

# Hybrid Inverter

SUN- 3 / 3.6 / 5 / 6 K-SG04LP1-EU



Colorful touch LCD, IP65 protection degree



DC couple and AC couple to retrofit existing solar system

16

Max. 16pcs parallel for on-grid and off-grid operation; Support multiple batteries parallel

140

Max. charging/discharging current of 140A

6

6 time periods for battery charging/discharging



Support storing energy from diesel generator

**Deye**



Stock Code: 605117.SH

Model	SUN-3K -SG04LP1-24-EU	SUN-3K -SG04LP1-EU	SUN-3.6K -SG04LP1-EU	SUN-5K -SG04LP1-EU	SUN-6K -SG04LP1-EU
Battery Input Data					
Battery Type	Lead-acid or Li-Ion				
Battery Voltage Range (V)	20~30	40~60	40~60	40~60	40~60
Max. Charging Current (A)	140	70	90	120	135
Max. Discharging Current (A)	140	70	90	120	135
Number of battery input	Yes				
Charging Curve	3 Stages / Equalization				
Charging Strategy for Li-Ion Battery	Self-adaption to BMS				
PV String Input Data					
Max. DC Input Power (W)	3900	3900	4680	6500	7800
Rated PV Input Voltage (V)	370 (125~500)				
Start-up Voltage (V)	125				
MPPT Voltage Range (V)	150-425				
Full Load DC Voltage Range (V)	300-425				
PV Input Current (A)	13			13+13	
Max. PV I <sub>SC</sub> (A)	17			17+17	
No.of MPP Trackers	1			2	
No.of Strings per MPP Tracker	1				
AC Output Data					
Rated AC Output and UPS Power (W)	3000		3600	5000	6000
Max. AC Output Power (W)	3300		3690	5500	6600
AC Output Rated Current (A)	13.6/13		16.4/15.7	22.7/21.7	27.3/26.1
Max. AC Current (A)	15/14.3		18/17.2	25/23.9	30/28.7
Max. Continuous AC Passthrough (A)	35				40
Peak Power (off grid)	2 time of rated power, 10 S				
Power Factor	0.8 leading to 0.8 lagging				
Output Frequency and Voltage	50/60Hz; L/N/PE 220/230Vac (single phase)				
Grid Type	Single Phase				
DC injection current (mA)	THD<3% (Linear load<1.5%)				
Efficiency					
Max. Efficiency	97.60%				
Euro Efficiency	96.50%				
MPPT Efficiency	99.90%				
Protection					
Integrated	PV Input Lightning Protection, Anti-islanding Protection, PV String Input Reverse Polarity Protection, Insulation Resistor Detection, Residual Current Monitoring Unit, Output Over Current Protection, Output Shorted Protection, Surge protection				
Output Over Voltage Protection	DC Type II/AC Type III				
Certifications and Standards					
Grid Regulation	CEI 0-21, VDE-AR-N 4105, NRS 097, IEC 62116, IEC 61727, G99, G98, VDE 0126-1-1, RD 1699, C10-11				
Safety EMC / Standard	IEC/EN 61000-6-1/2/3/4, IEC/EN 62109-1, IEC/EN 62109-2				
General Data					
Operating Temperature Range ( )	-40~60 , >45 derating				
Cooling	Natural cooling				
Noise (dB)	<30 dB				
Communication with BMS	RS485; CAN				
Weight (kg)	14			15.1	
Size (mm)	330W x 433H x238D				
Protection Degree	IP65				
Installation Style	Wall-mounted				
Warranty	5 years				

# Hybrid Inverter

SUN- 5 / 6 / 8 / 10 / 12 K-SG04LP3-EU



- 100** 100% unbalanced output, each phase; Max. output up to **50%** rated power
-  DC couple and AC couple to retrofit existing solar system
- 16** Max. 16pcs parallel for on-grid and off-grid operation; Support multiple batteries parallel
- 240** Max. charging/discharging current of 240A
- 48** 48V low voltage battery, transformer isolation design
- 6** 6 time periods for battery charging/discharging
-  Support storing energy from diesel generator

**Deye**

Stock Code: 605117.SH



Model	SUN-5K -SG04LP3-EU	SUN-6K -SG04LP3-EU	SUN-8K -SG04LP3-EU	SUN-10K -SG04LP3-EU	SUN-12K -SG04LP3-EU
Battery Input Data					
Battery Type	Lead-acid or Li-Ion				
Battery Voltage Range (V)			40~60		
Max. Charging Current (A)	120	150	190	210	240
Max. Discharging Current (A)	120	150	190	210	240
External Temperature Sensor	Yes				
Charging Curve	3 Stages / Equalization				
Charging Strategy for Li-Ion Battery	Self-adaption to BMS				
PV String Input Data					
Max. DC Input Power (W)	6500	7800	10400	13000	15600
Rated PV Input Voltage (V)	550 (160~800)				
Start-up Voltage (V)	160				
MPPT Voltage Range (V)	200-650				
Full Load DC Voltage Range (V)	350-650				
PV Input Current (A)	13+13			26+13	
Max. PV ISC (A)	17+17			34+17	
Number of MPPT / Strings per MPPT	2/1+1			2/2+1	
AC Output Data					
Rated AC Output and UPS Power (W)	5000	6000	8000	10000	12000
Max. AC Output Power (W)	5500	6600	8800	11000	13200
AC Output Rated Current (A)	7.6	9.1	12.1	15.2	18.2
Max. AC Current (A)	11.4	13.6	18.2	22.7	27.3
Max. Continuous AC Passthrough (A)	45				
Peak Power (off grid)	2 time of rated power, 10 S				
Power Factor	0.8 leading to 0.8 lagging				
Output Frequency and Voltage	50/60Hz; 3L/N/PE 220/380, 230/400Vac				
Grid Type	Three Phase				
DC injection current (mA)	THD<3% (Linear load<1.5%)				
Efficiency					
Max. Efficiency	97.60%				
Euro Efficiency	97.00%				
MPPT Efficiency	99.90%				
Integrated	PV Input Lightning Protection, Anti-islanding Protection, PV String Input Reverse Polarity Protection, Insulation Resistor Detection, Residual Current Monitoring Unit, Output Over Current Protection, Output Shorted Protection, Surge protection				
Output Over Voltage Protection	DC Type II/AC Type III				
Certifications and Standards					
Grid Regulation	CEI 0-21, VDE-AR-N 4105, NRS 097, IEC 62116, IEC 61727, G99, G98, VDE 0126-1-1, RD 1699, C10-11				
Safety EMC / Standard	IEC/EN 61000-6-1/2/3/4, IEC/EN 62109-1, IEC/EN 62109-2				
General Data					
Operating Temperature Range (°C)	-45~60°C, >45°C derating				
Cooling	Smrat cooling				
Noise (dB)	<45 dB				
Communication with BMS	RS485; CAN				
Weight (kg)	33.6				
Size (mm)	422W x 699.3H x279D				
Protection Degree	IP65				
Installation Style	Wall-mounted				
Warranty	5 years				

# GOODWE

## ES Series (14A)

### Single-phase Hybrid Inverter (LV)

The GoodWe ES series is a bi-directional energy storage inverter with the ability to control the flow of energy intelligently. During the day, the PV array generates electricity which can be provided either to the loads, fed into the grid or charge the battery, depending on the economics and set-up. The electricity stored can be released when the loads require it during the night, including inductive loads such as air conditioners or refrigerators. Additionally, the power grid can also charge storage devices via the inverter. An all-round intelligent system for maximum energy flexibility.



Charge controller and inverter integrated



Maximum charge and discharge up to 100A



Export control (Zero export)



IP65 dustproof and waterproof



8 ms UPS-level Switching



Fanless design, long lifespan

Technical Data	GW3648D-ES <sup>*7</sup>	GW5048D-ES <sup>*8</sup>
<b>Battery Input Data</b>		
Battery Type <sup>*1</sup>	Li-Ion	Li-Ion
Nominal Battery Voltage (V)	48	48
Battery Voltage Range (V)	40 ~ 60	40 ~ 60
Max. Continuous Charging Current (A) <sup>*1</sup>	75	100
Max. Continuous Discharging Current (A) <sup>*1</sup>	75	100
Max. Charging Power (W)	3600	4600
Max. Discharging Power (W)	3600	4600
<b>PV String Input Data</b>		
Max. Input Power (W)	4600	6500
Max. Input Voltage (V)	580	580
MPPT Operating Voltage Range (V)	125 ~ 550	125 ~ 550
Start-up Voltage (V)	125	125
Nominal Input Voltage (V)	360	360
Max. Input Current per MPPT (A)	14 / 14	14 / 14
Max. Short Circuit Current per MPPT (A)	17.5 / 17.5	17.5 / 17.5
Number of MPPTs	2	2
Number of Strings per MPPT	1	1
<b>AC Output Data (On-grid)</b>		
Nominal Apparent Power Output to Utility Grid (VA) <sup>*5</sup>	3680	5000
Max. Apparent Power Output to Utility Grid (VA) <sup>*2</sup>	3680	5000
Max. Apparent Power from Utility Grid (VA)	7360	9200
Nominal Output Voltage (V)	230	230
Nominal AC Grid Frequency (Hz)	50 / 60	50 / 60
Max. AC Current Output to Utility Grid (A)	16 <sup>*6</sup>	24.5
Max. AC Current From Utility Grid (A)	32	40
Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)	
Max. Total Harmonic Distortion	<3%	<3%
<b>AC Output Data (Back-up)</b>		
Back-up Nominal Apparent Power (VA)	3680	4600
Max. Output Apparent Power (VA) <sup>*3</sup>	3680 (5520@10sec)	4600 (6900@10sec)
Max. Output Current (A)	16	20
Nominal Output Voltage (V)	230 (±2%)	230 (±2%)
Nominal Output Frequency (Hz)	50 / 60 (±0.2%)	50 / 60 (±0.2%)
Output THDv (@Linear Load)	<3%	<3%
<b>Efficiency</b>		
Max. Efficiency	97.6%	97.6%
European Efficiency	97.0%	97.0%
Max. Battery to AC Efficiency	94.0%	94.0%
MPPT Efficiency	99.9%	99.9%
<b>Protection</b>		
PV Insulation Resistance Detection	Integrated	Integrated
Residual Current Monitoring	Integrated	Integrated
PV Reverse Polarity Protection	Integrated	Integrated
Anti-islanding Protection	Integrated	Integrated
AC Overcurrent Protection	Integrated	Integrated
AC Short Circuit Protection	Integrated	Integrated
AC Overvoltage Protection	Integrated	Integrated
<b>General Data</b>		
Operating Temperature Range (°C)	-25 ~ +60	-25 ~ +60
Relative Humidity	0 ~ 95%	0 ~ 95%
Max. Operating Altitude (m)	3000	3000
Cooling Method	Natural Convection	Natural Convection
Display	LED & APP	LED & APP
Communication with BMS <sup>*4</sup>	RS485; CAN	RS485; CAN
Communication with Meter	RS485	RS485
Communication with Portal	Wi-Fi	Wi-Fi
Weight (kg)	28	30
Dimension (W x H x D mm)	516 x 440 x 184	516 x 440 x 184
Noise Emission (dB)	<25	<25
Topology	Non-isolated	Non-isolated
Ingress Protection Rating	IP65	IP65
Mounting Method	Wall Bracket	Wall Bracket

\*1: The actual charge and discharge current also depends on the battery.

\*2: 4600 for VDE 0126-1-1 & VDE-AR-N4105 & NRS 097-2-1, 5100 for CEI 0-21 (GW5048D-ES); 4050 for CEI 0-21 (GW3648D-ES).

\*3: Peak output apparent power can be reached only if PV and battery power is enough.

\*4: CAN communication is configured by default. If 485 communication is used, please replace the corresponding communication line.

\*5: 4600 for VDE 0126-1-1 & VDE-AR-N4105 & NRS 097-2-1, 4600 for CEI 0-21 (GW5048D-ES).

\*6: 18 for CEI 0-21.

\*7: FOR AUSTRALIA ONLY. Model GW3648D-ES inverters are designed without DC switch. For inverters designed with DC switch, the model name should be GW3648C-ES.

\*8: FOR AUSTRALIA ONLY. Model GW5048D-ES inverters are designed without DC switch. For inverters designed with DC switch, the model name should be GW5048C-ES.

\*: Under off-grid mode, then battery capacity should be more than 100Ah.

\*: When there is no battery connected, inverter starts feeding in only if string voltage is higher than 200V.

\*: AFDPF: Active Frequency Drift with Positive Feedback, AQDPF: Active Q Drift with Positive Feedback.

\*: Please visit GoodWe website for the latest certificates.





**GOODWE**  
YOUR SOLAR ENGINE

# SECU-A Series

## Low Voltage Battery

GoodWe's SECU-A Series is a low voltage lithium battery, which is made from safe and durable lithium iron phosphate. The battery follows a modular design, making it extendable. As a plug and play device, it can be installed easily and quickly. Thanks to their safe design, the batteries can be connected together in parallel.



Safe & Reliable



Expandable Modular Design



Long Lifespan

Technical Data		SECU-A5.4L
Model		
Battery Type		LiFePO <sub>4</sub>
System Weight		49Kg
Dimensions (W × D × H )		400 × 226.2 × 484.2mm
Protection		IP20 (indoor)
Warranty		10 years (performance warranty)
Installed Capacity		5.4 kWh
Usable Energy		4.8 kWh
DoD		90%
Nominal Voltage		51.2 V
Operating Voltage Range		48 ~ 57.6 V
Internal Resistance		≤ 20 mΩ
Electrical		
Max. Charge Current		50A
Max. Discharge Current		50A
Operating Temperature Range		-10°C ~ 50°C*
Humidity		15% ~ 85%
System Configuration		
Module Connection		6 Parallels
Capacity Range		5.4 / 10.8 / 16.2 / 21.6 / 27 / 32.4 kWh
Usable Energy Range		4.8 / 9.6 / 14.4 / 19.2 / 24 / 28.8 kWh
Max. Charge Current		50A (1 Module) / 100A (2~6 Modules)
Max. Discharge Current		50A (1 Module) / 100A (2~6 Modules)
Monitoring Parameters		system voltage, current, cell voltage, cell temperature, PCBA temperature
Communication		CAN
Certification		UN38.3

\*: Do not charge batteries when temperature is below 0°C. Batteries start derating when the temperature is above 40°C.



# SPF 3500~5000 ES

- Integrated MPPT charge controller.
- Equalization charging function.
- Work with battery or without battery.
- Maximum PV input voltage up to 450VDC.
- Configurable grid or solar input priority.
- Optional WIFI/ GPRS remote monitoring.
- Support parallel operation for capacity expansion up to 30kW.
- PV and Grid power the load jointly if PV energy insufficient.
- Flexibly schedule the Inverter charging and discharging time.



P O W E R  
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T O M O -  
R R O W

**Growatt**  
powering tomorrow

Datasheet	SPF 3500 ES	SPF 5000 ES
Battery Voltage	48VDC	
Battery Type	Lithium/Lead-acid	
INVERTER OUTPUT		
Rated Power	3500VA/ 3500W	5000VA/ 5000W
Parallel Capability	Yes, 6 units maximum	
AC Voltage Regulation (Battery Mode)	230VAC ± 5% @ 50/60Hz	
Surge Power	7000VA	10000VA
Efficiency (Peak)	93%	
Waveform	Pure sine wave	
Transfer Time	10ms typical, 20ms Max	
SOLAR CHARGER		
Maximum PV Array Power	4500W	6000W
MPPT Range @ Operating Voltage	120VDC ~ 430VDC	
Number of Independent MPP Trackers/ Strings Per MPP Tracker	1/1	
Maximum PV Array Open Circuit Voltage	450VDC	
Maximum Solar Charge Current	80A	100A
AC CHARGER		
Charge Current	60A	80A
AC Input Voltage	230 VAC	
Selectable Voltage Range	170-280 VAC (For Personal Computers) ; 90-280 VAC (For Home Appliances)	
Frequency Range	50Hz/60Hz (Auto sensing)	
PHYSICAL		
Protection Degree	IP20	
Dimension (W/H/D)	330/485/135mm	330/485/135mm
Net Weight	11.5kgs	12kgs
OPERATING ENVIRONMENT		
Humidity	5% to 95% Relative Humidity(Non-condensing)	
Altitude	<2000m	
Operating Temperature	0°C - 55°C	
Storage Temperature	-15°C - 60°C	



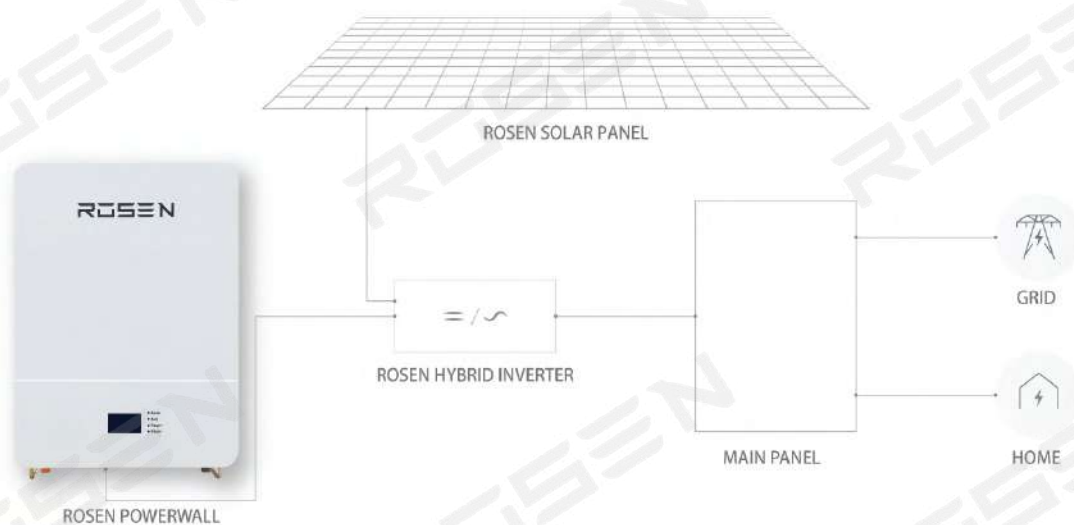
# Rosen Solar Energy Co., Ltd.

## Powerwall LiFePo4 Battery Specification

Model: LFP48V100AH

### Modified Record

Revision	V.006	Draft	Chuanjun Bao
Date	2021-09-23	Checked	Chuanqiang Yao
File No.	LF48100-210901	Approved	Jack Tian







## 1. General Information

This specification is suitable for the 48v 100ah battery pack, and describes its dimensions, characteristics, technical requirements and precautions for use.

## 2. Battery Specification (@ 25±5℃)

NO	Items		Characteristics
System specification			
2.1	Battery Cell		3.2V 50AH, Prismatic, LiFePo4
2.2	Nominal capacity		100AH
2.3	Total energy		4.8KWh
2.4	Nominal voltage		48Vdc
2.5	Cell compose method		15S2P
2.6	End of discharge voltage		40.5V
2.7	Charging voltage		52.5~54.75V
2.8	Max. charging current		100Adc
2.9	Max. discharging current		100Adc
2.10	Max. power		4800W
2.11	Pulse discharge current		150A@1S
2.12	Display method and language		LCD, English
2.13	Communication interface		CAN and RS485
2.14	BMS parallel supports		Yes, Max. 14units
2.15	BMS series support		Not support
2.16	Cooling method		Natural cooling
2.17	Dimension		W 495±5mm
			H 190±5mm
			L 680±5 mm
2.18	IP rating		IP21
2.19	Net Weight		About 67 Kg
2.20	Cycle life (80% DOD, 25℃)		≥6000 times
2.21	Life time( 25℃)		10 years
2.22	Protection		Over voltage, Low voltage, Over current, Over temperature, Low temperature, Short circuit.
2.23	Operation Humidity		0~95% RH (No condensing)
2.24	Operation temperature	Charge	0~50℃
		Discharge	-15~55℃
2.25	Self-discharge rate	Residual capacity	≤3%/Month; ≤15%/ Year
		Recover capacity	≤1.5%/Month; ≤8%/ year



### 3. Electrical Characteristics & Test Condition

Testing Conditions: Environment Temperature:  $25\pm 5^{\circ}\text{C}$ ; Humidity: 45%~75%.

Normal charge: Charge battery under CC(0.5C)/CV(54V) mode until over charge protection or the charge current reduce to 0.05C, and then rest for 1h.

NO	Items	Criterion		Condition
3.1	Normal Capacity	100AH		After Normal charge, discharge @0.33C current to the end of discharge voltage.
3.2	Internal Impedance	$\leq 22\text{m}\Omega$		@50% SOC @1kHz AC internal resistance test instrument.
3.3	Short circuit protection	Auto cut off load when short circuit		Connect the positive and negative of this battery pack through a lead with $0.1\Omega$ resistance.
3.4	Cycle life	$\geq 6000$ cycles		After Normal charge, discharge @0.5C current to the end of discharge voltage. Repeat above process until discharge capacity reduce to 80% of initial value.
3.5	Discharge temperature characteristic @0.2C	$-15^{\circ}\text{C}$ (6h)	$\geq 60\%$	$\frac{\text{Capacity @specified temperature}}{\text{Capacity @ } 25^{\circ}\text{C}}$ the percentage accord with criterion
		$0^{\circ}\text{C}$ (6h)	$\geq 80\%$	
		$25^{\circ}\text{C}$ (4h)	$\geq 100\%$	
		$55^{\circ}\text{C}$ (4h)	$\geq 95\%$	
3.6	Capacity retention rate	Remain capacity $\geq 96\%$		After normal charge, store the battery @ $25\pm 5^{\circ}\text{C}$ for 28days, then discharge capacity @0.2C, the retention capacity accord with criterion.

### 4. Circuit Protection

The batteries are supplied with a LiFePo4 Battery Management System (BMS) that can monitor and optimized each single prismatic cell during charge & discharge, to protect the battery pack over charge, over discharge, short circuit. Overall, the BMS helps to ensure safe and accurate running.

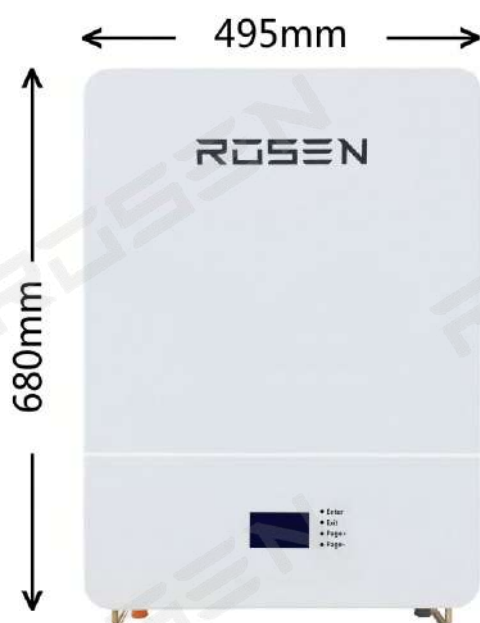
No	Item	Content	Criterion
4.1	Over charge	Over-charge protection Alarm for each cell	$3.5\pm 0.05\text{V}$
		Over-charge protection for each cell	$3.65\pm 0.05\text{V}$
		Over-charge protection delay time	0.5~1.5s
		Over-charge release for each cell	$3.4\pm 0.05\text{V}$
		Over-charge protection Alarm for system	$52.5\pm 0.5\text{V}$
		Over-charge protection for system	$54.75\pm 0.5\text{V}$
		Over-charge protection delay time	0.5~1.5s
		Over-charge release for system	$51\pm 0.5\text{V}$
		Over-charge release method	Under the release voltage than 60s
4.2	Over discharge	Over-discharge alarm for each cell	$2.90\pm 0.05\text{V}$
		Over-discharge protection each cell	$2.70\pm 0.05\text{V}$



		Over-discharge protection delay time	0.5~1.5s
		Over-discharge release for each cell	3.0±0.05V
		Over-discharge alarm for system	43.5±0.5V
		Over-discharge protection system	40.5±0.5V
		Over-discharge protection delay time	0.5~1.5s
		Over-discharge release for each cell	45±0.5V
		Over-discharge release method	Higher the release voltage than 60s
4.3	Over current	Charge over current protection alarm	100±5A
		Charge over current protection	120±5A
		Charge over current protection delay time	0.5~1.5s
		Charge over current release method	Auto release after 1min
		Discharge over current protection alarm	100±5A
		Discharge over current protection	120±5A
		Discharge over current protection delay time	0.5~1.5s
		Discharge over current release	Auto release after 1min
		Short circuit protection	Yes
		Short circuit protection release	cut-off download or exchange fuse
4.4	Temperature	Charge over temperature protection	Protect@55±3℃; Release@50±3℃;
		Charge under temperature protection	Protect@-10±3℃; Release@5±3℃
		Discharge over temperature protection	Protect@55±3℃; Release@50±3℃;
		Discharge under temperature protection	Protect@-15±3℃; Release@-0±3℃;

## 5. User guide

### 5.1 Product dimension(mm)

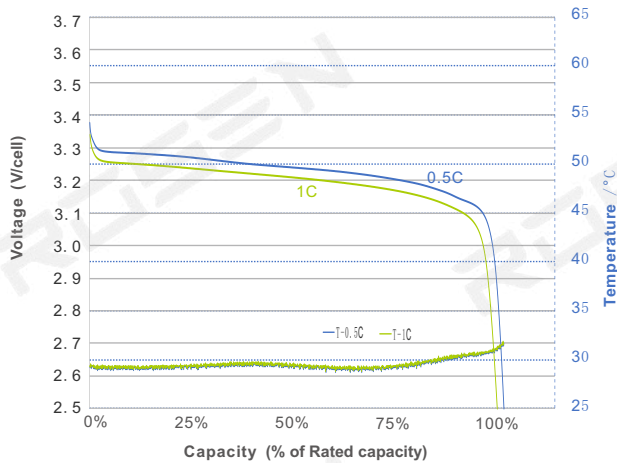




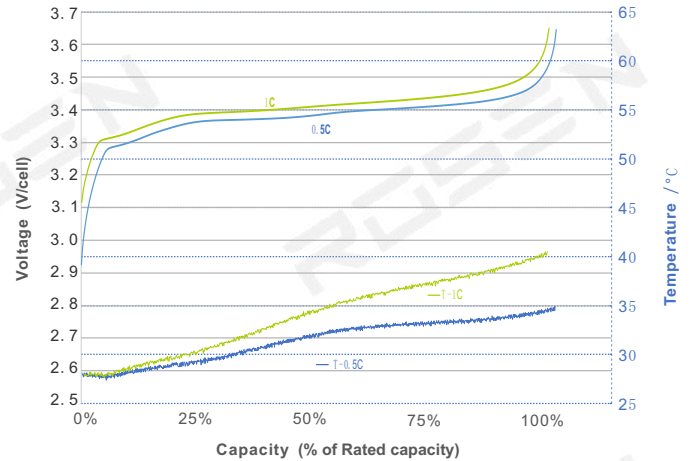


## 48V POWERWALL LITHIUM BATTERY

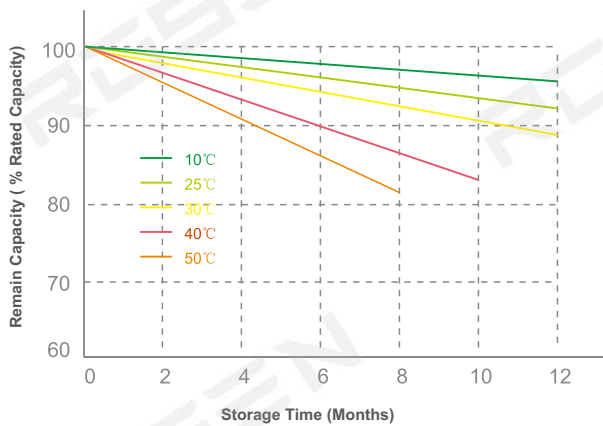
Different Discharge Rate and Temperature Characteristic



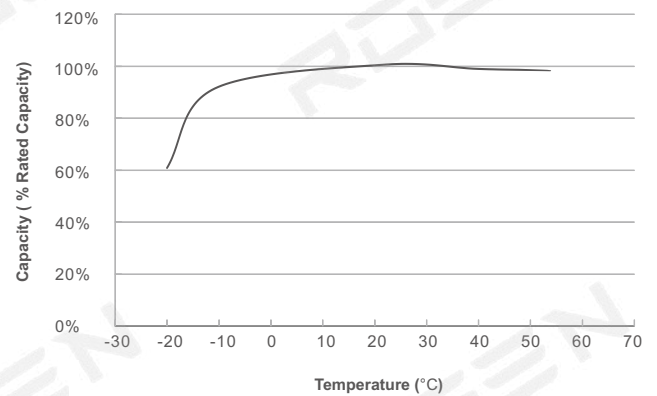
Different Charge Rate and Temperature Characteristic



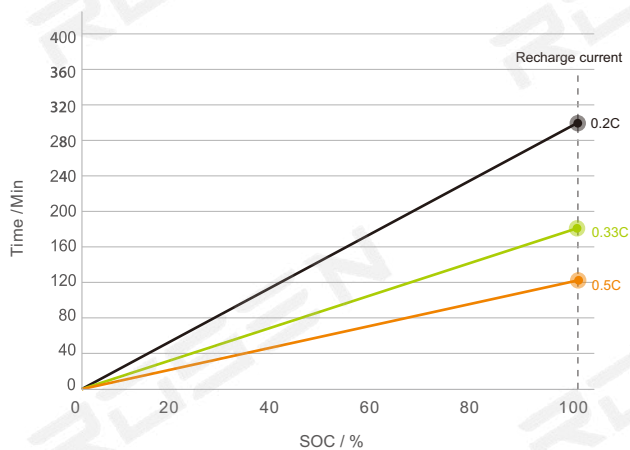
Different Temperature Self Discharge Curve



Capacity with Different Temperature



Typical Recharge Time



Typical Cycle Life

