

Qualcomm® QSS110 Sensor

A smart sensor built to measure the tilt of utility poles and to detect impact sustained by the pole. The cellular-connected inclinometer is easy to mount on poles, is powered autonomously using solar energy, and periodically reports data to the cloud.

Overview

The QSS110 is a device that provides critical utility pole tilt information and any impact the pole may sustain. This information can be used by a utility company to monitor pole condition and ascertain any damage inflicted to the pole due to natural disasters or accidents such as vehicle collision. The device uses NB-IoT to connect with the network. It is equipped with a solar panel that charges a super capacitor which in turn provides power to the device. The QSS110 is designed to work with the Qualcomm Aware™ cloud.



Accurate sensing and out-of-the-box cellular connectivity

- Highly accurate tilt angle measurements with a resolution of less than 1 degree
- Integrated, pre-provisioned eSIM for NB-IoT connectivity



Qualcomm Aware cloud-integrated

- Integrated with the Qualcomm Aware cloud, which provides a service portal for device management and data visualization
- Developer-friendly service API for seamless Qualcomm Aware integrations with utility companies' clouds



Solar powered

- Eco-friendly device powered by solar energy
- Equipped with a super capacitor that stores energy to power the device during nights and sub-optimal light conditions
- Energy harvesting chip allows super capacitor to be charged in low sunlight conditions



Ultra-low power operation

- Finely adapted device power states that allow device to last for a month on a full charge
- Always-on impact detection algorithm that runs in low-power mode



QSS110 Applications

- Periodic tilt measurement
- Impact detection
- Vibration analysis

Features and Performance Metrics

- Cellular inclinometer with NBIOT connectivity support
- Single SKU with comprehensive RF bands support from 700 MHz to 2.1 GHz
- Integrated eSIM allowing connectivity in the US and EU
- 30 mAh super capacitor for storing energy
- MPPT chip for supporting charging under low-sunlight conditions
- Small sized solar panel for charging super capacitor. Needs 2.5 hours of sunlight to fully charge the super capacitor
- 30 days of use with once-daily reporting to the cloud without sunlight
- < 5 micro amps of current consumption in between tilt measurements ensure long battery life
- Power optimizations such as support for 3GPP PSM features and sleep state management enable prolonged battery life
- Cloud-configurable sensor sampling and reporting parameters that offer a trade-off between performance and power

Cloud Integration

- A Qualcomm Aware cloud agent on the device allows the inclinometer to be commissioned for customer shipment journeys via the cloud
- The cloud can control the device-level sensor, location, power, connectivity, and device management policies through the cloud agent or dashboard
- Device tilt, device health data, diagnostic data, and alerts sent from device to cloud are encrypted and can be unencrypted by the cloud
- Software can be updated remotely to add new features to the device by means of a FOTA package push from the cloud

Specifications

| QSS110 | |
|------------------------|---|
| Dimensions | 98 mm x 40 mm x 15 mm |
| Weight | < 100 g |
| Cellular Technology | Rel.14 LTE Cat-NB2 |
| Connectivity | Pre-provisioned e-SIM for connectivity in US and EU |
| RF Bands - LTE | Low band: B5, B8, B12, B13, B14, B17, B18, B19, B20, B26, B28, B85 Mid band: B1, B2, B3, B4, B25, B66, B70 |
| Solar Panel | Efficiency 25%, peak power 250 mW, voltage 4-5 V |
| Turn ON Mechanism | Magnet is used to trigger interrupt from a hall sensor |
| Sensors | Accelerometer up to /±16 g support Low-power state current consumption of 2 micro amps |
| Powered By | Li-ion super capacitor |
| Energy Harvesting Chip | MPPT chip for charging in sub-optimal conditions |
| Operating Conditions | Temperature: -30° C to 60° C |
| IP Rating | IP55 |
| Mounting | Mounted on poles using zip ties |

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