ALPHA & OMEGA
SEMICONDUCTOR

AOY2N60

600V,2A N-Channel MOSFET

General Description

- Advanced High Voltage MOSFET technology
- Low $R_{DS(ON)}$
- Low Ciss and Crss
- High Current Capability
- RoHS and Halogen Free Compliant

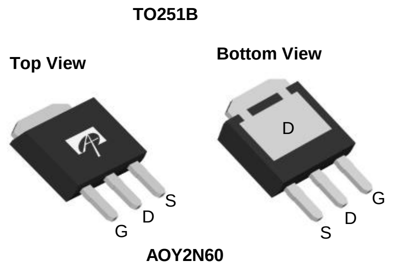
Product Summary

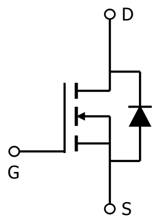
V_{DS} @ Tj,max	700V
I_D (at V_{GS}=10V)	2A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 4.7Ω

100% UIS Tested
100% R_g Tested

Applications

- General Lighting for LED and CCFL
- AC/DC Power supplies for Industrial, Consumer, and Telecom





Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOY2N60	TO-251B	Tube	3500

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current[B]	T_C=25°C	I_D	2	A
	T_C=100°C		1.4	
Pulsed Drain Current [C]		I_{DM}	6	
Avalanche Current [C,I]		I_{AR}	4.6	A
Repetitive avalanche energy [C,I]		E_{AR}	10.6	mJ
Single pulsed avalanche energy [H]		E_{AS}	97	mJ
Peak diode recovery dv/dt		dv/dt	5	V/ns
Power Dissipation [B]	T_C=25°C	P_D	57	W
	Derate above 25°C		0.45	W/ °C
Junction and Storage Temperature Range		T_J, T_{STG}	-50 to 150	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	°C

Thermal Characteristics

Parameter	Symbol	Typical	Maximum	Units
Maximum Junction-to-Ambient [A,G]	$R_{\theta JA}$	40	50	°C/W
Maximum Case-to-sink [A]	$R_{\theta CS}$	-	0.5	°C/W
Maximum Junction-to-Case[D,F]	$R_{\theta JC}$	1.8	2.2	°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		700		
BV_{DSS} /ΔTJ	Zero Gate Voltage Drain Current	ID=250µA, VGS=0V		0.7		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V, V_{GS}=0V			1	µA
		V_{DS}=480V, 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=1A		3.9	4.7	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=1A		2.8		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.79	1	V
I_S	Maximum Body-Diode Continuous Current				2	A
I_{SM}	Maximum Body-Diode Pulsed Current [C]				6	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		295		pF
C_{oss}	Output Capacitance			30		pF
C_{rss}	Reverse Transfer Capacitance			2.3		pF
R_g	Gate resistance	f=1MHz		3.2		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=480V, I_D=2A		6.5	11	nC
Q_{gs}	Gate Source Charge			1.5		nC
Q_{gd}	Gate Drain Charge			1.8		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=300V, I_D=2A, R_G=25Ω		16		ns
t_r	Turn-On Rise Time			11		ns
$t_{D(off)}$	Turn-Off DelayTime			28		ns
t_f	Turn-Off Fall Time			14		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=2A,dI/dt=100A/µs,V_{DS}=100V		268		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=2A,dI/dt=100A/µs,V_{DS}=100V		1.6		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 in a TO252 package, 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.

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.

G.These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

H. L=60mH, I_{AS}=1.8A, V_{DD}=150V, R_G=10Ω, Starting T_J=25° C.

I. L=1.0mH, V_{DD}=150V, R_G=25Ω, Starting T_J=25° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

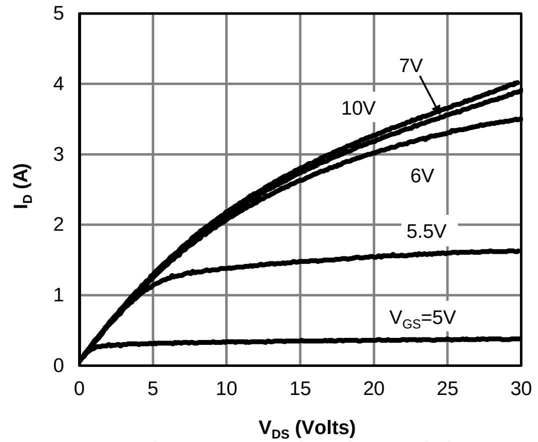


Figure 1: On-Region Characteristics

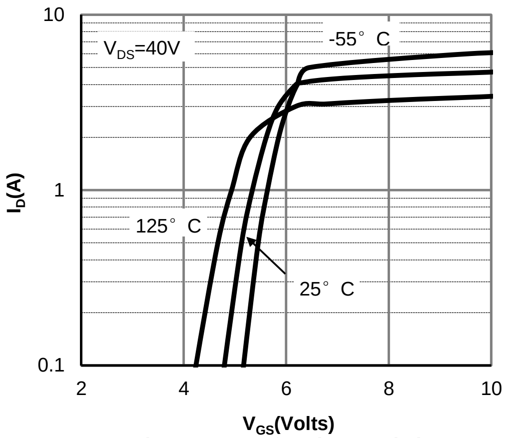


Figure 2: Transfer Characteristics

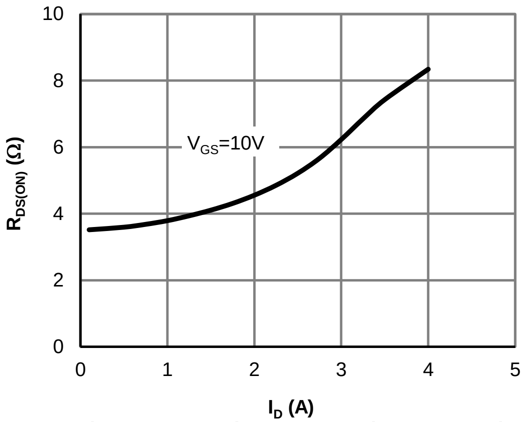


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

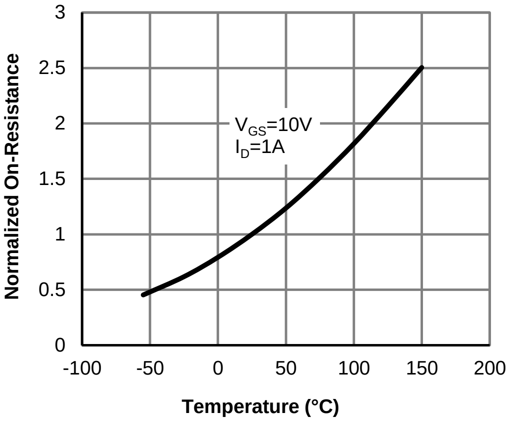


Figure 4: On-Resistance vs. Junction Temperature

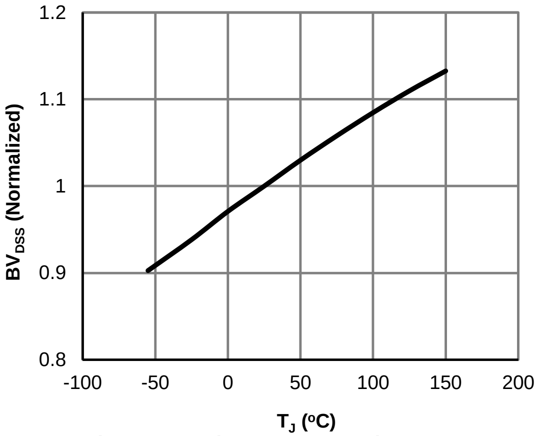


Figure 5: Break Down vs. Junction Temperature

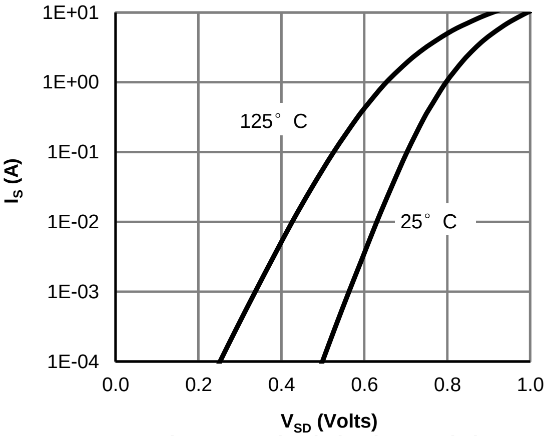


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

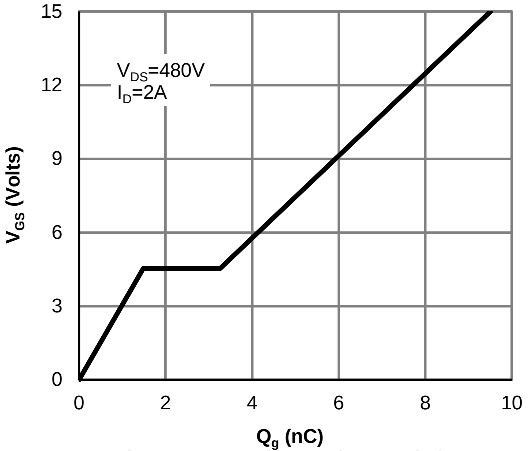


Figure 7: Gate-Charge Characteristics

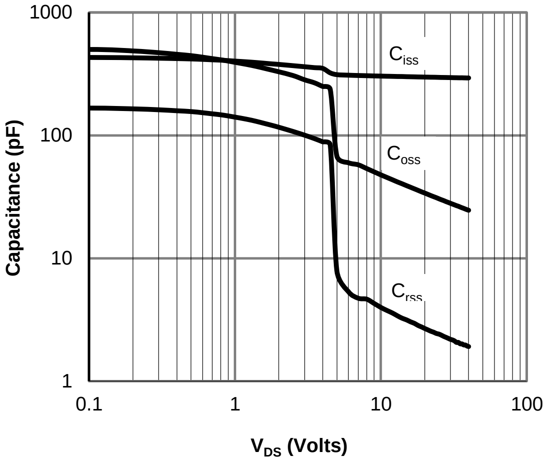


Figure 8: Capacitance Characteristics

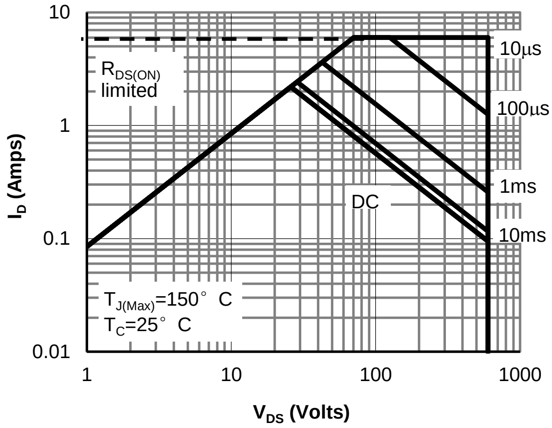


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

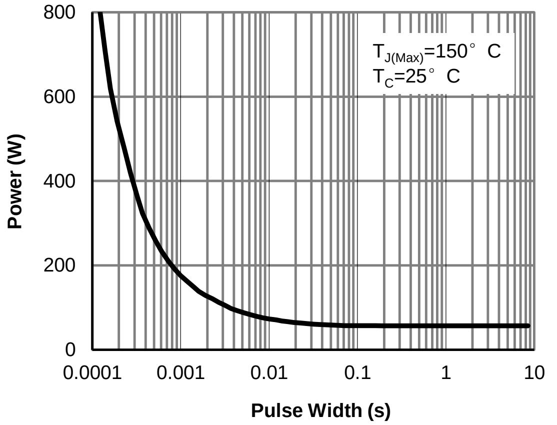


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

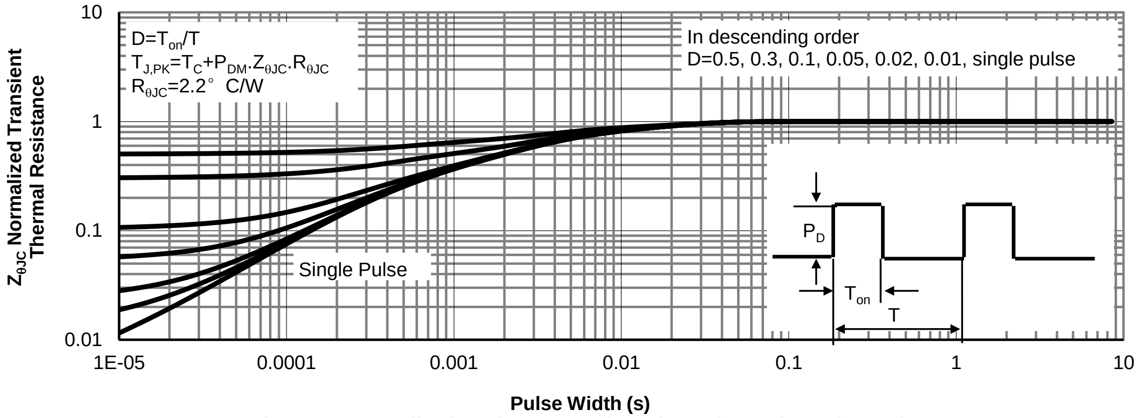


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

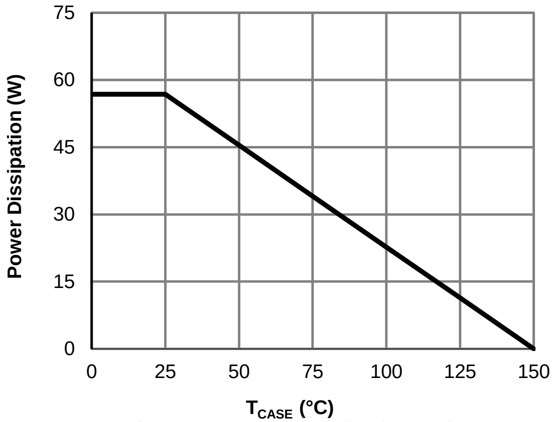


Figure 12: Power De-rating (Note B)

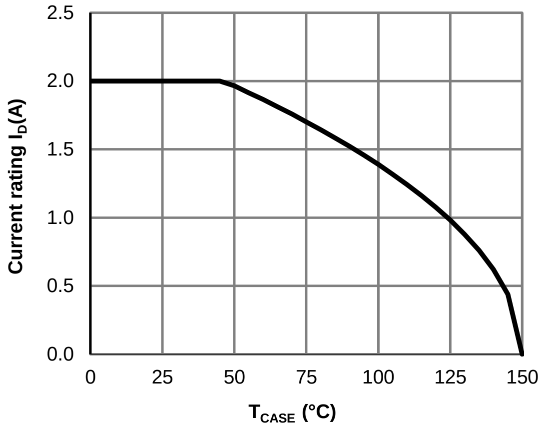


Figure 13: Current De-rating (Note B)

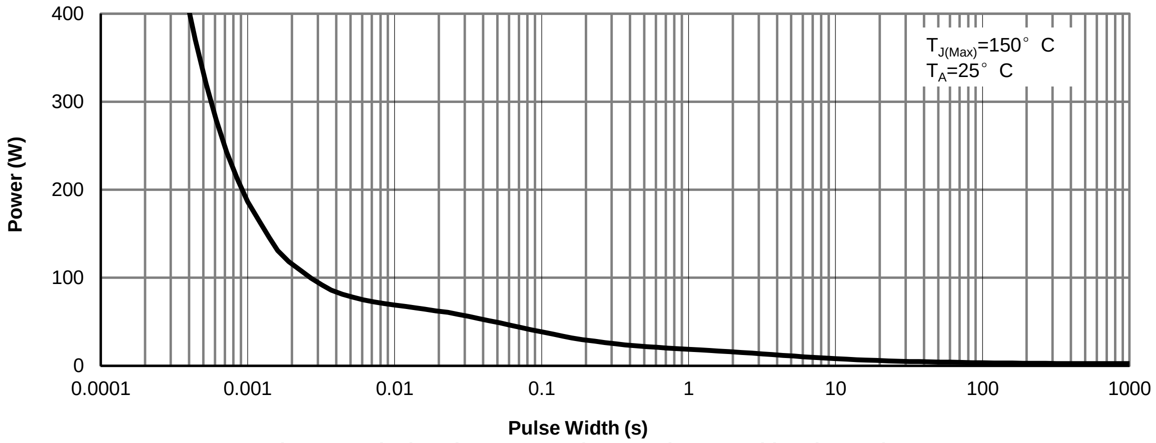


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

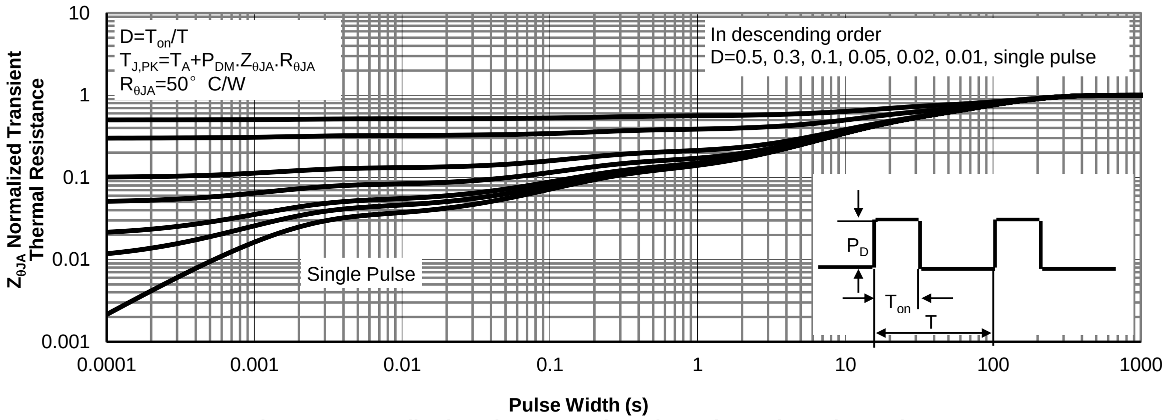
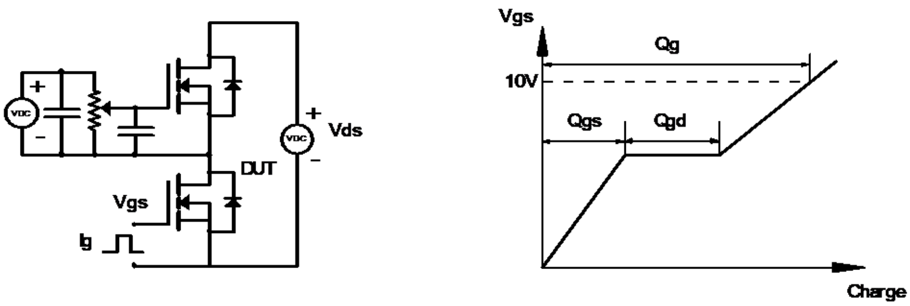
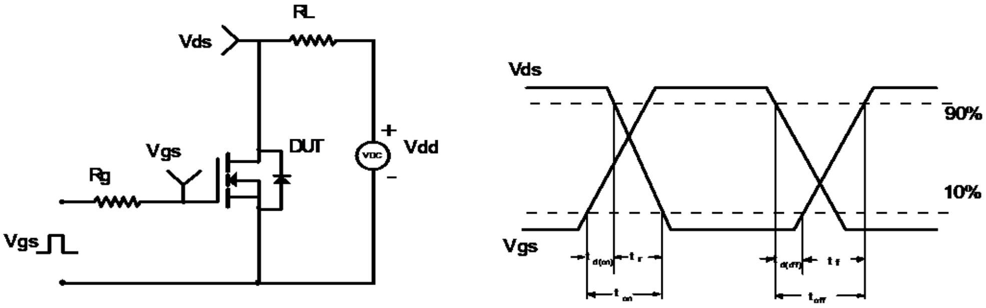


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

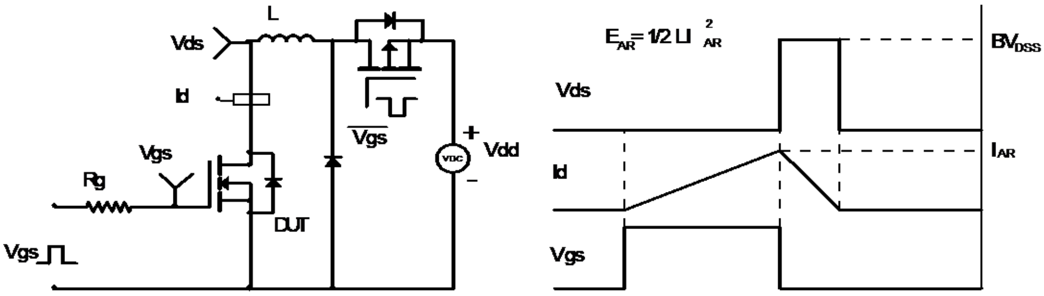
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms