



***KC Hardware Design Guide***

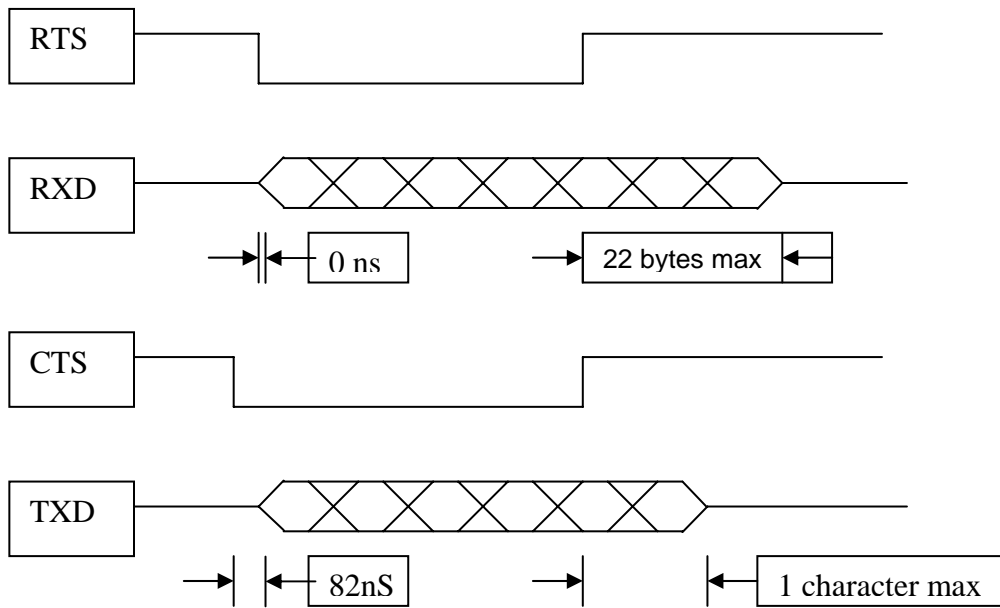
version 27.JUL.2005

# 1 Preface

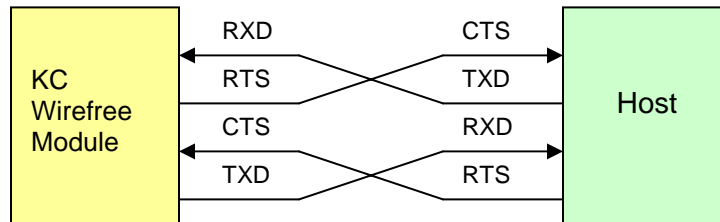
KC Wirefree modules support UART, USB, and GPIO hardware interfaces. This document details typical usage model for these features. Please note that the usage of these interfaces is dependant upon the firmware that is loaded into the module, and is beyond the scope of this document.

# 2 UART Interface

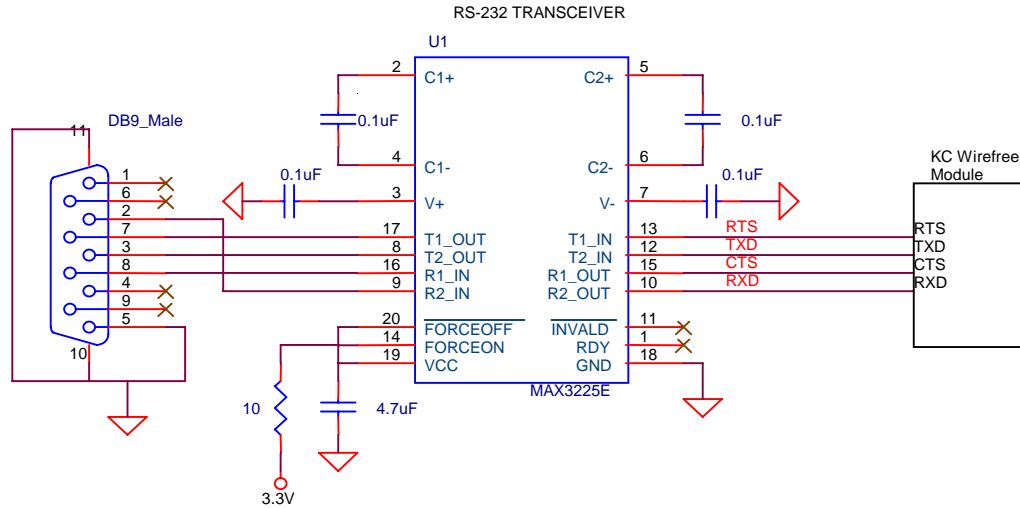
The UART is compatible with the 16450 industry standard and supports 2400, 4800, 9600, 19.2 K, 38.4 K, 57.6 K, 115.2 K, 230.4 K, 460.8 K, and 921.6 K bits/s rates. Four signals are provided with the UART interface. The TXD and RXD pins are used for data while the CTS and RTS pins are used for flow control.



UART Timing Diagram



UART Signal Connections



Typical UART Circuit

### 3 USB Interface

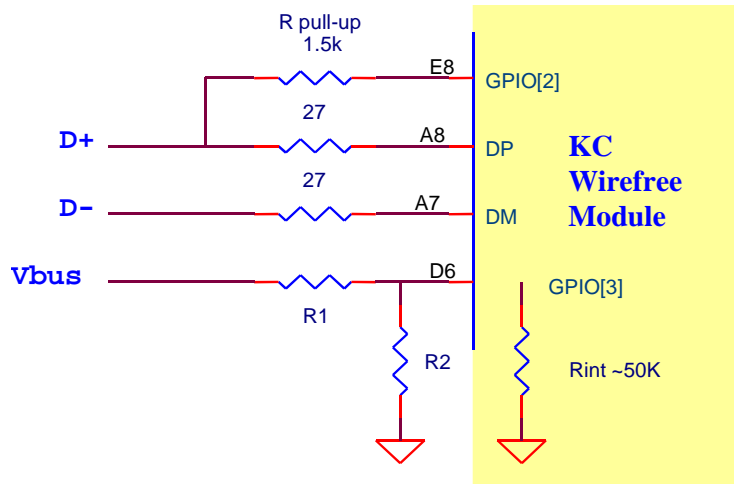
KC Wirefree modules support a full speed USB version 2.0 compliant interface capable of directly driving a USB cable. The module operates as a USB peripheral and responds to requests from a USB master host controller.

#### 3.1 USB Pull-Up Resistor

A 1.5KΩ pull up resistor needs to be connected between GPIO [2] and the USB D+ line. This pulls the USB D+ line high when the module is ready for enumeration, signaling to the host controller that the module is a full speed (12Mbps) USB device.

#### 3.2 USB Self-Powered Mode

In USB self-powered mode, the module is powered from its own power supply and not from the USB Vbus line. In order to detect when the USB Vbus line is powered up, the USB Vbus line is monitored by GPIO [3] through a voltage divider formed by R1 and Rint as shown below. A 20KΩ series resistor (R1) with a 50KΩ shunt resistor (Rint) will generate close to +3.3Vdc at the GPIO [3] pin. This will produce around 55uA of leakage current through the voltage divider. If less leakage current is desired, the internal pull down resistor can be disabled and an external voltage divider (formed by R1 and R2) can be used to minimize the leakage current.

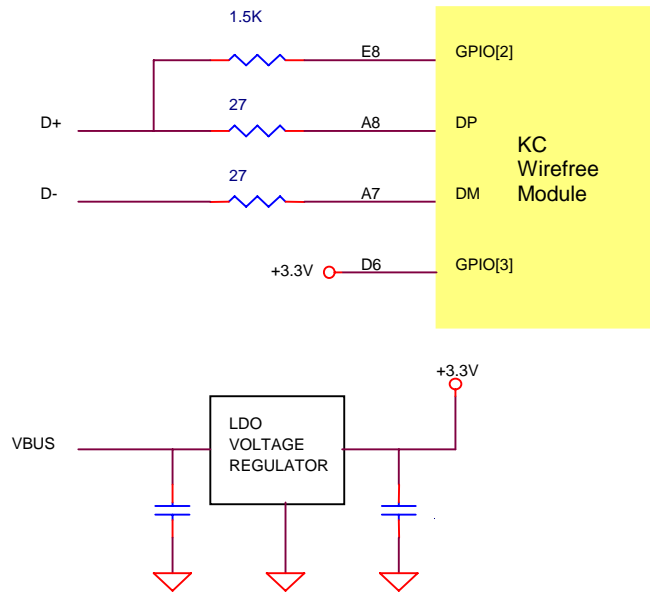


**Typical USB Connection for Self Powered Mode**

### 3.3 USB Bus-Powered Mode

In USB bus-powered mode, the module is powered from the USB Vbus line by means of a Low Drop Out (LDO) Voltage Regulator. When choosing the LDO Voltage Regulator for supplying the +3.3V, some factors that need to be considered are:

1. The voltage specification for the USB Vbus line is +4.75V to +5.25V.
2. The total current required (average and peak) for the design.
3. The voltage regulator's drop out voltage vs. output current.
4. The voltage regulator's power dissipation over the operating temperature range.
5. Filtering requirements on the USB Vbus line to attenuate noise above the voltage regulator's bandwidth.
6. The suspend state current draw.



**Typical USB Connection for Bus Powered Mode**

## 4 GPIO Interface

All GPIOs are capable of sinking and sourcing 2mA of I/O current. These terminals are 5V tolerant.

GPIO [0] to GPIO [7] are internally pulled down with 50K $\Omega$  (nominal) resistors  
 GPIO [8] to GPIO [15] are internally pulled up with 50K $\Omega$  (nominal) resistors.