TCC2 Electronics Module

Time-Resolved Photon Counting

EDINBURGH INSTRUMENTS

Features

- TSCPC time range: 2.5 ns - 50 µs
- MCS time range: 5 µs - 200 s
- Time resolution from 305 fs/ch
- Rep rates up to 100 MHz
- Forward and reverse modes
- Up to 3 detector channels

Applications

- Time-Resolved Fluorescence (TCSPC)
- Phosphorescence Lifetime (MCS)
- Förster Resonance Energy Transfer (FRET)
- Optical Tomography
- Time of Flight / LIDAR

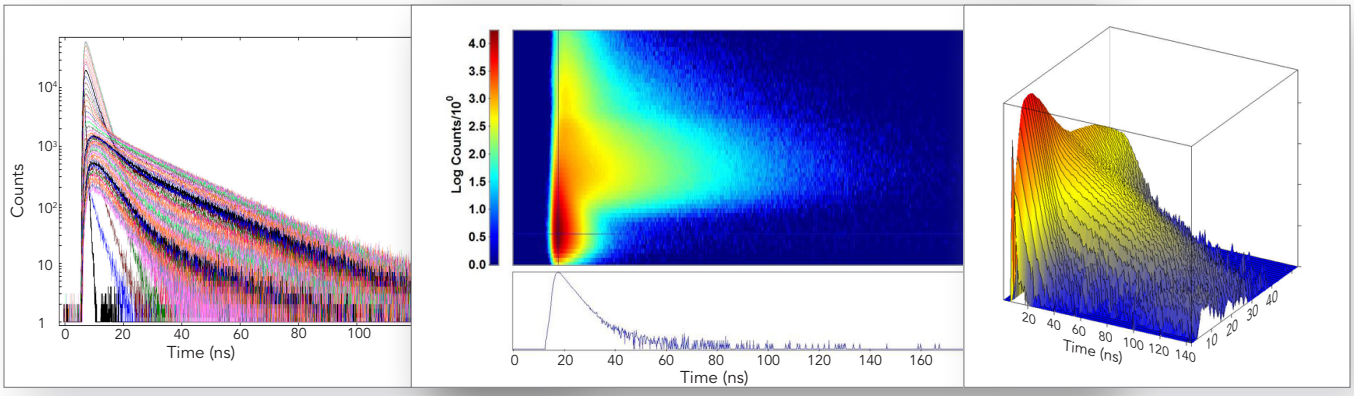
The TCC2 is a unique electronics module for the measurement of kinetics via Time-Correlated Single Photon Counting (TCSPC) and Multi-Channel Scaling (MCS), and allows three sources and three detectors to be permanently connected.

In TCSPC mode, kinetics from a few picoseconds can be measured using a high repetition rate source. TCSPC modules are generally available in two forms: with an Analogue-to-Digital Convertor which can have high temporal resolution, but may suffer from lower acquisition speed; or, with a Time-to-Digital Convertor (TDC) which has higher acuisition speed but at the expense of a reduced temporal resolution. The Edinburgh Instruments TCC2 works with an ultra-fast flash Analogue-to-Digital convertor and proprietary dead-time management. This demonstrates unrivalled temporal performance with acquisition frequencies up to 100 MHz. The module also incorporates novel electronics that eliminate the need for cable swapping or external delay selection.

In MCS mode, kinetics from ~10 ns up to seconds can be measured with frequencies up to 1 MHz. The built-in TCSPC and MCS operations complement each other to allow the fast, simple measurement of kinetics over twelve orders of magnitude. The TCC2 is supplied with full data acquisition and lifetime analysis software.

Time-Resolved Emission Spectroscopy (TRES)

TRES is a powerful tool in fluorescence lifetime studies. This measurement example shows complex fluorescence decay kinetics for a single fluorophore; Norharman, dissolved in a protic solvent. The TCC2 data acquisition electronics work seamlessly with all of the comprehensive fluorescence data analysis software packages available from Edinburgh Instruments.



Sample: Norharman in methanol (5×10^{-5}M)
Excitation Source: 280 nm pulsed LED (EPLED-280)
Results: The resulting TRES map details the three different exponential lifetimes with overlapping emission bands of Norharman, highlighting the three different forms present; neutral = 2.3 ns, zwitterion = 5.1 ns, and cation = 18.0 ns

Technical Specifications

Start & Stop Inputs

Type	Constant Fraction Delay
Input Pulse Height	0 to – 3000 mV
Threshold	0 to – 500 mV
Constant Fraction	0.3, fixed
Constant Fraction Delay	Plug-in Delay
Frequency Divider	1, 2, 4, 8
Input Connectors	SMA, 50 Ω
Jitter	20 ps

Data Acquisition

Modes of Operation	Forward or Reverse
Shifting Delay	0 to 800 ns in steps
Dead Time	400 ns
Number of Detector Channels	3, computer controlled
Number of Synchronisation Channels	3, computer controlled
Number of Reference Channels	1
Number of Trigger Channels	1, to trigger MCS operation

TCSPC Operation

Time Range	2.5 ns to 50 µs
Number of Channels	512, 1024, 2048, 4096, 8192
Minimum Time per Channel	305 fs
Max Repetition Rate	Up to 100 MHz

MCS Operation

Time Range	5 µs to 200 s
Number of Channels	500, 1000, 2000, 4000, 8000
Minimum Time per Channel	10 ns
Max Repetition Rate	Up to 1 MHz
Trigger Input	0 to 5000 mV

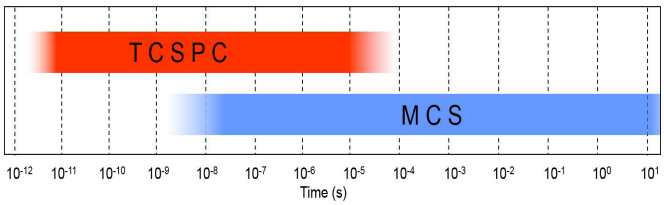
Computer Interface

Interface	USB 2.0
Dimensions	284 mm (W) x 358 mm (D) x 147 mm (H)
Power Requirements	36 V (100 - 240 V power supply included)

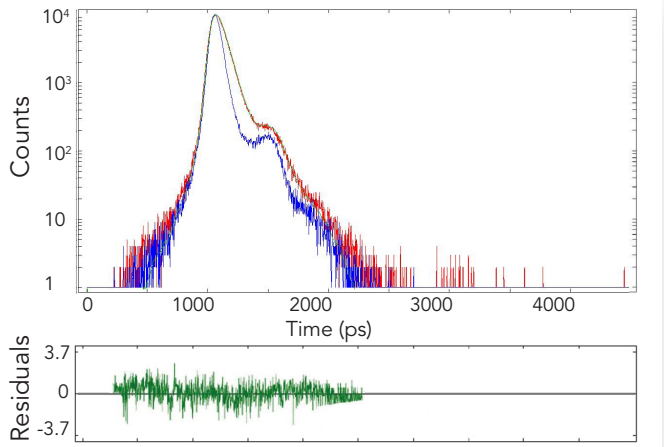
Software

Applications	F980 Software Package
Operating System	Windows 7, 8, 10

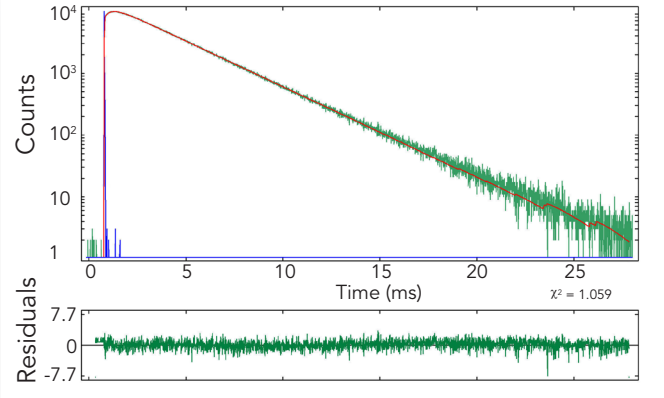
Combining TCSPC and MCS data acquisition in one electronics module enables a lifetime range that extends over twelve orders of magnitude, from a few picoseconds to seconds.



The graph illustrates the range of kinetics that can be measured by both data acquisition techniques.



Sample: DASPI in ethanol
Excitation Source: 375 nm pulsed diode laser (EPL-375)



Sample: Rare-earth doped glass
Excitation Source: 60 W Microsecond flash lamp

Customer support is available worldwide

For more information contact us below or visit **www.edinst.com**

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