

SB52 SoM and EVB introduction

Prepared by Lion Wang

Ver.: 1.4

2021/12/21



Outline

- EVK Pack Overview
- Hardware introduction
 - SOM specification
 - Outline and pin definition
 - Accessories assemble
 - UART debug port setting
- Software and design document introduction
 - Software refresh(Use flash_tool)
 - Reference resource (BSP & Documents)
- EVB HW and SW status

EVK PACK OVERVIEW



Evaluation Kit: Boards & Accessories



Box



QRcode for quick access download center

SB52 SoM
+
Carrier board



Two camera module



12V Power Adapter



Two antenna BT&WiFi



HARDWARE INTRODUCTION



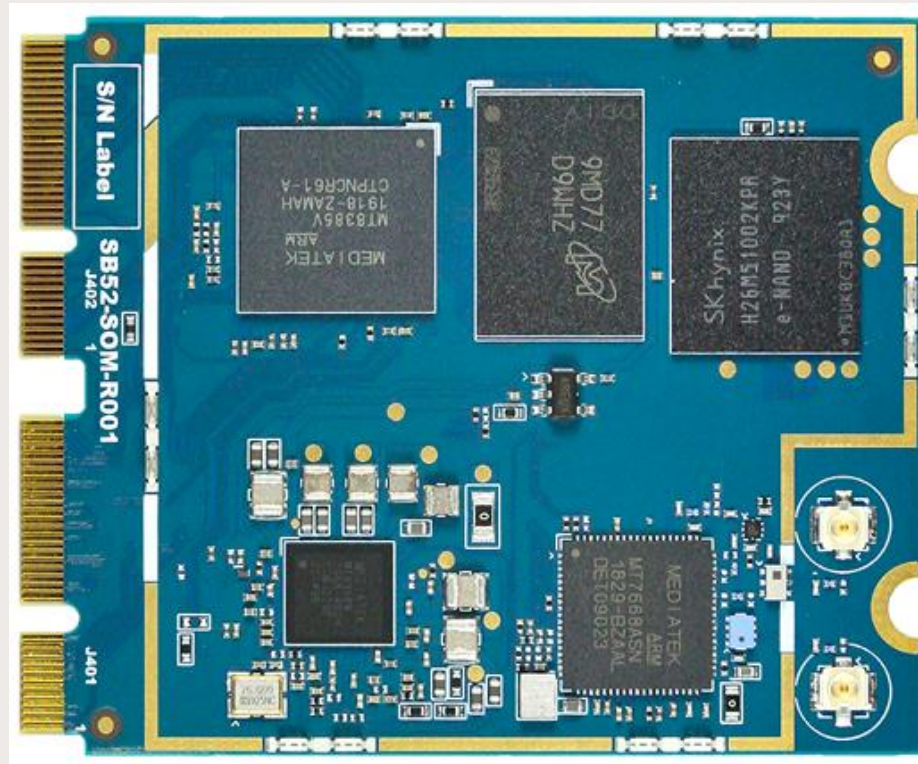
SB52 SoM Specifications 1/2

Specifications		Note
SOM	SB52	
Main Chip	MT8385	
MPU	CA73 x4 @2.0GHZ, CA53 x4 @2.0GHZ	
GPU	Mali-G72 MP3 @700MHz	
Vision DSP	Tensilica VP6 x2 @500MHz	
RAM	LPDDR4x 2GB or 4GB	
Flash	eMMC, 16GB or 32GB	
Wireless Connectivity	MT7668	
WiFi	802.11 a/b/g/n/ac MIMO	
Bluetooth	BT 5.0	
Display Interface		
LCD	MIPI DSI, 4 lane , up to 2400x1080	
HDMI	NA	
Camera Interface	MIPI-CSI, 4 data lanes x2, 32MP	
Wired Connectivity		
USB Host	NA	
USB OTG	USB2.0 OTG	
Ethernet	NA	can perform Ethernet fucntion by USB to Ethernet bridge chip

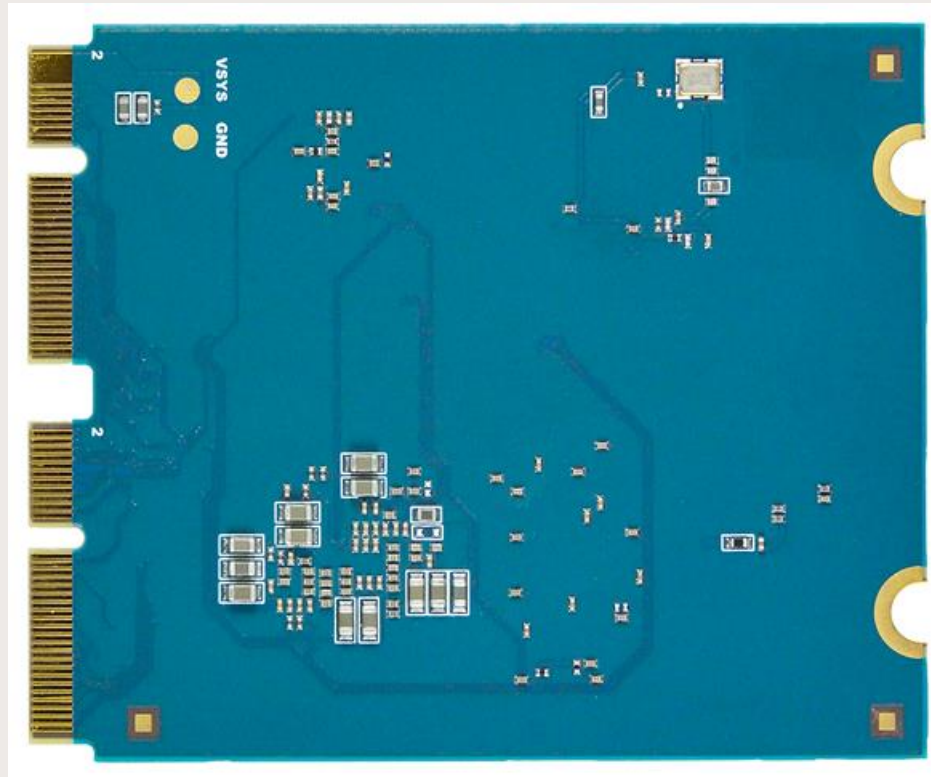
SB52 SoM Specifications 2/2

Specifications		Note
Audio Interface		
I2S	x1	
D-MIC	2 channel	
Earphone	R/L channel output, microphone input, button detection	
Other Interface		
I2C	X4	
SDIO	NA	
PWM	x2 max.	
SPI	x1	
UART	X2	UART0 is config as debug port by default
keys	2x2 key matrix	
ADC	x1	
GPIO	Shared with other interfaces, total pin count depends on the pin configuration	
Debug Interface		
JTAG	x1	Through M.2 interface
UART	x1	UART0 through M.2 interface
Interface voltage Level	1.8V	
Power supply	3.40V~5.00V, 3.8V typical	
Dimension	~ 45mm x 55mm	
Intrface Connector		
Main	M.2 E-key x2	
Optional	NA	

SB52 illustration (Top)



SB52 illustration (Bottom)

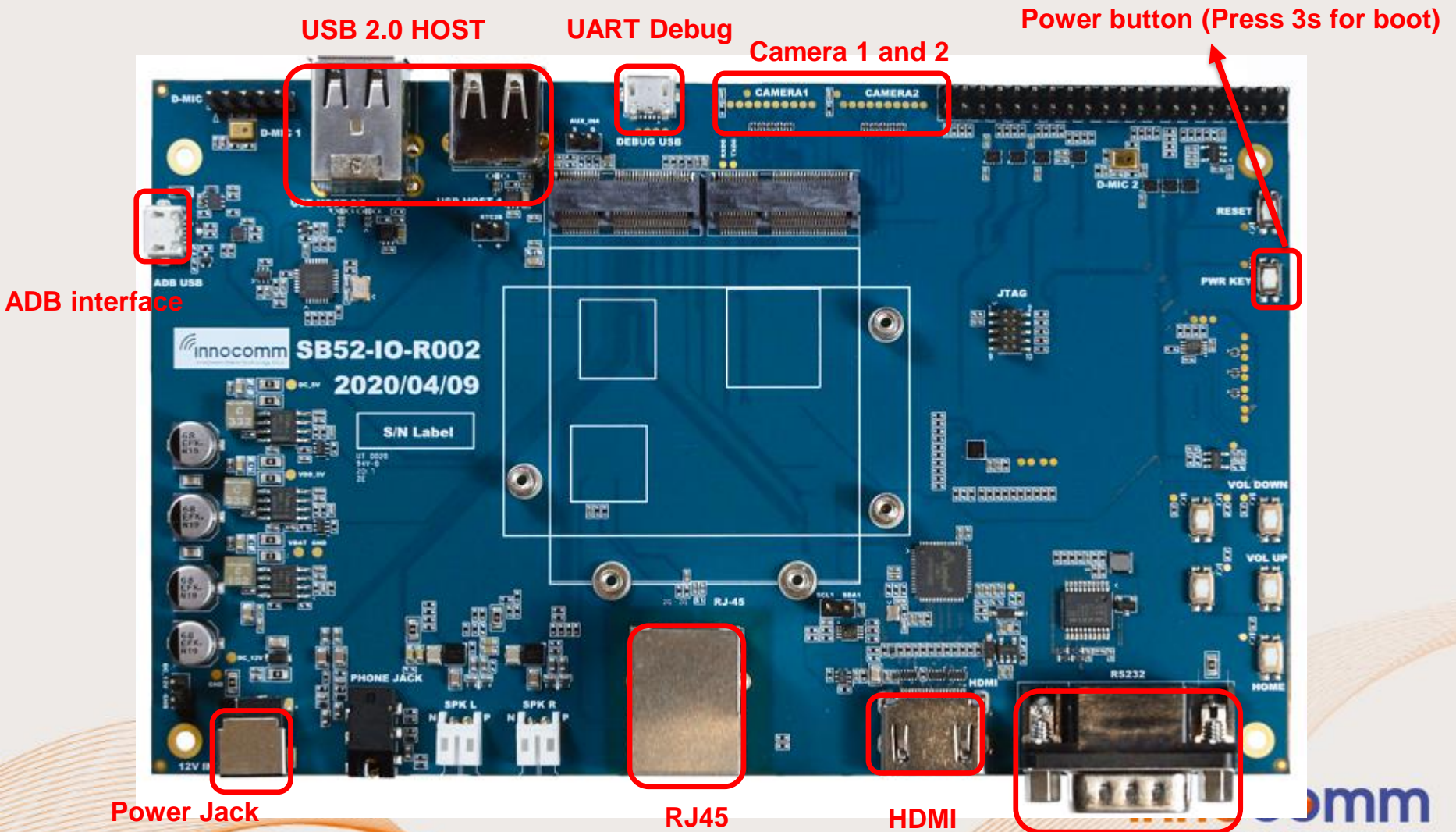


SB52 SoM Pin Define

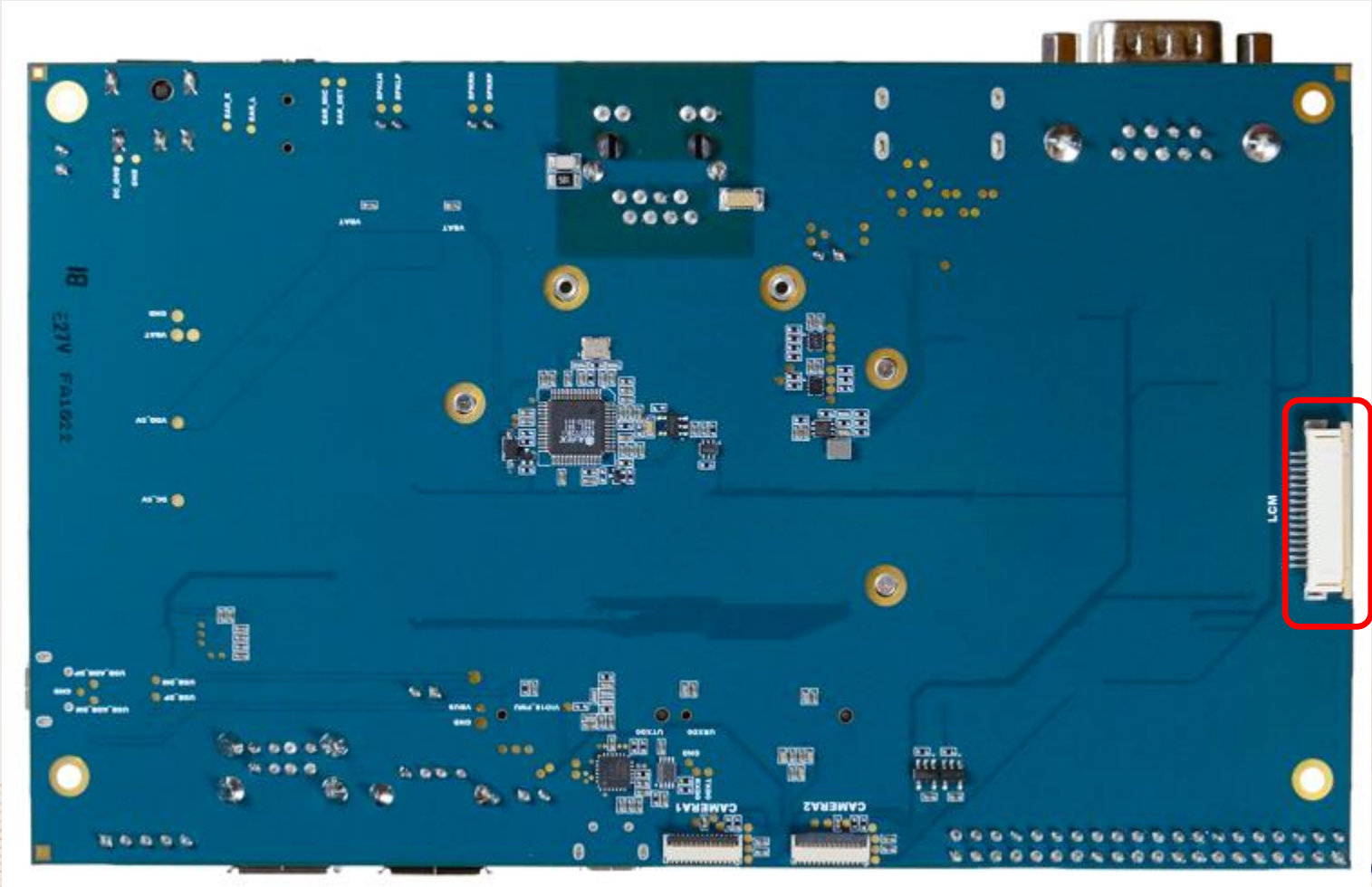
SB52 Pin Function	M.21	SB52 Pin Function
RESET	1 2	VBAT
PWRKEY	3 4	VBAT
VCAMA2_PMU	5 6	VBAT
GND	7 8	VBAT
GND	9 10	GND
AUXIN4	11 12	VBUS
GPIO9	13 14	VRTC28_PMU
GPIO17	15 16	GPIO10
UCTS1	17 18	GPIO22
SDA2	19 20	GPIO23
SCL2	21 22	GPIO24
MIC_MICBIAS0	23	
AU_VIN2_N	33 32	SPL_CSB
AU_VIN0_P	35 34	SPL_CK
AU_VIN0_N	37 36	SPL_MI
AU_REFN	39 38	SPL_MO
AUDIO_HPR	41 40	URTS1
AUDIO_HPL	43 42	GPIO19
GND	45 44	GPIO150
MIC_MICBIAS1	47 46	I2S1_LRCK
AU_VIN1_P	49 48	I2S1_BCK
AU_VIN1_N	51 50	I2S1_DO
ACCDET	53 52	KPROW0
HP_EINT	55 54	URXD1
GND	57 56	UTXD1
USB_DM_P0	59 58	KPCOL0
USB_DP_P0	61 60	KPROW1
GND	63 62	KPCOL1
SDA3	65 64	SDA1
SCL0	67 66	SCL1
GND	69 68	GPIO0
SDA0	71 70	GPIO20
SCL0	73 72	GPIO42
VIO18_PMU	75 74	GPIO8

SB52 Pin Function	M.22	SB52 Pin Function
AVSS28_AUD	1 2	VLDO28_PMU
GND	3 4	GPIO45
UART_RXD0	5 6	DISP_PWM
UART_TXD0	7 8	DISP_TE
HOMEKEY	9 10	GPIO21
IDDIG	11 12	GPIO2
GPIO98	13 14	GPIO1
GPIO102	15 16	GPIO7
DSIO_D2N	17 18	GPIO151
DSIO_D2P	19 20	DSIO_D3N
DSIO_D1N	21 22	DSIO_D3P
DSIO_D1P	23	
DSIO_D0P	33 32	DSIO_CKP
DSIO_D0N	35 34	DSIO_CKN
RDP3	37 36	CAM_CLK0
RDN3	39 38	RDN2
RDP1	41 40	RDP2
RDN1	43 42	RCP
RDN0	45 44	RCN
RDP0	47 46	GND
GND	49 48	RDN3_A
VCAMA_PMU	51 50	RDP3_A
VCAMD_PMU	53 52	RDN2_A
VCAMIO_PMU	55 54	RDP2_A
GPIO101	57 56	GPIO97
RCP_A	59 58	GND
RCN_A	61 60	GPIO3
GND	63 62	VMCH_PMU
CAM_CLK1	65 64	GPIO177
GND	67 66	I2S1_DI
RDN1_A	69 68	I2S1_MCK
RDP1_A	71 70	GPIO6
RDN0_A	73 72	GPIO5
RDP0_A	75 74	GPIO4

Evaluation Board illustration

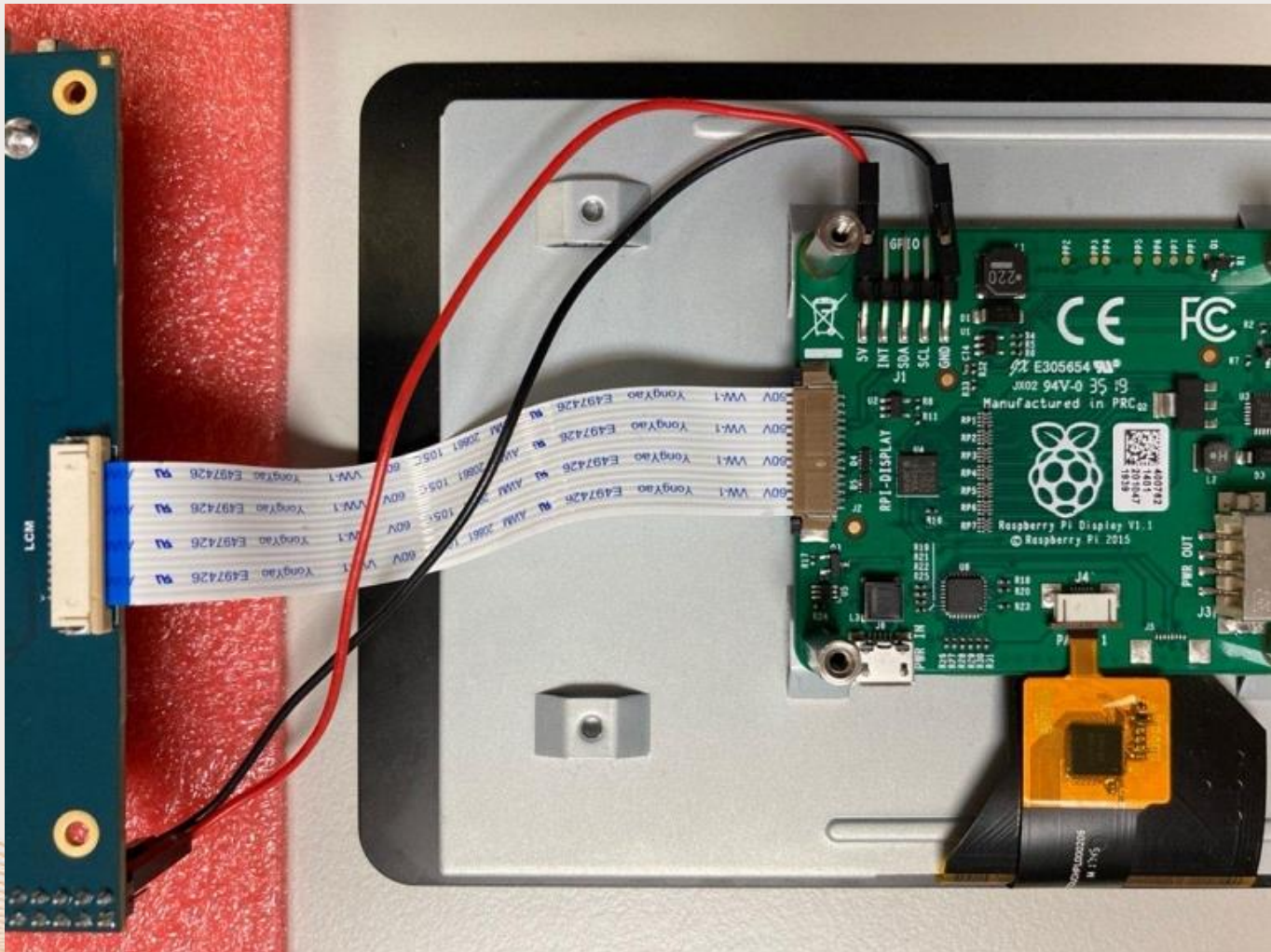


Evaluation Board illustration



DSI

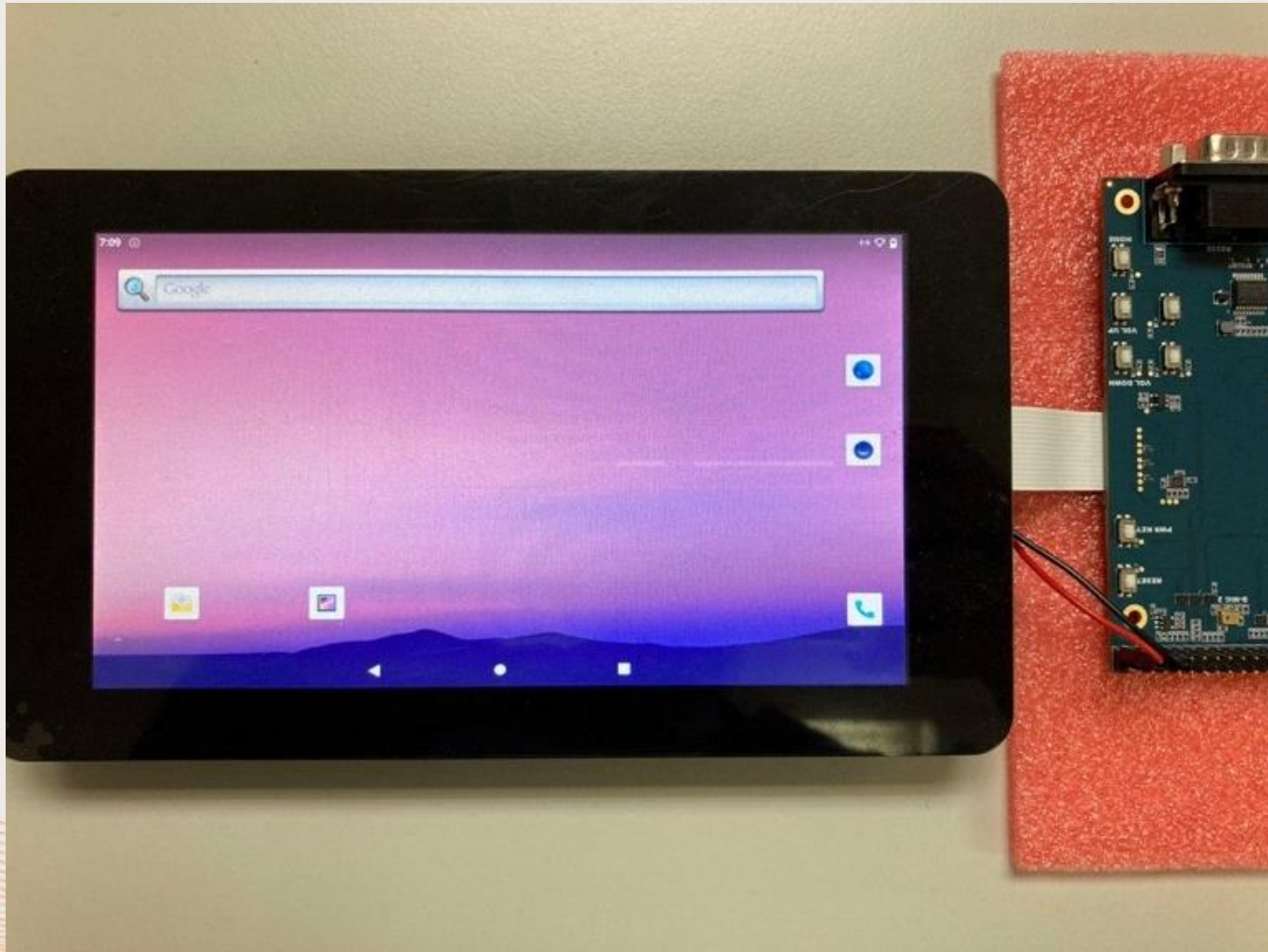
Assemble EVB with Raspberry Pi Display



mm

InnoComm Mobile Technology Corp.

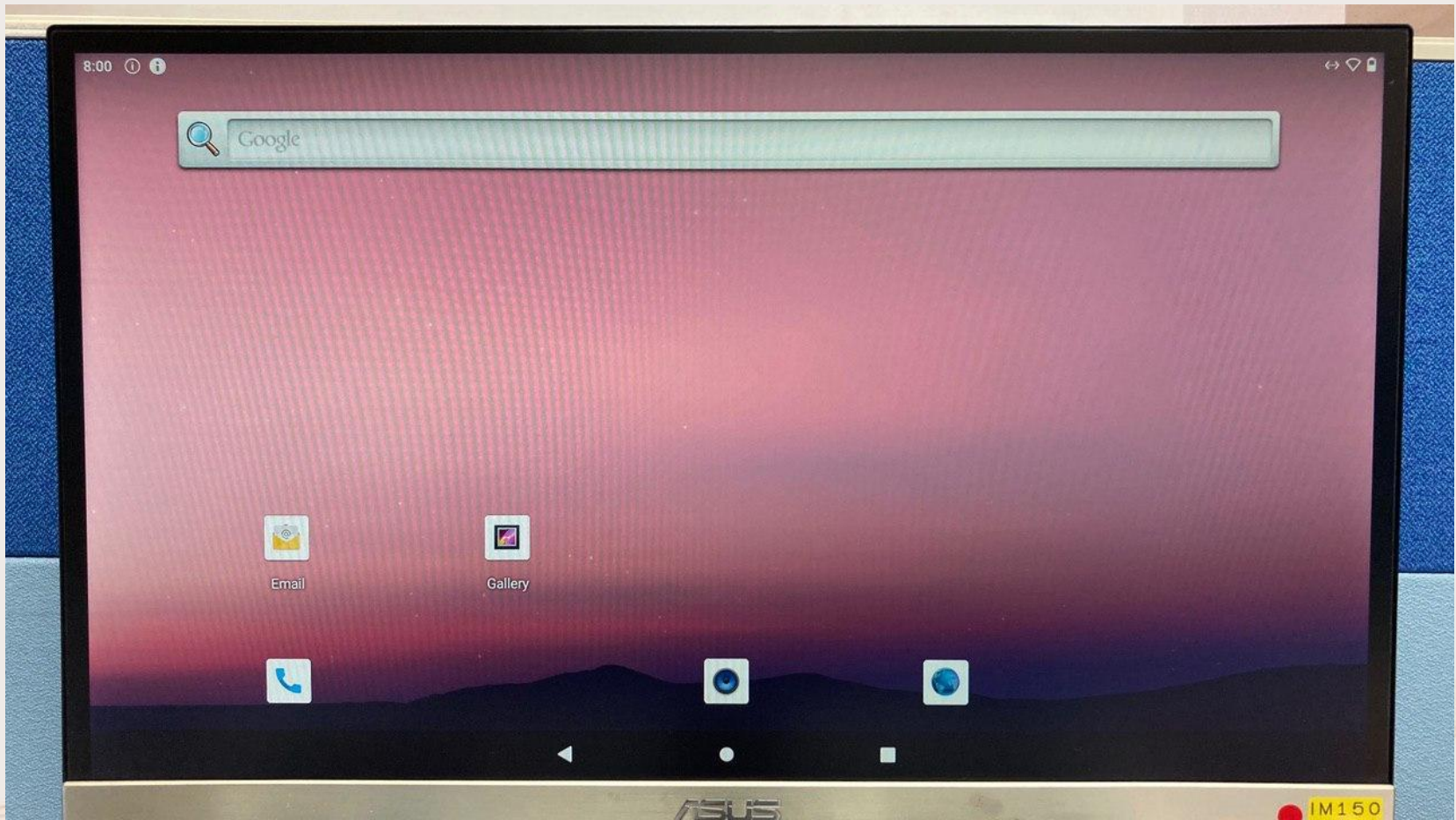
Assemble EVB with Raspberry Pi Display



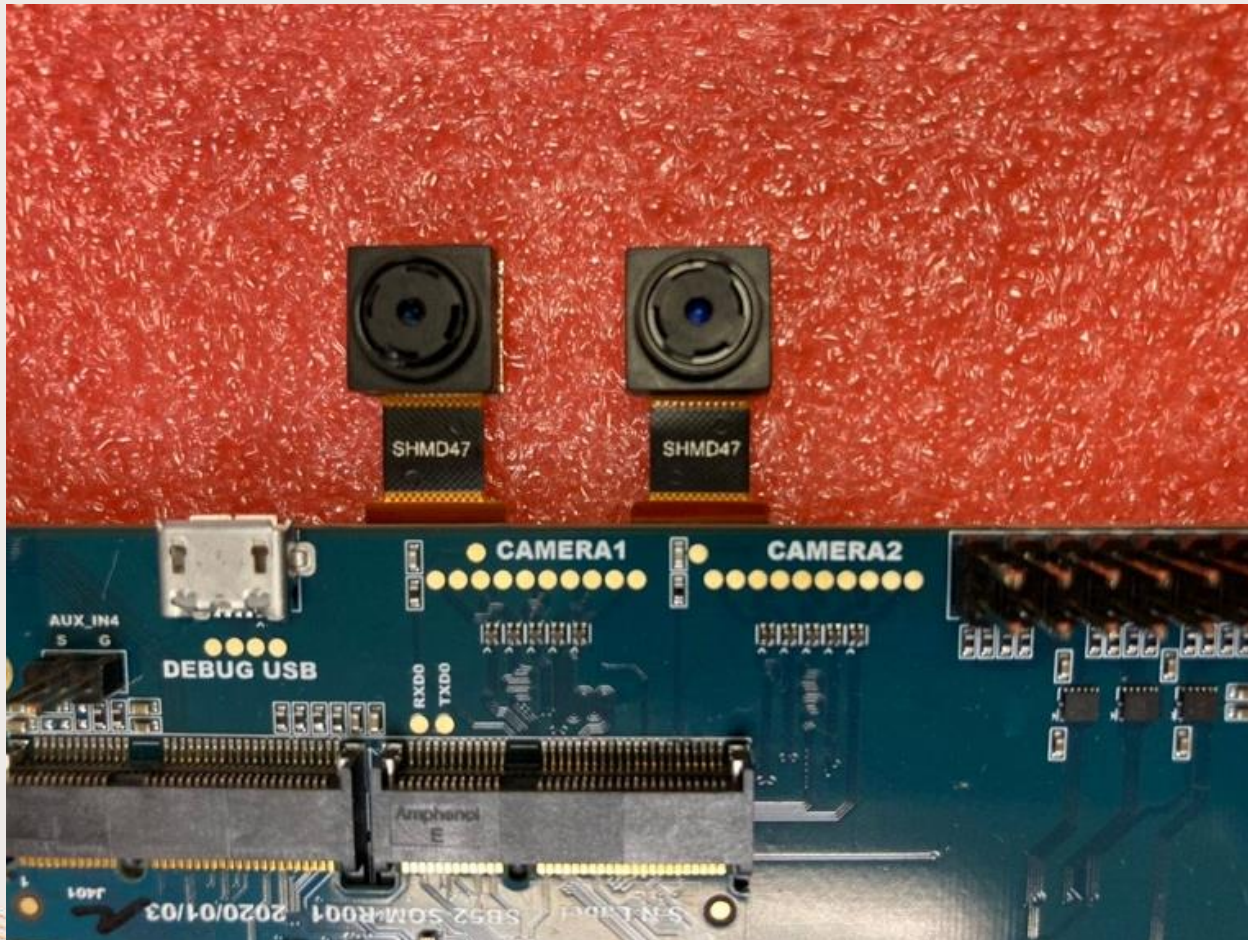
comm

InnoComm Mobile Technology Corp.

HDMI Display



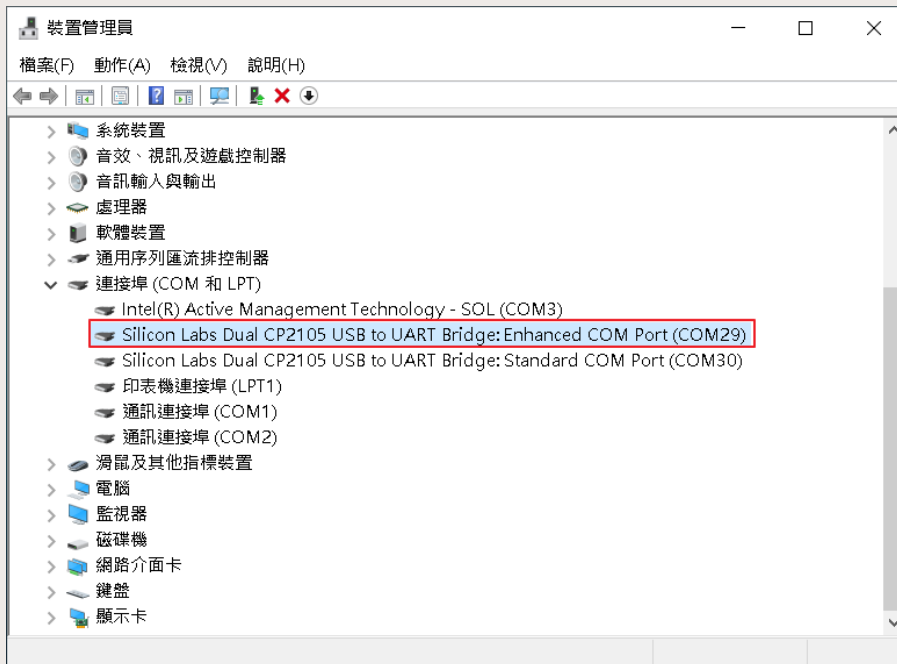
Assemble EVB with Camera 1 and 2



Switch Camera in Android Camera app



UART debug port setting



Port:	COM29
Speed:	921600
Data:	8 bit
Parity:	none
Stop bits:	1 bit
Flow control:	none

UART debug terminal

```
COM29 - Tera Term VT
File Edit Setup Control Window Help
[ 1093.877627] <7>.(7)[116:mdrt_thread][MDRT_ADC] trig_prd=31, rdy_time=1, MDRT_OUT=17
[ 1094.533655] <7>.(7)[116:mdrt_thread][MDRT_ADC] trig_prd=32, rdy_time=1, MDRT_OUT=17
[ 1094.926462] <7>.(7)[116:mdrt_thread]AUXADC ADC15 = 0x0
[ 1094.927110] <7>.(7)[116:mdrt_thread]AUXADC ADC16 = 0x0
[ 1094.927756] <7>.(7)[116:mdrt_thread]AUXADC ADC17 = 0x8011
[ 1094.928434] <7>.(7)[116:mdrt_thread]AUXADC ADC31 = 0x8011
[ 1094.929121] <7>.(7)[116:mdrt_thread]AUXADC MDRT_0 = 0x8040
[ 1094.929810] <7>.(7)[116:mdrt_thread]AUXADC MDRT_1 = 0x12b
[ 1094.930488] <7>.(7)[116:mdrt_thread]AUXADC MDRT_2 = 0x4
[ 1094.931144] <7>.(7)[116:mdrt_thread]AUXADC MDRT_3 = 0x1f
[ 1094.931810] <7>.(7)[116:mdrt_thread]AUXADC MDRT_4 = 0x1
[ 1094.932471] <7>.(7)[116:mdrt_thread]RG_AUXADC_CK_PDN = 0x0, RG_AUXADC_CK_PDN_HWEN = 0x1
[ 1094.933606] <7>-(7)[0:swapper/7][name:spm&]Power/swap CNT(soidle3,rgidle): [0] = (0,0), [1]
= (0,0), [2] = (0,0), [3] = (0,0), [4] = (0,0), [5] = (0,0), [6] = (0,0), [7] = (0,0),
[ 1094.933616] <7>-(7)[0:swapper/7][name:spm&]Power/swap soidle3_block_cnt: [by_frm] = 0, [by_
cpu] = 0, [by_srr] = 1636, [by_ufs] = 0, [by_tee] = 0, [by_clk] = 0, [by_des] = 0, [by_dis] =
0, [by_pwm] = 0, [by_pll] = 0, [by_boot] = 0,
[ 1094.933620] <7>-(7)[0:swapper/7][name:spm&]Power/swap soidle3_block_mask: 0x00000000, 0x000
00000, 0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000,
[ 1094.933623] <7>-(7)[0:swapper/7][name:spm&][resource_req_block] user: 0x4, 0x0
[ 1095.386242] <1>.(1)[106:dlpt_notify_thr][MDRT_ADC] OLD = 0x11, NOW = 0x11, CNT = 0
[ 1095.387583] <1>.(1)[106:dlpt_notify_thr]vbat_out_old=37360, vthr=696, T_curr=336, vbat_out=
37379
[ 1095.388761] <1>.(1)[106:dlpt_notify_thr]mt635x-auxadc mt635x-auxadc: name:BATADC, channel=0
, adc_out=0x588f, adc_result=3738
[ 1095.391823] <1>.(1)[106:dlpt_notify_thr]vbat_out_old=37370, vthr=696, T_curr=336, vbat_out=
37389
[ 1095.392963] <1>.(1)[106:dlpt_notify_thr]mt635x-auxadc mt635x-auxadc: name:BATADC, channel=0
, adc_out=0x5897, adc_result=3739
[ 1095.394372] <1>.(1)[106:dlpt_notify_thr][PBM] [ma_to_mw] 3739(mV) * 3376(mA) = 12622(mW)
[ 1095.395420] <1>.(1)[106:dlpt_notify_thr][DLPT_final] 3376,50,50,1,5500
```

SOFTWARE & DOCUMENT INTRODUCTION



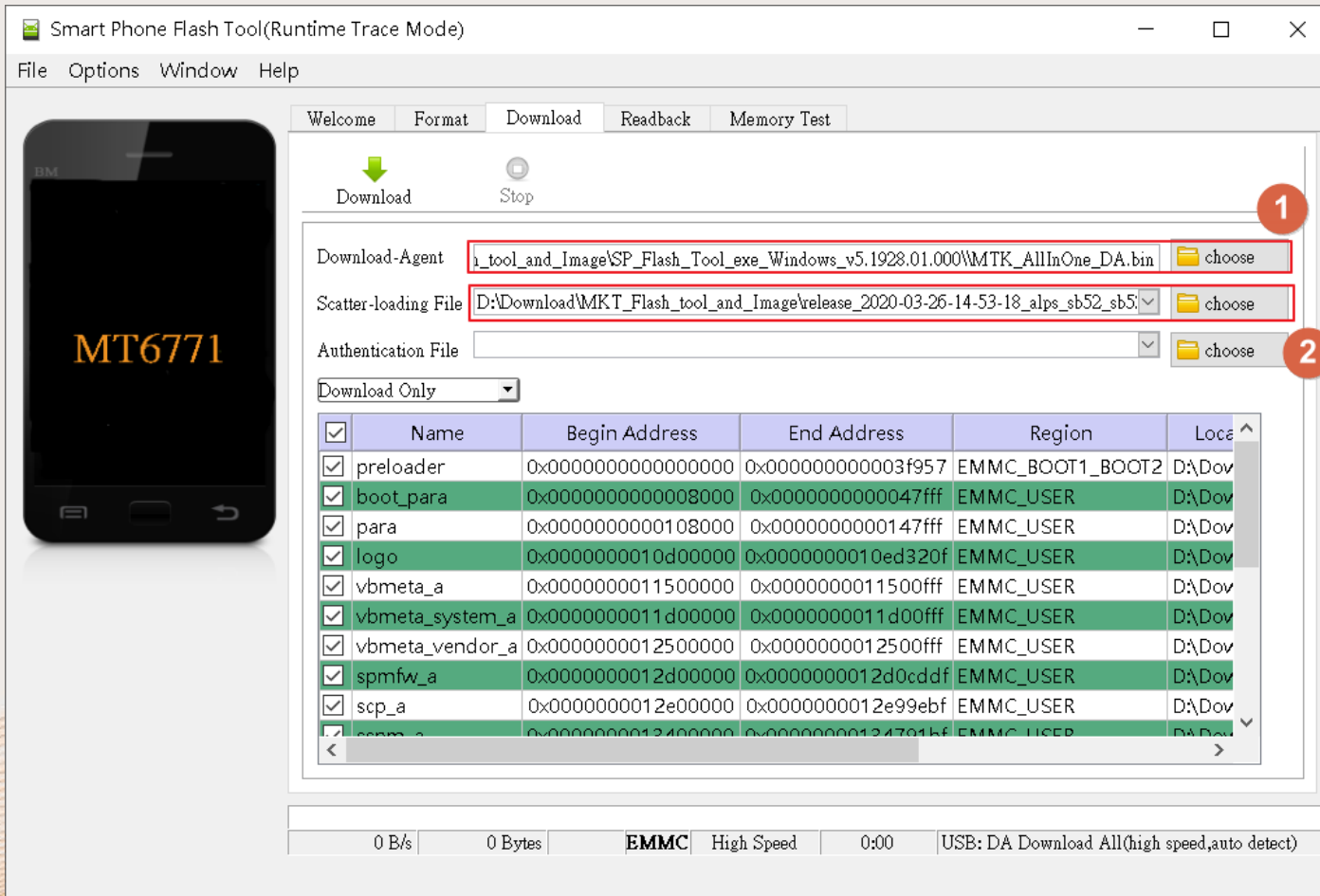
Software refresh(Use flash_tool)

- Install **Driver_Auto_Installer** and unzip **SP_Flash_Tool**
- Run **flash_tool.exe**

名稱	修改日期	類型	大小
codecs	2019/6/26 下午 0...	檔案資料夾	
imageformats	2019/6/26 下午 0...	檔案資料夾	
sqldrivers	2019/6/26 下午 0...	檔案資料夾	
assistant.exe	2019/6/26 下午 0...	應用程式	1,181 KB
BromAdapterTool.ini	2019/6/26 下午 0...	組態設定	1 KB
console_mode.xsd	2019/6/26 下午 0...	XSD 檔案	28 KB
CustPT.ini	2019/6/26 下午 0...	組態設定	1 KB
DA_PL.bin	2019/6/26 下午 0...	BIN 檔案	13,619 KB
DA_PL_CRYPT020.bin	2019/6/26 下午 0...	BIN 檔案	13,619 KB
DA_SWSEC.bin	2019/6/26 下午 0...	BIN 檔案	3,962 KB
DA_SWSEC_CRYPT020.bin	2019/6/26 下午 0...	BIN 檔案	3,962 KB
dl_without_scatter.xml	2019/6/26 下午 0...	nRFgoStudio.nRF...	2 KB
download_scene.ini	2019/6/26 下午 0...	組態設定	1 KB
flash_tool.exe	2019/6/26 下午 0...	應用程式	10,293 KB
flashtool.qch	2019/6/26 下午 0...	QCH 檔案	6,432 KB
flashtool.qhc	2019/6/26 下午 0...	QHC 檔案	12 KB

Software refresh(Use flash_tool)

- Follow steps in below to set flash tool **Download-Agent** and **Scatter file** for image.



The screenshot shows the 'Smart Phone Flash Tool(Runtime Trace Mode)' interface. The 'Download-Agent' field is highlighted with a red box and a '1' in a red circle. The 'Scatter-loading File' field is also highlighted with a red box and a '2' in a red circle. The 'Authentication File' field is empty. The 'Download Only' dropdown is set to 'Download Only'. The 'Download' button is highlighted with a green arrow. The 'Stop' button is highlighted with a red circle. The status bar at the bottom shows '0 B/s', '0 Bytes', 'EMMC High Speed', '0:00', and 'USB: DA Download All(high speed,auto detect)'.

<input checked="" type="checkbox"/>	Name	Begin Address	End Address	Region	Local
<input checked="" type="checkbox"/>	preloader	0x0000000000000000	0x000000000003f957	EMMC_BOOT1_BOOT2	D:\Dov
<input checked="" type="checkbox"/>	boot_para	0x0000000000008000	0x0000000000047fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	para	0x00000000000108000	0x00000000000147fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	logo	0x00000000010d00000	0x00000000010ed320f	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	vbmeta_a	0x00000000011500000	0x00000000011500fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	vbmeta_system_a	0x00000000011d00000	0x00000000011d00fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	vbmeta_vendor_a	0x00000000012500000	0x00000000012500fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	spmfw_a	0x00000000012d00000	0x00000000012d0cdf	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	scp_a	0x00000000012e00000	0x00000000012e99ebf	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	EMMC_USER	D:\Dov

Software refresh(Use flash_tool)

- Plug in Micro USB cable to OTG connector for download image from PC
- Select **Download Only** then **Power off**
- Click **Download** then **Power on**

Smart Phone Flash Tool(Runtime Trace Mode)

File Options Window Help

Welcome Format Download Readback Memory Test

Download 4 Stop

Download-Agent choose

Scatter-loading File choose

Authentication File choose

Download Only 3

<input checked="" type="checkbox"/>	Name	Begin Address	End Address	Region	Loca
<input checked="" type="checkbox"/>	preloader	0x0000000000000000	0x00000000000003f957	EMMC_BOOT1_BOOT2	D:\Dov
<input checked="" type="checkbox"/>	boot_para	0x00000000000008000	0x000000000000047fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	para	0x00000000000108000	0x00000000000147fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	logo	0x00000000010d00000	0x00000000010ed320f	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	vbmeta_a	0x00000000011500000	0x00000000011500fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	vbmeta_system_a	0x00000000011d00000	0x00000000011d00fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	vbmeta_vendor_a	0x00000000012500000	0x00000000012500fff	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	spmfw_a	0x00000000012d00000	0x00000000012d0cdf	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	scp_a	0x00000000012e00000	0x00000000012e99ebf	EMMC_USER	D:\Dov
<input checked="" type="checkbox"/>	rpm_a	0x00000000013400000	0x000000000134701bf	EMMC_USER	D:\Dov

0 B/s | 0 Bytes | EMMC | High Speed | 0:00 | USB: DA Download All(high speed,auto detect)

Software refresh(Use flash_tool)

Smart Phone Flash Tool(Runtime Trace Mode)

File Options Window Help

Welcome Format Download Readback Memory Test

Download Stop

Download-Agent: Flash_tool_and_Image\SP_Flash_Tool_exe_Windows_v5.1928.01.000\MTK_AllInOne_DA.bin

Scatter-loading File: D:\Download\MKT_Flash_tool_and_Image\release_2020-03-26-14-53-18_alps_sb52_sb52_10_

Authentication File:

Download Only

<input checked="" type="checkbox"/>	Name	Begin Address	End Address	Region	Location
<input checked="" type="checkbox"/>	preloader	0x0000000000000000	0x000000000003f957	EMMC_BOOT1_BOOT2	D:\Downlo.
<input checked="" type="checkbox"/>	boot_para	0x0000000000008000	0x0000000000047fff	EMMC_USER	D:\Downlo.
<input checked="" type="checkbox"/>	para	0x00000000000108000	0x00000000000147fff	EMMC_USER	D:\Downlo.
<input checked="" type="checkbox"/>	logo	0x0000000000010d0000	0x0000000000010d320f	EMMC_USER	D:\Downlo.
<input checked="" type="checkbox"/>	vbmeta_a	0x000000000001150000	0x0000000000011500ff	EMMC_USER	D:\Downlo.
<input checked="" type="checkbox"/>	vbmeta_system_a	0x0000000000011d0000	0x0000000000011d00ff	EMMC_USER	D:\Downlo.
<input checked="" type="checkbox"/>	vbmeta_vendor_a	0x000000000001250000	0x0000000000012500ff	EMMC_USER	D:\Downlo.
<input checked="" type="checkbox"/>	spmfw_a	0x0000000000012d0000	0x0000000000012d0cdd	EMMC_USER	D:\Downlo.
<input checked="" type="checkbox"/>	scp_a	0x0000000000012e0000	0x0000000000012e99ebf	EMMC_USER	D:\Downlo.

[cam_vpu3_a] Download Flash 100%

10.41M/s 138.68K EMMC High Speed 0:04 MediaTek PreLoader USB VCOM (Android) (COM31)

Chip Info

Chip Name: MT6771

Chip Version: 00ca00

Ext Clock: T_26M

Extern RAM Type: DRAM

EMMC Flash

Software refresh(Use flash_tool)

The screenshot displays the 'Smart Phone Flash Tool(Runtime Trace Mode)' interface. The main window is titled 'Smart Phone Flash Tool(Runtime Trace Mode)' and has a menu bar with 'File', 'Options', 'Window', and 'Help'. Below the menu bar are tabs for 'Welcome', 'Format', 'Download', 'Readback', and 'Memory Test'. The 'Download' tab is active, showing a 'Download' button with a green arrow and a 'Stop' button with a red circle. Below these buttons are three input fields for 'Download-Agent', 'Scatter-loading File', and 'Authentication File', each with a 'choose' button. A 'Download Only' dropdown menu is also present. A central dialog box titled 'Download Ok' with a green checkmark icon is overlaid on the interface. Below the dialog is a table with columns 'Name', 'Address', 'Region', and 'Location'. The table lists various flash data items, all of which are checked. At the bottom of the window, a status bar shows '[userdata] Download Flash 100%' and a progress bar. The left sidebar contains a 'Chip Info' section with fields for 'Chip Name' (MT6771), 'Chip Version' (00ca00), 'Ext Clock' (T_26M), and 'Extern RAM Type' (DRAM). Below this is an 'EMMC Flash' section with a gear icon.

Name	Address	Region	Location
preloader	0x000003f957	EMMC_BOOT1_BOOT2	D:\Downlo.
boot_para	0x0000047fff	EMMC_USER	D:\Downlo.
para	0x00000147fff	EMMC_USER	D:\Downlo.
logo	0x0000010ed320f	EMMC_USER	D:\Downlo.
vbmeta_a	0x0000000011500000	EMMC_USER	D:\Downlo.
vbmeta_system_a	0x0000000011d00000	EMMC_USER	D:\Downlo.
vbmeta_vendor_a	0x0000000012500000	EMMC_USER	D:\Downlo.
spmfw_a	0x0000000012d00000	EMMC_USER	D:\Downlo.
scp_a	0x0000000012e00000	EMMC_USER	D:\Downlo.
...

[userdata] Download Flash 100%

17.87M/s	860.26K	EMMC	High Speed	1:33	Media Tek PreLoader USB VCOM (Android) (COM31)
----------	---------	------	------------	------	------------------------------------------------

Reference Resources: Documentation, Sources & Tools

Design Documentation:

- SB52_Android_User_Guide
- SB52_Flash_Tool_Download_Guide
- SB52_SOM_Datasheet
- SB52-SOM-Development-Kit-Hardware-User-Guide
- SB52_CARRIER BOARD SCHEMATIC

Flash tool & Source code:

- Driver_Auto_Installer_EXE_v5.1632.00.zip
- SP_Flash_Tool_exe_Windows_v5.1928.01.000.zip
- SP_Flash_Tool_exe_Linux_v5.1928.01.100.zip
- sb52.q0.mp1.812.tar.xz.zip
- sb52-yocto.108.tar.xz



Software Reference Development Guide

- SB52_Android_User_Guide

This tutorial guides developers how to build Android 10 with the SB52 board. It provides manuals for:

1. Setting up a Linux® OS build machine.
2. Building SB52 Android system images.
3. Downloading the images to SB52 development board.

- For more information about building the Android platform, please check <https://source.android.com/setup>

Flash Tool User Guide

- SB52_Flash_Tool_Download_Guide

This tutorial guides developers how to download the images using MediaTek flash tool to SB52 development board.

Hardware Datasheet

- SB52_SOM_Datasheet

This document gives you a better idea about SB52, MTK i500 System-on-Module hardware specification. In this document, it covers high level CPU specification, pin assignment, architecture, block diagram and interface description.

SB52EVK Hardware User Guide

- SB52-SOM-Development-Kit-Hardware-User-Guide

SB52 SOM development kit is composed of a SB52 SOM and a carrier board. This user guide will introduce Carrier's IO and connector pin define.

SB52EVK Carrier Board Schematic

- SB52_CARRIER BOARD SCHEMATIC

For customer reference SB52 carrier board circuit design.



EVB HW & SW Status

Hardware

- Raspberry Pi Display can't run with HDMI at the same time.
- Earphone jack's MIC not work in R002 EVB.
- Don't support HDMI audio output.

Software

- Operation System: Android 10
- Google Play Store is not included & APK can be installed manually.

Camera module vendor information

OV8858

CMOS 8-megapixel (3264x2448) Image Sensor

Vendor PN SHMD47

Supplier Contact Window:

Rick Chen [mailforspam.com](mailto:rickchen@richtek-hk.com)

香港瑞晶光电科技有限公司

HONGKONG RICHTEK PHOTO-ELECTRONICS LIMITED

珠海市彩韵电子科技有限公司

ZHUHAISHI CAIYUN ELECTRONICS CO.,LTD

Tel:+86-756-6290870

Mobile Phone: +8613726229313 +886 931683305

E-mail: rickchen@richtek-hk.com



Certification

CE

FCC ID:YAISB52

MIC



Support Pack

- Download center: documentation
 - Member Registration: <http://www.innocomm.com/en/getaquote.aspx>
 - Documents Available : <http://www.innocomm.com/download.aspx>
 - Module specification
 - EVB (carrier board) Hardware manual and schematic (by request)
 - Android User Guide and Flash Tool Download Guide
 - MTK Drivers customization documents
- Free Support
 - FAE SW & HW consult fae@innocomm.com
 - Carrier board schematics for reference. Design consultant.
 - Peripherals QVL list (Display, camera module, antenna...) : Refer to MTK QVL.
 - MTK e-Service
 - Technical Forum <http://forum.innocomm.com>
 - Android & Linux BSP for all. Source code release.
 - Module 2D/3D file
- Paid Support Service
 - Case by case

APPENDIX



History

Version	Date	By	Change Description
1.0	2020/6/18	Lion Wang	1st initial version
1.1	2020/6/30	Lion Wang	Update Android OS version.
1.2	2020/11/18	Lion Wang	Update Camera module information
1.3	2021/1/18	Lion Wang	Update Certification information
1.4	2021/12/21	Lion Wang	Update don't support HDMI audio output information