L76 Series GNSS Module Presentation

November, 2015

Contents

Highlights

Support Multi-GNSS Systems

L76: GPS+GLONASS
L76B: GPS+BeiDou
L76G: GPS+GLONASS+Galileo (Note1)

Ultra Low Power Consumption

18mA@Tracking mode (Note2)
25mA@Acquisition mode (Note2)

AlwaysLocate™

An intelligent controller of power
Consumption

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™

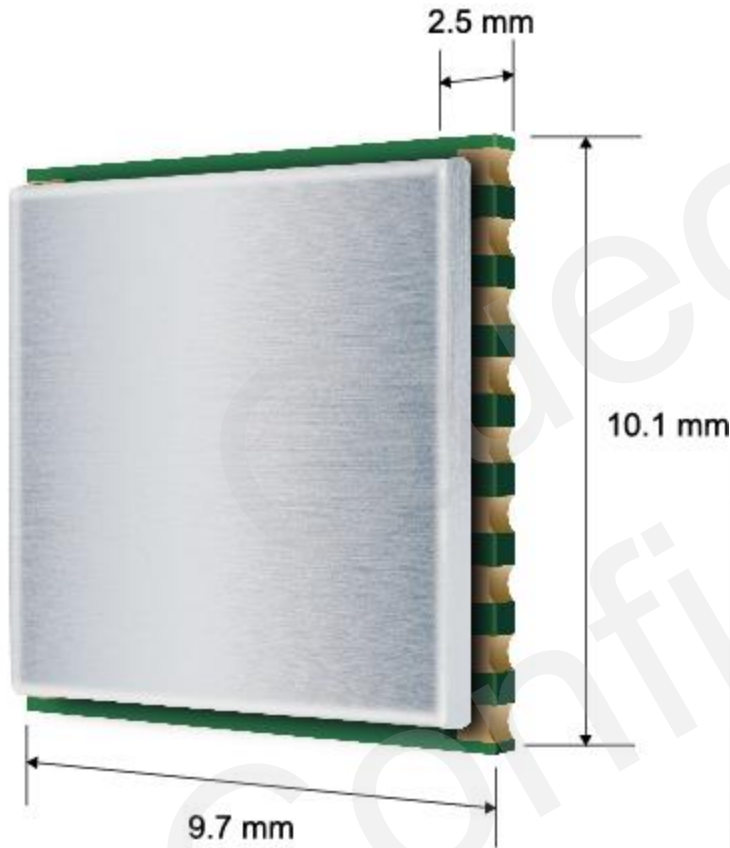Advanced AGPS technology
Without external memory

Anti-Jamming

Multi-tone Active Interference
Canceller

Highest Sensitivity

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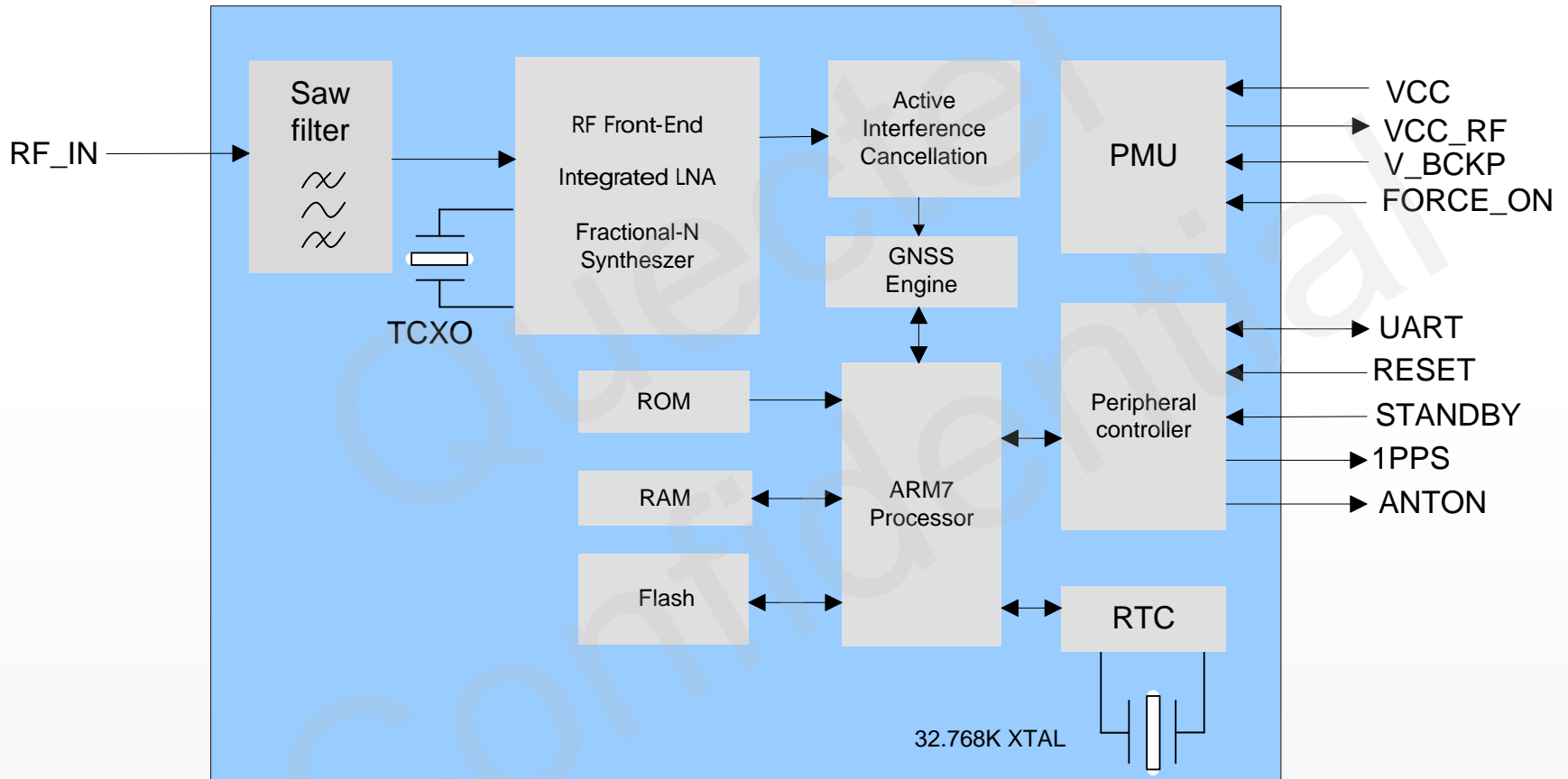-148dBm@Acquisition mode

Note1: L76G is under development.
Note2: Measured in GPS+GLONASS system.

Mechanical Dimensions

2.5 mm

10.1 mm

9.7 mm

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, 18mA@Tracking

- ➢ AlwaysLocate™, an intelligent algorithm for power saving

- ➢ LOCUS, innate logger solution with no need of host and external flash

- ➢ High sensitivity, -165dBm@Tracking, -148dBm@Acquisition

- ➢ Support DGPS, QZSS, SBAS(WASS/EGNOS/MSAS/GAGAN)

- ➢ Anti-Jamming, Multi-tone Active Interference Canceller

- ➢ Balloon mode, for high altitude up to 80km

- ➢ PPS VS. NMEA can be used in time service

Specifications

L1 Band Receiver (1575.42MHz)	Channel	33 (tracking) / 99 (acquisition)	Environmental	Operating Temperature	-40℃ to 85℃
	C/A code			Storage Temperature	-45℃ to 125℃
	SBA	WAAS, EGNOS MSAS,GAGAN	Dynamic Performance	Maximum Altitude	Max.18000m
Horizontal Position Accuracy	Autonomous	<2.5m CEP		Maximum Velocity	Max.515m/s
Velocity Accuracy	Without aid	<0.1m/s		Maximum Acceleration	4G
Acceleration Accuracy	Without aid	0.1m/s²	Dimensions	10.1 x 9.7 x 2.5mm	
Timing Accuracy	1PPS	10ns	Weight	Approx. 0.6g	
Reacquisition Time		<1s	Serial Interface	UART: Adjustable 4800~115200 bps Default: 9600bps	
TTFF@-130dBm with EASY™	Cold Start	<15s	Update Rate	1Hz by default, up to 10Hz	
	Warm Start	<5s	I/O Voltage	2.7V ~ 2.9V	
	Hot Start	<1s	Protocols	NMEA 0183 PMTK	
TTFF@-130dBm without EASY™	Cold Start	<35s	Power Supply	2.8V ~ 4.3V	
	Warm Start	<30s	Power Acquisition	25mA (GPS+GLONASS)	
	Hot Start	<1s	Power Tracking	18mA (GPS+GLONASS)	
Sensitivity	Acquisition	-148dBm	Power Saving	2.6mA@AlwaysLocate™	
	Tracking	-165dBm		7uA@Backup Mode	
	Re-acquisition	-160dBm		500uA@Standby 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 GNSS 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 GNSS 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.
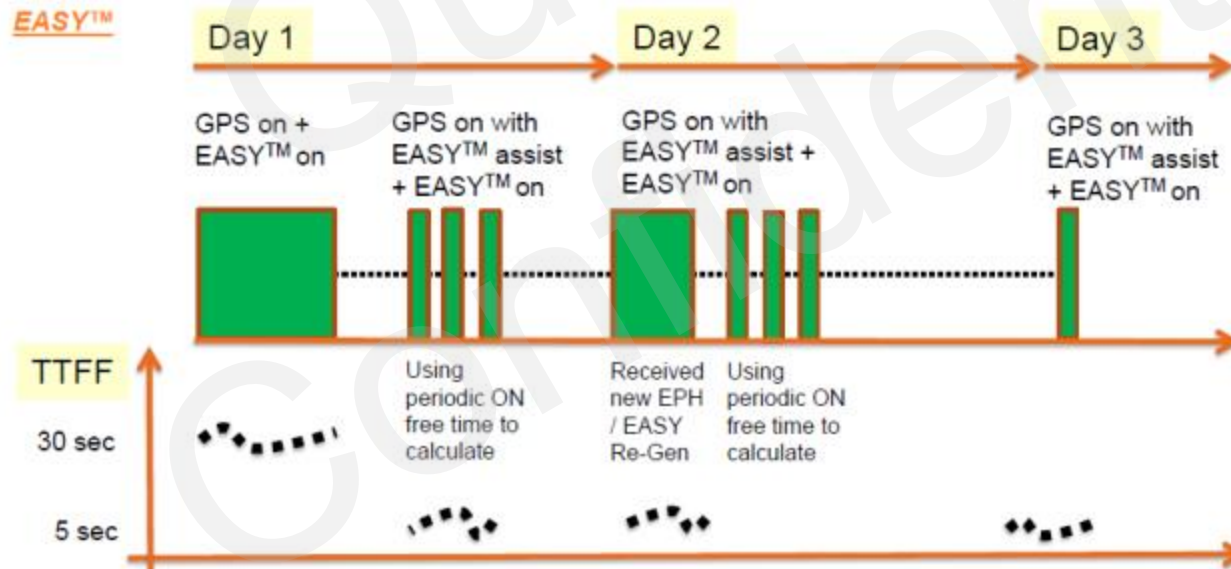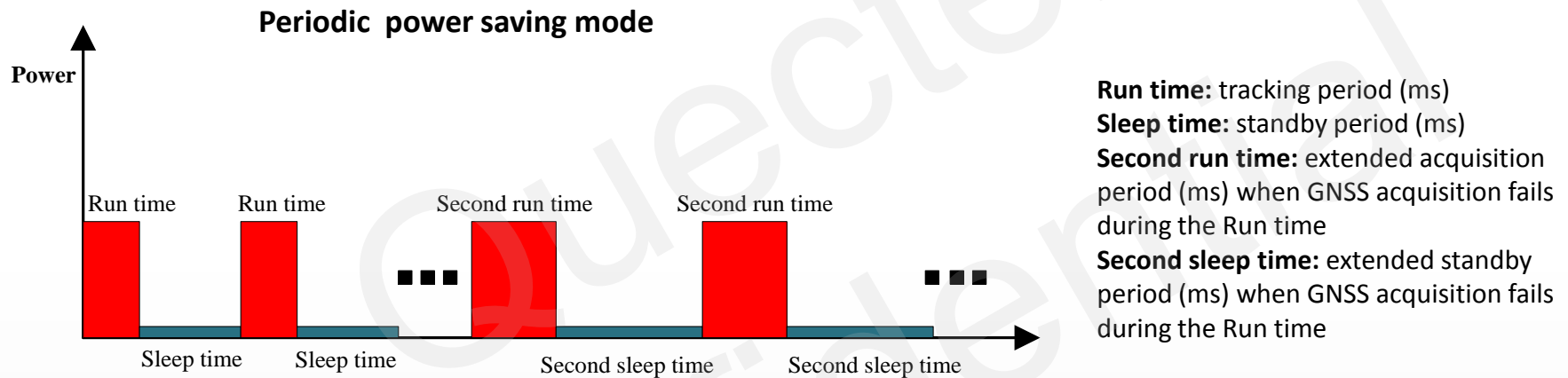
Self-AGPS EASY Technology(2)

➢ **TTFF Comparison**

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

With EASY™ technology, L76 series accelerates TTFF obviously.

Periodic Standby Mode

Periodic standby mode can control power on/off time of GNSS 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

Periodic power saving mode

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

Notes:

1. Normally, the GNSS module will enter the periodic mode after successfully fixing position. But if acquisition fails, the GNSS module still can enter this mode.
2. If GNSS 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, 1, 3000, 12000, 18000, 72000*16 for periodic mode with 3s in tracking mode and 12s sleep in standby mode. The average current is about 3.7mA.

AlwaysLocate^{TM} Technology

➢AlwaysLocate™ is an intelligent controller of periodic mode.

➢L76 series 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 2.6mA.

Contents
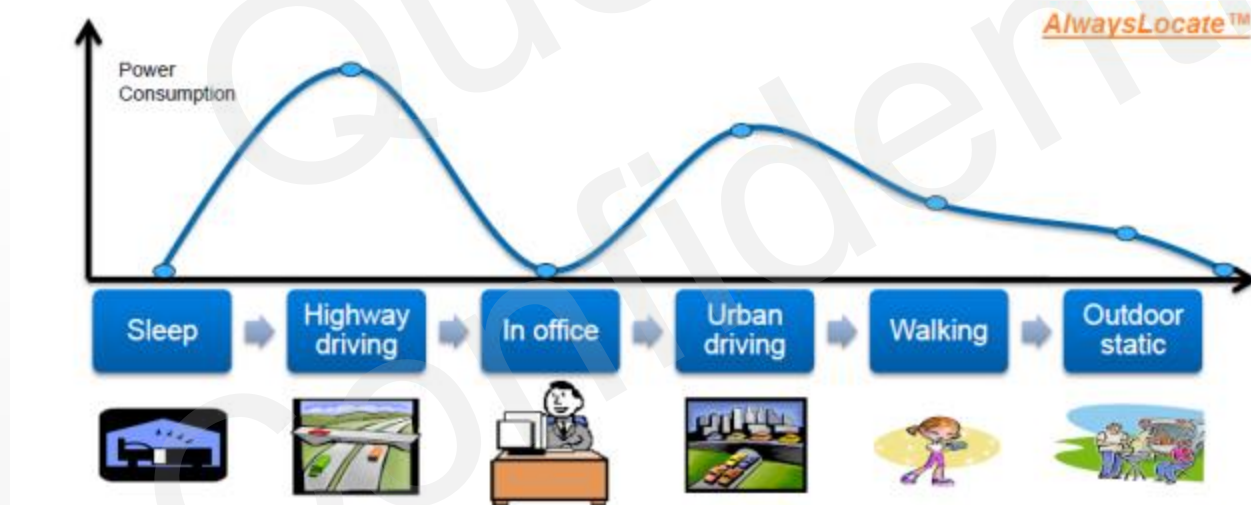
Highlights

Advanced Features

Quectel L76 Vs. Competitor's Product

Support Package

L76 vs. Ucompany LEX-6N(1)

➤ Specification Comparison

Product Features		L76	Ucompany LEX-6N
Power supply		2.8V~4.3V	2.7V~3.6V
Power Consumption	Acquisition mode	25mA@3.3V	40mA@3.0V typical
	Tracking mode	18mA@3.3V	
Sensitivity	Acquisition	-148dBm	-148dBm
	Tracking	-165dBm	-162dBm
	Re-acquisition	-160dBm	-157dBm
TTFF @ -130dBm	Hot start	<1s	1s
	Warm start	<5s (EASY™)	26s
	Cold start	<15s (EASY™)	26s
Position Accuracy		2.5m CEP	4m CEP
Timing Accuracy	1PPS	10ns	10ns
Data Update Rate		Up to 10Hz	Up to 5Hz

L76 vs. Ucompany LEX-6N(2)

➢ **Tracking Comparison**

When driving across overpass and making a turn, L76 module can still capture the accurate tracking data. But Ucompany module has a small drift.

L76 vs. Ucompany LEX-6N(3)

➢ Tracking Comparison

When driving under the overpass, L76 module shows its excellent performance. But Ucompany's module has a bigger drift.

Contents

Support Package(1)

Evaluation Board
- ➢ Interfaces
  - • Serial port
  - • Antenna interface
  - • Micro-USB interface

- ➢ Accessories
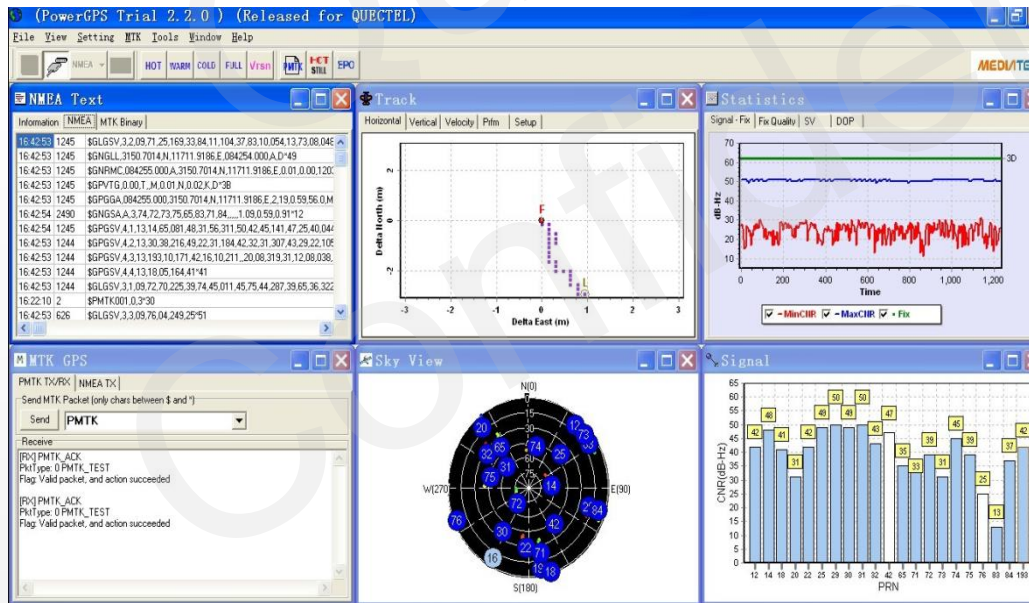 - • Micro-USB cable
  - • Antenna

Support Package(2)

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

- ➢ PC tool
  - PowerGPS - GPS/GLONASS testing tool