

KStar100 GNSS Disciplined Oscillator

High Precision, Functional Flexible Oscillator



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

The KStar series 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°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°C temperature variations
- Fast frequency locking time as Stratum 2 clock source
- Multiple outputs
- USB / Ethernet interface

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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Specifications

GNSS

GNSS Reception Capability	GPS L1C/A, SBAS L1C/A, QZSS L1C/A, QZSS L1 SAIF, GLONASS L1OF, BeiDou B1, Galileo E1B/C		
GNSS Reception	32 channels		
GNSS 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	
GNSS Antenna Connector	TNC		
GNSS Antenna Impedance	50 Ω		
GNSS Antenna Bias	3.3 V		

Lock Time

Power On to Lock (< 0.5 ppb)	< 5min. (TYP)
Holdover to Lock (< 0.5 ppb)	< 3min. (TYP)

Holdover

Time Accuracy to UTC (within 24-hour / $\pm 10^{\circ}\text{C}$ temperature variations)	$\pm 1.5 \mu\text{s}$ (TYP)
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Computer Interface

USB Version 2.0	Type-B Receptacle, Virtual COM Driver, 115200-8-N-1
Ethernet (Optional)	RJ-45, TCP/IP, 100 BASE-T

Protocol

NMEA 0183 Standard Ver 4.10
Proprietary ASCII command

Compliances

Frequency Accuracy & Holdover	ITU-T G.812
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Specifications

1PPS Output	Condition	Min.	Typ.	Max.	Unit
Output voltage high	LVC MOS, IOH = -12mA	2.4			V
Output voltage low	LVC MOS, IOH = 12mA			0.7	V
Nominal Output Impedance			50		Ω
Programmable Duty		10		90	%
Rising/Falling Time	5pF load		0.7	1	ns
Accuracy @ Lock				± 10	ns
Stability @ Lock				± 4	ns
Accuracy @Holdover				$\pm 1.5\mu\text{s} / 24\text{H}$	ns

10MHz Output (LVC MOS)	Condition	Min.	Typ.	Max.	Unit
Output voltage high	LVC MOS, IOH = -12mA	2.4			V
Output voltage low	LVC MOS, IOH = 12mA			0.7	V
Nominal Output Impedance			50		Ω
Duty		45		55	%
Rising/Falling Time	5pF load		0.7	1	ns
Long Term Stability (24h average) @ Lock				$\pm 1 \times 10^{-12}$	
Short Term Stability (Allan deviation $\tau=1\text{sec.}$) @ Lock				5×10^{-11}	

Environment	Min.	Typ.	Max.	Unit
Operating temperature	-20		+70	$^{\circ}\text{C}$
Storage temperature	-40		+85	$^{\circ}\text{C}$
Operation humidity			+85	%R.H

Power	Min.	Typ.	Max.	Unit
Supply Voltage	4.75	5.0	5.25	VDC
Warm Up			1300	mA
Steady State @ 25 $^{\circ}\text{C}$			700	mA
Connector	2.5mm DC Power Socket with Lock			

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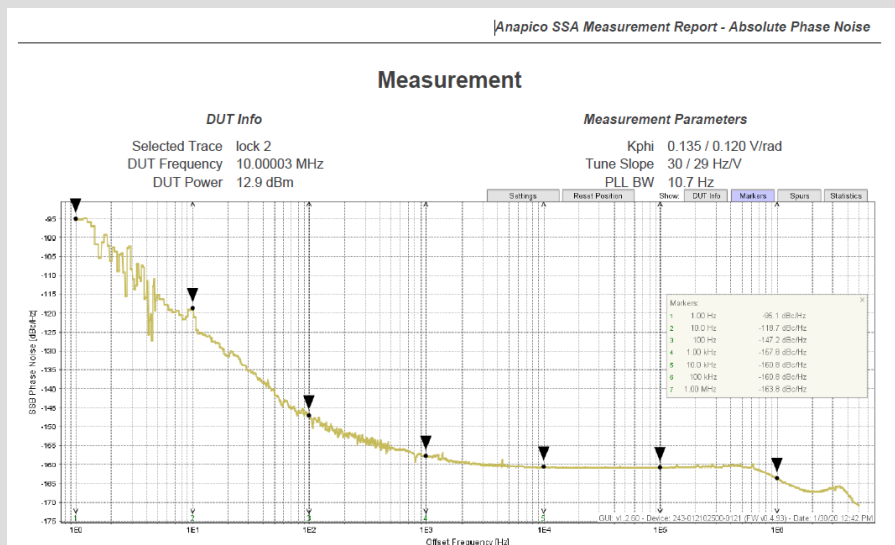


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Specifications

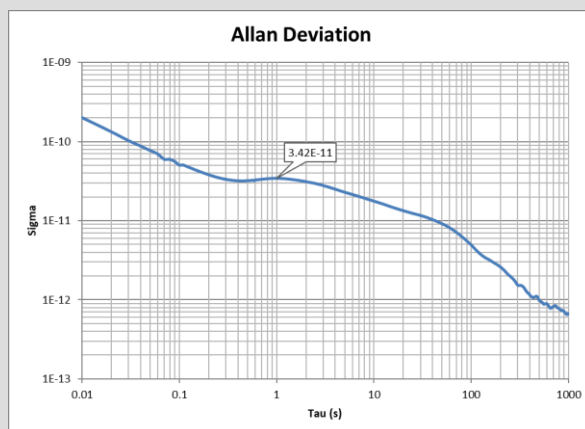
Phase Noise at RF Output (at GNSS locked)

Offset Frequency	Phase Noise max
1Hz	-95 dBc/Hz
10Hz	-118 dBc/Hz
100Hz	-145 dBc/Hz
1KHz	-155 dBc/Hz
10KHz	-158 dBc/Hz
100KHz	-158 dBc/Hz
1MHz	-158 dBc/Hz



Short Term Stability

Tau (sec)	1
Allan Deviation (Sigma)	5×10^{-11}



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Accessories

GNSS Antenna		Typ.	Unit
Bias Voltage		3.3	V
Gain		28	dBi
Cable Type		RG58	
Material		PVC	
Connector		TNC male	
Cable Length		10 Other lengths available upon request	meter
Dimensions		Antenna Diameter : Mount Diameter : Height :	95 mm 105 mm 175 mm

Optional Features



Programmable Frequency Synthesizer Output

	Min.	Typ.	Max.	Unit
Output Frequency	1		200	MHz
Duty	40	50	60	%
VOH	2.4		3.3	V
VOL			0.45	V
Nominal Output Impedance		50		Ω
Accuracy			50	ppb
Typical Phase Jitter on outputs (RMS)		0.5		ps



Uninterruptible Batteries Backup

Batteries Backup Time	3	hour
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Testing Condition

1. Connected USB, GNSS Antenna, 1PPS and 10MHz
2. Temperature at 25 °C
3. No programmable frequency option

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

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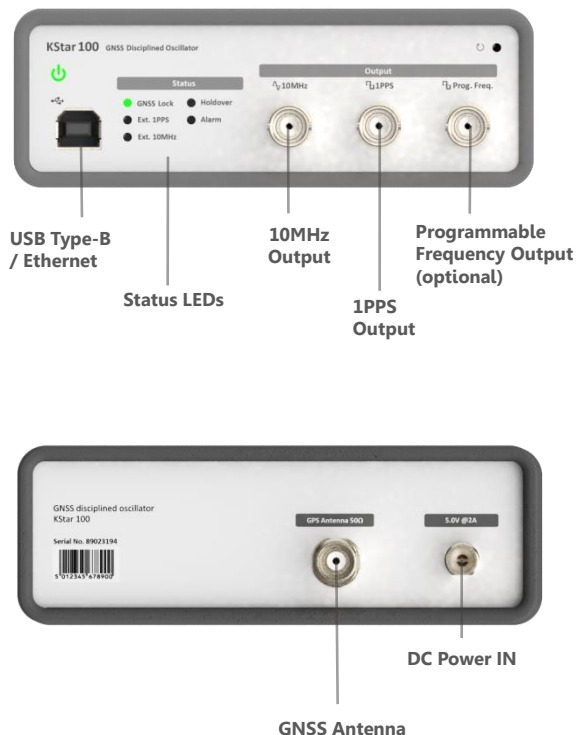
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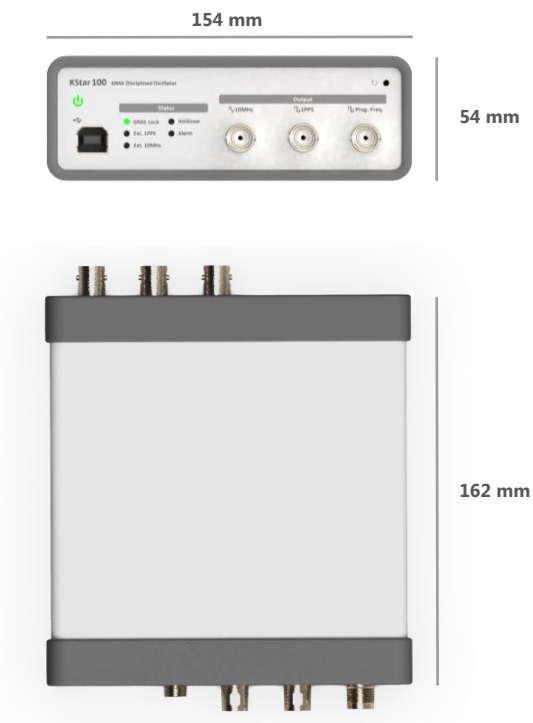
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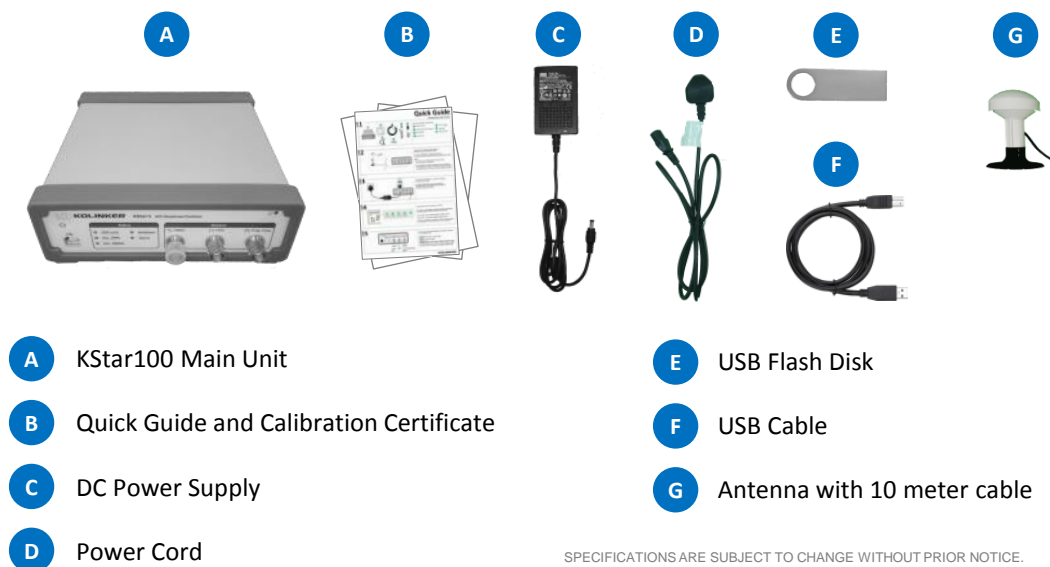
Signal Connections



Dimension



Standard Package



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