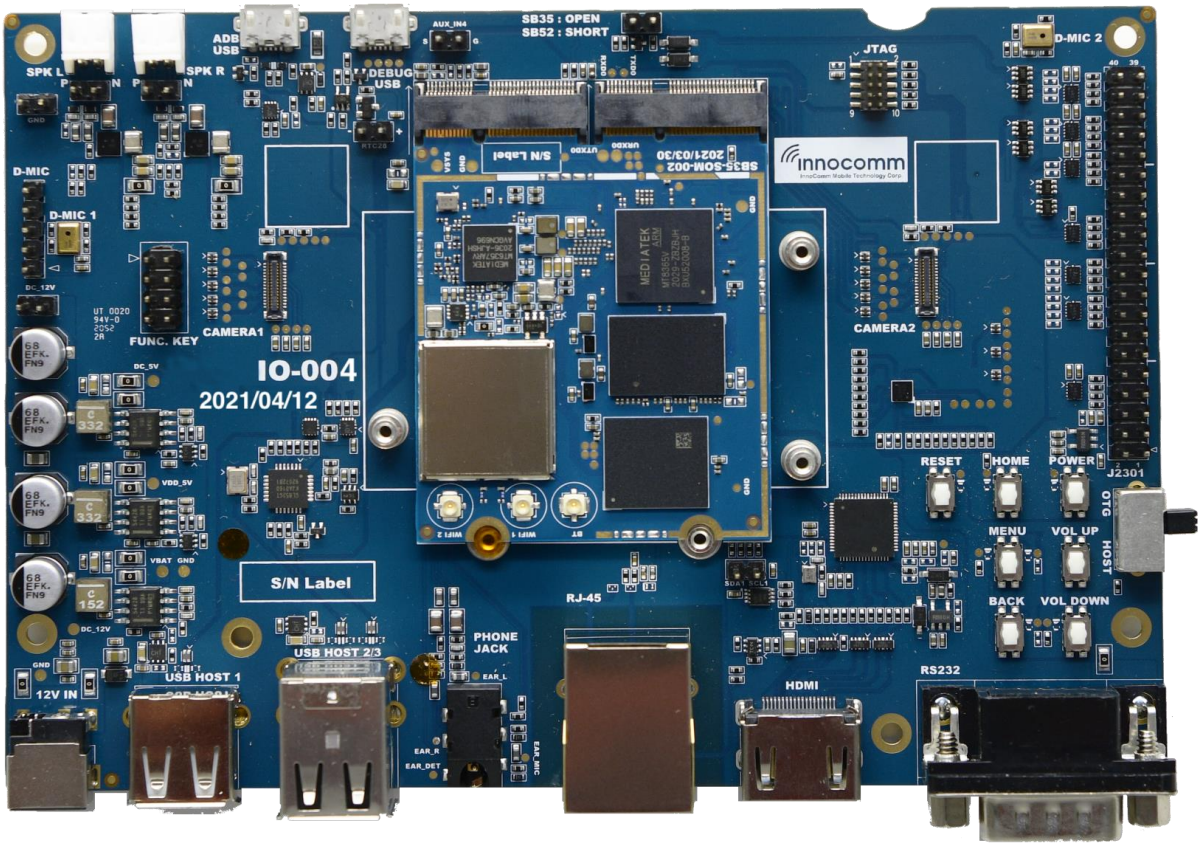
SB35 Development Kit Hardware User Guide



Revisions History

Date	Version Number	Document Changes
2021/06/10	0.1	Initial Draft
2022/11/16	1.1	Update 3-11 ADB/Host USB and Ethernet Update IO board Dimension

Table of Contents

1 Overview

1.1 General Information

SB35 SOM is a high-performance System on Module(SOM) designed based on the i350 processor from MediaTek The i350 device, with integrated Bluetooth, WLAN, and APU modules, is a highly integrated baseband platform incorporating application processing subsystems. The chip integrates ARM®Cortex-A73/A53 MPCore operating up to 2GHz, AI Processor MediaTek APU 1.0, and powerful multi-standard video codec.

SB35 Development kit includes a SOM and EVM board, EVM board is a 12-V input and provide follow functions

- 40-Pin GPIO 2.54mm pin header
- 10/100 Ethernet socket
- HDMI
- D-MIC *2
- ADB USB*1 / Host USB *3 / trace log USB *1
- Earphone jack *1 / 4.6W stereo SPK out *2
- RS232 DB15
- 2 data lane DSI FPC connector.
- 4 data lane CSI FPC Connector *2
- Power On, Reset, Home key and function Key *4
- Micro SD-Card

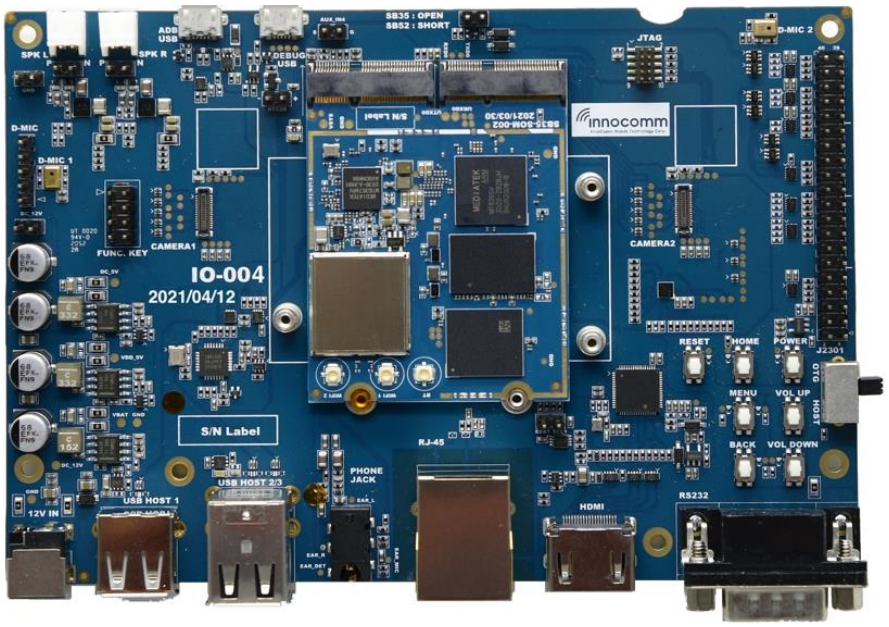


Figure 1-1 SB35 development kit

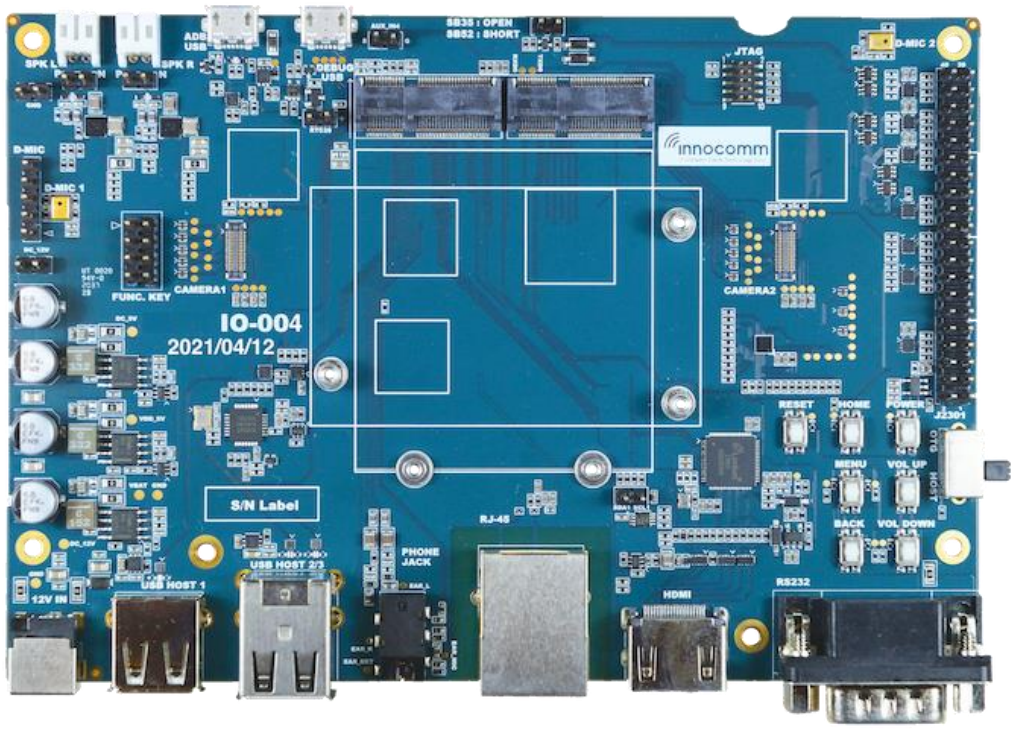


Figure 1-3 Top side connectors of EVM board

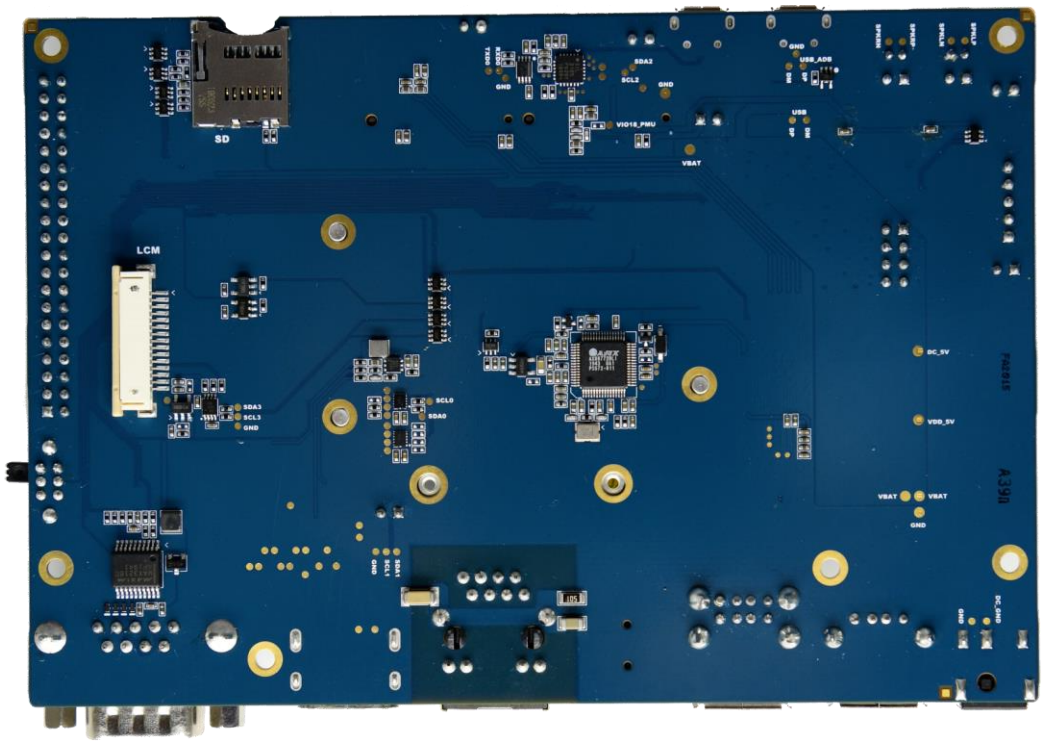


Figure 1-3 Bottom side connectors of EVM board

1.2 Architecture and Block Diagram

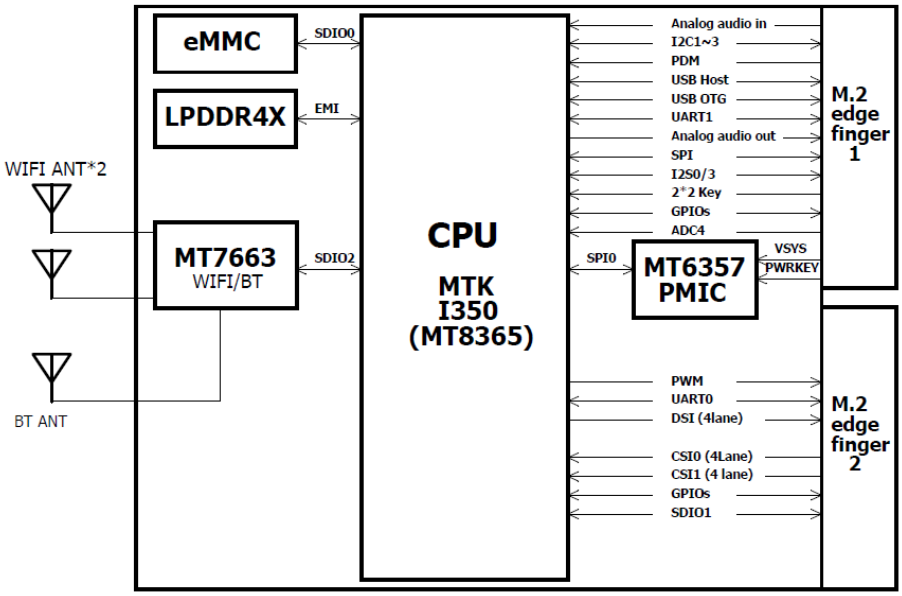


Figure 1-4 SB35 Development Kit System Block Diagram

1.3 Feature Summary

- MTK I350 CPU
- 2/4GB LPDDR4 RAM
- 16/32GB eMMC
- 1 x MIPI DSI (2 data lane / PI LCM accord)
- 2 x MIPI CSI (4 data lane each)
- Wi-Fi 802.11 a/b/g/n/ac, MIMO (MT7663)
- Bluetooth 5.1 (MT7663)
- 1 x USB 2.0 OTG
- 1 x USB 2.0 debug port
- 3 x USB A type Host
- 10/100 Ethernet RJ-45 Jack
- HDMI output
- 40 pin GPIO pin header (GPIO, PWM,I2C , UART, SPI..etc)
- Stereo speaker connector.
- Earphone Jack
- 1 x DB15 RS232 connector
- Micro SD-Card

1.4 Dimension

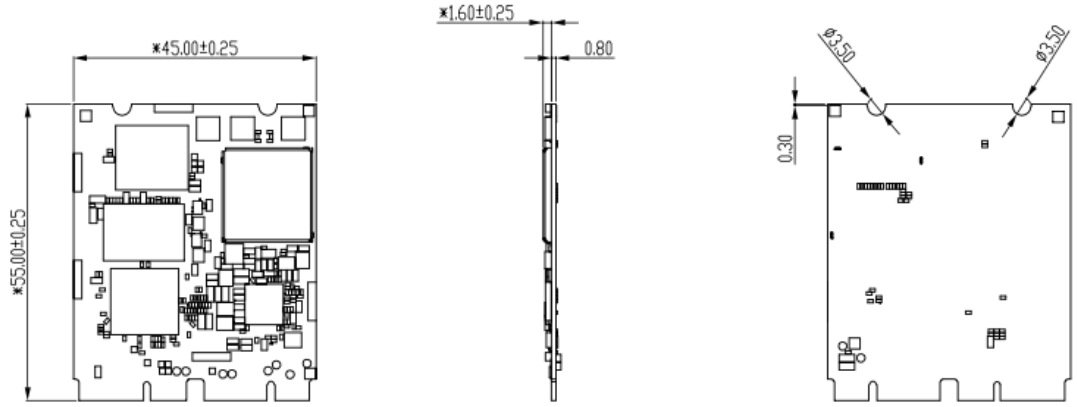


Figure 1-5 SB35 SOM board Dimension

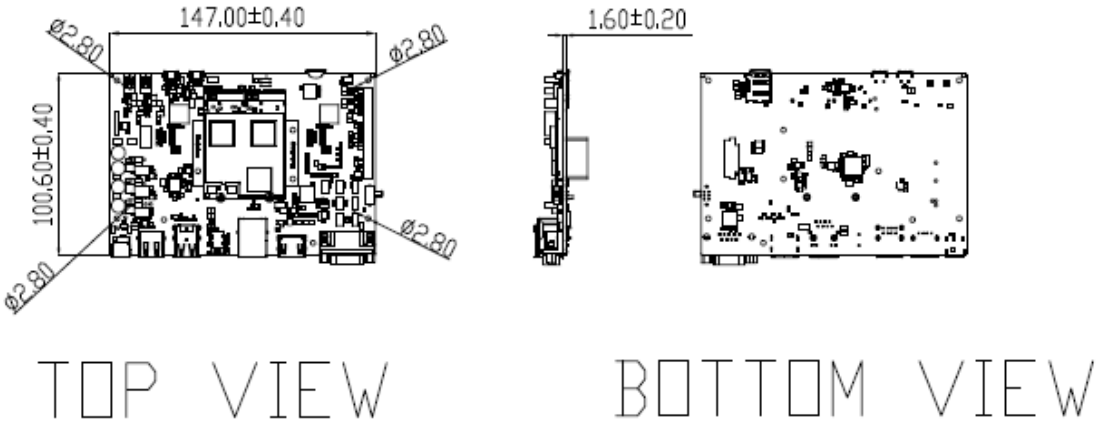


Figure 1-5 SB35 EVM board Dimension

2 Main Hardware Components

SB35 SOM has two75-pin M.2 E-key golden fingers to connect with another carrier board. It integrates MTK the i350, LPDDR4 Memory, eMMC, Power Manage IC(PMIC), and Wi-Fi/Bluetooth on the module.

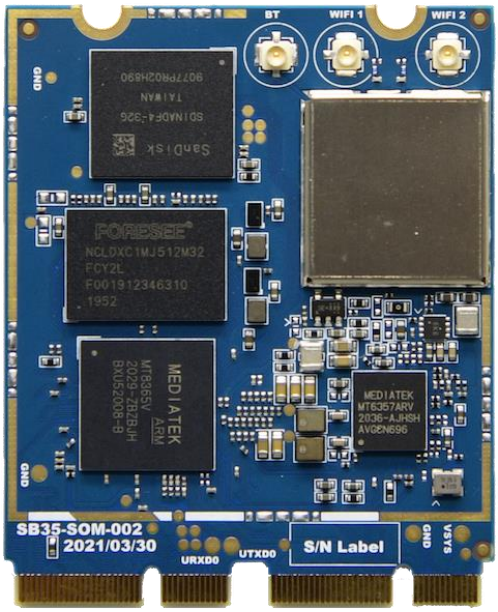


Figure 2-1 Top side of SB35 SOM

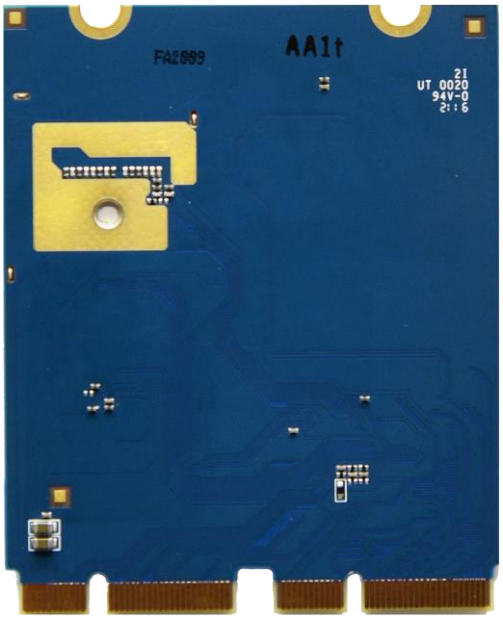


Figure 2-2 Bottom side of SB35 SOM

2.1 CPU

MTK i350 processor integrates a Quad-core ARM® Cortex-A53 MPCore equipped with the NEON engine offers processing power necessary to support the latest Open OS along with its demanding applications such as web browsing, email, and games.

The features of i350 processors include the following:

- Quad-core ARM Cortex-A53MPCore operating at 2GHz
- NEON multimedia processing engine
- ARM TrustZone security
- MediaTek APU 1.0 (AI Processor)

2.2 Memory

SB35 SOM is embedded LPDDR4X memory with the following feature,

- Dual channels with a 16-bit data bus width
- Up to 3200MHz memory clock
- Supports self-refresh/ partial self-refresh mode
- Advanced bandwidth arbitration control

2.3 Power Management IC

MTK MT6357 power management IC is used for SB35 SOM. MT6357 is a programmable power management IC that integrates 5 buck converters and 29 LDOs to provide all power rails required by SoC and peripherals.

MT6357 adopts the SPI interface and two SRCLKEN control pins to control buck converters, LDOs, and various drivers; it provides enhanced safety control and protocol for handshaking with i350.

For system management, it provides the following features,

- Support software shutdown or hardware power off
- 32K RTC oscillator for system timing
- Watchdog reset
- Over-current and thermal overload protection
- OVP, UVLO function
- Precision voltage, temperature, and current measurement fuel gauge

2.4 eMMC Storage

The onboard eMMC device is connected to the MSDC0 interface of the i350 processor in an 8-bit width configuration.

2.5 Wi-Fi/Bluetooth Module

MTK MT7663 WIFI/BT IC is used for SB35. It supports Wi-Fi 802.11 a/b/g/n/ac MIMO and BT5.1.

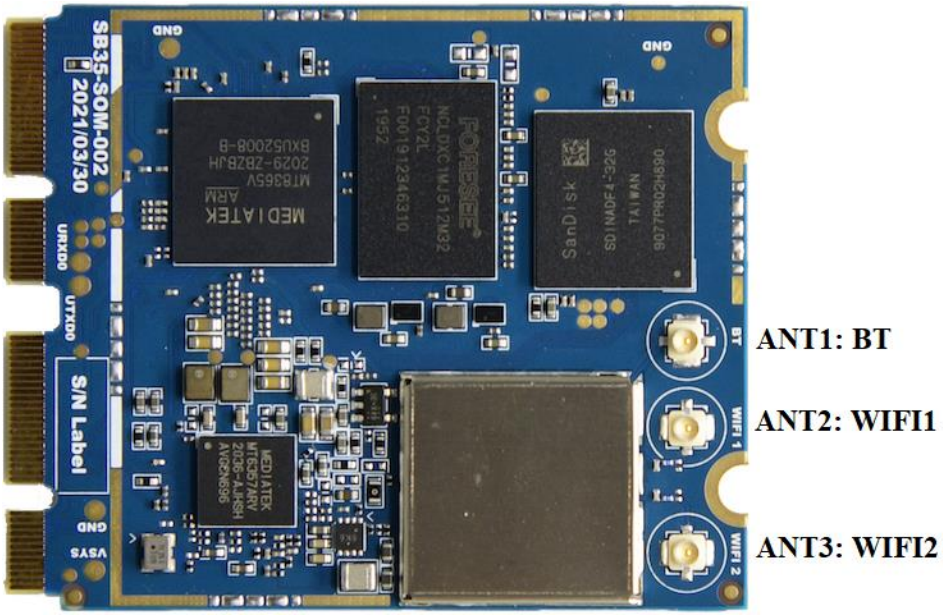


Figure 2-3 the antenna of SB35 SOM

3 Interfaces and Connectors

3.1 SB35 SOM interface

SB35 SOM use two M.2 E-key golden finger to connect with EVM board.

Please refer to SB35 SOM datasheet for detail pin definition

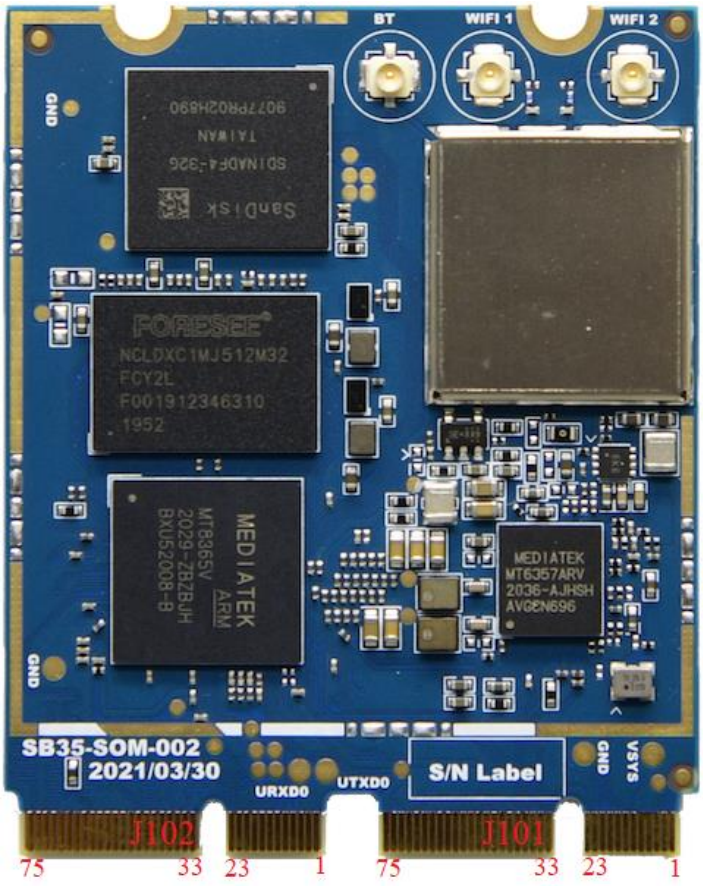


Figure3-1 SB35 SOM M.2 E-key interface

3.2 EVM board GPIO Expansion Header

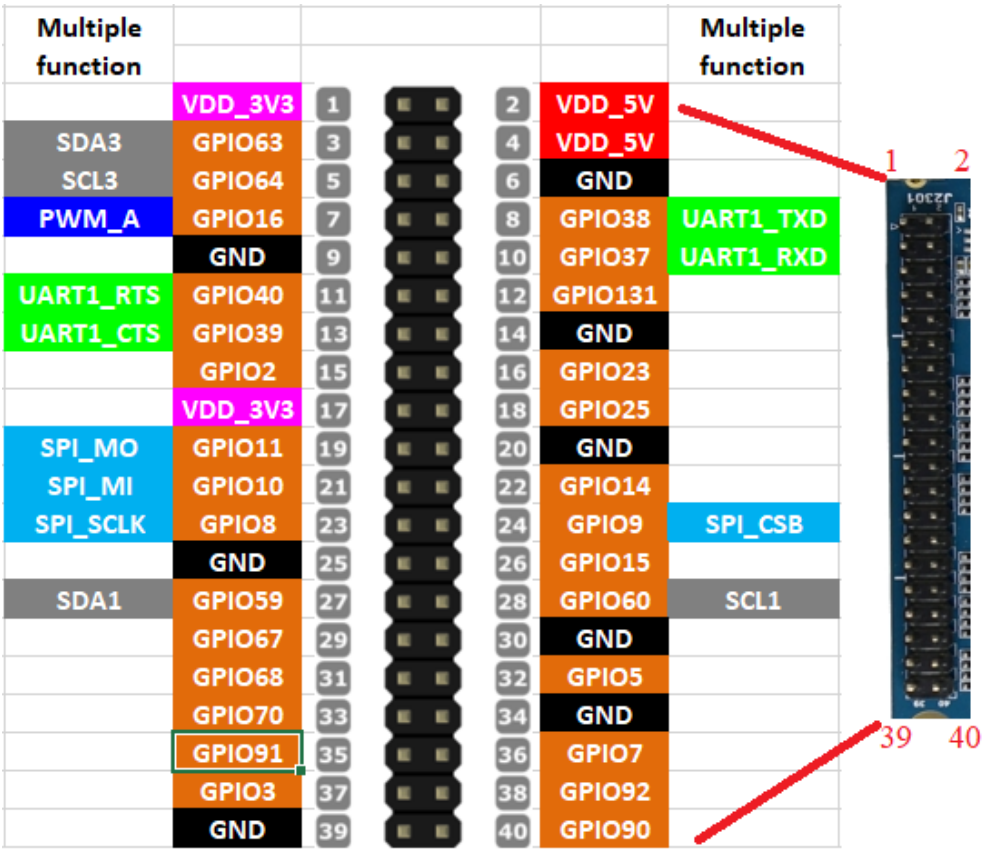


Figure3-2Expansion header

The expansion connector is a 40-pin header that contains I2Cs, UARTs, SPI, PWM, GPIOs, and power for user use. And all GPIO pin-outs are 3.3V level.

UART interface supports the following serial data transmit/receive protocols and configurations:

- Supports word lengths from 5 to 8 bits with an optional parity bit and 1 or 2 stop bits
- UART1 port support hardware automatic flow control
- Supports baud rates from 110bps up to 961,600bps

I2C interfaces which provide a serial interface for external devices and supports the following configurations:

- Adjustable clock speed for FS mode operation
- Supports 7-bit addressing
- Supports I2C_FIFO mode

SPI interface supports the following configurations:

- Max speed 50MHz
- support Master/Slave modes, a chip selects to support multiple peripherals

PWM interface supports the following configurations:

- PWM supports Old mode and FIFO mode
- PWM duty cycle range: 0% ~ 100% ; 1024 steps
- PWM output frequency range : 0 Hz ~ 39 MHz

Power interface supports the following configurations:

- VDD_5V power can provide 5V/4A but share with HOST USB 5V and SPK AMP power
- VGPIOEXT_3V3 power can provide 3.3V/300mA

Pin #	Function	Multi-pin	Pin #	Function	Multi-pin
1	**VDD_3V3**		2	**VDD_5V**	
3	I2C3_SDA	Camera1 I2C	4	**VDD_5V**	
5	I2C3_SCL	Camera1 I2C	6	**GND**	
7	GPIO16	DC_5V enable	8	UART1_TXD	RS232
9	**GND**		10	UART1_RXD	RS232
11	UART1_RTS	RS232	12	GPIO131	
13	UART1_CTS	RS232	14	**GND**	
15	GPIO2	DSI switch SEL	16	GPIO23	KEY
17	**VDD_3V3**		18	GPIO25	KEY
19	SPI_MOSI	HDMI I2S	20	**GND**	
21	SPI_MISO	HDMI I2S	22	GPIO14	Camera2 PWDN
23	SPI_SCLK	HDMI I2S	24	SPI_CS0	HDMI I2S
25	**GND**		26	GPIO15	Camera2 reset
27	I2C1_SDA	Audio AMP / HDMI I2C	28	I2C1_SCL	Audio AMP / HDMI I2C
29	GPIO67		30	**GND**	
31	GPIO68		32	GPIO5	Ethernet PME
33	GPIO70		34	**GND**	
35	GPIO91	RS232 Shutdown	36	GPIO7	Audio AMP reset
37	GPIO3	LCM 3V3 enable	38	GPIO92	Camera2 power enable
39	GND		40	GPIO90	RS232 enable

Table 3-1 Pin assignments of expansion connector

Notes:

1. **Red word is power pin**
2. **Green word is I2C pin**
3. **Blue word is multi-pin. if use GPIO pin function and then multifunction will not work.**

3.3 EVM board peripherals placement

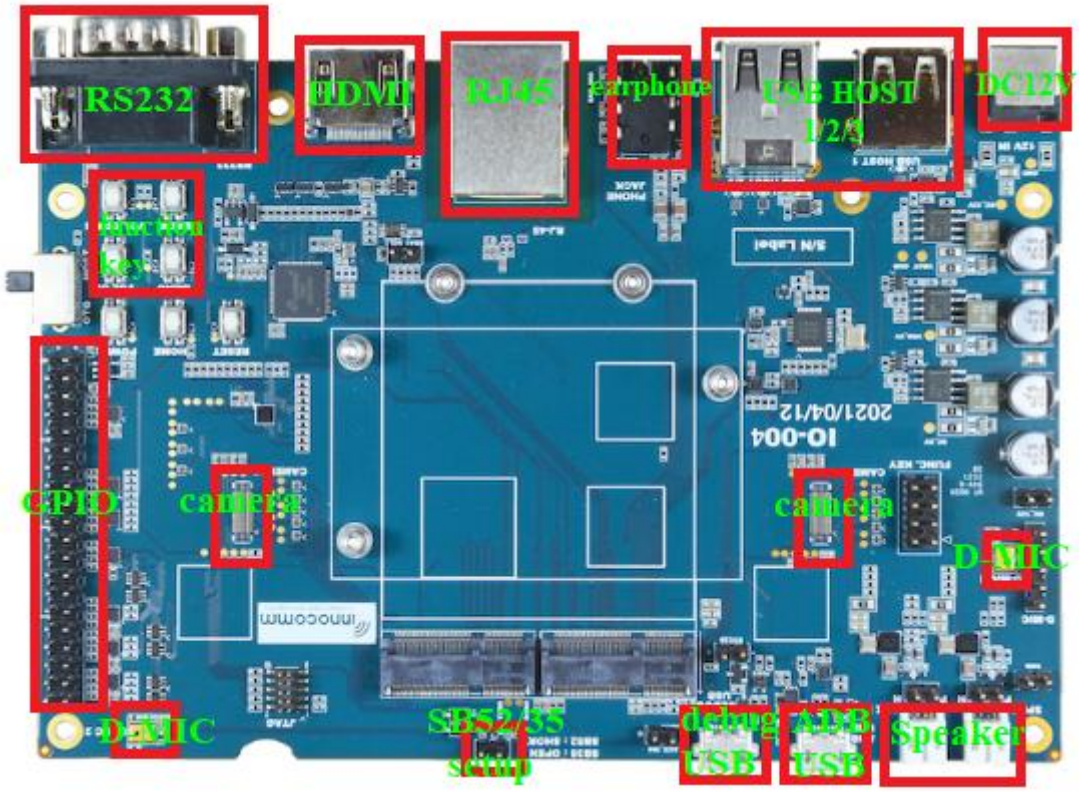


Figure3-3 EVM Board TOP side peripherals placement

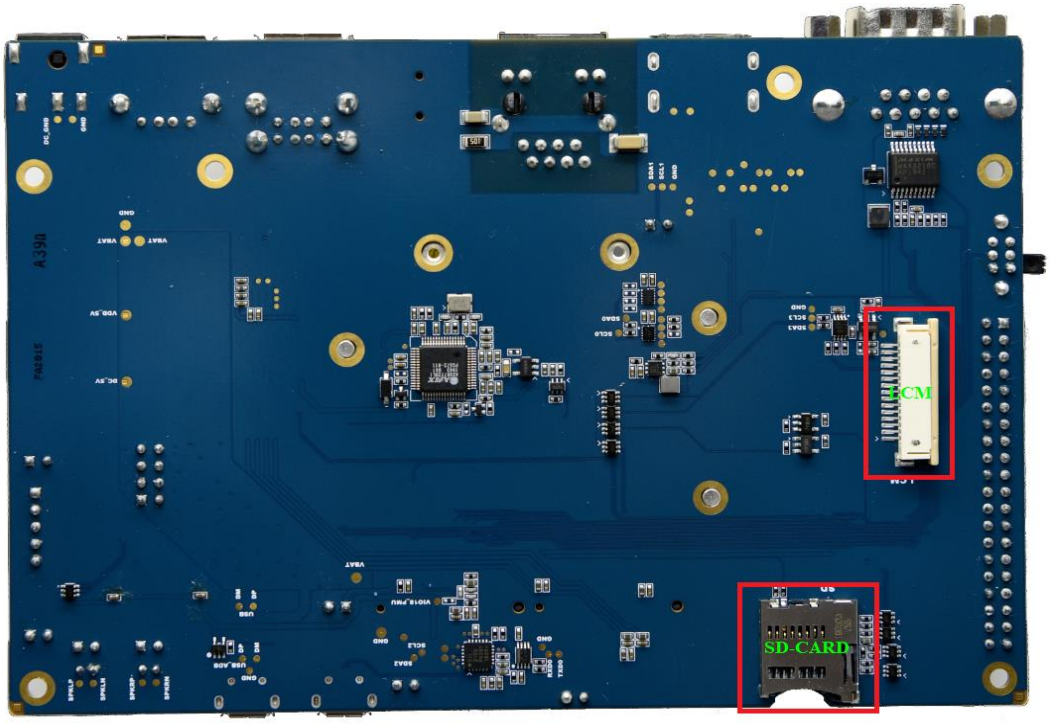


Figure3-4 EVM Board Bottom side peripherals placement

3.4 Power and function Key interface

The 12V power is provided by a DC JACK -HCH IDJ-D47B2 (ø5.5/2.0mm) that is dedicated to the power supply, Power-On button, and Reset button on the EVM board to turn on the SOM. Other Key can define to function key.

3.5 Trace Log USB

SB35 EVM board support trace log output through a micro USB connector . COM port select "Silicon Labs Dual CP2105 USB to UART Bridge Enhanced COM port".

3.6 Audio interface

SB35 EVM provides a 3.5 ø earphone jack and one pair R/L speaker connector, by use mount resistor setup can change to mono SPK out.

speaker amp can provide 4.3W@8Ω speaker

3.7 RS232 interface

SB35 EVM board use convert UART1 signal to provide RS232 interface on A DB-15 male connector, RS232 convert chip can support to 120Kbps data rate

3.8 Digital MIC interface

SB35 EVM board provides two digital MIC on board for microphone function, D-MIC part number is SPK0415HM4H-B by Knowles

3.9 Display interface

SB35 SOM provides a 4-lanes MIPI display interface operating up to 1080p60 resolution, SB35 EVM board use DSI switch chip to provide two display interface, an HDMI connector and an FPC connector for 2 data-lane PI DSI LCM, The pin definitions please see figure3-5.

if both devices are connected, DSI LCM priority is higher.

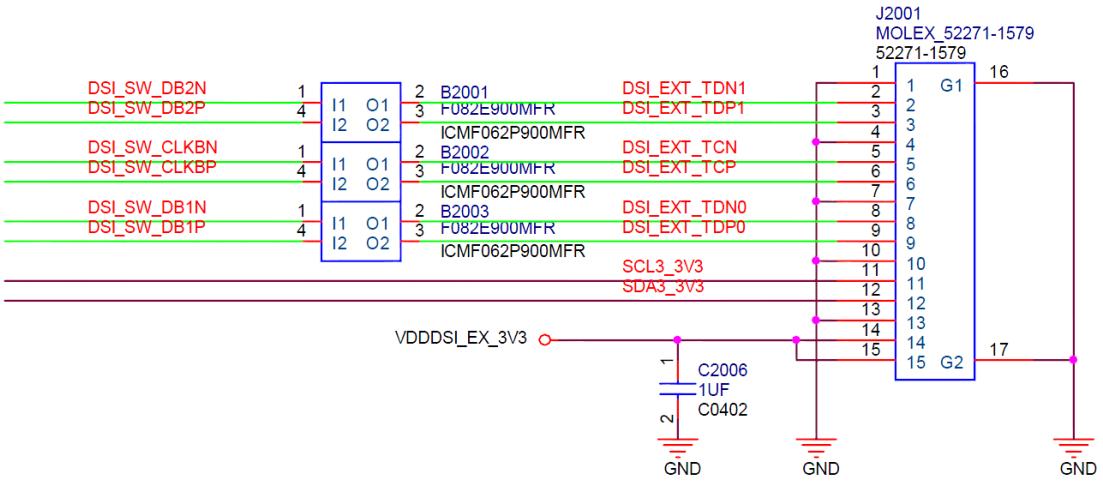


Figure3-5 DSI pin definition

3.10 MIPI CSI connector

SB35 EVM board provides two 4-lanes CSI interface, the CSI interface operates up to a maximum bit rate of 1.5Gbps per lane and provides 4K@30fps capability for the 4 lanes.

CSI pin definitions please see figure3-6.

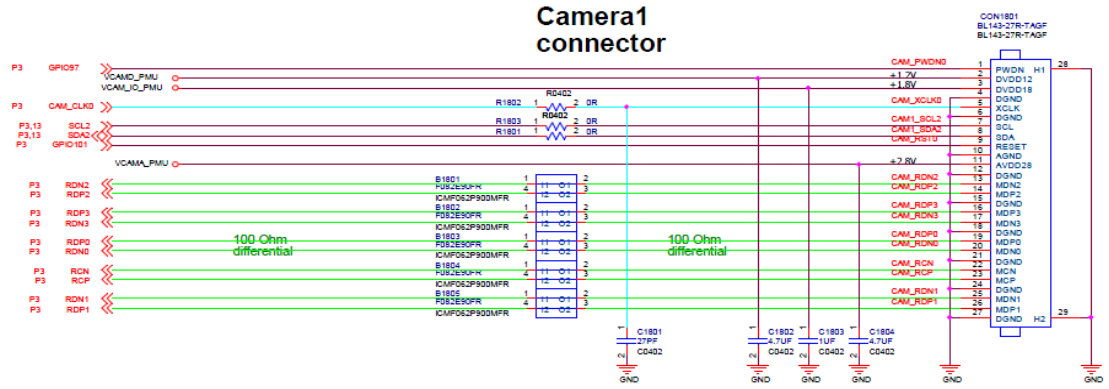


Figure3-6 MIPI CSI Camera1 Signal Pins

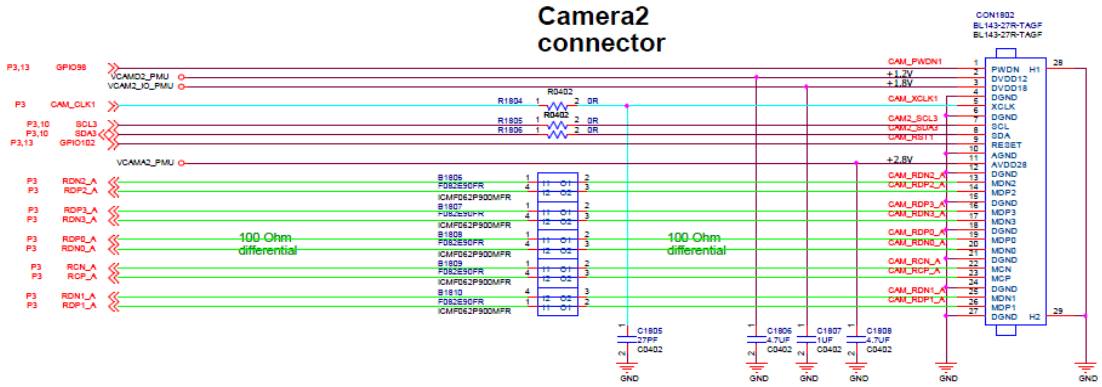


Figure3-7 MIPI CSI Camera2 Signal Pins

3.11 ADB/Host USB and Ethernet

SB35 SOM board support USB2.0*2 (1*OTG mode, 1*Host mode). Three USB2.0 A-type hosts and Ethernet RJ45 are available on when USB switch to USB1.

4 Reference Documents

1. MT8365_AIoT Application Processor datasheet.
2. MT6357_PMIC_Data_Sheet.
3. MT7663_Datasheet.