

HI3516DV300 SOM PCBA DATASHEET

Build-version: Hi3516DV300_SOM_VA0

Build-date: 2020-11-18

Build: Peter

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About This Document

Purpose

This document describes the base functions, interface usages and hardware specification of HI3516DV300 SOM.

Related Version

The following table lists the product version related to this document.

Product Name	Version	Release Date
HI3516DV300_SOM_VAO	VA0	2020.11.18

Intended Audience

This document is intended for:

- Technical Support Engineer
- Hardware engineer
- Mechanical structure engineer
- Software engineer

Change History

Version	Describes
HI3516DV300_SOM_VAO	The first official release

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1 Overview

1.1 Brief Introduction

HI3559V200_SOM is a board with encoding and decoding capabilities using HiSilicon new-generation SoC. It shows customers the powerful multimedia functions and rich peripheral interfaces of the HI3559V200 chip, and provide customers with product hardware PCBA based on the Hi3516DV300 chip, which is used in single Sensor/Dual Sensor IPC, encoder, decoder, NVR, AI edge computing box products. Customers can flexibly realize their own product functional requirements by designing or customizing the interface board by themselves. At the same time, it is equipped with our open source framework system software, which has high stability, compatibility, flexibility and scalability, which shortens the development cycle of customers' products and reduces customers' development costs and risks. It can be applied to multiple industries such as smart monitoring, smart retail, smart industry, smart transportation, and smart education.

PCBA Interface see below:



Top



Bottom

Interface Name	Description
J1	Multi-function expansion interface (include SDI00/1、USB2.0、USB3.0、UART0/1/2/3/4、I2S、SPI2/3、AUDIO、PWM、GPIO)
J2	Sensor0/Sensor1/VI port

1.2 Hardware Feature

1.2.1 Hi3559V200 Key Specifications

1) Processor Core

- ARM Cortex-A7 MP2 @900MHz, 32 KB I-Cache, 32 KB D-Cache
256KB L2 cache
- Neon acceleration and integrated FPU

2) Smart Video Analysis

- Neural network acceleration engine with processing performance up to 0.4 TOPS.

Intelligent functions such as third-party object (face) detection and tracking as well as scenario identification

3) ISP

- Multi-channel TDM for processing 2-channel sensor video input
- Adjustable 3A functions (AE, AWB, and AF)
- FPN removal
- 2-frame WDR exposure, local tone mapping, strong light suppression, and backlight compensation
- Defect pixel correction and LSC
- Multi-level 3DNR, which removes motion smearing and chroma noise and provides excellent image effects in low illumination
- 3D-LUT color adjustment
- Image dynamic contrast enhancement and edge enhancement

-
-
- CAC and purple fringe removal
 - Dehaze
 - 6-DoF image stabilization (based on video or gyro information) and rolling-shutter correction
 - Lens GDC
 - Image rotation by 90° or 270°
 - Image mirror and flip
 - Multi-channel 1/15.5x -16x scaling for output
 - OSD overlaying of up to eight regions before encoding
 - ISP adjustment tool on the PC

4) Video Encoding and Decoding Performance

- Maximum resolution for H.265/H.264 encoding and decoding: 3840 x 2160
- H.265/H.264 encoding and decoding performance:
 - 3840 x 2160@30 fps + 720p@30 fps encoding
 - 3840 x 2160@30 fps decoding
- Maximum resolution for JPEG encoding and decoding: 8192 x 8192
- Maximum JPEG encoding and decoding performance: 16MP (4608 x 3456)@10 fps
- Multiple bit rate control modes such as CBR, VBR, and FIXQP
- Maximum bit rate for H.265/H.264 encoding output: 100Mbit/s
- Encoding of eight ROIs

5) Video Interface

VI

- 4-lane image sensor serial input, and MIPI, sub-LVDS, and HiSPi interfaces
- Division of the 4-lane MIPI sensor input into two groups of 2-lane MIPI input
 - Maximum resolution of the first input: 4608 x 3456;
 - Maximum resolution of the second input: 2048 x 1536
- 10-/12-/14-bit Bayer RGB DC timing VI
- BT.656 and BT.1120 video input in YUV format

-
- One YUV input through the MIP

VO

- Overlay of two layers (video layer and graphics layer)
- HDMI 1.4 interface, with the maximum output of 3840 x 2160@30 fps
- 4-lane MIPI DSI output
- 6-/8-/16-/18-/24-bit digital LCD interface
- BT. 656/BT. 1120 interface

6) Audio Interface Encoding and Decoding

- Integrated audio codec, supporting 16-bit audio input and output
- Single-end dual-channel input and stereo output
- I₂S interface for connecting to external audio codec
- HDMI audio output
- Voice encoding/decoding complying with multiple protocols by using software
- Audio encoding formats such as AAC/G.711/G.726/
- Audio VQE processing

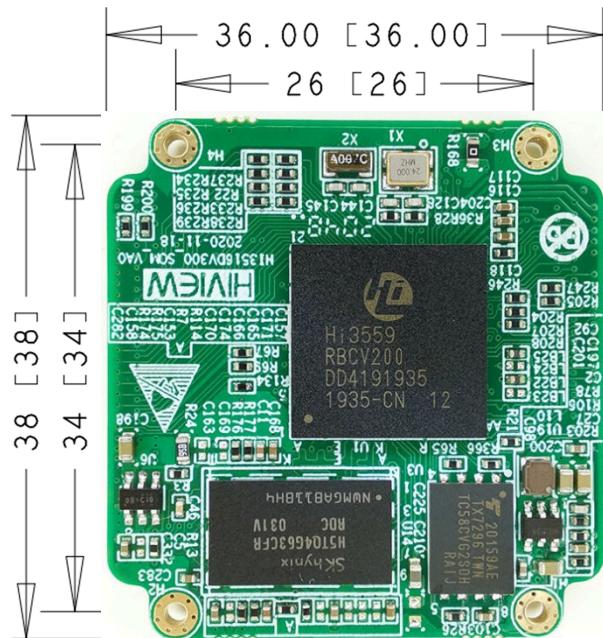
1.2.2 Hardware optional configuration

SoC		Hi3559V200					
Memory	Flash	<input checked="" type="checkbox"/> NAND <input type="checkbox"/> NOR <input type="checkbox"/> eMMC			<input type="checkbox"/> 64MB <input type="checkbox"/> 128MB <input checked="" type="checkbox"/> 256MB		
	RAM	<input checked="" type="checkbox"/> DDR3 <input type="checkbox"/> DDR4 <input type="checkbox"/> LPDDR4			<input checked="" type="checkbox"/> 1GB <input type="checkbox"/> 2GB <input type="checkbox"/> 4GB		
RTC		<input checked="" type="checkbox"/> Internal RTC				<input type="checkbox"/> External RTC	
Hardware-based encryption		<input checked="" type="checkbox"/> Support				<input type="checkbox"/> Not support	
Watchdog		<input checked="" type="checkbox"/> Internal				<input type="checkbox"/> External	
Dimensions		38*36mm					

2 Hardware Introduction

2.1 Hi3559V200 SOM Hardware Introduction

2.1.1 Mechanical Dimensions



单位: mm

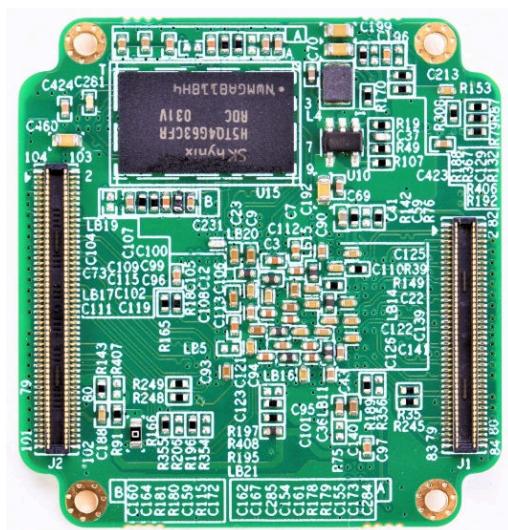


Table 2-1 Interface definition

J1 Connector ---SENSOR0/1, VI Multiplexing (Model. -HIROSE DF40C-80DP-0.4V(51))			
Pin No. /Name		Pin No. /Name	
PIN1	HDMI_TXCN	PIN2	5V0_USB
PIN3	HDMI_TXCP	PIN4	GND
PIN5	GND	PIN6	SDIO0_CARD_DETECT/GPIO1_1
PIN7	HDMI_TXON	PIN8	SDIO0_CDATA0/GPIO1_4
PIN9	HDMI_TXOP	PIN10	DVDD3318_SDIO_VOUT
PIN11	GND	PIN12	SDIO0_CDATA1/GPIO1_5/JTAG_TMS
PIN13	HDMI_TX1N	PIN14	SDIO0_CCLK_OUT/GPIO1_2/JTAG_TRSTN
PIN15	HDMI_TX1P	PIN16	SDIO0_CCMD/GPIO1_3
PIN17	GND	PIN18	SDIO0_CDATA3/GPIO1_7/JTAG_TDI
PIN19	HDMI_TX2N	PIN20	SDIO0_CDATA2/GPIO1_6/JTAG_TDO
PIN21	HDMI_TX2P	PIN22	SDIO0_CARD_POWER_EN/GPIO1_0/JTAG_TCK
PIN23	GND	PIN24	GND
PIN25	MIPI_RX0_D1N	PIN26	USB_PWREN/GPIO2_2
PIN27	MIPI_RX0_D1P	PIN28	USB_OVRCUR/GPIO2_0
PIN29	GND	PIN30	GND
PIN31	MIPI_RX0_CK1N/VI_DATA8	PIN32	USB_DM
PIN33	MIPI_RX0_CK1P/VI_DATA9	PIN34	USB_DP
PIN35	GND	PIN36	GND
PIN37	MIPI_RX0_D3N/VI_DATA10	PIN38	HDMI_HOTPLUG/GPIO2_4/UART3_RXD
PIN39	MIPI_RX0_D3P/VI_DATA11	PIN40	HDMI_SDA/GPIO2_6/UART3_RTSN/I2C4_SDA/FLASH_TRIGGER
PIN41	GND	PIN42	HDMI_SCL/GPIO2_7/UART3_CTSN/I2C4_SCL/SHUTTER_TRIGGER
PIN43	MIPI_RX0_DON	PIN44	HDMI_CEC/GPIO2_5/UART3_TXD
PIN45	MIPI_RX0_DOP	PIN46	GND
PIN47	GND	PIN48	SPI0_CS_N/I2C1_SCL/GPIO4_5/SPI_3LINE_CS_N/SENSOR_HS

PIN49	MIPI_RX0_D2P/VI_DATA14	PIN50	SPI0_SDI/I2C1_SDA/GPIO4_4/SENSOR_VS
PIN51	MIPI_RX0_D2N/VI_DATA15	PIN52	SPI0_SCLK/I2C0_SCL/GPIO4_2/SPI_3LINE_SCLK
PIN53	GND	PIN54	SPI0_SDO/I2C0_SDA/GPIO4_3/SPI_3LINE_SDATA
PIN55	MIPI_RX0_CKOP/VI_DATA12	PIN56	VI_DATA7/VOU656_DATA7/SPI2_CSN/GPIO3_7/UART2_TXD
PIN57	MIPI_RX0_CKON/VI_DATA13	PIN58	VI_DATA5/VOU_DATA5/SPI2_SDO/GPIO3_5/UART2_CTSN
PIN59	GND	PIN60	VI_DATA4/VOU_DATA4/SPI2_SCLK/GPIO3_4/UART_RTSN
PIN61	VI_CLK/VOU656_CLK/GPIO2_3	PIN62	VI_DATA6/VOU656_DATA6/SPI2_SDI/GPIO3_6/UART2_RXD
PIN63	SENSOR0_CLK/GPIO4_0	PIN64	GND
PIN65	GND	PIN66	SENSOR0_RSTN/BOOT_SEL1/GPIO4_1
PIN67	VI_DATA2/VOU656_DATA2/I2C6_SCL /GPIO3_2	PIN68	VI_DATA3/VOU656_DATA3/I2C6_SDA/GPIO3_3
PIN69	VI_DATA0/VOU656_DATA0/I2C5_SCL /GPIO3_0	PIN70	VI_DATA1/VOU656_DATA1/I2C5_SDA/GPIO3_1
PIN71	GND	PIN72	VI_VS/SENSOR_VS/SENSOR1_CLK/GPIO4_6/FALSH_TRIG
PIN73	AC_MICBIAS	PIN74	VI_HS/SENSOR_HS/SENSOR1_RSTN/GPIO4_7/SHUTTER_TRIG
PIN75	AC_INL/MIC_IN	PIN76	GND
PIN77	AC_INR	PIN78	AC_OUTL
PIN79	GND	PIN80	AC_OUTL

J2 Connector Multiplexing interface 1 (Model. -HIROSE DF40C-100DP-0.4V(51))

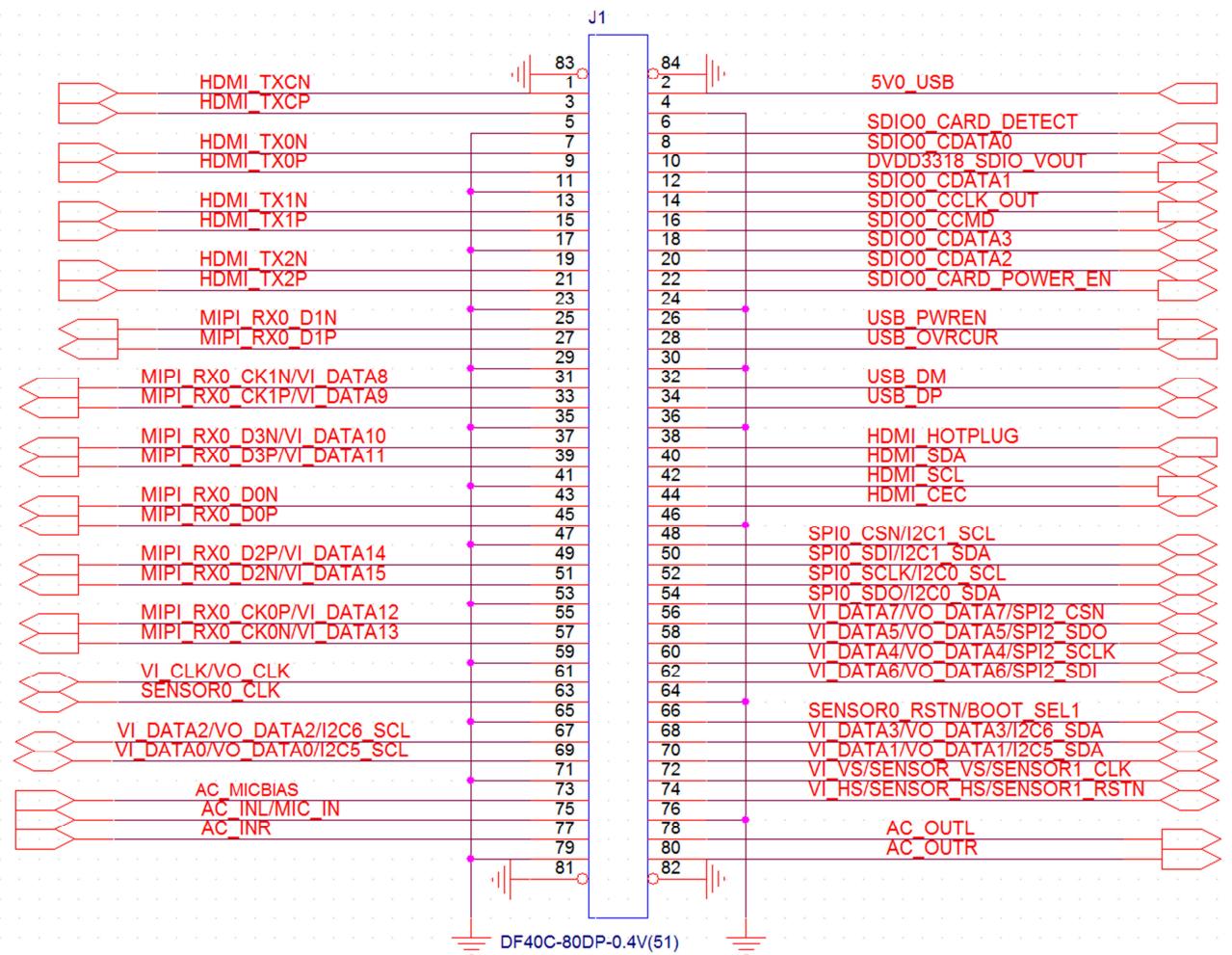
Pin No. /Name		Pin No. /Name	
PIN1	3.3V	PIN2	3.3V
PIN3	3.3V	PIN4	3.3V
PIN5	3.3V	PIN6	3.3V
PIN7	GND	PIN8	GND
PIN9	GND	PIN10	GND
PIN11	GND	PIN12	GND
PIN13	SYS_RSTN_OUT/GPIO10_5	PIN14	1.8V
PIN15	GND	PIN16	1.8V
PIN17	LCD_RST/GPIO0_5/LCD_DATA22	PIN18	GND
PIN19	TP_INT/GPIO0_4/LCD_DATA21	PIN20	UPDATE_MODE/GPIO0_0
PIN21	I2C3_SDA/GPIO0_1/LCD_DATA20	PIN22	GND
PIN23	I2C3_SCL/GPIO0_2/LCD_DATA19	PIN24	DSI_D1P/LCD_DATA11/LCD1_DATA0/GPIO9_7 /VOU1120_DATA12
PIN25	RMII_RX_DV/GPIO7_3/LCD_DATA6/ VOU656_DATA1/VOU1120_DATA1	PIN26	DSI_D1N/LCD_DATA10/LCD1_HSYNC/GPIO9_6 /VOU1120_DATA13
PIN27	RMII_RXD0/GPIO7_5/LCD_DE	PIN28	GND
PIN29	RMII_RXD1/GPIO7_4/LCD_VSYNC	PIN30	DSI_D0N/LCD_DATA9/LCD1_VSYNC/GPIO10_1 /VOU1120_DATA14
PIN31	RMII_CLK/GPIO7_2/LCD_HSYNC	PIN32	DSI_D0P/LCD_DATA8/LCD1_DE/GPIO10_0 /VOU1120_DATA15
PIN33	RMII_TXD0/GPIO7_1/LCD_DATA0 /VOU656_DATA7/VOU1120_DATA7	PIN34	GND
PIN35	RMII_TXD1/TEST_CLK/LCD_DATA1/VOU656_DATA6 /VOU1120_DATA6/GPIO8_7	PIN36	DSI_CKN/LCD_DATA13/LCD1_DATA2/GPIO9_5 /VOU1120_DATA10
PIN37	RMII_TX_EN/GPIO7_0/LCD_DATA2/VOU656_DATA5	PIN38	DSI_CKP/LCD_DATA12/LCD1_DATA1/GPIO9_4

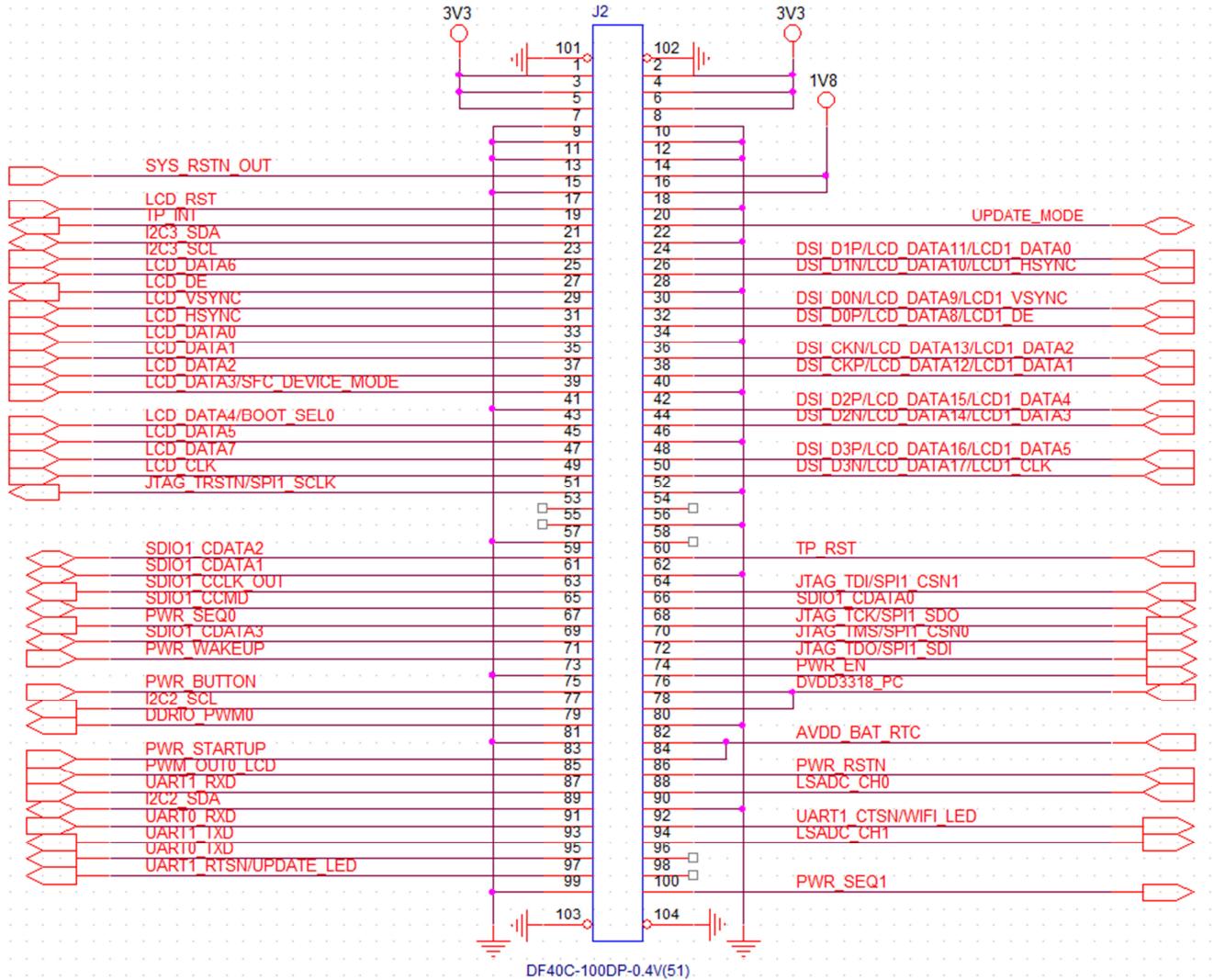
	/VOU1120_DATA5		/VOU1120_DATA11
PIN39	EPHY_RSTN/GPIO7_6/LCD_DATA3/VOU656_DATA4 /VOU1120_DATA4/SFC_DEVICE_MODE	PIN40	GND
PIN41	GND	PIN42	DSI_D2P/LCD_DATA15/LCD1_DATA4/GPIO9_3 /VOU1120_DATA8
PIN43	MDCK/GPIO8_6/LCD_DATA4/ VOU656_DATA3/VOU1120_DATA3/BOOT_SEL0	PIN44	DSI_D2N/LCD_DATA14/LCD1_DATA3/GPIO9_2 /VOU1120_DATA9
PIN45	MDIO/GPIO8_5/LCD_DATA5/ VOU656_DATA2/VOU1120_DATA2	PIN46	GND
PIN47	EPHY_CLK/GPIO7_7/LCD_DATA7/ VOU656_DATA0/VOU1120_DATA0	PIN48	DSI_D3P/LCD_DATA16/LCD1_DATA5/GPIO9_0 /SHUTTER_TRIG
PIN49	LCD_CLK/GPIO0_6/VOU656_CLK/VOU1120_CLK	PIN50	DSI_D3N/LCD_DATA17/LCD1_CLK/GPIO9_1 /FLASH_TRIGGER
PIN51	JTAG_TRSTN/SPI1_SCLK/ RMII_TXD1/I2S_MCLK/GPIO8_0	PIN52	GND
PIN53	NC	PIN54	NC
PIN55	NC	PIN56	GND
PIN57	GND	PIN58	NC
PIN59	SDI01_CDATA2/GPIO6_4/RMII_TX_EN	PIN60	TP_RST/GPIO0_3/IR_IN/LCD_DATA18
PIN61	SDI01_CDATA1/GPIO6_3/MDIO	PIN62	GND
PIN63	SDI01_CCLK_OUT/GPIO6_0/RMII_RX_DV	PIN64	JTAG_TDI/SPI1_CS_N1/LCD_DATA23/I2S_SD_RX /GPIO8_4
PIN65	SDI01_CCMD/GPIO6_1/EPHY_CLK	PIN66	SDI01_CDATA0/GPIO6_2/MDCK
PIN67	PWR_SEQ0/GPIO11_1	PIN68	JTAG_TCK/SPI1_SDO/ RMII_RXD1/I2S_BCLK_TX/GPIO8_1
PIN69	SDI01_CDATA3/GPIO6_5/EPHY_RSTN	PIN70	JTAG_TMS/SPI1_CS_N0/ RMII_TXD0/I2S_WS_TX/GPIO8_2
PIN71	PWR_WAKEUP/GPIO11_0	PIN72	JTAG_TDO/SPI1_SDI/ RMII_RXD0/I2S_SD_TX/GPIO8_3

PIN73	GND	PIN74	PWR_EN/GPIO11_3
PIN75	PWR_BUTTON	PIN76	DVDD3318_PC
PIN77	I2C2_SCL/GPIO5_7	PIN78	DVDD3318_PC
PIN79	DDRIO_PWM0/GPIO6_6	PIN80	GND
PIN81	GND	PIN82	AVDD_BAT_RTC
PIN83	PWR_STARTUP	PIN84	AVDD_BAT_RTC
PIN85	PWM_OUT0_LCD/GPIO6_7	PIN86	PWR_RSTN
PIN87	UART1_RXD/GPIO5_2	PIN88	LSADC_CH0/GPIO10_3
PIN89	I2C2_SDA/GPIO5_6	PIN90	GND
PIN91	UART0_RXD/GPIO5_4	PIN92	UART1_CTSN/WIFI_LED/GPIO5_1/UART4_TXD
PIN93	UART1_TXD/GPIO5_3	PIN94	LSADC_CH1/GPIO10_4
PIN95	UART0_TXD/GPIO5_5	PIN96	NC
PIN97	UART1_RTSN/UPDATE_LED/GPIO5_0/UART4_RXD	PIN98	NC
PIN99	GND	PIN10 0	PWR_SEQ1/GPIO11_2

2.1.2 Bus List

2.1.3 Interface schematic



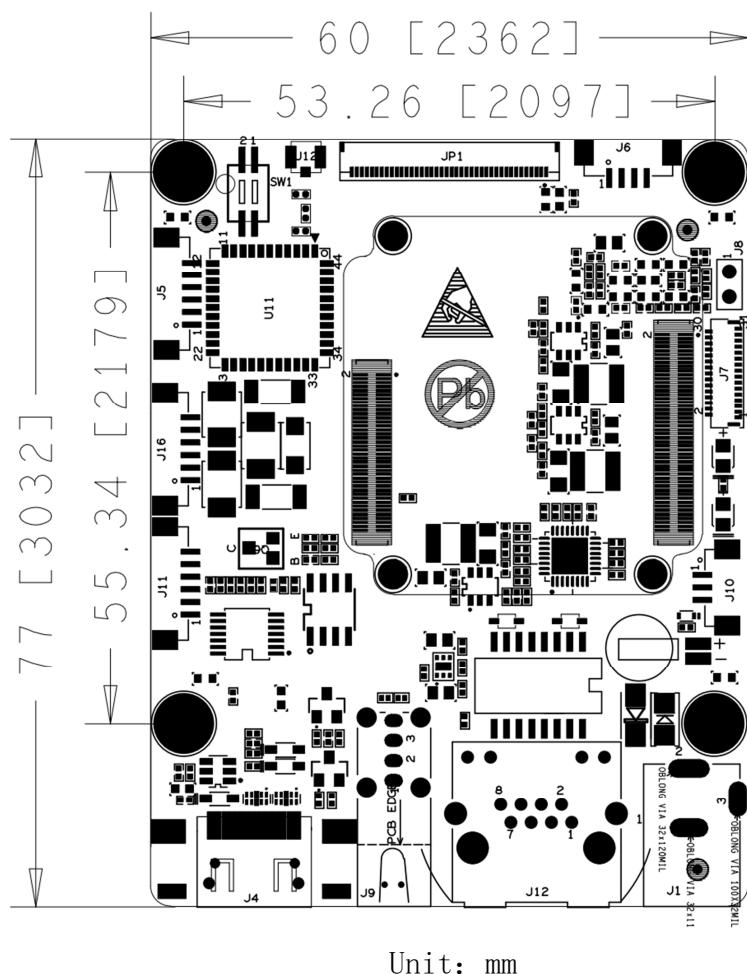


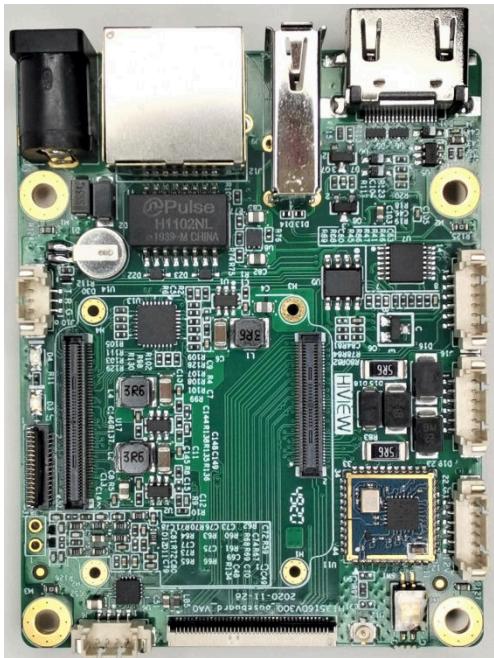
2.2 Hi3559V200 Base Board Introduction

2.2.1 Brief Introduction

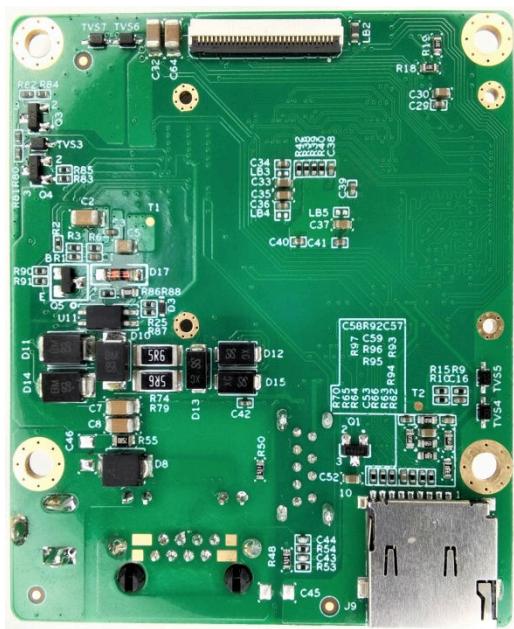
This base board is exposing every interface from our company's Hi3559V200 SOM board, provides a development platform and reference base-board design for Hi3559V200 SOM board. The board integrates a WIFI module (BL-M8189FS6 (VC), 802.11n 150Mbps) which can be used as a wireless video product. It provides MIPI CSI interface, MIPI DSI interface, HDMI interface, which can be used as video encoding and video decoding product. Provide SD card storage, RS485, UART, AUDIO, ALARM, AUTO-IRIS control, CDS detection, USB and other interfaces, and also reserve some IO ports for customers to choose flexibly to meet customer needs in various application scenarios.

2.2.2 Mechanical Dimensions





TOP



BOTTOM

Table 2-2 Interface definition

J6 Connector ---P_IRIS (Model. SMD4_1.25mm_Vertical)				
Pin No. /Name		Function	Pin No. /Name	Function
PIN1	B-		PIN2	A-
PIN3	A+		PIN4	B+

JP1 Connector ---Sensor in (Model..FPC40-0.5mm)				
Pin No. /Name		Function	Pin No. /Name	Function
PIN1	3V3		PIN2	3V3
PIN3	SPI0_SCLK/I2C0_SCL		PIN4	SPI0_CSN/I2C1_SCL
PIN5	SPI0_SDI/I2C1_SDA		PIN6	SPI0_SDO/I2C0_SDA
PIN7	GND		PIN8	NC
PIN9	NC		PIN10	GND
PIN11	NC		PIN12	NC
PIN13	MIPIO_D3M		PIN14	MIPIO_D3P

PIN15	GND		PIN16	SENSOR0_HS	
PIN17	SENSOR0_VS		PIN18	MPI0_D2M	
PIN19	MPI0_D2P		PIN20	GND	
PIN21	MPI0_D1P		PIN22	MPI0_D1M	
PIN23	MPI0_CKP		PIN24	MPI0_CKM	
PIN25	GND		PIN26	MPI0_DOM	
PIN27	MPI0_DOP		PIN28	NC	
PIN29	NC		PIN30	GND	
PIN31	NC		PIN32	NC	
PIN33	SENSOR0_CLK		PIN34	IR_CUT_0_CONTROL1	
PIN35	IR_CUT_0_CONTROL2		PIN36	CDS	
PIN37	SENSOR0_RSTN		PIN38	NC	
PIN39	12V0		PIN40	12V0	

J10 Connector--- Debug uart0 (Model. SMD3-1.25mm_Vertical)					
Pin No. /Name		Function	Pin No. /Name		Function
PIN1	GND		PIN2	UART0_RXD	
PIN3	UART0_TXD				

J7 Connector ---DSI interface (Model. USL00-30L-A)					
Pin No. /Name		Function	Pin No. /Name		Function
PIN1	LEDA	LED POWER SUPPLY	PIN2	LEDA	LED POWER SUPPLY
PIN3	LEDA	LED POWER SUPPLY	PIN4	NC	
PIN5	LEDK	LED POWER GND	PIN6	LEDK	LED POWER GND
PIN7	LEDK	LED POWER GND	PIN8	LEDK	LED POWER GND
PIN9	GND		PIN10	GND	

PIN11	DSI_D2P		PIN12	DSI_D2N	
PIN13	GND		PIN14	DSI_D1P	
PIN15	DSI_D1N		PIN16	GND	
PIN17	DSI_CKP		PIN18	DSI_CKN	
PIN19	GND		PIN20	DSI_D0P	
PIN21	DSI_D0N		PIN22	GND	
PIN23	DSI_D3P		PIN24	DSI_D3N	
PIN25	GND		PIN26	NC	
PIN27	TFT_RSTN		PIN28	NC	
PIN29	1V8		PIN30	3V3	
PIN30	3V3				

J5 Connector --- To IR led board (Model. SMD6-1.25mm_Vertical)					
Pin No. /Name		Function	Pin No. /Name		Function
PIN1	CDS	CDS voltage Level Input, High or Low	PIN2	IR_CONTROL	LED on/off control
PIN3	GND		PIN4	GND	
PIN5	DC12V0	LED board power supply	PIN6	DC12V0	LED board power supply

J11 Connector --- Audio&UART2 (Model. SMD6-1.25mm_Vertical)					
Pin No. /Name		Function	Pin No. /Name		Function
PIN1	AUDIO_OUTL		PIN2	AUDIO_OUTR	
PIN3	AUDIO_INL		PIN4	AUDIO_INR	
PIN5	UART2_RX		PIN6	UART2_TX	

J16 Connector --- RS485&Alarm in/out (Model. SMD6-1.25mm_Vertical)

Pin No. /Name		Function	Pin No. /Name		Function
PIN1	RS485_A		PIN2	RS485_B	
PIN3	GND		PIN4	ALARM_IN	Connect to GND, The Alarm happened
PIN5	RELAY1_COM		PIN6	RELAY1_OPEN	

J8--- MIC IN (Model. SIP2_2.54mm)

Connector No. /Name		Function	Connector No. /Name		Function
PIN1	MICIN_N		PIN2	MICIN_P	

SW1--- GPIO SET KEY

Connector No. /Name		Function	Connector No. /Name		Function
PIN1	GND	GPIO3_5 LOW	PIN2	GND	GPIO3_2 LOW
PIN3	3V3	GPIO3_2 HIGH	PIN4	3V3	GPIO3_5 HIGH

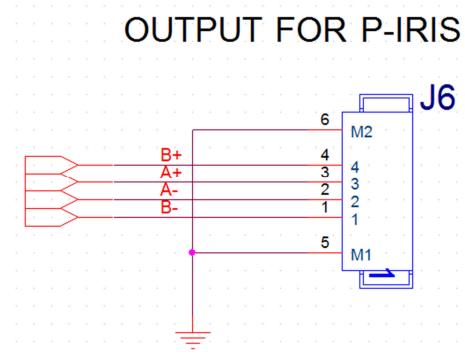
Other function interface

Connector No. /Name		Function	Connector No. /Name		Function
J4	HDMI OUT		KEY1	UPDATE_MODE KEY	GPIO0_0, Default high
J9	USB2.0		J12	RJ4 (No Support)	
J1	DC12V	Power input	J15	TF CARD	

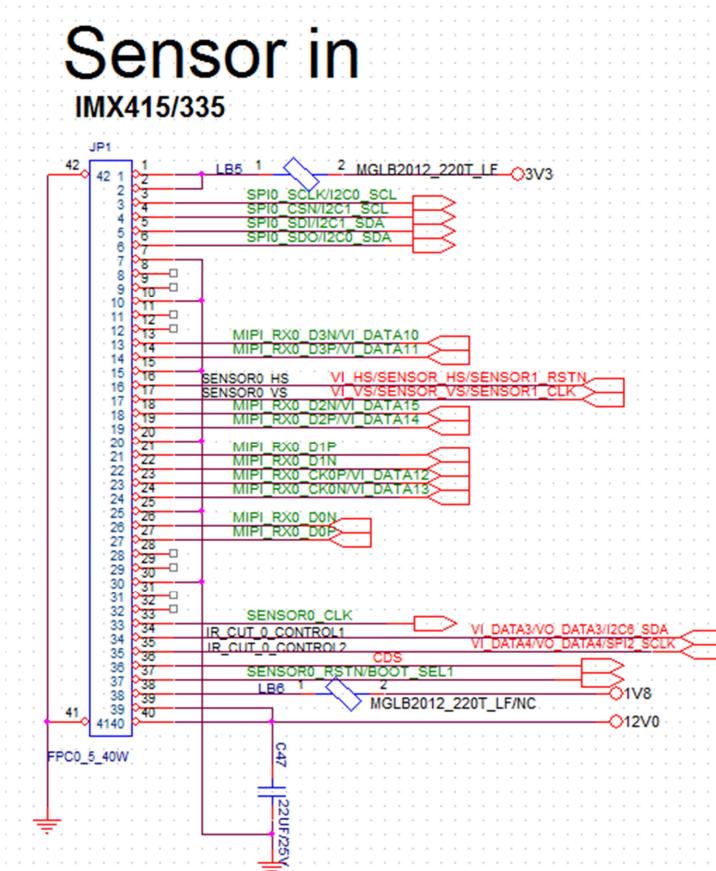
2.2.3 Bus List

2.2.4 Interface schematic

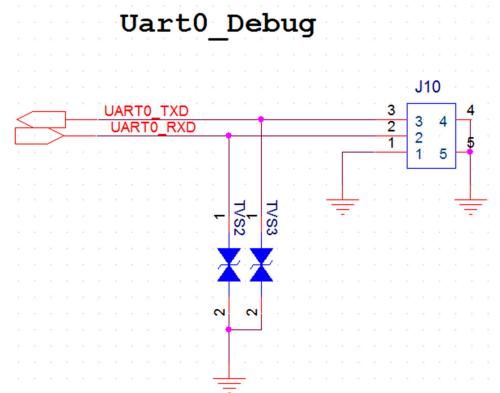
J6-P_IRIS



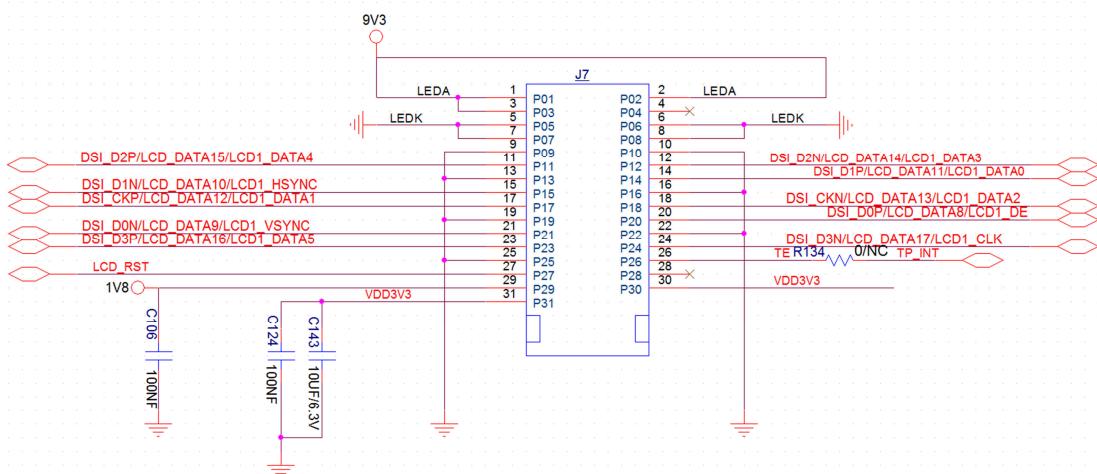
JP1-Sensor 0 input



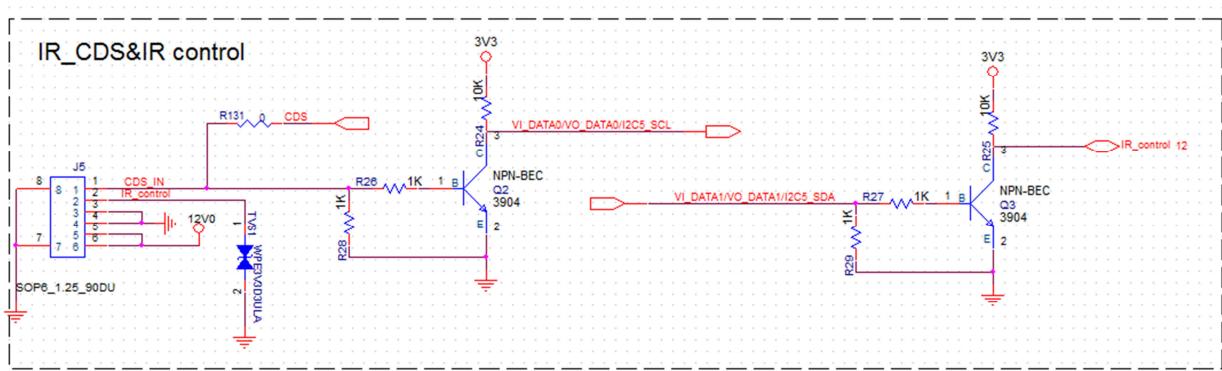
J10-Debug UART0



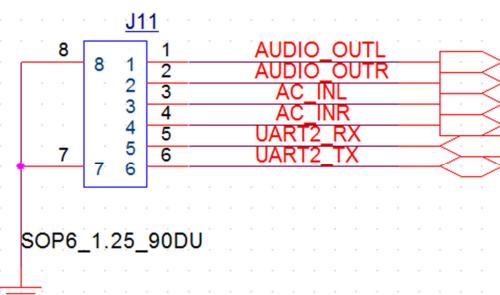
J7-LED display



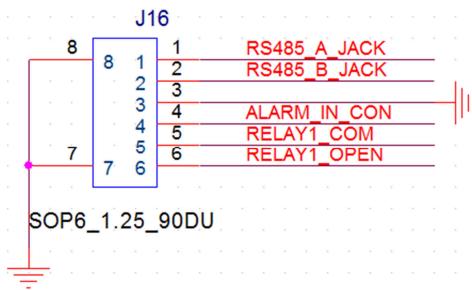
J5-To IR led board



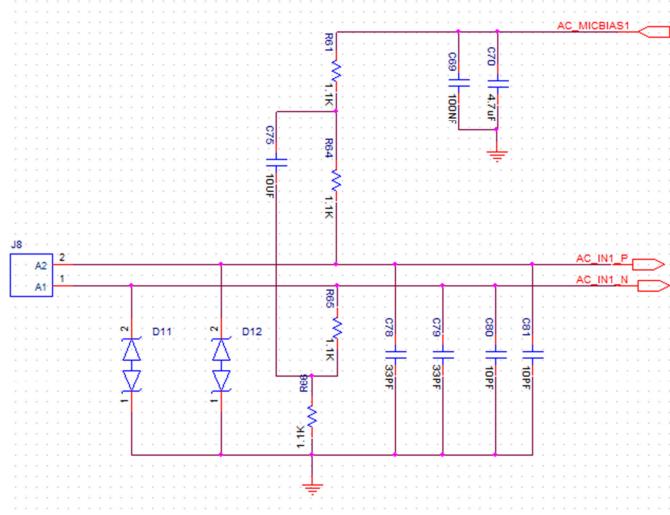
J11-Audio&UART2



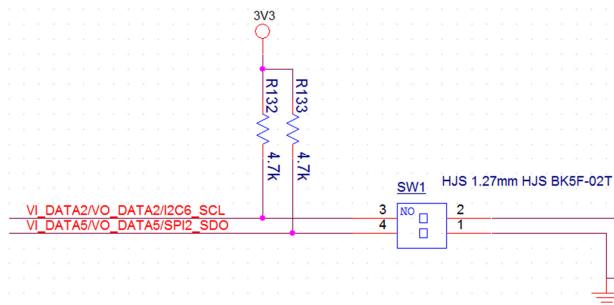
J16-RS485 & Alarm in/out



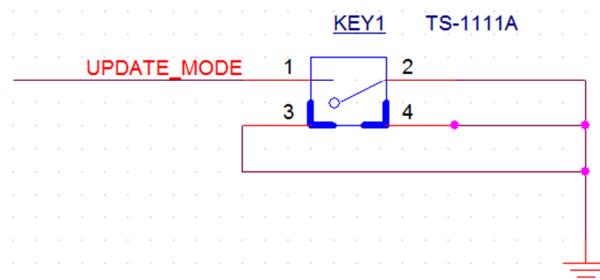
J8-Mic in



SW1-GPIO set



Key1-Update key



3. Operation Guide

3. 1 Precautions

For product testing or application development environment, please read the following precautions before operation:

- In the power-on state, the bare board cannot be hot-plugged, and it is forbidden to touch the internal components of the PCBA board by hand;
- The power output capacity of each port is limited, do not exceed the specifications, otherwise the system will crash or even burn the board;
- Pay attention to the docking I/O level, and prohibit over-specification applications, otherwise it will cause the I/O to burn out;
- SoC and DDR are used for heat dissipation, keep away from heat sources to avoid affecting the performance and life of the chip;
- Carefully check the connection of each component to avoid wrong connection causing burn-in or failure to work.

3. 2 Configuration

3. 2. 1 Sensor, VI, DSI/LCD Power Configuration

The working level of Sensor, VI, DSI/LCD can pass the magnetic beads according to the actual application mode

LB22/LB23: AVDD3318_MIPIRX

LB24/LB25:DVDD3318_VI

LB5/LB21:AVDD3318_MIPITX

For selection, SOM defaults to 1.8V, as shown in the schematic diagram below, according to the different product application requirements of customers, select the corresponding matching level mode during testing and production.

