

AOT1N60
1.3A, 600V N-Channel MOSFET

formerly engineering part number AOT9600

General Description

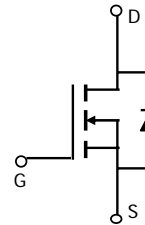
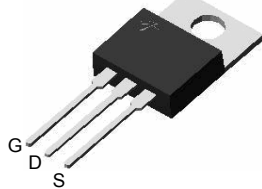
The AOT1N60 has been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability these parts can be adopted quickly into new and existing offline power supply designs.

Features

V_{DS} (V) = 700V @ 150°C
 I_D = 1.3A
 $R_{DS(ON)} < 9\Omega$ ($V_{GS} = 10V$)
100% UIS Tested!
100% R_g Tested!
 C_{iss} , C_{oss} , C_{rss} Tested!

Top View

TO-220


Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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	I_D	$T_C=25^\circ\text{C}$	1.3
		$T_C=100^\circ\text{C}$	0.8
Pulsed Drain Current ^C	I_{DM}	4	A
Avalanche Current ^C	I_{AR}	1.0	A
Repetitive avalanche energy ^C	E_{AR}	15	mJ
Single pulsed avalanche energy ^G	E_{AS}	30	mJ
Peak diode recovery dv/dt	dv/dt	5	V/ns
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	41.7
		Derate above 25°C	0.33
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	$R_{\theta JA}$	55	65	°C/W
Maximum Case-to-Sink ^A	$R_{\theta CS}$	-	0.5	°C/W
Maximum Junction-to-Case ^{D,F}	$R_{\theta JC}$	2	3	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=25^\circ\text{C}$	600			V
		$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=150^\circ\text{C}$		700		V
$BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$		0.6		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=600\text{V}, V_{GS}=0\text{V}$			1	μA
		$V_{DS}=480\text{V}, T_J=125^\circ\text{C}$			10	
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	3	4.1	5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=0.65\text{A}$		7.5	9	Ω
g_{FS}	Forward Transconductance	$V_{DS}=40\text{V}, I_D=0.65\text{A}$		0.9		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.65	1	V
I_S	Maximum Body-Diode Continuous Current				1	A
I_{SM}	Maximum Body-Diode Pulsed Current				4	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$	100	130	160	pF
C_{oss}	Output Capacitance		11	14.5	17.5	pF
C_{riss}	Reverse Transfer Capacitance		1.4	1.8	2.2	pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	2.8	3.5	5.3	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=480\text{V}, I_D=1\text{A}$		6.1	8	nC
Q_{gs}	Gate Source Charge		1.3	2	nC	
Q_{gd}	Gate Drain Charge		3.1	4	nC	
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=300\text{V}, I_D=1\text{A}, R_G=25\Omega$		10	12	ns
t_r	Turn-On Rise Time		6.7	8	ns	
$t_{D(off)}$	Turn-Off Delay Time		20	25	ns	
t_f	Turn-Off Fall Time		11.5	15	ns	
t_{rr}	Body Diode Reverse Recovery Time	$I_F=1.3\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$		114	137	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=1.3\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$		0.63	0.76	μC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A=25^\circ\text{C}$.

B: The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$ in a TO220 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 $T_{J(MAX)}=150^\circ\text{C}$.

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 $<300\mu\text{s}$ 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 $T_{J(MAX)}=150^\circ\text{C}$.

G: $L=60\text{mH}, I_{AS}=1\text{A}, V_{DD}=150\text{V}, R_G=10\Omega$, Starting $T_J=25^\circ\text{C}$

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

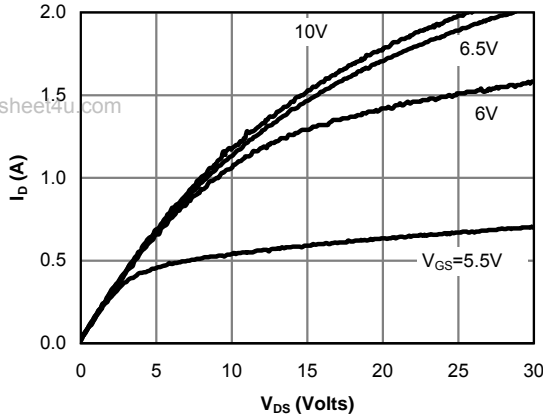


Fig 1: On-Region Characteristics

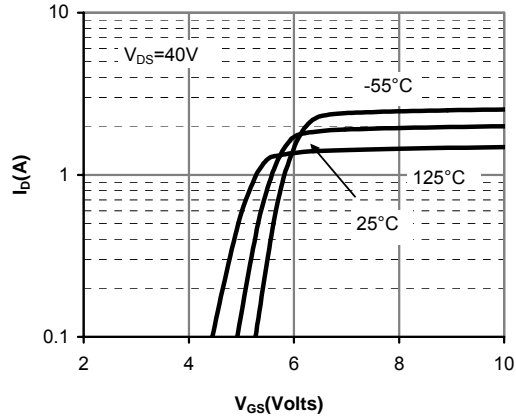


Figure 2: Transfer Characteristics

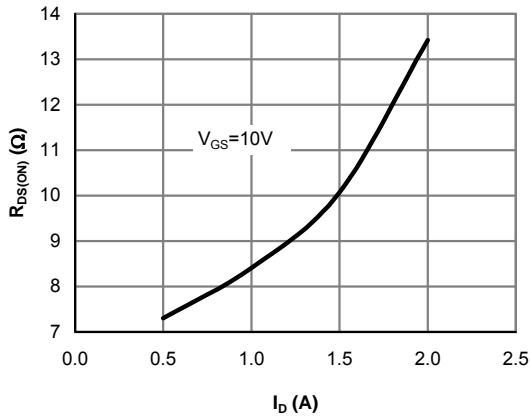


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

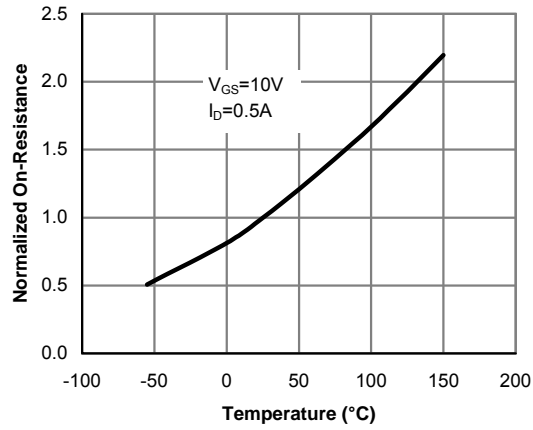


Figure 4: On-Resistance vs. Junction Temperature

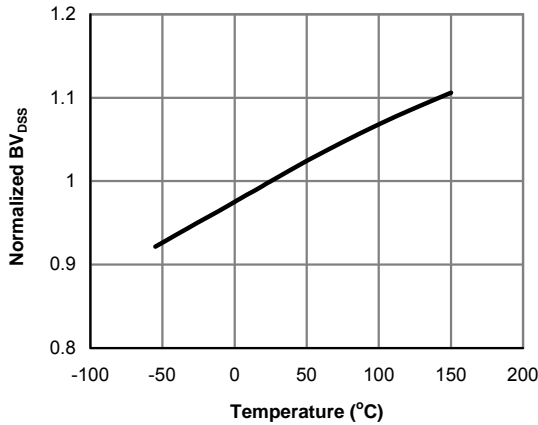


Figure 5: Break Down vs. Junction Temperature

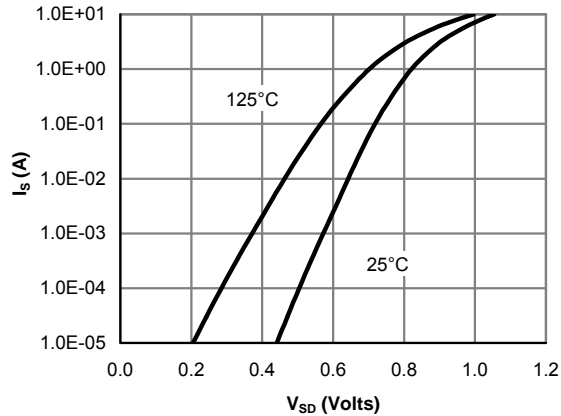


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

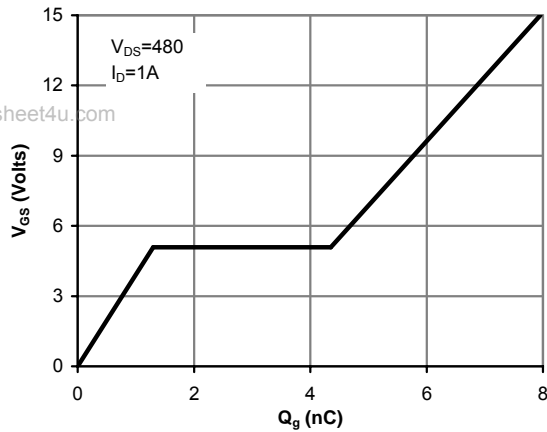


Figure 7: Gate-Charge Characteristics

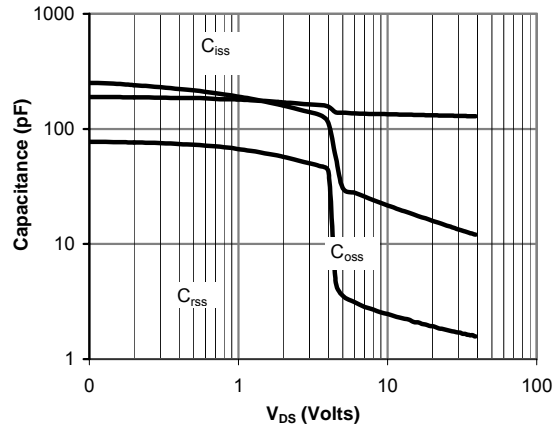


Figure 8: Capacitance Characteristics

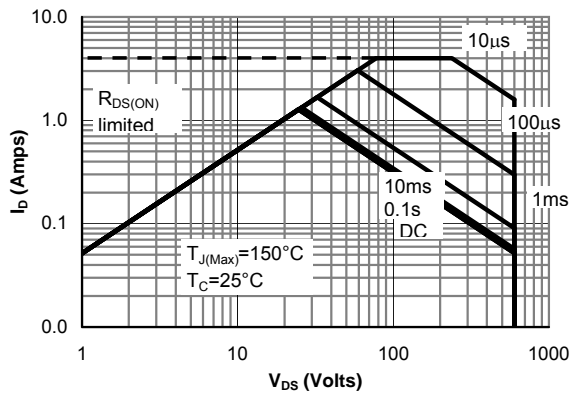


Figure 9: Maximum Forward Biased Safe Operating Area for AOT1N60 (Note F)

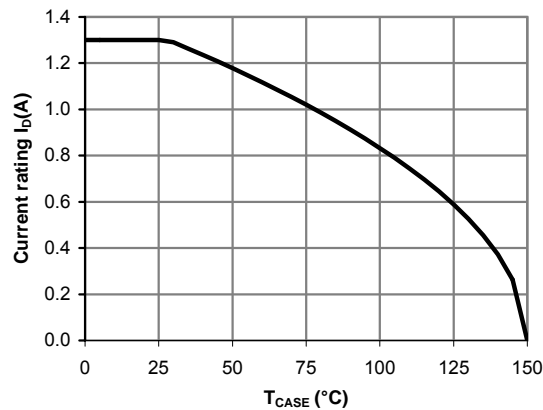


Figure 10: Current De-rating (Note B)

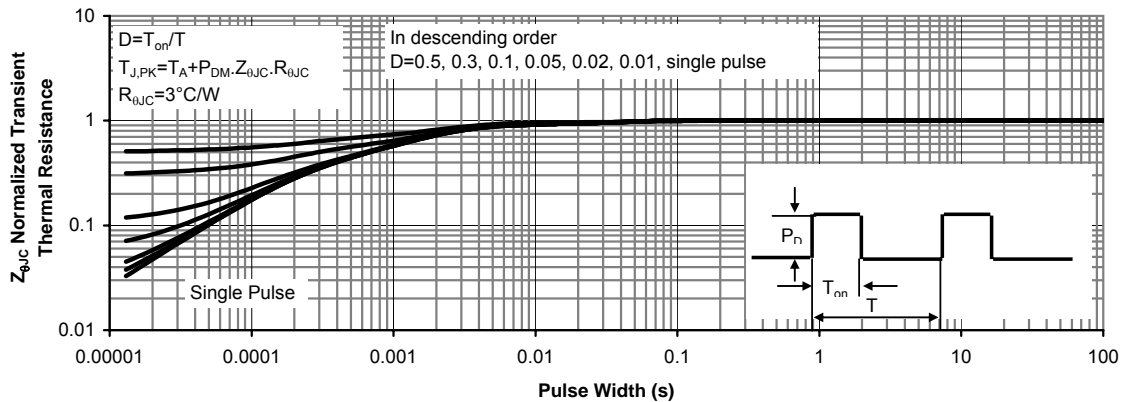
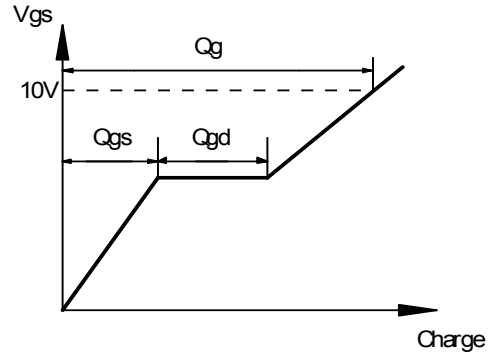
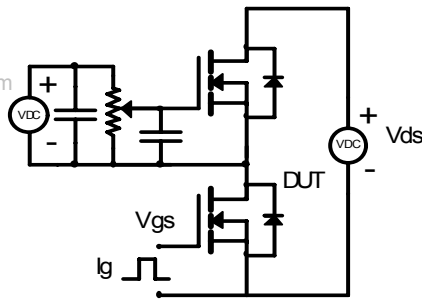


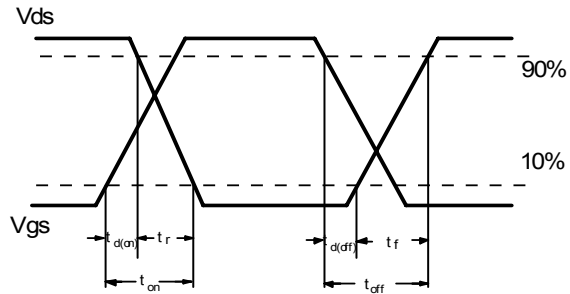
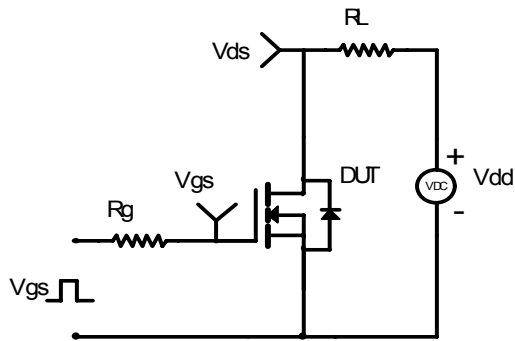
Figure 11: Normalized Maximum Transient Thermal Impedance for AOT1N60 (Note F)

Gate Charge Test Circuit & Waveform

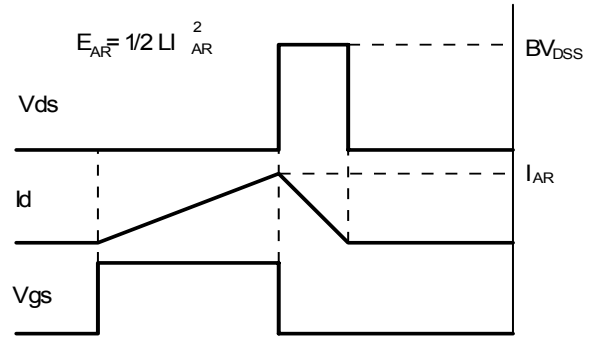
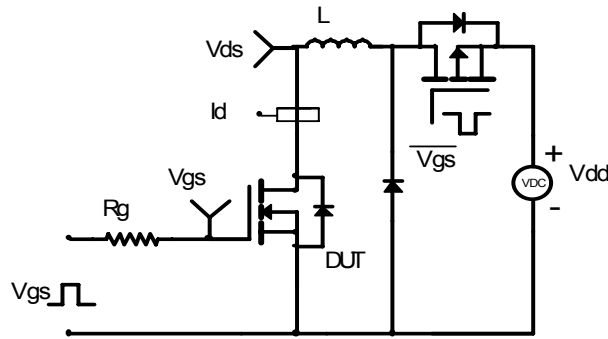
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