



Future Technology Devices International Ltd

USB-COM232-PLUS1

CE FC UK
CA

Datasheet

Neither the whole nor any part of the information contained in, or the product described in this manual, may be adapted or reproduced in any material or electronic form without the prior written consent of the copyright holder. This product and its documentation are supplied on an as-is basis and no warranty as to their suitability for any particular purpose is either made or implied. Future Technology Devices International Ltd will not accept any claim for damages howsoever arising as a result of use or failure of this product. Your statutory rights are not affected. This product or any variant of it is not intended for use in any medical appliance, device or system in which the failure of the product might reasonably be expected to result in personal injury. This document provides preliminary information that may be subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Future Technology Devices International Ltd, Unit1, 2 Seaward Place, Centurion Business Park, Glasgow, G41 1HH, United Kingdom. Scotland Registered Number: SC136640

1 Introduction

1.1 Functional Description

The USB-COM-Plus modules are a family of communication devices. This model, USB-COM232-Plus1, provides a simple method of adapting legacy serial devices with RS232 interfaces to modern USB ports. This is accomplished by incorporating the industry standard FTDI FT232RQ USB-Serial bridge chip.

The integrated electronics of the USB-COM232-PLUS1 utilise the FTDI FT232RQ and includes RS232 level shifters plus TXD/RXD LEDs to provide a visual indication of data traffic through the module.



Figure 1.1 USB-COM232-Plus1

The module uses a standard USB-B device connector for connection to an upstream host or hub port. RS232-level signals, including modem handshake signals, are available on an industry-standard DE-9P connector. The maximum RS232-level data rate is 1Mbps.

Pin 9 of the DE-9P connector can be configured to output (+5V) with a configuration [utility](#) available free from <https://ftdichip.com/>.

The USB-COM232-Plus1 module requires USB device drivers, available free from <https://ftdichip.com/>, which are used to make the USB-COM232-Plus1 appear as a Virtual COM Port (VCP). This allows existing serial communications software, such as HyperTerminal, to exchange data through the USB-COM232-Plus1 to a legacy RS232 peripheral device.

1.2 LED Description

The USB-COM232-Plus1 uses three LEDs to indicate a valid link as well as data traffic according to the following table:

LED Color	Function	Description
Yellow	Enumerated	ON when USB-COM-Plus is configured and ready
Green	TxD Activity	Flashes when data is transmitted from the USB-COM232-Plus1 to the attached RS232 device
Red	RxD Activity	Flashes when data is transmitted from the attached RS232 device to the USB-COM232-Plus1

Table 1.1 – LED Description

1.3 Block Diagram

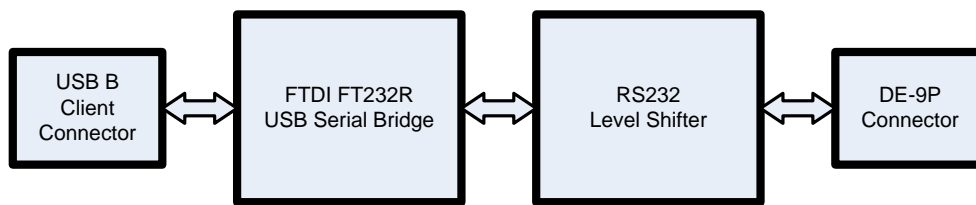


Figure 1.2 USB-COM232-Plus1 Block Diagram

1.3.1 Block description

USB B Client Connector

This connector provides the interface for connection to a USB Host or Hub port. The maximum cable length is 5 meters, according to the USB 2.0 specification.

FTDI FT232RQ

The FTDI FT232RQ provides the USB-to-Serial conversion. Operating system device drivers are required in order to work with the FT232RQ to provide the Virtual COM Port serial functionality.

RS232 Level Shifter

The RS232 level shifter converts the signals provided by the FT232RQ into the voltage levels required by RS232 devices.

DE-9P Connector (Male)

The DE-9P connector is configured in an industry standard (TIA/EIA-574) pin-out to provide connection to RS232 peripherals through standard cables. See section 3.1.2

1.4 Features

- Adds one RS-232 serial port by connecting to USB
- Easy plug & play installation and RS-232 device connection
- Works with USB 1.1 & 2.0 Host and Hub ports
- Industry Standard FTDI chip set & device drivers for maximum compatibility
- Microsoft Windows® WHQL-certified, Mac, Linux and Android device drivers
- Installs as a standard Windows COM port
- COM port number can be changed to any available COM port number, including COM1 to COM4, to support HyperTerminal, or any other serial communications software application running in Windows
- FIFO: 128 bytes transmit buffer, 256 bytes receive buffer
- RS-232 data signals: TxD, RxD, RTS, CTS, DSR, DTR, DCD, RI, GND
- Powered by USB port. No external power adapter required.
- RI signal can be configured for +5VDC output at 250mA
- Serial port speed up to 1Mbps
- Serial Communication Parameters
 - Parity: None, Even, Odd
 - Data bits: 7, 8
 - Flow control: RTS/CTS, DSR/DTR, X-ON/X-OFF, None
- One DE-9P male connector
- LEDs indicate USB Enumeration, RxD, TxD for monitoring port status & easy diagnostics
- Operating temperature of -40°C to +85°C

1.5 Driver Support

Royalty free VIRTUAL COM PORT (VCP) and D2XX Direct Drivers are available for the following Operating Systems (OS):

- Windows
- Linux
- Mac
- Android (J2xx / D2xx only)

See the following website link for the full driver support list including OS versions and legacy OS.

<https://ftdichip.com/drivers/>.

Virtual COM Port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port.

D2XX Direct Drivers allow direct access to the USB device through a DLL. Application software can access the USB device through a series of DLL function calls. The functions available are listed in the [D2XX Programmer's Guide](#) document which is available from the [Documents](#) section of our website.

Please also refer to the [Installation Guides](#) webpage for details on how to install the drivers.

1.6 Performance Figures

Parameter	Performance
USB Interface	12Mbps USB 2.0 Full-Speed
RS232 Interface	Standard Windows baud rates (300bps to 921.6Kbps) Custom baud rates (300bps to 1Mbps) through baud rate aliasing. See FTDI Application Note: Configuring FT232R, FT2232 and FT232BM Baud Rates

Table 1.2 - Performance Figures

Part Number	Description
USB-COM232-Plus1	USB-COM-Plus Full-Speed USB to 1-Port RS232 module

Table 1.3 - Ordering Information

Table of Contents

1	Introduction	2
1.1	Functional Description	2
1.2	LED Description	3
1.3	Block Diagram	3
1.3.1	Block description	3
1.4	Features	4
1.5	Driver Support	4
1.6	Performance Figures	5
2	Installation	8
2.1	Example Applications and Configurations	8
2.1.1	Wiring	8
2.2	Device Driver Installation	9
2.2.1	Microsoft Windows	9
2.2.2	Mac OS X, Linux, Windows CE	9
2.3	Configuration Utility	9
3	Connections	11
3.1	External Connectors	11
3.1.1	USB	11
3.1.2	RS232	11
4	Electrical details	12
4.1	USB	12
4.2	RS232	12
4.3	Power Output	12
5	Mechanical Details	13
5.1	Module Mechanical Dimensions	13
6	Physical Environment Details	14
6.1	Storage	14
6.2	Operating	14
7	Environmental Approvals & Declarations	15
7.1	EMI Compatibility	15
7.2	Safety	15
7.3	Environmental	15
7.4	Reliability	15

7.4.1	MTTF	15
7.5	Import / Export Information.....	16
8	Troubleshooting	17
8.1	Hardware	17
8.2	Device Driver	17
8.3	Technical Support	18
9	Contact Information	19
Appendix A - List of Figures and Tables		20
Appendix B - Revision History		21

2 Installation

2.1 Example Applications and Configurations

2.1.1 Wiring

Insert the A-plug into an available USB Host or Hub port. Insert the B-plug into the B-receptacle on the USB-COM232-Plus1.

RS232 cables have followed a standard 9-pin configuration on a D-sub connector since the mid-1980s. The USB-COM232-Plus1 follows this standard as a Data Terminal Equipment (DTE) device. If the RS232 equipment being connected is a Data Communication Equipment (DCE) device, it is typical that a straight-through cable can be used.

DTE Pin Number	Signal Name	DCE Pin Number
1	DCD = Data Carrier Detect	1
2	RXD = Receive Data	2
3	TXD = Transmit Data	3
4	DTR = Data Terminal Ready	4
5	GND = RS232 signal ground	5
6	DSR = Data Set Ready	6
7	RTS = Request To Send	7
8	CTS = Clear To Send	8
9	RI – Ring Indicator / +5VDC	9

Table 2.1 – RS232 DTE to DCE connection with straight-through cable

If the USB-COM232-Plus1 is connected to another DTE device, a serial “null-modem” cable is required. A null-modem handles connecting output signals to the corresponding input signals on the other end. Table 2.2 shows a typical null-modem cable. Note that RI and DCD are not always used.

DTE Pin Number	Signal Name	DTE Pin Number
2	RXD = Receive Data	3
3	TXD = Transmit Data	2
4	DTR = Data Terminal Ready	6
5	GND = RS232 signal ground	5
6	DSR = Data Set Ready	4
7	RTS = Request To Send	8
8	CTS = Clear To Send	7

Table 2.2 – RS232 DTE to DTE connection with null-modem cable

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

2.2 Device Driver Installation

The USB-COM232-Plus1 module drivers are available for download from <https://ftdichip.com/>.

2.2.1 Microsoft Windows

With the device drivers being Windows Hardware Quality Labs (WHQL) certified, they are also available through download directly from the Microsoft® Windows® Update service. Simply plug the device into the Windows PC and the drivers should load automatically if the PC is connected to the internet. Additional installation instructions can be found on the [Installation Guides](#) page of our website.

2.2.2 Mac OS X, Linux, Windows CE

Device drivers and FTDI installation guides for Mac OS X, Linux and Android are available for download on the FTDI Chip website. Follow the respective FTDI [Installation Guides](#) for the chosen operating system.

2.3 Configuration Utility

A [utility](#) to which configures the function of Pin 9 of the D-sub connector on the USB-COM232-Plus1 configuration utility is available for download from www.ftdichip.com.

The configuration utility is a Windows-only application which selects the mode for pin 9 on the D-sub connector. This utility will configure one USB-COM232-Plus1 adapter at a time. Ensure an adapter is connected to your PC and run the utility:

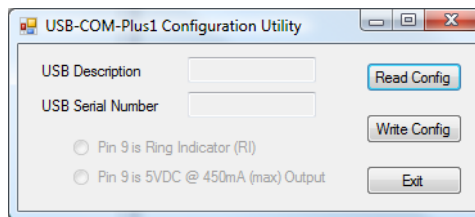


Figure 2.1 – Pin 9 Configuration Utility

The current configuration must be read before modifying the settings. Click on the “Read Config” button. A notice will appear if successful:

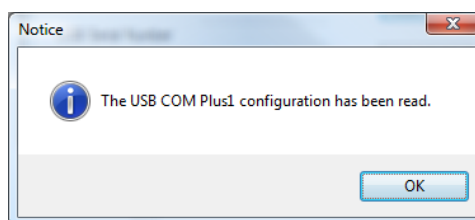


Figure 2.2 – Pin 9 Configuration Utility – Read Configuration

The current configuration is displayed, including the adapter description and serial number:

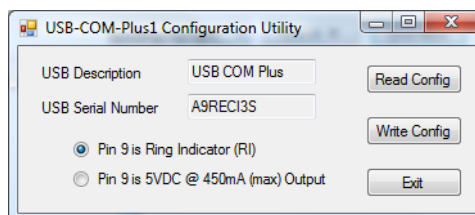
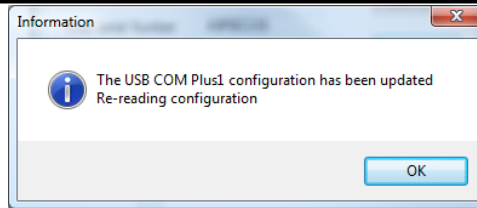
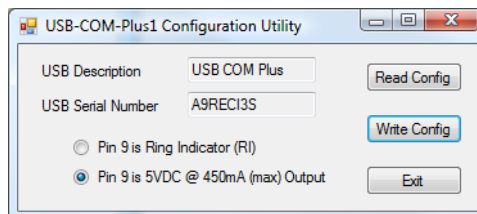


Figure 2.3 – Pin 9 Configuration Utility – Display Current Settings

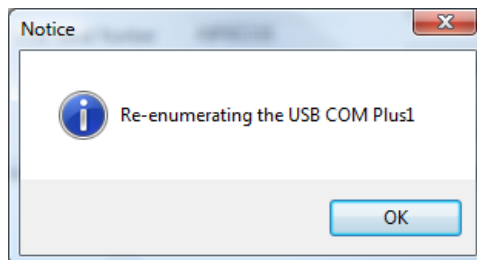
Select whether to change the function of the D-sub pin 9, then click “Write Config”:

**Figure 2.4 – Pin 9 Configuration Utility – Write Configuration**

The new values will be read from the USB-COM232-Plus1:

**Figure 2.5 – Pin 9 Configuration Utility – Read New Settings**

The adapter has been reconfigured. Press Exit:

**Figure 2.6 - Pin 9 Configuration Utility – Exit Program**

The utility forces the adapter to re-enumerate on the USB bus, and then closes. The USB-COM232-Plus1 is ready for use with its new settings.

Note: The utility states 450mA (max) Output however this is actually 250mA (max) as per section 4.3.

3 Connections

3.1 External Connectors

3.1.1 USB

The USB-COM232-Plus1 is a downstream USB 2.0 Device. A standard USB Series "B" receptacle is mounted inside the USB-COM232-Plus1 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	Ground	GND = USB signal ground
Shield	Case Ground	Drain = typically connected to the host PC case

Table 3.1 – USB "B" Receptacle Pin-Out

3.1.2 RS232

The RS232 port is configured as Data Terminal Equipment (DTE), with a 9-contact D-Sub Pin connector. Pin assignments are according to TIA/EIA-574 which formally defines the assignments for a COM port found on many personal computers. In addition, Ring Indicator (RI) may be re-assigned to provide +5VDC to an external device with a maximum current draw of 250mA once the USB-COM232-Plus1 has been enumerated by the system.

Pin Number	Pin Type	Description
1	Input	DCD = Data Carrier Detect
2	Input	RXD = Receive Data
3	Output	TXD = Transmit Data
4	Output	DTR = Data Terminal Ready
5	Ground	GND = RS232 signal ground
6	Input	DSR = Data Set Ready
7	Output	RTS = Request To Send
8	Input	CTS = Clear To Send
9	Input / Power	RI = Ring Indicator or +5VDC @ 250mA max
Shield	Case Ground	Drain = typically connected to the host PC case

Table 3.2 – DE-9P RS232 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***		30	50	mA	***Does not include power supplied to external device connected to pin 9 when configured for power output mode

Table 4.1 - USB Electrical Details

4.2 RS232

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V _{trans}	Transmitter output voltage swing	± 5			V	RL = 3KΩ
V _{rec}	Receiver input voltage range	±2.4		±25	V	Input resistance = 3KΩ to 7KΩ
	ESD HBM		±15		KV	RS-232 Inputs and Outputs

Table 4.2 - RS232 Electrical Details

4.3 Power Output

The USB-COM232-Plus1 offers option to reassign the RI pin (see section 3.1.2) to provide +5V DC for an external device that requires power. The maximum allowable current is 500mA, including the circuitry of the USB-COM232-Plus1 itself. Up to 250mA may be used by the external device.

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
I _o	Output Power Current	0		250	mA	USB-COM232-Plus1 configured for power output mode

Table 4.3 - Power Output for USB-COM232-Plus1

5 Mechanical Details

5.1 Module Mechanical Dimensions

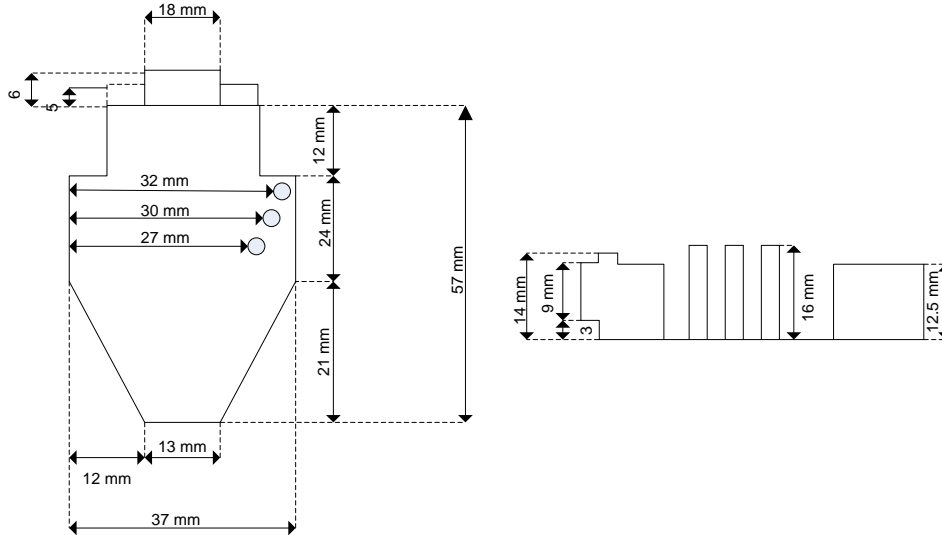


Figure 5.1 - USB-COM232-Plus1 PCB Dimensions

6 Physical Environment Details

6.1 Storage

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
T	Storage Temperature Range	TBD		TBD	°C	

Table 6.1 - Storage Temperature

6.2 Operating

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, CE and UKCA

The USB-COM232-Plus1 has been tested to be compliant with both FCC Part 15 Subpart B and European EMC Directive and UKCA.



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.

IEC60601

The USB-COM232-Plus1 has been tested to be compliant with IEC60601-1-2: Medical electrical equipment - Part 1: General requirements for safety – 2, Collateral standard: Electromagnetic compatibility.



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 USB-COM232-Plus1 is defined as Limited Power Supply (LPS) device, with operating voltages under 60VDC.

7.3 Environmental

The USB-COM232-Plus1 is a lead-free device that complies with the following environmental directives: RoHS, WEEE, REACH, PFOS and DecaBDE.

7.4 Reliability

The USB-COM232-Plus1 is designed as a robust USB-Serial module for use in many environments. There are no user-serviceable parts. Any failure will require a replacement of the unit.

7.4.1 MTTF

The Mean Time To Failure is calculated at TBD hours.

7.5 Import / Export Information

Import / Export Information	
Country of Origin	China
Harmonized Code	8542.90.0000
Product Description	USB to RS232 Development Module, Single 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.

RS232 cables – check the following:

- Output signals (TXD, RTS, DTR) are connected to the respective inputs (RXD, CTS, DSR) in each direction.
- Check for specific handshake requirements of your RS232 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, RTS to CTS and DTR to DSR. 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. See <https://ftdichip.com/>.

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

See the FTDI installation guides for additional details: <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 as noted in Figure 2.13. 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, also found on the Advanced driver options screen in Figure 2.13.
- **COM PORT IN USE:** Windows keeps track of all COM port assignments. If multiple FTDIChip 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 should be uninstalled according to the FTDI installation guide: <https://ftdichip.com/document/installation-guides/>.

8.3 Technical Support

Technical support may be obtained from your nearest FTDI office:

United Kingdom:	support1@ftdichip.com
United States:	us.support@ftdichip.com
China:	cn.support@ftdichip.com
Taiwan	tw.support1@ftdichip.com

9 Contact Information

Head Office – Glasgow, UK

Future Technology Devices International Limited
Unit 1, 2 Seaward Place, Centurion Business Park
Glasgow G41 1HH
United Kingdom
Tel: +44 (0) 141 429 2777
Fax: +44 (0) 141 429 2758

E-mail (Sales) sales1@ftdichip.com
E-mail (Support) support1@ftdichip.com
E-mail (General Enquiries) admin1@ftdichip.com

Branch Office – Tigard, Oregon, USA

Future Technology Devices International Limited
(USA)
7130 SW Fir Loop
Tigard, OR 97223
USA
Tel: +1 (503) 547 0988
Fax: +1 (503) 547 0987

E-Mail (Sales) us.sales@ftdichip.com
E-Mail (Support) us.support@ftdichip.com
E-Mail (General Enquiries) us.admin@ftdichip.com

Branch Office – Taipei, Taiwan

Future Technology Devices International Limited
(Taiwan)
2F, No. 516, Sec. 1, NeiHu Road
Taipei 114
Taiwan, R.O.C.
Tel: +886 (0) 2 8797 1330
Fax: +886 (0) 2 8751 9737

E-mail (Sales) tw.sales1@ftdichip.com
E-mail (Support) tw.support1@ftdichip.com
E-mail (General Enquiries) tw.admin1@ftdichip.com

Branch Office – Shanghai, China

Future Technology Devices International Limited
(China)
Room 1103, No.666 West Huaihai Road,
Shanghai, 200052
China
Tel: +86 21 62351596
Fax: +86 21 62351595

E-mail (Sales) cn.sales@ftdichip.com
E-mail (Support) cn.support@ftdichip.com
E-mail (General Enquiries) cn.admin@ftdichip.com

Web Site

<http://ftdichip.com>

Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

System and equipment manufacturers and designers are responsible to ensure that their systems, and any Future Technology Devices International Ltd (FTDI) devices incorporated in their systems, meet all applicable safety, regulatory and system-level performance requirements. All application-related information in this document (including application descriptions, suggested FTDI devices and other materials) is provided for reference only. While FTDI has taken care to assure it is accurate, this information is subject to customer confirmation, and FTDI disclaims all liability for system designs and for any applications assistance provided by FTDI. Use of FTDI devices in life support and/or safety applications is entirely at the user's risk, and the user agrees to defend, indemnify and hold harmless FTDI from any and all damages, claims, suits or expense resulting from such use. This document is subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Neither the whole nor any part of the information contained in, or the product described in this document, may be adapted or reproduced in any material or electronic form without the prior written consent of the copyright holder. Future Technology Devices International Ltd, Unit 1, 2 Seaward Place, Centurion Business Park, Glasgow G41 1HH, United Kingdom. Scotland Registered Company Number: SC136640

Appendix A - List of Figures and Tables

List of Figures

Figure 1.1 USB-COM232-Plus1	2
Figure 1.2 USB-COM232-Plus1 Block Diagram	3
Figure 2.1 – Pin 9 Configuration Utility	9
Figure 2.2 – Pin 9 Configuration Utility – Read Configuration	9
Figure 2.3 – Pin 9 Configuration Utility – Display Current Settings	9
Figure 2.4 – Pin 9 Configuration Utility – Write Configuration	10
Figure 2.5 – Pin 9 Configuration Utility – Read New Settings	10
Figure 2.6 - Pin 9 Configuration Utility – Exit Program	10
Figure 5.1 - USB-COM232-Plus1 PCB Dimensions	13

List of Tables

Table 1.1 – LED Description	3
Table 1.2 - Performance Figures	5
Table 1.3 - Ordering Information	5
Table 2.1 – RS232 DTE to DCE connection with straight-through cable	8
Table 2.2 – RS232 DTE to DTE connection with null-modem cable	8
Table 3.1 – USB "B" Receptacle Pin-Out	11
Table 3.2 – DE-9P RS232 Pin-Out	11
Table 4.1 - USB Electrical Details	12
Table 4.2 - RS232 Electrical Details.....	12
Table 4.3 - Power Output for USB-COM232-Plus1	12
Table 6.1 - Storage Temperature	14
Table 6.2 - Operating Temperature	14
Table 7.1 - Import / Export Information	16

Appendix B - Revision History

Document Title: USB-COM232-PLUS1 Datasheet
Document Reference No.: FT_000118
Clearance No.: FTDI# 76
Product Page: [Modules](#)
Document Feedback: [Send Feedback](#)

Revision	Changes	Date
Version Draft	First Draft	January 2009
Version 1.0	First Release	22-01-2009
Version 1.1	Added Pin 9 Configuration Utility Details Corrected Taiwan address. Corrected +5V supply output to 250mA	25-02-2009
Version 1.2	Edited Section 1.3.1, Removed the statement "A standard "A to B" cable is provided"	12-04-2010
Version 1.3	Added UKCA compliance and updated part number to FT232RQ. Updated driver support and links.	19/7/2023