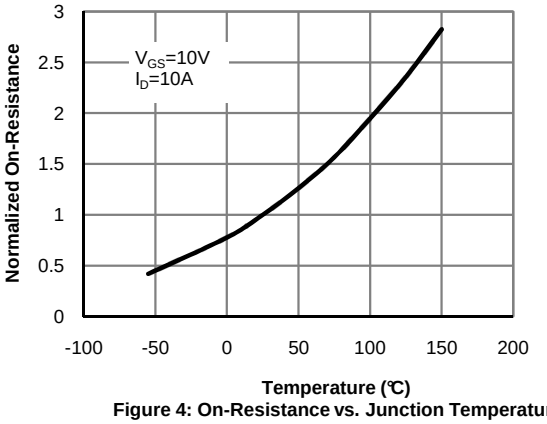


Figure 4: On-Resistance vs. Junction Temperature

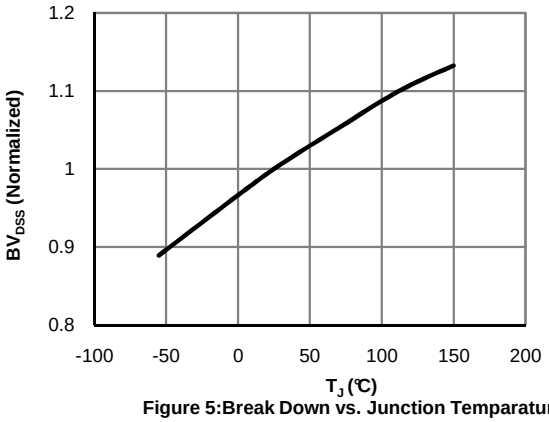


Figure 5:Break Down vs. Junction Temparature

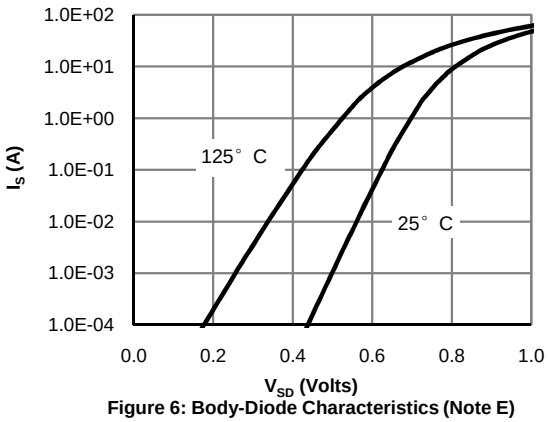


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

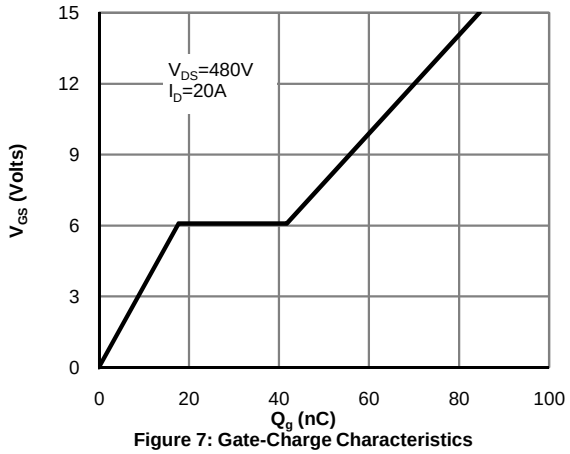


Figure 7: Gate-Charge Characteristics

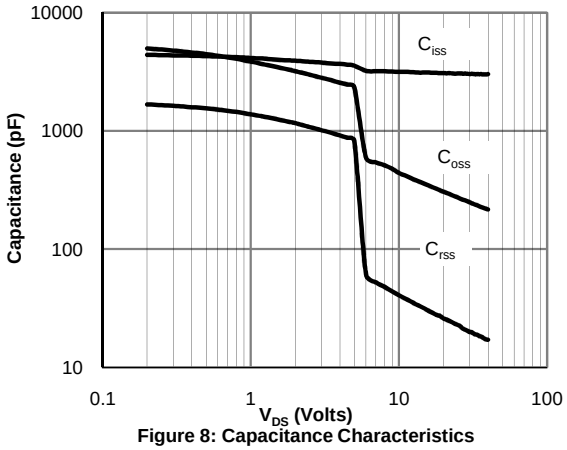


Figure 8: Capacitance Characteristics

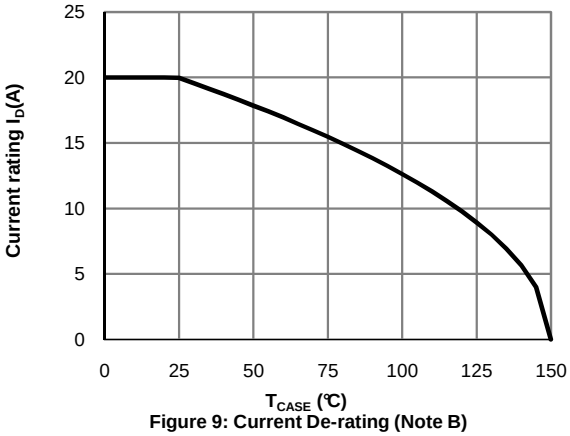


Figure 9: Current De-rating (Note B)

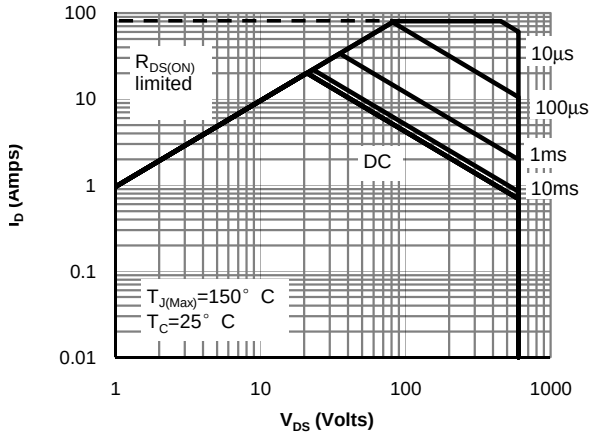


Figure 10: Maximum Forward Biased Safe Operating Area for AOK20N60 (Note F)

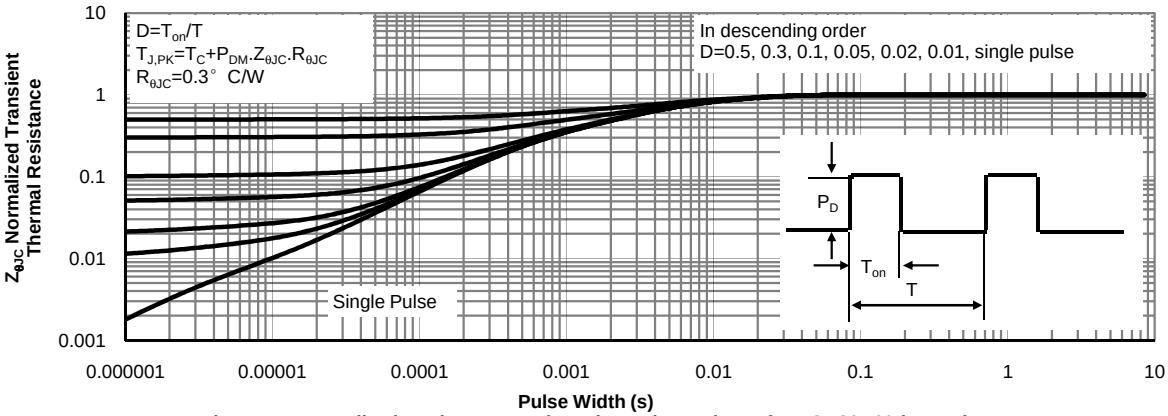
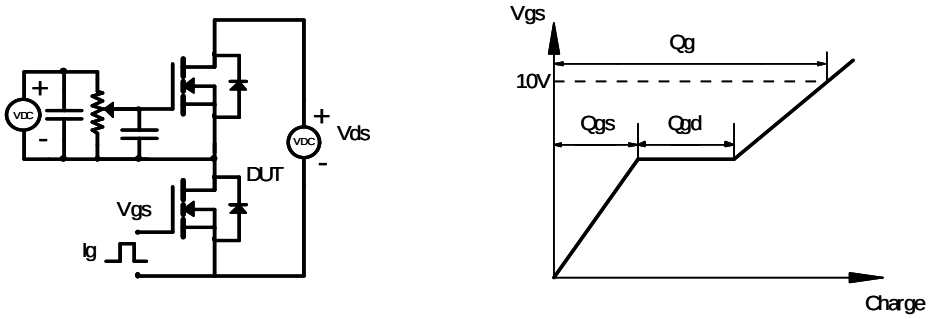
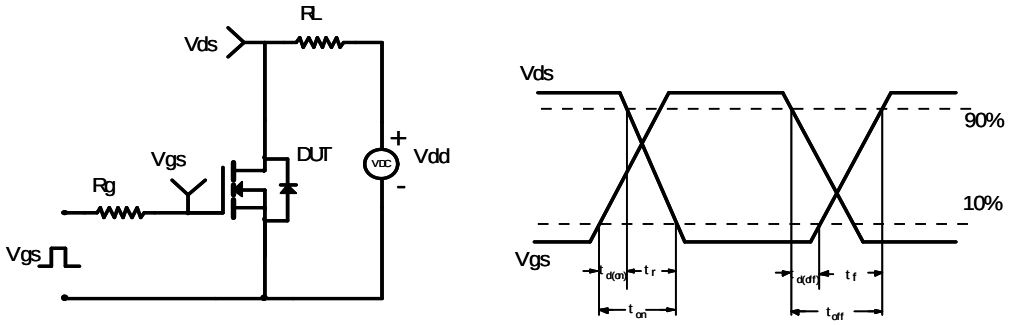


Figure 11: Normalized Maximum Transient Thermal Impedance for AOK20N60 (Note F)

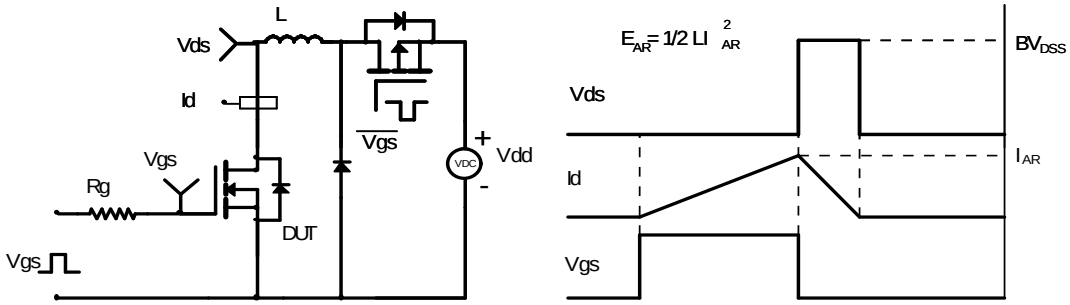
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

