

## AOT460

### N-Channel Enhancement Mode Field Effect Transistor

#### General Description

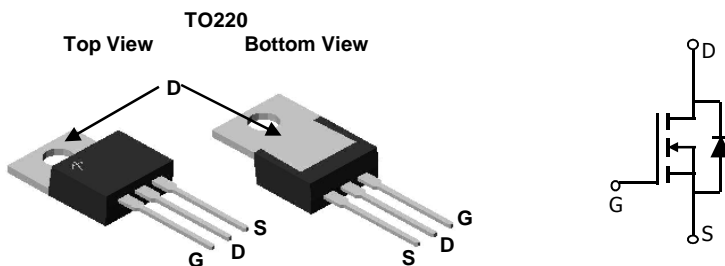
The AOT460/L uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in UPS, high current switching applications. AOT460 and AOT460L are electrically identical.

- RoHS Compliant
- Halogen Free

#### Features

$V_{DS} (V) = 60V$   
 $I_D = 85 A$  ( $V_{GS} = 10V$ )  
 $R_{DS(ON)} < 7.5m\Omega$  ( $V_{GS} = 10V$ )

**100% UIS Tested!**



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>C</sup>	$T_C=25^\circ C$	85	A
	$T_C=100^\circ C$	66	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	340	
Avalanche Current <sup>C</sup>	$I_{AR}$	80	A
Repetitive avalanche energy $L=0.1mH$ <sup>C</sup>	$E_{AR}$	320	mJ
Power Dissipation <sup>B</sup>	$T_C=25^\circ C$	268	W
	$T_C=100^\circ C$	134	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ C$

#### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units	
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State	$R_{\theta JA}$	45	60	$^\circ C/W$
Maximum Junction-to-Case <sup>B</sup>	Steady-State	$R_{\theta JC}$	0.45	0.56	$^\circ C/W$

Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	60			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			10 50	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2	2.95	4	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	340			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =30A T <sub>J</sub> =125°C		6.3 10.5	7.5 13	mΩ
g <sub>FS</sub>	Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =30A		90		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 <sup>G</sup>				85	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =30V, f=1MHz		3800	4560	pF
C <sub>OSS</sub>	Output Capacitance			430		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			190		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.5	2.3	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =30A		68	88	nC
Q <sub>g(4.5V)</sub>	Total Gate Charge			33		nC
Q <sub>gs</sub>	Gate Source Charge			15		nC
Q <sub>gd</sub>	Gate Drain Charge			19		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, R <sub>L</sub> =1Ω, R <sub>GEN</sub> =3Ω		18		ns
t <sub>r</sub>	Turn-On Rise Time			35		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			44		ns
t <sub>f</sub>	Turn-Off Fall Time			23		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =30A, dI/dt=100A/μs		53	64	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =30A, dI/dt=100A/μs		98		nC

A: The value of R<sub>θJA</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>=175° 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>=175° C.

D: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</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>=175° C.

G: The maximum current rating is limited by bond-wires.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

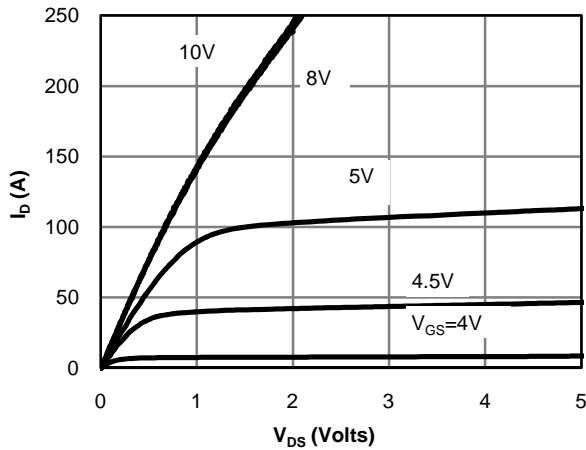


Figure 1: On-Region Characteristics

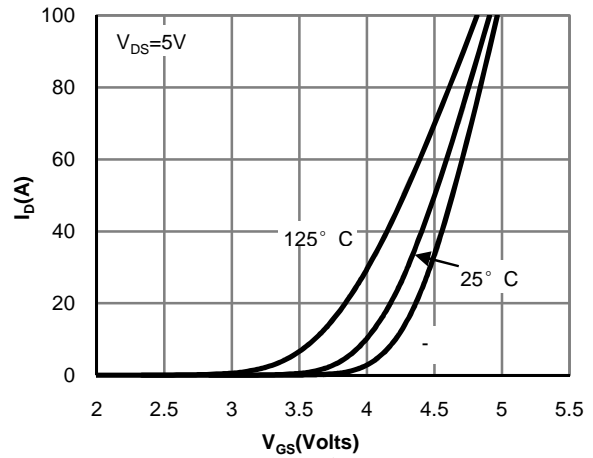


Figure 2: Transfer Characteristics

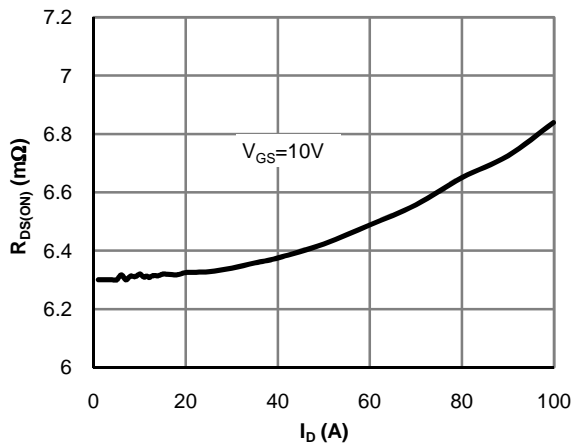


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

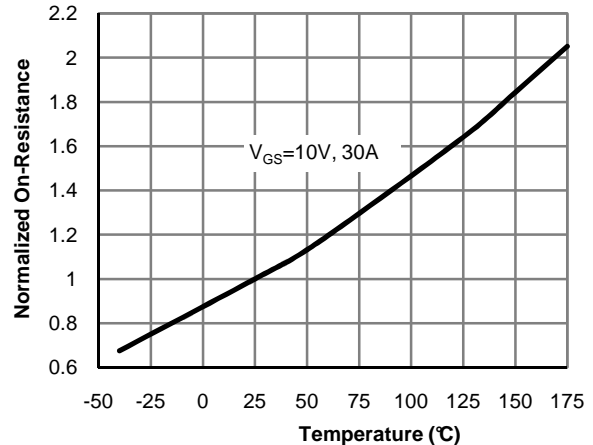


Figure 4: On-Resistance vs. Junction Temperature

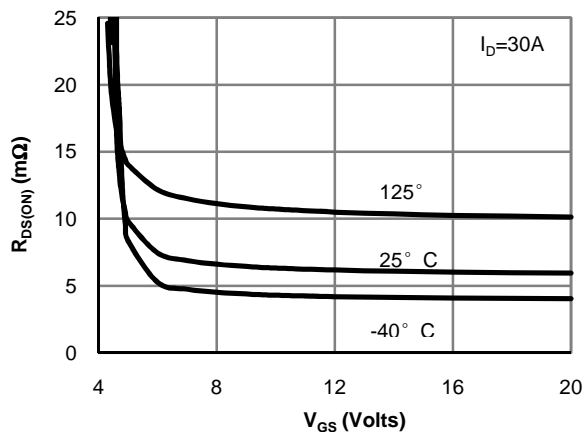


Figure 5: On-Resistance vs. Gate-Source Voltage

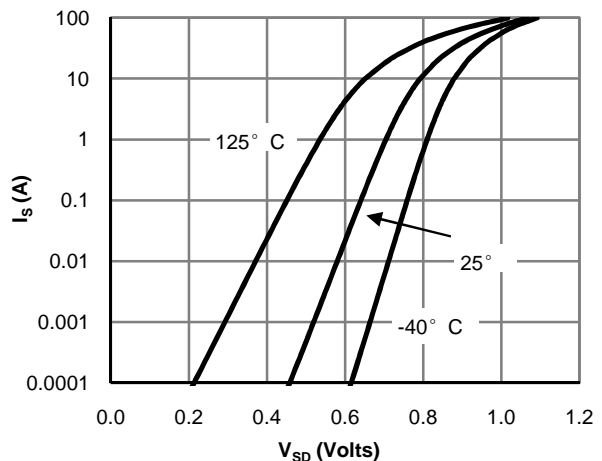


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

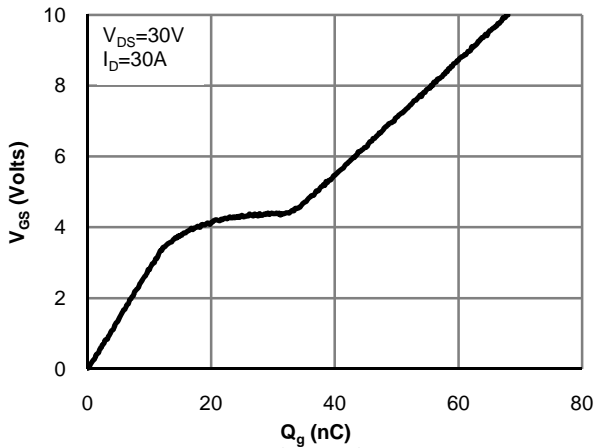


Figure 7: Gate-Charge Characteristics

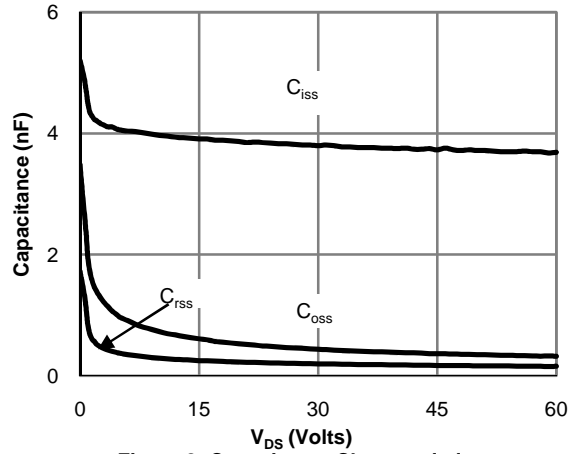


Figure 8: Capacitance Characteristics

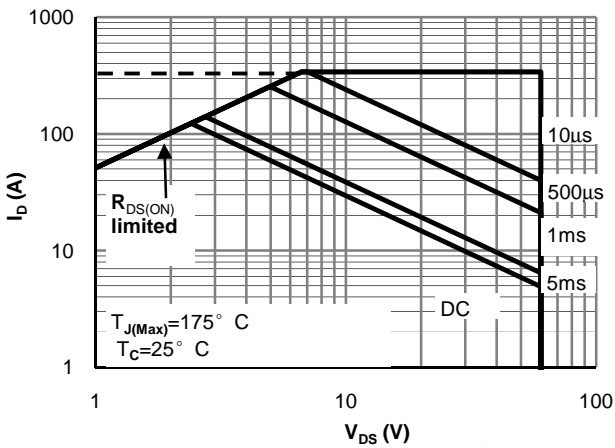


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

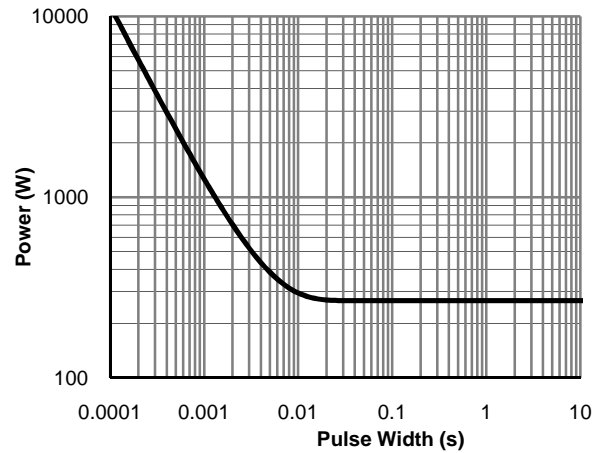


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

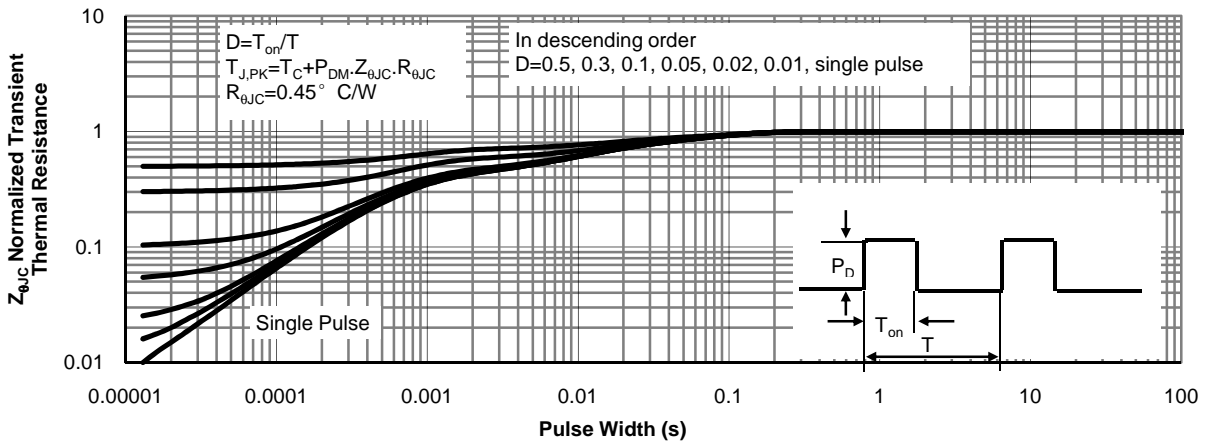


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

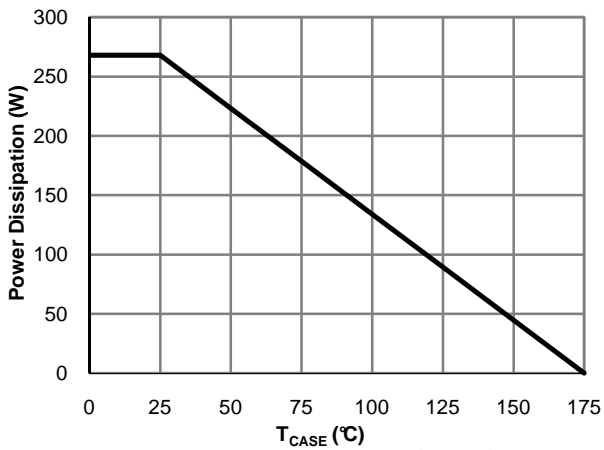


Figure 13: Power De-rating (Note B)

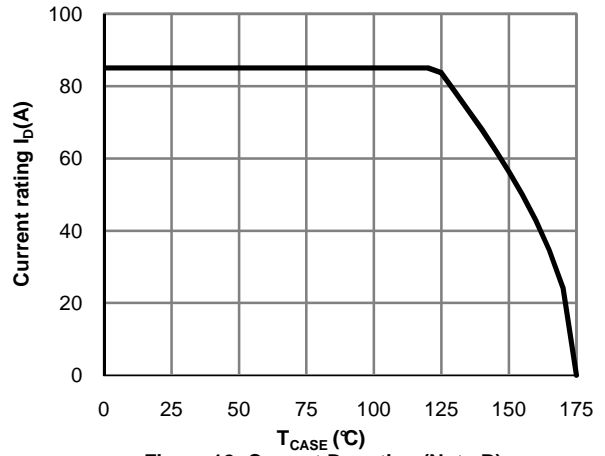


Figure 12: Current De-rating (Note B)

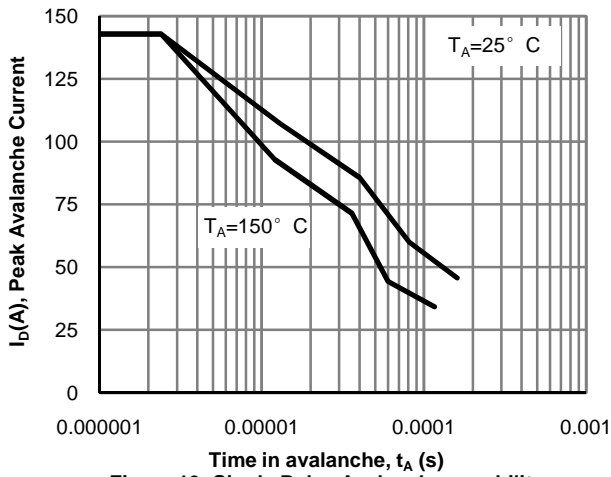
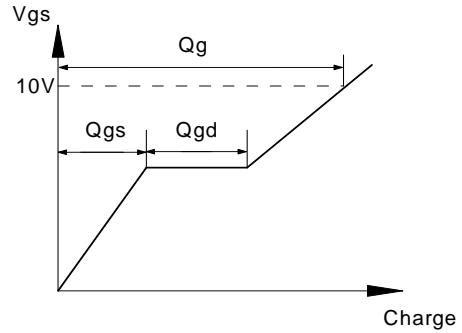
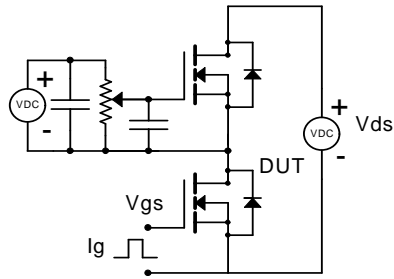
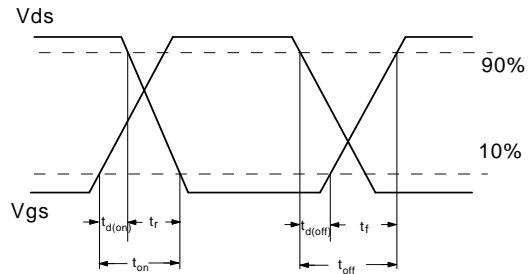
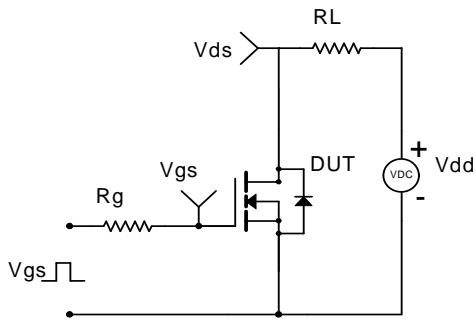


Figure 10: Single Pulse Avalanche capability

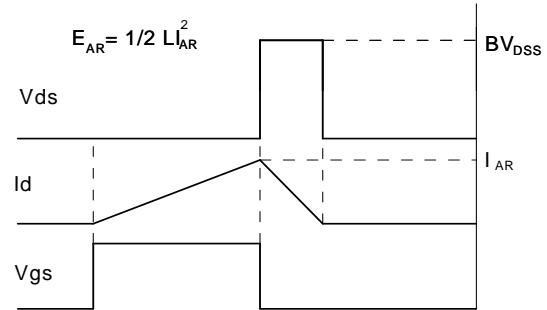
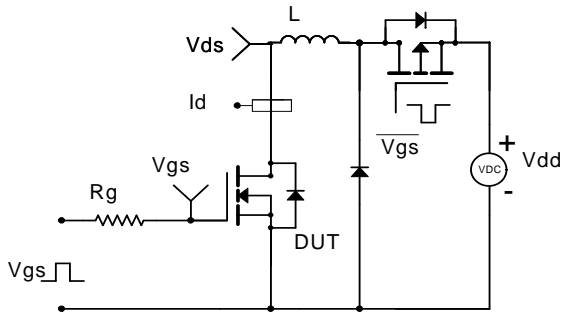
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

