



RVT101HVSNWN00

STM32 EMBEDDED 10.1" DISPLAY DATASHEET

Rev.1.1
2022-02-14

| ITEM | CONTENTS | UNIT |
|--------------------------------|-------------------------------------|-------------------|
| LCD Type | TFT/Transmissive/Normally Black/IPS | / |
| Size | 10.1 | Inch |
| Viewing Direction | Free | / |
| Outside Dimensions (W x H x D) | 229.46 x 149.10 x 12.25 | mm |
| Active Area (W x H) | 216.96 x 135.60 | mm |
| Pixel Pitch (W x H) | 0.1695 x 0.1695 | mm |
| Resolution | 1280 x 800 | / |
| Brightness | 1000 | cd/m ² |
| Color Depth | 16.7 M | / |
| Pixel Arrangement | RGB Vertical Stripe | / |
| Driver IC of Board | STM32H747XIH6 | / |
| External SDRAM | 64Mbit (32-bit access) | / |
| External Flash Memory | 512Mbit | / |
| Supply Voltage for Module | 6.0-36.0 | V |
| With/Without Touch | Without Touch Panel | / |
| Weight | 333 | g |

Note 1: RoHS3 compliant

Note 2: LCM weight tolerance: $\pm 5\%$.



1. REVISION RECORD

| REV NO. | REV DATE | CONTENTS | REMARKS |
|---------|------------|--|---------|
| 1.0 | 2022-01-10 | Initial release | |
| 1.1 | 2022-02-14 | Update the absolute maximum rating of V_{DD} to 0V-48.0V | |



2. CONTENTS

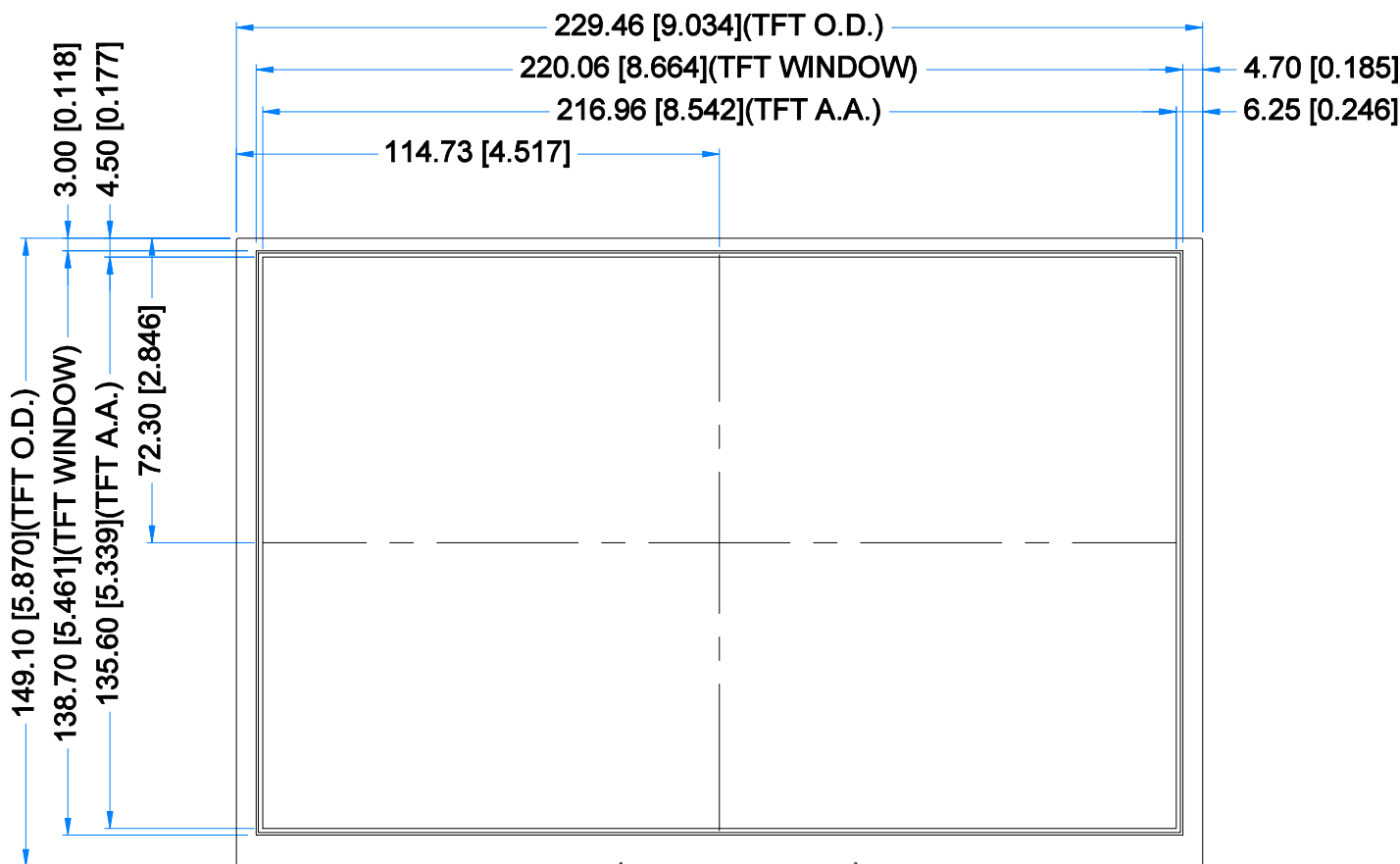
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3. MODULE CLASSIFICATION INFORMATION

| RV | T | 101 | H | V | S | N | W | N | 00 |
|----|----|-----|----|----|----|----|----|----|-----|
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |

| NO. | PARAMETER | SYMBOL |
|-----|-------------------|--|
| 1. | BRAND | RV – Riverdi |
| 2. | PRODUCT TYPE | T – TFT Standard |
| 3. | DISPLAY SIZE | 101 – 10.1” |
| 4. | MODEL SERIAL NO. | H – High Brightness, IPS TFT. |
| 5. | RESOLUTION | V – 1280 x 800 px |
| 6. | LCD+CONTROL BOARD | S –STM32 Embedded Display MCU STM32H747XIH6 |
| 7. | FRAME | N – Without Mounting Metal Frame |
| 8. | BACKLIGHT TYPE | W – LED White |
| 9. | TOUCH PANEL | N – Without Touch Panel |
| 10. | VERSION | 00 – (00-99) |



1.25 MM MOLEX CONNECTORS

| NO. | TYPE | MATE WITH |
|-------------|------------|------------|
| P1 (RS232) | 53261-0571 | 51021-0500 |
| P2 (POWER) | 53261-0571 | 51021-0500 |
| P3 (RS485) | 53261-0471 | 51021-0400 |
| P6 (SWD) | 53261-0671 | 51021-0600 |
| P7 (HAPTIC) | 53261-0271 | 51021-0200 |
| P10 (USB) | 53261-0571 | 51021-0500 |
| P11 (CAN1) | 53261-0471 | 51021-0400 |
| P15 (CAN2) | 53261-0471 | 51021-0400 |

1.27MM PIN HEADER AND SOC

| NO. | TYPE | MATE WITH |
|-----------|----------------|----------------|
| P8 | CH51402M100-0P | CBC1402D100 OF |
| U9a & U9b | PBHTD20SPP-JL | CH51202V100 OR |
| P5 & P12 | 62130421021 | 62200213421 (|

LCD NOTES:

- LCD TYPE: TRANSMISSIVE, NORMALLY BLACK, IPS
- RESOLUTION: 1280x800
- VIEWING ANGLE: FREE
- SURFACE LUMINANCE: 1000cd/m²
- MCU ON THE BOARD: STM32H747XIH6
- EXTERNAL FLASH MEMORY SIZE: 512Mbit
- EXTERNAL SDRAM SIZE: 64Mbit (32-bit access)
- SUPPLY VOLTAGE FOR MODULE: 6.0V - 36.0V

GENERAL NOTES:

- ZERO BAD PIXELS FOR TFT
- OPERATING TEMPERATURE: -20°C ~ 70°C
- STORAGE TEMPERATURE: -30°C ~ 80°C
- WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm[0.012inch]
- RoHS3 COMPLIANT



5. ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | MIN | MAX | UNIT | NOTE |
|---|-----------------|------|------|------|-----------|
| Supply Voltage for Module | VDD | 0 | 48.0 | V | Note 1 |
| Digital I/O signals Voltage | - | -0.5 | 3.3 | | Note 1, 2 |
| Operating Temperature | T _{OP} | -20 | 70 | °C | |
| Storage Temperature | T _{ST} | -30 | 80 | °C | |
| Storage Humidity (@ 25 ± 5°C) | H _{ST} | 10 | - | % RH | |
| Operating Ambient Humidity (@ 25 ± 5°C) | H _{OP} | 10 | - | % RH | |

Note 1. Exceeding maximum values may cause improper operation or permanent damage to the unit.

Note 2. Most of the GPIOs have the 5.0 V tolerant input voltage, please refer to the datasheet of STM32H747XIH6 for more details.

6. ELECTRICAL CHARACTERISTICS

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | |
|---------------------------|----------------------------------|---------------------------|------|------|------|----|
| Supply Voltage for Module | VDD_IN | 6.0 | 12.0 | 36.0 | V | |
| POWER 'ENABLE' = '0' | Current Drawn from VDD_IN @6.0V | I _{VDD_IN=6.0V} | - | 60 | - | uA |
| | Current Drawn from VDD_IN @12.0V | I _{VDD_IN=12.0V} | - | 147 | - | uA |
| | Current Drawn from VDD_IN @24.0V | I _{VDD_IN=24.0V} | - | 388 | - | uA |
| | Current Drawn from VDD_IN @36.0V | I _{VDD_IN=36.0V} | - | 629 | - | uA |
| POWER 'ENABLE' = '1' | Current Drawn from VDD_IN @6.0V | I _{VDD_IN=6.0V} | - | 851 | - | mA |
| | Current Drawn from VDD_IN @12.0V | I _{VDD_IN=12.0V} | - | 412 | - | mA |
| | Current Drawn from VDD_IN @24.0V | I _{VDD_IN=24.0V} | - | 226 | - | mA |
| | Current Drawn from VDD_IN @36.0V | I _{VDD_IN=36.0V} | - | 160 | - | mA |
| Input Voltage "H" Level | V _{IH} | 2.0 | - | 3.3 | V | |
| Input Voltage "L" Level | V _{IL} | 0 | - | 0.8 | V | |

Note. POWER 'ENABLE' refers to pin 3, 'ENABLE' of the power input connector.

By default, POWER 'ENABLE' = '1',

When POWER 'ENABLE' = '0', the device is turned off.

7. BACKLIGHT ELECTRICAL CHARACTERISTICS

| PARAMETER | SYMBOL | MIN | TYP | MAX | UNIT | NOTE |
|-----------|--------|-----|--------|-----|-------|--------|
| Lifetime | - | - | 50,000 | - | hours | Note 1 |

Note 1. Operating life means the period in which the LED brightness goes down to 50% of the initial brightness. Typical operating lifetime is the estimated parameter.



8. ELECTRO-OPTICAL CHARACTERISTICS

| ITEM | SYMBOL | CONDITION | MIN | TYP | MAX | UNIT | RMK | NOTE |
|----------------------------|-------------------|---|------|------|------|-------------------|--------|------|
| Response Time | Tr+Tf | $\theta=0^\circ$ $\varnothing=0^\circ$ Ta=25 °C | - | 25 | 35 | ms | FIG 1. | 4 |
| Contrast Ratio | Cr | | 800 | 1000 | - | --- | FIG 2. | 1 |
| Luminance Uniformity | δ WHITE | | - | 75 | - | % | FIG 2. | 3 |
| Surface Luminance | Lv | | - | 1000 | - | cd/m ² | FIG 2. | 2 |
| Viewing Angle Range | θ | $\varnothing = 90^\circ$ | 75 | 85 | - | deg | FIG 3. | 6 |
| | | $\varnothing = 270^\circ$ | 75 | 85 | - | deg | FIG 3. | |
| | | $\varnothing = 0^\circ$ | 75 | 85 | - | deg | FIG 3. | |
| | | $\varnothing = 180^\circ$ | 75 | 85 | - | deg | FIG 3. | |
| CIE (x, y) Chromaticity | Rx | $\theta=0^\circ$ $\varnothing=0^\circ$ Ta=25 °C | 0.22 | 0.26 | 0.30 | - | FIG 2. | 5 |
| | Ry | | 0.20 | 0.24 | 0.28 | - | | |
| | Gx | | 0.34 | 0.38 | 0.42 | - | | |
| | Gy | | 0.50 | 0.54 | 0.58 | - | | |
| | Bx | | 0.10 | 0.14 | 0.18 | - | | |
| | By | | 0.09 | 0.13 | 0.17 | - | | |
| | Wx | | 0.28 | 0.32 | 0.36 | - | | |
| | Wy | | 0.29 | 0.33 | 0.37 | - | | |

Note 1. Contrast Ratio (CR) is defined mathematically as below, for more information see Figure 2.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

Note 2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see Figure 2.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

Note 3. The uniformity in surface luminance δ WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the minimum luminance of 5 points luminance by maximum luminance of 5 points luminance. For more information see Figure 2.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

Note 4. Response time is the time required for the display to transition from white to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see Figure 1. The test equipment is Autronic-Melchers's ConoScope series.

Note 5. CIE (x, y) chromaticity, the x, y value is determined by measuring luminance at each test position 1 through 5, and then calculating the average value.

Note 6. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to LCD surface. For more information see Figure 3.

Note 7. For viewing angle and response time testing, the testing data is based on Autronic-Melchers's ConoScope series. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, CIE the test data is based on TOPCON's BM-5 photo detector.

Figure 1. The definition of response time

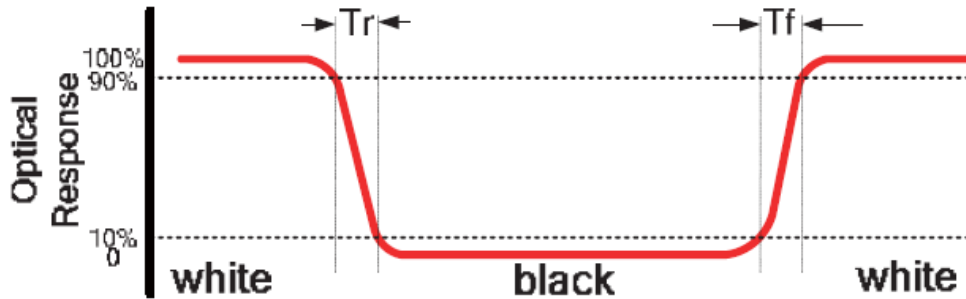
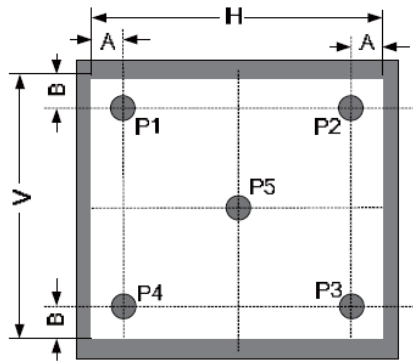


Figure 2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity



A: 5mm

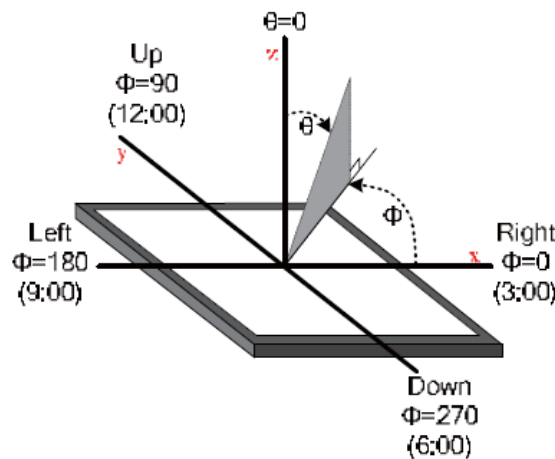
B: 5mm

H, V: Active Area

Light spot size $\varnothing=5\text{mm}$, 500mm distance from the LCD surface to detector lens.

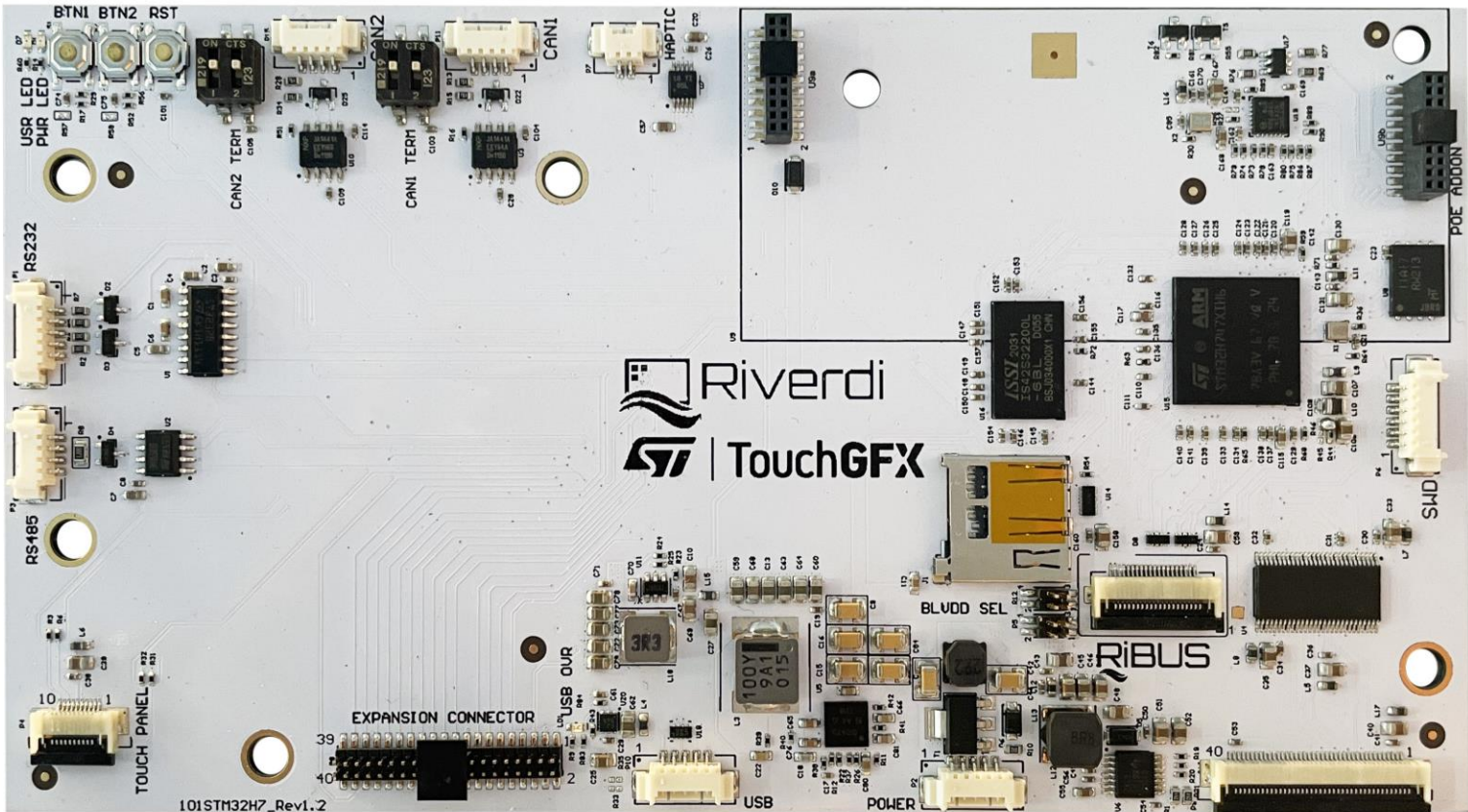
Measurement instrument is TOPCON'S luminance meter BM-5

Figure 3. The definition of viewing angle





9. BOARD INTERFACES AND CONNECTORS



9.1 Power input connector

The 1.25mm, 5-pin Molex connector labeled as “POWER’ is power input connector.

There is an internal reverse polarity protection which ensures that the device is not damaged if the power supply polarity is reversed.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|--------|-------------------------------|--------|
| 1 | VDD_IN | Power supply input; 6.0-36.0V | Note 1 |
| 2 | VDD_IN | Power supply input; 6.0-36.0V | |
| 3 | ENABLE | Enable/ Disable power supply | Note 2 |
| 4 | GND | Ground | |
| 5 | GND | Ground | |

Note 1: STM32 Embedded Display allows to directly connect one additional display to the system. There is RiBUS connector on the board where you can connect any of intelligent display from Riverdi based on EVE4 (BT817Q). However, please note that it may change power supply requirement as below:

The power supply voltage must range from 7.0V- 14.0 V (TYP. 9V), if [Riverdi EVE4 10.1" series display](#) is connected through RiBUS. At the same time, please also configure the backlight voltage jumpers, P5 and P12, according to subchapter 10.8, note 1.

The power supply voltage ranges from 6.0 V- 36.0V if any of [Riverdi EVE4 3.5",4.3",5.0" and 7.0" series display](#) is connected through RiBUS. At the same time, please also configure the backlight voltage jumpers, P5 and P12, according to subchapter 9.8, note 1.



Note 2: By default, pin “ENABLE” is pull up to VDD and enabled. To disable, ground the pin to turn off the device completely.

9.2 USB interface

The 1.25mm, 5-pin Molex connector labeled as “USB’ is USB interface.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|---------|---------------------------------|--------|
| 1 | VCC_USB | Power supply | Note 1 |
| 2 | D- | USB data- | |
| 3 | D+ | USB data+ | |
| 4 | ID | USB OTG ID; Host /Device detect | Note 1 |
| 5 | GND | Ground | |

Note 1. Configuration of the USB Host/Device mode:

Host Mode: Pin 4 (ID) should be connected to GND.

In this mode, it can provide +5V output voltage to the connected USB device and Max output current 500 mA.

Device Mode: Pin 4 (ID) should be not connected (floating).

9.3 RS485 interface

The 1.25mm, 4-pin Molex connector labeled as “RS485’ is RS485 interface.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|--------|--|------|
| 1 | A | Non-inverting receiver input and non-inverting driver output | |
| 2 | B | Inverting receiver input and inverting driver output | |
| 3 | GND | Ground | |
| 4 | VDD_IN | Power supply input; 6.0-36.0V | |

9.4 RS232 interface

The 1.25mm, 5-pin Molex connector labeled as “RS232’ is RS232 interface.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|-----|-----------------|------|
| 1 | RTS | Request to send | |
| 2 | CTS | Clear to send | |
| 3 | TXD | Transmit Data | |
| 4 | RXD | Receive Data | |
| 5 | GND | Ground | |



9.5 2 x CAN FD interfaces

The main board supports 2 channels of the CANFD (Control Area Network Flexible Data-Rate) communication bus, based on the high-speed (2.5-8.0Mbps) CAN transceiver.

2 pcs of 1.25mm, 4-pin Molex connectors labeled as “CAN1” and “CAN2” are respectively interfaces of CAN FD1 and CAN FD2.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|--------|----------------------------------|------|
| 1 | GND | Ground | |
| 2 | CAN_L | CAN Low-Level Voltage | |
| 3 | CAN_H | CAN High-Level Voltage | |
| 4 | VDD_IN | Power supply input; 6.0 – 36.0 V | |

9.6 Haptic feedback connector

The 1.25mm, 2-pin Molex connector labeled as “HAPTIC” is haptic feedback connector.

Haptic feedback P7 is used to connect with the haptic motor directly.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|------|--|--------|
| 1 | OUT+ | Positive haptic driver differential output | Note 1 |
| 2 | OUT_ | Negative haptic driver differential output | |

Note 1: The haptic driver applies DRV2605L and is controlled by internal I2C1.

9.7 SWD (Serial Wire Debug) connector

The 1.25mm, 6-pin Molex connector labeled as “SWD” is SWD interface, which is used for programming the MCU on board.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|-----------|-------------------------------------|------|
| 1 | VCC_+3.3V | Power input | |
| 2 | SW_CLK | Serial wire clock | |
| 3 | GND | Ground | |
| 4 | SW_DIO | Serial wire debug data input/output | |
| 5 | RST | Reset; Active low | |
| 6 | SWO | Serial wire trace output | |



9.8 RiBUS

Any size of the [Riverdi EVE4 series display](#) can be connected through RiBUS to act as a slave module to the mainboard.

| NO. | PIN | DESCRIPTION | NOTE |
|-----|-------------|--|--------|
| 1 | VCC_+3.3V | Supply voltage for module; TYP3.3V | |
| 2 | GND | Ground | |
| 3 | SPI_SCLK | SPI SCK signal | |
| 4 | MISO/ IO.1 | SPI MISO signal / SPI Quad mode: SPI data line 1 | |
| 5 | MOSI/ IO.0 | SPI MOSI signal / SPI Quad mode: SPI data line 0 | |
| 6 | CS | SPI chips select signal | |
| 7 | INT | Interrupt signal from device to the system, Active Low | |
| 8 | RST/PD | Reset / Power down signal, Active Low, | |
| 9 | GPIO.0 | GPIO.0 | |
| 10 | DISP_AUDIO | Display audio in/out | |
| 11 | GPIO.1/IO.2 | SPI Single/Dual mode: General purpose IO0. QSPI mode: SPI data line 2 | |
| 12 | GPIO.2/IO.3 | SPI Single/Dual mode: General purpose IO1. QSPI mode: SPI data line 3 | |
| 13 | NC | Not connected | |
| 14 | NC | Not connected | |
| 15 | NC | Not connected | |
| 16 | NC | Not connected | |
| 17 | BLVDD | Supply voltage for backlight | Note 1 |
| 18 | BLVDD | Supply voltage for backlight | |
| 19 | BLGND | Backlight Ground, internally connected to GND | |
| 20 | BLGND | Backlight Ground, internally connected to GND | |

Note 1. For Riverdi EVE4 10.1" series displays, the backlight voltage (BLVDD) must range from 7.0 - 14.0V (TYP. 9V).

For Riverdi EVE4 series display ranging from sizes of 3.5" to 7.0", the backlight voltage (BLVDD) is 5V.

Backlight jumper selectors, P5 and P12, labeled as "BLVDD SEL" are used to configure the backlight voltage range.

Warning! When you configure the jumpers, be sure that the module is powered off.

DO NOT change ANY jumpers while the module has power. Improper operation might cause permanent damage to the unit.

Please also pay special attention to not misplace the jumpers. **Incorrect jumpers setting may lead to damage to the module as well.**

The P5, P12 jumpers setting are shown below.

Table 1. Backlight power (5.0 V) select jumpers setting

| SETTING | P5, PIN 1 & 2 | P5, PIN 3 & 4 | P12, PIN 1 & 2 | P12, PIN 3 & 4 |
|--------------|---------------|---------------|----------------|----------------|
| 5V (Default) | Short | Open | Short | Open |

Figure 4. Backlight jumper setting - 5.0V(Default)

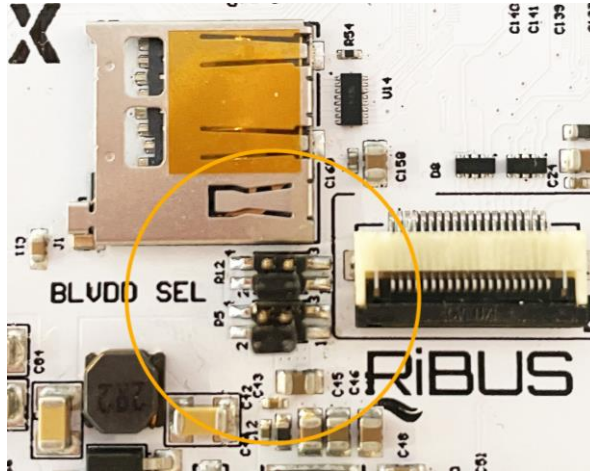
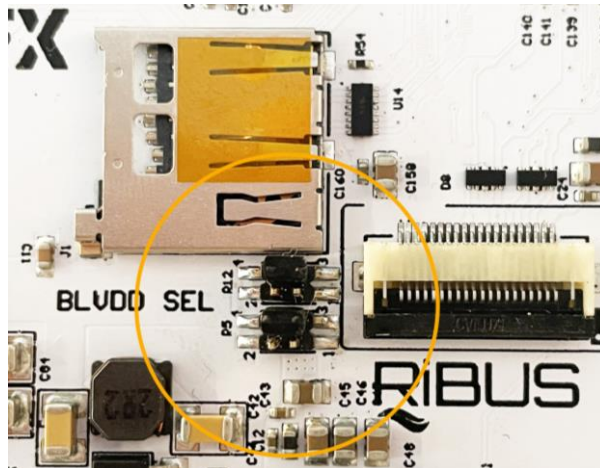


Table 2. Backlight power (7.0V-14.0V) select jumpers setting

| SETTING | P5, PIN 1 & 2 | P5, PIN 3 & 4 | P12, PIN 1 & 2 | P12, PIN 3 & 4 |
|---------------|---------------|---------------|----------------|----------------|
| 7.0V - 14.0 V | Open | Short | Open | Short |

Figure 5. Backlight jumper setting - 12.0V



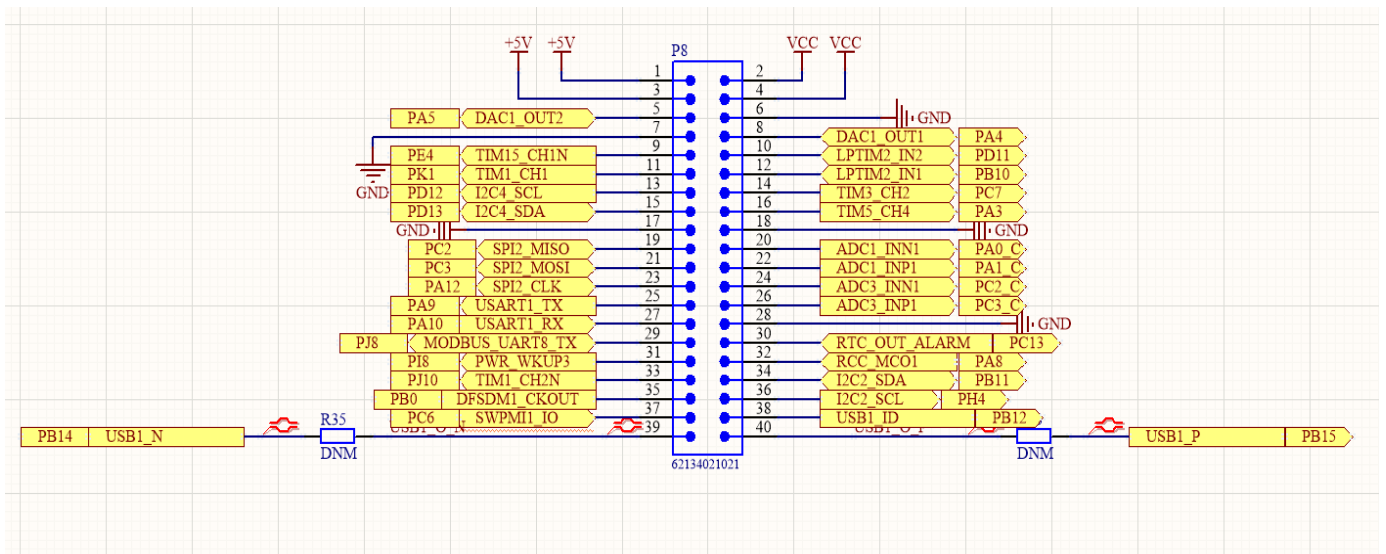


9.9 Expansion connector

The main board has one 1.27mm, 40-pin expansion pin header which is labeled as “EXPANSION CONNECTOR”,

It provides direct access to below GPIOs of MCU STM32H747XIH6, which make it possible to easily extend a daughterboard for a specific application.

- 2 x I²C
- 1 x UART
- 1 x USART
- 1 x SPI
- 1 x USB
- 7 x PWMs
- 2 x DACs (Digital-to-analog)
- 2 x ADCs (Analog-to-digital)



Each of the GPIO pins can be configured by software as output (push-pull or open-drain, with or without pull-up or pull-down), as input (floating, with or without pull-up or pull-down) or as peripheral alternate function. Most of the GPIO pins are shared with digital or analog alternate functions. Please refer to the [datasheet of MCU STM32H747XIH6](#) for more details.

| I/O/P | PIN NAME | NO. | NO. | PIN NAME | I/O/P |
|-------|----------|-----|-----|-----------|-------|
| P | VCC_+5V | 1 | 2 | VCC_+3.3V | P |
| P | VCC_+5V | 3 | 4 | VCC_+3.3V | P |
| I/O | PA5 | 5 | 6 | GND | P |
| P | GND | 7 | 8 | PA4 | I/O |
| I/O | PE4 | 9 | 10 | PD11 | I/O |
| I/O | PK1 | 11 | 12 | PB10 | I/O |
| I/O | PD12 | 13 | 14 | PC7 | I/O |
| I/O | PD13 | 15 | 16 | PA3 | I/O |
| P | GND | 17 | 18 | GND | P |
| I/O | PC2 | 19 | 20 | PA0_C | I/O |
| I/O | PC3 | 21 | 22 | PA1_C | I/O |
| I/O | PA12 | 23 | 24 | PC2_C | I/O |
| I/O | PA9 | 25 | 26 | PC3_C | I/O |
| I/O | PA10 | 27 | 28 | GND | P |



| | | | | | |
|-----|------|----|----|------|-----|
| I/O | PJ8 | 29 | 30 | PC13 | I/O |
| I/O | P18 | 31 | 32 | PA8 | I/O |
| I/O | PJ10 | 33 | 34 | PB11 | I/O |
| I/O | PB0 | 35 | 36 | PH4 | I/O |
| I/O | PC6 | 37 | 38 | PB12 | I/O |
| I/O | PB14 | 39 | 40 | PB15 | I/O |

Note. The total output current $I_{VCC=5V}$ from pin 1 and pin3 is maximum 1A.

The total output current $I_{VCC=3.3V}$ from pin 2 and pin 4 is maximum 500mA.

9.10 Micro SD slot

The mainboard is equipped with Micro-SD slot, which supports all types of Micro SD cards.

9.11 2 x 20-pin, 1.27 mm pin sockets for POE Add-on Board

The 2 x 20-pin, 1.27 mm, pin sockets, labeled as U9a and U9b, are used to connect the Riverdi POE Add-on Board.

The Riverdi POE Add-on Board features 10/100M Ethernet Port with Power-Over-Ethernet enabled. It allows you to power the module through the Ethernet port.

Note: The Riverdi POE Add-on Board is sold separately.

10. USER INTERFACES

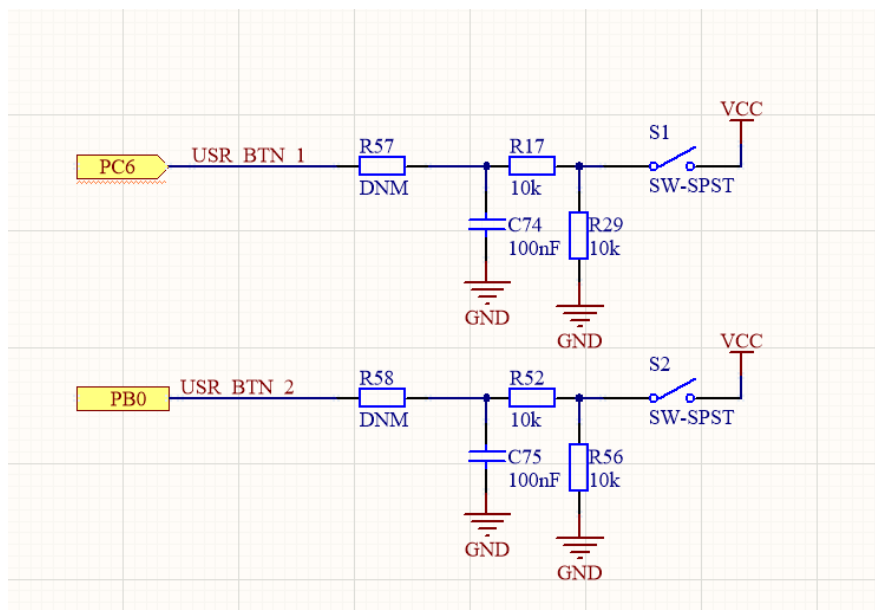
10.1 3 x push buttons

Push button labeled as “RST” is used to “RESET” the module.

Another 2 push buttons labeled as BTN1, BTN2 are for user’s development.

- BTN1(S1) is connected to pin 37, PC6, of the expansion connector.
- BTN2(S2) is connected to pin 35, PB0, of the expansion connector.

By default, R57 and R58 are not mounted. Please solder 0402 0R resistor or short R57, R58 to enable the pushbuttons BTN1(S1), BTN2(S2).



10.2 3 x LEDs

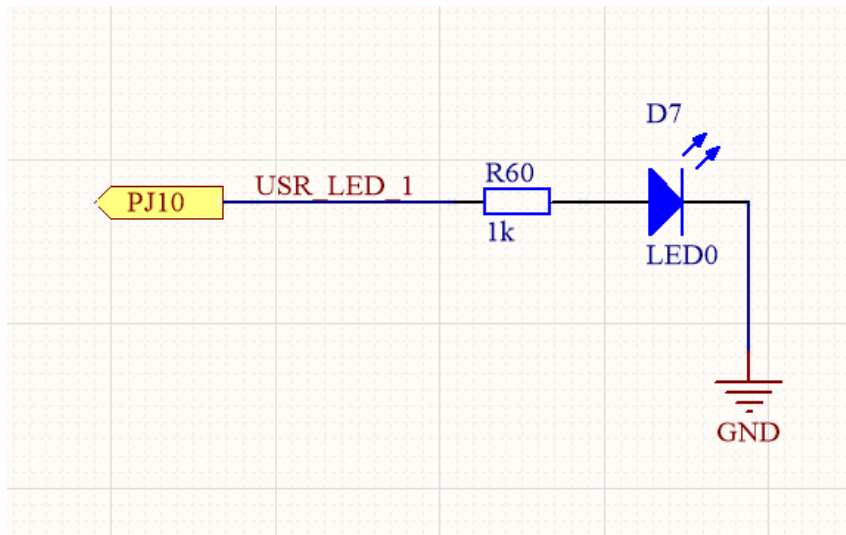
1 x LED, labeled as 'PWR LED', emits green light when the module is powered.

1 x LED, labeled as 'USB OVR', emits red light when VCC_USB pin is shorted.

1 x LED, labeled as 'USR LED', is for user's development.

- The 'USR LED' is connected to pin 33, PJ10, of the expansion connector.

By default, the resistor R60, (1k ohms) is soldered. Please remove R60 to use GPIO channel PJ10.



11. DISPLAY SEPCIFICATION

11.1 TFT resolution

The supported resolution of the display in this module is 1280*800.

11.2 Full TFT specification

For detailed information on the display, please refer to datasheet of display [RVTI01HVLNWN00](#).

12.INSPECTION

Standard acceptance/rejection criteria for TFT module

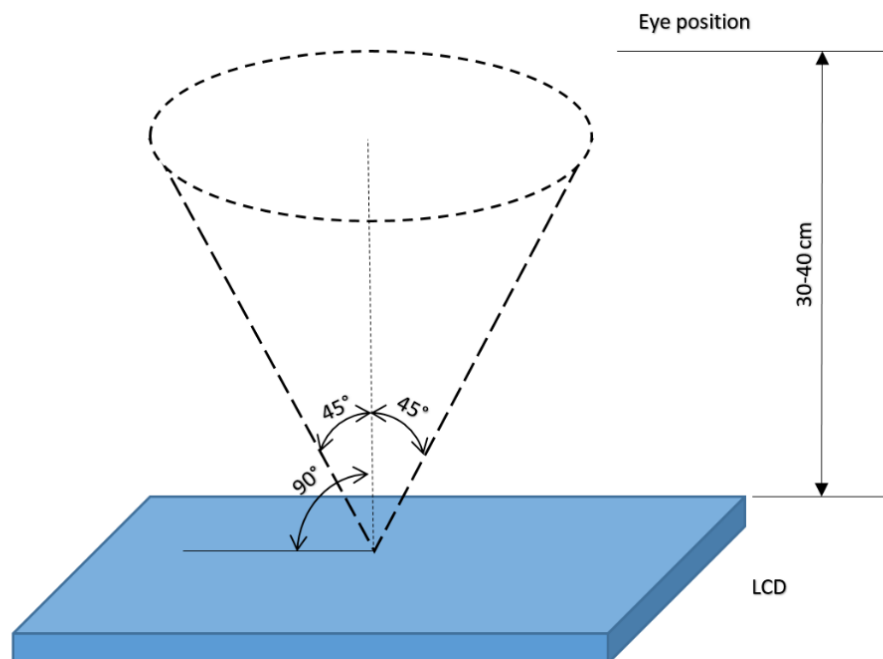
12.1 Inspection condition

Ambient conditions:

- Temperature: $25 \pm 2^{\circ}\text{C}$
- Humidity: $(60 \pm 10) \%RH$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance: $35 \pm 5\text{cm}$ between inspector bare eye and LCD.

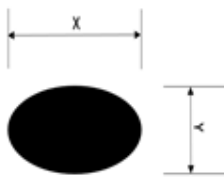
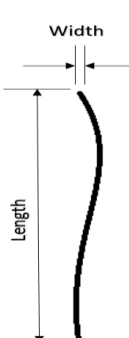
Viewing Angle: U/D: $45^{\circ}/45^{\circ}$, L/R: $45^{\circ}/45^{\circ}$





12.2 Inspection standard

The LCD TFT has zero bad pixels. Please refer the item “Bright/Dark dots”.

| ITEM | | CRITERION | | |
|--|--|----------------------------------|-------------------------|---------------|
| Black spots, white spots, light leakage, Foreign Particle (round Type) |  <p>$D=(x+y)/2$ Spots density: 10 mm</p> | Size =10.1" | | |
| | | Average Diameter | Qualified Qty | |
| | | $D \leq 0.2$ mm | Ignored | |
| | | $0.2 \text{ mm} < D \leq 0.3$ mm | N≤4 | |
| | | $0.5\text{mm} < D$ | N = 0 | |
| LCD black spots, white spots, light leakage (line Type) |  <p>Spots density: 10 mm</p> | Size =10.1" | | |
| | | Length | Width | Qualified Qty |
| | | - | $W \leq 0.05$ | Ignored |
| | | $L \leq 5.0$ | $0.05 < W \leq 0.1$ | $N \leq 3$ |
| | | $5.0 < L$ | $0.10 < W$ $5.0 < L$ | N = 0 |
| Bright/Dark Dots | Size =10.1" | | | |
| | Item | | Qualified Qty | |
| | Bright dots | | 0 | |
| | Dark dots | | 0 | |
| | Cluster Bright Dots or Dark Dots | | 0 | |
| Total Bright and Dark Dots | | 0 | | |
| Clear spots | Size ≥ 5" | | | |
| | Average Diameter | | Qualified Qty | |
| | $D < 0.2$ mm | | Ignored | |
| | $0.2 \text{ mm} < D < 0.3$ mm | | 4 | |
| | $0.3 \text{ mm} < D < 0.5$ mm | | 2 | |
| | $0.5 \text{ mm} < D$ | | 0 | |
| Spots density: 10 mm | | | | |
| Touch panel spot | Size ≥ 5" | | | |
| | Average Diameter | | Qualified Qty | |
| | $D < 0.25$ mm | | Ignored | |
| | $0.25 \text{ mm} < D < 0.5$ mm | | 4 | |
| $0.5 \text{ mm} < D$ | | 0 | | |
| Touch panel White line Scratch | Size ≥ 5" | | | |
| | Length | Width | Qualified Qty | |
| | - | $W < 0.03$ | Ignored | |
| | $L < 5.0$ | $0.03 < W < 0.05$ | 2 | |
| - | $0.05 < W$ | 0 | | |



13. RELIABILITY TEST

| NO. | TEST ITEM | TEST CONDITION | NOTE |
|-----|-------------------------------------|--|--------|
| 1 | High Temperature Storage | 80°C/120 hours | Note 1 |
| 2 | Low Temperature Storage | -30°C/120 hours | |
| 3 | High Temperature Operating | 70 °C /120 hours | |
| 4 | Low Temperature Operating | -20°C/120 hours | |
| 5 | High Temperature and High Humidity | Humidity 40°C, 90%RH, 120Hrs | |
| 6 | Thermal Cycling Test (No operation) | -20°C for 30min, 70°C for 30 min. 100 cycles. Then test at room temperature after 1 hour | Note 2 |
| 7 | Vibration Test | Frequency: 10 ÷ 55 Hz. Stroke: 1.5 mm. Sweep: 10Hz ÷ 55Hz ÷ 10 Hz. 2 hours for each direction of X, Y, Z (Total 6 hours) | |
| 8 | Package Drop Test | Height: 60 cm 1 corner, 3 edges, 6 surfaces | |

Note 1. Sample quantity for each test item is 5 ÷ 10 pcs.

Note 2. Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.



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