



ITRI
Industrial Technology
Research Institute

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MEASUREMENT SERVICE REPORT

Industrial Technology Research Institute

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Test Report

Date Issued : 2021-10-05

Report No. : 11055C01031-2-2-02

Version : A

Service Item : 日照計累積照度比對英文測試報告

Brand Name : -----

Model(Item No./Style) : -----

Serial No. : -----

Client

Company Name : 日灝能源科技股份有限公司

Address : 新北市板橋區溪福里金門街369巷11號7樓

Result of Service Item, performed by ITRI Laboratory, is specified on the next/ following page(s).

This report, including a signature page and content, is a total of 11 pages. The validity of this report no longer exists if signature page and content are separated.



Signature

Vice President and General Director
Green Energy and Environment
Research Laboratories

Chao Yang Huang

Department Manager



Commission Information:

Sample name : Pyranometer

Brand name 、 Model no. 、 Serial no. : Refer to table 1

Duration of test : September 03 to September 30, 2021

Laboratory Information:

Lab. name: Photovoltaics System Testing Laboratory

Address of Lab.: Rm. 415, BF., No. 360, Gaofa 2nd Rd., Guiren Dist., Tainan City 711,
Taiwan (R.O.C.)

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宋洪義

Approval Signatory

宋洪義

Testing Lab. Head



I. Test Results and Descriptions:

1. Information of pyranometer




Table 1				
Item	Brand name	Model no.	Serial no.	Provider
Table A	Hukseflux	SR30-D1	6586	ITRI-GEL-R300- Photovoltaics System Testing Laboratory
Table B	Deltaohm	PYRA03AC	21013200	日灝能源
Table C	Hukseflux	SR05-D2A2	9379	日灝能源

2. Documentation:

Table 2	
Customer information	日灝能源科技股份有限公司
Test site address	Roof of Building C, No. 360, Gaofa 2nd Rd., Guiren Dist., Tainan City 郵遞區號, Taiwan (R.O.C.) 台南市歸仁區高發二路 360 號 C 棟屋頂
Site information	
Latitude, Longitude	A(22°55'15.4"N 120°17'29.6"E) B(22°55'13.0"N 120°17'30.6"E) C(22°55'13.8"N 120°17'32.8"E) D(22°55'16.1"N 120°17'31.8"E)
Data acquisition timing and reporting	Sampling 3 seconds
	Recording 1 minute
	Reporting 28 days (2021/09/03~2021/09/30)
Angle of pyranometer	Global horizontal irradiance



3. Measured parameters:

Table A		
Measured parameters	Global horizontal irradiance	
Number of sensor	1 pcs	
Manufacturer	Hukseflux	
Mode/Serial No.	SR30-D1/6586	
Sensor locations		
		
Pyranometer at the red circle		
Sensor maintenance	Recalibration	(1) Once per year (2) Report No.: 10907C03567-1-1-03
Sensor type	Classified	

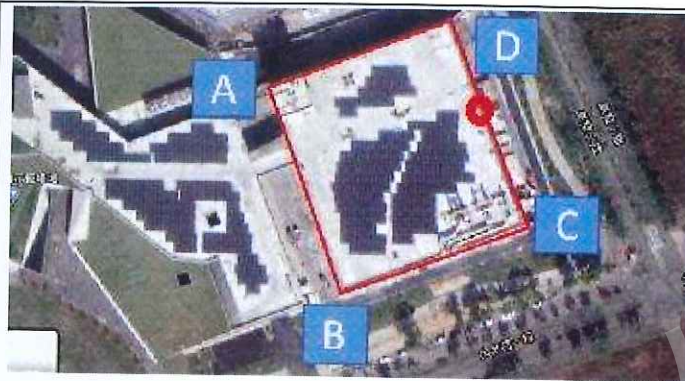


<input checked="" type="checkbox"/> Thermopile pyranometers	<input checked="" type="checkbox"/> Class A	<input checked="" type="checkbox"/> Secondary standard per ISO 9060 <input type="checkbox"/> High quality per WMO Guide No. 8 (Uncertainty $\leq 3\%$ for hourly totals)
	<input type="checkbox"/> Class B	<input type="checkbox"/> First class per ISO 9060 <input type="checkbox"/> Good quality per WMO Guide No. 8 (Uncertainty $\leq 8\%$ for hourly totals)
	<input type="checkbox"/> Class C	Any: _____
<input type="checkbox"/> PV reference cell <input type="checkbox"/> PV reference module	<input type="checkbox"/> Class A	Uncertainty $\leq 3\%$ from (100 ~1500) $\text{W} \cdot \text{m}^2$
	<input type="checkbox"/> Class B	Uncertainty $\leq 8\%$ from (100 ~1500) $\text{W} \cdot \text{m}^2$
	<input type="checkbox"/> Class C	Any: _____
<input type="checkbox"/> Photodiode sensors	<input type="checkbox"/> Class A	Not applicable: _____
	<input type="checkbox"/> Class B	Not applicable: _____
	<input type="checkbox"/> Class C	Any: _____



Table B

Measured parameters	Global horizontal irradiance
Number of sensor	1 pcs
Manufacturer	Deltaohm
Mode/Serial No.	PYRA03AC/21013200
Sensor locations	



Pyranometer at the red circle


Sensor maintenance	Recalibration	N/A
Sensor type	Classified	
<input checked="" type="checkbox"/> Thermopile pyranometers	<input type="checkbox"/> Class A	<input type="checkbox"/> Secondary standard per ISO 9060 <input type="checkbox"/> High quality per WMO Guide No. 8 (Uncertainty $\leq 3\%$ for hourly totals)
	<input type="checkbox"/> Class B	<input type="checkbox"/> First class per ISO 9060 <input type="checkbox"/> Good quality per WMO Guide No. 8 (Uncertainty $\leq 8\%$ for hourly totals)
	<input checked="" type="checkbox"/> Class C	Any: Second class pyranometer according to ISO 9060.
<input type="checkbox"/> PV reference cell <input type="checkbox"/> PV reference module	<input type="checkbox"/> Class A	Uncertainty $\leq 3\%$ from (100 ~1500) $W \cdot m^2$
	<input type="checkbox"/> Class B	Uncertainty $\leq 8\%$ from (100 ~1500) $W \cdot m^2$
	<input type="checkbox"/> Class C	Any: _____
<input type="checkbox"/> Photodiode sensors	<input type="checkbox"/> Class A	Not applicable: _____
	<input type="checkbox"/> Class B	Not applicable: _____
	<input type="checkbox"/> Class C	Any: _____



Table C

Measured parameters	Global horizontal irradiance
Number of sensor	1 pcs
Manufacturer	Hukseflux
Mode/Serial No.	SR05-D2A2/9379
Sensor locations	



		
		Pyranometer at the red circle
Sensor maintenance	Recalibration	N/A
Sensor type	Classified	
■ Thermopile pyranometers	<input type="checkbox"/> Class A	<input type="checkbox"/> Secondary standard per ISO 9060 <input type="checkbox"/> High quality per WMO Guide No. 8 (Uncertainty $\leq 3\%$ for hourly totals)
	<input type="checkbox"/> Class B	<input type="checkbox"/> First class per ISO 9060 <input type="checkbox"/> Good quality per WMO Guide No. 8 (Uncertainty $\leq 8\%$ for hourly totals)
	■ Class C	Any: <u>Second class pyranometer according to ISO 9060.</u>
<input type="checkbox"/> PV reference cell <input type="checkbox"/> PV reference module	<input type="checkbox"/> Class A	Uncertainty $\leq 3\%$ from (100 ~1500) $W \cdot m^2$
	<input type="checkbox"/> Class B	Uncertainty $\leq 8\%$ from (100 ~1500) $W \cdot m^2$
	<input type="checkbox"/> Class C	Any: _____
<input type="checkbox"/> Photodiode sensors	<input type="checkbox"/> Class A	Not applicable: _____
	<input type="checkbox"/> Class B	Not applicable: _____
	<input type="checkbox"/> Class C	Any: _____



4. Test result:

Date	Duration ^{Note 1}	Module no./SN		
		SR30-D1	LPPYRA03AC	SR05-D2A2
		6586	21013200	9379
2021/9/3	10:20:36 ^{Note 2} ~15:36:18	2.34	2.24	2.34
2021/9/4	05:58:27~17:09:21	5.25	4.98	5.22
2021/9/5	06:11:54~17:36:00	5.10	4.86	5.09
2021/9/6	05:57:00~17:56:12	5.41	5.16	5.39
2021/9/7	05:55:15~18:02:12	6.00	5.69	5.98
2021/9/8	06:00:51~17:59:06	5.72	5.45	5.69
2021/9/9	06:04:48~17:58:45	6.27	6.02	6.30
2021/9/10	05:57:00~17:50:39	6.28	6.02	6.32
2021/9/11	06:07:42~17:42:06	2.89	2.75	2.86
2021/9/12	06:16:24~17:51:45	2.92	2.81	2.91
2021/9/13	06:07:42~17:39:57	1.40	1.34	1.39
2021/9/14	05:51:09~17:48:21	6.56	6.30	6.56
2021/9/15	05:56:57~17:45:21	6.37	6.08	6.35
2021/9/16	06:07:57~17:48:06	6.67	6.36	6.67
2021/9/17	06:02:15~17:57:48	6.16	5.87	6.16
2021/9/18	06:02:48~17:46:45	5.09	4.85	5.10
2021/9/19	06:15:30~17:47:51	5.45	5.20	5.46
2021/9/20	06:03:57~17:43:39	5.94	5.69	5.98
2021/9/21	06:03:33~17:58:12	3.54	3.36	3.52
2021/9/22	06:02:18~17:47:21	6.04	5.75	6.04
2021/9/23	06:02:12~17:49:42	5.82	5.53	5.80
2021/9/24	06:03:48~17:38:54	5.44	5.19	5.42
2021/9/25	06:05:45~17:57:06	5.34	5.09	5.36
2021/9/26	06:04:57~17:40:39	6.56	6.27	6.60
2021/9/27	06:06:42~17:36:24	4.47	4.25	4.47
2021/9/28	06:07:51~17:36:03	5.92	5.68	5.93
2021/9/29	06:07:30~17:35:42	5.28	5.05	5.27
2021/9/30	06:08:45~17:32:06	4.99	4.72	4.96
2021/09/03~2021/09/30 Summing the irradiance		145.22 kWh/m ²	138.58 kWh/m ²	145.12 kWh/m ²
Deviation(Benchmark:SR30-D1)		N/A	4.57 %	0.06 %

Note 1: According to process data for irradiance and PV-generated power should be restricted to the daylight hours of each day (sunrise to sunset, irradiance $\geq 20 \text{ W/m}^2$) to avoid extraneous night-time data values that introduce errors in analyses, unless such errors have been demonstrated to be negligible.

Note 2: Start to tset.



II. Descriptions:

1. Date and Location of Test

The test was performed at the site address in table2, ITRI during the period from September 03, 2021 to September 30, 2021.

2. Test Methods : According to the IEC 61724-1:2017.

3. Equipment of test

Standard equipment	Serial No.	Traceability Unit	Report No.	Traceability Date	Due Date
Irradiance	6586	ITRI-CMS	10907C03567-1-1-03	2020/10/08	2021/10/07

III. References:

1. IEC 61724-1 : 2017, first edition, Photovoltaic system performance –Part 1: Monitoring.

