

To annotate the images, we used VGG Image Annotator by the University of Oxford (<https://www.robots.ox.ac.uk/~vgg/software/via/> ; <https://www.robots.ox.ac.uk/~vgg/software/via/via-1.0.6.html>).

### **Defect Class Names:**

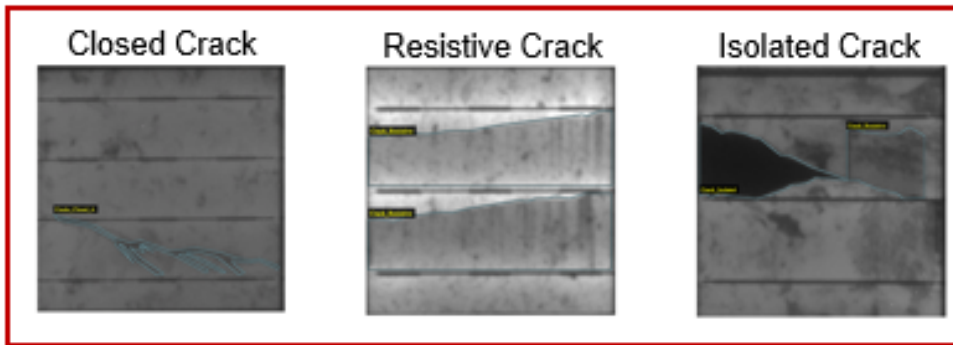
The following are the defect class names and descriptions:

1. Contact\_FrontGridInterruption
2. Contact\_BeltMarks
3. Contact\_Corrosion
4. Contact\_NearSolderPad: (if rectangular defect [like front grid interruption] touches busbar)
5. Interconnect\_Disconnected
6. Interconnect\_HighlyResistive (\*bright area around busbar is NOT consistent in width from ends to middle)
7. Interconnect\_BrightSpot (bright area around busbar with Interconnect\_HighlyResistive defect) - Not a defect, but helpful in identifying the area with Interconnect\_Highlyresistive defect
8. Crack\_Closed
9. Crack\_Resistive
10. Crack\_Isolated

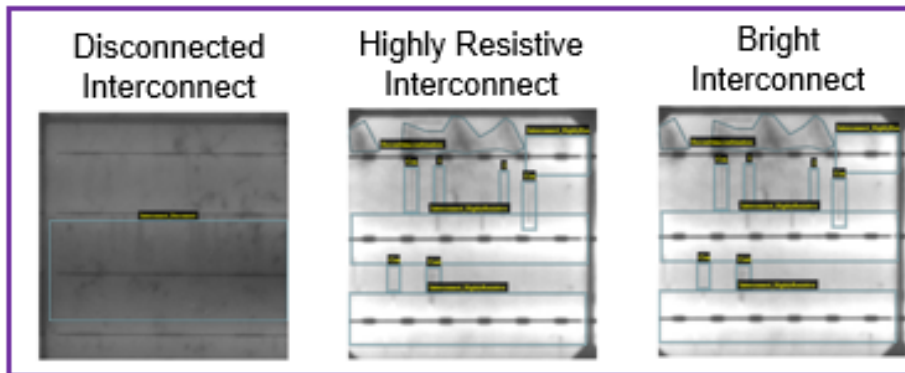
### **Guide to annotating EL images / Saving CSV files:**

1. Create a folder with the images you would like to annotate in your computer
2. Upload them at <https://www.robots.ox.ac.uk/~vgg/software/via/via-1.0.6.html>
3. Click on "Region Attributes"
4. Where it says "[Add new]" type "Defect\_Class" to define the column name for the defects
5. Click and use one of the listed Region Shapes to outline the defect
6. Under "Region Attributes", write the defect class for the defect in which you have outlined for that image. Please be exact with the spelling of the class
7. Once you have finished annotating all of the images you have uploaded, click on the "Annotation" tab at the top of the page and then "Save as CSV"
8. Save the CSV file in your desired location on your computer

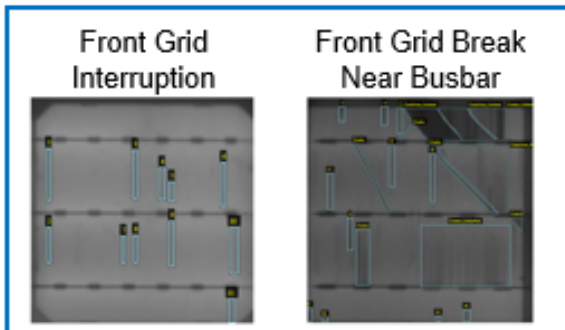
(a) Cracks



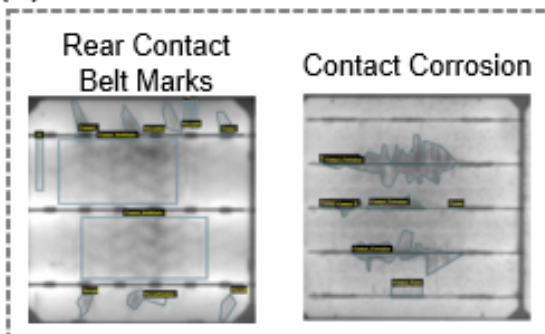
(c) Interconnect defects



(b) Common contact defects



(d) Rare contact defects



Example Region Attributes Chart:

	Defect_Class	[ Ad
1	Contact_NearSolderPad	
2	Contact_FrontGridInterruption	
3	Crack_Closed	

### Annotation Tips

1. When labeling cracks, include busbars
2. Only use 2D bounded regions, do not use the polyline (for cracks)
3. Outline each defect precisely (defect pixels labeled) and include only a bit of its surrounding (outlines as tightly as possible)
4. Avoid defect overlaps, but outline touching defects as close as possible to each other
5. When looking at high resistivity errors, make sure to capture the gradient inside the free form

Note: When you load a CSV from a previous session, start a new session, and save the CSV, it will NOT have the notations from the previous session. This also means that if you load 50 cells one day and notate 25, there will be rows in the CSV for the other 25 showing no notations. Loading this CSV to do the other 25 and notating will not overwrite anything and you will just get a csv for that session alone. In short, CSVs do not get updated. Do not delete CSVs from previous sessions, as those notations will be deleted and you will have to redo them. There is no use in loading a CSV from a previous session unless you are looking over the notations.

Note: If for some reason, your notation session gets cut short because of a power flash, accidentally closing the window, etc., VGG keeps the notation in the browser cache. Reopen the browser and VGG, save the cache (it saves as a JSON file), and import it with your images. The notations will be there.

Quality control: for cells that are loaded into the VGG software which are not notated, the output CSV will have entries which show no defects. After each notation session, check the CSV and delete rows that are blank if those cells have defects. Cells without defects will naturally have a row that shows nothing. Leave these. This will prevent incorrect entries.