

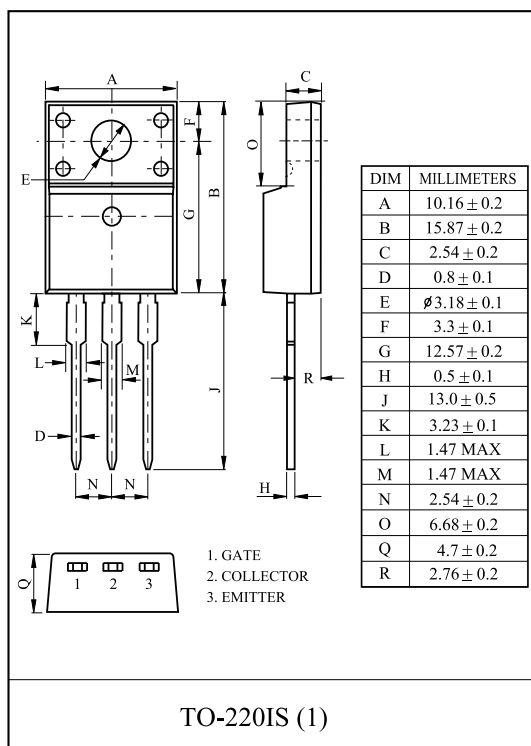
General Description

KEC NPT Trench IGBTs offer low switching losses, high energy efficiency and high avalanche ruggedness as well as short circuit ruggedness.

It is designed for hard switching applications.

FEATURES

- High speed switching
- High system efficiency
- Short Circuit Withstand Times 5us(@T_C=100)
- Extremely enhanced avalanche capability

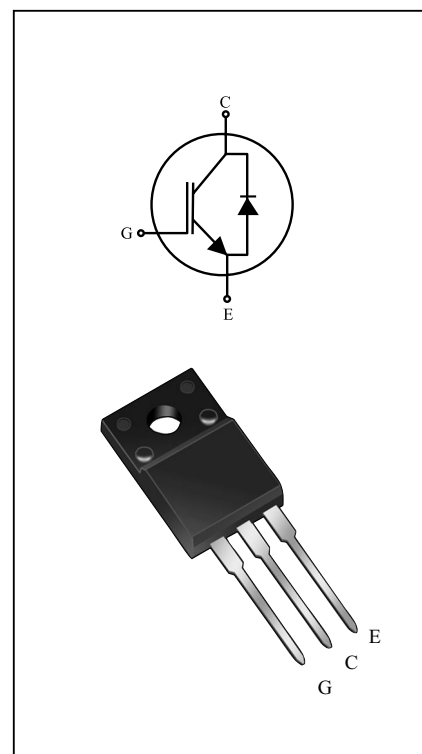


MAXIMUM RATING (Ta=25)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V _{CES}	600	V
Gate-Emitter Voltage		V _{GES}	± 20	V
Collector Current	@T _C =25	I _C	15	A
	@T _C =100		7.5	A
Pulsed Collector Current		I _{CM} *	30	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	41.6	W
	@T _C =100		17	W
Maximum Junction Temperature		T _j	150	
Storage Temperature Range		T _{stg}	-55 to + 150	

THERMAL CHARACTERISTIC

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Junction to Case (IGBT)	R _{thJC}	3.0	/W
Thermal Resistance, Junction to Case (DIODE)	R _{thJCD}	3.6	/W
Thermal Resistance, Junction to Ambient	R _{thJA}	62.5	/W



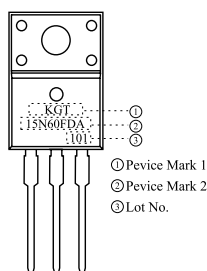
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ELECTRICAL CHARACTERISTICS (Ta=25)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Collector-Emitter Breakdown Voltage	BV _{CES}	V _{GE} =0V , I _C =250μA	600	-	-	V
Collector Cut-off Current	I _{CES}	V _{GE} =0V, V _{CE} =600V	-	-	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 =2mA	4.5	5.7	7.0	V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =15A	-	1.7	1.95	V
		V _{GE} =15V, I _C =15A, T _C =125	-	2.0	-	V
		V _{GE} =15V, I _C =30A, T _C =25	-	2.3	-	V
Dynamic						
Total Gate Charge	Q _g	V _{CC} =300V, V _{GE} =15V, I _C = 15A	-	70	-	nC
Gate-Emitter Charge	Q _{ge}		-	10	-	nC
Gate-Collector Charge	Q _{gc}		-	35	-	nC
Turn-On Delay Time	t _{d(on)}	V _{CC} =300V, I _C =15A, V _{GE} =15V,R _G =10Ω Inductive Load, T _C = 25	-	30	-	ns
Rise Time	t _r		-	20	-	ns
Turn-Off Delay Time	t _{d(off)}		-	90	-	ns
Fall Time	t _f		-	35	-	ns
Turn-On Switching Loss	E _{on}		-	0.18	-	mJ
Turn-Off Switching Loss *Note(1)	E _{off}		-	0.25	-	mJ
Total Switching Loss	E _{ts}		-	0.43	-	mJ
Turn-On Delay Time	t _{d(on)}		V _{CC} =300V, I _C =15A, V _{GE} =15V, R _G =10Ω Inductive Load, T _C = 125	-	35	-
Rise Time	t _r	-		25	-	ns
Turn-Off Delay Time	t _{d(off)}	-		95	-	ns
Fall Time	t _f	-		70	-	ns
Turn-On Switching Loss	E _{on}	-		0.28	-	mJ
Turn-Off Switching Loss *Note(1)	E _{off}	-		0.4	-	mJ
Total Switching Loss	E _{ts}	-		0.7	-	mJ
Input Capacitance	C _{ies}	V _{CE} =30V, V _{GE} =0V, f=1MHz		-	1270	-
Ouput Capacitance	C _{oes}		-	90	-	pF
Reverse Transfer Capacitance	C _{res}		-	45	-	pF
Short Circuit Withstand Time	t _{sc}	V _{CC} =300V, V _{GE} =15V, T _C =100	5	-	-	μs

*Notes(1) Energy loss include tail current and diode reverse recovery.

Marking



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ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	V _F	I _F = 15A	T _C =25	-	1.6	2.3	V
			T _C =125	-	1.3	-	
Diode Reverse Recovery Time	t _{rr}	I _F = 15A di/dt = 800A/μs	T _C =25	-	45	80	ns
			T _C =125	-	70	-	
Diode Peak Reverse Recovery Current	I _{rr}		T _C =25	-	12	25	A
			T _C =125	-	22	-	
Diode Reverse Recovery Charge	Q _{rr}		T _C =25	-	300	1200	nC
			T _C =125	-	1000	-	

Fig 1. Saturation Voltage Characteristics

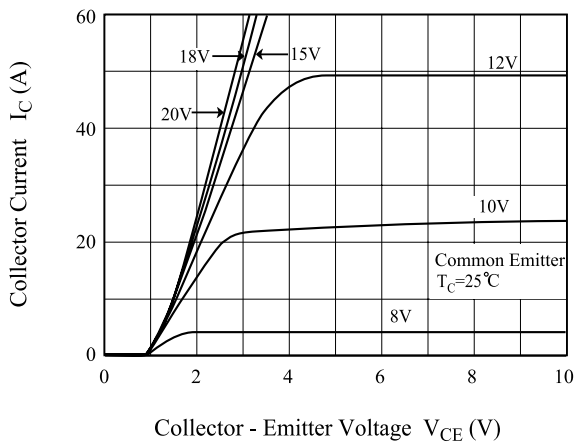


Fig 2. Saturation Voltage Characteristics

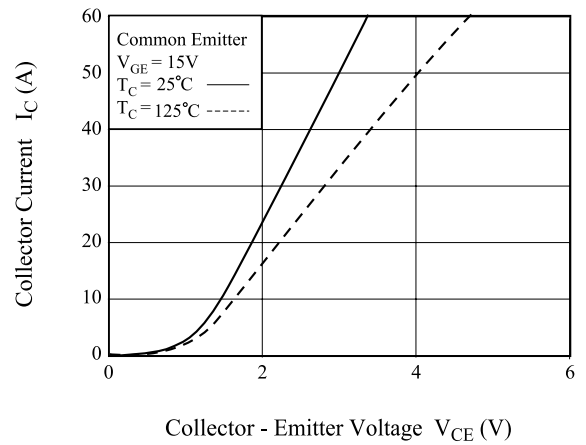


Fig 3. Saturation Voltage vs. Case Temperature

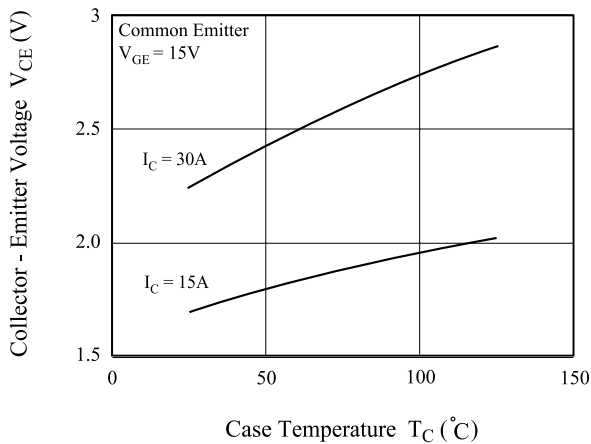


Fig 4. Saturation Voltage vs. V_GE

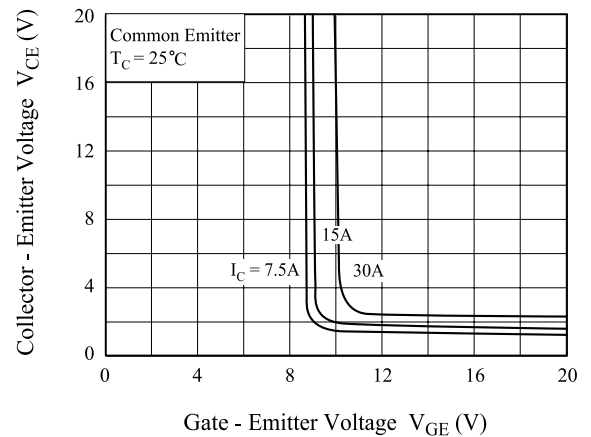


Fig 5. Saturation Voltage vs. V_GE

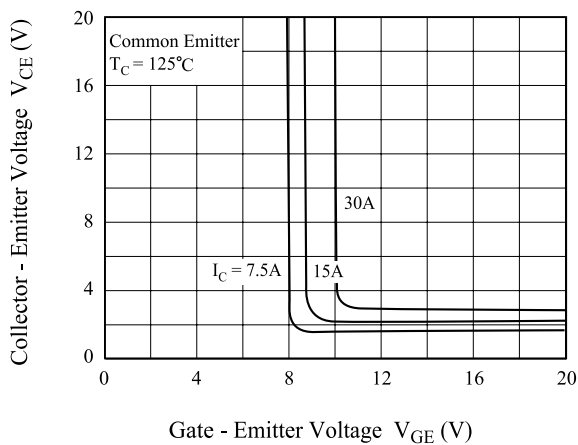


Fig 6. Capacitance Characteristics

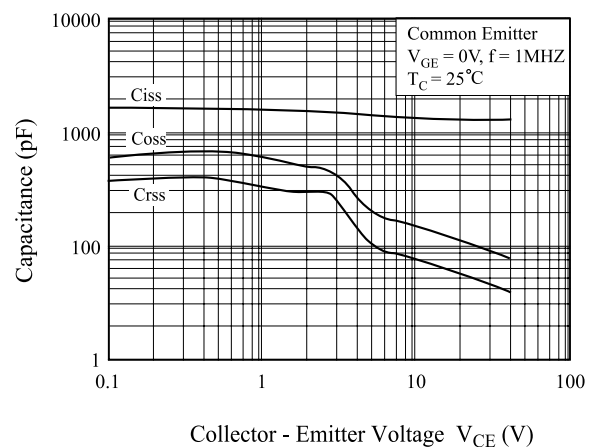


Fig 7. Turn-On Characteristics vs. Gate Resistance

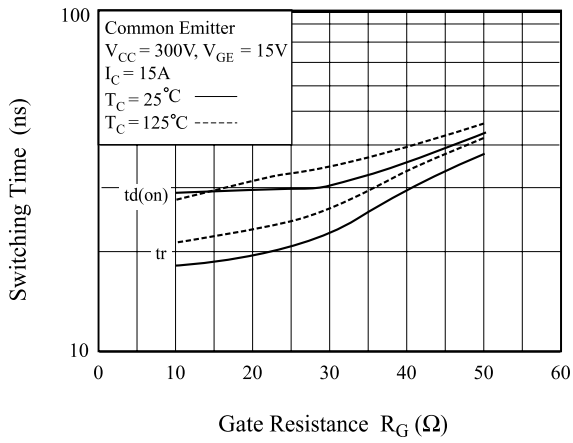


Fig 8. Turn-Off Characteristics vs. Gate Resistance

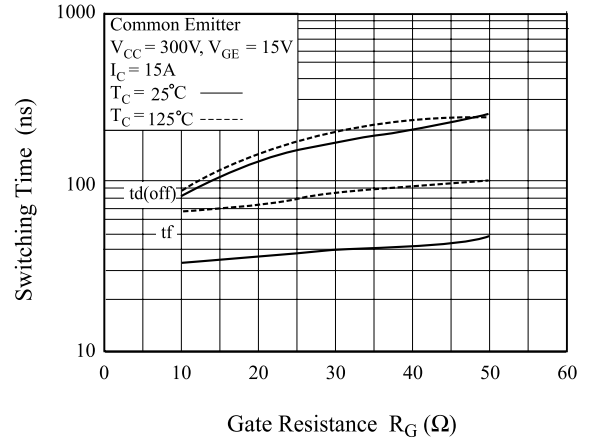


Fig 9. Turn-On Characteristics vs. Collector Current

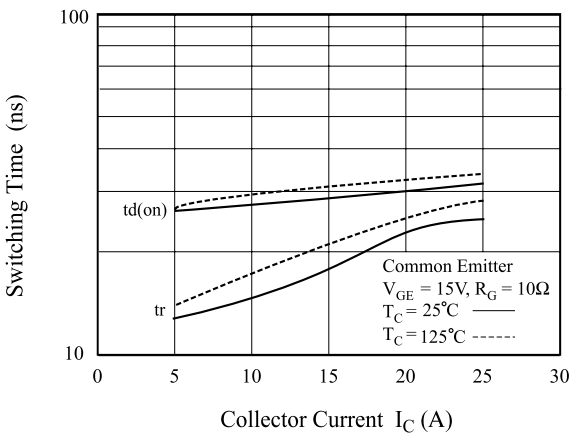


Fig 10. Turn-Off Characteristics vs. Collector Current

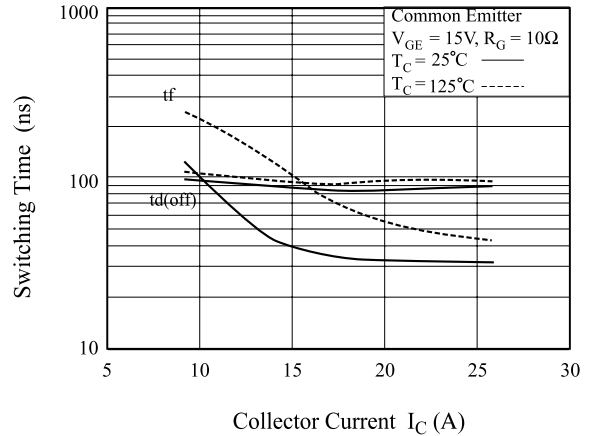


Fig 11. Switching Loss vs. Gate Resistance

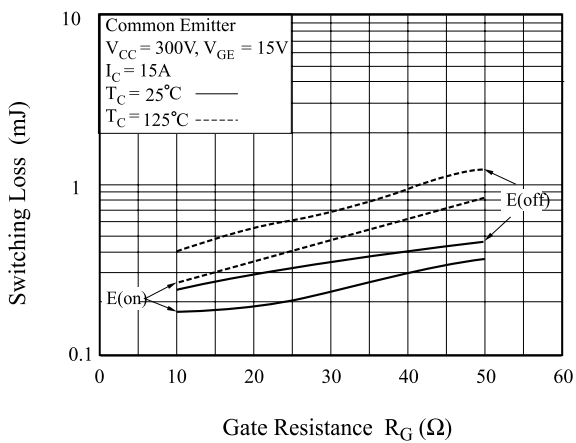
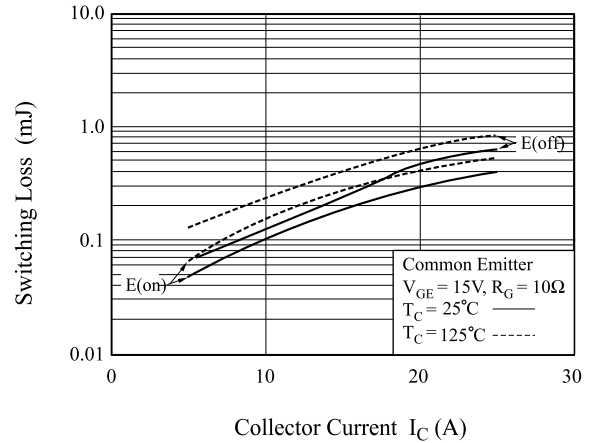


Fig 12. Switching Loss vs. Collector Current



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Fig 13. Gate Charge Characteristics

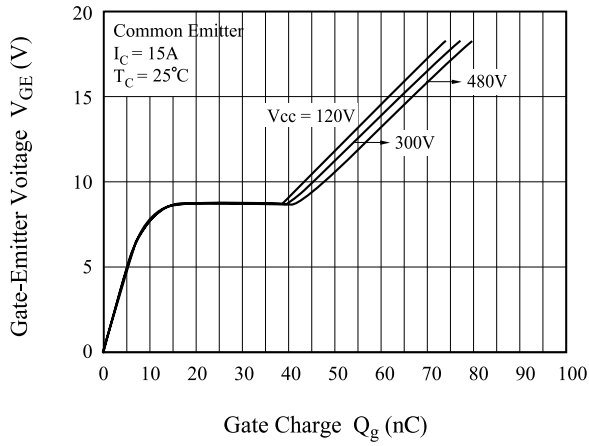


Fig 14. SOA Characteristics

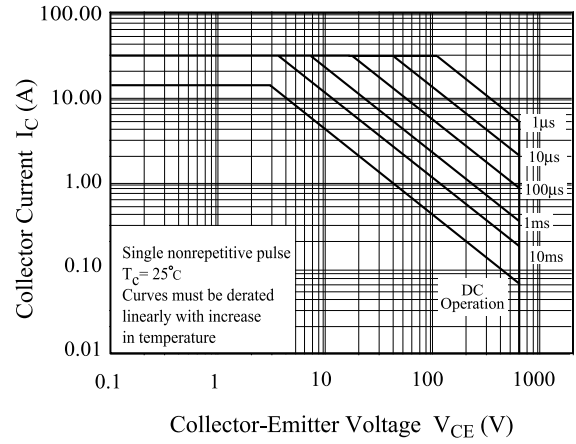


Fig 15. Turn-Off SOA

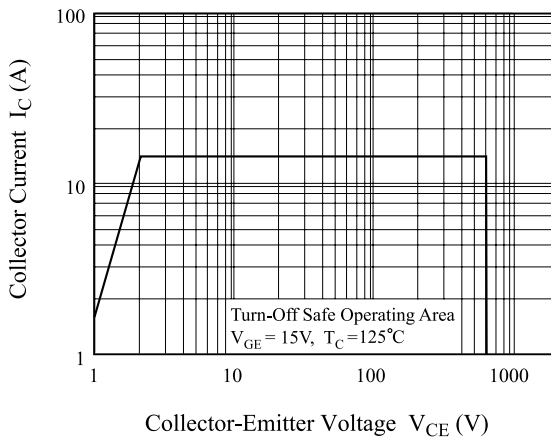


Fig 16. Transient Thermal Impedance of IGBT

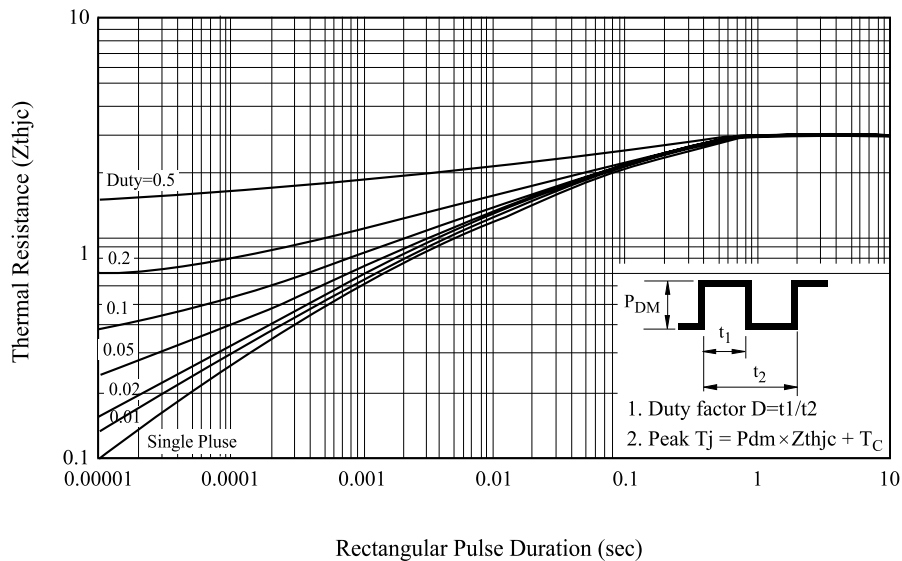


Fig 17. Collector Current vs Case Temperature

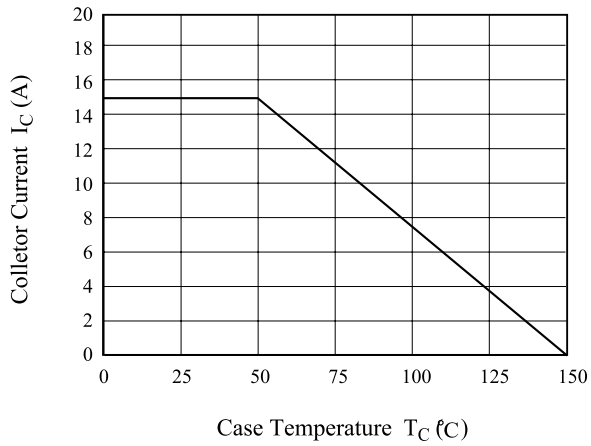


Fig 18. Collector Dissipation vs Case Temperature

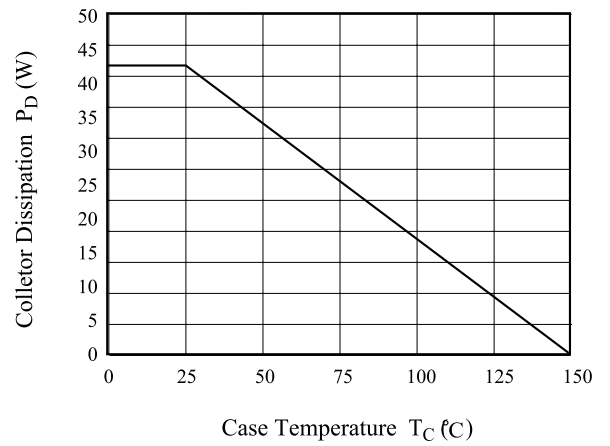


Fig 19. Forward Characteristics

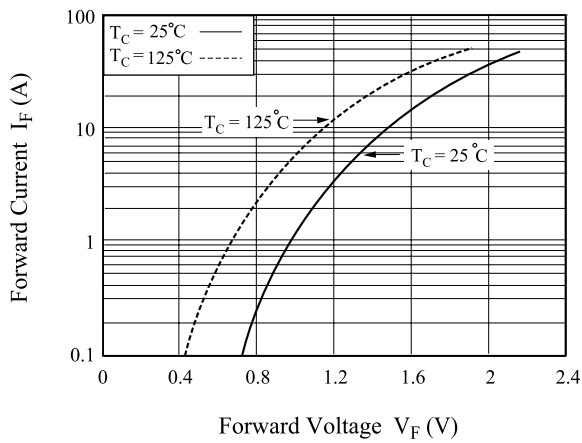


Fig 20. Reverse Recovery Current

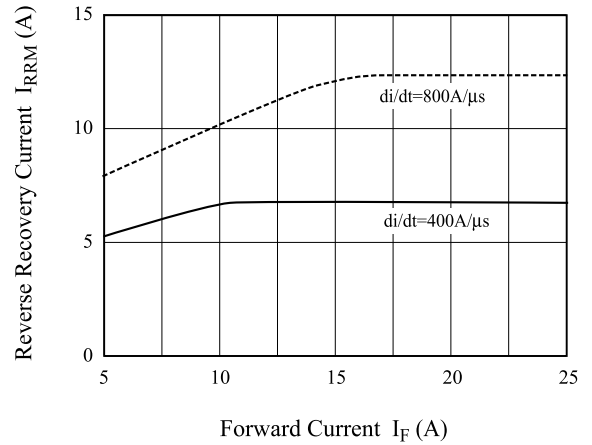


Fig 21. Reverse Recovery Time

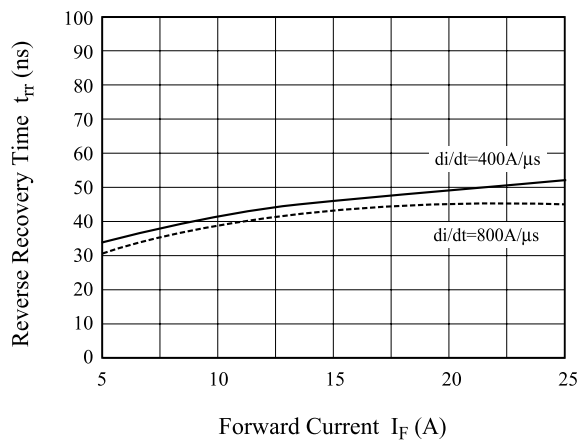


Fig 22. Switching Test Circuit

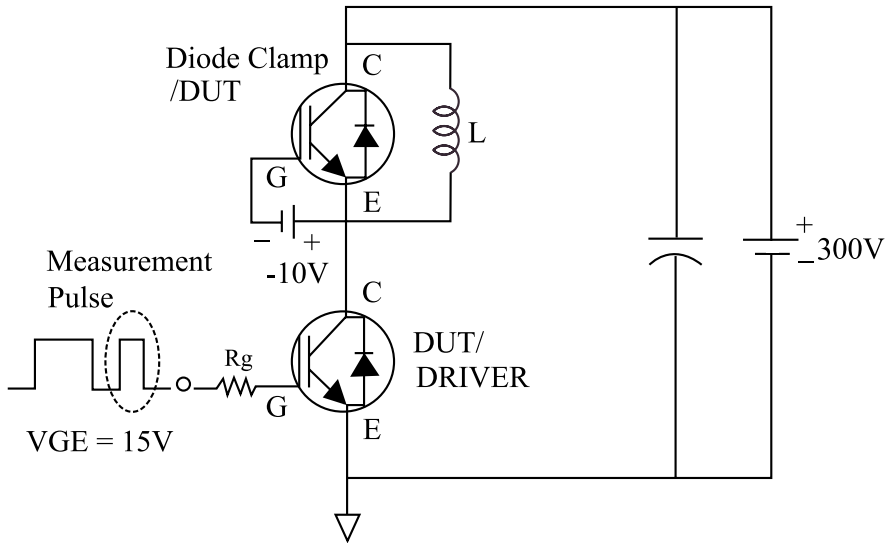


Fig 23. Definition Switching Time & Loss

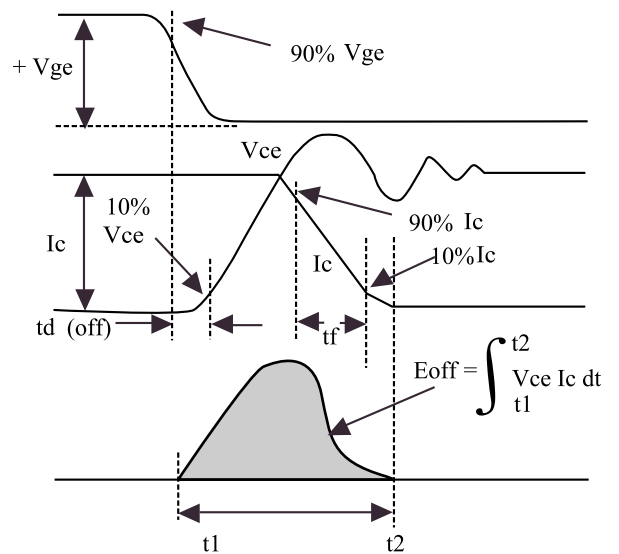
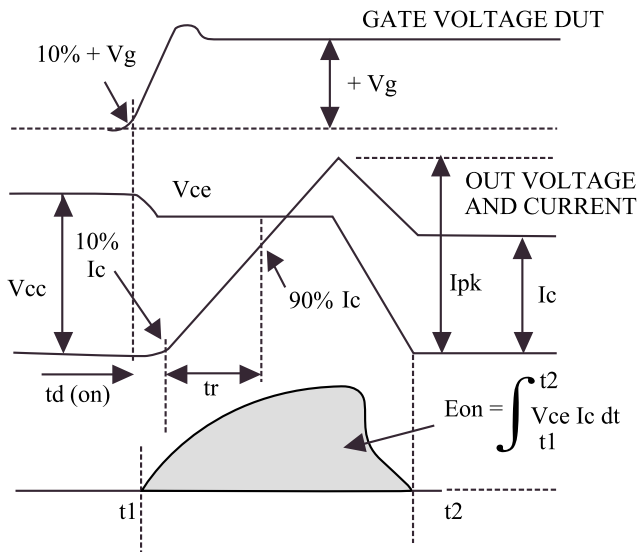


Fig 24. Definition Diode Switching Time

