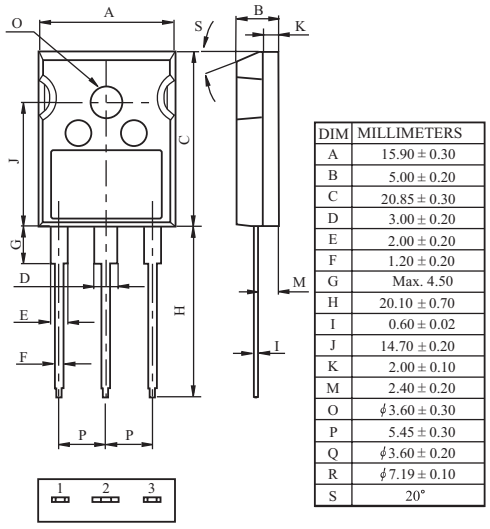
General Description

KEC Field Stop Trench IGBTs offer low switching losses, high energy efficiency and short circuit ruggedness.

It is designed for applications such as Power Factor Correction(PFC), Inverterized MWO Welder, Uninterrupted Power Supplies(UPS) and General Converters.



DIM	MILLIMETERS
A	15.90 ± 0.30
B	5.00 ± 0.20
C	20.85 ± 0.30
D	3.00 ± 0.20
E	2.00 ± 0.20
F	1.20 ± 0.20
G	Max. 4.50
H	20.10 ± 0.70
I	0.60 ± 0.02
J	14.70 ± 0.20
K	2.00 ± 0.10
M	2.40 ± 0.20
O	ϕ3.60 ± 0.30
P	5.45 ± 0.30
Q	ϕ3.60 ± 0.20
R	ϕ7.19 ± 0.10
S	20°

TO-247

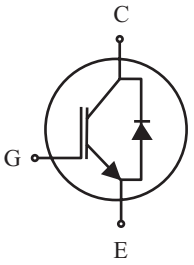
FEATURES

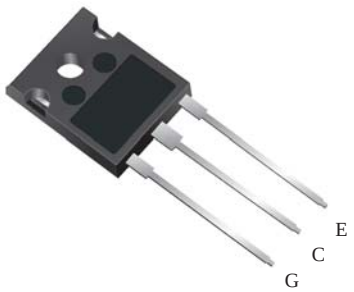
- High speed switching
- High ruggedness, temperature stable behavior
- Extremely enhanced avalanche capability

MAXIMUM RATING (Ta=25℃)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V_{CES}	650	V
Gate-Emitter Voltage		V_{GES}	±20	V
Collector Current	@Tc=25℃	I_C	100	A
	@Tc=100℃		50	A
Pulsed Collector Current		I_{CM}*	150	A
Diode Continuous Forward Current	@Tc=100℃	I_F	50	A
Diode Maximum Forward Current		I_{FM}	100	A
Maximum Power Dissipation	@Tc=25℃	P_D	300	W
	@Tc=100℃		150	W
Maximum Junction Temperature		T_j	175	℃
Storage Temperature Range		T_{stg}	-55 to + 150	℃

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





THERMAL CHARACTERISTIC

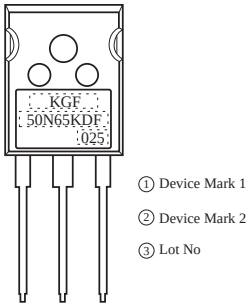
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Junction to Case (IGBT)	$R_{th\,JC}$	0.5	℃/W
Thermal Resistance, Junction to Case (DIODE)	$R_{th\,JC}$	1.47	℃/W
Thermal Resistance, Junction to Ambient	$R_{th\,JA}$	40	℃/W

ELECTRICAL CHARACTERISTICS (Ta=25℃)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	V_{GE}=0V , I_C=250 μA	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=0.5mA	4.2	5.3	6.4	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=50A	-	1.75	2.1	V
		V_{GE}=15V, I_C=100A	-	2.44	-	V
		V_{GE}=15V, I_C=50A, T_C = 150℃	-	2.1	-	V
Dynamic						
Total Gate Charge	Q_g	V_{CC}=300V, V_{GE}=15V, I_C= 50A	-	92	-	nC
Gate-Emitter Charge	Q_{ge}		-	18	-	nC
Gate-Collector Charge	Q_{gc}		-	35	-	nC
Turn-On Delay Time	$t_{d(on)}$	V_{CC}=300V, V_{GE}=15V, I_C=50A, R_G=10Ω Inductive Load, T_C = 25℃ (Note 1)	-	51	-	ns
Rise Time	t_r		-	62	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	144	-	ns
Fall Time	t_f		-	26	-	ns
Turn-On Switching Loss	E_{on}		-	1.48	-	mJ
Turn-Off Switching Loss	E_{off}		-	0.57	-	mJ
Total Switching Loss	E_{ts}		-	2.05	-	mJ
Turn-On Delay Time	$t_{d(on)}$	V_{CC}=300V, V_{GE}=15V, I_C=50A, R_G=10Ω Inductive Load, T_C = 150℃ (Note 1)	-	53	-	ns
Rise Time	t_r		-	65	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	163	-	ns
Fall Time	t_f		-	33	-	ns
Turn-On Switching Loss	E_{on}		-	1.65	-	mJ
Turn-Off Switching Loss	E_{off}		-	0.83	-	mJ
Total Switching Loss	E_{ts}		-	2.48	-	mJ
Input Capacitance	C_{ies}	V_{CE}=30V, V_{GE}=0V, f=1MHz	-	2386	-	pF
Ouput Capacitance	C_{oes}		-	131	-	pF
Reverse Transfer Capacitance	C_{res}		-	98	-	pF
Short Circuit Withstand Time	t_{sc}	V_{CC}=300V, V_{GE}=15V, T_C=100℃	5	-	-	μs

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

Marking



① Device Mark 1
② Device Mark 2
③ Lot No

ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	V_F	I_F = 50A	T_C=25℃	-	1.9	-	V
			T_C=150℃	-	2.0	-	
Diode Reverse Recovery Time	t_{rr}	V_{CC} = 300V I_F = 50A di/dt = 300A/ μs	T_C=25℃	-	97.5	-	ns
			T_C=150℃	-	155	-	
Diode Peak Reverse Recovery Current	I_{rr}		T_C=25℃	-	8.5	-	A
			T_C=150℃	-	12.7	-	
Diode Reverse Recovery Charge	Q_{rr}		T_C=25℃	-	0.6	-	μC
			T_C=150℃	-	1.4	-	

Fig 1. Saturation Voltage Characteristics

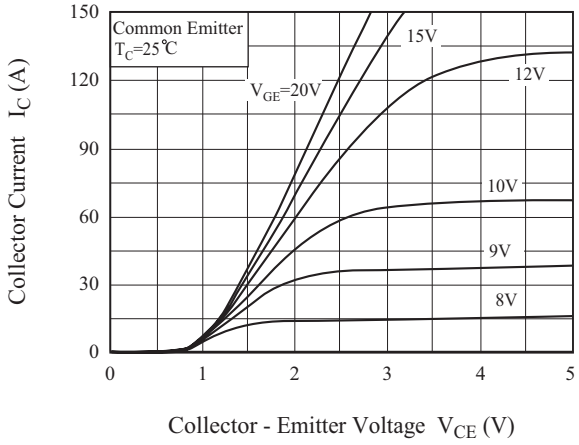


Fig 2. Saturation Voltage Characteristics

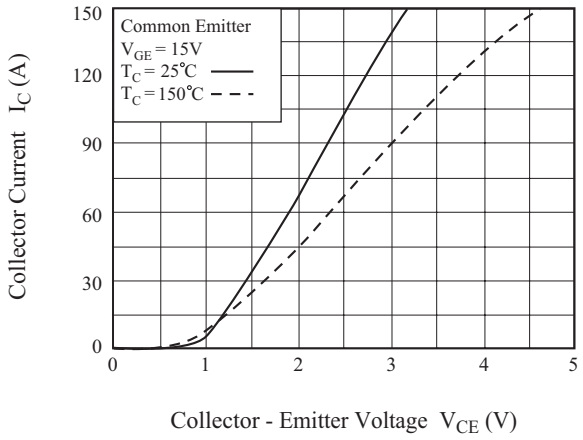


Fig 3. Saturation Voltage vs. Case Temperature

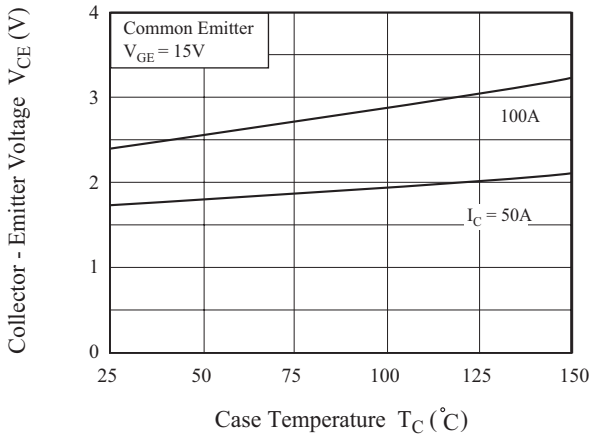


Fig 4. Saturation Voltage vs. V_{GE}

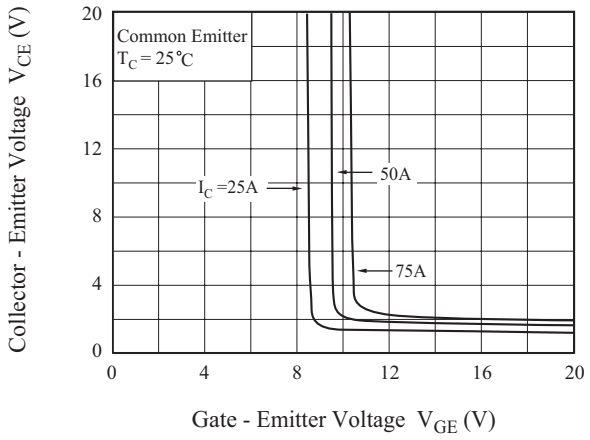


Fig 5. Saturation Voltage vs. V_{GE}

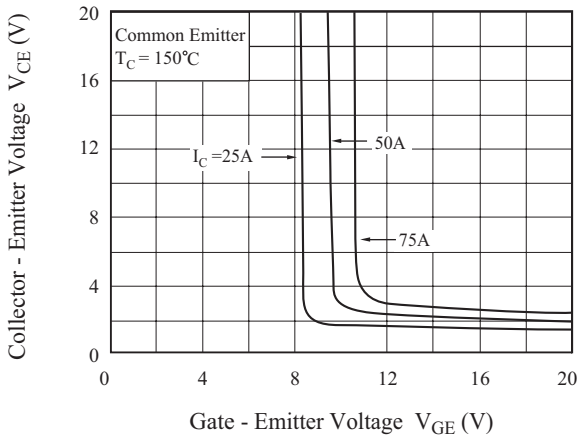


Fig 6. Capacitance Characteristics

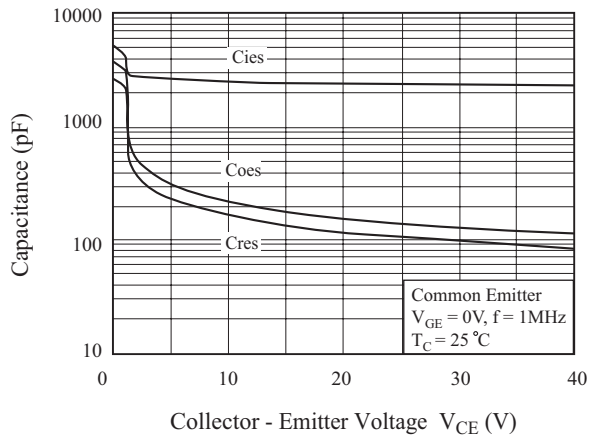


Fig 7. Turn-On Characteristics vs. Gate Resistance

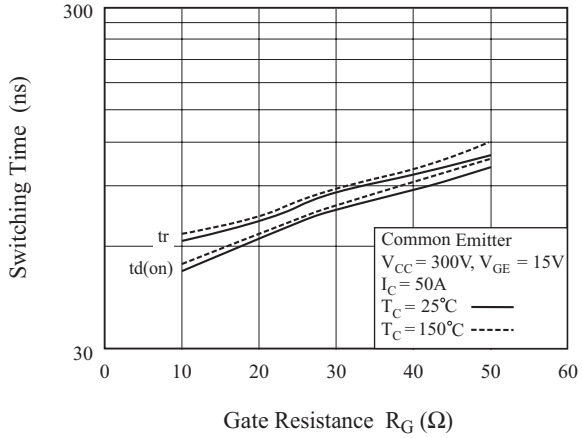


Fig 8. Turn-Off Characteristics vs. Gate Resistance

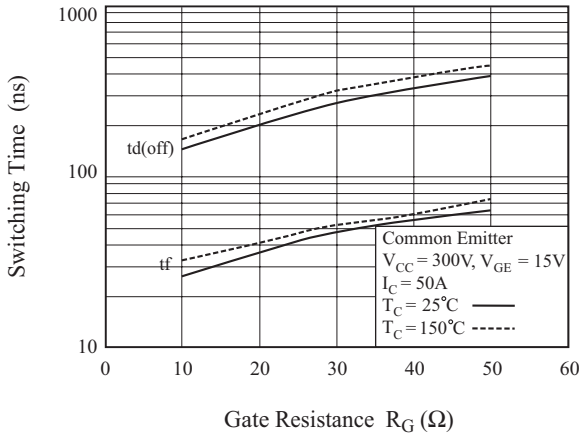


Fig 9. Switching Loss vs. Gate Resistance

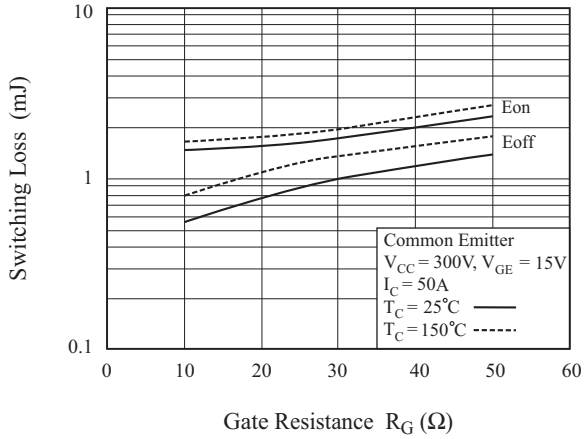


Fig 10. Turn-On Characteristics vs. Collector Current

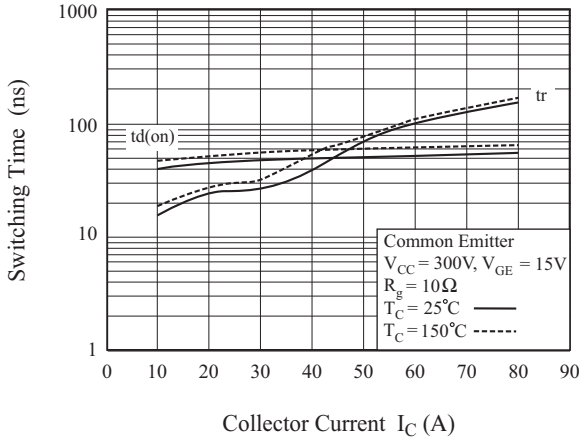


Fig 11. Turn-Off Characteristics vs. Collector Current

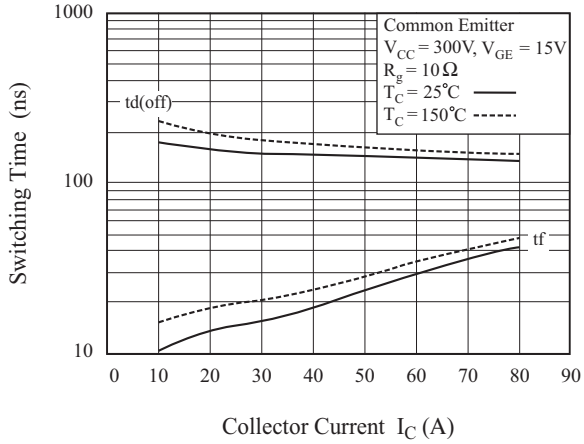


Fig 12. Switching Loss vs. Collector Current

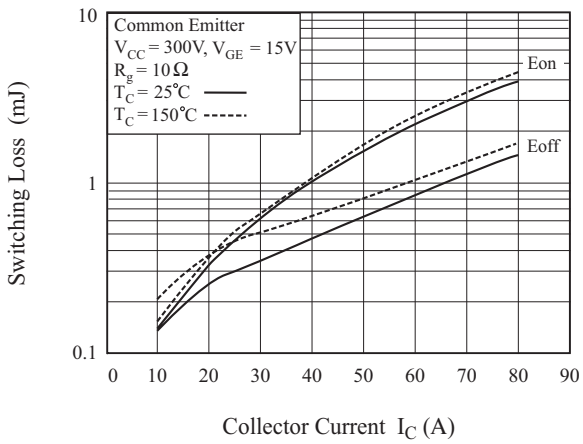


Fig 13. Gate Charge Characteristics

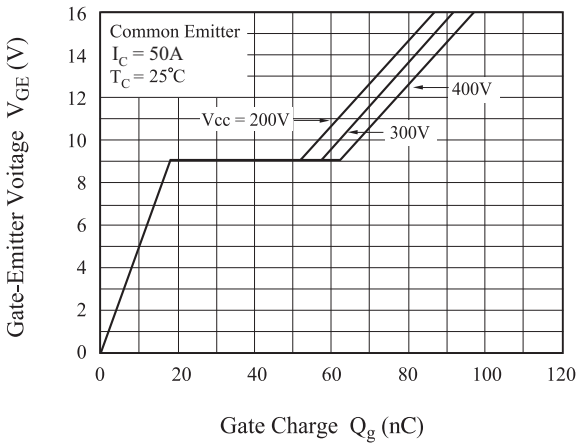


Fig 14. SOA Characteristics

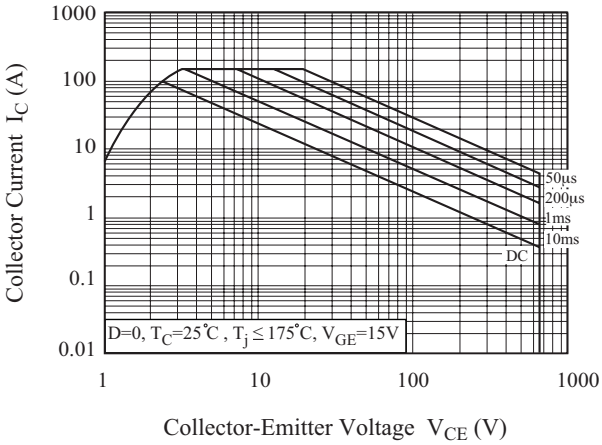


Fig 15. Transient Thermal Impedance of IGBT

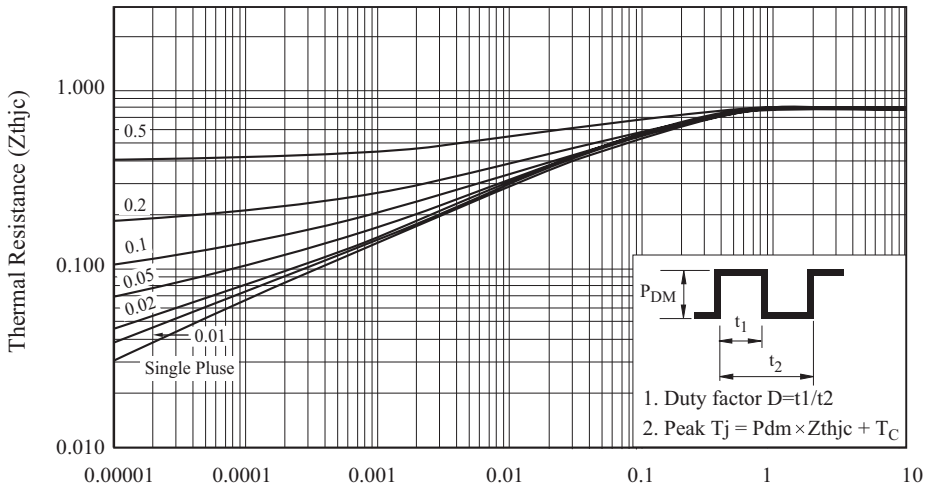


Fig 16. Forward Characteristics

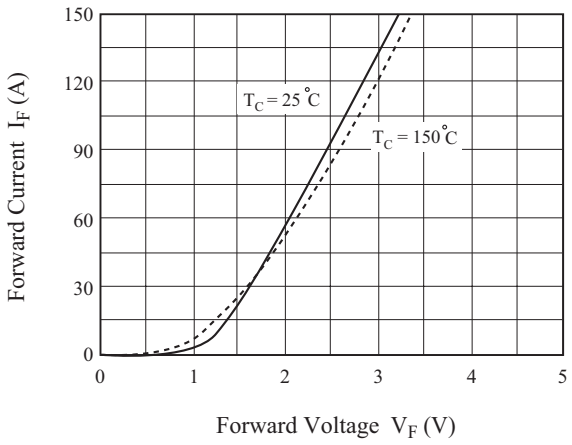


Fig 17. Reverse Recovery Current

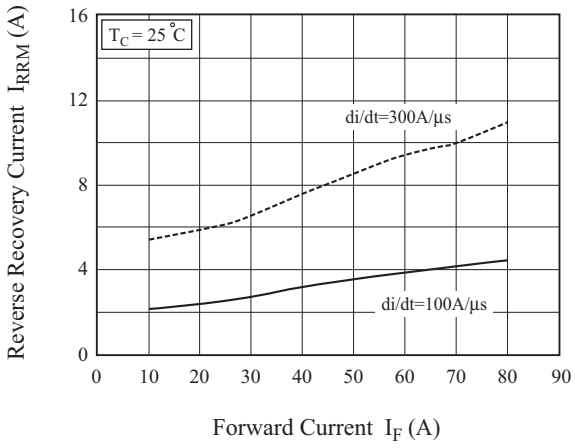


Fig 18. Reverse Recovery Time

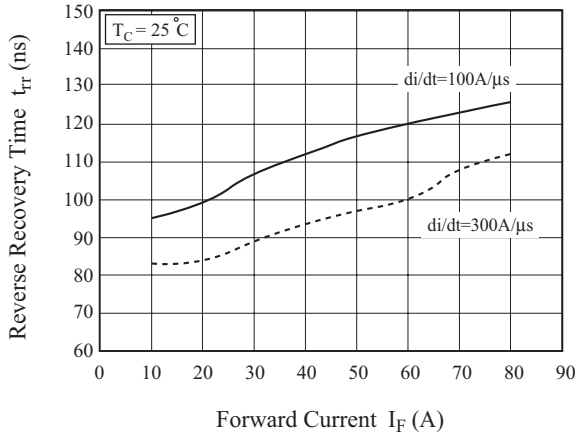


Fig 19. Switching Test Circuit

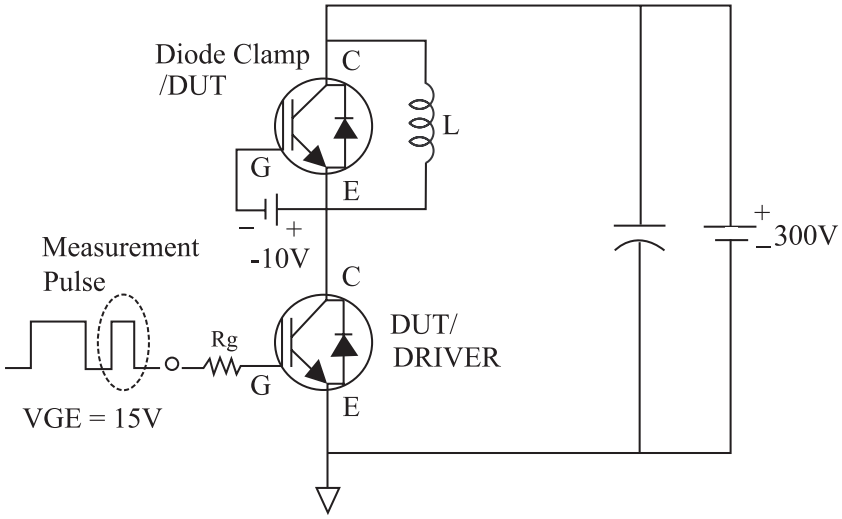
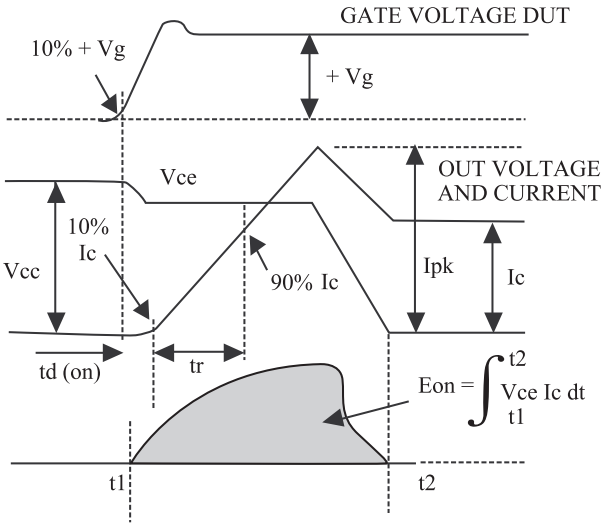


Fig 20. Definition Switching Time & Loss



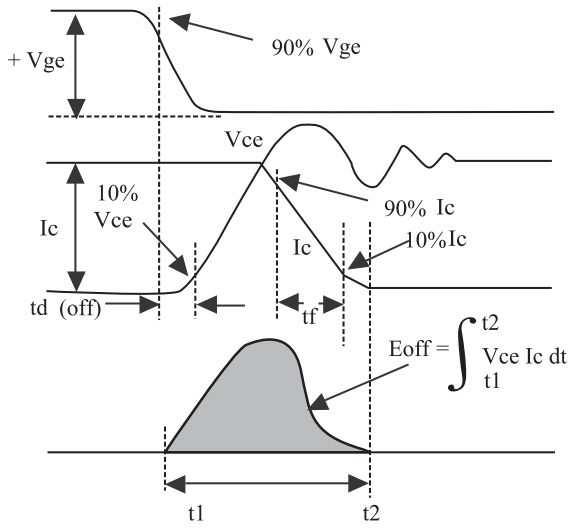


Fig 21. Definition Diode Switching Time