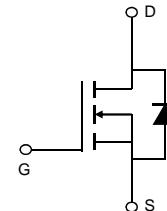


## General Description

The AOT240L & AOB240L & AOTF240L uses Trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Power losses are minimized due to an extremely low combination of  $R_{DS(ON)}$  and  $C_{SS}$ .

## Features

$V_{DS}$	40V
$I_D$ (at $V_{GS}=10V$ )	105A/85A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 2.9mΩ (< 2.6mΩ*)
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	< 3.7mΩ (< 3.5mΩ*)



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

Parameter	Symbol	AOT240L/AOB240L	AOTF240L	Units
Drain-Source Voltage	$V_{DS}$	40		V
Gate-Source Voltage	$V_{GS}$	$\pm 20$		V
Continuous Drain Current <sup>G</sup>	$I_D$	105	85	A
$T_C=100^\circ\text{C}$		82	60	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	400		
Continuous Drain Current	$I_{DSM}$	20		A
$T_A=70^\circ\text{C}$		16		
Avalanche Current <sup>C</sup>	$I_{AS}$	68		A
Avalanche energy L=0.1mH <sup>C</sup>	$E_{AS}$	231		mJ
Power Dissipation <sup>B</sup>	$P_D$	176	41	W
$T_C=100^\circ\text{C}$		88	20	
Power Dissipation <sup>A</sup>	$P_{DSM}$	1.9		W
$T_A=70^\circ\text{C}$		1.2		
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175		°C

**Thermal Characteristics**

Parameter	Symbol	AOT240L/AOB240L	AOTF240L	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10\text{s}$	15	15	°C/W
Maximum Junction-to-Ambient <sup>A D</sup>	Steady-State	65	65	°C/W
Maximum Junction-to-Case	Steady-State	0.85	3.6	°C/W

\* Surface mount package TO263

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	40			V
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{DS}=40\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{\text{GSS}}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1	1.7	2.2	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=10\text{V}, V_{DS}=5\text{V}$	400			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=20\text{A}$		2.4	2.9	$\text{m}\Omega$
		TO220/TO220F $T_J=125^\circ\text{C}$		3.7	4.7	
		$V_{GS}=4.5\text{V}, I_D=20\text{A}$ TO220/TO220F		3	3.7	$\text{m}\Omega$
		$V_{GS}=10\text{V}, I_D=20\text{A}$ TO263		2.1	2.6	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=20\text{A}$ TO263		2.7	3.5	$\text{m}\Omega$
$g_{\text{FS}}$	Forward Transconductance	$V_{DS}=5\text{V}, I_D=20\text{A}$	78			S
$V_{\text{SD}}$	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.65	1	V
$I_S$	Maximum Body-Diode Continuous Current <sup>G</sup>				105	A
<b>DYNAMIC PARAMETERS</b>						
$C_{\text{iss}}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=20\text{V}, f=1\text{MHz}$		3510		pF
$C_{\text{oss}}$	Output Capacitance			1070		pF
$C_{\text{rss}}$	Reverse Transfer Capacitance			68		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	0.5	1	1.5	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=20\text{V}, I_D=20\text{A}$		49	72	nC
$Q_g(4.5\text{V})$	Total Gate Charge			22	32	nC
$Q_{\text{gs}}$	Gate Source Charge			9		nC
$Q_{\text{gd}}$	Gate Drain Charge			7		nC
$t_{\text{D(on)}}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=20\text{V}, R_L=1\Omega, R_{\text{GEN}}=3\Omega$		11		ns
$t_r$	Turn-On Rise Time			10		ns
$t_{\text{D(off)}}$	Turn-Off DelayTime			38		ns
$t_f$	Turn-Off Fall Time			11		ns
$t_{\text{rr}}$	Body Diode Reverse Recovery Time	$I_F=20\text{A}, dI/dt=500\text{A}/\mu\text{s}$		21		ns
$Q_{\text{rr}}$	Body Diode Reverse Recovery Charge	$I_F=20\text{A}, dI/dt=500\text{A}/\mu\text{s}$		58		nC

A. The value of  $R_{\text{WA}}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation  $P_{\text{DSM}}$  is based on  $R_{\text{WA}}$  and the maximum allowed junction temperature of  $150^\circ\text{C}$ . The value in any given application depends on the user's specific board design, and the maximum temperature of  $175^\circ\text{C}$  may be used if the PCB allows it.

B. The power dissipation  $P_D$  is based on  $T_{J(\text{MAX})}=175^\circ\text{C}$ , 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  $T_{J(\text{MAX})}=175^\circ\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^\circ\text{C}$ .

D. The  $R_{\text{WA}}$  is the sum of the thermal impedance from junction to case  $R_{\text{JC}}$  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  $T_{J(\text{MAX})}=175^\circ\text{C}$ . The SOA curve provides a single pulse rating.

G. The maximum current limited by package.

H. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .

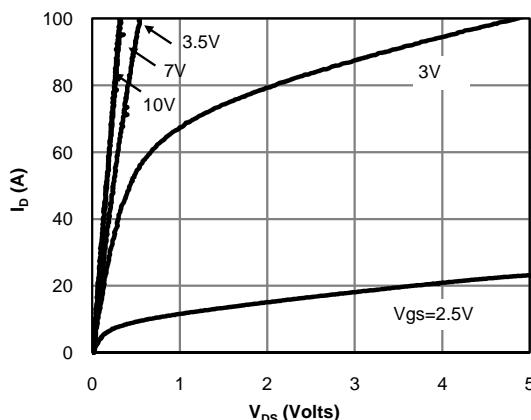
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**


Fig 1: On-Region Characteristics (Note E)

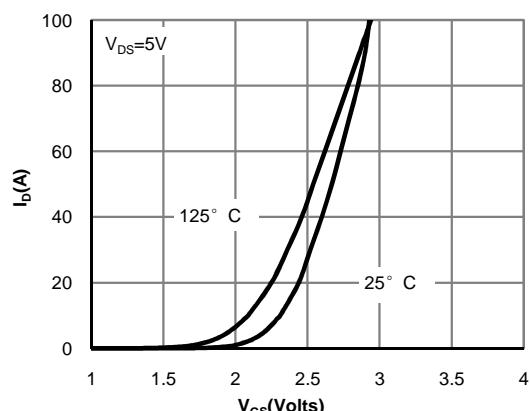


Figure 2: Transfer Characteristics (Note E)

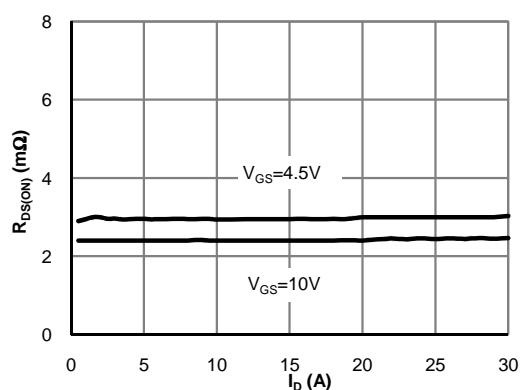


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

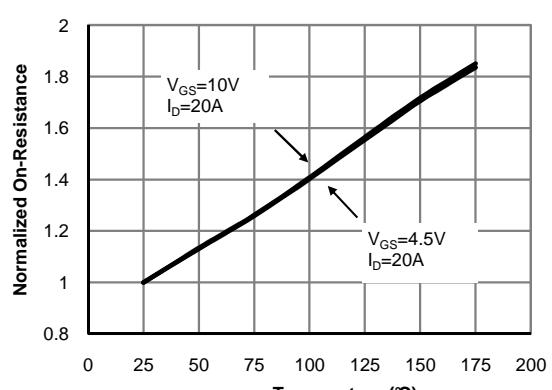


Figure 4: On-Resistance vs. Junction Temperature (Note E)

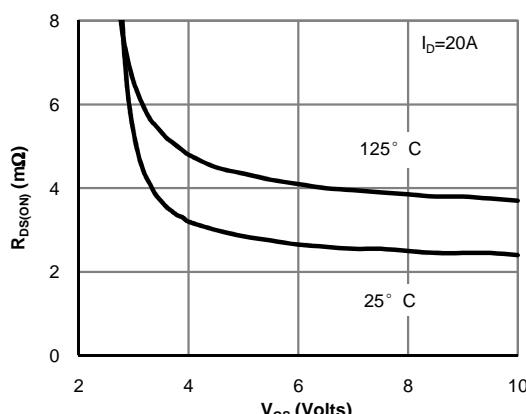


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

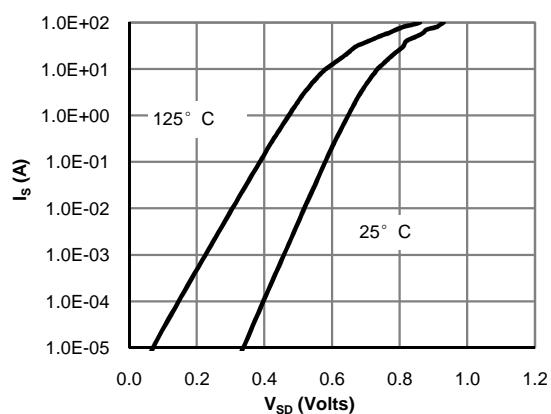
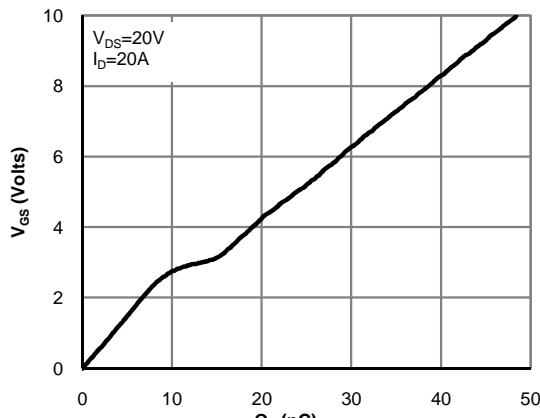
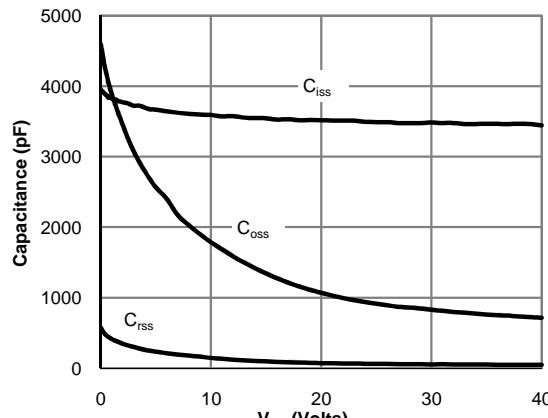
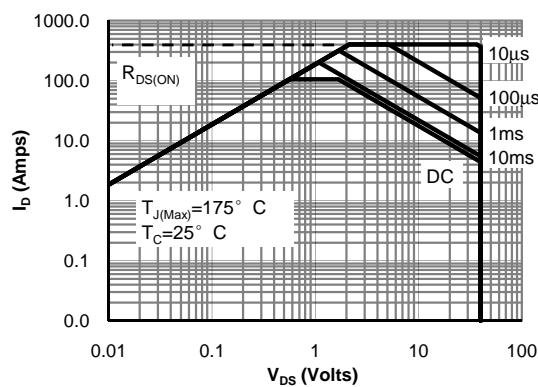
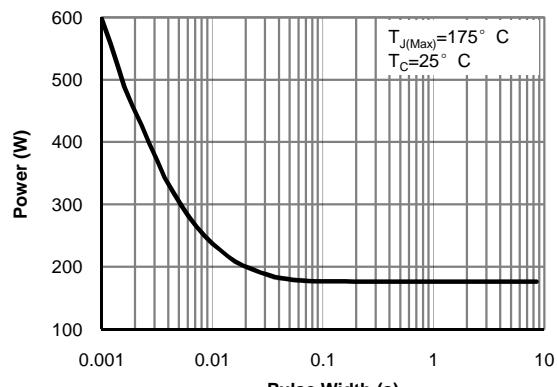
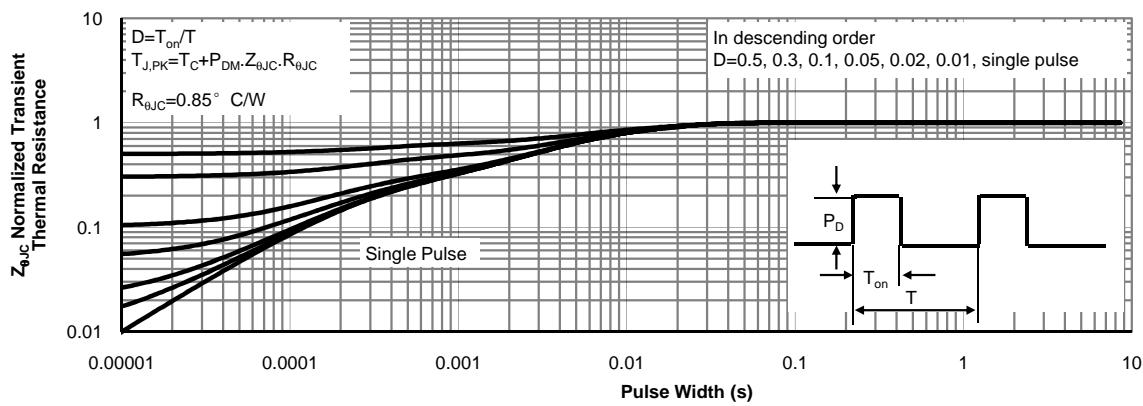


Figure 6: Body-Diode Characteristics (Note E)

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Figure 7: Gate-Charge Characteristics**

**Figure 8: Capacitance Characteristics**

**Figure 9: Maximum Forward Biased Safe Operating Area for AOT240L and AOB240L (Note F)**

**Figure 10: Single Pulse Power Rating Junction-to-Case for AOT240L and AOB240L (Note F)**

**Figure 11: Normalized Maximum Transient Thermal Impedance for AOT240L and AOB240L (Note F)**



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飞思卡尔(深圳)功率半导体有限公司

AOT240L/AOB240L/AOTF240L

40V N-Channel MOSFET

#### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

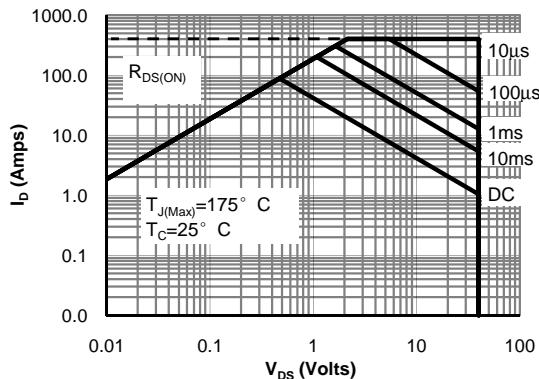


Figure 12: Maximum Forward Biased Safe Operating Area for AOTF240L

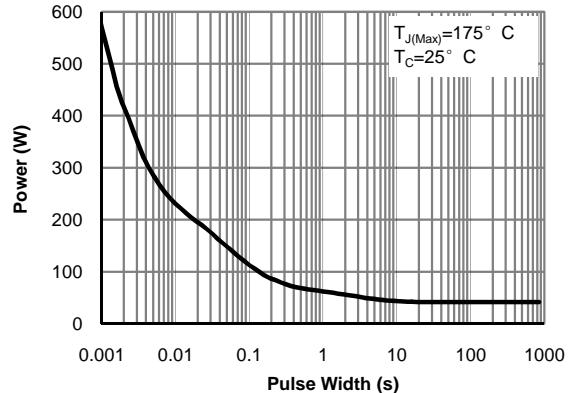


Figure 13: Single Pulse Power Rating Junction-to-Case for AOTF240L (Note F)

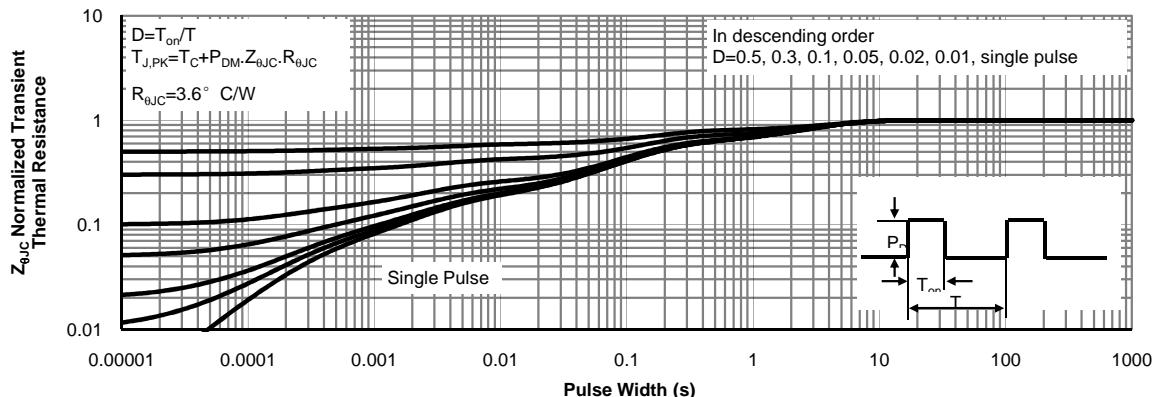
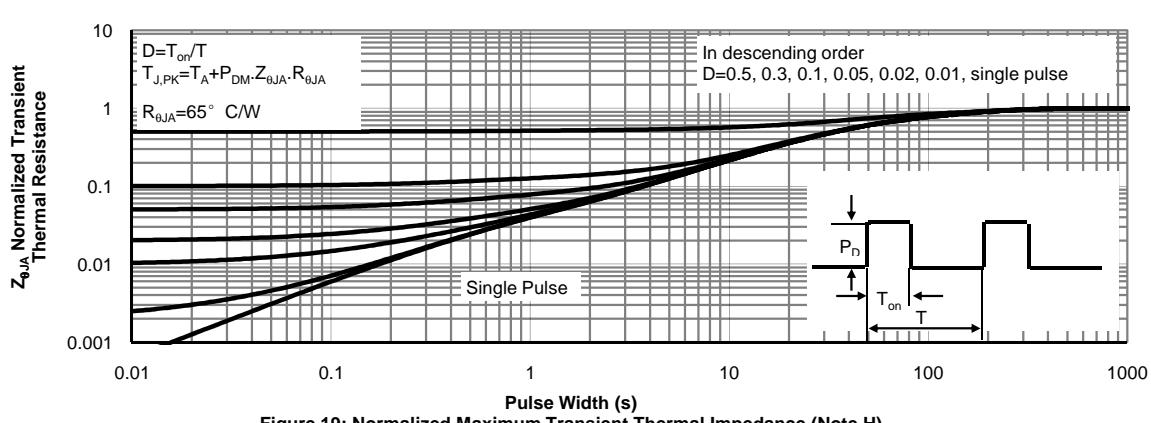
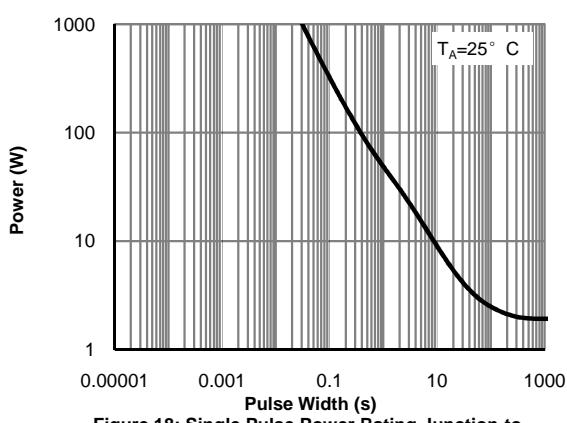
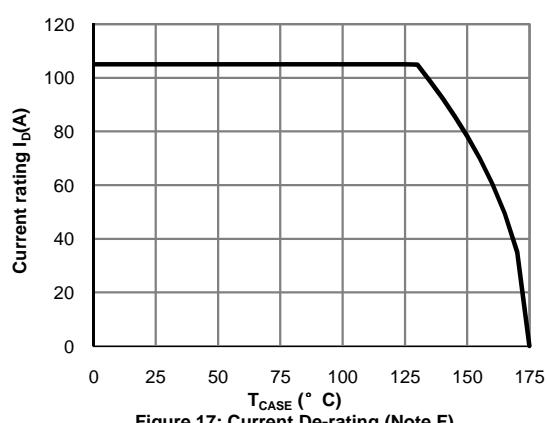
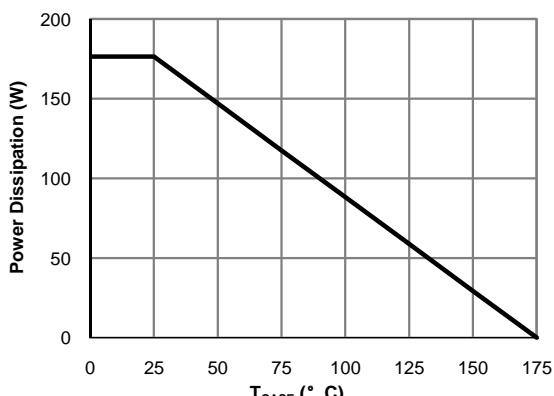
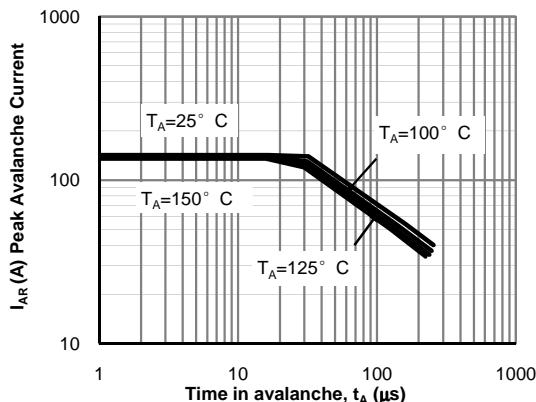
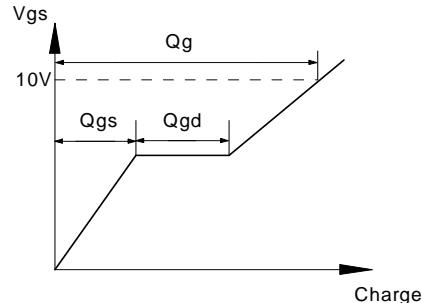
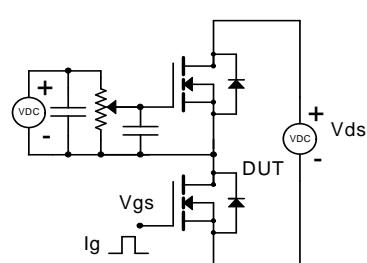


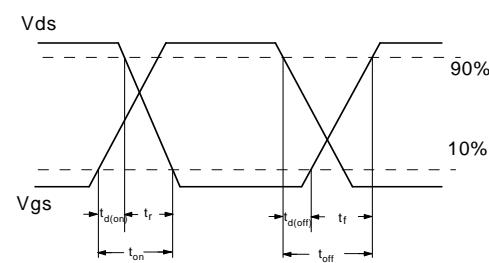
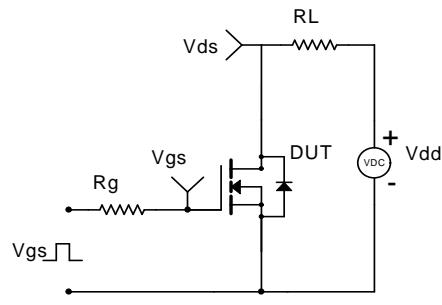
Figure 14: Normalized Maximum Transient Thermal Impedance for AOTF240L (Note F)

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**


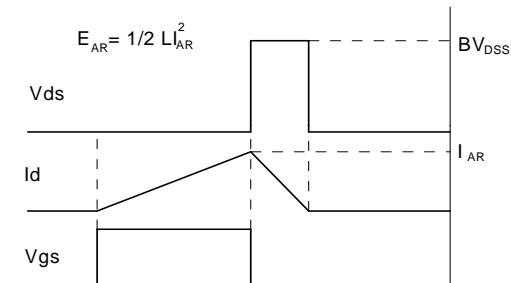
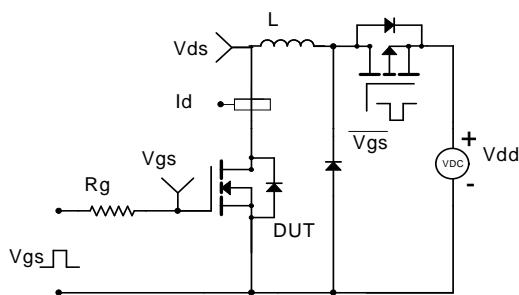
Gate Charge Test Circuit &amp; Waveform



Resistive Switching Test Circuit &amp; Waveforms



Unclamped Inductive Switching (UIS) Test Circuit &amp; Waveforms



Diode Recovery Test Circuit &amp; Waveforms

