ZERØKEY

SPATIAL INTELLIGENCE

Quantum RTLS™ 2.0 Datasheet

Models:

QTM-EAP10
QTM-AGP10
QTM-UAR10
QTM-UMR10
QTM-DWR10
QTM-DMC10
QTM-SMR10

Digitizes 3D location in real-time with up to 1.5 mm accuracy

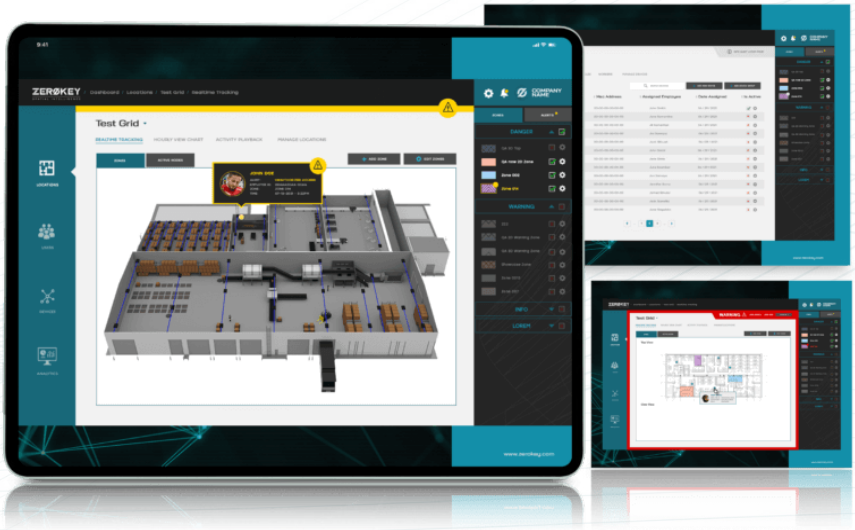
Wide-area scalability supports virtually any use case

Rapid deployment with industry-leading automatic calibration

Hyper-Accurate RTLS for Industrial Applications

Quantum RTLS 2.0 is a hyper-accurate location technology that digitizes complex industrial operations in real-time with up to 1.5 mm 3D accuracy - a 100-fold accuracy gain over other location technologies, including Ultra-Wideband. The technology provides unprecedented operational visibility of manufacturing, supply chain, logistics, and human-centric workflows, enabling real-time optimization and integration of processes across entire organizations.

By precisely digitizing 3D spatial locations in real-time, Quantum RTLS 2.0 is revolutionizing industrial environments, one factory, warehouse, and facility at a time.



The ZeroKey Difference

Leveraging proprietary technology supported by over 30 patents, Quantum RTLS 2.0 tracks critical enterprise assets, processes, goods and people with unrivaled accuracy. Historically, the digitization of complex human-centric processes has been challenging due to the technical limitations of earlier technologies. Quantum RTLS 2.0 unlocks this untapped value by precisely digitizing, digitally twinning, and streamlining manual processes in real-time to increase production efficiency, eliminate manual data entry steps, and improve first-pass yields.

Breakthrough 3D Location Technology

Quantum RTLS 2.0 combines hyper-accurate 3D localization and wide-area scalability to drive optimization through total operational visibility.

The system's Mobile devices capture valuable operational data in real-time to provide a fully automated and digitally controlled factory of the future. Ultra-low latency position updates enable countless new operational efficiencies in many industries, from manufacturing to construction job sites. The ZeroKey system offers the flexibility, simplicity, and speed required to support temporary and permanent deployments ranging from large-scale wide-area coverage to localized work cell coverage.

System Specifications

3D Positioning Accuracy	up to 1.5 mm[1]
Positioning Update Rate	up to 20 Hz[2]
Typical Measurement Latency	14 ms (typ.)

Features

Total business intelligence.

Actionable insights into facility-wide operations and processes drives better data-driven decision making and improved bottom-line performance.

Unparalleled accuracy.

The only industrial real-time location system (RTLS) in the market that provides up to 1.5 mm 3D positioning accuracy.

Rapid low-cost deployment.

Industry-leading calibration technology automatically calculates the exact location of every fixed device, eliminating the need for costly surveying or mapping throughout the deployment process.

Six Degrees of Freedom (6DoF).

Each device provides six degrees of freedom position and orientation output[3]. Advanced sensor fusion algorithms tightly couple multiple sensor outputs to provide highly accurate and reliable heading and orientation data.

Expandable.

Online provisioning supports rapid scalability across entire facilities, while advanced sensor fusion algorithms and multichannel operation enable simultaneous operation of a large number of devices.

Open API and extensible plugin interfaces.

Core functions of the Quantum RTLS 2.0 hardware are accessible through the ZeroKey API, providing direct control of devices and system operation. Sample source code examples are provided for popular platforms, including Python, C#, Java, and JavaScript.

[1] Under unobstructed conditions with view to 6 anchor nodes configured in an ideal network geometry
[2] Dependent on the number of Mobile units
[3] Applies exclusively to the QTM-UMR10 and QTM-DWC10 devices

Rapid and Low-Cost Deployment

Quantum RTLS 2.0 is packed with advanced features to deliver fast and easy set-up of new positioning networks. Fixed Anchors are available in two interoperable models to efficiently deploy and scale Quantum RTLS 2.0 in varying industrial environments.

The QTM-EAP10 Anchor is a daisy chainable Power-over-Ethernet (PoE 802.3at) model that reduces costs and installation time by connecting up to 10 devices on a single Ethernet connection. The QTM-UAR10 Anchor is battery operated or optionally powered via micro-USB, making it ideal for temporary installations or placement where a low-profile footprint is preferred.

QTM-EAP10
PoE Anchor

QTM-UAR10
Universal Anchor

ZeroKey Calibration
Technology

Rapid Installation: Save Money and Time

Anchors are easily secured to the included mounting hardware with toolless locking plates located on the back of the devices. The QTM-EAP10's gimbal-mounted transducer makes it possible to focus the device toward key areas, allowing optimal deployment geometries with fewer anchors. The adjustable receiver lowers installation complexity and cost by enabling clients to use opportune mounting points in a facility.

Automatic Calibration Technology

Automatic calibration technology built-in to Quantum RTLS 2.0 dramatically lowers the total cost of ownership by eliminating the need for expert installers, manual surveying, specialized tools, or external support.

Anchors

QTM-EAP10

Daisy-Chainable PoE+ (802.3at) Anchor

QTM-UAR10

Micro-USB Rechargeable Universal Anchor

Gateways

QTM-AGP10

Quantum RTLS 2.0 Gateway with PoE+ (802.3at)

Edge Compute Device

QTM-AEA10

On-Premises Positioning Server with Cloud Connectivity

Mobiles

QTM-DWR10

Lightweight, Wearable Wristband Mobile

QTM-DMC10

Ultra-compact Coin Cell Battery (2032) Mobile

QTM-SMR10

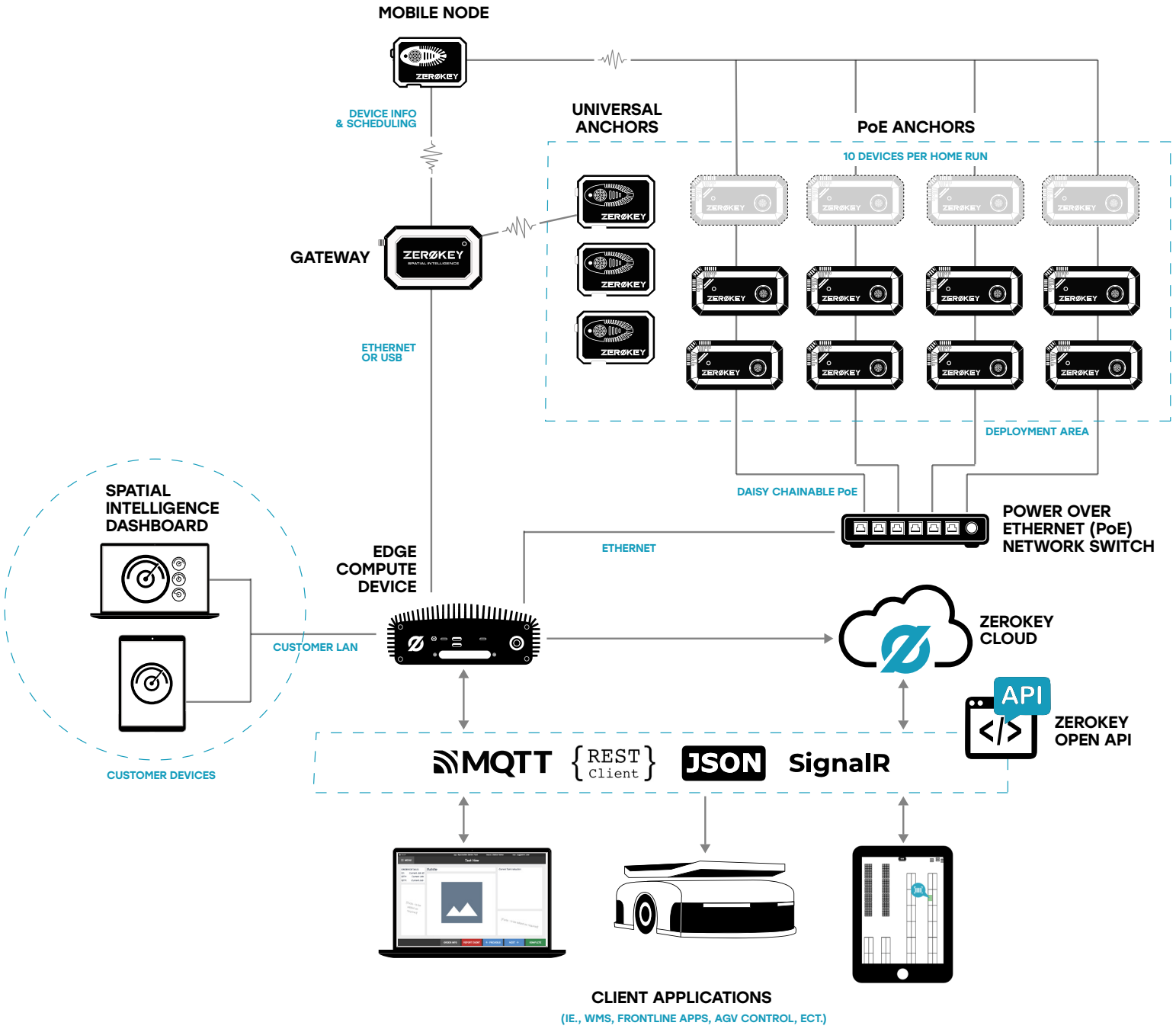
Lightweight, Wearable Mobile with Visual, Haptic, and Audible Alarm

QTM-UMR10

Micro-USB Rechargeable Universal Mobile

System Example

Full compatibility between all Quantum RTLS 2.0 Anchor and Mobile devices enables a highly configurable system architecture. This diagram demonstrates a typical enterprise deployment. Detailed documentation of ZeroKey's open API is available at https://api.zerokey.com.



QTM-EAP10

PoE+ Input	48 - 57 V	
DC Supply	48 - 57 V	
Power Dissipation	2.25 W	
PoE Standard	PoE+ 802.3at	
USB (Service Port)	Micro-USB	
Ethernet	2x RJ45	
Daisy Chain Limit	10	
Aux Port	Optional external ultrasonic transducer[1]	
DC Jack	2.1 mm / 0.08 in ID 5.5 mm / 0.21 in OD Center-pin positive	
Radio Band	2.4 GHz ISM band	
Radio Protocol	Proprietary GFSK @ 2 Mbps	
Output Power	8 dBm	
Radio Range	Up to 200 m / 0.12 mi	
Regulatory Certifications	USA, Canada, Europe, Japan, Korea, Australia, New Zealand	
Transmit SPL	Max 110 dB @ 50 kHz	
Ultrasonic Range	Up to 20 m / 65 ft	
Dimensions	119 x 65.9 x 31.5 mm 4.6 x 2.5 x 1.2 in	
Weight	106 g	
Material	Flame retardent FR-PC (Lexan FR Resin 945 Asia)	
Mounting	Multi-use adapter plate (114 x 121 mm)	
Operating Temperature	-20 to 60 °C	-4 to 140 °F
Charging Temperature	0 to 60 °C	32 to 140 °F
Humidity	5 to 95% non-condensing	
Safety Certification	IEC 62368-1:2018, EN 62368-1, UL 62368-1:2019, CSA C22.2 No. 62368-1:2019	

† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

See https://zerokey.com/patents for a complete list of patents applicable to this product.

[1] Requires QTM-ETC10 external transducer kit (sold separately).

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QTM-AGP10

PoE+ Input	48 - 57 V	
DC Supply	48 - 57 V	
Power Dissipation	1.5 W	
PoE Standard	PoE+ 802.3at	
USB (Service Port)	USB-C	
Ethernet	RJ45	
DC Jack	2.1 mm / 0.08 in ID 5.5 mm / 0.21 in OD Center-pin positive	
Radio Band	2.4 GHz ISM band	
Radio Protocol	Proprietary GFSK @ 2 Mbps	
Output Power	8 dBm	
Radio Range	Up to 200 m / 0.12 mi	
Regulatory Certifications	USA, Canada, Europe, Japan, Korea, Australia, New Zealand	
Dimensions	101.4 x 65 x 24.3 mm 3.99 x 2.5 x 0.9 in	
Weight	76 g	
Mounting	Multi-use adapter plate (114 x 121 mm)	
Operating Temperature	-20 to 60 °C	-4 to 140 °F
Charging Temperature	0 to 60 °C	32 to 140 °F
Humidity	5 to 95% non-condensing	
Safety Certification	IEC 62368-1:2018, EN 62368-1, UL 62368-1:2019, CSA C22.2 No. 62368-1:2019	

† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

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QTM-UAR10

Input Voltage	5 V	
Charge Time	4 h (typ.)	
Battery Life	Up to 360 h[1]	
USB	Micro-USB	
Radio Band	2.4 GHz ISM band	
Radio Protocol	Proprietary GFSK @ 2 Mbps	
Output Power	8 dBm	
Radio Range	Up to 200 m / 0.12 mi	
Regulatory Certifications	USA, Canada, Europe, Japan, Korea, Australia, New Zealand	
Transmit SPL	Max 110 dB @ 50 kHz	
Ultrasonic Range	Up to 20 m / 65 ft	
Dimensions	64 x 45.2 x 17.7 mm 2.5 x 1.7 x 0.6 in	
Weight	30 g	
Mounting	Fixed base plate (50.2 x 50 mm) Swivel base plate (54 x 50.2 mm)	
Operating Temperature	-20 to 60 °C	-4 to 140 °F
Charging Temperature	0 to 60 °C	32 to 140 °F
Humidity	5 to 95% non-condensing	
Safety Certification	IEC 62368-1:2018, EN 62368-1, UL 62368-1:2019, CSA C22.2 No. 62368-1:2019	

† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

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[1] Refer to graph on pg. 13.

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QTM-UMR10

Input Voltage	5 V	
Charge Time	4 h (typ.)	
Battery Life	Up to 360 h[1]	
USB	Micro-USB	
Radio Band	2.4 GHz ISM band	
Radio Protocol	Proprietary GFSK @ 2 Mbps	
Output Power	8 dBm	
Radio Range	Up to 200 m / 0.12 mi	
Regulatory Certifications	USA, Canada, Europe, Japan, Korea, Australia, New Zealand	
Transmit SPL	Max 110 dB @ 50 kHz	
Ultrasonic Range	Up to 20 m / 65 ft	
Dimensions	64 x 45.2 x 17.7 mm 2.5 x 1.7 x 0.6 in	
Weight	30 g	
Mounting	Fixed base plate (50.2 x 50 mm) Swivel base plate (54 x 50.2 mm)	
Operating Temperature	-20 to 60 °C	-4 to 140 °F
Charging Temperature	0 to 60 °C	32 to 140 °F
Humidity	5 to 95% non-condensing	
Safety Certification	IEC 62368-1:2018, EN 62368-1, UL 62368-1:2019, CSA C22.2 No. 62368-1:2019	

† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

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[1] Refer to graph on pg. 13.

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QTM-DWR10

Input Voltage	5 V	
Charge Time	4 h (typ.)	
Battery Life	Up to 195 h[1]	
USB (Charge Port)	Micro-USB	
Radio Band	2.4 GHz ISM band	
Radio Protocol	Proprietary GFSK @ 2 Mbps	
Output Power	8 dBm	
Radio Range	Up to 200 m / 0.12 mi	
Regulatory Certifications	USA, Canada, Europe, Japan, Korea, Australia, New Zealand	
Transmit SPL	Max 110 dB @ 50 kHz	
Ultrasonic Range	up to 20 m / 65 ft	
Dimensions	37.6 x 25.5 x 11.2 mm 1.4 x 1.0 x 0.4 in	240 x 25.5 x 11.2 mm with wrist strap 9.4 x 9.4 x 0.6 in with wrist strap
Weight	30 g	
Mounting	Wrist strap (20 mm) Adapter plate (39 x 28 x 5.5 mm)	
Operating Temperature	-20 to 60 °C	-4 to 140 °F
Charging Temperature	0 to 60 °C	32 to 140 °F
Humidity	5 to 95% non-condensing	
Safety Certification	IEC 62368-1:2018, EN 62368-1, UL 62368-1:2019, CSA C22.2 No. 62368-1:2019	

† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

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[1] Refer to graph on pg. 13.

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QTM-DMC10

Input Voltage	5 V	
Battery Life	Up to 96.5 weeks[1]	
Battery Consumption per Query	0.029 uAh	
Queries per Battery (240 mAh)	7,310,344 (typ.)	
Radio Band	2.4 GHz ISM band	
Radio Protocol	Proprietary GFSK @ 2 Mbps	
Output Power	8 dBm	
Radio Range	Up to 200 m / 0.12 mi	
Regulatory Certifications	USA, Canada, Europe, Japan, Korea, Australia, New Zealand	
Transmit SPL	Max 110 dB @ 50 kHz	
Ultrasonic Range	Up to 20 m / 65 ft	
Dimensions	36 x 36 x 11 mm 1.4 x 1.4 x 0.4 in	47 x 36 x 15.5 mm with strap 1.8 x 1.4 x 0.6 in with strap
Weight	30 g	
Mounting	Clip-in adapter plate (47 x 18 x 13 mm)	
Operating Temperature	-20 to 60 °C	-4 to 140 °F
Charging Temperature	0 to 60 °C	32 to 140 °F
Humidity	5 to 95% non-condensing	
Safety Certification	IEC 62368-1:2018, EN 62368-1, UL 62368-1:2019, CSA C22.2 No. 62368-1:2019	

† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

See https://zerokey.com/patents for a complete list of patents applicable to this product.

[1] Refer to graph on pg. 13.

v. 122022 *Information subject to change without notice.

QTM-SMR10

Input Voltage	5 V	
Charge Time	4 h (typ.)	
Battery Life	Up to 360 h[1]	
USB (Service Port)	Micro-USB	
Radio Band	2.4 GHz ISM band	
Radio Protocol	Proprietary GFSK @ 2 Mbps	
Output Power	8 dBm	
Radio Range	Up to 200 m / 0.12 mi	
Regulatory Certifications	USA, Canada, Europe, Japan, Korea, Australia, New Zealand	
Transmit SPL	Max 110 dB @ 50 kHz	
Ultrasonic Range	Up to 20 m / 65 ft	
Dimensions	47 x 72.7 x 19 mm 1.8 x 2.8 x 0.7 in	47 x 90 x 33.6 mm with clip 1.8 x 3.5 x 1.3 in with clip
Weight	30 g	
Mounting	Garment clip and lanyard ring	
Operating Temperature	-20 to 60 °C	-4 to 140 °F
Charging Temperature	0 to 60 °C	32 to 140 °F
Humidity	5 to 95% non-condensing	
Safety Certification	IEC 62368-1:2018, EN 62368-1, UL 62368-1:2019, CSA C22.2 No. 62368-1:2019	

† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

See https://zerokey.com/patents for a complete list of patents applicable to this product.

[1] Refer to graph on pg. 13 titled QTM-UMR10 Battery Life.

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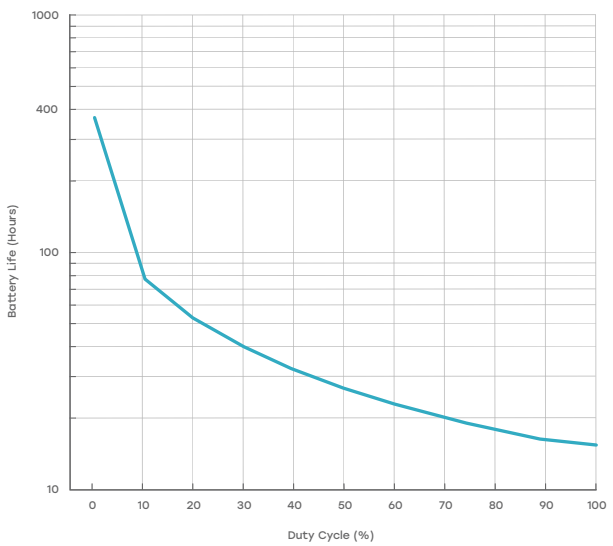
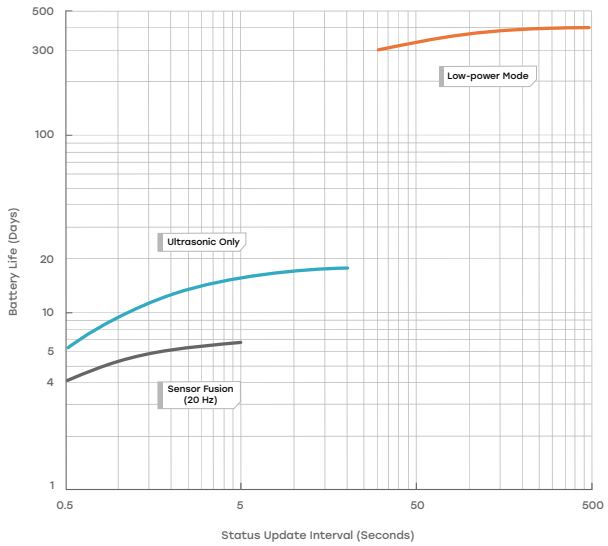
Operational Modes and Performance

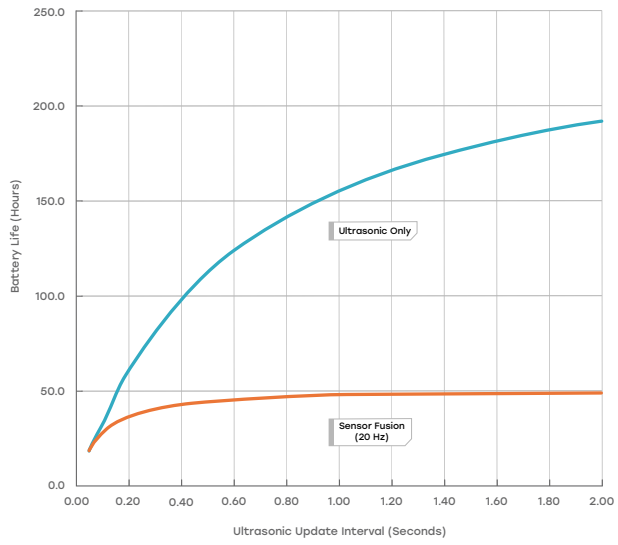
QTM-UAR10 Battery Life vs Duty Cycle



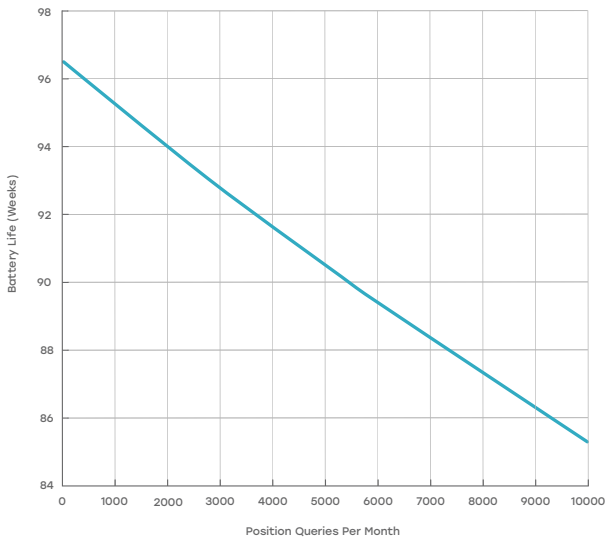
QTM-UMR10 Battery Life



QTM-DWR10 Battery Life



QTM-DMC10 Battery Life



† Pat. US 9/977,113, US 10/051,599, US 10/448,357, US 10/627,479, US 10/736,075, US 10/893,502, CN109073740B, KR102252251B1, US 15/339,885, US 15/982,750, US 16/031,553, US 16/560,543, US 16/820,445, US 16/919,822.

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