

## 1200V 75A Trench and Field Stop IGBT

JJT75N120HA

### Key performance:

- $V_{CE}=1200V$
- $I_C=75A@T_C=100^{\circ}C$
- $V_{CE(sat)}=2.0V$

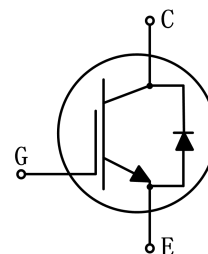
### Features:

- Trench and field-stop technology
- Easy parallel switching capability
- Low  $V_{CEsat}$
- High ruggedness performance
- RoHS compliant

### Applications:

- Solar converters
- On-Board Charger

TO-247PLUS



### Package parameters

Type	Marking	Package	Packaging Method
JJT75N120HA	T75120HA	TO-247PLUS	Tube

## Maximum ratings

Symbol	Parameter	Values	Unit
$V_{CES}$	Collector-emitter voltage	1200	V
$V_{GES}$	Gate-emitter voltage	$\pm 20$	V
$I_C$	Continuous collector current ( $T_C=25^\circ\text{C}$ )	150	A
	Continuous collector current ( $T_C=100^\circ\text{C}$ )	75	A
$I_{CM}$	Pulsed collector current, $t_p$ limited by $T_{vjmax}$	300	A
$I_F$	Diode continuous forward current ( $T_C=100^\circ\text{C}$ )	75	A
$I_{FM}$	Diode maximum current, $t_p$ limited by $T_{vjmax}$	150	A
$P_{tot}$	Power dissipation ( $T_C=25^\circ\text{C}$ )	1456	W
	Power dissipation ( $T_C=100^\circ\text{C}$ )	728	W
$T_{vj}$	Operating junction temperature range	-40 to +175	$^\circ\text{C}$
$T_{stg}$	Storage temperature range	-55 to +150	$^\circ\text{C}$

## Thermal characteristics

Symbol	Parameter	Values		Unit
		Typ.	Max.	
$R_{th(j-c)}$	Thermal resistance, junction to case for IGBT	-	0.10	K/ W
$R_{th(j-c)}$	Thermal resistance, junction to case for Diode	-	0.44	K/ W
$R_{th(j-a)}$	Thermal resistance, junction to ambient	-	40	K/ W

**Electrical characteristics of IGBT** ( $T_{vj}=25^{\circ}\text{C}$  unless otherwise specified)

**Static characteristics**

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
$BV_{CES}$	Collector-emitter breakdown voltage	$V_{GE}=0\text{V}$ , $I_C=250\mu\text{A}$	1200	-	-	V
$I_{CES}$	Collector-emitter leakage current	$V_{CE}=1200\text{V}$ , $V_{GE}=0\text{V}$	-	-	100	$\mu\text{A}$
$I_{GES}$	Gate leakage current, forward	$V_{GE}=20\text{V}$ , $V_{CE}=0\text{V}$	-	-	100	nA
	Gate leakage current, reverse	$V_{GE}=-20\text{V}$ , $V_{CE}=0\text{V}$	-	-	-100	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$V_{GE}=V_{CE}$ , $I_C=1\text{mA}$	5.2	5.6	6.0	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_{GE}=15\text{V}$ , $I_C=75\text{A}$	-	2.0	-	V
		$V_{GE}=15\text{V}$ , $I_C=75\text{A}$ , $T_{vj}=175^{\circ}\text{C}$	-	2.6	-	V

**Dynamic characteristics**

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
$C_{ies}$	Input capacitance	$V_{CE}=30\text{V}$ $V_{GE}=0\text{V}$ $f=1\text{MHz}$	-	18650	-	pF
$C_{oes}$	Output capacitance		-	340	-	pF
$C_{res}$	Reverse transfer capacitance		-	80	-	pF
$Q_g$	Total gate charge	$V_{CC}=960\text{V}$ $V_{GE}=15\text{V}$ $I_C=75\text{A}$	-	560	-	nC

## Switching characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $V_{GE}=0/15V$ $I_C=75A$ $R_G=10\Omega$ Inductive load	-	138	-	ns
$t_r$	Rise time		-	120	-	ns
$t_{d(off)}$	Turn-off delay time		-	676	-	ns
$t_f$	Fall time		-	71	-	ns
$E_{on}$	Turn-on energy		-	7.7	-	mJ
$E_{off}$	Turn-off energy		-	3.7	-	mJ
$E_{ts}$	Total switching energy		-	11.4	-	mJ
$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $V_{GE}=0/15V$ $I_C=75A$ $R_G=10\Omega$ Inductive load $T_{vj}=175^\circ C$	-	124	-	ns
$t_r$	Rise time		-	121	-	ns
$t_{d(off)}$	Turn-off delay time		-	691	-	ns
$t_f$	Fall time		-	82	-	ns
$E_{on}$	Turn-on energy		-	8.4	-	mJ
$E_{off}$	Turn-off energy		-	4.1	-	mJ
$E_{ts}$	Total switching energy		-	12.5	-	mJ

**Electrical characteristics of Diode** ( $T_{vj}=25^{\circ}\text{C}$  unless otherwise specified)

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
$V_F$	Diode forward voltage	$I_F=75\text{A}$	-	2.1	-	V
		$I_F=75\text{A}, T_{vj}=175^{\circ}\text{C}$	-	1.8	-	V
$t_{rr}$	Diode reverse recovery time	$V_R=600\text{V}$ $I_F=75\text{A}$ $di_F/dt=-600\text{A}/\mu\text{s}$	-	163	-	ns
$I_{rrm}$	Diode peak reverse recovery current		-	20	-	A
$Q_{rr}$	Diode reverse recovery charge		-	2046	-	nC
$t_{rr}$	Diode reverse recovery time	$V_R=600\text{V}$ $I_F=75\text{A}$ $di_F/dt=-600\text{A}/\mu\text{s}$ $T_{vj}=175^{\circ}\text{C}$	-	278	-	ns
$I_{rrm}$	Diode peak reverse recovery current		-	39	-	A
$Q_{rr}$	Diode reverse recovery charge		-	6679	-	nC

## Typical performance characteristics

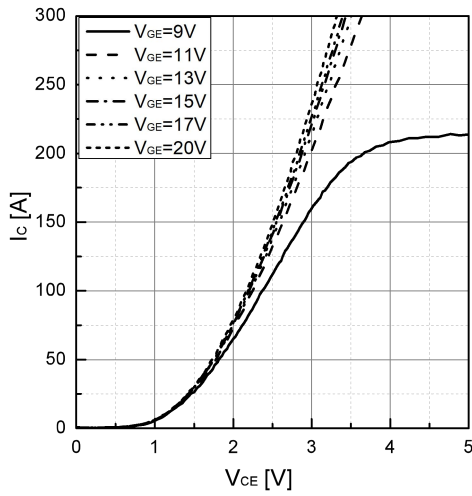


Fig 1. Typical output characteristic ( $T_{vj}=25^\circ\text{C}$ )

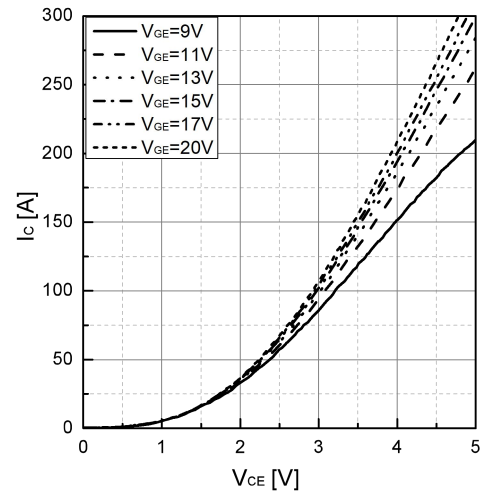


Fig 2. Typical output characteristic ( $T_{vj}=175^\circ\text{C}$ )

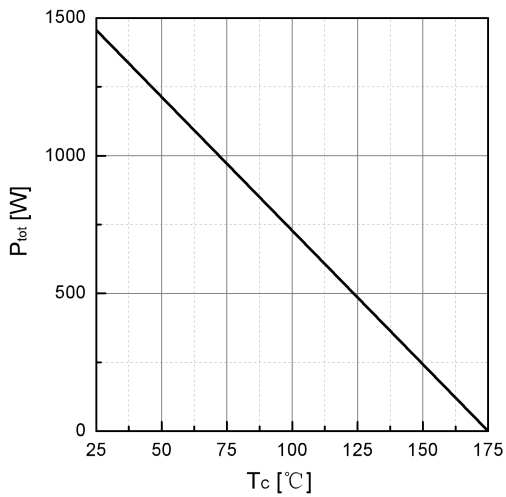


Fig 3. Power dissipation as a function of  $T_c$

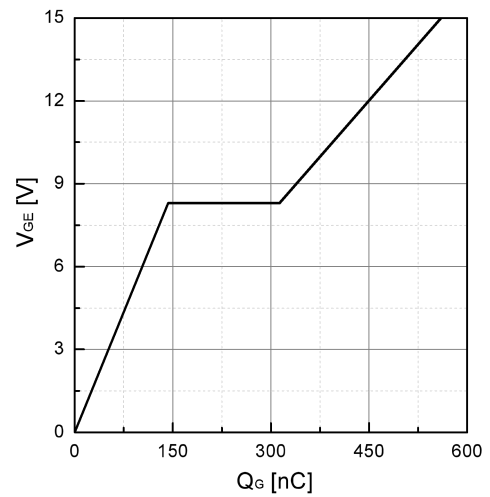


Fig 4. Typical Gate charge

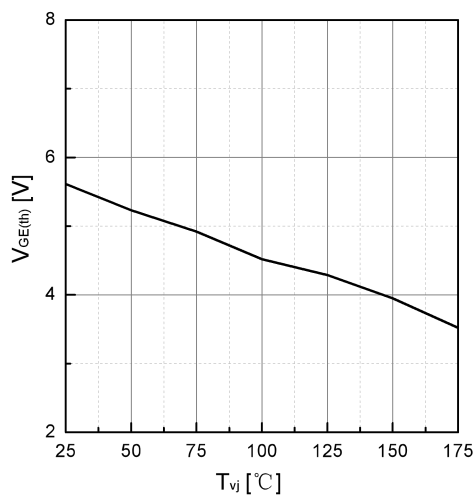


Fig 5. Typical  $V_{GE(th)}$  as a function of  $T_{vj}$   
( $I_c=1\text{mA}$ )

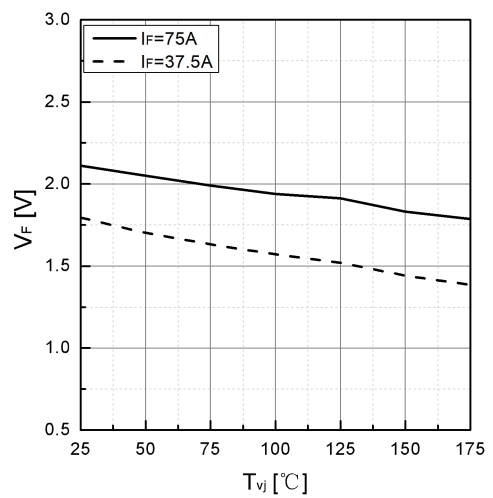


Fig 6. Typical  $V_F$  as a function of  $T_{vj}$

## Typical performance characteristics

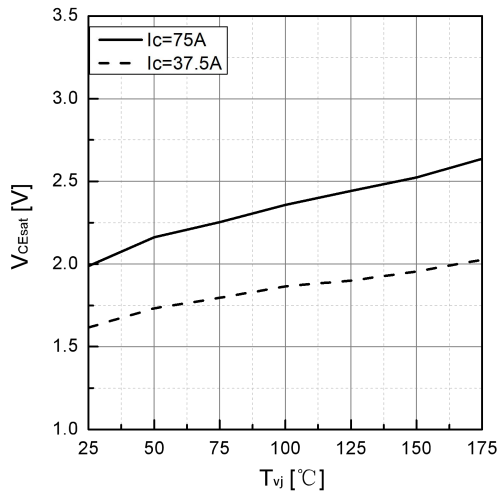


Fig 7. Typical  $V_{CEsat}$  as a function of  $T_{vj}$

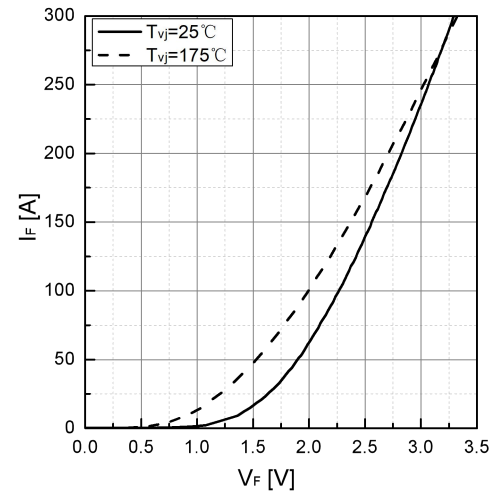


Fig 8. Typical  $I_F$  as a function of  $V_F$

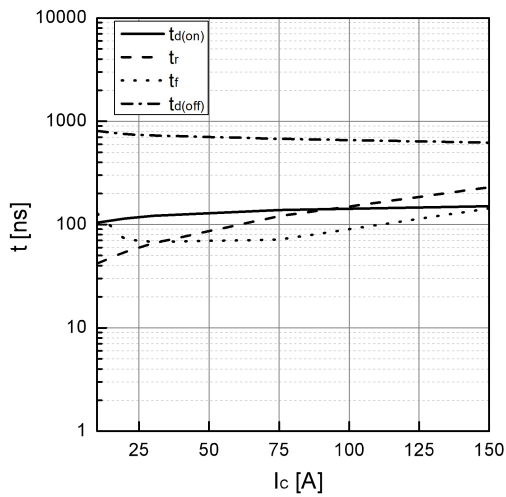


Fig 9. Typical switching time as a function of  $I_c$

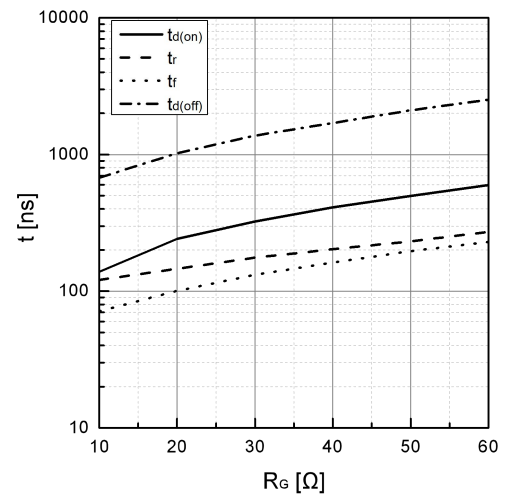


Fig 10. Typical switching times as a function of  $R_G$

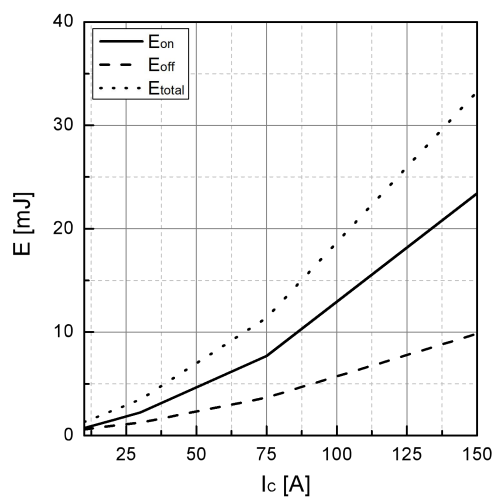


Fig 11. Typical switching energy losses as a function of  $I_c$

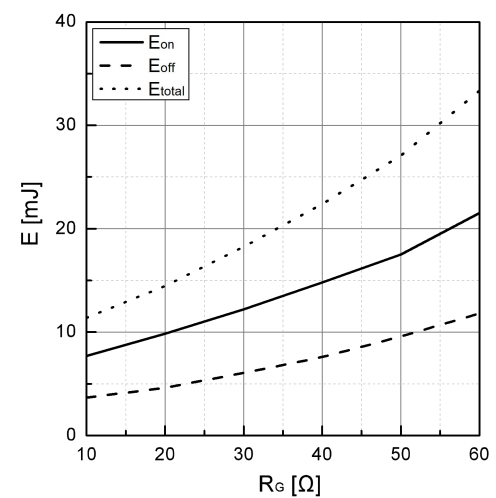


Fig 12. Typical switching energy losses as a function of  $R_G$

## Typical performance characteristics

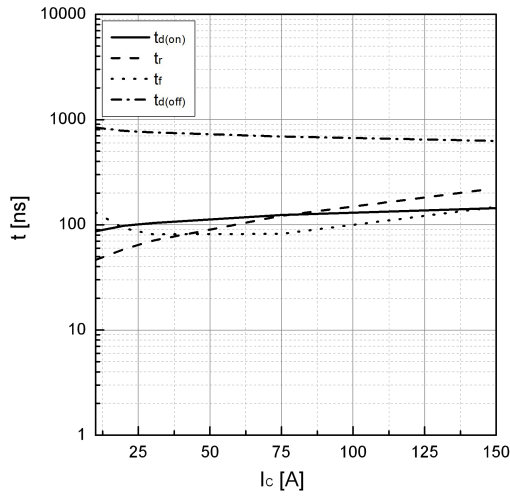


Fig 13. Typical switching time as a function of  $I_C$   
( $T_{Vj}=175^\circ\text{C}$ )

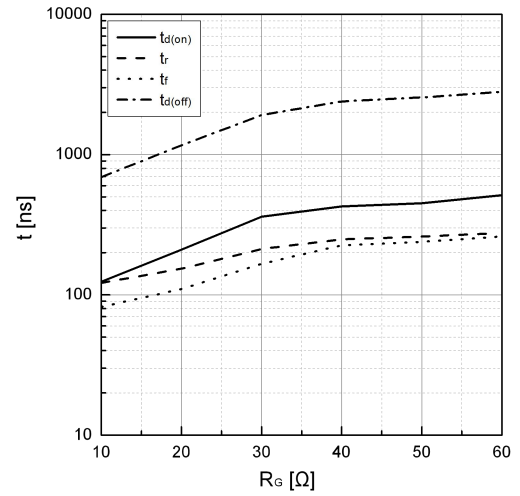


Fig 14. Typical switching times as a function of  $R_G$   
( $T_{Vj}=175^\circ\text{C}$ )

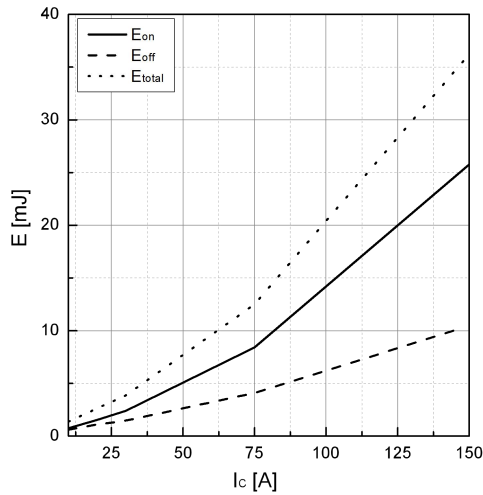


Fig 15. Typical switching energy losses as a function of  $I_C$  ( $T_{Vj}=175^\circ\text{C}$ )

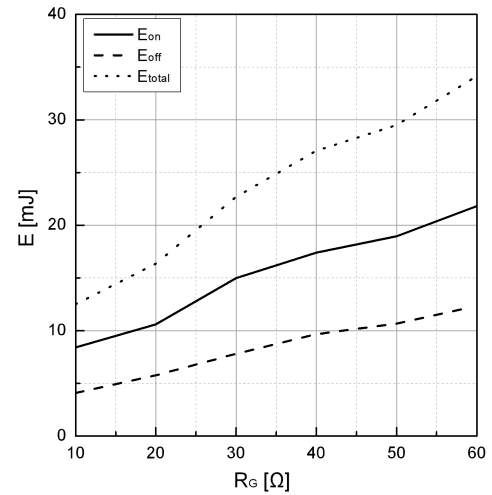


Fig 16. Typical switching energy losses as a function of  $R_G$  ( $T_{Vj}=175^\circ\text{C}$ )

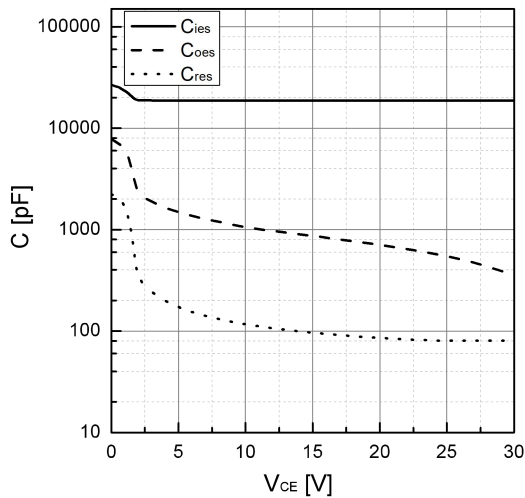


Fig 17. Typical capacitance as a function of  $V_{CE}$   
( $f=1\text{MHz}$ ,  $V_{GE}=0\text{V}$ )

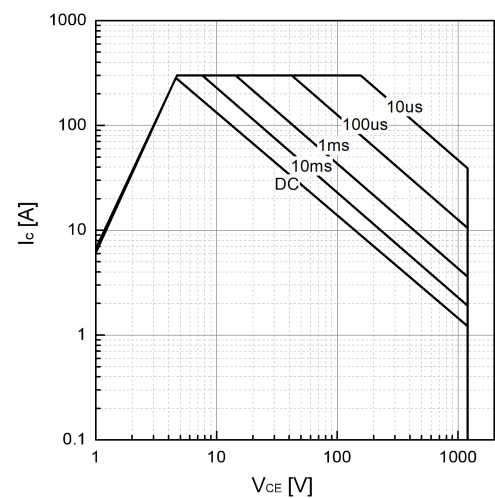


Fig 18. Safe operating area



## Typical performance characteristics

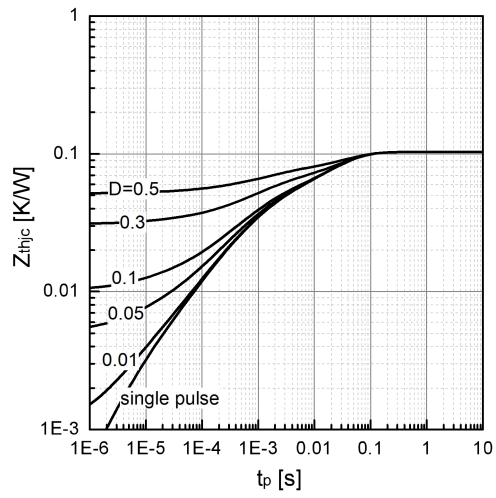
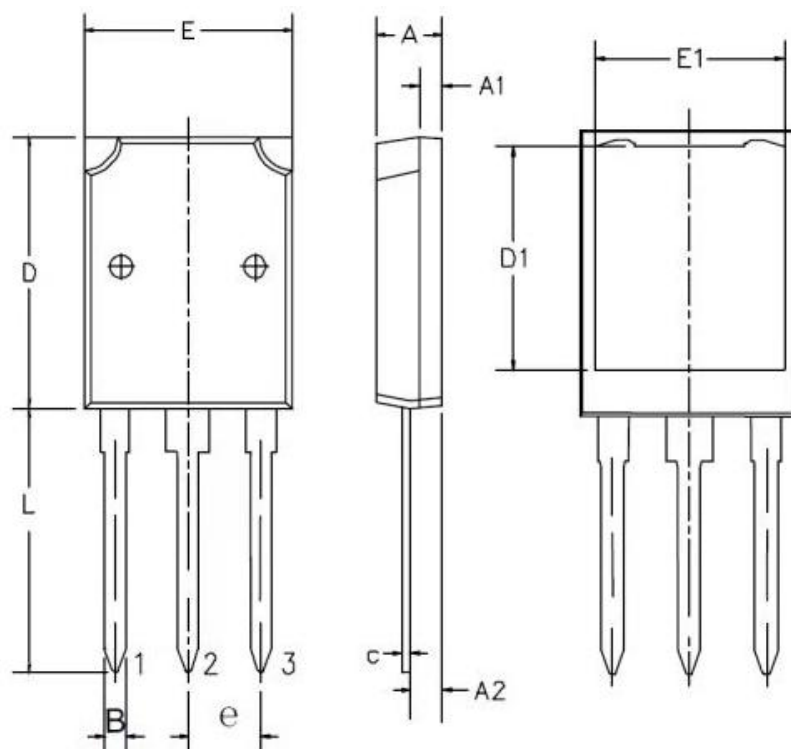


Fig 19. Transient thermal impedance of IGBT

## Package dimension

### TO-247PLUS



Ref.	Min.(mm)	Typ.(mm)	Max.(mm)
A	4.92	5.00	5.08
A2	2.27	2.35	2.43
A1	1.92	2.00	2.08
B	1.16	1.20	1.24
C	0.56	0.60	0.64
D	20.70	20.90	21.1
E	15.80	15.90	16.00
E1	13.92	14.02	14.12
e	5.34	5.44	5.54
L	19.80	20.00	20.20

## Revision history

Date	Revision	Changes
2024-09-25	Rev. 1.1	Update
2025-01-26	Rev. 1.2	Add SOA and Rth graph
2025-02-17	Rev. 1.3	Modify the package size

## Disclaimer

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