



USB
REAL-TIME SPECTRUM
ANALYZER

SAM SERIES
6.3/8.5 GHz

Key facts

Frequency range: 9 kHz to 6.3/8.5 GHz

1 GHz DANL: -166 dBm/Hz

1 GHz phase noise: -110 dBc/Hz@10 kHz

Analysis bandwidth: up to 100 MHz

USB3.0/2.0 type C interface

Highly compatible API interface

Windows 11/10/8/7 (x86、x64) are supported

Debian 12/11/10 (x64、AArch64) are supported

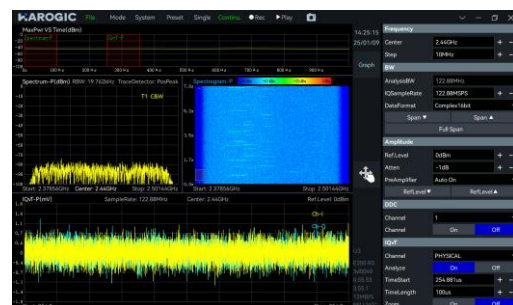
Ubuntu 24.04/22.04/20.04/18.04 (x64、AArch64) are supported

Applications

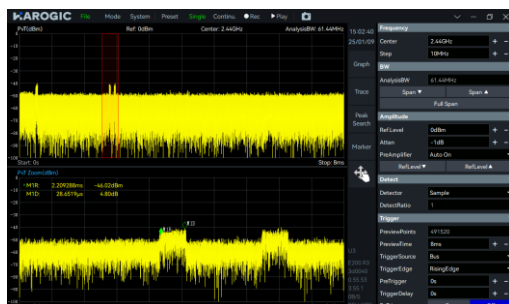
Standard spectrum sweep



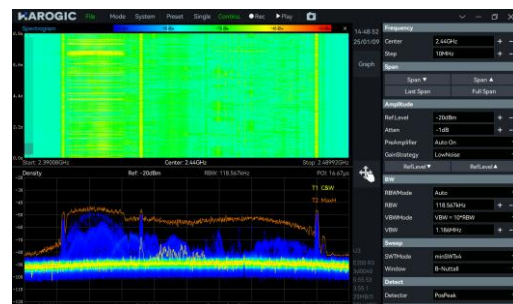
IQ streaming and analysis



Power vs time analysis



Real-time analysis



Specifications*

FREQUENCY

Frequency range	SAM-60 M3	SAM-80
	9 kHz-6.3 GHz	9 kHz-8.5 GHz
Reference clock	Internal or external	
Frequency accuracy	TCXO (std.)	<1 ppm, manual correction is available
	OCXO (opt01)	<1 ppm, manual correction is available
	Ext. GNSS disciplined OCXO (opt23)	<0.05 ppm, when locked to GNSS
Aging and temperature stability	TCXO (std.)	<1 ppm/year, <1 ppm
	OCXO (opt01)	<1 ppm/year, <0.15 ppm
	Ext. GNSS disciplined OCXO (opt23)	<1 ppm/year, <0.05 ppm

SPECTRUM PURITY

SSB phase noise (dBc/Hz)	SAM-60 M3		SAM-80	
Carrier frequency	1 GHz	6.3 GHz	1 GHz	8.5 GHz
1 kHz	-107.5	-92.7	-110.3	-93.5
10 kHz	-114.2	-99.7	-120.0	-100.5
100 kHz	-112.5	-98.6	-120.1	-100.8
1 MHz	-132.8	-120.1	-131.4	-116.9

Residual response (dBm)
spur reject = enhanced
RBW =1 kHz
PosPeak detector

Reference level (R.L.)	SAM-60 M3		SAM-80	
	0 dBm	-50 dBm	0 dBm	-50 dBm
100 kHz-100 MHz	-101	-123	-99	-122
100 MHz-6.3 GHz	-87	-116	-88	-119
6.3 GHz-8.5 GHz	-	-	-84	-113

Image rejection	> 90 dBc (typ.) for spur reject = enhanced > 35 dBc (typ.) for spur reject = bypass
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IF rejection	Low IF architecture
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Local oscillator related spurious

<-65 dBc
Center frequency $\pm (N/M)*125$ MHz, N,M = 1,2,3,4,5...

IIP3 / IIP2 (dBm)

Carrier frequency	SAM-60 M3		SAM-80	
	1 GHz	6.3 GHz	1 GHz	8.5 GHz
R.L. = 20 dBm	51.0 / 84.9	43.4 / 65.9	49.6 / 87.5	41.0 / 57.4
R.L. = 0 dBm	40.1 / 85.1	25.3 / 94.6	35.6 / 84.3	25.5 / 44.8
R.L. = -20 dBm	10.0 / 66.4	4.7 / 17.7	11.5 / 67.4	2.4 / 34.2

AMPLITUDE

Max. input power (CW)	23 dBm	30 MHz-6.3/8.5 GHz and the preamplifier is off
	10 dBm	9 kHz-30 MHz or preamplifier is on
Max. DC voltage		± 10 VDC
Display range		DANL- 23 dBm
Amplitude accuracy		± 2.0 dB
IF in-band flatness		± 2.0 dB
Reference level (R.L.)		-50 dBm - 23 dBm
RF preamplifiers		automatically turn on or forcibly turn off
VSWR	R.L. = 10 dBm	<1.7:1
30 MHz to Max.Freq.	R.L. = 0 dBm	<2.0:1
	R.L. = -40 dBm	<2.5:1

Display average noise level
(DANL) (dBm/Hz)
RBW=10 kHz

Reference level	SAM-60 M3		SAM-80	
	-20 dBm	-50 dBm	-20 dBm	-50 dBm
9 kHz	-134.6	-149.3	-133.3	-151.2
100 kHz - 30 MHz	-138.6	-161.2	-139.1	-161.1
30 MHz - 3.0 GHz	-145.0	-161.0	-150.4	-166.4
3.0 GHz - 6.3 GHz	-141.0	-158.0	-145.6	-164.4
6.3 GHz - 8.5 GHz	-	-	-134.3	-154.9

**STANDARD
SPECTRUM ANALYSIS**

Detector	PosPeak, NegPeak, Sample, Average, RMS, MaxPower	
RBW	0.1 Hz-10 MHz	
VBW	0.1 Hz-10 MHz	
Data chart	SAStudio4 software provides spectrum, waterfall chart, and historical trace	
Measurements	Channel power, OBW, X dB bandwidth, Adjacent channel power ratio, IM3	
Sweep speed	SAM-60 M3	SAM-80
RBW = 250kHz FPGA spur reject = standard	about 379 GHz/s	about 339 GHz/s
RBW = 250 kHz FPGA spur reject = enhanced	about 179 GHz/s	about 170 GHz/s
RBW = 30 kHz FPGA spur reject = enhanced	about 9 GHz/s	about 8 GHz/s
RBW = 1 kHz CPU spur reject = enhanced	about 1.3 GHz/s	about 1.2 GHz/s

IQ RECORDING

Burst recording bandwidth	Maximum: 100 MHz The built-in memory depth is 128 Mbytes
Continuous recording bandwidth	Maximum: 50 MHz Limited by the bandwidth of USB interface and hard disk. The storage depth is limited by the hard disk capacity
IQ sample rate	125MSPS, decimate factor: 1,2,4,8,16,32,64,128,256,512,1024,2048,4096 supported (FPGA)
External trigger response	Maximum response frequency 500 times/sec

**DETECTION
ANAYLSYS**

Lowest time resolution	8 ns
Max. analysis bandwidth	100 MHz
Detector	PosPeak, NegPeak, Sample, Average, RMS, MaxPower

**REAL TIME
SPECTRUM ANALYSIS**

FFT analysis

FFT engine is implemented in FPGA. Frame compression and trace detection are supported. No missing samples between FFT frames

FFT frame update rate= $10^9 \text{ ns}/(N * D * 8 \text{ ns})$; POI = $N * D * 8 \text{ ns}$
 N for FFT points (2048,1024,512,256,128,64,32)
 D for decimate factor (1, 2, 4, 8...)

Typical settings	FFT refresh rate	POI
N = 2048, D = 1	61,035 times/sec	16.384 us
N = 32, D = 1	3,906,250 times/sec	0.256 us

Max. analysis bandwidth	100 MHz
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Window function	B-Nuttall, Flat-top, LowSideLobe
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RBW	14.73 MHz-3.59 kHz (Flat-top) 7.81 MHz-1.90 kHz (B-Nuttall) 13 grades for each window type
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Amplitude resolution	0.75 dB
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GENERAL

Input and output

Power supply	Type-C, dedicated power supply port. Acceptable voltage range: 4.75 to 5.25 V (ripple < 0.2 Vpp). Device will fetch up to 2 A current from this port
Data interface	Type-C, USB3.0 and USB2.0 (lower bandwidth) Device will fetch up to 1 A current from this port
RF input	SMA (F), Input impedance 50 Ω
RF output	SMA (F), Input impedance 50 Ω
Reference input	MCX (F), amplitude ≥ 1.5 Vpp, input impedance is 330 Ω
Reference output	Unavailable
External trigger input	Type-C, 3.3 V CMOS, input: high impedance
External trigger output	Type-C (3), 3.3 V CMOS
Analog IF output	Unavailable

	SAM-60 M3	SAM-80
Power consumption	7-10 W	9-12 W
Enclosure	Core with no enclosure and fan is provided	

Size (D * W * H) and weight	156x62x22 mm and about 290 g	
GNSS synchronization	External GNSS (opt21)	+/- 100 ns
	External GNSS (opt22)	+/- 75 ns
	External GNSS (opt23)	+/- 50 ns
System requirements	Windows 11/10/8/7	x86、x64
	Debian 12/11/10	x64、AArch64
	Ubuntu 24.04/22.04/20.04/18.04	x64、AArch64
Operating temperature (ambient/core)	T0 class (std.)	0-50 °C/0-70 °C
	T1 class (opt40)	-20-65 °C/-20-85 °C
	T2 class (opt41)	-40-85 °C (core)
Storage temperature (ambient)	T0 class (std.)	-20-70 °C
	T1 class (opt40)	-40-85 °C
	T2 class (opt41)	-40-85 °C (core)
Packaging and accessories	Flash disk * 1, USB 3.0 cable * 2, power adapter * 1	

*Specification applies under the following conditions:

(1) Start up and warm up for 10 minutes

(2) Ambient temperature 25 °C (core temperature 50 °C)

(3) Stand spectrum analysis mode-spurious rejection enhance on.

(4) Necessary heat dissipation is provided to ensure the ambient and core temperature within the rated range at the same time

OPTIONS

Code		
01	Built-in OCXO reference clock	built-in hardware
02	Built-in signal generator	built-in hardware
20	MUXIO IO board	accessory
21	External GNSS	accessory
22	External high precision GNSS	accessory
23	External GNSS disciplined OCXO reference clock	accessory
34	External omnidirectional antenna, 400-8000MHz, Gain<2dBi	accessory
40	T1 temperature class	built-in hardware
41	T2 temperature class, only available for core	built-in hardware
71	Basic digital modulation analysis	software
72	Pulse signal measurement	software

BUILT-IN SIGNAL GENERATOR (opt02)

Frequency range	100 kHz-6.3 GHz, step 10 Hz	
Power range	-50 dBm-0 dBm, 0.25 dB for each step	
VSWR	<2.0:1	30 MHz-6.3 GHz
Non-harmonic spurs	<-50 dBc	

Harmonics

Frequency range	Second harmonic	Third harmonic and above
100 kHz-30 MHz	<-10 dBc	<-10 dBc
30 MHz-1.6 GHz	<-10 dBc	<-10 dBc
1.6 GHz-3 GHz	<-20 dBc	<-20 dBc
3 GHz-3.2 GHz	<-20 dBc	<-20 dBc
3.2 GHz-6.3 GHz	<-20 dBc	<-20 dBc

Leakage to receiver

100 kHz-30 MHz	>90 dBc
30 MHz-3 GHz	>80 dBc
3 GHz-6.3 GHz	>70 dBc



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