

# SHURE®

LEGENDARY  
PERFORMANCE™

# AXIENT



## AXT600 Spectrum Manager



## IMPORTANT SAFETY INSTRUCTIONS

1. READ these instructions.
2. KEEP these instructions.
3. HEED all warnings.
4. FOLLOW all instructions.
5. DO NOT use this apparatus near water.
6. CLEAN ONLY with dry cloth.
7. DO NOT block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. DO NOT install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. DO NOT defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. PROTECT the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. ONLY USE attachments/accessories specified by the manufacturer.
12. USE only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. UNPLUG this apparatus during lightning storms or when unused for long periods of time.



14. REFER all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. DO NOT expose the apparatus to dripping and splashing. DO NOT put objects filled with liquids, such as vases, on the apparatus.
16. The MAINS plug or an appliance coupler shall remain readily operable.
17. The airborne noise of the Apparatus does not exceed 70dB (A).
18. Apparatus with CLASS I construction shall be connected to a MAINS socket outlet with a protective earthing connection.
19. To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
20. Do not attempt to modify this product. Doing so could result in personal injury and/or product failure.



This symbol indicates that dangerous voltage constituting a risk of electric shock is present within this unit.



This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

**WARNING:** This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

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## AXT600 Spectrum Manager

The Axiom Spectrum Manager is a powerful tool for calculating, analyzing and assigning compatible frequencies to wireless components. The Spectrum Manager scans the RF environment and uses this data to calculate compatible frequencies for all wireless channels found on the network. Networked wireless systems can be programmed from the Compatible Frequency List, while backup frequencies are continuously monitored and ranked according to quality. During operation, the Spectrum Manager deploys clear frequencies to receivers when interference occurs. Built-in spectrum monitoring tools provide visual and audio tracking of RF activity.

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## Features

### Wideband Scanning

The Spectrum Manager captures scan data for the entire UHF frequency range available for wireless audio. The scan is compiled using two antenna inputs, with sensitivity and resolution that are directly applicable to wireless receivers.

### Compatible Frequency List

The Compatible Frequency List (CFL) is list of available frequencies that can be calculated, viewed, and edited from the Spectrum Manager or it can be generated from a computer running Wireless Workbench® 6. The on-board frequency calculator can be adjusted to avoid specific TV channels, frequency ranges or RF signal above a specified threshold. During operation the Spectrum Manager provides current status of each frequency in the list. Clear frequencies are deployed from the compatible frequency list to initially setup a system or to replace frequencies degraded by interference.

### Event Log

The **Event Log** records actions of the Spectrum Manager during operation. Actions include changes to frequencies and equipment controlled by the Spectrum Manager. Reviewing the event log after a performance provides a snapshot of system performance.

### Backup Frequency Monitoring

The data screen tracks the status of all frequencies available for Axiom systems. The number of frequencies is displayed for each band, including real-time status of in-use and backup frequencies.

### RF Scanning

The scanning feature of the Spectrum Manager graphically plots the measured RF signal across the full frequency range. **Cursor**, **Zoom**, and **Peak** tools allow detailed inspection of the data.

### Listen

Use the **Listen** feature to tune to a frequency and monitor FM demodulated signal using headphones. The data screen displays the signal strength for the selected frequency.

### Networking

Networking enables many of the advanced features of the Axiom system, including monitoring and control of remote devices. Rack components have two RJ45 Ethernet ports capable of 10/100 Mbps network speeds. The Ethernet ports are power over Ethernet (PoE) enabled to supply power to the ShowLink™ access point or other class 1 Ethernet devices.

### RF Cascade Ports

The cascade ports allow sharing of RF signal with up to 5 components without antenna splitters or distribution amplifiers.

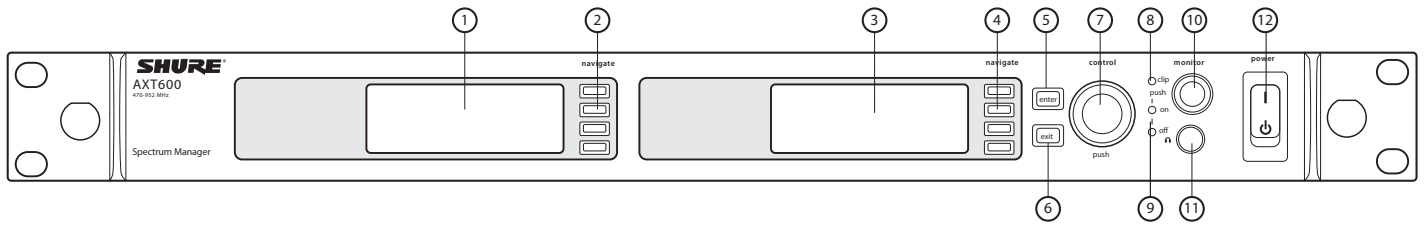
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## Included Components

1-foot Coaxial Cascade Cable (2)	95N2035
IEC AC Power Cable (1)	95A9128
IEC AC Extension Cable (1)	95A9129
Shielded 3-foot Ethernet Cable (1)	C803
Shielded 8-inch Ethernet Jumper Cable (1)	C8006
Hardware Kit (1)	90XN1371
22-inch Coaxial Cable* (1)	95B9023
33-inch Coaxial Cable* (1)	95C9023

\* with integrated bulkhead for front mounting antennas.

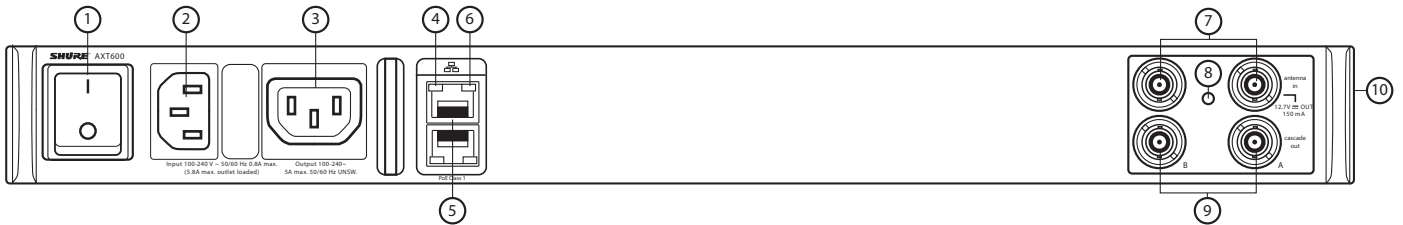
## Front Panel



- ① **Data display screen**  
Displays Frequency Monitoring status, RF plots, and signal strength.
- ② **Data display navigation buttons**  
Use to access menu options.
- ③ **Menu screen display**  
Displays menus and settings.
- ④ **Menu navigation buttons**  
Use to select and navigate through menus.
- ⑤ **Enter button**  
Use to enter and save parameter changes.
- ⑥ **Exit button**  
Cancels parameter changes or returns to a previous menu screen.

- ⑦ **Control wheel**
  - Push to select menu items for editing
  - Turn to edit a parameter value
- ⑧ **Monitor clip LED**  
Indicates audio overload when illuminated.
- ⑨ **Monitor output LED**  
Indicates monitor output on or off.
- ⑩ **Monitor volume knob**  
Adjusts monitor volume.
- ⑪ **Monitor jack**  
6.5 mm (1/4") jack.
- ⑫ **Power switch**  
Power the unit on or off.

## Rear Panel



- ① **AC power primary switch**  
AC main power switch.
- ② **AC power in**  
IEC connector 100 - 240 V AC.
- ③ **AC power cascade**  
Use IEC extension cables to connect up to 5 rack components to a single AC power source.
- ④ **Network speed LED (amber)**
  - Off = 10 Mbps
  - On = 100 Mbps
- ⑤ **Ethernet ports: Class 1 PoE enabled (2)**  
Connect to an Ethernet network to enable remote control and monitoring.
- ⑥ **Network status LED (green)**
  - Off = no network link
  - On = network link active
  - Flashing = network link active, flash rate corresponds to traffic volume

- ⑦ **RF antenna input jacks**  
For antenna A and antenna B.
- ⑧ **RF input status LED**  
Indicates the voltage status of the RF input.
  - Green = DC voltage on
  - Red flashing = fault condition
  - Off = DC voltage off
- ⑨ **RF cascade ports**  
Passes the RF signal to additional components.
- ⑩ **Temperature activated fan**  
Ensures top performance in high temperature environments. Clean fan screen as needed to maintain airflow.

## Connecting Antennas

Two antennas allow the Spectrum Manager to capture scan data and analyze the RF signals used in diversity receiver applications. If active antennas are used, set **AntennaDC Power** to **On**.

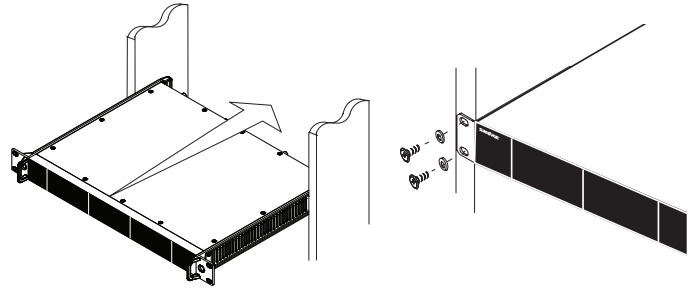
To use front-mounted antennas:

1. Insert the bulkhead adapters on the supplied front-mounting cables through the holes in each bracket and secure them from the front using the supplied hardware.
2. Connect the supplied antenna cables to the antenna input BNC connectors on the rear panel.

## Mounting Instructions

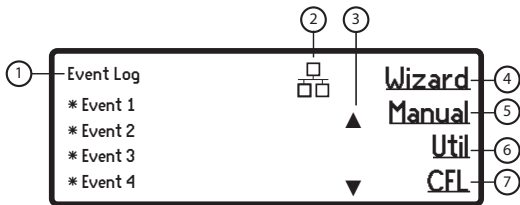
This component is designed to fit into an audio rack.

**WARNING:** To prevent injury this apparatus must be securely attached to the rack.



## Home Menu Screen

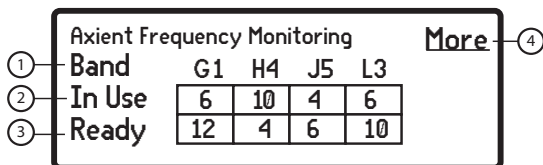
During operation, the home menu screen displays the following indicators:



- ① **Event Log**  
Records Spectrum Manager functions during operation.
- ② **Network Icon**  
Indicates connectivity with other devices on the network.  
**Note:** IP address must be valid to enable networked control.
- ③ **Scroll Arrows**  
Indicates additional log entries listed above or below.
- ④ **Wizard Sub-menu**  
Accesses the following wizard functions:
  - **All New**
  - **Update Freqs**
  - **Update Devices**
- ⑤ **Manual Sub-menu**  
Accesses the following menus:
  - **Devices**
  - **Scans**
  - **Listen**
- ⑥ **Util Sub-menu**  
Accesses the following menus:
  - **Display**
  - **Network**
  - **Lock**
  - **More** (additional functions)
- ⑦ **CFL Sub-menu**  
Accesses the following menus:
  - **New**
  - **Edit**
  - **More** (including **Analyze** and **Clear**)
  - **Deploy**

## Data Display Screen

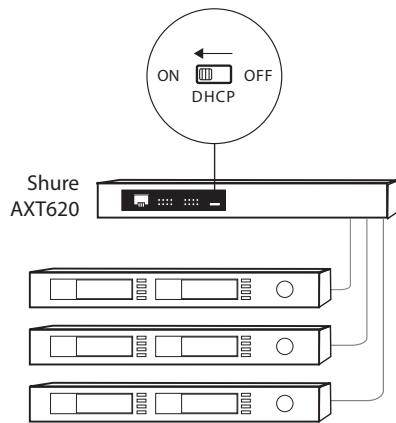
During operation, the data display shows the backup frequency monitoring screen. When the **Scanning** function is active, the display shows the RF plot. When the **Listen** feature is active, the display shows a graphic representation of signal strength for a selected frequency.



- ① **Band**  
Lists frequency bands for Axient devices controlled by the Spectrum Manager
- ② **In Use**  
Lists the number of CFL frequencies used by devices controlled by the Spectrum Manager
- ③ **Ready**  
Lists the number of frequencies that are currently clear and can be deployed
- ④ **More**  
Indicates additional frequency band entries are available

## Networking a Spectrum Manager and Receivers

The Spectrum Manager uses an Ethernet connection to deploy frequencies to networked components. For automatic network configuration, use a DHCP enabled Ethernet switch such as the AXT620 or an Ethernet router with DHCP service. Use multiple Ethernet switches to extend the network for larger installations.



Multiple device network example using the Shure AXT620 Ethernet switch

**Note:** For smaller systems, connect the Spectrum Manager and receivers using the Ethernet ports on the back panel. The devices fall back to compatible addresses if the IP Mode is set to Automatic and there is no DHCP server.

### Automatic IP Addressing

1. If using a Shure AXT620 Ethernet switch, set the **DHCP** switch to **ON**.
2. Set the IP mode to automatic for all devices (**Util > Network > Mode > Automatic**)

### Manual IP Addressing

1. Connect the Spectrum Manager and receivers to an Ethernet switch.
2. Set the IP Mode to **Manual** for all devices:
  - Menu: **Util > Network**
  - Use the control wheel to set valid IP addresses for all devices. Set the subnet mask for all devices to the same value.

### Troubleshooting

Use only one DHCP server per network

All devices must share the same subnet mask

All devices must have the same level of firmware revision installed

Look for the network icons on the display of each device:

- If the icon is not there, check the cable connection and the LEDs on the network jack.
- If the LEDs are not on and the cable is plugged in, replace the cable and recheck the LEDs and network icon.

Use the Find All utility (**Util > Network > Find All**) to view devices on the network:

- The Find All report lists all devices on the network.
- Check the IP address for devices not shown in the Find All report to ensure that they are on the same subnet.

To check connectivity of WWB6 to the network:

1. Start WWB6 software and use Inventory view to see devices connected to the network.
2. If not, find the IP address from one of the devices on the network (such as an AXT400 receiver) and see if you can ping it from the computer running WWB6.
3. From a WINDOWS/MAC command prompt, type "ping IPADDRESS" of the device (e.g. "ping 192.168.1.100").
4. If the ping returns success (no packet loss), then the computer can see the device on the network. If the ping returns failure (100% packet loss), then check the IP address of the computer to ensure it's on the same subnet as the device.
5. If the pings are successful and the devices still do not show up in the WWB6 inventory, check to ensure all firewalls are either disabled or allow the WWB network traffic to pass to the application. Check that firewall settings are not blocking network access.

## RF Coordination Wizard

The Spectrum Manager includes a wizard to provide guided device and frequency configuration. Choose one of the following setup task options:

### All New

Use the **All New** option for initial RF coordination.

- Finds receivers and other devices on the network to manage
- Scans the RF spectrum for available frequencies
- Calculates a compatible frequency list (CFL) to match the needs of the networked devices
- Deploys frequencies to the managed devices

### Update Freqs

Use the **Update Freqs** option to refresh the frequencies for an existing wireless system.

- Scans the RF spectrum for available frequencies
- Calculates the compatible frequency list (CFL) to match the needs of the networked devices
- Deploys frequencies to the managed devices

### Update Devices

Use the **Update Devices** option when adding new devices to a wireless system.

- Finds devices on the network to manage
- Deploys frequencies from the existing compatible frequency list (CFL) to the managed devices

## Using All New Wizard Option for System Setup

The following example shows the steps for initial RF coordination using the **All New** wizard option. Use the **Update Freqs** or **Update Devices** wizard options to coordinate an existing wireless system.



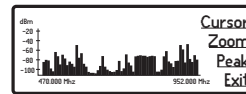
1. From the home menu screen choose Wizard and select the **All New** option.



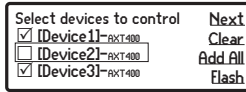
5. Allow the scan to complete.



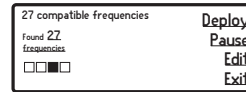
2. The **Found Channels** screen displays the frequency band and model of devices on the network. Press **Next**.



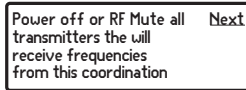
The RF plot is displayed in the data window. Press **Next**.



3. Press the control wheel to place a checkmark in the box next to the **Device ID**. Use the control wheel to select other devices or press **Add All**. Press **Flash** to identify a specific device in the list. Press **Next** when finished.



6. Allow the CFL calculation to complete.



4. Mute all transmitters. Press **Next**.



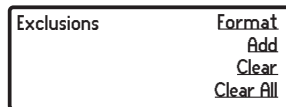
7. Press **Deploy** to assign frequencies to the network devices.

## Exclusions

Most RF environments contain frequencies where it is not desirable to operate wireless equipment, such as those reserved for local broadcasts, public safety, or other users. Exclusions can be entered into the Spectrum Manager to prevent it from including these frequencies in its calculation of a compatible frequency list.

### Entering Exclusions

1. Menu: **CFL > New > Exclusions**

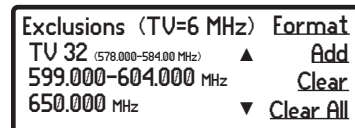


2. Press the menu button next to the **Add** option.

3. Press the control wheel to highlight **TV**, **Start**, or **Stop**:

- To exclude a single frequency, set the values for the **Start** frequency and the **Stop** frequency to the same value
- To exclude a range of frequencies, use the **Start** and **Stop** values to define the frequency range
- To exclude a TV channel, use the control wheel to set the channel number

4. When finished, press **ENTER** to save changes.



In this example, TV channel 32, the range of 599.00 to 604.000 MHz, and 650.000 MHz will be excluded from the compatible frequency calculation.

## Event Log

The event log records the actions of the Spectrum Manager and other devices it manages, as listed below. The log stores up to 150 events. The start of an event record is indicated with an asterisk (\*). The most recent events appear at the top of the log. Use the control wheel to scroll through the list of events. When the storage limit is reached, the oldest events are overwritten.

**Note:** A power cycle or firmware update will clear the event log.

### Frequencies:

- Backup frequency degraded
- Backup frequency upgraded
- Frequency served to [channel name]
- Scan Stored

### Managed Devices:

- [Device ID] goes off-line
- [Device ID] comes on-line
- [Device ID] removed
- [Device ID] added
- Transmitter [Tx] profile changed

### Compatible Frequency List (CFL):

- CFL cleared
- New frequency added
- Frequency deleted
- Frequency value changed
- Frequency type changed
- CFL deployed
- New CFL calculated

### Exclusions:

- Exclusion threshold changed
- Exclusion added (frequency or range)
- Exclusion cleared (frequency or range)

# Spectrum Monitoring

The Spectrum Manager has built-in tools to provide an excellent resource for examining, tracking, and troubleshooting the RF spectrum.

## Backup Frequency Monitoring

Axient Frequency Monitoring					<b>More</b>
Band	G1	H4	J5	L3	
In Use	6	10	4	8	
Ready	12	4	6	10	

During operation, the data screen tracks the status of frequencies available for Axient channels in the system. The total number of frequencies available for each band are displayed, including real-time status of in-use and backup frequencies. Backup frequencies which have been degraded by the monitoring function are removed from the count of **Ready** frequencies.

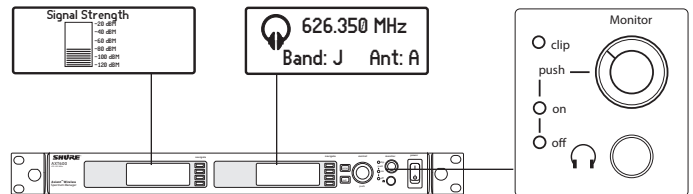
- **In Use** = frequencies that are deployed to Axient components including off-line devices
- **Ready** = frequencies that are open and available for use as backups or for other components
- **More** = select to view additional frequency bands

## Listen

Use this feature to monitor the FM demodulated signal at a selected frequency.

Menu: **Manual > Listen**

- Use the control wheel to select the frequency and antenna for monitoring.
- The data display shows the signal strength of the selected frequency.
- The menu display shows the selected frequency and antenna.
- The **Listen** feature can also be accessed from the **CFL > Edit** menu, allowing easy cueing of frequencies that are in use or backups.



## Scanning

Performing a spectrum scan creates a plot of RF activity on the data display. Use the **Cursor**, **Zoom**, and **Peak** tools to examine a specific area of the plot. The **Store** option allows for 2 plots of scan data to be saved by the Spectrum Manager for reference or for CFL calculation. Scans initiated from the Spectrum manager menu cover the entire tuning range. The Frequency Plot tool in Wireless Workbench software can be used to scan a subset of this range and provides options for step size and resolution bandwidth.

Sweep: Single	<b>Start</b>
Peak Hold: Off	
Exclusion Threshold > -85 dB	<b>Recall Store</b>

Scanning	
■■■■■■■■□□□□	<b>Exit</b>
Antenna A	

Menu: **Manual > Scan**

1. Set the following modes:

- **Sweep** = **Single** or **Continuous**
- **Peak Hold** = **Off** or **ON**
- **Exclusion Threshold** = The Spectrum Manager excludes scanned frequencies above this value from the Compatible Frequency List calculation. The threshold can be viewed during edit on the **Scan Data** display.

2. Press **Start** to begin scanning. Scan progress is shown on the display. When finished press **Store** to save a scan. Select **Recall** to access a stored scan. The recalled scan will overwrite the current scan data.

The RF plot is shown on the Data Display screen.

**Cursor Tool**

**Cursor** adds a movable vertical dashed line placed on the RF plot. Use the control wheel to position the **Cursor** at any point in the plot.

The frequency value and signal strength for the selected point are displayed at the top of the plot.

**Zoom Tool**

**Zoom** magnifies RF plot to allow for detailed analysis of a portion of the spectrum.

Use **Zoom** to identify individual frequencies in crowded RF environments.

**Peak Tool**

**Peak** enables the cursor to only select the highest peaks of the RF plot.

**Peak** provides a quick way to identify the strongest signals in the RF plot.



## Specifications- AXT600 Spectrum Manager

<b>RF Tuning Frequency Range</b>	470–865, 925–952 MHz									
<b>RF Tuning Step Size</b>	25, 200, 1000 kHz									
<b>Noise Floor</b>	<table border="0"> <tr> <td><b>Resolution</b></td> <td><b>25 kHz:</b></td> <td>-110 dBm</td> </tr> <tr> <td><b>Bandwidth:</b></td> <td><b>200 kHz:</b></td> <td>-100 dBm</td> </tr> <tr> <td></td> <td><b>1000 kHz:</b></td> <td>-90 dBm</td> </tr> </table>	<b>Resolution</b>	<b>25 kHz:</b>	-110 dBm	<b>Bandwidth:</b>	<b>200 kHz:</b>	-100 dBm		<b>1000 kHz:</b>	-90 dBm
<b>Resolution</b>	<b>25 kHz:</b>	-110 dBm								
<b>Bandwidth:</b>	<b>200 kHz:</b>	-100 dBm								
	<b>1000 kHz:</b>	-90 dBm								
<b>Image Rejection</b>	>110 dB, typical									
<b>Spurious Response</b>	<-100 dBm, typical									
<b>Ultimate Quieting</b>	>90 dB, A-Weighted									
<b>Dimensions</b>	44 mm x 483 mm x 366 mm (1.7 in. x 19.0 in. x 14.4 in.), H x W x D									
<b>Weight</b>	5.5 kg (12.0 lbs)									
<b>Housing</b>	Steel; Extruded aluminum									
<b>Power Requirements</b>	100 to 240 V AC, 50-60 Hz									
<b>Current Drain</b>	0.8 A RMS (referenced at 120 V AC)									
<b>Operating Temperature Range</b>	-18°C (0°F) to 63°C (145°F)									
<b>Storage Temperature Range</b>	-29°C (-20°F) to 74°C (165°F)									

### Scan Time

The Spectrum Manager scans the entire RF tuning frequency range in 64 seconds using 8 scanning modules in parallel. Scan time per 60 MHz may be less for specified ranges that allow scanning modules to work in parallel.

Step Size	Maximum Scan Time per 60 MHz
25 kHz:	48 seconds
*200 kHz:	7 seconds
*1000 kHz:	1 second

\*Available only with WWB6 control

### RF Input

<b>Connector Type</b>	BNC
<b>Configuration</b>	Unbalanced, active
<b>Impedance</b>	50 Ω
<b>Maximum Input Level</b>	-20 dBm
<b>Bias Voltage</b>	12 V DC, 150 mA (300 mA maximum)

### Cascade Output

<b>Connector Type</b>	BNC
<b>Configuration</b>	Unbalanced, active
<b>Impedance</b>	50 Ω
<b>Insertion Loss</b>	<5 dB

### Monitor Audio Output

<b>Audio Frequency Response</b>	40 – 18 kHz, ±3 dB						
<b>Configuration</b>	Unbalanced mono, 1/4 in. (will drive stereo phones)						
<b>Impedance</b>	50 Ω						
<b>Maximum Signal Level</b>	1 W @ 63 Ω						
45 kHz max. deviation							
<b>Pin Assignments</b>	<table border="0"> <tr> <td><b>Tip:</b></td> <td>audio +</td> </tr> <tr> <td><b>Ring:</b></td> <td>audio +</td> </tr> <tr> <td><b>Sleeve:</b></td> <td>ground</td> </tr> </table>	<b>Tip:</b>	audio +	<b>Ring:</b>	audio +	<b>Sleeve:</b>	ground
<b>Tip:</b>	audio +						
<b>Ring:</b>	audio +						
<b>Sleeve:</b>	ground						

## Networking

<b>Power Over Ethernet (PoE)</b>	50 V DC, Class 1
<b>Network Interface</b>	Dual Port Ethernet 10/100 Mbps
<b>Network Addressing Capability</b>	DHCP or Manual IP address

## Firmware Updates

Firmware is embedded software in each component that controls functionality. Periodically, new versions of firmware are developed to incorporate additional features and enhancements. To take advantage of design improvements, new versions of the firmware can be uploaded and installed using the Firmware Update Manager tool available in WWB6 software. Firmware is available for download from <http://www.shure.com/wwb>.

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## Certifications

Meets essential requirements of the following European Directives:

- Conforms to European Regulation (EC) No. 1275/2008, as amended.
- R&TTE Directive 99/5/EC
- WEEE Directive 2002/96/EC, as amended by 2008/34/EC
- RoHS Directive 2002/95/EC, as amended by 2008/35/EC

**Note:** Please follow your regional recycling scheme for electronic waste

Meets requirements of the following standards: EN 300 422 Parts 1 and 2, EN 301 489 Parts 1 and 9, EN60065.

Approved under the Declaration of Conformity (DoC) provision of FCC Part 15.

Certified in Canada by IC to RSS-123.

**IC:** 616A-AXT600

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation of this device is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**Note:** EMC conformance testing is based on the use of supplied and recommended cable types. The use of other cable types may degrade EMC performance.

**Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.**

The CE Declaration of Conformity can be obtained from Shure Incorporated or any of its European representatives. For contact information please visit [www.shure.com](http://www.shure.com)

The CE Declaration of Conformity can be obtained from: [www.shure.com/europe/compliance](http://www.shure.com/europe/compliance)

Authorized European representative:

Shure Europe GmbH

Headquarters Europe, Middle East & Africa

Department: EMEA Approval

Jakob-Dieffenbacher-Str. 12

75031 Eppingen, Germany

Phone: 49-7262-92 49 0

Fax: 49-7262-92 49 11 4

Email: [info@shure.de](mailto:info@shure.de)

### Information to the user

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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