



**TTL-232R**

**TTL to USB Serial Converter Range of  
Cables**



**Datasheet**



**Connective Peripherals Pte Ltd**  
**178 Paya Lebar Road, #07-03 Singapore 409030**  
**Tel.: +65 67430980 Fax: +65 68416071**

E-Mail (Support): [support@connectiveperipherals.com](mailto:support@connectiveperipherals.com) Web: [www.connectiveperipherals.com/products](http://www.connectiveperipherals.com/products)

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. Connective Peripherals Pte 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. Connective Peripherals Pte Ltd, 178 Paya Lebar Road, #07-03 Singapore 409030. Registered Number: 201617872E

## 1 Description

The **TTL-232R** cables are a family of USB to TTL serial UART converter cables incorporating the FT232R USB to Serial UART interface IC device which handles all the USB signalling and protocols. The cables provide a fast, simple way to connect devices with a TTL level serial interface to USB.

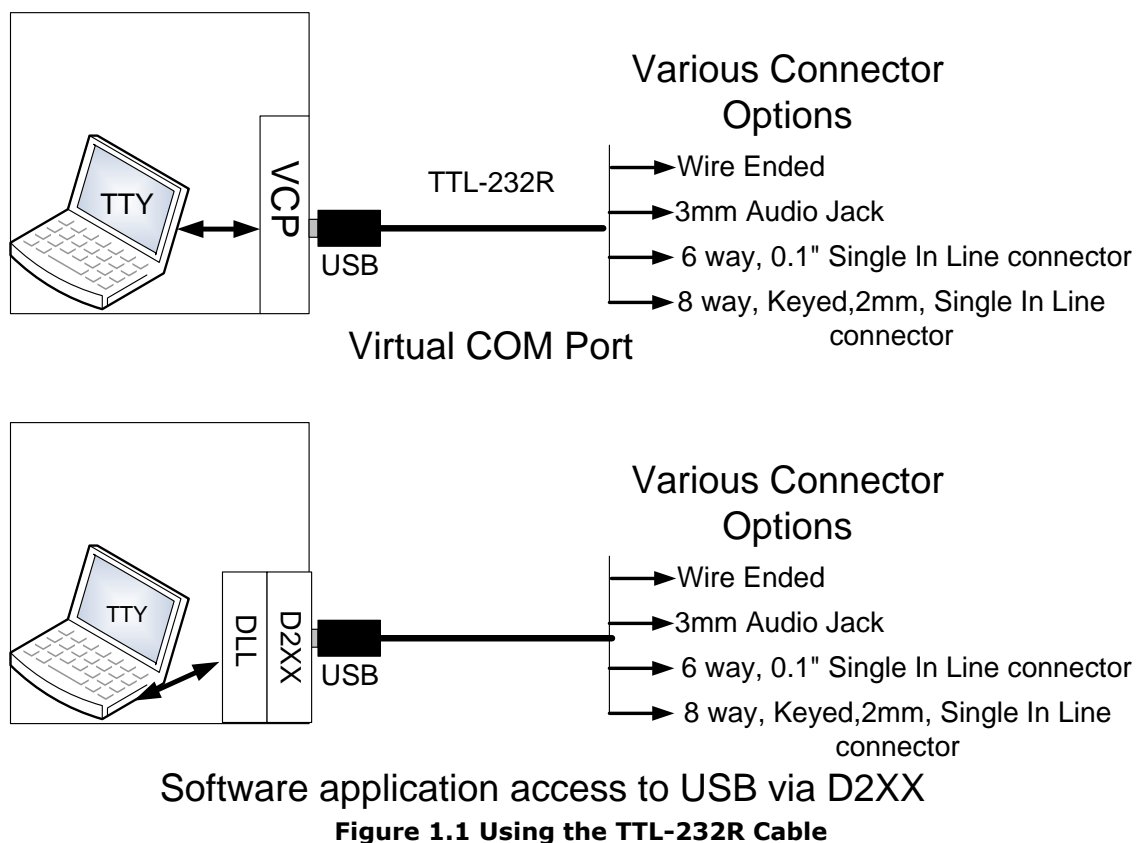
Each TTL-232R cable contains a small internal electronic circuit board, utilising the FT232R, which is encapsulated into the USB connector end of the cable. Refer to [DS\\_FT232R](#) for more information. The other end of the cable comes with a selection of different connectors supporting various applications – see **Table 1.1**

Cables are FCC, CE, UKCA and RoHS compliant and are available at TTL levels of +5V and +3.3V.

Cables are available with either a 6-way SIL, 0.1" pitch connector, a 3.5mm Audio Jack, an 8 way keyed 2mm pitch connector (intended for use with VMUSIC2 or VDRIVE2) or bare, tinned wire ended connections (see **Table 1.1**)

The USB 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 3 MBaud. Each cable supports the FTDIChip-ID™, with a unique USB serial number programmed into the FT232R. This feature can be used to create a security or password protected file transfer access using the cable. Further information and examples on this feature are available at [FTDIChip-ID Projects](#).

The TTL-232R cables require USB drivers, available free from <http://www.connectiveperipherals.com>, which are used to make the FT232R in the cable appear as a virtual COM port (VCP). This allows the user to communicate with the FT232R 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 FT232R on the cable through a DLL. This is illustrated in the **Figure 1.1**.



## 1.1 Available Cables and Part Numbers

The following **Table 1.1** gives details of the available TTL-232R cables.

Part Number	Description	End Connector*	Cable details
TTL-232R-5V**	USB to UART cable with +5V TTL level UART signals.	6 pin SIL, 0.1" pitch	6 core, UL2464 24 AWG, diam=5mm
TTL-232R-3V3	USB to UART cable with +3.3V TTL level UART signals.	6 pin SIL, 0.1" pitch	6 core, UL2464 24 AWG, diam=5mm
TTL-232R-5V-WE**	USB to UART cable with +5V TTL level UART signals.	Wire Ended (no connector)	6 core, UL2464 24 AWG, diam=5mm
TTL-232R-3V3-WE	USB to UART cable with +3.3V TTL level UART signals.	Wire Ended (no connector)	6 core, UL2464 24 AWG, diam=5mm
TTL-232R-5V-AJ**	USB to UART cable with +5V TTL level UART signals.	3.5mm Audio Jack	2 core and spiral, 24 AWG diam=5mm
TTL-232R-3V3-AJ	USB to UART cable with +3.3V TTL level UART signals.	3.5mm Audio Jack	2 core and spiral, 24 AWG diam=5mm
TTL-232R-3V3-2mm	USB to UART cable with +3.3V TTL level UART signals.	8 way, keyed, 2mm connector for use with VDRIVE2 or VMUSIC2 modules	7 core, UL2464 26 AWG, diam=5mm

**Table 1.1 TTL-232R Cables Descriptions and Part Numbers**

\* CP supports customised end connector designs. For more information, please contact [sales@connectiveperipherals.com](mailto:sales@connectiveperipherals.com)

\*\* These cables are identical to cables which do not have the "5V" in the part number. The 5V was added to the part number for clarity.

## 1.2 Certifications

TTL-232R range of cables are fully RoHs compliant as well as CE, FCC and UKCA certified



## 1.3 USB Compliant

The TTL-232R cables are fully compliant with the USB 2.0 specification.



## **Table of Contents**

<b>1</b>	<b>Description.....</b>	<b>2</b>
1.1	Available Cables and Part Numbers.....	3
1.2	Certifications .....	3
1.3	USB Compliant .....	3
<b>2</b>	<b>Typical Applications .....</b>	<b>6</b>
2.1	Driver Support .....	6
2.2	Driver Installation.....	6
2.3	Features.....	7
<b>3</b>	<b>Features of FT232R applicable toTTL-232R Cables .....</b>	<b>8</b>
<b>4</b>	<b>TTL-232R-5V and TTL-232R-3V3 Cables.....</b>	<b>9</b>
4.1	TTL-232R-5V, TTL-232R-3V3 Connector Pin Out & Mechanical details .....	9
4.2	TTL-232R-5V and TTL-232R-3V3 Cable Signal Descriptions .....	9
4.3	TTL-232R-5V and TTL-232R-3V3 Electrical Parameters.....	10
4.3.1	TTL-232R-5V Electrical Parameters .....	10
4.3.2	TTL-232R-3V3 Electrical Parameters .....	10
<b>5</b>	<b>TTL-232R-5V-AJ and TTL-232R-3V3-AJ .....</b>	<b>11</b>
5.1	TTL-232R-5V-AJ, TTL-232R-3V3-AJ Connector Pin Out and Mechanical details .....	11
5.2	TTL-232R-5V-AJ and TTL-232R-3V3-AJ Cable Signal Descriptions .....	12
5.3	TTL-232R-5V-AJ and TTL-232R-3V3-AJ Electrical Parameters .....	12
5.3.1	TTL-232R-5V-AJ Electrical Parameters.....	12
5.3.2	TTL-232R-3V3-AJ Electrical Parameters.....	12
<b>6</b>	<b>TTL-232R-5V-WE and TTL-232R-3V3-WE Cables .....</b>	<b>13</b>
6.1	TTL-232R-5V-WE, TTL-232R-3V3-WE Connections and Mechanical Details.....	13
6.2	TTL-232R-5V-WE and TTL-232R-3V3-WE Cable Signal Descriptions .....	13
6.3	TTL-232R-5V-WE & TTL-232R-3V3-WE Electrical Parameters .....	14
6.3.1	TTL-232R-5V-WE Electrical Parameters .....	14
6.3.2	TTL-232R-3V3-WE Electrical Parameters .....	14
<b>7</b>	<b>TTL-232R-3V3-2mm Cables.....</b>	<b>15</b>

---

<b>7.1</b>	<b>TTL-232R-3V3-2mm Connector Pin Out and Mechanical details</b>	<b>15</b>
<b>7.2</b>	<b>TTL-232R-3V3-2mm Cable Signal Descriptions .....</b>	<b>16</b>
<b>7.3</b>	<b>TTL-232R-3V3-2mm Electrical Parameters .....</b>	<b>16</b>
<b>8</b>	<b>Cable PCB Circuit Schematic.....</b>	<b>17</b>
<b>9</b>	<b>Contact Information.....</b>	<b>18</b>
	<b>Appendix A - Cable EEPROM Configuration.....</b>	<b>19</b>
	<b>Appendix B - References .....</b>	<b>20</b>
	Document References .....	20
	Acronyms and Abbreviations .....	20
	<b>Appendix C - List of Figures and Tables .....</b>	<b>21</b>
	List of Figures .....	21
	List of Tables .....	21
	<b>Appendix D - Revision History.....</b>	<b>22</b>

## 2 Typical Applications

- USB to Serial TTL Level Converter
- Upgrading Legacy Peripherals to USB
- Interface Microcontroller UART or I/O to USB
- Interface FPGA / PLD to USB
- Interface to VDRIVE2 or VMUSIC2 modules.
- Replace MAX232 type level shifters allowing for direct connection of products to PC via USB
- USB Instrumentation PC interface
- USB Industrial Control
- USB Software / Hardware Encryption Dongles

### 2.1 Driver Support

#### Royalty free VIRTUAL COM PORT

##### (VCP) DRIVERS for...

- Windows 11, 10, 8.x, 7
- Windows XP (legacy)
- Windows CE 4.2, 5.0 and 6.0 (Legacy)
- macOS 10.9 and above
- Linux 2.4 and greater

#### Royalty free D2XX Direct Drivers

##### (USB Drivers + DLL S/W Interface)

- Windows 11, 10, 8.x, 7
- Windows XP (legacy)
- Windows CE 4.2, 5.0 and 6.0 (Legacy)
- macOS 10.9 and above
- Linux 2.4 and greater

The drivers listed above are all available to download for free from <https://connectiveperipherals.com> Various legacy and 3rd Party Drivers are also available for other operating systems. Refer to <https://connectiveperipherals.com> and [www.ftdichip.com](http://www.ftdichip.com) for details.

### 2.2 Driver Installation

For driver installation and troubleshooting, please refer to the **Connective Peripherals USB to Serial Converters Driver Installation Guide (CP\_000084)** which is available from [www.connectiveperipherals.com](http://www.connectiveperipherals.com).

## 2.3 Features

- TTL-232R Converter Cable provides a USB to TTL Serial interface with various end connectors.
- On board FT232R provides single chip USB to asynchronous serial data transfer interface.
- Entire USB protocol handled by the electronics in the cable USB.
- Connect directly to a microcontroller UART or I/O pins.
- UART interface support for 7 or 8 data bits, 1 or 2 stop bits and odd / even / mark / space / no parity.
- Fully assisted hardware (RTS#/CTS#) or X-On / X-Off software handshaking.
- Data transfer rates from 300 baud to 3 Mbaud at TTL levels.
- Internal EEPROM with user writeable area.
- 5V CMOS drive outputs and 5V safe TTL inputs makes the TTL-232R easy to interface to 5V MCU's.
- FTDI's royalty-free VCP allow for communication as a standard emulated COM port and D2XX 'direct' drivers provide DLL application programming interface.
- Support for FT232R FTDIChip-ID™ feature for improved security.
- +5V or +3.3V output allows external logic to be powered from the USB port.
- 6-way outputs provide Tx, Rx, RTS#, CTS#, VCC and GND (except Audio Jack which provides only TX, RX and GND).
- 8-way, keyed connector to support VDRIVE2 and VMUSIC2.
- 3-way Audio Jack connector provides Tx, Rx and GND.
- Low USB bandwidth consumption.
- UHCI / OHCI / EHCI host controller compatible.
- USB 2.0 Full Speed compatible, can be used with USB1.1, USB2.0 and USB3 hosts and hub ports.
- -40°C to +85°C operating temperature range.
- Cable length is 1.80m (6 feet).
- FCC, CE and UKCA compliant.
- Custom versions also available (subject to MOQ).

---

### 3 Features of FT232R applicable to TTL-232R Cables

The TTL-232R cables use FT232R USB to serial IC device. This section summarises the key features of the FT232R which apply to the TTL-232R USB to serial TTL converter cables. For further details, and a full features and enhancements description refer to [FT232R](#) 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. A user area in the internal EEPROM is available to system designers to allow storing additional data. 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 <https://www.ftdichip.com/Support/Utilities.htm>. Note that the user area is not modifiable using FT\_Prog.

**Lower Operating and Suspend Current.** The FT232R 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 application should not exceed 2.5mA to remain USB compliant).

**Low USB Bandwidth Consumption.** The USB interface of the FT232R has been designed to use as little as possible of the total USB bandwidth available from the USB host controller.

**High Output Drive Option.** The UART interface output pins can be configured to use the FT232R's high output drive option. This option allows the FT232R I/O pins to drive up to three times the standard signal drive level. This allows multiple devices to be driven, or devices that require greater signal drive strength to be interfaced to the cable. This option is enabled in the internal EEPROM.

**UART Pin Signal Inversion.** 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#.



## 4 TTL-232R-5V and TTL-232R-3V3 Cables

The TTL-232R-5V and TTL-232R-3V3 cables are both terminated by a 6 way, 0.1", Single-In-Line (SIL) connector. The difference between the two cables is that the TTL-232R-5V operates at +5V levels (signals and power supply) and the TTL-232R-3V3 operates at +3.3V levels (signals only, VCC= +5V).

### 4.1 TTL-232R-5V, TTL-232R-3V3 Connector Pin Out & Mechanical details

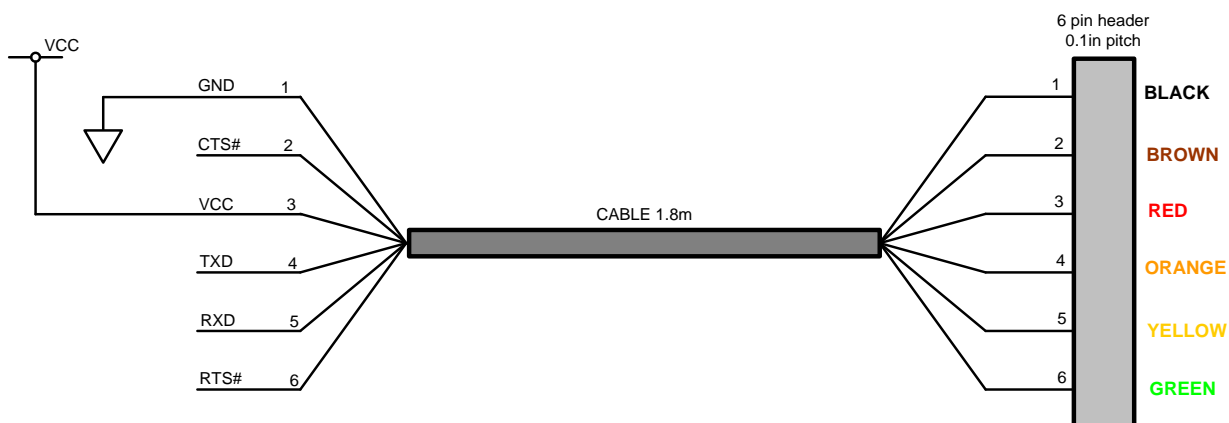


Figure 4.1 TTL-232R-5V and TTL-232R-3V3, 6 Way Header Pin Out

The mechanical details of the 6-way connector is shown in Figure 4.2.

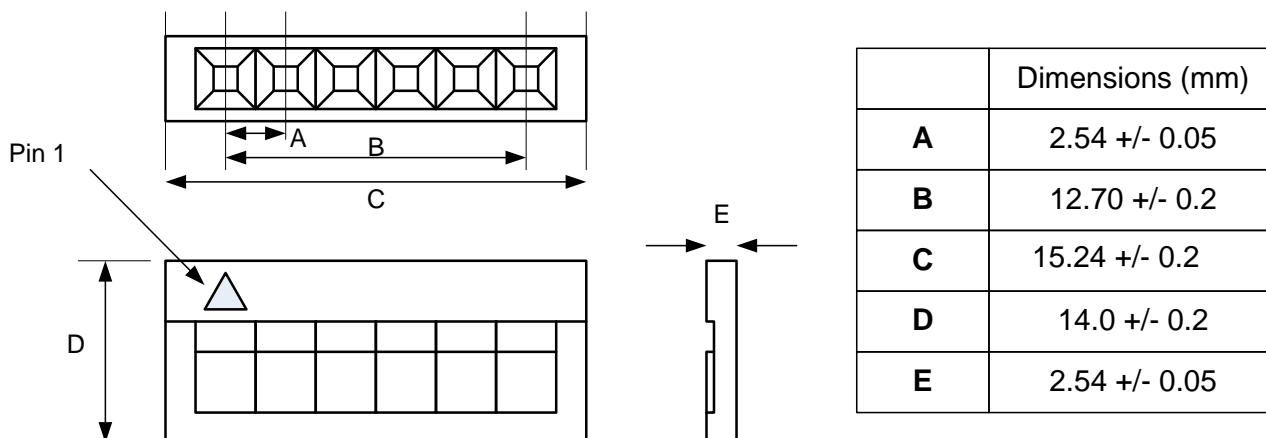


Figure 4.2 TTL-232R-5V TTL-232R-3V3, 6 Way Header Mechanical Details

### 4.2 TTL-232R-5V and TTL-232R-3V3 Cable Signal Descriptions

Header Pin Number	Name	Type	Colour	Description
1	GND	GND	Black	Device ground supply pin.
2	CTS#	Input	Brown	Clear to Send Control input / Handshake signal.
3	VCC	Output	Red	+5V output,
4	TXD	Output	Orange	Transmit Asynchronous Data output.
5	RXD	Input	Yellow	Receive Asynchronous Data input.
6	RTS#	Output	Green	Request To Send Control Output / Handshake signal.

Table 4.1 TTL-232R-5V and TTL-232R-3V3 Cable Signal Descriptions

## 4.3 TTL-232R-5V and TTL-232R-3V3 Electrical Parameters

### 4.3.1 TTL-232R-5V Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
VCC	Output Power Voltage	4.25	5.0	5.25	V	Dependant on the USB port that the TTL-232R-5V is connected to
I <sub>o</sub>	Output Power Current	-	-	75	mA	Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40	-	+85	°C	

**Table 4.2 TTL-232R-5V I/O Operating Parameters**

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V <sub>oh</sub>	Output Voltage High	3.2	4.1	4.9	V	I source = 2mA
V <sub>ol</sub>	Output Voltage Low	0.3	0.4	0.6	V	I sink = 2mA
V <sub>in</sub>	Input Switching Threshold	1.0	1.2	1.5	V	
V <sub>Hys</sub>	Input Switching Hysteresis	20	25	30	mV	

**Table 4.3 TTL-232R-5V I/O Pin Characteristics**

### 4.3.2 TTL-232R-3V3 Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
VCC	Output Power Voltage	4.25	5.0	5.25	V	Dependant on the USB port that the TTL-232R-3V3 is connected to
I <sub>o</sub>	Output Power Current	-	-	75	mA	Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40	-	+85	°C	

**Table 4.4 TTL-232R-3V3 I/O Operating Parameters**

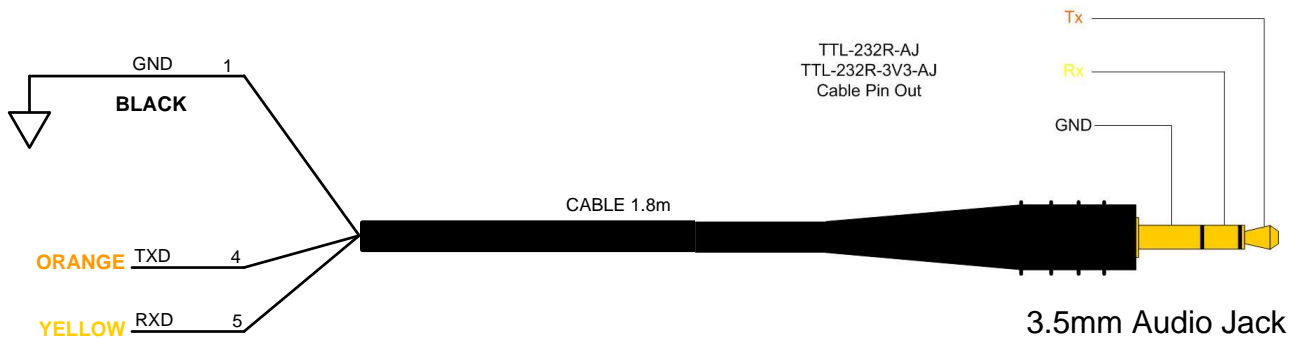
Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V <sub>oh</sub>	Output Voltage High	2.2	2.8	3.2	V	I source = 3mA
V <sub>ol</sub>	Output Voltage Low	0.3	0.4	0.6	V	I sink = 8mA
V <sub>in</sub>	Input Switching Threshold	1.0	1.2	1.5	V	
V <sub>Hys</sub>	Input Switching Hysteresis	20	25	30	mV	

**Table 4.5 TTL-232R-3V3 I/O Pin Characteristics**

## 5 TTL-232R-5V-AJ and TTL-232R-3V3-AJ

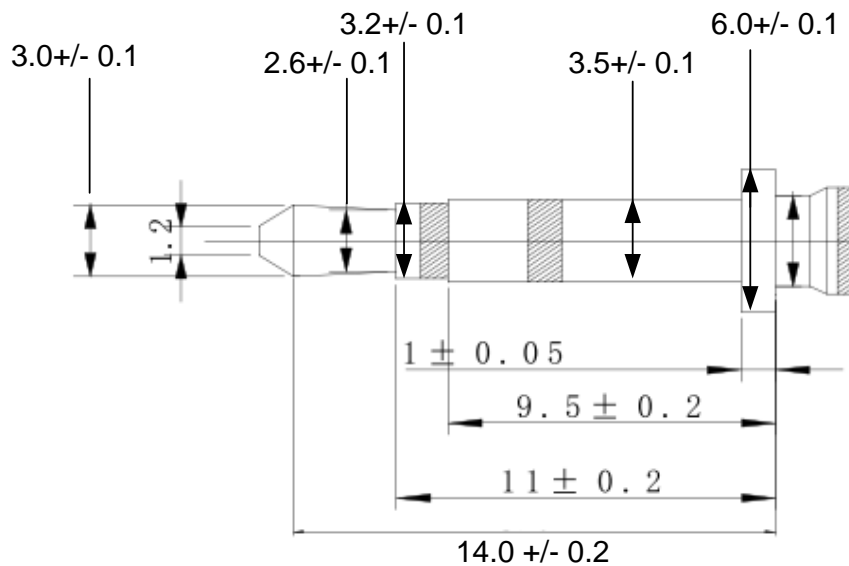
The TTL-232R-5V-AJ and TTL-232R-3V3-AJ cables are both terminated by a standard 3.5mm Audio Jack (AJ) connector. The difference between the two cables is that the TTL-232R-5V-AJ operates at +5V levels (signals and power supply) and the TTL-232R-3V3-AJ operates at +3.3V levels (signals and power supply). On these cables the VCC power is not transferred.

### 5.1 TTL-232R-5V-AJ, TTL-232R-3V3-AJ Connector Pin Out and Mechanical details



**Figure 5.1 TTL-232R-5V and TTL-232R-3V3, -AJ Pin Out**

The mechanical details of the Audio Jack connector are shown in **Figure 5.2**.



Dimensions in mm

**Figure 5.2 TTL-232R-5V-AJ and TTL-232R-3V3-AJ Audio Jack Mechanical Details**

## 5.2 TTL-232R-5V-AJ and TTL-232R-3V3-AJ Cable Signal Descriptions

Header Pin Number	Name	Type	Description
TIP	TXD	Output	Transmit Asynchronous Data output.
RING	RXD	Input	Receive Asynchronous Data input.
SLEEVE	GND	GND	GND

Table 5.1 TTL-232R-5V-AJ and TTL-232R-3V3-AJ Cable Signal Descriptions

## 5.3 TTL-232R-5V-AJ and TTL-232R-3V3-AJ Electrical Parameters

### 5.3.1 TTL-232R-5V-AJ Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
I <sub>o</sub>	Output Power Current	-		75	mA	Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40		+85	°C	

Table 5.2 TTL-232R-5V-AJ I/O Operating Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V <sub>oh</sub>	Output Voltage High	3.2	4.1	4.9	V	I source = 6mA
V <sub>ol</sub>	Output Voltage Low	0.3	0.4	0.6	V	I sink = 6mA
V <sub>in</sub>	Input Switching Threshold	1.0	1.2	1.5	V	
V <sub>Hys</sub>	Input Switching Hysteresis	20	25	30	mV	

Table 5.3 TTL-232R-5V-AJ I/O Pin Characteristics

### 5.3.2 TTL-232R-3V3-AJ Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
I <sub>o</sub>	Output Power Current	-		75	mA	Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40		+85	°C	

Table 5.4 TTL-232R-3V3-AJ I/O Operating Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V <sub>oh</sub>	Output Voltage High	2.2	2.8	3.2	V	I source = 3mA
V <sub>ol</sub>	Output Voltage Low	0.3	0.4	0.6	V	I sink = 8mA
V <sub>in</sub>	Input Switching Threshold	1.0	1.2	1.5	V	
V <sub>Hys</sub>	Input Switching Hysteresis	20	25	30	mV	

Table 5.5 TTL-232R-3V3-AJ I/O Pin Characteristics

## 6 TTL-232R-5V-WE and TTL-232R-3V3-WE Cables

The TTL-232R-5V-WE and TTL-232R-3V3-WE cables are both un-terminated; they are bare and tinned wires. The difference between the two cables is that the TTL-232R-5V-WE operates at +5V levels (signals and power supply) and the TTL-232R-3V3-WE operates at +3.3V levels (signals only, VCC=+5V).

### 6.1 TTL-232R-5V-WE, TTL-232R-3V3-WE Connections and Mechanical Details

Figure 6.1 shows the cable signals and the wire colours for these signals on the TTL-232R-5V-WE and TTL-232R-3V3-WE cables.

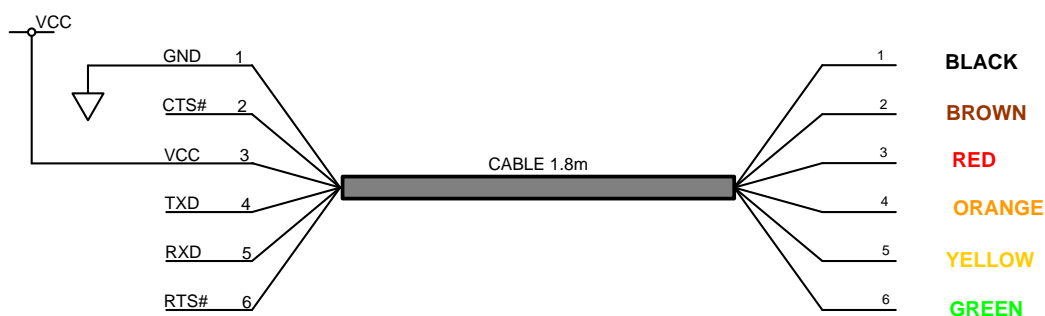


Figure 6.1 TTL-232R-5V-WE and TTL-232R-3V3-WE Connections

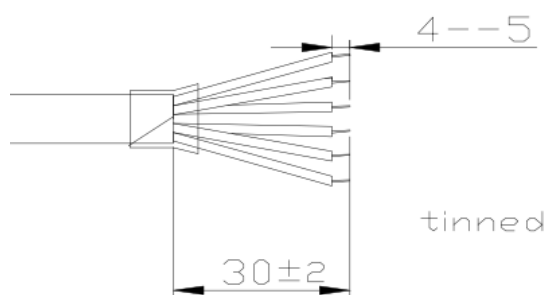


Figure 6.2 TTL-232R-5V-WE and TTL-232R-3V3-WE Mechanical Details (dimensions in mm)

### 6.2 TTL-232R-5V-WE and TTL-232R-3V3-WE Cable Signal Descriptions

Colour	Name	Type	Description
Black	GND	GND	Device ground supply pin.
Brown	CTS#	Input	Clear to Send Control input / Handshake signal.
Red	VCC	Output	+5V output
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 6.1 TTL-232R-5V-WE and TTL-232R-3V3-WE Cable Signal Descriptions

## 6.3 TTL-232R-5V-WE & TTL-232R-3V3-WE Electrical Parameters

### 6.3.1 TTL-232R-5V-WE Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
VCC	Output Power Voltage	4.25	5.0	5.25	V	Dependant on the USB port that the TTL-232R-5V-WE is connected to
I <sub>o</sub>	Output Power Current	-		75	mA	Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40		+85	°C	

**Table 6.2 TTL-232R-5V-WE I/O Operating Parameters**

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V <sub>oh</sub>	Output Voltage High	3.2	4.1	4.9	V	I source = 6mA
V <sub>ol</sub>	Output Voltage Low	0.3	0.4	0.6	V	I sink = 6mA
V <sub>in</sub>	Input Switching Threshold	1.0	1.2	1.5	V	
V <sub>Hys</sub>	Input Switching Hysteresis	20	25	30	mV	

**Table 6.3 TTL-232R-5V-WE I/O Pin Characteristics**

### 6.3.2 TTL-232R-3V3-WE Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
VCC	Output Power Voltage	4.25	5.0	5.25	V	Dependant on the USB port that the TTL-232R-3V3-WE is connected to
I <sub>o</sub>	Output Power Current	-		75	mA	Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40		+85	°C	

**Table 6.4 TTL-232R-3V3-WE I/O Operating Parameters**

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V <sub>oh</sub>	Output Voltage High	2.2	2.8	3.2	V	I source = 3mA
V <sub>ol</sub>	Output Voltage Low	0.3	0.4	0.6	V	I sink = 8mA
V <sub>in</sub>	Input Switching Threshold	1.0	1.2	1.5	V	
V <sub>Hys</sub>	Input Switching Hysteresis	20	25	30	mV	

**Table 6.5 TTL-232R-3V3-WE I/O Pin Characteristics**

## 7 TTL-232R-3V3-2mm Cables

The TTL-232R-3V3-2mm cable is terminated by an 8 way, 2mm pitch, Single-In-Line (SIL) keyed connector. The TTL-232R-3V3-2mm operates at +3.3V levels (signals and power supply). These cables are primarily intended for interfacing the VDRIVE2 and VMUSIC2 modules.

Note that when connected to VDRIVE2 or VMUSIC2 module, the TTL-232R-3V3-2mm cable 8-way connector pin 1 connects to pin 8 of the module, and pin 8 of the cable connects to pin 1 of the cable.

### 7.1 TTL-232R-3V3-2mm Connector Pin Out and Mechanical details

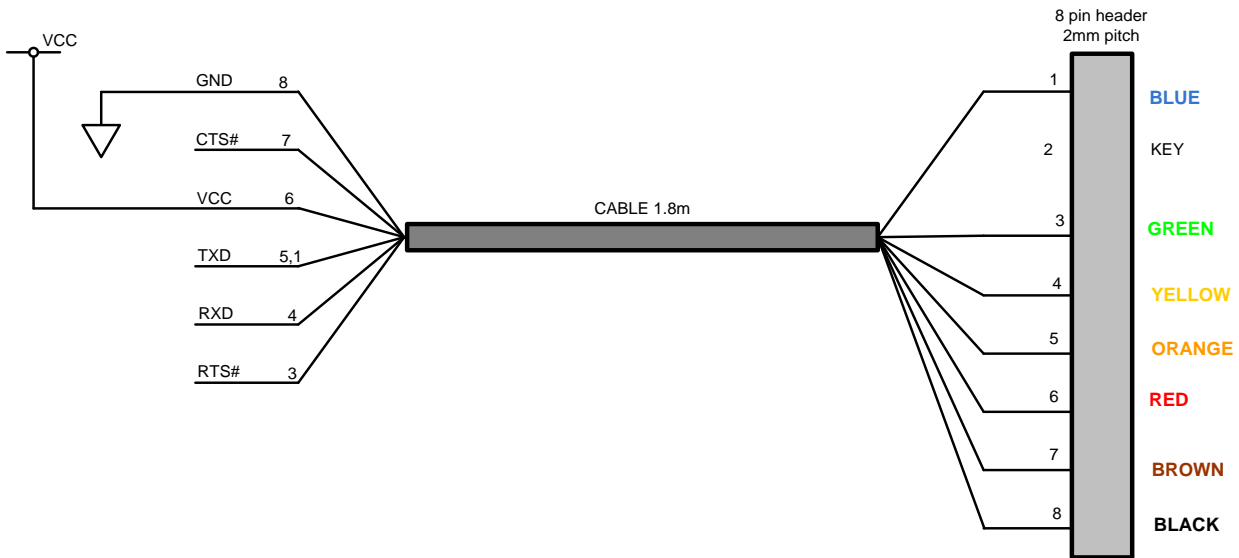


Figure 7.1 TTL-232R-3V3-2mm, 8 Way Header Pin Out

The mechanical details of the 2mm pitch 8 way, keyed, connector is shown in the following diagram -

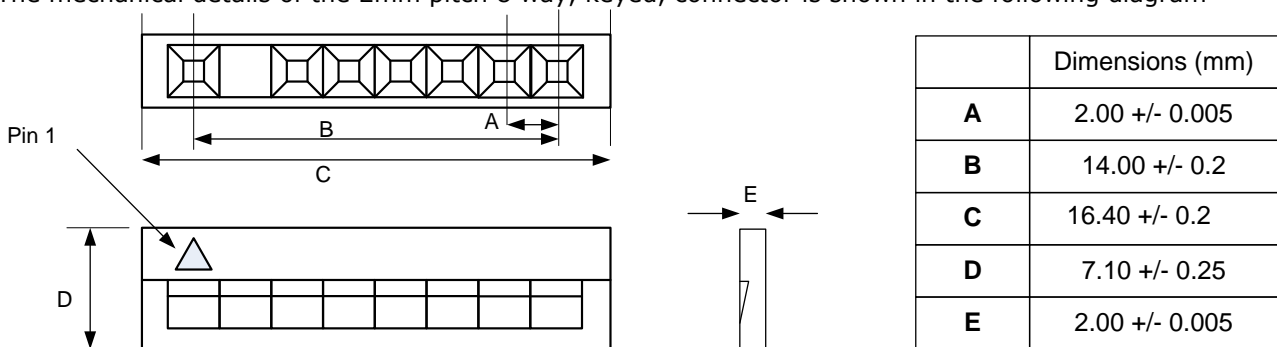


Figure 7.2 TTL-232R-3V3-2mm, 2mm pitch, Keyed, 8-way Header Mechanical Details

## 7.2 TTL-232R-3V3-2mm Cable Signal Descriptions

Header Pin Number	Name	Type	Colour	Description
1	RI#	Output	Blue	Ring Indicator Control Input. When remote wake up is enabled taking RI# low (20ms active low pulse) can be used to resume the VMUSIC2 or VDRIVE2 host controller from suspend. Connected to TXD.
2	KEY	KEY	KEY	This connection is keyed to connect to the VRDIVE2 or the VMUSIC2 modules
3	RTS#	Output	Green	Request To Send Control Output / Handshake signal.
4	RXD	Input	Yellow	Receive Asynchronous Data input.
5	TXD	Output	Orange	Transmit Asynchronous Data output.
6	VCC	Output	Red	+5V output,
7	CTS#	Input	Brown	Clear to Send Control input / Handshake signal.
8	GND	GND	Black	Device ground supply pin.

**Table 7.1 TTL-232R-3V3-2mm Cable Signal Descriptions**

## 7.3 TTL-232R-3V3-2mm Electrical Parameters

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
VCC	Output Power Voltage	4.25	5.0	5.25	V	Dependant on the USB port that the TTL-232R-3V3-2mm is connected to
I <sub>o</sub>	Output Power Current	-		75	mA	Must be less than 2.5mA during suspend.
T	Operating Temperature Range	-40		+85	°C	

**Table 7.2 TTL-232R-3V3-2mm I/O Operating Parameters**

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V <sub>oh</sub>	Output Voltage High	2.2	2.8	3.2	V	I source = 3mA
V <sub>ol</sub>	Output Voltage Low	0.3	0.4	0.6	V	I sink = 8mA
V <sub>in</sub>	Input Switching Threshold	1.0	1.2	1.5	V	
V <sub>Hys</sub>	Input Switching Hysteresis	20	25	30	mV	

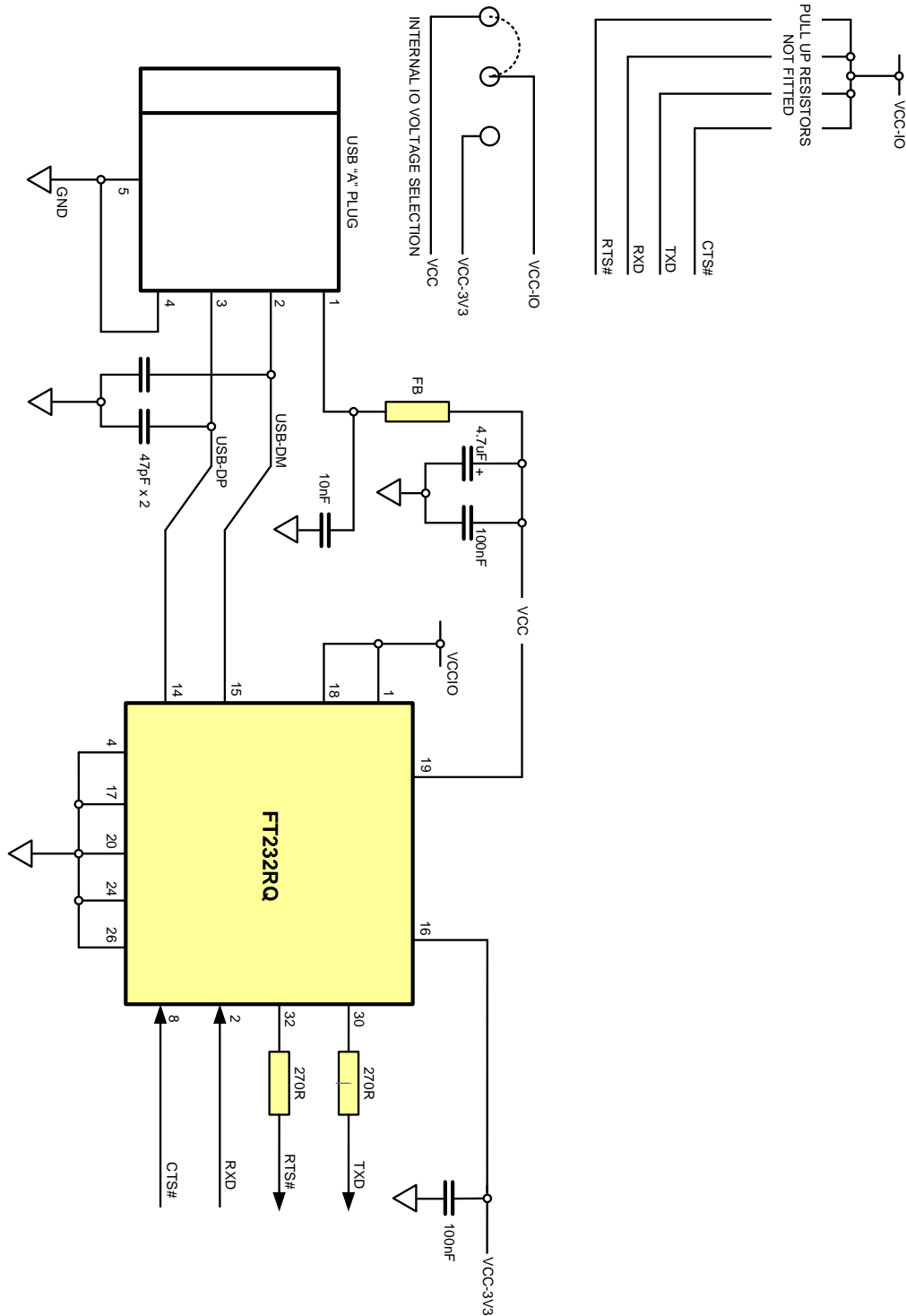
**Table 7.3 TTL-232R-3V3-2mm I/O Pin Characteristics**



## 8 Cable PCB Circuit Schematic

The circuit schematic for the small internal electronic circuit board, utilising the FT232R, which is encapsulated into the USB connector end of the cable, is shown in **Figure 8.1**.

Customised versions of these cables are also available. Users interested in customised versions of these cables should contact CP Sales ([sales@connectiveperipherals.com](mailto:sales@connectiveperipherals.com)).



**Figure 8.1 Circuit Schematic of PCB Used in the TTL to USB Serial Converter Cables**

## 9 Contact Information

### Global Headquarters – Singapore

Connective Peripherals Pte Ltd  
178 Paya Lebar Road  
#07-03  
Singapore 409030

Tel: +65 67430980  
Fax: +65 68416071

E-Mail (Sales)	<a href="mailto:sales@connectiveperipherals.com">sales@connectiveperipherals.com</a>
E-Mail (Support)	<a href="mailto:support@connectiveperipherals.com">support@connectiveperipherals.com</a>
Web Site URL	<a href="http://www.connectiveperipherals.com">http://www.connectiveperipherals.com</a>
Web Shop URL	<a href="http://www.connectiveperipherals.com">http://www.connectiveperipherals.com</a>

## Appendix A - Cable EEPROM Configuration

Each TTL-232R cable is controlled by the FT232R IC. This FT232R 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 the table given below -

Parameter	Value	Notes
USB Vendor ID (VID)	0403h	FTDI default VID (hex)
USB Product ID (PID)	6001h	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	Product description depends on the cable. The following lists the Product description for each different cable. TTL-232R-5V TTL-232R-3V3 TTL-232R-5V-AJ TTL-232R-AJ-3V3 TTL-232R-5V-WE TTL-232R-3V3-WE TTL-232R-3V3-2mm = USB <-> Serial Cable
Max Bus Power Current	90mA	
Power Source	Bus Powered	
Device Type	FT232R	
USB Version	0200	Returns USB 2.0 device description to the host. Note: The device is be 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.
Load VCP Driver	Enabled	Makes the device load the VCP driver interface for the device.
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 for this service - [support@connectiveperipherals.com](mailto:support@connectiveperipherals.com).

Note that the EEPROM is supplied programmed ready to use for most applications. Changing the EEPROM settings is for advanced users only. Changing the settings can cause incorrect operation of the device. Before editing the VID or PID, note that this requires the user to have a driver with matching VID/PID in order to install the device before it can be used again. It is recommended to contact technical support if in doubt before making any changes.

## Appendix B - References

### Document References

[FT232R USB UART IC Datasheet](#)

### Acronyms and Abbreviations

Terms	Description
DLL	Dynamic Link Library
EHCI	Enhanced Host Controller Interface
EEPROM	Electrically Erasable Programmable Read Only Memory
FPGA	Field Programmable Gate Array
IC	Integrated Circuit
MCU	Microcontroller Unit
RoHS	Restriction of Hazardous Substance
SIL	Single In Line
OHCI	Open Host Controller Interface
PLD	Programmable Logic Device
TTL	Transistor-Transistor Logic
USB	Universal Serial Bus
UART	Universal Asynchronous Receiver/Transmitter
UHCI	Universal Host Controller Interface

## Appendix C - List of Figures and Tables

### List of Figures

Figure 1.1 Using the TTL-232R Cable .....	2
Figure 4.1 TTL-232R-5V and TTL-232R-3V3, 6 Way Header Pin Out .....	9
Figure 4.2 TTL-232R-5V TTL-232R-3V3, 6 Way Header Mechanical Details .....	9
Figure 5.1 TTL-232R-5V and TTL-232R-3V3, -AJ Pin Out.....	11
Figure 5.2 TTL-232R-5V-AJ and TTL-232R-3V3-AJ Audio Jack Mechanical Details .....	11
Figure 6.1 TTL-232R-5V-WE and TTL-232R-3V3-WE Connections.....	13
Figure 6.2 TTL-232R-5V-WE and TTL-232R-3V3-WE Mechanical Details (dimensions in mm) .....	13
Figure 7.1 TTL-232R-3V3-2mm, 8 Way Header Pin Out .....	15
Figure 7.2 TTL-232R-3V3-2mm, 2mm pitch, Keyed, 8-way Header Mechanical Details .....	15
Figure 8.1 Circuit Schematic of PCB Used in the TTL to USB Serial Converter Cables .....	17

### List of Tables

Table 1.1 TTL-232R Cables Descriptions and Part Numbers .....	3
Table 4.1 TTL-232R-5V and TTL-232R-3V3 Cable Signal Descriptions .....	9
Table 4.2 TTL-232R-5V I/O Operating Parameters .....	10
Table 4.3 TTL-232R-5V I/O Pin Characteristics .....	10
Table 4.4 TTL-232R-3V3 I/O Operating Parameters.....	10
Table 4.5 TTL-232R-3V3 I/O Pin Characteristics.....	10
Table 5.1 TTL-232R-5V-AJ and TTL-232R-3V3-AJ Cable Signal Descriptions .....	12
Table 5.2 TTL-232R-5V-AJ I/O Operating Parameters .....	12
Table 5.3 TTL-232R-5V-AJ I/O Pin Characteristics .....	12
Table 5.4 TTL-232R-3V3-AJ I/O Operating Parameters .....	12
Table 5.5 TTL-232R-3V3-AJ I/O Pin Characteristics .....	12
Table 6.1 TTL-232R-5V-WE and TTL-232R-3V3-WE Cable Signal Descriptions .....	13
Table 6.2 TTL-232R-5V-WE I/O Operating Parameters.....	14
Table 6.3 TTL-232R-5V-WE I/O Pin Characteristics.....	14
Table 6.4 TTL-232R-3V3-WE I/O Operating Parameters.....	14
Table 6.5 TTL-232R-3V3-WE I/O Pin Characteristics.....	14
Table 7.1 TTL-232R-3V3-2mm Cable Signal Descriptions .....	16
Table 7.2 TTL-232R-3V3-2mm I/O Operating Parameters .....	16
Table 7.3 TTL-232R-3V3-2mm I/O Pin Characteristics .....	16
Table 0.1 Default Internal EEPROM Configuration.....	19

## Appendix D - Revision History

Revision	Changes	Date
Version 1.0	Document transferred from FTDI to CP	29-12-2020
Version 1.1	Updated to reflect UKCA compliance. Added driver install section and other minor updates	28-01-2023