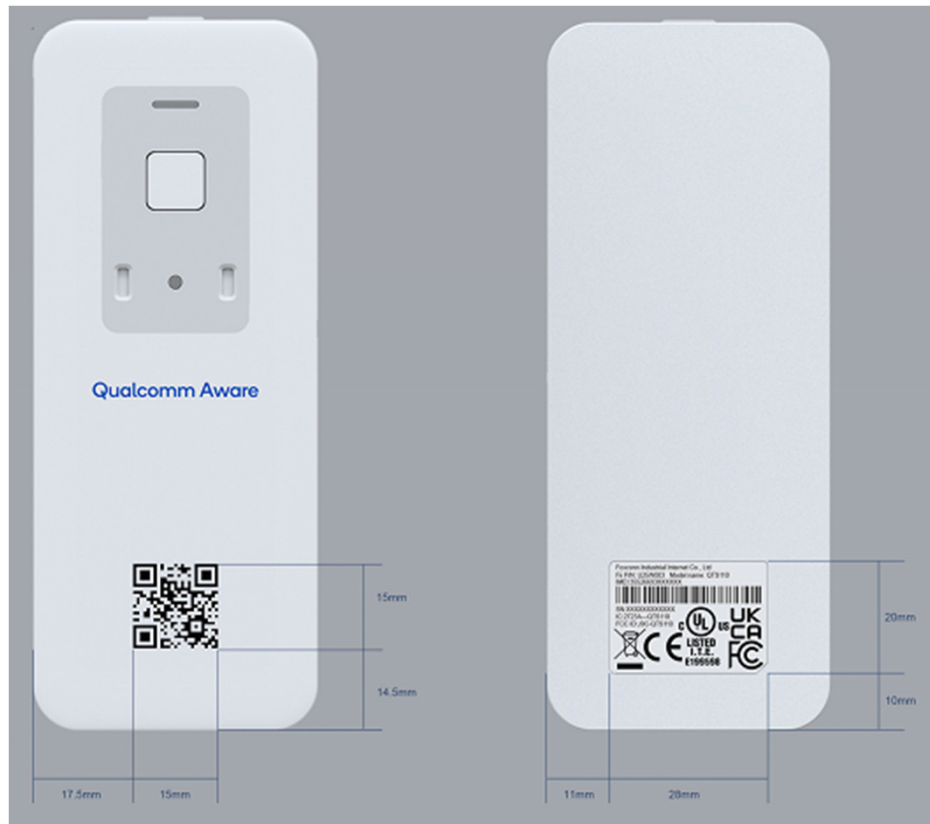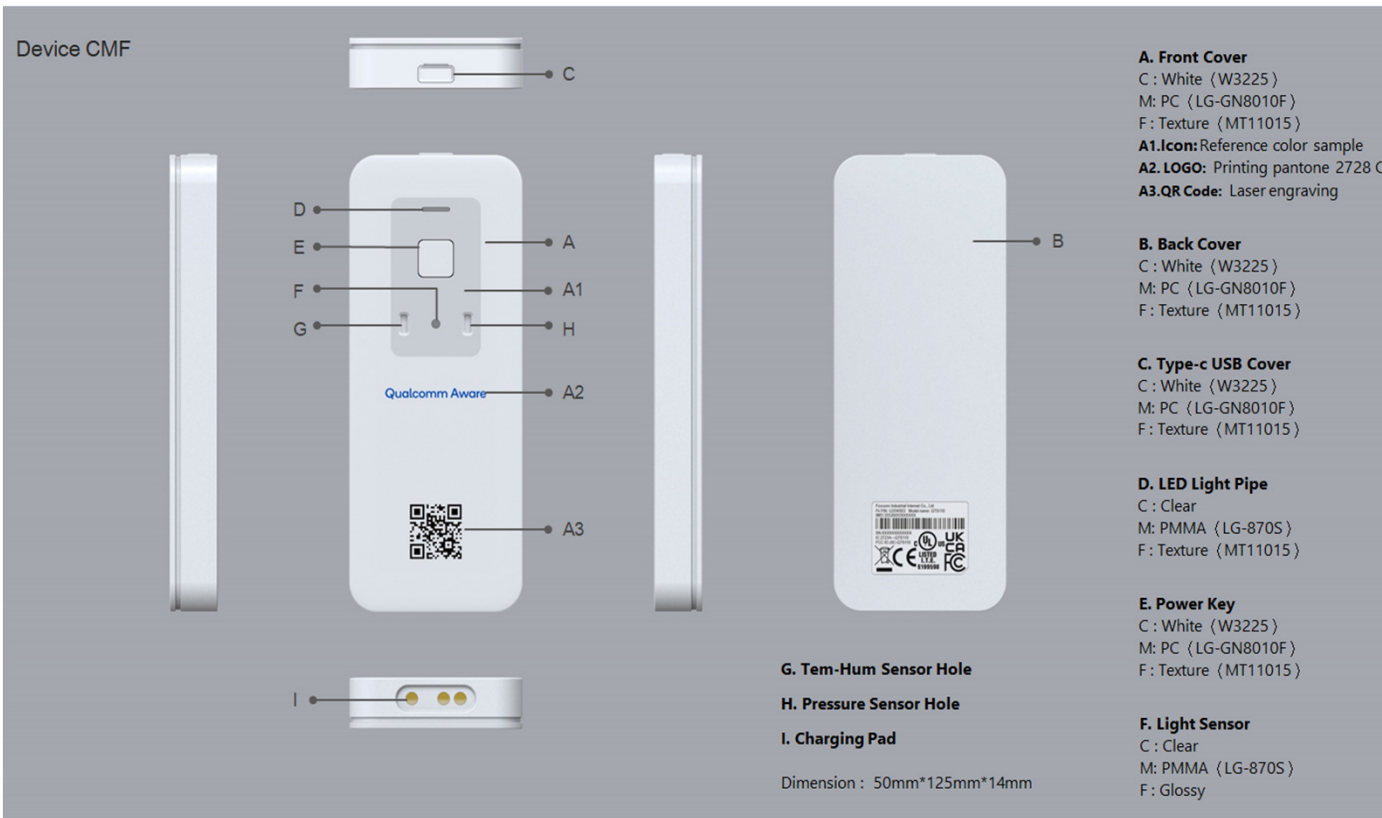# QTS110 User Manual

General description

Ultra low power, cloud connected, globally usable track and sense device

QTS110 is a track and sense device that can be used in shipping and logistics field for tracking the location of a cargo and to monitor environmental condition of cargo during transit and during warehousing. The device can be used in multimodal journeys over land, sea and air.

QTS110 is a device with a cellular radio that works on three different radio access technologies: LTE-M, NBIoT and GPRS/2G. It is equipped with a GNSS receiver, and a Wi-Fi receive module for collecting information about nearby Wi-Fi access points for the purpose of determining location. In addition, the device has a number of sensors. The device sends location and sensor measurements to a cloud on a periodic basis or when certain events are triggered.

Design and components

Device CMF

D
E
F
G

A
A1
H

Qualcomm Aware — A2

A3

C

B

I

A. Front Cover
C : White （W3225）
M: PC （LG-GN8010F）
F : Texture （MT11015）
A1.Icon: Reference color sample
A2. LOGO: Printing pantone 2728 C
A3.QR Code: Laser engraving

B. Back Cover
C : White （W3225）
M: PC （LG-GN8010F）
F : Texture （MT11015）

C. Type-c USB Cover
C : White （W3225）
M: PC （LG-GN8010F）
F : Texture （MT11015）

D. LED Light Pipe
C : Clear
M: PMMA （LG-870S）
F : Texture （MT11015）

E. Power Key
C : White （W3225）
M: PC （LG-GN8010F）
F : Texture （MT11015）

F. Light Sensor
C : Clear
M: PMMA （LG-870S）
F : Glossy

G. Tem-Hum Sensor Hole

H. Pressure Sensor Hole

I. Charging Pad

Dimension : 50mm*125mm*14mm

- Dimension - 50mm*125mm*14mm

- Weight - About 140g

- Sensors:
  - Inertial measurement unit aka IMU
  - Temperature sensor
  - Humidity sensor
  - Ambient light sensor
  - Pressure sensor

- One USB2.0 type-C female connector

- Power button

- 1x Red/Green/Blue LED

- eSIM

- Communications module that supports LTE-M, NBIoT and 2G

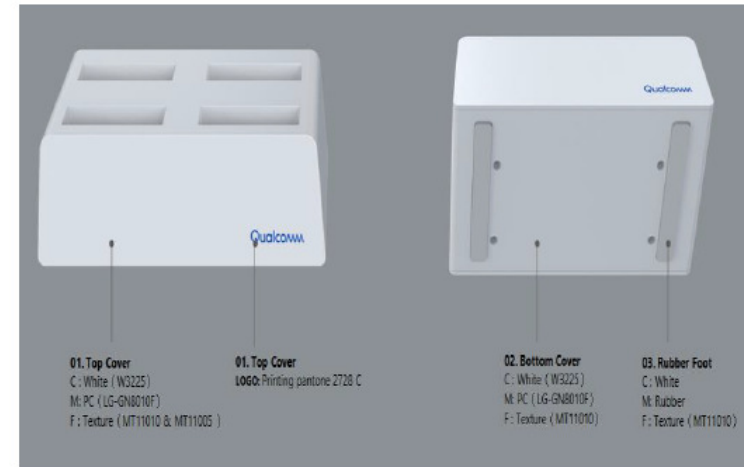- WiFi module for positioning

Use Cases and capabilities

Use case supported by QTS 110
Asset tracking and remote management
Shipment tracking and logging
Totes and pallet shipment
Cold chain tracking for food and pharma
Air cargos

| Capabilities QTS 110 |
| --- |
| International Protection rating: IP65 |
| Multi-mode LTE Cat.M1, LTE Cat.NB2, EGPRS |
| Geolocation: GNSS, cellular & WiFi based positioning |
| Status LEDs: GNSS status; cellular status; power status |
| Programmable non-mechanical touch power button |
| Battery powered with high efficiency |
| Out-of-the box cellular connectivity |

Device battery charging

- Device can be placed on the charging cradle to charge it

- The device shows a blinking XXXX color LED while it is charging. When the device charge is 85% or higher the LED color changes to YYYY.

- After charging is complete, device should be removed from the cradle.

Item	Specification
Device dimension	149.3mm*86.4mm*45mm
Operating environment	Temperature: 5°C to 40°C Humidity: 85%RH (no condensation)
Operating voltage	Charge Input: 12V
External interface	1xPower Jack
Flammability standard	94HB
ESD	Air discharge +/- 15KV, Contact discharge +/- 8KV
Environmental standard	GP
Regulatory list	FCC,CE,UL/CB

01. Top Cover
C : White (W3225)
M: PC (LG-GN8010F)
F : Texture (MT11010 & MT11005)

01. Top Cover
LOGO: Printing pantone 2728 C

02. Bottom Cover
C : White (W3225)
M: PC (LG-GN8010F)
F : Texture (MT11010)

03. Rubber Foot
C : White
M: Rubber
F : Texture (MT11010)

Device Label

QTS 110 has been certified with regulatory bodies and against regulatory standards and as such contains markings related to these certifications
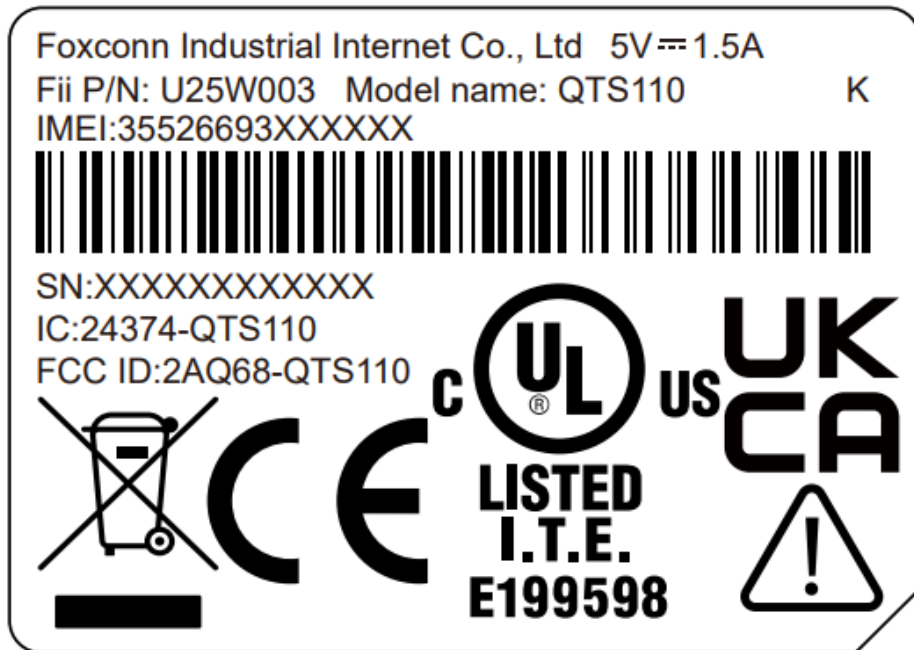
Markings on the device label include:

- 1. Model number: QTS110
- 2. FCCID: 2AQ68-QTS110
- 3. ICCID: 24374-QTS110
- 4. SN(Serial number)
- 5. IMEI
- 6. CE logo
- 7. WEEE logo
- 8. UL logo
- 9. England UKCA logo
- 10. Warning logo of UL

QR Code

- The QR code can be scanned by a camera on a cell phone in order to access a device specific public URL

- The URL provides information about the tracker device such as the firmware on the device, whether device is being used for a shipment, remaining battery life and few other things.

- Since the URL is a public URL journey specific details such as origination and destination address, current location of the tracker, customer specific information is not provided.

Specifications

Item		Specification
Device dimension		50mm*125mm*14mm(typical)
Main Chipset		Qualcomm/ MDM9205-0 (LTE Modem) Qualcomm/ SDR105 (WAN RF) Qualcomm/ SMB231(Charger IC) Qualcomm/ QTA3516(Antenna tuner) Qualcomm/ PM9205(PMIC) Qualcomm/QCA4004(WiFi SoC)
Wireless connectivity	Cellular	LTE Cat.M1+ Cat. NB2, 3GPP Rel14 Class5(20dBm)
	GPRS/ EGPRS	Low band: ▪ GPRS power class 4 (33dBm), EGPRS power class E2 (27dBm) Mid band: ▪ GPRS power class 1 (30dBm) , EGPRS power class E2 (26dBm)
	GNSS	GPS/GAL/GLO/Beidou/QZSS , L1 band(1575.42MHz) High precision GNSS (Gen 9VT) - no concurrency with LTE
	Wi-Fi	2.4G only (IEEE 802.11b/g/n)
Band Plan	LTE	Cat.M1 bands: Low Band: B5, B8, B12, B13, B14, B18, B19, B20, B26, B27, B28, B85 Middle Band: B1,B2,B3,B4,B25,B66 NB bands: Low Band: B5,B8,B12,B13,B18,B19,B20,B26,B28,B85 Middle Band:B1,B2,B3,B4,B25,B66
	GPRS	Low bands: GSM850,GSM900 Middle band: DCS, PCS
Over Temperature Protection: 60 degree ℃ Under Temperature Protection: 0 degree ℃		

Flight Mode

The QTS110 flight mode feature disables the device transmitters while the device is in flight in accordance with FAA advisory circular A.C 91.21-1D

- The flight detection algorithm on QTS110 is designed to prevent emission while the device is in a flight. In case the device has any scheduled transmissions to the cloud, the algorithm checks two independent sources to confirm whether the device is in flight. These two sources include the cellular radio where the speed/velocity with which the device is moving is assessed and the other source is an accelerometer sensor which look for a unique sequence of events. Only when both the checks confirm that device is not in a flight, is the device is allowed to transmit. If any one of the checks fails, the device is put in airplane mode thereby preventing the device from transmitting and receiving any cellular signals.

Flight Mode

- Acceleration Sensor: The LSM6DSO32TR is a 3-axis combo sensor containing an accelerometer and gyroscope that comes in small land grid array package (LGA) and with an operating temperature range from -40 °C to +85 °C. The features of this sensor include:

- Cellular Radio: The cellular modem inside QTS110 is a Qualcomm low power modem called MDM 9205. It supports three radio access technologies, namely LTE-M (or eMTC), NBIoT and 2G/EGPRS. On LTE-M and NB the device supports power class 5 which means it is capable of transmitting as high as 20 dBm. The power amplifier used for 2G supports transmit power up to 33 dBm.

LED states...more

LED requirements for Connectivity, Location and Sensor

State	Significance	LED color and blink rate
Ongoing data exchange with cloud	Device is uploading telemetry data to the cloud.	Green + fast blinking
Loss or no cellular connectivity	Device does not have cellular connectivity.	Blue + fast blinking
Threshold breach/excursion	Temperature/pressure/humidity/ALS threshold breach occurred during shipment.	Solid Yellow
Location attempt	Device is attempting a position fix (GNSS or terrestrial based)	White + fast blinking

LED states related to battery and charging

State	Significance	LED color and blink rate
FOTA download and update	FOTA update will happen only when device is placed on charging dock. The LED will display ongoing FOTA update (if any).	Solid white
Error/alarm (sensors malfunction, critical issue)	Indication for hardware malfunction, high device temperature etc	Solid blue
DAM app crash	DAM application crashes	Solid red

Safety and regulatory guidelines

- 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.

- The QTS110 has been tested to the limits for a Class B digital device, according to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The QTS110 generates uses and radiates radio frequency energy and if not installed and used according to instructions, may cause harmful interference to radio communications or be interfered with. There is no guarantee that interference will not occur in a particular installation.

- If the QTS110 does cause harmful interference to radio or television reception, which can be determined by turning the QTS110 off and on, try to correct the interference by taking one or more of the following actions:
  - Increase the distance between the QTS110 and radio or television receiver
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
  - Consult the dealer where you bought your radio/TV or an experienced radio/TV technician

- If the QTS110 is being interfered with try to correct the interference by taking one or more of the following actions:
  - Make sure that the outlet you have plugged the QTS110 into is no closer than 10 ft (3 m) of a Wi-Fi access point, microwave oven or 2.4 GHz cordless phone.
  - Increase the distance between the QTS110 and all other electronic equipment by moving the device to a different electrical wall outlet.

- Do not install the device in locations that may expose the product to ignitable or flammable gases or liquids.

- Do not expose the 2net device to extreme temperatures.

- Plug the AC Adapter only into a power source in accordance with the input voltage ratings marked on the AC Adapter.

- Do no operate the device with a damaged plug, or after the product malfunctions or is dropped or damaged in any manner. Avoid dropping the device.

- Do not clean the tracker with any solvent and avoid immersing/dipping it in water

- Do not dispose of the tracker in household waste, use USB cables that are compliant and do not crack open the tracker casing

Federal Communications Commission (FCC) Information

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Battery Warnings

English version:
CAUTION
- Risk of explosion if the battery is replaced by an incorrect type
- 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.
- When using class I AC adapter must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. Hazardous voltage could occur on user accessible metal parts by improperly wiring socket outlet.
- This product is intended to be supplied by a UL Listed Power Adapter rated output 5Vdc, min. 1.5A, Tma is 60 degree C minimum, Altitude is 2000m minimum.

French version
MISE EN GARDE:
- Pile au lithium Attention: Risque d'explosion si la pile n'est pas remplacée correctement. Remplacez uniquement par un type identique ou équivalent. Jetez les piles conformément aux instructions du fabricant.

- Mise au rebut d'une BATTERIE dans un feu ou un four chaud, ou écrasement ou découpage mécanique d'une BATTERIE, pouvant entraîner une EXPLOSION

- Laisser une BATTERIE dans un environnement extrêmement chaud pouvant entraîner une EXPLOSION ou une fuite de liquide ou de gaz inflammable

- UNE BATTERIE soumise à une pression d'air extrêmement basse pouvant entraîner une EXPLOSION ou une fuite de liquide ou de gaz inflammable.
- Lors de l'utilisation de l'adaptateur secteur de classe I, il doit être mis à la terre. La fiche d'alimentation doit être connectée à une prise de terre correctement câblée. Une tension dangereuse peut se produire sur les pièces métalliques accessibles à l'utilisateur en cas de câblage incorrect de la prise de courant.
- Ce produit est destiné à être alimenté par un adaptateur d'alimentation homologué UL sortie nominale 5Vdc, min. 1,5 A, Tma est de 60 degrés C minimum, l'altitude est de 2000 m minimum.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

ISED compliance statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) L'appareil ne doit pas produire de brouillage;
(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Radiation Exposure statement

This equipment complies with FCC/IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 30 cm between the radiator and your body.
Cet équipement est conforme aux limites d'exposition aux radiations FCC/IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 30 cm entre le radiateur et votre corps.

Troubleshooting/FAQ

- Q: What do the LEDs on the device indicate?
  - A: Please refer to the LED section of this document for details.

- Q: How do I provision the tracker for a shipment journey?
  - Login to Aware portal to provision the device for the journey. You can specify the shipment start and end points along with any waypoints in between. The frequency of reporting from the tracker to the cloud can also be configured from the portal.

- Q: Do I need to get a SIM card to use with the device?
  - The device comes with in embedded SIM card and out of the box connectivity.