Customer Code :

# DATASHEET

DAPU P/N: **CC107C-D128-10.00MHz**

Customer P/N: _____

| DAPU | | | Customer Approval |
|---|---|---|---|
| Drew | Audited | Approved | |
| Amway.wei | Tony · Wang | James.Liu | |
| Date: 2018.4.2 | | | Stamp, please! Thanks! |


## Guangdong Dapu Telecom TechnologyCo.,Ltd

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**Table of amendment**

| Version | Revision contents | Prepared by | Revised date |
|---|---|---|---|
| 1.0 | The first issued | Chen Jian | 2018.1.30 |
| 1.1 | Added Section 7ROHS-6<br>Added Section 8 Package<br>Added Software Description | Chen Jian | 2018.3.12 |
| 1.2 | Changed Section 4 Electrical Characteristics：<br>Interrupt High: Passive<br>Low: Active | Chen Jian | 2018.4.2 |
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# 1 Description

The CC107C-D128-10.00MHz is a high holdover performance, high integration clock module with advanced compensation algorithm. It can achieve better than 1E-12 frequency stability and ±1.5us holdover capability over 24 hours.

The CC107C-D128-10.00MHz provides messages to improve the reliability and maintainability of the network.

The CC107C-D128-10.00MHz has a built-in GNSS Receiver as the timing reference.

# 2 Features

- Built-in GNSS receiver, GPS/GLONASS/BeiDou/QZSS supported.
- Timing accuracy ≤20ns.
- Better than 1.5us over 24hour@±5℃ variation without SyncE.
- Reference clock could be derived from GNSS or configured as SyncE.
- Firmware could be updated remotely.
- Operation temperature -40ºC~85ºC.

# 3 Pin Definition

## 3.1 SMA Connector

A SMA-KWE connector is placed on the top of the PCB for GNSS RF input.

## 3.2 Connector between Timing Card and PTP Card

A connector, 61083-064402LF, is the interface between the clock card and main board, placed on the bottom of the PCB. The pin definition of the connector is as table 1.

| PIN | ROW1 | I/O | ROW2 | I/O | PIN |
|---|---|---|---|---|---|
| 1 | VCC5V0 | I | VCC5V0 | I | 2 |
| 3 | GND | - | GND | - | 4 |
| 5 | 1PPS_OUT | O | VCC5V0 | I | 6 |
| 7 | TOD_OUT | O | GND | - | 8 |
| 9 | GND | - | INT | O | 10 |
| 11 | GND | - | RESERVED3 | I/O | 12 |
| 13 | TXD1 | O | GND | - | 14 |
| 15 | TXD2 | O | GND | - | 16 |
| 17 | GND | - | RXD1 | I | 18 |
| 19 | GND | - | RXD2 | I | 20 |
| 21 | 10M-1 | O | GND | - | 22 |

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| | | | | | |
|---|---|---|---|---|---|
| 23 | GND | - | GND | - | 24 |
| 25 | GND | - | SYNCE CLOCK | I | 26 |
| 27 | GND | - | GND | - | 28 |
| 29 | LOCK | O | 10M-2 | O | 30 |
| 31 | LOCK_DISABLE/ENABLE | I | GND | - | 32 |
| 33 | GND | - | TIMING_CARD_TYPE | O | 34 |
| 35 | GND | - | TIMING_ONLINE | O | 36 |
| 37 | NC | I | GND | - | 38 |
| 39 | NC | I | GND | - | 40 |
| 41 | GND | - | NC | I | 42 |
| 43 | GND | - | NC | I | 44 |
| 45 | NC | I | GND | - | 46 |
| 47 | NC | I | GND | - | 48 |
| 49 | GND | - | NC | O | 50 |
| 51 | GND | - | NC | O | 52 |
| 53 | RESET | I | GND | - | 54 |
| 55 | RESERVED1 | I/O | RESERVED2 | I/O | 56 |
| 57 | GND | - | GND | - | 58 |
| 59 | VCC5V0 | I | VCC5V0 | I | 60 |

**Table 1 Pin Definition of Connector CN1**

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## 4 Electrical Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| GNNS Timing Modules Input | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
| | Connector | SMA-KWE | | | | |
| | | | | | | |
| Supply Voltage | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
| | Supply Voltage | 4.75 | 5.0 | 5.25 | V | |
| | Current Consumption | | | 3000 | mA | |
| | Steady Consumption | | 900 | | mA | During steady state operation @25℃ |
| | Connector | Refer to Table 1 | | | | |
| | | | | | | |
| 1 PPS Output | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
| | Waveform | HCMOS | | | | |
| | High-Level Output Voltage ($V_{OH}$) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Pulse Width | 0.1 | 100 | 400 | ms | |
| | Phase Accuracy | -20 | | 20 | ns | |
| | Connector | Refer to Table 1 | | | | |
| | | | | | | |
| TOD | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
| | Waveform | HCMOS | | | | |
| | High-Level Output Voltage ($V_{OH}$) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Connector | Refer to Table 1 | | | | |
| | | | | | | |
| 10MHz Output | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
| | Waveform | HCMOS | | | | |
| | High-Level Output Voltage ($V_{OH}$) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | Duty Cycle | 45 | 50 | 55 | % | |
| | Connector | Refer to Table 1 | | | | |

| Serial Interfaces | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
|---|---|---|---|---|---|---|
| | Rx High-Level Input Voltage (VH ) | 2.7 | | | V | |
| | Rx Low-Level Input Voltage (VL) | | | 0.4 | V | |
| | Tx High-level Output Voltage(VH ) | 2.7 | | | V | |
| | Tx Low-Level Output Voltage (VL) | | | 0.4 | V | |
| | Serial Protocol | 115200-N-8-1 | | | | |
| | Connector | Refer to Table 1 | | | | |

| Interrupt | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
|---|---|---|---|---|---|---|
| | High-Level Output Voltage ($V_{OH}$ ) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Signal Indication | High: Passive<br>Low: Active | | | | |
| | Connector | Refer to Table 1 | | | | |

| Timing Card Online | Parameters | Min. | Typ. | Max. | Unit. | Test Condition |
|---|---|---|---|---|---|---|
| | High-Level Output Voltage ($V_{OH}$ ) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Signal Indication | High: Absent<br>Low: Present | | | | |
| | Connector | Refer to Table 1 | | | | |

| Reset | Parameters | Min. | Typ. | Max. | Unit. | |
|---|---|---|---|---|---|---|
| | High-Level Output Voltage ($V_{OH}$ ) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Signal Indication | Low: Active | | | | |
| | Connector | Refer to Table 1 | | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Lock Signal Output | Parameters | Min. | Typ. | Max | Unit. | Test Condition |
| | High-Level Output Voltage ($V_{OH}$) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Connector | Refer to Table 1 | | | | |
| | | | | | | |
| Lock Disable/Enable Signal Input | Parameters | Min. | Typ. | Max | Unit. | |
| | High-Level Output Voltage ($V_{OH}$) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Signal indication | High: Lock Enable<br>Low: Lock Disable | | | | |
| | Connector | Refer to Table 1 | | | | |
| | | | | | | |
| Timing Card Type Signal Output | Parameters | Min. | Typ. | Max | Unit. | |
| | High-Level Output Voltage ($V_{OH}$) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Signal Indication | High: Timing Processing Card<br>Low: Timing Card | | | | |
| | Connector | Refer to Table 1 | | | | |
| | | | | | | |
| SyncE Clock Signal Input | Parameters | Min. | Typ. | Max | Unit. | |
| | High-Level output Voltage ($V_{OH}$) | 2.7 | | | V | |
| | Low-Level Output Voltage ($V_{OL}$) | | | 0.4 | V | |
| | Frequency | 10MHz | | | | |
| | Connector | Refer to Table 1 | | | | |
| | | | | | | |
| Power LED Indication | Parameters | Description | | | | |
| | Color | Green | | | | |
| | Status | OFF: The system 5V power off<br>ON : The system 5V power on | | | | |
| | PCB Silk-screen | D2 | | | | |
| | | | | | | |
| Clock LED Indication | Parameters | Description | | | | |
| | Color | Green | | | | |

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| | | |
|---|---|---|
| | Status | OFF: Free Run<br>ON: Hold Over<br>Once per second: Locked<br>Three times per second: Fast Capture |
| | PCB Silk-screen | D3 |

**Table 2 Electrical Characteristics**

# 5 Software Description

The CC107C-D128-10.00MHz is customized for UTStarcom, has a UART interface to communicate with the main board. The protocol and message follow "GM30 Software Interface Specification" from UTStarcom**.**

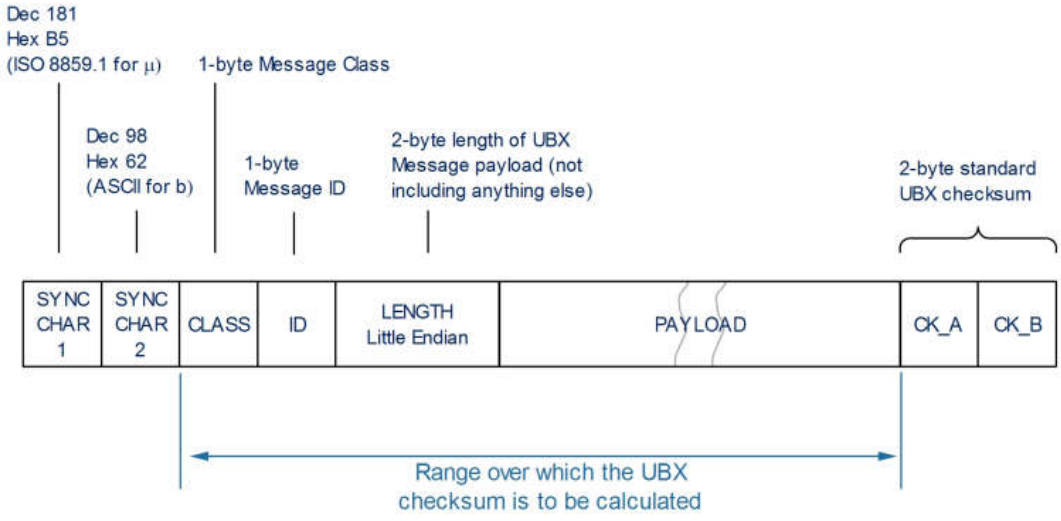
## 5.1 Timing Card Protocol Key Features

Timing Card supports a UBX proprietary protocol to communicate with a host computer. This protocol has the following key features:

• Compact - uses 8-bit Binary Data.
• Checksum Protected - uses a low-overhead checksum algorithm
• Modular - uses a 2-stage message identifier (Class and Message ID)

## 5.2 UBX Frame Structure

The structure of a basic UBX Frame is shown in the following diagram.

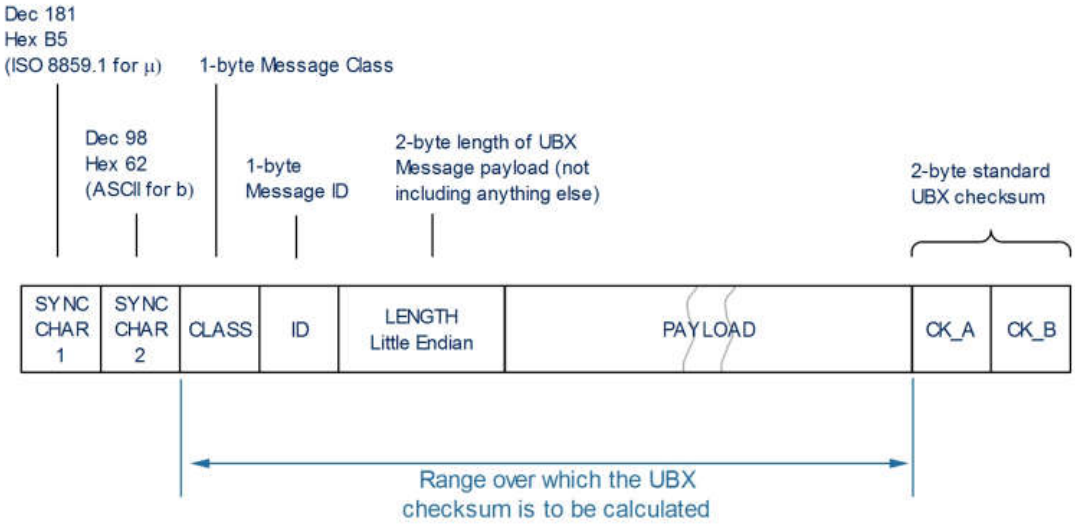



• Every Frame starts with a 2-byte Preamble consisting of two synchronization characters: 0xB5 0x62.
• A 1-byte Message Class field follows. A Class is a group of messages that are related to each other.
• A 1-byte Message ID field defines the message that is to follow.
• A 2-byte Length field follows. The length is defined as being that of the payload only. It does not include the Preamble, Message Class, Message ID, Length, or CRC fields. The number format of the length field is

a Little-Endian unsigned 16-bit integer.
• The Payload field contains a variable number of bytes.
• The two 1-byte CK_A and CK_B fields hold a 16-bit checksum whose calculation is defined below. This concludes the Frame.

### 5.3 UBX Checksum

The checksum is calculated over the Message, starting and including the CLASS field, up until, but excluding, the Checksum Field:




The checksum algorithm used is the 8-Bit Fletcher Algorithm, which is used in the TCP standard (RFC 1145).This algorithm works as follows: Buffer[N] contains the data over which the checksum is to be calculated. The two CK_ values are 8-Bit unsigned integers, only! If implementing with larger-sized integer values, make sure to mask both CK_A and CK_B with 0xFF after both operations in the loop.

```
CK_A = 0, CK_B = 0
For(I=0;I<N;I++)
{
    CK_A = CK_A + Buffer[I]
    CK_B = CK_B + CK_A
}
```

After the loop, the two U1 values contain the checksum, transmitted after the Message, which conclude the Frame.

### 5.4 UBX Message Flow

There are certain features associated with the messages being sent back and forth.

**a) Acknowledgement**

When messages from the class CFG are sent to the receiver, the receiver will send an "acknowledge" (ACK-ACK) or a "not acknowledge" (ACK-NAK) message back to the sender, depending on whether or not the message was processed correctly. Some messages from other classes (e.g. LOG) also use the same acknowledgement mechanism.

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**b) Polling Mechanism**

All messages that are output by the receiver in a periodic manner (i.e. messages in classes MON, NAV and RXM) can also be polled. The UBX protocol is designed so that messages can be polled by sending the message required to the receiver but without a payload (or with just a single parameter that identifies the poll request). The receiver then responds with the same message with the payload populated.

## 5.5 UBX Class IDs

The following table lists are supported. A class is a grouping of messages which are related to each other. There are two category of classes, one category of classes are used to forward by timing processing card, another category of classes are used to process by timing processing card and PTP module ,this category is user-defined. Two category of classes are defined as forwarding category and non-forwarding category

| Name | Class Id | Description |
|---|---|---|
| Forwarding Category | | |
| NAV | 0x01 | Navigation Results Messages: Position, Speed, Time, Acceleration, Heading, DOP, SVs used |
| RXM | 0x02 | Receiver Manager Messages: Satellite Status, RTC Status |
| INF | 0x04 | Information Messages: Printf-Style Messages, with IDs such as Error, Warning, Notice |
| ACK | 0x05 | ACK/NACK Messages: Acknowledge or Reject messages to CFG input messages |
| CFG | 0x06 | Configuration Input Messages: Set Dynamic Model, Set DOP Mask, Set Baud Rate, etc. |
| UPD | 0x09 | Firmware Update Messages: Memory/Flash erase/write, Reboot, Flash identification, etc. |
| MON | 0x0A | Monitoring Messages: Communication Status, CPU Load, Stack Usage, Task Status |
| AID | 0x0B | Assist Now Aiding Messages: Ephemeris, Almanac, other A-GPS data input |
| TIM | 0x0D | Timing Messages: Time Pulse Output, Time Mark Results |
| ESF | 0x10 | External Sensor Fusion Messages: External Sensor Measurements and Status Information |
| MGA | 0x13 | Multiple GNSS Assistance Messages: Assistance data for various GNSS |
| LOG | 0x21 | Logging Messages: Log creation, deletion, info and retrieval |
| SEC | 0x27 | Security Feature Messages |
| HNR | 0x28 | High Rate Navigation Results Messages: High rate time, position, speed, heading |
| Non-forwarding Category | | |
| SACK | 0x59 | ACK/NACK Messages: Acknowledge or Reject messages to System CFG input messages |
| SCFG | 0x5A | System Configuration Input Messages: Set GNSS receiver |

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| | | |
|---|---|---|
| | | Model, Set Baud Rate, Set TOD Model, etc. |
| SUPD | 0x60 | Timing processing card Software Update Messages: Memory/Flash erase/write, Reboot, Flash identification, etc. |
| FUPD | 0x61 | GNSS receiver Firmware Update Messages: Memory/Flash erase/write, Flash identification, etc. |
| SLOG | 0x63 | System Logging Messages: Log creation, deletion, info and retrieval |
| STA | 0x65 | State Messages: Working State, Clock state, TOD state, etc. |

## 5.6 TCD-ACK (0x59)

### TCD-ACK-ACK (0x59 0x01)

| *Message* | **ACK-ACK** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Message Acknowledged** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Output | | | | | |
| *Comment* | Output upon processing of an input message | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x59 | 0x01 | *2* | *See below* | CK_A CK_B |

*Payload Contents:*

| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* |
|---|---|---|---|---|---|
| *0* | U1 | - | clsID | - | Class ID of the Not-Acknowledged Message |
| *1* | U1 | - | msgID | - | Message ID of the Not-Acknowledged Message |

### TCD-ACK-NACK (0x59 0x00)

| *Message* | **ACK-NACK** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Message Acknowledged** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Output | | | | | |
| *Comment* | Output upon processing of an input message | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x59 | 0x00 | *2* | *See below* | CK_A CK_B |

*Payload Contents:*

| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* |
|---|---|---|---|---|---|
| *0* | U1 | - | clsID | - | Class ID of the Not-Acknowledged Message |
| *1* | U1 | - | msgID | - | Message ID of the Not-Acknowledged Message |

## 5.7 TCD-STA (0x65)

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**TCD-STA-CLK (0x65 0x01)**

| *Message* | **STA-CLK** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Clock Status** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Get | | | | | |
| *Comment* | Output the status of timing card | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x65 | 0x01 | *2* | *See below* | CK_A CK_B |

*Payload Contents:*

| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* |
|---|---|---|---|---|---|
| 0 | U1 | - | clkState | - | Clock state:<br>0=fast capturing, 1=1ocked,<br>2=holdover, 3=free run. |
| 1 | U1 | - | clkSource | - | Clock source:<br>0= SyncE, 1=GNSS. |

**TCD-STA-ALM (0x65 0x02)**

| *Message* | **STA-ALM** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Clock Alarm** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Get | | | | | |
| *Comment* | Output the alarm information | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x65 | 0x02 | 1 | *See below* | CK_A CK_B |

*Payload Contents:*

| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* |
|---|---|---|---|---|---|
| 0 | X1 | - | clkAlarm | - | One bit mask, indicating clock alarm. |

| *Bitfield in clkAlarm* | *Name* | *Description* |
|---|---|---|
| *BIT0* | GnssReciverOffline | 1=alarm on,0=alarm off |
| *BIT1* | AntInterference | 1=alarm on,0=alarm off |
| *BIT2* | LossPPS | 1=alarm on,0=alarm off |
| *BIT3* | LossGNSSsignal | 1=alarm on,0=alarm off |
| *BIT4* | DegGNSS signal | 1=alarm on,0=alarm off |
| *BIT5* | CLKPLLHold | 1=alarm on,0=alarm off |
| *BIT6* | CLKPLLFreerun | 1=alarm on,0=alarm off |

| | | |
|---|---|---|
| *BIT7* | CLKPLLFastcap | 1=alarm on,0=alarm off |

**TCD-STA-PER (0x65 0x03)**

| | | | | | | |
|---|---|---|---|---|---|---|
| *Message* | **STA-PER** | | | | | |
| *Description* | **Performance Status** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Get | | | | | |
| *Comment* | Output temperature / time error information | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x65 | 0x03 | 1 | *See below* | CK_A CK_B |

*Payload Contents:*

| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* |
|---|---|---|---|---|---|
| 0 | I4 | - | ReveiverTempMax | ℃ | reveivermaximum temperature |
| 4 | I4 | | ReveiverTempCur | ℃ | reveiver current temperature |
| 8 | I4 | | ReveiverTempMin | ℃ | reveiverminimum temperature |
| 12 | I4 | | TimingTempMax | ℃ | Timing Card maximum temperature |
| 16 | I4 | | TimingTempCur | ℃ | Timing Card current temperature |
| 20 | I4 | | TimingTempMin | ℃ | Timing Card minimum temperature |
| 24 | I4 | | TIE_Max | ns | Timing Card maximum time error vs GNSS |
| 28 | I4 | | TIE_Cur | ns | Timing Card current time error vs GNSS |
| 32 | I4 | | TIE_Min | ns | Timing Card minimum time error vs GNSS |

**TCD-STA-INV (0x65 0x04)**

| | | | | | | |
|---|---|---|---|---|---|---|
| *Message* | **STA-INV** | | | | | |
| *Description* | **Inventory Information** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Get | | | | | |
| *Comment* | Output the timing card version information | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x65 | 0x04 | 152 | *See below* | CK_A CK_B |

*Payload Contents:*

| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* |
|---|---|---|---|---|---|

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| | | | | | |
|---|---|---|---|---|---|
| 0 | String(size:30Bytes) | - | Module Name | - | NAME: Manufactory ID |
| 30 | String(size:10Bytes) | | FAC | - | FAC: Manufacture Factory Information |
| 40 | String(size:16Bytes) | | Serial Number | - | SN: Serial No. |
| 56 | String(size:32Bytes) | | HWVersion | - | VER: Hardware Version |
| 88 | String(size:32Bytes) | | FWVersion | - | VER: Firmware Version |
| 120 | String(size:32Bytes) | | SWVersion | - | VER: Software Version |

**TCD-STA-RST (0x65 0x06)**

| *Message* | **STA-RST** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Reset Timing Card** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Set | | | | | |
| *Comment* | Software reset timing card | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x65 | 0x06 | 0 | -- | CK_A CK_B |
| *Payload Contents:* | | | | | | |

## 5.8 TCD-SCFG (0x5A)

**TCD-SCFG-PAR (0x5A 0x01)**

| *Message* | **SCFG-PAR** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Configure frequency protection mode** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Set | | | | | |
| *Comment* | Set frequency to protection mode / non protection mode | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x5A | 0x01 | 4 | *See below* | CK_A CK_B |
| *Payload Contents:* | | | | | | |
| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* | |
| 0 | U1 | - | FreMode | - | Frequency protection mode:<br>0: non protection mode | |

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| | | | | | |
|---|---|---|---|---|---|
| | | | | | 1: protection mode |
| 1 | U2 | | wtr | S | wait time to restore |
| 3 | U1 | | FreSource | | Frequency source:<br>0: frequency from GNSS<br>1:frequency from SyncE |

**TCD- SCFG-PULSE (0x5A 0x03)**

| *Message* | **TCD- SCFG-PULSE** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Configure 1PPS Time pulse duration** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Get/Set | | | | | |
| *Comment* | Set the 1PPS Time pulse duration | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x5A | 0x03 | 1 | *See below* | CK_A CK_B |

*Payload Contents:*

| *Byte Offset* | *Number Format* | *Scaling* | *Name* | *Unit* | *Description* |
|---|---|---|---|---|---|
| 0 | U1 | - | PULSE | - | 0：10ms; 1：20ms; 3：40ms; 4：60ms; 5：80ms; 6：100ms; 7：200ms; 8:400ms |

## 5.9 TCD-SUPD (0x60)

**TCD-SUPD-CPFL (0x60 0x06)**

| *Message* | **SUPD-CPFL** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Timing Card Update CPLD Firmware File** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Set | | | | | |
| *Comment* | Request update the firmware file of CPLD and erase flash | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x60 | 0x06 | 0 | -- | CK_A CK_B |
| *Payload Contents:* | | | | | | |

**Note:**
Waiting ACK and then using xmodem1024 protocol send CPLD firmware file to Timing card.

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**TCD-SUPD-CPLD (0x60 0x07)**

| *Message* | **SUPD-CPLD** | | | | | |
|---|---|---|---|---|---|---|
| *Description* | **Timing Card update CPLD firmware** | | | | | |
| *Firmware* | Supported on: version = "tc_r1.0" | | | | | |
| *Type* | Set | | | | | |
| *Comment* | Request update CPLD firmware, using new firmware file | | | | | |
| *Message Structure* | *Header* | *Class* | *ID* | *Length (Bytes)* | *Payload* | *Checksum* |
| | 0xB5 0x62 | 0x60 | 0x07 | 0 | -- | CK_A CK_B |
| *Payload Contents:* | | | | | | |

## 5.10 BOOT-COMMAND

| *Command name* | *Command code* | *type* | *Description* |
|---|---|---|---|
| *Cmd1* | "E5C00F9FFU" | *string* | *Erase timing card firmware* |
| *Cmd2* | "\r\nshell?" | *string* | *Timing card in boot mode* |
| *Cmd3* | **"E5C00 F9FF..... .....\r\nshell?U@?"** | *string* | *Erase firmware finish ,waiting to receive new firmware* |

## 5.11 Firmware Update

**Timing Card firmware upgrade**

1、Send TCD-STA-RST (0x65 0x06) message.
2、Send *Cmd1*in 3 seconds after*Cmd2* is received.
3、Send firmware file to Timing Card after *Cmd3* is received.
4、After the update is finished, the Timing Card will reset.

**Timing Card CPLD firmware upgrade**

1、Send TCD-SUPD-CPFL (0x60 0x06) message, Timing Card will erase backup of CPLD, then send ACK.
2、Timing Card will send string 'C' waiting for firmware file.
3、Send CPLD file via xmodem1024 protocol.
4、Send TCD-SUPD-CPLD (0x60 0x07)message.

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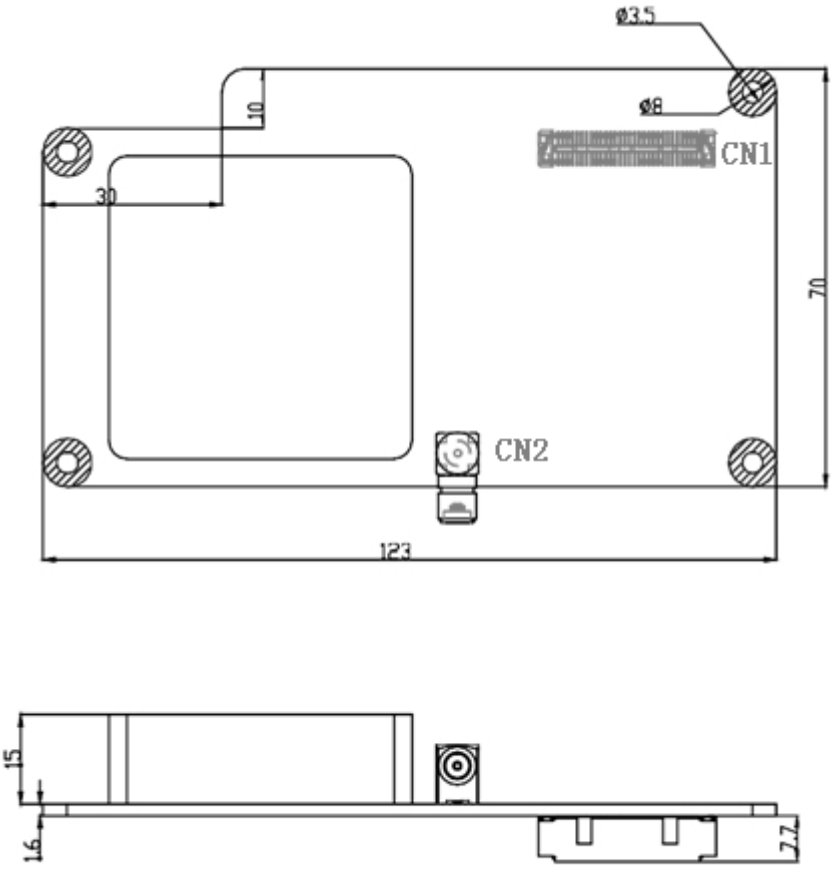
## 6 Mechanical Structure(mm)




**Note1:** Tolerance ± 1.0mm

## 7 ROHS-6

The CC107C-D128-10.00MHz meets the ROHS-6 requirements.

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## 8 Package(mm)