

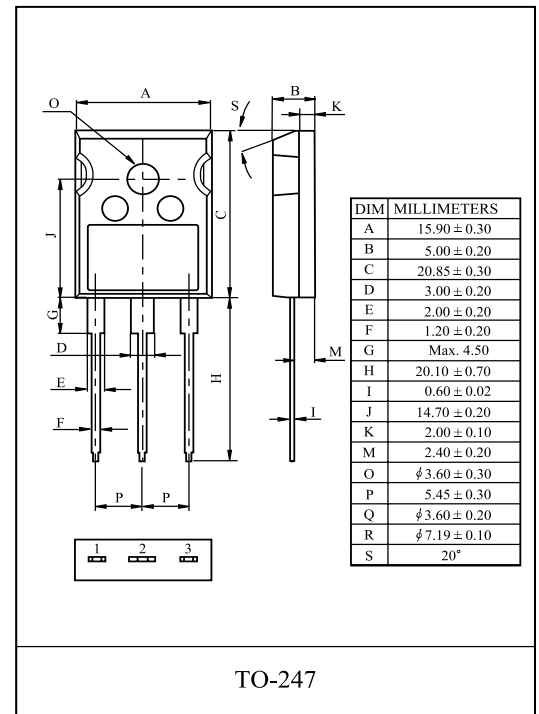
General Description

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

It is designed for applications such as motor control, uninterrupted power supplies(UPS), general inverters.

FEATURES

- High speed switching
- High system efficiency
- Short Circuit Withstand Times 10us
- Extremely enhanced avalanche capability



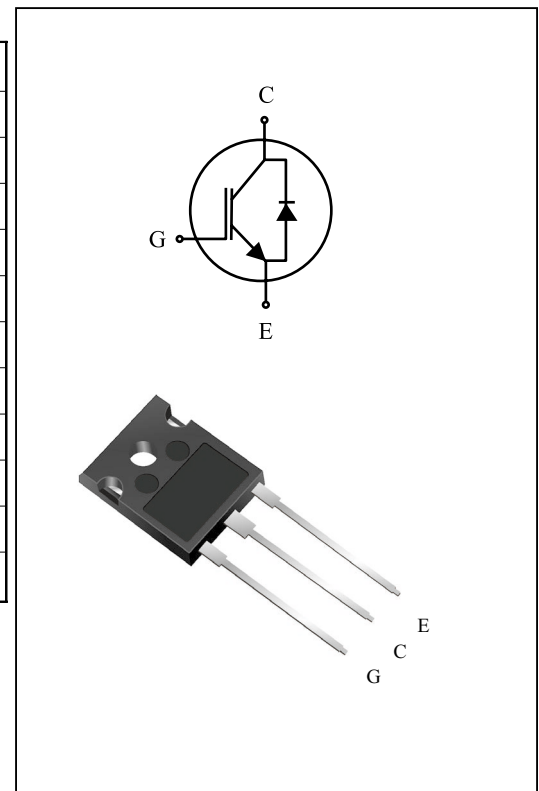
MAXIMUM RATING (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V_{CES}	1200	V
Gate-Emitter Voltage		V_{GES}	±20	V
Collector Current	@Tc=25°C	I_C	80	A
	@Tc=100°C		40	A
Pulsed Collector Current		I_{CM}^*	120	A
Diode Continuous Forward Current	@Tc=100°C	I_F	40	A
Diode Maximum Forward Current		I_{FM}	160	A
Maximum Power Dissipation	@Tc=25°C	P_D	357	W
	@Tc=100°C		140	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 (IGBT)	R_{thJC}	0.35	°C/W
Thermal Resistance, Junction to Case (DIODE)	R_{thJC}	1.1	°C/W
Thermal Resistance, Junction to Ambient	R_{thJA}	40	°C/W

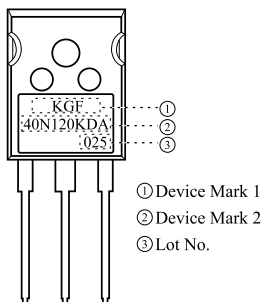


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ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Collector-Emitter Breakdown Voltage	BV _{CES}	V _{GE} =0V , I _C =1mA	1200	-	-	V
Collector Cut-off Current	I _{CES}	V _{GE} =0V, V _{CE} =1200V	-	-	1.0	mA
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 =40mA	4.5	6.0	7.5	V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =40A	-	1.9	2.25	V
		V _{GE} =15V, I _C =40A, T _C = 125°C	-	2.2	-	V
		V _{GE} =15V, I _C =80A	-	2.5	-	V
Dynamic						
Total Gate Charge	Q _g	V _{CC} =600V, V _{GE} =15V, I _C = 40A	-	230	350	nC
Gate-Emitter Charge	Q _{ge}		-	30	-	nC
Gate-Collector Charge	Q _{gc}		-	110	-	nC
Turn-On Delay Time	t _{d(on)}	V _{CC} =600V, I _C =40A, V _{GE} =15V,R _G =10Ω Inductive Load, T _C = 25°C	-	60	-	ns
Rise Time	t _r		-	45	-	ns
Turn-Off Delay Time	t _{d(off)}		-	310	-	ns
Fall Time	t _f		-	70	-	ns
Turn-On Switching Loss	E _{on}		-	3.5	5.2	mJ
Turn-Off Switching Loss	E _{off}		-	1.9	2.8	mJ
Total Switching Loss	E _{ts}		-	5.4	8.0	mJ
Turn-On Delay Time	t _{d(on)}	V _{CC} =600V, I _C =40A, V _{GE} =15V, R _G =10Ω Inductive Load, T _C = 125°C	-	60	-	ns
Rise Time	t _r		-	50	-	ns
Turn-Off Delay Time	t _{d(off)}		-	350	-	ns
Fall Time	t _f		-	175	-	ns
Turn-On Switching Loss	E _{on}		-	4.3	6.4	mJ
Turn-Off Switching Loss	E _{off}		-	3.0	4.5	mJ
Total Switching Loss	E _{ts}		-	7.3	10.9	mJ
Input Capacitance	C _{ies}	V _{CE} =30V, V _{GE} =0V, f=1MHz	-	4800	-	pF
Ouput Capacitance	C _{oes}		-	195	-	pF
Reverse Transfer Capacitance	C _{res}		-	135	-	pF
Short Circuit Withstand Time	t _{sc}	V _{CC} =600V, V _{GE} =15V, T _C =100°C	10	-	-	μs

Marking



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ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	V _F	I _F = 40A	T _C =25°C	-	2.2	2.6	V
			T _C =125°C	-	1.9	-	
Diode Reverse Recovery Time	t _{rr}	I _F = 40A di/dt = 200A/ μs	T _C =25°C	-	360	520	ns
			T _C =125°C	-	460	-	
Diode Peak Reverse Recovery Current	I _{rr}		T _C =25°C	-	16	21	A
			T _C =125°C	-	19	-	
Diode Reverse Recovery Charge	Q _{rr}		T _C =25°C	-	2800	4200	nC
			T _C =125°C	-	5200	-	

Fig 1. Saturation Voltage Characteristics

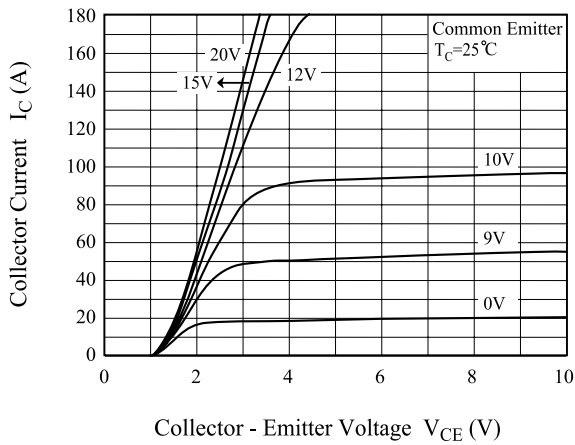


Fig 2. Saturation Voltage Characteristics

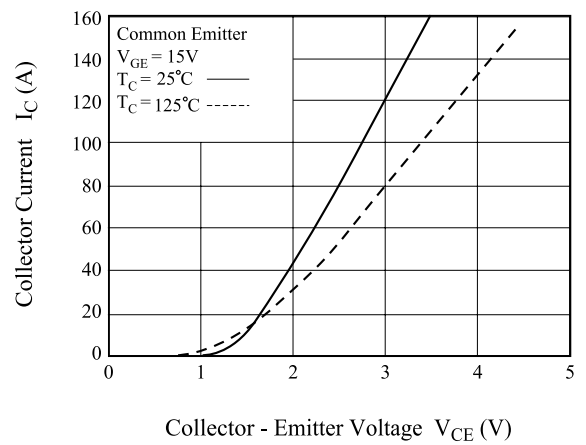


Fig 3. Saturation Voltage vs. Case Temperature

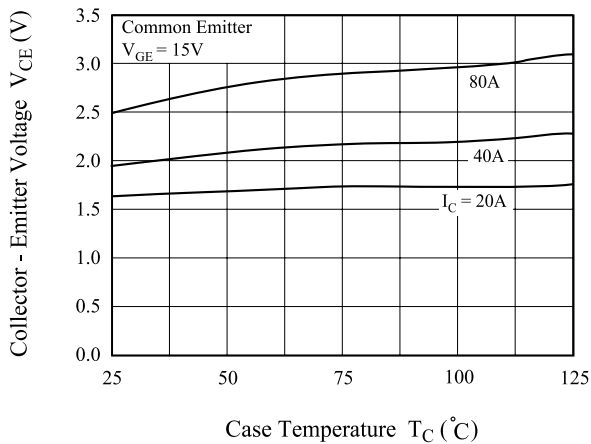


Fig 4. Saturation Voltage vs. V_{GE}

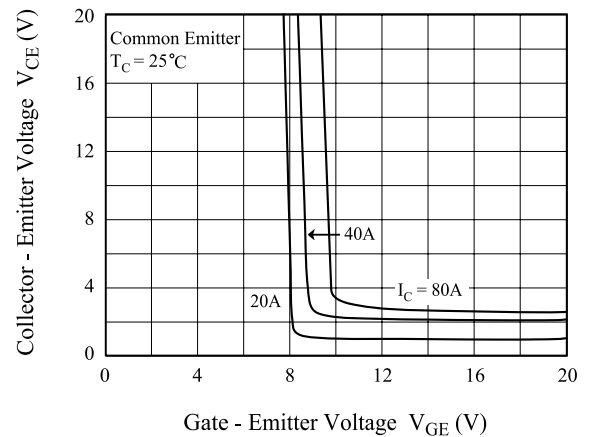


Fig 5. Saturation Voltage vs. V_{GE}

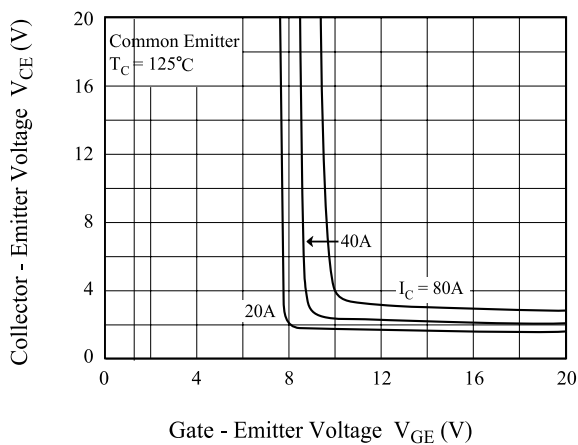
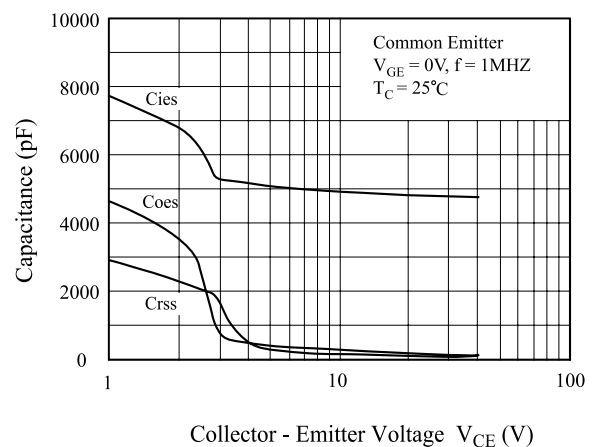


Fig 6. Capacitance Characteristics



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Fig 7. Turn-On Characteristics vs. Gate Resistance

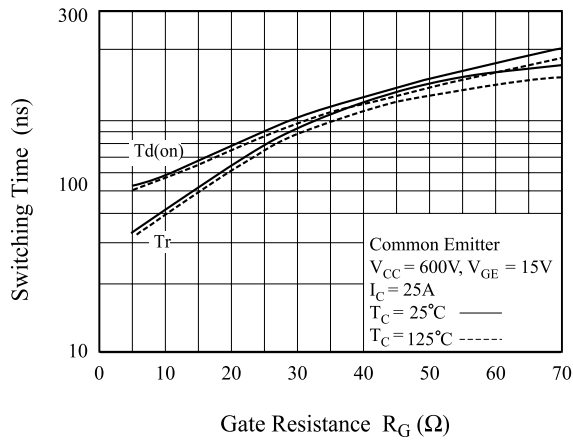


Fig 8. Turn-Off Characteristics vs. Gate Resistance

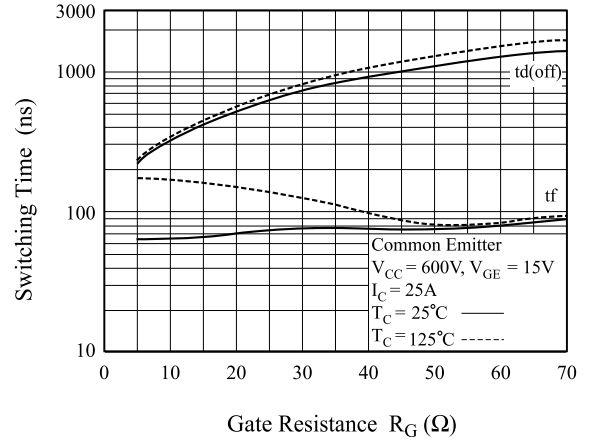


Fig 9. Switching Loss vs. Gate Resistance

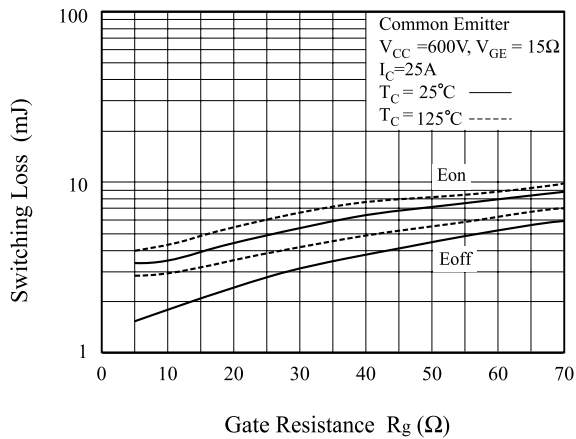


Fig 10. Turn-On Characteristics vs Collector Current

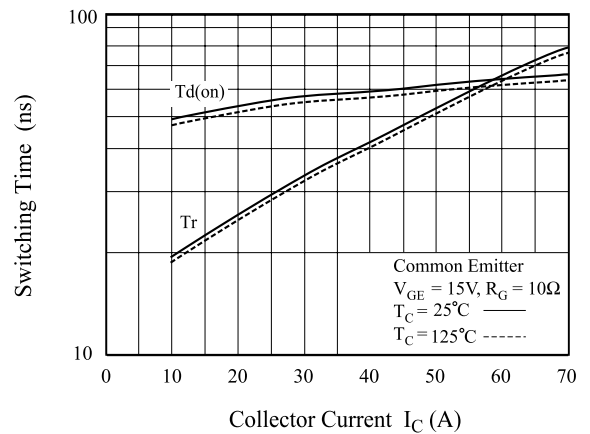


Fig 11. Turn-Off Characteristics vs Collector Current

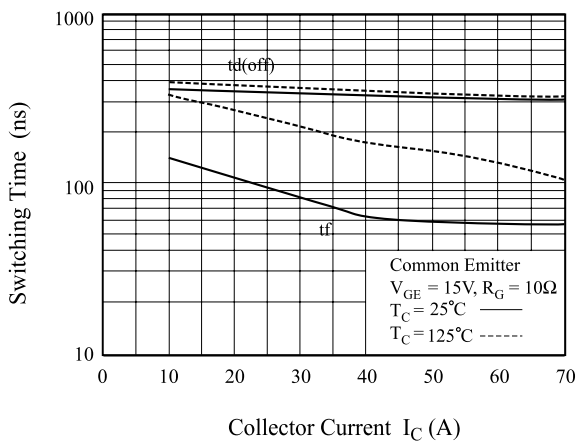
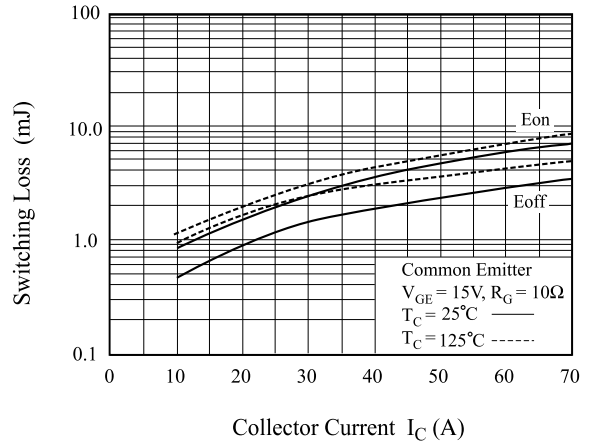


Fig 12. Switching Loss vs. Collector Current



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Fig 13. Gate Charge Characteristics

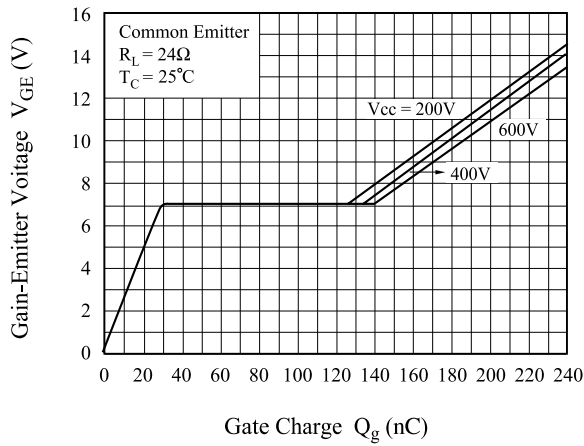


Fig 14. SOA Characteristics

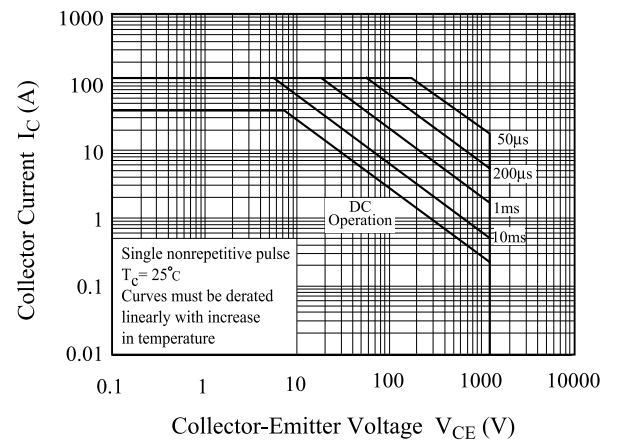


Fig 15. Turn-Off SOA

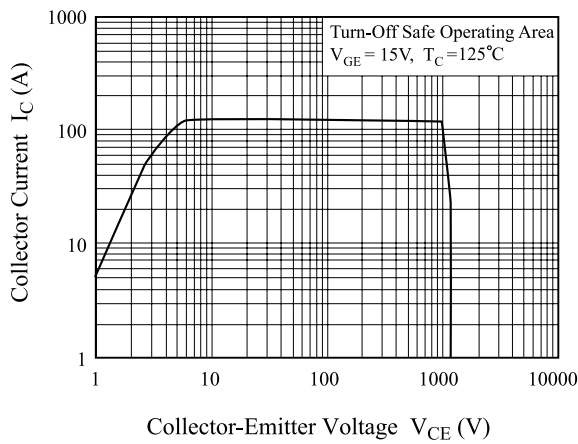


Fig 16. Transient Thermal Impedance of IGBT

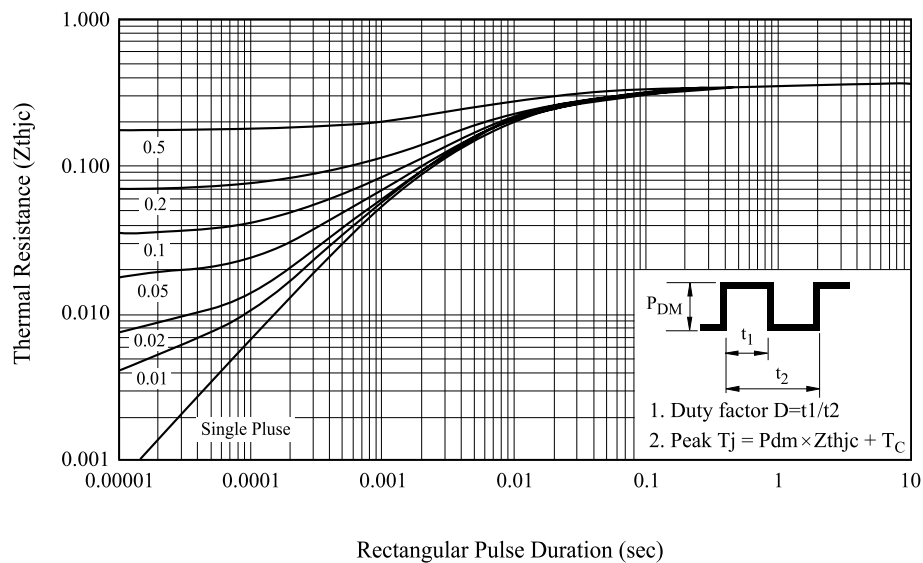


Fig 17. Forward Characteristics

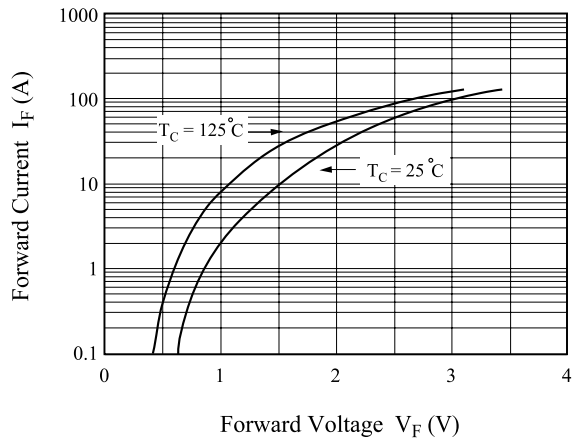


Fig 18. Reverse Recovery Current

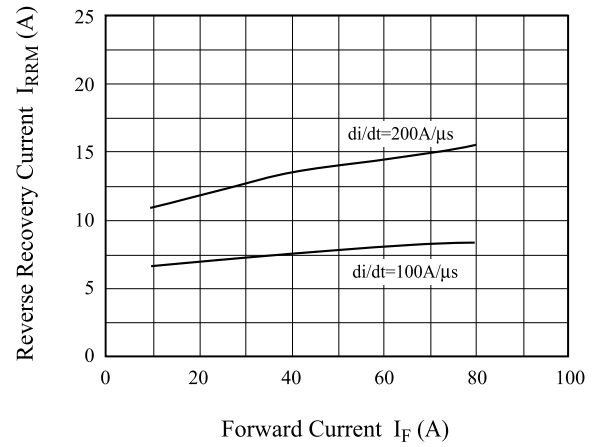


Fig 19. Reverse Recovery Time

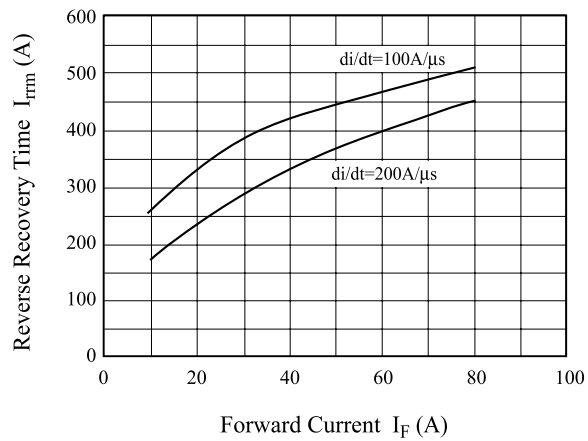


Fig 21. Switching Test Circuit

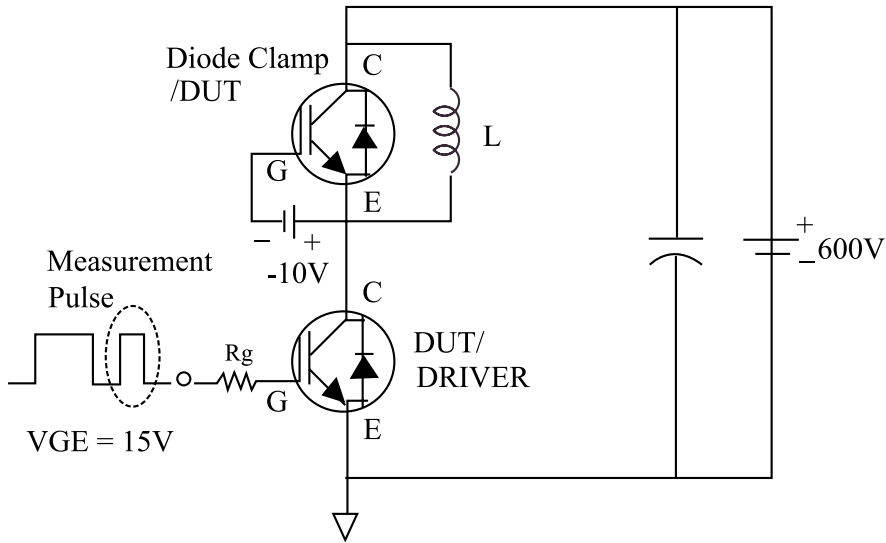


Fig 22. Definition Switching Time & Loss

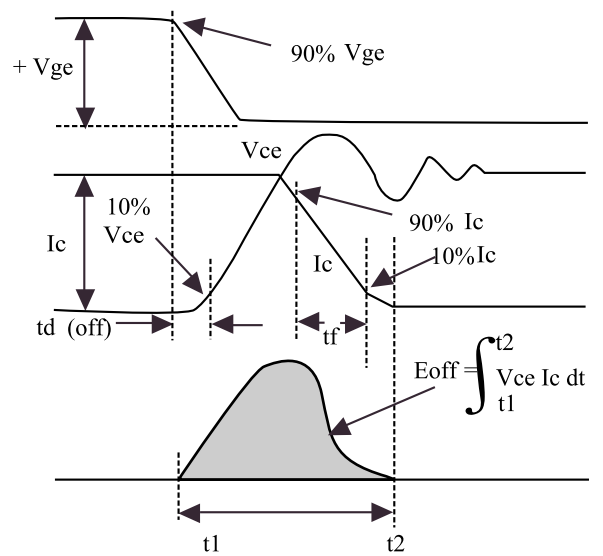
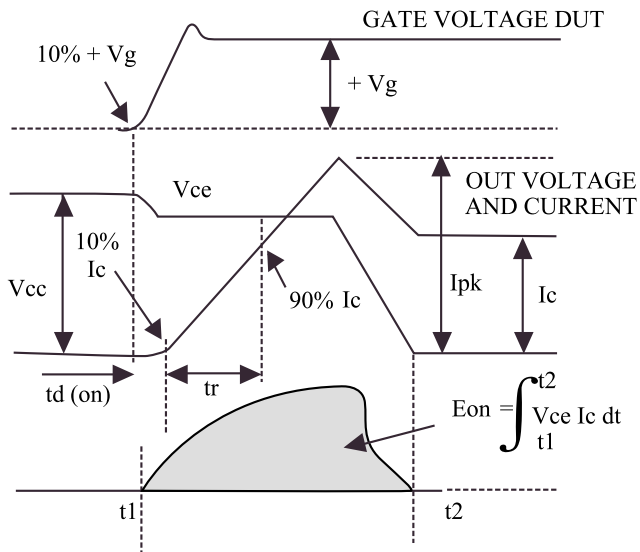


Fig 23. Definition Diode Switching Time

