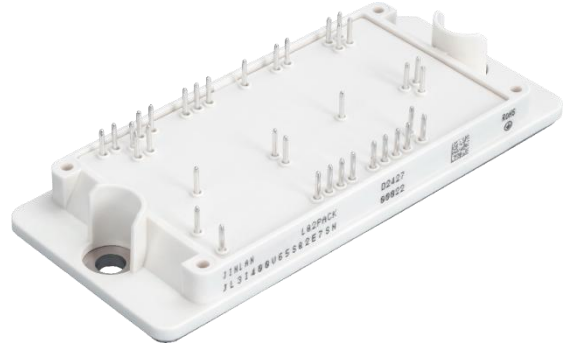


JL3I400V65SQ2G7SN

3-Level NPC Inverter Module with 650V Trench Stop IGBTs

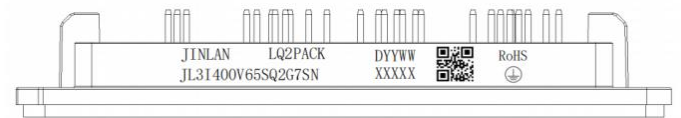
Features

- Electrical features
 - Neutral Point Clamped Three-Level Inverter Module
 - 650V Trench Stop IGBTs
 - $T_{vj\ op}=175^{\circ}C$
 - Low Inductive Layout
 - Thermistor
- Mechanical features
 - Package with CTI >500
 - Solderable Pins



LQ2 Pack

MARKING DIAGRAM

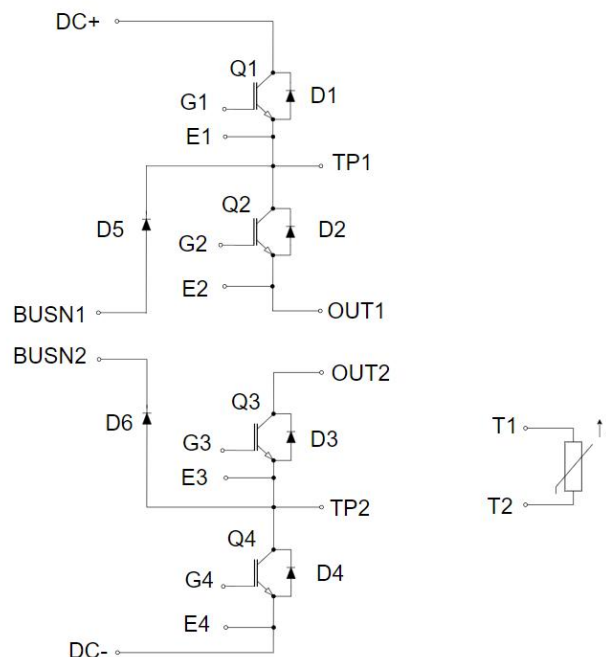


Typical Applications

- Solar Inverters
- UPS Systems
- Energy Storage System

JINLAN	= Company Name
JL3I400V65SQ2G7SN	= Specific Device Code
JYWW	= Year and Work Week Code
XXXXX	= Serial Number
QR code	= Custom Assembly Information

Description





Package Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f=50\text{Hz}$, $t=60\text{s}$	4.0	kV
Internal isolation		basic insulation(class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{creep}	terminal to heatsink	>12.7	mm
Clearance	d_{clear}	terminal to heatsink	>12.7	mm
Comparative tracking index (electrical)	CTI		>500	
RTI Elec.	RTI	housing	140	$^{\circ}\text{C}$

Package Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Storage Temperature Range	T_{STG}			-40		125	$^{\circ}\text{C}$
Mounting torque for module mounting	M	-Mounting according to valid application note	M5, Screw	3	--	5	Nm
Weight	G			--	179.7	--	g



IGBT

Absolute Maximum Ratings Q1,Q2,Q3,Q4 (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{CES}	Collector-Emitter Voltage	650	V
V _{GES}	Gate-Emitter Voltage	±30	V
I _{CN}		400	A
I _C	Collector Current @ T _c =65°C	300	A
I _{CM}	Pulsed Collector Current, t _p =1ms	800	A
T _{jmax}	Maximum Junction Temperature	175	°C

Characteristics Q1,Q4 (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V _{CE(sat)}	Collector–Emitter Saturation Voltage	I _C =400A, V _{GE} = 15V	T _{vj} = 25 °C	--	1.55	2.00	V
			T _{vj} = 150 °C	--	1.80	--	
V _{GE(TH)}	Gate–Emitter Threshold Voltage	I _C =5mA,V _{CE} =V _{GE}		4.0	5.0	6.0	V
I _{CES}	Collector–Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} = 650 V		--	--	800	μ A
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = ±30 V, V _{CE} = 0 V, T _{vj} = 25°C		--	--	±100	nA
R _{Gint}	Internal Gate Resistance	T _{vj} = 25 °C		--	1.1	--	Ω
C _{ies}	Input Capacitance	V _{CE} =25V,V _{GE} =0V, f=1MHz		--	23.1	--	nF
C _{oes}	Output capacitance			--	0.88	--	nF
C _{res}	Reverse Transfer			--	0.15	--	nF
Q _G	Gate Charge	V _{CC} =480V, I _C =400A,V _{GE} =15V		--	0.70	--	μC
t _{d(on)}	Turn–On Delay Time	T _J = 25°C V _{CE} = 400 V, I _C = 400 A V _{GE} = –5 V to +15 V R _{Gon} = 25Ω,R _{Goff} = 25Ω		--	420	--	ns
t _r	Rise Time			--	140	--	
t _{d(off)}	Turn–off Delay Time			--	1160	--	
t _f	Fall Time			--	180	--	
E _{on}	Turn–On Switching Loss per Pulse	T _J = 150°C V _{CE} = 400 V, I _C = 400 A V _{GE} = –5 V to +15 V R _{Gon} = 25Ω,R _{Goff} = 25Ω		--	27.96	--	mJ
E _{off}	Turn Off Switching Loss per Pulse			--	43.16	--	
t _{d(on)}	Turn–On Delay Time			--	373	--	ns
t _r	Rise Time			--	206	--	
t _{d(off)}	Turn–off Delay Time			--	1420	--	
t _f	Fall Time			--	170	--	
E _{on}	Turn–on Switching Loss per Pulse			--	41.4	--	mJ
E _{off}	Turn Off Switching Loss per Pulse			--	39.90	--	
R _{thJC}	Thermal resistance	Junction-to-Case (per IGBT)		--	0.12	--	K/W
T _{vj op}		Temperature under switching conditions		–40		175 ¹⁾	°C

¹⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

Characteristics Q2,Q3 (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =400A, V _{GE} = 15V	T _{vj} = 25 °C	--	1.25	1.80	V
			T _{vj} = 150 °C	--	1.40	--	
V _{GE(TH)}	Gate-Emitter Threshold Voltage	I _C =5mA,V _{CE} =V _{GE}		4.0	5.0	6.0	V
I _{CES}	Collector-Emitter Cutoff Current	V _{GE} = 0 V, V _{CE} = 650 V		--	--	800	μ A
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = ±30 V, V _{CE} = 0 V, T _{vj} = 25°C		--	--	±100	nA
R _{Gint}	Internal Gate Resistance	T _{vj} = 25 °C		--	0.7	--	Ω



Cies	Input Capacitance	$V_{CE}=25V, V_{GE}=0V,$ $f=1MHz$	--	13.9	--	nF
Co _{es}	Output capacitance		--	0.53	--	nF
C _{res}	Reverse Transfer		--	0.09	--	nF
Q _G	Gate Charge	$V_{CC}=480V, I_C=400A, V_{GE}=15V$	--	0.40	--	μC
t _{d(on)}	Turn-On Delay Time	$T_J = 25^{\circ}C$ $V_{CE} = 400V, I_C = 400A$ $V_{GE} = -5V \text{ to } +15V$ $R_{Gon} = 25\Omega, R_{Goff} = 25\Omega$	--	492	--	ns
t _r	Rise Time		--	175	--	
t _{d(off)}	Turn-off Delay Time		--	1411	--	
t _f	Fall Time		--	231	--	
E _{on}	Turn-On Switching Loss per Pulse		--	34.53	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	22.37	--	
t _{d(on)}	Turn-On Delay Time	$T_J = 150^{\circ}C$ $V_{CE} = 400V, I_C = 400A$ $V_{GE} = -5V \text{ to } +15V$ $R_{Gon} = 25\Omega, R_{Goff} = 25\Omega$	--	437	--	ns
t _r	Rise Time		--	257	--	
t _{d(off)}	Turn-off Delay Time		--	1727	--	
t _f	Fall Time		--	218	--	
E _{on}	Turn-on Switching Loss per Pulse		--	43.12	--	mJ
E _{off}	Turn Off Switching Loss per Pulse		--	31.92	--	
R _{thJC}	Thermal resistance	Junction-to-Case (per IGBT)	--	0.086	--	K/W
T _{vj op}		Temperature under switching conditions	-40		175 ²⁾	°C

²⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

Inverse Diodes D1,D2,D3,D4

Absolute Maximum Ratings D1,D2,D3,D4 (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	650	V
I _F	Diode Continuous Forward Current @ T _c =65°C	400	A
I _{FRM}	Diode Maximum Forward Current t _p =1ms	800	A

Characteristics D1,D2,D3,D4 (T_c=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 400 A, T _J = 25°C	--	1.60	2.40	V
		I _F = 400 A, T _J = 150°C	--	1.50	--	
t _{rr}	Reverse Recovery Time	$T_J = 25^{\circ}C$ $V_{CE} = 400V, I_C = 400A$ $V_{GE} = -5V \text{ to } +15V, R_G = 25\Omega$	--	304	--	ns
Q _{rr}	Reverse Recovery Charge		--	7.9	--	μC
I _{RRM}	Peak Reverse Recovery Current		--	140	--	A
E _{rr}	Reverse Recovery Energy		--	2.4	--	mJ
t _{rr}	Reverse Recovery Time	$T_J = 150^{\circ}C$ $V_{CE} = 400V, I_C = 400A$ $V_{GE} = -5V \text{ to } +15V, R_G = 25\Omega$	--	464	--	ns
Q _{rr}	Reverse Recovery Charge		--	18.0	--	μC
I _{RRM}	Peak Reverse Recovery Current		--	220	--	A
E _{rr}	Reverse Recovery Energy		--	5.8	--	mJ
R _{thJC}	Thermal resistance	Junction-to-Case (per diode)		0.136		K/W
T _{vj op}		Temperature under switching conditions	-40		175 ³⁾	°C

³⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.



Neutral Point Diodes D5, D6

Absolute Maximum Ratings D5, D6 (T_c = 25°C unless otherwise noted)

Symbol	Description	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	650	V
I _F	Diode Continuous Forward Current @ T _c =65°C	400	A
I _{FRM}	Diode Maximum Forward Current t _p =1ms	800	A

Characteristics D5, D6 (T_c=25°C unless otherwise noted)

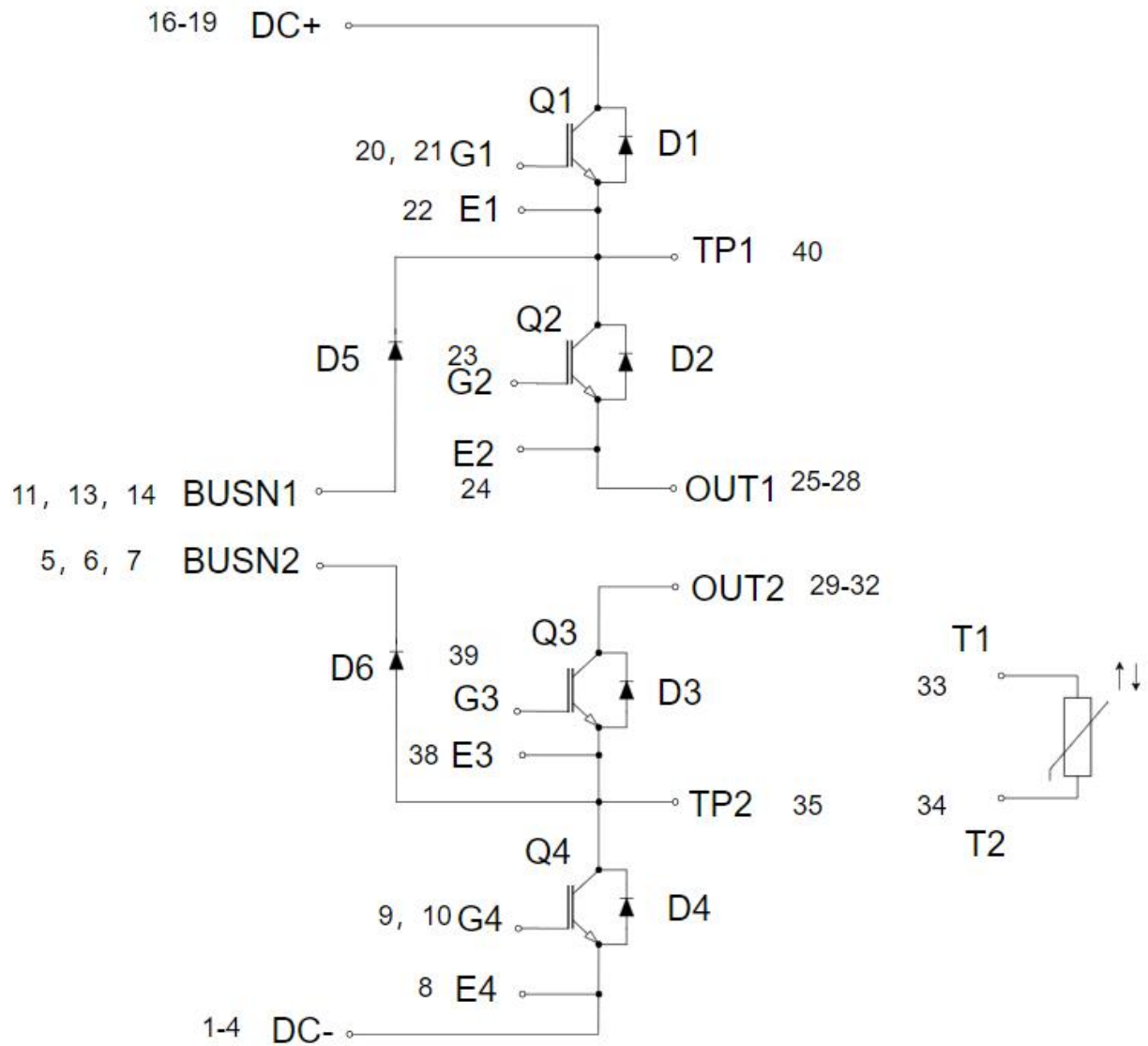
Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _F	Diode Forward Voltage	I _F = 400 A, T _J = 25°C	--	1.60	2.40	V
		I _F = 400 A, T _J = 150°C	--	1.50	--	
t _{rr}	Reverse Recovery Time	T _J = 25°C V _{CE} = 400 V, I _c = 400 A V _{GE} = -5 V to +15 V, R _G = 25Ω	--	304	--	ns
Q _{rr}	Reverse Recovery Charge		--	7.9	--	μC
I _{RRM}	Peak Reverse Recovery Current		--	140	--	A
E _{rr}	Reverse Recovery Energy		--	2.4	--	mJ
t _{rr}	Reverse Recovery Time	T _J = 150°C V _{CE} = 400 V, I _c = 400 A V _{GE} = -5 V to +15 V, R _G = 25Ω	--	464	--	ns
Q _{rr}	Reverse Recovery Charge		--	18.0	--	μC
I _{RRM}	Peak Reverse Recovery Current		--	220	--	A
E _{rr}	Reverse Recovery Energy		--	5.8	--	mJ
R _{thJC}	Thermal resistance	Junction-to-Case (per diode)		0.13		K/W
T _{vj op}		Temperature under switching conditions	-40		175 ⁴⁾	°C

⁴⁾T_{vj op} > 150°C is only allowed for operation at overload conditions.

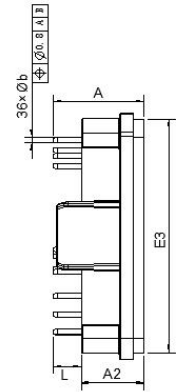
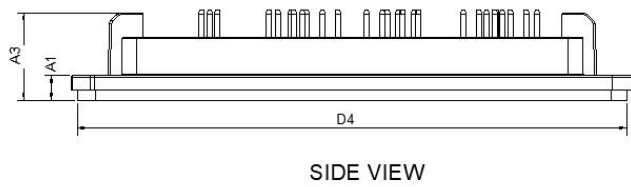
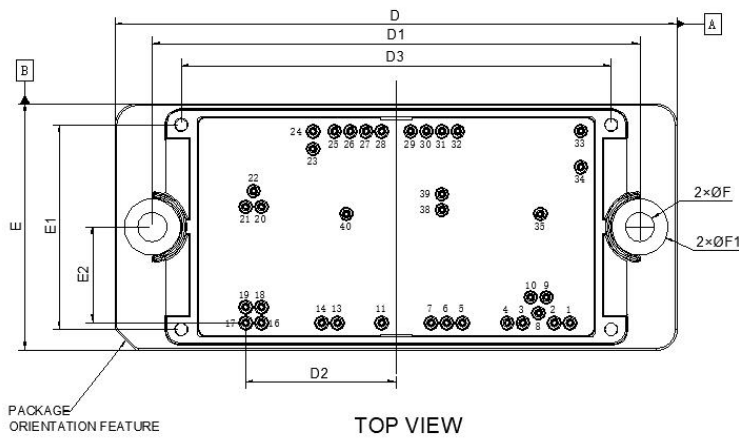
NTC Characteristics

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
R ₂₅	Nominal Resistance	T=25°C	--	22	--	kΩ
R ₁₀₀	Nominal Resistance	T=100°C		1486		Ω
R/R	Deviation of R25		-5	--	5	%
P _D	Power Dissipation		--	200	--	mW
	Power Dissipation Constant		--	2	--	mW/K
B _{25/50}	B-value	tolerance ±3%	--	3950	--	K
B _{25/100}	B-value	tolerance ±3%	--	3998	--	K

CIRCUIT DIAGRAM



PACKAGE DIMENSION



SIDE VIEW

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	16.63	17.23	17.83
A1	4.50	4.70	4.90
A2	11.60	12.00	12.40
A3	16.40	16.70	17.00
b	0.95	1.00	1.05
D	106.80	107.20	107.60
D1	92.90	93.00	93.10
D2	28.40	28.70	29.00
D3	81.80	82.00	82.20
D4	104.35	104.75	105.15
E	46.60	47.00	47.40
E1	38.80	39.00	39.20
E2	17.95	18.25	18.55
E3	44.30	44.60	44.90
F	5.40	5.50	5.60
F1	10.70 REF		
L	5.03	5.23	5.43

PIN	PIN POSITION		PIN	PIN POSITION	
	X	Y		X	Y
1	61.85	0.00	23	12.85	33.15
2	58.85	0.00	24	12.85	36.5
3	52.85	0.00	25	16.95	36.5
4	49.85	0.00	26	19.95	36.5
5	41.35	0.00	27	22.95	36.5
6	38.35	0.00	28	25.95	36.5
7	35.35	0.00	29	31.45	36.5
8	55.85	1.85	30	34.45	36.5
9	57.35	4.85	31	37.45	36.5
10	54.35	4.85	32	40.45	36.5
11	25.95	0.00	33	63.9	36.55
13	17.5	0.00	34	63.9	29.7
14	14.5	0.00	35	56.2	20.75
16	3.00	0.00	38	37.4	21.5
17	0.00	0.00	39	37.4	24.5
18	3.00	3.00	40	19.2	20.75
19	0.00	3.00			
20	3.00	22.1			
21	0.00	22.1			
22	1.5	25.1			



REVISION HISTORY

Document version	Date of release	Description of changes
Rev.00	2025-03-30	Preview



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