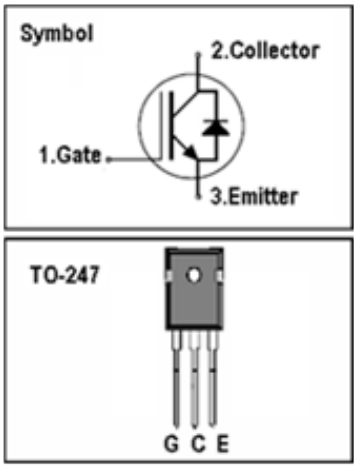
IGBT



Features

- 1200V,25A
- $V_{CE(sat)(typ.)}$=1.66V@V_{GE}=15V,I_C=25A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA

General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as Motor control, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current (T_C=25 ℃)	50	A
	Continuous Collector Current (T_C=100℃)	25	A
I_{CM}	Pulsed Collector Current (Note 1)	75	A
I_F	Diode Continuous Forward Current (T_C=100 ℃)	25	A
I_{FM}	Diode Maximum Forward Current (Note 1)	75	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation (T_C=25 ℃)	250	W
T_J	Operating Junction Temperature Range	-55 to +175	℃
T_{STG}	Storage Temperature Range	-55 to +175	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	0.45	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	0.3	℃/ W
$R_{th\ j\text{-}a}$	Thermal Resistance, Junction to Ambient	40	℃/ W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}= 0V, I_C= 1mA	1200	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 1200V, V_{GE}= 0V	-	-	1	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}= ± 30V, V_{CE}= 0V	-	-	± 200	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 1mA	5.6	-	8.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 25A	-	1.66	2.1	V
Q_g	Total Gate Charge	V_{CC}=600V V_{GE}=15V IC=25A	-	106		nC
Q_{ge}	Gate-Emitter Charge		-	26.2		nC
Q_{gc}	Gate-Collector Charge		-	48		nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V V_{GE}=15V I_C=25A R_G=4Ω Inductive Load T_C=25 ℃	-	24.3	-	ns
t_r	Turn-on Rise Time		-	7.36	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	126	-	ns
t_f	Turn-off Fall Time		-	125	-	ns
Eon	Turn-on Switching Loss		-	1.37	-	mJ
Eoff	Turn-off Switching Loss		-	1.13	-	mJ
Ets	Total Switching Loss		-	2.5	-	mJ
C_{ies}	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 1MHz	-	2600	-	pF
C_{oes}	Output Capacitance		-	85	-	pF
C_{res}	Reverse Transfer Capacitance		-	20	-	pF

Electrical Characteristics of Diode (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=25A	-	1.9	2.8	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 600V I_F= 25A dIF/dt = 200A/us	-	357		ns
I_{rr}	Diode peak Reverse Recovery Current		-	7.95		A
Q_{rr}	Diode Reverse Recovery Charge		-	1550		nC

Notes：

1. Repetitive Rating: Pulse width limited by maximum junction temperature

Typical Performance Characteristics

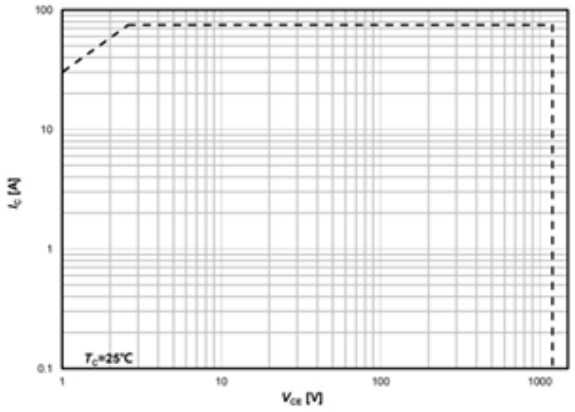


Figure 1. **Forward bias safe operating area**

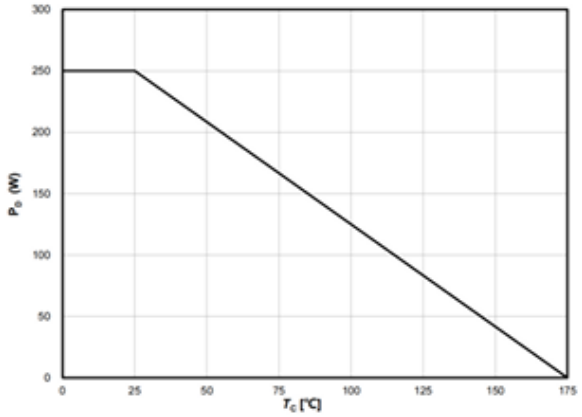


Figure 2. **Power dissipation as a function of case temperature**

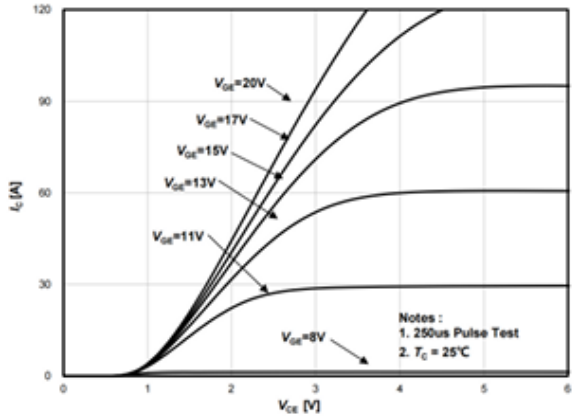


Figure 3. **Typical output characteristic(25℃)**

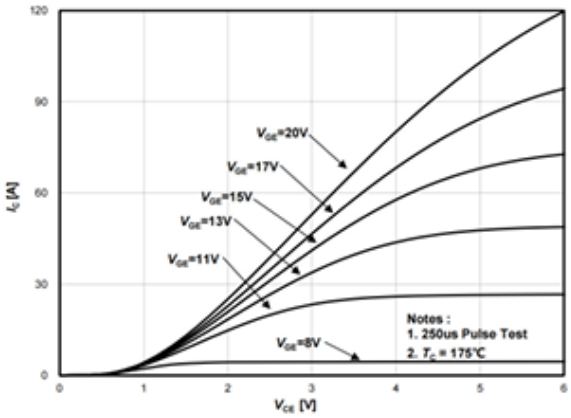


Figure 4. **Typical output characteristic(175℃)**

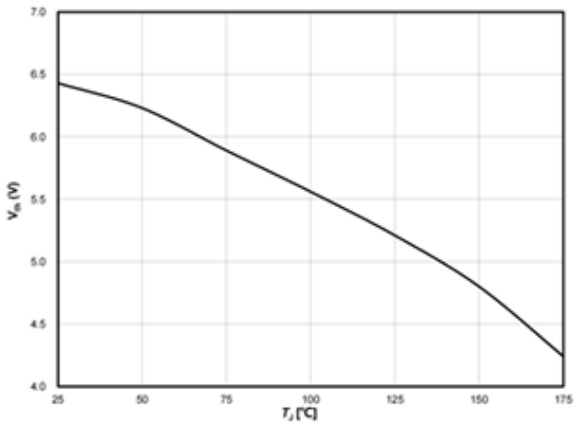


Figure 5. **Gate-emitter threshold voltage as a function of junction temperature**

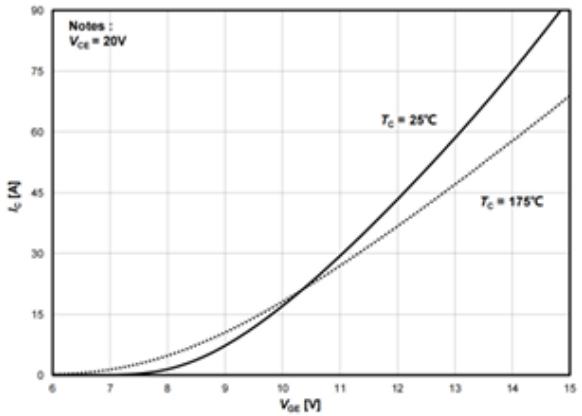


Figure 6. **Typical transfer characteristic**

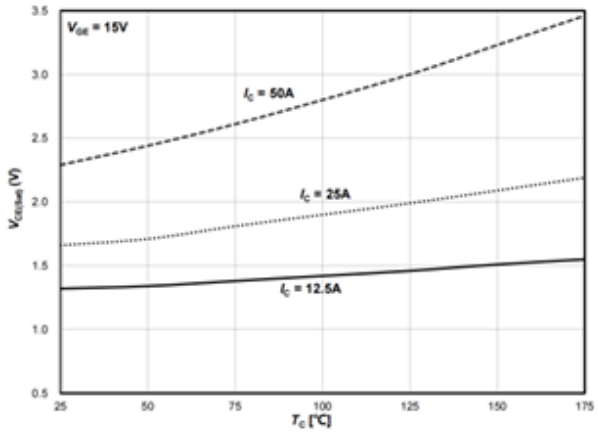


Figure 7. **Typical collector-emitter saturation voltage as a function of junction temperature**

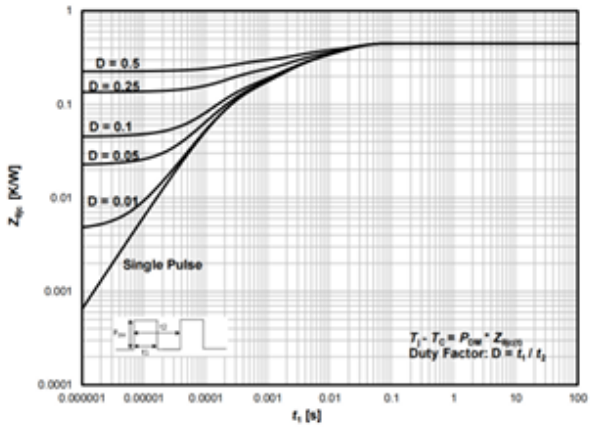


Figure 8. **IGBT transient thermal impedance**

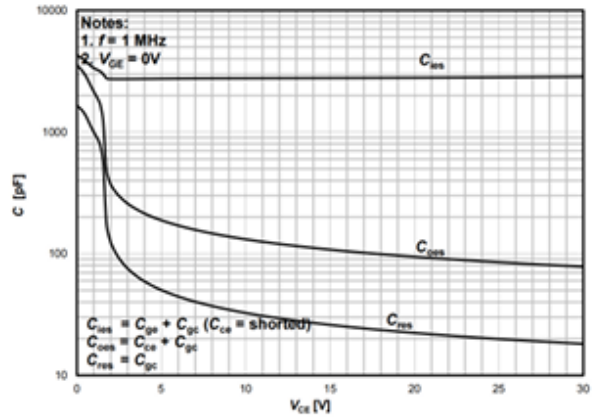


Figure 9. **Typical capacitance as a function of collector-emitter voltage**

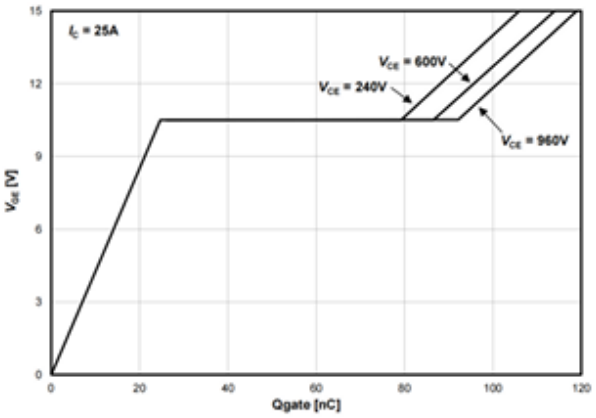


Figure 10. **Typical gate charge**

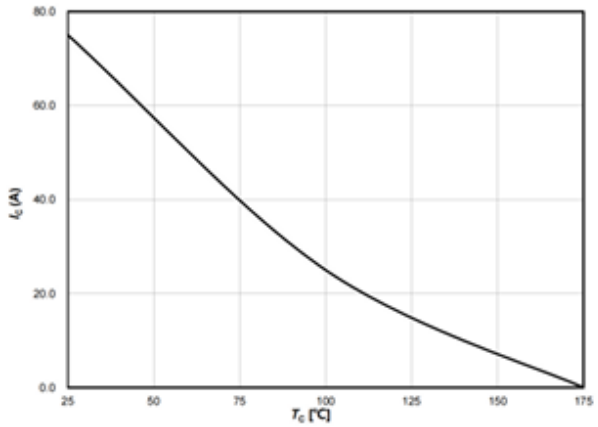


Figure 11. **Collector current as a function of case temperature**

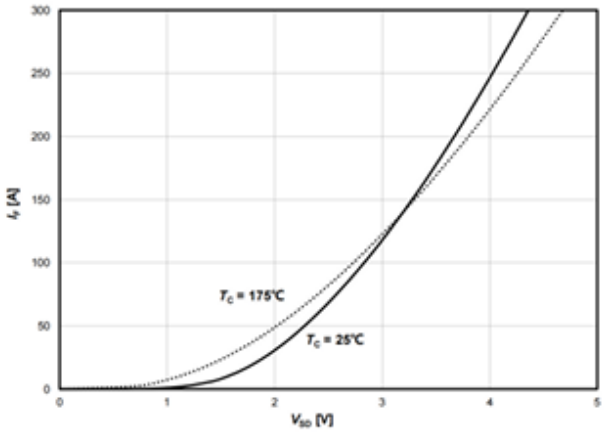


Figure 12. **Typical diode forward current as a function of forward voltage**

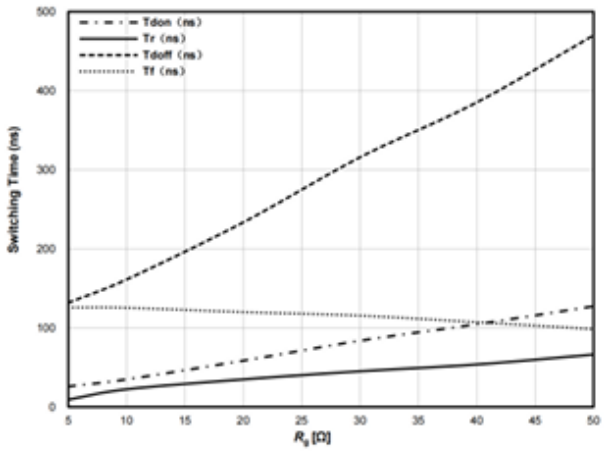


Figure 13. **Typical switching times as a function of gate resistance**

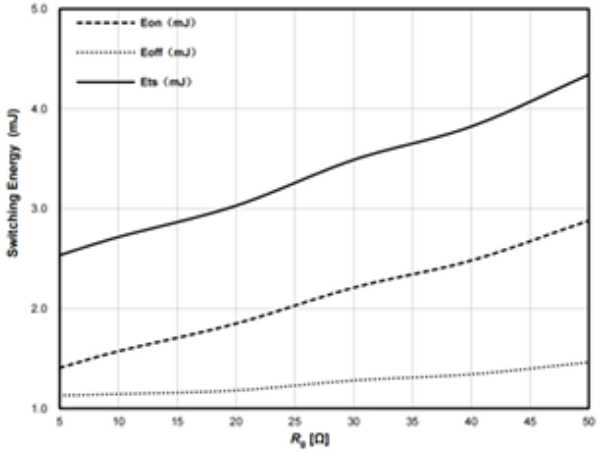


Figure 14. **Typical switching energy losses as a function of gate resistance**

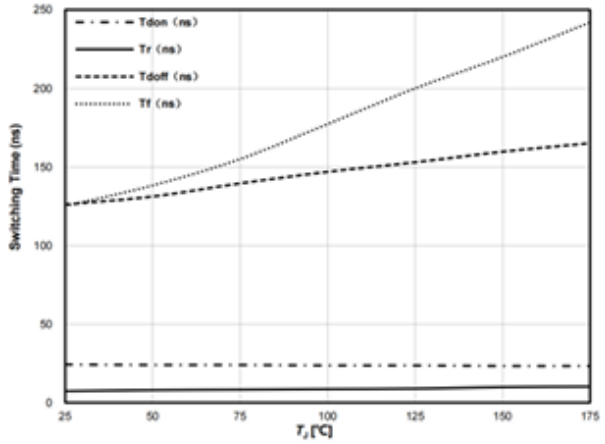


Figure 15. **Typical switching times as a function of junction temperature**

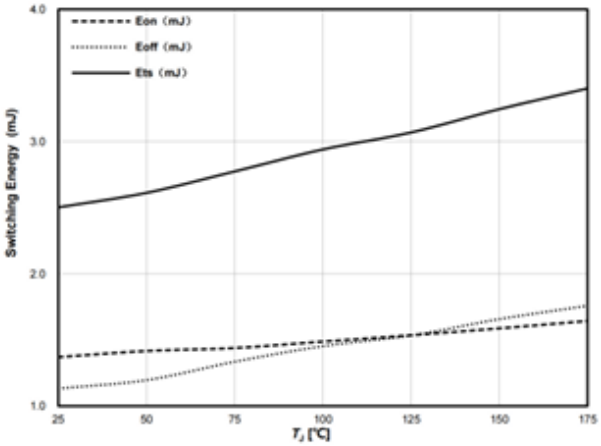


Figure 16. **Typical switching energy losses as a function of junction temperature**

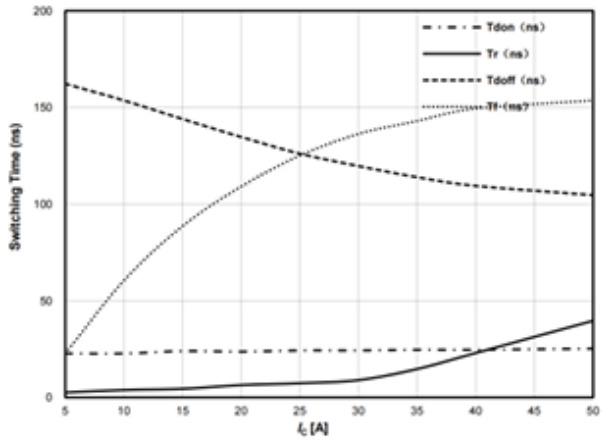


Figure 17. **Typical switching times as a function of collector current**

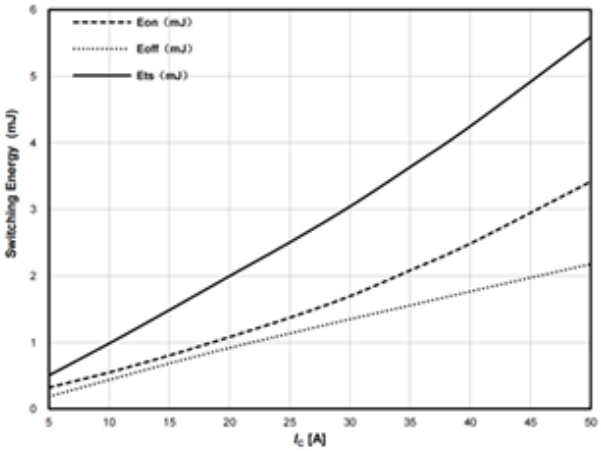


Figure 18. **Typical switching energy losses as a function of collector current**

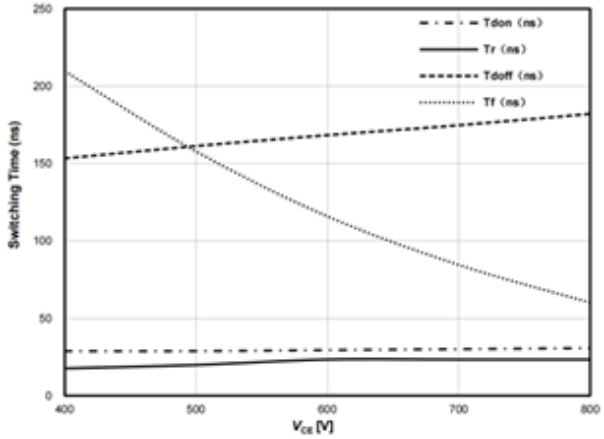


Figure 19. **Typical switching times as a function of collector emitter voltage**

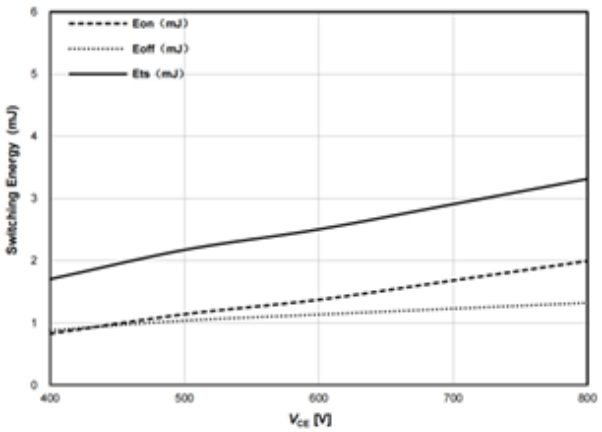
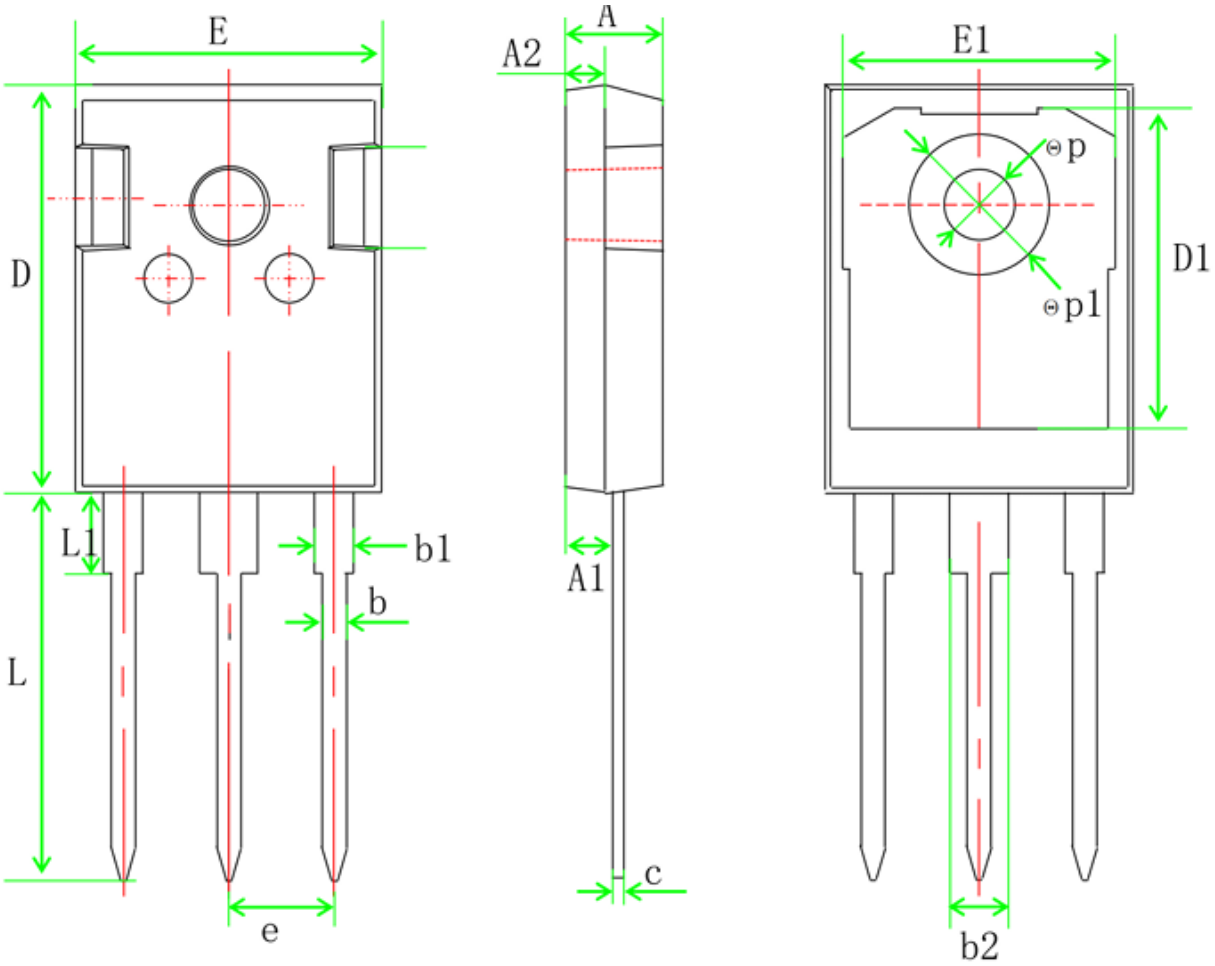


Figure 20. **Typical switching energy losses as a function of collector emitter voltage**

TO-247 PACKAGE OUTLINE



SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	4.80	5.00	5.20	D	20.70	21.00	21.30
A1	2.21	2.41	2.61	D1	16.25	16.55	16.85
A2	1.85	2.00	2.15	E	15.50	15.80	16.10
b	1.10	1.20	1.36	E1	13.00	13.30	13.60
b1	1.90	2.00	2.21	L	19.42	19.92	20.42
b2	2.85	3.00	3.21	L1	4.03	4.13	4.43
c	0.45	0.60	0.75	Θp	3.45	3.60	3.75
e	5.29	5.44	5.59	Θp1			7.4

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