

Testcenter Serial: 6001_Zora

Job ID: Scanoffice_001_23022021

Address: TUAS / Joukahaisenkatu 7

Country / City: FI 20520 Turku

Number of Modules: 3

Comments:

The study was performed by the TUAS MOBILE SOLAR Lab, calibrated on 28.2.2020 by MBJ Services GmbH. The references used for characterization was the TURU004 / 192M6H601312220 PERC Reference Module, calibrated at 1.4.2020 by Fraunhofer ISE – CalLab PV Modules, accredited by Deutsche Akkreditierungsstelle GmbH.

The expanded measurement uncertainty for the measured module types is 2.5% with a probability of 95%. The study included three (3) modules of the type Longi LR4-60HIH-370M, rated at 370 Wp.

With a nominal power of 370 Wp the 2.5% measurement uncertainty means a range from 361...379 Wp. The average power of the measured modules was 366.3 Wp, which is below the rated nominal power, but still within the uncertainty range.

In the electroluminescence images no mismatching between cells was visible.

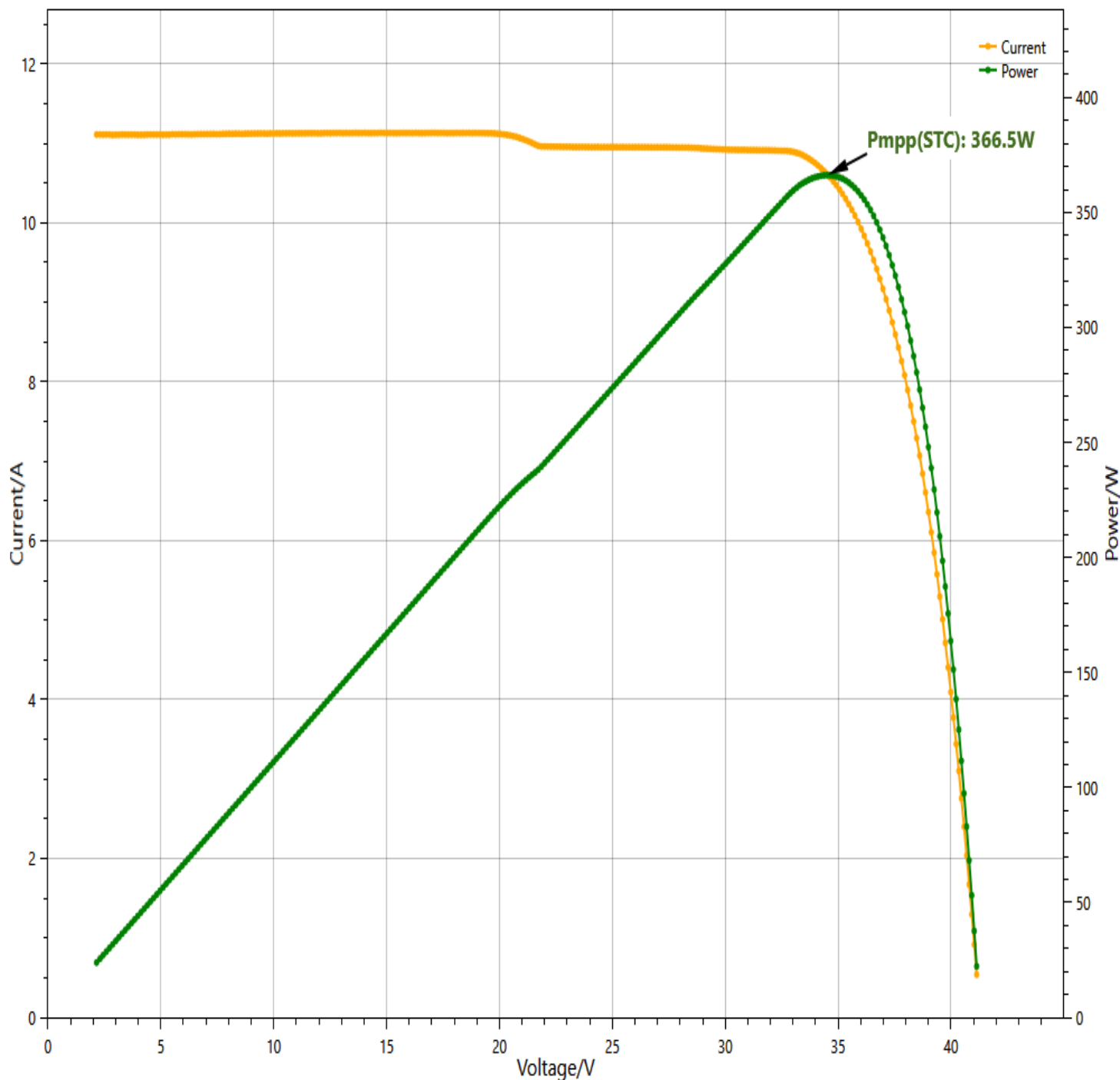
Some small cracks were visible on one of the modules, but not enough to affect the power measurements in any significant way.

MBJ Unique ID: 600120210223153558

Module ID: LRP903032201100302847

Type ID: Longi / LR4-60HIH-370M

I-V Curve



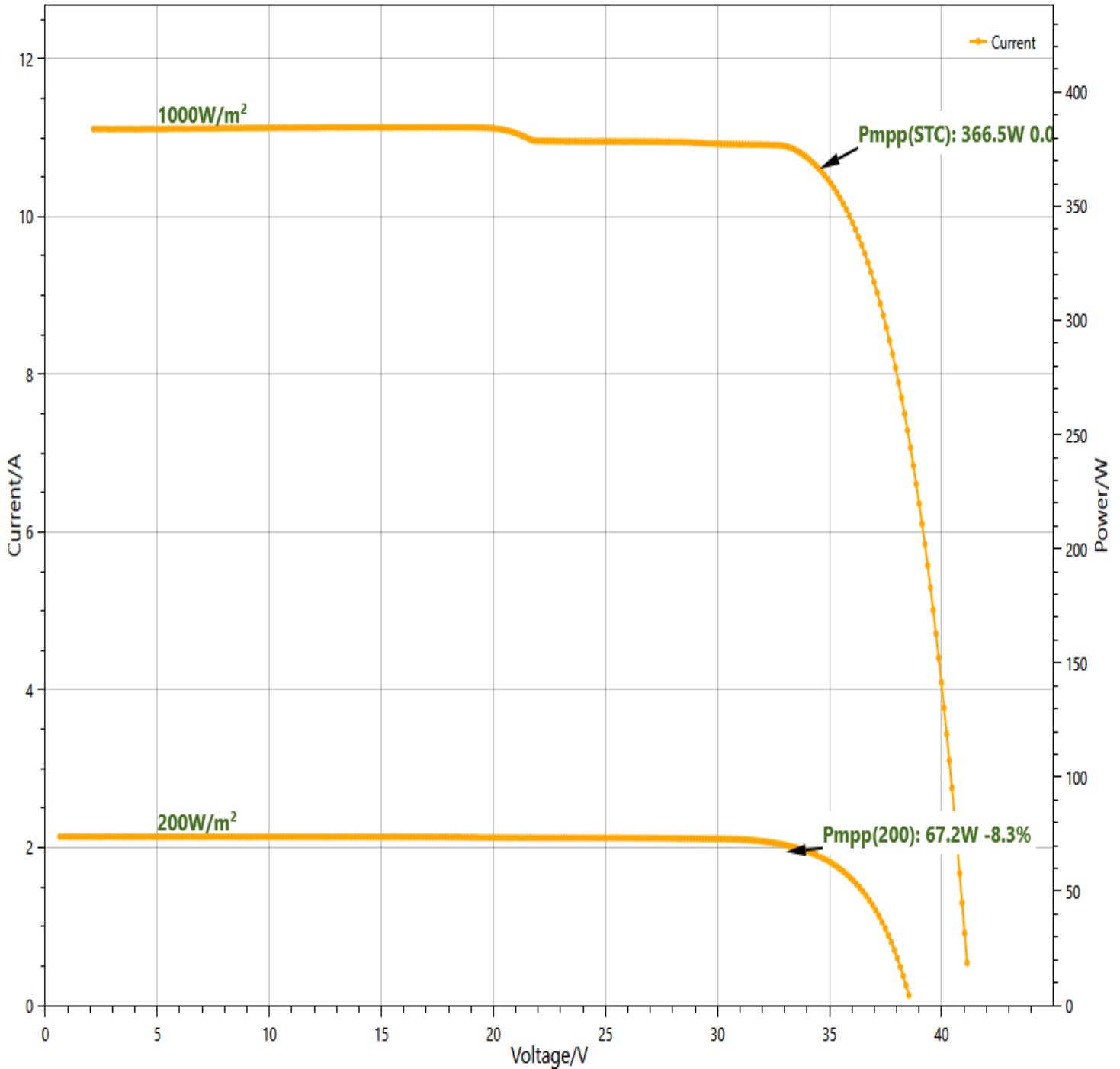
	Pmpp[W]	Imp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	366.5	10.61	34.55	11.11	41.30	1000.0	79.9
Measured	367.9	10.57	34.80	11.13	41.34	998.5	80.0
Tmod[°C]:24.5	Tref[°C]:26.3		Tfl[°C]:26.57		Tout[°C]:n/a		T[ms]:142.0
Type:Mono	alpha[%]:0.048		beta[%]:-0.270				
IEC aICF:0.060	IEC Rs[Ohm]:0.01		kappa[mOhm/K]:3.00				
Software:748p			Reference: ISE_PERC_Reference				
			FFCorr: -0.572%				

MBJ Unique ID: 600120210223153558

Module ID: LRP903032201100302847

Type ID: Longi / LR4-60HIH-370M

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	67.2	366.5
Module Eff [%]	18.5	20.1
Eff Delta [%]	-8.3	0.0

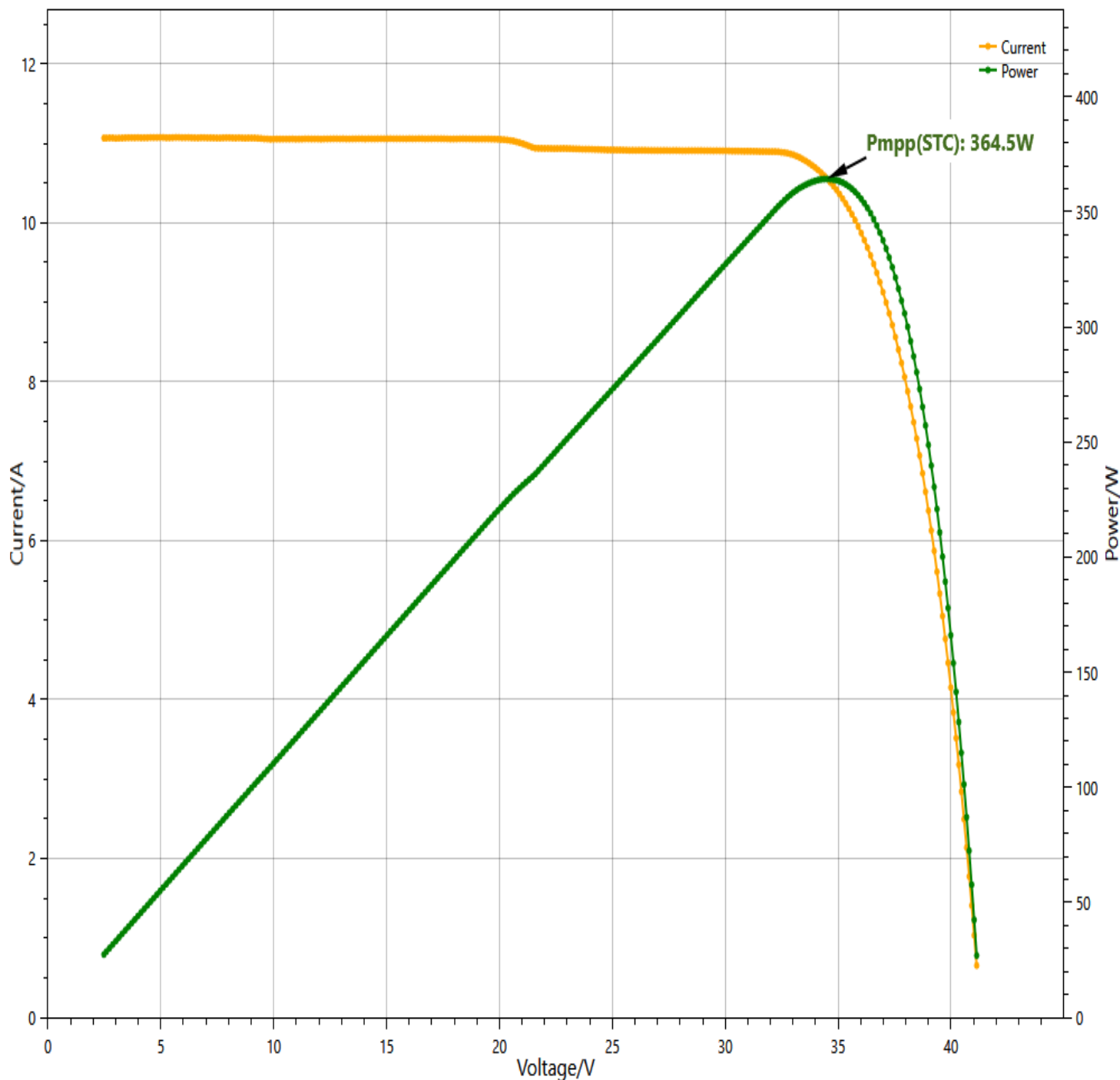
Measured [W/m2] 203.0 998.5
Module Width/Height (Portrait) [mm]:1038*1755

MBJ Unique ID: 600120210223152315

Module ID: LRP903032201100303074

Type ID: Longi / LR4-60HIH-370M

I-V Curve



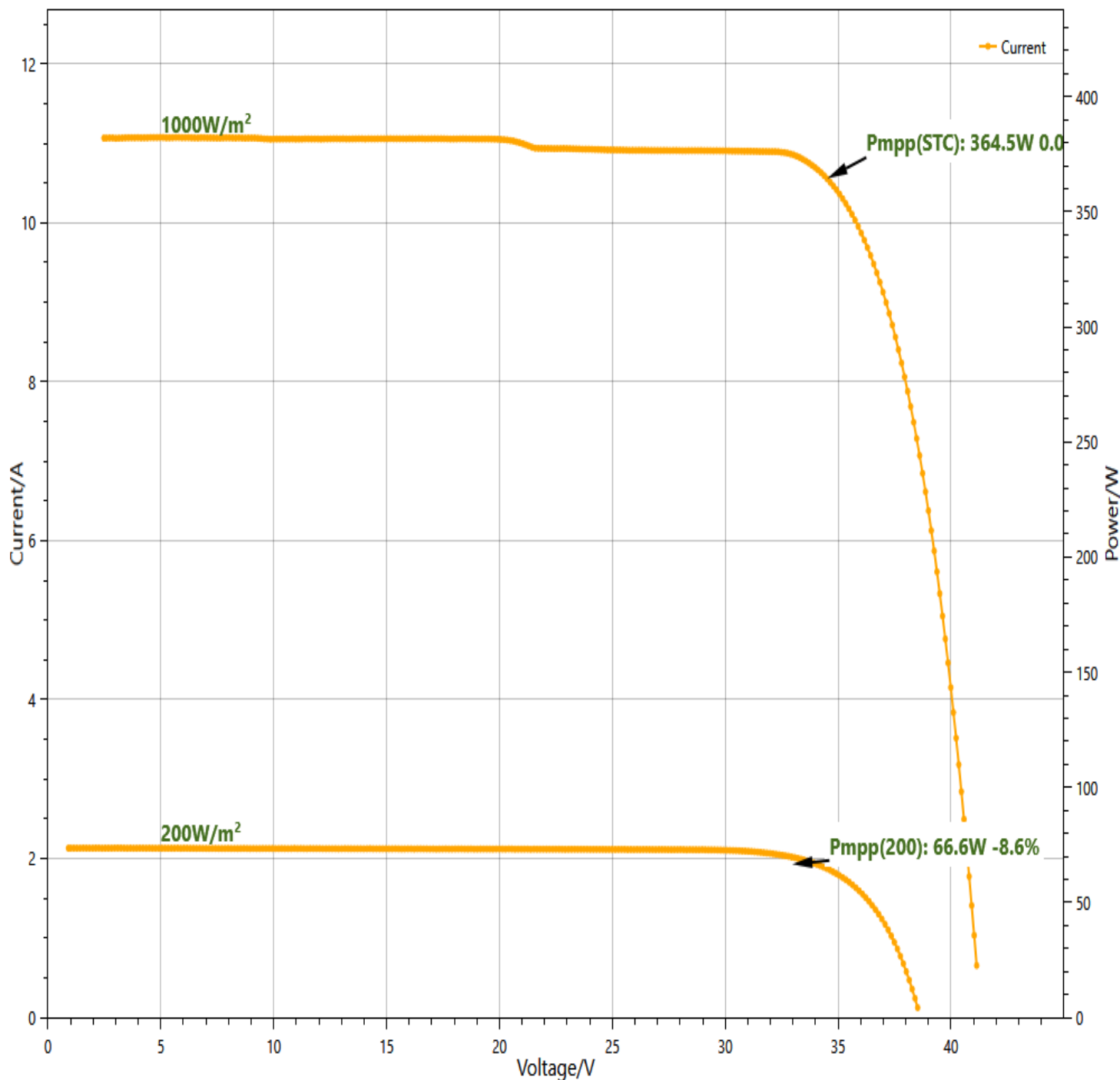
	Pmpp[W]	Impp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	364.5	10.56	34.52	11.06	41.33	1000.0	79.7
Measured	364.3	10.53	34.61	11.09	41.24	998.4	79.6
Tmod[°C]:25.7	Tref[°C]:26.3	Tfl[°C]:27.48		Tout[°C]:n/a		T[ms]:141.0	
Type:Mono	alpha[%]:0.048	beta[%]:-0.270					
IEC aICF:0.060	IEC Rs[Ohm]:0.01	kappa[mOhm/K]:3.00					
Software:748p	Reference: ISE_PERC_Reference						
FFCorr: -0.572%							

MBJ Unique ID: 600120210223152315

Module ID: LRP903032201100303074

Type ID: Longi / LR4-60HIH-370M

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	66.6	364.5
Module Eff [%]	18.3	20.0
Eff Delta [%]	-8.6	0.0

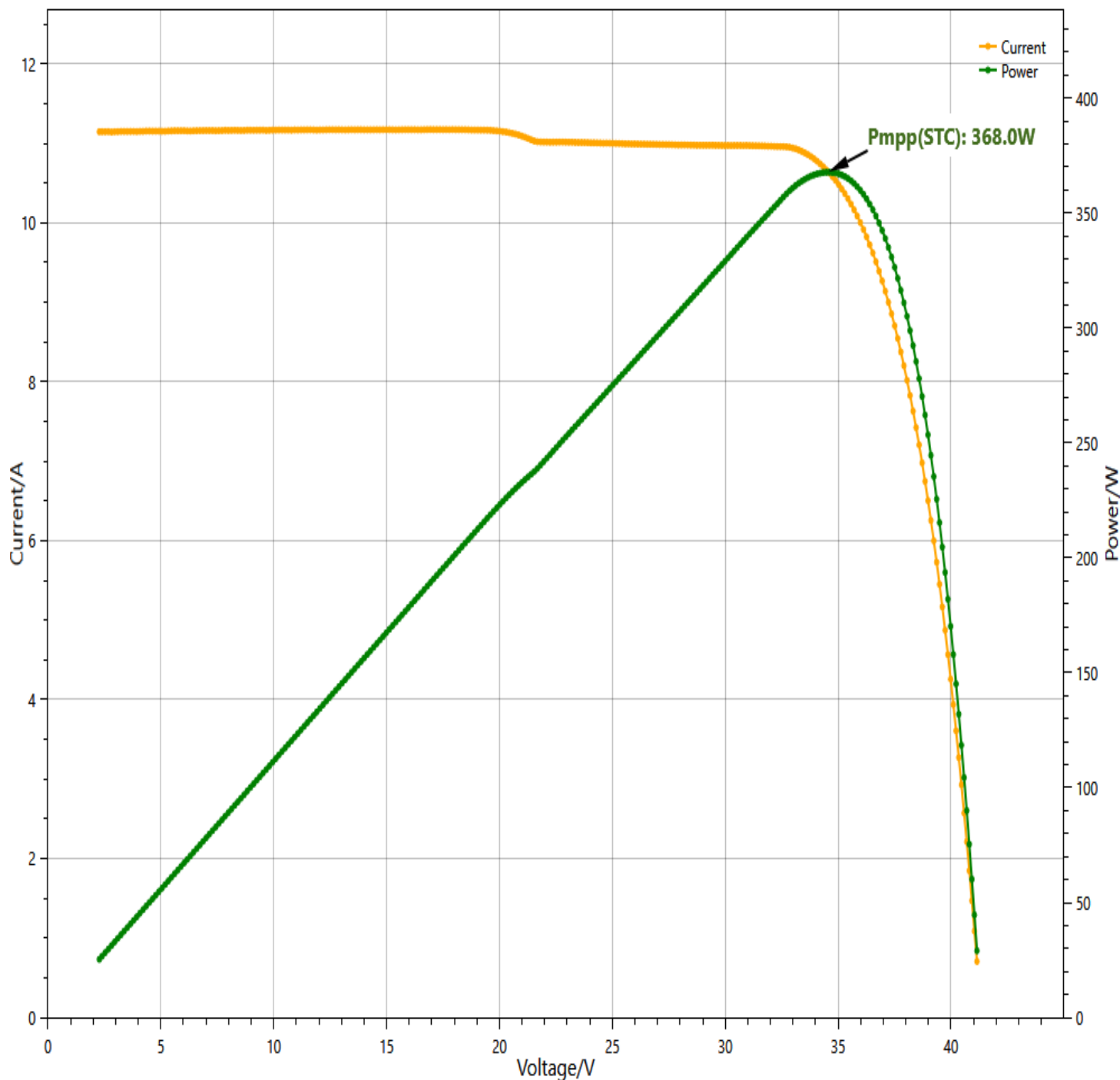
Measured [W/m2] 203.0 998.4
Module Width/Height (Portrait) [mm]:1038*1755

MBJ Unique ID: 600120210223154557

Module ID: LRP903032201100303086

Type ID: Longi / LR4-60HIH-370M

I-V Curve



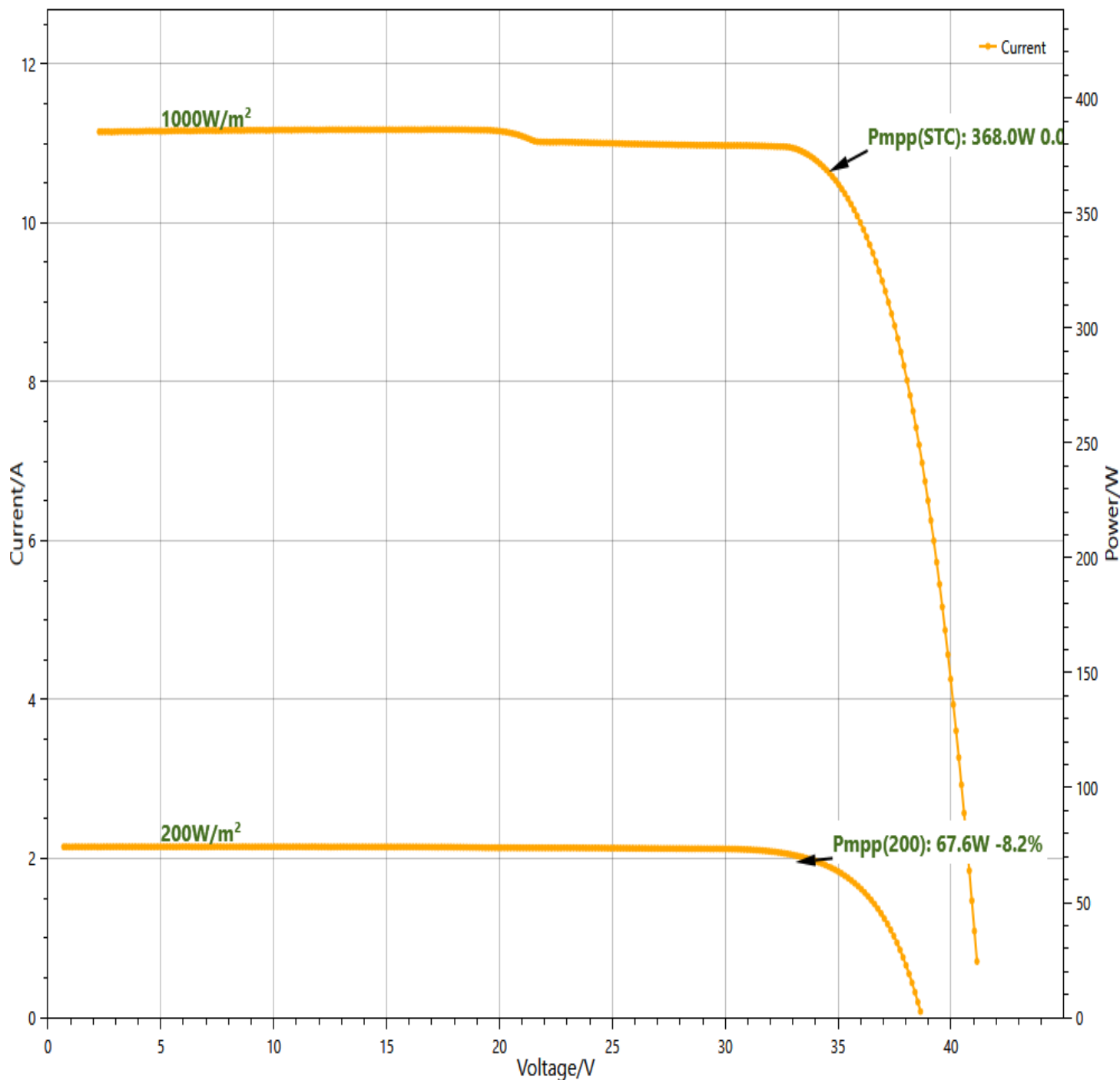
	Pmpp[W]	Imp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	368.0	10.64	34.58	11.14	41.36	1000.0	79.9
Measured	369.3	10.61	34.82	11.15	41.40	998.2	80.0
Tmod[°C]:24.5	Tref[°C]:26.2		Tfl[°C]:28.12		Tout[°C]:n/a		T[ms]:141.5
Type:Mono	alpha[%]:0.048		beta[%]:-0.270				
IEC aICF:0.060	IEC Rs[Ohm]:0.01		kappa[mOhm/K]:3.00				
Software:748p	Reference: ISE_PERC_Reference						
	FFCorr: -0.572%						

MBJ Unique ID: 600120210223154557

Module ID: LRP903032201100303086

Type ID: Longi / LR4-60HIH-370M

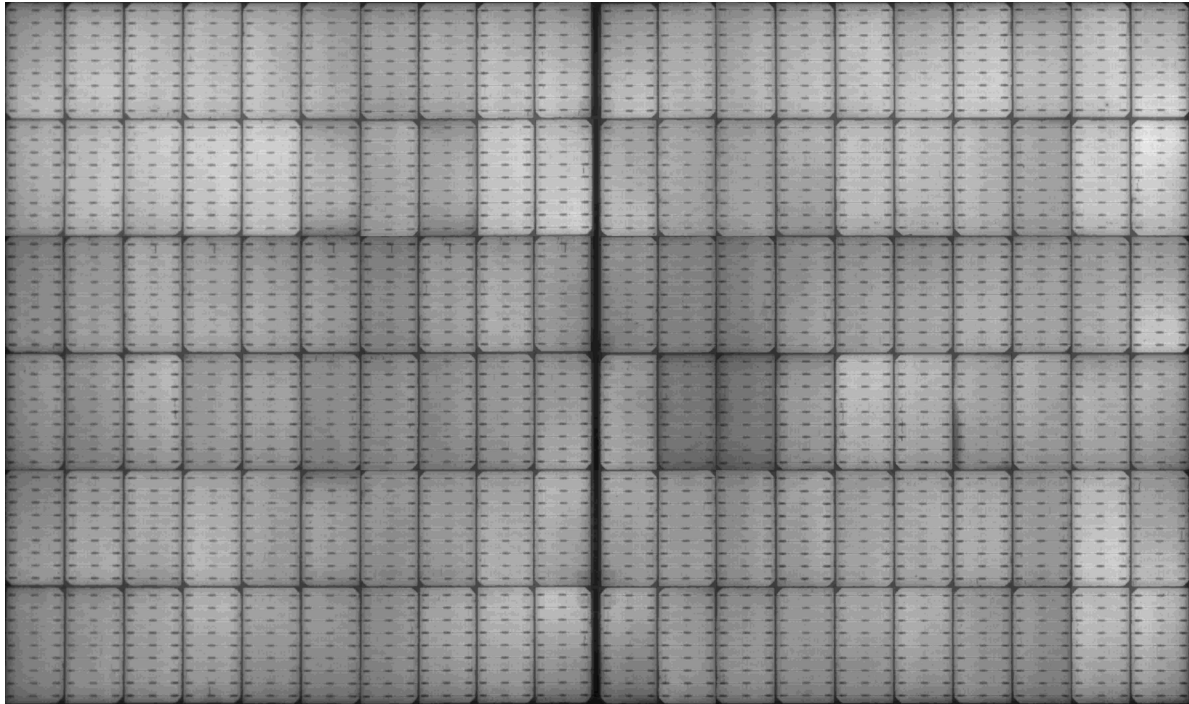
I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	67.6	368.0
Module Eff [%]	18.6	20.2
Eff Delta [%]	-8.2	0.0

Measured [W/m2] 202.9 998.2
Module Width/Height (Portrait) [mm]:1038*1755

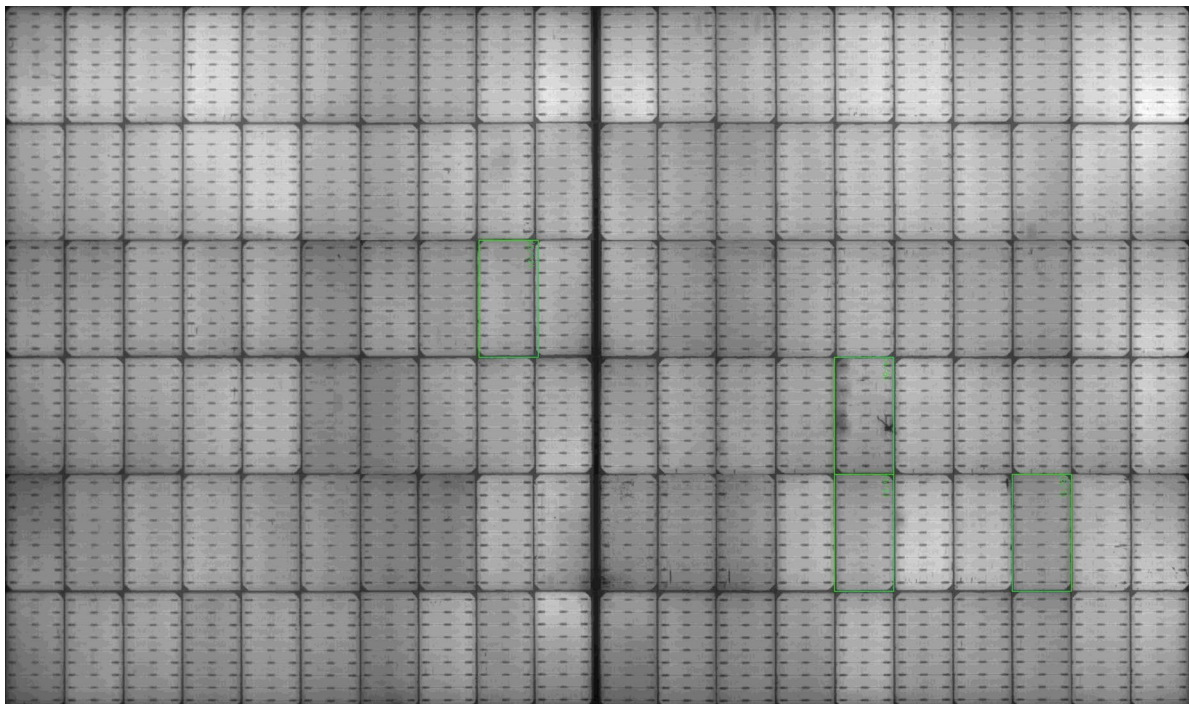
Electroluminescence for 600120210223153558



Current[A]: 12.020
Exposure Time [ms]: 400

Voltage[V]: 45.360

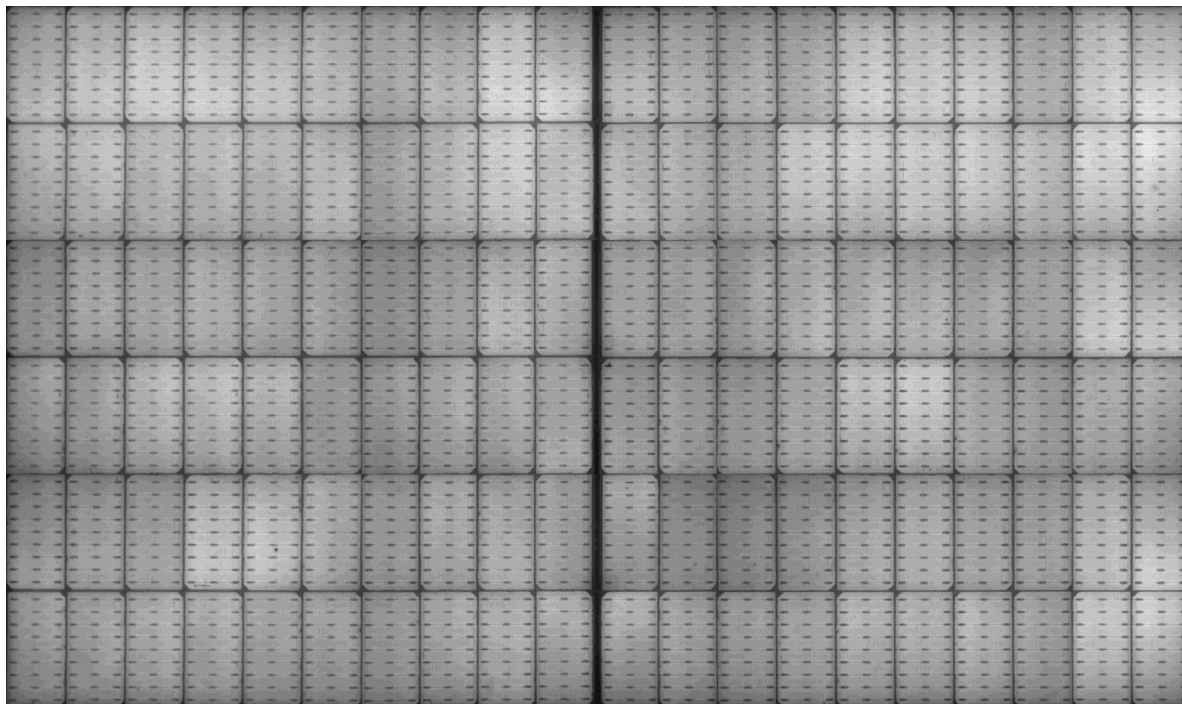
Electroluminescence for 600120210223152315



Current[A]: 12.020
Exposure Time [ms]: 400

Voltage[V]: 45.040

Electroluminescence for 600120210223154557



Current[A]: 12.020

Voltage[V]: 45.360

Exposure Time [ms]: 400

MBJ Unique ID	Module ID	Module Type/Description	Judgment
600120210223153558	LRP903032201100302 847	Longi LR4-60HIH-370M	ClassC
600120210223152315	LRP903032201100303 074	Longi LR4-60HIH-370M	ClassC
600120210223154557	LRP903032201100303 086	Longi LR4-60HIH-370M	ClassC

MBJ Unique ID	Connection Check	Diode Test	HiPot Test	GND Bond Tests		
				Port 1	Port 2	Port 3
600120210223153558	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210223152315	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210223154557	Successfull	Successfull	n/a	n/a	n/a	n/a

MBJ Unique ID	Pmpp[W]	Impp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
600120210223153558	366.5	10.61	34.55	11.11	41.30	1000.0	79.9
600120210223152315	364.5	10.56	34.52	11.06	41.33	1000.0	79.7
600120210223154557	368.0	10.64	34.58	11.14	41.36	1000.0	79.9

MBJ Unique ID	Red	Yellow	Green	Blue	White
600120210223153558	0	0	0	0	120
600120210223152315	0	0	4	0	116
600120210223154557	0	0	0	0	120