G7A

Product Specifications

Issue 1.2 Date 2019-08-15

Notice

This document provides guide for users to use G7A.

This document is intended for system engineers (SEs), development engineers, and test engineers.

THIS GUIDE PROVIDES INSTRUCTIONS FOR CUSTOMERS TO DESIGN THEIR APPLICATIONS. PLEASE FOLLOW THE RULES AND PARAMETERS IN THIS GUIDE TO DESIGN AND COMMISSION. NEOWAY WILL NOT TAKE ANY RESPONSIBILITY OF BODILY HURT OR ASSET LOSS CAUSED BY IMPROPER OPERATIONS.

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About This Document

Scope

This document is applicable to G7A series.

Audience

This document is intended for system engineers (SEs), development engineers, and test engineers.

Change History

Issue	Date	Change	Changed By
1.0	2019-02	Initial draft	Zhuo Jianzheng
1.1	2019-07	- Deleted I2C - Updated the bottom dimensions	Gong Hualiang
1.2	2019-08	- Revised the values of channel quality - Reversed the label figures	Gong Hualiang

Conventions

Symbol	Indication
	This warning symbol means danger. You are in a situation that could cause fatal device damage or even bodily damage.
	Means reader be careful. In this situation, you might perform an action that could result in module or product damages.
	Means note or tips for readers to use the module

Related Documents

Neoway_G7A_Datasheet

Neoway_G7A_HW_User_Guide

Neoway_G2/G7A_Receiver_Command_Mannual

Neoway_GNSS_EVK_User_Guide

1 About G7A

G7A is a GNSS module that supports BDS B1, GPS L1, and GLONASS L1. It adopts a unified chipset integrating baseband and RF and its dimensions are 10.6 mm x 9.7 mm x 2.2 mm. It is an optimal navigation solution to demands for high sensitivity, low power consumption, and low cost in different navigation devices

1.1 Overview

G7A series including the following variants and band configurations.

Table 1-1 Versions and bands

Module	Variants	GPS	BDS	GLONASS	Support GAGAN
G7A	G7A-B1	√	√		
	G7A-D1	√		√	√

1.2 Block Diagram

G7A consists of the following functional units:

- GNSS baseband

- RF front end components

- RTC

- Peripheral interfaces

Figure 1-1 Block diagram
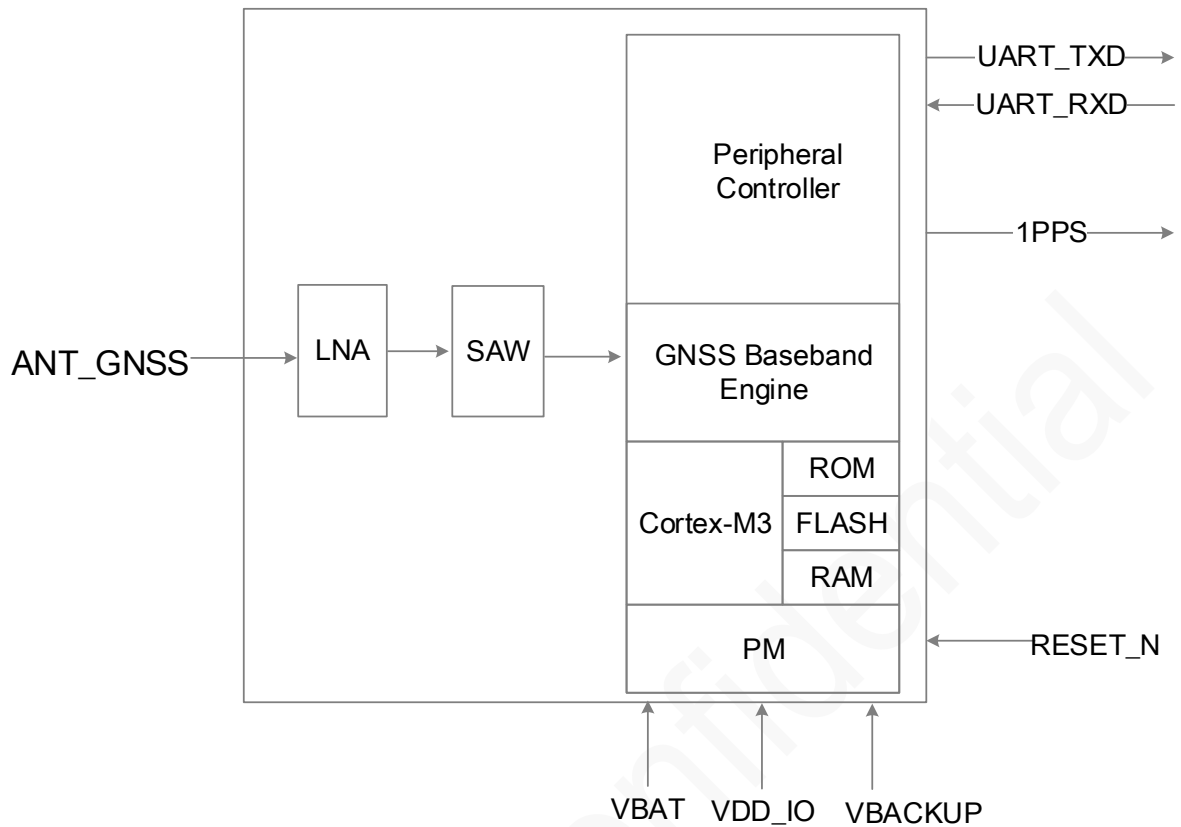
1.3 Specifications

Parameter	Description	Min.	Typ.	Max	Unit	Remarks
Positioning precision (open air)	Horizontal		<3		m	
	Elevation		<4.5		m	
Speed precision			<0.1		m/s	
Channel quantity	Capturing		32			
	Tracking		32			
TTFF (@-130dBm)	Cold start		<32		s	
	Hot start		1		s	
	Recapture		1		s	
Sensitivity	Cold start		-148		dBm	
	Hot start		-156		dBm	
	Recapture		-160		dBm	
	Tracking		-162		dBm	

| Baud rate		4800	9600	256000	bps	9600bps by default
Update frequency			1	10	Hz	1Hz by default
Operating voltage	VBAT	2.7	3.3	3.6	V	
	VDD_IO	2.7	3.3	3.6	V	
	VBACKUP	1.4	3.3/3.0	3.6	V	
Current (@instrument)	Capturing		30		mA	3.3 V
	Tracking		28		mA	3.3 V
	Idle		10		µA	3.3 V
Certification and Approvals	RoHS, CE					

2 Pad Layout and Pin Definition

There are 18 pins on G7A and their pads are in LCC package.

2.1 Pad Layout

错误!未找到引用源。 shows the pad layout of G7A.

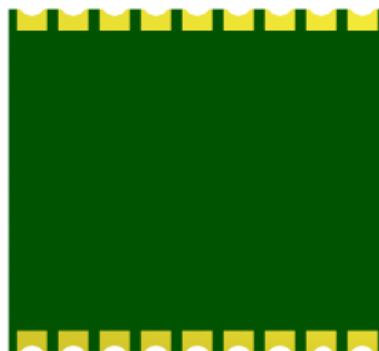Figure 2-1 G7A pin definition (top view)
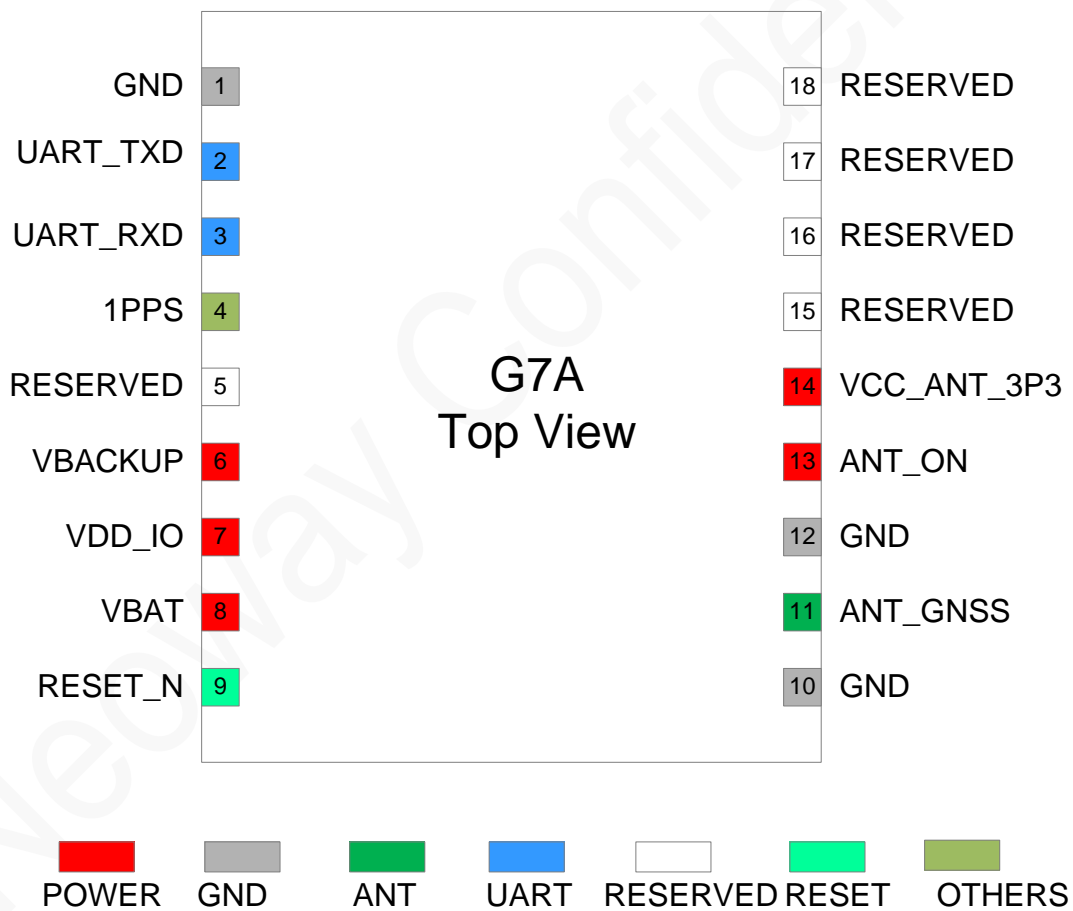
2.2 Appearance

Figure 2-2 Top view

Figure 2-3 Bottom view

3 Electrical Feature and Reliability

This chapter describes the electrical features and reliability of G7A.

3.1 Electrical Features

To ensure that G7A functions properly, operate it in recommended operationg conditions.

Table 3-1 Extreme operating voltage

Parameter	Description	Minimum Value	Maximum Value	Unit
VBAT	Power supply	-0.3	4.5	V
VDD_IO	Power supply	-0.3	4.5	V
VBACKUP	Backup power supply	-0.3	4.5	V
VIO	IO voltage	-0.3	4.5	V

⚠ If the input voltage is lower than the minimum value, the module might fail to start. If the voltage exceeds the high threshold or there is a voltage burst during the startup, the module might be damaged permanently.

Table 3-2 Recommended operating voltage

Parameter	Minimum Value	Typical Value	Maximum Value	Unit
VBAT	2.7	3.3	3.6	V
VDD_IO	2.7	3.3	3.6	V
VBACKUP	1.4	3.3/3.0	3.6	V

Table 3-3 Current features

State		Current	Unit
Continuous position fix	Multi-mode	30	mA
	Single-mode	28	mA
Idle		10	µA

3.2 Temperature

Table 3-4 Temperature feature

Module Status	Minimum Value	Typical Value	Maximum Value
Operating	-40°C	25 °C	85°C
Storage	-45°C	/	125°C

If the module works in an environment where the temperature exceeds the thresholds of the operating temperature range, some of its RF performance indicators might be worse but it can still work properly.

3.3 ESD Protection

Humidity: 45% Temperature: 25 °C

Table 3-5 ESD feature

Testing Point	Contact Discharge	Air Discharge
VBAT	±8 kV	±15 kV
GND	±8 kV	±15 kV
ANT	±8 kV	±15 kV
Cover	±8 kV	±15 kV
UART	±4 kV	±8 kV
Others	±4 kV	±8 kV

4 Mechanical Features

This chapter describes the mechanical features of G7A.

4.1 Dimensions

Figure 4-1 G7Adimensions (Unit: mm)
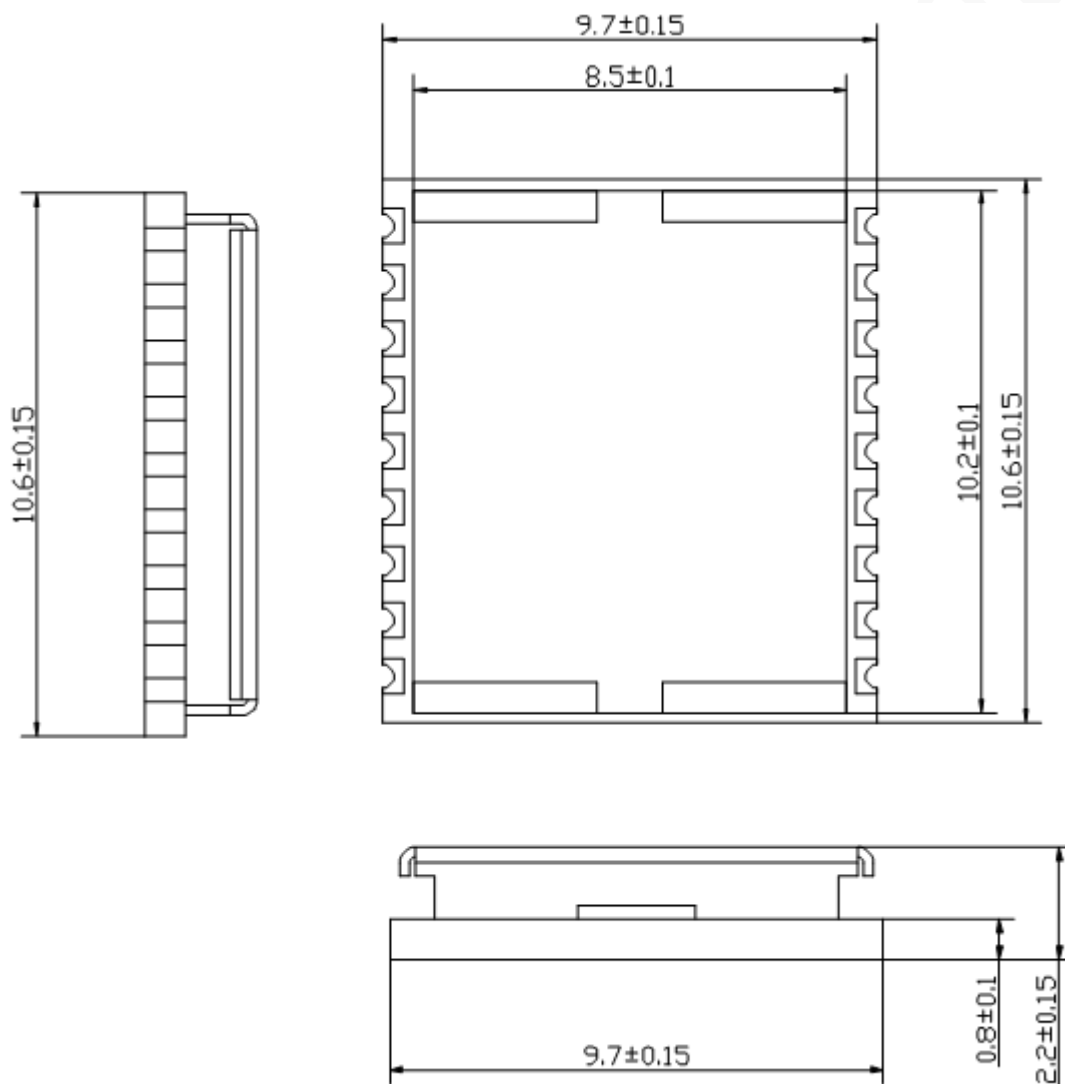
4.2 Label

Figure 4-2 and Figure 4-3 shows the label of G7A.

Figure 4-2 G7A-B1 label
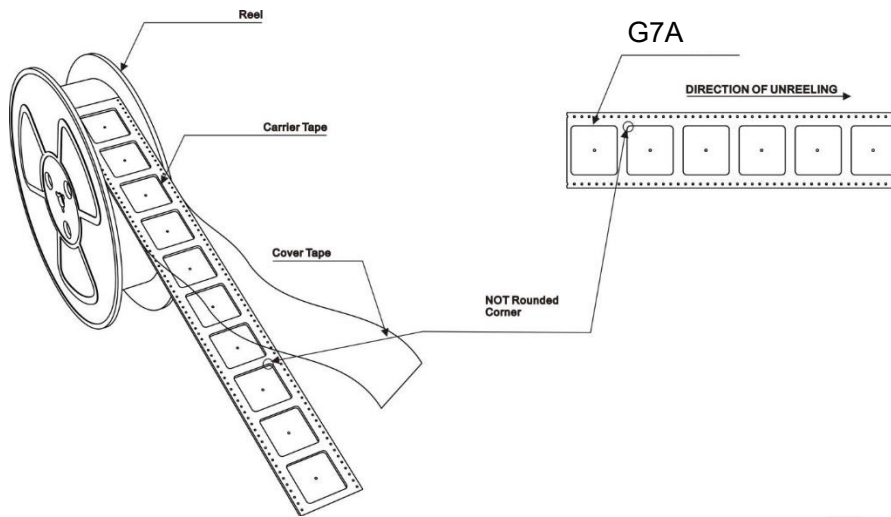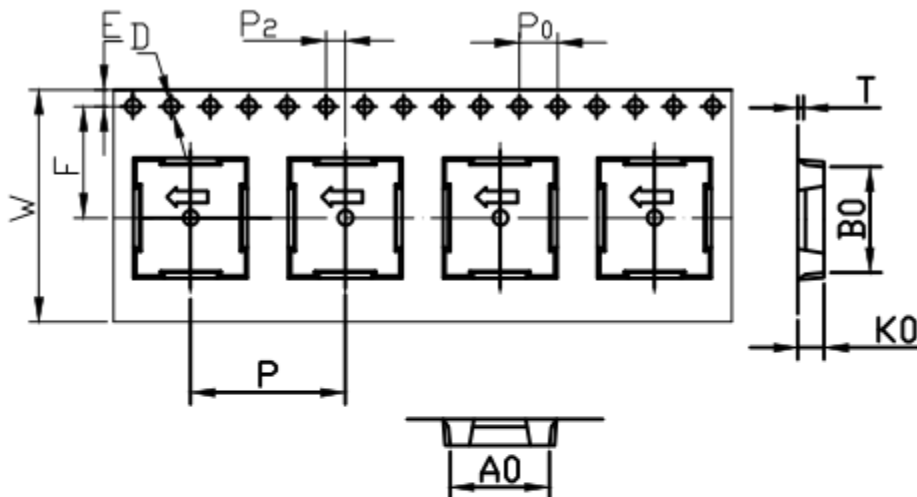

Figure 4-3 G7A-D1 label

4.3 Packaging

G7A modules are packed in sealed bags on delivery to guarantee a long shelf life. Follow the same package of the modules again in case of opened for any reasons.

4.3.1 Tape & Reel Packaging

G7A in mass production are shipped in the following package.

Tape

ITEM	W	A0	B0	K0	K1	P	F	E	D	D1	P0	P2
DIM	$24.0^{+0.30}_{-0.10}$	$10.1^{+0.10}_{-0.10}$	$11.0^{+0.10}_{-0.10}$	$2.7^{+0.10}_{-0.10}$	$0.00^{+0.10}_{-0.10}$	$16.0^{+0.10}_{-0.10}$	$11.5^{+0.10}_{-0.10}$	$1.75^{+0.10}_{-0.10}$	$1.50^{+0.10}_{-0.00}$	$0.00^{+0.25}_{-0.00}$	$4.00^{+0.10}_{-0.10}$	$2.00^{+0.10}_{-0.10}$

Reel
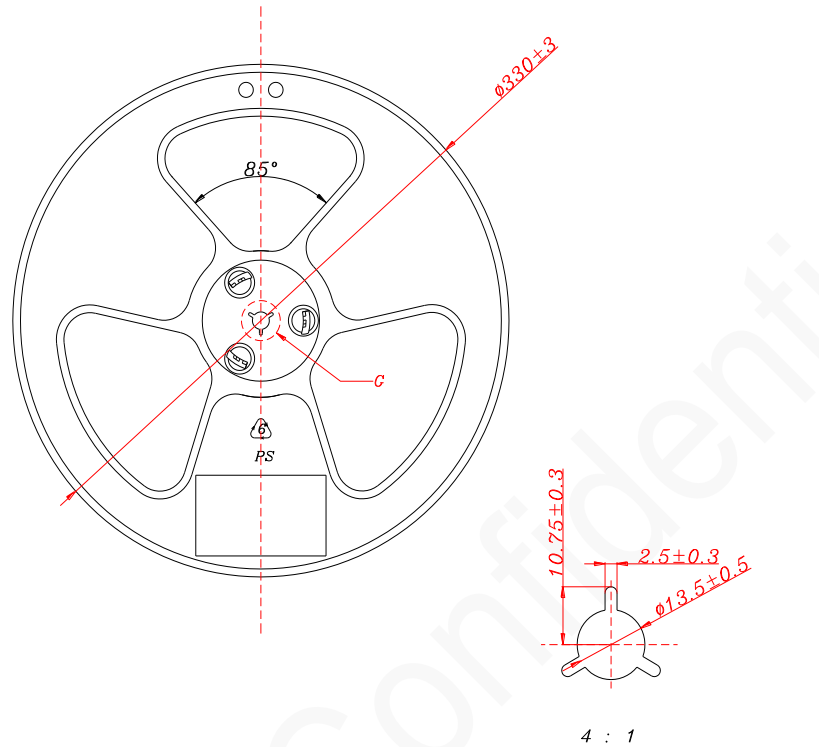
4.3.2 Mositure-Sensitive

G7A is a level 3 moisture-sensitive electronic elements, in compliance with IPC/JEDEC J-STD-020 standard.

If the module is exposed to air for more than 48 hours at conditions not worse than 30°C/60% RH, bake it at a temperature higher than 90 degree for more than 12 hours before SMT.Or, if the indication card shows humidity greater than 20%, the baking procedure is also required.Do not bake modules with the package tray directly.

5 Application Design and SMT

G7A is introduced in LCC package. This chapter provides G7A foot print, recommended PCB design and SMT information to guide users how to mount the module onto application PCB board.
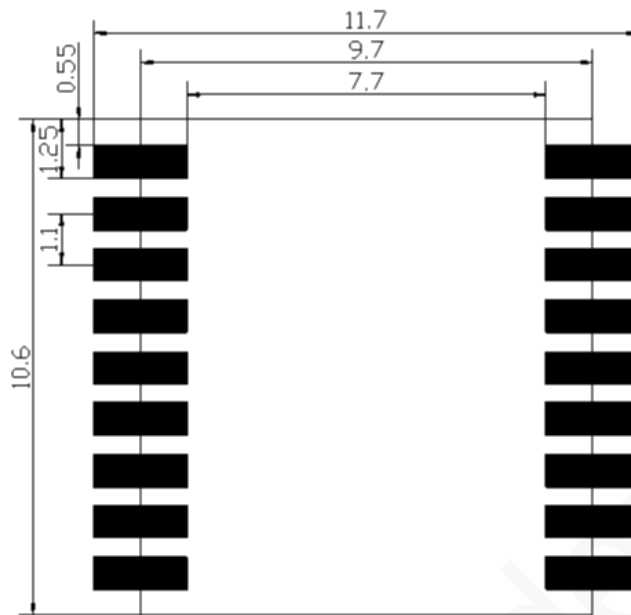
5.1 G7A Foot Print

Figure 5-1 G7A foot print (bottom view)
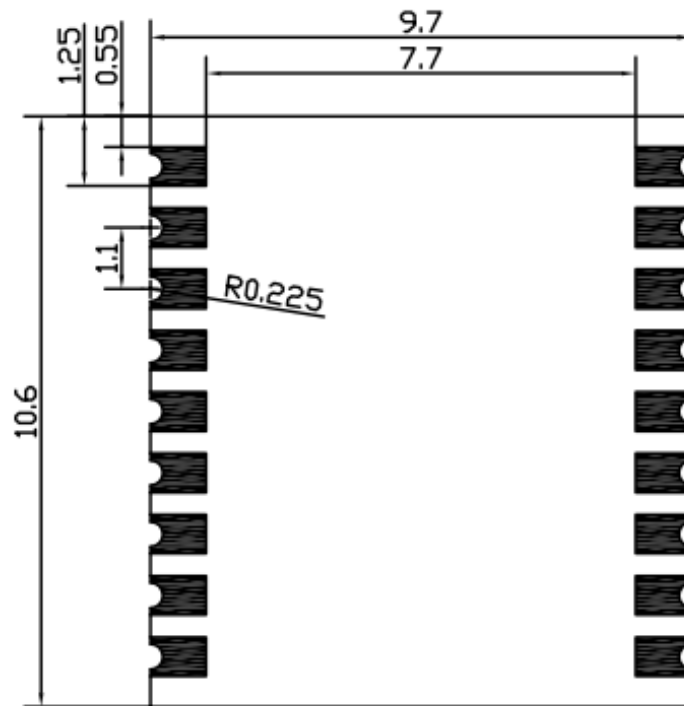
5.2 Recommended Footprint

错误!未找到引用源。 shows the recommended application PCB footprint. (Unit: mm)

Figure 5-2 Recommended PCB footprint (top view)

5.3 Stencil

The recommended stencil thickness is at least 0.12 mm to 0.15 mm.

5.4 Solder Paste

Do not use a kind of solder paste different from our module technique.

- The melting temperature of solder paste with lead is 35°C lower than that of solder paste without lead. It is easy to cause faulty joints for LCC inside the module after second reflow soldering.

- When using only solder pastes with lead, please ensure that the reflow temperature is kept at 220°C for more than 45 seconds and the peak temperature reaches 240°C.

5.5 Reflow Profile

G7A is compatible with industrial standard reflow profile for lead-free SMT process.

The reflow profile is process dependent, so the following recommendation is just a start point guideline:

- Only one flow is supported.

- Quality of the solder joint depends on the solder paste volume. Minimum of 0.12 mm to 0.15 stencil thickness is recommended.

- Use bigger aperture size of the stencil than actual pad size.

- Use a low-residue, no-clean type solder paste.

Figure 5-3 Temperature curve
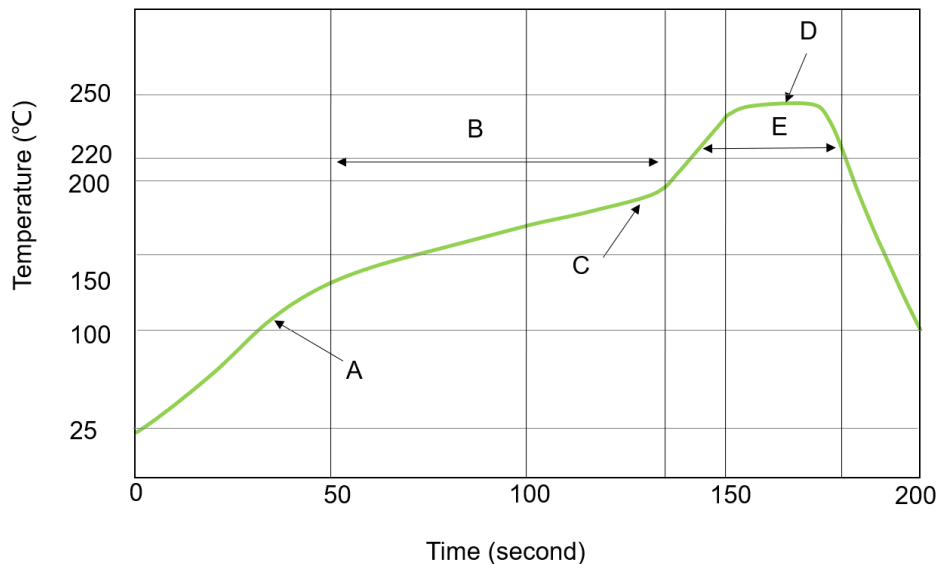
X: Time (s) Y: Temperature (°C)

Technical parameters:

- Ramp up rate: 1 to 4°C/sec

- Ramp down rate: -3 to-1°C/sec

- Soaking zone: 150-180°C for 60-100 seconds

- Reflow zone: >220°C for 40-90 seconds

- Peak temperature: 235-245°C

> ⚠ Neoway will not provide warranty for heat-responsive element abnormalities caused by improper temperature control.

For information about cautions in G7A storage and mounting, refer to *Neoway Module Reflow Manufacturing Recommendations*.

To maintain and manually desolder it, use heat guns with great opening, adjust the temperature to 245 degrees (depending on the type of the solder paste), and heat the module till the solder paste is melt. Use tweezers to remove the module. Do not shake the module in high temperature while removing it. Otherwise, the components inside the module might be misplaced.

6 Safety Recommendations

Ensure that this product is used in compliant with the requirements of the country and the environment. Please read the following safety recommendations to avoid body hurts or damages of product or work place:

- Do not use this product at any places with a risk of fire or explosion such as gasoline stations, oil refineries, etc

- Do not use this product in environments such as hospital or airplane where it might interfere with other electronic equipment.

Please follow the requirements below in application design:

- Do not disassemble the module without permission from Neoway. Otherwise, we are entitled to refuse to provide further warranty.

- Please design your application correctly by referring to the HW design guide document and our review feedback on your PCB design.

- Please avoid touch the pins of the module directly in case of damages caused by ESD.

A Abbreviation

Abbr	Full Name
AGPS	Assisted GPS
CEP	Circular Error Probable
DGPS	Differential GPS
EASY	Embedded Assist System
EGNOS	European Geostationary Navigation Overlay Service
EPO	Extended Prediction Orbit
EMI	Electro Magnetic Interference
ESD	Electronic Static Discharge
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
GGA	GPS Fix Data
GLONASS	Global Navigation Satellite System
GSV	GNSS Satellites in View
I/O	Input/output
LNA	Low Noise Amplifier
MSAS	Multi-Functional Satellite Augmentation System
NMEA	National Marine Electronics Association
PPS	Pulse Per Second
PRN	Pseudo Random Noise Code
QZSS	Quasi-Zenith Satellite System
RHCP	Right Hand Circular Polarization
RMC	Recommended Minimum Specific GNSS Data
SBAS	Satellite-based Augmentation System
SAW	Surface Acoustic Wave
TTFF	Time To First Fix
UART	Universal Asynchronous Receiver & Transmitter