

650V 40A Trench and Field Stop IGBT

JJT40N65UE

Key Features:

- $V_{CE} = 650V$
- $I_C = 40A @ V_{CE} = 100$
- $V_{CE(sat)} = 1.9V$

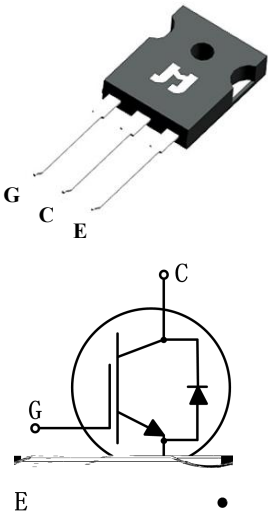
TO-247

Features:

- Trench and field-stop technology.
- Easy parallel switching capability.

Benefits:

- High efficiency for inverters.
- High ruggedness performance.
- RoHS compliant.



Applications:

- PFC applications
- Welding machines

Package

Type	Marking	Package	Packaging Method
JJT40N65UE	T4065UE	TO-247	Tube

M

	P		
CES	Collector-emitter voltage	650	V
GES	Gate-emitter voltage	±20	V
C	Continuous collector current ($T_C=25^\circ\text{C}$)	80	A
	Continuous collector current ($T_C=100^\circ\text{C}$)	40	A
CM	Pulsed collector current, I_P limited by t_{vjmax}	160	A
F	Diode continuous forward current ($T_C=100^\circ\text{C}$)	40	A
FM	Diode maximum current, I_P limited by t_{vjmax}	160	A
P_{tot}	Power dissipation ($T_C=25^\circ\text{C}$)	300	W
	Power dissipation ($T_C=100^\circ\text{C}$)	150	W
T_{vj}	Operating junction temperature range	-40 to +175	
T_{stg}	Storage temperature range	-55 to +150	

	P			
		$R_{th(j-c)}$	$R_{th(j-a)}$	
$R_{th(j-c)}$	Thermal resistance, junction to case for IGBT	-	0.5	K/ W
$R_{th(j-c)}$	Thermal resistance, junction to case for Diode	-	0.9	K/ W
$R_{th(j-a)}$	Thermal resistance, junction to ambient	-	40	K/ W

**E** **IGB** ($v_j=25$ unless otherwise specified)

Static characteristics

	P					
			M .	.	M .	
$_{CES}$	Collector-emitter breakdown voltage	$_{GE}=0V, I_C=250\mu A$	650	-	-	V
$_{CES}$	Collector-emitter leakage current	$_{CE}=650V, _{GE}=0V$	-	-	50	μA
$_{GES}$	Gate leakage current, forward	$_{GE}=20V, _{CE}=0V$	-	-	100	nA
	Gate leakage current, reverse	$_{GE}=-20V, _{CE}=0V$	-	-	-100	nA
$_{GE(th)}$	Gate-emitter threshold voltage	$_{GE}=_{CE}, _C=1mA$	4.0	5.0	6.0	V
$_{CE(sat)}$	Collector-emitter saturation voltage	$_{GE}=15V, _C=40A$	-	1.9	-	V
		$_{GE}=15V, _C=40A, _{vj}=175$	-	2.6	-	V

Dynamic characteristics

	P					
			M .	.	M .	
$_{ies}$	Input capacitance	$_{CE}=30V$ $_{GE}=0V$ $=1MHz$	-	2480	-	pF
$_{oes}$	Output capacitance		-	95	-	pF
$_{res}$	Reverse transfer capacitance		-	21	-	pF
$_g$	Total gate charge	$_{CC}=520V$ $_{GE}=15V$ $_C=40A$	-	78	-	nC

Switching characteristics

	P					
			M .	.	M .	
d(on)	Turn-on delay time	$V_{CC}=400V$ $V_{GE}=0/15V$ $I_C=40A$ $R_G=10\Omega$ Inductive load	-	32	-	ns
r	Rise time		-	55	-	ns
d(off)	Turn-off delay time		-	106	-	ns
f	Fall time		-	51	-	ns
on	Turn-on energy		-	0.9	-	mJ
off	Turn-off energy		-	0.5	-	mJ
ts	Total switching energy		-	1.4	-	mJ
d(on)	Turn-on delay time	$V_{CC}=400V$ $V_{GE}=0/15V$ $I_C=40A$ $R_G=10\Omega$ Inductive load $v_{vj}=175$	-	28	-	ns
r	Rise time		-	52	-	ns
d(off)	Turn-off delay time		-	128	-	ns
f	Fall time		-	75	-	ns
on	Turn-on energy		-	1.4	-	mJ
off	Turn-off energy		-	0.7	-	mJ
ts	Total switching energy		-	2.1	-	mJ



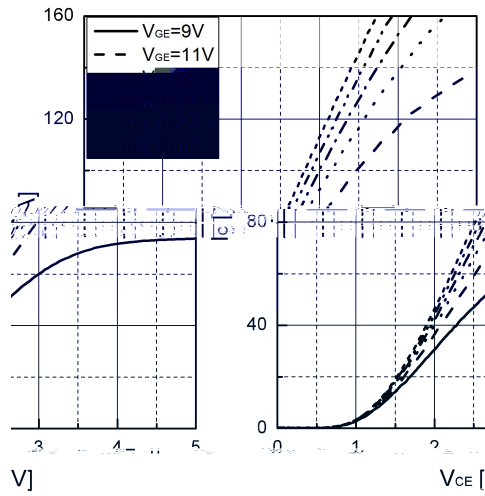


Fig 1. Typical output characteristic ($v_j=25^\circ\text{C}$)

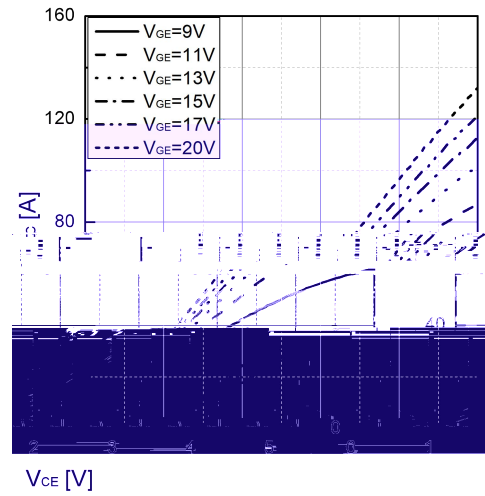


Fig 2. Typical output characteristic ($v_j=175^\circ\text{C}$)

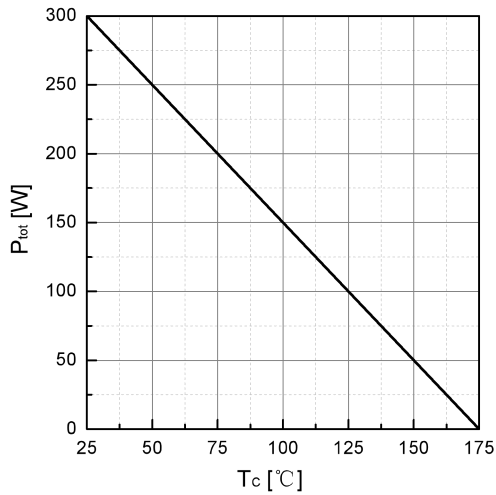


Fig 3. Power dissipation as a function of

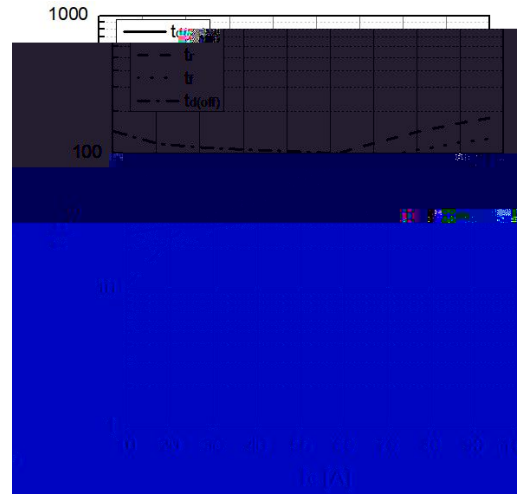


Fig 4. Typical switching time as a function of v_{ce}

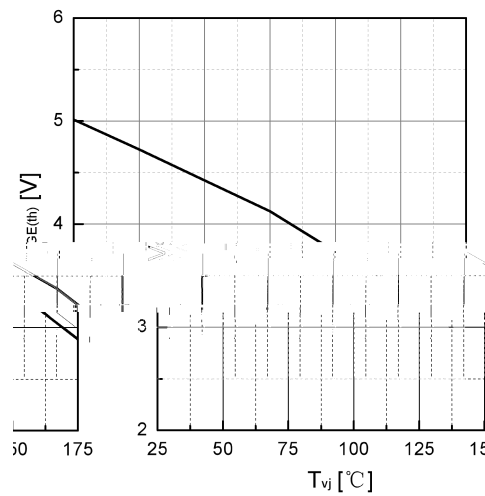


Fig 5. Typical $V_{GE(th)}$ as a function of v_j

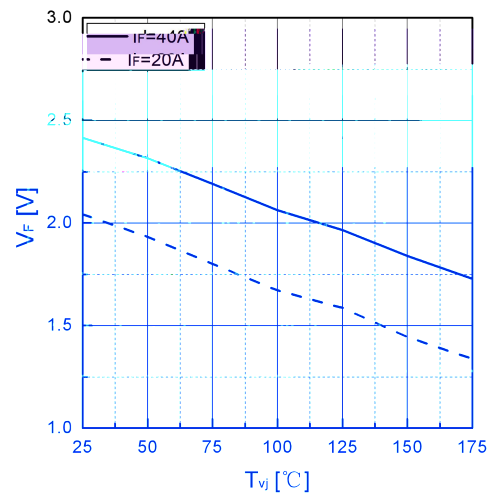


Fig 6. Typical V_F as a function of v_j

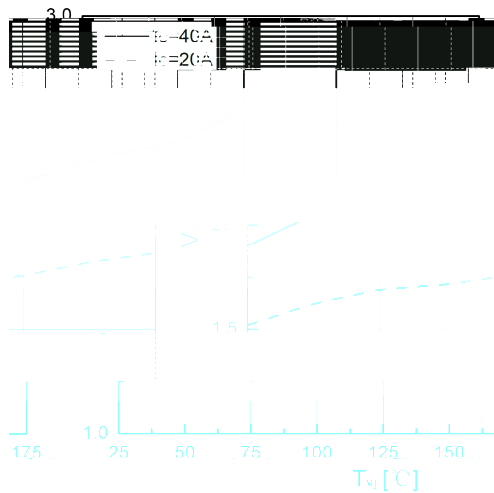


Fig 7. Typical $C_{E_{sat}}$ as a function of V_j

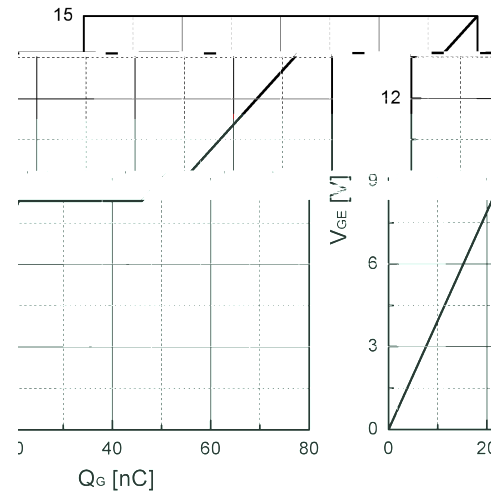


Fig 8. Typical Gate charge

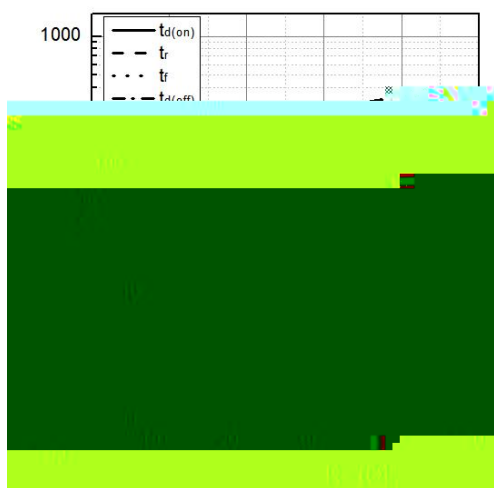


Fig 9. Typical switching times as a function of V_j

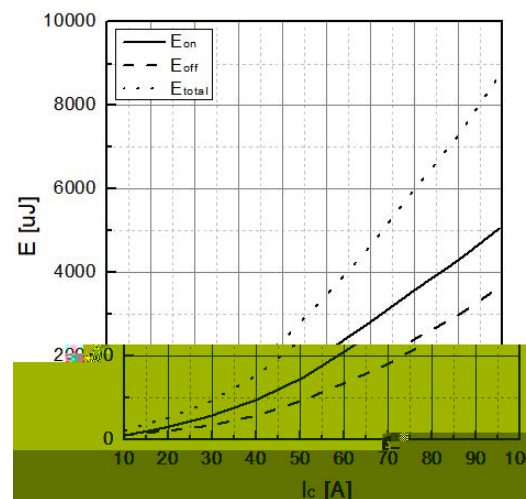


Fig 10. Typical switching energy losses as a function of I_c

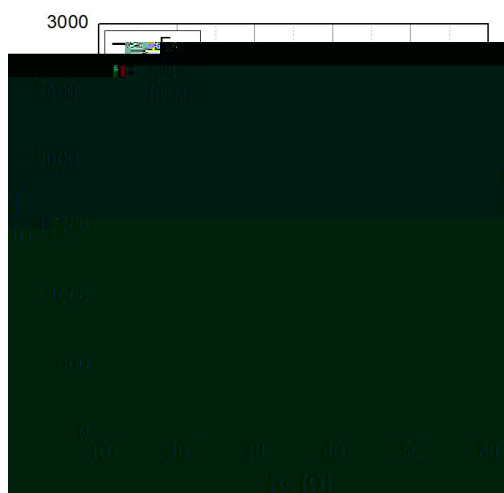


Fig 11. Typical switching energy losses as a function of V_j

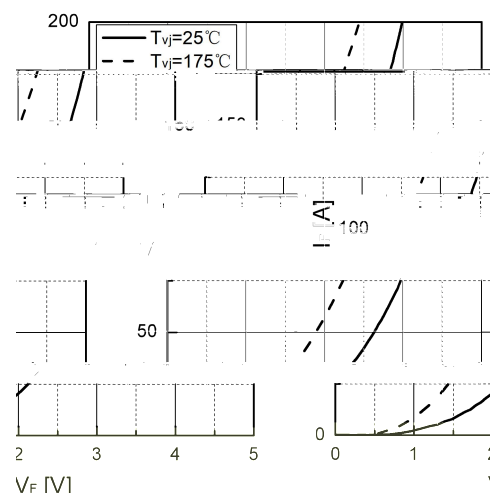


Fig 12. Typical F as a function of V_F

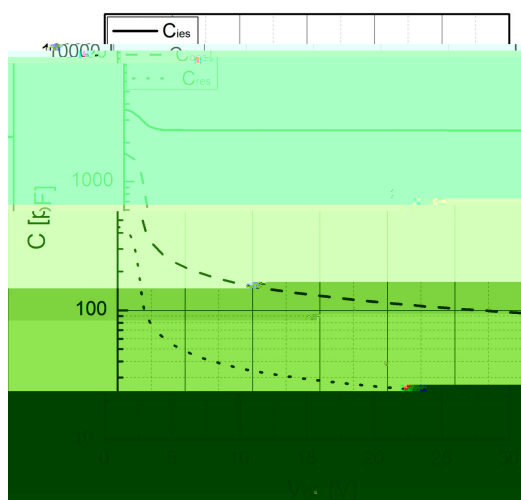


Fig 13. Typical capacitance as a function of V_{CE}
($f=1\text{MHz}$, $V_{GE}=0\text{V}$)

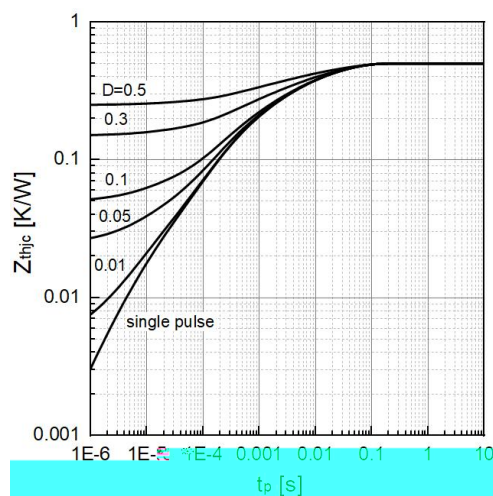


Fig 14. Transient thermal impedance of IGBT



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	21.20	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	5.25	-	5.65	0.207	-	0.222
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
M	2.80	3.00	3.20	0.110	0.118	0.126
N	2.90	3.10	3.30	0.114	0.122	0.130



Date	Revision	Changes
2023-11-20	Rev 1.0	Release of the datasheet
2024-04-17	Rev 1.1	Update
2024-05-17	Rev 1.2	Update
2026-06-25	Rev 1.3	Update thermal

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