

Quarch Technology Ltd

2-Channel PAM Fixture

Technical Manual

For use with:

- QTL2608 – 2-Channel PAM Fixture**
- QTL2623 – 4-Channel PAM Fixture**
- QTL2628 – External shunt PAM Fixture**



Change History

| | | |
|-----|-------------|---|
| 1.0 | June 2020 | Initial customer release |
| 1.1 | August 2023 | Added 4-channel and external shunt versions |
| | | |
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About this Manual

Thank you for your purchase of this Quarch Fixture. This manual is intended as a technical reference, describing the features, operations and control API of the unit.

Additional documents available include Quick start guides, Datasheets and Application notes. These can be located on our website: www.quarch.com

This manual provides the following:

- Safety information
- An overview of the product and its features
- Details of the control interfaces
- Command specification
- Locations of additional help and examples.

Product Safety

This product is intended for experienced technical users in a test lab environment. It is essential that you are familiar with this manual before using the device.

Safety warnings

This product must be used with the Quarch Power Analysis Module (PAM) only. It must be directly connected to the PAM via the provided USB-C cable.

Risk Assessment

While these products have no significant hazard cases, they must be used carefully by competent personnel.

In new use cases, a risk assessment should be completed, to ensure the entire test setup is safe to operate and will not cause an unacceptable risk to the operators or other lab users.

This should include careful routing of power and control cables to avoid trip hazards.

Cleaning and Maintenance

The products may be dusted with a dry cloth. Water and alcohol based (or any other liquid) cleaners should not be used.

All parts of the system should be inspected before and after use.

Damaged components should not be used and cannot be repaired by the user. Please contact Quarch to arrange for repair.

Manufacturer Details

The Torridon System is designed and manufactured by:

Quarch Technology Ltd (registered in Scotland no: SC307569)

Unit 7, Dalfaber Industrial Estate

Aviemore

UK

PH22 1ST

Web: www.quarch.com

Email: enquiries@quarch.com

Phone: +44 1343 508 140

Environmental Conditions

The products are designed for use in dry, dust free, indoor lab conditions, at altitudes below 2000m and ambient temperatures between 20C-30C and 0-80% non-condensing humidity.

Installation

The product is designed for use on a desk/bench location.

Product Misuse

The product is designed lab testing industry standard interfaces, complying with the relevant industry specifications. Other uses may cause incorrect operation, protection impairment or damage to the product and should be avoided.

In the Box

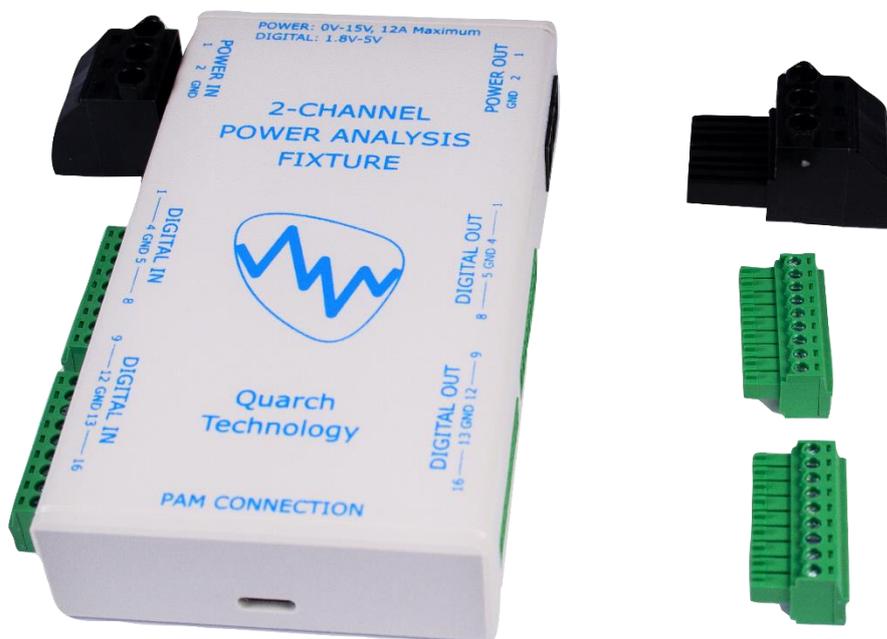
Each power module comes with the same basic kit of parts.

QTL2608 – 2-Channel PAM Fixture

1x Fixture

2x Power connector (MPN: 1929940000)

4x Digital Connector (MPN: CTBP92HD/9)

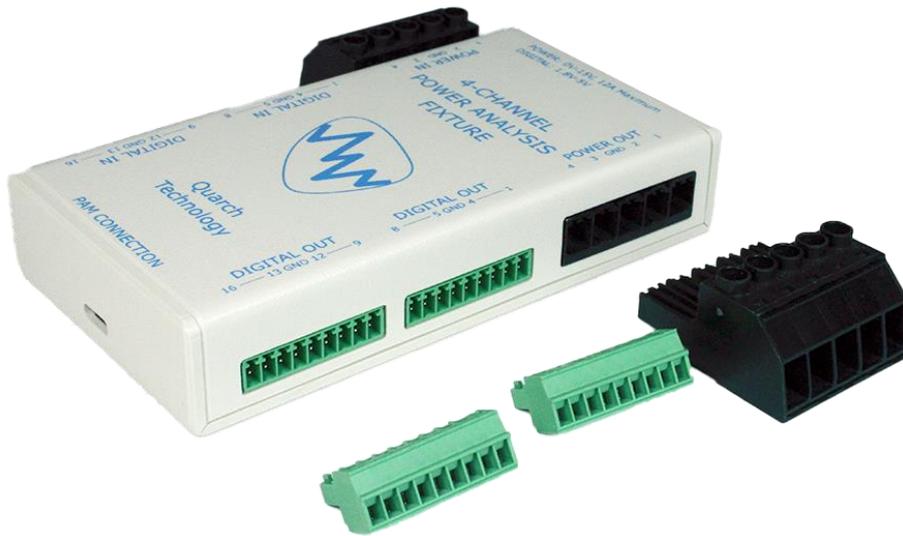


QTL2623 – 4-Channel PAM Fixture

1x Fixture

2x Power connector (MPN: 1929960000)

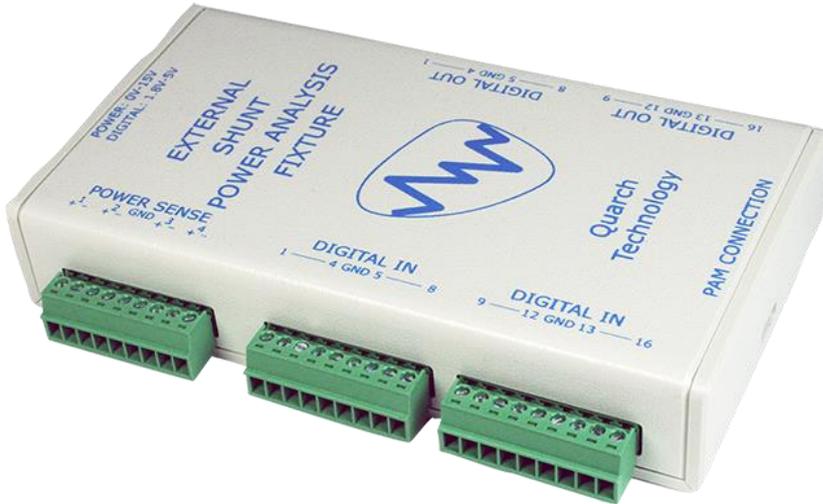
4x Digital Connector (MPN: CTBP92HD/9)



QTL2628 – External Shunt PAM Fixture

1x Fixture

5x Digital Connector (MPN: CTBP92HD/9)



Introduction

These fixtures allow you to capture both analogue measurements (voltage, power and current) and also digital signals. This provides you with a cost effective mixed-signal capture device which can be used with a wide variety of wiring looms and even embedded shunt resistors.

There are several units in the range, each with different options for measuring power rails, so you are sure to find one that fits your requirements.

The data can be captured in high resolution and viewed in real time or stored for later processing and analysis.

This fixture requires a PAM controller to function.

Main features

- View and capture power performance of a device at high resolution.
- Capture digital signal transitions.
- Monitor a wide range of different devices
- Fully automate capture with simple Python scripting

Technical Specifications

Power Analysis Module Fixtures from Quarch are all based on the same technical platform and work in a similar way. Each has 16 digital capture channels, the difference being on the analog options:

| Module | Analog rails |
|---------------------------|---|
| QTL2608 2-Channel | 2x High range rails (100uA to 12A) |
| QTL2623 4-Channel | 4x Standard rails (10mA to 12A) |
| QTL2628 External Shunt | 4x 12bit differential probe points for custom shunt resistors |

Fixture connections

2-channel and 4-channel devices require the power rail to be routed through the device. Digitals can be routed through, or only connected on the input side, as is most convenient.

QTL2608 – 2-Channel PAM

| Item | Location | Purpose |
|--------------------|-------------|--|
| USB-C | Front panel | Connects to PAM controller |
| Power In | Side panel | Connects to power source |
| Power Out | Side panel | Connects to power sink |
| Digital in (1-8) | Side panel | Connects to digital signals |
| Digital in (9-16) | Side panel | Connects to digital signals |
| Digital out (1-8) | Side panel | Connects to digital signals (Optional) |
| Digital out (9-16) | Side panel | Connects to digital signals (Optional) |

QTL2623 – 4-Channel PAM

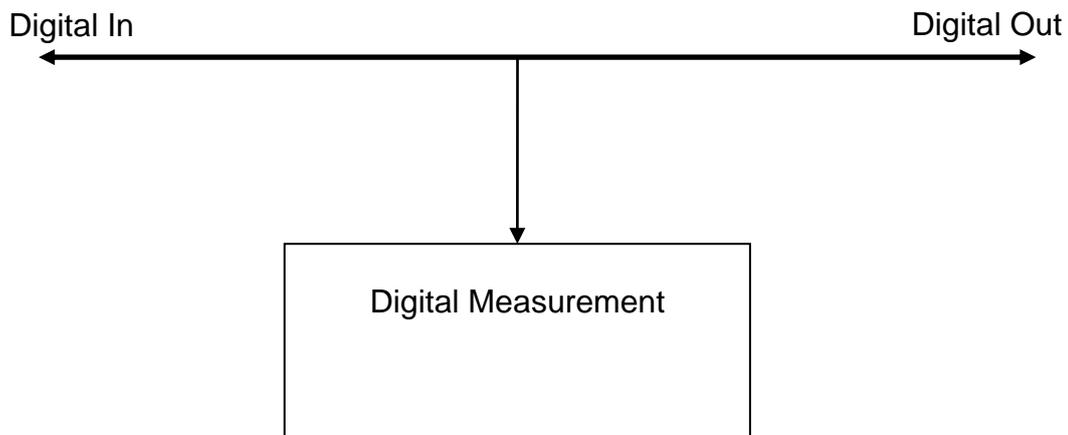
| Item | Location | Purpose |
|--------------------|-------------|--|
| USB-C | Front panel | Connects to PAM controller |
| Power In | Side panel | Connects to power source |
| Power Out | Side panel | Connects to power sink |
| Digital in (1-8) | Side panel | Connects to digital signals |
| Digital in (9-16) | Side panel | Connects to digital signals |
| Digital out (1-8) | Side panel | Connects to digital signals (Optional) |
| Digital out (9-16) | Side panel | Connects to digital signals (Optional) |

QTL2628 – External Shunt PAM

| Item | Location | Purpose |
|--------------------|-------------|---|
| USB-C | Front panel | Connects to PAM controller |
| Differential In | Side panel | Connects to each side of the external shunt |
| Digital in (1-8) | Side panel | Connects to digital signals |
| Digital in (9-16) | Side panel | Connects to digital signals |
| Digital out (1-8) | Side panel | Connects to digital signals (Optional) |
| Digital out (9-16) | Side panel | Connects to digital signals (Optional) |

Digital signals

This modules can measure digital signals. These signals can operate in the range of 0V to 5V and can either be passed through the fixture (using the digital in and digital out ports) or just presented to one side, either in or out. Additionally, the digital signals are a passive passthrough, so signals can be bidirectional and still pass through the module. Internally, the module measures the signal and converts it to a Boolean value.



External shunt resistors

QTL2628 is intended for connection to embedded shunt resistors that you have installed in your test boards. By connection to each side of the shunt, we sense the voltage on both sides, allowing calculation of the current

A wide range of shunt resistor values are supported. Accurate current measurements will rely on the user selecting a known shunt value with an appropriate accuracy of resistance for the total sense circuit. This is unlike our other units where the shunts are built in and calibrated as part of the production process.

In most cases this will lead the external shunt unit to have lower accuracy, but it benefits from a much wider range of currents that it can measure, and the ability to tap in to circuits that would otherwise be hard to analyze.

The differential sense circuit can read up to 65mV across the resistor. To choose an ideal shunt, consider the largest current you want to measure. Choose a shunt value that will give around a 50mV drop across the shunt for that maximum current.

The maximum recommended shunt value is 100 Ohm.

Connection and accessories

The product is designed to connect to a PAM controller via the supplied USB-C cable. Only official PAM controllers may be connected here. Do not use this port for any other purpose. Only one fixture can be attached at a time and no additional USB-C switches, extenders or similar components may be used.

Here we show a “2-Channel PAM Fixture” along with the main unit. This is for illustrative purposes only.



Controlling the Module

All control of the fixture is via the PAM controller. The PAM technical manual should be referenced to see the available commands.

Some PAM commands require to identify a specific measurement rail on the fixture. These details can be found in the Appendices below, which describe every measurement channel on this fixture.

Appendix 1 – Measurement Channels

QTL2608 – 2-Channel PAM

| Channel Type | Channel Name | Unit | Channel Type | Channel Name | Unit |
|--------------|--------------|---------|--------------|--------------|---------|
| V VOLTage | POWER_1 | mV | | | |
| V VOLTage | POWER_2 | mV | | | |
| C CURrent | POWER_1 | uA | | | |
| C CURrent | POWER_2 | uA | | | |
| D DIGital | DIGITAL_1 | Boolean | D DIGital | DIGITAL_9 | Boolean |
| D DIGital | DIGITAL_2 | Boolean | D DIGital | DIGITAL_10 | Boolean |
| D DIGital | DIGITAL_3 | Boolean | D DIGital | DIGITAL_11 | Boolean |
| D DIGital | DIGITAL_4 | Boolean | D DIGital | DIGITAL_12 | Boolean |
| D DIGital | DIGITAL_5 | Boolean | D DIGital | DIGITAL_13 | Boolean |
| D DIGital | DIGITAL_6 | Boolean | D DIGital | DIGITAL_14 | Boolean |
| D DIGital | DIGITAL_7 | Boolean | D DIGital | DIGITAL_15 | Boolean |
| D DIGital | DIGITAL_8 | Boolean | D DIGital | DIGITAL_16 | Boolean |

QTL2623 – 4-Channel PAM

| Channel Type | Channel Name | Unit | Channel Type | Channel Name | Unit |
|--------------|--------------|---------|--------------|--------------|---------|
| V VOLTage | POWER_1 | mV | | | |
| V VOLTage | POWER_2 | mV | | | |
| V VOLTage | POWER_3 | mV | | | |
| V VOLTage | POWER_4 | mV | | | |
| C CURrent | POWER_1 | uA | | | |
| C CURrent | POWER_2 | uA | | | |
| C CURrent | POWER_3 | uA | | | |
| C CURrent | POWER_4 | uA | | | |
| D DIGital | DIGITAL_1 | Boolean | D DIGital | DIGITAL_9 | Boolean |
| D DIGital | DIGITAL_2 | Boolean | D DIGital | DIGITAL_10 | Boolean |
| D DIGital | DIGITAL_3 | Boolean | D DIGital | DIGITAL_11 | Boolean |
| D DIGital | DIGITAL_4 | Boolean | D DIGital | DIGITAL_12 | Boolean |
| D DIGital | DIGITAL_5 | Boolean | D DIGital | DIGITAL_13 | Boolean |
| D DIGital | DIGITAL_6 | Boolean | D DIGital | DIGITAL_14 | Boolean |
| D DIGital | DIGITAL_7 | Boolean | D DIGital | DIGITAL_15 | Boolean |
| D DIGital | DIGITAL_8 | Boolean | D DIGital | DIGITAL_16 | Boolean |

QTL2628 – External Shunt PAM

| Channel Type | Channel Name | Unit | Channel Type | Channel Name | Unit |
|-----------------|--------------|---------|--------------|--------------|---------|
| V VOLTage | POWER_1 | mV | | | |
| V VOLTage | POWER_2 | mV | | | |
| V VOLTage | POWER_3 | mV | | | |
| V VOLTage | POWER_4 | mV | | | |
| dV (deltaVolts) | POWER_1 | udV | | | |
| dV (deltaVolts) | POWER_2 | udV | | | |
| dV (deltaVolts) | POWER_3 | udV | | | |
| dV (deltaVolts) | POWER_4 | udV | | | |
| D DIGital | DIGITAL_1 | Boolean | D DIGital | DIGITAL_9 | Boolean |
| D DIGital | DIGITAL_2 | Boolean | D DIGital | DIGITAL_10 | Boolean |
| D DIGital | DIGITAL_3 | Boolean | D DIGital | DIGITAL_11 | Boolean |
| D DIGital | DIGITAL_4 | Boolean | D DIGital | DIGITAL_12 | Boolean |
| D DIGital | DIGITAL_5 | Boolean | D DIGital | DIGITAL_13 | Boolean |
| D DIGital | DIGITAL_6 | Boolean | D DIGital | DIGITAL_14 | Boolean |
| D DIGital | DIGITAL_7 | Boolean | D DIGital | DIGITAL_15 | Boolean |
| D DIGital | DIGITAL_8 | Boolean | D DIGital | DIGITAL_16 | Boolean |

Customer support from Quarch

There are multiple ways to access the support you need. You can contact us directly or access an extensive range of valuable support materials from <http://quarch.com/support>.

Contact us direct

Get going quickly and easily, with help direct from the engineers:

- Call **+44 1343 508 140** or email support@quarch.com during UK office hours.
- Our international partners are well trained in the use of our products and can deal with many basic technical queries from within your time zone, if you prefer. Check <http://quarch.com/resellers> for the contact details of your regional supplier.

Access support from the Quarch website

You can download up-to-date software and drivers, technical manuals, datasheets and more from our website. To help you get started quickly we provide additional documents, such as examples in Perl, Python and C# and Telnet and Serial instructions.

Key places to visit on the Quarch website

- Register your Quarch product to confirm your international warranty: <http://quarch.com/product-registration>
- Download a wide range of documentation, free applications and drivers to help you make the best possible use of your Quarch tools: <http://quarch.com/content/downloads>
- Access the Quarch support forum (<http://quarch.com/forum>):
 - Find discussion topics, support information and testing ideas.
 - Browse existing topics or login to your user account to ask for information and advice.
- Sign up for Quarch Technical Updates to get the most out of your Quarch products. Updates are published approximately once a quarter and include news about the latest features, tools, application notes and software updates. See <http://quarch.com/content/sign-quarch-technical-updates>.