

AC7915A Datasheet

Zhuhai Jieli Technology Co.,LTD

Version: V1.2

Date: 2023.03.03

Copyright © Zhuhai Jieli Technology Co.,LTD. All rights reserved

AC7915A Features

High performance 32-bit RISC CPU

- Double core RISC 32-bit CPU(Support FPU)
- DC-320MHz 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

- 29 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

- FUSB 1.1/HUSB2.0 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
- Quadrate decoder

- Watchdog
- One Crystal Oscillator
- Two channel 16-bit DAC with headphone amplifier
- Four channels Audio 16-bit ADC
- Four channels MIC amplifier
- Four channels analog MUX
- Eleven 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 V2.1(BR+EDR)+ BLE V5.3 specification
- Bluetooth Piconet and Scatternet support
- Meet class2 and class3 transmitting power requirement
- Support GFSK and $\pi/4$ DQPSK all packet types
- Provides 18dbm+ transmitting power
- Receiver with -89dBm sensitivity at least
- Support a2dp\avctp\avdtp\avrcp\hfp\spp\smpl\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, MCS32, 20MHz/40MHz BW, 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

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

- Support apply to AP/STA

- Transmitter power:

DSSS 1M/S	19	dBm
MCS0	19	dBm
MCS7	14	dBm

- Receiver sensitivity:

DSSS 1M/S	-97	dBm
MCS0	-92.5	dBm
MCS7	-74	dBm

Packages

- QFN52(6mm*6mm)

Temperature

- Operating temperature: -40°C to +85°C
- Storage temperature: -65°C to +150°C

1. Pin Definition

1.1 Pin Assignment

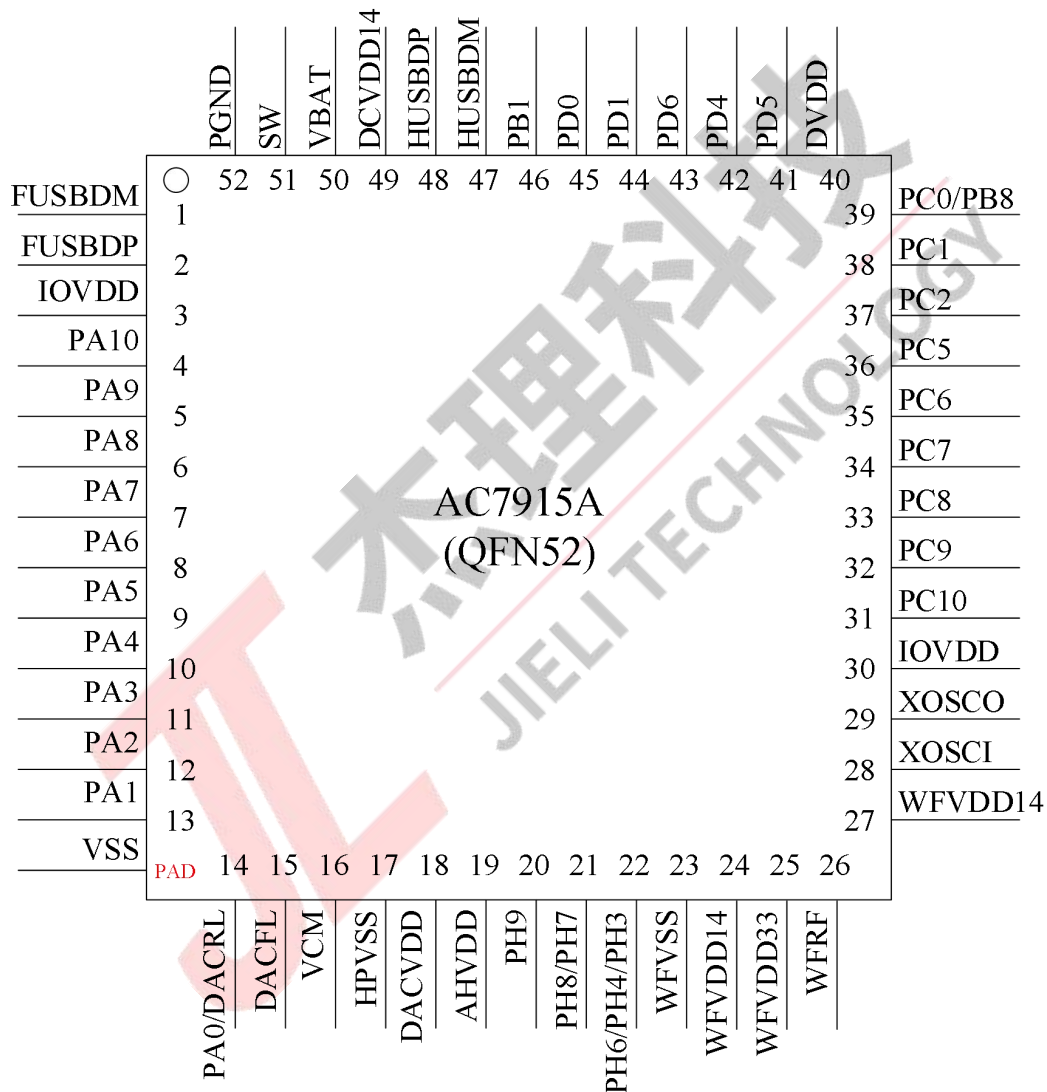


Figure 1-1 AC7915A_QFN52 Package Diagram

1.2 Pin Description

Table 1-1 AC7915A_QFN52 Pin Description

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
1	FUSBDM	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
2	FUSBDP	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
3	IOVDD	P	/	IO Power 3.3V	-
4	PA10	I/O	24/16/8/2.4	GPIO	LCD_SYNC1_A: LCD Synchronization1(A) SENSOR0_SYNC1_A: Sensor0 Synchronization1(A) SD0_DAT1B: SD0 Data1(B) ALNK0_DAT3B1: Audio Link0 Data3(B1) ALNK1_DAT3B1: Audio Link1 Data3(B1) ADC2: ADC Channel 2 TMR7CK(MCPWM)
5	PA9	I/O	24/16/8/2.4	GPIO	LCD_SYNC0_A: LCD Synchronization0(A) SENSOR0_SYNC0_A: Sensor0 Synchronization0(A) SD0_DAT0B: SD0 Data0(B) ALNK0_DAT2B1: Audio Link0 Data2(B1) ALNK1_DAT2B1: Audio Link1 Data2(B1) TMR6CK(MCPWM)
6	PA8	I/O	24/16/8/2.4	GPIO	LCD_CLK_A: LCD Clock(A) SENSOR0_CLK_A: Sensor0 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

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
7	PA7	I/O	24/16/8/2.4	GPIO	LCD_D0_A: LCD Data0(A) SENSOR0_D7_A: Sensor0 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
8	PA6	I/O	24/16/8/2.4	GPIO	LCD_D1_A: LCD Data1(A) SENSOR0_D6_A: Sensor0 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)
9	PA5	I/O	24/16/8/2.4	GPIO	LCD_D2_A: LCD Data2(A) SENSOR0_D5_A: Sensor0 Data5(A) UART0_TXA: Uart0 Data Out(A) SD0_DAT2B: SD0 Data2(B) AMUX2: Simulator Channel 2 ALNK0_SCLKB1: Audio Link0 Serial Clock(B1) ALNK1_SCLKB1: Audio Link1 Serial Clock(B1) CAP3: Timer3 Capture
10	PA4	I/O	24/16/8/2.4	GPIO	LCD_D3_A: LCD Data3(A) SENSOR0_D4_A: Sensor0 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)

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
11	PA3	I/O	24/16/8/2.4	GPIO	LCD_D4_A: LCD Data4(A) SENSOR0_D3_A: Sensor0 Data3(A) SPI2_CLKC: SPI2 Clock(C) MIC2P: MIC2 P Channel UART0_TXC: Uart0 Data Out(C) PWMCH0H(MCPWM)
12	PA2	I/O	24/16/8/2.4	GPIO	LCD_D5_A: LCD Data5(A) SENSOR0_D2_A: Sensor0 Data2(A) SPI2_DIC: SPI2 Data In(C) MIC0P: MIC0 P Channel TMR0CK(MCPWM)
13	PA1	I/O	24/16/8/2.4	GPIO	LCD_D6_A: LCD Data6(A) SENSOR0_D1_A: Sensor0 Data1(A) MIC0N: MIC0 N Channel PWM0: Timer0 PWM Output
14	PA0	I/O	24/16/8/2.4	GPIO	LCD_D7_A: LCD Data7(A) SENSOR0_D0_A: Sensor0 Data0(A) AMUX0: Simulator Channel 0 TMR1CK(MCPWM) Wakeup2: Port Wakeup 2
	DACRL	O	/	DAC Rear Left Channel	-
15	DACFL	O	/	DAC Front Left Channel	-
16	VCM	P	/	VCM	-
17	HPVSS	P	/	Audio Ground	-
18	DACVDD	P	/	DAC Power	-
19	AHVDD	P	/	Audio Power	-
20	PH9	I/O	24/16/8/2.4	GPIO	MIC1P: MIC1 P Channel
21	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
22	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) TOUCH15: Touch Input Channel 15

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
	PH3	I/O	24/16/8/2.4	GPIO	LCD_SYNC2_A/B: LCD Synchronization2(A/B) ADC11: ADC Channel 11 PWMCH5H(MCPWM) TOUCH14: Touch Input Channel 14
23	WVSS	P	/	WIFI Ground	-
24	WVDD14	P	/	RF Power 1.4V	-
25	WVDD33	P	/	RF Power 3.3V	-
26	WRF	-	/	RF Antenna	-
27	WVDD14	P	/	RF Power 1.4V	-
28	XOSCI	I	/	RF OSCI	-
29	XOSCO	O	/	RF OSCO	-
30	IOVDD	P	/	IO Power 3.3V	-
31	PC10	I/O	24/16/8/2.4	GPIO	SD0_CLKD: SD0 Clock(D) SPI1_DOB: SPI1 Data Out(B) ISP_DI_B Q-decoder1 UART2_RXB: Uart2 Data In(B) ADC9: ADC Channel 9 TMR5CK(MCPWM) PWM3: Timer3 PWM Output TOUCH10: Touch Input Channel 10 SDTAP_DATA
32	PC9	I/O	24/16/8/2.4	GPIO	SD0_CMDD: SD0 CMD(D) SPI1_CLKB: SPI1 Clock(B) ISP_CLK_B Q-decoder0 UART2_TXB: Uart2 Data Out(B) ADC8: ADC Channel 8 TMR4CK(MCPWM) TOUCH9: Touch Input Channel 9 SDTAP_CLKA
33	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

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
34	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
35	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
36	PC5	I/O	24/16/8/2.4	GPIO	SD0_DAT3D: SD0 Data3(D) ALNK0_DAT2A: Audio Link0 Data2(A) ALNK1_DAT2A: Audio Link1 Data2(A) SPI0_CSB: SPI0 Chip Select(B) TMR2CK(MCPWM) PWM4: Timer4 PWM Output TOUCH5: Touch Input Channel 5
37	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) SPI0_DAT3B(3): SPI0 Data3 In(B) SD1_DAT0B: SD1 Data0(B) PWMCH4L(MCPWM) CAP1: Timer1 Capture TOUCH2: Touch Input Channel 2
38	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) SPI0_DAT2B(2): SPI0 Data2 In(B) SD1_CLKB: SD1 Clock(B) ADC7: ADC Channel 7 PWM1: Timer1 PWM Output Wakeup11: Port Wakeup 11 TOUCH1: Touch Input Channel 1

PIN NO.	Name	I/O Type	Drive (mA)	Function	Other Function
39	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) SPI0_DIB(1): SPI0 Data In(B) 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
40	DVDD	P	/	Core Power 1.2V	-
41	PD5	I/O	24/16/8/2.4	GPIO	SPI0_DOA(0): SPI0 Data Out(A) SFC_DOA(0): SFC Data Out(A)
42	PD4	I/O	24/16/8/2.4	GPIO	SPI0_CLKA: SPI0 Clock(A) SFC_CLKA: SFC Clock(A)
43	PD6	I/O	24/16/8/2.4	GPIO	SFGAT: Flash Power Gate
44	PD1	I/O	24/16/8/2.4	GPIO	SPI0_DIA(1): SPI0 Data In(A) SFC_DIA(1): SFC Data In(A)
45	PD0	I/O	24/16/8/2.4	GPIO (pull up)	SPI0_CSA: SPI0 Chip Select(A) SFC_CSA: SFC Chip Select(A)
46	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
47	HUSBDM	I/O	10	USB Negative Data	-
48	HUSBDP	I/O	10	USB Positive Data	-
49	DCVDD14	P	/	Core Power 1.4V	-
50	VBAT	P	/	LDO Power	-
51	SW	P	/	DC-DC Switch Pin	-
52	PGND	P	/	PMU Ground	-
PAD		P	/	VSS	-

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
WVDD33	RF Power 3.3V Voltage	-0.3	3.5	V
AHVDD	Audio Power Voltage	-0.3	3.5	V
WVDD14	RF Power 1.4V Voltage	-0.3	1.55	V
V _{3.3IO}	3.3V IO Input Voltage	-0.3	IOVDD+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	—
IOVDD	Voltage output	2.1	3.3	3.5	V	LDO5V = 5V, 200mA loading
DCVDD14	Voltage output	1.2	1.4	1.55	V	LDO mode: 70mA loading DC-DC mode: 120mA loading
DVDD	Voltage output	0.87	1.2	1.32	V	LDO5V=5V, 100mA loading
WVDD33	Voltage Input	2.1	3.3	3.5	V	—
AHVDD	Voltage Input	2.1	3.3	3.5	V	—
WVDD14	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	—	$0.3 \cdot IOVDD$	V	$IOVDD = 3.3V$
V_{IH}	High-Level Input Voltage	$0.7 \cdot IOVDD$	—	$IOVDD + 0.3$	V	$IOVDD = 3.3V$
IO output characteristics						
V_{OL}	Low-Level Output Voltage	—	—	0.33	V	$IOVDD = 3.3V$
V_{OH}	High-Level Output Voltage	2.7	—	—	V	$IOVDD = 3.3V$

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.FUSBDM & FUSBDP default pull down
FUSBDP FUSBDM	10mA	—	1.5K	15K	3. Internal pull-up/pull-down resistance accuracy $\pm 20\%$

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	—	-72	—	dB	
S/N	—	99	—	dB	
Output Swing	—	0.9	—	Vrms	
Dynamic Range	—	93	—	dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
DAC Output Power	15	—	—	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/0dB 10Kohm loading With A-Weighted Filter
THD+N	—	-72	—	dB	
Crosstalk	—	-80	—	dB	

2.7 WIFI Characteristics

2.7.1 Transmitter

Table 2-7-1

Parameter	Date Rate	Min	Typ	Max	Unit	Test Conditions
TX Power (802.11b)	1Mbps	-	19	-	dBm	25°C Power Supply VBAT=3.7V WfVDD33=3.3V 2442MHz 4 Layer Board
	2Mbps	-	19	-	dBm	
	5.5Mbps	-	19	-	dBm	
	11Mbps	-	19	-	dBm	
TX Power (802.11g)	6Mbps	-	19	-	dBm	
	9Mbps	-	19	-	dBm	
	12Mbps	-	19	-	dBm	
	18Mbps	-	19	-	dBm	
	24Mbps	-	18	-	dBm	
	36Mbps	-	17	-	dBm	
	48Mbps	-	16	-	dBm	
	54Mbps	-	15	-	dBm	
TX Power (802.11n, HT20)	MCS0	-	19	-	dBm	
	MCS1	-	19	-	dBm	
	MCS2	-	19	-	dBm	
	MCS3	-	18	-	dBm	
	MCS4	-	17	-	dBm	
	MCS5	-	16	-	dBm	
	MCS6	-	15	-	dBm	
	MCS7	-	14	-	dBm	

Refer to IEEE802.11 specification for TX spectrum limits

2.7.2 Receiver

Table 2-7-2

Parameter	Date Rate	Min	Typ	Max	Unit	Test Conditions
RX Sensitivity (802.11b) (8% PER for 1024 octet PSDU)	1Mbps	-	-97	-	dBm	25°C Power Supply VBAT=3.7V WfVDD33=3.3V 2442MHz 4 Layer Board
	2Mbps	-	-95	-	dBm	
	5.5Mbps	-	-93	-	dBm	
	11Mbps	-	-90	-	dBm	
RX Sensitivity (802.11g) (10% PER for 1024 octet PSDU)	6Mbps	-	-92.5	-	dBm	
	9Mbps	-	-91	-	dBm	
	12Mbps	-	-89	-	dBm	
	18Mbps	-	-87	-	dBm	
	24Mbps	-	-84	-	dBm	
	36Mbps	-	-80	-	dBm	

Parameter	Date Rate	Min	Typ	Max	Unit	Test Conditions
	48Mbps	-	-77	-	dBm	25℃ Power Supply VBAT=3.7V WfVDD33=3.3V 2442MHz 4 Layer Board
	54Mbps	-	-75.5	-	dBm	
RX Sensitivity (802.11n,20MHz) (10% PER for 1024 octet PSDU)	MCS0	-	-92.5	-	dBm	
	MCS1	-	-89	-	dBm	
	MCS2	-	-87	-	dBm	
	MCS3	-	-84	-	dBm	
	MCS4	-	-80	-	dBm	
	MCS5	-	-76	-	dBm	
	MCS6	-	-75	-	dBm	
	MCS7	-	-74	-	dBm	
Maximum Receive Level	1Mbps	-	-8	-	dBm	
	11Mbps	-	-8	-	dBm	
	6Mbps	-	-8	-	dBm	
	54Mbps	-	-8	-	dBm	
	MCS0	-	-8	-	dBm	
	MCS7	-	-8	-	dBm	

2.8 BT Characteristics

Table 2-8

BT Type	Parameter	Min	Typ	Max	Unit	Test Conditions
BDR	Out Power	-	18	20	dBm	25℃ Power Supply VBAT=3.7V WfVDD33=3.3V 4 Layer Board
	Sensitivity(BER=0.1%)	-	-92	-	dBm	
EDR	Out Power	-	18	18.5	dBm	
	Sensitivity(BER=0.1%)	-	-91	-	dBm	
BLE	Out Power	-	18	19.5	dBm	
	1M Sensitivity(PER=30.8%)	-	-95	-	dBm	
	2M Sensitivity(PER=30.8%)	-	-89	-	dBm	
	Long Range S8 Sensitivity(PER=30.8%)	-	-104	-	dBm	
	Long Range S2 Sensitivity(PER=30.8%)	-	-100	-	dBm	

2.9 ESD Protection

Table 2-9

Parameter	Typ.	Test pin	Reference standard
Human Body Mode	$\pm 4\text{KV}$	All pins(except WFRF)	JEDEC EIA/JESD22-A114
Machine Mode	$\pm 200\text{V}$	All pins	JEDEC EIA/JESD22-A115
Charge Device Model	$\pm 1\text{KV}$	All pins	JEDEC EIA/JESD22-C101F
Latch up	$\pm 200\text{mA}$	All GPIO pins	JEDEC STANDARD NO.78E
	$1.5\times V_{\text{opmax}}$	All power pins	

Note : $1.5\times V_{\text{opmax}}$ = 1.5 times maximum operating voltage.

3. Package Information

3.1 QFN52(6mm*6mm)

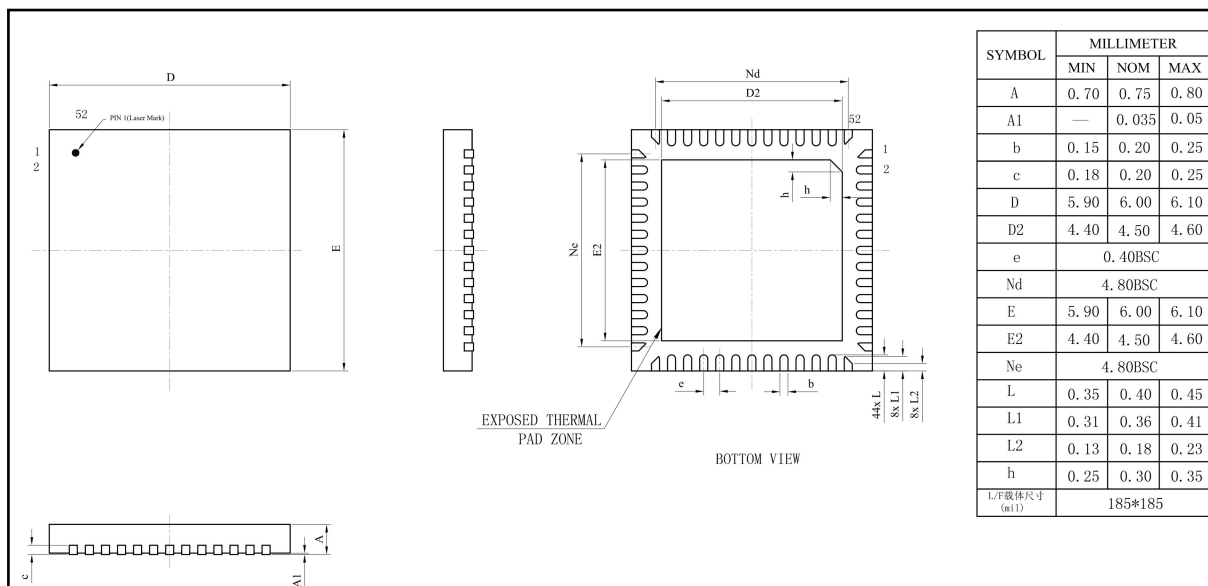
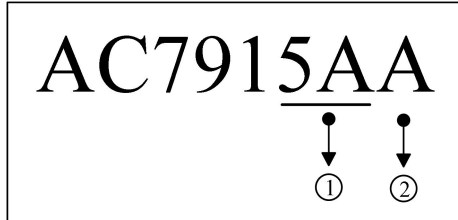


Figure 3-1 AC7915A_QFN52 Package

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. Solder-Reflow Condition

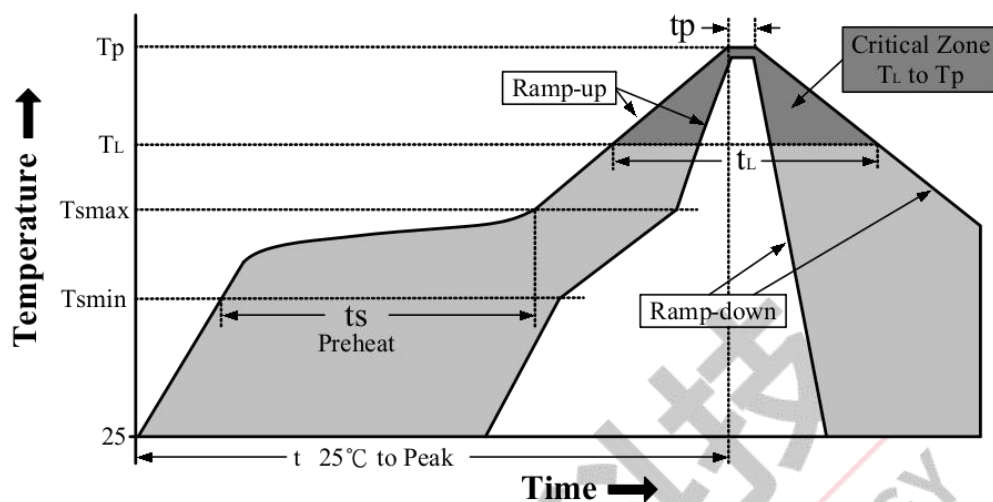


Figure 5-1 Classification Reflow Profile

Classification Profiles

Table 5-1

Profile Feature		Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak	Temperature Min (T _{sm})	100°C	150°C
	Temperature Max (T _{smax})	150°C	200°C
	Time (ts) from (T _{sm} to T _{smax})	60-120 seconds	60-180 seconds
Average ramp-up rate (T _{smax} to T _p)		3°C/second max	3°C/second max
Liquidous temperature (T _L)		183°C	217°C
Time (t _L) maintained above T _L		60-150 seconds	60-150 seconds
Peak package body temperature (T _p)		See Table 6-2	See Table 6-3
Time within 5°C of actual Peak Temperature (tp) ²		10-30 seconds	20-40 seconds
Ramp-down rate (T _p to T _L)		6°C/second max	6°C/second max
Time 25°C to peak temperature		6 minutes max	8 minutes max

Note 1: All temperatures refer to topside of the package, measured on the package body surface.

Note 2: Time within 5°C of actual peak temperature (tp) specified for the reflow profiles is a “supplier” minimum and “user” maximum.

SnPb - Classification Temperature

Table 5-2

Package Thickness	Volume mm ³ < 350	Volume mm ³ ≥ 350
<2.5 mm	240 +0/-5°C	225 +0/-5°C
≥2.5 mm	225 +0/-5°C	225 +0/-5°C

Pb-free - Classification Temperature **Table 5-3**

Package Thickness	Volume mm ³ < 350	Volume mm ³ 350 - 2000	Volume mm ³ > 2000
< 1.6mm	260℃	260℃	260℃
1.6 mm - 2.5mm	260℃	250℃	245℃
> 2.5mm	250℃	245℃	245℃

6. Revision History

Date	Revision	Description
2022.06.28	V1.0	Initial Release
2022.08.04	V1.1	Updated parameter
2023.03.03	V1.2	Modify the chip feature description