Z1-N module specification

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Catalogue

1 Product Overview

Z1-N has a built-in 32-bit MCU with a maximum operating speed of up to 120 MHz, built-in 2 Mbyte flash memory, and 256 KB of RAM. Support graffiti IoT cloud connectivity, and MCU's instructions specifically designed for signal processing extensions enable effective audio encoding and decoding.

Z1-N has a wide range of peripherals, such as PWM and UART. Up to five 32-bit PWM outputs make the chip very suitable for high-quality LED control.

1.1 Characteristics

Built-in low-power 32-bit CPU, which can also serve as an application processor

The main frequency supports 120MHz

Working voltage: 3.0V-3.6V

Peripherals: 8 × GPIO, 2 × UART

- Wi Fi connectivity

– 802.11 b/g/n

- Channel 1-14@2.4GHz (CH1-11 for US/CA/TW, CH1-13 for EU/CN, CH1-14 for JP)

- Support WEP, WPA/WPA2, WPA/WPA2 PSK (AES), WPA3 security modes

- Maximum output power of +17.61dBm in 802.11b mode

- Supports STA/AP/STA+AP working modes

- Supports two distribution methods: SmartConfig and AP (including Android and iOS devices)

On board PCB antenna, antenna peak gain 0.72dBi

- Working temperature: -40 ℃ to 85 ℃

• Bluetooth connectivity

Low power Bluetooth V5.2 complete standard

1.2 Application Fields

• Intelligent buildings

•Smart home and home appliances
•Smart sockets, smart lights

•Industrial wireless control

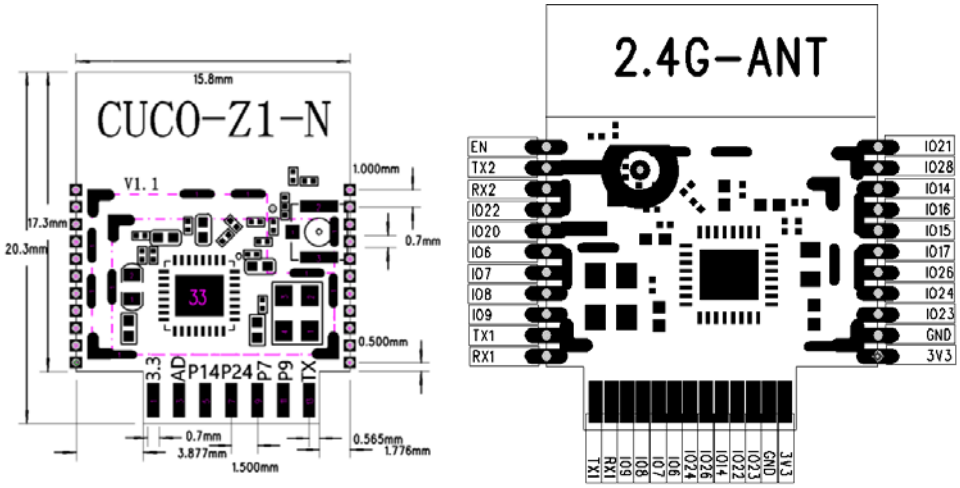
• Baby monitor

• Webcam

•Intelligent public transportation

2 module interface

2．1 size package



2.2 Pin definition

1 3.3V P module 3.3V power supply pin

2 GND P Module ground pin

3 IO23 /ADC I/O General GPIO pin, corresponding to PA23 of IC

4 IO22 I/O General GPIO pin, corresponding to PA22 of IC

5 IO14 I/O General GPIO pin, corresponding to P14 of IC

6 IO26 I/O General GPIO pin, corresponding to P26 of IC

7 IO24 I/O General GPIO pin, corresponding to P24 of IC

8 IO6 I/O General-purpose GPIO pin, corresponding to P6 of IC

9 IO7 I/O General-purpose GPIO pin, corresponding to P7 of IC

10 IO8 I/O General GPIO pin, corresponding to P8 of IC

11 IO9 I/O General-purpose GPIO pin, corresponding to P9 of IC

12 RX1 I/O General GPIO pin, corresponding to P10 of IC

13 TX1 I/O General GPIO pin, corresponding to P11 of IC

The following are the module patch pins (partially multiplexed plug-in pins)

14 RX1 I/O General GPIO pin, corresponding to P10 of IC

15 TX1 I/O General GPIO pin, corresponding to P11 of IC

16 IO9 I/O General GPIO pin, corresponding to P9 of IC

17 IO8 I/O General GPIO pin, corresponding to P8 of IC

18 IO7 I/O General GPIO pin, corresponding to P7 of IC

19 IO6 I/O General-purpose GPIO pin, corresponding to P6 of IC

20 IO20 I/O General GPIO pin, corresponding to P20 of IC

21 IO22 I/O General GPIO pin, corresponding to P22 of IC

22 RX2 I/O General GPIO pin, corresponding to P1 of IC

23 TX2 I/O General GPIO pin, corresponding to P0 of IC

24 EN P Potential energy pin of the module chip, pull-down is valid, internally pull up

25 IO21 I/O module chip selection pin, pull down to enter the programming mode,Corresponding to ICP21

26 IO28 I/O General GPIO pin, corresponding to P28 of IC

27 IO14 I/O General GPIO pin, corresponding to P14 of IC

28 IO16 I/O General GPIO pin, corresponding to P16 of IC

29 IO15 I/O General GPIO pin, corresponding to P15 of IC

30 IO17 I/O General GPIO pin, corresponding to P17 of IC

31 IO26 I/O General GPIO pin, corresponding to P26 of IC

32 IO24 I/O General GPIO pin, corresponding to P24 of IC

33 IO23/ADC I/O General GPIO pin, corresponding to PA23 of IC

34 GND P Module ground pin

35 3V3 P module power supply pin

The definition of interface pins is explained in the following table: P means power pin, I/O means input and output pin, Symbol IO Type Function

3 Electrical parameters

3.1 Absolute electrical parameters

Parameter Description Min Max Unit

Ts storage temperature -55 125 ℃
VBAT supply voltage -0.3 3.9 V

ESD voltage(mannequin)
ESD voltage

TAMB-25℃ -4 4 kV

TAMB-25℃ -200 200 V
(machine model)
3.2 Normal working conditions

Parameter Description Min Typ Max Unit

Ta operating temperature -40 - 85 ℃
VBAT supply voltage 3 3.3 3.6 V

VOL IO low level output
VOH IO high level output

VSS - VSS+0.3V

VBAT-0.3 - VBAT V

3.3 RF power consumption

Working state Mode Speed Transmission power

peak (typical
value) unit

Receive 11b 11Mbps Continuous Receive 73 82 mA Receive 11g 54Mbps Continuous Receive 75 82 mA Receive 11n MCS7 Continuous Receive 75 82 mA
The test condition of the transmitting working current is the packet sending state of the module with 100% duty cycle.

3.4 Operating current

Ta=25℃ average value

The light flashes quickly

The light flashes slowly

The indicator light flashes quickly Operating status, Wi-Fi
Weak network connection status, on
In the working state, the Wi-Fi indicator is always off

working status,
Ta=25℃ Average Maximum (Typical) Unit

4 RF parameters
4.1 Basic radio frequency characteristics

Parameter Item Detailed Description

Operating frequency 2.412-2.484GHz
Wi-Fi standard IEEE 802.11b/g/n (channel 1-14)
Data transfer rate 11b: 1, 2, 5.5, 11 Mbps
11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
11n: HT20 MCS0-7
11n: HT40 MCS0-7

4.2 Wi-Fi launch performance

Parameter item Min. value Typical value Max. value Unit

RF average output power, 802.11b CCK Mode 11M
RF average output power, 802.11g OFDM Mode 54M
RF average output power, 802.11n OFDM Mode MCS7

-17.61 - dBm

-14.56 - dBm

-14.55 - dBm

Frequency Error -20 - 20 ppm

4.3 Wi-Fi reception performance

sensitivity,

sensitivity,802.11g OFDM Mode 54M PER<10%, RX
sensitivity,802.11n OFDM Mode MCS7 PER<10%, RX
sensitivity, Bluetooth LE 1M

4.4 Bluetooth transmission performance

- -73 - dBm

- -96 - dBm

Parameter Item Minimum Value Typical Value Maximum Unit Operating Frequency 2402 - 2480 MHz
Air Rate - 1 - Mbps
Transmit power -20 6 20 dBm
Frequency error -150 - 150 KHz

4.5 Bluetooth reception performance

Parameter item Min. value Typical value Max. value Unit
RX Sensitivity - -96 - dBm

Maximum RF signal input -10 - - dBm

Co-channel rejection ratio - 10 - dB

5 Antenna Information
5.1 Antenna Type
The Z1-N antenna is a PCB antenna.
5.2 Reducing Antenna Interference
When using the PCB antenna on the Wi-Fi module, in order to ensure the optimal Wi-Fi performance, it is recommended that the distance between the antenna part of the module and other metal parts be at least 15mm.
The user PCB board should not be routed or even covered with copper in the antenna area, so as not to affect the performance of the antenna.

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 to 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 operate 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 to 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: 2APUZ-Z1-N. The end product must be labeled in a visible area with the following: "Contains Transmitter Module FCC ID: 2APUZ-Z1-N".

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.

Declaration of Conformity European Notice

CE

Hereby, Hangzhou Tuya Information Technology Co., Ltd declares that this module product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU,2011/65/EU. A copy of the Declaration of conformity can be found at https://www.tuya.com.

This product must not be disposed of as normal household waste, in accordance with the EU directive for waste electrical and electronic equipment (WEEE-2012/19/EU). Instead, it should be disposed of by returning it to the point of sale, or to a municipal recycling collection point.

The device could be used with a separation distance of 20cm from the hu-man body.

OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2) This device and its antenna(s) must not be co‑located with any other transmitters except in accordance with FCC multi‑transmitter product procedures. Referring to the multi‑transmitter policy, multipletransmitter(s) and module(s) can be operated simultaneously without C2PC.

End product labeling:

The final end product must be labeled in a visible area with the following: “Contains Transmitter Module FCC ID:’’2APUZ-Z1-N’’.

If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCCrules

FCC Part 15 Subpart C 15.247

2.3 Specific operational useconditions

The module Z1-N is a module with Bluetooth and WIFI 2.4G function.

Operation Frequency:2402-2480MHz for BLE; 2412-2462MHz for WIFI 2.4G

Antenna Type: PCB Antenna

Antenna Gain: 0.72 dBi

The module can be used for mobile or applications with a maximum 0.72 dBi antenna. The host manufacturer installing this module into their product must ensure that the final composit product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operaition. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

2.4 Limited module procedures

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs

Not applicable. The module has its own antenna, and doesn't need a host's printed board microstrip trace antenna etc.

2.6 RF exposure considerations

The module must be installed in the host equipment such that at least 20cm is maintained betweenthe antenna and users'body; and if RF exposure statement or module layout is

changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization

2.7 Antennas

Antenna Specification are as follows:

Type: PCB Antenna

Gain:0.72 dBi

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna;

The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a 'unique' antenna coupler. As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

2.8 Label and complianceinformation

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2APUZ-Z1-N"with their finished product.

2.9 Information on test modes and additional testingrequirements

Data transfer module demo board can control the EUT work in RF test mode at specified test channel. Additional testing, Part 15 Subpart B disclaimer. The module without unintentional-radiator digital circuit, so the module does not required an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

2.10 Additional testing, Part 15 Subpart Bdisclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

IC Caution

- English

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.

The device has been evaluated to meet general RF exposure requirements. The device can be used under fixed/mobile exposure conditions. The minimum separation distance

is 20 cm.

- French:
L’émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes :
1. L’appareil ne doit pas produire de brouillage;
2. L’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’encompromettre le fonctionnement.
L'appareil a été évalué pour répondre aux exigences générales d'exposition RF.L'appareil peut être utilisé dans des conditions d'exposition fixes / mobiles.La distance de séparation minimale est de 20 cm.