

ISSUE 2; May 2017

### Description

- A GPS disciplined OCXO incorporating GPS receiver unit to give 1PPS and 10MHz output. Holdover stability up to 1.5µs over 24hrs is achieved using an adaptive algorithm. Standard NMEA0183 data is available to the user via a serial port. Frequency stability better than 1E-12.

Note: Non-GPS GNSS support is available upon request, please contact our Application Support department.
- Working States (Workflow Diagram):**

Run1: Fast track. Adjust the OCXO 10MHz output frequency quickly to track the GPS.

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

Holdover: No GPS 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 GPS input.
- NMEA Data Words:**

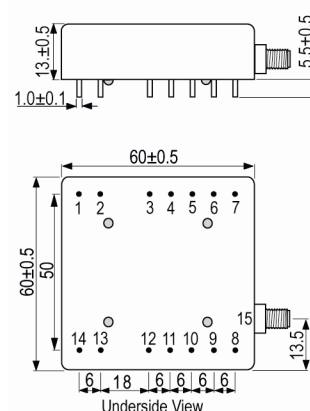
The following standard GNSS data is available to the user via the interface on Pin 6 and Pin 7: GPRMC, GPVTG, GPGGA, GPGSA, GPGSV, GPGLL, GPZDA. These are broadcast every second in sync with the 1PPS output.
- Note 1:** The IQCM-110 should be left powered and running for 7 days minimum before operation to allow for the OCXO's internal drift to stabilise.

**Note 2:** The adaptive module algorithm can be built after two days operation with good GPS signal, however this data will be lost at power down.

**Note 3:** When State Input (Pin 8) is set low the IQCM-110 will operate in Holdover mode regardless of the 1PPS signal condition.



### Outline (mm)



- Pin Connections**
1. N/C
  2. 10MHz OCXO Output
  3. 1PPS Output
  4. GND
  5. State Output
  6. RX Input
  7. TX Output
  8. State Input
  9. GND
  10. GPS 1PPS Output
  11. GND
  12. +Vs
  13. GND
  14. N/C
  15. SMA connector for GPS aerial

### Frequency Parameters

- Frequency: 10.0MHz
- 10MHz RF Output Details, Pin 2:**

HCMOS Compatible -

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): ±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): ±0.2ppb per day, ±10ppb per year
- 1PPS Output from internal GPS receiver, Pin 10, Phase Accuracy when locked to GPS:**

Initial Lock Status (<30mins locked to GPS): ±200ns max

Full Lock (>30mins locked to GPS): ±80ns max

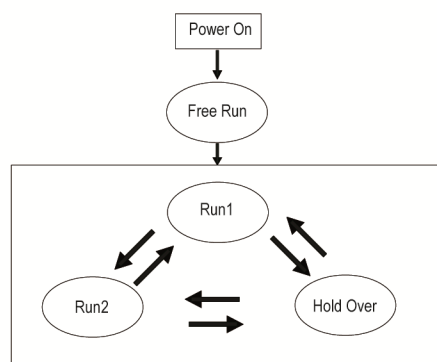
Steady Lock State (>24hrs GPS lock): 25ns RMS max
- 24hrs Holdover Capability:**

Reference 7 days powered on, 2 days GPS lock.

Temperature varied <1°C/min within operating temperature range.

Total Temperature Change	Holdover Capability
ΔT<±2°C	±1.5µs
- Note: Other options available on request, please contact our Application Support department.

### Workflow Diagram



### Sales Office Contact Details:

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### Electrical Parameters

- Supply Voltage 5.0V  $\pm$ 5%
- Note: Pins 3 to 11 and Pin 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 output from internal GPS receiver, Pin 10:  
Waveform: HCMOS  
Test Condition: 15pF  
ViH: 2.7V min  
ViL: 0.4V max  
Pulse Width: 100ms min
- State Input, Pin 8 (<5mA load):  
Lock: 2.7V min  
Unlock: 0.4V max  
Pin 8 has an internal pull-up cct.
- Power Supply Details, Pin 12:  
Supply Voltage: 5.0V  $\pm$ 5%  
Current Consumption: 2A during warm up, 1A steady state @ 25°C  
AC Ripple: 50mV pk-pk max, 10Hz to 1MHz
- GPS Internal Receiver Specification:  
Type: GPS Position Lock  
Number of Channels: 50  
Frequency Band: L1 (1575.42MHz)  
Tracking Code: C/A Code  
Tracking Capability: 12 Satellites  
Sensitivity: Tracking and Navigation 162dBm  
Reacquisition -157dBm  
Cold Start (autonomous) -148dBm  
Antenna Input SMA-KE (active antenna recommended)

### Operating Temperature Ranges

- -20 to 75°C

### Output Details

- Output Compatability HCMOS
- Note: Sinewave 50Ω option available on request, please contact our Application Support department.
- 1PPS Reference Output, Pin 3 (15pF test condition):  
Waveform: HCMOS  
VoH: 2.7V min  
VoL: 0.4V max  
Pulse Width: 100ms min
- Lock Status Indicator, Pin 5:  
Module Locked: 2.7V min  
Module Holdover: 0.4V max  
Module Locked means Working State is = Run2  
Current: 5mA max
- Serial Interface (Pin 6 and Pin 7):  
NMEA-0183  
VoL and ViL: 0.4V max  
VoH and ViH: 2.7V min  
Baud rate: 9600  
Bits: 8  
Parity: N  
Stop Bit: 1

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### 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: -20 to 75°C
- Storage Conditions:
  - Temperature: -55 to 105°C
  - Humidity: 30 to 80%
- Shock: IEC 68-2-27 Test Ea, Severity 50A: 50G 11ms half sinewave, 3 times in three mutually perpendicular planes.
- Vibration: IEC 68-2-06, Test Fc: 10G, 0.75mm acceleration, 10Hz to 500Hz, 3 times in three mutually perpendicular planes.

### Manufacturing Details

- ESD Levels: ANSI/ESDA/JEDEC JS-001-2010:
  - Human Body Model, Class 2: 2000V to 4000V
  - Machine Model, Class B: 200V to 400V

### Ordering Information

- 10MHz Output Compatibility Options:
  - HCMOS (standard)
  - Sinewave
- Operating Temperature Range Options:
  - 20 to 75°C (standard)
  - 40 to 85°C

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	ΔT<±5°C
±8.0us	ΔT<±5°C
±1.5us	ΔT<±2°C (LTE-TDD compatible)
±8.0us	ΔT<±2°C
- Holdover Options ref 8hrs Holdover Period:

Max error	Max temp change
±1.5us	ΔT<±5°C
±8.0us	ΔT<±5°C
±1.5us	ΔT<±2°C
±8.0us	ΔT<±2°C
- Note that for other combinations please contact our Application Support department.

### Compliance

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

### Packaging Details

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

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