UCA-X5-3USBC

X5-SuperLite Battery Cradle: USB-C IN & 2x USB-C OUT

Technical Datasheet (Original Instructions)

USB-C IN & 2x USB-C OUT
X5 SuperLite Battery Cradle

Benefits & Features

- Easily power USB-C compatible laptop PCs, tablets/iPads, instruments and monitors, using the URB-X5 plug-in battery via:
  - URB-X5 compatible battery cradle with 2x USB-C OUT connectors
- Charge the companion URB-X5 Lithium-ion battery via AC mains using the USB-C charge (IN) port via USB-C style charger
- An alternative to the URS-X5 power system to directly power DC portable devices on pole or mobile carts
- Attach to pole cart or mobile cart
  - Sturdy, slender aluminum bracket permits various mounting locations
- Quickly insert or remove the URB-X5 battery for recharge
  - Battery receptacle with 15 degrees of tilt flexibility
  - Durable battery locking latch with single handed release
- Supports simultaneous USB-C IN (charge) and OUT (discharge) operation

Functional Overview

The UCA-X5-3USBC provides a convenient, safe, and reliable way of providing a USB-C power charge input and a “DC Power” discharge output from an Ultralife URB-X5 battery in medical cart or other similar cart or portable application. These USB-C power outputs provide the user with a simple interface to existing notebook computers, tablets, or other electronic devices that utilize the industry standard USB-C power source.

A separate USB-C port operates as a USB-C sink input port to charge the URB-X5 battery from a USB-C compatible charger when the URB-X5 battery is inserted in the UCA-X5-3USBC Cradle.

The SMBus data bus for the URB-X5 is accessible via a USB Mini connector for access to battery status and state of charge information if desired.

UCA-X5-3USBC also has a power port for an optional hold-up battery (referred to as HUB), P/N: URB003S, to provide temporary power during hot-swap of a depleted URB-X5 battery.

Technical Specifications

Model No.	X5-SuperLite
Part No.	UCA-X5-3USBC
Weight	0.5Kg
Interfaces	URB-X5 contact pins, 2x USB-C OUT, 1x USB-C IN, 1x USB Mini B (SMBus), 1x HUB interface

USB-C IN Configuration

Sink (CHARGE) capability at up to 140Watts: 5V⎓3A, 9V⎓3A, 15V⎓3A, 20V⎓5A, 28V⎓5A
USB-C Charger rates must match Volts and Amps to negotiate the matched rate
Default Min V-A rate is 5V⎓3A. Higher V-A rate may be negotiated if matching V-A.
Over-current and Over-Temperature protection: Hiccup mode[1]
USB Power Delivery (PD) 3.1 Sink

USB-C OUT Configuration

Source (DISCHARGE) capability at up to 100 Watts: DC: 5V⎓3A, 9V⎓3A, 15V⎓3A, 20V⎓5A
PPS: 5.0V–21V ⎓ 5.0A MAX.
Over-current and Over-Temperature protection: Hiccup mode[1]
USB Power Delivery (PD) 3.1 Source

USB-C OUT Configuration:

Source (Discharge) capability at up to 65 Watts: DC: 5V⎓5A, 9V⎓5A, 15V⎓5A, 20V⎓3.25A
PPS: 5.0V–21V ⎓ 3.25A MAX
Over-current and Over-Temperature protection: Hiccup mode[1]
USB Power Delivery (PD) 3.1 Source

Battery Charge:	14.4V up to 20.0A
Battery Pre-charge:	200mA to 7.5V (2.5V/cell)
Electronics Quiescent Current:	4mA max. (without USB-C connected)
Operational Temperature:	-10°C to 50°C (14°F to 122°F)
Charging Temperature:	0°C to 45°C (32°F to 113°F)
Storage Temperature:	-20°C to 60°C (-4°F to 140°F)
Storage / Operating Altitude:	2000m. (6,562 ft.) max / 5000m (16, 404 ft.) max
Humidity:	80% relative
Atmospheric Pressure:	79.5kPa – 110kPa

Notes

1. Hiccup mode: Output will completely turn off. Unplug/re-plug to regain
2. This product should only be used with a UL listed Class II power supply adapter with USB-C voltage ratings of 5V, 9V, 15V, 20V, and 28V, and up to 5A of current.

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Certifications Overview (Pending Test Completions)

- **Medical Safety and Performance**: IEC 60601-1:2005+AMD1:2012 (PENDING TEST APPROVALS)
- **EMC**
  - **IEC:** IEC 60601-1-2:2015+A1:2021; IEC 60601-3-2:2018+A1:2020; IEC 60601-3-3:2013+A2:2021
  - **EU:** EN 60601-1-2:2015+A1:2021; EN 61000-3-2:2014+A1:2019; EN 61000-3-3:2013+A1:2019
  - **UK:** BS EN 60601-1-2:2015+A1:2021; BS EN 61000-3-2:2014+A1:2019; BS EN 61000-3-3:2013+A1:2019
  - **AUS/NZ:** AS/NZS 3200.1.2:2005; AS/NZS 61000.3.2:2014; AS/NZS 61000.3.3:2013

- **FCC:** Federal Register CFR 47, Part 15, subpart B

- **IP41** per IEC 60529:2013

Applications

The UCA-X5-3USBC Cradle, when mated with the URB-X5 Battery, is ideally suited for providing USB-C DC power for computers, tablets, and instruments on

- Medical carts
- Warehouse terminal carts or podiums,
- Other portable industrial or commercial carts.

Product Usage

The UCA-X5-3USBC is a docking cradle that provides two USB-C power interfaces for a URB-X5 battery. Once a URB-X5 battery is securely latched into the UCA-X5-3USBC, the operator can utilize the USB-C ports on the docking cradle to discharge or charge the battery.

The UCA-X5-3USBC Type-C IN and OUT ports operate in compliance with the USB Power Delivery (PD) specification USB PD Rev 3.1.

The USB-C ports can provide up to 165W of negotiated discharge power, or 140W of negotiated charge power, when attached to a similar USB-C PD devices. The UCA-X5-3USBC internally accomplishes the power conversion to safely charge and discharge the URB-X5 battery at the appropriate voltage and current rate negotiated between the connected USB-C PD device and the UCA-X5-3USBC.

INPUT:
The USB-C IN port on the UCA-X5-3USBC can be connected to a USB-C compatible power supply (power block, wall wart, or similar) to charge the URB-X5 at up to 140W:

- DC: 5V⎓3A, 9V⎓3A, 15V⎓3A, 20V⎓5A, or 28V⎓5A.

When connected with a 140W capable supply, the UCA-X5-3USBC can charge the URB-X5 is approximately 2.5 hours.

OUTPUT:
The USB-C OUT ports can each be connected to an external (load) device, such as a tablet or computer, to power or charge the connected device.

- Source (Discharge) Port 1 capability up to 100 Watts:
  - DC: 5V⎓3A, 9V⎓3A, 15V⎓3A, or 20V⎓5A
  - PPS: 5.0V–21V ⎓ 5.0A
- Source (Discharge) Port 2 capability up to 65 Watts:
  - DC: 5V⎓3A, 9V⎓3A, 15V⎓3A, or 20V⎓3.25A
  - PPS: 5.0V–21V ⎓ 3.25A

URB-X5 Battery Inserting into X5-SuperLite Battery Cradle

For charge and discharge operations of 100W and greater, the UCA-X5-3USBC requires the use of an appropriate E-Marker USB-C cable, or the high power will not be negotiated.

The UCA-X5-3USBC USB-B Mini connector provides a physical connection for SMBus communications as a pass-through interface to the URB-X5 battery SMBus v1.1 interface. A user can connect to this port for SMBus battery data access including status, state of charge, and programming.

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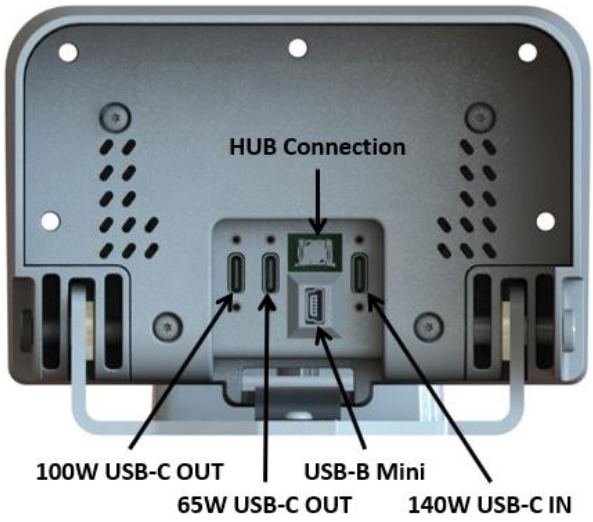
Connector Locations & Pinout

- 140W USB-C IN Connector- Socket Type
  - Shown at USB-C location
  - Standard USB-C Pinout
- 100W USB-C OUT Connector- Socket Type
  - Shown at USB-C location
  - Standard USB-C Pinout
- 65W USB-C OUT Connector- Socket Type
  - Shown at USB-C location
  - Standard USB-C Pinout
- HUB Connection
  - Shown at HUB Connection location
- USB-B Mini Connector- Socket Type
  - Shown in USB Mini location
  - SMBus Custom Pinout as follows:

USB-B Mini Connector SMBus Pinout	
Pin	**Function**
1	5V
2	SCL
3	SDA
4	N/C
5	GND



All USB-C ports are provided with M2 threaded inserts to accommodate locking screws for dual-screw USB Type-C plugs so prevent accidental disconnection. Locations are compliant with the USB Type-C Locking Connector specification from the USB-IF.

Hold-Up Battery (HUB) Operation and URB-X5 Hot-Swap

An optional Hold-Up Battery (HUB), P/N URB003S, is available to allow for automatic backup power when the URB-X5 battery is fully discharged or loses power.

When connected, the URB003S can supply 100W for up to 5 minutes to power the attached USB-C loads without needing to turn off the load. The hold-up power will allow a Hot-Swap of the URB-X5 battery with a different URB-X5, or for the USB-C supply/charger to be connected.

When not in use, the URB003S charges automatically from the URB-X5 battery or attached USB-C supply/charger. Once fully charged, the URB003S will sit idle awaiting need.

State of Charge Indicator (SOCI)

An optional State of Charge Indicator (SOCI), P/N URX-X5-SLITE, is available to connect to the USB Mini port on the UCA-X5-3USBC and display the remaining capacity and estimated discharge time of the URB-X5 battery.

The URX-X5-LITE connects to the UCA-X5-3USBC with a standard USB Mini to USB-C cable.

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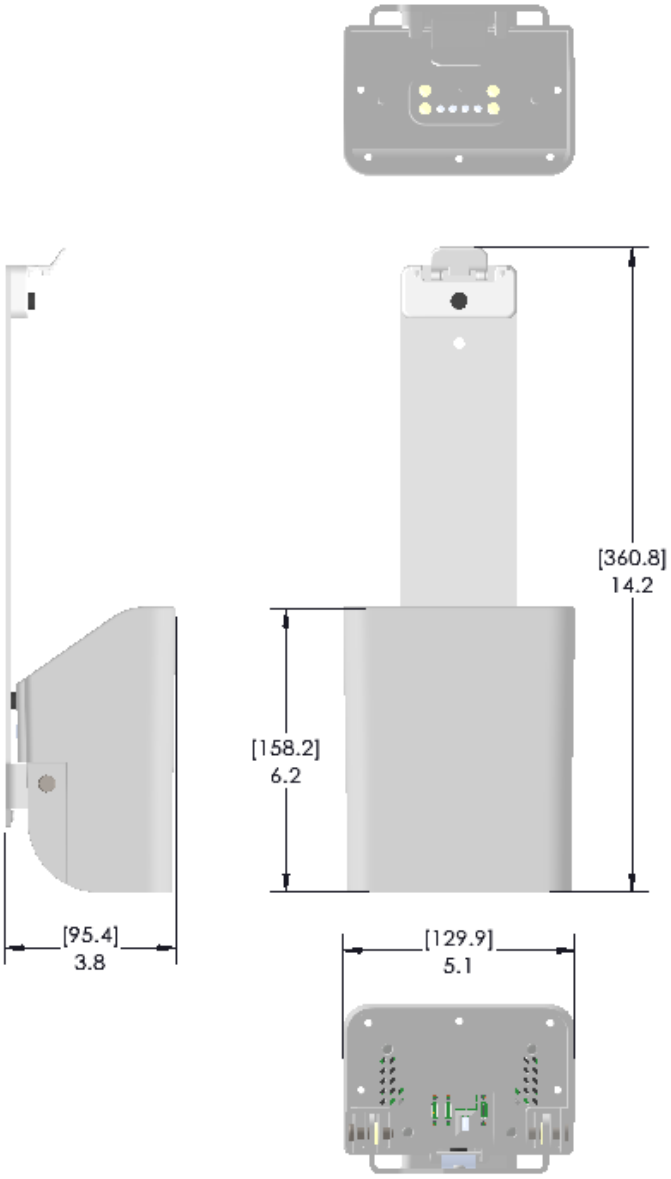
Product Dimensions



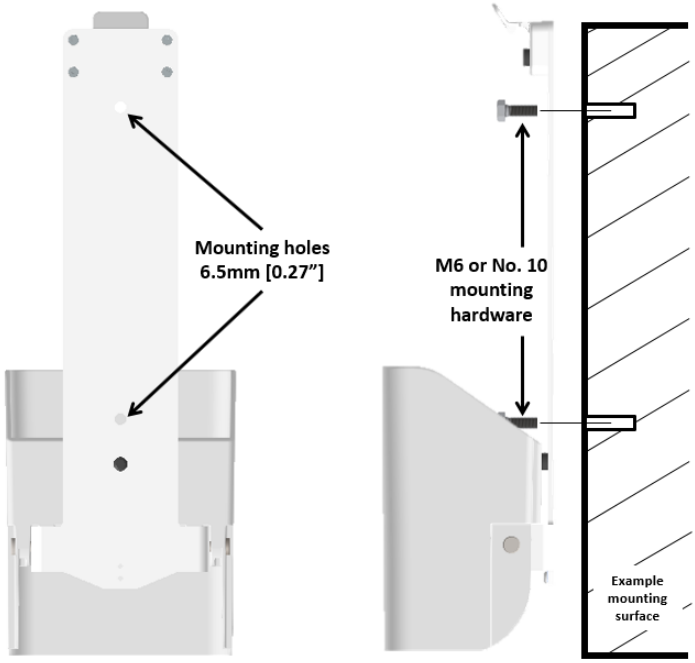
Dimensions: [mm] in

Product Installation

The UCA-X5-3USBC provides two 6.5mm (0.26”) mounting holes on the mounting bracket to facilitate rigid mounting.

Install the UCA-X5-3USBC using M6 or No. 10 hardware into a stable structure, ensuring the hardware and structure are capable of supporting at least 22.7 Kg (50 lbs).

> **NOTE**: The use of lock washers or thread-locker is recommended if mounting on a cart or alternate location where vibration is possible.



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USB-C Pass-through Mode

The USB-X5-3USBC can operate in a USB-C power pass-through mode for Hot-Swap, without the use of a HUB, when a USB-C supply/charger is plugged into the USB-C IN port, and a load is plugged into the USB-C OUT port. When the USB-C charger is plugged in and properly negotiated, the URB-X5 can be removed from the cradle and the power from the USB-C IN port will automatically supply the USB-C OUT load; allowing for the URB-X5 battery to be hot-swapped.

In order for the pass-through mode to operate, the following must occur:

1. A URB-X5 battery must be installed when the USB-C OUT negotiation takes place. The pass-through mode will not operate if the user attempts to plug in a charger to the USB-C IN and then a load into the USB-C OUT without a URB-X5 battery present.
2. The USB-C IN charger must be able to supply and negotiate a higher power (W) than the USB-C OUT load. If the USB-C IN charger cannot supply enough power, the USB-C OUT load will overcurrent and turn off. If this occurs, the USB-C OUT cable will need to be unplugged and plugged back in to re-negotiate.
3. Due to power loss in the USB-C cables, and the power conversion loss inside the UCA-X5-3USBC unit, the maximum load power will be roughly 85% of the defined port power in the Pass-through mode. For example, a 100W output port will only supply a maximum of 85W to the load. Any additional power draw will result in an Overcurrent fault on the USB-C port that will turn off power to the port and load (Hiccup mode).

Operation of Multiple UCA-X5-3USBC in a System

In order to increase capacity of a system, a user may wish to utilize multiple UCA-X5-3USBC. This is safe to do; however there are some design requirements that should be considered.

Connection in Parallel:

When utilizing USB-C output cables that automatically negotiate and present a DC output voltage, such as pre-manufactured USB-C to DC barrel output cables, it may be beneficial to connect outputs together to increase the system capacity or output power.

If attempting to connect multiple UCA-X5-3USBC in parallel, in which all outputs are connected together on a bus (or similar) to power the same load, the following must be understood and followed:

- The load must be below the total, summed power of all UCA-X5-3USBC units.
- Only matching, negotiated PDOs must be used (e.g. 20V in parallel with 20V, 15V with 15V, etc.)
  - Do NOT attempt to parallel un-matched voltages (e.g. 20V with 15V, etc.)
- Only matching-sized power ports must be used (e.g. 100W with 100W, 65W with 65W, etc.)
  - Do NOT attempt to parallel the 100W with the 65W
- Each UCA-X5-3USBC output must be Diode OR'd to prevent back charge from one unit to the other.
- It must be understood that if outputs are in parallel, and a load is drawing more power than a single UCA-X5-3USBC rating, if one of the units stops providing power (battery out of capacity or faults), the load will increase on the units in parallel and potentially result in Over-Current faults on those units. Overcurrent faults will cause the USB-C port to turn off and power will be lost to the load.

Connection in Daisy-Chain (Series):

Multiple UCA-X5-3USBC units can also be connected in series in a daisy-chain configuration where the USB-C output on one unit is connected to the USB-C input on the subsequent unit using a USB-C cable. This type of configuration will increase the system capacity and decrease the amount of custom cabling.

When connecting in a daisy-chain configuration, the following must be understood and followed:

- To get the highest power transfer (100W), a proper E-Marker USB-C cable is needed for the daisy-chain connection.
- In this configuration, the UCA-X5-3USBC unit that is directly connected to the load will simultaneously provide the power to the load and be charged by the unit(s) upstream. Therefore, the URB-X5 battery in the UCA-X5-3USBC unit powering the load will maintain its capacity while the URB-X5 batter(y/ies) in the upstream unit(s) will decrease in capacity.
- The daisy-chain setup will operate in USB-C Pass-through mode when the URB-X5 battery, installed in the UCA-X5-3USBC unit that is directly connected to the load, is hot-swapped. The reduction of output power to 85% of rating while in Pass-through mode will still apply.

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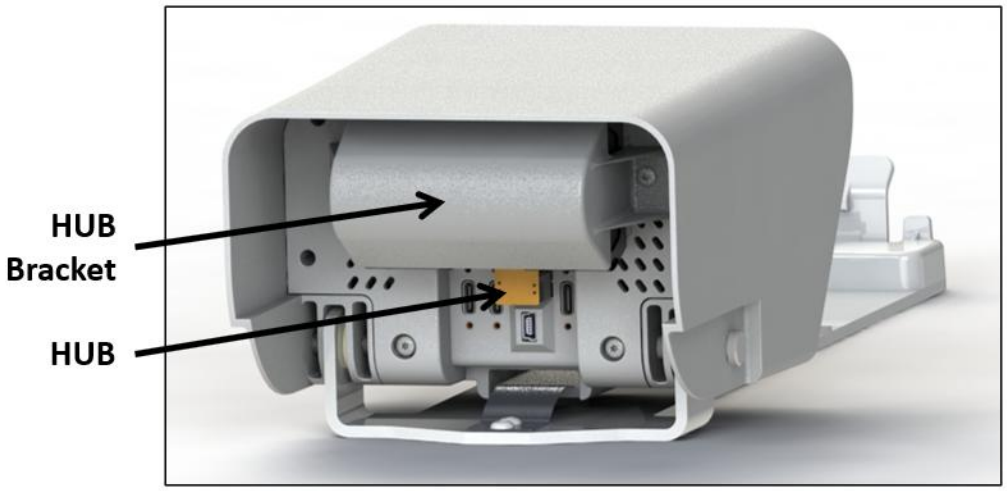
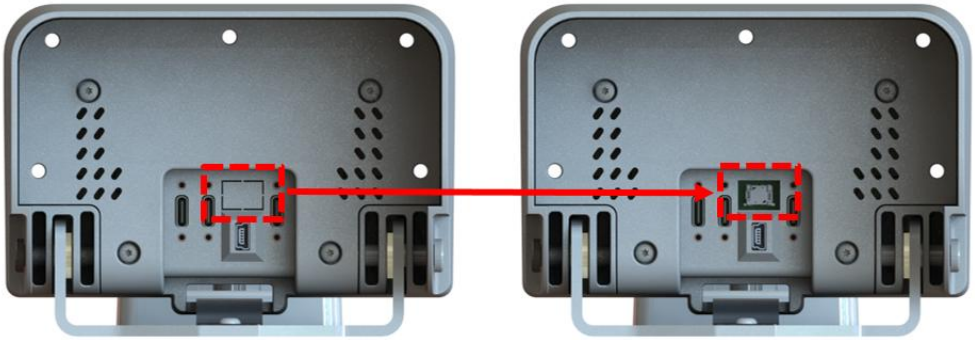
HUB Connector Access and HUB Installation

The URB003S HUB is designed to permanently mount to the bottom of the UCA-X5-3USBC utilizing a designed bracket, P/N 56106640, without impeding the USB-C and USB Mini connectors.



The bottom lid on the UCA-X5-3USBC is shipped with a cover on top of the HUB interface connector for protection when a HUB is not used. However, the cover is designed to break away when access is needed to the connector. The cover is connected to the main lid with four small tabs; light pressure will cleanly snap the tab connections allowing the cover to be removed.

NOTE: Once the cover is removed, it cannot be replaced. Ultralife does not recommend removing the cover unless a HUB is intended to be used.



Example of Cover Removed from Bottom Lid to expose HUB Interface Connector

HUB Installation Instructions:

1. Remove UCA-X5-3USBC from any structure and disconnect any cabling. Remove any URB-X5 battery from the UCA-X5-3USBC.

2. Locate the HUB interface connector cover on the bottom plate of the UCA-X5-3USBC and remove by snapping away from the four small tabs, if needed.

   NOTE: The bottom plate may need to be removed for easier removal of the connector cover. Remove and install the plate by accessing the four M3 Torx screws holding the bottom plate to the UCA-X5-3USBC.

3. With the bottom plate in place, remove the two M3 Torx screws from the top side of the plate and set aside. Verify that both M3 Torx screws on the bottom side of the plate are installed.

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4. Place the URB003S HUB flat on the bottom plate, as shown, and plug in the HUB connector to the interface connector on the UCA-X5-3USBC.

5. Locate the HUB Bracket, PN 56106640. Install the supplied strip of foam cushioning on the inside cavity of the bracket by removing the adhesive back and pressing in place. The foam cushioning will interface with the top of the battery.
   NOTE: If no foam is installed, do not use the bracket. The HUB will not be mounted securely.

6. Place the bracket over the HUB and align the bracket holes with the holes on the bottom plate.

7. Locate the M3 Torx screws supplied with the bracket and install into the existing holes on the bottom plate. Tighten the screws until the bracket is flush with the lid and the screw heads are flush with the bracket. **Do not overtighten the screws**.

8. {optional} Connect a USB-C load to the UCA-X5-3USBC to confirm that the HUB is operational.

When installed and connected, the HUB is powering the internal electronics of the UCA-X5-3USBC and will deplete. A fully charged HUB will power the electronics for approximately 4 days. The HUB should be disconnected for periods of prolonged storage.

Product Maintenance and Service

Ensure that the UCA-X5-3USBC is not physically damaged and is free of debris prior to use. If it is damaged, do not attempt to use it.

UCA-X5-3USBC connectors should be kept clear of moisture and excessive dust. If exposed to dirt or dust, the connectors should be cleaned with compressed air.

The UCA-X5-3USBC product is not user serviceable. Any service, repair, or replacement should only be performed by the manufacturer.

Product Cleaning

The UCA-X5-3USBC product can be cleaned with the following, as needed, over the life of the product:

- Cloth moistened with 70% isopropyl alcohol (IPA) solution
- Soap/water solution
- Common germicidal or disinfectant wipes.

Never use an abrasive sponge, cleaning pad or cloth on the UCA-X5-3USBC.

Never use aggressive alkaline (basic) or acidic cleaners on the aluminum mounting plate.

Ensure that the product is dry from cleaning before use.

Product Support Contact

If you have any questions regarding the UCA-X5-3USBC product, call +1-281-240-4000 and ask for UCA-X5-3USBC support.

Return / Disposal

To arrange a return of material, contact the supplier to make arrangements or contact the customer service line at +1 281-240-4000 Ext 201. A Return Material Authorization (RMA) is required for all products.

The UCA-X5-3USBC may be subject to Federal, State, or local regulations. Consult the applicable regulations prior to disposal as waste electronic equipment.

The UCA-X5-3USBC contains recyclable materials and recycling is encouraged over disposal.

Safety Notices / Symbols

- This product is intended for use only with the Ultralife X5 Battery, URB-X5. This product has not been tested and should not be used with other batteries.
- This product should not be disassembled for any reason.
- This product is not intended to be used by children. Children shall not play with the appliance. Cleaning and user maintenance shall not be done by children.
- This product is not to be used by persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Reference the EMC ACCOMPANYING DOCUMENT for information and precautions regarding electromagnetic interference and emissions.


Manufacturer

Part Number

Serial Number


Date of Manufacture


Caution necessary when operating


Risk of electric shock


Keep dry and away from rain


For indoor use only


Refer to instruction manual and follow instructions for use


Product certified to applicable European Union directives


Certified to Federal Communications Commission requirements

Compliant to Restriction of Hazardous Substances Directive

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EMC ACCOMPANYING DOCUMENT

The UCA-X5-3USBC requires special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in these accompanying documents. Portable and mobile RF communications equipment can affect medical electrical equipment.

WARNING: A risk of increased emissions or decreased immunity may result when charger cables are attached.

WARNING: Observe to verify normal operations if it is necessary to use adjacent to or stacked with other equipment.

Guidance and Manufacturer's Declaration – Electromagnetic Emissions		
The UCA-X5-3USBC is intended for use in the electromagnetic environment specified below. The customer or the user of the UCA-X5-3USBC should assure that it is used in such an environment.		
Emissions Test	**Compliance**	**Electromagnetic Environment - Guidance**
RF emissions CISPR 11/EN55011	Group 1	The UCA-X5-3USBC uses RF energy only for its internal function. RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11/EN55011	Class A	The UCA-X5-3USBC is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC/EN 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC/EN 61000-3-3	Complies	

Guidance and Manufacturer's Declaration – Electromagnetic Immunity			
The UCA-X5-3USBC is intended for use in the electromagnetic environment specified below. The customer or the user of the UCA-X5-3USBC should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment - Guidance**
Electrostatic Discharge (ESD) IEC/EN 61000-4-2	±6kV contact ± 8kV air	±6kV contact ± 8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Power Frequency (50/60 Hz) Magnetic Field IEC/EN 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be a levels characteristic of a typical location in a typical commercial or hospital environment.
Electrical Fast Transient/Burst IEC/EN 610004-4	+2kV for power supply lines	+2kV	Mains power quality should be that of a typical commercial or hospital environment
Surge IEC/EN 61000-4-5	+1kV line(s) to line(2) +2kV line(s) to earth	+1kV line to line +2kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.

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Voltage dips, short interruptions and voltage variations on power supply input lines IEC/EN 61000-4-11	<5% UT (>95% dip in UT) For 0,5 cycle 50% UT (60% sip in UT) For 5 cycles 70% UT (30% dip in UT) For 25 cycles <5% UT (>95% dip in UT For 5 s	Complies Complies Complies Complies	Mains power quality should be that of a typical commercial or hospital environment.
Conducted RF IEC/EN 61000-4-6 Radiated RF IEC/EN 61000-4-3	3Vrms 3 V/m 80 MHz to 2.5 GHz	3Vrms 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the UCA-X5-3USBC, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = [3.5/3] \sqrt{P}$ $d = [3.5/3] \sqrt{P}$ 80 MHz to 800 MHz $d = [7/3] \sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a. Should be less than the compliance level in each frequency range. b. Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1: For system level certification of Radiated RF, a USB-C charger that is emissions certified should be used, or a ferrite (ex. Fair-Rite PN 0431167281) double-looped with USB-C cable may be needed.

NOTE 2: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 3: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

- Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the UCA-X5-3USBC is used exceeds the applicable RF compliance level above, the UCA-X5-3USBC should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the UCA-X5-3USBC.

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Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the UCA-X5-3USBC

The UCA-X5-3USBC is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the UCA-X5-3USBC can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the UCA-X5-3USBC as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter(W)	**Separation distance according to frequency of transmitter (m)**		
	150 kHz to 80 MHz $d = [3.5/3]\sqrt{P}$	**80 MHz to 800 MHz** $d = [3.5/3]\sqrt{P}$	**800 MHz to 2.5 GHz** $d = [7/3]\sqrt{P}$ **800 MHz to 2.5 GHz**
0.01	0.117	0.117	0.233
0.1	0.369	0.369	0.738
1	1.167	1.167	2.333
10	3.689	3.689	7.379
100	11.667	11.667	23.333

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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