

N25

Product Specifications

Issue 1.2 Date 2020-09-01



Copyright © Neoway Technology Co., Ltd 2020. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Neoway Technology Co., Ltd.

neoway is the trademark of Neoway Technology Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

This document provides guide for users to use N25.

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.

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE DUE TO PRODUCT VERSION UPDATE OR OTHER REASONS.

EVERY EFFORT HAS BEEN MADE IN PREPARATION OF THIS DOCUMENT TO ENSURE ACCURACY OF THE CONTENTS, BUT ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS DOCUMENT DO NOT CONSTITUTE A WARRANTY OF ANY KIND, EXPRESS OR IMPLIED.

Neoway provides customers complete technical support. If you have any question, please contact your account manager or email to the following email addresses:

Sales@neoway.com

Support@neoway.com

Website: <http://www.neoway.com>

Contents

1 About N25	7
1.1 Overview	7
1.2 Block Diagram.....	7
1.3 Features	8
2 Compliant Standards	10
3 Pin and Appearance	11
3.1 Pad Layout	11
3.2 Appearance	12
4 Electrical Feature and Reliability	13
4.1 Electric Thresholds.....	13
4.2 Current Feature.....	13
4.3 Temperature	14
4.4 ESD Protection.....	14
5 RF Features	15
5.1 Operating Bands	15
5.2 TX Power and RX Sensitivity	15
6 Mechanical Features	17
6.1 Dimensions.....	17
6.2 Label.....	18
6.3 Package	18
6.3.1 Tape & Reel Packaging	18
6.3.2 Moisture-Sensitive	20
6.4 Storage Conditions.....	20
7 Application Design and SMT	21
7.1 N25 Foot Print.....	21
7.2 Application Foot Print	22
7.3 Stencil.....	22
7.4 Solder Paste.....	22
7.5 Reflow Profile	23
8 Safety Recommendations	25

Table of Figures

Figure 1-1 Block diagram	8
Figure 3-1 N25 pin definition (top view)	11
Figure 3-2 Top view of N25	12
Figure 3-3 Bottom view of N25.....	12
Figure 6-1 N25 dimensions (Unit: mm)	17
Figure 6-2 N25 label.....	18
Figure 7-1 N25 foot print (bottom view)	21
Figure 7-2 Application PCB foot print (top view)	22
Figure 7-3 Temperature curve.....	23

Table of Tables

Table 1-1 Variants and bands.....	7
Table 1-2 N25 baseband and wireless features.....	8
Table 4-1 N25 electrical features.....	13
Table 4-2 N25 currents (Typical).....	13
Table 4-3 Temperature feature.....	14
Table 4-4 N25 ESD feature.....	14
Table 5-1 N25 operating band.....	15
Table 5-2 N25 RFTX power.....	15
Table 5-3 N25 receiving sensitivity.....	16

About This Document

Scope

This document is applicable to N25 series.




Audience

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

Change History

Issue	Date	Change	Changed By
1.0	2018-12	Initial draft	Huang Jianlong
1.1	2020-02	<ul style="list-style-type: none">Added CAT-NB2Added functions related to 3GPP Release 4Changed the operating temperature rangeChanged the thickness of the module	Zhao Rongzhou
1.2	2020-05	<ul style="list-style-type: none">Corrected the wireless rate of NB-IoTCorrected the tolerance information of the module dimensions.Updated some information related to the cloud platform, protocol, and certificates.	Zhao Rongzhou

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_N25_Datasheet

Neoway_N25_HW_User_Guide

Neoway_N25_AT_Command_Mannual

Neoway_N25_EVK_User_Guide

1 About N25

N25 is an industrial-grade NB-IoT module developed on RDA8909B and supports NB-IoT (Cat NB1/Cat NB2) and GPRS 850/900/1800/1900 MHz.

1.1 Overview

N25 supports different frequency bands and provides two variants.

Table 1-1 Variants and bands

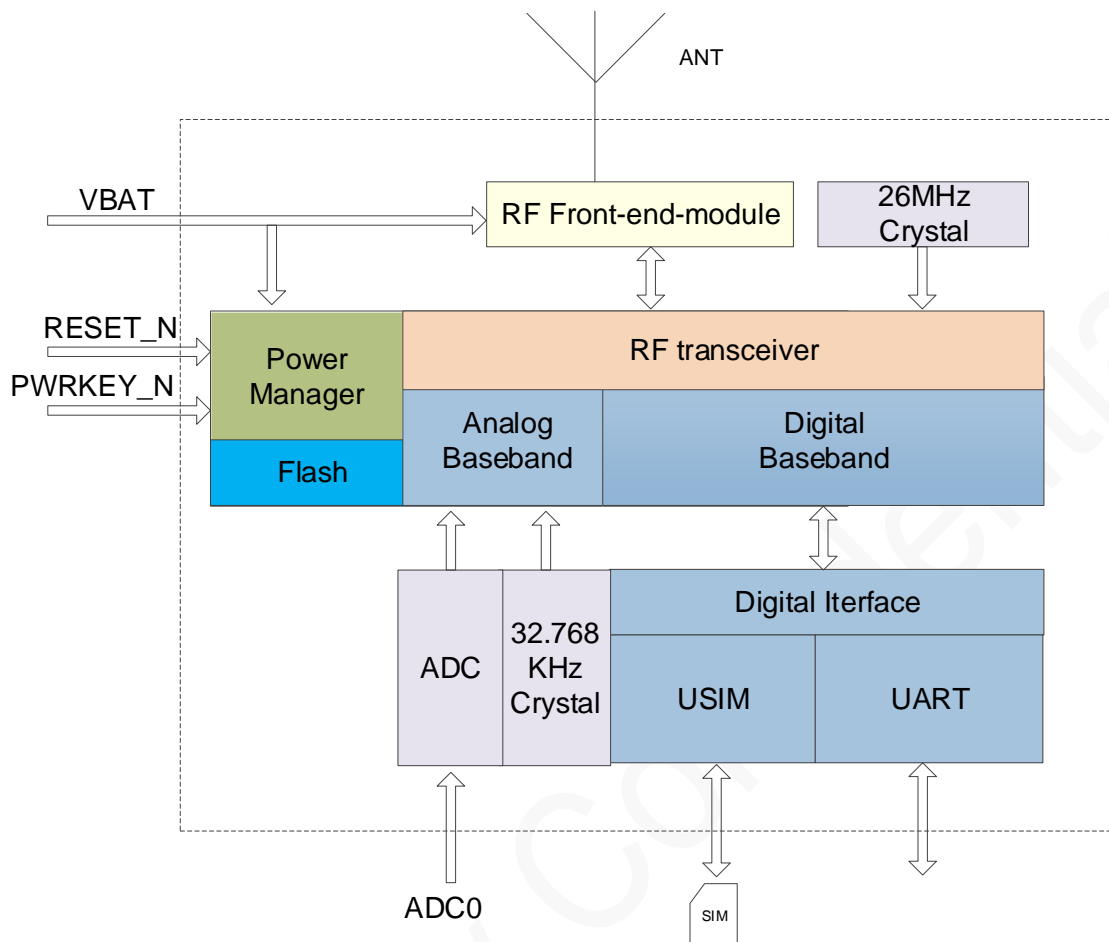
Module	Variant	Network	Band
N25	N25-CN-011AS1	Cat NB/GPRS	Cat NB1/CatNB2: HD-FDD: B3,B5,B8 GPRS: 1800/1900MHz
	N25-EU-011AS1	Cat NB/GPRS	Cat NB1/CatNB2: HD-FDD: B3,B5,B8,B20,B28 GPRS: 850/900/1800/1900MHz

Featured with ultra-low power consumption, extensive coverage and simple peripheral circuits, N25 facilitates development and is well applicable to IoT applications that requires low rate and low power consumption. It adopts 52-pin LGA package and its dimensions are 24 mm x 20 mm x 2.45 mm, which can meet the size requirement of most customers.

1.2 Block Diagram

N25 provides the following functionality modules: baseband, Flash, crystal oscillator, power management, digital interfaces (USIM, UART, etc), and RF section.

Figure 1-1 Block diagram



1.3 Features

Table 1-2 N25 baseband and wireless features

Parameter	Description
Physical features	<ul style="list-style-type: none"> • Dimensions: (24.0±0.10) mm × (20±0.10) mm × (2.45±0.10) mm • Package: 52-pin LGA • Weight: around 1.8 g
Temperature ranges	Operating: -40°C to +85°C Storage: -45°C to +90°C
Operating voltage	VBAT: 3.4V to 4.3V, TYP: 3.8V
MIPS processor	Main frequency: 192 MHz, 16KB L2 cache
Memory	RAM: 32 Mb ROM: 32 Mb

Band	B3, B5, B8, B20, B28
Wireless rate	LTE Cat NB1: 26 Kbps (DL) /62.5 Kbps (UL) LTE Cat NB2: 127 Kbps (DL)/158.5 Kbps (UL) GPRS: 85.6 Kbps (DL/UL)
Transmit power	LTE: +23 dBm+/-2 dBm (Power Class 3) GPRS 850/900: 33 dBm+/-2dB GPRS 1800/1900: 30 dBm+/-2dB
Application interfaces	4G antenna, 50 Ω characteristic impedance 1 UART interface with hardware flow control, used to send AT commands 1 USIM interface, compatible with 1.8V/3V USIM card 1 ADC interface 2*2 mm eSIM (Optional)
AT commands	3GPP Rel-13 3GPP Rel-14 Neoway extended commands
SMS	TEXT/PDU Point to Point/Cell Broadcast
Cloud platform	China Mobile OneNet, China Telecom IoT Cloud, Huawei OceanConnect
Protocol	CoAP/UDP/LWM2M/TCP/IP/PPP/DNS/FTP/HTTP/HTTPS/DTLS/SMS
Certificates and Approvals	CCC、SRRC、CTA、RoHS、CE、GCF*、FCC* China Mobile, China Unicom, China Telecom Alibaba Cloud*

* indicates in development

2 Compliant Standards

N25 complies with the following standards:

- 3GPP TS Cat NB1 Specification Set
- Ministry of Industry and Information Technology PRC, Measures for the Network Access Management of Telecommunication Equipment (2014 Amendment)
- GB4943.1-2011 Information technology equipment - Safety - Part 1: General requirements
- CNCA-O7C-031:2007 Rules for Compulsory Certification of Telecommunication Equipment Telecommunication Terminal Equipment

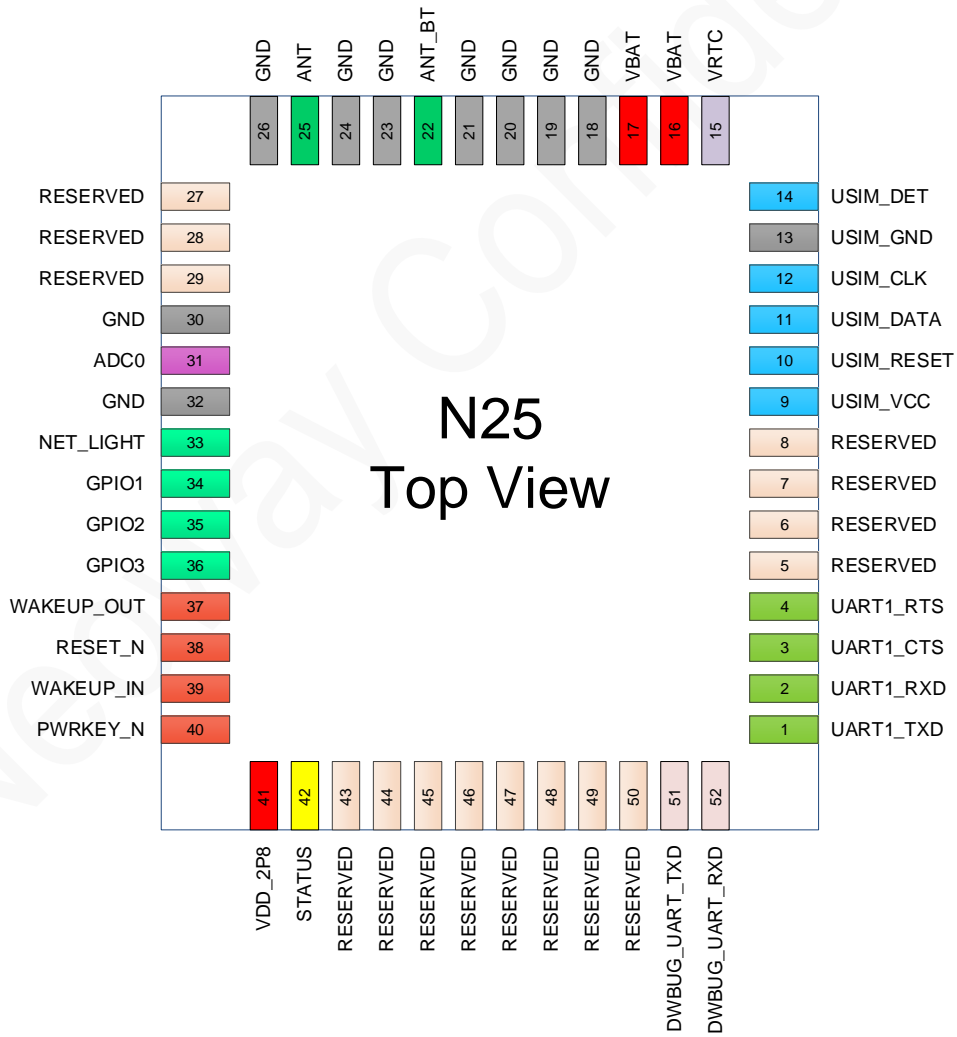
3 Pin and Appearance

There are 52 pins on N25 and their pads are introduced in LGA package.

3.1 Pad Layout

Figure 3-1 shows the pad layout of N25.

Figure 3-1 N25 pin definition (top view)

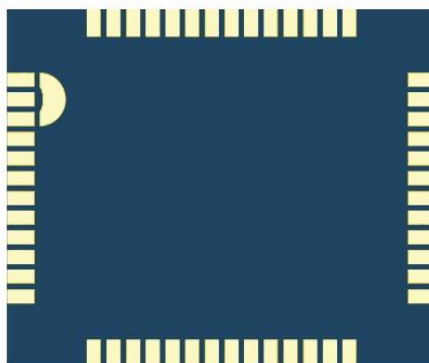


3.2 Appearance

Figure 3-2 Top view of N25



Figure 3-3 Bottom view of N25



The label and bottom view of the N25 module in the above picture are for reference only. Detailed information is in accordance with the final product.

4 Electrical Feature and Reliability

This chapter describes the electrical features and reliability of N25.

4.1 Electric Thresholds

Table 4-1 N25 electrical features

Status		Minimum Value	Typical Value	Maximum Value
VBAT	V _{in}	3.4V	3.8V	4.3V
	I _{in}	/	/	2 A



- 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.
- If LDO or DC-DC is used to supply power for the module, ensure that it outputs a current of at least 2 A.

4.2 Current Feature

Table 4-2 N25 currents (Typical)

Band	State	Power (dBm)	PSM (uA)	Idle (DRX/eDRX) (mA)	Active (mA)	
					TX	RX
Cat NB: B3, B5, B8, B20, B28		23	<4.5	1.7/1	180	30
		0	<4.5	1.7/1	51	30
		-10	<4.5	1.7/1	36	30

4.3 Temperature

Table 4-3 Temperature feature

Module Status	Minimum	Typical	Maximum
Operating	-40°C	25°C	85°C
Storage	-45°C	25°C	90°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.

4.4 ESD Protection

Humidity: 45% Temperature: 25°C

Table 4-4 N25 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
Others	±2 kV	±4 kV

5 RF Features

This chapter describes the RF features of N25.

5.1 Operating Bands

Table 5-1 N25 operating band

制式	Operating Band	Uplink	Downlink
Cat-NB1/Cat-NB2	HD-FDD-LTE B3	1710~1785MHz	1805~1880MHz
	HD-FDD-LTE B5	824~849MHz	869~894MHz
	HD-FDD-LTE B8	880~915MHz	925~960MHz
	HD-FDD-LTE B20	832~862MHz	791~821MHz
	HD-FDD-LTE B28	703~748MHz	758~803MHz
GPRS	GPRS850	824~849MHz	869~894MHz
	GPRS900	880~915MHz	925~960MHz
	GPRS1800	1710~1785MHz	1805~1880MHz
	GPRS1900	1850~1910MHz	1930~1990MHz

5.2 TX Power and RX Sensitivity

Table 5-2 N25 RFTX power

Band	Max Power	Min Power
HD-FDD LTE B3	23dBm+2/-2dB	<-40dBm
HD-FDD LTE B5	23dBm+2/-2dB	<-40dBm
HD-FDD LTE B8	23dBm+2/-2dB	<-40dBm
HD-FDD LTE B20	23dBm+2/-2dB	<-40dBm
HD-FDD LTE B28	23dBm+2/-2dB	<-40dBm
GSM850/EGSM900	33dBm+2/-2dB	/

DCS1800/PCS1900	30dBm+2/-2dB	/
-----------------	--------------	---

Table 5-3 N25 receiving sensitivity

Band	REFSENS	Duplex Mode
LTEB3,B5,B8,20,B28	$\leq -113\text{dBm}@200\text{KHz}$ $\leq -123\text{dBm}@15\text{KHz}$	HD-FDD
GSM850/EGSM900/DCS1800/PCS1900	$< -108\text{ dBm}@200\text{KHz}$	FDD



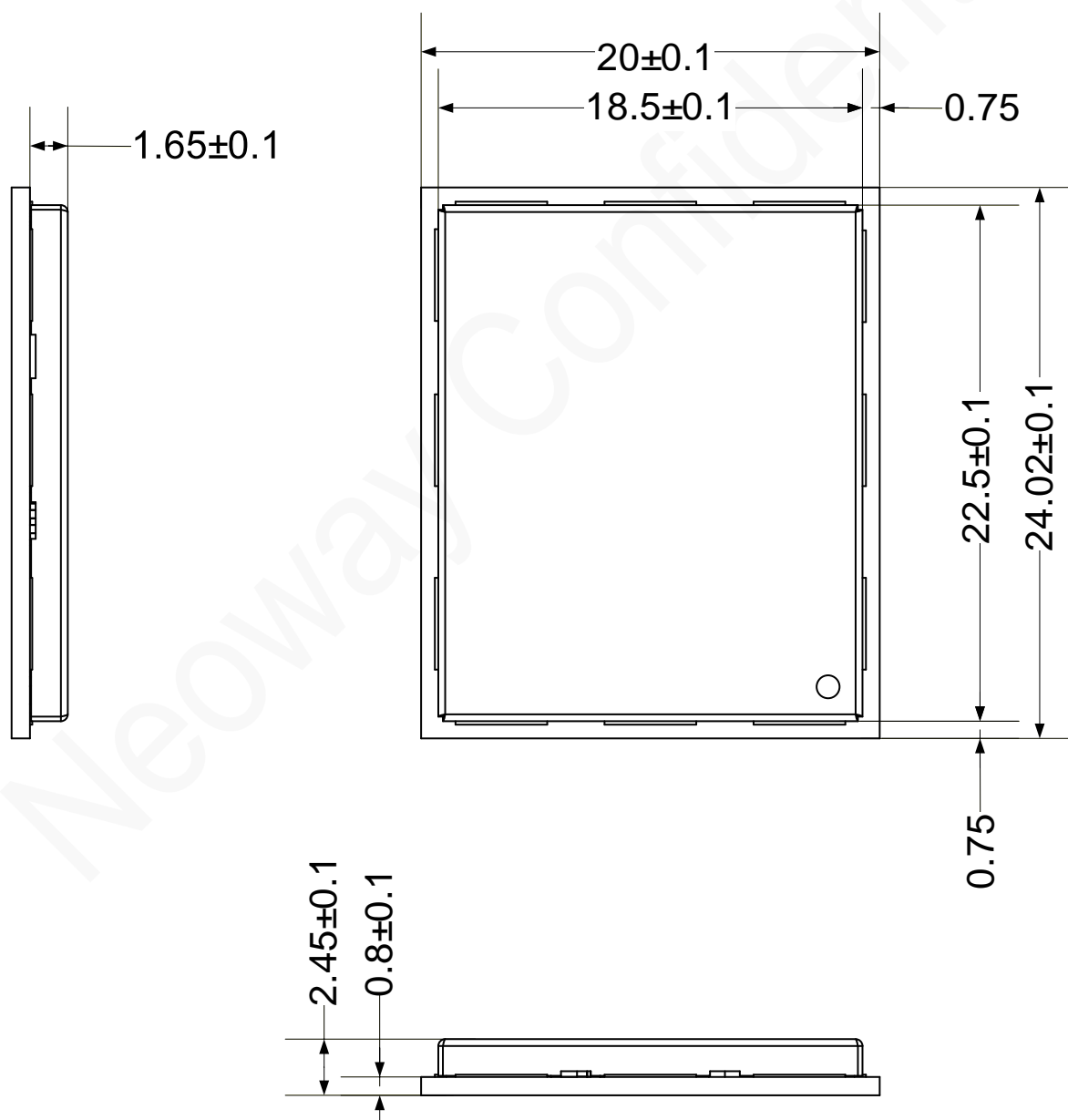
The values were obtained by RF analyzers in lab.

6 Mechanical Features

This chapter describes the mechanical features of N25.

6.1 Dimensions

Figure 6-1 N25 dimensions (Unit: mm)



6.2 Label

Figure 6-2 shows the label of N25.

Figure 6-2 N25 label

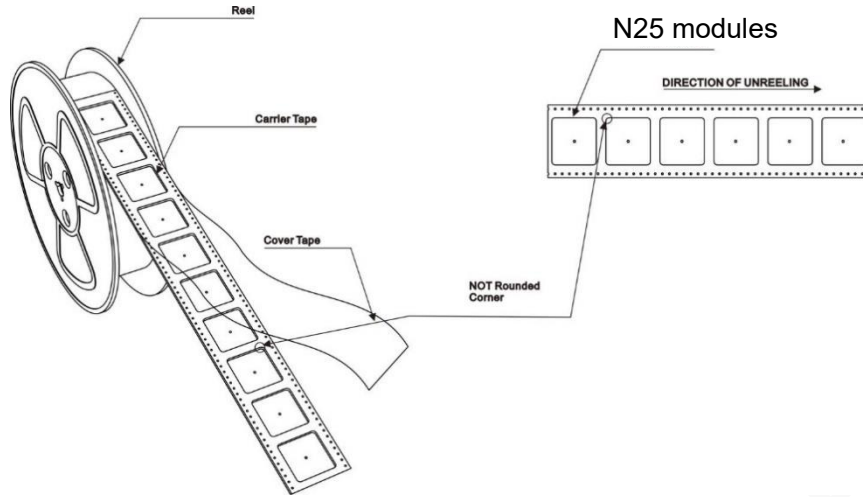


6.3 Package

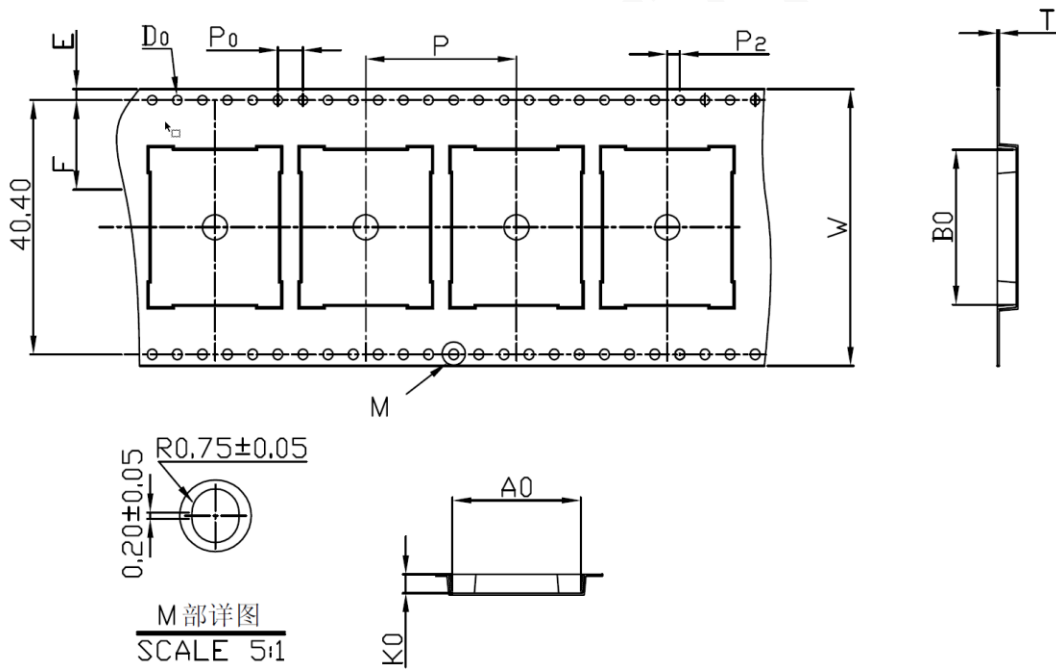
N25 modules are packed in sealed bags on delivery to guarantee a long shelf life. Follow the same package of the modules again in case of opened for any reasons.

6.3.1 Tape & Reel Packaging

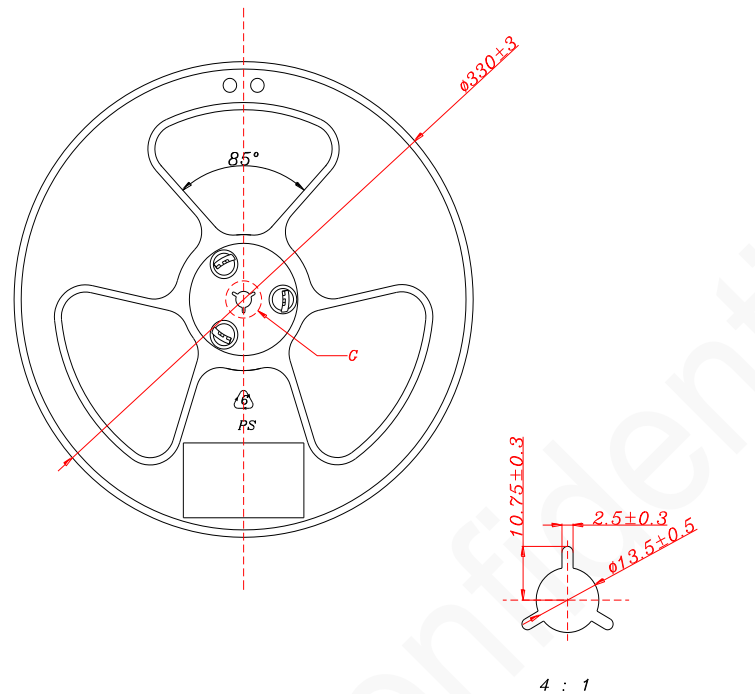
N25 in mass production are shipped in the following package.



Tape



Reel



6.3.2 Moisture-Sensitive

N25 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 $30^\circ\text{C}/60\% \text{RH}$, bake it at a temperature higher than 90°C 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.

6.4 Storage Conditions

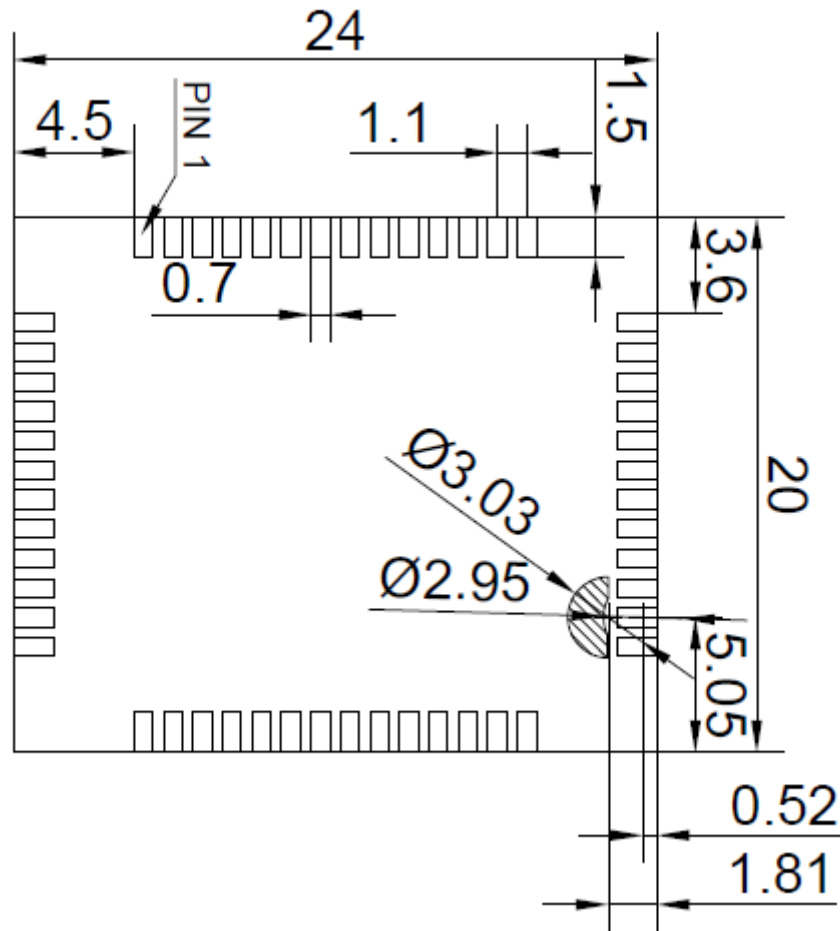
- Temperature: $20^\circ\text{C} \sim 26^\circ\text{C}$
- Humidity: 40%-60%
- Period: 120 days

7 Application Design and SMT

N25 is introduced in 52-PIN LGA package. This chapter provides N25 foot print, recommended PCB design and SMT information to guide users how to mount the module onto application PCB board.

7.1 N25 Foot Print

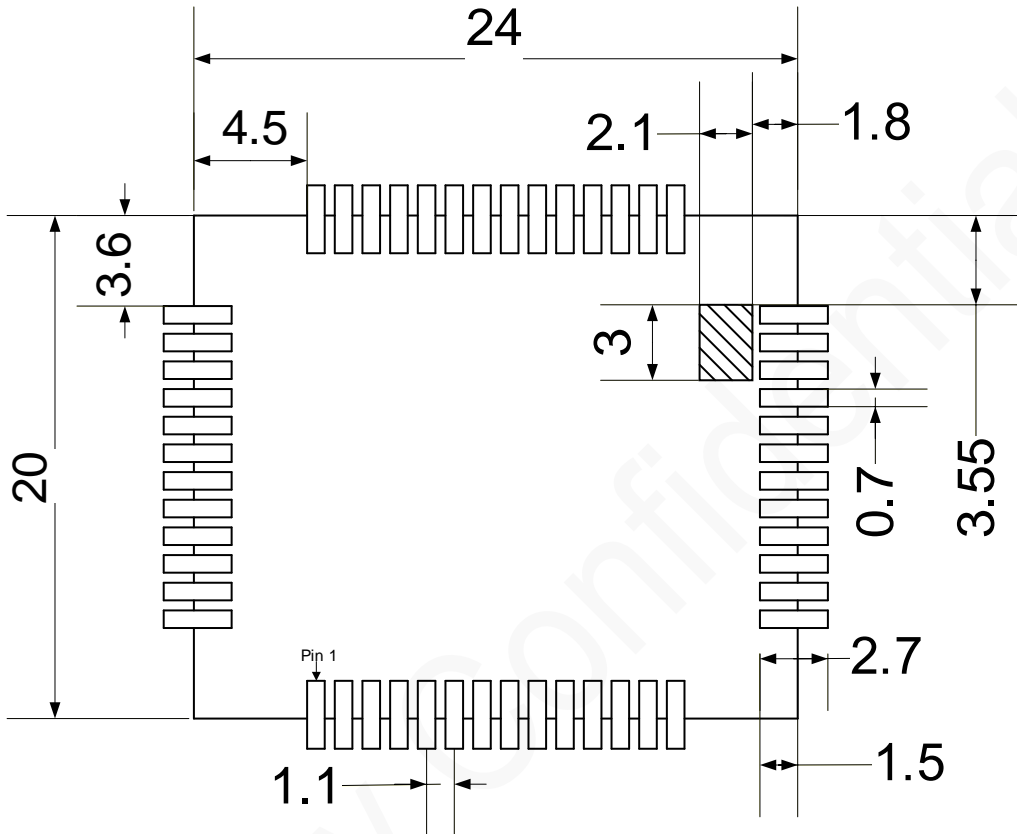
Figure 7-1 N25 foot print (bottom view)



7.2 Application Foot Print

Figure 3-1 shows the recommended application PCB foot print. (Unit: mm)

Figure 7-2 Application PCB foot print (top view)



The area on the module corresponding to the shade is GND copper foil for production. Do Not route any signal lines or drill signal via-holes in the shaded area of the application PCB. Only GND traces and GND via-holes are allowed in this area. Otherwise, the signal lines might be short-circuited.

7.3 Stencil

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

7.4 Solder Paste

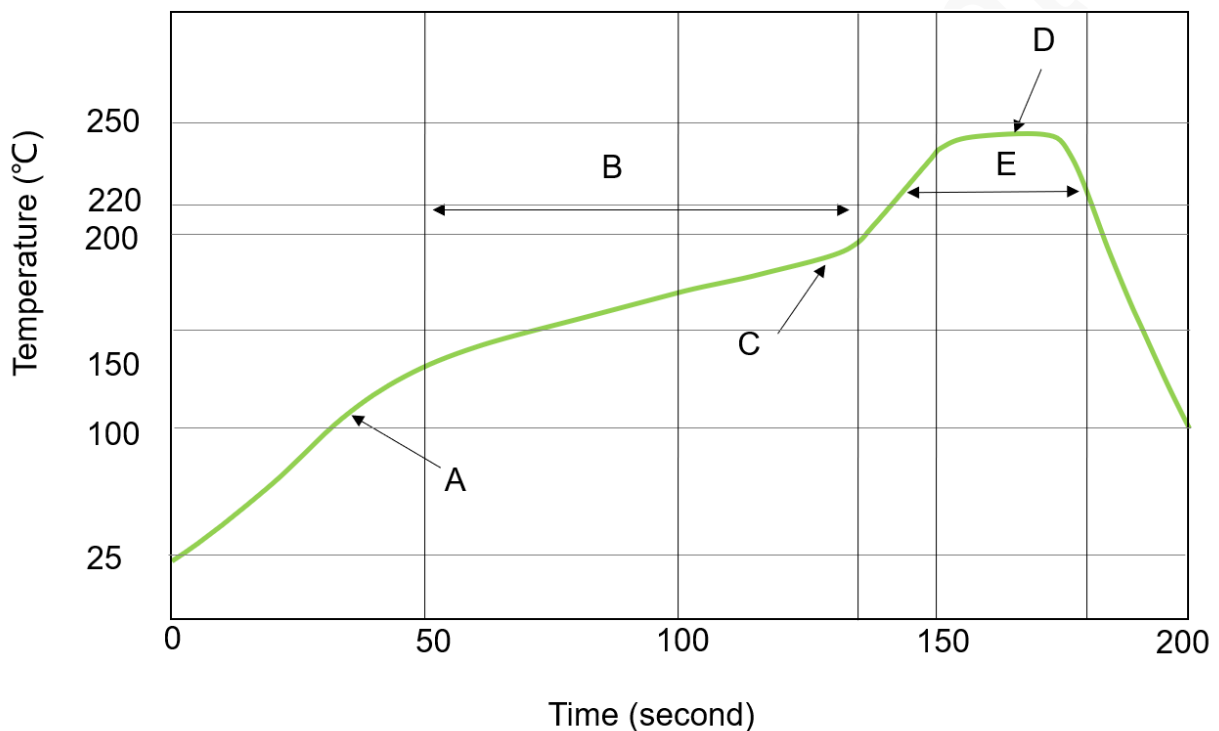
Do not use a kind of solder paste different from our module technique.

- 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 LGA 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.

7.5 Reflow Profile

N25 is compatible with industrial standard reflow profile for lead-free SMT process.

Figure 7-3 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 N25 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.

Neoway Confidential

8 Safety Recommendations

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

- 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 hospitals or airplanes 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 connect the product to a stable power supply and route traces following fire safety standards.
- Please avoid touching the pins of the module directly in case of damages caused by ESD.
- Do not remove the USIM card in idle mode if the module does not support hot-plugging.