# GEN4 PCIe Card and Drive Modules

**Automate hot-plug, dual redundancy and fault injection testing for GEN4 PCIe card devices**

Quarch
Data Sheet

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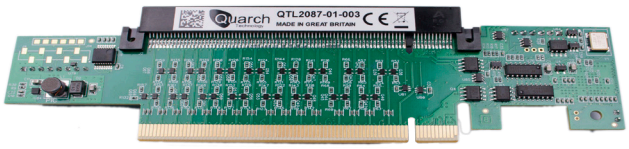
## Automate hot-plug, dual redundancy and fault injection testing for GEN4 PCIe Card devices




## Highlights

- Supports the full range of PCIe devices
- Removes manual intervention, for fully automated testing
- Precise and consistent timing control over hot-swap scenarios
- Completely transparent at the protocol layer
- Create and test many different fault conditions
- Simple to control with your existing test automation system

## Use Cases

| | |
|---|---|
| **System Qualification** | Run repeated test cycles with bounds testing of all possible hot-swap and lane width scenarios |
| **Regression Testing** | Automated regression tests spot issues earlier during development |
| **RAID Testing** | Force drive rebuilds, single/double RAID faults |
| **Failover Testing** | Test dual redundancy, fault monitoring and performance during a failure |
| **Fault Injection** | Simulate a large number of fault scenarios |

## Hot Swap

PCIe data is switched with high speed RF switches, ensuring that our modules are almost totally transparent to the storage system. Host/Device connections will appear as if they are directly attached.

Individual control over each pin allows us to create almost any possible hot-swap or fault scenario. Precise timing ensures that every test can be exactly re-created. Versions are available with inrush current limits, to help high power devices hot-plug on hosts with limited power supply capacity.

The modules can be manually controlled for bench testing, or easily integrated into your existing test automation system as part of a fully automated test solution.

## Module Range

The Gen4 range expanding rapidly as the interface gains traction. If you do not see the module you require, please let us know and we can get a time scale for you.

**HS** Modules also switch the PCIe lanes and have an additional injection port to allow power margining and measurement from our Programmable Power Module.

All modules support data rates up to 16GT/s.

Active signal driving is support for signals such as PERST, CLKREQ and WAKE. The exact signals driven varies from module to module

All the PCIe Card modules support some form of power monitoring; basic internal measurement in the case of the 'Lite' module while the remaining devices have an injection port for the Power Module.

Interface options depend on the controller you chose, but include simple Serial, USB and LAN options. These can be accessed from almost any scripting language. You will need to purchase a separate controller to use this module.

Drive modules can be combined with other Torridon modules as part of a full test-automation system.

## Supplied Parts

Each module comes with a 40cm interface cable, for connection to a controller.

## Also Required

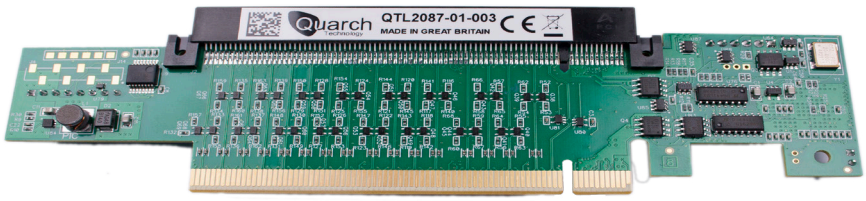
**Controller** - You will require one slot on a Torridon Controller for each Cable Module

**Downloads** - Our website contains many useful downloads to help you get started: www.quarch.com

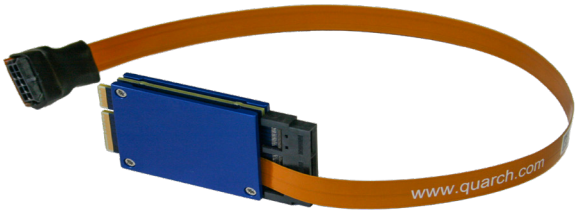
**USB Drivers**
**Technical Manuals**
**Quick Start Guides**
**Example Scripts**
**TestMonkey GUI**

## Products Versions

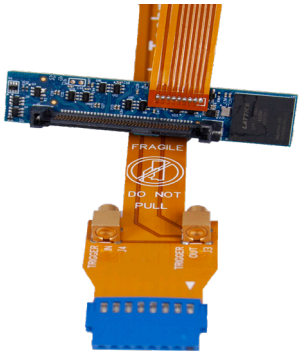
| Product Code | Product Options |
|---|---|
| **QTLXXXX** | Product code, made up from options below |
| **QTL2087** | Gen4 PCIe x16 HS Card Module + Triggering |
| **QTL2128** | Gen4 PCIe x16 HS Card Module |
| **QTL2135** | Gen4 PCIe x16 HS Card Module + Inrush Limit |
| **QTL2207** | Gen4 PCIe U.2 Drive Module |
| **QTL2266** | Gen4 PCIe U.2 Drive Module + Triggering |
| **QTL2245** | Gen4 PCIe U.3 Drive Module |
| **QTL2270** | Gen4 PCIe U.3 Drive Module +Triggering |
| **QTL2161** | Gen4 EDSFF x8 Card Module |
| **QTL2272** | Gen4 EDSFF x8 Card Module +Triggering |
| **QTL2334** | Gen4 EDSFF x4 Card Module |
| **QTL2351** | Gen4 EDSFF x4 Card Module +Triggering |
| **QTL2322** | Gen4 M.2 M-Key Card Module |
| **QTL2395** | Gen4 M.2 M-Key Card Module +Triggering |




x16 Card Module




EDSFF x8 Module




U.2 Drive Module

## Required Controllers - One port on a controller is required for each module

| Product Code | Description | |
|---|---|---|
| **QTL1260** | Torridon Interface Kit<br>Simple USB and Serial control options for bench testing |  |
| **QTL1461** | 4 Port Torridon Controller<br>Control up to 4 modules via Serial/LAN/ USB connection |  |
| **QTL1079** | 28 Port Torridon Controller<br>Control up to 28 modules via Serial, LAN or USB connection |  |

## Accessories

| Product Code | Description |
|---|---|
| **QTL999** | HD Programmable Power Module<br>Power margining any uA range power measurement, ideal for PCIe devices |
| **QTL1558** | 40cm Torridon Double Ended Interface Cable (Female to Female)<br>Replacement cable for Card Modules, connects Module to Controller |
| **QTL1870** | 100cm Torridon Double Ended Interface Cable (Female to Female)<br>Replacement cable for Card Modules, connects Module to Controller |
| **QTL1381** | 100cm Torridon Extension Cable (Male to Female)<br>Extends an existing Double Ended Torridon cable or fixed Drive Module Cable |

## Technical Information

| Connections | QTL2087 | QTL2128 | QTL2135 | QTL2207 | QTL2266 | QTL2245 | QTL2270 |
|---|---|---|---|---|---|---|---|
| **Host Side Connector** | PCIe x16 | | | U.2 | | U.3 | |
| **Device Side Connector** | PCIe x16 | | | U.2 | | U.3 | |
| **Max Speed** | 16GT/s | | | | | | |
| **Protocols** | PCIe | | | | | PCIe/SAS/SATA/GENz | |
| **Signals Switched** | All[*1] | | | | | | |

| Connections (cont) | QTL2161 | QTL2272 | QTL2334 | QTL2351 | QTL2322 | QTL2395 |
|---|---|---|---|---|---|---|
| **Host Side Connector** | EDSFF x8 | | EDSFF x4 | | M.2 | |
| **Device Side Connector** | EDSFF x8 | | EDSFF x4 | | M.2 | |
| **Form Factor** | E1.L | | E1.S | | M-Key | |
| **Max Speed** | 16GT/s | | | | | |
| **Protocols** | PCIe | | | | PCIe, SATA | |
| **Signals Switched** | All[*1] | | | | | |

[*1] All power, high speed data, mated and sideband pins are individually switched. GND pins are directly routed through the module.

| Control | QTL2087 | QTL2128 | QTL2135 | QTL2207 | QTL2266 | QTL2245 | QTL2270 |
|---|---|---|---|---|---|---|---|
| **Power Supply** | Via Torridon Controller | | | | | | |
| **Control Ports** | Torridon Connector | | | | | | |
| **Triggering** | SMA | X | X | X | MCX | X | MCX |
| **Power Injection Port** | √ | √ | √ | X | X | X | X |

| Control (cont) | QTL2161 | QTL2272 | QTL2334 | QTL2351 | QTL2322 | QTL2395 |
|---|---|---|---|---|---|---|
| **Power Supply** | Via Torridon Controller | | | | | |
| **Control Ports** | Torridon Connector | | | | | |
| **Triggering** | X | MCX | X | MCX | X | MCX |
| **Power Injection Port** | X | X | X | X | X | X |

| Dimensions | QTL2087 | QTL2128 | QTL2135 | QTL2207 | QTL2266 | QTL2245 | QTL2270 |
|---|---|---|---|---|---|---|---|
| **Offsets Drive By** | 41.94mm | | | 11.86mm | | | |
| **Length/Width** | 167.67mm | | | 69.05mm | | | |
| **Height** | - | | | 15.9mm | | | |
| **Compatible Devices** | x1 - x16 PCIe Cards | | | SSDs,HDDs | | | |

| Dimensions (cont) | QTL2161 | QTL2272 | QTL2334 | QTL2351 | QTL2322 | QTL2395 |
|---|---|---|---|---|---|---|
| **Offsets Drive By** | 52.02mm | | 53.8 | | - | |
| **Length/Width** | 38.4mm | | 31.50 | | 80mm | |
| **Height** | - | | - | | - | |
| **Compatible Devices** | E1.L x4 - x8 | | E1.S x4 | | M-Key | |

| Features | QTL2087 | QTL2128 | QTL2135 | QTL2207 | QTL2266 | QTL2245 | QTL2270 |
|---|---|---|---|---|---|---|---|
| **Basic (power) hot/swap** | √ | √ | √ | √ | √ | √ | √ |
| **Full hot-swap** | √ | √ | √ | √ | √ | √ | √ |
| **Pin Bounce Simulation** | Simple/Custom. 10uS minimum period | | | Simple/Custom. 1uS minimum period | | | |
| **Signal Glitch** | Single/Cycle/PRBS. 50nS minimum length | | | | | | |
| **Voltage Monitoring** | √ | √ | √ | √ | √ | √ | √ |
| **Power Monitoring** | Requires Power Module | | | X | X | X | X |
| **Active Signal Driving** | CLKREQ, WAKE, PERST and similar (depending on the interface) | | | | | | |

| Features (cont) | QTL2161 | QTL2272 | QTL2334 | QTL2351 | QTL2322 | QTL2395 |
|---|---|---|---|---|---|---|
| **Basic (power) hot/swap** | √ | √ | √ | √ | √ | √ |
| **Full hot-swap** | √ | √ | √ | √ | √ | √ |
| **Pin Bounce Simulation** | Simple/Custom. 1uS minimum period | | | | | |
| **Signal Glitch** | Single/Cycle/PRBS. 50nS minimum length | | | | | |
| **Voltage Monitoring** | √ | √ | √ | √ | √ | √ |
| **Power Monitoring** | X | X | X | X | X | X |
| **Active Signal Driving** | CLKREQ, WAKE, PERST and similar | | | | | |

| Controllers | All Modules |
|---|---|
| **Serial Control** | Supported on all Controllers |
| **USB Control** | Supported on all Controllers |
| **REST Control** | Supported on QTL1079 and QTL1461 |
| **Telnet Control** | Supported on QTL1079 and QTL1461 |