

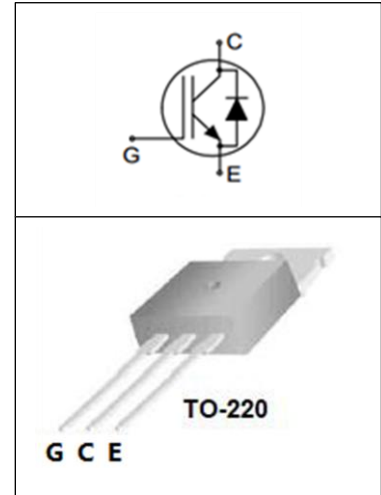
## IGBT

### Features

- 600V,25A
- $V_{CE(sat)(typ.)}=2.1V@V_{GE}=15V,I_C=25A$
- 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 SMPS, general inverter and other switching applications.



### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
$V_{CES}$	Collector-Emitter Voltage	600	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 30$	V
$I_C$	Continuous Collector Current ( $T_C=25^\circ C$ )	45	A
	Continuous Collector Current ( $T_C=100^\circ C$ )	25	A
$I_{CM}$	Pulsed Collector Current (Note 1)	75	A
$I_F$	Diode Continuous Forward Current ( $T_C=100^\circ C$ )	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 ( $T_C=25^\circ C$ )	140	W
	Maximum Power Dissipation ( $T_C=100^\circ C$ )	55	W
$T_J$	Operating Junction Temperature Range	-55 to +150	$^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to +150	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j-c}$	Thermal Resistance, Junction to case for IGBT	0.9	$^\circ C/W$
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	1.2	$^\circ C/W$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	62	$^\circ C/W$

**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=250\mu A$	600	-	-	V
$I_{CES}$	Collector-Emitter Leakage Current	$V_{CE}=600V, V_{GE}=0V$	-	-	100	$\mu A$
$I_{GES}$	Gate Leakage Current, Forward	$V_{GE}=30V, V_{CE}=0V$	-	-	100	nA
	Gate Leakage Current, Reverse	$V_{GE}=-30V, V_{CE}=0V$	-	-	100	nA
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=25A$	-	2.1	2.6	V
$Q_g$	Total Gate Charge	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=25A$	-	62		nC
$Q_{ge}$	Gate-Emitter Charge		-	8		nC
$Q_{gc}$	Gate-Collector Charge		-	32		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=25A$ $R_G=28\Omega$ Inductive Load $T_C=25^\circ\text{C}$	-	20	-	ns
$t_r$	Turn-on Rise Time		-	27	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	200	-	ns
$t_f$	Turn-off Fall Time		-	24	-	ns
$E_{on}$	Turn-on Switching Loss		-	0.65	-	mJ
$E_{off}$	Turn-off Switching Loss		-	0.28	-	mJ
$E_{ts}$	Total Switching Loss		-	0.93	-	mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V$ $V_{GE}=0V$ $f=1\text{MHz}$	-	900	-	pF
$C_{oes}$	Output Capacitance		-	285	-	pF
$C_{res}$	Reverse Transfer Capacitance		-	70	-	pF

**Electrical Characteristics of Diode** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_F$	Diode Forward Voltage	$I_F=25A$	-	1.6	2.0	V
$t_{rr}$	Diode Reverse Recovery Time	$V_{CE}=400V$ $I_F=25A$ $di/dt=200A/\mu s$	-	85		ns
$I_{rr}$	Diode peak Reverse Recovery Current		-	14		A
$Q_{rr}$	Diode Reverse Recovery Charge		-	200		nC

**Notes:**

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

## Typical Performance Characteristics

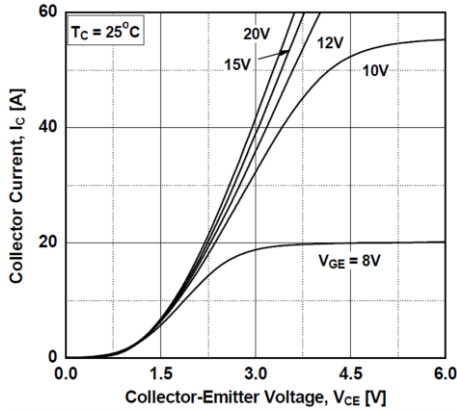


Fig 1. Output characteristics

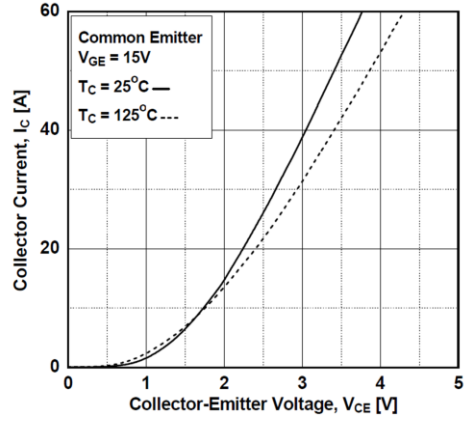


Fig 2. Typical Saturation Voltage Characteristics

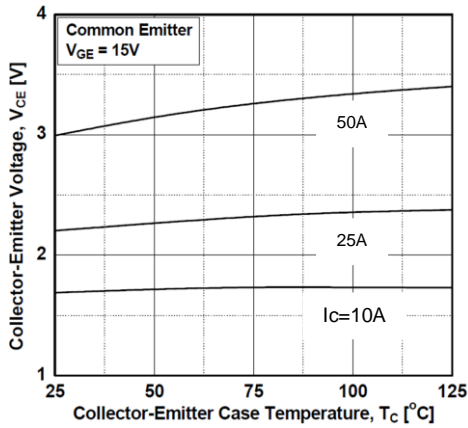


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

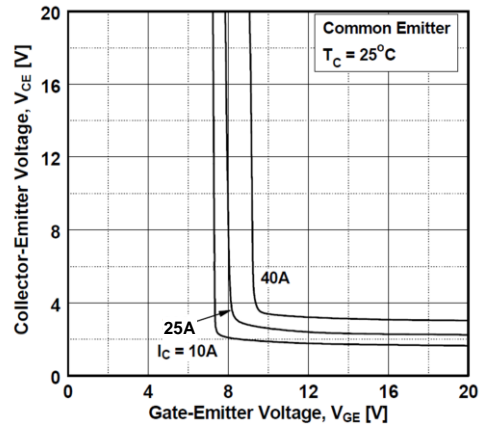


Figure 4. Saturation Voltage vs.  $V_{GE}$

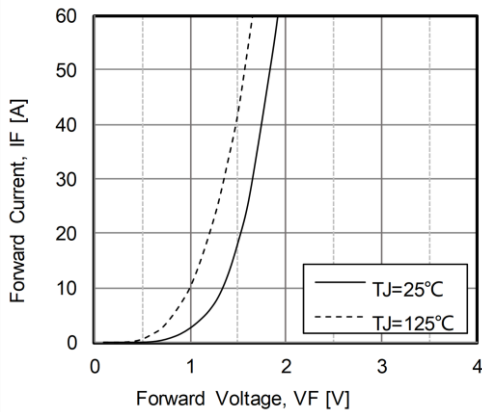


Figure 5. Forward Characteristics

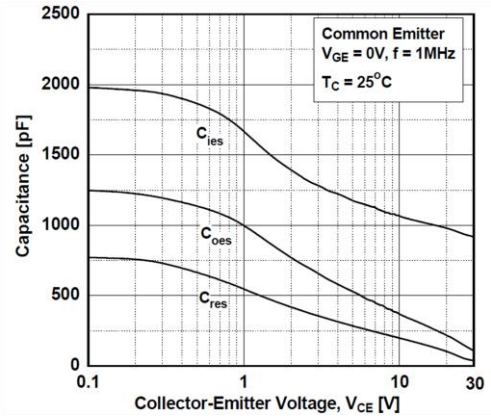


Figure 6. Capacitance Characteristics

**Typical Performance Characteristics**

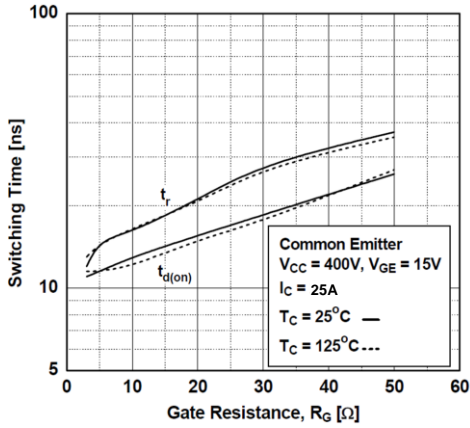


Figure 7. Turn-On Characteristics vs. Gate Resistance

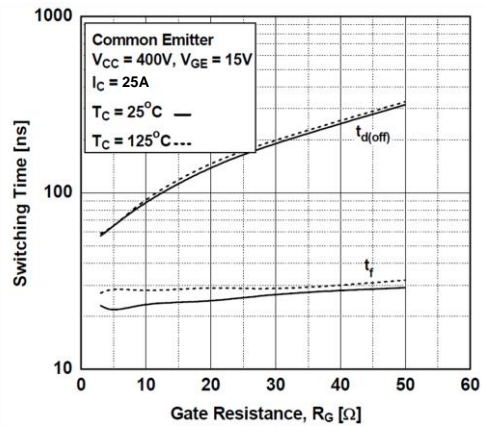


Figure 8. Turn-Off Characteristics vs. Gate Resistance

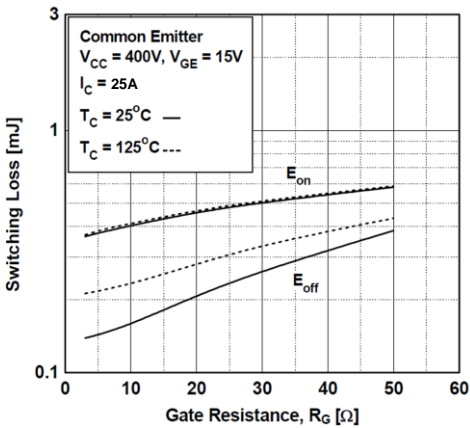


Figure 9. Switching Loss vs. Gate Resistance

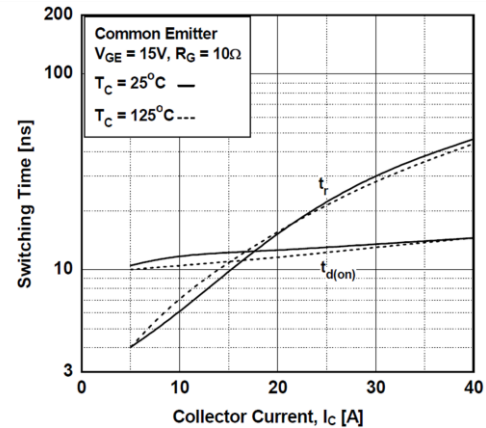


Figure 10. Turn-On Characteristics vs. Collector Current

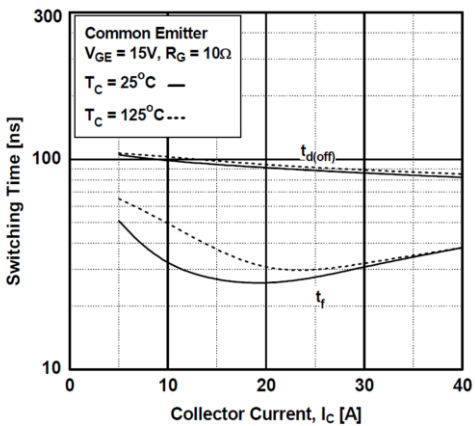


Figure 11. Turn-Off Characteristics vs. Collector Current

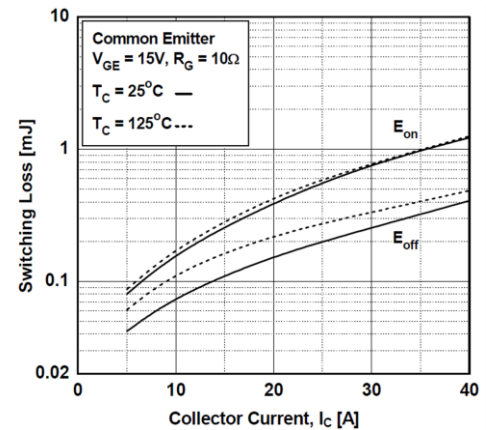


Figure 12. Switching Loss vs. Collector Current

**Typical Performance Characteristics**

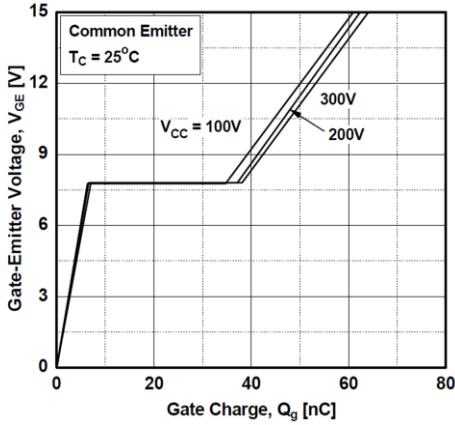


Figure 13. Gate Charge Characteristics

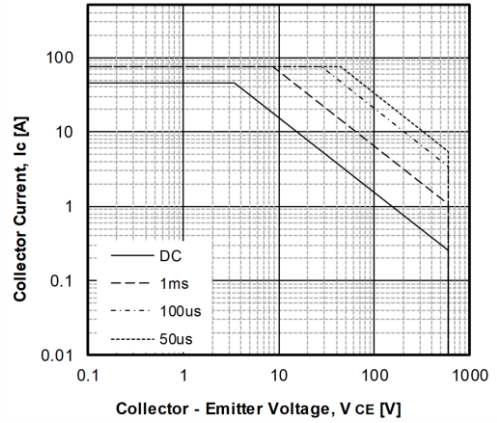


Figure 14. SOA Characteristics

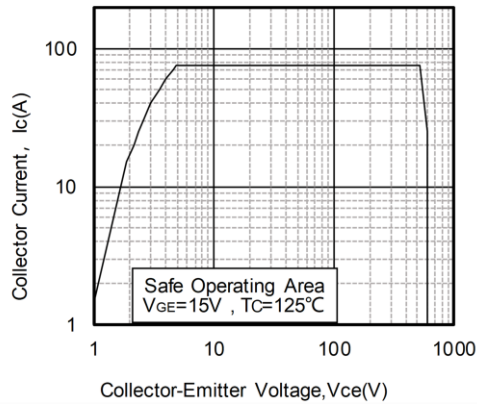


Figure 15. Turn-Off SOA

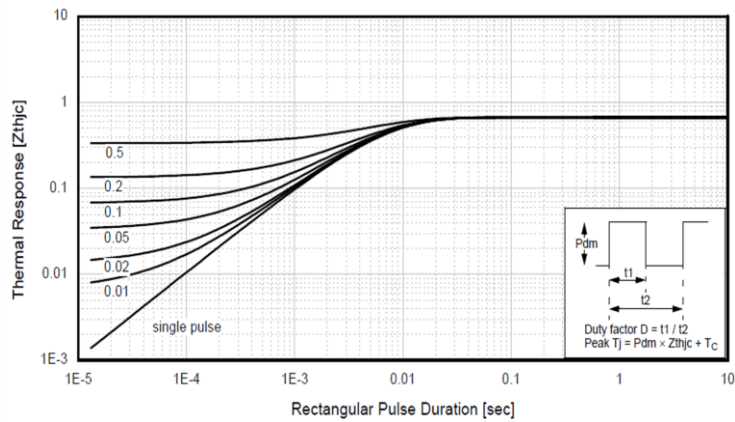
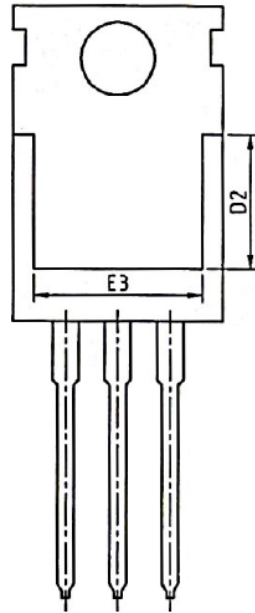
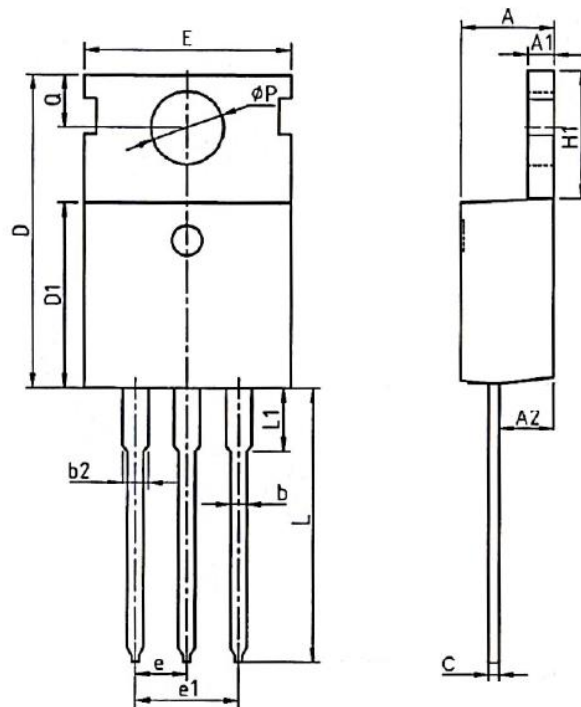


Figure 19. Transient Thermal Impedance of IGBT

封装外型



SYMBOL	MIN	NOM	MAX
A	4.37	4.57	4.7
A1	1.25	1.3	1.4
A2	2.2	2.4	2.6
b	0.7	0.8	0.95
b2	1.17	1.27	1.47
c	0.45	0.5	0.6
D	15.1	15.6	16.1
D1	8.8	9.1	9.4
D2	5.5	-	-
E	9.7	10	10.3
E3	7	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.5	6.85
L	12.75	13.5	13.8
L1	-	3.1	3.4
ΦP	3.4	3.6	3.8
Q	2.6	2.8	3



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