

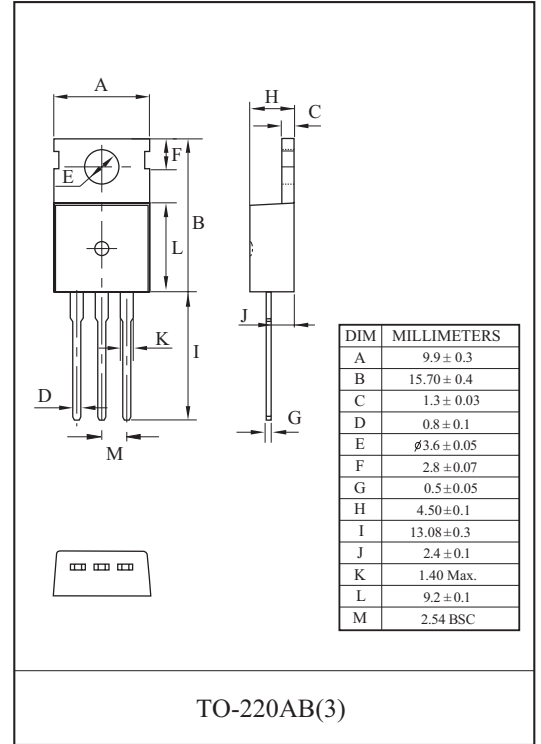
General Description

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.

FEATURES

- High speed switching
- High ruggedness, temperature stable behavior
- Short Circuit Withstand Times > 5 μ s(@T_C=100)
- Extremely enhanced avalanche capability



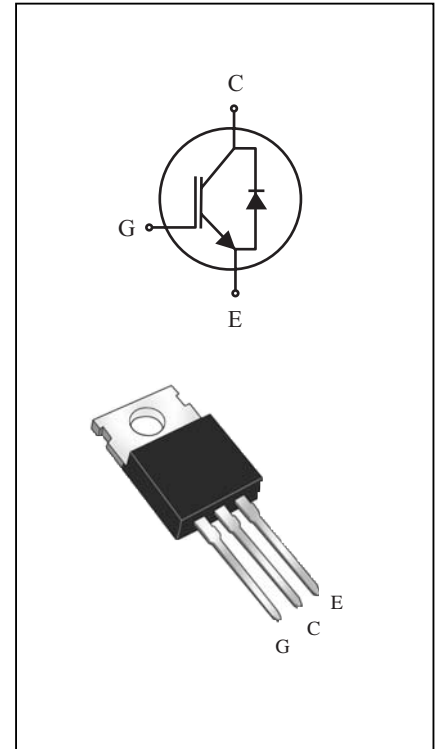
MAXIMUM RATING (T_a=25)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	V _{CES}	650	V
Gate-Emitter Voltage	V _{GES}	± 20	V
Collector Current	@T _c =25	30	A
	@T _c =100	15	A
Pulsed Collector Current	I _{CM} *	45	A
Diode Continuous Forward Current	@T _c =25	I _F	15 A
Diode Maximum Forward Current	I _{FM}	45	A
Maximum Power Dissipation	@T _c =25	P _D	99 W
	@T _c =100		39 W
Maximum Junction Temperature	T _j	150	
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}	1.26	/W
Thermal Resistance, Junction to Case (DIODE)	R _{th,JC}	3.0	/W
Thermal Resistance, Junction to Ambient	R _{th,JA}	62.5	/W



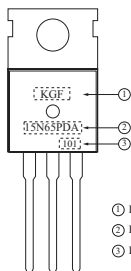
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ELECTRICAL CHARACTERISTICS (Ta=25)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Static							
Collector-Emitter Brekdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250 \mu A$	650	-	-	V	
Collector Cut-off Current	I_{CES}	$V_{GE}=0V, V_{CE}=650V$	-	-	250	μA	
Gate Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}= \pm 20V$	-	-	± 100	nA	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=2mA$	3.9	4.9	5.9	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A$	-	1.75	2.1	V	
		$V_{GE}=15V, I_C=30A, T_C = 25$	-	2.34	-	V	
		$V_{GE}=15V, I_C=15A, T_C = 125$	-	1.96	-	V	
Dynamic							
Total Gate Charge	Q_g	$V_{CC}=300V, V_{GE}=15V, I_C= 15A$	-	29	-	nC	
Gate-Emitter Charge	Q_{ge}		-	6.5	-	nC	
Gate-Collector Charge	Q_{gc}		-	11.5	-	nC	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=300V, I_C=15A, V_{GE}=15V, R_G=10$ Resistive Load, $T_C = 25$ (Note1)	-	21	-	ns	
Rise Time	t_r		-	12	-	ns	
Turn-Off Delay Time	$t_{d(off)}$		-	58	-	ns	
Fall Time	t_f		-	14	-	ns	
Turn-On Switching Loss	E_{on}		-	0.17	0.20	mJ	
Turn-Off Switching Loss *Note(1)	E_{off}		-	0.07	0.09	mJ	
Total Switching Loss	E_{ts}		-	0.24	0.29	mJ	
Turn-On Delay Time	$t_{d(on)}$		$V_{CC}=300V, I_C=15A, V_{GE}=15V, R_G=10$ Resistive Load, $T_C = 125$ (Note1)	-	21	-	ns
Rise Time	t_r			-	15	-	ns
Turn-Off Delay Time	$t_{d(off)}$			-	60	-	ns
Fall Time	t_f	-		23	-	ns	
Turn-On Switching Loss	E_{on}	-		0.15	-	mJ	
Turn-Off Switching Loss *Note(1)	E_{off}	-		0.14	-	mJ	
Total Switching Loss	E_{ts}	-		0.29	-	mJ	
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	-	827	992	pF	
Ouput Capacitance	C_{oes}		-	54.75	-	pF	
Reverse Transfer Capacitance	C_{res}		-	39.18	-	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.

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ELECTRICAL CHARACTERISTICS OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	V_F	$I_F=15A$	$T_C = 25$	-	1.87	-	V
			$T_C = 125$	-	1.93	-	
Diode Reverse Recovery Time	t_{rr}		$T_C = 25$	-	45	-	ns
			$T_C = 125$	-	59	-	
Diode Peak Reverse Recovery Current	I_{rr}	$V_{CC}=300V, I_F=15A,$ $di/dt=600A/\mu s$	$T_C = 25$	-	12	-	A
			$T_C = 125$	-	11.3	-	
Diode Reverse Recovery Charge	Q_{rr}		$T_C = 25$	-	0.38	-	μC
			$T_C = 125$	-	0.54	-	

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Fig 1. Saturation Voltage Characteristics

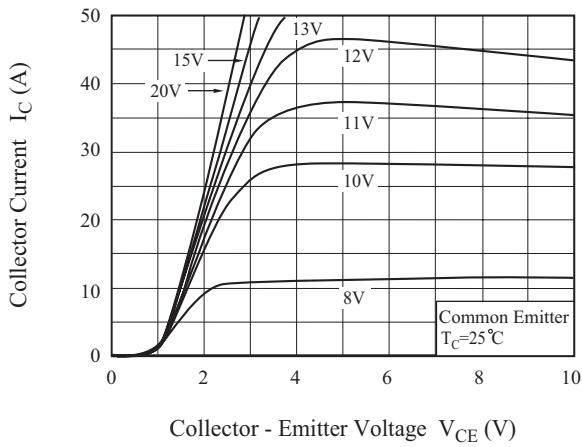


Fig 2. Saturation Voltage Characteristics

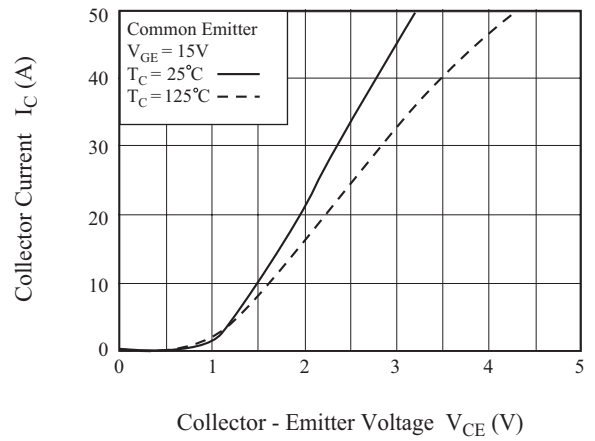


Fig 3. Saturation Voltage vs. Case Temperature

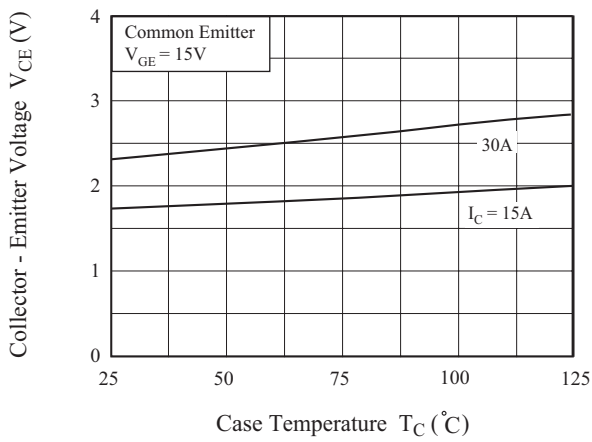


Fig 4. Saturation Voltage vs. V_GE

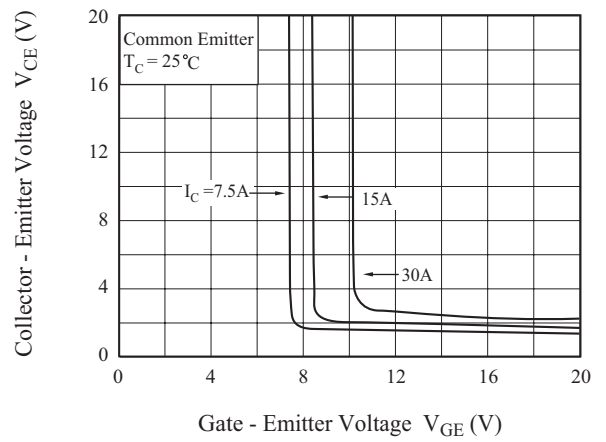


Fig 5. Saturation Voltage vs. V_GE

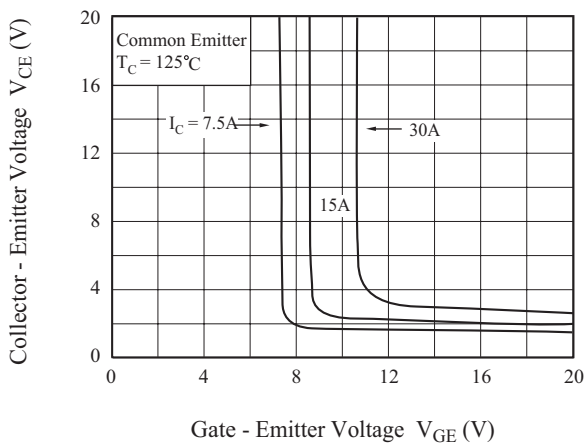


Fig 6. Capacitance Characteristics

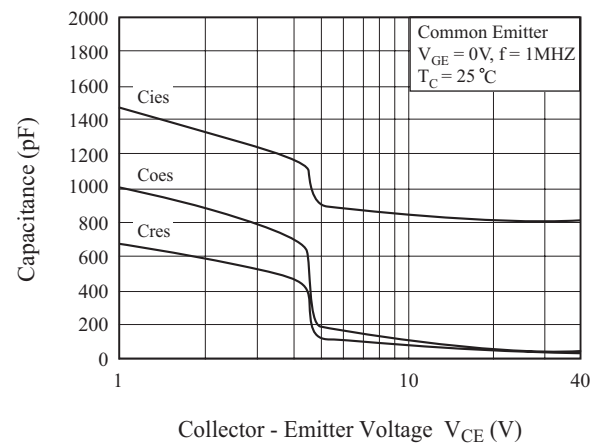


Fig 7. Turn-On Characteristics vs. Gate Resistance

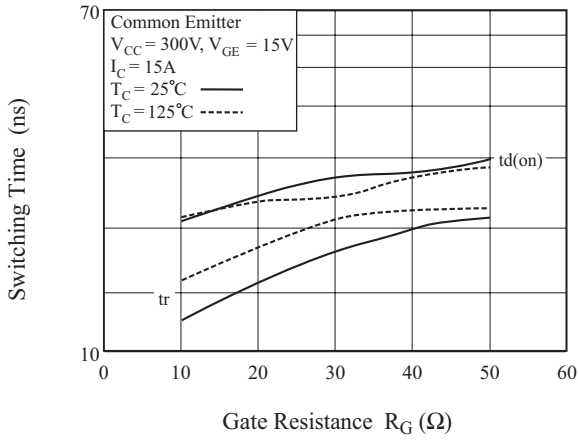


Fig 8. Turn-Off Characteristics vs. Gate Resistance

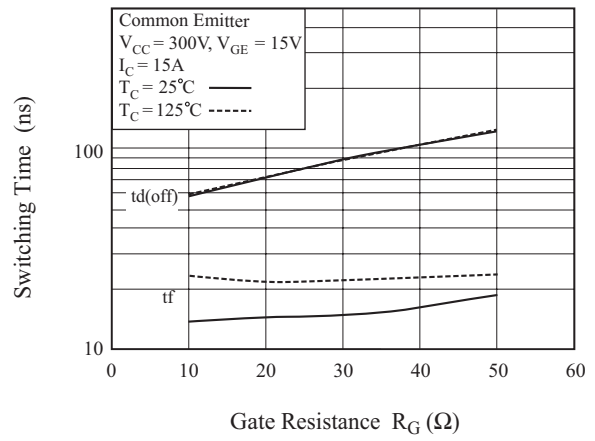


Fig 9. Switching Loss vs. Gate Resistance

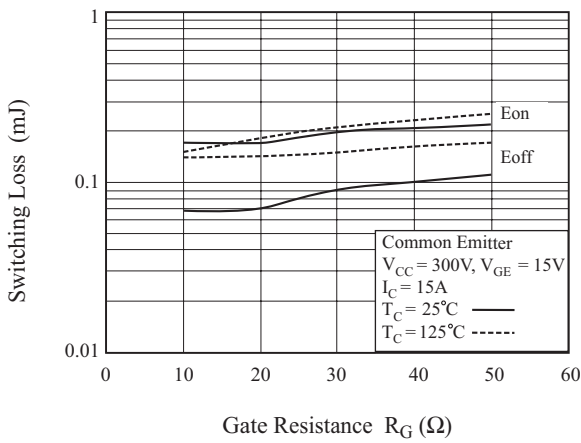


Fig 10. Turn-On Characteristics vs. Collector Current

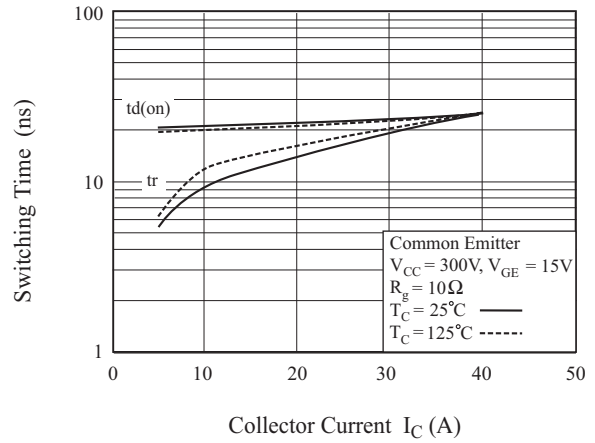


Fig 11. Turn-Off Characteristics vs. Collector Current

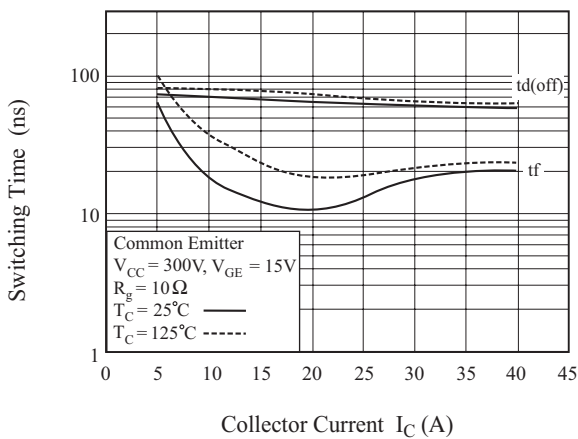
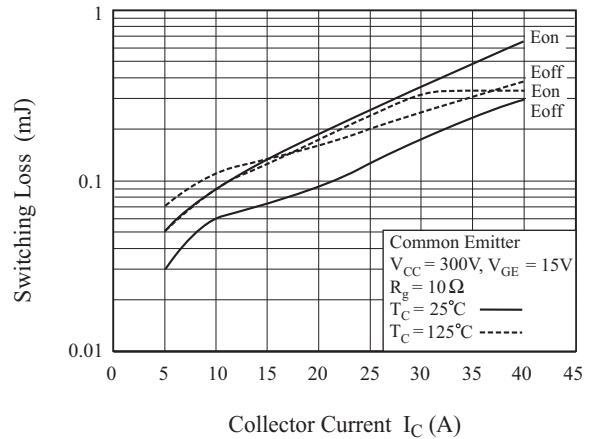


Fig 12. Switching Loss vs. Collector Current



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Fig 13. Gate Charge Characteristics

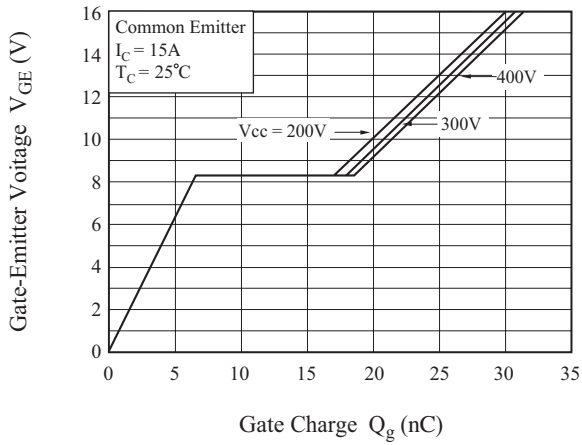


Fig 14. SOA Characteristics

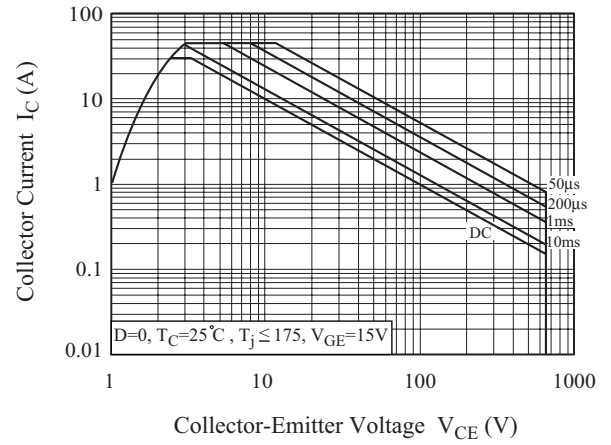


Fig 15. Turn-Off SOA

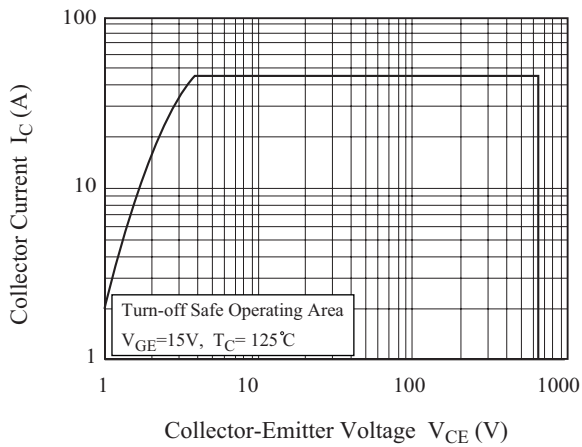
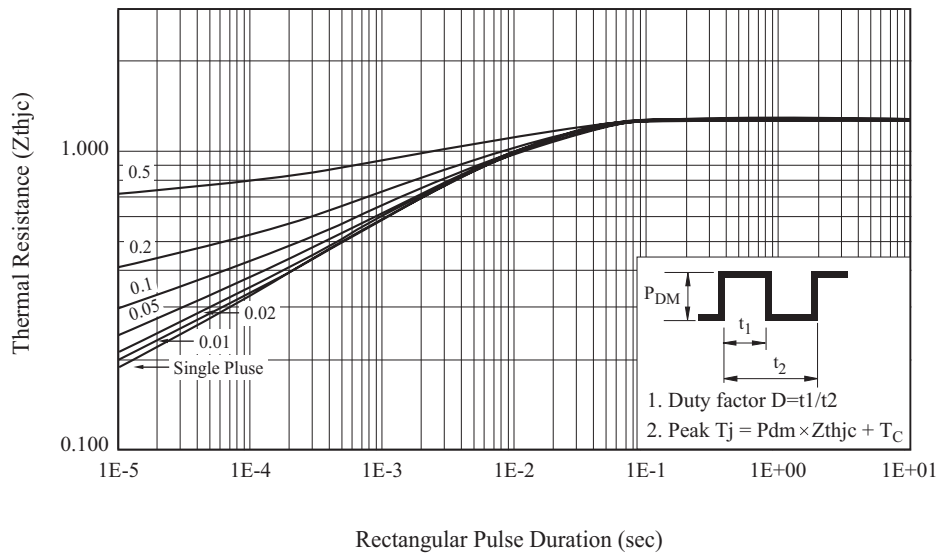


Fig 16. Transient Thermal Impedance of IGBT



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Fig 17. Forward Characteristics

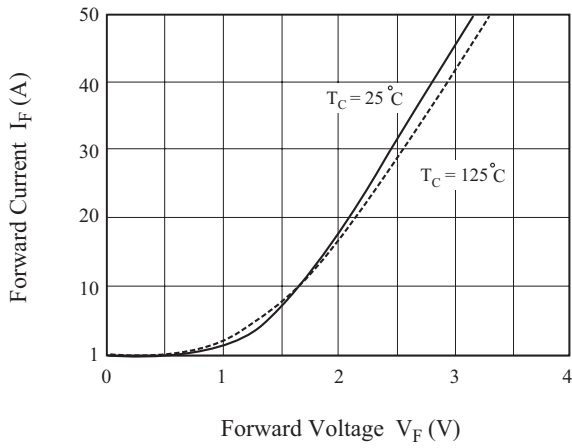


Fig 18. Reverse Recovery Current

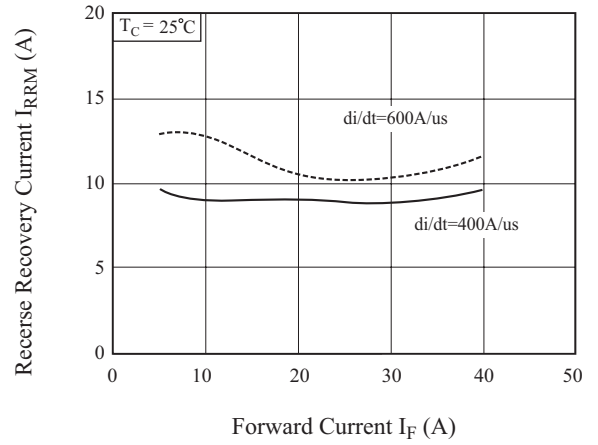


Fig 19. Reverse Recovery Time

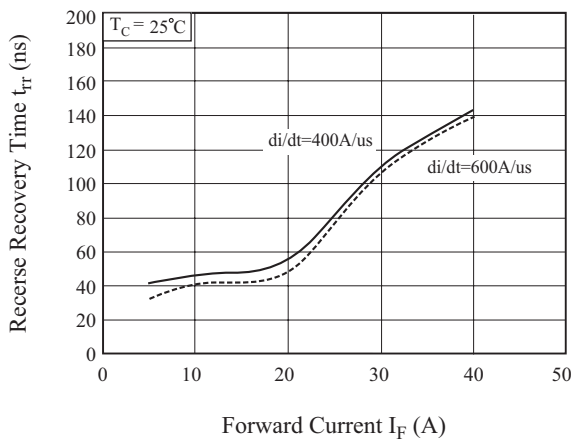


Fig 20. Switching Test Circuit

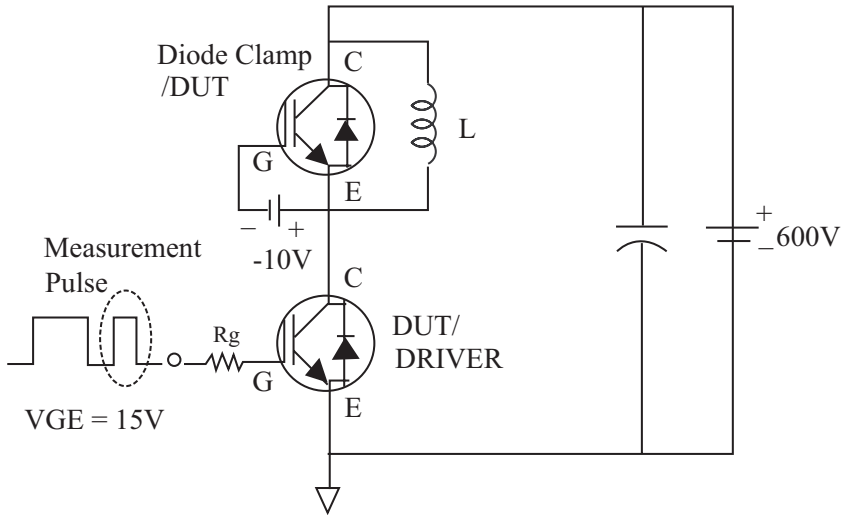


Fig 21. Definition Switching Time & Loss

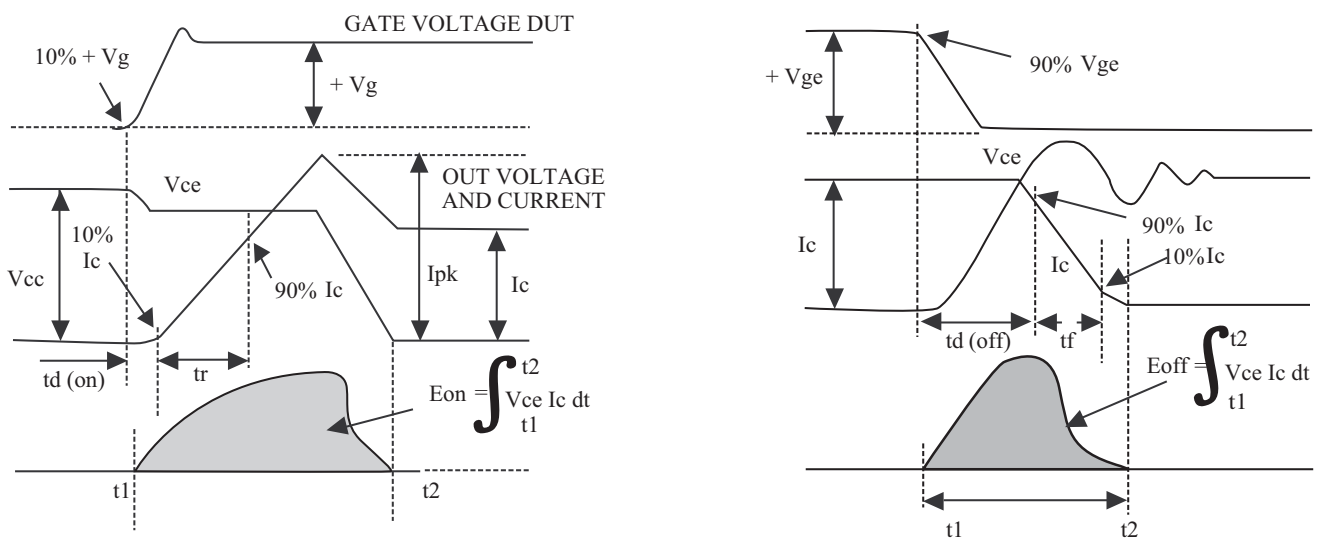


Fig 22. Definition Diode Switching Time

