

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 Power Factor Correction(PFC), Inverterized MWO, Welder, Uninterrupted Power Supplies(UPS) and General Converters.

FEATURES

- High speed switching
- High ruggedness, temperature stable behavior
- Extremely enhanced avalanche capability

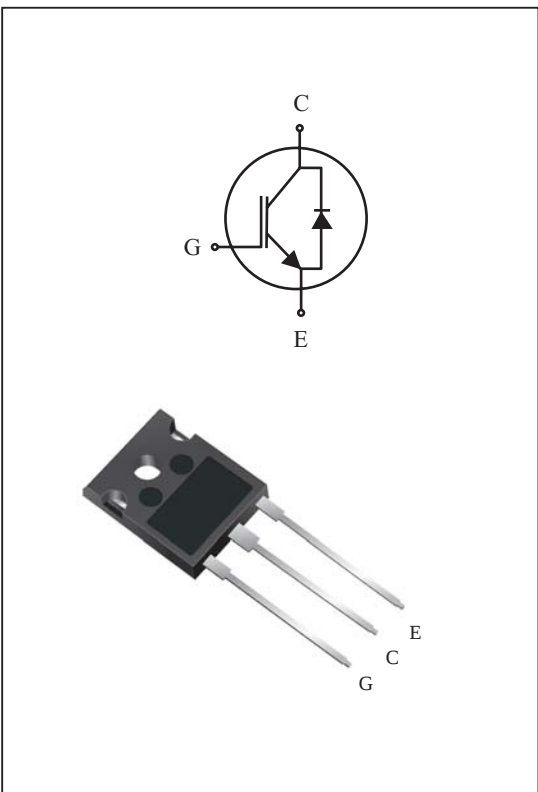
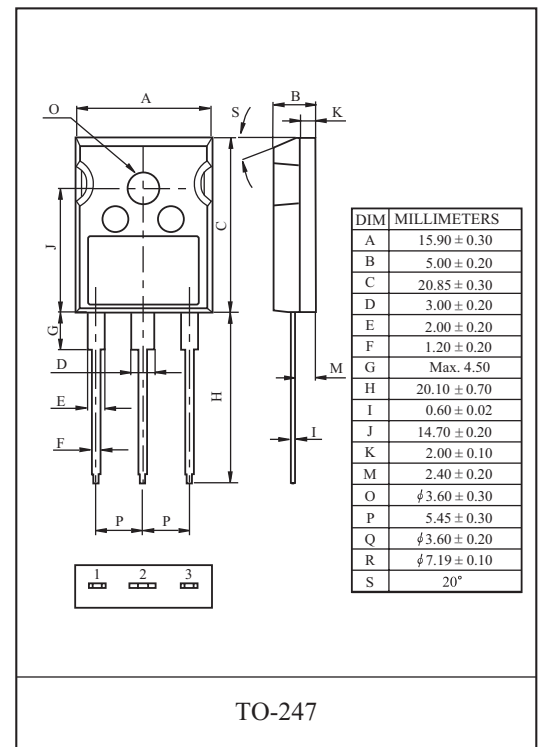
MAXIMUM RATING (Ta=25 °C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V_{CES}	650	V
Gate-Emitter Voltage		V_{GES}	± 20	V
Collector Current	@Tc=25	I_C	120	A
	@Tc=100		60	A
Pulsed Collector Current		I_{CM}^*	180	A
Diode Continuous Forward Current	@Tc=100	I_F	60	A
Diode Maximum Forward Current		I_{FM}	120	A
Maximum Power Dissipation	@Tc=25	P_D	340	W
	@Tc=100		170	W
Maximum Junction Temperature		T_j	175	
Storage Temperature Range		T_{stg}	-55 to + 175	

*Repetitive rating : Pulse width limited by max. junction temperature

THERMAL CHARACTERISTIC

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Junction to Case (IGBT)	R_{thJC}	0.44	/W
Thermal Resistance, Junction to Case (DIODE)	R_{thJC}	1.3	/W
Thermal Resistance, Junction to Ambient	R_{thJA}	40	/W



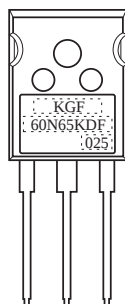
KGF60N65KDF

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 μA	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} = ± 20V	-	-	± 100	nA
Gate Threshold Voltage	V _{GE(th)}	V _{GE} =V _{CE} , I _C =1mA	4.3	5.4	6.5	V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =60A	-	1.77	2.2	V
		V _{GE} =15V, I _C =120A	-	2.47	-	V
		V _{GE} =15V, I _C =60A, T _C = 150	-	2.12	-	V
Dynamic						
Total Gate Charge	Q _g	V _{CC} =400V, V _{GE} =15V, I _C = 60A	-	105	-	nC
Gate-Emitter Charge	Q _{ge}		-	20	-	nC
Gate-Collector Charge	Q _{gc}		-	52	-	nC
Turn-On Delay Time	t _{d(on)}	V _{CC} =400V, V _{GE} =15V, I _C =60A, R _G =10 Ω Inductive Load, T _C = 25 (Note 1)	-	56	-	ns
Rise Time	t _r		-	101	-	ns
Turn-Off Delay Time	t _{d(off)}		-	173	-	ns
Fall Time	t _f		-	34	-	ns
Turn-On Switching Loss	E _{on}		-	3.1	-	mJ
Turn-Off Switching Loss	E _{off}		-	1.1	-	mJ
Total Switching Loss	E _{ts}		-	4.2	-	mJ
Turn-On Delay Time	t _{d(on)}	V _{CC} =400V, V _{GE} =15V, I _C =60A, R _G =10 Ω Inductive Load, T _C = 150 (Note 1)	-	56	-	ns
Rise Time	t _r		-	100	-	ns
Turn-Off Delay Time	t _{d(off)}		-	216	-	ns
Fall Time	t _f		-	42	-	ns
Turn-On Switching Loss	E _{on}		-	3.2	-	mJ
Turn-Off Switching Loss	E _{off}		-	1.7	-	mJ
Total Switching Loss	E _{ts}		-	4.9	-	mJ
Input Capacitance	C _{ies}	V _{CE} =30V, V _{GE} =0V, f=1MHz	-	2981	-	pF
Ouput Capacitance	C _{oes}		-	158	-	pF
Reverse Transfer Capacitance	C _{res}		-	34	-	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

KGF60N65KDF

ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	V _F	I _F = 60A	T _C =25	-	2.16	-	V
			T _C =150	-	2.2	-	
Diode Reverse Recovery Time	t _{rr}	V _{CC} = 400V I _F = 60A di/dt = 300A/ μs	T _C =25	-	116	-	ns
			T _C =150	-	148.5	-	
Diode Peak Reverse Recovery Current	I _{rr}		T _C =25	-	9.7	-	A
			T _C =150	-	12.7	-	
Diode Reverse Recovery Charge	Q _{rr}		T _C =25	-	0.6	-	μC
			T _C =150	-	1.3	-	

Fig 1. Saturation Voltage Characteristics

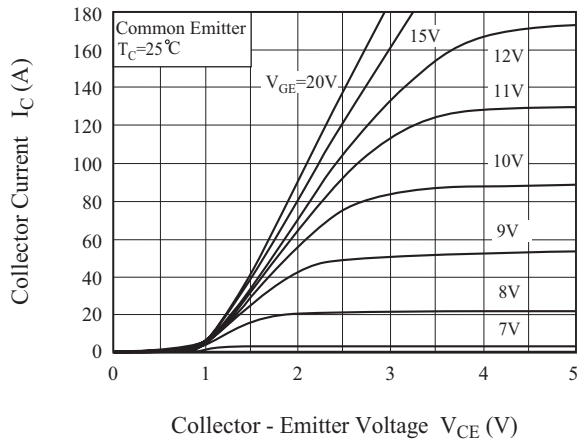


Fig 2. Saturation Voltage Characteristics

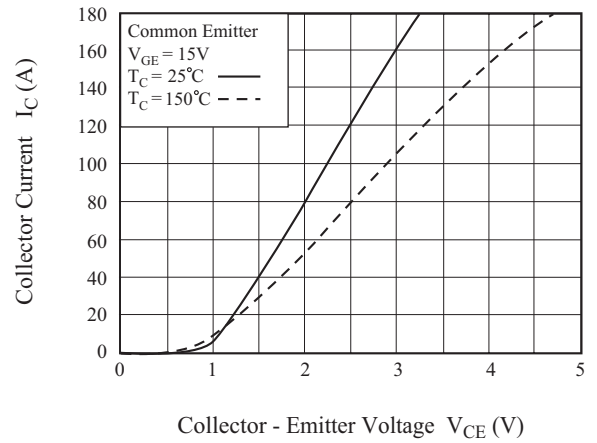


Fig 3. Saturation Voltage vs. Case Temperature

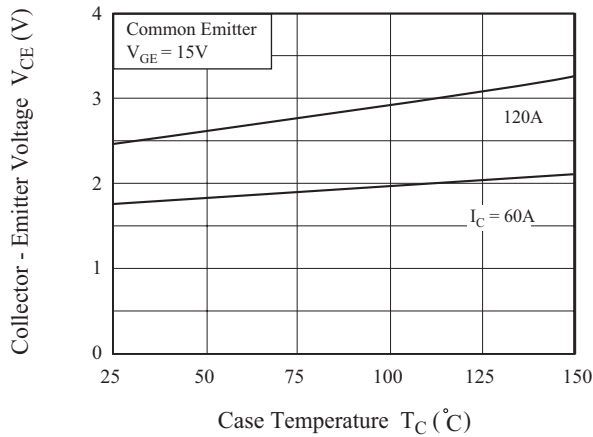


Fig 4. Saturation Voltage vs. V_{GE}

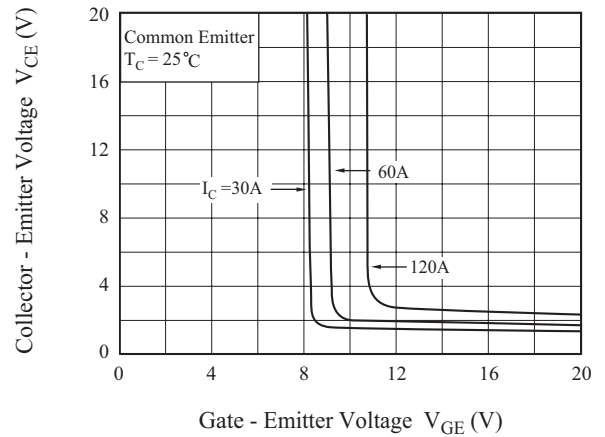


Fig 5. Saturation Voltage vs. V_{GE}

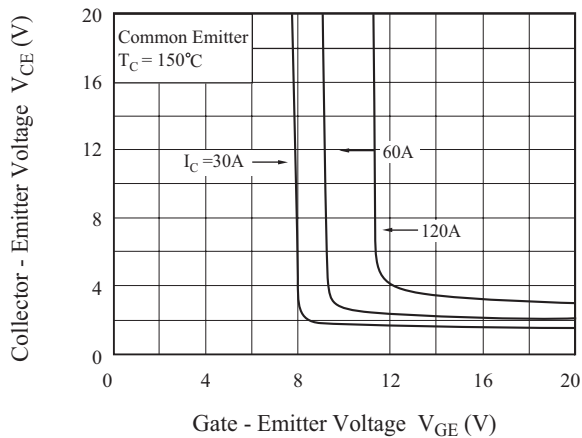


Fig 6. Capacitance Characteristics

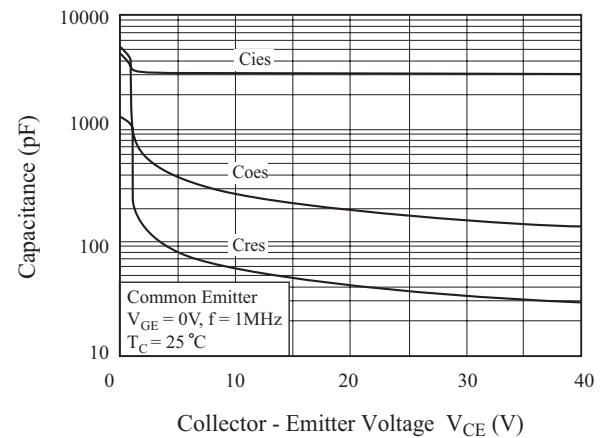


Fig 7. Turn-On Characteristics vs. Gate Resistance

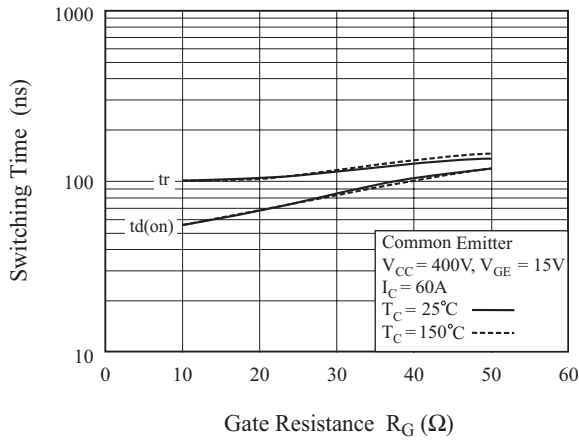


Fig 8. Turn-Off Characteristics vs. Gate Resistance

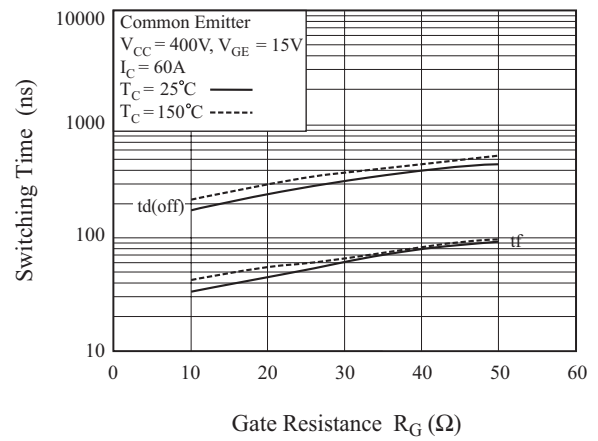


Fig 9. Switching Loss vs. Gate Resistance

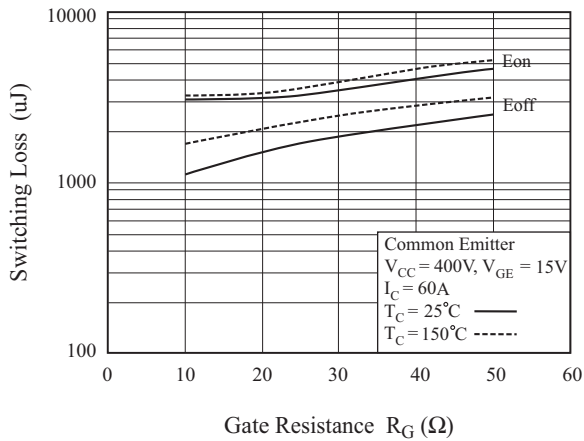


Fig 10. Turn-On Characteristics vs. Collector Current

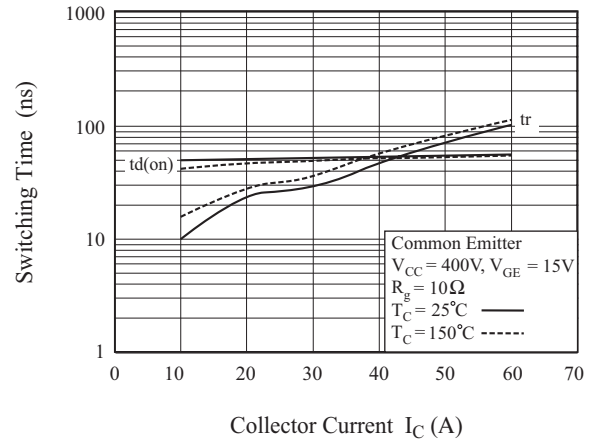


Fig 11. Turn-Off Characteristics vs. Collector Current

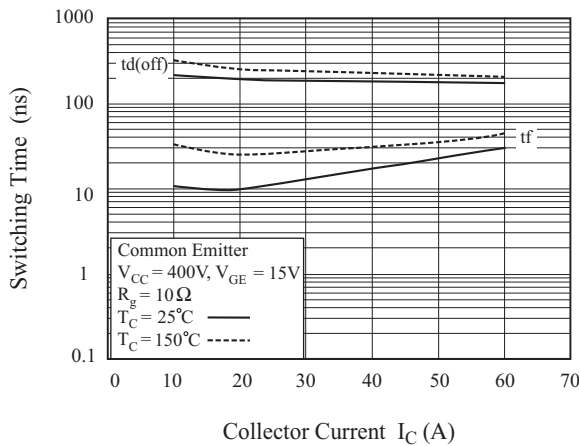


Fig 12. Switching Loss vs. Collector Current

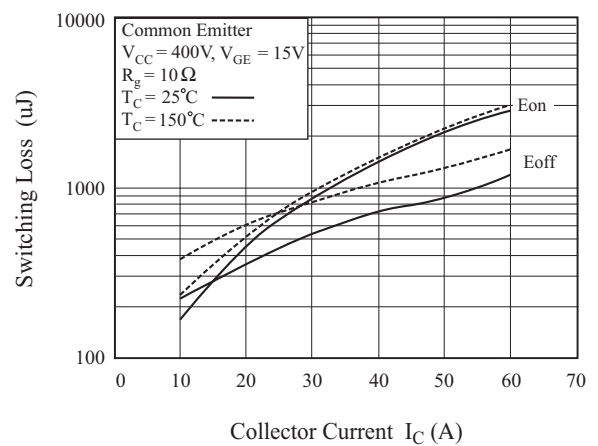


Fig 13. Gate Charge Characteristics

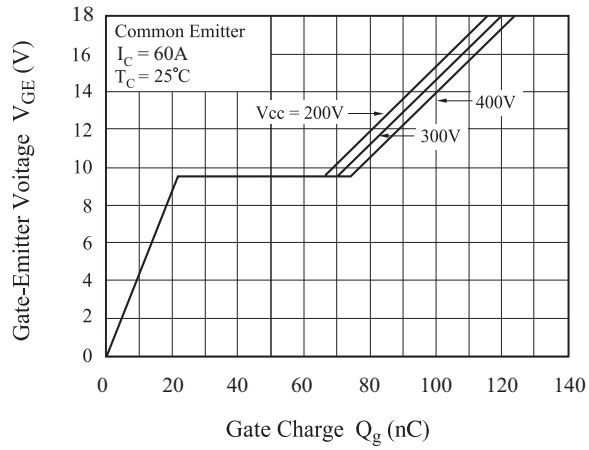


Fig 14. SOA Characteristics

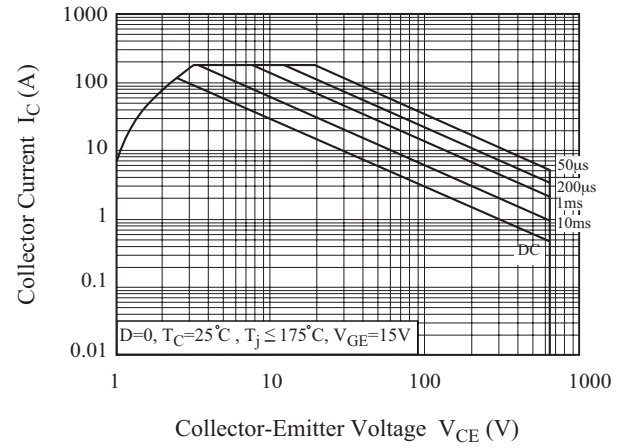


Fig 15. Transient Thermal Impedance of IGBT

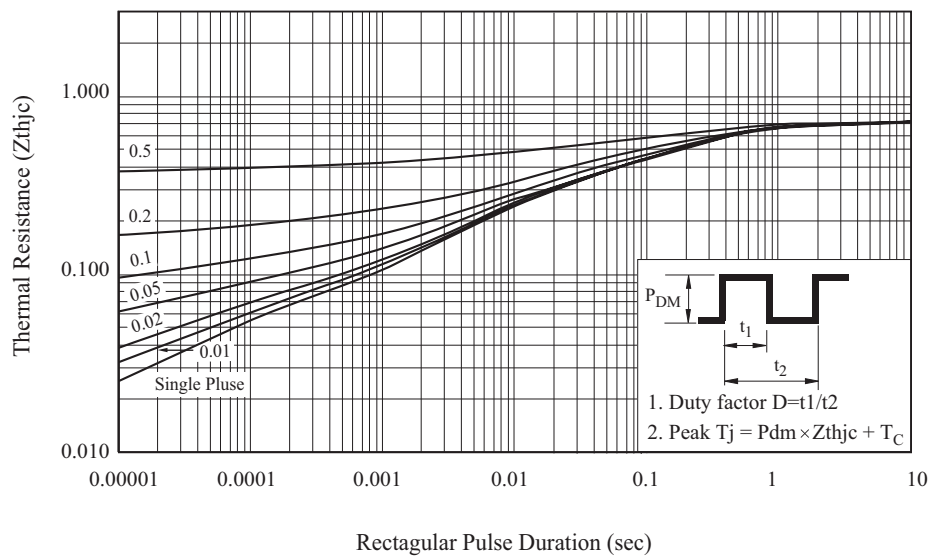


Fig 16. Forward Characteristics

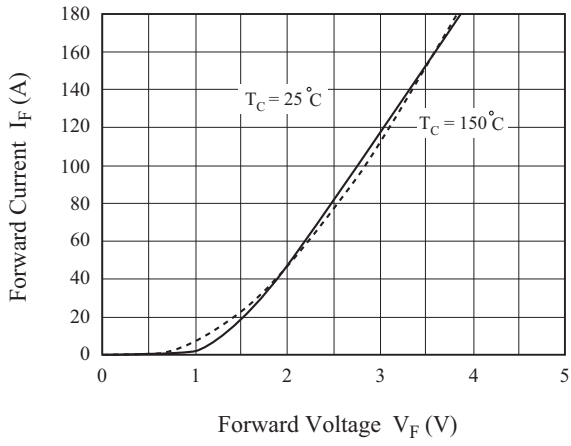


Fig 17. Reverse Recovery Current

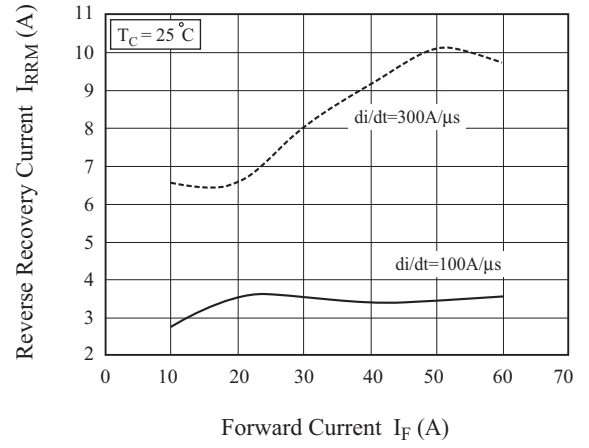


Fig 18. Reverse Recovery Time

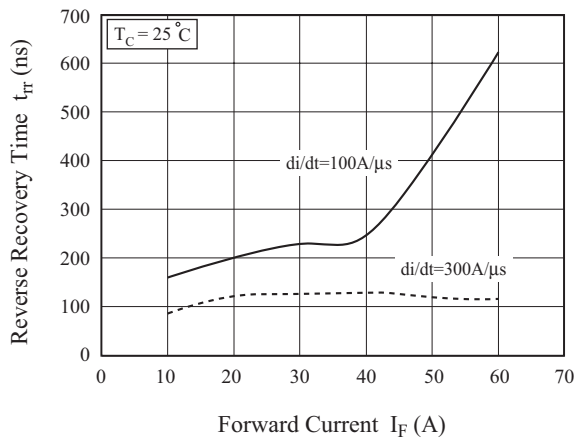


Fig 19. Switching Test Circuit

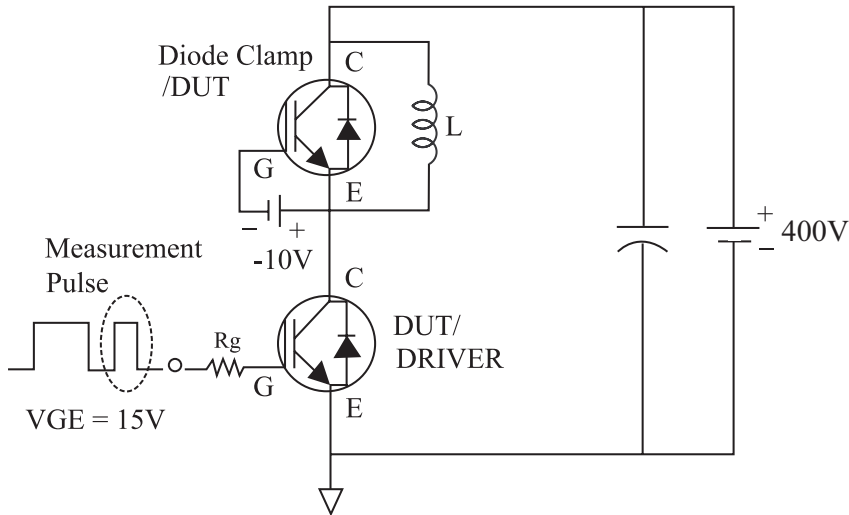


Fig 20. Definition Switching Time & Loss

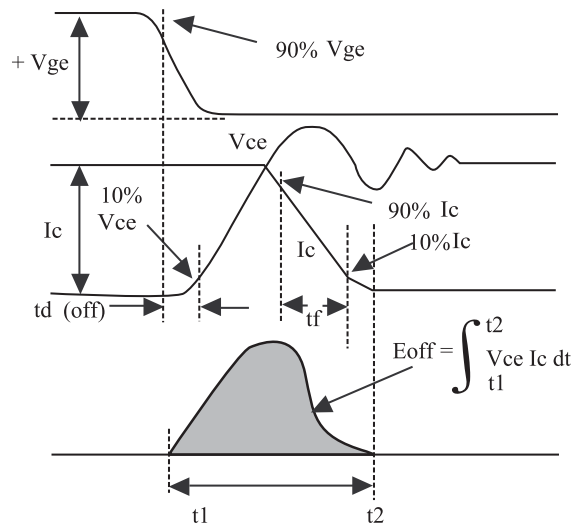
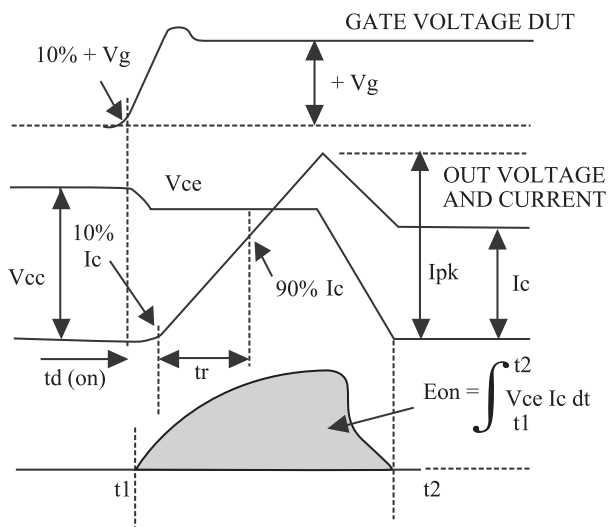


Fig 21. Definition Diode Switching Time

