

Customer Code : \_\_\_\_\_

# DATASHEET

DAPU P/N: CC107C-D128-10.00MHz

Customer P/N: \_\_\_\_\_

DAPU			Customer Approval
Drew	Audited	Approved	Stamp, please! Thanks!
Date: 2018.6.9			

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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 7 ROHS-6 Added Section 8 Package Added Software Description	Chen Jian	2018.3.12
1.2	Changed Section 4 Electrical Characteristics: InterruptHigh: Passive Low: Active	Chen Jian	2018.4.2
1.3	Added GNSS firmware upgrade Description Added UBX-NAV-SAT Description	TengChengwang	2018.5.4
1.4	Added Performance Description Added Environmental Conditions Description	TengChengwang	2018.5.30
1.5	Added Lock-In Time Description	TengChengwang	2018.6.9



## 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  $\pm 1.5\mu s$  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/Galileo supported.
- Timing accuracy  $\leq 20ns$ .
- Better than  $1.5\mu s$  over 24 hours @  $\pm 5^\circ C$  variation without SyncE.
- Reference clock could be derived from GNSS or configured as SyncE.
- Firmware could be updated remotely.
- Operation temperature  $-40^\circ C \sim 85^\circ C$ .



### 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
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



#### 4 Electrical Characteristics

GNSS timing modulesInput	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 @25°C	
	Connector	Refer to Table 1					
1 PPS Output	Parameters	Min.	Typ.	Max.	Unit.	Test Condition	
	Waveform	HCMOS					
	High-Level Output Voltage(V <sub>OH</sub> )	2.7			V		
	Low-level Output voltage (V <sub>OL</sub> )			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 <sub>OH</sub> )	2.7			V		
	Low-level Output Voltage (V <sub>OL</sub> )			0.4	V		
	Connector	Refer to Table 1					
10MHz Output	Parameters	Min.	Typ.	Max.	Unit.	Test Condition	
	Waveform	HCMOS					
	High-Level Output Voltage(V <sub>OH</sub> )	2.7			V		
	Low-level Output Voltage (V <sub>OL</sub> )			0.4	V		



	Duty Cycle	45	50	55	%	
	Connector	Refer to Table 1				
Serial Interfaces	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	
	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 Low: Active				
	Connector	Refer to Table 1				
TimingCardOnline	Parameters	Min.	Typ.	Max.	Unit.	Test Condition
	High-LevelOutput Voltage( $V_{OH}$ )	2.7			V	
	Low-level Output voltage ( $V_{OL}$ )			0.4	V	
	Signal indication	High: Absent Low: Present				
	Connector	Refer to Table 1				
Reset	Parameters	Min.	Typ.	Max.	Unit.	
	High-LevelOutput Voltage( $V_{OH}$ )	2.7			V	
	Low-level Output voltage ( $V_{OL}$ )			0.4	V	
	Signal indication	High: Passive Low: Active				
	Connector	Refer to Table 1				
Lock Status	Parameters	Min.	Typ.	Max	Unit.	Test Condition
	High-Level Output	2.7			V	



	Voltage( $V_{OH}$ )					
	Low-level Output voltage ( $V_{OL}$ )			0.4	V	
	Connector	Refer to Table 1				
Lock Enable	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 Low: Lock Disable				
	Connector	Refer to Table 1				
Timing Card Type	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 Low: Timing Card				
	Connector	Refer to Table 1				
SyncE Clock 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 ON : The system 5V power on				
	PCB silk-screen	D2				
Clock LED Indication	Parameters	Description				
	Color	Green				
	Status	OFF: Free Run ON: Hold Over				



		Once per second: Locked Three times per second: Fast Capture				
PCB silk-screen		D3				
Performance	Parameters	Min.	Typ.	Max	Unit.	
	Warm-up Time			15	min	V <sub>C</sub> =5.0V@25°C
	Initial Frequency Tolerance	-0.05		+0.05	× 10 <sup>-6</sup>	T <sub>A</sub> =25°C V <sub>C</sub> =5.0V DAC=0x7FFF After warm-up is finished.
	Frequency Tolerance vs. Temperature	-0.02		+0.02	× 10 <sup>-9</sup>	V <sub>C</sub> =5.0V, temperature slope is less than 2°C per minute.
	Frequency Tolerance vs. Supply Voltage	-0.02		+0.02	× 10 <sup>-9</sup>	T <sub>A</sub> =25°C C <sub>load</sub> =15pF
	Aging Tolerance Per Day	-0.1		+0.1	× 10 <sup>-9</sup>	T <sub>A</sub> =25°C V <sub>C</sub> =5V
	Aging Tolerance 1 Year	-0.01		+0.01	× 10 <sup>-6</sup>	T <sub>A</sub> =25°C V <sub>C</sub> =5.0V after power on 30 days
	Lock-In Time			20	minute	T <sub>A</sub> =25°C V <sub>C</sub> =5.0V After warm-up is finished.
	Time Accuracy	-20		+20	ns	T <sub>A</sub> =25°C V <sub>C</sub> =5.0V An hour after locking to reference
	Holdover	-1.5		+1.5	us	Δ T = ± 5 °C , 24hours holdover after power on 7days and 2 days lock.
Phase Noise	Phase Noise	Min.	Typ.	Max	Unit.	
			-100	-90	dBc/Hz	1Hz
			-130	-120		10Hz





			-145	-135		100Hz
			-150	-145		1KHz
			-155	-150		10KHz
			-155	-150		100KHz
			-155	-150		1MHz

## 5 Environmental Characteristics

		Min.	Typ.	Max	Unit.	
Environmental Conditions	Operable Temperature	-40		+85	°C	
	Storage Temperature	-40		+85	°C	
	ESD Level	Human Body Model,class2: 2000V to 4000V; ANSI/ESDA/JEDEC JS-001-2010.				
		Machine Model,classB: 200V to 400V; ANSI/ESDA/JEDEC JS-001-2010.				
	Moisture Sensitivity Level	Level 2.				
	Vibration	Test Condition:0.75mm;acceleration:10g;10Hz~500Hz,one cycle per 30min,test 2 hours.(3 times for each direction X, Y, Z),IEC 68-2-06 Test Fc.				
	Shock	50g;11ms;half sine wave(3 times for each direction X,Y,Z),IEC 68-2-27 Test Ea/Severity 50A.				

## 6 Software Description

The CC107C-D128-10.00MHz is customized for UTStarcom,has a UART interface to communicate with themainboard.Theprotocoland message follow “GM30SoftwareInterfaceSpecification” from UTStarcom.

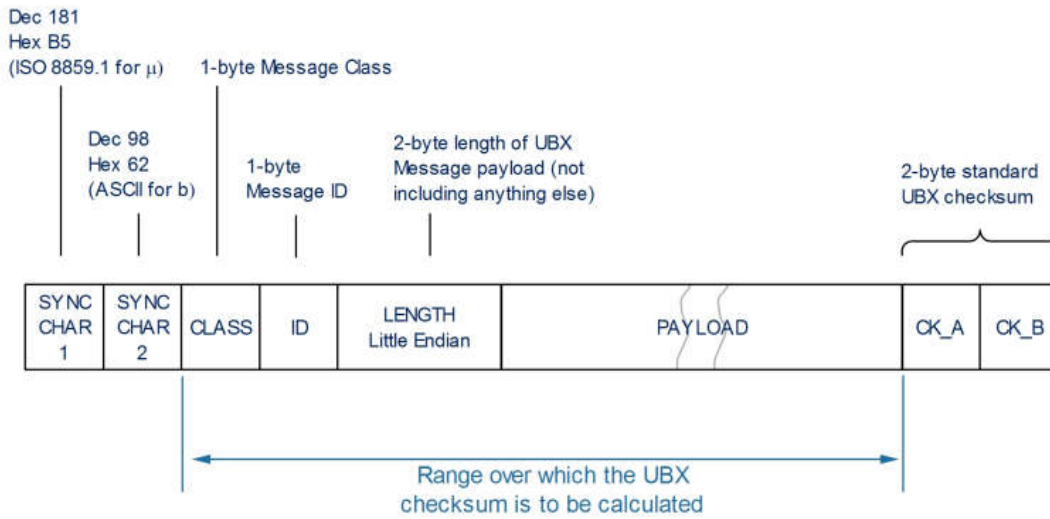
### 6.1 Timing Card Protocol Key Features

Timing Card support 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)

### 6.2 UBX Frame Structure

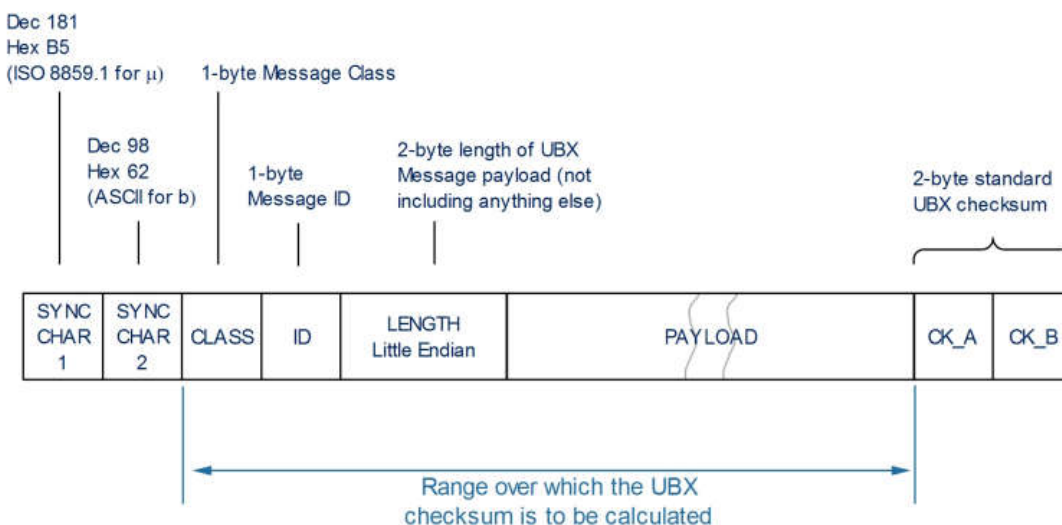
The structure of a basic UBX Frame is shown in the following diagram.



- 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.

### 6.3 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.

### 6.4 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.

#### 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.

### 6.5 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
<b>Forwarding Category</b>		
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/NAK 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	AssistNow 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 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.

## 6.6 TCD-ACK (0x59)

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

<i>Message</i>	<b>ACK-ACK</b>					
<i>Description</i>	<b>Message Acknowledged</b>					
<i>Firmware</i>	Supported on: version = "tc_r1.0"					
<i>Type</i>	Output					
<i>Comment</i>	Output upon processing of an input message					
<i>Message Structure</i>	<i>Header</i>	<i>Class</i>	<i>ID</i>	<i>Length (Bytes)</i>	<i>Payload</i>	<i>Checksum</i>
	0xB5 0x62	0x59	0x01	2	See below	CK_A CK_B
<i>Payload Contents:</i>						
<i>Byte</i>	<i>Number</i>	<i>Scaling</i>	<i>Name</i>	<i>Unit</i>	<i>Description</i>	



Offset	Format				
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	

**6.7 TCD-STA (0x65)****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: 0=fast capturing, 1=locked,	



					2=holdover, 3=free run.
1	U1	-	clkSource	-	Clock source: 0= SyncE, 1=GNSS.

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

<i>Message</i>	<b>STA-ALM</b>					
<i>Description</i>	<b>Clock Alarm</b>					
<i>Firmware</i>	Supported on: version = "tc_r1.0"					
<i>Type</i>	Get					
<i>Comment</i>	Output the alarm information					
<i>Message Structure</i>	<i>Header</i>	<i>Class</i>	<i>ID</i>	<i>Length (Bytes)</i>	<i>Payload</i>	<i>Checksum</i>
	0xB5 0x62	0x65	0x02	1	See below	CK_A CK_B
<i>Payload Contents:</i>						
<i>Byte Offset</i>	<i>Number Format</i>	<i>Scaling</i>	<i>Name</i>	<i>Unit</i>	<i>Description</i>	
0	X1	-	clkAlarm	-	One bit mask, indicating clock alarm.	

<i>Bitfield in clkAlarm</i>	<i>Name</i>	<i>Description</i>
<i>BIT0</i>	GnssReciverOffline	1=alarm on,0=alarm off
<i>BIT1</i>	AntInterference	1=alarm on,0=alarm off
<i>BIT2</i>	LossPPS	1=alarm on,0=alarm off
<i>BIT3</i>	LossGNSSsignal	1=alarm on,0=alarm off
<i>BIT4</i>	DegGNSS signal	1=alarm on,0=alarm off
<i>BIT5</i>	CLKPLLHold	1=alarm on,0=alarm off
<i>BIT6</i>	CLKPLLFreerun	1=alarm on,0=alarm off
<i>BIT7</i>	CLKPLLFastcap	1=alarm on,0=alarm off

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

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



Byte Offset	Number Format	Scaling	Name	Unit	Description
0	I4	-	ReveiverTempMax	°C	reveivermaximum temperature
4	I4		ReveiverTempCur	°C	reveiver current temperature
8	I4		ReveiverTempMin	°C	reveiverminimumtemperature
12	I4		TimingTempMax	°C	Timing Card maximum temperature
16	I4		TimingTempCur	°C	Timing Card current temperature
20	I4		TimingTempMin	°C	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	<b>STA-INV</b>					
Description	<b>Inventory Information</b>					
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	
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	<b>STA-RST</b>
Description	<b>Reset Timing Card</b>
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:						

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

Message	<b>SCFG-PAR</b>					
Description	<b>Configure frequency protection mode</b>					
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: 0: non protection mode 1: protection mode	
1	U2		wtr	S	wait time to restore	
3	U1		FreSource		Frequency source: 0: frequency from GNSS 1: frequency from SyncE	

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

Message	<b>TCD- SCFG-PULSE</b>					
Description	<b>Configure 1PPS Time pulse duration</b>					
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
<i>Payload Contents:</i>						
<i>Byte Offset</i>	<i>Number Format</i>	<i>Scaling</i>	<i>Name</i>	<i>Unit</i>	<i>Description</i>	
0	U1	-	PULSE	-	0: 10ms; 1: 20ms; 3: 40ms; 4: 60ms; 5: 80ms; 6: 100ms; 7: 200ms; 8:400ms	

## 6.9 TCD-SUPD (0x60)

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

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

**Note:**

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

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

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

**TCD-SUPD-GNSSF (0x60 0x08)**

<i>Message</i>	<b>SUPD-GNFL</b>					
<i>Description</i>	<b>Timing Card Update GNSS Firmware File</b>					
<i>Firmware</i>	Supported on:version = "tc_r1.1"					
<i>Type</i>	Set					
<i>Comment</i>	Request update the firmware file of GNSS and erase flash					
<i>Message Structure</i>	<i>Header</i>	<i>Class</i>	<i>ID</i>	<i>Length (Bytes)</i>	<i>Payload</i>	<i>Checksum</i>
	0xB5 0x62	0x60	0x08	0	--	CK_A CK_B
<i>Payload Contents:</i>						

**Note:**

Waiting ACK and then using xmodem1024 protocol send GNSS firmware file to Timing card.

**TCD-SUPD-GNSS (0x60 0x09)**

<i>Message</i>	<b>SUPD-GNSS</b>					
<i>Description</i>	<b>Timing Card update GNSS firmware</b>					
<i>Firmware</i>	Supported on:version = "tc_r1.1"					
<i>Type</i>	Set					
<i>Comment</i>	Request update GNSS firmware, using new firmware file					
<i>Message Structure</i>	<i>Header</i>	<i>Class</i>	<i>ID</i>	<i>Length (Bytes)</i>	<i>Payload</i>	<i>Checksum</i>
	0xB5 0x62	0x60	0x09	4	--	CK_A CK_B
<i>Payload Contents:</i>						
<i>Byte Offset</i>	<i>Number Format</i>	<i>Scaling</i>	<i>Name</i>	<i>Unit</i>	<i>Description</i>	
0	U4	--	FILE LEN	--	The length of GNSS firmware file	

**6.10 BOOT-COMMAND**

<i>Command name</i>	<i>Command code</i>	<i>type</i>	<i>Description</i>
<i>Cmd1</i>	"E006C00025BFFU"	<i>string</i>	Erase timing card firmware
<i>Cmd2</i>	"\r\nshell?"	<i>string</i>	Timing card in boot mode
<i>Cmd3</i>	"E 006C00"	<i>string</i>	Erase firmware



	025BFF..... ..... shell?U@?"	g	<i>finish ,waiting to  receive new  firmware</i>	
--	------------------------------------	---	--	--

## 6.11 Firmware Update

### Timing Card firmware upgrade

- 1、 SendTCD-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

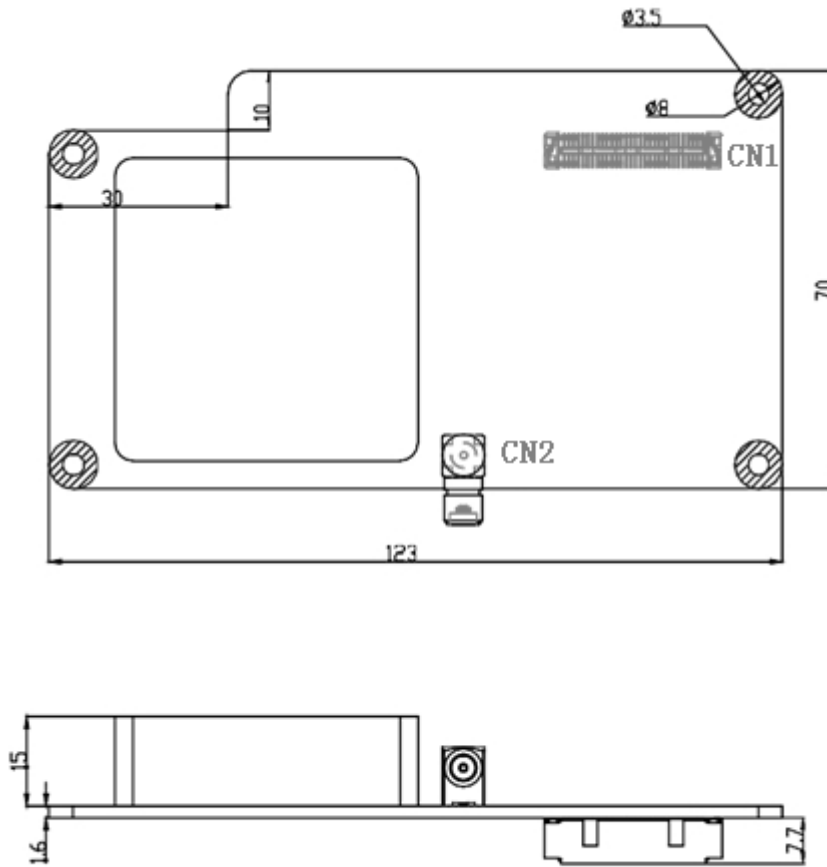
- 1、 SendTCD-SUPD-CPFL (0x60 0x06) message, Timing Card will erase backup of CPLD, then send ACK.
- 2、 Timing Card will send string 'C' waiting for firmware file.
- 3、 Send CPLD file via xmodem1024 protocol.
- 4、 Send TCD-SUPD-CPLD (0x60 0x07)message.

### Timing Card GNSS firmware upgrade

- 1、 SendTCD-SUPD-GNSSF (0x60 0x08) message, Timing Card will erase backup of GNSS, then send ACK.
- 2、 Timing Card will send string 'C' waiting for firmware file.
- 3、 Send GNSS file via xmodem1024 protocol.
- 4、 Send TCD-SUPD-GNSS (0x60 0x09)message.



## 7 Mechanical Structure(mm)



**Note1:** Tolerance  $\pm 1.0$ mm

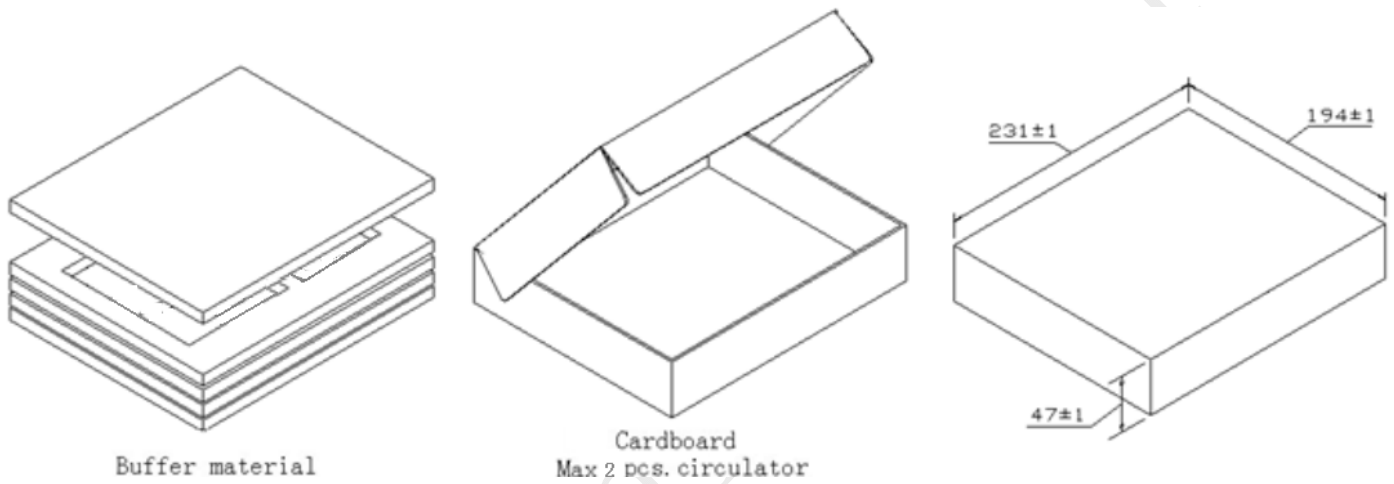


## 8 ROHS-6

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

- 1、Pd < 1000ppm.
- 2、Cd < 100ppm.
- 3、Hg < 1000ppm.
- 4、Cr+6 < 1000ppm.
- 5、PBBS < 1000ppm.
- 6、PBDEs < 1000ppm.

## 9 Package(mm)





## Appendix

### Satellite Information

<i>name</i>	<i>type</i>	<i>Description</i>
<i>numSvs</i>	U1	Currently tracked number of satellites
<i>gnssId</i>	U1	GNSS identifier assignment by UBX: 0 GPS 1 SBAS 2 Galileo 3 BeiDou 4 IMES 5 QZSS 6 GLONASS
<i>svId</i>	U1	Satellite identifier assignment by UBX: see( <a href="#">Satellite numbering table</a> )
<i>cno</i>	U1	Carrier to noise ratio (signal strength)
<i>PreRes</i>	I2	Pseudo range residual
<i>qualityInd</i>	Flags.bit2	Signal quality indicator: 0: no signal 1: searching signal 2: signal acquired 3: signal detected but unusable 4: code locked and time synchronized 5, 6, 7: code and carrier locked and time synchronized
<i>svUsed</i>	Flags.bit3	1 = SV is currently being used for navigation

### Satellite Numbering Table

<i>GNSS Type</i>	<i>SV range</i>	<i>UBX gnssId:svId</i>	<i>UBX svId</i>
GPS	G1-G32	0:1-32	1-32
SBAS	S120-S158	1:120-158	120-158
Galileo	E1-E36	2:1-36	211-246
BeiDou	B1-B37	3:1-37	159-163,33-64
IMES	I1-I10	4:1-10	173-182
QZSS	Q1-Q5	5:1-5	193-197
GLONASS	R1-R32, R?	6:1-32, 6:255	65-96, 255