Technical Guide

This manual offers all the required information about the usage of the photovoltaic architectonic glazing manufactured by Onyx Solar. All instructions must be carefully read and the steps herein exposed must be followed. Onyx Solar will not be liable for any damages, losses or expenses due to the failure of complying with the conditions specified in this document.

El siguiente manual ofrece la información necesaria sobre el correcto diseño y uso del vidrio arquitectónico fotovoltaico fabricado por Onyx Solar. Por favor, lea la guía en su totalidad, y siga los pasos aquí expuestos. La empresa no se hace responsable de los daños, pérdidas o gastos derivados de la inadecuada aplicación de las condiciones establecidas en este documento.

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1. COMPANY INTRODUCTION

ONYX SOLAR: QUIÉNES SOMOS

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ONYX SOLAR is a **leading design and manufacturing company offering architectonic photovoltaic glazing** that embodies the characteristics of the solar photovoltaic technology and the functionality of the traditional glazing; allowing the integration of photovoltaic properties on the surfaces of any building.

In this sense, Onyx offers a huge range of photovoltaic glazing that fulfills the highest quality standards of the Building Integrated Photovoltaic Industry (BIPV). At Onyx, the scope of our work covers from the design stage of the photovoltaic glazing to the manufacturing, installation process, testing and commissioning, achieving the optimal balance between aesthetics, energy production and the economics of the product. We always take in count the original ideas of the architect or designer team, and adding photovoltaic properties to the project and providing passive properties at the building. The goal is reach the optimal balance between aesthetics, power and efficiency of the product. Glass-glass modules represent a multifunctional bioclimatic solution which combines both active and passive properties such as UV and IR filter, acoustic and thermal insulation and solar protection: incoming light modulation and building's energy efficiency.

Onyx Solar, a firm with wide experience in the building integration photovoltaic solutions (BIPV), offers a full range of architectural and engineering consulting in design, manufacturing, and installation of photovoltaic constructive solutions.

ONYX SOLAR es la **empresa líder en diseño y fabricación de vidrio arquitectónico fotovoltaico** que aunando las características eléctricas de la tecnología solar fotovoltaica y las características funcionales del vidrio como material arquitectónico tradicional, permiten la integración de los vidrios fotovoltaicos en cualquier parte de la envolvente del edificio.

En este sentido, Onyx Solar ofrece una amplia gama de módulos de vidrio fotovoltaicos que cumplen con los más altos estándares de calidad de la Integración Fotovoltaica en Edificios (BIPV). En Onyx, el alcance de nuestro trabajo cubre, desde la etapa de diseño del edificio mediante soluciones con vidrio fotovoltaico, su fabricación, el proceso de instalación, y la comprobación y puesta en marcha del sistema. Siempre buscando respetar las ideas originales del arquitecto autor del proyecto, pero añadiéndole las propiedades fotovoltaicas y potenciando las características pasivas de las construcciones con vidrio. La meta es alcanzar el equilibrio óptimo entre estética, producción de energía y eficiencia del producto. Los módulos de vidrio fotovoltaico representan una solución bioclimática multifuncional que combina propiedades activas y pasivas, como el filtro de rayos infrarrojos y ultravioletas, aislamiento acústico y térmico y protección solar: regulación de la luz entrante y eficiencia energética del edificio.

Onyx Solar, gracias a su amplísima experiencia en la integración fotovoltaica de edificios (BIPV), está en condiciones de ofrecer una gama completa de servicios de consultoría **de arquitectura e ingeniería** en el ámbito del diseño, fabricación, e instalación de soluciones constructivas fotovoltaicas.

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2. PRODUCT INTRODUCTION

INTRODUCCIÓN AL PRODUCTO

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ONYX SOLAR designs, manufactures and if necessary installs both aesthetic **crystalline and amorphous silicon glass/glass BIPV modules.** Technical data sheets and structural lay-out of Onyx's standard products are shown in the following pages, offering comprehensive information to ease the understanding of the fundamental objective of **the photovoltaic glazing's integration in the building envelope**.

ONYX SOLAR diseña, fabrica y en su caso, instala, **vidrios de tecnología de silicio cristalino y silicio amorfo**. En las siguientes páginas encontraras las fichas técnicas y el diseño estructural de los productos estándar de Onyx, ofreciendo una amplia información sobre las distintas alternativas desarrolladas por ONYX, para encontrar en cada la caso la mejor solución para la **integración fotovoltaica en la envolvente del edificio**.

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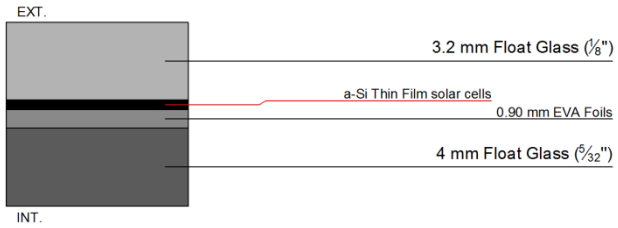
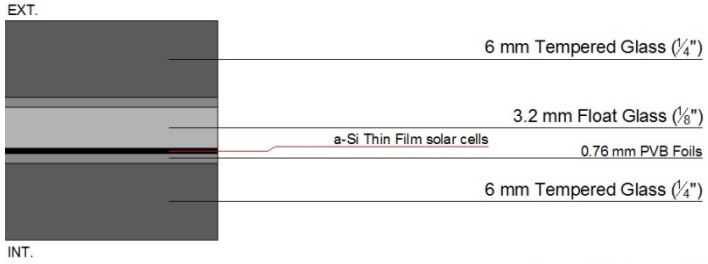
Standard configuration & thickness:

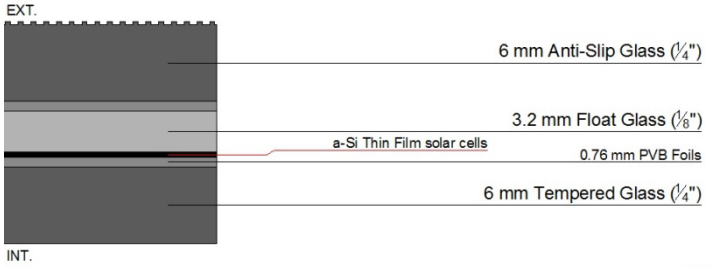
Configuración y espesor estándar



Total thickness: 8.10 mm (5/16")



Total thickness: 16.72 mm (11/16")



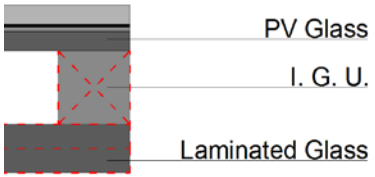
Total thickness: 16.72 mm (11/16")

Non-standard thickness?

¿Espesor no estándar?

We can offer you a wide range of customized thicknesses, including insulating glass units.
Podemos ofrecerle una amplia gama de espesores personalizados, incluyendo elementos de vidrio aislante.

Please contact us for more information.
Para más información, contacte con nosotros.



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Standard color category:

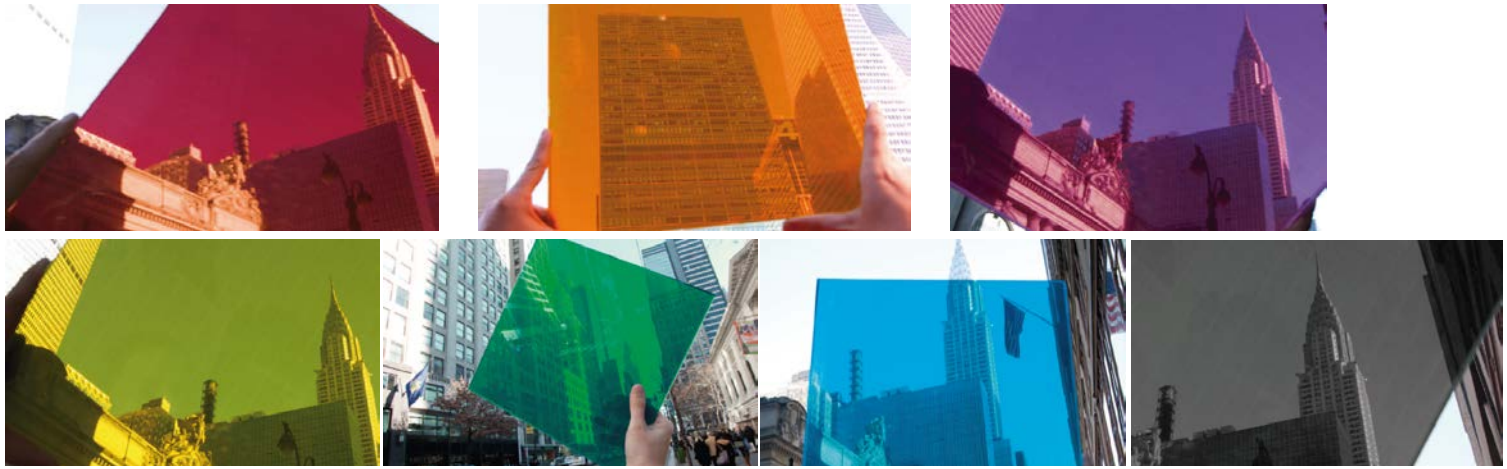
Familias de colores estándar :

Category A:

light red	*orange*	*light grey*	*white*	*black*
000C	000E	0007	000A	000G

Category B:

dark red	*yellow*	*green*	*light blue*	*dark blue*	*purple*	*dark grey*
00CC	0044	0046	0066	00DD	006C	007H



If your project requires other customized colors, please contact us for more information about other color range.
Si su proyecto requiere otro color personalizado, contacte con nosotros para más información sobre otras gamas de color.

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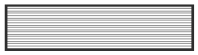
Standard sizes:

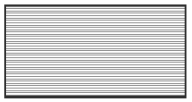
Medidas Estándar
(a-Si)

THIN FILM PV GLASS

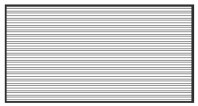
1245 x 300 mm
49" x 11 13/16"



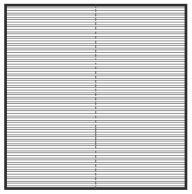
1200 x 600 mm
47 1/4" x 23 5/8"



1245 x 635 mm
49" x 25"

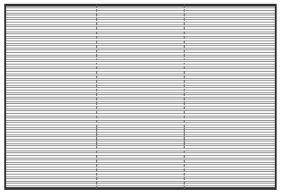


1242 x 1245 mm
49" x 49"

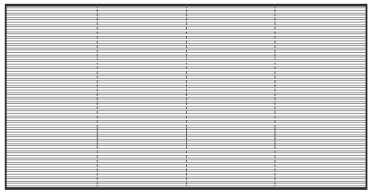


2462 x 635 mm
97" x 25"

1849 x 1245 mm
73" x 49"



2456 x 1245 mm
96 3/4" x 49"



Non-standard size?

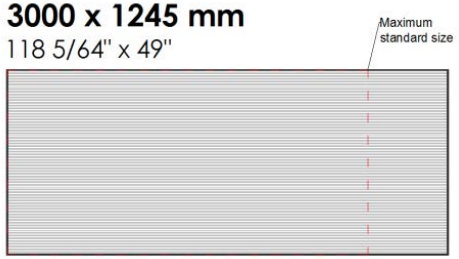
¿Medidas no estándar?

We can offer you a wide range of customized sizes up to 3200 x 2000* mm.
En Onyx Solar ofrecemos una amplia gama de tamaños personalizados de hasta 3200x2000* mm.

Please contact us for more information.
Para más información, contacte con nosotros.

***Please, consult us the availabilitiy in sides up than 1245 mm. ***Consultar disponibilidad en anchos mayores de 1245mm

3000 x 1245 mm
118 5/64" x 49"



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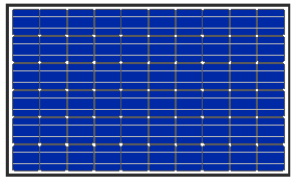
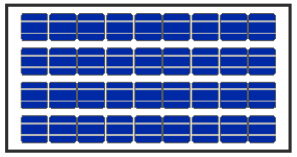
CRYSTALLINE PV GLASS

1641 x 989 mm
64 5/8" x 39"

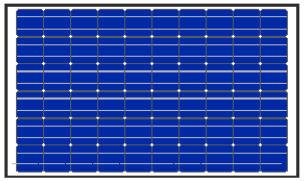


1475 x 480 mm
58" x 18 7/8"

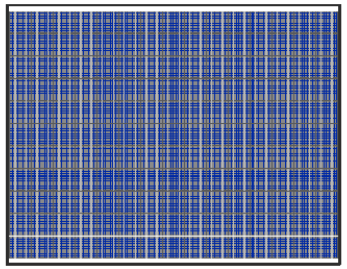
1650 x 850 mm
65" x 33 1/2"



1700 x 1000 mm
67" x 39 3/8"



Transparent Cells
1931 x 1511 mm
76 1/16" x 59 1/2"



FLOOR PV GLASS

600 x 600 mm
23 5/8" x 23 5/8"

Non-standard size?

¿Medidas no estándar?

We can offer you a wide range of customized sizes up to 3200 x 2000 mm.
En Onyx Solar ofrecemos una amplia gama de tamaños personalizados de hasta 3200x2000 mm.

Please contact us for more information.
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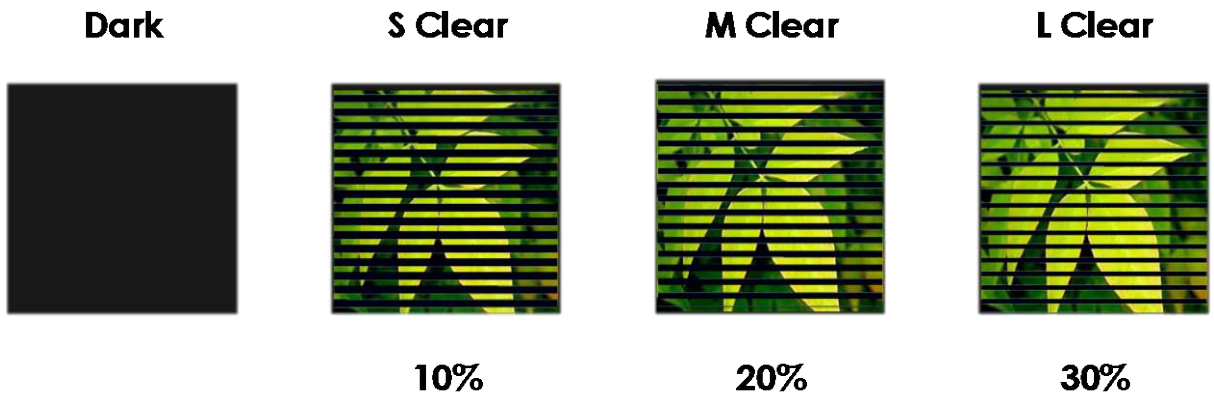
Degree of Transparency:

Grados de semitransparencia:



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Please follow this sketch in order to define your glass:

Por favor, siga el siguiente esquema para definir el tipo de vidrio:

636 BN - 12451242 - 00 - 1

PV Glass Configuration: *Configuración de vidrio fotovoltaico/*

636= 6 mm Tempered glass + 3,2 float glass + 6 mm Tempered glass
044= 4 mm Tempered glass + 4 mm Tempered glass
04T= 4 mm Tempered glass + 1 mm Backsheet

Type of Encapsulant foil: *Tipo de capa encapsulante*

AN=EVA Neutral (transparent/colorless) *Neutro (transparente/sin color)*
BN=PVB Neutral (transparent/colorless) *Neutro (transparente/sin color)*
BA=PVB color category A *categoría de color A*

BB=PVB color category B *categoría de color B*

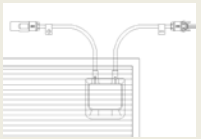
Dimensions of PV Glass (length-width in mm)
Dimensiones de vidrio fotovoltaico (largo-ancho en mm)

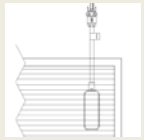
See-through degree:
Grado de transparencia/

00=DARK (OPACO)
10=Clear-10%
20=Clear-20%
30=Clear-30%

Amorphous silicon technology (a-Si):
Tecnología de silicio amorfo:

Junction box */ Caja de conexiones*
1= standard
2= 1 rail monopolar





Crystalline technology (c-Si):
Tecnología de silicio cristalino:

Type of cells */ tipo de células fotovoltaicas*
M= Monocrystalline (Mono)
P = Polycrystalline (Poly)
T = Transparent

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3. TECHNICAL DATA SHEETS: AMORPHOUS SILICON PV GLASS

FICHAS TÉCNICAS: VIDRIO FV SILICIO AMORFO

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PHOTOVOLTAIC GLASS

1245 x 300 mm

034_N-12450300-_ _-_

Electrical data test conditions (STC)		DARK-0% ref. 00	S-CLEAR 10% ref. 10	L-CLEAR 20% ref. 20	XL-CLEAR 30% ref. 30
Nominal peak power	P_{mpp} (Wp)	23	18	15	13
Open-circuit voltage	V_{oc} (V)	23	23	23	23
Short-circuit current	I_{sc} (A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp} (V)	17	17	17	17
Current at nominal power	I_{mpp} (A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

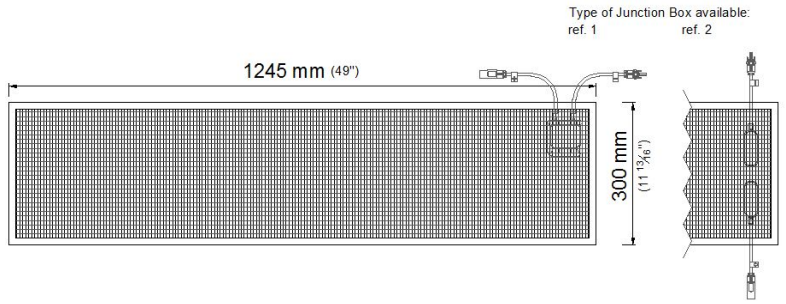
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	300
Thickness	mm	8,10 (EVA) 7,96 (PVB)
Surface area	sqm	0,37
Weight	Kg	6,00
Cell type		a-Si Thin Film
PV Glass		3,2 mm Float Glass
Rear Glass		4,0 mm Float Glass
Thickness encapsulation	ref. A	0,90 mm EVA Foils
	ref. B	0,76 mm PVB Foils

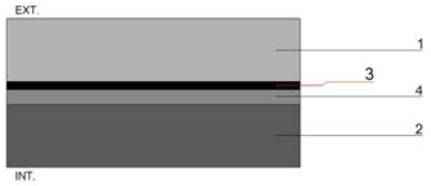
Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40…+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



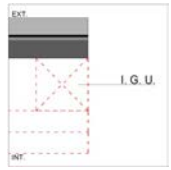
PV GLASS CONFIGURATION



1 PV Glass
2 Rear Glass
3 Cell type
4 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS

1200 x 600 mm

034_N-12000600-_ _-_

Electrical data test conditions (STC)		ref. 00 DARK-0%	ref. 10 S-CLEAR 10%	ref. 20 L-CLEAR 20%	ref. 30 XL-CLEAR 30%
Nominal peak power	P_{mpp} (Wp)	44	34	29	25
Open-circuit voltage	V_{oc} (V)	45	45	45	45
Short-circuit current	I_{sc} (A)	1,45	1,11	0,94	0,80
Voltage at nominal power	V_{mpp} (V)	34	34	34	34
Current at nominal power	I_{mpp} (A)	1,30	1,00	0,84	0,74
Power tolerance not to exceed	%	±5	±5	±5	±5

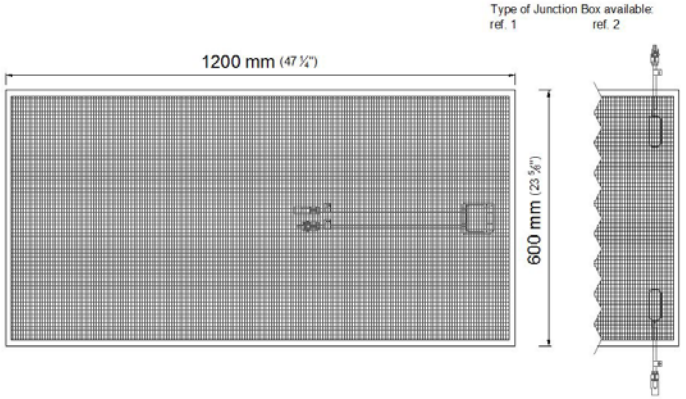
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1200
Width	mm	600
Thickness	mm	8,10 (EVA) 7,96 (PVB)
Surface area	sqm	0,72
Weight	Kg	11,52
Cell type		a-Si Thin Film
PV Glass		3,2 mm Float Glass
Rear Glass		4,0 mm Float Glass
Thickness encapsulation	ref. A	0,90 mm EVA Foils
	ref. B	0,76 mm PVB Foils

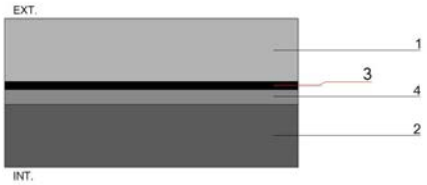
Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40…+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



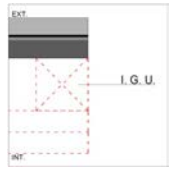
PV GLASS CONFIGURATION



1 PV Glass
2 Rear Glass
3 Cell type
4 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS

1245 x 635 mm

034_N-12450635-_ _-_

Electrical data test conditions (STC)		ref. 00 DARK-0%	ref. 10 S-CLEAR 10%	ref. 20 L-CLEAR 20%	ref. 30 XL-CLEAR 30%
Nominal peak power	P_{mpp}(Wp)	49	37	31	28
Open-circuit voltage	V_{oc}(V)	48	48	48	48
Short-circuit current	I_{sc}(A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp}(V)	36	36	36	36
Current at nominal power	I_{mpp}(A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

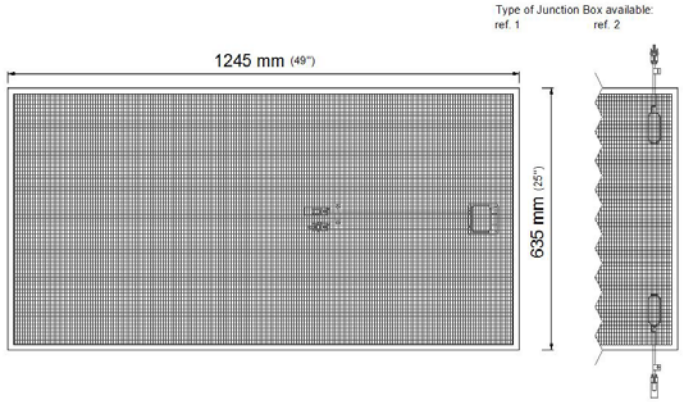
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	635
Thickness	mm	8,10 (EVA) 7,96 (PVB)
Surface area	sqm	0,79
Weight	Kg	12,65
Cell type		a-Si Thin Film
PV Glass		3,2 mm Float Glass
Rear Glass		4,0 mm Float Glass
Thickness encapsulation	ref. A	0,90 mm EVA Foils
	ref. B	0,76 mm PVB Foils

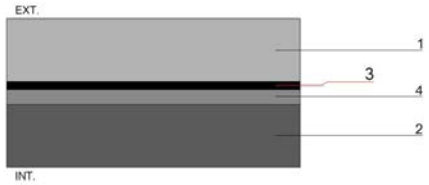
Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



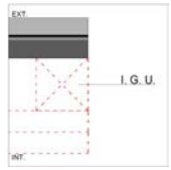
PV GLASS CONFIGURATION



1 PV Glass
2 Rear Glass
3 Cell type
4 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS					035BN-12450635-_ _-_
1245 x 635 mm		ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**DARK-0%**	**S-CLEAR 10%**	**L-CLEAR 20%**	**XL-CLEAR 30%**
Nominal peak power	P_{mpp}(Wp)	49	37	31	28
Open-circuit voltage	V_{oc}(V)	48	48	48	48
Short-circuit current	I_{sc}(A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp}(V)	36	36	36	36
Current at nominal power	I_{mpp}(A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	635
Thickness	mm	8,96
Surface area	sqm	0,79
Weight	Kg	16,20
Cell type		a-Si Thin Film
PV Glass		3,2 mm Float Glass
Rear Glass		5,0 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	0,76 mm PVB Foils

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

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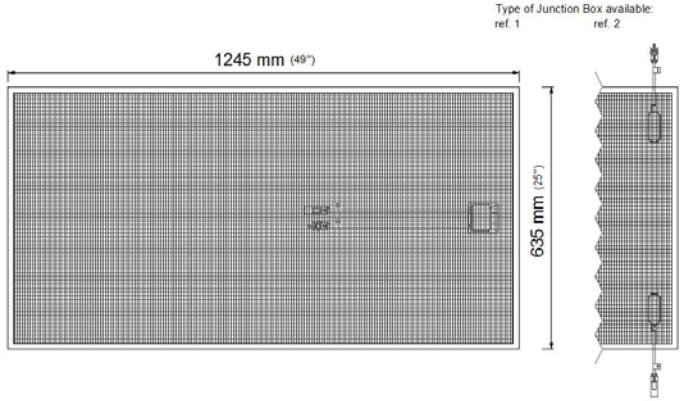
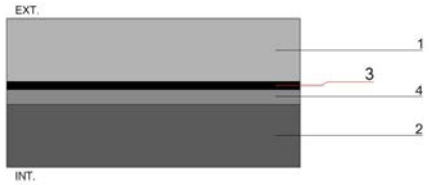
PV GLASS DIMENSIONS



PV GLASS CONFIGURATION

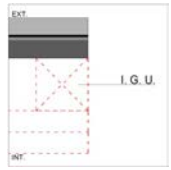


1 PV Glass
2 Rear Glass
3 Cell type
4 Encapsulation type

PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
  Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
  Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS				636BN-12451242-_ _-_	
1245 x 1242 mm		ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**DARK-0%**	**S-CLEAR 10%**	**L-CLEAR 20%**	**XL-CLEAR 30%**
Nominal peak power	P_{mpp}(Wp)	95	73	61	54
Open-circuit voltage	V_{oc}(V)	94	94	94	94
Short-circuit current	I_{sc}(A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp}(V)	71	71	71	71
Current at nominal power	I_{mpp}(A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	1242
Thickness	mm	16,72
Surface area	sqm	1,55
Weight	Kg	58,90
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

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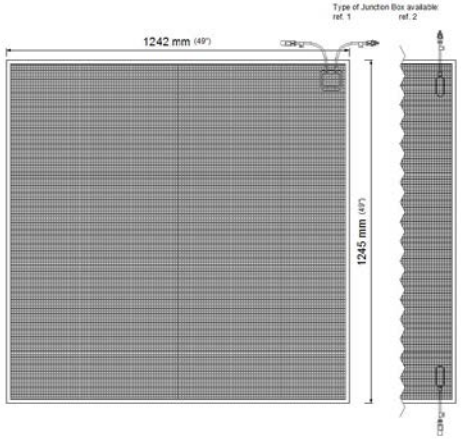
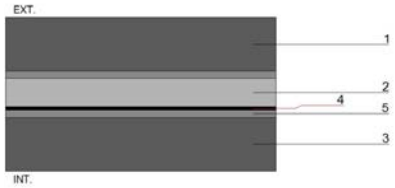
PV GLASS DIMENSIONS



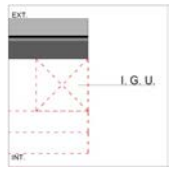
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sq.m.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS 2462 x 635 mm		636BN-24620635-_ _-_ ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**DARK-0%**	**S-CLEAR 10%**	**L-CLEAR 20%**	**XL-CLEAR 30%**
Nominal peak power	P_{mpp}(Wp)	96	74	62	55
Open-circuit voltage	V_{oc}(V)	48	48	48	48
Short-circuit current	I_{sc}(A)	2,97	2,27	1,93	1,64
Voltage at nominal power	V_{mpp}(V)	36	36	36	36
Current at nominal power	I_{mpp}(A)	2,67	2,06	1,72	1,52
Power tolerance not to exceed	%	±5	±5	±5	±5

STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	2462
Width	mm	635
Thickness	mm	16,72
Surface area	sqm	1,56
Weight	Kg	59,28
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

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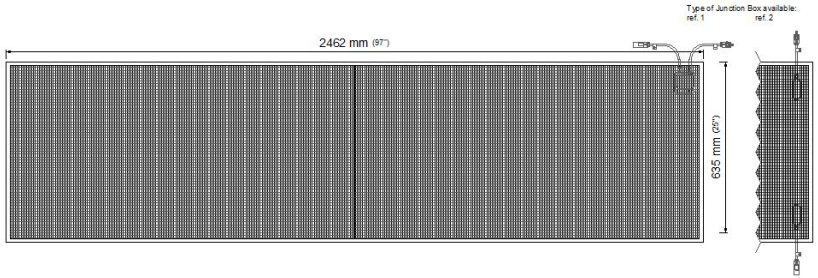
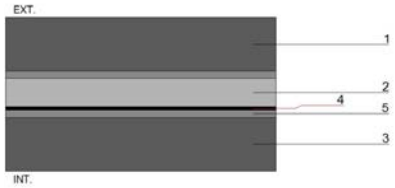
PV GLASS DIMENSIONS



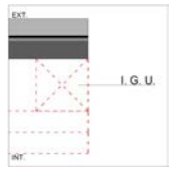
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sq.m.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS				636BN-12451849-_ _-_	
1245 x 1849 mm		ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**DARK-0%**	**S-CLEAR 10%**	**L-CLEAR 20%**	**XL-CLEAR 30%**
Nominal peak power	P_{mpp}(Wp)	142	109	91	81
Open-circuit voltage	V_{oc}(V)	140	140	140	140
Short-circuit current	I_{sc}(A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp}(V)	105	105	105	105
Current at nominal power	I_{mpp}(A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

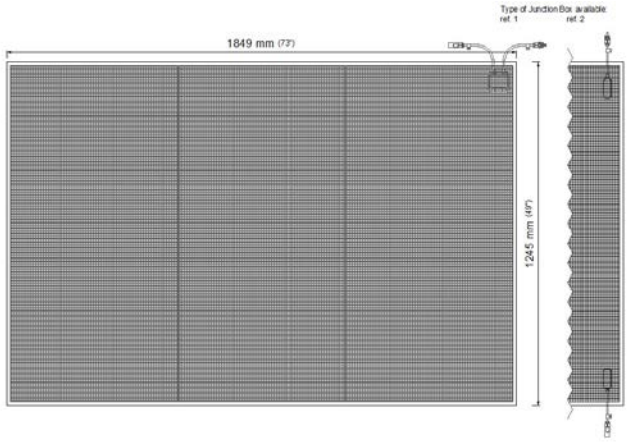
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	1849
Thickness	mm	16,72
Surface area	sqm	2,30
Weight	Kg	87,40
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

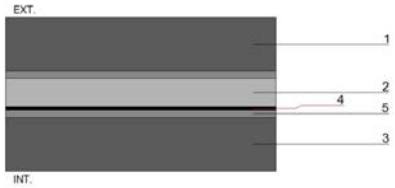
Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



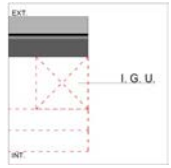
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS				636BN-12452456-_ _-_	
1245 x 2456 mm		ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**DARK-0%**	**S-CLEAR 10%**	**L-CLEAR 20%**	**XL-CLEAR 30%**
Nominal peak power	P_{mpp}(Wp)	189	146	122	108
Open-circuit voltage	V_{oc}(V)	185	185	185	185
Short-circuit current	I_{sc}(A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp}(V)	140	140	140	140
Current at nominal power	I_{mpp}(A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	2456
Thickness	mm	16,72
Surface area	sqm	3,06
Weight	Kg	116,28
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

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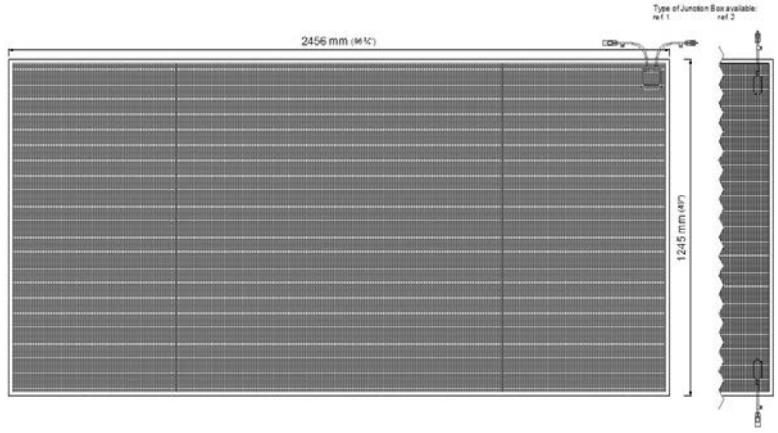
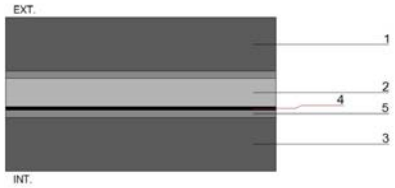
PV GLASS DIMENSIONS



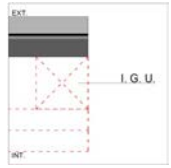
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sq.m.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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4. TECHNICAL DATA SHEETS: CRYSTALLINE PV GLASS

FICHAS TÉCNICAS: VIDRIO FV SILICIO CRISTALINO

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PHOTOVOLTAIC GLASS			04TA_-16410989-_ _-_
1641 x 989 mm		ref. M	ref. P
Electrical data test conditions (STC)		**6" Mono-Crystalline**	**6" Poly-Crystalline**
Nominal peak power	P_{mpp}(Wp)	274	238
Open-circuit voltage	V_{oc}(V)	38	37
Short-circuit current	I_{sc}(A)	9,09	8,45
Voltage at nominal power	V_{mpp}(V)	32	30
Current at nominal power	I_{mpp}(A)	8,55	7,93
Power tolerance not to exceed	%	±3	±3

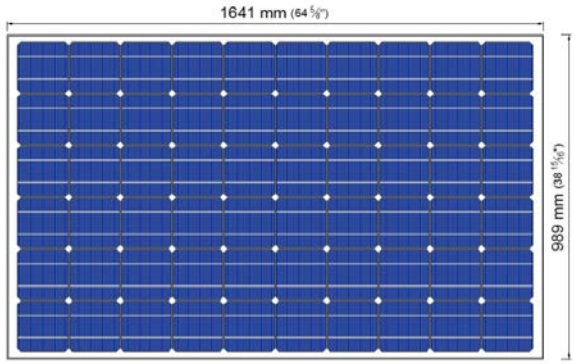
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description			
Length	mm	1641	
Width	mm	989	
Thickness	mm	5,90 (Glass) 46,00 (Alu frame)	
Surface area	sqm	1,62	
Weight	Kg	23,50	
Cell type (no PV cells)		6" Mono-Cryst. (60)	6" Poly-Cryst. (60)
PV Glass		4,0 mm Tempered Glass	
Rear Layer		1,0 mm backsheet	
Thickness encapsulation	ref. A	0,90 mm EVA Foils	
	ref. B	PVB Foils (not available)	

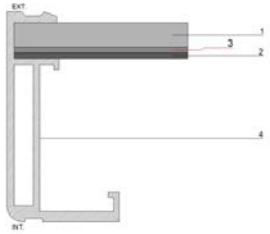
Junction Box		
Protection	IP65	
Wiring Section	2,5 mm^2 / 4,0 mm^2	
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,49 / -0,43
Temperature Coefficient of V_{oc}	%/°C	-0,35 / -0,343
Temperature Coefficient of I_{sc}	%/°C	+0,045 / +0,027

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



PV GLASS CONFIGURATION



1 PV Glass
2 Rear Layer
3 Cell type
4 Aluminium frame

NOTES

* For optical and further mechanical properties, please go to:

Technical Guide. 7.-Other Properties.

* Junction box type and location should be approved by the customer.

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PHOTOVOLTAIC GLASS 1475 x 480 mm		04TA_-14750480-_ _-_ ref. M	ref. P
Electrical data test conditions (STC)		**6" Mono-Crystalline**	**6" Poly-Crystalline**
Nominal peak power	P_{mpp} (Wp)	77	63
Open-circuit voltage	V_{oc} (V)	10	10
Short-circuit current	I_{sc} (A)	9,09	8,45
Voltage at nominal power	V_{mpp} (V)	9	8
Current at nominal power	I_{mpp} (A)	8,55	7,93
Power tolerance not to exceed	%	±3	±3

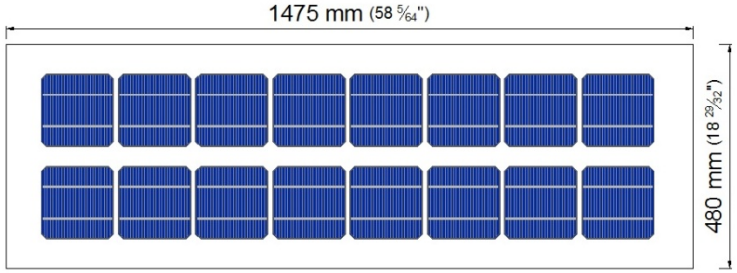
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description			
Length	mm	1475	
Width	mm	480	
Thickness	mm	5,90 (Glass) 46,00 (Alu frame)	
Surface area	sqm	0,70	
Weight	Kg	10,00	
Cell type (no PV cells)		6" Mono-Cryst (16)	6" Poly-Cryst (16)
PV Glass		4,0 mm Tempered Glass	
Rear Layer		1,0 mm backsheet	
Thickness encapsulation	ref. A	0,90 mm EVA Foils	
	ref. B	PVB Foils (not available)	

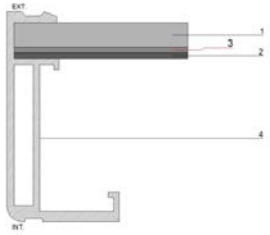
Junction Box			
Protection		IP65	
Wiring Section		2,5 mm^2 / 4,0 mm^2	
Limits			
Maximum system voltage	V_{sys} (V)	1.000	
Operating module temperature	°C	-40...+85	
Temperature Coefficients			
Temperature Coefficient of P_{mpp}	%/°C	-0,49	-0,43
Temperature Coefficient of V_{oc}	%/°C	-0,35	-0,343
Temperature Coefficient of I_{sc}	%/°C	+0,045	+0,027

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



PV GLASS CONFIGURATION



1 PV Glass
2 Rear Layer
3 Cell type
4 Aluminium frame

NOTES

* For optical and further mechanical properties, please go to:

Technical Guide. 7.-Other Properties.

* Junction box type and location should be approved by the customer.

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PHOTOVOLTAIC GLASS 1475 x 480 mm		044A_-14750480-_ _-_ ref. M	ref. P
Electrical data test conditions (STC)		**6" Mono-Crystalline**	**6" Poly-Crystalline**
Nominal peak power	P_{mpp} (Wp)	77	63
Open-circuit voltage	V_{oc} (V)	10	10
Short-circuit current	I_{sc} (A)	9,09	8,45
Voltage at nominal power	V_{mpp} (V)	9	8
Current at nominal power	I_{mpp} (A)	8,55	7,93
Power tolerance not to exceed	%	±10	±10

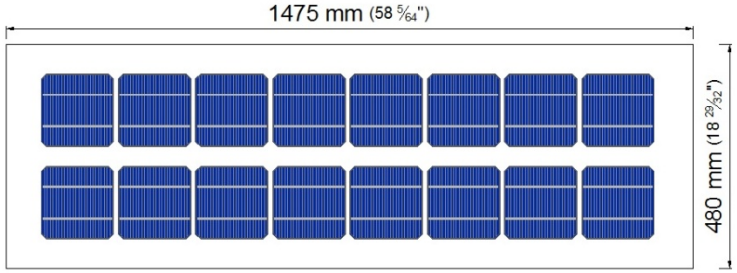
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description			
Length	mm	1475	
Width	mm	480	
Thickness	mm	9,80	
Surface area	sqm	0,70	
Weight	Kg	14,00	
Cell type (no PV cells)		6" Mono-Cryst (16)	6" Poly-Cryst (16)
Front Glass		4,0 mm Tempered Glass	
Rear Glass		4,0 mm Tempered Glass	
Thickness encapsulation	ref. A	1,80 mm EVA Foils	
	ref. B	PVB Foils (not available)	

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,451
Temperature Coefficient of V_{oc}	%/°C	-0,361
Temperature Coefficient of I_{sc}	%/°C	+0,08

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS

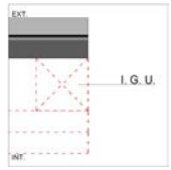


PV GLASS CONFIGURATION

1 Front Glass
2 Rear Glass
3 Cell type
4 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS			0_ _A_-16500850-_ _-_
1650 x 850 mm		ref. M	ref. P
Electrical data test conditions (STC)		**6" Mono-Cryst.**	**6" Poly-Cryst.**
Nominal peak power	P_{mpp}(Wp)	162	143
Open-circuit voltage	V_{oc} (V)	23	22
Short-circuit current	I_{sc}(A)	9,09	8,45
Voltage at nominal power	V_{mpp}(V)	19	18
Current at nominal power	I_{mpp}(A)	8,55	7,93
Power tolerance not to exceed	%	±10	±10

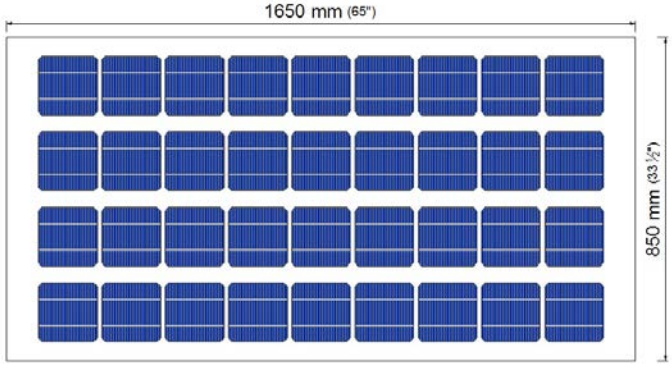
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description			
Length	mm	1650	
Width	mm	850	
Thickness	mm	9,80 / 11,80 / 13,80 / 17,80	
Surface area	sqm	1,40	
Weight	Kg	28,00 / 35,00 / 42,00 / 56,00	
Cell type (no PV cells)		6" Mono-C. (36)	6" Poly-C. (36)
Front Glass		4,0 / 5,0 / 6,0 / 8,0 Tempered Glass	
Rear Glass		4,0 / 5,0 / 6,0 / 8,0 Tempered Glass	
Thickness encapsulation	ref. A	1,80 mm EVA Foils	
	ref. B	PVB Foils (not available)	

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,451
Temperature Coefficient of V_{oc}	%/°C	-0,361
Temperature Coefficient of I_{sc}	%/°C	+0,08

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS

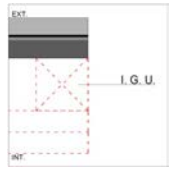


PV GLASS CONFIGURATION

1 Front Glass
2 Rear Glass
3 Cell type
4 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS			0__A_-17001000-_ _-_
1700 x 1000 mm		ref. M	ref. P
Electrical data test conditions (STC)		**6" Mono-Crystalline**	**6" Poly-Crystalline**
Nominal peak power	P_{mpp}(Wp)	274	238
Open-circuit voltage	V_{oc}(V)	38	37
Short-circuit current	I_{sc}(A)	9,09	8,45
Voltage at nominal power	V_{mpp}(V)	32	30
Current at nominal power	I_{mpp}(A)	8,55	7,93
Power tolerance not to exceed	%	±10	±10

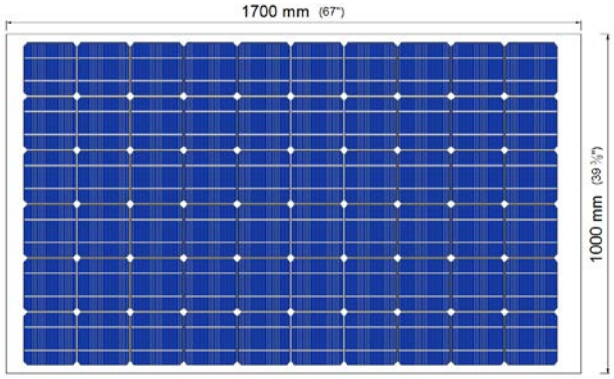
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description			
Length	mm	1700	
Width	mm	1000	
Thickness	mm	9,80 / 11,80 / 13,80 / 17,80	
Surface area	sqm	1,70	
Weight	Kg	34,00 / 42,50 / 51,00 / 68,00	
Cell type (no PV cells)		6" Mono-Cryst (60)	6" Poly-Cryst (60)
Front Glass		4,0 / 5,0 / 6,0 / 8,0 Tempered Glass	
Rear Glass		4,0 / 5,0 / 6,0 / 8,0 Tempered Glass	
Thickness encapsulation	ref. A	1,80 mm EVA Foils	
	ref. B	PVB Foils (not available)	

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,451
Temperature Coefficient of V_{oc}	%/°C	-0,361
Temperature Coefficient of I_{sc}	%/°C	+0,08

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS

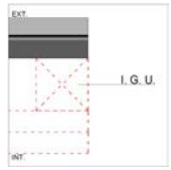


PV GLASS CONFIGURATION

1 Front Glass
2 Rear Glass
3 Cell type
4 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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PHOTOVOLTAIC GLASS

1931 x 1511 mm

088AB-19311511-20-T

ref. T

Electrical data test conditions (STC)		5'' Mono-Crystalline Transparent
Nominal peak power	P_{mpp} (Wp)	321
Open-circuit voltage	V_{oc} (V)	33
Short-circuit current	I_{sc} (A)	13,20
Voltage at nominal power	V_{mpp} (V)	27
Current at nominal power	I_{mpp} (A)	11,90
Power tolerance not to exceed	%	±10

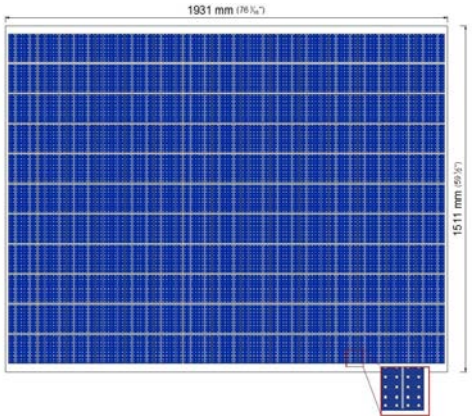
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1931
Width	mm	1511
Thickness	mm	17,80
Surface area	sqm	2,92
Weight	Kg	116,80
Cell type (no PV cells)		5" Mono-Crystalline Transparent (165)
Front Glass		8,0 mm Tempered Glass
Rear Glass		8,0 mm Tempered Glass
Thickness encapsulation	ref. A	1,80 mm EVA Foils
	ref. B	PVB Foils (not available)

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,45
Temperature Coefficient of V_{oc}	%/°C	-0,33
Temperature Coefficient of I_{sc}	%/°C	+0,042

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS

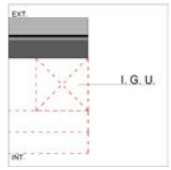


PV GLASS CONFIGURATION

1 Front Glass
2 Rear Glass
3 Cell type
4 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and location should be approved by the customer.



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5. TECHNICAL DATA SHEETS: PV GLASS FLOOR

FICHAS TECNICAS: SUELO TRANSITABLE FOTOVOLTAICO

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PHOTOVOLTAIC GLASS					636BN-06000600-_ _-_
600 x 600 mm		ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**DARK-0%**	**S-10%**	**L-20%**	**XL-30%**
Nominal peak power	P_{mpp} (Wp)	22	17	14	13
Open-circuit voltage	V_{oc} (V)	45	45	45	45
Short-circuit current	I_{sc} (A)	0,72	0,55	0,47	0,40
Voltage at nominal power	V_{mpp} (V)	34	34	34	34
Current at nominal power	I_{mpp} (A)	0,65	0,50	0,42	0,37
Power tolerance not to exceed	%	±5	±5	±5	±5

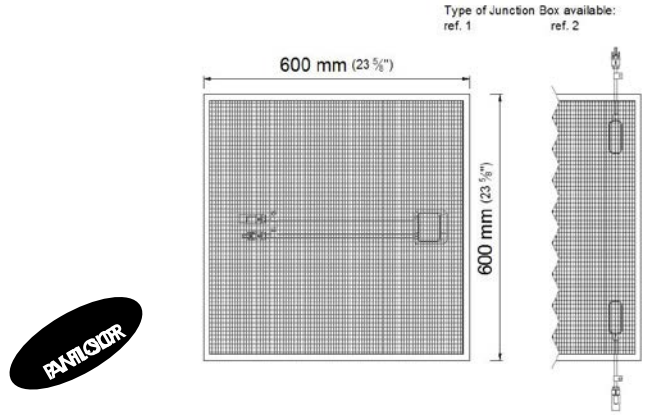
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	600
Width	mm	600
Thickness	mm	16,72
Surface area	sqm	0,36
Weight	Kg	14,40
Cell type		a-Si Thin Film
Front Glass		6 mm Anti-Slip Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

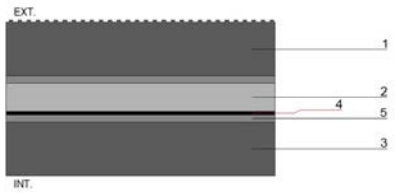
Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 / 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type

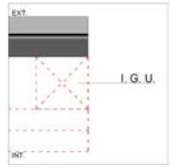
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:

Technical Guide. 7.-Other Properties.

* Junction box type and location should be approved by the customer.



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6. TECHNICAL DATA SHEETS: PV URBAN FURNITURE

FICHAS TECNICAS: MOBILIARIO URBANO FOTOVOLTAICO

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PHOTOVOLTAIC GLASS				636_N-06220317-_ _-_	
622 x 317 mm		ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**CLEAR-0%**	**CLEAR-10%**	**CLEAR-20%**	**CLEAR-30%**
Nominal peak power	P_{mpp}(Wp)	12,06	9,36	7,92	6,84
Open-circuit voltage	V_{oc} (V)	24,00	24,00	24,00	24,00
Short-circuit current	I_{sc}(A)	0,75	0,57	0,49	0,41
Voltage at nominal power	V_{mpp}(V)	18,00	18,00	18,00	18,00
Current at nominal power	I_{mpp}(A)	0,67	0,52	0,44	0,38
Power tolerance not to exceed	%	±5	±5	±5	±5

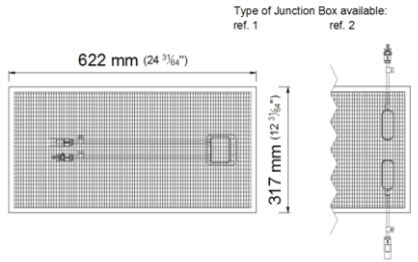
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	622
Width	mm	317
Thickness	mm	16,72
Surface area	sqm	0,20
Weight	Kg	7,49
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

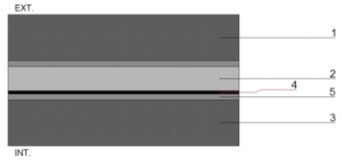
Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 or 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



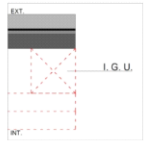
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and configuration should be analyzed as per clients request or project needs.



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PHOTOVOLTAIC GLASS					636_N-06220635-_ _-_
622 x 635 mm		ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**CLEAR-0%**	**CLEAR-10%**	**CLEAR-20%**	**CLEAR-30%**
Nominal peak power	P_{mpp}(Wp)	24,12	18,72	15,84	13,68
Open-circuit voltage	V_{oc} (V)	48,00	48,00	48,00	48,00
Short-circuit current	I_{sc} (A)	0,75	0,57	0,49	0,41
Voltage at nominal power	V_{mpp} (V)	36,00	36,00	36,00	36,00
Current at nominal power	I_{mpp} (A)	0,67	0,52	0,44	0,38
Power tolerance not to exceed	%	±5	±5	±5	±5

STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	622
Width	mm	635
Thickness	mm	16,72
Surface area	sqm	0,39
Weight	Kg	15,00
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 or 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

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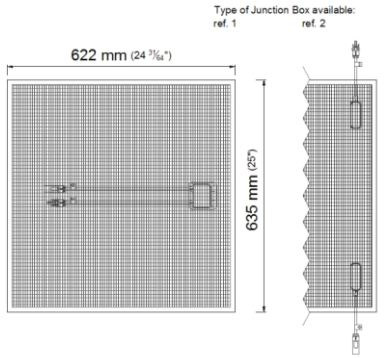
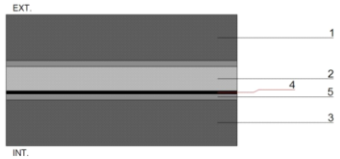
PV GLASS DIMENSIONS



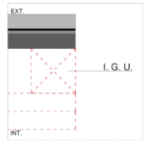
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and configuration should be analyzed as per clients request or project needs.



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PHOTOVOLTAIC GLASS 1245 x 317 mm		636_N-12450317-_ _-_ ref. 00	ref. 10	ref. 20	ref. 30
Electrical data test conditions (STC)		**CLEAR-0%**	**CLEAR-10%**	**CLEAR-20%**	**CLEAR-30%**
Nominal peak power	P_{mpp}(Wp)	24,30	18,72	15,66	13,86
Open-circuit voltage	V_{oc} (V)	24,00	24,00	24,00	24,00
Short-circuit current	I_{sc} (A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp} (V)	18,00	18,00	18,00	18,00
Current at nominal power	I_{mpp} (A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

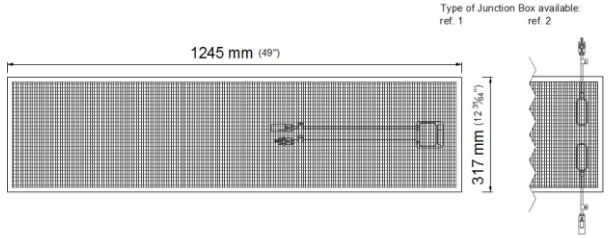
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	317
Thickness	mm	16,72
Surface area	sqm	0,39
Weight	Kg	15,00
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

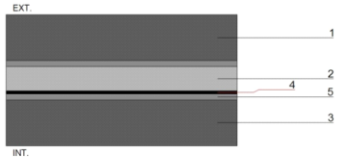
Junction Box		
Protection		IP65
Wiring Section		2,5 mm^2 or 4,0 mm^2
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



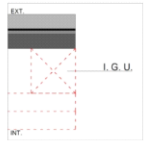
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and configuration should be analyzed as per clients request or project needs.



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PHOTOVOLTAIC GLASS 1245 x 635 mm		ref. 00	ref. 10	ref. 20	636_N-12450635-_ _-_ ref. 30
Electrical data test conditions (STC)		**CLEAR-0%**	**CLEAR-10%**	**CLEAR-20%**	**CLEAR-30%**
Nominal peak power	P_{mpp}(Wp)	48,60	37,44	31,32	27,72
Open-circuit voltage	V_{oc} (V)	48,00	48,00	48,00	48,00
Short-circuit current	I_{sc} (A)	1,50	1,15	0,98	0,83
Voltage at nominal power	V_{mpp} (V)	36,00	36,00	36,00	36,00
Current at nominal power	I_{mpp} (A)	1,35	1,04	0,87	0,77
Power tolerance not to exceed	%	±5	±5	±5	±5

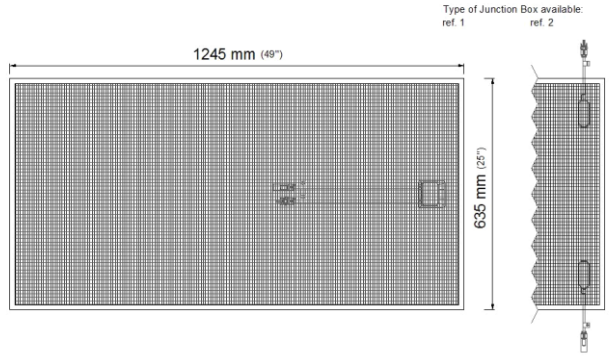
STC: 1000 w/m², AM 1.5 and a cell temperature of 25°C, stabilized module state.

Mechanical description		
Length	mm	1245
Width	mm	635
Thickness	mm	16,72
Surface area	sqm	0,79
Weight	Kg	30,00
Cell type		a-Si Thin Film
Front Glass		6 mm Tempered Glass
PV Glass		3,2 mm Float Glass
Rear Glass		6 mm Tempered Glass
Thickness encapsulation	ref. A	EVA Foils (not available)
	ref. B	1,52 mm PVB Foils

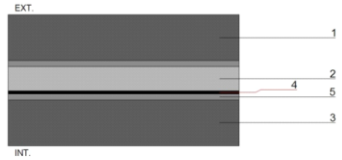
Junction Box		
Protection		IP65
Wiring Section		2,5 mm² or 4,0 mm²
Limits		
Maximum system voltage	V_{sys} (V)	1.000
Operating module temperature	°C	-40...+85
Temperature Coefficients		
Temperature Coefficient of P_{mpp}	%/°C	-0,19
Temperature Coefficient of V_{oc}	%/°C	-0,28
Temperature Coefficient of I_{sc}	%/°C	+0,09

* All technical specifications are subject to change without notice by Onyx Solar

PV GLASS DIMENSIONS



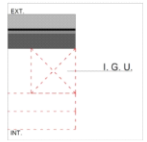
PV GLASS CONFIGURATION



1 Front Glass
2 PV Glass
3 Rear Glass
4 Cell type
5 Encapsulation type
EVA Foils ref. A
PVB Foils ref. B

NOTES

* For optical and further mechanical properties, please go to:
Technical Guide. 7.-Other Properties.
* Optional: Insulating Glass Unit. U value (W/sqm.K), please go to:
Technical Guide. 8.-Insulating Glass Unit.
* Junction box type and configuration should be analyzed as per clients request or project needs.



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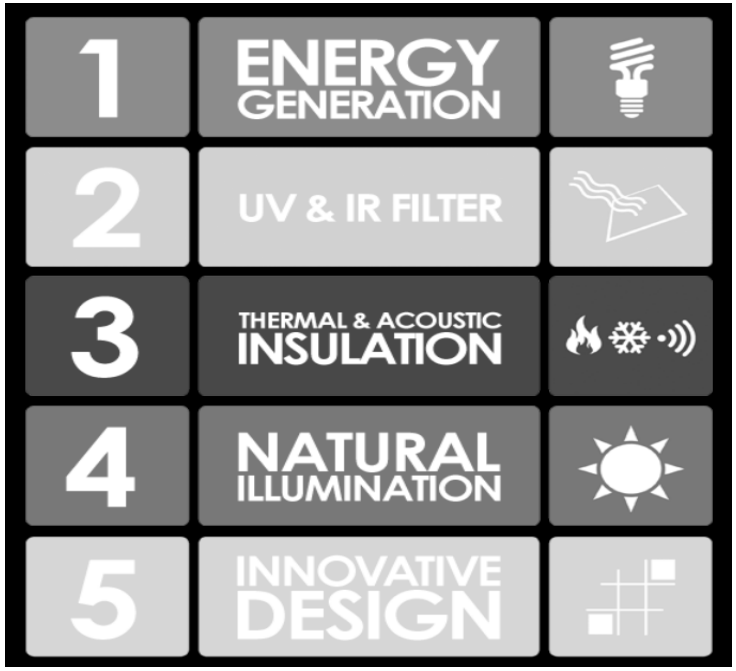
7. OTHER PROPERTIES

OTRAS PROPIEDADES



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PROPERTIES STANDARDS		GLASS 3+4 0%	10%	20%	30%
PEAK POWER	(Wp/m²)	62,5	44,4	38,9	33,3
SPECIFIC WEIGHT	(Kg/m²)	16,7	16,7	16,7	16,7
THERMAL TRANSMITTANCE (U value) UNE-EN 673:1998	(W/m²K)	5,7	5,7	5,7	5,7
SOLAR FACTOR (g) UNE-EN 410:2011		22,00%	29,00%	34,00%	41,00%
TRANSMISSION UV UNE-EN 410:1998		0,00%	1,50%	1,50%	4,70%
SOLAR TRANSMISSION UNE-EN 410:1998		0,20%	9,40%	15,00%	24,30%
LIGHT TRANSMISSION UNE-EN 410:1998		0,20%	10,80%	17,30%	28,40%
LIGHT REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998		7,60%	8,30%	7,60%	8,20%
LIGHT REFLECTION (INNER SIDE) UNE-EN 410:1998		61,00%	52,90%	47,80%	37,90%
SOLAR REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998		14,80%	13,90%	11,10%	12,40%
SOLAR REFLECTION (INNER SIDE) UNE-EN 410:1998		60,00%	52,20%	46,70%	37,90%
FIRE REACTION Standard classification UNE-EN 13501-1:2007 UNE-EN 13823:2002 / ISO 11925-2:2002		B-s1,d0	B-s1,d0	B-s1,d0	B-s1,d0
RESISTENCE TO SOFT BODY IMPACT UNE-EN 12600:2003		2(B)2	2(B)2	2(B)2	2(B)2
TEMPERED GLASS STANDARDS UNE-EN 12150		Not Aplicable			
ACOUSTIC ATTENUATION UNE-EN 12578:2002	dB	32(-1;-3)	32(-1;-3)	32(-1;-3)	32(-1;-3)
RESISTENCE TO EFFRACTION UNE-EN 356:2001		Not Aplicable			
HIGH TEMPERATURE TEST UNE-EN ISO 12543-4:1998		APPROVED			
RADIATION TEST UNE-EN ISO 12543-4:1998		APPROVED			
ACCELERATED AGING TEST UNE- EN 4892-2:2006		APPROVED			

PROPERTIES STANDARDS		GLASS 6T+3+6T 0%	10%	20%	30%
PEAK POWER	(Wp/m²)	62,5	44,4	38,9	33,3
SPECIFIC WEIGHT	(Kg/m²)	41	41	41	41
THERMAL TRANSMITTANCE (U value) UNE-EN 673:1998	(W/m²K)	5,2	5,2	5,2	5,2
SOLAR FACTOR (g) UNE-EN 410:2011		23,00%	29,00%	32,00%	37,00%
TRANSMISSION UV UNE-EN 410:1998		0,00%	0,10%	0,30%	0,40%
SOLAR TRANSMISSION UNE-EN 410:1998		0,00%	7,40%	11,50%	18,60%
LIGHT TRANSMISSION UNE-EN 410:1998		0,00%	10,10%	16,30%	26,70%
LIGHT REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998		7,30%	7,30%	7,00%	7,10%
LIGHT REFLECTION (INNER SIDE) UNE-EN 410:1998		52,00%	49,30%	44,40%	34,30%
SOLAR REFLECTION (PHOTOACTIVE SIDE) UNE-EN 410:1998		11,50%	10,20%	8,50%	9,00%
SOLAR REFLECTION (INNER SIDE) UNE-EN 410:1998		43,00%	41,10%	35,80%	28,50%
FIRE REACTION Standard classification UNE-EN 13501-1:2007 UNE-EN 13823:2002 / ISO 11925-2:2002		B-s1,d0	B-s1,d0	B-s1,d0	B-s1,d0
RESISTENCE TO SOFT BODY IMPACT UNE-EN 12600:2003		1(B)1	1(B)1	1(B)1	1(B)1
TEMPERED GLASS STANDARDS UNE-EN 12150		Comply with UNE-EN12150			
ACOUSTIC ATTENUATION UNE-EN 12578:2002	dB	34(-1;-3)	34(-1;-3)	34(-1;-3)	34(-1;-3)
RESISTENCE TO EFFRACTION UNE-EN 356:2001		P3A	P3A	P3A	P3A
HIGH TEMPERATURE TEST UNE-EN ISO 12543-4:1998		APPROVED			
RADIATION TEST UNE-EN ISO 12543-4:1998		APPROVED			
ACCELERATED AGING TEST UNE- EN 4892-2:2006		APPROVED			

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DEPENDING ON THE FINAL BIPV GLASS CONFIGURATION, IT CAN COMPLY WITH THE FOLLOWING STANDARDS:

Photovoltaic glass:

- EN 12600:2003. Glass in building - Pendulum test - Impact test method and classification for flat glass.
- ISO 12543-4:2011. Glass in building - Laminated glass and laminated safety glass.
- EN 13501:2007. Fire classification of construction products and building elements.
- EN 356:2001. Resistance against hand strike.
- EN 410:2011. Glass in building - Determination of luminous and solar characteristics of glazing.
- EN 12150:2005. Glass in building - Thermally toughened soda lime silicate safety glass.

DEPENDIENDO DE LA CONFIGURACION FINAL, EL VIDRIO FV PUEDE CUMPLIR CON LAS SIGUIENTES NORMATIVAS:

Vidrio Fotovoltaico:

- EN 12600:2003. Vidrio para la edificación. Ensayo pendular. Método de ensayo al impacto y clasificación para vidrio plano.
- ISO 12543-4:2011. Vidrio para la edificación. Vidrio laminado y vidrio laminado de seguridad.
- EN 13501:2007. Clasificación en función del comportamiento frente al fuego de los productos de construcción y elementos para la edificación.
- EN 356:2001. Vidrio de construcción. Vidrio de seguridad. Ensayo y clasificación de la resistencia al ataque manual.
- EN 410:2011. Vidrio para la edificación. Determinación de las características luminosas y solares de los acristalamientos.
- EN 12150:2005. Vidrio para edificación - Vidrio de silicato sodocálcico de seguridad templado térmicamente.

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PVB Interlayers:

- ANSI Z97.1. Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test.
- ASTM D792. Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- ASTM E1269. Standard Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry.
- ASTM D1004. Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
- ASTM D542. Standard Test Method for Index of Refraction of Transparent Organic Plastics.
- ASTM E1354. Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.
- ASTM F433. Standard Practice for Evaluating Thermal Conductivity of Gasket Materials.
- ASTM D1929. Standard Test Method for Determining Ignition Temperature of Plastics.
- EN 410:2011. Glass in building - Determination of luminous and solar characteristics of glazing.
- JIS K6771. Flexible vinyl tube.

Encapsulante PVB:

- ANSI Z97.1. Materiales de Vidrio de Seguridad usados en Edificación - Especificaciones de Desempeño de Seguridad y Métodos de Prueba.
- ASTM D792. Métodos de Prueba Estándar para la Densidad y Gravedad específica (Densidad Relativa) de plásticos por Desplazamiento.
- ASTM E1269. Método de Prueba Estándar para determinar la capacidad calorífica específica mediante Análisis Térmico Diferencial.
- ASTM D1004. Método de Prueba Estándar para la Resistencia al Desgarro de láminas de plástico.
- ASTM D542. Método de Prueba Estándar para medir el Índice de refracción de plásticos orgánicos transparentes.
- ASTM E1354. Método de prueba estándar para el calor y las tasas de emisiones visibles de humo Materiales y Productos usando un calorímetro de consumo de oxígeno.
- ASTM F433. Práctica estándar para la evaluación de la conductividad térmica de los materiales de las juntas.
- ASTM D1929. Método de prueba estándar para determinar la temperatura de ignición de los plásticos.
- EN 410:2011. Vidrio para la edificación. Determinación de las características luminosas y solares de los acristalamientos
- JIS K6771. Tubo flexible de vinilo.

One Rail Junction Box:

- UL approved.
- TÜV approved to IEC 61215 ed. 2 approved.

Anti-Slip:

- UNE ENV 12633:2003. Method of determination of unpolished and polished slip/skid resistance value.
- DIN 51130: Ramp Method Standard Footwear.
- DIN 51097: Ramp Method Barefoot.
- ASTM C 1028-07: Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like-Surfaces by the Horizontal Dynamometer Pull-Meter Method.

Caja de conexiones Monopolar:

- UL aprobada.
- TÜV aprobada para IEC 61215 ed. 2 aprobada.

Anti-Deslizante:

- UNE ENV 12633:2003. Método para la determinación del valor de la resistencia al deslizamiento/resbalamiento de los pavimentos pulidos y sin pulir.
- DIN 51130: Método de rampa, Pies calzados.
- DIN 51097: Método de rampa, Pies descalzos.
- ASTM C 1028-07: Método de prueba estándar para determinar el coeficiente de fricción estática de Baldosa Cerámicas y Otras superficies similares por el método de Dinamómetro Horizontal.

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FLOOR GLASS CERTIFICATION *CERTIFICACIÓN DE SUELO*	DESCRIPTION *DESCRIPCIÓN*	CLASIFICATION *CLASIFICACIÓN*
UNE ENV 12633	Pendulum method / *Prueba pendular*	Class 3
DIN 51130	Ramp method Shod foot / *Pie calzado en rampa*	R-12
DIN 51097	Ramp method Bare foot / *Pie descalzo en rampa*	Class B
ASTM C 1028-07	Coefficient Dry / *coeficiente seco*	≥ 0,7
	Coefficient Wet / *coeficiente húmedo*	≥ 0,6
EN 101:91 MOHS	Surface hardness / *dureza superficial*	Scale 4
UL 410	Slip coefficient / *coeficiente de deslizamiento*	> 0,6

STANDARDS AND CERTIFICATIONS FOR PV FLOOR GLASS

ADA requirements of Slip coefficient * Slip resistance is based on the frictional force needed on the walking surface to keep the shoes and crutches from slipping while walking under otherwise slippery conditions. While the dynamic coefficient of friction during walking varies in a complex and non-uniform way, the static coefficient of friction, which can be measured in several ways, provides a close approximation of the slip resistance of a surface. The Occupational Safety and Health Administration recommend that walking surfaces have a static coefficient of friction of 0.5. A research project sponsored by the Architectural and Transportation Barriers Compliance Board (Access Board) conducted tests with persons with disabilities and concluded that a higher coefficient of friction was needed. A static coefficient of friction of 0.6 is recommended for accessible routes and 0.8 for ramps.

NORMATIVAS Y CERTIFICACIONES PARA EL SUELO FV

Requisitos de la ADA de Coeficiente de deslizamiento *La resistencia al deslizamiento se basa en la fuerza de fricción necesaria para evitar que el tacón de un zapato o la punta de una muleta se deslicen sobre una superficie transitable bajo condiciones probables de encontrar en esa superficie. Mientras que el coeficiente de fricción dinámico durante la marcha varía de una forma compleja y no uniforme, el coeficiente estático de fricción, que se puede medir de varias maneras, proporciona una estrecha aproximación de la resistencia al deslizamiento de una superficie. La Administración de Seguridad y Salud recomiendan que las superficies transitables tengan un coeficiente de fricción estática de 0,5. Un proyecto de investigación patrocinado por la Junta de Cumplimiento de Barreras Arquitectónicas y de Transporte (Access Board) llevó a cabo pruebas con personas con discapacidad y concluyó que un mayor coeficiente de fricción era necesario para tales personas. Se recomienda un coeficiente estático de fricción de 0,6 para rutas accesibles y 0,8 para las rampas.

8. INSULATING GLASS UNITS

VIDRIO AISLANTE O DE DOBLE ACRISTALAMIENTO

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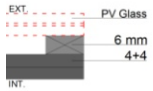
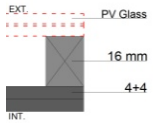
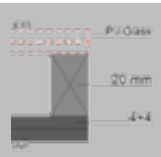
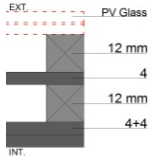
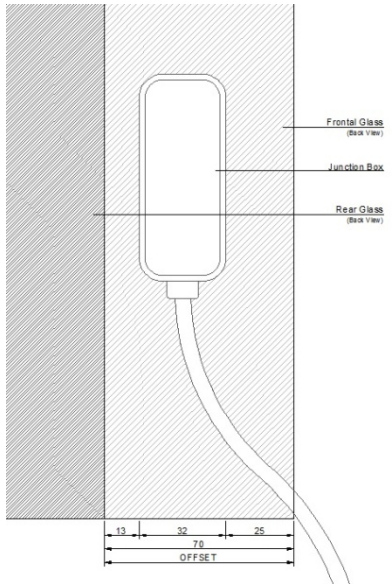
INERT GAS HOUSE		CONFIGURATION CHAMBER	INNER GLASS	U value W/m²ºK
SINGLE SPACER 6 mm		6 mm Air Chamber	4+4 mm	3,2
		6 mm Argon Chamber	4+4 mm	2,9
		6 mm Air Chamber	4+4 mm low-e	2,4
		6 mm Argon Chamber	4+4 mm low-e	1,9
SINGLE SPACER 12 mm		12 mm Air Chamber	4+4 mm	2,7
		12 mm Argon Chamber	4+4 mm	2,6
		12 mm Air Chamber	4+4 mm low-e	1,6
		12 mm Argon Chamber	4+4 mm low-e	1,2
SINGLE SPACER 16 mm		16 mm Air Chamber	4+4 / 6T mm	2,6
		16 mm Argon Chamber	4+4 / 6T mm	2,5
		16 mm Air Chamber	4+4 / 6T mm low-e	1,3
		16 mm Argon Chamber	4+4 / 6T mm low-e	1,1
SINGLE SPACER 20 mm		20 mm Air Chamber	4+4 mm	2,7
		20 mm Argon Chamber	4+4 mm	2,5
		20 mm Air Chamber	4+4 mm low-e	1,4
		20 mm Argon Chamber	4+4 mm low-e	1,1
DOUBLE SPACER 12 / 4 / 12 mm		12/4/12 Air Chamber	4+4 mm	1,9
		12/4/12 Argon Chamber	4+4 mm	1,7
		12/4/12 Air Chamber	4+4 mm low-e	1,2
		12/4/12 Argon Chamber	4+4 mm low-e	1,0

*U Value calculated including frontal glasss configuration of 3+4.

OFFSET - IGU GLASS

Back View



Section View

*Junction box type and configuration could be adapted for clients request or project needs.

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9. INTERNATIONAL STANDARDS

NORMAS INTERNACIONALES

- **IEC 61646**: Thin-film terrestrial photovoltaic (PV) modules Design qualification and type approval
- **IEC 61125**: Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval
- **IEC 61730-1**: Safety qualification for PV modules of crystalline silicon for construction use.
- **UL 1703**: Flat-Plate Photovoltaic Modules and Panels
- **EN 12600:2003**. Glass in building - Pendulum test - Impact test method and classification for flat glass.
- **ISO 12543-4:2011**. Glass in building - Laminated glass and laminated safety glass
- **EN 13501:2007**. Fire classification of construction products and building elements
- **EN 356:2001**. Resistance against hand stroke
- **EN 410:2011.** Glass in building - Determination of luminous and solar characteristics of glazing.
- **EN 12150:2005.** Glass in building - Thermally toughened soda lime silicate safety glass.
- **EN 12600:2003.** Glass in building - Pendulum test - Impact test method and classification for flat glass

- **IEC 61646:** Módulos fotovoltaicos (FV) de lámina delgada para uso terrestre. Cualificación del diseño y homologación.
- **IEC 61125:** Módulos fotovoltaicos (FV) de silicio cristalino para uso terrestre. Cualificación del diseño y homologación**.**
- **IEC 61730-1:** Cualificación de la seguridad de los módulos fotovoltaicos (FV). Parte 1: Requisitos de construcción.
- **UL 1703*:*** Módulos y Paneles Fotovoltaicos de Placa Plana.
- **ISO 12543-4:2011.** Vidrio para la edificación. Vidrio laminado y vidrio laminado de seguridad.
- **EN 13501:2007.** Clasificación en función del comportamiento frente al fuego de los productos de construcción y elementos para la edificación.
- **EN 356:2001.** Vidrio de construcción. Vidrio de seguridad. Ensayo y clasificación de la resistencia al ataque manual.
- **EN 410:2011.** Vidrio para la edificación. Determinación de las características luminosas y solares de los acristalamientos.
- **EN 12150:2005.** Vidrio para la edificación. Vidrio de silicato sodocálcico de seguridad templado térmicamente.
- **EN 12600:2003.** Vidrio para la edificación. Ensayo pendular. Método de ensayo al impacto y clasificación para vidrio plano.

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Any type of manipulation or installation that is not contained in the norms stipulated in this document, along with any other concerns, the installer must be consulted with the supplier company to receive proper instructions.

Cualquier tipo de manipulación o instalación que no esté contenida en las normas estipuladas en este documento y que pueda significar alguna duda para el instalador, debe ser consultado con la empresa proveedora para recibir la información correspondiente.

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10. WARRANTY

CERTIFICADO DE GARANTÍA DEL PRODUCTO

Onyx Solar Energy S.L., a company dedicated to the development of BIPV solutions for buildings and other sustainable building solutions, guarantees the quality of the glass/glass modules according to the technical specifications and applicable regulations described in this submittal.
Terms and conditions of the glass/glass PV Module warranty are expressed as follows:

1. WARRANTY DESCRIPTION

A) LIMITED WARRANTY FOR MATERIALS AND MANUFACTURING DEFECTS.

*Onyx Solar Energy S.L guarantees during a period of **5 years**, starting from the initial purchase date, that the PV Module is free from any defect in material or manufacture.*

If, during the WARRANTY term, your PV Module became inoperative as a consequence of any defect in the manufacturing or the materials, Onyx Solar Energy S.L (after verifying the communicated defect) reserves the right to choose between repairing the defective module, substituting an equivalent one or refunding the price of the defective module.

Onyx Solar Energy S.L., empresa dedicada al desarrollo de soluciones de Integración Fotovoltaica para Edificios (BIPV, por sus siglas en inglés) y otras soluciones sostenibles para la construcción, garantiza la calidad de sus vidrios fotovoltaicos de acuerdo a las especificaciones técnicas y a las legislaciones pertinentes descritas en este manual.
Los términos y condiciones de la garantía de los vidrios/módulos de vidrio fotovoltaicos se expresan a continuación:

1. DESCRIPCIÓN DE LA GARANTÍA

A) GARANTÍA PARA MATERIALES POR DEFECTOS DE MATERIALES Y FABRICACIÓN.

*Onyx Solar Energy S.L garantiza que durante un periodo de **5 años** desde la fecha de compra, el modulo fotovoltaico estará libre de defectos en sus materiales o fabricación.*

Si, durante el periodo de validez de esta garantía, el modulo fotovoltaico adquirido resulta inoperativo como consecuencia de cualquier defecto en la fabricación o en los materiales, Onyx Solar Energy S.L (tras verificar el defecto comunicado) se reserva el derecho a elegir entre reparar el modulo defectuoso, substituirlo por uno equivalente o devolver el precio del módulo defectuoso.

B) LIMITED WARRANTY FOR SPECIFIC OUTPUT POWER.

Table below shows the output power value production that Onyx Solar Energy S.L guarantees as a minimum value measured under standard conditions (STC)[1]

TIME[2]	***OUTPUT POWER VALUE[3]***
10 years	*80%*

(1) Standard conditions (STC): 1000W/m² solar radiation, cell temperature 25ºC+/- 2ºC and 1.5AM.
(2) Period starting from initial delivery date.
(3) Percentage applied on minimum power specified in this submittal

If Onyx Solar Energy S.L determines, using measuring standard conditions STC, that the PV Module is not generating the minimum specified output power guaranteed during the term of the warranty, then Onyx Solar Energy S.L reserves the right to choose between repairing the defective module, substituting it for an equivalent one or supplying the additional components to achieve, at least, the guaranteed minimum output power percentage.

B) GARANTÍA LIMITADA DE GENERACION DE ELECTRICIDAD.

La siguiente tabla muestra el valor de potencia de salida que Onyx Solar Energy S.L garantiza como valor mínimo medido bajo condiciones estándar (STC)[1]

DURACIÓN[2]	***VALOR DE LA POTENCIA DE SALIDA[3]***
10 años	*80%*

(1)Condiciones estándar (STC): 1000W/m² radiación solar, temperatura de la célula 25ºC+/- 2ºC and 1.5AM.
(2)Periodo que comienza desde la fecha de entrega de la mercancía.
(3)Porcentaje aplicado a la potencia mínima especificada en este manual.

Si Onyx Solar Energy S.L determina, usando las condiciones estándar de medida STC, que el módulo fotovoltaico no está generando la potencia de salida mínima especificada garantizada durante la duración de la garantía, entonces Onyx Solar Energy SL se reserva el derecho a elegir entre reparar el módulo defectuoso, sustituirlo por uno equivalente, o suministrar los componentes adicionales necesarios para obtener al menos el porcentaje mínimo de electricidad garantizado.

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2. GENERAL TERMS.

The following conditions will be applicable to the PV glass/glass modules provided by Onyx Solar Energy S.L for this project and guaranteed according to the section above.

- *Onyx Solar Energy S.L can, according to its own criteria, use new pieces or new products or refurbished products to repair the module or substitute the module under this WARRANTY with a new or refurbished one.*
- *Onyx Solar Energy S.L reserves the right to supply a different but equivalent module to attend the accepted claims in the case that the manufacturing of the original module may have ceased or that the initial specifications have been modified.*
- *Onyx Solar Energy S.L is not responsible for, and the client hereby accepts responsibility for the costs of any local work and any cost associated to the installation, elimination, reinstallation or transportation of the module and/or any other associate component serviced during the WARRANTY period.*

The warranty offered herein will be applicable only while the (i) product is property of the initial purchaser that acquired the product for his own use and not in order to resell or (ii) acquired as a result of the purchase of the building where the product is installed.

The validity of the present warranty will not be extended beyond the original period specified and described in sections A) and B) of the present certificate.

2. TÉRMINOS GENERALES.

Las siguientes condiciones serán aplicables a los vidrios/módulos de vidrio fotovoltaicos suministrados por Onyx Solar Energy S.L para este proyecto y garantizados de acuerdo a la sección anterior.

- *Onyx Solar Energy S.L puede, a su elección, utilizar partes o productos nuevos o restaurados para reparar el panel o la sustitución del panel bajo GARANTÍA con uno restaurado o por uno nuevo.*
- *Onyx Solar Energy S.L se reserva el derecho a suministrar un módulo equivalente diferente del suministrado inicialmente, para atender las reclamaciones de garantía en el caso de que haya cesado la fabricación del módulo original o las especificaciones iniciales hayan sido modificadas.*
- *Onyx Solar Energy S.L no es responsable de, y el cliente acepta hacerse cargo de los costes de cualquier mano de obra local o cualquier coste asociado a la instalación, eliminación, reinstalación o transporte del módulo y/o cualquier otro componente asociado sujeto a servicio durante la garantía proporcionada.*

La garantía aquí ofrecida será aplicable solo si el producto es (i) propiedad del comprador inicial que adquirió este producto para su uso propio y no para reventa o (ii) si fue adquirido como resultado de la compra de la propiedad inmobiliaria donde el producto fue instalado.

La validez de la presente garantía no se extenderá más allá del periodo original especificado y descrito en las secciones A) y B) del presente certificado.

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3. EXCLUSIONS AND LIMITATION OF WARRANTY

The warranties herein offered do not cover damage, failure or defects caused by:

- *Not following the installation, functioning or maintenance instructions offered by Onyx Solar Energy S.L*
- *Reparations, modifications or manipulation of the modules object of the present WARRANTY done by any other person that is not a technician authorized by Onyx Solar Energy S.L, or if the PV glass/glass modules are connected to non-recommended equipment.*
- *Misuse or negligent acts.*
- *Damage caused by over tension, atmospheric discharge, fire, floods, plague, acts of god, accidental breakage, actions by third parties and other events or accidents beyond reasonable control by Onyx Solar Energy S.L and those that do not occur under normal operating conditions.*
- *Breakage of the laminates if the modules are installed on systems not recommended by Onyx Solar Energy S.L.*

PV modules with manipulated series number or non-recognizable identification shall not be subject to the WARRANTY.

Onyx Solar Energy S.L does NOT give any WARRANTY, explicit or implicit, different from the warranties herein expressed and is not guaranteeing nor responsible for suitability of the module for any purpose.

3. EXCLUSIONES Y LIMITACIONES DE LA GARANTÍA

Las garantías aquí ofrecidas no cubren el daño, fallo o defecto causado por:

- *No seguir las instrucciones de instalación, funcionamiento o mantenimiento establecidas por Onyx Solar Energy S.L*
- *Reparaciones, modificaciones o manipulaciones de los módulos objeto de la presente GARANTÍA realizadas por cualquier persona que no sea un técnico autorizado por Onyx Solar Energy S.L, o si módulos de vidrio fotovoltaicos han sido conectados a equipos no recomendados.*
- *Mal uso o negligencia.*
- *Daño causado por excesiva tensión, descarga atmosférica, fuego, inundaciones, plagas, actos de fuerza mayor, daños accidentales, acción de terceras partes o cualquier otro suceso o accidente fuera del control razonable de Onyx Solar Energy S.L y aquellos que no ocurren bajo condiciones operativas normales.*
- *Daños de los laminados si los módulos están instalados en sistemas no recomendados por Onyx Solar Energy S.L..*

Aquellos módulos fotovoltaicos con números de serie manipulados o sin identificación reconocible no estarán sujetos a esta GARANTÍA.

Onyx Solar Energy S.L NO concede ninguna GARANTÍA, explícita o implícita, diferente a las garantías aquí expresadas y no garantiza ni es en ningún caso responsable de la idoneidad o validez del módulo para ningún fin determinado.

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4. CLAIM FOR THE SERVICE UNDER WARRANTY AND/OR INFORMATION ABOUT THE OPTIONS FOR DISPOSITION AND RECYCLING.

Onyx Solar Energy S.L is not responsible for any special, incidental, consequential or punitive damage that may result from the use or lack of use or failure of the module to perform the guaranteed function, including but not limited to damages for requested services, costs of substitution services, lost benefits or savings, and expenses resulting from lawsuit against third parties. The maximum responsibility of Onyx Solar Energy S.L under any WARRANTY, explicit or implicit or established by law or due to any manufacturing or design defect, is limited to the purchase price of the product. The buyer's exclusive remedy for non-compliance of the WARRANTY or for manufacturing or design defect is only the one herein stated.

If at any time any controversy shall arise between BUYER and Onyx Solar Energy S.L regarding the warranties provided in this certificate, the parties hereto agree to attend mediation. In the event mediation is unsuccessful, both parties agree to submit any dispute to binding arbitration, before one arbitrator in Ávila, Spain, under the rules of Arbitration of the "Corte Española de Arbitraje", and that any award shall be enforceable in a court of competent jurisdiction.

To obtain technical service under WARRANTY or options for waste and/or recycling, please contact Onyx Solar Energy. The contact numbers can be found at http://www.onyxsolar.com

4. RECLAMACIÓN DE SERVICIOS BAJO GARANTÍA Y/O INFORMACIÓN SOBRE LAS OPCIONES DE DESECHO Y RECICLAJE.

Onyx Solar Energy S.L no es responsable de ningún daño especial, incidental, consecuente, punitivo o por daños o perjuicios que pueda resultar del uso o falta de uso o fallo del módulo para realizar su función garantizada, incluyendo daños por servicios solicitados, costes de servicios de sustitución, beneficios o ahorros perdidos, y gastos derivados de procesos legales contra terceras partes. La máxima responsabilidad de Onyx Solar Energy S.L bajo cualquier GARANTÍA explícita o implícita o establecida por ley o debida a cualquier defecto de fabricación o diseño, está limitada al precio de compra del producto. La compensación exclusiva para el comprador por el no cumplimiento de esta GARANTÍA o por defecto de fabricación o diseño es solamente la aquí expuesta.

Si en cualquier momento surge cualquier controversia entre el COMPRADOR y Onyx Solar Energy S.L relacionada con las garantías estipuladas en este certificado, las partes acuerdan someterse a mediación. En caso de que la mediación no sea efectiva, ambas partes están de acuerdo en someterse a arbitraje vinculante, frente a un árbitro, en Ávila, España, bajo las normas de arbitraje de la Corte Española de Arbitraje y a que el laudo recibido sea vinculante y ejecutable ante cada tribunal de jurisdicción competente.

Para obtener servicio técnico bajo GARANTÍA u opciones para el desecho o reciclaje, por favor contacte a Onyx Solar Energy. Nuestros teléfonos de contacto pueden encontrase en http://www.onyxsolar.com

In the case of a claim according to this WARRANTY the post-sale department will activate the internal general procedure for claims and once analyzed the client will be informed of the corrective actions to be taken.

5. COMING INTO FORCE OF THE PRESENT DOCUMENT.

The present certificate, that modifies any previous existing document, will come into force on the XXXXXXXX, XXth, 20XX and will apply to the specific project described in this submittal.

6. COMING INTO FORCE OF THE WARRANTY.

The effect of the present WARRANTY will commence on the day of the initial purchase by the client, whose name appears in the present WARRANTY certificate.

CLIENT	
PURCHASE DATE	
DELIVERY NOTE	

En el caso de una reclamación acorde a esta GARANTÍA, el departamento de postventa comenzará los procedimientos generales internos para reclamaciones y una vez analizada, el cliente será informado de las acciones correctivas que se tomarán.

5. ENTRADA EN VIGOR DEL PRESENTE DOCUMENTO.

El presente certificado, que modifica cualquier documento existente anteriormente, tendrá como fecha de entrada en vigor el XX, XXXXXXXX, 20XX y aplicará al proyecto específico descrito en este manual.

6. FECHA EFECTIVA DE LA GARANTÍA.

Los efectos de la presente GARANTÍA comenzarán el día del pedido inicial efectuado por el cliente, cuyo nombre aparece en este certificado de GARANTÍA.

CLIENTE	
FECHA DE COMPRA	
ALBARÁN	

OFFICIAL STAMP OF THE COMPANY

SELLO OFICIAL DE LA EMPRESA

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