

A128 SOM Datasheet

Rev. 03

Linkplay Confidential

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1 Overview

A128 SOM: QCS405 + PMS405 + WCN3999 2x2 11ac/BT5.1 connectivity + QCA9377-3 System-on-Module.

1.1 A128 Parameters

Key parameters of A128 are shown in Table 1-1

No.	Type	Description	Parameters
1	SoC	Qualcomm QCS405	64-bit Arm Cortex-A53 quad-core, supports up to 12 Dolby channels
2	eMCP	LPDDR3	1GByte 32-bit wide memory support for up to 800MHz
3		eMMC5.1	8GByte
4	PMIC	Qualcomm PMS405	Optimized for the QCS405
5	WLAN-BT	Qualcomm WCN3999	2x2 MIMO with IEEE 802.11 a/b/g/n/ac WLAN standards Bluetooth 5.0 + LE
6		Qualcomm QCA9377-3	5G 1x1 802.11 a/n/ac
7	Interface	Ethernet RGMII	10M/100M/1000M
8		USB	USB 2.0 and USB 3.0 with Type-C
9		I2S	x3
10		I2C	x4
11		PDM	Supports 4 D-MIC
12		IR IN	x1
13		UART	x2
14		GPIO	x40

Table 1-1 A128 Parameters

1.2 A128 Overview

1.3 A128 Dimension

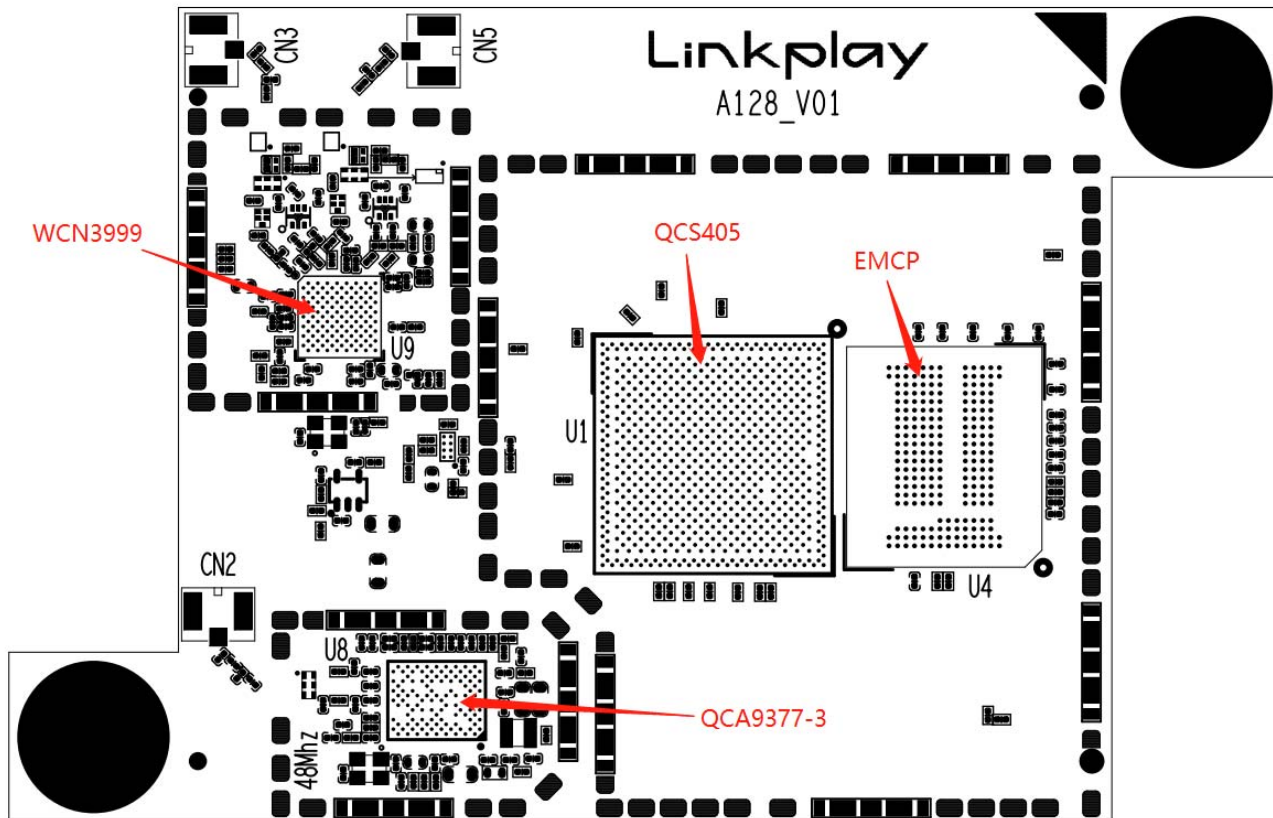


Figure 1-2 A128 Top View

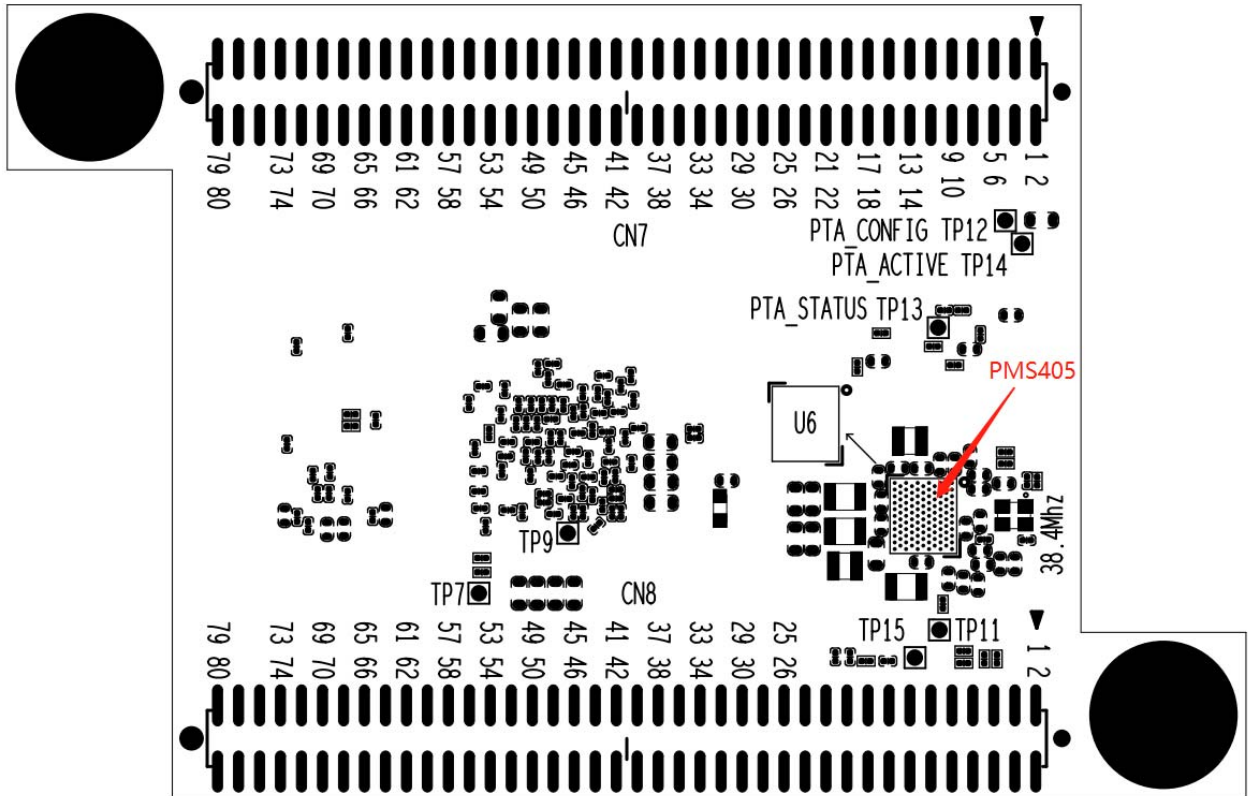


Figure 1-3 A128 Bottom View

2 A128 Specification

2.1 Application Block Diagram

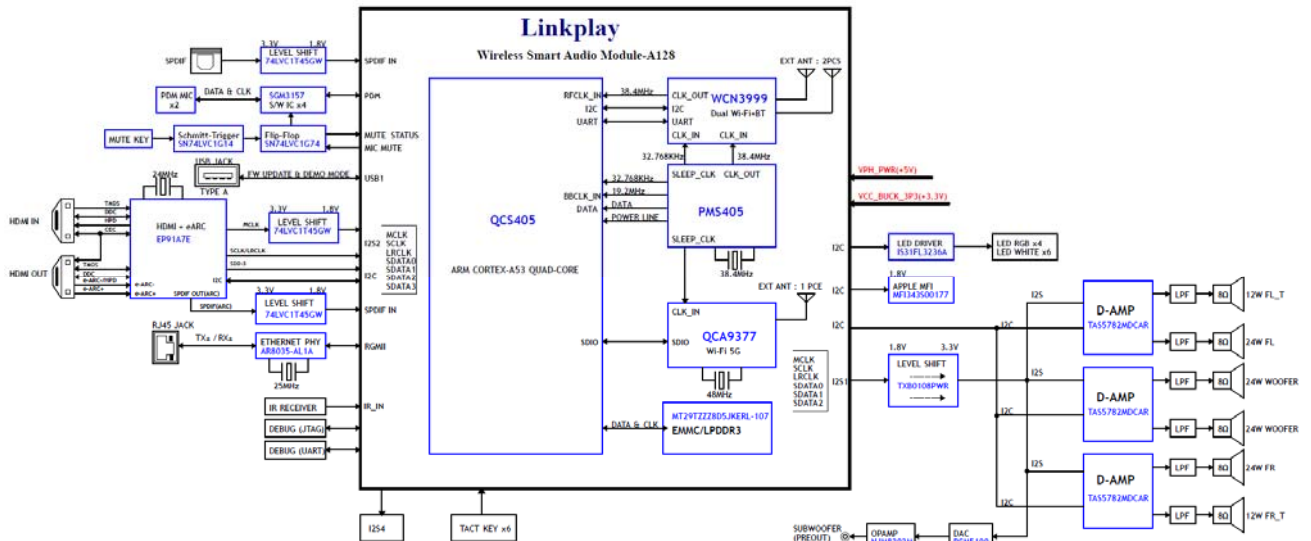


Figure 2-1 Application Block Diagram

2.2 Application Processor

The QCS405 device is an audio/Wi-Fi SoC for use in the smart Speaker, Smart Assistant, Mesh router and Soundbar markets. It includes a 64-bit ARM Cortex-A53 Quad-core application processor. QCS405 supports up to 12 channels.

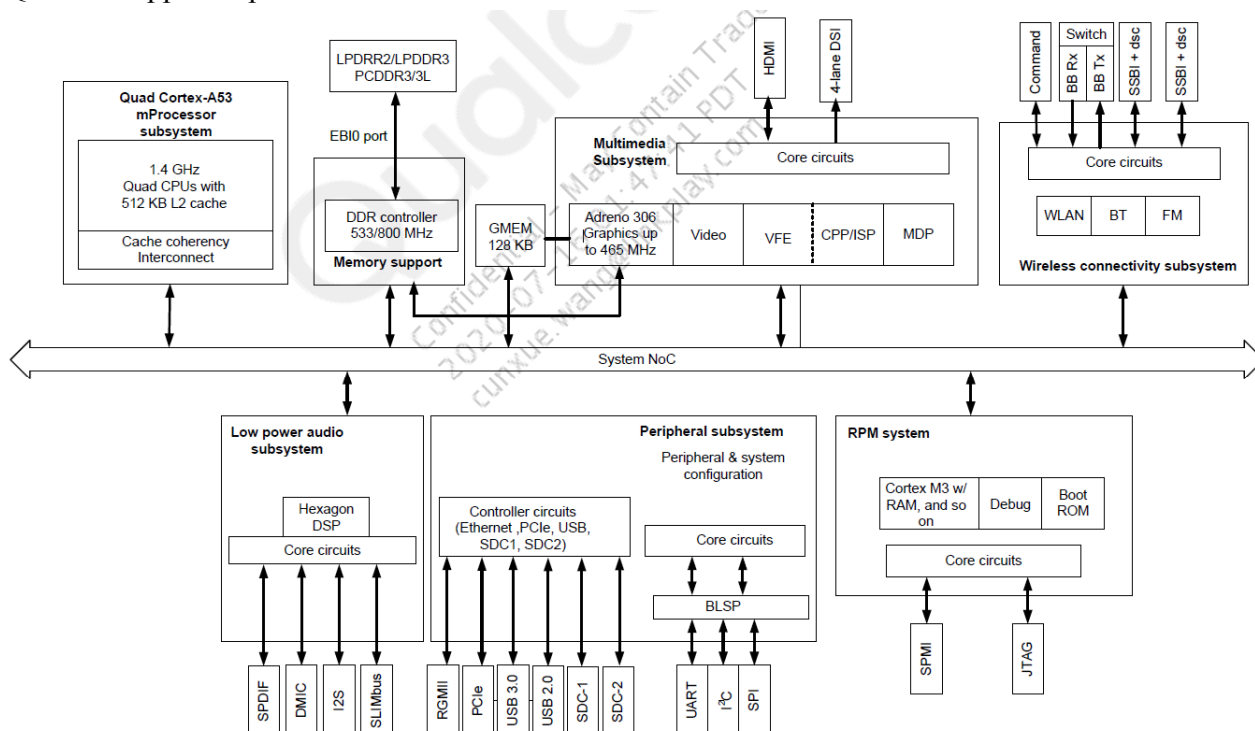


Figure 2-2 QCS405 Subsystem

2.3 eMCP

- 32-bit 8Gb LPDDR3 1866MHz
- eMMC Data transfer rate: up to 400MB/s
- MMC I/F Clock frequency: 0~200MHz

2.4 PMIC-PMS405

- System-clock and sleep-clock sources for QCS405 chipset
- Two RF (low noise) outputs
- One BB (low-noise) output
- Sleep-clock output
- SPMI RCS support for interrupt communication

2.5 WLAN-BT

2.5.1 WCN3999

- 2x2 802.11ac with MU-MIMO
- 160 MHz & DBS support
- Concurrent operation for WLAN and BT with and without dedicated BT antenna

- RF performance meets all carrier requirements

2.5.2 QCA9377-3

- 1x1 802.11a/n/ac (5GHz only)
- Low-power SDIO 3.0 interface for WLAN

3 Hardware and Mechanical

3.1 General Specification

No.	Items	Specification
1	Working voltage	5V
2	Working current	TBD
3	Standby current	TBD
4	Wi-Fi working distance	TBD
5	Bluetooth working distance	TBD
6	Interface	RGMI, USB, I2S, I2C, PDM, GPIO, UART
7	PCB thickness	1.4mm

Table 3-1 General Specification

3.2 Hardware Interface

A128 Pin map is shown as Figure 3-1:

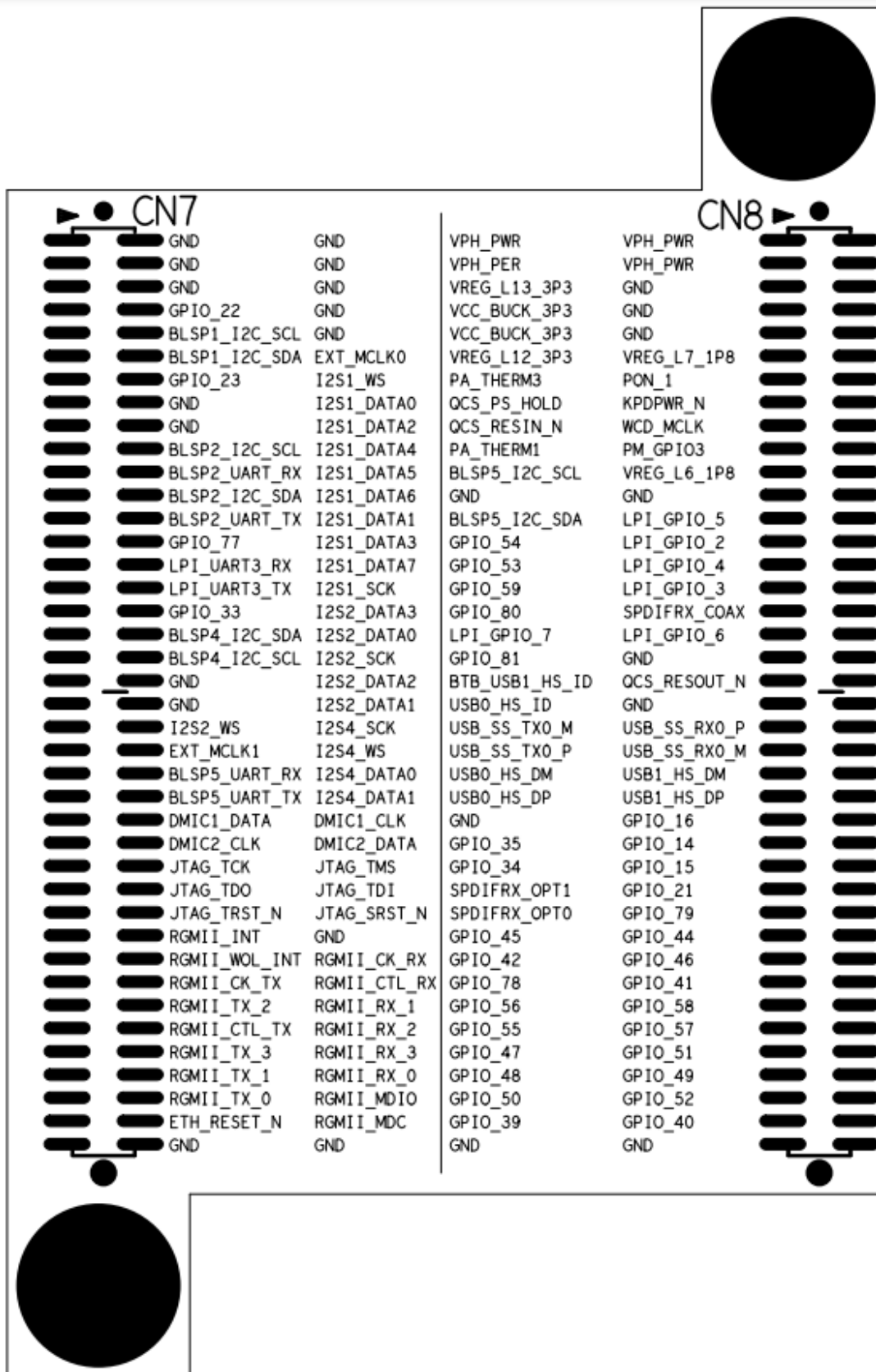


Figure 3-1 A128 Pin Map

Pin definition of connectors:

CN7			
Pin No.	Pin Name	Pin No.	Pin Name
1	GND	2	GND
3	GND	4	GND
5	GND	6	GND
7	GPIO_22	8	GND
9	BLSP1_I2C_SCL	10	GND
11	BLSP1_I2C_SDA	12	EXT_MCLK0
13	GPIO_23	14	I2S1_WS
15	GND	16	I2S1_DATA0
17	GND	18	I2S1_DATA2
19	BLSP2_I2C_SCL	20	I2S1_DATA4
21	BLSP2_UART_RX	22	I2S1_DATA5
23	BLSP2_I2C_SDA	24	I2S1_DATA6
25	BLSP2_UART_TX	26	I2S1_DATA1
27	GPIO_77	28	I2S1_DATA3
29	LPI_UART3_RX	30	I2S1_DATA7
31	LPI_UART3_TX	32	I2S1_SCK
33	GPIO_33	34	I2S2_DATA3
35	BLSP4_I2C_SDA	36	I2S2_DATA0
37	BLSP4_I2C_SCL	38	I2S2_SCK
39	GND	40	I2S2_DATA2
41	GND	42	I2S2_DATA1
43	I2S2_WS	44	I2S4_SCK
45	EXT_MCLK1	46	I2S4_WS
47	BLSP5_UART_RX	48	I2S4_DATA0
49	BLSP5_UART_TX	50	I2S4_DATA1
51	DMIC1_DATA	52	DMIC1_CLK
53	DMIC2_CLK	54	DMIC2_DATA
55	JTAG_TCK	56	JTAG_TMS
57	JTAG_TDO	58	JTAG_TDI
59	JTAG_TRST_N	60	JTAG_SRST_N

61	RGMII_INT	62	GND
63	RGMII_WOL_INT	64	RGMII_CK_RX
65	RGMII_CK_TX	66	RGMII_CTL_RX
67	RGMII_TX_2	68	RGMII_RX_1
69	RGMII_CTL_TX	70	RGMII_RX_2
71	RGMII_TX_3	72	RGMII_RX_3
73	RGMII_TX_1	74	RGMII_RX_0
75	RGMII_TX_0	76	RGMII_MDIO
77	ETH_RESET_N	78	RGMII_MDC
79	GND	80	GND

CN8			
Pin No.	Pin Name	Pin No.	Pin Name
1	VPH_PWR	2	VPH_PWR
3	VPH_PWR	4	VPH_PWR
5	VREG_L13_3P3	6	GND
7	VCC_BUCK_3P3	8	GND
9	VCC_BUCK_3P3	10	GND
11	VREG_L12_3P3	12	VREG_L7_1P8
13	PA_THERM3	14	PON_1
15	QCS_PS_HOLD	16	KPDPWR_N
17	QCS_RESIN_N	18	WCD_MCLK
19	PA_THERM1	20	PM_GPIO3
21	BLSP5_I2C_SCL	22	VREG_L6_1P8
23	GND	24	GND
25	BLSP5_I2C_SDA	26	LPI_GPIO_5
27	GPIO_54	28	LPI_GPIO_2
29	GPIO_53	30	LPI_GPIO_4
31	GPIO_59	32	LPI_GPIO_3

33	GPIO_80	34	SPDIFRX_COAX
35	LPI_GPIO_7	36	LPI_GPIO_6
37	GPIO_81	38	GND
39	BTB_USB1_HS_ID	40	QCS_RESOUT_N
41	USB0_HS_ID	42	GND
43	USB_SS_TX0_M	44	USB_SS_RX0_P
45	USB_SS_TX0_P	46	USB_SS_RX0_M
47	USB0_HS_DM	48	USB1_HS_DM
49	USB0_HS_DP	50	USB1_HS_DP
51	GND	52	GPIO_16
53	GPIO_35	54	GPIO_14
55	GPIO_34	56	GPIO_15
57	SPDIFRX_OPT1	58	GPIO_21
59	SPDIFRX_OPT0	60	GPIO_79
61	GPIO_45	62	GPIO_44
63	GPIO_42	64	GPIO_46
65	GPIO_78	66	GPIO_41
67	GPIO_56	68	GPIO_58
69	GPIO_55	70	GPIO_57
71	GPIO_47	72	GPIO_51
73	GPIO_48	74	GPIO_49
75	GPIO_50	76	GPIO_52
77	GPIO_39	78	GPIO_40
79	GND	80	GND

Table 3-2 Pin Name

4 Software Introduction

4.1 Feature List

- Amazon Alexa build in

- Music stream protocol
Support Spotify Connect, Airplay2, DLNA and QPlay protocol
- Music content
Support iHeartRadio, Napster/Rhapsody, Tidal, Deezer, Qobuz, Audible, Radio.de, NPR, Qingting FM, QQ FM, Douban FM inside, with the help of App, you can search, stream, playback and preset the music of the above music services.
- Multiroom
Support multiroom.
Support Airplay, Spotify, Bluetooth, Aux-in multiroom playback.
- Music format
HTTP/HTTPS/RTSP/MMS/TS protocol
HLS/ASX/M3U playlist format
MP3/AAC/FLAC/ALAC/WMA/APE/OGG codec
- BT sink and source
Support 5.0: A2DP, AVRCP, HFP, HID profiles
Support BLE
Support EDR
- Preset
With the help of App, you can store the music playlist in the A128. Then the end user can play the playlist by the button/voice or timer even without the App.

5 Mechanical Dimensions

L x W: 75mm x 48mm, 1.27mm pitch dual row SMT pin headers

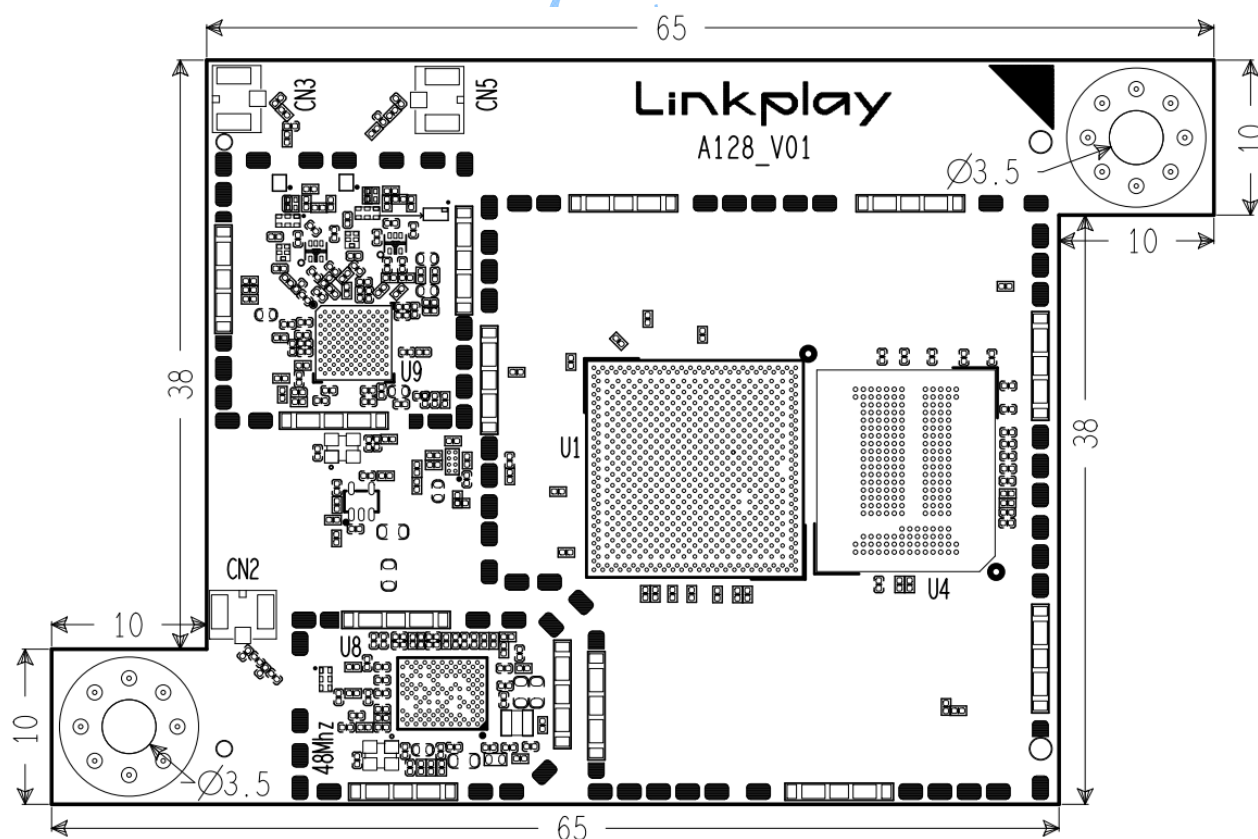


Figure 3-1 A128 Length and Width

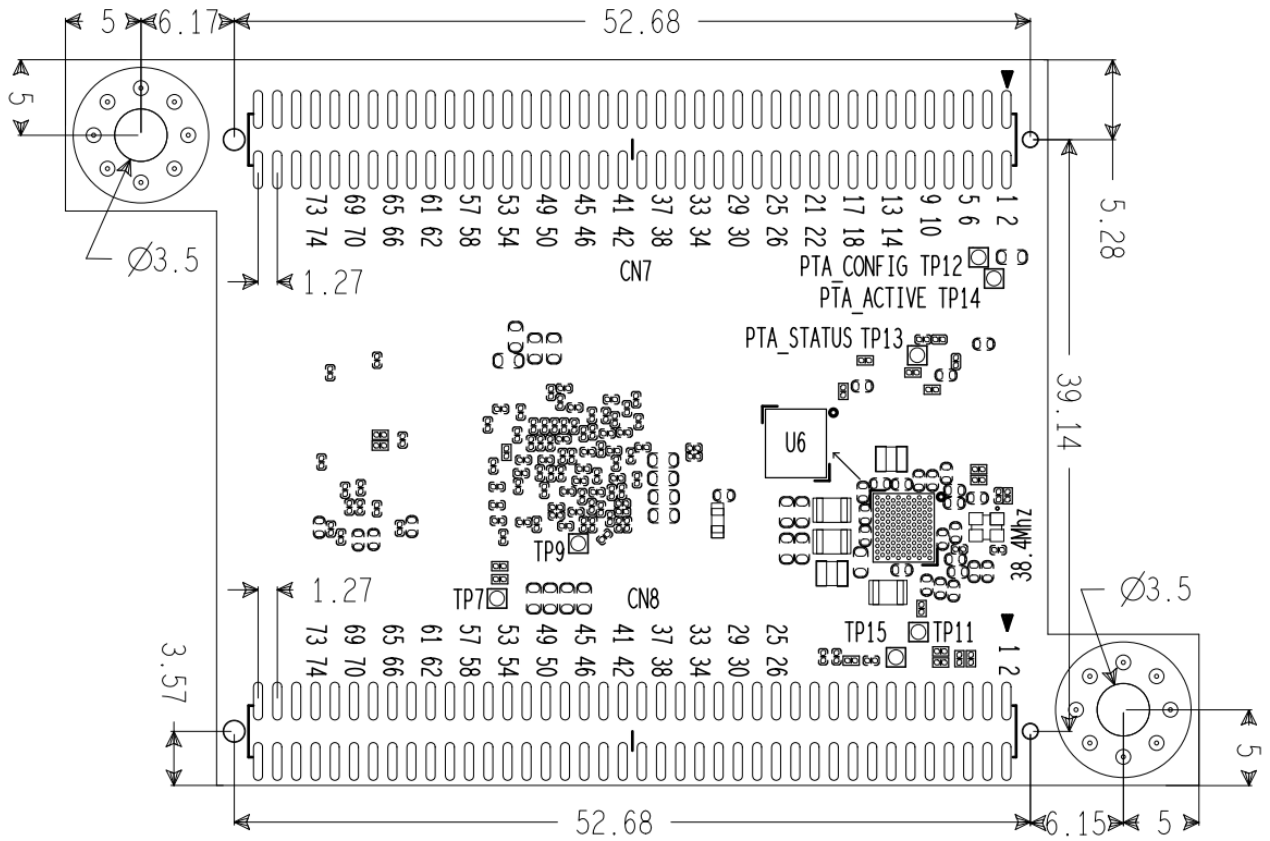


Figure 3-2 A128 Pin Header Dimension

6 Environmental Characteristics

6.1 Environmental Ratings

The environmental ratings are shown as following table.

Characteristic	Value	Units	Conditions/Comments
Ambient Operating Temperature Range	-5 ~ 40	°C	
Operating Temperature Range	-5 ~ 70	°C	
Storage Temperature Range Without Operation	-5 ~ 45	°C	
Relative humidity	Less than 80	%	Operating
	Less than 60	%	Storage

6.2 Electrostatic Discharge Specifications

Extreme caution must be exercised to prevent electrostatic discharge (ESD) damage. Proper use of wrist and heel grounding straps to discharge static electricity is required when handling these devices. Always store unused material in its antistatic packaging.

ESD Specifications

Type	Symbol	Condition	ESD Rating	Unit
ESD Handling	ESD_HAND_HBM	Human Body Model Contact Discharge per JEDEC EID/JESD22-A114	1000	V
Machine Model	ESD_HAND_MM	Machine Model Contact	30	V

(MM)				
CDM	ESD_HAND_CDM	Charged Device Model Contact Discharge per JEDEC EIA/JESD22-C101	300	V

7 PCBA Picture and Package

RoHS, REACH and MSDS compliant.

7.1 A128 Pictures



Notes:

7.2 Package



7.3 Q'ty and Weight

Weight of 1 piece with antistatic bag:

One tray:

Weight of one tray:

One carton:

Total Q'ty of one carton:

Total weight of one carton:

8 Revision History

Revision	Date	Originator	Comments
01	08/18/2020	Tonny Wang	First revision release.
02	09/11/2020	Tonny Wang	Update pin name, pin map and overview.
03	11/03/2020	Alex Wang	Add software feature list.

NOTICE:

- ◆ please keep this product and accessories attached to the places which children can't touch;
- ◆ do not splash water or other liquid onto this product, otherwise it may cause damage;
- ◆ do not put this product near the heat source or direct sunlight, otherwise it may cause deformation or malfunction;
- ◆ please keep this product away from flammable or naked flame;
- ◆ please do not repair this product by yourself. Only qualified personnel can be repaired.

1. 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.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with 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 equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment 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 equipment and receiver.

Connect the equipment 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 equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body

- 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; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

- French:

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radio électrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01**2.2 List of applicable FCC rules**

FCC Part 15 Subpart C 15.247 & 15.209&407

2.3 Specific operational use conditions

The module is a WIFI+BT Module

IEEE 802.11 a/b/g/n/ac 2T/2R +1T/1R

Operation Frequency: 2402-2480MHz/2412-2462/5150~5850MHz

The module can be used for mobile or portable applications with a maximum antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. 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 between the 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:

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 compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2ANOG-A128" with their finished product.

2.9 Information on test modes and additional testing requirements

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is **only** FCC authorized for FCC Part 15 Subpart C 15.247 & 15.209 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 circuitry), 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.

Federal Communication Commission Statement (FCC, U.S.)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with 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 equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment 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.

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.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTES**Co-location warning:**

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

OEM integration instructions:

This device is intended only for OEM integrators 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 external antenna(s) that has been originally tested and certified with this module.

As long as the conditions above are met, further transmitter test 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 (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End product labeling:

The final end product must be labeled in a visible area with the following: "Contains Transmitter Module FCC ID: 2ANOG-A128"

Information that must be placed in the end user manual:

The OEM integrator 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.