

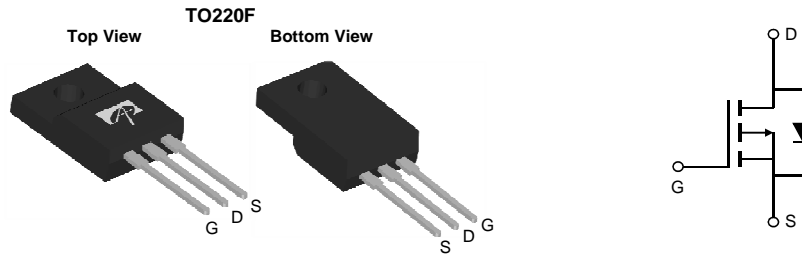
General Description

The AOTF4185 combines advanced trench MOSFET - 40V technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

V_{DS}	-40V
I_D (at $V_{GS}=-10V$)	-34A
$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 16m Ω
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 20m Ω

100% UIS Tested
 100% R_g Tested



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	-34
		$T_C=100^\circ\text{C}$	-27
Pulsed Drain Current ^C	I_{DM}	-100	A
Avalanche Current ^C	I_{AS}, I_{AR}	-42	A
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}, E_{AR}	88	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	33
		$T_C=100^\circ\text{C}$	16
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^{AD}	$R_{\theta JA}$	10	13	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case	$R_{\theta JC}$	3	4.5	$^\circ\text{C}/\text{W}$

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	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-40V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	-1.7	-1.85	-2.5	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-120			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-20A T _J =125°C		13 19	16 23	mΩ
		V _{GS} =-4.5V, I _D =-15A		16	20	
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-20A		50		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.72	-1	V
I _S	Maximum Body-Diode Continuous Current				-20	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, f=1MHz		2550		pF
C _{oss}	Output Capacitance			280		pF
C _{riss}	Reverse Transfer Capacitance			190		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	2.5	4	6	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =-10V, V _{DS} =-20V, I _D =-20A		42	55	nC
Q _{g(4.5V)}	Total Gate Charge			18.6		nC
Q _{gs}	Gate Source Charge			7		nC
Q _{gd}	Gate Drain Charge			8.6		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-20V, R _L =1.0Ω, R _{GEN} =3Ω		9.4		ns
t _r	Turn-On Rise Time			20		ns
t _{D(off)}	Turn-Off DelayTime			55		ns
t _f	Turn-Off Fall Time			30		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-20A, di/dt=500A/μs		25	33	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-20A, di/dt=500A/μs		75		nC

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)}=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_{J(MAX)}=175° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs 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)}=175° C.

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

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

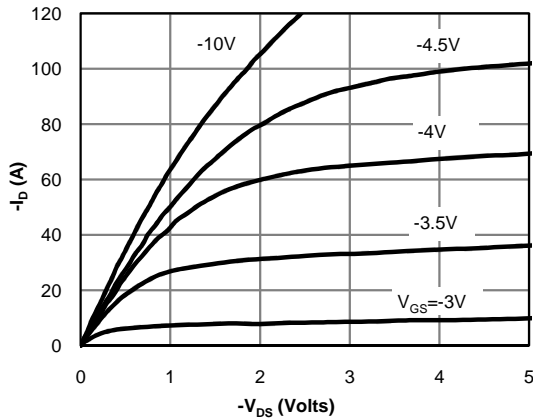


Figure 1: On-Region Characteristics (Note E)

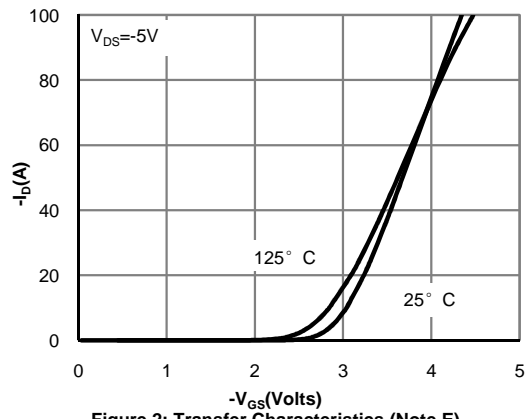


Figure 2: Transfer Characteristics (Note E)

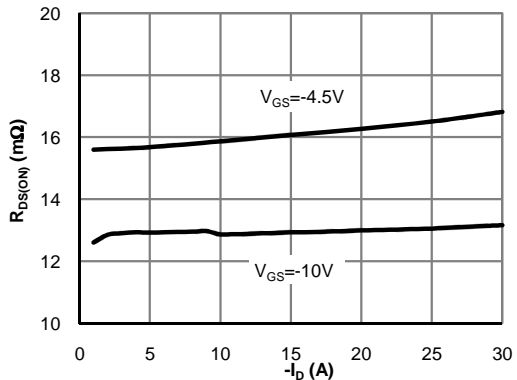


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

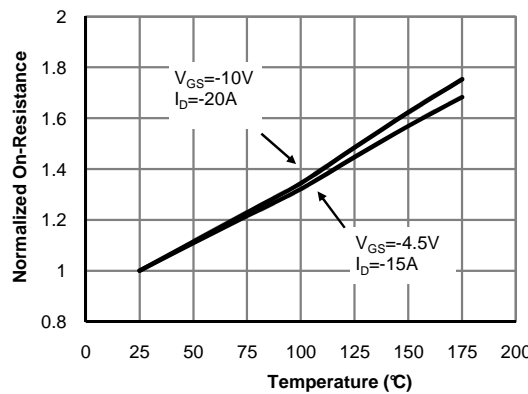


Figure 4: On-Resistance vs. Junction Temperature (Note E)

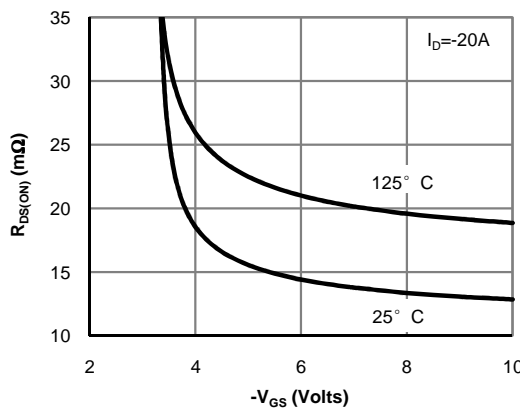


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

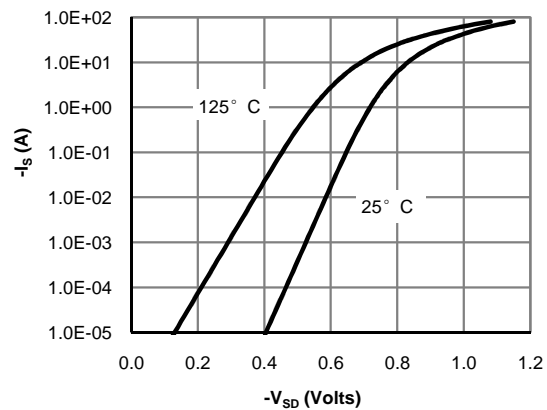


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

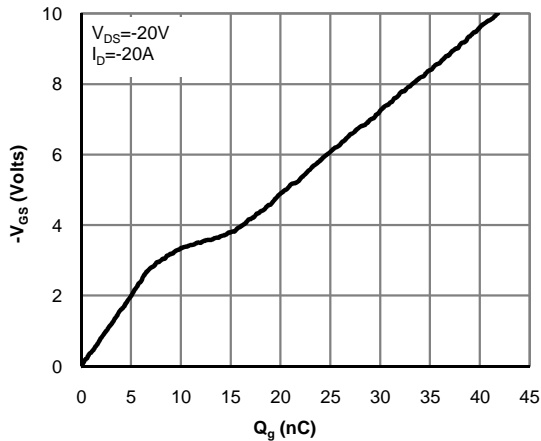


Figure 7: Gate-Charge Characteristics

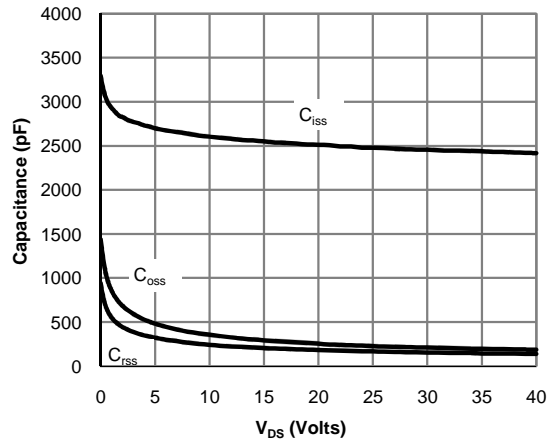


Figure 8: Capacitance Characteristics

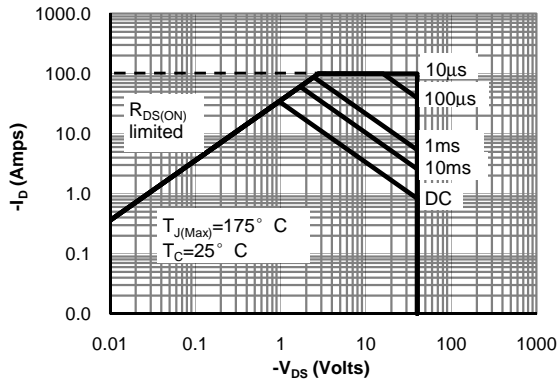


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

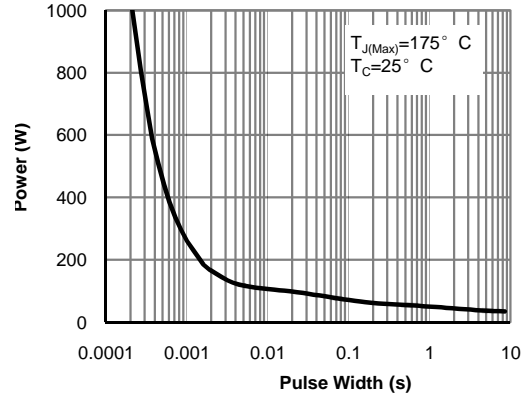


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

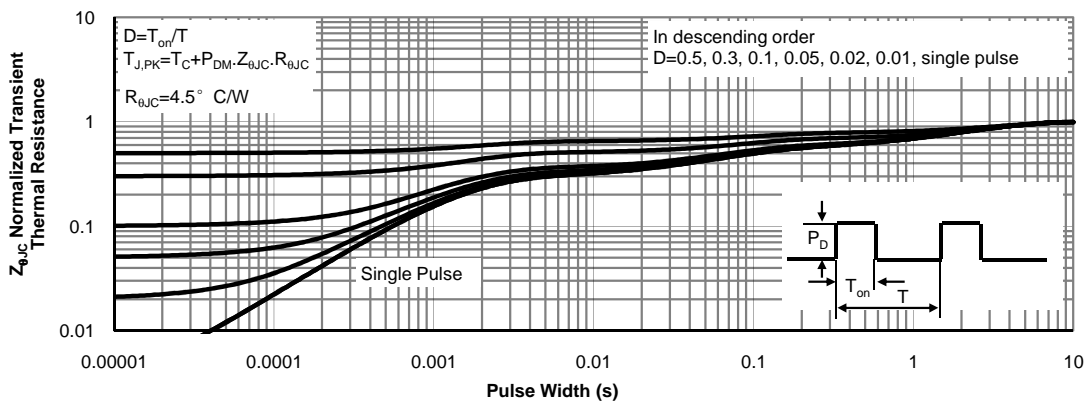


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

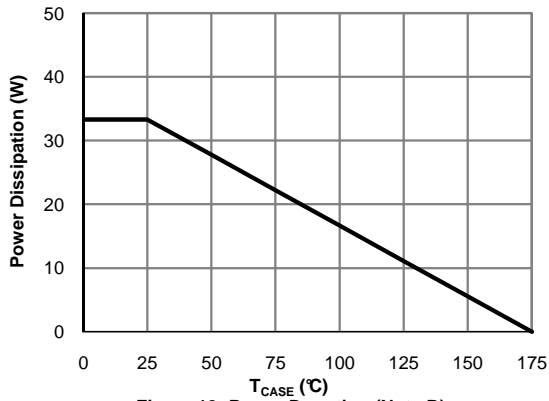


Figure 12: Power De-rating (Note B)

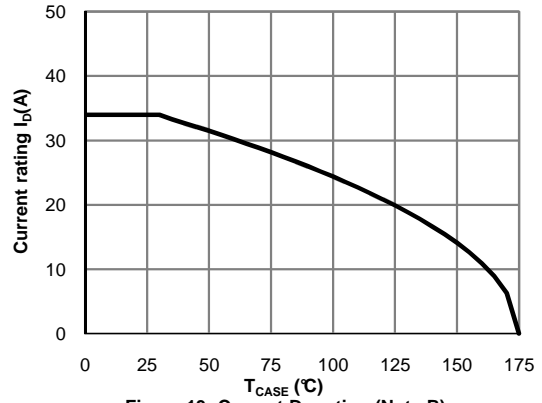


Figure 13: Current De-rating (Note B)

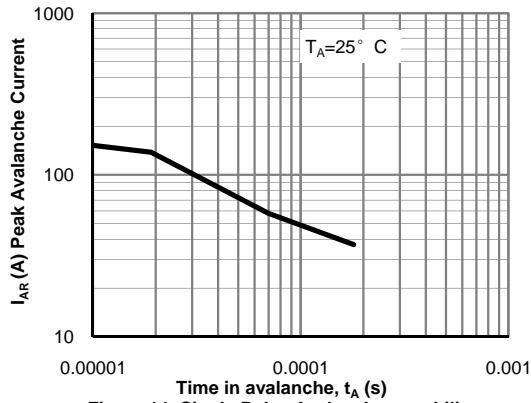
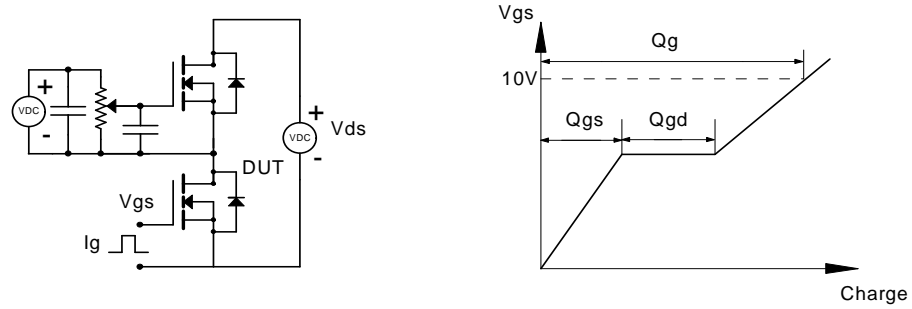
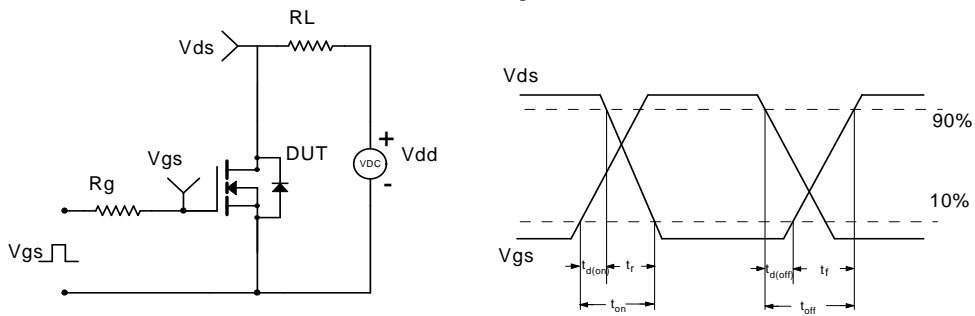


Figure 14: Single Pulse Avalanche capability

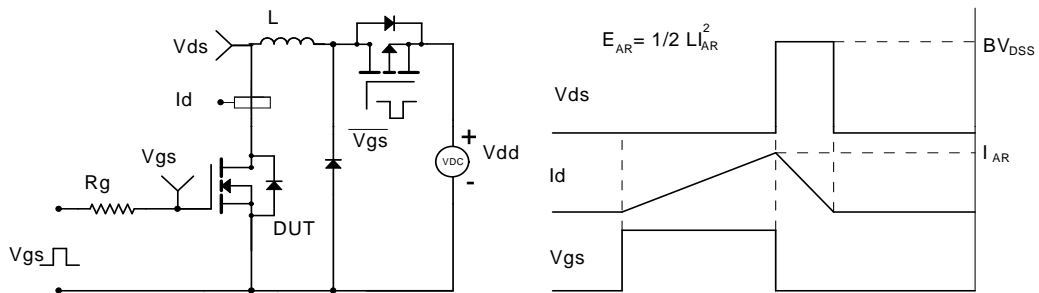
Gate Charge Test Circuit & Waveform



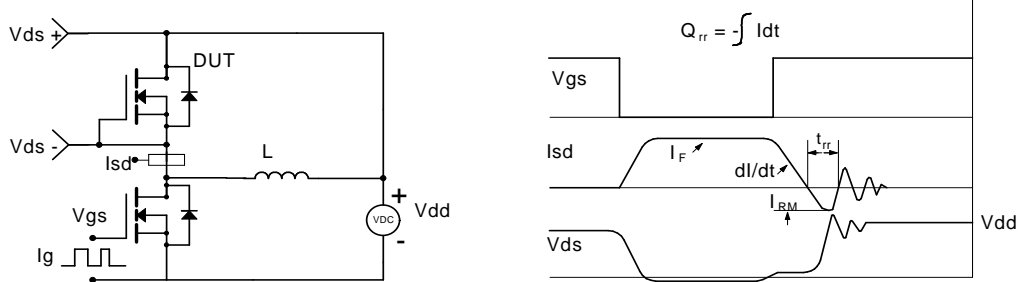
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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