

Testcenter Serial: 6001_Zora

Job ID: CanadianSolar_01092021

Address: TUAS / Joukahaisenkatu 7

Country / City: FI 20520 Turku

Number of Modules: 10

Module Type/Description: CanadianSolar CS3L-370MS

PMPP NOM[W]: 370W

Comments:

The study was performed by the TUAS MOBILE SOLAR Lab, calibrated on 28.2.2020 by MBJ Services GmbH. The reference used for characterization was the TURU007 / 20210310025 Mono reference Module, calibrated at 26.5.2021 by Fraunhofer ISE – CalLab PV Modules, accredited by Deutsche Akkreditierungsstelle GmbH.

The expanded measurement uncertainty for the measured module types is 2.4% with a probability of 95%. The study included ten (10) modules of the type CanadianSolar CS3L-370MS.

With a nominal power of 370 Wp the 2.4% measurement uncertainty means a range from 361...379 Wp. The average power of the measured modules was 373.0 Wp, which is slightly above the nominal power but still well within the measurement uncertainty.

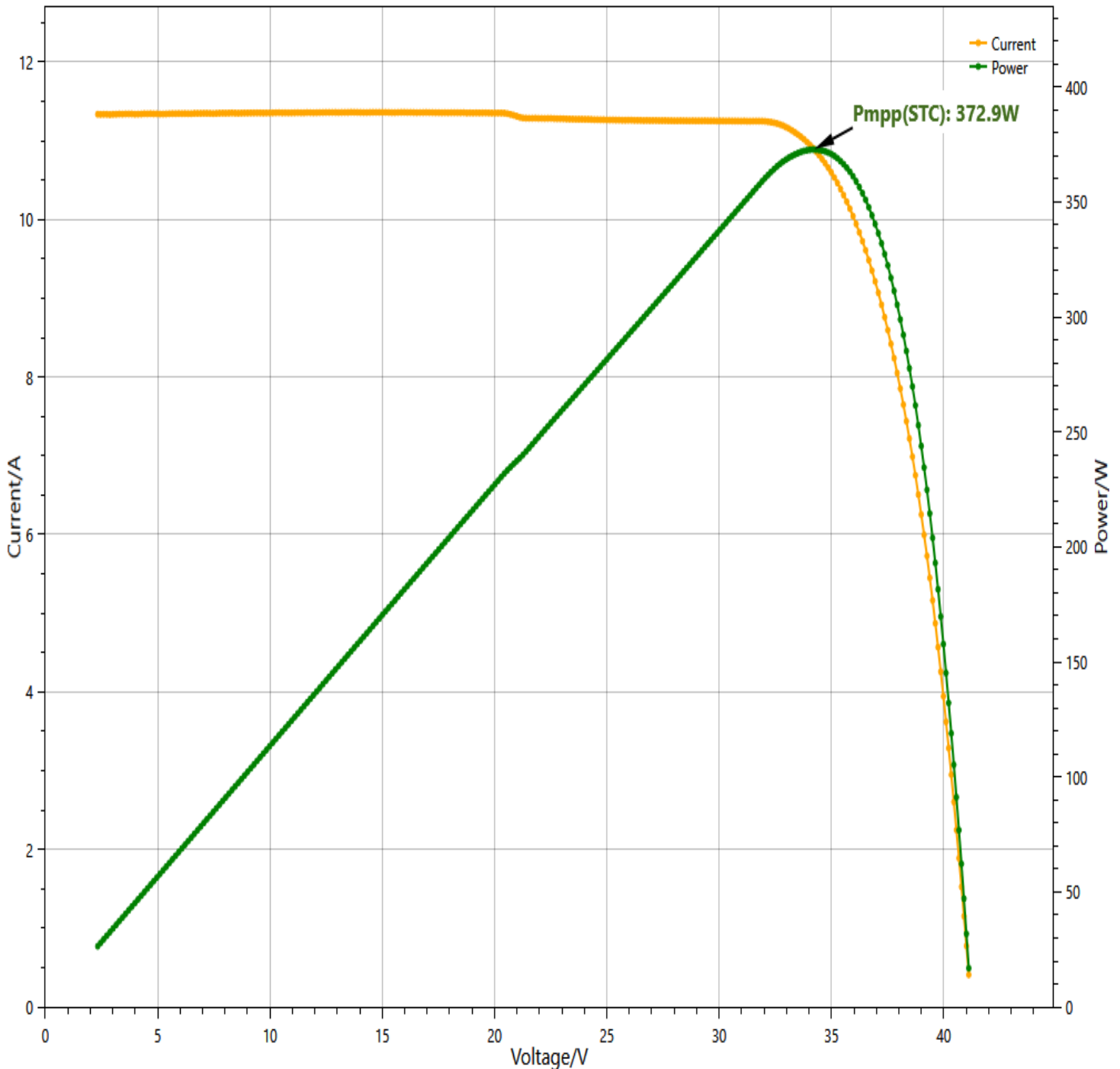
In the electroluminescence some images mismatching between cells was visible. One crack was found on one of the tested panels. All cells had a dark discoloration along the uncut edge of the half-cut cells.

MBJ Unique ID: 600120210901153438

Module ID: 12104050870628

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



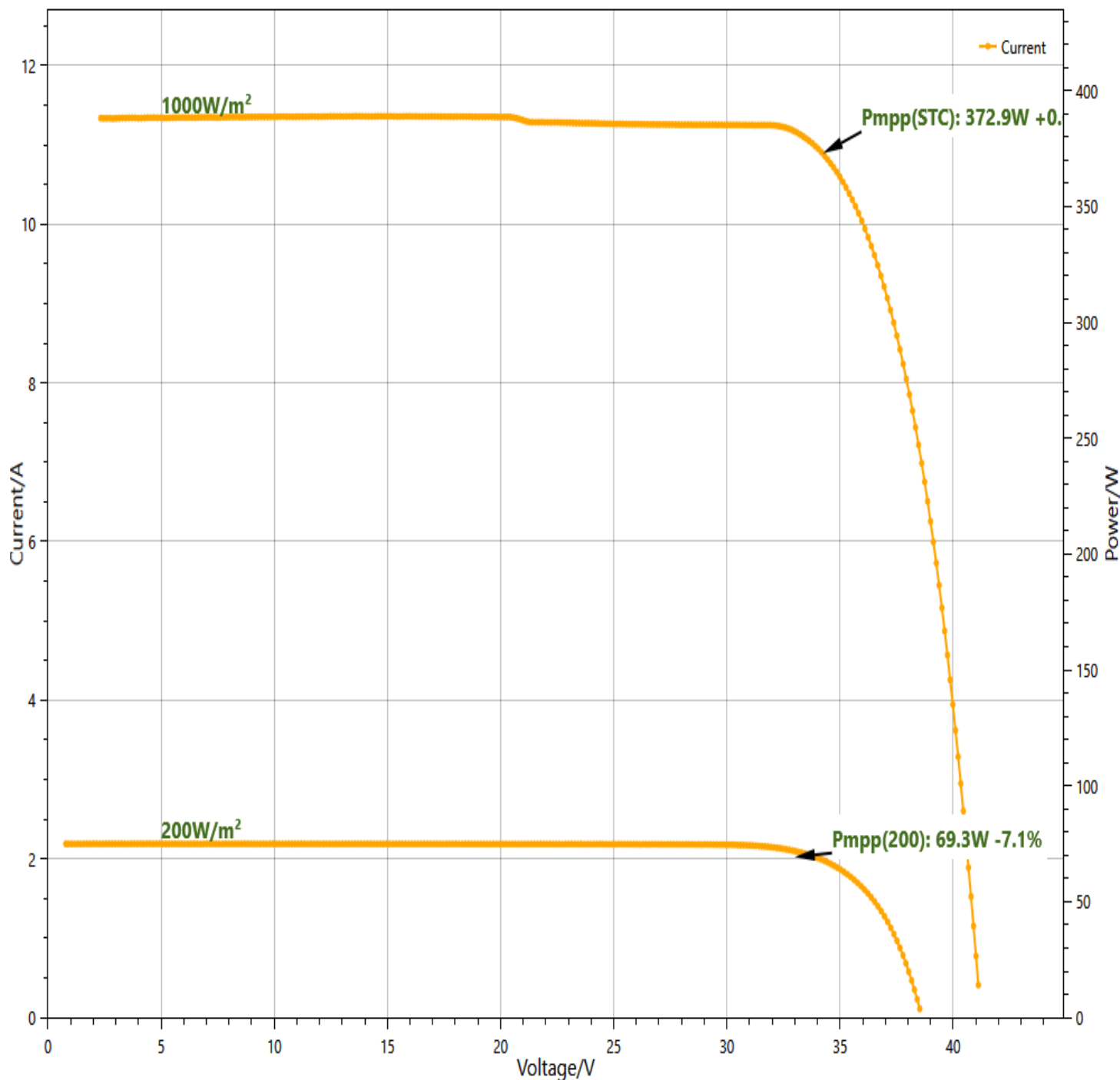
	Pmpp[W]	Impp[A]	Ump[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	372.9	10.89	34.23	11.33	41.24	1000.0	79.8
Measured	375.9	10.85	34.65	11.35	41.33	998.1	80.2
Tmod[°C]:24.3	Tref[°C]:26.7		Tfl[°C]:28.00		Tout[°C]:n/a		T[ms]:142.0
Type:Mono	alpha[%]:0.050		beta[%]:-0.350				
IEC aICF:0.060	IEC Rs[Ohm]:0.01						
Software:748p	Reference: ISE_Mono_Reference						
	FFCorr: -0.960%						

MBJ Unique ID: 600120210901153438

Module ID: 12104050870628

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.3	372.9
Module Eff [%]	18.7	20.2
Eff Delta [%]	-7.1	0.0

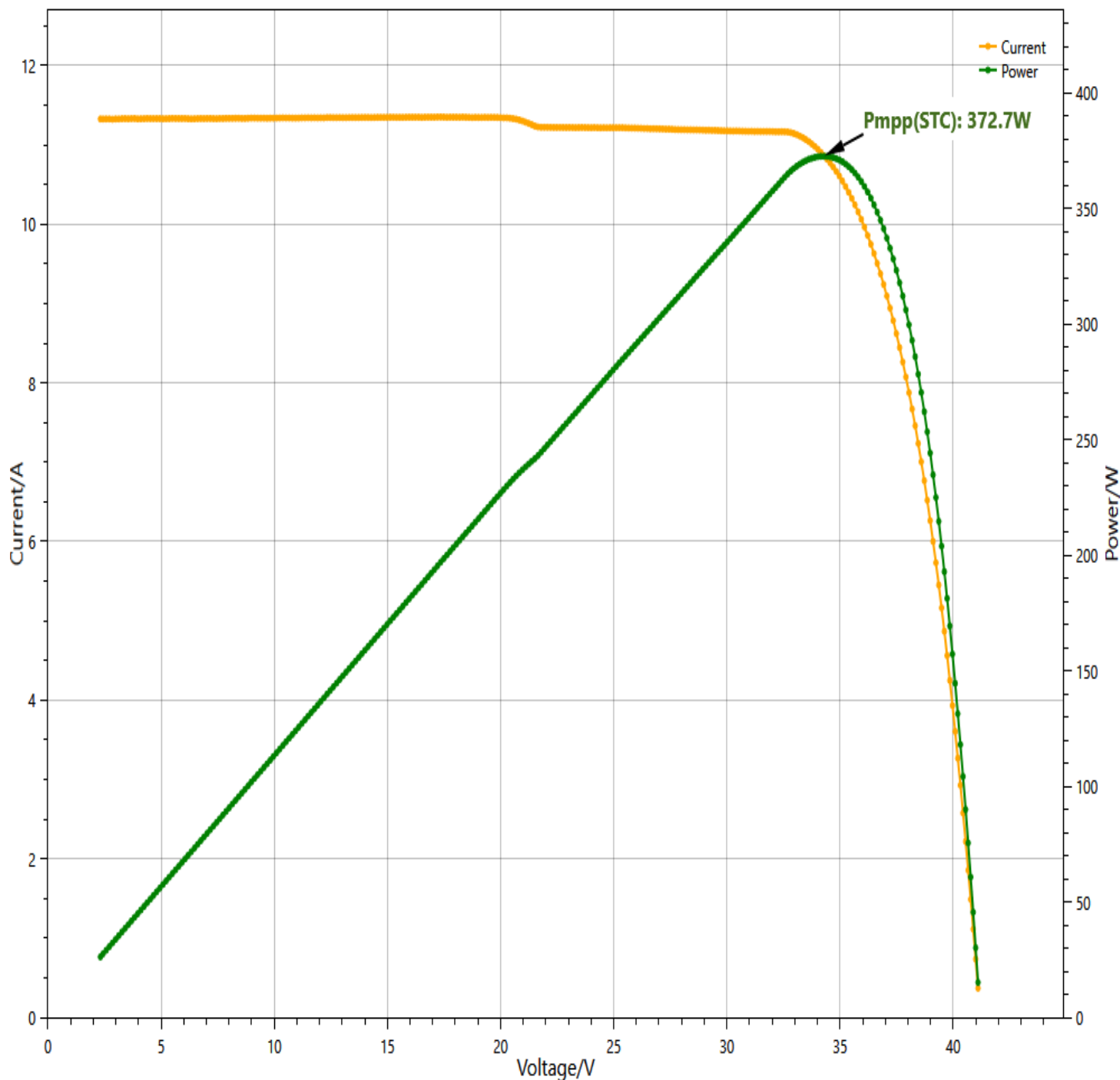
Measured [W/m2] 203.2 998.1
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901154424

Module ID: 12104050870635

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



	Pmpp[W]	Impp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	372.7	10.86	34.31	11.32	41.21	1000.0	79.9
Measured	375.8	10.82	34.73	11.34	41.31	998.1	80.2

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Type:Mono	alpha[%]:0.050	beta[%]:-0.350		
IEC aICF:0.060	IEC Rs[Ohm]:0.01			
Software:748p				

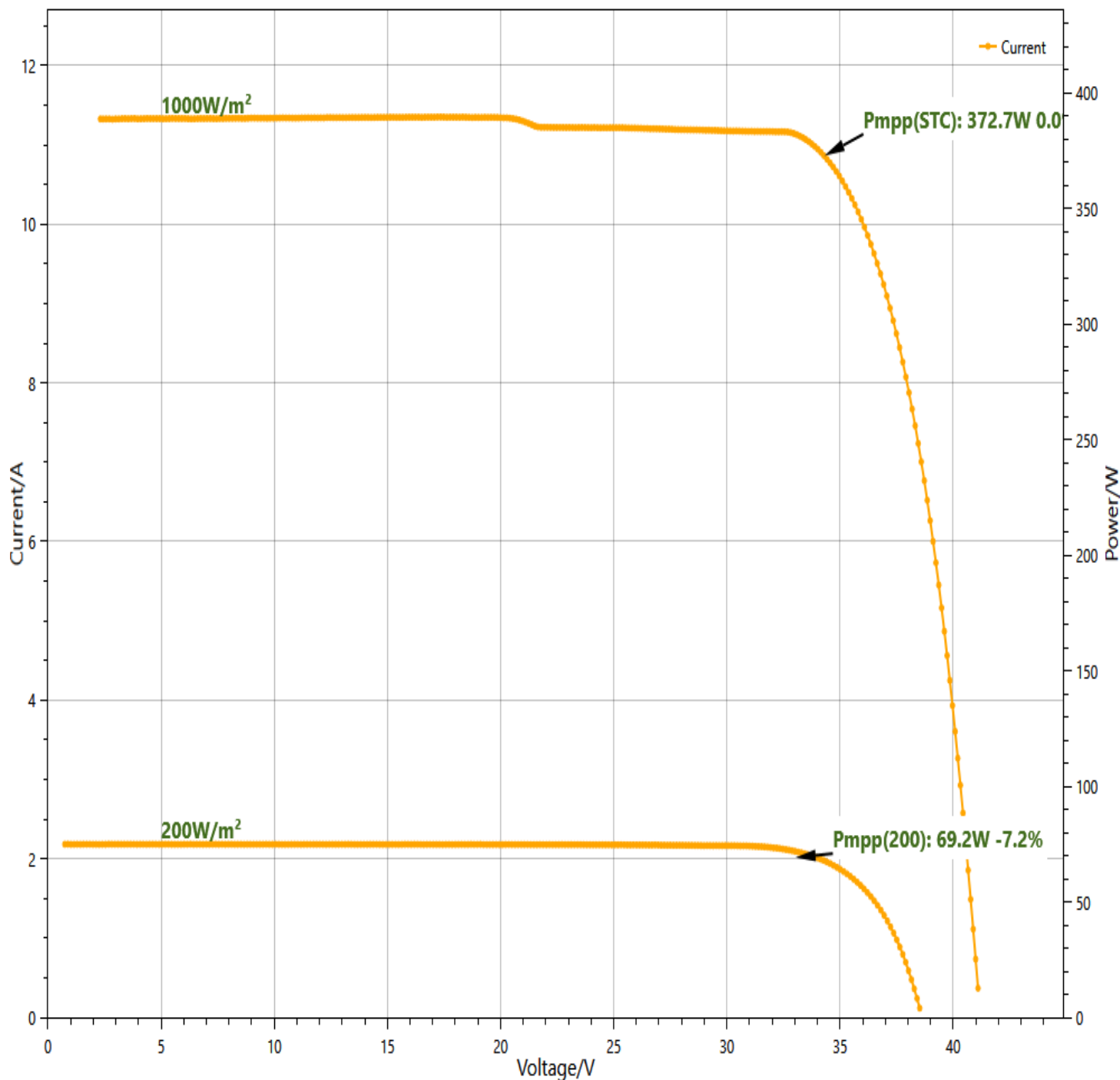
Reference: ISE_Mono_Reference
FFCorr: -0.960%

MBJ Unique ID: 600120210901154424

Module ID: 12104050870635

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.2	372.7
Module Eff [%]	18.7	20.2
Eff Delta [%]	-7.2	0.0

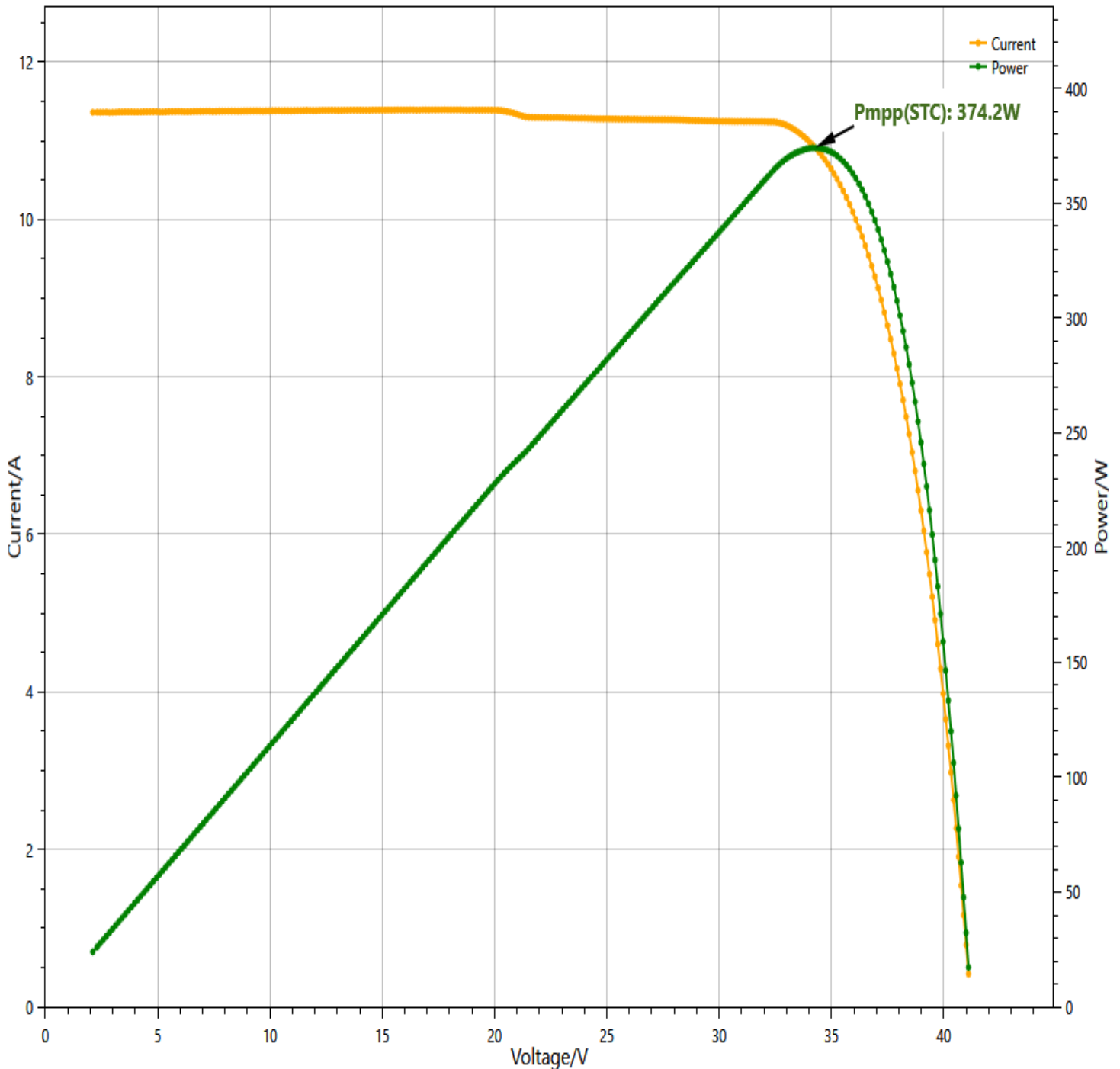
Measured [W/m2] 203.2 998.1
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901155342

Module ID: 12104050870773

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



	Pmpp[W]	Impp[A]	Umpv[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	374.2	10.91	34.29	11.36	41.22	1000.0	79.9
Measured	377.3	10.87	34.71	11.37	41.34	997.7	80.3

Tmod[°C]:24.1	Tref[°C]:26.6	Tfl[°C]:26.99	Tout[°C]:n/a	T[ms]:142.5
Type:Mono	alpha[%]:0.050	beta[%]:-0.350		
IEC aICF:0.060	IEC Rs[Ohm]:0.01			
Software:748p				

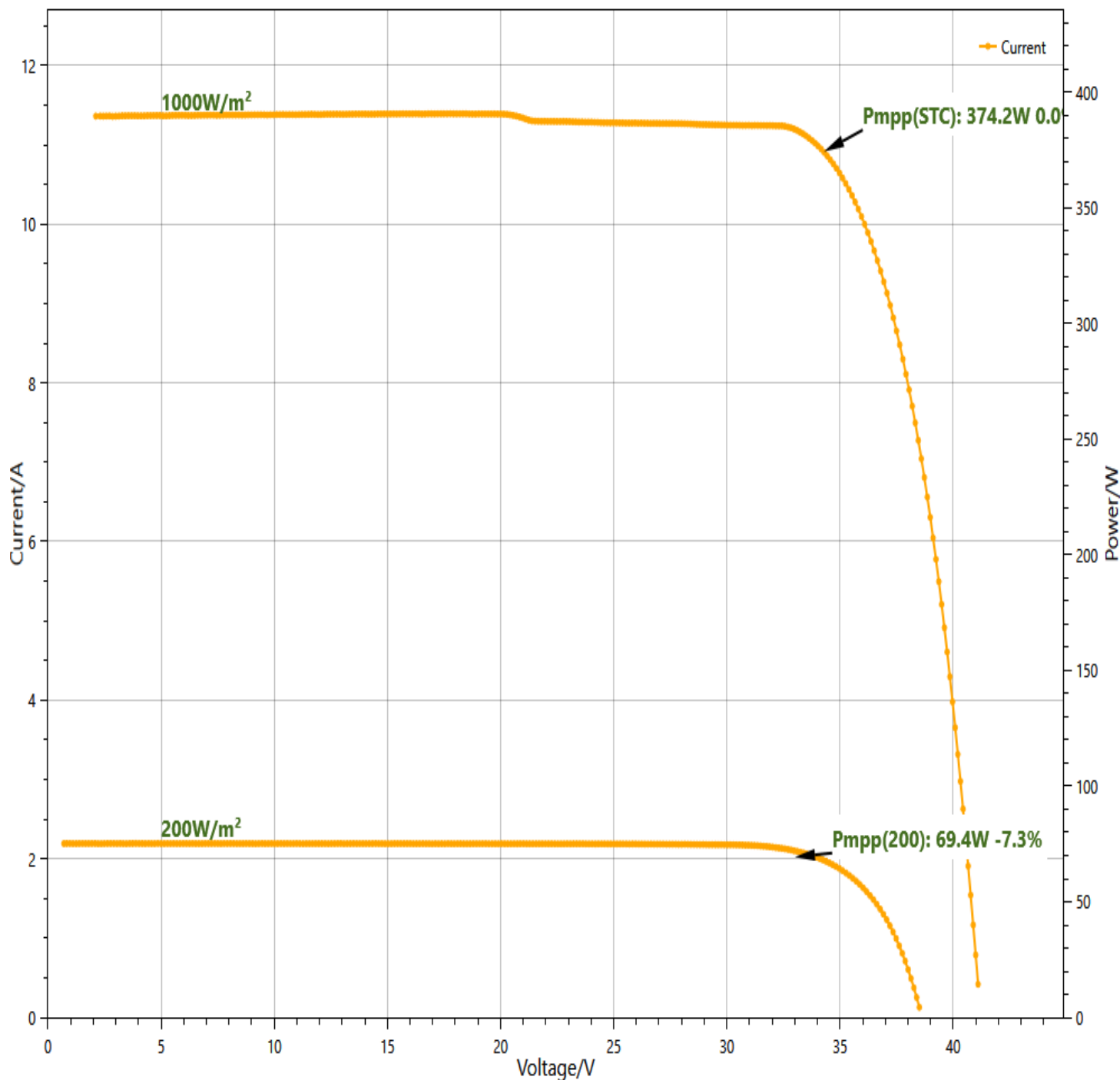
Reference: ISE_Mono_Reference
FFCorr: -0.960%

MBJ Unique ID: 600120210901155342

Module ID: 12104050870773

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.4	374.2
Module Eff [%]	18.8	20.2
Eff Delta [%]	-7.3	0.0

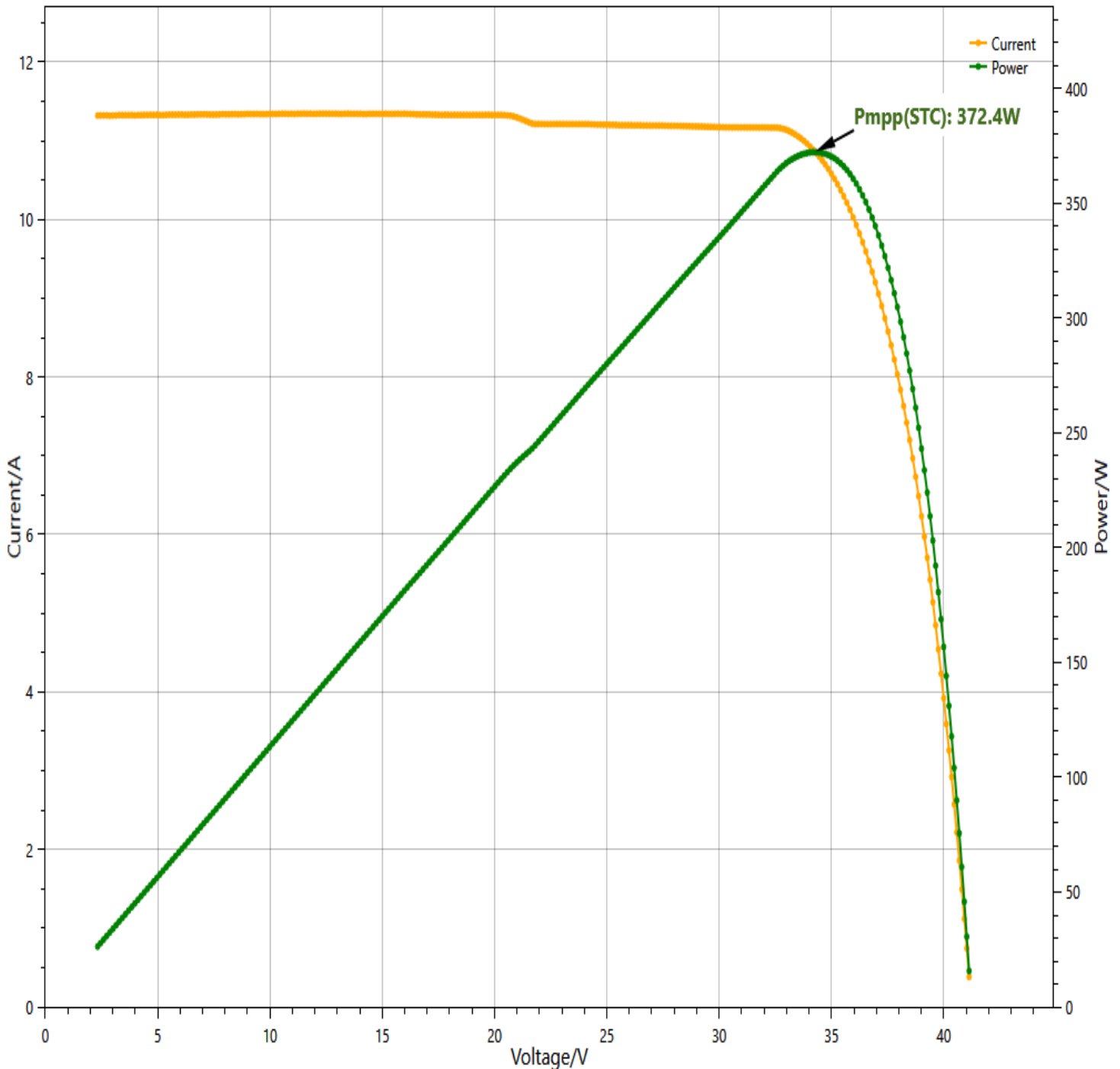
Measured [W/m2] 203.1 997.7
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901152527

Module ID: 12104050870793

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



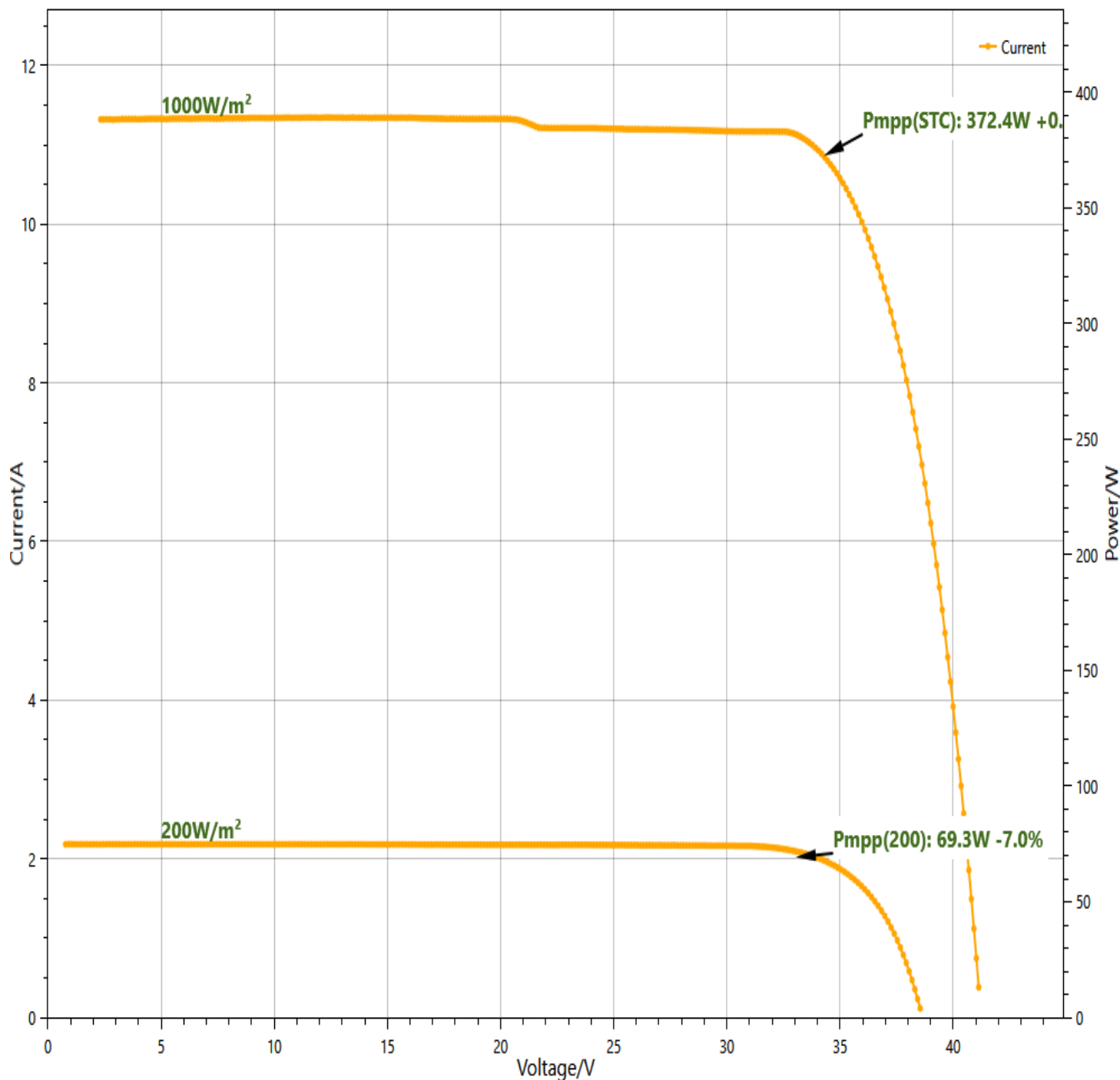
	Pmpp[W]	Impp[A]	Umpv[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	372.4	10.86	34.29	11.31	41.24	1000.0	79.8
Measured	375.5	10.83	34.68	11.34	41.32	998.7	80.1
Tmod[°C]:24.4	Tref[°C]:26.6		Tfl[°C]:26.41		Tout[°C]:n/a		T[ms]:142.0
Type:Mono	alpha[%]:0.050		beta[%]:-0.350				
IEC aICF:0.060	IEC Rs[Ohm]:0.01						
Software:748p	Reference: ISE_Mono_Reference						
	FFCorr: -0.960%						

MBJ Unique ID: 600120210901152527

Module ID: 12104050870793

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.3	372.4
Module Eff [%]	18.7	20.1
Eff Delta [%]	-7.0	0.0

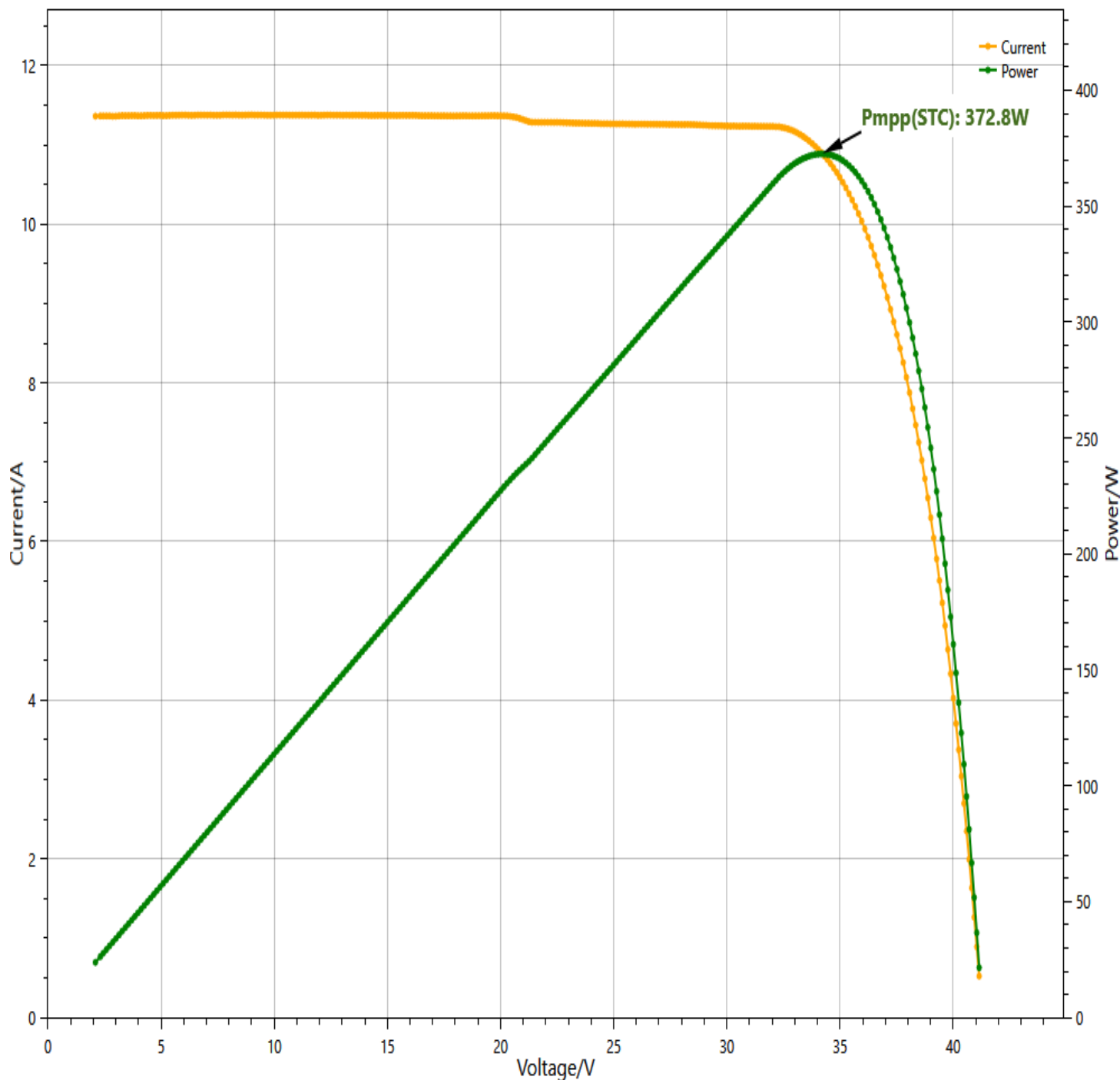
Measured [W/m2] 203.3 998.7
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901153017

Module ID: 12104050870985

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



	Pmpp[W]	Impp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	372.8	10.89	34.23	11.36	41.31	1000.0	79.5
Measured	375.6	10.85	34.62	11.37	41.38	998.1	79.8

Tmod[°C]:24.4	Tref[°C]:26.6	Tfl[°C]:27.97	Tout[°C]:n/a	T[ms]:142.5
Type:Mono	alpha[%]:0.050	beta[%]:-0.350		
IEC aICF:0.060	IEC Rs[Ohm]:0.01			
Software:748p				

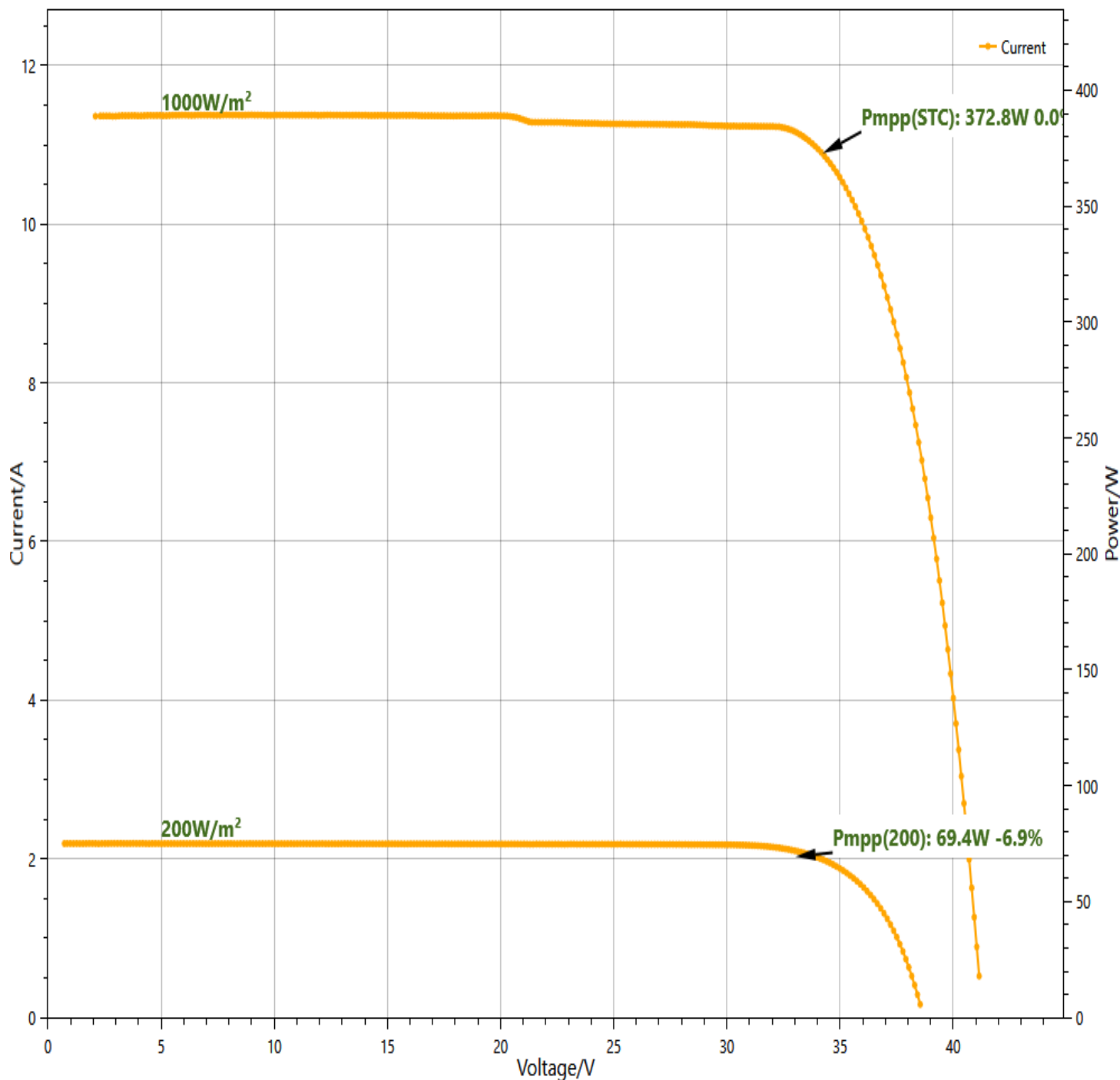
Reference: ISE_Mono_Reference
FFCorr: -0.960%

MBJ Unique ID: 600120210901153017

Module ID: 12104050870985

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.4	372.8
Module Eff [%]	18.8	20.2
Eff Delta [%]	-6.9	0.0

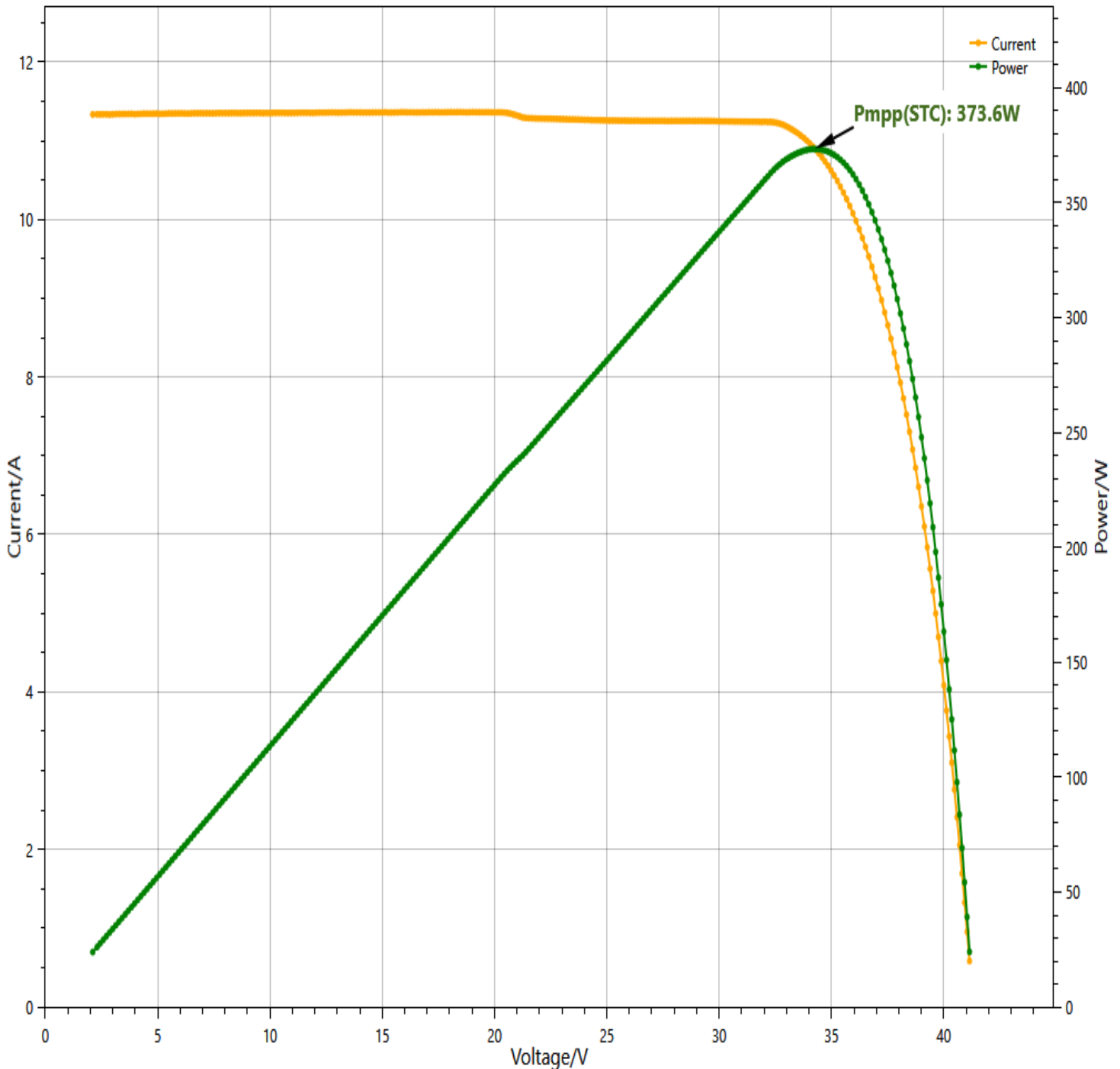
Measured [W/m2] 203.2 998.1
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901153946

Module ID: 12104050871064

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



	Pmpp[W]	Impp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	373.6	10.90	34.27	11.33	41.32	1000.0	79.8
Measured	376.4	10.86	34.67	11.34	41.40	997.9	80.1

Tmod[°C]:24.3	Tref[°C]:26.7	Tfl[°C]:27.43	Tout[°C]:n/a	T[ms]:142.5
Type:Mono	alpha[%]:0.050	beta[%]:-0.350		
IEC aICF:0.060	IEC Rs[Ohm]:0.01			
Software:748p				

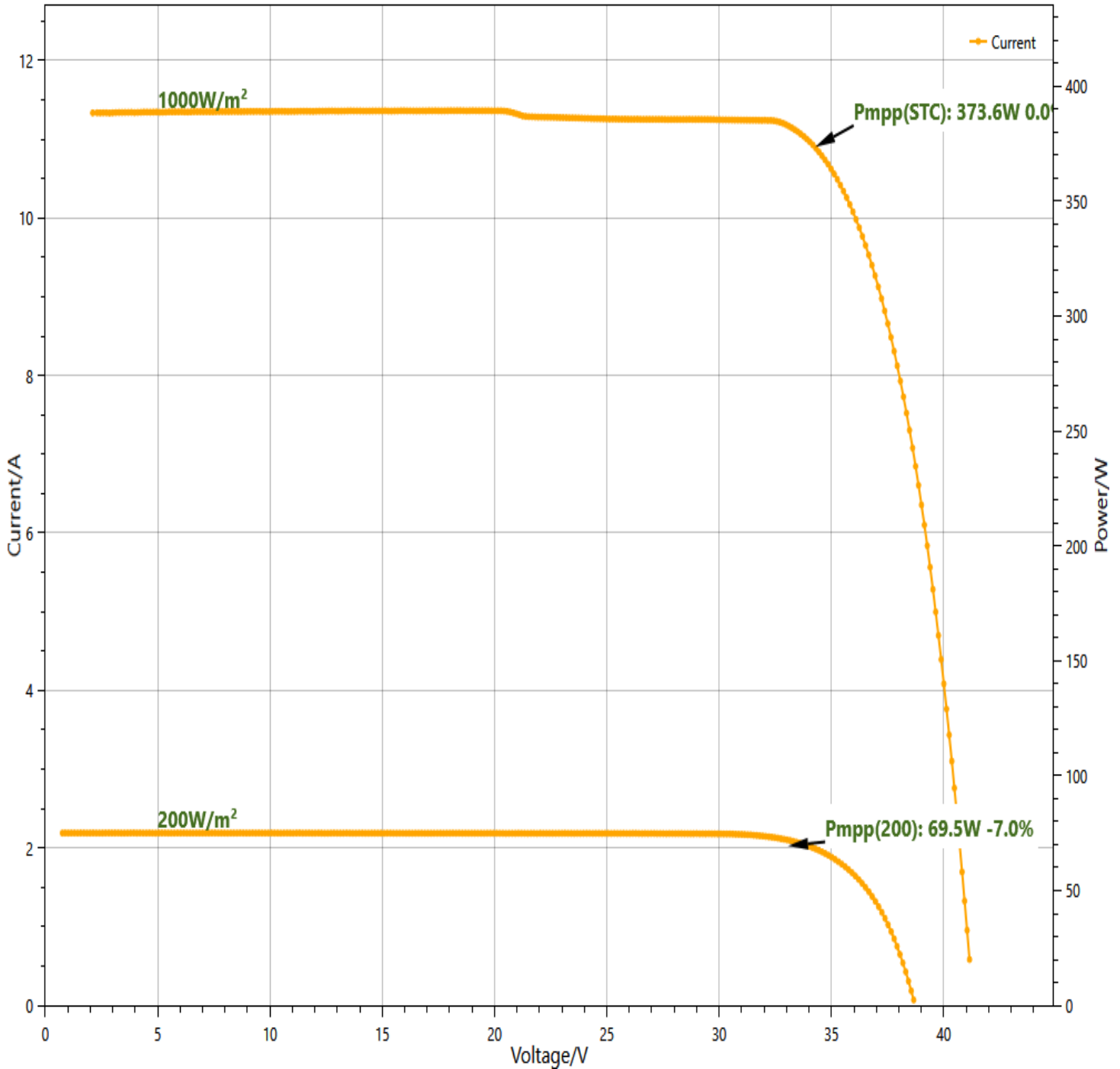
Reference: ISE_Mono_Reference
FFCorr: -0.960%

MBJ Unique ID: 600120210901153946

Module ID: 12104050871064

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.5	373.6
Module Eff [%]	18.8	20.2
Eff Delta [%]	-7.0	0.0

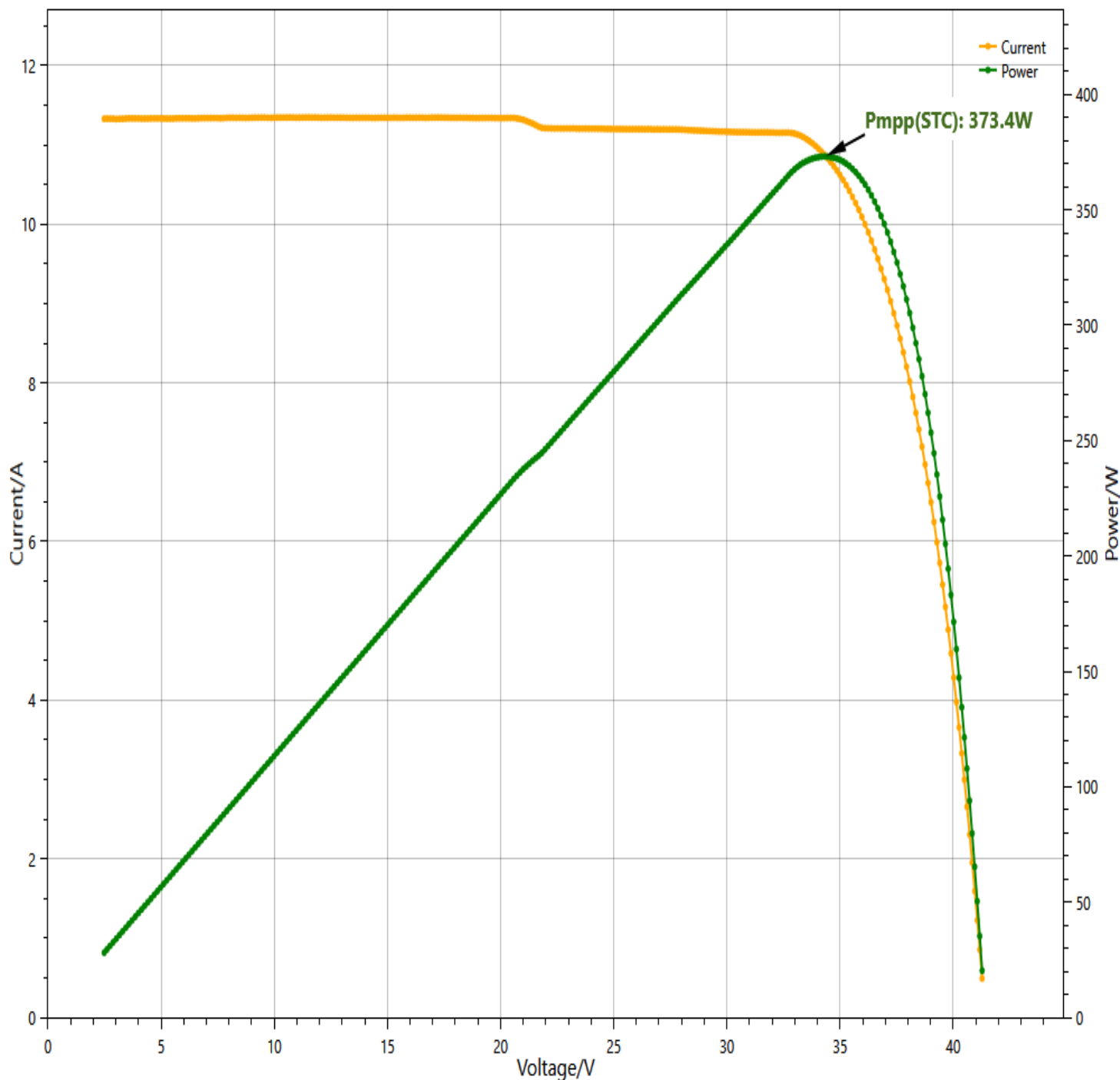
Measured [W/m2] 203.2 997.9
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901132239

Module ID: 12104050871092

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



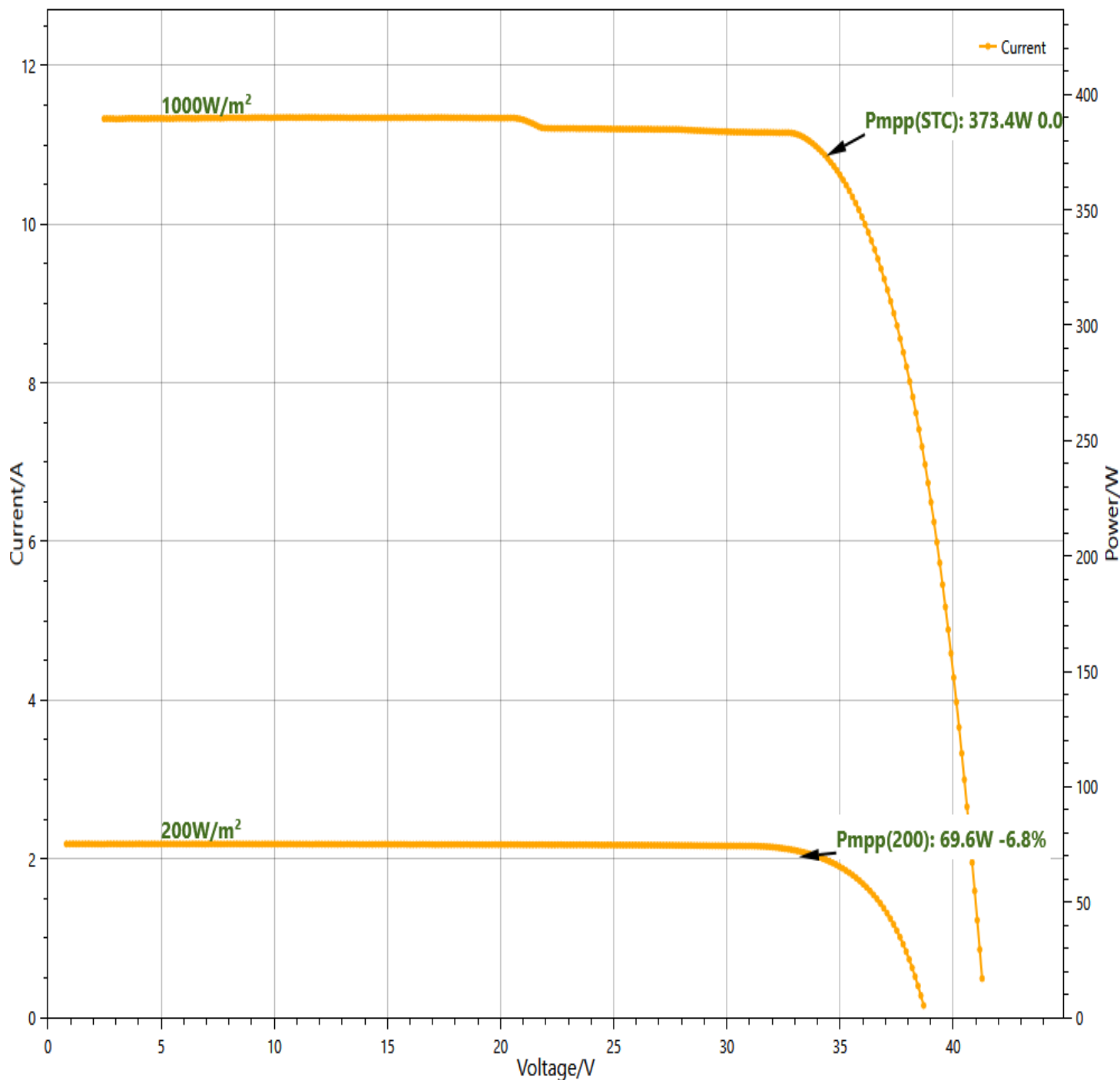
	Pmpp[W]	Imp[A]	Ump[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	373.4	10.86	34.38	11.33	41.43	1000.0	79.6
Measured	375.0	10.83	34.63	11.36	41.36	998.5	79.8
Tmod[°C]:25.4	Tref[°C]:26.4		Tfl[°C]:26.38		Tout[°C]:n/a		T[ms]:142.0
Type:Mono	alpha[%]:0.050		beta[%]:-0.350				
IEC aICF:0.060	IEC Rs[Ohm]:0.01						
Software:748p	Reference: ISE_Mono_Reference						
	FFCorr: -0.960%						

MBJ Unique ID: 600120210901132239

Module ID: 12104050871092

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.6	373.4
Module Eff [%]	18.8	20.2
Eff Delta [%]	-6.8	0.0

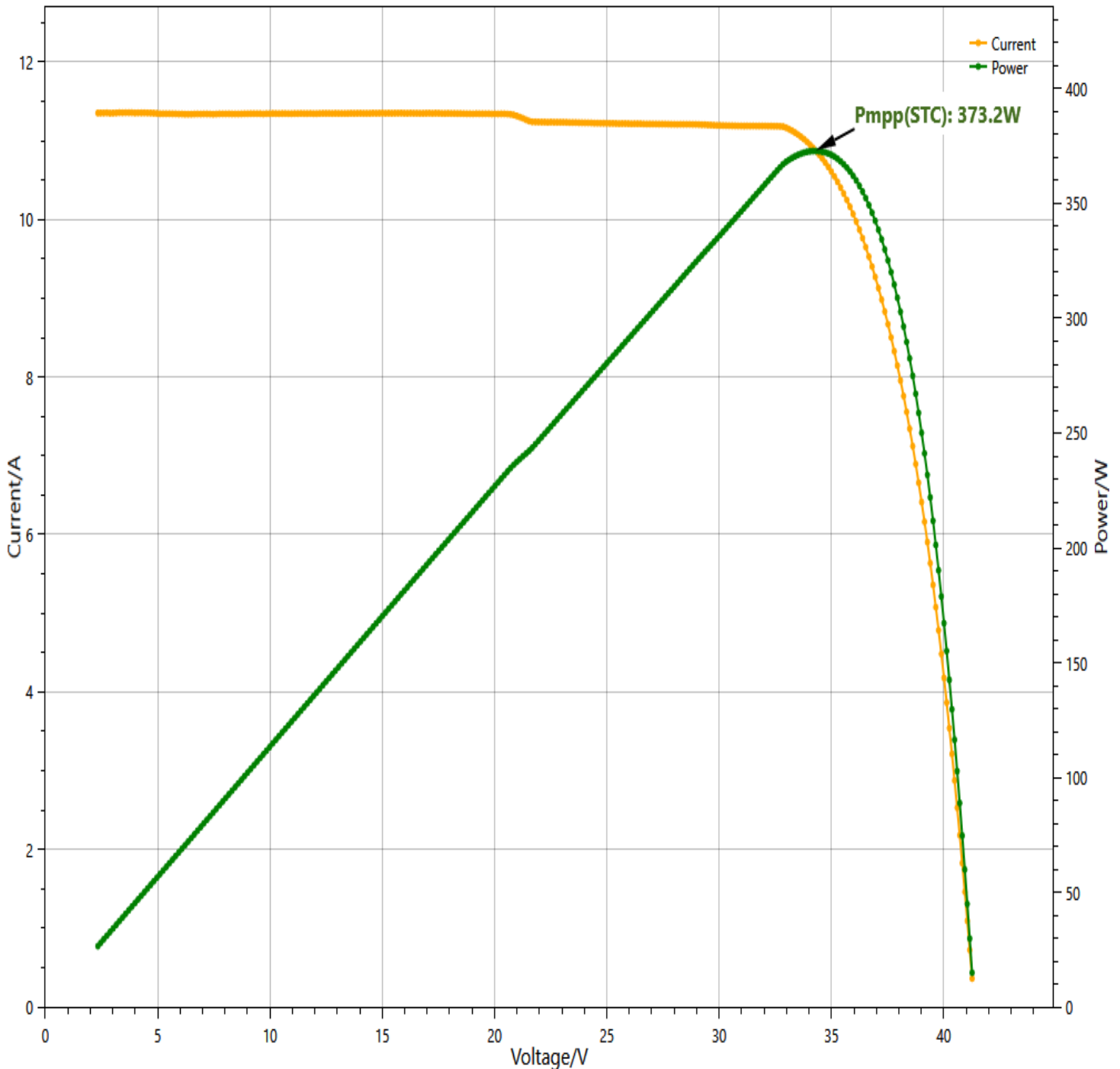
Measured [W/m2] 203.3 998.5
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901155754

Module ID: 12104050871100

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



	Pmpp[W]	Impp[A]	Ump[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	373.2	10.88	34.31	11.37	41.37	1000.0	79.3
Measured	375.9	10.83	34.70	11.38	41.46	997.6	79.7

Tmod[°C]:24.3	Tref[°C]:26.5	Tfl[°C]:26.91	Tout[°C]:n/a	T[ms]:142.5
Type:Mono	alpha[%]:0.050	beta[%]:-0.350		
IEC aICF:0.060	IEC Rs[Ohm]:0.01			
Software:748p				

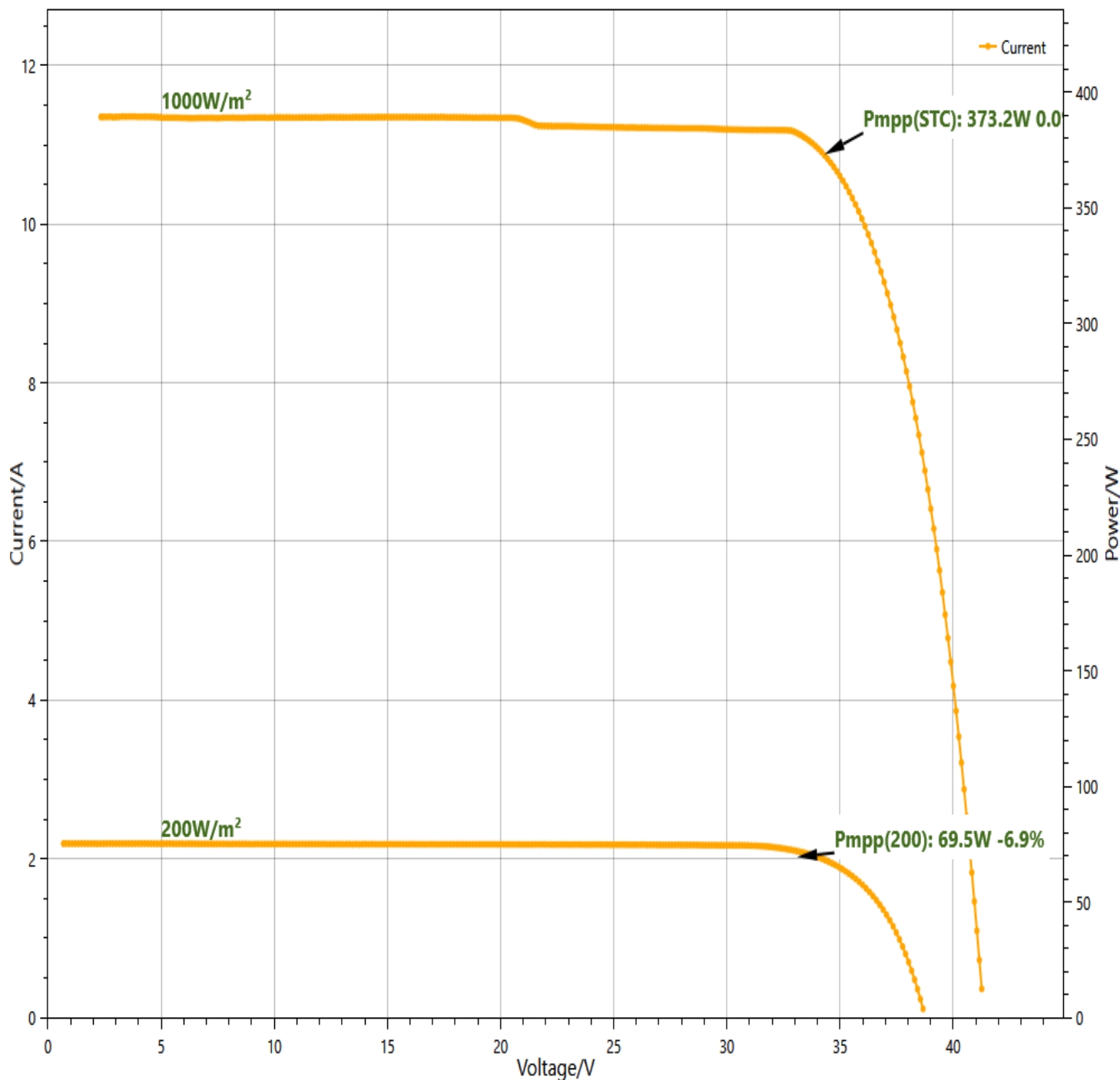
Reference: ISE_Mono_Reference
FFCorr: -0.960%

MBJ Unique ID: 600120210901155754

Module ID: 12104050871100

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.5	373.2
Module Eff [%]	18.8	20.2
Eff Delta [%]	-6.9	0.0

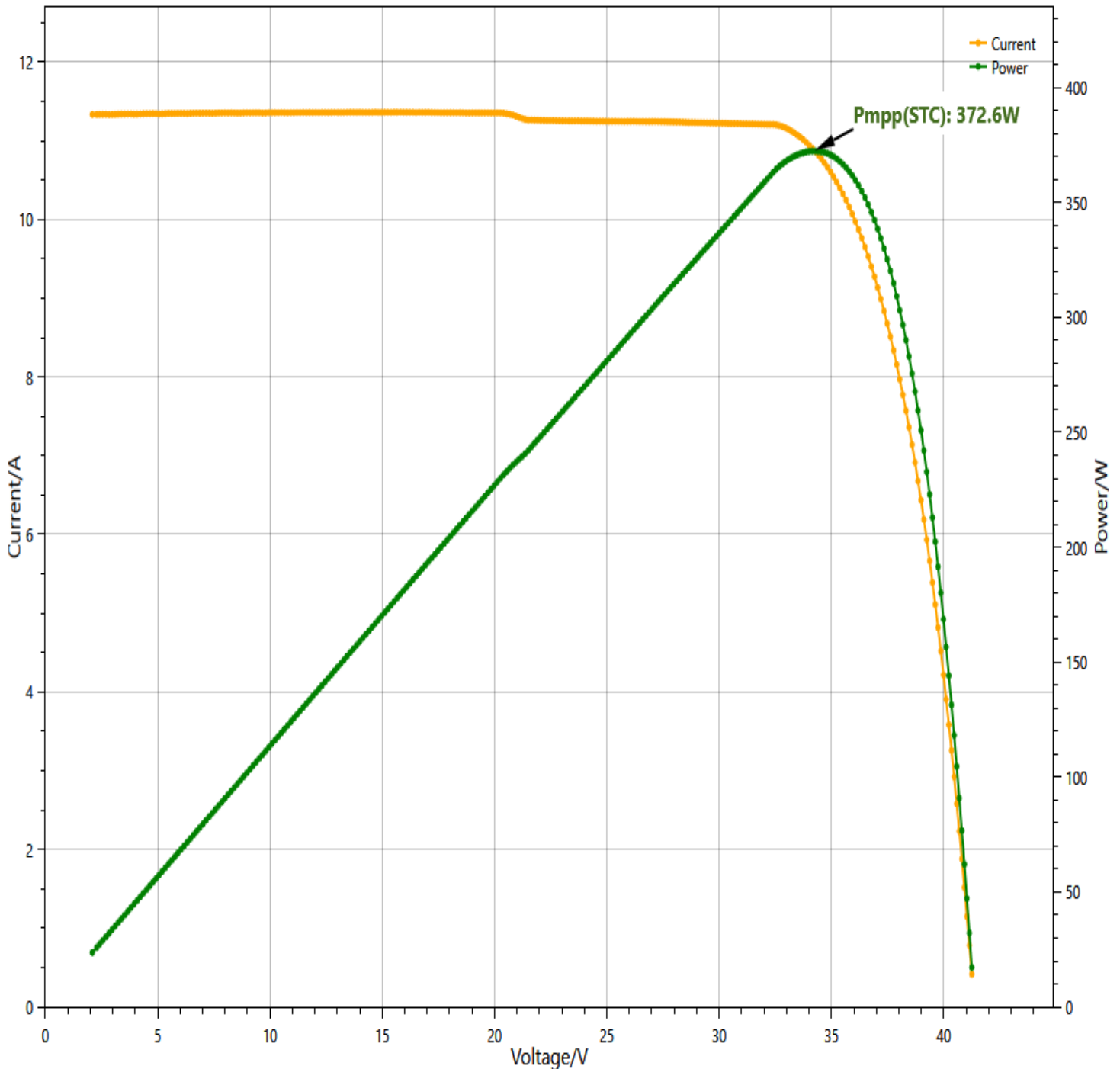
Measured [W/m2] 203.1 997.6
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901133232

Module ID: 12104050920037

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



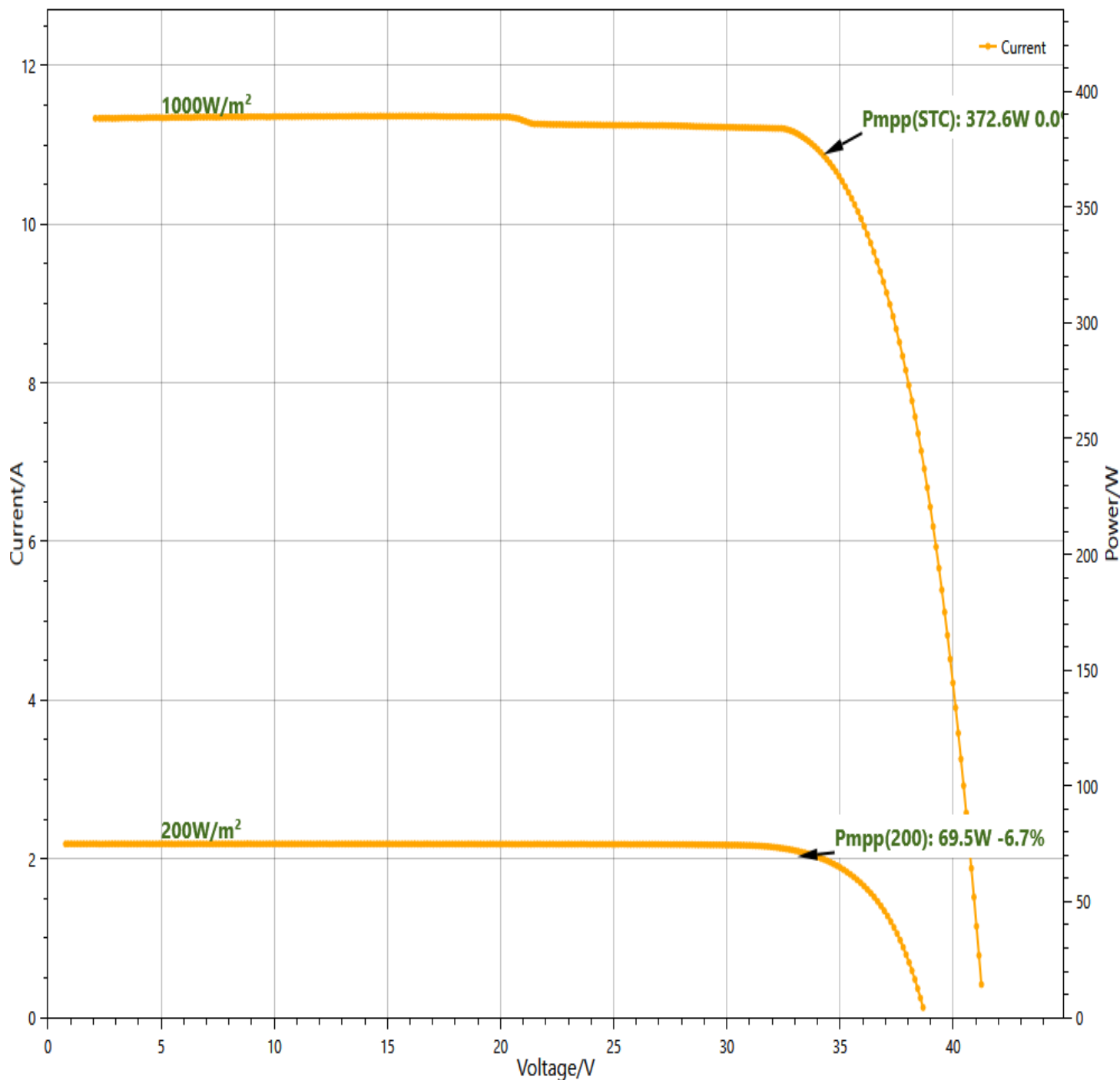
	Pmpp[W]	Impp[A]	Umpp[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	372.6	10.88	34.26	11.33	41.38	1000.0	79.5
Measured	375.9	10.84	34.68	11.35	41.48	998.4	79.9
Tmod[°C]:24.2	Tref[°C]:26.4		Tfl[°C]:28.25		Tout[°C]:n/a		T[ms]:143.0
Type:Mono	alpha[%]:0.050		beta[%]:-0.350				
IEC aICF:0.060	IEC Rs[Ohm]:0.01						
Software:748p			Reference: ISE_Mono_Reference				
			FFCorr: -0.960%				

MBJ Unique ID: 600120210901133232

Module ID: 12104050920037

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.5	372.6
Module Eff [%]	18.8	20.1
Eff Delta [%]	-6.7	0.0

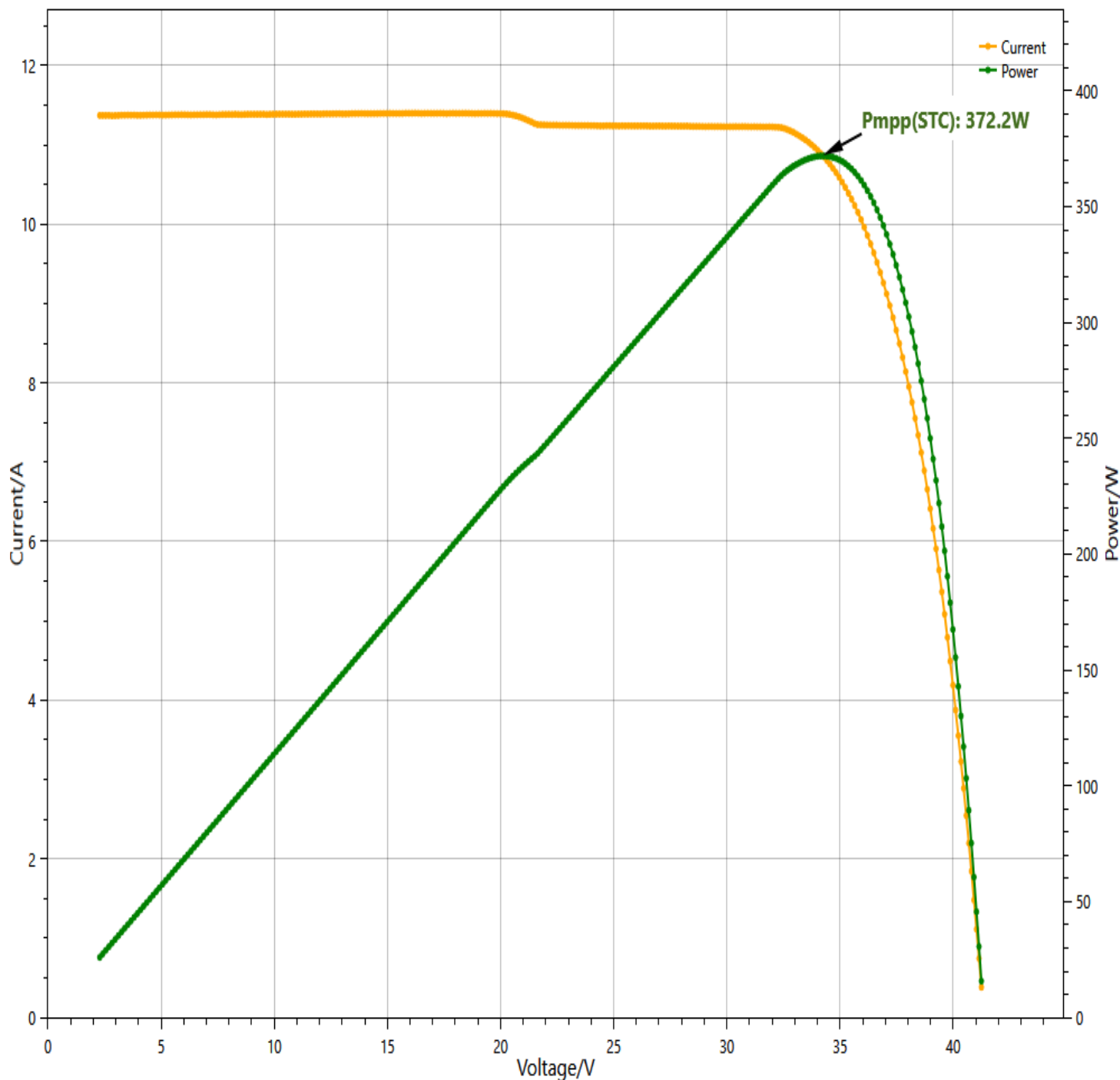
Measured [W/m2] 203.3 998.4
Module Width/Height (Portrait) [mm]:1048*1765

MBJ Unique ID: 600120210901154907

Module ID: 12104050920063

Type ID: CanadianSolar / CS3L-370MS

I-V Curve



	Pmpp[W]	Impp[A]	Ump[V]	Isc[A]	Uoc[V]	Irr[W/m2]	FF[%]
IEC60891 STC	372.2	10.87	34.24	11.36	41.36	1000.0	79.2
Measured	375.1	10.82	34.66	11.38	41.47	997.6	79.5

Tmod[°C]:24.2	Tref[°C]:26.6	Tfl[°C]:27.08	Tout[°C]:n/a	T[ms]:142.5
Type:Mono	alpha[%]:0.050	beta[%]:-0.350		
IEC aICF:0.060	IEC Rs[Ohm]:0.01			
Software:748p				

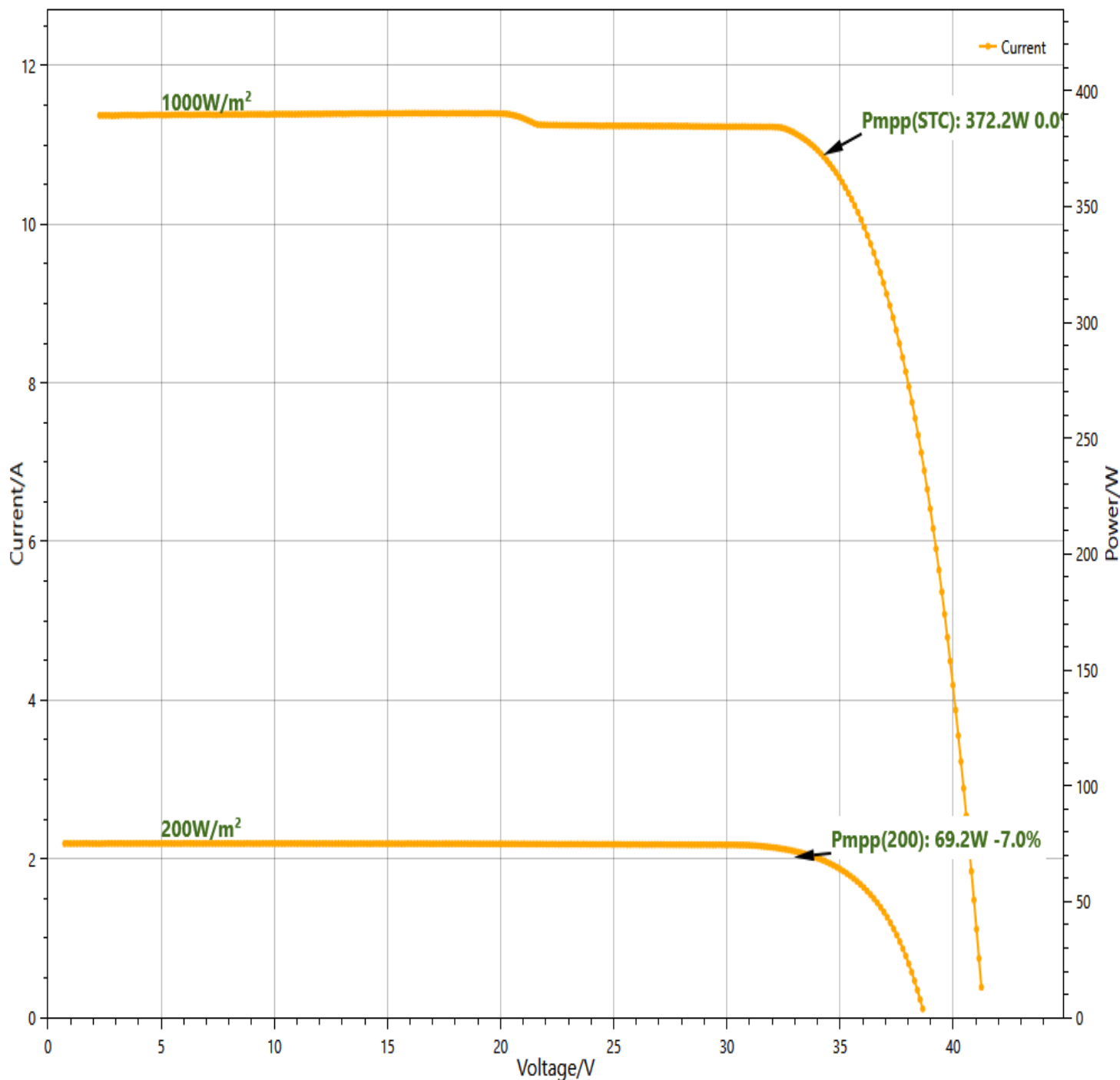
Reference: ISE_Mono_Reference
FFCorr: -0.960%

MBJ Unique ID: 600120210901154907

Module ID: 12104050920063

Type ID: CanadianSolar / CS3L-370MS

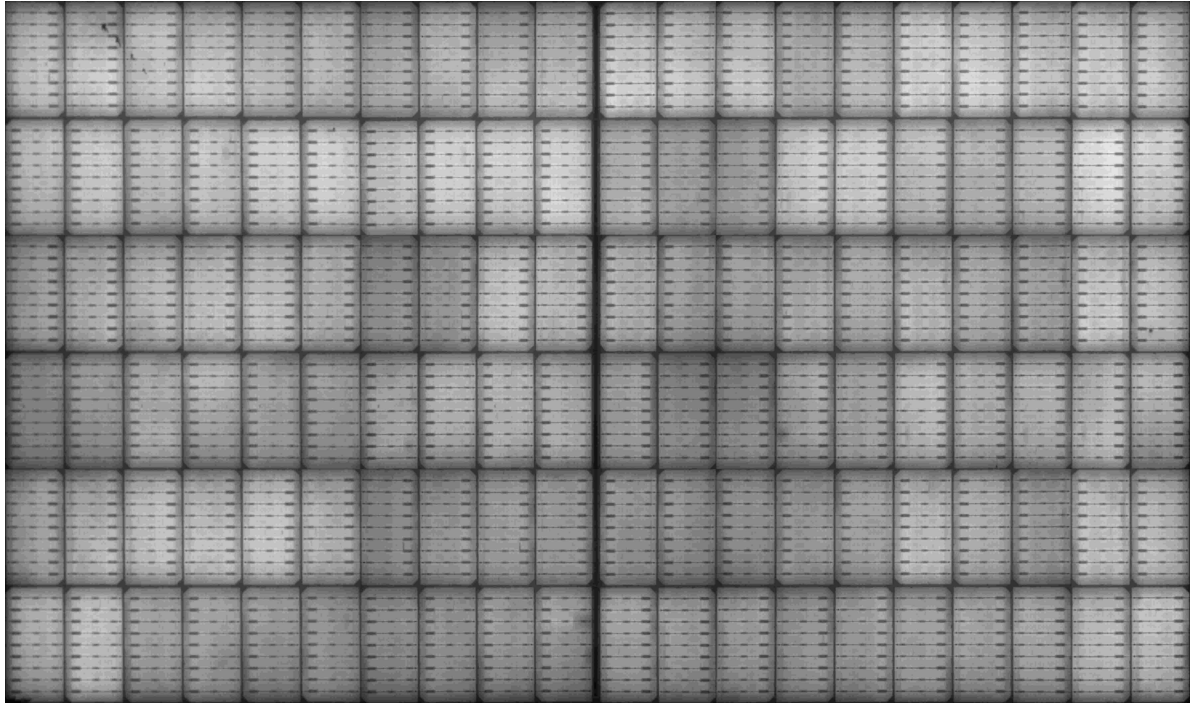
I-V Curve



IEC60891 Irr [W/m2]	200	1000
IEC60891 Pmpp [W]	69.2	372.2
Module Eff [%]	18.7	20.1
Eff Delta [%]	-7.0	0.0

Measured [W/m2] 203.1 997.6
Module Width/Height (Portrait) [mm]:1048*1765

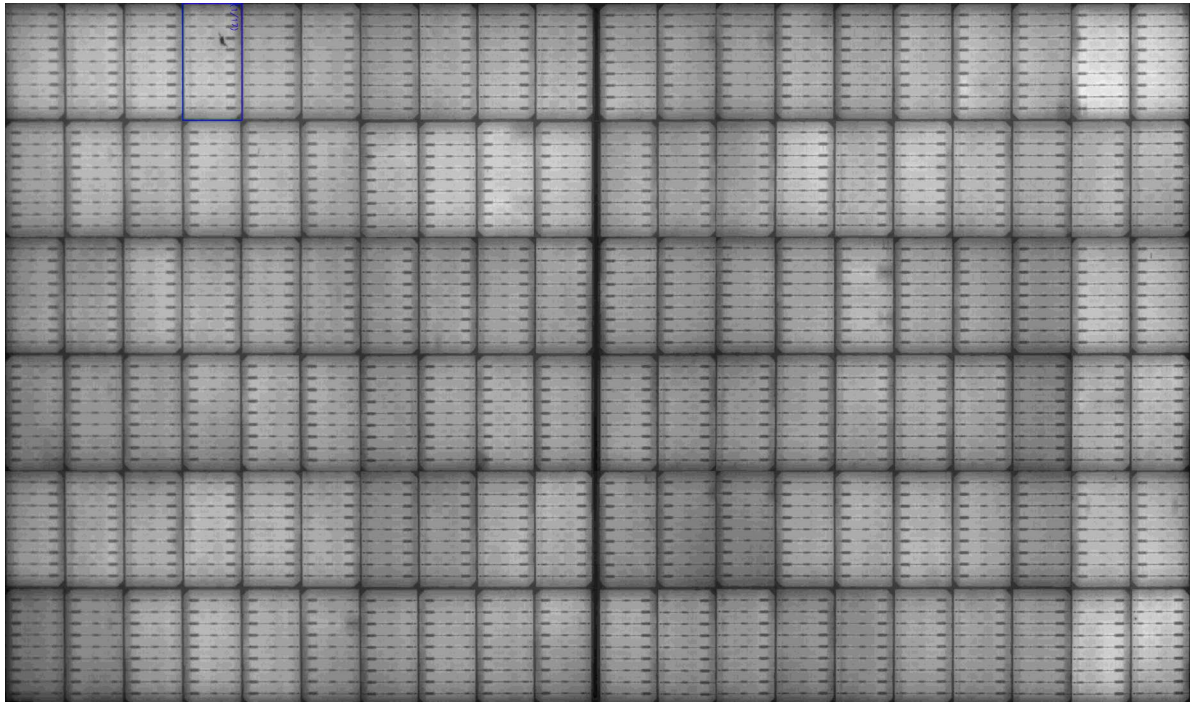
Electroluminescence for 600120210901153438



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

Voltage[V]: 45.360

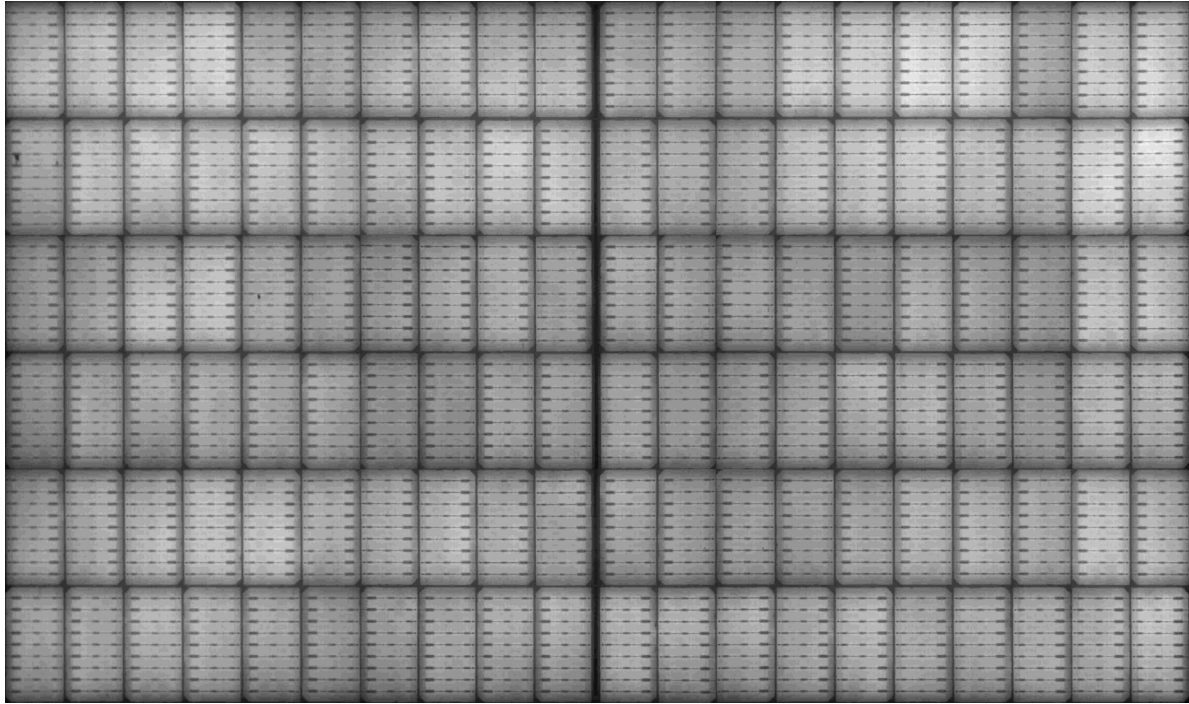
Electroluminescence for 600120210901154424



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

Voltage[V]: 45.360

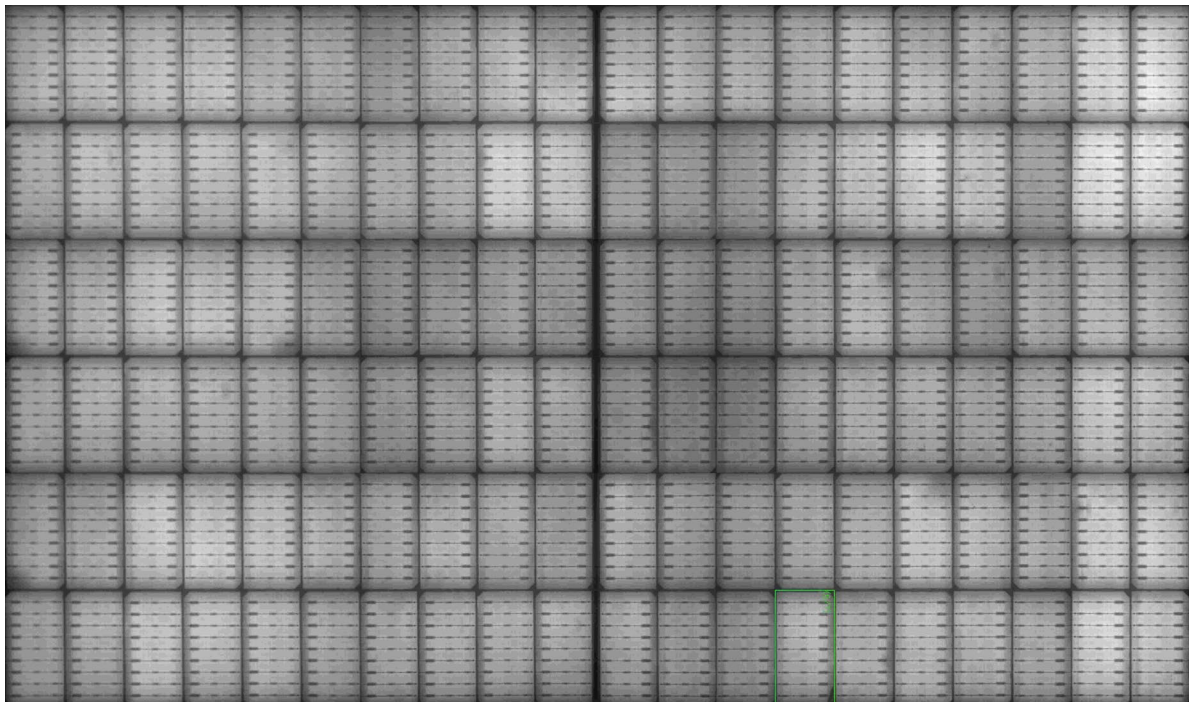
Electroluminescence for 600120210901155342



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

Voltage[V]: 45.360

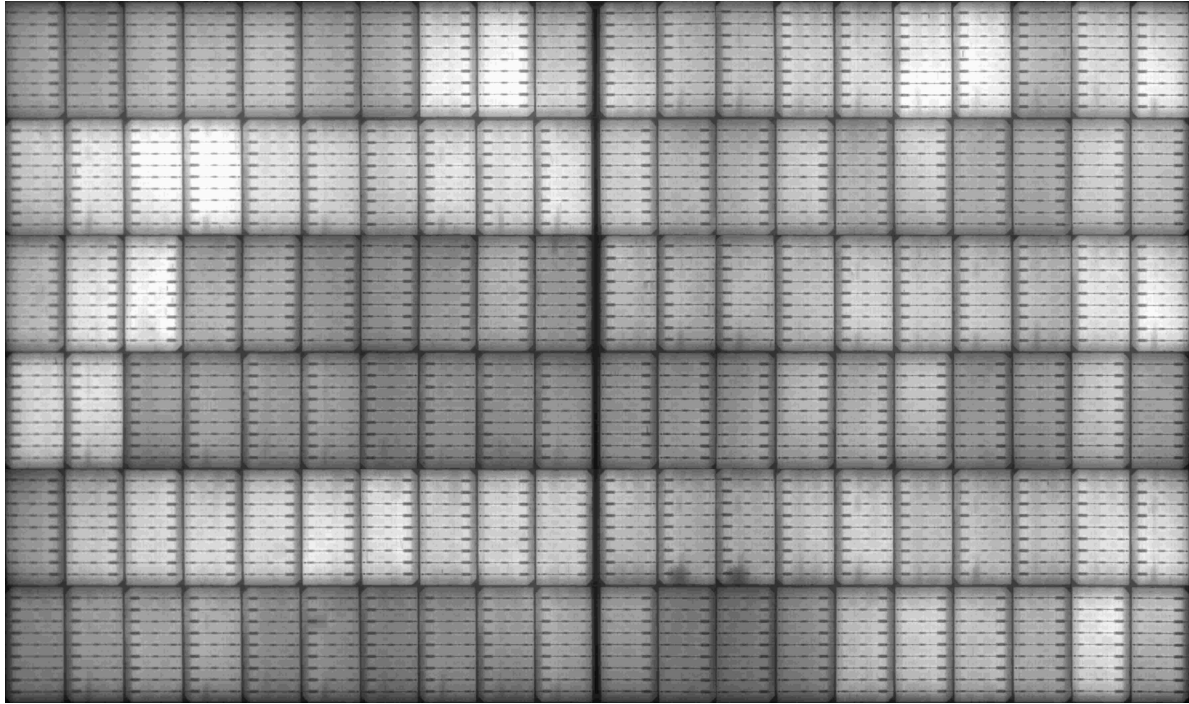
Electroluminescence for 600120210901152527



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

Voltage[V]: 45.360

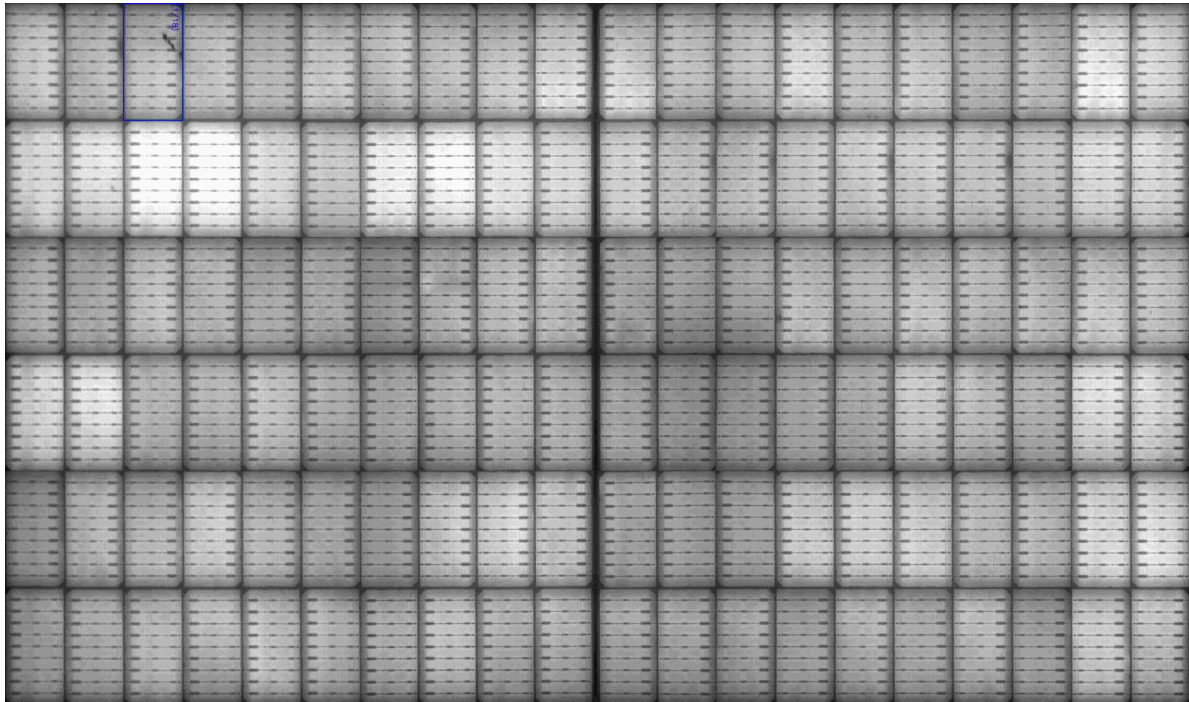
Electroluminescence for 600120210901153017



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

Voltage[V]: 45.360

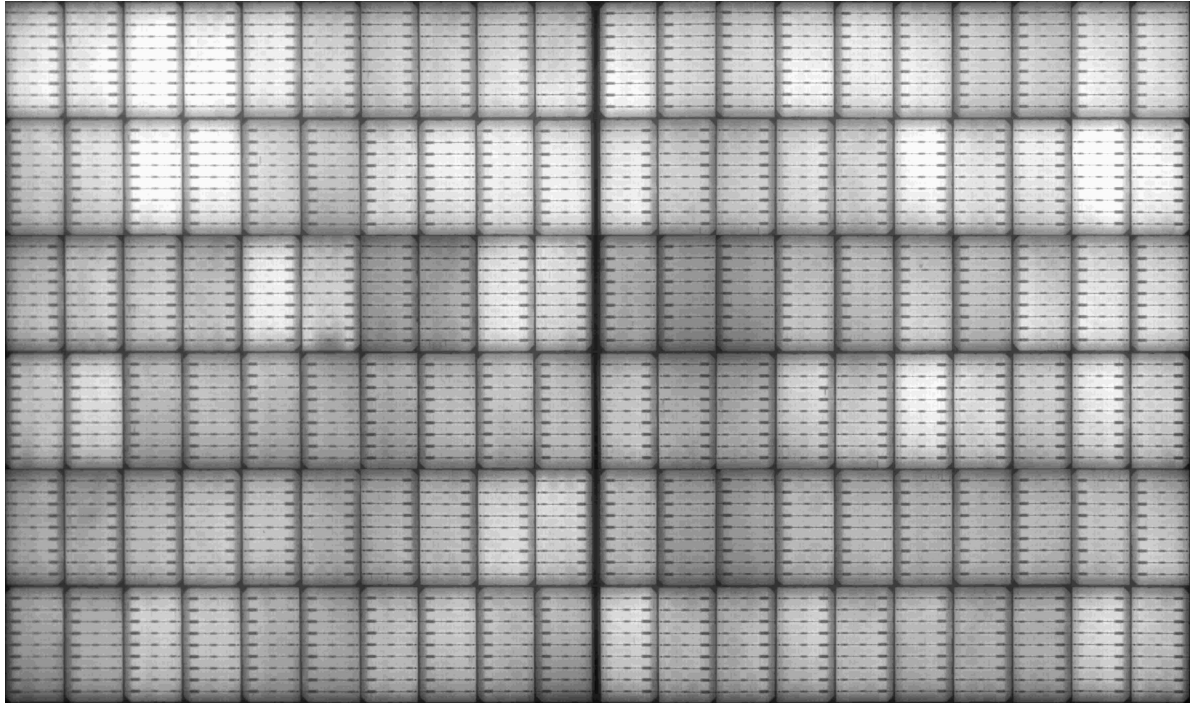
Electroluminescence for 600120210901153946



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

Voltage[V]: 45.680

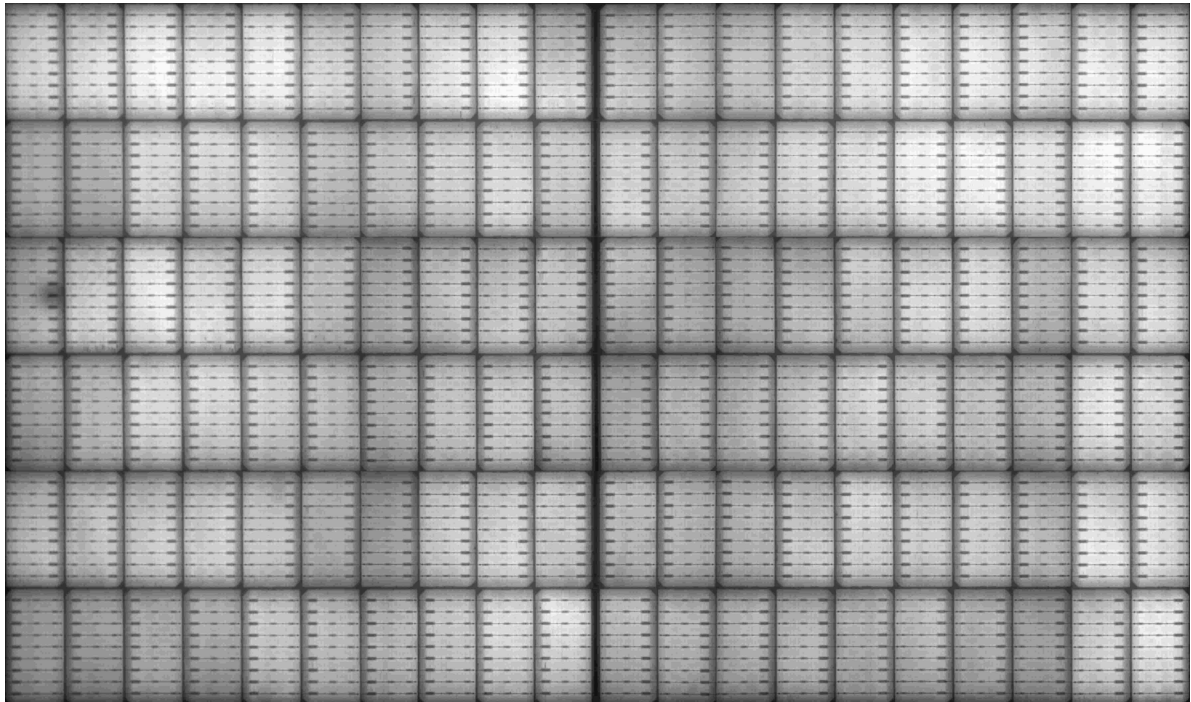
Electroluminescence for 600120210901132239



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

Voltage[V]: 45.360

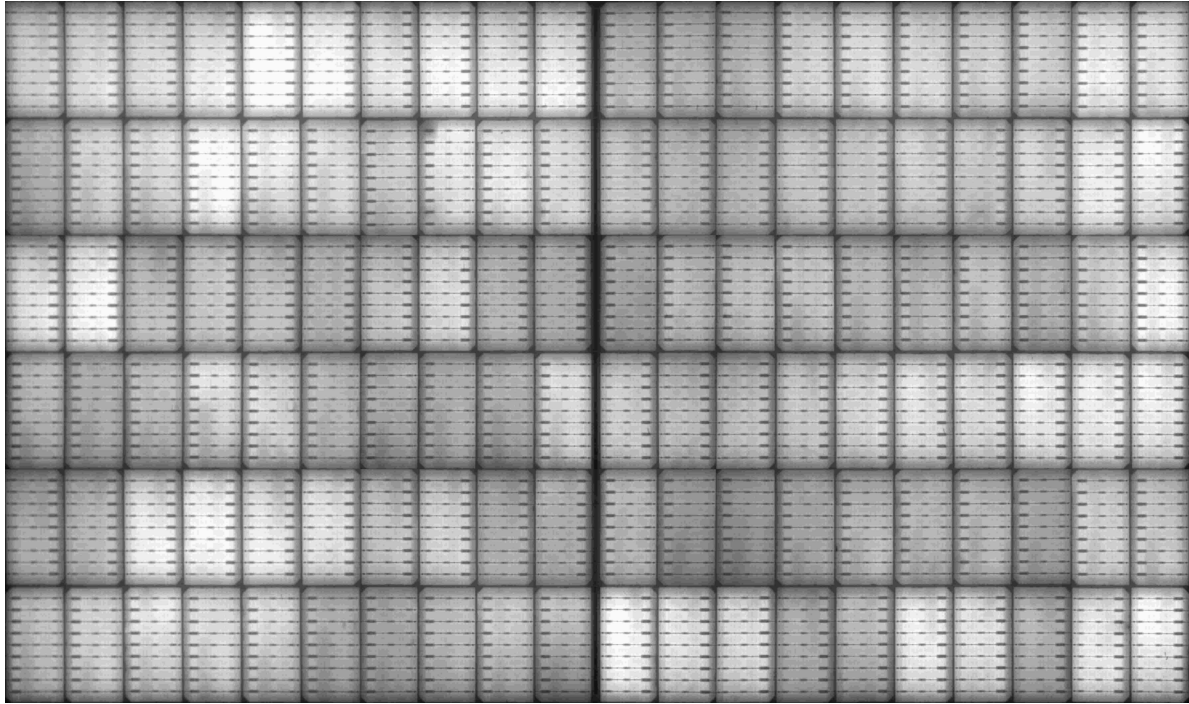
Electroluminescence for 600120210901155754



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

Voltage[V]: 45.680

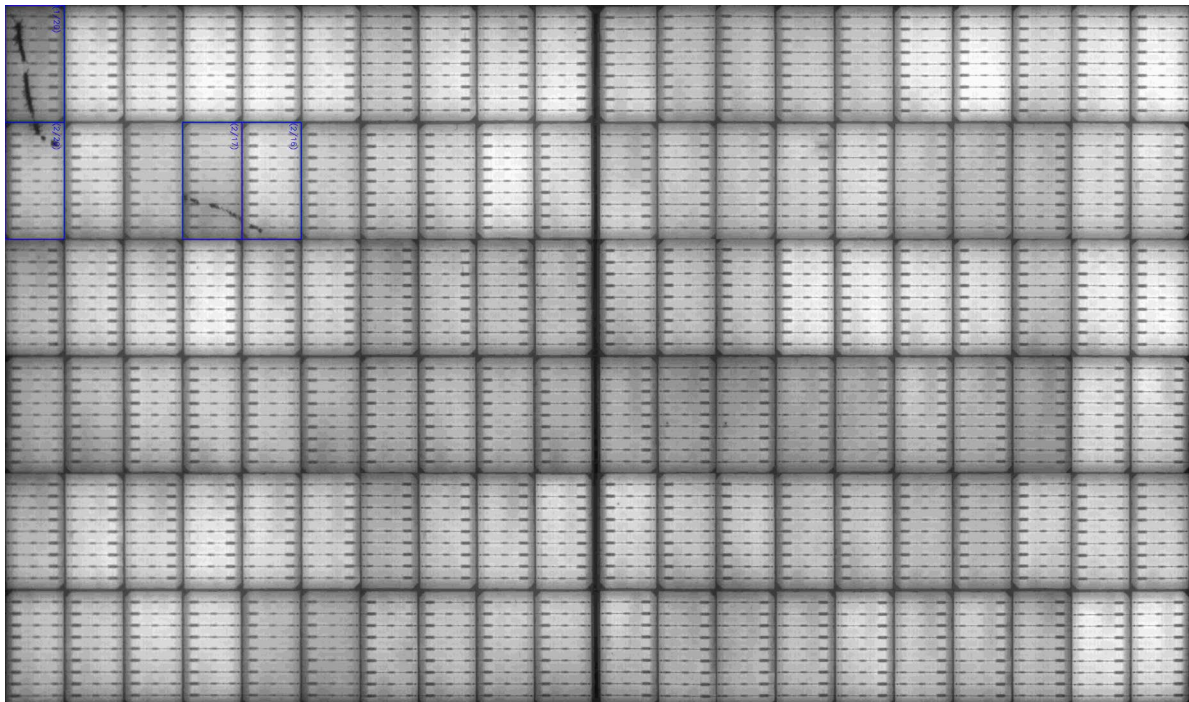
Electroluminescence for 600120210901133232



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

Voltage[V]: 45.680

Electroluminescence for 600120210901154907



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

Voltage[V]: 45.680

MBJ Unique ID	Module ID	Module Type/Description	Judgment
600120210901153438	12104050870628	CanadianSolar CS3L-370MS	ClassB
600120210901154424	12104050870635	CanadianSolar CS3L-370MS	ClassB
600120210901155342	12104050870773	CanadianSolar CS3L-370MS	ClassB
600120210901152527	12104050870793	CanadianSolar CS3L-370MS	ClassB
600120210901153017	12104050870985	CanadianSolar CS3L-370MS	ClassB
600120210901153946	12104050871064	CanadianSolar CS3L-370MS	ClassB
600120210901132239	12104050871092	CanadianSolar CS3L-370MS	ClassB
600120210901155754	12104050871100	CanadianSolar CS3L-370MS	ClassB
600120210901133232	12104050920037	CanadianSolar CS3L-370MS	ClassB
600120210901154907	12104050920063	CanadianSolar CS3L-370MS	ClassB

MBJ Unique ID	Connection Check	Diode Test	HiPot Test	GND Bond Tests		
				Port 1	Port 2	Port 3
600120210901153438	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901154424	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901155342	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901152527	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901153017	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901153946	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901132239	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901155754	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901133232	Successfull	Successfull	n/a	n/a	n/a	n/a
600120210901154907	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[%]
600120210901153438	372.9	10.89	34.23	11.33	41.24	1000.0	79.8
600120210901154424	372.7	10.86	34.31	11.32	41.21	1000.0	79.9
600120210901155342	374.2	10.91	34.29	11.36	41.22	1000.0	79.9
600120210901152527	372.4	10.86	34.29	11.31	41.24	1000.0	79.8
600120210901153017	372.8	10.89	34.23	11.36	41.31	1000.0	79.5
600120210901153946	373.6	10.90	34.27	11.33	41.32	1000.0	79.8
600120210901132239	373.4	10.86	34.38	11.33	41.43	1000.0	79.6
600120210901155754	373.2	10.88	34.31	11.37	41.37	1000.0	79.3
600120210901133232	372.6	10.88	34.26	11.33	41.38	1000.0	79.5
600120210901154907	372.2	10.87	34.24	11.36	41.36	1000.0	79.2

MBJ Unique ID	Red	Yellow	Green	Blue	White
600120210901153438	0	0	0	0	120
600120210901154424	0	0	0	1	119
600120210901155342	0	0	0	0	120
600120210901152527	0	0	1	0	119
600120210901153017	0	0	0	0	120
600120210901153946	0	0	0	1	119
600120210901132239	0	0	0	0	120
600120210901155754	0	0	0	0	120
600120210901133232	0	0	0	0	120
600120210901154907	0	0	0	4	116