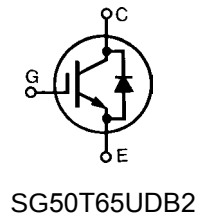
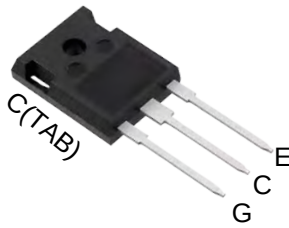


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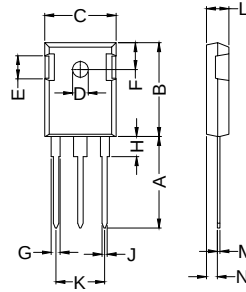
Discrete IGBTs



SG50T65UDB2

G=Gate, C=Collector,
E=Emitter, TAB=Collector

Dimensions TO-247AD



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.620	0.640
ØD	3.15	3.65	0.124	0.144
E	4.32	5.49	0.170	0.216
F	5.40	6.30	0.213	0.248
G	1.65	2.18	0.065	0.086
H	3.80	4.50	0.150	0.177
J	1.00	1.40	0.039	0.055
K	10.80	11.10	0.425	0.437
L	4.70	5.30	0.185	0.209
M	0.40	0.80	0.016	0.031
N	1.50	2.49	0.059	0.098



MAXIMUM RATING (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V_{CES}	650	V
Gate-Emitter Voltage		V_{GES}	±20	V
Collector Current	@Tc=25°C	I_C	100	A
	@Tc=100°C		50	A
Pulsed Collector Current		I_{CM}^*	150	A
Diode Continuous Forward	@Tc=100°C	I_F	50	A
Current Diode Maximum		I_{FM}	100	A
Forward Current Maximum Power Dissipation	@Tc=25°C	P_D	277	W
	@Tc=100°C		111	W
Maximum Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	-55 to +150	°C

*Repetitive rating : Pulse width limited by max. junction temperature

THERMAL CHARACTERISTIC

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Junction to Case	R_{thJC}	0.45	°C/W
(IGBT) Thermal Resistance, Junction to Case	R_{thJC}	1.0	°C/W
Case (DIODE) Thermal Resistance, Junction to Ambient	R_{thJA}	40	°C/W

General Description

SIRECTIFIER Trench Field Stop IGBTs offer low switching losses, high energy efficiency and short circuit ruggedness. It is designed for applications such as motor control, uninterrupted power supplies(UPS), general inverters.

FEATURES

- High speed switching
- High ruggedness, temperature stable behavior
- Short Circuit Withstand Times 10us
- Extremely enhanced avalanche capability

SG50T65UDB2

Discrete IGBTs

ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Collector-Emitter Breakdown Voltage	BV _{CES}	V _{GE} =0V , I _C =250μA	650	-	-	V
Collector Cut-off Current	I _{CES}	V _{GE} =0V, V _{CE} =650V	-	-	250	μA
Gate Leakage Current	I _{GES}	V _{CE} =0V, V _{GE} =±20V	-	-	±100	nA
Gate Threshold Voltage	V _{GE(th)}	V _{GE} =V _{CE} , I _C =5mA	4.5	5.5	7.0	V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =50A	-	1.65	2.10	V
		V _{GE} =15V, I _C =100A	-	2.25	-	V
		V _{GE} =15V, I _C =50A, T _C = 125°C	-	1.90	-	V
Dynamic						
Total Gate Charge	Q _g	V _{CC} =300V, V _{GE} =15V, I _C = 50A	-	200	-	nC
ChargeGate-Emitter Charge	Q _{ge}		-	30	-	nC
Gate-Collector Charge	Q _{gc}		-	100	-	nC
Turn-On Delay Time	t _{d(on)}	V _{CC} =300V, I _C =50A, V _{GE} =15V,R _G =10Ω Inductive Load, T _C = 25°C (Note 1)	-	60	-	ns
Rise Time	t _r		-	45	-	ns
Turn-Off Delay Time	t _{d(off)}		-	250	-	ns
Fall Time	t _f		-	40	-	ns
Turn-On Switching Loss	E _{on}		-	1.25	1.65	mJ
Turn-Off Switching Loss	E _{off}		-	0.95	1.25	mJ
Total Switching Loss	E _{ts}		-	2.2	2.9	mJ
Turn-On Delay Time	t _{d(on)}	V _{CC} =300V, I _C =50A, V _{GE} =15V, R _G =10Ω Inductive Load, T _C = 125°C (Note 1)	-	60	-	ns
Rise Time	t _r		-	50	-	ns
Turn-Off Delay Time	t _{d(off)}		-	260	-	ns
Fall Time	t _f		-	50	-	ns
Turn-On Switching Loss	E _{on}		-	1.25	-	mJ
Turn-Off Switching Loss	E _{off}		-	1.15	-	mJ
Total Switching Loss	E _{ts}		-	2.4	-	mJ
Input Capacitance	C _{ies}	V _{CE} =30V, V _{GE} =0V, f=1MHz	-	4000	5200	pF
CapacitanceOuput Capacitance	C _{oes}		-	250	-	pF
Reverse Transfer Capacitance	C _{res}		-	150	-	pF
Short Circuit Withstand Time	t _{sc}	V _{CC} =300V, V _{GE} =15V, T _C =100°C	10	-	-	μs

Note 1 : Energy loss include tail current and diode reverse recovery.

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ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	V _F	I _F = 50A	T _C =25°C	-	1.8	2.5	V
			T _C =125°C	-	1.9	-	
Diode Reverse Recovery Time	t _{rr}	V _{CC} =300V, I _F =50A di/dt = 600A/μs	T _C =25°C	-	100	-	ns
			T _C =125°C	-	175	-	
Diode Peak Reverse Recovery Current	I _{rr}		T _C =25°C	-	19	-	A
			T _C =125°C	-	22	-	
Diode Reverse Recovery Charge	Q _{rr}		T _C =25°C	-	1.1	-	μC
			T _C =125°C	-	2.3	-	

Fig.1 Forward Characteristics

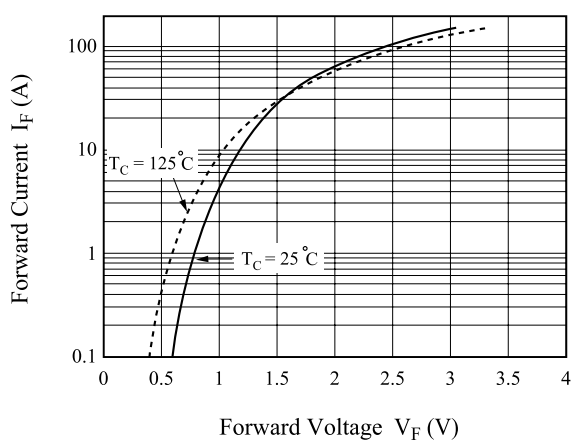


Fig.2 Reverse Recovery Current

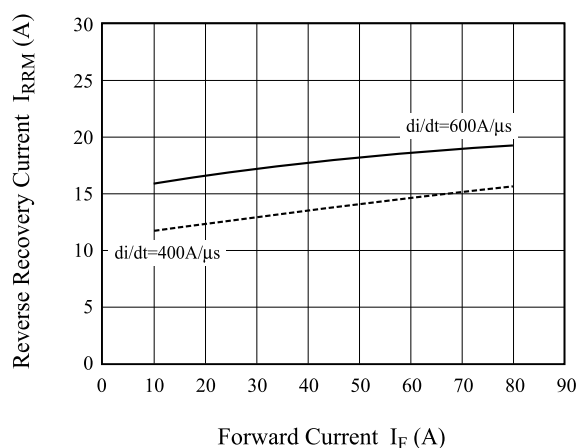
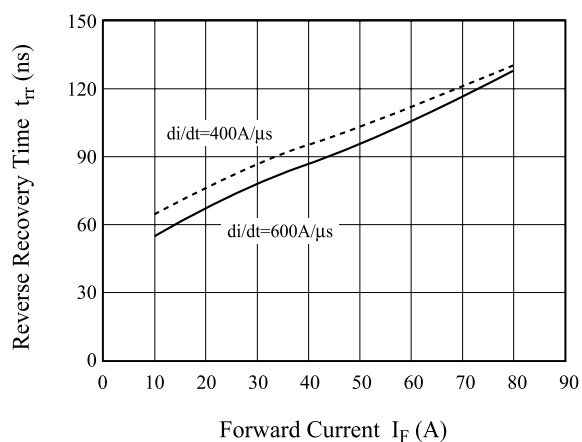


Fig.3 Reverse Recovery Time



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Fig.4 Saturation Voltage Characteristics

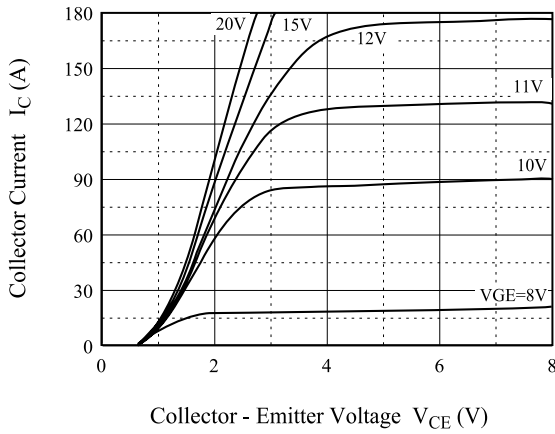


Fig.5 Saturation Voltage Characteristics

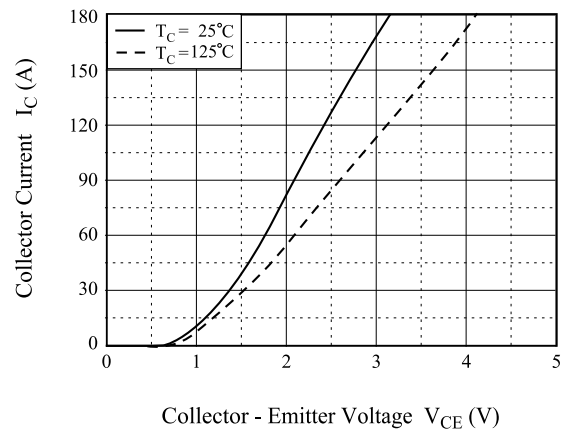


Fig.6 Saturation Voltage vs. Case Temperature

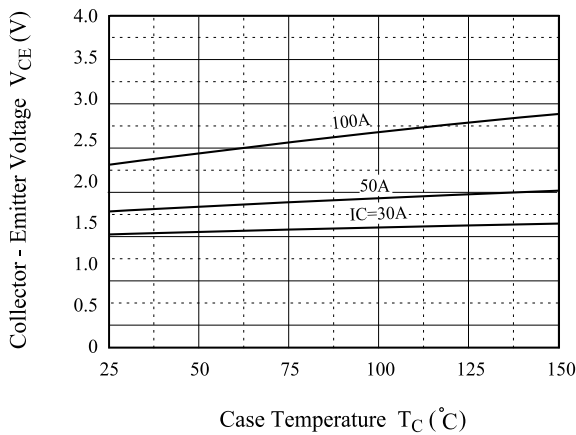


Fig.7 Saturation Voltage vs. V_{GE}

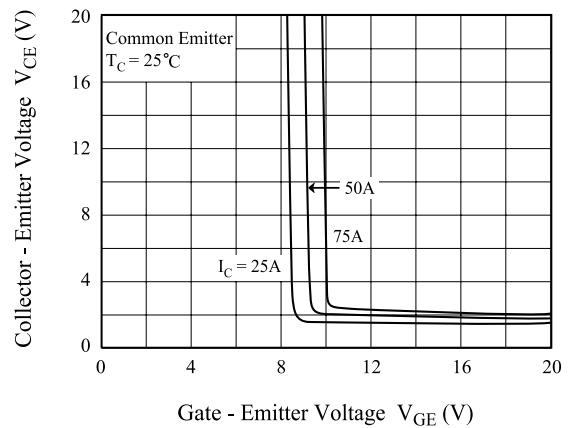


Fig.8 Saturation Voltage vs. V_{GE}

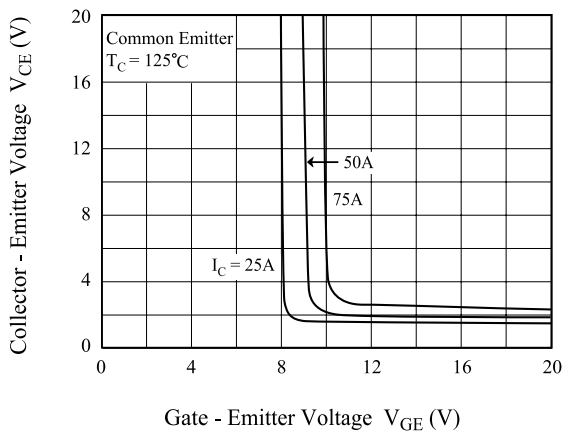
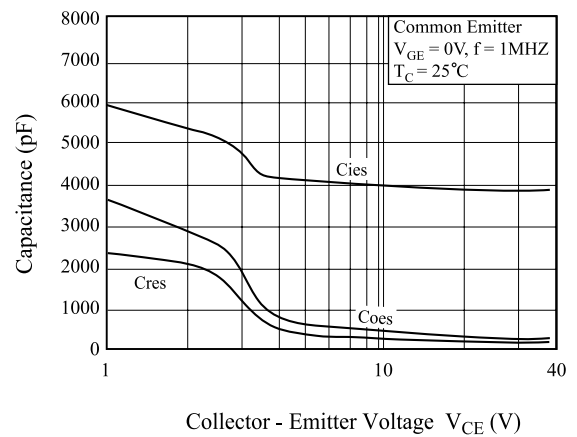


Fig.9 Capacitance Characteristics



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Discrete IGBTs

Fig.10 Turn-On Characteristics vs. Gate Resistance

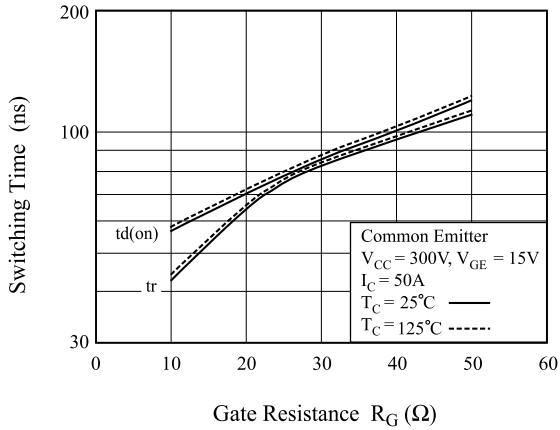


Fig.11 Turn-Off Characteristics vs. Gate Resistance

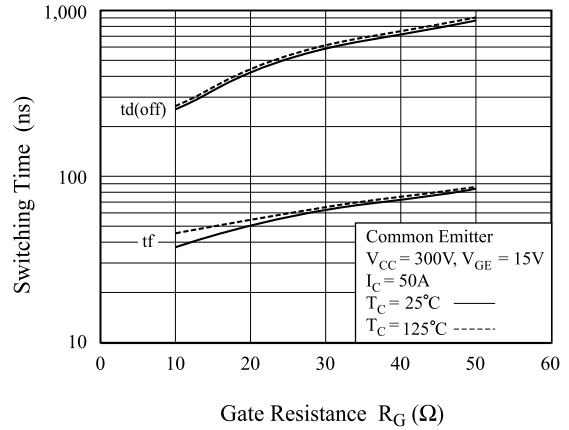


Fig.12 Switching Loss vs. Gate Resistance

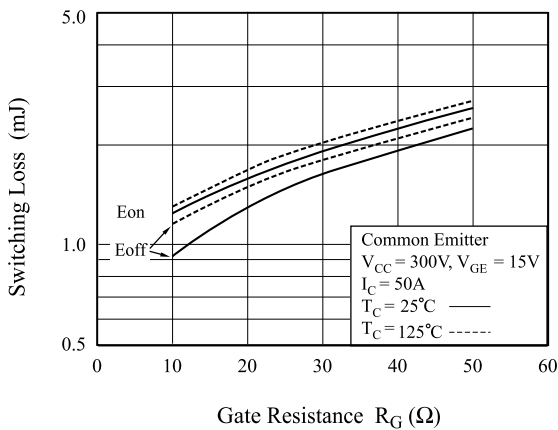


Fig.13 Turn-On Characteristics vs. Collector Current

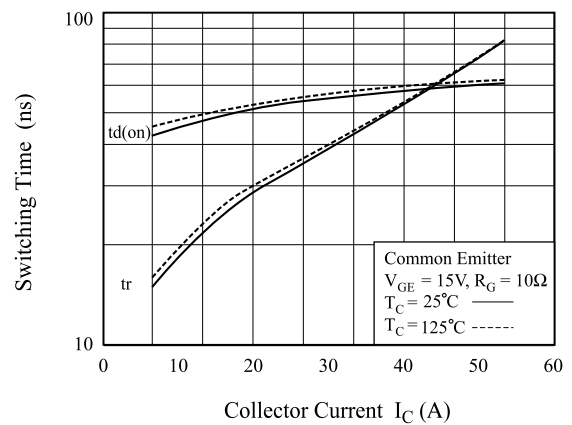


Fig.14 Turn-Off Characteristics vs. Collector Current

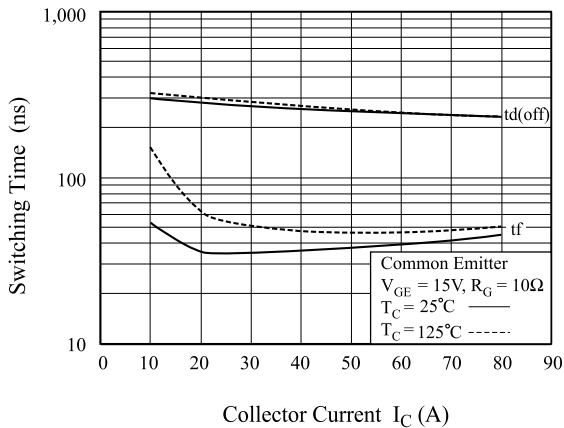
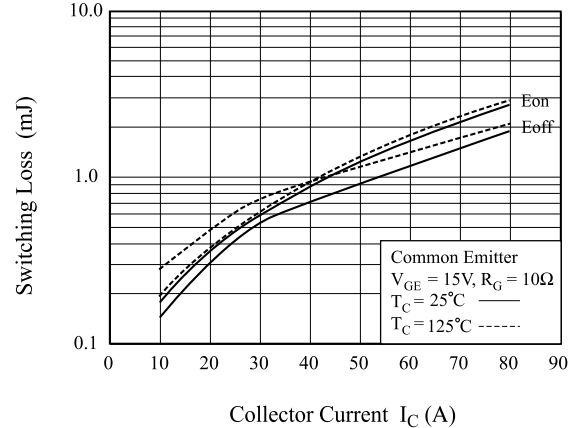


Fig.15 Switching Loss vs. Collector Current



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Fig.16 Gate Charge Characteristics

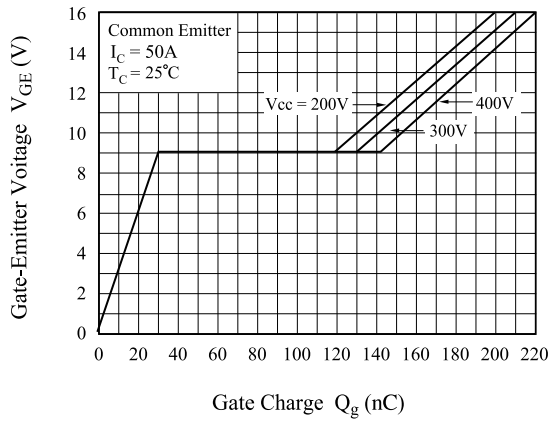


Fig.17 SOA Characteristics

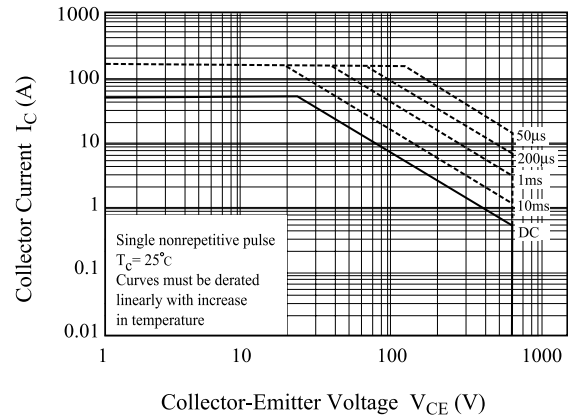


Fig.18 Turn-Off SOA

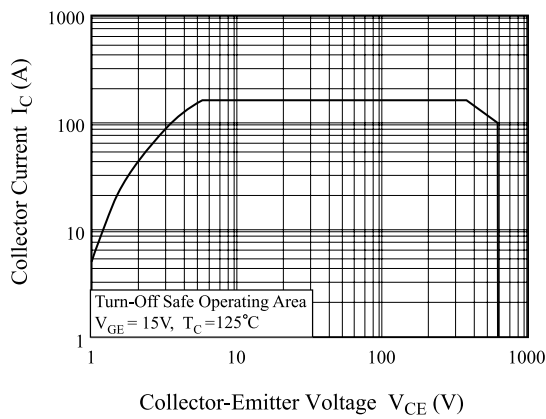
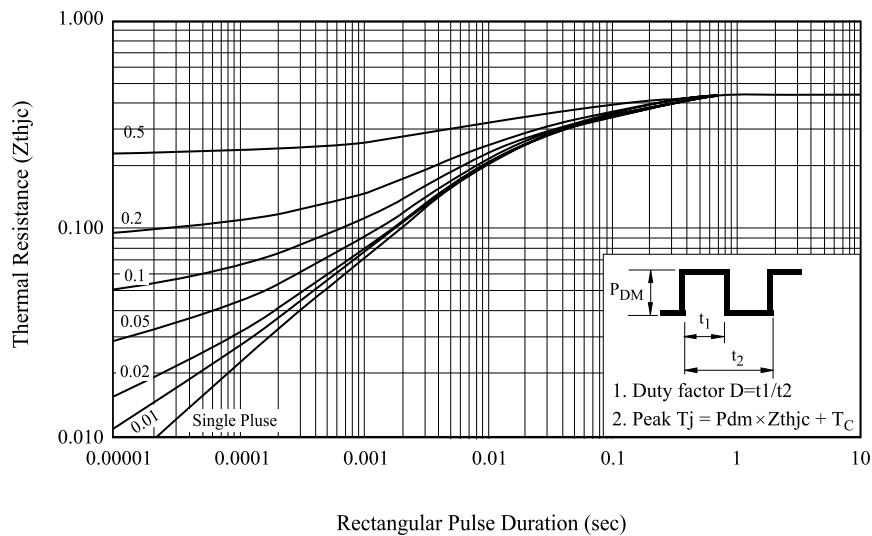


Fig.19 Transient Thermal Impedance of IGBT



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Discrete IGBTs

Fig.20 Switching Test Circuit

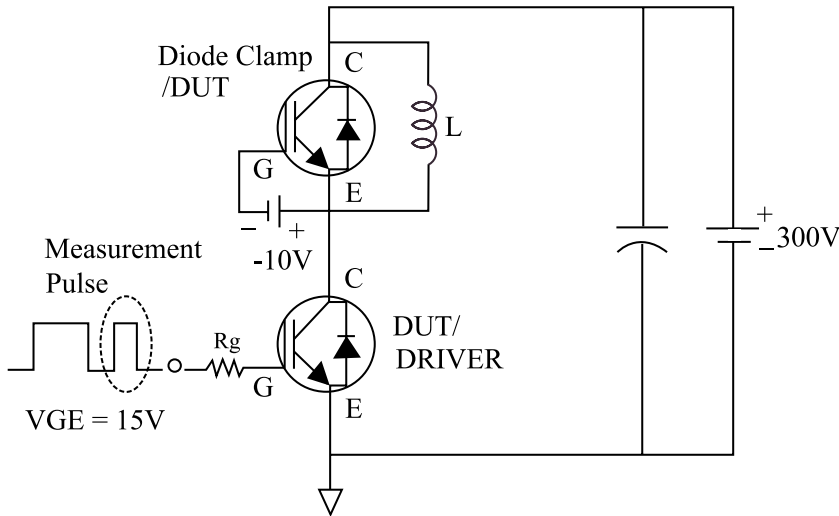


Fig.21 Definition Switching Time & Loss

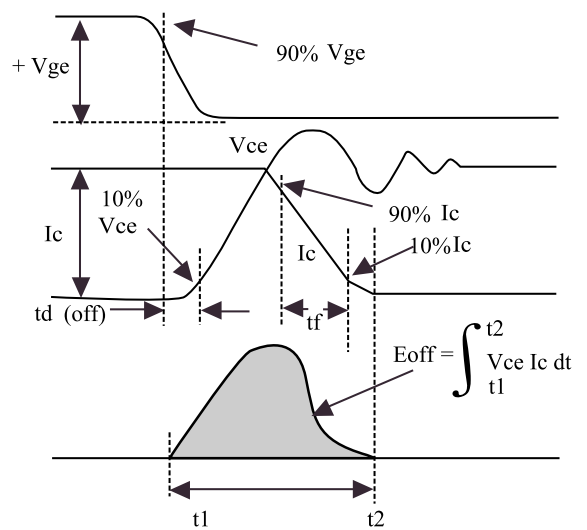
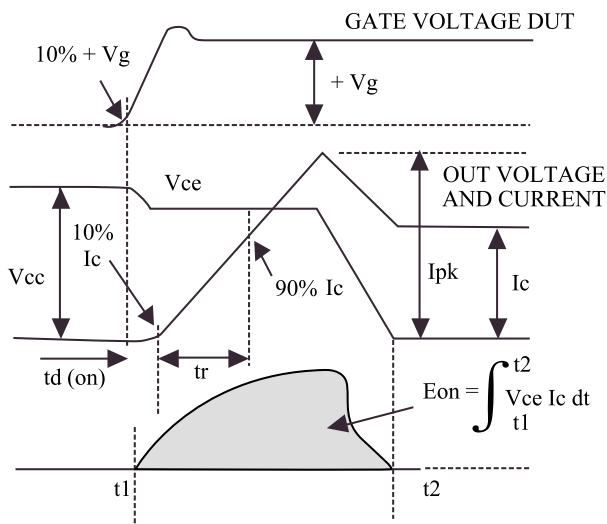


Fig.22 Definition Diode Switching Time

