NL04A

Datasheet

Includes:

NL04A

version 1.0

Nanoleaf

About This Guide

This document provides introduction to the specifications of NL04A and hardware.

Release Notes

Date	version	Release notes
2022.07	V1.0	First release.

Documentation Change Notification

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Certification

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1. Overview

NL04A is EFR32MG24-based modules developed by Nanoleaf.

Table 1-1. NL04A

Module	NL04A
Core	EFR32MG24
Antenna	Onboard antenna
Dimensions (unit: mm)	(17.50 ± 0.10) x (22.50 ± 0.10) x (3.20 ± 0.10) .
Schematics	See *Figure 5-1* for details.

> 📖 ***Note:***
> *For more information on EFR32MG24, please refer to EFR32MG24 Datasheet.*

Table 1-2. NL04A Specifications

Categories	Items	Specifications
Certification	RF certification	SRRC, FCC, CE (RED), IC, NCC, KCC, TELEC (MIC) **(All Ongoing)
	Green certification	RoHS, REACH
Test	Reliablity	HTOL/HTSL/uHAST/TCT/ESD
BLE	Modulation Type	GFSK
	Frequency range	2402 MHz ~ 2480 MHz
Thread	Modulation Type	QPSK
	Frequency range	2405 MHz ~ 2480 MHz
Hardware	Peripheral interface	ADC/GPIO/I²C/I²S/SPI/UART
		GPIO/PWM
	Operating voltage	2.7 V ~ 3.8 V
	Operating current	Average: 10 mA
	Minimum current delivered by power supply	200 mA
	Operating temperature range	-40 °C ~ 85 °C
	Storage temperature	-40 °C ~ 85 °C

本模块为完整独立操作发射模块，CMIIT ID：
如产品只使用本无线发射模块时，应在最终产品上标志本模块的CMIIT ID码。

Categories	Items	Specifications
Software	External interface	-
	Moisture sensitivity	level Level 3
	Firmware upgrade	OTA (via network)/Download and write via host
	Software development	Supports Cloud Server Development/SDK for custom firmware development
	User configuration	Cloud Server, Android/iOS app

2. Pin Description

Figure 2-1 shows the pin distribution of the NL04A.

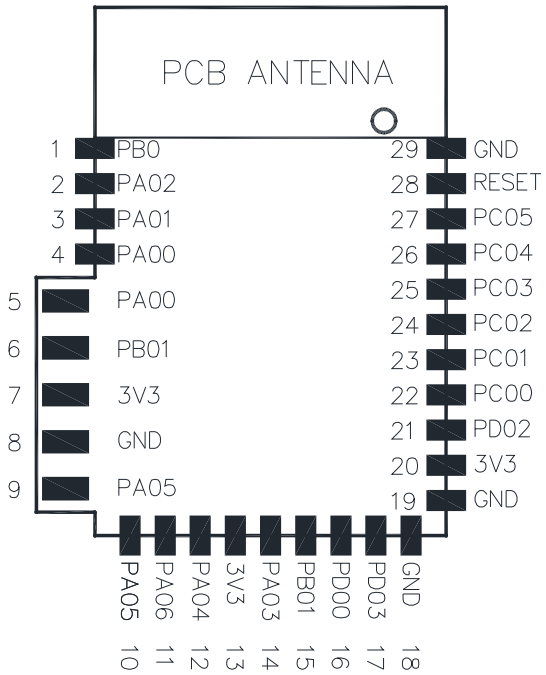

Figure 2-1. NL04 Pin Layout (Top View)

> **Note:**
> *All Gnd Pin should connect to Fatherboard GND*

NL04A have 29 pins. Please see the pin definitions in Table 2-1.

Table 2-1. NL04A Pin Definitions

3. Functional Description

3.1. Core

The ARM Cortex-M processor includes a 32-bit RISC processor integrating the following features and tasks in the system:

- ARM Cortex-M33 RISC processor achieving 1.50 Dhrystone MIPS/MHz
- ARM TrustZone security technology
- Embedded Trace Macrocell (ETM) for real-time trace and debug
- Up to 1536 kB flash program memory
- Up to 256 kB RAM data memory
- Configuration and event handling of all modules
- 2-pin Serial-Wire debug interface

3.2. Memory

3.2.1. SPI Flash

NL04A currently integrate a 8-Mbit SPI flash and also supports these SPI modes: Standard SPI, DIO (Dual I/O), DOUT (Dual Output), QIO (Quad I/O) and QOUT (Quad Output).

4. Electrical Characteristics

> **Note:**
> *Unless otherwise specified, measurements are based on VDD = 3.3 V, TA = 25 °C.*

4.1. Electrical Characteristics

Table 4-1. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Operating temperature	-	-40	20	85	℃
Maximum soldering temperature (Condition: IPC/JEDEC J-STD-020)	-	-	-	260	℃
Supply voltage	VDD	2.7	3.3	3.8	V
Input logic level low	V_{IL}	-	-	0.3*IOVDD	V
Input logic level high	V_{IH}	0.7*IOVDD	-	-	V
Output logic level low	V_{OL}	-	-	0.2*IOVDD	V
Output logic level high	V_{OH}	0.8*IOVDD	-	-	V

4.2. RF Radio

Table 4-2. RF Radio Characteristics

MODE	Description	Min	Typ	Max	Unit
Thread Radio, 250 kbps O-QPSK DSSS	Input frequency	2405	-	2480	MHz
	Output Power	-	-	10	dBm
	Sensitivity	-	-104.5	-	dBm
Bluetooth® Low Energy Radio GFSK	Input frequency	2402	-	2480	MHz
	Output Power	-	-	10	dBm
	Sensitivity@1 Mbps GFSK	-	-94.4	-	dBm

4.3. Power Consumption

The following power consumption data were obtained from the tests with a 3.3 V power supply and a voltage stabilizer, in 25 °C ambient temperature. All data are based on 50% duty cycle in continuous transmission mode.

Table 4-3. Power Consumption

MODE	Specs	Min	Typ	Max	Unit
Thread Radio, 250 kbps O-QPSK DSSS	Thread Radio, Active RX Mode	-	9.4	-	mA
	Active TX Mode @ 0 dBm	-	9.3	-	mA
	Active TX Mode @ 10 dBm	-	33.8	-	mA
Bluetooth® Low Energy Radio	Thread Radio, Active RX Mode	-	8.8	-	mA
	Active TX Mode @ 0 dBm	-	9.3	-	mA
	Active TX Mode @ 10 dBm	-	33.8	-	mA

4.4. Reflow Profile

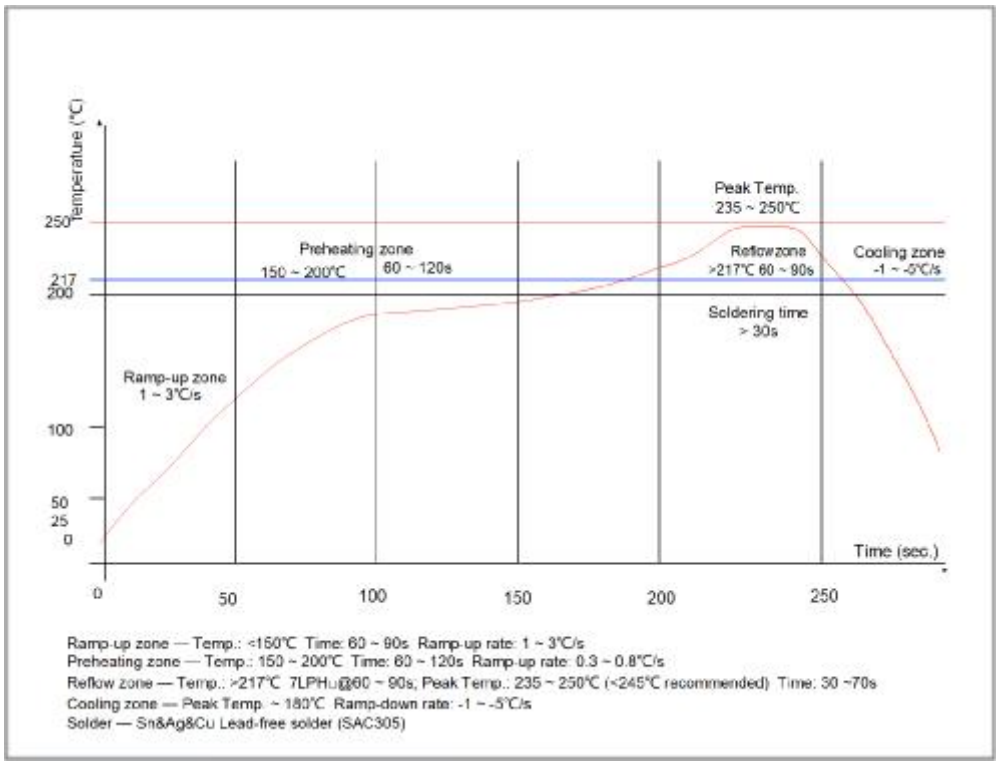

Figure 4-1. NL04A Reflow Profile

> **Note:**
>
> *Solder the module in a single reflow. If the PCBA requires multiple reflows, place the module on the PCB during the final reflow.*

4.5. Electrostatic Discharge

Table 4-4. Electrostatic Discharge Parameters

Name	Symbol	Reference	Level	Max	Unit
Electrostatic Discharge (Human - Body Model)	V_{ESD} (HBM)	Temperature: 23 ± 5 ℃ Based on ANSI/ESDA/JEDEC JS - 001 - 2014	2	2000	V
Electrostatic Discharge (Charged - Device Model)	V_{ESD} (CDM)	Temperature: 23 ± 5 ℃ Based on JEDEC EIA/JESD22 - C101F	C2	500	

NCC警語：取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。
前述合法通信，指依電信管理法規定作業之無線電通信。
低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate this device.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Note: This device has been tested and found to comply with the limits for a Class B digital device, according to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses, and can radiate radio frequency energy and, if not installed and used following the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the device and receiver.
- Connect the device into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Radiation Exposure Statement
This device complies with FCC radiation exposure limits set forth for an uncontrolled rolled environment. This device should be installed and operated with a minimum distance of 20cm between the radiator and your body.
Important Note
This radio module must not be installed to co-locate and operating simultaneously with other radios in the host system except following FCC multi-transmitter product procedures. Additional testing and device authorization may be required to operate simultaneously with other radios.
The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end-user.
The host product manufacturer is responsible for compliance with any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.
The end-user manual shall include all required regulatory information/warnings as shown in this manual, including “This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body”.
This device has got an FCC ID: 2AEWY-NL04A. The end product must be labeled in a visible area with the following: “Contains Transmitter Module FCC ID: 2AEWY-NL04A”.
This device is intended only for OEM integrators under the following conditions:
The antenna must be installed such that 20cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna.
As long as the 2 conditions above are met, further transmitter tests will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.
ISED Statement:
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:
1.This device may not cause interference.
2.This device must accept any interference, including interference that may cause undesired operation of the device.
Cet appareil contient des émetteurs/récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d’Innovation, Sciences et Développement économique Canada. L’exploitation est soumise aux deux conditions suivantes :
1.Cet appareil ne peut pas provoquer d’interférences.
2.Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l’appareil.

This device has got an IC: 20489-NL04A. The end product must be labeled in a visible area with the following: “Contains Transmitter Module IC: 20489-NL04A”.

Cet appareil a un IC:20489-NL04A. Le produit final doit être étiqueté dans une zone visible avec ce qui suit?"Contient le circuit intégré du module émetteur?IC:20489-NL04A".
Le manuel de l'utilisateur final doit inclure toutes les informations/avertissements réglementaires requis, comme indiqué dans ce manuel, y compris "Ce produit doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et le corps de l'utilisateur".

A. Appendix—Learning Resources