H500 USER MANUAL

DOCUMENT ID: UMH5-20150604-01
CLASSIFICATION: CONFIDENTIAL
VERSION: 1.10

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1. TECHNICAL SPECIFICATIONS

1.1 SUPPORTED OPERATING SYSTEMS

PC based OS - USB connection:
- Windows Vista x86 and x64
- Windows 7 x86 and x64
- Windows 8 x86 and x64
- Windows 8.1 x86 and x64
- Windows 10 x86 and x64
- OSX 10.7
- OSX 10.8
- OSX 10.9
- OSX 10.10
- Linux (available upon request)

Mobile OS - Bluetooth connection:
- iOS 7
- iOS 8
- Android 4.x
- Android 5.x
- Windows Phone 8.x

1.2 MICROCONTROLLER
- 32-bit Multi-AHB bus matrix for concurrent execution and data transfers
- ARM Cortex M3 SoC
- Real-time 120MHz/150DMIPS zero-wait state execution from embedded flash
- ART Accelerator™ with advanced prefetching queue and branch cache
- Battery backed embedded RTC with ultra-low dynamic power consumption
- USB 2.0 High Speed support
- Hardware accelerated AES, 3DES, SHA-1, MD5, HMAC
- True Random Number Generator
- Flexible static memory interface (Micro SD, SPI flash)
- Multiple USART, SPI, I²C, GPIO for maximum integration
- Multiple 12-bit ADC

1.3 FIRMWARE
- Custom designed with focus on security, performance and power usage
- Secure Second Level Boot loader to boot only a validly signed Firmware
- Multiple flash partitions (CD-ROM, Public, Private, Hidden, Read-only)
- Access to Mass Storage over USB 2.0 High Speed
- Customizable VID and PID information
- Access to device/partition management controlled by Business Logic Module
- High speed AES-256 hardware encryption on Private Partition
- Customizable User Experience with RGB LED and functional button
- Customizable Business Logic Module
- Exports cryptographic operations (AES, 3DES, SHA-1, SHA-256, RSA-1024, RSA-2048, PKCS#1 encryption and signing, ANSI 9.31 CSRNG) via H-Token Middleware
- Secure channel with H-Token Middleware
- Encrypted File System for storing crypto keys and objects

1.4   MIDDLEWARE
- PKCS #11 v2.20 interface
- Device management interface
- Secure channel between the PC Application and Middleware
- Secure channel between the Middleware and the Firmware
- Support for shared access to the device from multiple Applications
- Optional Windows Service for environments where access to the USB is restricted to system services

1.5   POWER SUPPLY
- Lithium-Polymer high capacity rechargeable battery (450mAh)
- Fast charging through micro USB from host PC and wall charger
- Supports USB connected mode operation while charging
- Certification for Transport of Goods (UN38.3)

1.6   BLUETOOTH
- Single-Chip Bluetooth Solution Integrating Bluetooth
  Basic Rate (BR)/Enhanced Data Rate (EDR)/
  Low Energy (LE) Features fully Compliant with the Bluetooth 4.0 Specification Up to
  the HCI Layer - Supports SPP (over BR/EDR) and ATT (over LE) protocols
- Best-in-Class Bluetooth (RF) performance (TX Power, RX Sensitivity, Blocking)
  - Class 1.5 TX Power Up to +12 dBm
  - Internal Temperature Detection and Compensation to Ensure Minimal Variation in RF Performance Over Temperature, with no External Calibration Required
  - Improved Adaptive Frequency Hopping (AFH) Algorithm with Minimum Adaptation Time
- Advanced Power Management for Extended Battery Life and Ease of Design:
  - On-Chip Power Management, Including Direct Connection to Battery
  - Low Power Consumption for Active, Standby, and Scan Bluetooth Modes
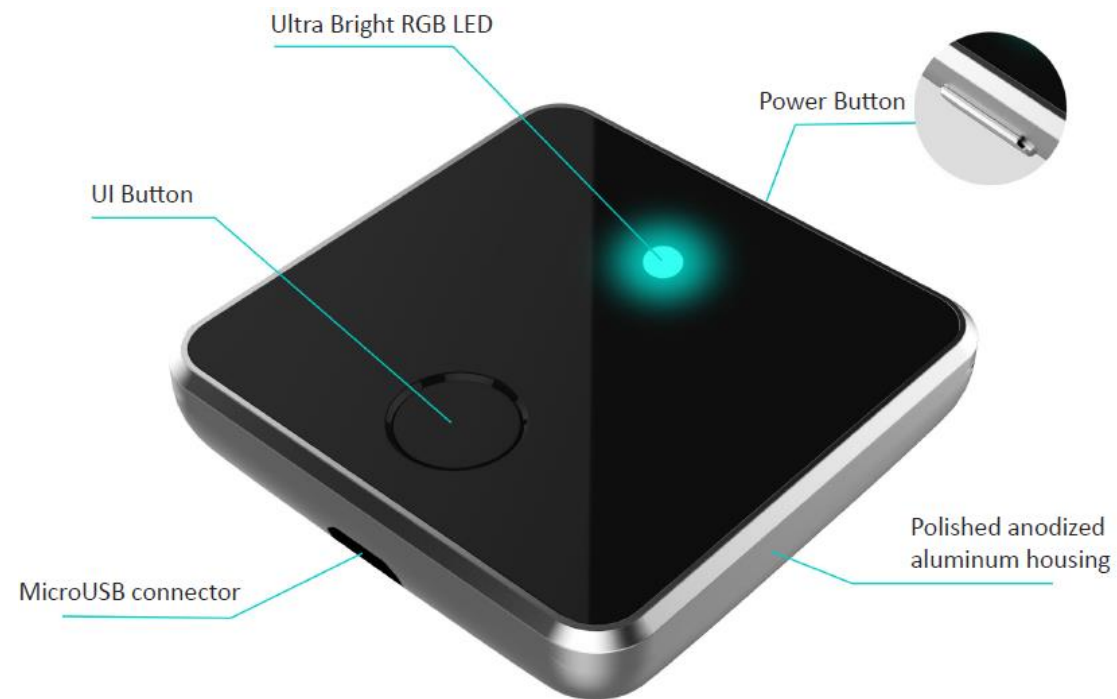 - Shutdown and Sleep Modes to Minimize Power Consumption

1.7   PHYSICAL
Size	45mm x 45mm x 11mm
Weight	30 g – 55 g
Operation Temperature	0°C to 40°C
Storage Temperature	-10°C to 70°C
Operation Humidity	30% to 80%
Storage Humidity	20% to 93% (40°C)
Sequential Read Rate	up to10 MB/s
Sequential Write Rate	up to 4 MB/s
Memory Endurance	10,000 Program/Erase Cycles
Data Retention	JEDEC compliant

1.8   MISCELLANEOUS
- SSCD-ready port (optional)
- RGB (multi-color) LED on the front panel
- Functional button on the front panel
- Micro USB port on the bottom side
- Power button on the top side
- Flash mass storage up to 32 GB
- USB-IF, CE, FCC, RoHS, WEEE compliant

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Ultra Bright RGB LED

Power Button

UI Button

MicroUSB connector

Polished anodized aluminum housing

2. H500 STATES & TRANSITIONS

The H500 device communicates its status to the User through a combination of LED colors and pulsing frequencies. Each LED color-frequency association is linked to one and only one main operational state.

<u>LED Colors</u>

WHITE	Business logic notifications
RED	Battery Level notifications
ORANGE	Charging notifications
BLUE	Bluetooth notifications
GREEN	USB notifications

<u>LED Frequencies:</u>

SLOW PULSE	Slowly fading in-out (about 0.5 Hz)
PULSE	Switching on-off (about 1 Hz)
FAST PULSE	Quick blinking (about 4 Hz)
SOLID	Steady

<u>Battery Levels:</u>

FULL:	Battery is fully charged
OK:	Battery has enough charge to allow extended usage
LOW:	Connect to charger as soon as possible (less than 12% charge left)
EMPTY:	The device cannot operate without first being fully charged

<u>Disclaimer</u>
The H500 device should be fully charged at least once during each 30 day interval. Allowing the battery to fully discharge down to the EMPTY state will reduce the battery's lifetime and require a lengthy recover procedure (ref. section 3.4)

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H500 States Table

STATUS NAME	LED	WHAT YOU SEE	WHAT IT MEANS
While the device is connected to the wall charger:			
FULLY CHARGED		Solid orange light	The battery is fully charged
CHARGING		Pulsing orange light	The battery is charging
CHARGING LOW		Pulsing red light	The battery is charging but still low
CHARGING EMPTY		Solid red light	The battery is charging but almost empty
While the device is powered ON from battery:			
CHARGE NOW!		Fast pulsing red light then OFF	Connect to charger and charge until LED light becomes solid orange
BT READY		Pulsing blue light	Ready to connect over bluetooth
BT ACTIVE		Solid blue light	Connected over bluetooth
BT STANDBY		Slowly pulsing blue light	Connection over blutooth was lost - waiting to reconnect
While the device is connected to the USB port of a PC:			
CHARGE NOW!		Fast pulsing red light then OFF	Connect to charger and charge until LED light becomes solid orange
USB READY		Pulsing blue light	Connected over USB
USB ACTIVE		Fast pulsing green light	Transmitting data over USB
USB STANDBY		Slowly pulsing green light	USB port is in standby mode

Note: When the battery needs to be charged, a short inetrmittent red pulse will be visible in the Ready, Active and Standby color states listed above

3. Operating with the H500

3.1 Activating Bluetooth Transmission

To activate the Bluetooth mode on the H500, keep it disconnected from any other equipment. Press the power button and release it when the LED shows a blue light.

As a result the internal Bluetooth chip and associated components will power up and bring the device to the BT Ready state (ref. H500 States Table). The H500 device is now discoverable as a Bluetooth device with which you can pair and connect. After about 3 minutes in BT Ready or BT Standby modes without any connection over Bluetooth, the H500 will automatically switch OFF to save battery.

Note:

The H500 supports both BR/EDR and BLE Bluetooth modes. However, both modes cannot be supported at the same time. After connecting in one mode, the H500 should be turned OFF and unpaired in order to be connected in another mode on the same device.

3.2 Using the H500 as Mass Storage Device

To use the H500 in mass storage mode, connect the device to the USB port of any working PC. When the device detects a connection over USB it will switch to USB Ready mode (ref. H500 States Table) and the LED will start emitting a green light.

In this mode, after the required drivers are automatically loaded by the operating system, a new mass storage 4GB partition will be mounted on the PC and become accessible for reading/writing data. The H500 will be listed as QubiBox under the Safely Remove Hardware option, with a VID = 261C and PID = 2300.

After about 3 minutes in USB Standby mode without reconnection, the H500 will automatically switch OFF to save battery.

3.3 Charging the Battery

To activate the battery charging mode, connect the device to the USB port of any working PC or to a USB wall-charger.

While connected to the PC, the H500 will be charged only after it is properly configured and mounted. With reference to the H500 States Table, charging will occur only in the USB Ready and USB Active modes.

While connected to the wall charger, the H500 will start charging right away and communicate its state as shown in the H500 States Table.

3.4   RECOVERING A FULLY DISCHARGED BATTERY

In case the battery of the H500 was left to discharge below the EMPTY state, it will need to be recovered by connecting it to a wall-charger. In fact, the battery recovery can be performed using <u>only</u> a wall charger and will continue until the power is raised at least up to the EMPTY level.

Note:

During the recovery procedure, the <u>LED will not light up</u>. Please allow at least 4hrs time for the H500 to reach the Charging Empty state and show a solid red LED light (ref. H500 States Table).

FCC Statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or   television   reception,   which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

 • Reorient or relocate the receiving antenna.
 • Increase the separation between the equipment and receiver.
 • Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Modifications to this product will void the user's authority to operate this equipment.