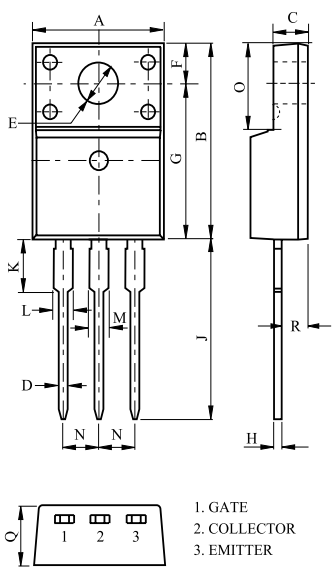
General Description

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



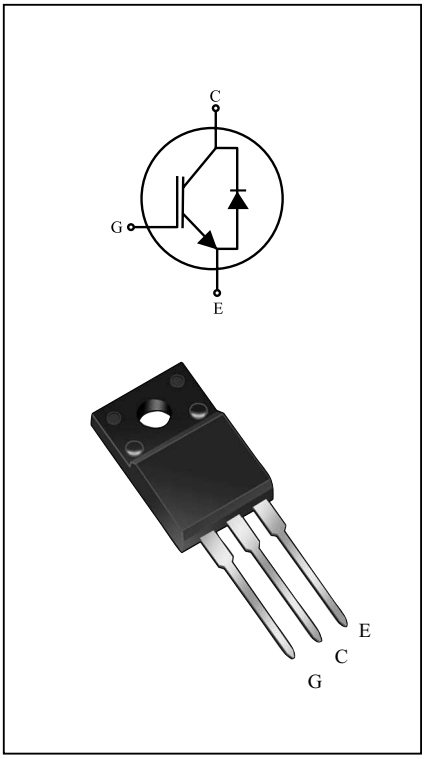
DIM	MILLIMETERS
A	10.16±0.2
B	15.87±0.2
C	2.54±0.2
D	0.8±0.1
E	ø3.18±0.1
F	3.3±0.1
G	12.57±0.2
H	0.5±0.1
J	13.0±0.5
K	3.23±0.1
L	1.47 MAX
M	1.47 MAX
N	2.54±0.2
O	6.68±0.2
Q	4.7±0.2
R	2.76±0.2

TO-220IS (1)

MAXIMUM RATING (Ta=25℃)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V_{CES}	600	V
Gate-Emitter Voltage		V_{GES}	± 20	V
Collector Current	@Tc=25℃	I_C	30 (1)	A
	@Tc=100℃		15 (1)	A
Pulsed Collector Current		I_{CM} (2)	60 (1)	A
Diode Continuous Forward Current	@Tc=25℃	I_F	30 (1)	A
Diode Maximum Forward Current		I_{FM} (2)	60 (1)	A
Maximum Power Dissipation	@Tc=25℃	P_D	41.6	W
	@Tc=100℃		17	W
Maximum Junction Temperature		T_j	150	℃
Storage Temperature Range		T_{stg}	-55 to + 150	℃

(1) : Limited by maximum junction temperature.
(2) : Pulse width limited by maximum junction temperature.



THERMAL CHARACTERISTIC

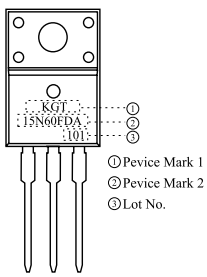
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Junction to Case (IGBT)	R_{thJC}	3.0	℃/W
Thermal Resistance, Junction to Case (DIODE)	R_{thJCD}	3.6	℃/W
Thermal Resistance, Junction to Ambient	R_{thJA}	62.5	℃/W

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㎂	600	-	-	V
Collector Cut-off Current	I_{CES}	V_{GE}=0V, V_{CE}=600V	-	-	250	㎂
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	-	ns
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	-	pF
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



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

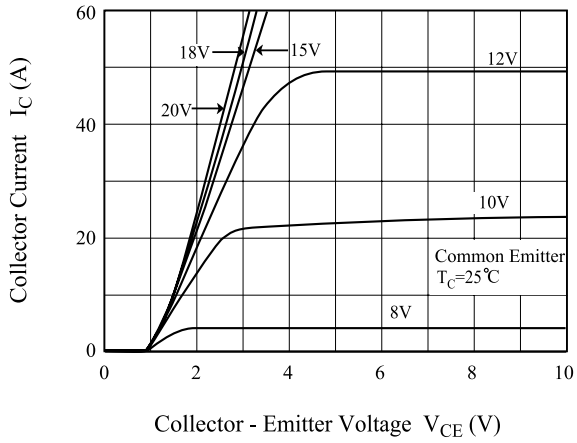


Fig 2. Saturation Voltage Characteristics

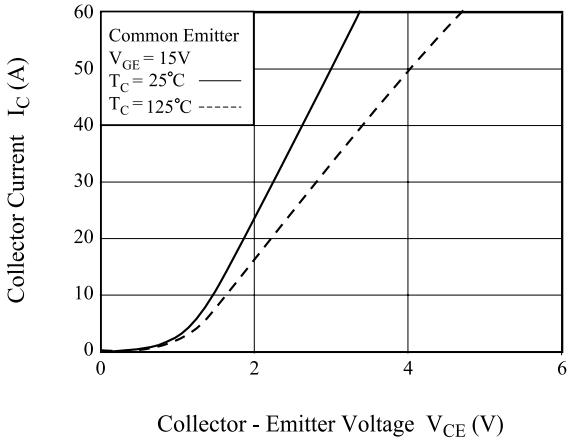


Fig 3. Saturation Voltage vs. Case Temperature

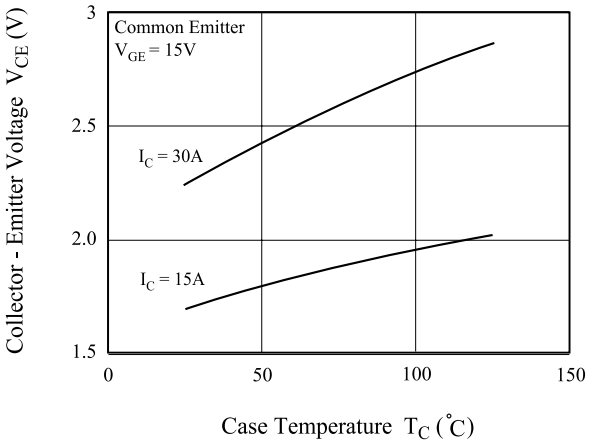


Fig 4. Saturation Voltage vs. V_{GE}

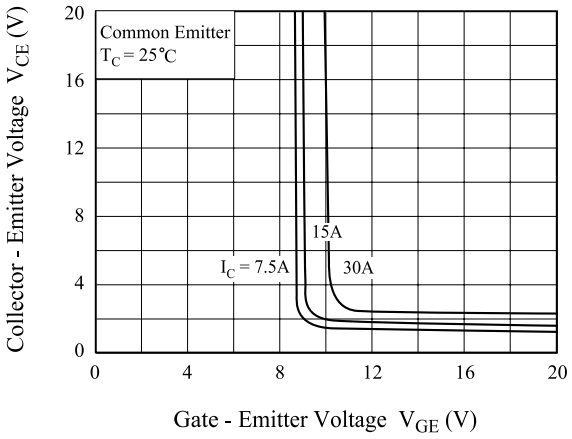


Fig 5. Saturation Voltage vs. V_{GE}

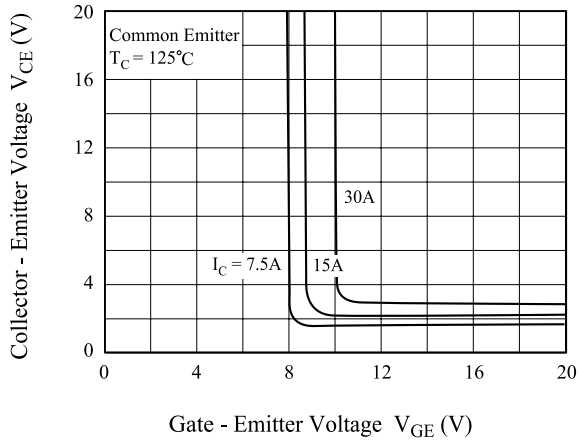


Fig 6. Capacitance Characteristics

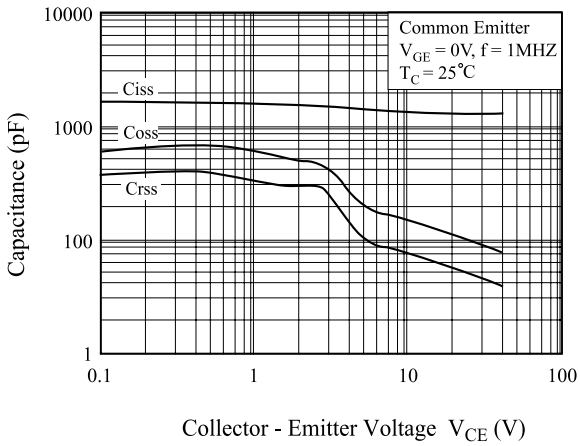


Fig 7. Turn-On Characteristics vs. Gate Resistance

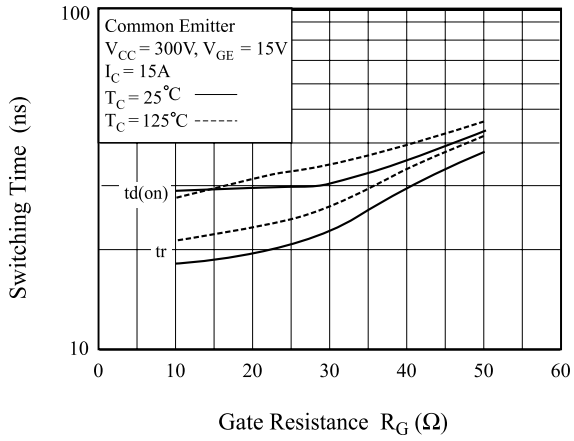


Fig 8. Turn-Off Characteristics vs. Gate Resistance

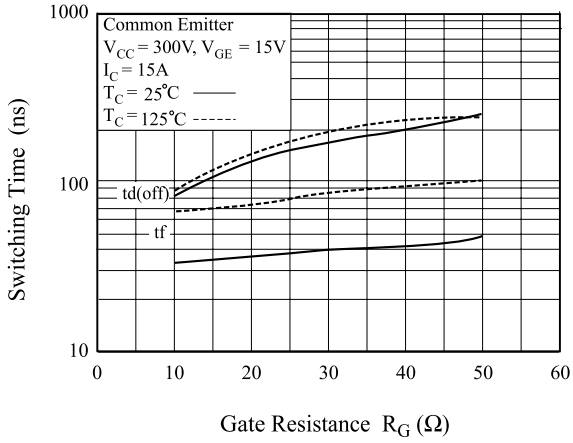


Fig 9. Turn-On Characteristics vs. Collector Current

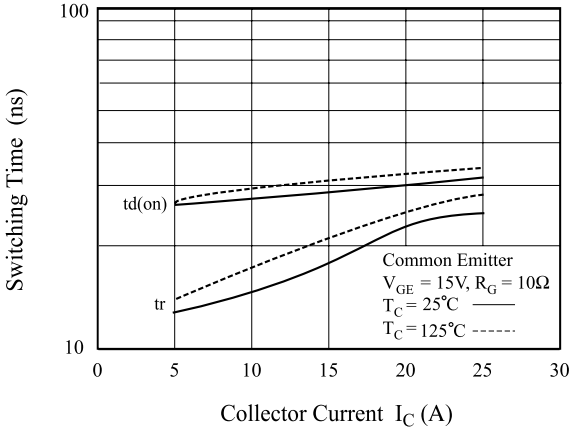


Fig 10. Turn-Off Characteristics vs. Collector Current

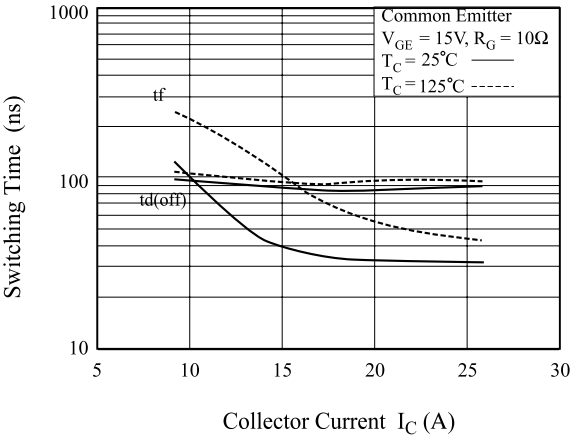


Fig 11. Switching Loss vs. Gate Resistance

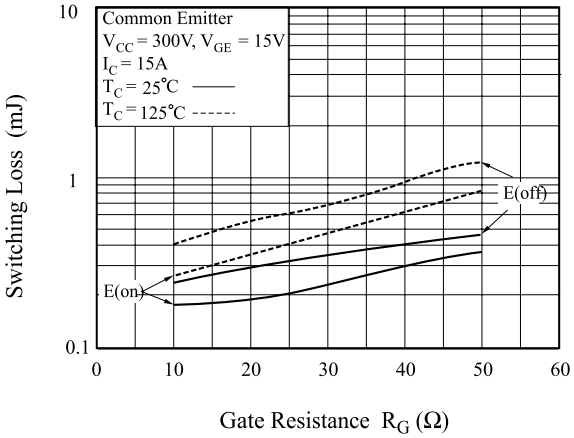


Fig 12. Switching Loss vs. Collector Current

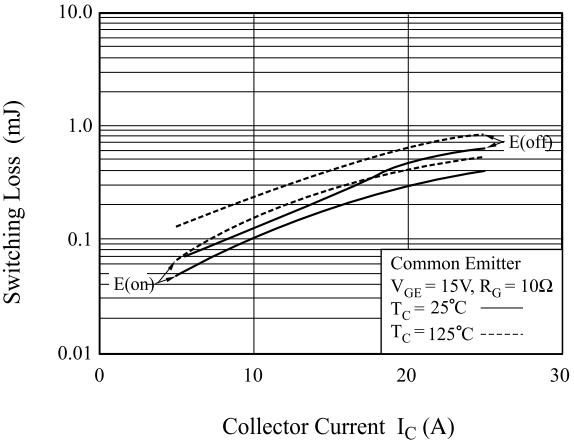


Fig 13. Gate Charge Characteristics

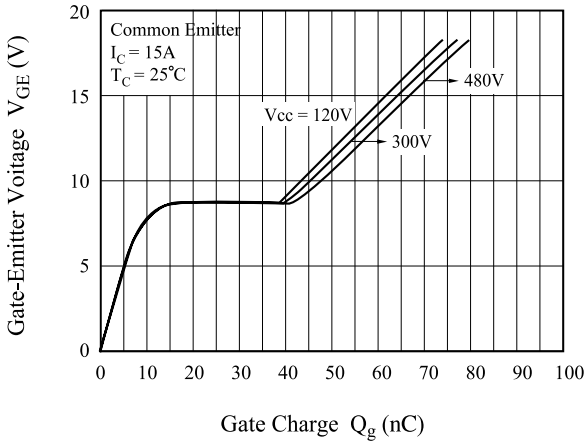


Fig 14. SOA Characteristics

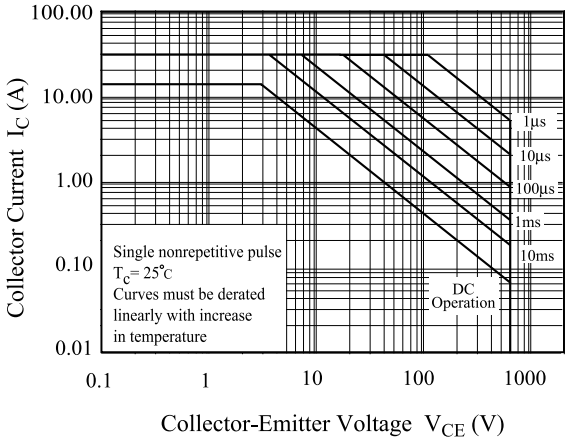


Fig 15. Turn-Off SOA

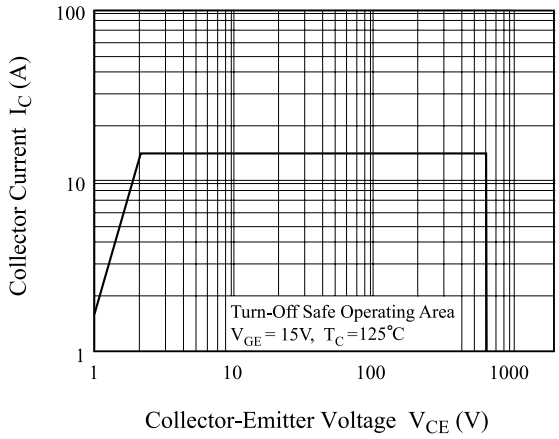


Fig 16. Transient Thermal Impedance of IGBT

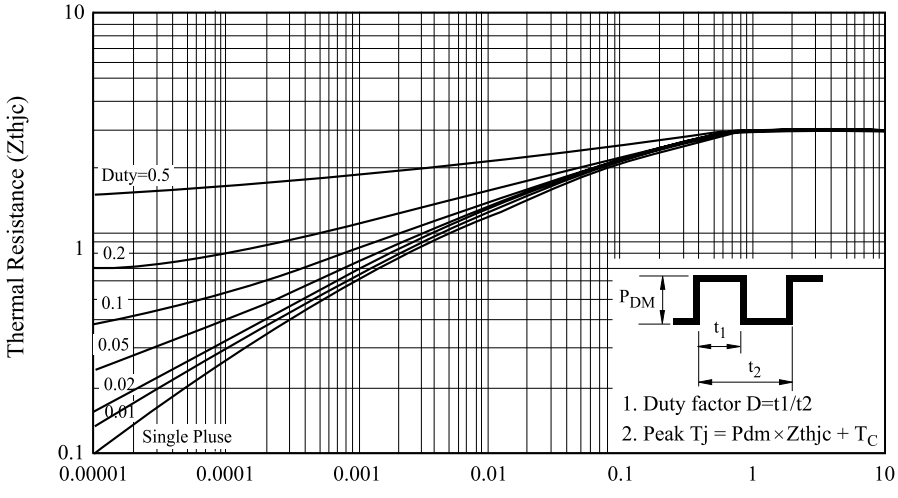


Fig 17. Collector Current vs Case Temprature

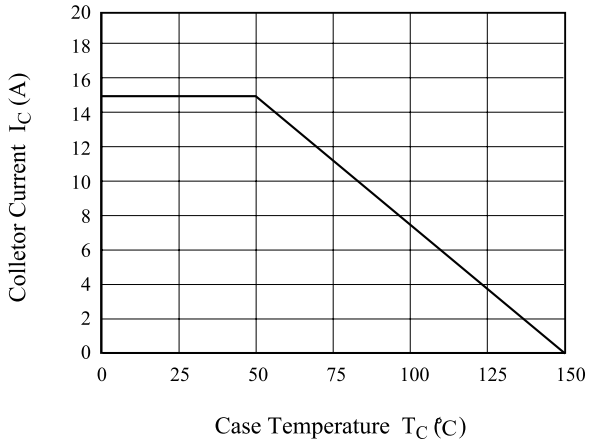


Fig 18. Collector Dissipation vs Case Temprature

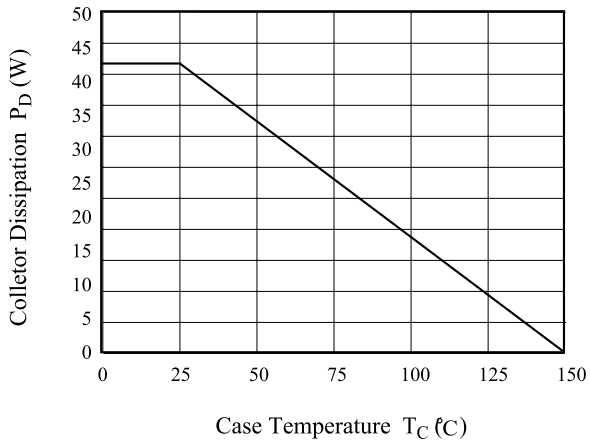


Fig 19. Forward Characteristics

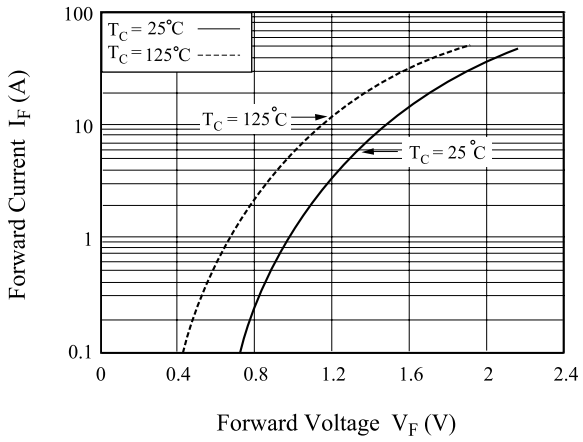


Fig 20. Reverse Recovery Current

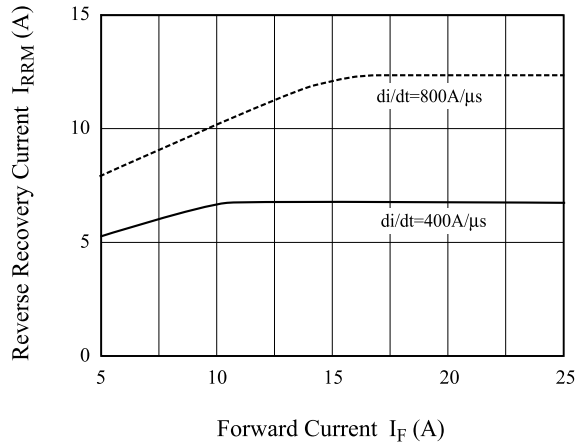


Fig 21. Reverse Recovery Time

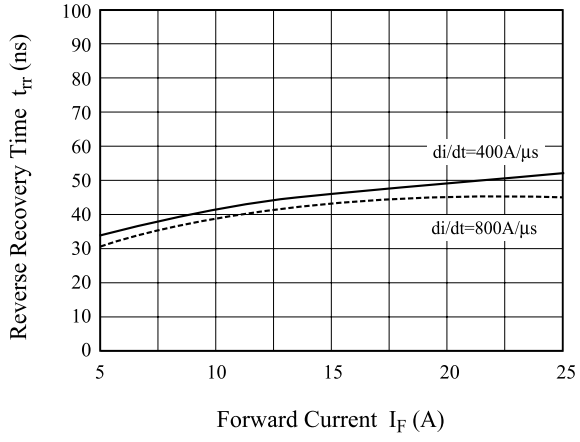


Fig 22. Switching Test Circuit

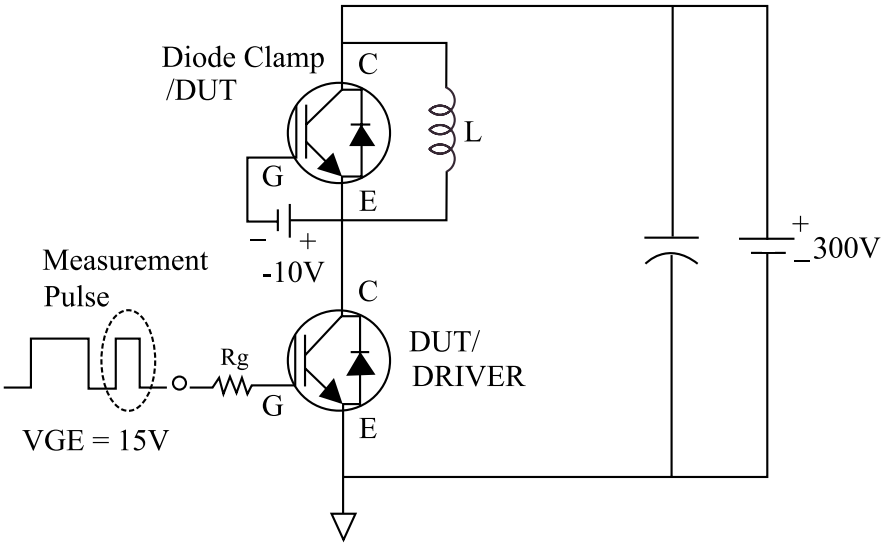
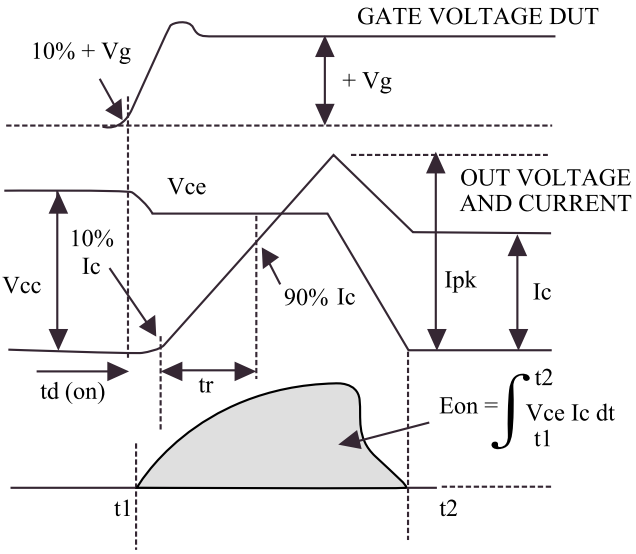


Fig 23. Definition Switching Time & Loss



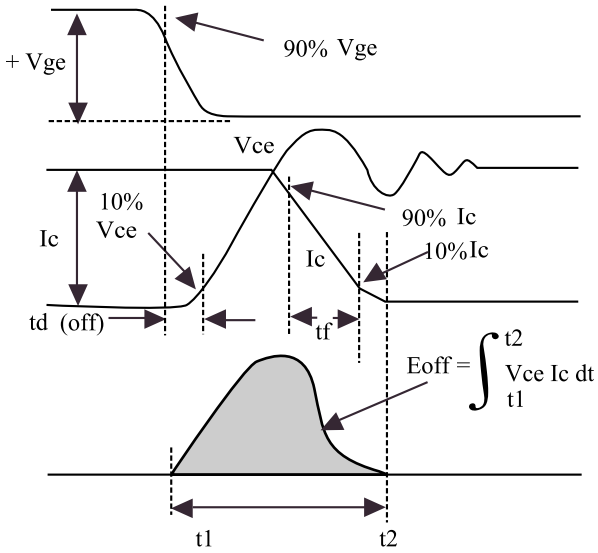


Fig 24. Definition Diode Switching Time