



Connective Peripherals Pte Ltd

**USB2-H-6002 Hi-Speed USB to 2-Port
RS422 Adapter**

Datasheet

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The USB-COM-Plus adaptors are a family of communication devices from Connective Peripherals Pte Ltd. This model, USB2-H-6002, provides a simple method of adapting legacy serial devices with two RS422 interfaces to modern USB ports by incorporating the FTDI FT2232H Hi-Speed USB bridge chip.

The adaptor provides two RS422 ports from a single USB port and features LED status indicators.

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Table of Contents

1	Introduction	4
1.1	Functional Description	4
1.2	LED Description.....	5
1.3	Block Diagram.....	5
1.3.1	Block description	5
1.4	Features.....	5
1.5	Performance Figures.....	6
1.6	Ordering Information.....	6
2	Installation	7
2.1	Hardware Installation	7
2.2	Mounting.....	7
2.2.1	Wiring.....	7
2.3	Device Driver Installation	8
3	Connections	9
3.1	External Connectors.....	9
3.1.1	USB.....	9
3.1.2	RS422.....	9
4	Electrical Details	10
4.1	USB	10
4.2	RS422	10
5	Mechanical Details	11
5.1	Module Mechanical Dimensions.....	11
5.2	UniClip™ Mechanical Dimensions	12
6	Physical Environment Details	13
6.1	Storage Temperature	13
6.2	Operating Temperature.....	13
7	Environmental Approvals & Declarations	14
7.1	EMI Compatibility.....	14
7.2	Safety	14
7.3	Environmental.....	14
7.4	Reliability.....	14

7.5 Import / Export Information	14
8 Troubleshooting	15
8.1 Hardware	15
8.2 Device Driver	15
8.3 Technical Support	16
9 Contact Information	17
Appendix A - List of Figures and Tables	18
List of Figures	18
List of Tables	18
Appendix B - Revision History	19

1 Introduction

1.1 Functional Description

The USB-COM-Plus adapters are a family of communication devices. This model, USB2-H-6002, provides a simple method of adapting legacy serial devices with RS422 interfaces to a modern USB 2.0 Hi-Speed port. This is accomplished by incorporating the industry standard FTDI FT2232H Hi-Speed USB-Serial bridge chip.

Each USB2-H-6002 adapter contains a small internal electronic circuit board which utilises the FTDI FT2232H, mounted inside a rugged plastic enclosure capable of withstanding industrial temperature ranges. The integrated electronics also include RS422 level shifters and TXD/RXD LEDs to provide a visual indication of data traffic through the adapter.



Figure 1.1 USB-COM-Plus USB2-H-6002

Flexible mounting allows the USB2-H-6002 to be used in a variety of applications, from a portable adapter to accompany a laptop to permanent installations in industrial, commercial, and retail locations. The enclosure incorporates a standard USB Mini-B client connector for connection to an upstream host or hub port. RS422-level signals are available on each of the industry-standard DE-9P connectors. The maximum RS422-level data rate is 8Mbps.

The USB2-H-6002 adapter requires USB device drivers, available free from <http://www.connectiveperipherals.com>, which are used to make the USB2-H-6002 appear as a Virtual COM Port (VCP). This allows existing serial communications software, such as HyperTerminal, to exchange data through the USB2-H-6002 to a legacy RS422 peripheral device.

1.2 LED Description

The USB2-H-6002 uses five LEDs to indicate a valid link and data traffic according to the following table:

LED Color	Function	Description	Quantity
Yellow	Enumerated	ON when USB2-H-6002 is configured and ready	1
Red	TxD Activity	Flashes when data is transmitted from the USB2-H-6002 to the attached RS422 device	2
Green	RxD Activity	Flashes when data is transmitted from the attached RS422 device to the USB2-H-6002	2

Table 1.1 – LED Description

1.3 Block Diagram

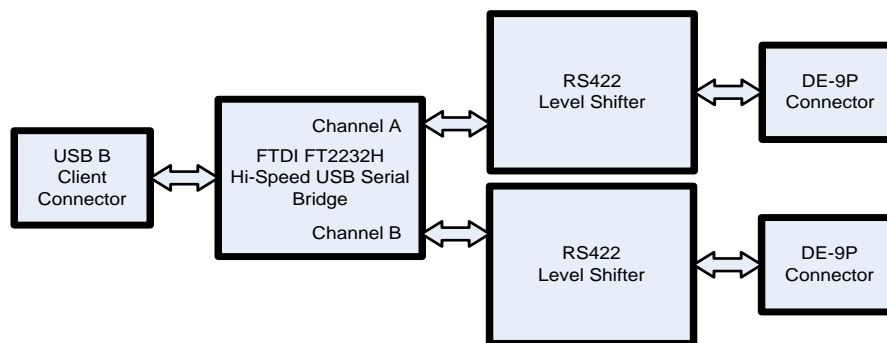


Figure 1.2 USB2-H-6002 Block Diagram

1.3.1 Block description

USB Mini B Client Connector

This connector provides the interface for connection to a USB Host or Hub port. A standard "A to Mini B" cable is provided, though one of a different length may also be used. The maximum cable length is 5 meters, according to the USB 2.0 specification.

FTDI FT2232H

The FTDI [FT2232H](#) provides the USB-to-Serial conversion. Operating system device drivers are required in order to work with the FT2232H to provide the Virtual COM Port serial functionality.

RS422 Level Shifter

The RS422 level shifter converts the signals provided by the FT2232H into the voltage levels required by RS422 devices.

DE-9P Connector (Male)

The DE-9P connector is configured in an industry standard (TIA/EIA-422) pin-out to provide connection to RS422 peripherals through standard cables. See section 3.1.2.

1.4 Features

- Adds dual RS-422 serial port by connecting to a USB 2.0 Hi-Speed interface.
- Easy plug & play installation and RS-422 device connection
- Provides a USB2.0 Hi-Speed(480Mbps) interface and works with USB 1.1, 2.0 and 3.0 Host and Hub ports
- Industry Standard FTDI chip set & device drivers for maximum compatibility
- Microsoft Windows® WHQL-certified drivers (Windows 7 - Windows 11)
- Legacy drivers also available for older Windows versions back to XP, and Windows CE

- macOS and Linux device drivers
- Installs as two standard Windows COM ports
- COM port number can be changed to any available COM port number, to support HyperTerminal, or any other serial communications software application running in Windows
- FIFO: 4k byte transmit buffer, 4k byte receive buffer
- RS-422 data signals: TxD+, TxD-, RxD+, RxD-, RTS+, RTS-, CTS+, CTS-, GND
- Powered by USB port. No external power adapter required.
- Serial port speed up to 8Mbps
- Serial Communication Parameters
 - Parity: None, Even, Odd
 - Data bits: 7, 8
 - Flow control: RTS/CTS, X-ON/X-OFF, None
- Two DE-9P male connectors
- LEDs indicate USB Enumeration, RxD, TxD for monitoring port status & easy diagnostics
- High-temperature plastic enclosure
- Operating temperature of -40°C to +85°C
- USB cable of 0.9 meter included
- FCC and CE approved.

1.5 Performance Figures

Parameter	Performance
USB Interface	480Mbps USB 2.0 High-Speed
RS422 Interface	Standard Windows baud rates (300bps to 921.6Kbps) Custom baud rates (300bps to 8Mbps) through baud rate aliasing. See FTDI Application Note: Aliasing VCP Baud Rates

Table 1.2 - Performance Figures

1.6 Ordering Information

Part Number	Description
USB2-H-6002	USB-COM-Plus Hi-Speed USB to 2-Port RS422 Adapter

Table 1.3 - Ordering Information

2 Installation

2.1 Hardware Installation

There are no switches or jumpers to configure on the USB2-H-6002.

2.2 Mounting

The USB2-H-6002 is provided with two mounting options: UniClip™ Wall/DIN rail mount and rubber feet. The UniClip Wall/DIN rail mount allows the USB2-H-6002 to be permanently mounted to a wall or attached to a DIN rail. The rubber feet can be used when mobility or desktop use is desired.

Note: The UniClip provides a permanent mounting style. The USB2-H-6002 case may be damaged if the UniClip is removed.

The following figures indicate various mounting styles.



Figure 2.1 - USB2-H-6002 with UniClip Brackets



Figure 2.2 - USB2-H-6002 with Rubber Feet

2.2.1 Wiring

A standard 0.9m USB "A" to "Mini- B" cable is provided.

Insert the A-plug into an available USB Host or Hub port. Insert the Mini-B plug into the Mini-B receptacle on the USB2-H-6002.

The USB2-H-6002 follows EIA-422 standard as a Data Terminal Equipment (DTE) device. If the RS422 equipment being connected is a Data Communication Equipment (DCE) device, it's typical that a straight-through cable can be used.

The following table shows the signal assigned to each pin on the DE-9P connectors of the USB2-H-6004. The last column also shows which corresponding signal on the external RS422 device the pin would be connected to.

DTE Pin Number	Signal Name	Expected Connecting Signal
1	TXD- = Transmit Data, negative polarity	RXD-
2	TXD+ = Transmit Data, positive polarity	RXD+
3	RXD+ = Receive Data, positive polarity	TXD+
4	RXD- = Receive Data, negative polarity	TXD-
5	GND = signal ground	GND
6	RTS- = Request To Send, negative polarity	CTS-
7	RTS+ = Request To Send, positive polarity	CTS+
8	CTS+ = Clear To Send, positive polarity	RTS+
9	CTS- = Clear To Send, negative polarity	RTS-

Table 2.1 – RS422 DTE to DCE connection with straight-through cable

Some serial devices may require certain handshake signals be connected. Refer to your device manual for cabling details.

2.3 Device Driver Installation

For driver installation, please refer to the **Connective Peripherals USB to Serial Converters Driver Installation Guide (CP_000084)** which is available from www.connectiveperipherals.com.

3 Connections

3.1 External Connectors

3.1.1 USB

The USB-H-6002 is a downstream USB 2.0 Device. A standard USB Series "Mini-B" receptacle is mounted inside the USB-H-6002 to facilitate connection to an upstream USB Host or Hub.

Pin Number	Pin Type	Description
1	Power	VBUS - USB Power provided from upstream USB Host or Hub
2	Bidirectional	D- = USB data signal, negative polarity
3	Bidirectional	D+ = USB data signal, positive polarity
4	ID	No connected
5	Ground	GND = USB signal ground
Shield	Case Ground	Drain = typically connected to the host PC case

Table 3.1 - USB "Mini-B" Receptacle Pin-Out

3.1.2 RS422

The RS422 port is configured as Data Terminal Equipment (DTE), with a 9-contact D-Sub Pin connector. Pin assignments are according to TIA/EIA-422.

Pin Number	Pin Type	Description
1	Output	TXD- = Transmit Data, negative polarity
2	Output	TXD+ = Transmit Data, positive polarity
3	Input	RXD+ = Receive Data, positive polarity
4	Input	RXD- = Receive Data, negative polarity
5	Ground	GND = signal ground
6	Output	RTS- = Request To Send, negative polarity
7	Output	RTS+ = Request To Send, positive polarity
8	Input	CTS+ = Clear To Send, positive polarity
9	Input	CTS- = Clear To Send, negative polarity
Shield	Case Ground	Drain = typically connected to the host PC case

Table 3.2 - DE-9P RS422 Pin-Out

4 Electrical Details

4.1 USB

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
USB_VCC	Input Power Voltage*	4.25	5.0*	5.25	V	*Present when USB cable is attached, and USB Host or Hub powered.
I _{CC}	USB current		85		mA	Unit connected to USB port and idle (no RS422 cabling connected and no data transfer)
			180		mA	2 ports with loopback connections running at 1MBaud. Actual current consumption depends on the characteristics of the RS422 cabling and attached devices.

Table 4.1 - USB Electrical Details

4.2 RS422

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
Receiver Input						
VCM	Common-mode input voltage range	-7	+12		V	
IN	Input Current			1.0	mA	VIN = +12V
				-0.8		VIN = -7V
VTH	Differential Threshold Voltage	-0.2		+0.2	V	
VIHYST	Input Hysteresis		20		mV	
RIN	Input Resistance, RIN	12	15		kΩ	
Transmitter Output						
VOD	Differential Output Voltage,	1.5		5	V	With RL = 54Ω. CL = 50pF *
ESD Tolerance						
ESD HBM	RS422 Inputs and Outputs		±15		kV	
EN61000-4-2 Contact Discharge	RS-422 Inputs and Outputs		±8		kV	
EN61000-4-2 Air Gap Discharge	RS-422 Inputs and Outputs		±15		kV	

Table 4.2 - RS422 Electrical Details

* - The 54 ohms is the equivalent of two 120-ohm termination resistors placed on each side of the transmission line and the input impedance of 32 receivers on the line.

5 Mechanical Details

5.1 Module Mechanical Dimensions

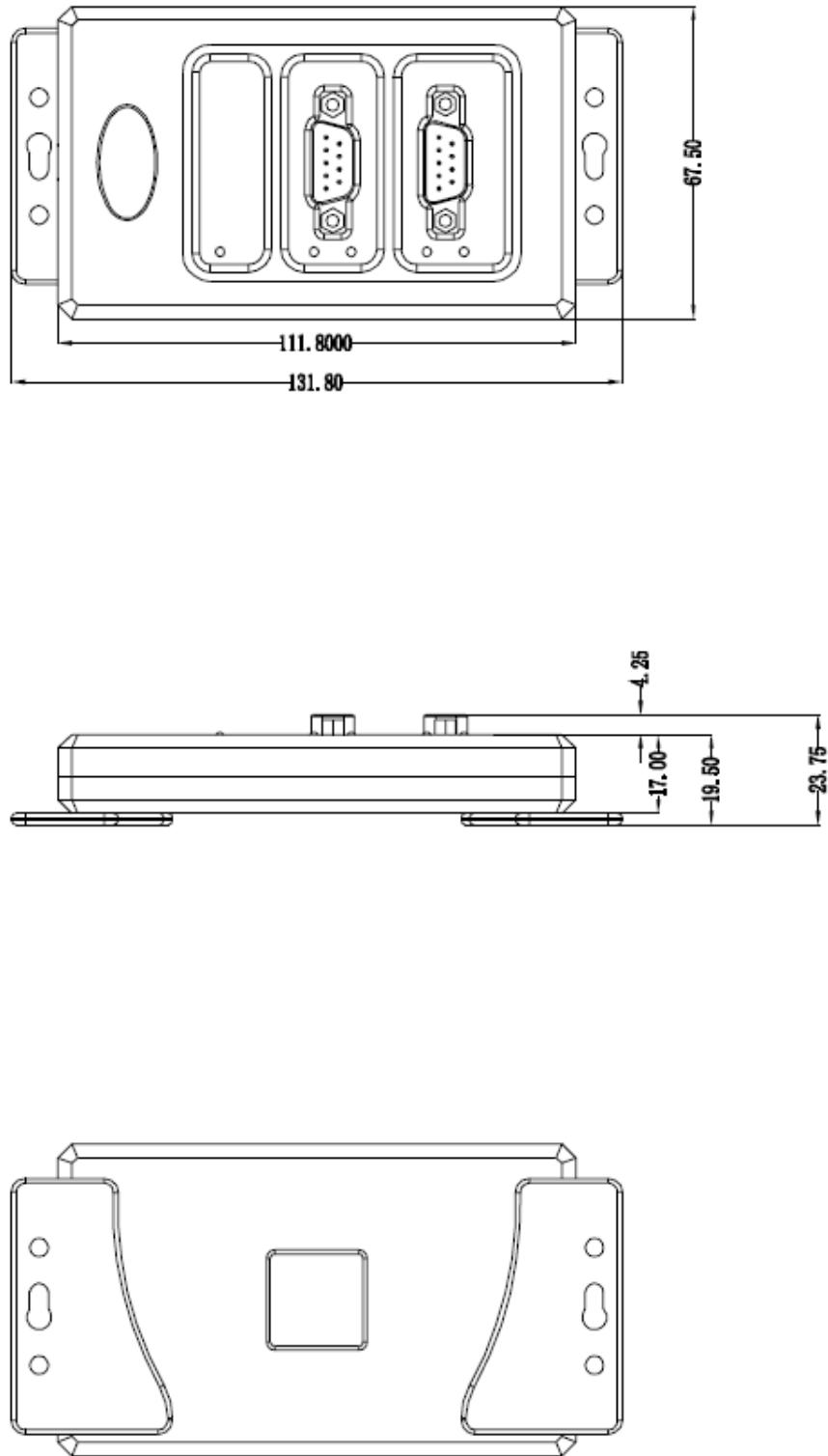


Figure 3.1 - USB2-H-6002 Case Dimensions

Dimensions are shown in mm.

5.2 UniClip™ Mechanical Dimensions

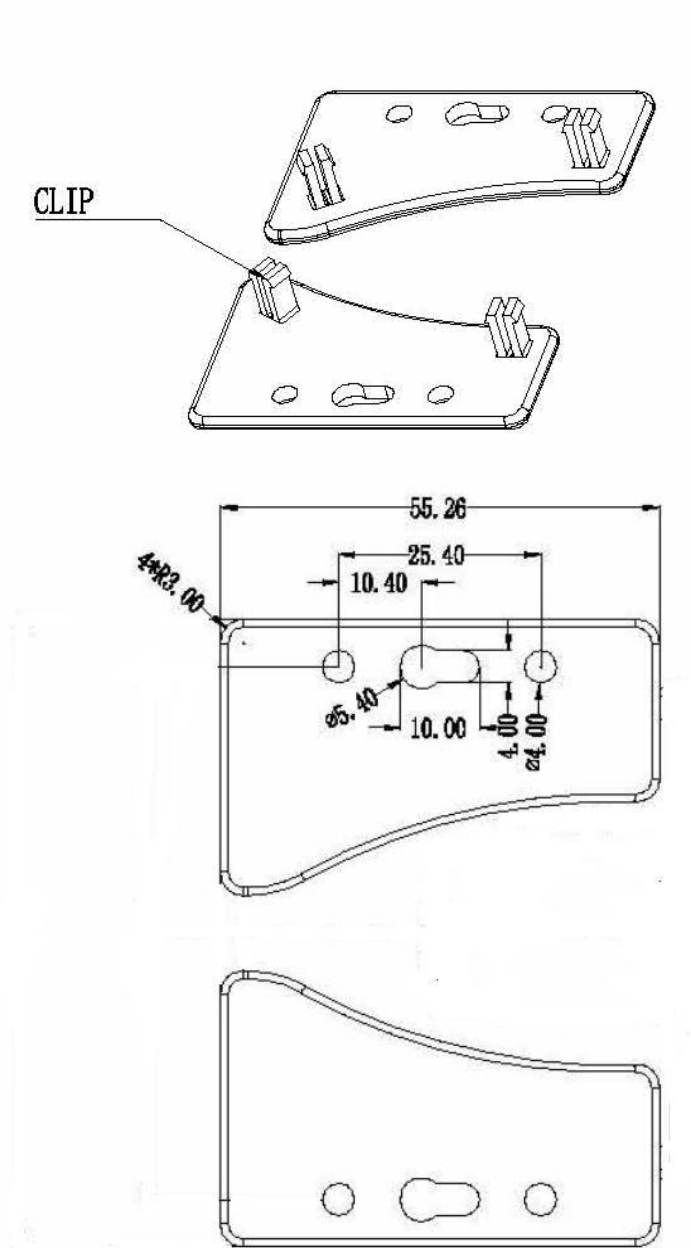


Figure 4.2 - USB2-H-6002 UniClip Dimensions

The UniClips are symmetrical. Dimensions (in mm) are shown for one UniClip only for clarity.

6 Physical Environment Details

6.1 Storage Temperature

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
T	Storage Temperature Range		25		°C	Dry and dust-free space with a constant temperature and relative humidity less than 65%.

Table 6.1 - Storage Temperature

6.2 Operating Temperature

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
T	Operating Temperature Range	-40		+85	°C	5% to 95% RH, non condensing

Table 6.2 - Operating Temperature

7 Environmental Approvals & Declarations

7.1 EMI Compatibility

FCC and CE

The USB2-H-6002 has been tested to be compliant with both FCC Part 15 Subpart B and European EMC Directive.



Note: This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.



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.

7.2 Safety

The USB2-H-6002 is defined as Limited Power Supply (LPS) device, with operating voltages under 60VDC.

7.3 Environmental

The USB2-H-6002 is a lead-free device that complies with the following environmental directives: RoHS, WEEE, REACH, PFOS and DecaBDE.

7.4 Reliability

The USB2-H-6002 is designed as a robust USB-Serial adapter for use in many environments. There are no user-serviceable parts. Any failure will require a replacement of the unit.

7.5 Import / Export Information

Import / Export Information	
Country of Origin	China
Harmonized Code	TBD
Product Description	USB to RS422 Computer Adapter, Dual Port
USA ECCN	EAR99 - No License Required

Table 7.1 - Import / Export Information

8 Troubleshooting

8.1 Hardware

Cables are the most common sources of trouble with external devices.
Check the following:

- USB cable is properly inserted at both ends
- Computer power is ON
- Computer is not in Sleep or Standby
- If a USB Hub is used, be sure it is set for "Self-Powered" operation
- If a USB Hub is used, be sure all cables are properly inserted
- If all the above are OK, the Yellow LED should be lit, indicating the device has been recognized by the USB subsystem.

RS422 cables – check the following:

- Output signals (TXD+, TXD-, RTS+, RTS-) are connected to the respective inputs (RXD+, RXD-, CTS+, CTS-) in each direction.
- Check for specific handshake requirements of your RS422 peripheral.
- If handshake signals are not used, ensure the application is set to "No Hardware Handshake", or equivalent.
- Test the port with a loop-back connector. Connect TXD+ to RXD+, TXD- to RXD-, RTS+ to CTS+ and RTS- to CTS-. Use a simple terminal program to check that data is transmitted and received.

8.2 Device Driver

Ensure the latest device driver is in use. For instructions on how to remove and re-install the latest driver, refer to the **Connective Peripherals USB to Serial Converters Driver Installation Guide (CP_000084)** which is available from www.connectiveperipherals.com.

If other devices with FTDI chips are installed in the system, check with all manufacturers of these devices for the latest device drivers.

The FTDI installation guides also have additional information on driver installation: <https://ftdichip.com/document/installation-guides/>.

Common Windows Device Driver Troubles:

- **DEVICE TIMES OUT:** The default settings of the device driver assume typical data transfers of hundreds to thousands or more bytes at a given time. Some applications, such as a GPS device, only send data in short packets, often only a few bytes. If this is the case, it may be necessary to adjust the driver buffer size and/or latency timer to smaller values. These values can be adjusted through the advanced driver options which can be accessed by double-clicking on the device under the Ports (COM & LPT) section of the Windows Device Manager and clicking the advanced button in the Port Settings tab. The buffer size can be reduced to 64 bytes. The latency timer can be set as low as 2ms. A setting of 1ms will cause unnecessary USB traffic and could adversely affect data transmission.
- **ERRATIC MOUSE POINTER:** The device driver defaults to query an attached device to find out whether it is a mouse or modem, consistent with native COM port operation. Some RS232 peripherals constantly send short packets of data, causing the host system to "think" a mouse or modem has been attached. These short packets will interfere with normal mouse operation causing the pointer to jump around the screen. If this happens, disconnect the RS232 device, and *uncheck the Serial Enumerator* option. This setting is in the advanced driver options which can be accessed by double-clicking on the device under the Ports (COM & LPT) section of the Windows Device Manager and clicking the advanced button in the Port Settings tab.

- COM PORT IN USE: Windows keeps track of all COM port assignments. If multiple products have been connected to a single system, the COM port number will increase, even if the other devices are not attached. If the higher COM port assignments are not acceptable for the application, known unused COM port numbers can be uninstalled as shown in the **Connective Peripherals USB to Serial Converters Driver Installation Guide (CP_000084)** which is available from www.connectiveperipherals.com and the FTDI driver installation guides at <https://ftdichip.com/document/installation-guides/>.

8.3 Technical Support

Technical support may be obtained from your nearest Connective Peripherals office. See details below.

E-Mail (Support): support@connectiveperipherals.com

Web: <http://www.connectiveperipherals.com>

9 Contact Information

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Appendix A - List of Figures and Tables

List of Figures

Figure 1.1 USB-COM-Plus USB2-H-6002	4
Figure 1.2 USB2-H-6002 Block Diagram	5
Figure 2.1 - USB2-H-6002 with UniClip Brackets.....	7
Figure 2.2 - USB2-H-6002 with Rubber Feet	7
Figure 5.1 - USB2-H-6002 Case Dimensions	11
Figure 5.2 - USB2-H-6002 UniClip Dimensions	12

List of Tables

Table 1.1 - LED Description	5
Table 1.2 - Performance Figures	6
Table 1.3 - Ordering Information	6
Table 2.1 - RS422 DTE to DCE connection with straight-through cable.....	8
Table 3.1 - USB "Mini-B" Receptacle Pin-Out.....	9
Table 3.2 - DE-9P RS422 Pin-Out	9
Table 4.1 - USB Electrical Details	10
Table 4.2 - RS422 Electrical Details	10
Table 6.1 - Storage Temperature.....	13
Table 6.2 - Operating Temperature	13
Table 7.1 - Import / Export Information	14

Appendix B - Revision History

Revision	Changes	Date
1.0	Initial release	12-08-2010
1.01	Modified enclosure colours to black/silver	30-03-2010
1.2	Re-branding to reflect the migration of the product from EasySync to Connective Peripherals name – logo change, copyright changed, contact information Changed, all internal hyperlinks changed.	08-03-2019
1.3	Replaced driver install section with link to Connective Peripherals USB to Serial Converters Driver Installation Guide (CP_000084). Updated current consumption.	04-07-2022