



Data Sheet

1121 Audio Analyzer



Taking performance to a new peak

Audio Analyzer Model 1121

The Model 1121 Audio Analyzer is an enhanced version of our Model 1120. The 1121 incorporates: selectable output impedances of 50, 150 and 600 ohms, 16 volt rms output, additional 0.3 millivolt full scale measurement range, and quasi-peak detection. It can be used as a direct replacement in an 1120 application. The 1121 instrument automatically tunes and auto-ranges for maximum accuracy and resolution. Distortion, frequency response, AC and DC voltage measurements are a single keystroke away. The instrument is ideally suited for stimulus response applications because of an on-board low-distortion audio source. Internal control of the source and analyzer allows for swept measurements.

For the accurate measurement of complex waveforms and noise, the audio analyzer uses true RMS average or quasi-peak detection. Accurate distortion measurements can be made to -90 dB (0.003%) between 20 Hz and 20 kHz. Over the same frequency range, flatness measurements are possible to 0.05 dB (0.5%). The audio analyzer precision reciprocal counter gives fast and accurate characterization of audio frequencies.



- Frequency Range, 10 Hz to 200 kHz
- Measurement level, 300µV to 300 V fs
- Low distortion audio source for testing systems, amplifiers, receivers and components
- Non-volatile memory for instant recall of up to 99 complete front panel setups

Specifications

Frequency Measurement

Range	5 Hz to 200 kHz
Resolution	
0.001 Hz	5.000 Hz to 199.999 Hz
0.01 Hz	200.00 Hz to 1999.99 Hz
0.1 Hz	2.0000 kHz to 19.9999 kHz
1.0 Hz	20.000 kHz to 199.999 kHz
Accuracy	Timebase accuracy + 1 count
Sensitivity	
5.0 mV in the Frequency mode	50.0 mV in the Distortion & SINAD modes

Timebase

Type	10 MHz TCXO
Accuracy	±1 ppm yr

AC Level Measurement

Ranges (full scale)	300.0 V, 30.00 V, 3.000 V, 300.0 mV, 30.00 mV, 3.000 mV, and 0,300 mV
Overrange	33% except on 300 V range
Accuracy	
± 1%, 50 Hz to 50 kHz	1 mV to 300 V, 0.5% typ.
± 2%, 20 Hz to 100 kHz	1 mV to 300 V, 1.0% typ.
± 3%, 10 Hz to 100 kHz	1 mV to 300 V, 1.5% typ.
± 4%, 10Hz to 100 kHz	0.3 mV to 300 V, 2.0% typ.

DC Level Measurement

Ranges (full scale)	300.0 V, 30.00 V, and 3.000 V
Overrange	33% except on 300 V range
Accuracy	±1.0% or 6 mV whichever is greater

Distortion Measurement

Fundamental Frequency Range	10 Hz to 100 kHz usable to 140 kHz
Resolution	
0.00001 % for <0.11000% THD	0.0001 % for <1.1 % THD
0.001 % for <11 % THD	0.01 % for <100% THD
Display Range	0.00001% to 100.0% (-140.00 to 0.00 dB)
Accuracy	± 1 dB; 20 Hz to 20 kHz ± 2 dB; 10 Hz to 100 kHz
Input Voltage Range	50 mV to 300 V
Distortion Measurement Range (the higher of)	
0.01% (-80 dB) or 10 µV	10Hz to 20kHz, 80kHz BW
0.02% (-74 dB) or 20 µV	10 Hz to 50 kHz, 220 kHz BW
0.032% (-70 dB) or 40 µV	10 Hz to 50 kHz, 500 kHz BW
0.056% (-65 dB) or 50 µV	50 kHz to 100 kHz, 500 kHz BW

SINAD Measurement

Fundamental Frequency Range	10 Hz to 100 kHz usable to 140 kHz tuned to the source frequency setting
Display Range	0.00 to 140.00 dB
Accuracy	±1 dB; 20 Hz to 20 kHz ±2 dB; 10 Hz to 100 kHz
Input Voltage Range	50 mV to 300 V
SINAD Measurement Range	80 dB or 10 µV 10Hz to 20 kHz, 80 kHz BW 74 dB or 20 µV 10 Hz to 50 kHz, 220 kHz BW 70 dB or 40 µV 10 Hz to 50 kHz, 500 kHz BW 65 dB or 50 µV 50 kHz to 100 kHz, 500 kHz BW
S/N Measurement Frequency Range	10 Hz to 100 kHz usable to 140 kHz
Display Range	0.00 to 140.00 dB
Accuracy	±1 dB
Input Voltage Range	50 mV to 300 V
Residual Noise (the higher of)	85 dB or 10 µV; 80 kHz BW 85 dB or 20 µV; 220 kHz BW 85 dB or 40 µV; 500 kHz BW
Common Mode Rejection Ratio CMRR	>70 dB 20 Hz to 1kHz, V in <3V >45 dB 1 kHz to 20 kHz, V in <3V
Limits	Common mode Differential input voltage < 4.25 V pk 3.000 V range < 42.5 V pk 30.00 V range < 425 V pk; 300.0 V range

Analyzer Input

Type	Balanced (full differential)
Impedance	100 k ohms ± 1% and <300 pF each side to ground in all measurement modes
Protection	Excessive common mode levels are hardware limited on all input ranges and fuse protection is employed against peak levels exceeding 425 V max

Audio Filters

30 kHz low Pass Filter Accuracy	30 kHz ± 2 kHz. Rolloff: Third-order Butterworth; 60 dB/decade
80 kHz low Pass Filter Accuracy	80 kHz ± 4 kHz. Rolloff: Third-order Butterworth; 60 dB/decade
220 kHz low Pass Filter Accuracy	220 kHz ± 20 kHz. Rolloff: Third-order Butterworth; 60 dB/decade

Source Specifications

Frequency Range	10 Hz to 140 kHz
Resolution	0.001 Hz 10.000 Hz to 199.999 Hz 0.01 Hz 200.00 Hz to 1999.99 Hz 0.1 Hz 2.0000 kHz to 19.9999 kHz 1.0 Hz 20.000 kHz to 140.000 kHz
Accuracy	10 ppm + timebase accuracy + 1 count

Timebase

Type	10 MHz TCXO
Accuracy	±1 ppm/yr

Output level

Range (open circuit)	0.01 mV to 16.0 Vrms
Resolution	0.01 mV 0 mV to 30 mV 0.1 mV 30 mV to 300 mV 1.0 mV 300 mV to 3V 5.0 mV 3V to 16V
Accuracy (0.6 mV to 16 V)	± 0.5% of setting + 0.05% of Range 10 Hz to 50 kHz; typically 0.3% ± 1.0% of setting + 0.05% of Range 50 kHz to 100 kHz; typically 0.6% ± 1.5% of setting + 0.1 % of Range 100 kHz to 140 kHz; typically 1.0%
Flatness (into 50 ohms)	± 0.5%; 30 mV to 8 V 10Hz to 50 kHz, 1 kHz ref ± 1.0%; 30 mV to 8 V 10 Hz to 100 kHz, 1 kHz ref ± 1.5%; 30 mV to 8 V 10 Hz to 140 kHz, 1 kHz ref
Distortion and Noise (the higher of)	0.01% (-80 dB) or 10 µV 10 Hz to 20 kHz, 80 kHz BW 0.02% (-74 dB) or 10 µV 20 kHz to 50 kHz, 220 kHz BW 0.032% (-70 dB) or 35 µV 10 Hz to 50 kHz BW 0.056% (-65 dB) or 50 µV 50 kHz to 100 kHz, 500 kHz BW 0.1% (-60 dB) or 50 µV 100 kHz to 140 kHz, 500 kHz BW
Impedance	50 ohms ± 2% 150 ohms ± 1% 600 ohms ± 1%
Power Requirements	80 VA; 100, 120, 220 or 240 V 50 to 400 Hz
Operating Temperature	0° to 55°C
Weight	25 lbs (11.3 kg)
Dimensions	17.75 in (45.1 cm) wide 5.85 in (14.9 cm) high 18 in (45.8 cm) deep

Supplemental Information

AC Measurement

RMS Detector	True RMS responding for signals with a crest factor of <3
Average Detector	Average responding RMS calibrated
Quasi-peak Detector	Meets CCIR recommendations 468-3, accuracy ± 6% 20 Hz to 20 kHz
Bandwidth	5 Hz to 500 kHz

Frequency Measurement

Technique	Reciprocal counting with 10 MHz time base
Source Oscillator Switching Speed	Simultaneous Frequency and level Changes (using IEEE-488 burst mode) <12 ms
Level Transition	<10 ms

Analyzer Measurement Speed

	First rdg	Measurement rate
Frequency	<1.0 sec	4 rdgs/sec
Level	<1.0 sec	10 rdgs/sec
Distortion	<1.0 sec	8 rdgs/sec
SINAD:	<1.0 sec	8 rdgs/sec
SIN	<2.0 sec	1 rdgs/sec



Rear Panel Connectors

Monitor	(600 ohm output impedance)
AC level, Frequency and SIN Modes	Provides a scaled output of input signal
Distortion and SINAD Modes	Provides a scaled output of input signal with the fundamental removed
SYNC	Provides TTL compatible output relative to the source oscillator frequency
X CLK	TTL compatible input for external 10 MHz counter reference. Automatic Switching to external signal when present
X AXIS	0 to 5 VDC signal corresponding to the source oscillator frequency or levels in the Sweep mode. 1000 ohm output impedance
Y AXIS	0 to 5 VDC signal corresponding to the displayed measurement value and entered plot limits, 1000 ohm output impedance
PENUP	TTL compatible output
IEEE-488 Bus	Complies with IEEE-488. Implements AH1, SH1, T6, TE0, L4, LE0, SR1, RI1, PPO, DC1, DT1, C0 and E1
CE Mark	Declares Conformity to European Community (EC) Council Directives: 89/336/EECI93/68/EEC, 73/23/EECI/93/68/EEC & Standards: EN55011, EN50082-1, EN61010-1

Accessories

Included	Spare input/output fuses, line fuses
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Accessories Available:

Rack-mounting kit	PIN 95004491A
Rack-mounting kit with ears and handles	PIN 95004492A
Single binding post to BNC(M)	PIN 95401801A

Options

-01	Rear Panel Input/Output
-11	400 Hz High Pass Filter
-12	Psophometric (CCITT) Band Pass Filter
-13	CCIR Filter
-15	A Weighting Filter
-16	B Weighting Filter
-17	C Weighting Filter
-18	Audio Bandpass Filter
-19	C-Message Filter