GEN5 PCIe Card and Drive Breaker Modules

Automate hot-plug, dual redundancy and fault injection testing for GEN5 PCIe card devices

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Data Sheet

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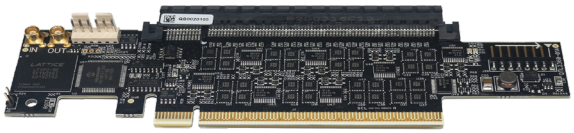
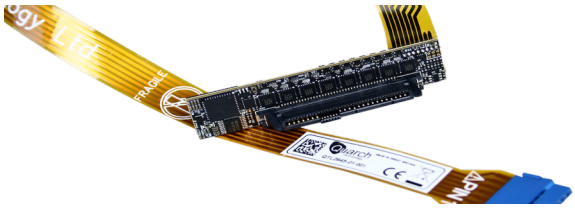




Highlights

- 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 advanced 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 Gen5 range is expanding 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.

NOTE: Due to the signal intergity issues around early Gen5 devices, we request you evaluate a module in your test system before purchase.

The 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 32GT/s.

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

With the '+Triggering' option, sideband monitoring allows you to query the state of a sideband, or even divery the state out of the triggering port, for easy connection to a scope or analyzer

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

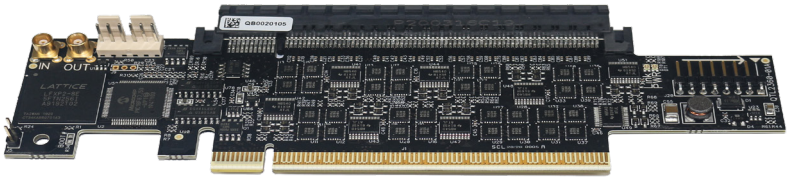
Controller - You will require one slot on a Torridon Controller for each Cable Module

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

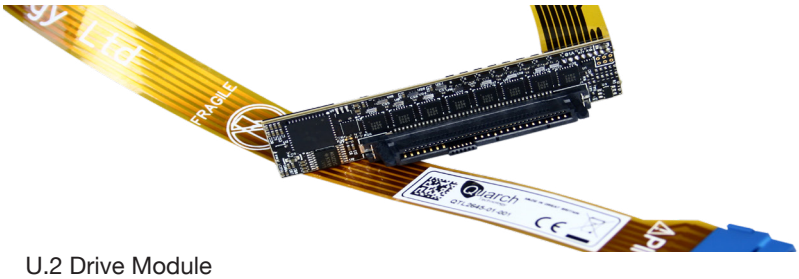
- **USB Drivers**
- **Technical Manuals**
- **Quick Start Guides**
- **Example Scripts**
- **TestMonkey GUI**

Products Versions

Product Code	Product Options
QTLXXXX	Product code, made up from options below
QTL2357	Gen5 PCIe x16 Breaker Module
QTL2358	Gen5 PCIe x16 Breaker Module + Triggering
QTL2396	Gen5 PCIe x16 Breaker Module + Inrush Limit
QTL2798	Gen5 PCIe x16 Breaker Module + Triggering + Inrush Limit
QTL2652	Gen5 PCIe x16 Lite Breaker Module
QTL2658	Gen5 PCIe x16 Lite Breaker Module + Inrush Limit
QTL2645	Gen5 PCIe U.2 Breaker Module
QTL2651	Gen5 PCIe U.2 Breaker Module + Triggering
QTL2662	Gen5 PCIe U.3 Breaker Module
QTL2661	Gen5 PCIe U.3 Breaker Module + Triggering
QTL2757	Gen5 SFF Lite Breaker
QTL2686	Gen5 EDSFF E3 x4 Breaker Module
QTL2692	Gen5 EDSFF E3 x4 Breaker Module + Triggering



x16 Card Module



U.2 Drive Module

EDSFF E3 Drive Module

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

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

Accessories

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

Technical Information

Connections	QTL2357	QTL2358	QTL2396	QTL2798	QTL2652	QTL2658
Host Side Connector	PCIe x16					
Device Side Connector	PCIe x16					
Max Speed	32GT/s					
Protocols	PCIe					
Signals Switched	All*1				Non Data*2	

Connections...	QTL2645	QTL2651	QTL2757	QTL2661	QTL2662	QTL2686	QTL2692
Host Side Connector	SFF-8639					EDSFF x4	
Device Side Connector	SFF-8639					EDSFF x8	
Max Speed	32GT/s						
Protocols	PCIe		PCIe, SAS			PCIe	
Signals Switched	All U.2*1		Non Data*2	All U.3*1	All U.3*1	All*1	

*1 All power, high speed data, mated and sideband pins are individually switched. GND pins are directly routed through the module.
*2 High speed data is directly routed. Sidebands and power is switched (some are switches as a group)

Control	QTL2357	QTL2358	QTL2396	QTL2798	QTL2652	QTL2658
Power Supply	Via Torridon Controller					
Control Ports	Torridon Connector					
Triggering	X	SMA	X	SMA	X	X
Power Injection Port	√	√	√	√	X	X

Control...	QTL2645	QTL2651	QTL2757	QTL2661	QTL2662	QTL2686	QTL2692
Power Supply	Via Torridon Controller						
Control Ports	Torridon Connector						
Triggering	X	SMA	X	SMA	X	X	SMA
Power Injection Port	X	X	X	X	X	X	X

Dimensions	QTL2357	QTL2358	QTL2396	QTL2798	QTL2652	QTL2658
Offsets Drive By	46.75mm				42.38mm	
Length/Width	167.67mm				167.65mm	
Height	-					
Compatible Devices	x1 - x16 PCIe Cards					

Dimensions...	QTL2645	QTL2651	QTL2757	QTL2661	QTL2662	QTL2686	QTL2692
Offsets Drive By	11.86mm					35mm	
Length/Width	69.05mm					76mm	
Height	15.9mm					7.5mm	
Compatible Devices	U.2		SFF	U.3	U.3	x4 EDSFF E3 Drives	

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

Features	QTL2357	QTL2358	QTL2396	QTL2798	QTL2652	QTL2658	QTL2645	QTL2651
Basic (power) hot/swap	√	√	√	√	√	√	√	√
Full hot-swap	√	√	√	√	X	X	√	√
Pin Bounce Simulation	1uS minimum period				N/A		1uS minimum period	
Signal Glitch	Single/Cycle/PRBS				N/A		Single/Cycle/PRBS	
Voltage Monitoring	√	√	√	√	√	√	√	√
Power Monitoring	Requires Power Module				X	X	X	X
Active Signal Driving	PERST, WAKE, CLKREQ, PWRBRK				X	X	PERST, DUALPORT, IF_DET, PWR_DIS, PRSNT, HPT0, HPT1	
Signal Monitoring	PERST, WAKE, CLKREQ, PWRBRK, SMCLK, SMDAT				X	X	PERST, PERSTB, SMCLK, SMDAT, DUALPORT, IF_DET, ACTIVITY, WAKE, PWR_DIS, PRSNT, HPT0, HPT1	

Features...	QTL2645	QTL2651	QTL2757	QTL2661	QTL2662	QTL2686	QTL2692
Basic (power) hot/swap	√	√	√	√	√	√	√
Full hot-swap	√	√	X	√	√	√	√
Pin Bounce Simulation	1uS minimum period		X	1uS minimum period			
Signal Glitch	Single/Cycle/PRBS		X	Single/Cycle/PRBS			
Voltage Monitoring	√	√	√	√	√	√	√
Power Monitoring	X	X	X	X	X	X	X
Active Signal Driving	PERST, DUALPORT, IF_DET, PWR_DIS, PRSNT, HPT0, HPT1		X	PRSNT, PERST, PERSTB, DUALPORTEN, PWRDIS, IFDET, IFDET2, HPT0, HPT1		PRSNT0, PERST0, SMBRST, PWRDIS, MFG, DUALPORTEN	
Signal Monitoring	PERST, PERSTB, SMCLK, SMDAT, DUALPORT, IF_DET, ACTIVITY, WAKE, PWR_DIS, PRSNT, HPT0, HPT1		X	PERST, PERSTB, SMBCLK, SMBDAT, DUALPORT, IF_DET, IFDET2, HPT0, HPT1, PRSNT, WAKE, PWRDIS		PRSNT0, PERST0, SMBRST, SMBCLK, SMBDAT, PWRDIS, MFG, DUALPORTEN	