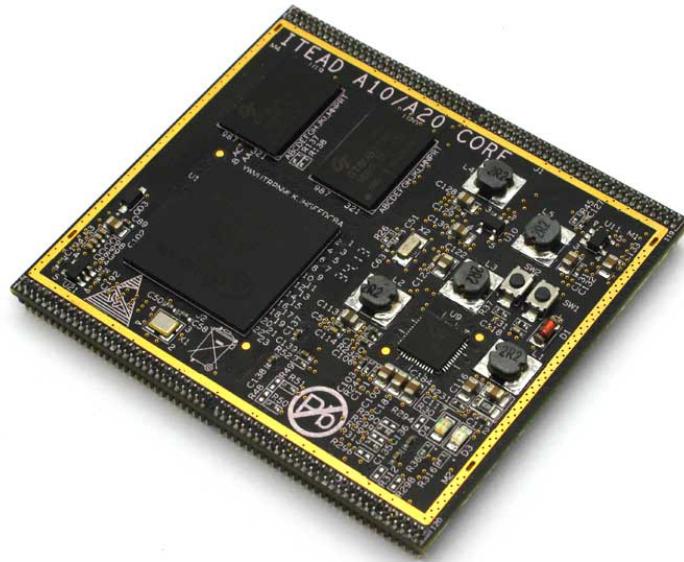ITEAD STUDIO
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ITEAD A10 Core

Overview

ITEAD A10 CORE is a minimum system module based on design of A10 chip. With ARM Cortex A8 core, it supports maximum frequency up to 1GHz. The module is equipped with 1G DDR3 memory and 4G FLASH. The digital circuit section and the overall power design of SDRAM on the module has been completed, so it can work directly after powering up with a stable 5V supply.

To use ITEAD A10 CORE for project development, design of complex multi-layer high-speed circuit is not required, as you only need to provide it with a stable 5V power supply and connect the pins on the module to the corresponding socket (such as HDMI, Micro-SD card, USB, etc.), or to the relevant circuit bus (such as I / O ports, UART, SPI, etc.). With design of such functional board, the difficulty will be decreased compared to directly using chips with SDRAM, FLASH, power circuit and functional circuit for the layout and the project development cycle will also be greatly reduced.

Specifications

CPU	Allwinner A10
PCB size	62.72 X 56.39 X 1.61mm
Indicator	3V3
Interface	4 groups of 2*30 1mm pitched female headers break out all I/O interfaces
Input voltage	4.85~5.15VDC, typical value of 5VDC

Electrical characteristics

| Item	Typical value	Unit
CPU speed	1G	HZ
RAM capacity	1G	Bit
FLASH capacity [1]	0/4G	Byte
Voltage at I/O port	3.3	V
Input voltage	4.85~5.15	VDC
Working current（low load）[2]	350	mA
Working current（high load）[3]	600	mA

Note 1： There are two versions of NAND FLASH capacity: 0G and 4G.

Note 2： Working current (low load) refers to the working current when no other operations are done (CPU occupancy rate of about 2%) after entering ITEAD OS instead of the minimum working current; SATA hard drive is a big power consumer, working current will reach up to 550mA when connecting2.5-inch SATA hard drive in the low load condition.

Note 3： Working current (high load) refers to the working current when CPU is doing super pi operation (CPU occupancy rate of about 98%) after entering ITEAD OS instead of the maximum working current.

Hardware

Appearance

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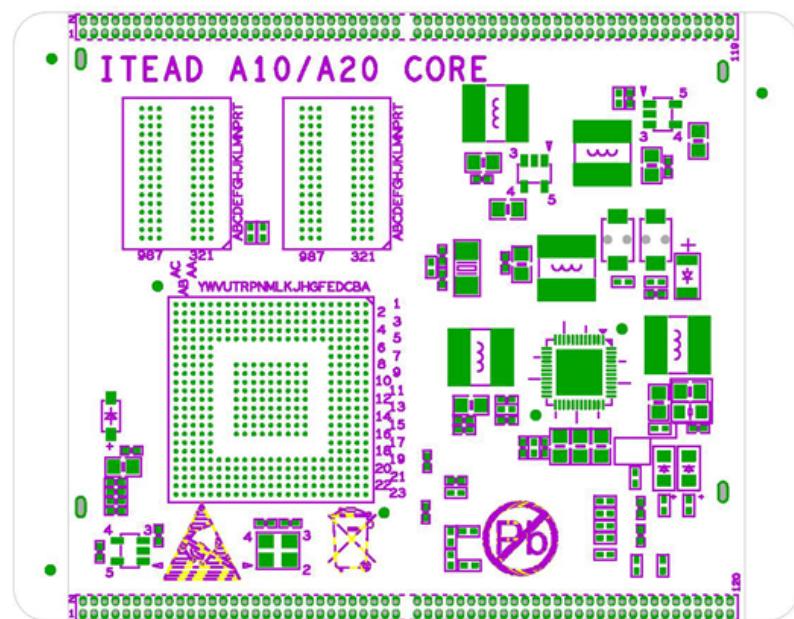
We supplied Eagle library file for customers to do secondary development based on the core board, and the downloading address is:http://blog.iteadstudio.com/itead-core-eagle-library/

For detailed dimension and specifications, please find in appendix 1.

Keys and indicators

pinMap

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For clear vector diagram, you can download in the following address: http://url6.org/hSb.
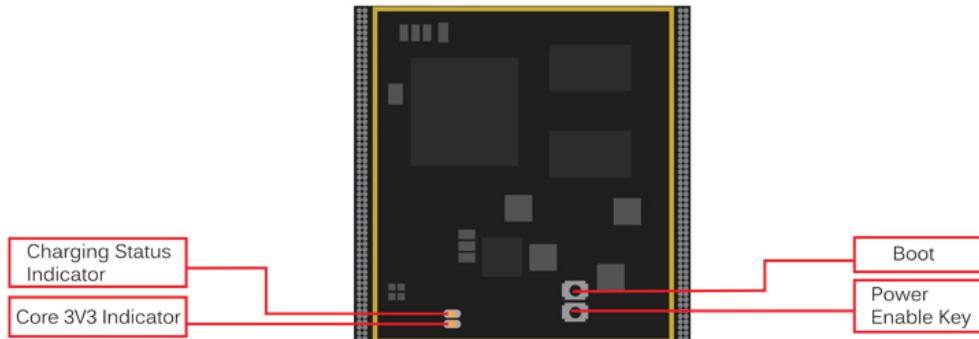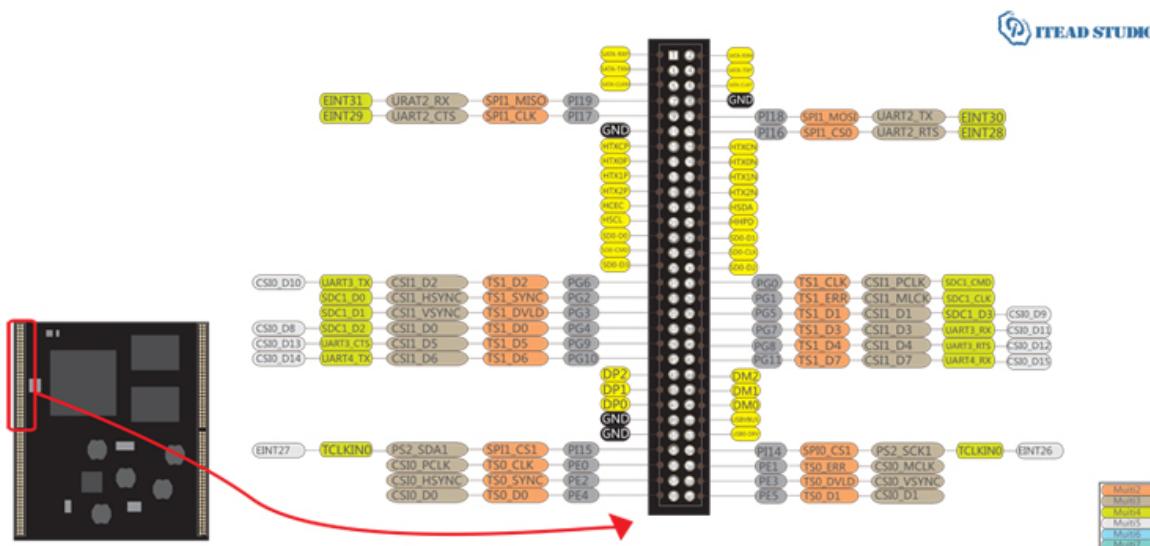
For multiplexing characteristics of CPIO in A10 Core and its function definition in Itead OS, please find in appendix 2.

Basic parameters

CPU

- ARM Cortex-A8 Core
- 32KB I-Cache/32KB D-Cache/256K L2 Cache
- Using NEON for video, audio and graphic workloads eases the burden of supporting more dedicated accelerators across the SoC and enables the system to support the standards of tomorrow
- RCT JAVA-Accelerations to optimize just in time (JIT) and dynamitic adaptive compilation (DAC), and reduces memory footprint up to three times
- Trustzone technology allows for secure transactions and digital right managements (DRM)

GPU

3D

- support Open GL ES 2.0 / open VG 1.1

2D

- support BLT / ROP2/3/4
- Rotation 90/180/270 degree
- Mirror / alpha (including plane and pixel alpha) / color key support
- Scaling function with 4*4 taps and 32 phase ta
- Support format conversion

VPU

- Video Decoding (Super HD 2160P)
- Support all popular video formats, including VP8, AVS, H.264, H.263, VC-1, MPEG-1/2/4
- Support 1920*1080@60fps in all formats

Video Encoding

- Support encoding in H.264 High Profile format
- 1080p@60fps
- 720p @100fps

Display Processing Ability

- Four moveable and size-adjustable layers
- support 8 tap scale filter in horizontal and 4 tap in vertical direction for scaling
- support Multi-format image input
- support Alpha blending / color key / gamma
- support Hardware cursor / sprite
- support Vertical keystone correction
- support Output color correction (luminance / hue / saturation etc)
- support motion adaptive de-interlace
- support Video enhancement
- support 3D format content input/output format convert/display (including HDMI)

Display Output Ability

- Support HDMI V1.3/V1.4
- Flexible LCD interface (CPU / Sync RGB / LVDS) up to 1920*1080 resolution
- CVBS / YPbPr up to 1920*1080 resolution

Image Input Ability

- Dual camera sensor interface (CSI0 supports ISP function)

Memory

- 1GB DDR3 SDRAM
- None / 4G NAND Flash

Peripherals

- 1 USB 2.0 OTG controller for general application/2 USB2.0 EHCI Controller for HOST application
- 4 high-speed Memory controller supports SD version 3.0 and MMC version 4.2
- 8 UARTs with 64 Bytes TX FIFO and 64 Bytes RX FIFO,
- 1UART with full modem function
- 2 UARTs with RTS/CTS hardware flow control
- 5 UARTs with two wires
- 4 SPI controller
- 1 dedicated SPI controller for serial NOR Flash boot application
- 3 SPI for general applications
- 3 Two-Wire Interfaces up to 400Kbps
- Key Matrix (8x8) with internal debounce filter
- IR controller supports MIR, FIR and IR remoter
- 2-CH 6-bits LRADC for line control
- Internal 4-wire touch panel controller with pressure sensor and 2-point touch
- I2S/PCM controller for 8-channel output and 2-channel input

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- AC97 controller compatible with AC97 version 2.3 standard
- Internal 24-bits Audio Codec for 2 channel headphone, 2 channel microphone, 2 channel FM
- Input and Line input
- 2 PWM controller

System

- 8 channel normal DMA and 8 channel dedicated DMA
- Internal (32K+64K) SRAM on chip
- 6 timer, 1 RTC timer and 1 watchdog

Security

- Security System
- Support DES, 3DES, AES encryption and decryption.
- Support SHA-1, MD5 message digest
- Support hardware 64-bit random generator
- 128-bits EFUSE chip ID

Appendix 1: Dimension and specifications
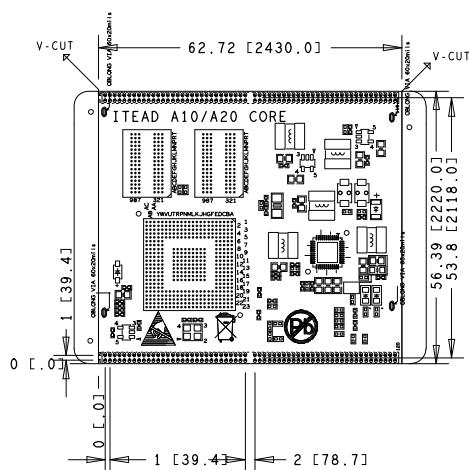
Appendix 2: Multiplexing characteristics of GPIO and its definition in ITEAD OS

A10 GPIO Multiplexing Characteristics						Itead OS Pin Assignment	
PORT	MULTIPLEX FUNCTION SELECT					GPIO ID	MULTI2
	MULTI2	MULTI3	MULTI4	MULTI5	MULTI6	MULTI7	
PA0	ERXD3	SPI1_CS0	UART2_RTS	-	-	-	#N/A	#N/A
PA1	ERXD2	SPI1_CLK	UART2_CTS	-	-	-	#N/A	#N/A
PA2	ERXD1	SPI1_MOSI	UART2_TX	-	-	-	#N/A	#N/A
PA3	ERXD0	SPI1_MISO	UART2_RX	-	-	-	#N/A	#N/A
PA4	ETXD3	SPI1_CS1	-	-	-	-	#N/A	#N/A
PA5	ETXD2	SPI3_CS0	-	-	-	-	#N/A	#N/A
PA6	ETXD1	SPI3_CLK	-	-	-	-	#N/A	#N/A
PA7	ETXD0	SPI3_MOSI	-	-	-	-	#N/A	#N/A
PA8	ERXCK	SPI3_MISO	-	-	-	-	#N/A	#N/A
PA9	ERXERR	SPI3_CS1	-	-	-	-	#N/A	#N/A
PA10	ERXDV	-	UART1_TX	-	-	-	#N/A	#N/A
PA11	EMDC	-	UART1_RX	-	-	-	#N/A	#N/A
PA12	EMDIO	UART6_TX	UART1_RTS	-	-	-	#N/A	#N/A
PA13	ETXEN	UART6_RX	UART1_CTS	-	-	-	#N/A	#N/A
PA14	ETXCK	UART7_TX	UART1_DTR	-	-	-	#N/A	#N/A
PA15	ECRS	UART7_RX	UART1_DSR	-	-	-	#N/A	#N/A
PA16	ECOL	CAN_TX	UART1_DCD	-	-	-	#N/A	#N/A
PA17	ETXERR	CAN_RX	UART1_RING	-	-	-	#N/A	#N/A
PB0	TWI0_SCK	-	-	-	-	-	#N/A	#N/A
PB1	TWI0_SDA	-	-	-	-	-	#N/A	#N/A
PB2	PWM0	-	-	-	-	-	108	PWM0
PB3	IR0_TX	-	NC	-	-	-	121	IR0_TX
PB4	IR0_RX	-	-	-	-	-	122	IR0_RX
PB5	I2S_MCLK	AC97_MCLK	-	-	-	-	123	I2S_MCLK
PB6	I2S_BCLK	AC97_BCLK	-	-	-	-	124	I2S_BCLK
PB7	I2S_LRCK	AC97_SYNC	-	-	-	-	125	I2S_LRCLK

PB8	I2S_DO0	AC97_DO	-	-	-	-	126	I2S_DOUT
PB9	I2S_DO1	-	-	-	-	-	127	#N/A
PB10	I2S_DO2	-	-	-	-	-	128	#N/A
PB11	I2S_DO3	-	-	-	-	-	129	#N/A
PB12	I2S_DI	AC97_DI	NC	-	-	-	130	#N/A
PB13	SPI2_CS1	-	NC	-	-	-	131	SPDIF_OUT
PB14	SPI2_CS0	JTAG_MS0	-	-	-	-	133	SPI2_CS
PB15	SPI2_CLK	JTAG_CK0	-	-	-	-	134	SPI2_SCK
PB16	SPI2_MOSI	JTAG_DO0	-	-	-	-	135	SPI2_MO
PB17	SPI2_MISO	JTAG_DI0	-	-	-	-	136	SPI2_MI
PB18	TWI1_SCK	-	-	-	-	-	67	I2C1_SCK
PB19	TWI1_SDA	-	-	-	-	-	68	I2C1_SDA
PB20	TWI2_SCK	-	-	-	-	-	69	I2C2_SCK
PB21	TWI2_SDA	-	-	-	-	-	70	I2C2_SDA
PB22	UART0_TX	IR1_TX	-	-	-	-	71	UART0_TX
PB23	UART0_RX	IR1_RX	-	-	-	-	72	UART0_RX
PC0	NWE#	SPI0_MOSI	-	-	-	-	#N/A	#N/A
PC1	NALE	SPI0_MISO	-	-	-	-	#N/A	#N/A
PC2	NCLE	SPI0_CLK	-	-	-	-	#N/A	#N/A
PC3	NCE1	-	-	-	-	-	#N/A	#N/A
PC4	NCE0	-	-	-	-	-	#N/A	#N/A
PC5	NRE#	-	-	-	-	-	#N/A	#N/A
PC6	NRB0	SDC2_CMD	-	-	-	-	#N/A	#N/A
PC7	NRB1	SDC2_CLK	-	-	-	-	#N/A	#N/A
PC8	NDQ0	SDC2_D0	-	-	-	-	#N/A	#N/A
PC9	NDQ1	SDC2_D1	-	-	-	-	#N/A	#N/A
PC10	NDQ2	SDC2_D2	-	-	-	-	#N/A	#N/A
PC11	NDQ3	SDC2_D3	-	-	-	-	#N/A	#N/A
PC12	NDQ4	-	-	-	-	-	#N/A	#N/A
PC13	NDQ5	-	-	-	-	-	#N/A	#N/A
PC14	NDQ6	-	-	-	-	-	#N/A	#N/A
PC15	NDQ7	-	-	-	-		#N/A	#N/A
PC16	NWP	-	-	-	-	-	#N/A	#N/A
PC17	NCE2	-	-	-	-	-	#N/A	#N/A
PC18	NCE3	-	-	-	-	-	#N/A	#N/A
PC19	NCE4	SPI2_CS0	-	-	-	-	#N/A	#N/A
PC20	NCE5	SPI2_CLK	-	-	-	-	#N/A	#N/A
PC21	NCE6	SPI2_MOSI	-	-	-	-	#N/A	#N/A
PC22	NCE7	SPI2_MISO	-	-	-	-	#N/A	#N/A
PC23	-	SPI0_CS0	-	-	-	-	#N/A	#N/A

PD0	LCD0_D0	LVDS0_VP0	-	-	-	-	9	LCD0_0
PD1	LCD0_D1	LVDS0_VN0	-	-	-	-	10	LCD0_1
PD2	LCD0_D2	LVDS0_VP1	-	-	-	-	11	LCD0_2
PD3	LCD0_D3	LVDS0_VN1	-	-	-	-	12	LCD0_3
PD4	LCD0_D4	LVDS0_VP2	-	-	-	-	13	LCD0_4
PD5	LCD0_D5	LVDS0_VN2	-	-	-	-	14	LCD0_5
PD6	LCD0_D6	LVDS0_VPC	-	-	-	-	15	LCD0_6
PD7	LCD0_D7	LVDS0_VNC	-	-	-	-	16	LCD0_7
PD8	LCD0_D8	LVDS0_VP3	-	-	-	-	17	LCD0_8
PD9	LCD0_D9	LVDS0_VN3	-	-	-	-	18	LCD0_9
PD10	LCD0_D10	LVDS1_VP0	-	-	-	-	19	LCD0_10
PD11	LCD0_D11	LVDS1_VN0	-	-	-	-	20	LCD0_11
PD12	LCD0_D12	LVDS1_VP1	-	-	-	-	21	LCD0_12
PD13	LCD0_D13	LVDS1_VN1	-	-	-	-	22	LCD0_13
PD14	LCD0_D14	LVDS1_VP2	-	-	-	-	23	LCD0_14
PD15	LCD0_D15	LVDS1_VN2	-	-	-	-	24	LCD0_15
PD16	LCD0_D16	LVDS1_VPC	-	-	-	-	25	LCD0_16
PD17	LCD0_D17	LVDS1_VNC	-	-	-	-	26	LCD0_17
PD18	LCD0_D18	LVDS1_VP3	-	-	-	-	27	LCD0_18
PD19	LCD0_D19	LVDS1_VN3	-	-	-	-	28	LCD0_19
PD20	LCD0_D20	CSI1_MCLK	-	-	-	-	29	LCD0_20
PD21	LCD0_D21	SMC_VPPEN	-	-	-	-	30	LCD0_21
PD22	LCD0_D22	SMC_VPPPP	-	-	-	-	31	LCD0_22
PD23	LCD0_D23	SMC_DET	-	-	-	-	32	LCD0_23
PD24	LCD0_CLK	SMC_VCCEN	-	-	-	-	33	LCD0_CLK
PD25	LCD0_DE	SMC_RST	-	-	-	-	34	LCD0_DE
PD26	LCD0_HSYNC	SMC_SLK	-	-	-	-	35	LCD0_HS
PD27	LCD0_VSYNC	SMC_SDA	-	-	-	-	36	LCD0_VS
PE0	TS0_CLK	CSI0_PCLK	-	-	-	-	91	CSI0_PCLK
PE1	TS0_ERR	CSI0_MCLK	-	-	-	-	92	CSI0_MCLK
PE2	TS0_SYNC	CSI0_HSYNC	-	-	-	-	93	CSI0_HS
PE3	TS0_DVLD	CSI0_VSYNC	-	-	-	-	94	CSI0_VS
PE4	TS0_D0	CSI0_D0	-	-	-	-	95	CSI0_D0

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PE5	TS0_D1	CSI0_D1	-	-	-	-	96	CSI0_D1
PE6	TS0_D2	CSI0_D2	-	-	-	-	97	CSI0_D2
PE7	TS0_D3	CSI0_D3	-	-	-	-	98	CSI0_D3
PE8	TS0_D4	CSI0_D4	-	-	-	-	99	CSI0_D4
PE9	TS0_D5	CSI0_D5	-	-	-	-	100	CSI0_D5
PE10	TS0_D6	CSI0_D6	-	-	-	-	101	CSI0_D6
PE11	TS0_D7	CSI0_D7	-	-	-	-	102	CSI0_D7
PF0	SDC0_D1	-	JTAG_MS1	-	-	-	#N/A	#N/A
PF1	SDC0_D0	-	JTAG_DI1	-	-	-	#N/A	#N/A
PF2	SDC0_CLK	-	UART0_TX	-	-	-	#N/A	#N/A
PF3	SDC0_CMD	-	JTAG_DO1	-	-	-	#N/A	#N/A
PF4	SDC0_D3	-	UART0_RX	-	-	-	#N/A	#N/A
PF5	SDC0_D2	-	JTAG_CK1	-	-	-	#N/A	#N/A
PG0	TS1_CLK	CSI1_PCLK	SDC1_CMD	-	-	-	79	SD1_CMD
PG1	TS1_ERR	CSI1_MLCK	SDC1_CLK	-	-	-	80	SD1_CLK
PG2	TS1_SYNC	CSI1_HSYNC	SDC1_D0	-	-	-	81	SD1_D0
PG3	TS1_DVLD	CSI1_VSYNC	SDC1_D1	-	-	-	82	SD1_D1
PG4	TS1_D0	CSI1_D0	SDC1_D2	CSI0_D8	-	-	83	SD1_D2
PG5	TS1_D1	CSI1_D1	SDC1_D3	CSI0_D9	-	-	84	SD1_D3
PG6	TS1_D2	CSI1_D2	UART3_TX	CSI0_D10	-	-	85	UART3_TX
PG7	TS1_D3	CSI1_D3	UART3_RX	CSI0_D11	-	-	86	UART3_RX
PG8	TS1_D4	CSI1_D4	UART3_RTS	CSI0_D12	-	-	87	UART3_RTS
PG9	TS1_D5	CSI1_D5	UART3_CTS	CSI0_D13	-	-	88	UART3_CTS
PG10	TS1_D6	CSI1_D6	UART4_TX	CSI0_D14				
PG11	TS1_D7	CSI1_D7	UART4_RX	CSI0_D15				
PH0	LCD1_D0	ATAA0	UART3_TX	-	EINT0	CSI1_D0	37	#N/A
PH1	LCD1_D1	ATAA1	UART3_RX	-	EINT1	CSI1_D1	38	#N/A
PH2	LCD1_D2	ATAA2	UART3_RTS	-	EINT2	CSI1_D2	39	#N/A
PH3	LCD1_D3	ATAIRQ	UART3_CTS	-	EINT3	CSI1_D3	40	#N/A
PH4	LCD1_D4	ATAD0	UART4_TX	-	EINT4	CSI1_D4	41	#N/A
PH5	LCD1_D5	ATAD1	UART4_RX	-	EINT5	CSI1_D5	42	#N/A
PH6	LCD1_D6	ATAD2	UART5_TX	-	EINT6	CSI1_D6	43	#N/A

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PH7	LCD1_D7	ATAD3	UART5_RX	-	EINT7	CSI1_D7	44	#N/A
PH8	LCD1_D8	ATAD4	KP_IN0	-	EINT8	CSI1_D8	45	#N/A
PH9	LCD1_D9	ATAD5	KP_IN1	-	EINT9	CSI1_D9	46	#N/A
PH10	LCD1_D10	ATAD6	KP_IN2	-	EINT10	CSI1_D10	47	#N/A
PH11	LCD1_D11	ATAD7	KP_IN3	-	EINT11	CSI1_D11	48	#N/A
PH12	LCD1_D12	ATAD8	PS2_SCK1	-	EINT12	CSI1_D12	49	#N/A
PH13	LCD1_D13	ATAD9	PS2_SDA1	SMC_RST	EINT13	CSI1_D13	50	#N/A
PH14	LCD1_D14	ATAD10	KP_IN4	SMC_VPPEN	EINT14	CSI1_D14	51	#N/A
PH15	LCD1_D15	ATAD11	KP_IN5	SMC_VPPPP	EINT15	CSI1_D15	52	#N/A
PH16	LCD1_D16	ATAD12	KP_IN6	SMC_DET	EINT16	CSI1_D16	53	#N/A
PH17	LCD1_D17	ATAD13	KP_IN7	SMC_VCCEN	EINT17	CSI1_D17	54	#N/A
PH18	LCD1_D18	ATAD14	KP_OUT0	SMC_SLK	EINT18	CSI1_D18	55	#N/A
PH19	LCD1_D19	ATAD15	KP_OUT1	SMC_SDA	EINT19	CSI1_D19	56	#N/A
PH20	LCD1_D20	ATAOE	CAN_TX	-	EINT20	CSI1_D20	57	#N/A
PH21	LCD1_D21	ATADREQ	CAN_RX	-	EINT21	CSI1_D21	58	#N/A
PH22	LCD1_D22	ATADACK	KP_OUT2	SDC1_CMD	-	CSI1_D22	59	#N/A
PH23	LCD1_D23	ATACS0	KP_OUT3	SDC1_CLK	-	CSI1_D23	60	#N/A
PH25	LCD1_CLK	ATACS1	KP_OUT4	SDC1_D0	-	CSI1_PCLK	62	#N/A
PH26	LCD1_DE	ATAIORDY	KP_OUT5	SDC1_D1	-	CSI1_FIELD	63	#N/A
PH27	LCD1_HSYNC	ATAIOR	KP_OUT6	SDC1_D2	-	CSI1_HSYNC	64	#N/A
PI0	NC	-	-	-	-	-	103	GPS_CLK
PI1	NC	-	-	-	-	-	104	GPS_SIGN
PI2	NC	-	-	-	-	-	105	GPS_MAG
PI3	PWM1	-	-	-	-	-	107	PWM1
PI4	SDC3_CMD	-	-	-	-	-	113	SD3_CMD

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PI5	SDC3_CLK	-	-	-	-	-	114	SD3_CLK
PI6	SDC3_D0	-	-	-	-	-	115	SD3_D0
PI7	SDC3_D1	-	-	-	-	-	116	SD3_D1
PI18	SDC3_D2	-	-	-	-	-	76	UART2_TX
PI19	SDC3_D3	-	-	-	-	-	75	UART2_RX
PI10	SPI0_CS0	UART5_TX	-	-	EINT22	-	109	SPI0_CS
PI11	SPI0_CLK	UART5_RX	-	-	EINT23	-	110	SPI0_SCK
PI12	SPI0_MOSI	UART6_TX	-	-	EINT24	-	111	SPI0_MO
PI13	SPIO_MISO	UART6_RX			EINT25			
PI14	SPI0_CS1	PS2_SCK1	TCLKIN0		EINT26			
PI15	SPI1_CS1	PS2_SDA1	TCLKIN0		EINT27			
PI16	SPI1_CS0	UART2_RTS			EINT28			
PI17	SPI1_CLK	URAT2_CTS			EINT29			
PI18	SPI1_MOSI	UART2_TX			EINT30			
PI19	SPI1_MISO	URAT2_RX			EINT31			
PI20	PS2_SCK0	UART7_RX			HSCL			
PI21	PS2_SDA0	UART7_TK			HDSA			

Note 1： "-" indicates no such function definition in the chip

Note 2： "#N/A" indicates no function definition in Itead OS

Revision record

Version	Description	Written by	Date
v1.0	Initial version	Jerry Shi	10th, August, 2013
V1.1	Revision of pinmap and core dimension	Jerry Shi	3rd, September, 2013