

Customer Code:

DATASHEET

DAPU P/N: 10MHz-024-1pps

Customer P/N: _____

DAPU			Customer Approval
Drew	Audited	Approved	Stamp, please! Thanks!
Date: 2023.06.21			

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Table of Amendment

Version	Revision contents	Prepared by	Revised date
1.0	First issued	<i>Amway</i>	2023.05.18
1.1	The "Phase Noise"changed	<i>Amway</i>	2023.06.21

DAPU

Confidential



1 General Description

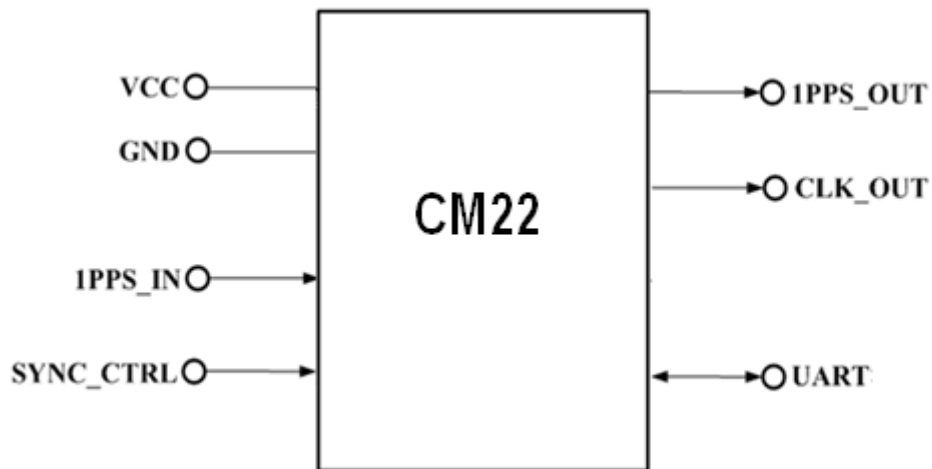


Figure 1 CM22

Figure 1 is the basic diagram of CM22. CM22 is a high-performance clock module designed to provide precise frequency and phase synchronizing with external time reference for telecom and other applications.

Key features:

- **Reference:** 1PPS and TOD from GNSS receiver, IEEE1588 etc.
- **Temperature Stability:** $\pm 0.2\text{ppb}(-45^{\circ}\text{C}-85^{\circ}\text{C})$
- **Holdover:** $\pm 50\mu\text{s}/24\text{H}$, after locking 2H
- **Clocks Input and Output:** 1*1PPS input, 1*1PPS output and 1*10MHz output
- **Serial Interface:** 1*UART for management and ToD In/Output
- **Mechanical Size:** 20.2mm*20.2mm*13.0mm



2 Pin Definition

Table 1 Pin Definition

Pin group	Pin#	Pin Name	Type	Description
Supply Voltage	2	VCC	PWR	Power Supply
	3	GND	GND	Ground
Control and Status Pins	1	SYNC_CTRL	I	Synchronization Procedure Control
UART	5	RXD	I	Asynchronous Serial Data Output/Input
	6	TXD	O	
Input Clock	4	1PPS_IN	I	1PPS Reference Input.
Output Clocks	7	1PPS_OUT	O	1PPS Output
	8	CLK_OUT	O	10.00MHz Output

3 Electrical Parameters

Table 2 Electrical Parameters

Parameter	Symbol	Minimum	Typical	Maximum	Units
LVC MOS Input					
High Level Input Voltage	V_{IH}	2.0			V
Low Level Input Voltage	V_{IL}			0.8	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	10.00			MHz	Synchronizing with 1PPS reference.
	Duty Cycle	45	50	55	%	Load 15pF
	Frequency vs. Temperature	-0.2		+0.2	$\times 10^{-9}$	$V_{CC}=3.3V$; $O_{load}=15pF$; T_A varies from $-45^{\circ}C$ to $85^{\circ}C$, temperature slope less than $2^{\circ}C$ per minute.
	Accuracy	-5		+5	$\times 10^{-12}$	24 hours average value when locked to 1PPS.
	Short-term Stability	-0.01		+0.01	$\times 10^{-9}$	$V_{CC}=3.3V$; $T_A=25^{\circ}C$; 1s; no EMI\EMC or other interference.
	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			-110		dBc/Hz
			-143		100Hz	
			-155		1KHz	
			-155		10KHz	
			-155		100KHz	
			-160		1MHz	
1 PPS Input	Waveform	LVCMOS				
	Pulse Width	0.001	100	500	ms	
1 PPS Output	Waveform	LVCMOS				
	Pulse Width	0.001	100	500	ms	
	Accuracy	-50		+50	ns	Synchronizing with 1PPS reference.
	24 hours holdover	-50		+50	μs	$\Delta T=40^{\circ}C$, 24 hours holdover after locking 2 hours; temperature slope less than $1^{\circ}C$ per minute.



	6 hours holdover	-50		+50	us	$\Delta T=40^{\circ}\text{C}$, 6 hours holdover after locking 30 minutes; temperature slope less than 1°C per minute.
Supply Voltage	Supply Voltage	3.135	3.3	3.465	V	
	Warm Up Current			750	mA	
	Steady Current			300	mA	@25 $^{\circ}\text{C}$
	AC Ripple			50	mVpk-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).

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

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: \$GPZDA,010516.00,26,11,2008,00,00*6B

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
<p>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</p>			

6 Control Pins

CM22 is a clock module which synchronizes the local clock to reference such as 1 PPS retrieving from GPS. CM22 will work normally performing synchronizing algorithm when the SYNC_CTRL pin is driven high. It also could be forced to work in free-run or holdover status when the SYNC_CTRL pin is driven low.



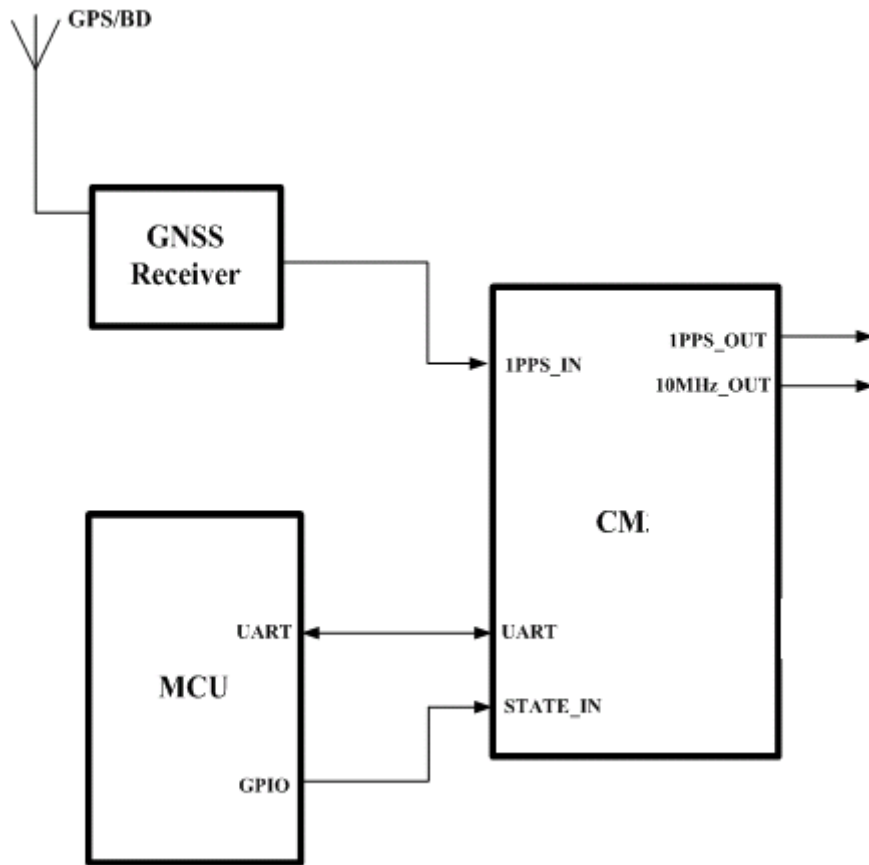
7 Environmental Conditions

Table 5 Environmental Conditions

Parameter	Conditions	
Operating Temperature	-45°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: 30 min per direction X, Y and Z. 12Hz~2000Hz, PSD (Power Spectral Density) 0.01g ² /Hz.	
	Narrow-Band Parameter	
	Frequency (Hz)	PSD (g ² /Hz)
	80-100	0.4
	160-200	0.1
240-300	0.025	
Shock	100g; 11ms; 3 times for each 3 directions X, Y, Z. Waveform refers to GJB150.18A-2009, Part 18: Shock Test.	
Relative Humidity	20%~70%	Full Package Storage
Temperature	-10°C~35°C	



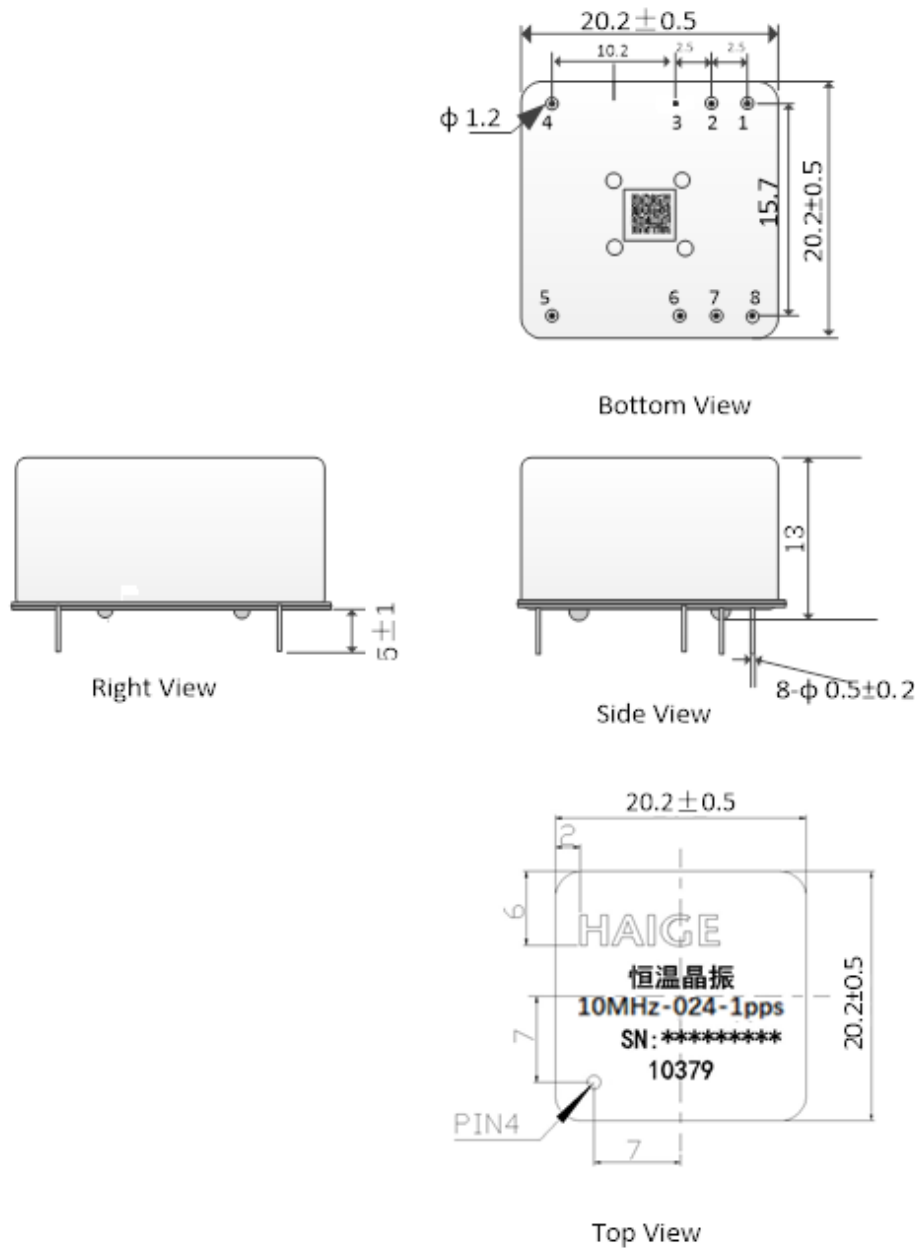
8 Typical Application



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



9 Mechanical Structure (mm)



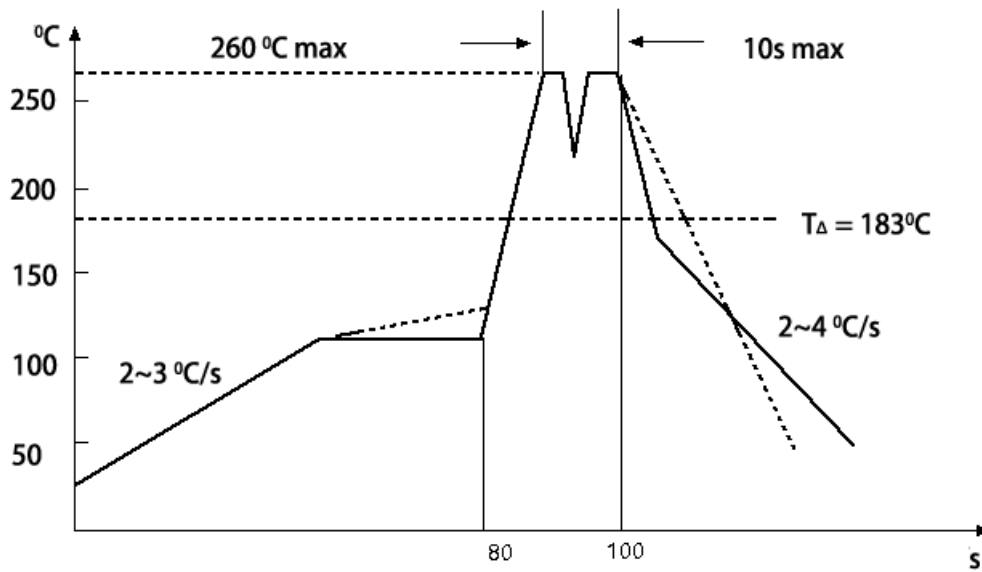
备注 1: 其它未标注公差: ± 0.5 mm

备注 2: 印字标识要求:

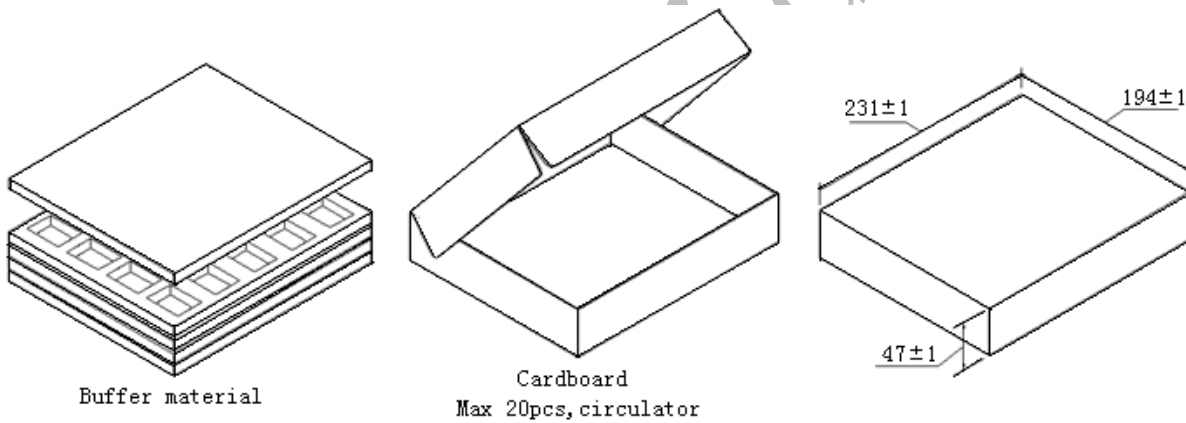
- 1) 文字标识采用激光刻制, 除首行外, 其余字高均为 1.5 mm, 字体为黑体, 以居中对称美观为原则;
- 2) 首行“HAIGE”按提供的“logo.cdr”文件制作, 字高为 2.5 mm, 无颜色要求;
- 3) 第二、三行为晶振的名称型号;
- 4) 第四行为生产批次号“*****”代表年、月及序号, 如 202207001, 代表 2022 年 7 月份, 第 001 只;
- 5) 第五行为制造商代码:10379;
- 6) 第六行“•”为 4 脚位置标识, 该管脚为 1PPS 输入管脚。



10 Wave Soldering Curve (RoHS)



11 Package (mm)



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