

UPSOLAR PV MODULES – PACKING SOLUTIONS

1. PV Module Standard Dimensions

Type	Mono 72 cells (5 inches)	Mono 60 cells (6 inches)	Poly 54 cells	Poly 60 cells	Poly 72 cells
Dimensions (mm)	1580×808×40	1640×992×40	1482×992×40	1640×992×40	1956×992×50

2. Packing Quantity

Type	Mono 72 cells (5 inches)		Mono 60 cells (6 inches)	Poly 60 cells	Poly 72 cells
Container	20GP	40GP	40HQ	40HQ	40HQ
Pcs / pallet	26	26	26	26	21
Pallet Gross Weight (kg)	410		520	520	590
Volume/pallet (m ³)	1.75		2.20	2.20	2.60
Pallets / container	14	28	28	28	22
Pcs / container	364	728	728	728	462

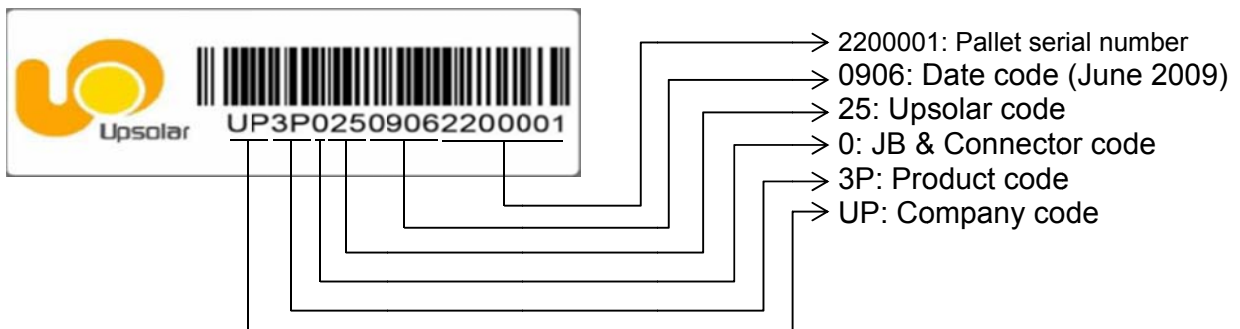
3. Wooden Pallet Dimensions

Type	Mono 72 cells (5 inches)	Mono 60 cells (6 inches)	Poly 60 cells	Poly 72 cells
Pallet Dimensions (mm)	1620×1130×120	1680×1130×120	1680×1130×120	2000×1130×120

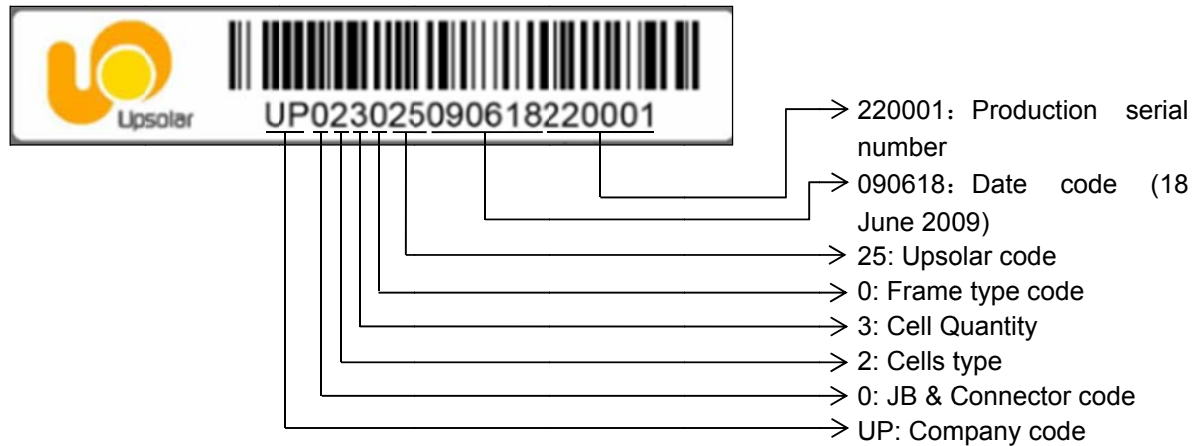
Remark: one 5mm-thick plywood board is inserted between 2 pallets to avoid any damages during transportation

4. Pallet and Module Serial Number Signification

➤ **Example: Pallet bar code**



➤ **Example: Module bar code**



Remark 1: Pallet number and module serial numbers are inserted inside a water-proof bag attached on one side of the carton in order to make warehouse management more efficient on customer site.

Remark 2: Module serial numbers are encapsulated at the top left corner of each module.

5. Upsolar Current Classification for PV modules






A- Purpose:

When several modules are installed on one string (=series connection), the modules with the lowest current at maximum power (I_{mp}) will penalize the electricity production of the full string. This phenomenon is called performance loss due to current mismatch.

To limit this effect, it is important to verify that all the modules that will be connected on one string are showing similar maximum power current. UPSOLAR proposes this service by sorting every module during the flash test to avoid complications to the customer during his PV system installation.

B- Classification:

5 current classes have been defined (alpha, beta, gamma, delta and epsilon). The ranges of current for each class are given in the table here-under for the 2 main product families identified in UPSOLAR catalogue: monocrystalline and polycrystalline.

Current class	Alpha (α)	Beta (β)	Gamma (γ)	Delta (δ)	Epsilon (ϵ)
Label					
Ref. UP-MXXXM Monocrystalline (5-inch cells)	$I_{\alpha} < 5.00A$	$5.00A \leq I_{\beta} < 5.15A$	$5.15A \leq I_{\gamma} < 5.30A$	$5.30A \leq I_{\delta} < 5.45A$	$I_{\epsilon} \geq 5.45A$
Ref. UP-MXXXM Monocrystalline (6-inch cells)	$I_{\alpha} < 8.15A$	$8.15A \leq I_{\beta} < 8.25A$	$8.25A \leq I_{\gamma} < 8.35A$	$8.35A \leq I_{\delta} < 8.45A$	$I_{\epsilon} \geq 8.45A$
Ref. UP-MXXXP Polycrystalline	$I_{\alpha} < 8.15A$	$8.15A \leq I_{\beta} < 8.25A$	$8.25A \leq I_{\gamma} < 8.35A$	$8.35A \leq I_{\delta} < 8.45A$	$I_{\epsilon} \geq 8.45A$

C- Integration into the Manufacturing Process:

During the flash test in the factory, the modules are first sorted per power by excluding from the lot the ones for which the maximum power value is not included in the range of $\pm 3\%$ of the nominal power. Modules are then sorted per current according to the I-V curve values given by the same flash test.

- One pallet only contains modules of the same current class.
- A label indicating the current class is stuck on each module frame (see label format here-above)

N.B: The values given in this document are defined as standard and are subject to change in the future, due to continuous technology improvement.

6. Flash Reports

A flash report is available for each container shipped. It contains the following information: container number, lead sealing number, pallet code, module type, module serial numbers, electrical parameters, flash test date and current classification.

Container No.: OOLU7462055				Lead sealing No.: ALD9515							
Pallet No.	No.	Type	Serial No.	Pm(W)	Voc(V)	Isc(A)	Vpm(V)	Ipm(A)	FF	Date	Grade
UP4M028090300407	1	UP-M185M	UP0120281008220080	186.7	45.47	5.605	35.69	5.233	0.733	24-08-2010	I _γ

	23	UP-M185M	UP0120281008220083	187.8	45.47	5.615	35.83	5.242	0.734	24-08-2010	I _γ

7. Upsolar Packing Process



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