

2261A Analyze-R™

Spectrum Monitor / Analyzer

SPECTRUM MONITOR FOR WIRELESS VERIFICATION

- Designed for spread-spectrum power measurement and interference identification
- 38 Selectable 100 MHz-wide bands
- Data Logger with embedded GPS Receiver
- Total-Channel-Power measurement in real-time, on-site (optional)
- Auto C/I calculation & Unattended Data Recording
- Sensitivity -103 dBm, typ.
- Battery-powered, 5–6 hrs. continuous operating time, 3 hours recharge.
- Rugged and light weight (<7 lbs./3.2 kg) including Battery & Back-Pack.



The model 2261A Analyze-R™, is an affordable, easy-to-use, application specific Spectrum Monitor/Analyzer that addresses the 900 MHz & 2.4 GHz unlicensed ISM bands; the 3.4–4.2 GHz licensed/unlicensed bands; the 4.9 GHz Public Safety band; all of the unlicensed 5–6 GHz U-NII/ISM bands; and, the 5.8 GHz DSCR band. The Analyze-R™ is designed for non-technical personnel doing site spectrum monitoring and analysis, surveying, installing, maintaining, and troubleshooting of the latest wireless communication systems. This unique instrument is designed for field use, is a fraction of the cost and more sensitive than a full-featured general-purpose spectrum analyzer, and *far easier to use!*

Data Recording

The Analyze-R™ contains a data logger, with an embedded GPS receiver and GPS-disciplined real-time clock, for recording either single frequency data or an entire 100 MHz-wide band sweep, in 1 MHz steps. Each record contains frequency; power; and GPS position/date/time data. Up to 255 records can be saved to the instrument's non-volatile internal memory. The instrument includes RS-232 and USB interfaces.

Log View-R™

The companion Log View-R™ software provides a virtual graphic display of the original recorded data and is used for measurement analysis, programming for unattended operation of the instrument, and data transfer between the instrument and a PC.

C/I Calculation

The Log View-R™ software utility will display both the radio's 'Carrier' sweep as well as the 'Interference' sweep simultaneously. Markers can be set to the radio's modulation bandwidth and the software will automatically compute the 'Total Channel Power' of both the Carrier and the Interference, *normalized to the carrier's bandwidth*, and calculate the Carrier-to-Interference figure, in dBm, indicating the *real-world fade margin* at the site. *This is the single most important information a spectrum analyzer can provide a wireless operator and the Analyze-R™ is the only instrument on the market that correctly provides this information!*

Unattended Data Recording

Using Log View-R™, the Analyze-R™ can be programmed to make unattended measurements at remote sites, allowing the instrument to operate on its own, recording spectrum data without supervision. This feature provides site analysis of interfering signals which may only show up at irregular times of the day or night and is invaluable for surveying potential new site locations and analyzing sources of problems within existing sites over many hours or days without the requirement of on-site personnel. Programmable functions include 'Start Date/Time', 'Stop Date/Time', 'Recording Rate', 'Single Frequency' or 'Band Sweep', 'Peak Hold' or 'Average' mode, and minimum amplitude 'Threshold'. Unattended programming can be downloaded to the instrument or saved as a file and sent to a remote location for downloading to a remote instrument at a later date.

Total Channel Power option

This optional feature provides front panel observation and calculation of 'Total Channel Power' *within a user-defined bandwidth, in real-time—on site*. This feature replaces the need for a separate power meter and verifies channel power anomalies due to fading/interference and improper equipment operation—something a power meter cannot do. With this option you can check the transmitter, connection cables, antennas, and receiver for proper equipment and path operation without the need to post-process the information in Log View-R.

Applications

The Analyze-R™ allows you to quickly acquire, document, and analyze accurate test measurements for site analysis. Applications include:

- Verifying geographical site coordinates and antenna centerline azimuth & elevation for precise analysis of system engineering and site surveying.
- Measuring and documenting the RF signature of your radio, and interfering sources, and calculating the real-world Carrier to Interference (C/I) figure in dB.
- Measuring and monitoring the Total Channel Power of your equipment, on-site, at the transmitter, along the path, or at the receiver (optional feature).
- Capturing intermittent interfering sources at remote sites without personnel present.
- Identification and analysis of path 'fading' (multiple paths from transmitter to receiver causing attenuation, slower data stream, or disruption/loss of the transmitted data).
- Differentiating between interference, path-induced fading, and equipment problems.
- Confirming optimum antenna locations and providing antenna alignment at the receiver.
- Site analysis for point-to-point and point-to-multipoint wireless links.

2261A Technical Specifications

Receiver

Selectable Frequency Bands: (100 MHz-wide bands in 50 MHz steps)

Band 1 (1)	890 to 940 MHz (500 kHz resolution)
Band 2 (1)	2.400 to 2.500 GHz (1 MHz resolution)
Band 3 (15)	3.400 to 4.200 GHz (1 MHz resolution)
Band 4 (21)	4.900 to 6.000 GHz (1 MHz resolution)

Bandwidth: 2 MHz

Sensitivity: -103 dBm, typical

Overload Point: -30 dBm, typical

Damage Level: +10 dBm

Frequency Stability: 2×10^{-5} (0° to 50°C)

Graphic Display: 64 x 128 pixel LCD, backlit. Displays freq. band (101, 1 MHz points) or single frequency with power (peak hold or average)

Graphic Resolution:

Power: 1.25 dB/pixel

Frequency: 1 MHz/pixel

Graphic Dynamic Range: 35 dBm to -102.9 dBm, graphically displayed.

Numeric Dynamic Range: 24.1 dBm to -103.8 dBm, numerically displayed

Update Time: 300 ms (2 ms measure, 1 ms compute per channel x 100 channels)

Marker: Marker set with a front panel knob. Marker frequency and power intercept are displayed at the top of the LCD

TCP Markers (opt): Dual markers, separated by user setting (knob), capture and calculate Total Channel Power between markers. Markers moved across display with knob. TCP & center freq. shown on display

Marker Resolution: 0.3 dB (power), 1 MHz (frequency)

Record-R™ Data Logging

Data Recorded: Received Signal Level in dBm per channel (peak hold or average), Frequency, Longitude, Latitude, Date, Time, M/N & S/N of instrument

Max. No. of Records: 255 single frequency or band sweep records.

Record Time: Band sweep ≤ 2 seconds, single frequency ≈ 20 ms, to store results in memory

GPS

Frequency: L1 (1575.42 MHz), C/A code (SPS), 8-channel continuous tracking, 32 correlators

Position Accuracy: 2 meters CEP (50%)

Timing Accuracy: ± 95 ns

Position Fix Update: 1s

Time to Lock: Cold Start: <130 seconds (90%); Warm Start: <45 seconds (90%); Hot Start: <20 seconds (90%)

Reacquisition Time: <2 seconds (90%) after loss of signal

Log View-R™ Software Utility (Windows 95/98/2000/XP)

Downloading Records: Records can be downloaded, thru RS-232-C or USB rear panel connectors to a remote computer and displayed, saved, and printed.

C/I Calculation: Simultaneously Displays Carrier and Interference sweeps and automatically computes the C/I figure.

Unattended Recording: Programs instrument for unattended data recording.

Environmental Data

Operating Temperatures: -10°C to 40°C (14°F to 104°F)

Storage Temperature: -40°C to 71°C (-40°F to 160°F)

Relative Humidity: 95% $\pm 5\%$ 10°C to 30°C
75% $\pm 5\%$ to 40°C
45% $\pm 5\%$ above 40°C

Burn In: Failure-free burn in of no less than 100 hours at 40°C

Pollution Degree: 1 (no pollution) (EN 61010-1/3.7)

Transient Overvoltage: Installation Category II (EN 61010-1/J)

Supplementary Specifications

Warranty: One Year Limited Warranty

Montreal Protocol: Nil Return

ISO 9000: Pendulum Instruments, Inc. (formally XL Microwave) Quality System for design and manufacture is certified to ISO 9001:2000 by RWTÜV.

CE (European Union): EN 55011:1998 w/A1:1999; Group 1 Class B (emissions)
EN 61326-1:1997 w/A1:1998 (immunity)

Mechanical Data

Power: Self Contained 12V, 2.3 Ah, rechargeable sealed Lead-Acid Camcorder Battery (op time $\approx 5-6$ hrs; charging ≈ 3 hrs.)

Weight: Less than 3.2 kg (7 lbs). (including Instrument Back-Pack and Battery)

Dimensions (HxWxD): 89 mm x 213 mm x 333 mm (3.5 in. x 8.375 in. x 13.1 in.)

Antenna Connector: 'N' female (front panel)

RS-232-C Connector: DB-9 (rear panel)

USB Connector: USB-B (rear panel)

Ordering Information

Basic Models

2261A	Analyze-R™
2261A-1000	Validate-R™ site survey kit, includes: (1 hard transport case w/wheels; 3 band-specific directional antennas; 1 omni-directional antenna)

Included with Instrument

- 1 Weather-resistant Instrument Back-Pack
- 1 Coax Cable Assembly, N(m) to N(m), 6-foot long
- 1 RS-232 Cable Assembly, D-sub 9-pin (m) to D-sub 9-pin (f), 3m (9.8 ft.)
- 1 USB Cable Assembly, USB 'A'(m) to USB 'B'(m), 2m (6.6 ft.)
- 1 Battery, Rechargeable, 12 VDC/2.3 Ah, Sealed Lead/Acid Battery
- 1 AC MAINS powered Battery Charger (90-264 VAC/47-63 Hz); with IEC-320 input connector
- 1 AC MAINS Power Cord (IEC-320 to NEMA, type 5-15p plug)
- 1 Operating/Maintenance Manual (CD) with Laminated User Card

Options

Option 01	Total Channel Power feature, on instrument
Option 313	Attenuator, in-line, -60 dB, N(f) to N(m)
Option 342	Antenna, stub, omni-directional multi-band
Option 343	Antenna, directional plate, 2.4-2.5 GHz
Option 344	Antenna, directional plate, 5.15-5.35 GHz
Option 345	Antenna, directional plate, 5.725-5.875 GHz

Accessories

Accessory 320	Battery, spare 12V/2.3 Ah
Accessory 325	Adapter, SMA(f) to N(m)
Accessory 322	Battery Charger, vehicle DC adapter/charger
Accessory 329	Cable, coax cable assembly, SMA to N
Accessory 338	Cable, ruggedized low-loss coax cable assembly
Accessory 326	Case, watertight, airtight, corrosion proof

Specifications subject to change without notice

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Pendulum Instruments

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- Experts in time & frequency calibration, measurement and analysis