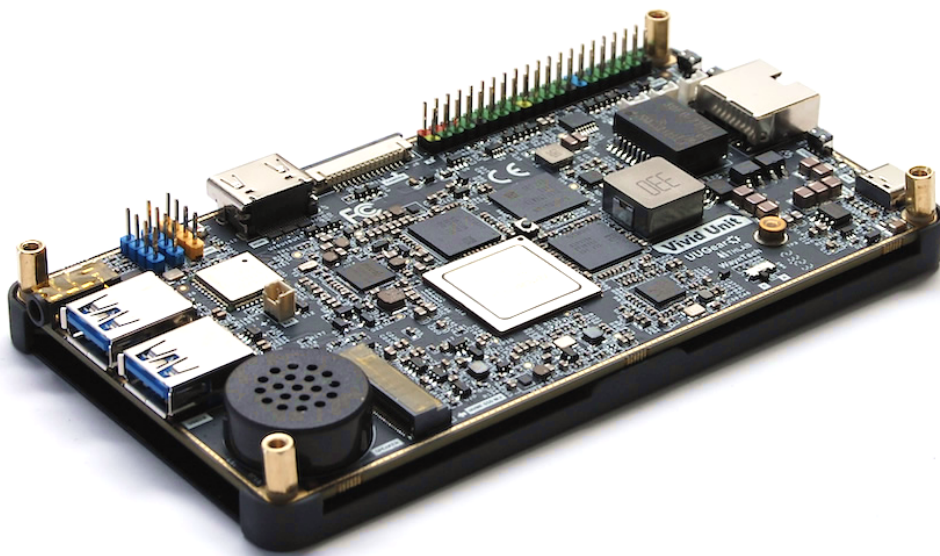


## **Vivid Unit:**

**Versatile Single Board Computer with Touchscreen**



**User Manual (revision 1.10)  
FCC ID:2BDPU-VIVIDUNIT**

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## 1. Product Overview

Vivid Unit is a powerful and versatile single-board computer that can be used for a wide range of applications. Its compact size and touch screen interface make it perfect for hobby projects and industrial applications.

With its powerful ARM CPU and up to 4GB of RAM, Vivid Unit is capable of running a variety of software applications, from basic desktop environments to more demanding industrial control systems. It offers GPIO with SPI, I<sup>2</sup>C, UART, SDIO and ADC interfaces, which allows for easy integration with a wide range of sensors, peripherals, and other hardware devices.

Vivid Unit can be used for a variety of projects, such as:

- Smart home automation: Vivid Unit can be used to control lights, temperature, and other home appliances using various sensors and input devices.
- Robotics: Vivid Unit's GPIO and camera interface make it ideal for use in robotics projects, such as autonomous cars or robotic arms.
- Industrial control systems: Vivid Unit is ideal for use in industrial control systems, and it can be mounted like a screen for the whole system, which the users can interact with.

Whether you're a hobbyist, a student, or a professional, Vivid Unit offers a powerful and flexible platform for your computing needs.



## 2. Technical Specifications

- **Processor and Memory**
  - ARM CPU: RK3399 (Cortex-A72 Dual-core + Cortex-A53 Quad-core)
  - GPU: Mali-T860MP4
  - RAM: 2GB or 4GB LPDDR4
  - Storage: 16GB or 32GB eMMC
- **Connectivity**
  - Ethernet x1 (RJ45 connector)
  - Wi-Fi (802.11b/g/n)
  - Bluetooth 4.1 (BLE)
- **Display and Touchscreen**
  - Display: 5.5 inch, 1280x720 resolution
  - Touchscreen: Capacitive multi-touch
- **GPIO**
  - 40-pin header with Raspberry Pi compatible pinout
  - SPI x 1
  - I<sup>2</sup>C x 2
  - UART x 1
  - SDIO x 1
- **USB Ports**
  - USB 3.0 x 2
  - USB 2.0 x 2 (via pin headers)
  - USB type-C x1 (for power and flashing OS)
- **Audio**
  - Microphone: Stereo microphone array
  - Speaker: Built-in speaker
  - Headphone jack: 3.5mm
- **Camera Interface**
  - MIPI CSI x 1
- **Additional Interfaces**
  - NVMe M.2 interface x 1
  - ADC channels x 3 (via 4-pin header)
- **Power**
  - DC 5V (via USB type-C cable)
  - POE (via RJ45 connector)
- **Buttons**
  - Power on/off x 1
  - Volume up/down x 2
- **Dimensions and Weight**
  - Dimensions: 146mm x 78mm x 17mm
  - Weight: 170g

## 3. Getting Started

Vivid Unit is a fully assembled device and can be used directly.

After connecting the power supply (via USB-C cable or PoE cable) to Vivid Unit, you can tap the power button to boot the system.

Vivid Unit has pre-installed Debian Linux 11 with XFCE desktop environment, and virtual keyboard is also installed by default, so you can input text via the touch screen.

## 4. Using Vivid Unit

### 4.1 Using the virtual keyboard

Vivid Unit doesn't come with a physical keyboard, but it features a touchscreen display that allows you to input text through a virtual keyboard.

To use the virtual keyboard, you can simply tap on the keyboard icon located on the taskbar at the bottom of the screen. This will bring up the virtual keyboard, which you can use to type in text just like a physical keyboard. You can switch between letters, numbers, and symbols by tapping the relevant keys on the keyboard. To close the virtual keyboard, simply tap the keyboard icon on the taskbar again.

### 4.2 Connecting to the internet

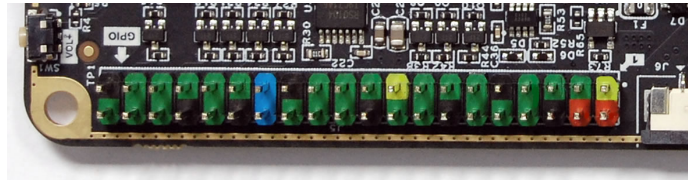
To connect Vivid Unit to the internet, there are two possible ways: via WiFi and via Ethernet cable.

To connect to the internet via WiFi, click on the WiFi icon in the system tray and select the desired network from the list of available networks. Enter the network password if required and click "Connect".

Alternatively, you can also connect to the internet via Ethernet cable by plugging the cable into the Ethernet port on Vivid Unit, and connecting the other end to a router or modem. Vivid Unit should automatically detect the network and connect to the internet.

### 4.3 Using 40-pin GPIO header

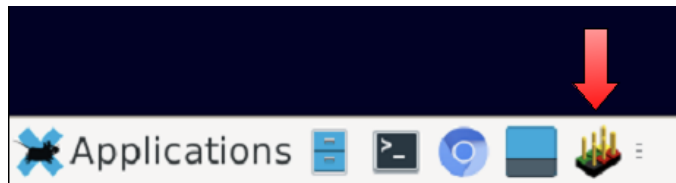
Vivid Unit comes with a 40-pin GPIO header, which is compatible with the GPIO header in Raspberry Pi. All I/O pins are in 3.3V level and there are two pins that connect to the 5V power rail.



A software named “vgp” is pre-installed into the device and you can use it to monitor/control GPIO pins. The vgp software consists of a command line tool (vgp) and a GUI tool (VGPW).

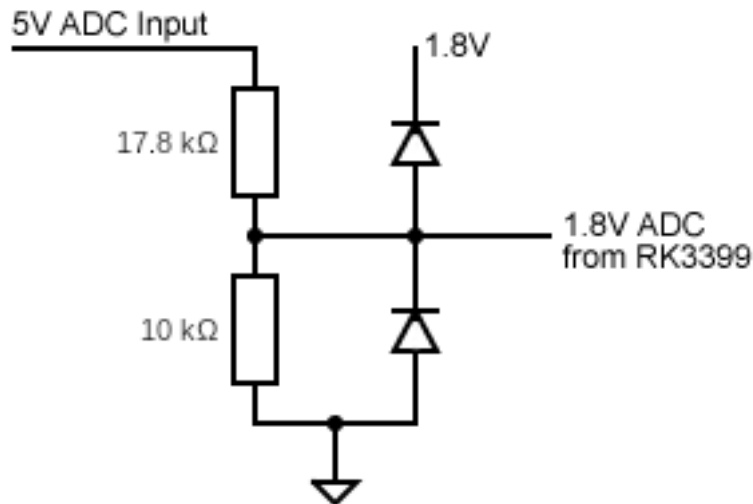
To run the command line tool, you can type “vgp” in the command console. To get more information about the accepted arguments, you can run “vgp –help”.

To run the GUI tool, you can tap on the VGPW icon in the task panel.



#### 4.4 Using 4-pin ADC header

Vivid Unit also provides three 10-bit ADC channels (A0, A3 and A4). RK3399 provides ADC with 1.8V full-scale voltage, and Vivid Unit adds voltage divider and protection circuit (as shown below), to increase the full-scale voltage to 5V. The final resolution is 4.88mV.



It is safe to connect A0, A3 or A4 channel to any pin in the 40-pin GPIO header, because they can measure voltage up to 5V. If you want to measure voltage higher than 5V, you will need to implement an additional voltage divider.

## 4.5 Using USB interface

Vivid Unit has two USB 3.0 ports that can be used directly to connect USB devices such as keyboards, mice, USB drives, or other peripherals. To use the USB ports on Vivid Unit, simply plug in the USB device into the USB port.

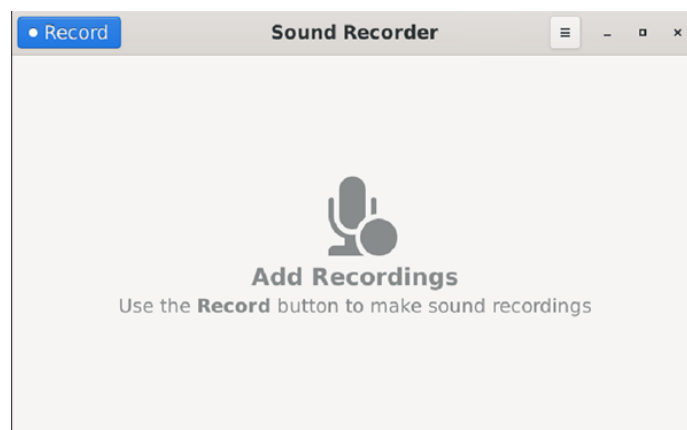
It is important to note that if you are using a USB storage device, you should properly eject it from the system before disconnecting it to prevent data corruption.

Vivid Unit also has two USB 2.0 channels, which are provided as two 4-pin headers, and cannot be used directly. To use these USB 2.0 channels, you will need to connect an adapter or breakout board that allows you to connect USB devices to these headers.

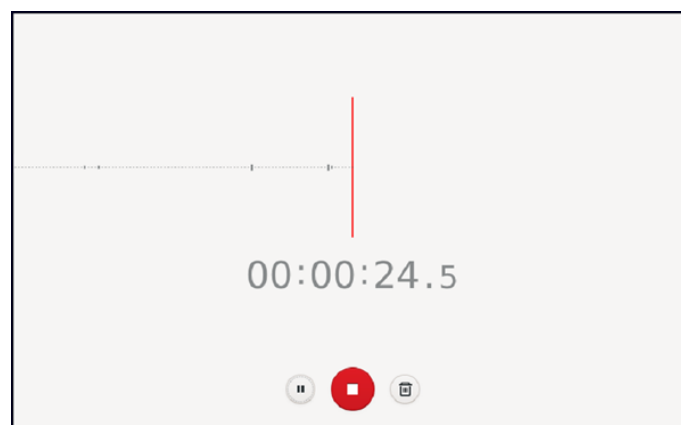
## 4.6 Recording and replaying audio

Vivid Unit has two on board microphones and it can be used for audio streaming or recording.

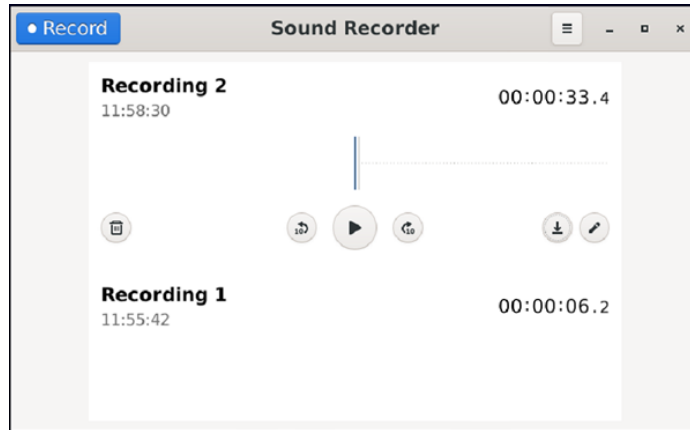
In the application menu, under the “Multimedia” category, you can find “Sound Recorder”.



Just click the blue “Record” button to start the recording:



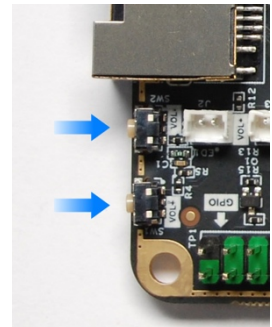
To stop the recording, you just need to click the red button. You can then save this recording with specified name, and even export the audio file.



## 4.7 Connecting to a headset

To connect a wired headset to Vivid Unit, simply plug in the headset's audio jack into the 3.5mm audio port located on the right side of the device. The audio will automatically switch to the headset once it is plugged in. To adjust the volume of the audio, use the volume buttons located on the left side of the device.

If the audio is not playing through the headset after plugging it in, ensure that the headset is securely plugged in and the volume on both the headset and Vivid Unit are turned up.



## 4.8 Using the MIPI camera interface

You can use 15-pin FFC flex cable with 1mm pitch to connect a MIPI camera module to the camera interface on Vivid Unit.

An application named “Cheese” has been pre-installed. Open the Cheese application from the Applications menu in the bottom left corner of the desktop, and you should be able to see the camera view directly. You may take photo or record a video with this application.

## 4.9 Connecting to an external display

It is possible to connect an external display to Vivid Unit via an HDMI cable. Although not mandatory, it is recommended to switch off Vivid Unit and the external display before connecting them with an HDMI cable. After the connection, the screen on Vivid Unit should now be mirrored or extended to the external display, depending on the display settings.



## 4.10 Adding SSD storage

There is an NVME M.2 interface on board and you can connect an NVME SSD to it. This SSD will work as additional storage.

## 4.11 Using realtime clock (RTC)

There is an RTC on Vivid Unit. It is actually integrated within the power supply management chip RK808. There is no I2C interface for this RTC though, you can use the “hwclock” command to access its data.

You can display the RTC with this command:

```
sudo hwclock --show
```

You can test the RTC with this command :

```
sudo hwclock --test
```

If you want the RTC to keep time when the device is not powered, you will need to connect a 3V battery to that small white connector.

## 4.12 Flashing OS into eMMC

To install the operating system on your Vivid Unit, you will need to flash an OS disk image using the RKDevTool.exe tool on your PC. Begin by opening RKDevTool.exe on your PC, and connecting your Vivid Unit to your PC using a USB type-C cable. Next, press and hold the MASROM button located in the middle of the Vivid Unit's PCB, and then press the power button until your PC recognizes Vivid Unit as a USB device.

Once your Vivid Unit is recognized, click on the "Upgrade Firmware" tab in the RKDevTool.exe window. Then, click the "Firmware" button to browse and specify the OS disk image file. Finally, click on the "Upgrade" button to start the flashing process. You will need to wait for the flashing process to complete, after which your Vivid Unit will automatically reboot and enter the OS.

## 5. FCC Statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

**Warning:** Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### **RF warning statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

The product does not have enough suitable space to place complete label information except for FCC ID, so the label is placed on the user manual.

## 6. Revision History

Revision	Date	Description
1.00	2023.10.25	Initial revision
1.10	2023.11.29	Add FCC statement