

USB to Serial converters with Optical Isolation

Connective Peripherals offer a wide range of USB to serial solutions for a variety of applications.

When selecting a USB-Serial converter to connect your serial device to the computer over USB, you will usually consider several factors including the type of interface used by the serial device (e.g. RS232/RS422/RS485) along with the number of serial ports needed, the maximum baud rate, the type of enclosure and serial connector.

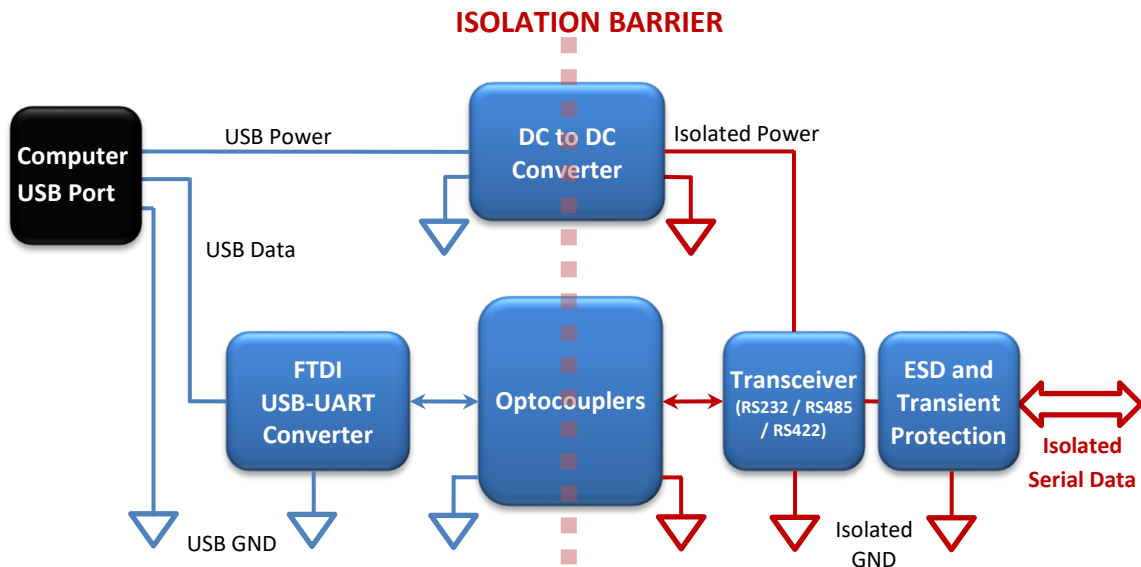
One additional thing you should consider is whether you require an optically isolated converter. In most USB to Serial converters, there is no galvanic isolation and so there is an electrical connection between your PC and the serial device attached to the converter through the conversion chips inside. Note that they do however have protection against things like ESD that may be encountered in the operating environment.

A non-isolated converter works well for most applications as the serial device and the computer are often in the same area, powered from the same mains circuit in the building, and not subject to leakage and ground loops from different power sources. The cabling is not exposed to excessive interference, and the attached serial equipment does not generate large spikes or surges.

However, there are other cases where the serial device connected to the USB-Serial Converter is used in a harsher environment. Some examples include:

- Applications such as industrial machine control over an RS485 network where the controlling computer and the serial device may have differences in ground potential on their interfaces due to their power source or due to leakage currents. This can result in ground loops and excessive current flowing through the ground lines back to the computer.
- Applications such as environmental monitoring and sensor data logging where long cables or cables running outdoors can pick up high levels of interference and spikes from the environment or from equipment or cabling in close proximity. The noise and spikes can propagate into the converter through the serial connector
- Applications such as factory / industrial automation or programming of PLCs or where the device attached to the serial port is switching large electrical devices on and off such as motors. This can then cause noise and transients on the USB link.
- There can even be cases (such as some test and measurement set-ups) where the computer and serial device are located beside each other but where the serial instrument is likely to cause spikes and noise, either as part of normal use or if a fault occurs in the attached serial instrument

In the above cases, the issues on the serial side can cause data errors or cause the USB host to suddenly disconnect the serial device which can lead to disruption and require manual intervention to recover the systems operation. In some cases, significant damage can be caused to the converter and to the PC itself where spikes, surges or leakage currents travel to the PC via the USB cable.



The isolated converter helps to solve these issues by using an optical barrier in the data lines (via optocouplers as shown) so that the USB and the serial side are no longer electrically connected. It therefore helps provide protection to the computer controlling the system. Any noise and spikes on the serial side will not be passed back to the USB side and to the computer. The computer and the serial bus have their power and ground isolated (via an internal DC:DC converter) to avoid ground loops. The converters also have additional protection circuits to protect against transients etc. causing damage to the line drivers on the serial side.

If you are choosing a converter for an application where ground loops, noise, interference, spikes and surges may be present (either as part of normal operation or as a result of another piece of equipment operating incorrectly) then selecting an isolated converter is worth considering. Likewise, if you currently use a non-isolated converter and experience these kinds of problems, consider trying an isolated model to improve reliability and provide additional protection.

Related Products:

- ES-U-1101-MB USB to isolated RS232 port with metal case
- ES-U-2101C USB to isolated RS422 or RS485 port with plastic case
- ES-U-2101-MB USB to isolated RS422 or RS485 or RS232 port with metal case
- ES-U-2102-M USB to 2 port isolated (RS422 or RS485) with metal case

About Connective Peripherals

Connective Peripherals Pte Ltd is a supplier of communications and instrumentation products, with expertise in serial connectivity solutions that are based on USB, CAN and RS232/RS422/RS485 interfaces. The company's products encompass adapter boards and cables delivering connectivity between USB and serial interfaces, plus award-winning USB based oscilloscopes, data loggers and logic analysers. OEM and ODM design services are also offered.

Headquartered in Singapore, in the heart of the Asia Pacific region, the company's dedication to quality of service and exceptional technical support has been appreciated by both corporate and individual customers. As a result, its sales have extensively expanded into the global market.

For more information go to <https://www.connectiveperipherals.com>

Written by:

Graham Brown

Customer Support Engineer