 SUPER SPACK [®] Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	Part No.		
	SPF48V100-SM (51.2V100AH)	Page No.	1/12
		Version	A1


Lithium iron Phosphate Battery

Specification

MODEL: SPF48V100-SM(51.2V100Ah)


Prepared By/Date	Checked By/Date	Approved By/Date

Customer Approval	Signature/Date
	Company Name
	Company Stamp

 SUPER SPACK® Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	Part No.		
	SPF48V100-SM (51.2V100AH)	Page No.	2/12
		Version	A1

Amendment Records

Edition	Description	Prepared by	Approved by	Date
A0	First Edition	Yadong Qin		2020-04-14
A1	New cells used	Yadong Qin		2020-07-16

 SUPER SPACK [®] Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	SPF48V100-SM (51.2V100AH)	Part No.	
		Page No.	3/12
		Version	A1

1. Scope

This specification is applied to the LiFePO₄ battery pack that manufactured by Superpack. There is built-in smart BMS for over charge/discharge, over temperature and short-circuit protection.

2. Specification

No.	Item	General Parameter	Remark
1	Rated Capacity	102Ah	Standard discharge (0.2C) after standard charge (0.2C)
2	Minimal Capacity	100Ah	
3	Nominal Voltage	51.2V	
4	Life Expectation	Residual capacity is more than 80% of the rated capacity	1)Charge: CC@0.2C to 57.6V, then CV till current to 0.05C 2)Rest: 30min. 3)Discharge: 0.2C to 44.8V Temperature:20±5°C Carry out 1500 cycles 4)100%DOD .
5	Discharge cut-off voltage	2.0V/cell ($\geq 32.0V$)	44.8V recommended
6	Charging cut-off voltage	3.65V/cell ($\leq 58.4V$)	57.6V recommended
7	Assembly method	IFR26650-4.0Ah	16S25P
8	Housing material	Steel casing	
9	Standard charge	0.2C constant current (CC) charge to 57.6V, then constant voltage (CV) 57.6V charge till charge current decline to $\leq 0.05C$	Charge time : Approx 7.0h

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

3


Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562

Email: marketing@super-pack.com.cn

Fax: +86-769-82260590

Web: www.super-pack.com.cn

 SUPER SPACK® Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	SPF48V100-SM (51.2V100AH)	Part No.	
		Page No.	4/12
		Version	A1

10	Standard discharge	Constant current 0.2C Cut-off voltage 44.8V	
11	Maximum Continuous Charge Current	100A@25℃	If the batteries in parallel exist high voltage difference, the charging current would be limited to 20A
12	Maximum Continuous Discharge Current	100A@25℃	Over current1 100A for 2S; Over current2 210A for 80mS;
13	Operation Temperature Range	Charge: 0~55℃	60±25%R.H. At lower temperature, the charge current should be smaller.
		Discharge: -10~60℃	
14	Storage Temperature Range	Less than 6 months: 0~25℃	60±25%R.H. at the shipment state
		Less than 3 months:-5~35℃	
15	Approx. Weight	54 Kg	
16	Dimension	482.6(19')*432.2*220(5U)	Width*Depth*Height mm
17	Short Circuit Protection	≥413Afor 70μs	Recover automatically after removal of short
18	Cell balancing	100mA	
19	Over-temperature protection	Discharge: Min.: -10℃, Max.: 60℃ Charge: Min.: 0℃, Max.: 60℃	
20	Communication protocol	RS485 & RS232	

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

4


Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562

Email: marketing@super-pack.com.cn

Fax: +86-769-82260590

Web: www.super-pack.com.cn

 Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	Part No.		
	SPF48V100-SM (51.2V100AH)	Page No.	5/12
	Version	A1	

3. Performance And Test Conditions

3.1 Standard Test Conditions

Test should be conducted with new batteries within one week after shipment from our factory and the batteries shall not be cycled more than five times before the test. Unless otherwise specified, test and measurement shall be done under temperature of $20\pm 5^{\circ}\text{C}$ and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature $15\sim 30^{\circ}\text{C}$ and humidity 25~85%RH.

3.2 Measuring Instrument or Apparatus

3.2.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01mm.

3.2.2 Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than $10\text{k}\Omega/\text{V}$

3.2.3 Ammeter

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than 0.01Ω .

3.2.4 Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method (1kHz LCR meter).

3.3 Standard Charge/Discharge

3.3.1 Standard Charge : 0.2C

Charging at 0.2C constant current until the battery reaches 57.6V. The battery shall then be charged at constant voltage of 57.6V while tapering the charge current. Charging shall be terminated when the current has tapered to 0.05C. Charge time is approx 7.0 hours, The battery shall demonstrate no permanent degradation when charged between 0°C and 55°C .

3.3.2 Standard Discharge : 0.2C

Battery shall be discharged at a constant current of 0.2C to 44.8V @ $20 \pm 5^{\circ}\text{C}$

3.3.3 If no otherwise specified, the rest time between charging and discharging is 30min.

3.4 Appearance

There shall be no such defect as crack, rust, leakage, which may adversely affect commercial value of battery.

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

5


Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562

Email: marketing@super-pack.com.cn

Fax: +86-769-82260590

Web: www.super-pack.com.cn

	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	SPF48V100-SM (51.2V100AH)	Part No.	
		Page No.	6/12
	Version	A1	

4. Handling of battery

4.1 Prohibition short circuit

Never short circuit battery. It generates very high current which causes heating of the battery and may cause electrolyte leakage, gassing or explosion that is very dangerous. The terminals may be easily short-circuited by putting them on conductive surface. Such outer short circuit may lead to heat generation and damage of the battery.

4.2. Mechanical shock

Falling, hitting, bending, etc. may cause degradation of battery characteristics.

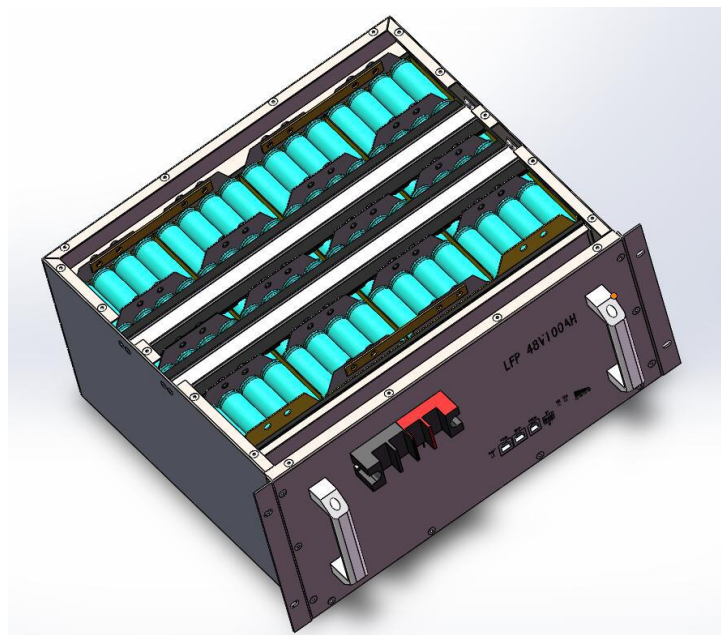
5. Period of Warranty

The period of warranty is 18 months from the date of shipment. Superpack guarantees to give a replacement in case of battery with defects proven due to manufacturing process instead of the customer abuse and misuse.

6. Storing the Batteries

The batteries should be stored at room temperature, charged to about 30% to 50% of capacity. We recommend that battery to be charged once each three months to prevent over-discharge.

7. Photo (for reference only)



8. Any other items which are not covered in this specification shall be agreed by both parties.

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

6


Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562

Email: marketing@super-pack.com.cn

Fax: +86-769-82260590

Web: www.super-pack.com.cn

 Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	SPF48V100-SM (51.2V100AH)	Part No.	
		Page No.	7/12
		Version	A1

Specification of BMS

No.	Specification	Default parameters	adjustable	remark	
1	Over-charge protection (single cell)	Alarm voltage	3600mV	yes	
		Over-charge voltage	3650mV	yes	
		Over-charge delay time	1.0S	yes	
		Over-charge release voltage	3340mV	yes	
2	Over--discharge protection (single cell)	Alarm voltage	2800mV	yes	If the battery cannot recover 30 seconds after over-discharge protection, it will be low power consumption mode
		Over-discharge voltage	2000mV	yes	
		Over-discharge delay time	1.0S	yes	
		Over-discharge release voltage	2900mV	yes	
3	Over-charge protection (battery)	Alarm voltage	57.60V	yes	
		Over-charge voltage	58.40V	yes	
		Over-charge delay time	1.0S	yes	
		Over-charge release voltage	53.40V	yes	
4	Over--discharge protection (battery)	Alarm voltage	44.80V	yes	If the battery cannot recover 30 seconds after over-discharge protection, it will be low power consumption mode
		Over-discharge voltage	32.00V	yes	
		Over-discharge delay time	1.0S	yes	
		Over-discharge release voltage	46.40V	yes	
5	Over-current (charge) protection	Alarm current	85A	yes	
		Protection current	90A	yes	
		Over-current delay time	2.0S	yes	
		Automatically release	1 minute later		
		Released by discharging	Discharge current > 0.5A		
6	Over-current(discharge) protection current1	Alarm current1	95A	yes	
		Protection current1	100A	yes	
		Over-current delay time 1	2.0S	yes	
		Automatically release	Removal of load		
		Released by charging	Charge current > 0.5A		
7	Over-current(discharge) protection current2	Protection current2	210A	yes	
		Over-current delay time 2	80mS	yes	
		Automatically release	Removal of load		

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

7


Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562

Email: marketing@super-pack.com.cn

Fax: +86-769-82260590

Web: www.super-pack.com.cn

 SUPER SPACK [®] Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16	
		Approved Date		
	SPF48V100-SM (51.2V100AH)		Part No.	
			Page No.	8/12
		Version	A1	

		Released by charging	Charge current > 0.5A		
8	Short circuit protection	Protection current	≥413A		
		Short delay time	70μS		
		Automatically release	Removal of load		
9	Over-temperature (MOS) protection	Alarm temperature	100	yes	
		Alarm recover temperature	95	yes	
		Protection temperature	110°C	yes	
		Over-temperature release temperature	85°C	yes	
10	Temperature protection (cell)	Low temperature (charge) alarm	5°C	yes	
		Low temperature (charge) protection	0°C	yes	
		Low temperature (charge) release temperature	5°C	yes	
		High temperature (charge) alarm	55°C	yes	
		High temperature (charge) protection	60°C	yes	
		High temperature (charge) release temperature	55°C	yes	
		Low temperature (discharge) alarm	-5°C	yes	
		Low temperature (discharge) protection	-10°C	yes	
		Low temperature (discharge) release temperature	-5°C	yes	
		High temperature (discharge) alarm	60°C	yes	
		High temperature (discharge) protection	65°C	yes	
		High temperature (discharge) release temperature	60°C	yes	
		11	Ambient temperature protection	Low ambient temperature alarm	
Low ambient temperature	-30°C			yes	

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

8


Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562


Email: marketing@super-pack.com.cn

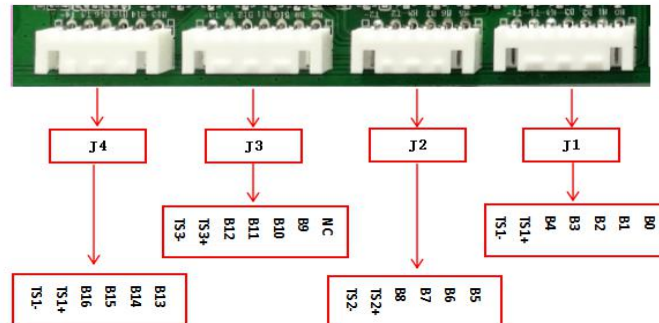
Fax: +86-769-82260590

Web: www.super-pack.com.cn

 SUPER SPACK Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	SPF48V100-SM (51.2V100AH)	Part No.	
		Page No.	9/12
		Version	A1

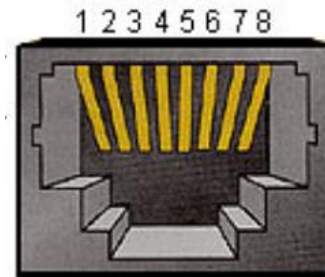
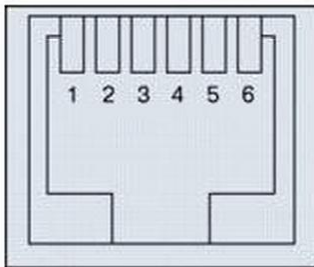
		protection			
		Low ambient release temperature	-25°C	yes	
		High ambient temperature alarm	65°C	yes	
		High ambient temperature protection	70°C	yes	
		High ambient release temperature	65°C	yes	
12	Current consumption	Normal mode	≤20mA		
		Sleep mode	≤300μA		
		Low power consumption	≤30μA		
13	Balancing function	Balancing start voltage	3450mV	yes	
		Balancing start voltage different	30mV	yes	
14	Default Capacity	Low capacity alarm	SOC < 10%	yes	No alarm during charging
		Residual capacity	100AH	yes	
		Full capacity	100AH	yes	
15	Power failure	Sleep voltage	2000mV	yes	
		Delay time	1min	yes	

 SUPER SPACK Best Solution of Battery	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	SPF48V100-SM (51.2V100AH)	Part No.	
		Page No.	10/12
	Version	A1	




BMS can communicate with HOST via RS232 or RS485 interface. From HOST, we can read the information of the battery/batteries such as battery voltage, current, temperature, status, SOC, SOH etc. We can set up the parameters to do corresponding operation. We can upgrade program via RS232 and the default baud rate is 9600bps.

When batteries connected in parallel, we can read all batteries' information via RS485 interface of the master battery.



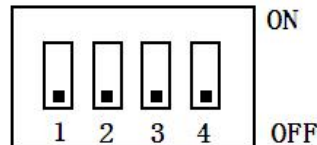
RS485 communication port

RS232--use RJ11 plug		RS485--use RJ45 plug	
RJ11 pin	Definition	RJ45 pin	definition
1,2,6	NC	1,8	RS485-B
3	TX	2,7	RS485-A
4	RX	3,6	NC
5	GND	4,5	NC

	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16
		Approved Date	
	SPF48V100-SM (51.2V100AH)	Part No.	
		Page No.	11/12
		Version	A1

Code Switch instruction:







We can distinguish different batteries from address when the batteries are connected in parallel. Each battery has a unique address in the whole battery system. We can set up address as follows,



address	Code switch address				description
	#1	#2	#3	#4	
0	OFF	OFF	OFF	OFF	Use alone
1	ON	OFF	OFF	OFF	Pack1 (master)
2	OFF	ON	OFF	OFF	Pack2
3	ON	ON	OFF	OFF	Pack3
4	OFF	OFF	ON	OFF	Pack4
5	ON	OFF	ON	OFF	Pack5
6	OFF	ON	ON	OFF	Pack6
7	ON	ON	ON	OFF	Pack7
8	OFF	OFF	OFF	ON	Pack8
9	ON	OFF	OFF	ON	Pack9
10	OFF	ON	OFF	ON	Pack10
11	ON	ON	OFF	ON	Pack11
12	OFF	OFF	ON	ON	Pack12
13	ON	OFF	ON	ON	Pack13
14	OFF	ON	ON	ON	Pack14
15	ON	ON	ON	ON	Pack15

LED instruction

Table 1 LED status instruction

status	normal/alarm/protect ion	RUN	ALM	Fuel gauge LED				Description
								
Power off	sleep	off	off	off	off	off	off	All off
standby	normal	flash1	off	Indicate as per fuel gauge				Standby status
	alarm	flash1	flash3					Low voltage

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

11


Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562

Email: marketing@super-pack.com.cn

Fax: +86-769-82260590

Web: www.super-pack.com.cn

	Guangdong Superpack Technology Co., Ltd.	Prepared Date	2020-07-16	
		Approved Date		
	SPF48V100-SM (51.2V100AH)		Part No.	
			Page No.	12/12
		Version	A1	

charge	normal	on	off	Indicate as per SOC (The LED of max. SOC Flash2)				ALM will not flash when over-charge alarm
	alarm	on	flash3					
	Over-charge protection	on	off	on	on	on	on	If there is no power supply, the indicator is standby status
	Temperature, over-current, failure protection	off	on	off	off	off	off	off
discharge	normal	FLASH3	OFF	Indicate as per SOC				
	alarm	FLASH3	FLASH3					
	Over-discharge protection	OFF	OFF	OFF	OFF	OFF	OFF	stop discharging
	Over temperature, over-current, short, reverse, failure protection	OFF	ON	OFF	OFF	OFF	OFF	OFF
failure		OFF	ON	OFF	OFF	OFF	OFF	Stop charging & discharging

Table 2 SOC indicator instruction

status		charge				discharge			
Fuel gauge indicator		L4 ●	L3 ●	L2 ●	L1 ●	L4 ●	L3 ●	L2 ●	L1 ●
SOC (%)	0~25%	off	off	off	flash2	off	off	off	on
	25~50%	off	off	flash2	on	off	off	on	on
	50~75%	off	flash2	on	on	off	on	on	on
	75~100%	flash2	on	on	on	on	on	on	on
RUN indicator ●		on				flash (flash3)			

Table 3 LED flash instruction

Flash method	on	off
flash1	0.25S	3.75S
flash2	0.5S	0.5S
flash3	0.5S	1.5S

Note: we can enable or disable the alarm of LED indicator from HOST. The default settings are enable

GUANGDONG SUPERPACK TECHNOLOGY CO., LTD.

12

Add: Huiyi Industry Park, No. 138 Jiabin Road, Tianxin Village, Huangjiang Town, Dongguan, Guangdong 523763, P. R. China

Tel: +86-769-82260562

Email: marketing@super-pack.com.cn

Fax: +86-769-82260590

Web: www.super-pack.com.cn