

AC7901B Datasheet

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Version: V1.2

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AC7901B Features

High performance 32-bit RISC CPU

- Double core RISC 32-bit CPU(Support FPU)
- 24KB D-Cache 6way, 32KB I-Cache 8way
- DC-280MHz operation
- 128 Vectored interrupts
- Four Levels interrupt priority

Image Signal Processor

- Support DVP and BT656 interface timing
- Support YUV422 format (Input)
- Support YUV422 and YUV420 format (Output)
- Support 720p@30fps input size

Flexible I/O

- 28 GPIO pins
- All GPIO pins can be programmable as input or output individually
- All GPIO pins are internal pull-up/pull-down selectable individually
- CMOS/TTL level Schmitt triggered input
- External wake up/interrupt on all GPIOs

Peripheral Feature

- USB 1.1 OTG controller
- Audio interface supports IIS, left adjusted, right adjusted and DSP mode
- Multi-function 32-bit timers, support capture and PWM mode
- 16-bit PWM generator for motor driving
- Three full-duplex advanced UART
- Three SPI interface supports host and device mode
- Two SD Card Host controller
- One IIC interface supports host and device mode
- One SPDIF receiving interface without analog amplify
- One Quadrature decoder

- Watchdog
- One Crystal Oscillator
- One channel 16-bit DAC with headphone amplifier
- Four channels Audio 16-bit ADC
- Four channels MIC amplifier
- Four channels analog MUX
- Ten channels 10-bit ADC
- Power-on reset
- Embedded PMU support low power mode

Bluetooth Feature

- CMOS single-chip fully-integrated radio and baseband
- Compliant with Bluetooth V5.0+BR+EDR+BLE specification
- Bluetooth Piconet and Scatternet support
- Meet class2 and class3 transmitting power requirement
- Support GFSK and $\pi/4$ DQPSK all packet types
- Provides +15dbm transmitting power
- Receiver with -93dBm sensitivity
- Support a2dp\avctp\avdtp\avrcp\hfp\spp\smp\att\gap\gatt\rfcomm\sdpl2cap profile

WIFI Feature

- Support all mandatory IEEE 802.11b data rates of 1, 2, 5.5 and 11 Mbps, all 802.11g payload data rates of 6, 9, 12, 18, 24, 36, 48 and 54 Mbps, as well as 802.11n MCS0~MCS7, 20MHz, 800ns and 400ns guard interval.
- Support Advanced 1x1 802.11n features:
Full / Half Guard Interval
Frame Aggregation
Reduced Inter-frame Space (RIFS)
Space Time Block Coding (STBC)
Greenfield mode

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- Support
WEP/WPA-PSK(TKIP/CCMP)/WPA2-PSCK
AES256/AES128/SHA256/SHA128

- Support apply to AP/STA

- Transmitter power:

DSSS 1M/S 17 dBm

MCS0 15 dBm

MCS7 12 dBm

- Receiver sensitivity:

DSSS 1M/S -95 dBm

MCS0 -93 dBm

MCS7 -72 dBm

Power Supply

- VBAT is 2.2V to 5.5V

- VDDIO is 2.1V to 3.6V

- AVDDHP is 2.1V to 3.6V

Packages

- QFN48(6mm*6mm)

Temperature

- Operating temperature: -40°C to +85°C

- Storage temperature: -65°C to +150°C

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1. Pin Definition

1.1 Pin Assignment

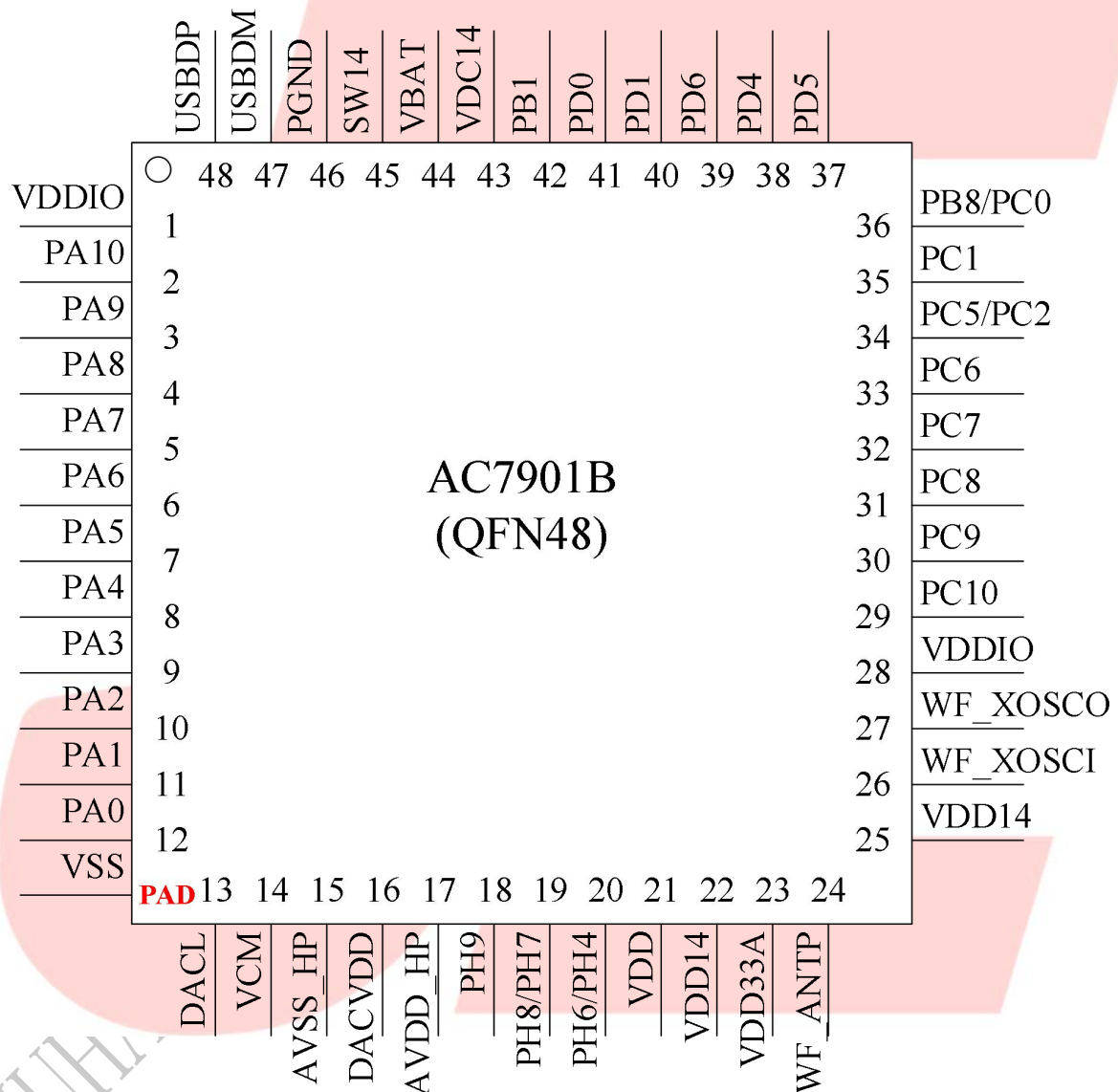


Figure 1-1 AC7901B_QFN48 Package Diagram

1.2 Pin Description

Table 1-1 AC7901B_QFN48 Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	VDDIO	P	/	IO Power 3.3V	-
2	PA10	I/O	24/16/8/2.4	GPIO	SENSOR_VSYN_A: Sensor Vertical Synchronization(A) SD0_DAT1B: SD0 Data1(B) ALNK0_DAT3B1: Audio Link0 Data3(B1) ALNK1_DAT3B1: Audio Link1 Data3(B1) ADC2: ADC Channel 2 TMR7CK(MCPWM)
3	PA9	I/O	24/16/8/2.4	GPIO	SENSOR_HSYN_A: Sensor Horizontal Synchronization(A) SD0_DAT0B: SD0 Data0(B) ALNK0_DAT2B1: Audio Link0 Data2(B1) ALNK1_DAT2B1: Audio Link1 Data2(B1) TMR6CK(MCPWM)
4	PA8	I/O	24/16/8/2.4	GPIO	SENSOR_CLK_A: Sensor Clock(A) IIC_SDA_B: IIC SDA(B) SD0_CLKB: SD0 Clock(B) ALNK0_DAT1B1: Audio Link0 Data1(B1) ALNK1_DAT1B1: Audio Link1 Data1(B1) SPDIF_D ADC1: ADC Channel 1 PWMCH1L(MCPWM) Wakeup4: Port Wakeup 4 SDTAP_DATD
5	PA7	I/O	24/16/8/2.4	GPIO	SENSOR_D7_A: Sensor Data7(A) IIC_SCL_B: IIC SCL(B) SD0_CMDB: SD0 CMD(B) ALNK0_DAT0B1: Audio Link0 Data0(B1) ALNK1_DAT0B1: Audio Link1 Data0(B1) SPDIF_C ADC0: ADC Channel 0 PWMCH1H(MCPWM) TMR0: Timer0 Clock In Wakeup3: Port Wakeup 3 SDTAP_CLKD

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PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
6	PA6	I/O	24/16/8/2.4	GPIO	SENSOR_D6_A: Sensor Data6(A) UART0_RXA: Uart0 Data In(A) SD0_DAT3B: SD0 Data3(B) ALNK0_LRCKB1: Audio Link0 Word Select (B1) ALNK1_LRCKB1: Audio Link1 Word Select(B1) FPIN0(MCPWM)
7	PA5	I/O	24/16/8/2.4	GPIO	SENSOR_D5_A: Sensor Data5(A) UART0_TXA: Uart0 Data Out(A) SD0_DAT2B: SD0 Data2(B) AMUX2: Simulator Channel 2 ALNK0_SCKB1: Audio Link0 Serial Clock(B1) ALNK1_SCKB1: Audio Link1 Serial Clock(B1) CAP3: Timer3 Capture
8	PA4	I/O	24/16/8/2.4	GPIO	SENSOR_D4_A: Sensor Data4(A) CLKOUT1: Clock Out1 SPI2_DOC: SPI2 Data Out(C) MIC2N: MIC2 N Channel ALNK0_MCKB1: Audio Link0 Master Clock(B1) ALNK1_MCKB1: Audio Link1 Master Clock(B1) UART0_RXC: Uart0 Data In(C) PWMCH0L(MCPWM)
9	PA3	I/O	24/16/8/2.4	GPIO	SENSOR_D3_A: Sensor Data3(A) SPI2_CLKC: SPI2 Clock(C) MIC2P: MIC2 P Channel UART0_TXC: Uart0 Data Out(C) PWMCH0H(MCPWM)
10	PA2	I/O	24/16/8/2.4	GPIO	SENSOR_D2_A: Sensor Data2(A) SPI2_DIC: SPI2 Data In(C) MIC0P: MIC0 P Channel TMR0CK(MCPWM)
11	PA1	I/O	24/16/8/2.4	GPIO	SENSOR_D1_A: Sensor Data1(A) MIC0N: MIC0 N Channel PWM0: Timer0 PWM Output
12	PA0	I/O	24/16/8/2.4	GPIO	SENSOR_D0_A: Sensor Data0(A) AMUX0: Simulator Channel 0 TMR1CK(MCPWM) Wakeup2: Port Wakeup 2

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PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
13	DACL	O	/	DAC Left Channel	-
14	VCM	P	/	VCM	-
15	AVSS_HP	P	/	Audio Ground	-
16	DACVDD	P	/	DAC Power	-
17	AVDD_HP	P	/	Audio Power	-
18	PH9	I/O	24/16/8/2.4	GPIO	MIC1P: MIC1 P Channel
19	PH8	I/O	24/16/8/2.4	GPIO	MIC1N: MIC1 N Channel
	PH7	I/O	24/16/8/2.4	GPIO	AMUX1: Simulator Channel 1 UART1_RXA: Uart1 Data In(A) PWMCH5L(MCPWM) Wakeup13: Port Wakeup 13
20	PH6	I/O	24/16/8/2.4	GPIO	MIC3P: MIC3 P Channel UART1_TXA: Uart1 Data Out(A) FPIN3(MCPWM) PWM2: Timer2 PWM Output
	PH4	I/O	24/16/8/2.4	GPIO	AMUX3: Simulator Channel 3 FPIN4(MCPWM)
21	VDD	P	/	Core Power	-
22	VDD14	P	/	RF Power 1.4V	-
23	VDD33A	P	/	RF Power 3.3V	-
24	WF_ANTP	-	/	RF Antenna	-
25	VDD14	P	/	RF Power 1.4V	-
26	WF_XOSCI	I	/	RF OSCI	-
27	WF_XOSCO	O	/	RF OSCO	-
28	VDDIO	P	/	IO Power 3.3V	-
29	PC10	I/O	24/16/8/2.4	GPIO	SD0_CLKD: SD0 Clock(D) SPI1_DOB: SPI1 Data Out(B) Q-decoder1 UART2_RXB: Uart2 Data In(B) ADC9: ADC Channel 9 TMR5CK(MCPWM) PWM3: Timer3 PWM Output TOUCH10: Touch Input Channel 10

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PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
30	PC9	I/O	24/16/8/2.4	GPIO	SD0_CMDD: SD0 CMD(D) SPI1_CLKB: SPI1 Clock(B) Q-decoder0 UART2_TXB: Uart2 Data Out(B) ADC8: ADC Channel 8 TMR4CK(MCPWM) TOUCH9: Touch Input Channel 9
31	PC8	I/O	24/16/8/2.4	GPIO	SD0_DAT0D: SD0 Data0(D) SPI1_DIB: SPI1 Data In(B) SPDIF_B PWMCH2L(MCPWM) CAP5: Timer5 Capture TOUCH8: Touch Input Channel 8
32	PC7	I/O	24/16/8/2.4	GPIO	SD0_DAT1D: SD0 Data1(D) SPDIF_A PWMCH2H(MCPWM) CAP4: Timer4 Capture TOUCH7: Touch Input Channel 7
33	PC6	I/O	24/16/8/2.4	GPIO	SD0_DAT2D: SD0 Data2(D) ALNK0_DAT3A: Audio Link0 Data3(A) ALNK1_DAT3A: Audio Link1 Data3(A) TMR3CK(MCPWM) PWM5: Timer5 PWM Output TOUCH6: Touch Input Channel 6
34	PC5	I/O	24/16/8/2.4	GPIO	SD0_DAT3D: SD0 Data3(D) TMR2CK(MCPWM) PWM4: Timer4 PWM Output TOUCH5: Touch Input Channel 5
	PC2	I/O	24/16/8/2.4	GPIO	IIC_SDA_C: IIC SDA(C) ALNK0_LRCKA: Audio Link0 Word Select(A) ALNK1_LRCKA: Audio Link1 Word Select(A) SD1_DAT0B: SD1 Data0(B) PWMCH4L(MCPWM) CAP1: Timer1 Capture TOUCH2: Touch Input Channel 2

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PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
35	PC1	I/O	24/16/8/2.4	GPIO	IIC_SCL_C: IIC SCL(C) ALNK0_SCLKA: Audio Link0 Serial Clock(A) ALNK1_SCLKA: Audio Link1 Serial Clock(A) SD1_CLKB: SD1 Clock(B) ADC7: ADC Channel 7 PWM1: Timer1 PWM Output Wakeup11: Port Wakeup 11 TOUCH1: Touch Input Channel 1
36	PC0	I/O	24/16/8/2.4	GPIO	CLKOUT0: Clock Out0 ALNK0_MCKA: Audio Link0 Master Clock(A) ALNK1_MCKA: Audio Link1 Master Clock(A) SD1_CMDB: SD1 CMD(B) ADC6: ADC Channel 6 PWMCH4H(MCPWM) Wakeup10: Port Wakeup 10 TOUCH0: Touch Input Channel 0
	PB8	I/O	24/16/8/2.4	GPIO	SDGAT: SD Power Gate
37	PD5	I/O	24/16/8/2.4	GPIO	SPI0_DOA(0): SPI0 Data Out(A) SFC_DOA(0): SFC Data Out(A)
38	PD4	I/O	24/16/8/2.4	GPIO	SPI0_CLKA: SPI0 CLK(A) SFC_CLKA: SFC Clock(A)
39	PD6	I/O	24/16/8/2.4	GPIO	SFGAT: Flash Power Gate
40	PD1	I/O	24/16/8/2.4	GPIO	SPI0_DIA(1): SPI0 Data In(A) SFC_DIA(1): SFC Data In(A)
41	PD0	I/O	24/16/8/2.4	GPIO (pull up)	SPI0_CSA: SPI0 Chip Select(A) SFC_CSA: SFC Chip Select(A)
42	PB1	I/O	24/16/8/2.4	GPIO (pull up)	ISP_DO UART0_TXB: Uart0 Data Out(B) ADC3: ADC Channel 3 Long Press reset TMR1: Timer1 Clock In Wakeup8: Port Wakeup 8
43	VDC14	P	/	Core power 1.4V	-
44	VBAT	P	/	LDO Power	-

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PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
45	SW14	P	/	DC-DC Switch pin	-
46	PGND	P	/	Ground	-
47	USBDM	I/O	10	USB Negative Data (pull down)	UART1_RXD: Uart1 Data In(D) ISP_DI_A SPI2_DOB: SPI2 Data Out(B) IIC_SDA_A: IIC SDA(A) ADC12: ADC Channel 12 SDTAP_DATB
48	USBDP	I/O	10	USB Positive Data (pull down)	UART1_TXD: Uart1 Data Out(D) ISP_CLK_A SPI2_CLKB: SPI2 Clock(B) IIC_SCL_A: IIC SCL(A) ADC13: ADC Channel 13 SDTAP_CLKB
PAD		P	/	VSS	-

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2. Electrical Characteristics

2.1 Absolute Maximum Ratings

Table 2-1

Symbol	Parameter	Min	Max	Unit
Tamb	Ambient Temperature	-40	+85	°C
Tstg	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	-0.3	5.5	V
VDD33A	RF Power 3.3V Voltage	-0.3	3.6	V
AVDDHP	Audio Power Voltage	-0.3	3.6	V
VDD14	RF Power 1.4V Voltage	-0.3	1.55	V
V _{3.3IO}	3.3V IO Input Voltage	-0.3	VDDIO+0.3	V

2.2 PMU Characteristics

Table 2-2

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VBAT	Voltage Input	2.2	3.7	5.5	V	—
VDDIO	Voltage output	2.1	3.3	3.6	V	LDO5V = 5V, 200mA loading
VDC14	Voltage output	1.2	1.4	1.55	V	LDO mode: 70mA loading DC-DC mode: 120mA loading
VDD	Voltage output	0.87	1.2	1.32	V	LDO5V=5V, 100mA loading
VDD33A	Voltage Input	2.1	3.3	3.6	V	—
AVDDHP	Voltage Input	2.1	3.3	3.6	V	—
VDD14	Voltage Input	1.2	1.4	1.55	V	—

2.3 IO Input/Output Electrical Logical Characteristics

Table 2-3

IO input characteristics						
Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V_{IL}	Low-Level Input Voltage	-0.3	—	$0.3 * V_{DDIO}$	V	$V_{DDIO} = 3.3V$
V_{IH}	High-Level Input Voltage	$0.7 * V_{DDIO}$	—	$V_{DDIO} + 0.3$	V	$V_{DDIO} = 3.3V$
IO output characteristics						
V_{OL}	Low-Level Output Voltage	—	—	0.33	V	$V_{DDIO} = 3.3V$
V_{OH}	High-Level Output Voltage	2.7	—	—	V	$V_{DDIO} = 3.3V$

2.4 Internal Resistor Characteristics

Table 2-4

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PA, PC, PD, PH, PB1, PB8	8mA	24mA	10K	10K	1.PB1&PD0 default pull up 2.USBDM & USBDP default pull down 3.internal pull-up/pull-down resistance accuracy $\pm 20\%$
USBDP USBDM	10mA	—	1.5K	15K	

2.5 DAC Characteristics

Table 2-5

Parameter	Min	Typ	Max	Unit	Test Conditions
Frequency Response	20	—	20K	Hz	1KHz/0dB 10Kohm loading With A-Weighted Filter
THD+N	—	-78	—	dB	
S/N	—	92	—	dB	
Crosstalk	—	-80	—	dB	
Output Swing	—	0.75	—	Vrms	
Dynamic Range	—	90	—	dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power	11	—	—	mW	32ohm loading

2.6 ADC Characteristics

Table 2-6

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range	—	87	—	dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
S/N	—	90	—	dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
THD+N	—	-72	—	dB	
Crosstalk	—	-80	—	dB	

3. Package Information

3.1 QFN48(6mm*6mm)

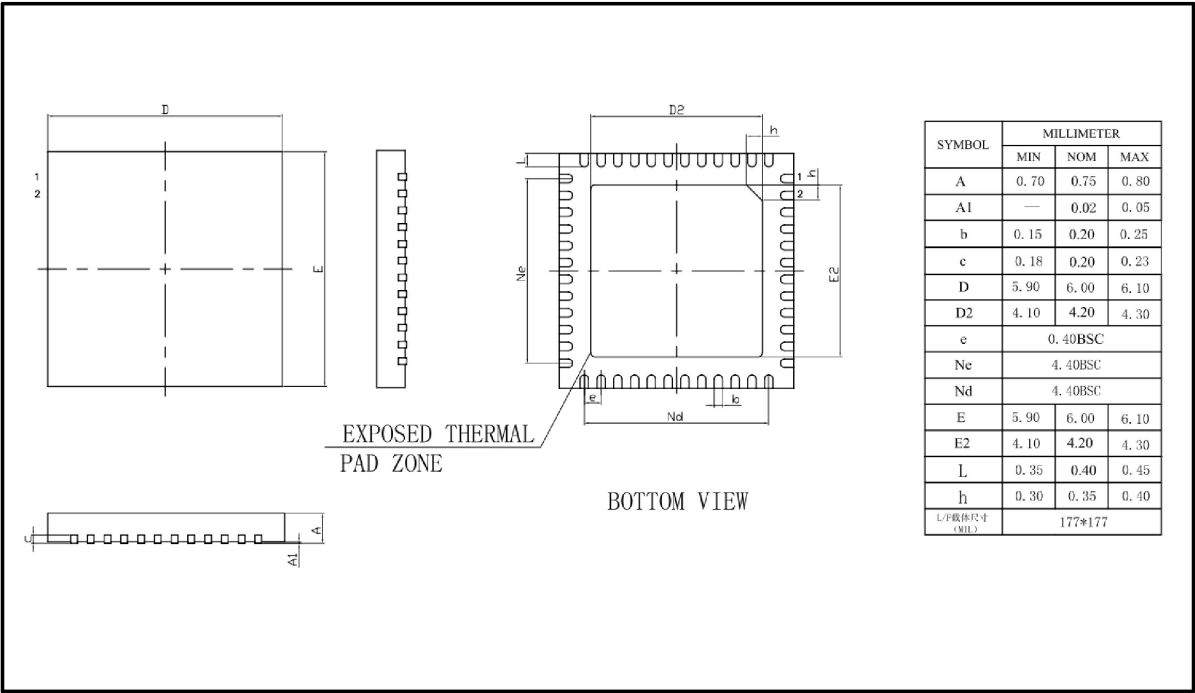
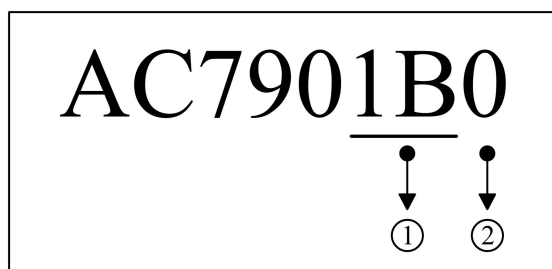


Figure 3-1 AC7901B_QFN48 Package

4. Package Type Specification



① Represents different chips (different packages or bindings)

② Represents different memory sizes

0: No memory

2: 2Mbit Flash

4: 4Mbit Flash

8: 8Mbit Flash

6: 16Mbit Flash

3: 32Mbit Flash

5: 64Mbit Flash

7: 128Mbit Flash

A: 1Mx16 SDRAM

B: 4Mx16 SDRAM

C: 16M bit PSRAM

D: 64M bit PSRAM

5. Revision History

Date	Revision	Description
2019.10.25	V1.0	Initial Release
2020.05.19	V1.1	Update Format
2021.06.02	V1.2	Modify transmit power parameters Modify DAC performance parameters Modify the absolute maximum rating Delete the ALNK0_DAT2A function description of PC5 in Table 1-1