



## HI3519DV500 SOM PCBA Specification

Version : HI3519DV500\_SOM\_VA0

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# Forward

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## Purpose

This document mainly describes the basic functions, interface definition, and hardware features of the hi3519dv500\_som core board and baseboard.

## Related Version

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

Product name	Version	Release date
HI3519DV500_SOM_VAO	VAO	2022. 05. 18

## Intended Audience

This document is intended for:

- Technical Support Engineer
- Hardware engineer
- Mechanical structure engineer
- Software engineer
- Sales personnel for electronic parts and components

## Change History

Version	Description
HI3519DV500_SOM_VAO	The first official release

# Contents

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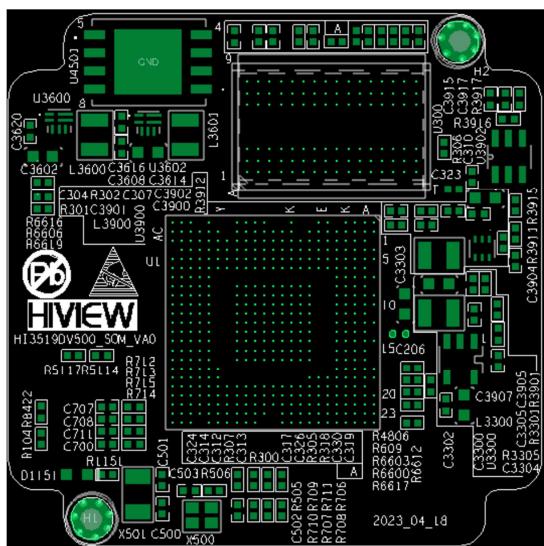
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# 1 Summary

## 1.1 Brief introduction

HI3519dv500\_som core board is a smart video processing full-function core module developed by hiview for hi3519dv500 media processing chip, hi3519dv500 Is an ultra HD intelligent soc launched for the vision industry, This SoC provides up to four sensor inputs and optimum image processing capabilities, including 4K@30 fps image signal processing (ISP), AI-powered real-time noise reduction (NR), and a wide range of traditional image enhancement and processing algorithms, such as 2F wide dynamic range (WDR), multi-level NR, 6-DoF digital image stabilization (DIS), any view stitching (AVS), and Mono-Color-Fusion (MCF). It also allows for the access and processing of thermal infrared, structured-light, and time-of-flight (ToF) sensors; Built-in dual-core A 55, Provide efficient, rich and flexible cpu resources, to meet customer computing and control needs; While integrates an efficient neural network (NN) inference engine with up to 2.5 TOPS NN compute power, which supports mainstream NN frameworks,. Rich interface resources, support a g mac, extended 10 / 100 / 1000 Mbps network interface, support extended 8 lane sensor serial input, support Uart / SPI / I2C / SDIO / DSI / I2S and other general interface extension. It can be applied to single sensor / double sensor / 4sensor ipc, encoder, decoder, ai edge computing box products, users can through the design by themself or custom interface board for flexible implement their product function requirements, at the same time with our open source framework system software that is high stability, strong compatibility, flexibility, and scalability, can greatly shorten the development cycle of customer products, also reduce customer development cost and risk. It can be applied to intelligent monitoring, retail, industry, transportation, education, medical, UAV, video conference and other industries.



## 1.2 Hardware Feature

### 1.2.1 HI3519DV500 Key Specifications

#### Processor Core

- Dual-core Arm Cortex-A55@1000 MHz
- 32 KB I-cache, 32 KB D-cache, and 256 KB L3 cache
- Neon acceleration and integrated floatingpoint unit (FPU)
- TrustZone

#### System-Level Acceleration Modules

- Hardware accelerated standard CRC32, CRC16, and CRC8 polynomial calculation unit
- Hardware accelerated high-speed direct memory access (DMA) module

#### Intelligent Video Analysis

- NN Complete APIs and toolchains
- Upgraded intelligent video engine (IVE) operators, including computer morphological operators for feature point detection, perimeters, optical flows, and more
- Upgraded depth processing unit (DPU) algorithm for the binocular depth image acceleration unit, supporting a resolution of up to 2048 x 2048 pixels, a parallax of up to 224 pixels, and 720p@30 fps processing performance

#### Video Codec

- H.264 Baseline Profile/Main Profile/High Profile Level 5.1
- H.265 Main Profile Level 5.1
- Up to 6144 x 6144 H.264/H.265 codec resolution
- I-frames and P-frames
- Typical performance of H.264/H.265 multistream codec:
  - 3840 x 2160@30 fps (encoding) + 1920 x 1080@30 fps (encoding) + 720 x 480@30 fps (encoding)
  - 3840 x 2160@30 fps (encoding) + 720 x 480@30 fps (encoding) + 1920 x 1080@30 fps (decoding)
  - 3840 x 2160@30 fps (decoding)
- On-screen display (OSD) overlay before encoding of eight regions
- CBR, VBR, AVBR, FixQp, and QpMap bit rate control modes
- Up to 80 Mbps output bit rate  $\lambda$  Encoding of eight regions of interest (ROIs)
- Mosaic encoding overlay on the video front end
- Digital watermark
- Perceptual video coding (PVC) for bitrate reduction
- JPEG baseline codec
- Up to 16384 x 16384 JPEG codec resolution
- Maximum JPEG performance:

## Summary

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- Encoding: 3840 x 2160@60 fps (YUV420)
- Decoding: 3840 x 2160@30 fps (YUV420)

## ISP

- Synchronous processing of multiple sensors
- Adjustable 3A functions: automatic exposure (AE), automatic white balance (AWB), and automatic focus (AF)
- Fixed pattern noise (FPN)
- Defect pixel correction and lens shading correction
- 2-frame WDR, advanced local tone mapping, strong light suppression, and backlight compensation
- Multi-level three-dimensional noise reduction (3DNR)
- Image edge enhancement
- Dehaze
- Dynamic contrast improvement (DCI)
- 3D-LUT color adjustment
- Next-generation lens distortion correction
- Geometry correction of any shape such as fisheye
- 6-DoF DIS
- Gyro stabilization and rolling shutter correction
- Image mirroring, flipping, and rotation by 90 or 270 degrees
- NN-based real-time dynamic range compression (DRC), Bayer noise reduction (BNR), 3DNR, or demosaicing (DM) processing on images
- Dual-light fusion of mono and color images
- ISP adjustment tool on the PC

## Video and Graphics Processing

- Graphics and image scaling by 1/15.5x to 16x
- Horizontal AVS
  - Two 2560 x 1440@30 fps inputs and up to 5120 x 1440@30 fps or 2560 x 2880@30 fps output
  - Four 1920 x 1080@30 fps inputs and up to 6144 x 1080@30 fps or 1920 x 4320@30 fps output
- Overlaying of video and graphics layers
- Color space conversion (CSC)

## Video Input Interfaces

- 8-lane image sensor serial inputs and multiple interfaces such as MIPI, LVDS, subLVDS, and HiSPI
- Multiple combinations such as 2x4-lane and 4x2-lane modes, and up to 4-sensor inputs
- 8-/10-/12-/14-bit RGB Bayer DC timing video input and up to 148.5 MHz clock frequency
- BT.601, BT.656, and BT.1120 video input interfaces
- One to four YUV inputs through the MIPI virtual channels
- Access of mainstream CMOS level thermal imaging sensors
- Structured light module

- Continuous-wave (CW) ToF image sensor

## Video Output Interfaces

- One BT.1120 or BT.656 output interface with up to 1920 x 1080@60 fps for BT.1120
- 6-/8-bit serial output or 16-/18-/24-bit RGB parallel output with up to 74.25 MHz frequency
- 4-lane MIPI DSI/CSI output with up to 1.8 Gbps per lane and 3840 x 2160@30 fps
- Gamma correction and horizontal sharpening

## Audio Interfaces and Processing

- Embedded audio codec, supporting 16-bit dual-channel differential voice inputs and dual-channel single-ended voice outputs
- One I2S interface, compatible with the multichannel time division multiplexing (TDM) transmission mode
- Eight digital mic array inputs
- Multi-protocol voice codec
- Audio 3A functions: AEC, ANR, and ALC

## Security Isolation and Engines

- Secure boot
- REE and TEE hardware isolation based on TrustZone
- NN model and data protection
- Hardware-based AES128/256 symmetric encryption algorithms
- Hardware-based RSA3072/4096 signature verification algorithms
- Hardware-based ECC256/384/512 elliptic curve algorithms
- Hardware-based SHA-256/384/512 and HMAC\_SHA256/384/512 algorithms
- Hardware-based SM2/3/4 Chinese cryptographic algorithms
- Hardware-based true random number generator (TRNG)
- 28-kbit one-time programming (OTP) storage space

## Network Interface

- One GE interface:
  - RGMII and RMII modes
  - Acceleration units such as TCP segmentation offload (TSO), UDP fragmentation offload (UFO), and checksum offload engine (COE)

## Peripheral Interfaces

- Two SDIO 3.0 interfaces
  - SDIO0 supports the secure digital extended capacity (SDXC) card with up to 2 TB storage.
  - SDIO1 supports the connection with a WiFi module.
- One USB 3.0/USB 2.0 interface — USB host-device switchover
- Power-on reset (POR) and external input reset
- Real-time clock (RTC) with independent power supply
- Simplified power-on and power-off control logic for SoC standby wakeup
- 4-channel low-speed analog-to-digital converters (LSADCs)

## Summary

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- Three-wire control interface dedicated for RGB small-sized displays
- Multiple UART, I2C, SPI, PWM, and GPIO interfaces

## External Memory Interfaces

- DDR4, LPDDR4, and LPDDR4x interfaces
  - 2 x 16-bit DDR4
  - 1 x 32-bit LPDDR4 and LPDDR4x
  - Up to 2666 Mbps DDR4 rate
  - Up to 2933 Mbps LPDDR4 and LPDDR4x rate
  - Up to 4 GB storage
- SPI NOR and SPI NAND flash interfaces
  - 1-/2-/4-wire mode
  - 3-byte and 4-byte address modes for the SPI NOR flash
- eMMC 5.1 interface with up to 2 TB storage
- Booting from the eMMC, SPI NOR flash, or SPI NAND flash

## SDK

Linux 5.10 SDK

## Physical Specifications

- Power consumption
  - 2.5 W typical power consumption (4Kp30 encoding + 2 TOPS)
- Operating voltage
  - Core voltage: 0.9 V
  - I/O voltage: 1.8 V or 3.3 V
  - DDR4, LPDDR4, and LPDDR4x interface voltages: 1.2 V, 1.1 V, and 0.6 V, respectively
- Package
  - RoHS, 15 mm x 15 mm FCCSP
  - 0.65 mm ball pitch

### 1.2.2 SOM Board Hardware Feature

SoC		HI3519DV500					
Memory	Flash	<input checked="" type="checkbox"/> NAND	<input type="checkbox"/> NOR	<input type="checkbox"/> eMMC	<input checked="" type="checkbox"/> 512MB	<input type="checkbox"/> 4GB	<input type="checkbox"/> 16GB
	RAM	<input checked="" type="checkbox"/> DDR4	<input type="checkbox"/> LPDDR4	<input type="checkbox"/> LPDDR4X	<input checked="" type="checkbox"/> 2GB	<input type="checkbox"/> 4GB	<input type="checkbox"/> 8GB
RTC		<input checked="" type="checkbox"/> Internal RTC			<input type="checkbox"/> External RTC		
Firmware encryption		<input checked="" type="checkbox"/> Support			<input type="checkbox"/> Not support		
Watch dog		<input checked="" type="checkbox"/> Internal			<input type="checkbox"/> External		

## Summary

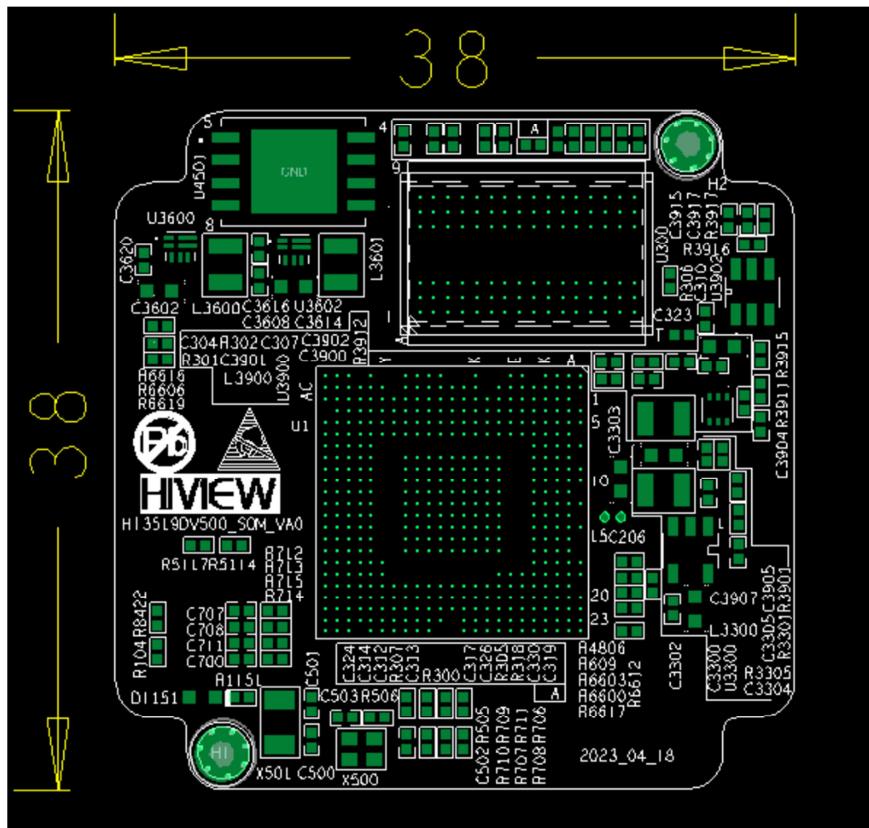
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<b>Board size</b>	38*38mm, M1.5*2 screw		
<b>Operating temperature</b>	-30~70°C		
<b>Power input</b>	DC5V 1.5A, DC3.3V 1A		
<b>Interface</b>	<b>MIPI</b>	1x	8-lane i , up to 4-sensor inputs
	<b>USB</b>	1x	One USB 3.0/USB 2.0 interface, USB host-device switchover
	<b>GMAC</b>	1x	One GE interface, RGMII and RMII modes
	<b>I2C</b>	8x	I2C3-6 is for sensor, Others can be used as the general I2C
	<b>SPI</b>	4x	Support the master mode and slave mode, SPI0/1 used for Sensor configuration, SPI2/3 used to control the peripherals
	<b>UART</b>	6x	UART0: 2-wire UART for debugging UART1/2/5: 4-wire UART UART3/4/5: 2-wire UART
	<b>I2S</b>	1x	Support extension audio codec
	<b>SDI03.0</b>	2x	SDI00 supports the secure digital extended capacity (SDXC) card with up to 2 TB storage, SDI01 supports the connection with a WiFi module

## 2 Hardware Introduction

## 2.1 HI3519DV500 SOM Hardware Introduction

### **2.1.1 Mechanical Dimensions**



Size, Unit: mm

## 1. Structure Specification

Structure Parameter	
Connector	DF40C(3.0)-100DP and 90DP-0.4V
Size	38*38mm
Pin distance	0.4mm
Pin quantity	190pin

## 2. Interface Definition

Connector order	Description
J1	Multi-function extension interface1 (CSI、AUDIO、USB、UART、SPI and so on) , 100pin
J2	Multi-function extension interface2 (DSI、USB、PCIE、RGMII、SDIO、UART、SPI and so on) , 90pin

J1 --- (Spec. DF40C-100DP-0.4V(51), 0.4mm_Vertical)					
Pin No. /Name		Power domain(V)	Pin No. /Name		Power domain (V)
PIN1	UART0_RXD/GPIO1_6	3.3	PIN2	UART0_TXD/GPIO9_7	3.3
PIN3	SPI1_CSN/GPIO1_3/I2C6_SD A, EMMC_DATA7/PWM1_OUT3_0 _P, SPI_3WIRE_CSN/VI_HS	1.8	PIN4	EMMC_DS/GPIO1_5	3.3
PIN5	SPI1_SDI/GPIO1_2/I2C6_SC L, EMMC_DATA6/PWM_OUT3_2_ P, VI_VS	1.8	PIN6	USB_OVRCUR/GPIO10_5	1.8
PIN7	SPI1_SDO/GPIO1_1/I2C5_SD A, EMMC_DATA5/PWM_OUT3_1_ P, SPI_3WIRE_DATA, THERMO_SD3	1.8	PIN8	SENSOR1_HS/GPIO0_3/SENS ORO_HS, SENSOR2_HS/PWM_O UT2_O_P, BOOT PARA_SELO/ SENSOR1_CLK, THERMO_SD2	1.8
PIN9	SPI1_SCLK/GPIO1_0/I2C5_S CL, EMMC_DATA4/PWM_OUT3_0 _P, SPI_3WIRE_CLK, THERMO_SD2	1.8	PIN10	SENSOR1_VS/GPIO0_4/SENS ORO_VS, SENSOR2_VS/PWM1_ OUT4_O_P, BOOT_SELO/THER MO_SD3	1.8
PIN11	EMMC_RST_N/GPIO1_4/SFC_C	3.3	PIN12	GPIO0_0/PWM_OUT3_0_P	1.8

## Hardware Introduction

	SN1			UPDATE_MODE_N/THERMO_RS TN	
PIN13	GND		PIN14	GND	
PIN15	SENSOR1_RSTN/GPIO0_2 ,  SENSOR0_RSTN/SENSOR2_RST N	1.8	PIN16	MIPI_RX1_D2N/GPIO13_7 ,  PWM1_OUT3_0_N1.8	1.8
PIN17	SENSOR1_CLK/GPIO0_1 ,  SENSOR0_CLK/SENSOR2_CLK, FAST_BOOT_MODE	1.8	PIN18	MIPI_RX1_D2P/GPIO14_0 ,  PWM1_OUT3_0_P	1.8
PIN19	GND		PIN20	GND	
PIN21	MIPI_RX1_DON/GPIO13_5 ,  PWM_OUT4_0_N	1.8	PIN22	MIPI_RX1_CK0N/GPIO14_1,  PWM_OUT0_0_P	1.8
PIN23	MIPI_RX1_DOP/GPIO13_6 ,  PWM_OUT4_0_P	1.8	PIN24	MIPI_RX1_CK0P/GPIO14_2,  PWM_OUT1_0_P	1.8
PIN25	GND		PIN26	GND	
PIN27	MIPI_RX1_CK1N/GPIO14_3,	1.8	PIN28	MIPI_RX1_D3N/GPIO14_7 ,  PWM1_OUT5_0_N	1.8
PIN29	MIPI_RX1_CK1P/GPIO14_4	1.8	PIN30	MIPI_RX1_D3P/GPIO1_7 ,  PWM1_OUT5_0_P	1.8
PIN31	GND		PIN32	GND	
PIN33	MIPI_RX0_DON/GPIO12_1 ,  PWM1_OUT0_0_N/VI_DATA10	1.8	PIN34	MIPI_RX1_D1N/GPIO14_5	1.8
PIN35	MIPI_RX0_DOP/GPIO12_2 ,  PWM1_OUT0_0_P/VI_DATA11	1.8	PIN36	MIPI_RX1_D1P/GPIO14_6	1.8
PIN37	GND		PIN38	GND	
PIN39	MIPI_RX0_CK1N/GPIO12_7, P  WM_OUT5_0_N/VI_DATA4, THE RMO_D03	1.8	PIN40	MIPI_RX0_D2P/GPIO12_4 ,  PWM_OUT4_0_P/VI_HS/VI_D  ATA15	1.8

## Hardware Introduction

PIN41	MIPI_RX0_CK1P/GPIO13_0, P WM_OUT5_0_P/VI_DATA5, THE RMO_D00	1.8	PIN42	MIPI_RX0_D2N/GPIO12_3, PWM_OUT4_0_N/VI_VS/VI_D ATA14	1.8
PIN43	GND		PIN44	GND	
PIN45	SENSOR0_HS/GPIO11_5/SENS OR1_HS, SENSOR2_HS/PWM1_0 UTO_0_P, VI_DATA7/THERMO_ VS	1.8	PIN46	MIPI_RX0_CK0P/GPIO12_6, PWM1_OUT2_0_P/VI_DATA13	1.8
PIN47	SENSOR0_VS/GPIO11_6/SENS OR1_VS, SENSOR2_VS/PWM1_OUT1_0_P , VI_DATA6/THERMO_SD1	1.8	PIN48	MIPI_RX0_CKON/GPIO12_5, PWM1_OUT4_0_P/VI_DATA12	1.8
PIN49	SENSOR0_CLK/GPIO12_0, SENSOR1_CLK/SENSOR2_CLK, PWM1_OUT3_0_P/VI_DATA9, VI_DATA5/THERMO_MCK	1.8	PIN50	GND	
PIN51	GND		PIN52	MIPI_RX0_D3P/GPIO13_4, PWM1_OUT1_0_P/VI_DATA3, THERMO_D01	1.8
PIN53	SPI0_CS1/GPIO11_0/SENS0 R3_CLK, SENSOR1_RSTN/PWM_OUT5_0_ P, VI_DATA3/THERMO_PS	1.8	PIN54	MIPI_RX0_D3N/GPIO13_3, PWM_OUT2_0_P/VI_DATA2, THERMO_D02	1.8
PIN55	SENSOR0_RSTN/GPIO11_7, SENSOR1_RSTN/SENSOR2_RST N, PWM1_OUT2_0_P/VI_DATA8 , VI_DATA4/THERMO_SD0	1.8	PIN56	GND	
PIN57	PWM_OUT0_0_P/GPIO10_6,	1.8	PIN58	MIPI_RX0_D1P/GPIO13_2,	1.8

## Hardware Introduction

	SENSOR0_CLK/SENSOR1_CLK, SENSOR2_CLK			PWM_OUT1_0_P/VI_DATA1, THERMO_D04	
PIN59	SPI0_SDI/GPIO11_2/I2C3_S  CL,  SENSOR1_VS/SENSOR0_VS,  SENSOR2_VS/VI_DATA0/THERMO_D07	1.8	PIN60	MIPI_RX0_D1N/GPIO13_1,  PWM_OUT0_0_P/VI_DATA0,  THERMO_D05	1.8
PIN61	SPI0_SDO/GPIO11_3/I2C4_S  DA, SENSOR1_RSTN/SENSOR0_RSTN, SENSOR2_RSTN/VI_DATA2/THERMO_HS	1.8	PIN62	GND	
PIN63	SPI0_CSNO/GPIO11_1/I2C3_SDA, SENSOR1_HS/SENSOR0_HS, SENSOR2_HS/VI_DATA1/THERMO_D06	1.8	PIN64	USB_DP	
PIN65	SPI0_SCLK/GPIO11_4/I2C4_SCL,  SENSOR1_CLK/SENSOR0_CLK,  SENSOR2_CLK/VI_CLK/THERMO_CLK	1.8	PIN66	USB_DM	
PIN67	PWM_OUT1_0_P/GPIO10_7,  PWM_OUT0_0_N	1.8	PIN68	GND	
PIN69	USB_PWREN/GPIO10_4,  SDI01_CARD_DETECT	3.3	PIN70	USB3_TXM0	
PIN71	5V0_USB_VBUS	USB 5V input	PIN72	USB3_TXP0	
PIN73	GND		PIN74	GND	
PIN75	AC_MICBIAS		PIN76	USB3_RXP0	

## Hardware Introduction

PIN77	AC_INL0/N		PIN78	USB3_RXM0	
PIN79	AC_INL0/P		PIN80	GND	
PIN81	AC_INR1/P		PIN82	SYS_RSTN_OUT/WDG_RSTN	3.3
PIN83	AC_INR1/N		PIN84	LSADC_CH2/GPIO10_1/FLASH_H_TRIGGER, VSYNC_TE_MIPITX, SDIO1_CARD_POWER_EN_N	3.3
PIN85	GND		PIN86	PWR_SEQ0/GPIO9_0/PWM_OUT_T3_0_N, PWM1_OUT5_0_P	3.3 (DVDD_P MC)
PIN87	AC_OUTL		PIN88	PWR_SEQ1/GPIO9_1/UART5_TXD, PWM_OUT3_1_N/PWM1_0_UT5_0_N	3.3 (DVDD_P MC)
PIN89	AC_OUTR		PIN90	PWR_WAKEUP1/GPIO9_5/I2C1_SCL, PWM1_OUT5_0_P	3.3 (DVDD_P MC)
PIN91	GND		PIN92	PWR_RSTN	3.3 (DVDD_P MC)
PIN93	LSADC_CH0/GPIO8_7/I2C7_SDA	3.3	PIN94	LSADC_CH3/GPIO10_2/SHUTTER_TRIGGER	3.3
PIN95	LSADC_CH1/GPIO10_0/I2C7_SCL	3.3	PIN96	PWR_STARTUP/GPIO9_3/I2C1_SDA, PWM1_OUT3_0_N	3.3 (DVDD_P MC)
PIN97	PWR_BUTTON/GPIO9_2/UART5_RXD, PWM_OUT3_2_N	3.3 (DVDD_P MC)	PIN98	PWR_WAKEUP0/GPIO9_4/I2C2_SDA, PWM_OUT5_0_N	3.3 (DVDD_P MC)
PIN99	PWR_EN/GPIO9_6/I2C2_SCL, PWM1_OUT5_0_N	3.3 (DVDD_P MC)	PIN100	AVDD_BAT	1.6~3.6 input

J2 --- (Spec. DF40C-90DP-0.4V(51), 0.4mm_Vertical)					
Pin No. /Name		Power domain (V)	Pin No. /Name		Power domain (V)
PIN1	3V3 Power in	3.3	PIN2	5V0 Power in	5.0

## Hardware Introduction

PIN3	3V3 Power in	3. 3	PIN4	5V0 Power in	5. 0
PIN5	3V3 Power in	3. 3	PIN6	5V0 Power in	5. 0
PIN7	3V3 Power in	3. 3	PIN8	5V0 Power in	5. 0
PIN9	3V3 Power in	3. 3	PIN10	5V0 Power in	5. 0
PIN11	GND		PIN12	GND	
PIN13	GND		PIN14	GND	
PIN15	GND		PIN16	GND	
PIN17	GND		PIN18	GND	
PIN19	GND		PIN20	GND	
PIN21	JTAG_TDI/GPIO5_0/I2S0_BC  LK, SPI3_CSN1/RGB_DATA1,  PWM2_OUT4_0_P/DMIC_SD3	3. 3	PIN22	GND	
PIN23	JTAG_TCK/GPIO4_5/I2S0_MC  LK, SPI3_SCLK/RGB_CLK,  PWM2_OUT3_0_P/SPI_TFT_CL  K, DMIC_MCLK	3. 3	PIN24	EPHY_RSTN/GPIO2_5/I2C2_  SDA, RGB_DATA16	3. 3
PIN25	JTAG_TDO/GPIO4_7/I2S0_SD  _TX, SPI3_SDO/RGB_VS/PWM2  _OUT1_0_P, DMIC_SD2	3. 3	PIN26	EPHY_CLK/GPIO2_4,  BOOT PARA_SEL1/RGB_DATA  15	3. 3
PIN27	JTAG_TMS/GPIO4_6/I2S0_WS  , SPI3_SDI/RGB_DATA0,  PWM2_OUT2_0_P/SPI_TFT_DA  TA, DMIC_SD1	3. 3	PIN28	I2C0_SDA/GPIO5_1/RGB_DE	3. 3
PIN29	DVDD3318_SDIO_VOUT	Power output 1.8	PIN30	GND	
PIN31	JTAG_TRSTN/GPIO4_4/I2S0_  SD_RX, SPI3_CSN0/RGB_HS/P  WM2_OUT0_0_P, SPI_TFT_CSN	3. 3	PIN32	UART2_RXD/GPIO2_0/SPI2_  CSN, I2S0_WS/I2C1_SDA	3. 3

## Hardware Introduction

	/DMIC_SD0				
PIN33	UART1_CTSN/GPI08_6/UART3_RXD,	3. 3	PIN34	SYS_RSTN	3. 3, input
PIN35	UART1_RXD/GPI08_3	3. 3	PIN36	UART2_RTSN/GPIO2_2/UART4_RXD, SPI2_SDI/I2S0_SD_TX/I2C2_SDA	3. 3
PIN37	UART1_RTSN/GPI08_5/UART3_TXD	3. 3	PIN38	UART2_CTSN/GPIO2_3/UART4_TXD, SPI2_SDO/I2S0_BCLK/I2C2_SCL	3. 3
PIN39	UART1_RXD/GPI08_4	3. 3	PIN40	UART2_RXD/GPIO2_1/SPI2_SCLK, I2S0_MCLK/I2C1_SCL	3. 3
PIN41	SDIO0_CARD_DETECT/GPIO8_1	1. 8	PIN42	GND	
PIN43	SDIO0_CARD_POWER_EN_N/GP108_2	1. 8	PIN44	MDIO/GPIO2_7/I2C2_SCL, I2S0_SD_RX/RGB_DATA18	3. 3
PIN45	SDIO0_CCLK_OUT/GPIO8_0	1. 8	PIN46	MDCK/GPIO2_6/BOOT PARA_SEL2, RGB_DATA17	3. 3
PIN47	GND		PIN48	RGMII_TXD3/GPIO3_6/SPI3_CSNO, I2S0_BCLK/RGB_DAT A5/DMIC_SD0, SPI_TFT_CSN	3. 3
PIN49	SDIO0_CDATA1/GPIO7_5	1. 8	PIN50	RGMII_TXD2/GPIO3_7/SPI3_CSNI, I2S0_SD_TX/RGB DATA7/DMIC_SD1, SPI_TFT_DATA	3. 3
PIN51	SDIO0_CCMD/GPIO7_3	1. 8	PIN52	RGMII_TXD1/RMII_TXD1/GPIO4_0, RGB_DATA8/SFC_EMMC_BOOT_MODE,	3. 3

## Hardware Introduction

PIN53	SDI00_CDATA3/GPIO7_7	1.8	PIN54	RGMII_TXD0/RMII_TXD0/GP I04_1, RGB_DATA9/BOOT_SE L1	3.3
PIN55	SDI00_CDATA0/GPIO7_4	1.8	PIN56	GND	
PIN57	SDI00_CDATA2/GPIO7_6	1.8	PIN58	RGMII_TXCKOUT/TEST_CLK, RMII_CLK/GPIO4_3/RGB_DA TA10	3.3
PIN59	DVDD3318_PMC	3.3 or 1.8 power input, default is 3.3	PIN60	RGMII_TXEN/RMII_TXEN/GP I04_2, BOOT PARA_SEL3/RG B_DATA11	3.3
PIN61	GND		PIN62	RGMII_RXD3/GPIO3_0/SPI3 _SD0, I2S0_WS/RGB_DATA4/ DMIC_SD2	3.3
PIN63	DSI_DON/GPIO6_1, VO_BT1120_DATA1/I2C1_SCL , RGB_DATA22/RGB_DATA9, PWM2_OUT1_0_P	3.3 or 1.8 power input, default is 3.3	PIN64	RGMII_RXD2/GPIO3_1/SPI3 _SD1, I2S0_SD_RX/RGB_DAT A3/DMIC_SD3	3.3
PIN65	DSI_DOP/GPIO6_2, VO_BT1120_DATA0/I2C1_SDA , RGB_DATA23/RGB_DATA10, PWM2_OUT4_0_P	3.3 or 1.8 power input, default is 3.3	PIN66	RGMII_RXD1/RMII_RXD1/GP I03_2, I2C1_SDA/RGB_DATA 12	3.3
PIN67	GND		PIN68	RGMII_RXD0/RMII_RXD0/GP I03_3, I2C1_SCL/RGB_DATA 13	3.3
PIN69	DSI_D1N/GPIO5_5, VO_BT1120_DATA3/I2C2_SDA , RGB_DATA20/RGB_DATA5/UA	3.3 or 1.8 power input, default is 3.3	PIN70	RGMII_RXDV/RMII_RXDV_CR S, GPIO3_4/RGB_DATA14	3.3

## Hardware Introduction

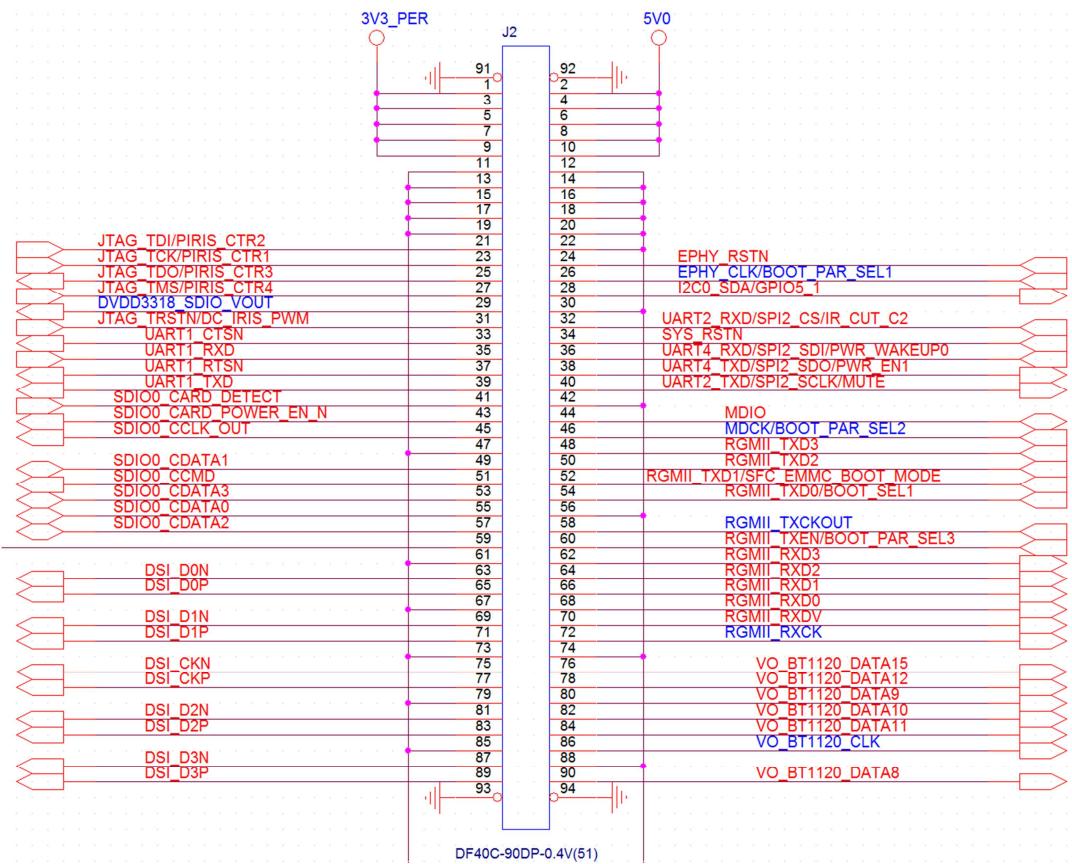
	RT5_RXD, PWM2_OUT1_0_P				
PIN71	DSI_D1P/GPIO5_6, VO_BT1120_DATA2/I2C2_SCL , RGB_DATA21/RGB_DATA6/UAR T5_TXD, PWM2_OUT3_0_P	3.3 or 1.8 power input, default is 3.3	PIN72	RGMII_RXCK/GPIO3_5/SPI3_SCLK, I2S0_MCLK/RGB_DATA6/DMIC_MCLK, SPI_TFT_CLK	3.3
PIN73	GND		PIN74	GND	
PIN75	DSI_CKN/GPIO5_7, VO_BT1120_DATA5/SPI3_SCL K, RGB_DATA7/SPI_TFT_CLK, PWM2_OUT4_0_P	3.3 or 1.8 power input, default is 3.3	PIN76	I2C0_SCL/GPIO5_2, VO_BT1120_DATA15/RGB_DA TA2,	3.3
PIN77	DSI_CKP/GPIO6_0, VO_BT1120_DATA4/RGB_DATA 19, RGB_DATA8/PWM2_OUT0_0_P	3.3 or 1.8 power input, default is 3.3	PIN78	SDIO1_CDATA2/GPIO6_7, VO_BT1120_DATA12/EMMC1_ DATA2, RGB_DATA15	3.3
PIN79	GND		PIN80	SDIO1_CDATA3/GPIO7_0, VO_BT1120_DATA9/EMMC1_D ATA3, RGB_DATA16	3.3
PIN81	DSI_D2N/GPIO6_3, VO_BT1120_DATA6/SPI3_SD0 , RGB_DATA11/PWM2_OUT3_0_ P	3.3 or 1.8 power input, default is 3.3	PIN82	SDIO1_CDATA1/GPIO6_6, VO_BT1120_DATA10/EMMC1_ DATA1, RGB_DATA14	3.3
PIN83	DSI_D2P/GPIO6_4, VO_BT1120_DATA14/SPI3_CS N1, EMMC1_RST_N/RGB_DATA1 2, PWM2_OUT2_0_P	3.3 or 1.8 power input, default is 3.3	PIN84	SDIO1_CDATA0/GPIO6_5, VO_BT1120_DATA11/EMMC1_ DATA0, RGB_DATA13	3.3
PIN85	GND		PIN86	SDIO1_CCLK_OUT/GPIO7_1,	3.3

## Hardware Introduction

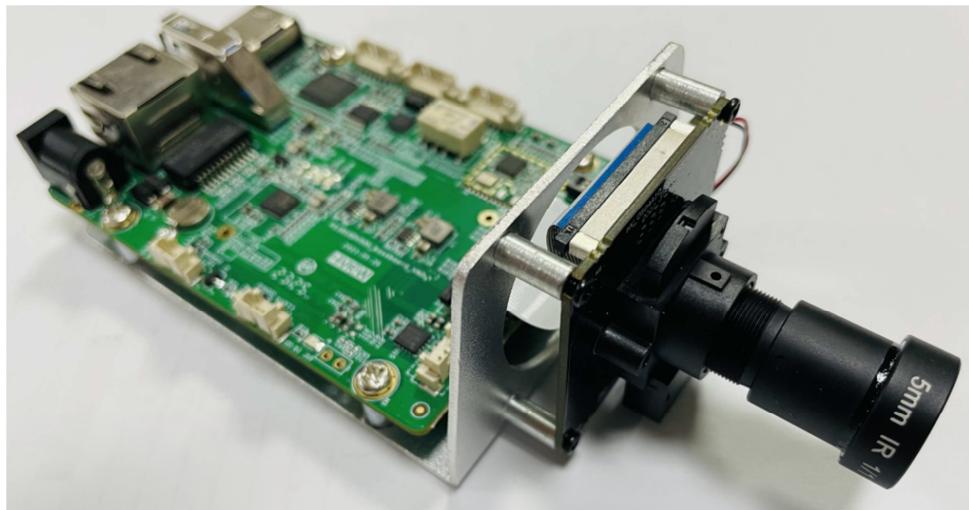
				VO_BT1120_CLK/EMMC1_CLK , RGB_DATA17	
PIN87	DSI_D3N/GPIO5_3/VO_BT656  _CLK, SPI3_CSNO/VO_BT1120  _DATA13, RGB_DATA3/SPI_TF  T_CS, PWM2_OUT0_O_P	3.3 or 1.8  power  input, default  is 3.3	PIN88	GND	
PIN89	DSI_D3P/GPIO5_4,  VO_BT1120_DATA7/SPI3_SDI  , RGB_DATA4/SPI_TFT_DATA,  PWM2_OUT2_O_P	3.3 or 1.8  power  input, default  is 3.3	PIN90	SDIO1_CCMD/GPIO7_2,  VO_BT1120_DATA8/EMMC1_C  MD,	3.3



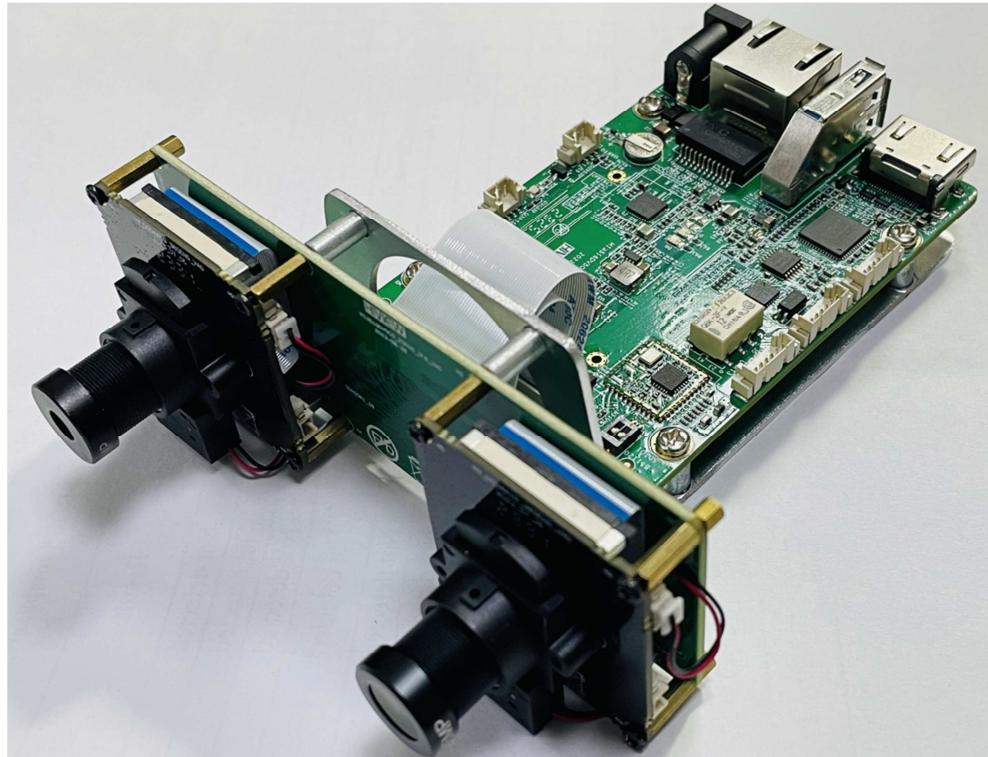
## Hardware Introduction



## 2.2 HI3519DV500 SOM for Development Board

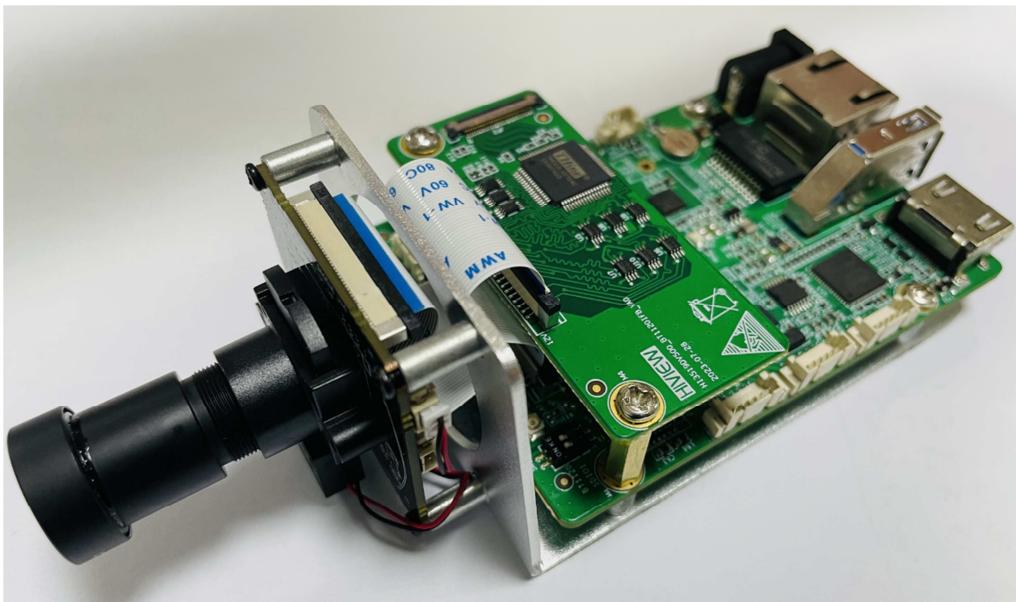


Model	HV-DM19DV500-C1
Sensor	OS08A20, 1/1.8" CMOS
Lens	Fixed lens: 6mm IR 1/1.8", 12MP
IR-CUT	Support
Power	DC12V, 1A



Model	HV-DM19DV500-C2
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Sensor	2*OS04A10, 1/1.8" CMOS
Lens	Fixed lens:2*6mm IR 1/1.8", 12MP
IR-CUT	Support
Power	DC12V, 1A

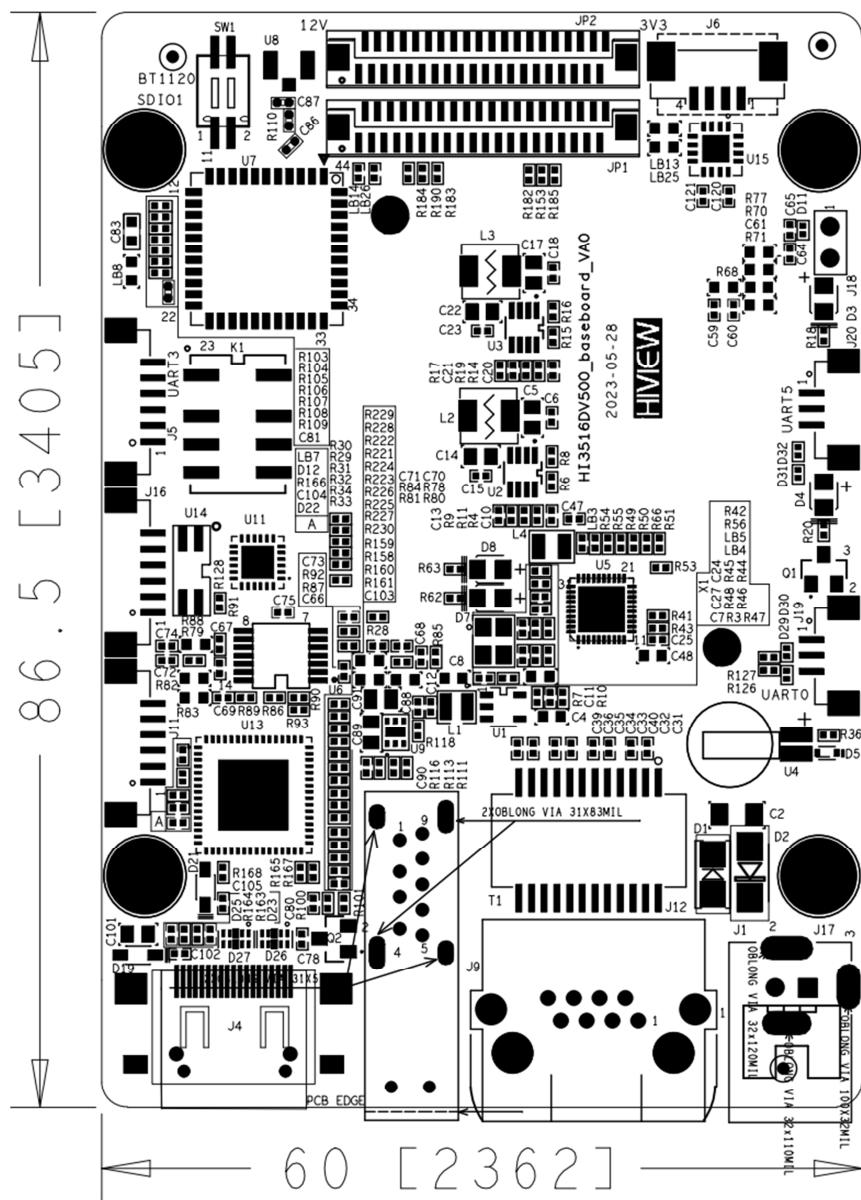


Model	HV-DM19DV500-C3
Sensor + BT1120	OS08A20, 1/1.8" CMOS + Sony LVDS module
Lens	Fixed lens:6mm IR 1/1.8", 12MP
IR-CUT	Support
Power	DC12V, 1A

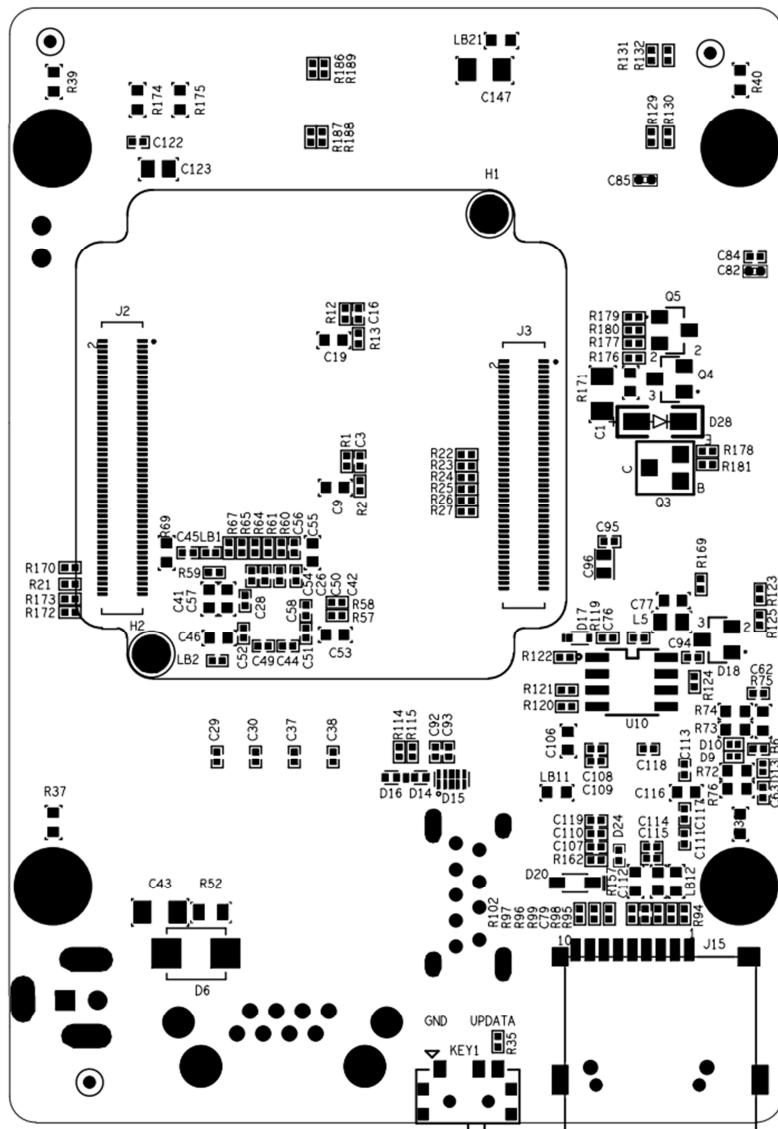
## 2.3 HI3519DV500 SOM for Baseboard

This baseboard is match for our HI3519DV500 SOM board, users can use the board to quickly verify, test, and evaluate the functions and performance of the HI3519DV500, the development board can also be used as the whole machine product. The baseboard supply the VI interface (MIPI CSI,BT1120,BT656,HT), VO interface(MIPI DSI,BT1120),HDMI output, SD card、RS485、UART、AUDIO in/out、ALARM in/out、P-IRIS control、CDS 、USB interface and so on,to meet the requirements of various application scenarios.

### 2.3.1 Baseboard Structure and Hardware introduction



Top view



Bottom view

## 1. Structure introduction

Structure parameter	
Connector	DF40HC (3.0)-100DS-0.4V, DF40HC (3.0)-90DS-0.4V,
Size	60*85.5mm
Pin distance	0.4mm
Pin quantity	190pin

## 2. Interface definition

Connector order	Description

J2	Same as the J1 of SOM baord			
J3	Same as the J2 of SOM board			

JP1 ---Sensor0 interface (Spec. FPC40_0.5mm_Vertical)					
Pin No. /Name		Function	Pin No. /Name		Function
PIN1	12V	POWER OUTPUT	PIN2	12V	POWER OUTPUT
PIN3	1.8V	POWER OUTPUT	PIN4	SENSOR0_RSTN/VI_D 8/T_SD0	1.8V
PIN5	CDS_IN	3.3V	PIN6	UART2_RXD/SPI2_CS /IR_CUT_C2/GPIO2_0	IR_CUT_0_C ONTROL2, 3.3V
PIN7	I2C0_SDA/GPIO5_1	IR_CUT_0_C ONTROL1, 3.3V	PIN8	SENSOR0_CLK/VI_D9 /T_MCK	1.8V
PIN9	NC		PIN10	NC	
PIN11	GND		PIN12	NC	
PIN13	NC		PIN14	MIPI_RX0_D0P/VI_D 11	1.8V
PIN15	MIPI_RX0_D0N/VI_D10	1.8V	PIN16	GND	
PIN17	MIPI_RX0_CK0N/VI_D12	1.8V	PIN18	MIPI_RX0_CK0P/VI_D13	1.8V
PIN19	MIPI_RX0_D1N/VI_D0 /T_D05	1.8V	PIN20	MIPI_RX0_D1P/VI_D 1/T_D04	1.8V
PIN21	GND		PIN22	MIPI_RX0_D2P/VI_H S/VI_D15	1.8V
PIN23	MIPI_RX0_D2N/VI_VS		PIN24	SENSOR0_VS/VI_D6/	1.8V

## Hardware Introduction

	/VI_D14			T_SD1	
PIN25	SENSOR0_HS/VI_D7/T_VS	1.8V	PIN26	GND	
PIN27	MIPI_RX0_D3P/VI_D3/T_D01	1.8V	PIN28	MIPI_RX0_D3N/VI_D2/T_D02	1.8V
PIN29	NC		PIN30	NC	
PIN31	GND		PIN32	NC	
PIN33	NC		PIN34	GND	
PIN35	SPI0_SDO/I2C4_SDA/VI_D2/T_HS	1.8V	PIN36	SPI0_SDI/I2C3_SCL/VI_D0/T_D07	1.8V
PIN37	SPI0_CSNO/I2C3_SDA/VI_D1/T_D06	1.8V	PIN38	SPI0_CLK/I2C4_SCL/VI_CLK/T_CLK	1.8V
PIN39	3.3V	POWER OUTPUT	PIN40	3.3V	POWER OUTPUT

JP2 ---Sensor1interface (Spec. FPC40_0.5mm_Vertical)					
Pin No. /Name		Function	Pin No. /Name		Function
PIN1	12V	POWER OUTPUT	PIN2	12V	POWER OUTPUT
PIN3	1.8V	POWER OUTPUT	PIN4	SENSOR1_RSTN	1.8V
PIN5	CDS_IN	3.3V	PIN6	JTAG_TRSTN/DC_IRIS_PWM/GPIO4_4	IR_CUT_O_C ONTROL2, 3. 3V
PIN7	LSADC_CH3/GPIO10_2	IR_CUT_O_C ONTROL1, 3. 3V	PIN8	SENSOR1_CLK/FAST_BOOT_MODE	1.8V
PIN9	NC		PIN10	NC	

PIN11	GND		PIN12	NC	
PIN13	NC		PIN14	MIPI_RX1_DOP	1.8V
PIN15	MIPI_RX1_DON	1.8V	PIN16	GND	
PIN17	MIPI_RX1_CKON	1.8V	PIN18	MIPI_RX1_CKOP	1.8V
PIN19	MIPI_RX1_D1N	1.8V	PIN20	MIPI_RX1_D1P	1.8V
PIN21	GND		PIN22	MIPI_RX1_D2P	1.8V
PIN23	MIPI_RX1_D2N		PIN24	SENSOR1_VS/BOOT_S EL0/T_SD3	1.8V
PIN25	SENSOR1_HS/BOOT_PA R_SEL0/T_SD2	1.8V	PIN26	GND	
PIN27	MIPI_RX1_D3P	1.8V	PIN28	MIPI_RX1_D3N	1.8V
PIN29	NC		PIN30	NC	
PIN31	GND		PIN32	NC	
PIN33	NC		PIN34	GND	
PIN35	SPI1_SDO/I2C5_SDA/ T_SD3	1.8V	PIN36	NC	1.8V
PIN37	NC	1.8V	PIN38	SPI1_SCLK/I2C5_SC L/T_SD2	1.8V
PIN39	3.3V	POWER OUTPUT	PIN40	3.3V	POWER OUTPUT

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

**J19 --- Debug uart0 (Spec. SMD3-1. 25mm\_Vertical)**

Pin No. /Name		Function	Pin No. /Name		Function
PIN1	GND		PIN2	UART0_RXD	
PIN3	UART0_TXD				

**J5 --- IR\_led&Uart3 (Spec. SMD6-1. 25mm\_Vertical)**

Pin No. /Name		Function	Pin No. /Name		Function
PIN1	CDS	CDS voltage Level Input, 3. 3V	PIN2	IR_CONTROL	LED on/off control, 3. 3V
PIN3	GND		PIN4	12V power output	
PIN5	UART3_RXD	3. 3V	PIN6	UART3_TXD	3. 3V

**J11 --- Audio&Uart 4 (Spec. 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	UART3_RXD	3. 3V	PIN6	UART3_TXD	3. 3V

**J16 --- RS485&Alarm in/out (Spec. SMD6-1. 25mm\_Vertical)**

Pin No. /Name		Function	Pin No. /Name		Function
PIN1	RS485_A	UART1	PIN2	RS485_B	UART1
PIN3	GND		PIN4	ALARM_IN	Connect to GND, The Alarm happened
PIN5	RELAY1_COM		PIN6	RELAY1_OPEN	

**SW1--- Multiplex function set key(High or low at the same time)**

## Hardware Introduction

Connector No. /Name		Function	Connector No. /Name		Function
PIN1	3. 3V	SDI01	PIN2	3. 3V	SDI01
	0V (default)	BT1120		0V (default)	BT1120

Other function interface					
Connector No. /Name		Function	Connector No. /Name		Function
J4	HDMI OUT		KEY1	UPDATE_MODE KEY	1:Normal mode 0:Update mode 1 pin is 0
J9	USB3. 0		J12	RJ45	10/100M /1000M Ethernet
J1	DC12V	Power input	J15	TF CARD	