Customer Code:

DATASHEET

DAPU P/N: CM22A-C328-10.00MHz-A

Customer P/N: _____

DAPU			Customer Approval
Drew	Audited	Approved	
Amway.wei	Carry.Wang	Jason Zhao	
Date: 2024.02.22			Stamp, please! Thanks!

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Table of Amendment

Version	Revision contents	Prepared by	Revised date
1.0	First issued	Amway	2024.02.22

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Table of Contents

1 GENERAL DESCRIPTION 4
2 PIN DEFINITION 5
3 ELECTRICAL PARAMETERS 5
4 PERFORMANCE 6
5 UART 7
6 CONTROL PINS 8
7 ENVIRONMENTAL CONDITIONS 9
8 TYPICAL APPLICATION 10
9 MECHANICAL STRUCTURE (MM) 11
10 WAVE SOLDERING CURVE (ROHS) 12
11 PACKAGE（MM） 12

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1 General Description

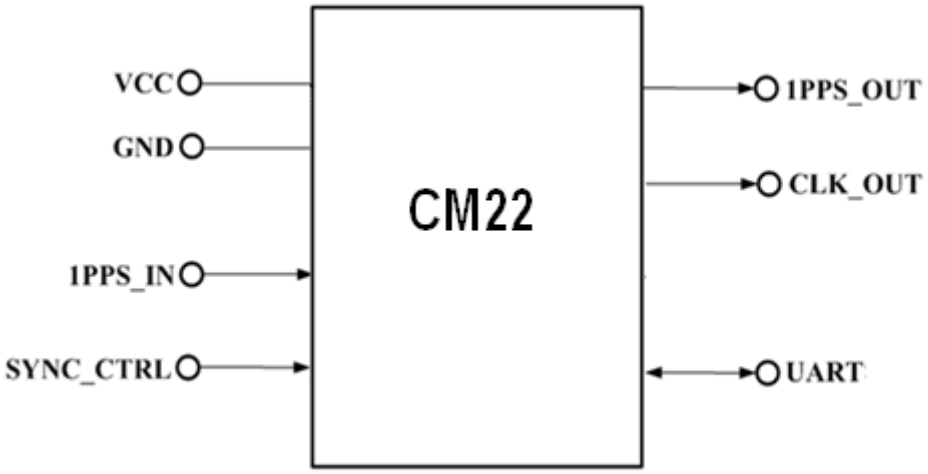

Figure 1 CM22

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

Key features:

- **Reference:** 1PPS and TOD from GNSS receiver, IEEE1588 etc.
- **Temperature Stability:** ±0.3ppb(-43℃~75℃)
- **Holdover:** ±5ms/168H，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*13mm

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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
LVCMOS Input					
High Level Input Voltage	V_{IH}	2.0			V
Low Level Input Voltage	V_{IL}			0.8	V
LVCMOS Output					
High Level Output Voltage	V_{OH}	2.4			V
Low Level Output Voltage	V_{OL}			0.4	V

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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	-0.3		+0.3	$\times10^{-9}$	V_{CC}=3.3V; O_{load}=15pF; $T_A$varies from-43℃ to 75℃, temperature slope less than 2℃per minute.
	Accuracy	-5		+5	$\times10^{-12}$	24 hours average value when locked to 1PPS.
	Short-term Stability	-0.01		+0.01	$\times10^{-9}$	V_{CC}=3.3V;T_A=25℃; 1s; no EMI\EMC or other interference.
	Daily Aging	-0.5		+0.5	$\times10^{-9}$	V_{CC}=3.3V; T_A=25℃.
	Yearly Aging	-0.03		+0.03	$\times10^{-6}$	
	Phase Noise		-110	-100	dBc/Hz	10Hz
			-143	-138		100Hz
			-155	-150		1KHz
			-155	-150		10KHz
			-155	-150		100KHz
			-160	-155		1MHz
1 PPS Intput	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.
	168 hours holdover	-5		+5	ms	168 hours holdover after locking 2 hours; temperature slope less than 1℃ per minute, Temperature Range:-40℃~65℃.

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Supply Voltage	Supply Voltage	3.135	3.3	3.465	V	
	Warm Up Current			750	mA	
	Steady Current			300	mA	@25℃ (650mA@-40℃ Typical)
	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 LVTTL-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℃

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<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	xxxxx	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 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.

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7 Environmental Conditions

Table 5 Environmental Conditions

Parameter	Conditions	
Operating Temperature	-43℃ to 75℃	
Storage Temperature	-55℃ to 105℃	
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℃~35℃	

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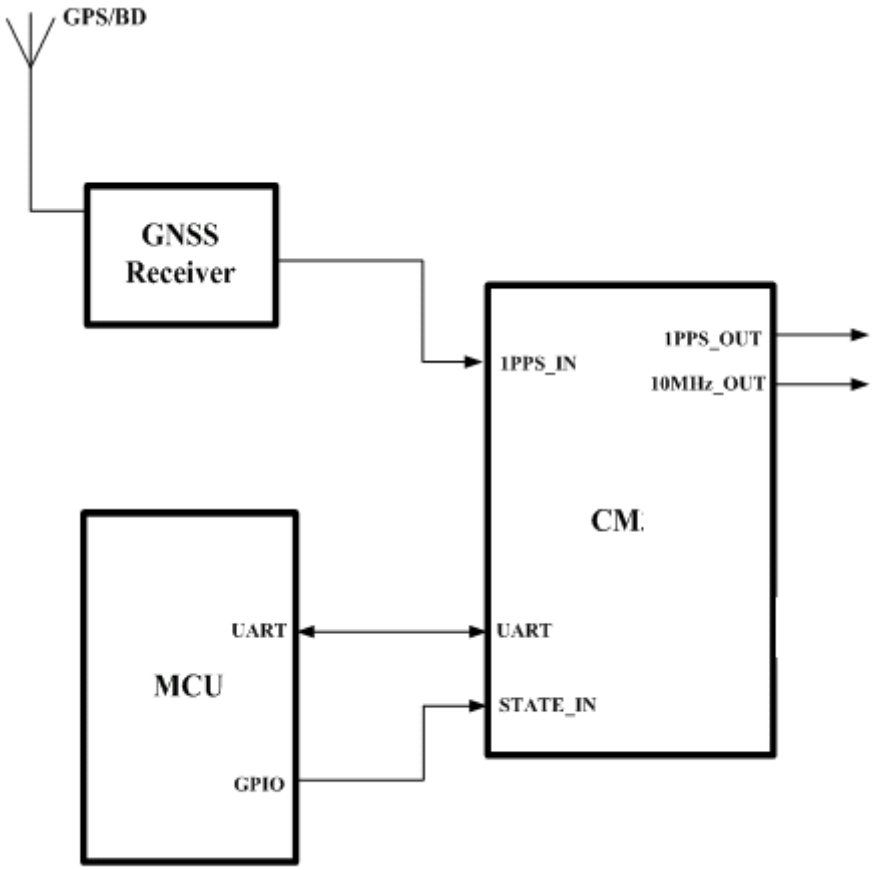
8 Typical Application



GNSS Receive offers 1PPS signal to CM22.

The MCU monitors the work state of CM22.

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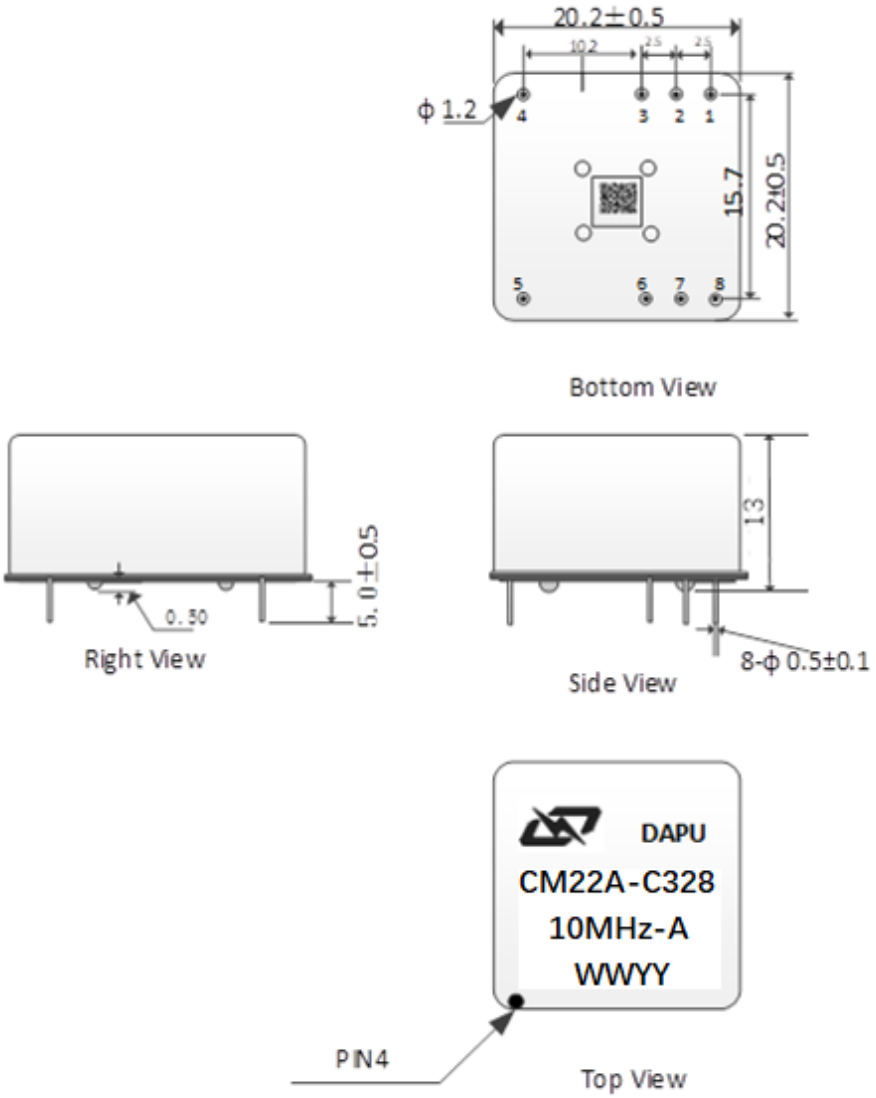
9 Mechanical Structure (mm)



Note1: Tolerance ± 0.3mm without mark.

Note2: WW represents Week.
YY represents Year.

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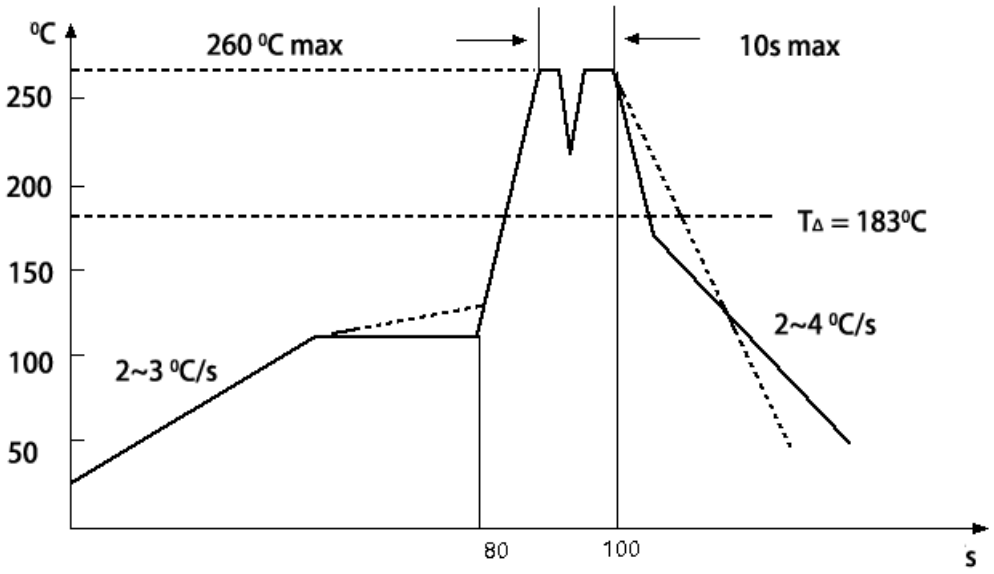
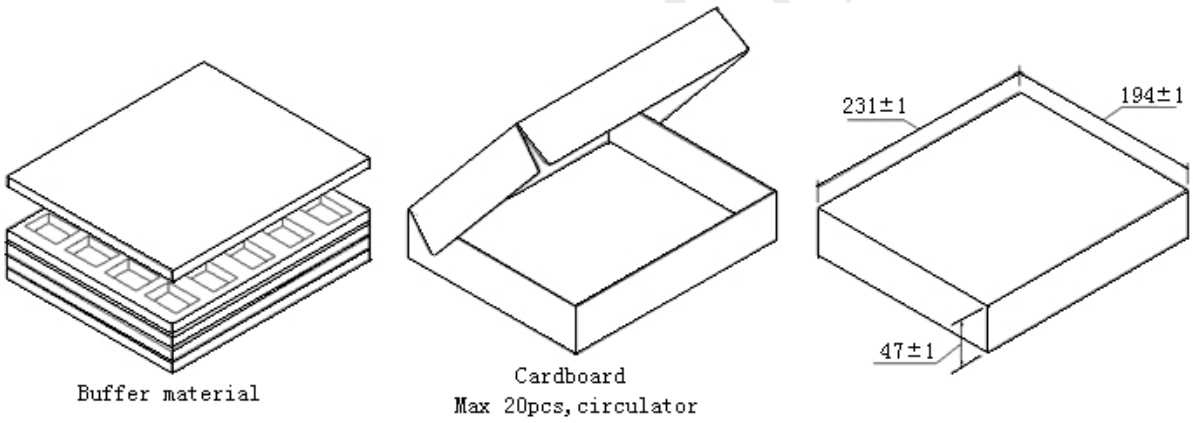
10 Wave Soldering Curve (RoHS)



11 Package（mm）



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