



ST250Q6 PRODUCT LAUNCH

Monday 30th April 2012



AFFORDABLE. CLEAN. EMISSIONS-FREE RENEWABLE ELECTRICITY.

Outline

1. Sungrid Ltd
2. Standards Compliance
3. Quality Control beyond Standards
4. ST250Q6 Introduction
5. ST250Q6 Comparison

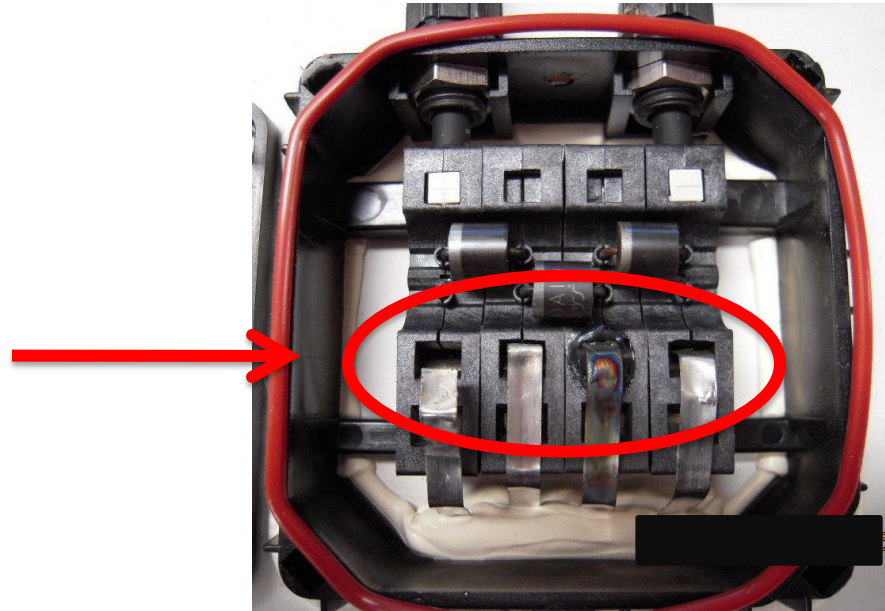
The Sungrid Story

Founders: Phil Livingston & Darren Anderson



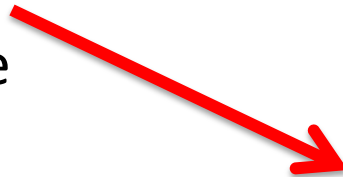
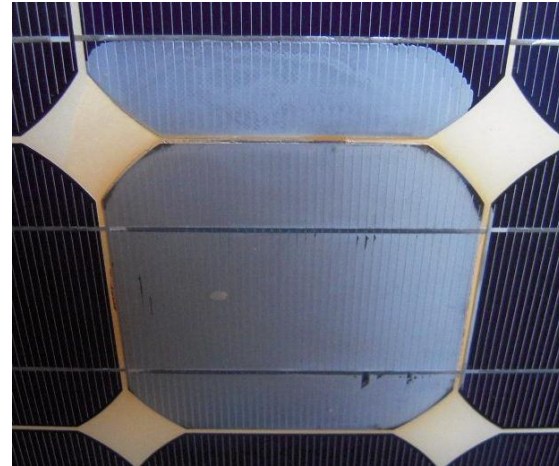
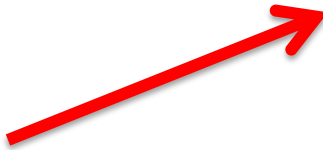
Module Quality Issues

Improperly connected Junction Box leading to electrical failure of the module and potential fire risk.



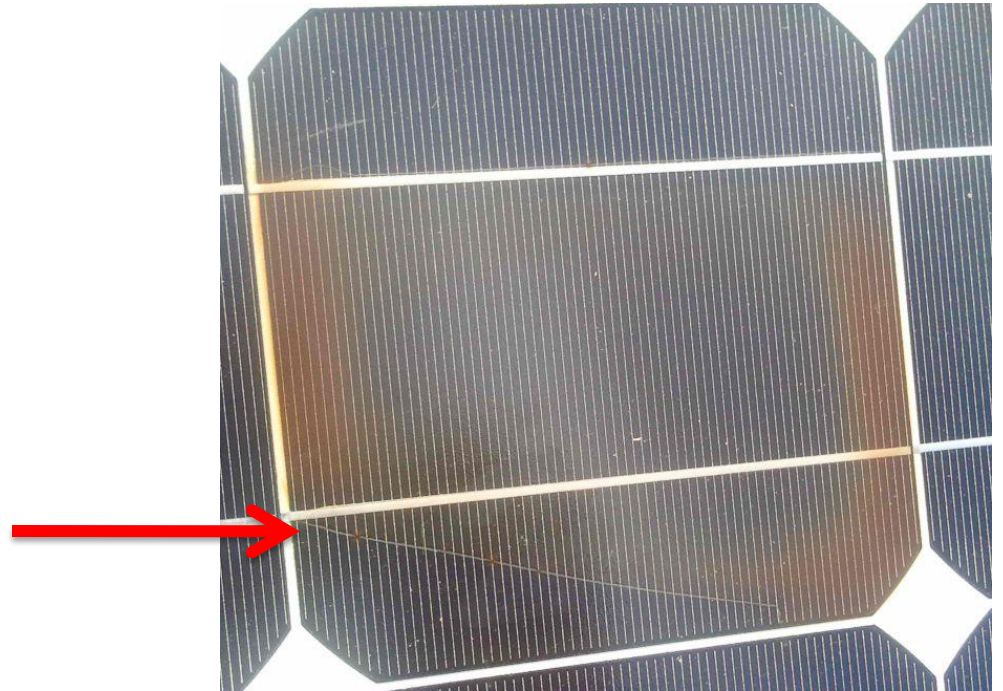
Module Quality Issues

Delamination due to inferior back-sheet and EVA combination resulting in panel failure and potential fire risk.



Module Quality Issues

Cracked cell leading to hot-spot, and potential fire risk.



Outline

1. Sungrid Ltd
2. Standards Compliance
3. Quality Control beyond Standards
4. ST250Q6 Introduction
5. ST250Q6 Comparison

Standards Compliance and Validity

INTERNATIONAL STANDARDS



Certified to: IEC61215,
IEC61730-1, IEC61730-2

→ Design qualification →

→ Safety qualification →



ACCREDITED TESTING LABORATORIES



- Thermal cycling (200 cycles from -40°C to +85°C)
- Damp heat (1000hrs, 85°C, 85% relative humidity)
- Wind/Snow Load Test 2400/5400 Pa
- Hail Test 25mm at >80km/hr



VALID if:

- Specified Material
- Manufacturing technique
- Specified Component



Bill of Material

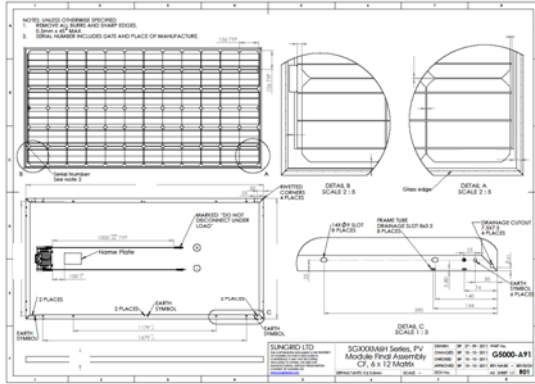
Module Assembly

NATIONAL CERTIFICATION REGULATORS



Quality Assurance to meet IEC Requirements

MODULE ASSEMBLY



SUNGRID™
 www.sungrid.co.za



ST250QGF		
Values at STC*		
Maximum Power	Power	250 Wp
Voltage at Pmax	Vmp	30.74 V
Current at Pmax	Imp	8.29 A
Open Circuit Voltage	Voc	37.71 V
Short Circuit Current	Isc	8.86 A
*STC: 1000W/m ² , AM1.5, T=25°C		
Operating Temperature	-40°C to +85°C	
Size	1650mm x 991mm x 40mm	
Weight	18.5kg	
Max System Operating Voltage	1000V	
Max Series Fuse Rating	15A	
Power Tolerance	+3/-3%	
Module Application	Class A	
Product Code	ST250QGF-8201	



BILL OF MATERIAL (BOM)

IEC Test and Certification Institute
 IEC Testing and Certification Institute
 International Standards, 10, 11th Street, 1600, Midrand, South Africa
 Telephone: 011 708 3474/4811 Fax: 011 708 3474/4811

Report No. 1
 Report No. 2
 Page 1 of 1

Client: SunGrid (Pty) Ltd
 Description: Bill of Materials for PV modules

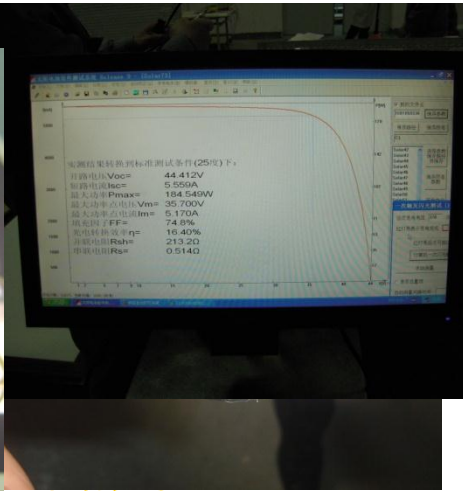
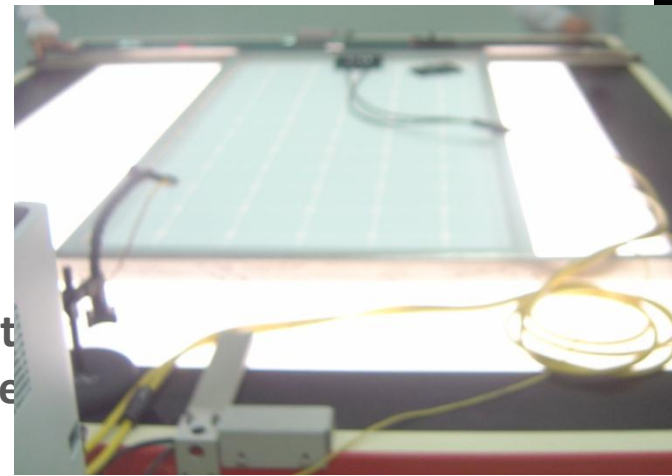
Item No.	Description	QTY	UOM
1	Monocrystalline Silicon Solar Cell	1	Cell
2	Monocrystalline Silicon Solar Cell	1	Cell
3	Monocrystalline Silicon Solar Cell	1	Cell
4	Monocrystalline Silicon Solar Cell	1	Cell
5	Monocrystalline Silicon Solar Cell	1	Cell
6	Monocrystalline Silicon Solar Cell	1	Cell
7	Monocrystalline Silicon Solar Cell	1	Cell
8	Monocrystalline Silicon Solar Cell	1	Cell
9	Monocrystalline Silicon Solar Cell	1	Cell
10	Monocrystalline Silicon Solar Cell	1	Cell
11	Monocrystalline Silicon Solar Cell	1	Cell
12	Monocrystalline Silicon Solar Cell	1	Cell
13	Monocrystalline Silicon Solar Cell	1	Cell
14	Monocrystalline Silicon Solar Cell	1	Cell
15	Monocrystalline Silicon Solar Cell	1	Cell
16	Monocrystalline Silicon Solar Cell	1	Cell
17	Monocrystalline Silicon Solar Cell	1	Cell
18	Monocrystalline Silicon Solar Cell	1	Cell
19	Monocrystalline Silicon Solar Cell	1	Cell
20	Monocrystalline Silicon Solar Cell	1	Cell
21	Monocrystalline Silicon Solar Cell	1	Cell
22	Monocrystalline Silicon Solar Cell	1	Cell
23	Monocrystalline Silicon Solar Cell	1	Cell
24	Monocrystalline Silicon Solar Cell	1	Cell
25	Monocrystalline Silicon Solar Cell	1	Cell
26	Monocrystalline Silicon Solar Cell	1	Cell
27	Monocrystalline Silicon Solar Cell	1	Cell
28	Monocrystalline Silicon Solar Cell	1	Cell
29	Monocrystalline Silicon Solar Cell	1	Cell
30	Monocrystalline Silicon Solar Cell	1	Cell
31	Monocrystalline Silicon Solar Cell	1	Cell
32	Monocrystalline Silicon Solar Cell	1	Cell
33	Monocrystalline Silicon Solar Cell	1	Cell
34	Monocrystalline Silicon Solar Cell	1	Cell
35	Monocrystalline Silicon Solar Cell	1	Cell
36	Monocrystalline Silicon Solar Cell	1	Cell
37	Monocrystalline Silicon Solar Cell	1	Cell
38	Monocrystalline Silicon Solar Cell	1	Cell
39	Monocrystalline Silicon Solar Cell	1	Cell
40	Monocrystalline Silicon Solar Cell	1	Cell
41	Monocrystalline Silicon Solar Cell	1	Cell
42	Monocrystalline Silicon Solar Cell	1	Cell
43	Monocrystalline Silicon Solar Cell	1	Cell
44	Monocrystalline Silicon Solar Cell	1	Cell
45	Monocrystalline Silicon Solar Cell	1	Cell
46	Monocrystalline Silicon Solar Cell	1	Cell
47	Monocrystalline Silicon Solar Cell	1	Cell
48	Monocrystalline Silicon Solar Cell	1	Cell
49	Monocrystalline Silicon Solar Cell	1	Cell
50	Monocrystalline Silicon Solar Cell	1	Cell
51	Monocrystalline Silicon Solar Cell	1	Cell
52	Monocrystalline Silicon Solar Cell	1	Cell
53	Monocrystalline Silicon Solar Cell	1	Cell
54	Monocrystalline Silicon Solar Cell	1	Cell
55	Monocrystalline Silicon Solar Cell	1	Cell
56	Monocrystalline Silicon Solar Cell	1	Cell
57	Monocrystalline Silicon Solar Cell	1	Cell
58	Monocrystalline Silicon Solar Cell	1	Cell
59	Monocrystalline Silicon Solar Cell	1	Cell
60	Monocrystalline Silicon Solar Cell	1	Cell
61	Monocrystalline Silicon Solar Cell	1	Cell
62	Monocrystalline Silicon Solar Cell	1	Cell
63	Monocrystalline Silicon Solar Cell	1	Cell
64	Monocrystalline Silicon Solar Cell	1	Cell
65	Monocrystalline Silicon Solar Cell	1	Cell
66	Monocrystalline Silicon Solar Cell	1	Cell
67	Monocrystalline Silicon Solar Cell	1	Cell
68	Monocrystalline Silicon Solar Cell	1	Cell
69	Monocrystalline Silicon Solar Cell	1	Cell
70	Monocrystalline Silicon Solar Cell	1	Cell
71	Monocrystalline Silicon Solar Cell	1	Cell
72	Monocrystalline Silicon Solar Cell	1	Cell
73	Monocrystalline Silicon Solar Cell	1	Cell
74	Monocrystalline Silicon Solar Cell	1	Cell
75	Monocrystalline Silicon Solar Cell	1	Cell
76	Monocrystalline Silicon Solar Cell	1	Cell
77	Monocrystalline Silicon Solar Cell	1	Cell
78	Monocrystalline Silicon Solar Cell	1	Cell
79	Monocrystalline Silicon Solar Cell	1	Cell
80	Monocrystalline Silicon Solar Cell	1	Cell
81	Monocrystalline Silicon Solar Cell	1	Cell
82	Monocrystalline Silicon Solar Cell	1	Cell
83	Monocrystalline Silicon Solar Cell	1	Cell
84	Monocrystalline Silicon Solar Cell	1	Cell
85	Monocrystalline Silicon Solar Cell	1	Cell
86	Monocrystalline Silicon Solar Cell	1	Cell
87	Monocrystalline Silicon Solar Cell	1	Cell
88	Monocrystalline Silicon Solar Cell	1	Cell
89	Monocrystalline Silicon Solar Cell	1	Cell
90	Monocrystalline Silicon Solar Cell	1	Cell
91	Monocrystalline Silicon Solar Cell	1	Cell
92	Monocrystalline Silicon Solar Cell	1	Cell
93	Monocrystalline Silicon Solar Cell	1	Cell
94	Monocrystalline Silicon Solar Cell	1	Cell
95	Monocrystalline Silicon Solar Cell	1	Cell
96	Monocrystalline Silicon Solar Cell	1	Cell
97	Monocrystalline Silicon Solar Cell	1	Cell
98	Monocrystalline Silicon Solar Cell	1	Cell
99	Monocrystalline Silicon Solar Cell	1	Cell
100	Monocrystalline Silicon Solar Cell	1	Cell

ENSURES MODULE BUILT TO:
 - MECHANICAL
 - ELECTRICAL
 SPECIFICATIONS & TOLERANCES

ENSURES SPECIFIED MATERIAL ARE USED

SUNGRID QA/QC

- Random Batch Check of:
 - Mechanical Specifications
 - Electrical Performances: flash test
 - Electrical Continuity: insulation test
- BOM Check of: certified material use



WITHIN THE IEC 61215/61730 SCOPE



Outline

1. Sungrid Ltd
2. Standards Compliance
3. Quality Control beyond Standards
4. ST250Q6 Introduction
5. ST250Q6 Comparison

Quality Assurance to overcome IEC Requirements

AUSTRALIAN ENGINEER ENSURING QA/QC:

Bill Of Material (BOM)

- Selection of best components in the certified list
- Warehousing:
 - certified materials used
 - storage conditions and shelf life observed

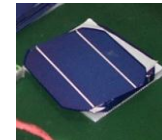
MODULE ASSEMBLY

- Visual Inspections
 - Sungrid Manufacturing Procedures

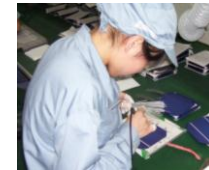
→ **Visible to naked eye**

→ **Not Visible to naked eye**

QUALITY DEFINITION:
SAFETY : IEC 61215/61730
QUALITY : SUNGRID QA/QC



Cell sorting



Tabbing



Stringing



Layup



Lamination

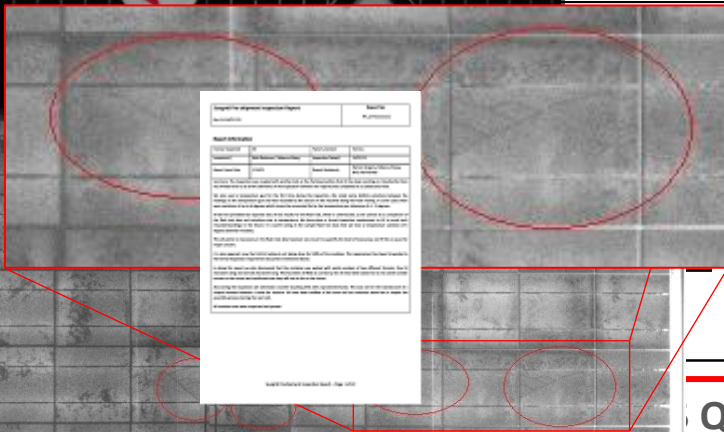


Framing



Packaging

EL Testing



Outline

1. Sungrid Ltd
2. Standards Compliance
3. Quality Control beyond Standards
4. ST250Q6 Introduction
5. ST250Q6 Comparison

ST250Q6

- **Quasi-monocrystalline cell**

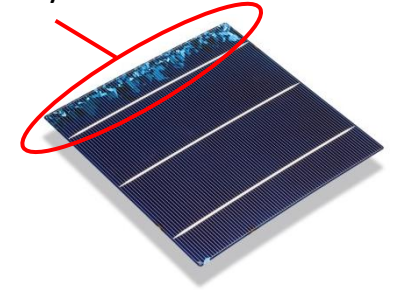
- Cutting edge technology
- 3 Busbars

→ Better electrical performance and efficiency distribution than pure multicrystalline cells ⁽¹⁾



PERFORMANCE

Multi-crystalline part



Eff. average 18.3%

- **Glass Coating**

from 3M Anti Reflective



- **Superior Frame Design**

- Robust: crimped corners + structural al alloy
- Functional: drainage holes
- Aesthetic: black anodized finish



- **Advanced Junction Box**

- Potted
- IP 67



RELIABILITY



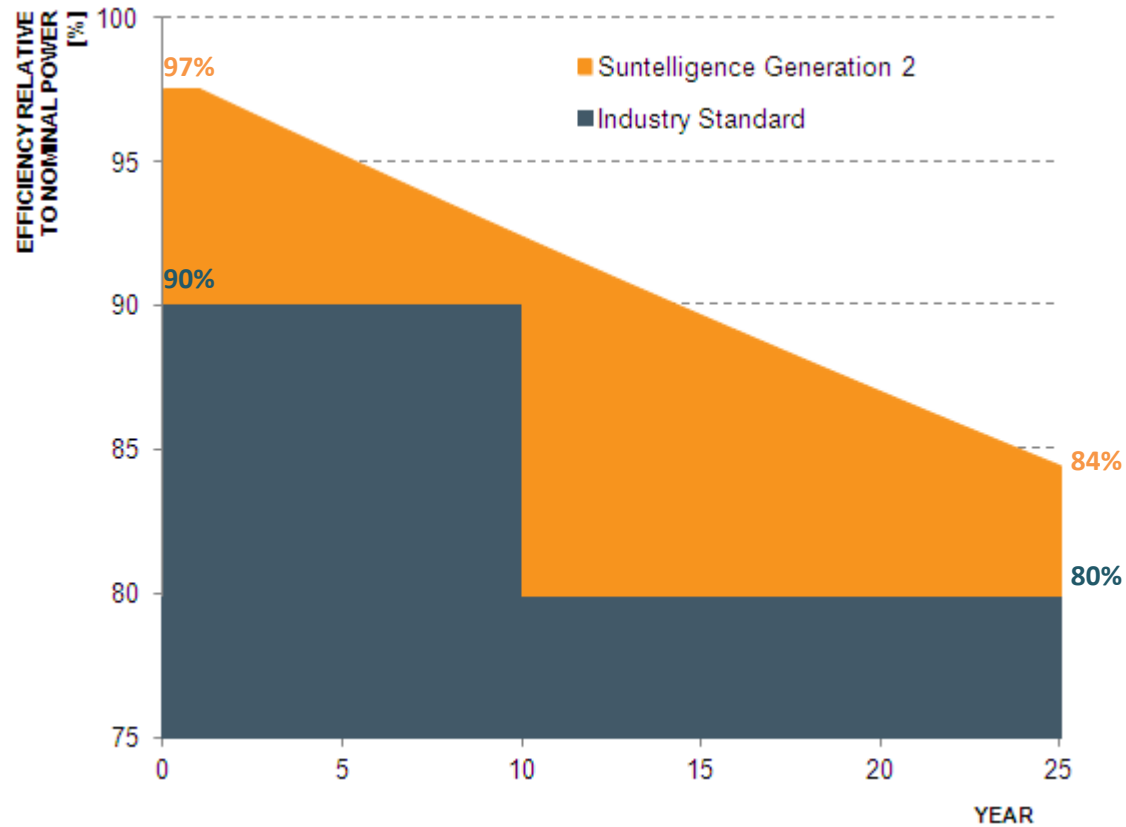
Sources:

- (1) Photon 6-2011, The Quest for quasi
- (2) JA Solar March 2012, Maple Product Introduction



ST250Q6

- Performance Warranty
 - Australian
 - Linear

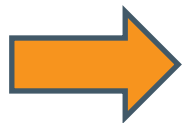


Outline

1. Sungrid Ltd
2. Standards Compliance
3. Quality Control beyond Standards
4. ST250Q6 Introduction
5. ST250Q6 Comparison

ST250Q6 Comparison

ELECTRICAL at STC	Suntelligence ST-250Q6	LDK LDK-D-250-20	Q.Cells Q.Peak 250
Nominal Power	250	250	250
Short Circuit Current I_{SC} [A]	8.86	8.92	9.07
Open Circuit Voltage V_{OC} [V]	37.71	37.8	37.15
Current at PMPP I_m [A]	8.29	8.38	8.41
Voltage at PMPP V_m [V]	30.14	29.9	30.01
Efficiency η [%]	15.3	15.3	15.0



Fairly similar



Notes:

STC = Standard Test Conditions, 1000W/m², 25°C, AM1.5

Sources:

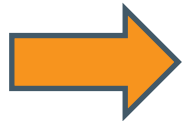
LDK_220D_260D_20_EN_V1_12_120315.pdf

QCells_Datenblatt_QPEAK_2012-02_Rev06_EN_WEB.pdf



ST250Q6 Comparison

TEMPERATURE CHARACTERISTICS	Suntelligence ST-250Q6	LDK LDK-D-250-20	Q.Cells Q.Peak 250
Temperature Coefficient of I_{SC} , α [%/°C]	0.055	0.060	0.040
Temperature Coefficient of V_{OC} , β [%/°C]	-0.340	-0.340	-0.320
Temperature Coefficient of P_{MPP} , γ [%/°C]	-0.430	-0.470	-0.460



Better temperature coefficients means **better power outputs** when temperature increases

Assumptions: 1 year =
1750 units/kW installed

-0.43 [%/°C] → -12.9 [%/°C] **5 days of** 87.0 [%/°C] →

1524.3 units/kW

-0.47 [%/°C] → -14.1 [%/°C] **generation a year** 85.9 [%/°C] →

1503.3 units/kW



Notes:
NOCT= Normal Operating Cell Temperature, 800W/m², 20°C, AM1.5
Sources:
LDK_220D_260D_20_EN_V1_12_120315.pdf
QCells_Datenblatt_QPEAK_2012-02_Rev06_EN_WEB.pdf



ST250Q6 Comparison

PHYSICAL	Suntelligence ST-250Q6	LDK LDK-D-250-20	Q.Cells Q.Peak 250
Solar Cells	Quasi Mono (NEW)	Monocrystalline	Monocrystalline
Front Sheet	3.2mm tempered glass AR coating	3.2mm tempered glass AR coating	3.2mm tempered glass AR coating
Frame	Anodized black	Anodized silver	Anodized silver
Weight [kg]	19.5	19	19.8
Dimensions [mm]	1650 x 991 x 40	1642 x 994 x 40	1670 x 1000 x 50
Junction Box	IP67 rated, potted	IP65 rated	IP 68 rated
Connectors	MC4 compatible	MC4 or compatible	Yamaichi Y-SOL4
Wind/Snow Loads [Mpa]	2400/5400	2400/5400	



Notes: AR = Anti Reflective

Sources:

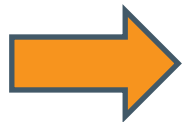
LDK_220D_260D_20_EN_V1_12_120315.pdf

QCells_Datenblatt_QPEAK_2012-02_Rev06_EN_WEB.pdf



ST250Q6 Comparison

WARRANTY	Suntelligence ST-250Q6	LDK LDK-D-250-20	Q.Cells Q.Peak 250
Service Location	Australia	China	Germany
Workmanship	10 years	10 years	10 years
Performance	92% after 10 years 91% after 12 years 84% after 25 years	90% after 12 years 80% after 25 years	92% after 10 years 83% after 25 years
Type	Linear	Standard Block Method	Linear



Better warranties for Australia

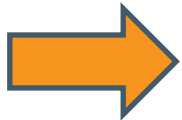


Sources:
 LDK_220D_260D_20_EN_V1_12_120315.pdf
 QCells_Datenblatt_QPEAK_2012-02_Rev06_EN_WEB.pdf



ST250Q6 Comparison

PACKAGING	Suntelligence ST-250Q6	LDK LDK-D-250-20	Q.Cells Q.Peak 250
Pieces per Pallet	25	50	20
Container Size [ft]	40	40	40
Pallet Quantity	28	50	26
Module Quantity	700	700	520



- Power Labeling
- Serial number on frame side for logistics



Sources:
LDK_220D_260D_20_EN_V1_12_120315.pdf
QCells_Datenblatt_QPEAK_2012-02_Rev06_EN_WEB.pdf

