

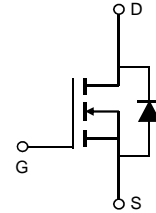
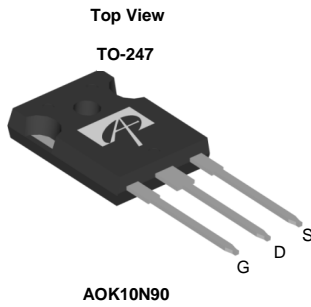
General Description

The AOK10N90 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}	1000@150°C
I_D (at $V_{GS}=10V$)	10A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 0.98Ω

100% UIS Tested
 100% R_g Tested



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	AOK10N90	Units
Drain-Source Voltage	V_{DS}	900	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	10
		$T_C=100^\circ\text{C}$	7
Pulsed Drain Current ^C	I_{DM}	38	A
Avalanche Current ^C	I_{AR}	3.7	A
Repetitive avalanche energy ^C	E_{AR}	205	mJ
Single plused avalanche energy ^G	E_{AS}	410	mJ
Peak diode recovery dv/dt	dv/dt	5	V/ns
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	403
		Derate above 25°C	3.2
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	AOK10N90	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	$R_{\theta JC}$	0.31	°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	900			V	
		I _D =250μA, V _{GS} =0V, T _J =150°C		1000			
BV _{DSS} /ΔT _J	Zero Gate Voltage Drain Current	I _D =250μA, V _{GS} =0V		0.9		V/°C	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =900V, V _{GS} =0V			1	μA	
		V _{DS} =720V, T _J =125°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	3.4	4	4.5	V	
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =5A		0.82	0.98	Ω	
g _{FS}	Forward Transconductance	V _{DS} =40V, I _D =5A		17		S	
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V	
I _S	Maximum Body-Diode Continuous Current				10	A	
I _{SM}	Maximum Body-Diode Pulsed Current				38	A	
DYNAMIC PARAMETERS							
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz	2100	2630	3160	pF	
C _{oss}	Output Capacitance		130	190	250	pF	
C _{rss}	Reverse Transfer Capacitance		10	18	26	pF	
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	1.5	3.4	5.2	Ω	
SWITCHING PARAMETERS							
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =720V, I _D =10A	45	60	75	nC	
Q _{gs}	Gate Source Charge				13		nC
Q _{gd}	Gate Drain Charge				27		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =450V, I _D =10A, R _G =25Ω			64	ns	
t _r	Turn-On Rise Time				105		ns
t _{D(off)}	Turn-Off DelayTime				155		ns
t _f	Turn-Off Fall Time				84		ns
t _{rr}	Body Diode Reverse Recovery Time		I _F =10A, di/dt=100A/μs, V _{DS} =100V	460	575	700	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =10A, di/dt=100A/μs, V _{DS} =100V	7.0	9.9	12.0	μC	

A. The value of R_{θJA} 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_{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 <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}=3.7A, 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

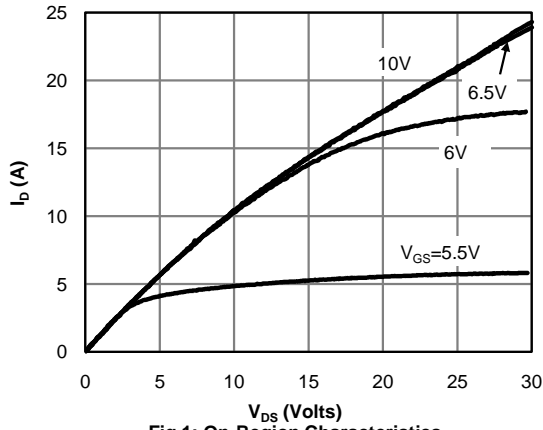


Fig 1: On-Region Characteristics

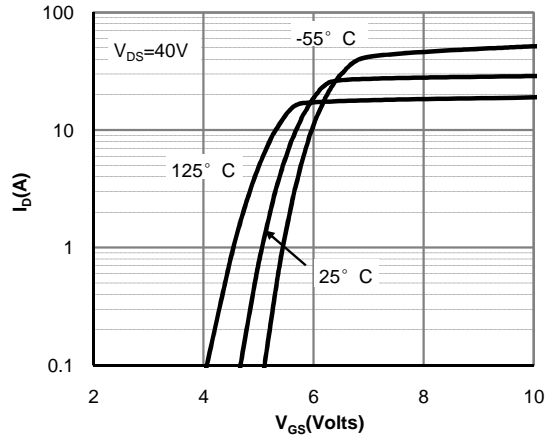


Figure 2: Transfer Characteristics

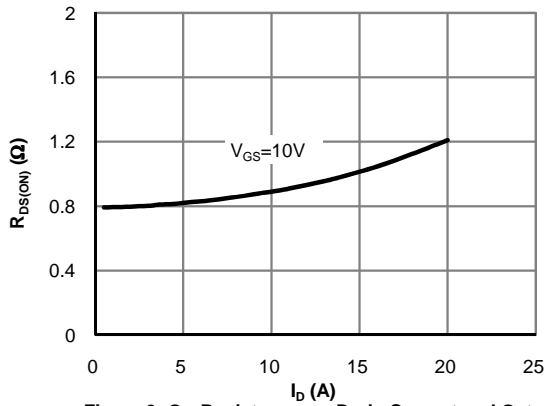


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

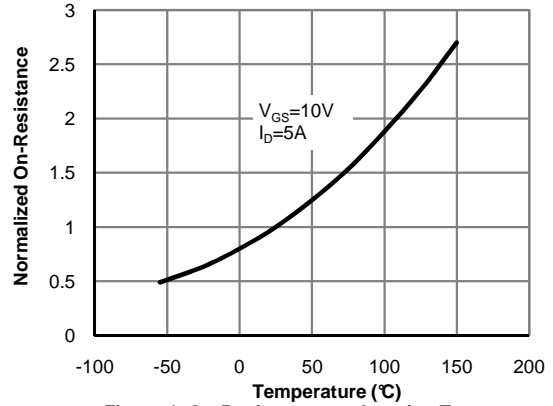


Figure 4: On-Resistance vs. Junction Temperature

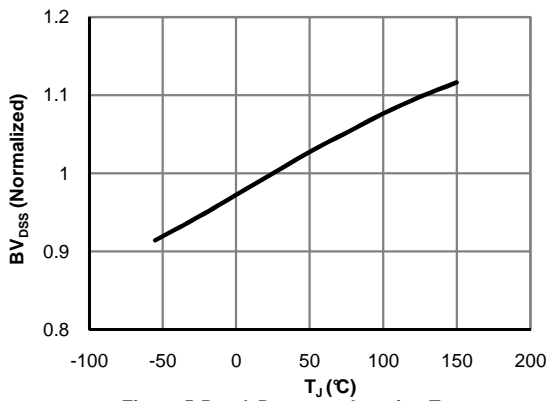


Figure 5: Break Down vs. Junction Temperature

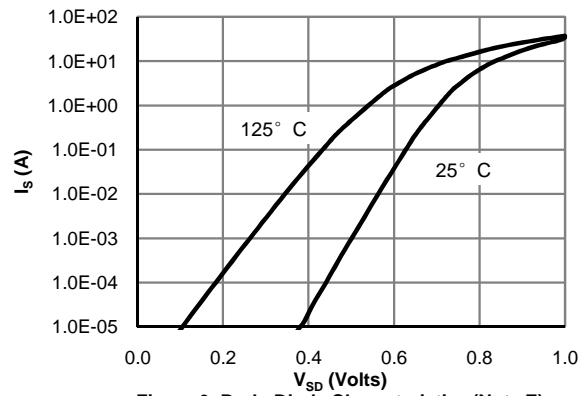


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

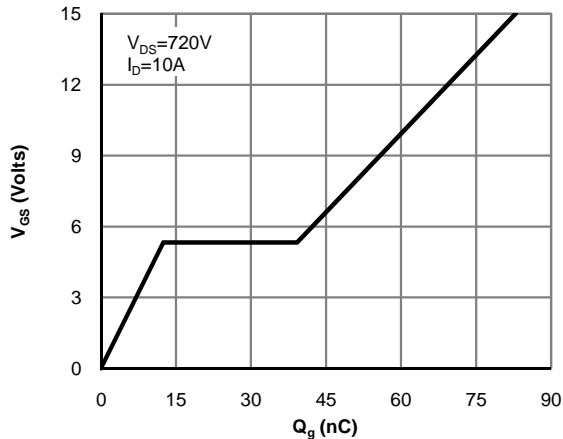


Figure 7: Gate-Charge Characteristics

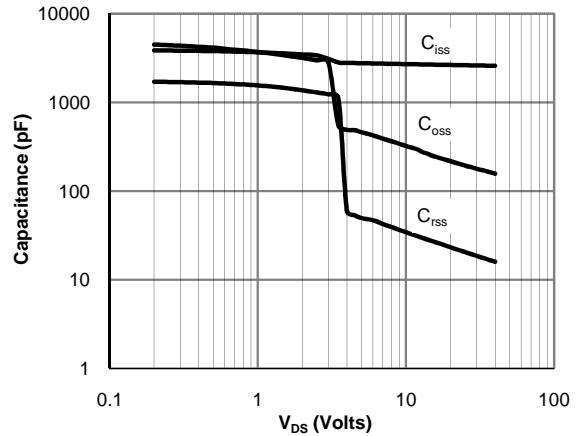


Figure 8: Capacitance Characteristics

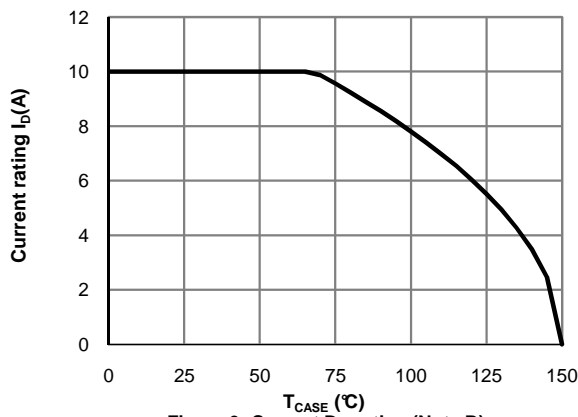


Figure 9: Current De-rating (Note B)

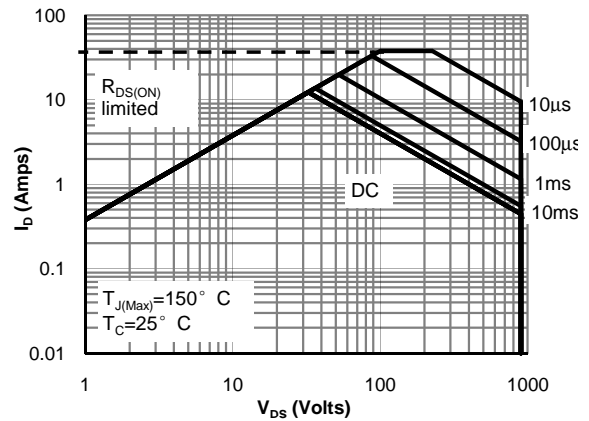


Figure 10: Maximum Forward Biased Safe Operating Area for AOK10N90 (Note F)

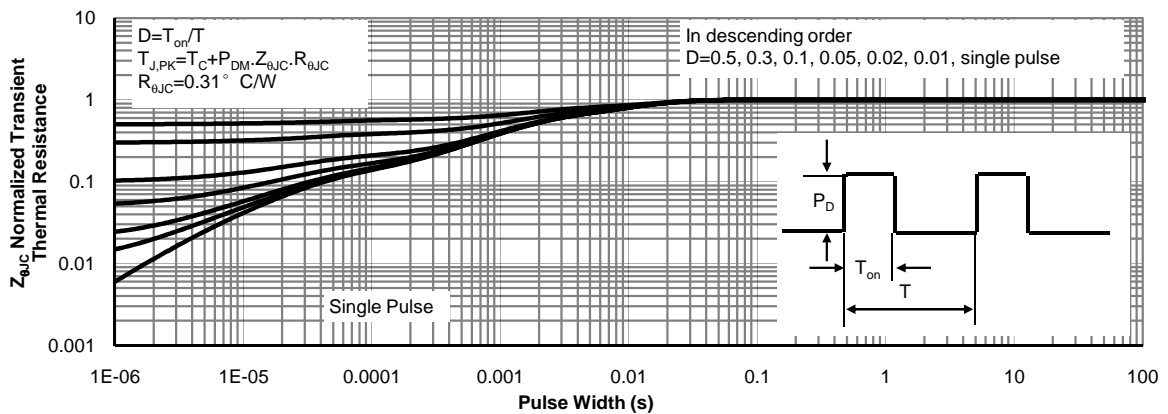
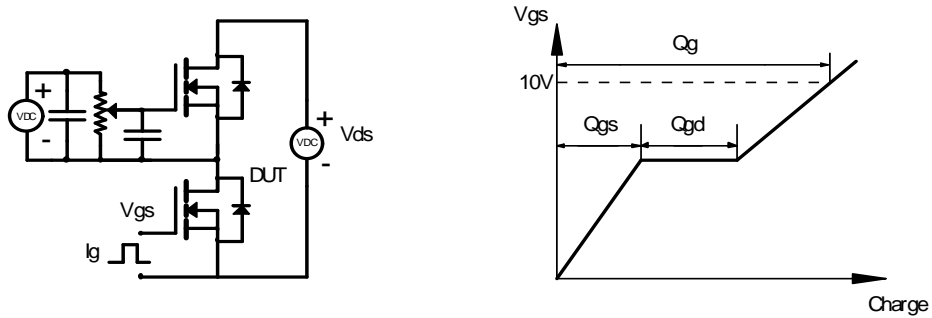
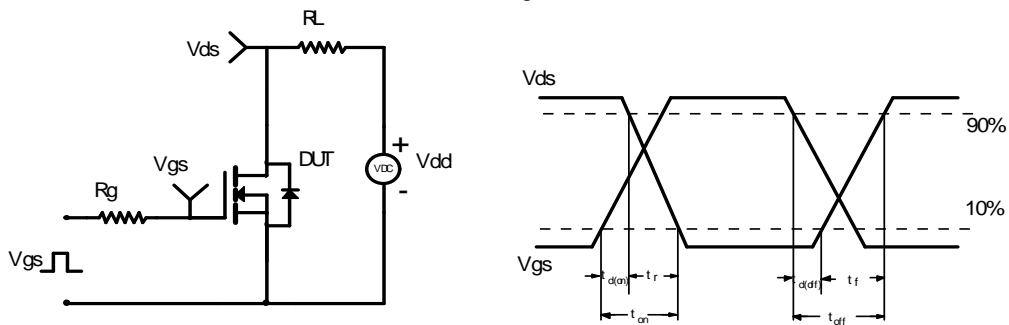


Figure 11: Normalized Maximum Transient Thermal Impedance for AOK10N90 (Note F)

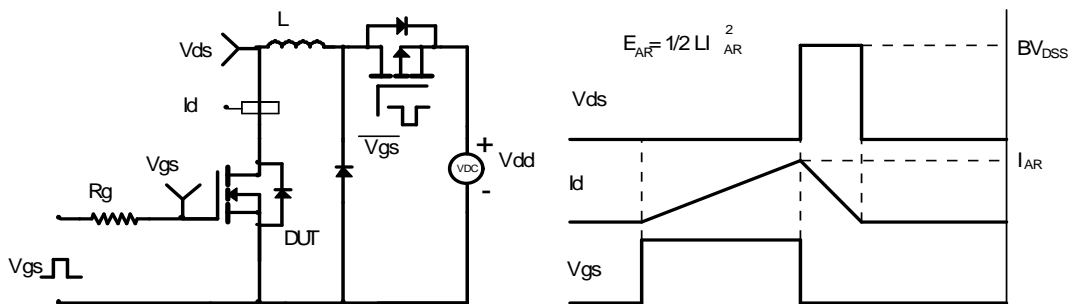
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

