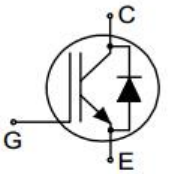
IGBT

Features



- 600V,20A
- $V_{CE(sat)(typ.)}$=1.85V@V_{GE}=15V,I_C=20A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms

General Description

JIAEN trench IGBTs offer lower losses and higher energy efficiency for application such as PFC, UPS, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Continuous Collector Current (T_C=25℃)	40	A
	Continuous Collector Current (T_C=100℃)	20	A
I_{CM}	Pulsed Collector Current (Note 1)	60	A
I_F	Diode Continuous Forward Current (T_C=100℃)	20	A
I_{FM}	Diode Maximum Forward Current (Note 1)	60	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation (T_C=25℃)	26	W
	Maximum Power Dissipation (T_C=100℃)	10	W
T_J	Operating Junction Temperature Range	-55 to +150	℃
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	4.8	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	6.9	℃/ W
$R_{th\ j\text{-}a}$	Thermal Resistance, Junction to Ambient	65	℃/ 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	600	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 600V, V_{GE}= 0V	-	-	100	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}=20V, V_{CE}= 0V	-	-	200	nA
	Gate Leakage Current, Reverse	V_{GE}= -20V, V_{CE}= 0V	-	-	-200	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 250uA	4.5	-	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 15A	-	1.85	2.4	V
Qg	Total Gate Charge	V_{CC}=480V V_{GE}=15V I_C=20A	-	60		nC
Qge	Gate-Emitter Charge		-	9		nC
Qgc	Gate-Collector Charge		-	25		nC
Cies	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 1MHz	-	1100	-	pF
Coes	Output Capacitance		-	60	-	pF
Cres	Reverse Transfer Capacitance		-	34	-	pF
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V V_{GE}=15V I_C=20A R_G=10Ω Inductive Load T_C=25℃	-	31	-	ns
t_r	Turn-on Rise Time		-	29	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	44	-	ns
t_f	Turn-off Fall Time		-	35	-	ns
Eon	Turn-on Switching Loss		-	0.58	-	mJ
Eoff	Turn-off Switching Loss		-	0.2	-	mJ
Ets	Total Switching Loss		-	0.78	-	mJ

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=20A	-	1.6	2.2	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 300V I_F= 10A dI_F/dt = 100A/us	-	47		ns
I_{rr}	Diode peak Reverse Recovery Current		-	7.5		A
Q_{rr}	Diode Reverse Recovery Charge		-	176		nC

Notes:

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

Typical Performance Characteristics

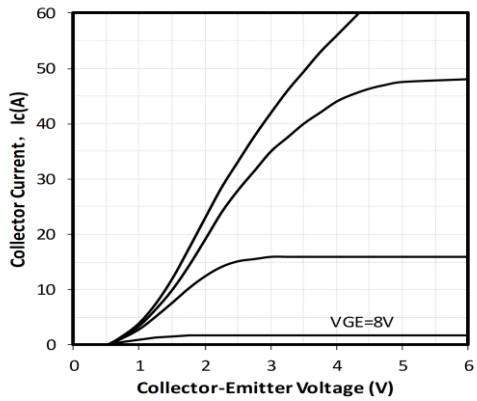


Fig 1. Output characteristics

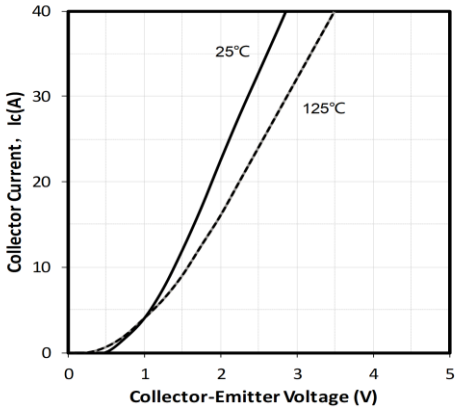


Fig 2. Typical Saturation Voltage Characteristics， V_{GE}=15V

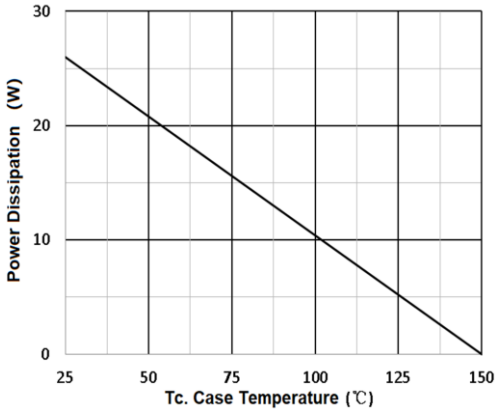


Figure 3. Power Dissipation vs. Tc

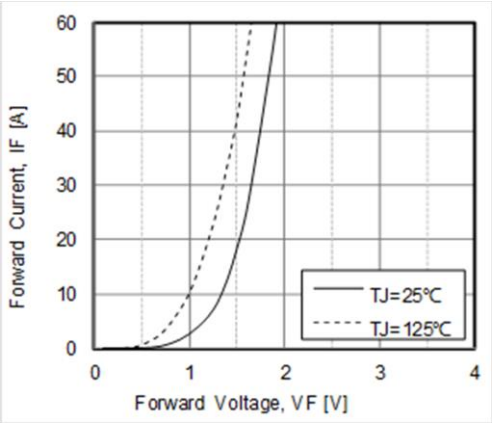


Figure 4. Forward Characteristics

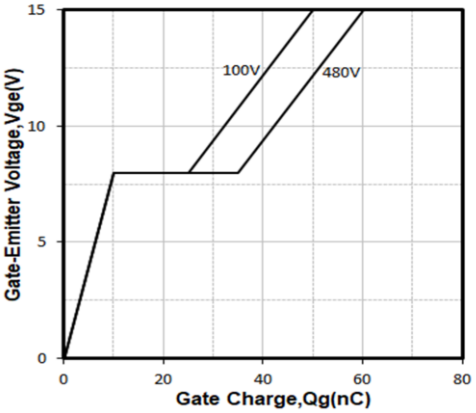


Figure 5. Gate Charge Characteristics

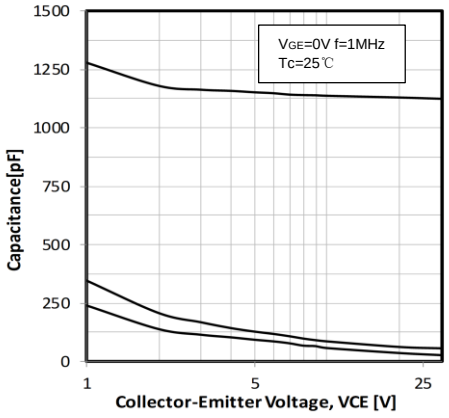


Figure 6. Capacitance Characteristics

Typical Performance Characteristics

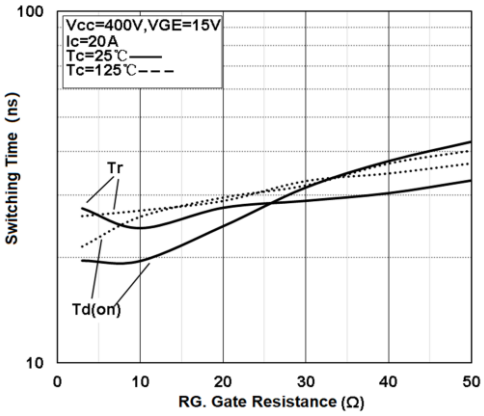


Figure 7. Turn-On Characteristics vs. Gate Resistance

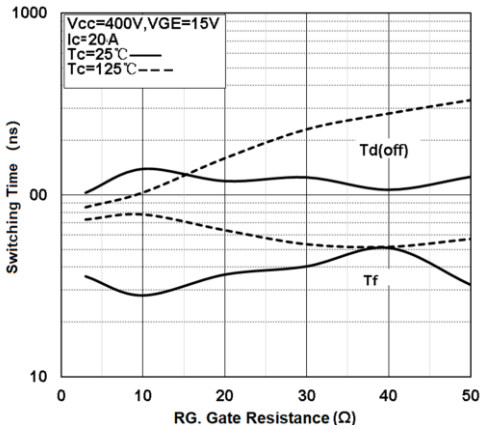


Figure 8. Turn-Off Characteristics vs. Gate Resistance

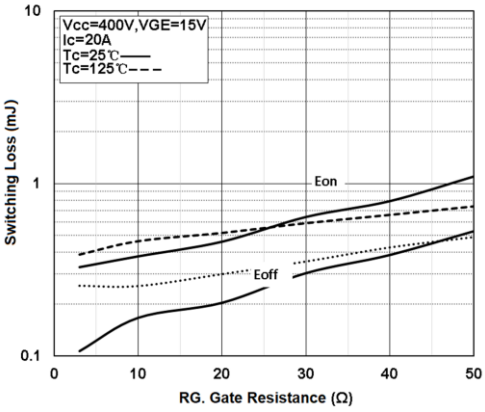


Figure 9. Switching Loss vs. Gate Resistance

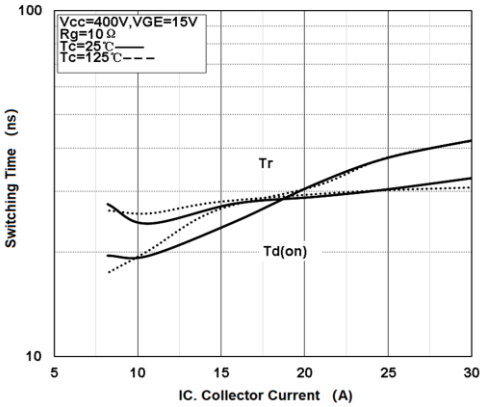


Figure 10. Turn-On Characteristics vs. Collector Current

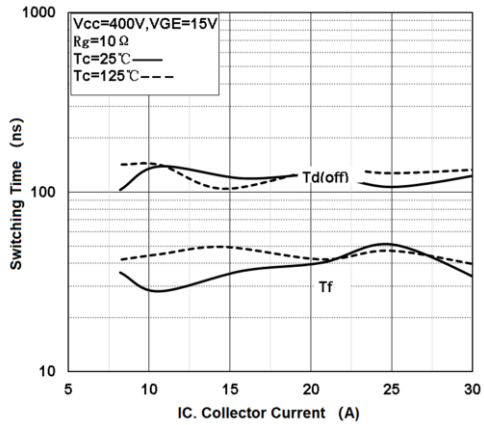


Figure 11. Turn-Off Characteristics vs. Collector Current

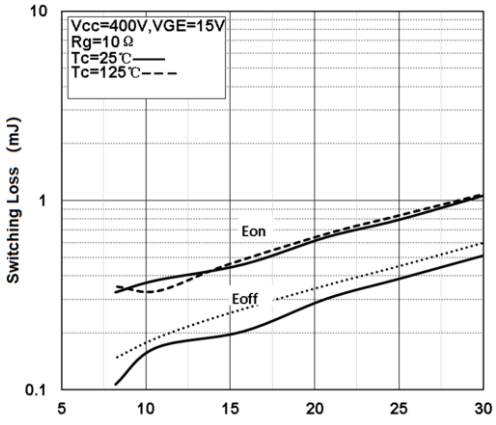


Figure 12. Switching Loss vs. Collector Current

Typical Performance Characteristics

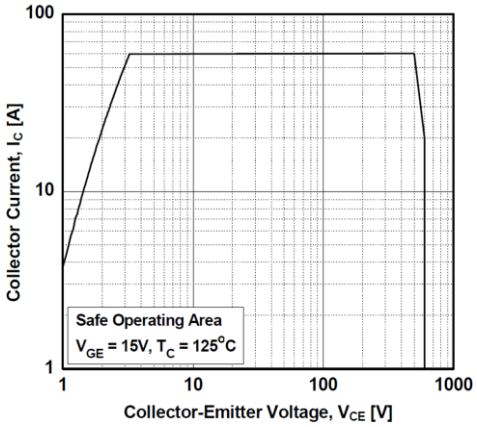


Figure 13. Turn-Off SOA

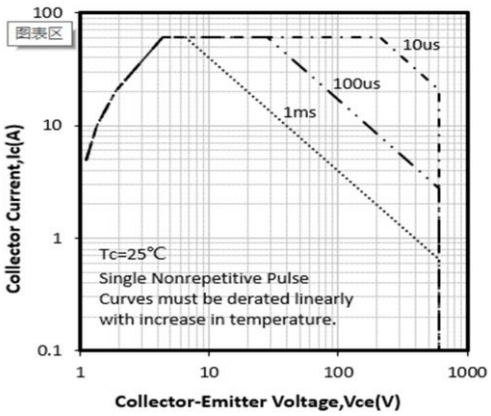


Figure 14. SOA Characteristics

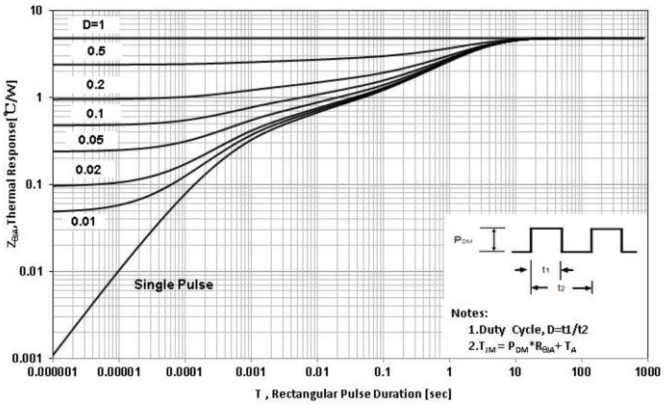
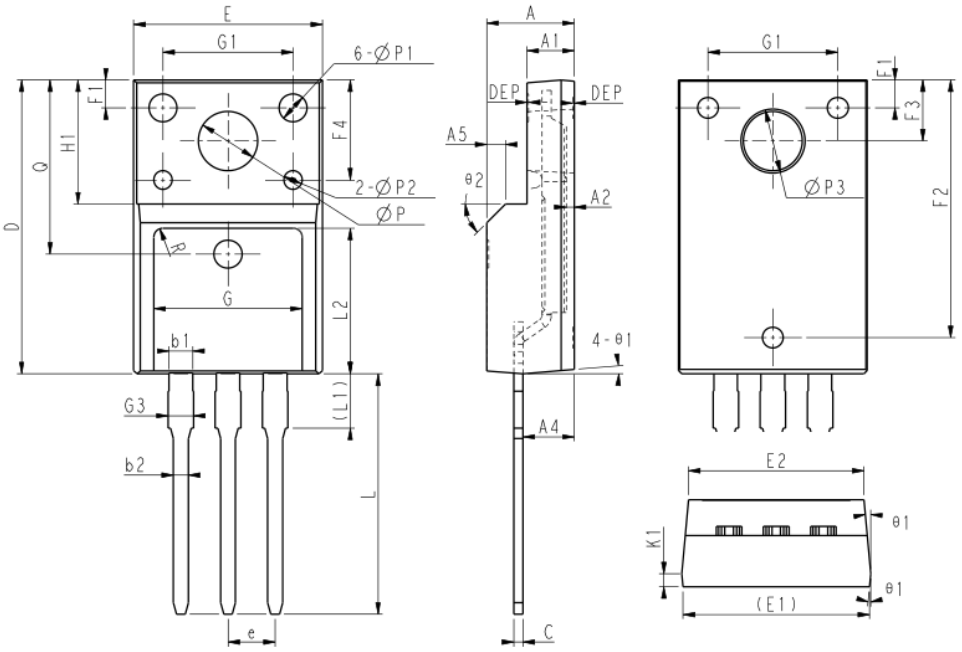


Figure 15. Transient Thermal Impedance of IGBT

Package



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.16	10.32
E1	9.94	10.04	10.14
E2	9.36	9.46	9.56
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.43	-	0.48
A4	2.66	2.76	2.86
A5		1.00REF	
c	0.45	0.50	0.60
D	15.67	15.87	16.07
Q		9.40REF	
H1		6.70REF	
e		2.54BSC	
ΦP		3.18REF	
L	12.78	12.98	13.18
L1	2.83	2.93	3.03
L2	7.70	7.80	7.90
ΦP1	1.40	1.50	1.60
ΦP2	0.95	1.00	1.05
ΦP3		3.45REF	
θ1	3°	5°	7°
θ2	-	45°	-
DEP	0.05	0.10	0.15
F1	1.00	1.50	2.00
F2	13.80	13.90	14.00
F3	3.20	3.30	3.40
F4	5.30	5.40	5.50
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
G3	1.25	1.35	1.45
b1	1.23	1.28	1.38
b2	0.75	0.80	0.90
K1	0.65	0.70	0.75
R		0.50REF	

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