

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

Test equipment Solutions Ltd
Unit 8 Elder Way
Waterside Drive
Langley
Berkshire
SL3 6EP

T: +44 (0)1753 596000
F: +44 (0)1753 596001

Email: info@TestEquipmentHQ.com
Web: www.TestEquipmentHQ.com

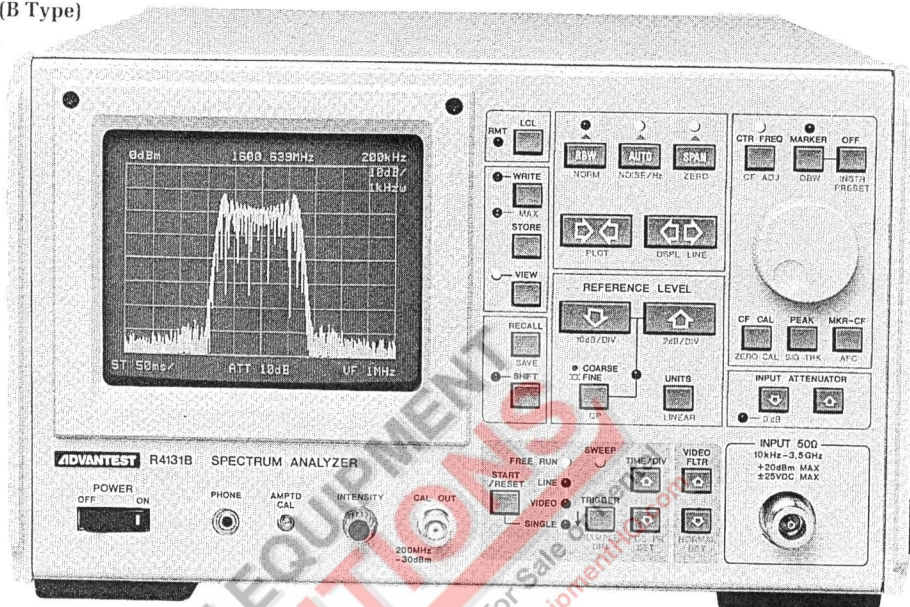


Spectrum Analyzers

10 kHz to 3.5 GHz

R4131A/AN/B/BN

- Excellent Skirt Characteristics: -80 dBc
- Built-In AFC Function (B Type)
- Save/Recall Functions, Including Waveforms
- Auto-Recall Function



R4131 Series Spectrum Analyzer

The R4131 Series incorporates the performance of the already-popular TR4131 Series of 3.5 GHz spectrum analyzers and provides additional features as well. Weighing just 10 kg (22 lbs), these analyzers have a measurement-condition memory function which includes waveforms, an auto-recall function which recalls measurement conditions when power is switched on and other features to simplify operation. In addition to these new features, these analyzers use the proven spectrum analysis expertise of ADVANTEST, with standard features of directly readable field strength measurements compensated for antenna calibration factor and quasipeak value measurements conforming to CISPR standards.

The R4131 series features a maximum input sensitivity of -116 dBm, a dynamic range of 70 dB and a skirt characteristics of -80 dBc or better.

Especially, the B type analyzer provides AFC (Automatic Frequency Control), enabling highly stable spectrum analysis.

The TR4153A/4153B and TR4154 Tracking Generators can be added to these analyzers to enable frequency-characteristic measurements with a wide dynamic range. For use in measuring systems, GPIB is as standard, as well as direct plotting and video output for use in system applications.

■ 10 kHz to 3.5 GHz Coverage in a 10 kg Package

The R4131, weighing just 10 kg, covers the wide frequency range of 10 kHz to 3.5 GHz, and is designed for both high performance and portability. The R4131 can be used in such diverse applications as 3rd harmonic measurements of 900 MHz-band mobile radio equipment, received field strength measurements of satellite broadcasts and evaluation/maintenance of CATV systems.

■ Choose from 4 Models, Depending upon Your Application.

The R4131 consists of 4 models, enabling selection for various application requirements. All models feature high performance and set of features and functions for various applications.

| | R4131A | R4131AN | R4131B | R4131BN |
|-----------------------------------|-------------------|---------|--------|----------|
| Frequency range | 10 kHz to 3.5 GHz | | | |
| Input impedance | 50 Ω | 75 Ω | 50 Ω | 75 Ω |
| Center frequency display accuracy | ±10 MHz | | | ±100 kHz |
| Positive/negative display | N/A | | | YES |
| Field strength measurement | standard | | | standard |
| Quasi-peak value measurement | standard | | | standard |
| GPIB | standard | | | standard |
| Occupied band width measurement | N/A | | | Optional |

■ Save/Recall Function for Conditions and Waveforms

The R4131 Series has a save/recall function which operates for not only measurement condition settings but for waveforms as well. Three sets of conditions and waveforms are stored and recalled. The enables a stored waveform to be used as a reference in comparison measurements at different locations. Independent from this function, is an auto-recall function that serves to automatically set the desired measurement conditions when power is switched on, a great convenience in making onsite measurements.

■ Video Signal Modulation Analysis

The R4131B and R4131BN feature a positive/negative display function usually found on more sophisticated equipment. This can be used to perform AM modulation measurements on video signals.

Spectrum Analyzers

Portable and Light Weight

R4131 Series

R4131A/R4131AN Specifications

Frequency
Frequency range: 10 kHz to 3.5 GHz
Center frequency display: Displayed on the CRT with a maximum resolution of 1 kHz
Center frequency display accuracy: ± 10 MHz, after zero calibration at local feed through. ± 15 MHz under GPIB control
Frequency span: 50 kHz to 4 GHz in ten divisions on the horizontal scale on the CRT, selectable in 1-2-5 sequence.
 With zero span, operates as a fixed tuned receiver.
Frequency span accuracy: $\pm 5\%$
Stability:

Frequency stability 100 kHz/5 min., after 30 min. warm-up
Residual FM 2 kHz_{p-p} max./100 ms

Noise sideband: -80 dBc max. at resolution bandwidth of 1 kHz (at 20 kHz from the carrier, with a 10 Hz video filter)

Resolution:

Resolution bandwidth (3 dB points) 1 kHz to 1 MHz in 1, 3, 10 sequence (6 dB points) 9 kHz, 120 kHz, when QP mode is selected
Selectivity (ratio of 60 dB:3 dB resolution bandwidths) 15:1 max.
Resolution bandwidth accuracy $\pm 20\%$, CISPR standard or better in QP mode

Marker display: Can be set at any point.

Resolution Max. 1 kHz (Depending on the span.)

Measurement accuracy Center frequency display accuracy + frequency span accuracy

Amplitude

Screen display range:

LOG mode With respect to reference level 80 dB for a 10 dB/div display and 20 dB for a 2 dB/div display, or 40 dB for a 5 dB/div display in QP mode

LIN mode 10 div

Linearity:

LOG mode ± 0.15 dB/1 dB, ± 1 dB/10 dB, ± 1.5 dB/70 dB or above

LIN mode $\pm 5\%$ of fullscale

Reference level:

LOG mode -69 dBm to +40 dBm (40.25 dB μ to 150 dB μ for the R4131AN) (for 10 dB/div, 10 dB and 1 dB steps, and for 1 dB/div and 5 dB/div, 1 dB and 0.25 dB steps)

LIN mode 72.77 μ V to 22.36 V (102.9 μ V to 31.62 V for R4131AN)

Reference level accuracy: ± 1 dB in LOG mode (in the reference level range of 0 to -59 dBm (110 dB μ to 51 dB μ for the R4131AN), at 200 MHz, with attenuation at 10 dB after level calibration)

Reference level units: Selectable as dBm, dB μ or dB μ /m.

When dB μ /m is selected, an automatic correction is made for the antenna calibration factor.

Marker display:

Resolution 0.2 dB (for 10 dB/div) or 0.05 dB (for 2 dB/div)

dBm/Hz Rms noise level is displayed normalized with respect to the 1 Hz-bandwidth noise at the marker position.

Dynamic range:

Average noise level -116 dBm (-114 dBm for the R4131AN) +1.55f (GHz) dB or less (at a resolution bandwidth of 1 kHz, with a 10 Hz video filter, with attenuation 0 dB, at 1 MHz or above)

2nd and 3rd order distortion 70 dB or greater (when input level is -30 dBm, at 10 MHz or above)

Frequency response (with 10 dB attenuation)

| R4131A | R4131AN |
|--|---|
| ± 1 dB (100 kHz \leq frequency \leq 2 GHz) | ± 1.5 dB (100 kHz to 1.5 GHz) ± 2.5 dB (10 kHz to 2 GHz) |
| ± 3.5 dB (10 kHz \leq frequency \leq 3.5 GHz) | ± 4 dB (2 GHz to 3.5 GHz) |

Residual response -100 dBm max. (-98 dBm for the R4131AN) (with attenuation 0 dB, input termination 50 Ω , frequency > 100 kHz)

Video filter: 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 300 kHz, 1 MHz

Resolution bandwidth switching accuracy: ± 1 dB ($+20^\circ\text{C}$ to 30°C)

Gain compression: 1 dB max. for -10 dBm input

Sweep

Sweep time: 5 ms/div to 100 s/div selectable in 1-2-5 sequence

Sweep time accuracy: $\pm 15\%$

Trigger modes: Free-run, line, video and single (reset, start)

Input

RF input: Approx. 50 Ω , N connector (75 Ω , NC connector for the R4131AN)

Maximum input level: +20 dBm (127 dB μ for the R4131AN), ± 25 VDC max. (with 20 dB or greater input attenuation)

Input attenuator: 0 to 50 dB in 10 dB steps

Input attenuator switching accuracy: ± 1 dB (10 kHz \leq frequency \leq 2 GHz) or ± 1.5 dB (2 GHz < frequency \leq 3.5 GHz), with respect to 10 dB attenuation

Input VSWR (at 10 dB input attenuation or greater):

| R4131A | R4131AN |
|---|---|
| 1.5 max. (100 kHz \leq frequency \leq 2 GHz) | 1.5 max. (100 kHz to 1.5 GHz) |
| 2.0 max. (2 GHz \leq frequency \leq 3.5 GHz) | 2 max. (10 kHz to 2 GHz) 2.5 max. (2 GHz to 3.5 GHz) |

Display Section

Display: Waveform, setting conditions, grid

Trace: WRITE waveform and VIEW waveform (up to 2 waveform displayed on the CRT)

WRITE: Posi-peak and sample display

MAX HOLD: For every repetition from the beginning of the function, the maximum signal level along the horizontal axis is displayed.

MARKER: Frequency and level at the marker point are measured and displayed.

PEAK SEARCH: The marker is moved to the point of maximum level on the displayed waveform.

MRK CF: The center frequency is changed to the marker frequency.

ZERO CAL: Improves the center frequency accuracy for local feedthrough

PLOT: Direct plotting via the GPIB (using an ADVANTEST or HP plotter)

NORMALIZE: Display of values relative to an internally stored reference response.

SAMPLE: Display of instantaneous time-signal levels at each analysis position for each sweep

Output

Calibration output signal: 200 MHz ± 30 kHz, -30 dBm (80 dB μ for the R4131AN) ± 0.5 dB

Monitor output: Approx. 8 Ω , enables monitoring using an earphone.

Recorder outputs: Analog output of WRITE waveform only

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: 3.58 MHz IF output, approx. 50 Ω

Video output: Approx. 1 V_{p-p}, approx. 75 Ω (composite signal for external CRT)

Probe power output: ± 15 V, 4-pin connector

GPIB: The R4131A/R4131AN is fully controllable over the GPIB for automatic testing as well as direct plotting without an external controller.

General Specifications

Save/recall: Up to 3 sets of measurement conditions, including waveforms, can be stored in memory and auto-recall can be used to automatically recall stored conditions when power is applied.

Operating environment: 0°C to $+50^\circ\text{C}$

Storage environment: -20°C to $+70^\circ\text{C}$

Power requirements: Specified at time of ordering

| Option No. | Standard | 44 |
|------------------|-----------|------------|
| Line voltage (V) | 90 to 132 | 198 to 250 |

50/60 Hz, 120 VA max.

Dimensions: Approx. 300(W) \times 177(H) \times 460(D) mm

Weight: Approx. 10 kg (22 lbs.)

Standard Accessories

| Item | Model | Remarks |
|-------------------|------------|--|
| Power cable | MP-43 | |
| Input cable | MI-02 | Connector UG-88/U BNC-BNC (for R4131A) |
| Input cable | A01234 | Connector BCP-C3 BNC-BNC (for R4131AN) |
| Connector adaptor | JUG-201A-U | N-BNC adaptor (for R4131A) |
| Connector adaptor | BA-A165 | NC-BNC adaptor (for R4131AN) |

Spectrum Analyzers

10 kHz to 3.5 GHz

R4131 Series

R4131B/R4131BN Specifications

Frequency

Frequency range: 10 kHz to 3.5 GHz

Center frequency display: Displayed on the CRT with a maximum resolution of 1 kHz

Center frequency display accuracy (with local feed through after zero calibration):

Below 2.5 GHz $\pm (100 \text{ kHz} \pm 3\% \text{ of span})$, at a sweep time of 5 ms to 0.5 s/div.

Above 2.5 GHz $\pm 10 \text{ MHz}$

Frequency span: 50 kHz to 4 GHz in ten divisions on the horizontal scale on the CRT, selectable in 1-2-5 steps.

With zero span, operates as a fixed tuned receiver.

Frequency span accuracy: $\pm 5\%$

Stability:

Frequency stability at fixed frequency after 30 min. warm-up

Below 2.5 GHz 10 kHz/10 min. or better

Above 2.5 GHz 100 kHz/5 min. or better

Residual FM 2 kHz_{p-p} max./100 ms

Noise sideband: -80 dBc max. at resolution bandwidth of 1 kHz (at 20 kHz from the carrier, with a 10 Hz video filter)

Resolution:

Resolution bandwidth

(3 dB points) 1 kHz to 1 MHz in 1-3 steps

(6 dB points) 9 kHz, 120 kHz, when QP mode is selected

Selectivity (ratio of 60 dB:3 dB resolution bandwidths) 15:1 max.

Resolution bandwidth accuracy $\pm 20\%$, CISPR standard or better in QP mode

Marker display: Can be set at any point.

Resolution Max. 1 kHz (Depends on the span.)

Measurement accuracy Center frequency display accuracy + frequency span accuracy

Amplitude

Screen display range:

LOG mode With respect to reference level 80 dB for a 10 dB/div display and 20 dB for a 2 dB/div display, or 40 dB for a 5 dB/div display in QP mode

LIN mode 10 div

Linearity:

LOG mode $\pm 0.15 \text{ dB/1 dB}$, $\pm 1 \text{ dB/10 dB}$, $\pm 1.5 \text{ dB/70 dB}$ or above

LIN mode $\pm 5\%$ of fullscale

Reference level:

LOG mode -69 dBm to +40 dBm (40.25 dB μ to 150 dB μ for the R4131BN) (for 10 dB/div, 10 dB and 1 dB steps, and for 1 dB/div and 5 dB/div, 1 dB and 0.25 dB steps)

LIN mode 72.77 μ V to 22.36 V (102.9 μ V to 31.62 V for R4131BN)

Reference level accuracy: $\pm 1 \text{ dB}$ in LOG mode (in the reference level range of 0 to -59 dBm (110 dB μ to 51 dB μ for the R4131BN), at 200 MHz, with attenuation at 10 dB after level calibration)

Reference level units: Selectable as dBm, dB μ or dB μ /m.

When dB μ /m is selected, an automatic correction is made for the antenna calibration factor.

Marker display:

Resolution 0.2 dB (for 10 dB/div) or 0.05 dB (for 2 dB/div)

dBm/Hz Rms noise level is displayed normalized with respect to the 1 Hz-bandwidth noise at the marker position.

Dynamic range:

Average noise level -116 dBm (-114 dBm for the R4131BN) +1.55f (GHz) dB or less (at a resolution bandwidth of 1 kHz, with a 10 Hz video filter, with attenuation 0 dB, at 1 MHz or above)

2nd and 3rd order distortion 70 dB or greater (when input level is -30 dBm, at 10 MHz or above)

Frequency response (with 10 dB attenuation):

| R4131B | R4131BN |
|--|---|
| $\pm 1.0 \text{ dB}$ | $\pm 1.5 \text{ dB}$ (100 kHz to 1.5 GHz) |
| (100 kHz \leq frequency \leq 2 GHz) | $\pm 2.5 \text{ dB}$ (10 kHz to 2 GHz) |
| $\pm 2.0 \text{ dB}$ | $\pm 4 \text{ dB}$ (2 kHz to 3.5 GHz) |
| (10 kHz \leq frequency \leq 3.5 GHz) | |

Residual response -100 dBm max. (-98 dBm for the R4131BN) (with attenuation 0 dB, input termination 50 Ω , frequency > 100 kHz)

Video filter: 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz, 300 kHz, 1 MHz

Resolution bandwidth switching accuracy: $\pm 1 \text{ dB}$ (+20°C to 30°C)

Gain compression: 1 dB max. for -10 dBm input

Sweep

Sweep time: 5 ms/div to 100 s/div selectable in 1-2-5 steps

Sweep time accuracy: $\pm 15\%$

Trigger modes: Free-run, line, video and single (reset, start)

Input

RF input: Approx. 50 Ω , N connector (75 Ω , NC connector for the R4131BN)

Maximum input level: +20 dBm (127 dB μ for the R4131BN), $\pm 25 \text{ VDC}$ max. (with 20 dB or greater input attenuation)

Input attenuator: 0 to 50 dB in 10 dB steps

Input attenuator switching accuracy: $\pm 1 \text{ dB}$ (10 kHz \leq frequency \leq 2 GHz or $\pm 1.5 \text{ dB}$ (2 GHz < frequency \leq 3.5 GHz), with respect to 10 dB attenuation

Input VSWR (at 10 dB input attenuation or greater):

| R4131B | R4131BN |
|---|-------------------------------|
| 1.5 max. | 1.5 max. (100 kHz to 1.5 GHz) |
| (100 kHz \leq frequency \leq 2 GHz) | 2 max. (10 kHz to 2 GHz) |
| 2.0 max. | 2.5 max. (2 GHz to 3.5 GHz) |
| (2 GHz \leq frequency \leq 3.5 GHz) | |

Display Section

Display: Waveform, setting conditions, grid

Trace: WRITE waveform and VIEW waveform (up to 2 waveforms displayed on the CRT)

WRITE: Posi-peak and sample and posi/nega display

MAX HOLD: For every repetition from the beginning of the function, the maximum signal level along the horizontal axis is displayed.

MARKER: Frequency and level at the marker point are measured and displayed.

PEAK SEARCH: The marker is moved to the point of maximum level on the displayed waveform.

MRK CF: The center frequency is changed to the marker frequency.

ZERO CAL: Improves the center frequency accuracy for local feedthrough

PLOT: Direct plotting via the GPIB (using an ADVANTEST or HP plotter)

NORMALIZE: Display of values relative to an internally stored reference response.

SAMPLE: Display of instantaneous time-signal levels at each analysis position for each sweep

Output

Calibration output signal: 200 MHz $\pm 30 \text{ kHz}$, -30 dBm (80 dB μ for the R4131BN) $\pm 0.5 \text{ dB}$

Monitor output: Approx. 8 Ω , enables monitoring using an earphone.

Recorder outputs: Analog output of WRITE waveform only

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: 3.58 MHz IF output, approx. 50 Ω

Video output: Approx. 1 V_{p-p}, approx. 75 Ω (composite signal for external CRT)

Probe power output: $\pm 15 \text{ V}$, 4-pin connector

GPIB: The R4131B/4131BN is fully controllable over the GPIB for automatic testing as well as direct plotting without an external controller.

Spectrum Analyzers

Portable and Light Weight

R4131 Series

General Specifications

Save/recall: Up to 3 sets of measurement conditions, including waveforms, can be stored in memory and auto-recall can be used to automatically recall stored condition when power is applied.

Operating environment: 0°C to +50°C

Storage environment: -20°C to +70°C

Power requirements: Specified at time of ordering

| Option No. | Standard | 44 |
|------------------|-----------|------------|
| Line voltage (V) | 90 to 132 | 198 to 250 |

50/60 Hz, 120 VA max.

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

Weight: Approx. 10 kg (22 lbs.)

Standard Accessories

| Item | Model | Remarks |
|-------------------|------------|--|
| Power cable | MP-43 | |
| Input cable | MI-02 | Connector UG-88/U BNC-BNC (for R4131B) |
| Input cable | A01234 | Connector BCP-C3 BNC-BNC (for R4131BN) |
| Connector adaptor | JUG-201A-U | N-BNC adaptor (for R4131B) |
| Connector adaptor | BA-A165 | NC-BNC adaptor (for R4131BN) |
| Connector adaptor | NPC-NFJ | C15 type adaptor (for R4131BN) |

Option

Option 04 Occupied Bandwidth Measurement

Occupied band width is calculated from the measured spectrum data as the bandwidth which contains 99% of the radiated power, this being digitally displayed.

Accessories



TR4153A/4153B

Tracking Generator

The TR4153A/4153B can be combined with the TR4131 Series spectrum analyzer for use in frequency response measurements of devices such as amplifiers and filters over the frequency range of 100 kHz to 2 GHz. It generates a signal having a frequency which precisely tracks the analyzer's frequency, thereby enabling measurements with a wide dynamic range.

Specifications (TR4153A)

Frequency range: 100 kHz to 2 GHz

Output impedance: Approx. 50 Ω

Output VSWR: 1.5 max. (at -10 dBm output)

Output level flatness: ±1 dB max. (with respect to 200 MHz output, over an output level range of 0 to -59 dBm and frequency range of 100 kHz to 2 GHz)

Output level variable range: 0 to -59 dBm in 1 dB steps (continuous adjustment over the range 0 to 1.5 dB or greater using the level adjustment)

Output level switching accuracy: ±0.2 dB/1 dB (0 to -9 dB) ±1.0 dB/10 dB (0 to -50 dB)

Spurious output components: Harmonics ≤ 20 dBc, non-harmonics ≤ 30 dBc (at 0 dBm output)

Tracking generator leakage: -110 dBm

GPIB:

Standard enables remote control and data output

General Specifications

Output connector type: N

Operating environment:

Temperature 0°C to 40°C

Humidity 85% max.

Power requirements: Specified at time of ordering

| Option No. | Standard | 32 | 43 | 44 |
|------------------|-----------|------------|------------|------------|
| Line voltage (V) | 90 to 110 | 103 to 132 | 198 to 242 | 207 to 250 |

50 Hz/60 Hz

Power consumption: 50 VA max

Dimensions: Approx. 300(W) × 90(H) × 440(D) mm

Weight: 10 kg max.

Accessories

| Name | Model | Product code | Remarks |
|------------------|--------|--------------|------------------------------|
| Power cable | MP-43 | | |
| Output cable | MI-04 | | UG-21D connector to N-N |
| Connecting cable | A01002 | | SMA-SMA connectors, 2 cables |
| Connecting cable | MI-02 | | UG-88/U, BNC-BNC |

Specifications (TR4153B)

Frequency range: 100 kHz to 2 GHz

Output impedance: Approx. 50 Ω

Output VSWR:

1.5 max. (100 kHz to 1.5 GHz)

2.0 max. (100 kHz to 2.0 GHz)

Output level flatness: ±0.7 dB max. (with respect to 200 MHz output, over an output level range of 0 to -10 dBm and frequency range of 100 kHz to 2 GHz)

Output level variable range: 0 to -10 dBm or greater, continuously variable

Spurious output components: Harmonics ≤ 20 dBc, non-harmonics ≤ 30 dBc (at 0 dBm output)

Tracking generator leakage: -110 dBm

General Specifications

Output connector type: N

Operating environment:

Temperature 0°C to 40°C

Humidity 85% max.

Power requirements: Specified at time of ordering

| Option No. | Standard | 32 | 43 | 44 |
|------------------|-----------|------------|------------|------------|
| Line voltage (V) | 90 to 110 | 103 to 132 | 198 to 242 | 207 to 250 |

50 Hz/60 Hz

Power consumption: 50 VA max

Dimensions: Approx. 300(W) × 90(H) × 440(D) mm

Weight: 10 kg max.

Standard Accessories

| Name | Model | Product code | Remarks |
|------------------|--------|--------------|------------------------------|
| Power cable | MP-43 | | |
| Output cable | MI-04 | | UG-21D connector to N-N |
| Connecting cable | A01002 | | SMA-SMA connectors, 2 cables |
| Connecting cable | MI-02 | | UG-88/U, BNC-BNC |