

### General Description

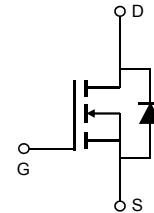
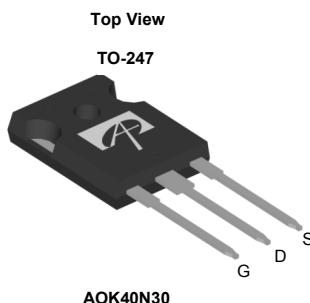
The AOK40N30 is fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low  $R_{DS(on)}$ ,  $C_{iss}$  and  $C_{rss}$  along with guaranteed avalanche capability this part can be adopted quickly into new and existing offline power supply designs.

For Halogen Free add "L" suffix to part number:  
AOK40N30L

### Product Summary

$V_{DS}$	350@150°C
$I_D$ (at $V_{GS}=10V$ )	40A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 0.085Ω

100% UIS Tested  
100%  $R_g$  Tested



### Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	AOK40N30	Units
Drain-Source Voltage	$V_{DS}$	300	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	40	A
$T_C=100^\circ C$		25	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	135	
Avalanche Current <sup>C</sup>	$I_{AR}$	8.5	A
Repetitive avalanche energy <sup>C</sup>	$E_{AR}$	1083	mJ
Single pulsed avalanche energy <sup>G</sup>	$E_{AS}$	2167	mJ
Peak diode recovery $dv/dt$	$dv/dt$	5	V/ns
Power Dissipation <sup>B</sup>	$P_D$	357	W
Derate above $25^\circ C$		2.9	W/ $^\circ C$
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	$T_L$	300	$^\circ C$

### Thermal Characteristics

Parameter	Symbol	AOK40N30	Units
Maximum Junction-to-Ambient <sup>A,D</sup>	$R_{\theta JA}$	40	$^\circ C/W$
Maximum Case-to-sink <sup>A</sup>	$R_{\theta CS}$	0.5	$^\circ C/W$
Maximum Junction-to-Case	$R_{\theta JC}$	0.35	$^\circ C/W$

**Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	300			V
		I <sub>D</sub> =250μA, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C		350		
BV <sub>DSS</sub> /ΔT <sub>J</sub>	Zero Gate Voltage Drain Current	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V		0.28		V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =300V, V <sub>GS</sub> =0V			1	μA
		V <sub>DS</sub> =240V, T <sub>J</sub> =125°C			10	
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =5V, I <sub>D</sub> =250μA	2.9	3.5	4.1	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		0.065	0.085	Ω
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =40V, I <sub>D</sub> =20A		32		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.7	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				40	A
I <sub>SM</sub> <sup>C</sup>	Maximum Body-Diode Pulsed Current				135	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz	2170	2718	3270	pF
C <sub>oss</sub>	Output Capacitance		280	405	530	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		18	31	45	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	0.6	1.4	2.1	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =240V, I <sub>D</sub> =40A	48	60	72	nC
Q <sub>gs</sub>	Gate Source Charge			13		nC
Q <sub>gd</sub>	Gate Drain Charge			21		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =150V, I <sub>D</sub> =40A, R <sub>G</sub> =25Ω		54		ns
t <sub>r</sub>	Turn-On Rise Time			166		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			152		ns
t <sub>f</sub>	Turn-Off Fall Time			118		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =40A, dI/dt=100A/μs, V <sub>DS</sub> =100V	220	275	330	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =40A, dI/dt=100A/μs, V <sub>DS</sub> =100V	6.5	8.2	10	μC

A. The value of R<sub>0JA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25°C.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=150°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25°C.

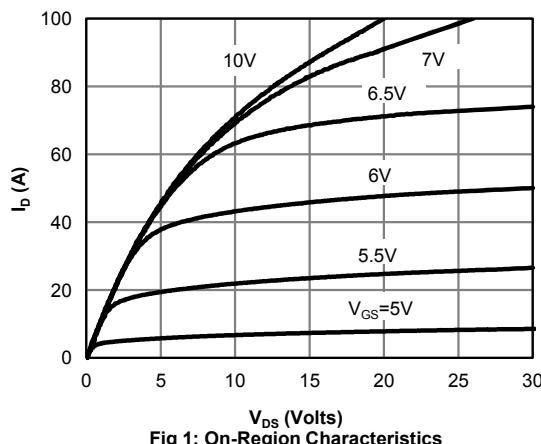
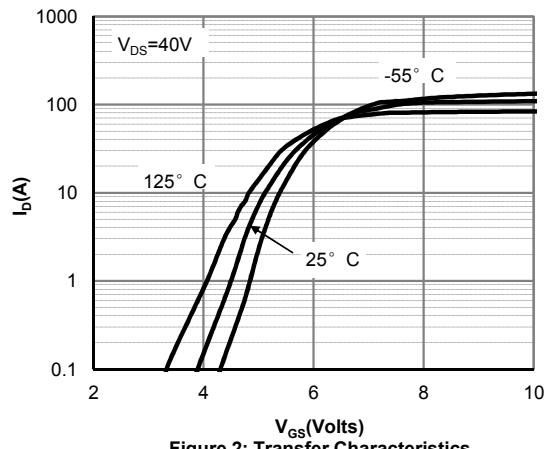
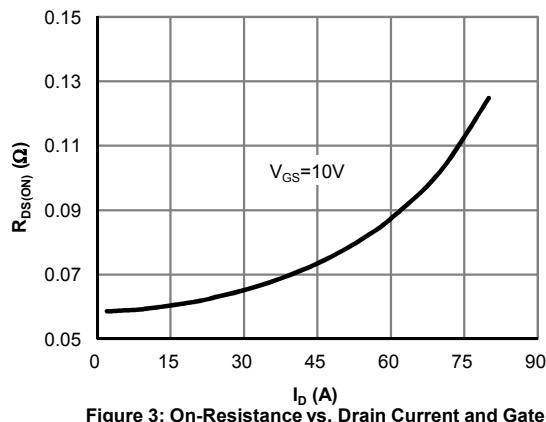
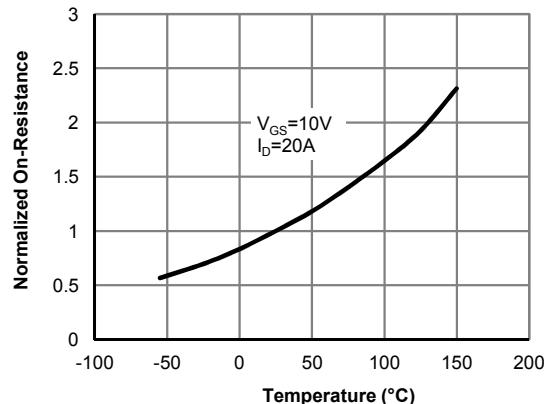
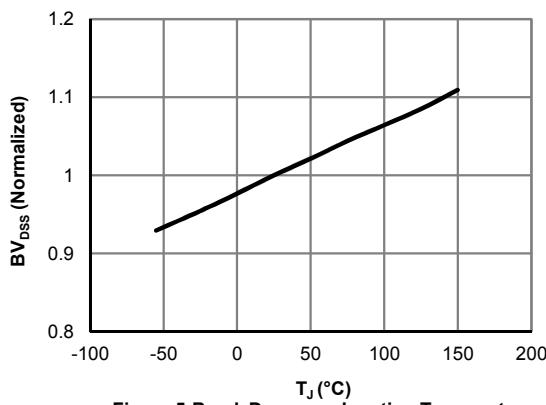
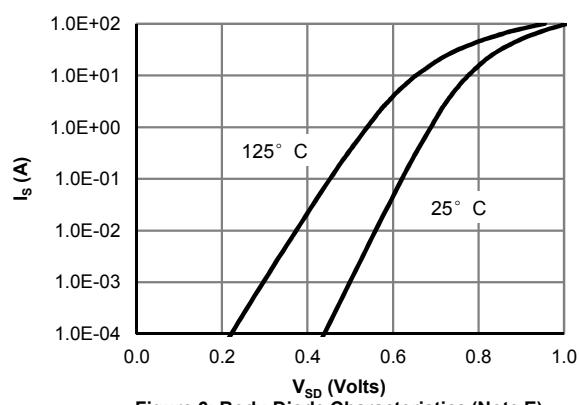
D. The R<sub>0JA</sub> is the sum of the thermal impedance from junction to case R<sub>0JC</sub> and case to ambient.

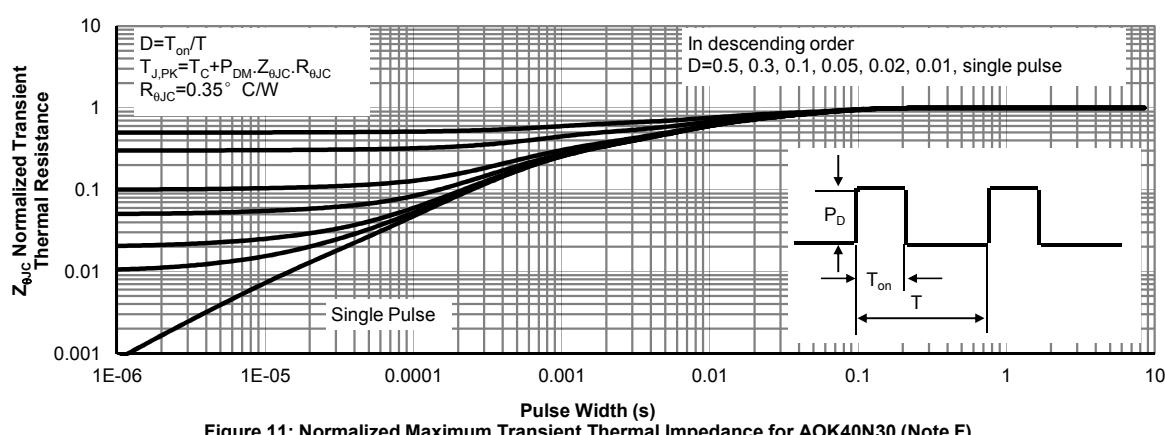
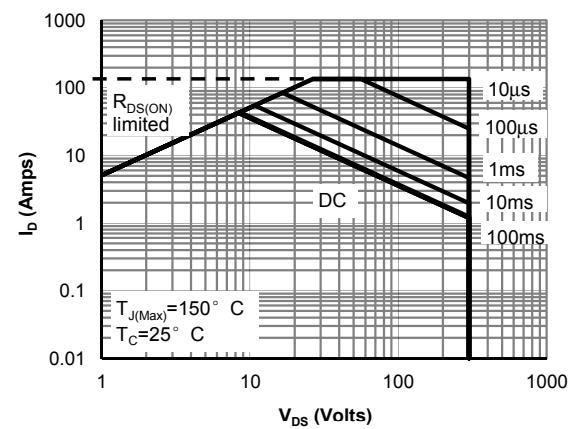
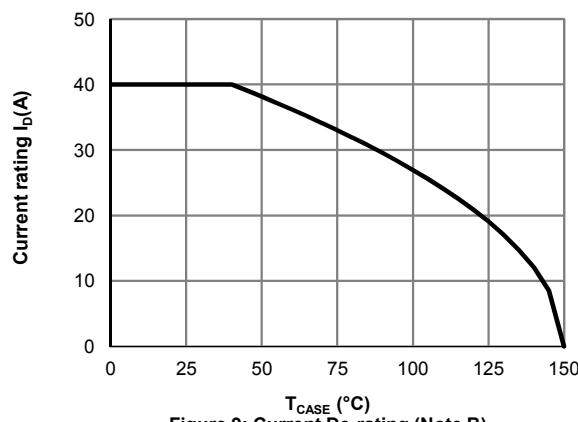
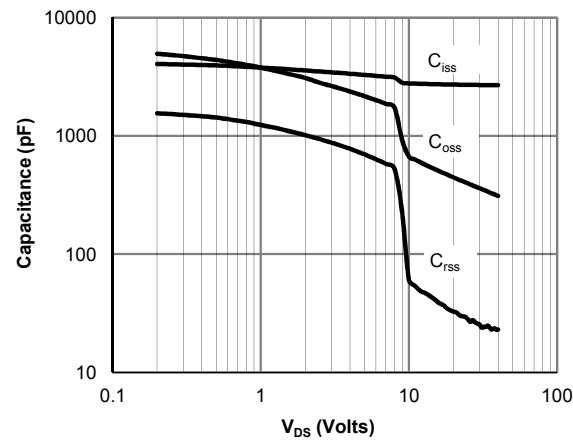
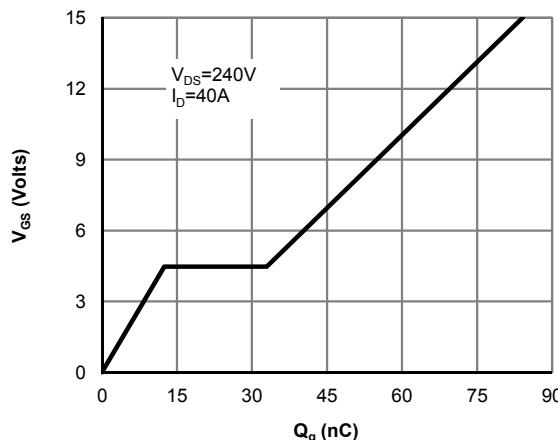
E. The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

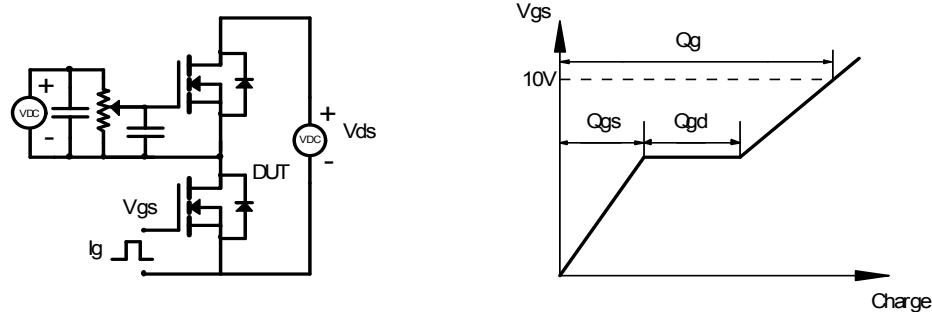
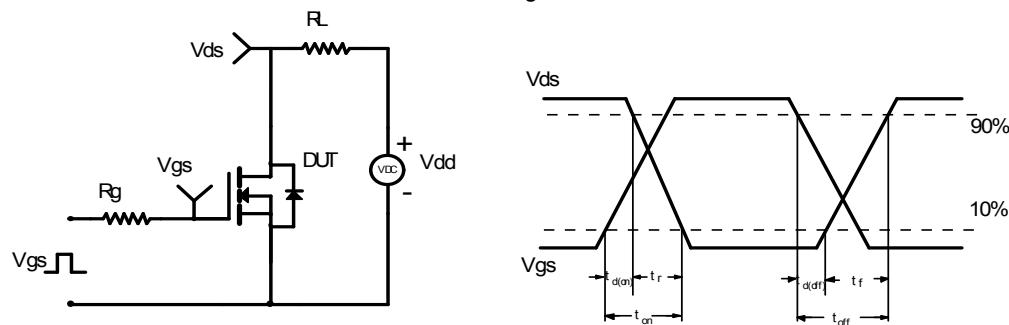
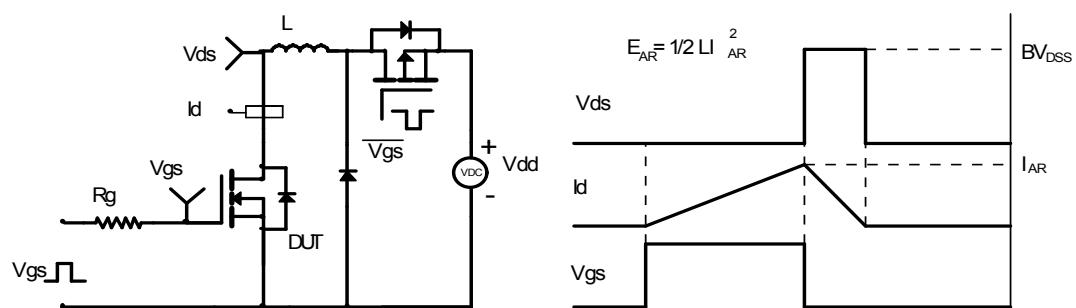
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.

G. L=60mH, I<sub>AS</sub>=8.5A, V<sub>DD</sub>=150V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C

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**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**


**Gate Charge Test Circuit & Waveform**

**Resistive Switching Test Circuit & Waveforms**

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

**Diode Recovery Test Circuit & Waveforms**
