



# Genio 1200 Evaluation Kit

## User Guide

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**Release date:** 2023-05-26

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## Version History

Version	Date	Author	Description
0.1	2023-05-26	MediaTek	Draft Release

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# 1 Overview

## 1.1 General Information

Genio 1200 EVK is an evaluation kit of MediaTek MT8395 platform, integrated with Wi-Fi/Bluetooth (M.2 Module) and 5G/GPS (M.2 Module), which is a high performance IoT platform with rich features.

**Note:** Genio 1200 EVK is only for development and evaluation, please follow the "MT8395 Baseband Design Notice" document for hardware design rules.

## 1.2 Architecture and Block Diagram

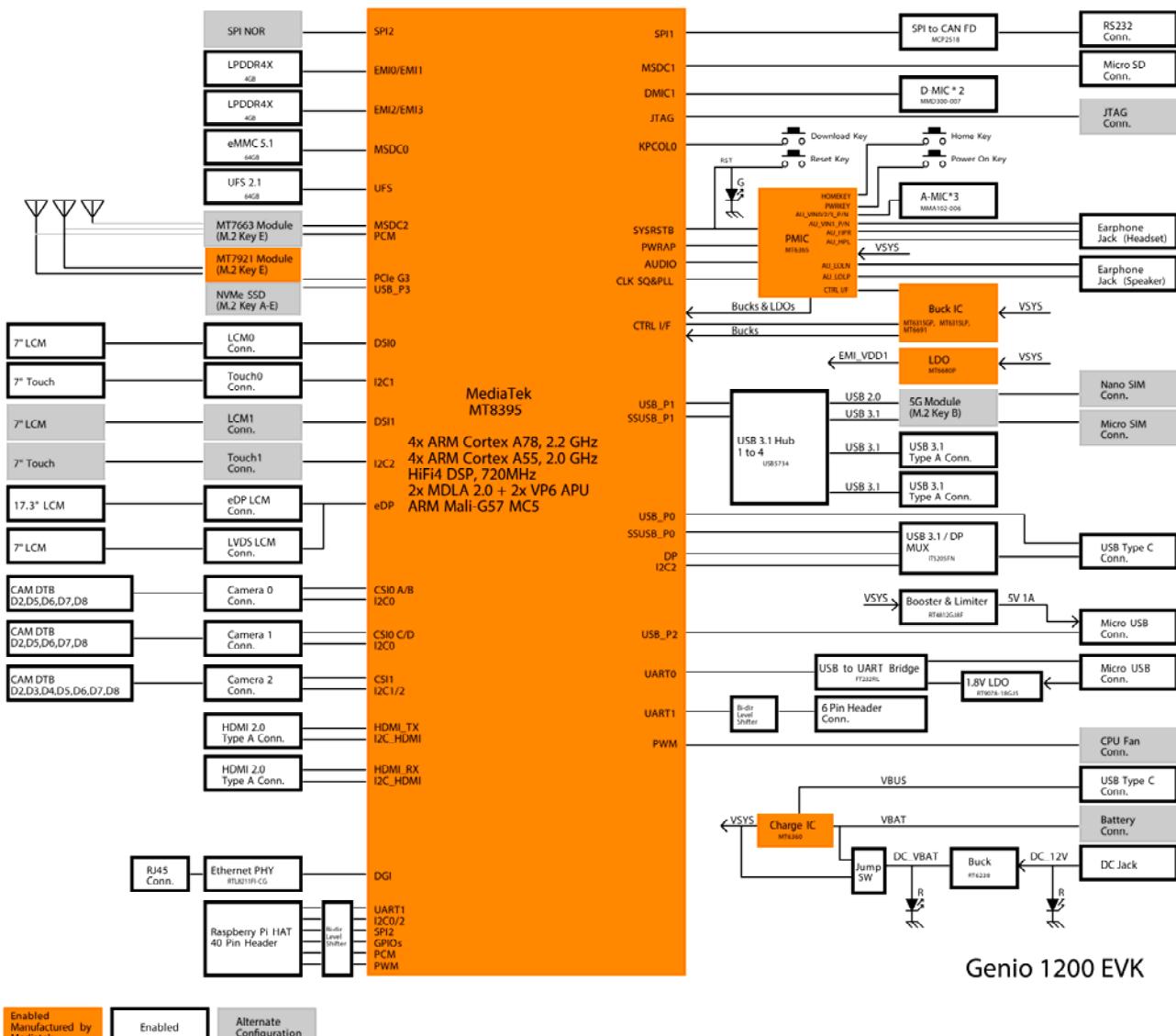


Figure 1-1 Genio 1200 Evaluation Kit System Block Diagram

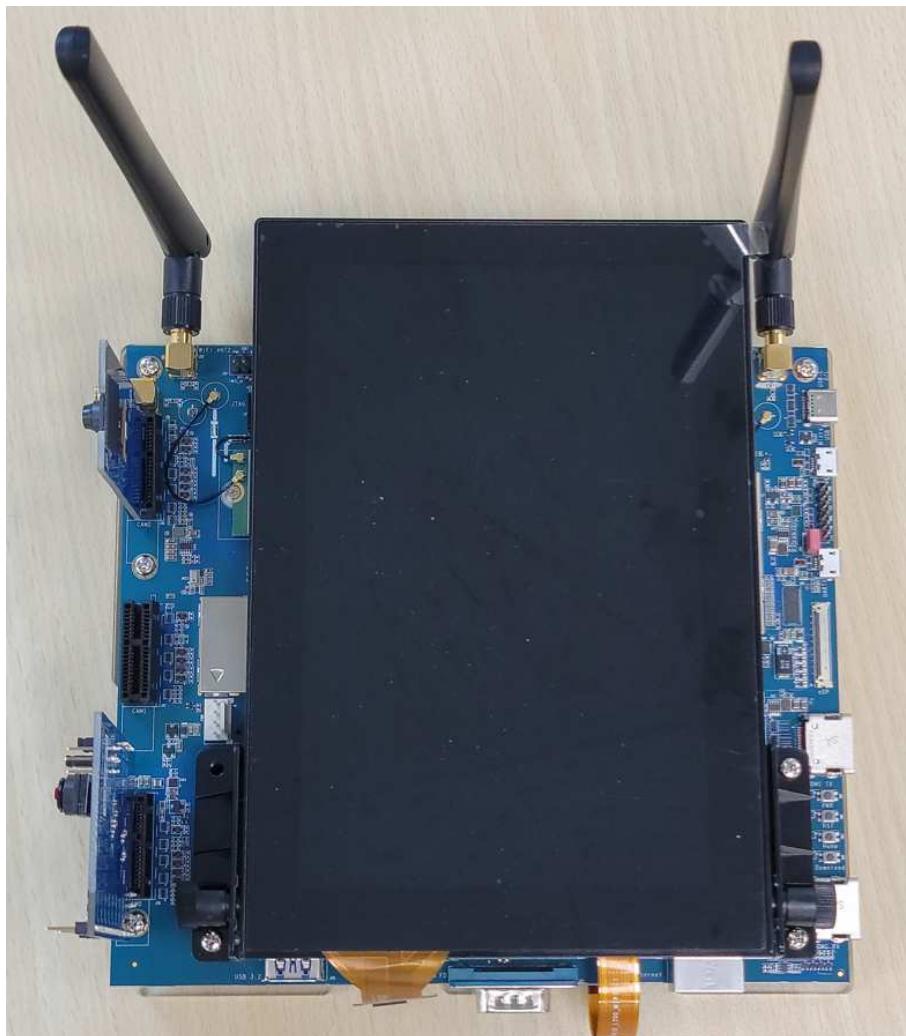
## 1.3 Feature Summary

- MediaTek CPU (MT8395IV/ZA)
- MediaTek PMIC (MT6365IAW/B)
- 4GB LPDDR4X RAM x 2 (Micron MT53E1G32D2FW-046 IT:B)
- 64GB eMMC x 1 (Western Digital SDINBDG4-64G-XI2)
- $\Phi$  2.0 DC Jack x 1 (for 12V DC Input)
- Micro SD Card Connector x 1
- Push Button x 4 (Power, Reset, Home and Download)
- LED x 3 (System Power, Reset, DC-IN Power)
- 4-Lane MIPI DSI x 2
- 4-Lane MIPI CSI x 3
- HDMI x 2 (IN x 1, OUT x 1)
- LVDS x 1
- eDP x 1
- 10/100/1000M Ethernet x 1 (Realtek RTL8211FI-CG)
- Micro USB x 2 (device, UART)
  - UART Port for Trace Log with USB to UART Bridge IC
- USB Type-A 3.2 Connector x 2
- USB Type-C Connector (USB 3.2/DP MUX)
- 3.5mm Earphone Jack x 1 (with Microphone Input)
- 3.5mm Line Out Audio Jack x 1
- Analog Microphone x 3 (Merry MMA102-006)
- Digital Microphone x 2 (Merry MMA102-007)
- UART Port x 1 (6 PIN/2.54mm Pin Header)
- M.2 Slot Key E x 1
  - For AzureWave AW-XB468NF Wi-Fi 6 & BT 5.2 Module
- M.2 Slot Key B x 1
  - For Quectel RM500K-CN 5G Sub-6 Module
- 40-Pin 2.54mm Pin Header x 1 (for Raspberry Pi Like I/O Interface)
- Micro SIM x 1
- Nano SIM x 1
- Operating Temperature: -40°C ~ 85°C

## 2 Introduction

Genio 1200 EVK board integrates MediaTek MT8395 processor, 64bit LPDDR4X memory, eMMC, UFS, Power Management IC (MT6365), Wi-Fi/BT M.2 Module and 5G M.2 Module.

The package contains a Genio 1200 EVK main board, MIPI DSI 7" LCD panel, one Wi-Fi 6 module and two camera daughter boards.



**Figure 2-1 Genio 1200 EVK System Setup**

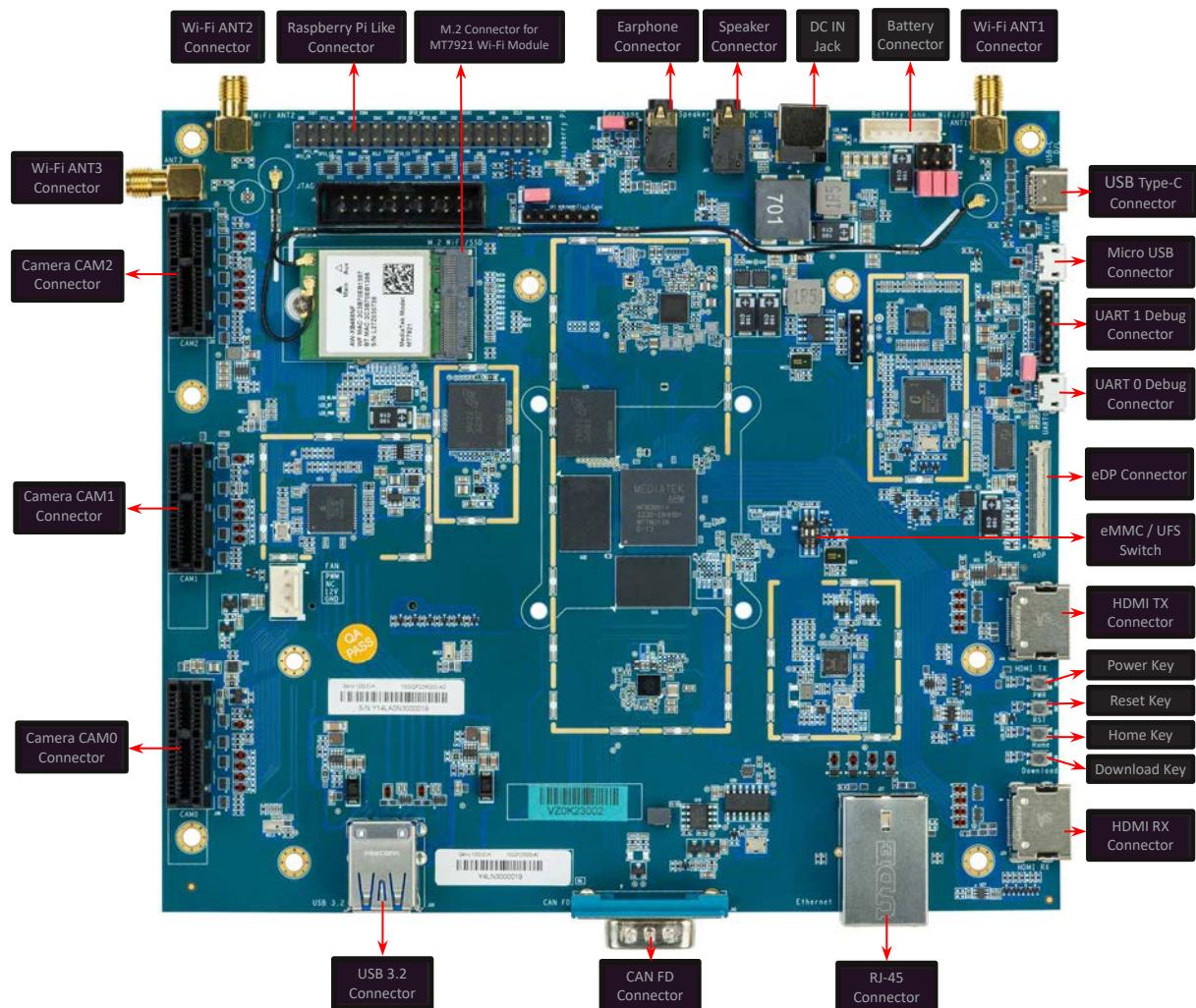


Figure 2-2 Genio 1200 EVK Top View

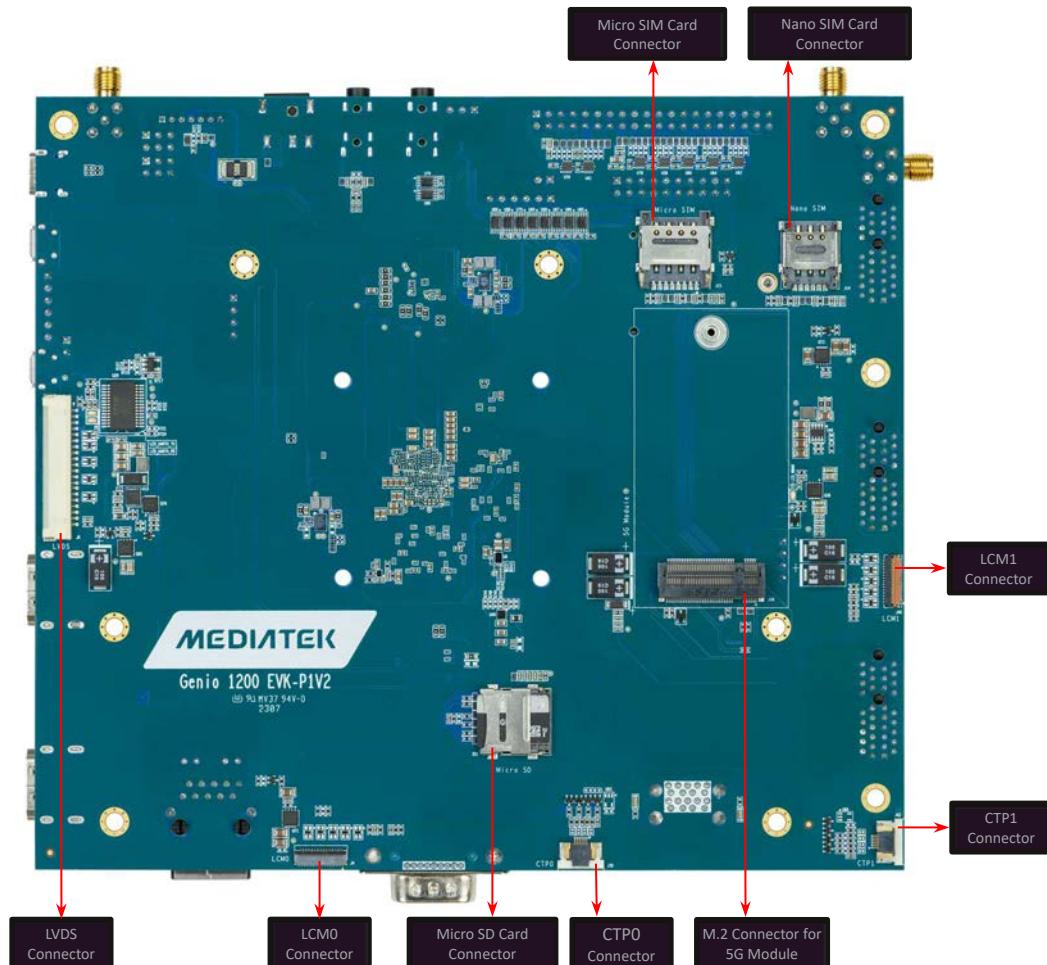


Figure 2-3 Genio 1200 EVK Bottom View

Table 2-1 Contains in the Box

S.No	Part Number or Marketing	Item Name	Description	Quantity
1	Genio 1200 EVK-P1V2	Genio 1200 EVK Main Board		1
2	IoT-CAM-DTB-D1V2-D2	D2 Camera Board	Camera Daughter Board Using IMX214 Image Sensor	1
3	IoT-CAM-DTB-D1V3-D6	D6 Camera Board	Camera Daughter Board Using AR0830 Image Sensor	1
4	KD070FHFID078-01-C021A	7" LCD Panel	LCM Module	1
5	M.2 Wi-Fi 6 module AW-XB468NF (IC: MT7921L)	Wi-Fi Module	Installed	1
6	IPEX to IPEX cable-158mm		Installed on Mainboard	1
7	IPEX to IPEX cable-50mm		Installed on Mainboard	1
8	SMA antenna	Wi-Fi Antenna		2
9	12V AC adaptor + power cord			1

**Table 2-2 Key Component List**

Function	Manufacturer	PN
Baseband Processor	MediaTek	MT8395IV/ZA
Main PMIC	MediaTek	MT6365IAW/B
Sub PMIC	MediaTek	MT6360PP
Buck	MediaTek	MT6315LP/B, MT6315GP/B, MT6691SVP/A
LDO	MediaTek	MT6680P/A
Memory	Micron	MT53E1G32D2FW-046 IT:B
eMMC	Western Digital	SDINBDG4-64G-XI2
UFS	Micron	MTFC64GASAONS-IT
Camera Module	MediaTek	IoT-CAM-DTB-D1V2-D2, IoT-CAM-DTB-D1V3-D6
Connectivity	AzureWave	AW-XB468NF (MT7921L Module)
Ethernet PHY	Realtek	RTL8211FI-CG

## 2.1 CPU (MT8395IV/ZA)

MediaTek Genio 1200 processor is a highly integrated platform incorporating the following key features:

- Quad-Core ARM® Cortex-A78 processor
- Quad-Core ARM® Cortex-A55 processor
- Arm Mali-D57 MC5 3D Graphics Accelerator (GPU) with Vulkan 1.1, OpenGL ES 3.2 and OpenCL 2.2
- Dual-core AI Processor Unit (APU) Cadence® Tensilica®
- VP6 processor with AI Accelerator (AIA)
- Single-core Cadence HiFi 4 Audio Engine DSP
- LPDDR4X: Up to 16GB, with memory data rate up to LPDDR4X-4266
- Display output supporting 4K60 + 4K60 resolution
- Image processing: 48MP @ 30fps for single camera capture; 16MP +16MP @ 30fps for dual camera capture
- Video encoding: 4K @ 60 fps with HEVC/H.264
- Video decoding: 4K @ 90 fps with AV1/VP9/HEVC/H.264

## 2.2 Power Management IC (MT6365IAW/B)

MediaTek MT6365 power management IC is a programmable power management IC that integrates 9 buck converters and 33 LDOs to provide all power rails required by SoC and peripherals.

MT6365 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 the processor MT8395.

For system management, it provides the following features,

- 9 buck converters and 33 LDOs
- Precision voltage, temperature, and current measurement fuel gauge
- 26MHz external crystal for system clock
- 32.768KHz RTC oscillator for system timing
- Watchdog reset
- Over-current and thermal overload protection
- OVP, UVLO function
- WFBGA-203 package

## 2.3 DRAM (Micron MT53E1G32D2FW-046 IT:B)

Genio 1200 EVK has two 4GB LPDDR4X memory with the following features.

- Dual Channels with 16-bit Data Bus Width
- Supports self-refresh/ partial self-refresh mode
- Supports dual-rank memory device

## 2.4 eMMC Storage (Western Digital SDINBDG4-64G-XI2)

A 64GB eMMC 5.1 SDINBDG4-64G-XI2 of Western Digital is used for code and data storage, via MSDC0 interface of the baseband processor MT8395 with 8-bit width data bus.

## 2.5 UFS Storage (Micron MTFC64GASAONS-IT)

A 64GB UFS MTFC64GASAONS-IT of Micron is used for code and data storage, which can be switched by the switch SW5 on the EVK. Please refer to chapter 2.10.

## 2.6 M.2 Wi-Fi/Bluetooth Module (AzureWave AW-XB468NF)

MediaTek MT7921 is designed inside AzureWave AW-XB468NF M.2 Module. It supports following features.

- M.2 2230 Wi-Fi Module with Key A-E
- MediaTek MT7921L Wi-Fi Chip
- PCIe/USB Interface
- Wi-Fi 802.11 a/b/g/n/ac/ax
- Dual Band 2T/2R MIMO
- Bluetooth 5.2
- Security WFA WPA/WPA2/WPA3 Personal, WPS 2.0, WAPI
- Integrated LNA, PA and T/R Switch

## 2.7 M.2 5G Module (Quectel\_RM500K-CN) - Planning, Schedule: 2023/Q4

MediaTek Genio 1200 EVK supports Quectel RM500K-CN M.2 Module, which has following features:

- M.2 Key B WWAN
- USB 3.0/USB 2.0
- Dual SIM Single Standby (Micro SIM x 1 + nano SIM x 1)
- 5G NR SA support n1/n28/n41/n78/n79
- 5G NR NSA support n41/n78/n79
- LTE-FDD support B1/B3/B5/B8/B28
- LTE-TDD support B34/B39/B40/B41
- WCDMA support B1/B8
- GNSS support GPS/GLONASS/BeiDou (COMPASS)/Galileo/QZSS

## 2.8 How to Power Up the System

Power on the Genio 1200 EVK board by following steps.

Step1: Must install camera daughter board (DTB) on CAM0 or CAM2 connector.

(If camera app without in Android desktop, please refer to chapter 7 Appendix of Genio 1200 EVK User Guide for fixed it)

Step2: Connect UART0 to the computer via a micro-USB cable (If you want to see the logs).

Step3: Plug in the DC 12V power adapter.

Step4: Long press PWR button more than 3 seconds.

You will see the screen is shown on MIPI DSI display and some trace logs come out from UART0.

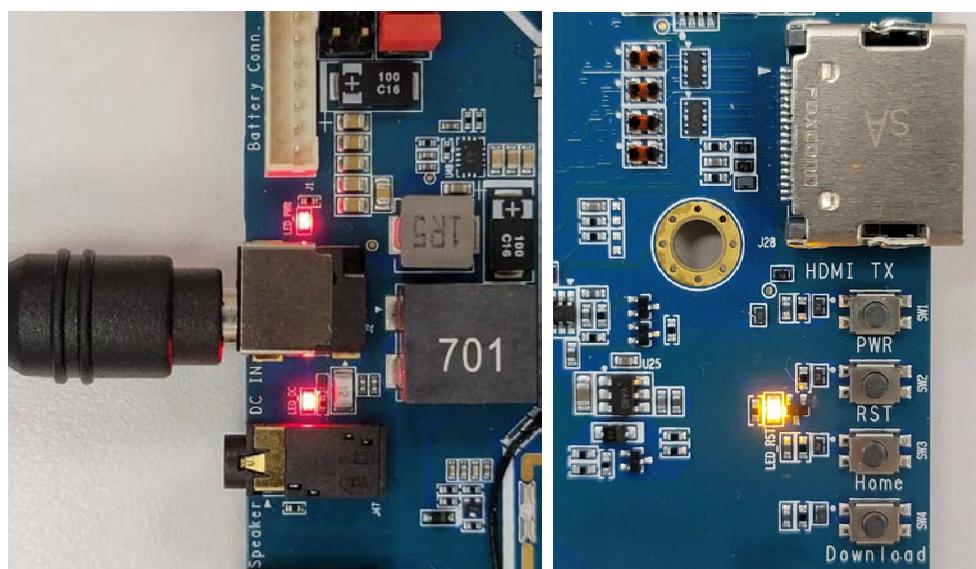


Figure 2-4 Power Up the System

```

[ 28.759408] <4>-(4) [1070:Binder:1022_2][CEC] mtk_cec_tx_event_handler,888,err:Header NACK
[ 28.760435] <4>-(4) [1070:Binder:1022_2][CEC] mtk_cec_tx_event_handler,913,err:Retransmit
[ 28.761451] <4>-(4) [1083:kworker/4:2][CEC] mtk_cec_tx_wk_handle,740,notify CEC CORE adapter trans
mit NACK
[ 28.763097] <7>.(7) [130:cec-mtk-hdmi-ce][CEC] mtk_cec_adap_transmit
[ 28.763665] <5>.(5) [1083:ActivityManager]BOOTPROF: 28763.662145:AP Init:[service]:[com.android.d.setInputmethod.latin]:[com.android.inputmethod.latin/com.android.inputmethod.latin.LatinIME]:pid:35
14
[ 28.763925] <7>.(7) [130:cec-mtk-hdmi-ce][CEC] mtk_cec_print_cec_frame,386,cec message initiator is
4
[ 28.767008] <4>.(4) [1072:android.fg]BOOTPROF: 28767.005222:PMS:reconcileAppsDataLI
[ 28.767744] <7>.(7) [130:cec-mtk-hdmi-ce][CEC] mtk_cec_print_cec_frame,387,cec message follower is
0
[ 28.769639] <7>.(7) [130:cec-mtk-hdmi-ce][CEC] mtk_cec_print_cec_frame,388,cec message length is 1
5
[ 28.771098] <7>.(7) [130:cec-mtk-hdmi-ce][CEC] mtk_cec_print_cec_frame,389,cec message opcode is 0
847
[ 28.772242] <7>.(7) [130:cec-mtk-hdmi-ce][CEC] mtk_cec_send_msg,667,tx header=0x40,seq=6,op=0x47,1
-15
[ 28.773356] <7>.(7) [130:cec-mtk-hdmi-ce][CEC] mtk_cec_tx_trigger_send
[ 28.790010] <1>.(1)[l:init]init 27: [28768][0]processing action (sys.boot_completed=1) from (/ven
dor/etc/init/hw/init.mt8395.rc:997)
[ 28.790408] <6>.(6) [72:kworker/6:1]mt635x-auxadc mt635x-auxadc: name:CHIP_TEMP, channel=4, adc_o
u=0x634, adc_result=697
[ 28.792305] <1>.(1)[l:init]init 27: [28768][0]Command 'write /sys/devices/system/cpu/eas/enable 2
' action=sys.boot_completed=1 (/vendor/etc/init/hw/init.mt8395.rc:999) took 0ms and failed: Unable t
o write to file '/sys/devices/system/cpu/eas/enable' open() failed: Permission denied
[ 28.802653] <0>.(0)[l:init]init 27: [28779][0]Command 'write /proc/sys/kernel/sched_migration_com
t_ns 200000' action=sys.boot_completed=1 (/vendor/etc/init/hw/init.mt8395.rc:1007) took 0ms and fail
ed: Unable to write to file '/proc/sys/kernel/sched_migration_comt_ns': open() failed: Permission de
nied
[ 28.818566] <0>.(0)[347:init]BOOTPROF: 28818.557145: OFF
[ 28.819469] <0>.(0)[l:init]init 27: [28797][0]processing action (sys.boot_completed=1) from (/sys
tem_ext/etc/init/hw/init.ace.rc:50)
[ 28.821298] <0>.(0)[l:init]init 27: [28797][0]starting service 'ace-reinit'...
[ 28.835404] <7>.(7)[l:init]init 27: [28813][0]processing action (ro.build.type=userdebug 44 sys.b
oot_completed=1) from (/system_ext/etc/init/hw/init.ace.rc:61)

```

Figure 2-5 Console Screen

**Note:** If you want to use the camera APP, please make sure to plug in the D2/D6 camera daughter board before power up the EVK.

## 2.9 EVK Debug

- Micro USB (J34) output UART log
- Please install FT232RL driver



Figure 2-6 Debug Port

- Check PC USB port could be recognized the UART device
- Setting “serial line” (ex. COM86), “speed” to 921600, choose “connection type” to serial and press “Open” on PuTTY for log (Example on PuTTY)

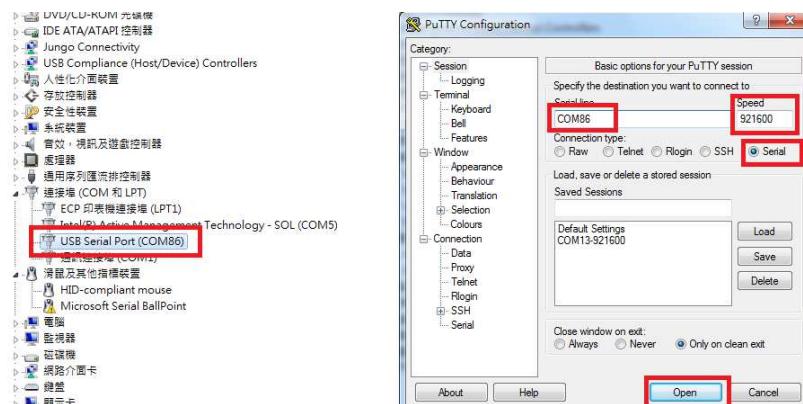
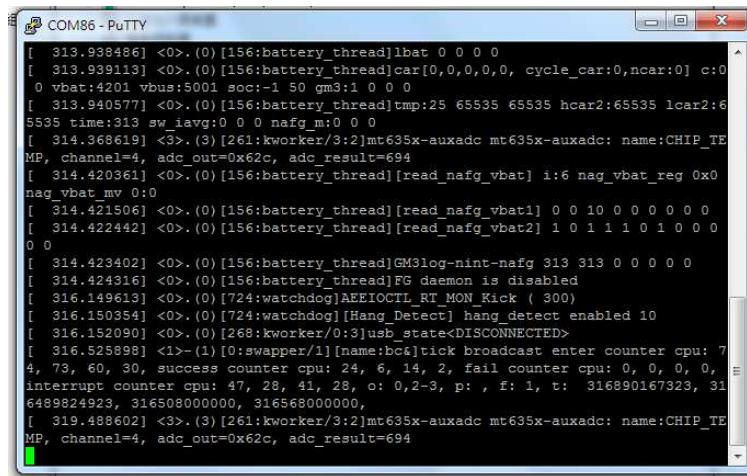


Figure 2-7 Putty Example



```
[ 313.938486] <0>. (0) [156:battery_thread]lbat 0 0 0 0
[ 313.939113] <0>. (0) [156:battery_thread]car[0,0,0,0,0, cycle_car:0,ncar:0] c:0
0 vbat:4201 vbus:5001 soc:-1 50 gm3:1 0 0 0
[ 313.940577] <0>. (0) [156:battery_thread]tmp:25 65535 65535 hcar2:65535 lcar2:6
5535 time:313 sw_iavg:0 0 0 nafg_m:0 0 0
[ 314.368619] <3>. (3) [261:kworker/3:2]mt635x-auxadc mt635x-auxadc: name:CHIP_TE
MP, channel=4, adc_out=0x62c, adc_result=694
[ 314.420361] <0>. (0) [156:battery_thread][read_nafg_vbat] i:6 nafg_vbat_reg 0x0
nafg_vbat_mv 0:0
[ 314.421506] <0>. (0) [156:battery_thread][read_nafg_vbat1] 0 0 10 0 0 0 0 0 0 0
[ 314.422442] <0>. (0) [156:battery_thread][read_nafg_vbat2] 1 0 1 1 1 0 1 0 0 0
0 0
[ 314.423402] <0>. (0) [156:battery_thread]GM3log-nint-nafg 313 313 0 0 0 0 0
[ 314.424316] <0>. (0) [156:battery_thread]FG daemon is disabled
[ 316.149613] <0>. (0) [724:watchdog]AEIIOCTL_RT_MON_Kick ( 300)
[ 316.150354] <0>. (0) [724:watchdog]Hang_Detect hang detect enabled 10
[ 316.152090] <0>. (0) [268:kworker/0:3]usb_state<DISCONNECTED>
[ 316.525898] <1>-(1)[0:swapper/1][name:bc&]tick broadcast enter counter cpu: 7
4, 73, 60, 30, success counter cpu: 24, 6, 14, 2, fail counter cpu: 0, 0, 0, 0,
interrupt counter cpu: 47, 28, 41, 28, o: 0,2-3, p: , f: 1, t: 316890167323, 31
6489824923, 316508000000, 316568000000,
[ 319.488602] <3>. (3) [261:kworker/3:2]mt635x-auxadc mt635x-auxadc: name:CHIP_TE
MP, channel=4, adc_out=0x62c, adc_result=694
```

Figure 2-8 Log Screen

- Install the "MTK USB cable driver (Driver\_Auto\_Installer\_EXE.zip)" and "Universal ADB driver (UniversalAdbDriverSetup.zip)" into your Windows 10 host machine

## 2.10 How to Switch Boot from eMMC to UFS

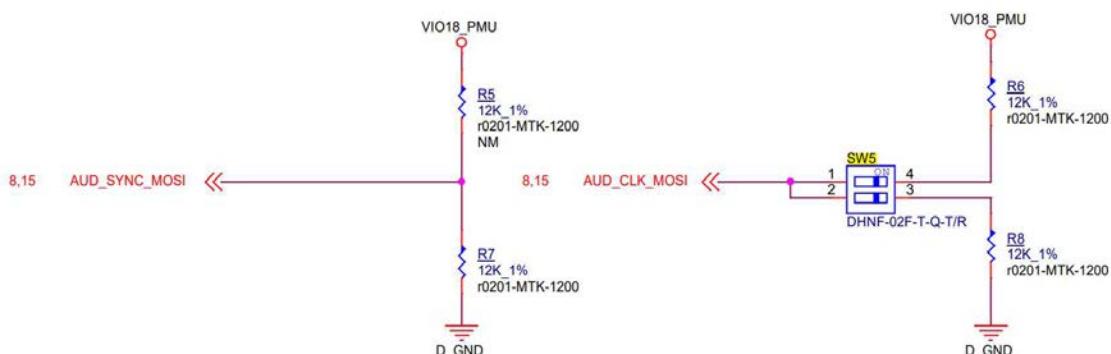
You can choose to boot from eMMC or boot from UFS by switching the state of SW5.

**Table 2-3 Boot Initiation (SW5)**

Boot from eMMC	Boot from UFS
1: ON, 2: OFF (Default)	1: OFF, 2: ON

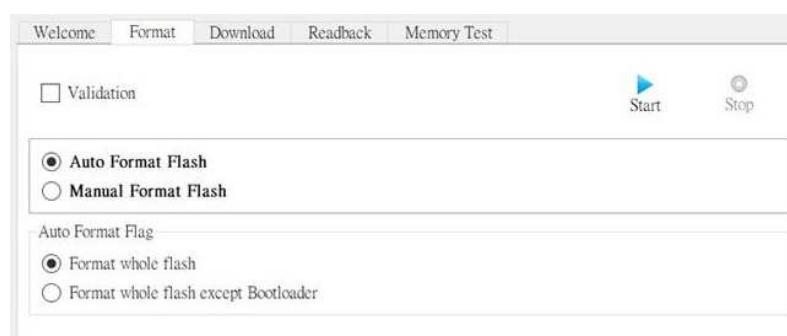
**Table 2-4 SW5 Pin Status**

AUD_SYNC_MOSI	AUD_CLK_MOSI	Storage Booting	SW5
L	H (by external PU)	Only eMMC boot	1: ON, 2: OFF (Default)
L	L	Only UFS boot	1: OFF, 2: ON



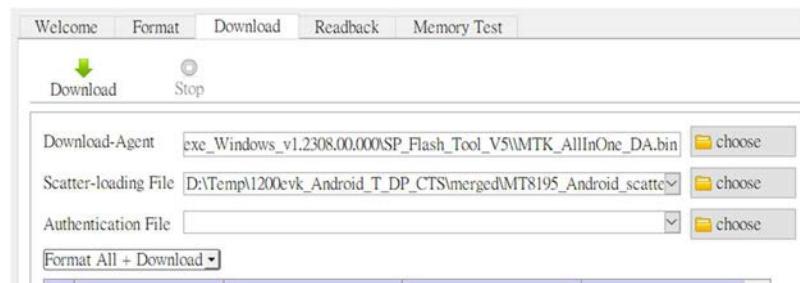
**Figure 2-9 Boot on Strapping Path**

1. Power off the EVK, then switch DIP (SW5) to eMMC boot: Run "SP Flash Tool", on <Format> tab, press <Start> button to format eMMC. Then plug the USB Type-C cable to EVK. It will format eMMC partition automatically.



**Figure 2-10 Flash Tool Format Screen**

2. Power off the EVK, then switch DIP (SW5) to UFS boot: Run "SP Flash Tool", on <Download> tab, choose <Format All + Download> in combo box, and then press <Download> to flash image to UFS partition.



**Figure 2-11 Flash Tool Download Screen**

3. After flashing finished, remove the USB Type-C cable and reboot system.

**Note:** Choose "Format All + Download", if MAC address were set previously, after this action MAC address will be format.

## 3 Interface and Connectors

### 3.1 Genio 1200 EVK I/O Connectors

Table 3-1 Main Board Connectors

Description	Location	Note
Battery Connector	J1	
DC Jack	J2	
DC-IN Power On Indicator	LED 11	Red LED
System Power On Indicator	LED 1	Red LED
Reset Indicator	LED10	Yellow LED
Power On Button	SW1	
Reset Button	SW2	
Home Button	SW3	
Download Button	SW4	
Boot Switch	SW5	Switch between eMMC and UFS
USB 3.2	J10	Dual USB Type-A 3.2 x 2
USB 3.2 Type-C	J12	USB 3.2 Port / DP Display Port (MUX)
USB 2.0	J13	Micro USB
UART0	J34	Debug (Core Processor Log)
UART1	J52	Debug (SCP Log)
Micro SD Card Connector	SD1	
LCM0 Connector	J4	7" MIPI DSI Panel (DSI 0)
LCM1 Connector	J40	7" MIPI DSI Panel (DSI 1)
CTP0 Connector	J39	7" Touch
CTP1 Connector	J42	7" Touch
eDP Connector	J8	17.3" eDP Panel
LVDS Connector	J6	LVDS Panel
CAM0 Connector	J30	MIPI CSI0 A/B Interface
CAM1 Connector	J31	MIPI CSI0 C/D Interface
CAM2 Connector	J32	MIPI CSI1 A/B Interface
Nano SIM Card Connector	J14	
Micro SIM Card Connector	J15	
M.2 3052 Key B Slot	J18	RM500K-CN 5G Module
Wi-Fi Antenna (Aux)	J21	
Wi-Fi Antenna (main)	J23	
Wi-Fi Antenna (main spare)	J25	
M.2 2230 Key E Slot	J26	AW-XB468NF(MT7921L) Wi-Fi Module
Ethernet	J27	
HDMI TX	J28	HDMI Out
HDMI RX	J29	HDMI In
Raspberry Pi Like I/O	J33	

JTAG	J35	
SPI Flash Connector	J38	
CAN FD	J45	
Earphone Jack	J46	
Line Out	J47	
CH7513 EEPROM Connector	J48	
eDP/LVDS Switch Jumper	J49	
Auto Power On Jumper	J51	
FAN Connector	FAN1	

## 3.2 System Power Paths

### 3.2.1 System Power

There are three power supply paths for the system. DC adaptor supply have two paths connect 12V DC adaptor, a buck converter (Richtek RT6238), which convert 12V (DC Jack) to 4.2V output. The 4.2V output connect two jumpers.

The first path is to short the jumper J50, the 4.2V output is connected to VSYS.

The second path is to short the jumper J44, the 4.2V output is connected to the charger IC (MediaTek MT6360), and then connected to VSYS through the charger IC.

**Note: DO NOT** connect the battery in the second path.

The third path is battery power (not verified), the battery power is connected to the charger IC (MediaTek MT6360), and then connected to VSYS through the charger IC. This path supports those applications using Li-polymer batteries.

*Table 3-2 Power Paths (J50 and J44)*

Power Path DC to VSYS	Power Path DC to VBAT

J50 short 1-2, short 3-4, short 5-6 ( default )

J44 short 1-2, short 3-4, short 5-6

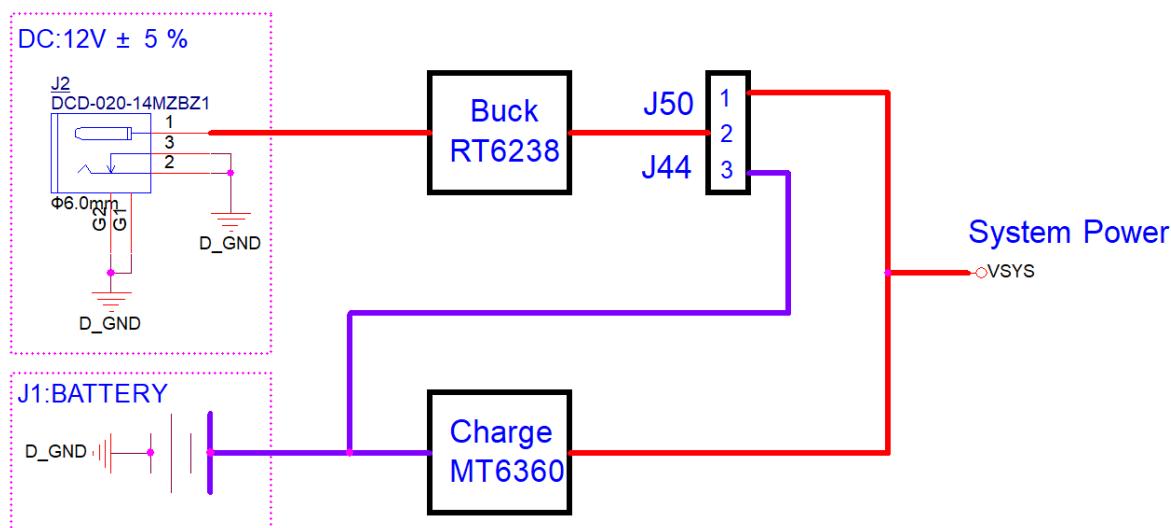


Figure 3-1 System Power Path

### 3.2.2 Auto Power On

The Genio 1200 EVK supports system power on when adapter is plugged in. You need to change the J51 jumper to switch the power on mode.

If you need to use "auto power on" function, please ask MediaTek for a patch.

Table 3-3 Auto Power On (J51)

Manual Power On	Auto Power On
J51 short 1-2 (default)	J51 short 2-3

## 3.3 I/O Interface

### LED Indicators

There are three LED indicators.

Table 3-4 LED Indicators

LED Indicators	Location	Color	Note
DC-IN Power Indicator	LED 11	Red	LED is on if adaptor is on
Reset Indicator	LED10	Yellow	LED is off if reset signal is low
System Power Indicator	LED 1	Red	LED is on while 12V to 5V complete

**UART**

On the Genio 1200 EVK there is a UART (UART0) with a USB to UART bridge IC and a 4-wire UART (UART1) console directly out of the SoC.

- Supports word Lengths from 5 to 8 bits with an optional parity bit and 1 or 2 stop bits
- Supports baud rates from 110 bps up to 921600 bps
- FTDI USB to UART bridge IC FT232RL

**Table 3-5 UART Ports (J34 and J52)**

UART	Location	Note
UART0	J34 (Micro USB)	Core Processor Log
UART1	J52 (6 pin header)	System Companion Processor (SCP) Log

**I2C**

- Four I2C buses (I2C0, I2C1, I2C2 and I2C6)
- Supports Master Mode only
- Adjustable clock speed for LS/FS/FS+ mode operation
- Supports 7-bit address

**Table 3-6 I2C Bus**

I2C Bus	Purpose	Note
I2C0	CAM0 CAM1 Raspberry Pi Like I/O	IMX214 IMX214
I2C1	CAM2-1 Buck-Boost UFS EXT Power TP Controller - 0 USB HUB	IMX214 RT4803 MT6691OTP GT9271 USB5734
I2C2	TP Controller - 1 USB Type-C MUX CAM2-2 Raspberry Pi Like I/O	GT9271 IT5205FN IMX214
I2C6	Power_I2C LP4X DRAM Buck	MT6360 MT6691SVP/A

**SPI**

- Support Master/Slave mode
- One chip select output

**PWM**

- PWM supports old mode and FIFO mode
- The frequency can be set from 0Hz to 39MHz

## Raspberry Pi Like I/O Interface

Table 3-7 Pin Assignments of the Raspberry Pi Like I/O Pin Header

Pin #	Description	Note	Pin #	Description	Note
1	3.3V		2	5V	
3	SDA0	GPIO8	4	5V	
5	SCL0	GPIO9	6	GND	
7	GPIO-04		8	TXD1	GPIO102
9	GND		10	RXD1	GPIO103
11	GPIO-03		12	GPIO-05	
13	GPIO-101		14	GND	
15	GPIO-02		16	GPIO-01	
17	3V3		18	GPIO-00	
19	SPI0_MO	GPIO142	20	GND	
21	SPI0_MI	GPIO143	22	GPIO-57	
23	SPI0_CLK	GPIO141	24	SPI0_CS	GPIO140
25	GND		26	GPIO-100	
27	SDA2	GPIO12	28	SCL2	GPIO13
29	GPIO-66		30	GND	
31	GPIO-68		32	GPIO-65	
33	PWM	GPIO109	34	GND	
35	SPI1_MI	GPIO139	36	SPI1_CS	GPIO136
37	GPIO-67		38	SPI1_MO	GPIO138
39	GND		40	SPI1_CLK	GPIO137

### Note:

1. VDD\_5V power can provide 5V/2A maximum but share with USB Host VBUS 5V output
2. VGPIOEXT\_3V3 power can deliver 3.3V/300mA
3. Black words are ground pins
4. Red words are power pins
5. Green words are special function pins
6. Blue words are GPIOs
7. Pink words are pins, which multiplex with other function. Please check section 3.16 Pin Mux for Other Interfaces

### 3.4 Micro SD Card Connector

Genio 1200 EVK has one MicroSD connector. It uses MT8395 MSDC1 interface and supports following features.

- Default Speed Mode
- High Speed Mode
- SDR12 Mode
- SDR25 Mode
- SDR50 Mode
- SDR104 Mode
- DDR50 Mode
- Support 1bit/4bit SD Bus Width

### 3.5 Power and Function Key Interface

12V power supplies to the system from a 2.0 mm DC Jack. Power-on button and Reset button on the evaluation-board to turn on and reboot the system. Home and Download buttons make the operation easier.

### 3.6 USB Device

Genio 1200 EVK has two USB device ports, among which the USB Type-C port can be used for ADB debugging port.

### 3.7 USB Host

Genio 1200 EVK has four USB host ports for USB device connections, which are two USB Type-A connectors and one USB Type-C connector and one Micro USB connector.

*Table 3-8 USB Feature in Genio 1200 EVK*

USB Port 0 on SoC	SW Support Mode		Function
	Host Mode	Device Mode	
USB3.2 Gen1	Support	Support	USB Type-C
USB2.0	Support	Support	USB Type-C

USB Port 1 on SoC	SW Support Mode		Function
	Host Mode	Device Mode	
USB3.2 Gen1	Support	Not Support	EVK with Hub
USB2.0	Support	Not Support	EVK with Hub

USB Port 2 on SoC	SW Support Mode		Function
	Host Mode	Device Mode	
USB2.0	Support	Support	Micro USB

USB Port 3 on SoC	SW Support Mode		Function
	Host Mode	Device Mode	
USB2.0	Support	Not Support	Wi-Fi Module

## 3.8 Audio Interface

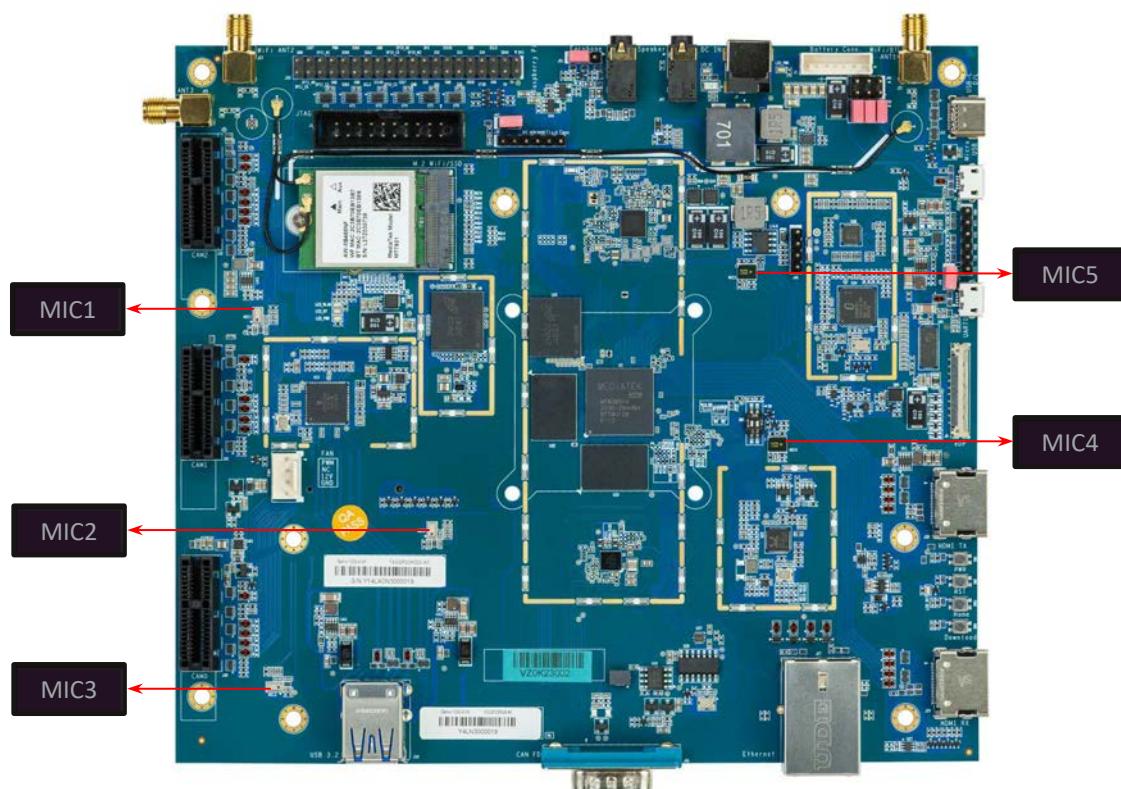
Genio 1200 EVK provides a 3.5mm earphone jack (with a microphone input) and another 3.5mm audio jack for line out (no audio amplifier is build-in).

## 3.9 Microphones

Genio 1200 EVK provides three analog microphones (Merry MMA102-006) and two digital microphones (Merry MMD300-007).

**Table 3-9 Microphones Location**

Location	Type	Note
MIC1	Analog Microphone	To PMIC MT6365
MIC2	Analog Microphone	To PMIC MT6365
MIC3	Analog Microphone	To PMIC MT6365
MIC4	Digital Microphone	To Processor MT8395
MIC5	Digital Microphone	To Processor MT8395



**Figure 3-2 Microphone Placement**

### 3.10 MIPI DSI Interface

Genio 1200 EVK provides two 4-lane MIPI DSI interface. A Startek LCM (KD070FHFID078-01-C021A) with touch pad is provided in the box. The I2C capacitive touch controller is Goodix GT9271.

- Up to 1.2Gbps for 1-Data Lane
- Pixel format of RGB565/RGB666 or Loosely RGB666/RGB888
- Support peripheral TE and external TE signal detection

### 3.11 MIPI CSI Interface

Genio 1200 EVK provides three 4-lane CSI interfaces, the CSI interface operates up to a maximum bit rate of 1.5Gbps per lane. Camera daughter board are connected through PCIe x1 slot.

Default: CAM0 and CAM2 enable

### 3.12 Ethernet Interface

- Operate with an external Ethernet PHY (Realtek RTL8211F-CG)
- Dynamically configurable to support 10/100/1000M with RGMII
- CRC-32 checking with optional forwarding of the FCS field to the user application
- Optional magic packet detection
- EEE (Energy Efficient Ethernet) MII signaling according to the IEEE 802.3az specification
- RJ-45 Ethernet connector with transformer and LEDs in it

*Table 3-10 Ethernet LED Indicator*

B	10M	100M	1G
Link	-	Orange LED	Green LED
Active		Yellow LED Flash	

### 3.13 How to Switch between eDP and LVDS Panel

Default setting is J49 jumper shorted, the EVK supports LVDS panel output (through a bridge IC CH7513), while setting J49 jumper open, the EVK supports eDP panel.

eDP and LVDS panel output function is not supported simultaneously.

If you need to use eDP or LVDS function, please ask MediaTek for a patch.

**Table 3-11 Panel Switch (J49)**

LVDS Panel	eDP Panel
	
J49 short ( default )	J49 open

**Table 3-12 Pin Mux for eDP and LVDS Interface**

MT8395 eDP	Switch IC(U81) Port A	Switch IC(U81) Port B
EDP_LN0_TXN	EDP_LN0_TXN_A	EDP_LN0_TXN_B
EDP_LN0_TXP	EDP_LN0_TXP_A	EDP_LN0_TXP_B
EDP_LN1_TXN	EDP_LN1_TXN_A	EDP_LN1_TXN_B
EDP_LN1_TXP	EDP_LN1_TXP_A	EDP_LN1_TXP_B
EDP_LN2_TXN		EDP_LN2_TXN_B
EDP_LN2_TXP		EDP_LN2_TXP_B
EDP_LN3_TXN		EDP_LN3_TXN_B
EDP_LN3_TXP		EDP_LN3_TXP_B
EDPAUXN	EDP_AUXN_A	EDP_AUXN_B
EDPAUXP	EDP_AUXP_A	EDP_AUXP_B
EDP_HPD	HPD_A	HPD_B

### 3.14 HDMI Port

Genio 1200 EVK provide two HDMI ports included one HDMI TX and one HDMI RX port.

HDMI TX features

Video part

- Polarity inversion
- Support Deep Color up to 16bits
- Support max frequency up to 594 MHz (4096 x2160p@60 Hz 8 bits mode)
- Support video color space RGB 444, YCbCr 4:2:2(ITU 601 and 709), YCbCr 4:4:4(ITU 601 and 709), YCbCr 4:2:0 and xvYCC
- Support 3D HDMI function
- Support SD mode
- Support HD/FHD/UFHD mode

Audio part

- Support Single LPC SPDIF IEC60958(up to 192 kHz and up to 24 bits), 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192 kHz
- Single compressed SPDIF IEC61937(up to 192 kHz)
- Support multi-channel PCM input(max.8channels)
- Support Direct Stream Digital (DSD) audio
- Support output compressed lossless audio according to HDMI 2.0(Dolby TrueHD and DTS-HD) Misc
- Support Hot Plug Detect (HPD)
- Support discovery by Extended Display Identification Data (EDID)
- Compatible with Digital Visual Interface (DVI) 1.0
- Support High-bandwidth Digital Content Protection (HDCP) 1.4/HDCP 2.3
- Support dynamic metadata Max to 2KB
- DDC supports clock stretching
- Support VRR/ALLM/eARC feature
- Support Consumer Electronics Control (CEC) function

HDMI RX features

Video part

- Support Deep Color up to 16bits
- Support max frequency up to 594 MHz (4096 x2160p@60 Hz 8 bits mode)
- Support video color space RGB 444, YCbCr 4:2:2(ITU 601 and 709), YCbCr 4:4:4(ITU 601 and 709), YCbCr 4:2:0 and xvYCC
- Support 3D HDMI function
- Support SD mode
- Support HD/FHD/UFHD mode

Audio part

- Support Single LPC SPDIF IEC60958(up to 192 kHz and up to 24 bits), 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192 kHz
- Single compressed SPDIF IEC61937(up to 192 kHz)
- Support multi-channel PCM input(max.8channels)
- Support Direct Stream Digital (DSD) audio
- Support output compressed lossless audio according to HDMI 2.0(Dolby TrueHD and DTS-HD) Misc
- Support Internal Extended Display Identification Data (EDID) 512 bytes
- Support HDCP key revocation scheme
- Compatible with DVI 1.0
- Support HDCP 1.4/HDCP 2.3
- Support HDR10+/Dolby dynamic metadata
- Support Consumer Electronic Control (CEC) function

### 3.15 Antenna Connector

Genio 1200 EVK has three Wi-Fi antenna connectors, users can connect them via coaxial cables. These antennas are designed for AzueWave M.2 (MT7921) Wi-Fi module.



Figure 3-3 Antenna Connectors

Table 3-13 On-Board Antenna

Location	Band	Note
J21	Antenna 1	Wi-Fi / BT (AUX)
J23	Antenna 2	Wi-Fi (MAIN)
J25	Antenna 3	Spare

### 3.16 Pin Mux for Other Interface

J43 jumper default set to not support Raspberry Pi configuration. Use the J43 jumper to switch the GPIO shared by the M.2 slot (for MT7663), DSI, UART and Raspberry Pi Like I/O.

Table 3-14 Other Interface (J43)

NOT Raspberry Pi Configuration	Raspberry Pi Configuration Supports
	

J43 short ( default )

J43 open

**Table 3-15 Pin Mux Controlled by Setting Jumper J43 Open or Short**

MT8395 GPIO	Port Y0 of Switch IC (J43 Short)	Port Y1 of Switch IC (J43 Open)
GPIO00	MSDC2_CMD	RasPi_GPIO_00
GPIO01	MSDC2_CLK	RasPi_GPIO_01
GPIO02	MSDC2_DAT3	RasPi_GPIO_02
GPIO03	MSDC2_DAT0	RasPi_GPIO_03
GPIO04	MSDC2_DAT2	RasPi_GPIO_04
GPIO05	MSDC2_DAT1	RasPi_GPIO_05
GPIO57	DSI1_LCM_RST	RasPi_GPIO_57
GPIO65	MT7663_I2S_DO	RasPi_GPIO_65
GPIO66	MT7663_I2S_BCK	RasPi_GPIO_66
GPIO67	MT7663_I2S_DI	RasPi_GPIO_67
GPIO68	MT7663_I2S_LRCK	RasPi_GPIO_68
GPIO100	UART_RTS_D	RasPi_GPIO_100
GPIO101	UART1_CTS_D	RasPi_GPIO_101
GPIO102	UART1_TX	RasPi_TXD
GPIO103	UART1_RX	RasPi_RXD
GPIO107	DSI1_DSI_TE	RasPi_PWM

## 4 Camera Daughter Board

There are two camera boards incorporated with Genio 1200 EVK: D2 and D6 camera daughter board (DTB).

Genio 1200 EVK built in with three CAM connectors, and the configure is setting as below:

**Table 4-1 Camera Configure (CAM Connector)**

Camera Configure	Front Camera	Rear Camera
Configure 1 (Default)	CAM 0	CAM 2
Configure 2	CAM 1	CAM 2

### 4.1 D2 Camera Daughter Board

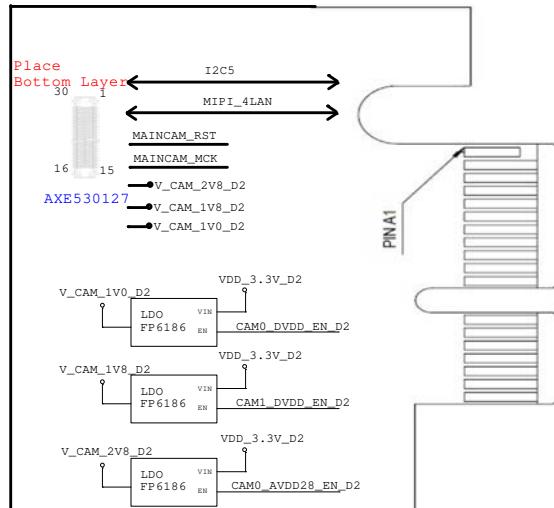
The D2 camera DTB integrated with a SONY IMX214-0AQH5-C image sensor chip, which is a high-performance camera image processor with rich features.



**Figure 4-1 D2 Camera DTB**

#### 4.1.1 Key Feature and Block Diagram

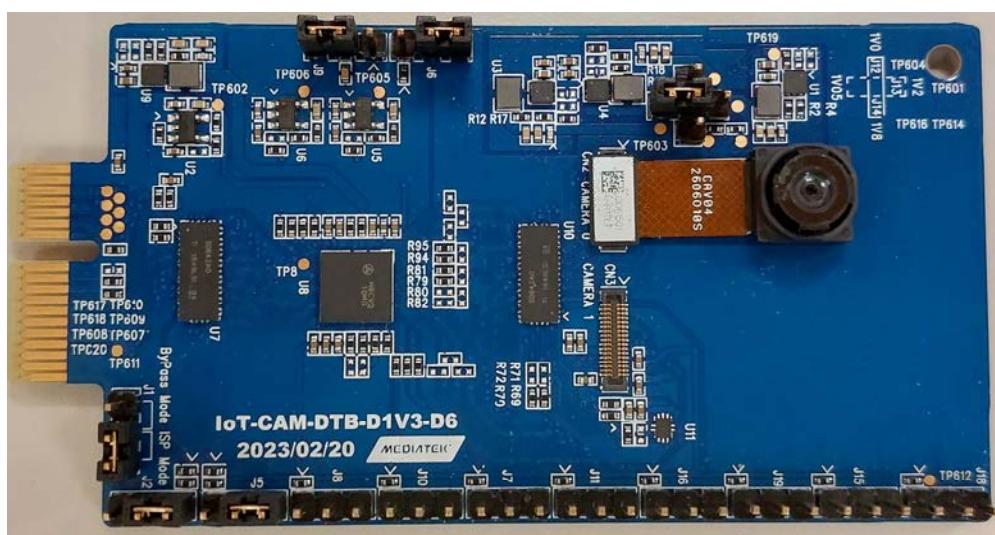
- Support 4-Lane MIPI CSI Interface and connect with main board through a 36 pin Gold-Finger.
- Integrate a 1.0V LDO circuit for camera digital power supply, a 2.8V LDO circuit for camera analog power supply and a 1.8V LDO circuit for camera I/O power supply.



**Figure 4-2 Block Diagram of D2 Camera DTB**

## 4.2 D6 Camera Daughter Board

The D6 camera DTB has two MIPI CSI paths, one connecting directly with the processor (MT8395) on the main board, and another connecting with the main board through an ISP (On-Semiconductor AP1302CSSL00SMGA0-DR). These two MIPI paths are switched by a MIPI multiplexer (TI TS3DV642RUARQ1).



**Figure 4-3 D6 Camera DTB**

## 4.2.1 Key Feature and Block Diagram

- Support 4-Lane MIPI CSI Interface and connect with main board through a 36 pin Gold-Finger
- Supports camera module with/without ISP (On-Semiconductor AP1302CSSL00SMGA0-DR)
- 8M pixel camera modules (VF08001 with ON-Semiconductor CMOS image sensor AR0830)
- Since there is only one CSI interface from the main board, the D6 DTB can support two camera modules, with ISP and without ISP, switched by a MIPI multiplexer (TI TS3DV642RUARQ1)

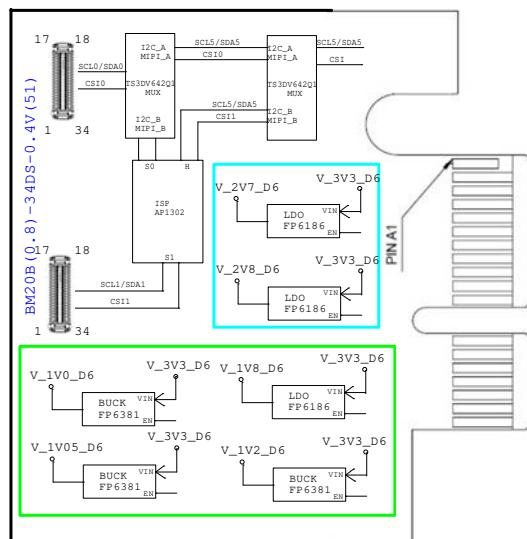


Figure 4-4 Block Diagram of D6 Camera DTB

## 4.2.2 Configure D6 Camera DTB

Table 4-2 Configure D6 Camera DTB

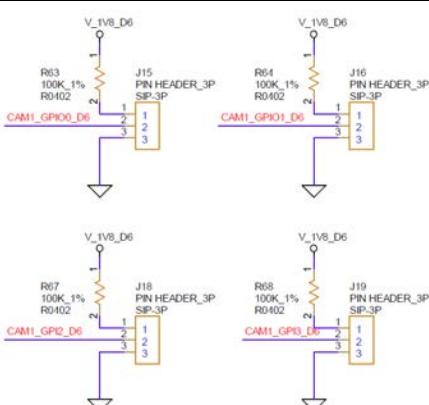
Schematic	Description
<b>I2C ID Select</b> 	(1) Jumper@1-2: ISP I2C address = 0x7A (2) Jumper@2-3: ISP I2C address = 0x78
<b>TESTMODE Select</b> 	(1) Jumper@1-2: Test Mode (2) Jumper@2-3: Normal

Schematic	Description																												
	(1) Jumper@ 1-2: ISP Mode (2) Jumper@ 2-3: Bypass Mode																												
	(1) Jumper@ 1-2: ISP Mode (2) Jumper@ 2-3: Bypass Mode																												
	(1) Jumper@ J13.1-J13.2: VDD = 1.05V (2) Jumper@ J13.2-J13.3: VDD = 1.2V (3) Jumper@ J12.1-J13.2: VDD = 1.0V (4) Jumper@ J14.1-J13.2: VDD = 1.8V																												
<table border="1"> <tr> <th>CAM0 + CAM1</th> <th>R79</th> <th>R80</th> <th>R81</th> <th>R82</th> <th>R94</th> <th>R95</th> </tr> <tr> <td>2 Lane + 2 Lane</td> <td>NM</td> <td>NM</td> <td>NM</td> <td>NM</td> <td>NM</td> <td>NM</td> </tr> <tr> <td>3 Lane + 3 Lane</td> <td>NM</td> <td>OR</td> <td>NM</td> <td>OR</td> <td>OR</td> <td>OR</td> </tr> <tr> <td>4 Lane + 2 Lane</td> <td>OR</td> <td>NM</td> <td>OR</td> <td>NM</td> <td>OR</td> <td>OR</td> </tr> </table>	CAM0 + CAM1	R79	R80	R81	R82	R94	R95	2 Lane + 2 Lane	NM	NM	NM	NM	NM	NM	3 Lane + 3 Lane	NM	OR	NM	OR	OR	OR	4 Lane + 2 Lane	OR	NM	OR	NM	OR	OR	Number of data lanes can be set according to the resistors table in the left picture.
CAM0 + CAM1	R79	R80	R81	R82	R94	R95																							
2 Lane + 2 Lane	NM	NM	NM	NM	NM	NM																							
3 Lane + 3 Lane	NM	OR	NM	OR	OR	OR																							
4 Lane + 2 Lane	OR	NM	OR	NM	OR	OR																							

#### 4.2.3 D6 Camera DTB Optional Function

Table 4-3 Optional Function of D6 Camera DTB

Schematic	Description
	GPIO[0]: Flash output (default), all input options in GPI[2]. GPIO[1]: Shutter output (default), 3-D daisy chain communication output and all options in GPI[2]. GPI[2]: SADDR and standby. GPI[3]: 3D daisy chain communication input and all options in GPI[2].

Schematic	Description
	<p><b>GPIO[0]:</b> Flash output (default), all input options in GPI[2].</p> <p><b>GPIO[1]:</b> Shutter output (default), 3-D daisy chain communication output and all options in GPI[2].</p> <p><b>GPI[2]:</b> SADDR and standby.</p> <p><b>GPI[3]:</b> 3D daisy chain communication input and all options in GPI[2].</p>

## 5 Power Distribution

### 5.1 Power Distribution

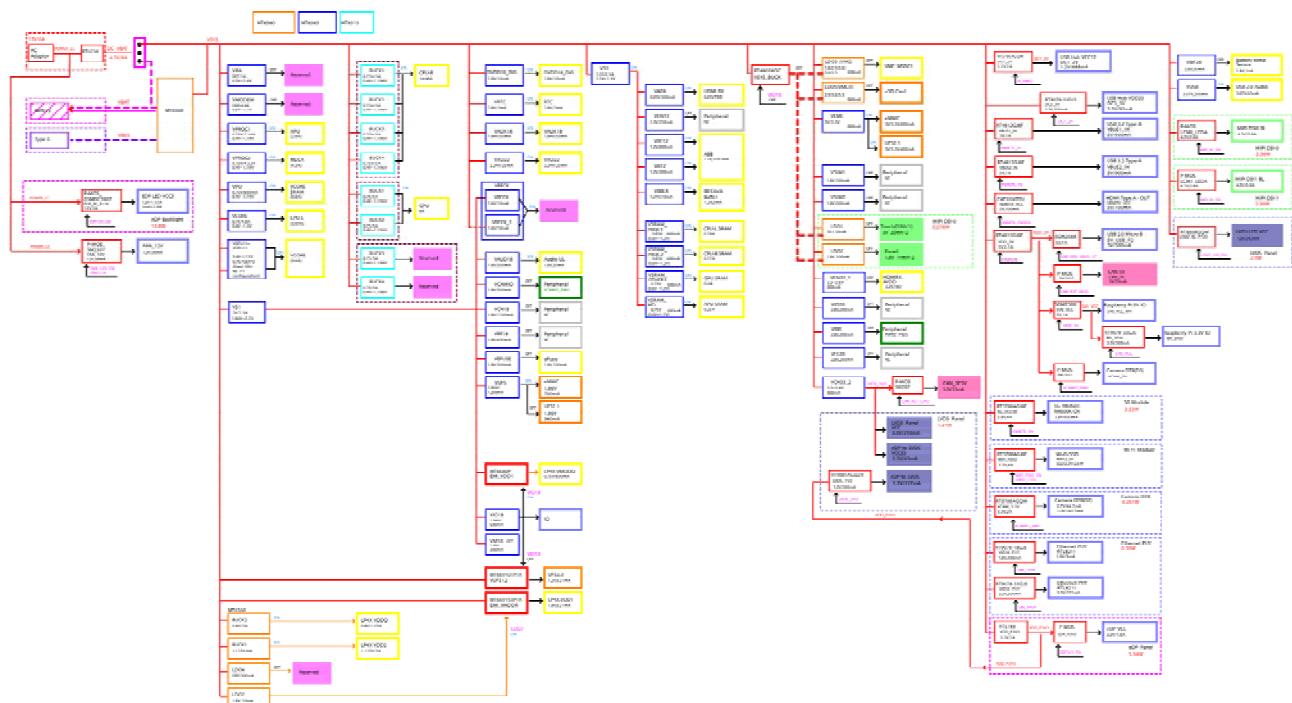


Figure 5-1 Power Distribution

## 6 Software

- Genio 1200 EVK is supported by two different software stacks: Android and Yocto. The pre-installed software for Genio 1200 EVK is Android
- Another software stack, IoT Yocto, is also provided as a separate download. The following sections describe how to build, get, and flash the images for Android and Yocto system respectively

### 6.1 Android

#### 6.1.1 Android Software Project and Configuration

*Table 6-1 Android Project Name and Configuration*

Project Name	Configuration
AIOT8395P6_64_BSP	IoT EVK+MT7921

#### 6.1.2 How to Get Android Software Image

Please contact with your VAR, Distributor, MediaTek FAE.

#### 6.1.3 Android Software Image Flash Method

Following steps can reflash the system codes of Genio 1200 EVK board.

1. Connect ADB port to PC via USB Type-C connector (J12)
2. Execute MediaTek Flash Tool
3. Select the proper Android scatter txt file
4. Select the download mode (“Firmware Upgrade” is preferred.)
5. Start download by pressing the button of “Download”
6. Plug in the DC power cord, the downloader will start

**Note:** If the downloader does not start, please press Download button and plug in the DC power cord will execute a force download.

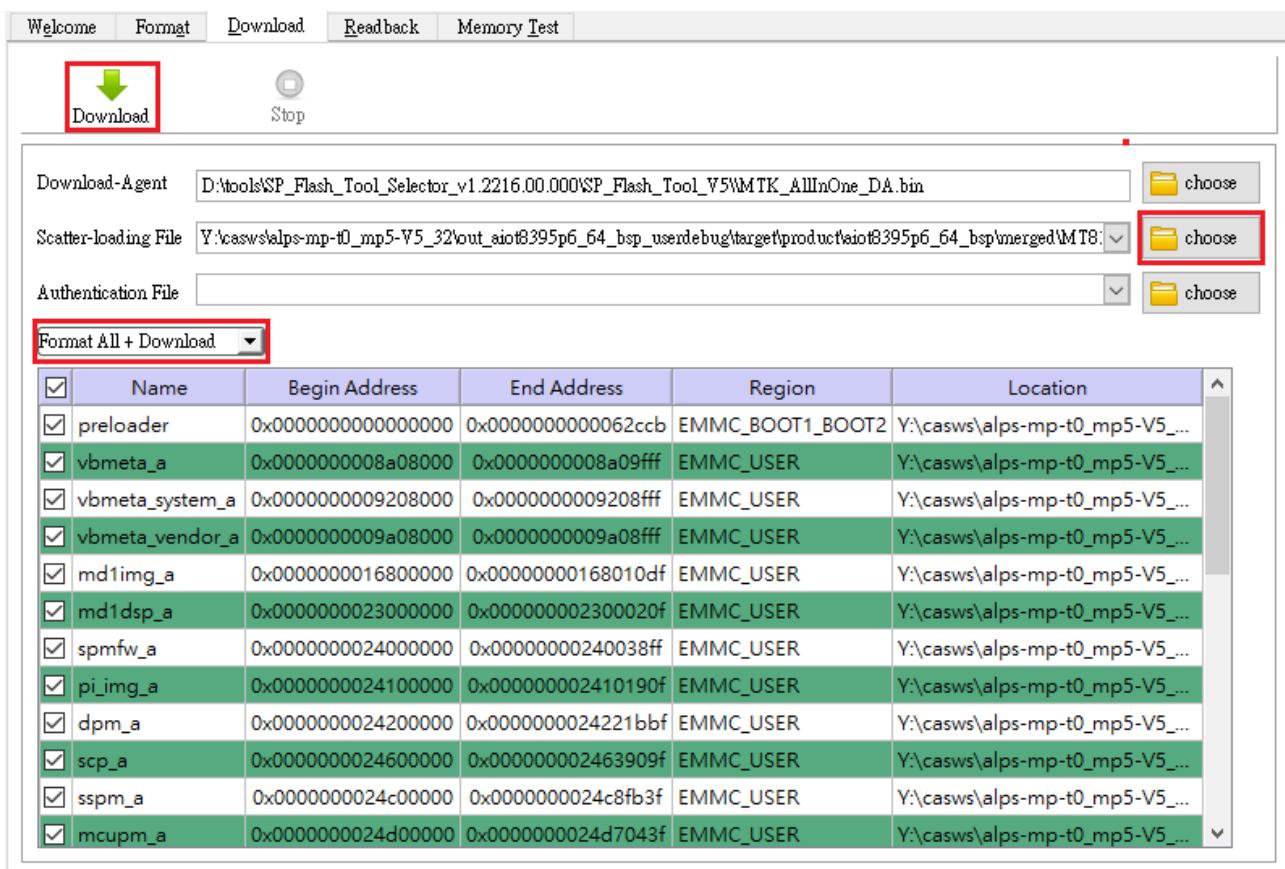


Figure 6-1 Flash Tool Window



Figure 6-2 Download Port

## 6.2 Yocto

The Yocto software for Genio 1200 EVK is IoT Yocto.

Please note that the enabled board hardware and supported features of IoT Yocto is different from Android.

For an overview, please refer to: <https://mediatek.gitlab.io/aiot/doc/aiot-dev-guide/>

**Please note that then entire eMMC (except for data stored in eMMC RPMB) will be erased if you flash the board with IoT Yocto images.**

### 6.2.1 Yocto Software Project and Configuration

The build environment for IoT Yocto, and Yocto projects in general, is different from Android. To build Genio 1200 EVK with IoT Yocto, you need to setup Yocto build environment first:

<https://mediatek.gitlab.io/aiot/doc/aiot-dev-guide/master/sw/yocto/get-started/env-setup.html>

After the build environment is ready, set the bitbake MACHINE configuration to genio-1200-evk. Please visit the website for detail:

<https://mediatek.gitlab.io/aiot/doc/aiot-dev-guide/master/sw/yocto/get-started/build-code.html#build-images-for-genio-evk-boards>

### 6.2.2 How to get Yocto Software Image

To download the latest prebuilt board images, please visit:

<https://mediatek.gitlab.io/aiot/doc/aiot-dev-guide/sw/yocto/download.html#prebuilt-board-images>

### 6.2.3 Yocto Software Image Flash Method

IoT Yocto images uses a different tool to flash board images. Please visit the following link to install the flash tool for IoT Yocto on your computer:

<https://mediatek.gitlab.io/aiot/doc/aiot-dev-guide/master/sw/yocto/get-started/env-setup.html>

After the flash tool has been installed, visit this page to flash the downloaded prebuilt image package:

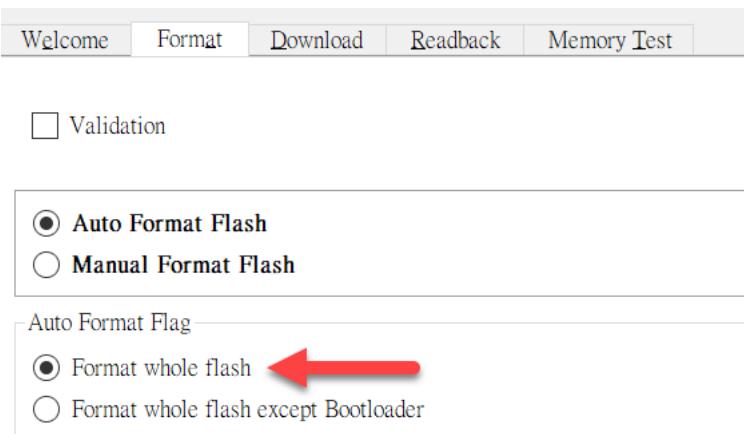
<https://mediatek.gitlab.io/aiot/doc/aiot-dev-guide/master/sw/yocto/get-started/flash.html>

## 6.3 How to switch Android Image and Yocto Image

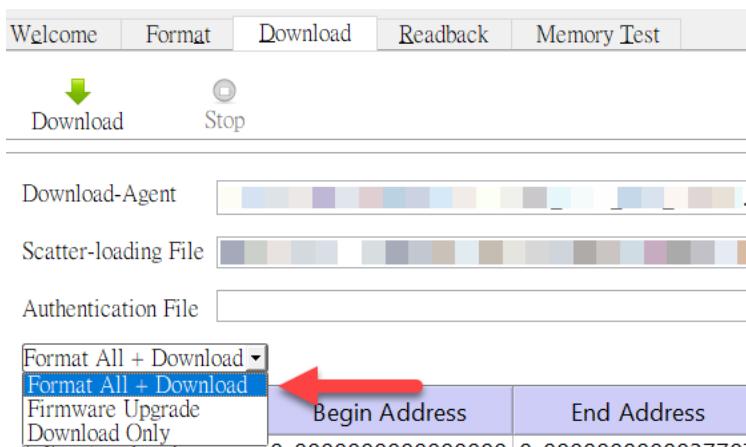
Please note that the storage partition layout of Android and Yocto are different, and the boot flow is also different. Consequently,

1. When flashing IoT Yocto images, **eMMC storage (except for data stored in eMMC RPMB) will be erased**, as the IoT Yocto flash tool always format the storage partitions, making the steps the same regardless the existing image on the board storage.
2. To flash Android images to a board with IoT Yocto images already flashed, you'll need to:

A. Configure the “Format” option as “Format whole flash”:



B. Select “Format All + Download” option before flashing the Android image:



C. You need to manually set the board into “Download Mode” by keeping pressing the “Download” button on the EVK while resetting the board.

## 7 Appendix

### 7.1 The Reason Why Camera Icon Disappears on Home Screen and How to Resolve It

This is because the camera app detects the existence of camera sensor from Android 4.1.

If there's no camera sensor, it hides the camera icon.

The detection is made the very first boot up time the device flashed with a new SW. If it does not find the camera sensor, the icon is hidden permanently even the camera sensor is plugged afterward.

Step:

1. Power off the Genio 1200 EVK
2. Install the camera DTB into one of the camera connectors and power on the Genio 1200 EVK
3. Execute Factory reset:  
Settings -> System -> Reset options -> Erase all data (factory reset) -> ERASE ALL DATA -> ERASE ALL DATA
4. Genio 1200 EVK will auto power on
5. Check the camera function

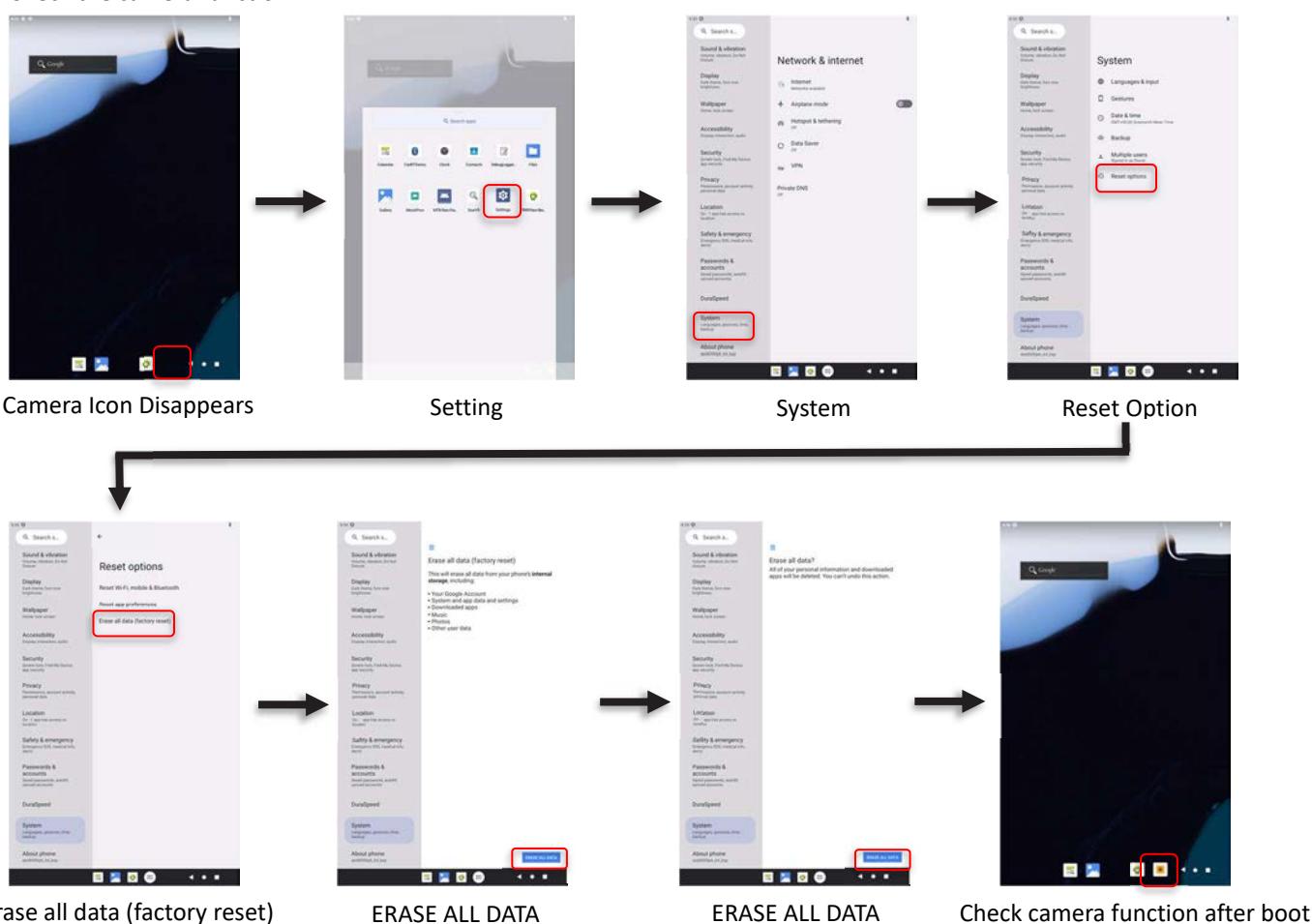


Figure 7-1 Factory Reset

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