GLOBALSAT GPS Module

Hardware Data Sheet

Product No : EM-506N5

User Manual Version 1.0

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Product Description

Product Description

EM-506N5 GNSS module features high sensitivity, low power and ultra small form factor. This module uses MTK chip, even in urban canyons and dense foliage environment, it can also provide you with excellent sensitivity and performance. Suitable for the following applications:

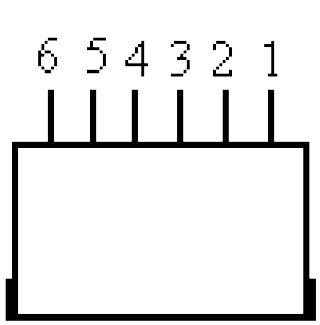
- Automotive navigation
- Fleet management
- Marine navigation

Product Features

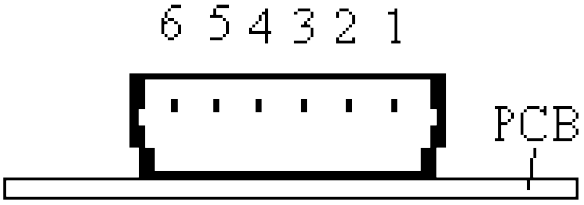
- MediaTek high performance L1 band GNSS receiver
- Multi-Constellation GPS/GLONASS/Galileo/BeiDou/QZSS receiver
- Very high sensitivity (Tracking Sensitivity: -165 dBm)
- Extremely fast TTFF (Time To First Fix) at low signal level
- Support UART interface.
- Built-in LNA(with in CHIP)
- Support NMEA 0183 V3.01 / V4.1 (GGA, GSA, GSV, RMC, VTG, GLL, ZDA, GRS, GST)
- Support OSP protocol
- Support for SBAS ranging,WASS, EGNOS, MSAS and GAGAN
- Compact size (30.0mm x 30.0 mm x 8.0mm) suitable for space-sensitive application

Note: Features mentioned above are available depending on firmware versions. Please contact us first to specify which features you will require, before purchase.

Product Pin Description



1 : GND
2 : VIN
3 : RX
4 : TX
5 : GND
6 : 1PPS



PIN Number(s)	Name	Type	Description	Note
1,5	GND	P	Ground.	
2	VIN	P	This is the main power supply to the engine board. (4.5Vdc to 6.5Vdc)	
3	RXD	I	This is the main receive channel for receiving software commands to the engine board from MTK “PowerGPS” software or from user written software. Baud rate based on flash memory setting.	
4	TXD	O	This is the main transmits channel for outputting navigation and measurement data to user’s navigation software or user written software. Output 3.0V level.	
6	1PPS	O	One pulse per second output. This pin output signal based on firmware setting .*1	

***1.Supports a 1PPS output, but will not have an LED. If you don't need a 1PPS output but require an LED, then please contact our sales department for more information.**

Electrical Specification

Absolute Maximums Ratings

Parameter	Min.	Typ.	Max.	Conditions	Unit
POWER Supply					
Main power supply(VCC)	4.5	5.0	6.5		V
Main power supply Current		32	36	GPS is not 3D Fixed.	mA
		29	35	GPS is 3D Fixed.	mA
RF Operating Frequency					
GPS L1CA /QZSS L1CA / SBAS L1/Galileo E1(E1B+E1C)		1575.42			MHz

GLONASS L10F		1602			MHz
BeiDou B1I		1561.098			MHz

DC Electrical characteristics

Parameter	Symbol	Min.	Typ.	Max.	Conditions	Units
TX Low Level Output Voltage	V_{OL}			0.4		V
TX High Level Output Voltage	V_{OH}		2.8	3.6		V
RX Low Level Input Voltage	V_{IL}	-0.3		0.4		V
RX High Level Input Voltage	V_{IH}	1.62		3.6		V
I/O Low Level Output Voltage	V_{OL}			0.4		V
I/O High Level Output Voltage	V_{OH}	1.62	1.8	1.98	1pps(default)	V

Receiver Performance

Sensitivity	Tracking : Acquisition (Cold Start TTFF):	-165dBm -148 dBm
Time-To-First-Fix[1]	Cold Start – Autonomous	< 35 sec
	Warm Start – Autonomous[2]	< 15 sec
	Hot Start – Autonomous[3]	< 1 sec. ,Average
Horizontal Position Accuracy[4]	Autonomous	< 2.5m
Velocity Accuracy[5]	Speed Heading	< 0.05 m/s < 0.01 degrees
Reacquisition	0.1 second, average	
Update Rate	1 Sec / 5 Sec	
Maximum Altitude	< 18,000 meter	
Maximum Velocity	< 500 meter/ second	
Maximum Acceleration	< 4G	

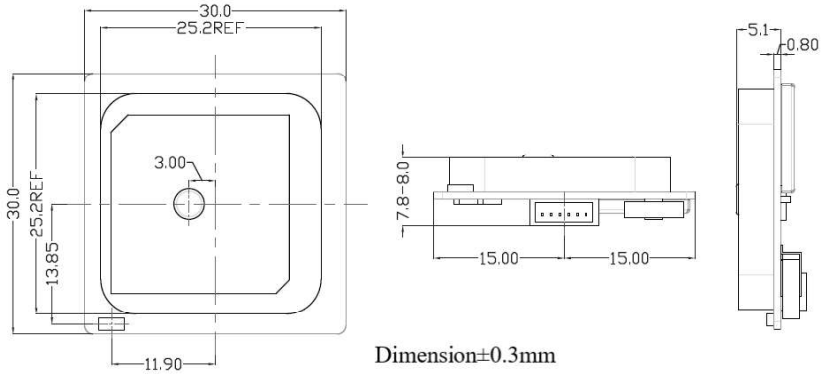
<Note>

1. 50% -130dBm Fu 0.5ppm Tu ±2s Pu 30Km
2. Commanded **Warm START**
3. Commanded **Hot START**
4. CEP 50% static receiver 24 hour -130dBm(open sky)
5. CEP 50% @ 30m/s

Environmental Characteristics

Parameter	Min	Typ	Max	Unit
Humidity Range	5		95	% non-condensing
Operation Temperature	-40	25	85	℃
Storage Temperature	-40		85	℃

Physical Characteristic



OPERATING Description

GND

This is Ground pin for the baseband circuit.

VIN

This is the main power supply to the engine board. (4.5Vdc to 6.5Vdc)

RXD

This is the main channel for receiving software commands from MTK “PowerGPS” software or from your proprietary software.

TXD

This is the main transmits channel for outputting navigation and measurement data to user’s navigation software or user written software. Output is TTL level, 0V ~ 3.3V.

1PPS

This pin exports signal to indicate the GPS status.
GPS unfix: always low level.

GPS fixed: After 3D positioning, a pulse is output every second for about 5 seconds, and the pulse width is 1 ms (define minimum).

LED

LED indicator for GPS fix or not fix

LEDOFF: Receiver switch off
LED ON: No fixed, Signal searching
LED Flashing: About 5 seconds after 3D positioning

SOFTWARE COMMAND

1. Interface Protocol

1.1. Proprietary AIROHA (PAIR) Commands

PAIR command is an AIROHA proprietary GNSS data transferring protocol. This protocol is used to configure the GNSS module's parameters, to set/get aiding information, and to receive notifications from the GNSS module. To process data conveniently, the PAIR commands is aligned with the NMEA sentence format.

1.2. PAIR packet format

The PAIR packet format with number of bytes allocated for each field is shown in Table 1 .

Table 1. PAIR packet format.

1	4	3	variable	1	1	1	1	1
Preamble	Tracker ID	PktType	DataField	*	CHK1	CHK2	CR	LF

The details of each field in the packet are described in Table 2.

Table 2. PAIR packet detail for each field.

Parameter	Length	Description
Preamble	1	**$**
TalkerID	4	**PAIR**
PktType	3	An indicator from 000 to 999 specifying the decoding type of the packet.
DataField		A comma symbol '**,**' must be inserted before each **DataField** to help the decoder processing the **DataField**.
*	1	The star symbol '*' marks the end of the DataField.
CHK1, CHK2	2	the checksum of the data between **Preamble** and '*'
CR, LF	2	The two bytes are used to identify the end of the packet.

2. NMEA Commands

The module supports the National Marine Electronics Association (NMEA) message based on NMEA 0183 v3.01/v4.10. The following sections show the structure of NMEA protocol message and the corresponding commonstandard messages format.

2.1. NMEA protocol

In general, the NMEA message is started with '$' character, followed by talker ID, sentence ID, data fields, and checksum, and ended with '<CR><LF>', as shown Figure 1.For the further information, please refer to NMEA 0183 Interface Standard, Version 4.10, June, 2012 at www.nmea.org. Table 3. shows the details of the NMEA protocol. Table 4.~ 7. define the talker ID and sentence ID for different constellations and different NMEA versions.

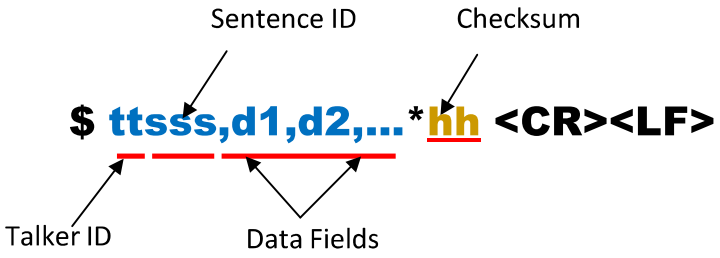


Figure 1. NMEA protocol overview.

Table 3. NMEA protocol detail description.

Parameter	Length	Description
Preamble	1	**$**
TalkerID	2	It is used for various GNSS configurations, such as **GP/GL/GA/GB/GN.**
SentenceID	3	Fields descriptions, such as GGA/GSA/GSV/RMC.
DataField		A comma symbol ',' must be inserted before each data field to help the decoder processing the **DataField**.
*	1	The star symbol '*' marks the end of the DataField.
CHK1, CHK2	2	The checksum of the data between **Preamble** and '*'
CR, LF	2	The two bytes are used to identify the end of the packet.

Table 4. Talker ID description.

Talker ID	Description (Configuration GNSS)
GP	GPS
GL	GLONASS
GA	Galileo
GB*	Beidou
GI*	NavIC
GN	Multi-GNSS

* NMEA v3.01/v4.10 does not define talker ID for Beidou/NavIC. 'GB'/'GI' only defines in NMEA v4.11.

Table 5. Sentence ID description

Sentence ID	Description
GGA	Global Positioning System Fix Data
GLL	Geographic Position, Latitude and Longitude
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites In View
RMC	Recommended Minimum Specific GNSS Data
VTG	Course Over Ground & Ground Speed
ZDA	GNSS Time & Date

Table 6. Talker ID display in different GNSS system (for NMEA 0183 v3.01).

Talker ID	GPS only	GLONASS only	Galileo only	Beidou only	NavIC only	Multi-GNSS GPS+GLO+GAL+BDS+NavIC
GGA	GP	GL	GA	GB*	GI*	GN
GLL						
RMC						
VTG						
ZDA						
GSA**						GP+GL+GA+GB+GI
GSV						

Table 7. Talker ID display in different GNSS system (for NMEA 0183 v4.10).

Talker ID	GPS only	GLONASS only	Galileo only	Beidou only	NavIC only	Multi-GNSS GPS+GLO+GAL+BDS+NavIC
GGA	GP	GL	GA	GB*	GI*	GN
GLL						
RMC						
VTG						
ZDA						
GSA**						
GSV						GP+GL+GA+GB+GI

* NMEA v3.01/v4.10 does not define talker ID for Beidou/NavIC. 'GB'/'GI' only defines in NMEA v4.11.

** The difference between NMEA 0183 v3.02 and v4.10 for talker ID is GSA.

2.2. Standard messages

The standard NMEA messages are GGA/GLL/GSA/GSV/RMC/VTG/ZDA. The satellite ID, system ID, and signal ID in the NMEA sentences are defined in Table 8. The following shows the details of these messages based on **NMEA0183 v4.10**.

➢ GGA

Time, position and fix related data. The output location will be affected by the datum selected. The default datum is WGS84.

$--GGA,hhmmss.sss,ll.llll,a,yyy.yyyy,a,x,xx,x.xx,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>

No.	Format	Description
1	hhmmss.sss	UTC time of position
2	ll.llll,a	Latitude - N/S
3	yyy.yyyy,a	Longitude - E/W
4	x	GNSS Quality indicator
5	xx	Number of satellites in use, may be different from the number in view
6	x.xx	Horizontal dilution of precision
7	x.x,M	Altitude re: mean-sea-level (geoid), meters
8	x.x,M	Geoidal separation, meters
9	x.x	Age of Differential GPS data
10	xxxx	Differential reference station ID, 0000-1023

➢ GLL

Position fix, the time of position fix, and status.

$--GLL,ll.llll,a,yyy.yyyy,a,hhmmss.sss,A,a*hh<CR><LF>

No.	Format	Description
1	ll.llll,a	Latitude - N/S
2	yyy.yyyy,a	Longitude - E/W
3	hhmmss.sss	UTC of position
4	A	Status A = Data valid/V = Data not valid
5	a	Mode Indicator

➢ GSA

Dilution of precision (DOP) and active satellites.

$--GSA,a,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.xx,x.xx,x.xx,h*hh<CR><LF>

No.	Format	Description
1	a	Mode: M = Manual, forced to operate in 2D or 3D mode A = Automatic, allowed to automatically switch 2D/3D

No.	Format	Description
2	x	Mode: 1 = Fix not available, 2 = 2D, 3 = 3D
3	xx	ID numbers1 of satellites used in solution
4	x.xx	PDOP
5	x.xx	HDOP
6	x.xx	VDOP
7	h	GNSS System ID (1:GPS, 2:GLONASS, 3:Galileo, 4:Beidou, 6:NavIC) (Only supported in NMEA v4.10 format, ref Table 9)

➢ **GSV**

The number of GNSS satellites in view, PRN, elevation, azimuth, and SNR.

$--GSV,x,x,xx,xx,xx,xxx,xx,. .....,xx,xx,xxx,xx,h*hh<CR><LF>

No.	Format	Description
1	x	Total number of sentences
2	x	Sentence number
3	xx	Total number of satellites in view
4	xx	Satellite ID number
5	xx	Elevation, degrees, 90o maximum
6	xxx	Azimuth, degrees True, 000 to 359
7	xx	SNR (C/No) 00-99 dB-Hz, null when not tracking
8	h	Signal ID (Only support in NMEA v4.10 format, ref Table 9)

➢ **RMC**

Recommended minimum specific GNSS data, i.e., position, SOG, COG, and time.

$--RMC,hhmmss.sss,A,ll.llll,a,yyy.yyyy,a,x.xx,x.xx,xxxxxx,x.x,a,a,a*hh<CR><LF>

No.	Format	Description
1	hhmmss.sss	UTC of position fix
2	A	Status A = Autonomous, V = Invalid, D = Differential
3	ll.llll,a	Latitude - N/S
4	yyy.yyyy,a	Longitude - E/W
5	x.xx	Speed over ground, knots
6	x.xx	Course Over Ground, degrees True
7	xxxxxx	Date: ddmmyy
8	x.x,a	Magnetic variation, degrees E/W1
9	a	Mode Indicator
10	a	Navigational Status (Only support in NMEA v4.10 format)

➢ **VTG**

Course over ground (COG) and speed over ground (SOG).

$--VTG,x.xx,T,x.xx,M,x.xx,N,x.xx,K,a*hh<CR><LF>

No.	Format	Description
1	x.xx,T	Course over ground, degrees True
2	x.xx,M	Course over ground, degrees Magnetic
3	x.xx,N	Speed over ground, knots
4	x.xx,K	Speed over ground, km/hr
5	a	Mode Indicator

➢ **ZDA**

GNSS time and date.

$ --ZDA,hhmmss.sss,xx,xx,xxxx,xx,xx*hh<CR><LF>

No.	Format	Description
1	hhmmss.sss	UTC of position fix
2	xx	Day, 01 to 31, UTC
3	xx	Month, 01 to12
4	xxxx	Year
5	xx	Local zone hours
6	xx	Local zone minutes

➢ **GRS**

GNSS Range Residuals.

$--GRS,hhmmss.sss,1,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x,h,h*hh<CR><LF>

No.	Format	Description
1	hhmmss.sss	UTC of position fix
2	mode	1 = Residuals are recomputed after the GGA is computed
3	x.x	Range residuals (m) for SVs used in the navigation solution. SV order must match the order of GSA.
4	h	GNSS System ID (1:GPS, 2:GLONASS, 3:Galileo, 4:Beidou, 6:NavIC) (Only supported in NMEA v4.10 format, ref Table 9)
5	h	Signal ID (Only support in NMEA v4.10 format, ref Table 9)

➢ **GST**

GNSS Psuedorange Error Statistics.

$--GST,hhmmss.sss,x.x,x.x,x.x,x.x,x.x,x.x,x.x,x.x*hh<CR><LF>

No.	Format	Description
1	hhmmss.sss	UTC time of position
2	x.x	RMS value of standard deviation of the ranges, meters.
3	x.x	Standard deviation of semi-major axis of error-ellipse, meters.
4	x.x	Standard deviation of semi-minor axis of error-ellipse, meters.
5	x.x	Orientation of semi-major axis of error ellipse, degrees from true north.
6	x.x	Standard deviation of latitude error, meters.
7	x.x	Standard deviation of longitude error, meters.
8	x.x	Standard deviation of altitude error, meters.

Table 8. Satellite ID in NMEA sentence.

Constellation	PRN numbers	Satellite ID (AIROHA)	Satellite ID (NMEA 0183 v4.10)
GPS	1-32	1-32	1-32
SBAS	120-138	33-51	33-64
GLONASS	1-24	65-88	65-99
Galileo	1-36	1-36	1-36
Beidou	1-63	1-63	N/A
QZSS	193-199	193-199	N/A
NavIC	1-14	1-14	N/A

Table 9. System/Signal ID in NMEA sentence.

Constellation	System ID (AIROHA)	Signal ID (AIROHA)	System ID (NMEA 0183 v4.10)	Signal ID (NMEA 0183 v4.10)
GPS L1C/A	1	1	1	1
GPS L5Q	1	8	1	8
GLONASS L1	2	1	2	1
Galileo E1-BC	3	7	3	7
Galileo E5a	3	1	3	1
Beidou B1I	4*	1*		
Beidou B2a	4*	4*		
NavIC L5	6*	1*		

* Beidou/NavIC is not defined in NMEA v4.10

3. Input Command

PAIR command is an AIROHA proprietary GNSS data transfer protocol.
This protocol is used to configure the GNSS module's parameters, aiding information and to receive notifications from the GNSS module. The PAIR aligns with the NMEA sentence format to process data more efficiently.

➢ 001 PAIR_ACK

Description	Acknowledge of PAIR command
Data Field	$PAIR001,Command_ID,Result*CS<CR><LF>
Example	Send: $PAIR666*3C\r\n Response: $PAIR001,666,0*3D\r\n ==> Success
Note	This item is the response of commands. The GNSS system automatically sends this command. Do not directly send it to the GNSS system.

➢ 002 PAIR_GNSS_SUBSYS_POWER_ON

Description	Power on the GNSS system. Include DSP/RF/Clock and other GNSS modules.
Data Field	$PAIR002*CS<CR><LF>
Example	Send: $PAIR002*38\r\n Response: $PAIR001,002,1*38\r\n ==> The power on process is running. Please wait a moment. $PAIR001,002,0*39\r\n ==> Power on was successful.
Note	Please send this command before using any location service.

➢ 003 PAIR_GNSS_SUBSYS_POWER_OFF

Description	Power off GNSS system. Include DSP/RF/Clock and other GNSS modules. CM4 also can receive commands (Include the AT command / the race Command / the part of PAIR command which is not dependent on DSP.) after sending this command.
Data Field	$PAIR003*CS<CR><LF>
Example	Send: $PAIR003*39\r\n Response: $PAIR001,003,1*39\r\n ==> The power off process is running. Please wait a moment. $PAIR001,003,0*38\r\n ==> Power off was successful.
Note	The location service is not available after this command is executed. The system can still receive configuration PAIR commands. The application is running if

	necessary.

➢ 004 PAIR_GNSS_SUBSYS_HOT_START

Description	Hot Start. Use the available data in the NVRAM.
Data Field	$PAIR004*CS<CR><LF>
Example	Send: $PAIR004*3E\r\n Response: $PAIR001,004,0*3F\r\n ==> Success

➢ 005 PAIR_GNSS_SUBSYS_WARM_START

Description	Warm Start. Not using Ephemeris data at the start.
Data Field	$PAIR005*CS<CR><LF>
Example	Send: $PAIR005*3F\r\n Response: $PAIR001,005,0*3E\r\n ==> Success

➢ 006 PAIR_GNSS_SUBSYS_COLD_START

Description	Cold Start. Not using the Position, Almanac and Ephemeris data at the start.
Data Field	$PAIR006*CS<CR><LF>
Example	Send: $PAIR006*3C\r\n Response: $PAIR001,006,0*3D\r\n ==> Success

➢ 007 PAIR_GNSS_SUBSYS_FULL_COLD_START

Description	Full Cold Start. In addition to Cold start, this command clears the system/user configurations at the start. It resets the GNSS module to the factory default.
Data Field	$PAIR007*CS<CR><LF>
Example	Send: $PAIR007*3D\r\n Response: $PAIR001,007,0*3C\r\n ==> Success

➢ 023 PAIR_SYSTEM_REBOOT

Description	Reboot GNSS whole chip, including the GNSS submodule and other all CM4 modules.

Data Field	$PAIR023*CS<CR><LF>
Example	Send: $PAIR023*3B\r\n Response: Reboot directly. Without Response.

➢ 062 PAIR_COMMON_SET_NMEA_OUTPUT_RATE

Description	Set the NMEA sentence output interval of corresponding NMEA type.
Data Field	$PAIR062,<Type>,<Output_Rate>*CS<CR><LF> Type: NMEA Type -1 Reset all sentence to default value. 0 NMEA_SEN_GGA, // GGA interval - GPS Fix Data 1 NMEA_SEN_GLL, // GLL interval - Geographic Position - Latitude longitude 2 NMEA_SEN_GSA, // GSA interval - GNSS DOPS and Active Satellites 3 NMEA_SEN_GSV, // GSV interval - GNSS Satellites in View 4 NMEA_SEN_RMC, // RMC interval - Recommended Minimum Specific GNSS Sentence 5 NMEA_SEN_VTG, // VTG interval - Course Over Ground and Ground Speed 6 NMEA_SEN_ZDA, // ZDA interval - Time & Date 7 NMEA_SEN_GRS, // GRS interval - GNSS Range Residuals 8 NMEA_SEN_GST, // GST Interval - GNSS Pseudorange Error Statistics Output_Rate: Output interval setting (Valid range: 0~20, default value: 1) 0 - Disabled or not supported sentence 1 - Output once every one position fix 2 - Output once every two position fixes 3 - Output once every three position fixes 4 - Output once every four position fixes 5 - Output once every five position fixes
Example	Send: $PAIR062,0,3*3D\r\n Response: $PAIR001,062,0*3F\r\n ==> Success

➢ 066 PAIR_COMMON_SET_GNSS_SEARCH_MODE

Description	The device restarts when it receives this command. Abbreviation: (GPS: "G", GLONASS: "R", Galileo: "E", BeiDou: "B", NavIC, "I") Support constellation in L1 package: G/ GR/ GE/ GB/ GREB Support constellation in L1 + L5 package: GREB / GEB Support constellation in L1 + NavIC package G/ I/ GEI/ GREB/ GREBI QZSS is always switchable.

Data Field	$PAIR066,<GPS_Enabled>,<GLONASS_Enabled>,<Galileo_Enabled>,<BeiDou_Enabled>,<QZSS_Enabled>,<NavIC_Enabled>*CS<CR><LF> GPS_Enabled: "0", disable (DO NOT search GPS satellites). "1", search GPS satellites. GLONASS_Enabled: "0", disable (DO NOT search GLONASS satellites). "1", search GLONASS satellites. Galileo_Enabled: "0", disable (DO NOT search Galileo satellites). "1", search Galileo satellites. BeiDou_Enabled: "0", disable (DO NOT search BeiDou satellites). "1", search BeiDou satellites. QZSS_Enabled: "0", disable (DO NOT search QZSS satellites). "1", search QZSS satellites. NavIC_Enabled: "0", disable (DO NOT search NavIC satellites). "1", search NavIC satellites.
Example	Send: $PAIR066,1,0,0,0,0,0*3B\r\n ==> Search GPS satellites only. Response: $PAIR001,066,0*3B\r\n ==> Success Send: $PAIR066,1,1,1,1,1,1,0*3B\r\n ==> Search GPS, GLONASS, Galileo, BeiDou, QZSS satellites. Response: $PAIR001,066,0*3B\r\n ==> Success Send: $PAIR066,1,1,0,0,0,0,0*3A\r\n ==> Search GPS and GLONASS satellites. Response: $PAIR001,066,0*3B\r\n ==> Success

➢ 104 PAIR_COMMON_SET_DUAL_BAND

Description	This command is to set Dual Band state when GNSS service is powered off. The command fails in the following cases: If GNSS Service is powered on, refer to PAIR002 and PAIR003. If firmware is a single band. If GNSS search mode cannot be supported in the next Dual Band state, for example:

	If the current GNSS Search mode is G+GLO, "PAIR104,1" will fail, because Dual Band doesn't support G+GLO. All detailed information related to failure will be displayed in system log.
Data Field	$PAIR104,<DUAL_BAND_Enabled>*CS<CR><LF> DUAL_BAND_Enabled: "0", disable (DO NOT open Dual Band). "1", enable.
Example	Send: $PAIR104,0*23\r\n Response: $PAIR001,104,0*3E\r\n ==> Success

➢ 410 PAIR_SBAS_ENABLE

Description	Enable searching a SBAS satellite or not. When navigation mode is Fitness or Swimming mode, SBAS is not supported.
Data Field	$PAIR410,<Enabled>*CS<CR><LF> Enabled: Enable or disable '0' = Disable '1' = Enable
Example	send: $PAIR410,1*22\r\n ==> Enable SBAS Response: $PAIR001,410,0*3E\r\n ==> Success

➢ 864 PAIR_IO_SET_BAUDRATE

Description	Set port baud rate configuration.
Data Field	$PAIR864,<Port_Type>,<Port_Index>,<Baudrate>*CS<CR><LF> Port_Type: HW Port Type. 0: UART Port_Index: HW Port Index UART - 0: UART0, 1: UART1, 2: UART2 Baudrate: the baud rate need config. Support 115200, 230400, 460800, 921600, 3000000
Example	Send: $PAIR864,0,0,115200*1B\r\n Response: $PAIR001,864,0*31\r\n ==> Success *[Note]
Note	Must reboot the device after changing the port baud rate. The change will valid after reboot.

RoHS / Lead Free Compliance

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RoHS / Lead Free Compliance

Dear Sales:

This letter is intended to answer questions you may come across regarding the compliance of Globalsat WorldCom Corporation products with the following European Directive 2011/65/EU （RoHS）:

- Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment （RoHS）.

This Directive aim is to avoid or limit the use of hazardous material compliant and meet the Standard by July.16,2011 of less than "0.1% by weight per homogeneous material for lead,hexavalent chromium,mercury, PBB and PBDE and 0.01% by weight and per homogeneous material for cadmium".

Globalsat has incorporated the requirement of 2011/65/EU into the product / technology development roadmaps and is committed to make lead free / RoHS fully compliant product available for shipment by July.16,2011.

Kevin Tan
Quality Assurance Manager

Prince Cheng
Chief Executive Officer（CEO）

QR8204-02A

Reversion history

Reversion	Date	Name	Status / Comments
V1.0	2021/12/21	Jeff Chang	Initial Version