ADVANTEST

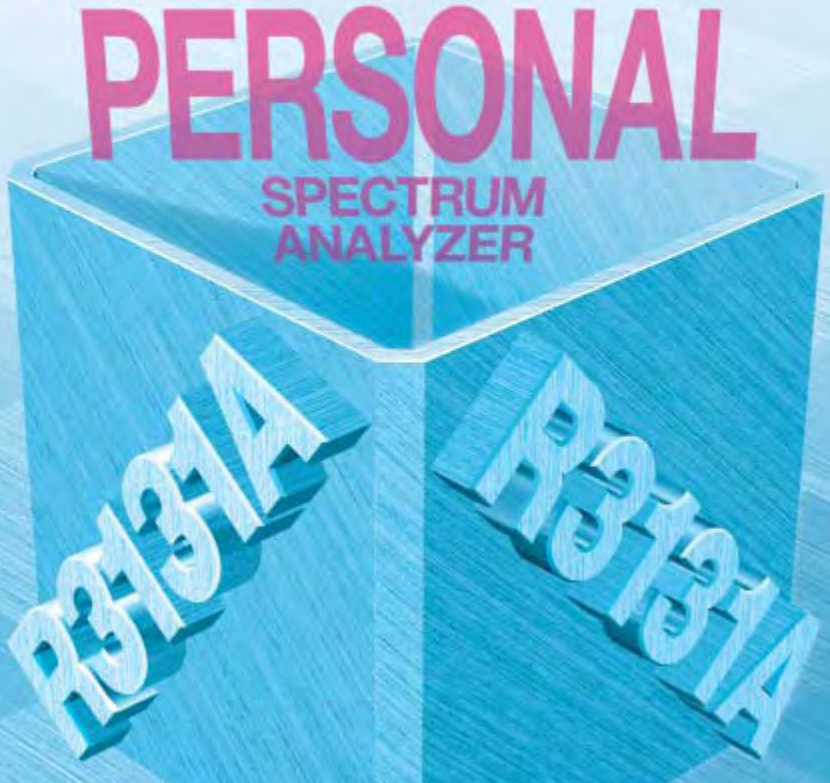
R3131A
Spectrum Analyzer

A personal spectrum analyzer for use in diverse applications

R3131A

The R3131A is an easy-to-use personal spectrum analyzer which combines high accuracy necessary for digital radio measurement with excellent operability and usability.

The R3131A can be used in diverse fields, for a multitude of applications.

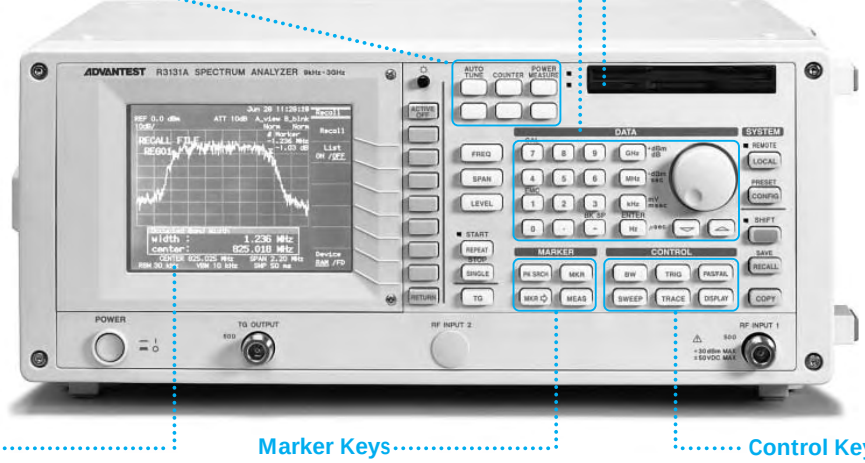


Front Panel Layout

Common Keys
Auto Tune, counter and power measurements made simple by these keys.

Data Entry Keys
The data entry keys arranged together with the FREQ, SPAN, and LEVEL basic functions improves operability.

Floppy Disk Drive
Measurement parameters and results can be recorded on a 3.5-inch floppy disk.Because the bit map and text formats are compatible,the recorded data can easily be transferred to a PC.



5.7-inch B/W STN Display

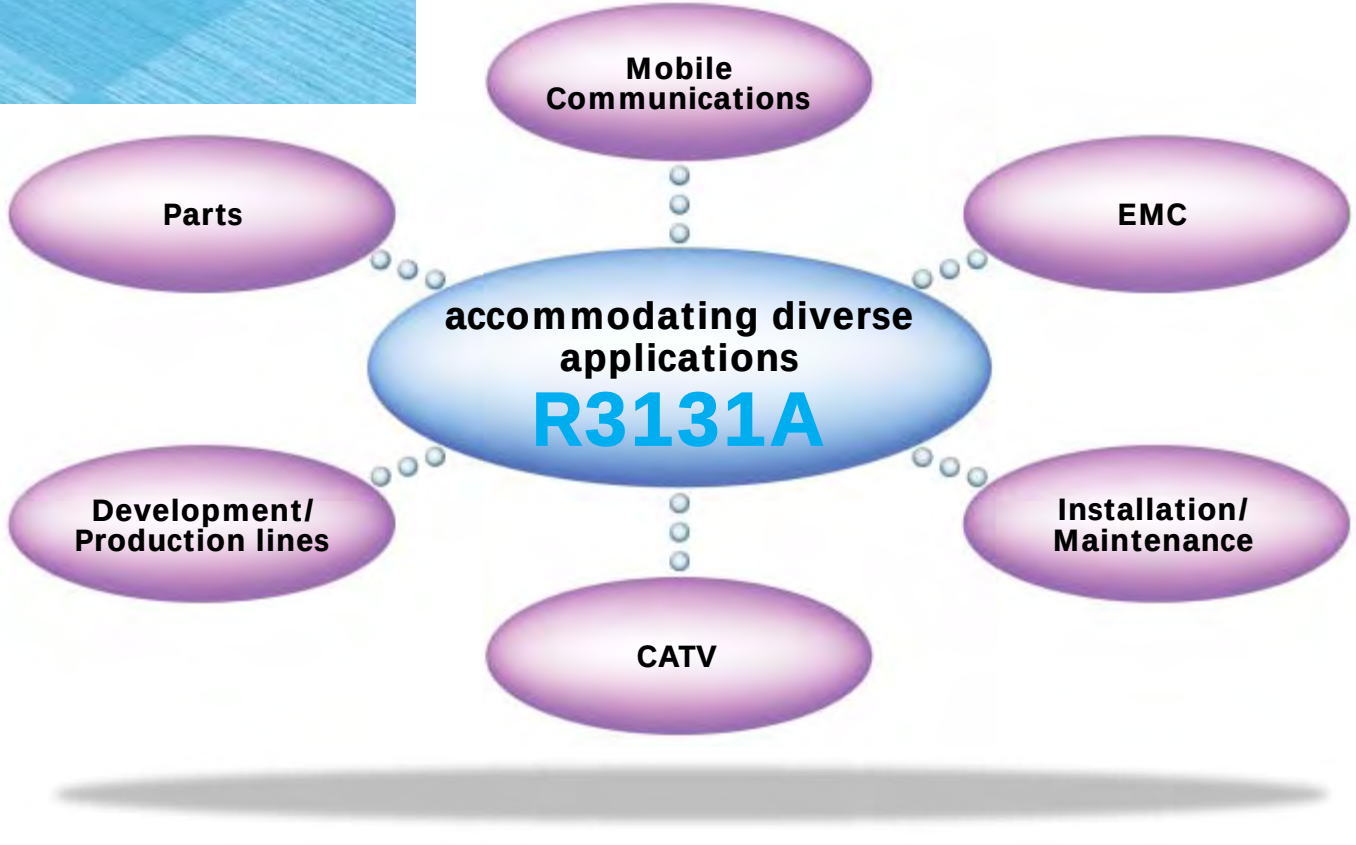
Marker Keys
Various marker functions like delta marker and peak search function are available.

Control Keys
For setting bandwidth, sweep and various parameters, R3131A meets to all the measurements.

R3131A
PERSONAL SPECTRUM ANALYZER

Features

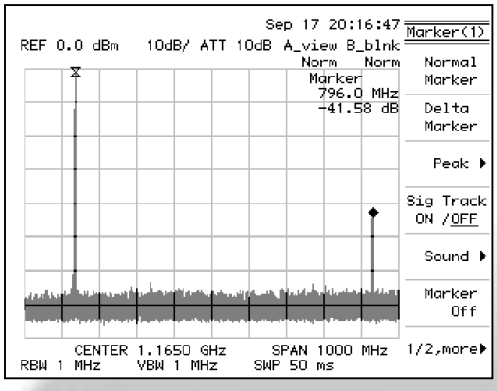
- Built-in high accuracy OBW, ACP, and Power measurement functions which can be applied to digital radio measurement
  - Frequency stabilization
  - Improved SPAN accuracy
  - Improved level accuracy
- Improved ease of use through Auto TUNE function
- Total level accuracy guaranteed by Auto CAL function
- Standard interfaces: GPIB, RS232C, Centronics, and FD drive
- Large character display allows results to be seen
- Substantial EMC measurement function
- Improved system operation speed
- Operation key arrangement for ease of use
- Compact and light weight (12 kg) with a space-saving design
- High performance realized within an economical platform
- Tracking generator option (OPT.74)



Independent operation keys improve operability

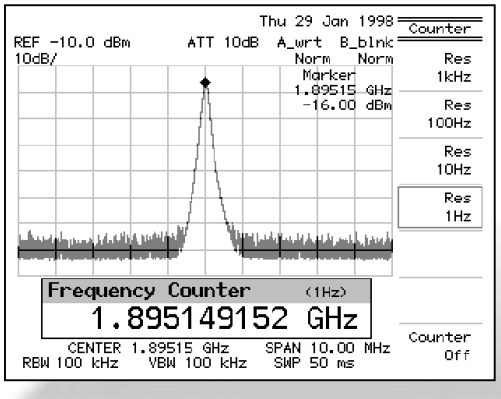
AUTO TUNE

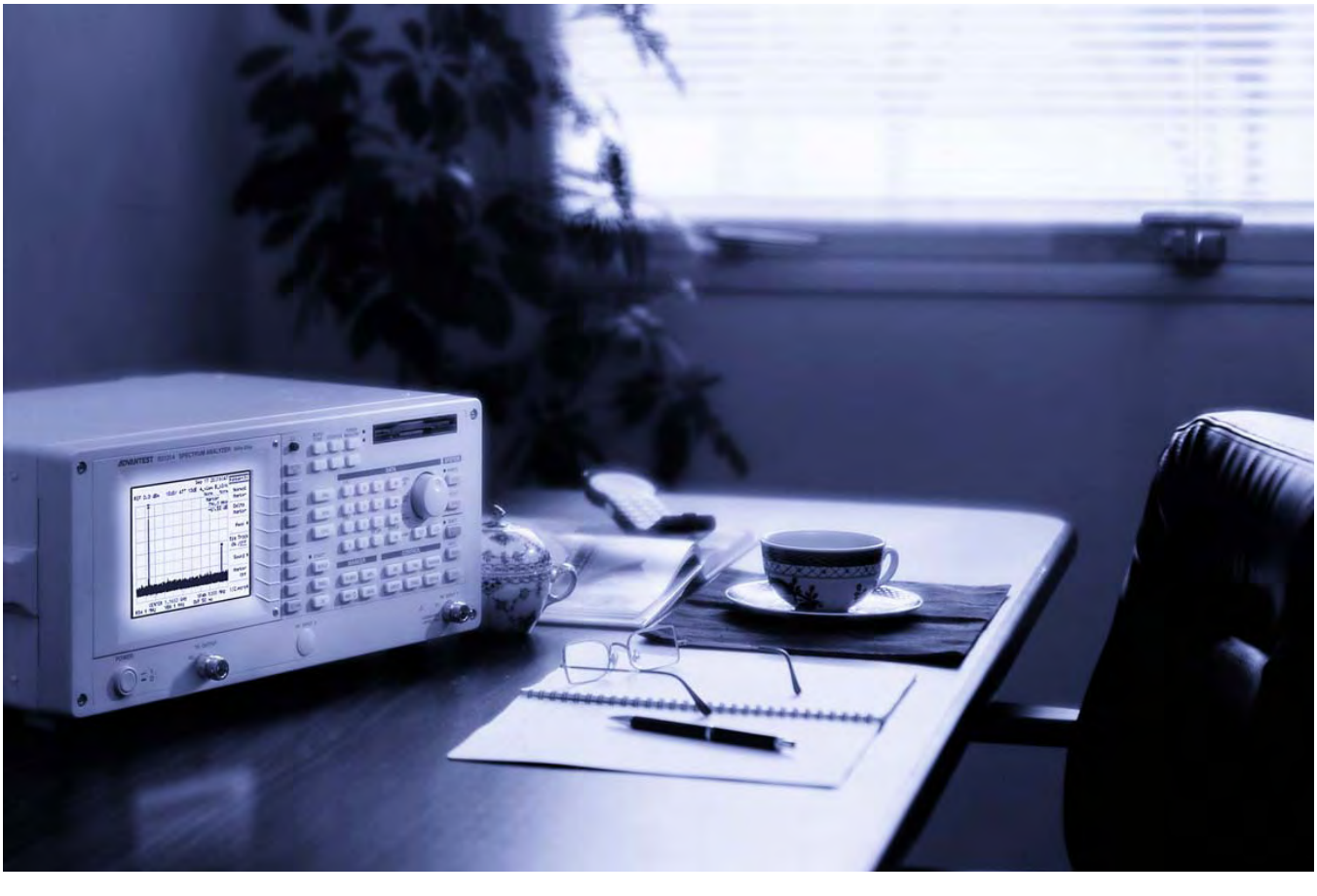
Searches for the signal with the maximum level within the 3 GHz band and sets the center frequency automatically. Then, reproduces the setting which existed immediately before execution of AUTO TUNE, allowing observation under the same measurement conditions.



COUNTER

Performs frequency measurement with the built-in frequency counter simply by moving the marker to the signal. You can select a measurement resolution from 1Hz up to 1kHz. The measurement results are displayed with enlarged characters, for easy viewing.

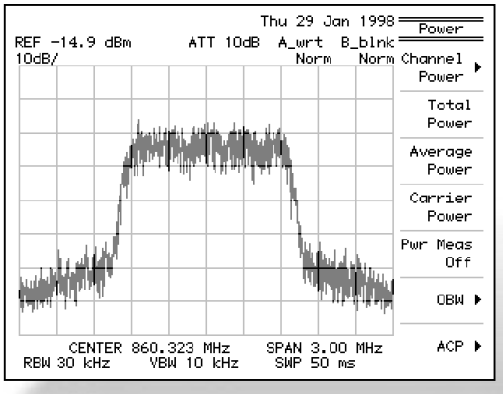




POWER MEASURE

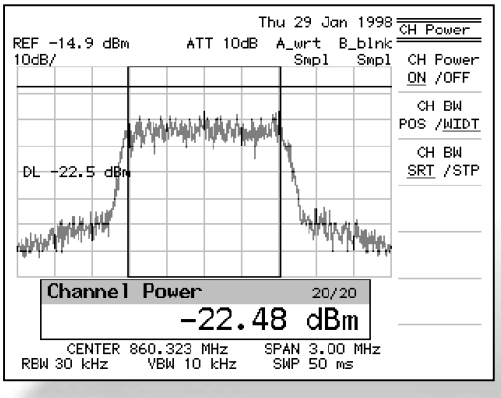
POWER MEASURE

The R3131A can measure the power within the specified band of frequency diffuse signals and the total power of multi-carrier signals. It can also be used to measure the occupied frequency bandwidth (OBW) and adjacent channel leakage power (ACP) which are essential to transmission characteristics testing for radio equipment.



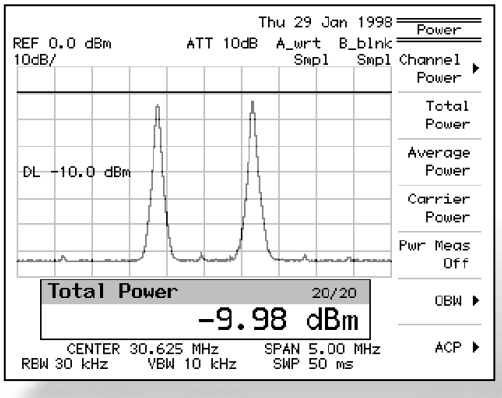
Channel Power

The R3131A allows you to measure the total power within the window and display it as the channel power simply by setting the measurement window to the specified occupied bandwidth.



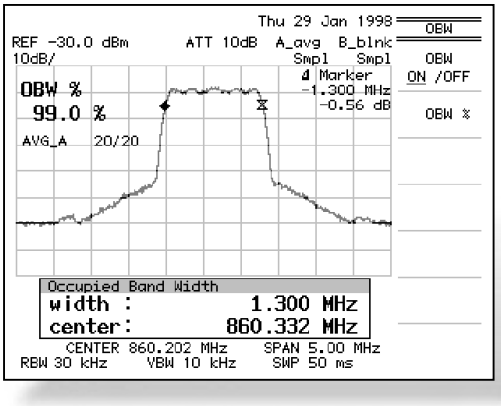
Total Power

Obtains the total power from the spectrum displayed on the screen. This function is useful for total power measurement of multi-carrier signals.



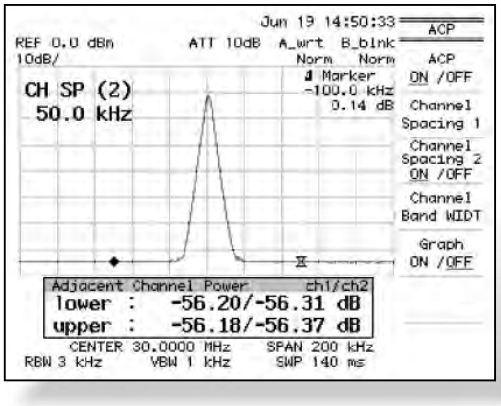
OBW

Measures the frequency band which contains 99% of the total power of the spectrum displayed on the screen. In addition, the % value of OBW can be set to any desired value.



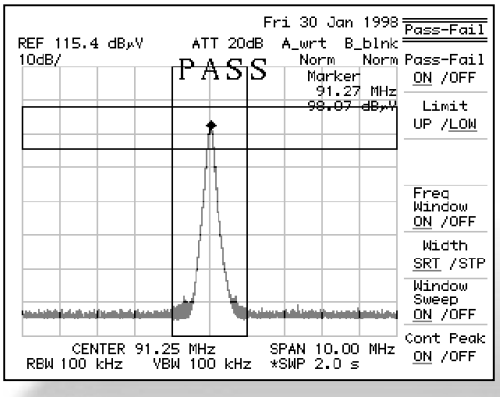
ACP

The measurement results can be displayed in graphical form, including upper and lower point data, up to the 2nd ACP, respectively, offset from the carrier and leakage power value at all the displayed frequency points.

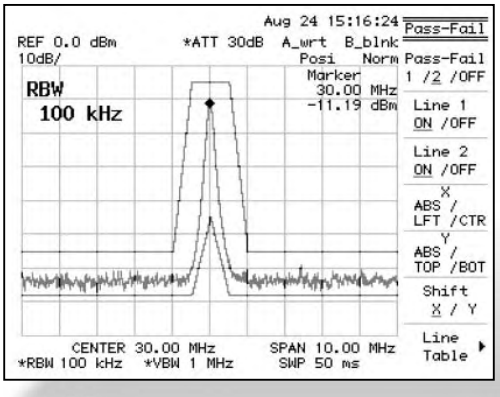


PASS/FAIL

There is a choice of two types of limit tests for waves to be measured. One is a simple method, in which either a signal level or frequency is evaluated for wave shape in accordance with a given window range. The other is a limit line method, in which electromagnetic compatibility (EMC) and filter characteristics are evaluated in accordance with the limit lines.



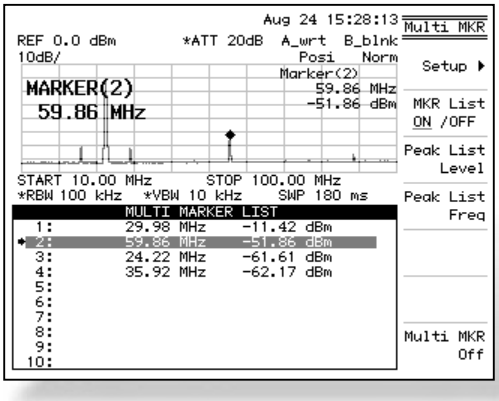
The window range set along the X and Y axes is the PASS area. The signal level or frequency at a marked point is evaluated in accordance with the range.



Any UPPER and LOWER limit lines can be set. Pass or Fail judgement can be made in accordance with the limit lines.

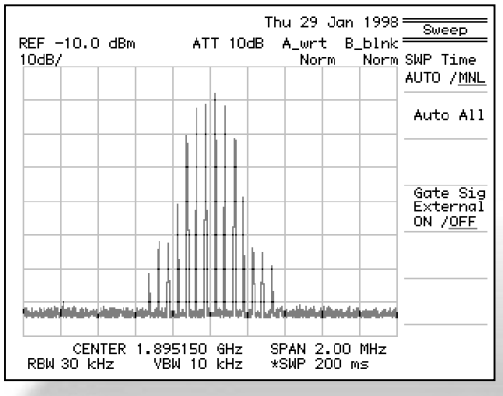
MULTIPLE MARKERS

Up to 10 markers can be set. Therefore, this feature is useful for applications that require the measurement of each level of multiple carrier signals, filter cutoff characteristics, etc. at multiple marked points.

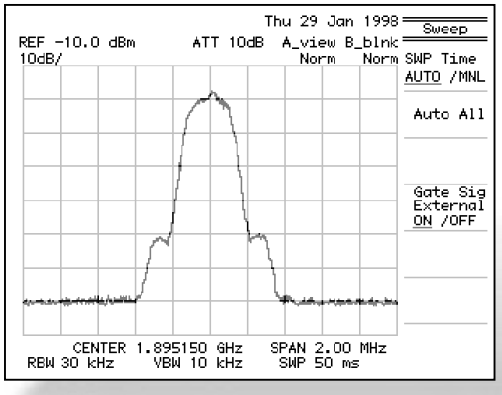


GATED SWEEP

Bursted signals could not directly be observed with former spectrum analyzers. The R3131A allows spectrum analysis of the burst signal by supplying a trigger signal synchronizing with the burst transmission.



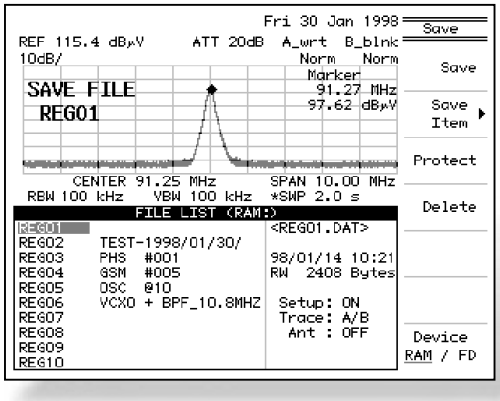
GATED SWEEP OFF



GATED SWEEP ON

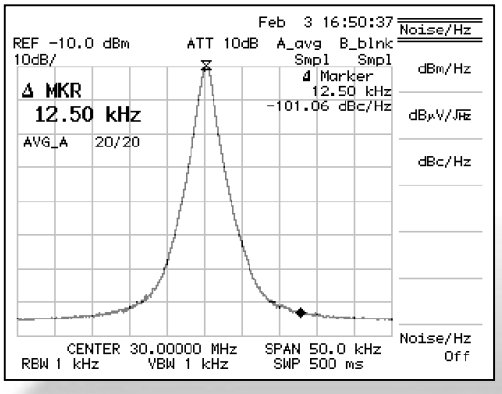
SAVE/RECALL

The R3131A allows you to store and recall measured waveform data and measurement conditions. The R3131A unit offers up to 10 dedicated files for storage. In addition, the built-in standard floppy disk drive allows, you to store them on MS-DOS formatted floppy disks.



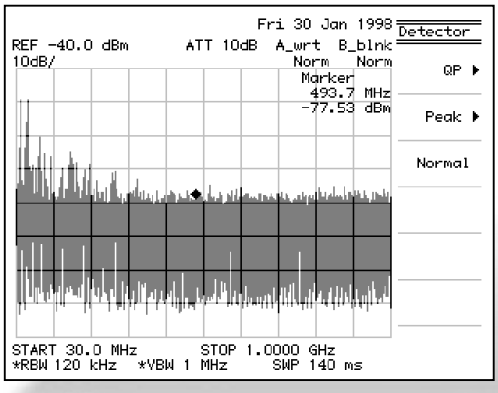
Diverse measurement functions

The MEAS key incorporates the XdB Down measurement function which is useful for noise measurement, AM modulation measurement, 2-signal 3rd-order distortion measurement, and filter cut-off frequency measurement. In noise measurement, bandwidth conversion can easily be made and the PBW calibration function for improvement of measurement accuracy is effective. The PBW calibration function is a new calibration function which performs correction, in power measurement, based on conversion of the R3131A resolution bandwidth filter to an ideal filter, thereby allowing measurement with higher accuracy.



EMC

This function measures electromagnetic interference generated by various electronic equipment. This function incorporates the 9 kHz and 120 kHz RBW and QP detector conforming to the CISPR Pub.16-1 standard. In addition, using the AM/FM demodulation signal fed from the PHONE jack on the rear panel, you can identify broadcasting radio waves which act as external noise. Prior to measurement of noise emission on the approved site, this function is very useful for preparatory evaluation and solution.



Antenna and Level Correction Functions (EDIT of Corr.table is not performed by the R3131A unit.)

Various antenna correction factors provided by Advantest are built-in the R3131A. Simply by selecting the Model name of the antenna, the level indication of the R3131A is calibrated to an absolute value, allowing you to read the value directly in unit of dBµ/m. When you use an antenna from other manufacturers, you can reflect its antenna correction factor in the level indication of the R3131A by performing steps **1** and **2** below.

1

SHIFT + SAVE / RECALL → Save / Save Item / Protect / Delete → Setup ON/OFF, Trace ON/OFF, Antenna Correction ON/OFF

1. Set Antenna Correction to ON and SAVE the file.
2. OPEN the file from the floppy disk using Excel on the PC.
3. Enter the frequency and correction level in the ⟨ANT CORR⟩ area and then overwrite it on the floppy disk.

MAX. 50 Points

4. Load the floppy disk in the R3131A and then RECALL the file. The Correction table is created.

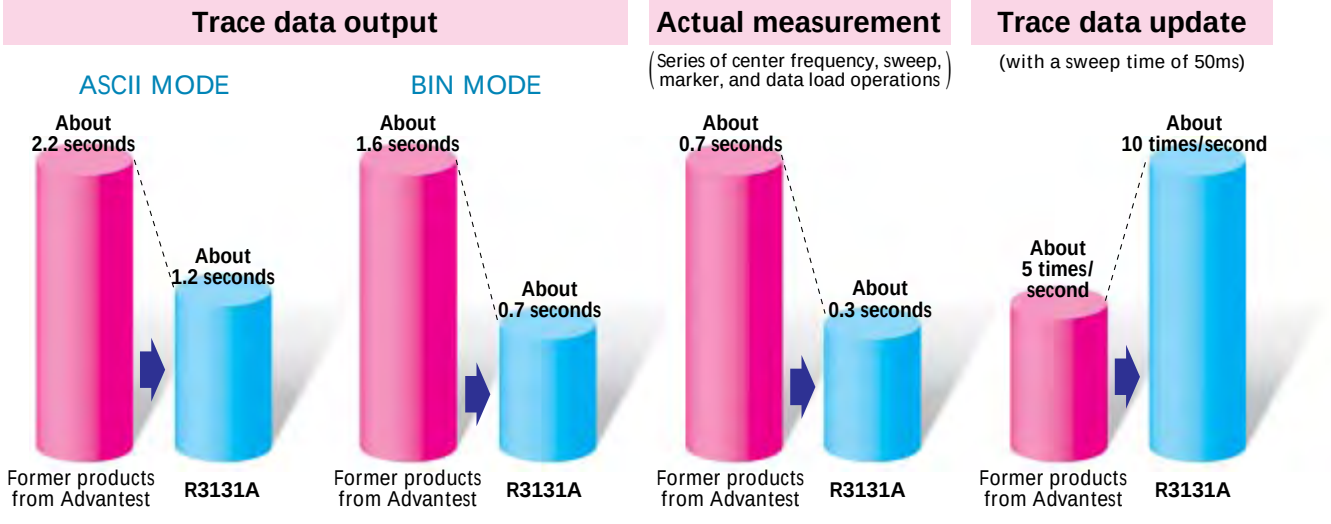
2

SHIFT + EMC / 1 → Field → Correction ON/OFF

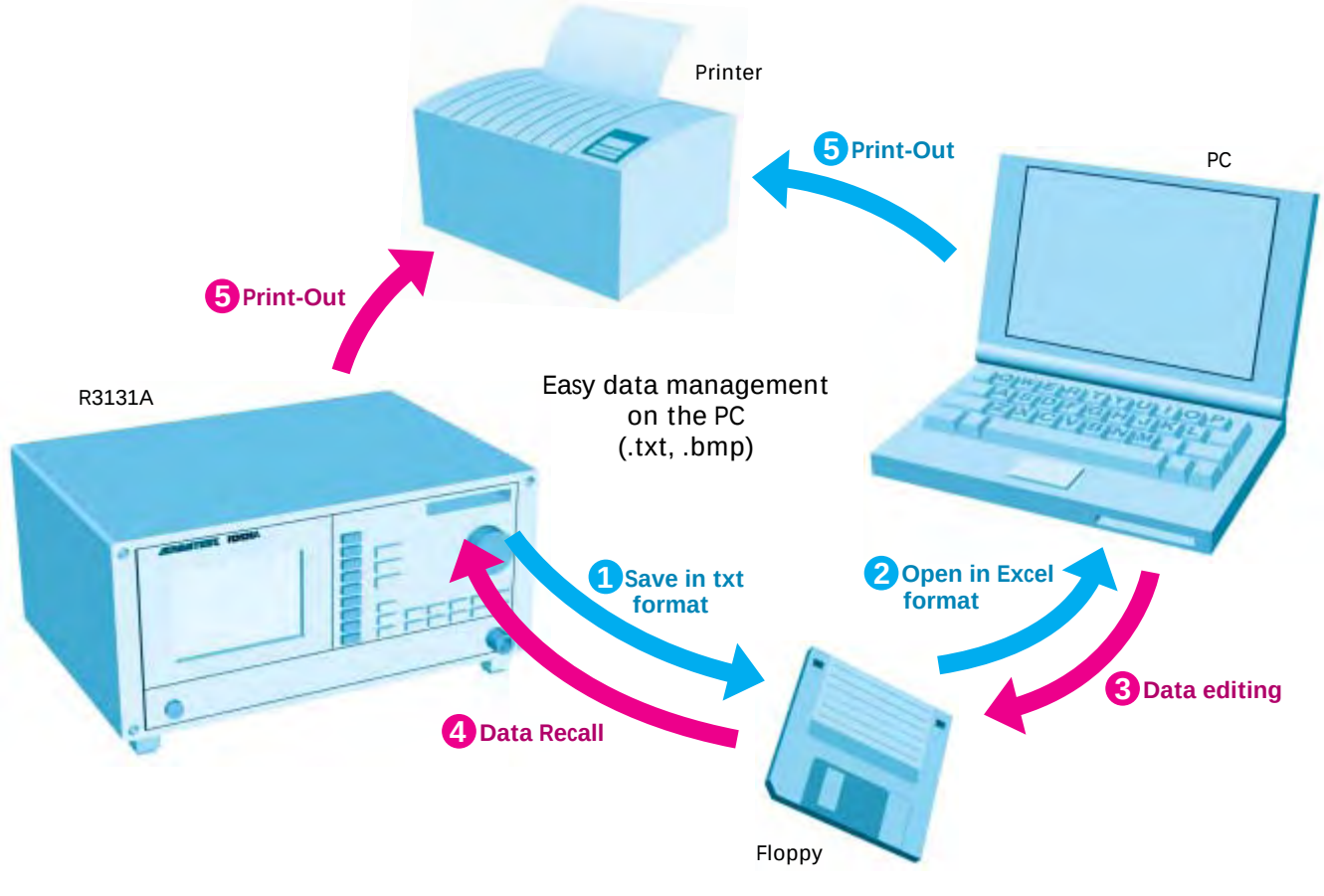
Set Correction to ON. The corrected data is reflected on the screen data.

Improved system throughput

The throughput of production and adjustment lines is largely affected by the measurement time of measuring instruments and data transmission time. With newly developed internal processing technology, the R3131A has shortened the time necessary for GPIB control and data transmission by half or more in comparison with former products. In addition, by reducing the settling time of the local oscillator, the waveform update rate in unit time has been doubled.
(In either case, comparison is made under the same conditions.)

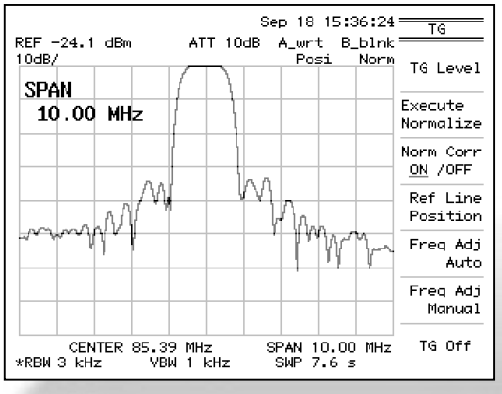


Use of Data Save/Recall of the R3131A



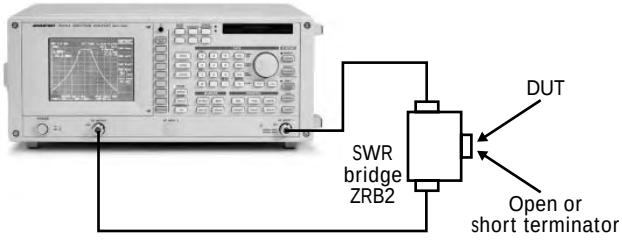
Tracking generator option (OPT.74)

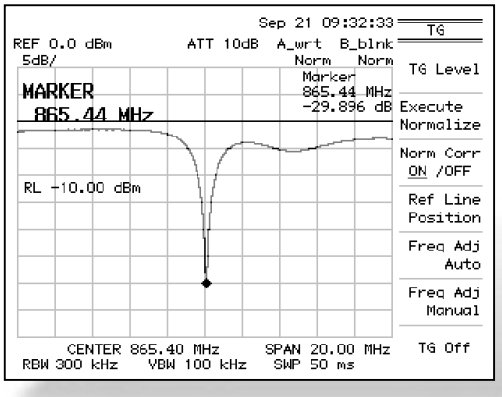
The tracking generator (OPT.74) is a monoblock option which is integrated in R3131A. It can generate constant level signal synchronized with sweep frequency in the frequency range up to 3 GHz and therefore can easily measure the frequency characteristic of object device. Besides, with the normalize function which cancels the frequency characteristic of measuring system, highly accurate measurement is possible. Because the output level can be set in a wide range (from 0 to -59.9 dBm, in 0.1 dB steps), it can be used to measure filter pass characteristic, cable loss, amplifier gain, etc.



For the measurement of reflection characteristic

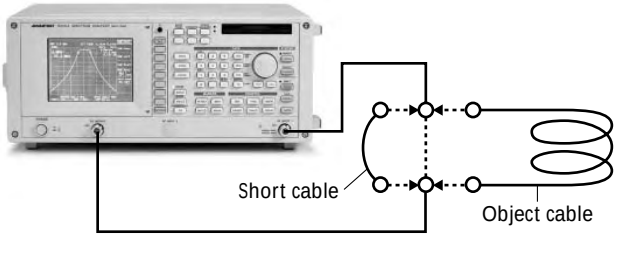
With the SWR bridge, the reflection characteristic of antennas and filters can be measured.

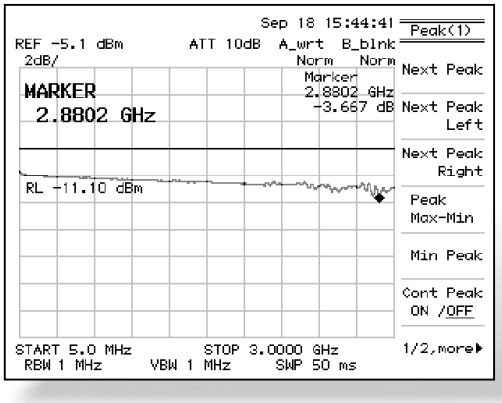




For the measurement of cable loss

With the short cable, the high-frequency loss characteristic of cable can be measured from the differential when the object cable is connected.





Specifications

Frequency

Range:	9 kHz to 3 GHz
Frequency reading accuracy:	± (Frequency reading x Frequency reference accuracy+ Span x Span accuracy + 0.15 x Resolution bandwidth + 1 kHz)
Marker counter accuracy:	± (Marker frequency x Frequency reference accuracy + 1 LSD) (S/N ≥ 25 dB, SPAN ≤ 200 MHz)
Marker counter resolution:	1 Hz to 1 kHz
Frequency reference source accuracy:	±2 ppm/year ±5 ppm at operating temperature range
Frequency span:	zero, 10 kHz to 3 GHz
Frequency span accuracy:	≤ ±3% (50 kHz ≤ span ≤ 3 GHz) ≤ ±10% (10 kHz ≤ span < 50 kHz, typ. ±3%)
Frequency stability Residual FM:	≤ 100 Hzp-p/100 ms (zero span)
Sideband noise:	≤ 100 dBc/Hz (20 kHz offset)
Resolution 3 dB bandwidth:	300 Hz to 1 MHz 1-3 step
Bandwidth accuracy:	≤ ±20% (RBW 1 kHz to 1 MHz) ≤ ±50% (RBW 300 Hz, typ. ±20%)
Selectivity (60 dB:3 dB):	≤ 15:1 (RBW 1 kHz to 1 MHz) ≤ 20:1 (RBW 300 Hz, 50 dB:3 dB)
6 dB bandwidth:	9 kHz, 120 kHz
Video bandwidth:	10 Hz to 1MHz 1-10 step

Amplitude

Amplitude measurement range:	+30 dBm to Average noise level
Maximum input level:	+30 dBm, 50 VDC
Display range LOG: LIN:	 10 dB/div 8 div, 1,2,5 dB/div 10 div 10%/div of reference level
Reference level range LOG: LIN:	 -64 dBm to + 40 dBm +141.1 µV to + 22.36 V
Input attenuator range:	0 to 50 dB 10 dB step

Sweep

Sweep time:	50 ms to 500 s
Sweep time accuracy:	≤ ±3%
Trigger mode:	FREE RUN, VIDEO, EXT, LINE
Sweep mode:	REPEAT, SINGLE

Dynamic range

Average noise level:	-113 dBm +2 f (GHz) dB (at RBW 1 kHz, VBW 10 Hz, INPUT ATT 0 dB, frequency ≥ 1 MHz)
1 dB gain compression:	> -5 dBm (mixer input level, f ≥ 20 MHz)
Secondary harmonic distortion:	≤ -70 dB (input frequency ≥ 10 MHz, mixer input level -30 dBm)
3rd Order Intermodualation:	≤ -70 dB (input frequency ≥ 10 MHz, mixer input level -30 dBm, Δf > 50 kHz)
Other input spurious:	≤ -60 dB (offset ≥ 20 MHz, mixer input level -30 dBm)
Residual response:	≤ -100 dBm (Frequency ≥ 1 MHz, INPUT ATT = 0 dB, input 50 Ω terminated)

Amplitude accuracy

Calibration signal:	30 MHz, -20 dBm ±0.3 dB
Frequency response:	≤ ±0.5 dB (100 kHz to 3 GHz, ATT = 10 dB) ≤ ±1 dB (100 kHz to 2 GHz) ≤ ±2 dB (9 kHz to 3 GHz) (after calibration at 30 MHz reference)
Scale display accuracy LOG: LIN:	 ≤ ±0.5 dB (0 to -20 dB) (after auto calibration) ≤ ±1.5 dB/70 dB (after auto calibration) ≤ ±1.0 dB/10 dB (after auto calibration) ≤ ±0.2 dB/1 dB (after auto calibration) ±5% of reference level
Input attenuator switching accuracy:	≤ ±0.3 dB (10 dB reference, 30 MHz)
Resolution bandwidth switching accuracy:	≤ ±0.5 dB (after auto calibration)
IF gain error:	≤ ±0.5 dB (after auto calibration)
Total level accuracy:	±1.5 dB (after auto calibration, REF = -50 to 0 dBm, ATT = 10 dB, 2 dB/div, RBW = 300 kHz, f > 100 kHz)

Input/output

RF input connector/impedance:	N type jack/50 Ω (nominal)
VSWR:	≤ 1.5 (100 kHz to 2 GHz, INPUT ATT ≥ 10 dB) ≤ 2.0 (9 kHz to 3 GHz, INPUT ATT ≥ 10 dB)
10 MHz REF. input:	BNC jack, 50 Ω
Input range:	-10 dBm to +10 dBm
Ext. trigger input:	BNC jack, 10 kΩ (nominal), DC coupling
Phone output:	Mini monophonic jack, 8 Ω
GPIB interface:	IEEE-488 bus connector
Serial interface:	D-SUB 9-pin
Printer interface:	D-SUB 25-pin, ESC/P, PCL
Floppy disk drive:	3.5-inch, 1.4 Mbyte, MS-DOS format

General specifications

Operating conditions:	0°C to +50°C, 85%RH max. (without condensation)
Storage conditions:	-20°C to + 60°C
Power supply:	100/200 VAC, auto switching 100 VAC ; 100 V to 120 V, 50 Hz/60 Hz 220 VAC ; 220 V to 240 V, 50 Hz/60 Hz
Power consumption:	200 VA max. (100 VAC)
Weight:	12 kg or less
Dimensions:	Approx. 424 mm (W) x 177 mm (H) x 300 mm (D)

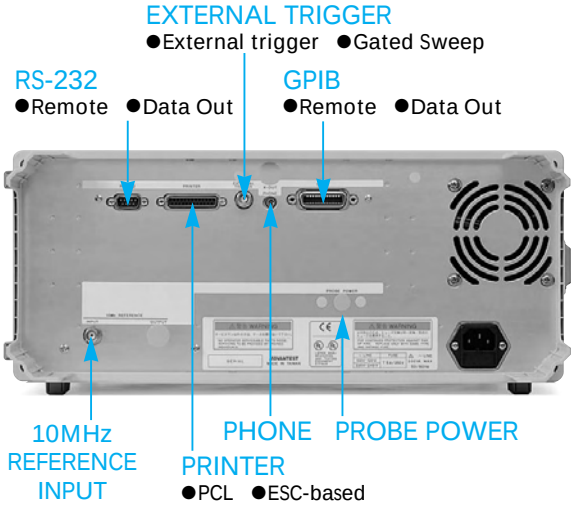
OPT.74 Tracking Generator

Frequency range:	100 kHz to 3.0 GHz
Output level range:	0 dBm to -59.9 dBm (0.1 dB step)
Output level accuracy:	≤ ±0.5 dB (30 MHz, -10 dBm, 20°C to 30°C)
Output level flatness:	at -10 dBm,referenced to 30 MHz ≤ ±1.0 dB (100 kHz to 1.0 GHz) ≤ ±1.5 dB (100 kHz to 3.0 GHz)
Output level switching error:	at referenced to -10 dBm ≤ ±1.0 dB (100 kHz to1.0 GHz, output level ≥ -30 dBm) ≤ ±2.0 dB (100 kHz to 2.6 GHz) ≤ ±3.0 dB (100 kHz to 3.0 GHz)
Output spurious Harmonic: Non-harmonic:	 ≤ -20 dBc (output level =-10 dBm) ≤ -30 dBc (output level =-10 dBm)

Windows is a trademark of Microsoft Corporation.

Specifications may change without notification.

Rear panel



Applicable printer control code

- ●ESC/P
- ●ESC/P Raster
- ●HP PCL

Printers with the Centronics interface using the above commands as control codes can be used.

R3131A Spectrum Analyzer (OPT.74 Tracking generator option)

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