

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.

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Spectrum Analyzers

100 Hz to 8 GHz

R3265A/3365A

- High-Input Sensitivity: -145 dBm
- High-Speed Sweep of 5 μ s/div and Digital Read output
- Gated Sweep Function
- Memory Card Function
- BASIC Controller Function
- Variety of I/O Interfaces
 GPIB, Serial I/O (RS232C), Modulation Accuracy Interface



R3265A/3365A Spectrum Analyzers

R3265A/3265AP/3365A Series offers a large-sized CRT screen in a portable unit and a wide frequency range, allowing measurements from 100 Hz to 8 GHz in a single sweep. Due to a newly developed high purity synthesizer, the series also provides excellent spectral purity of -110 dBc/Hz at 2.6 GHz (10 kHz offset frequency).

This unit performs especially well in measuring the spurious emission intensity of new mobile communications equipment, the bandwidth of occupied frequencies and signal leakage from adjacent channels. In the low-noise mode, the series has a high-input sensitivity of -145 dBm (1 MHz to 3.6 GHz), so it can easily measure low level signals.

The R3265A Series is provided with a BASIC controller as a standard feature. This feature allows measured data or set conditions to be stored and the free construction of automatic measurement systems without the need for external controllers.

A preselector for low frequencies has been added to the R3265A, enabling the unit to realize a dynamic range of 100 dB and higher for carrier waves of 250 MHz and higher. The R3365A has a built-in tracking generator and is ideal for measuring frequency characteristics when setting up or maintaining digital radio base stations.

Selection Guide

	R3265A	R3365A
Frequency measuring range	100 Hz to 8 GHz	
Tracking generator	-	○
Preselector	○	○

○ : Internal preselector from 500 Hz

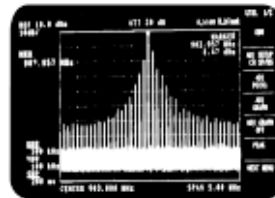
■ Resolution Bandwidths of 10 Hz to 3 MHz

For frequency resolution, the R3265A Series incorporates a narrow-band (10 Hz) IF bandwidth filter that can separate nearby signals from the wide IF bandwidth filter (3 MHz) which improve the measurement sensitivity to a pulsed RF signal. The series can thus be used for a wide variety of measurements.

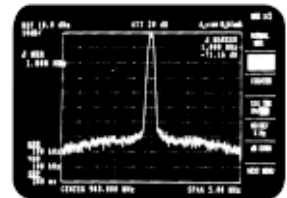
The narrow-band IF bandwidth filter also incorporates a digital IF filter, thus enabling both nearby signal characteristic measurements with high selectivity as well as high-speed measurements.

■ Gated Sweep Function

The R3265A Series includes a burst signal (TDMA and video signals) analysis function as a standard feature. When combined with the high-speed sweep function, this function can be used to monitor the transmission power in an arbitrary one-time slot of a TDMA signal or to analyze the noise in one horizontal line of a TV signal.



Normal



Gated sweep

Monitoring the carrier signal in a pulsed RF signal

R3265A/3365A

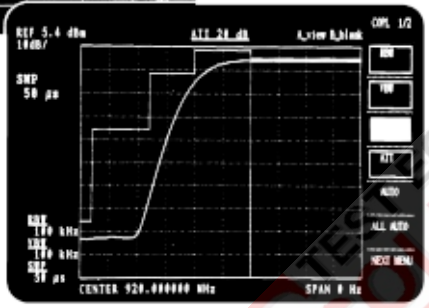
High-Speed Sweep of 5 μ s/div

The R3265A Series uses a high-speed digitizer to perform high-speed sweeps of 5 μ s/div during zero span. This data can also be averaged using an averaging function. This function is ideally suited for monitoring the mean transmission power and duration of Time Division Multiple Access (TDMA) signals that are used in the Global System Mobile (GSM) digital car telephone system in Europe and in the next-generation of car telephone systems in Japan and the U.S.A. An arbitrary range can be expanded using a delayed sweep function.



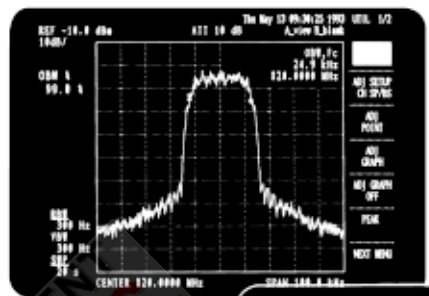
The upper- and lower-limit values can be set and displayed using a template function.

Magnification of a specified area during the zero span mode of the delayed sweep function.



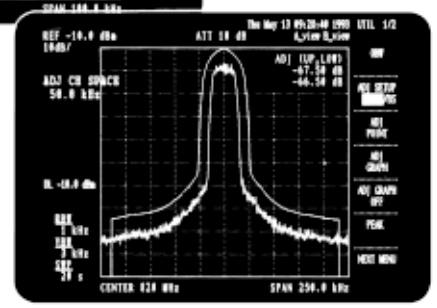
Measurement of Occupied Bandwidths and Adjacent-Channel Leakage Power

By calculating the measured spectrum data, the R3265A Series can easily measure the occupied bandwidth of a radio transmission characteristic and the leakage power of an adjacent channel. A carrier frequency is also displayed when the occupied bandwidth is measured. The leakage power from an adjacent channel can be measured in a dynamic range of 70 dB (typical value) due to the excellent signal purity of the series.



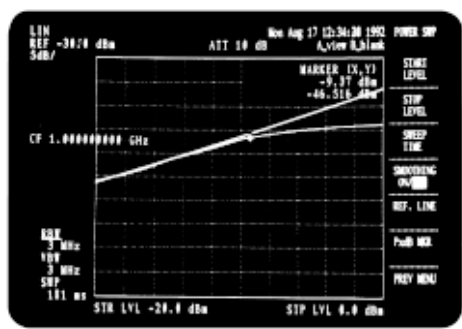
OBW (occupied bandwidth) measurement of PDC 800 MHz band.

ADJ (adjacent channel leakage power) measurement of PDC 800 MHz band.



Power Sweep Function Ideal For Measuring Amplifier Linearity and Saturation Point (R3365A Only)

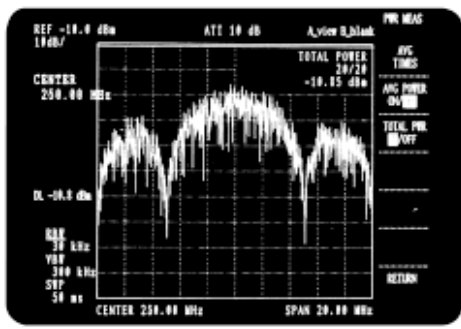
The R3365A has a Power Sweep Function which sweeps the output level. This function has been made possible through a newly developed attenuator in the tracking generator output section which used a semiconductor switch. The level sweep with a 30 dB/0.1 dB step sweep range provides high precision measurements of amplifier input/output characteristics.



Amplifier 1 dB gain compression point measurement

Full Range of Digital Radio Evaluation Functions

In addition to its functions for doing burst signal analysis and measuring occupied bandwidth and adjacent channel leakage power, the R3265A Series has added a total power and average power measurement function and a quasi-analog display function. A built-in digital modulation analysis interface is also included, so that modulation accuracy can be easily measured just by connecting the R3541A/B Digital Modulation Analysis Unit (sold separately).



Total power measurement of spread spectrum

Spectrum Analyzers

100 Hz to 8 GHz

R3265A/3365A (Continued from previous page)

Specifications

Frequency

Frequency range: 100 Hz to 8 GHz

Frequency band

R3265A/3365A
100 Hz to 3.6 GHz
3.5 to 7.5 GHz
7.4 to 8 GHz

Preselector: 3.5 GHz to 8 GHz using YIG tuned preselector

Frequency readout accuracy (Start, Stop, CF, Marker): \pm (freq readout \times freq reference accuracy + span \times span accuracy + 0.15 \times RBW + 10 Hz)

Span accuracy: \pm 3% (span > 2 MHz), \pm 5% (span \leq 2 MHz)

Count frequency marker:

Resolution: 1 Hz to 1 kHz

Count accuracy (S/N \geq 25 dB): \pm (marker freq \times freq reference accuracy + 5 Hz + 1 LSD)

Delta marker count accuracy: \pm (delta marker freq \times freq reference accuracy + 10 Hz + 2 LSD)

Frequency reference accuracy: \pm 2 \times 10⁻⁸/day, \pm 1 \times 10⁻⁷/year, \pm 5 \times 10⁻⁹/day (Opt. 21)

Frequency stability:

Residual FM (zero span): <3 Hz/0.1s

Drift (after warm up 1 hr.): <2.5 kHz \times sweep time (minute)
(50 kHz < span \leq 2 MHz)
<60Hz \times sweep time (minute)
(Span \leq 50 kHz)

Spectral purity:

Offset	f \leq 2.6 GHz	f > 2.6 GHz
1 kHz	<-100 dBc/Hz	<-95 dBc/Hz
10 kHz	<-110 dBc/Hz	<-108 dBc/Hz
20 kHz	<-110 dBc/Hz	<-108 dBc/Hz
100 kHz	<-114 dBc/Hz	<-110 dBc/Hz

Frequency span:

Lin span: Range: 200 Hz to 8 GHz, zero span

Accuracy: \pm 3% (span > 2 MHz), \pm 5% (span \leq 2 MHz)

Log span: Range: 1 kHz to 1 GHz, 1, 2, 3 decades selected

Accuracy: \pm (10% + stop freq \times 0.1%)

Resolution bandwidth (3dB):

Range: 10 Hz to 3 MHz 1, 3, 10 sequence

Accuracy: \pm 15% 100 Hz to 1 MHz, \pm 25% 30 Hz (25°C \pm 10°C), 3 MHz, \pm 50% 10 Hz to 100 Hz (digital IF)

Bandwidth (6 dB): 200 Hz, 9 kHz, 120 kHz, 1MHz (Accuracy 10%)

Conformed to CISPR standard

Video bandwidth range: 1 Hz to 3 MHz 1, 3, 10 sequence

Amplitude

Amplitude range: +30 dBm to average display noise level

Display range: 10 \times 10 division graticule

Log: 10, 5, 2, 1, 0.5, 0.2, 0.1 dB/div

Linear: 10% of reference level/div

QP log: 40 dB(5 dB/div)

Input attenuator range: 0 to 70 dB (10 dB step)

Dynamic Range

Maximum dynamic range:

Distortion characteristic for 1 dB gain compression to noise level:

Frequency range	R3265A/3365A
200 MHz to 3.6 GHz	132 dB - 1.55 \times f (GHz)
10 MHz to 3.6 GHz	130 dB - 1.55 \times f (GHz)

Displayed average noise level: 10 Hz RBW (digital IF), 0 dB input atten, 20 times avg.

Frequency range	R3265A/3365A
1 kHz	-100 dBm
10 kHz	-110 dBm
100 kHz	-111 dBm
1 MHz	-135 dBm
10 MHz to 3.6 GHz	-(140 - 1.55 \times f (GHz)) dBm
10 MHz to 3.6 GHz (low noise mode)	-(145 - 1.55 \times f (GHz)) dBm
3.5 to 8 GHz	-135 dBm

Gain compression (1 dB):

Frequency range	R3265A/3365A
>10 MHz	-10 dBm (mixer level)
>200 MHz	-8 dBm (mixer level)

Spurious response:

Second harmonic distortion

R3265A/3365A	Reference input frequency range	Mixer level
<-70 dBc	100 MHz to 1.8 GHz	-30 dBm
<-60 dBc	10 MHz to 1.8 GHz	-30 dBm
<-100 dBc	>1.75 GHz	-10 dBm

Third order intermodulation distortion

R3265A/3365A	Reference input frequency range	Mixer level
<-70 dBc	200 MHz to 3.6 GHz	-30 dBm
<-60 dBc	10 MHz to 3.6 GHz	
<-75 dBc	>3.5 GHz	

Amplitude Accuracy

Frequency response:

In band flatness (10 dB input atten)

R3265A/3365A	Frequency range
\pm 1.5 dB	100 Hz to 3.6 GHz
\pm 1.0 dB	50 MHz to 2.6 GHz
\pm 1.5 dB	3.5 MHz to 7.5 GHz
\pm 1.5 dB	7.4 MHz to 8 GHz

Additional uncertainty due to band switching: \pm 0.5 dB

Frequency response referenced to CAL signal (10 dB input atten):

\pm 3 dB 100 Hz to 8 GHz

Calibrator accuracy: -10 dBm \pm 0.3 dB

IF gain uncertainty: After automatic calibration

< \pm 0.5 dB (0 to -50 dBm), < \pm 0.7 dB (0 to -80 dBm)

Scale fidelity (After automatic calibration)

Log: \pm 0.2 / 1 dB, \pm 1 / 10 dB, \pm 1.5 / 90 dB

Linear: \pm 5% of reference level

QP mode log: \pm 1.0 / 30 dB, \pm 2 / 40 dB, \pm 1.0 / 40 dB (25°C \pm 10°C)

Input attenuator switching accuracy: referenced to 10 dB, 20 to 70 dB switching

\pm 1.1 / 10 dB step, 2.0 dB max, 0 to 8 GHz

Resolution bandwidth switching uncertainty:

At reference RBW: 300 kHz, after automatic calibration

\leq \pm 0.3 dB 100 Hz to 3 MHz

\leq \pm 1 dB 30 Hz

\leq \pm 1.5 dB 10 to 100 Hz (digital IF)

Pulse digitization uncertainty: (pulse response mode PRF > 700 / sweep time) Peak to Peak

Log: 1.2 dB (RBW \leq 1 MHz), 3 dB (RBW: 3 MHz)

Linear: 4% of ref level (RBW \leq 1 MHz), 12% of ref level (RBW: 3 MHz)

SWEEP

Sweep time:

- SPAN = 0: 50 μ s to 1000 s and manual sweep
- SPAN \geq 200 Hz: 20 ms to 1000 s and manual sweep
- Accuracy: \pm 3%

Sweep trigger: Free run, line, single, video, TV-H, TV-V, external

Demodulation

Spectrum demod:

- Modulation type: AM and FM
- Audio output: Speaker and phone jack with volume control
- Marker pause time: 100 ms to 1000 s

Inputs/Outputs

RF Input:

- Connector type: N type female
- Impedance: 50 Ω (nominal)
- VSWR (input atten \geq 10 dB, at set frequency):
 - < 1.5 : 1 for \leq 3.6 GHz (nominal)
 - < 2.0 : 1 for >3.6 GHz (nominal)
- LO emission level (average):
 - < -80 dBm (typical valve), 10 dB input atten, 0 to 26.5 GHz

Video output:

- Connector: BNC female, rear panel
- Impedance (AC coupled): 75 Ω (nominal)
- Amplitude: Approx. 1 V_{pp} (Composite video signal), 75 Ω termination

External trigger input:

- Connector BNC female, rear panel
- Impedance 10 k Ω (nominal), DC coupled
- Trigger level TTL level

Gate input:

- Connector BNC female, rear panel
- Impedance 10 k Ω (nominal), DC coupled
- Sweep stop Between LOW and TTL level
- Sweep Between HIGH and TTL level

Probe power: 4 pin connector front panel

- Voltage: +15V, -15V
- Current: 150 mA max, each

Phone output: Demodulated audio

- Connector: Subminiature Monophonic jack, front panel
- Power output: 0.2 watt, 8 Ω (nominal)

GPIB plotter:

- IEEE-488, bus connector
- R9833, HP7470A, HP7475A, HP7440A, HP7550A

Delayed Sweep

Trigger signal source: External trigger signal, VIDEO trigger, TV-V trigger (onset or fall slope can be selected)

Delay time: 200 ns to 1.5 s with a resolution of 100 ns

Delayed sweep time: 50 μ s to 1000 s (the resolution is the same as that set in the sweep time.)

Gated Sweep

Trigger signal source:

Frequency domain analysis

- External trigger input (TTL level), Gate input (TTL level)
- IF DET trigger

- Trigger level variable at IF DET monitor
- Span 7 MHz max.

- Usable input pulse width 100 μ s min.
- Through or lowpass filter selectable

Time domain analysis

- External trigger input (TTL level), Gate input (TTL level)
- IF DET trigger

- Trigger level variable at IF DET monitor
- Usable input pulse width 100 μ s min.

- Through or lowpass filter selectable

Gate position: 300 ns to 100 ms with resolution of 100 ns

Gate width: 1 μ s to 1.5 s with a resolution of 100 ns

Tracking Generator (R3365A)

Frequency range: 100 kHz to 3.6 GHz

Output level: -3 to -30 dBm in 0.1 dB steps

Output level flatness: \pm 3.0 dB (100 kHz to 3.6 GHz)

Output level accuracy: \pm 0.5 dB (25 MHz, -10 dBm output, 25°C \pm 10°C)

Vernier accuracy: \pm 0.5 dB (25 MHz, -10 dBm output, 25°C \pm 10°C)

Output spurious:

Harmonic -15 dBc max.

Non-harmonic -25 dBc max. (with 3 dBm output)

Dynamic range: -110 dBm (1 MHz to 3 GHz)

-100 dBm (3 to 3.6 GHz)

Power sweep range: 30 dB (0.1 dB steps)

General Specifications

Operating conditions:

Operating temperature: 0 to 50°C

Storage temperature: -20 to 60°C

Humidity: RH 85% max.

Power supply: Automatically selects 100 or 220 VAC

100 VAC:

Voltage: 90 to 132V

Power consumption: Max. 400 VA

Frequency: 48 to 440 Hz

220 VAC:

Voltage: 198 to 250V

Power consumption: Max. 400 VA

Frequency: 48 to 66 Hz

Mass: 22 kg (nominal, excluding options, front cover and accessories)

Dimensions: 177 (H) \times 353 (W) \times 450 (D) mm (excluding handle, feet and front cover)

Accessories

Product	Model	Remarks
Power cable	A01412	
Input cable	MC-61	Connector UG-88/U
Input cable	MI-09	Connector 3DW-P2
Converter adaptor	JUG-201A-U	N-BNC converter
IC memory card		One card (32 K bytes)
Front cover		

Options

Option 07 Interface for R3553 Preselector

Option 10 Level calibration

Option 21 \pm 5 \times 10⁻⁹/day crystal

PR326503-IC GSM-MS measurement software

Execution environment: R3265A/3271A, R3365A/3371A

PR326513-IC GSM-BS measurement software

Execution environment: R3265A/3271A, R3365A/3371A

***1** DECT measurement software

Execution environment: R3265A/3271A, R3365A/3371A

***2** PCN-MS measurement software

Execution environment: R3265A/3271A, R3365A/3371A

***3** PCN-BS measurement software

Execution environment: R3265A/3271A, R3365A/3371A

*1, *2, *3; Please contact office for details