

# INSTALLATION & SERVICE INSTRUCTIONS

## MANUAL FOR SOLAR PV MODULE



READ THIS MANUAL BEFORE USING SOVA SOLAR PRODUCTS.

FAILURE TO FOLLOW THE MANUAL MAY RESULT IN SERIOUS INJURY/DAMAGE.

**“Preserve the manual for long use”**

### **DISCLAIMER OF LIABILITY**

This manual describes the installation, operation and maintenance of the solar photovoltaic module. The installation, handling and use of Sova Solar crystalline modules are beyond company control. Sova Solar does not assume any responsibility for loss, damage, injury or expense resulting from the improper installation, handling, use or maintenance.

Sova Solar assumes no responsibility for any infringement of patents or other rights of third parties that may result from use of the module. No license is granted by implication or under any patent or patent rights. Specifications included in this manual are subject to change without prior notice.

### **SAFETY**

- Follow the general and national safety and accident prevention regulations.
- Instructions relating to the functional safety of the system are in bold type.
- Do not connect any defective or damaged equipment (including measurement equipment) to PV modules.
- Follow the charging instructions of the battery manufacturer.
- Check the charging process regularly as described by the charger manufacturer.
- Never alter or remove the factory plates and identification labels.
- Keep children away from PV systems.
- Do not use water to extinguish fires of an electrical origin.
- Do not walk on the modules.

**The warnings, precautions and instruction discussed in this manual cannot cover all possible conditions and situations that may occur. The module should be used with common sense and caution by the end user.**

### **INSTALLATION WARNING**

#### **DANGER OF EXPLOSION FROM SPARKING! DANGER OF ELECTRIC SHOCK!**

Solar modules generate electricity under incident light. The open circuit high voltage is present, even when the incident light levels are low. So it is recommended that the connection to the charge controller, load and battery may only be connected by trained personnel and in accordance with the applicable regulations.

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**FOLLOW THE INSTALLATION AND OPERATING INSTRUCTIONS FOR PV MODULE AND ALSO FOR ALL COMPONENTS OF THE PV SYSTEM.**

- Protect the solar modules from incident light during installation, e.g. cover them.
- Never touch un-insulated cable ends.
- Use only insulated tools.
- Handle solar module with care, edges may be sharp.
- Module must be connected using UL listed outdoor rated wire of the correct thickness for the amperage rating and length.
- As thumb rule, maximum voltage drop in the loop should be 3%.
- Ensure that no cables are damaged.
- Verify that installation surface has no hidden obstacles.
- At a voltage of > 75 V, particularly with regard to module open circuit voltage (over the entire temperature range), the entire solar energy system must be installed with protection class II as per IEC 61730.
- Select appropriate charge controller and battery for the solar module.
- Secure all connections using terminals, or solder all wire splices to ensure good connection.
- Ensure that all loads to be connected are switched off. If necessary, remove the fuse.

## **UNPACKING AND STORAGE**

- At time of receipt, verify that the product delivered is in fact the product ordered.
- Leave the product in its original packing box until you are ready to install.
- Store packing boxes in a clean, dry area with relative humidity below 85% and ambient temperatures between -20°C and 50°C.
- Do not stack more than the 2 Boxes (Pallets) of each other.

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- At the installation site, take care to keep modules and particularly their electrical contacts clean and dry before installation. If connector cables are left in damp conditions then the contacts may corrode. Any module with corroded contacts should not be used.
- If pallets are stored temporarily outside then place a protective covering over the pallet to protect it from direct weathering and do not stack more than 1 pallet high.
- Two people are required to unpack the modules from the packing box, when handling modules always use both hands.
- Protect the module edges for temporary storage outside the pallet.
- Do not use a knife to cut the zip-ties, but use wire cutting pliers.
- Do not place modules directly on top of each other.

### CLIMATE CONDITION

- Install the SOVA SOLAR Photovoltaic modules in the following conditions: Operating temperature: -40°C to +85°C.
- Storage temperature: -40°C to +50°C.
- Humidity: below 85RH%.
- Wind pressure: below 2400Pa. (speed 130km/h for 1hr)
- Snow Load Pressure: below 5400Pa.
- Corrosion resistance: except for corrosive salt area and sulfurous area.

### MOUNTING

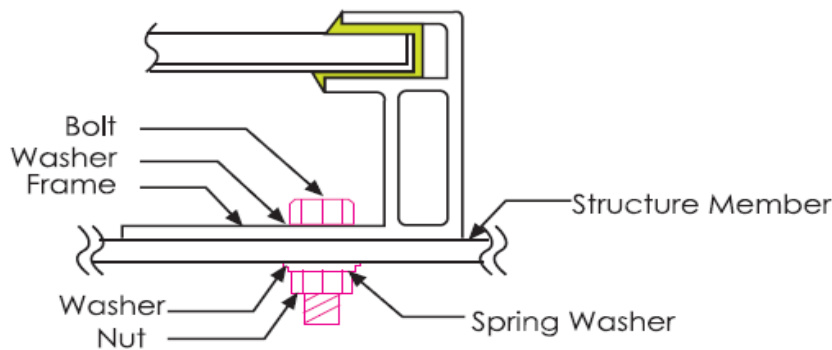
- Before installing your system, contact local authorities to determine the necessary permit, installation and inspection requirements.
- Mounting location for solar module must be facing SUN and not be blocked by shadows. It is recommended to tilt to horizon equal to the latitude of the location for annual optimized power generation.
- Do not install PV modules in a location where they will be immersed in water or continually exposed to water from a sprinkler or fountain, etc.
- Avoid using a mounting method that will block the drainage holes in the module frame.

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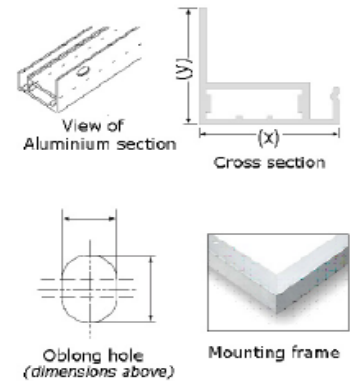
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- Panels are not subjected to wind or snow loads exceeding the maximum permissible loads, and are not subject to excessive forces due to the thermal expansion of the support structures.
- The minimum mechanical means is to be used for securement of the module or panel to the roof as per the instructions below, For a non-integral module or panel, the assembly is to be mounted over a fire resistant roof covering rated for the application
- Structure must be strong enough to support the weight of the solar module and wind load. Mounting system consists of corrosion-proof bolts and nuts through the mounting holes in the mounting frame. Mounting holes details for all modules are given in table below-

### MODULE HOLE OBLONG (mm) 8X10



### FRAME



| Model Range(Polycrystalline) | Model Range (MONO PERC) | Module Dimension(mm) | Mounting hole (Oblong-mm) | Vertical(mm) | Horizontal(mm) |
|------------------------------|-------------------------|----------------------|---------------------------|--------------|----------------|
| SS29572MC - SS35572MC        | SS33072MP - SS40072MP   | 1961 x 991 x 40      | 8 x 10                    | 978          | 943            |
| SS28066MC - SS34066MC        | SS30566MP - SS36566MP   | 1802 x 991 x 40      | 8 x 10                    | 901          | 943            |
| SS26060MC - SS31060MC        | SS28060MP - SS34060MP   | 1646 x 991 x 40      | 8 x 10                    | 820          | 943            |
| SS23054MC - SS28054MC        | SS25054MP - SS30054MP   | 1485 x 991 x 40      | 8 x 10                    | 743          | 943            |
| SS21048MC - SS25048MC        | SS22548MP - SS26548MP   | 1326 x 991 x 40      | 8 x 10                    | 663          | 943            |
| SS16036MC - SS19036MC        | SS17036MP - SS20036MP   | 1008 X 991 X 40      | 8 x 10                    | 504          | 943            |

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### **SERIES / PARALLEL CONNECTIONS**

Modules can be wired in series to increase voltage. Connect wires from positive terminal of one module to the negative terminal of the next module. All modules connected in series should be of the same model number and/or type. Make sure the number of modules connected in series does not exceed:  $((\text{Maximum system voltage} / \text{Open circuit voltage of the module}) - 1)$  at standard condition, AM1.5G, 25 degrees temperature, 1,000 W/m<sup>2</sup>. Connect modules in parallel to increase current. Connect wires from the positive terminal of the one module to the positive terminal of the next module. Do not connect modules in parallel without using a connection box. The number of parallel strings depends on the system integrator's requirements and the inverter ratings.

This can be done using the formula below,  
Max System voltage =  $X * Voc * [1 + ((T\alpha - Voc (\%)) \times (25 - T_{min}))]$  Where

X - No: modules which are connected in series.

Voc - Open circuit voltage of each module (Refer to the Data Sheet)

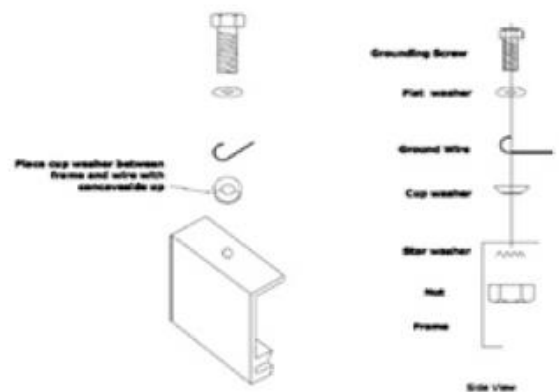
T $\alpha$ -Voc - Thermal coefficient of open circuit voltage for the module in Percentage (refer to Sova Solar Spec sheet)

T<sub>min</sub> - Minimum ambient temperature of the location of the plant

### **GROUNDING**

Module frames should be connected to an earth ground for safety and protection from lightning. The array frame shall be grounded in accordance with NEC Article 250 (USA) or CEC in Canada. A good connection between the grounding hardware is essential for an effective ground. The anodization on a module frame provides a coating to minimize the corrosion due to weather and it acts as a barrier that reduces the effectiveness of the grounding connection. For an adequate ground, the grounding hardware should pierce the anodization layer.

1. Stainless steel Bolt -304 with hexagonal and cheese head  
Bolt Size: 8 — 32 (As per ASME standard chart)  
In Metric standard: M4 x 16 mm lon engage thread is 13.5 mm with the frame (2.5 mm frame thickness and 16mm length of the screw)
2. Stainless Steel Cupped Washer —M4 Stainless steel 304.
3. Stainless Steel Flat Washer — M4 Stainless steel 304.
4. Tar Washer — M4 Stainless steel 304
5. Stainless Steel Nut — M4 stainless steel 304.



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### ROOF MOUNTING

- Clearance between the module frame and the mounting surface is required to allow cooling air to circulate around the back of the module. This also allows any condensation or moisture to dissipate. The module should never be sealed to the mounting surface with sealant that prevents air from circulating under the module.
- Leave 4 inches of clearance between the roof and the module frame.
- Refer to your local authority for guidelines and requirements for building or structural fire safety.
- For roof application, the modules should be mounted over a fire resistant covering rated for the application
- Sova Solar PV Modules have a Class C fire resistance rating in accordance with IEC 61730 certification. The fire rating of this module is valid only when mounted in the manner specified in the Mechanical mounting instructions. Rooftop installations should be placed over fire resistant roof Coverings only. Roof constructions and installations may affect the fire safety of a building; improper installation may create hazards in the event of a fire.

**Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at Standard Test Conditions. Accordingly, the values of  $I_{sc}$  and  $V_{oc}$  marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes, and size of controls connected to the PV output.**

**Do not drill through the Aluminium frame. You may damage the frame or break the glass.**

### ELECTRICAL PARAMETERS

The tolerance of Voltage and Current within  $\pm 3\%$  for grid and  $\pm 5\%$  for battery charging.

For Multi Crystalline Modules-

Temperature coefficient for  $V_{oc}/^{\circ}\text{C}$  is  $-0.25\%$

Temperature coefficient power/ $^{\circ}\text{C}$  is  $-0.277\%$

### MODULE WIRING

- Refer to section 690-8 of the National Electric Code (NEC) for an additional multiplying factor of 125% (80% de-rating) which may be applicable.
- Conductor recommendations: Stranded copper cables with a cross sectional area of  $4\text{mm}^2$  which are rated for 1000VDC/ 1500VDC,  $90^{\circ}\text{C}$  and are UV resistant.( For TSM-PE05A.\*\* , PE14A.\*\* , 1500 V DC,  $90^{\circ}\text{C}$  and are UV resistant) All other cables used to connect the DC system should have a similar (or better) specification .
- **Artificially concentrated sunlight shall not be directed on the module or panel.**

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### FUSING

- When fuses are fitted they should be rated for the maximum DC voltage and connected in each, non-grounded pole of the array (i.e. if the system is not grounded then fuses should be connected in both the positive and negative poles).
- The maximum rating of a fuse connected in series with an array string is typically 15A but the actual module specific rating can be found on the product label and in the product datasheet.
- This fuse rating value also corresponds to the maximum reverse current that a module can withstand (when one string is shaded then the other parallel strings of modules will be loaded by the shaded string and current will flow) and therefore impacts the number of strings in parallel.
- Bypass Diode qty. in Junction Box: 3nos – Model no: GF3045

### TYPE OF PRODUCT APPLICATION

“The modules are qualified for application class A: Hazardous voltage (IEC61730: higher than 50V DC; EN61730: higher than 120V), hazardous power applications (higher than 240W) where general contract access is anticipated (Modules qualified for safety through EN IEC61730-1 and EN IEC61730- 2 within this application class are considered to meet the requirements for Safety class II).

### SERVICING

Before service and maintenance or cleaning follow these to prevent from electric shock:

- Wear electrically insulated gloves.
- Cover the solar module with blanket or any dense cover.
- Disconnect module connection to the battery and load and then check the module and mounting system.
- Clean with mild, non-rough cleanser and soft cloth then dry and inspect the solar module system every after 15days to get optimum output. The frequency may vary depending on the dust pollutant level in your surroundings.

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### PRODUCT TEST & LIMITED WARRANTY

Product certified by IS 14286 and IS 61730-1 & 2. Test conducted such as wind speed, mechanical load, damp-heat, reverse current high voltage test etc.

Upto 20watt: Manufacturing defect: 2years. Rated power: 8 years to 90%:10years to 80%.

Above 20watt: Manufacturing defect: 5years. Rated power: 12 years to 90%: 25years to 80%.

### TECHNICAL DATA SHEET

| Model Name | System Voltage (V) | Electrical Ratings (Polycrystalline Module) |        |         |        |        |    |         | Fuse rating (A) | Module weight (Kg) |
|------------|--------------------|---|--------|---------|--------|--------|----|---------|-----------------|--------------------|
|            |                    | Voc (V)                                     | Vm (V) | Isc (A) | Im (A) | Pm (W) | FF | Eff (%) |                 |                    |

#### 72 Cells

|           |      |       |       |      |      |     |     |       |    |      |
|-----------|------|-------|-------|------|------|-----|-----|-------|----|------|
| SS35572MC | 1500 | 46.77 | 37.69 | 9.73 | 9.42 | 355 | 78% | 18.27 | 20 | 21.3 |
| SS35072MC | 1500 | 46.68 | 37.53 | 9.62 | 9.33 | 350 | 78% | 18.01 | 20 | 21.3 |
| SS34572MC | 1500 | 46.60 | 37.25 | 9.56 | 9.27 | 345 | 78% | 17.75 | 20 | 21.3 |
| SS34072MC | 1500 | 46.56 | 37.01 | 9.48 | 9.20 | 340 | 77% | 17.50 | 20 | 21.3 |
| SS33572MC | 1500 | 46.42 | 36.87 | 9.41 | 9.10 | 335 | 77% | 17.24 | 20 | 21.3 |
| SS33072MC | 1500 | 46.31 | 36.77 | 9.30 | 8.98 | 330 | 77% | 16.98 | 20 | 21.3 |
| SS32572MC | 1500 | 46.15 | 36.68 | 9.21 | 8.87 | 325 | 77% | 16.72 | 20 | 21.3 |
| SS32072MC | 1500 | 45.92 | 36.58 | 9.12 | 8.76 | 320 | 77% | 16.47 | 20 | 21.3 |
| SS31572MC | 1500 | 45.69 | 36.45 | 9.08 | 8.65 | 315 | 76% | 16.21 | 20 | 21.3 |
| SS31072MC | 1500 | 45.46 | 36.32 | 8.94 | 8.54 | 310 | 76% | 15.95 | 20 | 21.3 |
| SS30572MC | 1500 | 45.23 | 36.22 | 8.85 | 8.43 | 305 | 76% | 15.69 | 20 | 21.3 |
| SS30072MC | 1500 | 45.00 | 36.11 | 8.76 | 8.31 | 300 | 76% | 15.44 | 20 | 21.3 |
| SS29572MC | 1500 | 44.77 | 36.05 | 8.67 | 8.19 | 295 | 76% | 15.18 | 20 | 21.3 |

#### 66 cells

|           |      |       |       |      |      |     |     |       |    |      |
|-----------|------|-------|-------|------|------|-----|-----|-------|----|------|
| SS34066MC | 1500 | 43.76 | 34.85 | 9.95 | 9.76 | 340 | 78% | 19.04 | 20 | 19.6 |
| SS33566MC | 1500 | 43.43 | 34.74 | 9.90 | 9.65 | 335 | 78% | 18.76 | 20 | 19.6 |
| SS33066MC | 1500 | 43.22 | 34.47 | 9.79 | 9.58 | 330 | 78% | 18.48 | 20 | 19.6 |
| SS32566MC | 1500 | 42.99 | 34.37 | 9.68 | 9.46 | 325 | 78% | 18.20 | 20 | 19.6 |
| SS32066MC | 1500 | 42.77 | 34.27 | 9.57 | 9.34 | 320 | 78% | 17.92 | 20 | 19.6 |
| SS31566MC | 1500 | 42.64 | 34.19 | 9.54 | 9.22 | 315 | 78% | 17.64 | 20 | 19.6 |
| SS31066MC | 1500 | 42.50 | 34.08 | 9.40 | 9.10 | 310 | 78% | 17.36 | 20 | 19.6 |
| SS30566MC | 1500 | 42.45 | 33.93 | 9.29 | 8.99 | 305 | 77% | 17.08 | 20 | 19.6 |
| SS30066MC | 1500 | 42.30 | 33.84 | 9.20 | 8.87 | 300 | 77% | 16.80 | 20 | 19.6 |
| SS29566MC | 1500 | 42.12 | 33.72 | 9.10 | 8.75 | 295 | 77% | 16.52 | 20 | 19.6 |
| SS29066MC | 1500 | 41.93 | 33.61 | 8.96 | 8.63 | 290 | 77% | 16.24 | 20 | 19.6 |
| SS28566MC | 1500 | 41.82 | 33.50 | 8.82 | 8.51 | 285 | 77% | 15.96 | 20 | 19.6 |
| SS28066MC | 1500 | 41.73 | 33.39 | 8.68 | 8.39 | 280 | 77% | 15.68 | 20 | 19.6 |

#### 60 cells

|           |      |       |       |      |      |     |     |       |    |    |
|-----------|------|-------|-------|------|------|-----|-----|-------|----|----|
| SS31060MC | 1500 | 39.78 | 31.76 | 9.95 | 9.77 | 310 | 78% | 19.00 | 20 | 18 |
| SS30560MC | 1500 | 39.48 | 31.58 | 9.90 | 9.66 | 305 | 78% | 18.70 | 20 | 18 |
| SS30060MC | 1500 | 39.29 | 31.34 | 9.86 | 9.58 | 300 | 78% | 18.39 | 20 | 18 |
| SS29560MC | 1500 | 39.08 | 31.29 | 9.68 | 9.43 | 295 | 78% | 18.09 | 20 | 18 |
| SS29060MC | 1500 | 38.88 | 31.06 | 9.57 | 9.34 | 290 | 78% | 17.78 | 20 | 18 |
| SS28560MC | 1500 | 38.76 | 30.95 | 9.54 | 9.21 | 285 | 77% | 17.47 | 20 | 18 |
| SS28060MC | 1500 | 38.64 | 30.81 | 9.42 | 9.10 | 280 | 77% | 17.17 | 20 | 18 |
| SS27560MC | 1500 | 38.59 | 30.67 | 9.29 | 8.98 | 275 | 77% | 16.86 | 20 | 18 |
| SS27060MC | 1500 | 38.45 | 30.56 | 9.22 | 8.85 | 270 | 76% | 16.55 | 20 | 18 |
| SS26560MC | 1500 | 38.29 | 30.48 | 9.10 | 8.72 | 265 | 76% | 16.25 | 20 | 18 |
| SS26060MC | 1500 | 38.12 | 30.36 | 8.96 | 8.59 | 260 | 76% | 15.94 | 20 | 18 |



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### 54 cells

|           |      |       |       |      |      |     |     |       |    |      |
|-----------|------|-------|-------|------|------|-----|-----|-------|----|------|
| SS28054MC | 1500 | 35.80 | 28.67 | 9.98 | 9.78 | 280 | 78% | 19.03 | 20 | 16.2 |
| SS27554MC | 1500 | 35.53 | 28.50 | 9.92 | 9.66 | 275 | 78% | 18.69 | 20 | 16.2 |
| SS27054MC | 1500 | 35.36 | 28.21 | 9.85 | 9.58 | 270 | 78% | 18.35 | 20 | 16.2 |
| SS26554MC | 1500 | 35.17 | 28.09 | 9.64 | 9.44 | 265 | 78% | 18.01 | 20 | 16.2 |
| SS26054MC | 1500 | 34.99 | 27.95 | 9.59 | 9.32 | 260 | 77% | 17.67 | 20 | 16.2 |
| SS25554MC | 1500 | 34.88 | 27.86 | 9.54 | 9.18 | 255 | 77% | 17.33 | 20 | 16.2 |
| SS25054MC | 1500 | 34.78 | 27.65 | 9.36 | 9.06 | 250 | 77% | 16.99 | 20 | 16.2 |
| SS24554MC | 1500 | 34.73 | 27.55 | 9.22 | 8.90 | 245 | 77% | 16.65 | 20 | 16.2 |
| SS24054MC | 1500 | 34.61 | 27.44 | 9.14 | 8.76 | 240 | 76% | 16.31 | 20 | 16.2 |
| SS23554MC | 1500 | 34.46 | 27.35 | 9.10 | 8.60 | 235 | 75% | 15.97 | 20 | 16.2 |
| SS23054MC | 1500 | 34.31 | 27.26 | 8.96 | 8.45 | 230 | 75% | 15.63 | 20 | 16.2 |

### 48 cells

|           |      |       |       |      |      |     |     |       |    |      |
|-----------|------|-------|-------|------|------|-----|-----|-------|----|------|
| SS25048MC | 1500 | 31.82 | 25.60 | 9.97 | 9.78 | 250 | 79% | 19.02 | 20 | 14.6 |
| SS24548MC | 1500 | 31.58 | 25.37 | 9.94 | 9.66 | 245 | 78% | 18.64 | 20 | 14.6 |
| SS24048MC | 1500 | 31.43 | 25.07 | 9.84 | 9.58 | 240 | 78% | 18.26 | 20 | 14.6 |
| SS23548MC | 1500 | 31.26 | 24.92 | 9.63 | 9.44 | 235 | 78% | 17.88 | 20 | 14.6 |
| SS23048MC | 1500 | 31.10 | 24.80 | 9.57 | 9.29 | 230 | 77% | 17.50 | 20 | 14.6 |
| SS22548MC | 1500 | 31.01 | 24.65 | 9.54 | 9.13 | 225 | 76% | 17.12 | 20 | 14.6 |
| SS22048MC | 1500 | 30.91 | 24.51 | 9.35 | 8.98 | 220 | 76% | 16.74 | 20 | 14.6 |
| SS21548MC | 1500 | 30.87 | 24.45 | 9.24 | 8.80 | 215 | 75% | 16.36 | 20 | 14.6 |
| SS21048MC | 1500 | 30.76 | 24.40 | 9.15 | 8.61 | 210 | 75% | 15.98 | 20 | 14.6 |

### 36 cells

|           |      |       |       |      |      |     |     |       |    |      |
|-----------|------|-------|-------|------|------|-----|-----|-------|----|------|
| SS19036MC | 1500 | 23.82 | 19.52 | 9.98 | 9.74 | 190 | 80% | 19.01 | 20 | 10.8 |
| SS18536MC | 1500 | 23.56 | 19.20 | 9.92 | 9.65 | 185 | 79% | 18.51 | 20 | 10.8 |
| SS18036MC | 1500 | 23.43 | 18.95 | 9.85 | 9.51 | 180 | 78% | 18.01 | 20 | 10.8 |
| SS17536MC | 1500 | 23.34 | 18.77 | 9.62 | 9.33 | 175 | 78% | 17.51 | 20 | 10.8 |
| SS17036MC | 1500 | 23.28 | 18.51 | 9.51 | 9.20 | 170 | 77% | 17.01 | 20 | 10.8 |
| SS16536MC | 1500 | 23.16 | 18.39 | 9.36 | 8.98 | 165 | 76% | 16.51 | 20 | 10.8 |
| SS16036MC | 1500 | 22.96 | 18.29 | 9.12 | 8.75 | 160 | 76% | 16.01 | 20 | 10.8 |