

Customer Code:

DATASHEET

DAPU P/N: CM23B-G428-10.00MHz

Customer P/N: _____

| DAPU | | | Customer Approval |
|------------------|---------|----------|------------------------|
| Drew | Audited | Approved | Stamp, please! Thanks! |
| | | | |
| Date: 2024.07.25 | | | |

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1. General Description

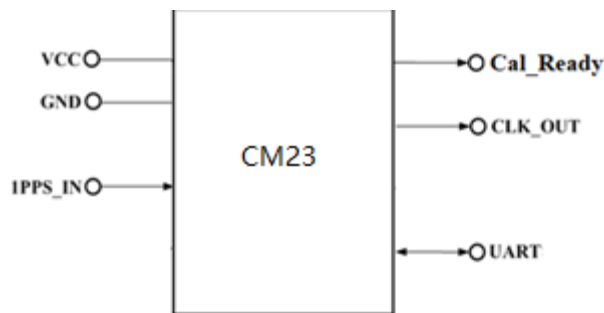


Figure 1 CM23

Figure 1 is the basic diagram of CM23. CM23 is a high-performance clock module designed to provide precise frequency and can be calibrated automatically via a high-level reference 1PPS input.

Key features:

- **Reference:** 1PPS from GNSS receiver, IEEE1588 etc. to calibrate the 10.0MHz CLK_OUT accuracy;
- **Temperature Stability:** ± 0.5 ppb;
- **Frequency accuracy:** $5E-8$, power on 5 minutes;
- **Clocks Input and Output:** 1*1PPS input or 10.0MHz input, and 1*10.0MHz output;
- **Serial Interface:** 1*UART for management;
- **Mechanical Size:** 36.2mm*27.2mm*13mm.



2. Pin Definition

Table 1 Pin Definition

| Pin group | Pin# | Pin Name | Type | Description |
|----------------|------|----------|------|---------------------------------------|
| Input Clock | 3 | REF_IN | I | 1PPS or 10.0MHz Reference Input. |
| Supply Voltage | 1 | VCC | PWR | Power Supply |
| UART | 7 | RXD | I | Asynchronous Serial Data Output/Input |
| | 6 | TXD | O | |
| Supply Voltage | 4 | GND | GND | Ground. |
| Output Clock | 5 | CLK_OUT | O | 10.0MHz output |
| | 2 | 1PPS_OUT | O | 1PPS output |

3. Electrical Parameters

Table 2 Electrical Parameters

| Parameter | Symbol | Minimum | Typical | Maximum | Units |
|---------------------------|----------|---------|---------|---------|-------|
| LVC MOS Input | | | | | |
| High Level Input Voltage | V_{IH} | 2.4 | | | V |
| Low Level Input Voltage | V_{IL} | | | 0.4 | V |
| LVC MOS Output | | | | | |
| 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 | 10.0 | | | MHz | Synchronizing with 1PPS reference. | |
| | Wave | HCMOS | | | | | |
| | Duty Cycle | 45 | | 55 | % | Load 15pF | |
| | Frequency vs. Temperature | -0.5 | | +0.5 | $\times 10^{-9}$ | $V_{CC}=5.0V$; $O_{load}=50\Omega$, T_A varies from $-40^{\circ}C$ to $85^{\circ}C$, temperature slope less than $2^{\circ}C$ per minute. | |
| | Accuracy | -5 | | +5 | $\times 10^{-10}$ | power on 5 minutes after calibrated. | |
| | Short-term Stability | | | 0.005 | $\times 10^{-9}$ | $V_{CC}=5.0V$; $T_A=25^{\circ}C$; 1s; | |
| | Daily Aging | -0.5 | | +0.5 | $\times 10^{-9}$ | power on 30 day, $V_{CC}=5.0V$; $T_A=25^{\circ}C$. | |
| | Yearly Aging | -0.3 | | +0.3 | $\times 10^{-6}$ | | |
| | Phase Noise | | | | -98 | dBc/Hz | 1Hz |
| | | | | | -133 | | 10Hz |
| | | | | | -155 | | 100Hz |
| | | | | | -160 | | 1KHz |
| | | | | -162 | 10KHz | | |
| | | | | -163 | 100KHz | | |
| Holdover | -2.0 | | +2.0 | us | $\Delta = \pm 5^{\circ}C$ Holdover 4 hours, after lock 1PPS 72 hours | | |
| Supply Voltage | Supply Voltage | 4.75 | 5.0 | 5.25 | V | | |
| | Warm Up Current | | | 1000 | mA | | |
| | Steady Current | | | 450 | mA | @25°C | |



5. UART

UART interface is used for management, 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).

a) TOD input sentence format

\$GPZDA, <1>,<2>,<3>,<4>,<5>,<6>*HH<CR><LF>

| Parameter Number | Parameter Name | Format | Description |
|---|----------------|-----------|---------------------------------|
| <1> | UTC time | hhmmss.ss | Hour,minute,second,9 characters |
| <2> | day | dd | Range: 01~31, 2 characters |
| <3> | month | mm | Range: 01~12, 2 characters |
| <4> | year | yyyy | 4 characters |
| <5> | NA | 00 | Filled with 00 |
| <6> | NA | 00 | Filled with 00 |
| <p>Note: All sentences begin with "\$" , end with<CR><LF></p> <p>* HH represents the bitwise XOR result of all characters between "\$" and "**"</p> <p><CR><LF>: Carriage Return and Line Feed.</p> <p>Example: \$GPZDA,010516.00,26,11,2008,00,00*6B</p> | | | |

b) TOD output sentence format

\$DPZDA, <1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>,<13>,<14>*HH<CR><LF>

| Parameter Number | Parameter Name | Format | Description |
|------------------|------------------------|------------|---|
| <1> | UTCtime | hhmmss | Hour,minute,second, 6 characters |
| <2> | Day | dd | Range: 01~31, 2 characters |
| <3> | Month | mm | Range: 01~12, 2 characters |
| <4> | Year | yyyy | 4 characters |
| <5> | System state | xx | 00-Freerun, 01-fast track, 10-lock, 11-holdover |
| <6> | Lock indicator | x | 0-unlock, 1-locked |
| <7> | temperature | xxx | Unit: 0.1℃。 e.g.234means23.4℃ |
| <8> | Input identifier | x | 1-1PPS Input, 0-no1PPS Input. |
| <9> | GPZDA input identifier | x | 1 means GPZDA Input, 0 means no GPZDA Input. |
| <10> | reserve | 0 | -- |
| <11> | T1 | xxxxxx | Test parameter1: range +8192~-8192, 5 parameters |
| <12> | T2 | xxxxxxxxxx | Test parameter2: range 65535.0000~00000.0000, 10 parameters |
| <13> | T3 | xxxxxxxxxx | Test parameter3: 10 parameters |
| <14> | reserve | xxxxxxx | 7 characters |



Note: All sentences begin with "\$" , end with<CR><LF>
 * HH represents the bitwise XOR result of all characters between "\$" and "*"
 <CR><LF>: Carriage Return and Line Feed.
 Example:
 \$DPZDA,010517,26,11,2008,10,1,315,1,1,0,-0000,31945.0000,-0000.1146,0000000*78

6. Environmental Conditions

Table 5 Environmental Conditions

| Parameter | Conditions | |
|----------------------------|--|----------------------|
| Operating Temperature | -40°C to 85°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; JEDEC JESD22-A115C. | |
| 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 | |



7. Typical Application

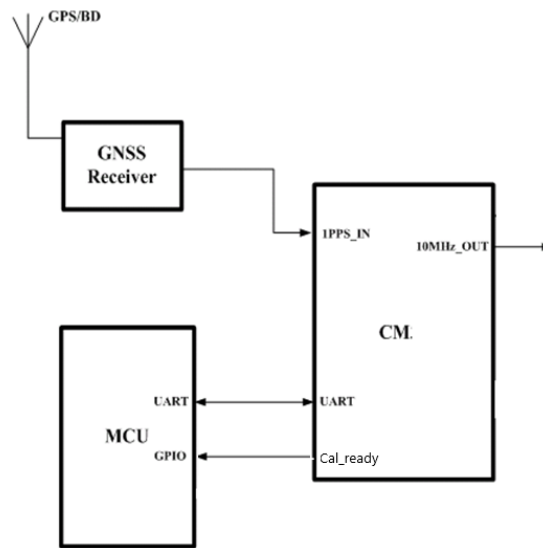


Figure 2Typical application

GNSS Receiver offers 1PPS signal to CM23.

The MCU monitors the work state of CM23.



8. Mechanical Structure (mm)

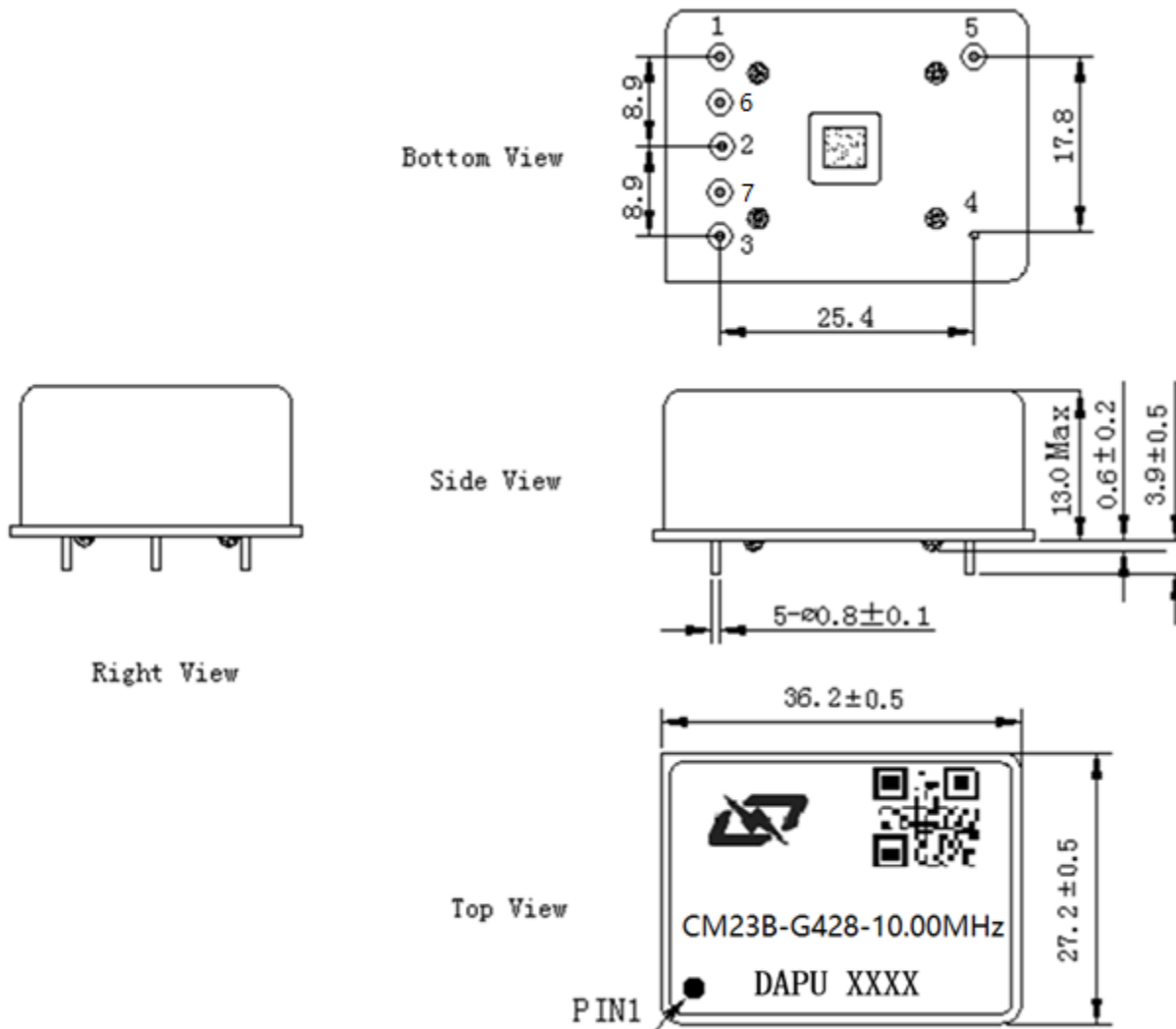


Figure 3 Mechanical structure

Note1: Tolerance ± 0.3mm without mark.

Note2: The first two xx representative: year
After two xx representative: week



9. Wave Soldering Curve(RoHS)

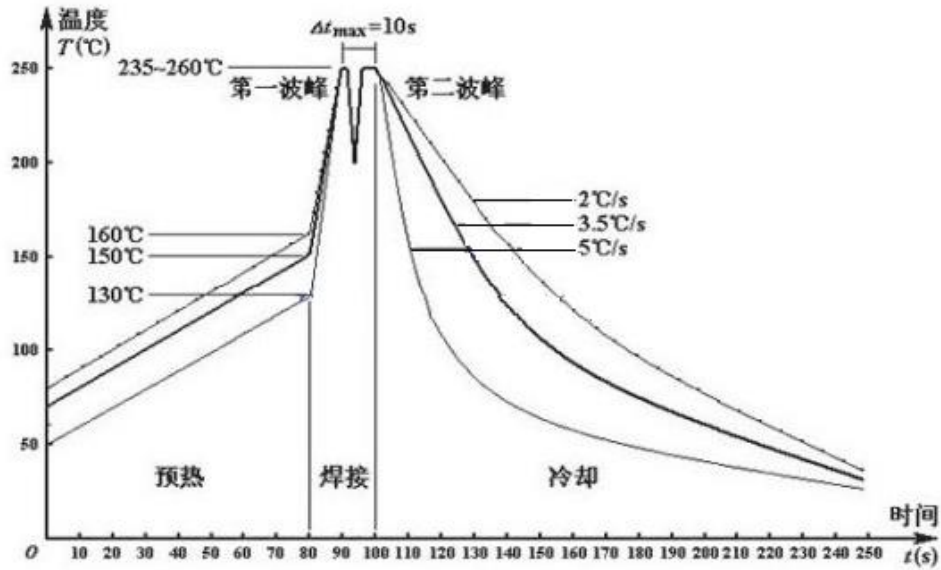


Figure 4 Wave soldering curve

10. Package (mm)

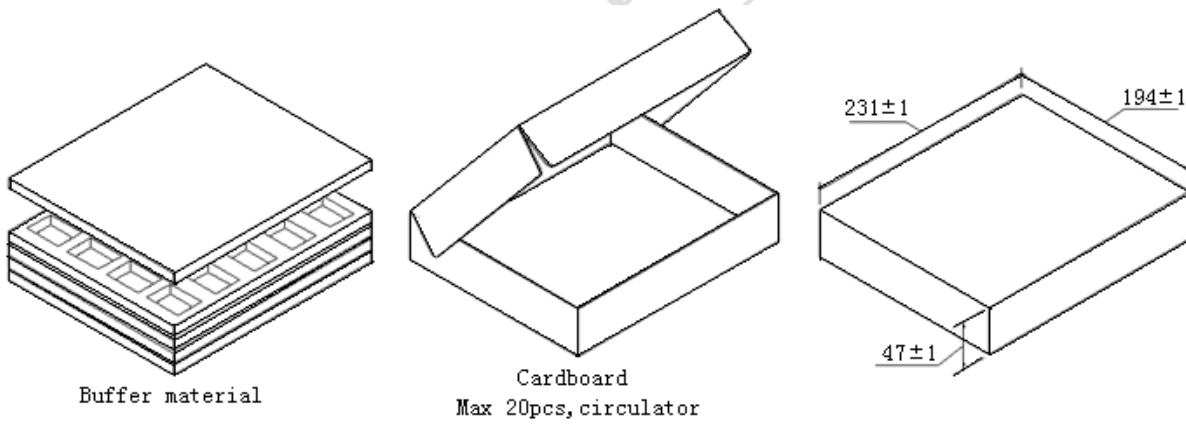


Figure 5 Package