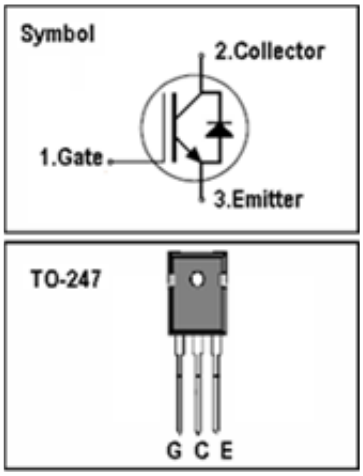
IGBT



Features

- 650V,50A
- $V_{CE(sat)(typ.)}$=1.8V@V_{GE}=15V,I_C=50A
- 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 UPS, Induction converters, Uninterruptible power supplies and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Continuous Collector Current (T_C=25 ℃)	100	A
	Continuous Collector Current (T_C=100℃)	50	A
I_{CM}	Pulsed Collector Current (Note 1)	200	A
I_F	Diode Continuous Forward Current (T_C=100 ℃)	50	A
I_{FM}	Diode Maximum Forward Current (Note 1)	200	A
P_D	Maximum Power Dissipation (T_C=25 ℃)	535	W
	Maximum Power Dissipation (T_C=100℃)	267	W
T_J	Operating Junction Temperature Range	-40 to +175	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	0.28	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	0.42	℃/ 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= 250uA	650	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 650V, V_{GE}= 0V	-	-	50	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}=±20V, V_{CE}= 0V	-	-	±100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 1mA	4.5	-	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 50A	-	1.8	-	V
Q_g	Total Gate Charge	V_{CC}=520V V_{GE}=15V I_C=50A	-	158		nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V V_{GE}=15V I_C=50A R_G=10Ω Inductive Load T_C=25 ℃	-	52	-	ns
t_r	Turn-on Rise Time		-	82	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	193	-	ns
t_f	Turn-off Fall Time		-	61	-	ns
Eon	Turn-on Switching Loss		-	1.7	-	mJ
Eoff	Turn-off Switching Loss		-	1.0	-	mJ
Ets	Total Switching Loss		-	2.7	-	mJ
C_{ies}	Input Capacitance	V_{CE}=30V V_{GE}=0V f = 1MHz	-	4820	-	pF
C_{oes}	Output Capacitance		-	170	-	pF
C_{res}	Reverse Transfer Capacitance		-	37	-	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=50A	-	1.8	-	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 400V I_F= 50A dif/dt= 800A/ns	-	82	-	ns
I_{rr}	Diode peak Reverse Recovery Current		-	15	-	A
Q_{rr}	Diode Reverse Recovery Charge		-	698	-	nC

Notes:

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

Typical performance characteristics

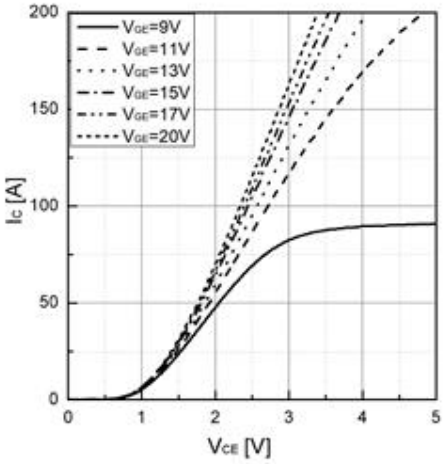


Fig 1. Typical output characteristic (T_{vj}=25℃)

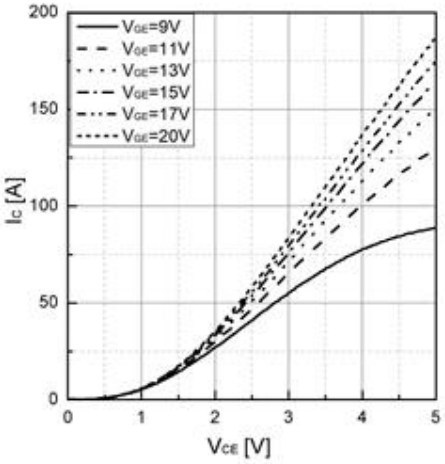


Fig 2. Typical output characteristic(T_{vj}=175℃)

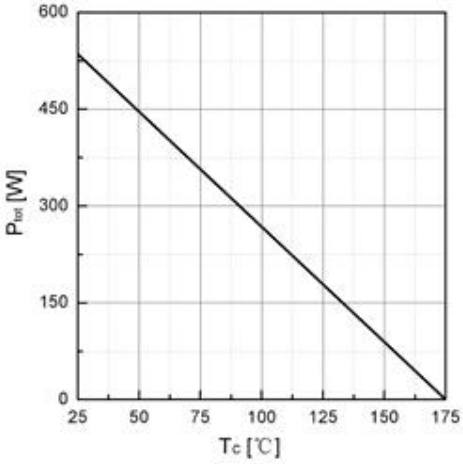


Fig 3. Power dissipation as a function of T_C

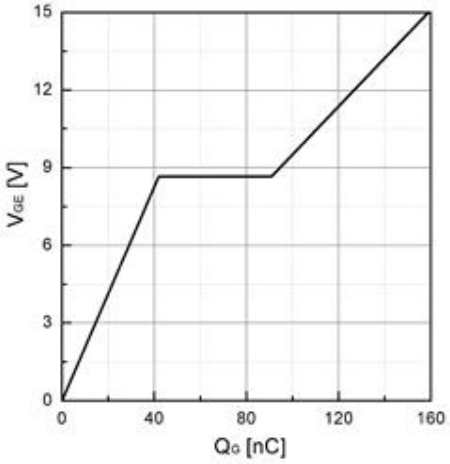


Fig 4. Typical Gate charge

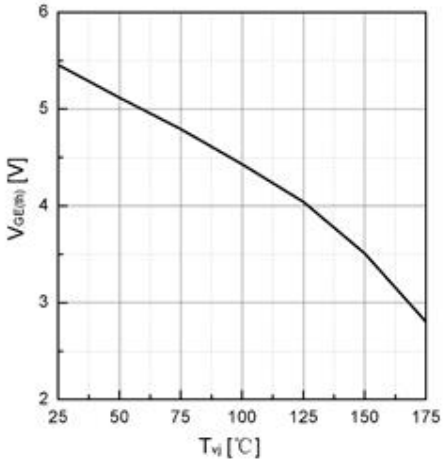


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj} (I_C=1mA)

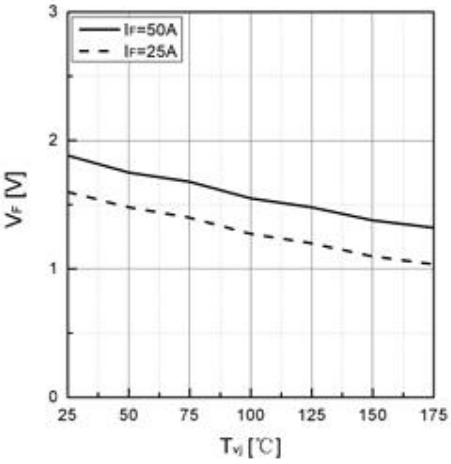


Fig 6. Typical V_F as a function of T_{vj}

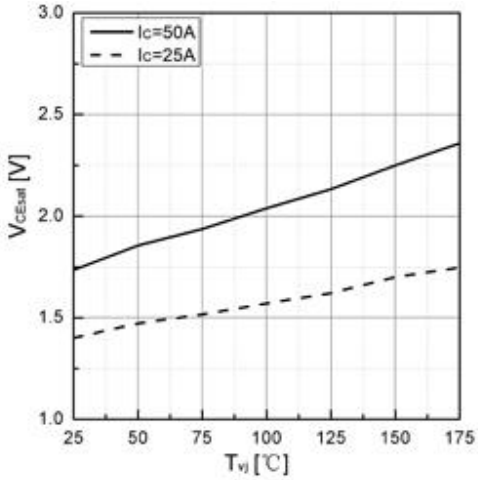


Fig 7. Typical V_{CEsat} as a function of T_{vj}

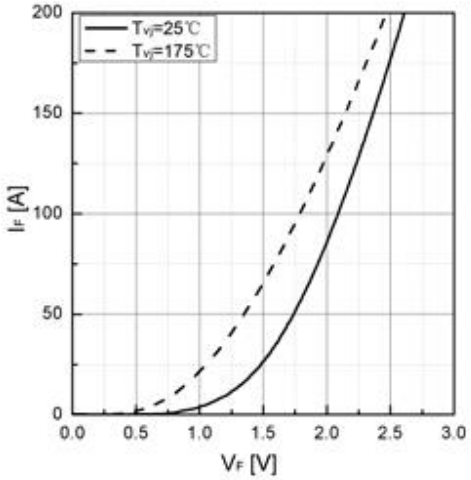


Fig 8. Typical I_F as a function of V_F

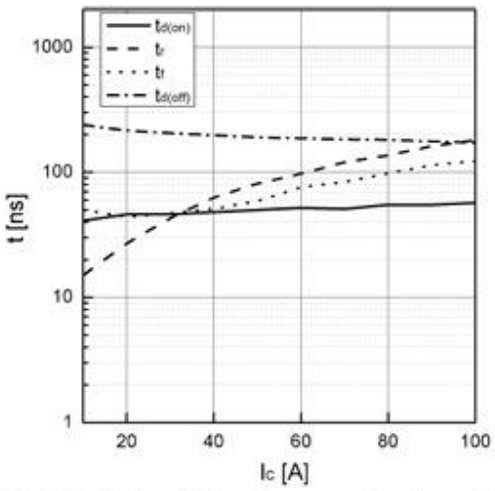


Fig 9. Typical switching time as a function of I_C

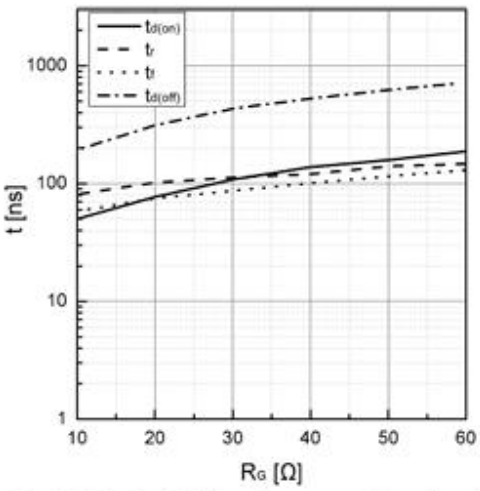


Fig 10. Typical switching times as a function of R_G

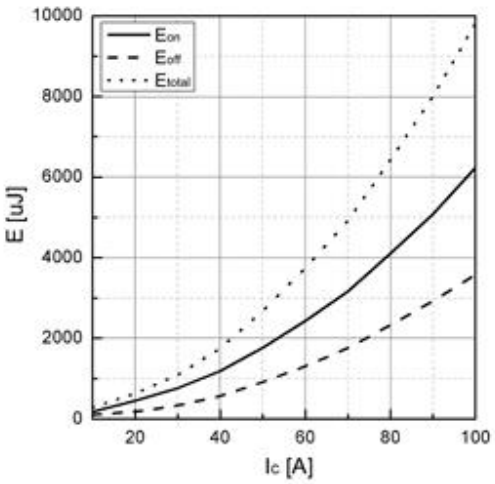


Fig 11. Typical switching energy losses as a function of I_C

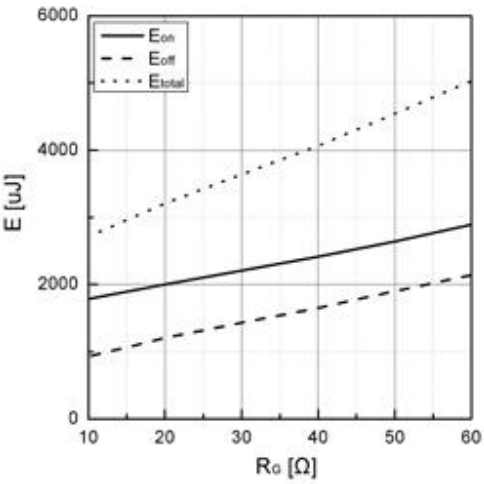


Fig 12. Typical switching energy losses as a function of R_G

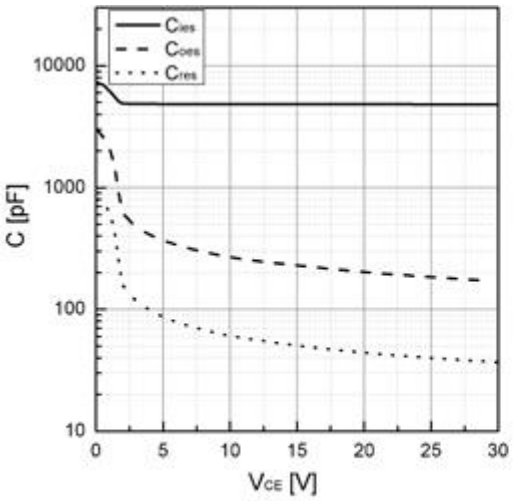


Fig 13. Typical capacitance as a function of V_{CE} (f=1Mhz, V_{GE}=0V)

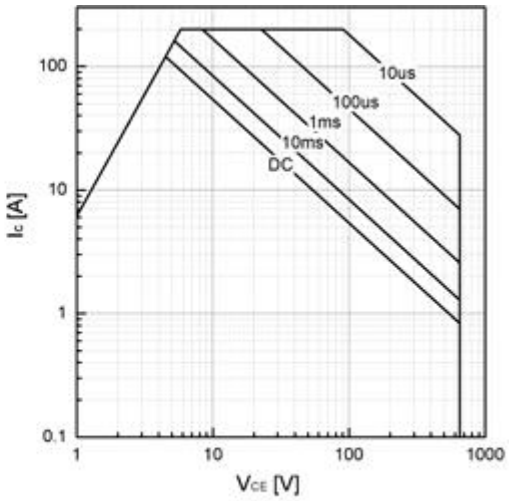


Fig 14. Safe operating area

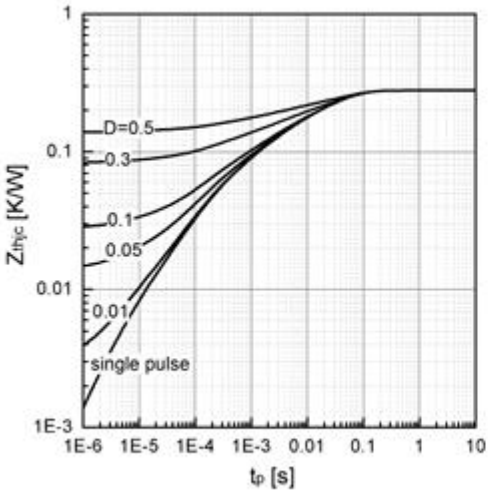
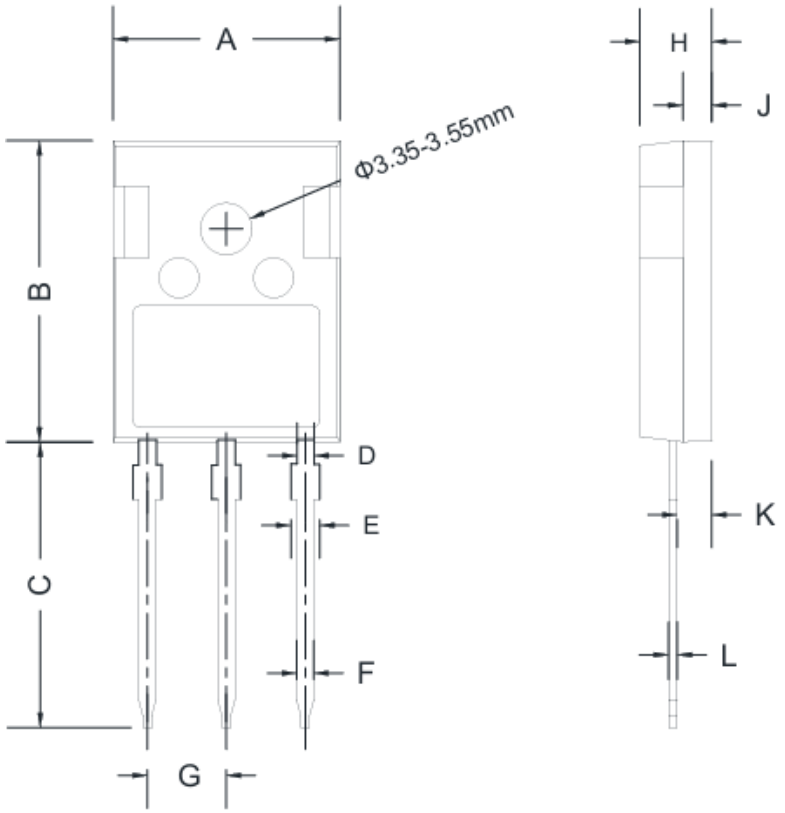


Fig 15. Transient thermal impedance of IGBT

TO-247 PACKAGE OUTLINE



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.50	15.80	16.10	0.610	0.622	0.634
B	20.80	21.00	22.20	0.819	0.827	0.835
C	19.70	20.00	20.30	0.776	0.787	0.799
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.90	2.10	2.30	0.075	0.083	0.091
F	1.00	1.20	1.40	0.039	0.047	0.055
G	-	5.44	-	-	0.214	-
H	4.80	5.00	5.20	0.189	0.197	0.205
J	1.90	2.00	2.10	0.075	0.079	0.083
K	2.20	2.35	2.50	0.087	0.093	0.098
L	0.41	0.60	0.79	0.016	0.024	0.031

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