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N720 OpenLinux Specifications

Version 1.0

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Notice

This document provides guide for users to use the N720 OpenLinux.

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

The information in this document is subject to change without notice due to product version update or other reasons.

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Contents

1 Overview 1

2 Compliant Standards 2

3 Features 3

4 Specifications and Pin Definition 5

5 PCB Foot Print 8

6 Electrical Features and Reliability 9

1.2 Temperature 9

1.3 Operating Band 9

1.4 TX Power and RX Sensitivity 10

1.5 GNSS Features 11

1.6 ESD Features 12

7 Mounting the Module onto the Application Board 13

8 Packaging and Storage 14

1.7 Packaging 14

1.8 Storage Conditions 15

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Table of Figures

Figure 1-1 Top view of N720 OpenLinux 5

Figure 4-2 Bottom view of N720 OpenLinux 5

Figure 4-3 N720 OpenLinux module pin definition (Top View) 6

Figure 4-4 N720 OpenLinux dimensions 7

Figure 5-1 N720 OpenLinux PCB foot print(Top View) 8

Figure 8-1 N720 OpenLinux tray 14

Figure 8-2 N720 OpenLinux package 14

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Table of Tables

Table 1-1 Variants and bands 1
Table 3-1 N720 OpenLinux baseband and wireless features 3
Table 4-1 N720 OpenLinux dimensions 5
Table 6-1 Temperature feature 9
Table 6-2 N720 OpenLinux operating band 9
Table 6-3 N720 OpenLinux RF power and RX sensitivity 10
Table 6-4 GNSS parameters 11
Table 6-5 N720 OpenLinux ESD features 12

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1 Overview

N720 OpenLinux is an industrial-grade 4G module developed on Qualcomm platform. Its dimensions are 30 mm x 28 mm x 2.8 mm. This module has an ultra-wide operating temperature range of -40 °C to +85 °C and electrostatic capacity of 8 kV. N720 OpenLinux is well applicable to develop MiFi, wireless meter reading terminal, in-vehicle computers, POS, industrial routers, and other IoT terminals with the following features:

- ARM Cortex-A7 processors, 1.3 GHz main frequency, 256 kB L2 cache, 28 nm process technology
- GSM/GPRS/EDGE &CDMA2000 1x/1xAdvanced/1xEV-DOrA &&WCDMA R99 to DC-HSPA+&&TD-SCDMA&LTE Cat4
- USB2.0/ SIM/ADC/UART/ SPI/I2C/SGMII/SDIO

N720 OpenLinux includes the following two variants:

Table 1-1 Variants and bands

Module	Variant	Region	Category	Band
N720 OpenLinux	CA	China	Cat4	LTE FDD: B1, B3, B5, B8 LTE TDD: B38, B39, B40, B41 TD-SCDMA: B34, B39 UMTS: B1, B8 EV-DO: BC0 CDMA 1x: BC0 GSM/GPRS/EDGE: 900/1800 MHz
	EA	Europe	Cat4	LTE FDD: B1, B3, B5, B7, B8, B20 LTE TDD: B40 UMTS: B1, B8 GSM/GPRS/EDGE: 900/1800 MHz

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2 Compliant Standards

1. 3GPP TS 07.07*AT command set for GSM Mobile Equipment (ME)*
2. YD 1214-2006 *Technical requirement of 900/1800MHz TDMA Digital Cellular Mobile Telecommunication Network General Packet Radio Service (GPRS)Equipment: Mobile Stations*
3. YD 1215-2006*Testing Methods of 900/1800MHz TDMA Digital Cellular Mobile Telecommunication Network General Packet Radio Service (GPRS)Equipment: Mobile Stations*
4. YD 1032-2000*Limits and Measurement Methods of Electromagnetic Compatibility for 900/1800MHz Digital Cellular Telecommunications System Part1:Mobile Station and Ancillary Equipment*
5. YD/T 2220-2011 *Technical Requirement and test method of WCDMA/GSM(GPRS) dual mode digit mobile user equipment (phase 4)*
6. Ministry of Industry and Information Technology PRC, *Measures for the Network Access Management of Telecommunication Equipment (2014 Amendment)*
7. GB4943.1-2011 *Information technology equipment - Safety - Part 1: General requirements*
8. GB/T22450.1-2008 *Limits and measurement methods of electromagnetic compatibility for 900/1800MHz TDMA digital cellular telecommunications system - Part 1: Mobile station and ancillary equipment*
9. CNCA-O7C-031:2007*Rules for Compulsory Certification of Telecommunication Equipment Telecommunication Terminal Equipment*
10. 3GPP TS GSM *Specification Set*
11. 3GPP TS WCDMA *Specification Set*
12. CDMA2000@1x,1xAdvanced,1xEV-DOrA *Specification Set*
13. 3GPP TS LTE Cat4 4G *Specification Set*

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3 Features

Table 3-1 N720 OpenLinux baseband and wireless features

Specifications	Description
Power supply	VBAT: 3.3V to 4.3V; Typical value: 3.8 V
Current in sleep mode	< 4 mA
Current in idle mode	< 20 mA
Operating temperature	-40 °C to +85 °C
Processor	ARM Cortex-A7 processor Main frequency: 1.3 GHz 256 kB L2 cache
Memory	RAM: 256MB ROM: 512MB
Band	See Table 1-1
Rate	GPRS: Max 85.6 Kbps(DL) / Max 85.6 Kbps(U) CDMA: Max 3.1 Mbps (DL) / Max 1.8 Mbps (UL) WCDMA: DC-HSPA+, Max 42 Mbps(DL)/Max 5.76 Mbps(UL) TD-SCDMA: Max 4.2 Mbps(DL)/Max 2.2 Mbps(UL) FDD-LTE: non-CA cat4, Max 150 Mbps(DL)/Max 50 Mbps(UL) TDD-LTE: non-CA cat4, Max 130 Mbps(DL)/Max 35 Mbps(UL)
Transmit power	EGSM900: +33 dBm (Power Class 4) DCS1800: +30 dBm (Power Class 1) EDGE 900 MHz: +27 dBm (Power Class E2) EDGE1800 MHz: +26 dBm (Power Class E2) TD-SCDMA:+23 dBm (Power Class 3) CDMA 1X/EVDO:+23 dBm(Power Class 3) UMTS: 23 dBm (Power Class 3) LTE: +23 dBm (Power Class 3)
Antenna	2G/3G/4G antenna, 4G diversity antenna, GNSS antenna, 50 Ω impedance
UART	At most 4 Mbps, 3 UART interfaces
I2C	2 I2C interfaces, master mode only
SPI	1 SPI interface, master mode only 50 Mbps at most
UIM	1 UIM interface, 1.8V/3V dual-voltage adaptive
USB	1 USB2.0 high-speed interface
ADC	2 15-bit ADC interfaces, detectable voltage ranging from 0.1 V to 1.7 V

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SDIO	1 SDIO interface, used for WLAN
GPIO	8 GPIOs, for users to develop
SGMII	Ethernet interface

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4 Specifications and Pin Definition

Table 4-1 N720 OpenLinux dimensions

Specifications	N720 OpenLinux
Dimensions (H x W x D)	(28±0.1) mm x (30±0.1) mm x (2.8±0.1) mm
Weight	5.1 g
Package	100-pin LGA

Figure 1-1 Top view of N720 OpenLinux

Figure 4-2 Bottom view of N720 OpenLinux

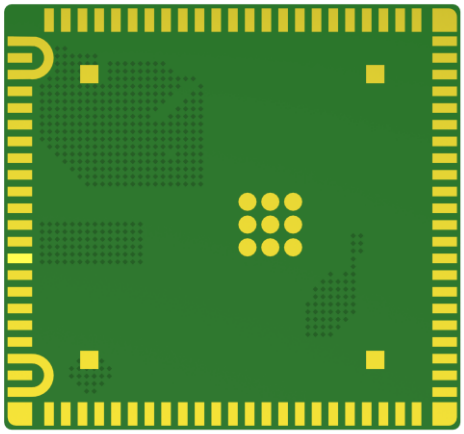

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Figure 4-3 N720 OpenLinux module pin definition (Top View)

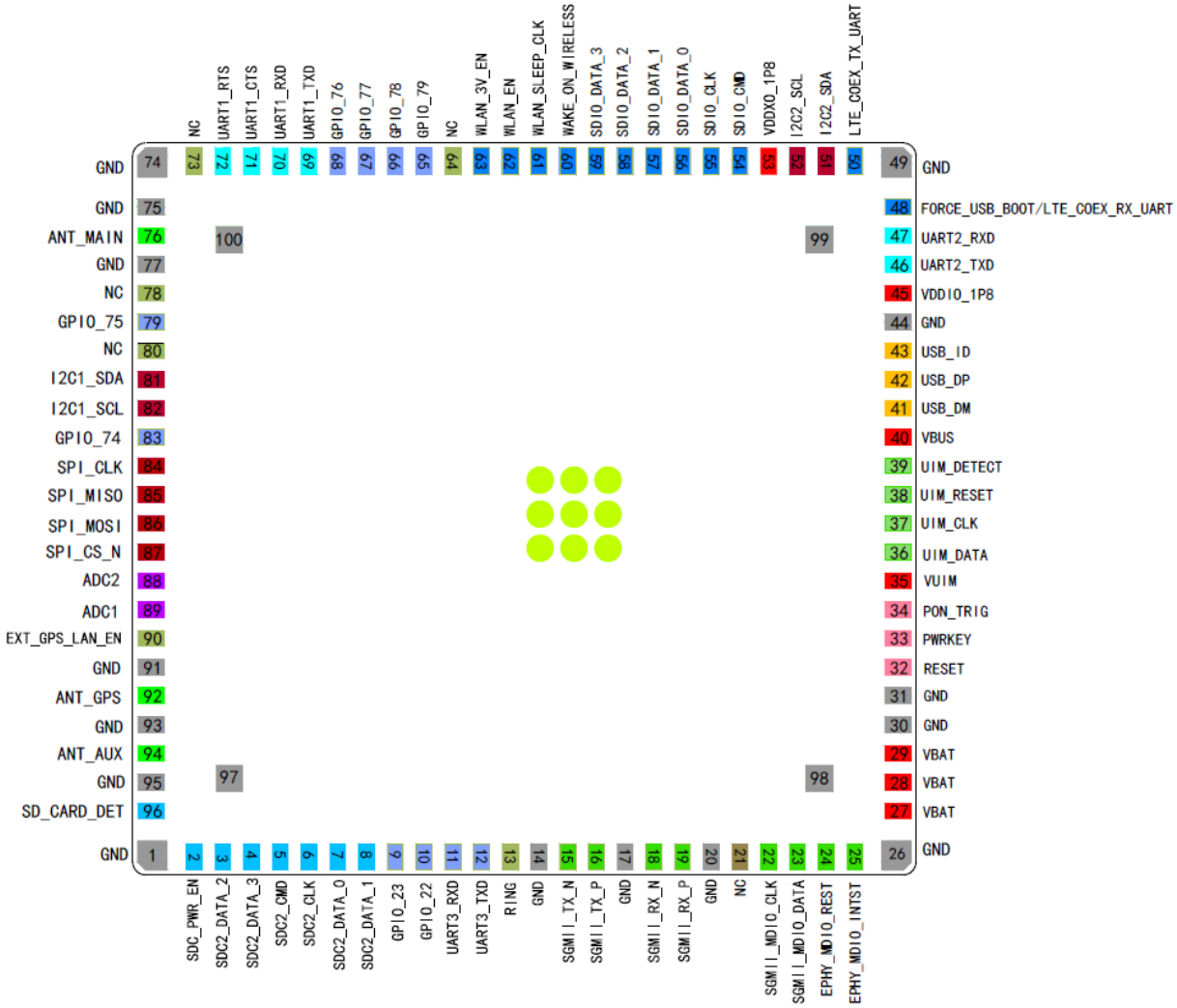
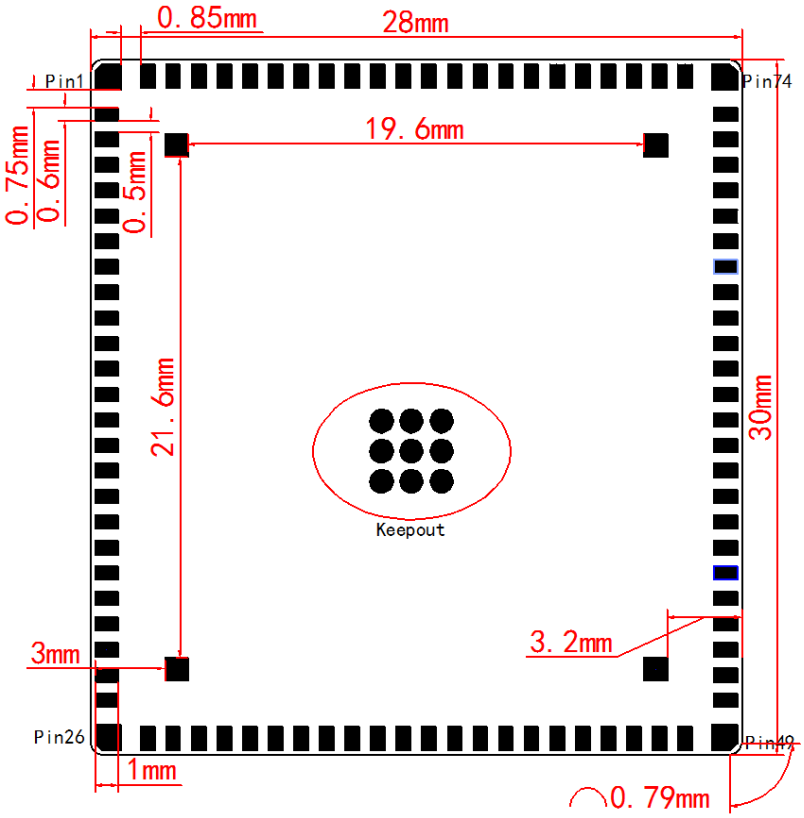
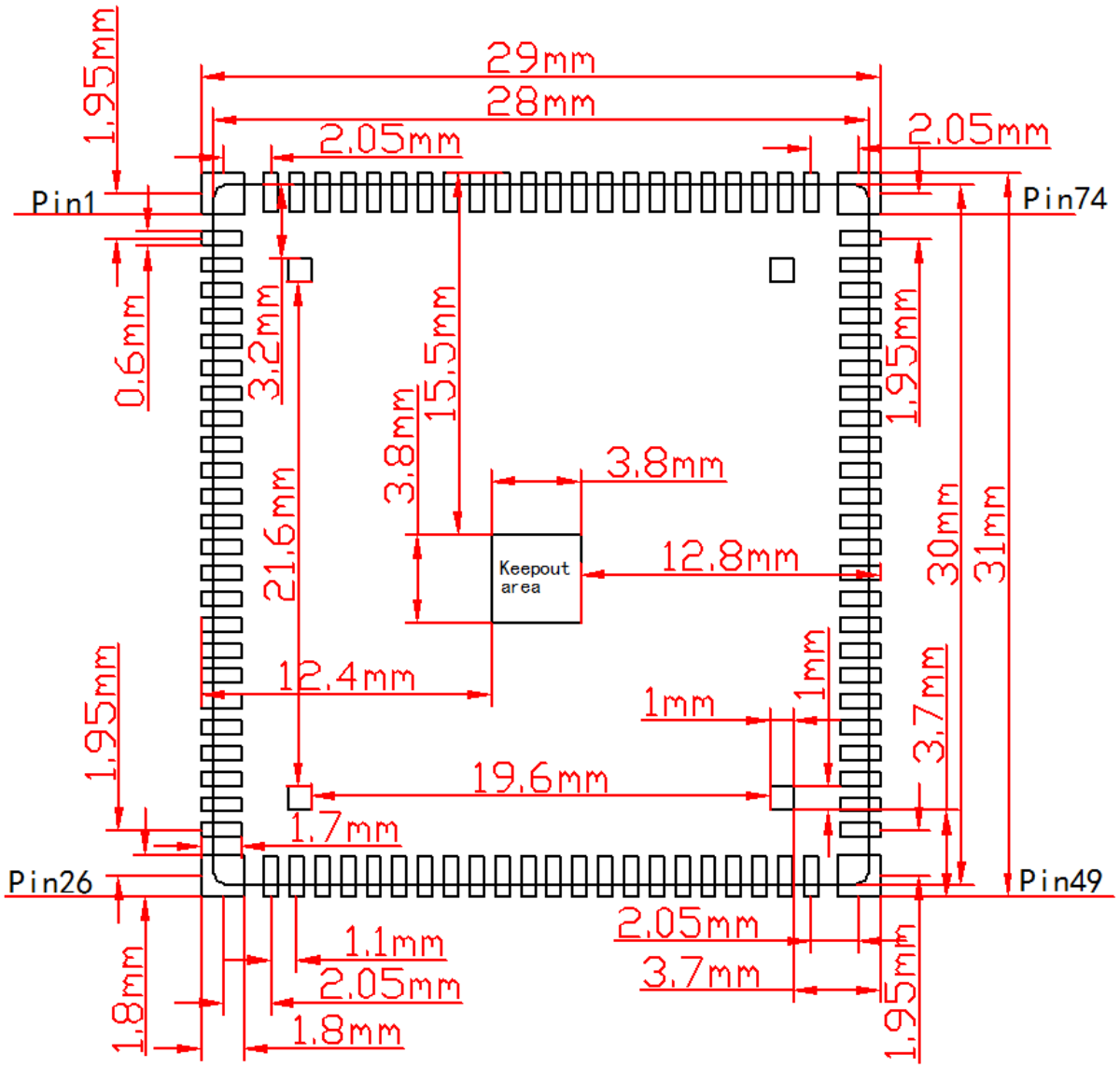


Figure 4-4 N720 OpenLinux dimensions



5 PCB Foot Print

Figure 5-1 N720 OpenLinux PCB foot print(Top View)



CAUTION

A test point is reserved at the Silk Area. It is recommended that a layer of white ink is added in case short circuit. Do not layout any trace under the JTAG pin.

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6 Electrical Features and Reliability

1.2 Temperature

Table 6-1 Temperature feature

Module Status	Minimum Value	Typical Value	Maximum Value
Work	-40 °C	25 °C	85 °C
Storage	-45 °C		90 °C

CAUTION

If the module works in temperature exceeding the thresholds, its RF performance might be worse but it can still work properly.

1.3 Operating Band

Table 6-2 N720 OpenLinux operating band

Operating band	Uplink	Downlink
EGSM900	880~915 MHz	925~960 MHz
DCS1800	1710~1785 MHz	1805~1880 MHz
CDMA BC0	824~849 MHz	869~894 MHz
UMTS B1	1920~1980 MHz	2110~2170 MHz
UMTS B8	880~915 MHz	925~960 MHz
TD-SCDMA B34	2010~2025 MHz	2010~2025 MHz
TD-SCDMA B39	1880~1920 MHz	1880~1920 MHz
FDD-LTE B1	1920~1980 MHz	2110~2170 MHz
FDD-LTE B3	1710~1785 MHz	1805~1880 MHz
FDD-LTE B5	824~849 MHz	869~894 MHz
FDD-LTE B7	2500~2570 MHz	2620~2690 MHz
FDD-LTE B8	880~915 MHz	925~960 MHz
FDD-LTE B20	832~862 MHz	791~821 MHz
TDD-LTE B38	2570~2620 MHz	2570~2620 MHz

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TDD-LTE B39	1880~1920 MHz	1880~1920 MHz
TDD-LTE B40	2300~2400 MHz	2300~2400 MHz
TDD-LTE B41	2555~2655 MHz	2555~2655 MHz

1.4 TX Power and RX Sensitivity

Table 6-3 N720 OpenLinux RF power and RX sensitivity

Band	Transmitting Power	Receiving Sensitivity
EGSM900	33 dBm+2/-2 dBm	<-108 dBm
DCS1800	30 dBm+2/-2 dBm	<-108 dBm
CDMA BC0	24dBm+1/-1 dBm	<-107 dBm
UMTS B1	24 dBm +1/-3 dBm	<-108 dBm
UMTS B8	24 dBm +1/-3 dBm	<-109 dBm
TD-SCDMA B34	24 dBm +1/-3 dBm	<-109 dBm
TD-SCDMA B39	24 dBm +1/-3 dBm	<-109 dBm
FDD-LTE B1 (10 MHz)	23mdBm+2/-2 dBm	<-97 dBm
FDD-LTE B3 (10 MHz)	23 dBm+2/-2 dBm	<-95 dBm
FDD-LTE B5(10 MHz)	23 dBm+2/-2 dBm	<-95 dBm
FDD-LTE B7(10 MHz)	23 dBm+2/-2 dBm	<-95 dBm
FDD-LTE B8(10 MHz)	23 dBm+2/-2 dBm	<-95 dBm
FDD-LTE B20(10 MHz)	23 dBm+2/-2 dBm	<-95 dBm
TDD-LTE B38(10 MHz)	23 dBm+2/-2 dBm	<-97 dBm
TDD-LTE B39(10 MHz)	23 dBm+2/-2 dBm	<-97 dBm
TDD-LTE B40(10 MHz)	23 dBm+2/-2 dBm	<-97 dBm
TDD-LTE B41(10 MHz)	23 dBm+2/-2 dBm	<-95 dBm

NOTE

All the values above are obtained in the lab environment. In actual applications, there might be a difference because of the network environment.

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1.5 GNSS Features

Table 6-4 GNSS parameters

Parameter	Value
GPS L1 operating frequency	1575.42±1.023MHz
GLONASS operating frequency	1597.5~1605.9 MHz
BDS operating frequency	1559.1~1563.1 MHz
Tracking sensitivity	-160dBm (GPS)/-159.5 dBm (GLONASS)/TBD (Beidou)
Capturing sensitivity	-144 dBm (GPS)/-143.5 dBm (GLONASS)
Positioning precision (in air)	< 3m (CEP50)
Hot start (in air)	<2.5s
Cold start (in air)	<35s
Update frequency	1Hz by default
CNRin/CNRout	3 dB
Max. positioning altitude	18000 m
Max. positioning speed	515 m/s
Max. positioning acceleration	4 g
GNSS data type	NMEA-0183
GNSS antenna type	Passive/active antenna

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1.6 ESD Features

Humidity: 45% Temperature: 25 °C

Table 6-5 N720 OpenLinux ESD features

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

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7 Mounting the Module onto the Application Board

N720 OpenLinux 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 volume. Minimum of 0.12 mm to 0.15mm stencil thickness is recommended.
- Use bigger aperture size of the stencil than actual pad size.
- Use a low-residue, no-clean type solder paste.

For information about cautions in N720 OpenLinux storage and mounting, refer to *Neoway Module Reflow Manufacturing Recommendations*.

When maintaining and manually desoldering it, use heat guns with great opening, adjust the temperature to 250 degrees (depending on the type of the solder paste), and heat the module till the solder paste is melt. Then remove the module using tweezers. Do not shake the module in high temperature when removing it. Otherwise, the components inside the module might get misplaced.

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8 Packaging and Storage

1.7 Packaging

N720 OpenLinux modules are packaged in sealed bags on delivery to guarantee a long shelf life. Package the modules again in case of opening for any reasons.

If exposed to air for more than 48 hours at conditions not worse than 30 °C/60% RH, a baking procedure should be done 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.

Figure 8-1 N720 OpenLinux tray

Figure 8-2 N720 OpenLinux package

1.8 Storage Conditions

- Temperature: 20°C~ 26°C
- Humidity: 40%-60%
- Period: 120 days

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