AOBS30B65LN

650V, 30A Alpha IGBT™
AEC-Q101 Qualified

General Description

- 650V breakdown voltage
- Low Vce(sat) and fast turn-on speed
- High ruggedness and temperature stable behavior
- Automotive qualified

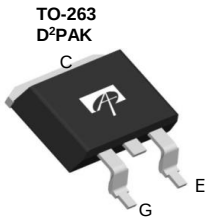
Applications

- Discharge switch
- Relay replacement
- PTC heater

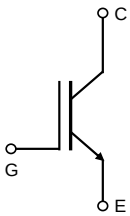
Product Summary

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

RoHS Compliant



AOBS30B65LN



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOBS30B65LN	TO263	Tape & Reel	800

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	AOBS30B65LN	Units
Collector-Emitter Voltage		V_{CE}	650	V
Gate-Emitter Voltage		V_{GE}	±30	V
Continuous Collector Current	T_C=25°C	I_C	60	A
	T_C=100°C		30	
Pulsed Collector Current, Limited by T_{Jmax}		I_{CM}	90	A
Turn-Off SOA, V_{CE}≤650V, Limited by T_{Jmax}		I_{LM}	90	A
Short Circuit Withstanding Time (1) V_{GE}=15V, V_{CC}≤400V, T_J≤175°C		t_{SC}	5	µs
Power Dissipation	T_C=25°C	P_D	227	W
	T_C=100°C		114	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	°C

Thermal Characteristics

Parameter	Symbol	AOBS30B65LN	Units
Maximum Junction-to-Ambient	$R_{\theta JA}$	65	°C/W
Maximum IGBT Junction-to-Case	$R_{\theta JC}$	0.66	°C/W

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

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV_{CES}	Collector-Emitter Breakdown Voltage	I_C=1mA, V_{GE}=0V, T_J=25°C		650	-	-	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C=30A	T_J=25°C	-	1.86	2.35	V
			T_J=125°C	-	2.32	-	
			T_J=175°C	-	2.58	-	
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	V_{CE}=5V, I_C=1mA		4	4.7	5.4	V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE}=650V, V_{GE}=0V	T_J=25°C	-	-	10	µA
			T_J=125°C	-	-	500	
			T_J=175°C	-	-	10000	
I_{GES}	Gate-Emitter Leakage Current	V_{CE}=0V, V_{GE}=±30V		-	-	±100	nA
g_{FS}	Forward Transconductance	V_{CE}=20V, I_C=30A		-	20	-	S
DYNAMIC PARAMETERS							
C_{ies}	Input Capacitance	V_{GE}=0V, V_{CC}=25V, f=1MHz		-	1246	-	pF
C_{oes}	Output Capacitance			-	77	-	pF
C_{res}	Reverse Transfer Capacitance			-	38	-	pF
Q_g	Total Gate Charge	V_{GE}=15V, V_{CC}=520V, I_C=30A		-	52	-	nC
Q_{ge}	Gate to Emitter Charge			-	14	-	nC
Q_{gc}	Gate to Collector Charge			-	22	-	nC
$I_{C(SC)}$	Short Circuit Collector Current	V_{GE}=15V, V_{CC}=400V, $t_{sc}\leqslant$5us, $T_J\leqslant$175°C		-	150	-	A
R_g	Gate Resistance	V_{GE}=0V, V_{CC}=0V, f=1MHz		-	11	-	Ω
SWITCHING PARAMETERS, (Load Inductive, T_J=25°C)							
$T_{d(on)}$	Turn-On Delay Time	T_J=25°C, V_{GE}=15V, V_{CC}=400V, I_C=30A, R_G=10Ω, Eon and Etotal include diode (AOTF30B65LN2) reverse recovery		-	24	-	ns
T_r	Turn-On Rise Time			-	28	-	ns
$T_{d(off)}$	Turn-Off Delay Time			-	109	-	ns
T_f	Turn-Off Fall Time			-	13	-	ns
E_{on}	Turn-On Energy			-	0.74	-	mJ
E_{off}	Turn-Off Energy			-	0.33	-	mJ
E_{total}	Total Switching Energy			-	1.07	-	mJ
SWITCHING PARAMETERS, (Load Inductive, T_J=175°C)							
$T_{d(on)}$	Turn-On Delay Time	T_J=175°C, V_{GE}=15V, V_{CC}=400V, I_C=30A, R_G=10Ω, Eon and Etotal include diode (AOTF30B65LN2) reverse recovery		-	22	-	ns
T_r	Turn-On Rise Time			-	31	-	ns
$T_{d(off)}$	Turn-Off Delay Time			-	130	-	ns
T_f	Turn-Off Fall Time			-	28	-	ns
E_{on}	Turn-On Energy			-	0.82	-	mJ
E_{off}	Turn-Off Energy			-	0.62	-	mJ
E_{total}	Total Switching Energy			-	1.44	-	mJ

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

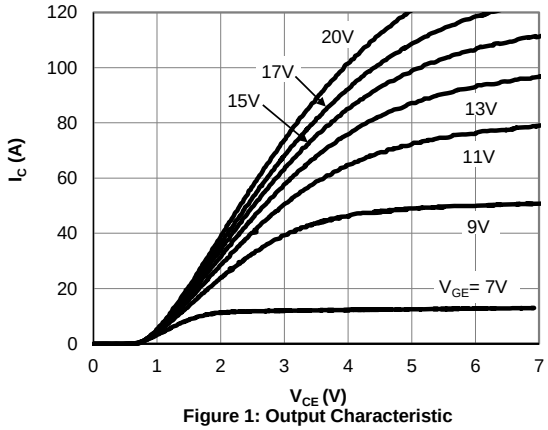


Figure 1: Output Characteristic (T_j=25°C)

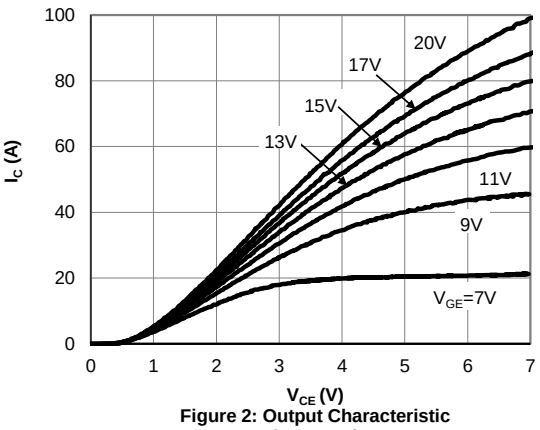


Figure 2: Output Characteristic (T_j=175°C)

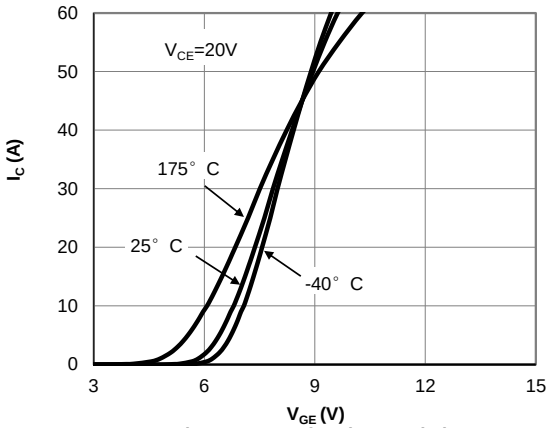


Figure 3: Transfer Characteristic

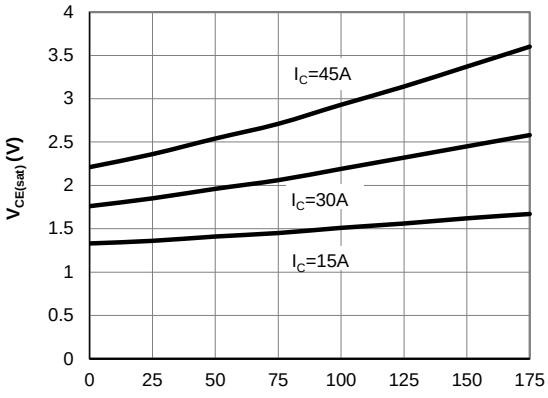


Figure 4: Collector-Emitter Saturation Voltage vs. Junction Temperature

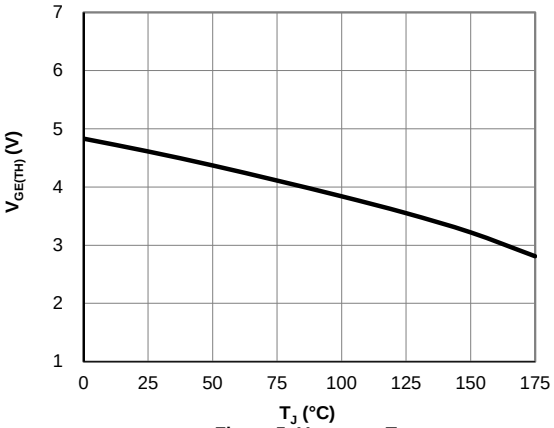


Figure 5: $V_{GE(TH)}$ vs. T_j

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

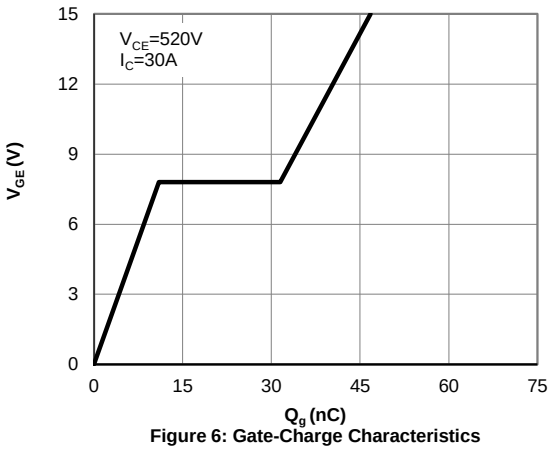


Figure 6: Gate-Charge Characteristics

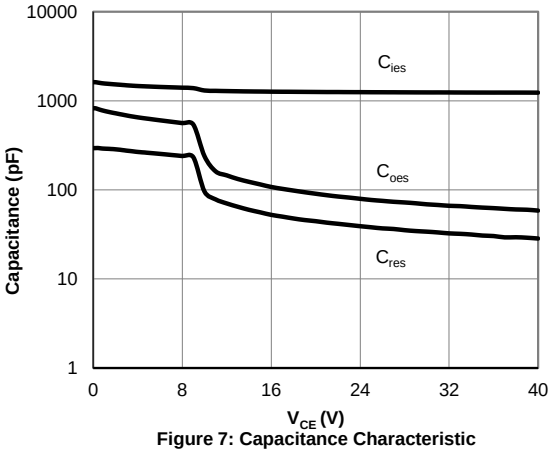


Figure 7: Capacitance Characteristic

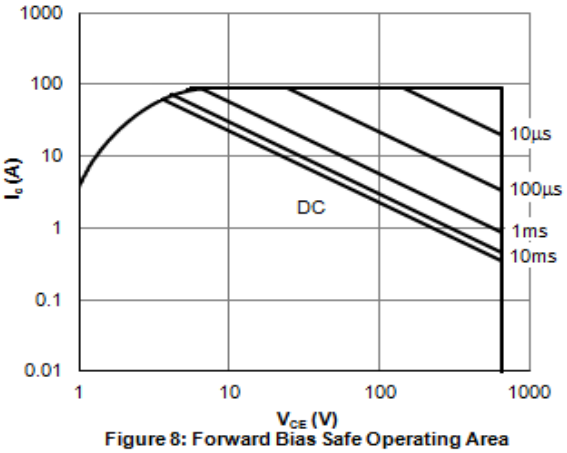


Figure 8: Forward Bias Safe Operating Area (T_C=25°C, V_{GE}=15V)

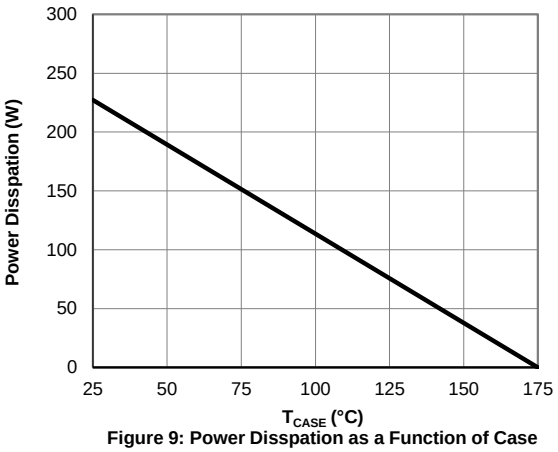


Figure 9: Power Disspation as a Function of Case

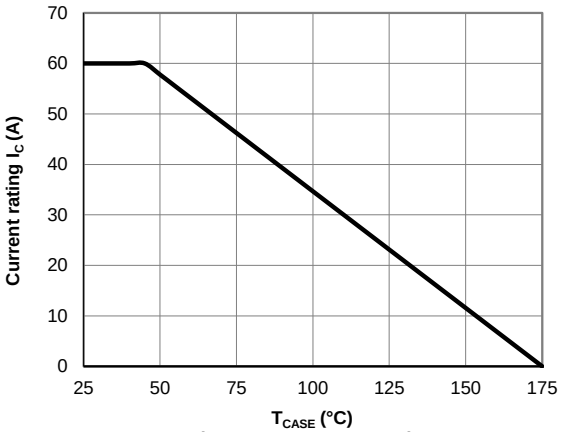


Figure 10: Current De-rating

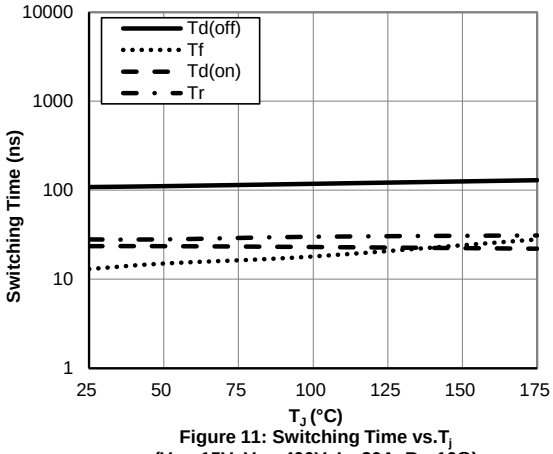


Figure 11: Switching Time vs.T_j (V_{GE}=15V, V_{CE}=400V, I_C=30A, R_g=10Ω)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

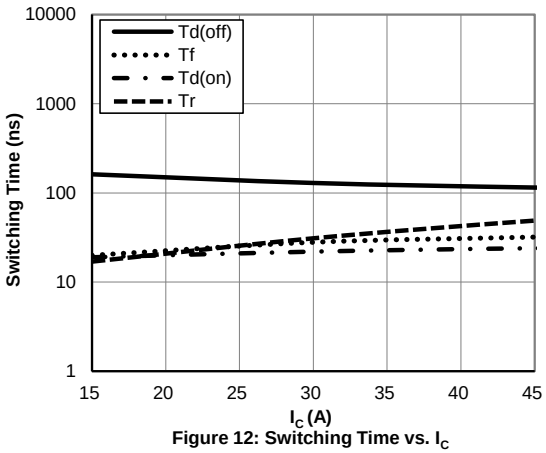


Figure 12: Switching Time vs. I_C
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, R_g=10Ω)

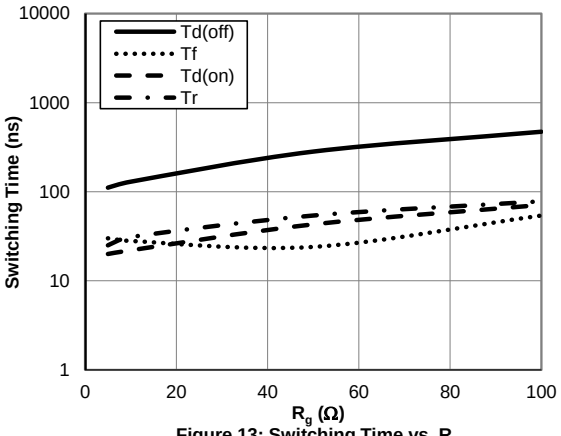


Figure 13: Switching Time vs. R_g
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, I_C=30A)

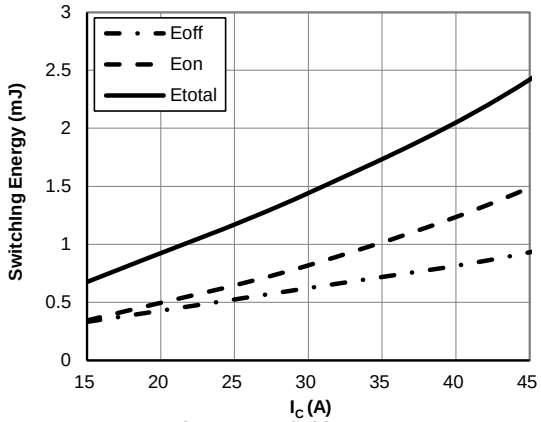


Figure 14: Switching Loss vs. I_C
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, R_g=10Ω)

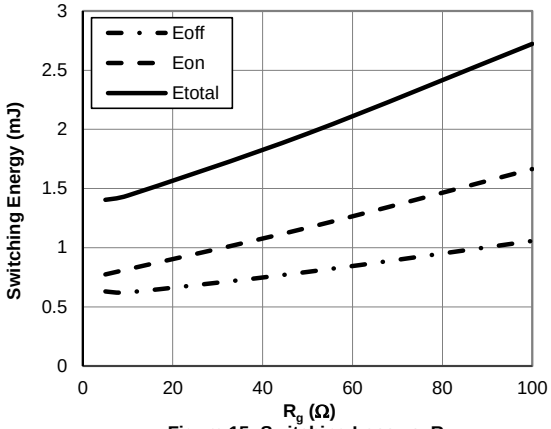


Figure 15: Switching Loss vs. R_g
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, I_C=30A)

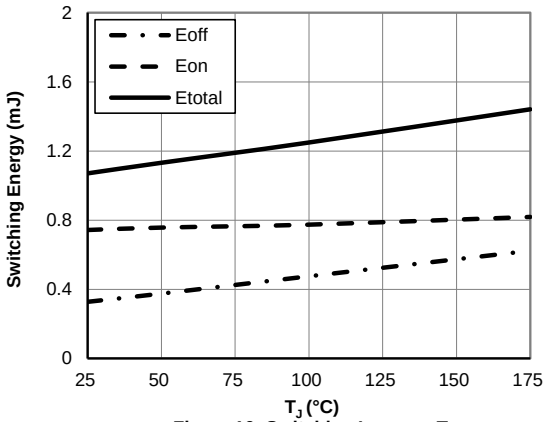


Figure 16: Switching Loss vs. T_j
(V_{GE}=15V, V_{CE}=400V, I_C=30A, R_g=10Ω)

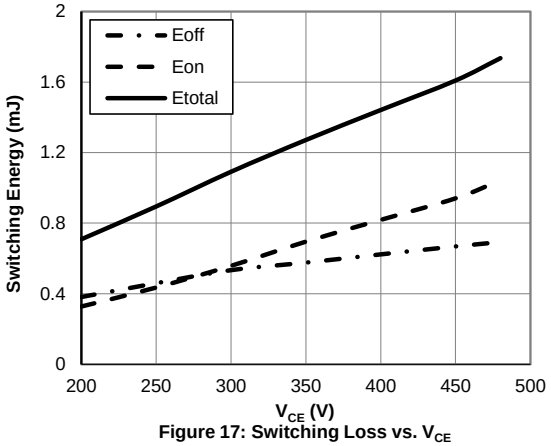


Figure 17: Switching Loss vs. V_{CE}
(T_j=175°C, V_{GE}=15V, I_C=30A, R_g=10Ω)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

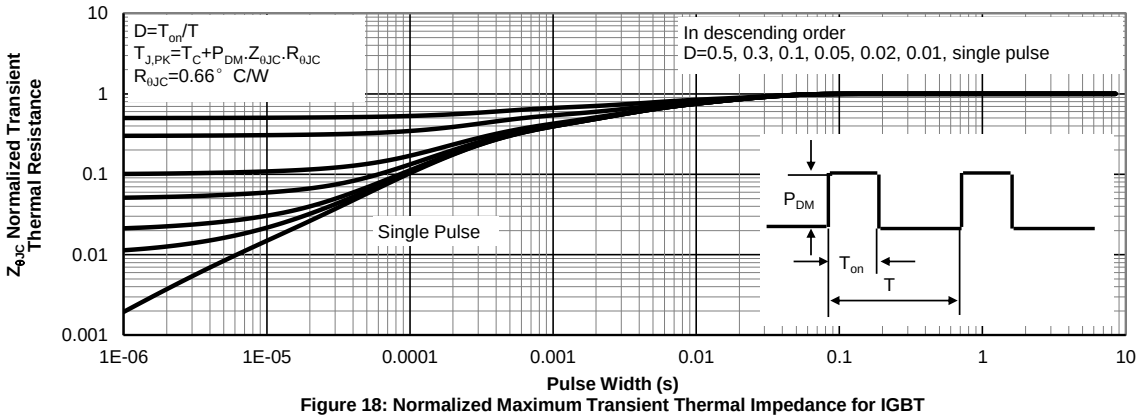


Figure 18: Normalized Maximum Transient Thermal Impedance for IGBT

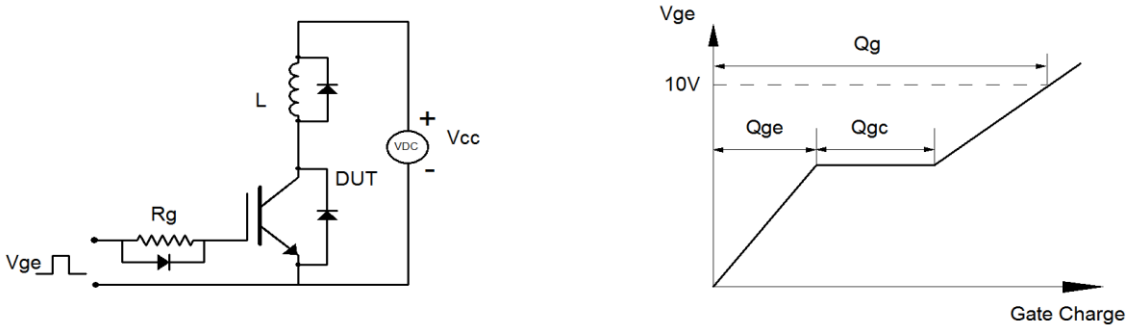


Figure A: Gate Charge Test Circuit & Waveforms

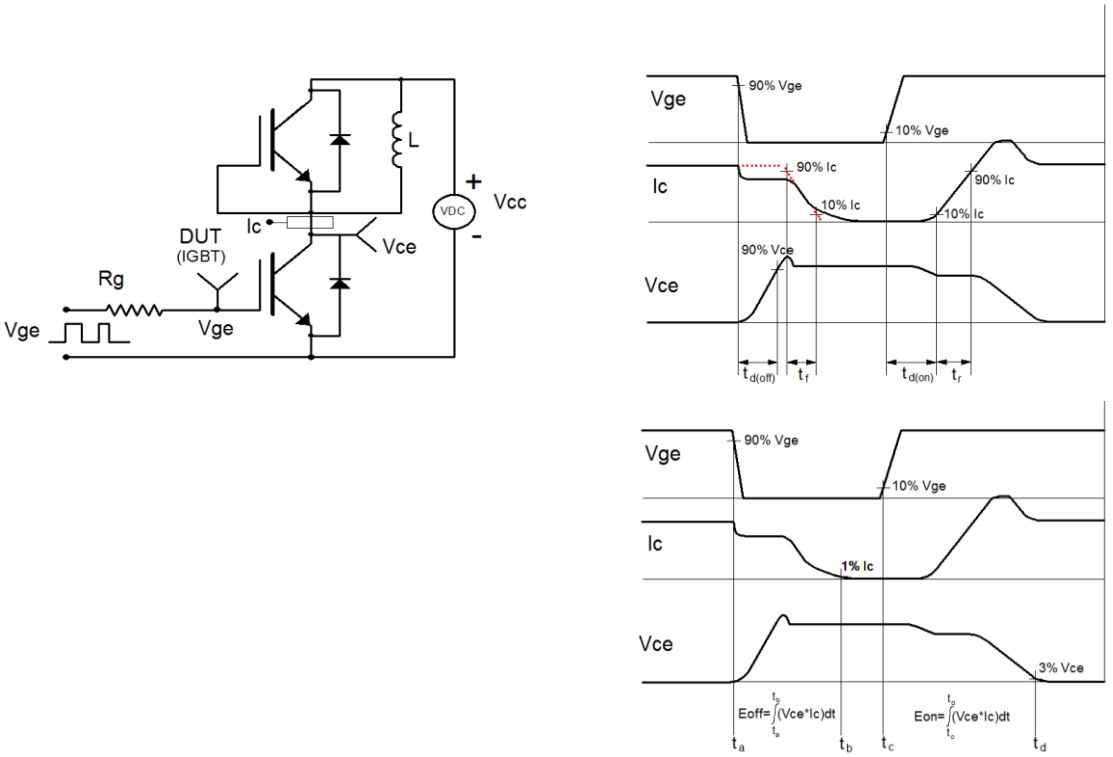


Figure B: Inductive Switching Test Circuit & Waveforms