Introduction

The Chipi-X cable is a USB to RS232 level full-handshake UART cable. Chipi-X utilises FTDI’s FT231XS USB to full-handshake UART IC and FT3243S RS232 transceiver IC. A male DB9 (aka DE9) connector provides the connectivity for RS232 communications and a USB-A plug tethered by a 10cm cable to the PCB provides connectivity for USB communications.

All components used are Pb-free (RoHS compliant).

1.1 Features

- Entire USB protocol handled on the FT231XS chip
- FTDI’s royalty-free VCP and D2XX drivers eliminate the requirement for USB driver development in most cases
- UART interface support for 7 or 8 data bits, 1 or 2 stop bits and odd / even / mark / space / no parity
- Fully assisted hardware or X-On / X-Off software handshaking
- Data transfer rates from 300 baud to 250 kilo-baud at RS232 voltage levels
- 512 byte receive buffer and 512 byte transmit buffer utilising buffer smoothing technology to allow for high data throughput
- Adjustable receive buffer timeout
- ESD protection on RS232 I/Os exceeding ±15kV IEC1000-4-2 Air Gap Discharge, ±15kV for Human Body Mode (HBM) and ±8kV IEC1000-4-2 Contact Discharge
- ESD protection on USB lines exceeding ±2kV for Human Body Mode (HBM), ±200V for Machine Mode (MM) and ±500V for Charged Device Mode (CDM)
- Integrated MTP-ROM for storing USB VID, PID, serial number and product description strings
- Low operating and USB suspend current
- Low USB bandwidth consumption
- USB 2.0 Full Speed compatible
- -40°C to 85°C extended operating temperature range
- Latch-up Free
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2 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 via our website.

Please also refer to the Installation Guides documents for details on how to install the drivers.

3 Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chipi-X</td>
<td>Generic part number, no part assigned to this part number.</td>
</tr>
<tr>
<td>CHIPI-X10</td>
<td>USB to RS232 converter with a 10cm cable and an enclosure.</td>
</tr>
</tbody>
</table>

Table 3.1 – Chipi-X Ordering Information

4 Certifications

The Chipi-X cables are fully RoHS compliant as well as CE, UKCA and FCC certified.
5 Functional Description

5.1 Block Diagram

Figure 5.1 – Chipi-X Block Diagram

5.2 Electrical Details

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
<th>Units</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vtrans</td>
<td>Transmitter output voltage swing</td>
<td>+/- 5</td>
<td>+/- 6.5</td>
<td>+/- 15</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Vrec</td>
<td>Receiver input voltage range</td>
<td>-25</td>
<td>+25</td>
<td></td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.1 – Chipi-X I/O Characteristics

<table>
<thead>
<tr>
<th>Description</th>
<th>Conditions</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD HBM</td>
<td>RS-232 Inputs and Outputs</td>
<td></td>
<td>±15 kV</td>
<td></td>
</tr>
<tr>
<td>EN61000-4-2ContactDischarge</td>
<td>RS-232 Inputs and Outputs</td>
<td></td>
<td>±8 kV</td>
<td></td>
</tr>
<tr>
<td>EN61000-4-2AirGapDischarge</td>
<td>RS-232 Inputs and Outputs</td>
<td></td>
<td>±15 kV</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.2 – Chipi-X ESD Tolerance
6 Chipi-X Signals and Pin Out

6.1 RS232 Signals

Figure 6.1 – Chipi-X DB9 Pin Out

<table>
<thead>
<tr>
<th>DB9 pin No.</th>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
<td>Input</td>
<td>Data Carrier Detect control input.</td>
</tr>
<tr>
<td>2</td>
<td>RXD</td>
<td>Input</td>
<td>Receive Asynchronous Data input.</td>
</tr>
<tr>
<td>3</td>
<td>TXD</td>
<td>Output</td>
<td>Transmit Asynchronous Data output.</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>Output</td>
<td>Handshake signal: Data Terminal Ready control output.</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Ground</td>
<td>Device ground supply pin</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>Input</td>
<td>Handshake signal: Data Set Ready control input</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>Output</td>
<td>Handshake signal: Request To Send Control Output</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>Input</td>
<td>Handshake signal: Clear to Send Control input</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
<td>Input</td>
<td>Ring Indicator control input. When remote wakeup is enabled in the FT231XS's internal MTP-ROM taking RI# low can be used to resume the PC USB host controller from suspend.</td>
</tr>
</tbody>
</table>

Table 6.1 – Chipi-X RS232 Signals

6.2 USB Signals

<table>
<thead>
<tr>
<th>Wire Colour</th>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>VBUS</td>
<td>Power</td>
<td>5V power.</td>
</tr>
<tr>
<td>White</td>
<td>DM</td>
<td>Signal</td>
<td>USB data.</td>
</tr>
<tr>
<td>Green</td>
<td>DP</td>
<td>Signal</td>
<td>USB data.</td>
</tr>
<tr>
<td>Black</td>
<td>GND</td>
<td>Ground</td>
<td>Ground.</td>
</tr>
<tr>
<td>Black (longer wire)</td>
<td>Shield</td>
<td>Shield</td>
<td>Cable shield.</td>
</tr>
</tbody>
</table>

Table 6.2 – Chipi-X USB Lines
7 Module Dimensions

Figure 7.1 – Chipi-X Dimensions

Figure 7.2 – Enclosure Dimensions

All dimensions are given in millimetres.

Chipi-X cables only use lead free components, and are fully compliant with European Union directive 2002/95/EC.
8 Chipi-X Circuit Schematic

* Optional - may be required to reduce EMI emissions

** The shield wire of the USB cable should be soldered to the DB9 outer can

Figure 8.1 – Chipi-X Circuit Schematic
9 Internal MTP ROM Configuration

Following a power-on reset or a USB reset the FT231X will scan its internal MTP ROM and read the USB configuration descriptors stored there. The default values programmed into the internal MTP ROM in the FT231XS used on the Chipi-X are shown in Table 9.1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB Vendor ID (VID)</td>
<td>0403h</td>
<td>FTDI default VID (hex)</td>
</tr>
<tr>
<td>USB Product UD (PID)</td>
<td>6015h</td>
<td>FTDI default PID (hex)</td>
</tr>
<tr>
<td>Serial Number Enabled?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Serial Number</td>
<td>See Note</td>
<td>A unique serial number is generated and programmed into the MTP ROM during final test of the UM232R module.</td>
</tr>
<tr>
<td>Pull down I/O Pins in USB Suspend</td>
<td>Disabled</td>
<td>Enabling this option will make the device pull down on the UART interface lines when the power is shut off (PWREN# is high).</td>
</tr>
<tr>
<td>Manufacturer Name</td>
<td>FTDI</td>
<td></td>
</tr>
<tr>
<td>Product Description</td>
<td>Chipi-X</td>
<td></td>
</tr>
<tr>
<td>Max Bus Power Current</td>
<td>90mA</td>
<td></td>
</tr>
<tr>
<td>Power Source</td>
<td>Bus Powered</td>
<td></td>
</tr>
<tr>
<td>Device Type</td>
<td>FT231X</td>
<td></td>
</tr>
<tr>
<td>USB Version</td>
<td>0200</td>
<td>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).</td>
</tr>
<tr>
<td>Remote Wake Up</td>
<td>Enabled</td>
<td>Taking RI# low will wake up the USB host controller from suspend.</td>
</tr>
<tr>
<td>High Current I/Os</td>
<td>Disabled</td>
<td>Enables the high drive level on the UART and CBUS I/O pins.</td>
</tr>
<tr>
<td>Load VCP Driver</td>
<td>Enabled</td>
<td>Makes the device load the VCP driver interface for the device.</td>
</tr>
<tr>
<td>CBUS0</td>
<td>Tristate</td>
<td></td>
</tr>
<tr>
<td>CBUS1</td>
<td>Tristate</td>
<td></td>
</tr>
<tr>
<td>CBUS2</td>
<td>Tristate</td>
<td></td>
</tr>
<tr>
<td>CBUS3</td>
<td>SLEEP#</td>
<td></td>
</tr>
<tr>
<td>Invert UART</td>
<td>Disabled</td>
<td>Signal on this pin becomes TXD# if enable.</td>
</tr>
</tbody>
</table>

Table 9.1 – Default Internal MTP ROM Configuration

The internal MTP ROM in the FT231X can be programmed over USB using the utility program FT_PROG. FT_PROG can be downloaded from [https://ftdichip.com/](https://ftdichip.com/). 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 FTDI for a free block of unique PIDs. Contact FTDI Support via support1@ftdichip.com for this service, also see TN_100 and TN_101.
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## Appendix B – Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Changes</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 1.0</td>
<td>Initial Datasheet Released</td>
<td>14-03-2012</td>
</tr>
<tr>
<td>Version 1.1</td>
<td>Correct typo on page 1</td>
<td>07-06-2016</td>
</tr>
<tr>
<td>Version 1.2</td>
<td>Added UKCA compliance and logos. Updated driver section and links.</td>
<td>07-07-2023</td>
</tr>
</tbody>
</table>