

## PHOTON Lab's outdoor module tests: Results of 2014 yield measurements

2014 rank	Manufacturer	Model	Performance ratio (%) 2014	Yield (kWh/kW) 2014	Deviation from test winner (%)	Cell type	Origin	Production dates*1	Installed in	STC power (W)	Module Area (m <sup>2</sup> )	Yield per area (kWh/m <sup>2</sup> ) 2014	2013 rank
1	Sopray Energy	SR-190	94.9	1,178.3	-	Mono	-	-	1/2013	190.8	1.28	175.7	1
2	Risen Energy	SYP190S-M	94.7	1,175.7	0.22	Mono	CN	-	10/2012	188.9	1.28	173.5	2
3	Sonalis	SL190TU-36M	94.4	1,173.0	0.45	Mono	CN	-	8/2012	196.6	1.28	180.2	5
4	Sunpower	SPR-245NE-WHT-D	93.9	1,166.4	1.01	Mono	-	-	1/2012	245.2	1.24	230.7	-
5	Renesola	JC245M-24/Bbv	93.7	1,163.6	1.25	quasi-mono	-	-	10/2012	246.6	1.63	176.0	8
6	Hanwha Q Cells	Q.PRO-G2 235	93.6	1,162.3	1.36	Multi	PL	-	11/2012	236.9	1.67	164.9	4
7	Huanghe Photovoltaic Technology	HH230(30)P	93.6	1,162.0	1.38	Multi	CN	-	1/2012	231.7	1.64	164.2	-
8	Sunpower	SPR-327NE-WHT-D	93.5	1,160.8	1.49	Mono	-	-	1/2012	325.8	1.63	232.0	-
9	Risen Energy	SYP250M	93.4	1,159.7	1.58	Mono	CN	-	7/2012	243.7	1.63	173.4	6
10	ET Solar Industry	ET-M660250WW	93.2	1,158.1	1.71	Mono	CN	-	12/2012	248.9	1.63	176.8	3
11	Sunpower	SPR-320NE-WHT-D	93.1	1,156.3	1.87	Mono	-	-	1/2012	325.5	1.63	230.9	-
12	Jinko Solar	JKM275P-72	92.9	1,154.1	2.05	Multi	-	-	4/2012	275.5	1.94	163.9	14
13	Seraphim Solar System	SRP-220-6PB	92.6	1,150.6	2.35	Multi	CN	-	10/2011	226.1	1.63	159.6	12
14	Hareon Solar Technology	HR-230P-18/Bb	92.4	1,148.3	2.55	Multi	-	-	7/2011	230.6	1.62	163.5	20
15	Sopray Energy	SR-156P-235	92.4	1,147.7	2.60	Multi	-	-	1/2013	235.6	1.64	164.9	9
16	Phono Solar	PS190M-24/F	92.4	1,147.3	2.63	Mono	CN	-	5/2012	192.0	1.28	172.1	24
17	CSG PVTech	CSG240M2	92.4	1,147.2	2.64	Multi	-	-	1/2013	242.8	1.63	170.9	7
18	CSG PVTech	CSG250S2	92.3	1,146.8	2.67	Mono	-	-	1/2013	250.1	1.63	176.0	10
19	Runda PV	RS230P-60	92.3	1,146.7	2.68	Multi	CN	-	1/2012	237.8	1.64	166.3	33
20	Topsolar Green	TSM96-125M-250W	92.3	1,146.6	2.69	Mono	CN	-	3/2012	246.6	1.70	166.3	-
21	Jinko Solar	JKM190M-72	92.2	1,145.4	2.79	Mono	-	2010	7/2011	191.1	1.28	171.0	13
22	Renesola	JC250S-24/Bb	92.2	1,144.9	2.83	Mono	-	-	6/2012	246.5	1.63	173.2	-
23	RealForce Power	RF-240P60	92.0	1,142.9	3.00	Multi	CN	-	1/2013	241.9	1.64	168.6	11
24	ET Solar Industry	ET-P660240	92.0	1,142.2	3.06	Multi	CN	-	7/2011	236.1	1.63	165.4	16
25	Hirmin Clean Energy	HG-190S/Ba	91.9	1,141.6	3.11	Mono	-	-	1/2012	194.5	1.28	173.5	-
25	JA Solar Technology	JAP6 60-240/3BB	91.9	1,141.6	3.11	Multi	-	-	1/2013	242.1	1.63	169.6	-
27	Renesola	JC245M-24/Bb	91.9	1,141.5	3.12	Multi	-	-	10/2012	247.7	1.63	173.4	30
28	V-Energy	VE260PV	91.9	1,140.9	3.17	Multi	IT	-	1/2012	234.6	1.66	161.3	35
29	Fluitemik	FTS-220 P	91.8	1,140.2	3.23	Multi	PT	-	11/2011	231.8	1.62	163.2	-
30	Chaori Solar Energy	CRM245S156M-60	91.8	1,139.8	3.27	Mono	-	-	5/2012	246.3	1.63	172.2	60
31	Chint Solar / Astronergy	CHSM 5612M (185)	91.7	1,139.5	3.29	Mono	-	-	1/2012	187.4	1.28	166.8	-
32	Huanghe Photovoltaic Technology	HH190(36)M	91.7	1,138.9	3.34	Mono	CN	-	1/2012	190.9	1.28	169.9	47
33	Kinmac Solar	KSS-6P6A-230	91.6	1,138.3	3.39	Multi	TW	2010	2/2011	234.1	1.64	162.5	28
34	Yingli Green Energy Holding	YL240P-29b	91.6	1,138.0	3.42	Multi	CN	-	1/2012	246.6	1.63	172.2	-
35	JCS Solar	JCSM290M-72	91.5	1,137.0	3.51	Mono	-	-	1/2012	296.9	1.94	174.0	54
35	Sunlink PV	SL220-20M230	91.5	1,137.0	3.51	Mono	CN	-	2/2011	237.9	1.65	163.9	22
37	Linuo Group	LN240(30)P-3-240	91.5	1,136.5	3.55	Multi	-	-	1/2013	239.5	1.64	165.9	25
38	Apollo Solar Energy	ASEC-235G6M	91.4	1,135.8	3.61	Multi	TW	2011	1/2012	238.0	1.61	167.9	-
38	Qixin Solar Electrical Appliance	SL250CE-48M	91.4	1,135.8	3.61	Mono	-	-	4/2012	255.9	1.69	172.0	56
40	NESL Solartech	DJ-235P	91.4	1,135.1	3.67	Multi	CN	-	5/2012	237.7	1.63	165.5	39
41	Lightway Green New Energy	LW235(29)P1650x990	91.4	1,134.8	3.69	Multi	CN	-	4/2012	235.7	1.63	164.1	42
42	Win Win Precision Technology	Winaico WSP-240P6	91.4	1,134.7	3.70	Multi	-	-	4/2012	245.2	1.66	167.6	107
43	Solon	SOLON Blue 230/07(Z25)	91.3	1,133.7	3.79	Multi	DE	2008	2/2011	226.9	1.64	156.9	21
43	Sungen	SGM-235P	91.3	1,133.7	3.79	Multi	CN	-	5/2012	235.4	1.63	163.7	46
45	JA Solar Technology	JAM6-60-250/SI	91.3	1,133.5	3.80	Mono	-	-	1/2013	253.1	1.65	173.9	17
46	Eoply New Energy Technology	EP125M/72-190W	91.2	1,133.1	3.84	Mono	CN	-	1/2013	187.3	1.28	165.8	45
46	ITS Innotech Solar	EcoPlus ITS220ECU5	91.2	1,133.1	3.84	Multi	SE	2011	1/2012	242.7	1.65	166.6	-
46	Jinko Solar	JKM255PP-60	91.2	1,133.1	3.84	Multi	-	Since 3/2013	1/2014	254.4	1.64	176.1	-
49	ZN Shine PV-Tech	ZX250(48)MS	91.2	1,132.6	3.88	Mono	CN	-	7/2011	252.3	1.70	168.1	-
50	Phono Solar	PS230P-20/U	91.2	1,132.5	3.89	Multi	CN	-	5/2012	235.8	1.63	163.8	41
51	Qixin Solar Electrical Appliance	SL230CE-30P	91.2	1,132.4	3.90	Multi	-	-	4/2012	239.6	1.62	167.5	-
52	CH Solar	CH Solar 180 mono	91.1	1,131.8	3.95	Mono	CN	Through 2010	4/2010	184.4	1.28	163.0	40
53	CNPV Solar Power	CNPV-220P	91.1	1,131.1	4.01	Multi	CN	2006	7/2011	224.2	1.63	155.6	26
54	BYD	BYD 120P6-30	91.0	1,130.8	4.03	Multi	CN	-	9/2012	243.6	1.63	169.0	82
55	MPrime Solar Solutions	M 235P	91.0	1,130.6	4.05	Multi	PT	-	1/2012	240.7	1.61	169.0	-
56	China Sunergy	CSUN260-60M	91.0	1,130.0	4.10	Mono	CN	-	1/2012	254.0	1.62	177.2	61
57	SolarWorld	Sunmodule Plus SW 225 mono	91.0	1,129.8	4.12	Mono	US	2009	3/2010	233.4	1.67	157.9	37
58	Linuo Group	LN180(36)M-185	90.9	1,129.6	4.13	Mono	-	2003	7/2011	191.8	1.28	169.3	-
59	Sunflower Light	SF125x125-72-M(180)	90.9	1,129.1	4.18	Mono	CN	-	2/2011	176.6	1.28	155.8	63
60	Topsolar Green	TSM72-125M-190W	90.9	1,128.5	4.23	Mono	CN	-	7/2011	185.9	1.28	163.9	-

Performance ratio (%) 2013	Performance ratio (%) January 2014	Yield (kWh/kW) January 2014	Performance ratio (%) February 2014 (%)	Yield (kWh/kW) February 2014	Performance ratio (%) March 2014	Yield (kWh/kW) March 2014	Performance ratio (%) April 2014	Yield (kWh/kW) April 2014	Performance ratio (%) May 2014	Yield (kWh/kW) May 2014	Performance ratio (%) June 2014	Yield (kWh/kW) June 2014	Performance ratio (%) July 2014	Yield (kWh/kW) July 2014	Performance ratio (%) August 2014	Yield (kWh/kW) August 2014	Performance ratio (%) September 2014	Yield (kWh/kW) September 2014	Performance ratio (%) October 2014	Yield (kWh/kW) October 2014	Performance ratio (%) November 2014	Yield (kWh/kW) November 2014	Performance ratio (%) December 2014	Yield (kWh/kW) December 2014
94.0	104.1	47.1	102.7	65.6	95.8	125.7	95.4	130.0	94.1	141.1	92.0	151.0	90.2	141.3	94.5	123.6	92.9	114.7	96.2	69.8	100.0	50.9	103.6	17.6
93.8	104.6	47.3	101.9	65.2	95.4	125.2	94.6	128.9	94.3	141.4	92.3	151.6	90.1	141.2	94.0	123.0	92.6	114.3	95.5	69.3	99.5	50.7	105.1	17.8
93.3	104.6	47.3	101.9	65.1	96.1	126.1	95.0	129.5	93.8	140.7	91.7	150.6	89.8	140.7	93.4	122.2	92.3	113.9	95.0	68.9	99.3	50.6	103.0	17.5
-	101.2	45.7	101.4	64.8	95.2	124.9	94.4	128.6	93.7	140.6	92.0	151.1	90.4	141.7	93.1	121.8	91.6	113.0	93.7	67.9	96.0	48.9	101.7	17.3
93.1	104.5	47.3	102.4	65.5	95.0	124.6	93.9	128.0	92.6	138.9	90.5	148.6	88.3	138.4	92.4	120.9	91.8	113.3	95.3	69.2	100.3	51.1	106.0	18.0
93.3	104.8	47.4	103.0	65.9	94.3	123.7	92.9	126.6	92.4	138.6	90.5	148.6	88.4	138.5	92.8	121.5	91.8	113.3	95.5	69.2	100.2	51.1	106.3	18.0
-	103.8	46.9	101.3	64.7	94.2	123.5	93.5	127.4	92.7	139.0	90.7	149.0	89.7	140.5	92.7	121.2	91.3	112.7	94.8	68.7	99.3	50.6	104.7	17.8
-	100.8	45.6	99.6	63.7	94.1	123.4	94.7	129.0	93.7	140.6	91.6	150.4	89.9	140.9	92.4	120.9	91.4	112.9	93.5	67.8	95.7	48.7	100.2	17.0
93.1	103.7	46.9	101.9	65.2	94.4	123.9	94.0	128.1	93.0	139.5	90.7	148.9	88.1	138.0	92.5	121.0	90.9	112.2	94.0	68.2	98.4	50.1	104.9	17.8
93.4	103.5	46.8	101.6	64.9	94.4	123.8	94.0	128.1	92.9	139.4	90.7	149.0	88.7	139.0	91.9	120.3	90.7	112.0	93.1	67.5	97.4	49.6	104.3	17.7
-	101.0	45.7	99.6	63.7	94.0	123.2	93.7	127.6	92.9	139.4	91.2	149.7	89.2	139.8	92.5	121.0	91.3	112.7	93.2	67.6	95.5	48.6	102.0	17.3
92.6	104.3	47.2	102.1	65.3	94.4	123.8	93.4	127.2	91.9	137.9	89.5	147.0	87.2	136.7	91.8	120.1	91.0	112.3	94.3	68.4	99.2	50.6	105.3	17.9
92.6	102.8	46.5	101.1	64.6	94.6	124.0	93.3	127.2	92.2	138.3	90.0	147.8	87.4	137.0	91.2	119.3	90.7	111.9	92.9	67.4	96.0	48.9	104.3	17.7
92.1	103.5	46.8	101.1	64.6	94.3	123.7	92.6	126.2	91.4	137.1	89.2	146.5	87.1	136.5	91.1	119.2	90.9	112.2	93.0	67.5	97.9	49.9	107.3	18.2
93.0	102.8	46.5	100.9	64.5	93.7	122.9	92.7	126.3	91.7	137.5	89.8	147.4	87.3	136.8	91.4	119.6	90.1	111.2	93.1	67.5	97.5	49.7	105.1	17.8
92.0	100.9	45.6	99.5	63.6	92.9	121.9	92.1	125.5	91.8	137.8	89.9	147.6	88.1	138.1	92.1	120.5	90.8	112.0	93.4	67.8	97.0	49.4	103.4	17.6
93.1	102.6	46.4	101.3	64.7	93.8	123.0	92.8	126.4	91.7	137.6	89.4	146.8	87.3	136.8	91.4	119.6	90.3	111.4	92.6	67.2	97.1	49.5	104.1	17.7
93.0	102.7	46.4	101.2	64.7	93.6	122.7	92.7	126.3	91.6	137.3	89.7	147.2	87.0	136.4	91.5	119.7	90.2	111.3	93.1	67.5	97.2	49.5	104.5	17.7
91.5	103.3	46.7	100.5	64.2	93.7	122.9	92.7	126.4	91.4	137.1	89.5	146.9	87.2	136.6	91.4	119.5	89.8	110.8	92.6	67.2	97.9	49.9	108.7	18.4
-	102.7	46.4	101.0	64.6	94.1	123.4	92.9	126.5	91.8	137.6	89.6	147.1	87.4	136.9	90.8	118.7	90.6	111.8	92.6	67.2	96.6	49.2	100.8	17.1
92.6	102.5	46.4	100.7	64.3	94.0	123.3	92.6	126.2	91.5	137.3	89.4	146.7	87.1	136.5	90.8	118.7	90.5	111.7	92.6	67.1	96.9	49.4	104.8	17.8
-	102.3	46.3	100.4	64.2	92.9	121.9	92.5	126.0	91.4	137.1	89.4	146.8	87.2	136.7	91.5	119.6	90.0	111.1	93.2	67.6	97.4	49.6	106.1	18.0
92.8	102.5	46.4	101.1	64.6	93.4	122.5	92.7	126.3	91.6	137.4	89.5	146.9	87.1	136.5	90.9	118.9	89.4	110.3	92.1	66.8	95.9	48.9	102.6	17.4
92.2	104.1	47.1	101.1	64.6	93.5	122.6	92.4	125.8	91.2	136.8	88.9	146.0	86.5	135.5	90.7	118.6	89.7	110.7	92.6	67.1	97.2	49.5	104.9	17.8
-	101.0	45.7	99.0	63.3	92.5	121.3	91.7	124.9	91.4	137.0	89.5	147.0	87.7	137.4	91.1	119.2	90.4	111.6	93.1	67.6	96.9	49.3	101.5	17.2
-	102.6	46.4	100.6	64.3	93.4	122.5	92.5	126.0	91.3	136.9	89.1	146.4	86.9	136.1	90.8	118.8	90.1	111.2	91.9	66.7	95.2	48.5	104.6	17.8
91.7	103.1	46.6	100.7	64.3	92.7	121.6	91.3	124.3	90.7	136.0	88.9	145.9	86.7	135.9	91.1	119.1	90.5	111.6	93.7	67.9	99.0	50.4	103.9	17.6
91.4	103.6	46.8	100.5	64.2	92.9	121.8	91.8	125.1	90.8	136.2	88.5	145.3	86.7	135.9	91.2	119.3	89.8	110.8	93.4	67.8	98.4	50.1	103.4	17.6
-	101.2	45.8	100.3	64.1	93.4	122.5	92.2	125.6	91.0	136.5	89.1	146.4	86.5	135.6	91.0	119.0	89.9	110.9	93.3	67.7	95.9	48.8	102.3	17.4
90.7	101.9	46.1	100.2	64.0	92.3	121.0	91.4	124.5	91.0	136.5	89.3	146.6	86.8	136.0	91.0	119.0	90.0	111.1	92.9	67.4	97.7	49.8	104.7	17.8
-	103.4	46.7	98.9	63.2	92.9	121.8	92.1	125.5	91.0	136.5	89.2	146.4	87.1	136.4	90.2	117.9	90.0	111.1	92.7	67.3	97.4	49.6	100.7	17.1
90.9	101.0	45.6	99.8	63.8	92.9	121.8	91.9	125.2	90.8	136.2	88.9	145.9	86.9	136.1	91.1	119.2	89.8	110.8	92.7	67.2	97.0	49.4	103.3	17.5
91.7	103.4	46.7	100.4	64.2	93.5	122.6	92.0	125.3	90.8	136.2	88.5	145.4	86.1	134.9	89.8	117.5	89.8	110.9	92.1	66.8	97.4	49.6	107.4	18.2
-	104.0	47.0	100.7	64.4	92.6	121.4	91.3	124.4	90.6	135.8	88.7	145.6	86.8	136.0	90.8	118.8	89.4	110.3	92.6	67.1	97.1	49.5	103.7	17.6
90.8	101.9	46.1	99.6	63.6	92.8	121.7	91.9	125.2	90.6	135.8	88.6	145.5	86.4	135.4	90.4	118.2	89.3	110.2	92.9	67.4	98.8	50.3	103.2	17.5
92.0	103.1	46.6	100.7	64.4	93.5	122.6	92.1	125.4	90.8	136.1	88.4	145.2	85.8	134.5	89.8	117.5	89.8	110.8	92.2	66.8	97.0	49.4	103.7	17.6
91.9	101.4	45.9	99.6	63.7	92.7	121.6	91.6	124.8	90.7	136.0	88.8	145.8	87.0	136.3	90.6	118.6	89.7	110.7	92.3	66.9	96.4	49.1	101.5	17.2
-	102.2	46.2	99.9	63.9	92.5	121.3	91.7	125.0	90.2	135.3	88.3	144.9	86.1	134.9	91.2	119.2	89.3	110.3	92.8	67.3	97.5	49.6	104.9	17.8
90.7	100.7	45.5	98.3	62.9	93.1	122.1	91.9	125.2	91.0	136.5	88.7	145.6	86.8	136.0	90.4	118.2	89.7	110.7	91.9	66.7	96.1	49.0	102.7	17.4
91.2	101.3	45.8	99.4	63.5	92.1	120.8	91.2	124.2	90.6	135.9	88.6	145.6	87.0	136.4	90.4	118.3	89.6	110.6	92.6	67.2	96.7	49.3	103.6	17.6
91.1	100.5	45.4	99.1	63.4	92.0	120.7	91.9	125.2	90.9	136.4	88.9	146.0	86.9	136.2	90.3	118.1	90.0	111.0	91.6	66.5	95.4	48.6	101.8	17.3
89.4	97.9	44.2	97.8	62.5	91.5	120.0	90.3	123.0	88.7	133.1	89.5	146.9	87.8	137.5	92.4	120.8	91.7	113.2	93.5	67.8	96.0	48.9	98.6	16.7
92.0	102.7	46.4	100.5	64.2	93.5	122.6	91.8	125.1	90.8	136.1	88.3	145.0	85.9	134.6	89.8	117.5	89.0	109.8	91.4	66.3	95.8	48.8	102.1	17.3
90.9	101.5	45.9	99.7	63.7	92.6	121.4	91.6	124.8	90.7	136.0	88.7	145.6	86.3	135.2	90.6	118.5	89.2	110.1	91.9	66.7	96.0	48.9	100.1	17.0
92.1	101.1	45.7	99.8	63.8	92.9	121.9	92.0	125.4	91.1	136.6	89.0	146.1	86.6	135.8	90.0	117.7	88.6	109.4	90.6	65.7	94.3	48.0	102.2	17.3
91.0	99.8	45.1	98.4	62.9	92.4	121.2	91.5	124.7	90.9	136.4	88.8	145.9	86.7	135.9	90.2	117.9	89.6	110.6	91.4	66.3	95.4	48.6	103.9	17.6
-	100.5	45.4	98.7	63.1	92.2	120.9	91.9	125.2	90.8	136.2	88.6	145.5	87.0	136.3	90.4	118.3	89.4	110.3	91.6	66.5	95.2	48.5	99.6	16.9
-	103.5	46.8	100.4	64.2	93.3	122.4	91.4	124.5	90.1	135.2	87.7	144.0	85.3	133.7	89.3	116.8	89.7	110.7	92.2	66.9	97.8	49.8	107.4	18.2
-	100.7	45.5	99.3	63.4	92.4	121.2	92.1	125.5	90.8	136.2	88.6	145.6	86.2	135.1	90.0	117.8	88.7	109.5	91.7	66.5	95.5	48.7	103.4	17.5
91.1	100.4	45.4	98.6	63.1	92.1	120.7	90.9	123.9	90.6	135.9	88.8	145.8	86.1	134.9	90.5	118.4	90.1	111.2	92.2	66.9	96.3	49.0		

## PHOTON Lab's outdoor module tests: Results of 2014 yield measurements

2014 rank	Manufacturer	Model	Performance ratio (%) 2014	Yield (kWh/kW) 2014	Deviation from test winner (%)	Cell type	Origin	Production dates*1	Installed in	STC power (W)	Module Area (m <sup>2</sup> )	Yield per area (kWh/m <sup>2</sup> ) 2014	2013 rank
61	CSG PV Tech	CSG180S1-35/36	90.8	1,127.7	4.29	Mono	CN	2008	6/2010	184.1	1.28	162.2	19
61	SolarWorld	Sunmodule Plus SW 225 poly	90.8	1,127.7	4.29	Multi	DE	2004-2011	2/2011	228.6	1.68	153.4	75
63	Chaoxi Solar Energy	CRM240S156P-60	90.8	1,127.6	4.30	Multi	-	-	5/2012	241.0	1.63	166.7	55
64	Topray Solar	TPS105T-180W	90.8	1,127.3	4.33	Mono	CN	-	5/2011	184.8	1.28	162.8	44
65	Amerisolar, Worldwide Energy & Manufacturing	AS-6P30-230W	90.7	1,126.2	4.42	Multi	-	-	1/2012	236.8	1.64	162.6	81
65	Luxor Solar	LX-250M/156-60+	90.7	1,126.2	4.42	Mono	-	-	1/2013	247.5	1.62	172.1	69
65	REC	Premium 210	90.7	1,126.2	4.42	Multi	SE	Through 2008	2/2011	212.2	1.65	144.8	18
68	Hengdian Group Dmegg	DM190-M125-72	90.6	1,125.7	4.46	Mono	CN	-	4/2012	196.6	1.28	172.9	-
68	Mage Solar	Mage Powertec Plus 230/6PH-US	90.6	1,125.7	4.46	Multi	US	-	7/2011	231.8	1.62	161.1	58
70	China Sunergy	CSUN250-60M	90.6	1,125.6	4.47	Mono	CN	-	1/2012	248.4	1.62	172.6	68
71	Kioto Photovoltaics	KPV 210 PE	90.6	1,125.5	4.48	Multi	AT	2008-2010	2009	206.6	1.49	156.1	84
72	CSG PV Tech	CSG230M2-30	90.6	1,125.3	4.50	Multi	CN	2008	6/2010	228.3	1.63	157.6	32
72	Win Win Precision Technology	Winaico WSP-230P6	90.6	1,125.3	4.50	Multi	TW	2009	2009	234.4	1.66	158.9	36
74	REC	REC245PE	90.6	1,125.2	4.51	Multi	SG	-	1/2013	242.4	1.65	165.3	64
75	Ningbo Solar Electric Power	Sun Earth TDB125x125-72-P 180W	90.6	1,125.0	4.52	Mono	CN	Through 2010	2/2011	179.2	1.28	157.5	43
76	Daqo New Energy	DQ235PSCa	90.6	1,124.8	4.54	Multi	CN	-	1/2012	238.0	1.63	164.3	-
77	Talesun Solar	TP572M 195W	90.5	1,124.6	4.56	Mono	CN	2011	1/2012	196.1	1.28	172.3	104
78	SolarWorld	Sunmodule Plus SW 245 poly	90.5	1,124.3	4.58	Multi	DE	-	1/2012	245.3	1.67	165.1	80
79	Solar Modules Nederland	TC245-MO	90.5	1,124.1	4.60	Mono	NL	2010-2011	2/2011	246.7	1.64	169.1	34
80	Amerisolar, Worldwide Energy & Manufacturing	AS-5M (190)	90.5	1,123.7	4.63	Mono	-	-	1/2012	195.0	1.28	171.2	92
81	Linsun Renewable Energy (LSP)	SK60P6225	90.5	1,123.6	4.64	Multi	-	-	7/2011	228.3	1.62	158.3	23
82	Sunerg Solar	XP 60/156-230	90.4	1,123.1	4.68	Multi	IT	-	2/2011	226.0	1.63	155.7	29
83	Aleo Solar	Aleo S_18 225	90.4	1,122.6	4.73	Multi	DE, ES	2005	4/2010	230.5	1.64	157.8	38
83	Solar-Fabrik	Premium L poly (225)	90.4	1,122.6	4.73	Multi	DE	-	2/2011	223.6	1.66	151.2	49
83	Sunage	SAM 96/5	90.4	1,122.6	4.73	Mono	CH	-	7/2011	256.6	1.78	161.8	66
86	Vikram Solar	ELDORA 220 (220)	90.4	1,122.5	4.74	Multi	-	-	7/2011	233.3	1.61	162.7	-
87	Mage Solar	Mage Powertec Plus 230/6PO	90.3	1,121.6	4.81	Multi	CN	-	1/2012	229.9	1.64	157.2	94
88	Axitec	AC-236P/156-60S	90.3	1,121.0	4.86	Multi	DE	Through 2011	2/2011	232.9	1.66	157.2	59
89	PV Power Technologies	PVQ3 220	90.2	1,120.3	4.92	Multi	IN	2008	2009	223.6	1.62	154.6	117
90	Solarwatt	M220-60 GET AK (230)	90.2	1,120.0	4.95	Mono	DE	2005	2/2011	231.5	1.66	156.2	65
91	Solargate	SG-2350	90.1	1,119.7	4.97	Multi	TW	-	1/2012	246.3	1.62	170.3	100
92	BP Solar International	BP 3280 T	90.1	1,119.1	5.02	Multi	-	Through 2011	5/2011	287.4	1.98	162.4	76
93	Jetion Solar	JT230(30)P1655x992	90.1	1,118.9	5.04	Mono	CN	2005	2/2011	232.4	1.64	158.6	73
93	Trina Solar Energy	TSM-250PC05	90.1	1,118.9	5.04	Multi	-	-	6/2012	249.3	1.64	170.1	93
95	Galaxy Energy	GS260m-96	90.1	1,118.6	5.07	Mono	DE	-	2/2011	252.9	1.67	169.4	77
95	S-Energy	SM-220PA8	90.1	1,118.6	5.07	Multi	KR	-	2009	224.4	1.59	157.9	50
97	ZSD (Zentralsolar Deutschland)	Genius SDM 185-10004-185	90.0	1,117.5	5.16	Mono	-	-	7/2011	190.6	1.28	166.4	52
98	REC	REC230PE	90.0	1,117.4	5.17	Multi	SG	2010	2/2011	237.6	1.65	160.9	53
99	Kenmec Mechanical Engineering	TKSA-23001	89.9	1,117.2	5.19	Multi	TW	-	7/2011	235.0	1.64	160.1	99
100	Bosch Solar Energy	Bosch c-Si M 60 230	89.9	1,117.1	5.19	Mono	DE	2009-2010	2/2011	233.2	1.64	158.8	67
100	Eoply New Energy Technology	EP156P/60-235W	89.9	1,117.1	5.19	Multi	CN	-	1/2013	237.8	1.63	163.0	71
100	Jinko Solar	JKM235P-60	89.9	1,117.1	5.19	Multi	-	-	1/2012	231.4	1.64	157.6	70
103	Conergy	Conergy PowerPlus 235P	89.9	1,116.2	5.27	Multi	DE	-	1/2012	240.0	1.63	164.4	-
103	Solaria Energia	S6P2G225	89.9	1,116.2	5.27	Multi	ES	2010	5/2011	232.7	1.63	159.4	97
105	Axitec	AC-250M/156-60S	89.8	1,116.0	5.29	Mono	CN, EU	-	1/2012	248.9	1.63	170.4	111
106	Helios Technology	H3A230P	89.8	1,115.7	5.31	Multi	EU	-	1/2012	232.2	1.63	158.9	-
106	Linuo Group	LN240(30)P-225	89.8	1,115.7	5.31	Multi	-	2003	7/2011	236.5	1.64	160.9	48
108	Trina Solar Energy	TSM-180DC01	89.8	1,115.6	5.32	Mono	CN	2007	2009	176.2	1.28	153.6	79
109	CNPV Solar Power	CNPV-240P	89.8	1,115.3	5.35	Multi	CN	2006	7/2011	243.1	1.64	165.3	-
110	Win Win Precision Technology	Winaico WSP-235P6	89.8	1,115.2	5.36	Multi	TW	-	5/2010	240.1	1.66	161.3	74
111	Chint Solar / Astronergy	CHSM 6610P (230)	89.7	1,114.6	5.41	Multi	-	-	1/2012	234.2	1.64	159.2	72
112	Upsolar	UP-M180M	89.7	1,114.1	5.45	Mono	CN	2010-2011	3/2010	181.5	1.28	158.0	90
113	Sungen	SGM-195D	89.6	1,112.4	5.59	Mono	CN	-	5/2012	196.5	1.28	170.8	109
114	Risen Energy	SY185S-M	89.5	1,112.1	5.62	Mono	CN	-	7/2011	191.7	1.28	166.5	-
115	Shinsung	SS-BM260C	89.4	1,110.8	5.73	Mono	KR	-	4/2012	258.8	1.60	179.7	120
116	NexPower Technology	NT-125AX	89.4	1,110.6	5.75	µc-Si / a-Si	TW	2009-2010	11/2010	125.4	1.58	88.1	57
117	CEEG Solar Science & Technology	SST 265-72P	89.4	1,110.1	5.79	Multi	CN	2005	2/2011	281.0	1.94	160.8	89
118	REC	REC230AE	89.4	1,109.9	5.80	Multi	SE	2007/2010	2/2010	228.6	1.65	153.8	31
118	Sonalis	SL-180CE-36M	89.4	1,109.9	5.80	Mono	CN	-	3/2010	185.1	1.28	160.5	86
120	Yingli Green Energy Holding	YL210P-29b	89.3	1,109.8	5.81	Multi	CN	2009	2/2011	214.3	1.63	145.9	106

Performance ratio (%) 2013	Performance ratio (%) January 2014	Yield (kWh/kW) January 2014	Performance ratio (%) February 2014 (%)	Yield (kWh/kW) February 2014	Performance ratio (%) March 2014	Yield (kWh/kW) March 2014	Performance ratio (%) April 2014	Yield (kWh/kW) April 2014	Performance ratio (%) May 2014	Yield (kWh/kW) May 2014	Performance ratio (%) June 2014	Yield (kWh/kW) June 2014	Performance ratio (%) July 2014	Yield (kWh/kW) July 2014	Performance ratio (%) August 2014	Yield (kWh/kW) August 2014	Performance ratio (%) September 2014	Yield (kWh/kW) September 2014	Performance ratio (%) October 2014	Yield (kWh/kW) October 2014	Performance ratio (%) November 2014	Yield (kWh/kW) November 2014	Performance ratio (%) December 2014	Yield (kWh/kW) December 2014
92.1	100.5	45.4	99.8	63.8	93.4	122.5	91.9	125.3	90.5	135.7	88.4	145.2	85.8	134.5	89.2	116.7	88.4	109.2	90.4	65.5	92.7	47.2	98.1	16.6
90.3	100.0	45.2	98.4	62.9	92.2	120.9	91.1	124.2	90.2	135.4	88.1	144.6	86.0	134.8	89.6	117.2	89.3	110.2	91.6	66.4	95.4	48.6	101.5	17.2
90.7	100.8	45.6	98.9	63.2	91.9	120.6	91.1	124.1	90.0	135.1	88.0	144.5	85.7	134.3	89.7	117.4	88.8	109.6	91.8	66.6	96.0	48.9	104.7	17.8
91.0	99.5	45.0	98.4	62.9	92.5	121.3	91.2	124.3	90.3	135.4	88.4	145.1	86.3	135.3	89.6	117.2	89.0	109.8	90.8	65.9	94.0	47.9	101.3	17.2
90.2	101.5	45.9	99.3	63.5	92.0	120.6	90.9	123.8	89.7	134.6	87.8	144.1	85.4	133.9	89.5	117.0	88.9	109.7	92.1	66.8	95.7	48.8	103.3	17.5
90.5	101.0	45.7	99.1	63.3	92.3	121.0	91.0	124.0	90.0	135.0	88.0	144.5	85.6	134.2	89.4	117.0	88.4	109.1	90.8	65.8	96.4	49.1	103.3	17.5
92.1	101.1	45.7	99.1	63.3	93.1	122.1	91.3	124.5	90.1	135.1	87.9	144.4	85.4	133.8	89.3	116.8	88.4	109.1	90.8	65.9	95.2	48.5	99.9	16.9
-	100.2	45.3	98.8	63.2	91.2	119.7	90.2	122.9	90.2	135.4	88.1	144.7	86.3	135.2	90.0	117.8	88.6	109.4	91.3	66.2	95.6	48.7	102.2	17.3
90.7	101.8	46.0	100.1	64.0	92.2	120.9	90.8	123.7	89.8	134.6	87.6	143.9	85.3	133.7	89.5	117.1	88.4	109.1	91.2	66.2	95.8	48.8	103.8	17.6
90.5	101.6	45.9	99.4	63.5	92.1	120.8	91.6	124.8	90.3	135.4	87.9	144.4	85.5	133.9	89.4	116.9	88.1	108.8	90.6	65.7	95.3	48.6	99.5	16.9
90.1	101.5	45.9	99.2	63.4	92.0	120.7	91.1	124.2	89.6	134.4	88.4	145.2	84.8	132.8	88.1	115.3	89.1	110.0	92.0	66.7	96.7	49.2	103.5	17.6
91.5	101.4	45.9	99.9	63.8	92.6	121.5	91.4	124.5	90.0	134.9	88.0	144.5	85.5	134.0	89.0	116.5	88.2	108.9	90.4	65.6	94.4	48.1	100.7	17.1
91.4	100.4	45.4	99.5	63.6	92.4	121.2	91.3	124.3	90.3	135.4	88.1	144.7	85.7	134.2	89.6	117.2	88.4	109.1	90.6	65.7	93.1	47.4	100.0	17.0
90.6	100.1	45.2	99.6	63.7	93.1	122.1	92.3	125.7	90.9	136.4	86.6	142.3	85.4	133.8	89.0	116.4	87.4	107.8	90.7	65.8	95.2	48.5	103.0	17.5
91.1	102.0	46.1	100.2	64.1	92.8	121.7	91.3	124.4	90.0	135.0	87.8	144.1	85.4	133.7	89.3	116.9	89.3	110.2	91.3	66.2	88.3	45.0	103.7	17.6
-	100.1	45.3	99.8	63.8	92.7	121.6	91.3	124.4	90.2	135.3	87.8	144.2	85.4	133.9	89.0	116.4	88.4	109.1	90.7	65.8	94.0	47.9	101.4	17.2
89.5	99.8	45.1	98.6	63.0	91.3	119.7	89.9	122.5	89.7	134.5	87.8	144.2	86.0	134.8	90.5	118.4	88.8	109.6	91.8	66.6	96.0	48.9	101.7	17.3
90.2	101.4	45.9	98.3	62.8	91.7	120.3	90.8	123.6	89.7	134.5	87.7	144.0	85.5	133.9	89.3	116.8	89.1	109.9	91.4	66.3	95.8	48.8	102.3	17.4
91.4	103.1	46.6	100.3	64.1	92.5	121.3	91.1	124.1	89.8	134.6	87.5	143.7	85.2	133.4	88.8	116.1	88.1	108.7	90.6	65.7	95.4	48.6	101.1	17.2
89.9	99.6	45.0	98.6	63.0	91.6	120.1	90.3	123.1	90.0	135.0	88.0	144.6	86.2	135.0	89.2	116.7	88.8	109.5	91.3	66.2	95.5	48.6	99.1	16.8
92.0	101.3	45.8	100.2	64.1	92.6	121.5	91.4	124.5	89.9	134.8	87.4	143.5	85.7	134.3	89.2	116.7	88.0	108.6	90.1	65.3	93.7	47.7	99.4	16.9
91.7	102.3	46.3	99.4	63.5	93.2	122.2	91.1	124.1	89.7	134.6	87.1	143.0	84.9	133.0	88.7	116.0	88.6	109.3	90.8	65.8	95.2	48.5	99.0	16.8
91.3	100.7	45.5	99.4	63.5	92.3	121.0	91.3	124.4	90.2	135.3	87.6	143.8	85.7	134.3	89.0	116.4	87.8	108.3	89.9	65.2	93.4	47.6	102.3	17.4
90.9	100.8	45.6	98.0	62.6	92.5	121.3	90.9	123.9	89.7	134.6	87.5	143.7	85.5	133.9	89.3	116.8	88.7	109.5	90.6	65.7	93.9	47.9	100.4	17.0
90.5	100.4	45.4	98.7	63.1	92.2	120.9	90.8	123.7	89.7	134.5	87.6	143.9	85.5	134.0	89.2	116.7	88.7	109.5	90.8	65.8	94.7	48.2	99.9	17.0
-	101.1	45.7	99.4	63.6	92.6	121.5	91.4	124.5	89.7	134.6	88.1	144.7	84.6	132.6	88.6	115.8	88.3	109.0	90.8	65.9	93.6	47.7	99.7	16.9
89.9	102.1	46.2	100.4	64.2	92.3	121.1	90.9	123.8	89.3	133.9	88.3	141.6	84.8	132.8	89.1	116.6	88.2	108.9	91.4	66.3	96.0	48.9	102.2	17.3
90.7	102.7	46.4	99.6	63.7	92.0	120.6	90.5	123.3	89.4	134.1	87.2	143.1	84.1	131.8	88.5	115.8	88.1	108.7	91.0	66.0	96.9	49.3	106.3	18.0
89.0	99.6	45.0	98.2	62.8	91.3	119.7	90.3	123.0	89.0	133.5	86.8	142.6	85.8	134.5	89.5	117.1	89.2	110.1	91.5	66.4	95.1	48.5	102.1	17.3
90.6	103.0	46.6	100.3	64.1	92.0	120.6	90.3	123.1	89.2	133.7	86.7	142.4	84.1	131.9	88.6	115.9	88.1	108.8	91.0	66.0	96.7	49.3	104.4	17.7
89.6	100.6	45.5	99.2	63.4	91.7	120.3	90.2	122.9	89.2	133.7	87.1	143.0	85.0	133.2	89.1	116.6	88.0	108.6	91.0	66.0	95.8	48.8	103.9	17.6
90.3	99.4	44.9	97.8	62.5	92.3	121.0	90.8	123.7	89.6	134.4	87.6	143.8	85.5	134.0	88.6	115.9	88.3	109.0	89.8	65.1	93.3	47.5	101.9	17.3
90.4	99.9	45.2	98.3	62.9	91.7	120.2	90.4	123.2	89.3	133.9	87.4	143.5	85.3	133.6	89.1	116.5	88.3	109.0	90.5	65.7	94.5	48.2	100.1	17.0
89.9	99.0	44.7	97.5	62.3	91.3	119.7	90.3	123.1	89.5	134.3	87.6	143.8	85.5	134.0	89.2	116.7	88.5	109.2	91.1	66.1	95.0	48.4	98.5	16.7
90.3	99.7	45.1	98.1	62.7	92.1	120.7	90.6	123.5	89.5	134.2	87.2	143.2	85.3	133.6	88.9	116.3	88.4	109.1	90.4	65.6	94.2	48.0	97.4	16.5
90.9	101.2	45.8	98.9	63.2	92.0	120.7	90.5	123.4	89.4	134.1	87.1	143.1	84.6	132.6	88.5	115.8	88.1	108.8	90.6	65.7	95.0	48.4	101.1	17.1
90.8	100.3	45.3	99.3	63.4	92.1	120.8	90.8	123.7	89.8	134.6	87.8	144.2	85.0	133.2	88.0	115.1	87.8	108.4	89.6	65.0	92.4	47.1	98.4	16.7
90.8	100.7	45.6	98.3	62.9	91.9	120.5	90.7	123.6	89.5	134.2	87.2	143.1	84.8	132.9	88.3	115.5	88.1	108.7	89.8	65.2	94.1	48.0	103.0	17.5
89.6	100.0	45.2	99.2	63.4	92.0	120.6	90.7	123.5	89.4	134.1	87.3	143.3	84.9	133.1	88.6	115.9	88.0	108.6	90.2	65.4	92.8	47.3	99.0	16.8
90.5	102.6	46.4	100.0	63.9	91.8	120.3	90.2	122.8	89.0	133.5	86.7	142.4	84.0	131.6	88.4	115.7	87.7	108.3	90.5	65.6	96.0	48.9	104.4	17.7
90.4	100.5	45.5	98.7	63.1	91.4	119.9	90.2	122.9	89.1	133.7	87.0	142.8	84.9	133.1	88.8	116.2	88.0	108.6	90.2	65.4	95.0	48.4	103.0	17.5
90.5	103.4	46.8	100.7	64.4	92.1	120.8	90.7	123.5	88.7	133.0	86.1	141.4	83.6	130.9	88.2	115.4	87.2	107.7	91.1	66.0	97.2	49.5	104.8	17.8
-	99.6	45.1	99.5	63.6	90.8	119.1	89.7	122.2	88.8	133.2	86.9	142.6	85.5	133.9	89.2	116.7	88.1	108.7	90.5	65.6	94.8	48.3	101.1	17.2
89.7	100.0	45.2	97.9	62.6	91.2	119.6	90.2	122.9	89.2	133.8	87.0	142.9	84.5	132.4	88.5	115.8	88.4	109.1	90.5	65.6	95.2	48.5	105.6	17.9
89.3	99.7	45.1	99.7	63.8	90.8	119.1	88.4	120.4	89.7	134.6	86.8	142.5	85.6	134.1	89.1	116.5	88.1	108.7	90.1	65.4	94.9	48.4	103.0	17.5
-	98.3	44.5	96.5	61.7	90.7	118.9	89.5	121.9	89.0	133.5	87.7	144.1	85.8	134.4	89.5	117.0	88.6	109.3	90.8	65.9	94.2	48.0	97.9	16.6
90.9	101.1	45.7	99.7	63.7	92.0	120.6	90.5	123.3	89.1	133.6	87.2	143.2	84.3	132.1	88.1	115.2	87.4	107.8	89.8	65.1	94.1	47.9	102.3	17.4
90.3	98.4	44.5	97.4	62.2	91.1	119.5	90.2	122.9	89.6	134.4	87.4	143.5	85.8	134.4	88.7	116.1	88.0	108.6	90.0	65.3	92.9	47.3	99.3	16.8
-	101.7	46.0	99.7	63.8	92.5	121.3	90.6	123.5	89.2	133.8	86.9	142.7	84.2	132.0	87.8	114.9	87.2	107.6	89.9	65.2	94.1	47.9	98.1	16.6
90.4	101.0	45.7	99.5	63.6	91.6	120.2	90.6	123.4	89.6	134.4	87.1	143.1	84.2	132.0	87.4	114.3	86.8	107.1	89.9	65.2	96.5	49.1	100.9	17.1
90.4	99.1	44.8	98.5	62.9	91.8	120.4	90.4	1																

## PHOTON Lab's outdoor module tests: Results of 2014 yield measurements

2014 rank	Manufacturer	Model	Performance ratio (%) 2014	Yield (kWh/kW) 2014	Deviation from test winner (%)	Cell type	Origin	Production dates*1	Installed in	STC power (W)	Module Area (m <sup>2</sup> )	Yield per area (kWh/m <sup>2</sup> ) 2014	2013 rank
121	Mage Solar	Mage Powertec Plus 225/6PJ	89.3	1,109.6	5.83	Multi	CN	Through 2011	2009	232.0	1.64	157.0	101
122	Lilie Energie	Lilie SPL 185	89.3	1,109.4	5.85	Mono	–	–	2/2011	185.3	1.28	160.6	103
123	Conergy	Conergy PowerPlus 220P	89.3	1,108.9	5.89	Multi	DE	2009	3/2010	224.2	1.63	152.5	87
124	Siliken	SLK60P6L 230Wp	89.2	1,108.4	5.93	Multi	ES	–	2009	229.7	1.62	157.2	15
125	Solarbest Energy-Tech	ZSB M190	89.2	1,107.8	5.98	Mono	CN	–	12/2011	186.1	1.28	161.1	102
126	Bisol	BMU-215-2/233	89.2	1,107.6	6.00	Multi	SI	2009	2/2011	234.2	1.63	159.1	88
127	IBC Solar	IBC MonoSol 240 TT	89.2	1,107.4	6.02	Mono	DE	Through 2011	2/2011	246.0	1.66	164.1	96
128	SWAT International	SWAT-240-PS	89.1	1,106.9	6.06	Multi	–	–	5/2011	245.1	1.64	165.4	62
129	Upsolar	UP-M185M	89.1	1,106.5	6.09	Mono	CN	2010-2011	2/2011	189.2	1.28	163.6	–
130	Ningbo Solar Electric Power	Sun Earth TDB125x125-72-P 160W	89.1	1,106.1	6.13	Mono	CN	–	2/2011	161.6	1.28	139.6	112
131	Eging Photovoltaic Technology	EGM-185	89.0	1,105.2	6.20	Mono	CN	2010	2/2011	188.4	1.28	162.7	105
132	Frankfurt Solar	FS215W-POLY	88.9	1,104.8	6.24	Multi	CN	–	2009	221.3	1.61	151.9	110
133	Lilie Energie	Lilie SPL 185-I	88.9	1,104.7	6.25	Mono	–	–	2/2011	187.1	1.28	161.5	115
134	Suntech Power	STP205-18/Ud	88.9	1,104.1	6.30	Multi	CN	–	2/2011	213.8	1.47	160.6	114
135	CNPV Solar Power	CNPV-185M	88.9	1,104.0	6.31	Mono	CN	2006	3/2010	193.8	1.28	167.1	78
136	Zytech Engineering	ZT 230P	88.9	1,103.9	6.31	Multi	CN	–	2/2011	230.8	1.64	155.4	116
137	China Sunergy	CSUN240-60P	88.8	1,103.2	6.37	Multi	CN	–	1/2012	243.7	1.62	166.0	119
138	BP Solar International	BP 3220 T	88.6	1,100.7	6.59	Multi	CN	Through 2011	7/2011	232.5	1.67	153.2	51
139	Sunrise Solartech	SRM 180D72-GE	88.5	1,099.7	6.67	Mono	CN	–	2009	181.5	1.28	156.0	118
140	Alex Solar	ALM-190D-24	88.5	1,099.5	6.69	Mono	CN	2009	7/2011	187.8	1.27	162.6	–
141	Bisol	BMU-215-2/221	88.3	1,097.3	6.87	Multi	SI	2007	2/2010	229.1	1.64	153.3	108
142	CNPV Solar Power	CNPV-190M	88.2	1,095.0	7.07	Mono	CN	2006	7/2011	197.4	1.28	168.9	95
143	Perfectenergy	PEM-180/185-72M-SCC	88.1	1,094.3	7.13	Mono	CN	2008	6/2010	191.3	1.28	163.5	121
144	Trina Solar Energy	TSM-225PC05	88.0	1,093.5	7.20	Multi	CN	–	2/2010	233.0	1.64	155.4	91
145	Isofoton	ISF-255	87.9	1,091.8	7.34	Mono	ES	2012	4/2012	255.0	1.66	167.7	124
146	Kyocera	KD210GH-2PU	87.5	1,086.6	7.78	Multi	EU	2009	2/2011	212.1	1.48	155.7	123
147	CNPV Solar Power	CNPV-240M	87.2	1,083.7	8.03	Mono	CN	2006	7/2011	249.7	1.64	165.0	122
148	Scheuten Solar Systems	Multisol P6-60	87.2	1,083.6	8.04	Multi	DE	–	6/2011	238.1	1.66	155.4	128
149	Day4 Energy	Day4 48MC 185	87.1	1,082.1	8.16	Multi	CA	2006	2/2011	186.5	1.29	156.4	136
150	Sharp	NU-185E1	87.0	1,080.0	8.34	Mono	GB	2005	3/2011	186.1	1.32	152.3	127
151	SolarWorld	Sunmodule Plus SW 210 poly	86.9	1,079.1	8.42	Multi	DE	2004	2006	212.2**2	1.68	136.3	132
152	Shell Solar (now with Solarworld)	Shell SQ 150-C	86.8	1,078.7	8.45	Mono	PT	Through 2005	2006	155.8**2	1.32	127.3	130
153	Schott Solar	SCHOTT POLY TM 220	86.6	1,076.2	8.67	Multi	CZ	2008-2009	2/2011	224.7	1.67	144.8	125
154	Calrays	CPM 250-A-96	86.6	1,075.3	8.74	Mono	–	–	7/2011	244.0	1.67	157.1	126
155	Hanwha SolarOne	SF160-24-1M175 (scac)	86.5	1,074.3	8.83	Mono	CN	–	2/2010	183.0	1.28	153.6	–
156	Evergreen Solar	ES-A-210-fa2	86.0	1,068.1	9.35	Ribbon	US	2008	3/2011	210.0	1.57	142.9	129
157	Evergreen Solar	ES-E-210-fc3	85.6	1,063.0	9.79	Ribbon	US	–	2/2011	211.2	1.64	136.9	–
158	Sovello	SV-X-205-fa1	85.3	1,059.4	10.09	Ribbon	DE	–	2/2011	206.1	1.57	139.1	131
159	Suntech Power	STP190-18/Ud	84.9	1,054.4	10.52	Multi	CN	2005	2/2011	182.9	1.47	131.2	139
160	Sunways	MHH plus 190 (190 Wp)	84.3	1,047.0	11.14	Multi	DE	2003-2005	2005	199.5**2	1.42	147.1	143
161	Canadian Solar	CS6A-170P	83.4	1,036.0	12.08	Multi	CN	2007**3	2007	174.4**2	1.30	139.0	142
162	Solar-Fabrik	SF 145A	83.3	1,035.1	12.15	Ribbon	DE	2003-2004	2005	145.8**2	1.23	122.7	140
163	Sovello	SV-X-200-fa1	83.2	1,033.4	12.30	Ribbon	DE	2009-2011	1/2011	205.0	1.58	134.1	137
164	Solar-Fabrik	SF 130/4-130	83.2	1,033.1	12.32	Mono	DE	2006-2010	3/2010	130.7	1.00	135.0	138
165	Enmvee Photovoltaics	ES-230P60	82.9	1,029.4	12.64	Multi	IN	2008-2011	3/2010	234.0	1.69	142.5	134
166	Kyocera	KC170GT-2	82.6	1,025.9	12.93	Multi	JP	Through 2006	2006	178.4**2	1.27	144.1	145
167	Hanwha SolarOne	SF160 M5-24 (175 W)	82.3	1,022.1	13.26	Mono	CN	–	2007	174.6**2	1.28	139.4	141
168	Isofoton	IS-170/24	82.1	1,019.2	13.50	Mono	ES	2007	2009	172.8	1.26	139.8	144
169	ASE (now with Schott Solar)	ASE-300-DG-FT (300 W)	81.3	1,010.3	14.26	Ribbon	US	1997-2006	2007	308.1**2	2.42	128.6	–
170	Isofoton	I-110/24	80.6	1,001.6	15.00	Mono	ES	Through 2005	2006	102.5**2	0.86	119.4	146
171	Sharp	NT-R5E3E	79.5	987.9	16.16	Mono	JP	2003	2005	187.9**2	1.30	142.8	149
172	BP Solar International	BP 7185 S	78.9	979.5	16.87	Mono	ES, IN	–	2005	185.1**2	1.25	145.0	147
173	Photowatt International	PW 1650-175W	78.8	978.7	16.94	Multi	FR	2005**3	2006	171.4**2	1.34	125.2	148
174	Evergreen Solar	ES-180-RL	73.7	916.0	22.26	Ribbon	DE	2006-2008	2007	185.4**2	1.50	113.2	150

\*1 when the date of production was unavailable, the date when the PHOTON Lab bought the module was used (if possible)

\*\*2 STC power specification was not determined by PHOTON Lab but by the manufacturer

\*\*3 purchased

Performance ratio (%) 2013	Performance ratio (%) January 2014	Yield (kWh/kW) January 2014	Performance ratio (%) February 2014 (%)	Yield (kWh/kW) February 2014	Performance ratio (%) March 2014	Yield (kWh/kW) March 2014	Performance ratio (%) April 2014	Yield (kWh/kW) April 2014	Performance ratio (%) May 2014	Yield (kWh/kW) May 2014	Performance ratio (%) June 2014	Yield (kWh/kW) June 2014	Performance ratio (%) July 2014	Yield (kWh/kW) July 2014	Performance ratio (%) August 2014	Yield (kWh/kW) August 2014	Performance ratio (%) September 2014	Yield (kWh/kW) September 2014	Performance ratio (%) October 2014	Yield (kWh/kW) October 2014	Performance ratio (%) November 2014	Yield (kWh/kW) November 2014	Performance ratio (%) December 2014	Yield (kWh/kW) December 2014
89.6	98.7	44.6	98.6	63.0	91.4	119.9	90.0	122.7	88.6	132.9	86.6	142.2	84.2	132.0	88.4	115.6	87.5	108.0	89.8	65.1	92.0	46.9	98.9	16.8
89.5	100.3	45.4	98.3	62.8	91.3	119.7	89.5	121.9	88.4	132.5	86.2	141.5	84.1	131.7	88.0	115.1	87.6	108.1	90.0	65.3	94.7	48.3	100.4	17.0
90.0	100.4	45.4	98.5	62.9	91.5	120.1	90.4	123.1	88.8	133.2	86.4	141.8	83.6	131.0	87.5	114.4	86.6	106.9	89.5	64.9	94.3	48.0	101.1	17.2
92.4	101.2	45.7	99.0	63.3	92.7	121.5	91.0	123.9	89.5	134.2	86.7	142.4	83.8	131.2	86.7	113.4	85.8	105.9	87.5	63.4	91.2	46.5	99.6	16.9
89.5	99.0	44.7	97.8	62.5	91.2	119.6	89.8	122.3	88.7	133.1	86.7	142.3	84.4	132.3	87.7	114.7	86.9	107.3	89.4	64.8	92.8	47.3	99.2	16.8
90.0	99.1	44.8	97.4	62.3	91.2	119.6	89.9	122.5	88.6	132.9	86.6	142.2	84.6	132.6	88.1	115.3	86.9	107.2	88.9	64.5	92.9	47.3	97.8	16.6
89.8	101.2	45.7	99.6	63.7	91.1	119.4	89.6	122.1	88.2	132.2	86.0	141.2	83.5	130.9	87.9	114.9	86.8	107.1	89.6	65.0	94.1	47.9	101.7	17.3
90.6	100.4	45.4	97.8	62.5	91.6	120.1	90.2	122.8	88.9	133.4	86.6	142.0	83.8	131.3	87.2	114.0	86.6	106.9	88.4	64.1	92.8	47.3	98.8	16.8
–	99.1	44.8	97.3	62.2	90.7	118.9	89.5	121.9	88.3	132.4	86.5	142.0	84.3	132.1	88.0	115.1	87.1	107.5	89.6	65.0	93.6	47.7	99.5	16.9
89.2	100.0	45.2	98.1	62.7	90.4	118.6	89.2	121.5	88.0	132.0	85.9	141.1	83.9	131.5	87.6	114.6	87.7	108.2	90.0	65.3	94.4	48.1	101.4	17.2
89.5	98.9	44.7	97.2	62.1	90.8	119.1	89.5	121.9	88.5	132.8	86.3	141.8	84.1	131.7	87.8	114.8	87.2	107.6	89.2	64.7	93.0	47.4	98.1	16.6
89.4	98.6	44.6	98.1	62.7	90.5	118.7	89.3	121.7	88.3	132.4	86.3	141.6	83.8	131.3	88.1	115.2	87.0	107.4	89.3	64.7	93.2	47.5	99.1	16.8
89.0	99.7	45.1	97.4	62.3	90.6	118.9	89.1	121.4	88.1	132.1	85.8	140.9	83.6	131.1	87.6	114.6	87.3	107.7	89.9	65.2	94.7	48.2	102.3	17.4
89.1	99.0	44.8	97.3	62.2	90.8	119.1	89.5	121.9	88.4	132.5	86.4	141.8	83.3	130.5	87.0	113.8	87.3	107.8	89.2	64.7	93.3	47.5	102.7	17.4
90.3	99.5	45.0	98.0	62.7	91.3	119.7	90.7	123.5	89.4	134.1	87.0	142.9	83.7	131.1	86.4	113.0	85.3	105.3	87.5	63.5	91.3	46.5	97.6	16.6
89.0	99.6	45.0	97.6	62.4	90.8	119.1	89.3	121.7	88.2	132.3	85.9	141.1	83.4	130.6	87.6	114.5	86.9	107.2	89.8	65.1	94.2	48.0	99.5	16.9
88.9	98.6	44.6	97.0	62.0	90.5	118.6	89.7	122.1	88.4	132.6	86.3	141.8	84.3	132.1	87.5	114.4	86.5	106.7	88.9	64.5	93.1	47.4	96.2	16.3
90.8	100.0	45.2	98.9	63.2	91.4	119.9	89.3	121.6	87.9	131.8	85.7	140.7	83.2	130.3	86.7	113.4	86.4	106.7	88.4	64.1	92.5	47.1	97.9	16.6
89.0	97.8	44.2	96.7	61.8	89.9	118.0	88.6	120.7	87.6	131.4	85.6	140.6	83.2	130.4	88.1	115.2	86.8	107.1	89.9	65.2	94.0	47.9	101.5	17.2
–	98.6	44.6	95.1	60.8	91.1	119.5	89.6	122.0	88.1	132.2	86.3	141.7	83.3	130.5	87.1	113.9	86.9	107.3	88.3	64.0	92.2	46.9	94.9	16.1
89.4	99.5	45.0	98.0	62.7	90.7	119.0	89.3	121.7	88.1	132.1	85.3	140.1	83.8	131.3	86.0	112.5	85.0	104.9	87.3	63.3	93.9	47.8	99.4	16.9
89.8	98.5	44.5	97.1	62.0	90.5	118.7	89.1	121.4	87.9	131.9	85.8	140.9	83.1	130.3	86.5	113.1	86.1	106.3	87.5	63.5	90.3	46.0	96.1	16.3
88.5	97.7	44.2	96.8	61.9	90.4	118.6	88.8	121.0	87.8	131.6	85.6	140.5	83.2	130.3	86.9	113.7	85.9	106.0	88.1	63.9	91.2	46.5	95.0	16.1
89.9	99.2	44.8	98.0	62.6	90.6	118.9	88.3	120.3	87.8	131.7	85.3	140.1	82.5	129.2	86.1	112.6	85.3	105.3	88.1	63.9	92.8	47.3	99.4	16.9
87.9	97.2	44.0	96.7	61.8	88.9	116.6	88.1	120.1	87.6	131.4	85.3	140.1	83.1	130.2	87.5	114.4	85.8	105.9	87.9	63.8	91.7	46.7	98.9	16.8
88.2	97.6	44.1	95.9	61.3	89.8	117.8	88.1	120.1	87.0	130.5	84.7	139.1	82.5	129.3	85.8	112.3	85.6	105.7	87.4	63.4	91.3	46.5	97.0	16.5
88.3	98.7	44.6	96.6	61.7	90.0	118.0	88.4	120.4	86.5	129.7	84.2	138.2	81.6	127.8	85.2	111.4	85.6	105.6	87.0	63.1	91.0	46.4	98.3	16.7
87.4	97.0	43.9	96.5	61.7	89.2	117.0	88.5	120.6	87.3	131.0	85.1	139.8	82.6	129.4	85.0	111.2	84.2	104.0	87.1	63.1	90.0	45.9	95.1	16.1
86.1	98.3	44.5	96.0	61.4	89.0	116.7	87.8	119.7	86.5	129.8	84.2	138.3	81.3	127.3	85.3	111.6	85.7	105.8	87.5	63.5	92.4	47.0	97.5	16.5
87.4	99.0	44.8	96.7	61.8	89.0	116.7	87.5	119.2	86.0	129.0	83.6	137.3	80.7	126.4	85.4	111.7	85.3	105.3	88.1	63.9	93.0	47.4	98.1	16.6
86.8	96.5	43.6	96.2	61.5	88.7	116.4	87.9	119.7	86.7	130.0	84.0	138.0	81.7	128.1	85.3	111.6	85.0	104.9	86.7	62.9	90.5	46.1	95.9	16.3
87.0	95.9	43.3	96.0	61.4	88.8	116.4	87.9	119.7	86.3	129.5	84.0	137.9	81.6	127.9	85.5	111.9	84.5	104.3	87.6	63.6	91.2	46.5	96.0	16.3
87.5	98.5	44.6	95.7	61.2	88.5	116.1	86.8	118.3	85.8	128.8	83.6	137.2	81.1	127.1	84.7	110.8	84.9	104.8	86.9	63.0	92.6	47.1	101.2	17.2
87.5	96.2	43.5	95.6	61.1	88.4	115.9	87.1	118.6	86.1	129.1	84.2	138.2	81.8	128.2	85.1	111.3	84.8	104.6	86.4	62.7	89.9	45.8	94.7	16.1
–	95.7	43.3	95.3	60.9	88.9	116.6	87.1	118.6	85.9	128.9	83.5	137.0	81.4	127.5	85.4	111.7	85.0	105.0	86.5	62.7	90.0	45.8	95.2	16.2
87.2	97.7	44.2	96.4	61.6	88.1	115.5	86.3	117.5	84.6	126.9	82.7	135.8	80.7	126.4	84.3	110.3	84.1	103.8	86.7	62.9	91.2	46.5	98.8	16.8
–	95.8	43.3	93.9	60.0	88.0	115.4	86.2	117.5	84.9	127.3	82.8	135.9	80.3	125.8	84.5	110.5	83.9	103.6	85.7	62.1	89.8	45.8	93.0	15.8
86.8	97.1	43.9	95.4	61.0	87.7	115.1	85.7	116.7	84.1	126.2	82.6	135.6	79.4	124.5	83.1	108.7	83.2	102.6	85.5	62.0	90.9	46.3	98.5	16.7
85.3	93.4	42.2	92.1	58.9	86.6	113.6	85.7	116.8	84.7	127.0	82.3	135.1	80.3	125.8	83.5	109.2	83.3	102.8	85.6	62.1	88.9	45.3	92.5	15.7
83.3	91.6	41.4	93.4	59.7	85.5	112.2	84.6	115.2	83.2	124.8	81.2	133.4	83.5	130.8	81.1	106.1	81.3	100.3	87.3	63.3	86.9	44.3	90.6	15.4
83.3	92.3	41.7	93.1	59.5	84.9	111.4	83.7	114.0	82.6	123.9	80.5	132.1	77.9	122.1	82.1	107.4	82.0	101.2	85.2	61.8	87.8	44.7	95.6	16.2
84.2	91.9	41.5	91.0	58.1	86.5	113.4	85.3	116.2	83.8	125.7	81.4	133.7	79.1	123.9	80.8	105.6	80.8	99.7	82.2	59.7	84.6	43.1	84.1	14.3
85.5	93.3	42.2	91.7	58.6	85.6	112.3	83.8	114.2	83.8	125.6	81.8	134.3	78.6	123.1	80.5	105.2	80.4	99.2	81.8	59.3	85.9	43.8	91.2	15.5
85.4	92.0	41.6	85.9	54.9	86.7	113.7	85.2	116.0	83.4	125.1	81.2	133.4	78.8	123.5	81.8	107.0	82.5	101.9	81.9	59.4	85.2	43.4	77.9	13.2
86.6	94.6	42.8	93.6	59.8	85.9	112.6	84.3	114.9	83.1	124.6	79.5	130.6	77.3	121.2	80.5	105.3	79.7	98.3	82.5	59.9	87.0	44.3	89.3	15.2
82.8	91.6	41.4	89.6	57.3	85.0	111.5	83.7	114.1	82.3	123.5	79.9	131.2	77.7	121.7	80.9	105.8	81.1	100.1	82.7	60.0	86.3	43.9	90.2	15.3
83.7	91.0	41.2	91.6	58.5	84.6	110.9	82.9	113.0	81.6	122.4	79.5	130.5	77.7	121.7	81.0	106.0	80.7	99.6	82.4	59.8	85.0	43.3	90.0	15.3
82.9	89.1	40.3	88.3	56.4	83.8	110.0	82.4	112.2	81.4	122.0	79.0	129.8	80.3	125.8	81.0	105.9	80.5	99.4	82.3	59.7	84.9	43.2	85.9	14.6
–	88.8	40.2	87.2	55.8	83.2	109.1	81.8	111.4	80.8	121.2	78.7	129.3	77.4	121.2	80.8	105.7	80.1	98.9	82.3	59.7	84.9	43.3	87.2	14.8
81.3	87.1	39.4	85.2	54.5	83.4	109.4	82.4	112.2	81.3	122.0	79.0	129.7	77.1	120.9	79.4	103.9	79.7	98.4	79.0	57.3	80.5	41.0	77.3	13.1
79.8	88.1	39.8	86.5	55.3	81.1	106.4	80.1	109.1																