

General Description

- Trench Power AlphaSGT™ technology
- Low $R_{DS(ON)}$
- RoHS and Halogen Free Compliant

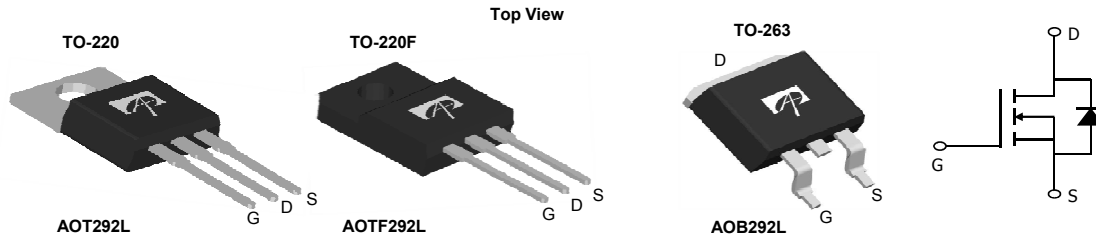
Applications

- Synchronous Rectification for power supply
- Ideal for boost converters

Product Summary

V_{DS}	100V
I_D (at $V_{GS}=10V$)	105A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 4.5mΩ (< 4.1mΩ*)
$R_{DS(ON)}$ (at $V_{GS}=6V$)	< 5.3mΩ (< 4.9mΩ*)

100% UIS Tested
 100% Rg Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOT292L	TO-220	Tube	1000
AOTF292L	TO-220F	Tube	1000
AOB292L	TO-263	Tape & Reel	800

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

Parameter	Symbol	AOT(B)292L	AOTF292L	Units
Drain-Source Voltage	V_{DS}	100		V
Gate-Source Voltage	V_{GS}	±20		V
Continuous Drain Current I_D^{G**}	$T_C=25^\circ\text{C}$	105	70	A
	$T_C=100^\circ\text{C}$	82	50	
Pulsed Drain Current I_{DM}^C		420		A
Continuous Drain Current I_{DSM}	$T_A=25^\circ\text{C}$	14.5		A
	$T_A=70^\circ\text{C}$	11.5		
Avalanche Current I_{AS}^C		60		A
Avalanche energy E_{AS}^C	$L=0.1\text{mH}$	180		mJ
V_{DS} Spike	10µs	120		V
Power Dissipation P_D^B	$T_C=25^\circ\text{C}$	300	47	W
	$T_C=100^\circ\text{C}$	150	23	
Power Dissipation P_{DSM}^A	$T_A=25^\circ\text{C}$	2.1		W
	$T_A=70^\circ\text{C}$	1.3		
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175		$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	AOT(B)292L	AOTF292L	Units
Maximum Junction-to-Ambient $R_{\theta JA}^A$	$t \leq 10\text{s}$	15		$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient $R_{\theta JA}^{AD}$	Steady-State	60		$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case	Steady-State	0.5	3.2	$^\circ\text{C}/\text{W}$

* Surface mount package TO263

** Package limited for TO220 & TO263

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	100			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =100V, V _{GS} =0V T _J =55°C			1	μA
					5	
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	2.3	2.8	3.4	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A TO220/TO220F T _J =125°C		3.7	4.5	mΩ
				6.1	7.4	
		V _{GS} =6V, I _D =20A TO220/TO220F		4.2	5.3	mΩ
			V _{GS} =10V, I _D =20A TO263		3.3	4.1
V _{GS} =6V, I _D =20A TO263				3.8	4.9	mΩ
	g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		90	
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.68	1	V
I _S	Maximum Body-Diode Continuous Current (TO220/TO263) ^G				105	A
	Maximum Body-Diode Continuous Current (TO220F)				50	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =50V, f=1MHz		6775		pF
C _{oss}	Output Capacitance			557		pF
C _{riss}	Reverse Transfer Capacitance			32		pF
R _g	Gate resistance	f=1MHz	0.4	0.8	1.2	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =50V, I _D =20A		90	126	nC
Q _g (4.5V)	Total Gate Charge			40	60	nC
Q _{gs}	Gate Source Charge			24		nC
Q _{gd}	Gate Drain Charge			13.5		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =50V, R _L =2.5Ω, R _{GEN} =3Ω		20		ns
t _r	Turn-On Rise Time			11.5		ns
t _{D(off)}	Turn-Off Delay Time			48		ns
t _f	Turn-Off Fall Time			10		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, di/dt=500A/μs		50		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, di/dt=500A/μs		380		nC

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The Power dissipation P_{DSM} is based on R_{θJA} ≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175° C may be used if the PCB allows it.

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. Single 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. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

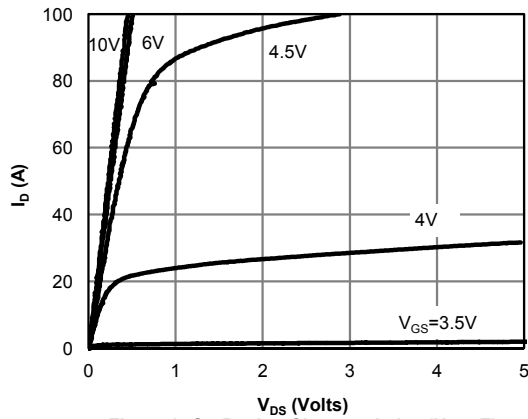


Figure 1: On-Region Characteristics (Note E)

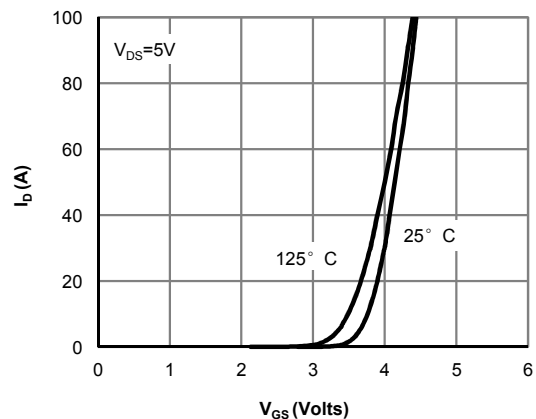


Figure 2: Transfer Characteristics (Note E)

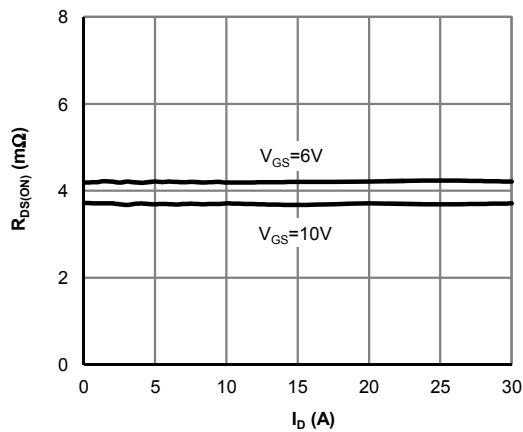


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

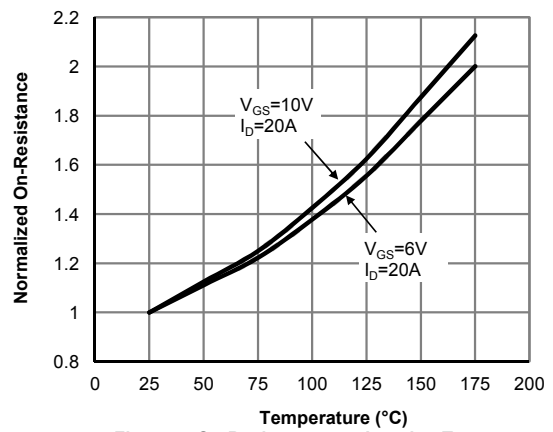


Figure 4: On-Resistance vs. Junction Temperature (Note E)

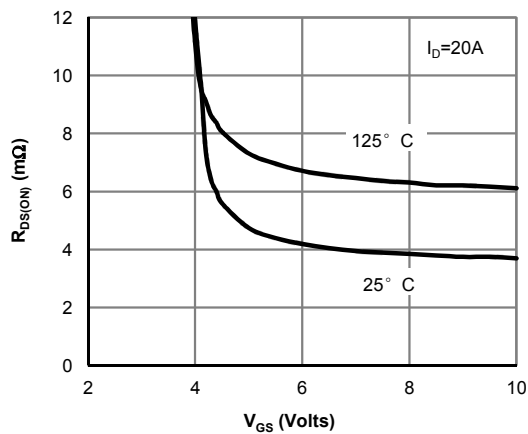


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

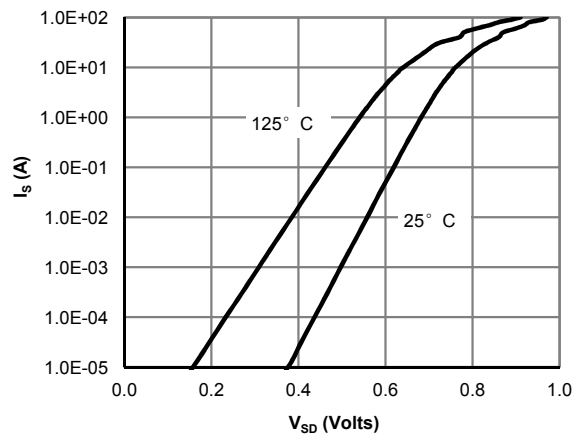


Figure 6: Body-Diode Characteristics (Note E)

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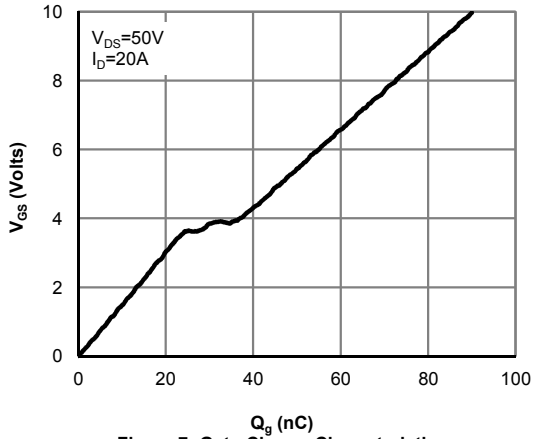


Figure 7: Gate-Charge Characteristics

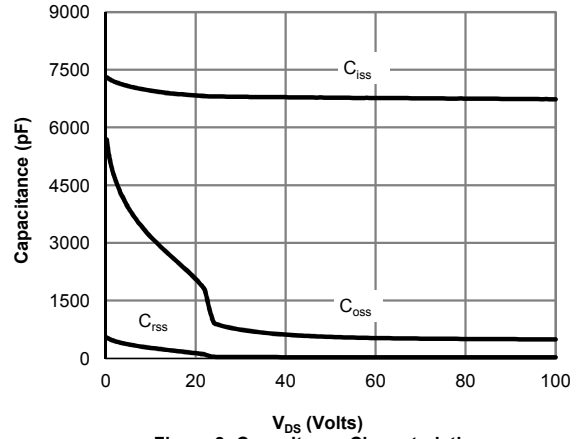


Figure 8: Capacitance Characteristics

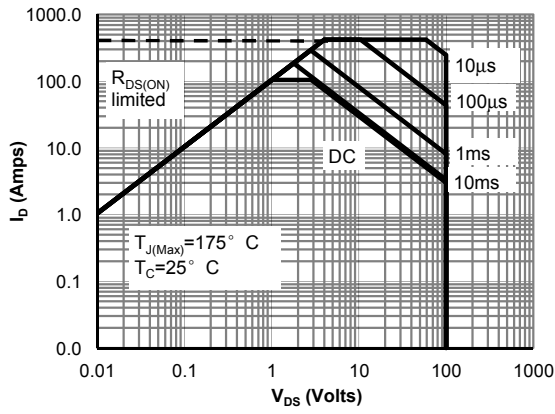


Figure 9A: Maximum Forward Biased Safe Operating Area for TO220 & TO263 (Note F)

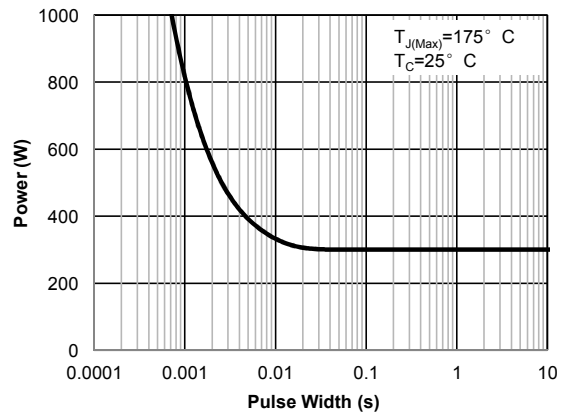


Figure 10A: Single Pulse Power Rating Junction-to-Case for TO220 & TO263 (Note F)

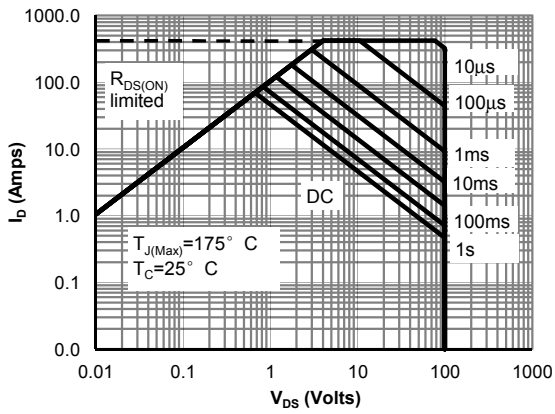


Figure 9B: Maximum Forward Biased Safe Operating Area for TO220F (Note F)

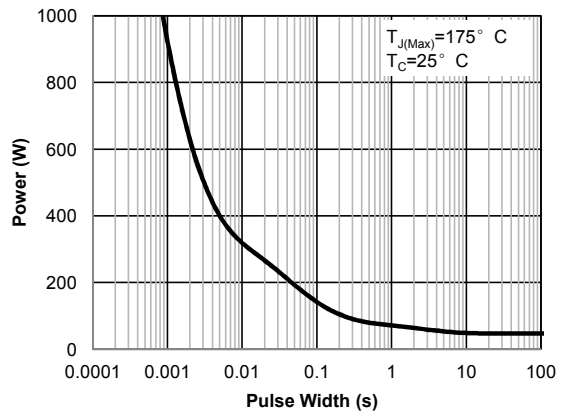


Figure 10B: Single Pulse Power Rating Junction-to-Case for TO220F (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

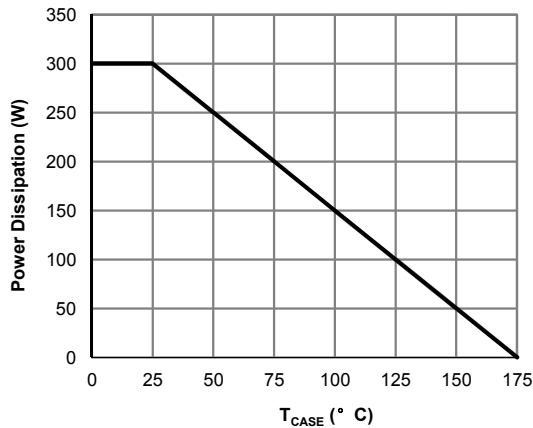


Figure 11A: Power De-rating for TO220 & TO263 (Note F)

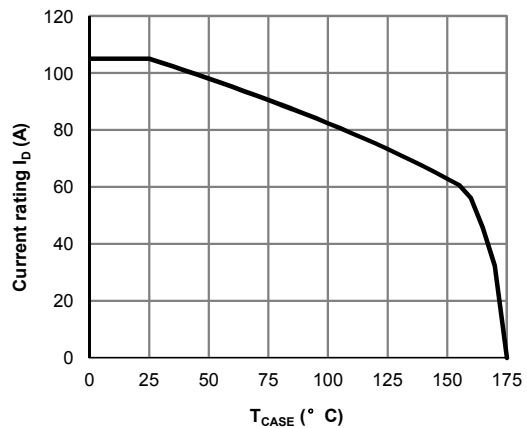


Figure 12A: Current De-rating for TO220 & TO263 (Note F)

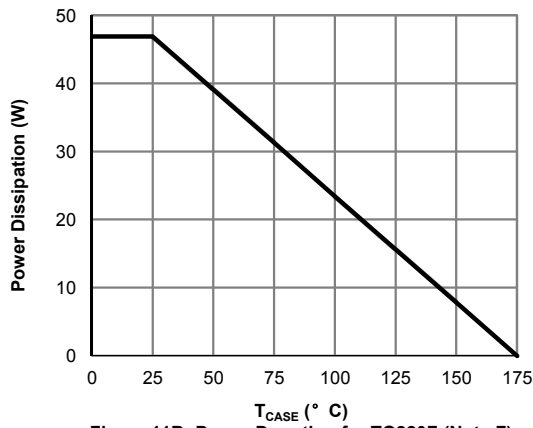


Figure 11B: Power De-rating for TO220F (Note F)

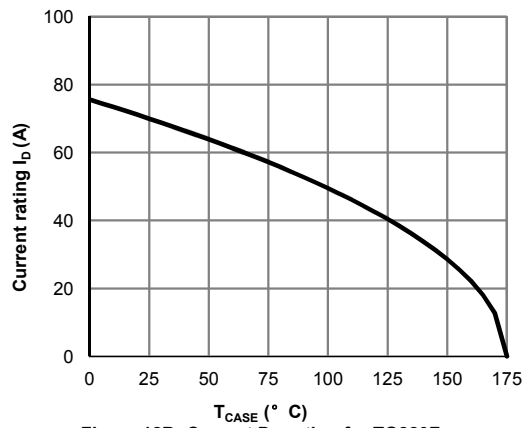


Figure 12B: Current De-rating for TO220F (Note F)

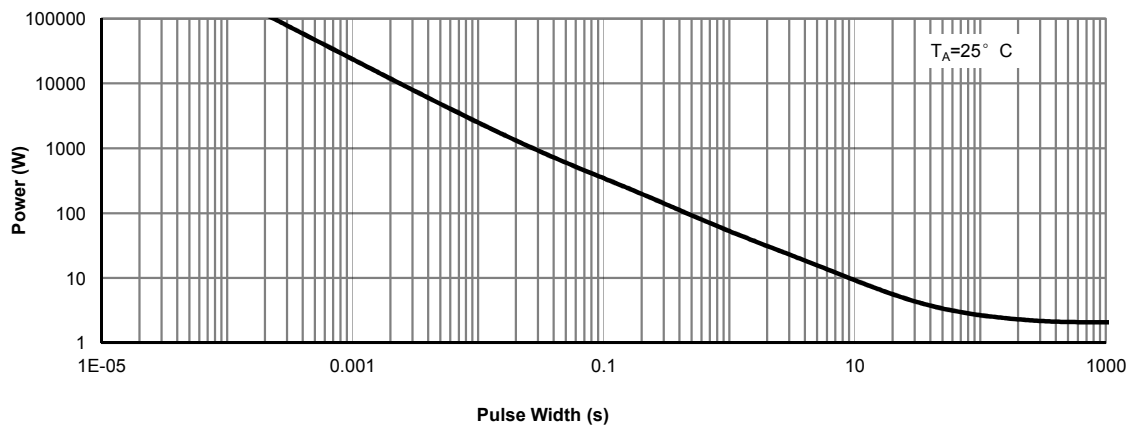


Figure 13: Single Pulse Power Rating Junction-to-Ambient (Note H)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

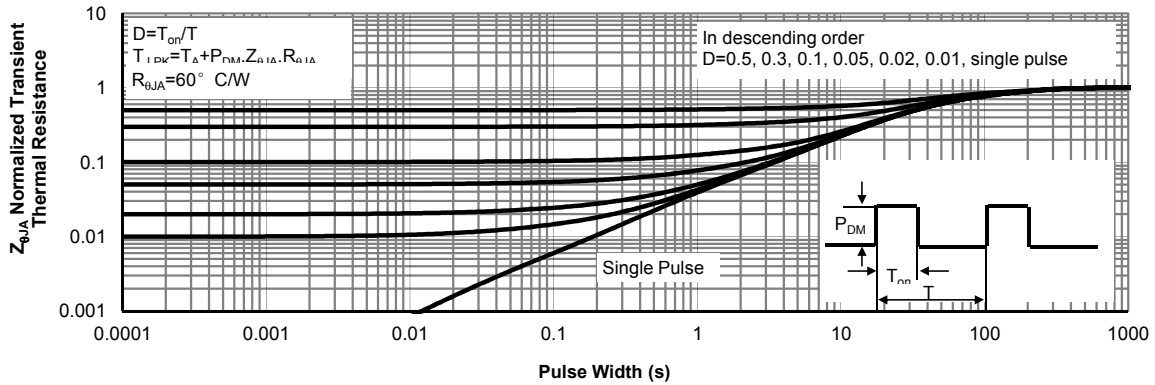


Figure 14: Normalized Maximum Transient Thermal Impedance (Note H)

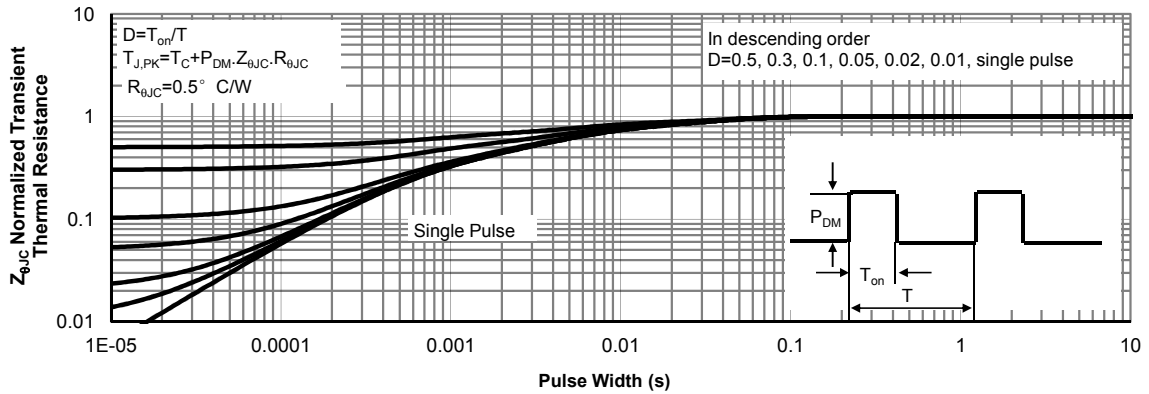


Figure 15A: Normalized Maximum Transient Thermal Impedance for TO220 & TO263 (Note F)

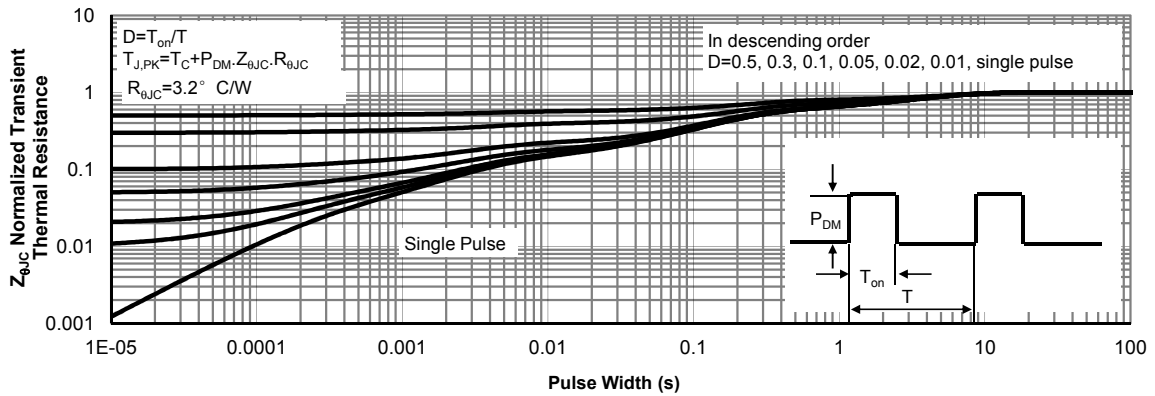


Figure 15B: Normalized Maximum Transient Thermal Impedance for TO220F (Note F)

Figure A: Gate Charge Test Circuit & Waveforms

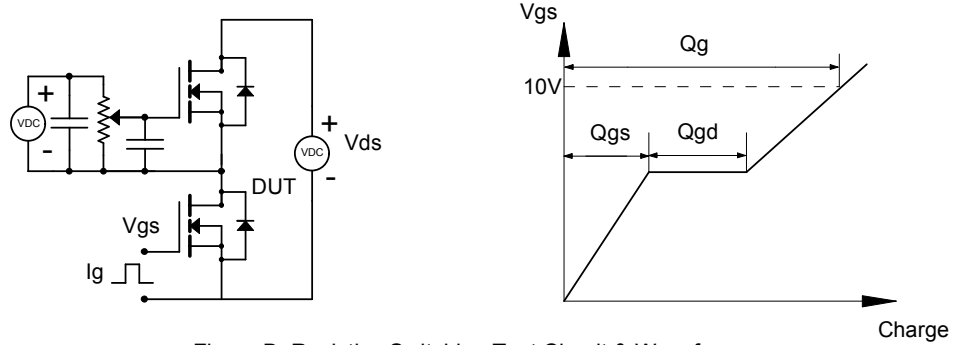


Figure B: Resistive Switching Test Circuit & Waveforms

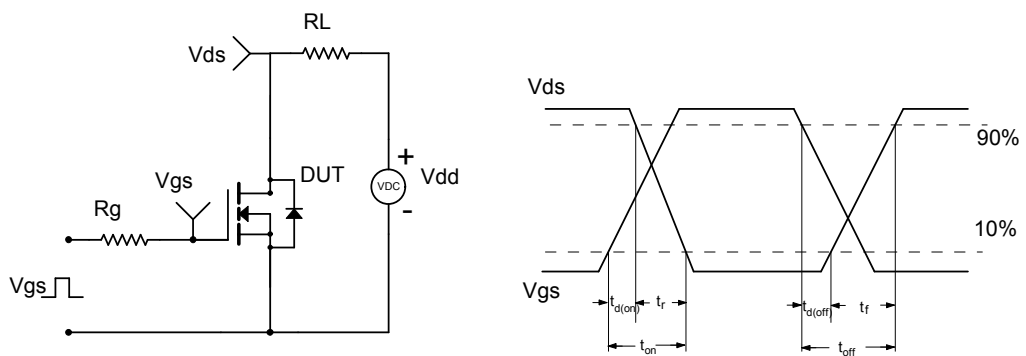


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

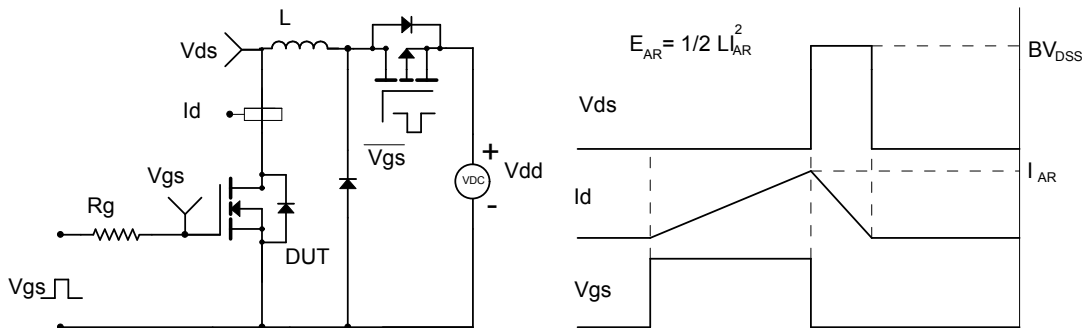
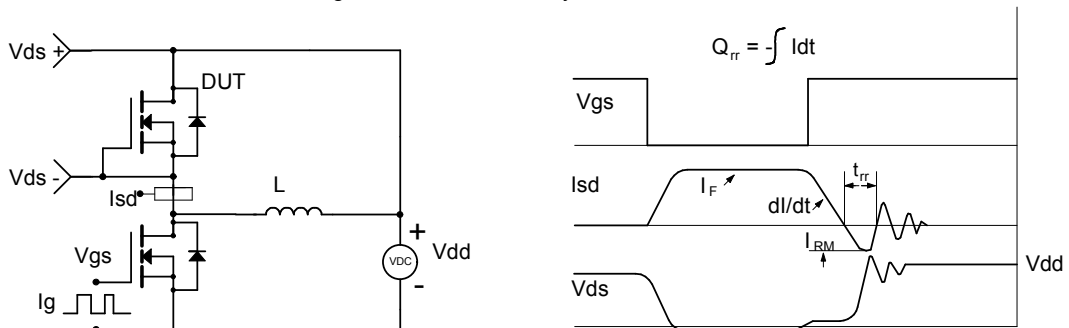


Figure D: Diode Recovery Test Circuit & Waveforms



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