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# AOT210L/AOB210L

## 30V N-Channel MOSFET

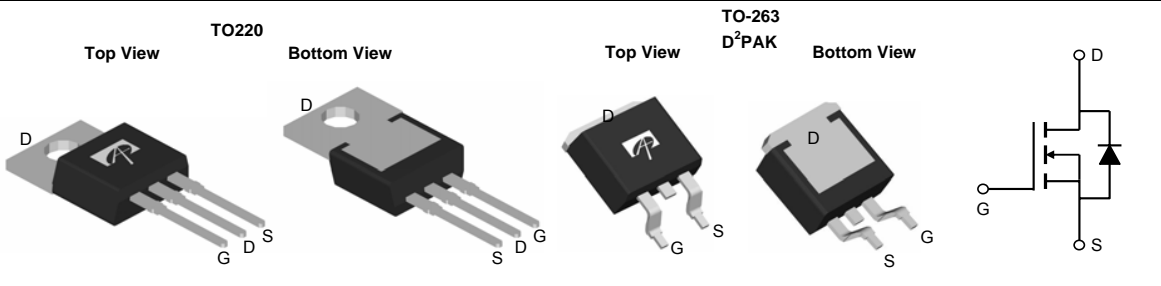
### General Description

The AOT210L/AOB210L 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  $C_{rss}$ .

### Product Summary

$V_{DS}$	30V
$I_D$ (at $V_{GS}=10V$ )	105A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 2.9m $\Omega$ (< 2.6m $\Omega^*$ )
$R_{DS(ON)}$ (at $V_{GS} = 4.5V$ )	< 3.7m $\Omega$ (< 3.5m $\Omega^*$ )

100% UIS Tested  
100%  $R_g$  Tested



### Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>G</sup>	$I_D$	$T_C=25^\circ C$	105
		$T_C=100^\circ C$	82
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	400	A
Continuous Drain Current	$I_{DSM}$	$T_A=25^\circ C$	20
		$T_A=70^\circ C$	16
Avalanche Current <sup>C</sup>	$I_{AS}, I_{AR}$	68	A
Avalanche energy $L=0.1mH$ <sup>C</sup>	$E_{AS}, E_{AR}$	231	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ C$	176
		$T_C=100^\circ C$	88
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ C$	1.9
		$T_A=70^\circ C$	1.2
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ C$

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	12	15	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A,D</sup>		Steady-State	54	65
Maximum Junction-to-Case	$R_{\theta JC}$	0.7	0.85	$^\circ C/W$

\* Surface mount package 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	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
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	1	1.7	2.2	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	400			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A TO220 T <sub>J</sub> =125°C		2.4 3.7	2.9 4.7	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A TO220		3	3.7	
		V <sub>GS</sub> =10V, I <sub>D</sub> =20A TO263		2.1	2.6	
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A TO263		2.7	3.5	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		78		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.65	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current <sup>g</sup>				105	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz	2800	3520	4300	pF
C <sub>oss</sub>	Output Capacitance		920	1320	1720	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		50	90	120	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	0.5	1	1.5	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A	39	48	58	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge		17	22	27	nC
Q <sub>gs</sub>	Gate Source Charge		7	9	11	nC
Q <sub>gd</sub>	Gate Drain Charge		4	7	10	nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3Ω		11		ns
t <sub>r</sub>	Turn-On Rise Time			10		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			38		ns
t <sub>f</sub>	Turn-Off Fall Time			11		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, dI/dt=500A/μs	14	21	28	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, dI/dt=500A/μs	40	58	76	nC

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>h</sub>=25°C. The Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> 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>b</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. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=175°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25°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 <30Qμs pulses, duty cycle 0.5% max.

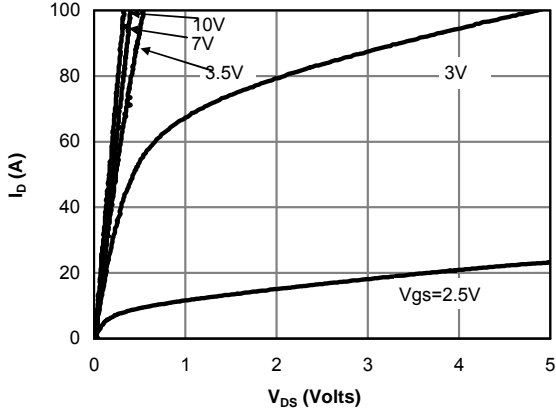
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=175°C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

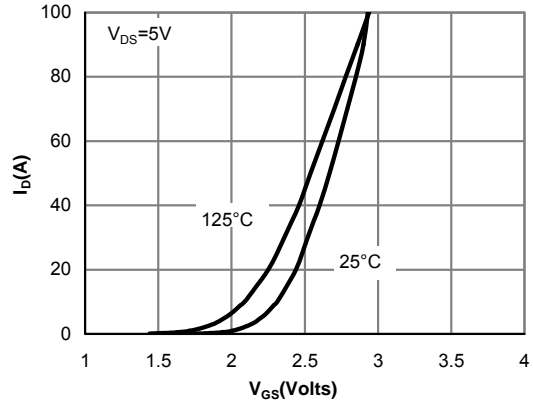
H. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>h</sub>=25°C.

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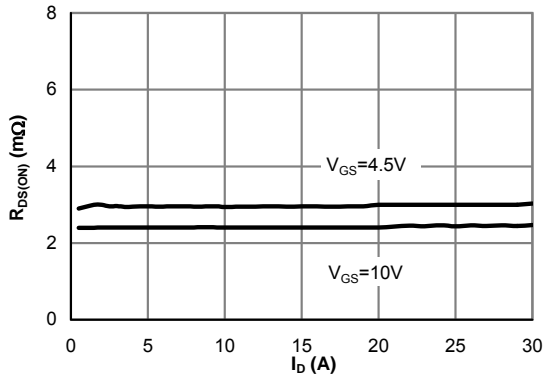
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



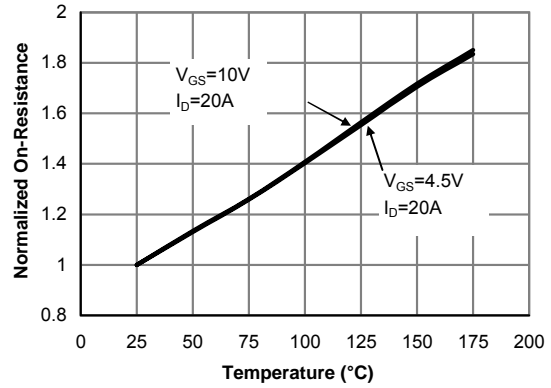
**Figure 1: On-Region Characteristics (Note E)**



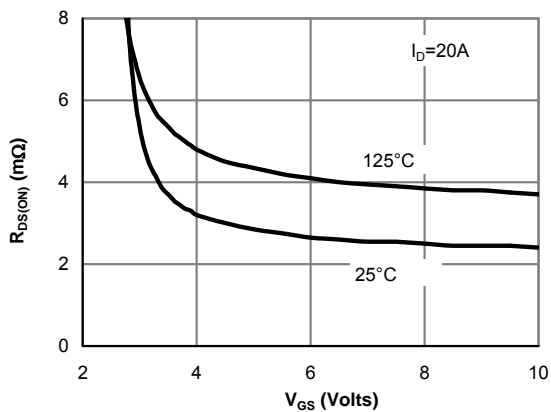
**Figure 2: Transfer Characteristics (Note E)**



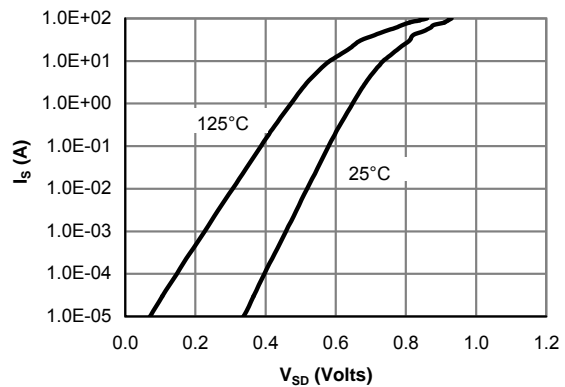
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



**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**

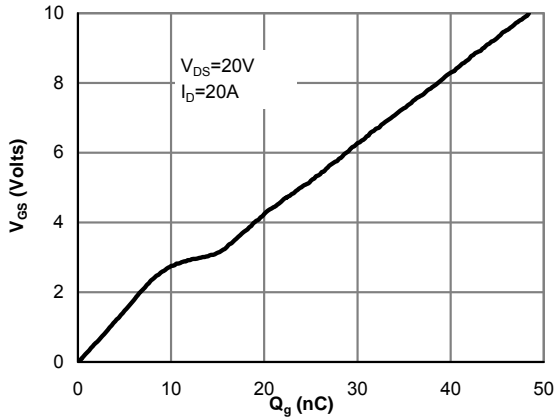


Figure 7: Gate-Charge Characteristics

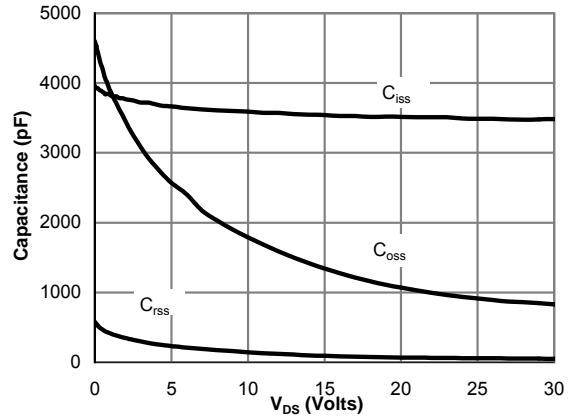


Figure 8: Capacitance Characteristics

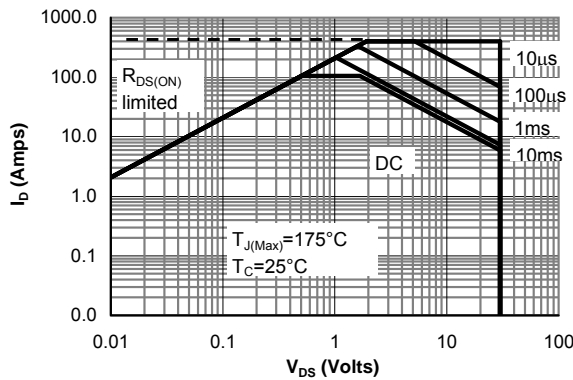


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

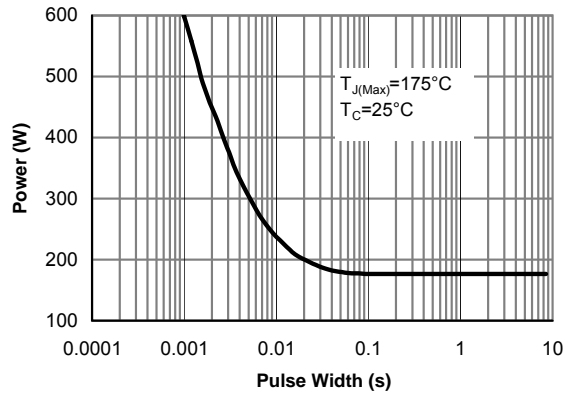


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

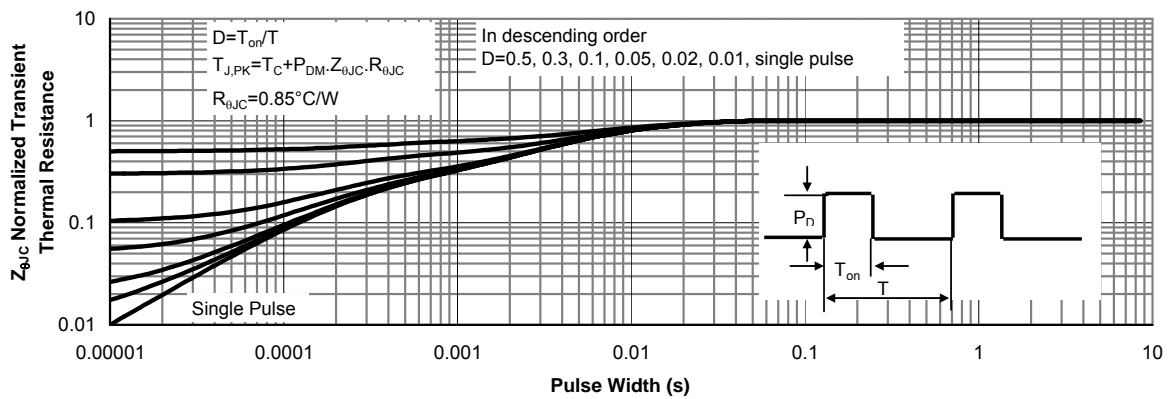


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

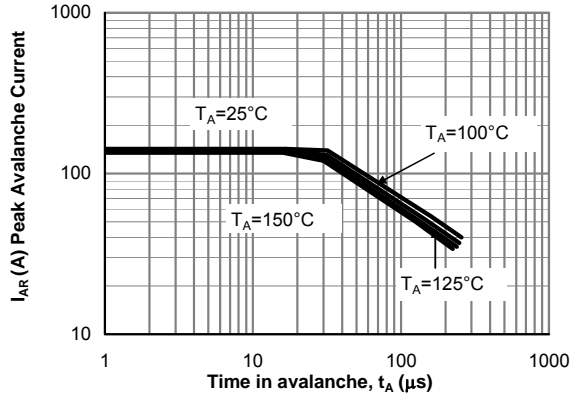


Figure 12: Single Pulse Avalanche capability (Note C)

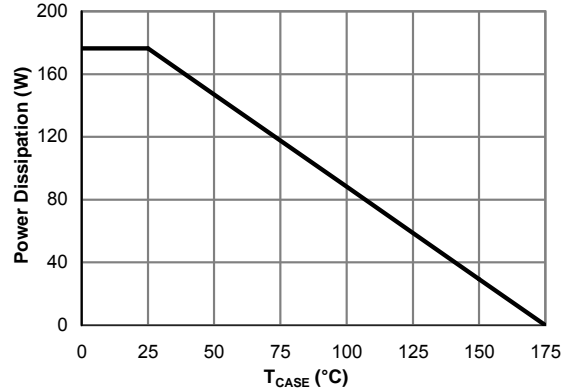


Figure 13: Power De-rating (Note F)

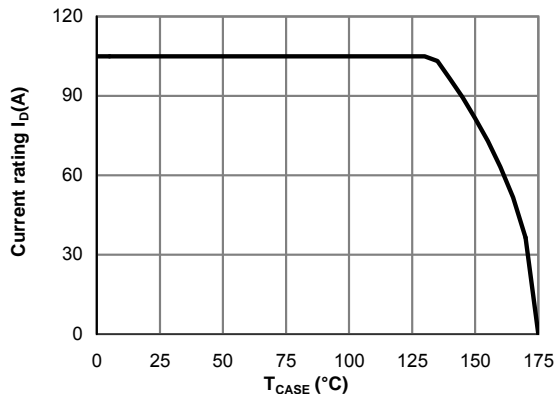


Figure 14: Current De-rating (Note F)

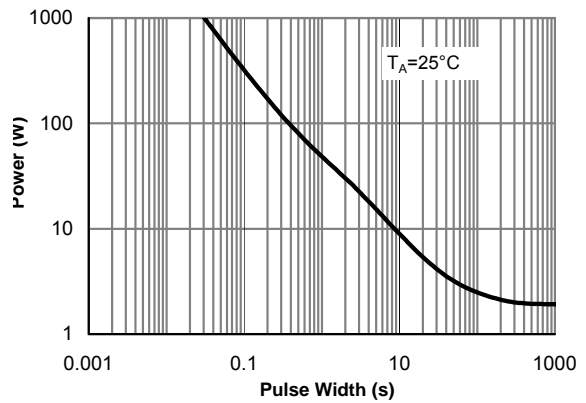


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

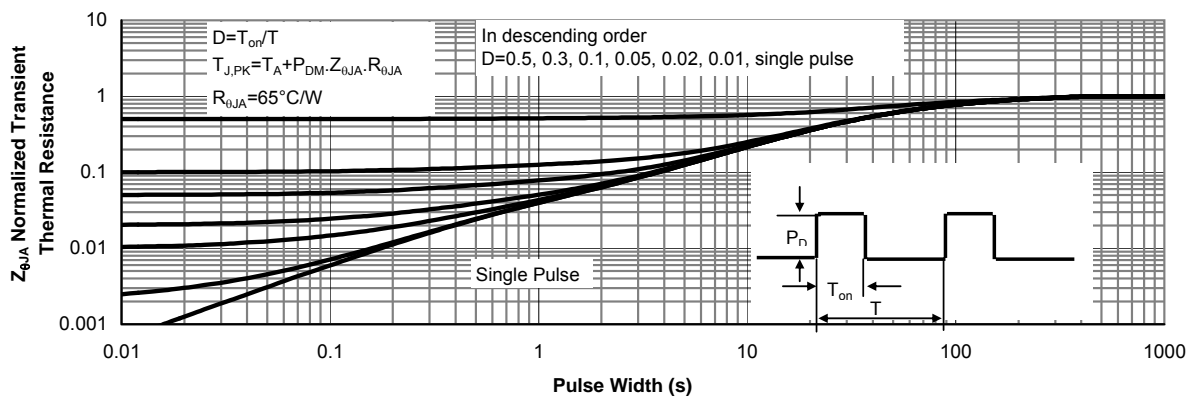
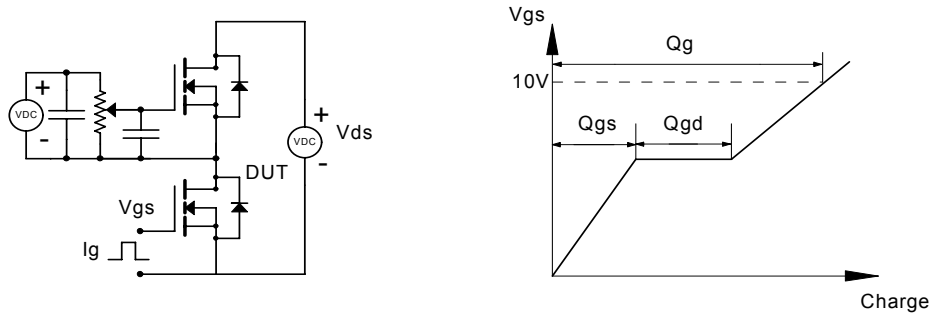
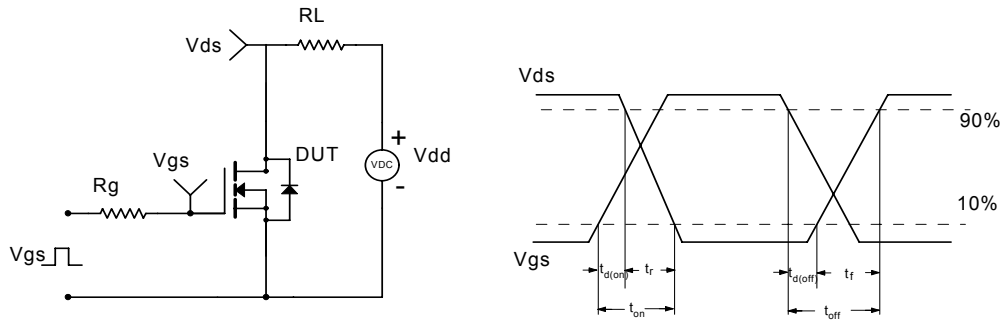


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

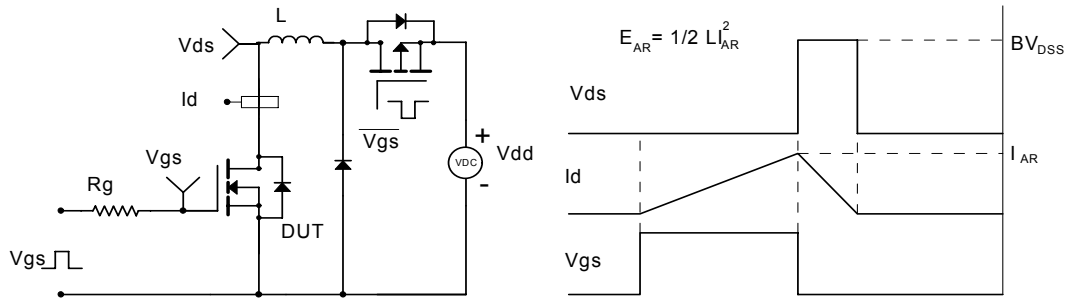
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

