

# L1 GNSS Module for High Dynamics Application

ORION D17

GNSS Receiver Module for Launch Vehicle Application  
Datasheet



17mm x 22mm

Revision 2

Date March 06, 2025

1

# ORION D17

---



## High Dynamics GPS / GLONASS / Galileo / Beidou / QZSS Receiver

### Features

- GPS/QZSS L1, GLO L1, GAL E1, BDS B1I
- 16 million time-frequency hypothesis testing per sec
- 45sec cold start TTFF
- < 30m 3D<sub>RMS</sub> at launch vehicle dynamics
- < 1m/sec 3D<sub>RMS</sub> at launch vehicle dynamics
- Multipath detection and suppression
- 17mm x 22mm size
- NMEA-0183 and SkyTraq Binary Protocol
- Operating temperature -40 ~ +85°C
- RoHS compliant

The ORION D17 is a state-of-the-art global navigation satellite system receiver capable of using GPS, GLONASS, Galileo, Beidou, and QZSS signal for high dynamics application.

The quad-GNSS satellite navigation receiver module receives greater number of satellite signal than available for GPS-only receivers. The increased satellite number offers superior accuracy performance.

The ORION D17 module contains SkyTraq Phoenix positioning engine inside, featuring high sensitivity, low power consumption, and fast TTFF. The high-performance signal parameter search engine is capable of testing 16 million time-frequency hypotheses per second, offering industry-leading signal acquisition and TTFF speed.

The ORION D17 module contains SAW filter for increased jamming immunity, and works with active antenna.

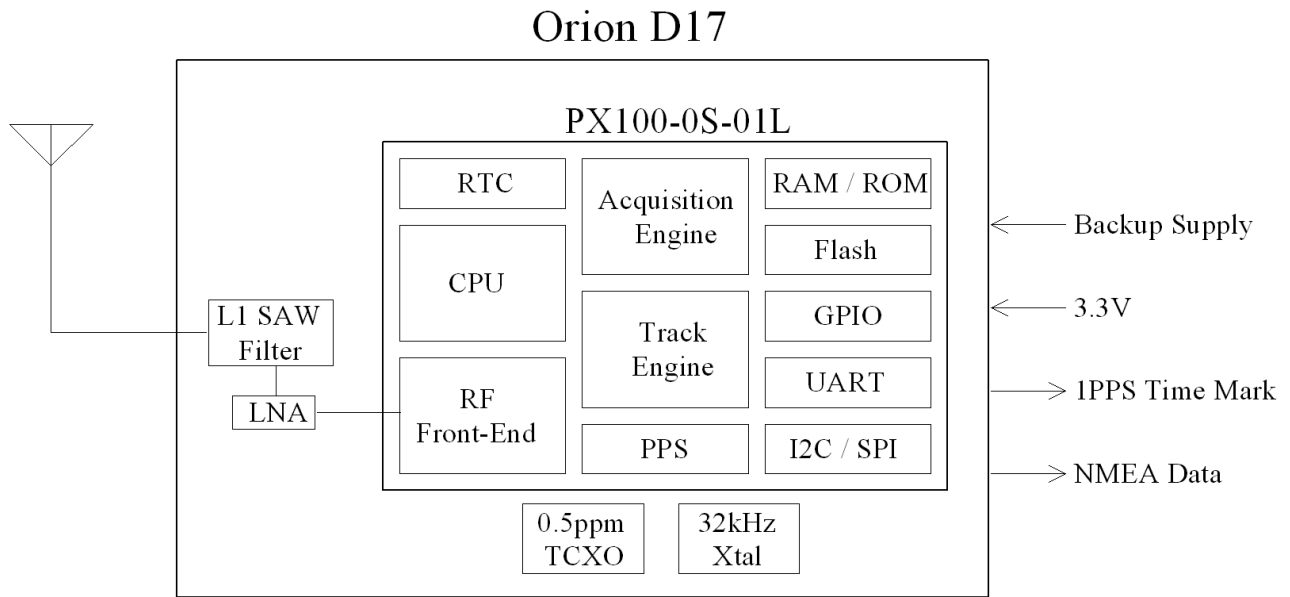
### Applications

- Navigation and Tracking

## TECHNICAL SPECIFICATIONS

Receiver Type	230 channel Phoenix GNSS engine GPS/QZSS L1, GLONASS L1, Galileo E1, Beidou B1I
Accuracy	Position < 30m 3D <sub>RMS</sub> Velocity < 1m/sec 3D <sub>RMS</sub> at 8Km/sec velocity, 11G acceleration, 1.5m/sec <sup>3</sup> jerk
Startup Time	45sec cold start average with 40dB-Hz or higher signal level at 8Km/sec velocity, 2G acceleration, 1.5m/sec <sup>3</sup> jerk
Reacquisition	may lose lock due to large jerk, re-track within 15sec after jerk becomes < 1.5m/sec <sup>3</sup>
Multi-path Mitigation	Advanced multi-path detection and suppression
Update Rate	10Hz
Dynamics	11G acceleration, 1.5m/sec <sup>3</sup> jerk
Operational Limits	Velocity up to 10Km/sec
Serial Interface	3.3V LVTTTL level
Protocol	NMEA-0183 V4.1 GGA, GLL, GSA, GSV, RMC, VTG, ZDA, THS 460800 baud, 8, N, 1  SkyTraq raw data binary 460800 baud, 8, N, 1
Datum	Default WGS-84 and user definable in stand-alone mode
Input Voltage	3.3V DC +/-10%
Current Consumption	125mA
Dimension	17mm L x 22mm W x 2.9mm H
Weight:	1.7g
Operating Temperature	-40°C ~ +85°C
Storage Temperature	-55 °C ~ +100°C
Humidity	5% ~ 95% non-condensing

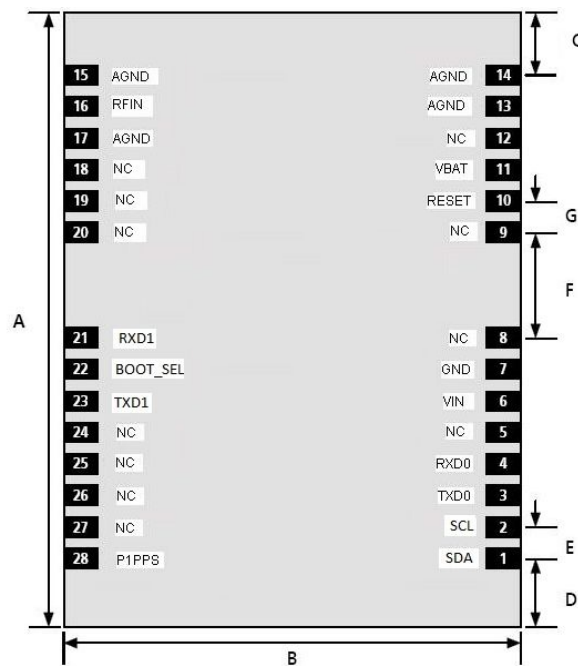
## FUNCTIONAL DESCRIPTION



The ORION D17 is a high-performance satellite navigation receiver in a compact surface mount package. It is based on the SkyTraq Phoenix positioning technology, providing fast signal acquisition performance. The module includes internal SAW filter, works with active antenna. The simple UART serial interface and the standard NMEA-0183 protocol make usage of ORION D17 very easy and straightforward.

The ORION D17 module performs all the necessary system initialization, signal acquisition, signal tracking, data demodulation, and calculation of navigation solution autonomously.

## MECHANICAL CHARACTERISTICS



A	22.4mm
B	17.0mm
C	2.85mm
D	2.55mm
E	1.1mm
F	3.8mm
G	1.1mm

## PINOUT DESCRIPTION

Pin No.	Name	Description
1	SDA	I2C interface data signal, 3V LVTTTL. Currently unused.
2	SCL	I2C interface clock signal, 3V LVTTTL. Currently unused.

3	TXD0	UART serial data output, 3V LVTTTL. One full-duplex asynchronous serial UART port is implemented. This UART output is normally used for sending position, time and velocity information from the receiver in NMEA-0183 format. When idle, this pin output HIGH.
4	RXD0	UART serial data input, 3V LVTTTL. One full-duplex asynchronous serial UART port is implemented. This UART input is normally for sending commands or information to the receiver in SkyTraq binary protocol. In the idle condition, this pin should be driven HIGH. If the driving circuitry is powered independently of ORION D17, ensure that this pin is not driven to HIGH when primary power to ORION D17 is removed, or a 10K-ohm series resistor can be added to minimize leakage current from application to the powered off module.
5	NC	No connection
6	VIN	Main power supply, 3.0V ~ 3.6V DC
7	GND	System ground
8,9	NC	No connection
10	RESET	External active-low reset input. Only needed when power supply rise time is very slow or software-controlled reset is desired.
11	VBAT	Backup supply voltage for internal RTC and backup SRAM, 1.3V ~ 3.6V. VBAT must be applied whenever VIN is applied. This pin should be powered continuously to minimize the startup time. If VIN and VBAT are both removed, the receiver will be in factory default mode upon power up, all user configuration set is lost. For applications the does not care cold starting every time, this pin can be connected to VIN.
12	NC	No connection
13,14,15	AGND	RF ground
16	RFIN	RF input, connects to antenna. There is 3V DC bias output for powering active antenna. Active antenna detection and short protection is provided.
17	AGND	RF ground
18,19,20	NC	No connection
21	RXD1	UART serial data input, 3V LVTTTL. Currently unused.
22	BOOT_SEL	No connection for normal use. Pull-low for loading firmware into empty or corrupted Flash memory from ROM mode.
23	TXD1	UART serial data output, 3.3V LVTTTL. Currently unused.
24,25,26,27	NC	No connection
28	P1PPS	One-pulse-per-second (1PPS) time mark output, 3.3V LV-TTL. The rising edge synchronized to UTC second when getting 3D position fix. The pulse duration is about 100msec at rate of 1 Hz.

## ELECTRICAL SPECIFICATIONS

### ABSOLUTE MAXIMUM RATINGS

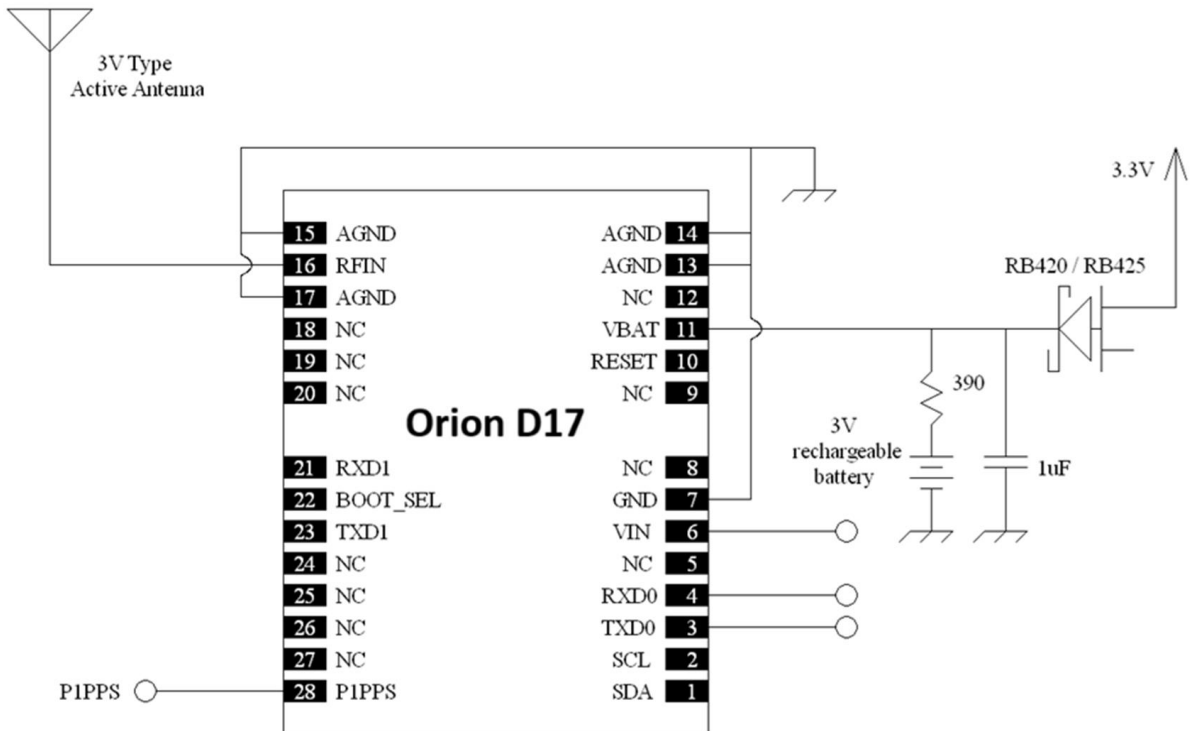
Parameter	Minimum	Maximum	Condition
Supply Voltage (VIN)	-0.5	3.6	Volt
Backup Battery Voltage (VBAT)	-0.5	3.6	Volt
Input Pin Voltage	-0.5	VIN+0.5	Volt
Input Power at RF_IN		+5	dBm
Storage Temperature	-55	+100	degC

### OPERATING CONDITIONS

Parameter	Min	Typ	Max	Unit
Supply Voltage (VIN)	3	3.3	3.6	Volt
Acquisition Current (exclude active antenna current)		125		mA
Tracking Current (exclude active antenna current)		125		mA
Backup Voltage (VBAT)	1.3		3.6	Volt
Backup Current (VDD33 voltage applied)		54		uA
Backup Current (VDD33 voltage off)		13		uA
Output Low Voltage			0.4	Volt
Output HIGH Voltage	2.4			Volt

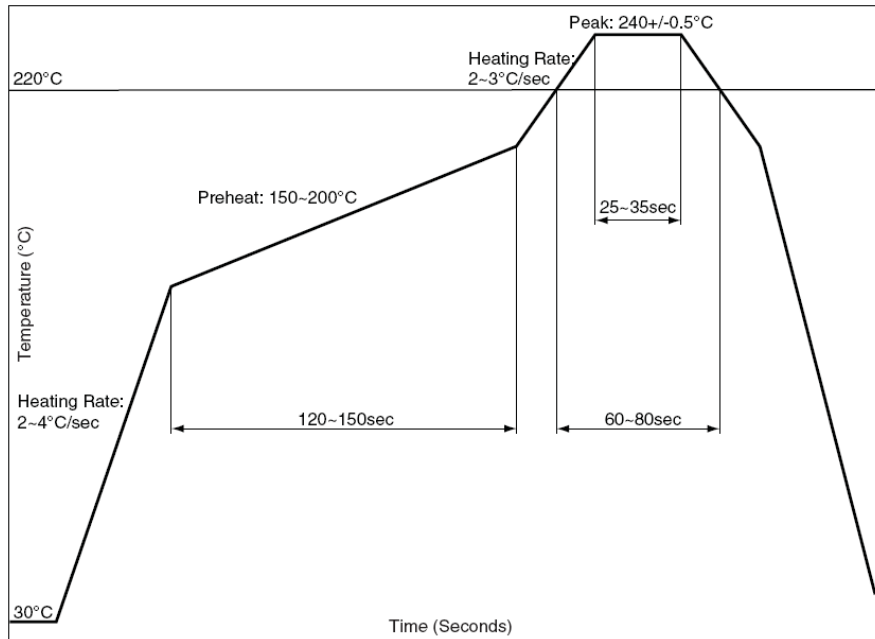
Input LOW Voltage			0.8	Volt
Input HIGH Voltage	2			Volt
Input LOW Current	-10		10	uA
Input HIGH Current	-10		10	uA

## APPLICATION CIRCUIT



## RECOMMENDED REFLOW PROFILE





The reflow profile shown above should not be exceeded, since excessive temperatures or transport times during reflow can damage the module. Cooling temperature fall rate: max 3°C / sec

## ANTENNA CONSIDERATIONS

The ORION D17 is designed to be used with L1 GPS / GLONASS / Galileo / Beidou multi-constellation active antenna. Antenna with gain up to 30dB and noise figure less than 2dB can be used. I

## POWER SUPPLY REQUIREMENT

ORION D17 requires a stable power supply, avoid ripple on VIN pin (<50mVpp). Power supply noise can affect the receiver's sensitivity. Bypass capacitors should be placed close to the module VIN pin, with values adjusted depending on the amount and type of noise present on the supply line.

## BACKUP SUPPLY

The purpose of backup supply voltage pin (VBAT) is to keep the SRAM memory and the RTC powered when the module is powered down. This enables the module to have a faster time-to-first-fix when the module is powered on again. The backup current drain is less than 55µA. In normal powered on state, the internal processor access the SRAM and current drain is higher in active mode

## 1PPS OUTPUT

A 1 pulse per second signal (100msec HIGH duration) is generated on 1PPS pin when the receiver has 3D position fix using 4 or more satellites. The rising edge of the pulse is aligned with UTC second, with accuracy of about 10nsec. It outputs constant LOW when no position fix is available initially.

## LAYOUT GUIDELINES

Separate RF and digital circuits into different PCB regions.

It is necessary to maintain 50-ohm impedance throughout the entire RF signal path. Try keeping the RF signal path as short as possible.

Do not route the RF signal line near noisy sources such as digital signals, oscillators, switching power supplies, or other RF transmitting circuit. Do not route the RF signal under or over any other components (including ORION D17), or other signal traces. Do not route the RF signal path on an inner layer of a multi-layer PCB to minimize signal loss.

Avoid sharp bends for RF signal path. Make two 45-deg bends or a circular bend instead of a single 90-degree bend if needed.

Avoid vias with RF signal path whenever possible. Every via adds inductive impedance. Vias are acceptable for connecting the RF grounds between different layers. Each of the module's ground pins should have short trace tying immediately to the ground plane below through a via.

The bypass capacitors should be low ESR ceramic types and located directly adjacent to the pin they are for.

## **HANDLING GUIDELINE**

The ORION D17 modules are rated MSL4, must be used for SMT reflow mounting within 72 hours after taken out from the vacuumed ESD-protective moisture barrier bag in factory condition < 30degC / 60% RH. If this floor life time is exceeded, or if the received ESD-protective moisture barrier bag is not in vacuumed state, then the device need to be pre-baked before SMT reflow process. Baking is to be done at 85degC for 8 to 12 hours. Once baked, floor life counting begins from 0, and has 72 hours of floor life at factory condition < 30degC / 60% RH.

ORION D17 module is ESD sensitive device and should be handled with care.

## NMEA Output Description

The output protocol supports NMEA-0183 standard. The implemented messages include GGA, GLL, GSA, GSV, VTG, RMC, and ZDA messages. The NMEA message output has the following sentence structure:

\$aacc,c-c\*hh<CR><LF>

The detail of the sentence structure is explained in Table 1.

Table 1: The NMEA sentence structure

character	HEX	Description
"\$"	24	Start of sentence.
Aacc		Address field. "aa" is the talker identifier. "ccc" identifies the sentence type.
","	2C	Field delimiter.
C-c		Data sentence block.
"*"	2A	Checksum delimiter.
Hh		Checksum field.
<CR><LF>	0D0A	Ending of sentence. (carriage return, line feed)

Table 2: Overview of SkyTraq receiver's NMEA messages

<b>\$GPGGA</b>	Time, position, and fix related data of the GPS receiver.
<b>\$GNGLL</b>	Position, time and fix status.
<b>\$GNGSA</b>	Used to represent the ID's of satellites which are used for position fix. When GPS satellites are used for position fix, \$GNGSA sentence is output with system ID 1. When GLONASS satellites are used for position fix, \$GNGSA sentence is output with system ID 2. When Galileo satellites are used for position fix, \$GNGSA sentence is output with system ID 3. When BDS satellites are used for position fix, \$GNGSA sentence is output with system ID 4.
<b>\$GPGSV</b> <b>\$GLGSV</b> <b>\$GAGSV</b> <b>\$GBGSV</b>	Satellite information about elevation, azimuth and CNR, \$GPGSV is used for GPS satellites, while \$GLGSV is used for GLONASS satellites, while \$GAGSV is used for GALILEO satellites, while \$GBGSV is used for BEIDOU satellites.
<b>\$GNRMC</b>	Time, date, position, course and speed data.
<b>\$GNVTG</b>	Course and speed relative to the ground.
<b>\$GNZDA</b>	UTC, day, month and year and time zone.

The formats of the supported NMEA messages are described as follows:

**GGA – Global Positioning System Fix Data**

Time, position and fix related data for a GPS receiver.

Structure:

\$GPGGA,hhmmss.sss,ddmm.mmmmm,a,dddmm.mmmmm,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx\*hh<CR><LF>  
                   1                  2                  3                  4                  5  6  7  8  9          10  11  12  13

Example:

\$GNGGA,052315.000,2447.09094,N,12100.52369,E,2,12,0.6,97.9,M,19.6,M,,0000\*75<CR><LF>

Field	Name	Example	Description
1	UTC Time	025315.000	UTC of position in hhmmss.sss format, (000000.000 ~ 235959.999)
2	Latitude	2447.09094	Latitude in ddmm.mmmm mformat Leading zeros transmitted
3	N/S Indicator	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
4	Longitude	12100.52369	Longitude in dddmm.mmmmm format Leading zeros transmitted
5	E/W Indicator	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	Quality Indicator	2	GPS quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode 3: GPS PPS Mode, fix valid 4: Real Time Kinematic. System used in RTK mode with fixed integers 5: Float RTK. Satellite system used in RTK mode., floating integers 6: Estimated (dead reckoning) Mode 7: Manual Input Mode 8: Simulator Mode
7	Satellites Used	12	Number of satellites in use, (00 ~ 12)
8	HDOP	0.6	Horizontal dilution of precision, (0.0 ~ 99.9)
9	Altitude	97.9	mean sea level (geoid), (-9999.9 ~ 17999.9)
10	Geoidal Separation	19.6	Geoidal separation in meters
11	Age of Differential GPS data		Age of Differential GPS data NULL when DGPS not used
12	DGPS Station ID	0000	Differential reference station ID, 0000 ~ 1023
13	Checksum	75	

### **GLL – Latitude/Longitude**

Latitude and longitude of current position, time, and status.

Structure:

\$GNGLL,ddmm.mmmmm,a,dddmm.mmmmm,a,hhmmss.sss,A,a\*hh<CR><LF>  
1 2 3 4 5 6 7 8

Example:

\$GNGLL,2447.09094,N, 12100.52369,E, 052315.000,A,D\*4A<CR><LF>

Field	Name	Example	Description
1	Latitude	2447.09094	Latitude in ddmm.mmmmm format Leading zeros transmitted
2	N/S Indicator	N	Latitude hemisphere indicator 'N' = North 'S' = South
3	Longitude	12100.52369	Longitude in dddmm.mmmmm format Leading zeros transmitted
4	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
5	UTC Time	052315.000	UTC time in hhmmss.sss format (000000.000 ~ 235959.999)
6	Status	A	Status, 'A' = Data valid, 'V' = Data not valid
7	Mode Indicator	D	Mode indicator 'A' = Autonomous mode 'D' = Differential mode 'E' = Estimated (dead reckoning) mode 'M' = Manual input mode 'S' = Simulator mode 'N' = Data not valid
8	Checksum	4A	

**GSA – GNSS DOP and Active Satellites**

GNSS receiver operating mode, satellites used in the navigation solution reported by the GGA or GNS sentence and DOP values.

Structure:

\$GNGSA,A,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x,x\*hh<CR><LF>  
 1 2 3 3 3 3 3 3 3 3 3 3 3 4 5 6 7 8

Example:

\$GNGSA,A,3,10,12,14,20,21,24,25,31,32,193,,,1.1,0.6,0.9,1\*01<CR><LF>  
 \$GNGSA,A,3,69,70,73,79,80,,,,,,,,,1.1,0.6,0.9,2\*3C<CR><LF>  
 \$GNGSA,A,3,01,02,03,06,09,10,14,16,21,22,26,,1.1,0.6,0.9,4<CR><LF>

Field	Name	Example	Description
1	Mode	A	Mode 'M' = Manual, forced to operate in 2D or 3D mode 'A' = Automatic, allowed to automatically switch 2D/3D
2	Mode	3	Fix type 1 = Fix not available 2 = 2D 3 = 3D
3	Satellite used 1~12	10, 12, 14, 20, 21, 24, 25, 31, 32, 193	01 ~ 32 are for GPS; 33 ~ 64 are for WAAS (PRN minus 87); 193 ~ 197 are for QZSS; 65 ~ 88 are for GLONASS (GL PRN) ; 01 ~ 36 are for GALILEO (GA PRN); 01 ~ 37 are for BDS (BD PRN). GPS, GLONASS, GALILEO and BDS satellites are differentiated by the GNSS system ID in table 3. Maximally 12 satellites are included in each GSA sentence.
4	PDOP	1.1	Position dilution of precision (0.0 to 99.9)
5	HDOP	0.6	Horizontal dilution of precision (0.0 to 99.9)
6	VDOP	0.9	Vertical dilution of precision (0.0 to 99.9)
7	GNSS System ID	1	GNSS system ID* 1 = GPS 2 = GLONASS 3 = GALILEO 4 = BDS 5 = IRNSS
8	Checksum	01	

\*GNSS System ID identifies the GNSS system ID according to Table 3.

Table 3: GNSS Identification Table for GSA, GSV

System	System ID (Talker)	Signal ID	Signal Name
GPS	1 (GP)	0	All signals
		1	L1 C/A
		2	L1 P(Y)
		3	L1C
		4	L2 P(Y)
		5	L2C-M
		6	L2C-L
		7	L5-I
		8	L5-Q
GLONASS	2 (GL)	0	All signals
		1	G1 C/A
		2	G1P
		3	G2 C/A
		4	GLONASS (M) G2P
GALILEO	3 (GA)	0	All signals
		1	E5a
		2	E5b
		3	E5 a+b
		4	E6-A
		5	E6-BC
		6	L1-A
		7	L1-BC
BDS	4 (BD)	0	All signals
		1	B1
		5	B2A
		B	B2
		8	B3
		3	B1C
IRNSS	6 (GI)	0	All signals
		1	L5

**GSV – GNSS Satellites in View**

Number of satellites (SV) in view, satellite ID numbers, elevation, azimuth, and SNR value. Four satellites maximum per transmission.

Structure:

```
$GPGSV,x,x,xx,xx,xx,xxx,xx,...,xx,xx,xxx,xx,x *hh<CR><LF>
  1 2 3 4 5 6 7 4 5 6 7 8 9
```

Example:

```
$GPGSV,4,1,15,10,79,250,50,194,73,072,,193,69,127,45,25,64,114,46,1*67<CR><LF>
$GPGSV,4,2,15,20,54,175,45,32,44,334,46,41,39,242,43,12,36,055,46,1*68<CR><LF>
$GPGSV,4,3,15,31,32,256,45,14,25,310,39,24,15,049,38,21,07,191,35,1*61<CR><LF>
$GPGSV,4,4,15,15,04,106,18,29,03,144,,26,01,206,,1*56<CR><LF>
$GLGSV,2,1,06,80,77,332,44,69,55,098,49,70,46,347,43,73,29,221,45,1*79<CR><LF>
$GLGSV,2,2,06,79,25,026,42,71,01,325,,1*76<CR><LF>
$GBGSV,3,1,12,21,77,107,50,26,73,278,49,06,59,009,45,03,58,203,43,1*7D<CR><LF>
$GBGSV,3,2,12,16,58,002,47,07,55,180,,01,53,142,43,09,47,329,43,1*73<CR><LF>
$GBGSV,3,3,12,02,40,241,39,10,31,200,40,22,25,134,41,14,19,321,41,1*77<CR><LF>
```

Field	Name	Example	Description
1	Number of message	4	Total number of GSV messages to be transmitted (1-5)
2	Sequence number	1	Sequence number of current GSV message
3	Satellites in view	15	Total number of satellites in view (00 ~ 20)
4	Satellite ID	10	01 ~ 32 are for GPS; 33 ~ 64 are for WAAS (PRN minus 87); 193 ~ 197 are for QZSS; 65 ~ 88 are for GLONASS (GL PRN) ; 01 ~ 36 are for GALILEO (GA PRN); 01 ~ 37 are for BDS (BD PRN). GPS, GLONASS, GALILEO and BDS satellites are differentiated by the GNSS system ID in table 3. Maximally 4 satellites are included in each GSV sentence.
5	Elevation	79	Satellite elevation in degrees, (00 ~ 90)
6	Azimuth	250	Satellite azimuth angle in degrees, (000 ~ 359 )
7	SNR	50	C/No in dB (00 ~ 99) Null when not tracking
8	GNSS System ID	1	Signal ID*
9	Checksum	67	

\*GNSS Signal ID identifies the GNSS signal name according to Table 3.



**RMC – Recommended Minimum Specific GNSS Data**

Time, date, position, course and speed data provided by a GNSS navigation receiver.

Structure:

\$GNRMC,hhmmss.sss,A,dddmm.mmmmm,a,dddmm.mmmmm,a,x.x,x.x,ddmmyy,,,a,a\*hh<CR><LF>  
                   1      2          3          4          5          6  7  8      9      101112

Example:

\$GNRMC,052315.000,A,2447.09094,N,12100.52369,E,000.0,169.9,261219,,,D,V\*0F<CR><LF>

Field	Name	Example	Description
1	UTC time	052315.000	UTC time in hhmmss.sss format (000000.00 ~ 235959.999)
2	Status	A	Status 'V' = Navigation receiver warning 'A' = Data Valid
3	Latitude	2447.09094	Latitude in dddmm.mmmmm format Leading zeros transmitted
4	N/S indicator	N	Latitude hemisphere indicator 'N' = North 'S' = South
5	Longitude	12100.52369	Longitude in dddmm.mmmmm format Leading zeros transmitted
6	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
7	Speed over ground	000.0	Speed over ground in knots (000.0 ~ 999.9)
8	Course over ground	169.9	Course over ground in degrees (000.0 ~ 359.9)
9	UTC Date	261219	UTC date of position fix, ddmmyy format
10	Mode indicator	D	Mode indicator 'A' = Autonomous mode 'D' = Differential mode 'E' = Estimated (dead reckoning) mode 'F' = Float RTK. Satellite system used in RTK mode, floating integers 'M' = Manual Input Mode 'N' = Data not valid 'P' = Precise 'R' = Real Time Kinematic. System used in RTK mode with fixed integers 'S' = Simulator Mode
11	Navigation status		Navigation status indicator according to IEC61108 requirement on 'Navigational (or Failure) warnings and status indicators'. 'S' = Safe 'C' = Caution 'U' = Unsafe 'V' = Navigation status not valid, equipment is not providing navigation status indicator.
12	checksum	0F	

**VTG – Course Over Ground and Ground Speed**

The actual course and speed relative to the ground.

Structure:

GNVTG,x.x,T,,M,x.x,N,x.x,K,a\*hh<CR><LF>  
 1 2 3 4 5

Example:

\$GNVTG,169.9,T,,M,000.0,N,000.0,K,D\*11<CR><LF>

Field	Name	Example	Description
1	Course	169.9	True course over ground in degrees (000.0 ~ 359.9)
2	Speed	000.0	Speed over ground in knots (000.0 ~ 999.9)
3	Speed	000.0	Speed over ground in kilometers per hour (000.0 ~ 1800.0)
4	Mode	D	Mode indicator 'A' = Autonomous mode 'D' = Differential mode 'E' = Estimated (dead reckoning) mode 'M' = Manual input mode 'N' = Data not valid 'P' = Precise 'S' = Simulator mode
5	Checksum	11	

**ZDA – TIME AND DATE**

UTC, day, month, year and local time zone

Structure:

\$GNZDA,hhmmss.sss,xx,xx,xxxx,xx,xx\*hh<CR><LF>  
 1 2 3 4 5 6 7

Example:

\$GNZDA,052315.000,26,12,2019,00,00\*45<CR><LF>

Field	Name	Example	Units	Description
1	UTC time	052315.000		UTC time in hhmmss.sss format (000000.00 ~ 235959.999)
2	UTC Day	26		UTC time: day (01 ~ 31)
3	UTC Month	12		UTC time: month (01 ~ 12)
4	UTC Year	209		UTC time: year (4 digit format)
5	Local zone hour	00		Local zone hours (00 ~ +/- 13)
6	Local zone minutes	00		Local zone minutes (00 ~59)
7	Checksum	45		Checksum

**STI,008 – ECEF Coordinate Position and Velocity**

ECEF coordinate position and velocity of a GNSS navigation receiver.

Structure:

```
$PSTI,008,hhmmss.ssssss,A,x.x,x.x,x.x,x.x,x.x,x.x*x*hh<CR><LF>
  1  2  3  4  5  6  7  8  9
```

Example:

```
$PSTI,008,111507.600452,A,-2984963.81,4966115.02,2657516.21,0.04,0.03,0.04*42<CR><LF>
```

Field	Name	Example	Description
1	UTC time	111507.600452	UTC time in hhmmss.ssssss format (000000.0000000 ~ 235959.9999999)
2	Status	A	Status 'V' = Navigation receiver warning 'A' = Data Valid
3	ECEF-X	-2984963.81	ECEF X coordinate Unit in meter
4	ECEF-Y	4966115.02	ECEF X coordinate Unit in meter
5	ECEF-Z	2657516.21	ECEF X coordinate Unit in meter
6	ECEF-VX	0.04	ECEF X Veolcity Unit in m/s
7	ECEF-VY	0.03	ECEF Y Veolcity Unit in m/s
8	ECEF-VZ	0.04	'ECEF Z Veolcity Unit in m/s
9	Checksum	42	

## Raw Measurement Binary Interface Description

Please see application note AN0039

**ORDERING INFORMATION**

<b>Model Name</b>	<b>Description</b>
ORION D17	L1 High Dynamics GPS/GLONASS/Galileo/Beidou/QZSS Receiver

## Revision History

Revision	Date	Description
1	September 11, 2024	Initial release
2	March 06, 2025	Update baudrate

The information provided is believed to be accurate and reliable. These materials are provided to customers and may be used for informational purposes only. No responsibility is assumed for errors or omissions in these materials, or for its use. Changes to specification can occur at any time without notice.

These materials are provided "as is" without warranty of any kind, either expressed or implied, relating to sale and/or use including liability or warranties relating to fitness for a particular purpose, consequential or incidental damages, merchantability, or infringement of any patent, copyright or other intellectual property right. No warrant on the accuracy or completeness of the information, text, graphics or other items contained within these materials. No liability assumed for any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of these materials.

The product is not intended for use in medical, life-support devices, or applications involving potential risk of death, personal injury, or severe property damage in case of failure of the product.