

# User Instructions for PV Report Generator

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## Introduction

Welcome to the R.U.S.L.A.N Pro — a tool developed to make the analysis and reporting of solar cell measurements for both 2-pixel and 8-pixel devices.

## Initial Interface

Upon launching the software, users are greeted with a welcome screen featuring the following options:

- **Pixel Configuration Selection:**  
Users must choose the type of the device that will be analysed:
    - **2-Pixel**
    - **8-Pixel**
  - **Name Input:**  
Users must input their name. This name will appear on the cover page of the generated PDF report.
  - **Visit Research Group Website:**  
A button is available to visit the website of the SMAT research group.
  - **Look at the Instructions:**  
A button is available to check the instructions to use this software.
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## 2-Pixel Mode

When the **2-Pixel** button is selected, the following features and inputs become available:

- **Experiment Date:**  
Users can input the date of the measurement. If no date is provided, the software automatically uses the current date as the default.
- **Metadata Input (Optional):**  
Users may provide the following experimental metadata:
  - Scan Rate
  - Sun Intensity
  - Temperature

These fields are optional. If left empty, the report will indicate the values as "N/A."

- **Select Excel File:**

Users must upload an Excel file containing PV measurement data. The accepted formats are:

- .xlsx

- .xlsm

The file must follow a specific **Excel Template** (details on the template are provided below).

- **Check Template Functionality:**

Before generating a report, users are encouraged to validate the format of the uploaded Excel file using the **Check Template** button. It verifies the following:

1. **Sheet Name Order and Format**

Ensures all sheets follow the correct naming convention and sequential order.

2. **Presence of Required Column Headers**

Checks for the existence of these critical columns:

- VOLTAGE (V)

- CURRENT (uA)

- POWER (uW)

- mA/cm<sup>2</sup>

- mW/cm<sup>2</sup>

3. **Presence of Necessary Formulas**

Confirms that the essential formulas for calculating power and current density are present.

It should be noted that **Check Template** only verifies naming of sheets, header presence, and formula existence. It **does not** validate whether numerical data is correctly placed under the appropriate headers. Users must ensure that data placement is accurate to avoid generating invalid results. The 2-Pixel Device folder includes excel files that could be used to test how the button works.

- **Generate Report:**

Once validation is complete, the user can proceed by clicking the **Generate Report** button.

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## 8-Pixel Mode

In the **8-Pixel** configuration, users will:

- **Select Folder:**

Choose the folder containing all subfolders with 8-pixel measurement data that is generated with FLUXIM LITOS LITE (<https://www.fluxim.com/litos-lite>). The directory should follow the naming convention:

[sample\_1][1], [sample\_1][2], ..., [sample\_1][8]

[sample\_2][1], ..., [sample\_2][8]

- **Validation of Folder Structure:**

The software checks whether the folder structure matches the expected naming pattern. If the structure is incorrect, a warning message is displayed. If the structure is valid, a green confirmation message appears.

- **Metadata Extraction:**

In 8-Pixel mode, metadata is automatically read from each Excel file. No manual metadata input is required.

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## Notes on the Excel Template

The Excel template required for analysis in **2-Pixel** mode is located in the software directory under:

/Data/2-Pixel/2-Pixel Measurement Template.xlsx

This template is structured to accommodate measurements for up to **25 samples**, each having two pixels (left and right). Strict adherence to the template's structure is critical for the software to function correctly.

### Sheet Naming Convention

Each measurement is recorded on a separate sheet following a specific naming format:

[sample number]-[pixel side]-[scan direction]

Where:

- **Sample number:** Sequential number of the sample (e.g., 1, 2, 3, ...).
- **Pixel side:**
  - l for the **left** pixel,
  - r for the **right** pixel.

- **Scan direction:**
  - fw for **forward** scan,
  - rv for **reverse** scan.

**Example:**

- 22-l-fw: Sample 22, left pixel, forward scan.
- 18-r-rv: Sample 18, right pixel, reverse scan.

**Important:**

The sheets must be ordered sequentially:

1. Left pixel forward scan (l-fw),
2. Left pixel reverse scan (l-rv),
3. Right pixel forward scan (r-fw),
4. Right pixel reverse scan (r-rv), then repeated for the next sample (Sample 2, Sample 3, etc.).

Incorrect ordering or inconsistent naming will cause incorrect results. The data extraction stops, if the consecutive two sheets do not contain data.

**Required Data Fields**

Each sheet must include the following essential parameters:

Parameter	Column/Cell	Details
<b>Voltage (V)</b>	Column <b>B</b>	Place values directly under the cell containing the text ' <b>Voltage (V)</b> '.
<b>Current (uA)</b>	Column <b>C</b>	Place values directly under the cell containing the text ' <b>Current (uA)</b> '.
<b>Active Area (cm<sup>2</sup>)</b>	Cell <b>N4</b>	Enter the active area size in <b>cm<sup>2</sup></b> .

**Note:** The units must strictly match the specified units (V, uA, cm<sup>2</sup>) or the generated report will contain incorrect results.

If the active area is entered in the **first sheet** (1-l-fw), it will automatically be copied and applied to all subsequent sheets. However, users are free to manually adjust the active area for individual samples by editing the value in cell **N4** for each sheet.

After inputting the data to the template, the file should be saved with 'Save As' option with a different name to preserve the template. The resultant file is then ready to be analysed! There are sample data files in Data Folder that could be used to generate initial reports.