

## 600V/75A

## 2-PACK IGBT MODULE (Half - Bridge)

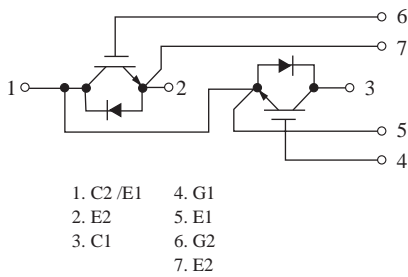
### FEATURES

- Trench NPT Technology
- Low  $V_{CE(sat)}$
- Low Turn-off loss
- Short tail current
- Positive temperature coefficient
- 10us Short Circuit Capability
- Switching frequency range limited under 30kHz
- UL Recognized. File No. E305401

### APPLICATION

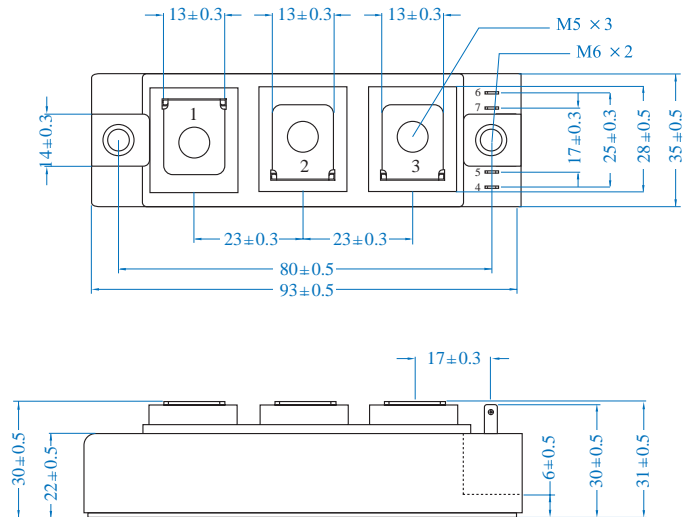
- Motor Controls
- General purpose inverters
- Servo Controls

### INTERNAL CIRCUIT



### OUTLINE DRAWING

Unit : mm



### MAXIMUM RATING (Ta=25 °C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-to-Emitter Voltage		$V_{CES}$	600	V
Gate-Emitter Voltage		$V_{GES}$	$\pm 20$	V
Continuous Collector Current	DC	$I_C$	75	A
Pulsed Collector Current	1ms	$I_{CP}$	150	A
Power Dissipation		$P_D$	160	W
Isolation Voltage test	AC @ 1 minute	$V_{iso}$	2500	V
Junction Temperature		$T_j$	-40 ~ +150	
Storage Temperature		$T_{stg}$	-40 ~ +125	
Weight		Weight	190 ± 5	g
Mounting Torque (M6)		M	5	N.m
Terminal Connection torque (M5)		M	4	N.m

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## ELECTRICAL CHARACTERISTICS (Ta=25 )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
<b>Static</b>							
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$V_{GE}=0V, I_C=1mA$	600	-	-	V	
Collector Cut-off Current	$I_{CES}$	$V_{GE}=0V, V_{CE}=600V$	-	-	1.0	mA	
Gate Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}= \pm 20V$	-	-	$\pm 100$	nA	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1mA$	-	5.8	-	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A$	-	1.68	2.0	V	
		$V_{GE}=15V, I_C=75A, T_C = 125$	-	1.87	-	V	
		$V_{GE}=15V, I_C=150A$	-	2.38	-	V	
<b>Dynamic</b>							
Total Gate Charge	$Q_g$	$V_{CE}=300V, V_{GE}= \pm 15V, I_C= 75A$	-	238	-	nC	
Gate-Emitter Charge	$Q_{ge}$		-	49	-	nC	
Gate-Collector Charge	$Q_{gc}$		-	122	-	nC	
Turn-On Delay Time	$t_{d(on)}$	$V_{CE}=300V, I_C=75A, V_{GE}= \pm 15V, R_G=10$ Inductive Load, $T_C = 25$	-	152	-	ns	
Rise Time	$t_r$		-	75	-	ns	
Turn-Off Delay Time	$t_{d(off)}$		-	250	-	ns	
Fall Time	$t_f$		-	69	-	ns	
Turn-On Switching Loss	$E_{on}$		-	0.7	-	mJ	
Turn-Off Switching Loss	$E_{off}$		-	3.0	-	mJ	
Total Switching Loss	$E_{ts}$		-	3.7	-	mJ	
Turn-On Delay Time	$t_{d(on)}$		$V_{CE}=300V, I_C=75A, V_{GE}= \pm 15V, R_G=10$ Inductive Load, $T_C = 125$	-	149	-	ns
Rise Time	$t_r$			-	77	-	ns
Turn-Off Delay Time	$t_{d(off)}$			-	246	-	ns
Fall Time	$t_f$	-		74	-	ns	
Turn-On Switching Loss	$E_{on}$	-		0.9	-	mJ	
Turn-Off Switching Loss	$E_{off}$	-		3.66	-	mJ	
Total Switching Loss	$E_{ts}$	-		4.96	-	mJ	
Input Capacitance	$C_{ies}$	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	-	6290	-	pF	
Output Capacitance	$C_{oes}$		-	290	-	pF	
Reverse Transfer Capacitance	$C_{res}$		-	81	-	pF	
Short Circuit Current	$I_{SC}$	$V_{CC}=300V, V_{GE}= \pm 15V,$ $t_{psc} 10\mu s$	-	380	-	A	

## THERMAL CHARACTERISTIC

CHARACTERISTIC	SYMBOL	Max	UNIT
Junction to Case (IGBT Part, Per 1/2 Module)	$R_{th(j-c)}$	0.64	/W
Junction to Case (Diode Part, Per 1/2 Module)	$R_{th(j-c)}$	1.21	

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## ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Diode Forward Voltage	$V_F$	$I_F = 75A$	$T_C = 25$	-	1.7	2	V
			$T_C = 125$	-	1.8	-	
Diode Reverse Recovery Time	$t_{rr}$	$I_F = 75A,$ $R_G = 10$	$T_C = 25$	-	124	149	ns
			$T_C = 125$	-	197	-	
Diode Peak Reverse Recovery Current	$I_{rr}$		$T_C = 25$	-	31	37	A
			$T_C = 125$	-	34	-	
Diode Reverse Recovery Charge	$Q_{rr}$		$T_C = 25$	-	2.02	2.42	uC
			$T_C = 125$	-	3.22	-	

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Fig 1. Saturation Voltage Characteristics

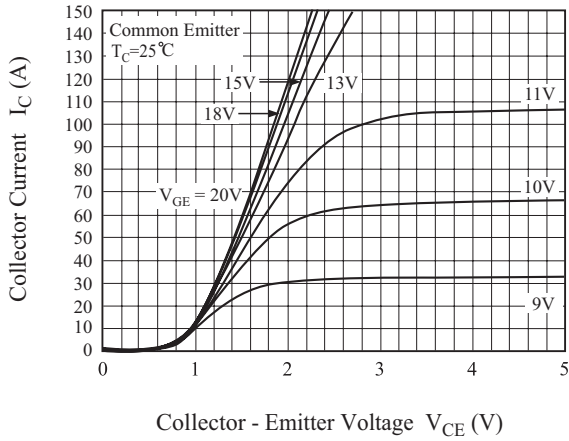


Fig 2. Saturation Voltage Characteristics

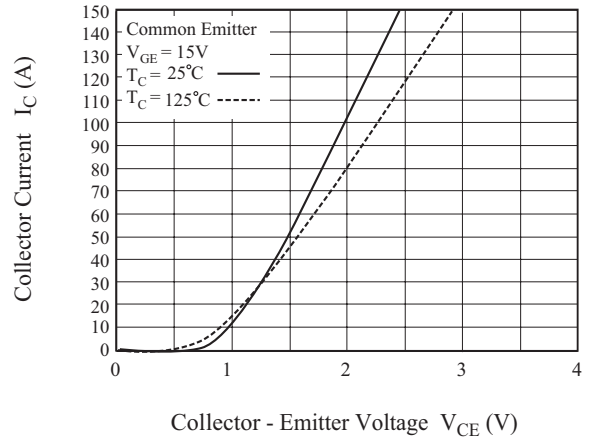


Fig 3. Saturation Voltage vs. Case Temperature

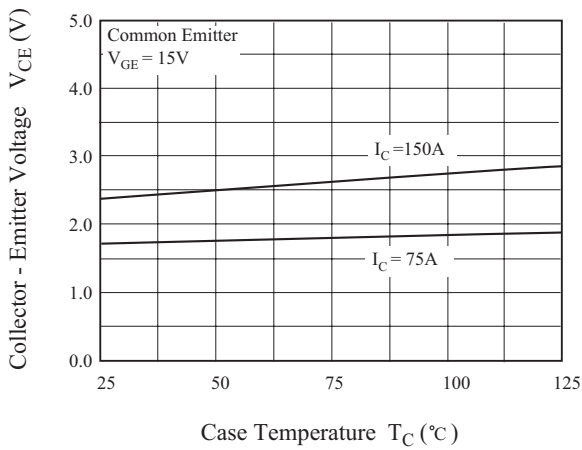


Fig 4. Saturation Voltage vs.  $V_{GE}$

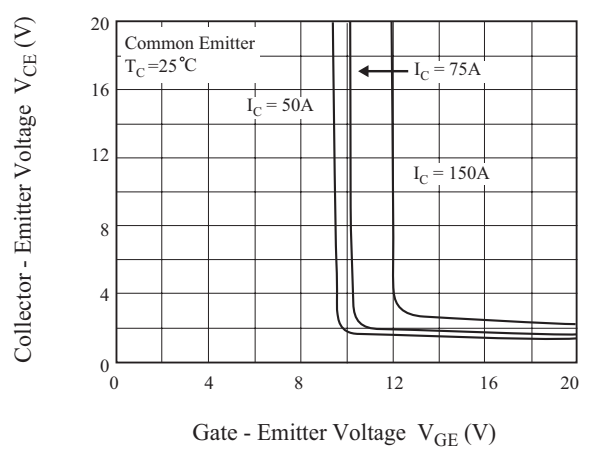


Fig 5. Saturation Voltage vs.  $V_{GE}$

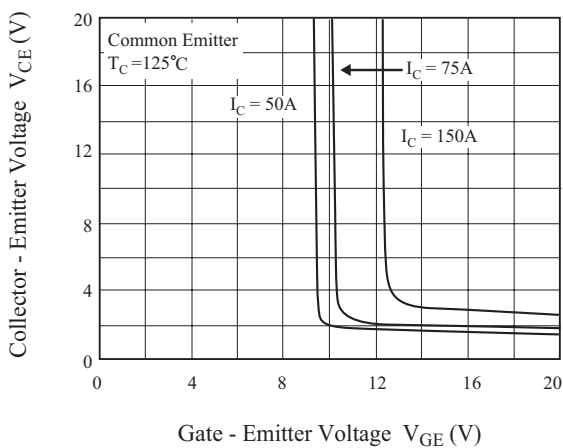


Fig 6. Capacitance Characteristics

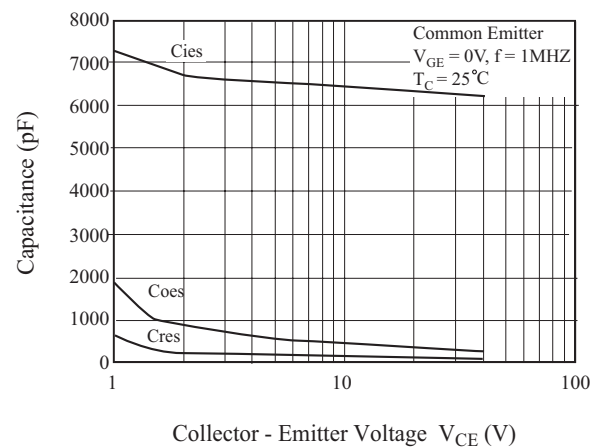


Fig 7. Turn-On Characteristics vs. Gate Resistance

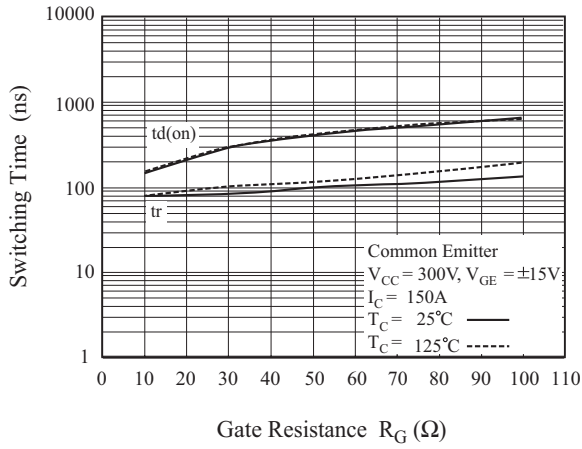


Fig 8. Turn-Off Characteristics vs. Gate Resistance

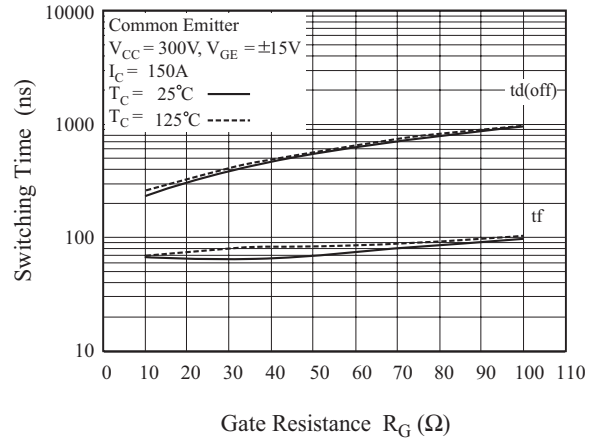


Fig 9. Switching Loss vs. Gate Resistance

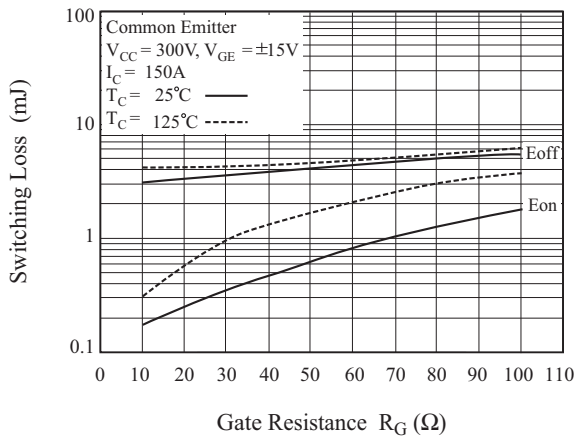


Fig 10. Turn-On Characteristics vs. Collector Current

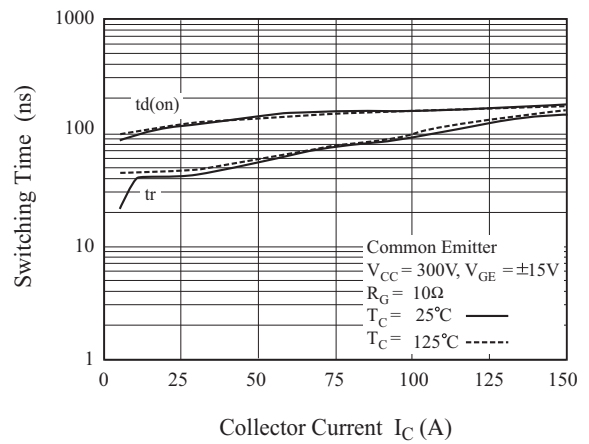


Fig 11. Turn-Off Characteristics vs. Collector Current

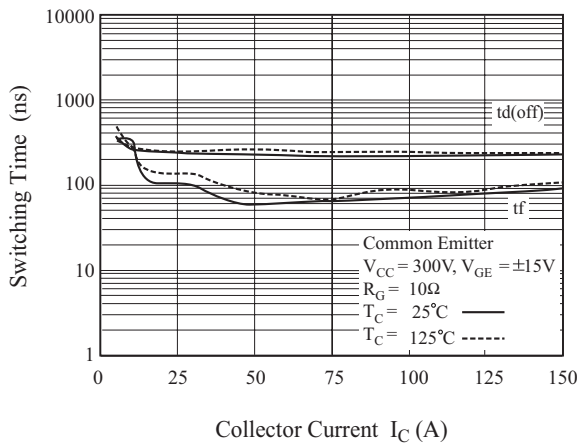
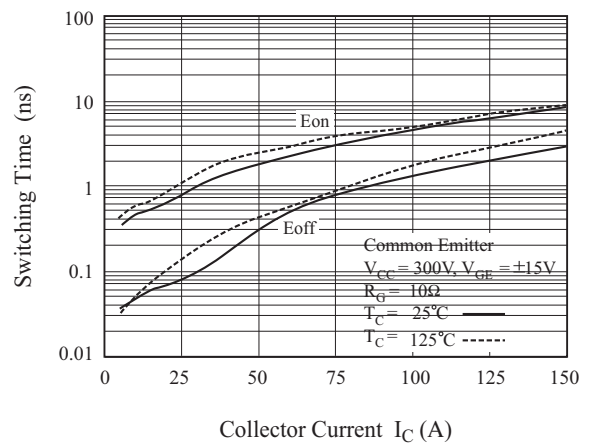


Fig 12. Turn-Off Characteristics vs. Collector Current



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Fig 13. Gate Charge Characteristics

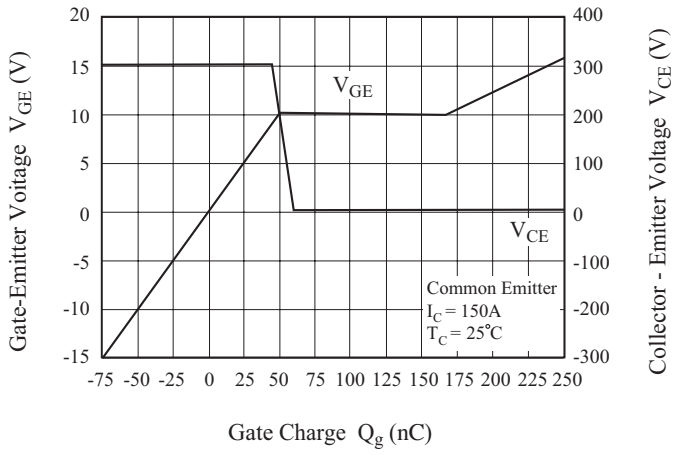


Fig 14. Reverse Bias Safe Operating Area (Max)

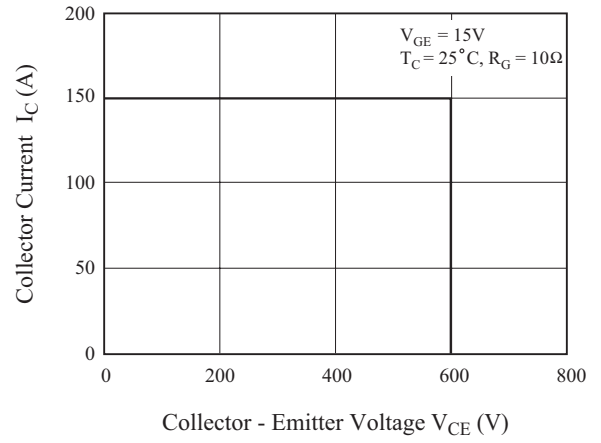
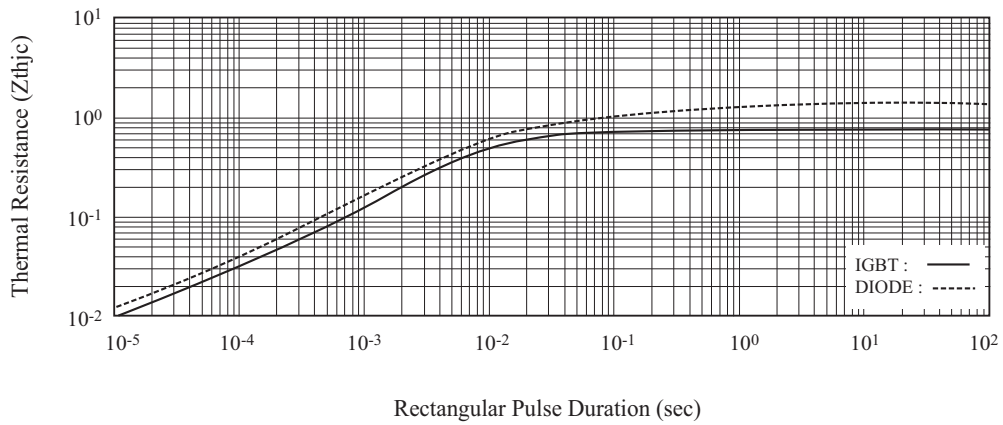


Fig15. Transient Thermal Response Curve



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Fig 16. Forward Characteristics

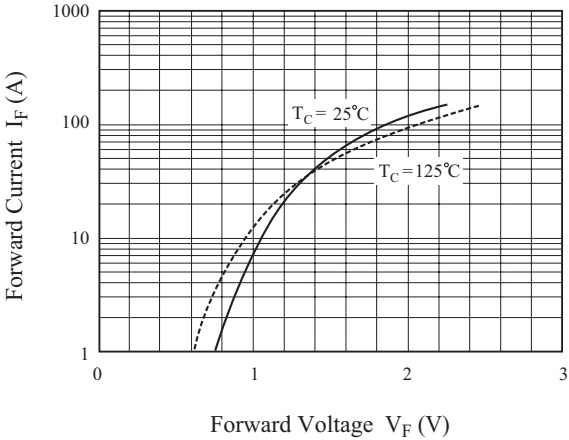


Fig 17. Reverse Recovery Current

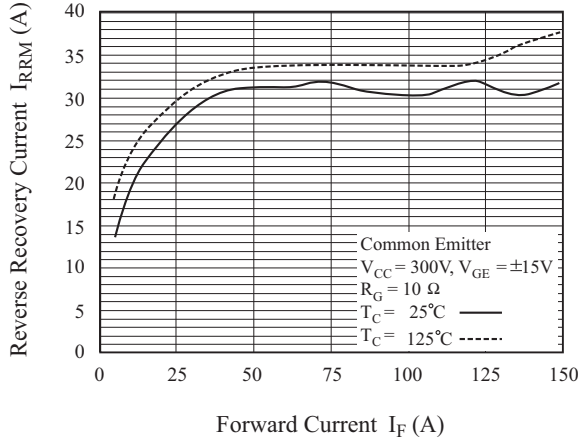


Fig 18. Reverse Recovery Current

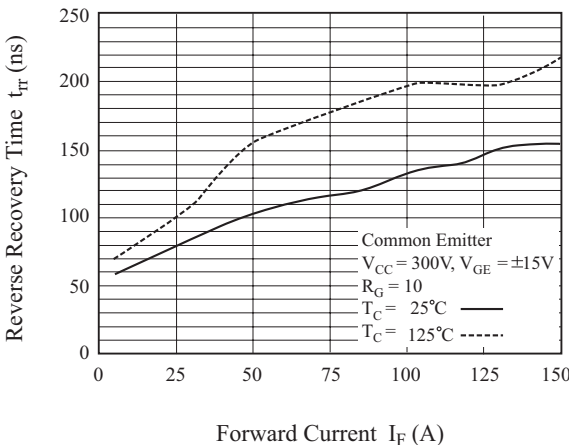


Fig 19. Switching Test Circuit

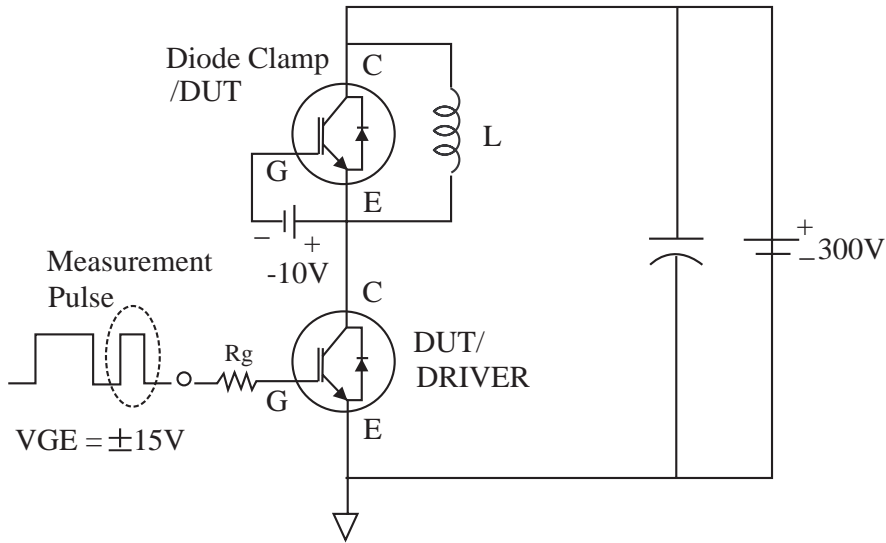


Fig 20. Definition Switching Time & Loss

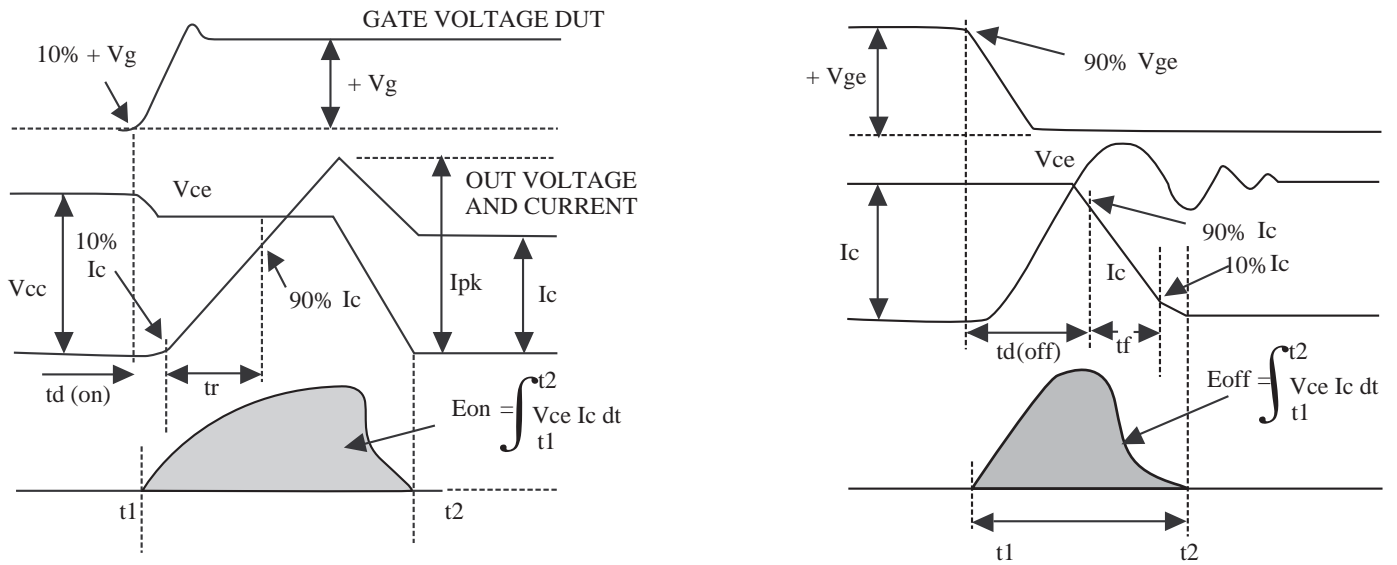


Fig 21. Definition Diode Switching Time

