**LOCOSYS Technology Inc.**
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| Product name | Description | Version |
|---|---|---|
| MZ-1722-P | Multi-constellation dual-frequency GNSS module that can output raw data | 0.1 |


# 1 Introduction

LOCOSYS MZ-1722-P is a multi-constellation dual-frequency GNSS module that can output raw data for high precision location, such as RTK and PPK. The raw measurement and ephemeris data are transmitted with the standard RTCM3.X format that include GPS L1/L2, GLONASS L1/L2, BEIDOU L/L2 and QZSS L1/L2. It also provides autonomous position with NMEA format. The maximum update rate is 10Hz. Besides, built-in anti-jamming technology and rapid requisition make it the good solution for high precision application.

# 2 Features

- Support GPS, GLONASS, BEIDOU, and QZSS
- Support dual-frequency raw data
- Built-in anti-jamming technology
- Low signal strength, rapid acquisition
- Industrial operating temperature range -40 to +85°C
- RoHS compliant
- Small form factor 17 x 22.4 x 2.4 mm
- LOCOSYS IATF 16949 certified production sites.

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# 3 Applications

- Autonomous Vehicle Guidance
- Autonomous Vehicle (ex: AVN/T-BOX/HUD)
- Internet of Vehicles
- Unmanned Aerial Vehicles
- Precision Agriculture
- Hand-Held Device
- AGV Robotics
- V2V / V2X System
- Geographical measurement
- Geographical survey points
- Offshore / Marine Applications

# 4 System Block Diagram

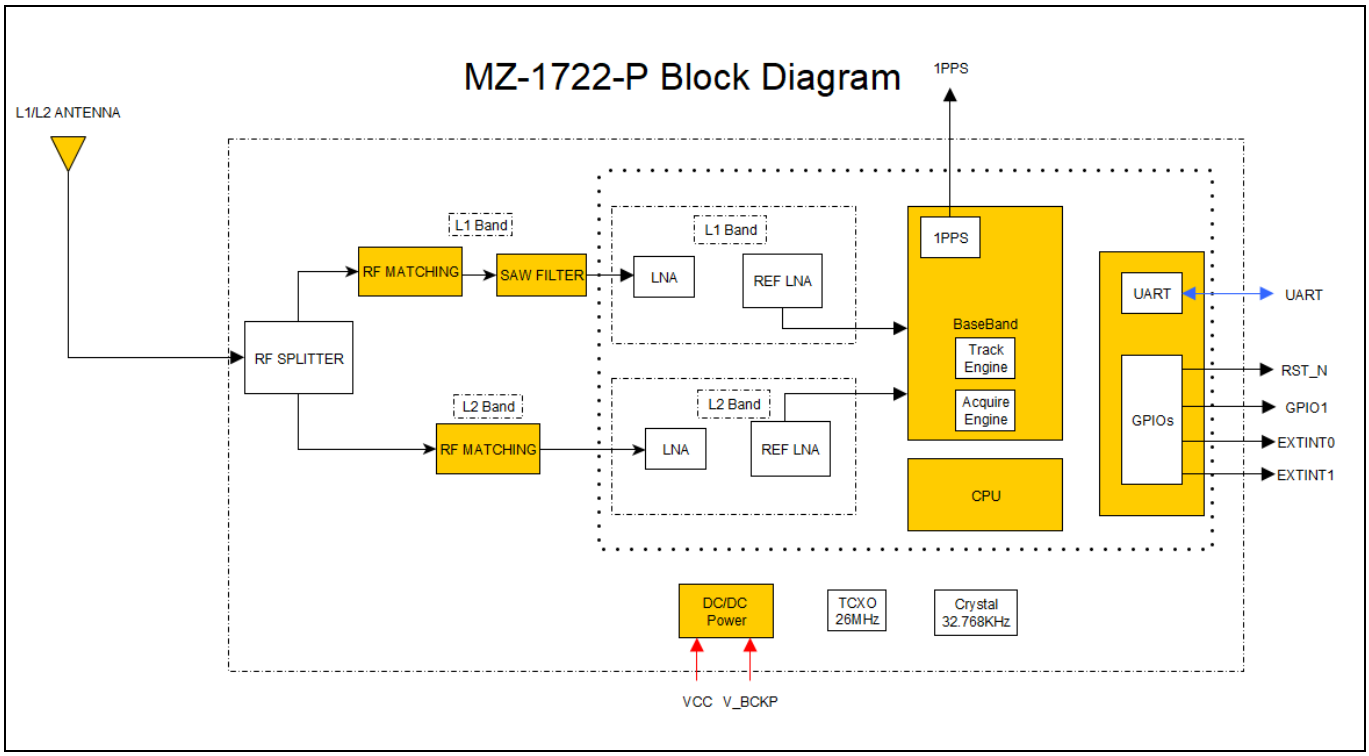


Fig 4-1 System block diagram.

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# 5 Performance

## 5.1 GNSS performance

| | | |
|---|---|---|
| Frequency | GPS/QZSS: L1 C/A , L2C<br>GLONASS: L1OF , L2OF<br>BEIDOU: B1I , B2I | |
| Channels | Support 64 channels | |
| Update rate | 1Hz (default), 2Hz , 5Hz or 10Hz | |
| Sensitivity (1) | Tracking | -155dBm |
| | Cold start | -140dBm |
| Acquisition Time | Cold Start | 32s (typical) |
| | Hot start | 2s (typical) |
| Position Accuracy | Autonomous | 2.5m CEP |
| Raw Measurement Data Precision (2) | Pseudo-range Observable Precision | GPS L1 ≤20cm, L2 ≤40cm<br>BDS B1 ≤20cm, B2 ≤20cm<br>GLONASS G1 ≤50cm, G2 ≤50cm |
| | Carrier Phase Observable Precision | GPS L1 ≤1mm, L2 ≤2mm<br>BDS B1 ≤1mm, B2 ≤1mm<br>GLONASS G1 ≤2mm, G2 ≤2mm |
| Max. Altitude | < 18,000 m | |
| Max. Velocity | < 515 m/s | |
| Dynamics | 4g | |
| Protocol Support | NMEA 0183 | 115200 bps , 8 data bits, no parity, 1 stop bits (default)<br>1Hz: GGA, GLL, GSA, GSV, RMC, VTG, GST<br>1Hz: $PLSVD |
| | Raw data | 115200 bps, RTCM V3.3, message type 1005, 1075, 1085, 1115, 1125, 1019, 1020, 1042, 1044 |

Note1: Demonstrated with a good external LNA.

Note2: CEP 50%, 24 hours static, -130dBm, > 6 SVs.

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# 6 Pin assignment and descriptions

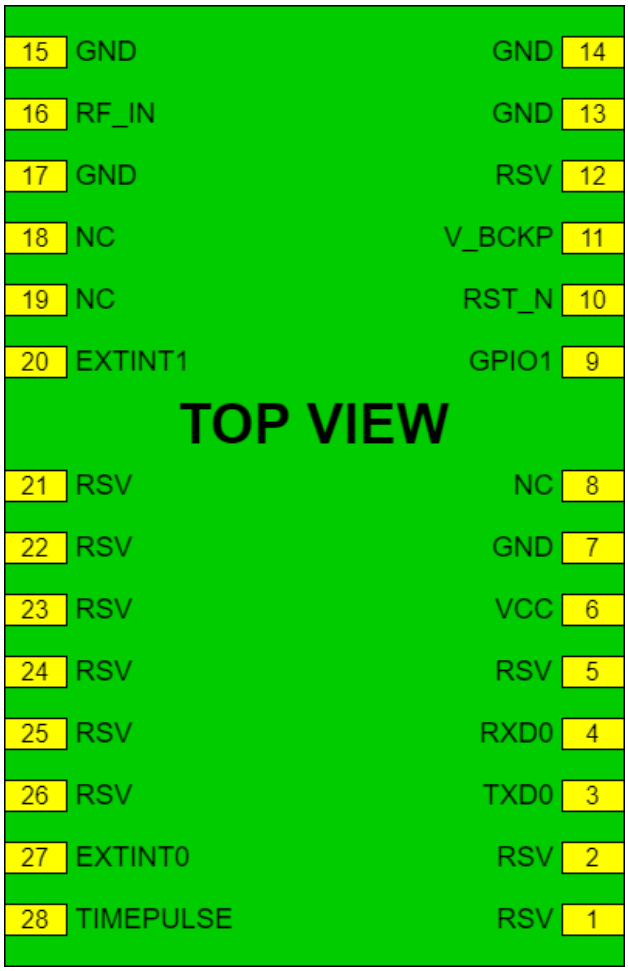


*Table 6-1 Pin descriptions*

| Pin # | Name | Type | Description | Note |
|---|---|---|---|---|
| 1 | RSV | | Reserved pin. Leave unconnected. | |
| 2 | RSV | | Reserved pin. Leave unconnected. | |
| 3 | TXD0 | O | UART, asynchronous output | |
| 4 | RXD0 | I | UART, asynchronous input | |
| 5 | RSV | | Reserved pin. Leave unconnected. | |
| 6 | VCC | P | Main power supply (3.0V~3.6V), | |
| 7 | GND | P | Ground | |
| 8 | NC | | Not connected | |
| 9 | GPIO1 | I/O | General GPIO signal. Leave unconnected if not used. | |
| 10 | RST_N | I | External reset, valid at low level. The pull-up resistor is internally arranged in the module. It is directly connected with the control signal output pin. Do not serially connect | |

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| | | | | |
|---|---|---|---|---|
| | | | the resistor. Leave unconnected if not used. | |
| 11 | V_BCKP | P | Backup battery supply voltage | |
| 12 | RSV | | Reserved pin. Leave unconnected. | |
| 13 | GND | P | Ground | |
| 14 | GND | P | Ground | |
| 15 | GND | P | Ground | |
| 16 | RF_IN | I | GNSS RF signal input | |
| 17 | GND | P | Ground | |
| 18 | NC | | Not connected | |
| 19 | NC | | Not connected | |
| 20 | EXTINT1 | I | External interrupt signal 1. Leave unconnected if not used. | |
| 21 | RSV | | Reserved pin. Leave unconnected. | |
| 22 | RSV | | Reserved pin. Leave unconnected. | |
| 23 | RSV | | Reserved pin. Leave unconnected. | |
| 24 | RSV | | Reserved pin. Leave unconnected. | |
| 25 | RSV | | Reserved pin. Leave unconnected. | |
| 26 | RSV | | Reserved pin. Leave unconnected. | |
| 27 | EXTINT0 | I | External interrupt signal 0, suspended if not in use. | |
| 28 | TIMEPULSE | O | Time pulse (1PPS, default 500 ms pulse/sec),(Typical 3.3V) | |

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# 7 DC & Temperature characteristics

## 7.1 Absolute maximum ratings

| Parameter | Symbol | Ratings | Units |
|---|---|---|---|
| Input Voltage | VCCabs | 3.6 | V |
| Input Backup Battery Voltage | V_BCKPabs | 3.6 | V |
| Operating Temperature Range | Topr_abs | -40 ~ 85 | ℃ |
| Storage Temperature Range | Tstg_abs | -40 ~ 85 | ℃ |

## 7.2 DC Electrical characteristics

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Input Voltage | VCC | | 3.0 | 3.3 | 3.6 | V |
| Input Backup Battery Voltage | V_BCKP | | 2.0 | | 3.6 | V |
| Supply Current | Iss | VCC = 3.3V,<br>w/o active antenna,<br>Peak<br>Tracking | | <br><br><br>115(1) | 130 | <br><br>mA<br>mA |
| Backup Battery Current | Ibat | VCC = 0V | | 66 | | uA |
| High Level Input Voltage | $V_{IH}$ | | 0.7*VCC | | | V |
| Low Level Input Voltage | $V_{IL}$ | | | | 0.2*VCC | V |
| High Level Output Voltage | $V_{OH}$ | | VCC-0.4 | | | V |
| Low Level Output Voltage | $V_{OL}$ | | | | 0.4 | V |

Note: Measured when position fix is available.

## 7.3 Temperature characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Operating Temperature | Topr | -40 | - | 85 | ℃ |
| Storage Temperature | Tstg | -40 | 25 | 85 | ℃ |

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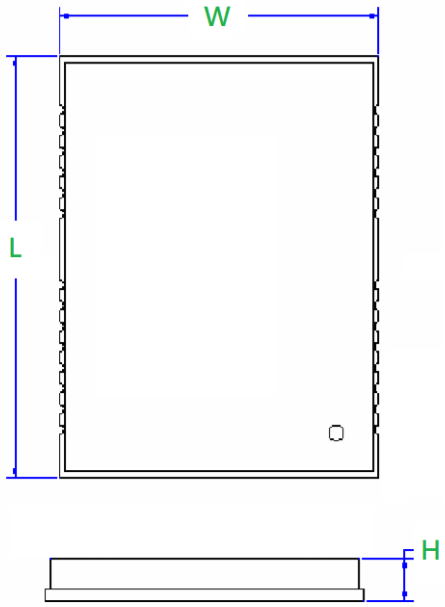
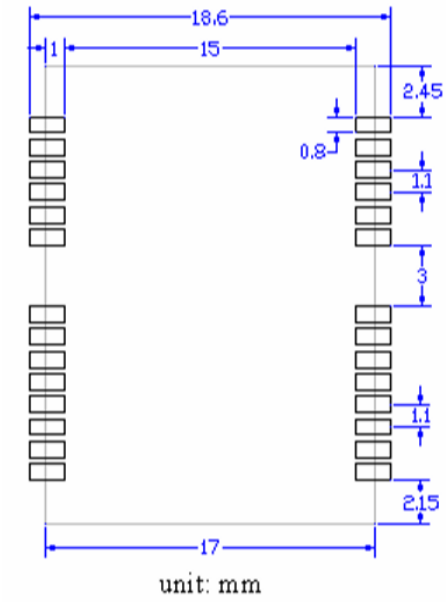
# 8 Outline dimensions




| Symbol | Min. (mm) | Typ. (mm) | Max. (mm) |
|---|---|---|---|
| W | 17.1 | 17.0 | 17.2 |
| L | 22.1 | 22.4 | 22.7 |
| H | 2.2 | 2.4 | 2.6 |

## 8.1 Recommended land pattern dimensions




Note: The recommended land pattern dimensions are shown for reference only, as actual pad layouts may vary depending on application.

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# 9 Design Considerations

To ensure that MZ-1722-P can work normally, pay attention to the following items:

- Provide VCC pin with a reliable power supply. The voltage should be monotonically increased when this power supply is powered on. The power-on time should not exceed 10ms. During the power-on process, there should be no step or groove; in addition, the level should be recovered to zero level after power-off.
- Ground all GND pins of the module.
- Connect RF_IN signal to the antenna, and keep the line impedance at 50 Ohms.
- Ensure that the serial port 0 is connected to PC or the external processor so that the user can receive the positioning information data using the serial port. The software can be also upgraded through the serial port.

To obtain good performance, pay special attention to the following items in the design:

(1) Power supply: It is necessary to use the stable and low ripple power supply to guarantee good performance. The voltage ripple peak shall not exceed 50mV.

- Suggest to use LDO to ensure the pure power supply;
- Place LDO near the module ;
- Widen the power line or transmit current through the copper coated surface of the segmentation layer;
- Prevent the power line from passing through the high-power and high-impedance devices, such as magnetic coil.

(2) UART interface: ensure that the signal and baud rate of the main device are consistent with MZ-1722-P module.

(3) Antenna interface: the antenna line shall be matched with the impedance, short, smooth e and no acute angle.

(4) Antenna: in order to guarantee better signal-to-noise ratio, ensure that the antenna is separated from the electromagnetic radiation source, especially electromagnetic radiation at the frequency band of 1559-1577MHz.

(5) For PCB layout, do not route below MZ-1722-P.

(6) This module is a temperature sensitive device. Rapid temperature change will cause its performance degradation. Keep away from the high temperature air and the high-power heating device in use as far as possible.

(7) If RST_N is required to be conducted for the external module, the driving current shall be more than 5mA.

(8) To avoid the damage to the module caused by static electricity, it is suggested that ESD protection device should be added between the module and the external antenna input port. Ensure the reliable antenna connection before using the module. Forbid hot plugging the antenna.

(9) This module does not support the antenna feed and detection functions. If the module is externally connected with the active antenna, the power supply shall be separately provided for the active antenna.

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# 10 Reel Packing information

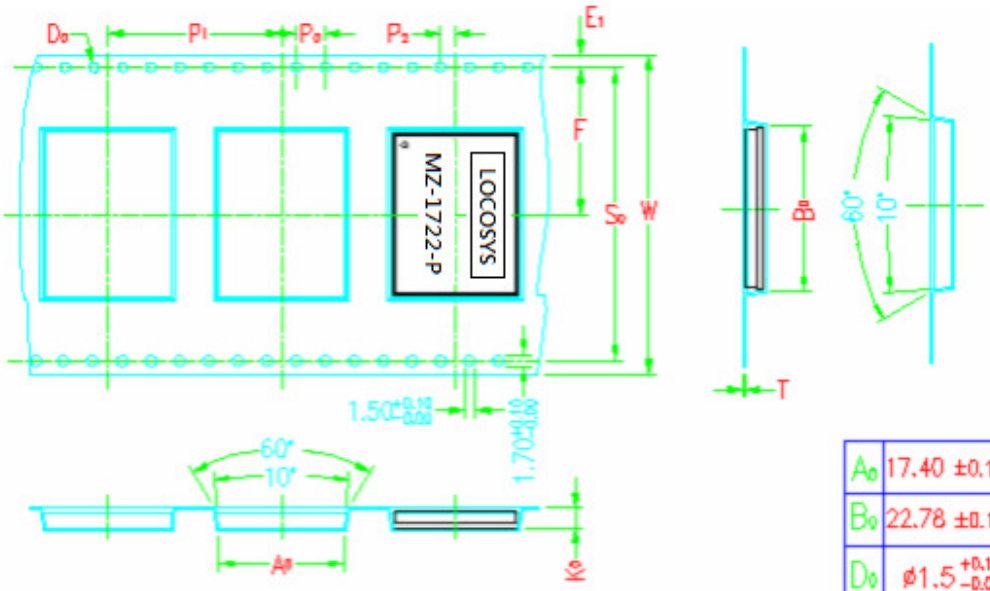
## 10.1 ESD precaution

GNSS modules are electrostatic sensitive devices. Handling the modules without proper ESD protection may result in severe damage to them. ESD protection must be implemented throughout the processing, handling and even when the modules are being returned for repair.

## 10.2 Packaging

The modules are sealed in a moisture barrier ESD bag with the appropriate units of desiccant and a humidity indicator card. It should not be opened until the modules are ready to be soldered onto the application.

### 10.2.1 Packaging




1. 10 sprocket hole pitch cumulative tolerance ±0.2
2. Camber not to exceed 1mm in 100mm
3. A0 and B0 measured on a plane 0.3mm above the bottom of the pocket
4. K0 measured from a plane on the inside bottom of the pocket to the top surface of the carrier .
5. pocket position relative to sprocket hole measured as true position of pocket,not pocket hole.
6. Component load per 15"reel: 1000 pcs
7. All dimensions meet EIA-481-D requirements.

| | |
|---|---|
| $A_0$ | 17.40 ±0.10 |
| $B_0$ | 22.78 ±0.10 |
| $D_0$ | $\phi 1.5^{+0.10}_{-0.00}$ |
| $E_1$ | 1.75 ±0.10 |
| F | 20.20 ±0.15 |
| $K_0$ | 2.88 ±0.10 |
| $P_0$ | 4.00 ±0.10 |
| $P_1$ | 24.00 ±0.10 |
| $P_2$ | 2.00 ±0.15 |
| $S_0$ | 40.40 ±0.10 |
| T | 0.30 ±0.05 |
| W | 44.00 ±0.30 |

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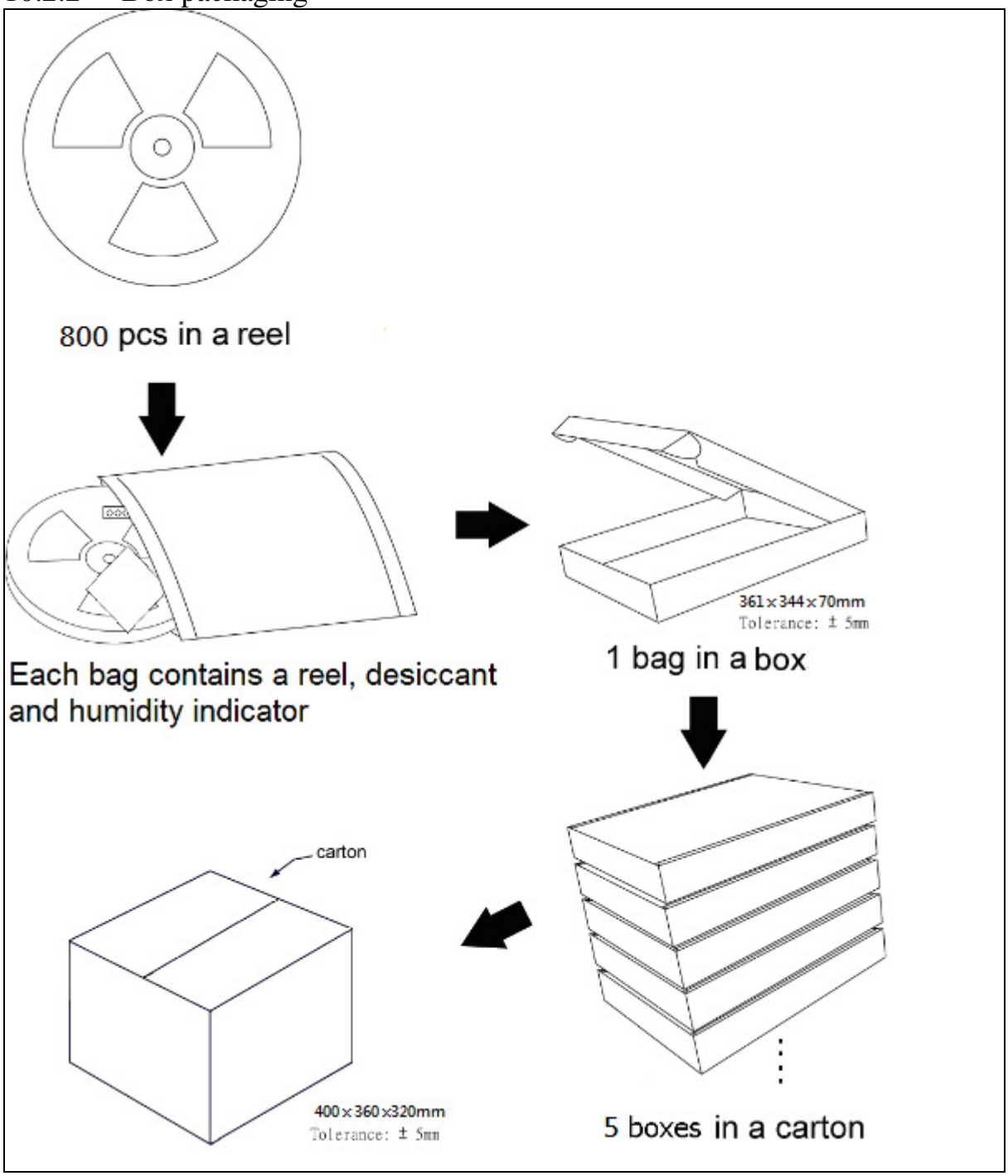
### 10.2.2 Box packaging




## 10.3 Moisture sensitivity level

The moisture sensitivity level of the module is 3. After the sealed bag is opened, modules should be mounted within 168 hours at factory conditions of ≦ 30°C and 60% RH or stored at ≦ 20% RH.

The modules require baking before mounting if above conditions are not met. If baking is required, the modules without the tape and reel may be baked for:

a. 192 hours at 40°C + 5°C / -0°C and < 5% RH
b. 24 hours at 125°C + 5°C / -0°C

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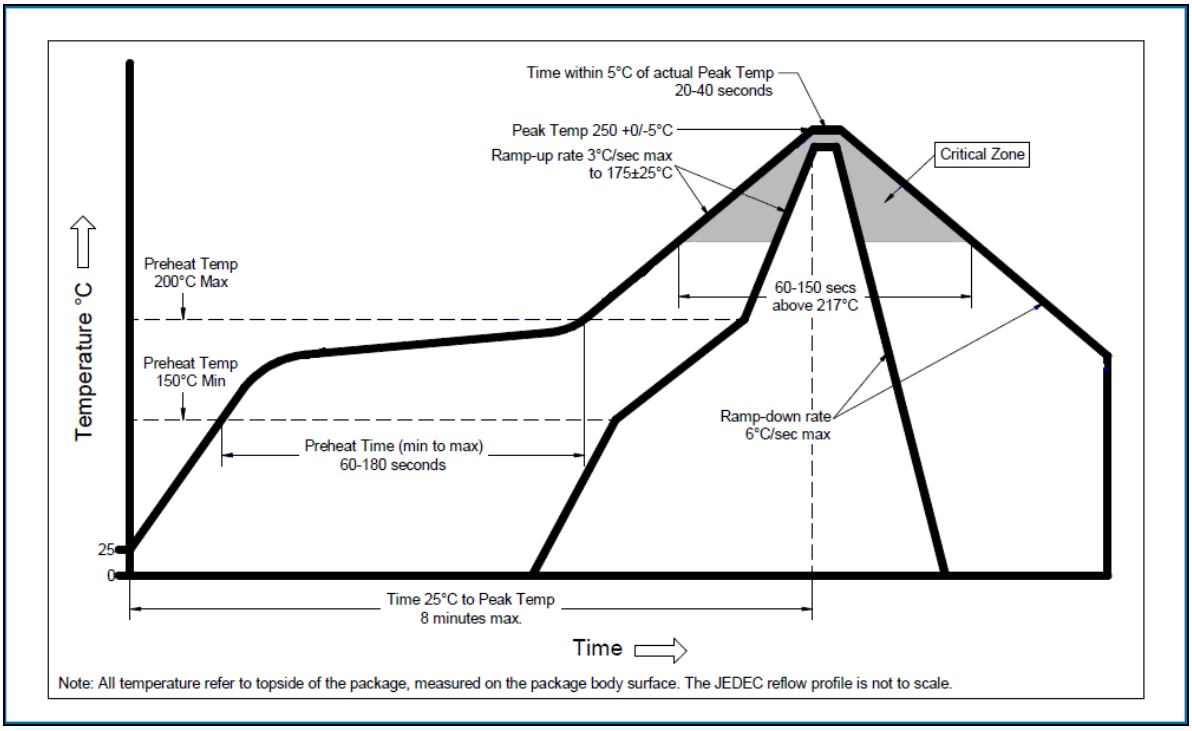
## 10.4 Reflow soldering




Note the module mounted to the top side (first reflow side) may fall off during reflow soldering of the bottom side.

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# Document change list

## Revision 0.1

- Draft release on May 16, 2019.