

CTA Matrix IV Measurement Software Report

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June 3, 2024

Introduction

The CTA Matrix IV Measurement Software is a designed a tool for managing and conducting IV measurements using the Keithley 2420 SourceMeter and the 707A Switching Matrix. The software is built using Python, integrating several modules and drivers to provide a user-friendly graphical interface for efficient operation.

Software Requirements

To run the CTA Matrix IV Measurement Software, the following prerequisites are necessary:

- **NI-488.2:** driver for hardware interfacing.
- **cta_matrix_iv.exe:** GUI to perform the measurements

The compiled software has been tested on Windows, although the GUI should be functional on other operating systems using the Python source code and installing the necessary modules, assuming availability of NI-488.2 drivers for the chosen OS.

GitHub Repository

The source code and documentation for the software are available on GitHub at the following link.

Software Features

GUI Overview

The software's GUI is designed with several functional tabs to manage various aspects of the IV measurements:

- **Connection Tab:** connection setup and hardware interfacing (fig. 1).
- **Controls Tab:** Allows users to toggle channels on and off, start and stop measurements, and use emergency controls. Diagnostic indicators provide feedback after measurements are completed. LEDs indicate ongoing measurements (fig 2).
- **Debug Mode:** intended for troubleshooting and advanced handling of the parameters (fig. 3). This tabs only show up when launching *cta_matrix_iv.exe* from command line with the additional *--debug* parameter.

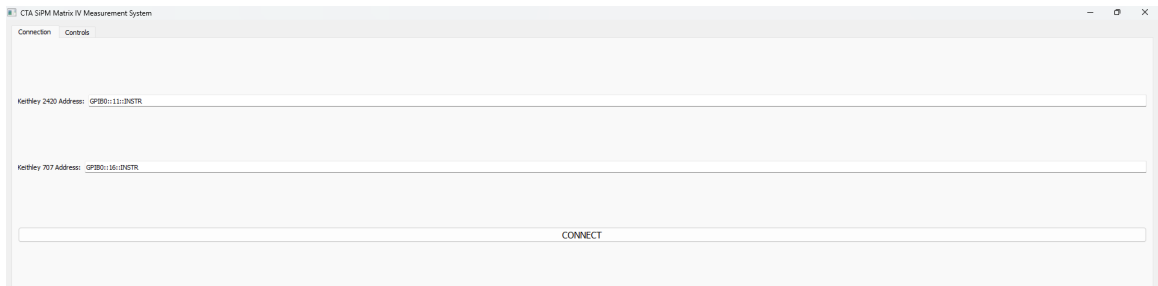


Figure 1: Connection tab

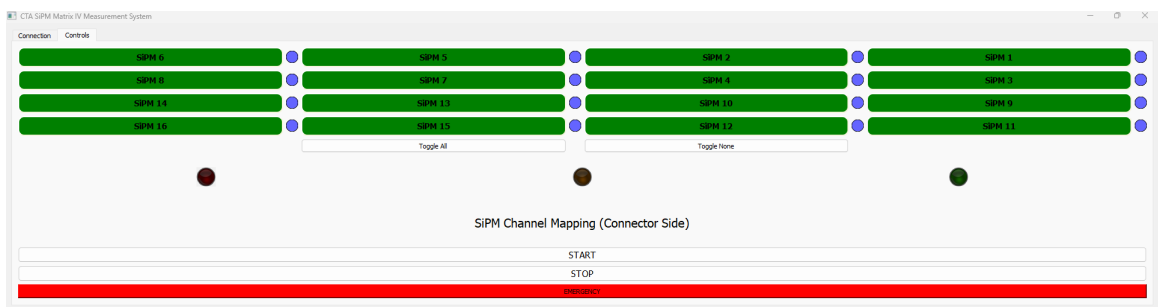


Figure 2: Controls tab

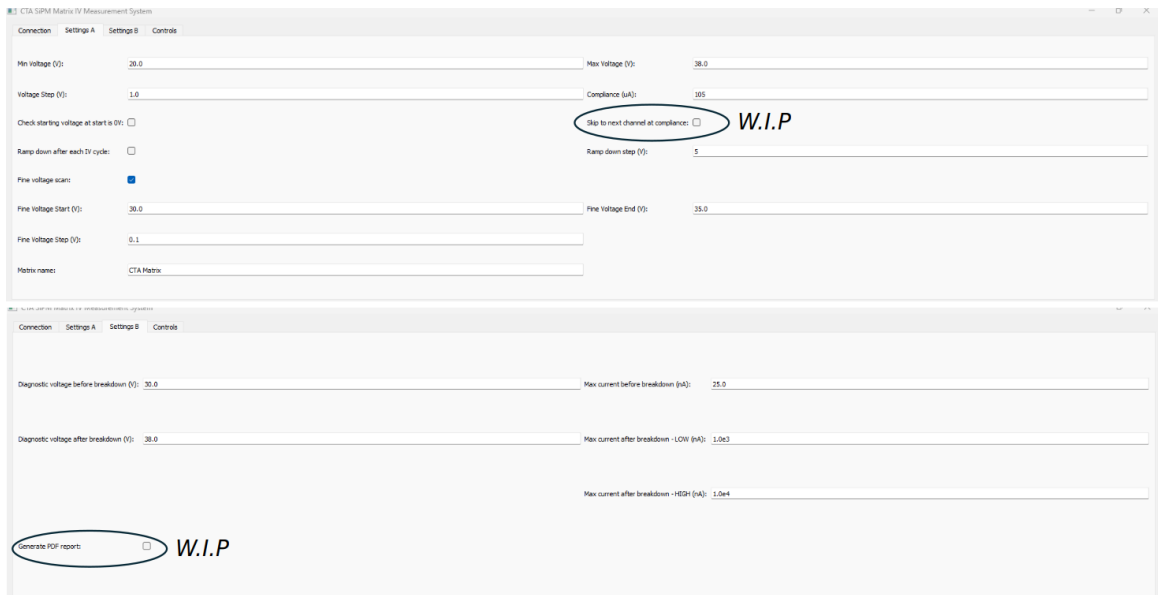


Figure 3: Debug tabs

Input Handling

An input dialog is used to enter the Matrix name before starting the measurements. Proper handling for window closing events is implemented to ensure smooth user experience and data integrity.

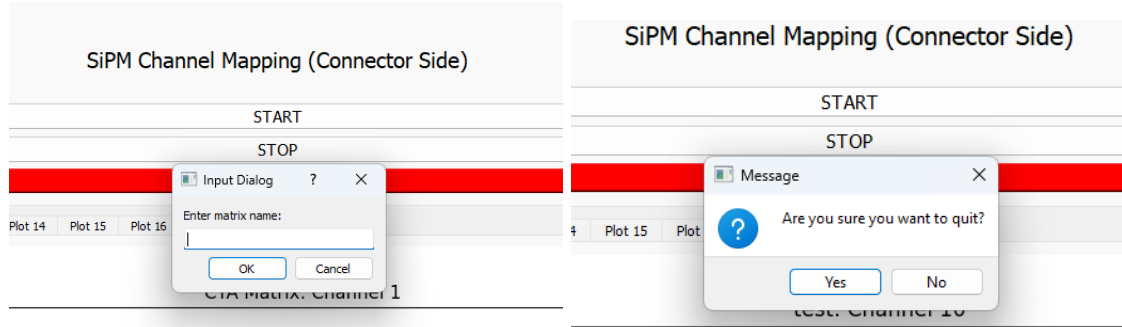


Figure 4: Matrix name input dialog (left) and windows closing handling (right)

Data Management

The software saves IV measurements as txt files. Additionally, it generates plots for both single channel and all channels, which are saved as png images for later analysis.

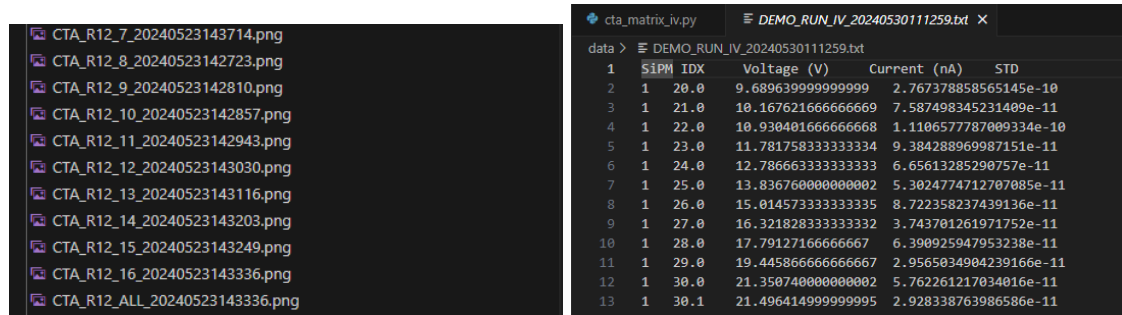


Figure 5: Matrix name input dialog (left) and windows closing handling (right)

Demo Run

A demo run video can be found [here](#).

Quick Diagnostic Features

After measurements are performed on all the active channels, value of the currents at two voltage values (one before and one after the expected breakdown voltage) are compared with reference value.

The corresponding LED indicator next to each active channel will then illuminate green if the two values are within spec, red otherwise.