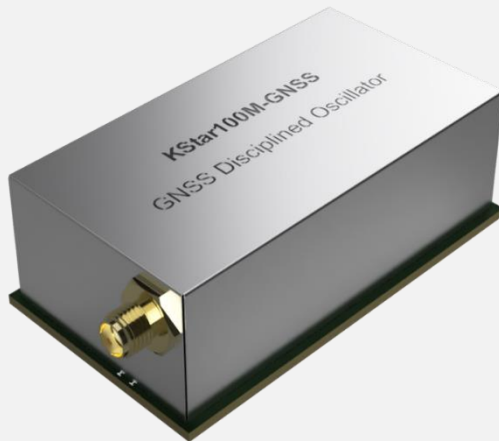


# KStar100M-GNSS

## GNSS Disciplined Oscillator Module

High Precision, Functional Flexible Oscillator



Holdover <  $\pm 1.5\mu\text{s}$  over 24 hours

The KStar100M-GNSS GNSSDO is time and frequency synchronized to GNSS and provides a low noise 10MHz and a 1PPS outputs. It receives GNSS signals with a sensitivity of down to -167dBm. With a long-term frequency stability that shows deviations of less than  $1\text{E}-12$ . The new KStar achieves the quality standards of Stratum 2 of the Network Time Protocol and ITU-T Type II (G.812) of the International Telecommunication Union.

While temperature variation and aging of the core crystal impact the accuracy of traditional GNSSDOs when there is outage in GNSS-signal, the KStar GNSSDO is able to learn and compensate the influence of temperature and aging characteristics by the advanced AOM system modeling algorithm. As a result the holdover performance for the 1PPS output is better than  $\pm 1.5\mu\text{s}$  accuracy over 24 hours under temperature variation of up to  $20^\circ\text{C}$ .

### Key Features

- Support GPS, GLONASS, BeiDou & Galileo
- Better than  $1\text{E}-12$  long term frequency stability
- Holdover of less than  $\pm 1.5\mu\text{s}$  over 24 hours at  $20^\circ\text{C}$  temperature variations
- Fast frequency locking time as Stratum 2 clock source
- Compact form factor in 72x41x22 mm

### Applications

- Stratum 2 (Type II) Clock Source
- WiMAX/LTE Mobile Base Station
- 5G/4G LTE-TDD and LTE-FDD
- Precision Time Base Reference
- General Timing and Synchronization



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## GNSS Receiver

GNSS Receiver				
Bands		GPS L1C/A, SBAS L1C/A, QZSS L1C/A, QZSS L1 SAIF, GLONASS L1OF, BeiDou B1, Galileo E1B/C		
Channels		32		
Sensitivity		GPS	Tracking	-166 dBm
			Acquisition	-157 dBm
		GLONASS	Tracking	-166 dBm
			Acquisition	-151 dBm
		BeiDou	Tracking	-159 dBm
			Acquisition	-146 dBm
		Galileo	Tracking	-159 dBm
			Acquisition	-142 dBm
Antenna Connector		SMA		
Antenna Impedance		50 Ω		
Antenna Bias Voltage		3.3 V		

GNSS Antenna (Optional)				
Bias Voltage		3.3		V
Gain		28		dBi
Cable Type		RG58		
Material		PVC		
Connector		SMA male		
Cable Length		10		meter
		Other length available upon request		
Dimensions		Antenna Diameter	95	mm
		Mount Diameter	105	mm
		Height	175	mm

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## Technical Specifications

	Parameters	Conditions	Min	Typ	Max	Unit
Environment	Operating Temperature		-20		+70	°C
	Storage Temperature		-40		+85	°C
	Operation Humidity				+85	%R.H.
Power	Supply Voltage		4.75	5.0	5.25	V (DC)
	Start Up Current				1300	mA
	Steady State Current	@ 25 °C			700	mA
1PPS Output	Output voltage high	LVC MOS, I <sub>OH</sub> = -12mA	2.4			V
	Output voltage low	LVC MOS, I <sub>OL</sub> = 12mA			0.7	V
	Nominal output impedance			50		Ω
	Programmable Duty Cycle		10		90	%
	Rising / Falling Time	5pF load		0.7	1	ns
	Accuracy	Locked to GNSS			± 10	ns
	Stability	Locked to GNSS			± 4	ns
Holdover Accuracy	over 24 hours, ±10°C temperature variation			± 1.5	us	
10MHz Output	Output voltage high	LVC MOS, I <sub>OH</sub> = -12mA	2.4			V
	Output voltage low	LVC MOS, I <sub>OL</sub> = 12mA			0.7	V
	Nominal output impedance			50		Ω
	Duty Cycle		45		55	%
	Rising / Falling Time	5pF load		0.7	1	ns
	Long Term Stability	Locked to GNSS, 24 hours average			±1E-12	
	Allan Deviation (ADEV)	Locked to GNSS, at τ=1sec.			5E-11	
Lock Time	Power On to Lock (< 0.5 ppb)			< 5		min
	Holdover to Lock (< 0.5 ppb)			< 3		min
Communication Interface	UART	115200-8-N-1				
Protocol	Proprietary ASCII Commands					
Compliances	Frequency Accuracy & Holdover	ITU-T G.812				

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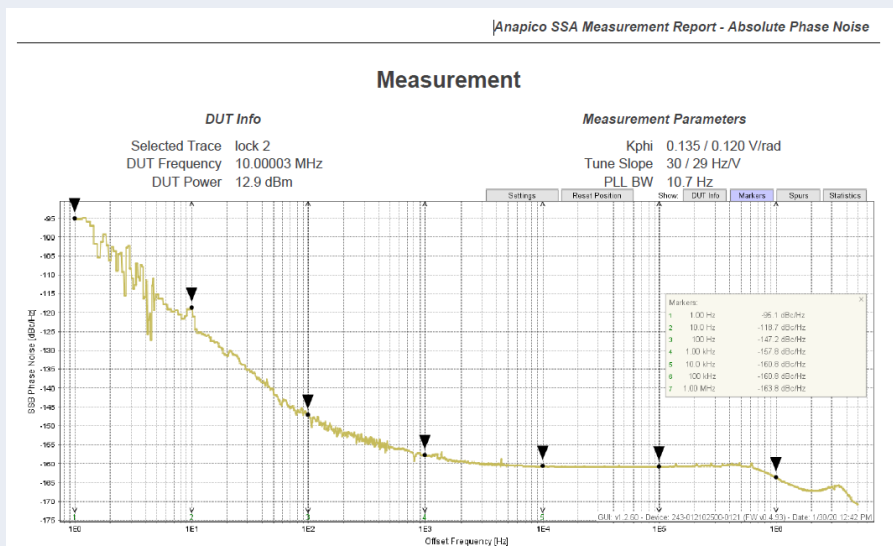


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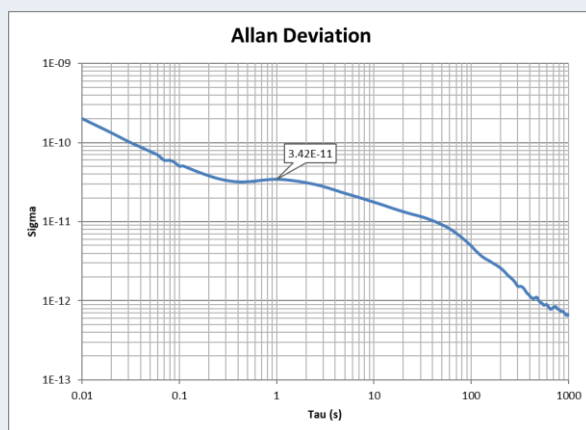
## Stability Performance

	Offset Frequency (Hz)	Phase Noise max. (dBc/Hz)
Phase Noise at 10MHz Output (tracking to GNSS)	1	-95
	10	-118
	100	-145
	1K	-155
	10K	-158
	100K	-158
	1M	-158



Short Term Stability (ADEV)

5E-11 at  $\tau = 1$  sec



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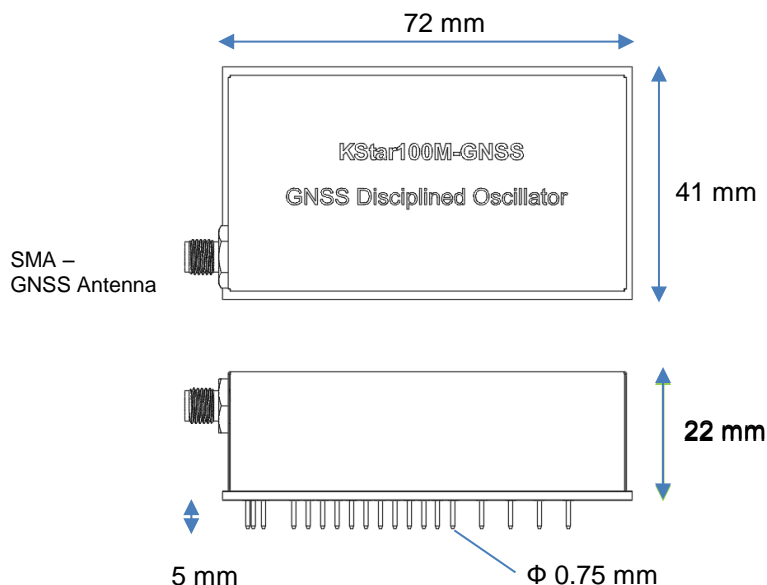


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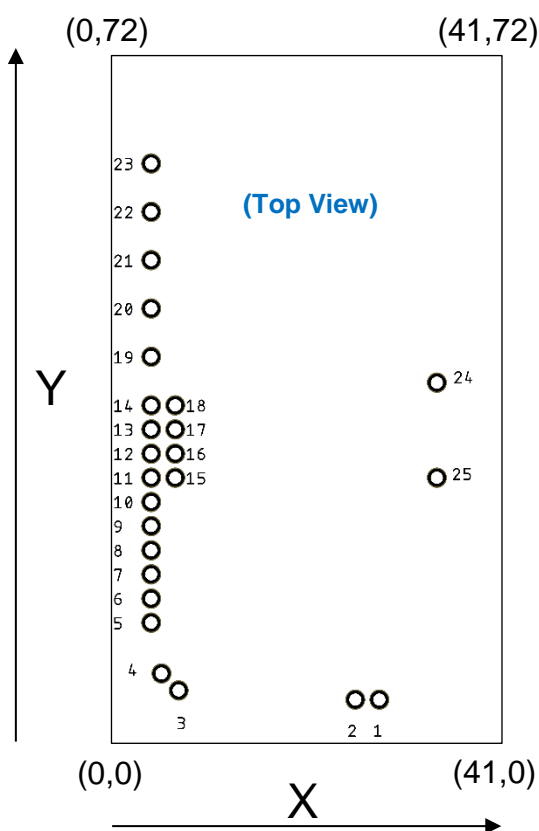


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## Dimensions



## Pin Coordinates



Pin	Signal Type	Function	X (mm)	Y (mm)
1	Gnd	GND	28.3	4.45
2	Supply Voltage	+5V	25.76	4.45
3	Gnd	GND	7.19	5.41
4	No Connection		5.4	7.2
5	Output	1PPS Output	4.3	12.53
6	Input	Reset	4.3	15.07
7	Output	UART TxD	4.3	17.61
8	Input	UART RxD	4.3	20.15
9	Output	PLL Locked	4.3	22.69
10	Input	Forced Holdover	4.3	25.23
11	Output	Holdover	4.3	27.77
12	Output	Alarm	4.3	30.31
13	Do Not Connect	Reserved for Factory Use	4.3	32.85
14	Do Not Connect	Reserved for Factory Use	4.3	35.39
15	Do Not Connect	Reserved for Factory Use	6.84	27.77
16	Do Not Connect	Reserved for Factory Use	6.84	30.31
17	No Connection		6.84	32.85
18	Gnd	GND	6.84	35.39
19	Output	10MHz Output #1	4.3	40.47
20	Do Not Connect	Reserved for Factory Use	4.3	45.55
21	Gnd	GND	4.3	50.63
22	Gnd	GND	4.3	55.71
23	Gnd	GND	4.3	60.79
24	Gnd	GND	34.34	37.77
25	Gnd	GND	34.34	27.77

All dimensions are in millimeter (mm)

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## Extension Board (Optional)

An Extension Board is available for easy evaluation of KSTAR modules. It extends the pin connections from the module to SMA connectors and headers on the extension board, and optionally provides additional features as below:



### Programmable Frequency Dual Synthesizer Output (optional)

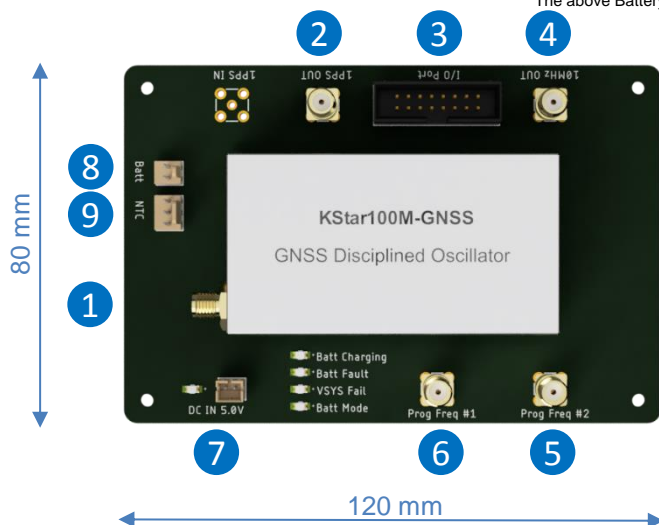
	Min	Typ	Max	Unit
Output #1	1		200	MHz
Output #2	1		200	MHz
Duty Cycle	40	50	60	%
VOH	2.4		3.3	V
VOL			0.45	V
Nominal Output Impedance		50		$\Omega$
Accuracy			50	ppb
Phase Jitter (RMS)		0.5		ps



### Batteries Backup (optional)

	Conditions	Min	Typ	Max	Unit
Battery type			Lithium		
Voltage	1. Connected USB, ref, 1PPS and 10MHz.		3.7		V
Capacity	2. Temperature at 25°C.		4.4		AH
Backup Time	3. Without synthesizer option.		3		Hours

The above Battery life test is used for reference information only, values not guaranteed.



- 1 SMA - GNSS Antenna
- 2 SMA - 1PPS Output
- 3 2 x 8 Header – User I/Os (UART)
- 4 SMA – 10MHz Output
- 5 SMA – Programming Freq. Output #1
- 6 SMA – Programming Freq. Output #2
- 7 2 x 1 Header – Power Input
- 8 2 x 1 Header – Li-Ion / LiFePO4 Battery
- 9 3 x 1 Header – Battery NTC Input

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