# MC20 GNSS

# AT Commands Manual

**GSM/GPRS/GNSS Module Series**

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# About the Document

## History

| Revision | Date | Author | Description |
|---|---|---|---|
| 1.0 | 2016-06-24 | Hyman DING | Initial |
| 1.1 | 2016-07-30 | Hyman DING | Added the following new AT commands: AT+QGNSSTS/AT+QGNSSEPO/ AT+QGREFLOC/AT+QGEPOAID |

# Contents

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# 1 Introduction

GNSS, a featured function embedded in Quectel MC20 module, can help customers get the current accurate coordinates, high precision time, etc.

MC20 integrates both GNSS and GSM engines which can work as a whole (all-in-one solution) unit or work independently (stand-alone solution) according to customer demands. In all-in-one solution, the internal GNSS module can be regarded as a peripheral of the whole unit, and is completely controlled by the GSM module, including power supply, UART communication, etc. In stand-alone solution, the internal GNSS module and the GSM module work independently, and the GNSS has to be controlled separately.

# 2 AT Commands for MC20 GNSS

## 2.1. Overview of AT Commands for MC20 GNSS

The commands below are effective only in all-in-one solution.

**Table 1: Overview of AT Commands for MC20 GNSS**

| Command | Description |
|---|---|
| AT+QGNSSC | Control power supply of GNSS module |
| AT+QGNSSRD | Read GNSS navigation information |
| AT+QGNSSCMD | Send commands to GNSS module |
| AT+QGNSSETS | Get time synchronization status for GNSS module |
| AT+QGNSSEPO | Enable/Disable EPO™ function |
| AT+QGREFLOC | Set reference location information for QuecFastFix Online |
| AT+QGEPOAID | Trigger EPO™ function |

### 2.1.1. AT+QGNSSC Control Power Supply of GNSS Module

The command is used to control the power supply of GNSS module.

| AT+QGNSSC Control Power Supply of GNSS Module | |
|---|---|
| Test Command<br>**AT+QGNSSC=?** | Response<br>**+QGNSSC:** (list of supported **<mode>**s)<br><br>**OK** |
| Read Command<br>**AT+QGNSSC?** | Response<br>**+QGNSSC: <mode>** |

| | |
|---|---|
| | OK |
| Write Command<br>**AT+QGNSSC=<mode>** | Response<br>**OK**<br><br>If error is related to ME functionality:<br>**+CME ERROR: <err>** |

**Parameter**

| | | |
|---|---|---|
| **<mode>** | 0 | Power off GNSS module |
| | 1 | Power on GNSS module |

**NOTE**

In stand-alone solution, the power supply of GNSS is controlled by an external circuit rather than the PIN GPS_VCC_EN. In such case, command **AT+QGNSSC** cannot be used and thus can be ignored.

### 2.1.2. AT+QGNSSRD Read GNSS Navigation Information

The command is used to get the GNSS navigation information.

| **AT+QGNSSRD** | **Read GNSS Navigation Information** |
|---|---|
| Test Command<br>**AT+QGNSSRD=?** | Response<br>**+QGNSSRD:** (list of supported **<item>**s)<br><br>**OK** |
| Read Command<br>**AT+QGNSSRD?** | Response<br>**+QGNSSRD:** (information of all supported **<item>**s)<br><br>**OK** |
| Write Command<br>**AT+QGNSSRD=<item>** | Response<br>**+QGNSSRD:** (information of **<item>**s)<br>**OK**<br><br>If error is related to ME functionality:<br>**+CME ERROR: <err>** |

**Parameter**

| | |
|---|---|
| **<item>** | "NMEA/GGA": Get GGA sentence |
| | "NMEA/GLL": Get GLL sentence |

| | |
|---|---|
| | “NMEA/GSA”: Get GSA sentence<br>“NMEA/GSV”: Get GSV sentence<br>“NMEA/RMC”: Get RMC sentence<br>“NMEA/VTG”: Get VTG sentence |

### 2.1.3. AT+QGNSSCMD Send Commands to GNSS Module

The command is used to send commands to GNSS module, which allows customers to optionally use some functions to meet application demands.

| AT+QGNSSCMD Send Commands to GNSS Module | |
|---|---|
| Test Command<br>**AT+QGNSSCMD=?** | Response<br>**+QGNSSCMD: (0,1),“cmdString”**<br><br>**OK** |
| Write Command<br>**AT+QGNSSCMD=<cmdType>,<cmdString>** | Response<br>**OK**<br><br>If error is related to ME functionality:<br>**+CME ERROR: <err>** |

**Parameter**

| | | |
|---|---|---|
| **<cmdType>** | 0 | NMEA style command |
| | 1 | Hex style command |
| **<cmdString>** | Command string | |

**NOTE**

Currently only **<cmdType>**=0 is supported.

### 2.1.4. AT+QGNSSTS Get Time Synchronization Status for GNSS Module

The command is used to get time synchronization status for GNSS module. Time plays a very important role in EPO™ function.

| AT+QGNSSTS Get Time Synchronization Status for GNSS Module | |
|---|---|
| Test Command<br>**AT+QGNSSTS=?** | Response<br>**+QGNSSTS: <status>** |

| | |
|---|---|
| | **OK** |
| Read Command<br>**AT+QGNSSTS?** | Response<br>**+QGNSSTS: <status>**<br><br>**OK** |

### Parameter

| | | |
|---|---|---|
| **<status>** | 0 | Time is not synchronized |
| | 1 | Time is synchronized successfully |

**NOTE**

Exact time is very important to EPO™ function. So customers must ensure the time is valid before using EPO™ function.

## 2.1.5. AT+QGNSSEPO Enable/Disable EPO™ Function

The command is used to enable or disable EPO™ function.

| **AT+QGNSSEPO Enable/Disable EPO™ Function** | |
|---|---|
| Test Command<br>**AT+QGNSSEPO=?** | Response<br>**+QGNSSEPO:** (list of supported **<mode>**s)**[,<account_id>]**<br><br>**OK** |
| Read Command<br>**AT+QGNSSEPO?** | Response<br>**+QGNSSEPO: <mode>,<account_id>**<br><br>**OK** |
| Write Command<br>**AT+QGNSSEPO=<mode>[,<account_id>]** | Response<br>**OK**<br><br>If error is related to ME functionality:<br>**+CME ERROR: <err>** |

### Parameter

| | | |
|---|---|---|
| **<mode>** | 0 | Disable EPO™ function |
| | 1 | Enable EPO™ function |
| **<account_id>** | 2 | Set account ID for EPO™ function |

**NOTE**

The parameter **<account_id>** only supports 2. It can be omitted when input, and in this case, 2 will be used as the default value.

### 2.1.6. AT+QGREFLOC Set Reference Location Information for QuecFastFix Online

The command is used to set reference location information for QuecFastFix Online function.

| AT+QGREFLOC Set Reference Location Information for QuecFastFix Online | |
|---|---|
| Test Command<br>**AT+QGREFLOC=?** | Response<br>**+QGREFLOC: <ref_latitude>,<ref_longitude>**<br><br>**OK** |
| Read Command<br>**AT+QGREFLOC?** | Response<br>**+QGREFLOC: <ref_latitude>,<ref_longitude>**<br><br>**OK** |
| Write Command<br>**AT+QGREFLOC=<ref_latitude>,<ref_longitude>** | Response<br>**OK**<br><br>If error is related to ME functionality:<br>**+CME ERROR: <err>** |

**Parameter**

| | |
|---|---|
| **<ref_latitude>** | Latitude information of the reference location |
| **<ref_longitude>** | Longitude information of the reference location |

**NOTES**

1. The range of **<ref_latitude>** is -90°~90°North Latitude, and the range of **<ref_longitude>** is -180°~180 East Longitude. The input format of the parameter should retain 6 decimal places, and the unit is degree.
2. The command works for QuecFastFix Online function and should be set before executing **AT+QGNSSEPO=1**.

### 2.1.7. AT+QGEPOAID Trigger EPO™ Function

The command is used to trigger EPO™ function.

| AT+QGEPOAID Trigger EPO™ Function | |
|---|---|
| Test Command<br>**AT+QGEPOAID=?** | Response<br>**OK** |
| Active Command<br>**AT+QEPOAID** | Response<br>**OK**<br><br>If error is related to ME functionality:<br>**+CME ERROR: <err>** |

**NOTES**

1. If GNSS is powered on already, customers could use this command to trigger EPO™ function after executing **AT+QGNSSEPO=1**.
2. If execute **AT+QGNSSEPO=1** first and then power on GNSS, executing this command will not trigger EPO™ function.

# 3 Examples

## 3.1. AT+QGNSSC

```
AT+QGNSSC?                  // Query GNSS power status
+QGNSSC: 0                  // GNSS powered off
OK
AT+QGNSSC=1                 // Power on GNSS
OK
```

## 3.2. AT+QGNSSRD

```
AT+QGNSSRD?                 // Inquire GNSS NMEA sentence
+QGNSSRD: $GNRMC,033836.000,A,3150.8272,N,11711.9889,E,0.00,140.50,140716,,,D*72
$GNVTG,140.50,T,,M,0.00,N,0.00,K,D*26
$GNGGA,033836.000,3150.8272,N,11711.9889,E,2,10,0.96,166.6,M,0.0,M,,*4A
$GPGSA,A,3,28,16,09,27,08,07,30,,,,,,1.52,0.96,1.17*01
$BDGSA,A,3,04,07,10,,,,,,,,,,1.52,0.96,1.17*1F
$GPGSV,3,1,10,08,64,016,51,07,61,300,28,42,42,134,34,30,34,315,42*7E
$GPGSV,3,2,10,27,32,043,45,16,25,085,43,09,17,227,39,28,08,294,30*7D
$GPGSV,3,3,10,26,02,102,,193,,,*76
$BDGSV,3,1,09,10,76,324,44,08,76,235,,07,73,125,44,15,48,226,28*6A
$BDGSV,3,2,09,01,47,141,27,12,41,240,27,02,38,231,,04,32,119,39*69
$BDGSV,3,3,09,05,18,252,27*5D
$GNGLL,3150.8272,N,11711.9889,E,033836.000,A,D*40

OK
AT+QGNSSRD="NMEA/RMC"       // Inquire RMC information
+QGNSSRD: $GNRMC,033837.000,A,3150.8272,N,11711.9889,E,0.00,140.50,140716,,,D*73

OK
AT+QGNSSRD="NMEA/GSA"       // Inquire GSA information
+QGNSSRD: $GPGSA,A,3,28,16,09,27,08,07,30,,,,,,1.52,0.96,1.17*01
$BDGSA,A,3,04,07,10,,,,,,,,,,1.52,0.96,1.17*1F

OK
AT+QGNSSRD?                 // Inquire GNSS NMEA sentence
```

```
+QGNSSRD: $GNRMC,033839.000,A,3150.8272,N,11711.9889,E,0.00,140.50,140716,,,D*7D
$GNVTG,140.50,T,,M,0.00,N,0.00,K,D*26
$GNGGA,033839.000,3150.8272,N,11711.9889,E,2,10,0.96,166.6,M,0.0,M,,*45
$GPGSA,A,3,28,16,09,27,08,07,30,,,,,,1.52,0.96,1.17*01
$BDGSA,A,3,04,07,10,,,,,,,,,,1.52,0.96,1.17*1F
$GPGSV,3,1,10,08,64,016,51,07,61,300,26,42,42,134,34,30,34,315,42*70
$GPGSV,3,2,10,27,32,043,46,16,25,085,43,09,16,226,39,28,08,294,30*7E
$GPGSV,3,3,10,26,02,102,,193,,,*76
$BDGSV,3,1,09,10,76,324,44,08,76,235,,07,73,125,44,15,48,226,28*6A
$BDGSV,3,2,09,01,47,141,27,12,41,240,27,02,38,231,,04,32,119,39*69
$BDGSV,3,3,09,05,18,252,27*5D
$GNGLL,3150.8272,N,11711.9889,E,033839.000,A,D*4F

OK
```

## 3.3. AT+QGNSSCMD

```
AT+QGNSSCMD=0,"$PMTK605*31"          // Inquire GNSS version information
OK

+QGNSSCMD: $PMTK705,AXN_3.82_3333_16051101,0001,MC20-GNSS,1.0*2A
```

## 3.4. AT+QGNSSTS

```
AT+QGNSSTS=?          // Test command
+QGNSSTS: (0,1)

OK
AT+QGNSSTS?           // Read time synchronization mode and status
+QGNSSTS: 1           // Time synchronized successfully

OK
```

## 3.5. AT+QGNSSEPO

```
AT+QGNSSEPO=?              // Test command
+QGNSSEPO: (0,1)[,<account_id>]

OK
AT+CREG?;+CGREG?           // Check network status
+CREG: 0,1
```

```
+CGREG: 0,1

OK
AT+QGNSSEPO=1          // Enable EPO™ function

OK
AT+QGNSSEPO?           //Read EPO™ status
+QGNSSEPO: 1,2

OK
```

## 3.6. AT+QGREFLOC

```
AT+QGREGLOC=?              // Test command
+QGREFLOC: <ref_latitude>,<ref_longitude>

OK
AT+QGREFLOC=31.507985,117.119750
OK
```

## 3.7. AT+QGEPOAID

```
AT+QGNSSC=1            // Power on GNSS
OK
AT+CREG?;+CGREG?       // Check network status
+CREG: 0,1

+CGREG: 0,1

OK
AT+QGNSSTS?            // Inquire time synchronization status
+QGNSSTS: 1

OK
AT+QGNSSEPO=1
OK
AT+QGEPOAID
OK
```

## 3.8. Complete Example for Operating EPO™ and QuecFastFix Online

```
AT+QGNSSC=1              // Power on GNSS
OK
AT+QIFGCNT=2
OK
AT+QICSGP=1,”CMNET”
OK
AT+QGNSSTS?              // Read time synchronization status
+QGNSSTS: 0

OK
AT+CREG?;+CGREG?         // Check network status
+CREG: 0,2

+CGREG: 0,2

OK
AT+CREG?;+CGREG?         // Check network status
+CREG: 0,1

+CGREG: 0,1

OK
AT+QGNSSTS?              // Read time synchronization status
+QGNSSTS: 1              // Time synchronization completed

OK
AT+QGREFLOC=31.507985,117.119750   // Set reference location information for QuecFastFix Online
OK
AT+QGNSSEPO=1            // Enable EPO™ function
OK
AT+QGEPOAID              // Trigger EPO™ function
OK
AT+QGNSSRD?
+QGNSSRD: $GNRMC,032220.291,V,,,,,0.00,0.00,140716,,,N*5D
$GNVTG,0.00,T,,M,0.00,N,0.00,K,N*2C
$GNGGA,032220.291,,,,,0,0,,,M,,M,,*5D
$GPGSA,A,1,,,,,,,,,,,,,,*1E
$BDGSA,A,1,,,,,,,,,,,,,,*0F
$GPGSV,2,1,07,23,,,31,08,,,49,30,,,33,16,,,45*7E
$GPGSV,2,2,07,07,,,44,27,,,49,26,,,43*72
$BDGSV,1,1,03,10,,,47,04,,,40,07,,,48*62
$GNGLL,,,,,,032220.291,V,N*6F
```

```
OK
AT+QGNSSRD?
+QGNSSRD: $GNRMC,032221.301,V,,,,,0.00,0.00,140716,,,N*54
$GNVTG,0.00,T,,M,0.00,N,0.00,K,N*2C
$GNGGA,032221.301,,,,,0,0,,,M,,M,,*54
$GPGSA,A,1,,,,,,,,,,,,,,,*1E
$BDGSA,A,1,,,,,,,,,,,,,,,*0F
$GPGSV,2,1,07,23,,,31,08,,,49,30,,,33,16,,,45*7E
$GPGSV,2,2,07,07,,,44,27,,,49,26,,,43*72
$BDGSV,1,1,03,10,,,47,04,,,40,07,,,48*62
$GNGLL,,,,,032221.301,V,N*66

OK
…
AT+QGNSSRD?
+QGNSSRD: $GNRMC,032225.306,A,3150.7859,N,11711.9215,E,0.06,204.08,140716,,,A*70
$GNVTG,204.08,T,,M,0.06,N,0.11,K,A*2B
$GNGGA,032225.306,3150.7859,N,11711.9215,E,1,9,1.54,35.0,M,0.0,M,,*40
$GPGSA,A,3,08,30,16,07,27,26,,,,,,,1.75,1.54,0.83*00
$BDGSA,A,3,10,04,07,,,,,,,,,,1.75,1.54,0.83*19
$GPGSV,3,1,09,08,70,004,49,07,55,309,44,42,45,141,,27,38,040,49*7D
$GPGSV,3,2,09,16,28,079,45,30,28,317,31,26,06,096,43,193,,,*7C
$GPGSV,3,3,09,23,,,28*7B
$BDGSV,1,1,03,07,74,113,48,10,74,329,47,04,32,119,40*51
$GNGLL,3150.7859,N,11711.9215,E,032225.306,A,A*4A

OK
AT+QGNSSRD?
+QGNSSRD: $GNRMC,032225.306,A,3150.7859,N,11711.9215,E,0.06,204.08,140716,,,A*70
$GNVTG,204.08,T,,M,0.06,N,0.11,K,A*2B
$GNGGA,032225.306,3150.7859,N,11711.9215,E,1,9,1.54,35.0,M,0.0,M,,*40
$GPGSA,A,3,08,30,16,07,27,26,,,,,,,1.75,1.54,0.83*00
$BDGSA,A,3,10,04,07,,,,,,,,,,1.75,1.54,0.83*19
$GPGSV,3,1,09,08,70,004,49,07,55,309,44,42,45,141,,27,38,040,49*7D
$GPGSV,3,2,09,16,28,079,45,30,28,317,31,26,06,096,43,193,,,*7C
$GPGSV,3,3,09,23,,,28*7B
$BDGSV,1,1,03,07,74,113,48,10,74,329,47,04,32,119,40*51
$GNGLL,3150.7859,N,11711.9215,E,032225.306,A,A*4A

OK
```

# 4 Appendix

## 4.1. Related Documents

**Table 2: Related Documents**

| SN | Document Name | Remark |
|---|---|---|
| [1] | NMEA 0183 Version 3.01 | Standard for Interfacing Marine Electronic Devices |
| [2] | Quectel_MC20_Hardware_Design | MC20 Hardware Design |

## 4.2. Terms and Abbreviations

**Table 3: Terms and Abbreviations**

| Abbreviation | Description |
|---|---|
| GGA | Global Positioning System Fixed Data |
| GLL | Geographic Position – Latitude/Longitude |
| GNSS | Global Navigation Satellite System |
| GPS | Global Positioning System |
| GSA | GNSS DOP and Active Satellites |
| GSM | Global System for Mobile Communication |
| GSV | GNSS Satellites in View |
| ME | Mobile Equipment |

| | |
|---|---|
| NMEA | National Marine Electronics Association |
| RMC | Recommended Minimum Specific GNSS Data |
| VTG | Course Over Ground and Ground Speed |

## 4.3. Summary of CME ERROR Codes Related to GNSS

**Table 4: Different Coding Schemes of +CME ERROR Related to GNSS: <err>**

| Code of <err> | Meaning |
|---|---|
| 7101 | Invalid parameter |
| 7102 | Not supported |
| 7103 | Operation failed |