JJMICROELECTRONICS

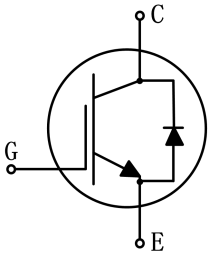
1200V 75A Trench and Field Stop IGBT

JJT75N120HA

Key performance:

- V_{CE}=1200V
- I_C=75A@T_C=100℃
- $V_{CE(sat)}$=2.0V

TO-247PLUS



Features:

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

Applications:

- Solar converters
- On-Board Charger

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	±20	V
I_C	Continuous collector current (T_C=25℃)	150	A
	Continuous collector current (T_C=100℃)	75	A
I_{CM}	Pulsed collector current, t_p limited by T_{vjmax}	300	A
I_F	Diode continuous forward current (T_C=100℃)	75	A
I_{FM}	Diode maximum current, t_p limited by T_{vjmax}	150	A
P_{tot}	Power dissipation (T_C=25℃)	1456	W
	Power dissipation (T_C=100℃)	728	W
T_{vj}	Operating junction temperature range	-40 to +175	℃
T_{stg}	Storage temperature range	-55 to +150	℃

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℃ unless otherwise specified)

Static characteristics

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

Dynamic characteristics

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
C_{ies}	Input capacitance	V_{CE}=30V V_{GE}=0V f=1MHz	-	18650	-	pF
C_{oes}	Output capacitance		-	340	-	pF
C_{res}	Reverse transfer capacitance		-	80	-	pF
Q_g	Total gate charge	V_{CC}=960V V_{GE}=15V I_C=75A	-	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=10Ω 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=10Ω Inductive load T_{vj}=175℃	-	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℃ unless otherwise specified)

Symbol	Parameter	Test condition	Values			Unit
			Min.	Typ.	Max.	
V_F	Diode forward voltage	I_F=75A	-	2.1	-	V
		I_F=75A，T_{vj}=175℃	-	1.8	-	V
t_{rr}	Diode reverse recovery time	V_R=600V I_F=75A di_F/dt=-600A/μs	-	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=600V I_F=75A di_F/dt=-600A/μs T_{vj}=175℃	-	278	-	ns
I_{rrm}	Diode peak reverse recovery current		-	39	-	A
Q_{rr}	Diode reverse recovery charge		-	6679	-	nC

Typical performance characteristics

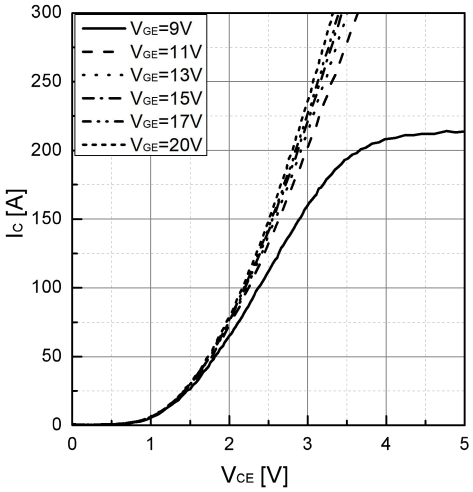


Fig 1. Typical output characteristic (T_{vj}=25℃)

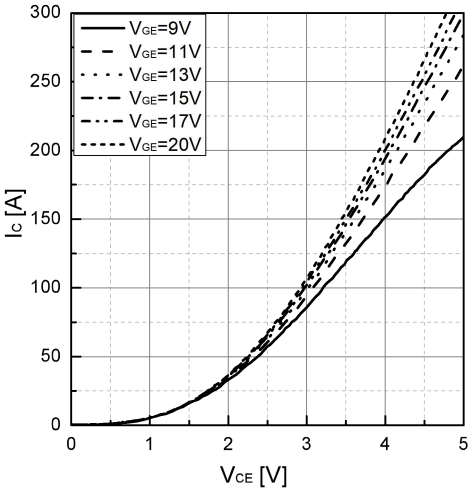


Fig 2. Typical output characteristic(T_{vj}=175℃)

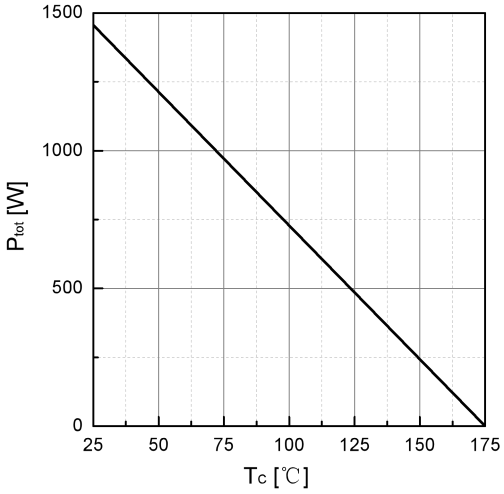


Fig 3. Power dissipation as a function of T_C

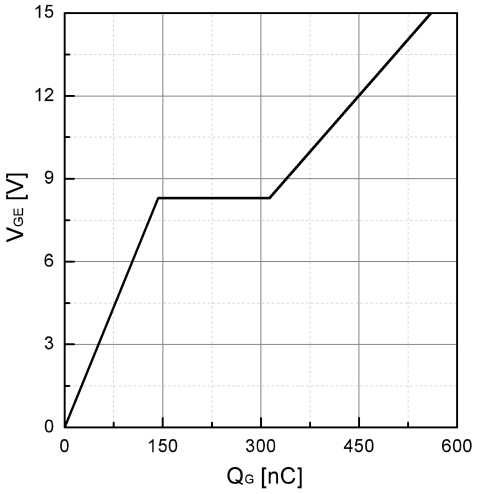


Fig 4. Typical Gate charge

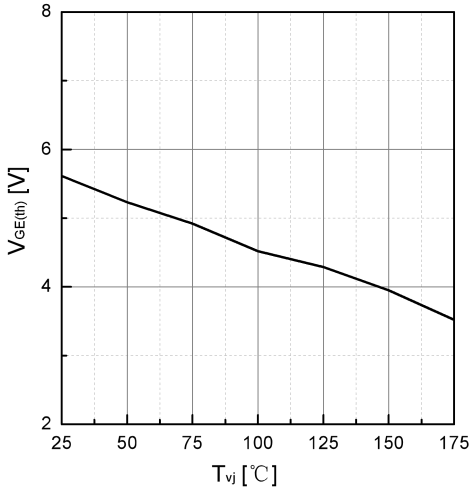


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj} (I_C=1mA)

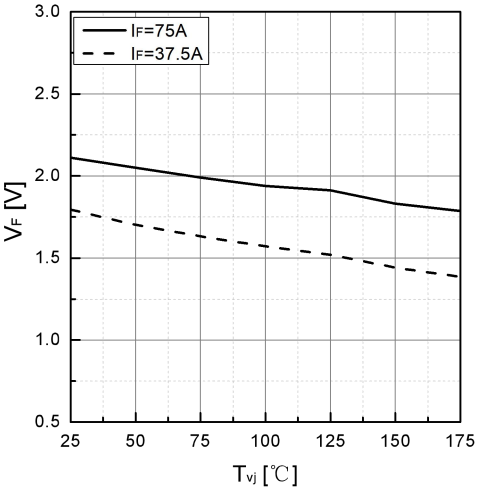


Fig 6. Typical V_F as a function of T_{vj}

Typical performance characteristics

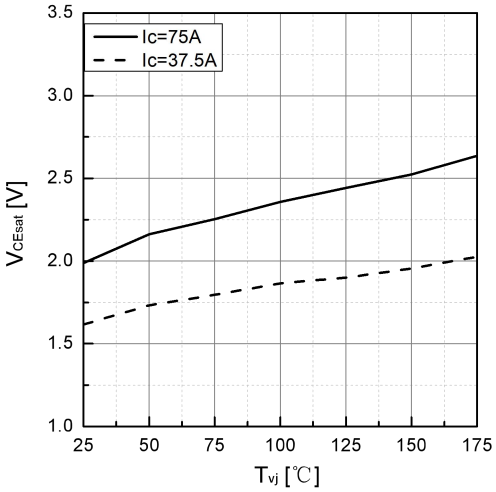


Fig 7. Typical V_{CEsat} as a function of T_{vj}

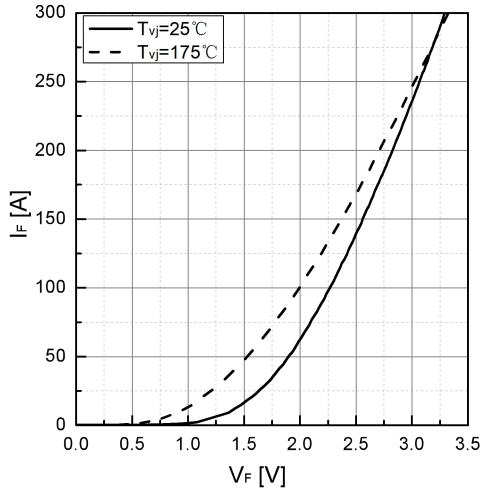


Fig 8. Typical I_F as a function of V_F

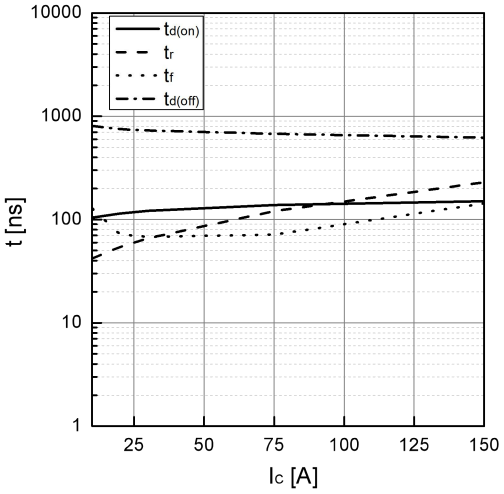


Fig 9. Typical switching time as a function of I_C

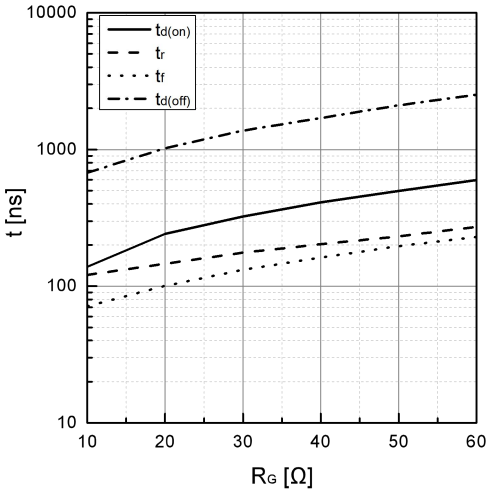


Fig 10. Typical switching times as a function of R_G

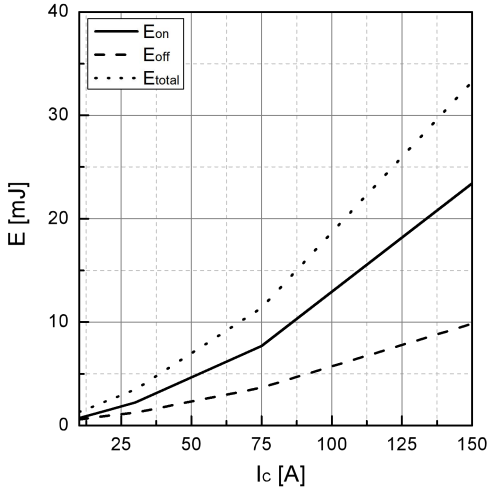


Fig 11. Typical switching energy losses as a function of I_C

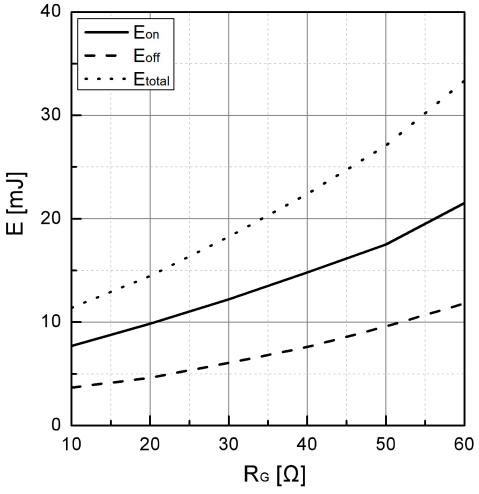


Fig 12. Typical switching energy losses as a function of R_G

Typical performance characteristics

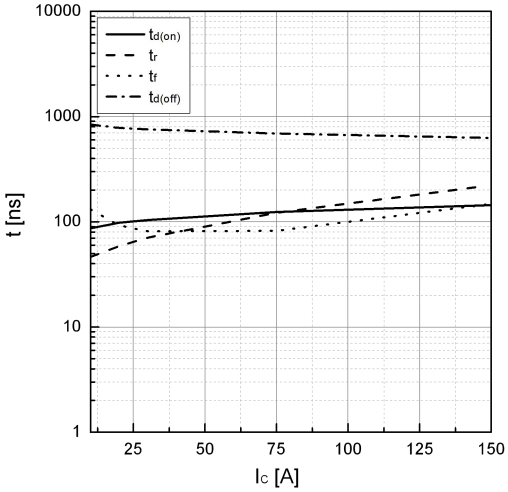


Fig 13. Typical switching time as a function of I_C (T_{vj}=175℃)

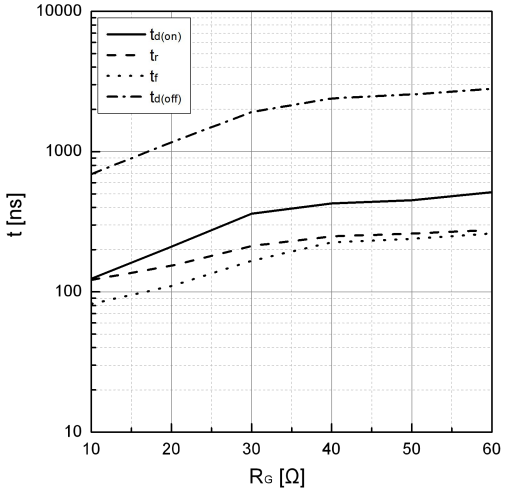


Fig 14. Typical switching times as a function of R_G (T_{vj}=175℃)

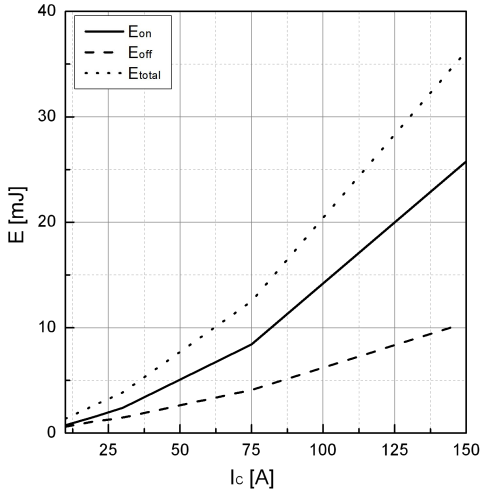


Fig 15. Typical switching energy losses as a function of I_C (T_{vj}=175℃)

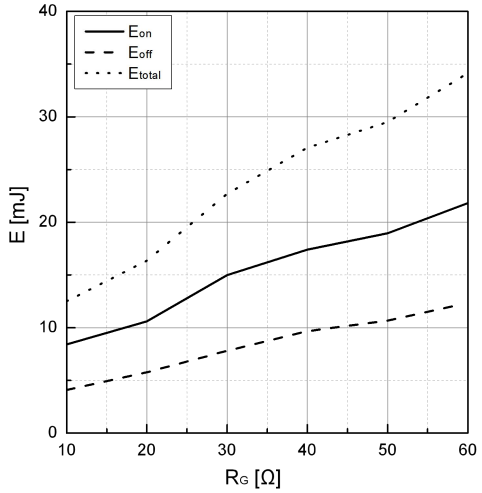


Fig 16. Typical switching energy losses as a function of R_G (T_{vj}=175℃)

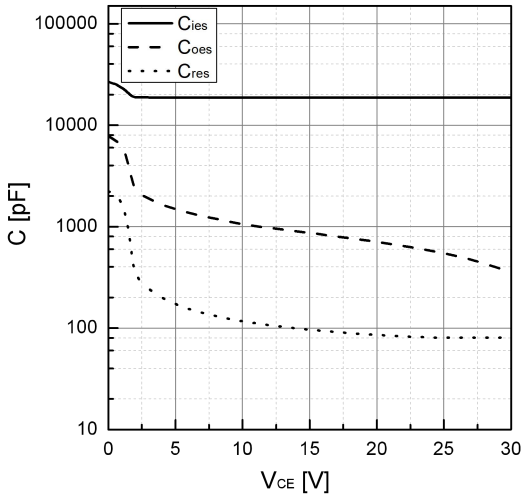


Fig 17. Typical capacitance as a function of V_{CE} (f=1Mhz, V_{GE}=0V)

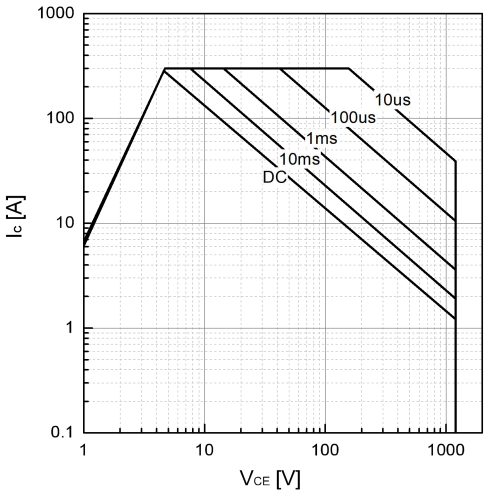


Fig 18. Safe operating area

Typical performance characteristics

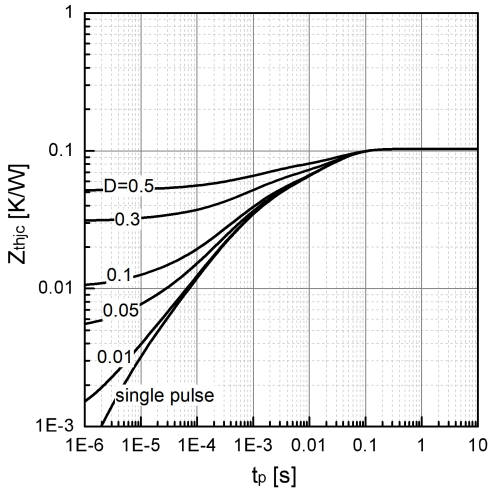
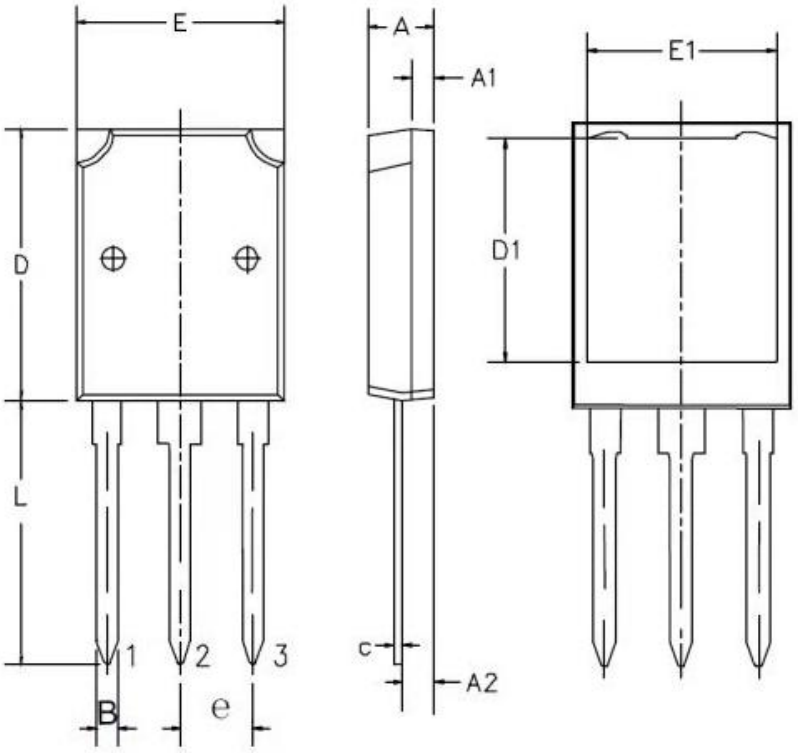


Fig 19. Transient thermal impedance of IGBT

Package dimension

TO-247PLUS



Ref.	Min.(mm)	Typ.(mm)	Max.(mm)
A	4.92	5.00	5.08
A1	2.27	2.35	2.43
A2	1.92	2.00	2.08
B	1.16	1.20	1.24
C	0.58	0.60	0.62
D	20.80	20.90	21.00
E	15.80	15.90	16.00
E1	13.94	14.02	14.10
e	5.34	5.44	5.54
L	19.80	20.00	20.20

Revision history

Date	Revision	Changes
2024-05-30	Rev. 1.0	Release of the datasheet.
2024-09-25	Rev. 1.1	Update
2025-01-26	Rev. 1.2	Add SOA and Rth graph

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