



# ZK601 Hardware Specifications

## GSM/GPRS/LTE CAT.M1&NB1 GPS

### Intelligent Terminal

Version: 1.00

*International Telematics Solutions* **Innovator**

[www.queclink.com](http://www.queclink.com)

<b>Document Title</b>	ZK601 Hardware Specification
<b>Version</b>	1.00
<b>Author</b>	Xin Yang
<b>Date</b>	2019-08-05

**Note 1:** T-Panel 201 is Model Name for sales. ZK601 is a model name for T-Panel 201 in company inside.

**Note 2:** This manual is a Worldwide version. The operation frequency band of the product will be different for different countries. Details please consult Queclink.

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## 0. Revision History

Version	Date	Author	Description of Change
1.00	2019-08-05	Xin Yang	Initial Version

## 1. Introduction

ZK601 software function development mainly involves electric control unit (ECU), @Track Air Protocol, instrument display, headlight control, acceleration, brake, key on panel, voice broadcast and Bluetooth. ZK601 device is designed to connect to the scooter to enable remotely lock/unlock, to track the position information and to report the status of the scooter. By using the accelerator or brake, the user can increase or decrease the speed of the scooter. By using the key on the panel, the user can turn on the headlight, switchover the speed-up mode or end using the scooter. All the information will be reported to the backend sever to facilitate the basic functions of the scooter.

## 2. Special Note

LoT must be powered on again by pressing power button or charging if it is powered down unexpectedly.

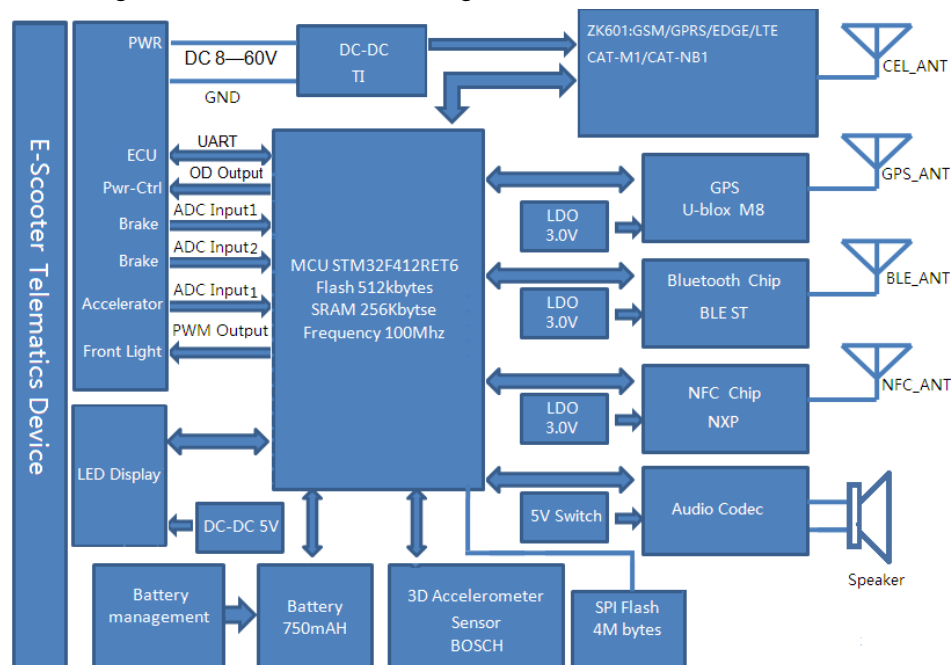
## 3. Basic Specification

Item	Specification
<b>Dimension</b>	Length*Width*Height: 149mm*47mm*51mm
<b>Input Power</b>	DC: 36V±5V( withstand 60V for less than 2 seconds)
<b>Backup Battery</b>	Li-Polymer, 750mAh
<b>IP Grade</b>	IP67
<b>Operating Temperature</b>	-20°C ~ +60°C
<b>Power Consumption</b>	Active: 36V@ 21mA Sleep: 36V@ 5mA Shut-down: 36V@ ≤100uA

## 4. Hardware Description

### 4.1. Hardware Block Diagram

Following is the Hardware Block Diagram of ZK601:



### 4.2. Internet RF Specification

The ZK601 supports GSM/GPRS/EDGE/ LTE CAT-M1/ CAT-NB1 for selection.

#### 4.2.1. ZK601 (GSM&GPRS) RF specification

Item	ZK601 (GSM&GPRS) RF specification
<b>Applicable Region</b>	Worldwide
<b>Technology</b>	GSM&GPRS&EDGE
<b>Operation Band</b>	GSM: US:GSM850/ PCS1900 EU: EGSM900/ DCS1800
<b>GSM/GPRS/EDGE Features</b>	GPRS: Support GPRS multi-slot class 33 Max 107kbps (DL)/Max 85.6kbps (UL) EDGE: Support EDGE multi-slot class 33 Max 296kbps (DL)/Max 236.8kbps (UL) CSD: CSD transmission rates: 14.4kbps non-transparent
<b>RF Output Power</b>	Class 4 (33dBm±2dB) for GSM850 and EGSM900

	Class 1 (30dBm±2dB) for DCS1800 and PCS1900 Class E2 (27dBm±3dB) for GSM850 and EGSM900 8-PSK Class E2 (26dBm±3dB) for DCS1800 and PCS1900 8-PSK
<b>Receive Sensitivity</b>	GSM850: -109.5dBm (typ.) EGSM900: -108.5dBm (typ.) DCS1800: -110dBm (typ.) PCSM1900: -108dBm (typ.)
<b>Transmit Mode</b>	TCP
<b>Antenna</b>	Internal only

#### 4.2.2. ZK601 (LTE CAT.M1&CAT.NB1) RF specification

Item	ZK601 (LTE CAT.M1&CAT.NB1) RF Specification
<b>Applicable Region</b>	Worldwide
<b>Technology</b>	LTE CAT.M1&CAT.NB1:
<b>Operation Band</b>	LTE-FDD: US: B2/B4/B5/B12/B13/B/B25 EU: B1/B3/B8/B20/B28
<b>LTE Features</b>	Support LTE Cat.M1 and LTE Cat.NB1 Cat.M1: Max. 375kbps (DL)/375kbps (UL) Cat.NB1: Max. 32kbps (DL)/70kbps (UL)
<b>RF Output Power</b>	LTE-FDD: 23dBm±2.7dB
<b>Receive Sensitivity</b>	LTE-FDD: -107 dBm (typ.) for CAT.M1, -117 dBm (typ.) for CAT.NB1
<b>Transmit Mode</b>	TCP
<b>Antenna</b>	Internal only

#### 4.3. GPS Specification

Item	GPS Specification
<b>GPS Chipset</b>	U-blox M8
<b>Receive Type</b>	u-blox All-In-One GPS receiver
<b>Receive Sensitivity (GPS+GLONASS)</b>	Tracking & Navigation: -167 dBm Reacquisition: -160 dBm Cold Start: -148 dBm Hot Start: -157 dBm
<b>Position Accuracy (CEP)</b>	GPS<2.5m GPS+GLONASS<2.5m BEIDOU<3m GLONASS<4m
<b>TTFF(Open Sky/GPS+GLONASS)</b>	Cold Start: 26S average Hot Start: < 1s
<b>Antenna</b>	Internal only

#### 4.4. BLE Specification

Full Bluetooth 4.1 or higher integration from ST.

The minimum communication distance is 15 meters regardless of device orientation.

Item	BLE Specification
Frequency	2.4GHz RF transceiver compatible with Bluetooth low energy (BLE)
Receive Sensitivity	-88dBm
RF Output Power	Up to 10dBm
Antenna	Internal only

#### 4.5. NFC Specification

Item	NFC Specification
Frequency	Contactless communication at 13.56MHz
Read Range	<2cm
Support Protocol	ISO/IEC 15693
Antenna	Internal only

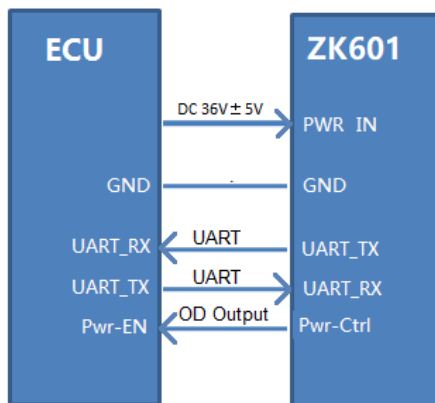
#### 4.6. Other Parameters

Item	Specification
MCU	STM32F411RET6: Core: Cortex – M4 Flash memory: 512K bytes Ram: 128k bytes Frequency: Up to 100Mhz
G-Sensor	Mode Type: 3D accelerometer Acceleration Range: $\pm 2/\pm 4/\pm 8/\pm 16g$
Audio Codec	I2S/PCM serial port 24-bit, 8 to 96 kHz sampling frequency 95 dB signal to noise ratio 1.25W@8Ω/5V or 1.8W@4Ω/4.2V mono class D speaker driver



## 5. Hardware Interface Description

### 5.1. ECU Interface



#### Power Input:

- Wide range input: 36V±5V DC
- Short-circuit protection
- Soft-start timer
- Smart Power Management

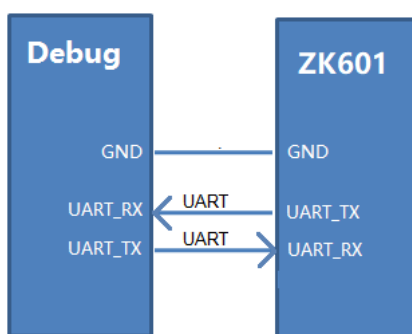
#### UART Interface:

- Baud rate auto adaption, support 9600bps, 19200bps, 115200bps
- 3.3V and 5V TTL level compatible

#### Power Control Wire

- To activate ECU
- OD drain output, compatible with external pull-up voltage 3V-36V

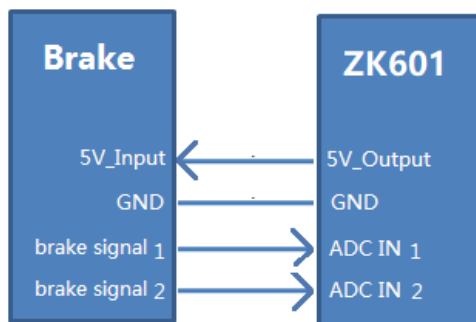
### 5.2. Debug Interface



#### Main Features:

- For purpose of configuration/firmware upgrade of MCU
- 3.3V and 5V TTL level compatible

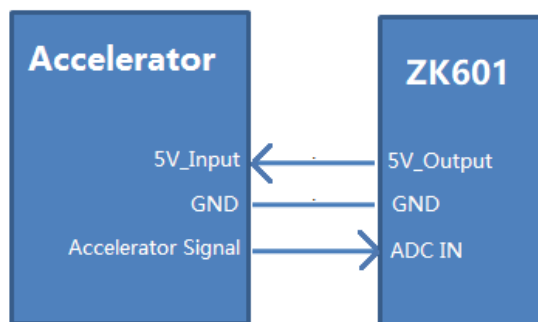
### 5.3. Dual Brake Interface



**Main Features:**

- The power 5V for the brake HALL sensor is controllable
- HALL output voltage 1-4V, sensitivity: 1.2mV/G

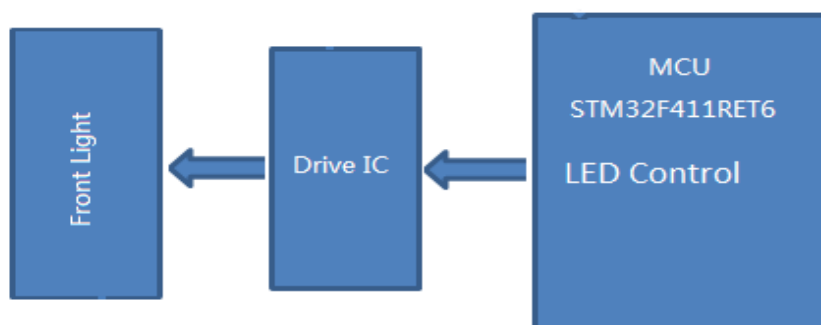
### 5.4. Accelerator Interface



**Main Feature:**

- The power 5V for the brake HALL sensor is controllable
- HALL output voltage 1-4V, sensitivity: 1.2mV/G

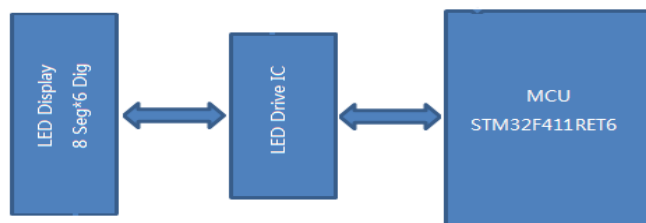
### 5.5. Front Light Interface



**Main Feature:**

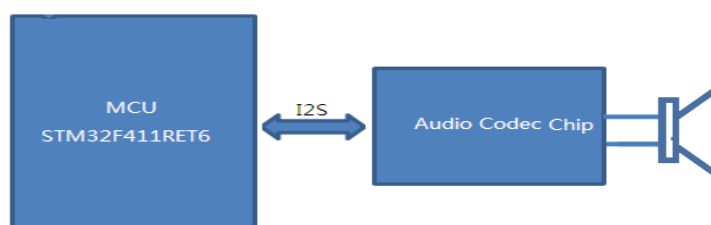
- Drives LED strings up to 12V
- Switch current limit: 0.4A
- PWM dimming frequency: 20KHz~1MHz (this function is reserved)

## 5.6. LED Display



- Drive LED SEG up to 50mA@5V, Drive up LED GRID to 200 mA@5V
- Display mode: 8seg\*6dig
- Refresh Rate: 450KHz

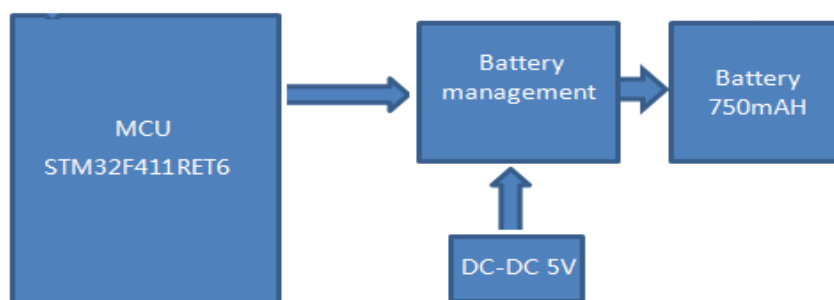
## 5.7. Audio Codec



### Main Feature:

- High performance and low power multibit delta-sigma audio ADC and DAC
- I 2S/PCM master or slave serial data port
- 24-bit, 8 to 96 kHz sampling frequency
- Signal to noise ratio: 95 dB, THD+N: -85 dB
- 1.25W@8Ω/5V or 1.8W@4Ω/4.2V mono class D speaker driver

## 5.8. Battery Charging Management



### Main Feature:

- Integrated dynamic power path management
- Supports up to 0.3A charge current
- Supports short-circuit and chip thermal protection
- Support battery temperature detection during charging
- Status indication - Charging/Done

## 6. User Guide

### 6.1. Guiding

1. Connect ZK601 to Scooter with 5 Pin Serial port Cable.
2. To charge Scooter to activate ZK601.
3. ZK601 uploads the GPS data or the status of Scooter to Server.
4. ZK601 receives command from Server to control Scooter.

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: This product 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 product 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 product 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 into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radioexempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

ce matériel est conforme aux limites de dose d'exposition aux rayonnements, CNR-102 énoncée dans un autre environnement. cette equipment devrait être installé et exploité avec distance minimale de 20 entre le radiateur et votre corps.

#### RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.