

ADVANTEST

R3131A

The Advantest R3131A is a 9 kHz to 3 GHz personal spectrum analyzer designed to offer a balance of performance, ease of use, and economy. It is well-suited for a variety of RF applications, including digital radio and electromagnetic compatibility (EMC) measurements. The instrument features automated functions such as Auto TUNE and Auto CAL to ensure measurement accuracy, and is equipped with standard interfaces including GPIB, RS-232, and a 3.5-inch floppy disk drive. Its compact, lightweight cabinet with a standard rack-mount profile allows for both benchtop and system integration.

SPECIFICATIONS

General

Interfaces	GPIB (IEEE-488), RS-232-C, Centronics (Parallel printer), PS/2 Keyboard, 3.5-inch Floppy Disk Drive
Display	5.7-inch color TFT LCD (640 x 480 pixels)
Warm-up Time	20 minutes

Physical

Operating Temperature	0 to +50 °C °C
Dimensions (W×H×D)	424 mm × 177 mm × 300 mm mm
Weight	9 kg or less kg

Frequency Specifications

Frequency Range	9 kHz to 3 GHz
Frequency Span Range	50 kHz to 3 GHz, and Zero Span
Frequency Span Accuracy	±1%
Reference Frequency Accuracy	±2 x 10 ⁻⁶ / year
Frequency Temperature Stability	±2 x 10 ⁻⁶ (0 °C to +50 °C)
Aging Rate Per Year	±2 x 10 ⁻⁶ / year
Phase Noise at 20 kHz Offset	<= -100 dBc/Hz
Residual FM	<= 20 Hz p-p / 100 ms

Amplitude Specifications

Amplitude Measurement Range	+20 dBm to DANL
Maximum Safe Input Level	+20 dBm (with attenuator ≥ 10 dB)
Maximum DC Input Voltage	0 V
Displayed Average Noise Level (DANL)	≤ -113 dBm (1 MHz to 3 GHz, RBW 1 kHz, VBW 10 Hz, 0 dB Attenuation)
Frequency Response	± 1.0 dB (100 kHz to 3 GHz)
Input Attenuator Range	0 to 50 dB
Input Attenuator Step	10 dB
Reference Level Range	-64 dBm to +40 dBm
1 dB Gain Compression Point	> -5 dBm (mixer level, > 100 MHz)

Sweep and Trigger Specifications

Sweep Time Range (Span > 0 Hz)	50 ms to 500 s
Sweep Time Range (Zero Span)	50 μ s to 500 s
Sweep Mode	Continuous, Single
Trigger Source	Free Run, Single, Video, External, Line

Resolution and Bandwidth

Resolution Bandwidth (RBW) Range	1 kHz to 1 MHz (1, 3 sequence), 9 kHz, 120 kHz
Video Bandwidth (VBW) Range	10 Hz to 1 MHz (1, 10 sequence)
RBW Selectivity (60 dB / 3 dB Ratio)	$< 15:1$
RBW Accuracy	$\pm 15\%$

Dynamic Range and Distortion

Third-Order Intermodulation Distortion (TOI)	< -70 dBc (two -30 dBm tones at mixer, > 10 MHz)
Second-Harmonic Distortion	< -70 dBc (mixer level -30 dBm, > 10 MHz)
Input VSWR	$< 1.5:1$ (100 kHz to 3 GHz, attenuator ≥ 10 dB)
Spurious Responses (Non-Harmonic)	≤ -70 dBc
Residual Responses	≤ -90 dBm (10 MHz to 3 GHz, 0 dB attenuation)

Signal Processing and Measurements

Trace Detectors	Normal, Positive Peak, Negative Peak, Sample
Number of Traces	2 (Trace A, Trace B)
Marker Functions	Peak Search, Next Peak, Marker $\rightarrow$ CF, Marker $\rightarrow$ Ref, Delta Marker
Channel Power Measurement	Standard
Adjacent Channel Power Ratio (ACPR)	Standard
Occupied Bandwidth (OBW)	Standard
Harmonic Distortion Measurement	Standard
Gated Sweep Function	Standard

Inputs & Outputs

RF Input Connector	N-type female
RF Input Impedance	50 Ω
Reference Input (10 MHz)	BNC female, -10 dBm to +10 dBm
Reference Output (10 MHz)	BNC female
External Trigger Input	BNC female, TTL level
Calibrator Output	30 MHz, -20 dBm (BNC female)
GPIB Interface	IEEE-488 (24-pin)
RS-232 Interface	D-sub 9-pin (RS-232-C)
Printer Interface	Centronics (D-sub 25-pin)
Keyboard Interface	PS/2 style (mini-DIN)

Display & User Interface

Display Type	Color TFT LCD
Display Size	5.7-inch
External Storage Media Support	3.5-inch Floppy Disk Drive (1.44 MB)

Physical & Power

AC Input Voltage Range	100 to 120 V AC / 220 to 240 V AC (auto-switching)
AC Input Frequency	50/60 Hz
Power Consumption	$\leq$ 200 VA
Dimensions (W x H x D)	424 mm $\times$ 177 mm $\times$ 300 mm

Environmental & Compliance

Operating Temperature Range	0 $^{\circ}$ C to +50 $^{\circ}$ C
Storage Temperature Range	-20 $^{\circ}$ C to +60 $^{\circ}$ C
Relative Humidity	$\leq$ 85% RH (no condensation)

Options & Accessories

Tracking Generator Option	Option 20 (100 kHz to 3 GHz)
High-Stability Reference Oscillator Option	Option 74

Calibration Output

Calibrator Frequency	30 MHz
Calibrator Level	-20 dBm
Calibrator Level Accuracy	$\pm$ 0.3 dB

EMI Measurement

EMI Filter Bandwidths (6 dB)	9 kHz, 120 kHz
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Tracking Generator Option

Tracking Generator Frequency Range	100 kHz to 3 GHz (with Option 20)
Tracking Generator Output Level Range	0 to -59 dBm in 1 dB steps (with Option 20)
Tracking Generator Output Level Flatness	±1.5 dB (with Option 20)

Audio

Audio Demodulation	AM / FM (with built-in speaker)
Audio Output Connector	3.5 mm monaural jack

Trace

Number of Trace Points	501
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Amplitude Accuracy

Amplitude Calibration Accuracy	±0.5 dB (at 30 MHz, -20 dBm, after self-calibration)
Log Display Linearity	±1.5 dB (0 to -80 dB), ±0.15 dB / 10 dB
Linear Display Linearity	±10% of reference level
Attenuator Switching Error	±1.1 dB (at 100 MHz, 10 to 50 dB range)

Storage

Floppy Disk Drive	3.5-inch, 1.44 MB MS-DOS formatted
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Compliance

EMC Compliance	EN55011, EN50082-1
Safety Compliance	EN61010-1, IEC61010-1

TECHNOLOGY

Superheterodyne Spectrum Analysis

APPLICATIONS

RF and Microwave Spectrum Analysis, EMC Testing, Digital Radio Measurements

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