LC760Z&L76-L&L76-LB

Software Difference Introduction

GNSS Module Series

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Contents

Table Index

1 Introduction

This document compares Quectel LC760Z, L76-L and L76-LB modules and provides a brief summary of their key features and characteristics. Its purpose is to facilitate the migration process from L76-L and L76-LB to the LC760Z. For more information, contact Quectel Technical Support (support@quectel.com).

NOTE

This document signifies the differences between LC760Z, L76-L and L76-LB in red.

1.1. Special Mark

Table 1: Special Mark

Mark	Definition
●	The symbol indicates that a function or technology is supported by the module(s).

2 Difference Summary

The Quectel LC760Z is basically compatible with the L76-L and L76-LB, but there are some differences between them that are outlined in this chapter.

The main software differences between LC760Z, L76-L and L76-LB are:

- LC760Z supports NMEA 0183 V4.11, while L76-L and L76-LB support NMEA 0183 V4.10. Additionally, L76-L and L76-LB support more proprietary protocol messages than the LC760Z.
- LC760Z supports concurrent reception of more satellite constellations than L76-L and L76-LB. See *Table 3: All Supported Constellation Combinations*.

3 Difference Introduction

3.1. Default Configurations

Differences in default configurations are listed in the following table.

Table 2: Differences in Default Configurations

Field	LC760Z	L76-L	L76-LB
Default Baud Rate	115200 bps	9600 bps	9600 bps
Default Constellation	GPS + GLONASS + Galileo + QZSS or GPS + Galileo + BDS + QZSS	GPS + GLONASS + QZSS	GPS + GLONASS + QZSS or GPS + BDS +QZSS

NOTE

1. LC760Z does not support simultaneous reception of GLONASS and BDS satellite signals. To switch from the configuration that includes receiving BDS satellite signals to those that support GLONASS satellite signals, contact Quectel Technical Support (support@quectel.com) to obtain the corresponding firmware version and vice versa.
2. L76-LB has two firmware versions that support different default constellations. Contact Quectel Technical Support (support@quectel.com) for details if necessary.

3.2. Constellations

Table 3: All Supported Constellation Combinations

Module	All Supported Constellations	All Supported Constellation Combinations
LC760Z	GPS, GLONASS, Galileo and QZSS	● GPS ● GPS + QZSS ● GPS + GLONASS ● GPS + GLONASS + QZSS ● GPS + Galileo ● GPS + Galileo + QZSS ● GPS + GLONASS + Galileo ● GPS + GLONASS + Galileo + QZSS (default)
	GPS, Galileo, BDS and QZSS	● GPS ● GPS + QZSS ● GPS + BDS ● GPS + BDS + QZSS ● GPS + Galileo ● GPS + Galileo + QZSS ● GPS + Galileo + BDS ● GPS + Galileo + BDS + QZSS (default)
L76-L	GPS, GLONASS, BDS, Galileo and QZSS	● GPS ● GPS + QZSS ● GPS + GLONASS ● GPS + Galileo ● GPS + BDS ● GPS + GLONASS + QZSS (default) ● GPS + Galileo + QZSS ● GPS + BDS + QZSS ● GPS + GLONASS + Galileo ● GPS + GLONASS + Galileo + QZSS
L76-LB	GPS, GLONASS, BDS and QZSS	● GPS ● GPS + QZSS ● GPS + GLONASS ● GPS + BDS ● GPS + GLONASS + QZSS (default) or GPS + BDS + QZSS (default)

NOTE

1. LC760Z does not support simultaneous reception of GLONASS and BDS satellite signals. To switch from the configuration that includes receiving BDS satellite signals to those that support GLONASS satellite signals, contact Quectel Technical Support (support@quectel.com) to obtain the corresponding firmware version and vice versa.
2. L76-LB has two firmware versions that support different default constellations. Contact Quectel Technical Support (support@quectel.com) for details if necessary.
3. The valid period of GPS week number is from April 2019 to November 2038 for LC760Z and from December 2014 to August 2034 for L76-L and L76-LB.

3.3. UART Baud Rates

The LC760Z supports the same number of UART baud rates as the L76-L and L76-LB, but the LC760Z supports higher baud rates. The supported baud rates are:

- LC760Z: 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, 230400 bps and 460800 bps.
- L76-L and L76-LB: 4800 bps, 9600 bps, 14400 bps, 19200 bps, 38400 bps, 57600 bps and 115200 bps.

3.4. PPS

LC760Z offers a broader range of supported PPS configurations compared to L76-L and L76-LB. The supported PPS configurations are:

Table 4: Supported PPS Configuration

PPS Configuration	Item	LC760Z	L76-L/L76-LB
Width	-	●	●
Period	-	●	●
Offset	-	●	-
Polarity	-	●	-
WorkMode	After the first fix	-	●
	In 3D fix only	●	●

PPS Configuration	Item	LC760Z	L76-L/L76-LB
	In 2D/3D fix only	-	●
	Always	-	●

3.5. AGNSS

Table 5: Supported AGNSS

AGNSS	LC760Z	L76-L/L76-LB
Ephemeris File	AID-PEPH-GPS	EASY & EPO
Validity	2 hours (online) 1–2 days (offline, currently the server can download for up to 7 days)	EASY: 6 hours (online) EPO: 3, 7,14 days (offline)

NOTE

For detailed instructions on implementing AGNSS, see *documents [1]* and *[2] application notes*.

3.6. Protocols

The LC760Z, L76-L and L76-LB modules support the following protocols:

Table 6: Supported Protocols

Protocol	Type	LC760Z	L76-L/L76-LB
NMEA 0183	Output, ASCII, standard	NMEA 0183 V4.11	NMEA 0183 V4.10
	Input/output, ASCII, proprietary	PQTM	PMTK and PQ
Binary	Input/Output, binary, proprietary	●	-

3.6.1. Standard NMEA Messages

3.6.1.1. TalkerID

The LC760Z supports NMEA 0183 V4.11 protocol, while the L76-L and L76-LB support NMEA 0183 V4.10 protocol. The TalkerIDs specified by NMEA 0183 V4.10 and NMEA 0183 V4.11 protocols are as follows:

Table 7: Differences in NMEA TalkerID

GNSS Constellation Configuration	TalkerID (NMEA 0183 V4.10)	TalkerID (NMEA 0183 V4.11)
GPS	GP	GP
GLONASS	GL	GL
Galileo	GA	GA
BDS	BD	GB
QZSS	GP	GQ
Combination of Multiple Satellite Systems	GP (fixed) GN (unfixed)	GN

3.6.1.2. Standard NMEA Message Types

LC760Z, L76-L and L76-LB support standard NMEA message output. The supported message types are listed below:

Table 8: Supported Standard NMEA Message Types

Standard NMEA Message	LC760Z	L76-L/L76-LB
RMC	●	●
GGA	●	●
GSV	●	●
GSA	●	●
VTG	●	●
GLL	●	●

Standard NMEA Message	LC760Z	L76-L/L76-LB
ZDA	●	-
GRS	●	-
GST	●	-
GBS	–	●
DTM	–	●

For details about the standard NMEA messages supported by LC760Z, L76-L and L76-LB, see *documents [3]* and *[4] protocol specifications*.

3.6.1.2.1. RMC

Recommended Minimum Specific GNSS Data. Time, date, position, course, and speed data provided by a GNSS receiver.

Type:

Output

Synopsis:

```
$<TalkerID>RMC,<UTC>,<Status>,<Lat>,<N/S>,<Lon>,<E/W>,<SOG>,<COG>,<Date>,<MagVar>,<MagVarDir>,<ModeInd>,<NavStatus>*<Checksum><CR><LF>
```

Parameter:

Field	Format	Note
$	Character	-
<TalkerID>	String, 2 characters	-
RMC	String, 3 characters	-
<UTC>	hhmmss.sss	-
<Status>	Character	-
<Lat>	ddmm.mmmmmm	LC760Z and L76-LB: The decimal fraction is 6 digits by default. L76-L: The decimal fraction is 4 digits by default.
<N/S>	Character	-

Field	Format	Note
<Lon>	dddmm.mmmmmm	LC760Z and L76-LB: The decimal fraction is 6 digits by default. L76-L: The decimal fraction is 4 digits by default.
<E/W>	Character	-
<SOG>	Numeric	-
<COG>	Numeric	-
<Date>	ddmmyy	-
<MagVar>	-	-
<MagVarDir>	-	-
<ModeInd>	Character	-
<NavStatus>	Character	-
<Checksum>	Hexadecimal	-
<CR><LF>	Character	-

3.6.1.2.2. GGA

Global Positioning System Fix Data. Time, position, and fix-related data for a GNSS receiver.

Type:

Output

Synopsis:

```
$<TalkerID>GGA,<UTC>,<Lat>,<N/S>,<Lon>,<E/W>,<Quality>,<NumSatUsed>,<HDOP>,<Alt>,M,<Sep>,M,<DiffAge>,<DiffStation>*<Checksum><CR><LF>
```

Parameter:

Field	Format	Note
$	Character	-
<TalkerID>	String, 2 characters	-
GGA	String, 3 characters	-

Field	Format	Note
<UTC>	hhmmss.sss	-
<Lat>	ddmm.mmmmmm	LC760Z and L76-LB: The decimal fraction is 6 digits by default. L76-L: The decimal fraction is 4 digits by default.
<N/S>	Character	-
<Lon>	dddmm.mmmmmm	LC760Z and L76-LB: The decimal fraction is 6 digits by default. L76-L: The decimal fraction is 4 digits by default.
<E/W>	Character	-
<Quality>	Numeric, 1 digit	-
<NumSatUsed>[1)]	Numeric, 2 digits	-
<HDOP>	Numeric	-
<Alt>	Numeric	LC760Z:and L76-L: The decimal fraction is 1 digit by default. L76-LB: The decimal fraction is 3 digits by default.
M	Character	-
<Sep>	Numeric	LC760Z:and L76-L: The decimal fraction is 1 digit by default. L76-LB: The decimal fraction is 3 digits by default.
M	Character	-
<DiffAge>	-	-
<DiffStation>	-	-
<Checksum>	Hexadecimal	-
<CR><LF>	Character	-

3.6.1.2.3. GLL

Geographic Position – Latitude/Longitude. Latitude and longitude of the GNSS receiver position, the time of position fix and status

Type:

Output

Synopsis:

```
$<TalkerID>GLL,<Lat>,<N/S>,<Lon>,<E/W>,<UTC>,<Status>,<ModeInd>*<Checksum><CR><LF>
```

Parameter:

Field	Format	Note
$	Character	-
<TalkerID>	String, 2 characters	-
GLL	String, 3 characters	-
<Lat>	ddmm.mmmmmm	LC760Z and L76-LB: The decimal fraction is 6 digits by default. L76-L: The decimal fraction is 4 digits by default.
<N/S>	Character	-
<Lon>	ddmm.mmmmmm	LC760Z and L76-LB: The decimal fraction is 6 digits by default. L76-L: The decimal fraction is 4 digits by default.
<E/W>	Character	-
<UTC>	Numeric, 3 digits	-
<Status>	Character	-
<ModeInd>	Character	-
<Checksum>	Hexadecimal	-
<CR><LF>	Character	-

3.6.1.2.4. ZDA, GRS and GST

ZDA, GRS and **GST** are only supported by LC760Z, see *documents [3]* and *[4] protocol specifications* for details.

3.6.1.2.5. GBS and DTM

GBS and **DTM** are only supported by L76-L and L76-LB, see *documents [3]* and *[4] protocol specifications* for details.

3.6.2. Proprietary Messages

LC760Z supports **PQTM** and **Binary** messages, whereas L76-L and L76-LB support **PMTK** and **PQ** messages.

Table 9: Difference Between PQTM and PQ Messages

LC760Z	L76-L/L76-LB	Description
PQTMVERNO	PQVERNO	Gets firmware version.
PQTMCFGMSGRATE	-	Configures the message output rate on the current port.
PQTMANTENNASTATUS	-	Outputs the antenna status.
PQTMCFGODO PQTMRESETODO PQTMODO	PQODO	PQTMCFGODO: Configures odometer feature PQTMRESETODO: Resets the accumulated mileage of the odometer. PQTMODO: Outputs odometer information. PQODO: Starts/stops odometer reading.
PQTMEPE	PQEPE	PQTMEPE: Outputs the estimated position error. PQEPE: Enables/disables **PQEPE** message output.
PQTMCFGGEOFENCE PQTMGEOFENCESTATUS	PQGEO	PQTMCFGGEOFENCE: Sets/gets the geofence feature. PQTMGEOFENCESTATUS: Outputs the geofence status. PQGEO: Configures/outputs Geofence feature.
PQTMJAMMING PQTMJAMMINGSTATUS	PQJAM	PQTMJAMMING: Configures/queries the jamming detection mode. PQTMJAMMINGSTATUS: Reports the jamming detection status. PQJAM: Configures/queries/outputs Jamming detection feature.
-	PQBAUD	Configures default baud rate of interface outputting NMEA messages.
-	PQ1PPS	Sets the type and pulse width of 1PPS output.
-	PQFLP	Enables/disables FLP mode or gets module operation mode.
-	PQTXT	Enables/disables **GPTXT** message output.
-	PQECEF ECEFPOSVEL	PQECEF: Enables/disables **ECEFPOSVEL** message output. ECEFPOSVEL: Automatic output of **ECEFPOSVEL** message.

LC760Z	L76-L/L76-LB	Description
-	PQPZ90	Enables/disables switching from WGS84 to PZ-90.11.
-	PQGLP	Enables/disables GLP mode or gets whether the GLP mode is enabled.
-	PQVEL	Enables/disables **PQVEL** output.
PQTMCFGNMEADP	PQPREC	Configures/gets the decimal places of the parameters in NMEA message.
-	PQGBS	Enables/disables **PQGBS** outputs.
-	PQRLM	Enables/disables the return link message output.

Table 10: Differences Between Binary and PMTK Messages

LC760Z	L76-L/L76-LB	Description
ACK-ACK ACK-NAK	PMTK001	ACK-ACK: Response to a valid or recognized message. ACK-NAK: Response to invalid or unrecognized message. PMTK001: Acknowledges a PMTK command to inform the sender whether the receiver has received the packet.
CFG-PRT	PMTK251	CFG-PRT: Configures/gets the UART interface and its baud rate. PMTK251: Configures the baud rate of UART interface.
CFG-MSG	PMTK314, PMTK414, PMTK514	CFG-MSG: Sets/gets NMEA message output frequency. PMTK314: Sets NMEA message output frequency. PMTK414: Queries the current NMEA message output frequency. PMTK514: Response to **PMTK_API_Q_NMEA_OUTPUT**.
CFG-PPS	PMTK255, PMTK256, PMTK285	CFG-PPS: Sets pulse per second. PMTK255: Enables/disables the function of fixing NMEA output time in PPS function. PMTK256: Enables/disables timing product mode. PMTK285: Sets PPS type.
CFG-CFG	-	Clears/saves current configurations.
CFG-DOP	-	Sets/gets the PDOP threshold for navigation.
CFG-ELEV	PMTK311	CFG-ELEV: Sets/gets elevation threshold for navigation. PMTK311: Sets satellite elevation mask.
CFG-NAVSAT	PMTK353, PMTK313, PMTK413, PMTK513, PMTK351,	CFG-NAVSAT: Sets/gets the status of satellite system. PMTK353: Configures the modules to start searching satellite system. PMTK313: Enables/disables SBAS satellite searching. PMTK413: Queries the setting of SBAS.

LC760Z	L76-L/L76-LB	Description
	PMTK352, PMTK301, PMTK401, PMTK501	PMTK513: Response to **PMTK_API_Q_SBAS_ENABLED**. PMTK351: Enables/disables QZSS NMEA format. PMTK352: Enables/disables QZSS function. PMTK301: Configures the source mode of DGPS correction data. PMTK401: Queries the setting of DGPS mode. PMTK501: Response to **PMTK_API_Q_DGPS_MODE**.
CFG-SIMPLERST	PMTK101, PMTK102, PMTK103, PMTK104	CFG-SIMPLERST: Starts/stops/resets the GNSS engine. PMTK101: Performs a hot start on the modules. PMTK102: Performs a warm start on the modules. PMTK103: Performs a cold start on the modules. PMTK104: Performs a full cold restart on the modules.
CFG-PWRCTL	PMTK220	CFG-PWRCTL: Sets/gets the power control mode and positioning frequency of the module. PMTK220: Sets position fix interval.
CFG-SPDHOLD	PMTK386	CFG-SPDHOLD: Sets/gets the static speed threshold. PMTK386: Sets the speed threshold for static navigation.
CFG-SLEEP	PMTK161	CFG-SLEEP: Sets the GNSS module into sleep state (low power mode) and configures the sleep time. PMTK161: Makes the modules enter Standby mode for power saving.
CFG-EPHSAVE	-	Enables/disables automatic ephemeris saving in Flash or gets ephemeris saving status in Flash.
-	PMTK010	Automatically outputs system information when the module is powered on.
-	PMTK011	Automatically outputs text information when the module powered on.
-	PMTK183, PMTK184, PMTK185	PMTK183: Queries LOCUS logging status. PMTK184: Erases the LOCUS logger flash data. PMTK185: Stops or starts LOCUS data logging.
-	PMTK223	Sets DEE parameters.
-	PMTK225	Sets the modules to Periodic mode for power saving.
-	PMTK286	Enables/disables AIC function.
-	PMTK306	Sets the minimum SNR of satellites in use.
-	PMTK605, PMTK705	PMTK605: Queries the firmware information. PMTK705: Outputs the firmware information.
-	PMTK622	Dumps LOCUS flash data.
-	PMTK838	Enables/disables jamming detection function.

LC760Z	L76-L/L76-LB	Description
-	PMTK869	Enables/disables EASY function or gets whether EASY function is enabled.
-	PMTK875	Enables/disables leap second message output or queries whether leap second message output is enabled.
-	PMTK886	Sets the navigation mode.
-	PMTKSPF	Outputs Jamming status.

NOTE

See *documents [3]* and *[4] protocol specifications* for details about proprietary messages supported by LC760Z, L76-L and L76-LB.

3.7. Supported Features

Differences in supported features are listed in the following table.

Table 11: Differences in Supported Features

Field	LC760Z	L76-L/L76-LB	Note
Cold/Hot/Warm start	●	●	–
Fix interval	●	●	LC760Z: 200–1000 ms. L76-L and L76-LB: 100–1000 ms.
Low power mode	●	●	LC760Z: Standby and Backup modes. L76-L: Standby, Backup, Periodic, AlwaysLocate and GLP modes L76-LB: Standby, Backup, Periodic and GLP modes.
GNSS search mode	●	●	–
Set/Get UART baud rate	●	●	About UART baud rates, see *Chapter 3.3 UART Baud Rate*.
Set PPS	●	●	About PPS parameters, see *Chapter 3.4 PPS*.
Set/Get SBAS status	●	●	–
Set/Get NMEA message output	●	●	–

Field	LC760Z	L76-L/L76-LB	Note
frequency			
Set/Get static navigation speed threshold	●	●	–
Get firmware version	●	●	–
Set/Get Jamming detection	●	●	–
Set/Get Geofence status	●	●	–
Set/Get PDOP threshold	●	–	–
Set/Get Antenna status	●	–	
Set/Get Odometer	●	●	-
Set FLP/GLP mode	–	●	-
Set/Output GPTXT	–	●	-
Set/Output ECEFPOSVEL	–	●	-
Set WGS84 to PZ-90.11	–	●	-
Configure/Output PQVEL/PQGBS	–	●	-
Set/Output return link message	–	●	-
Set/Get LOCUS/EASY functions	–	●	-
Set navigation mode	–	●	-
Set/Output leap second message	–	●	-
Set DEE function	–	●	-
Set AIC function	–	●	-

NOTE

See *documents [3]* and *[4] protocol specifications* for details about proprietary messages supported by LC760Z, L76-L and L76-LB.

3.8. Firmware Upgrade

Firmware upgrade process for the LC760Z, L76-L and L76-LB is different, see *documents [5]* and *[6] firmware upgrade guides* for details.

4 Appendix References

Table 12: Related Documents

Document Name
[1] Quectel_LC260Z(00)&LC760Z_AGNSS_Application_Note
[2] Quectel_Lx0&Lx6&LC86L&LG77L_AGNSS_Application_Note
[3] Quectel_LC260Z(00)&LC760Z_GNSS_Protocol_Specification
[4] Quectel_LG77L(C)&Lx0&Lx6&LC86L_Series_GNSS_Protocol_Specification
[5] Quectel_LC260Z(00)&LC760Z_Firmware_Upgrade_Guide
[6] Quectel_Lx6&LC86L&LG77L_Firmware_Upgrade_Guide

Table 13: Terms and Abbreviations

Abbreviation	Description
1PPS	One Pulse Per Second
AGNSS	Assisted GNSS (Global Navigation Satellite System)
ANT	Antenna
BDS	BeiDou Navigation Satellite System
COG	Course over Ground
Galileo	Galileo Satellite Navigation System (EU)
GLONASS	Global Navigation Satellite System (Russia)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View

Abbreviation	Description
HDOP	Horizontal Dilution of Precision
NMEA	NMEA (National Marine Electronics Association) 0183 Interface Standard
PDOP	Position Dilution of Precision
PGKC	Proprietary Protocol Defined by the Chipset Supplier
PQ	Quectel Proprietary Protocol
PQTM	Quectel Proprietary Protocol
QZSS	Quasi-zenith Satellite System
RMC	Recommended Minimum Specific GNSS Data
RTC	Real-time Clock
SBAS	Satellite-based Augmentation System
SOG	Speed over Ground
UART	Universal Asynchronous Receiver/Transmitter
UTC	Coordinated Universal Time
VTG	Course Over Ground & Ground Speed