

AC7925C Datasheet

Zhuhai Jieli Technology Co.,LTD

Version 1.3

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Revision History

Date	Revision	Author	Description
2024.07.12	V1.0	zh-jieli	Initial Release
2024.09.30	V1.1	zh-jieli	Add Power Domain Information
2024.12.07	V1.2	zh-jieli	Modify IO Characteristics and Operating Temperature
2025.01.09	V1.3	zh-jieli	Update Feature_Bluetooth, Update Block Diagram

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AC7925C Features

SYSTEM

- Dual Core 32bit DSP 320MHz
- With IEEE754 Single precision FPU
- Support jieli TEE
- Support FFT / MATRIX / MATH
- 2 x I-cache and D-cache
- On-chip SRAM 352kbyte
- Support SDTAP / EMU / ETM
- Support MMU
- Support MPU
- Built-in SDRAM/DDR (Maximum 64Mbyte)
- SPI FLASH Controller (Maximum 64Mbyte)
- 24MHz crystal oscillator
- Internal RC oscillator, PLL

Video Input

- Internal Image Signal Processor
- Support DVP, BT656, SPI interface
- Support 1 lane MIPI-CSI interface
- Support RAW, YUV422 formats
- Support video resize an time mark
- 2 x JPEG codec

Video output

- Support display color enhancement
- Support DPI, DBI, BT656 interface
- Support RGB, YUV formats

Graphics

- Internal 2D DMA
- Internal 2.5D GPU
- Support vector graphics rendering
- Support image resize, rotation, projection
- Support multiple blending mode
- Support ARGB, RGB, YUV, Lx, Ax formats

Bluetooth

- Dual-mode BT6.0 with LE Audio (DN Q332415)
- Support AoA/AoD
- Support LE audio BIS/CIS

- Support long range BLE
- Maximum transmitting power 19 dBm
- Receiver sensitivity
 - ❖ -95.5 dBm @BR
 - ❖ -96 dBm @EDR $\pi/4$ DQPSK
 - ❖ -88 dBm @EDR 8DPSK

IEEE 802.11b/g/n

- 1T1R in 2.4 GHz band
- 20 MHz and 40 MHz bandwidth
- Data rate up to 150 Mbps
- Security: WFA/WPA3 personal, WPS2.0, WAPI
- QoS: WFA WMM, WMM PS
- Support STBC, A-MPDU, A-MSDU, BLK-ACK
- Support Station, SoftAP, Station+SoftAP, Promiscuous mode
- Maximum transmitting power
 - ❖ 19 dBm @1Mbps, DSSS
 - ❖ 17 dBm @HT20, MCS0
 - ❖ 13 dBm @HT20, MCS7
- Receiver sensitivity
 - ❖ -97 dBm @1Mbps, DSSS
 - ❖ -93 dBm @HT20, MCS0
 - ❖ -74 dBm @HT20, MCS7

Peripherals

- 1 x High speed USB
- 2 x SD host controller
- 6 x Multi-function 32bit timer
- 5 x UART interface
- 3 x I²C Master/Slave interface
- 3 x SPI Master/Slave interface
- 1 x QDEC
- 1 x CAN Controller
- 8 x MCPWM
- 3 x Light strip Controller
- 1 x 10bit ADC(9 Channel)
- 36 x GPIO Support function remapping
- Built-in RTC with alarm, wakeup

PMU

- 1 x Buck DC-DC converter
- 2 x IO power domain
- WIFI PA support external power supply
- RTCVDD33 support external power supply
- Support temperature sensor
- VBAT range 2.7V to 5.5V
- IOVDD range 2.7V to 3.6V

Packages

- QFN68(7mm*7mm)

Temperature

- Operating temperature
TC = -20℃ to +85℃(standard range)
- Storage temperature -65℃ to +150℃

Applications

- IPC
- Driving recorder
- WIFI Appliances

1 Block Diagram

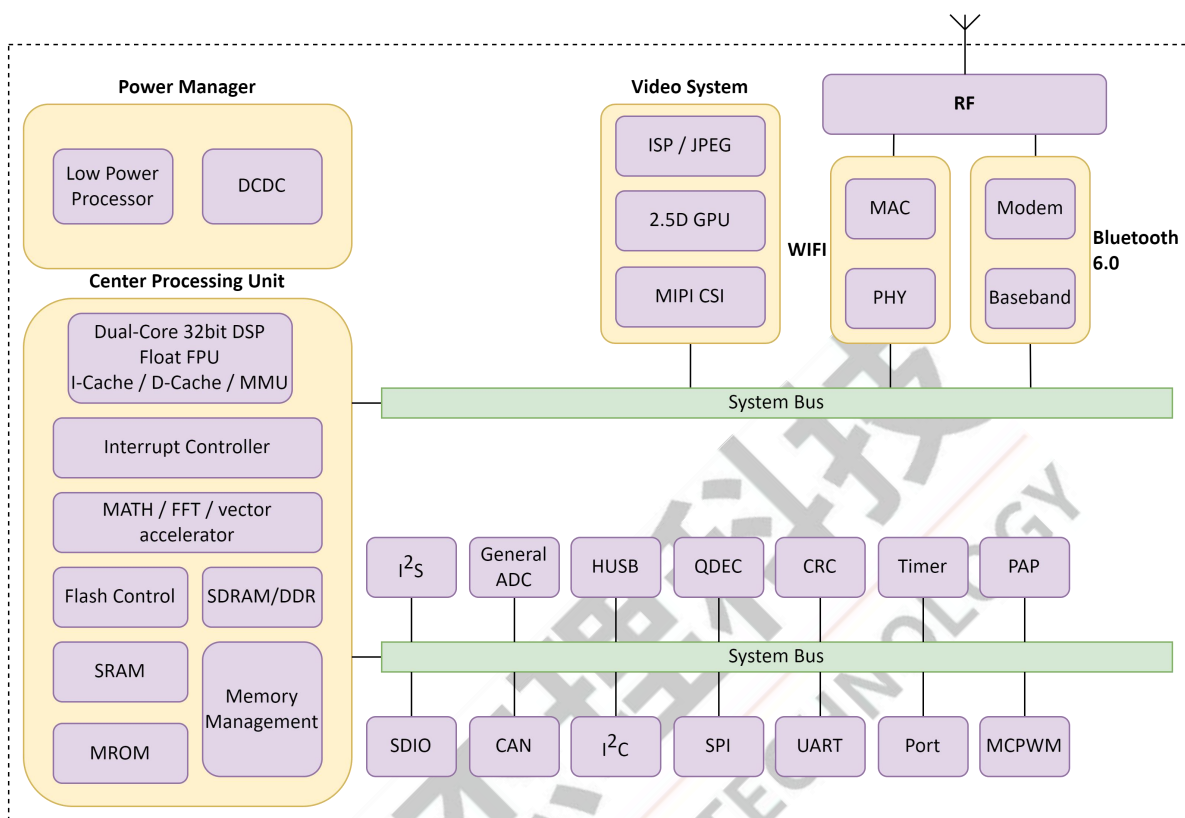


Figure 1-1 AC7925C Block Diagram

2 Pin Definition

2.1 Pin Assignment

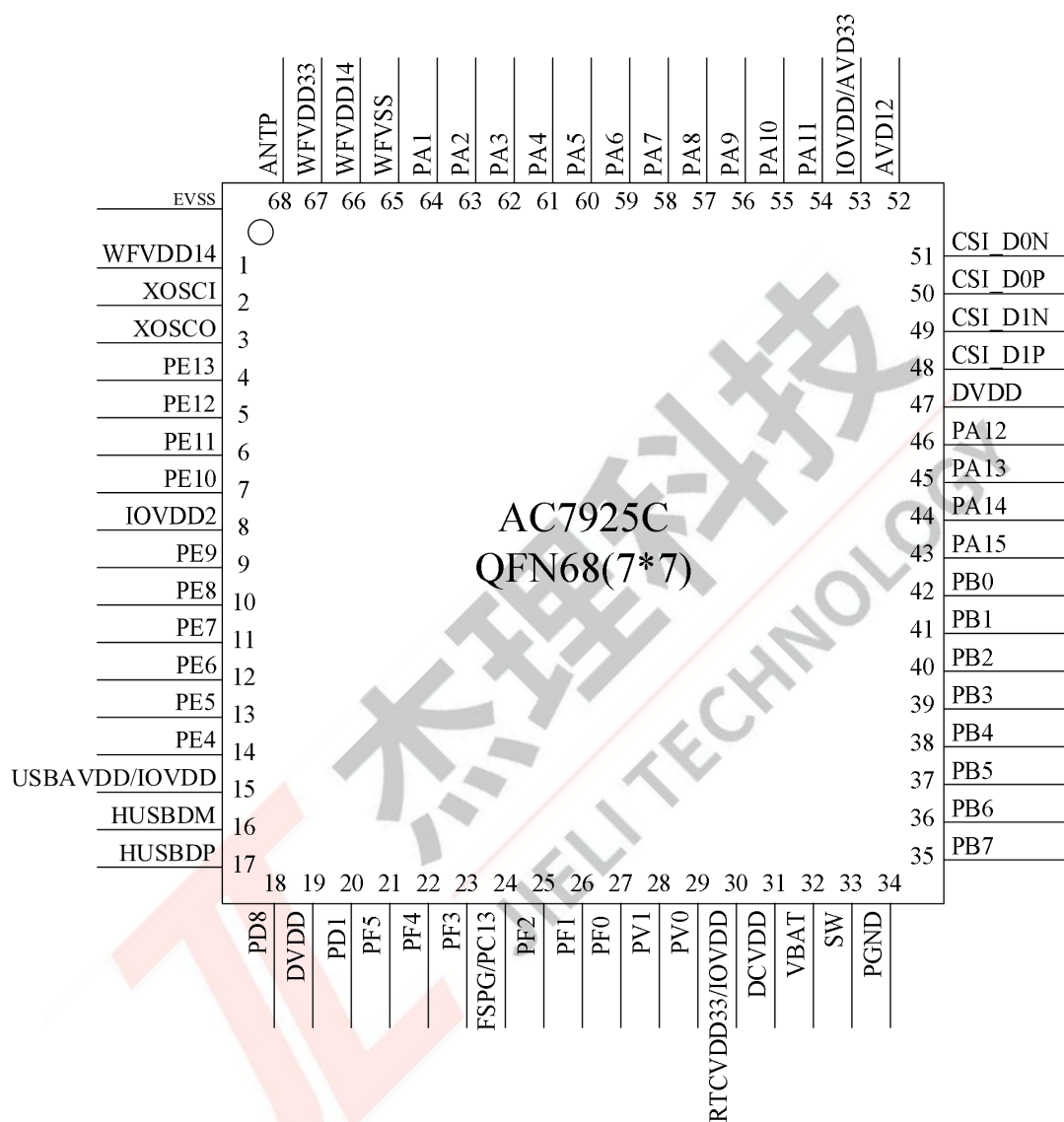


Figure 2-1 AC7925C Pin Assignment

2.2 Pin Description

Table 2-2-1 AC7925C Pin Description

Pin No.	Name	Type	IO Initial State	Description
1	WFVDD14	P	--	Wireless 1.4V Power
2	XOSCI	I	--	Crystal Oscillator Input
3	XOSCO	O	--	Crystal Oscillator Output
4	PE13	I/O	Z	--
5	PE12	I/O	Z	--
6	PE11	I/O	Z	--
7	PE10	I/O	Z	--
8	IOVDD2	P	--	IO Power for PE10~PE13
9	PE9	I/O	Z	ADC12(ADC Input Channel 12) IO Wakeup Channel 12 SD0_DATA3(C)
10	PE8	I/O	Z	ADC11(ADC Input Channel 11) IO Wakeup Channel 11 SD0_DATA2(C)
11	PE7	I/O	Z	ADC10(ADC Input Channel 10) IO Wakeup Channel 10 SD0_DATA1(C)
12	PE6	I/O	Z	ADC9(ADC Input Channel 9) IO Wakeup Channel 9 SD0_CLK(C)
13	PE5	I/O	Z	ADC8(ADC Input Channel 8) IO Wakeup Channel 8 SD0_CMD(C)
14	PE4	I/O	Z	ADC7(ADC Input Channel 7) IO Wakeup Channel 7 SD0_DATA0(C)
15	USBAVDD	P	--	High Speed USB Power
	IOVDD	P	--	IO Power for PA1~PA15, PB0~PB7, PC13, PD1, PD8, PE4~PE9, PF0~PF5, PV0~PV1
16	HUSBDM	I/O	15kΩ Pull-down	High Speed USB Negative Data
17	HUSB DP	I/O	15kΩ Pull-down	High Speed USB Positive Data
18	PD8	I/O	10kΩ Pull-up	MCLR(Device Reset) ADC4(ADC Input Channel 4) SD Power IO Wakeup Channel 4
19	DVDD	P	--	Digital Logic Power

Pin No.	Name	Type	IO Initial State	Description
20	PD1	I/O	10kΩ Pull-up	Hold down 0 to reset ADC1(ADC Input Channel 1) IO Wakeup Channel 1
21	PF5	I/O	Z	SFCTZ_DO SPITZ_DO
22	PF4	I/O	Z	SFCTZ_CLK SPITZ_CLK
23	PF3	I/O	Z	SFCTZ_DATA3 SPITZ_DATA3
24	FSPG	I/O	Z	Flash Power Output
	PC13	I/O	Z	ADC13(ADC Input Channel 13) IO Wakeup Channel 13
25	PF2	I/O	Z	SFCTZ_DATA2 SPITZ_DATA2
26	PF1	I/O	Z	SFCTZ_DI SPITZ_DI
27	PF0	I/O	Z	SFCTZ_CS SPITZ_CS
28	PV1	I/O	Z	AVDD18
29	PV0	I/O	Z	AVDD28
30	RTCVD33	P	--	RTC Power
	IOVDD	P	--	IO Power
31	DCVDD	P	--	DCDC Power
32	VBAT	P	--	Battery Input
33	SW	P	--	Buck DCDC Switch Port
34	PGND	G	--	Ground of Buck DC-DC converter
35	PB7	I/O	Z	LCD_DATA15(A/B) Sensor1_D7(A) PAP_D15(A/B) TS1_DATA3 SD0_CLK(D)
36	PB6	I/O	Z	LCD_DATA14(A/B) Sensor1_D6(A) PAP_D14(A/B) TS1_DATA2 SD0_CMD(D)
37	PB5	I/O	Z	LCD_DATA13(A/B) Sensor1_D5(A) PAP_D13(A/B) TS1_DATA1 SD0_DATA0(D)

Pin No.	Name	Type	IO Initial State	Description
38	PB4	I/O	Z	LCD_DATA12(A/B) Sensor1_D4(A) PAP_D12(A/B) TS1_DATA0 SD0_DATA1(D)
39	PB3	I/O	Z	LCD_DATA11(A/B) Sensor1_D3(A) PAP_D11(A/B) TS1_SYNC SD0_DATA2(D)
40	PB2	I/O	Z	LCD_DATA10(A/B) Sensor1_D2(A) PAP_D10(A/B) TS1_CLK SD0_DATA3(D)
41	PB1	I/O	Z	LCD_DATA9(A/B) Sensor1_D1(A) PAP_D9(A/B) TS1_VALID
42	PB0	I/O	Z	LCD_DATA8(A/B) Sensor1_D0(A) PAP_D8(A/B) TS1_ERROR
43	PA15	I/O	Z	LCD_SYNC2(A/B) Sensor1_SYNC1(A)
44	PA14	I/O	Z	LCD_SYNC1(A/B) Sensor1_SYNC0(A) PAP_RD(A/B)
45	PA13	I/O	Z	LCD_DCLK(A/B) Sensor1_CLK(A) TS0_DATA7
46	PA12	I/O	Z	LCD_SYNC0(A/B) PAP_WR(A/B) TS0_DATA6
47	DVDD	P	--	Digital Logic Power
48	CSI_D1P	I	--	MIPI CSI D1P
49	CSI_D1N	I	--	MIPI CSI D1N
50	CSI_D0P	I	--	MIPI CSI D0P
51	CSI_D0N	I	--	MIPI CSI D0N
52	AVD12	P	--	Analog 1.2V Power

Pin No.	Name	Type	IO Initial State	Description
53	IOVDD	P	--	IO Power
	AVD33	P	--	Analog 3.3V Power
54	PA11	I/O	Z	LCD_DATA7(A) Sensor0_D9(B) PAP_D7(A) TS0_DATA5
55	PA10	I/O	Z	SFC1_DO LCD_DATA6(A) Sensor0_D8(B) PAP_D6(A) TS0_DATA4 SD0_DATA3(B)
56	PA9	I/O	Z	SFC1_CLK LCD_DATA5(A) Sensor0_D7(B) PAP_D5(A) TS0_DATA3 SD0_DATA2(B)
57	PA8	I/O	Z	SFC1_DATA3 LCD_DATA4(A) Sensor0_D6(B) PAP_D4(A) TS0_DATA2 SD0_DATA1(B)
58	PA7	I/O	Z	LCD_DATA3(A) Sensor0_D5(B) PAP_D3(A) TS0_DATA1 SD0_CLK(B)
59	PA6	I/O	Z	SFC1_DATA2 LCD_DATA2(A) Sensor0_D4(B) PAP_D2(A) TS0_DATA0 SD0_CMD(B)
60	PA5	I/O	Z	SFC1_DI LCD_DATA1(A) Sensor0_D3(B) PAP_D1(A) TS0_CLK SD0_DATA0(B)

Pin No.	Name	Type	IO Initial State	Description
61	PA4	I/O	Z	SFC1_CS LCD_DATA0(A) Sensor0_D2(B) PAP_D0(A) TS0_SYNC
62	PA3	I/O	Z	Sensor0_CLK(B) TS0_VALID
63	PA2	I/O	Z	Sensor0_SYNC1(B) TS0_ERROR
64	PA1	I/O	Z	Sensor0_SYNC0(B)
65	WVSS	G	--	Ground of Wireless
66	WVDD14	P	--	Wireless 1.4V Power
67	WVDD33	P	--	Wireless 3.3V Power
68	ANTP	RF	--	Antenna Positive Port

Note

1.IO initial state abbreviations Z--High resistance, H--High level, L--Low level, X--May be changed during power on.

2.Timer, CAN, MCPWM, QDEC, UART, LEDC, I²C, I²S and SPI functions can be remapped to any I/O (except PF/PV/CSI).

Table 2-2-2 Pin Types Description

Pin Type	Description	Pin Type	Description
P	Power	I/O	Input or Output
G	Ground	I	Input
RF	RF antenna	O	Output

3 Electrical Characteristics

3.1 Absolute Maximum Ratings

Table 3-1 Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
T _{opt}	Operating temperature	-20	+85	°C
T _{stg}	Storage temperature	-65	+150	°C
VBAT	Supply Voltage	-0.3	5.5	V
IOVDD		-0.3	3.6	V
IOVDD2		-0.3	3.6	V
RTCVDD33		-0.3	3.6	V
DCVDD		-0.3	1.54	V
WVDD33		-0.3	3.6	V
WVDD14		-0.3	1.54	V
USBAVDD		-0.3	3.6	V
AVD33		-0.3	3.6	V
AVD12		-0.3	1.54	V
GPIO	Input voltage of GPIO	-0.3	3.6	V

Note

1. Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device.

3.2 ESD Ratings

Table 3-2 ESD Ratings

Parameter	Typ	Test pin	Reference standard
Human Body Mode	±4kV	All pins	JEDEC EIA/JESD22-A114
Machine Mode	±300V	All pins	JEDEC EIA/JESD22-A115
Charge Device Model	±1kV	All pins	ANSI/ESDA/JEDEC JS-002-2022

3.3 PMU Characteristics

Table 3-3 PMU Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VBAT	Power supply	--	2.7	3.7	5.5	V
Operating mode						
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IOVDD	Voltage output	--	2.4	3.3	3.4	V
	Loading current	IOVDD=3.3V@VBAT = 3.9V	--	--	200	mA
AVDD28	Voltage output	--	2.5	2.8	3.2	V
	Loading current	AVDD28=2.8V@IOVDD = 3.3V	--	--	100	mA
AVDD18	Voltage output	--	1.5	1.8	2.2	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
	Loading current	AVDD18=1.8V@IOVDD = 3.3V	--	--	60	mA
DCVDD	Voltage output	--	--	1.4	--	V
	Loading current	DCVDD=1.4V@IOVDD = 3.3V, LDO mode	--	--	60	mA
		DCVDD=1.4V@VBAT = 3.7V, DCDC mode	--	--	180	mA
Low Power mode						
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
IOVDD	Loading current	IOVDD=3.0V@VBAT = 3.7V	--	--	10	mA

3.4 IO Characteristics

Table 3-4 IO Characteristics

Input Characteristics						
Symbol	Parameter	Conditions	IO	Min	Max	Unit
V _{IL}	Low-Level Input Voltage	IOVDD2 = 3.0V	PE10~PE13	-0.3	1.4	V
		IOVDD2 = 1.8V	PE10~PE13	-0.3	0.7	V
		IOVDD = 3.0V	PA1~PA15 PB0~PB7 PC13, PD1, PD8 PE4~PE9 PF0~PF5 HUSBDP HUSBDM PV0~PV1	-0.3	1.4	V
V _{IH}	High-Level Input Voltage	IOVDD2 = 3.0V	PE10~PE13	1.7	3.3	V
		IOVDD2 = 1.8V	PE10~PE13	1.1	2.0	V
		IOVDD = 3.0V	PA1~PA15 PB0~PB7 PC13, PD1, PD8 PE4~PE9 PF0~PF5 HUSBDP HUSBDM PV0~PV1	1.7	3.3	V
Output Characteristics						
Symbol	Parameter	Conditions	IO	Typ		Unit
I _{OL}	Output Current	IOVDD2 = 3.0V Voutput = 0.3V	PE10~PE13	2.5(HD=0) 8(HD=1)		mA
		IOVDD2 = 1.8V Voutput = 0.2V		18.5(HD=2) 24(HD=3)		
		IOVDD = 3.0V		PA1~PA15	2.5(HD=0)	

		Voutput = 0.3V	PB0~PB7 PC13, PD1, PD8 PE4~PE9 PF0~PF5	8(HD=1) 18.5(HD=2) 24(HD=3)	
			PV0~PV1	2.5(HD=0) 18.5(HD=1)	mA
			HUSBDP HUSBDM	8	mA
I _{OH}	Output Current	IOVDD2 = 3.0V Voutput = 2.7V IOVDD2 = 1.8V Voutput = 1.6V	PE10~PE13	2.5(HD=0) 8(HD=1) 18.5(HD=2) 24(HD=3)	mA
				IOVDD = 3.0V Voutput = 2.7V	PA1~PA15 PB0~PB7 PC13, PD1, PD8 PE4~PE9 PF0~PF5
		PV0~PV1	2.5(HD=0) 18.5(HD=1)		mA
		HUSBDP HUSBDM	8		mA
		Internal Resistance Characteristics			
		Symbol	Parameter	Conditions	IO
R _{pu}	Pull-up Resistance	IOVDD = 3.0V IOVDD2 = 3.0V/1.8V	PA1~PA15 PB0~PB7 PC13, PD1, PD8 PE4~PE13 PF0~PF5	10k	Ω
			HUSBDP	1.5k(PU=1) 1k(PU=2/3)	Ω
R _{pd}	Pull-down Resistance	IOVDD = 3.0V IOVDD2 = 3.0V/1.8V	PA1~PA15 PB0~PB7 PC13, PD1, PD8 PE4~PE13 PF0~PF5	10k	Ω
			HUSBDP HUSBDM	15k	Ω

Note

1.Internal pull-up/pull-down resistance accuracy ±20%.

3.5 BT Characteristics

3.5.1 Transmitter

Table 3-5-1 Transmitter characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Maximum RF Transmit Power	BR	--	19	--	dBm
Maximum RF Transmit Power	EDR $\pi/4$ DQPSK EDR 8DPSK	--	19	--	dBm
Relative Transmit Power	EDR $\pi/4$ DQPSK EDR 8DPSK	--	1.5	--	dB
Maximum RF Transmit Power	BLE-1Mbps	--	19	--	dBm

3.5.2 Receiver

Table 3-5-2 Receiver characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Sensitivity	BR	--	-95.5	--	dBm
	EDR $\pi/4$ DQPSK	--	-96	--	dBm
	EDR 8DPSK	--	-88	--	dBm
	BLE-1Mbps	--	-98	--	dBm
	BLE-2Mbps	--	-95	--	dBm
	BLE-S2	--	-101	--	dBm
	BLE-S8	--	-106	--	dBm

3.6 WiFi Characteristics

3.6.1 Transmitter

TX Power with Spectral Mask and EVM Meeting 802.11 Standards.

Table 3-6-1 Transmitter characteristics

Parameter	Conditions	Min	Typ	Max	Unit
TX Power	802.11b, 1 Mbps, DSSS	--	19	--	dBm
	802.11b, 11 Mbps, CCK	--	19	--	dBm
	802.11g, 6 Mbps, OFDM	--	17	--	dBm
	802.11g, 54 Mbps, OFDM	--	14	--	dBm
	802.11n, HT20, MCS0	--	17	--	dBm
	802.11n, HT20, MCS7	--	13	--	dBm
	802.11n, HT40, MCS0	--	17	--	dBm
	802.11n, HT40, MCS7	--	12	--	dBm

3.6.2 Receiver

For RX tests, the PER (packet error rate) limit is 8% for 802.11b, and 10% for 802.11g/n.

Table 3-6-2 Receiver characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Sensitivity	802.11b, 1 Mbps, DSSS	--	-97	--	dBm
	802.11b, 2 Mbps, DSSS	--	-94.5	--	dBm
	802.11b, 5.5 Mbps, CCK	--	-93	--	dBm
	802.11b, 11 Mbps, CCK	--	-90	--	dBm
	802.11g, 6 Mbps, OFDM	--	-93	--	dBm
	802.11g, 9 Mbps, OFDM	--	-92	--	dBm
	802.11g, 12 Mbps, OFDM	--	-91	--	dBm
	802.11g, 18 Mbps, OFDM	--	-89	--	dBm
	802.11g, 24 Mbps, OFDM	--	-86	--	dBm
	802.11g, 36 Mbps, OFDM	--	-83	--	dBm
	802.11g, 48 Mbps, OFDM	--	-79	--	dBm
	802.11g, 54 Mbps, OFDM	--	-77	--	dBm
	802.11n, HT20, MCS0	--	-93	--	dBm
	802.11n, HT20, MCS1	--	-90.5	--	dBm
	802.11n, HT20, MCS2	--	-88	--	dBm
	802.11n, HT20, MCS3	--	-84.5	--	dBm
	802.11n, HT20, MCS4	--	-81.5	--	dBm
	802.11n, HT20, MCS5	--	-77	--	dBm
	802.11n, HT20, MCS6	--	-75	--	dBm
	802.11n, HT20, MCS7	--	-74	--	dBm
	802.11n, HT40, MCS0	--	-89	--	dBm
	802.11n, HT40, MCS1	--	-86	--	dBm
	802.11n, HT40, MCS2	--	-84	--	dBm
	802.11n, HT40, MCS3	--	-80	--	dBm
	802.11n, HT40, MCS4	--	-77.5	--	dBm
	802.11n, HT40, MCS5	--	-72.5	--	dBm
	802.11n, HT40, MCS6	--	-71.5	--	dBm
	802.11n, HT40, MCS7	--	-70	--	dBm
	802.11n, HT40, MCS32	--	-89	--	dBm

4 Package Information

4.1 QFN68_7*7mm

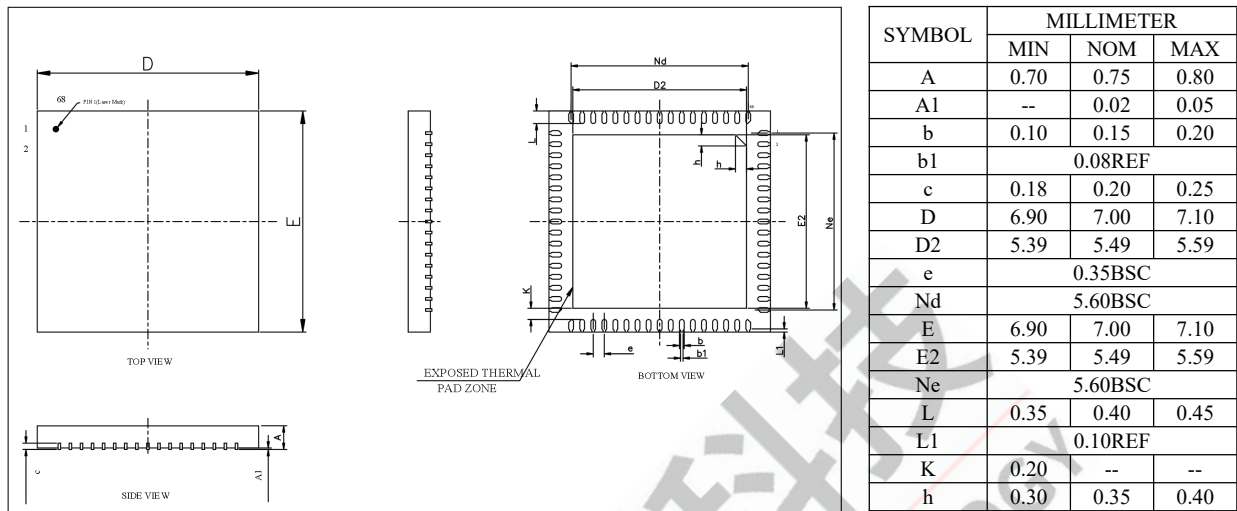


Figure 4-1 AC7925C Package

5 IC Marking Information

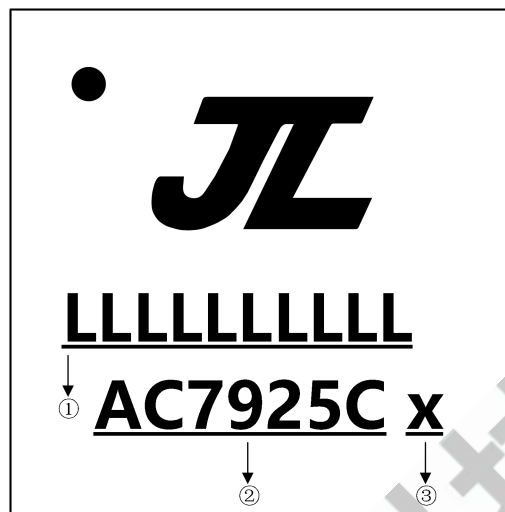


Figure 5-1 AC7925C Package Outline

- ① Production Batch
- ② Chip Model
- ③ Built-in DDR size
 - 0 No Flash 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
 - E 4Mx16bit DDR1
 - F 8Mx16bit DDR1
 - G 16Mx16bit DDR1

6 Solder-Reflow Condition

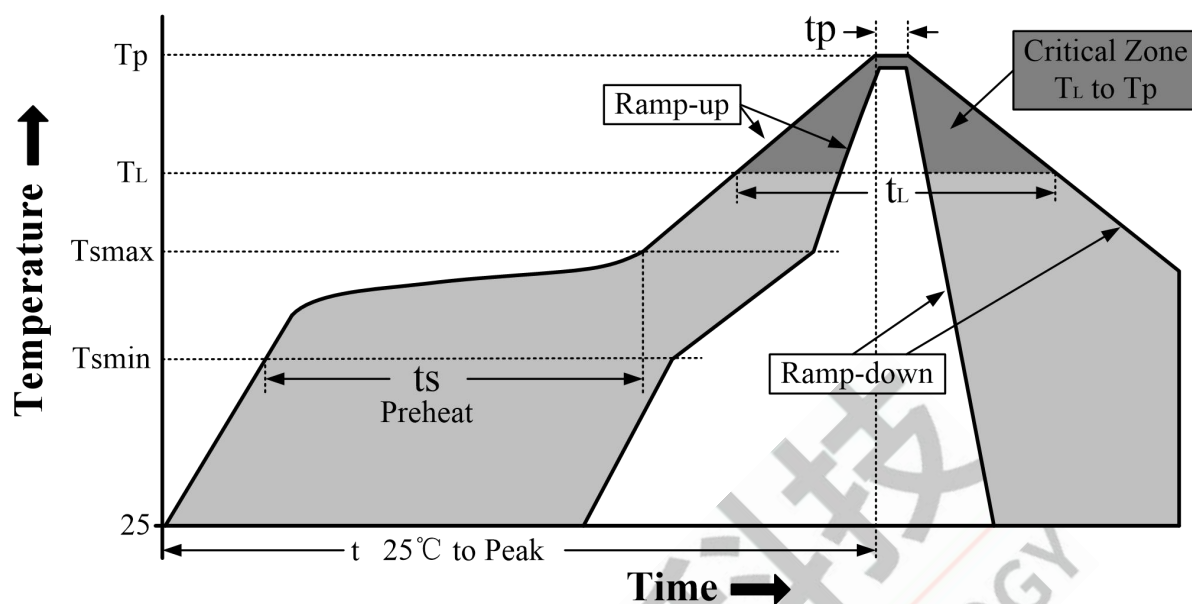


Figure 6-1 Classification Reflow Profile

Table 6-1 Classification Profiles

Profile Feature		Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat/Soak	Temperature Min (T_{smin})	100°C	150°C
	Temperature Max (T_{smax})	150°C	200°C
	Time (ts) from (T_{smin} 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
- 2.Time within 5°C of actual peak temperature (tp) specified for the reflow profiles is a "supplier" and "user" maximum.

Table 6-2 SnPb Classification Temperature

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

Table 6-3 Pb-free - Classification Temperature

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

Note

1.*Tolerance The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0°C.For example 260°C+0°C)at the rated MSL level.