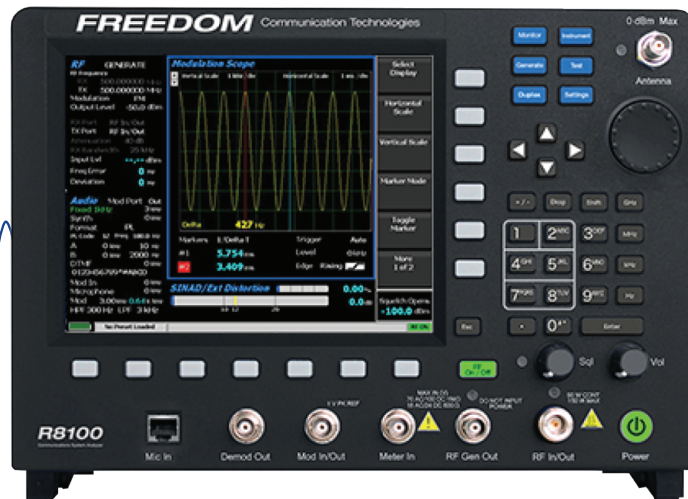


FREEDOM

Communications System Analyzer

R8100



DATA SHEET

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Operating/Display Modes

- AM/FM Duplex Monitor and Generator
- Audio Synthesizer
- Tracking Generator (Opt.)
- Dual Display (Opt.)
- Cable Fault Locator (Opt.)
- Spectrum Analyzer
- Frequency Counter
- Frequency Error Meter
- Digital Voltmeter
- Power Meter
- Oscilloscope
- Signal Strength Meter
- SINAD/Distortion Meter



General

Displayed Average Noise:

| | |
|--|-------------------------------------|
| Level (DANL): | -140 dBm (50 Ohm input termination) |
| Dynamic Range: | 80 dB |
| Input Related Spurious: | -60 dBc max |
| Residual Spurious (non-input related): | -70 dBm |

Power

| | |
|------------------------|--|
| DC Power Requirements: | 15-16 VDC @ 8.0 A max |
| AC Adapter Specs: | 100-240 VAC, 2.5 A max, 50-60 Hz |
| Battery Power: | Internal Battery |
| Battery Operation: | 1.5 hour typical Easily swappable for extended operation |

MECHANICAL/ENVIRONMENTAL

| | |
|--------------------------------------|---|
| Weight: | <16 lbs (7.2 kg) |
| Dimensions: | 9.4" (23.9 cm) H, 12.7" (32.3 cm) W, 7.5" (19.1 cm) D |
| Operating Altitude: | Up to 10,000 ft (3048 m) |
| Humidity: | 80% maximum relative humidity |
| Operating Temperature: | 0° to 50° C |
| Storage Temperature without Battery: | -30° to +80° C |
| Storage Temperature with Battery: | -20° to +50° C |
| Shock and Vibration Rating: | MIL-PRF-28800F, Class 3 |

WARRANTY

| | |
|--------------------------|-----------|
| Standard Warranty: | Two years |
| Three Year Service Plan: | Optional |
| Five Year Service Plan: | Optional |

Generator (Receiver Test)

| | |
|--------------------------------------|---|
| Port Protection Limit | 5W for 30 seconds |
| Frequency Range: | 1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz |
| Extended Frequency Range (Optional): | 1 MHz to 3GHz (250 kHz to 3 GHz typical) |
| Frequency Resolution: | 1 Hz |

OUTPUT LEVEL GENERATE PORT

| | |
|-------------|---|
| Range FM: | +5 dBm to -95 dBm below 2 GHz -5 dBm to -95 dBm above 2 GHz |
| Range AM: | -1 dBm to -95 dBm below 2 GHz -11 dBm to -95 dBm above 2 GHz |
| Resolution: | 0.1 dB |
| Accuracy: | ±2 dB |

OUTPUT LEVEL RF I/O PORT

| | |
|-------------|--|
| Range FM: | -30 dBm to -130 dBm below 2 GHz -40 dBm to -130 dBm above 2 GHz |
| Range AM: | -36 dBm to -130 dBm below 2 GHz -46 dBm to -130 dBm above 2 GHz |
| Resolution: | 0.1 dB |
| Accuracy: | ±1dB to 1GHz ; ±2dB > 1GHz |

SPECTRAL PURITY

| | |
|----------------------------------|---|
| Harmonic Spurious: | -20 dBc max |
| Non-Harmonic Spurious: | -35 dBc max |
| Residual FM: | 4Hz, 300 Hz to 3 kHz (<1GHz) 5 Hz, 300 Hz to 3 kHz (> 1 GHz) |
| Residual AM: | 1.0% max, 300 Hz to 3 kHz |
| SSB Phase Noise (20 kHz Offset): | -95 dBc/Hz max below 1 GHz (15° to 35° C) -93 dBc/Hz max all frequencies (0° to 50° C) |

FM MODULATION

| | |
|-----------------------|---------------------|
| Deviation Accuracy: | 5% of setting |
| Deviation Range: | 0 to 75 kHz |
| Deviation Resolution: | 1 Hz |
| Pre-emphasis: | 750 μs (selectable) |
| Modulation Bandwidth: | 5 Hz to 20 kHz |

AM MODULATION

| | |
|-----------------------|------------------|
| AM Depth Range: | 0 to 90% |
| Deviation Resolution: | 1% of setting |
| Modulation Bandwidth: | 100 Hz to 10 kHz |
| Deviation Accuracy: | 5% of setting |

Receiver (Transmitter Test)

Frequency Range: 250 kHz – 1 GHz (3 GHz optional)

SENSITIVITY

| | |
|----------------|----------------------------|
| Narrowband FM: | 2.0 uV for 10 dB EIA SINAD |
| Wideband FM: | 10 uV for 10 dB EIA SINAD |
| AM: | 10 uV for 10 dB EIA SINAD |

RF I/O PORT

| | |
|---------------------|---|
| VSWR: | < 1.2 to 2 GHz, ≤ 1.5 to 3 GHz |
| Max Power: | 50 W for 5 minutes 150 W for 30 seconds (30 sec. on, 5 min. off) |
| Absolute Max Power: | 150 W |
| Alarm: | Internal temperature alarm |

ANTENNA PORT

| | |
|----------------|---------|
| Maximum Power: | 0 dBm |
| Alarm: | +10 dBm |

IF FILTERS:

6.25 kHz, 12.5 kHz, 25 kHz, 50 kHz, 100 kHz, 200 kHz

FREQUENCY ERROR MEASUREMENT

| | |
|------------------|-------------|
| Type of Display: | Autoranging |
| Resolution: | 1 Hz |

FM DEVIATION MEASUREMENT

| | |
|---------------------|--|
| Demodulation Range: | Up to ±75 kHz |
| Accuracy: | ±5% plus residual FM |
| Frequency Response: | Selectable per the following: Low Pass Filters: 300 Hz, 3 kHz, 20 kHz High Pass Filters: 1 Hz, 300 Hz, 3 kHz |

DEMOD HARDWARE CHARACTERISTICS

| | |
|---|--|
| Demodulation Output Level: | 6.25 kHz B/W: 2.56V / 1 kHz 12.5 kHz B/W: 1.28V / 1 kHz 25 kHz B/W: 0.64V / 1 kHz 50 kHz B/W: 0.32V / 1 kHz 100 kHz B/W: 1.6V / 10 kHz 200 kHz B/W: 0.8V / 10 kHz |
| Demodulation Output Amplitude Flatness: | ±0.2 dB (300 Hz to 3 kHz), 1dB point @ 20kHz |
| Demodulation Output Impedance: | 100 ohms nominal |

AUDIO WEIGHTING FILTERS

| | |
|--------------|------------------------|
| Filters: | none, C-message, CCITT |
| De-emphasis: | 750 μs (selectable) |

AM MODULATION MEASUREMENTS

| | |
|---|---|
| Demodulation Range: | 0 to 100% |
| Accuracy: | ±5% for levels below 80% |
| Frequency Response: | Selectable per the following: Low Pass Filters: 300 Hz, 3kHz, 20kHz High Pass Filters: 1 Hz, 300 Hz, 3 kHz |
| Demodulation Output Level: | 0.8 V peak per 10% AM Modulation |
| Demodulation Output Amplitude Flatness: | ±0.2 dB (300 Hz to 3 kHz), 1dB point @ 20kHz |
| Output Impedance: | 100 ohms nominal |

RECEIVE SIGNAL STRENGTH LEVEL METER

| | |
|------------------|---|
| Frequency Range: | 1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz |
| Accuracy: | ±2 dB |
| Sensitivity: | -120 dBm (Antenna Port; Preamplifier on; 6.25 kHz IF B/W) |

BROADBAND POWER METER (RF In/Out Port)

| | |
|--------------------|---|
| Frequency Range: | 1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz |
| Measurement Range: | 0.1Wto150W |
| Input Impedance: | 50 Ohms |
| Accuracy: | ±10% (2 kHz – 1 GHz); ±10% (1 GHz – 3 GHz < 2.5W) |
| Protection: | Over temperature alarms |

FREQUENCY COUNTER

| | |
|-----------------------|-----------------|
| Frequency Range: | 5 Hz to 100 kHz |
| Period Counter Range: | 5 Hz to 20 kHz |
| Input Level: | 0.1 V rms min |

SINAD METER

| | |
|--------------|---------------------|
| Accuracy: | ±1 dB @ 12 dB SINAD |
| Input Level: | 0.1 V rms min |

DISTORTION METER

| | |
|----------------------|--|
| Range: | 1% to 20% |
| Distortion Accuracy: | The greater of: ±0.5% of distortion or ±10% of reading |
| Input Level: | 0.1 V rms min |

OPTIONAL MODES

DMR (MOTOTRBO™), NXDN Type - C Trunk, P25 Phase I Trunk, P25 Phase II, TETRA, PTC (ITCR)

Spectrum Analyzer

SWEEP

| | |
|-----------------------|---|
| Frequency Range: | 1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz |
| Frequency Resolution: | 1 Hz |
| Span Accuracy: | 5% |
| Update Rate: | ~10 times per second (depending on span) |

AMPLITUDE

| | |
|----------------------------------|---|
| Level Accuracy: | ±2 dB |
| Scales (dB/div): | 10 (1,2, & 5 w/ESA option) |
| Log Linearity Accuracy: | <0.1dB |
| Reference Level Resolution: | 1dB |
| Reference Level Range: | +60 to -70 dB |
| T/R Port Dynamic Range: | 80 dB |
| Typical Noise Floor Performance: | -140 dBm |
| SSB Phase Noise (20 kHz Offset): | -95 dBc/Hz max below 1 GHz (15° to 35° C) -93 dBc/Hz max all frequencies (0° to 50° C) |

Resolution Bandwidth

Auto Selected

Harmonic Spurious (Antenna Port, No Attenuation):

-20 dBc max

Non-Harmonic Spurious (Antenna Port, No Attenuation):

-60 dBc max

Residual Spurious (Input Terminated):

-70 dBm

Markers:

Delta, Absolute, and Frequency

Modes:

Standard, Average, Freeze, Max Hold, and Peak Hold

Oscilloscope

VERTICAL INPUT

Input Impedance: 1 Meg Ohm / 600 Ohm (Selectable)

Range: ± 100 VDC, ± 70 Vrms AC

Accuracy: 5% of full scale

Bandwidth: 0 to 50 kHz

HORIZONTAL SWEEP

Range: 20 uSec to 1 Sec / div. (Selectable)

TRIGGER SELECTION

Normal, Auto (Free Running), Single Sweep and Freeze

SPECIAL FUNCTIONS

Markers: Absolute Voltage, Delta Voltage, Delta Frequency and Delta Period

Audio Modulation Synthesizer

Modulation Types: 1 kHz tone, Private Line, Digital Private Line (w/ DPL Invert), Single Tone, DTMF, Two-Tone Paging, 5/6 Tone Paging, POCSAG, A&B Independent Synths., EURO Tones, User Defined Tone Sequences, and External inputs from both a supplied micro-phone and BNC input.

Modulation Output Level: Programmable to ± 8 V peak

Amplitude Flatness: ± 0.2 dB (300 Hz to 3 kHz), 1 dB point @ 20 kHz

1 kHz Tone Distortion: Not to exceed 1% THD

Impedance: 100 Ohms

External Modulation Input Level: ± 1 V peak reference

Amplitude Flatness: ± 0.2 dB (300 Hz to 3 kHz), 1 dB point @ 20 kHz

Impedance: 600 Ohms

External Microphone Input Amplitude Flatness: ± 0.2 dB (300 Hz to 3 kHz), 1 dB point @ 20 kHz

Tracking Generator

Frequency Range: 1MHz to 1GHz (250kHz to 1GHz typical); Optional to 3GHz

Digital Voltmeter (DVM)

| | |
|------------------|----------------------------------|
| Input Impedance: | 1 Meg Ohm / 600 Ohm (Selectable) |
| Voltage Range: | 1V, 10V, 70V full scale |
| Frequency Range: | 50 Hz to 20 kHz |
| DC Accuracy: | 1% full scale \pm 1 LSB |
| AC Accuracy: | 5% full scale \pm 1 LSB |

Timebase

| | |
|-------------------|--|
| Output Frequency: | 10 MHz |
| Stability: | Aging: \pm 0.1 ppm / year Temp.: \pm 0.01 ppm |
| Output Level: | Minimum 0 dBm into 50 Ohms |
| Warm Up: | 3 minutes: within \pm 0.1 ppm |

Display

FRONT PANEL DISPLAY

| | |
|-------------|-------------------------------------|
| Resolution: | 800 x 600 |
| Size: | Size: 8.4" (21.3 cm) Full Color LCD |

EXTERNAL DISPLAY

| | |
|-------------------|-----|
| External Display: | VGA |
|-------------------|-----|

REMOTE FRONT PANEL

| | |
|---------------------|-------------------------|
| Remote Front Panel: | Available over Ethernet |
|---------------------|-------------------------|

Optional Features

Spare Li-Ion Battery
Desktop Battery Charger

FREEDOM

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