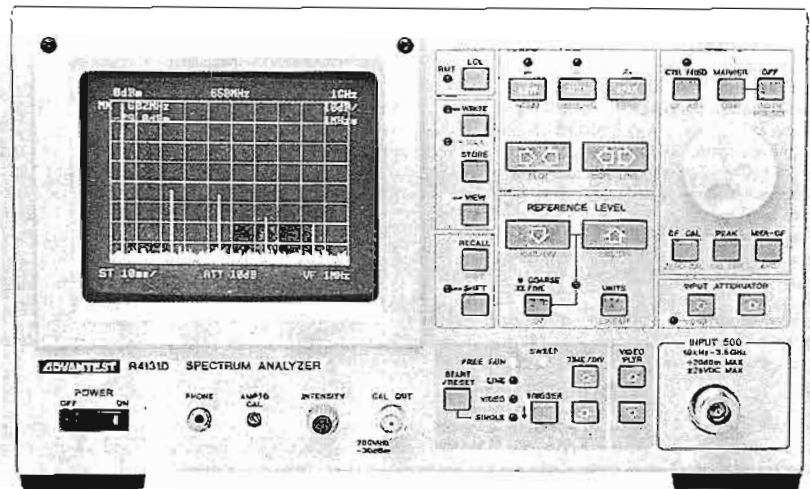


Spectrum Analyzers R4131

10 kHz to 3.5 GHz

Low-cost digital analyzers: general-purpose measurements in development, production, testshop and service as well as EMC precertification



Brief description

Spectrum Analyzers of the 4131 Series (Advantest) are compact units covering a wide frequency range from 10 kHz to 3.5 GHz. The marker function allows display of frequency and level with a resolution of 1 kHz and 0.05 dB respectively. Operation is greatly facilitated by peak search and center frequency display as well as by video filter, frequency response compensation, level display in dBm, dBμV, μV, mV, V, and also by the display of

all test parameters on the raster-scan screen. The analyzers have a digital memory for two waveform display modes, three nonvolatile memories for saving settings and waveforms, max hold mode as well as an audio monitor connector (AM/FM).

Full programmability via IEC/IEEE bus and plotter operation with menu selection make the analyzers suitable for use in automatic test systems. The universal characteristics of these portable instruments are further enhanced by

calibrated field-strength measurements with three different antennas, quasi-peak detector and a probe connector for high-impedance measurements.

Models available

R4131C: basic model

R4131D: model with higher frequency stability

R4131CN/R4131DN: 75-Ω models

Specifications in brief

| | |
|-----------------------------------|--|
| Frequency range | 10 kHz to 3.5 GHz |
| Resolution bandwidths | 1 kHz to 1 MHz/auto, QP (6 dB) 9/120 kHz |
| Shape factor | 15:1 |
| Frequency span/division | 5 kHz to 400 MHz, zero span |
| Center frequency display accuracy | models C and CN ±10 MHz models D and DN ±100 kHz models C and CN <100 kHz/5 min models D and DN <10 kHz/10 min <2.5 GHz |
| Frequency stability | <2 kHz (V_{pp})/0.1 s |
| Residual FM | -115 to +20 dBm/±25 V (DC) |
| Input level | >70 dB |
| Dynamic range | -110 dBm (1 kHz) (>1 MHz) |
| Inherent noise | <-70 dBc at -30 dBm |
| Intermodulation distortion | -100 dBm (>100 kHz) |
| Residual responses | -80 dBc (kHz) at 20 kHz |
| Phase noise | ±1 dB (<2 GHz), ±3.5 dB (>2 GHz, model C), ±2 dB (>2 GHz, model D); model N: ±1.5 dB (<1.5 GHz), ±2 dB <2 GHz, ±4 dB (>2 GHz) |
| Frequency response | -69 to +40 dBm/1-dB steps |
| Reference level | dBm, dBμV, dBmV, dB(μV/m), V |
| Level units | 10/2/1/0.25 dB |
| Level resolution | 0 to 50/10 dB |
| RF attenuator | |

| | |
|--|---|
| Video filter | 1 MHz, 300, 100, 10, 1 kHz, 100, 10 Hz, off |
| Sweep time | 50 ms to 1000 s |
| Marker | resolution 1 kHz, 0.2/0.05 dB |
| General data | |
| Screen | annotation, raster, digital memory, 400 x 700 dots IEC625/IEEE488 |
| Remote control | option 04 (for R4131D only) |
| Occupied bandwidth measurement | 300 mm x 177 mm x 460 mm; 10 kg |
| Dimensions (W x H x D); weight | |
| Extras | |
| IEC/IEEE-Bus Cable 1 m | 408JE-101 |
| 2 m | 408JE-102 |
| 19" Adapter 4 HU | A02433 |
| DOS Software for program-controlled EMC precertification | AES9950 |
| External EMC Preselector | AUP9211A |
| Pulse Limiter 9 kHz to 30 MHz | CFL9206 |
| Carrying Case | R16210 |
| DOS Software for PC control of analyzer | SPECTRA |

8.1 Technical Data of Function

(1) Frequency Specification

Frequency range : 10 kHz to 3.5 GHz
Frequency display : Displayed on the CRT screen
Maximum resolution: 1 kHz (to be changed according to the frequency span)
Frequency displaying accuracy:

| | | |
|----------------|------------------------------------|--|
| R4131A/AN/C/CN | Less than ± 10 MHz | After ZERO CAL |
| R4131B/BN/D/DN | ± 100 kHz + SPAN 3% or less | After ZERO CAL Within the range of 0 Hz to 2.5 GHz in center frequency and 5 ms to 0.5 S/DIV in sweep time. |
| | ± 10 MHz | After ZERO CAL Center frequency 2 GHz or more |

Frequency span : 4 GHz to 100 kHz, ZERO 1-2-5 step
Frequency span accuracy: $\pm 5\%$
Frequency stability : R4131A/AN/C/CN
Less than 100 kHz/5 min.
Frequency is fixed 30 min. after power ON.
R4131B/BN/D/DN
Less than 10 kHz/5 min
Frequency is fixed 30 min. after power ON.
(Within the range of 0 Hz to 2.5 GHz in
center frequency and 5 ms to 0.5 S/DIV in
sweep time)
Residual FM : Less than 2 kHz_{p-p}/100 ms
Noise sideband :

| | |
|------------------|--|
| More than 80 dBc | Where the resolution band width is assumed to be 1 kHz, video filter band width to be 10 Hz, and 20 kHz to be detuned from signal. |
|------------------|--|

R4131A/AN/B/BN
SPECTRUM ANALYZER
INSTRUCTION MANUAL

8.1 Technical Data of Function

Resolution:

Resolution band width

3 dB 1 kHz to 1 MHz with 1-3 step

6 dB 9 kHz to 120 kHz when QP mode is selected

Band width selectivity

: Less than 15:1 60 dB: 3 ratio of dB*
resolution band width

Resolution band width accuracy

: Less than $\pm 20\%$
Less than the value of CISPR Standards in
the QP mode

Marker display : Can be set freely

Resolution 1 kHz max. (To be changed according to the
SPAN)

Measuring accuracy ... Center frequency display accuracy +
frequency span accuracy

(2) Amplitude Specification

Tube surface display range

: LOG 80 dB 10 dB/DIV
20 dB 2 dB/DIV
40 dB 5 dB/DIV, In the QP mode only
LIN 10 DIV

Linearity

: LOG ± 0.15 dB/1 dB
 ± 1 dB/10 dB
 ± 1.5 dB/70 dB or more
Less than 5% of LIN scale

Reference level

: LOG -69 dBm to +40 dBm: R4131A/B/C/D,
40.25 dB μ to 150 dB μ : R4131AN/BN/CN/DN
10 dB, 1 dB step 10 dB/DIV
1 dB, 0.25 dB step 2 dB/DIV,
in the QP mode
LIN 72.77 μ V to +22.36 V: R4131A/B/C/D
(102.9 μ V to +31.62 V: R4131AN/BN/CN/DN)

Reference level accuracy

: Less than ± 1 dB in the LOG mode
This value is taken after calibrating the
level at a frequency of 200 MHz and input
ATT of 10 dB within the range of 0 to 59 dBm
(R4131A/B/C/D) and 110 dB μ to 51 dB μ
(R4131AN/BN/CN/DN) in reference level.

Unit of reference level: dBm, dB μ , dB μ /m, or dBmV, selectable

Marker display

Resolution 0.2 dB 10 dB/DIV
0.05 dB 2 dB/DIV

R4131A/AN/B/BN
SPECTRUM ANALYZER
INSTRUCTION MANUAL

8.1 Technical Data of Function

Dynamic range

Average noise level

| | |
|--------------------------------|--------------------------------|
| -116 dBm +1.55F (GHz) dB | Resolution band width |
| or less: R4131A/B | 1 kHz, Video filter band width |
| -114 dBm +1.55F (GHz) dB | 10 Hz, Input ATT 0 dB, |
| or less: R4131AN/BN | More than 1 MHz in frequency |
| -110 dBm: R4131C/D | |
| -108 dBm: R4131CN/DN | |

Secondary/tertiary distortion

..... More than 70 dB

Where the input level is assumed to be -30 dBm and frequency to be more than 1 MHz

Frequency response:

| | | | |
|--------------------------|---|--|--------------------------------------|
| R4131A/C | 100 kHz ≤ F ≤ 2 GHz ATT 10 dB or more ±1 dB or less | 10 kHz ≤ F ≤ 3.5 GHz ATT 10 dB or more ±3.5 dB or less | |
| R4131B/D | 100 kHz ≤ F ≤ 2 GHz ATT 10 dB or more ±1 dB or less | 10 kHz ≤ F ≤ 3.5 GHz ATT 10 dB or more ±2 dB or less | |
| R4131AN/BN R4131CN/DN | 100 kHz ≤ F ≤ 1.5 GHz ±1.5 dB or less | 10 kHz ≤ F ≤ 2 GHz ±2.5 dB or less | 2 kHz ≤ F ≤ 3.5 GHz ±4 dB or less |

Residual response: -100 dBm or less:

R4131A/B

When terminated at input

ATT 0 dB and input 50 Ω

-95 dBm or less:

R4131C/D

-98 dBm or less:

R4131AN/BN

When terminated at input

ATT 0 dB and input 75 Ω

-93 dBm or less:

R4131CN/DN

Note: At frequency > 100 kHz

Video filter band width:

1 MHz, 300 kHz, 100 kHz, 10 kHz, 1 kHz, 100 Hz, or 10 Hz

Resolution selecting accuracy

: Less than ± 1 dB

at +20°C to +30°C

Gain compression : Less than 1 dB

at input of -10 dBm

R4131A/AN/B/BN
SPECTRUM ANALYZER
INSTRUCTION MANUAL

8.1 Technical Data of Function

(3) Sweep Specification

Sweep time : 5 ms/div to 100 s/div with 1-2-5 step
Sweep time accuracy : Less than $\pm 15\%$
Sweep trigger : FREE RUN, LINE, VIDEO, and SINGLE (Reset/Start)

(4) Input Specification

| | |
|------------------------------|---|
| RF input | : Approx. 50 N-type input connector: R4131A/B/C/D Approx. 75 N-type input connector: R4131AN/BN R4131CN/DN |
| Maximum input level | : +20 dBm, ± 25 VDCmax 127 dBu, ± 25 VDCmax |
| Input ATT | : 0 to 50 dB |
| Input ATT selecting accuracy | : ± 1 dB or less ± 1.5 dB or less |
| Input VSWR | : R4131A/B/C/D 1.5 or less 2.0 or less R4131AN/BN/CN/DN 1.5 or less 2.0 or less 2.5 or less |

Input ATT 20 dB or more:
R4131A/B/C/D
Input ATT 20 dB or more:
R4131AN/BN/CN/DN
with a step of 10 dB

 $10 \text{ kHz} \leq F \leq 2 \text{ GHz}$
 (10 dB in standard)
 $2 \text{ GHz} < F \leq 3.5 \text{ GHz}$
 (10 dB in standard)

 $100 \text{ kHz} \leq F \leq 2 \text{ GHz}$
 $2 \text{ GHz} < F \leq 3.5 \text{ GHz}$
 At input ATT 10 dB or more

 $100 \text{ kHz} \leq F \leq 1.5 \text{ GHz}$
 $10 \text{ kHz} < F \leq 2 \text{ GHz}$
 $2 \text{ GHz} < F \leq 3.5 \text{ GHz}$
 At input ATT 10 dB or more

(5) Display Unit Specification

Display : Waveform, setting conditions, and grid
Trace : 2-screen display of WRITE waveform and VIEW waveform
WRITE : Memory is rewritten each time sweep and WRITE waveform is displayed.
STORE : WRITE waveform is stored.
VIEW : Stored waveform data is displayed.
MAX. HOLD : Each time of repetition from the starting point of this function, the maximum signal level on the horizontal axis is measured and displayed.
Dictation : This equipment provides the POSI/NEGA (for R4131B/BN/D/DN only), POSI, and SAMPLE display and detection functions.

(6) Output Specification

Output signal for calibration

: 200 MHz \pm 30 kHz, -30 dBm \pm 0.5 dB: R4131A/B/C/D
200 MHz \pm 30 kHz, 80 dB μ \pm 0.5 dB : R4131AN/BN
R4131CN/DN

Monitor output : Possible to listen with an earphone (approx. 8 Ω)

Recorder output : Analog output only for WRITE waveform

X-axis Approx. -5 V to +5 V (approx. 10 k Ω)

Y-axis Approx. 0 V to +4 V (approx. 220 Ω)

IF output : The IF signal, 3.58 MHz, is output at approx. 50 Ω .

Video output : This output includes the output terminal to external CRT display and VIDEO plotter, etc., output impedance of approx. 75 Ω , 1 V_{p-p}, and composite signal.

Probing power terminal \pm 15 V

: 4-pin connector

GPIB data output : Mode operation and I/O are enabled using the GPIB.

Plotter interface: Display screen can be recorded by connecting this equipment directly to the plotter without passing through the controller.

Output for TG:

1st LOCAL OUT -5 dBm or more Approx. 4 GHz to 7.5 GHz

2nd LOCAL OUT -5 dBm or more Approx. 3.77 GHz

SLOPE OUT; Sweep signal output for TG output level correction 2 V/GHz

(7) General Specifications

Using ambient conditions

: Less than 0°C to 50°C and 85% RH

Storage temperature range

: -20°C to +70°C

Power supply : 90 V to 132 V or 198 V to 250 V

48 to 66 Hz

Power consumption: Less than 120 VA

External dimensions

: Approx. 300 (W) x 177 (H) x 460 (D) (mm)

Weight : Approx. 10 kg : R4131A/AN/C/CN

Approx. 10.5 kg: R4131B/BN/D/DN

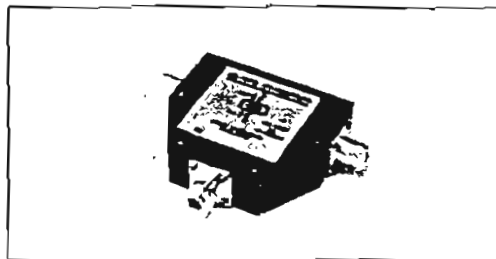
(8) Option (only R4131B/D)

OPTION 04 : Occupied frequency band width (OBW) measuring function

OPTION 14 : Occupied frequency band width (OBW) measuring function and 3 dB down width measuring function

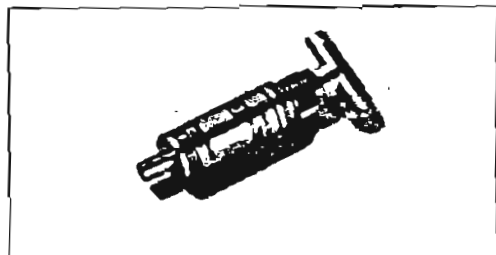
8.2 Accessories

● TR1625 RF Coupler



| | |
|--------------------|--|
| Frequency range | : DC-500 MHz |
| Maximum input | : 50 W |
| Degree of coupling | : 40 dB \pm 1 dB |
| Impedance | : 50 Ω in both main and auxiliary lines |
| V.S.W.R | : Less than 1.5 |
| Insertion loss | : Less than 1 dB |
| Connector | : Main line ... N-type for both main and auxiliary lines |

● TR1626 RF Coupler



| | |
|--------------------|---|
| Frequency range | : DC-1500 MHz |
| Maximum input | : 50 W |
| Degree of coupling | : 40 dB \pm 1 dB |
| Impedance | : 50 Ω in both main and auxiliary lines |
| V.S.W.R | : Less than 1.5 |
| Insertion loss | : Less than 1 dB |
| Connector | : Main line ... N-type, and auxiliary line ... BNC type |