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Version No.: V1.0

# Inductive Active Balancer

(EK-L22S1A)

## Product Datasheet

Shenzhen Enerkey BMS Power Technology Co., LTD

## Shenzhen Enerkey BMS Power Technology Co., LTD

|                      |                           |
|----------------------|---------------------------|
| Product Name         | Inductive Active Balancer |
| Product Model        | EK-L22S1A                 |
| Version              | V1.0                      |
| Adapt Battery String | 22S                       |
| Adapt Battery Type   | NCM/ LFP                  |
| Effective date       | 15th.Nov.2023             |

| Product change history |            |                          |         |
|------------------------|------------|--------------------------|---------|
| Version                | Date       | Change point description | Approve |
| V1.0                   | 2023-12-15 | Initial version          |         |

|            |                                                                                                                                                       |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
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Enerkey

## 1. Overview

- ①. This series of inductor-adjacent balancing boards is a balancing management system tailor-made for small-capacity series-connected battery packs.
- ②. This series of inductors are adjacent to the balancing board, and the voltage difference generated by charging and discharging triggers the balancing board to work, achieving balanced energy transfer.
- ③. This module fully automatically detects adjacent pressure differences around the clock to achieve active energy transfer balance.
- ④. When the voltage difference between adjacent batteries is  $>0.1V$ , the balancing operation is automatically triggered until the voltage difference between adjacent batteries is  $\leq 0.03V$ , and the balancing is completed.
- ⑤. When the adjacent voltage difference is  $0.1V$ , the balancing current reaches a maximum of  $1A$ . The balancing current is positively related to the adjacent voltage difference.
- ⑥. This series of inductor-adjacent balancing boards is suitable for mainstream ternary lithium batteries and lithium iron phosphate batteries on the market. Supports 2 to 24 battery strings. The inductance balancing board is not recommended for use with low strings. The indicator light will flash and an error message will appear. It cannot be used as a maintenance tool and the balancing efficiency is relatively low.
- ⑦. It is mostly used in battery packs of electric toys, electric balance vehicles, outdoor energy storage, small household appliances and other products. It can also be used for battery balancing maintenance and repair, etc. It mainly plays the role of repairing the battery pack voltage, restoring the battery pack capacity, and extending the battery pack life.

## 2. Technical Parameters

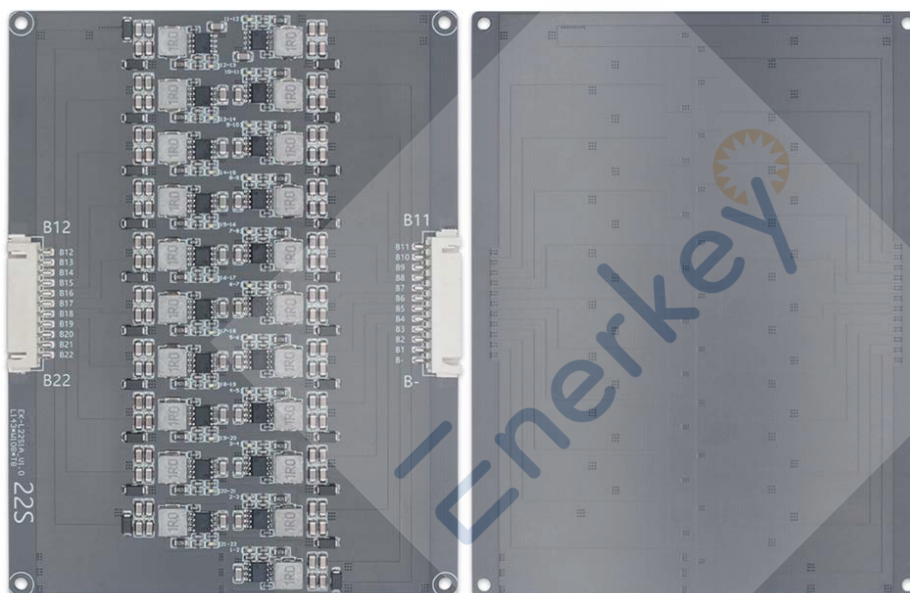
|                                       |                                                                                                                                                                                      |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name                          | EK-L22S1A                                                                                                                                                                            |
| Adapt String                          | 22s                                                                                                                                                                                  |
| Adapt Battery Type                    | NCM/LFP                                                                                                                                                                              |
| Cell Voltage Working Range            | 3.0-4.5V                                                                                                                                                                             |
| Cascading                             | Support (Not recommended)                                                                                                                                                            |
| Voltage Balancing Accuracy            | Adjacent voltage difference 30mV (typical value)                                                                                                                                     |
| balanced Approach                     | Detecting that the voltage difference between adjacent batteries is greater than 100mV triggers equalization;<br>Stop working when the adjacent voltage difference is less than 30mV |
| Balanced Current                      | 0.05V voltage difference balancing current 0.5A<br>0.1V voltage difference reaches the maximum balancing current of 1A                                                               |
| Undervoltage Protection Sleep Voltage | When the adjacent voltage difference is less than 30mV, it enters sleep state.                                                                                                       |
| Quiescent Operating Current           | 10uA                                                                                                                                                                                 |

|                                       |                                                                                                                          |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Working Temperature                   | -20℃ - +60℃                                                                                                              |
| Whether need an external power supply | No external power supply required;<br>Relying on internal energy transfer of the battery to achieve adjacent equilibrium |
| Product Size                          | L143*W108*T8mm                                                                                                           |
| Product Gross Weight                  | 135g                                                                                                                     |

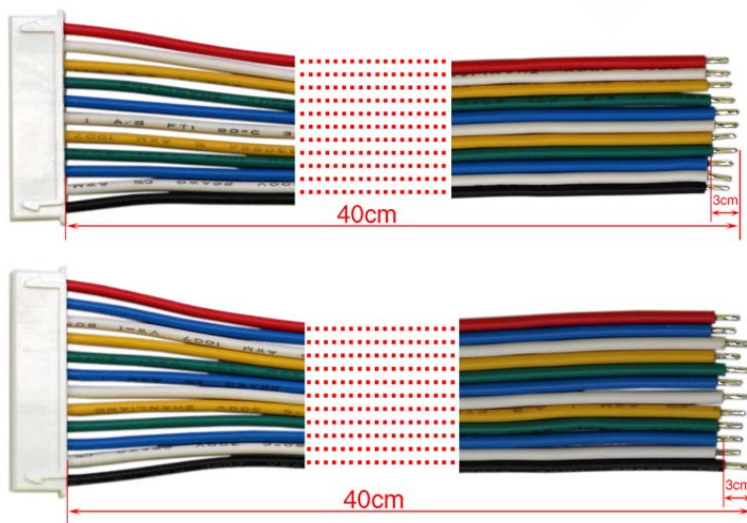
### 3. Product Photo

#### 1) Product Appearance

Special note: The shipped products are all coated with conformal anti-paint.



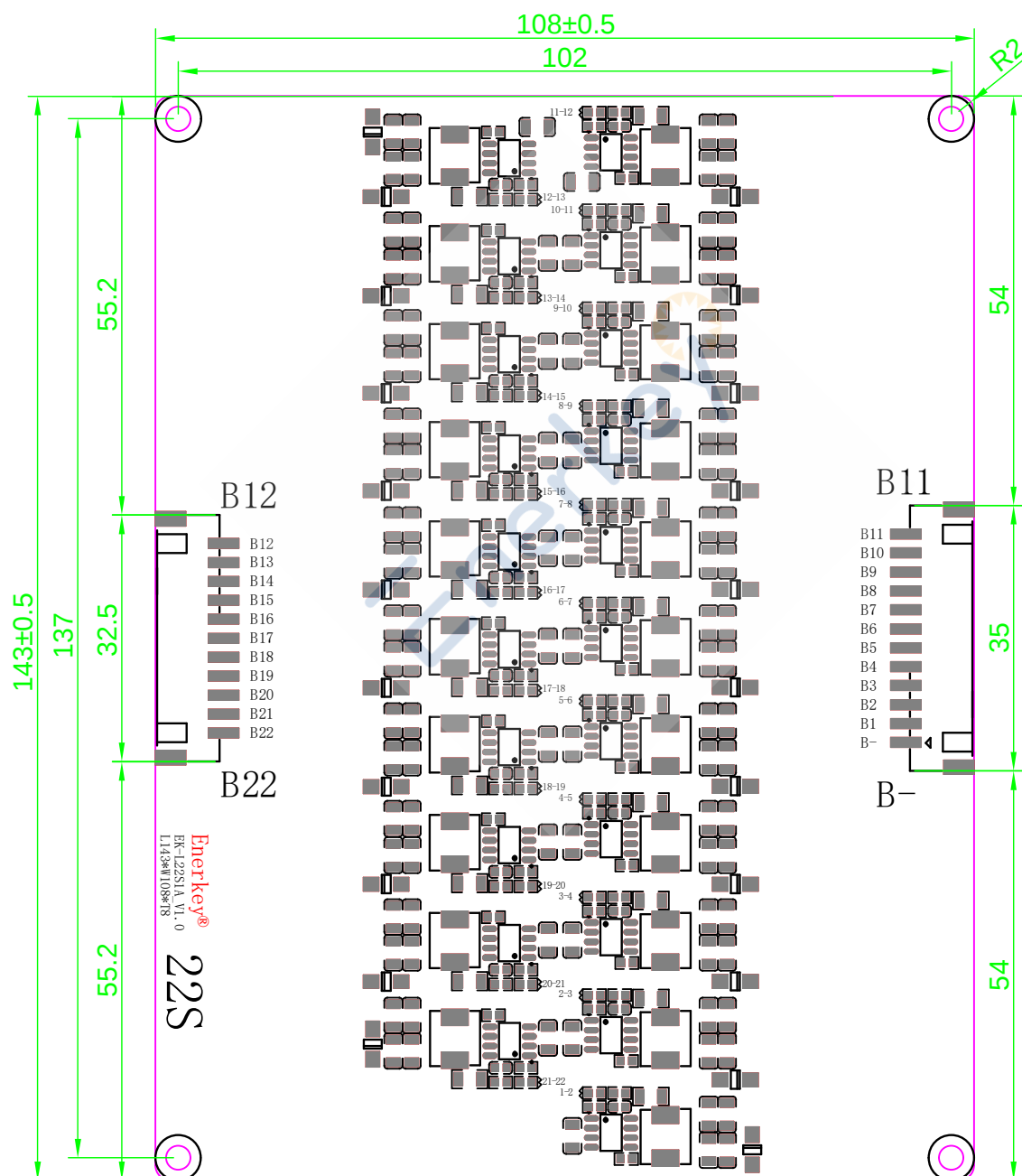
#### 2) Accessories



| Accessories specifications |          |             |             |                  |          |
|----------------------------|----------|-------------|-------------|------------------|----------|
| Terminal specifications    | Material | Line number | Line length | Stripping length | Quantity |
| XH2.54mm_11Pin             | Cu       | 22AWG       | 40cm        | 3cm              | 1        |
| XH2.54mm_12Pin             | Cu       | 22AWG       | 40cm        | 3cm              | 1        |

## 4. Product Drawing

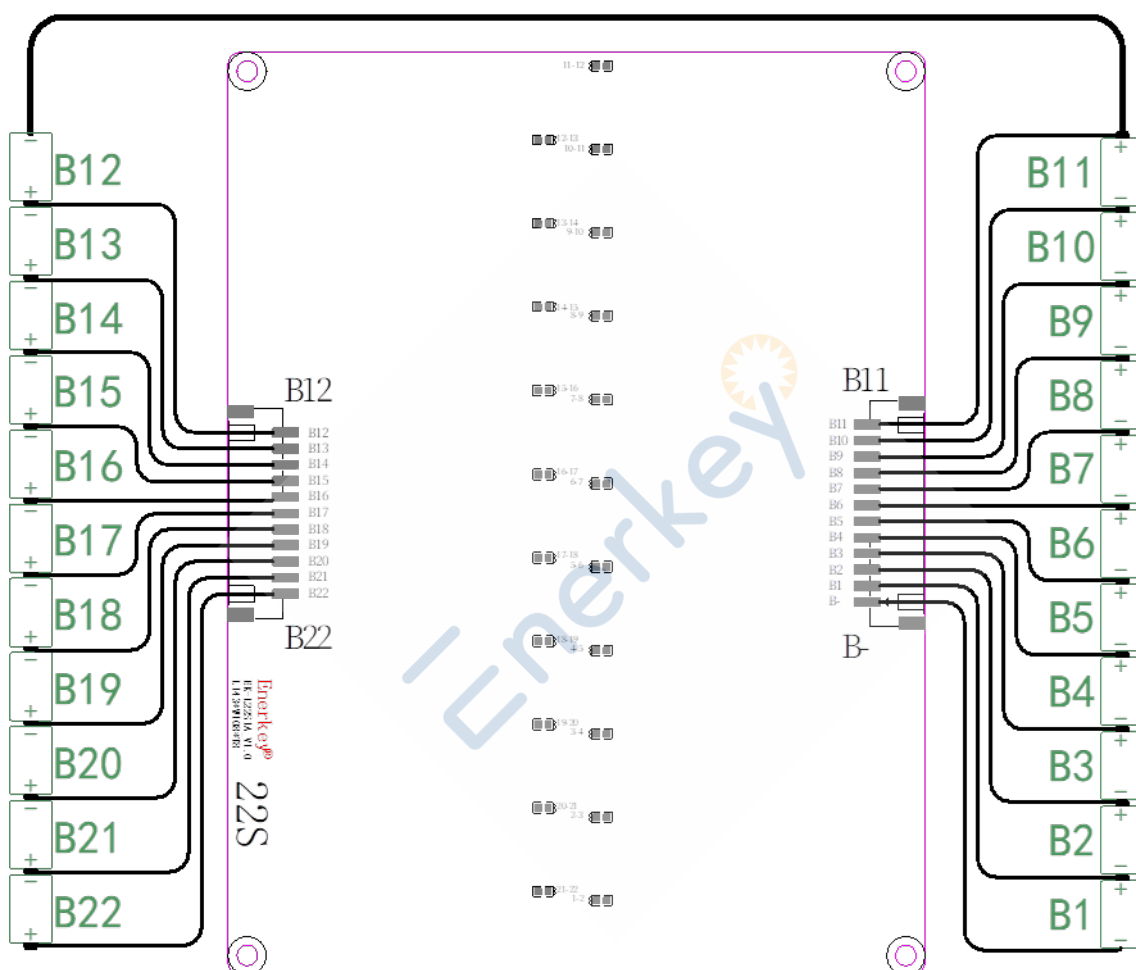
(No tolerance noted:  $\pm 0.15$ , Unit: mm)



| PCB Specifications |      |       |         |
|--------------------|------|-------|---------|
| Material           | FR-4 | Layer | 2 layer |

|               |                     |                      |        |
|---------------|---------------------|----------------------|--------|
| PCB thickness | 0.6±0.10            | Copper(CU) thickness | 1.0 oz |
| Pads plating  | Lead-free spray tin | Plate thickness      |        |
| Solder        | Black               | Silkscreen           | White  |

## 5. Product wiring diagram



### Wiring precautions

- ①. The assembly of this product requires welding operations; please strictly follow the wiring diagram! If you have any questions during the assembly process, please contact after-sales personnel.
- ②. When assembling, please solder the terminal wire to the battery pack first, and then insert the terminal wire into the product.
- ③. After connecting the battery, please pay attention to the insulation protection of the product to avoid short circuit when the power is on.

Special note: This balancing board is not recommended for cascade use as the balancing effect is not obvious.

## 6. Product indicator light description

Each battery corresponds to an LED indicator, and you can clearly observe whether each cell is balanced.

| Indicator status | Product operation status                        |
|------------------|-------------------------------------------------|
| Always on        | in equilibrium                                  |
| Flashing         | Bad battery contact                             |
| Go out           | Equalization completed/no equalization required |

## 7. Environmental substance requirements

Each battery corresponds to an LED indicator, and you can clearly observe whether each cell is balanced.

| Harmful Substance                     | Limit standard (mg/kg) |
|---------------------------------------|------------------------|
| Lead (Pb)                             | 1000                   |
| Cadmium (Cd)                          | 100                    |
| Mercury (Hg)                          | 1000                   |
| Hexavalent chromium (Cr6+)            | 1000                   |
| Polybrominated biphenyls (PBB)        | 1000                   |
| Polybrominated diphenyl ethers (PBDE) | 1000                   |

## 8. Safety protection measures, transportation and storage

### 1) Safety protection measures

①. There is no high voltage in the balancing board itself, and it will not cause electric shock damage to the body.

②. Do not repair the balancing board while the power is on. All repairs should be performed by qualified service personnel.

If the working voltage set by the factory is changed, the safety certificate no longer applies.

③. When using, please pay attention to the insulation treatment of the product to avoid short circuit.

④. Pay attention to ESD protection when using this product.

⑤. This product complies with the company's thrust standards: 0402 components  $\geq 1.0\text{KgF}$ ; 0603 components  $\geq 1.5\text{KgF}$ ; IC and MOS tubes  $\geq 2.0\text{KgF}$ .

### 2) Packaging and shipping

①. Separate and package PCBA with anti-static bubble bags.

②. The packed products can be transported by ordinary means of transportation when they are not directly affected by rain, snow or violent collisions and bumps.

It is not allowed to be placed together with corrosive substances such as acids and alkalis during transportation.

### 3) Storage

Packaged products should be stored in a permanent warehouse with a temperature of 0℃~35℃ and a relative humidity of no more than 80%.

The warehouse should be free of acid, alkali and corrosive gases, strong mechanical vibration and impact, and no strong magnetic field.

