

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

# DATASHEET

DAPU P/N: CM30B-X325-10.00MHz

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

| DAPU             |         |          | Customer Approval      |
|------------------|---------|----------|------------------------|
| Drew             | Audited | Approved | Stamp, please! Thanks! |
|                  |         |          |                        |
| Date: 2019.03.12 |         |          |                        |

## Guangdong Dapu Telecom Technology Co.,Ltd

Bldg 16,.N.Ind.Zone,SSL Industry Park, Dongguan City, Guangdong Province, China

TEL: 0086-0769-88010888 FAX: 0086-0769-81800098





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PRELIMINARY



## 1. General Description

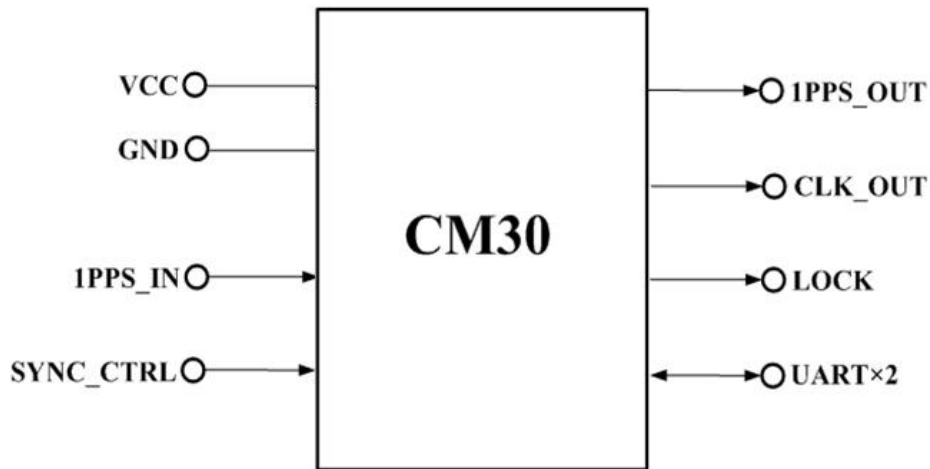


Figure 1 CM30

Figure 1 is the basic diagram of CM30. CM30 is a high-performance clock module designed to provide precise frequency and phase synchronizing with external time reference for telecom and other applications.

### Key features:

- **Reference:** 1PPS and TOD from GNSS receiver, IEEE1588 etc.;
- **Temperature Stability:**  $\pm 0.2$ ppb;
- **Holdover:**  $\pm 10\mu\text{s}/2\text{h}$  @  $\Delta T = \pm 10^\circ\text{C}$  after power up 30 minutes ;
- **Clocks Input and Output:** 1\*1PPS input, 1\*1PPS output and 1\*10MHz output;
- **Serial Interface:** 1\*UART for TOD, 1\*UART for management;
- **Mechanical Size:** 30mm\*25mm\*15mm.



## 2. Pin Definition

**Table 1 Pin Definition**

| Pin group               | Pin# | Pin Name  | Type | Description                           |
|-------------------------|------|-----------|------|---------------------------------------|
| Supply Voltage          | 3    | GND       | GND  | Ground                                |
|                         | 7    | VCC       | PWR  | Power Supply                          |
| Control and Status Pins | 1    | SYNC_CTRL | I    | Synchronizing Procedure Control       |
|                         | 12   | LOCK      | O    | Lock Status                           |
| UART                    | 8    | RXD0      | I    | Asynchronous Serial Data Output/Input |
|                         | 9    | TXD0      | O    |                                       |
|                         | 10   | RXD1      | I    |                                       |
|                         | 11   | TXD1      | O    |                                       |
| Input Clock             | 2    | 1PPS_IN   | I    | 1PPS Reference Input.                 |
| Output Clocks           | 5    | 1PPS_OUT  | O    | 1PPS Output                           |
|                         | 6    | CLK_OUT   | O    | 10.00MHz Output                       |
| Reserve                 | 4    | NC        |      | Reserved                              |

## 3. Electrical Parameters

**Table 2 Electrical Parameters**

| Parameter                 | Symbol   | Minimum | Typical | Maximum | Units |
|---------------------------|----------|---------|---------|---------|-------|
| <b>LVC MOS Input</b>      |          |         |         |         |       |
| High Level Input Voltage  | $V_{IH}$ | 2.4     |         |         | V     |
| Low Level Input Voltage   | $V_{IL}$ |         |         | 0.4     | V     |
| <b>LVC MOS Output</b>     |          |         |         |         |       |
| High Level Output Voltage | $V_{OH}$ | 2.4     |         |         | V     |
| Low Level Output Voltage  | $V_{OL}$ |         |         | 0.4     | V     |



## 4. Performance

**Table 3 Performance**

| Item           | Parameter                 | Minimum | Typical | Maximum | Units             | Test Condition                                                                                                                        |       |
|----------------|---------------------------|---------|---------|---------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------|
| Clock Output   | Nominal Frequency         | 10.00   |         |         | MHz               | Synchronizing with 1PPS reference.                                                                                                    |       |
|                | Duty Cycle                | 45      | 50      | 55      | %                 | Load 15pF                                                                                                                             |       |
|                | Frequency vs. Temperature | -0.2    |         | +0.2    | $\times 10^{-9}$  | V <sub>cc</sub> =3.3V; O <sub>load</sub> =15pF; T <sub>A</sub> varies from -10°C to 50°C, temperature slope less than 2°C per minute. |       |
|                | Accuracy                  | -5      |         | +5      | $\times 10^{-12}$ | 24 hours average value when locked to 1PPS.                                                                                           |       |
|                | Short-term Stability      | -0.01   |         | +0.01   | $\times 10^{-9}$  | V <sub>cc</sub> =3.3V; T <sub>A</sub> =25°C; 1s; using PN9000; no EMI/EMC or other interference.                                      |       |
|                | Daily Aging               | -0.5    |         | +0.5    | $\times 10^{-9}$  | V <sub>cc</sub> =3.3V; T <sub>A</sub> =25°C.                                                                                          |       |
|                | Yearly Aging              | -0.03   |         | +0.03   | $\times 10^{-6}$  |                                                                                                                                       |       |
|                | Phase Noise               |         |         | -110    | -100              | dBc/Hz                                                                                                                                | 10Hz  |
|                |                           |         |         | -143    | -138              |                                                                                                                                       | 100Hz |
|                |                           |         |         | -155    | -150              |                                                                                                                                       | 1KHz  |
|                |                           |         | -155    | -150    | 10KHz             |                                                                                                                                       |       |
|                |                           |         | -155    | -150    | 100KHz            |                                                                                                                                       |       |
|                |                           |         | -160    | -155    | 1MHz              |                                                                                                                                       |       |
| 1 PPS Output   | Pulse Width               |         | 100     |         | ms                |                                                                                                                                       |       |
|                | Accuracy                  | -50     |         | +50     | ns                | Synchronizing with 1PPS reference.                                                                                                    |       |
|                | 2 hours holdover          | -10     |         | +10     | μs                | ΔT=±10°C, 2 hours holdover after power up 30 minutes; temperature slope less than 2°C per minute.                                     |       |
| Supply Voltage | Supply Voltage            | 3.135   | 3.3     | 3.465   | V                 |                                                                                                                                       |       |
|                | Warm Up Current           |         |         | 750     | mA                |                                                                                                                                       |       |



|  |                |  |  |     |          |              |
|--|----------------|--|--|-----|----------|--------------|
|  | Steady Current |  |  | 350 | mA       | @25°C        |
|  | AC Ripple      |  |  | 50  | mV pk-pk | 10Hz to 1MHz |

## 5. UART

UART interfaces are used for management and TOD, which has a fixed baud rate (115200) using 1 stop bit and no parity. It is a LVTTTL-compatible port and needs an external translator to work with other signal types (such as RS-232C or RS-485).

### Time of Day

A TOD message format can be a GPRMC message or one of a group of other GPS messages or proprietary messages to suit specific causes. Such as a GPRMC message has the format \$GPRMC,122356,A,0000.0000,N,00000.0000,W,0.0,0.0,120508,,A\*F6 in which the commas are separators. The message is 62 characters in length (i.e. 62 bytes). No parity bit is used, but each byte has a stop bit. The architecture of the message is shown in Table 4.

**Table 4 Architecture of GPRMC message**

| Elements     | Description                                                                     |
|--------------|---------------------------------------------------------------------------------|
| \$GPRMC      | Message header.                                                                 |
| 122356       | UTC value.                                                                      |
| A            | Status (A = active, V = void).                                                  |
| 0000.0000,N  | Latitude, north (fixed to zero).                                                |
| 00000.0000,W | Longitude, west (fixed to zero).                                                |
| 0.0          | Speed over ground (fixed to zero).                                              |
| 0.0          | Track angle (fixed to zero).                                                    |
| 120508       | Date (ddmmyy).                                                                  |
| A            | A = autonomous, D = differential, E = estimated, S = simulation, N = not valid. |
| *F6          | Checksum.                                                                       |

## 6. Control and Status Pins

CM30 is a clock module which synchronizes the local clock to reference such as 1 PPS retrieving from GPS. CM30 will work normally performing synchronizing algorithm when the SYNC\_CTRL pin is driven high. It also could be force to work in free-run or holdover status when the SYNC\_CTRL pin is driven low.

The LOCK pin indicates the lock status of CM30. High level indicates the module is locked to external 1PPS reference. When the module never is locked to reference after power up, the status of module is free-run, the LOCK pin outputs low. When the reference is lost, the status of module is holdover, the LOCK pin also output low.



## 7. Environmental Conditions

**Table 5 Environmental Conditions**

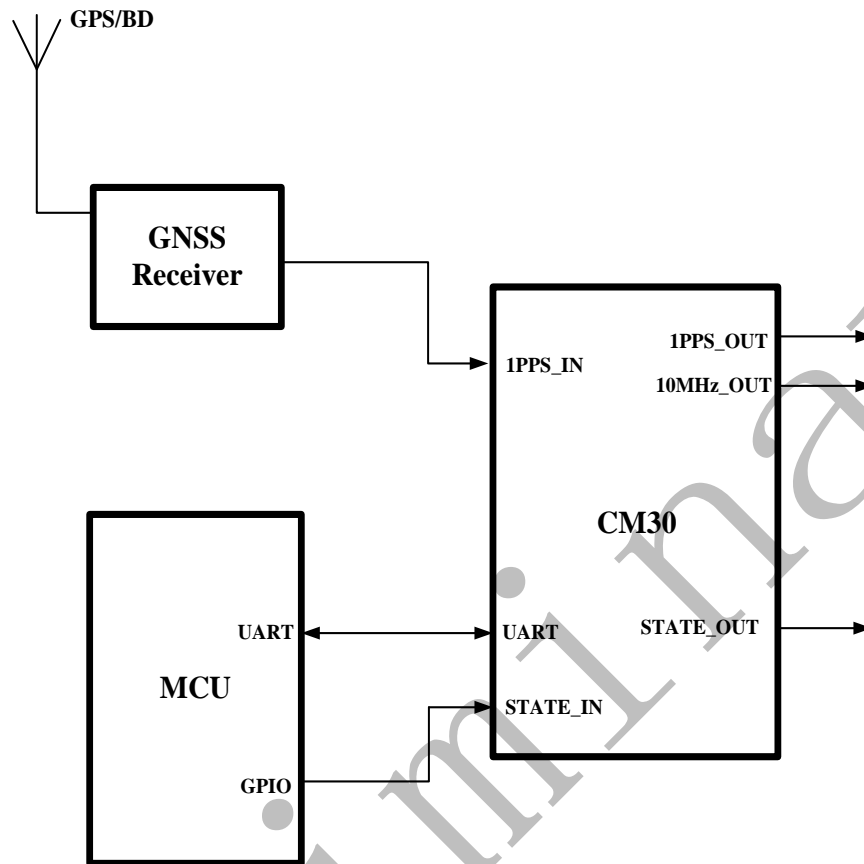
| Parameter                  | Conditions                                                                                                                                             |                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Operating Temperature      | -10°C to 50°C                                                                                                                                          |                      |
| Storage Temperature        | -55°C to 105°C                                                                                                                                         |                      |
| Storage Humidity           | 30%~80%                                                                                                                                                |                      |
| ESD Level                  | Human Body Model, class2: 2000V to 4000V; ANSI/ESDA/JEDEC JS-001-2010.                                                                                 |                      |
|                            | Machine Model, class B: 200V to 400V; ANSI/ESDA/JEDEC JS-001-2010.                                                                                     |                      |
| Moisture Sensitivity Level | Not humidity sensitive.                                                                                                                                |                      |
| Vibration                  | Test Condition: 0.75mm ;acceleration:10g;10Hz~500Hz, one cycle per 30 min, test 2 hour. (3 times for each 3 directions X ,Y , Z), IEC 68-2-06 Test Fc. |                      |
| Shock                      | 50g; 11ms; half sine wave (3 times for each 3 directions X, Y, Z), IEC 68-2-27 Test Ea/Severity 50A.                                                   |                      |
| Relative Humidity          | 20%~70%                                                                                                                                                | Full Package Storage |
| Temperature                | -10°C~35°C                                                                                                                                             |                      |

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## 8. Typical Application



**Figure 2 Typical application**

GNSS Receiver offers 1PPS signal to CM30.

The MCU monitors the work state of CM30.



## 9. Mechanical Structure (mm)

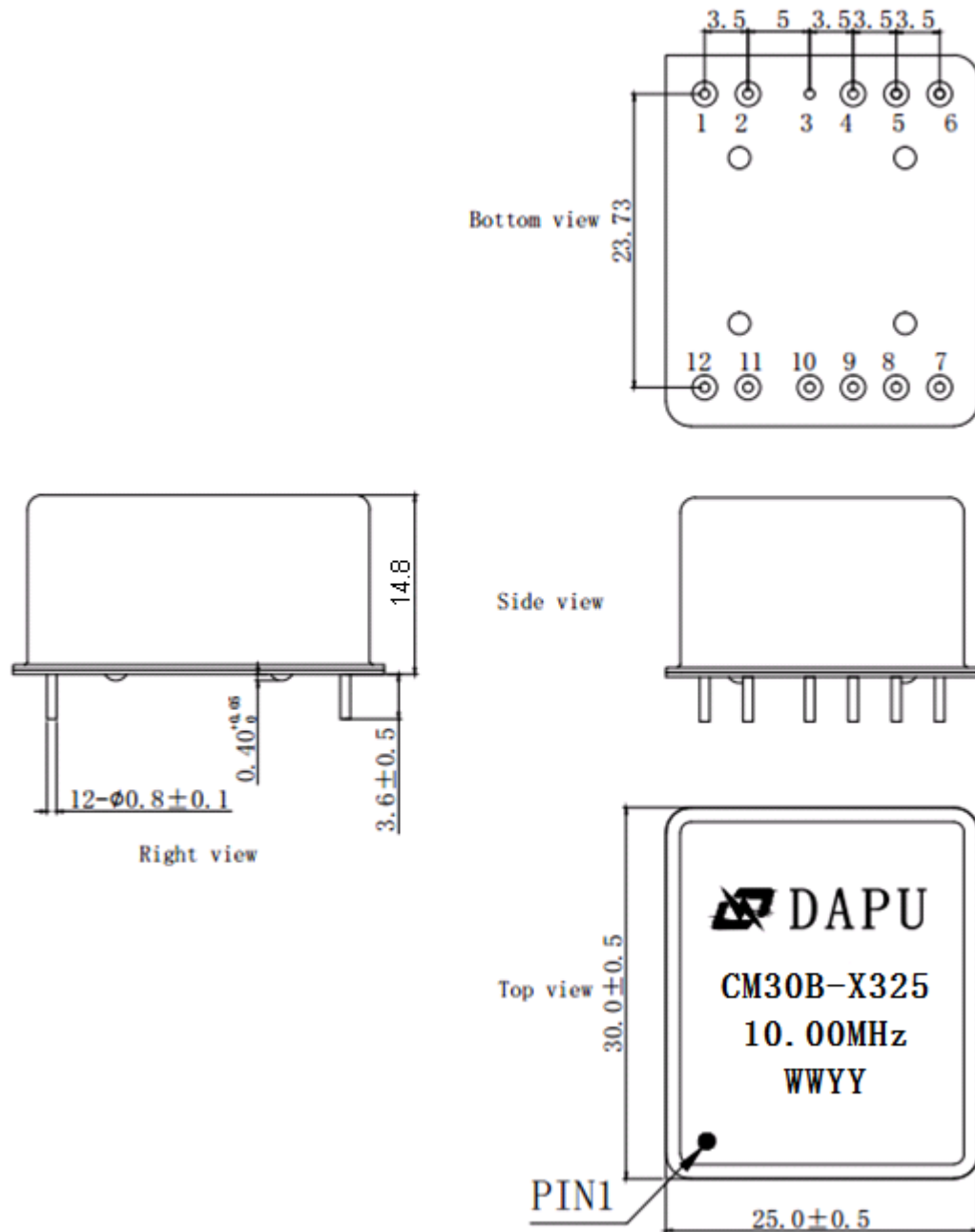


Figure 3 Mechanical structure

**Note1:** Tolerance  $\pm 0.3$ mm without mark.

**Note2:** WW represents Week.

YY represents Year.



### 10. Reflow Soldering Curve (RoHS)

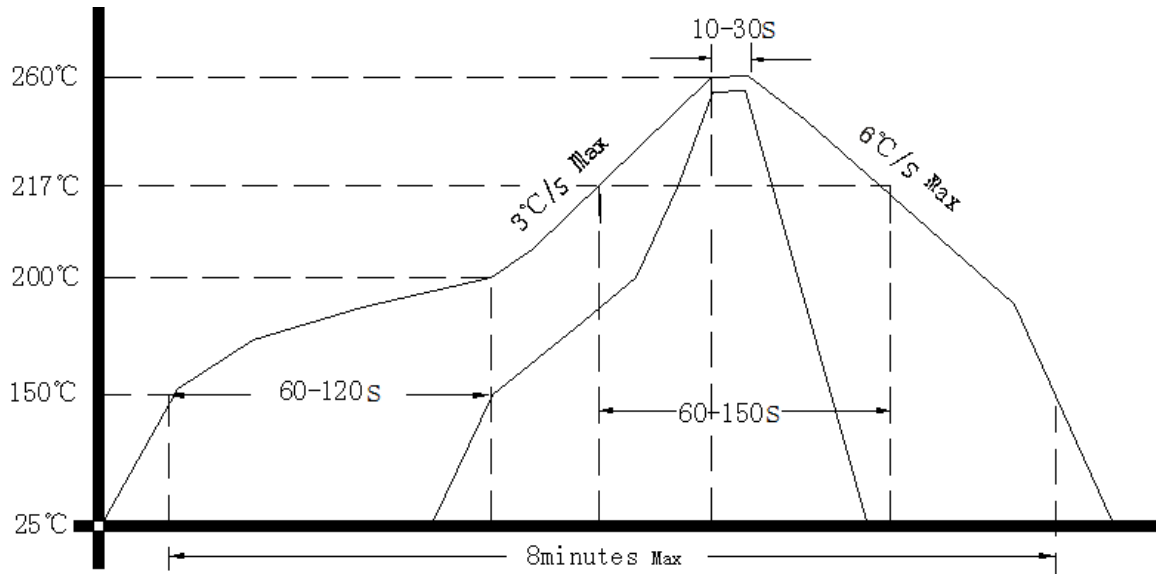


Figure 4 Reflow soldering curve

### 11. Package (mm)

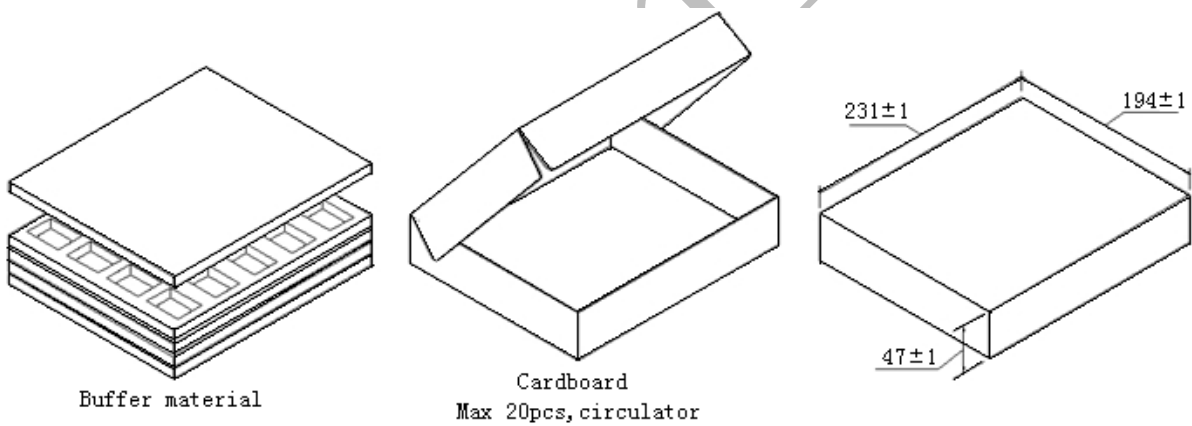


Figure 5 Package