

TDT v94 Release Notes

Major Changes and Improvements

New Hardware!

- **Support for the RZ10 and RZ10x Fiber Photometry System** – The RZ10(x) has integrated Lux LEDs, photosensors, and power meters for a more streamlined fiber photometry setup ([RZ10 System 3 Manual](#), [Synapse Manual](#))

Fiber Photometry Gizmo for RZ10 and RZ10x

- New gizmo features for RZ10 and RZ10x specific fiber photometry experiments. Now includes auto-detect of integrated LUX hardware, power meter readings, and photobleaching/experiment timing controls ([What's New document for getting started](#))

Miscellaneous Improvements

- **SynapseAPI**
 - User Gizmos and PA5 parameters are set much faster
- **Fiber Photometry gizmo (for non-RZ10(x) users)**
 - Removed 'Auto-Enable' checkbox for each driver. There is now one master control to enable lights in Outputs and Data Saving
 - Raw stores (Fi1r) are now split up into photosensor (Fi1r) and driver (Fi1d) stores
- **Synapse Preferences**
 - Added setting to select new hardware state behavior when making new experiment: fresh, keep, prompt
- **Electrical Stim Driver gizmo**
 - Waveform store disabled by default. Default target changed to IZV10
- **Epoc Event Storage gizmo**
 - Default setting is now 'Strobe Input'
- **File Stimulation gizmo**
 - Added TXT and CSV file options

Bug Fixes

- Fixed SIM closed-loop compilation errors and erroneous timing errors on mixed SIM boards
- Fixed Neural Stream Processor issue with adjusting filter frequencies at runtime
- Electrical Stim Driver
 - Fixed monopolar stim – stim duration was fixed at 2ms
 - Fixed parameter table – adjusted to V instead of mV when IZ2 target in Voltage mode
 - Fixed channel count for > 24 channels to IZ2.
- Fixed Corpus Counter and DSPP + PZ5 emulation
- Synapse Feedback URL link is no longer broken
- Fixed Pulse Generator gizmo API control of 'Enable' parameter
- Adjusted Ultrasonic Stimulation max duration based on processor sampling rate

What's New in Synapse 94?

Fiber Photometry Gizmo for RZ10 and RZ10x



What is the Fiber Photometry Gizmo?

The Fiber Photometry gizmo is designed for calcium imaging experiments that require driving LEDs and detecting fluorescent response signals from photosensors.

The gizmo uses the connected LEDs and sensors on the RZ10(x) to drive light and record responses.

One fiber photometry gizmo can be used to control all the driver outputs and sensor inputs of a given Lux I/O bank on the RZ10(x).

Configuring the Gizmo

1

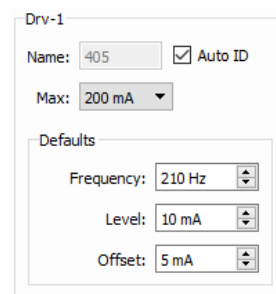
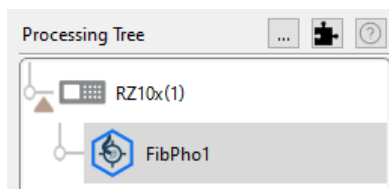
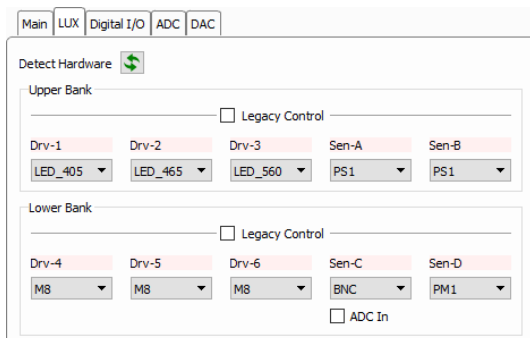
DETECT | Perform a 'Detect Hardware' in the RZ10(x) gizmo LUX tab. This will automatically inform any connected Fiber Photometry gizmos of the RZ10(x) hardware configuration

2

CONNECT | Attach the Fiber Photometry gizmo to the RZ10(x) processor from the 'Specialized' gizmos

3

DRIVE | Setup your Light Driver(s) tab to enable/ disable connected LEDs and set the Max current range



4

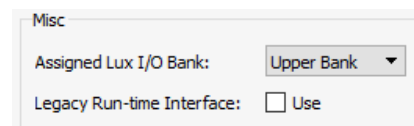
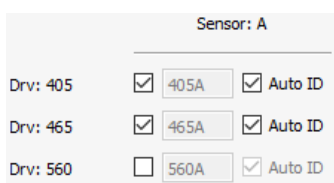
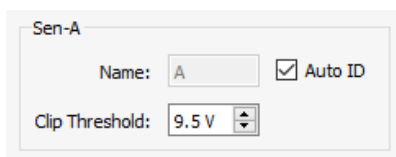
SENSE | Setup your Sensor(s) tab to enable/ disable connected photosensors

5

SAVE | Configure the Demodulator Save Options in the Outputs and Data Saving tab

6

ASSIGN | In the LUX tab, make sure the Assigned Lux I/O Bank matches the one you want to use with the gizmo

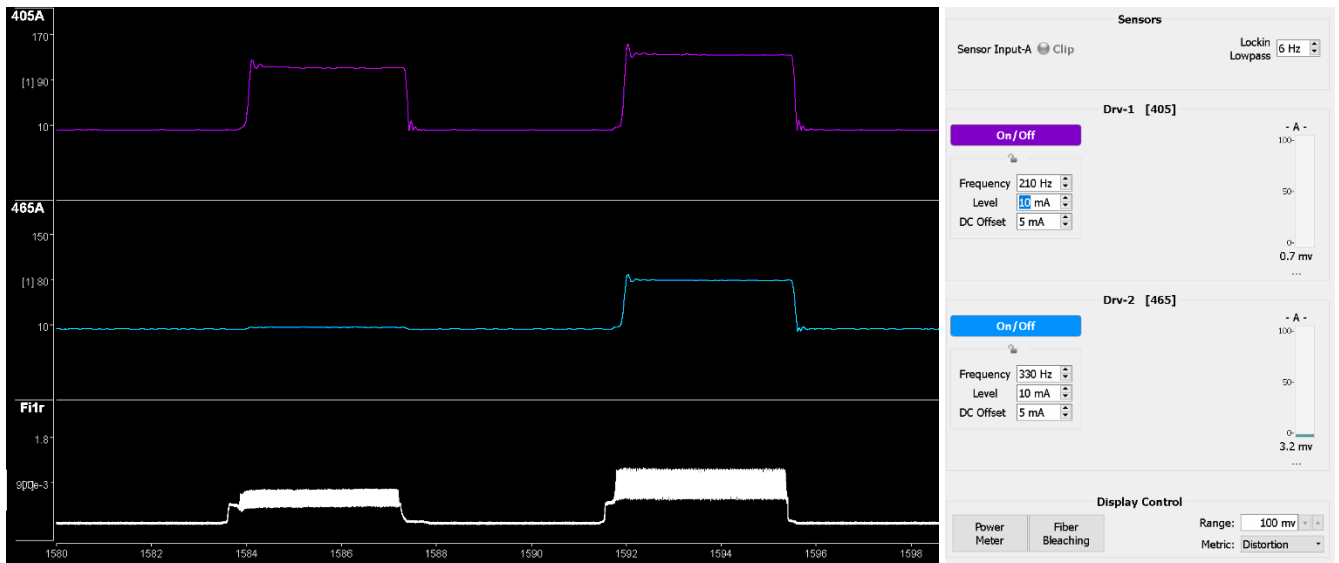


Example Run-Time Output

A typical two color/ one site experimental setup would look like this.

405A and 465A are the demodulated response signals that result from lock-in amplification of the LED driver signals with the photodetector signal. Demodulated traces auto-color based on the LUX LED wavelength selected during Design-Time.

Fi1r is the raw photosensor signal.



Example Run-Time output during an in-vitro test setup. The two demodulated responses and the raw photosensor signal respond as the LEDs go over different colored fluorescent surfaces.

LED driver controls and data display options

New Run-Time Features

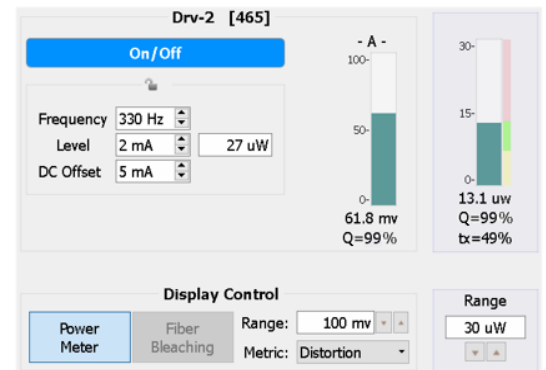
Power Output Indicator

Users can setup runtime light power measurements using the LUX PM1 power meter.

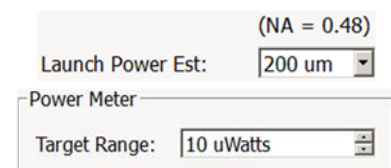
With a patch cables mated with the PM1 FC connector, In Run-Time (Preview mode only) under the Fiber Photometry Display Control press 'Power Meter' to enable PM1 readings.

Run-Time bar plots show the measured power of connected LEDs at a specified wavelength and driver frequency. The green area indicates power at 75%-133% the Target Range.

Users can setup 'Launch Power Est' to show the estimated power expected through the optical pathway before any loss. The 'tx' metric is the percent transmission based on the estimate and the PM1 output reading.



Run-Time settings and output



Design-Time Settings
(Light Drivers and LUX tabs)

Photobleaching Controls

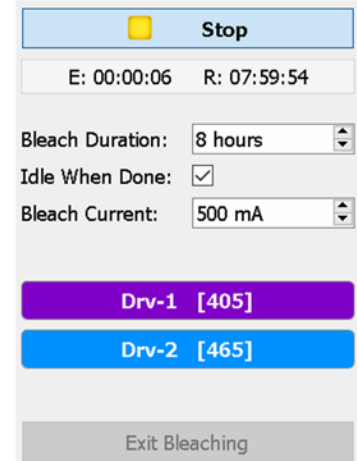
The fiber photometry gizmo has built in photobleaching controls to help users bleach their patch cables before recording.

The photobleaching uses a constant current output to shine high light power through patch cables to reduce autofluorescence.

The Fiber Bleaching option is only available during Preview Mode.

The user can set the total duration, which LEDs are active, and the current output for the bleaching.

Synapse will Idle and the LEDs will turn off when the timer finishes.

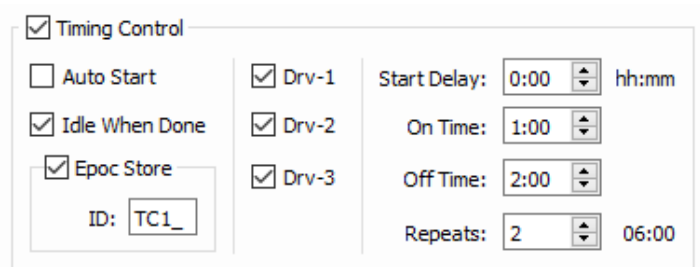


Master Control Timer

Timing control options are used to cycle the LEDs On and Off for set durations and repeats during Run-Time.

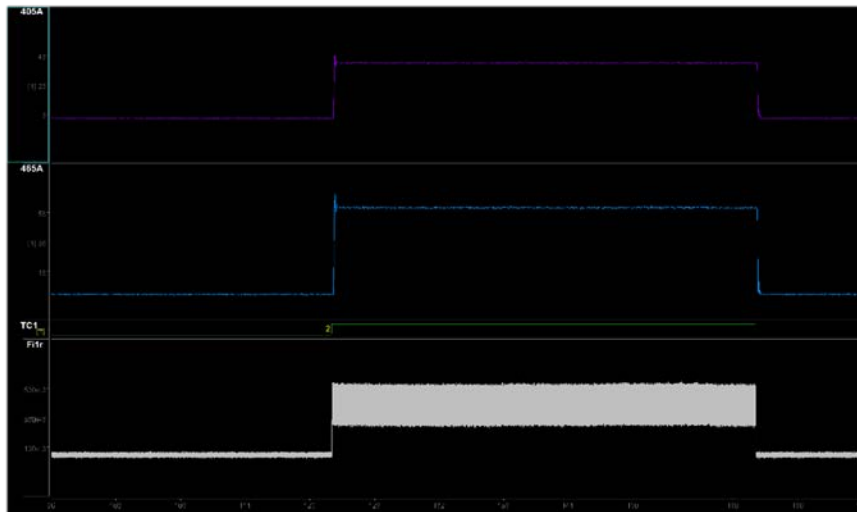
This feature is very useful for researchers running long (greater than 1 hour) experiments where photobleaching becomes a concern.

The 'Idle When Done' option will return Synapse to Idle mode upon completion of the timing sequence.



Design-Time settings (LUX tab)

The Epoc Store 'TC1_' will provide onset and offset timestamps for On Time and Off Time periods.



Run-Time settings and output

This release document is a supplement. For more information about Fiber Photometry Gizmo and Synapse see: [Web Link](#)
