

### General Description

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

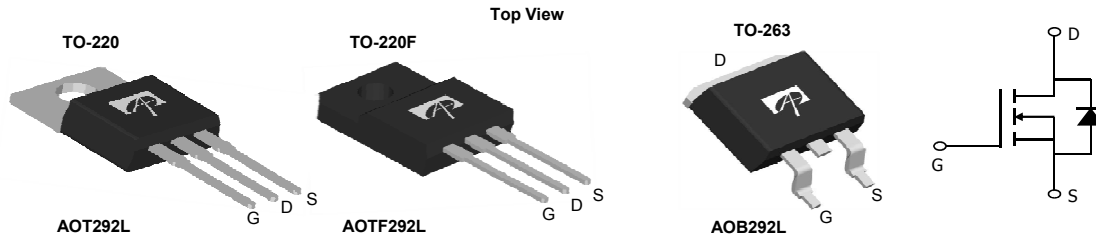
### Applications

- 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 $I_{DM}^C$	$I_{DM}$	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 $I_{AS}^C$	$I_{AS}$	60		A
Avalanche energy $E_{AS}^C$	$L=0.1\text{mH}$	180		mJ
$V_{DS}$ Spike	10μs	$V_{SPIKE}$		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		°C

### Thermal Characteristics

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

\* Surface mount package TO263

\*\* Package limited for TO220 & TO263

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	100			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1	μA
					5	
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.3	2.8	3.4	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A TO220/TO220F T <sub>J</sub> =125°C		3.7	4.5	mΩ
				6.1	7.4	
		V <sub>GS</sub> =6V, I <sub>D</sub> =20A TO220/TO220F		4.2	5.3	mΩ
			V <sub>GS</sub> =10V, I <sub>D</sub> =20A TO263		3.3	4.1
V <sub>GS</sub> =6V, I <sub>D</sub> =20A TO263		3.8		4.9	mΩ	
	g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		90	
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.68	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current (TO220/TO263) <sup>G</sup>				105	A
	Maximum Body-Diode Continuous Current (TO220F)				50	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, f=1MHz		6775		pF
C <sub>oss</sub>	Output Capacitance			557		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			32		pF
R <sub>g</sub>	Gate resistance	f=1MHz	0.4	0.8	1.2	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =20A		90	126	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			40	60	nC
Q <sub>gs</sub>	Gate Source Charge			24		nC
Q <sub>gd</sub>	Gate Drain Charge			13.5		nC
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, R <sub>L</sub> =2.5Ω, R <sub>GEN</sub> =3Ω		20		ns
t <sub>r</sub>	Turn-On Rise Time			11.5		ns
t <sub>D(off)</sub>	Turn-Off Delay Time			48		ns
t <sub>f</sub>	Turn-Off Fall Time			10		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=500A/μs		50		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, di/dt=500A/μs		380		nC

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> ≤ 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<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=175° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

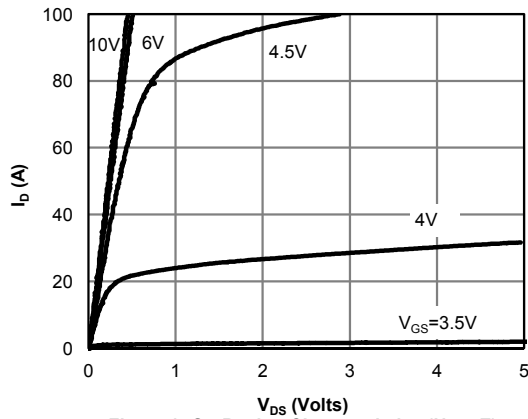
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=175° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

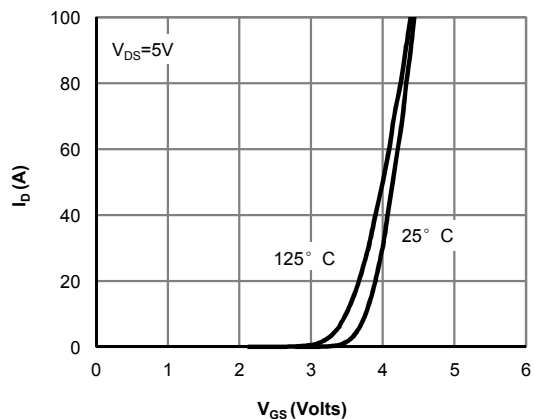
H. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C.

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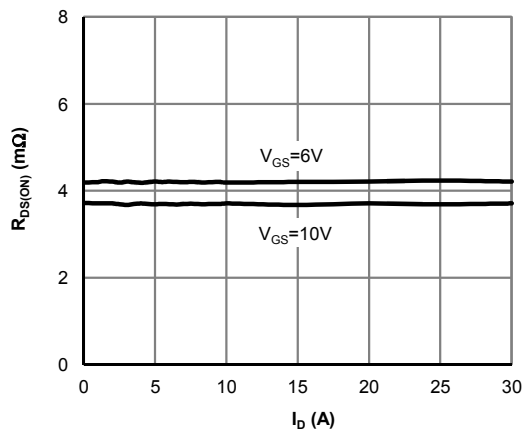
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



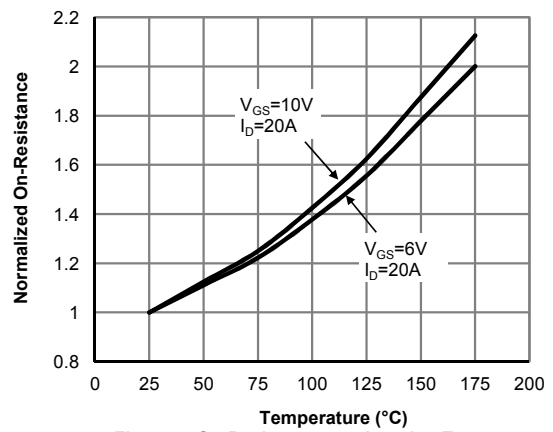
**Figure 1: On-Region Characteristics (Note E)**



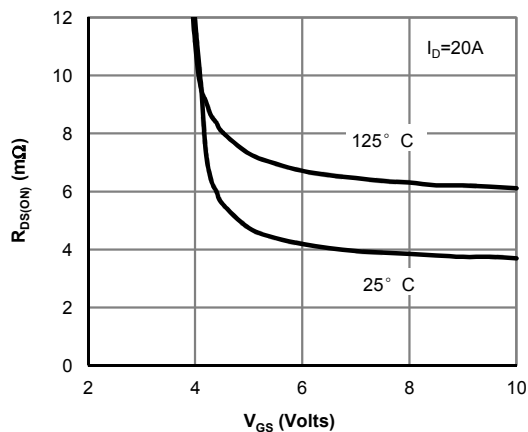
**Figure 2: Transfer Characteristics (Note E)**



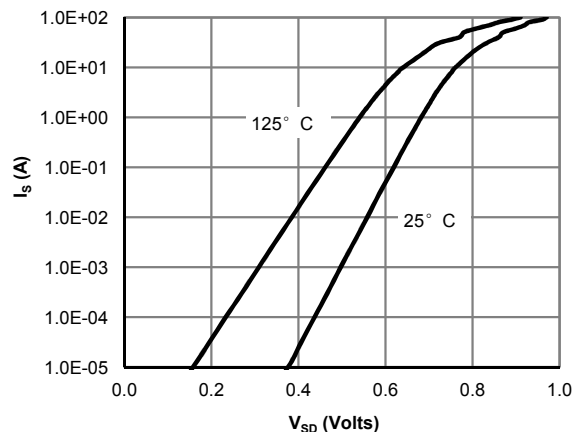
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



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

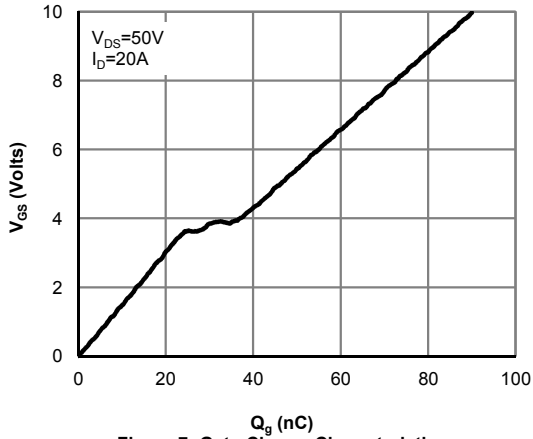


**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

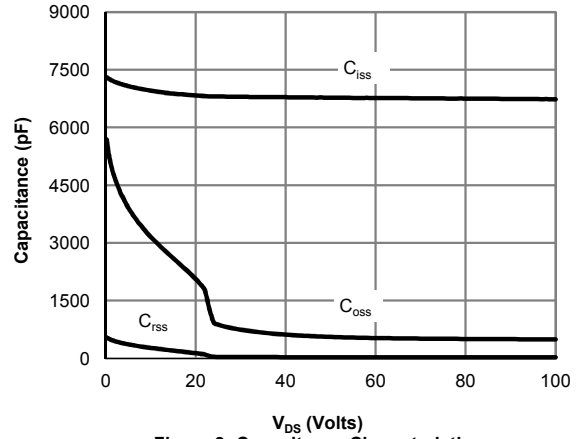


**Figure 6: Body-Diode Characteristics (Note E)**

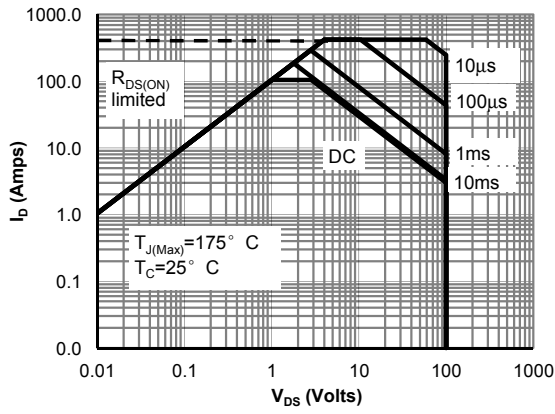
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



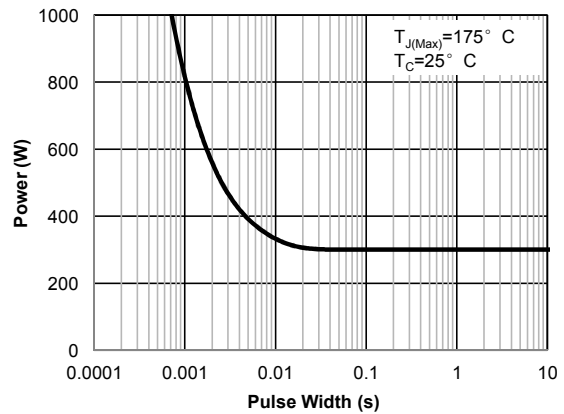
**Figure 7: Gate-Charge Characteristics**



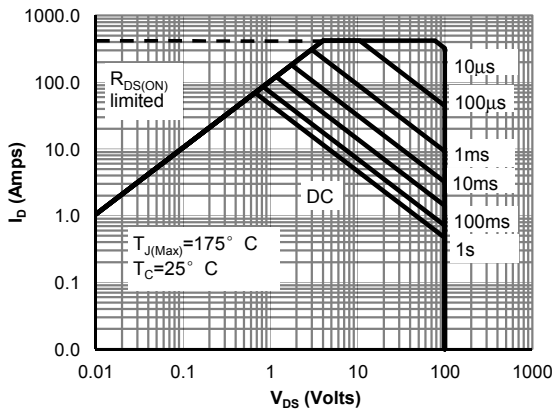
**Figure 8: Capacitance Characteristics**



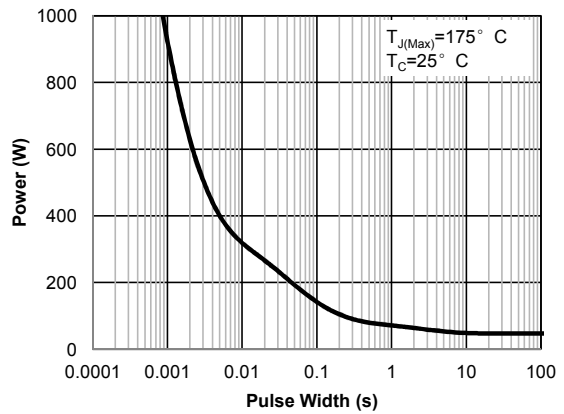
**Figure 9A: Maximum Forward Biased Safe Operating Area for TO220 & TO263 (Note F)**



**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**

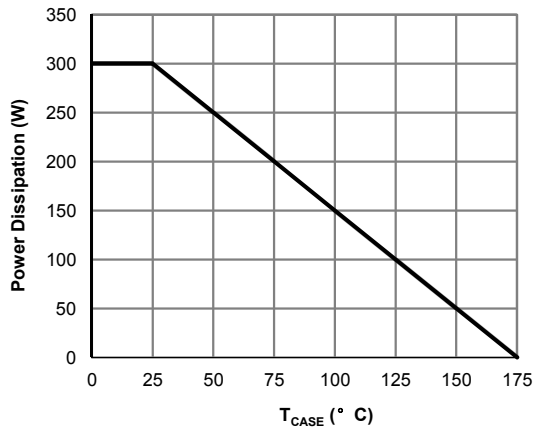


Figure 11A: Power De-rating for TO220 & TO263 (Note F)

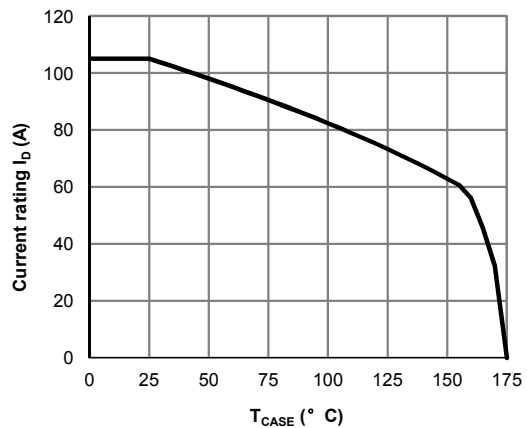


Figure 12A: Current De-rating for TO220 & TO263 (Note F)

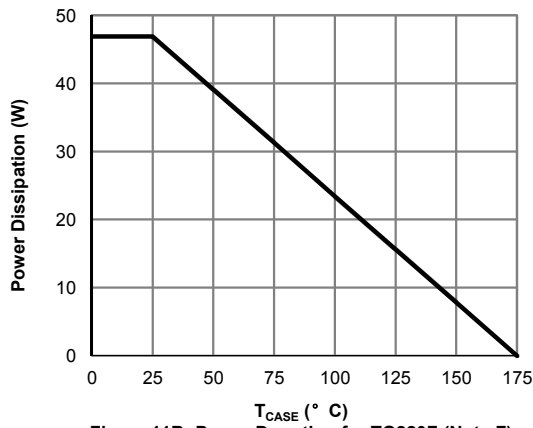


Figure 11B: Power De-rating for TO220F (Note F)

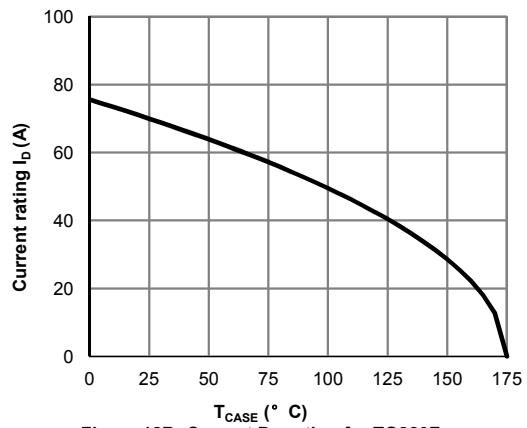


Figure 12B: Current De-rating for TO220F (Note F)

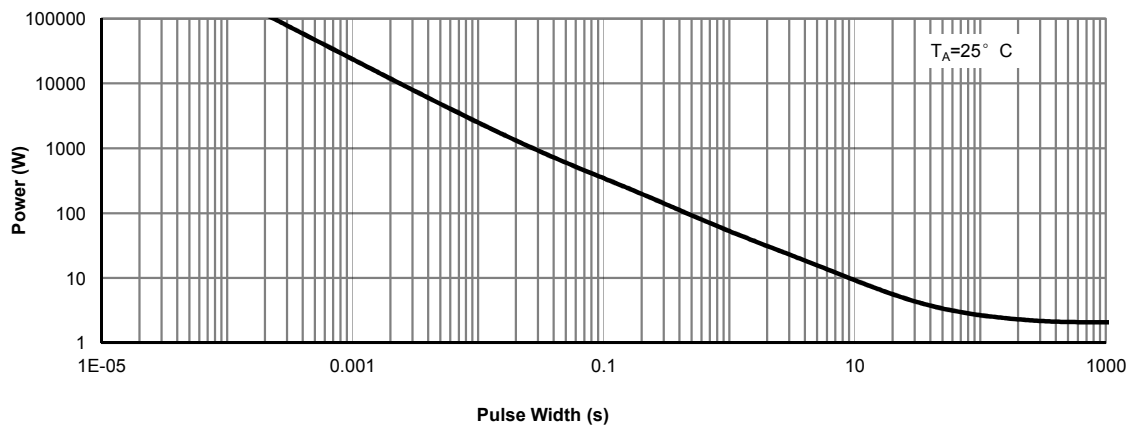
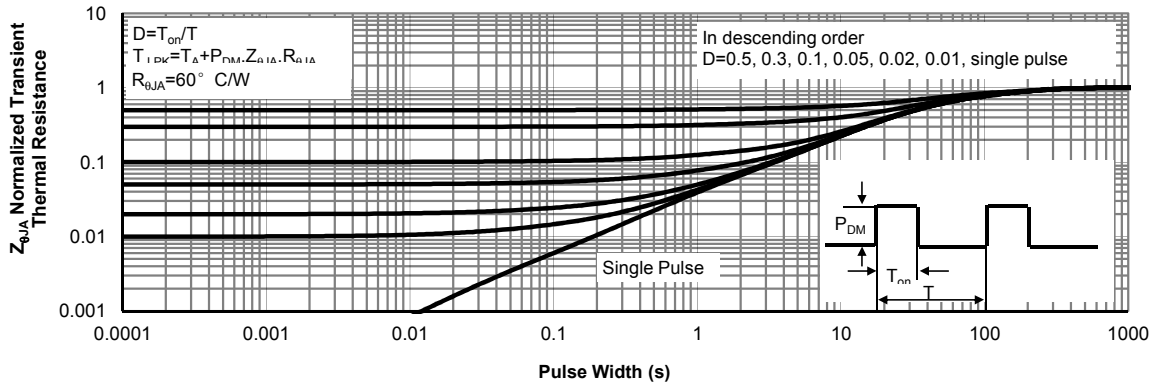
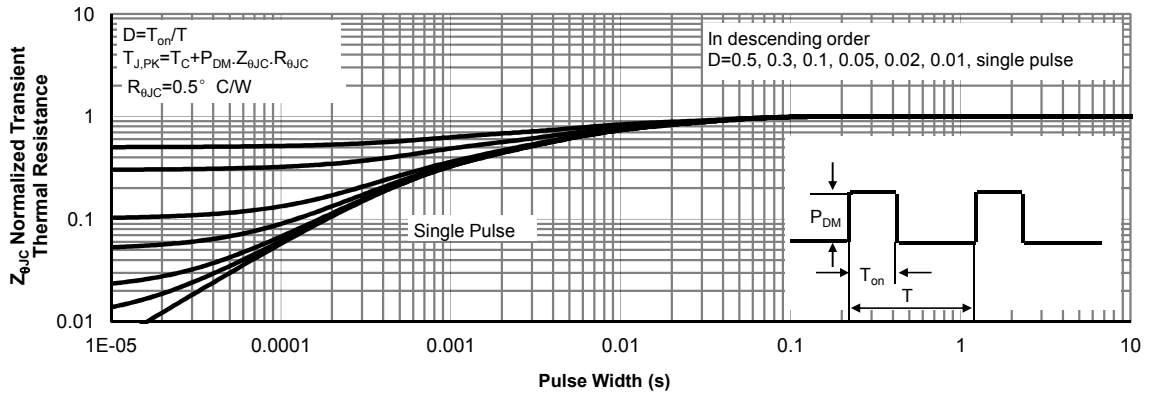


Figure 13: Single Pulse Power Rating Junction-to-Ambient (Note H)

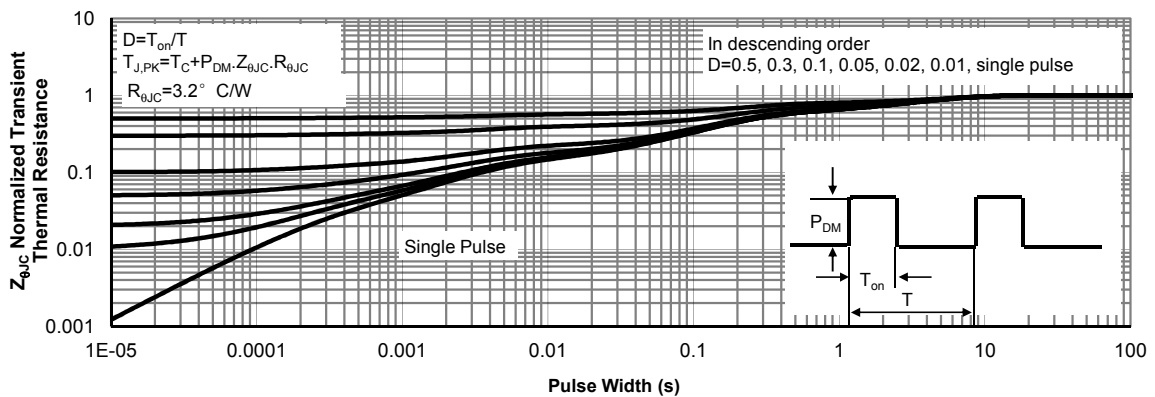
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**Figure 14: Normalized Maximum Transient Thermal Impedance (Note H)**



**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

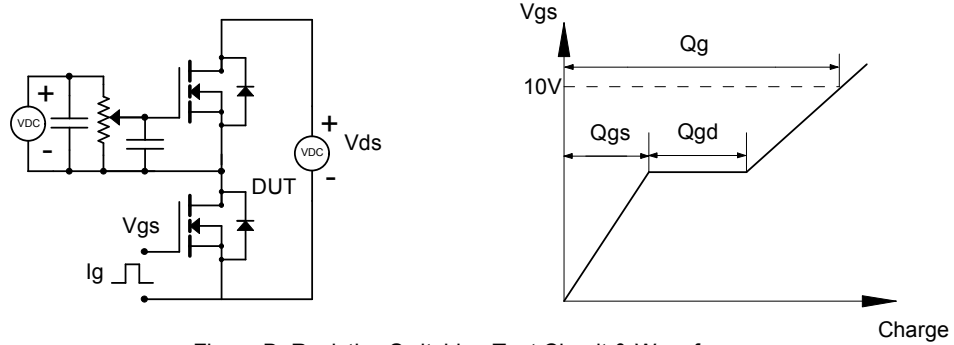


Figure B: Resistive Switching Test Circuit & Waveforms

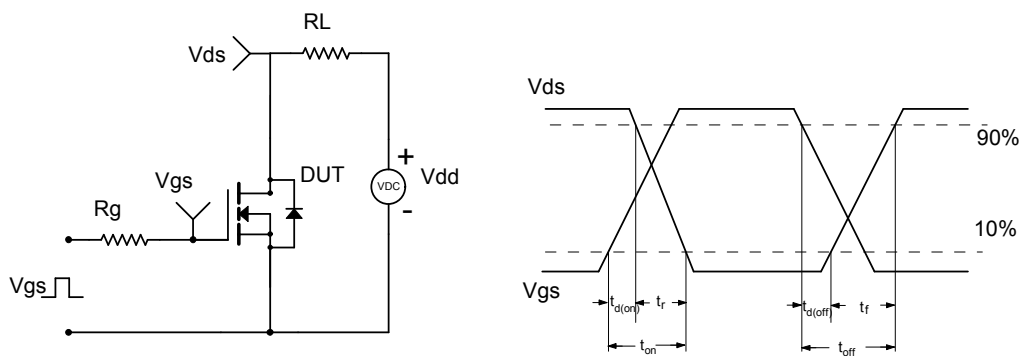


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

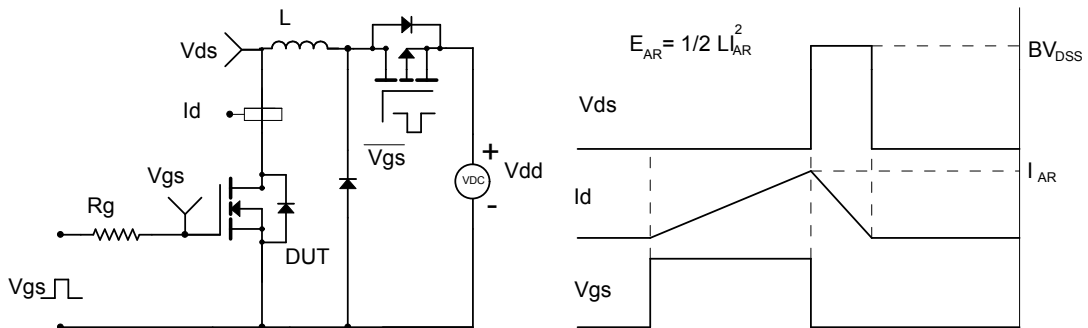
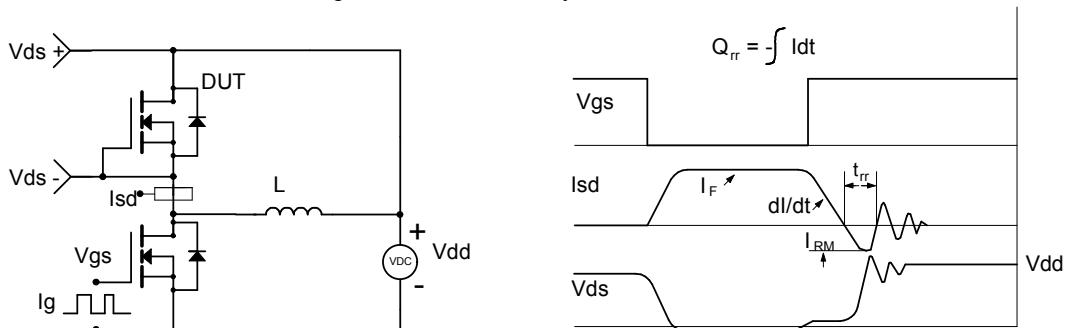


Figure D: Diode Recovery Test Circuit & Waveforms



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