USBC-FS-RS232-0V-1800-WE

Datasheet

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1 Introduction

The **USBC-FS-RS232-0V-1800-WE** is a USB Type C to RS232 levels serial UART converter cable incorporating FTDI's FT230XQ USB to serial UART interface IC device which handles all the USB signalling and protocols. The cable provides a fast, simple way to connect devices with a RS232 level serial UART interface to USB Type C.

The USBC-FS-RS232-0V-1800-WE contains a small internal electronic circuit board, utilising the FT230X, which is encapsulated into the USB Type C connector end of the cable. Refer to DS_FT230X for details. The integrated electronics also include the RS232 level shifter.

The other end of the cable is bare, tinned wire ended connections by default, but can be customised using different connectors to support various applications.

The cable is FCC, CE, and RoHS compliant.

The USB Type C side of the cable is USB powered and USB 2.0 full speed compatible. Each cable is 1.8m long and supports a data transfer rate up to 1 Mbaud. Each cable supports the FTDIChip-ID™, with a unique USB serial number programmed into the FT230X. This feature can be used to create a security or password protected file transfer access using the cable (requires D2XX drivers). Further information and examples on this feature are available at FTDIChip-ID Projects.

The USBC-FS-RS232-0V-1800-WE requires USB drivers, available free from https://www.ftdichip.com/FTDrivers.htm, which are used to make the FT230X in the cable appear as a virtual COM port (VCP). This allows the user to communicate with the USB Type C interface via a standard PC serial emulation port (for example TTY). Another USB driver, the D2XX driver, can also be used with application software to directly access the FT230X on the cable though a DLL. This is illustrated in Figure 1.1.
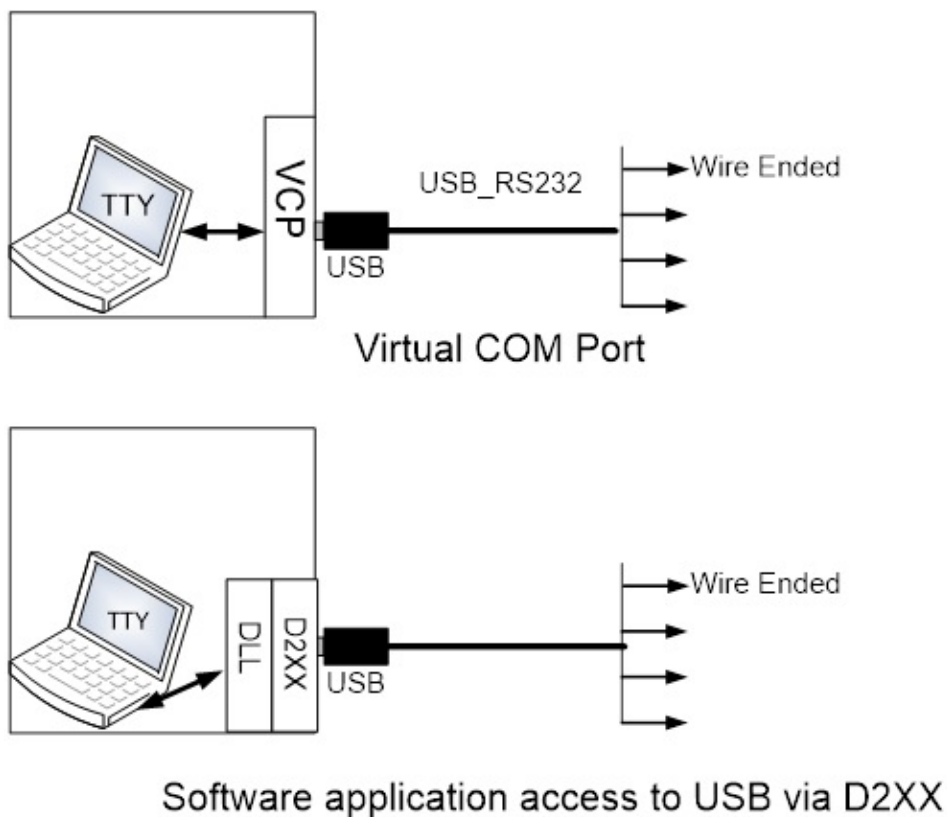

Figure 1.1 Using the USBC-FS-RS232-0V-1800-WE

1.1 Part Numbers

Table 1.1 gives details of the USBC-FS-RS232-0V-1800-WE part numbers.

Part Number	Description	End Connector*	Cable details
USBC-FS-RS232-0V-1800-WE	**USB Type C Full Speed** to **RS232** cable with red wire at 0V (open)	**W**ire **E**nded (no connector)	**1.8m** cable,6 core, UL2464 26 AWG, diam=4.8mm, Black

Table 1.1 USBC-FS-RS232-0V-1800-WE Descriptions and Part Numbers

CP supports customisation such as end connectors, 5V or 3.3V on red wire, and transparent housing with Tx/Rx LEDs. For more information, please contact your local CP sales office (see section **6** for contact details).

1.2 Certifications

USBC-FS-RS232-0V-1800-WE is fully RoHs compliant as well as CE and FCC certified.

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2 Typical Applications

- USB to serial RS232 level converter.
- Upgrading legacy peripherals to USB.
- Interface Microcontroller UART or I/O to USB*
- Interface FPGA or PLD to USB*

- USB Instrumentation PC interface.
- USB industrial control.
- USB password protected file transfers.

2.1 Driver Support

Royalty free VIRTUAL COM PORT (VCP) DRIVERS for…

- Windows 10 32,64-bit
- Windows 8/8.1 32,64-bit
- Windows 7 32,64-bit
- Windows 98, 98SE, ME, 2000, Server 2003, XP and Server 2008
- Windows XP and XP 64-bit
- Windows Vista and Vista 64-bit
- Windows XP Embedded
- Windows CE 4.2, 5.0 and 6.0
- Mac OS 8/9, OS-X
- Linux Kernel version 3.0.0 and onwards

Royalty free D2XX *Direct* Drivers (USB Drivers + DLL S/W Interface)

- Windows 10 32,64-bit
- Windows 8/8.1 32,64-bit
- Windows 7 32,64-bit
- Windows 98, 98SE, ME, 2000, Server 2003, XP and Server 2008
- Windows XP and XP 64-bit
- Windows Vista and Vista 64-bit
- Windows XP Embedded
- Windows CE 4.2, 5.0 and 6.0
- Mac OS-X
- Linux Kernel version 3.0.0 and onwards

The drivers listed above are all available to download for free from https://www.ftdichip.com/FTDrivers.htm. Various Third Party Drivers are also available for various other operating systems - see www.ftdichip.com for details.

Note: This cable uses RS232 levels and so an RS232 level shifter would be required at the MCU/FPGA/CPLD side as most MCUs/FPGAs/CPLDs use TTL/CMOS levels.

2.2 Features

- USBC-FS-RS232-0V-1800-WE converter provides a USB Type C to RS232 serial interface with customised end connectors.

- Entire USB protocol handled by the electronics in the cable's USBC moulding.

- EIA/TIA-232 and V.28/V.24 communication interface with low power requirements.

- UART interface support for 7 or 8 data bits, 1 or 2 stop bits and odd / even / mark / space / no parity.

- Internal EEPROM with user writeable area.

- FTDI's royalty-free VCP allow for communication as a standard emulated COM port and D2XX 'direct' drivers provide DLL application programming interface.

- Fully assisted hardware (RTS#/CTS#) or X-On / X-Off software handshaking.

- Data transfer rates from 300 baud to 1 Mbaud.

- Support for FT230X FTDIChip-ID™ feature for improved security.

- Low USB bandwidth consumption.

- UHCI / OHCI / EHCI host controller compatible.

- USB 2.0 Full Speed compatible.

- -40°C to +85°C operating temperature range.

- Cable length is 1.80m (6 feet).

- ESD Protection for RS-232 I/O's
  ±15kV Human Body Model (HBM)
  ±15kV EN61000-4-2 Air Gap Discharge
  ±8kV EN61000-4-2 Contact Discharge

- FCC and CE compliant.

- Custom versions available on request (subject to MOQ).

3 FT230X features relevant to USBC-FS-RS232-0V-1800-WE

The USBC-FS-RS232-0V-1800-WE use T230XQ USB to serial UART IC device. This section summarises the key features of the FT230XQ which applies to the USBC-FS-RS232-0V-1800-WE USBC to serial RS232 converter. For further details, and a full features and enhancements description, refer to the FT230X datasheet.

Internal EEPROM. The internal EEPROM in each cable is used to store USB Vendor ID (VID), Product ID (PID), device serial number, product description string and various other USB configuration descriptors. Each cable is supplied with the internal EEPROM pre-programmed as described in **Appendix A - Cable EEPROM Configuration**. The internal EEPROM descriptors can be programmed in circuit, over USB without any additional voltage requirement. It can be programmed using the FTDI utility software called FT Prog, which can be downloaded from https://www.ftdichip.com/Support/Utilities.htm. Additionally, there is a user area of the internal EEPROM available to system designers to allow storing of data (note that this is not modified by FT_Prog).

Lower Operating and Suspend Current. The FT230X has a low 15mA operating supply current and a very low USB suspend current of approximately 70µA. (Note that during suspend mode, the current drawn by any customised cable application which uses the USB supply, should not exceed 2.5mA to remain USB compliant)

Low USB Bandwidth Consumption. The USB interface of the FT230X, and therefore the USBC-FS-RS232-0V-1800-WE has been designed to use as little as possible of the total USB bandwidth available from the USB host controller.

UART Pin Signal Inversion. The sense of each of the UART signals can be individually inverted by configuring options in the internal EEPROM. For example CTS# (active low) can be changed to CTS (active high), or TXD can be changed to TXD#.

FTDIChip-ID™. The FT230X includes the new FTDIChip-ID™ security dongle feature. This FTDIChip-ID™ feature allows a unique number to be burnt into each cable during manufacture. This number cannot be reprogrammed. This number is only readable over USB can be used to form the basis of a security dongle which can be used to protect any customer application software being copied. This allows the possibility of using the USBC-FS-RS232-0V-1800-WE as a dongle for software licensing. Further to this, a renewable license scheme can be implemented based on the FTDIChip-ID™ number when encrypted with other information. This encrypted number can be stored in the user area of the FT230X internal EEPROM, and can be decrypted, then compared with the protected FTDIChip-ID™ to verify that a license is valid.

**Improved EMI Performance.** The USBC-FS-RS232-0V-1800-WE are FCC and CE certified.

Extended Operating Temperature Range - The USBC-FS-RS232-0V-1800-WE are capable of operating over an extended temperature range of -40º to +85º C thus allowing them to be used in automotive or industrial applications.

4 USBC-FS-RS232-0V-1800-WE

The USBC-FS-RS232-0V-1800-WE is un-terminated; it has bare and tinned wires.

4.1 USBC-FS-RS232-0V-1800-WE Connections & Mechanical Details

The following Figure 4.1 shows the cable signals and the wire colours for the signals on the USBC-FS-RS232-0V-1800-WE.
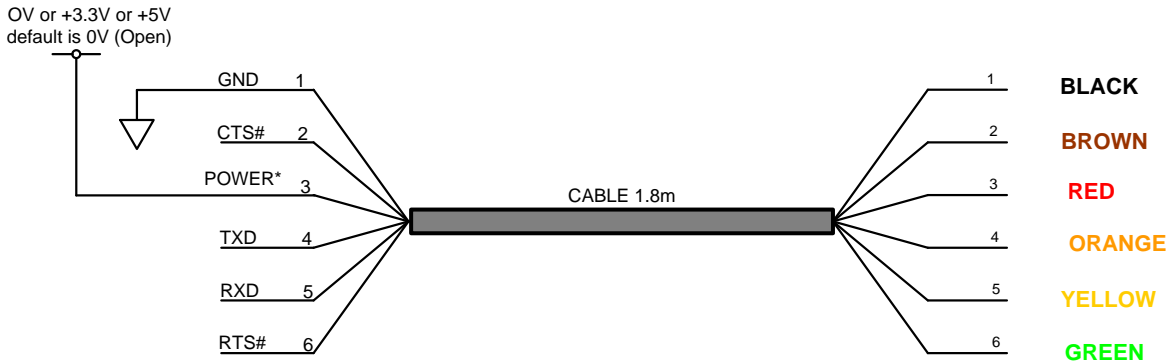
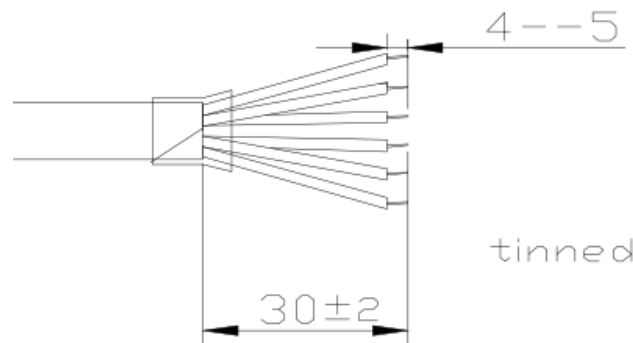**Figure 4.1 USBC-FS-RS232-0V-1800-WE Connections**

Figure 4.2 USBC-FS-RS232-0V-1800-WE Mechanical Details (dimensions in mm)

4.2 USBC-FS-RS232-0V-1800-WE Signal Descriptions

Colour	Name	Type	Description
Black	GND	GND	Device ground supply pin.
Brown	CTS#	Input	Clear to Send Control input / Handshake signal.
Red	POWER	Output	Power output. It can be customised to output +3.3V or +5V. Default version is 0V (open). If required, contact CP Sales sales@connectiveperipherals.com
Orange	TXD	Output	Transmit Asynchronous Data output.
Yellow	RXD	Input	Receive Asynchronous Data input.
Green	RTS#	Output	Request To Send Control Output / Handshake signal.

Table 4.1 USBC-FS-RS232-0V-1800-WE Signal Descriptions

4.3 USBC-FS-RS232-0V-1800-WE Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
VCC_5V	Output Power Voltage*	4.25	5.0*	5.25	V	*Default is 0V (open). This figure only applies when cable has been customised to output +5V. The range is dependent on the USB Type-C port that the USBC-FS-RS232-0V-1800-WE is connected to
VCC_3.3V	Output Power Voltage**	3.2	3.3**	3.4	V	**Default is 0V (open). This figure only applies when cable has been customised to output +3.3V.
I_O	Output Power Current***	-		75	mA	***Only applies when POWER output is customised to +5V or+3.3V Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40		+85	°C	

Table 4.2 USBC-FS-RS232-0V-1800-WE I/O Operating Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
Vtrans	Transmitter output voltage swing	+/- 5	+/- 6.5	+/- 15	V	
Vrec	Receiver input voltage range	-25		+25	V	

Table 3.3 USBC-FS-RS232-0V-1800-WE I/O Pin Characteristics

Description	Conditions	Minimum	Typical	Maximum
ESD HBM	RS-232 Inputs and Outputs		±15 kV	
EN61000-4-2ContactDischarge	RS-232 Inputs and Outputs		±8 kV	
EN61000-4-2AirGapDischarge	RS-232 Inputs and Outputs		±15 kV	

Table 4.4 USBC-FS-RS232-0V-1800-WE ESD Tolerance

5 Cable PCB Circuit Schematic

The circuit schematic for the small internal electronic circuit board, utilising the FT230X, which is encapsulated into the USBC connector end of the cable, is shown in Figure 5.1.

Customised versions of the cable are also available. Users interested in customised versions of these cables should contact sales@connectiveperipherals.com.
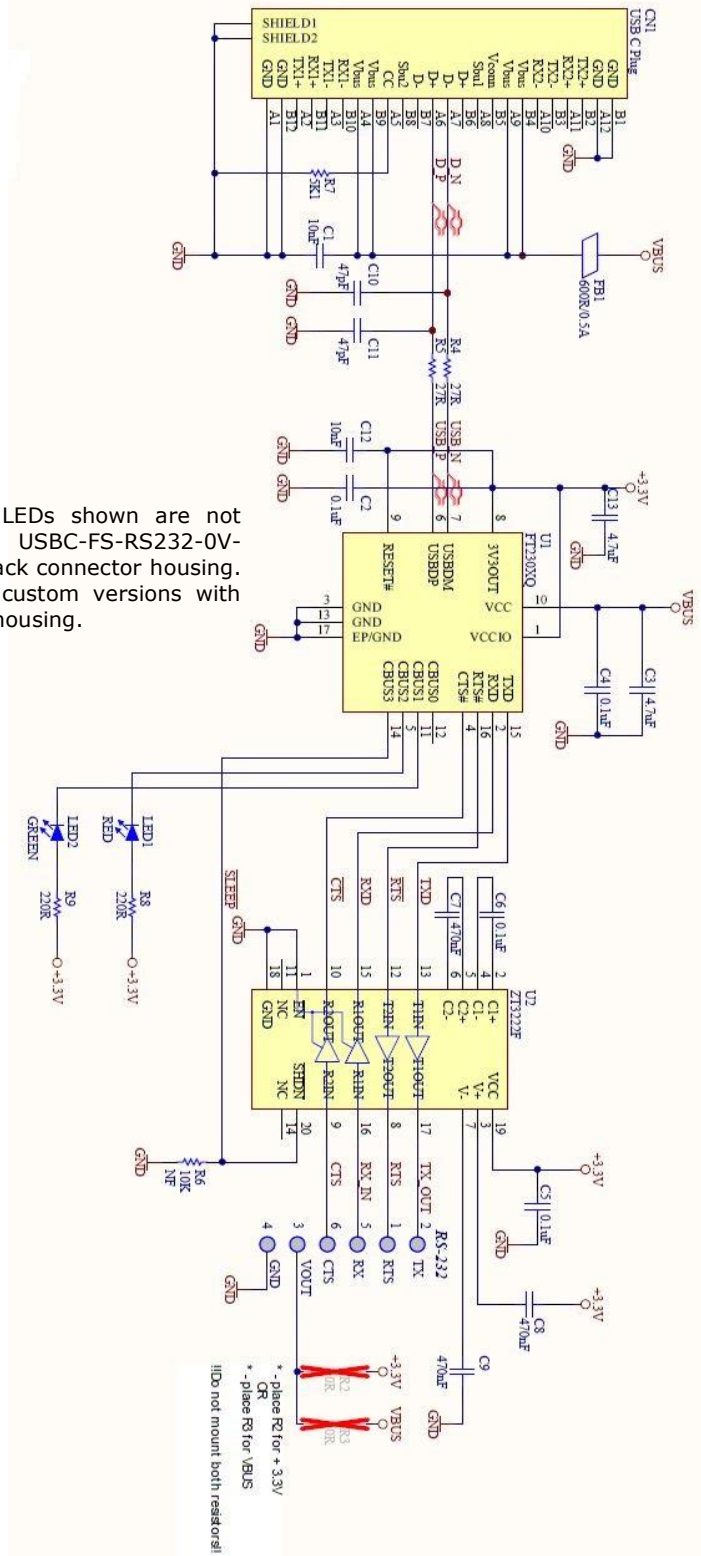
Note that the Tx/Rx LEDs shown are not fitted in the standard USBC-FS-RS232-0V-1800-WE as it has a black connector housing. They are available in custom versions with transparent connector housing.

Figure 5.1 Circuit Schematic of PCB Used in the USBC to RS232 Serial Converter Cable

6 Contact Information

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Appendix A - Cable EEPROM Configuration

Each USBC-FS-RS232-0V-1800-WE cable is controlled by the FT230X IC. This FT230X device contains an EEPROM which contains the USB configuration descriptors for that device. When the cable is plugged into a PC or a USB reset is performed, the PC will read these descriptors. The default values stored into the internal EEPROM are defined in Table 0.1

Parameter	Value	Notes
USB Vendor ID (VID)	0403h	FTDI default VID (hex)
USB Product UD (PID)	6015h	FTDI default PID (hex)
Serial Number Enabled?	Yes	
Serial Number	See Note	A unique serial number is generated and programmed into the EEPROM during device final test.
Pull down I/O Pins in USB Suspend	Disabled	Enabling this option will make the device pull down on the UART interface lines when the power is shut off (PWREN# is high).
Manufacturer Name	FTDI	
Product Description	See note	USBC-RS232-WE
Max Bus Power Current	90mA	
Power Source	Bus Powered	
Device Type	FT230X	
USB Version	0200	Returns USB 2.0 device description to the host. **Note:** The device is a USB 2.0 Full Speed device (12Mb/s) as opposed to a USB 2.0 High Speed device (480Mb/s).
Remote Wake Up	Disabled	
High Current I/Os	Enabled	Enables the high drive level on the UART and CBUS I/O pins. The device supports 4mA, 8mA, 12mA and 16mA drive strength settings. Default is 4mA
Load VCP Driver	Enabled	Makes the device load the VCP driver interface.
Invert TXD	Disabled	Signal on this pin becomes TXD# if enable.
Invert RXD	Disabled	Signal on this pin becomes RXD# if enable.
Invert RTS#	Disabled	Signal on this pin becomes RTS if enable.
Invert CTS#	Disabled	Signal on this pin becomes CTS if enable.

Table 0.1 Default Internal EEPROM Configuration

The internal EEPROM in the cable can be re-programmed over USB using the utility program FT Prog. Users who do not have their own USB Vendor ID but who would like to use a unique Product ID in their design can apply to CP for a free block of unique PIDs. Contact CP support@connectiveperipherals.com

Appendix B - List of Figures and Tables

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Appendix C - Revision History

Revision	Changes	Date
Version 1.0	Initial Release	29-07-2020
Version 1.1	Updated the Part Number & Device Description Updated the Default Internal EEPROM Configuration table	07-10-2020
Version 1.2	Updated the Part Number	06-11-2020