AVerMedia QL601

Applies to Qualcomm® Dragonwing QCS6490 processor

AVerMedia Technologies, Inc.
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Preface

Disclaimer

The information contained in this quick guidance, including but not limited to any product specification is subject to change without notice. AVerMedia assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the quick guidance.

Technical Support

If you experience the difficulty after reading this manual and/or using the product, please contact the reseller from which you purchased the product. In most cases, the reseller can help you with the product installation and the difficulty you encountered.

In case the reseller is not able to resolve your problem, our highly capable global technical support team can certainly assist you. Our technical support section is available 24 hours a day and 7 days a week through our website, with the click here. For more contact information, you may find it in the section of AVerMedia Global Offices.

Contact Enquiry

For more information of our products, pricing, and order placement, please fill in our inquiry form here, we will contact you within 24 hours.

Download User Manual

This product is currently in the Proof of Concept (PoC) stage. The User Manual is still under development and will be made available for download on our official website once completed.

Revision History

Revision	Date	Updates
V1.0	2025.07.30	PoC Sample Release
V2.0	2025.09.05	1st Sample Release

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Limited Product Warranty

AVerMedia provides a one-year product warranty. Should this product, in AVerMedia's opinion, fail to be in good working order during the warranty period, AVerMedia will, at its option, repair or replace it at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster, or non-AVerMedia authorized modification or repair.

You may obtain the warranty service by delivering this product to an authorized AVerMedia business partner or to AVerMedia along with the proof of purchase. Products returned to AVerMedia must be pre-authorized by AVerMedia with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured, and packaged for safe shipment. AVerMedia will return the product by prepaid shipment service.

It is not recommended to disassemble the box PC, which will impact on the warranty. The limited product warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, AVerMedia reserves the right to substitute an equivalent product if available or to retract the product warranty if no replacement is available.

The above product warranty is the only warranty authorized by AVerMedia. Under no circumstances will AVerMedia be liable in any way for any damage, including any lost profits, lost savings, or other incidental or consequential damages arising out of the use of, or inability to use, such product.

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ESD Warning

Electronic components and circuits are sensitive to Electrostatic Discharge (ESD). When handling any circuit board assemblies including AVerMedia products, it is highly recommended that ESD safety precautions can be observed. ESD safe best practices can include but are not limited to the following ones.

1. Leave the circuit board in the antistatic package until it is ready to be installed.
2. Use a grounded wrist strap when handling the circuit board. At a minimum, you need to touch a grounded metal object to dissipate any static charge, which may be present on you.
3. Avoid handling the circuit board in the carpeted areas.
4. Handle the board by the edges and avoid contact with the components.
5. Only handle the circuit boards in ESD safe areas, which may include ESD floor and/or table mats, wrist strap stations, and ESD safe lab coats.

Safety Precaution

1. All cautions and warnings on the device should be noted.
2. For safety consideration, do NOT open the device if not a qualified service stuff.
3. Place the device on a solid surface during installation to prevent falls.
4. Keep the device away from humidity.
5. Do NOT leave this device in an un-controlled environment with temperatures beyond the device's permitted storage temperature to avoid damage.
6. All adaptors and cables supplied by AVerMedia are verified. Do NOT use any others not supplied by AVerMedia to avoid any malfunction or fires.
7. Make sure the power source matches the power rating of the device.
8. Place the power cord where people cannot step on it. Do not put anything on the power cord.
9. Always completely disconnect the power while the device is not usage or idle for a long time.
10. Disconnect the device from any AC supply before cleaning. While cleaning, use a damp cloth instead of liquid or spray detergents.
11. Make sure the device is installed near a power outlet and easy for accessible.
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out the heatsink or heat spreader of the device when the system is running.
14. Never pour any liquid into the openings. This could cause fire or electric shock.
15. The static electricity should be noted while installing any internal components. Consider to use a grounding wrist strap and put all electronic parts in static-shielded containers.

If the following situations occur, please contact our service personnel:

(1) The device is dropped or damaged
(2) Damaged power cord or plug
(3) Exposure to moisture
(4) Liquid intrusion into the device
(5) Any obvious signs of damage displayed on the device
(6) Device is not working as expected or in a manner as described in this manual

1.0 Introduction

AVerMedia QL601 includes fully featured carrier board/box pc which is all developed for Qualcomm® Dragonwing QCS6490 processor. AVerMedia provides access to a wide range of latest interfaces on Qualcomm® Dragonwing QCS6490 processors.

QL601 provide multiple I/O include one HDMI video output, one DP video output, two USB 3.0 ports, two USB 2.0 ports, one GbE RJ-45 port, 40-pin expansion, one 4 Lane MIPI CSI-2 and one M.2 Key B.

Operating with Qualcomm® Dragonwing QCS6490 processor and the rich I/O functions, AVerMedia QL601 is the perfect choice for high-end performance AI edge computing platform for both industrial and commercial use cases.

1.1 Product Specifications

Platform/ Computing Power	Qualcomm® Dragonwing™ QCS6490 / 12.5TOPS
Memory and Storage	LPDDR4 x 8GB + UFS2.2 128GB
Networking	• 1 x GbE RJ-45 • 802.11ax Wi-Fi and Bluetooth 5.2 • 1 x M.2 Key B for LTE/5G; Micro SIM slot
Display Output	• 1 x HDMI output 3840 x 2160 at 60Hz • 1 x DP output 1920 x 1080 at 60Hz • 1 x 4 Lane MIPI-DSI
Temperature	-10°C~55°C Storage temperature 0°C ~ 75°C Relative humidity 40 °C @ 95%, Non-Condensing
MIPI Camera	• 1x 4-lane MIPI-CSI, 22pin FPC 0.5mm pitch (disable on Windows 11 IoT)
USB	• 2 x USB 2.0 type A (shared) • 2 x USB 3.0 Type-A (shared with M.2 Key B) • 1 x USB Type-C (BSP Flash)
Audio	1 x MIC.in/Line Out (disable on Windows 11 IoT)
Storage	1x micro-SD card slot
Expansion Header	• 40-pin Header : 2 x 3.3V DC power, 2 x 5V DC power, 1 x UART, 2 x SPI, 1 x PWM, 10 x GPIO, 2 x I2C
Input Power	• 3.5mm Screw Terminal; 12V/5A, 9V~20V is recommended
Power Cord	US/JP/EU/UK/TW/AU/CN (optional)
Buttons	Power and Reset
RTC Battery	Support RTC Battery (disable on Windows 11 IoT)
Dimensions	L: 142 mm x W: 92 mm x H: 61.6 mm (Box PC) L: 98.4 mm x W: 88.5 mm x H: 26.5 mm (SBC) Weight: 758g (Box PC); 84.2 g (SBC)
Certifications	CE, FCC, KC, VCCI
Operating System	Ubuntu20.04/Windows11 IOT/Android13/Qualcomm Linux1.3

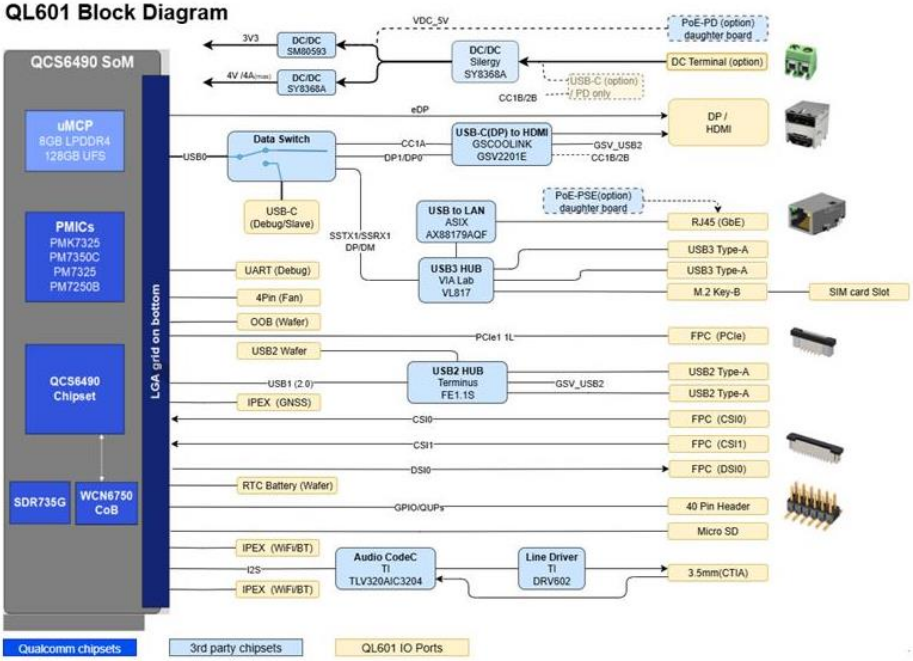
1.2 Optional Accessory

Item	QL601
OOB Board (RMII)	Support remote device management services
PSE Board	Support both power and data over a single Ethernet cable 1x 802.3af (PSE); Maximum 15.4W
PCIe to Ethernet Board	Support one more GbE-RJ45 port
PCIe to M.2 Key Adapter	Support extra SSD expansion

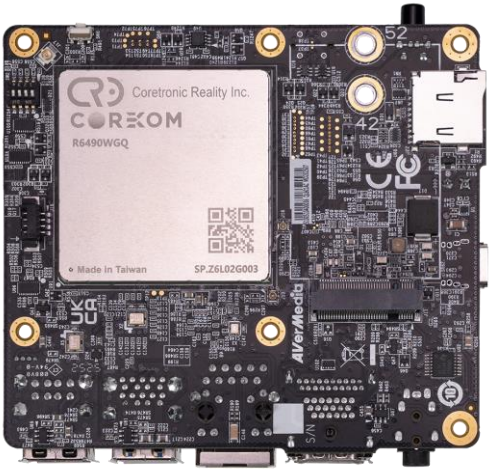
UART Cable	Support for serial communication between devices, commonly for data transfer, debugging, and firmware updates.

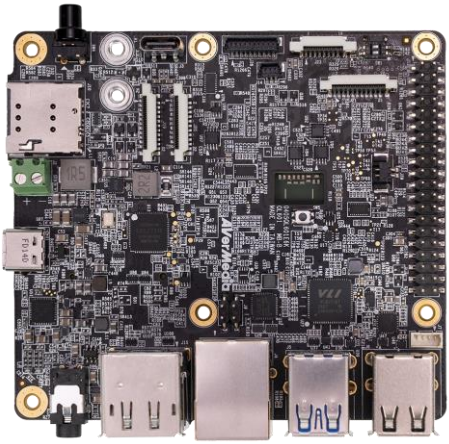
2.0 Product Overview

2.1 Block Diagram



2.2 Front View and Back View of Single board computer





2.3 Front View and Back View of Box PC

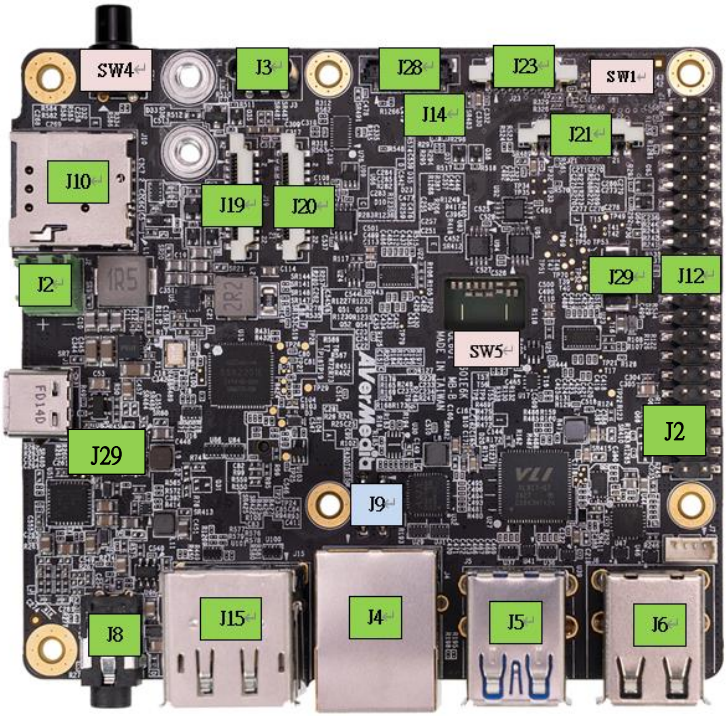
TBA

2.4 Carrier Board Interface

Top View Interface

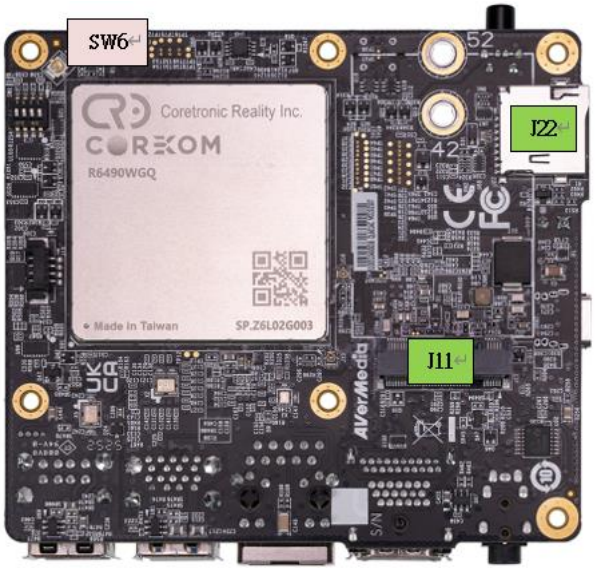
J2	DC Input Terminal
J3	USB Type-C connector (Download only)
J4	Gigabit Ethernet Connector w/LEDs and PoE-PSE
J5	USB 3.2 Gen1 Dual Port Type A Connector
J6	USB 2.0 Dual Port Type A Connector

J8	Audio Line Out/ Mic. In 3.5mm(CTIA) Connector
J10	Micro SIM card socket (Push-Push)
J11	M.2 B-Key Socket
J12	40 Pin Expansion Header
J14	Debug UART Wafer
J15	HDMI output Type-A Connector
J19	MIPI-CSI0 Input Connector
J20	MIPI-CSI1 Input Connector
J21	MIPI-DSI Input Connector
J23	PCIe FPC Connector
J29	External RTC Battery wafer
J9	PoE Power Connector
SW4	Power button
SW5	F_DL button
SW1	Download mode switch



Bottom View Interface

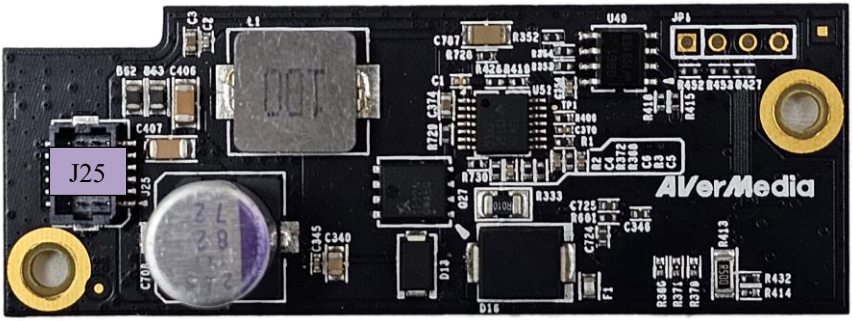
J11	M.2 B-key Socket for LTE/5G Module
J22	Micro SD Card Socket (Push-Push)
SW6	Reset button



2.5 PoE-PSE Board Interface

Top View Interface

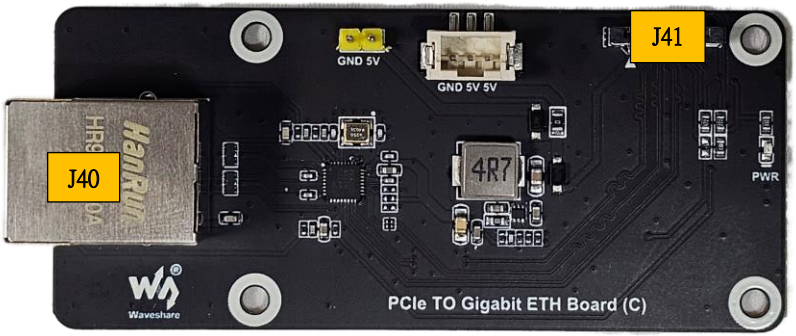
J25	PoE-PSE I/O Connector



2.6 PCIe to GbE Board Interface

Top View Interface

J40	Gigabit Ethernet Connector w/LEDs
J41	PCIe FPC Connector



2.7 OOB(Out-of-Band) Board Interface

Top View

J1	Gigabit Ethernet Connector w/LEDs
J7	OOB Wafer

3.0 Feature Description

3.1 DC Input Terminal

Function	DC power input connector
Location	J2
Type Description	SWITCHLAB 2pin socket
Manufacturer and Part Number	SWITCHLAB, MB332-350M02
Mating Connector	Any cable attached with DC power supplier connector.
Pinout	

Pin #	Description
PIN 1	+ DC Power
PIN 2	- GND

3.2 USB Type-C connector (Download only)

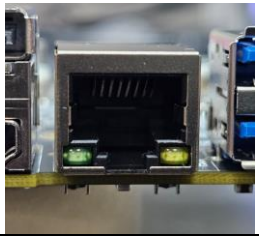
Function	For Emergency download (EDL) mode
Location	J3
Type Description	USB 3.1 Type-C female connector
Manufacturer and Part	Dongguan Compupack Technology ACNUB220027-001

Number		
Mating Connector	Any Standard Type-C interface cable or device.	
Pinout		

Pin#	Description	Pin#	Description
A1	GND	B12	GND
A2	TX1+	B11	RX1+
A3	TX1-	B10	RX1−
A4	VBUS	B9	VBUS
A5	CC1	B8	—
A6	D+	B7	D-
A7	D-	B6	D+
A8	—	B5	CC2
A9	VBUS	B4	VBUS
A10	RX2−	B3	TX2−
A11	RX2+	B2	TX2+
A12	GND	B1	GND

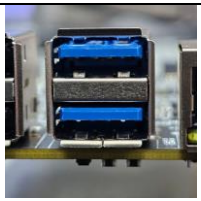
Remarks	None

3.3 Gigabit Ethernet Connector w/LEDs and PoE-PSE

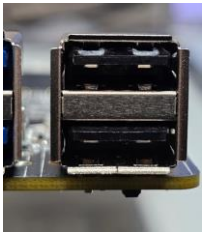
Function	For Gigabit Ethernet and PoE-PSE	
Location	J4	
Type Description	RJ45 W/TRANSFORMER 100/1000 BASE W/LED	
Manufacturer and Part Number	CONTACT TECHNOLOGY CORP. MJ45-111QC4A-GY-S307	
Mating Connector	Any standard 1Gb Ethernet mating connector can be applicable.	
Pinout	Comply with Ethernet standards.	
Remarks	None	

3.4 USB 3.2 Gen 2 Type-A Connector #1 , #2

Function	USB 3.2 Gen 2 Type-A connector #1 #2	

Location	J5	
Type Description	Dual-port USB 3.2 Gen 2 Type-A female connector	
Manufacturer and Part Number	冠泰 Champway CU3B-AFR15U-096H	
Mating Connector	Any USB 3.2 Gen 2 standard Type-A interface cable or device.	
Pinout	Please refer to USB 3.2 Gen 2 standard.	
Remarks	None	

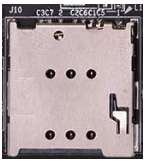
3.5 USB 2.0 Gen 1 Type-A Connector #1 , #2

Function	USB 2.0 Gen 1 Type-A connector #1 #2	
Location	J6	
Type Description	Dual-port USB 2.0 Gen 1 Type-A female connector	
Manufacturer and Part Number	捷湧 EDL UAF208D010B	
Mating Connector	Any USB 2.0 standard Type-A interface cable or device.	
Pinout	Please refer to USB 2.0 Gen 1 standard.	
Remarks	None	

3.6 Audio 3.5mm(CTIA) Connector

Function	Audio Line Out/ Mic. In 3.5mm(CTIA) Connector	
Location	J8	
Type Description	Audio Line Out/ Mic. In 3.5mm(CTIA) Connector	
Manufacturer and Part Number	京政電子 JKCR Electronics Co., Ltd. PJD-035-79SAZ1-R-M	
Mating Connector	Any 3.5mm CTIA standard interface cable or device.	
Pinout	Please refer to CTIA standard.	
Remarks	None	

3.7 Micro SIM Card Socket (Push-Push)

Function	Micro SIM Card	
Location	J10	
Type Description	SOCKET_MICRO SIM CARD_8PIN_90°_SMD	
Manufacturer and Part Number	福軒 Fullglory FG-0271AAAG06A PUSH PUSH 1.42H	
Pinout	Refer to Micro SIM card standard	
Remark	Push Push type	

3.8 M.2 B-Key Socket 3042/3052

Function	For LTE/5G expansion module	
Location	J11	
Type Description	M.2 B-Key Socket	
Manufacturer and Part Number	鴻騰精密科技 Foxconn Interconnect Technology Limited 2E0BC21-S85BB-7H (H8.5 ㎜)	
Mating Connector	M.2 B-Key standard USB2 / USB3 interface device.	
Pinout	Please refer to M.2 B-Key standard.	
Remarks	None	

3.9 Expansion 40 Pin Header

Function	Extended power supply, UART, SPI, PWM, GPIO, I2C signal	
Location	J12	
Type Description	Pin Hheader_2.54*2.54mm_90°_SMD	
Manufacturer and Part Number	頻銳 PINREX TECHNOLOGY CORP. 212-92-20GBE1	
Mating Connector	Pin Socket_2.54*2.54mm or 2.54mm Dupont Connector Female Terminal	

Pinout

Pin	Description	Pin	Description
1	+3V	2	+5V
3	I2C1 SDA	4	+5V
5	I2C1 SCL	6	GND
7	GPIO_16	8	UART0 TX
9	GND	10	UART0 RX
11	SPI1 CE1	12	SPI1 CE0
13	GPIO_111	14	GND
15	GPIO_112	16	GPIO_110
17	+3V	18	GPIO_109
19	SPI0 MOSI	20	GND
21	SPI0 MISO	22	GPIO_12
23	SPI0 SCLK	24	SPI0 CE0
25	GND	26	SPI0 CE1
27	I2C0 SDA	28	I2C0 SCL
29	GPIO_34	30	GND
31	GPIO_35	32	PWM0
33	GPIO_17	34	GND
35	SPI1 MISO	36	SPI1 CE2
37	GPIO_13	38	SPI1 MOSI
39	GND	40	SPI1 SCLK

Remarks: None

3.10 Debug UART Wafer

Function	For UART interface
Location	J14
Type Description	WAFER_1*3PIN_1 ㎜_180°
Manufacturer and Part Number	Aces Electronics 50228-00371-001
Mating Connector	Molex 510210300 or equivalent
Pinout	

	Pin# / Description 1 / TX 2 / GND 3 / RX	
Remarks	None	

3.11 DP & HDMI Output Connector

Function	DP + HDMI output connector	
Location	J15	
Type Description	DP+HDMI Type-A female connector	
Manufacturer and Part Number	光桀 Light Jie Co.,Ltd. DPRRA009-39	
Mating Connector	Any DP & HDMI Type-A interface cable or device.	
Pinout	Please refer to DP & HDMI standard.	
Remarks	None	

3.12 Micro SD Card Socket (Push-Push)

Function	Micro SD Card	
Location	J22	
Type Description	SOCKET_MICRO SD CARD_9PIN_90°_SMD	
Manufacturer and Part Number	福軒 Fullglory FG-0011BAAS09A	
Pinout	Refer to MicroSD card standard	
Remark	Push-Push	

3.13 MIPI CSI0 FPC Connector

Function	MIPI-CSI0 device with 22Pin FPC	
Location	J19	
Type Description	0.5mm 22PIN ZIF FPC CONN SMT S/T TYPE	
Manufacturer and Part Number	宏致_ACES 50554-02241-003	
Mating Connector	0.5mm 22Pin FPC.(Thickness:0.3+/-0.03)	

Pinout	
Remarks	None

Pin	Description	Pin	Description
1	+3V	2	CCI_I2C0_SDA
3	CCI_I2C0_SCL	4	GND
5	CSI0_LED_EN_XCLK	6	CSI0_POWER_EN
7	GND	8	CSI0_LN3P
9	CSI0_LN3M	10	GND
11	CSI0_LN2P	12	CSI0_LN2M
13	GND	14	CSI0_CLKP
15	CSI0_CLKM	16	GND
17	CSI0_LN1P	18	CSI0_LN1M
19	GND	20	CSI0_LN0P
21	CSI0_LN0M	22	GND

3.14 MIPI CSI1 FPC Connector

Function	MIPI-CSI1 device with 22Pin FPC
Location	J20
Type Description	0.5mm 22PIN ZIF FPC CONN SMT S/T TYPE
Manufacturer and Part Number	宏致_ACES 50554-02241-003
Mating Connector	0.5mm 22Pin FPC.(Thickness:0.3+/-0.03)

Pinout	<table><tr><th>Pin</th><th>Description</th><th>Pin</th><th>Description</th></tr><tr><td>1</td><td>+3V</td><td>2</td><td>CCI_I2C1_SDA</td></tr><tr><td>3</td><td>CCI_I2C1_SCL</td><td>4</td><td>GND</td></tr><tr><td>5</td><td>CSI1_LED_EN_XCLK</td><td>6</td><td>CSI1_POWER_EN</td></tr><tr><td>7</td><td>GND</td><td>8</td><td>CSI1_LN3P</td></tr><tr><td>9</td><td>CSI1_LN3M</td><td>10</td><td>GND</td></tr><tr><td>11</td><td>CSI1_LN2P</td><td>12</td><td>CSI1_LN2M</td></tr><tr><td>13</td><td>GND</td><td>14</td><td>CSI1_CLKP</td></tr><tr><td>15</td><td>CSI1_CLKM</td><td>16</td><td>GND</td></tr><tr><td>17</td><td>CSI1_LN1P</td><td>18</td><td>CSI1_LN1M</td></tr><tr><td>19</td><td>GND</td><td>20</td><td>CSI1_LN0P</td></tr><tr><td>21</td><td>CSI1_LN0M</td><td>22</td><td>GND</td></tr></table>	
Remarks	None	

3.15 MIPI DSI0 FPC Connector

Function	MIPI-DSI0 device with 22Pin FPC	
Location	J21	
Type Description	0.5mm 22PIN ZIF FPC CONN SMT S/T TYPE	
Manufacturer and Part Number	宏致_ACES 50554-02241-003	
Mating Connector	0.5mm 22Pin FPC.(Thickness:0.3+/-0.03)	

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<tr><td>3</td><td>I2C_SCL</td><td>4</td><td>GND</td></tr>
<tr><td>5</td><td>GPIO37</td><td>6</td><td>GPIO36</td></tr>
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</td><td>  </td></tr>
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3.16 PCIe FPC Connector

Function	PCIe device with 16Pin FPC	
Location	J23	
Type Description	0.5mm 16PIN ZIF FPC CONN SMT S/T TYPE	
Manufacturer and Part Number	宏致_ACES 50559-01641-003	
Mating Connector	0.5mm 16Pin FPC.(Thickness:0.3+/-0.03)	

Pinout	<table><tr><th>Pin#</th><th>Description</th><th>Pin#</th><th>Description</th></tr><tr><td>1</td><td>+5V</td><td>2</td><td>+5V</td></tr><tr><td>3</td><td>GND</td><td>4</td><td>REFCLK+</td></tr><tr><td>5</td><td>REFCLK-</td><td>6</td><td>GND</td></tr><tr><td>7</td><td>RX0+</td><td>8</td><td>RX0-</td></tr><tr><td>9</td><td>GND</td><td>10</td><td>TX0+</td></tr><tr><td>11</td><td>TX0-</td><td>12</td><td>GND</td></tr><tr><td>13</td><td>PWR_EN</td><td>14</td><td>WAKE_N</td></tr><tr><td>15</td><td>CLK_REQ_N</td><td>16</td><td>RESET</td></tr></table>	
Remarks	None	

3.17 PoE-PSE board I/O Connector

Function	PoE-PSE Extension for QL601	
Location	J25	
Type Description	WAFER_2*6PIN_1 ㎜_180°	
Manufacturer and Part Number	宏致_ACES 50238-01241-001	
Pinout	<table><tr><th>Pin#</th><th>Description</th><th>Pin#</th><th>Description</th></tr><tr><td>1</td><td>POE_P0</td><td>2</td><td>+3V3_STANDBY</td></tr><tr><td>3</td><td>PORTN_OUT0</td><td>4</td><td>SDA</td></tr><tr><td>5</td><td>+54V</td><td>6</td><td>SCL</td></tr><tr><td>7</td><td>+54V</td><td>8</td><td>SYS_RST</td></tr><tr><td>9</td><td>PWR(+12V)</td><td>10</td><td>GND</td></tr><tr><td>11</td><td>PWR(+12V)</td><td>12</td><td>GND</td></tr></table>	
Remark		

3.18 External RTC Battery wafer

Function	External RTC Battery wafer	
Location	J29	
Type Description	WAFER_1*2PIN_1.25 ㎜_90°_SMD	

Manufacturer and Part Number	ACES 50271-00201-001_BLACK
Mating Connector	ACES 50271-00201-001
Pinout	Pin Number / Description 1 / GND 2 / VCOIN
Remarks	None

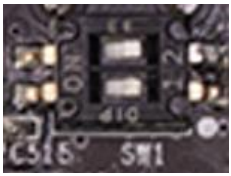
3.19 PoE connector

Function	PoE connector
Location	J9
Type Description	PIN HEADER_2.54*2.54mm_90°_SMD
Manufacturer and Part Number	頻銳 PINREX TECHNOLOGY CORP. 212-92-02GBE1
Mating Connector	Any 2.54mm pitch standard interface female
Pinout	Pin Number / Description 1 / VC2(PSE-) 2 / VC1(PSE+) 3 / VC4(PSE-) 4 / VC3(PSE+)
Remarks	None

1 2
3 4

3.20 Download mode switch

Function	Download mode switch
Location	SW1
Type Description	DIP_NDSVM-02Q-T-R_SMD4
Manufacturer and Part Number	冠泰 Champway NDSVM-02Q-T-R
Pinout	Pin Number / Description 1 / ON: Download mode OFF: Normal mode 2 / Reserved
Remarks	None



3.21 Power button

Function	Power button	
Location	SW4	
Type Description	TACT_TS104A2ME-035WBR-R_SMD-90°	
Manufacturer and Part Number	冠泰 Champway TS104A2ME-035WBR-R	
Pinout	N/A	
Remarks	None	

3.22 F_DL button

Function	F_DL button	
Location	SW5	
Type Description	TACT_TS106V1M-018BR-R_SMD	
Manufacturer and Part Number	冠泰 Champway TS106V1M-018BR-R	
Pinout	N/A	
Remarks	None	

3.23 Reset button

Function	Reset button	
Location	SW6	
Type Description	TACT_TS104A2ME-035WBR-R_SMD-90°	
Manufacturer and Part Number	冠泰 Champway TS104A2ME-035WBR-R	
Pinout	N/A	
Remarks	None	

3.24 Gigabit Ethernet Connector w/LEDs

Function	Gigabit Ethernet Connector w/LEDs	

	(PCIe to Gigabit Ethernet board)	
Location	J40	
Type Description	RJ45 with integrated magnetics	
Manufacturer and Part Number	HanRun 漢仁 HR911130A 1G-LEFT(G)+RIGHT(Y)-DOWN	
Mating Connector	Any standard 1Gb Ethernet mating connector can be applicable.	
Pinout	Comply with Ethernet standards.	
Remarks	None	

3.25 PCIe FPC Connector

Function	PCIe FPC Connector (PCIe to Gigabit Ethernet board)	
Location	J41	
Type Description	PCIE_2*8PIN_180°_SMD	
Manufacturer and Part Number	TBC	
Mating Connector	0.5mm 16Pin FPC.(Thickness:0.3+/-0.03)	

Pinout

Pin#	Description	Pin#	Description
1	+5V	2	+5V
3	GND	4	REFCLK+
5	REFCLK-	6	GND
7	RX0+	8	RX0-
9	GND	10	TX0+
11	TX0-	12	GND
13	PWR_EN	14	WAKE_N

	15	CLK_REQ_N	16	RESET	
	.				
Remarks	None				

Other Switches and Jumpers

Other switches and jumpers listed on the boards but not mentioned in this manual are reserved for the internal use by AVerMedia. They are not open to the client application.

4.0 Installation

4.1 Installation for each OS

4.1.1 Installation for Ubuntu20.04

- The input range is 9V to 20V with a ±10% tolerance, it is actually 8.1V to 22V
- Connect the power cord to the DC terminal (J2).
- Connect the UART cable to J14 3-pin connector. (Optional)
- Plug in AC power.
- Press and hold (around 2 sec) on the power button (SW4).
- If the boot procedure does not start or stop, press and hold (around 0.5 sec) on the reset button. (Optional)

(Please be careful not to shake the DC terminal)

4.1.2 Installation for Windows11 IoT

- The input range is 9V to 20V with a ±10% tolerance, it is actually 8.1V to 22V
- Connect the power cord to the DC terminal (J2).
- Plug in AC power.
- **Connect a DisplayPort (DP) monitor (require Full HD monitor).**
- Optionally, you may also connect an HDMI monitor as a secondary display.
- Press and hold (around 2 sec) on the power button (SW4).
- If no DP monitor is connected, the device will not boot up. Please remove the power, reconnect the DP monitor and the power, then turn the power on.
- The system has been preconfigured with a computer name and a user account. You may modify them if needed.

4.1.3 Installation for Android13

- The input range is 9V to 20V with a ±10% tolerance, it is actually 8.1V to 22V
- Connect the power cord to the DC terminal (J2).
- Connect the UART cable to J14 3-pin connector. (Optional)
- Plug in AC power.

- Press and hold (around 2 sec) on the power button (SW4).

- If the boot procedure does not start or stop, press and hold (around 0.5 sec) on the reset button. (Optional)

(Please be careful not to shake the DC terminal)

4.1.4 Installation for Qualcomm Linux1.3

- The input range is 9V to 20V with a ±10% tolerance, it is actually 8.1V to 22V

- Connect the power cord to the DC terminal (J2).

- Connect the UART cable to J14 3-pin connector. (Optional)

- Plug in AC power.

- Press and hold (around 2 sec) on the power button (SW4).

- If the boot procedure does not start or stop, press and hold (around 0.5 sec) on the reset button. (Optional)

(Please be careful not to shake the DC terminal)

4.2 BSP Setup Instruction

4.2.1 BSP Setup Instructions for Ubuntu20.04

BSP (board support package) file: QL601-UBUN_image.*.*.*.*.tar.gz for QL601
If you want to get the BSP download link, Please contact with AVerMedia FAE.

Default login username/password of the BSP is root/oelinux123

If you have difficulties to access the BSP download link, please visit AVerMedia website at https://professional.avermedia.com/support/download-and-faq, or contact technical support at https://professional.avermedia.com/support/technical-support or e-mail us at eusupport@avermedia.com for further assistance.

BSP Installation steps for AVerMedia QL601 board: (Important Note: Please backup your personal files before re-flashing BSP)
After you download the BSP file and put the file in a Linux PC, please refer to the steps below to re-flash BSP.

1. Let the AVerMedia QL601 initiate fastboot mode.
   Enter fastboot mode with Reset button (SW6):
   (1) Set up Download mode switch (SW1) to Download mode.
   (2) Connect the device to a 12V power supply.
   (3) Press and hold the Reset button (SW6).
   (4) Connect the QL601 device to the host machine via USB Type-C cable with QL601 download port(J3).

   Once you see the similar serial console messages as below, it means that the AVerMedia QL601 board is in the fastboot mode.

```
Fastboot: Initializing...
VB: Non-secure device: Security State: (0xFFF3F)
usb_eud_is_active: 1
Fastboot: Processing commands
VB: Non-secure device: Security State: (0xFFF3F)
VB: Non-secure device: Security State: (0xFFF3F)
Dev_Common_Speed: Dev Bus Speed: Super, state 2
Dev_Common_Speed: Dev Bus Speed: Super, state 2
Handling Cmd: getvar:product
Handling Cmd: getvar:version
```

2. Use the commands below on your PC to start re-flashing the BSP.
   $ sudo apt install android-tools-adb android-tools-fastboot
   $ tar zxvf QL601-UBUN_image.*.*.*.*.tar.gz

$ cd QL601-UBUN_image.*.*.*.*

$ ./burn.sh

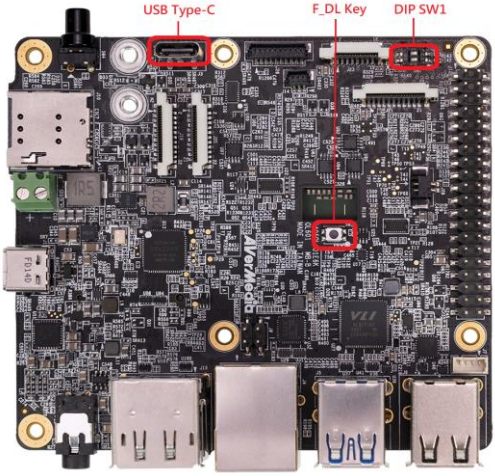
3. Emergency download (EDL) mode

To force the device into EDL mode, do the following:

1. Start EDL mode. DIP_SW1 1 switched to ON (EDL mode)

DIP_SW1	Name	Details	Default
1	EDL_DIP _SW	ON:EDL mode	OFF
2	Reserved	Reserved	OFF

2. Connect the device to a +12-V wall power supply.
3. Press and hold the F_DL button.
4. Connect the device to the host system through the USB Type-C connector.
5. Release the F_DL button. Device should now be in Qualcomm download (QDL) mode.



4. IP cam on Ethernet

4.1 Check IP cam connect port. Example:

$ifconfig

eth0 connect to IP cam.

4.2 Set the machine's network domain the same as the IP cam. Example:

$ifconfig eth0

4.3 check route table information Example:

$route

If no domain data in route table, Run under command add domain data to route table.

$ ip route add <IP>/24 dev eth0

4.4 check IP cam connect status.

Example:

$ ping

4.5 display IP cam video on HDMI interface command. export

- XDG_RUNTIME_DIR=/run/user/root && gst-launch-1.0 rtspsrc

location="rtsp://admin:admin@192.168.1.202/stream0" latency=10 ! rtph264depay ! h264parse ! avdec_h264 ! videoconvert ! waylandsink async=true sync=false

IP cam parameter: rtsp://admin:admin@192.168.1.202/stream0

4.2.2 BSP Setup Instruction for Windows11 IOT

1. About the Windows IoT BSP
   The device comes pre-flashed with the Windows IoT BSP. AVerMedia does not provide support for self-flashing or re-flashing the Windows IoT BSP. Adding the windows update version to a stable version (26100.4652).

2. Enter the BIOS menu
   To access the BIOS, use the Debug UART interface. After launching the UART console, repeatedly send the 'Home' key code (0x1b 0x5b 0x48) to the console while powering on the device. Continue sending the key code for approximately 10 seconds, then stop. The BIOS menu should appear in the UART console.

3. Sign up and update Allxon OOB config
   Follow SOP from below links:
   https://avermedia-my.sharepoint.com/:f:/p/hank_li/EusPw9VmhpxHsssVDxXeQ-QB8pTLz3v1pplU2qTqFZzeKw?e=k4ZWyG

4.2.3 BSP Setup Instruction for Android13

BSP (board support package) file: QL601-Android_image.*.*.*.*.tar.gz for QL601

If you want to get the BSP download link, Please contact with AVerMedia FAE.

If you have difficulties to access the BSP download link, please visit AVerMedia website at https://www.avermedia.com/professional/download, or contact technical support at https://www.avermedia.com/professional/technical_support or e-mail us at eusupport@avermedia.com for further assistance.

BSP Installation steps for AVerMedia QL601 board: (Important Note: Please backup your personal files before re-flashing BSP)

After you download the BSP file and put the file in a Linux PC, please refer to the steps below to re-flash BSP.

Use the Qualcomm QFIL tool to flash firmware onto the QL601 device. The process uses the Flat Build method with QFIL installed on a Windows host.

1. Setting up the Windows host

- Download and install QPM3.

(1) Go to QPM Portal at https://qpm.qualcomm.com/ . Log in using your Qualcomm

OneID credentials. If you do not have a Qualcomm OneID, create a new one by clicking “Sign up here”.

(2) Click the “Tools” tab and filter tools by “QPM”.

(3) Select “Qualcomm Package Manager 3”.

(4) Select the latest version from the list, then click “Download”.

(5) Run the downloaded installer QPM3.3.0.121.8.Windows-AnyCPU.exe.

(6) After the installation, Qualcomm Package Manager 3 will launch automatically

(7) Log in using your Qualcomm OneID credentials.

- Use QPM3 to install the Qualcomm USB Driver.

(1) Click the “Tools” tab and filter tools by “usb”.

(2) Select “Qualcomm USB Driver”.

(3) Click “Install.”

- Download and install QPST, which contains the QFIL tool.

(1) Go to QPST page at https://www.qualcomm.com/support/software-tools/tools.qualcomm-product-support-tool.fa2ec607-5c22-4d92-a4ed-ce3c96346225#overview. Log in using your Qualcomm OneID credentials. If you do not have a Qualcomm OneID, create a new one by clicking “Sign up”.

(2) Click “Download”.

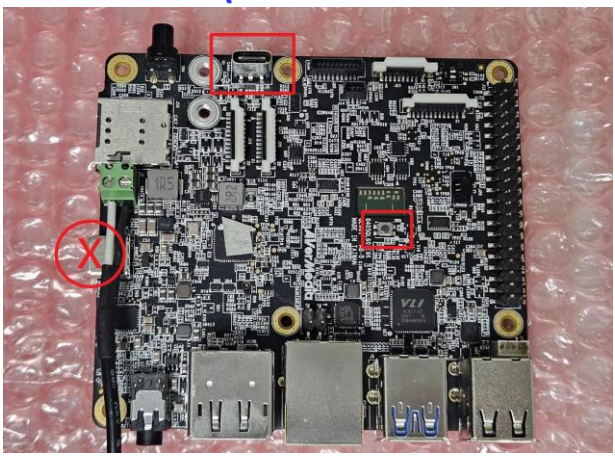
(3) Unzip QPST.WIN.2.7 Installer_00496.2.zip file and run installer QPST.2.7.496.1.exe.

2. Initiating the QL601 with EDL Mode

- Turn the switch 1 to ON.
- Connect the power cord to the DC terminal
- While pressing the button shown in the figure, connect this USB Type-C port on the device.

(1) The device will enter EDL mode and be ready for flashing.

(2) The Windows host should recognize the “Qualcomm HS-USB QDLoader 9008” device.



Notice:
Do NOT connect the USB Type-C PD port circled in the figure to the Windows host.
Doing so may cause hardware damage to the Windows host.

3. Flashing Firmware with QFIL
   - Launch the QFIL tool and follow the steps.
     (1) Click “Configuration” and set the “FireHose Configuration”.
        i. Device Type: “ufs”
        ii. Enable “Reset After Download” and “Erase All Before Download”.
     (2) Click “Select Port” and choose the “Qualcomm HS-USB QDLoader 9008” device.
     (3) Select Build Type.
        i. Choose “Flat Build”.
     (4) Select Programmer.
        i. Click “Browse” and select the “prog_firehose_ddr.elf” file in the Android image folder.
     (5) Click “Load XML”.
        i. Select all “rawprogram*.xml” files.
        ii. When prompted again, select all “patch*.xml” files.
     (6) Confirm Storage Type is set to “ufs”.
     (7) Click “Download” to begin the flashing process.
        i. Once flashing is complete, you will see a success message in the log window.
4. Follow the steps to re-boot the system.
   - Disconnect the power supply and the USB Type-C port.
   - Turn the switch 1 to OFF — this will disable power to the USB Type-C port and enable power to the HDMI, RJ45, and USB-A ports.
   - Reconnect the power supply.
5. Press the power button for 2 seconds to start the system.

4.2.4 BSP Setup Instruction for Qualcomm Linux1.3

TBD

5.0 Software

5.1 Ubuntu20.04

This section describes BSP's features for QL601

1. Support WI-FI/Bluetooth modules setup in command line.

Set up Wi-Fi Station

```
# wpa_cli -iwlan0

> add_network

> set_network 1 ssid " WiFi-SSID"

> set_network 1 psk " WiFi-password "

> enable_network 1

> q

Disable Wi-Fi connection:

# wpa_cli -i wlan0 disable_network 1
```

Set up Wi-Fi hotspot

```
Create hotspot:

# pgrep wpa_supplicant | xargs kill -9

# ifconfig wlan0 192.168.3.1 up

# hostapd -B /etc/wlan/hostapd.conf

Start DHCP server:

# dnsmasq -i wlan0 --bind-interfaces -l /data/dnsmasq.leases --no-daemon --no-resolv
--no-poll --dhcp-range=192.168.3.100,192.168.3.200,1h --listen-address=192.168.3.1 -
-dhcp-option-force=6,192.168.3.1 --server=8.8.8.8 &

Enable Internet sharing via eth0:
```

```
# iptables -t nat -A POSTROUTING -o eth0 -j MASQUERADE
```

Bluetooth

btapp

Enable BT device:

gap_menu

enable

Scan BT devices:

inquiry

Pair BT device:

pair XX:XX:XX:XX:XX:XX 0

2. USB camera

$ export XDG_RUNTIME_DIR=/run/user/root && gst-launch-1.0 v4l2src device=/dev/video2 ! image/jpeg, width=1920, height=1080, framerate=30/1 ! jpegdec ! video/x-raw, format=I420 ! waylandsink fullscreen=true async=true sync=false

3. RTC Battery

```
$ hwclock --show
```

4. Fan Speed

```
#=== Find cooling_device ===
cooling_device=""
for dev in /sys/class/thermal/cooling_device*; do
    type=$(cat "$dev/type")
    if [ "$type" == "pwm-fan" ]; then
        cooling_device=$dev
        break
    fi
done
    echo "RPM table:"
    echo " 0) 0       1) 1100      2) 1900      3) 2700"
    echo " 4) 3600   5) 4500      6) 5400      7) 6300   8) 7200   9) exit"
    echo "Enter 0~8 to change fan speed, or 9 to exit script"
    read -p "Enter fan level (0~9): " level
$echo   "$level" > “$cooling_device/cur_state”
```

5. CSI Camera

- Play one way HDMI output

```
export XDG_RUNTIME_DIR=/run/user/root && gst-launch-1.0 -e qtiqmmfsrc camera=1 name=camsrc ! video/x-raw,format=NV12,width=1920,height=1080,framerate=30/1 !  waylandsink fullscreen=true async=true sync=false
```

- Play two way HDMI output

```
export XDG_RUNTIME_DIR=/run/user/root && gst-launch-1.0 -e qtiqmmfsrc
```

camera=0 name=camsrc_0 ! video/x-raw,format=NV12,width=1920,height=1080,framerate=30/1 ! waylandsink x=0 y=0 width=480 height=270 sync=false qtiqmmfsrc camera=1 name=camsrc_1 ! video/x-raw,format=NV12,width=1920,height=1080,framerate=30/1 ! waylandsink fullscreen=true async=true sync=false

6. GPIO usage

Examples:

$ gpioset gpiochip0 <GPIO>=<level>

$ gpioget gpiochip0 <GPIO>

7. I2C

$ i2cdetect -r -y <bus>

$ i2cset -y <bus> <slave> <address> <data>

$ i2cget -y <bus> <slave> <address>

8. UART

Example:

$ stty -F /dev/ttyHS2 115200 cs8 -cstopb -parenb -echo –crtscts

$ echo 123456789 > /dev/ttyHS2

9. SPI

Example:

Use spidev_test for demo SPI

./spidev_test -D /dev/spidev0.0 -v -p "hello_0" -b 8 -s 500000

./spidev_test -D /dev/spidev1.0 -v -p "hello_1" -b 8 -s 500000

10. Audio

Example:

Audio Capture :

parec -v --rate=48000 --format=s16le --channels=2 --file-format=wav /opt/rec.wav --device=regular0

Audio Playback: # paplay /opt/rec.wav -v
Playback Volume (range 0->175) 127: 0dB, step:0.5dB # tinymix set 'PCM Playback Volume' 140
Enable HDMI audio: # amixer -c 0 cset name='DISPLAY_PORT Mixer MultiMedia4' 1

5.2 Windows11 IOT

Windows 11 IoT Enterprise (ARM version) offers a user interface that closely resembles the standard Windows 11 experience, making it easy for users to get started. Key features include:

- Start Menu and Search: Quickly access apps, settings, or search for files.
- Taskbar and Notification Area: View running programs, time, network status, and system notifications.
- File Explorer: Browse and manage files and folders on the device or network.
- Settings and Control Panel: Adjust system preferences such as network, display, sound, and user accounts.
- Multitasking and Virtual Desktops: Open multiple windows and organize tasks using virtual desktops.
- Input Support: Compatible with mouse, keyboard, touchscreen, and other common input devices.

Overall, the system operates just like regular Windows 11, so users can begin using it without needing to learn anything new.

Although Windows 11 IoT Enterprise (ARM version) looks and feels like regular Windows 11, there are several important differences that users should be aware of:

- Microsoft Store is not available: Users cannot install apps from the Microsoft Store. Only traditional desktop applications are supported.
- Cortana voice assistant is not included: Voice control and assistant features are removed from this version.
- OneDrive cloud sync is disabled by default: While it's technically possible to install OneDrive manually, it's not recommended for IoT devices due to stability and performance concerns.

- Appx and UWP applications are not supported: This version focuses on classic Win32 applications. Modern app packages (like those used on tablets or phones) cannot be installed.
- Supports x86 and x64 applications via emulation: Even though the system runs on ARM architecture, it can execute most x86 and x64 desktop applications through built-in emulation. This includes popular software like Chrome, Office, and Visual Studio Code. However, performance may vary depending on the complexity of the application, and kernel-mode components (like drivers) must be compiled natively for ARM64.

These differences make the IoT Enterprise ARM version especially suitable for devices that serve a specific function—such as factory terminals, digital signage, or retail systems—where stability, compatibility, and simplicity are key.

5.3 Android13

This section describes Android BSP's features.

1. Wi-Fi/BT
   Enable Wi-Fi/BT through the Android settings.

2. IP Camera
   Use an app (e.g., IP Camera Viewer) to play back the RTSP stream.

3. USB Camera
   Use an app (e.g., USB Camera) to play back the UVC stream.

4. RTC Battery

```
$ su
# hwclock --show
```

5. 40 Pin - GPIO

```
$ su
# gpioset gpiochip0 16=1
# gpioget gpiochip0 16
```

6. Fan speed level

```
$ su
# cooling_device=""
for dev in /sys/class/thermal/cooling_device*; do
    type=$(cat "$dev/type" 2>/dev/null)
    [ "$type" = "pwm-fan" ] && cooling_device=$dev && break
done

// Set fan level to 8 (max)
# echo 8 > "$cooling_device/cur_state"
```

```
// Set fan level to 0 (stopped)
# echo 0 > "$cooling_device/cur_state"
```

5.4 Qualcomm Linux1.3

TBD

6.0 Limitation for Windows11 IOT on QCS6490 SOM

	Function	Windows Disabled
Display Output	1 x DP output 1920 x 1080 at 60Hz	DP 4K monitor compatibility issue
	1 x 4 Lane MIPI-DSI	Not Support
Audio	1 x MIC.in / Line Out (disable on Windows 11 IoT)	Not Support
Camera Support	2 x 4-lane MIPI-CSI, 22pin FPC 0.5mm pitch (disable on Windows 11 IoT)	Not Support
Expansion Board	40-pin Headers: 2 x 3.3V DC power, 2 x 5V DC power, 1 x UART, 2 x SPI, 1 x PWM, 10 x GPIO, 2 x I2C	Not Support
Other I/O	1 x PCIe2.0	Not Support
	RTC wafer, Fan wafer, UART wafer, PoE Header	Debug UART, PoE header are enabled. The rests are not enabled yet.

7.0 Power Button/Reset Button Behavior

- Power On: Power Button 2s
- Shut Down: Reset Button 16s
- Reboot: Power Button 16s(Windows IOT) / Power Button 20s(Other OS)

8.0 Force Recovery Mode

TBD

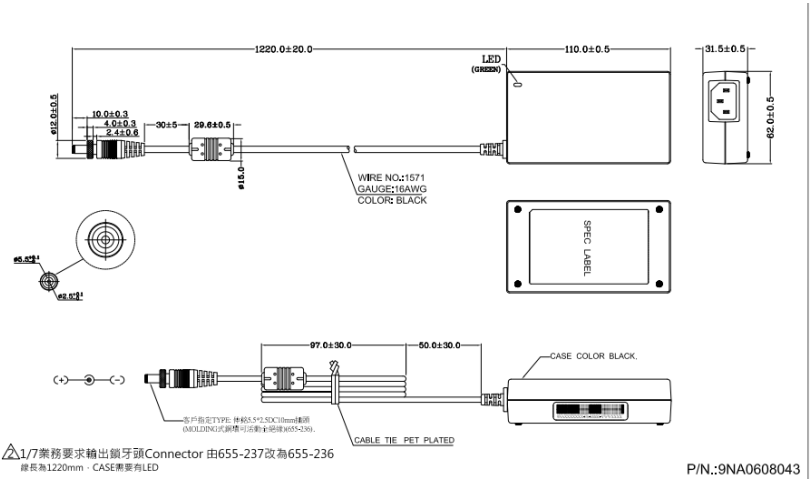
9.0 Power Consumption

TBD

10.0 Accessory Drawings

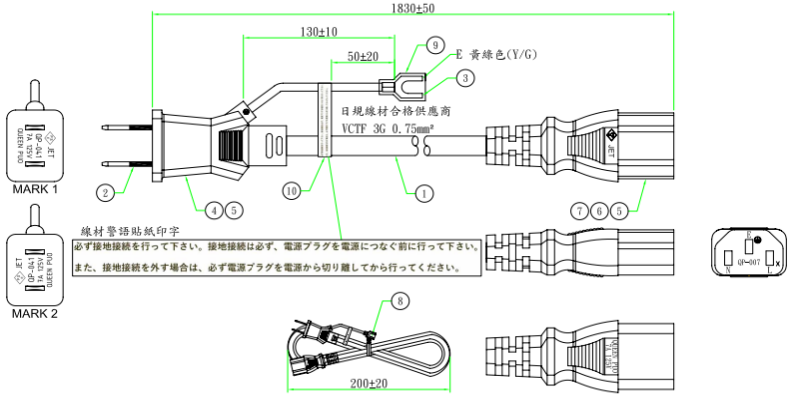
10.1 Fan Module/ Adapter/ Power Cord (Original)

- Power Adapter 04131HGOUANK



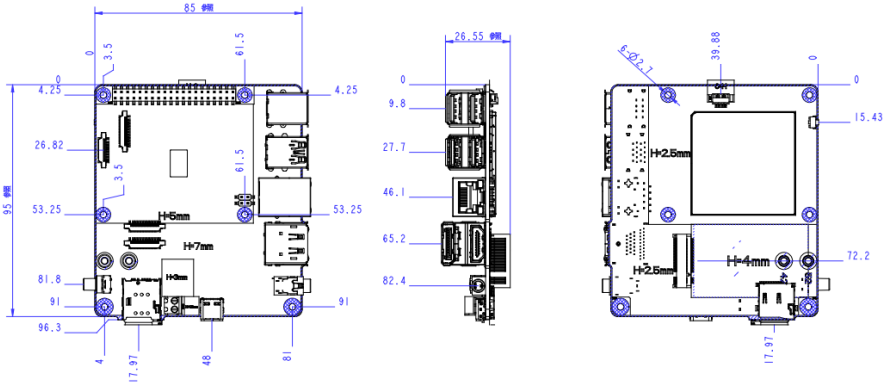
- Power Cord 064APOWERB32

  The standard power cord included with the QL601 is a 2-pin cord with ground. If you require an additional power cord, please refer to the accessories section on our website for purchase options.



11.0 QL601 2D Drawings

11.1 Dimension Drawing of Single Board Computer



11.2 Dimension Drawing of Box PC