Quarch Technology Ltd
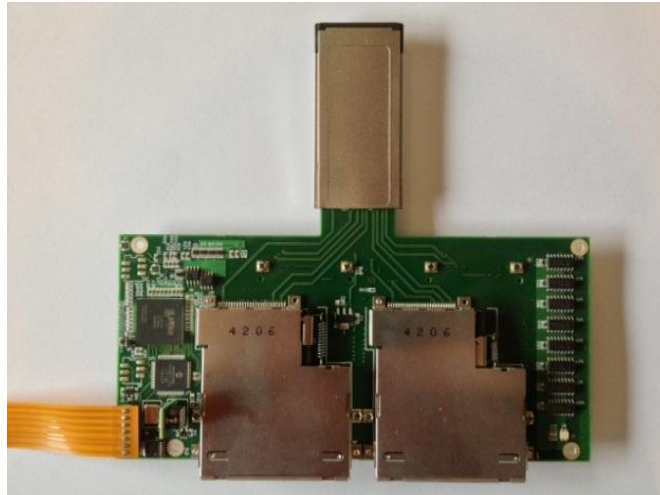
ExpressCard 2.0 Physical Layer Switch

Technical Manual

For use with:

QTL1584 – ExpressCard 2.0 Physical Layer Switch

Using Quarch firmware version 4.0 and above

Wednesday, 24 October 2012

Change History

1.0   24 October 2012   Initial Release

Contents

Introduction

The ExpressCard 2.0 Physical Layer Switch plugs into an ExpressCard 2.0 host port and provides 4 ExpressCard 2.0 device ports that can be switched into the host. This provides an automated solution for performing device swaps. The duration between disconnecting and reconnecting can be varied from 1s to 10s in 1s intervals.

Details of the electrical connections can be found below.

Technical Specifications

Switching Characteristics:

ExpressCard Connector Pin	Description	Switching Action
1 ,20 ,23, 26	Ground pins	All connected to digital Ground on the Module
2, 3, 18,19	USB and REFCLK	High speed differential USB 2 multiplexers
4, 5, 7, 8, 11, 13, 16,17	Sideband Signals	Digital SPST switches
6	Reserved	Reserved
21, 22, 24, 25	PCIe data lanes	Differential bi-directional PCIe 2.0 multiplexers

Mechanical Characteristics:
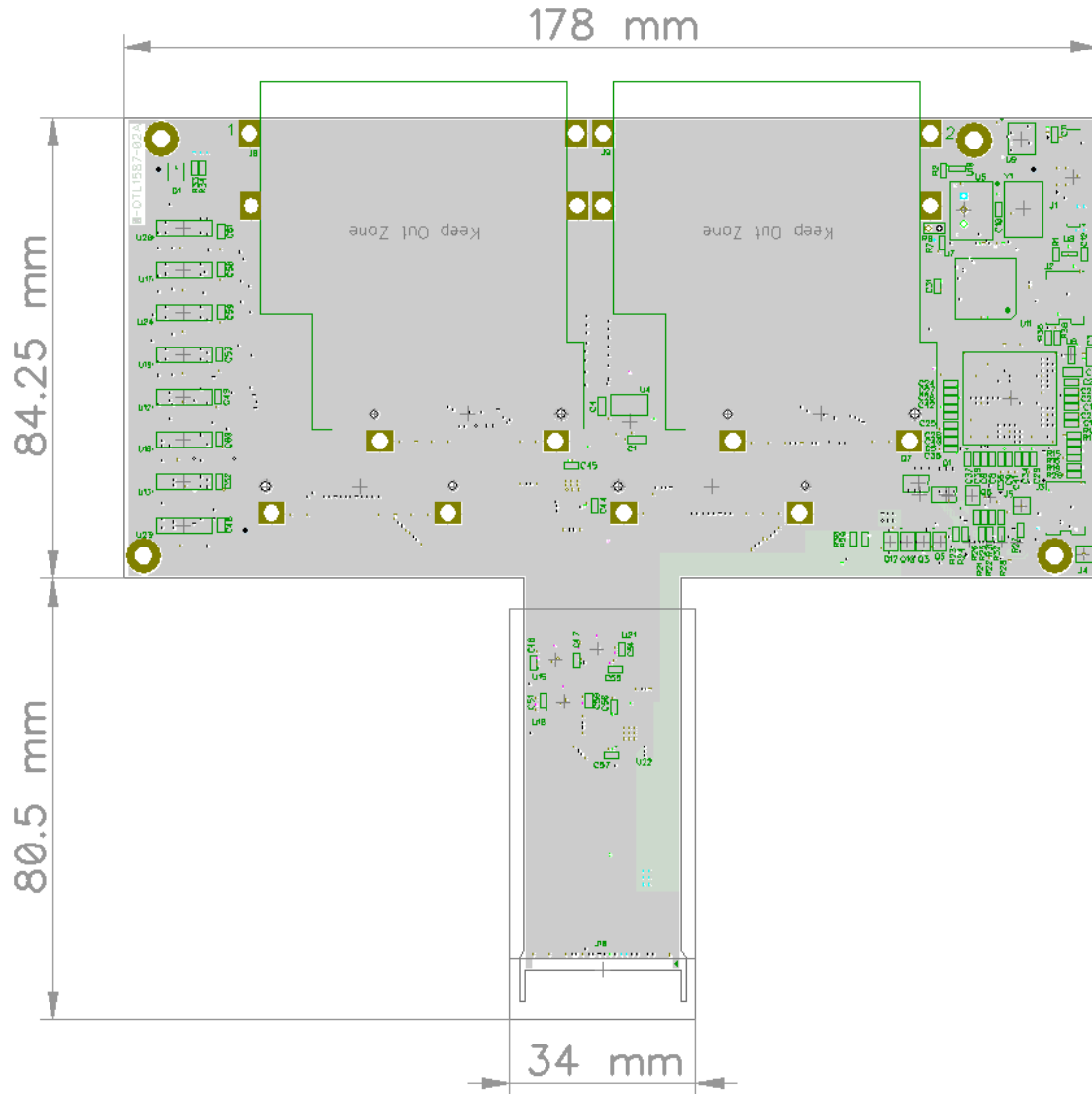
Usage Overview

Terminology

Quarch Multiplexer and Switching products refer to Host connectors with letters and Device connectors with numbers. On the ExpressCard 2.0 Switch the one Host connection is lettered 'a' and the 4 Device connectors are numbered from 1 to 4.

LEDs

There is one green LED to indicate that the module has power.

Control Interfaces

All Torridon Control Modules are designed to be used with a Torridon Array Controller (QTL1079) or a single Torridon Interface Card (QTL1144).

The control cable is an ultra-thin Flex cable.

Control Interface	Form Factor	Torridon Module Ports	Control Methods Available	Interfaces
Torridon Array Controller	1U 19" Rack Mounted unit	24 at the front, 4 at the rear	Serial Scripting Script Generation through **TestMonkey GUI**	Serial via DB9 or RJ45 Ethernet
Torridon Interface Card	102mm x 26mm PCB	1 port	Serial Scripting Script Generation through **TestMonkey GUI** Real-time USB Control via **TestMonkey GUI**	Serial via DB9 or RJ45 USB

Voltage Measurements

The modules are capable of measuring various voltages both for self test and to assist in the testing of a customer's system. The following measurement points are available:

Measurement Command	Description	Resolution / Accuracy
MEASure:VOLTage:SELF 1v2?	Returns the voltage of the modules internal 1.2v power rail	64mV / 5%
MEASure:VOLTage:SELF 2v5?	Returns the voltage of the modules internal 2.5v power rail	64mV / 5%
MEASure:VOLTage:SELF 3v3?	Returns the voltage of the modules internal 3.3v power rail	64mV / 5%
MEASure:VOLTage:SELF 5?	Returns the voltage of the modules internal 5v power rail	64mV / 5%
MEASure:VOLTage:SELF 12v?	Returns the voltage of the modules internal 12v power rail	64mV / 5%

Default Startup State

On power up or reset, the control modules enter a default state. Each host port is connected to a device port, and hosts and devices may be plugged into these ports and will be instantly connected

Host Port	Default Device Port
A	1

Controlling the Module

The module can be controlled either by:

- Serial ASCII terminal (such as HyperTerminal)
  This is normally used with scripted commands to automate a series of tests. The commands are normally generated by a script or user code (PERL, TCL, C, C# or similar).

- Telnet Terminal (Only when connected to an Array Controller). This mode uses exactly the same commands as the serial ASCII terminal

- USB
  Quarch's TestMonkey application can control a single module via USB, this allows simple graphical control of the module.

Serial Command Set

When connected via a serial terminal, the module has a simple command line interface

SCPI Style Commands

These commands are based on the SCPI style control system that is used by many manufacturers of test instruments. The entire SCPI specification has NOT been implemented but the command structure will be very familiar to anyone who has used it before.

- SCPI commands are NOT case sensitive
- SCPI commands are in a hierarchy separated by ':' (LEVel1:LEVel2:LEVel3)
- Most words have a short form (e.g. 'register' shortens to 'reg'). This will be documented as REGister, where the short form is shown in capitals.
- Some commands take parameters. These are separated by spaces after the main part of the command (e.g. "meas:volt:self 3v3?" Obtains the 3v3 self test measurement)
- Query commands that return a value all have a '?' on the end
- Commands with a preceding '*' are basic control commands, found on all devices
- Commands that do not return a particular value will return "OK" or "FAIL". Unless disabled, the fail response will also append a text description for the failure if it can be determined.

 # [comments]

Any line beginning with a # character is ignored as a comment. This allows commenting of scripts for use with the module.

*RST

Triggers a reset, the module will behave as if it had just been powered on

*CLR

Clear the terminal window and displays the normal start screen. Also runs the internal self test. The same action can be performed by pressing return on a blank line.

*IDN?

Displays a standard set of information, identifying the device. An example return is shown below

Family:	Torridon System	[The parent family of the device]
Name:	Ethernet Cable Pull Module	[The name of the device]
Part#:	QTL1271-01	[The part number of the hardware]
Processor:	QTL1159-01,3.50	[Part# and version of firmware]
Bootloader:	QTL1170-01,1.00	[Part# and version of bootloader]
FPGA 1:	1.0	[Version of FPGA core]

*TST?

Runs a set of standard tests to confirm the device is operating correctly, these tests are also performed at start up. Returns 'OK' or 'FAIL' followed by a list of errors that occurred, each on a new line.

CONFig:MODE BOOT

Configures the card for boot loader mode (to update the firmware), requires an update utility on the PC.

CONFig:MESSages [SHORt|USER]
CONFig:MESSages?

   Gets or sets the mode for messages that are returned to the user's terminal

   Short: Only a "FAIL" or "OK" will be returned
   User: Full error messages are returned to the user on failure

CONFig:TERMinal USER

Sets the terminal response mode to the default 'User' setting. This is intended for use with HyperTerminal or similar and manually typed commands

CONFig:TERMinal SCRIPT

Sets the terminal response mode for easier parsing. Especially useful from a UNIX/LINUX based system. Characters sent from the PC are not echoed by the device and a <CR><LF> is sent after the cursor to force a flush of the USART buffer.

CONFig:TERMinal ?

Returns the current terminal mode

CONFig:DEFault:STATE

Resets the state of the module. This will set all source/signal/glitch etc logic to its default power-on values. Terminal setting will not be affected. This command allows the module to be brought back to a known state without resetting it.

ExpressCard 2.0 Switch Signal Names

The switch allows full connections between the Source and Sink and also partial connections. The Source connector is referred to as 'A' and each Sink with a number from 1-8.

Display Port Switch Commands

MUX:CONnect A [PORT]

Creates a bidirectional connection of all signals between the Source and Sink [PORT], any other connections or forwards to/from the Source or Sink are turned off. [PORT] must be a number from 1 to 8.

MUX:[PORT]:SOURce?

Returns the ports or lanes that [PORT] is receiving data from

MUX:OFF [PORT|ALL]

Turns off the receiver and transmitter for [Port], or if ALL is used, it turns off all ports

Display Port Config Commands

CONFig:MUX:DELay

Set the duration in seconds between disconnecting and reconnecting when making a connection. CONFig:MUX:Delay 0 gives approx 1ms switching time.

CONFig:MUX:DELay ?

Return the current delay.

Control Register Map

Access to the FPGA registers should not be required normal operation and customers are encouraged to use the command set in order to maintain compatibility with future firmware versions. To obtain a full register map for your product please email support@quarch.com.