



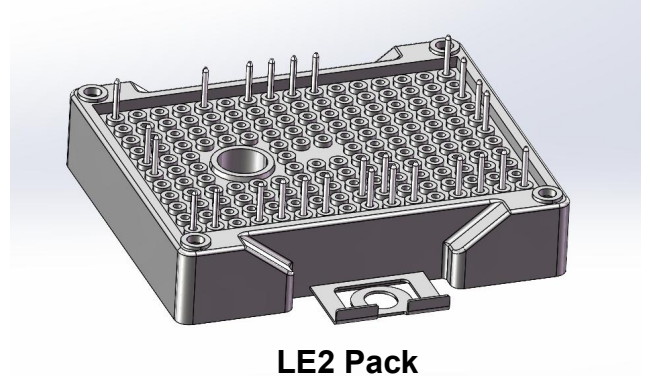
# JL3I75V65SE2E7SN

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

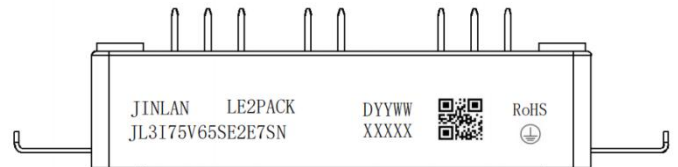


### Features

- Electrical features
  - 650V Trench Stop IGBTs
  - Low Inductive Design
  - Low Switching Losses
  - Low Inductive Layout
  - Thermistor
- Mechanical features
  - Compact Design
  - Solderable Pins
  - Al<sub>2</sub>O<sub>3</sub> Substrate with Low Thermal Resistance



LE2 Pack



### Typical Applications

- 3-Level-Applications
- Solar Applications
- UPS Systems

JINLAN

JL3I75V65SE2E7SN

YYWW

XXXXX

QR code

= Company Name

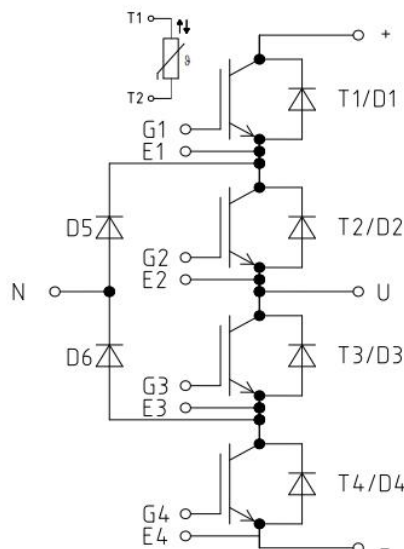
= Specific Device Code

= Year and Work Week Code

= Serial Number

= Custom Assembly Information

### Description





Package Insulation coordination

| Parameter                                  | Symbol      | Note or test condition              | Values    | Unit |
|--------------------------------------------|-------------|-------------------------------------|-----------|------|
| Isolation test voltage                     | $V_{ISOL}$  | RMS,f=50Hz,t=60s                    | 2.5       | kV   |
| Internal isolation                         |             | basic insulation(class 1,IEC 61140) | $Al_2O_3$ |      |
| Creepage distance                          | $d_{creep}$ | terminal to heatsink                | 11.5      | mm   |
| Clearance                                  | $d_{clear}$ | terminal to heatsink                | 10        | mm   |
| Comparative tracking index<br>(electrical) | CTI         |                                     | >200      |      |
| RTI Elec.                                  | RTI         | housing                             | 140       | ℃    |

Package Characteristic values

| Parameter                                | Symbol           | Note or test condition                        |  | Values |      |      | Unit |
|------------------------------------------|------------------|-----------------------------------------------|--|--------|------|------|------|
|                                          |                  |                                               |  | Min.   | Typ. | Max. |      |
| Stray Inductance                         | LCE              |                                               |  | --     | 15   | --   | nH   |
| Module Lead Resistance, Terminal to Chip | RCC'+EE'         |                                               |  | --     | 2.00 | --   | mΩ   |
| Storage Temperature Range                | T <sub>STG</sub> |                                               |  | -40    |      | 125  | ℃    |
| Mounting torque for module mounting      | M                | -Mounting according to valid application note |  | 40     | --   | 80   | N    |
| Weight                                   | G                |                                               |  | --     | 39   | --   | g    |

**IGBT (T1、T2、T3、T4)****Absolute Maximum Ratings** (T<sub>C</sub> = 25°C unless otherwise noted)

| Symbol            | Description                                                                      | Value | Unit |
|-------------------|----------------------------------------------------------------------------------|-------|------|
| V <sub>CES</sub>  | Collector-Emitter Voltage                                                        | 650   | V    |
| V <sub>GES</sub>  | Gate-Emitter Voltage                                                             | ±30   | V    |
| I <sub>CDC</sub>  | Continuous Collector Current @ T <sub>C</sub> = 80°C (T <sub>JMAX</sub> = 175°C) | 75    | A    |
| I <sub>CM</sub>   | Pulsed Collector Current, t <sub>p</sub> limited by T <sub>vj max</sub>          | 150   | A    |
| T <sub>jmax</sub> | Maximum Junction Temperature                                                     | 175   | °C   |
| P <sub>D</sub>    | Power Dissipation @ T <sub>C</sub> = 25°C                                        | 270   | W    |
|                   | Power Dissipation @ T <sub>C</sub> = 100 °C                                      | 135   | W    |

**Characteristics** (T<sub>C</sub>=25°C unless otherwise noted)

| Symbol               | Parameter                            | Test Condition                                                                                                                                | Min                      | Typ   | Max               | Unit |
|----------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------|-------------------|------|
| V <sub>CE(sat)</sub> | Collector-Emitter Saturation Voltage | I <sub>C</sub> = 50A,<br>V <sub>GE</sub> = 15V                                                                                                | T <sub>vj</sub> = 25 °C  |       | --                | V    |
|                      |                                      |                                                                                                                                               | T <sub>vj</sub> = 150 °C |       | --                |      |
|                      |                                      | I <sub>C</sub> = 75A,<br>V <sub>GE</sub> = 15V                                                                                                | T <sub>vj</sub> = 25 °C  |       | --                |      |
|                      |                                      |                                                                                                                                               | T <sub>vj</sub> = 150 °C |       | --                |      |
| V <sub>GE(TH)</sub>  | Gate-Emitter Threshold Voltage       | I <sub>C</sub> =1mA, V <sub>CE</sub> =V <sub>GE</sub>                                                                                         | 4.0                      | 4.75  | 5.5               | V    |
| I <sub>CES</sub>     | Collector-Emitter Cutoff Current     | V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 650 V                                                                                                | --                       | --    | 500               | μA   |
| I <sub>GES</sub>     | Gate-Emitter Leakage Current         | V <sub>GE</sub> = ±30 V, V <sub>CE</sub> = 0 V, T <sub>vj</sub> = 25°C                                                                        | --                       | --    | ±200              | nA   |
| R <sub>Gint</sub>    | Internal Gate Resistance             | T <sub>vj</sub> = 25°C                                                                                                                        | --                       | 0.8   | --                | Ω    |
| C <sub>ies</sub>     | Input Capacitance                    | V <sub>CE</sub> =25V, V <sub>GE</sub> =0V,<br>f=1MHz                                                                                          | --                       | 5800  | --                | pF   |
| C <sub>oes</sub>     | Output capacitance                   |                                                                                                                                               | --                       | 206   | --                | pF   |
| C <sub>res</sub>     | Reverse Transfer                     |                                                                                                                                               | --                       | 40    | --                | pF   |
| Q <sub>G</sub>       | Gate Charge                          | V <sub>CE</sub> = 480 V, I <sub>C</sub> = 75 A<br>V <sub>GE</sub> = -5 V to +15 V                                                             | --                       | 0.197 | --                | μC   |
| t <sub>d(on)</sub>   | Turn-On Delay Time                   | V <sub>CE</sub> =400V, I <sub>C</sub> =75A,<br>V <sub>GE</sub> = -5 V to +15 V, R <sub>g</sub> =5Ω<br>Inductive Load<br>T <sub>vj</sub> =25°C | --                       | 62    | --                | ns   |
| t <sub>r</sub>       | Rise Time                            |                                                                                                                                               | --                       | 30    | --                |      |
| t <sub>d(off)</sub>  | Turn-off Delay Time                  |                                                                                                                                               | --                       | 261   | --                |      |
| t <sub>f</sub>       | Fall Time                            |                                                                                                                                               | --                       | 45    | --                |      |
| E <sub>on</sub>      | Turn-On Switching Loss per Pulse     |                                                                                                                                               | --                       | 3.9   | --                | mJ   |
| E <sub>off</sub>     | Turn Off Switching Loss per Pulse    |                                                                                                                                               | --                       | 1.4   | --                |      |
| t <sub>d(on)</sub>   | Turn-On Delay Time                   | V <sub>CE</sub> =400V, I <sub>C</sub> =75A,<br>V <sub>GE</sub> = -5 V to +15 V, R <sub>g</sub> =5Ω<br>T <sub>J</sub> =175°C                   | --                       | TBD   | --                | ns   |
| t <sub>r</sub>       | Rise Time                            |                                                                                                                                               | --                       | TBD   | --                |      |
| t <sub>d(off)</sub>  | Turn-off Delay Time                  |                                                                                                                                               | --                       | TBD   | --                |      |
| t <sub>f</sub>       | Fall Time                            |                                                                                                                                               | --                       | TBD   | --                |      |
| E <sub>on</sub>      | Turn-on Switching Loss per Pulse     |                                                                                                                                               | --                       | 5.1   | --                | mJ   |
| E <sub>off</sub>     | Turn Off Switching Loss per Pulse    |                                                                                                                                               | --                       | 2.5   | --                |      |
| R <sub>thJC</sub>    | Thermal resistance                   | Junction-to-Case (per IGBT)                                                                                                                   | --                       | 0.48  | --                | K/W  |
| T <sub>vj op</sub>   |                                      | Temperature under switching conditions                                                                                                        | -40                      |       | 150 <sup>1)</sup> | °C   |

<sup>1)</sup>T<sub>vj op</sub> > 150°C is only allowed for operation at overload conditions.



## Diode (D1、D2、D3、D4)

**Absolute Maximum Ratings** (T<sub>c</sub> = 25°C unless otherwise noted)

| Symbol           | Description                                       | Value | Unit |
|------------------|---------------------------------------------------|-------|------|
| V <sub>RRM</sub> | Repetitive Peak Reverse Voltage                   | 650   | V    |
| I <sub>F</sub>   | Diode Continuous Forward Current                  | 75    | A    |
| I <sub>FM</sub>  | Diode Maximum Forward Current t <sub>p</sub> =1ms | 150   | A    |

**Characteristics** (T<sub>c</sub>=25°C unless otherwise noted)

| Symbol             | Parameter                     | Test Condition                                                                                                                 | Min | Typ  | Max               | Unit |
|--------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----|------|-------------------|------|
| V <sub>F</sub>     | Diode Forward Voltage         | I <sub>F</sub> = 75 A, T <sub>J</sub> = 25°C                                                                                   | --  | 1.50 | 2.50              | V    |
|                    |                               | I <sub>F</sub> = 75 A, T <sub>J</sub> = 175°C                                                                                  | --  | 1.40 | --                |      |
| T <sub>rr</sub>    | Reverse Recovery Time         | V <sub>CE</sub> =400V<br>V <sub>GE</sub> = -5 V to +15 V<br>I <sub>F</sub> =75A, R <sub>g</sub> =5Ω<br>T <sub>vj</sub> =25°C   | --  | 142  | --                | ns   |
| IRM                | Peak Reverse Recovery Current |                                                                                                                                | --  | 40   | --                | A    |
| Q <sub>rr</sub>    | Recovered Charge              |                                                                                                                                | --  | 2.35 | --                | μC   |
| E <sub>rec</sub>   | Reverse Recovery Energy       |                                                                                                                                | --  | 0.32 | --                | mJ   |
| T <sub>rr</sub>    | Reverse Recovery Time         | V <sub>CE</sub> =400V<br>V <sub>GE</sub> = -5 V to +15 V<br>I <sub>F</sub> =75A, R <sub>g</sub> =5Ω,<br>T <sub>vj</sub> =175°C | --  | 213  | --                | ns   |
| IRM                | Peak Reverse Recovery Current |                                                                                                                                | --  | 60   | --                | A    |
| Q <sub>rr</sub>    | Recovered Charge              |                                                                                                                                | --  | 5.78 | --                | μC   |
| E <sub>rec</sub>   | Reverse Recovery Energy       |                                                                                                                                | --  | 0.48 | --                | mJ   |
| R <sub>thJC</sub>  | Thermal resistance            | Junction-to-Case (per diode)                                                                                                   | --  | 0.53 | --                | K/W  |
| T <sub>vj op</sub> |                               | Temperature under switching conditions                                                                                         | -40 |      | 150 <sup>2)</sup> | °C   |

<sup>2)</sup>T<sub>vj op</sub> > 150°C is only allowed for operation at overload conditions.

## Diode (D5、D6)

**Absolute Maximum Ratings** (T<sub>c</sub> = 25°C unless otherwise noted)

| Symbol           | Description                                       | Value | Unit |
|------------------|---------------------------------------------------|-------|------|
| V <sub>RRM</sub> | Repetitive Peak Reverse Voltage                   | 650   | V    |
| I <sub>F</sub>   | Diode Continuous Forward Current                  | 75    | A    |
| I <sub>FM</sub>  | Diode Maximum Forward Current t <sub>p</sub> =1ms | 150   | A    |

**Characteristics** (T<sub>c</sub>=25°C unless otherwise noted)

| Symbol             | Parameter                     | Test Condition                                                                                                                 | Min | Typ  | Max               | Unit |
|--------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----|------|-------------------|------|
| V <sub>F</sub>     | Diode Forward Voltage         | I <sub>F</sub> = 75 A, T <sub>J</sub> = 25°C                                                                                   | --  | 1.50 | 2.50              | V    |
|                    |                               | I <sub>F</sub> = 75 A, T <sub>J</sub> = 175°C                                                                                  | --  | 1.40 | --                |      |
| T <sub>rr</sub>    | Reverse Recovery Time         | V <sub>CE</sub> =400V<br>V <sub>GE</sub> = -5 V to +15 V<br>I <sub>F</sub> =75A, R <sub>g</sub> =5Ω<br>T <sub>vj</sub> =25°C   | --  | 142  | --                | ns   |
| IRM                | Peak Reverse Recovery Current |                                                                                                                                | --  | 40   | --                | A    |
| Q <sub>rr</sub>    | Recovered Charge              |                                                                                                                                | --  | 2.35 | --                | μC   |
| E <sub>rec</sub>   | Reverse Recovery Energy       |                                                                                                                                | --  | 0.32 | --                | mJ   |
| T <sub>rr</sub>    | Reverse Recovery Time         | V <sub>CE</sub> =400V<br>V <sub>GE</sub> = -5 V to +15 V<br>I <sub>F</sub> =75A, R <sub>g</sub> =5Ω,<br>T <sub>vj</sub> =175°C | --  | 213  | --                | ns   |
| IRM                | Peak Reverse Recovery Current |                                                                                                                                | --  | 60   | --                | A    |
| Q <sub>rr</sub>    | Recovered Charge              |                                                                                                                                | --  | 5.78 | --                | μC   |
| E <sub>rec</sub>   | Reverse Recovery Energy       |                                                                                                                                | --  | 0.48 | --                | mJ   |
| R <sub>thJC</sub>  | Thermal resistance            | Junction-to-Case (per diode)                                                                                                   | --  | 0.53 | --                | K/W  |
| T <sub>vj op</sub> |                               | Temperature under switching conditions                                                                                         | -40 |      | 150 <sup>3)</sup> | °C   |

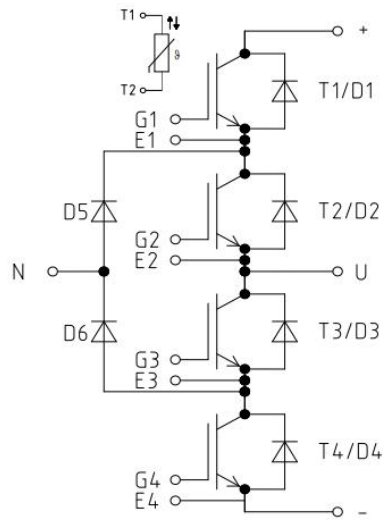
<sup>3)</sup>T<sub>vj op</sub> > 150°C is only allowed for operation at overload conditions.



NTC Characteristics (T<sub>C</sub> = 25°C unless otherwise noted)

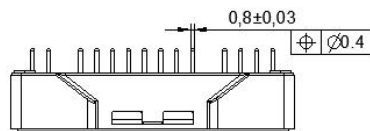
| Symbol              | Parameter         | Test Condition                                   | Min | Typ  | Max  | Unit |
|---------------------|-------------------|--------------------------------------------------|-----|------|------|------|
| R <sub>25</sub>     | Rated Resistance  |                                                  | --  | 5.0  | --   | kΩ   |
| ΔR/R                | Deviation of R100 | T <sub>C</sub> =100 °C, R <sub>100</sub> =493.3Ω | -5  | --   | 5    | %    |
| P <sub>25</sub>     | Power Dissipation |                                                  | --  | --   | 20.0 | mW   |
| B <sub>25/50</sub>  | B-value           | $R_2=R_{25}\exp[B_{25/50}(1/T_2- 1/(298.15K))]$  | --  | 3375 | --   | K    |
| B <sub>25/80</sub>  | B-value           | $R_2=R_{25}\exp[B_{25/80}(1/T_2- 1/(298.15K))]$  | --  | 3411 | --   | K    |
| B <sub>25/100</sub> | B-value           | $R_2=R_{25}\exp[B_{25/100}(1/T_2- 1/(298.15K))]$ | --  | 3433 | --   | K    |

## CIRCUIT DIAGRAM

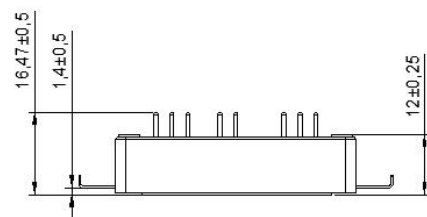


## PACKAGE DIMENSION

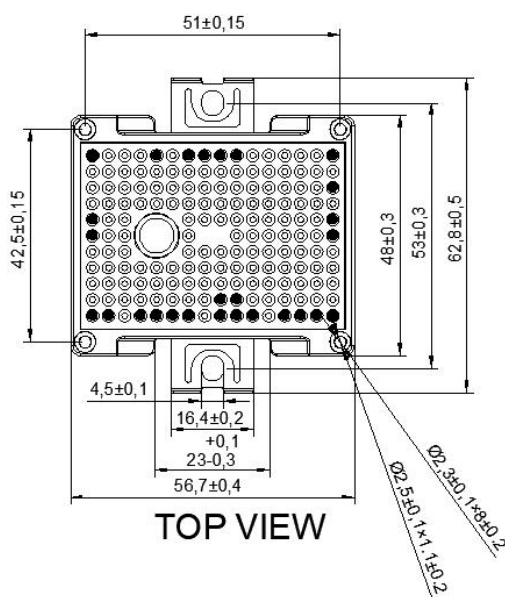
### Dimensions in Millimeters



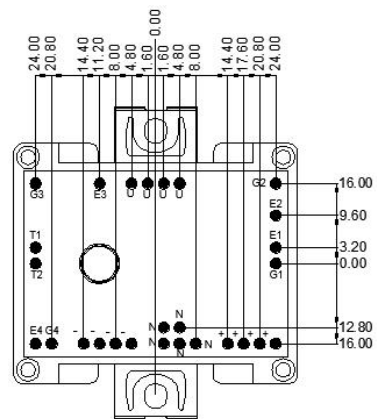
### SIDE VIEW



SIDE VIEW



TOP VIEW





REVISION HISTORY

| Document version | Date of release | Description of changes |
|------------------|-----------------|------------------------|
| Rev.00           | 2024-12-31      | Preview                |



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