waveshare WAV-USB-RS485422

waveshare USB to RS485/422 Industrial Grade Isolated Converter

User Manual - Model: WAV-USB-RS485422

Brand: waveshare

1. Overview

The waveshare USB to RS485/422 Industrial Grade Isolated Converter is designed to facilitate reliable data transmission between computers and RS485/RS422 devices. It incorporates original FT232RL and SP485EEN chips for stable and fast communication, along with comprehensive protection features. This manual provides essential information for the proper setup, operation, and maintenance of the device.

Figure 1: Front view of the waveshare USB to RS485/422 Industrial Grade Isolated Converter.

2. Package Contents

Verify that all items are present in the package:

- USB to RS485/422 Isolated Converter Unit
- USB-B Cable
- Small Screwdriver

Figure 2: Included items: the converter, a USB cable, and a screwdriver.

3. Features

The converter is equipped with advanced features for robust industrial applications:

- **Original Chips:** Onboard Original FT232RL and SP485EEN chips ensure fast, stable, and reliable communication with better compatibility.
- **Power Isolation:** Features unibody power supply isolation, providing stable isolated voltage without requiring an extra power supply for the isolated terminal.
- **Digital Isolation:** Incorporates unibody digital isolation for signal isolation, high reliability, strong anti-interference, and low power consumption.
- **Transient Voltage Suppressor (TVS):** Effectively suppresses surge voltage and transient spike voltage in the circuit, offering lightningproof and anti-electrostatic protection.
- **Self-Recovery Fuse & Protection Diodes:** Ensures stable current/voltage outputs, providing over-current/over-voltage proof and improving shock resistance.

- **ESD & Surge Protection:** Onboard 15KV ESD isolation protection and 600W lightningproof & anti-surge protection.
- **Terminal Resistor:** Onboard 120R terminal resistor on the RS485/RS422 ports, enabled by default and configurable via jumper.
- **LED Indicators:** Three LEDs indicate power (PWR), transmit data (TXD), and receive data (RXD) status.
- **Industrial Design:** Industrial rail-mount ABS case design, compact, easy to install, and cost-effective.

USB TO RS485/422

Industrial Grade Isolated Converter

Adopts original FT232RNL and SP485EEN chip solution, provids stable communication with built-in galvanic isolation, lightningproof and anti-electrostatic protection and so on, it is an ideal choice for industrial control equipments and/or applications with high communication requirement.

Figure 3: The converter's industrial-grade design and isolation capabilities.

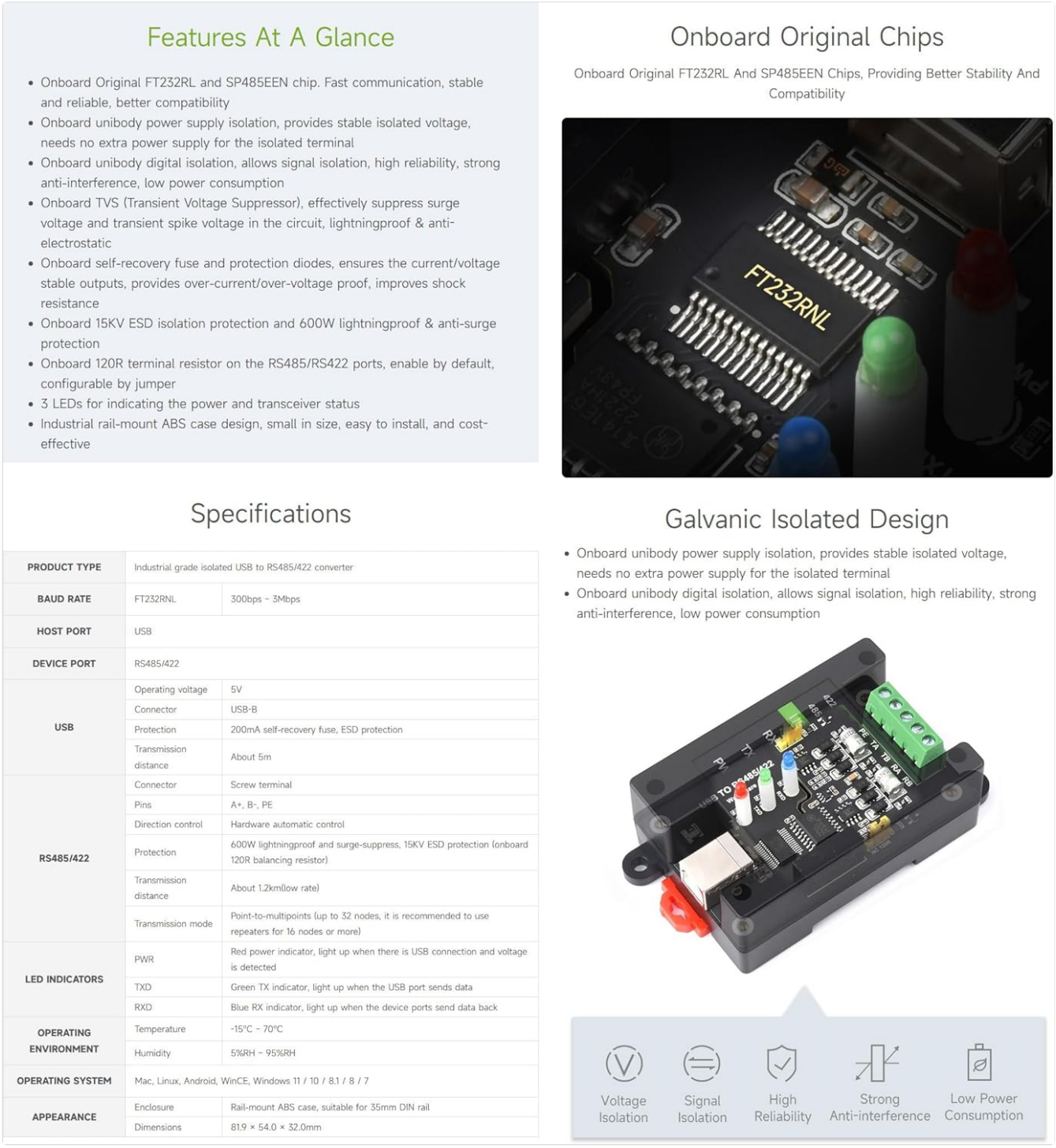

Figure 4: Overview of key features and the original FT232RL chip.

4. Protection Features

The device is engineered with multiple layers of protection to ensure stable and safe operation:

- **TVS (Transient Voltage Suppressor):** Protects against voltage spikes.
- **Self-Recovery Fuse:** Automatically resets after an overcurrent event.
- **Protection Diodes:** Safeguard against over-current and over-voltage.
- **ESD Protection:** 15KV Electrostatic Discharge protection.
- **Lightningproof & Anti-Surge Protection:** 600W protection against lightning and power surges.

Figure 5: Visual representation of the converter's comprehensive protection mechanisms.

5. Interface Description

The converter features clearly labeled interfaces and indicators for ease of use:

- **RS485/RS422 Interfaces:** Screw terminals for connecting to RS485 (A+, B-, PE) or RS422 (PE, TA, TB, RA, RB) devices.
- **USB & Power:** USB-B port for connecting to the host computer, providing both data and power.
- **LED Indicators:**
    - **PWR (Red):** Illuminates when the USB connection is established and voltage is detected.

- **TXD (Green):** Blinks when the USB port sends data.
- **RXD (Blue):** Blinks when the device ports receive data.

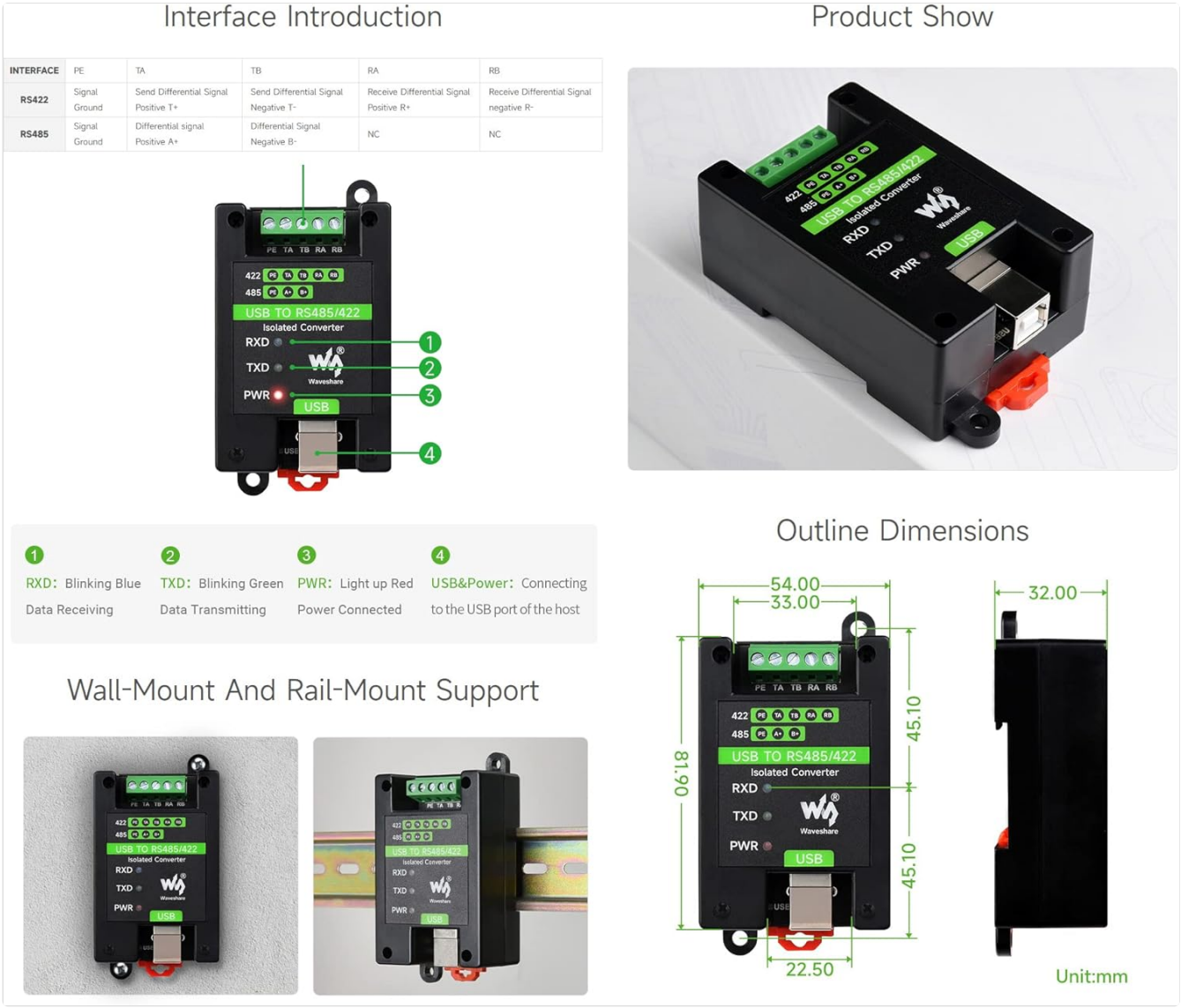

Figure 6: Detailed view of the converter's interfaces and LED indicators.

6. Setup & Installation

Follow these steps for proper setup and installation:

1. **Connect to Host:** Connect the converter to your computer's USB port using the provided USB-B cable. The PWR LED should light up.
2. **Connect to RS485/RS422 Device:** Use the screw terminals to connect your RS485 or RS422 device. Ensure correct polarity (A+, B- for RS485; PE, TA, TB, RA, RB for RS422).
3. **Terminal Resistor Configuration:** The onboard 120R terminal resistor is enabled by default. If your application requires it to be disabled, refer to the product's detailed documentation for jumper configuration.
4. **Driver Installation:** Install the necessary drivers for the FT232RL chip on your operating system (Mac, Linux, Android, Windows 11/10/8.1/8/7). Drivers are typically available from the FTDI website or Waveshare's product page.
5. **Mounting:** The converter features a rail-mount design, suitable for 35mm DIN rails, or can be wall-mounted using the integrated mounting holes.

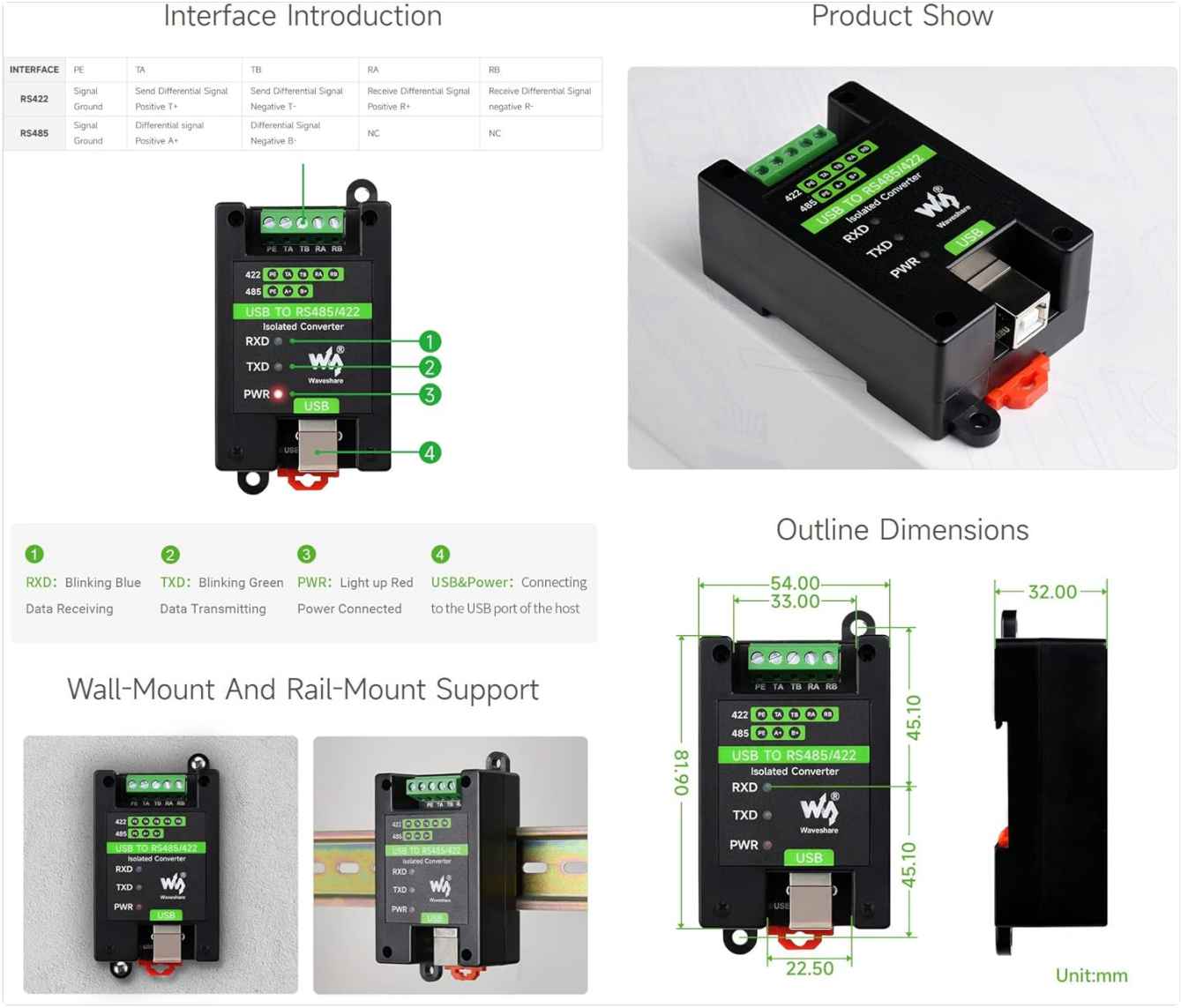

Figure 7: The converter supports both wall-mount and rail-mount installations.

7. Operating Instructions

Once connected and drivers are installed, the converter operates transparently, enabling bidirectional communication between your USB host and RS485/RS422 devices.

- **Data Transmission:** The device supports point-to-multipoint communication for up to 32 nodes. For more than 16 devices, using repeaters is recommended to maintain signal integrity over longer distances.
- **Transmission Distance:** The USB signal can be converted into a balanced differential RS485/422 signal. The transmission distance is approximately 1.2km for RS485/422, and about 5 meters for USB.
- **System Compatibility:** Compatible with a wide range of operating systems including Mac, Linux, Android, WinCE, and Windows (11, 10, 8.1, 8, 7).

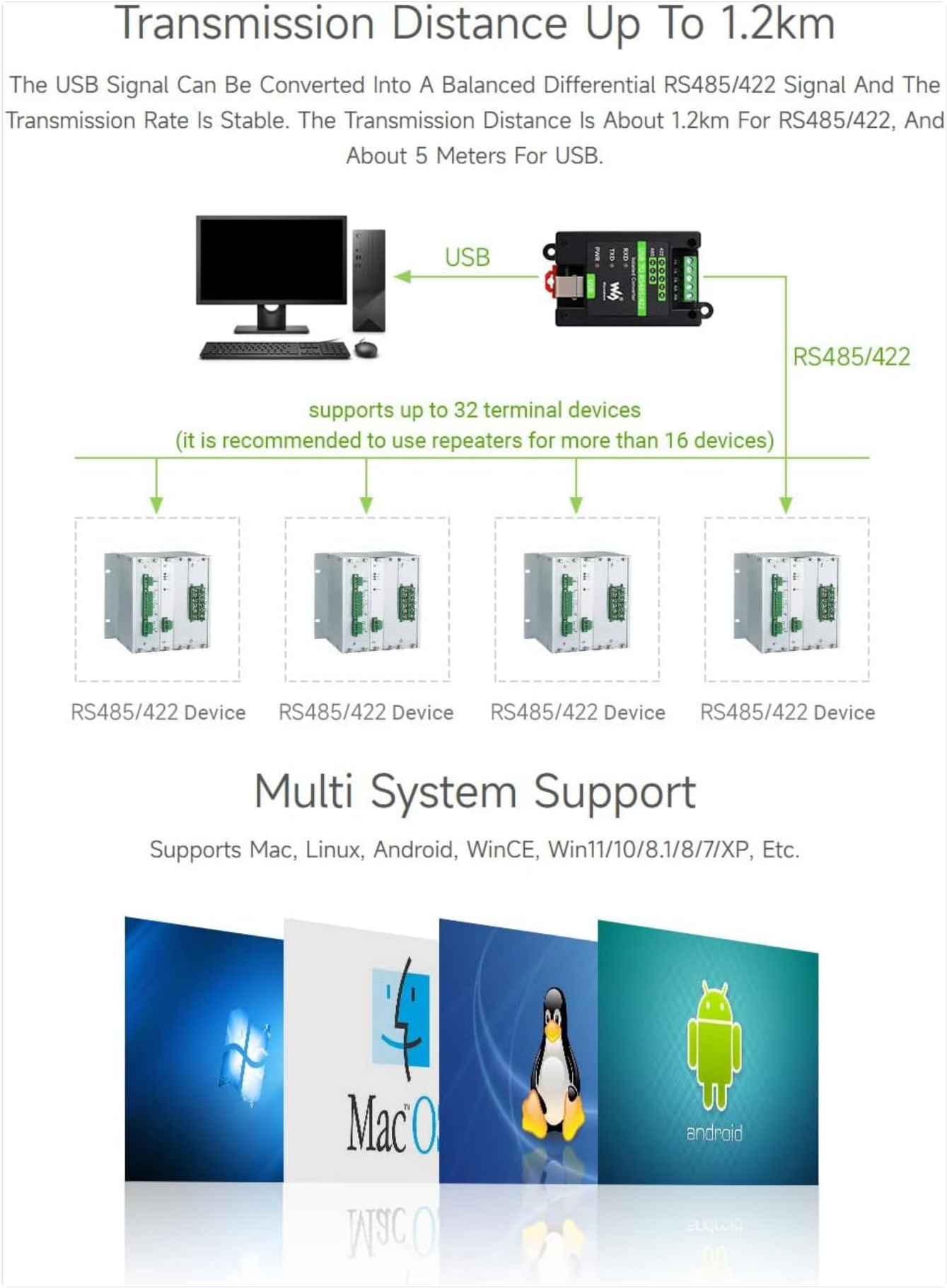

Figure 8: The converter supports long-distance transmission and multiple operating systems.

Video 1: An official product video demonstrating the features and usage of the USB to RS485/422 Industrial Grade Isolated Converter.

8. Specifications

Category	Parameter	Value
PRODUCT TYPE	Industrial grade isolated USB to RS485/422 converter	
BAUD RATE	FT232RNL	300bps ~ 3Mbps
HOST PORT	USB	
DEVICE PORT	RS485/422	
USB	Operating voltage	5V
	Connector	USB-B
	Protection	200mA self-recovery fuse, ESD protection
	Transmission distance	About 5m
RS485/422	Connector	Screw terminal
	Pins	A+, B-, PE
	Direction control	Hardware automatic control
	Protection	600W lightningproof and surge-suppress, 15KV ESD protection (onboard 120R balancing resistor)
	Transmission distance	About 1.2km (low rate)
	Transmission mode	Point-to-multipoints (up to 32 nodes, it is recommended to use repeaters for more than 16 devices)
LED INDICATORS	PWR	Red power indicator, light up when there is USB connection and voltage is detected
	TXD	Green TX indicator, light up when the USB port sends data
	RXD	Blue RX indicator, light up when the device ports send data back
OPERATING ENVIRONMENT	Temperature	-15°C ~ 70°C
	Humidity	5%RH ~ 95%RH
OPERATING SYSTEM	Mac, Linux, Android, WinCE, Windows 11 / 10 / 8.1 / 8 / 7	
APPEARANCE	Enclosure	Rail-mount ABS case, suitable for 35mm DIN rail
	Dimensions	81.9 × 54.0 × 32.0mm

9. Troubleshooting

If you encounter issues with the converter, consider the following:

- **No Power (PWR LED off):** Ensure the USB cable is securely connected to both the converter and the host computer. Try a different USB port or cable.
- **No Data Transmission (TXD/RXD LEDs not blinking):** Verify that the correct drivers are installed for the FT232RL chip. Check the wiring to your RS485/RS422 device for correct polarity and secure connections. Confirm that the communication parameters (baud rate, data bits, stop bits, parity) match between your host and the connected device.

- **Intermittent Connection:** Check for electromagnetic interference in the environment. Ensure cable lengths are within specified limits (5m for USB, 1.2km for RS485/422). For long RS485/422 networks or many nodes, consider using repeaters.
- **Device Not Recognized:** Reinstall the FTDI drivers. Try connecting to a different computer to rule out host-specific issues.

10. Maintenance

To ensure the longevity and optimal performance of your converter:

- **Cleaning:** Use a soft, dry cloth to clean the exterior of the device. Avoid using liquid cleaners or solvents.
- **Storage:** Store the converter in a cool, dry environment away from direct sunlight and extreme temperatures when not in use.
- **Environmental Conditions:** Operate the device within the specified temperature (-15°C ~ 70°C) and humidity (5%RH ~ 95%RH) ranges.
- **Cable Management:** Ensure cables are not kinked or under excessive strain to prevent damage.

11. Warranty & Support

For warranty information and technical support, please contact the manufacturer, Waveshare, directly. You may also find additional resources and updated drivers on their official website.
Additional documentation for this product can be found via the following links:

- User Manual (PDF)
- User Guide (PDF)