

KStar100M-1PPS

Disciplined Oscillator Module

High Precision, Functional Flexible Oscillator



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

The KStar100M-1PPS module is phase and frequency synchronized to external 1PPS reference, and provides a low noise 10MHz and a 1PPS outputs. 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 disciplined oscillator when there is outage in reference signal, the KStar100M-1PPS 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 1PPS signal from any GNSS receivers
- Reject phase jitter from the external 1PPS
- 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
- 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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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 Reference Input	High level input voltage	LVTTTL level	2.4			V
	Low level input voltage	LVTTTL Level			1.0	V
	Duty Cycle		5		90	%
1PPS Output	Output voltage high	LVC MOS, $I_{OH} = -12\text{mA}$	2.4			V
	Output voltage low	LVC MOS, $I_{OL} = 12\text{mA}$			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 1PPS Reference Input			± 10	ns
	Stability	Locked to 1PPS Reference Input			± 4	ns
	Holdover Accuracy	over 24 hours, $\pm 10^\circ\text{C}$ temperature variation			± 1.5	us
10MHz Output	Output voltage high	LVC MOS, $I_O = -12\text{mA}$	2.4			V
	Output voltage low	LVC MOS, $I_O = 12\text{mA}$			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 1PPS Reference Input, 24 hours average			$\pm 1\text{E}-12$	
	Allan Deviation (ADEV)	Locked to 1PPS Reference Input, at $\tau=1\text{sec}$.			$5\text{E}-11$	
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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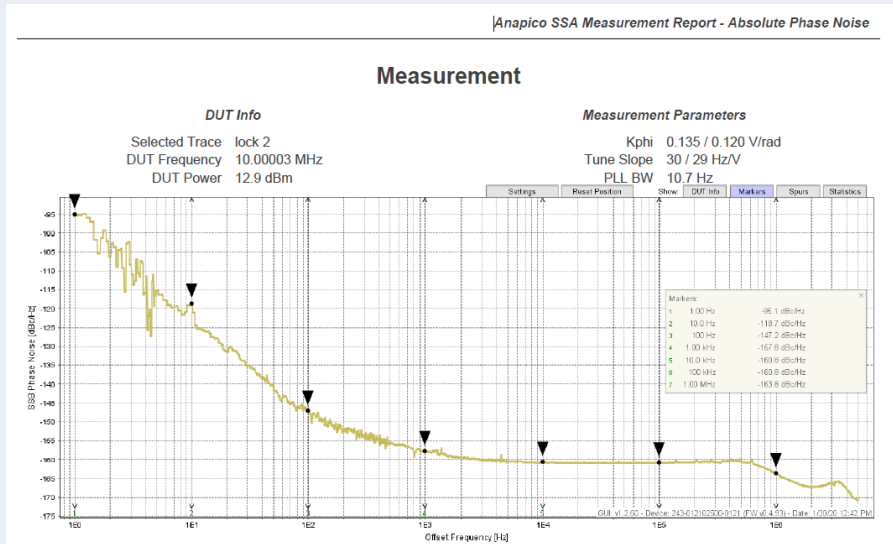


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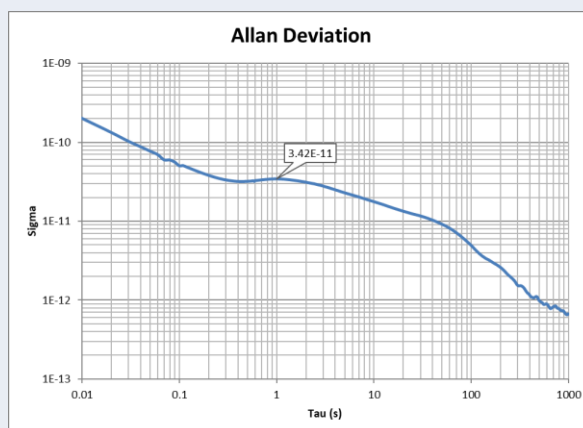
Stability Performance

	Offset Frequency (Hz)	Phase Noise max. (dBc/Hz)
Phase Noise at 10MHz Output (tracking to 1PPS Reference Input)	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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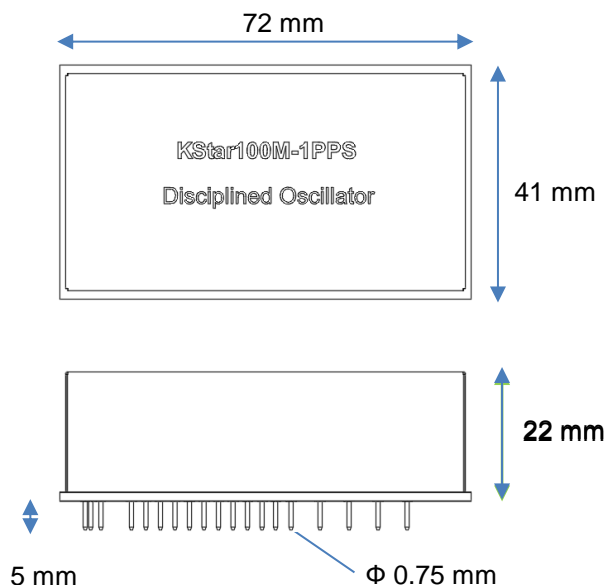


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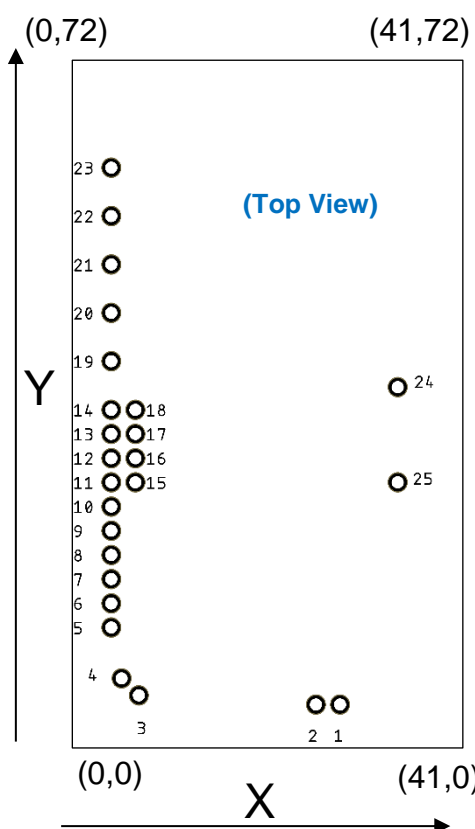


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Dimensions



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	Input	1PPS Reference IN	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)

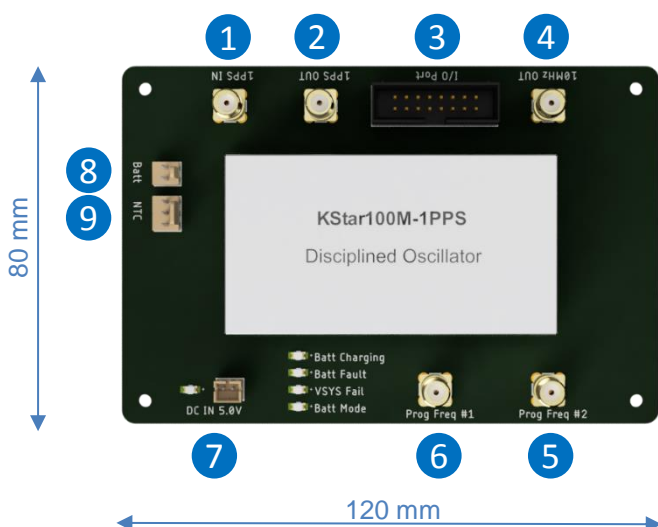
	Min	Typ	Max	Unit
Output #1	1		200	MHz
Output #2	1		200	MHz
Duty Cycle	40	50	60	%
VOH	2.4		3.3	V
VOL			0.45	V
Nominal Output Impedance		50		Ω
Accuracy			50	ppb
Phase Jitter (RMS)		0.5		ps



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 – 1PPS Reference Input
- 2 SMA - 1PPS Output
- 3 2 x 8 Header – User I/Os
- 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 – Lithium Battery
- 9 3 x 1 Header – Battery NTC Input

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