GPS Disciplined 10 MHz Reference Generator GPSD-2 Rev 1.0

The GPS Disciplined Reference Generator **GPSD-2,** a leaded component version of the popular GPS disciplined microprocessor supervised 10MHz OCXO, is designed to provide accurate and stable frequency locking for microwave digital phase locked loops, VHF/UHF radios, and test equipment. Four sine wave outputs are provided. The module operates over a wide range of supply voltages. Once calibrated by GPS disciplining, the GPSD-2 module maintains the same accuracy and stability as its OCXO module and will hold its calibration for up to 12 months.

The module is based on a CTI OSC5AB02 oven-controlled crystal oscillator OCXO, square wave, operating at 5V. The inherent OCXO has a warm-up time is less than 2 mins and stability is better han 10 ppb (±0.1Hz) at 0°C to 45°C. Phase noise is -80dBc/Hz@1Hz, -120dBc/Hz@10Hz, -140dBc/Hz@100Hz, -145dBc/Hz@ 1kHz, -150dBc/Hz.

The module may be configured for sine or square wave outputs of more than 0 dBm. Four SMA outputs are available along the back panel of the enclosure.

The GPSD-2 uses a u-blox GPS receiver and an Arduino Nano microprocessor to supervise and discipline the highly stable OCXO.

The module operates from a supply of 12 to 28V dc. At 12V the current drain at start-up is less than 0.6A. When settled, the current drain at 12V is less than 300mA and at 26V is less than 200mA.

The GPS receiver warm starts in seconds after which the precision 1PPS pulse is used to measure the frequency of the OCXO. After a few minutes delay for warm-up, the EEPROM stored is applied to set the OCXO to frequency. The frequency is then measured over 30 second intervals and, if necessary, corrections applied to correct the accuracy. After the initial warmup time, the frequency is measured over longer periods and fine corrections applied, if required. These small corrections will not affect the performance of digital protocols.

The status of the GPS disciplined OCXO is displayed on four LEDs:

- Power (Green) indicates unit is operating;
- 1PPS (Blue) indicates GPS receiver is locked and producing 1PPS timing pulses;
- Warn (Red) is lit steady during timed warm-up and flashes long during coarse discipline, then fast during fine discipline, and then goes out when accurate and stable ± 0.1Hz (± 10ppb);
- OK (Green) indicates the reference is GPS locked.

The GPS is configured to send NMEA sentences at 9600 baud via serial USB on the processor and quasi-RS-232 via a 3.5mm phone jack. The RMC, GGA, and GSV sentences may be connected to a personal computer for time synchronisation, grid square calculations, or beam headings. The RS-232 will synchronise radios such as the IC9700 for time and position.

Enclosure is an aluminium extruded enclosure 120 x 85 x 40 mm.

For What makes GPSD-2 Different? See https://vk4amg.blog/what-makes-gpsd-2-different/

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Specifications

Frequency	10	MHz	
Waveform	Sine		Square selectable all
Number of Outputs	4		SMA
Output level	> 0	dBm	3dBm typical
OCXO	OSC5AB02	CTI	Square wave 5V
Warm-up	2	min	typical
GPS Receiver	Neo 6	u-blox	6M 0.001
Antenna (not supplied)	> 15dBG	< 1.5dBF	+3V3 active
Time to lock	< 30	secs	warm start
GPS NEMA sentences	USB serial and quasi RS-232		RMC, GGA, GSV
Stability	< 10	pbb	after warm-up
	<5	pbb	disciplined
Accuracy (No GPS)	< 100	ppb	after warm-up
Accuracy (GPS)	< 100	ppb	after first start
	< 50	ppb	coarse discipline
	< 10	ppb	fine discipline
	< 5	ppb	disciplined
Power Supply	12 - 26	Vdc	
	At switch-on		5V 1A max
Consumption	500	mA	@12V
	300	mA	@26V
	After warm-up		
	150	mA	@12V
	250	mA	@26V
Phase Noise	-80	dBc/Hz	@1Hz
	-120	dBc/Hz	@10Hz
	-140	dBc/Hz	@100Hz
	-145	dBc/Hz	@1kHz
	-150	dBc/Hz	@10kHz
Output Connectors	SMA		
Power Connector	DC 2.1 jack		Lead supplied
Indicators LED	Green	Power	Supply On
	Blue	1PPS	Flashing GPS locked
	Red	Warn	Continuous not ready
			Slow Flash - coarse
			Fast Flash - fine
			Extinguished - Locked
	Green	OK	On frequency
Enclosure	Aluminium	extrusion	
	120 x 85 x 40	mm	L x W x D