



## Description

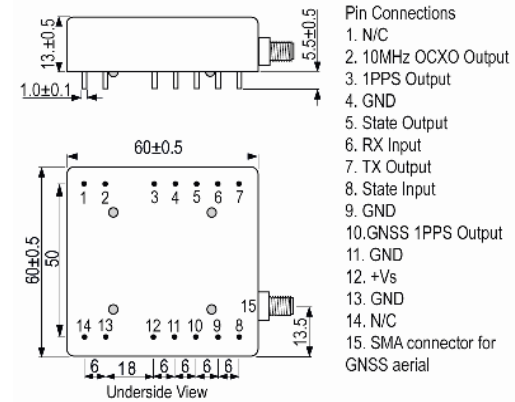
- A disciplined OCXO incorporating a GNSS receiver unit to give 1PPS and 10MHz output. With 1.5µs holdover stability achieved by using an adaptive algorithm. Standard NMEA0183 data is available to the user via a serial port.
- Model **IQCM-112**
- Model Issue number **1**
- Working States (Workflow Diagram):
  - Run1: Fast track. Adjust the OCXO 10MHz output frequency quickly to track the GNSS.
  - Run2: Slow track. Adjust the OCXO 10MHz output frequency slowly when phase error is in the defined range.
  - Holdover: No GNSS input present; an algorithm enables adaptive modelling of the frequency stability of an OCXO with reference to the GNSS timing signal.
  - Free Run: Clock module powered up with no GNSS input.
- NMEA Data Words: GNSS data is available to the user via the interface on Pin 6 and Pin 7. These are broadcast every second in sync with the 1PPS output.
- Note 1: The IQCM-112 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 3 days operation with good GNSS signal, however this data will be lost at power down.  
 Note 3: When State Input (Pin 8) is set low the IQCM-112 will operate in Holdover mode regardless of the 1PPS signal condition.

## Frequency Parameters

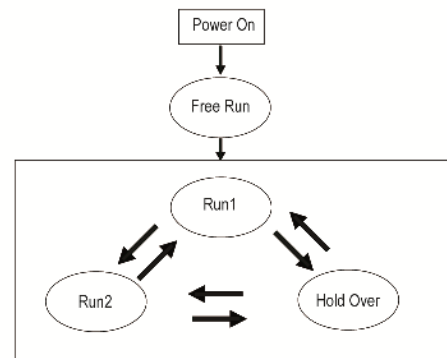
- Frequency **10.0MHz**
- Operating Temperature Range **-20.00 to 75.00°C**
- 10MHz RF Output Details, Pin 2:
  - HCMOS Compatible -
  - VoH: 2.7V min
  - VoL: 0.4V max
  - Rise and Fall Time: 8ns max
  - Duty Cycle: 45/55% max
  - Accuracy (24-hour averaging when locked to 1PPS): ±1ppt
  - Short Term Stability (tested after power for 1hr ref to 25°C, 1s, using PN9000 test equipment): 0.02ppb.
  - 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 GNSS receiver, Pin 10, Phase Accuracy when locked to GNSS:
  - Initial Lock Status (<30mins locked to GNSS): ±200ns max
  - Full Lock (>30mins locked to GNSS): ±80ns max
  - Steady Lock State (>24hrs GNSS lock): 25ns RMS max



## Outline (mm)



## Workflow Diagram



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**Electrical Parameters**

- Supply Voltage 5.0V ±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 GNSS 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 Enable: if left unconnected (internal pull-up cct) or logic high (2.7V min) is applied to pin 8 then the device will operate normally and lock when appropriate.  
Lock Disable: If logic low (0.4V max) is applied to pin 8 then the device cannot be locked.
- Power Supply Details, Pin 12:  
Supply Voltage: 5.0V ±5%  
Current Consumption: 2A during warm up, 1A steady state @ 25°C  
AC Ripple: 50mV pk-pk max, 10Hz to 1MHz
- GNSS Internal Receiver Specification:  
Type: GNSS Position Lock  
Number of Channels: 50  
Frequency Band: L1 (1575.42MHz)  
Tracking Code: C/A Code  
Tracking Capability: 12 Satellites  
Sensitivity: Tracking and Navigation -159dBm  
Reacquisition -144dBm  
Cold Start (autonomous) -148dBm  
Antenna Input SMA-KE (active antenna recommended)

**Output Details**

- Output Compatibility HCMOS
- 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**

- Storage 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

**Compliance**

- RoHS Status (2015/863/EU)      Compliant
- REACH Status                      Compliant
- MSL Rating (JDEC-STD-033):      Not Applicable

**Packaging Details**

- Pack Style: Bulk      Loose in bulk pack  
Pack Size: 1
- Alternative packing option available*

**Technical Notes**

- Holdover stability 1.5µs in 24hrs ref ±5°C*

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