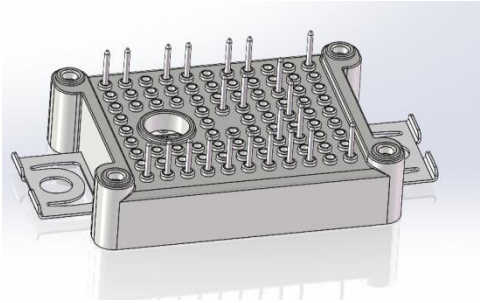
# JLPI30B65RE1E7SN

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

RoHS

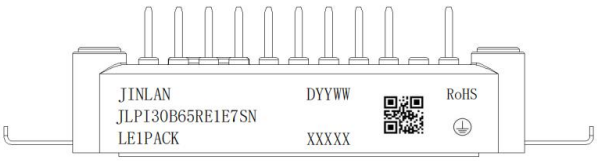
## Features

- Low $V_{CE(sat)}$ Trench IGBT technology
- 5μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Maximum junction temperature 175℃
- Low inductance case
- $Al_2O_3$ substrate with low thermal resistance
- Solder Contact Technology
- Rugged mounting due to integrated mounting clamps



**LE1 Pack**

## MARKING DIAGRAM

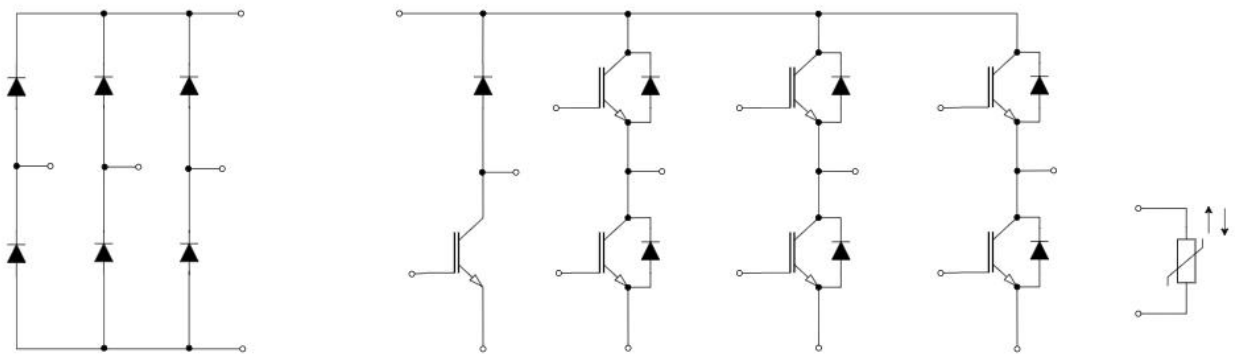



## Typical Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

| | |
|---|---|
| JINLAN | = Company Name |
| JLPI30B65RE1E7SN | = Specific Device Code |
| YYWW | = 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=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 |
| 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 | $L_{CE}$ | | -- | 30 | -- | nH |
| Storage Temperature Range | $T_{STG}$ | | -40 | | 125 | ℃ |
| Mountig force per clamp | F | | 20 | -- | 50 | N |
| Weight | G | | -- | 24 | -- | g |

# IGBT, Inverter

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

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | 650 | V |
| $V_{GES}$ | Gate-Emitter Voltage | ±20 | V |
| $I_C$ | Collector Current @ $T_C$=25℃ | 55 | A |
| | Collector Current @ $T_C$=100℃ | 30 | A |
| $I_{CM}$ | Pulsed Collector Current，$t_p$ limited by $T_{vj\,max}$ | 60 | A |

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

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CE(sat)}$ | Collector−Emitter Saturation Voltage | $V_{GE}$ = 15 V, IC = 30 A, $T_{vj}$ = 25°C | -- | 1.35 | 1.90 | V |
| | | $V_{GE}$ = 15 V, IC = 30 A, $T_{vj}$ = 150°C | -- | 1.55 | -- | |
| $V_{GE(TH)}$ | Gate−Emitter Threshold Voltage | $V_{GE}$ = $V_{CE}$ , IC = 1mA,$T_{vj}$ = 25°C | 4.50 | 5.25 | 6.00 | V |
| $I_{CES}$ | Collector−Emitter Cutoff Current | $V_{GE}$ = 0 V, $V_{CE}$ =$V_{CES}$ ,$T_{vj}$ = 25°C | -- | -- | 100 | μA |
| $I_{GES}$ | Gate-Emitter Leakage Current | $V_{GE}$ = $V_{GES}$ , $V_{CE}$ = 0 V， $T_{vj}$ = 25°C | -- | -- | 200 | nA |
| $R_{Gint}$ | Internal Gate Resistance | f=1MHz | -- | 1.0 | -- | Ω |
| $C_{ies}$ | Input Capacitance | $V_{CE}$=25V,f=1MHz, $V_{GE}$=0V | -- | 2200 | -- | pF |
| $C_{oes}$ | Output Capacitance | | -- | 71 | -- | pF |
| $C_{res}$ | Reverse Transfer | | -- | 17 | -- | pF |
| $Q_G$ | Gate Charge | $V_{CC}$=480V, $V_{GE}$= 15V, $I_C$=30A | -- | 82 | -- | nC |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CE}$ =400 V, $I_C$ = 30A $R_{G(on)}$ = 25Ω,$R_{G(off)}$=25Ω $V_{GE}$ =±15V Inductive Load $T_{vj}$ = 25°C | -- | 45 | -- | ns |
| $t_r$ | Rise Time | | -- | 16 | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | -- | 133 | -- | |
| $t_f$ | Fall Time | | -- | 15 | -- | |
| $E_{on}$ | Turn−On Switching Loss per Pulse | | -- | 0.80 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | -- | 0.32 | -- | |
| $E_{ts}$ | Total Switching Loss | | -- | 1.12 | -- | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CE}$=400 V, $I_C$ = 30A $R_{G(on)}$ = 25Ω,$R_{G(off)}$=25Ω $V_{GE}$ =±15V Inductive Load $T_{vj}$ = 150°C | -- | TBD | -- | ns |
| $t_r$ | Rise Time | | -- | TBD | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | -- | TBD | -- | |
| tf | Fall Time | | -- | TBD | -- | |
| $E_{on}$ | Turn−on Switching Loss per Pulse | | -- | 1.04 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | -- | 0.58 | -- | |
| $E_{ts}$ | Total Switching Loss | | -- | 1.62 | -- | |
| $I_{SC}$ | SC Data | $t_{SC}$≤5μs,$V_{GE}$ =15V, $T_{vj}$ =150℃,$V_{CC}$=400V | -- | 135 | -- | A |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per IGBT) | | TBD | | K/W |
| $T_{vj\,op}$ | | Temperature under switching conditions | -40 | | 175[1)] | ℃ |

[1)] $T_{vj\,op}$ > 150℃ is only allowed for operation at overload conditions.

## Diode, Inverter

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

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 650 | V |
| $I_F$ | Diode Continuous Forward Current | 30 | A |
| $I_{FM}$ | Diode Maximum Forward Current $t_p$=1ms | 60 | A |

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

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | Diode Forward Voltage | $I_F$ =30A, $V_{GE}$=0V， $T_{vj}$ = 25°C | -- | 1.5 | 2.2 | V |
| | | $I_F$ = 30A, $V_{GE}$=0V， $T_{vj}$ = 150°C | -- | 1.4 | -- | |
| Qr | Recovered Charge | $V_{CC}$ = 400 V, $I_C$ = 30 A<br>$R_{Gon}$ = 25Ω,$R_{Goff}$ = 25Ω<br>$V_{GE}$ =±15V<br>Inductive Load<br>$T_{vj}$ = 25°C | -- | 0.78 | -- | μC |
| IRM | Peak Reverse Recovery Current | | -- | 15 | -- | A |
| Trr | Reverse Recovery Time | | -- | 100 | -- | ns |
| $E_{rec}$ | Reverse Recovery Energy | | -- | 0.18 | -- | mJ |
| Qr | Recovered Charge | $V_{CC}$ = 400 V, $I_C$ = 30 A<br>$R_{Gon}$ = 25Ω,$R_{Goff}$ = 25Ω<br>$V_{GE}$ =±15V<br>Inductive Load<br>$T_{vj}$ = 150°C | -- | 1.75 | -- | μC |
| IRM | Peak Reverse Recovery Current | | -- | 25 | -- | A |
| Trr | Reverse Recovery Time | | -- | 140 | -- | ns |
| $E_{rec}$ | Reverse Recovery Energy | | -- | 0.22 | -- | mJ |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per diode) | -- | TBD | -- | K/W |
| $T_{vj\ op}$ | | Temperature under switching conditions | -40 | | 175[2)] | ℃ |

[2)] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions.

## Diode, Rectifier

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

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 1600 | V |
| $I_F$ | Diode Continuous Forward Current | 30 | A |
| $I_{FM}$ | Diode Maximum Forward Current $t_p$=1ms | 60 | A |

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

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | Diode Forward Voltage | $I_F$ =30A, $T_j$ = 150 °C | -- | 1.2 | -- | V |
| $I_R$ | Reverse Current | $T_j$=150 °C, $V_R$=1600V | -- | 1 | -- | mA |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per diode) | -- | TBD | -- | K/W |
| $T_{vj\ op}$ | | Temperature under switching conditions | -40 | | 175[3)] | ℃ |

[3)] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions.

# IGBT, Chopper

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

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | 650 | V |
| $V_{GES}$ | Gate-Emitter Voltage | ±20 | V |
| $I_C$ | Collector Current @ $T_C$=25℃ | 55 | A |
| | Collector Current @ $T_C$=100℃ | 30 | A |
| $I_{CM}$ | Pulsed Collector Current，$t_p$ limited by $T_{vj\,max}$ | 60 | A |

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

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CE(sat)}$ | Collector−Emitter Saturation Voltage | $V_{GE}$ = 15 V, IC = 30 A, $T_{vj}$ = 25°C | -- | 1.35 | 1.90 | V |
| | | $V_{GE}$ = 15 V, IC = 30 A, $T_{vj}$ = 150°C | -- | 1.55 | -- | |
| $V_{GE(TH)}$ | Gate−Emitter Threshold Voltage | $V_{GE}$ = $V_{CE}$ , Ic = 1mA,$T_{vj}$ = 25°C | 4.50 | 5.25 | 6.00 | V |
| $I_{CES}$ | Collector−Emitter Cutoff Current | $V_{GE}$ = 0 V, $V_{CE}$ =$V_{CES}$ ,$T_{vj}$ = 25°C | -- | -- | 100 | μA |
| $I_{GES}$ | Gate-Emitter Leakage Current | $V_{GE}$ = $V_{GES}$ , $V_{CE}$ = 0 V， $T_{vj}$ = 25°C | -- | -- | 200 | nA |
| $R_{Gint}$ | Internal Gate Resistance | f=1MHz | -- | 1.0 | -- | Ω |
| $C_{ies}$ | Input Capacitance | $V_{CE}$=25V,f=1MHz, $V_{GE}$=0V | -- | 2200 | -- | pF |
| $C_{oes}$ | Output Capacitance | | -- | 71 | -- | pF |
| $C_{res}$ | Reverse Transfer | | -- | 17 | -- | pF |
| $Q_G$ | Gate Charge | $V_{CC}$=480V, $V_{GE}$= 15V, $I_C$=30A | -- | 82 | -- | nC |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CE}$ =400 V, $I_C$ = 30A $R_{G(on)}$ = 25Ω,$R_{G(off)}$=25Ω $V_{GE}$ =±15V Inductive Load $T_{vj}$ = 25°C | -- | 45 | -- | ns |
| $t_r$ | Rise Time | | -- | 16 | -- | |
| $t_{d(off)}$ | Turn−off Delay Time | | -- | 133 | -- | |
| $t_f$ | Fall Time | | -- | 15 | -- | |
| $E_{on}$ | Turn−On Switching Loss per Pulse | | -- | 0.80 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | -- | 0.32 | -- | |
| $E_{ts}$ | Total Switching Loss | | -- | 1.12 | -- | |
| $t_{d(on)}$ | Turn−On Delay Time | $V_{CE}$=400 V, $I_C$ = 30A $R_{G(on)}$ = 25Ω,$R_{G(off)}$=25Ω ,$V_{GE}$ =±15V Inductive Load $T_{vj}$ = 150°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 | | -- | 1.04 | -- | mJ |
| $E_{off}$ | Turn Off Switching Loss per Pulse | | -- | 0.58 | -- | |
| $E_{ts}$ | Total Switching Loss | | -- | 1.62 | -- | |
| $I_{SC}$ | SC Data | $t_{SC}$≤5μs,$V_{GE}$ =15V, $T_{vj}$ =150℃,$V_{CC}$=400V | -- | 135 | -- | A |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per IGBT) | | TBD | | K/W |
| $T_{vj\,op}$ | | Temperature under switching conditions | -40 | | 175[4)] | ℃ |

[4)] $T_{vj\,op}$ > 150℃ is only allowed for operation at overload conditions.

# Diode, Chopper

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

| Symbol | Description | Value | Unit |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 650 | V |
| $I_F$ | Diode Continuous Forward Current | 10 | A |
| $I_{FM}$ | Diode Maximum Forward Current $t_p$=1ms | 20 | A |

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

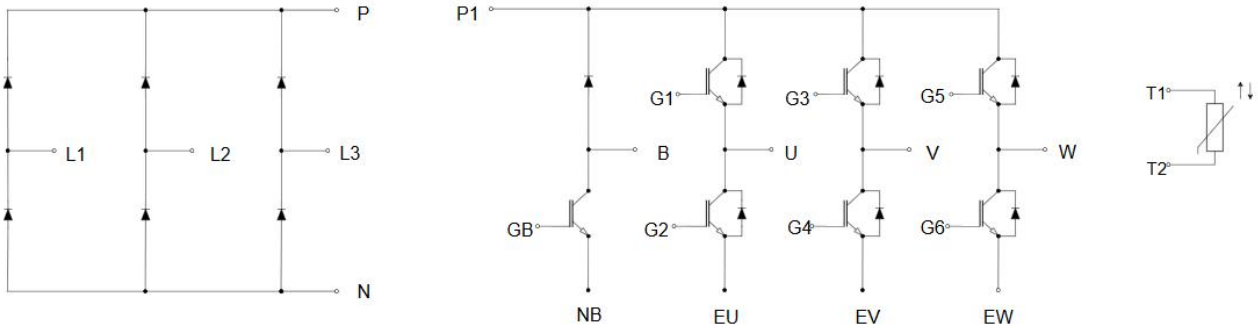
| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_F$ | Diode Forward Voltage | $I_F$ =10A, $V_{GE}$=0V, $T_{vj}$ = 25°C | -- | 1.4 | -- | V |
| | | $I_F$ = 10A, $V_{GE}$=0V, $T_{vj}$ = 150°C | -- | 1.3 | -- | |
| $Q_r$ | Recovered Charge | $V_R$ = 400 V, $I_F$ =10 A<br>$R_{G(on)}$ = 25Ω,$R_{G(off)}$ = 25Ω<br>$T_{vj}$ = 25°C | -- | 0.31 | -- | μC |
| $I_{RM}$ | Peak Reverse Recovery Current | | -- | 12.5 | -- | A |
| $T_{rr}$ | Reverse Recovery Time | | -- | 50 | -- | ns |
| $E_{rec}$ | Reverse Recovery Energy | | -- | 0.09 | -- | mJ |
| $Q_r$ | Recovered Charge | $V_R$ = 400 V, $I_F$ =10 A<br>$R_{G(on)}$ = 25Ω,$R_{G(off)}$ = 25Ω<br>$T_{vj}$ = 150°C | -- | 0.61 | -- | μC |
| $I_{RM}$ | Peak Reverse Recovery Current | | -- | 17.5 | -- | A |
| $T_{rr}$ | Reverse Recovery Time | | -- | 70 | -- | ns |
| $E_{rec}$ | Reverse Recovery Energy | | -- | 0.11 | -- | mJ |
| $R_{thJC}$ | Thermal resistance | Junction-to-Case (per diode) | | TBD | | K/W |
| $T_{vj\ op}$ | | Temperature under switching conditions | -40 | | 175[5)] | ℃ |

[5)] $T_{vj\ op}$ > 150℃ is only allowed for operation at overload conditions.

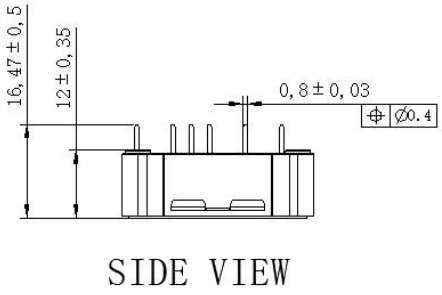
## NTC Characteristics (Tc = 25°C unless otherwise noted)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $R_{25}$ | Rated Resistance | | -- | 5.0 | -- | kΩ |
| ΔR/R | Deviation of $R_{100}$ | $T_C$=100 ℃,$R_{100}$=493.3 Ω | -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 |

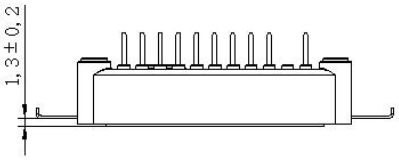
## CIRCUIT DIAGRAM



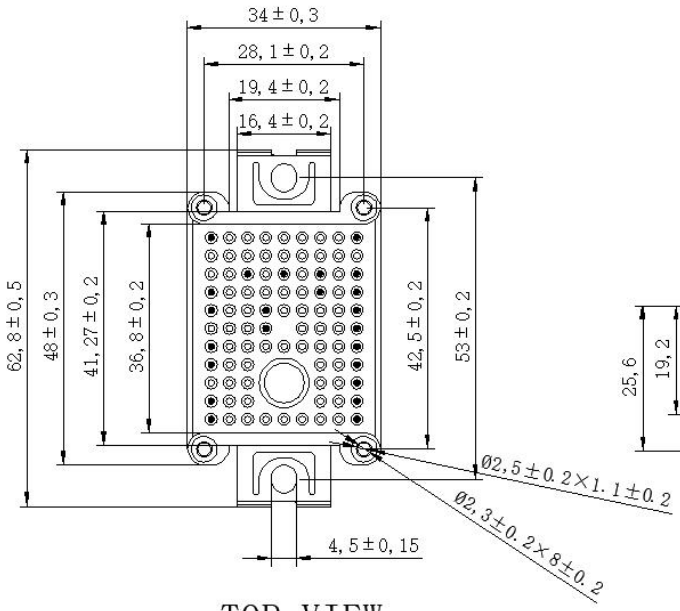

## PACKAGE DIMENSION



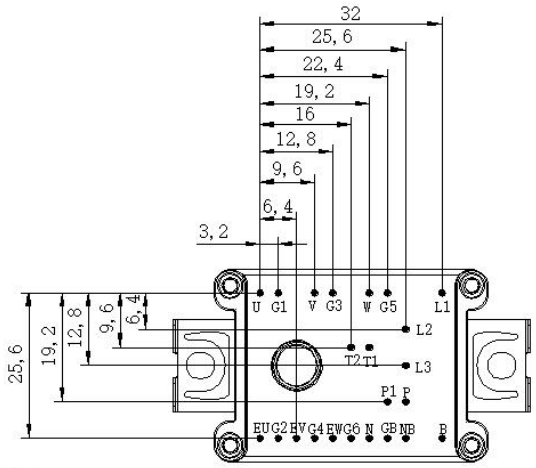

SIDE VIEW




SIDE VIEW




TOP VIEW



## REVISION HISTORY

| Document version | Date of release | Description of changes |
|---|---|---|
| Rev.00 | 2025-05-30 | Preview |

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