DS-3020

Spectrum SeriesTM Synthesizers
Ultra-Low Phase Noise, 0.1 - 20 GHz

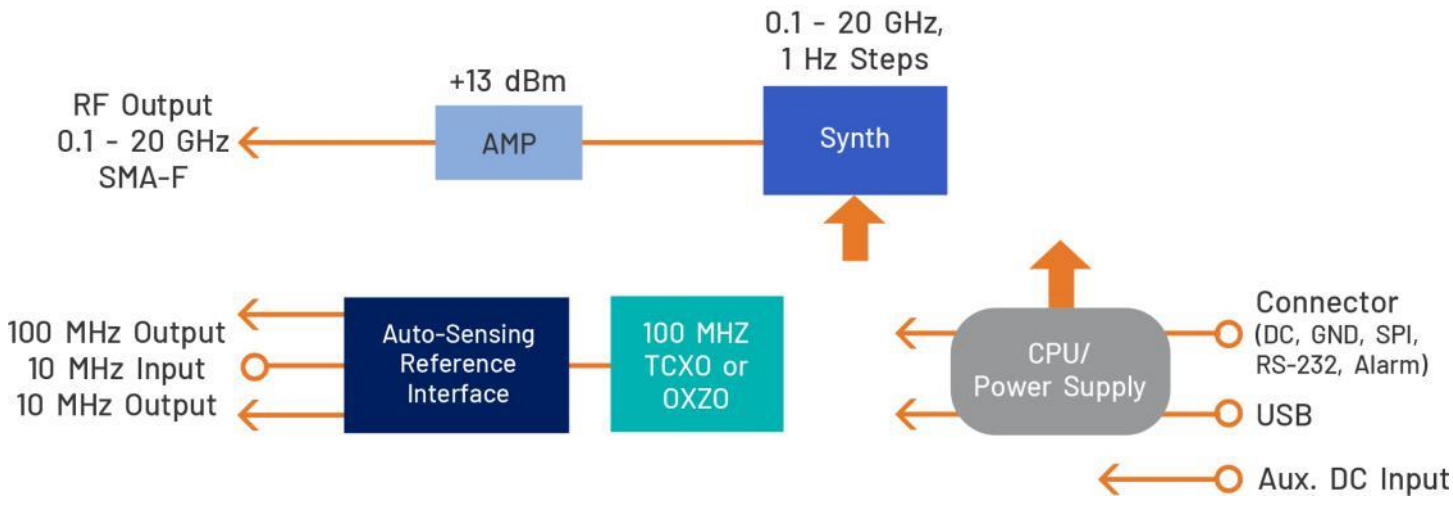
Ultra-low phase noise synthesizer

- 100 MHz to 20 GHz in 1 Hz steps
- State-of-the-art phase noise
- 10W power consumption
- Auto-sensing reference clock
- -30˚ to +70˚ C temperature range
- SPI, SCPI, and USB control – command-set and GUI control

Mercury's DS-3020 series is a state-of-the-art, DDS-based synthesizer family tuning continuously from 100 MHz to 20 GHz, in 1 Hz steps. Industry leading low phase noise and spurious performance meet and exceed requirements of the most demanding test equipment, receivers, and carrier transmitters.

Tuning is accomplished via 4-wire SPI, RS-232 SCPI commands or USB tuning. The synthesizer includes an internal reference which will auto-lock to an external 10 MHz reference when present.

DS-3020 BLOCK DIAGRAM



SPECIFICATIONS

RF Output

Parameter	Value
Frequency Tuning Range	100 MHz to 20 GHz
Frequency Tuning Resolution	1 Hz
Switching Speed	50 microsec, max, list mode; 200 micrsec nominal mode
RF Power Output	+13 dBm typ
RF Power Flatness, over freq range	+/- 2 dB max
Harmonics	-12 dBc max
Non-Harmonic spurious	-60 dBc max
VSWR (in band)	2.5:1 max (50 ohm)
Connector	SMA-female

General

Parameter	Value
DC Power	+9 to +15 VDC
Power Consumption	12W typ after warm-up
Stand-By Power & Wake-Up	<2 Watt in stand-by (std reference). Wake-up time approx. 100 mS
DC Power & Control Connector	14 Pin Male. Harwin M80-5401442. Datamate High Reliability series. Mates with M80-4611442 (female).
Aux DC Power	2.00 mm center pin. CUI MODEL: PJ-063AH. Mates with Jack insertion Diameter/Depth: 5.5.
USB Connection	Mini-USB
Operating Temperature	-30˚ to +70˚ C baseplate
Warm Up Time	2 minutes, max
Humidity	95% non-condensing
Alarm Type	TTL, Hi = OK
Size, Inches	6.5 x 4 x 0.7
Weight	14.5 oz.

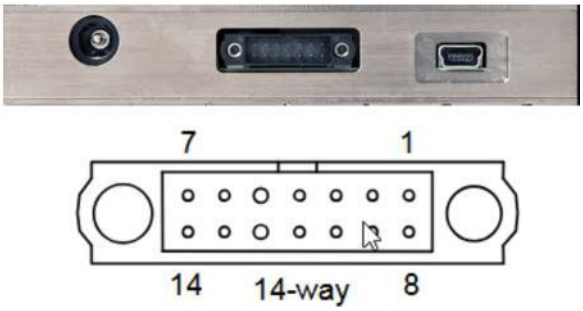
Reference

Parameter	Value
Internal Oscillator Type	OCXO
Internal Reference Frequency	100 MHz
Internal Reference, Aging, per year	<1 ppm
Internal Reference Stability over temp*	+/-.01 ppm
*Stability Temperature Range	-20˚ to +70˚ C
Reference Output, 10 MHz	10 MHz @ 6 dBm, +/- 2 dB, locked to the reference in use
Reference Output, 100 MHz	100 MHz @ 6 dBm, +/- 2 dB, locked to the reference in use
External Reference Input (customer supplied)	10 MHz @ 0 dBm, +/- 6 dBm
External Reference Input Max (no damage)	+17 dBm
Locking Range of External Reference	+/- 0.5 ppm
Reference Select	Auto-Sense; locked to external if present, otherwise internal
Input/Output Connectors	SMA-female

The DS-3020 has an internal 100 MHz reference. Two versions are available with differing stabilities and phase noise. A sample of the 100 MHz is provided. An external 10 MHz can be used to phase lock the internal 100 MHz and a sample of the eternal 10 MHz reference is provided for daisy-chaining purposes.

MONITOR AND CONTROL

Monitor and Control of the DS-3020 is accomplished by a single connector which provides DC, Ground, 4-Wire SPI, RS-232 (for SCPI commands), Alarms, and Muting. The interface connector locks to the female mating connector, providing a rugged and stable coupling for lab or field use. A secondary connection port is provided utilizing mini-USB. A user GUI is provided via the USB and packet level control is accomplished via SPI.



PROGRAMMING

Part	Description
DC Power & Control Connector	Multi-pin interface, male (all connections on one connector)
Programming Interfaces	RS-232 for SCPI commands, and 4 -Wire SPI (Clock/MOSI/MISO/SS)
Alternate Programming Port	USB, mini-USB form factor with GUI on Windows

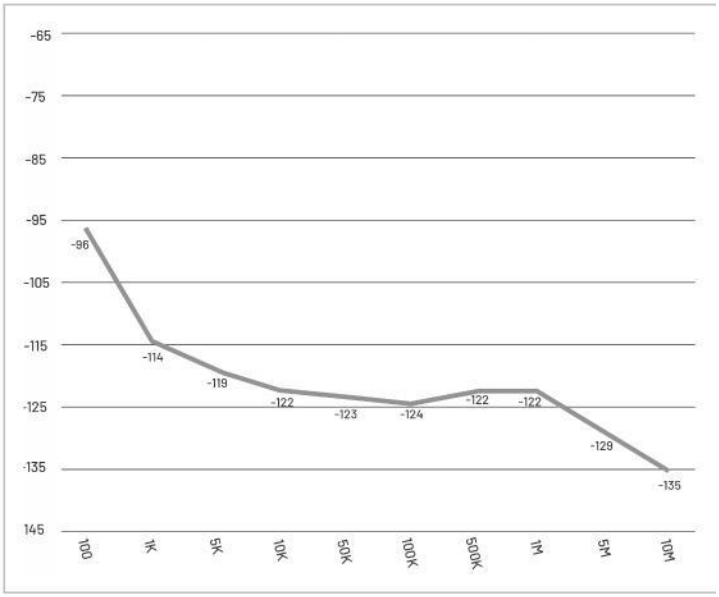
14-Pin Connector	Designation
Pin 1	RS-232 TX
Pin 2	ARM_NRST
Pin 3	LD OUT (5V)
Pin 4	SWDIO
Pin 5	SPI: MOSI
Pin 6	SPI: SS
Pin 7	+VIN
Pin 8	RS-232 RX
Pin 9	SW_CLK
Pin 10	TRIGGER
Pin 11	SPI: MISO
Pin 12	SPI: SCLK
Pin 13	GND
Pin 14	+VIN

PHASE NOISE

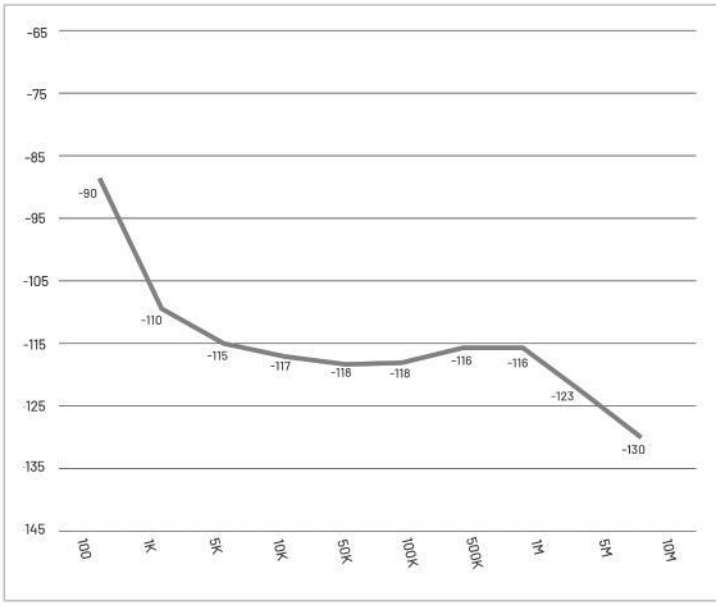
Model DS-3020 was created to give state-of-the-art noise performance. It is OCXO-based.

Phase Noise: typ, in dBc/Hz	2.5 GHz	5 GHz	10 GHz	20 GHz
100 Hz	-108	-102	-96	-90
1 kHz	-126	-120	-114	-110
10 kHz	-134	-128	-122	-117
100 kHz	-138	-132	-124	-118
1 MHz	-134	-128	-122	-116

Phase Noise: typ, in dBc/Hz	2.5 GHz	5 GHz	10 GHz	20 GHz
10 MHz	-147	-141	-135	-130
Deg RMS	0.02	0.05	0.10	0.20



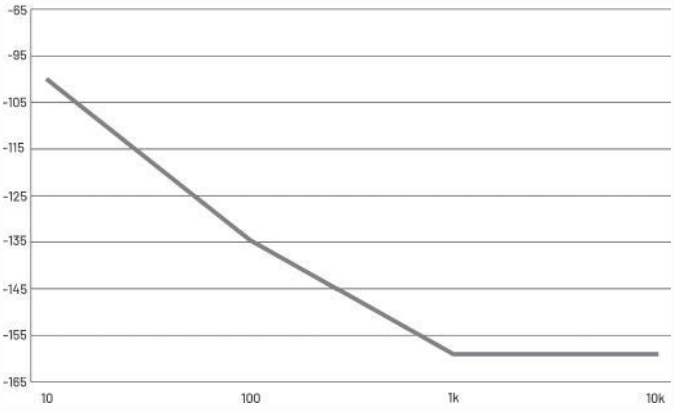
Phase Noise of DS-3020 at 10 GHz Ouput



Phase Noise of DS-3020 at 20 GHz

100 MHz Reference Oscillator Output Phase Noise

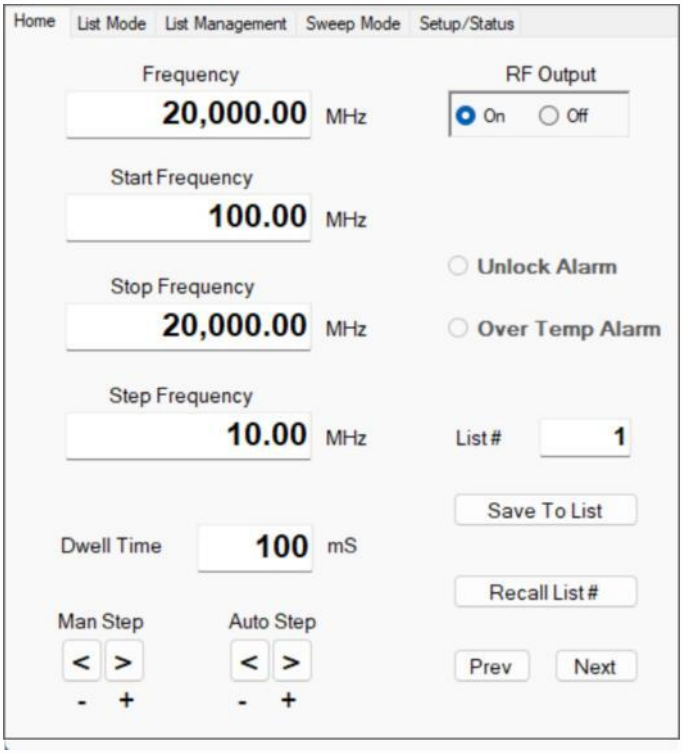
Phase Noise: typ, in dBc/Hz	DS-3020 (OCXO)
10 Hz	-100
100 Hz	-135
1 kHz	-160
10 kHz	-160

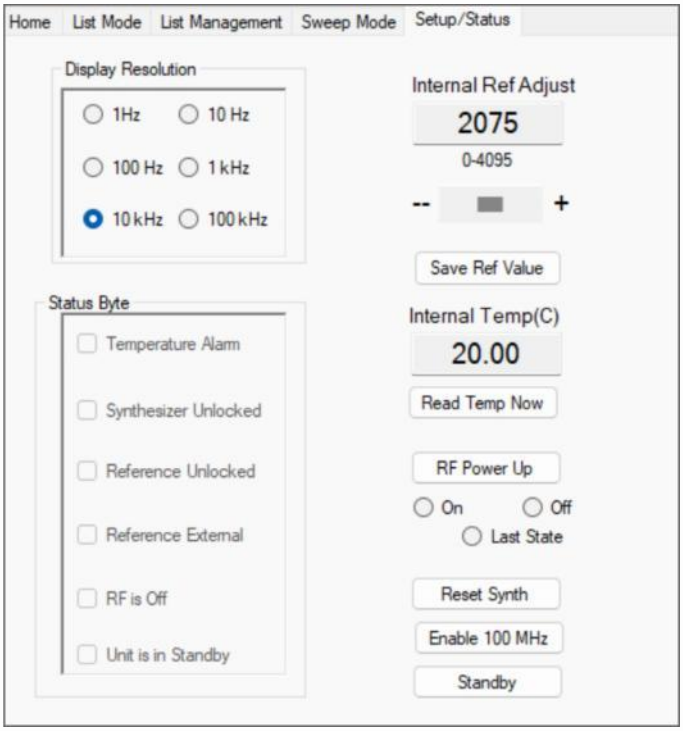


Phase Noise 100 MHz Reference Output

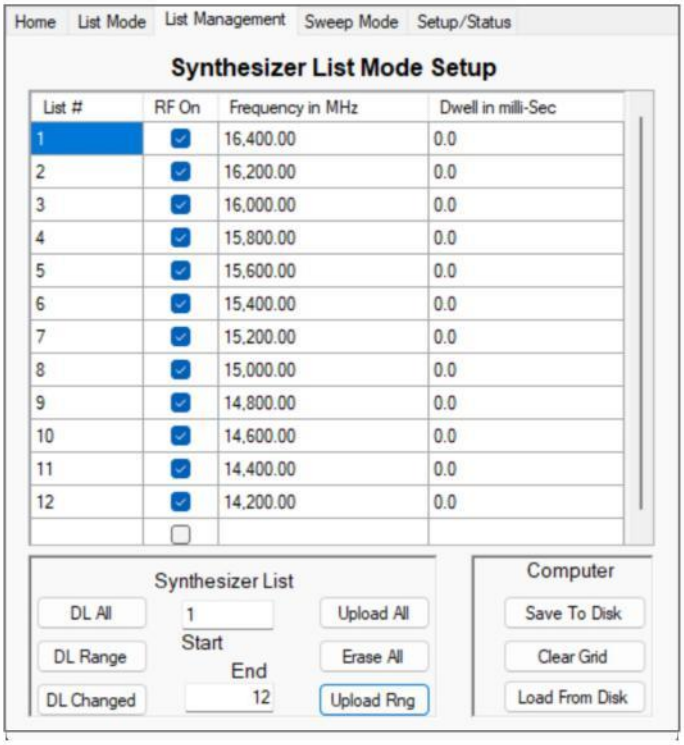
GUI-DRIVEN INTERFACE AND CONTROL

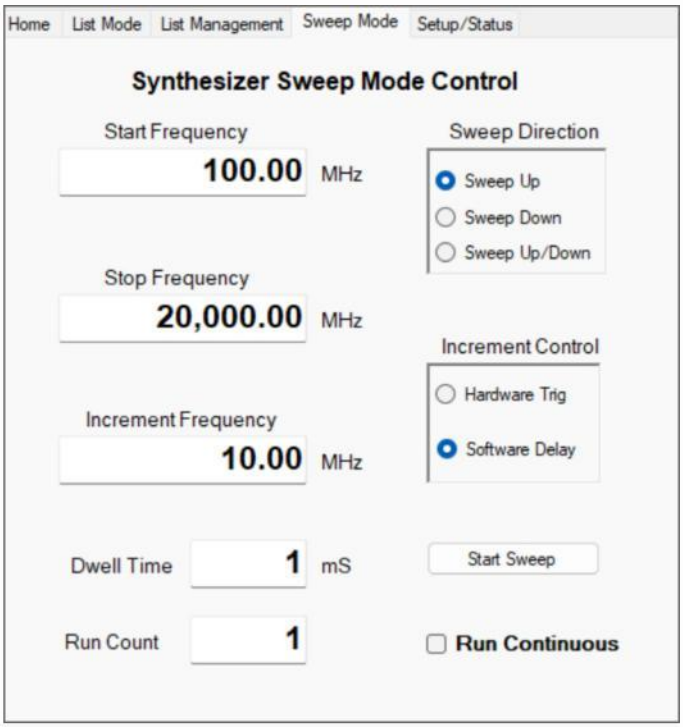
Examples of the GUI are shown below. **Complete control is also available using SPI.**

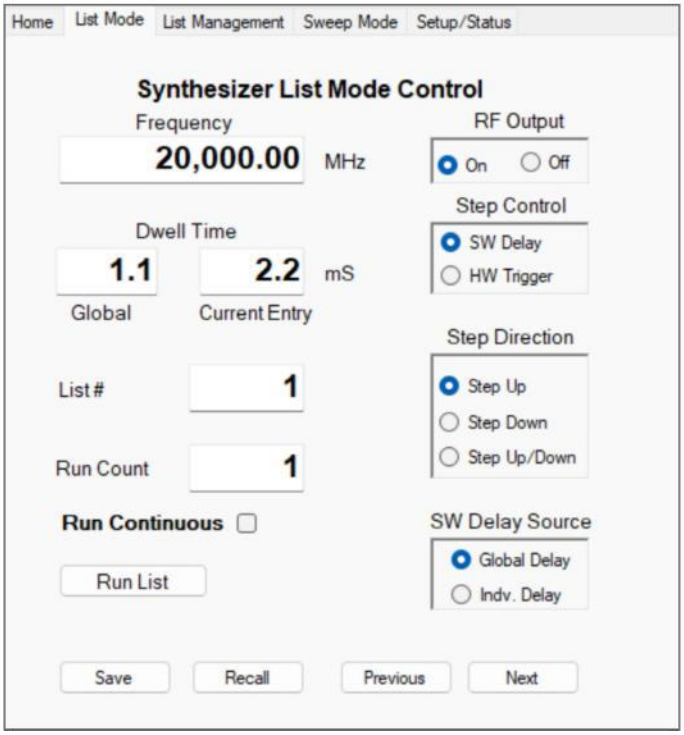




List and **Sweep Modes** are available.



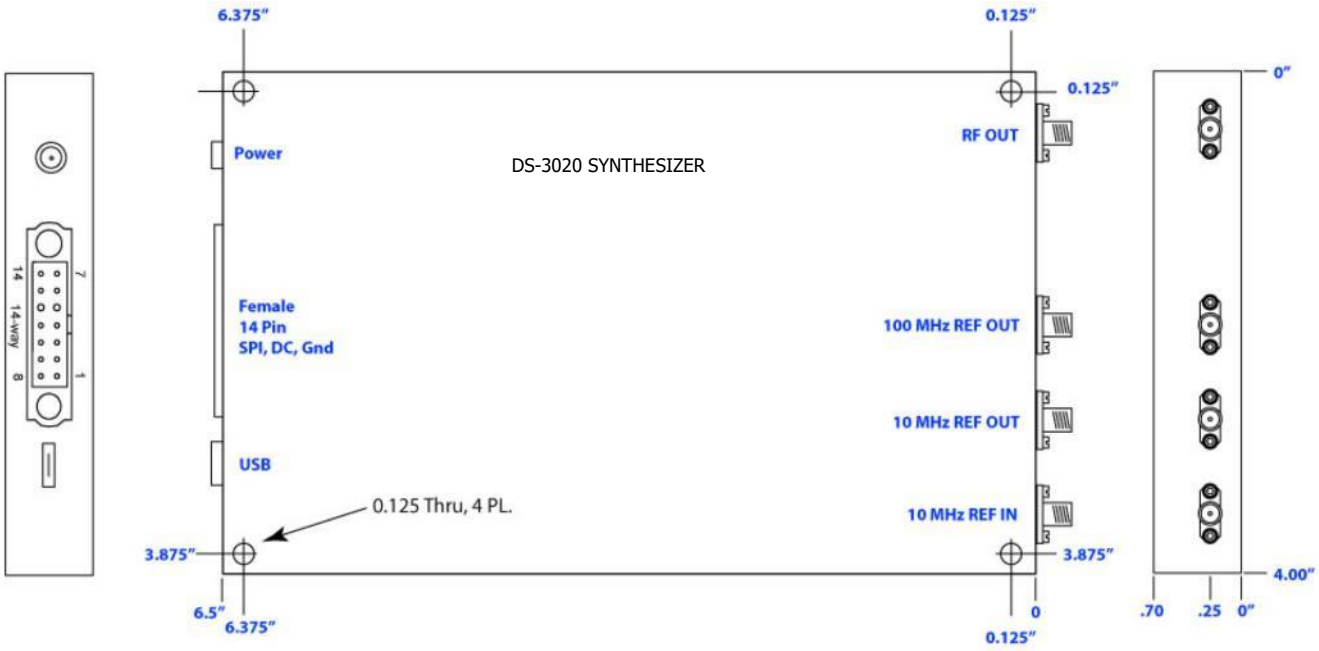




ORDERING INFORMATION

Model	Description
DS-3020	DS-3020 with "Ultimate" Phase Noise profile and stability
Option - SK	Optional Shock Mount Kit
Option - HS	Heatsink and Mount Kit
Option - CAB	Custom Cable Kit

DS-3020 OUTLINE DRAWING



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