

Insulated Gate Bipolar Transistor

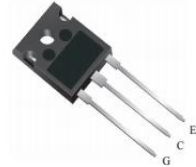
General Description:

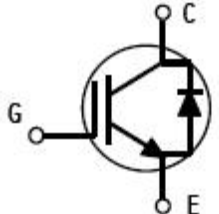
ROUM Field Stop Trench IGBTs offer low switching losses, high energy efficiency and short circuit ruggedness. It is designed for applications such as motor control, uninterrupted power supplies(UPS), general inverters.

Features:

- High speed switching
- High ruggedness, temperature stable behavior
- Short Circuit Withstand Times $\sim 10\mu s$
- Extremely enhanced avalanche capability

V_{CES}	1200	V
I_C	40	A
$P_{tot} (T_c=25^\circ C)$	357	W
$V_{CE(SAT)}$	1.9	V





Absolute Maximum Ratings ($T_c = 25^\circ C$ unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate- Emitter Voltage	± 20	V
I_C	Collector Current	80	A
	Collector Current @TC = 100 °C	40	A
I_{CM}^{a1}	Pulsed Collector Current	120	A
I_F	Diode Continuous Forward Current @TC = 100 °C	40	A
I_{FM}	Diode Maximum Forward Current	160	A
P_D	Power Dissipation @ TC = 25°C	357	W
	Power Dissipation @TC = 100 °C	140	W
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to +150	°C
T_L	Maximum Temperature for Soldering	300	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to case for IGBT	0.27	0.32	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to case for Diode	--	1.1	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	°C/W

ELECTRICAL CHARACTERISTICS (Ta=25°C)

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	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=40mA$	4.5	6.0	7.5	V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A$	-	1.9	2.25	V	
		$V_{GE}=15V, I_C=40A, T_C = 125^\circ C$	-	2.2	-	V	
		$V_{GE}=15V, I_C=80A$	-	2.5	-	V	
Dynamic							
Total Gate Charge	Q_g	$V_{CC}=600V, V_{GE}=15V, I_C=40A$	-	230	350	nC	
Gate-Emitter Charge	Q_{ge}		-	30	-	nC	
Gate-Collector Charge	Q_{gc}		-	110	-	nC	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=40A, V_{GE}=15V, R_G=10\Omega$ Inductive Load, $T_C = 25^\circ C$	-	60	-	ns	
Rise Time	t_r		-	45	-	ns	
Turn-Off Delay Time	$t_{d(off)}$		-	310	-	ns	
Fall Time	t_f		-	70	-	ns	
Turn-On Switching Loss	E_{on}		-	3.5	5.2	mJ	
Turn-Off Switching Loss	E_{off}		-	1.9	2.8	mJ	
Total Switching Loss	E_{ts}		-	5.4	8.0	mJ	
Turn-On Delay Time	$t_{d(on)}$		$V_{CC}=600V, I_C=40A, V_{GE}=15V, R_G=10\Omega$ Inductive Load, $T_C = 125^\circ C$	-	60	-	ns
Rise Time	t_r			-	50	-	ns
Turn-Off Delay Time	$t_{d(off)}$			-	350	-	ns
Fall Time	t_f	-		175	-	ns	
Turn-On Switching Loss	E_{on}	-		4.3	6.4	mJ	
Turn-Off Switching Loss	E_{off}	-		3.0	4.5	mJ	
Total Switching Loss	E_{ts}	-		7.3	10.9	mJ	
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	-	4800	-	pF	
Output Capacitance	C_{oes}		-	195	-	pF	
Reverse Transfer Capacitance	C_{res}		-	135	-	pF	
Short Circuit Withstand Time	t_{sc}	$V_{CC}=600V, V_{GE}=15V, T_C=100^\circ C$	10	-	-	μs	

ELECTRICAL CHARACTERISTIC OF DIODE

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Diode Forward Voltage	V_F	$I_F = 40A$	$T_C=25^{\circ}C$	-	2.2	2.6	V
			$T_C=125^{\circ}C$	-	1.9	-	
Diode Reverse Recovery Time	t_{rr}	$I_F = 40A$	$T_C=25^{\circ}C$	-	360	520	ns
			$T_C=125^{\circ}C$	-	460	-	
Diode Peak Reverse Recovery Current	I_{rr}	$I_F = 40A$ $di/dt = 200A/\mu s$	$T_C=25^{\circ}C$	-	16	21	A
			$T_C=125^{\circ}C$	-	19	-	
Diode Reverse Recovery Charge	Q_{rr}	$I_F = 40A$ $di/dt = 200A/\mu s$	$T_C=25^{\circ}C$	-	2800	4200	nC
			$T_C=125^{\circ}C$	-	5200	-	

Fig 1. Saturation Voltage Characteristics

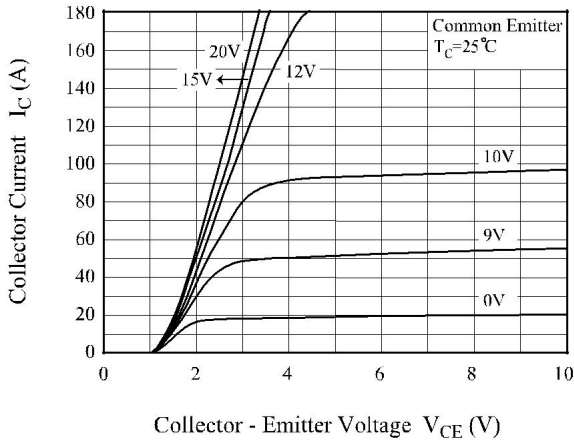


Fig 2. Saturation Voltage Characteristics

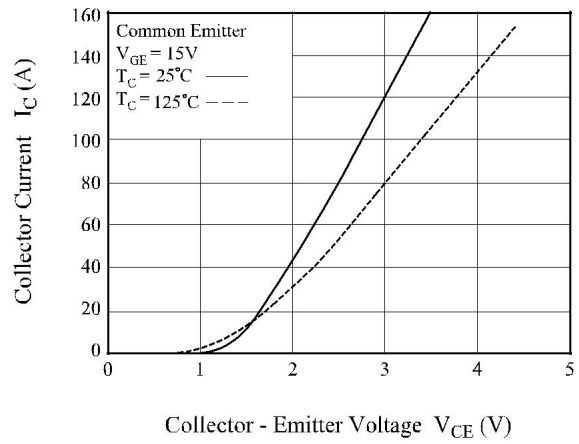


Fig 3. Saturation Voltage vs. Case Temperature

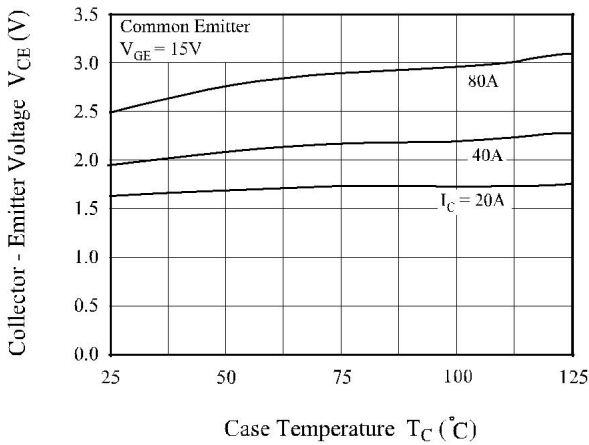


Fig 4. Saturation Voltage vs. V_{GE}

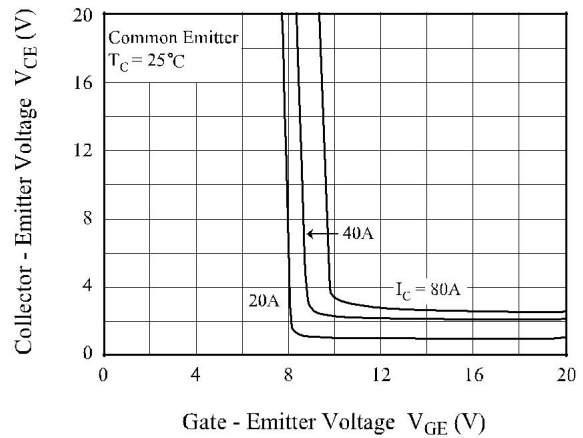


Fig 5. Saturation Voltage vs. V_{GE}

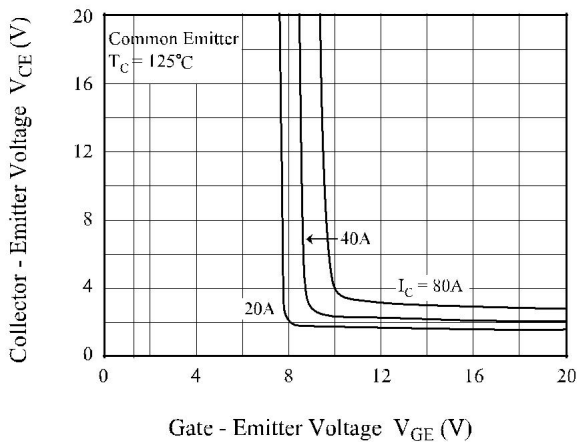


Fig 6. Capacitance Characteristics

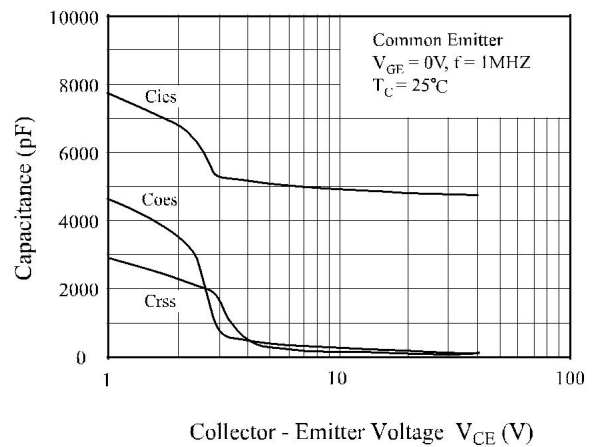


Fig 7. Turn-On Characteristics vs. Gate Resistance

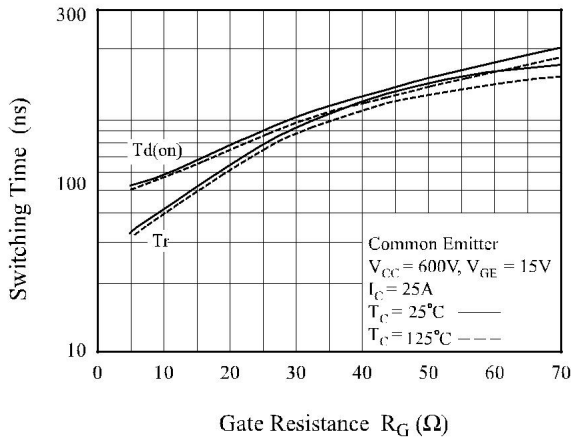


Fig 8. Turn-Off Characteristics vs. Gate Resistance

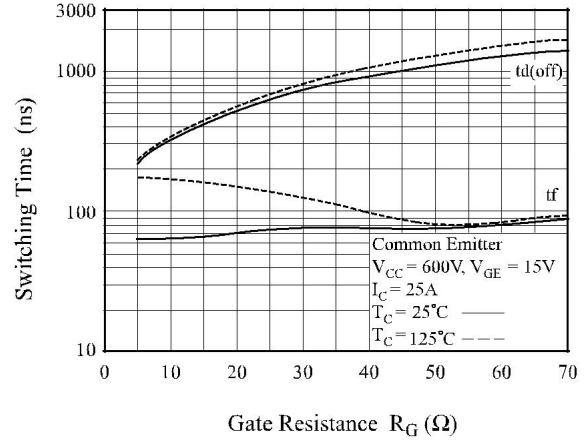


Fig 9. Switching Loss vs. Gate Resistance

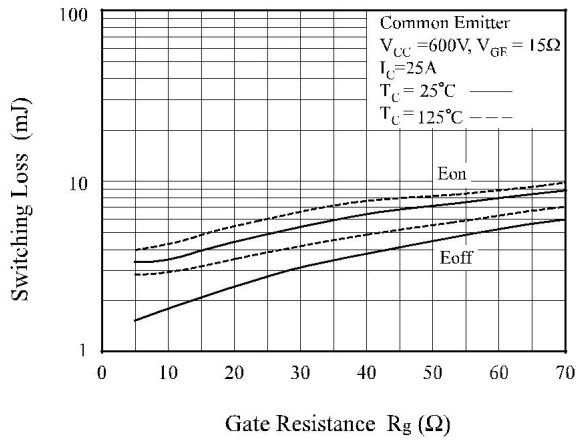


Fig 10. Turn-On Characteristics vs Collector Current

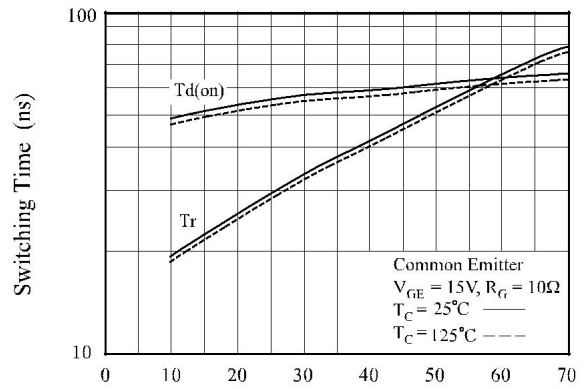


Fig 11. Turn-Off Characteristics vs Collector Current

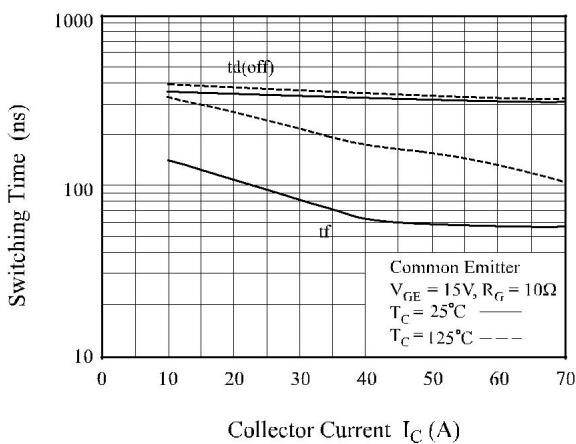


Fig 12. Switching Loss vs. Collector Current

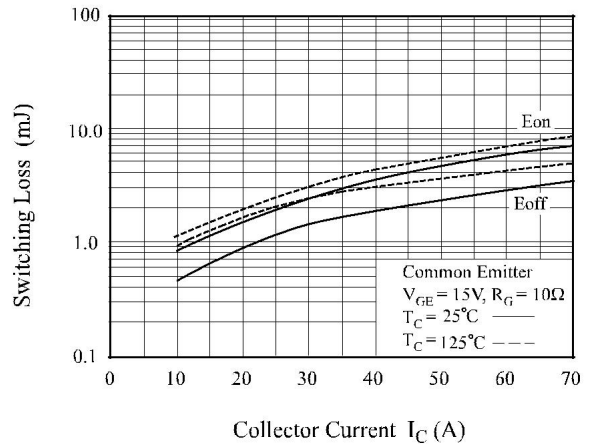


Fig 13. Gate Charge Characteristics

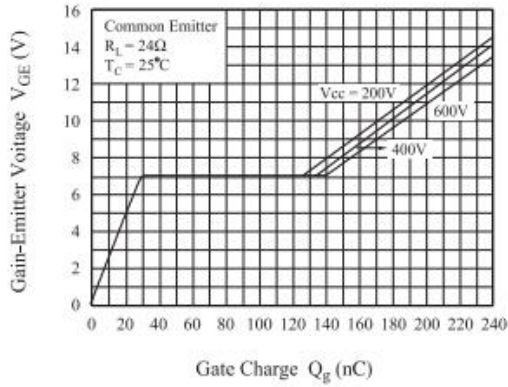


Fig 14. SOA Characteristics

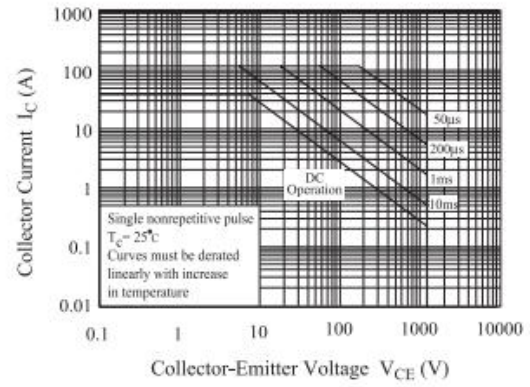


Fig 15. Turn-Off SOA

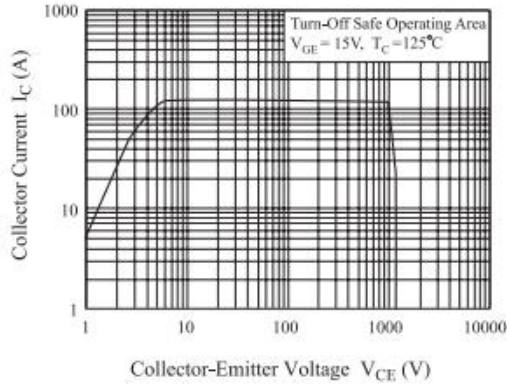


Fig 16. Transient Thermal Impedance of IGBT

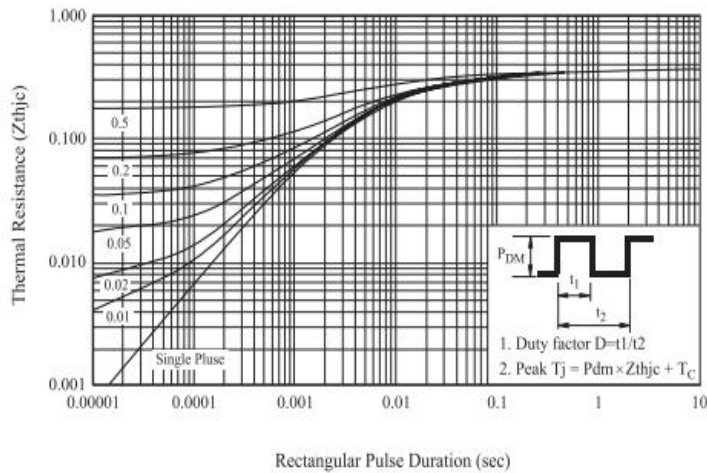


Fig 17. Forward Characteristics

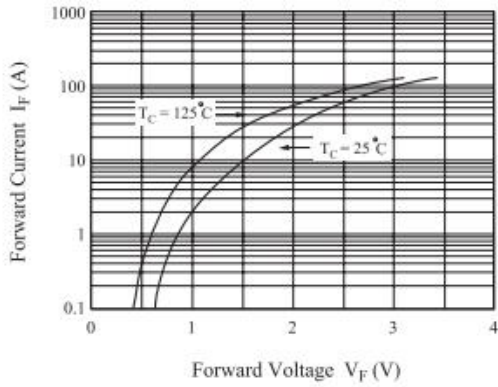


Fig 18. Reverse Recovery Current

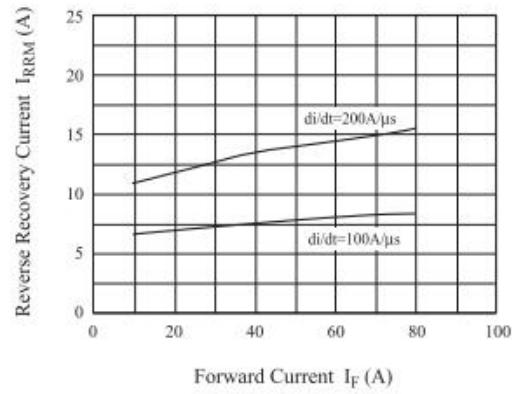


Fig 19. Reverse Recovery Time

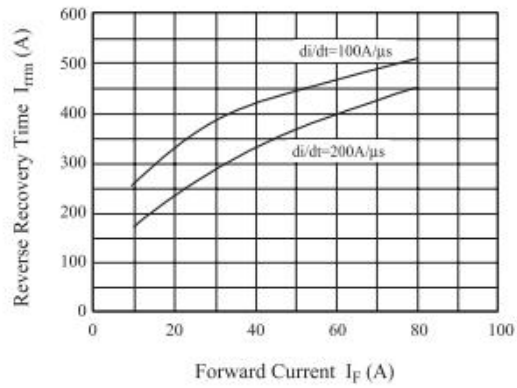


Fig 21. Switching Test Circuit

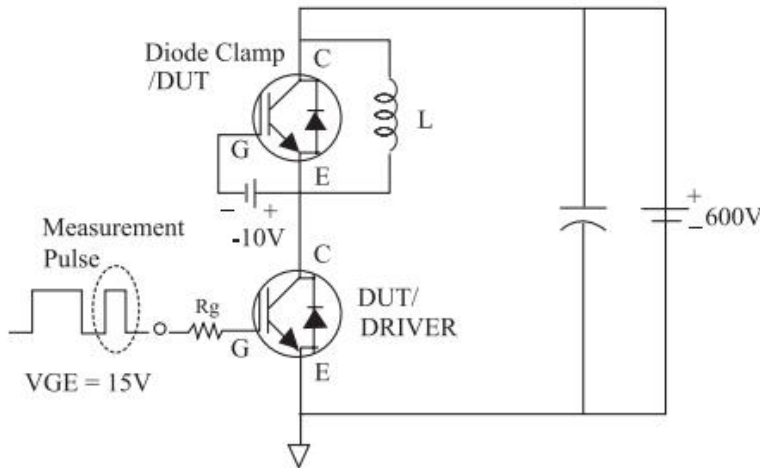


Fig 22. Definition Switching Time & Loss

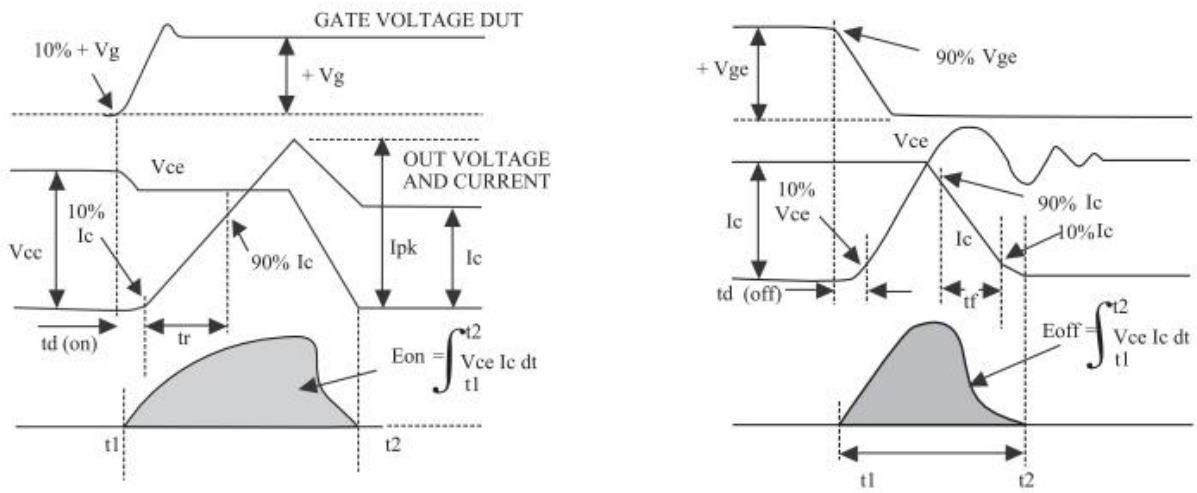
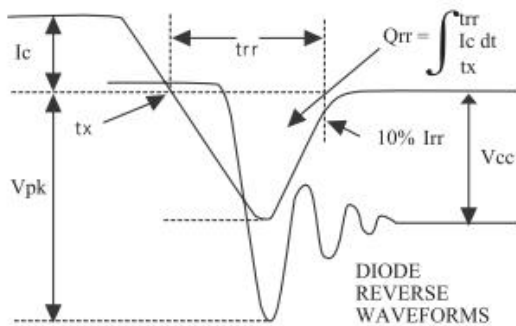
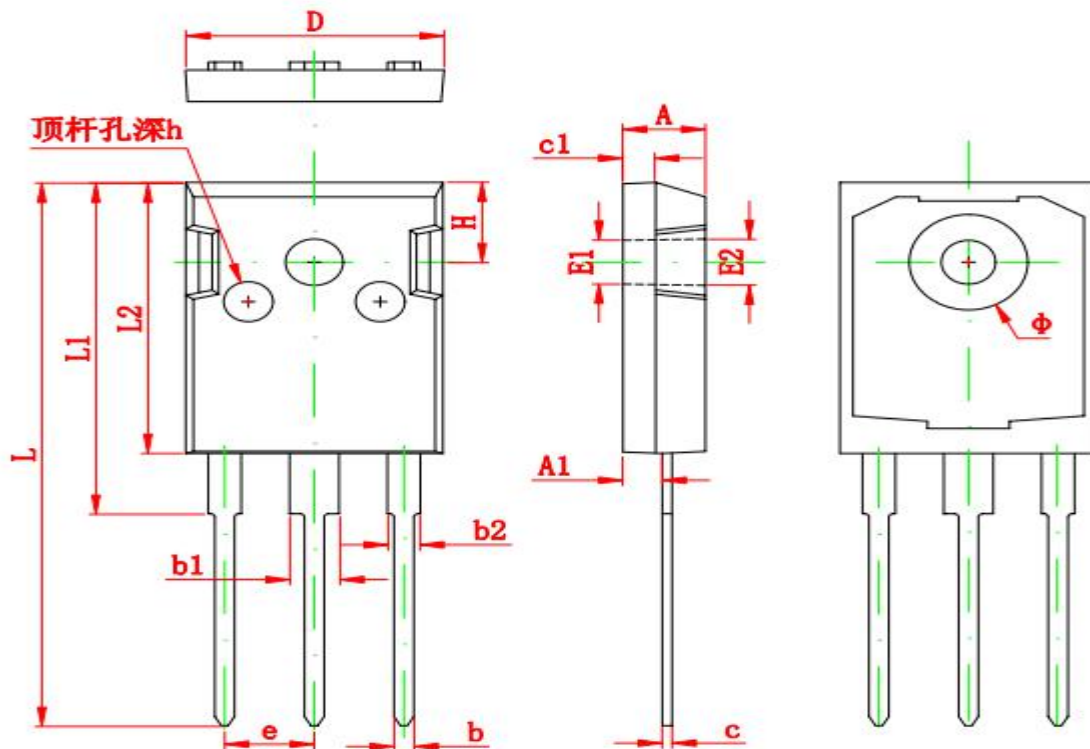


Fig 23. Definition Diode Switching Time



外形图



TO-247 封装

Symbo l	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	
h	0.000	0.300	0.000	0.012