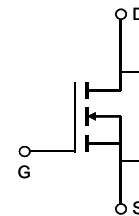# General Description

The AOT22N50 & AOTF22N50 have 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}	600V@150℃
I_D (at V_{GS}=10V)	22A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 0.26Ω

RoHS Compliant

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	AOT22N50	AOTF22N50	Units
Drain-Source Voltage		V_{DS}	500		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C=25℃	I_D	22	22*	A
	T_C=100℃		15	15*	
Pulsed Drain Current [C]		I_{DM}	88		
Avalanche Current [C]		I_{AR}	7		A
Repetitive avalanche energy [C]		E_{AR}	735		mJ
Single plused avalanche energy [G]		E_{AS}	1470		mJ
Peak diode recovery dv/dt		dv/dt	5		V/ns
Power Dissipation [B]	T_C=25℃	P_D	417	50	W
	Derate above 25°C		3.3	0.4	W/ °C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150		℃
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300		℃

Thermal Characteristics

Parameter	Symbol	AOT22N50	AOTF22N50	Units
Maximum Junction-to-Ambient [A,D]	$R_{\theta JA}$	65	65	℃/W
Maximum Case-to-sink [A]	$R_{\theta CS}$	0.5	--	℃/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.3	2.5	℃/W

* Drain current limited by maximum junction temperature.

Electrical Characteristics (T$_J$=25℃ 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℃	500			
		I$_D$=250µA, V$_{GS}$=0V, T$_J$=150℃		600		V
BV$_{DSS}$/ΔTJ	Zero Gate Voltage Drain Current	ID=250µA, VGS=0V		0.57		V/°C
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=500V, V$_{GS}$=0V			1	µA
		V$_{DS}$=400V, T$_J$=125℃			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$_D$=11A		0.21	0.26	Ω
g$_{FS}$	Forward Transconductance	V$_{DS}$=40V, I$_D$=11A		25		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V		0.7	1	V
I$_S$	Maximum Body-Diode Continuous Current				22	A
I$_{SM}$	Maximum Body-Diode Pulsed Current				88	A
DYNAMIC PARAMETERS						
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=25V, f=1MHz	2465	3086	3710	pF
C$_{oss}$	Output Capacitance		200	290	380	pF
C$_{rss}$	Reverse Transfer Capacitance		14	24	35	pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz	0.7	1.4	2.1	Ω
SWITCHING PARAMETERS						
Q$_g$	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=400V, I$_D$=22A	55	69	83	nC
Q$_{gs}$	Gate Source Charge		17	22	27	nC
Q$_{gd}$	Gate Drain Charge		12	24	36	nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=250V, I$_D$=22A, R$_G$=25Ω		60		ns
t$_r$	Turn-On Rise Time			122		ns
t$_{D(off)}$	Turn-Off DelayTime			124		ns
t$_f$	Turn-Off Fall Time			77		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=22A,dI/dt=100A/µs,V$_{DS}$=100V	415	524	630	ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=22A,dI/dt=100A/µs,V$_{DS}$=100V	7.5	9.6	12	µC

A. The value of R$_{θJA}$ 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, 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, Ratings are based on low frequency and duty cycles to keep initial T$_J$=25°C.
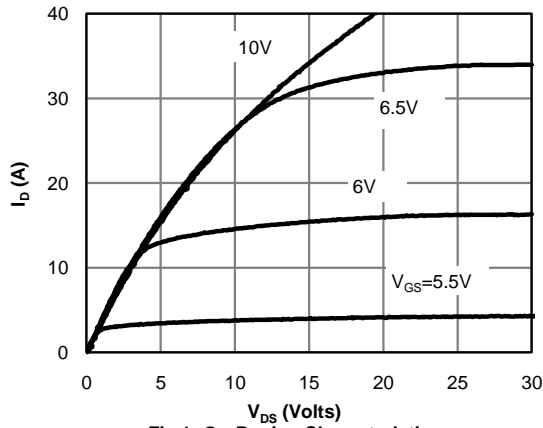D. The R$_{θJA}$ is the sum of the thermal impedence from junction to case R$_{θJC}$ and case to ambient.
E. The static characteristics in Figures 1 to 6 are obtained using <300 µs pulses, duty cycle 0.5% max.
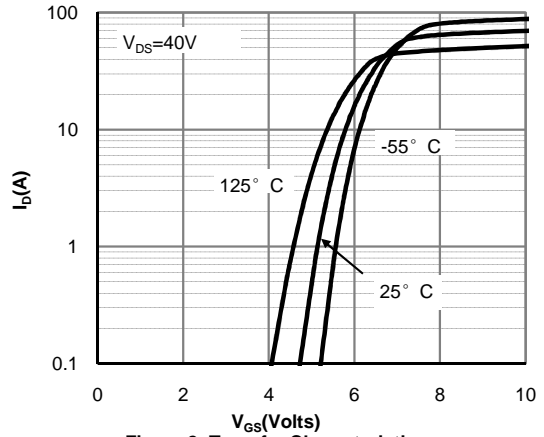F. These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T$_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.
G. L=60mH, I$_{AS}$=7A, V$_{DD}$=150V, R$_G$=25Ω, Starting T$_J$=25°C

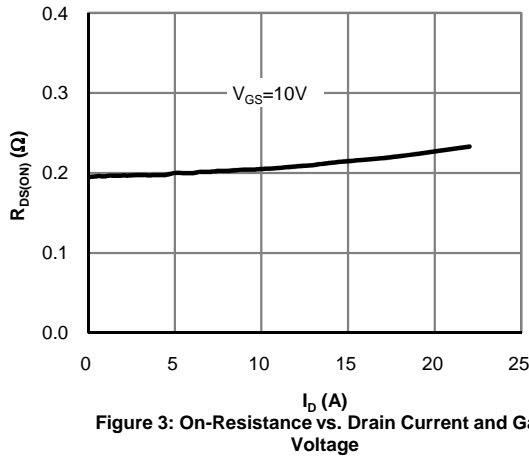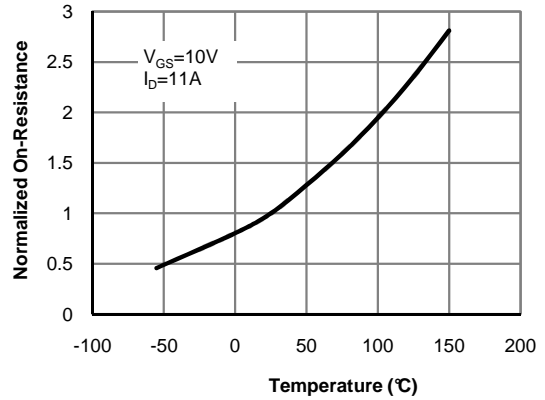## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

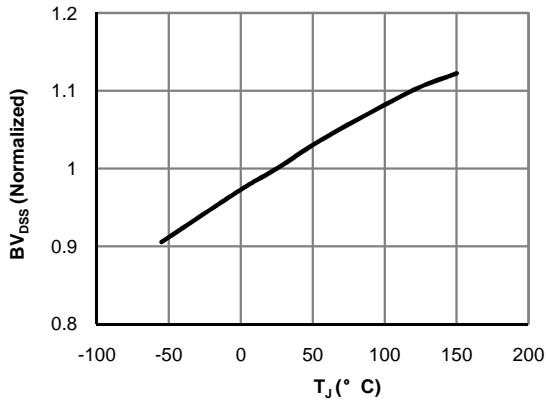**Fig 1: On-Region Characteristics**
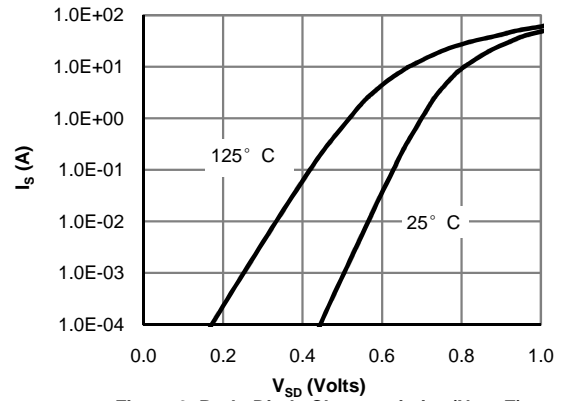

Figure 2: Transfer Characteristics

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

Figure 4: On-Resistance vs. Junction Temperature

Figure 5:Break Down vs. Junction Temparature

Figure 6: Body-Diode Characteristics (Note E)
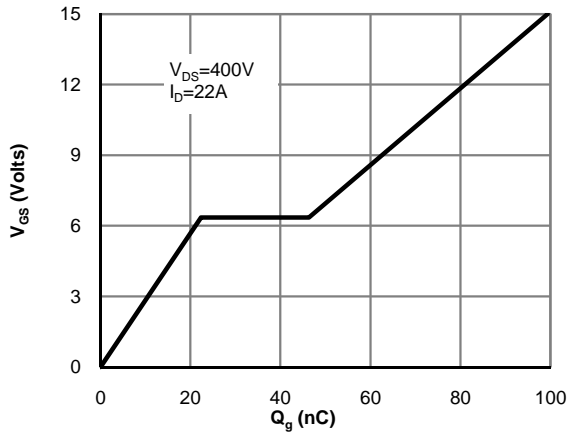
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

$V_{DS}=400V$
$I_D=22A$

Figure 7: Gate-Charge Characteristics

C_{iss}
C_{oss}
C_{rss}

Figure 8: Capacitance Characteristics

$R_{DS(ON)}$ limited

10μs
100μs
1ms
10ms

DC

$T_{J(Max)}=150°C$
$T_C=25°C$

Figure 9: Maximum Forward Biased Safe Operating Area for AOT22N50 (Note F)

$R_{DS(ON)}$ limited

10μs
100μs
1ms
10ms
0.1s
1s

DC

$T_{J(Max)}=150°C$
$T_C=25°C$

Figure 10: Maximum Forward Biased Safe Operating Area for AOTF22N50 (Note F)
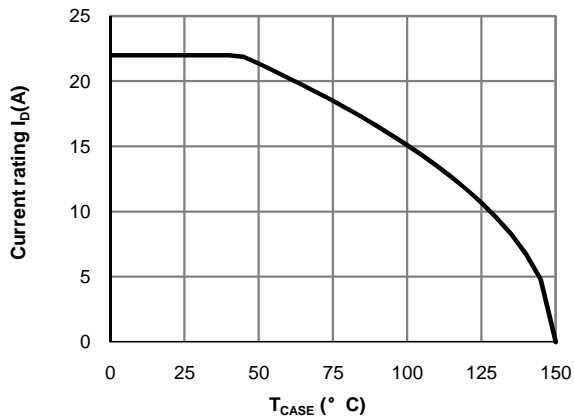

Figure 11: Current De-rating (Note B)
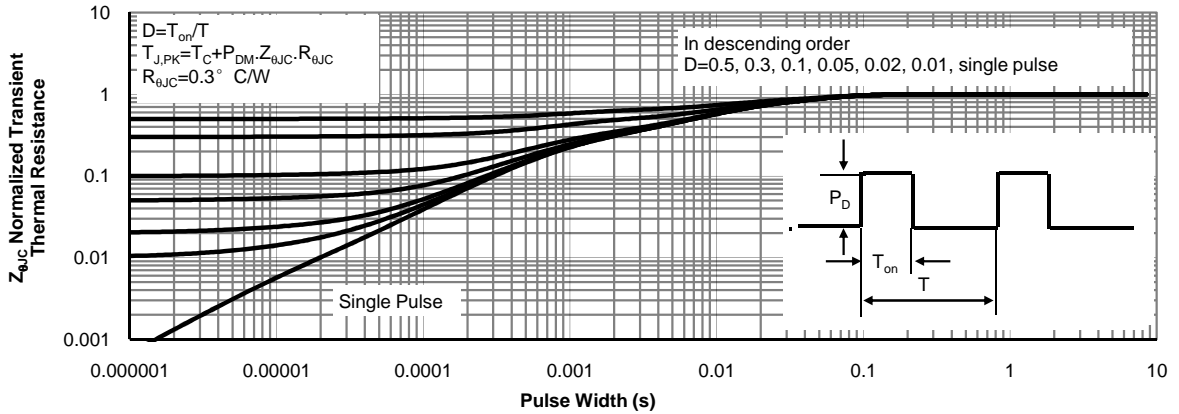
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

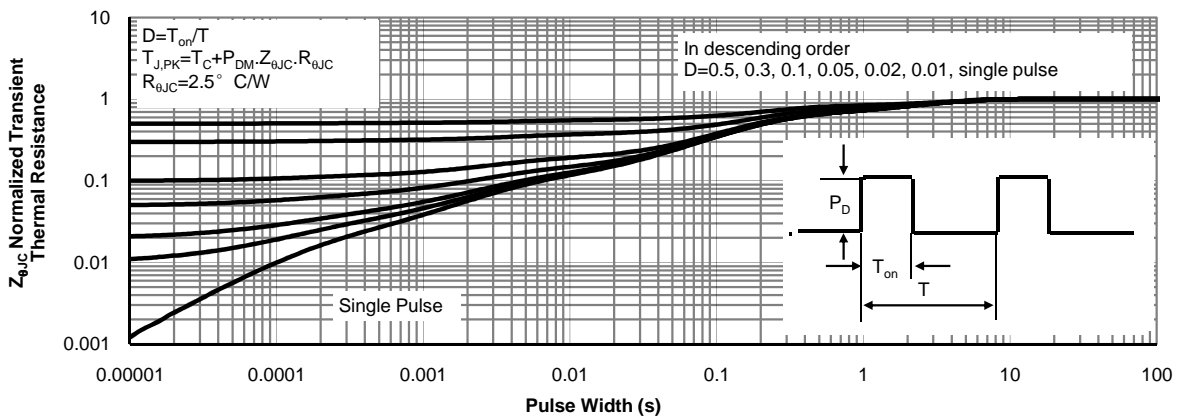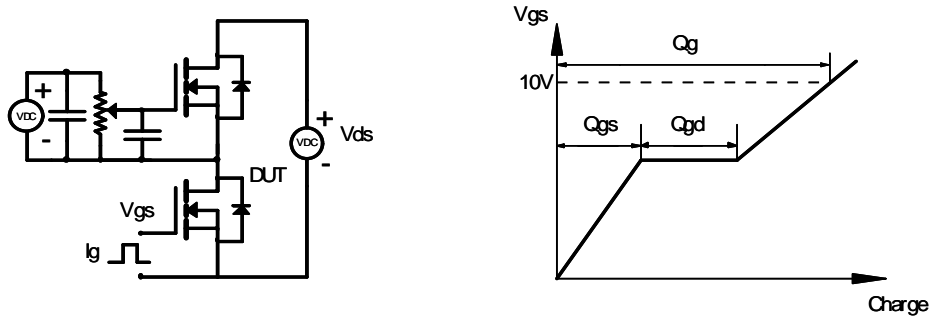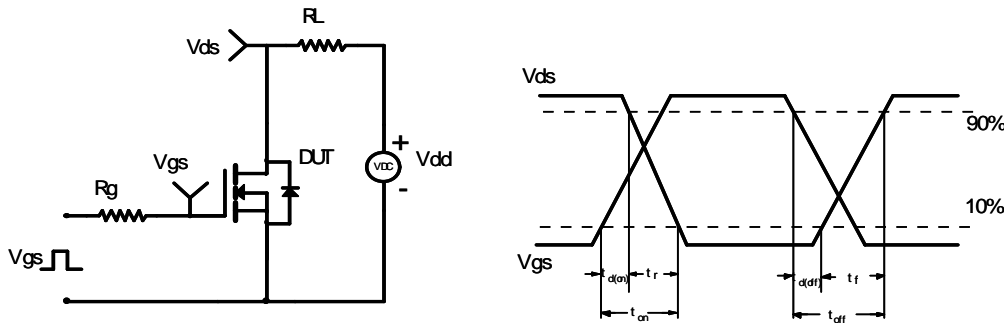Figure 12: Normalized Maximum Transient Thermal Impedance for AOT22N50 (Note F)

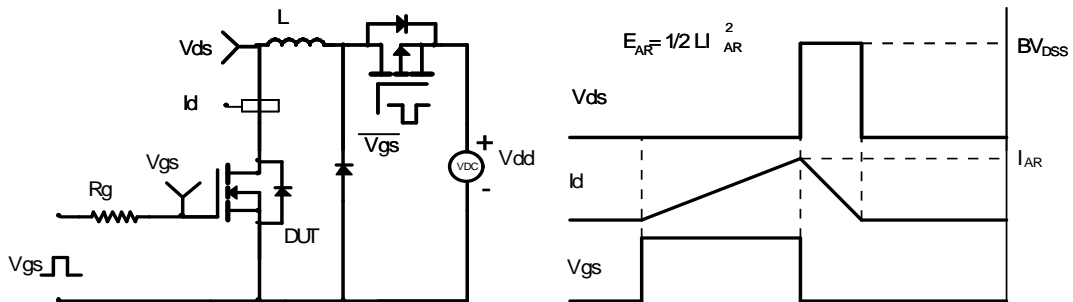Figure 13: Normalized Maximum Transient Thermal Impedance for AOTF22N50 (Note F)

飞思卡尔（深圳）功率半导体有限公司

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \ LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int I dt$$