Einstein-S500 SOM datasheet

Version History

version	description	principal	date
V0.1	Version 0.1	Einstein ™ development team	2017-09-01
V0.2	Version 0.2	Einstein ™ development team	2017-09-08
V0.3	1. Add the application example link of CubieAIO-S500	Einstein ™ development team	2017-11-12

Chapter 1 Overview

1.1 Overview

Einstein-S500 is a open-source and full-featured System On Module (SOM for short) product based on the S500 SOC from Actions Technology. Its main target is to shorten product development cycles, accelerate time to market, and reduce the development efforts. This embedded product provides a competitive software and hardware platform for innovation and industrialization.

S500 is a powerful 32-bit quad-core processor that uses 28nm process technology with an integrated ARM Cortex-A9 R4 quad-core CPU. PowerVR SGX544 GPU can provide powerful computing capabilities like displaying full-HD content and the independent video processing unit (VPU) supports multiple video files decoding simultaneously and decoding of all the almost video formats.

SOC S500 can reduce the complexity of the hardware system and it allows engineers to build a cost-effective embedded product very easily. The chip ATC2603C with the integrated audio codec can easily solve the problem of power management and also provides a cost effective BOM costs.

Currently Einstein-S500 is supporting Android 5.1.1 and Linux software development kit (SDK) and associated documentations. It's also available the CubieAIO-S500, which is a typical application example for Einstein-S500 SOM and open source industrial All-In-One embedded computer. CubieAIO-S500 includes a typical carrier board for the Einstein-S500 module, a metallic case, a 1024*600 LCD module and the corresponding touch panel. We think this product can be used to speed up more and more the development of creative projects .
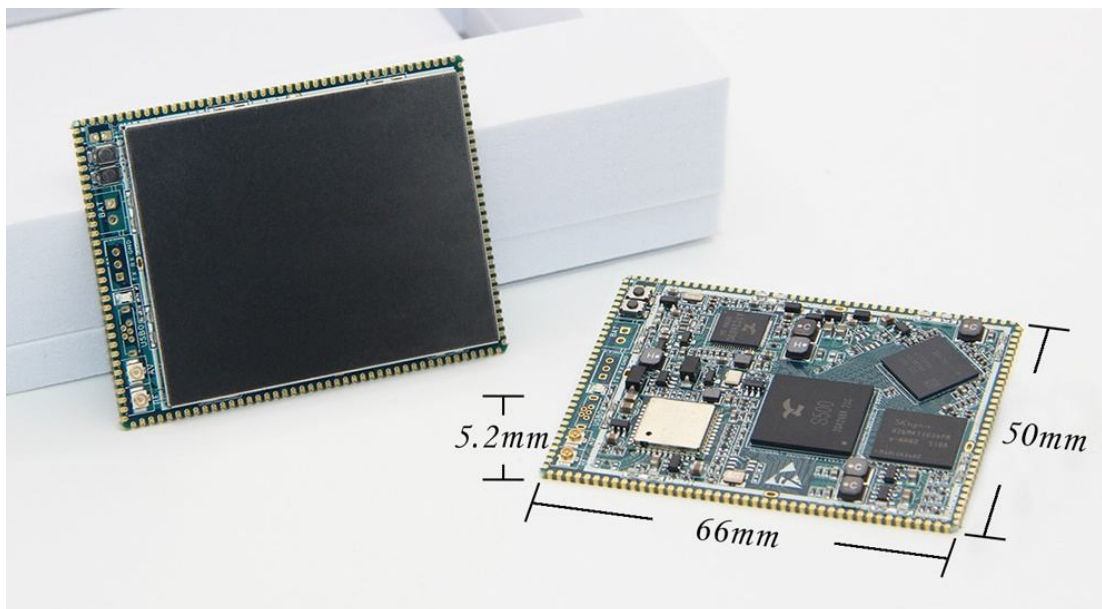
1.2 Features

- Supports dual (big and little core) system architecture to meet the needs of fast start scenarios
- Simultaneous dual differential displays of 1080p resolution
- Multi-channel video decoder, up to 6-channels simultaneously
- Support Dual DVP / MIPI-CSI camera encoding simultaneously
- Complete Linux distribution support, Support GPU acceleration and video hardware decoding acceleration

1.3 Applications

- Intelligent commercial display machines
- Robot
- Smart POS machines
- Game terminal
- Smart Appliances
- Video conferencing / video telephony
- Thin client / cloud terminal

- Industrial control
- Security Monitoring

1.4 Mechical characteristics

Chapter II Specifications and Functions

2.1 Basic Functions

- SOC: Actions S500 SOC, ARM Cortex-A9 R4 CPU, Imagination PowerVR SGX544 MP GPU
- Memory: up to 2GB LPDDR3, can be cut to 1GB or 512MB
- Storage: default 8GB eMMC, custom supports up to 64GB
- Wireless: Wifi 2.4GHz, 802.11 / b / g / n, Bluetooth 4.0 (HS) ble
- Power Management: perfect power management circuitry, support USB5V, DC5V, 3.7V main battery power input source
- Default interface: Vertical Micro USB port, 3-wires UART debug port, a battery interface, the RTC battery interface, display CVBS Ipex connector, Wifi & BT Ipex connector, Power button, ADFU button.
- Extended interface: 16 E-PAD ground pads on the bottom side and 150 pin holes on the edge (the specification is described in the next section).

2.2 Product scalability

- Supports extended USB3.0 OTG interface, supports Device and Host mode
- Supports two native USB2.0 HOST interface, support for a hierarchy USB HUB expansion
- External support expansion 10/100M bit RJ45 Ethernet port
- Support expansion HDMI 1.4b, compatible DVI1.0; support CVBS video output

- Support LVDS, RGB, MIPI-DSI external LCD screen, maximum resolution of 1920 * 1200
- Support for external expansion SDIO3.0 high-speed data card
- Support DVP & MIPI-CSI camera
- Support I2C, SPI, UART, PWM, LRADC and other common interfaces

2.3 Video interfaces

- Supports extended LVDS + MIPI-DSI interface on the display
- Support HDMI + LCD interface on the display
- Support two-channel MIPI-CSI camera interfaces, Support simultaneous dual camera recording applications

2.4 System software support

The Einstein-S500 can even work as stand-alone core board, but it is limited in functionality. So, when prototyping, it's recommended to use the CubieAIO-S500 (schematics and PCB/Gerber files are available) when developing on the SDK (software development kit).

There are two possibilities:

- Android system

Einstein-S500 can be programmed with Android5.1.1 system, Linux kernel 3.10 and it's recommended to significantly reduce the workload of the product development. CubieAIO-S500 supports all the extended signals, so it's easy to debug the functionality.

- Linux systems

Einstein-S500 can be programmed with Debian8 system, Linux kernel 3.10 and use of light weight LXDE X11 desktop. GPU acceleration and completion of the VPU depth optimized video codec are enable.

Chapter III Expansions

3.1 Expansion Pins Definitions

Pin No.	Ball No.	Def.Function	Mux.Function	Function Description
1	PMU: 23	REMCON	REMCON	general ADC input4 for remote control
			IR	IR control input
			LOSC_32K	32K clock output
			SGPIO0	General Purpose Input / Output 0 SVCC
2	PMU: 19	Li_BAT [3.7V]	Li_BAT [3.7V]	Connected to Li-Bat power supply
3	PMU: 28	LDO5OUT	LDO5OUT	Output of voltage regulator LDO5
4	PMU: 17	VBUS	VBUS	Connected to USB power supply
5		5VOUT	5VOUT	Einstein-S500 Ouput 5V
6		GND	GND	Ground

7	Y22	SD0_D1	SD0_D1	SDIO0 D1
			NOR_D1	NOR Flash D1
			UART2_TX	UART2 TX
			UART5_TX	UART5 TX
			GPIOC11	GPIOC11
8	Y23	SD0_D0	SD0_D0	SDIO0 D0
			NOR_D0	NOR Flash D0
			UART2_RX	UART2 RX
			UART5_RX	UART5 RX
			GPIOC10	GPIOC10
9	W23	SD0_D3	SD0_D3	SDIO0 D3
			NOR_D3	NOR Flash D3
			UART2_CTSB	UART2 CTSB
			UART1_RX	UART1 RX
			GPIOC13	GPIOC13
10	W24	SD0_CMD	SD0_CMD	SDIO0 CMD
			NOR_A1	NOR Flash A1
			GPIOC18	GPIOC18
11	W22	SD0_CLK	SD0_CLK	SDIO0 CLK
			GPIOC19	GPIOC19
12	V24	SD0_D2	SD0_D2	SDIO0 D2
			NOR_D2	NOR Flash D2
			UART2_RTSB	UART2 RTSB
			UART1_TX	UART1 TX
			GPIOC12	GPIOC12
13	AD23	UART3_RX	UART3_RX	UART3 RX
			GPIOD22	GPIOD22
14	AD24	UART3_TX	UART3_TX	UART3 TX
			GPIOD23	GPIOD23
15		GND	GND	Ground
16	D24	U3_DM0	U3_DM0	USB3 DM0
17	D23	U3_DP0	U3_DP0	USB3 DP0
18	C24	U3_IDPIN0	U3_IDPIN0	USB3 IDPIN0
19		GND	GND	Ground PAD
20	T21	SR0_CKOUT	SR0_CKOUT	Camera Sensor0 CKOUT
			NOR_D10	NOR Flash D10
			SENS1_CLKOUT	Camera Sensor1 CKOUT
			PWM1	PWM1
			GPIOD10	GPIOD10
twenty one	R22	SR0_PCLK	SR0_PCLK	Camera Sensor0 PCLK
			NOR_A3	NOR Flash A3
			PWM0	PWM0
			GPIOC31	GPIOC31

twenty two	R24	SR0_DATA1	CSI_DP2	MIPI-CSI DP2
			SR0_DATA1	Camera Sensor0 DATA1
twenty three	R23	SR0_DATA0	CSI_DN2	MIPI-CSI DN2
			SR0_DATA0	Camera Sensor0 DATA0
twenty four	P23	SR0_DATA2	CSI_DN0	MIPI-CSI DN0
			SR0_DATA2	Camera Sensor0 DATA2
25	P22	SR0_DATA3	CSI_DP0	MIPI-CSI DP0
			SR0_DATA3	Camera Sensor0 DATA3
26	N22	SR0_HSYNC	CSI_CP	MIPI-CSI CP
			SR0_HSYNC	Camera Sensor0 HSYNC
27	N24	SR0_VSYNC	CSI_CN	MIPI-CSI CN
			SR0_VSYNC	Camera Sensor0 VSYNC
28	M24	SR0_DATA5	CSI_DN3	MIPI-CSI DN3
			SR0_DATA5	Camera Sensor0 DATA5
29	N23	SR0_DATA4	CSI_DP3	MIPI-CSI DP3
			SR0_DATA4	Camera Sensor0 DATA4
30	M23	SR0_DATA7	CSI_DP1	MIPI-CSI DP1
			SR0_DATA7	Camera Sensor0 DATA7
31	M22	SR0_DATA6	CSI_DN1	MIPI-CSI DN1
			SR0_DATA6	Camera Sensor0 DATA6
32		GND	GND	Ground PAD
33	F4	TVCVBS	TVCVBS	TV CVBS
34		ADFU	ADFU	For Firmware download Key
35	M21	KS_IN1	KS_IN1	KEY IN1
			NOR_A6	NOR Flash A6
			PWM1	PWM1
			DRV_VBUS0	DRV VBUS0
			SENS1_D5	Camera Sensor1 D5
			PWM5	PWM5
			GPIOB4	GPIOB4
36	N21	KS_IN0	KS_IN0	KEY IN0
			NOR_A5	NOR Flash A5
			PWM0	PWM0
			SENS1_D4	Camera Sensor1 D4
			PWM4	PWM4
			GPIOB3	GPIOB3
37	L22	KS_OUT1	KS_OUT1	KEY OUT1
			NOR_A10	NOR Flash A10
			PWM3	PWM3
			SD0_CLK	SDIO0 CLK
			SENS1_VSYNC	Camera Sensor1 VSYNC
			GPIOB8	GPIOB8
38	L21	KS_IN2	KS_IN2	KEY IN2

			NOR_A7	NOR Flash A7
			PWM0	PWM0
			SENS1_D5	Camera Sensor1 D6
			GPIOB5	GPIOB5
39	L23	KS_OUT2	KS_OUT2	KEY OUT2
			NOR_A11	NOR Flash A11
			PWM2	PWM2
			UART5_TX	UART5 TX
			SD0_D1B	SDIO0 D1B
			SENS1_HSYNC	Camera Sensor1 HSYNC
			GPIOB9	GPIOB9
40	B24	HSOP	HSOP	USB3.0 HSOP
41	B23	HSON	HSON	USB3.0 HSON
42	A24	HSIN	HSIN	USB3.0 HSIN
43	A23	HSIP	HSIP	USB3.0 HSIP
44	G24	U2_DM2	U2_DM2	USB2.0 DM2
45	G23	U2_DP2	U2_DP2	USB2.0 DP2
46	F24	U2_DM1	U2_DM1	USB2.0 DM1
47	F23	U2_DP1	U2_DP1	USB2.0 DP1
48	G21	HSIC_DQS	HSIC_DQS	USB HSIC_DQS
49	F21	HSIC_DQ	HSIC_DQ	HSIC_DQ
50		GND	GND	Ground PAD
51	A22	HPD	HPD	HDMI HPD
52	B22	CEC	CEC	HDMI CEC
53	A21	TPCK	TPCK	HDMI TPCK
54	B21	TNCK	TNCK	HDMI TNCK
55	B20	TXOP0	TXOP0	HDMI TXOP0
56	C20	TXON0	TXON0	HDMI TXON0
57	A19	TXON1	TXON1	HDMI TXON1
58	B19	TXOP1	TXOP1	HDMI TXOP1
59	A18	TXON2	TXON2	HDMI TXON2
60	B18	TXOP2	TXOP2	HDMI TXOP2
61		GND	GND	Ground PAD
62	C17	EAN	EAN	LVDS EAN
			NOR_D8	NOR Flash D8
			LCD0_D3	LCD0 D3
			GPIOB29	GPIOB29
63	B17	EAP	EAP	LVDS EAP
			NOR_D9	NOR Flash D9
			LCD0_D4	LCD0 D4
			GPIOB28	GPIOB28
64	B16	EBP	EBP	LVDS EBP
			NOR_D15	NOR Flash D15

			LCD0_D6	LCD0_D6
			GPIOB26	GPIOB26
65	C16	EBN	EBN	LVDS EBN
			NOR_D14	NOR Flash D14
			LCD0_D5	LCD0 D5
			GPIOB27	GPIOB27
66	A15	EDN	EDN	LVDS EDN
			NOR_D12	NOR Flash D12
			LCD0_D11	LCD0 D11
			GPIOB23	GPIOB23
67	B15	EDP	EDP	LVDS EDP
			NOR_D13	NOR Flash D13
			LCD0_D12	LCD0 D12
			GPIOB22	GPIOB22
68	B14	EEN	EEN	LVDS EEN
			TS_ERR	Transport Stream Error
			NOR_WR	NOR Flash WR
			LCD0_D13	LCD0 D13
			GPIOB21	GPIOB21
69	C14	EEP	EEP	LVDS EEP
			TS_EN	Transport Stream Enable
			NOR_RD	NOR Flash RD
			LCD0_D14	LCD0 D14
			GPIOB20	GPIOB20
70	A16	ECN	ECN	LVDS ECN
			NOR_D7	NOR Flash D7
			LCD0_D7	LCD0 D7
			GPIOB25	GPIOB25
71	C15	ECP	ECP	LVDS ECP
			NOR_D11	NOR Flash D11
			LCD0_D10	LCD0 D10
			GPIOB24	GPIOB24
72	C10	ODP	ODP	LVDS ODP
			TS_IN5	Transport Stream data in 5
			LCD0_VSYNC0	LCD0 VSYNC0
			GPIOB12	GPIOB12
73	B11	ODN	ODN	LVDS ODN
			TS_IN4	Transport Stream data in 4
			LCD0_LDE0	LCD0 LDE0
			GPIOB13	GPIOB13
74	B13	OAN	OAN	LVDS OAN
			TS_START	Transport Stream Start
			LCD0_D15	LCD0 D15

			GPIOB19	GPIOB19
75	A13	OAP	OAP	LVDS OAP
			TS_CLK	Transport Stream Clock
			LCD0_D19	LCD0 D19
			GPIOB18	GPIOB18
76	C12	OBN	OBN	LVDS OBN
			TS_IN0	Transport Stream data in 0
			LCD0_D20	LCD0 D20
			GPIOB17	GPIOB17
77	A12	OBP	OBP	LVDS OBP
			TS_IN1	Transport Stream data in 1
			LCD0_D21	LCD0 D21
			GPIOB16	GPIOB16
78	A10	OEN	OEN	LVDS OEN
			TS_IN6	Transport Stream data in 6
			LCD0_HSYNC0	LCD0 HSYNC Signal
			GPIOB11	GPIOB11
79	B10	OEP	OEP	LVDS OEP
			TS_IN7	Transport Stream data in 7
			LCD0_DCLK0	LCD0 DCLK0
			GPIOB10	GPIOB10
80	B12	OCN	OCN	LVDS OCN
			TS_IN2	Transport Stream data in 2
			LCD0_D22	LCD0 D22
			GPIOB15	GPIOB15
81	C11	OCP	OCP	LVDS OCP
			TS_IN3	Transport Stream data in 3
			LCD0_D23	LCD0 D23
			GPIOB14	GPIOB14
82	B9	DSI_DN3	DSI_DN3	MIPI DSI DN3
			SD1_D3	SDIO1 D3
			LCD0_D9	LCD0 D9
			GPIOC1	GPIOC1
83	A9	DSI_DP3	DSI_DP3	MIPI DSI DP3
			SD1_CLKB	SDIO1 CLKB
			SD1_CLK	SDIO1 CLK
			LCD0_D16	LCD0 D16
			GPIOC0	GPIOC0
84	A7	DSI_CP	DSI_CP	MIPI DSI CP
			SD1_D1	SDIO1 D1
			LCD0_D1	LCD0 D1
			GPIOC4	GPIOC4
85	B7	DSI_CN	DSI_CN	MIPI DSI CN

			SD1_D0	SDIO1_D0
			LCD0_D0	LCD0 D0
			GPIOC5	GPIOC5
86	B8	DSI_DP1	DSI_DP1	MIPI DSI DP1
			SD1_D2	SDIO1 D2
			LCD0_D8	LCD0 D8
			GPIOC2	GPIOC2
87	C8	DSI_DN1	DSI_DN1	MIPI DSI DN1
			LCD0_D2	LCD0 D2
			GPIOC3	GPIOC3
88	A6	DSI_DP0	DSI_DP0	MIPI DSI_DP0
			SD0_CLKB	SDIO0 CLKB
			UART2_RX	UART2 RX
			SPI0_MISO	SPI0 MISO
			GPIOC6	GPIOC6
89	B6	DSI_DN0	DSI_DN0	MIPI DSI_DN0
			UART2_TX	UART2 TX
			SPI0_MOSI	SPI0 MOSI
			GPIOC7	GPIOC7
90	B5	DSI_DN2	DSI_DN2	MIPI DSI DN2
			SD1_D1B	SDIO1 D1B
			UART2_CTSB	UART2 CTSB
			SPI0_SS	SPI0 SS
			GPIOC9	GPIOC9
91	C6	DSI_DP2	DSI_DP2	MIPI DSI DP2
			SD1_CLKB	SDIO1 CLKB
			UART2_RTSB	UART2 RTSB
			SPI0_SCLK	SPI0 SCLK
			GPIOC8	GPIOC8
92	T19	LCD0_D18	LCD0_D18	LCD0 D18
			NOR_A2	NOR Flash A2
			SENS1_CLKOUT	Camera Sensor1 CLKOUT
			PWM2	PWM2
			PWM4	PWM4
			GPIOB30	GPIOB30
93	R19	LCD0_D17	LCD0_D17	LCD0 D17
			NOR_A0	NOR Flash A0
			SD0_CLKB	SDIO0 CLKB
			SD1_CMD	SDIO1 CMD
			PWM3	PWM3
			GPIOB31	GPIOB31
94		GND	GND	Ground PAD
95	G3	ETH_MDIO	ETH_MDIO	Ethernet MDIO

			GPIOA23	GPIOA23
96	H4	ETH_RXER	ETH_RXER	Ethernet RXER
			SPI3_MOSI	SPI3 MOSI
			UART2_TX	UART2 TX
			PWM1	PWM1
			GPIOA17	GPIOA17
97	J4	ETH_CRS_DV	ETH_CRS_DV	Ethernet CRS DV
			UART4_RX	UART4 RX
			SMII_RX	SMII RX
			SPI2_MISO	SPI2 MISO
			PWM4	PWM4
			GPIOA18	GPIOA18
98	J3	ETH_MDC	ETH_MDC	Ethernet MDC
			GPIOA22	GPIOA22
99	G2	ETH_REF_CLK	ETH_REF_CLK	Ethernet REF CLK
			UART4_TX	UART4 TX
			SMII_CLK	SMII CLK
			SPI2_MOSI	SPI2 MOSI
			GPIOA21	GPIOA21
100	G1	ETH_TXEN	ETH_TXEN	Ethernet TXEN
			UART2_RX	UART2 RX
			PWM0	PWM0
			SPI3_SCLK	SPI3 SCLK
			GPIOA16	GPIOA16
101	H3	ETH_TXD1	ETH_TXD1	Ethernet TXD1
			UART6_TX	UART6 TX
			SMII_SYNC	SMII SYNC
			PWM5	PWM5
			SPI2_SS	SPI2 SS
			GPIOA15	GPIOA15
102	H2	ETH_TXD0	ETH_TXD0	Ethernet TXD0
			UART6_RX	UART6 RX
			SMII_TX	SMII TX
			PWM4	PWM4
			SPI2_SCLK	SPI2 SCLK
			GPIOA14	GPIOA14
103	J2	ETH_RXD1	ETH_RXD1	Ethernet RXD1
			UART2_RTSB	UART2 RTSB
			UART5_TX	UART5 TX
			PWM2	PWM2
			SPI3_SS	SPI3 SS
			GPIOA19	GPIOA19
104	J1	ETH_RXD0	ETH_RXD0	Ethernet RXD0

			UART2_CTSB	UART2 CTSB
			UART5_RX	UART5 RX
			PWM3	PWM3
			SPI3_MISO	SPI3 MISO
			GPIOA20	GPIOA20
105		GND	GND	Ground
106	B3	NAND_CE0B	NAND_CE0B	NAND CE0B
			NAND_CEB0	NAND CEB0
			SPI2_SCLK	SPI2 SCLK
			GPIOD14	GPIOD14
107	C5	NAND_CEB3	NAND_CEB3	NAND CEB3
			PWM4	PWM4
			GPIOD17	GPIOD17
108	B2	NAND_ALE	NAND_ALE	NAND ALE
			SPI2_MISO	SPI2 MISO
			GPIOD12	GPIOD12
109	A2	NAND_CLE	NAND_CLE	NAND CLE
			SPI2_MOSI	SPI2 MOSI
			GPIOD13	GPIOD13
110	D2	NAND_DQSN	NAND_DQSN	NAND DQSN
			GPIOA13	GPIOA13
111	C3	NAND_DQS	NAND_DQS	NAND_DQS
			GPIOA12	GPIOA12
112	E3	NAND_CEB2	NAND_CEB2	NAND CEB2
			PWM5	PWM5
			GPIOD16	GPIOD16
113	AA19	SPI0_MOSI	SPI0_MOSI	SPI0 MOSI
			NOR_A15	NOR Flash A15
			TWI3_SDATA	TWI3 SDATA
			PCM0_SYNC	PCM0 SYNC
			GPIOC25	GPIOC25
114	AB18	SPI0_SCLK	SPI0_SCLK	SPI0 SCLK
			NOR_A12	NOR Flash A12
			TWI3_SCLK	TWI3 SCLK
			PCM0_CLK	PCM0 CLK
			GPIOC22	GPIOC22
115	AB19	SPI0_MISO	SPI0_MISO	SPI0 MISO
			NOR_A14	NOR Flash A15
			I2S_MCLK1	I2S MCLK1
			PCM1_IN	PCM1 IN
			PCM0_IN	PCM0 IN
			GPIOC24	GPIOC24
116	AC19	SPI0_SS	SPI0_SS	SPI0 SS

			NOR_A13	NOR Flash A13
			I2S_LRCLK1	I2S LRCLK1
			PCM1_OUT	PCM1 OUT
			PCM0_OUT	PCM0 OUT
			GPIOC23	GPIOC23
117	AB20	TWI1_SDATA	TWI1_SDATA	TWI1 SDATA
			GPIOE1	GPIOE1
118	AC20	TWI1_SCLK	TWI1_SCLK	TWI1_SCLK
			GPIOE0	GPIOE0
119	AD22	UART0_TX	UART0_TX	UART0 TX
			SPI1_SS	SPI1 SS
			TWI0_SCLK	TWI0 SCLK
			SPDIF	SPDIF
			PCM1_OUT	PCM1 OUT
			I2S_LRCLK1	I2S LRCLK1
			UART2_TX	UART2 TX
			GPIOC27	GPIOC27
120	AC22	UART0_RX	UART0_RX	UART0 RX
			SPI1_MISO	SPI1 MISO
			TWI0_SDATA	TWI0 SDATA
			PCM1_IN	PCM1 IN
			I2S_MCLK1	I2S MCLK1
			UART2_RX	UART2_RX
			GPIOC26	GPIOC26
121	AC23	UART3_RTSB	UART3_RTSB	UART3 RTSB
			UART5_RX	UART5 RX
			GPIOD24	GPIOD24
122	AC24	UART3_CTSB	UART3_CTSB	UART3 CTSB
			UART5_TX	UART5 TX
			GPIOD25	GPIOD25
123	AB23	TWI2_SCLK	TWI2_SCLK	TWI2 SCLK
			GPIOE2	GPIOE2
124	AB24	TWI2_SDATA	TWI2_SDATA	TWI2 SDATA
			GPIOE3	GPIOE3
125	V22	SIRQ0	SIRQ0	SIRQ0
			GPIOA24	GPIOA24
126	V21	SIRQ1	SIRQ1	SIRQ1
			GPIOA25	GPIOA25
127		GND	GND	Ground
128		3VOUT	3VOUT	3V For CPU GPIO
129		SW1OUT	SW1OUT	SWITCH1OUT
130		LDO1OUT	LDO1OUT	LDO1OUT
131		I2S_MCLK1	I2S_MCLK1	I2S_MCLK1

			LOSC32K	LOSC32K
			GPIO3	GPIO3
132		RTC_BAT	RTCBAT [3V]	RTC 3V BAT
133		VMICEXT	VMICEXT	External MIC bias
134		MICIN	MICINL	MIC channel input Left channel
			MICINLN	MIC0L Negative channel input
			DMICCLK	DMI controller Clock
135		VRO	VRO	VR output
136		VROS	VROS	VRO SENSE
137		FMINR	FMINR	FMR channel input
			PCM_DATAIN1	PCM audio interface Data in 1
138		FMINl	FMINL	FML channel input
			MICINLP	MIC0L Positive channel input
			PCM_DATAOUT1	PCM audio interface Data Out 1
139		OUTFL	OUTFL	Front left channel output
140		OUTFR	OUTFR	Front right channel output
141		AGND	AGND	Analog Ground
142		SGPIO5	SGPIO5	General Purpose Input / Output5
			IR	IR control input
			LOSC_32K	32K clock output
			PWM1	PWM output1
143		SGPIO4	SGPIO4	General Purpose Input / Output 4
			IR	IR control input
			LOSC_32K	32K clock output
			PWM0	PWM output0
144		SVCC	SVCC	SVCC
145		WALL2	WALL2	wall adapter power supply
146		WALL1	WALL1	wall adapter power supply
147		AUXIN2	AUXIN2	general ADC input2
			IR	IR control input
			LOSC32K	32K clock output
			SGPIO3	General Purpose Input / Output 3
148		LDO7OUT	LDO7OUT	Output of voltage regulator LDO7
149		ONOFF	ONOFF	ONOFF key input / reset signal
150		AUXINO	AUXINO	general ADC input0
			IR	IR control input
			LOSC32K	32K clock output
			PWM0	PWM output0
			SGPIO1	General Purpose Input / Output 1
151 ~ 166		GND	GND	Ground strengthen EPAD, need to connect to carrier board ground when production

Chapter IV Typical Applications

For more detailed product information, please visit these links:

http://www.cubietech.com/product-detail/cubieaio-s500-board/
http://www.cubietech.com/product-detail/cubieaio-s500/

Chapter V Application Notes

4.1 Design Attentions

In the choice of Einstein-S500 SOM for product development, note the following:

1. Einstein-S500 SOM is an Actions S500 core system on module. Based on the design, Cubietech originally designed it to maximize the performance of the S500 CPU, but we cannot guarantee to achieve the ultimate performance of the native S500 chip. So Einstein-S500 SOM cannot be guaranteed to reach all the functionality and performance of the S500 chip as described on the chip manufacturer datasheet.

2. Cubietech cannot guarantee the fully electronic validation and testing of all the expansions of the board. We can guarantee it for the CubieAIO-S500 expansions as they have been tested and verified.

3. Before selecting the Einstein-S500 SOM for product design, it is best to contact Cubietech or the local distributor for the latest product information and development progress.
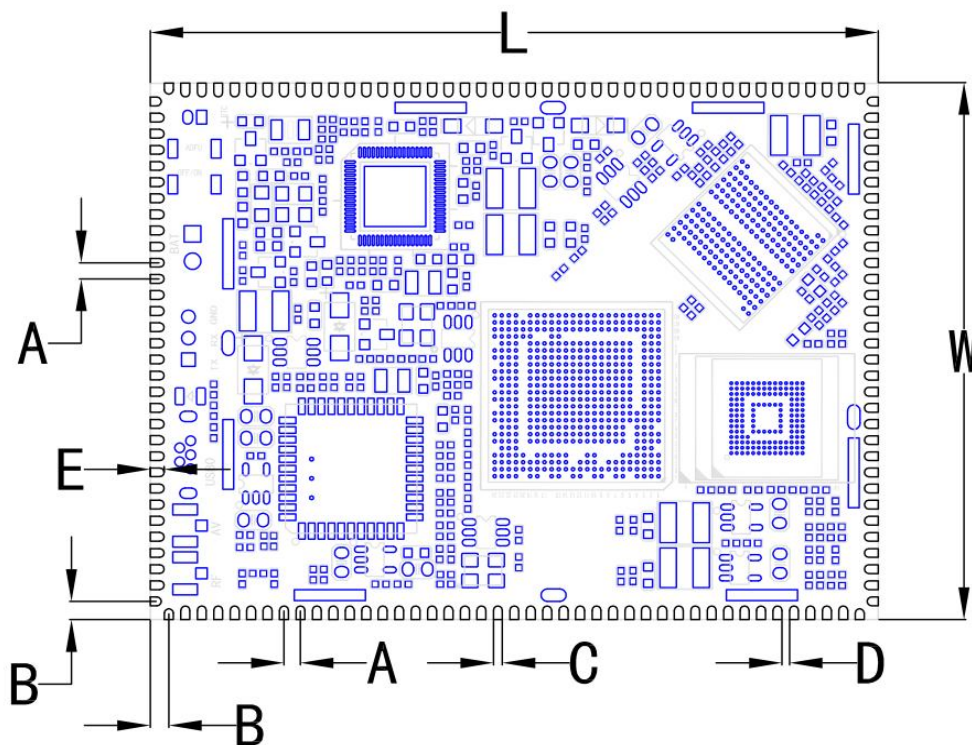
4.2 Production Attentions

In the choice of Einstein-S500 SOM production, shall pay attention to the following points
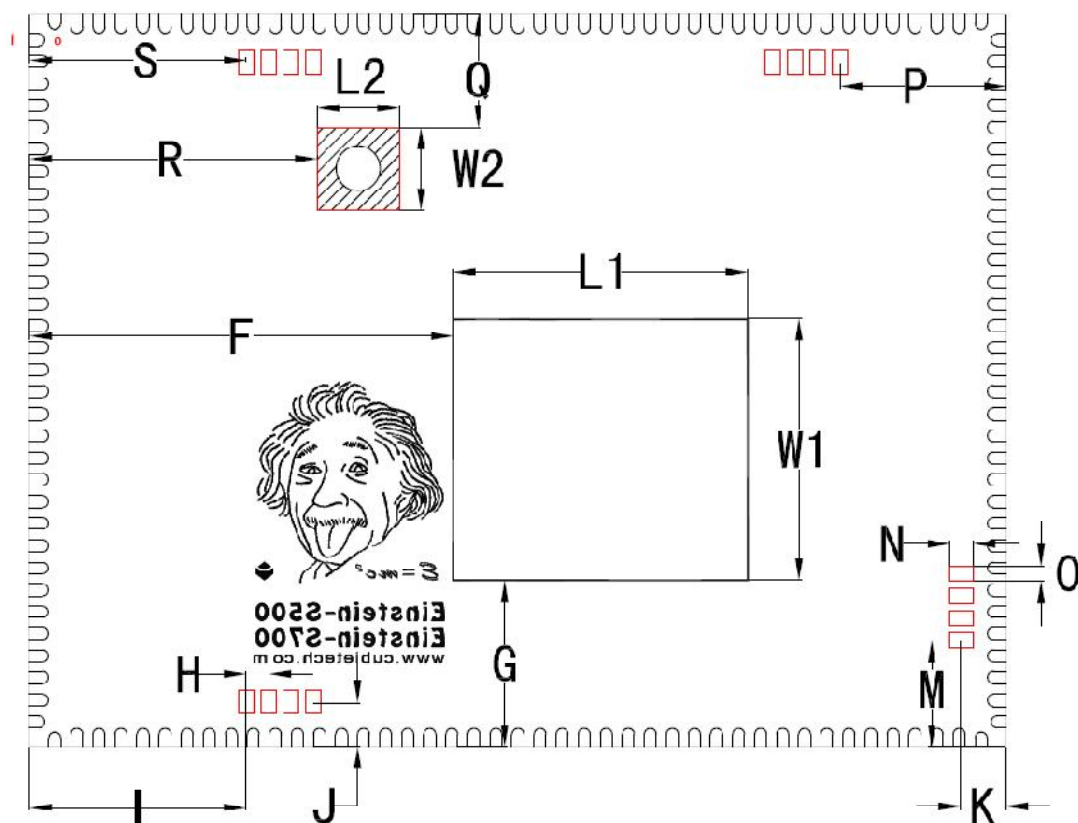
1. The Einstein-S500 SOM can support the reflow soldering process, but it requires baking dehumidification before reflow. If you are not sure about baking standards, it is best to contact Cubietech or the distributor (email: support@cubietech.com).

2. Because of its large size than chips, it could be difficult to place the Einstein-S500 SOM on the carrier board. If there is no good solution in the patch or no previous operational experience, it is best to contact Cubietech or the distributor (email: support@cubietech.com).

3. Einstein-S500 SOM maintenance of defective boards and the direct use of the main chip are different, if you need assistance in this regard, please contact Cubietech or the distributor (email: support@cubietech.com).

Chapter VI Dimensions information

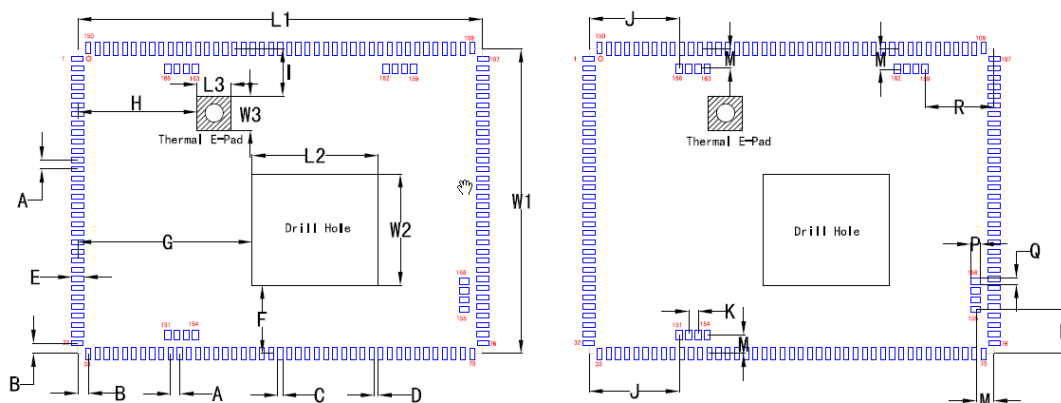## 6.1 Mechanical dimensions (including top and bottom sides)

Symbol	Dimensions in milimeter (mm)		
	MIN	TYP	MAX
L	49.85	49.90	49.95
W	66.35	66.40	66.45
A		1.50	
B	1.65	1.70	1.75
C	0.75	0.80	0.85
D	0.63	0.68	0.73
E	1.22	1.27	1.32

Symbol	Dimensions in milimeter (mm)		
	MIN	TYP	MAX
L1	19.97	20.02	20.07
W2	17.73	17.78	17.83
L2	5.51	5.56	5.61
W2	5.51	5.56	5.61
F	28.73	28.78	28.83
G	11.3	11.35	11.4
H		1.52	
I	14.69	14.74	14.79
J	3.1	3.15	3.2
K	3.1	3.15	3.2
M	7.19	7.24	4.29
N	1.55	1.6	165
O	0.95	1.0	1.05
P	11.13	11.28	11.23
Q	7.7	7.75	7.8
R	19.5	19.55	19.65
S	14.69	14.74	14.79

6.2 Recommended package size

Symbol	Dimensions in milimeter (mm)		
	MIN	TYP	MAX
L1	66.35	66.4	66.45
W1	49.85	49.9	49.95
L2	20.7	20.75	20.8
W2	18.2	18.25	18.3
L3	5.55	5.6	5.65
W3	5.55	5.6	5.65
A		1.5	
B	1.65	1.7	1.75
C	0.76	0.81	0.86
D	0.63	0.68	0.73
E	1.95	2.0	2.05
F	11.1	11.15	11.2
G	28.55	28.6	28.65
H	19.5	19.55	19.6
I	7.7	7.75	7.8
J	14.69	14.74	14.79
K		1.52	
M	3.1	3.15	3.2
N	7.19	7.24	7.29
P	1.55	1.6	1.65
Q	0.95	1.0	1.05
R	11.23	11.28	11.33

Chapter VII References

1. Einstein-S500 product introduction
http://www.cubietech.com/product-detail/einstein-s500/

2. CubieAIO-S500 public information (continually updated)
http://dl.cubieboard.org/model/CubieAIO-S500/

3. Einstein-S500 public information (continually updated)
http://dl.cubieboard.org/som/Einstein-S500

4. CubieBoard6 open-source hardware publicly available information (continually updated)
http://dl.cubieboard.org/model/CubieBoard6/

5. SOC S500 descriptions
http://www.actions-semi.com/cn/productview.aspx?id=147