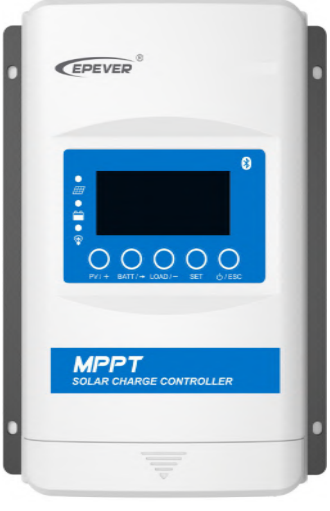
# MPPT Solar Charge Controller

## User Manual




**Models:**

**XTRA1206/1210/2206/2210/3210/3215/3415/4210/4215/4415N G3**

**XTRA1206/1210/2206/2210/3210/3215/3415/4210/4215/4415N G3 BLE**

EN

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# Important Safety Instructions

**Please keep this manual for future review.**

This manual contains all safety, installation, and operation instructions for the XTRA-N G3 or XTRA-N G3 BLE series Maximum Power Point Tracking (MPPT) controller ("controller" as referred to in this manual).



The Bluetooth trademark (as shown in the above figure) mentioned in this product and the user manual is owned by Bluetooth Special Interest Group (SIG).

**1. Safety instructions for installation**

- Read all the instructions and warnings carefully in the manual before installation.
- No user-serviceable components exist inside the controller. DO NOT disassemble or attempt to repair the controller.
- Mount the controller indoors. Avoid exposure to the components and do not allow water to enter the controller.
- Install the controller in a well-ventilated place. The controller's heat sink may become very hot during operation.
- Suggest installing appropriate external fast-acting fuses/breakers.
- Disconnect all PV array connections and the fast-acting fuses/breakers before controller installation and adjustment.
- Power connections must remain tight to avoid excessive heating from a loose connection.

| | |
|---|---|
| **WARNING** | Do not install the controller in humid, high salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments. |

**2. Other safety instructions**

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

  (1) This device may not cause harmful interference, and

  (2) This device must accept any interference received, including interference that may cause undesired operation.

- Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

- However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

  ✓ Reorient or relocate the receiving antenna.

  ✓ Increase the separation between the equipment and receiver.

  ✓ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

  ✓ Consult the dealer or an experienced radio/TV technician for help.

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

# Disclaimers

**The warranty does not apply to the following conditions:**

- Damage caused by improper use or inappropriate environment (such as the humid, high salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments).
- The actual current/voltage/power exceeds the limit value of the controller.
- Damage caused by working temperature exceeding the rated range.
- Arc, fire, explosion, and other accidents caused by failure to follow the controller stickers or manual instructions.
- Unauthorized dismantling or attempted repair.
- Damage caused by force majeure.
- Damage occurred during transportation or handling.

# 1 General Information

## 1.1 Overview

XTRA-N G3/XTRA-N G3 BLE series controllers, based on a new design concept, adopt the solar charge controller as the main component. A built-in Bluetooth module is a must for the XTRA-N G3 BLE series, which helps the end-users read and write parameters by phone APP conveniently.

The controllers adopt the advanced MPPT control algorithm, improving the maximum power point (MPP) tracking and acting speed. By minimizing the MPP loss rate and time, the controllers can track the MPP quickly to obtain the maximum energy under any conditions.

Independent voltage regulation, namely, the battery terminal of the controller can be connected to loads directly when there is no battery, is a new add function. It is friendly to various lithium batteries, avoiding the instability output voltage caused by the internal protection of the lithium batteries. The low self-consumption design significantly reduces the static power consumption and extends system standby time.

Characters of the charging power/current limit, charging power auto-reduction under the high temperature ensure the system stability after connecting with excess PV modules or working in a high-temperature environment.

IP33 Ingress protection and isolated RS485 com port design improve the controller's reliability and meet the different application requirements.

XTRA-N G3/XTRA-N G3 BLE series owns a three-stage charging mode, which effectively prolongs the battery's lifespan and improves performance. Comprehensive electronic protections, such as overcharge, over-discharge, PV & battery reverse polarity, etc., ensure the solar system is more reliable and durable. This controller can be widely used for RVs, household systems, monitoring fields, etc.

**Features：**

- High quality and low failure rate components of ST or IR to ensure the service life

- Advanced MPPT technology & ultra-fast tracking speed, tracking efficiency is up to 99.5%
- Maximum DC/DC transfer efficiency is as high as 98.5%; full load efficiency is up to 97.2%①
- Advanced MPPT control algorithm to minimize the lost rate and lost time
- Accurate recognizing and tracking of multi-peaks maximum power point
- Wider MPP(maximum power point) running voltage to optimize PV utilization
- Support multi battery types including lithium batteries
- Equipped with a stable self-activation function for the lithium battery
- Set the battery voltage parameters on the LCD②
- Battery temperature compensation
- Limit the charging power & charging current to no higher than the rated value
- Real-time energy statistics function
- Charging power reduction automatically for over-temperature
- Built-in Bluetooth to adjust settings through EPEVER APP③
- RS485 communication interface with optional 4G or Wi-Fi modules for remote monitoring
- Setting parameters via the PC software, APP, or remote meter
- Constant voltage output function④
- Comprehensive electronic protections
- Multiple load work modes
- Dustproof and waterproof design with IP33 enclosure⑤
- Low self-consumption, lower than 10mA⑥
- Operation at full load without charging power reduced in the working temperature range

**① Only the XTRA4415N G3/XTRA4415N G3 BLE@48V system supports.**

**② For the BCV, FCV, LVD, and LVR, users can modify them on the local controller when the battery type is "USE."**

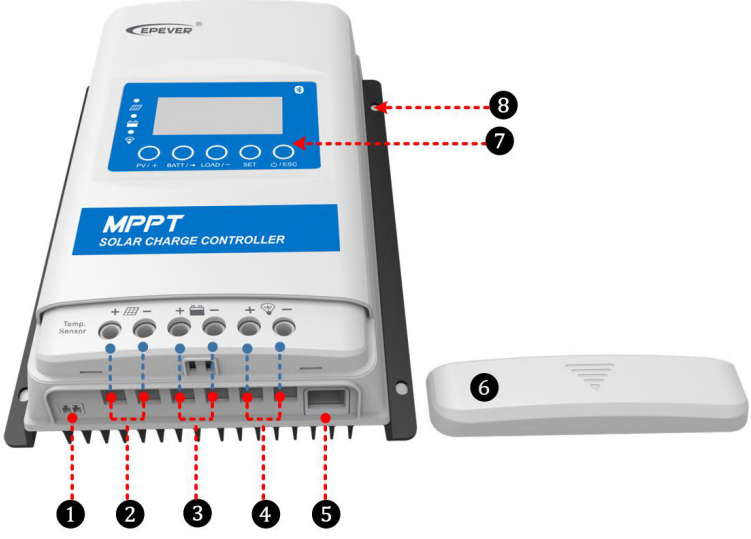
**③ Only the XTRA-N G3 BLE series support the built-in Bluetooth module.**

**④ To enable the constant voltage output function, ensure the input power is higher than the output power. Suppose the input power is lower than the output power. In that case, the controller enters the ON-OFF state intermittently caused by the under-voltage protection.**

**⑤ 3-protection against solid objects: protected against solid objects over 2.5mm.**
**3-protected against sprays to 60°from the vertical.**

⑥ **After disabling the COM port, the self-consumption is lower than 10mA.**

## 1.2 Characteristics

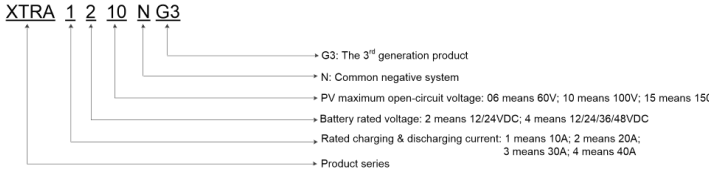



| | | | |
|---|---|---|---|
| ❶ | RTS★ port | ❺ | RS485 communication port |
| ❷ | PV terminals | ❻ | Terminal protection cover |
| ❸ | Battery terminals | ❼ | Display units |
| ❹ | Load terminals | ❽ | Mounting hole Φ5mm |

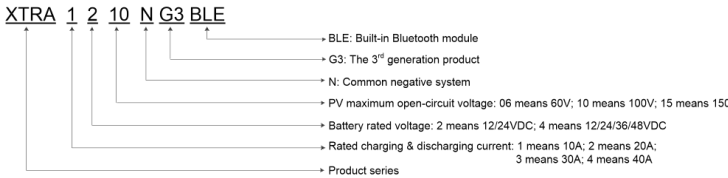
**★ If the temperature sensor is short-circuited or damaged, the controller will charge or discharge according to the setting voltage at 25 ºC (no temperature compensation).**

## 1.3 Naming rules

- **Naming rules for products without Bluetooth module**

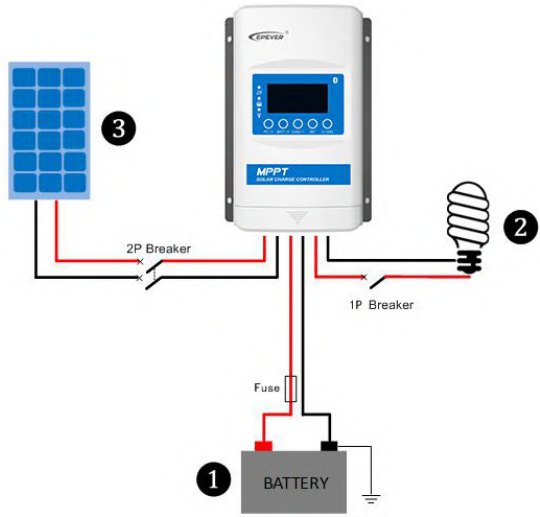



- **Naming rules for products with built-in Bluetooth module**




## 1.4 Connection diagram

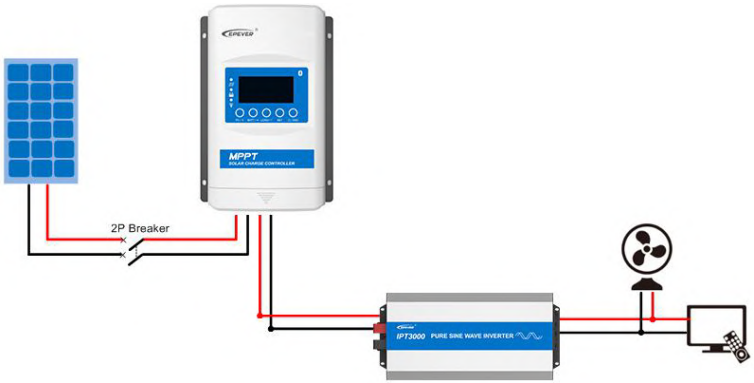
- **Battery Mode**



| | |
|---|---|
| **CAUTION** | • The cable length of the battery should not exceed 3 meters.<br>• The recommended cable length of the PV array should not exceed 3 meters (Note: If the cable length of the PV array is less than 3 meters, the system meets EN/IEC61000-6-3 requirements. If more than 3 meters, the system may not meet EN/IEC61000-6-3 requirements). |

- **No-battery Mode**

| | |
|---|---|
| **WARNING** | When there is no battery, the XTRA-N G3/XTRA-N G3 BLE series can be directly connected to the inverter. The inverter shall be connected to the battery terminals of the controller and meets the following conditions:<br>1) For high-frequency inverter: PV input power > (load output power÷inverter conversion efficiency÷controller conversion efficiency)<br>2) For power frequency inverter: PV input power > (load output power÷inverter conversion efficiency÷controller conversion efficiency÷2) |



# 2 Installation

## 2.1 Attentions

- Please read the instructions to familiarize yourself with the installation steps before installation.
- Be very careful when installing the batteries, especially flooded lead-acid batteries. Please wear eye protection, and have fresh water available to wash and clean any contact with battery acid.
- Keep the battery away from any metal objects, which may cause a short circuit of the battery.
- Explosive battery gases may come out from the battery during charging, so make sure the ventilation condition is good.
- Ventilation is highly recommended if mounted in an enclosure. Never install the controller in a sealed enclosure with flooded batteries! Battery fumes from vented batteries will corrode and destroy the controller circuits.
- Loose power connections and corroded wires may produce high heat that can melt wire insulation, burn surrounding materials, or even cause a fire. Ensure tight connections, use cable clamps to secure cables, and prevent them from swaying in mobile applications.
- The controller can work with lead-acid and lithium batteries within its control scope.
- The battery connection may be wired to one battery or a bank of batteries. The following instructions refer to a singular battery. However, it is implied that the battery connection can be made to either one battery or a group of batteries in a battery bank.
- Select the system cables according to $5A/mm^2$ or less current density following Article 690 of the National Electrical Code, NFPA 70.
- The wire size of the grounding wire should not be less than $4mm^2$.
- The torque of tightening the wiring screw should not be less than 1.2N.m.

## 2.2 PV array requirements

**Serial connection (string) of PV modules**

As the core component of the solar system, the controller could be suitable for various types of PV modules and maximize converting solar energy into electrical energy. According to the open-circuit

voltage ($V_{oc}$) and the maximum power point voltage ($V_{Mpp}$) of the MPPT controller, the series number of different types of PV modules can be calculated. The below table is for reference only.

**XTRA1206/2206N G3/XTRA1206/2206N G3 BLE:**

| System voltage | 36 cell Voc＜23V | | 48 cell Voc＜31V | | 54 cell Voc＜34V | | 60 cell Voc＜38V | |
|---|---|---|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | Max. | Best | Max. | Best |
| 12V | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 24V | 2 | 2 | - | - | - | - | - | - |

| System voltage | 72 cell Voc＜46V | | 96 cell Voc＜62V | | Thin-Film Module Voc＞80V |
|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | |
| 12V | 1 | 1 | - | - | - |
| 24V | 1 | 1 | - | - | - |

**NOTE**: The above parameter values are calculated under standard test conditions (STC (Standard Test Condition): Irradiance 1000W/m$^2$, Module Temperature 25℃, Air Mass1.5.)

**XTRA1210/2210/3210/4210N G3/XTRA1210/2210/3210/4210N G3 BLE:**

| System voltage | 36 cell Voc＜23V | | 48 cell Voc＜31V | | 54 cell Voc＜34V | | 60 cell Voc＜38V | |
|---|---|---|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | Max. | Best | Max. | Best |
| 12V | 4 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| 24V | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

| System voltage | 72 cell Voc＜46V | | 96 cell Voc＜62V | | Thin-Film Module Voc ＞80V |
|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | |
| 12V | 2 | 1 | 1 | 1 | 1 |
| 24V | 2 | 1 | 1 | 1 | 1 |

**NOTE**: The above parameter values are calculated under standard test conditions (STC (Standard Test Condition): Irradiance 1000W/m$^2$, Module Temperature 25℃, Air Mass1.5.)

**XTRA3215/4215N G3/XTRA3215/4215N G3 BLE:**

| System voltage | 36 cell Voc＜23V | | 48 cell Voc＜31V | | 54 cell Voc＜34V | | 60 cell Voc＜38V | |
|---|---|---|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | Max. | Best | Max. | Best |
| 12V | 4 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| 24V | 6 | 3 | 4 | 2 | 4 | 2 | 3 | 2 |

| System voltage | 72 cell Voc＜46V | | 96 cell Voc＜62V | | Thin-Film Module Voc ＞80V |
|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | |
| 12V | 2 | 1 | 1 | 1 | 1 |
| 24V | 3 | 2 | 2 | 1 | 1 |

**NOTE**: The above parameter values are calculated under standard test conditions (STC (Standard Test Condition): Irradiance 1000W/m$^2$, Module Temperature 25℃, Air Mass1.5.)

**XTRA3415/4415N G3/XTRA3415/4415N G3 BLE:**

| System voltage | 36 cell Voc＜23V | | 48 cell Voc＜31V | | 54 cell Voc＜34V | | 60 cell Voc＜38V | |
|---|---|---|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | Max. | Best | Max. | Best |
| 12V | 4 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| 24V | 6 | 3 | 4 | 2 | 4 | 2 | 3 | 2 |
| 48V | 6 | 5 | 4 | 3 | 4 | 3 | 3 | 3 |

| System voltage | 72 cell Voc＜46V | | 96 cell Voc＜62V | | Thin-Film Module Voc ＞80V |
|---|---|---|---|---|---|
| | Max. | Best | Max. | Best | |
| 12V | 2 | 1 | 1 | 1 | 1 |
| 24V | 3 | 2 | 2 | 1 | 1 |
| 48V | 3 | 2 | 2 | 2 | 1 |

**NOTE**: The above parameter values are calculated under standard test conditions (STC (Standard Test Condition): Irradiance 1000W/m$^2$, Module Temperature 25℃, Air Mass1.5.)

## 2.3 Wire size

The wiring and installation methods must conform to national and local electrical code requirements.

- **PV Wire Size**

The PV array output varies with the PV module size, connection method, and sunlight angle. The PV array's short circuit current (ISC) can calculate the minimum PV wire size. Please refer to the value of Isc in the PV module specification. When PV modules are connected in series, the Isc equals a PV module Isc. When PV modules are connected in parallel, the Isc equals the sum of the PV modules' Isc. The Isc of the PV array must not exceed the controller's maximum PV input current. Please refer to the table below:

**NOTE: All PV modules in a given array are assumed to be identical.**

**＊ Isc=short circuit current(amps)　Voc=open circuit voltage.**

| Model | Max. PV input current | Max. PV wire size* | Circuit breaker |
|---|---|---|---|
| XTRA1206/1210N G3<br>XTRA1206/1210N G3 BLE | 10A | 4mm²/12AWG | 16A/125V/2P |
| XTRA2206/2210N G3<br>XTRA2206/2210N G3 BLE | 20A | 6mm²/10AWG | 32A/125V/2P |
| XTRA3210/3215/3415N G3<br>XTRA3210/3215/3415N G3 BLE | 30A | 10mm²/8AWG | 40A/125V/2P |
| XTRA4210/4215/4415N G3<br>XTRA4210/4215/4415N G3 BLE | 40A | 16mm²/6AWG | 63A/125V/2P |

*** These are the maximum wire sizes that will fit the controller terminals.**

| | |
|---|---|
| **CAUTION** | When the PV modules are connected in series, the open-circuit voltage of the PV array must not exceed 46V (XTRA**06N G3/ XTRA**06N G3 BLE), 92V (XTRA**10N G3/ XTRA**10N G3 BLE), 138V (XTRA**15N G3/ XTRA**15N G3 BLE) at 25℃. |

➢ **Battery and Load Wire Size**

The battery and load wire size must conform to the rated current. The reference size is as below:

| Model | Rated charge current | Rated discharge current | Battery wire size | Load wire size | Circuit breaker |
|---|---|---|---|---|---|
| XTRA1206/1210N G3<br>XTRA1206/1210N G3 BLE | 10A | 10A | 4mm²/12AWG | 4mm²/12AWG | 16A/125V/2P |
| XTRA2206/2210N G3<br>XTRA2206/2210N G3 BLE | 20A | 20A | 6mm²/10AWG | 6mm²/10AWG | 32A/125V/2P |
| XTRA3210/3215/3415N G3<br>XTRA3210/3215/3415N G3 BLE | 30A | 30A | 10mm²/8AWG | 10mm²/8AWG | 40A/125V/2P |
| XTRA4210/4215/4415N G3<br>XTRA4210/4215/4415N G3 BLE | 40A | 40A | 16mm²/6AWG | 16mm²/6AWG | 63A/125V/2P |

| | |
|---|---|
| **CAUTION** | • The wire size is only for reference. Suppose there is a long distance between the PV array, the controller, and the battery. In that case, larger wires can be used to reduce the voltage drop and improve performance.<br>• The recommended battery wire is selected when the battery terminals are not connected to any additional inverter. |

## 2.4 Mounting

| | |
|---|---|
| **WARNING** | • Risk of explosion! Never install the controller in a sealed enclose with flooded batteries! Do not install in a confined area where battery gas can accumulate.<br>• Risk of electric shock! When wiring the solar modules, the PV array can produce a high open-circuit voltage, so disconnect the breaker before wiring and be careful. |
| **CAUTION** | The controller requires at least 150mm of clearance above and below for proper airflow. Ventilation is highly recommended if mounted in an enclosure. |

**Step 1: Determination of the installation location and heat-dissipation space**

The controller shall be installed in a place with sufficient airflow through the controller radiators and a minimum clearance of 150 mm from the upper and lower edges of the controller to ensure natural thermal convection. See Figure 2-1: Mounting.

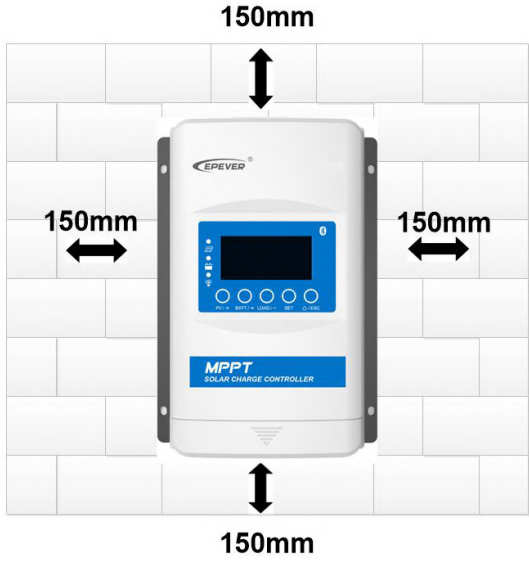



Figure 2-1 Mounting

| | |
|---|---|
| **CAUTION** | Suppose the controller is to be installed in an enclosed box. In that case, ensuring reliable heat dissipation through the box is important. |

**Step 2**：Connect the system in the order of ❶battery ➔ ❷load ➔ ❸PV array by Figure 2-2," Schematic Wiring Diagram" and disconnect the system in the reverse order❸❷❶.

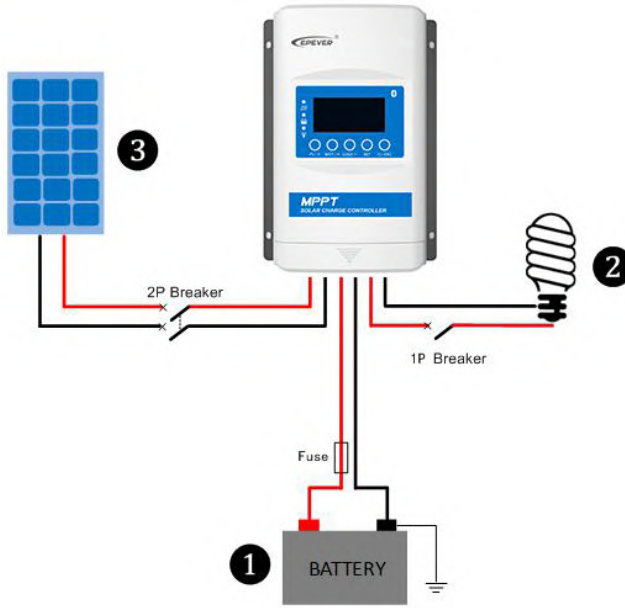



Figure 2-2 Schematic of wiring diagram

| | |
|---|---|
| ⚠ **CAUTION** | • While wiring the controller, do not connect the circuit breaker or fast-acting fuse. Ensure that the electrode polarity is correctly connected.<br>• A fast-acting fuse whose current is 1.25 to 2 times the rated current of the controller must be installed on the battery side with a distance from the battery not greater than 150 mm.<br>• The cable length of the battery should not exceed 3 meters.<br>• The recommended cable length of the PV array should not exceed 3 meters (Note: If the cable length of the PV array is less than 3 meters, the system meets EN/IEC61000-6-3 requirements. If more than 3 meters, the system may not meet EN/IEC61000-6-3 requirements).<br>• Suppose the controller is to be used in an area with frequent lightning strikes or an unattended area. In that case, it must install an external surge arrester.<br>• Suppose an inverter is to be connected to the system. In that case, you must connect the inverter directly to the battery, not to the load side of the controller. |

**Step 3：Grounding**

XTRA-N G3/ XTRA-N G3 BLE series are common-negative controllers; all the negative terminals can be grounded simultaneously, or anyone is grounded. However, according to the practical application, the negative terminals of the PV array, battery, and load can also be ungrounded. Still, the grounding terminal on the shell must be grounded. It effectively shields the electromagnetic interference from the outside and prevents some electric shock to the human body.

| | |
|---|---|
| **CAUTION** | A common-negative controller for a common-negative system, such as the motorhome, is recommended.<br>The controller may be damaged if a common-positive controller is used and the positive electrode is grounded in the common-negative system. |

**Step 4：Connect accessories**

- Connect the remote temperature sensor cable



**Temperature Sensor**

(Model: RT-MF58R47K3.81A)



**Remote Temperature Sensor Cable (Optional)**

(Model: RTS300R47K3.81A)

Connect the remote temperature sensor cable to the interface ❶ of the controller, and place the other end close to the battery.

| | |
|---|---|
| **CAUTION** | Suppose the remote temperature sensor is not connected to the controller. In that case, the default battery charging or discharging temperature setting is 25 °C without temperature compensation. |

- **Connect the accessories for RS485 communication**

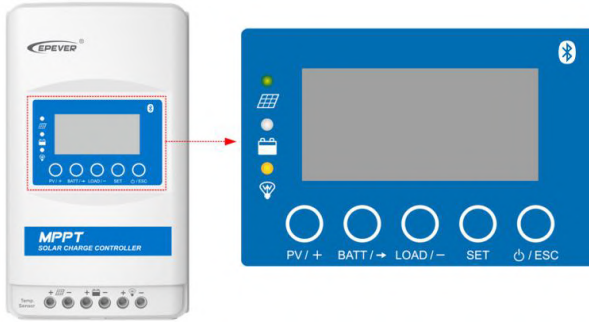
Refer to chaper4 **“Control Parameters Setting.”**

**Step 5：Powered on the controller**

Connect the battery's fast-acting fuse to power the controller. Then check the battery indicator's status (the controller operates normally when the indicator is lit in green). Connect the fast-acting fuse and circuit breaker of the load and PV array. Then the system will be operating in preprogrammed mode.

| | |
|---|---|
| **CAUTION** | If the controller is not operating properly or the battery indicator on the controller shows an abnormality, please refer to 5.2 “Troubleshooting.” |

# 3 Display units




## 3.1 Indicator

| Indicator | Color | Status | Instruction |
|---|---|---|---|
| | Green | On Solid | PV charges the battery with a low current |
| | Green | OFF | 1. No sunlight<br>2. Connection error<br>3. Low PV voltage |
| | Green | Slowly Flashing(1Hz) | Normal charging |
| | Green | Fast Flashing(4Hz) | PV Over voltage |
| | Green | On Solid | Normal |
| | Green | Slowly Flashing(1Hz) | Full |
| | Green | Fast Flashing(4Hz) | Overvoltage |
| | Orange | On Solid | Under voltage |
| | Red | On Solid | Over discharged |
| | Red | Slowly Flashing(1Hz) | Battery Overheating<br>Lithium battery Low temperature① |
| | Yellow | On Solid | Load ON |
| | Yellow | OFF | Load OFF |
| PV&BATTLED fast flashing | | | Controller Overheating<br>System voltage error② |

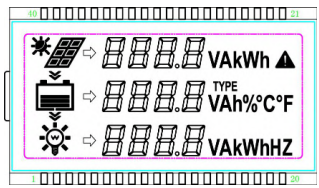
① When a lead-acid battery is used, the controller doesn't have low-temperature protection.

② When a lithium battery is used, the system voltage can't be identified automatically

## 3.2 Button

| | | |
|---|---|---|
| PV / + | Press the button | PV browsing interface |
| | | Setting data + |
| | Press the button and hold 5s | Setting the LCD cycle time, enabling or disabling the COM port |
| BATT / → | Press the button | BATT browsing interface |
| | | Cursor displacement during setting |
| | Press the button and hold 5s | Setting the battery type, battery capacity level, and temperature unit. |
| LOAD / – | Press the button | Controller load browsing interface |
| | | Setting data |
| | Press the button and hold 5s | Setting the load working mode |
| SET | Press the button | Enter into setting interface |
| | | Switch the setting interface to the browsing interface |
| | | Confirm the setting parameter |
| ↵ / ESC | Press the button | Exit the setting interface |

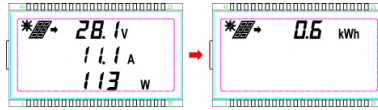
## 3.3 Display




**Note: The display screen can be viewed clearly when the angle between the end-users horizontal sight and the display screen is within 90°. If the angle exceeds 90°, the information on the display screen cannot be viewed clearly.**

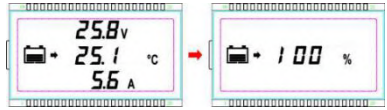
| Icon | Information | Icon | Information | Icon | Information |
|---|---|---|---|---|---|
| | Day | | Not charging | | Not discharging |
| | Night | | Charging | | Discharging |

**1) PV parameters**



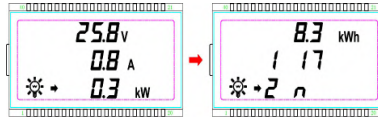

Display：Voltage/Current/Power/Generated Energy

**2) Battery parameters**




Display：Voltage/Current/Temperature/Battery capacity level

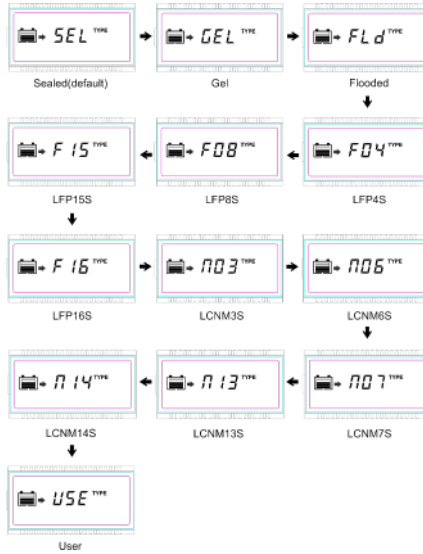
**3) Load parameters**




Display：Voltage/Current/Power/ Consumed energy/Load working mode-Timer1/ Load working mode-Timer2

## 3.4 Setting parameters

**1) Battery type**



**Note: If the controller supports 48V system voltage, the battery type will display LiFePO4 F15/F16 and Li(NiCoMn)O2 N13/N14.**

**Operation:**

**Step 1:** Press the BATT/→ button to browse the battery parameters on the initial interface. Then, press the SET button to enter the battery parameters setting interface.

**Step 2:** Long-press the BATT/→ button to enter the battery-type interface.

**Step 3:** Press the PV/+ or LOAD/− button to select the battery type.

**Step 4:** Press the SET button to confirm.

**Step5:** Continue to press the SET button twice or wait for 10S of no-operation to automatically go back to the battery parameters setting interface.

| | |
|---|---|
| **CAUTION** | Please refer to chapter 4.1 for the battery control voltage setting when the battery type is User. |

**2) Battery capacity**




**Operation:**

**Step 1:** Press the BATT/→ button to browse the battery parameters on the initial interface. Then, press the SET button to enter the battery parameters setting interface.

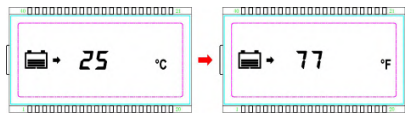
**Step 2:** Long-press the BATT/→ button to enter the battery-type interface.

**Step 3:** Press the SET button to jump to the battery capacity interface.

**Step 4:** Press the PV/+ or LOAD/− button to set the battery capacity.

**Step 5:** Press the SET button to confirm.

**3) Temperature units**



**Operation:**

**Step 1:** Press the 

button to browse the battery parameters on the initial interface. Then, press the 

button to enter the battery parameters setting interface.

**Step 2:** Long-press the 

button to enter the battery-type interface.

**Step 3:** Press the 

button twice to jump to the temperature unit's interface.

**Step 4:** Press the 

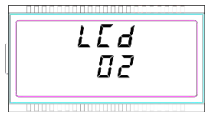
or 

button to set the temperature units.

**Step 5:** Press the 

button to confirm.

**4) LCD cycle time**




**NOTE: The LCD cycle default time is 2s, and the setting time range is 0～20s.**

**Operation:**

**Step 1:** Press the 

button to browse the PV parameters on the initial interface. Then, press the 

button to enter the PV parameters setting interface.

**Step 2:** Long-press the 

button to enter the LCD cycle time interface, and the cycle time flashes.

**Step 3:** Press the 

or 

button to set the LCD cycle time.

**Step 4:** Press the 

button to confirm.

**5) Clear the accumulated electricity**

**Operation:**

**Step 1:** Press the 

button to browse the PV parameters on the initial interface. Then, press the 

button to enter the PV parameters setting interface.

**Step 2:** Long-press the 

button to enter the LCD cycle time interface, and the cycle time flashes.

**Step 3:** Hold the 

button and the 

button for 5 seconds to clear the accumulated electricity.

**Note: Return to the PV parameters interface to confirm whether the accumulated electricity (kWH) is zero.**

**6) Enable the RS485 com port**

The RS485 com port supports 5V output and communication function when enabled. And it has no output and communication function when disabled. At the same time, the system's self-consumption is reduced further.




**Operation:**

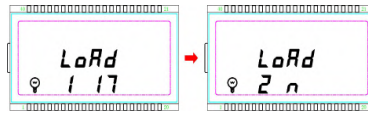
**Step 1:** Press the PV/+ button to browse the PV parameters on the initial interface. Then, press the SET button to enter the PV parameters setting interface.

**Step 2:** Long-press the PV/+ button to enter the LCD cycle time interface. Then, press the SET button to switch to the CON interface.

**Step 3:** Press the PV/+ or LOAD/− button to enable (EN) or disable (DIS) the RS485 com port.

**Step 4:** Press the SET button to confirm.

**7) Load type**




**Operation:**

**Step 1:** Press the LOAD/− button to browse the load parameters on the initial interface. Then, press the SET button to enter the load parameters setting interface.

**Step 2:** Long-press the LOAD/− button to enter the load type interface.

**Step 3:** Press the PV/+ or LOAD/− button to change the load type.

**Step 4:** Press the SET button to confirm.

**NOTE: Please refer to chapter 4.2 for the load modes.**

# 4 Parameters Setting

## 4.1 Battery parameters

### 4.1.1 Supported battery types

| | | |
|---|---|---|
| 1 | Battery | Sealed(default) |
| | | Gel |
| | | Flooded |
| 2 | Lithium battery | LiFePO4 (4S/8S/15S/16S) |
| | | Li(NiCoMn)O2 (3S/6S/7S/13S/14S) |
| 3 | User | |

**Note: If the controller supports 48V system voltage, the battery type will display LiFePO4 F15/F16 and Li(NiCoMn)O2 N13/N14.**

### 4.1.2 Local setting

| | |
|---|---|
| **WARNING** | When the default battery type is selected, the battery voltage parameters cannot be modified. To change these parameters, select the "USE" type. |

**Step1：Enter the "USE" battery type.** Detailed operations of entering the "USE" battery type are shown in the following table.

| Content | Operation steps |
|---|---|
| **Enter the "USE" battery type** | 1) Press the BATT/→ button to browse the battery parameters on the initial interface. Press the SET button to enter the battery parameters setting interface, and long-press the BATT/→ button to enter the battery-type interface.<br>2) Press the PV/+ or LOAD/− button to select the battery type, such as select the battery type as F04. And then press the SET button to confirm. Continue to press the SET button twice or wait for 10S of no-operation to automatically go back to the battery parameters setting interface.<br>3) Long-press the BATT/→ button to enter the battery-type interface again on the battery parameters setting interface. |

| | |
|---|---|
| | 4) Press the  or  button to select the battery type “USE.” |

**Step2: Set the battery parameters on the local device.**

Under the "USE" interface, the battery parameters that can be local set are shown in the table below:

| Parameters | Default | Range | Operation steps |
|---|---|---|---|
| System voltage level (SYS)★ | 12VDC | 12/24/36/ 48VDC or “0” (auto identity) | 1) Under the "USE" battery type, press the  button to enter the “SYS” interface.<br>2) Press the  button again to display the current “SYS” value.<br>3) Press the  or  button to modify the parameter.<br>4) Press the  button to confirm and enter the next parameter. |
| Boost charging voltage (BCV) | 14.4V | 9~17V | 5) Press the  button again to display the current voltage value.<br>6) Press the  or  button to modify the parameter (press the  button to increase 0.1V, press the  button to decrease 0.1V).<br>7) Press the  button to confirm and enter the next parameter. |
| Float charging voltage (FCV) | 13.8V | 9~17V | |
| Low voltage reconnect voltage (LVR) | 12.6V | 9~17V | |
| Low voltage disconnect voltage (LVD) | 11.1V | 9~17V | |
| Lithium battery protection enable (LEN) | NO | YES/NO | Press the  or  button to modify the switch status. **Note: It exists automatically from the current interface after no operation of more than 10S.** |

**★The SYS value can only be modified under the non-lithium "USE" type. The SYS value can be modified if the battery type is Sealed, Gel, Flooded before entering the "USE" type. The SYS value cannot be modified if it is a lithium battery type before entering the "USE" type.**

**For the no-battery application, if the actual system voltage is 12V, the SYS value can be set as "12VDC" or "0 (auto identify the system voltage)". If the actual system voltage is higher than 12V, such as 24V/36V/48V, the SYS value must be the same as the actual system voltage. Or the load cannot work normally.**

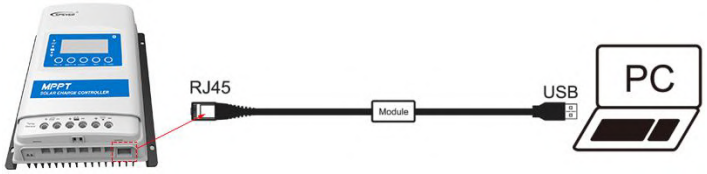
**Only the above battery parameters can be set on the local controller. The remaining battery parameters follow the following logic (the voltage level of the 12V system is 1, the voltage level of the 24V system is 2, and the voltage level of the 48V system is 4).**

| Battery type / Battery parameters | Sealed/Gel/Flooded User | LiFePO4 User | Li(NiCoMn)O2 User |
|---|---|---|---|
| Over voltage disconnect voltage | BCV+1.4V*voltage level | BCV+0.3V*voltage level | BCV+0.3V*voltage level |
| Charging limit voltage | BCV+0.6V*voltage level | BCV+0.1V*voltage level | BCV+0.1V*voltage level |
| Over voltage reconnect voltage | BCV+0.6V*voltage level | BCV+0.1V*voltage level | Boost charging voltage |
| Equalize charging voltage | BCV+0.2V*voltage level | Boost charging voltage | Boost charging voltage |
| Boost reconnect charging voltage | FCV-0.6V*voltage level | FCV-0.6V*voltage level | FCV-0.1V*voltage level |
| Under voltage warning reconnect voltage | UVW+0.2V*voltage level | UVW+0.2V*voltage level | UVW+1.7V*voltage level |
| Under voltage warning voltage | LVD+0.9V*voltage level | LVD+0.9V*voltage level | LVD+1.2V*voltage level |
| Discharging limit voltage | LVD-0.5V*voltage level | LVD-0.1V*voltage level | LVD-0.1V*voltage level |

### 4.1.3 Remote setting

**1) Setting the battery parameters by PC software**

Connect the controller's RJ45 interface to the PC's USB interface via a USB to RS485 cable. When selecting the battery type as "USE," set the voltage parameters by the PC software.




**2) Setting the battery parameters by APP**

- **Via an external WiFi module**

Connect the controller to an external WiFi module by the RS485 communication port. End-users can set the voltage parameters by the APP after selecting the battery type as "USE." Refer to the cloud APP manual for details.




- **Via an external Bluetooth module**

Connect the controller to an external Bluetooth module by the RS485 communication port. End-users can set the voltage parameters by the APP after selecting the battery type as "USE." Refer to the cloud APP manual for details.




- **Via a built-in Bluetooth module (only XTRA-N G3 BLE series support）**

Connect the mobile phone with the built-in Bluetooth module by the Bluetooth signal. End-users can set the voltage parameters by the APP after selecting the battery type as "USE." Refer to the cloud APP manual for details.




**3) Setting the battery parameters by MT52**

Connect the controller to the remote meter (MT52) through a standard network cable. After selecting the battery type as "USE," set the voltage parameters by the MT52. Refer to the MT52 manual or aftersales engineer for details.




**4) Controller parameters**

✧ **Battery voltage parameters**

**Parameters in below table are measured in the condition of 12V/25ºC. Please double the values in the 24V system and multiplies the values by 4 in the 48V system.**

| Battery type / Battery parameters | Sealed | GEL | FLD | User Defined |
|---|---|---|---|---|
| Over voltage disconnect voltage | 16.0V | 16.0V | 16.0V | 9~17V |
| Charging limit voltage | 15.0V | 15.0V | 15.0V | 9~15.5V |
| Over voltage reconnect voltage | 15.0V | 15.0V | 15.0V | 9~15.5V |
| Equalize charging voltage | 14.6V | —— | 14.8V | 9~15.5V |
| Boost charging voltage | 14.4V | 14.2V | 14.6V | 9~15.5V |
| Float charging voltage | 13.8V | 13.8V | 13.8V | 9~15.5V |
| Boost reconnect charging voltage | 13.2V | 13.2V | 13.2V | 9~15.5V |
| Low voltage reconnect voltage | 12.6V | 12.6V | 12.6V | 9~15.5V |
| Under voltage warning reconnect voltage | 12.2V | 12.2V | 12.2V | 9~15.5V |
| Under voltage warning voltage | 12.0V | 12.0V | 12.0V | 9~15.5V |
| Low voltage disconnect voltage | 11.1V | 11.1V | 11.1V | 9~15.5V |
| Discharging limit voltage | 10.6V | 10.6V | 10.6V | 9~15.5V |
| Equalize Duration | 120 | -- | 120 | 0~180 |

| | | | | |
|---|---|---|---|---|
| | minutes | | minutes | minutes |
| Boost Duration | 120 minutes | 120 minutes | 120 minutes | 10~180 minutes |

- **When the battery type is "USE," the battery voltage parameters follow the following logic:**

  A. Over Voltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Reconnect Charging Voltage.

  B. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage

  C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage.

  D. Under Voltage Warning Reconnect Voltage>Under Voltage Warning Voltage≥ Discharging Limit Voltage;

  E. Boost Reconnect Charging voltage >Low Voltage Reconnect Voltage.

✧ **Lithium Battery voltage parameters**

| Battery type / Battery parameters | LFP | | | |
|---|---|---|---|---|
| | **LFP4S** | **User Defined** | **LFP8S** | **User Defined** |
| Over voltage disconnect voltage | 14.8V | 9~17V | 29.6 V | 18~34V |
| Charging limit voltage | 14.6 V | 9~15.5V | 29.2 V | 18~31V |
| Over voltage reconnect voltage | 14.6 V | 9~15.5V | 29.2 V | 18~31V |
| Equalize charging voltage | 14.5 V | 9~15.5V | 29 .0 V | 18~31V |
| Boost charging voltage | 14.5 V | 9~15.5V | 29.0 V | 18~31V |
| Float charging voltage | 13.8 V | 9~15.5V | 27.6 V | 18~31V |
| Boost reconnect charging voltage | 13.2 V | 9~15.5V | 26.4 V | 18~31V |
| Low voltage reconnect voltage | 12.8 V | 9~15.5V | 25.6 V | 18~31V |
| Under voltage warning reconnect voltage | 12.2 V | 9~15.5V | 24.4 V | 18~31V |
| Under voltage warning voltage | 12.0 V | 9~15.5V | 24.0 V | 18~31V |
| Low voltage disconnect voltage | 11.1 V | 9~15.5V | 22.2 V | 18~31V |
| Discharging limit voltage | 11.0 V | 9~15.5V | 22.0 V | 18~31V |

**Note: The LFP4S is 12V battery system, and the LFP8S is 24V battery system.**

| Battery type / Battery parameters | LFP | | |
|---|---|---|---|
| | **LFP15S** | **LFP16S** | **User Defined** |
| Over voltage disconnect voltage | 55.5V | 59.2V | 36~68V |
| Charging limit voltage | 54.7V | 58.4V | 36~62V |

| | | | |
|---|---|---|---|
| Over voltage reconnect voltage | 54.7V | 58.4V | 36~62V |
| Equalize charging voltage | 54.3V | 58.0V | 36~62V |
| Boost charging voltage | 54.3V | 58.0V | 36~62V |
| Float charging voltage | 51.7V | 55.2V | 36~62V |
| Boost reconnect charging voltage | 49.5V | 52.8V | 36~62V |
| Low voltage reconnect voltage | 48.0V | 51.2V | 36~62V |
| Under voltage warning reconnect voltage | 45.7V | 48.8V | 36~62V |
| Under voltage warning voltage | 45.0V | 48.0V | 36~62V |
| Low voltage disconnect voltage | 41.6V | 44.4V | 36~62V |
| Discharging limit voltage | 41.2V | 44.0V | 36~62V |

**Note: The LFP15S and LFP16S are 48V battery system.**

| Battery type / Battery parameters | LNCM | | | | |
|---|---|---|---|---|---|
| | LNCM3S | User Defined | LNCM6S | LNCM7S | User Defined |
| Over voltage disconnect voltage | 12.8 V | 9~17V | 25.6 V | 29.8 V | 18~34V |
| Charging limit voltage | 12.6 V | 9~15.5V | 25.2 V | 29.4 V | 18~31V |
| Over voltage reconnect voltage | 12.5 V | 9~15.5V | 25.0 V | 29.1 V | 18~31V |
| Equalize charging voltage | 12.5 V | 9~15.5V | 25.0 V | 29.1 V | 18~31V |
| Boost charging voltage | 12.5 V | 9~15.5V | 25.0 V | 29.1 V | 18~31V |
| Float charging voltage | 12.2 V | 9~15.5V | 24.4 V | 28.4 V | 18~31V |
| Boost reconnect charging voltage | 12.1 V | 9~15.5V | 24.2 V | 28.2 V | 18~31V |
| Low voltage reconnect voltage | 10.5 V | 9~15.5V | 21.0 V | 24.5 V | 18~31V |
| Under voltage warning reconnect voltage | 12.2 V | 9~15.5V | 24.4 V | 28.4 V | 18~31V |
| Under voltage warning voltage | 10.5 V | 9~15.5V | 21.0 V | 24.5 V | 18~31V |
| Low voltage disconnect voltage | 9.3 V | 9~15.5V | 18.6 V | 21.7 V | 18~31V |
| Discharging limit voltage | 9.3 V | 9~15.5V | 18.6 V | 21.7 V | 18~31V |

**Note: The LNCM3S is 12V battery system, the LNCM6S and LNCM7S are 24V battery system.**

| Battery type / Battery parameters | LNCM | | |
|---|---|---|---|
| | LNCM13S | LNCM14S | User Defined |
| Over voltage disconnect voltage | 55.4V | 59.7V | 36~68V |
| Charging limit voltage | 54.6V | 58.8V | 36~62V |
| Over voltage reconnect voltage | 54.1V | 58.3V | 36~62V |
| Equalize charging voltage | 54.1V | 58.3V | 36~62V |
| Boost charging voltage | 54.1V | 58.3V | 36~62V |
| Float charging voltage | 52.8V | 56.9V | 36~62V |
| Boost reconnect charging voltage | 52.4V | 56.4V | 36~62V |
| Low voltage reconnect voltage | 45.5V | 49.0V | 36~62V |
| Under voltage warning reconnect voltage | 52.8V | 56.9V | 36~62V |
| Under voltage warning voltage | 45.5V | 49.0V | 36~62V |
| Low voltage disconnect voltage | 40.3V | 43.4V | 36~62V |
| Discharging limit voltage | 40.3V | 43.4V | 36~62V |

**Note: The LNCM13S and LNCM14S are 48V battery system.**

- **When the battery type is "USE," the Lithium battery voltage parameters follow the following logic:**

  A. Over Voltage Disconnect Voltage>Over Charging Protection Voltage(Protection Circuit Modules(BMS))+0.2V;

  B. Over Voltage Disconnect Voltage>Over Voltage Reconnect Voltage ＝ Charging Limit Voltage ≥ Equalize Charging Voltage ＝ Boost Charging Voltage ≥ Float Charging Voltage>Boost Reconnect Charging Voltage;

  C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage.

  D. Under Voltage Warning Reconnect Voltage>Under Voltage Warning Voltage≥ Discharging Limit Voltage;

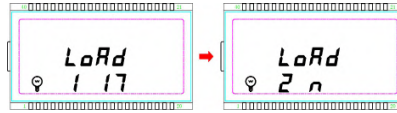
  E. Boost Reconnect Charging voltage> Low Voltage Reconnect Voltage;

  F. Low Voltage Disconnect Voltage ≥ Over Discharging Protection Voltage (BMS)+0.2V

| | |
|---|---|
| **CAUTION** | The required accuracy of BMS is no higher than 0.2V. We will not assume responsibility for the abnormal when the accuracy of BMS is higher than 0.2 v. |

## 4.2 Load modes

### 4.2.1 LCD setting




**When the LCD shows the above interface, it operates as follows:**

**Step1:** Press the LOAD / − button to browse the load parameters on the initial interface, and then press the SET button to enter the load parameters setting interface.

**Step 2:** Long-press the LOAD / − button to enter the load type interface.

**Step 3:** Press the PV / + or LOAD / − button to change the load type.

**Step 4:** Press the SET button to confirm.

**1) Load mode**

| 1** | Timer 1 | 2** | Timer 2 |
|---|---|---|---|
| **100** | Light ON/OFF | **2 n** | Disabled |
| **101** | The load will be on for 1 hour after sunset | **201** | The load will be on for 1 hour before sunrise |
| **102** | The load will be on for 2 hours after sunset | **202** | The load will be on for 2 hours before sunrise |
| **103 ～ 113** | The load will be on for 3～13 hours after sunset | **203 ～213** | The load will be on for 3～13 hours before sunrise |
| **114** | The load will be on for 14 hours after sunset | **214** | The load will be on for 14 hours before sunrise |
| **115** | The load will be on for 15 hours after sunset | **215** | The load will be on for 15 hours before sunrise |
| **116** | Test mode | **2 n** | Disabled |
| **117** | Manual mode(Default load ON) | **2 n** | Disabled |
| **118** | Always ON mode (The load always maintains the output state, and this mode is suitable for loads that require 24-hour power supply) | | |

| | |
|---|---|
| **CAUTION** | When selecting the load mode as the Light ON/OFF mode, Test mode, and Manual mode, only Timer 1 can be set, and Timer 2 is disabled and display "2 n". |

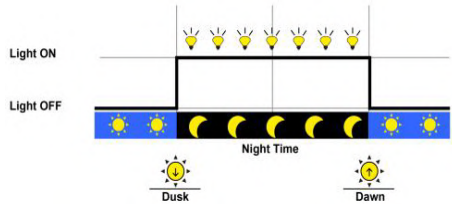
### 4.2.2 RS485 communication setting

**1) Load mode**

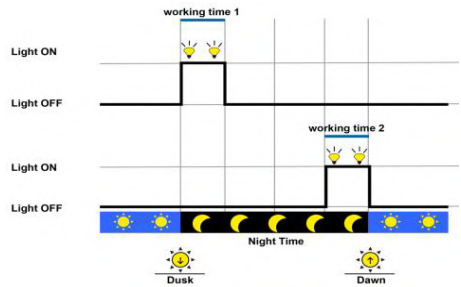
- **Manual Control (default)**

Control the load ON/OFF via the button or remote commands (e.g., PC software, APP, or remote meter).

- **Light ON/OFF**




- **Light ON+ Timer**




- **Time Control**

Control the load ON/OFF time by setting the real-time clock.

**2) Load mode settings**

Set the load modes by PC software, APP, or remote meter (MT52). For detailed connection diagrams and settings, refer to chapter 4.1.3 Remote Setting.

# 5 Others

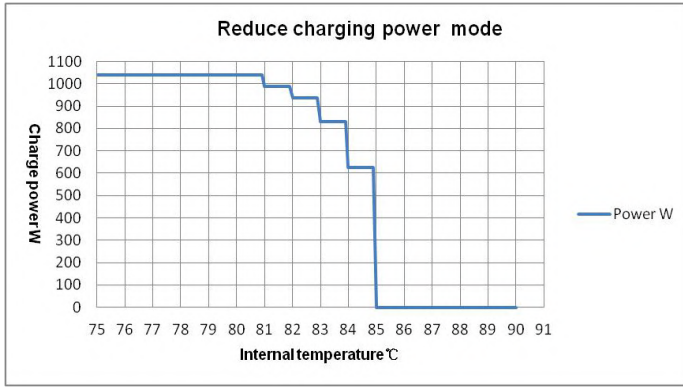
## 5.1 Protection

| Protections | Instructions |
|---|---|
| PV over current/ over power | When the charging current or power of the PV array exceeds the controller's rated current or power, it will be charged at the rated current or power.<br>**WARNING: When the PV's charging current is higher than the rated current, the PV's open-circuit voltage cannot be higher than the "maximum PV open-circuit voltage." Otherwise, the controller may be damaged.** |
| PV short circuit | When not in a PV charging state, the controller will not be damaged in case of a short-circuiting in the PV array.<br>**WARNING: It is forbidden to short-circuit the PV array during charging. Otherwise, the controller may be damaged.** |
| PV reverse polarity | When the polarity of the PV array is reversed, the controller may not be damaged and can continue to operate normally after the polarity is corrected.<br>**CAUTION: The controller is damaged when the PV array is connected reversely to the controller, and the PV array's actual operating power exceeds 1.5 times the rated charging power.** |
| Night reverse charging | Prevents the battery from discharging to the PV module at night. |
| Battery reverse polarity | The battery can be reversely connected when the PV is disconnected or reversely connected. Correct the wire connection to resume work.<br>**WARNING: The controller will be damaged when the PV connection is correct and the battery connection is reversed!** |
| Battery over voltage | When the battery voltage exceeds the Over Voltage Disconnect Voltage, the controller will stop charging the battery to protect the battery from being overcharged. |

| | |
|---|---|
| Battery over discharge | When the battery voltage is lower than the Low Voltage Disconnect Voltage, the controller will stop battery discharging to protect the battery from being over-discharged. |
| Battery over-heating | The controller can detect the battery temperature through an external temperature sensor. The controller stops working when its temperature exceeds 65 °C and restarts to work when its temperature is below 55 °C. |
| Lithium battery low temperature | When the temperature detected by the optional temperature sensor is lower than the Low Temperature Protection Threshold (LTPT), the controller will stop charging and discharging automatically. When the detected temperature is higher than the LTPT, the controller will work automatically (The LTPT is 0 °C by default and can be set within 10 ~ -40 °C). |
| Load short circuit | When the load is short-circuited (The short circuit current is ≥ 4 times the rated controller load current), the controller will automatically cut off the output. Suppose the load reconnects the output five times (delay of 5s, 10s, 15s, 20s, 25s). In that case, it needs to be canceled by pressing the Load button, restarting the controller, or waiting for one night-day cycle (night time>3 hours). |
| Overload | When the load is overloading (The overload current is ≥ 1.02 times the rated load current), the controller will automatically cut off the output. Suppose the load reconnects five times (delay of 5s, 10s, 15s, 20s, 25s). In that case, it needs to be canceled by pressing the Load button, restarting the controller, or waiting for one night-day cycle (night time>3 hours). |
| Controller over-heating★ | The controller can detect its internal temperature by the temperature sensor. The controller stops working when its internal temperature exceeds 85 °C and resumes work when its temperature is below 75 °C. |
| TVS high voltage transients | The internal circuitry of the controller is designed with Transient Voltage Suppressors (TVS), which can only protect against high-voltage surge pulses with less energy. Suppose the controller is to be used in an area with frequent lightning strikes. In that case, it is recommended to install an external surge arrester. |

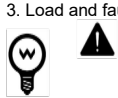
★When the internal temperature is 81℃, the reduced charging power mode is turned on. It reduces the charging power by 5%,10%,20%, and 40% with every increase of 1℃. If the internal temperature exceeds 85℃, the controller will stop charging. When the temperature declines to below 75 ℃, the controller will resume.

**For example XTRA4215N G3/XTRA4215N G3 BLE 24V system:**




## 5.2 Troubleshooting

| Possible reasons | Faults | Troubleshooting |
|---|---|---|
| PV array disconnection | Charging LED indicator off during daytime when sunshine falls on PV modules properly. | Confirm that PV wire connections are correct and tight |
| Battery voltage is lower than 8V | The wire connection is correct, and the controller is not working. | Please check the battery voltage. At least 8V to activate the controller. |
| Battery over voltage | Green charging indicator fast flashes. Battery level shows full, battery frame and fault icon blink. | Check if the battery voltage is higher than OVD (over voltage disconnect voltage), and disconnect the PV. |
| Battery over-discharged | Red charging indicator is ON solid. Battery level shows empty, battery frame and fault icon blink. | When the battery voltage is restored to or above LVR(low voltage reconnect voltage), the load will recover |
| Battery Overheating | Red battery indicator slow flashes. Battery frame and fault icon blink. | The controller will automatically turn the system off. When the temperature declines to below 55 ºC, the controller will resume. |

| | | |
|---|---|---|
| Controller Overheating | PV and BATT indicators fast flash. | When the heat sink of the controller exceeds 85℃, the controller will automatically cut off the input and output circuit. When the temperature is below 75℃, the controller will resume work. |
| System voltage error | | ①Check whether the battery voltage matches the system voltage level set on the controller.<br>②Change a matched battery or modify the system voltage level.<br>**Note:** The fault can be ignored for the no-battery application if the system voltage level matches the actual system voltage. The alarm will disappear after 3 minutes or press the Load button to cancel it. |
| Load Short Circuit | 1. The load has no output.<br>2. LCD blinks “E001.”<br>3. Load and fault icons blink.<br> | ①Check carefully load connection, and cancel the fault.<br>②Restart the controller.<br>③Wait for one night-day cycle (night time>3 hours). |
| Load Overload① | 1. The load has no output.<br>2. LCD blinks “E002.”<br>3. Load and fault icons blink.<br> | ①Please reduce the number of electric equipment.<br>②Restart the controller.<br>③Wait for one night-day cycle (night time>3 hours). |

① When the actual load current exceeds the rated value, the load will be cut off after a delay.

| Times of the actual load current Vs. the rated value | 1.02-1.15 | 1.15-1.25 | 1.25-1.35 | 1.35-1.5 |
|---|---|---|---|---|
| Delay time of the load cut off | 50s | 30s | 10s | 2s |

## 5.3 Maintenance

The following inspections and maintenance tasks are recommended at least twice yearly for best performance.

- Make sure the controller is firmly installed in a clean and dry ambient.
- Make sure no block on airflow around the controller. Clear up any dirt and fragments on the heat sink.
- Check all the naked wires to ensure insulation is not damaged by sun exposure, frictional wear, dryness, insects or rats, etc. Repair or replace some wires if necessary.
- Tighten all the terminals. Inspect for loose, broken, or burnt wire connections.
- Check and confirm that LED is consistent with required. Pay attention to any troubleshooting or error indication. Take corrective action if necessary.
- Confirm that all the system components are ground connected tightly and correctly.
- Confirm that all the terminals have no corrosion, insulation damage, high temperature, or burnt/discolored sign. Tighten terminal screws to the suggested torque.
- Clear up dirt, nesting insects, and corrosion in time.
- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the controller and other equipment.

| | |
|---|---|
|  **WARNING** | Risk of electric shock!<br>Ensure all the power is turned off before the above operations, and then follow the corresponding inspections and operations. |

# 6 Technical Specifications

| Item | XTRA1206N G3/G3 BLE | XTRA2206N G3/G3 BLE | XTRA1210N G3/G3 BLE | XTRA2210N G3/G3 BLE | XTRA3210N G3/G3 BLE | XTRA4210N G3/G3 BLE |
|---|---|---|---|---|---|---|
| **Electrical Parameters** | | | | | | |
| Battery Rated Voltage | 12/24VDC★ Auto | | | | | |
| Rated Charging Current | 10A | 20A | 10A | 20A | 30A | 40A |
| Rated Discharging Current | 10A | 20A | 10A | 20A | 30A | 40A |
| Controller Work Voltage Range | 8~31V | | | | | |
| PV Maximum Open-circuit Voltage | 60V(At minimum operating environment temperature)<br>46V(At 25℃ environment temperature) | | 100V(At minimum operating environment temperature)<br>92V(At 25℃ environment temperature) | | | |
| MPPT Voltage Range | (Battery voltage+2V)~36V | | (Battery voltage+2V)~72V | | | |
| Rated Charging Power | 130W/12V<br>260W/24V | 260W/12V<br>520W/24V | 130W/12V<br>260W/24V | 260W/12V<br>520W/24V | 390W/12V<br>780W/24V | 520W/12V<br>1040W/24V |

| Item | XTRA1206N G3/G3 BLE | XTRA2206N G3/G3 BLE | XTRA1210N G3/G3 BLE | XTRA2210N G3/G3 BLE | XTRA3210N G3/G3 BLE | XTRA4210N G3/G3 BLE |
|---|---|---|---|---|---|---|
| Maximum Conversion Efficiency | 97.9% | 98.3% | 98.2% | 98.3% | 98.6% | 98.6% |
| Maximum Load Efficiency | 97% | 96.7% | 96.2% | 96.4% | 96.6% | 96.5% |
| Static Losses (Enable the com. port) | ≤10mA(12V)<br>≤7mA(24V) | ≤10mA(12V)<br>≤7mA(24V) | ≤15mA(12V)<br>≤9mA(24V) | ≤15mA(12V)<br>≤9mA(24V) | ≤15mA(12V)<br>≤9mA(24V) | ≤15mA(12V)<br>≤9mA(24V) |
| Static Losses (Disable the com. port) | ≤8mA(12V)<br>≤5mA(24V) | ≤8mA(12V)<br>≤5mA(24V) | ≤8mA(12V)<br>≤6mA(24V) | ≤8mA(12V)<br>≤6mA(24V) | ≤8mA(12V)<br>≤5mA(24V) | ≤8mA(12V)<br>≤5mA(24V) |
| Discharge-circuit Voltage Drop | ≤0.23V | | | | | |
| Temperature Compensation ◆ | -3mV/℃/2V (Default) | | | | | |
| Grounding Type | Common negative | | | | | |
| RS485 Port | 5VDC/200mA(RJ45) | | | | | |
| LCD Backlight Time | Default: 60S, Range: 0~999S(0S: the backlight is ON all the time) | | | | | |

| Item | XTRA1206N G3/G3 BLE | XTRA2206N G3/G3 BLE | XTRA1210N G3/G3 BLE | XTRA2210N G3/G3 BLE | XTRA3210N G3/G3 BLE | XTRA4210N G3/G3 BLE |
|---|---|---|---|---|---|---|
| **Mechanical Parameters** | | | | | | |
| Dimension (L x W x H) | 175×143×48mm | 217×158×56.5mm | 175×143×48mm | 217×158×56.5mm | 230×165×63mm | 255×185×67.8mm |
| Mounting Size (L x W) | 120×134mm | 160×149mm | 120×134mm | 160×149mm | 173×156mm | 200×176mm |
| Mounting Hole Size | Φ5mm | Φ5mm | Φ5mm | Φ5mm | Φ5mm | Φ5mm |
| Terminal | 12AWG($4mm^2$) | 6AWG($16mm^2$) | 12AWG($4mm^2$) | 6AWG($16mm^2$) | 6AWG($16mm^2$) | 6AWG($16mm^2$) |
| Recommended Wire Size | 12AWG($4mm^2$) | 10AWG($6mm^2$) | 12AWG($4mm^2$) | 10AWG($6mm^2$) | 8AWG($10mm^2$) | 6AWG($16mm^2$) |
| Net Weight | 0.58kg | 0.97kg | 0.59kg | 0.97kg | 1.30kg | 1.72kg |

★ When a lithium battery is used, the system voltage can't be identified automatically.

◆ When a lithium battery is used, the temperature compensation coefficient must be "0" and can't be changed.

| Item | XTRA3215N G3/G3 BLE | XTRA4215N G3/G3 BLE | XTRA3415N G3/G3 BLE | XTRA4415N G3/G3 BLE |
|---|---|---|---|---|
| **Electrical Parameters** | | | | |
| Battery Rated Voltage | 12/24VDC★ Auto | | 12/24/36/48VDC★ Auto | |
| Rated Charging Current | 30A | 40A | 30A | 40A |
| Rated Discharging Current | 30A | 40A | 30A | 40A |
| Controller Work Voltage Range | 8~31V | 8~31V | 8~62V | 8~62V |
| PV Maximum Open-circuit Voltage | 150V(At minimum operating environment temperature)<br>138V(At 25℃ environment temperature) | | | |
| MPPT Voltage Range | (Battery voltage+2V)~108V | | | |
| Rated Charging Power | 390W/12V<br>780W/24V | 520W/12V<br>1040W/24V | 390W/12V<br>780W/24V<br>1170W/36V<br>1560W/48V | 520W/12V<br>1040W/24V<br>1560W/36V<br>2080W/48V |
| Maximum Conversion Efficiency | 97.6% | 97.9% | 98.1% | 98.5% |
| Maximum Load Efficiency | 95.1% | 95.4% | 96.9% | 97.2% |

| Item | XTRA3215N G3/G3 BLE | XTRA4215N G3/G3 BLE | XTRA3415N G3/G3 BLE | XTRA4415N G3/G3 BLE |
|---|---|---|---|---|
| Static Losses (Enable the com. port) | ≤15mA(12V)<br>≤9mA(24V) | ≤15mA(12V)<br>≤9mA(24V) | ≤14mA(12V)<br>≤9mA(24V)<br>≤8mA(36V)<br>≤7mA(48V) | ≤14mA(12V)<br>≤9mA(24V)<br>≤8mA(36V)<br>≤7mA(48V) |
| Static Losses (Disable the com. port) | ≤8mA(12V)<br>≤5mA(24V) | ≤8mA(12V)<br>≤5mA(24V) | ≤8mA(12V)<br>≤5mA(24V)<br>≤5mA(36V)<br>≤5mA(48V) | ≤8mA(12V)<br>≤5mA(24V)<br>≤5mA(36V)<br>≤5mA(48V) |
| Discharge-circuit Voltage Drop | ≤0.23V | | | |
| Temperature Compensation◆ | -3mV/℃/2V (Default) | | | |
| Grounding Type | Common negative | | | |
| RS485 Port | 5VDC/200mA(RJ45) | | | |
| LCD Backlight Time | Default: 60S, Range: 0~999S(0S: the backlight is ON all the time) | | | |
| **Mechanical Parameters** | | | | |
| Dimension (L x W x H) | 255×185×67.8mm | 255×187×75.7mm | 255×187×75.7mm | 255×189×83.2mm |
| Mounting Size (L x W) | 200×176mm | 200×178mm | 200×178mm | 200×180mm |
| Mounting Hole Size | Φ5mm | Φ5mm | Φ5mm | Φ5mm |
| Terminal | 6AWG(16mm$^2$) | 6AWG(16mm$^2$) | 6AWG(16mm$^2$) | 6AWG(16mm$^2$) |
| Recommended Wire Size | 8AWG(10mm$^2$) | 6AWG(16mm$^2$) | 8AWG(10mm$^2$) | 6AWG(16mm$^2$) |
| Net Weight | 1.66kg | 2.08kg | 2.16kg | 2.60kg |

★ When a lithium battery is used, the system voltage can't be identified automatically.

◆ When a lithium battery is used, the temperature compensation coefficient must be "0" and can't be changed.

**Environmental Parameters**

| Item | XTRA1206/2206/1210/2210/3210/4210N G3<br>XTRA1206/2206/1210/2210/3210/4210N G3 BLE | XTRA3215/4215/3415/4415N G3<br>XTRA3215/4215/3415/4415N G3 BLE |
|---|---|---|
| Work Temperature Range※ | -25℃~+50℃ | -25℃~+45℃ |
| Storage Temperature Range | -20℃~+70℃ | |
| Relative Humidity | ≤95%, N.C. | |
| Enclosure | IP33 (3-protection against solid objects: protected against solids objects over 2.5mm. 3-protected against sprays to 60°from the vertical. | |
| Pollution Degree | PD2 | |

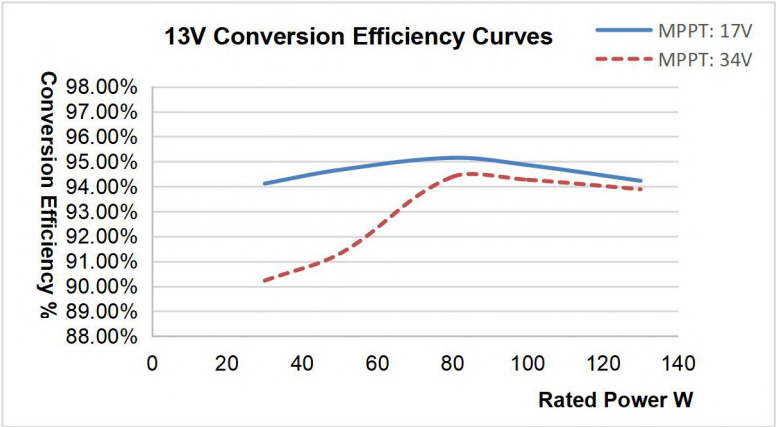
※ The controller can fully load working in the work temperature range. When the internal temperature reaches 81℃, the reducing charging power mode is turned on. Refer to chapter 5.1 Protection.

# Annex I Conversion Efficiency Curves

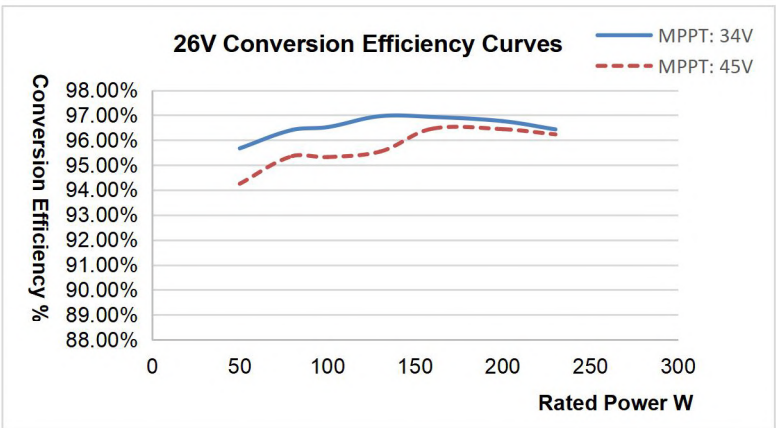
**Illumination Intensity: 1000W/m² Temperature: 25℃**

**Model: XTRA1206N G3/XTRA1206N G3 BLE**

**1. Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(13V)**

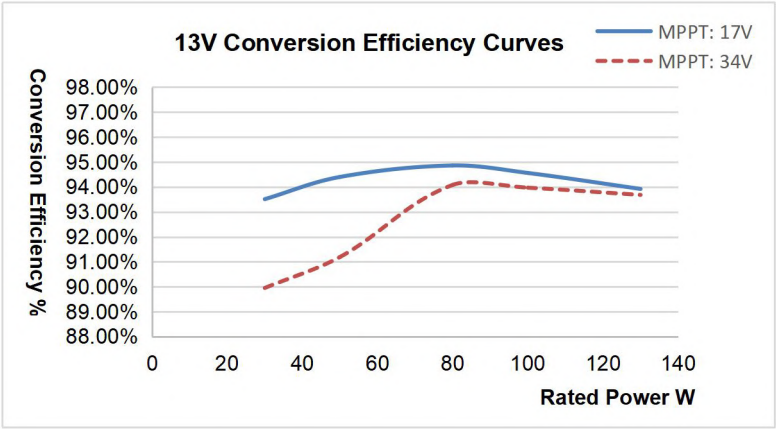



**2. Solar Module MPP Voltage(34V, 45V) / Nominal System Voltage(26V)**

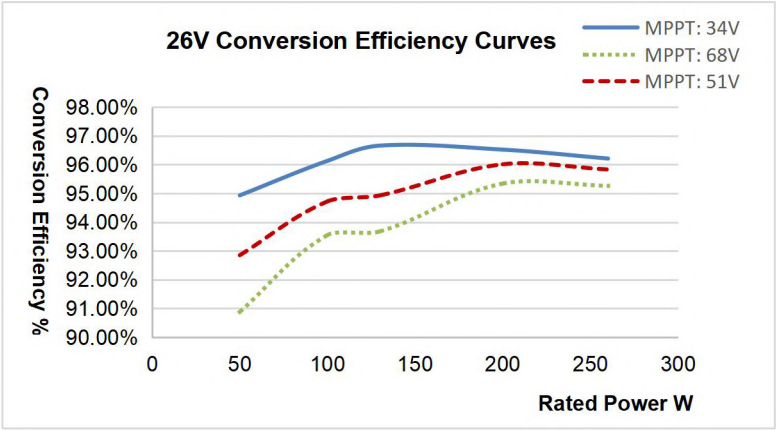


**Model: XTRA1210N G3/XTRA1210N G3 BLE**

1. **Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(13V)**

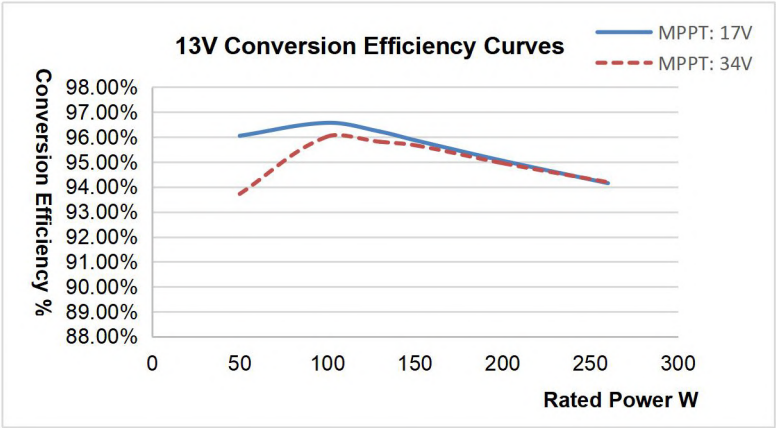



2. **Solar Module MPP Voltage(34V, 51V, 68V) / Nominal System Voltage(26V)**

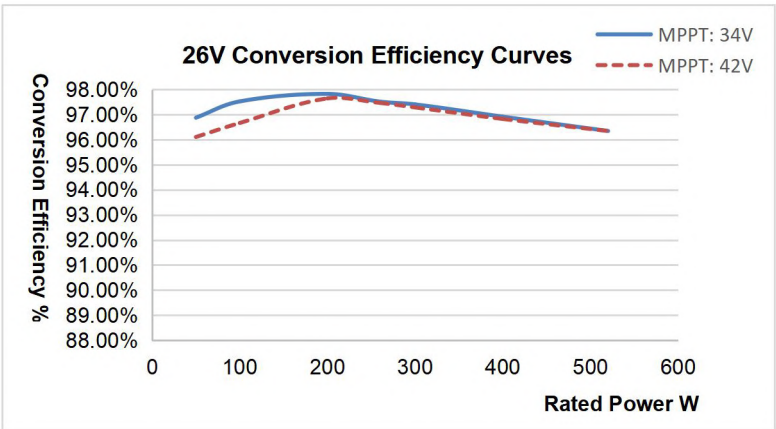


**Model: XTRA2206N G3/XTRA2206N G3 BLE**

1. **Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(13V)**

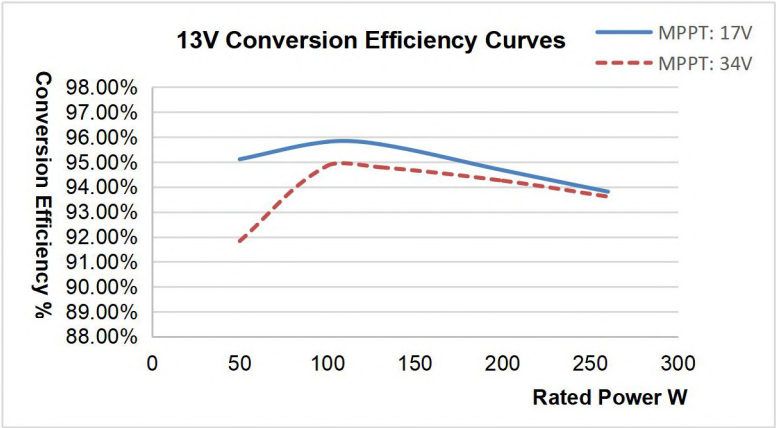



2. **Solar Module MPP Voltage(34V, 42V) / Nominal System Voltage(26V)**

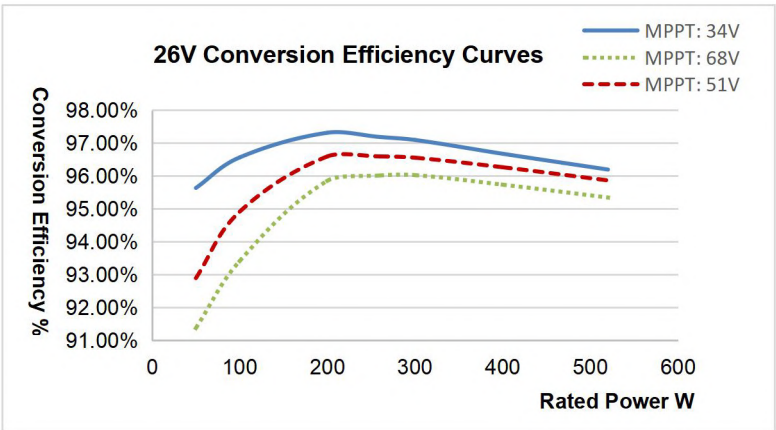


**Model: XTRA2210N G3/XTRA2210N G3 BLE**

1. **Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(13V)**

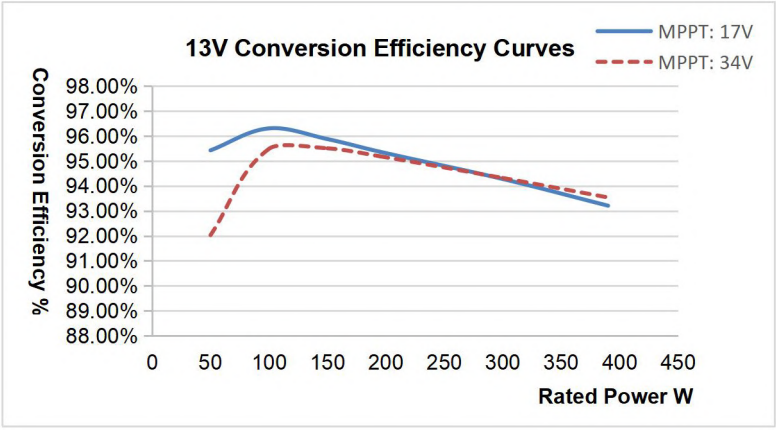



2. **Solar Module MPP Voltage(34V, 51V, 68V) / Nominal System Voltage(26V)**

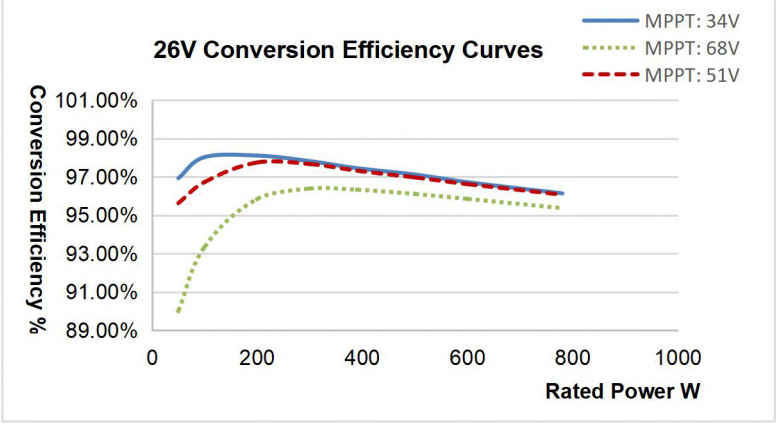


**Model: XTRA3210N G3/XTRA3210N G3 BLE**

**1. Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(13V)**

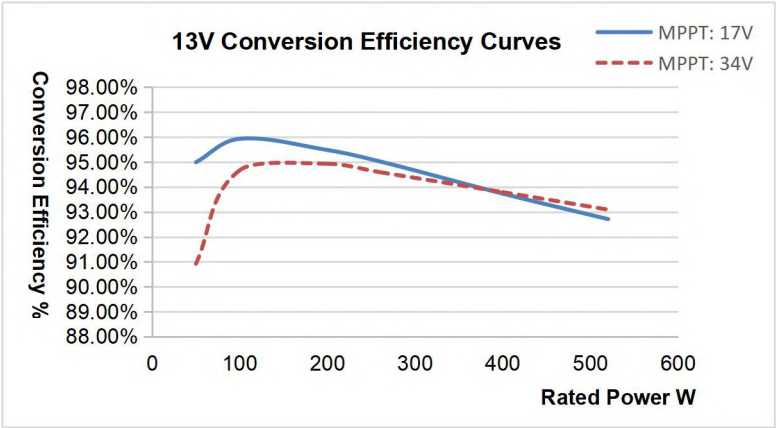



**2. Solar Module MPP Voltage(34V, 51V, 68V) / Nominal System Voltage(26V)**

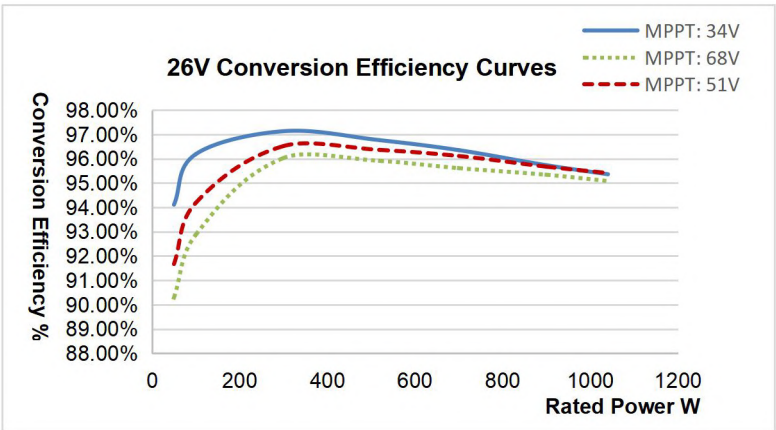


**Model: XTRA4210N G3/XTRA4210N G3 BLE**

**1. Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(13V)**

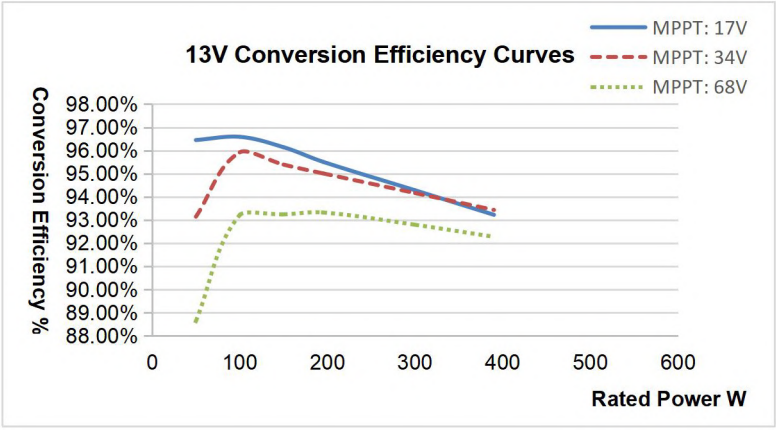



**2. Solar Module MPP Voltage(34V, 51V, 68V) / Nominal System Voltage(26V)**

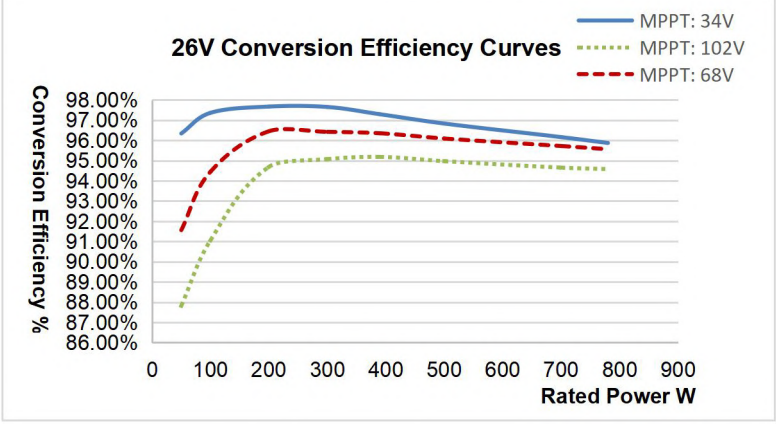


**Model: XTRA3215N G3/XTRA3215N G3 BLE**

**1. Solar Module MPP Voltage(17V, 34V, 68V) / Nominal System Voltage(13V)**

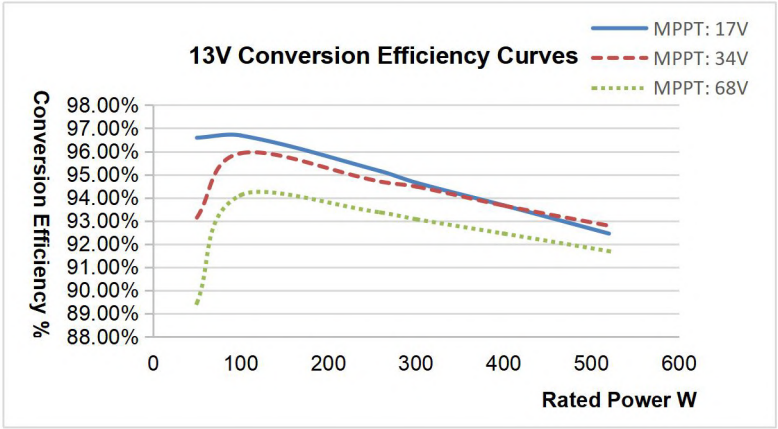



**2. Solar Module MPP Voltage(34V, 68V, 102V) / Nominal System Voltage(26V)**

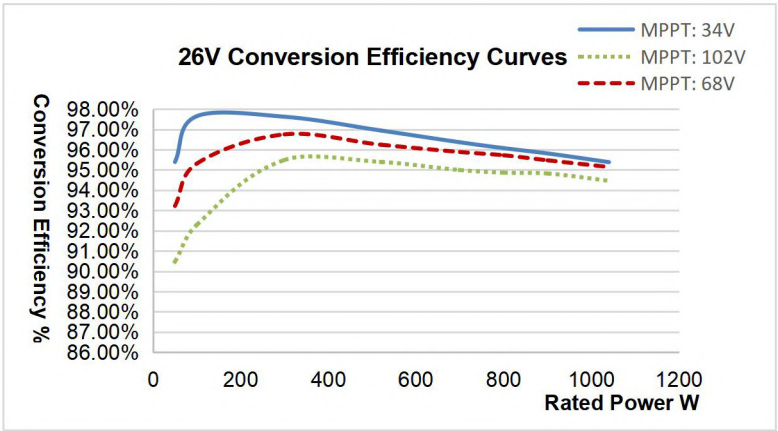


**Model: XTRA4215N G3/XTRA4215N G3 BLE**

**1. Solar Module MPP Voltage(17V, 34V, 68V) / Nominal System Voltage(13V)**

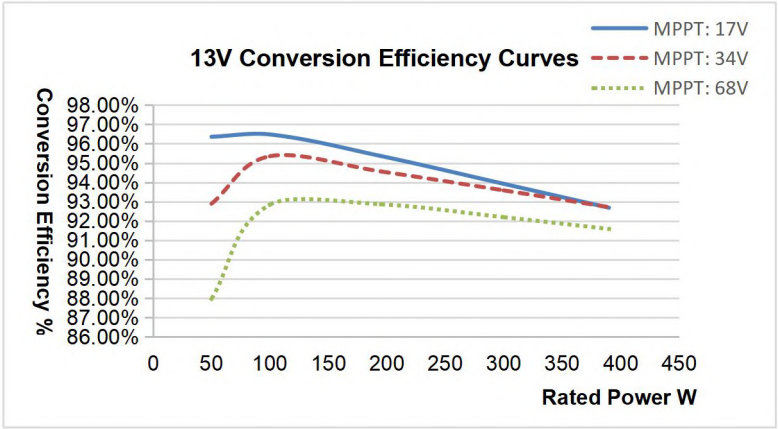



**2. Solar Module MPP Voltage(34V, 68V, 102V) / Nominal System Voltage(26V)**

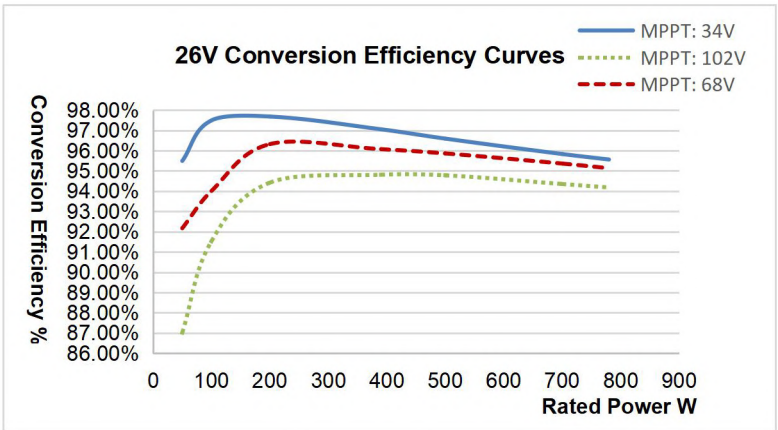


**Model: XTRA3415N G3/XTRA3415N G3 BLE**

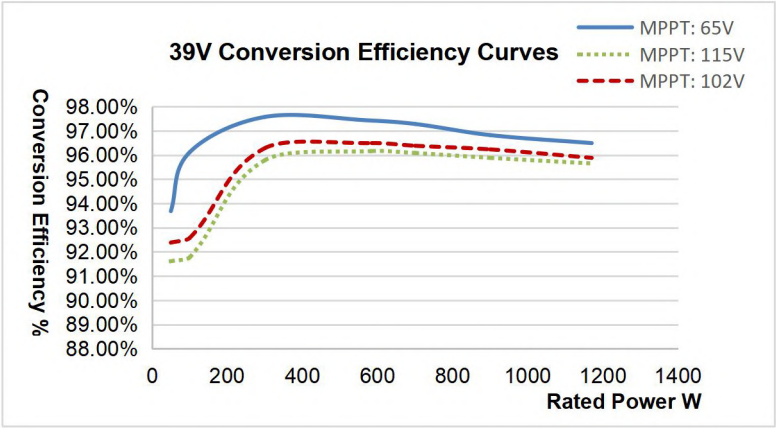
1. **Solar Module MPP Voltage(17V, 34V, 68V) / Nominal System Voltage(13V)**



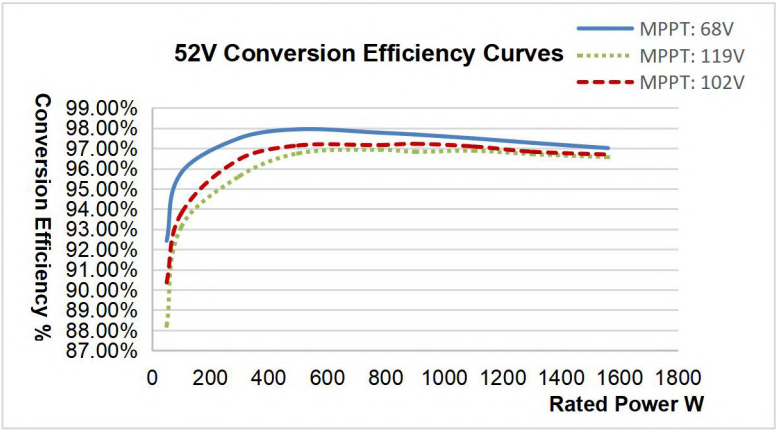

2. **Solar Module MPP Voltage(34V, 68V, 102V) / Nominal System Voltage(26V)**



3. **Solar Module MPP Voltage(65V, 102V, 115V) / Nominal System Voltage(39V)**

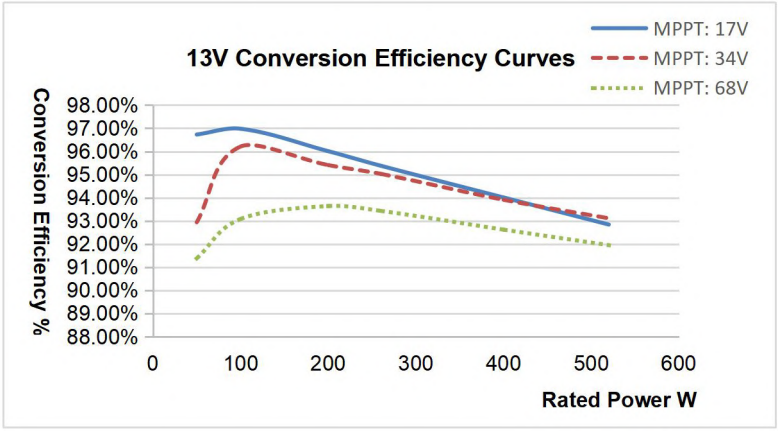



4. **Solar Module MPP Voltage(68V, 102V, 119V) / Nominal System Voltage(52V)**

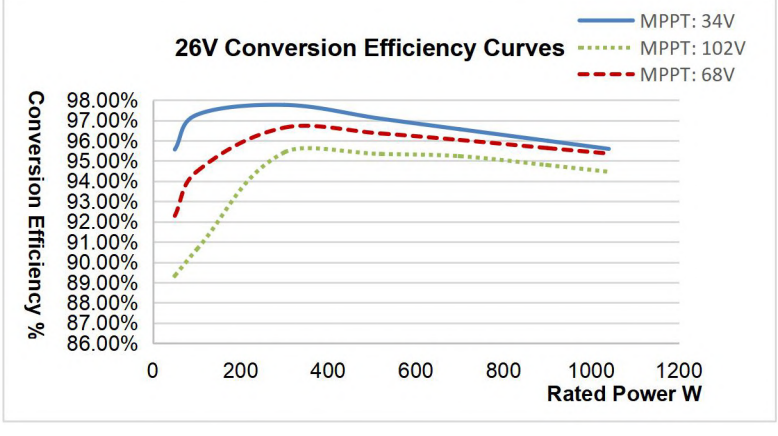


**Model: XTRA4415N G3/XTRA4415N G3 BLE**

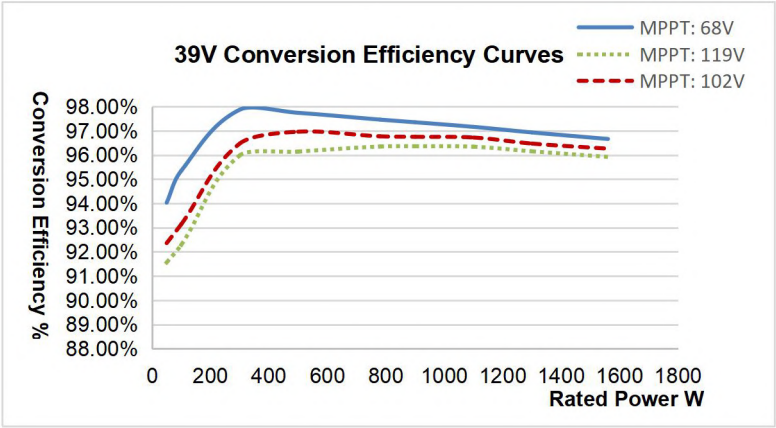
1. **Solar Module MPP Voltage(17V, 34V, 68V) / Nominal System Voltage(13V)**



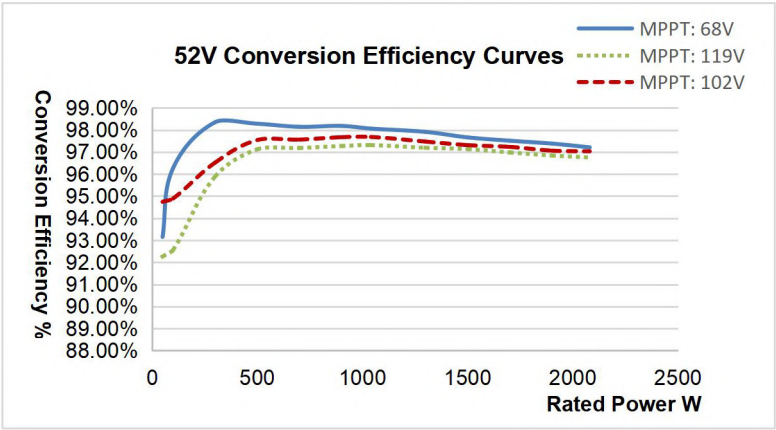

2. **Solar Module MPP Voltage(34V, 68V, 102V) / Nominal System Voltage(26V)**



3. **Solar Module MPP Voltage(68V, 102V, 119V) / Nominal System Voltage(39V)**




4. **Solar Module MPP Voltage(68V, 102V, 119V) / Nominal System Voltage(52V)**



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