L70 GPS Module Presentation

November, 2015

Contents

Highlights

MT3339 Single Chip Solution

66 acquisition channels
22 tracking channels

Ultra Low Power Consumption

12mA@Tracking mode
18mA@Acquisition mode

Fitness Low Power mode

only 5mA in static receiving

LOCUS

Innate logger solution with no need of host and external flash

Extremely Compact Size

10.1 x 9.7 x 2.5 mm

EASY™

Advanced AGPS technology
Without external memory

Anti-Jamming

Multi-tone Active Interference Canceller

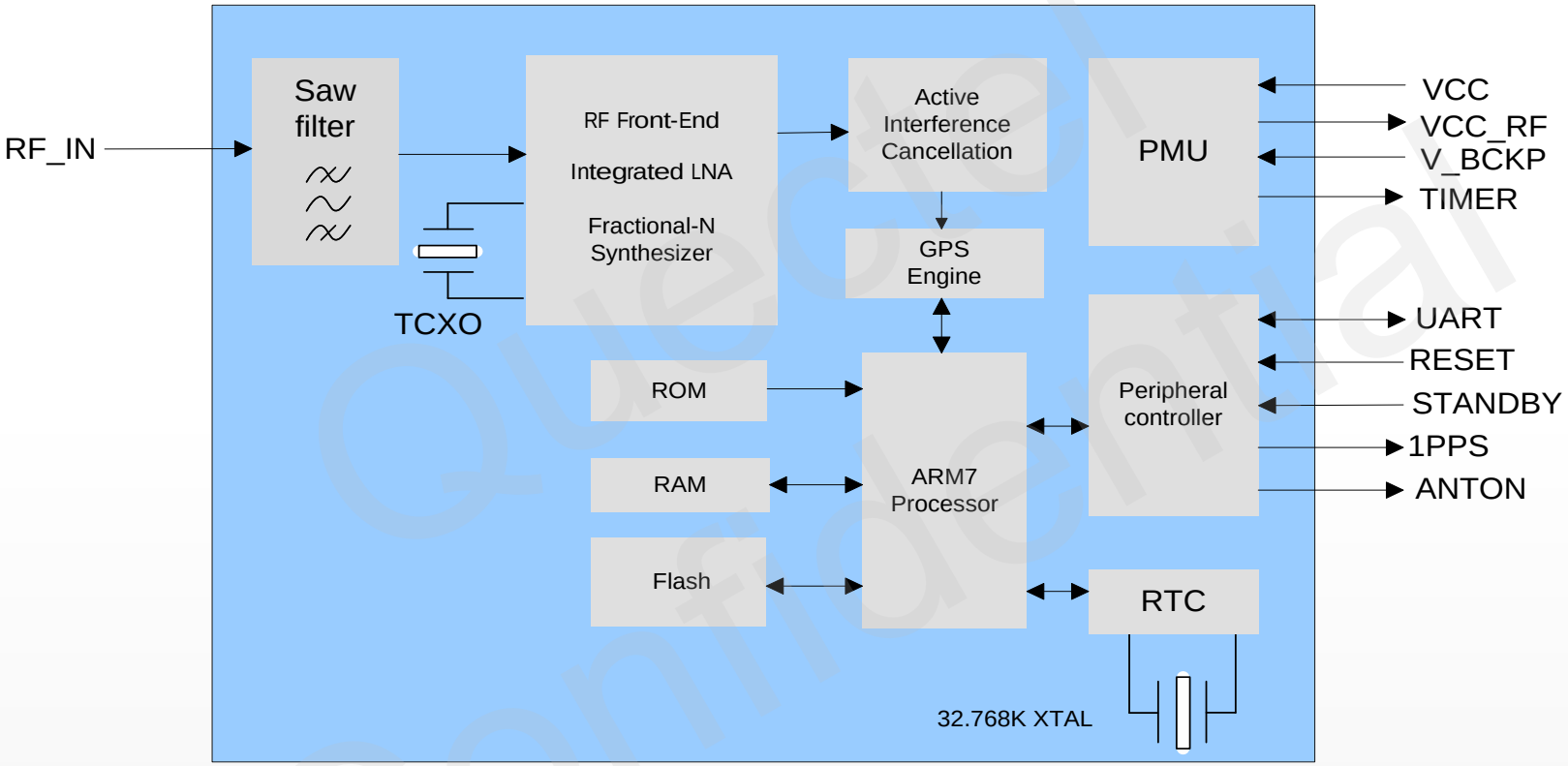
Highest Sensitivity

-165dBm@Tracking mode
-148dBm@Acquisition mode

Mechanical Dimensions

Length:	10.1 mm
Width:	9.7 mm
Height:	2.5 mm
Weight:	0.6 g

Hardware Architecture



Firmware

- Protocol
  - NMEA 0183 standard V3.01
  - MTK Private Protocol: PMTK
- Configurable Operating Modes
  - UART: Adjustable 4800~115200bps (default: 9600bps)
  - Update rate: 1Hz (default), up to 10Hz
  - Selectable output NMEA messages
  - Configurable Periodic Standby Mode
  - Selectable navigation mode

Target Applications

- Portable Devices
- Vehicle Management
- Asset Tracking
- Security System
- Connected PND
- GIS Application
- Industrial PDA

Contents

Receiver Performance

- EASY™, advanced AGPS technology without the need of external memory
- Extremely low power consumption, 12mA
- AlwaysLocate™, an intelligent controller of periodic mode
- LOCUS, innate logger solution with no need of host and external flash
- High sensitivity, -165dBm@Tracking, -148dBm@ Acquisition
- 66 acquisition channels, 22 tracking channels
- FLP(Fitness Low Power) mode, only 5mA in static receiving
- Balloon mode, for high altitude up to 80km
- Support DGPS, QZSS, SBAS(WASS/EGNOS/MSAS/GAGAN)
- Anti-Jamming, Multi-tone Active Interference Canceller
- PPS VS. NMEA can be used in time service
- Support SDK command developed by Quectel

Specifications

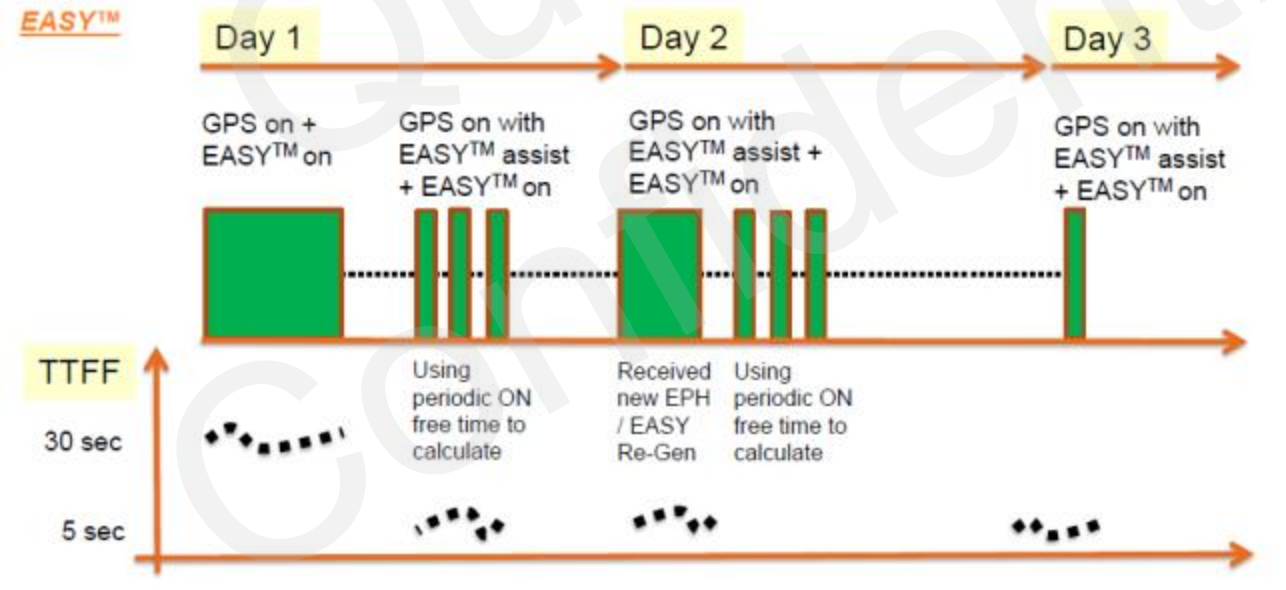
L1 Band Receiver (1575.42MHz)	Channel	22 (tracking) / 66 (acquisition)
	C/A code	
	SBA	WAAS, EGNOS MSAS,GAGAN
Horizontal Position Accuracy	Autonomous	<2.5m CEP
Velocity Accuracy	Without aid	<0.1m/s
Acceleration Accuracy	Without aid	0.1m/s²
Timing Accuracy	1PPS	10ns
Reacquisition Time		<1s
TTFF@-130dBm with EASY™	Cold Start	<15s
	Warm Start	<5s
	Hot Start	<1s
TTFF@-130dBm without EASY™	Cold Start	<35s
	Warm Start	<30s
	Hot Start	<1s
Sensitivity	Acquisition	-148dBm
	Tracking	-165dBm
	Re-acquisition	-160dBm

Environmental	Operating Temperature	-40℃ to 85℃
	Storage Temperature	-45℃ to 125℃
Dynamic Performance	Maximum Altitude	Max.18000m
	Maximum Velocity	Max.515m/s
	Maximum Acceleration	4G
Dimensions	10.1 x 9.7 x 2.5mm	
Weight	Approx. 0.6g	
Serial Interface	UART: Adjustable 4800~115200 bps Default: 9600bps	
Update Rate	1Hz by default, up to10Hz	
I/O Voltage	2.7V ~ 2.9V	
Protocols	NMEA 0183 PMTK	
Power Supply	2.8V ~ 4.3V	
Power Acquisition	18mA	
Power Tracking	12mA	
Power Saving	1.4mA@AlwaysLocate™	
	7uA@Backup Mode	
	200uA@Standby Mode	
	5mA@FLP Mode	
	Periodic Mode	
Antenna Type	Active or Passive	
Antenna Power	External or Internal VCC_RF	

Self-AGPS EASY Technology(1)

- EASY™ is the abbreviation for Embedded Assist System for quick positioning. With EASY™ technology, the GPS engine can calculate and predict automatically single ephemeris (up to 3 days) when the power is on, and then save the predict information into the memory. So the GPS engine can use the information for positioning later if there are not enough information received from the satellites.

- This function will be helpful for positioning and TTFF improvement under indoor or urban conditions.



Self-AGPS EASY Technology(2)

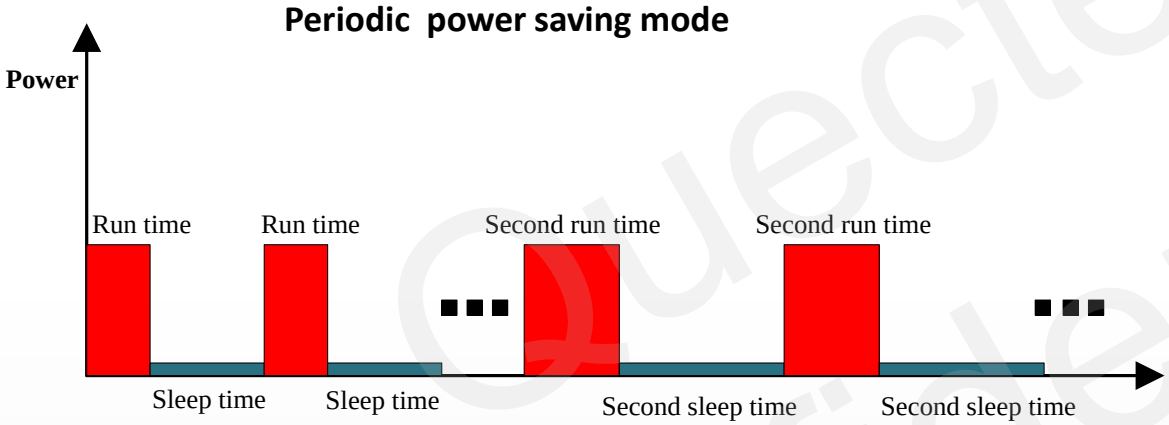
➢ **TTFF Comparison**

Test Condition		TTFF without EASY™	TTFF with EASY™
Under GPS signal Generator, conductive power level -130dBm	Cold Start	<35s	<15s
	Warm Start	<30s	<5 s

With EASY™ technology, L70 accelerates TTFF obviously.

Periodic Standby Mode

Periodic standby mode can control power on/off time of GPS periodically to reduce average power consumption, and on/off time can be configured by using PMTK command. For details, see the figure below.
Periodic standby mode can be entered by sending the following PMTK command.
$PMTK255, Type, Run time, Sleep time, Second run time, Second sleep time



Run time: tracking period (ms)
Sleep time: standby period (ms)
Second run time: extended acquisition period (ms) when GPS acquisition fails during the Run time
Second sleep time: extended standby period (ms) when GPS acquisition fails during the Run time

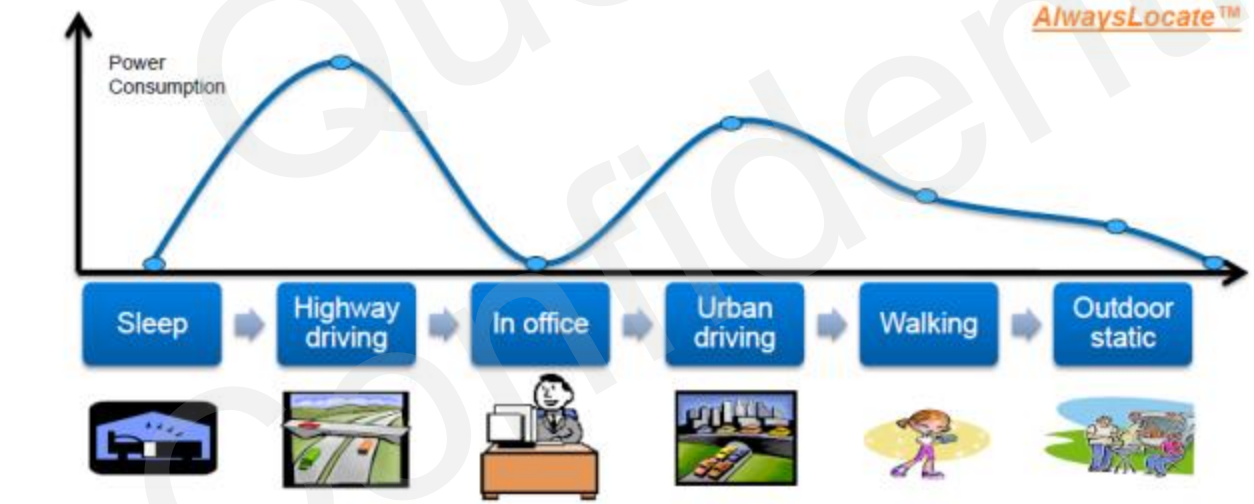
Notes:

1. Normally, the GPS module will enter the periodic mode after successfully fixing position. But if acquisition fails, the GPS module still can enter this mode.
2. If GPS acquisition fails during the Run time, in order to ensure the success of reacquisition, it is better to set the longer Second run time.

Example: PMTK225, 2, 3000, 12000, 18000, 72000*15 for periodic mode with 3s in tracking mode and 12s sleep in standby mode. The average current is about 2.5mA.

AlwaysLocate™ Technology

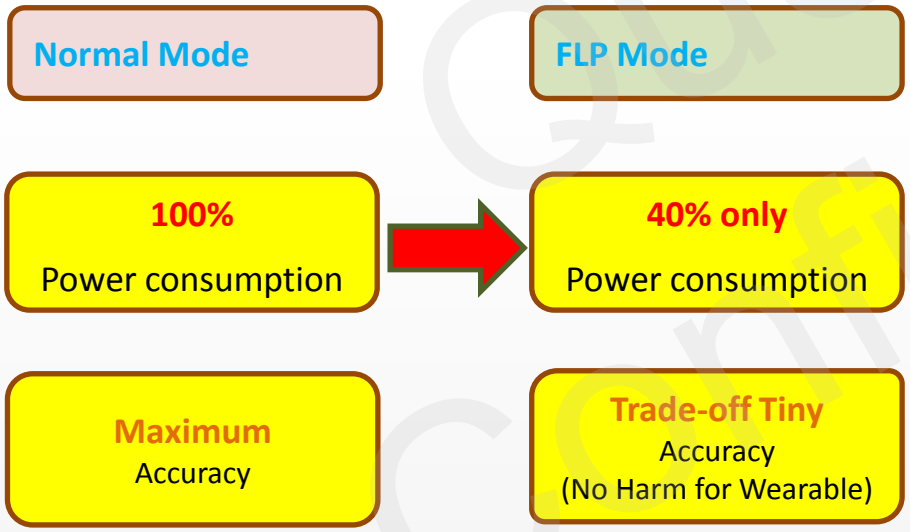
- AlwaysLocate™ is an intelligent controller of periodic mode.
- L70 can adaptively adjust the on/off time to achieve balance between positioning accuracy and power consumption according to the environmental and motion conditions. So the average power consumption is lower in AlwaysLocate™ power saving mode than that in periodic power saving mode. Typical average power is 1.4mA.



Fitness Low Power Mode

Fitness low power (FLP) is an optimized solution for wearable, fitness and tracking device. It provides a FLP mode for Quectel GPS modules to reduce power consumption with tiny accuracy trading-off. The FLP mode can be easily set by using a specific message.

In FLP mode, the module has good route consistence in walking and running scenarios, and can switch dynamic duty operation automatically. It will come back to normal mode in difficult environment to keep good accuracy as well, thus realizing maximum performance with the lowest power consumption.



Average Current for FLP Mode and Normal Mode of L70

Scenario	In FLP Mode (mA)	In Normal Mode (mA)
Static	5.0	12
Walking	5.4	12
Running	5.5	12
Driving	8.5	12

Contents

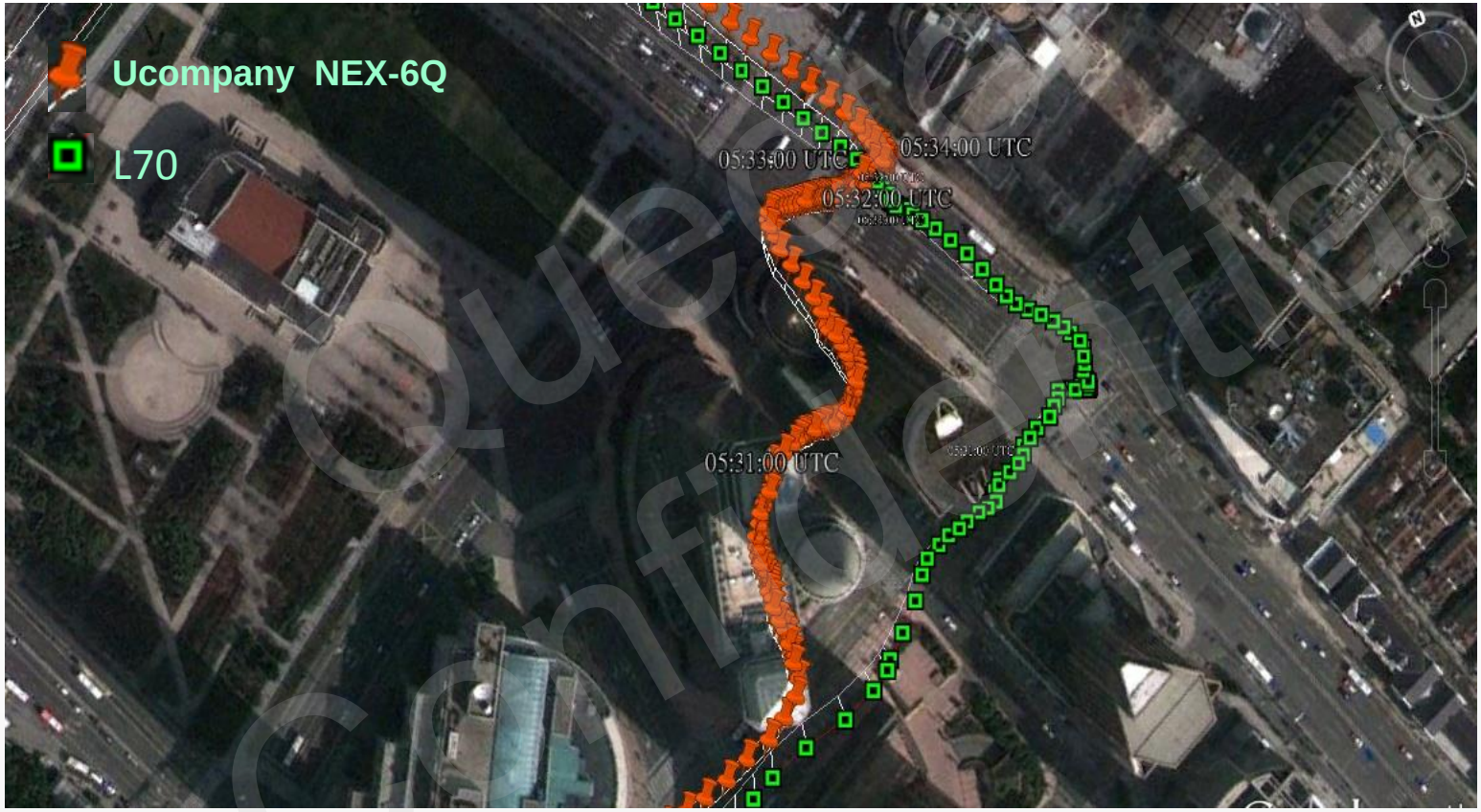
L70 vs. Ucompany NEX-6Q(1)

➢ Specification Comparison

Product Features		L70	Ucompany NEX-6Q
Power supply		2.8V~4.3V	2.7V~3.6V
Power Consumption	Acquisition Mode	18mA@3.3V	117mW@3.0V typical
	Tracking Mode	12mA@3.3V	
Sensitivity	Acquisition	-148dBm	-148dBm
	Tracking	-165dBm	-162dBm
	Re-acquisition	-160dBm	-160dBm
TTFF @ -130dBm	Hot Start	<1s	1s
	Warm Start	<5s (EASY™)	26s
	Cold Start	<15s (EASY™)	26s
Position Accuracy		2.5m CEP	2.5m CEP
Timing Accuracy	1PPS	10ns	30ns
Data Update Rate		Up to 10Hz	Up to 5Hz

L70 vs. Ucompany NEX-6Q(2)

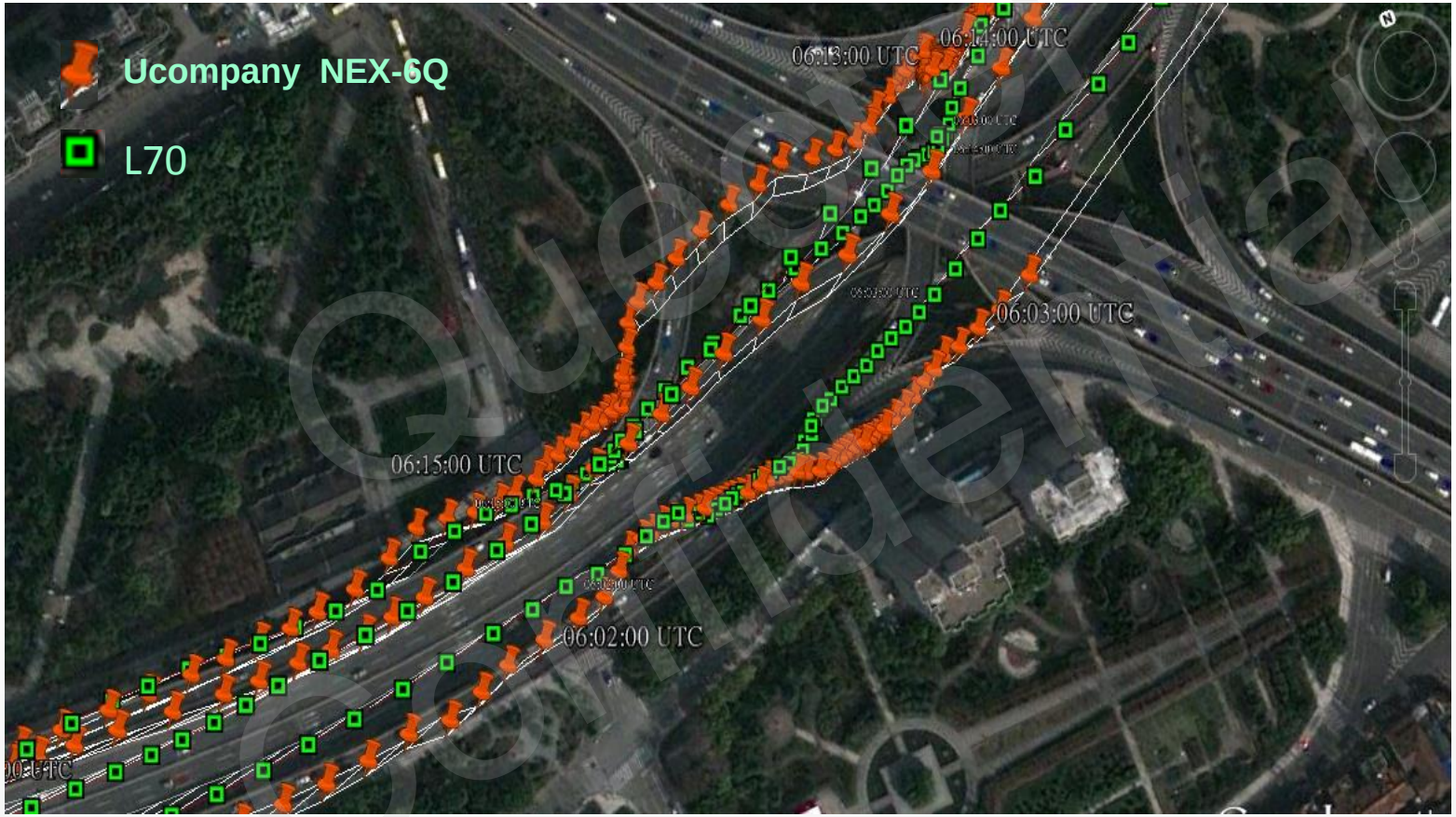
➢ **Tracking Comparison**



When driving across overpass and making a turn, L70 module can still capture the accurate tracking data. But Ucompany module has a small drift.

L7Q(30 vs. Ucompany NEX-6)

➢ **Tracking Comparison**



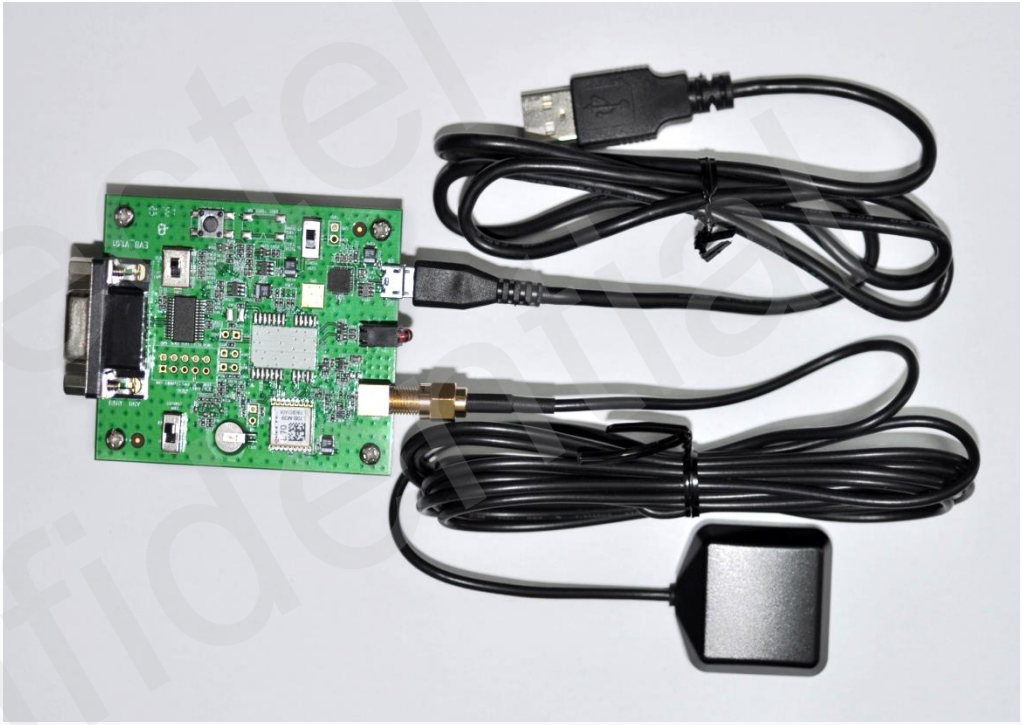
When driving under the overpass, L70 module shows its excellent performance. But Ucompany's module has a bigger drift.

Contents

Support Package(1)

Evaluation Board

- Interfaces
  - GPS serial port
  - Antenna interface
  - Adapter interface

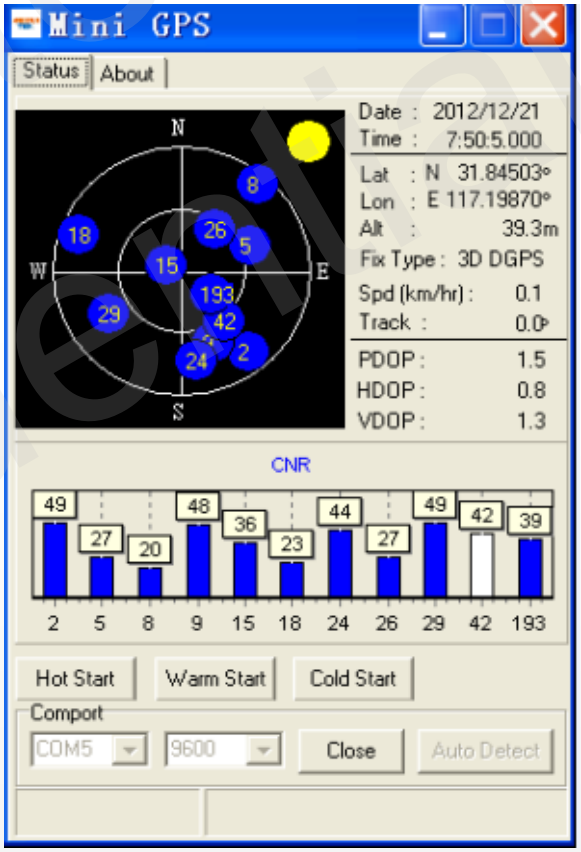


- Accessories
  - Serial port cable
  - DC 5V/2A power adapter
  - GPS antenna

Support Package(2)

- Documents
  - Hardware Design
  - GPS Protocol
  - Part&Decal in PADS and Protel Format
  - Evaluation Board User Guide
  - Circuit Reference Design

- PC tool
  - MiniGPS-GPS testing tool



Q&A…

Thank you