INSTALLATION AND OPERATION

USER MANUAL

WWW.UNICORE.COM

UM760 Series

Multi-GNSS Single-Frequency Positioning Module

Foreword

About This Document

This document describes the information of the hardware, installation, specification and the use of Unicore UM760 series modules.

Target Readers

This document is intended for technical personnel familiar with GNSS receivers.

Statement

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Revision History

Version	Revision History	Date
R1.0	First release.	Mar. 2026

Document Status

Releases	Status Descriptions	Current Status
Primary	This is a pre-release version with target specifications that are subject to revision.	
Alpha release	This is an alpha release version, which has been preliminarily tested and verified. The content may undergo minor modifications based on user feedback and further testing.	
Production release	The document contains the complete and final specifications.	√

1 Introduction

1.1 Overview

UM760 series modules are GNSS multi-constellation single-frequency modules independently developed by Unicore Communications. Based on the multi-constellation, single-frequency and high-performance GNSS SoC – UFirebird IV (UC7510 series), the module supports multi-constellation single-frequency joint positioning and can output accurate positioning results even in complex environments.

The manufacturing process of the UM760 series modules is in line with IATF 16949 and the GNSS chip inside the automotive-grade module (UM760A) conforms to the requirements of AEC-Q100.

Figure 1-1 UM760 Series Modules

Table 1-1 UM760 Series Modules Overview

Main Model		UM760A	UM760
Sub-model		02	02
Operating Temperature	-40°C ~+85°C	●	●
	-40°C~+105°C		
Grade	Professional		●
	Automotive	●	
System	GPS	●	●
	BDS	●	●
	GLONASS	●	●
	Galileo	●	●
	QZSS	●	●
	SBAS	●	●

Main Model		UM760A	UM760
Interface	UART	●	●
	I2C[1]	●	●
Data Update Rate		1Hz/ 5Hz/ 10Hz	1Hz/ 5Hz/ 10Hz

[1] I2C is supported by specific firmware.

1.2 Key Specifications

Table 1-2 Key Specifications

Power	
Voltage	+2.7V~3.6 V DC
Power Consumption	Tracking: 62 mA @ 3.3 V
	Acquisition: 64 mA @ 3.3 V
RF Input	
Constellations	GPS/GLONASS/BDS/Galileo/QZSS
Standing Wave Ratio	≤ 2.5
Input Impedance	50 Ω
Antenna Gain	15 dB ~ 30 dB
Physical Characteristics	
Dimensions	16.0 mm × 12.2 mm × 2.4 mm
Weight	0.92 g ± 0.05 g
Environmental Specifications	
Operating Temperature	-40°C ~ +85 °C
Storage Temperature	-45 °C ~ +90 °C
Vibration	JEDEC JESD22-B103
Shock	JEDEC JESD22-B103
Input/Output Data Interface	

UART x 1	LVTTL level, supported baud rate: 9600 ~ 921600 bps
I2C[1] x 1	Address:7 bit, operating in slave mode, transfer rate: 400 Kbps
GNSS Performance	
Frequencies	GPS: L1 C/A
	GLONASS: G1
	BDS: B1I, B1C
	Galileo: E1B/C
	QZSS: L1C/A, L1S, L1C/B[2]
	SBAS: L1C/A
Time to First Fix	Cold Start: 26 s
	Hot Start: 1 s
	Reacquisition: 1 s
	AGNSS[3]: 3 s
Horizontal Positioning Accuracy (CEP95)	1.5 m (SBAS enabled)
Velocity Accuracy[4]	0.05 m/s
Sensitivity (GNSS)	Tracking: -165 dBm
	Cold Start: -148 dBm
	Hot Start[5]: -156 dBm
	Reacquisition: -160 dBm
Data Update Rate	1 Hz / 5 Hz / 10 Hz
1PPS Accuracy (RMS)	20 ns
Data Format	NMEA0183, Unicore Protocol

[1] I2C is supported by specific firmware.

[2] L1C/B is supported by specific firmware.

[3] Timely injection of assistance data.

[4] 95% at 30 m/s for dynamic operation, open sky.

[5] Main power disconnected.

1.3 Interfaces

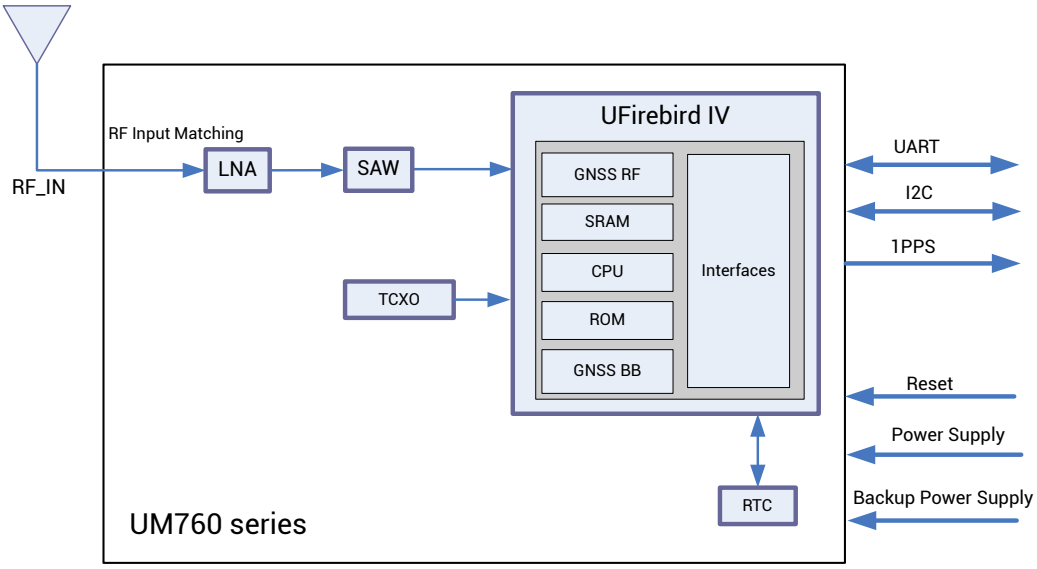


Figure 1-2 UM760 Series Modules Block Diagram

UART

UM760 series modules provide one UART for data transfer and firmware upgrade, and the signal input/output voltage level is LVTTL. The baud rate can be configured by users[1], and the maximum is 921600 bps. Ensure that the UART is connected to a PC or an external processor for firmware upgrade.

1PPS

UM760 series modules output 1PPS with adjustable pulse width and polarity.

1PPS cannot be used for timing application.

nRESET

Active LOW. The active time shall be no less than 10 ms.

[1] For more information, see *UFirebird IV Protocol Specification*.

2 Product Installation

2.1 Preparations

UM760 series modules are Electrostatic Sensitive Devices (ESD) and must be installed with special precautions when handling. Please take the following protective measures before opening the anti-static plastic box.

1. Follow the steps in section Hardware Installation in the correct order.
2. Electrostatic discharge (ESD) may cause damage to the device. All operations mentioned in this chapter shall be performed on an antistatic workbench, using an antistatic wristband and a conductive foam pad. If the antistatic workbench is unavailable, wear an antistatic wristband and connect the other end to a metal frame to play the anti-static role.
3. Hold the edge of the module, and DO NOT touch any components of the module.
4. Please check carefully whether the module is obviously loose or damaged. If there are any problems, please contact Unicore or the local dealer.

The following figure shows the typical installation of UM760 series evaluation kit (EVK).

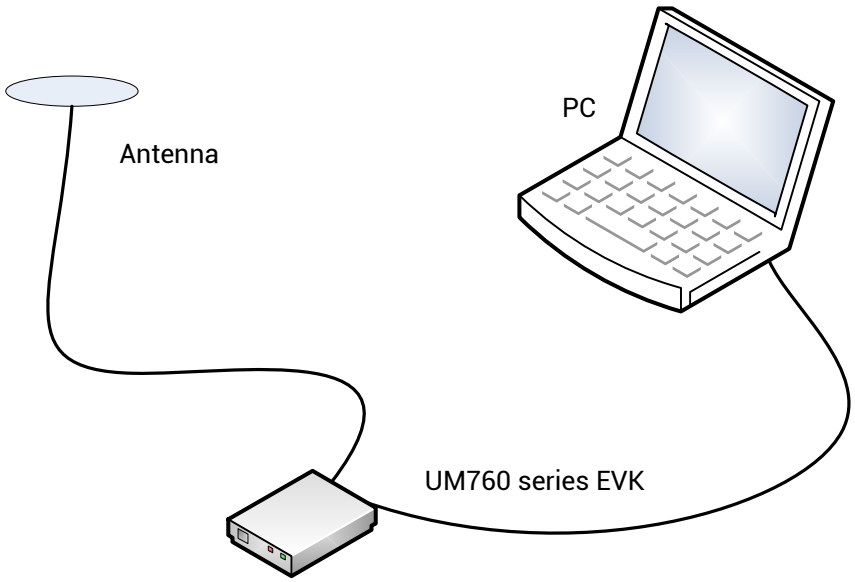


Figure 2-1 Typical Installation of the UM760 Series EVK

Please prepare the following items before installing the UM760 series modules.

- UM760 series EVK, including
  - An evaluation box with UM760 or UM760A module inside
  - Accessory GNSS antenna
  - USB cable with Type-C interface for data transfer and power supply
- PC or laptop with USB ports (Windows 7 and above)
- Unicore UPrecise software
- UM760 series User Manual

> **Note:** Please keep the packing box and anti-static plastic box for storage and handling.

2.2 Hardware Installation

After the above preparations, please follow the steps below to install the module, only for satellite navigation test.

1. Make sure to take adequate anti-static measures, such as wearing an anti-static wristband and grounding the workbench.
2. Open the package box and take out the UM760 series evaluation kit.
3. Use the GNSS antenna in the evaluation kit or use a GNSS antenna with appropriate gain (the GNSS frequencies supported by the antenna shall be in line with that of the module) and fix it in a non-blocking area; connect the antenna to the ANT port on the evaluation box.
4. Connect the evaluation box to a PC through the USB Type-C cable.
5. Open the UPrecise software on the PC.
6. Control the receiver through UPrecise to view the constellations, data stream, tracking status, map, etc. For more information, please refer to *UPrecise_User Manual*.

3 Technical Specifications

3.1 Electrical Specifications

3.1.1 Absolute Maximum Ratings

Table 3-1 Absolute Maximum Ratings

Item	Min.	Max.	Unit	Description
Power Supply Voltage (VCC)	-0.5	3.6	V	Main power supply
Backup Voltage (V_BCKP)	-0.5	3.6	V	Backup power supply for RTC
Digital IO Voltage	-0.5	3.6	V	Voltage at digital IO pins
Antenna Input Power (RF_IN)	/	+3	dBm	Maximum input power of antenna

3.1.2 Operational Conditions

Table 3-2 Operational Conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Power Supply Voltage	VCC	2.7	3.3	3.6	V	/
Ripple Voltage	V_{p-p}	/	/	50	mV	/
Tracking Average Current	I_{ACQ}	43	62	76	mA	VCC=3.3 V
Low Level Input Voltage	V_{IL}	0	/	0.2×VCC	V	/
High Level Input Voltage	V_{IH}	0.8×VCC	/	3.6	V	/
Low Level Output Voltage	V_{OL}	0	/	0.4	V	I_{out}=-5 mA
High Level Output Voltage	V_{OH}	VCC-0.55	/	VCC	V	I_{out}=5 mA
Antenna Gain	G_{ANT}	15	20	30	dB	/

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Backup Voltage	V_BCKP	1.7	/	3.6	V	/
RTC Time Keeping Current	I_BCKP	/	6	10	μA	/

3.2 Dimensions

The dimensions of UM760 series modules are as follows:

Table 3-3 Dimensions

Parameter	Min (mm)	Typical (mm)	Max (mm)
A	15.9	16.0	16.5
B	12.05	12.2	12.35
C	2.2	2.4	2.6
D	0.9	1.0	1.3
E	1.0	1.1	1.2
F	2.9	3.0	3.1
G	0.9	1.0	1.3
H	0.7	0.8	0.9
K (Outer edge of the stamp hole)	0.7	0.8	0.9
N (Inner edge of the stamp hole)	0.4	0.5	0.6
M	0.8	0.9	1.0

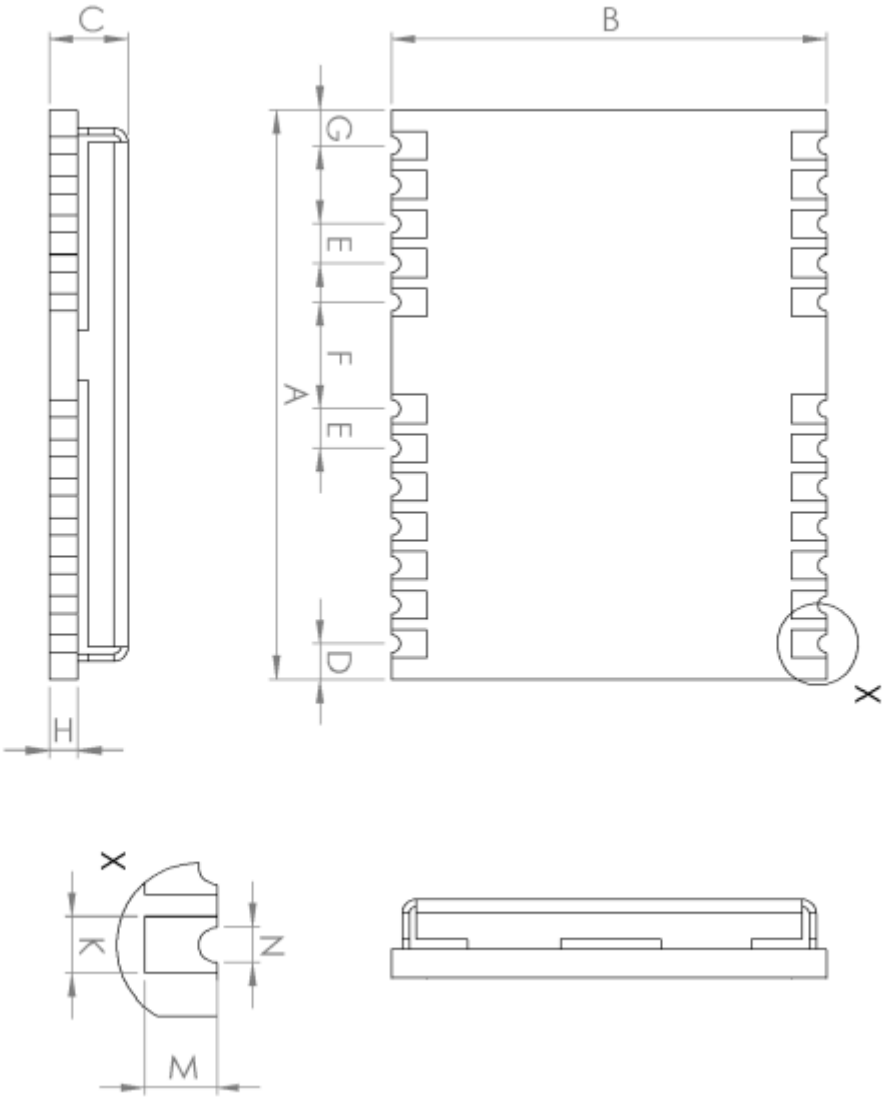


Figure 3-1 Mechanical Layout

3.3 Pin Definition

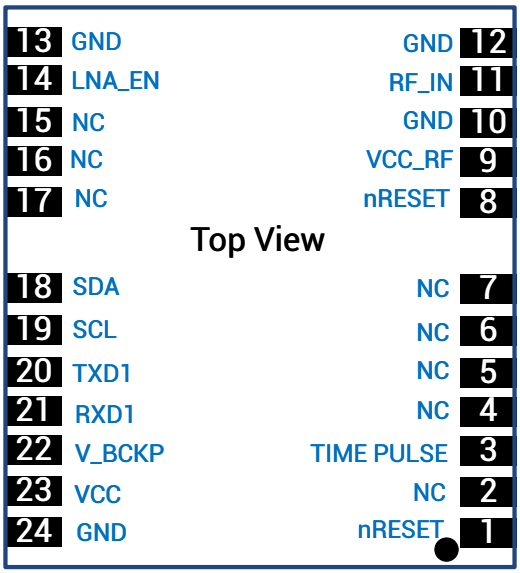


Figure 3-2 Pin Assignment

Table 3-4 Pin Definition

Pin No.	Name	I/O	Electrical Level	Description
1	nRESET	I	LVTTL	Reset pin, active low. Leave it floating if not used.
2	NC	/	/	Do not connect
3	TIME PULSE	O	LVTTL	Pulse per second (1PPS)
4	NC	/	/	Do not connect
5	NC	/	/	Do not connect
6	NC	/	/	Do not connect
7	NC	/	/	Do not connect
8	nRESET	I	LVTTL	Reset pin, active low. Leave it floating if not used.
9	VCC_RF	O	/	Antenna feed output. Recommended to use an external power supply rather than the VCC_RF pin.[1]
10	GND	/	/	Ground

Pin No.	Name	I/O	Electrical Level	Description
11	RF_IN	I	/	GNSS signal input
12	GND	/	/	Ground
13	GND	/	/	Ground
14	LNA_EN	O	LVTTL	Enable external LNA; high level by default.
15	NC	/	/	Do not connect
16	NC	/	/	Do not connect
17	NC	/	/	Do not connect
18	SDA	/	/	I2C data[2]
19	SCL	/	/	I2C clock
20	TXD1	O	LVTTL	UART TXD
21	RXD1	I	LVTTL	UART RXD
22	V_BCKP	I	1.7 V ~ 3.6 V	Backup voltage supply, used for hot start. If you do not use hot start, connect V_BCKP to VCC. Do NOT leave it floating or connect it to ground.
23	VCC	I	2.7 V ~ 3.6 V	Main supply voltage
24	GND	/	/	Ground

[1] If the antenna's power supply and the module's main power supply (VCC) use the same power rail, the ESD, surge and overvoltage introduced at the antenna will be directly applied to VCC, which may cause damage to the module. Therefore, it's recommended to design an independent power rail for the antenna to reduce the possibility of damage to the module.

[2] I2C is supported by specific firmware.

3.4 Recommended Footprint on the PCB

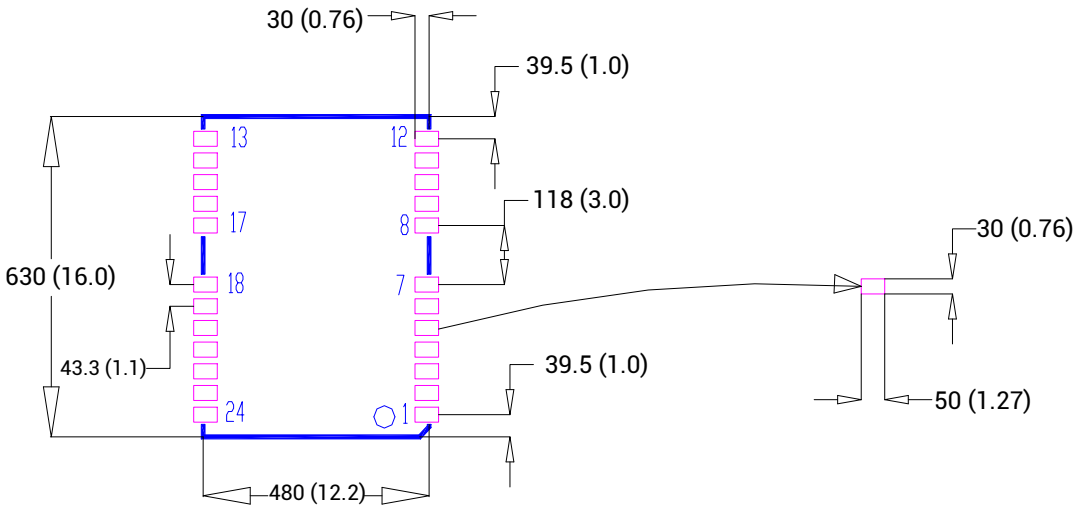


Figure 3-3 Recommended Footprint (unit: mil, in brackets: mm)

> **Note:** When designing PCB solder mask, ensure that the area under the UM760 series module is completely coated with solder mask.

3.5 Power Supply Requirements

3.5.1 Main Supply (VCC)

The voltage range of VCC is 2.7 V ~ 3.6 V.

Notes:

- The initial level of VCC when power-on shall be less than 0.4 V.
- The power-on ramp of VCC shall be monotonic, without plateaus.
- The undershoot and ringing of VCC when power-on shall be within 5% of VCC.
- The power-on waveform of VCC rising from 10% to 90% shall be within 100 μs ~ 10 ms.
- The time interval between the power-off of VCC (< 0.4 V) to the next power-on is recommended to be larger than 500 ms.

3.5.2 Backup Supply (V_BCKP)

When using hot start, it is necessary to supply backup power to the module.

The voltage range of V_BCKP is 1.7 V ~ 3.6 V.

Notes:

- The initial level of V_BCKP when power-on shall be less than 0.4 V.
- The power-on ramp of V_BCKP shall be monotonic, without plateaus.
- The undershoot and ringing of V_BCKP when power-on shall be within 5% of V_BCKP.
- The power-on waveform of V_BCKP rising from 10% to 90% shall be within 100 μs ~ 10 ms.
- The time interval between the power-off of V_BCKP (< 0.4 V) to the next power-on is recommended to be larger than 500 ms.
- The V_BCKP pin cannot be floating or connected to ground. When V_BCKP is not used, it shall be connected to VCC or connected to backup power.

4 Reliability Tests and Approvals

The UM760 series modules meet international standards in terms of reliability testing and environmental protection. For detailed information, please refer to the table Reliability Tests and Approvals.

Table 4-1 Reliability Tests and Approvals

Qualification Types		UM760A	UM760
Reliability Tests	JESD47, GB/T2423		√
	AEC-Q104 (Grade3)	√	
Approvals	RoHS	√	√
	REACH	√	√
	CE	√	√
	FCC	√	√
Manufacturing	IATF 16949	√	√
Moisture Sensitivity Level	MSL	MSL 3	MSL 3
ESD	HBM	±2000V	±2000V
	CDM	±500V	±500V

5 Package

5.1 Label Description

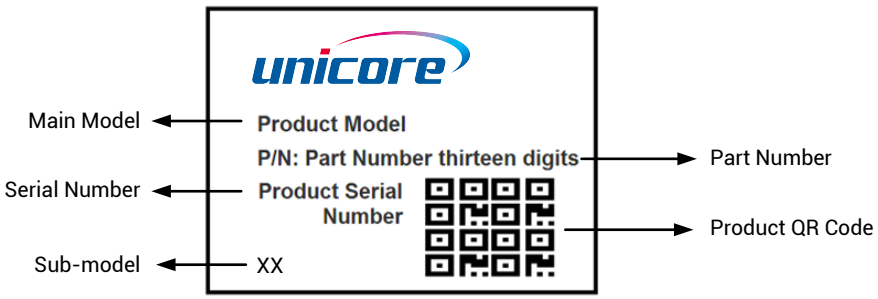


Figure 5-1 Label Description

5.2 Ordering Information

Table 5-1 Ordering Information

Main Model	Sub-model	Description
UM760A	02	Automotive-grade multi-GNSS single-frequency positioning module, operating temperature: -40°C ~ +85°C, supporting firmware upgrade, 16.0 mm × 12.2 mm, 500 pieces/reel
UM760	02	Industrial-grade multi-GNSS single-frequency positioning module, operating temperature: -40°C ~ +85°C, supporting firmware upgrade, 16.0 mm × 12.2 mm, 500 pieces/reel

5.3 Package Description

The UM760 series modules are packaged in carrier tape and reel (suitable for mainstream surface mount devices), in vacuum-sealed aluminum foil antistatic bags, with desiccant inside to prevent moisture. When using reflow soldering process to solder the modules, please strictly comply with the IPC standards to conduct temperature and humidity control. As the packaging materials such as the carrier tape can only withstand the temperature of 55 degrees Celsius, the modules shall be removed from the package during baking.

Figure 5-2 UM760 Series Modules Package

Table 5-2 Package Description

Item	Description
Number of Modules	500 pieces/reel
Reel Size	Tray: 13" External diameter: 330 mm Internal diameter: 100 mm Width: 24 mm Thickness: 2.0 mm
Carrier Tape	Space between (center-to-center distance): 20 mm

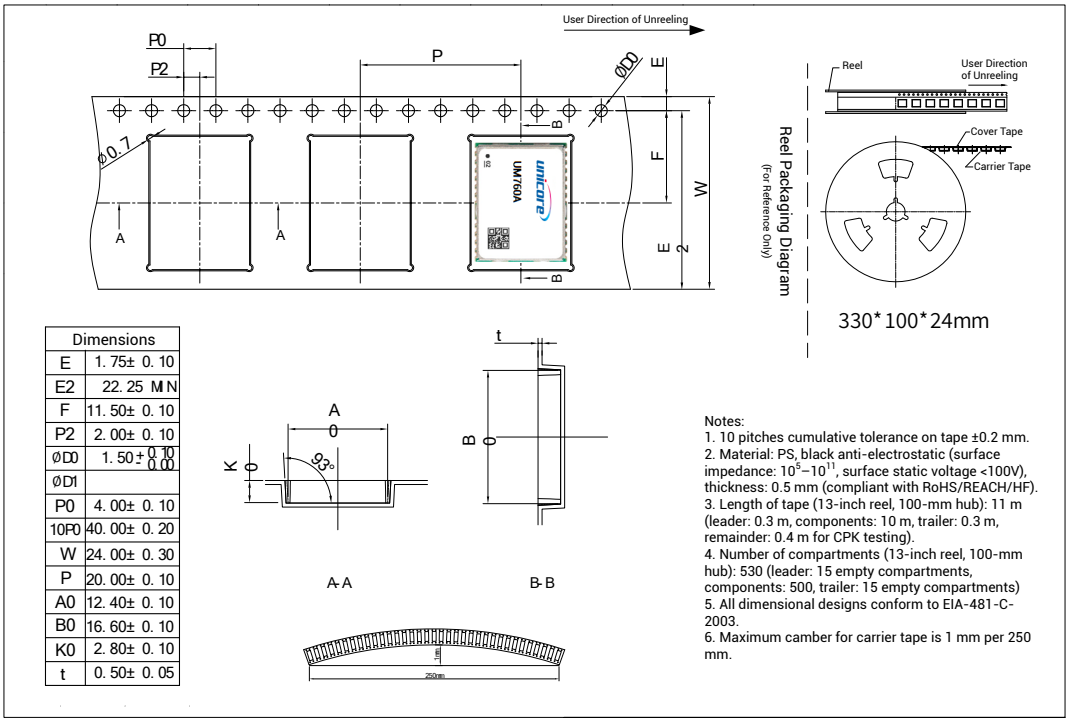


Figure 5-3 UM760 Reel Package Diagram

UM760 series modules are rated at MSL level 3. Please refer to the relevant IPC/JEDEC standards for baking requirements. Users may access to the website www.jedec.org to get more information.

The shelf life of UM760 series modules packaged in vacuum-sealed aluminum foil antistatic bags is one year.

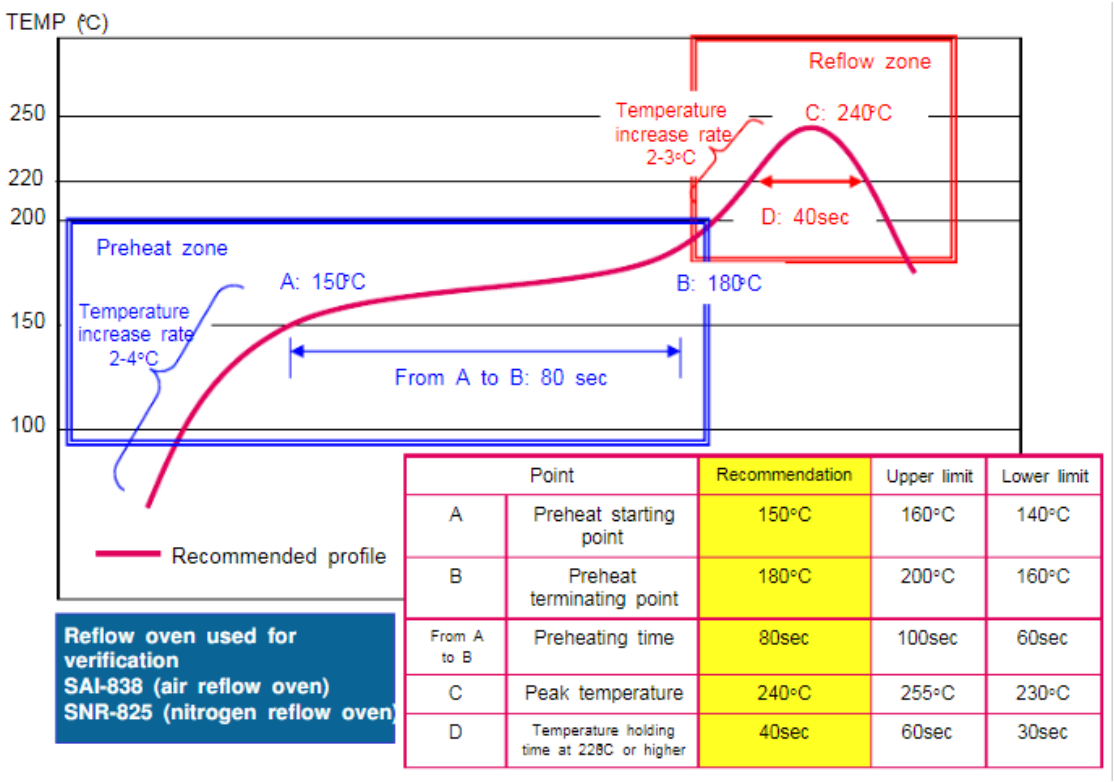
6 Clean

DO NOT use alcohol or other organic solvents to clean, which may cause the soldering flux residues flooding into the shielding cover, resulting in mildew or other problems.

7 Reflow Soldering

In order to avoid the module falling off, it shall be placed on the top of the main board during soldering. The reflow soldering temperature curve is recommended as shown in the figure below (M705-GRN360 is recommended for solder paste).

> **Note:** The module can be soldered only once.



Point		Recommendation	Upper limit	Lower limit
A	Preheat starting point	150℃	160℃	140℃
B	Preheat terminating point	180℃	200℃	160℃
From A to B	Preheating time	80sec	100sec	60sec
C	Peak temperature	240℃	255℃	230℃
D	Temperature holding time at 228C or higher	40sec	60sec	30sec

Figure 7-1 Reflow Soldering Temperature Curve

> **Note:** The apertures in the stencil need to meet the customer's own design requirements and inspection specifications. The thickness of the stencil shall be above 0.15 mm, and it is recommended to be 0.18 mm.

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