

### General Description

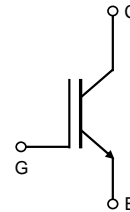
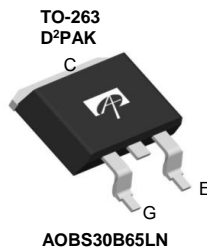
- 650V breakdown voltage
- Low  $V_{ce(sat)}$  and fast turn-on speed
- High ruggedness and temperature stable behavior
- Automotive qualified

### Applications

- Discharge switch
- Relay replacement
- PTC heater

### Product Summary

$V_{CE}$	650V
$I_C$ ( $T_C=100^\circ\text{C}$ )	30A
$V_{CE(sat)}$ ( $T_J=25^\circ\text{C}$ )	1.86V



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOBS30B65LN	TO263	Tape & Reel	800
<b>Absolute Maximum Ratings <math>T_A=25^\circ\text{C}</math> unless otherwise noted</b>			
Parameter	Symbol	AOBS30B65LN	Units
Collector-Emitter Voltage	$V_{CE}$	650	V
Gate-Emitter Voltage	$V_{GE}$	$\pm 30$	V
Continuous Collector Current	$I_C$	$T_C=25^\circ\text{C}$	60
		$T_C=100^\circ\text{C}$	30
Pulsed Collector Current, Limited by $T_{Jmax}$	$I_{CM}$	90	A
Turn-Off SOA, $V_{CE} \leq 650\text{V}$ , Limited by $T_{Jmax}$	$I_{LM}$	90	A
Short Circuit Withstanding Time <sup>(1)</sup> $V_{GE}=15\text{V}$ , $V_{CC} \leq 400\text{V}$ , $T_J \leq 175^\circ\text{C}$	$t_{SC}$	5	$\mu\text{s}$
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	227
		$T_C=100^\circ\text{C}$	114
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	$T_L$	300	$^\circ\text{C}$
<b>Thermal Characteristics</b>			
Parameter	Symbol	AOBS30B65LN	Units
Maximum Junction-to-Ambient	$R_{\theta JA}$	65	$^\circ\text{C/W}$
Maximum IGBT Junction-to-Case	$R_{\theta JC}$	0.66	$^\circ\text{C/W}$

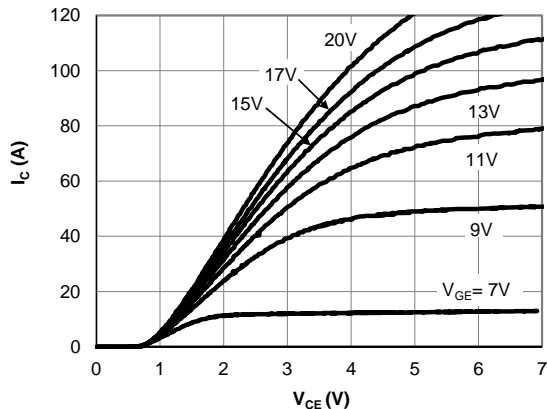
(1) Allowed number of short circuits: <1000; time between short circuits: >1s.

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

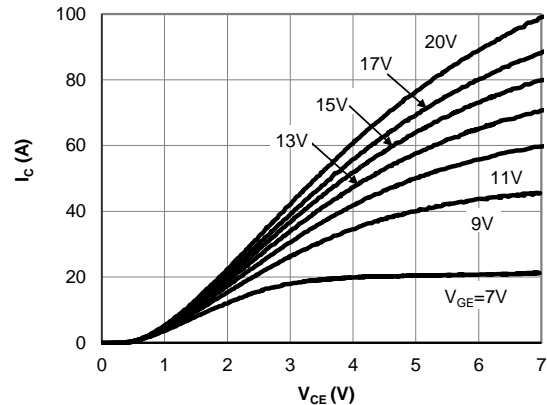
Symbol	Parameter	Conditions	Min	Typ	Max	Units	
<b>STATIC PARAMETERS</b>							
BV <sub>CES</sub>	Collector-Emitter Breakdown Voltage	I <sub>C</sub> =1mA, V <sub>GE</sub> =0V, T <sub>J</sub> =25°C	650	-	-	V	
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	V <sub>GE</sub> =15V, I <sub>C</sub> =30A	T <sub>J</sub> =25°C	-	1.86	2.35	V
			T <sub>J</sub> =125°C	-	2.32	-	
			T <sub>J</sub> =175°C	-	2.58	-	
V <sub>GE(th)</sub>	Gate-Emitter Threshold Voltage	V <sub>CE</sub> =5V, I <sub>C</sub> =1mA	4	4.7	5.4	V	
I <sub>CES</sub>	Zero Gate Voltage Collector Current	V <sub>CE</sub> =650V, V <sub>GE</sub> =0V	T <sub>J</sub> =25°C	-	-	10	μA
			T <sub>J</sub> =125°C	-	-	500	
			T <sub>J</sub> =175°C	-	-	10000	
I <sub>GES</sub>	Gate-Emitter Leakage Current	V <sub>CE</sub> =0V, V <sub>GE</sub> =±30V	-	-	±100	nA	
g <sub>FS</sub>	Forward Transconductance	V <sub>CE</sub> =20V, I <sub>C</sub> =30A	-	20	-	S	
<b>DYNAMIC PARAMETERS</b>							
C <sub>ies</sub>	Input Capacitance	V <sub>GE</sub> =0V, V <sub>CC</sub> =25V, f=1MHz	-	1246	-	pF	
C <sub>oes</sub>	Output Capacitance		-	77	-	pF	
C <sub>res</sub>	Reverse Transfer Capacitance		-	38	-	pF	
Q <sub>g</sub>	Total Gate Charge	V <sub>GE</sub> =15V, V <sub>CC</sub> =520V, I <sub>C</sub> =30A	-	52	-	nC	
Q <sub>ge</sub>	Gate to Emitter Charge		-	14	-	nC	
Q <sub>gc</sub>	Gate to Collector Charge		-	22	-	nC	
I <sub>C(SC)</sub>	Short Circuit Collector Current	V <sub>GE</sub> =15V, V <sub>CC</sub> =400V, t <sub>sc</sub> ≤5us, T <sub>J</sub> ≤175°C	-	150	-	A	
R <sub>g</sub>	Gate Resistance	V <sub>GE</sub> =0V, V <sub>CC</sub> =0V, f=1MHz	-	11	-	Ω	
<b>SWITCHING PARAMETERS, (Load Inductive, T<sub>J</sub>=25°C)</b>							
T <sub>d(on)</sub>	Turn-On Delay Time	T <sub>J</sub> =25°C V <sub>GE</sub> =15V, V <sub>CC</sub> =400V, I <sub>C</sub> =30A, R <sub>G</sub> =10Ω E <sub>on</sub> and E <sub>total</sub> include diode (AOTF30B65LN2) reverse recovery	-	24	-	ns	
T <sub>r</sub>	Turn-On Rise Time		-	28	-	ns	
T <sub>d(off)</sub>	Turn-Off Delay Time		-	109	-	ns	
T <sub>f</sub>	Turn-Off Fall Time		-	13	-	ns	
E <sub>on</sub>	Turn-On Energy		-	0.74	-	mJ	
E <sub>off</sub>	Turn-Off Energy		-	0.33	-	mJ	
E <sub>total</sub>	Total Switching Energy		-	1.07	-	mJ	
<b>SWITCHING PARAMETERS, (Load Inductive, T<sub>J</sub>=175°C)</b>							
T <sub>d(on)</sub>	Turn-On Delay Time	T <sub>J</sub> =175°C V <sub>GE</sub> =15V, V <sub>CC</sub> =400V, I <sub>C</sub> =30A, R <sub>G</sub> =10Ω E <sub>on</sub> and E <sub>total</sub> include diode (AOTF30B65LN2) reverse recovery	-	22	-	ns	
T <sub>r</sub>	Turn-On Rise Time		-	31	-	ns	
T <sub>d(off)</sub>	Turn-Off Delay Time		-	130	-	ns	
T <sub>f</sub>	Turn-Off Fall Time		-	28	-	ns	
E <sub>on</sub>	Turn-On Energy		-	0.82	-	mJ	
E <sub>off</sub>	Turn-Off Energy		-	0.62	-	mJ	
E <sub>total</sub>	Total Switching Energy		-	1.44	-	mJ	

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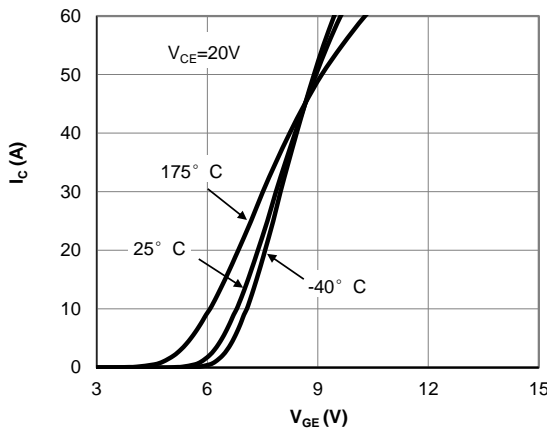
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



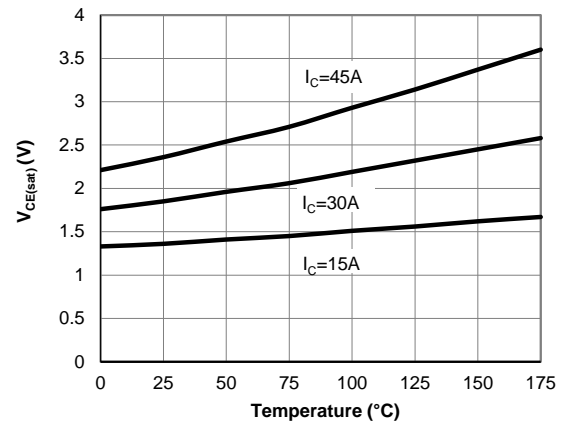
**Figure 1: Output Characteristic**  
( $T_j=25^\circ\text{C}$ )



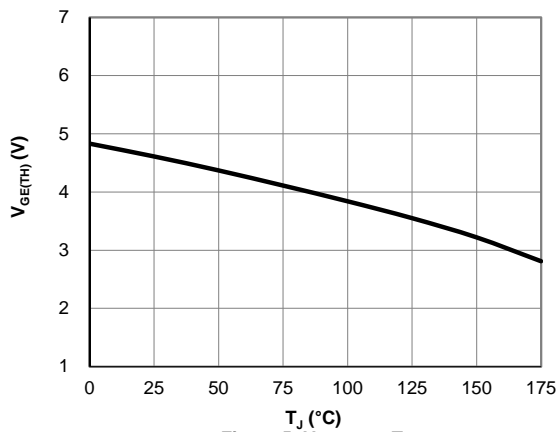
**Figure 2: Output Characteristic**  
( $T_j=175^\circ\text{C}$ )



**Figure 3: Transfer Characteristic**



**Figure 4: Collector-Emitter Saturation Voltage vs. Junction Temperature**



**Figure 5:  $V_{GE(TH)}$  vs.  $T_j$**

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

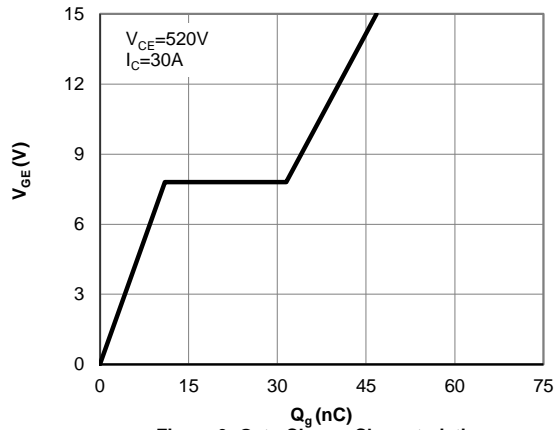


Figure 6: Gate-Charge Characteristics

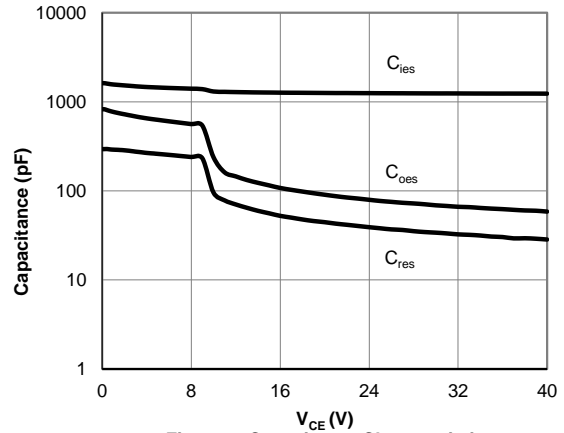


Figure 7: Capacitance Characteristic

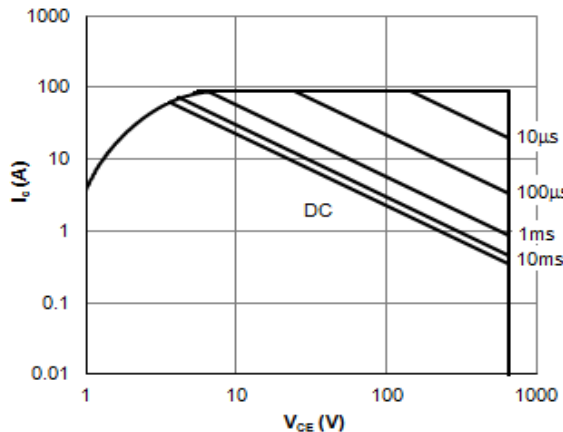


Figure 8: Forward Bias Safe Operating Area  
( $T_c=25^\circ\text{C}$ ,  $V_{GE}=15\text{V}$ )

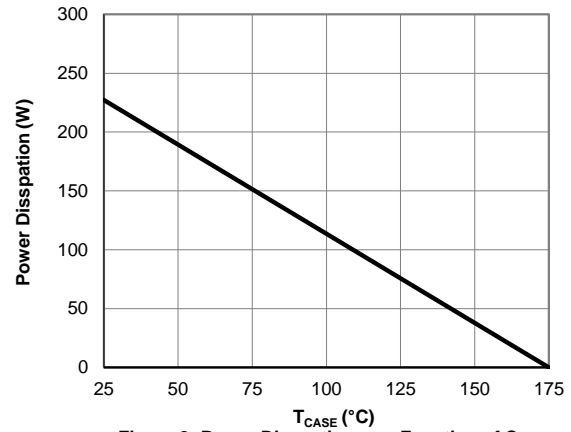


Figure 9: Power Dissipation as a Function of Case

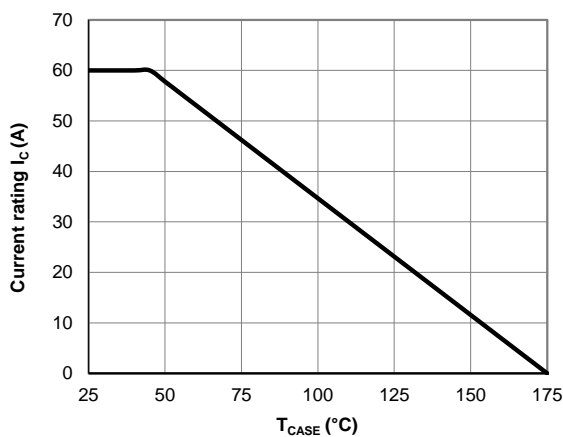


Figure 10: Current De-rating

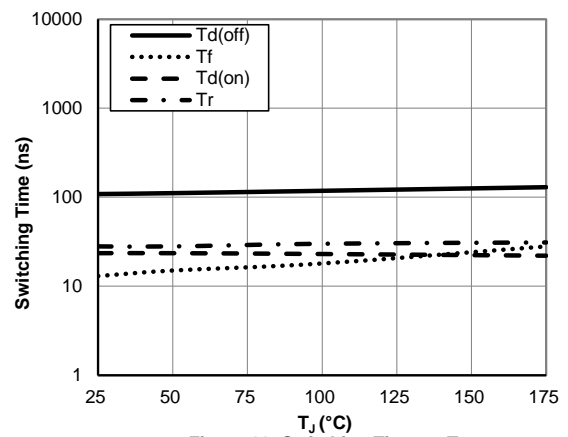
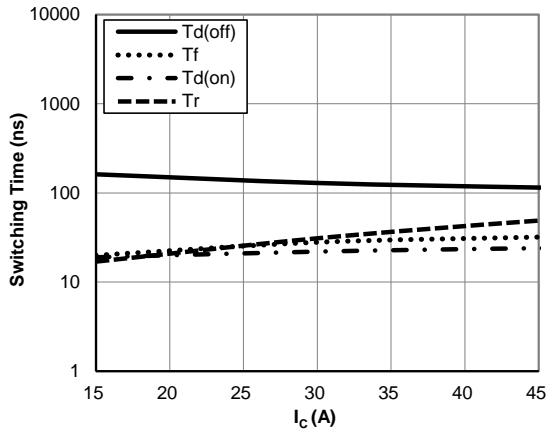
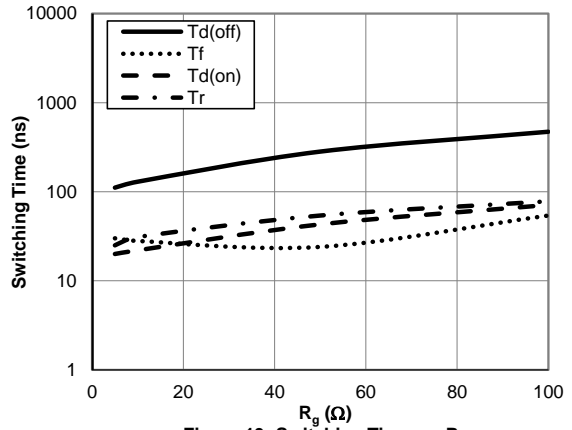


Figure 11: Switching Time vs.  $T_J$   
( $V_{GE}=15\text{V}$ ,  $V_{CE}=400\text{V}$ ,  $I_C=30\text{A}$ ,  $R_g=10\Omega$ )

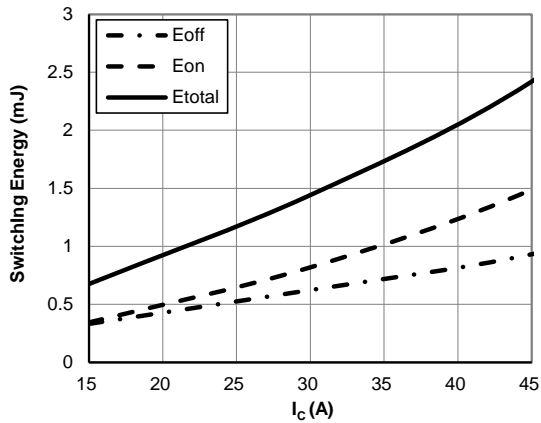
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



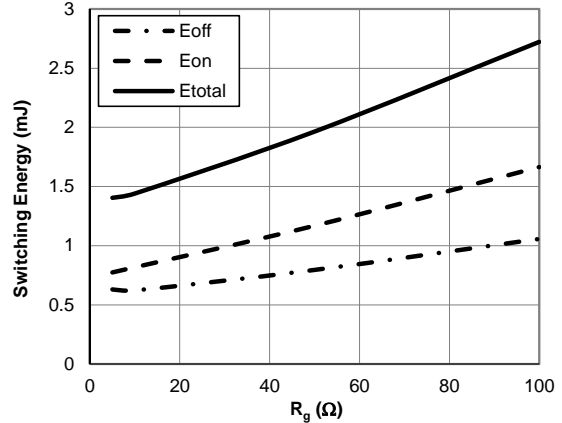
**Figure 12: Switching Time vs.  $I_C$**   
( $T_J=175^\circ\text{C}$ ,  $V_{GE}=15\text{V}$ ,  $V_{CE}=400\text{V}$ ,  $R_g=10\Omega$ )



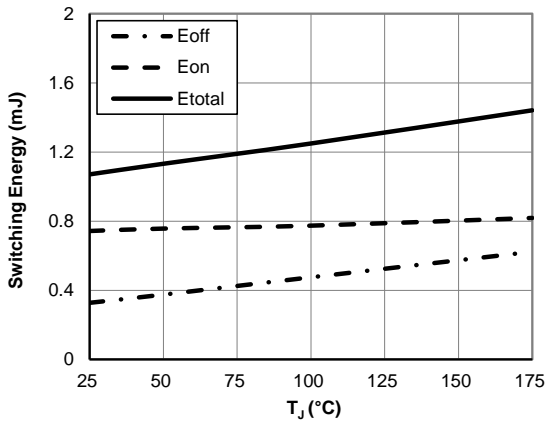
**Figure 13: Switching Time vs.  $R_g$**   
( $T_J=175^\circ\text{C}$ ,  $V_{GE}=15\text{V}$ ,  $V_{CE}=400\text{V}$ ,  $I_C=30\text{A}$ )



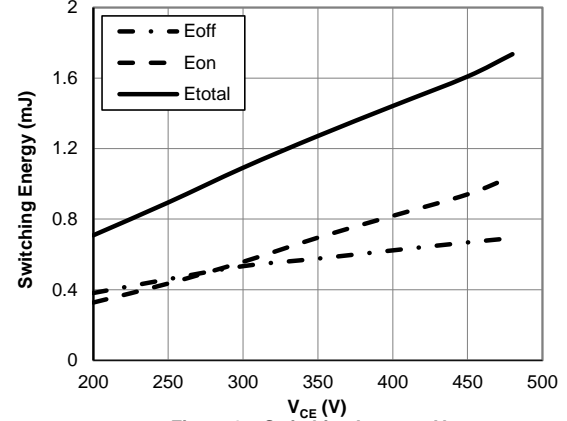
**Figure 14: Switching Loss vs.  $I_C$**   
( $T_J=175^\circ\text{C}$ ,  $V_{GE}=15\text{V}$ ,  $V_{CE}=400\text{V}$ ,  $R_g=10\Omega$ )



**Figure 15: Switching Loss vs.  $R_g$**   
( $T_J=175^\circ\text{C}$ ,  $V_{GE}=15\text{V}$ ,  $V_{CE}=400\text{V}$ ,  $I_C=30\text{A}$ )



**Figure 16: Switching Loss vs.  $T_J$**   
( $V_{GE}=15\text{V}$ ,  $V_{CE}=400\text{V}$ ,  $I_C=30\text{A}$ ,  $R_g=10\Omega$ )



**Figure 17: Switching Loss vs.  $V_{CE}$**   
( $T_J=175^\circ\text{C}$ ,  $V_{GE}=15\text{V}$ ,  $I_C=30\text{A}$ ,  $R_g=10\Omega$ )

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

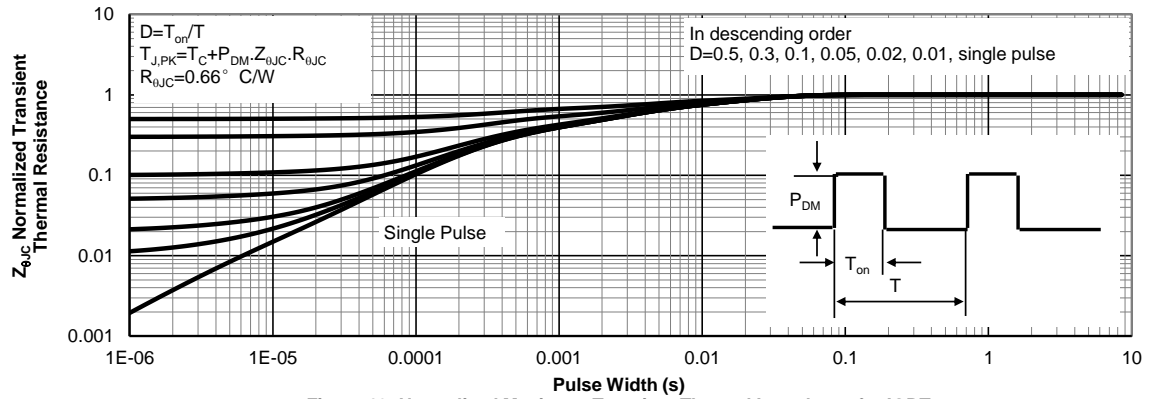


Figure 18: Normalized Maximum Transient Thermal Impedance for IGBT

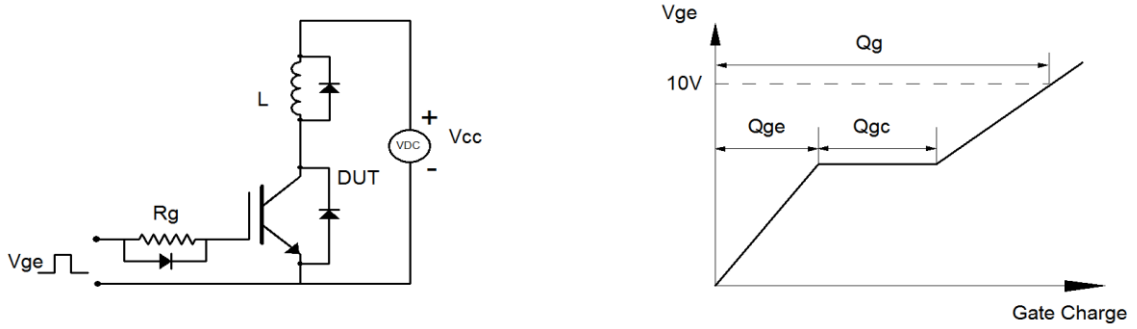


Figure A: Gate Charge Test Circuit & Waveforms

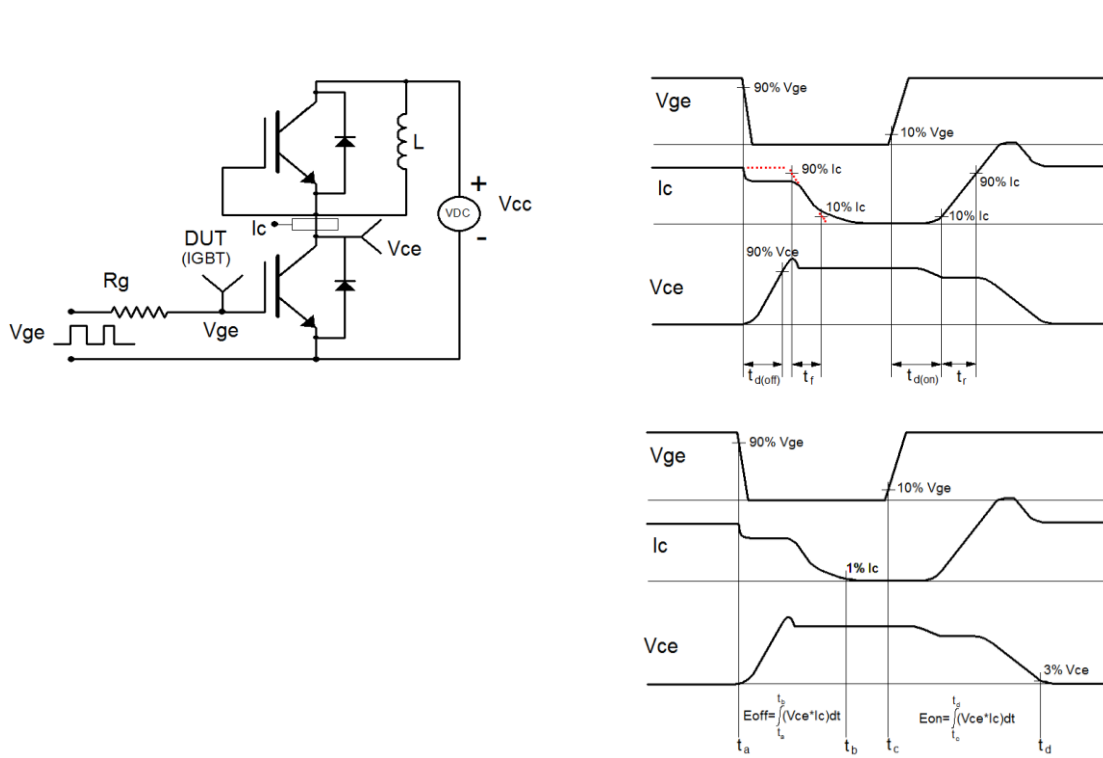


Figure B: Inductive Switching Test Circuit & Waveforms