SOLAR HOME SYSTEM (SHS)

A Solar Home System (SHS) is a solar system mainly designed to provide power for lighting and phone charging as the base use for remote off-grid households.

Key components of a solar home system or an SHS kit are solar panel, battery box and lights. Other optional accessories include extension cables and appliances such as TV, radio and fan.

Normally Direct Current (DC) kits are common due to low power requirements or specifications. However, advanced solar home systems can power television, radio, fan and in extreme cases small electrical appliances such as efficient fridges.

Usually, an SHS kit can be installed easily to provide solar power even by a non-technical person by just following either a provided manual or common knowledge.

Solar panels are put outside or on top of a roof; battery box is put inside a house, light cables are run to respective rooms via extension cable and connected to LED bulbs at the end and appliances are connected to the battery box.

While solar home systems are normally classified as addressing rural communities for the energy access challenge, they can be a vital tool in addressing the last mile connections in remote areas.

There are areas that are difficult for the grid to be extended, eg. on island or deep mountain, to and in such areas solar systems especially solar home systems can be a lucrative idea to light up the communities.

Uses of Solar Home Systems

SHS kits are generally used for lighting but advanced kits are nowadays available that can power entertainment, fan and other small appliances.

The challenge for SHS kits has been the fact that customer needs kept on increasing up to an extent that suppliers are beginning to see rising requests for affluent SHS needs.

Thus, those same people who were in energy poverty and used lighting SHS kits are now requesting to power more from SHS kits.

Hence the development of DC/AC SHS kits that are versatile and can power extra appliances such as efficient fridges.

Perhaps the commonest use case of a solar home system is for a rural or peri-urban household is for powering lighting and/or entertainment. Basically light cable will be run into different rooms for the house(s) where bulbs will be connected to provide light.

Entertainment and other appliances are usually connected in the bigger or sitting room where everyone has access to. The battery box is usually wall mount in this common room when everyone else can access it and see its status.

For an SHS kit, a radio will usually be detachable such that the father of the house can take it and move around with it without disturbing the other parts of the solar home system. Even though this usually undermines the rest of the family on radio entertainment.

Again small businesses in rural and peri-urban areas are good uses cases for solar home systems. Thus, a small investment into a good SHS system can be a good start to a shop enjoying free energy from the sun.

Distribution of Solar Home Systems

Effective distribution of SHS kits must include use of last mile agents. To be efficient on selecting agents, they must come from the targeted community or area. This is because when known people in a community become agents there is an instilled sense of ownership, confidence and trust.

Pay As You Go (PAYGO)

Pay-as-you-go payment method is whereby an end customer pays an initial deposit and takes ownership of the solar home system while committed to paying the remaining amount on periodic intervals such as daily, weekly or monthly until completion.

When a periodic installment is done, normally a voucher code is generated and the code is either sent to the customer via RFID card / phone SMS for the customer to punch it into the box or the box is unlocked remotely and automatically.

Failure to pay a periodic installment would mean no access to using the SHS kit as it will be disabled to provide power.

There are dedicated PAYGO platform / operator whose work is just to provide a platform for billing, credit tracking, payment tracking and in some cases inventory management to both solar home system suppliers and solar companies.

It usually takes a significant amount of time in order to be able to transact PAYGO transactions via mobile money due to integrations between the solar home system supplier and telecom provider in that particular country.

To solve this long time process, some PAYGO software providers use aggregators who are basically companies who have already integrated with the targeted telecoms companies such that there will be no need to go through this long and tiresome process.

PAYGO integration can be done in two ways either as software integration or hardware integration.

PAYGO Software integration just involves exchange of APIs (Application Programming Interfaces) between solar home system supplier and PAYGO platform company or solar company if the solar company is using their own PAYGO software.

PAYGO Hardware integration involves the PAYGO software provider company installing or embedding a hardware circuit or chip in the SHS battery box. This hardware is the one that will manages the whole PAYGO system including locking and unlocking.

Benefits of Solar Home Systems

- Easier to install and use
- Easier to decommission should there be need • Cheaper and lower initial investment
- Portable
- Highly suitable for last mile connections

Challenges of Solar Home Systems

- Lower energy and power supply
- Usually limited to DC appliances
- Suffer from intermittence like other solar systems
- Usually depend on GSM coverage for PAYGO locking and unlocking
- PAYGO integration takes a significant time frame to be achieved for new regions or countries

Summary

A solar home system is a powerful solar kit targeted mainly for bottom of the pyramid market. It can provide lighting, phone charging, entertainment and in some cases comes with other appliances.

To ease the burden of upfront cost, solar home systems can be purchased on pay as you go model where the end user deposits an initial deposit and pays the remaining amount on periodic intervals until completion and failure to pay an installment would mean no access to using the SHS kit.

Main Characteristics of 50wp SHS system

features:

Supports installment payment. It combines the functions of an inverter, solar controller, and energy storage battery to provide power for user equipment. The system has overload, over temperature, and short circuit protection. Easy to install and easy to use.

Application scenarios:

suitable for various electrical appliances in home or office environments, such as light bulbs, fans, TV, etc.

Output Interfaces:

- 12V DC ports
- USB ports
- Type C ports

Solar panels:

50W mono crystalline solar panel

Battery:

- Non fire Hazard Long Service life battery, up to 2000 ~ 2500 cycles, which is even longer than Li-on batteries' standard 1200-1800 cycles
- LED indicators which shows the remaining battery power

System Protection:

- Low Voltage protection
- Over voltage protection
- Over load protection
- Short circuit protection
- Over temperature protection

More Options:

- LAN / 4G - Wi-Fi Router
- Desktop Management software / handhold Tablet VMS machine
- Different accessories, including:
  - — Torch light
  - — AM / FM Radio
  - — LED Bulbs
  - — Phone Chargers
  - — RFID card (RF Card type, keypad type comes with no RF ID card)

Remark: Some of the pics for reference only, might be changed anytime at our option

PAY-AS-YOU-GO (PAYGO)

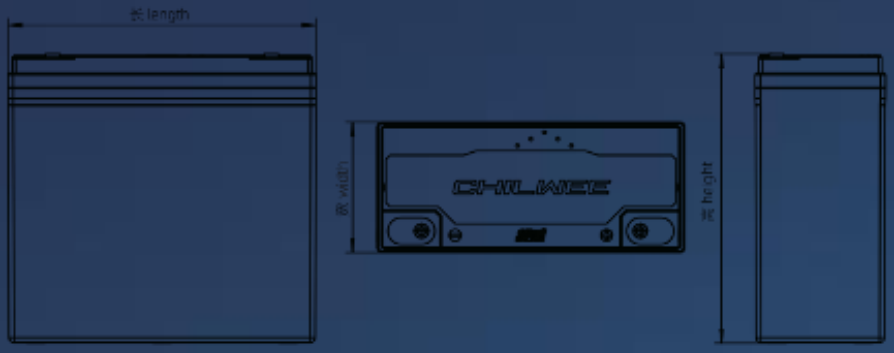
CostPlus Inc.

COSt PLUS INC.

超威电池

Technical Data Sheet of the

铅碳储能6-CNF-24CS



独特的铅-炭电池配方 确保优异的高倍率部分荷电特性
Unique Lead- Carbon recipe enables supper HPSOC performance

ABS 工程塑料 保证 外壳强度高
ABS engineering material guarantees container good strength

板栅连铸连轧工艺 提升板栅耐腐蚀性能
Con casting& rolling grid process boosts grids anti-corrosion performance

1800次循环@ 70%DOD, 4倍于普通VRLA 电池
1800cycles@ 70%DOD, x 4 VS conventional VRLA Battery

独特的正极铅膏制备技术 确保抗软化延长电池寿命
Unique positive paste preparation method alleviates battery plates anti-softening character & extends battery service span

优越的充电接受能力, 能量效率 ≥90%
Excellent performance on charge accptance , the energy efficiency is more than 90%

应用领域 Applications

- 户用储能：备电＋储能 Residential Energy Storage: Reserve power + energy storage
- 发电侧储能系统：调峰、调频 Energy storage in generation side: Peak regulation ,Frequency modulation
- 电力不稳定区域：备电 Reserve power for interrupt power place
- 银行及数据中心：备电＋储能 Bank& data center: Reserve power + energy storage
- 通信基站：备电+储能 Tele-Com station: Reserve power + energy storage

特性参数Specifications　尺寸 Dimension

电池型号 Types	额定电压V Normal voltage	C10 容量 Ah@25℃ Capacity C10@25℃	Dimension尺寸 mm±2			电池重量/kg Battery weight kg	铜芯螺纹直径 mm screw diameter of brass terminal
			长 Length	宽 Width	高 Height		
6-CNF-24CS	12	24	183	77.5	172	7.05±0.1	M5

放电特性参数 The discharge characters　恒流放电参数表 Constant current parameter

6-CNF-24CS constant curret A@25℃

Hour rate / cut-off voltage	15min	30min	1h	2h	3h	4h	5h	6h	7h	8h	9h	10h	20h
1.95V/cell	28.0	22.0	14.4	8.0	5.60	4.30	3.70	3.22	2.80	2.61	2.25	2.10	1.10
1.9V/cell	38.0	26.0	15.8	9.0	6.00	5.10	4.15	3.50	3.04	2.65	2.39	2.20	1.15
1.85V/cell	44.6	27.2	16.5	9.3	6.40	5.35	4.30	3.62	3.30	2.85	2.54	2.35	1.23
1.8V/cel	48.0	28.4	17.7	9.7	6.90	5.42	4.40	3.73	3.42	2.94	2.63	2.40	1.27
1.75V/cel	51.0	29.0	18.3	10.0	7.03	5.48	4.50	3.80	3.52	3.00	2.70	2.47	1.30
1.67V/cell	52.4	29.2	18.4	10.1	7.07	5.50	4.51	3.80	3.52	3.00	2.70	2.47	1.30

放电特性参数 The discharge characters　恒功率放电参数表 Constant power parameter

6-CNF-24CS constant power W@25℃

Hour rate / cut-off voltage	15min	30min	1h	2h	3h	4h	5h	6h	7h	8h	9h	10h	20h
1.95V/cell	360	275	160	108	70	50	44	40	34	29	27	24	12
1.9V/cell	440	287	180	112	76	57	47	43	37	32	30	27	13
1.85V/cell	510	330	205	113	79	63	49	44	38	34	32	29	14
1.8V/cel	540	350	210	116	82	67	51	45	39	35	33	30	15
1.75V/cel	550	360	218	119	84	69	52	46	40	36	34	31	15
1.67V/cell	554	360	219	120	85	70	53	46	40	36	34	31	15

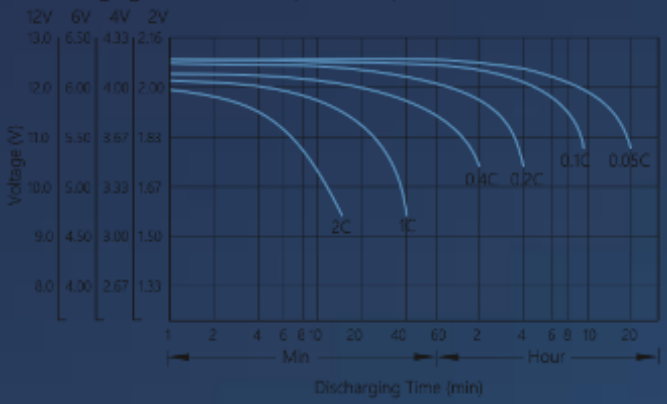
超威电池

铅碳储能6-CNF-24CS

产品特性曲线 The characteristic profiles

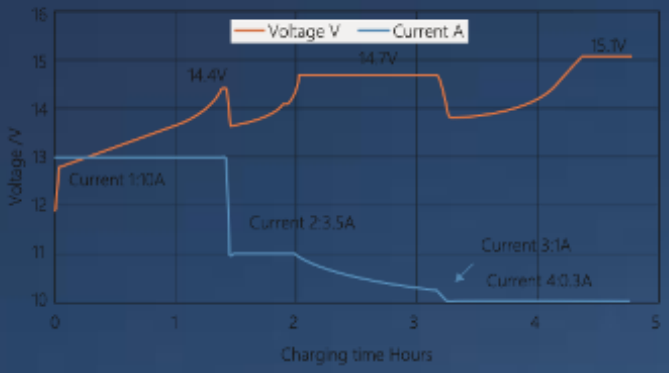
1.不同倍率放电曲线

Discharging Characteristics (25°C/77°F)



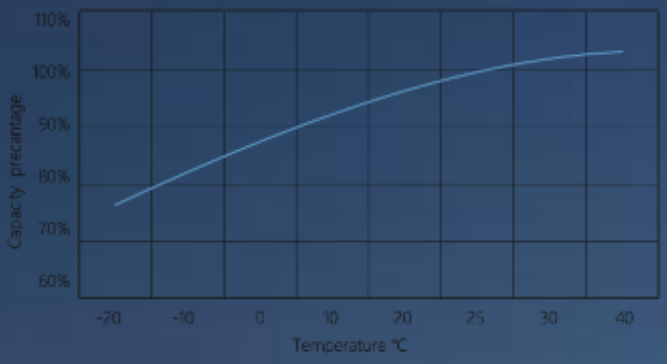
2.充电特征曲线

The charge Profile



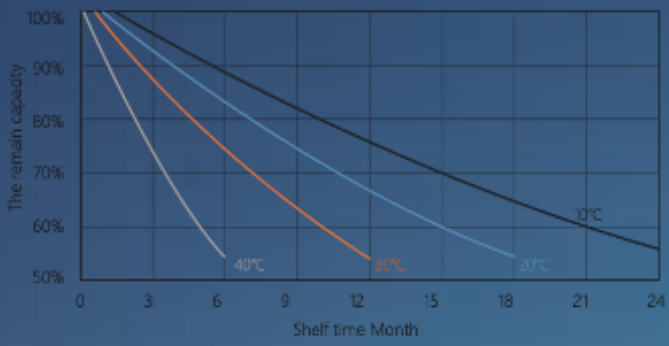
3.容量 VS 温度特性曲线

Capaicty vs Temperature



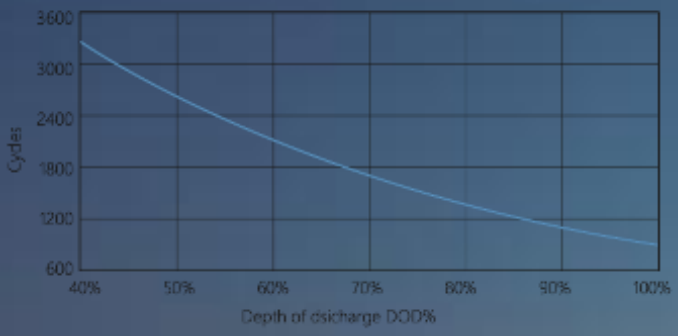
4.自放电 VS 温度

The remain capacity VS Shelf time in difference temperature conditions



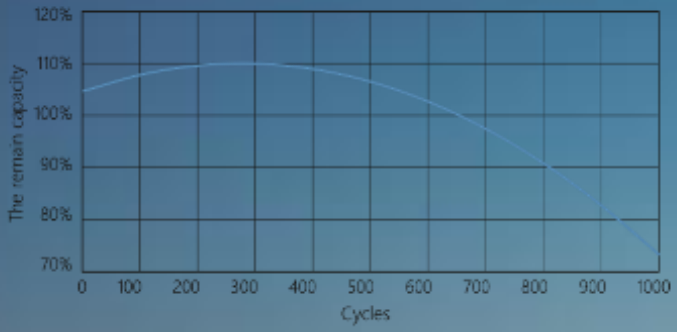
5.循环寿命 VS 放电深度

The cycles@25℃ VS Depth of Discharge



6.容量变化 VS 循环次数

Remain capacity VS Cycles



产品使用指导Guidelines for application

充电要求Requirement for charging

充电电流 Charge current	快速充电 Boost charge	浮充电 Float charge
限流≤0.3CA Max Current 0.2C A	恒压14.7V/ 电池 Constant voltage 14.7V/battery 温度补偿系数： -30mV/℃/电池，超出20-30℃之外 Temperature coefficient: -30mV/℃/battery out of temperature range 20-30℃	恒压 13.8V/ 电池 Constant voltage 13.8V/battery 温度补偿系数： -18mV/℃/电池 超出20-30℃之外 Temperature coefficient: -18mV/℃/ battery out of temperature range 20-30℃

安装与使用 Installation & application

·端子扭矩The strew of interminal : 8N.M,

·使用温度范围 the range of temperature in application: -20- 45℃, 推荐温度范围 recommend temperature range 20-30℃

·使用空间要求 the space requirement : 通风 Ventilation