



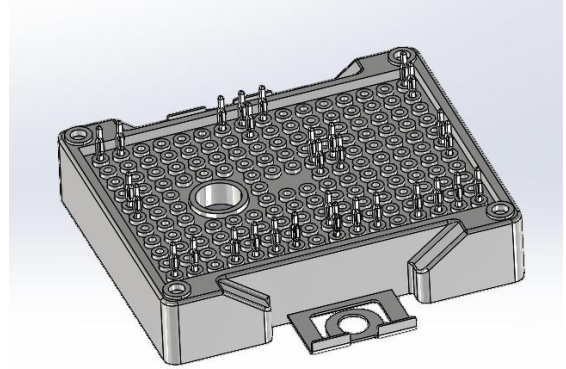
# JLSB150V65RE2E7PN

## Stack Boost Module with 650V Trench Stop IGBTs

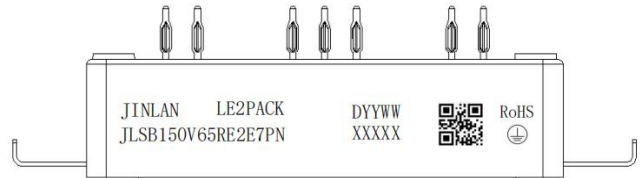


### Features

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



### LE2 Pack

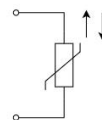
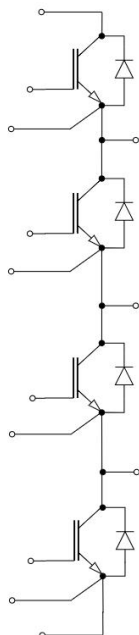


### Typical Applications

- Welding

|                   |                               |
|-------------------|-------------------------------|
| JINLAN            | = Company Name                |
| JLSB150V65RE2E7PN | = Specific Device Code        |
| YYWW              | = Year and Work Week Code     |
| XXXXXX            | = 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, $f=50\text{Hz}$ , $t=60\text{s}$ | 2.5                     | kV   |
| Internal isolation                         |             | basic insulation(class 1, IEC 61140)  | $\text{Al}_2\text{O}_3$ |      |
| 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                     | °C   |

## Package Characteristic values

| Parameter                                | Symbol    | Note or test condition | Values |      |      | Unit |
|------------------------------------------|-----------|------------------------|--------|------|------|------|
|                                          |           |                        | Min.   | Typ. | Max. |      |
| Stray Inductance                         | LCE       |                        | --     | 20   | --   | nH   |
| Module Lead Resistance, Terminal to Chip | RCC'+EE'  |                        | --     | 2    | --   | mΩ   |
| Storage Temperature Range                | $T_{STG}$ |                        | -40    |      | 125  | °C   |
| Mounting force per clamp                 | F         |                        | 40     | --   | 80   | N    |
| Weight                                   | G         |                        | --     | 39   | --   | g    |



## IGBT

### 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>C</sub>   | Collector Current @ T <sub>C</sub> =25°C                                    | 150   | A    |
|                  | Collector Current @ T <sub>C</sub> =100°C                                   | 300   | A    |
| I <sub>CM</sub>  | Pulsed Collector Current, t <sub>p</sub> limited by T <sub>vj max</sub>     | 175   | A    |
| P <sub>tot</sub> | Total power dissipation, T <sub>C</sub> = 25°C, T <sub>vj max</sub> = 150°C | 370   | 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> =150A,<br>V <sub>GE</sub> = 15V                                                                                                   | T <sub>vj</sub> = 25 °C | --                                                                                                            | 1.35  | 1.90              | V    |
|                      |                                      |                                                                                                                                                  | T <sub>vj</sub> = 150°C | --                                                                                                            | 1.50  | --                |      |
| V <sub>GE(TH)</sub>  | Gate–Emitter Threshold Voltage       | I <sub>C</sub> =3mA, V <sub>CE</sub> =V <sub>GE</sub>                                                                                            |                         | 4.0                                                                                                           | --    | 5.5               | V    |
| I <sub>CES</sub>     | Collector–Emitter Cutoff Current     | V <sub>GE</sub> = 0 V, V <sub>CE</sub> = 650 V                                                                                                   |                         | --                                                                                                            | --    | 200               | 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                                                                           |                         | --                                                                                                            | --    | ± 100             | nA   |
| R <sub>Gint</sub>    | Internal Gate Resistance             | T <sub>vj</sub> = 25 °C                                                                                                                          |                         | --                                                                                                            | 1.45  | --                | Ω    |
| C <sub>ies</sub>     | Input Capacitance                    | V <sub>CE</sub> =25V, V <sub>GE</sub> =0V,<br>f=1MHz                                                                                             |                         | --                                                                                                            | 11900 | --                | pF   |
| C <sub>oes</sub>     | Output capacitance                   |                                                                                                                                                  |                         | --                                                                                                            | 505   | --                | pF   |
| C <sub>res</sub>     | Reverse Transfer                     |                                                                                                                                                  |                         | --                                                                                                            | 71.4  | --                | pF   |
| Q <sub>G</sub>       | Gate Charge                          |                                                                                                                                                  |                         | V <sub>CE</sub> = 400 V, I <sub>C</sub> = 150 A<br>V <sub>GE</sub> = -5 V to +15 V<br>T <sub>vj</sub> = 25 °C | --    | 0.356             | --   |
| td(on)               | Turn–On Delay Time                   | V <sub>CE</sub> =400V, IC=150A,<br>V <sub>GE</sub> = -5 V to +15 V, R <sub>Gon</sub> =25Ω,<br>,R <sub>Goff</sub> =50Ω<br>T <sub>vj</sub> = 25 °C |                         | --                                                                                                            | 350   | --                | ns   |
| tr                   | Rise Time                            |                                                                                                                                                  |                         | --                                                                                                            | 50    | --                |      |
| td(off)              | Turn–off Delay Time                  |                                                                                                                                                  |                         | --                                                                                                            | 1220  | --                |      |
| tf                   | Fall Time                            |                                                                                                                                                  |                         | --                                                                                                            | 140   | --                |      |
| E <sub>on</sub>      | Turn–On Switching Loss per Pulse     | V <sub>CE</sub> =400V, IC=150A,<br>V <sub>GE</sub> = -5 V to +15 V, R <sub>Gon</sub> =25Ω,<br>R <sub>Goff</sub> =50Ω<br>T <sub>vj</sub> = 150 °C |                         | --                                                                                                            | 8.4   | --                | mJ   |
| E <sub>off</sub>     | Turn Off Switching Loss per Pulse    |                                                                                                                                                  |                         | --                                                                                                            | 15.4  | --                |      |
| td(on)               | Turn–On Delay Time                   |                                                                                                                                                  |                         | --                                                                                                            | 240   | --                | ns   |
| tr                   | Rise Time                            |                                                                                                                                                  |                         | --                                                                                                            | 60    | --                |      |
| td(off)              | Turn–off Delay Time                  | --                                                                                                                                               | 1220                    | --                                                                                                            |       |                   |      |
| tf                   | Fall Time                            | --                                                                                                                                               | 180                     | --                                                                                                            |       |                   |      |
| E <sub>on</sub>      | Turn–on Switching Loss per Pulse     |                                                                                                                                                  |                         | --                                                                                                            | 12.5  | --                | mJ   |
| E <sub>off</sub>     | Turn Off Switching Loss per Pulse    |                                                                                                                                                  |                         | --                                                                                                            | 14.7  | --                |      |
| R <sub>thJC</sub>    | Thermal resistance                   | Junction-to-Case (per IGBT)                                                                                                                      |                         | --                                                                                                            | 0.294 | --                | K/W  |
| T <sub>vj op</sub>   |                                      | Temperature under switching conditions                                                                                                           |                         | -40                                                                                                           |       | 175 <sup>1)</sup> | °C   |

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



## Diode

### 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                  | 150   | A    |
| I <sub>FM</sub>  | Diode Maximum Forward Current t <sub>p</sub> =1ms | 300   | 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> = 150 A, T <sub>vj</sub> = 25 °C                                                                                     | --  | 1.60  | 2.3               | V    |
|                    |                               | I <sub>F</sub> = 150 A, T <sub>vj</sub> = 150°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> =150A,R <sub>G</sub> =25Ω ,<br>T <sub>vj</sub> = 25 °C | --  | 160   | --                | ns   |
| I <sub>RM</sub>    | Peak Reverse Recovery Current |                                                                                                                                     | --  | 65    | --                | A    |
| Q <sub>rr</sub>    | Recovered Charge              |                                                                                                                                     | --  | 4.69  | --                | μC   |
| E <sub>rec</sub>   | Reverse Recovery Energy       |                                                                                                                                     | --  | 1.2   | --                | 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> =150A,R <sub>G</sub> =25Ω,<br>T <sub>vj</sub> = 150°C   | --  | 243   | --                | ns   |
| I <sub>RM</sub>    | Peak Reverse Recovery Current |                                                                                                                                     | --  | 91.97 | --                | A    |
| Q <sub>rr</sub>    | Recovered Charge              |                                                                                                                                     | --  | 12.94 | --                | μC   |
| E <sub>rec</sub>   | Reverse Recovery Energy       |                                                                                                                                     | --  | 3.165 | --                | mJ   |
| R <sub>thJC</sub>  | Thermal resistance            | Junction-to-Case (per diode)                                                                                                        | --  | 0.319 | --                | K/W  |
| T <sub>vj op</sub> |                               | Temperature under switching conditions                                                                                              | -40 |       | 175 <sup>2)</sup> | °C   |

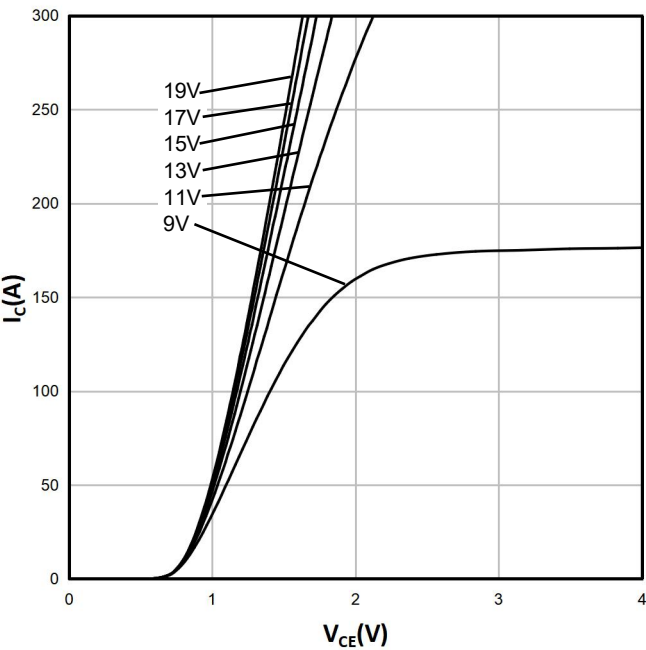
<sup>2)</sup>T<sub>vj op</sub> > 150°C is only allowed for operation at overload conditions.

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

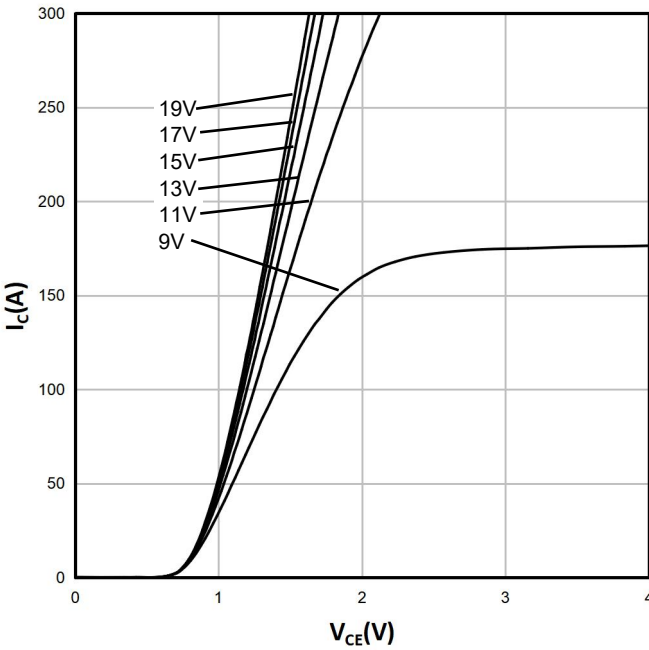
| Symbol              | Parameter         | Test Condition                                                                            | Min | Typ  | Max  | Unit |
|---------------------|-------------------|-------------------------------------------------------------------------------------------|-----|------|------|------|
| 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 <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/50</sub> (1/T <sub>2</sub> - 1/(298.15K))]  | --  | 3375 | --   | K    |
| B <sub>25/80</sub>  | B-value           | R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/80</sub> (1/T <sub>2</sub> - 1/(298.15K))]  | --  | 3411 | --   | K    |
| B <sub>25/100</sub> | B-value           | R <sub>2</sub> =R <sub>25</sub> exp[B <sub>25/100</sub> (1/T <sub>2</sub> - 1/(298.15K))] | --  | 3433 | --   | K    |



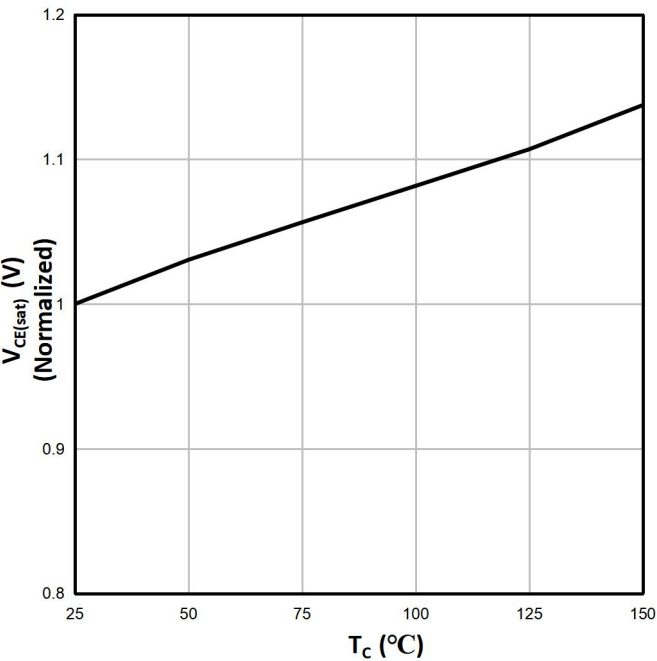
**Figure1.output characteristic IGBT,Inverter(typical)**  
 $T_{vj}=25^{\circ}\text{C}$



**Figure2.output characteristic IGBT,Inverter(typical)**  
 $T_{vj}=150^{\circ}\text{C}$



**Figure3. V<sub>CE(sat)</sub> vs. Temperature**



**Figure4.transfer characteristic IGBT,Inverter(typical)**  
 $V_{CE}=20\text{V}$

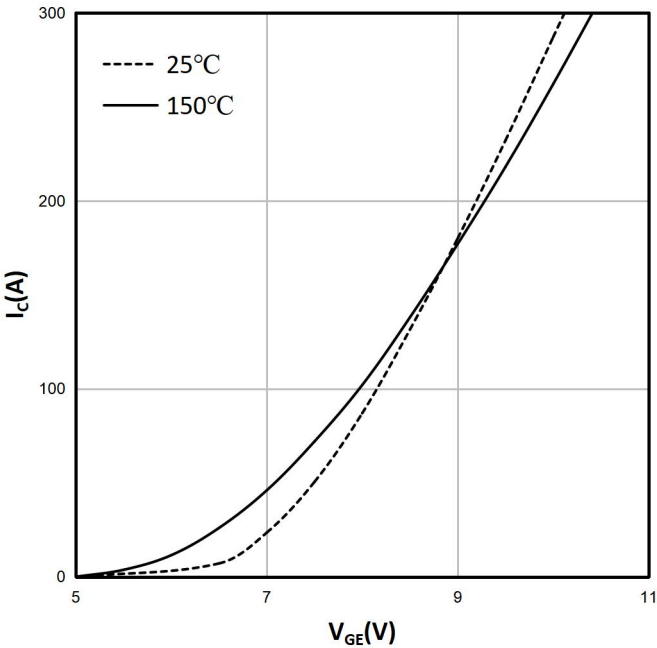




Figure5.  $V_{TH}$  vs. Temperature

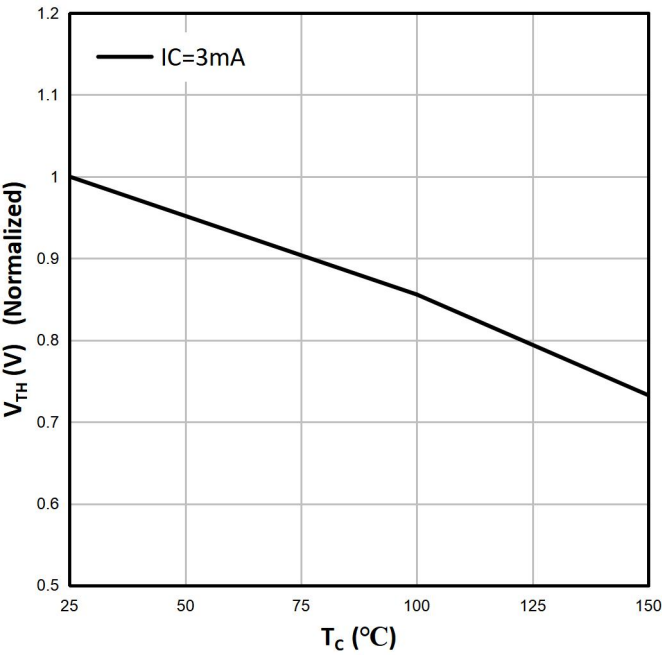


Figure6. Gate Charge Waveform

$V_{CC}=480V$

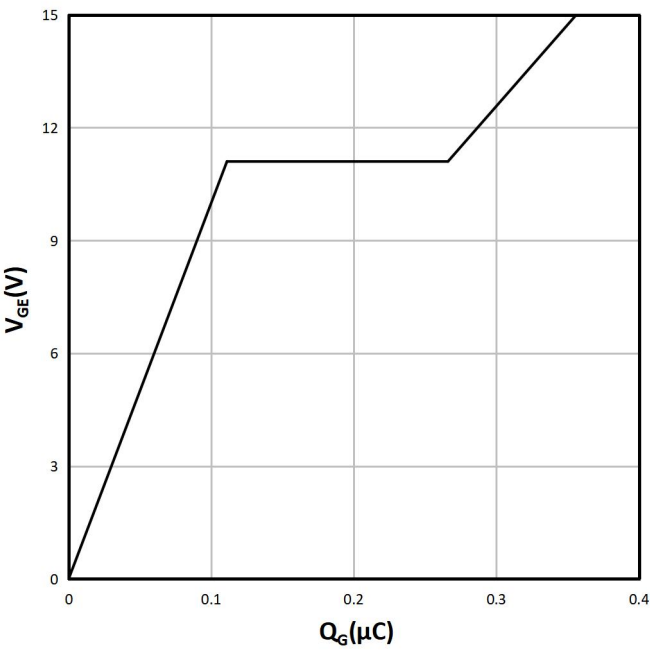


Figure7. switching losses IGBT, Inverter (typical)

$V_{CC}=400V$ ,  $R_{gon}=25\Omega$ ,  $R_{goff}=50\Omega$ ,  $V_{ge}=15V/-5V$

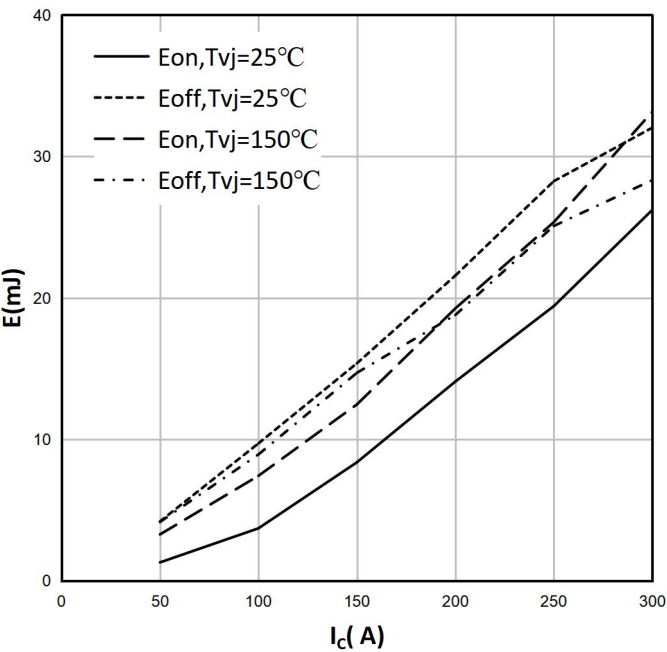
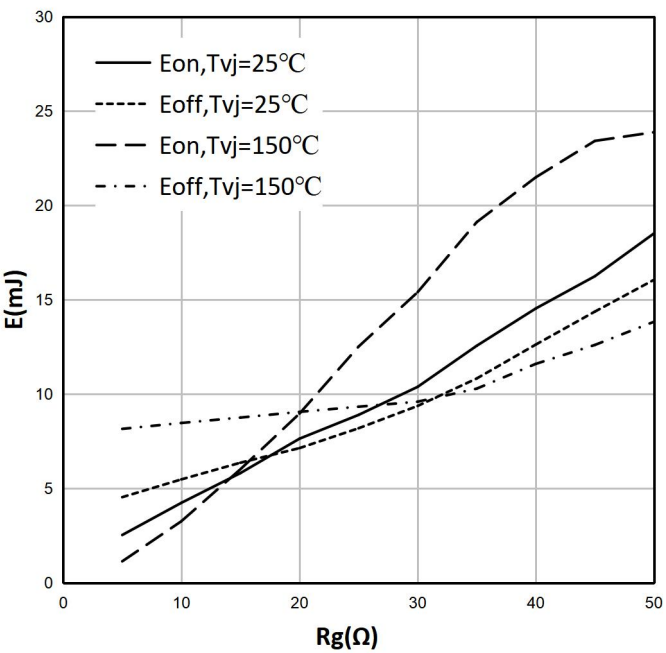


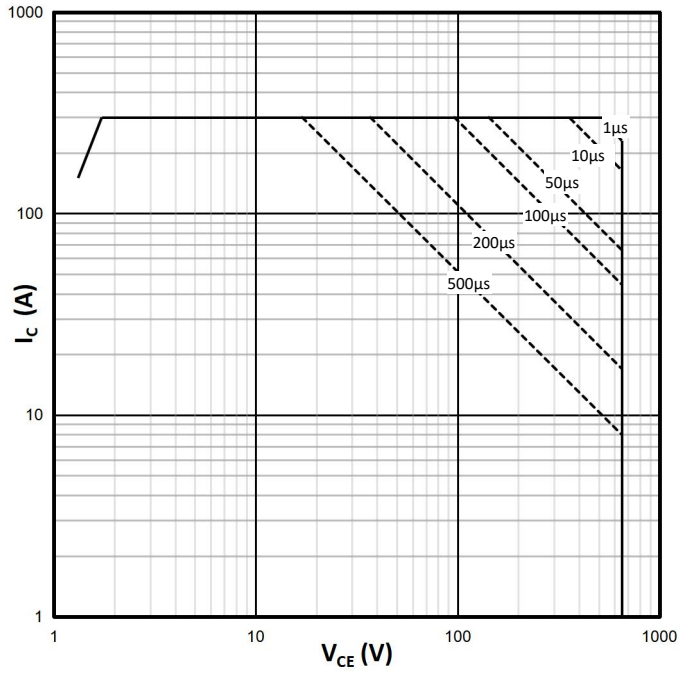
Figure8. switching losses IGBT, Inverter (typical)

$V_{CC}=400V$ ,  $I_C=150A$ ,  $V_{ge}=15V/-5V$

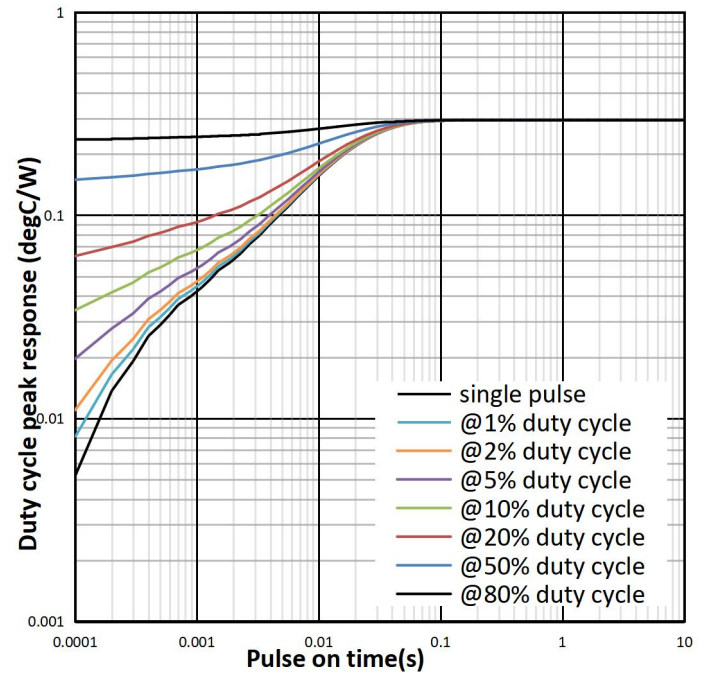


**Figure9. FBSOA**

$D=0$ ,  $T_c=25^{\circ}\text{C}$ ,  $T_j\leq 175^{\circ}\text{C}$ ,  $V_{ge}=15\text{V}$

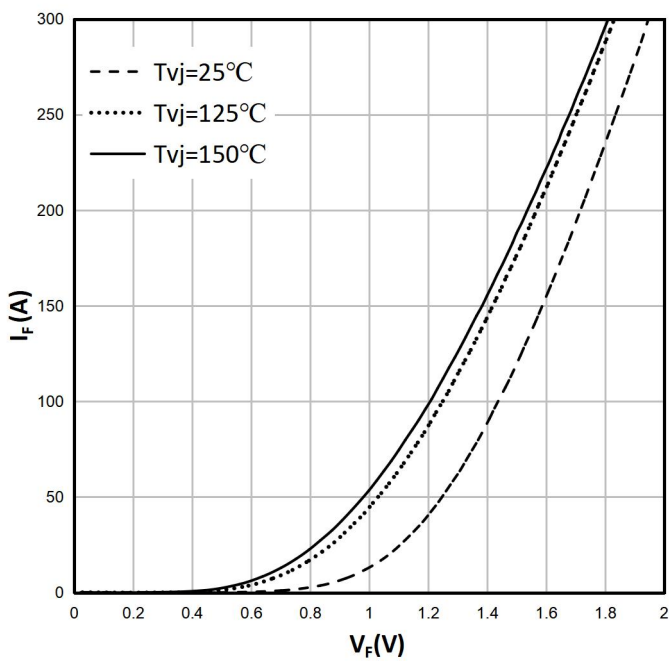


**Figure10. transient thermal impedance**



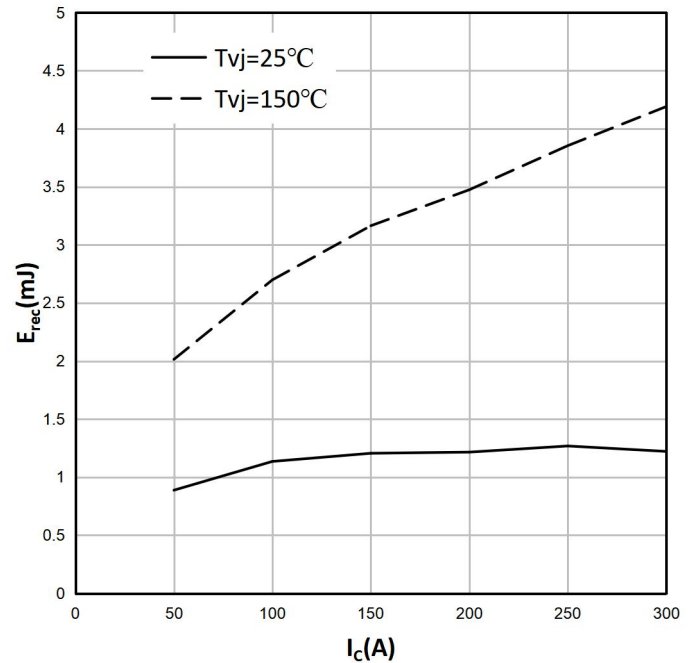
**Figure11. forward characteristic of Diode, Inverter(typical)**

$V_{GE}=0\text{V}$



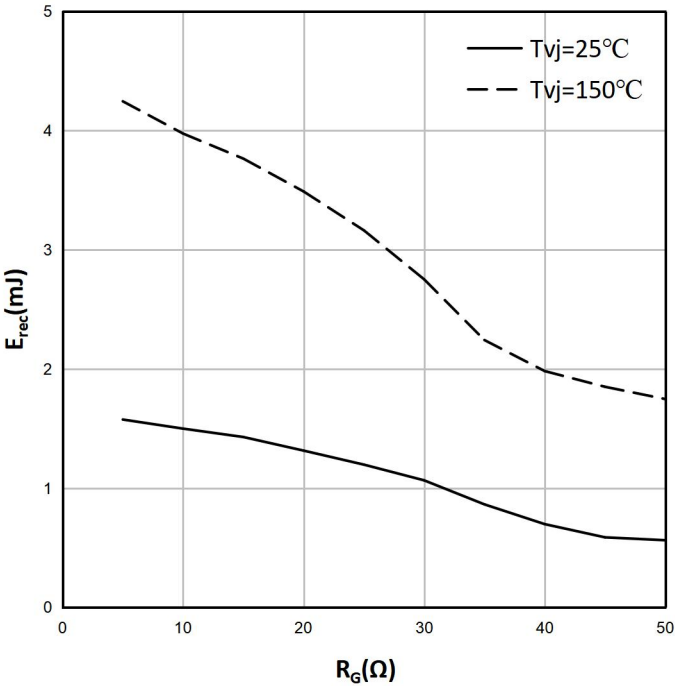
**Figure12.Reverse Recovery Energy Loss vs. IC**

$V_{cc}=400\text{V}$ ,  $R_g=25\Omega$ ,  $V_{ge}=15\text{V/-5V}$

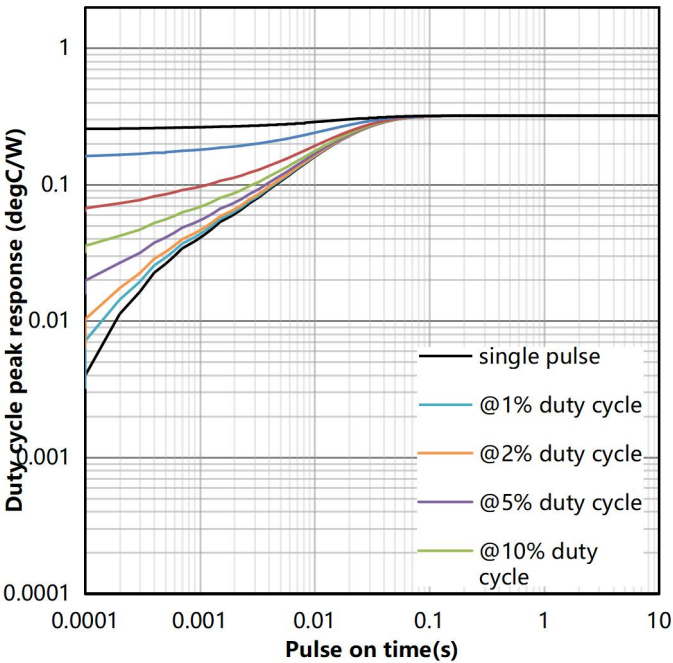




**Figure13.Reverse Recovery Energy Loss vs.vs. R<sub>G</sub>**  
V<sub>cc</sub>=400V, I<sub>C</sub>=150A, V<sub>ge</sub>=15V/-5V

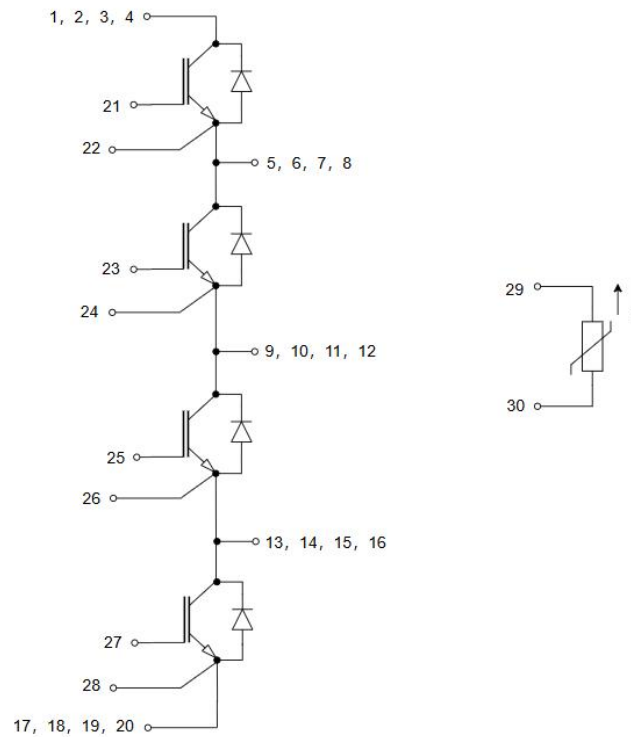


**Figure14. transient thermal impedance-FRD**



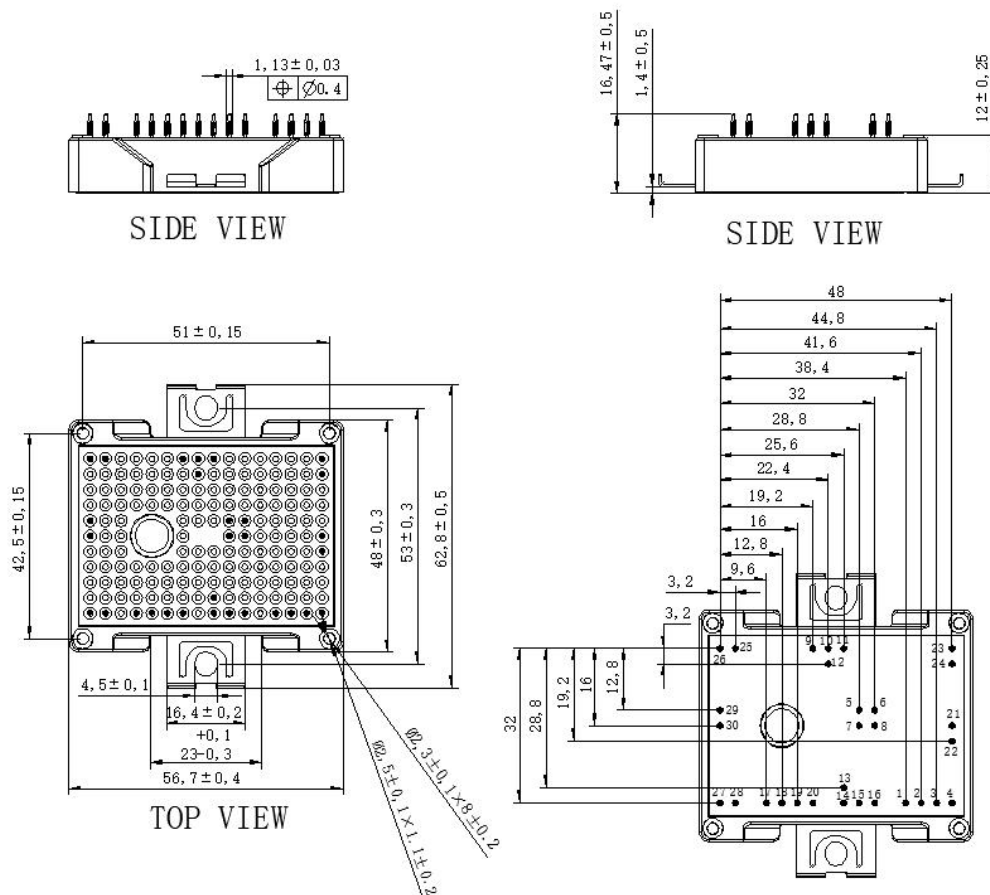


### CIRCUIT DIAGRAM



## PACKAGE DIMENSION

### Dimensions in Millimeters





REVISION HISTORY

| Document version | Date of release | Description of changes |
|------------------|-----------------|------------------------|
| Rev.00           | 2025-02-14      | Preview                |



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