

We Cooperate

ENERGY STORAGE BATTERY MANAGEMENT



Ligoo New Energy Technology Co., Ltd.

LIGOO

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Driving a Better World with Clean Energy

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BA62E1 DISPLAY & CONTROL UNIT



High-Performance Dual-Core Processor

ARM® Cortex-A55 + Cortex-R5 MCU

High Noise Immunity

Complies with GB/T 34131-2023

Highly Integrated Design

Non-sheet metal casing, smaller size with lower cost

Intelligent Battery Management

Status monitoring, SOC/SOH estimation, fault diagnosis and charge/discharge strategies, with lifetime data storage and intelligent cell-variation diagnostics and assessment.

Flexible Wireless & Display

Integrated 4G and Wi-Fi/BLE; supports a 10.1-inch display

Extensive Interfaces

4 Gigabit Ethernet, 4 isolated CAN FD and 6 isolated RS-485 ports

Technical Specifications

Function	Parameters	Description
System Power Supply		
Operating Voltage Range	DC18~32 V	Typical: 24 V
Operating Power Consumption	≤ 12 W	No external load connected
Environmental Specifications		
Operating Temperature Range	Storage Temperature Range	Operating Humidity Range
-40°C ~ 85°C	-40°C ~ 85°C	5%~95%

BP63D3



Smart Drivers & Diagnostics

8 smart high-side and 2 smart low-side drivers, all with fault feedback

Powerful Controller

HC32F4A0 MCU, 2 MB Flash, 240 MHz clock

High-Integrity Isolation

HV/LV spacing meets reinforced-insulation safety requirements

Extensive Communication Interfaces

1 CAN FD, 1 CAN, 2 isolated RS-485 and 1 Ethernet port; 2 daisy chains reduce bus load

Flexible Digital I/O

10 isolated digital inputs; 10 dry-contact outputs

High-Voltage Monitoring & Protection

3 HV sensing channels, integrated detection of total positive and total negative relay

Technical Specifications

Function	Parameters	Description
Low-Voltage Supply		
Supply Range	9~32V	Typical supply: 24 V
Rated Power Consumption	≤3W	No external load; controller board load only
Supply Voltage Sensing	Supported; accuracy <±250 mV; 1 channel	
Inputs / Outputs		
Load Drive (Relay Control)	Smart HSD; 8 channels	High-side rated current: 1 A
	Low-Side Switch; 2 channels	Low-side rated current: 1 A
Contact Input Sensing	5 potential-free contact channels; 5 powered contact channels; 10 channels	
Contact Outputs	Mechanical relay output; 10 channels	Relay rated current: 0.2 A
Hall Input	Analog Hall signal input: Threshold: 0-5 V; 2 channels	
Power Output		
Analog Hall Sensor Supply	Supply: 5 V, 200 mA; 1 channel	5 V Hall sensor supply supported
CAN Hall Sensor Supply	Supply: 12 V, 200 mA; 1 channel	12 V Hall sensor supply requires input >15 V. In a 12 V system, the Hall sensor can use the system supply.
CAN		
Baud Rate	1 standard CAN channel, 500 kbps; 1 CAN FD channel, 1 Mbps; 2 channels	Isolated CAN; adjustable baud rate
RS-485		
Baud Rate	115200bps; 2 channels	Isolated RS-485; adjustable baud rate
Ethernet		
Data Rate	100M; 1 channel	
4G		
Network Technology	Multi-carrier support	Optional
Data Rate	Max. downlink: 10 Mbps; Max. uplink: 5 Mbps	Optional
Daisy-Chain Communication		
Data Rate	1Mbps; 2 channels	Supports 1818 module units
Data Rate	1Mbps; 4 channels	Supports 33774 module units
Data Management		
Memory Type	Flash supported	16Mb
Memory Type	SD Card; Qty: 1	Up to 32G
Current Sensing		
Voltage-Output Hall Sensor	Required accuracy: ≤±1% FSR; 2 channels	Recommended brands: Jincheng and LEM
CAN_HALL	Required accuracy: ≤±0.2% FSR; Qty: 1	1 CAN_HALL channel supported
Shunt Sensing	Required accuracy: ≤±0.5% FSR; Qty: 1	Shunt current sensing supported
Current Measurement Range	±500A	
Pack Voltage Sensing		
Pack Voltage Platform	1500V	
Pack Voltage Accuracy	≤±5‰FSR	
Channel Count	3	
Sampling Interval	≤20 ms	
Temperature Sensing		
Channel Count	-20°C to 65°C; accuracy: ±1°C; Other temperatures: ±2°C accuracy; 4 channels	4 isolated temperature channels, including 1 for shunt temperature
Insulation Monitoring		
Voltage Platform	1500V	Pack voltage ≥400 V; relative error ≤±20%
Measurement Range	0~20MΩ	Pack voltage <400 V; relative error ≤±30%
Measurement Accuracy	0~50K@≤±10K; 50K~20M@≤±10%	Insulation resistance ≤50 kΩ; max. error ≤±10 kΩ; Insulation resistance: 50K-20 MΩ; max. error ≤±10%
SOC		
SOC Accuracy	<3%	Ternary lithium cells
	<5%	Lithium iron phosphate cells
Version Identification		
Software version identification	Supported	Read via PC software
Hardware version identification	Supported	Read via PC software
Environmental Specifications		
Operating Temperature Range	Storage Temperature Range	Operating Humidity Range
-40 ~85°C	-40°C~85°C	5 ~95%RH
IP Rating		
IP40		
Not waterproof; install inside the HV enclosure		

BP63D7



Smart Drivers & Diagnostics

8 smart high-side drivers; 2 HV sensing channels and positive/negative main-relay weld detection

Powerful Controller

HC32F4A0 MCU, 2 MB Flash, 240 MHz clock

Supports up to 1500 V

High-Voltage Platform

Extensive Communication Interfaces

1 CAN FD, 2 CAN, 3 isolated RS-485 and 2 Ethernet ports; 2 daisy chains reduce bus load

Insulation Monitoring

Insulation monitoring with adaptive system Y-capacitance compensation

High-Integrity Isolation

HV/LV spacing meets reinforced-insulation safety requirements



Technical Specifications

Function	Parameters	Description
LVS		
Supply Range	9~32V	Typical supply: 24 V
Rated Power Consumption	≤4W	No external load; controller board load only
Supply Voltage Sensing	Supported; accuracy <±250 mV; 1 channel	
Inputs / Outputs		
Load Drive (Relay Control)	Smart High-Side Driver; 8 channels	High-side rated current: 1 A
Contact Input Sensing	9 powered contact channels; 9 channels	
Digital Input Sensing	1 controller address input; 1 channel	
Contact Outputs	Mechanical relay output; 3 channels	Relay rated current: 0.2 A; 1 channel for controller address output
Power Output		
Analog Hall Sensor Supply	Supply: 5 V, 200 mA; 1 channel	5 V Hall sensor supply supported
CAN Hall Sensor Supply	Supply: 12 V, 200 mA; 1 channel	12 V Hall sensor supply requires input >15 V. In a 12 V system, the Hall sensor can use the system supply.
CAN		
Baud Rate	2 standard CAN channels; 1 CAN FD channel; 3 channels	Isolated CAN; adjustable baud rate
RS-485		
Baud Rate	115200bps; 3 channels	Isolated RS-485; adjustable baud rate
Ethernet Communication		
Data Rate	100M; 2 channels	
Daisy Chain Communication		
Data Rate	1Mbps; 2 channels	Isolated daisy chain; supports 33774 module units
Data Management		
Memory Type	Flash supported	16Mb
Current Sensing		
Voltage-Output Hall Sensor	Required accuracy: ≤±1% FSR; 2 channels	Recommended models: S118 or S124
CAN_HALL	Required accuracy: ≤±0.2% FSR; Qty: 1	1 CAN_HALL channel supported
Shunt Sensing	Required accuracy: ≤±0.5% FSR; Qty: 1	Shunt current sensing supported
Current Measurement Range	±500A	
Pack Voltage Sensing		
Measurement Range	0~1500V; 2 channels	2 pack voltage channels; 1 LINK- relay weld-detection channel
Pack Voltage Accuracy	≤±5‰FSR	
Sampling Interval	≤20 ms	
Temperature Sensing		
Channel Count	-20°C to 65°C; accuracy: ±1°C; Other temperatures: ±2°C accuracy; 5 channels	5 temperature channels, including 1 for shunt temperature
Insulation Monitoring		
Voltage Platform	1500V	Pack voltage ≥400 V; relative error ≤±20%
Measurement Range	0~20MΩ	Pack voltage <400 V; relative error ≤±30%
Measurement Accuracy	0~50K@≤±10K; 50K~20M@≤±10%	Insulation resistance ≤50 kΩ; max. error ≤±10 kΩ; Insulation resistance: 50K-20 MΩ; max. error ≤±10%
SOC		
SOC Accuracy	<3%	Ternary lithium cells
	<5%	Lithium iron phosphate cells
Version Identification		
Software version identification	Supported	Read via PC software
Hardware version identification	Supported	Read via PC software
Environmental Specifications		
Operating Temperature Range	Storage Temperature Range	Operating Humidity Range
-40 ~85°C	-40°C~85°C	5 ~95%RH
		IP Rating
		IP40
Not waterproof; install inside the HV enclosure		

BM112,64,32,16
PASSIVE-BALANCING BMU



Broad Cell
Compatibility

Supports lithium iron phosphate, ternary lithium and sodium-ion cells; the series covers 18S to 112S.

Wide Input Range &
Thermal Management

Ultra-wide 9V to 36 V input; supports pack-level fan / heating-film control

High-Integrity
Isolation

Increase the insulation safety distance between HV and LV

Comprehensive Safety Monitoring

Pack-level I/O; more than one temperature channel per cell ensures every cell is monitored.

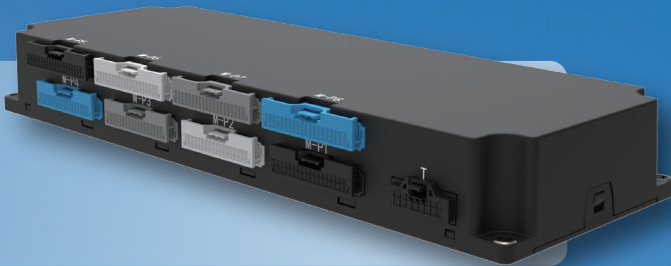
Supply Chain Resilience

Three BOM options ensure supply continuity

Technical Specifications

Function	Parameters	Description
AFE Input Voltage	12V~90V	Normal operating voltage range per monitoring IC
Low-Voltage Supply Voltage	9~32V	LVS operating voltage range
System Power Consumption	<1W	LVS power during normal operation
AFE Sleep Current	<20μA	Sleep current per monitoring IC
AFE Operating Current	<25mA	Operating current per monitoring IC
Cell Voltage Measurement Range	0~5V	During normal system operation
Cell Voltage Accuracy	±5mV	1~4.5 V range (-40°C to 85°C)
Cell Voltage Sampling Interval	100ms	
Temperature Measurement Range	-40°C~125°C	
Temperature Accuracy	±1°C(-20~65°C); ±2°C (other ranges)	
Temperature Sampling Interval	≤1S	
Balancing Current	>100mA	Peak current @ 3.6 V
Simultaneous Balancing Channels	7 channels / AFE	Odd/even channel activation
Balancing Duty Cycle	50% ±10%	Default: 50%
High-Side Output Load Capacity	24V/1A	Fan supply referenced to P-
Digital Input Sensing	Active high/low	Configurable; active low by default
PWM Output	Open-drain output	Load pulled up to 5 V; typical frequency 25 kHz; duty cycle 0~100%
Automatic addressing	Supported	
Operating Temperature Range	-40°C~85°C	
Storage Temperature Range	-40°C~85°C	
Operating Humidity Range	5%~95%	
IP Rating	IP40	

BM104,52
ACTIVE-BALANCING BMU



Automotive-Grade Active Balancing

Dedicated low-power balancing IC with built-in balancing algorithms and stuck-on detection

Efficient Energy Conversion

Bidirectional buck-boost circuit; balancing efficiency >90%

Comprehensive Protection

Integrated overvoltage and overtemperature protection

High Current, Compact Size

Balanced current ranges from 0.5A to 3A. The size is very suitable, saving PCB space.

High-Integrity Isolation

HV/LV spacing meets reinforced-insulation safety requirements

Flexible Balancing Strategies

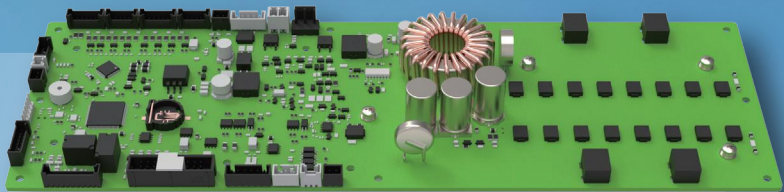
The modules support balanced operation as well as synchronous balancing of any battery within the battery pack to enhance efficiency



Technical Specifications

Function	Parameters	Description
AFE Input Voltage	12V~90V	Normal operating voltage range per monitoring IC
Low-Voltage Supply Voltage	9~32V	LVS operating voltage range
System Power Consumption	<1W	LVS power during normal operation
AFE Sleep Current	<20μA	Sleep current per monitoring IC
AFE Operating Current	<25mA	Operating current per monitoring IC
Cell Voltage Measurement Range	0~5V	During normal system operation
Cell Voltage Accuracy	±5mV	1~4.5 V range (-40°C to 85°C)
Cell Voltage Sampling Interval	100ms	
Temperature Measurement Range	-40°C~125°C	
Temperature Accuracy	±1°C(-20~65°C); ±2°C (other ranges)	
Temperature Sampling Interval	≤1S	
Balancing Current	2A	Active Balancing
Automatic addressing	Supported	
Operating Temperature Range	-40°C~85°C	
Storage Temperature Range	-40°C~85°C	
Operating Humidity Range	5%~95%	
IP Rating	IP40	

ESU48100F1



100 A continuous charge/discharge

Wi-Fi / Bluetooth / external display

Configurable Wi-Fi / Bluetooth / external display

Fits mainstream brand designs

Up to 64 units in parallel

8-16 cells in series; precharge and current limiting

Total state balance and intelligent host adaptation

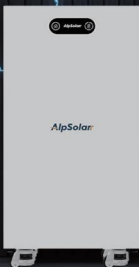
Automatic address assignment

50+ inverter protocols

RS-485 / CAN / UART interfaces



AC

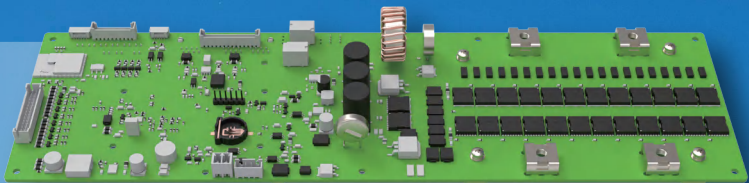


DC

Technical Specifications

Function	Parameters	Description
System Power Supply		
Nominal Voltage	51.2	1P16S100Ah (single pack)
Supply Voltage Range	44.8~58.4V	
Current Consumption	Sleep current: ≤200 μA @ 48 V, 25°C; Operating current: ≤65 mA @ 48 V, 25°C (with display); ≤55 mA @ 48 V, 25°C (without display)	No driver; no external power output
Wake-up	Button wakeup Charger wakeup Communication wakeup	Hold >3 s; release to wake Charger voltage - battery voltage >1 V RS-485/CAN
Voltage Sensing		
Module Voltage Sensing	Range: 32~60 V; Accuracy: Max(±1% FSR) @ ≥32 V	Software calibration supported
P+/P- Terminal Voltage Sensing	Range: 32~60 V; Accuracy: Max(2.0 V, ±2% FSR) @ ≥32 V	Software calibration supported
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ±10mV@2V~4.2V, 0~65°C; ±20mV@2V~4.2V, -40~85°C	Software calibration supported
Current Sensing		
Charge/Discharge Current Sensing	Method: onboard shunt; Range: -100 A to 100 A; Accuracy: ≤2% @ FS	Software calibration supported
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 40~100 mA @ 3.4 V	
Temperature Sensing		
4 cell temperature channels	Range: -40°C to 125°C; Accuracy: -20~65°C≤±1°C; -40~85°C≤±2°C; 85~125°C≤±3°C	
1 MOSFET temperature channel		
1 current-limiter temperature channel		
1 ambient temperature channel		
1 balancing temperature channel		
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port	
Current Rating	Max. continuous charge/discharge: 100 A	
Charge Current Limiting	Max. current limit: 10 A	
Heating		
Heating film	Power supplied by charger	
Communication		
RS-485	2 channels, 9600 bps	1 PCS port; 1 parallel-operation cascade port
CAN	1 channel, 500k	
UART	2 channels	1 display port; 1 Wi-Fi port
Other Interfaces		
Indicators	9 channels	6 LEDs: SOC, operation, fault and power-on
Push-button switch	1 channel	
Buzzer	1 channel	
Dry Contacts	2 channels	
Automatic addressing	Yes	
Primary/secondary unit identification	Yes	
Subordinate unit count detection	Yes	
One-touch parallel-system wake-up	Yes	One-touch controller wake-up
Wi-Fi	Yes	
Protection		
Cell Overcharge Protection	TBD	
Cell Overdischarge Protection	TBD	
Charge Overcurrent Protection	TBD	
Discharge Overcurrent Protection	TBD	
Charge/Discharge Overtemperature Protection	TBD	
Charge/Discharge Undertemperature Protection	TBD	
MOSFET Overtemperature Protection	TBD	
Output short-circuit protection	Supported	
Reverse-Polarity Protection	Supported	
Operating Temperature	Storage Temperature	Operating Humidity
-20°C~75°C	-40°C~85°C	5%~95%
		Dimensions
		220*100*29mm

ESU48200F1



200 A Max. Continuous
Charge / Discharge

Wi-Fi / Bluetooth / External
display

Configurable Wi-Fi / Bluetooth / External display

Fits mainstream
brand designs

Up to 64 Units in Parallel

8-16 Cells in Series | Pre-charge & Current Limiting

Total state balance and
intelligent host adaptation

Automatic Address Assignment

50+ Inverter Protocols

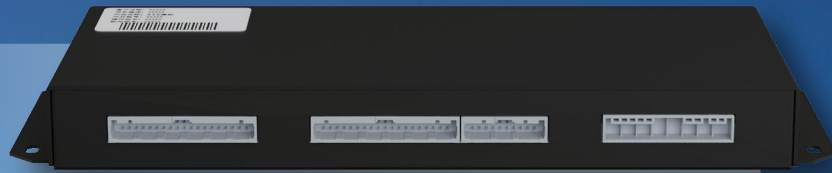
RS-485 / CAN / UART interfaces



Technical Specifications

Function	Parameters	Description
System Power Supply		
Nominal Voltage	51.2V	1P16S200Ah (single pack)
Supply Voltage Range	44.8~58.4V	
Current Consumption	Sleep current: ≤200uA@48V, 25°C; Operating current: ≤65 mA @ 48 V, 25°C (with display); ≤55 mA @ 48 V, 25°C (without display)	No driver; no external power output
Wake-up	Button wake-up Charger wake-up Communication wake-up	Hold >3 s; release to wake Charger voltage - battery voltage >1.5 V RS-485/CAN
Voltage Sensing		
Module Voltage Sensing	Range: 32-60 V; Accuracy: Max(±1%FSR)@>=32V	Software calibration supported
P+/P- Terminal Voltage Sensing	Range: 32-60 V; Accuracy: Max(2.0V, ±2%FSR)@>=32V	Software calibration supported
Cell Voltage Sensing	Range: 0-5 V; Accuracy: ±10mV@2V~4.2V, 0~65°C; ±20mV@2V~4.2V, -40~85°C	Software calibration supported
Current Sensing		
Charge/Discharge Current Sensing	Method: onboard shunt; Range: -200 A to 200 A; Accuracy: ≤2% @ FS	Software calibration supported
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 40-100 mA @ 3.4 V	
Temperature Sensing		
4 cell temperature channels	Range: -40°C to 125°C; Accuracy: -20~65°C≤±1°C; -40~85°C≤±2°C; 85~125°C≤±3°C	
1 MOSFET temperature channel		
1 current-limiter temperature channel		
1 ambient temperature channel		
1 balancing temperature channel		
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port	
Current Rating	Max. continuous charge/discharge: 200 A	
Charge Current Limiting	Max. current limit: 10 A	
Heating		
Heating film	Power supplied by charger	5 A supported
Communication		
RS-485	2 channels, 9600 bps	1 PCS port; 1 parallel-operation cascade port
CAN	1 channel, 500k	
UART	2 channels	1 display port; 1 Wi-Fi port
Other Interfaces		
Indicators	9 channels	6 LEDs: SOC, operation, fault and power-on
Push-button switch	1 channel	
Buzzer	1 channel	
Dry Contacts	2 channels	
Automatic addressing	Supported	
Primary/secondary unit identification	Supported	
Subordinate unit count detection	Supported	
One-touch parallel-system wake-up	Supported	One-touch controller wake-up
Wi-Fi	Supported	
Protection		
Cell overcharge/overdischarge; charge/discharge overcurrent, overtemperature and undertemperature; MOSFET overtemperature protection	TBD	
Output short-circuit / reverse-polarity protection	Supported	
Operating Temperature	-20°C~75°C	
Storage Temperature	-40°C~85°C	
Operating Humidity	5%~95%	
Dimensions	335*100*47.7mm	

BP63D8



Communication Interfaces

1 CAN FD, 2 CAN, 2 Isolated RS-485 and 1 Ethernet port

Smart Drivers

4 Smart High-Side and 2 Smart Low-Side Drivers, all with Fault Feedback

Supports up to 1500 V

High-Voltage Platform

Powerful Controller

HC32F4A0 MCU, 2 MB Flash, 240 MHz clock

Adaptive to System Y-capacitance

Integrated Insulation Monitoring

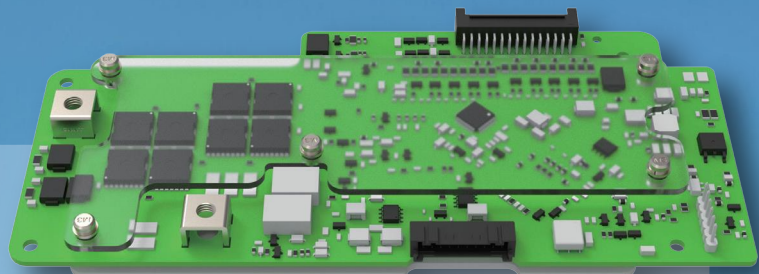
High-Voltage Monitoring & Protection

3 HV Sensing Channels, with Positive/Negative Main Relay Weld Detection

Technical Specifications

Function	Parameters	Description
Low-Voltage Supply		
Supply Range	9~32V	Typical supply: 24 V
Rated Power Consumption	≤3W	No external load; controller board load only
Supply Voltage Sensing	Supported; accuracy <±250 mV; 1 channel	
Inputs / Outputs		
Load Drive (Relay Control)	Smart High-Side Driver; 4 channels	High-side rated current: 1 A
	Low-Side Switch; 2 channels	Low-side rated current: 1 A
Contact Input Sensing	4 potential-free contact channels; 2 powered contact channels; 6 channels	Optocoupler isolation
Contact Outputs	Mechanical relay output; 4 channels	Relay rated current: 0.2 A
Automatic addressing	Automatic controller addressing for parallel operation	
Primary/secondary unit identification	Primary/secondary identification for parallel operation	
Module Address Output	Module address output supported	
Hall Input	Analog Hall signal input: Threshold: 0~5 V; 2 channels	
Power Output		
Analog Hall Sensor Supply	Supply: 5 V, 200 mA; 1 channel	5 V Hall sensor supply supported
CAN		
Baud Rate	CAN FD and standard CAN supported; 3 channels	Isolated CAN
RS-485		
Baud Rate	115200bps; 2 channels	Isolated RS-485; software-configurable baud rate
Wi-Fi		
-	Wi-Fi supported; 1 channel	Reserved; enclosure cutout required if used
Data Management		
Memory Type	Flash supported	16Mb
Current Sensing		
Voltage-Output Hall Sensor	Required accuracy: ≤±1% FSR; 2 channels	Recommended brands: Jincheng and LEM
Shunt Sensing	Required accuracy: ≤±0.5% FSR; 1 channel	Shunt current sensing supported
Current Measurement Range	±300A	
Pack Voltage Sensing		
Pack Voltage Sensing	1000V	
Pack Voltage Accuracy	≤±5%FSR	HV3 accuracy: ≤±8‰ FSR; other 2 channels: ≤±5‰ FSR
Channel Count	3	
Sampling Interval	≤20 ms	
Temperature Sensing		
Channel Count	-20°C to 65°C; accuracy: ±1°C; Other temperatures: ±2°C accuracy; 4 channels	4 isolated temperature channels, including 1 for shunt temperature
Insulation Monitoring		
Measurement Range	0~20MΩ	
Measurement Accuracy	0~50K@≤±10K; 50K~20M@≤±10%	
SOC		
SOC Accuracy	<3%	Ternary lithium cells
	<5%	Lithium iron phosphate cells
Version Identification		
Software version identification	Supported	Read via PC software
Hardware version identification	Supported	Read via PC software
Environmental Specifications		
Operating Temperature Range	-20~65°C	--
Storage Temperature Range	-40~85°C	--
Operating Humidity Range	5~95%RH	--

BPU7280A5



Flexible Wake-up Sources

ON, ACC, charger, discharge, communication and RTC wakeup

Comprehensive Safety

Multi-layer software protection with configurable strategies

High-Accuracy Sensing

Voltage: ± 10 mV; current: $\pm 1\%$ FSR

Precharge

Supplies short bursts of high current to external modules

High Current Capability

80 A continuous charge/discharge; 120 A pulse for 30 s

Multiple Communication Options

CAN, RS-485 and single-wire

Flexible Series Cell Count

Configurable 15-20S

Reliable Power Supply

100 V-rated power supply design

Microsecond Short-Circuit Protection

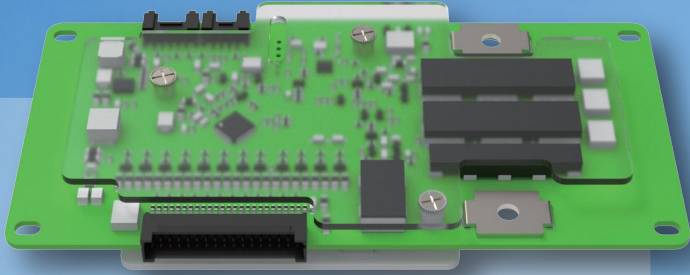
Rapid Response



Technical Specifications

Function	Parameters	Description
System Power Supply		
Nominal Voltage	72V	
Supply Voltage Range	20~90V	20S lithium manganese oxide
Power Consumption	Operating: ≤ 15 mA @ 72 V, 25°C; Standby: ≤ 3 mA @ 72 V, 25°C; Sleep: ≤ 100 μ A @ 72 V, 25°C	Low-current sensing available in standby
Wakeup	ACC wakeup ON wakeup	Active high; voltage >30 V Wake-up active at 300K resistance; wake-source identification supported
	CRG wakeup Discharge-current wakeup	Active high; voltage >30 V Wake-up active at 300K resistance; wake-source identification supported
	K-line wakeup	High-/low-level wake-up; active at 300K resistance. CRG connection can wake the unit with MOSFETs off; wake-source identification supported.
	CAN wakeup RS-485 wakeup RTC wakeup	Current >300 mA for 2 s Active high: >0.7 VDD
Voltage Sensing		
Module Voltage Sensing	Range: 20~100 V; Accuracy: MAX(0.5 V, $\pm 1\%$ FSR) @ ≥ 20 V	
Discharge Port Voltage Sensing	Range: 20~100 V; Accuracy: MAX(1.5 V, $\pm 2\%$ FSR) @ ≥ 20 V	
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ± 10 mV@2V~4.25V, 25°C; ± 20 mV@2V~4.25V, -40~85°C	
Current Sensing		
Charge/Discharge Current Sensing	Method: shunt sensing; Range: -120 A to 120 A; Accuracy: -30A~30A, ± 200 mA, 25°C; Outside ± 30 A: $\pm 2\%$ FSR	Continuous current: 75 A; Peak current: 120 A / 30 s
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 30~100 mA @ 3.4 V	
Temperature Sensing		
4 cell temperature channels	Range: -40°C to 125°C; Accuracy: $\pm 1^\circ$ C, -20~65°C; $\pm 2^\circ$ C, -40~-20°C & 65~85°C; $\pm 3^\circ$ C, 85~125°C	
2 MOSFET temperature channels; 1 balancing temperature channel; 1 pre-discharge temperature channel	Range: 0~125°C; Accuracy: $\pm 1^\circ$ C, 0~65°C; $\pm 2^\circ$ C, 65~85°C; $\pm 3^\circ$ C, 85~125°C	
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port; MOSFET drive-state feedback supported	
Charge/Discharge Current	Continuous charge/discharge current: 75 A; Pulse discharge current: 120 A / 30 s	
Predischarge		
Predischarge	C<3000uf, t<500ms	Meets minimum voltage requirement; Precharge current ≥ 2 A at 57.5 V
Communication		
RS-485	1 isolated channel, 115200 bps	
CAN	1 isolated channel, 500 kbps	
K-Line	1 non-isolated channel, 9600 bps	
Single-Wire	1 non-isolated channel, 500 bps	
Data Storage		
Flash memory	Operating log (50 entries)	
RTC		
RTC clock	Clock timekeeping supported	
Protection		
Cell overcharge / cell overdischarge / charge overcurrent / discharge overcurrent / charge & discharge overtemperature / undertemperature / MOSFET overtemperature / output short-circuit protection	Supported	
Operating Temperature	-40°C~85°C	
Storage Temperature	-40°C~85°C	
Operating Humidity	5%~95%	
Dimensions	173*82*17mm	

BPU7280B1



A battery protection board for aftermarket electric motorcycle conversions, with the following features and benefits:

Multiple Wake-up Options

Wired switch, charge/discharge, communication, Bluetooth and RTC wakeup

Comprehensive Safety

Multi-level software protection with configurable strategies

High-Accuracy Sensing

Voltage: ± 10 mV;
current: $\pm 1\%$ FSR

Precharge

Supplies short bursts of high current to external modules

High Current Capability

80 A continuous charge/discharge; 120 A pulse for 30 s

Multiple Communication Options

Bluetooth, UART and single-wire

Flexible Series Cell Count

Configurable 20~24S

Reliable Power Supply

Rated 100 V power supply design

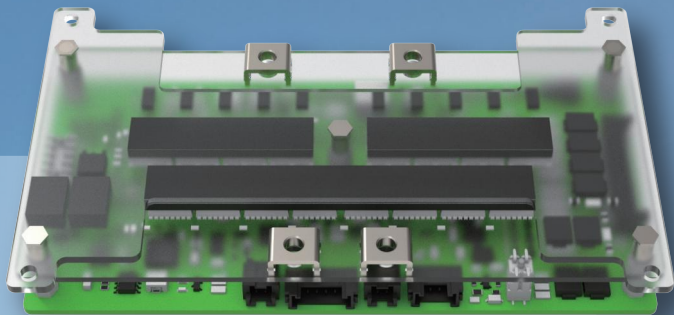
Microsecond Short-Circuit Protection

Rapid Response

Technical Specifications

Function	Parameters	Description
System Power Supply		
Nominal Voltage	72V	
Supply Voltage Range	20~90V	Lithium iron phosphate cells
Power Consumption	Operating: ≤ 15 mA @ 72 V, 25°C; Standby: ≤ 800 μ A @ 72 V, 25°C; Sleep: ≤ 50 μ A @ 72 V, 25°C	
Wake-up	Low-current switch wake-up (optional) Bluetooth wake-up Discharge-current wake-up Charging-voltage wake-up	SW active when connected to GND Discharge current >300 mA for 2 s Charger voltage - battery voltage >2 V
Voltage Sensing		
Module Voltage Sensing	Range: 20~90 V; Accuracy: MAX(1 V, $\pm 1\%$ FSR) @ ≥ 20 V	
Discharge Port Voltage Sensing	Range: 20~90 V; Accuracy: MAX(2 V, $\pm 2\%$ FSR) @ ≥ 20 V	
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ± 10 mV@2V~4.25V, 25°C; ± 20 mV@2V~4.25V, -40~85°C	
Current Sensing		
Charge/Discharge Current Sensing	Method: shunt sensing; Range: -120 A to 120 A; Accuracy: ± 0.5 A@-50A~50A, 25°C; $\pm 1\%$ FS@-120A~120A, 25°C	
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 40~100 mA @ 3.4 V	
Temperature Sensing		
2 cell temperature channels	Range: -40°C to 125°C; Accuracy: $\pm 1^\circ$ C, -20~65°C; $\pm 2^\circ$ C, -40~-20°C & 65~85°C; $\pm 3^\circ$ C, 85~125°C	
1 MOSFET temperature channel; 1 balancing temperature channel	Range: 0~125°C; Accuracy: $\pm 1^\circ$ C, 0~65°C; $\pm 2^\circ$ C, 65~85°C; $\pm 3^\circ$ C, 85~125°C	
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port; low-side control	
Charge/Discharge Current	Continuous charge/discharge current: 80 A; Pulse discharge current: 120 A / 30 s	
Pre-discharge		
Predischarge	Predischarge resistor: R = 10 Ω ; C<3000 μ F; t<500ms	
Communication		
Bluetooth	1 channel (standard)	
UART	1 channel (optional)	
Single-wire communication	1 channel (optional)	
Data Storage		
Flash memory	Stores historical fault data	
RTC		
RTC clock	Supported	
Protection		
Cell overcharge/overdischarge; charge/discharge overcurrent, overtemperature and undertemperature; MOSFET overtemperature; output short circuit protection	Supported	
Operating Temperature	-40°C~85°C	
Storage Temperature	-40°C~85°C	
Operating Humidity	5%~95%	
Dimensions	130*78.7*15.6mm	

BPU6480A1



A battery protection board for electric motorcycle OEMs, with the following features and benefits:

Efficient Heat Dissipation

Stacked two-board design for efficient space utilization

Comprehensive Safety

Multi-level software protection with configurable strategies

Multiple Wake-up Options

ON/ACC, charger, load connection, discharge, communication and RTC wake-up

High-Accuracy Sensing

Voltage: ± 10 mV; current: $\pm 1\%$ FSR

Precharge

Supplies short bursts of high current to external modules

High Current Capability

80 A continuous charge/discharge; 120 A pulse for 30 s

Flexible Communication

CAN, single wiring and serial communication

Flexible Series Cell Count

Configurable 15S to 20S

Reliable Power Supply

Rated 100V power supply design

Microsecond Short-Circuit Protection

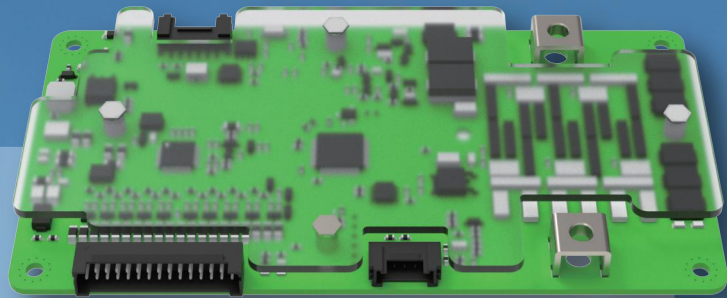
Rapid Response



Technical Specifications

Function	Parameters	Description
System Power Supply		
Nominal Voltage	64V	
Supply Voltage Range	20~80V	20S lithium iron phosphate
Power Consumption	Operating: ≤ 15 mA @ 64 V, 25°C; Cyclic low-power mode: ≤ 700 μ A, 25°C; Undervoltage low-power mode: ≤ 500 μ A, 25°C; Deep-undervoltage low-power mode: ≤ 500 μ A, 25°C; Sleep: ≤ 50 μ A @ 64 V, 25°C	
Wakeup	ACC wakeup	Active high; voltage >30 V; Wakeup and wake source identification supported
	ON wakeup	
	CRG wakeup (reserved)	Active high; voltage >30 V; Wakeup and wake source identification supported
	Load-connection wake-up	
	Current wake-up	High-level wakeup; With MOSFETs off, CRG can't wake the unit
	K-line wake-up	
	CAN wake-up	Wakeup and wake source identification supported
	RTC wake-up	
	Charger wake-up	
Voltage Sensing		
Module Voltage Sensing	Range: 20~100 V; Accuracy: MAX(0.5 V, $\pm 1\%$ FSR) @ ≥ 20 V	
Discharge Port Voltage Sensing	Range: 20~100 V; Accuracy: MAX(1.5 V, $\pm 2\%$ FSR) @ ≥ 20 V	
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ± 10 mV@2V~4.25V, 25°C; ± 20 mV@2V~4.25V, -40~85°C	
Current Sensing		
Charge/Discharge Current Sensing	Method: shunt sensing; Range: -120 A to 120 A	Continuous current: 80 A; Peak current: 120 A / 30 s
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 60~110 mA @ 3.4 V	
Temperature Sensing		
3 cell temperature channels	Range: -40°C to 125°C; Accuracy: $\pm 1^\circ$ C, -20~65°C; $\pm 2^\circ$ C, -40~-20°C & 65~85°C; $\pm 3^\circ$ C, 85~125°C	
1 MOSFET temperature channel	Range: 0~125°C; Accuracy: $\pm 1^\circ$ C, 0~65°C; $\pm 2^\circ$ C, 65~85°C; $\pm 3^\circ$ C, 85~125°C	
1 balancing-resistor temperature channel	Range: 0~125°C; Accuracy: $\pm 1^\circ$ C, 0~65°C; $\pm 2^\circ$ C, 65~85°C; $\pm 3^\circ$ C, 85~125°C	
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port	
Charge/Discharge Current	Continuous charge/discharge current: 80 A; Pulse discharge current: 120 A / 30 s	
Pre-discharge		
Predischarge	C<3000uf, t<500ms	
Communication		
CAN	1 isolated channel, 250 kbps	
K1 single-wire	1 channel, unisolated	
K2 single-wire	1 channel, unisolated	
Cat 1 communication	LTE-FDD B1/B3/B5/B8; LTE-TDD B34/B38/B39/B40/B41	External 4G module required
Positioning		
GNSS	GPS/BDS/GLONASS supported; Positioning accuracy: 10 m in open areas	External GPS module required
Data Storage		
Flash memory	Operating log	
RTC		
RTC clock	Clock timekeeping supported	
Protection		
Cell overcharge/overdischarge; charge/discharge overcurrent, overtemperature and undertemperature; MOSFET overtemperature; output short-circuit protection	Supported	
Operating Temperature	Storage Temperature	Operating Humidity
-40°C~85°C	-40°C~85°C	5%~95%
		Dimensions
		140mm×85mm×21.5mm

BPU6060A1



A battery protection board for shared battery-swapping applications, with the following features and benefits:

Multiple Wakeup Options
Wired switch, charge/discharge, communication and RTC wake up

Comprehensive Safety
Multi-level software protection with configurable strategies

Expansion Options & Cloud Connectivity
External indicator board, 4G/GPS and Bluetooth modules supported, with cloud-based real-time positioning and data monitoring.

High-Accuracy Sensing
Voltage: ± 10 mV; current: $\pm 1\%$ FSR

Precharge
Supplies short bursts of high current to external modules

High Current Capability
60 A continuous charge/discharge; 90 A pulse for 30S

Flexible Communication
CAN, singlewiring, RS-485 and serial communication

Flexible Series Cell Count
Configurable 15S to 20S

Reliable Power Supply
Rated 100 V power supply design

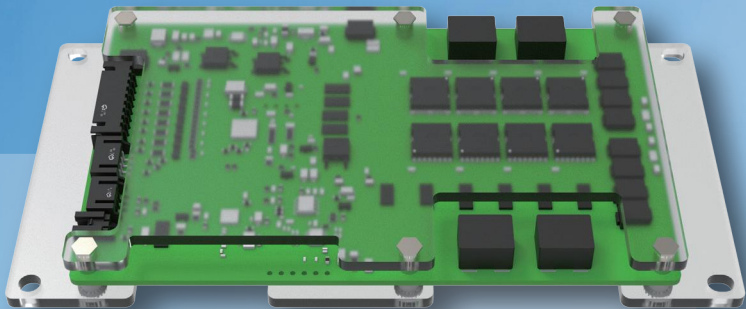
Microsecond Short-Circuit Protection
Rapid Response



Technical Specifications

Function	Parameters	Description
System Power Supply		
Voltage Platform	60V	Lithium iron phosphate cells
Supply Voltage Range	20~90V	
Power Consumption	Operating: ≤ 15 mA @ 64 V, 25°C; Standby: ≤ 500 μ A @ 64 V, 25°C; Sleep: ≤ 50 μ A @ 64 V, 25°C	
Wakeup	Low-current switch wakeup (optional) Discharge-current wakeup Charging-voltage wakeup	SW active when connected to GND Discharge current > 300 mA for 2 s Charger voltage - battery voltage > 2 V
Voltage Sensing		
Module Voltage Sensing	Range: 20~90 V; Accuracy: MAX(1 V, $\pm 1\%$ FSR) @ ≥ 20 V	
Discharge Port Voltage Sensing	Range: 20~90 V; Accuracy: MAX(2 V, $\pm 2\%$ FSR) @ ≥ 20 V	
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ± 10 mV @ 2V~4.25V, 25°C; ± 20 mV @ 2V~4.25V, -40~85°C	
Current Sensing		
Charge/Discharge Current Sensing	Method: shunt sensing; Range: -120 A to 120 A; Accuracy: ± 0.5 A @ -50A~50A, 25°C; $\pm 1\%$ FS @ -120A~120A, 25°C	
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 40~100 mA @ 3.4 V	
Temperature Sensing		
2 cell temperature channels	Range: -40°C to 125°C; Accuracy: $\pm 1^\circ$ C, -20~65°C; $\pm 2^\circ$ C, -40~-20°C & 65~85°C; $\pm 3^\circ$ C, 85~125°C	
1 MOSFET temperature channel; 1 balancing temperature channel	Range: 0~125°C; Accuracy: $\pm 1^\circ$ C, 0~65°C; $\pm 2^\circ$ C, 65~85°C; $\pm 3^\circ$ C, 85~125°C	
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port; low-side control	
Charge/Discharge Current	Continuous charge/discharge current: 60 A; Pulse discharge current: 90 A / 30 s	
Pre-discharge		
Pre-discharge	Pre-discharge resistor: R = 10 Ω ; 0C 3000uF, t<500ms	
Communication		
RS-485	1 channel (standard)	
CAN	1 channel (optional)	
UART	1 channel (optional)	
Single wiring communication	1 channel (optional)	
Data Storage		
Flash memory	Stores historical fault data	
RTC		
RTC clock	Supported	
Protection		
Cell overcharge/overdischarge; charge/discharge overcurrent, overtemperature and undertemperature; MOSFET overtemperature; output short-circuit protection	Supported	
Operating Temperature	-40°C~85°C	
Storage Temperature	-40°C~85°C	
Operating Humidity	5%~95%	
Dimensions	140mm*75mm*13.8mm	

BCU24100A2



A protection board for lithium batteries replacing lead-acid batteries, with the following features and benefits:

Multiple Wakeup Options
Bluetooth, charger and discharge-current wakeup

Comprehensive Safety
Multi-level software protection with configurable strategies

Supports four battery packs in series
100 V-rated MOSFET design

High-Accuracy Sensing
Voltage: ± 10 mV; current: $\pm 2\%$ FSR

Precharge
Supplies short bursts of high current to external modules

High Current Capability
100 A continuous charge/discharge; 200 A pulse for 3 S

Flexible Communication
Bluetooth app / Mini Program; non-isolated UART

Series Cell Count
Configurable 4S to 8S

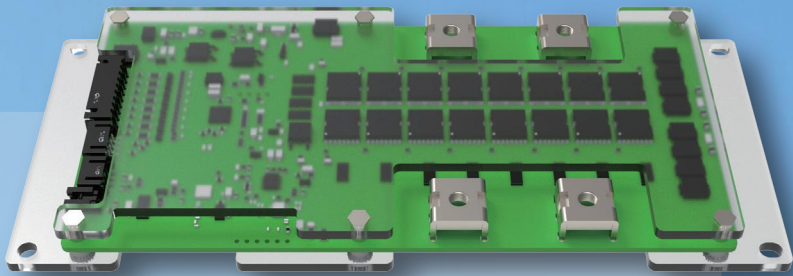
Microsecond Short-Circuit Protection
Rapid Response



Technical Specifications

Function	Specifications	Description
System Power Supply		
Nominal Voltage	12V, 24V	
Supply Voltage Range	10~36V	
Power Consumption	Operating: ≤ 30 mA @ 25.6 V, 25°C; Light sleep: ≤ 800 μ A @ 25.6 V, 25°C; Deep sleep: ≤ 50 μ A @ 25.6 V, 25°C	
Wakeup (Light Sleep)	Discharge-current wakeup	Current >1 A for 2 s
	Bluetooth wakeup	Bluetooth connection
	Charger wakeup	Charger voltage - battery voltage >2 V
Wakeup (Deep Sleep)	Charger wakeup	Charger voltage - battery voltage >2 V
Voltage Sensing		
Module Voltage Sensing	Range: 10~36 V; Accuracy: MAX(0.5 V, $\pm 1\%$ FSR) @ ≥ 10 V	
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ± 10 mV @ 2~4.2 V, 25°C; ± 20 mV @ 2V~4.2V, -40~85°C	
Current Sensing		
Charge/Discharge Current Sensing	Method: shunt sensing; Range: -300 A to 300 A; Accuracy: $\pm 2\%$ FSR	
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 30~100 mA @ 3.4 V	
Temperature Sensing		
2 cell temperature channels	Range: -40°C to 125°C; Accuracy: $\pm 2^\circ$ C, -40~85°C; $\pm 3^\circ$ C, 85~125°C	
1 MOSFET temperature channel	Range: 0~125°C; Accuracy: $\pm 2^\circ$ C, 0~85°C; $\pm 3^\circ$ C, 85~125°C	
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port	
Charge/Discharge Current	Continuous charge/discharge current: 100 A; Pulse discharge current: 200 A / 5 s	
Precharge		
Resistor precharge	R=100 Ω , t=5s	
Communication		
Bluetooth	BLE5.1	
Data Storage		
Flash memory	Fault log (100 entries)	
Protection		
Cell overcharge/overdischarge; charge/discharge overcurrent, overtemperature and undertemperature; MOSFET overtemperature; output short-circuit protection	Supported	
Operating Temperature	-20°C~70°C	
Storage Temperature	-40°C~85°C	
Operating Humidity	10%~90%	
Dimensions	135*85*20mm	

BCU12200A2



A protection board for lithium batteries replacing lead-acid batteries, with the following features and benefits:

Multiple Wakeup Options
Bluetooth, charger and discharge-current wake-up

Comprehensive Safety
Multi-level software protection with configurable strategies

Supports four battery packs in series
100 V-rated MOSFET design

High-Accuracy Sensing
Voltage: ± 10 mV; current: $\pm 2\%$ FSR

Precharge
Supplies short bursts of high current to external modules

High Current Capability
200 A continuous charge/discharge; 300 A pulse for 3 S

Flexible Communication
Bluetooth app / Mini Program; unisolated UART

Series Cell Count
Configurable 4S to 8S

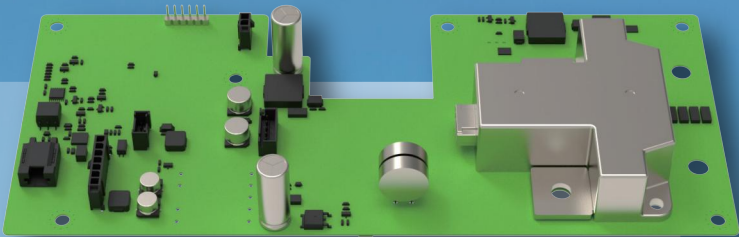
Microsecond Short-Circuit Protection
Rapid Response



Technical Specifications

Function	Parameters	Description
System Power Supply		
Nominal Voltage	12V, 24V	
Supply Voltage Range	10~36V	
Power Consumption	Operating: ≤ 30 mA @ 25.6 V, 25°C; Sleep: ≤ 800 μ A @ 25.6 V, 25°C; Shutdown: ≤ 50 μ A @ 25.6 V, 25°C	
Data Management		
Discharge-current wakeup		Current > 1 A for 2 s
Bluetooth wakeup		Bluetooth connection
Charger wakeup		Charger voltage - battery voltage > 2 V
Voltage Sensing		
Module Voltage Sensing	Range: 10~36 V; Accuracy: MAX(0.5 V, $\pm 1\%$ FSR) @ ≥ 10 V	
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ± 10 mV @ 2~4.2 V, 25°C; ± 20 mV @ 2V~4.2V, -40~85°C	
Current Sensing		
Charge/Discharge Current Sensing	Method: shunt sensing; Range: -500 A to 500 A; Accuracy: $\pm 2\%$ FSR	
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 30~100 mA @ 3.4 V	
Temperature Sensing		
2 cell temperature channels	Range: -40°C to 125°C; Accuracy: $\pm 2^\circ$ C, -40~85°C; $\pm 3^\circ$ C, 85~125°C	
1 MOSFET temperature channel	Range: 0~125°C; Accuracy: $\pm 2^\circ$ C, 0~85°C; $\pm 3^\circ$ C, 85~125°C	
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port	
Charge/Discharge Current	Continuous charge/discharge current: 200 A; Pulse discharge current: 300 A / 5 s	
Precharge		
Resistor precharge	R=100 Ω , t=5s	
Communication		
Bluetooth	BLE5.1	
Data Storage		
Flash memory	Fault log (100 entries)	
Protection		
Cell overcharge/overdischarge; charge/discharge overcurrent, overtemperature and undertemperature; MOSFET overtemperature; output short-circuit protection	Supported	
Operating Temperature	-20°C~70°C	
Storage Temperature	-40°C~85°C	
Operating Humidity	10%~90%	
Dimensions	170*85*20mm	

BPU96200A10



A high-voltage, high-current lithium battery protection board, with the following features and benefits:

Automotive-Grade Daisy Chain

Cascaded controller/module links resist HV break down; CAN communication provides high

Dual HV Protection

Disconnects if an HV connector loosens, preventing sudden incidents and protecting people and property.

High-Voltage Latching Relay

200 A / 350 V; zero-voltage switching (ZVS), no arcing/contact welding, fault detection and self-recovery. The relay replaces multiple NMOS banks for greater stability and less heat.

32S High-Voltage Platform

90 V to 120 V; 160 A charging; 80 A continuous / 200 A maximum discharge; 600 A pulses for 3 s, supporting demanding loads.

Accurate Sensing & SOC Estimation

Voltage accuracy of ± 10 mV and current accuracy of $\pm 1\%$ FSR, with intelligent SOC estimation for precise battery monitoring.

Ultra-Low Power & Wide Input Range

Operating current: 19 mA; storage mode: 0.02 μ A. Isolated supply: 10-200 V input, 12 V / 4 A output; ripple Vpp = 70

4G + GPS Connectivity

Remote location and backend monitoring; one-touch app startup; remote updates and data readout.

8 Temperature Channels

Comprehensive Thermal Protection

Microsecond Short-Circuit Protection

Rapid hardware and software protection

Flexible Controller Architecture

Supports module units with different series cell counts for shorter, lower-cost development and faster, reliable launches.



Technical Specifications

Function	Parameters	Description
System Power Supply		
Nominal Voltage	96V	1P32Sh (single pack)
Supply Voltage Range	96~116.8V	
Current Consumption	Sleep current: storage mode $\leq 40 \mu\text{A}$ @ 96 V, 25°C; Operating current: $\leq 20 \text{ mA}$ @ 48 V	No driver; no external power output
Wake-up	Storage-mode wakeup Charger wakeup Communication wakeup	Charger wakeup: none Communication wakeup: none
Voltage Sensing		
Module Voltage Sensing	Range: 96~116.8 V; Accuracy: Max($\pm 1\%$ FSR) @ $\geq 32 \text{ V}$	Software calibration supported
P+/P- Terminal Voltage Sensing	Range: 96~116.8 V; Accuracy: Max(2.0 V, $\pm 2\%$ FSR) @ $\geq 32 \text{ V}$	Software calibration supported
Cell Voltage Sensing	Range: 0~5 V; Accuracy: $\pm 10 \text{ mV}$ @ 2~4.2 V, 0~65°C; $\pm 20 \text{ mV}$ @ 2V~4.2V, -40~85°C	Software calibration supported
Current Sensing		
Charge/Discharge Current Sensing	Method: onboard shunt; Range: -200 A to 200 A; Accuracy: $\leq 2\%$ @ FS	Software calibration supported
Bidirectional Current Sensing	Supported	
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 40~100 mA @ 3.4 V	
Temperature Sensing		
8 cell temperature channels	Range: -40°C to 125°C; Accuracy: -20~65°C $\leq \pm 1^\circ\text{C}$; -40~85°C $\leq \pm 2^\circ\text{C}$; 85~125°C $\leq \pm 3^\circ\text{C}$	
Charge/Discharge		
Charge/Discharge Control	Single-relay control	
Current Rating	Max. continuous charge: 200 A; Max. continuous discharge: 200 A	
DC Bus Control		
Relay	Latching, 200 A / 350 V	
Release / Operate Time	$\leq 15 \text{ ms}$	
Dual coil	Common ground at midpoint	Coil resistance: 4R $\times$ 2
Coil Supply	18V/100ms	
Precharge		
Precharge	Precharge current limit: 1 A; 2200uF/300ms	
Communication		
4G communication		
CAN	1 channel, 500k	
GPS positioning		
Other Interfaces		
Daisy Chain	1 channel	Communication with module units
Relay Control Interface	Dual-coil pulse control	With bus voltage feedback
Storage Control	1 channel	
High-Voltage Enable Control	1 channel	
HV Circular-Connector Detection Interface	1 channel	
12 V, 50 W DC output	1 channel	
Precharge Circuit	1 channel	
Temperature Sensor	8 channels	
Fuse	1 channel	300A
Shunt	0.1mR	18W
Passive balancing	32 channels	40~60mA
General Specifications		
Charge/Discharge Port Configuration	Common charge/discharge port	
Charging Voltage	3.6 V $\times$ series cell count	
Cell Voltage Range	2.50~3.75V	
Max. Continuous Charge Current	160A	
Max. Continuous Discharge Current	80A	
Operating Current	$\leq 20 \text{ mA}$	
Light-Sleep Current	Not currently available	
Storage-Mode Current	40 μ A	
CAN wakeup	Not currently available	

APEX T1-135K-G1



A PCS for commercial and industrial PV-plus-storage applications, converting DC into AC at a fixed frequency and voltage. Features and benefits:

Automotive-Grade Daisy Chain

Cascaded controller/module links resist HV breakdown; CAN communication provides high noise immunity.

Dual HV Protection

Disconnects if an HV connector loosens, preventing sudden incidents and protecting people and property.

High-Voltage Latching Relay

200 A / 350 V; zero-voltage switching (ZVS), no arcing/contact welding, fault detection and self-recovery. The relay replaces multiple NMOS banks for greater stability and less heat.

32S High-Voltage Platform

90 V to 120 V; 160 A charging; 80 A continuous / 200 A maximum discharge; 600 A pulses for 3 s, supporting demanding loads.

Accurate Sensing & SOC Estimation

Voltage accuracy of ± 10 mV and current accuracy of $\pm 1\%$ FSR, with intelligent SOC estimation for precise battery monitoring.

Ultra-Low Power & Wide Input Range

Operating current: 19 mA; storage mode: $0.02 \mu\text{A}$. Isolated supply: 10-200 V input, 12 V / 4 A output; ripple $V_{pp} = 70$ mV.

Flexible Communication

Bluetooth app / Mini Program; non-isolated UART

Series Cell Count

Configurable 4S to 8S

Microsecond Short-Circuit Protection

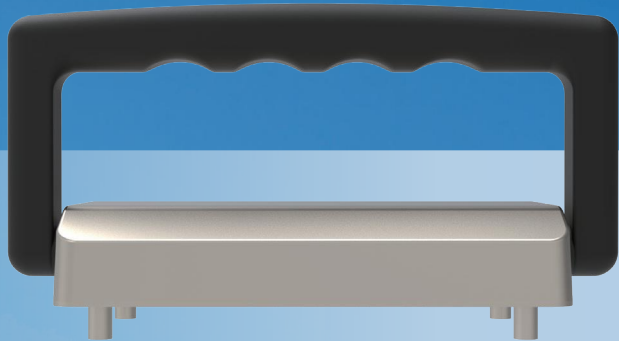
Rapid Response



Technical Specifications

Function	Parameters	Description
DC Specifications		
Max. DC Voltage (V)	1000	
Operating Voltage Range (V)	580~950	
Max. DC Current (A)	APEX T1-125K-G1: 208.3; APEX T1-135K-G1: 214.3	
AC Specifications		
Rated Voltage (V)	400	
Rated Current (A)	APEX T1-125K-G1: 180.4; APEX T1-135K-G1: 194.9	
Output Frequency (Hz)	50/60±0.5	
Rated Output Power (kW)	APEX T1-125K-G1: 125; APEX T1-135K-G1: 135	
Unbalanced Load Capability	100%	
Grid Connection	3-phase, 4-wire	
System Specifications		
Dimensions	660 × 280 × 776 mm (W × H × D)	
Weight	≤102kg	
IP Rating	IP66	
Protection Class	Class I	
Operating Temperature Range	-30°C to 60°C (derating above 45°C)	
Operating Humidity Range	0~100%	
Cooling	Intelligent forced-air cooling	
Max. Operating Altitude	4000 m (derating above 3000 m)	
Display	LED	
Communication Interfaces	Ethernet, RS-485, CAN	
Power Interface		
DC Wiring	Copper conductor cross-section: $\geq 70 \text{ mm}^2$	
AC Wiring	Copper conductor cross-section: $\geq 70 \text{ mm}^2$	
Signal Interface		
Ethernet Port	Cat 5e cable	
DI/DO	Wire size: $0.3\text{--}0.5 \text{ mm}^2$	
High-Voltage Sensing	Wire size: $0.3\text{--}0.5 \text{ mm}^2$	
RS-485/CAN	Shielded twisted-pair cable	

DTU401B53



An intelligent 3-in-1 solution for lithium-battery mobility, with the following features and benefits:

3-in-1 Connectivity Terminal

Bluetooth, multi-carrier 4G and positioning in one device

Wide Temperature Range & Dual-SIM Redundancy

Reliable operation from -40°C to 85°C; built-in eSIM plus external SIM support connectivity in remote areas.

DFOTA Remote Updates

Wireless firmware updates significantly reduce maintenance costs.

Multi-GNSS Positioning & Offline Service

Real-time GPS/BDS/GLONASS tracking and local Bluetooth data transfer, with no on-site internet connection required.

Real-Time BMS Monitoring

Access the 4G module over Bluetooth to view battery status at a glance.

Versatile Applications

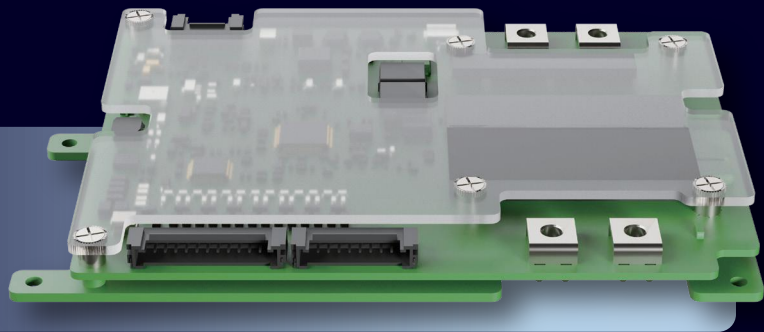
Remote monitoring for two-/three-wheel lithium-battery vehicles and industrial automation, plus onboard data transmission for intelligent transportation.



Technical Specifications

Function	Parameters	Description
Power Supply		
Supply Range	4.2~17V	Typical supply: 12 V
Rated Power Consumption	Operating current: ≤30 mA; Light-sleep current: ≤1.3 mA; Shutdown current: ≤6 μA	
Serial Communication		
Data Rate	Baud rates: 9600, 115200; 1 channel	1 external channel supported
3-in-1		
4G Module	Network access supported; 1 channel	Multi-carrier 4G
4G Module	Positioning supported; 1 channel	GPS\BDS\GNSS
Bluetooth	Wireless and serial connectivity; BLE 5.1	WeChat Mini Program and mobile Bluetooth app
Wakeup Methods		
Communication wake-up 4G/Bluetooth wake-up	Via external input signal 2 channels	External Wake-up
Positioning Features		
Positioning Accuracy	5M	Open areas (slightly reduced performance on campuses)
Tracking Sensitivity	-164dBm	
Cold Start	<30s	Starts within 30 s
Hot Start	<3s	Starts within 3 s
Communication Features		
Frequency Bands	LTE_FDD: B1/B3/B5/B8; LTE_TDD: B34/B39/B40/B41	Mainstream FDD/TDD bands in China
SIM Card	Internal SIM card and surface-mount eSIM	Choose one of two options
Signal Antenna		
4G antenna	Receives 4G signals; 1 channel	Attach to the side or rear of a structural part.
GPS ceramic antenna	Receives GPS signals; 1 channel	Board-mounted
Environmental Specifications		
Operating Temperature Range	-40~85°C	--
Storage Temperature Range	-40~85°C	--
Dimensions		
L × W × H	PCB dimensions: 68 × 32 × 1.6 mm	

BPU4870A1



Designed specifically for robotic applications, with the following features and benefits:

Isolated Communication & Flexible Wake-up

Onboard isolated RS-485 provides high noise immunity. Charge/discharge current, communication and charger-connection wake-up support standby, sleep and rapid power-on operation.

Common Hardware Platform

Supports 13 to 16 cells in series and robot battery packs across different power ratings, reducing hardware redesign costs across models.

Accurate Sensing & Intelligent Estimation

Based charge/discharge current sensing and real-time batter monitoring enable accurate SOC/SOH estimation.

Comprehensive Temperature Sensing & Passive Balancing

Multiple channels monitor cell, MOSFET and ambient temperatures. Passive balancing maintains cell consistency and safe power delivery during extended operation.

Convenient PC Configuration Tool

Read device data, update firmware OTA, configure parameters, and import/export data to simplify commissioning and maintenance.

Modular, Decoupled Hardware & Software

Shortens development cycles and accelerates volume production of robotics projects.



Technical Specifications

Function	Pameters	Description
System Power Supply		
Nominal Voltage	48V	
Supply Voltage Range	30~60V	
Power Consumption	Operating mode: ≤15 mA @48.0V, 25°C; Light sleep: ≤500 μA @48.0V, 25°C; Deep sleep: ≤200 μA @48.0V, 25°C	
Wake-up (Light Sleep)	ON switch wakeup RS-485 wakeup Discharge wakeup Local wakeup Charger wakeup	ON shorted to P+ Supported Discharge MOSFET on; current >1 A for 2 s Discharge MOSFET off Charger voltage - battery voltage >2 V
Wake-up (Deep Sleep)	ON switch wake-up Charger-connection wake-up	ON shorted to P+ Charger voltage - battery voltage >2 V
Voltage Sensing		
Module Voltage Sensing	Range: 30~60 V; Accuracy: MAX(0.5 V, ±1% FSR) @ ≥30 V	
Cell Voltage Sensing	Range: 0~5 V; Accuracy: ±10 mV @ 2~4.2 V, 25°C; ±20mV@2V~4.2V, -40~85°C	
Current Sensing		
Charge/Discharge Current Sensing	Method: shunt sensing; Range: -200 A to +200 A; Accuracy: ±0.5 A @ -70 A to 70 A, 25°C; ±1%FS@-120A~120A, 25C	
Cell Balancing		
Cell Voltage Balancing	Method: passive balancing; Balancing current: 40~100 mA	
Temperature Sensing		
4 cell temperature channels	Range: -40°C to 125°C; Accuracy: ±2°C, -40~85°C; ±3°C, 85~125°C	
1 MOSFET temperature channel	Range: -40°C to 125°C; Accuracy: ±2°C, 0~85°C; ±3°C, 85~125°C	
1 ambient temperature channel	Range: -40°C to 125°C; Accuracy: ±2°C, -40~85°C; ±3°C, 85~125°C	
1 balancing-resistor temperature channel	Range: -40°C to 125°C; Accuracy: ±2°C, -40~85°C; ±3°C, 85~125°C	
Charge/Discharge		
Charge/Discharge Control	Common charge/discharge port	
Charge/Discharge Current	Continuous charge/discharge current: 70 A; Pulse discharge current: 100 A / 5 s	Peak current: 100 A / 5 s
Precharge		
PTC precharge	Supported range: 3000~10000 μF	Capacitive or inductive loads
Communication		
RS-485	Isolated	Baud rates: 9600 bps, 115200 bps
Data Storage		
Flash memory	Fault log (100 entries)	
Protection		
Cell overcharge/overdischarge; charge/discharge overcurrent, overtemperature and undertemperature; MOSFET overtemperature; output short-circuit protection; secondary protection	Supported	
Operating Temperature	-20°C~70°C	
Storage Temperature	-40°C~85°C	
Operating Humidity	10%~90%	
Dimensions	132*100*12.69mm	