OneDot Protocol

Abstract

This document defines the data input and output protocols for the OneDot product.

Revision History

Version	Date	Description
1	2022.09	OneDot protocol version-1
2	2022.12	Added a field for static
3	2023.02	Added configuration for customized 100 Hz attitude output
4	2023.11	Added baud rate configuration

Contents

1 Input Messages

1.1 Common Configuration Commands

All input configuration commands use decimal format

- Restore Factory Settings

Factory Default: 50 42 E0 01 00 01 01 00

- Query Firmware Version

Query Version: 50 42 E3 01 00 00 00 00

- Output Rate – 1Hz by default

1Hz: 50 42 E4 01 00 80 80 00

10Hz: 50 42 E4 01 00 81 81 00

20Hz: 50 42 E4 01 00 82 82 00

50Hz: 50 42 E4 01 00 83 83 00

100Hz: 50 42 E4 01 00 83 83 00

- Debug Messages

Disable: 50 42 E7 01 00 81 81 00

Enable: 50 42 E7 01 00 80 80 00

- Baud Rate – 230400 by default

115200: 50 42 EA 01 00 80 80 00

230400: 50 42 EA 01 00 84 84 00

Note: Data rates greater than or equal to 50 Hz require 230400 baud rate.

1.2 User-Provided Heading Input

The module by default provides relative 3D attitude, with the power-on heading set to 0°. When external heading input is available, it can provide an absolute heading angle. There is no fixed frequency requirement for external heading input.

Input protocol follows the format: $SETHDT,86.844,END$

The heading value can have 1 to 3 decimal places. When the heading angle is not empty, it is considered a valid input heading.

2 Output Data

The output data includes a checksum, with the checksum character separated from the preceding data by *. The checksum is calculated as the XOR of all characters from $ up to (but not including) *, expressed in hexadecimal, as shown below.

Figure 3.1 Checksum Algorithm

```
void NMEACheckSum(char *pBuf)
{
   unsigned char ckSum = 0;

   pBuf++; /* skip the $ sign */

   while (*pBuf != '\0')
   {
      ckSum ^= *pBuf++;
   }
}
```

2.1 ASCII Output

2.1.1 Attitude and Status -- $PBATT,1

1Hz by default

Note: The byte count in ASCII output is for reference only and can be ignored

Field	***Type***	***Description***
Data ID	String	$PBATT
Data Sub-ID	Integer	1: Combined output
Timestamp	Integer	Sensor timestamp, in milliseconds
Valid Flag	Integer	0: Invalid output; 1: Valid output
Attitude Mode	Integer	Bit settings: 0x00: Attitude result invalid Bit 0: Roll & Pitch valid if set to 1 Bit 1: Heading valid if set to 1 Bit 2: Absolute heading if set to 1; Relative heading (0° at power-on) if not set Other bits: Reserved
Roll Angle	Integer	Unit: degrees ×100; positive when rotating clockwise around the longitudinal axis
Pitch Angle	Integer	Unit: degrees ×100; positive when rotating clockwise around the lateral axis
Heading Angle	Integer	Unit: degrees ×100; positive when rotating clockwise around the vertical axis

Roll Angle Est. Error	Integer	Unit: degrees ×100
Pitch Angle Est. Error	Integer	Unit: degrees ×100
Heading Angle Est. Error	Integer	Unit: degrees ×100
Static Flag	Integer	0: Dynamic; 1: Static
Linear Motion Factor	Integer	Dimensionless; larger values indicate higher linear velocity
Vibration Frequency	Integer	Unit: Hz ×100
Vibration Confidence	Integer	0: Unknown; 1: Normal; 2: Strong; 3: Very strong
Collision Flag	Integer	0: Normal; 1: Collision detected
Collision Level	Integer	0: None; 1: Medium; 2: High; 3: Severe
Burst Motion State	Integer	Bit settings: 00x00: Steady state Bit 0: Sudden acceleration/deceleration Bit 1: Sharp turn Bit 2: Rollover/fall Bit 3: Drop
Reserved [4]	Integer	Undefined; reserved fields (4 total)
Checksum	*Hex	Value after * is the checksum

2.1.2 IMU sensor data-- $PSNSR,23

Field	Type	Description
Data ID	String	$PSNSR
Data Sub-ID	Integer	23
Timestamp	Integer	Unit: milliseconds
Gyroscope X	Integer	Unit: deg/s ×1000
Gyroscope Y	Integer	Unit: deg/s ×1000
Gyroscope Z	Integer	Unit: deg/s ×1000
Accelerometer X	Integer	Unit: m/s² ×1000
Accelerometer Y	Integer	Unit: m/s² ×1000
Accelerometer Z	Integer	Unit: m/s² ×1000
Checksum	*Hex	Value after * is the checksum

2.1.3 Debug Data – $PSNSR,21

for debug only

2.1.4 Debug Data – $PBLKEND

For debug only

2.2 Binary Output Format