

Customer Code : _____

DATASHEET

DAPU P/N: CM30B-M325-10.00MHz

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DAPU			Customer Approval
Drew	Audited	Approved	Stamp, please! Thanks!
Date: 2019.03.22			

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PRELIMINARY



1. General Description

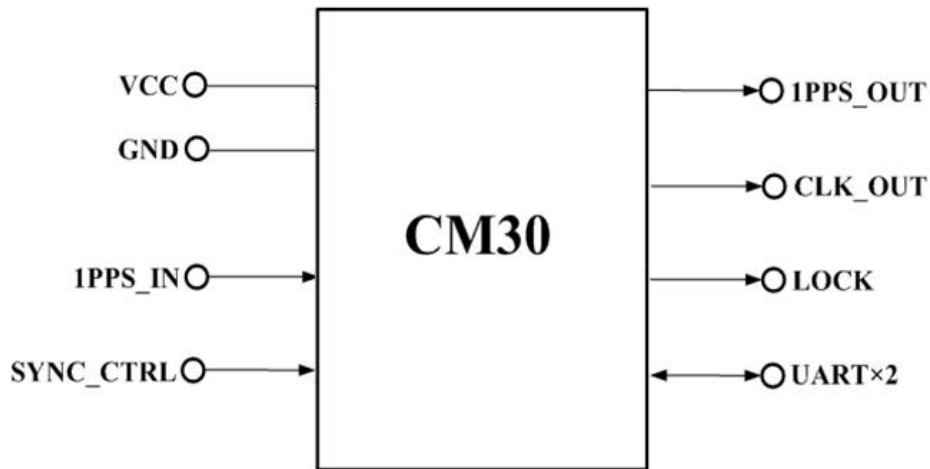


Figure 1 CM30

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:** ± 0.2 ppb;
- **Holdover:** $\pm 100\mu\text{s}/24\text{h}$ @ $\Delta T = \pm 10^\circ\text{C}$, 24 hours holdover after power up 7 days and lock 5 days;
- **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
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	10.00			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 -25°C to 70°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	$\times 10^{-9}$	V _{cc} =3.3V; T _A =25°C; 1s; using PN9000; no EMI/EMC or other interference.	
	Daily Aging	-0.5		+0.5	$\times 10^{-9}$	V _{cc} =3.3V; T _A =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.	
	24 hours holdover	-100		+100	μs	ΔT=±10°C, 24 hours holdover after power up 7 days and lock 5 days; 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	-25°C to 70°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

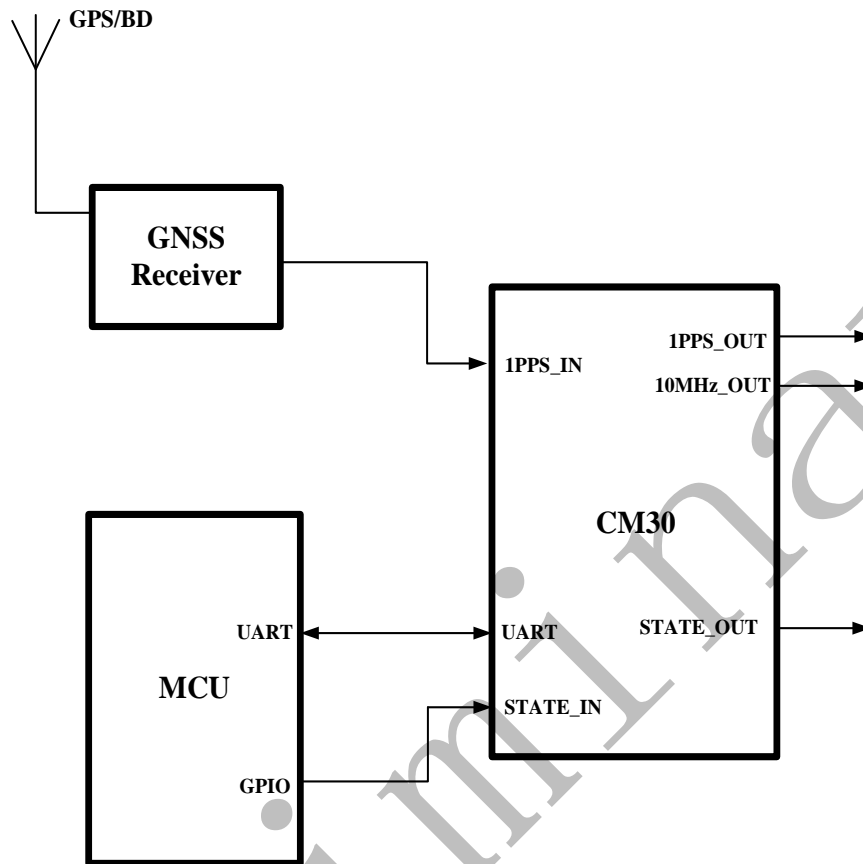


Figure 2 Typical application

GNSS Receiver offers 1PPS signal to CM30.

The MCU monitors the work state of CM30.



9. Mechanical Structure (mm)

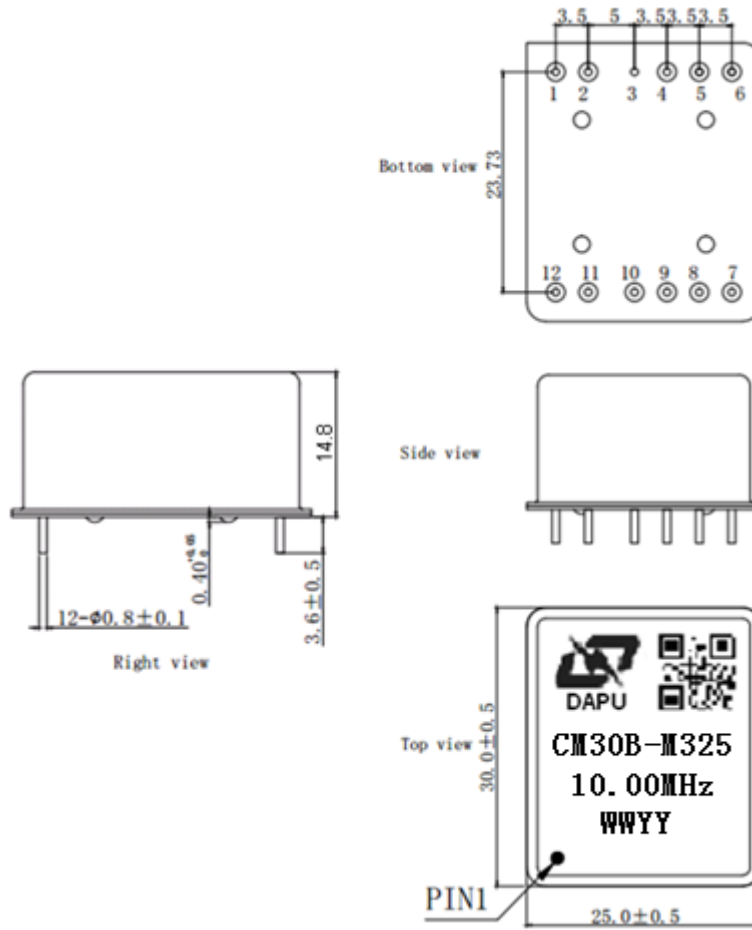


Figure 3 Mechanical structure

Note1: Tolerance ± 0.3 mm without mark.

Note2: WW represents Week.

YY represents Year.



10. Reflow Soldering Curve (RoHS)

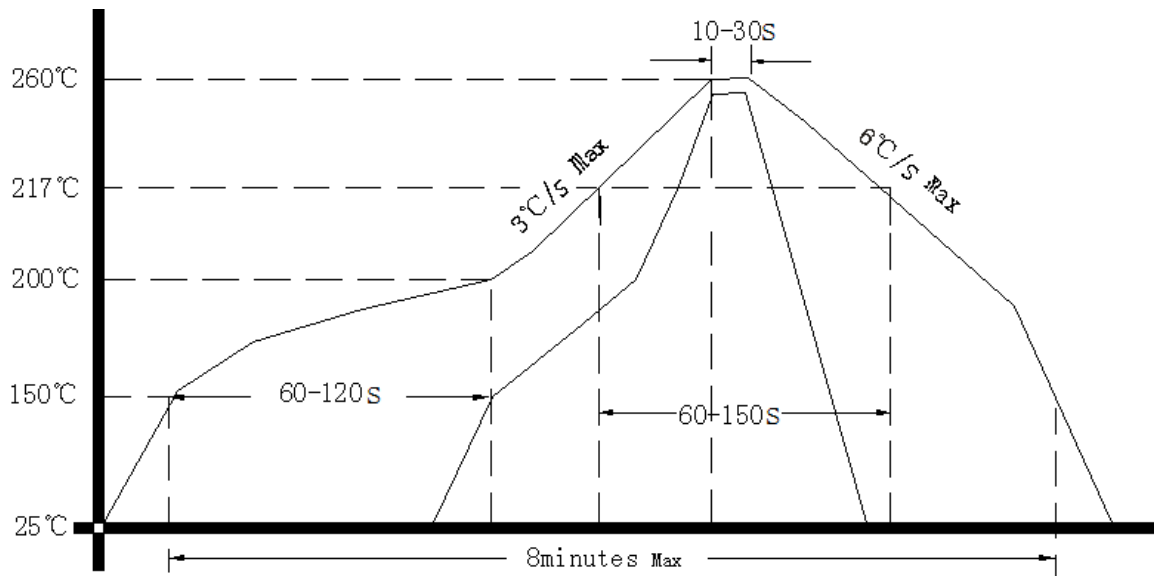


Figure 4 Reflow soldering curve

11. Package (mm)

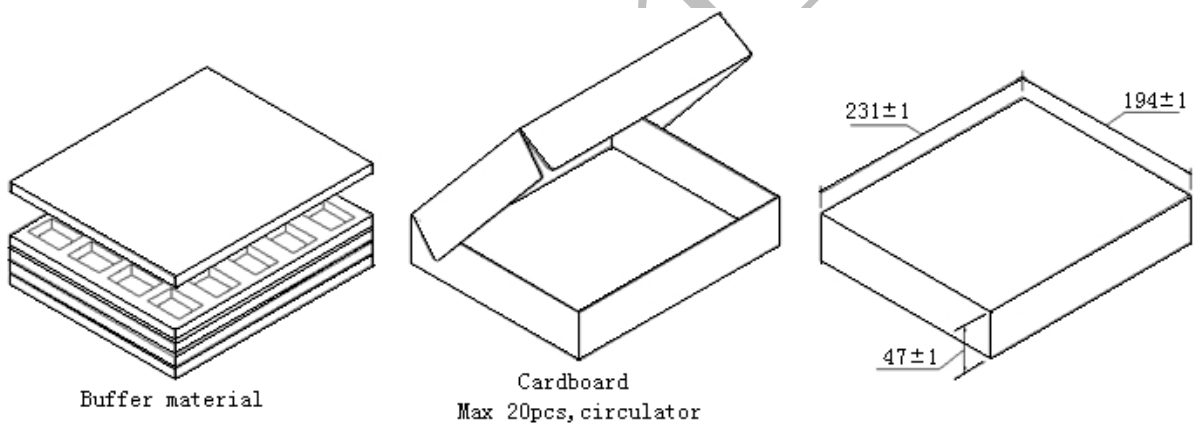


Figure 5 Package