

Customer Code:

DATASHEET

DAPU P/N: CM22B-O328-102.40MHz

Customer P/N: _____

DAPU			Customer Approval
Drew	Audited	Approved	Stamp, please! Thanks!
Date: 2023.05.05			

Guangdong Dapu Telecom Technology Co., Ltd

Building 5, No.24, Industrial East Road, Songshanhu Park, Dongguan, Guangdong, P.R. China

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



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1. General Description

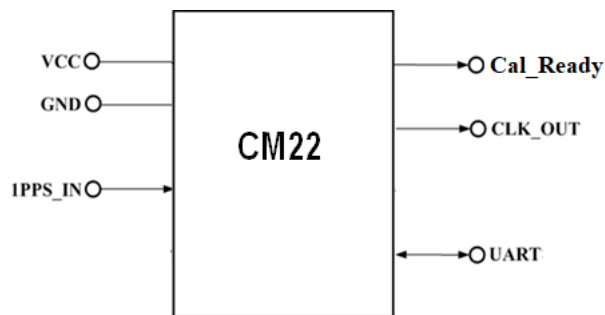


Figure 1 CM22

Figure 1 is the basic diagram of CM22. CM22 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 102.4M CLK_OUT accuracy;
- **Temperature Stability:** ± 10 ppb;
- **Frequency accuracy:** $5E-8$, power on 5 minutes;
- **Clocks Input and Output:** 1*1PPS input and 1*102.4MHz output;
- **Calibration Ready Output:** Output high when calibration completed;
- **Serial Interface:** 1*UART for management;
- **Mechanical Size:** 20.2mm*20.2mm*13mm.



2. Pin Definition

Table 1 Pin Definition

Pin group	Pin#	Pin Name	Type	Description
Supply Voltage	3	GND	GND	Ground
	2	VCC	PWR	Power Supply
Status Pin	1	Cal_Ready	O	Calibration completed
UART	5	RXD	I	Asynchronous Serial Data Output/Input
	6	TXD	O	
Input Clock	4	1PPS_IN	I	1PPS Reference Input.
Output Clocks	7	NC	O	NC
	8	CLK_OUT	O	102.4MHz 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	102.40			MHz	Synchronizing with 1PPS reference.	
	Wave Form	Sine Wave					
	Level	8	13		dBm		
	Frequency vs. Temperature	-1.0		+1.0	$\times 10^{-8}$	$V_{cc}=3.3V$; $O_{load}=50\Omega$, T_A varies from $-40^{\circ}C$ to $85^{\circ}C$, temperature slope less than $2^{\circ}C$ per minute.	
	Accuracy		-1		+1	$\times 10^{-8}$	Power on 1 hour after calibrated
			-5		+5	$\times 10^{-8}$	power on 5 minutes after power off in the first year
			-8		+8	$\times 10^{-8}$	power on 5 minutes after power off in the second year
	Short-term Stability	-0.01		+0.01	$\times 10^{-9}$	$V_{cc}=3.3V$; $T_A=25^{\circ}C$; 1s;	
	Daily Aging	-0.5		+0.5	$\times 10^{-9}$	$V_{cc}=3.3V$; $T_A=25^{\circ}C$.	
	Yearly Aging	-0.03		+0.03	$\times 10^{-6}$		
	Phase Noise			-82	-77	dBc/Hz	10Hz
				-105	-100		100Hz
			-141	-136	1KHz		
			-153	-148	10KHz		
			-157	-152	100KHz		
			-160	-155	1MHz		
Supply Voltage	Supply Voltage	3.135	3.3	3.465	V		
	Warm Up Current			750	mA		
	Steady Current			350	mA	@ $25^{\circ}C$	
	AC Ripple			50	mV pk-pk	10Hz to 1MHz	



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 "*" <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

\$ESZDA, <1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>*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	00Freerun, 01fast track, 10lock, 11holdover
<6>	Lock indicator	x	0unlock, 1 locked
<7>	temperature	xxx	Unit: 0.1℃。 e.g.234means23.4℃
<8>	Input identifier	x	1 means 1PPS Input, 0 means no1PPS Input.
<9>	GPZDA input	x	1 means GPZDA Input, 0 means no GPZDA Input.
<10>	reserve	0	--
<p>Note: All sentences begin with "\$" , end with<CR><LF></p> <p>* HH represents the bitwise XOR result of all characters between "\$" and "*" <CR><LF>: Carriage Return and Line Feed.</p> <p>Example: \$ESZDA,010517,26,11,2008,10,1,315,1,1,0*72</p>			

c) **UART input control commands format**

*Adjust Frequency in the step of 1.5E-11 of 102.4MHz to increase or decrease the CLK_OUT frequency.

\$ADF, <1><CR><LF>

Parameter Number	Parameter Name	Format	Description
<1>	Character bits	±XXXXXX	+ means frequency increasing, - means frequency decreasing; XXXXXX range: 00001~65535

*Feedback value:

\$ ADF_DATA, <1>,<2><CR><LF>

Parameter Number	Parameter Name	Format	Description
<1>	Character bits	±XXXXXX	+ means increase frequency, - means decrease frequency; XXX range: 00001~65535
<2>	Identifier	01	01, adjust feedback identifier

* Get the current adjustable range

\$GET_ADF_Range<CR><LF>

*Feedback value:

\$ Range_DATA, <1>,<2>,<3><CR><LF>

Parameter Number	Parameter Name	Format	Description
<1>	Negative Pull-in	-XXXXXX	Maximum value that Frequency can be decreased. XXX range: 00001~65535
<2>	Positive Pull-in	+XXXXXX	Maximum value that Frequency can be increased. XXX range: 00001~65535
<3>	Identifier	02	02, adjustable range feedback identifier.

*Save current value:

\$SAVE<CR><LF>

*Feedback value:

\$ SAVE_DATA, <1><CR><LF>

Parameter Number	Parameter Name	Format	Description
<1>	Character bits	±XXXXXX	Final frequency adjustment value + means frequency increasing, - means frequency decreasing; XXX range: 00001~65535

Note: **#error<CR><LF>** means wrong command format



6. Status Pin

This clock module can be calibrated via a high-level reference 1PPS input from GNSS receiver, IEEE1588 etc. The status pin will output high once calibration is completed and the frequency reappear accuracy is in 5E-8 after power on 5 minutes, and up to 1E-8 after power on 1 hour.

7. 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; 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	



8. Typical Application

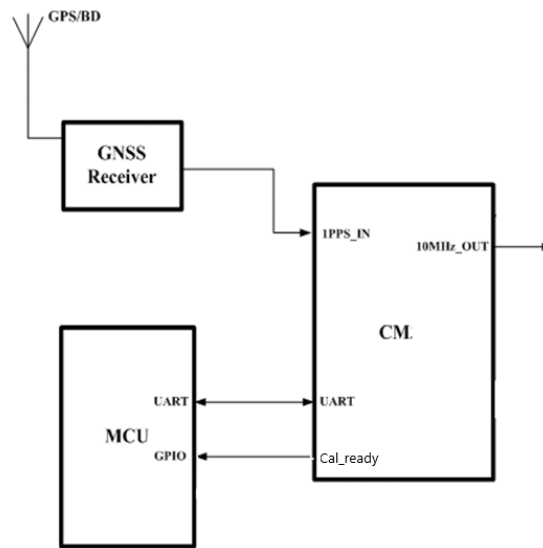


Figure 2Typical application

GNSS Receiver offers 1PPS signal to CM22.
The MCU monitors the work state of CM22.



9. Mechanical Structure (mm)

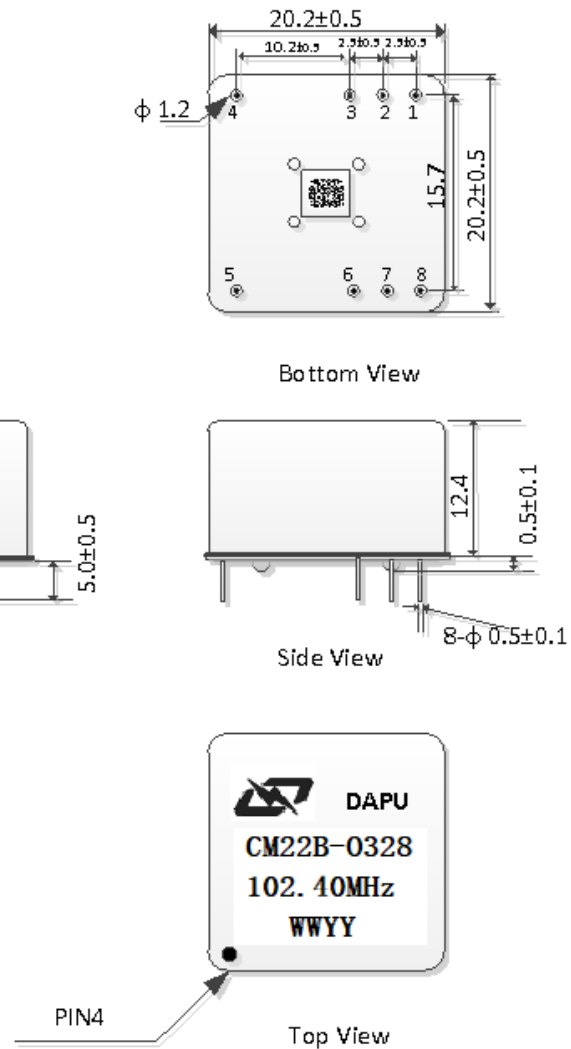


Figure 3 Mechanical structure

Note1: Tolerance ± 0.3 mm without mark.

Note2: WW represents Week.

YY represents Year.



10. Wave Soldering Curve(RoHS)

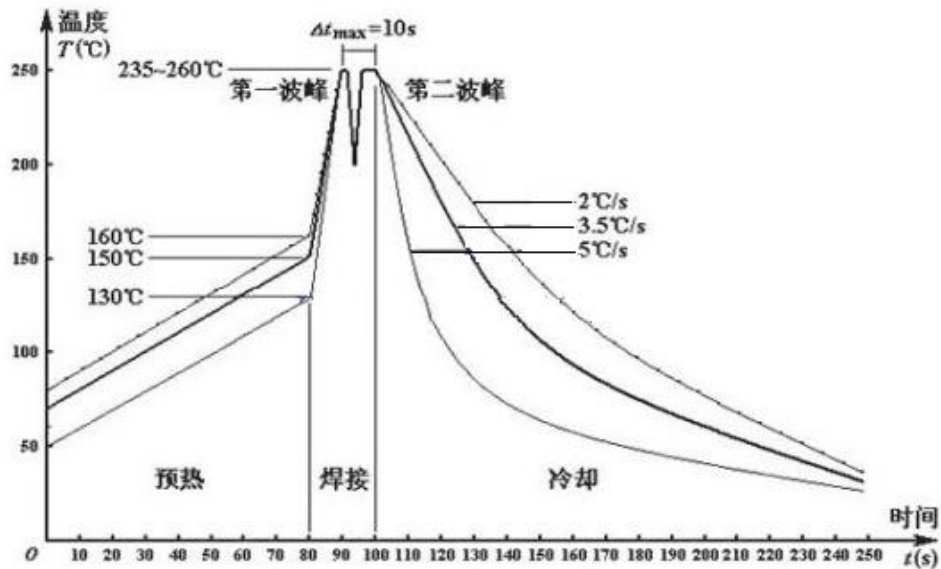


Figure 4 Wave soldering curve

11. Package (mm)

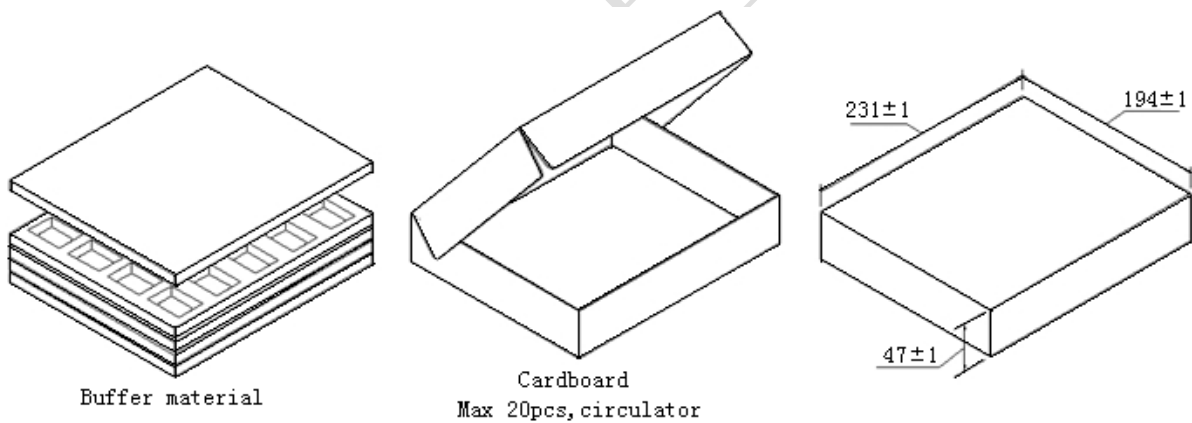


Figure 5 Package