

ISSUE 2; May 2017

Description

- A GNSS disciplined OCXO (GPSDO) incorporating sync to a 1pps input and 1pps output. Compatible with GPS, GLONASS, BEIDOU and GALILEO.

Holdover stability up to 1.5µs over 24hours, achieved using an adaptive algorithm.

Internal parameters of the algorithm, including maintenance alarms and message are available to the user via serial port.

Frequency stability better than 1E-12
- Application Information (Reference Drawing):

Connect the 1PPS output of your GPS system to the IQCM-200. A MCU can be used to monitor the working state of the IQCM-200.
- Working States (Reference Drawing):

Run1: Fast track. Adjust the OCXO 10MHz output frequency quickly to track the 1PPS to 10MHz with 1PPS reference.

Run2: Slow track. Adjust the OCXO 10MHz output frequency slowly when phase error is in the defined range.

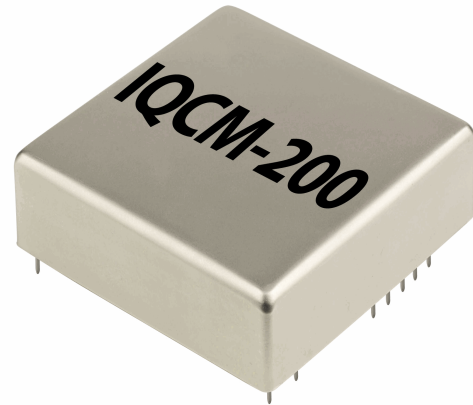
Holdover: No 1PPS input present; an algorithm enables adaptive modelling of the frequency stability of an OCXO with reference to the GPS timing signal.

Free Run: Clock module powered up with no 1PPS input.
- Note1: The IQCM-200 should be left powered and running for 7 days minimum before operation to allow for the OCXO's internal drift to stabilise.

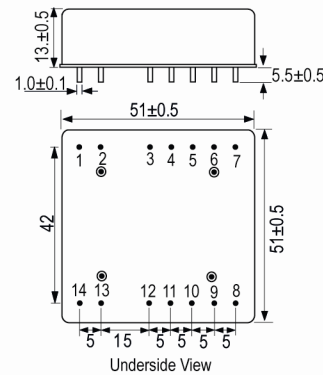
Note2: The adaptive module algorithm can be built after two days operation with good GPS signal, however this data will be lost at power down.

Note3: When State input (Pin 8) is set low the IQCM-200 will operate in Holdover mode regardless of the 1PPS signal condition.
- Output Data Word Example:

\$PDP,00,0,F,Q,-3095,32768.0000,32768.0000,000,000,00000.0000,00000.0000,00000.0000,00000.0000,3-23,+000.0000,-0000,www.iqdfp.com,1.1,2011-05-16*55

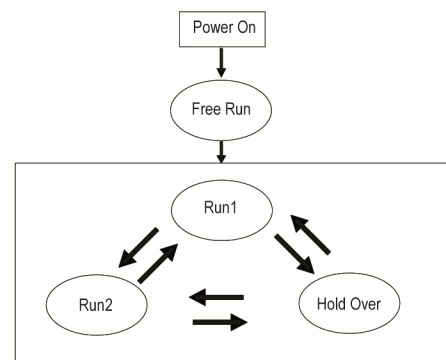


Outline (mm)



- Pin Connections
1. N/C
 2. N/C
 3. +Vs
 4. GND
 5. Lock Output
 6. RX Input
 7. TX Output
 8. State Input
 9. N/C
 10. 1PPS Input
 11. GND
 12. 1PPS Output
 13. GND
 14. 10MHz Output

Workflow Diagram



(See table for full description)

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Frequency Parameters

- Frequency 10.0MHz
 - 10MHz RF Output Details, Pin 14:
HCMOS Compatible, 15pF load
(Sinewave 50Ω option available)
VoH: 2.7V min
VoL: 0.4V max
Rise and Fall time: 8ns max
Duty Cycle: 45/55% max
Accuracy (24-hour averaging when locked to 1PPS): $\pm 1E-12$
Short Term Stability (tested after power for 1hr ref to 25°C, 1s, using PN9000 test equipment): $2E-11$ max
Ageing (Vs and temperature constant, reference to T=25°C, Vs = 5.0V and after 30 days operation): ± 0.2 ppb per day, ± 10 ppb per year
 - 24Hrs Holdover Capability
Reference 7 days powered on, 2 days GPS lock
Temperature varied $< 1^{\circ}\text{C}/\text{min}$ within operating temperature range
- | | |
|------------------------------------|----------------------|
| Total temperature change | Holdover capability |
| $\Delta T < \pm 2^{\circ}\text{C}$ | $\pm 1.5\mu\text{s}$ |

Note: Other options available on request

Electrical Parameters

- Supply Voltage 5.0V $\pm 5\%$
- Note: Pins 4 to 13 should not be subjected to a voltage greater 3.6V. If subjected to a higher voltage the processor will be damaged and the unit will not work correctly.
- 1PPS Reference Input, Pin 10 (15pF test condition):
Waveform: HCMOS
ViH: 2.7V min
ViL: 0.4V max
Pulse Width: 10us min
- State Input, Pin 8 (<5mA load):
Lock: 2.7V min
Unlock: 0.5V max
- Power Supply Details, Pin 3:
Supply Voltage: 5.0V $\pm 5\%$
Current Consumption: 1.4A during warm up, 600mA steady state @25°C
AC Ripple: 50mV pk-pk max, 10Hz to 1MHz

Operating Temperature Ranges

- -10 to 70°C

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Output Details

- Output Compatibility HCMOS
- 1PPS Reference Output, Pin 12 (50Ω test condition):
Waveform: HCMOS
VoH: 2.7V min
VoL: 0.4V max
Pulse Width: 10μs min
- Lock Status Indicator, Pin 5:
Module Locked: 2.7V min
Module Holdover: 0.4V max
Module Locked means Working State is = Run2
- Serial interface (Pin 6 and Pin 7)
UART
VoL and ViL: 0.4V max
VoH and ViH: 2.7V min
Baud rate: 9600
Bits: 8
Parity: N
Stop Bit: 1

Noise Parameters

- Phase Noise on 10MHz RF output signal (dBm/Hz)

| Offset | Typical | Max |
|--------|---------|------|
| 10Hz | -118 | -113 |
| 100Hz | -138 | -133 |
| 1kHz | -148 | -143 |
| 10kHz | -150 | -145 |
| 100kHz | -150 | -145 |
| 1MHz | -150 | -150 |

Environmental Parameters

- Operating Temperature Range: -10 to 70°C
- Storage Conditions:
Temperature: -55 to 105°C
Humidity: 30 to 80%
- Shock: IEC68-2-27 Test Ea, severity 50A, 50G 11ms half sinewave, 3 times in three mutually perpendicular axis
- Vibration: IEC 68-2-06 Test Fc, 10G, 0.75mm acceleration, 10Hz to 500Hz, 3 times in three mutually perpendicular axis

Manufacturing Details

- ESD Level:
ANSI/ESDA/JEDEC JS-001-2010; HBM Class 2; 2kV to 4kV
ANSI/ESDA/JEDEC JS-001-2010; Machine Model Class B
200V to 400V

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Ordering Information

- 10MHz Output Compatibility Options
 - HCMOS (Standard)
 - Sinewave
- Operating Temperature Range Options
 - 0 to 80°C
 - 10 to 70°C (Standard)
 Note: Holdover stability options will affect capability.
- Holdover Options ref 24hrs Holdover Period:

| | |
|-----------|---|
| Max error | Max temp change |
| ±1.5us | 0 to 60°C |
| ±8.0us | 0 to 60°C |
| ±1.5us | $\Delta T < \pm 5^\circ\text{C}$ |
| ±8.0us | $\Delta T < \pm 5^\circ\text{C}$ |
| ±1.5us | $\Delta T < \pm 2^\circ\text{C}$ (LTE-TDD compatible) |
| ±8.0us | $\Delta T < \pm 2^\circ\text{C}$ |
- Holdover Options ref 8hrs Holdover Period:

| | |
|-----------|----------------------------------|
| Max error | Max temp change |
| ±1.5us | $\Delta T < \pm 5^\circ\text{C}$ |
| ±8.0us | $\Delta T < \pm 5^\circ\text{C}$ |
| ±1.5us | $\Delta T < \pm 2^\circ\text{C}$ |
| ±8.0us | $\Delta T < \pm 2^\circ\text{C}$ |

 For other combinations please contact our sales offices

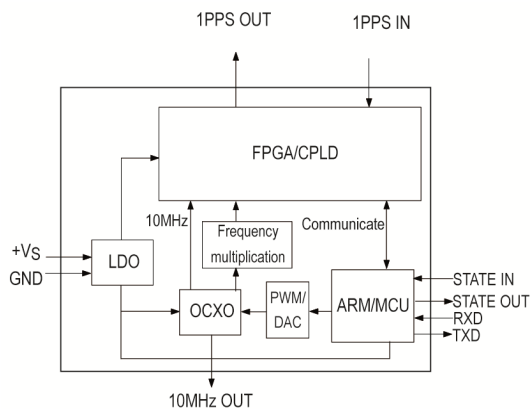
Compliance

- RoHS Status (2011/65/EU) Compliant
- REACH Status Compliant
- MSL Rating (JDEC-STD-033): Not Applicable

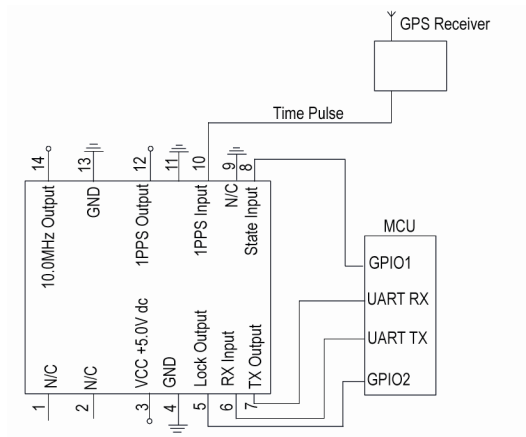
Packaging Details

- Pack Style: Bulk Loose in bulk pack
- Pack Size: 1

Functional Block Diagram



Application Information



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Output Data Word (Format Key: c=Character, d=Numerical Digit, s=Sign)

| Field No. | Name | Format | Description | Length |
|-----------|-------------|-----------|--|--------|
| 0 | \$PDP | \$ccc | Message ID, Protocol Header | 4 |
| 1 | No | dd | Message No | 2 |
| 2 | TxRxFlag | d | Transmit and Receive Flag (0=upper computer transmit, 1=upper computer receive) | 1 |
| 3 | CStatus | c | Current Status (F=warm up, L=lock, H=holdover) | 1 |
| 4 | TrackStatus | d | Track status (Q= fast track, S = slow track) | 1 |
| 5 | cPHDiff | sdddd | Current phase difference, 1 unit = 6.25ns | 5 |
| 6 | cPWM1 | dddd.dddd | Current PWM1 (Voltage control value1) | 10 |
| 7 | cPWM2 | dddd.dddd | Current PWM2 (Voltage Controlled Value 2), not used, default value =32769.000000 | 10 |
| 8 | SYNCNT | ddd | The synchronous times | 3 |
| 9 | HCNT | ddd | Power on hours count | 3 |
| 10 | HPAVG | dddd.dddd | The average of the PWM in the last half hour | 10 |
| 11 | VCH1 | dddd.dddd | Voltage Controlled compensation value every half hour | 10 |
| 12 | HPMOD | dddd.dddd | The Module PWM Value | 10 |
| 13 | VCM10 | dddd.dddd | Voltage controlled compensation value every 10mins | 10 |
| 14 | POS | d-dd | The position of the product. (Layer-No), just for the inner test. | 4 |
| 15 | inT | sdddd.ddd | NA | 9 |
| 16 | TcPHDiff | sdddd | The product current phase difference | 5 |
| 17 | Website | | www.IQDFP.com | 13 |
| 18 | Version | d.d | version | 3 |
| 19 | Date | ddd-dd-dd | Date | 10 |
| 20 | | dd | 55 | 2 |
| 21 | END | | <CR><LF> | 2 |

[Click for FOQs on IQD Advance Clock Modules](#)

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