Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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ALPHA & OMEGA SEMICONDUCTOR

AOK53S60

600V 53A αMOS™ Power Transistor

General Description

The AOK53S60 has been fabricated using the advanced αMOS™ high voltage process that is designed to deliver high levels of performance and robustness in switching applications.
By providing low $R_{DS(on)}$, Q_g and E_{OSS} along with guaranteed avalanche capability this part can be adopted quickly into new and existing offline power supply designs.

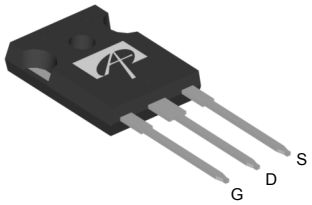
Product Summary

V_{DS} @ $T_{j,max}$	700V
I_{DM}	215A
$R_{DS(ON),max}$	0.07Ω
$Q_{g,typ}$	59nC
E_{oss} @ 400V	15µJ

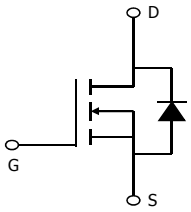
100% UIS Tested
100% R_g Tested

RoHS Compliant

Top View
TO247



AOK53S60



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOK53S60	TO-247	Tube	240

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	AOK53S60	Units
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	53	A
	T_C=100°C		33	
Pulsed Drain Current [C]		I_{DM}	215	
Avalanche Current [C]		I_{AR}	9.5	A
Repetitive avalanche energy [C]		E_{AR}	45	mJ
Single pulsed avalanche energy [G]		E_{AS}	1688	mJ
Power Dissipation [B]	T_C=25°C	P_D	520	W
	Derate above 25°C		4.2	W/ °C
MOSFET dv/dt ruggedness		dv/dt	100	V/ns
Peak diode recovery dv/dt			20	
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 [J]		T_L	300	°C

Thermal Characteristics

Parameter	Symbol	AOK53S60	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	$R_{\theta JC}$	0.24	°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	I_D=250µA, V_{GS}=0V, T_J=25°C	600	-	-	V
		I_D=250µA, V_{GS}=0V, T_J=150°C	650	700	-	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V, V_{GS}=0V	-	-	1	µA
		V_{DS}=480V, T_J=150°C	-	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	2.5	3.2	3.8	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=26.5A, T_J=25°C	-	0.058	0.07	Ω
		V_{GS}=10V, I_D=26.5A, T_J=150°C	-	0.155	0.185	Ω
V_{SD}	Diode Forward Voltage	I_S=26.5A,V_{GS}=0V, T_J=25°C	-	0.84	-	V
I_S	Maximum Body-Diode Continuous Current		-	-	53	A
I_{SM}	Maximum Body-Diode Pulsed Current		-	-	215	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=100V, f=1MHz	-	3034	-	pF
C_{oss}	Output Capacitance		-	222	-	pF
$C_{o(er)}$	Effective output capacitance, energy related [H]	VGS=0V, V_{DS}=0 to 480V, f=1MHz	-	170	-	pF
$C_{o(tr)}$	Effective output capacitance, time related [I]		-	524	-	pF
C_{rss}	Reverse Transfer Capacitance	VGS=0V, V_{DS}=100V, f=1MHz	-	3	-	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	1.8	-	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=480V, I_D=26.5A	-	59	-	nC
Q_{gs}	Gate Source Charge		-	17	-	nC
Q_{gd}	Gate Drain Charge		-	19	-	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=400V, I_D=26.5A, R_G=25Ω	-	48	-	ns
t_r	Turn-On Rise Time		-	102	-	ns
$t_{D(off)}$	Turn-Off DelayTime		-	215	-	ns
t_f	Turn-Off Fall Time		-	122	-	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=26.5A,dI/dt=100A/µs,V_{DS}=400V	-	664	-	ns
I_{rm}	Peak Reverse Recovery Current	I_F=26.5A,dI/dt=100A/µs,V_{DS}=400V	-	36	-	A
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=26.5A,dI/dt=100A/µs,V_{DS}=400V	-	14	-	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}=7.5A, V_{DD}=150V, Starting T_J=25° C
H. $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$.
I. $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$.
J. Wavesoldering only allowed at leads.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

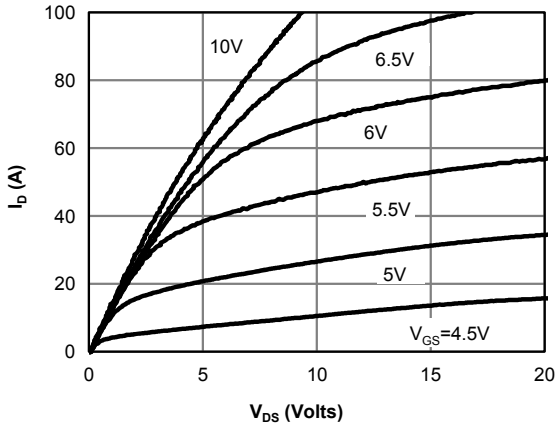


Figure 1: On-Region Characteristics@25°C

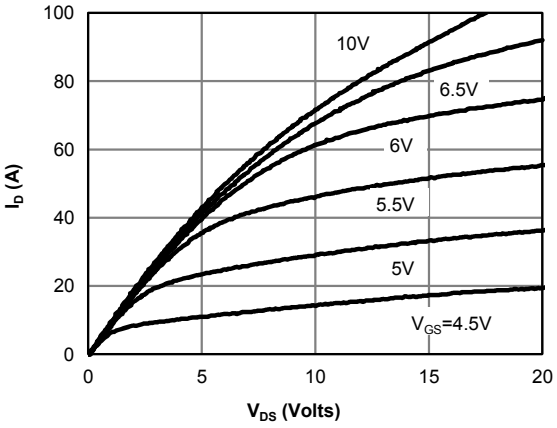


Figure 2: On-Region Characteristics@125°C

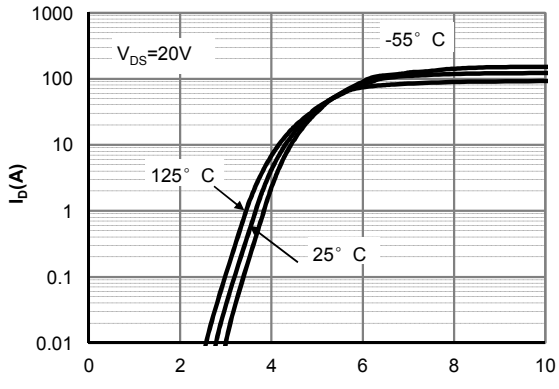


Figure 3: Transfer Characteristics

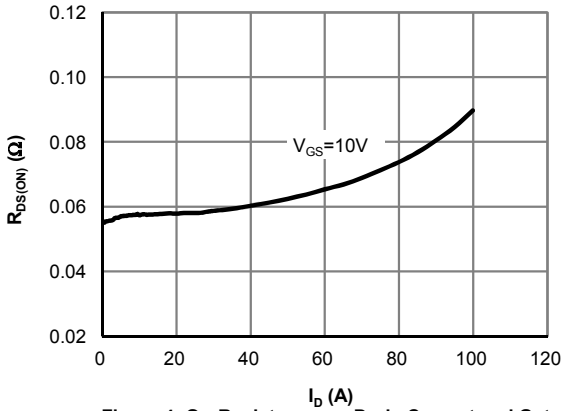


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

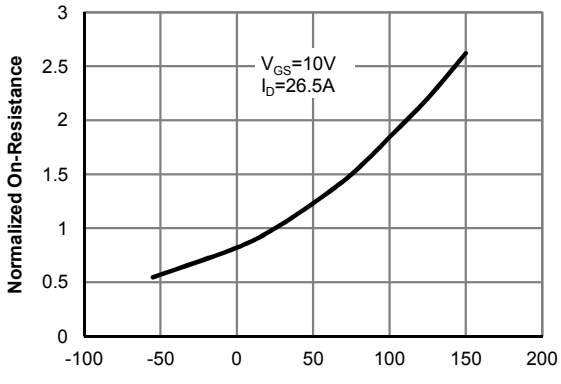


Figure 5: On-Resistance vs. Junction Temperature

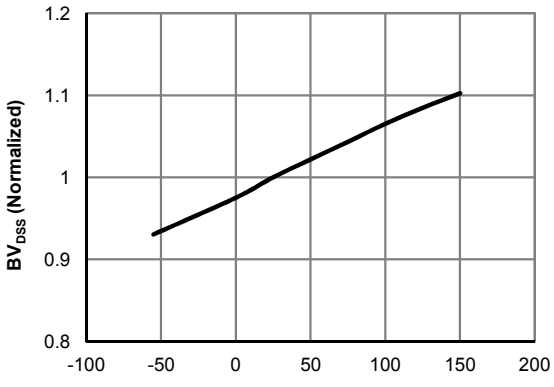


Figure 6: Break Down vs. Junction Temperature

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

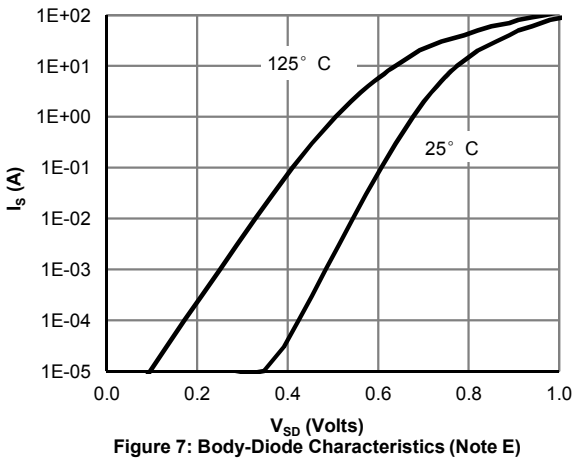


Figure 7: Body-Diode Characteristics (Note E)

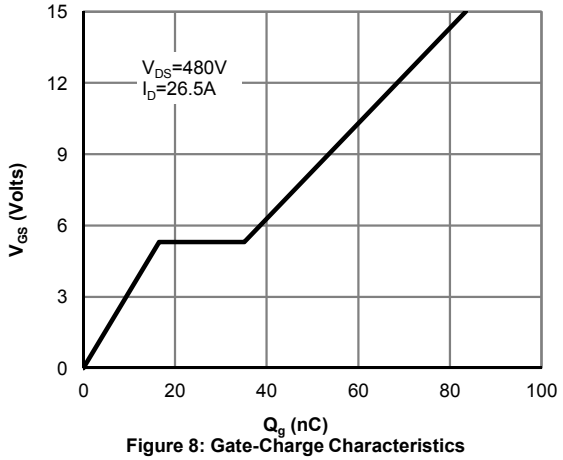


Figure 8: Gate-Charge Characteristics

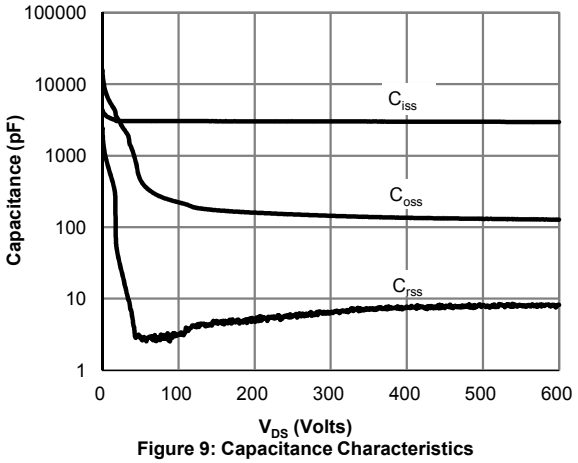


Figure 9: Capacitance Characteristics

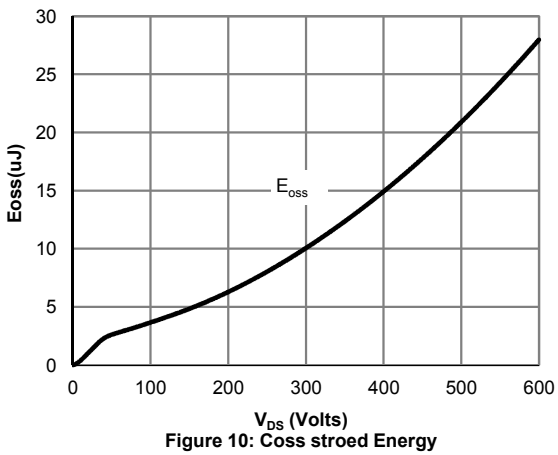


Figure 10: Coss stroed Energy

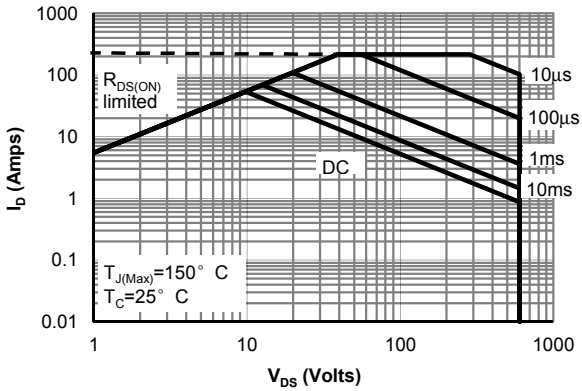


Figure 11: Maximum Forward Biased Safe Operating Area for AOK53S60 (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

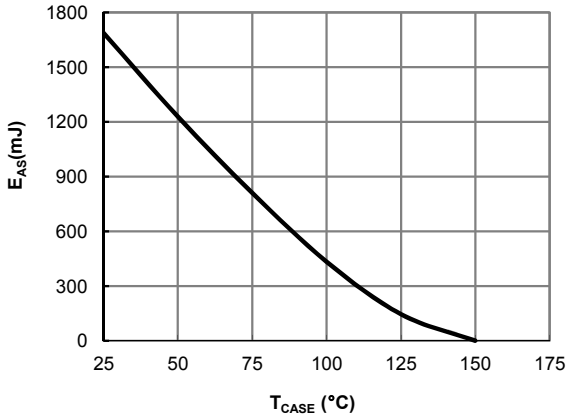


Figure 12: Avalanche energy

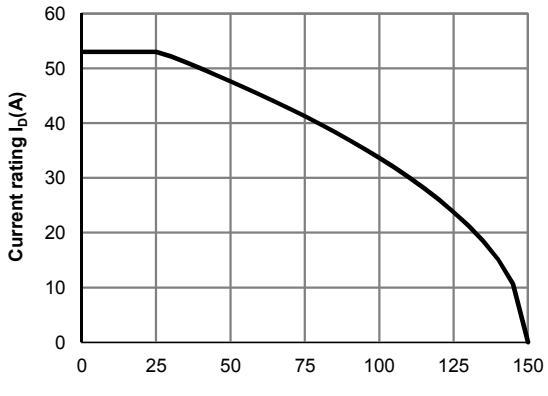


Figure 13: Current De-rating (Note B)

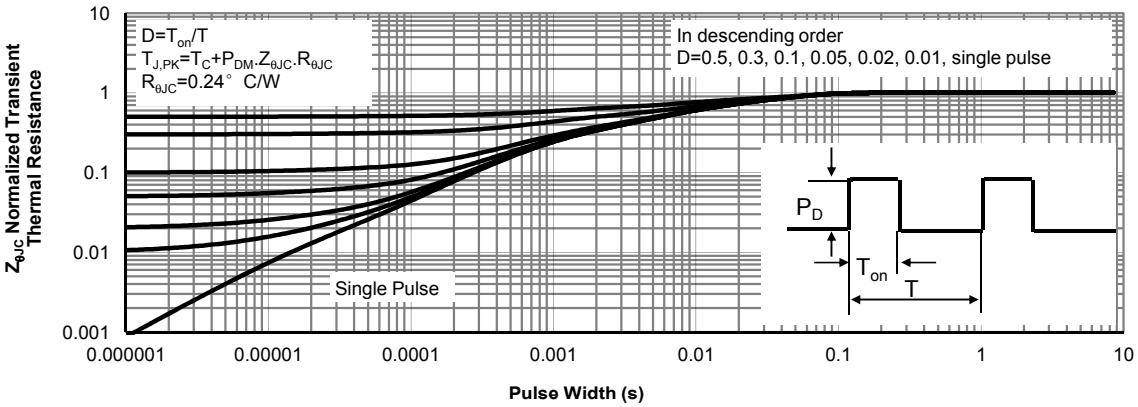
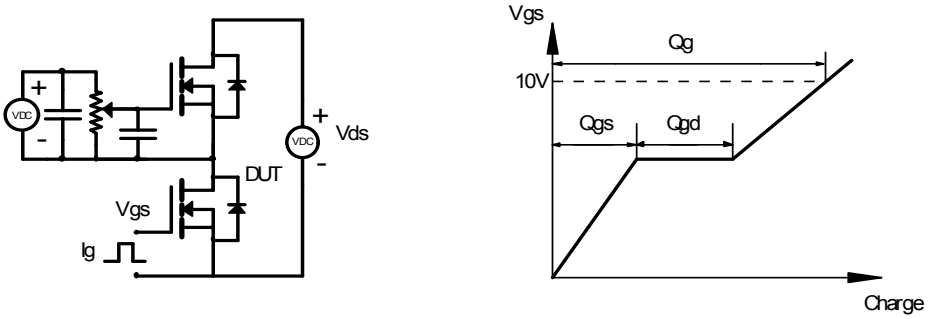
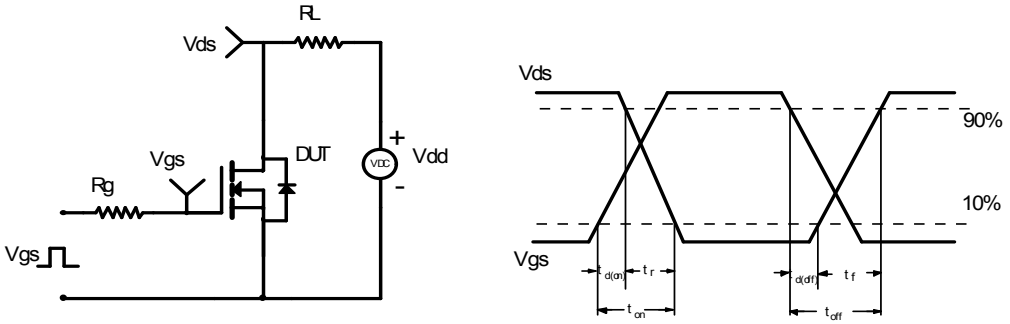


Figure 14: Normalized Maximum Transient Thermal Impedance for AOK53S60 (Note F)

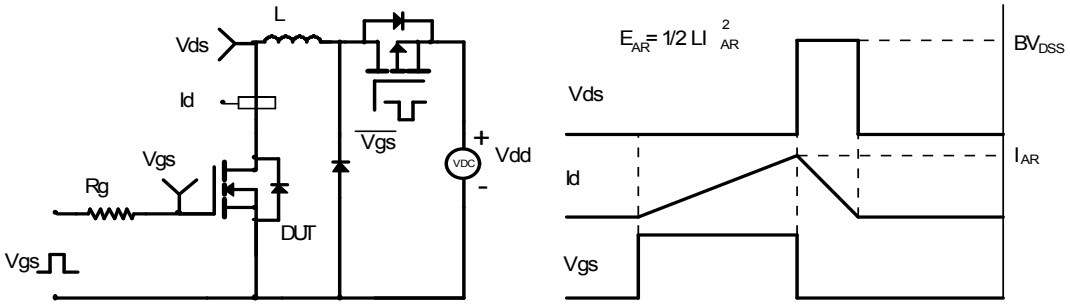
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms