# JLCD75B120RE1E7SN

LE1 PACK module with Trench/Fieldstop IGBT and Emitter Controlled diode and NTC

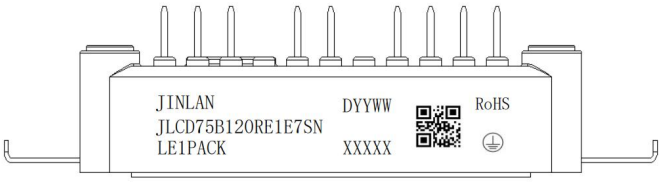
RoHS

## Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- $Al_2O_3$ substrate with low thermal resistance
- Solder Contact Technology

**LE1 Pack**

## MARKING DIAGRAM

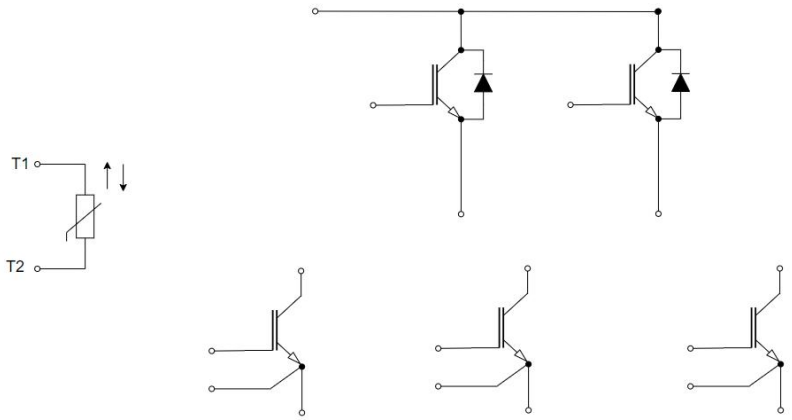



| | |
|---|---|
| JINLAN | = Company Name |
| JLCD75B120RE1E7SN | = Specific Device Code |
| YYWW | = Year and Work Week Code |
| XXXXX | = Serial Number |
| QR code | = Custom Assembly |

## Typical Applications

- Air Conditioning
- Motor Drives
- Servo Drives
- UPS Systems
- Auxiliary inverters

## Description



## Package Insulation coordination

| Parameter | Symbol | Note or test condition | Values | Unit |
|---|---|---|---|---|
| Isolation test voltage | $V_{ISOL}$ | RMS,f = 50Hz,t =60 s | 2.5 | kV |
| Internal isolation | | basic insulation(class 1,IEC 61140) | $Al_2O_3$ | |
| Creepage distance | $d_{creep}$ | terminal to heatsink | 11.5 | mm |
| Creepage distance | $d_{creep}$ | terminal to terminal | 6.3 | mm |
| Clearance | $d_{clear}$ | terminal to heatsink | 10 | mm |
| Clearance | $d_{clear}$ | terminal to terminal | 5 | mm |
| Comparative tracking index (electrical) | CTI | | >200 | |
| RTI Elec. | RTI | housing | 140 | ℃ |

## Package Characteristic values

| Parameter | Symbol | Note or test condition | | Values | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| Stray Inductance | $L_{CE}$ | | | -- | 25 | -- | nH |
| Module Lead Resistance, Terminal to Chip | $R_{CC'+EE'}$ | | | -- | 4.5 | -- | mΩ |
| Storage temperature | $T_{stg}$ | | | -40 | -- | 125 | ℃ |
| Mounting torque for module mounting | M | -Mounting according to valid application note | M5, Screw | 40 | -- | 80 | Nm |
| Weight | G | | | -- | 24 | -- | g |

# IGBT(T1,T2)

## Absolute Maximum Ratings ($T_c$ = 25°C unless otherwise noted)

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | 1200 | V |
| $V_{GES}$ | Gate-Emitter Voltage | ±30 | V |
| $I_C$ | Collector Current @ $T_C$=25℃ | 150 | A |
| | Collector Current @ $T_C$=100℃ | 75 | A |
| $I_{CM}$ | Pulsed Collector Current，$t_p$ limited by $T_{vj\,max}$ | 225 | A |
| $P_{tot}$ | Total power dissipation,$T_c$ = 25 °C , $T_{vjmax}$ = 175°C | 355 | W |

## Characteristics （$T_c$=25℃ unless otherwise noted）

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CE(sat)}$ | Collector−Emitter Saturation Voltage | $V_{GE}$ = 15 V, IC = 75 A, $T_{vj}$ = 25°C | -- | 1.65 | 2.50 | V |
| | | $V_{GE}$ = 15 V, IC = 75 A, $T_{vj}$ = 125°C | -- | 1.75 | -- | |
| | | $V_{GE}$ = 15 V, IC = 75 A, $T_{vj}$ = 150°C | -- | 1.85 | -- | |
| $V_{GE(TH)}$ | Gate−Emitter Threshold Voltage | $I_C$ = 3 mA,$V_{CE}$ = $V_{GE}$ | 5.0 | 6.0 | 7.0 | V |
| $I_{CES}$ | Collector−Emitter Cutoff Current | $V_{GE}$ = 0 V, $V_{CE}$ = 1200V | -- | -- | 100 | μA |
| $I_{GES}$ | Gate-Emitter Leakage Current | $V_{GE}$ = ±30 V, $V_{CE}$ = 0 V | -- | -- | 200 | nA |
| $R_{Gint}$ | Internal Gate Resistance | f = 1MHz | -- | 0.5 | -- | Ω |
| $C_{ies}$ | Input Capacitance | $V_{CE}$ = 25V,$V_{GE}$ = 0V, f = 1MHz | -- | 7.7 | -- | nF |
| $C_{res}$ | Reverse Transfer | | -- | 0.04 | -- | nF |
| $Q_G$ | Gate Charge | $V_{CE}$ = 600 V, $I_C$ = 75 A $V_{GE}$ = ±15 V | -- | 0.36 | -- | μC |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CC}$ = 600 V, $I_C$ = 75 A $R_{Gon}$ =10 Ω,$R_{Goff}$ = 15 Ω $V_{GE}$ = ±15 V Inductive Load $T_{vj}$ = 25 °C | -- | 90 | -- | ns |
| $t_r$ | Rise Time | | -- | 61 | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | -- | 304 | -- | |
| $t_f$ | Fall Time | | -- | 45 | -- | |
| $E_{on}$ | Turn−On Switching Loss per Pulse | | -- | 4.17 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | -- | 2.1 | -- | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CC}$ = 600 V, $I_C$ = 75 A $R_{Gon}$ =10 Ω,$R_{Goff}$ = 15 Ω $V_{GE}$ = ±15V Inductive Load $T_{vj}$ = 125 °C | -- | TBD | -- | ns |
| $t_r$ | Rise Time | | -- | TBD | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | -- | TBD | -- | |
| $t_f$ | Fall Time | | -- | TBD | -- | |
| $E_{on}$ | Turn−On Switching Loss per Pulse | | -- | TBD | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | -- | TBD | -- | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CC}$ = 600 V, $I_C$ = 75 A $R_{Gon}$ =10 Ω,$R_{Goff}$ = 15 Ω $V_{GE}$ = ±15V Inductive Load $T_{vj}$ = 175 °C | -- | TBD | -- | ns |
| tr | Rise Time | | -- | TBD | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | -- | TBD | -- | |
| $t_f$ | Fall Time | | -- | TBD | -- | |
| $E_{on}$ | Turn−on Switching Loss per Pulse | | -- | 5.86 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | -- | 2.90 | -- | |
| $I_{c(sc)}$ | SC Data | $t_P$ ≤ 10 μs,$V_{GE}$ ≤ 15 V $T_{vj}$ ≤ 150 ℃,$V_{CC}$ = 800 V $V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$·di/dt | -- | 330 | -- | A |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per IGBT) | | 0.31 | | 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. For detailed specifications please refer to AN 2018-14.

## Diode(D1,D2)

### Absolute Maximum Ratings (Tc = 25°C unless otherwise noted)

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1200 | V |
| $I_F$ | Diode Continuous Forward Current | 75 | A |
| $I_{FM}$ | Diode Maximum Forward Current $t_p$=1ms | 225 | A |

### Characteristics （Tc=25℃ unless otherwise noted）

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | Diode Forward Voltage | $I_F$ = 75 A, $V_{GE}$ = 0 V， $T_{vj}$ = 25°C | -- | 2.10 | 2.90 | V |
| | | $I_F$ = 75 A, $V_{GE}$=0 V， $T_{vj}$ =125°C | -- | 1.90 | -- | |
| | | $I_F$ = 75A, $V_{GE}$ = 0 V， $T_{vj}$ = 175°C | -- | 1.80 | -- | |
| $Q_r$ | Recovered Charge | $V_R$ = 600 V,$I_F$ = 75 A<br>$V_{GE}$ = -15 V<br>$T_{vj}$ =25 °C | -- | 1.24 | -- | µC |
| $I_{RM}$ | Peak Reverse Recovery Current | | -- | 27 | -- | A |
| $T_{rr}$ | Reverse Recovery Time | | -- | 175 | -- | ns |
| $E_{rec}$ | Reverse Recovery Energy | | -- | 1.23 | -- | mJ |
| $Q_r$ | Recovered Charge | $V_R$ = 600 V,$I_F$ = 75 A<br>$V_{GE}$ = -15 V<br>$T_{vj}$ =125 °C | -- | TBD | -- | µC |
| $I_{RM}$ | Peak Reverse Recovery Current | | -- | TBD | -- | A |
| $T_{rr}$ | Reverse Recovery Time | | -- | TBD | -- | ns |
| $E_{rec}$ | Reverse Recovery Energy | | -- | TBD | -- | mJ |
| $Q_r$ | Recovered Charge | $V_R$ = 600 V,$I_F$ = 75 A<br>$V_{GE}$ = -15 V<br>$T_{vj}$ =175 °C | -- | 4.25 | -- | µC |
| $I_{RM}$ | Peak Reverse Recovery Current | | -- | 43 | -- | A |
| $T_{rr}$ | Reverse Recovery Time | | -- | 270 | -- | ns |
| $E_{rec}$ | Reverse Recovery Energy | | -- | 1.73 | -- | mJ |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per diode) | -- | 0.59 | -- | 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. For detailed specifications please refer to AN 2018-14.

# IGBT(T3,T4,T5)

## Absolute Maximum Ratings ($T_c$ = 25°C unless otherwise noted)

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | 1200 | V |
| $V_{GES}$ | Gate-Emitter Voltage | ±30 | V |
| $I_{CDC}$ | Collector Current @ $T_C$=25℃ | 70 | A |
| | Collector Current @ $T_C$=100℃ | 35 | A |
| $I_{CM}$ | Pulsed Collector Current，$t_p$ limited by $T_{vj\,max}$ | 70 | A |
| $P_D$ | Power Dissipation @ $T_C$ = 25°C | 258 | W |
| | Power Dissipation @$T_C$ = 100 °C | 129 | W |

## Characteristics （$T_c$=25℃ unless otherwise noted）

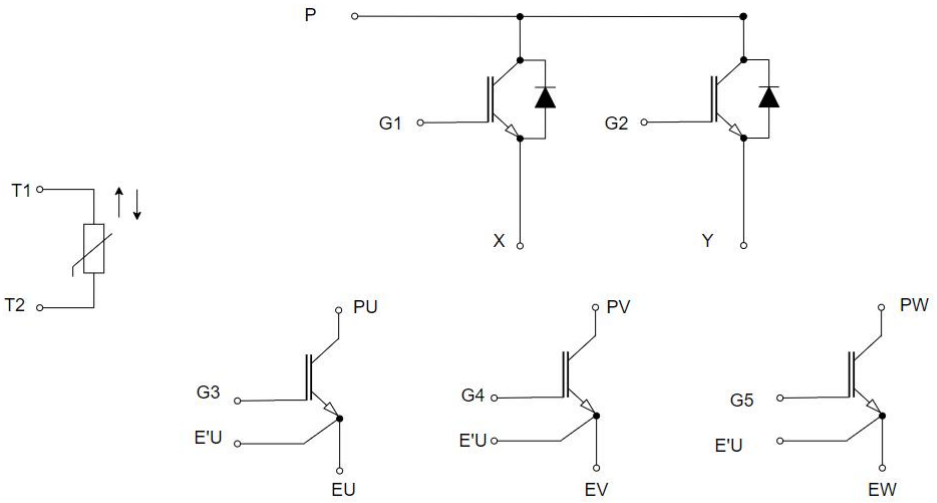
| Symbol | Parameter | Test Condition | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CE(sat)}$ | Collector−Emitter Saturation Voltage | $I_C$ = 35A, $V_{GE}$ = 15V | $T_{vj}$ = 25 °C | -- | 1.50 | 2.10 | V |
| | | | $T_{vj}$ = 175 °C | -- | 1.75 | -- | |
| $V_{GE(TH)}$ | Gate−Emitter Threshold Voltage | $I_C$ = 1 mA,$V_{CE}$ = $V_{GE}$ | | 5.0 | 6.0 | 7.0 | V |
| $I_{CES}$ | Collector−Emitter Cutoff Current | $V_{GE}$ = 0 V, $V_{CE}$ = 1200V | | -- | -- | 10 | μA |
| $I_{GES}$ | Gate-Emitter Leakage Current | $V_{GE}$ = ±30 V, $V_{CE}$ = 0 V | | -- | -- | 200 | nA |
| $R_{Gint}$ | Internal Gate Resistance | f = 1MHz | | -- | 0.6 | -- | Ω |
| $C_{ies}$ | Input Capacitance | $V_{CE}$ = 25V,$V_{GE}$ = 0V, f = 1MHz | | -- | 4.203 | -- | nF |
| $C_{res}$ | Reverse Transfer | | | -- | 0.024 | -- | nF |
| $Q_G$ | Gate Charge | $V_{CE}$ = 600 V, $I_C$ = 50 A $V_{GE}$ = ±15 V | | -- | 0.147 | -- | μC |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CC}$ = 600 V, $I_C$ = 35 A $R_{Gon}$ =10 Ω,$R_{Goff}$ = 15 Ω $V_{GE}$ = ±15 V Inductive Load $T_{vj}$ = 25 °C | | -- | 71 | -- | ns |
| $t_r$ | Rise Time | | | -- | 53 | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | | -- | 261 | -- | |
| $t_f$ | Fall Time | | | -- | 66.3 | -- | |
| $E_{on}$ | Turn−On Switching Loss per Pulse | | | -- | 2.34 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | | -- | 1.44 | -- | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CC}$ = 600 V, $I_C$ = 75 A $R_{Gon}$ =10 Ω,$R_{Goff}$ = 15 Ω $V_{GE}$ = ±15V Inductive Load $T_{vj}$ = 125 °C | | -- | TBD | -- | ns |
| $t_r$ | Rise Time | | | -- | TBD | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | | -- | TBD | -- | |
| $t_f$ | Fall Time | | | -- | TBD | -- | |
| $E_{on}$ | Turn−On Switching Loss per Pulse | | | -- | TBD | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | | -- | TBD | -- | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CC}$ = 600 V, $I_C$ = 75 A $R_{Gon}$ =10 Ω,$R_{Goff}$ = 15 Ω $V_{GE}$ = ±15V Inductive Load $T_{vj}$ = 175 °C | | -- | TBD | -- | ns |
| tr | Rise Time | | | -- | TBD | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | | -- | TBD | -- | |
| $t_f$ | Fall Time | | | -- | TBD | -- | |
| $E_{on}$ | Turn−on Switching Loss per Pulse | | | -- | 3.64 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | | -- | 2.00 | -- | |
| $I_{c(sc)}$ | SC Data | $t_P$ ≤ 10 μs,$V_{GE}$ ≤ 15 V $T_{vj}$ ≤ 150 °C,$V_{CC}$ = 800 V $V_{CEmax}$ = $V_{CES}$ -$L_{sCE}$·di/dt | | -- | 135 | -- | A |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per IGBT) | | | 0.50 | | K/W |
| $T_{vj\,op}$ | | Temperature under switching conditions | | -40 | | 175[1)] | °C |

[3)] $T_{vj\,op}$ > 150°C is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

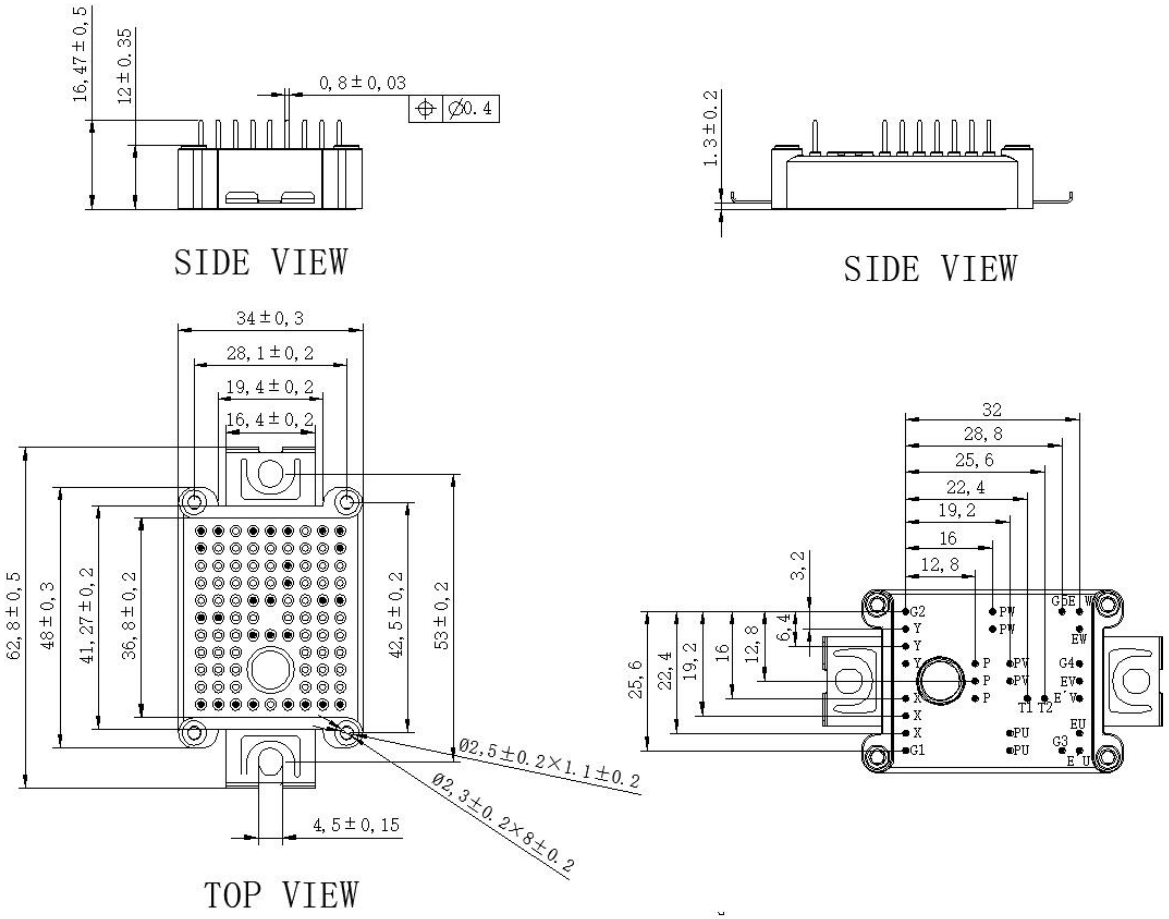
## NTC Characteristics (Tc = 25°C unless otherwise noted)

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

## CIRCUIT DIAGRAM




## PACKAGE DIMENSION



## REVISION HISTORY

| Document version | Date of release | Description of changes |
|---|---|---|
| Rev.00 | 2024-09-24 | Preview |

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