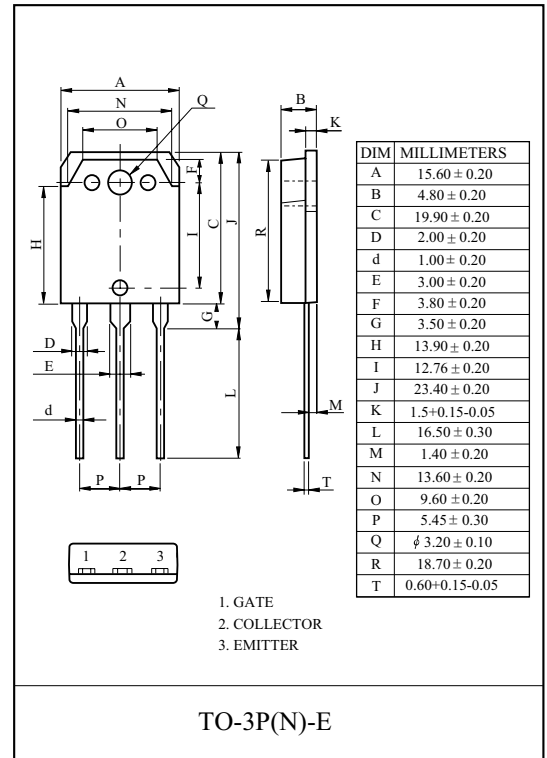


General Description

KEC NPT IGBTs offer low switching losses, high energy efficiency and high avalanche ruggedness for soft switching application such as general inverters, etc.

FEATURES

- High speed switching
- High system efficiency
- Soft current turn-off waveforms
- Extremely enhanced avalanche capability



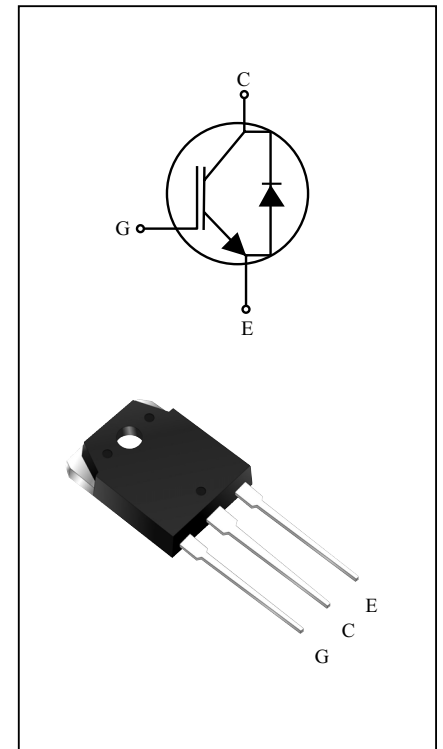
MAXIMUM RATING (Ta=25 °C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Emitter Voltage	V_{CES}	1200	V
Gate-Emitter Voltage	V_{GES}	± 20	V
Collector Current	I_C	@Tc=25	50
		@Tc=100	30
Pulsed Collector Current	I_{CM}^*	90	A
Diode Continuous Forward Current	@Tc=100	I_F	30
Diode Maximum Forward Current		I_{FM}	150
Maximum Power Dissipation	P_D	@Tc=25	310
		@Tc=100	125
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_{thJC}	0.4	/W
Thermal Resistance, Junction to Case (DIODE)	R_{thJC}	2.8	/W
Thermal Resistance, Junction to Ambient	R_{thJA}	40	/W



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ELECTRICAL CHARACTERISTICS (Ta=25)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Static							
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=1mA$	1200	-	-	V	
Collector Cut-off Current	I_{CES}	$V_{GE}=0V, V_{CE}=1200V$	-	-	1.0	mA	
Gate Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	± 100	nA	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=25mA$	4.0	5.5	7.0	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=30A$	-	1.95	2.30	V	
		$V_{GE}=15V, I_C=30A, T_C = 125$	-	2.25	-	V	
		$V_{GE}=15V, I_C=60A$	-	2.50	-	V	
Dynamic							
Total Gate Charge	Q_g	$V_{CC}=600V, V_{GE}=15V, I_C=30A$	-	200	300	nC	
Gate-Emitter Charge	Q_{ge}		-	20	-	nC	
Gate-Collector Charge	Q_{gc}		-	80	-	nC	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=30A, V_{GE}=15V, R_G=10$ Inductive Load, $T_C = 25$	-	60	-	ns	
Rise Time	t_r		-	50	-	ns	
Turn-Off Delay Time	$t_{d(off)}$		-	280	-	ns	
Fall Time	t_f		-	90	-	ns	
Turn-On Switching Loss	E_{on}		-	4.3	6.1	mJ	
Turn-Off Switching Loss	E_{off}		-	1.07	1.4	mJ	
Total Switching Loss	E_{ts}		-	5.37	7.5	mJ	
Turn-On Delay Time	$t_{d(on)}$		$V_{CC}=600V, I_C=30A, V_{GE}=15V, R_G=10$ Inductive Load, $T_C = 125$	-	55	-	ns
Rise Time	t_r			-	50	-	ns
Turn-Off Delay Time	$t_{d(off)}$			-	290	-	ns
Fall Time	t_f	-		130	-	ns	
Turn-On Switching Loss	E_{on}	-		5.0	6.3	mJ	
Turn-Off Switching Loss	E_{off}	-		1.6	2.1	mJ	
Total Switching Loss	E_{ts}	-		6.6	8.4	mJ	
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	-	3100	-	pF	
Output Capacitance	C_{oes}		-	100	-	pF	
Reverse Transfer Capacitance	C_{res}		-	80	-	pF	

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ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	V_F	$I_F = 30A$	$T_C = 25$	-	1.9	2.5	V
			$T_C = 125$	-	2.05	-	
Diode Reverse Recovery Time	t_{rr}	$I_F = 30A$	$T_C = 25$	-	250	330	ns
			$T_C = 125$	-	320	-	
Diode Peak Reverse Recovery Current	I_{rr}	$I_F = 30A$ $di/dt = 200A/\mu s$	$T_C = 25$	-	29	35	A
			$T_C = 125$	-	33	-	
Diode Reverse Recovery Charge	Q_{rr}	$I_F = 30A$ $di/dt = 200A/\mu s$	$T_C = 25$	-	3200	4700	nC
			$T_C = 125$	-	4750	-	

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Typical Performance Characteristics

Fig 1. Saturation Voltage Characteristics

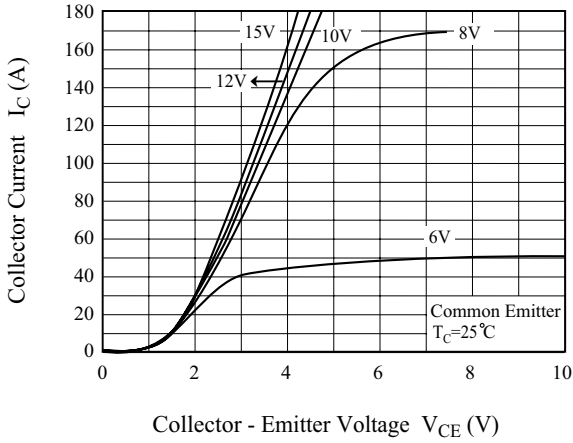


Fig 2. Saturation Voltage Characteristics

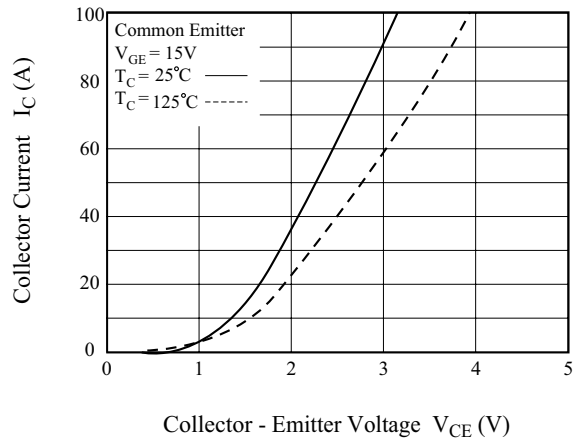


Fig 3. Saturation Voltage vs. Case Temperature

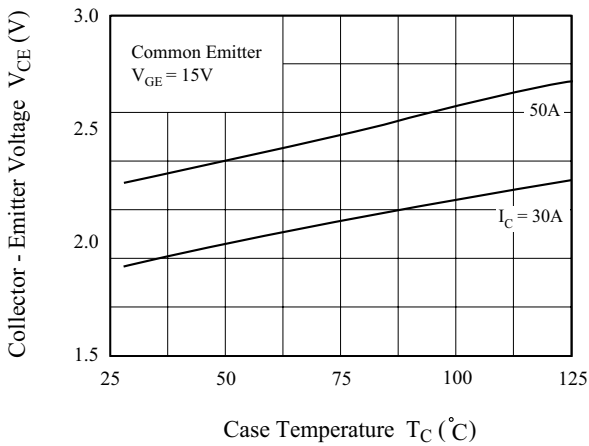


Fig 4. Saturation Voltage vs. V_{GE}

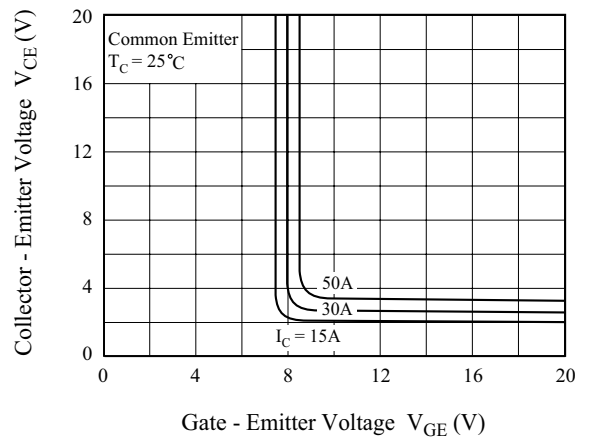


Fig 5. Saturation Voltage vs. V_{GE}

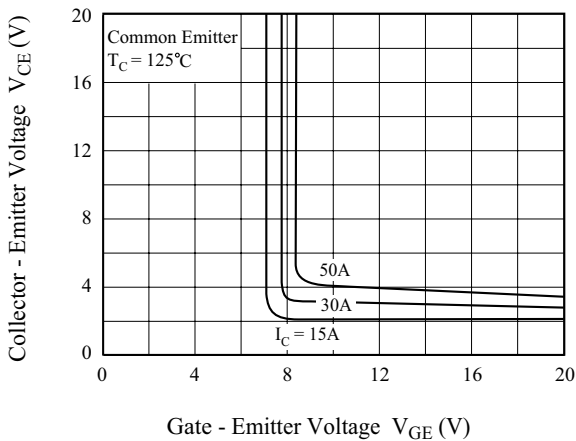
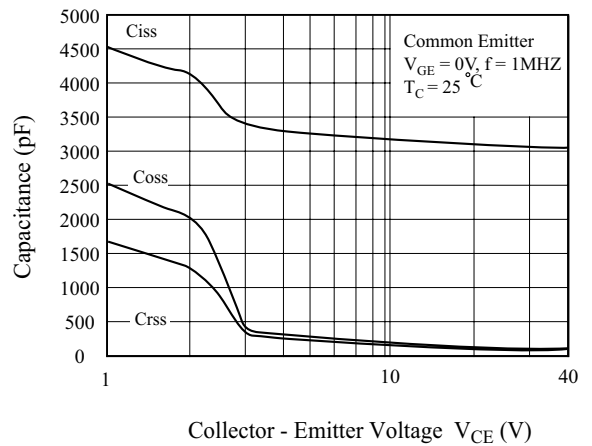


Fig 6. Capacitance Characteristics



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Typical Performance Characteristics (Continued)

Fig 7. Turn-On Characteristics vs. Gate Resistance

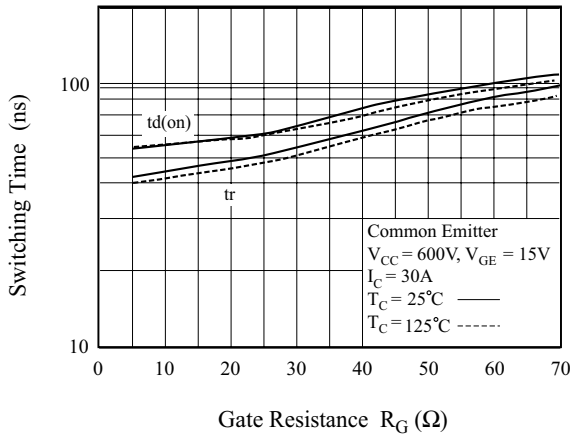


Fig 8. Turn-Off Characteristics vs. Gate Resistance

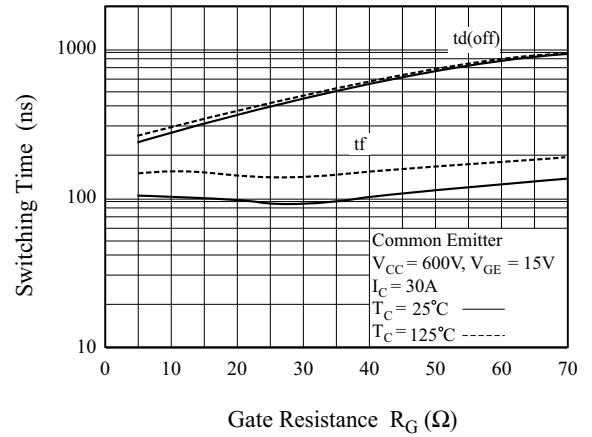


Fig 9. Switching Loss vs. Gate Resistance

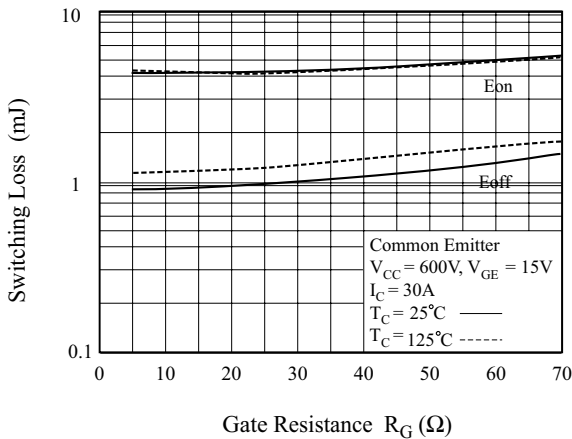


Fig 10. Turn-On Characteristics vs. Collector Current

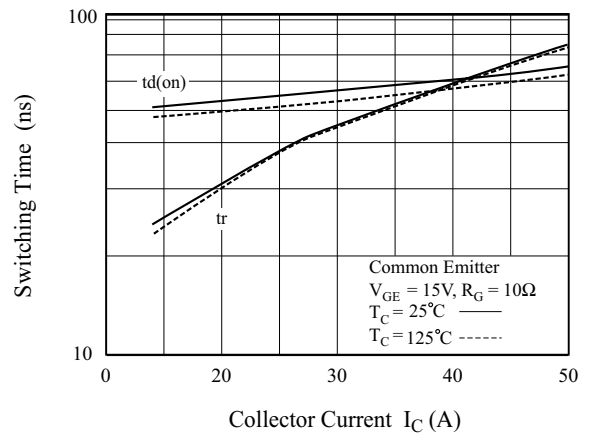


Fig 11. Turn-Off Characteristics vs. Collector Current

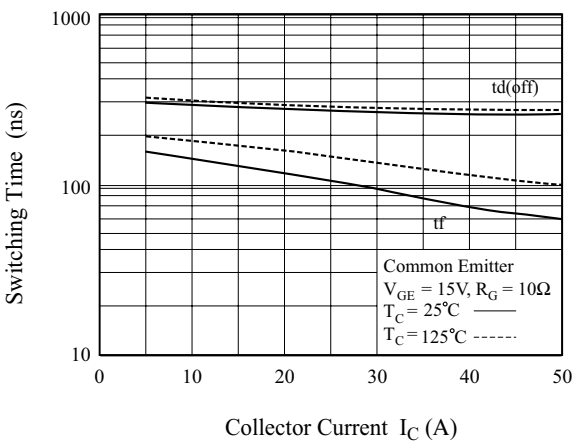
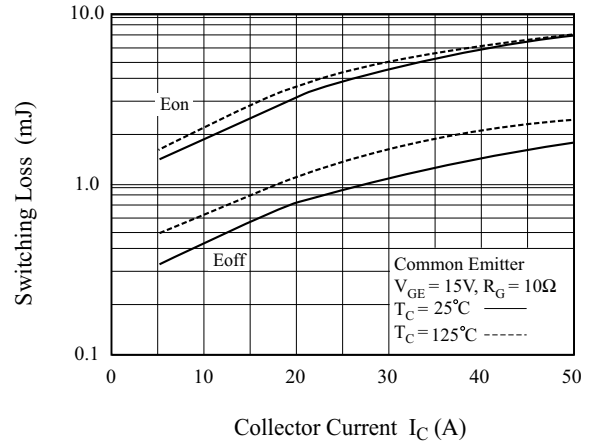


Fig 12. Switching Loss vs. Collector Current



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Typical Performance Characteristics (Continued)

Fig 13. Gate Charge Characteristics

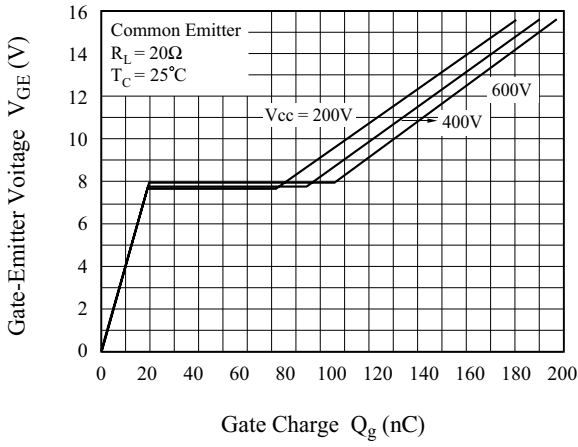


Fig 14. SOA Characteristics

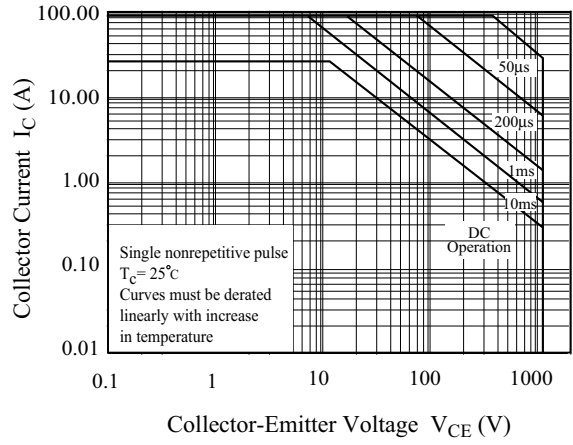


Fig 15. Turn-Off SOA

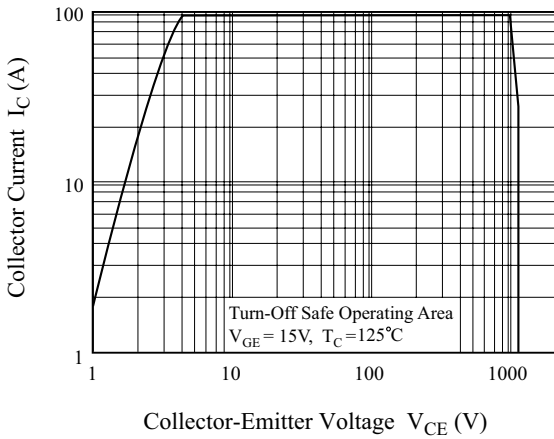
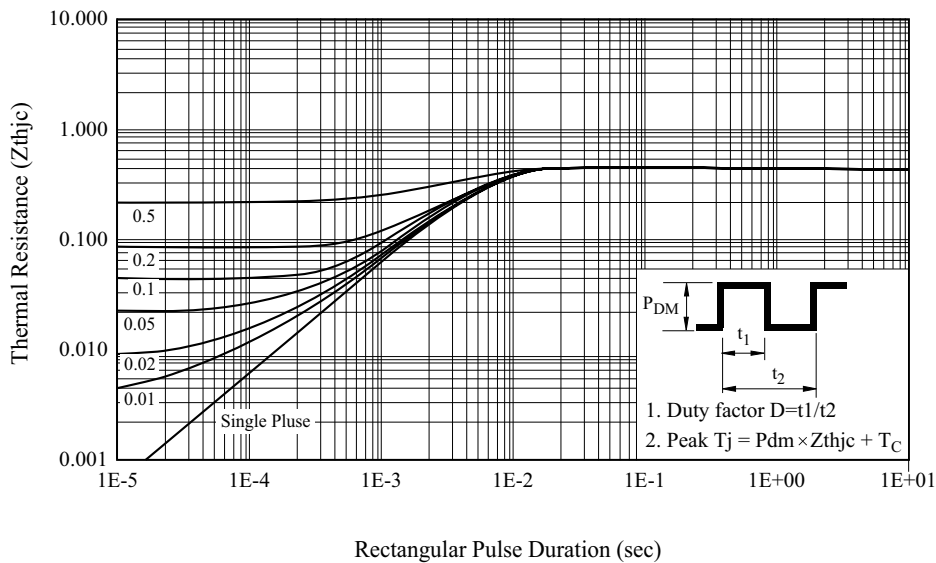


Fig 16. Transient Thermal Impedance of IGBT



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Typical Performance Characteristics

Fig 17. Forward Characteristics

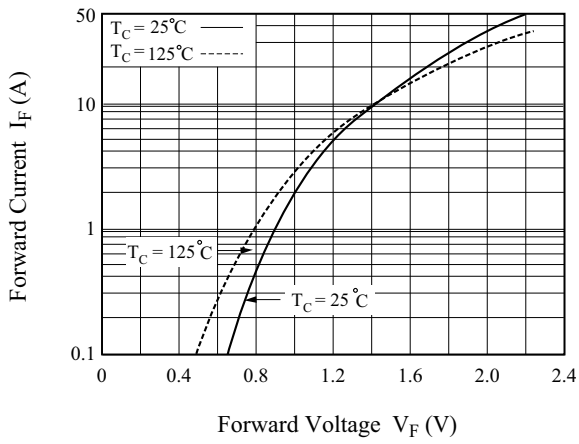


Fig 18. Reverse Recovery Current

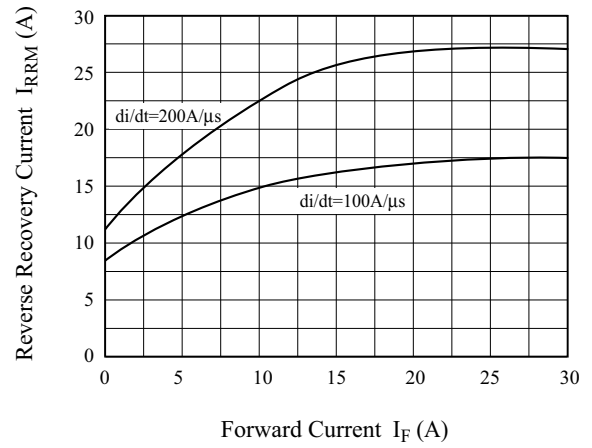
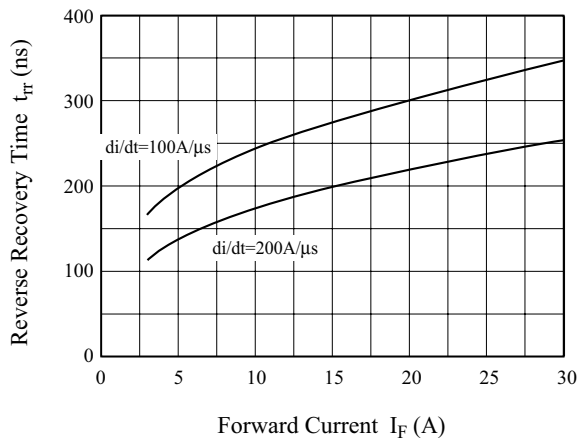


Fig 19. Reverse Recovery Time



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Definition Switching Time & Loss.

Fig 21. Switching Test Circuit

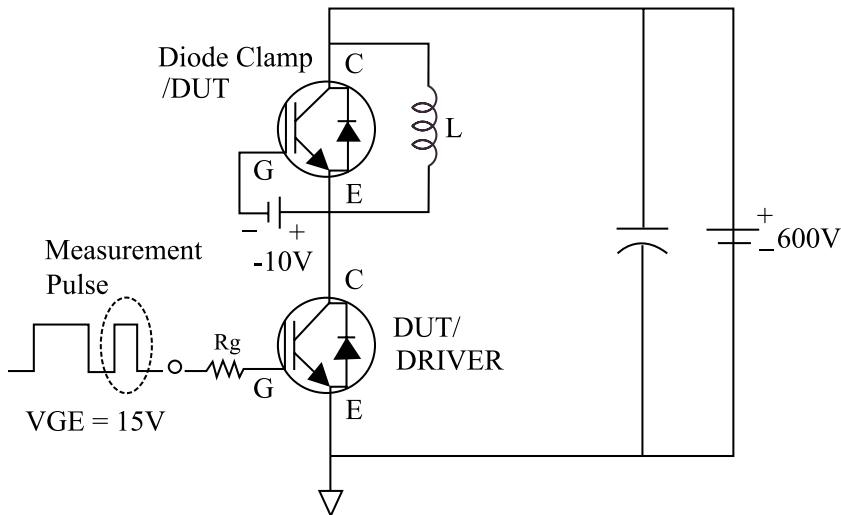


Fig 22. Definition Switching Time & Loss

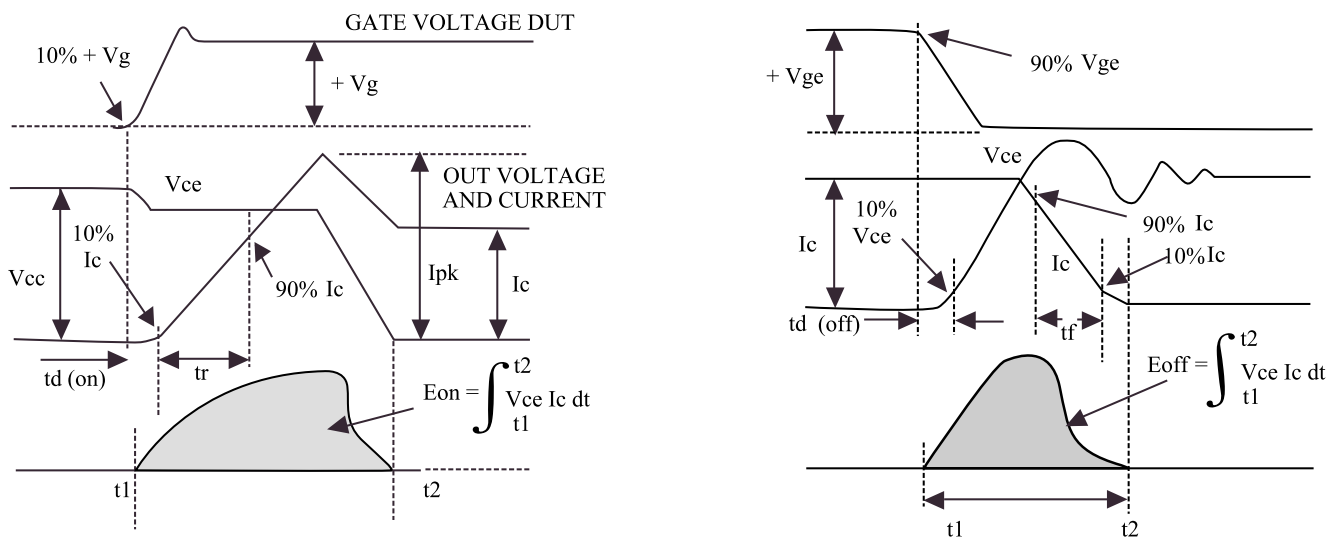


Fig 23. Definition Diode Switching Time

