

PRODUCT
DATASHEET



USB
REAL-TIME SPECTRUM
ANALYZER

SAE SERIES
9.5/20 GHz

Key facts

Frequency range: 9 kHz - 9.5/20 GHz

1 GHz DANL: -166 dBm/Hz

1 GHz phase noise: -99.7 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



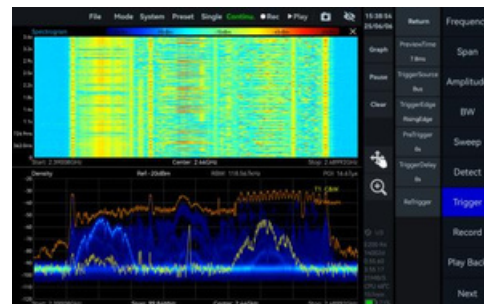
IQ streaming and analysis



Power vs time analysis



Real-time analysis



Specifications*

FREQUENCY

Frequency range	SAE-90	SAE-200
	9 kHz - 9.5 GHz	9 kHz - 20 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)				
Carrier frequency	SAE-90		SAE-200	
	1 GHz	9.5 GHz	1 GHz	20 GHz
1 kHz	-95.2	-91.5	-91.2	-80.6
10 kHz	-101.6	-98.5	-99.7	-90.6
100 kHz	-100.6	-99.7	-101.1	-96.2
1 MHz	-120.9	-116.2	-121.6	-111.5

Residual response (dBm)				
Spur reject = bypass				
RBW =1 kHz				
PosPeak detector				
Reference level (R.L.)	SAE-90		SAE-200	
	0 dBm	-50 dBm	0 dBm	-50 dBm
9kHz - 1 GHz	-83	-120	-90	-120
1GHz - 3 GHz	-83	-120	-80	-120
3GHz - 9.5/20 GHz	-90	-130	-90	-120



Image rejection	SAE-90	SAE-200
9 kHz - 3 GHz	>90 dBc (typ.)	>90 dBc (typ.)
3 GHz - 9.5 GHz	>90 dBc(typ.), spur reject = enhanced >60 dBc (typ.), spur reject = bypass	>90 dBc (typ.)
9.5 GHz - 20 GHz	-	>90 dBc(typ.), spur reject = enhanced; >60 dBc (typ.), spur reject = bypass

IF rejection	>90 dBc (typ.), spur reject = enhanced; >80 dBc (typ.), spur reject = bypass
Local oscillator related spurious	<-65 dBc Centerfrequency \pm (N/M) * 125 MHz, N, M = 1, 2,3, 4, 5...

IIP3 / IIP2 (dBm)	SAE-90		SAE-200	
	1 GHz	9.5 GHz	1 GHz	20 GHz
R.L. = 20 dBm	46.1/83.2	40.5/92.8	45.5/82.6	35.3/93.6
R.L. = 0 dBm	26.7/85.0	19.2/90.3	25.5/81.1	21.0/89.0
R.L. = -20 dBm	10.5/82.2	2.0/49.3	7.9/81.5	-4.5/55.3

AMPLITUDE

Max. input power (CW)	23 dBm 10 dBm	50 MHz - 9.5/20 GHz and the preamplifier is off 9 kHz - 50 MHz or preamplifier is on
Max. DC voltage	\pm 10 VDC	
Display range	DANL - 23 dBm (typ.)	
Amplitude accuracy	9 kHz - 9.5 GHz 9.5 GHz - 20 GHz	\pm 2.0 dB \pm 3.0 dB
IF in-band flatness	\pm 2.0 dB	
Reference level (R.L.)	-50 dBm - 23 dBm (typ.)	
RF preamplifiers	Automatically turn on or forcibly turn off	
VSWR 90 MHz to Max.Freq.	<2.0:1	



**Display average noise level
(DANL) (dBm/Hz)
RBW=1 kHz**

Reference level	SAE-90		SAE-200	
	-20 dBm	-50 dBm	-20 dBm	-50 dBm
9 kHz - 1 MHz	-143.0	-152.4	-143.6	-152.6
1 MHz - 90 MHz	-152.0	-159.2	-151.8	-160.0
90 MHz - 3.0 GHz	-146.0	-167.5	-149.7	-166.3
3.0 GHz - 9.5 GHz	-153.6	-167.0	-151.4	-157.5
9.5 GHz - 20 GHz	-	-	-156.1	-160.6

**STANDARD
SPECTRUM ANALYSIS**

Detector	PosPeak, NegPeak, Sample, Average, RMS, MaxPower
RBW	0.1 Hz - 10 MHz
VBW	0.1 Hz - 10 MHz
Data chart	SASudio4 software provides spectrum, spectrogram, and historical trace
Measurements	Channel power, OBW, XdB bandwidth, Adjacent channel power ratio, IM3

Sweep speed	SAE-90	SAE-200
RBW ≥ 1 MHz FPGA Spur reject = bypass	about 1.0 THz/s	about 1.0 THz/s
RBW = 250 kHz FPGA Spur reject = standard RBW = 50 kHz FPGA	about 561.7 GHz/s	about 566.4 GHz/s
Spur reject = bypass RBW = 1 kHz CPU Spur reject = bypass	about 209.8 GHz/s	about 214.6 GHz/s
	about 4.2 GHz/s	about 4.0 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



External reference clock input	MMCX (F), amplitude ≥ 1.5 Vpp, input impedance is 330 Ω
Reference clock output	Integrated in MUXIO, 3.3 V CMOS, programmable on/off
External trigger input	Integrated in MUXIO, 3.3 V CMOS, input: high impedance
Trigger output Analog IF output	Integrated in MUXIO, 3.3 V CMOS MMCX (F), maximum output power - 25 dBm output impedance 50 Ω supported, 307.2 MHz \pm 50 MHz

Power consumption 10 -14 W

	SAE-90	SAE-200
Size (D * W * H) Weight	131 * 70 * 30 mm 383g	139 * 68 * 31 mm and 408g
GNSS synchronization	External GNSS (opt21) External GNSS (opt22) External GNSS (opt23)	± 100 ns ± 75 ns ± 50 ns
System requirements	Windows 11/10/8/7 Debian 12/11/10 Ubuntu 24.04/22.04/20.04/18.04	x86, x64 x64, AArch64 x64, AArch64
Operating temperature (ambient/core)	T0 class (std.) T1 class (opt40) T2 class (opt41)	0 - 50 oC/0 - 70 oC -20 - 65 oC/-20 - 85 oC -40-65 oC/-40-85 oC
Storage temperature (ambient)	T0 class (std.) T1 class (opt40) T2 class (opt41)	-20 - 70 oC -40 - 85 oC -40 - 85 oC
Operating Relative Humidity	0 -40 oC >40 oC	5 - 75% 5 – 45%

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 oC (core temperature 50 oC)
- (3) Standard 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
- (5) Sweep speed and display average noise level test conditions: MCU:0.55.57,FPGA:0.55.22,API:0.55.61



OPTIONS

Code		
01	Built-in OCXO reference clock	built-in hardware
20	MUXIO IO Expansion 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 demodulation	software
72	Pulse detection	software

