



ALPHA & OMEGA
SEMICONDUCTOR

AOT3N100/AOTF3N100

1000V, 2.8A N-Channel MOSFET

General Description

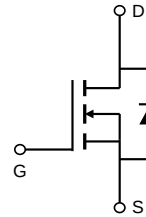
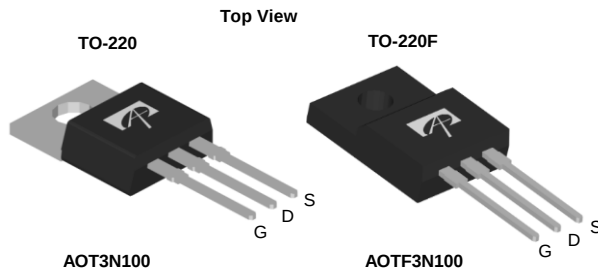
The AOT3N100 & AOTF3N100 are fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability these parts can be adopted quickly into new and existing offline power supply designs.

For Halogen Free add "L" suffix to part number:
AOT3N100 & AOTF3N100L

Product Summary

V_{DS}	1100@150°C
I_D (at $V_{GS}=10V$)	2.8A
$R_{DS(on)}$ (at $V_{GS}=10V$)	< 6Ω

100% UIS Tested
100% R_g Tested



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

Parameter	Symbol	AOT3N100	AOTF3N100	Units
Drain-Source Voltage	V_{DS}	1000		V
Gate-Source Voltage	V_{GS}	±30		V
Continuous Drain Current	I_D	2.8	2.8*	A
		1.8	1.8*	
Pulsed Drain Current ^C	I_{DM}	10		A
Avalanche Current ^C	I_{AR}	2.2		A
Repetitive avalanche energy ^C	E_{AR}	72		mJ
Single pulsed avalanche energy ^G	E_{AS}	145		mJ
Peak diode recovery dv/dt	dv/dt	5		V/ns
Power Dissipation ^B	P_D	132	38	W
		1.1	0.3	W/°C
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	AOT3N100	AOTF3N100	Units
Maximum Junction-to-Ambient ^{A,D}	$R_{\theta JA}$	65	65	°C/W
Maximum Case-to-sink ^A	$R_{\theta CS}$	0.5	--	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.95	3.3	°C/W

* Drain current limited by maximum junction temperature.

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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=25^{\circ}\text{C}$	1000			V
		$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=150^{\circ}\text{C}$		1100		
$BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$		1.07		$\text{V}/^{\circ}\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=1000\text{V}, V_{GS}=0\text{V}$			1	μA
		$V_{DS}=800\text{V}, T_J=125^{\circ}\text{C}$			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	$V_{DS}=5\text{V}, I_D=250\mu\text{A}$	3.3	4	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=1.5\text{A}$		4.8	6	Ω
g_{FS}	Forward Transconductance	$V_{DS}=40\text{V}, I_D=1.5\text{A}$		4		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.76	1	V
I_S	Maximum Body-Diode Continuous Current				2.8	A
I_{SM}	Maximum Body-Diode Pulsed Current				10	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$	550	690	830	pF
C_{oss}	Output Capacitance		30	44	60	pF
C_{rss}	Reverse Transfer Capacitance		2	5	8	pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	1.6	3.5	5.2	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=800\text{V}, I_D=3\text{A}$	10	15	20	nC
Q_{gs}	Gate Source Charge			3.8		nC
Q_{gd}	Gate Drain Charge			4.7		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=500\text{V}, I_D=3\text{A}, R_G=25\Omega$		22		ns
t_r	Turn-On Rise Time			25		ns
$t_{D(off)}$	Turn-Off DelayTime			40		ns
t_f	Turn-Off Fall Time			24		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=3\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$	300	400	500	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=3\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$	2.7	3.7	4.7	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 $T_{J(MAX)}=150^{\circ}\text{C}$, 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 $T_{J(MAX)}=150^{\circ}\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^{\circ}\text{C}$.

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 $T_{J(MAX)}=150^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

G. $L=60\text{mH}$, $I_{AS}=2.2\text{A}$, $V_{DS}=150\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

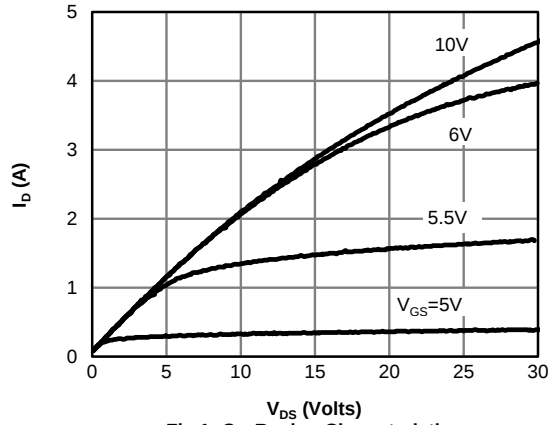


Fig 1: On-Region Characteristics

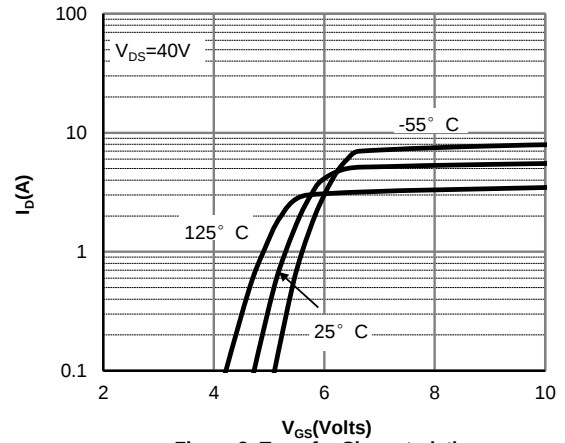


Figure 2: Transfer Characteristics

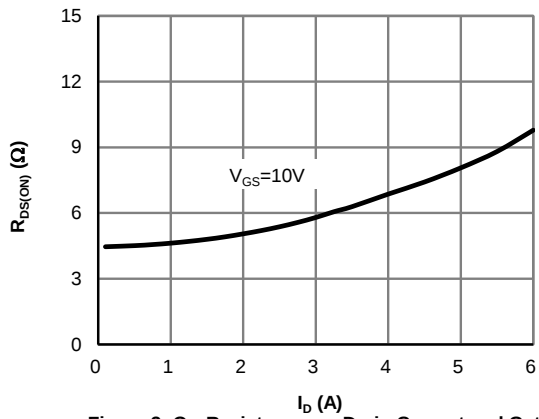


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

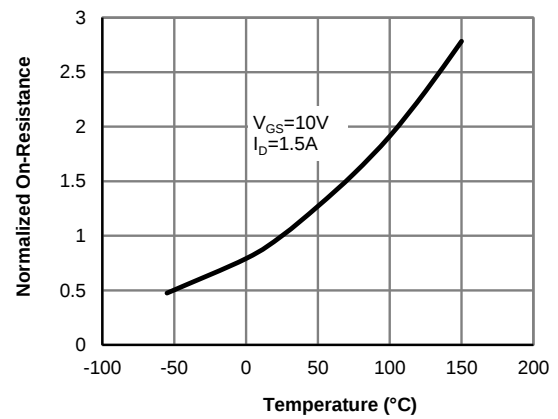


Figure 4: On-Resistance vs. Junction Temperature

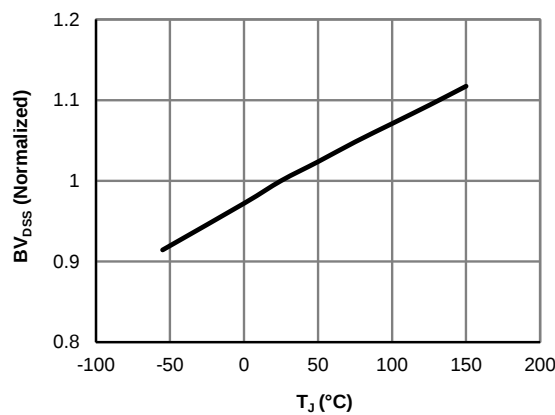


Figure 5: Break Down vs. Junction Temperature

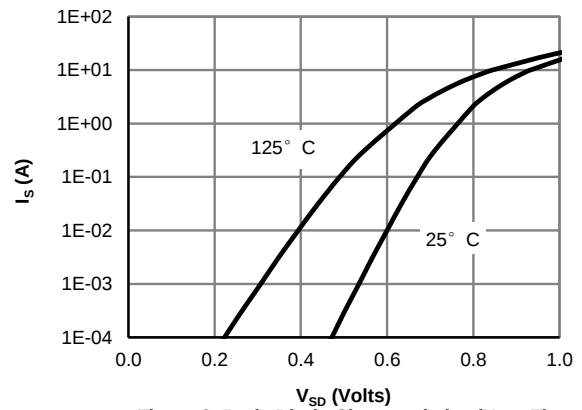


Figure 6: Body-Diode Characteristics (Note E)

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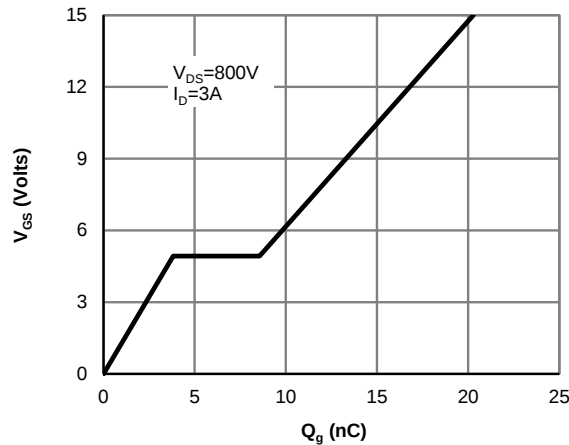


Figure 7: Gate-Charge Characteristics

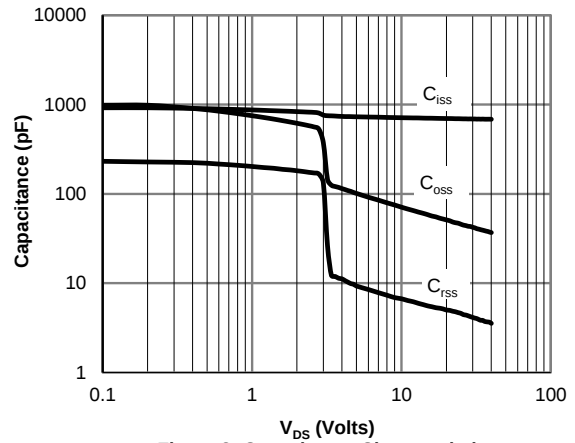


Figure 8: Capacitance Characteristics

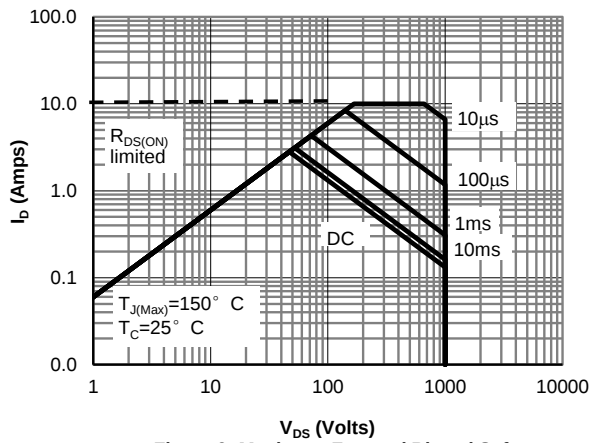


Figure 9: Maximum Forward Biased Safe Operating Area for AOT3N100 (Note F)

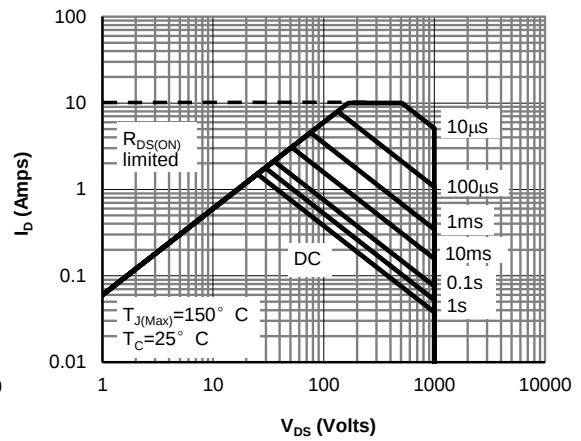


Figure 10: Maximum Forward Biased Safe Operating Area for AOTF3N100 (Note F)

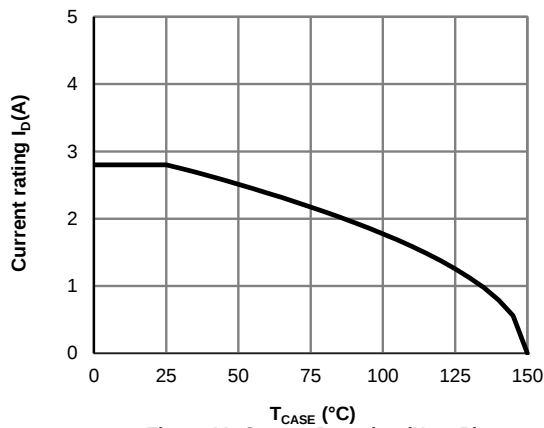
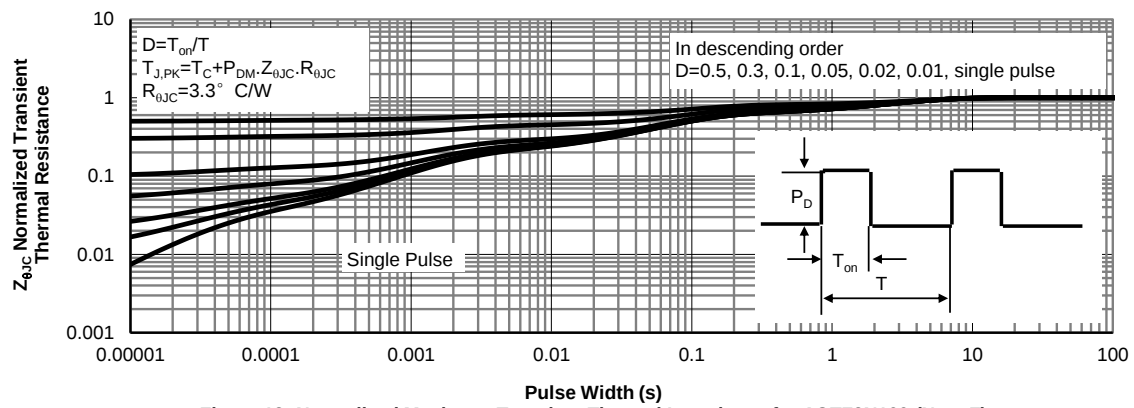
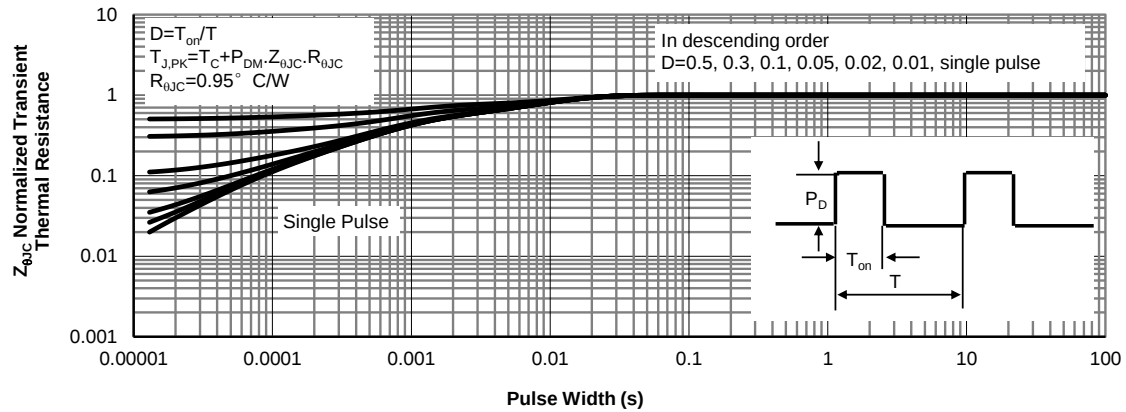
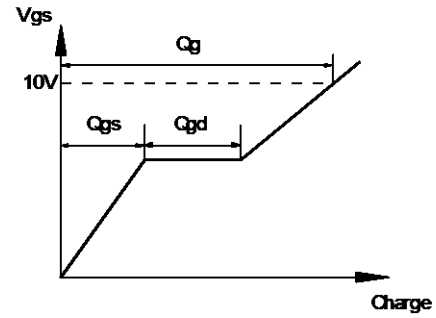
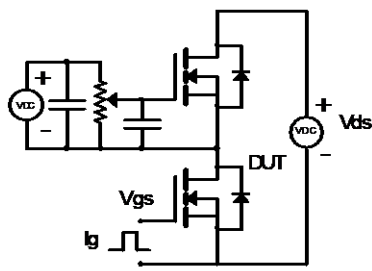


Figure 11: Current De-rating (Note B)

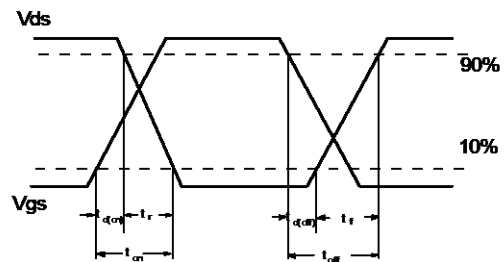
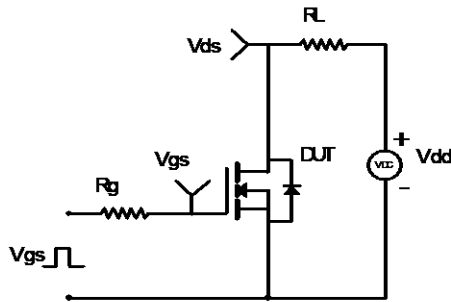
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



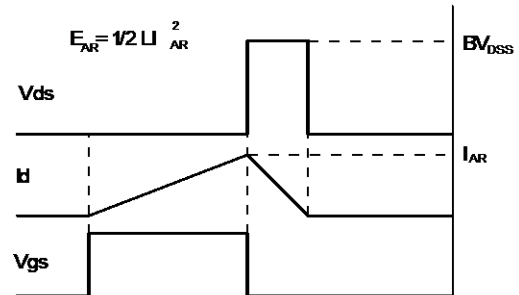
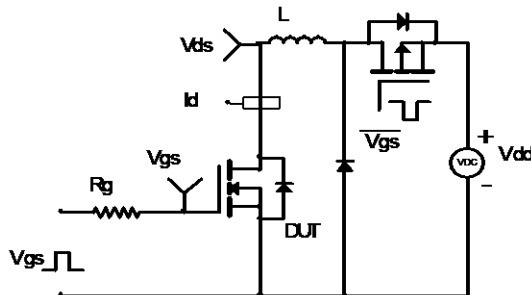
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

