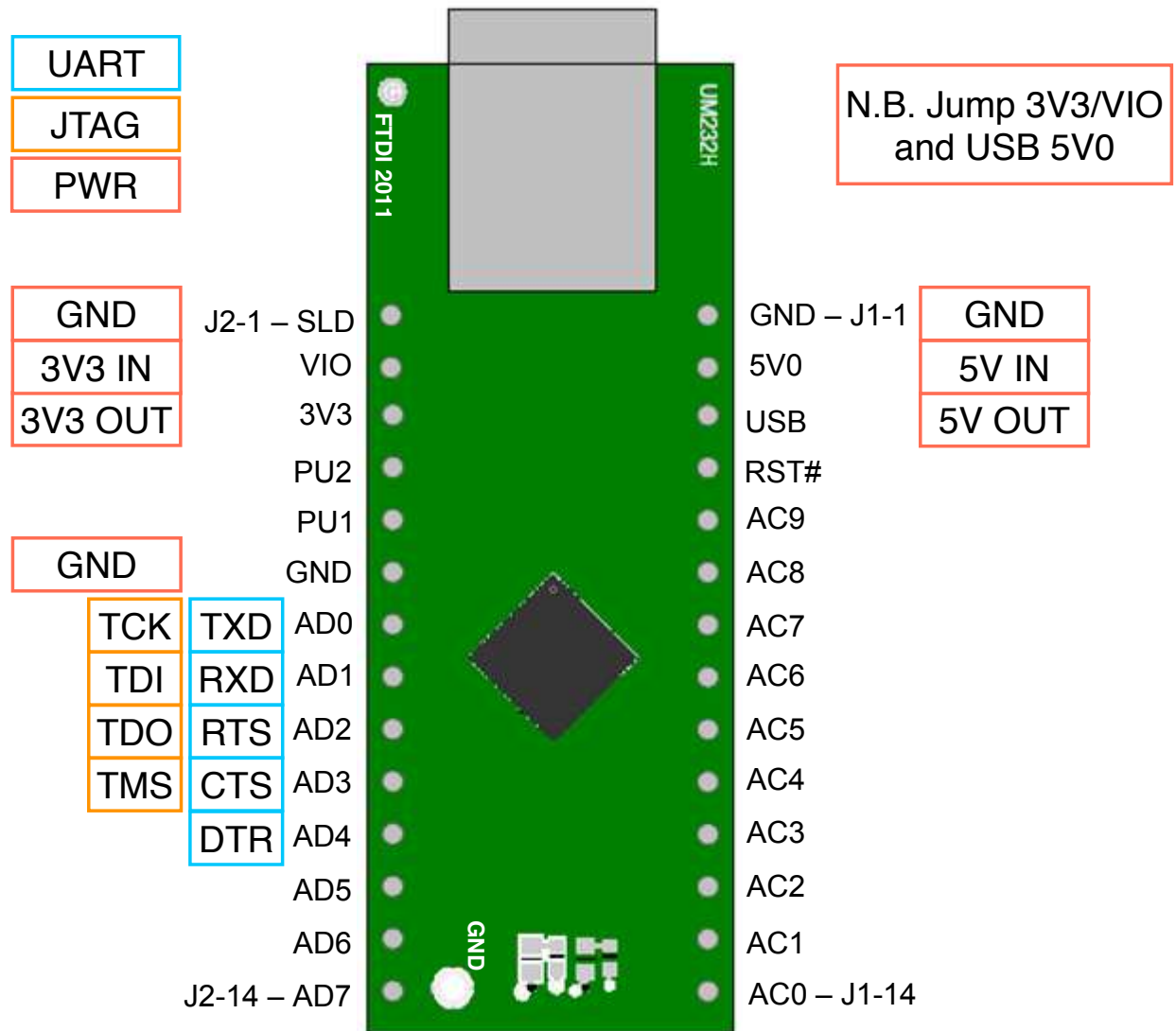


## 4 UM232H Pin Out and Signal Descriptions

### 4.1 UM232H Pin Out

The signal labels and pin designators for each pin of the UM232H is illustrated in Figure 2.



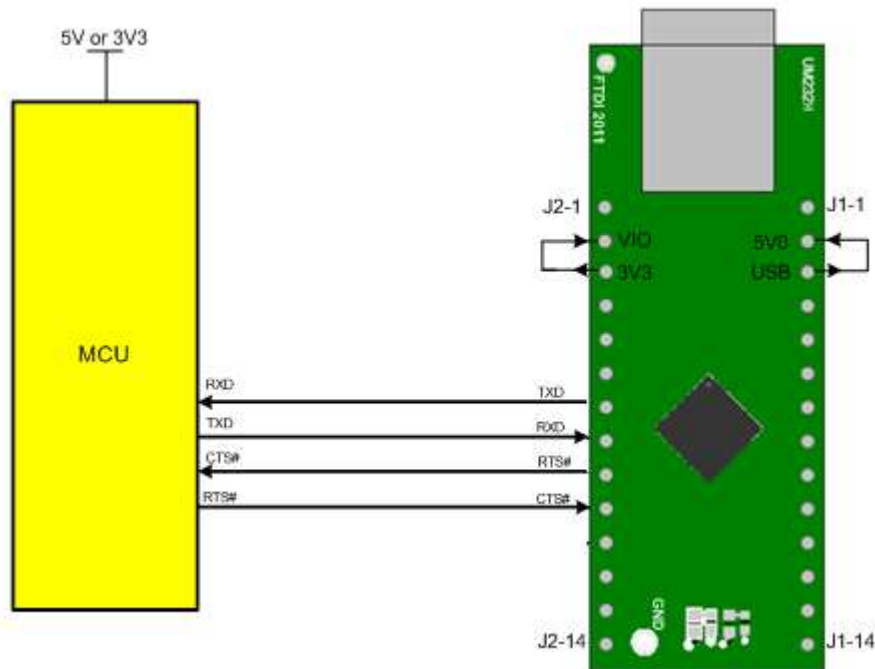
**Figure 2 – UM232H USB to Serial/FIFO Development Module**

## 7 Module Configurations

The UM232H Module can be configured as USB Bus-Powered or USB Self-Powered. This section describes how to configure the UM232H for a number of different power supply arrangements.

### 7.1 BUS Powered Configuration

Bus powered configuration, where the +5V supply that powers the module is sourced from the USB bus, and the 3V3 regulator output powers the core of the FT232H.



**Figure 4 – Bus Powered Configuration**

Figure 4 illustrates the UM232H in a typical USB bus powered design configuration, which consists of two connections, a J1-2 to J1-3 connection and a J2-2 to J2-3 connection.

Connecting J1-2 (5V0) to J1-3 (USB) takes the power from the VBUS pin (J1-3) and supplies it to the on chip voltage regulator input of the FT232H via pin 5V0 (J1-2).

Connecting J2-2 (VIO) (power input for core of the FT232H) and J2-3 (3V3) (power output from the FT232H) powers the VCCIO, VPLL and VPHY pins of the FT232H chip.

A USB Bus Powered device gets its power from the USB bus. Basic rules for USB Bus power devices are as follows –

- I. On plug-in to USB, the device must draw no more than 100mA.
- II. On USB Suspend the device must draw no more than 500µA.
- III. A Bus Powered High Power USB Device (one that draws more than 100mA) should use PWREN# to keep the current below 100mA on plug-in and 500µA on USB suspend.
- IV. A device that consumes more than 100mA cannot be plugged into a USB Bus Powered Hub.
- V. No device can draw more that 500mA from the USB Bus.

Interfacing the UM232H module to a microcontroller (MCU), or other logic for a bus powered design would be done in exactly the same way as for Self-Powered designs (see Section 7.3), except that the MCU or external logic would take its power supply from the USB bus (either the 5V on the USB pin, or 3.3V on the 3V3 pin).

**See full datasheet for other configurations**

## 4.2 Signal Descriptions

Pins marked \* are EEPROM selectable

FT232H										
Pin		Pin functions (depends on configuration)								
Pin #	Pin Name	ASYNCRS232	SYNCRS232	ASYNCRS232	ASYNCRS232	SYNCRS232	MPSSE	Fast Serial interface	CPU Style FIFO	FT1248
13	ADBUSB0	TXD	D0	D0	D0	D0	TCK/SK	FSDI	D0	MIOSI0
14	ADBUSB1	RXD	D1	D1	D1	D1	TDI/DO	FSCLK	D1	MIOSI1
15	ADBUSB2	RTS#	D2	D2	D2	D2	TDO/DI	FSDO	D2	MIOSI2
16	ADBUSB3	CTS#	D3	D3	D3	D3	TMS/CS	FSCTS	D3	MIOSI3
17	ADBUSB4	DTR#	D4	D4	D4	D4	GPIOL0	**TriSt-UP	D4	MIOSI4
18	ADBUSB5	DSR#	D5	D5	D5	D5	GPIOL1	**TriSt-UP	D5	MIOSI5
19	ADBUSB6	DCD#	D6	D6	D6	D6	GPIOL2	**TriSt-UP	D6	MIOSI6
20	ADBUSB7	RI#	D7	D7	D7	D7	GPIOL3	**TriSt-UP	D7	MIOSI7
21	ACBUS0	*TXDEN	RXF#	RXF#	ACBUS0	ACBUS0	GPIOH0	**ACBUS0	CS#	SCLK
25	ACBUS1	**ACBUS1	TXE#	TXE#	WRSTB#	WRSTB#	GPIOH1	**ACBUS1	A0	SS_N
26	ACBUS2	**ACBUS2	RD#	RD#	RDSTB#	RDSTB#	GPIOH2	**ACBUS2	RD#	MISO
27	ACBUS3	*RXLED#	WR#	WR#	ACBUS3	ACBUS3	GPIOH3	**ACBUS3	WR#	ACBUS3
28	ACBUS4	*TXLED#	SIWU#	SIWU#	SIWU#	SIWU#	GPIOH4	SIWU#	SIWU#	ACBUS4
29	ACBUS5	**ACBUS5	CLKOUT	ACBUS5	**ACBUS5	**ACBUS5	GPIOH5	**ACBUS5	**ACBUS5	ACBUS5
30	ACBUS6	**ACBUS6	OE#	ACBUS6	ACBUS6	ACBUS6	GPIOH6	**ACBUS6	**ACBUS6	ACBUS6
31	ACBUS7	PWRSV#	PWRSV#	PWRSV#	PWRSV#	PWRSV#	***GPIOH7	PWRSV#	PWRSV#	PWRSV#
32	ACBUS8	**ACBUS8	**ACBUS8	**ACBUS8	**ACBUS8	**ACBUS8	**ACBUS8	**ACBUS8	**ACBUS8	ACBUS8
33	ACBUS9	**ACBUS9	**ACBUS9	**ACBUS9	**ACBUS9	**ACBUS9	**ACBUS9	**ACBUS9	**ACBUS9	ACBUS9

**Table 2 – UM232H Signals**

Pins marked \*\* default to tri-stated inputs with an internal 75KΩ (approx.) pull up resistor to VCCIO.

Pin marked \*\*\* default to GPIO line with an internal 75KΩ pull down resistor to GND. Using the EEPROM this pin can be enabled USBVCC mode instead of GPIO mode.

Table 3 and 4 provides a description of the signals available on each pin of the UM232H module

Pin No.	Name	Type	Description
J1-1	GND	PWR	Module Ground Supply Pins
J1-2	5V0	Input	+5.0V or +3.3V power supply input.
J1-3	USB	Output	5V Power output USB port. For a low power USB bus powered design, up to 100mA can be sourced from the 5V supply on the USB bus. A maximum of 500mA can be sourced from the USB bus in a high power USB bus powered design.
J1-4	RST#	Input	Can be used by an external device to reset the FT232H. If not required can be left unconnected, or pulled up to VCCIO
J1-5	AC9	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-6	AC8	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-7	AC7	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PD. See ACBUS Signal Options, Table 4.3
J1-8	AC6	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-9	AC5	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-10	AC4	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-11	AC3	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-12	AC2	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-13	AC1	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3
J1-14	AC0	I/O	Configurable ACBUS I/O Pin. Function of this pin is configured by EEPROM. The default configuration is TriSt-PU. See ACBUS Signal Options, Table 4.3

**Table 3 – UM232H Connector J1 Signal Description**

Pin No.	Name	Type	Description
J2-1	SLD	Shield to GND	USB Cable Shield shorted to GND via a 0Ω resistor.
J2-2	VIO	PWR	1.8 to +3.3V supply to the UART Interface and ACBUS I/O pins
J2-3	3V3	Output/Input	+3.3V output from the integrated L.D.O. regulator if the UM232H is running on 5V self or bus powered designs. Therefore, this pin can be used to supply the FT232HL's VCCIO pin by connecting this pin to J2-2 (VIO). This pin can also be an input if the UM232H is running on 3.3V self-powered designs.
J2-4	PU2	Control	Pull up resistor pin connection 1. Connect to J1-3 (USB) in a self-powered configuration.
J2-5	PU1	Control	Pull up resistor pin connection 2. Connect to J1-4 (RST#) in a self-powered configuration.
J2-6	GND	PWR	Module Ground Supply Pins
J2-7	AD0	Output	Configurable Output Pin, the default configuration is Transmit Asynchronous Data Output / Handshake Signal..
J2-8	AD1	Input	Configurable Input Pin, the default configuration is Receiving Asynchronous Data Input / Handshake Signal..
J2-9	AD2	Output	Configurable Output Pin, the default configuration is Request to Send Control Output / Handshake Signal.
J2-10	AD3	Input	Configurable Input Pin, the default configuration is Clear To Send Control Input / Handshake Signal.
J2-11	AD4	Output	Configurable Output Pin, the default configuration is Data Terminal Ready Control Output / Handshake Signal.
J2-12	AD5	Input	Configurable Input Pin, the default configuration is Data Set Ready Control Input / Handshake Signal.
J2-13	AD6	Input	Configurable Input Pin, the default configuration is Data Carrier Detect Control Input / Handshake Signal..
J2-14	AD7	Input	Configurable Input Pin, the default configuration is RI#, Ring Indicator Control Input/ Handshake Signal. When remote wake up is enabled in the EEPROM taking RI# low >20ms can be used to resume the PC USB host controller from suspend.

**Table 4 – UM232H Connector J2 Signal Description**

**Note:** When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the EEPROM.

### 4.3 ACBUS Signal Options

The table below describes the EEPROM options which can be configured on the ACBUS I/O pins using the software utility FT\_PROG (which can be downloaded from the [FTDI utilities](#) page) The default EEPROM configuration is described in section 9.

ACBUS Signal Option	Available On ACBUS Pin	Description
TXDEN	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	TXDEN = (TTL level). Used with RS485 level converters to enable the line driver during data transmit. TXDEN is active from one-bit time before the start bit is transmitted on TXD until one-bit time after the last stop bit.
*PWREN#	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	Output is low after the device has been configured by USB, then high during USB suspend mode. This output can be used to control power to external logic P-Channel logic level MOSFET switch. Enable the interface pull-down option when using the PWREN# in this way.*
TXLED#	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	TXLED = Transmit signalling output. Pulses low when transmitting data (TXD) to the external device. This can be connected to an LED.
RXLED#	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	RXLED = Receive signalling output. Pulses low when receiving data (RXD) from the external device. This can be connected to an LED.
TX&RXLED#	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	LED drive – pulses low when transmitting or receiving data from or to the external device. For more details, refer to the <a href="#">FT232H</a> datasheet.
SLEEP#	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	Goes low during USB suspend mode. Typically used to power down an external TTL to RS232 level converter IC in USB to RS232 converter designs.
**CLK30	ACBUS0, ACBUS5, ACBUS6, ACBUS8, ACBUS9	30MHz Clock output.
**CLK15	ACBUS0, ACBUS5, ACBUS6, ACBUS8, ACBUS9	15MHz Clock output.
**CLK7.5	ACBUS0, ACBUS5, ACBUS6, ACBUS8, ACBUS9	7.5MHz Clock output.
TriSt-PU	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	Input Pull Up
DRIVE 1	ACBUS0, ACBUS5, ACBUS6, ACBUS8, ACBUS9	Output High
DRIVE 0	ACBUS0, ACBUS1, ACBUS2, ACBUS3, ACBUS4, ACBUS5, ACBUS6, ACBUS8, ACBUS9	Output Low
I/O mode	ACBUS5, ACBUS6, ACBUS8, ACBUS9	ACBUS Bit Bang

**Table 5 – ACBUS Signal Option**

\* A 10kΩ resistor pull up is also recommended.

\*\*When in USB suspend mode, the output clocks are also suspended.