Product Launch: iSitePower-M





Contents

- 1. Current Situations
- 2. Battery Basics
- 3. Product Introduction
- 4. System Configurations
- 5. Application Case Scenarios

Current Situations



Primary Challenge – Safety & Protections

Overheated battery leads to fire at Lebanon home (Ref. Labanon Express)

Rechargeable • lithium battery pack overheated and started the fire





Lahore: battery explosion triggers house fire, 2 killed, 3 hurt – 23rd Oct 2021 (Ref. Arynews)

- No Safety in Battery Charging
- Batteries limitations for Outdoor installations
- Improper and uncontrolled battery cooling



Huawei Proprietary - Restricted Distribution

Similar situations experienced in the Afghanistan & Yemen

Electricity Supply Sources and Difficulties

- Requirements of effective usage of solar power
- Solar Power • wastage during offpeak hours
- **Frequent Grid** • outages





Similar situations experienced in the Afghanistan & Yemen

Battery Basics



Li-Ion Battery Basics





Product Introduction

iSitePower-M

03







iSite-Power-M







Active Safety







New Way of Power Supply **New Consumption Experience**

Intelligent Power Mate iSitePower-M



Reliable 24 Hours Power Supply



1.5x surge current tolerance

IP65 Protection level



Wall

Mounted

Ē

Power Supply

Stylish Architecture







Obsidian curved screen, solar eclipse power ring



Glazed white shell



Enclosed wiring design





Intelligent Power Mate, Giving You the Greatest Care Invisibly



390mm

700mm

Integrated, high-density design Small size, and large capacity

158



Integrated high-density design, 0.1 m²

Fast deployment in 2 hours



5kW large-capacity power supply 15 kwh large-capacity backup power

Maximum: 15 kW; maximum: 45 kWh



Reliable 24 Hours Power Supply



24-hour Uninterrupted Power Supply



Daytime power supply from solar, Night from battery, Minimize the use of grid power





Solar Power + Intelligent Power Mate Supplementary power supply

Reduction in the "Grid +DG" power supply mode

- 1. Daytime power supply to load from solar power.
- 2. Night power supply through battery.
- 3. Grid & DG as third priority of power supply







Extraordinary Power Supply Experience



Stable, Consistent and Quality Power

Solar | Grid | DG | Battery

Bypass+Online Power Mode

<10ms Seamless Power Switching



APP management: Instant information of power

supply, battery and power usage information







Remote linking, instant

management on APP



On trip

At home

Working



U.21

U.21

Huawei Confidential

22

Natural heat dissipation architecture, Sleep-level silence, Enjoy zero-noise environment

Efficient heat dissipation structure and material

I EI

Enclosed noise reduction design

Fanless and efficient heat dissipation structure and material

<29dB operating sound

* ISO recommended base: sleeping environment < 30 dB

Waterproof and dustproof design, compatible indoor and outdoor deployment

IP65 protection level



ed Distribution







- Modular and precise configuration, reducing construction costs
- Old and new batteries hybrid use, reducing capacity expansion costs



24 Huawei Proprietary - Restricted Distribution

3 parallel systems Max. 15 kW | 45 kWh

Secure and Reliable



Multiple Protections From The Inside To Outside, Ensure Power Generation And Power Consumption Security





Selecting the stable LFP cell to avoid fire hazards



Built-in full-dimensional highprecision sensors Real-time monitoring of running status, ensuring no dead spots



System-level security authentication, Ensuring a safe power supply environment



3 Layer Safety Protection







Verified by IEC 62109





Optimal Charging & Discharging With Energy Optimizer For 3~5% More Useable Energy



Other High Voltage ESS Solution

- The SOH of cell will be affected by various factors like <u>temperature</u> <u>difference</u>, <u>operational degradation</u>, <u>factory deviation</u> etc. (e.g. Cold temperature increases the internal resistance and lowers the capacity</u>).
- ✓ The under performance of any cell (1/160) will lower the entire system's usable capacity by around <u>5%</u>.
- 28 Huawei Proprietary Restricted Distribution



iSitePower-M

- ✓ With Energy Optimizer (DC/DC), if any under performance cell (1/16), the impact will be limited to only one battery module.
- ✓ The same capacity loss (5%) of one cell only has 1.6% on entire system. Less by over 3% comparatively.



SOH III SOC

Supports New & Old Pack In One System Without Any Usable Capacity Loss



Other High Voltage ESS Solution

- ✓ Internal resistance of old battery pack increases due to operating degradation, which results in ESS SOH (capacity) decreases gradually.
- ✓ When new battery module mixed with old modules, <u>charging will halt (e.g.</u> <u>80%)</u> by BCU when old modules are fully charged.
- 29 Huawei Proprietary Restricted Distribution



iSitePower-M

- ✓ Each battery module is charged/discharged independently by Energy Optimizer (DC/DC).
- ✓ The new battery module can <u>fully use its capacity without any loss</u>. Saving <u>10%~30%</u> more usable energy comparatively.



Higher System Availability with Pack-level Fault Auto Isolation



Other High Voltage ESS Solution

- ✓ Utilize <u>serial connection</u> with each battery module (contains 32 cells per module) added up to make up a larger system.
- ✓ One failing cell (1 out of 160) will lead to entire system stop working.



- ✓ Utilize <u>parallel connection</u> with each battery module equipped with unique <u>Energy Optimizer (DC/DC)</u> to isolate faulty module.
- ✓ One failing cell (<u>1 out of 16</u>) only affect one battery module's performance, <u>no negative impacts on others</u>.



30 Huawei Proprietary - Restricted Distribution

Battery Module 0V Rapid Shutdown for Safer Installation & Maintenance

Electric Shock Risl High Voltage!	DC Input Voltage: Primo 150-455V Symo 160~700V	
Item	XXX	XXX
 Module Usable Energy	2.56kWh	2.71kWh
Module Numbers	2~5	3~8
Module Nominal Voltage	102.4V	51.2V
System Voltage	204~600V	120~480V

Other High Voltage ESS Solution

- ✓ Each module has an output voltage of <u>51.2V~102.4V</u> which is <u>unable to</u> <u>shutdown</u>.
- ✓ When connecting multiple modules in series, the overall system voltage will be <u>as high as 600V</u>, posing electric shock risk on installers.
- 31 Huawei Proprietary Restricted Distribution



- ✓ Under installation, maintenance scenario, the Energy Optimizer works <u>as an isolator</u> to keep output voltage of each battery module at <u>OV to</u> <u>ensure safety</u> by default.
- ✓ Under emergency, <u>shutdown the DC Switch on top</u> can trigger 0V output of each battery module.





AI Powered Internal Cell Short Circuit Diagnosis To Avoid Fire Hazard

Internal Short Circuit Challenges

- External factors like <u>crash, penetration, over heat</u> are causing internal short circuit and <u>instantly leads to massive thermal runaway</u>, posing fire and explosion dangers.
- Other factors like <u>cell overcharge & discharge, particle contamination</u> are causing growth of dendritic Li, posing potential short circuit risks in the future.
- 32 Huawei Proprietary Restricted Distribution



- ✓ Huawei provides advanced <u>internal short circuit detection algorithm</u> by precisely analyzing the each cell charge/discharge voltage curve.
- Sudden drop of cell voltage will trigger algorithm and leads to immediate isolate of faulty battery module to prevent dangers. Meanwhile, minor misalignment of cell charge/discharge curve will trigger alarms reminding people of potential future risks.



IP65 For Outdoor Environment Application



Other High Voltage ESS Solution

- <u>Different protection level</u> of one system, which cannot adjust to harsh environment application.
- ✓ The current protection level of ESS (IP55) cannot match inverter's protection level (IP65/IP66), which may cause potential reliability problems.

IP (or "Ingress Protection") ratings are defined in international standard EN 60529. They are used to define levels of sealing effectiveness of electrical enclosures against intrusion from foreign bodies (tools, dirt etc) and moisture.

First Digit (intrusion protection): 5: Partial protection against dust that may harm equipment. 6: Full protection against dust and other particulates, including a vacuum seal, tested against continuous airflow.

Second Digit (moisture protection): 5: Protection against low-pressure jets (6.3 mm) of directed water from any angle (limited ingress permitted with no harmful effects).



iSitePower-M

✓ <u>IP65 of whole system</u> for outdoor harsh environment application.



Wider Ambient Temperature Adaptability to Ensure Normal Operation Under Extreme Weather Conditions



Temperature Range (°C)	Normal Current(A)
-10~40	1C
40~50	0.5C

Other High Voltage ESS Solution

- Without heating function, when the battery is charged outdoor at low temperature (lower than 0°C), lithium crystals form on the negative side and <u>causing damage to the battery</u>.
- ✓ Charging derating will occur between -10 °C~0 °C, dropping to 20%
- 34 Huawei Proprietary Restricted Distribution





```
Heating films
```

-20°C~55°C

iSitePower-M

- ✓ Each battery pack has two heating films to adapt to a wider temperature range of <u>−20°C to 55°C.</u>
- ✓ Full charging work mode is between -20 °C~45 °C, and <u>full discharge</u> work mode is between -10 °C~45 °C.



High resistance, Face complicated power grid and loads environment in stable status

Resistance to power grid jump and high voltage

90V~300V, withstanding wide voltage jump 500V, high-voltage start-up resistance

Airconditioning

> Anti surge current of high-power loads

Motors

>1.5 times, withstanding the impact of the device startup current * Air conditioning, washing machine, motor



High reliability design, able to meet

Systems Configurations



System Possible Configuration



Based on various applications requirements from customers configurations can be designed



Application Scenarios



Experience New Ways of Power Supply without interruptions



Hospital Emergency Backup Power Supply



Villa Power Supply







Shopping centers



Reduction from DG Power usage



Consistent power supply to Critical loads



5 kWp PV Input, 5 kW AC Output, and 10 kWh Backup Capacity



- Supports two PV array inputs.
 15A per string, 90-435Vdc, 1MPPT
- The household power distribution box needs to be reconstructed according to the onsite load.

ltem	Key Specification	Quantity
Power modules	PV generation capacity: 5 kW; off-grid output: 6 kVA/5 kW	1
Battery modules	5 kWh energy storage, 2.5 kW output per battery module	2
Ground-mounting bracket	iSitePower-M ground-mounting bracket	1





15 kWp PV Input, 15 kW AC Output, and 30kWh Backup Capacity



Item	Key Specification	Quantity
Power module	PV generation capacity: 5 kW; off-grid output: 6 kVA/5 kW	3
Battery modules	5 kWh energy storage, 2.5 kW output per battery module	9
Ground-mounting bracket	iSitePower-M ground-mounting bracket	3
AC combiner box		1



Thank you.

Bring digital to every person, home and organization for a fully connected, intelligent world.

Copyright©2018 Huawei Technologies Co., Ltd. All Rights Reserved.

The information in this document may contain predictive statements including, without limitation, statements regarding the future financial and operating results, future product portfolio, new technology, etc. There are a number of factors that could cause actual results and developments to differ materially from those expressed or implied in the predictive statements. Therefore, such information is provided for reference purpose only and constitutes neither an offer nor an acceptance. Huawei may change the information at any time without notice.

