

Model:
RHEA-I660A

**Supercap backup board, 6 x 3V600F Cap, Internal, 12/19/24V
DC Input/Output, 7-segment display, R10**

User Manual

Revision

Date	Version	Changes
Oct. 25, 2023	1.00	Initial release

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Manual Conventions



WARNING / AVERTISSEMENT

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.

Des avertissements apparaissent lorsque des détails négligés peuvent endommager l'équipement ou entraîner des blessures. Les avertissements doivent être pris au sérieux.



CAUTION / ATTENTION

Cautionary messages should be heeded to help reduce the chance of losing data or damaging the product.

Les messages de mise en garde doivent être respectés afin de réduire les risques de perte de données ou d'endommagement du produit.



NOTE / REMARQUE

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes.

Ces messages informent le lecteur d'informations essentielles mais non critiques. Ces messages doivent être lus attentivement car toutes les instructions ou instructions qu'ils contiennent peuvent aider à éviter de commettre des erreurs.



HOT SURFACE / SURFACE CHAUDE

This symbol indicates a hot surface that should not be touched without taking care.

Ce symbole indique une surface chaude qui ne doit pas être touchée sans précaution.

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Chapter

1

Introduction

1.1 Overview



Figure 1-1: RHEA-I660A Series Module

The RHEA-I660A supercapacitor backup board uses six 600F 3V capacitors, which can support a maximum load of 150W, and can maintain uninterrupted power supply for about 60S at a normal temperature of 25 degrees, providing sufficient operating time for saving data and safely shutting down to avoid the computer system and data are damaged due to illegal power failure.

RHEA-I660A provides 12/19/24V three commonly used voltage inputs, and the output voltage is equal to the input voltage. A 7-segment display is also provided to display the current operating voltage or other warning information. The 7-segment display can be installed directly on the supercapacitor backup board, or it can be installed to other locations through a 20cm wire.

RHEA-I660A can be connected to the host through a USB Type-A cable. At the same time, the IEI supercapacitor management tool can provide 2 sets of power switch and 1 set of relay port control, and can also set the shutdown time and shutdown method after power failure. It can assist customers in handling various backup behaviors after the input terminal is powered off.

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1.2 Features

The RHEA-I660A Series features are listed below:

- Six 3.0V/600F supercapacitors
- 12/19/24 VDC adaptive input/output.
- Maximum 150W load 3V@25°C lasting 60 sec
- The standard 60W load 3V@25°C lasting 180 sec
- -40°C to 60°C wide temperature environment
- 500,000 charge-discharge life cycles
- Long supercapacitor lifetime, up to 10 years
- Intuitive power management software for easier management
- Provide power-off shutdown service through software/hardware

1.3 Technical Specifications

The RHEA-I660A technical specifications are listed as below.

Model Name	RHEA-I660A-R10
Battery type	Super Capacitor
Capacitance	6 x 600F@3V
Expected Lifespan	>10 years (when the capacitor works at 3V and 25°C)
Lifecycle	500000 charging/discharging cycles
Input Voltage	12V or 19V or 24V ±10%
Output Voltage	The output voltage is equal to the input voltage: Input 12V ±10%, output 12V Input 19V ±10%, output 19V Input 24V ±10%, output 24V Output power 150W
LED indication	Red / Yellow
Backup time	60 sec. (under 150W load at 3V@25°C) 180 sec. (under 60W load at 3V@25°C)
I/O connector	1 x LED connector (2x10 pin) 1 x DC IN (2x2 pin) 1 x DC OUT (2x2 pin) 1 x Relay button (1x6 pin) 1 x USB 2.0 Type-A 1 x Debug (1x3 pin) 1 x Firmware flash (2x7 pin) 2 x Power button (1x2 pin)
Security	Reverse/ Overload/ Overvoltage protection
Dimension(mm)	166 x 90.5 x 82.6
Weight	0.9kg/1.2kg
Operating Temperature	-40 ~ 60°C
Storage Temperature	-40 ~ 70°C

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Table 1-1: Technical Specifications

1.4 Backup Time Specification

1.4.1 Backup Time Test in Lab Environment

Test Conditions:

Power supply equipment: TUF-750B-GAMING 750W ATX power supply

Load: NGI N6206-60-50 Power load machine

Setting: 12V, 10-150W, the current is adjusted according to the power. eg: pumping 120W: current 10A; pumping 90W: current 7.5A

The RHEA-I660A's backup time test result is listed below.

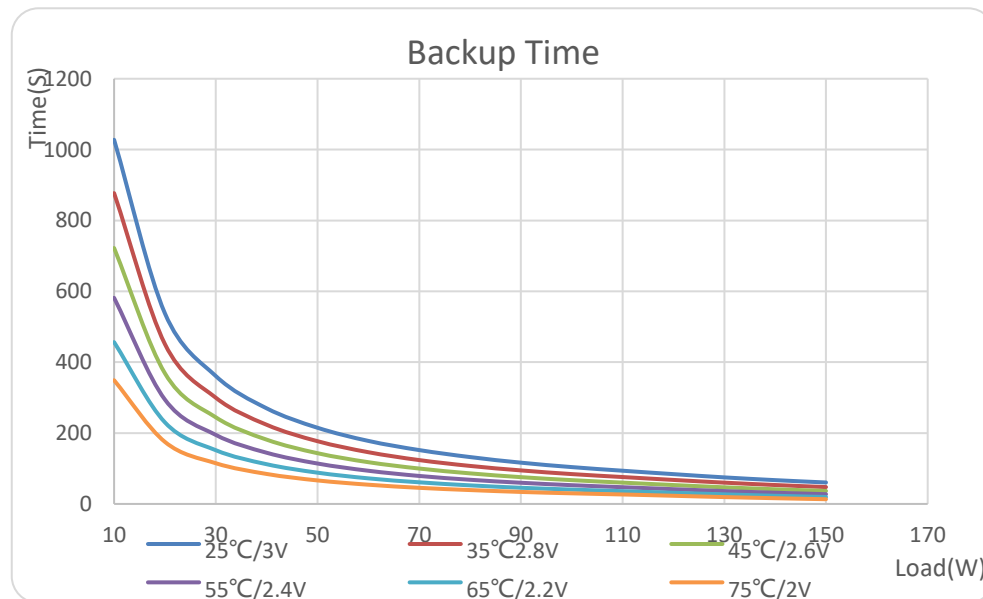


Table 1-2: Backup Time Curve

*Backup time depends on battery capacitance, load and temperature. Reduction of backup time may occur at an extremely high/low temperature.

1.4.2 Product Loading Test (low power consumption)

Board: KINO-EHL2-J6412C-R10

CPU: Intel® Celeron® J6412 2.0GHz (up to 2.6GHz, quad-core, 1.5M Cache, TDP=10W)

RAM: Transcend DDR4 3200 32GB (TS4GSH64V2E3)

HDD: Transcend 256GB M.2 (TS256GMTE452T2)

OS: Windows 10 Enterprise LTSC 2021

Test Software: BurnInTest V9.0 (setting: CPU & RAM & Graphics 100% Load)

Test results: 10min.42sec.

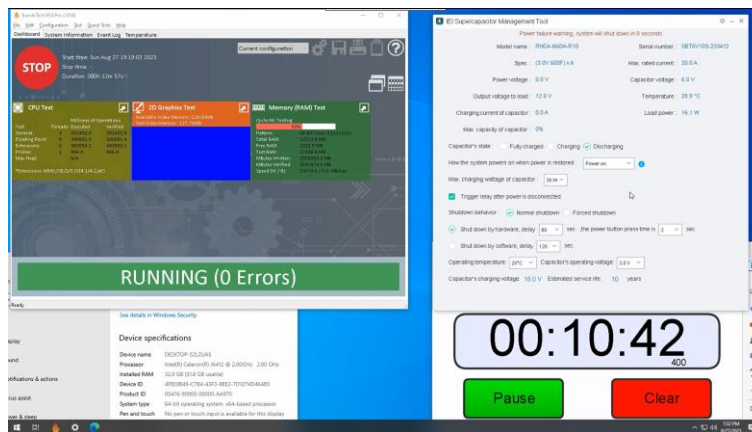


Figure 1-2: Discharge Test

1.4.3 Product Loading Test (high power consumption)

Board: KINO-ADL-P-i3-R10

CPU: Intel® Alder Lake-P Core™ i3-1220P (up to 4.4GHz, 12-core, 12M Cache, TDP=28W)

RAM: Transcend DDR4 3200 32GB (TS4GSH64V2E3)

HDD: ADATA 128G NVMe (IM2P32A8-128GITB5)

OS: Windows 10 Enterprise LTSC 2021

Test Software: BurnIn Test V9.0(Setting: CPU & RAM & Graphics 100% Load)

Test results: 5min.1sec.

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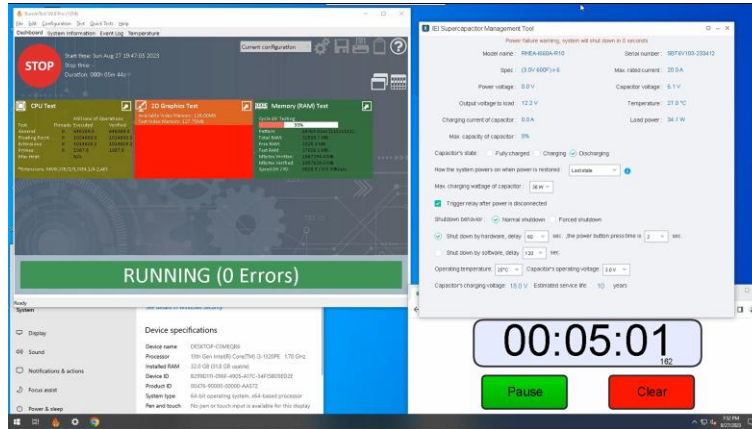


Figure 1-3: Discharge Test

1.4.4 Charge Time Test

Supercapacitor charging is set to 36W. The charging time under different operating voltages from 0 to 100% is as follows

Power in Voltage	Time (sec.)
3V	614
2.7V	494
2.5V	428
2.2V	334
2V	272

Table 1-3: Charging Time

1.5 I/O Interface

The I/O interface panel of the RHEA-I660A Series has the following standard I/O interface connectors:

- 1 x LED connector (2x10 pin)
- 1 x Power input (2x2 pin)
- 1 x Power output (2x2 pin)
- 1 x Relay button (1x6 pin)
- 1 x USB 2.0 Type-A
- 1 x Debug (1x3 pin)
- 1 x Firmware flash (2x7 pin)
- 2 x Power button (1x2 pin)

The standard I/O interface connectors are shown in **Figure 1-4**.

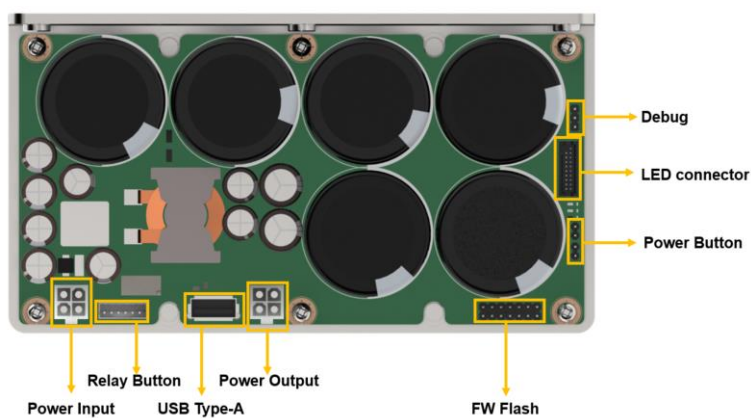


Figure 1-4: Standard I/O Interface Connectors

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1.6 Physical Dimensions

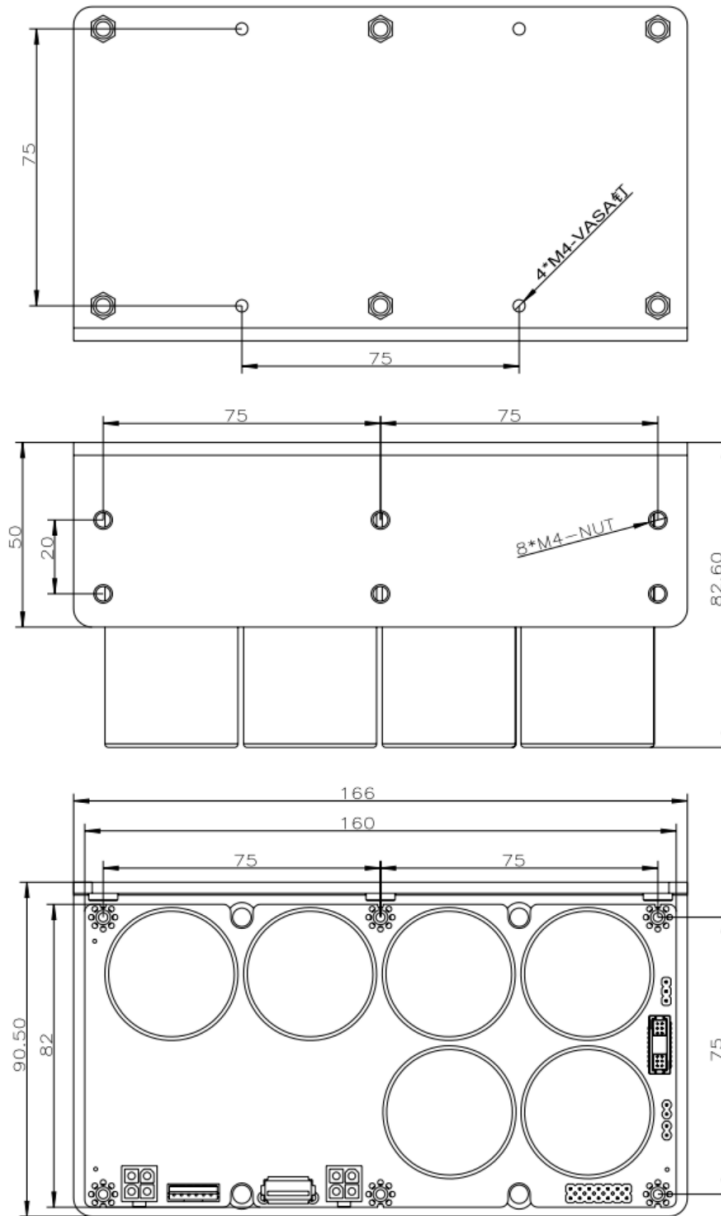


Figure 1-5: RHEA-I660A Dimensions

Chapter

2

Unpacking

RHEA-I660A

2.1 Unpacking

When the RHEA-I660A Series is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 2.2**
- Make sure the packing box is facing upwards so the RHEA-I660A Series does not fall out of the box.
- Make sure all the components shown in **Section 2.2** are present.

2.2 Unpacking Checklist



NOTE:

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the RHEA-I660A Series from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@ieiworld.com.tw.

The RHEA-I660A Series is shipped with the following components:




Quantity	Item	Image
1	RHEA-I660A Series module	
1	USB Type-A to Type-A cable	
1	LED cable	

Table 2-1: Packing List

The following table lists the optional items that can be purchased separately.



Optional	
Power input cable (P/N: 19T00-002500-100-RS)	
Power output cable (P/N: 32102-030000-200-RS)	
Power cable (P/N: 32205-005401-100-RS)	

Table 2-2: Optional Packing List

Chapter

3

Installation

3.1 Anti-Static Precautions



WARNING

Failure to take ESD precautions during the maintenance of the RHEA-I660A Series may result in permanent damage to the RHEA-I660A Series and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the RHEA-I660A Series. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the RHEA-I660A Series is accessed internally, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- **Wear an anti-static wristband:** - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- **Self-grounding:** - Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- **Use an anti-static pad:** - When configuring the RHEA-I660A Series, place it on an anti-static pad. This reduces the possibility of ESD damaging the RHEA-I660A Series.
- **Only handle the edges of the PCB:** - When handling the PCB, hold the PCB by the edges.

3.2 Installation Precautions

When installing the power module, please follow the precautions listed below:

- **Power turned off:** When installing the power module, make sure the power is off. Failing to turn off the power may cause severe injury to the body and/or damage to the system.
- **Certified Engineers:** Only certified engineers should install and modify onboard functionalities.

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- **Anti-static Discharge:** If a user opens the top cover of the power module, to configure the jumpers or plug in added peripheral devices, ground themselves first and wear an anti-static wristband.

3.3 Installing RHEA-I660A

The RHEA-I660A can be fixed to the system chassis either from the bottom or from the side. Check the product dimension diagram for the exact location of the screws. The steps below will guide you through the installation process.

3.3.1 Bottom Installation

Step 1: Fabricate a chassis that has screw holes corresponding to the screw holes on the bottom of the RHEA-I660A (see the dimension drawing for detailed information).

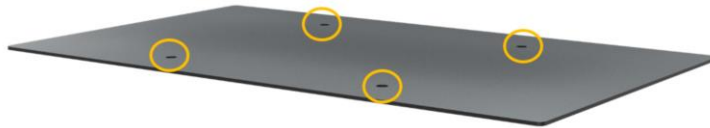


Figure 3-1: Screw Holes on Chassis

Step 2: Place the RHEA-I660A onto the chassis. Align the 4 screw holes on the bottom panel with the screw holes on the chassis.



Figure 3-2: Install RHEA-I660A

Step 3: Secure the RHEA-I660A by using 4 screws.



Figure 3-3: Secure the RHEA-I660A – from Bottom

3.3.2 Side Installation

Step 1: Fabricate a chassis that has screw holes corresponding to the screw holes on the side of the RHEA-I660A (see the dimension drawing for detailed information).



Figure 3-4: Screw Holes on Chassis

Step 2: Align the 6 screw holes on the side panel of the RHEA-I660A with the screw holes on the chassis.

RHEA-I660A



Figure 3-5: Install RHEA-I660A

Step 3: Secure the RHEA-I660A by using 6 screws.



Figure 3-6: Secure the RHEA-I660A – from Side

3.4 Connection Diagram

The RHEA-I660 is a power backup board built-in with supercapacitor. The following diagram provides an overview of I/O connection.

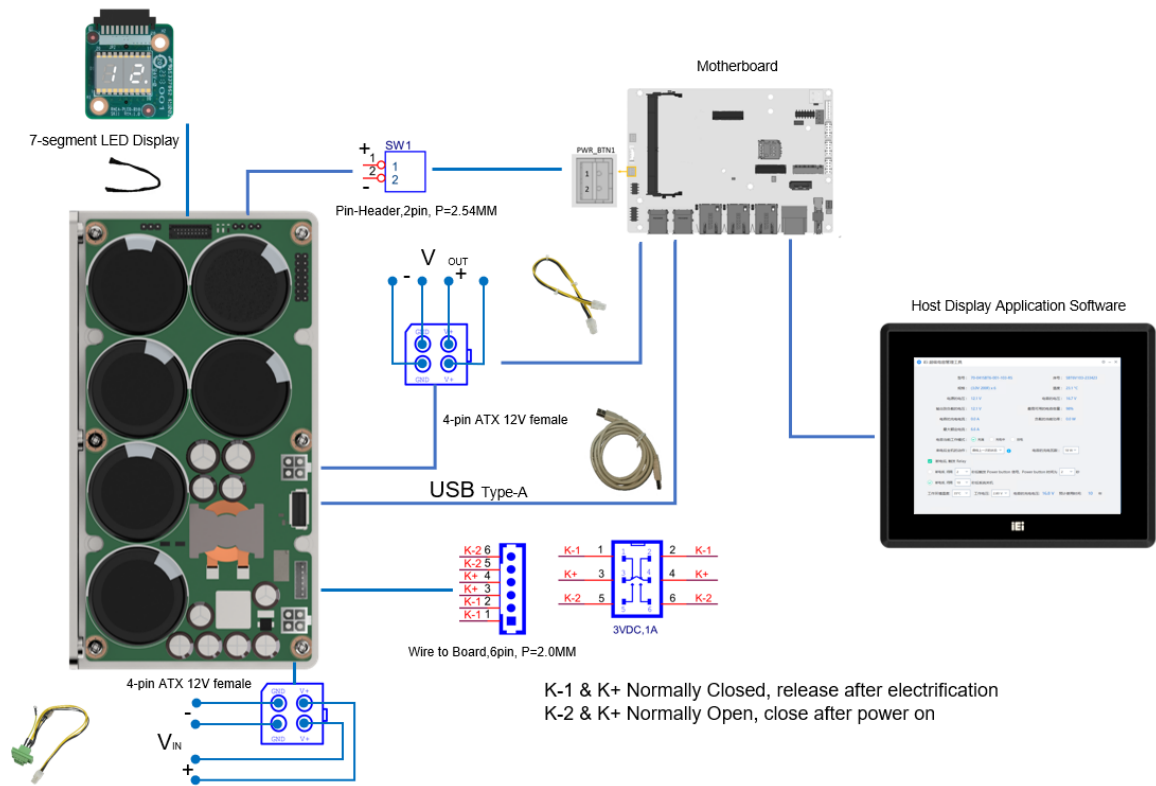


Figure 3-7: Connection Diagram

3.5 Indicator Light

The HEA-I660A provides 3 LED indicators on the board (Figure 3-8). You can check the operating status of the RHEA-I660A by observing the LED. See the table below for details.

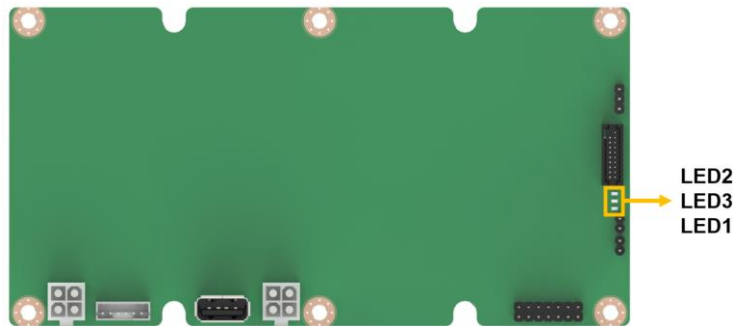


Figure 3-8: LED Indicators

RHEA-I660A

LED number	Always On	Flashing
1 (Red)	Capacitor voltage is too low	
2 (Yellow)	Capacitor discharging	
3 (Yellow)	Capacitor is full	Capacitor charging

Table 3-1: LED status

3.6 Connectors

3.6.1 Layout

The following diagram shows the connector locations of the RHEA-I660A.

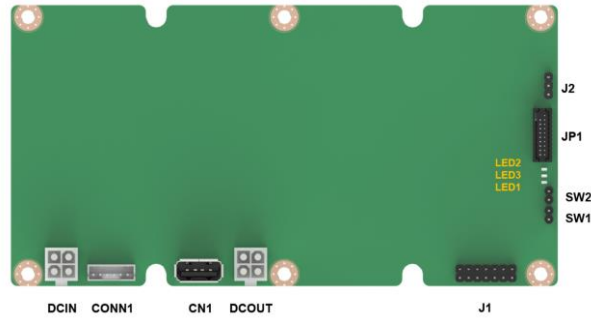


Figure 3-9: RHEA-I660A Layout

3.6.2 Internal Peripheral Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
Power input connector	4-pin ATX 12V female	DCIN
Relay connector	6-pin wafer	CONN1
USB 2.0 connector	USB TYPE-A	CN1
Power output connector	4-pin ATX 12V female	DCOUT
Flash connector	14-pin header	J1
Debug connector	3-pin header	J2
LED connector	20-pin header	JP1

Power button connector	2-pin wafer	SW1, SW2
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Table 3-2: Peripheral Interface Connectors

3.6.3 Power Input Connector

- CN Label:** DCIN
- CN Type:** 4-pin ATX 12V female, p=2.00 mm
- CN Location:** See **Figure 3-10**
- CN Pinouts:** See **Table 3-3**

This Power Input Connector allows the user to connect to an external power supply for DC input. Connect to a 12/19/24V $\pm 10\%$ input source according to the specification.

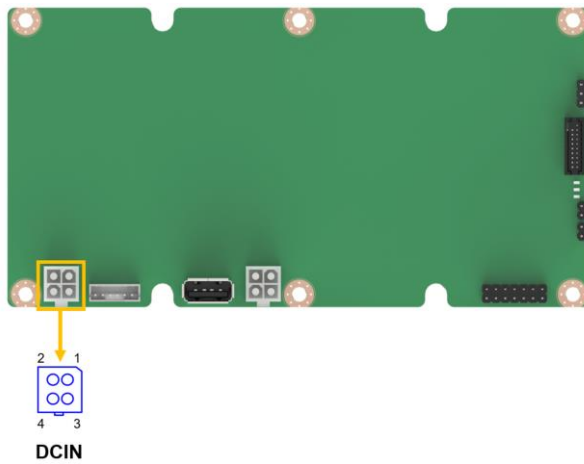


Figure 3-10: Power Input Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	VCC	4	VCC

Table 3-3: Power Input Pinouts

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3.6.4 Relay Connector

- CN Label:** **CONN1**
- CN Type:** 6-pin wafer, p=1.23 mm
- CN Location:** See **Figure 3-11**
- CN Pinouts:** See **Table 3-4**

The relay connector has two working states. Provides K+ and K-1 closed, K+ and K-2 open before energization. After power-on, K+ and K-1 are disconnected, and K+ and K-2 are closed; after power-off, it returns to the state before power-on, K+ and K-1 are closed, and K+ and K-2 are disconnected.

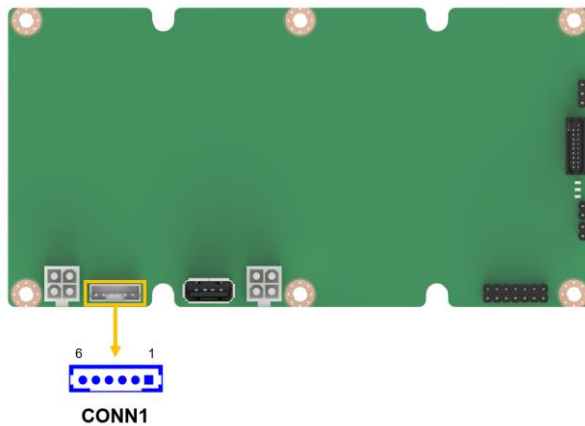


Figure 3-11: Relay Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	K-1	2	K-1
3	K+	4	K+
5	K-2	6	K-2

Table 3-4: Relay Pinouts

3.6.5 USB Connector

- CN Label:** CN1
- CN Type:** USB TYPE-A
- CN Location:** See **Figure 3-12**
- CN Pinouts:** See **Table 3-5**

This USB connector provides a USB Type-A communication link port. Use a standard USB Type-A cable to connect with peripherals.

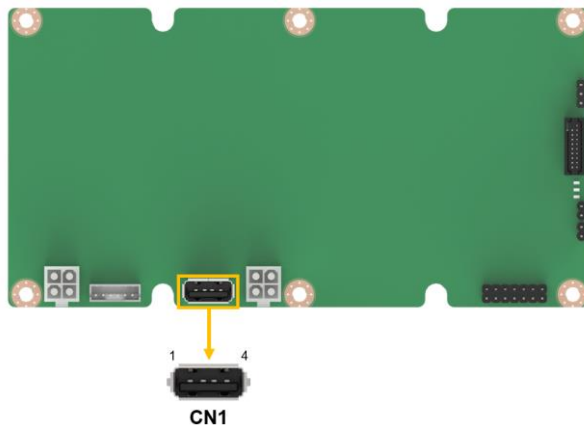


Figure 3-12: USB Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	D-
3	D+	4	GAND

Table 3-5: USB Connector Pinouts

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3.6.6 Power Output Connector

- CN Label:** DCOUT
- CN Type:** 4-Pin ATX 12V Female, p=2.00 mm
- CN Location:** See **Figure 3-13**
- CN Pinouts:** See **Table 3-6**

This power output connector allows the user to connect a load. The RHEA-I660A supports a maximum load of 150W. Ensure to provide the same output voltage according to the input.

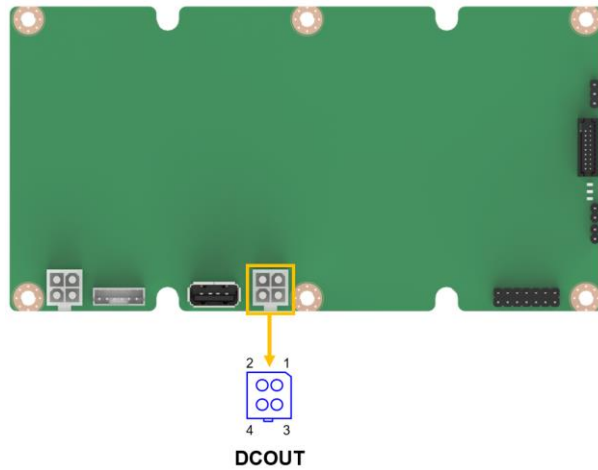


Figure 3-13: Power Output Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	VCC	4	VCC

Table 3-6: Power Output Pinouts

3.6.7 Firmware Flash Connector

- CN Label:** J1
- CN Type:** 14-pin header, p=2.54 mm
- CN Location:** See **Figure 3-14**
- CN Pinouts:** See **Table 3-7**

This firmware flash connector is for technical personnel to debug and use, non-technical personnel should not operate.

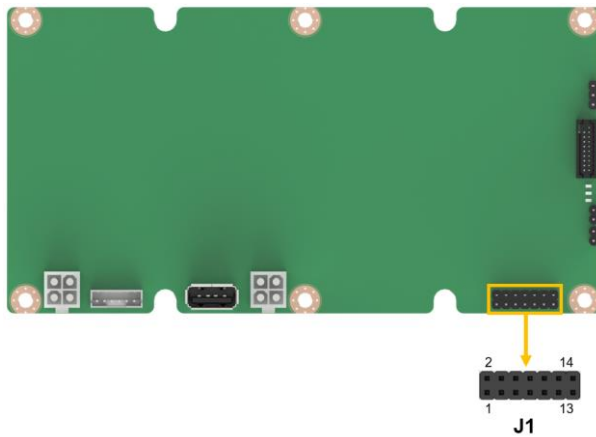


Figure 3-14: Firmware Flash Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	N/A	2	GND
3	N/A	4	RSTPU
5	TOOL0	6	T_RESET
7	N/A	8	+3V3
9	+3V3	10	RST
11	N/A	12	GND
13	RST	14	GND

Table 3-7: Firmware Flash Connector Pinouts

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3.6.8 Power Button Connector

- CN Label:** SW1, SW2
- CN Type:** 2-pin header, p=2.54 mm
- CN Location:** See **Figure 3-15**
- CN Pinouts:** See **Table 3-8**

This power button connector. A switching signal that can be used to trigger an end device connected to this connector. The trigger time can be set in combination with software.

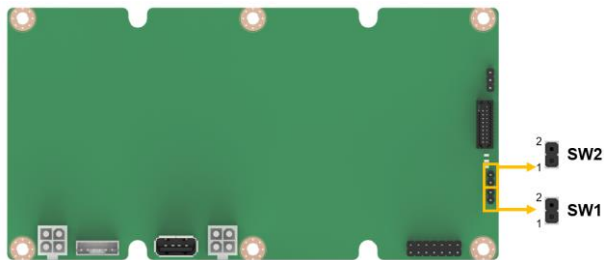


Figure 3-15: Power Button Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	PWR_BTN	2	GND

Table 3-8: Power Button Connector

3.6.9 7-segment Display Connector

- CN Label:** JP1
- CN Type:** 20-pin header, p=2.0 mm
- CN Location:** See **Figure 3-16**
- CN Pinouts:** See **Table 3-9**

This 7-segment display connector is used to connect a 7-segment display. A 7-segment display is plugged into the connector before shipment.

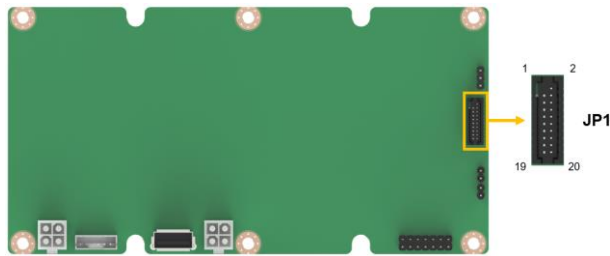


Figure 3-16: 7-segment Display Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	null	2	LED_HI_CTRL
3	LED_A	4	LED_LO_CTRL
5	LED_B	6	+3V3
7	LED_C	8	+3V3
9	LED_D	10	GND
11	LED_E	12	GND
13	LED_F	14	N/A
15	LED_G	16	N/A
17	LED_DP1	18	N/A
19	LED_DP2	20	N/A

Table 3-9: 7-segment Display Connector Pinouts

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3.6.10 Debug Connector

- CN Label:** J2
- CN Type:** 3-pin header, p=2.54 mm
- CN Location:** See **Figure 3-17**
- CN Pinouts:** See **Table 3-10**

This debug connector is for technical personnel to debug and use, non-technical personnel should not operate.

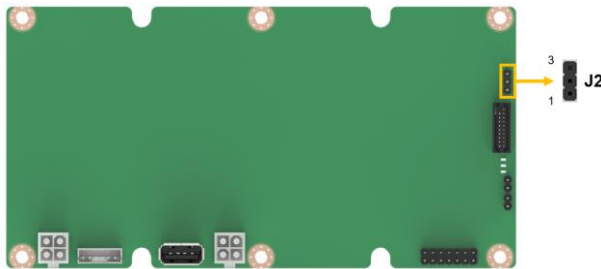


Figure 3-17: Debug Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	TXD1	2	TXD1
3	GND		

Table 3-10: Debug Connector Pinouts

3.6.11 7-segment Display

RHEA-I660A provides 7-segment display for displaying working status and abnormal information. The explanation of each code is provided in the following table.

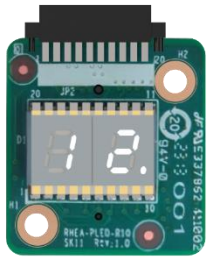


Figure 3-18: 7-segment Display

Mode	Character	Description	Trigger Condition	Cancel Method
normal	12.	Display input voltage: 12/19/24, the input voltage meets the range of 12/19/24 $\pm 10\%$, constant light indicates that the capacitor output is on, and flashing indicates that the capacitor output is off.	Default	other modes
	19.			
	24.			
Invalid input voltage	14	It shows that the input voltage does not meet the range of 12/19/24 $\pm 10\%$	The input voltage is higher than 8.0V, but not in the range of 12/19/24 $\pm 10\%$	Reconnect to a supported power source
Capacitor voltage is too low	CL	The capacitor voltage is too low, and the capacitor output is turned off	The capacitor voltage is lower than 6.0V when discharging or the capacitor voltage is lower than 6.5V when charging	The power supply is present and the capacitor voltage is higher than 6.5V
Capacitor voltage is too high	CH	The capacitor voltage is too high, and the capacitor output is turned off	The capacitor voltage is higher than the maximum rated voltage +1.0V	Power is present and the capacitor voltage is lower than the currently set maximum capacitor voltage

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overcurrent	OC	The capacitor discharge current is too high, and the capacitor output is turned off	Capacitor current exceeds rated current	The power supply is present and the capacitor current is lower than the rated current -0.5A
overvoltage	OU	output voltage exceeds too high, the capacitive output turns off	Capacitor output voltage higher than 12/19/24 $\pm 10\%$ range	Power is present and the capacitor output voltage is below 12/19/24 $\pm 10\%$ - 0.2V
overload	OL	The power of the load device is too high, and the capacitor output is turned off	Load power consumption exceeds rated power *1.05	The power supply is present and the load power consumption is lower than the rated power *0.95
overheating	OT	The temperature of the capacitor is abnormal, and the output of the capacitor is turned off	Capacitor temperature exceeds operating temperature range	The power supply is present and the temperature is higher than the minimum operating temperature +5 and less than the maximum temperature -5
shutdown	5D	The power supply is disconnected, and the capacitor output is turned off	System shutdown complete	power present

Table 3-11: 7-segment Display Message

Chapter

4

Software Application

RHEA-I660A

4.1 Introduction

The IEI Supercapacitor management tool obtains the basic status of the supercapacitor backup board through the USB Type-A cable. And you can set different working modes, shutdown methods and notification time, etc. It is recommended to run this application on Windows 10 or later.

4.2 Driver Installation

Please follow the steps below to complete the driver installation task.

Step 1: After connecting the USB Type-A cable to the supercapacitor backup board, the driver list will prompt that there is a USB serial port, and the driver needs to be installed.



Figure 4-1: Device Manager (before installation)

Step 2: Download the SuperCap setup file from IEI website. Run the CDMxxx_Setup.exe file.



Figure 4-2: Driver File

Step 3: A message screen appears (**Figure 4-3**). To continue the installation process click Run.

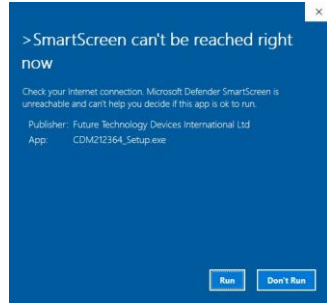


Figure 4-3: Message Screen

Step 4: The Setup Wizard starts installing the driver.

Step 5: The Installation Complete window appears (**Figure 4-4**). Click **Finish** to exit.

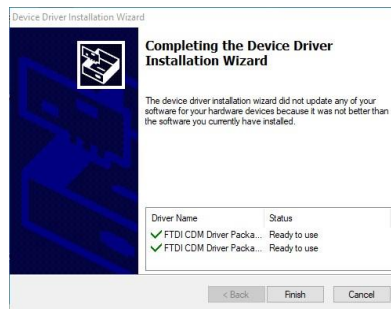


Figure 4-4: Installation Complete

Step 6: The Device Manager shows that a driver is installed for the USB port.



Figure 4-5: Device Manager (after installation)

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4.3 Application Installation

Please follow the steps below to complete the Supercapacitor Management Tool installation.

Step 1: Download the SuperCap setup file from IEI website. Run the SuperCap_Vxxx_win64.exe file.

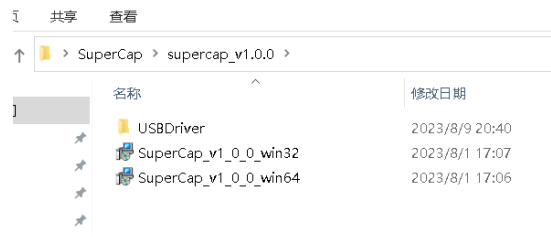


Figure 4-6: Driver File

Step 2: A message screen appears (Figure 4-7). To continue the installation process click Run.

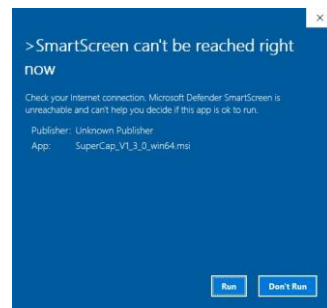


Figure 4-7: Welcome Screen

Step 3: The Setup Wizard starts installing the program.

Step 4: The Installation Complete window appears (Figure 4-8). Click **Finish** to exit.

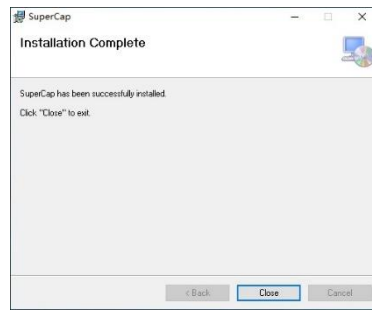


Figure 4-8: Installation Complete

Step 5: To launch the application, double click the shortcut (**Figure 4-9**) on the desktop



Figure 4-9: Software Icon

4.4 Supercapacitor Management Tool Overview

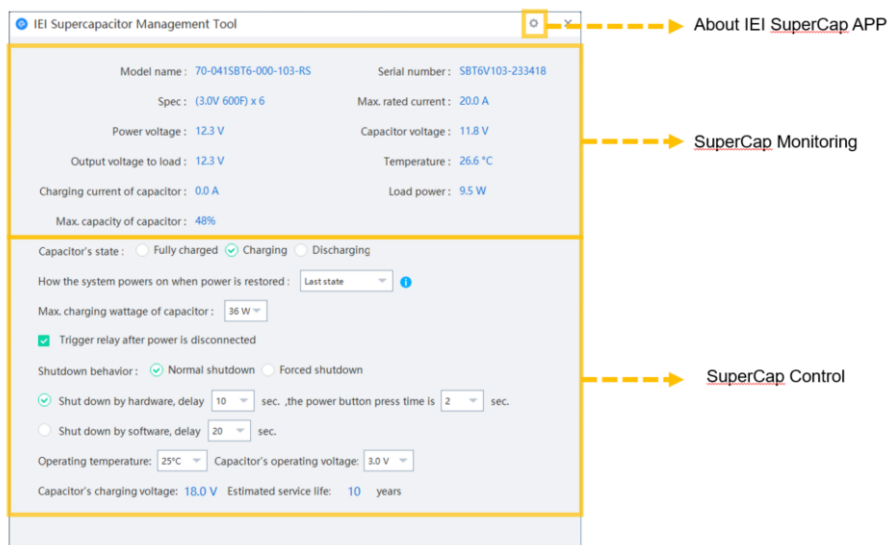


Figure 4-10: IEI Supercapacitor Management Tool Overview

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4.5 Monitoring

Through the USB connection, the upper part of the super capacitor management tool displays various information of the super capacitor backup board. The following sections describe the status information in detail.



Figure 4-11: IEI Supercapacitor Management Tool- Monitoring Overview

4.5.1 Model name information

Show the model number of this product.

Model name : RHEA-I660A-R10

Figure 4-12: Model Name Information

4.5.2 Serial Number Information

Display the serial number of this product.

Serial number : SBT6V103-233412

Figure 4-13: Serial Number Information

4.5.3 Spec Information

Display the single supercapacitor specification and overall quantity of the product.

Spec : (3.0V 600F) x 6

Figure 4-14: Spec Information

4.5.4 Max. Rated Current Information

Display the product's highest rated operating current,

Max. rated current : 20.0 A

Figure 4-15: Max. Rated Current Information

4.5.5 Power Voltage Information

Detect and identify the input power and display the voltage value. The input power supply is 12/19/24V \pm 10%. Out of range will not work.

Power voltage : 12.3 V

Figure 4-16: Power Voltage Information

4.5.6 Capacitor Voltage Information

Display the charging voltage of the supercapacitor (this is the charging voltage of 6 capacitors together).

Capacitor voltage : 14.1 V

Figure 4-17: Capacitor Voltage Information

4.5.7 Output Voltage to Load Information

Display the output voltage value (the output voltage is equal to the input voltage).

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Output voltage to load : 12.3 V

Figure 4-18: Output Voltage to Load Information

4.5.8 Temperature Information

Display the current temperature value of the super capacitor backup board.

Temperature : 27.3 °C

Figure 4-19: Temperature Information

4.5.9 Charging Current of Capacitor Information

Real-time display of the charging current of the supercapacitor.

Charging current of capacitor : 0.0 A

Figure 4-20: Charging Current of Capacitor Information

4.5.10 Load Power Information

Real-time display of output load power.

Load power : 6.3 W

Figure 4-21: Load Power Information

4.5.11 Max. Capacity of Capacitor Information

Display the current capacity of the supercapacitor, users can use this function to confirm whether it is full (after full, the capacity will repeat between 95% and 100%, which is normal)

Max. capacity of capacitor : 67%

Figure 4-22: Max. Capacity of Capacitor Information

4.5.12 Capacitor's State Information

Display the status of the current supercapacitor, full, charging or discharging. Users can confirm the status of the super capacitor through this function.



Figure 4-23: Capacitor's State Information

4.6 Remote Control

IEI Supercapacitor management tool allows the host to modify some basic functions of the supercapacitor backup board via USB: charging power, shutdown behavior, shutdown mode, and working temperature and voltage adjustment, etc.



Figure 4-24: IEI Supercapacitor Management Tool- Control Overview

4.6.1 How the system power on when power is restored

The user is allowed to modify the 3 items of this setting: Power off/ Power on/ last state to realize the working state of the motherboard when the power is turned off and on again. This setting will be modified directly through the APP to the setting in the BIOS. This setting only supports products in the IEI Compatibility List.

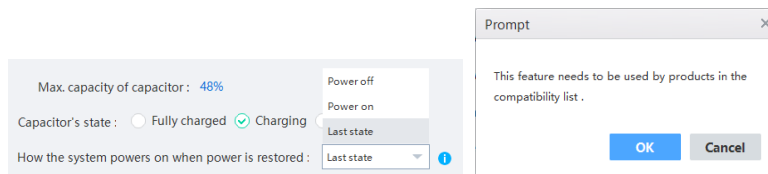


Figure 4-25: Power on when power is restored

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4.6.2 Max. Charging Wattage of Capacitor

Allows the user to adjust the charging power of the super capacitor backup board after power-on. After setting, the supercapacitor will work with the set power consumption of 36W@2A, 18W@1A, 9W@0.5A, and the Charging current of capacitor will display the current set current in real time.

Remarks: When it is set to a maximum of 36W, please select an adapter that exceeds the maximum power consumption of the load by 36W or more to prevent the charging current from being too large when the supercapacitor backup power board is powered on, causing the load to fail to start.

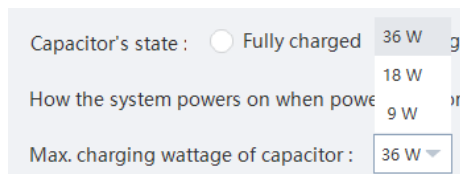


Figure 4-26: Max. Charging Wattage of Capacitor

4.6.3 Trigger relay after power is disconnected

After this setting is checked, it is allowed to trigger the Relay switch of the supercapacitor backup board after a power failure. The two sets of Relay switches will work between NC and NO. For the definition, please refer to Selection 3.6.4

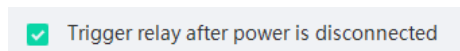


Figure 4-27: Trigger relay after power is disconnected

4.6.4 Shutdown Behavior

This setting is used to set the shutdown behavior triggered by software after power failure.

Normal shutdown: the software will close the IEI Supercapacitor Management Tool by itself after the set time countdown is completed, and then notify the operating system to shut down, The IEI Supercapacitor Management Tool stops working when it is closed. If any

other software interferes with the shutdown process, the user has to deal with it on their own.

Forced shutdown: after the software counts down to the set time, IEI Supercapacitor Management Tool will end all ongoing software processes, and then notify the system to shut down. At this time, there is no process running under the operating system. It is safe to shut down the computer.

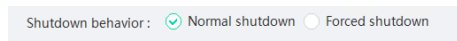


Figure 4-28: Shutdown Behavior

4.6.5 Shut Down by Hardware/Software

IEI super capacitor board provides two shutdown control methods:

Method 1: please refer to the wiring section first. Connect the Power Button cable. After the power is off, the supercapacitor backup board will end the IEI supercapacitor APP after the 10-second countdown set by the software (the default value can be set between 10-60S). Trigger the two Power Button switches of the supercapacitor backup source board. The trigger time is 2 seconds (preset value, adjustable between 2-8 seconds). The hardware switch will directly control the load device, and the hardware will shut down (please set the behavior of pressing the hardware switch under the load device system first).

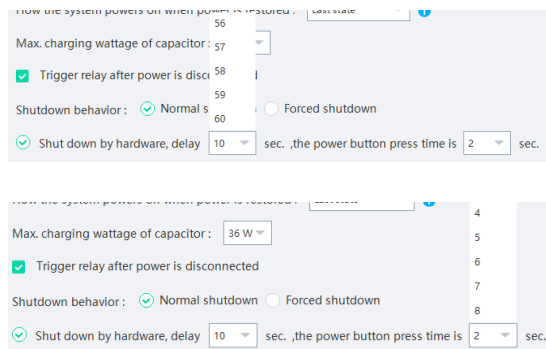


Figure 4-29: Shut Down by Hardware

Method 2: after power failure, the supercapacitor backup board will count down to 10 seconds after the software setting (the default value can be set between 10-120S),

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according to the above shutdown behavior settings, Perform a software shutdown operation.

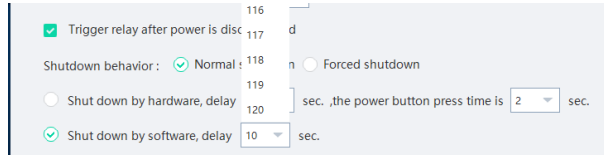


Figure 4-30: Shut down by Software

4.6.6 Temperature and Life

This setting allows customers to modify the operating temperature (25/35/45/55/65°C) and operating voltage (2.0/2.2/2.5/2.7/3.0V) of the Supercapacitor. When adjusting the operating temperature, the capacitor’s operating voltage will be automatically changed according to the operating temperature you set. With the adjustment, the backup time of the supercapacitor backup board will be changed (the default lifetime is 10 years). For details, please refer to Table 4-1. If you need to use it at a higher temperature and for a longer backup time, you can adjust the voltage, but a reminder will pop up, and capacitor lifetime will be re-calculated to a new one. For details, please refer to **Table 4-1**. If you need to use it at a higher temperature and for a longer backup time, you can readjust the voltage, and a reminder will pop up at this time. After adjustment, capacitor lifetime will be affected and a new calculated estimated lifetime will be obtained.

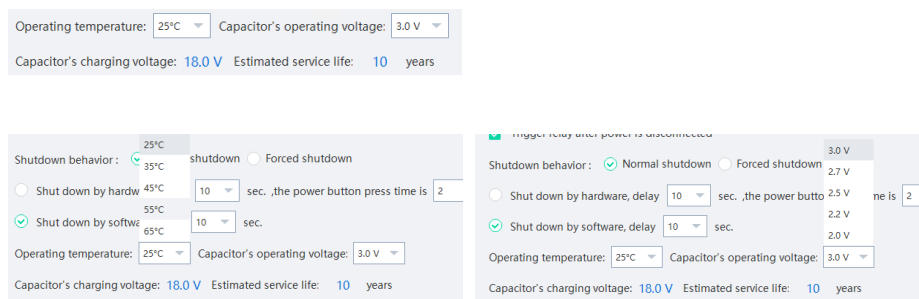


Figure 4-31: Temperature and Voltage Setting

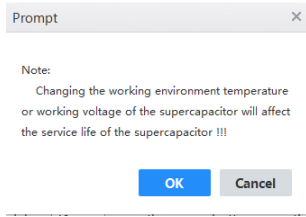


Figure 4-32: Warning Message

Load life under different voltage and temperature (h)											
Temp/Voltage	2V	2.1V	2.2V	2.3V	2.4V	2.5V	2.6V	2.7V	2.8V	2.9V	3V
65°C	96955 hours	61364 hours	38838 hours	24581 hours	15558 hours	9847 hours	6232 hours	3944 hours	2496 hours	1580 hours	1000 hours
	11.07 years	7.01 years	4.43 years	2.81 years	1.78 years	1.12 years	0.71 years	0.45 years	0.28 years	0.18 years	0.11 years
55°C	300561 hours	190228 hours	120398 hours	76201 hours	48229 hours	30524 hours	19319 hours	12227 hours	7739 hours	4898 hours	3100 hours
	34.31 years	21.72 years	13.74 years	8.70 years	5.51 years	3.48 years	2.21 years	1.40 years	0.88 years	0.56 years	0.35 years
45°C	931739 hours	589708 hours	373233 hours	236223 hours	149509 hours	94626 hours	59890 hours	37905 hours	23990 hours	15184 hours	9610 hours
	106.36 years	67.32 years	42.61 years	26.97 years	17.07 years	10.80 years	6.84 years	4.33 years	2.74 years	1.73 years	1.10 years
35°C	2888391 hours	1828095 hours	1157022 hours	732293 hours	463476 hours	293339 hours	185658 hours	117505 hours	74370 hours	47070 hours	29791 hours
	329.72 years	208.69 years	132.08 years	83.60 years	52.91 years	33.49 years	21.19 years	13.41 years	8.49 years	5.37 years	3.40 years
25°C	8954011 hours	5667096 hours	3586770 hours	2270107 hours	1436777 hours	909352 hours	575539 hours	364265 hours	230548 hours	145916 hours	92352 hours
	1022.15 years	646.93 years	409.45 years	259.14 years	164.02 years	103.81 years	65.70 years	41.58 years	26.32 years	16.66 years	10.54 years

Table 4-1: Relationship of Capacitor Temperature, Voltage and Life

4.7 Language

This setting can be used to modify the display language of the supercapacitor management tool. Currently, English and Simplified Chinese are supported.

After changing the language, the application needs to be restarted to take effect.

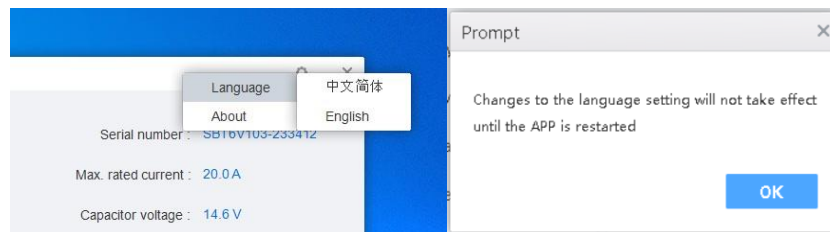


Figure 4-33: Language

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4.8 About

Users can check the application software and firmware version through this page, and can also upgrade the application software and firmware locally. Follow the steps below.

Before updating the version, please go to the IEI official website to download the latest local update software and firmware update package.

Step 1: Click to browse on the about page.



Figure 4-34: About

Step 2: Find the location of the local update file (the update file is a compressed package, please do not decompress it).

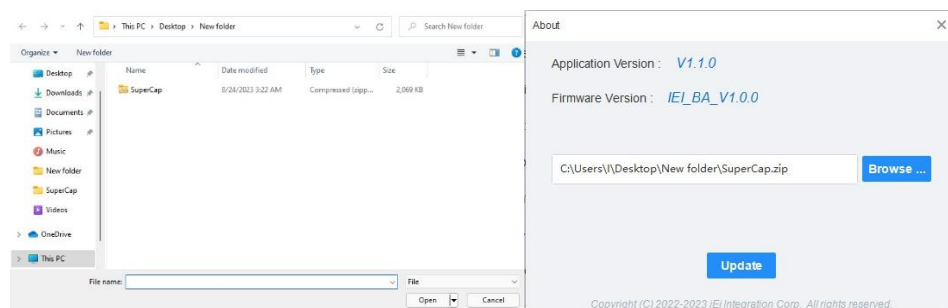


Figure 4-35: File Selection

Step 3: Click Update, it will prompt that there is a version that needs to be updated, click OK to continue.

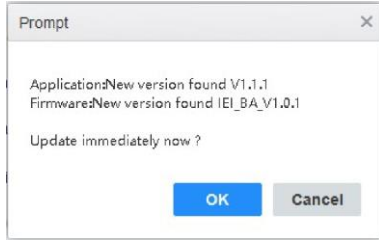


Figure 4-36: Version Prompt

Step 4: Before updating, it will prompt "Please keep the power unblocked when updating".

Click OK to continue

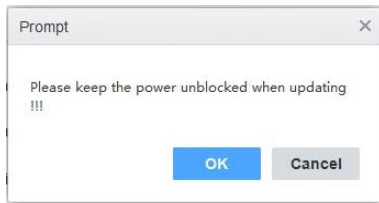


Figure 4-37: Prompt

Step 5: When both Application and Firmware need to be updated, Firmware will be updated first. When updating Firmware, the Application interface displays updating, LED1, LED3, and LED2 turn on and off in turn, and the 7-segment display does not display.



Figure 4-38: Firmware Updating

Step 6: After the firmware update is completed, the application installation window will

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appear. Please continue to update the application to the latest version. Refer to Chapter 4.3 for the application installation procedure.

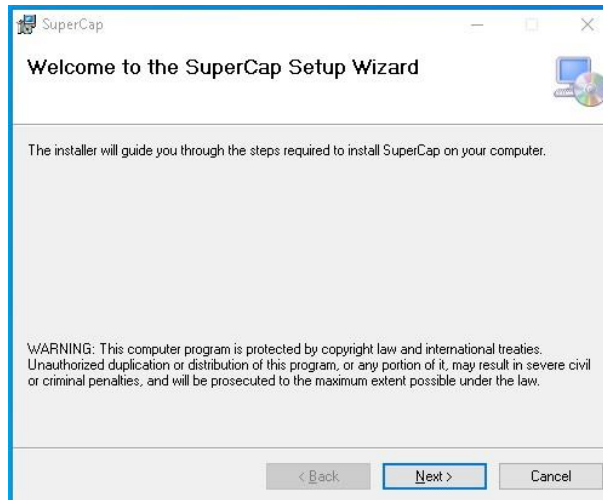


Figure 4-39: Application Update Installation

Step 7: After updating the application, restart the software and confirm the version.

(see **Figure 4-34**).

Appendix

A

Safety Precautions

5.1 Product Disposal



CAUTION:

Risk of explosion if the battery is replaced by an incorrect type;

Replacement of a battery with an incorrect type that can defeat a safeguard (for example, in the case of some lithium battery types);

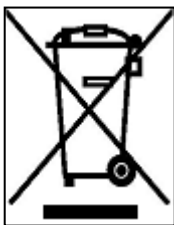
Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, that can result in an explosion;

Leaving a battery in an extremely high temperature surrounding environment that can result in an explosion or the leakage of flammable liquid or gas;

A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.

Dispose of used batteries according to instructions and local regulations.

- Outside the European Union - If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union:



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your display products, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

Appendix

B

Hazardous Materials Disclosure

RHEA-I660A

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the following table.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
Display	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006 (now replaced by GB/T 26572-2011).

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006 (now replaced by GB/T 26572-2011).

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有“环境友好使用期限”的标签，此期限是估算这些物质“不会有泄漏或突变”的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯 醚 (PBDE)
壳体	O	O	O	O	O	O
显示	O	O	O	O	O	O
印刷电路板	O	O	O	O	O	O
金属螺帽	O	O	O	O	O	O
电缆组装	O	O	O	O	O	O
风扇组装	O	O	O	O	O	O
电力供应组装	O	O	O	O	O	O
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T 11363-2006 (现由 GB/T 26572-2011 取代) 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 (现由 GB/T 26572-2011 取代) 标准规定的限量要求。