

Torridon System - Breakers

HOT-PLUG AND PHYSICAL LAYER FAULT INJECTION



INDUSTRY LEADING AUTOMATED TESTING

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Product Range Overview

KEY BENEFITS

The Torridon system is modular and made up of 'controllers' that run the system and 'breaker modules' that sit in the interface under test.

Automate hot-plug, link width configuration, PERST assertion, REFCLK fault, data error injection and many more physical layer tests.

Run one manual test with a couple of clicks in our TestMonkey app, or automate hundreds with our simple Python API.

Automate a single drive on a bench, or scale up to entire storage arrays

Supports all major device interfaces: SATA, SAS, PCIe. Also supports cable interfaces: USB, LAN, SATA, External PCIe, External SAS and more.

Quarch tools are widely trusted across the industry are included as required testing for Plugfest compliance events.

TORRIDON INTERFACE KIT

[Find out more](#)



Control a single breaker module via USB or Serial.

Ideal for simple bench tests and small scale automation.

INTERFACE KIT: CONTROLS A SINGLE BREAKER ACROSS EITHER: DIRECT USB, USB VIRTUAL COM PORT OR DIRECT RS-232 VIA RS232-D WIRED RJ-45 PORT. 12V 15W SUPPLY.

Torricon controller options



Button switches between direct USB and USB VCOM mode.

12v PSU powers the Breaker, so it is independent of host power.

Rear USB-2 and RJ-45 serial port for control.

4-PORT ARRAY CONTROLLER

[Find out more](#) >



Control up to 4 Breaker modules at the same time.

1U high and can be front or rear rack mounted with an additional kit.

4-PORT CONTROLLER: CONTROLS 4 BREAKER MODULE ACROSS EITHER: DIRECT USB, LAN OR DIRECT RS-232 VIA RS232-D WIRED RJ-45 PORT. 12V 60W SUPPLY.

Torridon controller options



USB, LAN and RS232 Serial control ports.

12v PSU powers the Breakers, so they are independent of host power.

Link port allows two controllers to be chained for 8 device control.

28-PORT ARRAY CONTROLLER

[Find out more](#)



28-PORT CONTROLLER: CONTROLS 28 BREAKER MODULE ACROSS EITHER: DIRECT USB, LAN OR DIRECT RS-232 VIA RS232-D WIRED RJ-45 PORT. 24 PORTS ON FRONT, 4 PORTS ON REAR. 12V 60W SUPPLY. RACK MOUNTS IN 1U. ADDITIONAL USB PORT ON FRONT

Torridon controller options



USB, LAN and RS232 Serial control ports.

12v PSU powers the Breakers, so they are independent of host power.

Link port allows two controllers to be chained for 48 device control.

Rear ports are ideal for cable breaker modules.

HIGH SPEED BREAKERS

Find out more 

- Individual switching of all pins (excluding grounds)
- Multi-stage hot-plug and pin-bounce generator with 1uS resolution
- Glitch generator with 50nS minimum period. PRBS generator for random glitch generation
- Driving and monitoring of major sidebands
- Triggering versions available with external trigger in/out



BREAKERS: FET SWITCHES ON POWER RAILS, HIGH SPEED RF SWITCHES ON PCIE LANES WITH INDIVIDUAL CONTROL ON EVERY PIN, DIGITAL SWITCHING ON SIDEBANDS. GROUNDS ARE PERMANENTLY CONNECTED. 1US TIMING RESOLUTION ON HOT-PLUG SIMULATION. 50NS MINIMUM GLITCH DURATION ON PCIE LANES. PIN-BOUNCE GENERATOR WITH CUSTOM USER PATTERNS. DRIVING AND MONITORING ON SELECTED SIDEBANDS. VOLTAGE MONITORING ON SELECTED RAILS

Torridon Breaker features

LITE BREAKERS

- Simplified hardware for cost effective hot-plug cycling
- Switching of power and sideband signals
- High speed data signals and grounds are permanently connected
- Multi-stage hot-plug generator with 1mS resolution



LITE BREAKER: FET SWITCHES ON POWER RAILS, DIGITAL SWITCHING ON SIDEBANDS. HIGH SPEED LANES AND GROUNDS ARE PERMANENTLY CONNECTED. 1MS TIMING RESOLUTION ON HOT-PLUG SIMULATION. BASIC HOT-PLUG ONLY, NO PIN-BOUNCE, DRIVING OR GLITCH. VOLTAGE MONITORING ON SELECTED RAILS.

GEN5 SFF U.2 & U.3 BREAKERS

[Find out more](#)



Optional triggering versions have MCX trigger in/out.

U.2 and U.3 versions, both supporting up to Gen5 speeds.

SFF BREAKERS: SUPPORTS SFF-8639 DEVICES UP TO GEN5 SPEEDS. DUALPORT DRIVES SUPPORTED.

U.2 BREAKER: DRIVE+MONITOR: PERST, CLKREQ/PERSTB, SMCLK, SMDAT, DUALPORTEN, IF_DET, PWR_DIS, PRSNT, HPT0, HPT1. MONITOR: ACTIVITY, WAKE. U.3 BREAKER: DRIVE+MONITOR: PRSNT, PWRDIS, DUALPORTEN, IFDET, IFDET2, HPT0, HPT1, PERST, PERSTB. MONITOR: SMBCLK, SMBDAT, WAKE 8

Storage breakers

GEN5 SFF LITE BREAKER

[Find out more](#)



Supports SFF-8639 drives: U.2, U.3, SAS and SATA.

Supports speeds up to Gen5 PCIe and SAS4.

LITE BREAKER: SUPPORTS SFF-8639 U.2 DEVICES UP TO GEN5 SPEEDS. DUALPORT DRIVES SUPPORTED. SUPPORTS ALL SFF-8639 DEVICES INCLUDING U.2, U.3 SAS AND SATA. CONTROLLED SIGNALS: 12V_POWER, 12V_CHARGE, 5V_POWER, 5V_CHARGE, 3V3_AUX, PERST_A, PERST_B, SIDEBAND (ALL OTHER SIDEBANDS).

24G SAS BREAKERS

[Find out more](#)



Optional triggering version has MCX trigger in/out.

Supports SAS/SATA drives up to SAS4 speeds

Storage breakers

12G SAS LITE BREAKER

[Find out more](#)



Supports SAS/SATA drives up to SAS3 speeds.

SAS LITE BREAKER: SUPPORTS SAS/SATA UP TO SAS3 SPEEDS. CONTROLLED SIGNALS: 5V_CHARGE, 5V_POWER, 12V_CHARGE, 12V_POWER, MATED, POWER_DISABLE.

GEN5 EDSFF E1 BREAKERS

[Find out more](#) >



Optional triggering version has MCX trigger in/out.

Supports E1.S and E1.L drives up to Gen5 speeds

Storage breakers

[Find out more](#) >



Optional triggering version has MCX trigger in/out.

Supports E3 drives up to Gen5 speeds.

E3 x4, E3 x8 and E3-2T x8 versions available.

E3BREAKERS: SUPPORTS EDSFF E3 DEVICES UP TO GEN5 SPEEDS, VERSIONS AVAILABLE DIFFER BY LANE WIDTH AND ENCLOSURE SIZE.
E1 SIGNALS: DRIVE+MONITOR: PERST0, PERST1, PRSNT0, LED, SMBRST, PWRDIS, DUALPORTEN. MONITOR: SMBCLK, SMBDAT.
E3 SIGNALS: DRIVE+MONITOR: PERST0, PERST1, PRSNT0, PRSNT1, LED, SMBRST, PWRDIS, DUALPORTEN. MONITOR: SMBCLK, SMBDAT, RFU_A42, RFU_B8.

GEN5 M.2 M-KEY BREAKERS

[Find out more](#) 



- Optional triggering version has MCX trigger in/out.
- Supports M.2 M-Key devices up to Gen5 speeds.
- Horizontal form factor.

M.2 BREAKERS: SUPPORTS M.2 M-KEY DEVICES UP TO GEN5 SPEEDS. DRIVE+MONITOR: PEWAKE, CLKREQ, LED1, PERST, SUSCLK, ALERT

Storage breakers

GEN5 X16 AIC BREAKERS

[Find out more](#) 

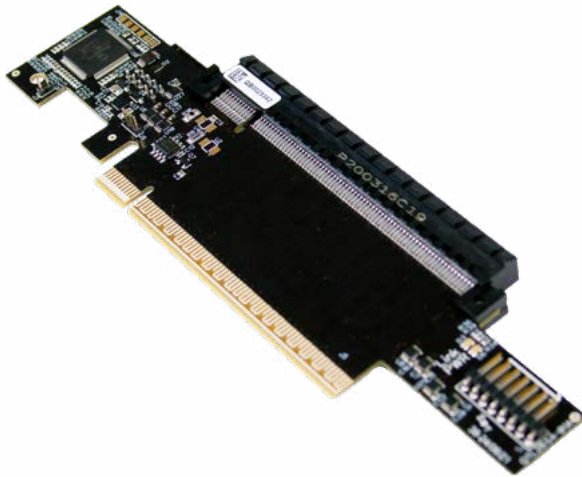


- Optional triggering version has MCX trigger in/out.
- Optional inrush limit version reduces inrush current load on hosts during SSD hot-plug
- Power injection port for Programmable Power Module, allowing measurement and margining

AIC BREAKERS: SUPPORTS AIC/SLOT DEVICES WITH UP TO 16 LANES, AND UP TO GEN5 SPEEDS, TRIGGERING AND INRUSHLIMITED VERSIONS ARE AVAILABLE. DRIVE+MONITOR: PERST, WAKE, CLKREQ, PWRBRK. MONITOR ONLY: SMCLK, SMDAT

GEN5 X16 AIC LITE BREAKERS

[Find out more](#)



Supports AIC/slot devices up to Gen5 speeds.

Optional inrush limit version reduces inrush current load on hosts during SSD hot-plug.

Direct USB header to power/control direct from a host PC.

AIC LITE BREAKERS: SUPPORTS PCIE AIC/SLOT DEVICES UP TO GEN5 SPEEDS. CONTROLLED SIGNALS: 12V_POWER, 3V3_POWER, 3V3_AUX, PRSNT, WAKE, PERST, CLKREQ, REFCLK, JTAG, SMCLK, SMDAT, PWRBRK.

Storage breakers

STORAGE AND BEYOND

[Find out more](#)

PCIe breakers support more than just SSDs. The devices are protocol agnostic and support PCIe, NVMe, OCP and CXL devices.

Any device compatible with the interface can be tested, including GPUs, AI accelerators, HBAs, NICs and more.

Not all breakers are shown here, multiple older variants are available on request, including: Keyed SATA SFF, x8 PCIe slot and SCA-40.



AIC BREAKERS: SUPPORTS AIC/SLOT DEVICES WITH UP TO 16 LANES, AND UP TO GEN5 SPEEDS, TRIGGERING AND INRUSHLIMITED VERSIONS ARE AVAILABLE. DRIVE+MONITOR: PERST, WAKE, CLKREQ, PWRBRK. MONITOR ONLY: SMCLK, SMDAT

ASYMMETRIC BREAKER BENEFITS



Reduce SI losses for Gen5 testing by removing additional adaptors/cables and test direct in a slot

Combine breaker and power analysis features onto a single device for all-in-one testing.

Larger form factor allows additional features on some devices, such as sideband probe points and PAM (Power Analysis Module) functionality with power, sideband and REFCLK monitoring.

Asymmetric breakers

GEN5 AIC TO U.2 ASYMMETRIC BREAKER

[Find out more](#) 



Supports PCIe U.2 drives up to Gen5 speeds in a PCIe x4 slot.

Optional triggering version with in/out trigger points.

PPM power injection port for Quarch Power Analysis Module.

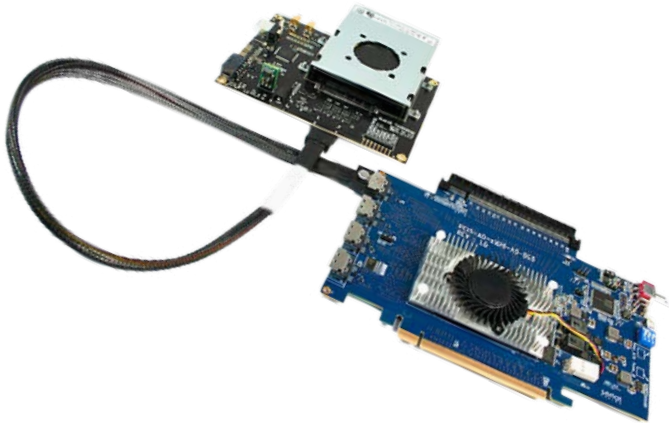
Probe points for selected sidebands

Direct USB control port in addition to Torridon controller.

AIC TO U.2 BREAKER: SUPPORTS U.2 X4 DRIVES UP TO GEN5 SPEEDS, TRIGGERING VERSIONS ARE AVAILABLE. DIRECT USB OR TORRIDON CONTROL PORT. DRIVE+MONITOR: PERST, PERSTB, DUALPORTEN, IF_DET, WAKE, PWR_DIS, HPT0, HPT1. MONITOR: SMCLK, SMDAT, ACTIVITY, PRSNT, IFDET_2, PRSNT1, PWRBRK, RSVD_A19, RSVD_A32, RSVD_P2

GEN5 MCIO TO U.2 ASYMMETRIC BREAKER

[Find out more](#)



Connect to a compatible MCIO host card, removing the need for adaptors or a U.2 host.

PPM power injection.

Probe points for selected sidebands.

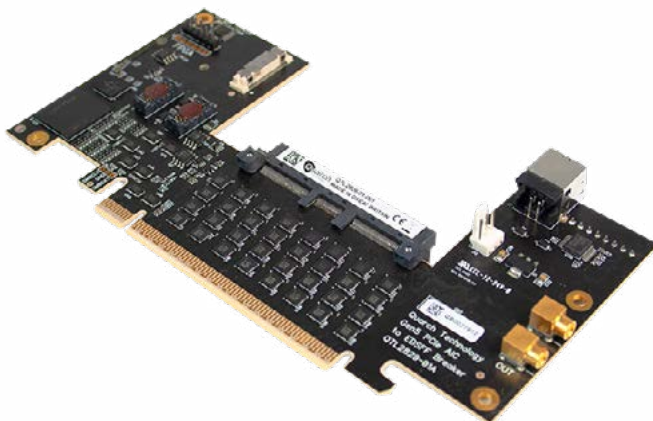
Direct USB control port in addition to Torridon controller.

External 12V PSU for drive supply.

Asymmetric breakers

GEN5 AIC TO EDSFF ASYMMETRIC BREAKER

[Find out more](#)



Supports EDSFF devices up to x16. Versions available with lower lane widths.

Optional triggering version with in/out trigger points.

Optional PAM connector to add power and sideband analysis

Direct USB control port in addition to Torridon controller.

CABLE BREAKER BENEFITS

Perform hot-plug and physical layer injection testing on a wide range of interconnect cables.

Test high speed data interconnects and control ports to maximise test coverage.

Many modules are rack-mountable to ease cabling.

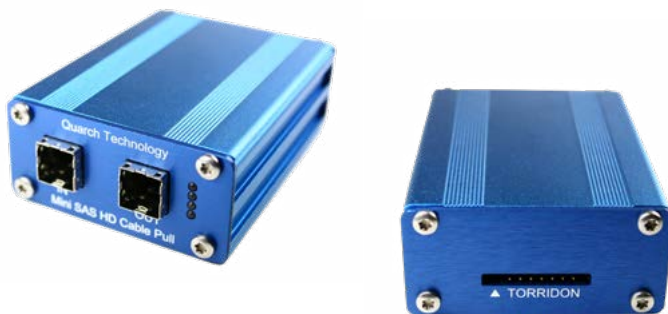
Cable breakers mirror the feature set of other breakers and so can be quickly added to existing test automated test plans.



Cable breakers

24G MINI SAS HD CABLE BREAKER

[Find out more](#) >



Supports SFF-8674 cables for external HD SAS interconnects up to 24G speeds.

44cm removable cable to connect to Torridon Controller.

Up to 4 units can be rack mounted in 1U.



SAS BREAKER: INDIVIDUAL RF SWITCHES ON EACH OF THE 4 SAS LANES. SIDEBAND SWITCHING FOR VMAN, VACT_0, VACT_1, MODPRSL, SDA, SCL, INTL. ACCESS TO EEPROM REGISTERS ON ACTIVE CABLES.

GEN4 EXTERNAL PCIE CABLE BREAKER

[Find out more](#)



Supports SFF-8644 cables for external PCIe interconnects up to Gen5 speeds.

44cm removable cable to connect to Torridon Controller.

Up to 4 units can be rack mounted in 1U.

PCIE BREAKER: INDIVIDUAL RF SWITCHES ON EACH OF THE 4 PCIE LANES. SIDEBAND SWITCHING FOR .PWR_B1, PWR_D1, CMI_SCL, CMI_SDA, CBL, PRSNT, MGT, PWR, CADDR, CINT. FULLY WIRED CUSTOM CABLE PROVIDED TO ENSURE THE BREAKER IS FULLY TRANSPARENT /WHEN IN USE. DRIVE+MONITOR: CADDR, CINT. MONITOR: CMI_SCL, CMI_SDA, CBL_PRSNT, MGT_PWR.

Cable breakers

GEN4 OCULINK CABLE BREAKER

[Find out more](#)



Supports SFF-8611 cables for external interconnects up to Gen4 speeds.

44cm removable cable to connect to Torridon Controller.

Up to 4 units can be rack mounted in 1U.

OCULINK BREAKER: INDIVIDUAL RF SWITCHES ON EACH OF THE 4 LANES. SIDEBAND SWITCHING FOR: VACT_1, VACT_2, VSP_PL, VSP_MN,CWAKE, SMDAT, SMCLK, PERST, CPRSNT, RSVD_A9.

SFP28 CABLE BREAKER

[Find out more](#)



Supports SFP cables up to SFP28 speeds. Designed for compatibility with SFP56.

44cm cable to connect to Torridon Controller.

'Inline' form factor, plugging into the host and extending the receptacle.

SFP28 BREAKER: INDIVIDUAL RF SWITCHES FOR THE DATA LANE. SUPPORTS ALL PROTOCOLS THAT FOLLOW THE SFP28 ELECTRICAL SPECIFICATION. SIDEBAND SWITCHING FOR: VCC_TX, VCC_RX, MOD_ABS, SDA, SCL, TX_FAULT, TX_DISABLE, RX_LOS, RS0, RS1

Cable breakers

QSFP28 CABLE BREAKER

[Find out more](#)



Supports QSFP cables up to QSFP28 speeds. Designed for compatibility with QSFP56.

44cm cable to connect to Torridon Controller.

'Inline' form factor, plugging into the host and extending the receptacle.

QSFP28 BREAKER: INDIVIDUAL RF SWITCHES FOR ALL 4 DATA LANES. SUPPORTS ALL PROTOCOLS THAT FOLLOW THE QSFP28 ELECTRICAL SPECIFICATION. SIDEBAND SWITCHING FOR: VCC_TX, VCC_RX, VCC_1, MOD_PRSL, SDA, SCL, INTL, RESETL, MODSELL, LPMODE

RJ-45 CABLE BREAKER

[Find out more](#)



Supports 10/100/1000 Base-T devices.

44cm cable to connect to Torridon Controller.

Triggering option available

RJ-45 BREAKER: INDIVIDUAL RF SWITCHES FOR THE DATA LANES. SUPPORTS 10/100/1000 BASE-T. DATA SWITCHING ONLY, POE WILL NOT PASS THROUGH. TRIGGERING VERSION AVAILABLE FOR SYNC WITH EXTERNAL DEVICES.

Cable breakers

USB 3.0 CABLE BREAKER

[Find out more](#)



Supports USB devices up to USB 3.0 speeds.

44cm cable to connect to Torridon Controller.

Individual switching for USB-3, USB-2 and VBUS.

USB 3.0 BREAKER: INDIVIDUAL RF SWITCHES FOR ALL USB LANES. FET SWITCHING FOR POWER

USB 3.1 TYPE-C CABLE BREAKER

[Find out more](#) >



Supports Low Speed, Full Speed, High Speed, Super Speed and Super Speed Plus devices.

44cm cable to connect to Torridon Controller.

Individual switching for USB-3, USB-2 and VBUS.

USB TYPE-C BREAKER: INDIVIDUAL RF SWITCHES FOR ALL USB LANES. FET SWITCHING FOR POWER

Cable breakers

-48V DC TELECOMS BREAKER

[Find out more](#) >



Supports power switching of -48V power to telecoms devices.

44cm cable to connect to Torridon Controller. Triggering option available.

Fitted with ELCON Mini 2-pin connectors.

-48V BREAKER: FET SWITCHING FOR 48V_POWER, SIDEBANDS: DETECT_1, DETECT 2. SUPPORTS UP TO 20A AT -48V. VOLTAGE TOLERANCE FROM -25 TO -72V.

MULTI-PROTOCOL AUTOMOTIVE BREAKER

[Find out more](#)



Supports USB-2, RS-232, RS-422, RS-485, CAN/LIN, I2C and 1000Base-T1.

Switches 4 data lanes and one power rail.

Pluggable screw terminals for quick connection

External triggering via MCX

Cable breakers

[Find out more](#)



Direct USB and LAN ports (no Torridon controller required).

Power from 12v or PoE.

Capture bus transactions with up to 1MHz sampling

MULTI-PROTOCOL BREAKER: ANALOG SWITCHING SUPPORTS MANY PROTOCOLS THAT HAVE A SIGNAL RANGE WITHIN -15V TO +15V AND BANDWIDTH OF LESS THAN 460 MHZ. FOR CAPTURE, BUS TRANSACTIONS ARE DIGITALLY SAMPLED AT 1MHZ MAX WITH CONFIGURABLE