Ranger

4K/HD Camera-Back
Transmitter and Receiver

Reference Guide
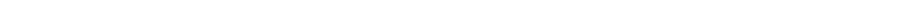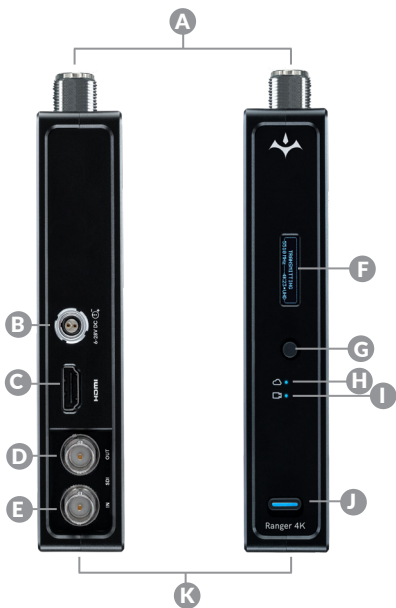
TABLE OF CONTENTS

PHYSICAL PROPERTIES

RANGER TRANSMITTER

RANGER RECEIVER

A: N-type connectors
B: 6-28V DC power input
C: HDMI input
D: 12G-SDI output
E: 12G-SDI input

F: OLED display
G: Menu joystick
H: Network status
I: Video status

J: Power switch
K: Micro-USB (not shown)
L: HDMI output
M: RP SMA connectors

ARRAY PANEL ANTENNA
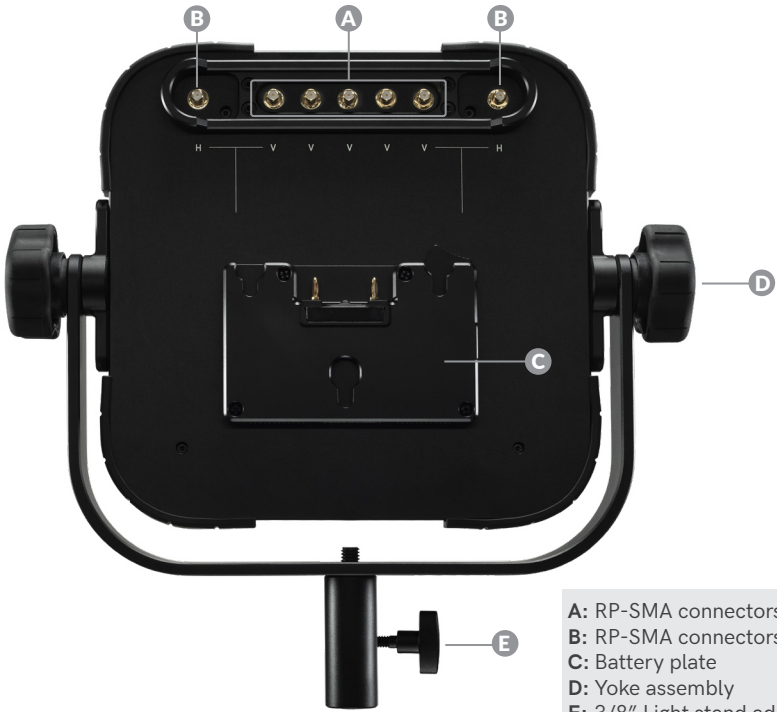
A: RP-SMA connectors (vertical)
B: RP-SMA connectors (horizontal)
C: Battery plate
D: Yoke assembly
E: 3/8" Light stand adapter

ANTENNA CONFIGURATION
The Array Panel Antenna has both vertical **(A)** and horizontal **(B)** antenna connectors for use in an H+V (horizontal + vertical) configuration, as recommended. For more information, go to **Vertical and Horizontal Antennas** on page 8.

GETTING STARTED

Ranger is an uncompressed, 4K/HDR wireless video transmission system for broadcast, live production, and professional A/V. The system utilizes our patented JSSC technology to send 10-bit, 4:2:2 video up to 5,000 ft. line of sight at less than 1 ms (millisecond delay).

Ranger operates over unlicensed and licensed bands from 4.9 GHz to 6 GHz. Some frequencies may require special licensing in certain countries.

POWER AND CONNECT

1 Attach the Ranger transmitter (male side) to the back of your camera.

2 Connect the output from your video source to either the SDI or HDMI input (D or F) on the transmitter. Connect either the SDI or HDMI output (E or M) from the Ranger receiver to the video input on your monitor. If using the Array Antenna, mount the receiver to the back of the antenna.
NOTE: If the receiver is mounted upright on a stand above the monitor, use a right-angle SDI adapter to relieve any strain caused by the weight of the cable, and to avoid damaging the SDI

3 Attach a compatible battery (Gold or V mount) to the back (female side) of both the transmitter and receiver.

4 Attach the H and V barrel antennas to the type-N connectors on the transmitter (A, B). The V antenna attaches to the V-connector, and the H antenna attaches to the H-connector.

5 *If using omni-directional antennas*: Attach the three 2dBi antennas to the receiver's center connectors and the two horizontal antennas to the left and right connectors (see image).

If using an 4K Array Antenna: Connect the receiver's three center connectors to the Array Antenna connections labeled "**V**," then connect the left and right connectors to the "**H**" connections using the RP-SMA connectors (see page 9).

6 Connect power to both the transmitter and receiver with the included A/C adapter or optional battery plate accessory. If using a battery plate, connect a compatible (AB Gold mount or V-Lock) battery.

RX antenna configuration

7 Move the power switches on both the transmitter and receiver (**L**) to the ON position. Video appears within a few seconds.

DEVICE OPERATION

- For best results when using multiple Ranger systems in the same area, place the transmitters and receivers a few feet apart from each other.
- Operation of other wireless equipment may interfere with the Ranger. Try to separate other wireless transmitters and receivers as much as possible.

POWER CONNECTOR/PIN OUT

Ranger devices use a locking 2-pin power connector similar to the 0B 302 series LEMO connector.

Pin	Description
1*	GND
2	+DC
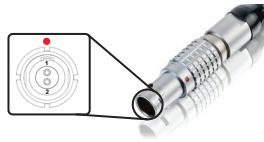
* Pin 1 is closest to the <u>red dot</u> on the connector

CUSTOM/3RD PARTY POWER CABLES

- Test the power cable polarity with **ONLY** the power cable connected to Ranger. Do not connect video cables.
- Check the power cable for shorts and proper grounding.

CAUTION: Using a reverse polarity or improperly–constructed power cable can damage the product and is not covered under warranty.

12G-SDI CABLES

Ranger devices require the use of 12G-SDI cables in order to reliably transport 12G video signals, and are included as a standard item. Ensure that your cables are rated for compatibility with your camera's output.

LAUNCHPAD APP

Use the Launchpad App to remotely manage and monitor every parameter of Ranger including pairing, frequency selection, and 3D LUTs.

CONNECT VIA BLUETOOTH

1 Download the Launchpad App.

2 Enable Bluetooth on your iOS or Android device.

3 Navigate to the Bluetooth menu on the transmitter and receiver, then select **Enable**.

4 Open the Launchpad App from your iOS or Android device, then tap the **Ranger Devices** button.

5 Select the device(s) you want to pair or monitor.

TRANSMITTER STATUS DISPLAY

Settings (Menu descriptions listed on pg. 11) - Tap the ⋮ button at the top of the screen to customize the transmitter's various settings.

Spectrum Analyzer - Detects congestion in the area and determines which frequencies are available to use. Each bar represents a frequency, and the height represents the amount of congestion in that frequency.

Status - Displays the current status of your input, including frequency and frequency information, camera recording status, temperature, and amount of linked receivers.

RECEIVER STATUS DISPLAY

Settings (Menu descriptions listed on pg. 11) - Tap the ⋮ button at the top of the display to customize the receiver's various settings such as the output format, audio, display and OSD.

Signal Quality - Determine the quality and reliability of the signal being received.

SNR (Signal to Noise Ratio) - Compare the signal power level to the noise power level from the attached antennas.

Range Analyzer - Displays the transmission distance between the transmitter and receiver.

Spectrum Analyzer - Detects congestion in the area and determines which frequencies are available to use. Each bar represents a frequency, and the height represents the amount of congestion in that frequency.

Status - Displays the name, link quality, resolution and other of your video input.
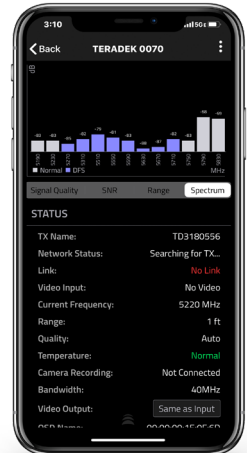
PAIRING

Ranger devices purchased as a set (TX and RX), are paired by default, requiring no additional configuration. Ranger devices purchased separately need to be paired using the device's front panel (OLED) menu, **Launchpad**, or the **Launchpad App**.

NOTE: Before starting either pairing process, ensure that both the transmitter and receiver have the same firmware version and have Bluetooth enabled.

PAIRING VIA THE LAUNCHPAD APP

1 Open the Launchpad App from your iOS or Android device, then tap the **Pairing**

2 Select the transmitter you wish to pair, then tap the **Next** button.

3 Select the receiver(s) you wish to pair with the transmitter, then tap the **Pair!** button. The Launchpad App will indicate when the pairing process is completed.

WIRED PAIRING VIA LAUNCHPAD

1 Connect both the transmitter and receiver(s) to your computer (Windows/Mac) via USB.

2 Open Launchpad, select the **Pairing** tab, then tap the **Wired Pairing** button.

3 Select the devices you want to pair, then click the **Pair Devices** button. Launchpad will indicate whether or not Pairing is successful.

PAIRING VIA THE FRONT PANEL MENU

1 Using the Menu Joystick **(G)**, navigate to the Pairing menu on both the transmitter and the receiver.

2 Select **Pairing** to begin the pairing process. The transmitter will begin scanning for a receiver within range and automatically pair to the receiver.

3 Once paired, the front panel will indicate whether or not Pairing is successful.

PAIRING TIPS

If you're having trouble getting units to pair, we recommend keeping the transmitter and receiver six feet apart when pairing (if antennas are connected). Without antennas, they can be closer. Keep all other RF devices nearby turned off or out of range to ensure the transmitter and receiver are only detecting each other. To eliminate any chance of interference, perform the **Wired Pairing** process via Launchpad.

MOUNTING

Ranger units require the use of external antennas for basic operation. For Ranger, we recommend **ONLY** using a Horizontal + Vertical (H+V) antenna configuration.

HORIZONTAL + VERTICAL ANTENNA CONFIGURATION

Vertical (V) antennas are ideal for achieving diversity indoors, and offer good performance in a wide variety of short-to-medium range situations when quick setup and flexibility is key. Once you move outdoors with the V antennas, the RF signals travel in a similar or identical manner towards the receiver, weakening diversity. **Horizontal (H) antennas** were designed for use with the V antennas. H antennas cause the RF signal from the transmitter to propagate in a perpendicular manner compared to the vertical signal from the V antenna. The **H+V antenna configuration** helps to maintain the quality and performance of your video transmission, especially when your signal would otherwise begin to deteriorate due to noise and/or longer ranges.

NOTE: H+V antennas must be attached to both the transmitter and receiver.

Ranger system with H+V antenna configuration

ARRAY PANEL ANTENNA

If using the **Array Panel Antenna** with your Ranger receiver, you must connect the receiver's three center connectors to the Array Antenna connections labeled "**V**," then connect the left and right connectors to the "**H**" connections using the RP-SMA connectors to establish the H+V antenna configuration (see below for connector placement). Once connected, position the antenna so that the front (with the Teradek logo) has a clear line of sight to the transmitter.

Ranger system and 4K Array Panel Antenna with H+V antenna configuration

The Array Panel Antenna has a built-in directional antenna with a receive pattern that varies based on its distance from the transmitter. The horizontal receive angle measures 55° at 5,000 ft (1.5 km), 104° at 4,000 ft (1.25 km), and is effectively omni-directional at up to 500 ft (150 m). The vertical receive angle measures 20° at any distance.

20°

500 ft (150 m) ~ 360°

4,000 ft (1.25 km) ~ 104°

5,000 ft (1.5 km) ~ 55°
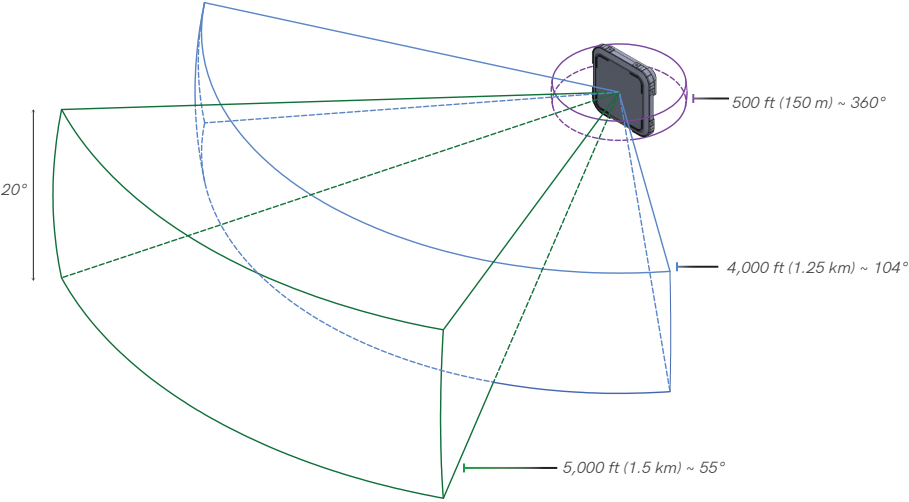
For more information about the different antenna configurations for Ranger, please visit: **https://www.teradek.com/blogs/articles/what-antennas-should-i-use-with-bolt-4k**

DEVICE PLACEMENT

Ranger devices are equipped with a dual mount battery plate that allows you to attach your device to either the back of a camera, monitor, or 4K Array Panel Antenna.

Ranger TX (w/dual mount) attaches to the back of a camera

Ranger RX (w/dual mount) mounts on the back of a monitor or Array Antenna

TRANSMITTER DISPLAY OPERATION

Ranger's configuration menus can be accessed from either the transmitter's front panel display or from the Launchpad app.

STATUS SCREENS
Press the menu joystick **(G)** to cycle through the status screens or to return from the menu.

- **MAIN STATUS**   - Displays the status of the wireless receiver, along with the current video resolution, frequency, and link quality (if connected).
- **INFO**   - Displays the current voltage and internal temperature of the unit.
- **HDMI STATUS**   - Displays the current HDMI color output

CONFIGURATION OPTIONS
Most of the options listed in this section can also be configured using the Launchpad app. Use the Menu joystick **(G)** to navigate the transmitter's configuration options.

WIRELESS SETTINGS
The transmitter's Wireless Settings menu contains several configurable options to optimize your transmitter's range, quality, and reliability.

WIRELESS SETTINGS - ENABLE BROADCAST MODE
Broadcast Mode allows you to transmit to multiple receivers simultaneously (non-DFS frequencies only), while also extending Ranger's transmission range.

- **Broadcast Mode Disabled** (Standard Multicast Mode) - Transmitter and connected receiver(s) coordinate with each other to establish which frequency to use; the transmitter communicates with the receiver via a downlink data channel, while the receiver maintains an uplink data channel to the transmitter.
- **Broadcast Mode Enabled** - Data uplink channel is disabled, allowing the transmitter to connect to an unlimited number of receivers, as long as they have already been paired. To achieve even better range performance, attach the receiver to your **4K Array Panel Antenna** while in Broadcast Mode.

WIRELESS SETTINGS - ENABLE FIXED FREQUENCY

Fixed Frequency Mode bypasses any automatic frequency switching logic, allowing your Ranger system to always attempt to connect on a specified frequency. Once a frequency is selected, the transmitter will only use that frequency. This allows your transmitter to link/reconnect to the receiver much faster. After enabling Fixed Frequency mode, navigate to **Frequencies** and select a frequency not in use (non-DFS frequencies only). For best results, ensure that both the transmitter and receiver have **Fixed Frequency Mode** enabled, have the same frequency selected, and use the **Spectrum Analyzer** (on the receiver's front panel or the Launchpad app) to search for the least congested frequency to use.

- **Fixed Frequency Mode Disabled** - Ranger scans all available channels and repeatedly switches from one frequency to the next during transmission
- **Fixed Frequency Mode Enabled** - Ranger connects to one specific frequency

NOTE: By default, Ranger will select the lowest available frequency from the Frequencies list if one has not been selected beforehand.

WIRELESS SETTINGS - ALLOW LICENSED CHANNELS

Enable or disable Licensed Channel selection within the Frequencies menu. Ranger supports an extended RF range of 4.9GHz to 6.0GHz, which includes both unlicensed and licensed channels. Selecting a specific licensed channel ensures there is no interference from other devices broadcasting within range. This is especially useful during large events such as sports or news broadcasts where multiple cameras are operating simultaneously. For all available frequencies, refer to the **FREQUENCIES BY REGION** chart on page 22.

NOTE: Fixed Frequency Mode must first be enabled to select a specific licensed channel. Otherwise, Ranger will automatically select a licensed channel (Auto Mode).

WIRELESS SETTINGS - SELECT BANDWIDTH

The Bandwidth menu lets you choose between 40MHz (default) and 20MHz operating modes. Ensure that both the transmitter and receiver are set to the same bandwidth with a resolution of up to 1080p60. For all available frequencies, refer to the **FREQUENCIES BY REGION** chart on page 22.

- **20MHz** - Reduces the amount of bandwidth by half, effectively doubling the number of usable frequencies while decreasing interference
- **40MHz** - (*Default*) Increases the amount of bandwidth by bonding two 20MHz channels, allowing for faster transfer rates but increased interference

NOTE: 20MHz mode supports HD/3G resolutions up to 1080p60. Resolutions up to 4k30 are also supported, but downscaled to 1080p before transmission (4k50/59/60 is not supported).

WIRELESS SETTINGS - **SELECT FREQUENCY**
The Frequencies menu contains a list of all available frequencies. Ranger will automatically select an operating frequency when multiple values are selected. If both the transmitter and receiver have **Fixed Frequency Mode** enabled, you can only select one frequency for Ranger to use. Frequencies marked with (DFS) must be scanned for one minute before they can be used, but are typically less crowded. For all available frequencies, refer to the **FREQUENCIES BY REGION** chart on page 22.

WIRELESS SETTINGS - **VIDEO QUALITY**
The Video Quality menu lets you adjust the balance between your signal's maximum range and quality according to the number of antennas used to transmit fine information. Ranger has three picture quality levels that vary based on the lowest quality link or the furthest receiver.

- **Auto Mode** — (*Default*) Transmitter automatically determines how many fine antennas are needed based on the range and signal quality
- **Longer Distance Mode** — (*One fine antenna*) Maintains the maximum range in situations where other sources of interference might be present, but will slightly reduce your video signal's maximum quality
- **Better Quality Mode** — (*Two fine antennas*) Maintains higher signal quality, but reduces the maximum range
- **Best Quality Mode** — (*Three fine antennas*) Ideal for complex, high contrast scenes that require the highest possible quality
- **Low Power Mode** — (*One fine antenna with shorter range*) Reduces the transmitter's total power consumption by about 1.5W, and may reduce any unwanted interference in multi-system environments

PAIR
Enable pairing on transmitters and receivers. Ranger units purchased as a set (TX and RX) are paired by default, requiring no additional configuration. If the units were purchased separately, or if they have never been paired, you will need to complete the pairing process (page 5). Once **Pairing** is complete, there is no need to repeat the process unless the TX or RX's OSD name has been modified, or if the region has been changed. To confirm if your devices were paired successfully, open either the **Unpair** menu (TX) or the **Switch TX** menu (RX) and verify that the paired device is listed.

NOTE: Before starting the pairing process, ensure that both the transmitter and receiver have the same firmware version and have Bluetooth enabled.
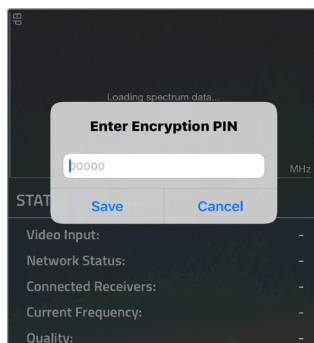
UNPAIR

Unpair and remove devices from your unit's paired device registry. This feature is useful in situations when paired devices are no longer being used and need to either be removed from the registry, or replaced. Transmitters can store up to six paired receivers in its device registry.

BLUETOOTH SETTINGS

Use the Bluetooth menu to enable or disable Bluetooth communication.

- **Enable Bluetooth** - Allows the transmitter and receiver to be paired and communicate with the Launchpad App
- **Use Bluetooth PIN** - Enables the use of a PIN for authentication when using the Launchpad App (*see image*)
- **Change PIN** - Press the Menu joystick towards the right to change the Bluetooth PIN

Enter Encryption PIN

00000   MHz

STAT   Save   Cancel

Video Input: -
Network Status: -
Connected Receivers: -
Current Frequency: -
Quality: -

NOTE: Bluetooth is disabled by default. In order to configure your Ranger devices via the Launchpad App, you must first enable Bluetooth.

DISPLAY SETTINGS

Use the Display Settings to control the OLED display operation. By default, the OLED display will invert every 10 minutes. You can set the display to invert every 30 minutes (lengthens the display life), or it can dim or turn off after either 10 minutes or 10 seconds.

- Invert every 30 min
- Dim every 10 min
- Dim after 10 sec
- Dim after 10 min
- Off after 10 sec
- No BurnIn Prevention

RESET ALL SETTINGS

Reset all configurable options to their factory defaults.

DEVICE INFO

Displays the model and serial number.

FIRMWARE VERSIONS

Displays the device's current firmware versions.

RECEIVER DISPLAY/OSD OPERATION

Ranger's configuration menus can be accessed from either the receiver's front panel display or from the Launchpad app. When enabled, the receiver's configuration menus are also displayed via On-Screen Display (OSD) on a connected monitor.

RECEIVER STATUS SCREENS

Press the menu joystick **(G)** to cycle through the status screens or to return from the menu.

- **MAIN STATUS** - Displays the status of the wireless receiver, along with the current video resolution, frequency, and link quality (if connected).
- **TIME CODE** - Displays the current time code if received from the transmitter.
- **INFO** - Displays the current voltage and internal temperature of the unit.
- **TX INFO** - Displays the name of the transmitter it is paired to.
- **HDMI STATUS** - Displays the current HDMI color output

CONFIGURATION OPTIONS

Most of the options listed in this section can also be configured using the Launchpad app. Use the Menu joystick **(G)** to navigate the configuration menus.

SWITCH TX

Ranger receivers can pair with up to four transmitters at a time. Switch TX allows you to quickly switch from one paired transmitter's camera feed to another paired transmitter. This feature is especially useful in multi-camera situations when you need to switch to a different camera's view mid-shoot, without having to perform the pairing process every time.

NOTE: The transmitter(s) need to first be paired with the receiver.

WIRELESS SETTINGS

The transmitter's Wireless Settings menu contains several configurable options to optimize your receiver's range, quality, and reliability.

WIRELESS SETTINGS - ENABLE FIXED FREQUENCY

Fixed Frequency Mode bypasses any automatic frequency switching logic, allowing your Ranger system to always attempt to connect on a specified frequency. Once a frequency is selected, the transmitter will only use that frequency. This allows your transmitter to link/reconnect to the receiver much faster. After enabling **Fixed Frequency mode**, navigate to **Frequencies** and select a frequency not in use (non-DFS

frequencies only). For best results, ensure that both the transmitter and receiver have **Fixed Frequency Mode** enabled, and use the **Spectrum Analyzer** (on the receiver's front panel or the Launchpad app) to search for the least congested frequency to use.

- **Fixed Frequency Mode Disabled** - Ranger scans all available channels and repeatedly switches from one frequency to the next during transmission
- **Fixed Frequency Mode Enabled** - Ranger connects to one specific frequency

NOTE: By default, Ranger will select the lowest available frequency from the Frequencies list if one has not been selected beforehand.

WIRELESS SETTINGS - ALLOW LICENSED CHANNELS
Enable or disable Licensed Channel selection under the **Frequencies** menu. Ranger supports an extended RF range of 4.9GHz to 6.0GHz, which includes both unlicensed and licensed channels. Selecting a specific licensed channel ensures there is no interference from other devices broadcasting within range . This is especially useful during large events such as sports or news broadcasts where multiple cameras are operating simultaneously. For all available frequencies, refer to the **FREQUENCIES BY REGION** chart on page 22.

NOTE: Fixed Frequency Mode must first be enabled to select a specific licensed channel. Otherwise, Ranger will automatically select a licensed channel (Auto Mode).

WIRELESS SETTINGS - SELECT BANDWIDTH
The Bandwidth menu lets you choose between 40MHz (default) and 20MHz operating modes. Ensure that both the transmitter and receiver are set to the same bandwidth with a resolution of up to 1080p60. For all available frequencies, refer to the **FREQUENCIES BY REGION** chart on page 22.

- **20MHz** - Reduces the amount of bandwidth by half, effectively doubling the number of usable frequencies while decreasing interference
- **40MHz** - (*Default*) Increases the amount of bandwidth by bonding two 20MHz channels, allowing for faster transfer rates but increased interference

NOTE: 20MHz mode supports HD/3G resolutions up to 1080p60. Resolutions up to 4k30 are also supported, but downscaled to 1080p before transmission (4k50/59/60 is not supported).

WIRELESS SETTINGS - SELECT FREQUENCY
The Frequencies menu contains a list of all available frequencies. Ranger will automatically select an operating frequency when multiple values are selected. If both the transmitter and receiver have **Fixed Frequency Mode** enabled, you can only select one frequency for Ranger to use. Frequencies marked with (DFS) must be scanned for one minute before they can be used, but are typically less crowded. For all available frequencies, refer to the **FREQUENCIES BY REGION** chart on page 22.

SPECTRUM ANALYZER

The built-in Spectrum Analyzer provides a visual indication of channel noise and saturation across the entire available frequency range. Move the Menu joystick left and right to select a frequency, then up and down to enable or disable it.
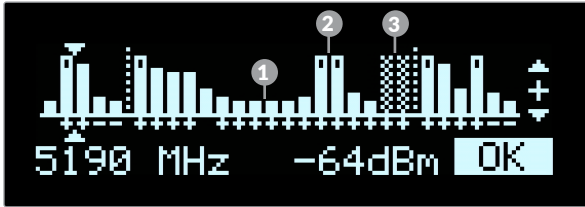
Frequencies are represented by bars; the higher the bar, the more congested that frequency is. Bars without a dot **(1)** indicate the frequency is not as saturated and can be used. Bars with a dot **(2)** indicate the frequency is too saturated to connect to. Faded bars **(3)** represent a frequency that is unavailable for use due to restrictions in particular regions.

SIGNAL QUALITY GRAPH

The Signal Quality Graph indicates the quality and reliability of the signal being received according to the amount of interference that is present between the RX and TX. Signal Quality is represented in percentages:

- Figures below 30% indicate **poor** signal quality
- Figures between 30% and 45% indicate **fair** signal quality
- Figures above 45% indicate **good** signal quality

PAIR

Enable pairing on transmitters and receivers. Ranger units purchased as a set (TX and RX) are paired by default, requiring no additional configuration. If the units were purchased separately, or if they have never been paired, you will need to complete the pairing process (page 5). Once **Pairing** is complete, there is no need to repeat the process unless the TX or RX's OSD name has been modified, or if the region has been changed. To confirm if your devices were paired successfully, open the either the **Unpair** menu (TX) or the **Switch TX** menu (RX) and verify that the paired device is listed.
NOTE: Before starting the pairing process, ensure that both the transmitter and receiver have the same firmware version and have Bluetooth enabled.

UNPAIR

Unpair and remove devices from your unit's paired device registry. This feature is useful in situations when paired devices are no longer being used and need to either be removed from the registry, or replaced. Receivers can store up to four transmitters in its device registry.

HDMI/SDI OUT FORMAT

You can choose to match the video source's resolution (**Same As Input**), or choose from the resolutions listed. If using the receiver with a recorder or monitor that is sensitive to video signal changes, select **Continuous Output** to ensure the signal stays constant even if the link is interrupted. Keep in mind that selecting Continuous Output adds a small delay to the video output. Selecting **SD**, **HD**, or **6G-UHD** matches the video source's frame rate while adjusting the resolution. This is useful for when you need to down-convert a 4K video to display on an HD monitor.

- **Continuous Output** - Video signal output stays constant when using a monitor or recorder that is sensitive to video signal changes
- **Same As Input** - Matches the transmitter's video source resolution.
- **SD** - Matches the TX frame rate and outputs SD resolution
- **HD** - Matches the TX frame rate and outputs1920x1080p
- **6K-UHD** - Matches the TX frame rate and outputs 3840x2160
- **Resolutions List** - Select a specific output resolution:
  - 4K (DCI) - 23.98/24/25/29.97/30/50/59.94/60
  - 4K (UHD) - 23.98/24/25/29.97/30/50/59.94/60
  - 1080p - 23.98/24/25/29.97/30/50/59.94/60
  - 1080psf - 23.98/24/25/29.97/30
  - 1080i - 50/59.94/60
  - 720p - 50/59.94/60
  - 480p - 59.94/576p - 50 (via HDMI ports only)
  - 480i (NTSC)
  - 576i (PAL)

HDMI SETTINGS

Ranger supports all HDMI output modes. You can select from one of the following options:

- Auto
- RGB 8bit
- RGB 10bit
- YCbCr 4:4:4 8bit
- YCbCr 4:4:4 10bit
- YCbCr 4:2:2 10bit
- YCbCr 4:2:0 8bit
- YCbCr 4:2:0 10bit

3D LUT SETTINGS

The 3D LUT settings menu contains specific looks that can be applied to your video output that either match or simulate how the video will appear after editing, along with options for how they are overlayed on your video output (**Full** or **Split** screen). Additional color preset files can be added and saved from your computer using **Launchpad** (page 21).

- **3D LUT Presets** - Select a specific look from the list of 3D LUT presets.
- **3D LUT Mode** - Select whether the look is applied to the entire video output (**Full Screen**) or half (**Split Screen**).

TEST PATTERN

The Test Pattern menu allows you to select a video resolution format to output a test pattern over HDMI or SDI.

- **Resolutions List**   - Select a specific output resolution:
  - 4Kp - 23.98/24/25/29.97/30/50/59.94/60
  - 1080p - 23.98/24/25/29.97/30/50/59.94/60
  - 1080psf - 23.98/24/25/29.97/30
  - 1080i - 50/59.94/60
  - 720p - 50/59.94/60
  - 480p - 59.94/576p - 50 (via HDMI ports only)
  - 480i (NTSC)
  - 576i (PAL)

AUDIO SETTINGS

Configure Ranger's Audio settings. If **Beep on REC** is activated, you will hear a short tone whenever the camera begins or stops recording. The **Mute Settings** allow you to completely mute audio or only mute audio while recording.

- **Beep on REC**   - Short tone when the camera begins or stops recording
- **Mute Settings**   - Select an option:
  - Off
  - Mute while record
  - On

BLUETOOTH SETTINGS

Use the Bluetooth menu to enable or disable Bluetooth communication.

- **Enable Bluetooth**   - Allows the transmitter and receiver to be paired and communicate with the Launchpad App
- **Use Bluetooth PIN**   - Enables the use of a PIN for authentication when using the Launchpad App (*see image*)
- **Change PIN**   - Press the Menu joystick towards the right to change the Bluetooth PIN
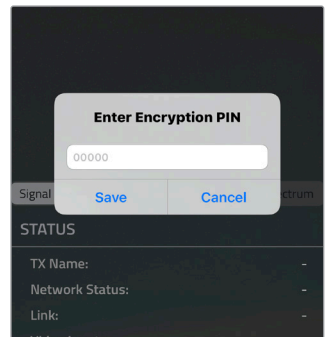
NOTE: Bluetooth is disabled by default. In order to configure your Ranger devices via the Launchpad App, you must first enable Bluetooth.

LAUNCHPAD

With Launchpad, you can configure all of your Ranger devices at once. Available as software for Windows and Mac, Launchpad allows you to pair multiple receivers to your transmitter, select frequencies, load 3D LUTs, and perform firmware upgrades.

CONFIGURATION OPTIONS

- **Pairing** - Pair or unpair your devices.
- **Settings -** Select the operating region (TX) and modify the RX/TX name.
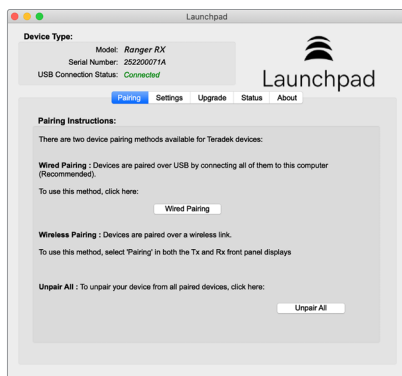- **Upgrade -** Update your devices with the latest firmware.
- **Status -** Displays detailed information about configuration and update statuses.
- **About -** Displays the software version and License Agreement.

SETTINGS

The Settings menu allows you to configure Ranger's operation parameters.

- **Select Region (TX)** - Configure Ranger to comply with your region's regulations governing use of the 5GHz spectrum. Once a region is selected, all available frequencies are enabled by default, and Ranger will automatically select an operating frequency. For all available frequencies, refer to the **FREQUENCIES BY REGION** chart on page 25. **NOTE: Pairing the TX and RX is required after a different region is selected.**
- **Select Name** - Modify the transmitter or receiver's name to make it easier to identify among other Bolt systems that are present.

UPGRADE

Teradek releases firmware updates periodically that add new features, improve performance, and fix vulnerabilities. To update Ranger, you'll need to load a firmware package into Launchpad.

Load from Web - If you have an Internet connection, click **Load from Web** to download the latest firmware package from Teradek's servers.

Load from PC - Click **Load from PC** if you have already downloaded the firmware package you wish to use. For latest firmware, visit:
https://www.teradek.com/pages/downloads#bolt4k
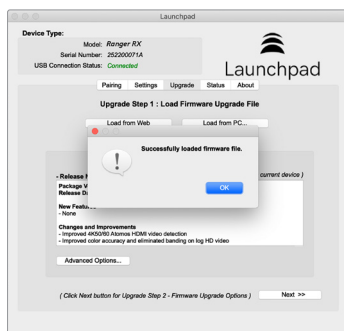
Once the firmware is loaded, and information about the package is displayed, click **Next** to proceed with the upgrade. You will then be presented with a list of device components and whether or not they are scheduled to be updated, along with two options:

Start Upgrade - Update your Ranger device(s) with the latest firmware version.

Advanced Options - View detailed version information for each component and the firmware upgrade package components. The Advanced screen also allows users to select which components to upgrade.
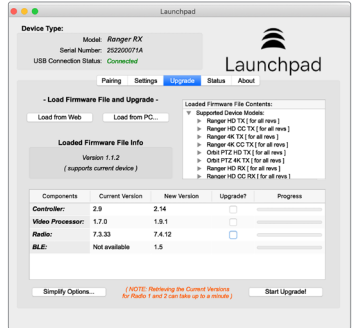
TROUBLESHOOTING/FAQ

CAN I DOWN-CONVERT FROM 4K TO HD IN ORDER TO DISPLAY VIDEO ON AN HD MONITOR?
Yes. Even if you feed the transmitter a 4K signal, you can output an HD signal from a paired receiver. Output settings are configured on the receiver (see page 14) or the Launchpad App.

WILL RANGER WORK WITH MY CURRENT BOLT?
No. Previous generation Bolts cannot communicate with Ranger. Ranger uses a different RF system along with a unique chipset not found in any of the previous generation Bolts.

DOES RANGER SUPPORT SDI METADATA/ANCILLARY DATA PASSTHROUGH?
Ranger supports a limited subset of SDI ancillary data (metadata) from certain cameras. The following data can be passed wirelessly from the transmitter to the receiver:

- Start/stop record flags
- Time code
- File/clip name (RED and ARRI cameras)
- Full metadata except for LUTs (ARRI cameras)

The following cameras are capable of transmitting SDI ancillary data, although any camera with time code embedded in the SDI signal should work:

- **RED Epic, Scarlet** - Supports time code, record start/stop, and file/clip name
- **ARRI** - Supports full metadata (except for LUTs)
- **Canon C300/C500/XF305/XF105** - Supports time code and record start/stop
- **Sony VENICE F3/F5/F55** - Supports time code and record start/stop
- **Panasonic** - Supports time code

THE LAUNCHPAD APP DOES NOT DISPLAY MY RANGER UNIT.
Ensure that both your Ranger and cellular device have Bluetooth enabled (see page 6). By default, Bluetooth is disabled on your Ranger device until you enable it.

CAN I USE ANY SDI OR HDMI CABLE WITH MY RANGER UNITS?
No. You should make sure that your SDI or HDMI cable is capable of handling **6G** or **12G** video. If using HDMI cables, it is recommended that you use an HDMI 2.0 compatible cable, and regularly check if your cables are still functional. HDMI cables are extremely delicate and repeated bending can damage the internal wiring to the point where it will no longer send a signal (especially a 4K signal).

HOW MANY RECEIVERS CAN I LINK TO ONE RANGER TRANSMITTER?

You can link up to six Ranger receivers to any one Ranger transmitter. However, In **Broadcast Mode** (see page 11), you can link an unlimited number of receivers to one transmitter.

WHAT ARE THE A/C POWER REQUIREMENTS FOR RANGER?

Ranger devices require more power than any of our previous products. When powering Ranger from an A/C outlet, use only the included A/C adapter. This A/C adapter has a higher voltage capacity that meets Ranger's increased power requirements. Lower rated A/C adapters are not supported, and using one will affect Ranger's performance and capabilities.

NOTE: These requirements only apply if you are using an A/C outlet to power on Ranger. Using a compatible battery and accessory cable as a power source will not affect Ranger's performance.

Supported A/C adapters:

- 9V 2.0A (18W)
- 12V 1.5A (18W)
- 12V 3.0A (included with Ranger)
- 12V 2.5A (30W)
- 24V 2.5A (60W)

Not supported:

- 12V 1.25A (15W)

CAN I INSTALL BATTERY PLATES ON MY RANGER UNITS MYSELF?

Yes. Recent changes to the device's chassis allows the user to assemble and install battery plates on either the receiver or transmitter. Earlier Ranger units required battery plates to be installed only by a trained technician at a Certified Teradek Repair Center. Contact Teradek to verify if your device's metal work is the latest.

FREQUENCIES BY REGION

NOTE: Pairing the TX and RX is required after a different region is selected.

Group / Bandwidth (MHz)	Freq Range 40	Freq Range 20	US (FCC) 40	US (FCC) 20	EU 40	EU 20	Canada 40	Canada 20	Japan 40	Japan 20	Australia/New Zealand 40	Australia/New Zealand 20	China/India 40	China/India 20
UNII1 (Non DFS)		5160		5160		5160						5160		
	5190	5180	5190	5180	5190	5180	5190	5180	5190	5180	5190	5180	5190	5180
		5200		5200		5200		5200		5200		5200		5200
	5230	5220	5230	5220	5230	5220	5230	5220	5230	5220	5230	5220	5230	5220
		5240		5240		5240		5240		5240		5240		5240
UNII2 (DFS)	5270	5260	5270	5260	5270	5260	5270	5260	5270	5260	5270	5260	5270	5260
		5280		5280		5280		5280		5280		5280		5280
	5310	5300	5310	5300	5310	5300	5310	5300	5310	5300	5310	5300	5310	5300
		5320		5320		5320		5320		5320		5320		5320
		5340				5340						5340		
	5510	5500	5510	5500	5510	5500	5510	5500	5510	5500	5510	5500		
		5520		5520		5520		5520		5520		5520		
	5550	5540	5550	5540	5550	5540	5550	5540	5550	5540	5550	5540		
		5560		5560		5560		5560		5560		5560		
	5590	5580	5590	5580	5590	5580		5580	5590	5580		5580		
		5600		5600		5600				5600				
	5630	5620	5630	5620	5630	5620			5630	5620				
		5640		5640		5640				5640				
	5670/5690/5710	5660	5670	5660		5660	5670	5660	5670	5660		5660		
		5680		5680	5690	5680		5680		5680	5690	5680		
		5700	5710	5700		5700		5700		5700		5700		
		5720		5720										
UNII3 (Non DFS)	5755	5745	5750	5740			5755	5745			5755	5745	5755	5745
		5765		5760				5765				5765		5765
	5795	5785	5790	5780			5795	5785			5795	5785	5795	5785
		5805		5800				5805				5805		5805
			5830	5820								5825		5825
				5840										

TECHNICAL SPECIFICATIONS

RANGER SYSTEM (4K)

	RANGER TX	RANGER RX
VIDEO		
Video Inputs	12G-SDI SMPTE 2082-1 standard/75 Ω (BNC x 1) 1x HDMI 2.0 Type-A receptacle	N/A
Video Outputs	12G-SDI SMPTE 2082-1 standard/75 Ω (BNC x 1)	12G-SDI SMPTE 2082-1 standard/75 Ω (BNC x 1) 1x HDMI 2.0 Type-A receptacle
Color Sampling	**SDI:** YCbCr 4:2:2, 10-bit **HDMI:** RGB 4:4:4, 8-bit | YCbCr 4:2:2, 10-bit	**SDI:** YCbCr 4:2:2, 10-bit **HDMI:** RGB 4:4:4, 8-bit | YCbCr 4:2:2, 10-bit
Delay (TX to RX)	<0.001sec (without format conversions)	<0.001sec (without format conversions)
Supported Resolutions	4Kp23.98/24/25/29.97/30/50/59.94/60 1080p 23.98/24/25/29.97/30/50/59.94/60 1080psf23.98/24/25/29.97/30 1080i50/59.94/60 720p50/59.94/60 480p59.94/576p50 (via HDMI ports only) 480i (NTSC)/576i (PAL)	
Input Cross Conversion	Yes, HDMI to SDI	N/A
Output Video Scaling	N/A	Yes, Framerate and Resolution Scaling
VIDEO PROCESSING		
Video Compression	Uncompressed	Uncompressed
Test Pattern Generator	N/A	Yes
Video Format Conversion Support	Yes	Yes
Spectrum Analyzer	Yes (via Launchpad App)	Yes
AUDIO		
Audio Compression	48kHz 24-bit PCM	48kHz 24-bit PCM
Audio Input	Embedded SDI/HDMI Audio Input (2 channel)	N/A
Audio Output	N/A	Embedded SDI/HDMI Audio Input (2 channel)
PHYSICAL ATTRIBUTES		
Dimensions	5.9" x 3.6" x 1.2" (149 x 91 x 30mm)	5.5" x 5.3" x 1.2" (140 x 133 x 30mm)
Weight	19.1oz (544g)	23.2oz (658g)
Construction	Milled aluminum (chassis), regulation-compliant PCB	Milled aluminum (chassis), regulation-compliant PCB

	RANGER TX	RANGER RX
INTERFACES		
Configuration Interface	OSD Screen with Menu Joystick Navigation	OSD Screen with Menu Joystick Navigation
Switches	On/Off Switch	On/Off Switch
Desktop App	Launchpad application for OSX & Windows	Launchpad application for OSX & Windows
Mobile App	Launchpad app (iOS and Android) configuration via Bluetooth	Launchpad app (iOS and Android) configuration via Bluetooth
USB Interface	Upgrade via Micro-USB	Upgrade via Micro-USB
Bluetooth Compatibility	Bluetooth 5 LE	Bluetooth 5 LE
NETWORK		
Wireless	**Licensed Frequencies*:** 4.850 ~ 5.150 GHz 5.350 ~ 5.470 GHz 5.850 ~ 5.925 GHz **Unlicensed Frequencies:** 5.150 ~ 5.250 GHz (**Non-DFS**) 5.250 ~ 5.350 GHz (**DFS**) 5.470 ~ 5.725 GHz (**DFS**) 5.725 ~ 5.850 GHz (**Non-DFS**) **By using this product in the licensed frequencies, you acknowledge and agree to comply with all applicable regulations and rules, and to only operate this system in compliance with the applicable license requirements.*	
RF Channel Selection	Auto, Manual (Manual available for non-DFS, DFS and Licensed Frequencies)	Auto, Manual (Manual available for non-DFS, DFS and Licensed Frequencies)
Encryption	AES-256, RSA-1024 key exchange	AES-256, RSA-1024 key exchange
RF power	21 dbm	18 dbm
Antennas	**1**x Horizontal N-Type 2dbi antenna **1**x Vertical N-Type 2dbi antenna	3x Vertical 2dbi antennas 2x Horizontal 2dbi antennas
Range	Up to 5000 ft line of sight (using Panel Antenna)	
Noise Rejection	Can coexist with WiFi and 5GHz cordless phones, Can operate up to 6 sets in same location	Can coexist with WiFi and 5GHz cordless phones, Can operate up to 6 sets in same location
POWER		
Power Input	2-Pin Circular locking connector 7-28 VDC	2-Pin Circular locking connector 7-28 VDC
Nominal Power Consumption	19 Watts	15 Watts
Operating Temperature	0~40 deg-C	0~40 deg-C
GENERAL		
Mountability	Integrated Gold or V Battery Mount, Multiple mounting options with M3, 3/8" and 1/4-20" holes	Integrated Gold or V Battery Mount, Multiple mounting options with M3, 3/8" and 1/4-20" holes

TECHNICAL SPECIFICATIONS

RANGER SYSTEM (HD)

	RANGER TX	RANGER RX
VIDEO		
Video Inputs	3G-SDI SMPTE 2082-1 standard/75 Ω, 1x HDMI 2.0 Type-A receptacle	N/A
Video Outputs	3G-SDI SMPTE 424M standard/75 Ω (BNC x 1)	3G-SDI SMPTE 424M standard/75 Ω (BNC x 2) 1 x HDMI 2.0 Type-A receptacle
Color Sampling	**SDI:** YCbCr 4:2:2, 10-bit **HDMI:** RGB 4:4:4, 8-bit | YCbCr 4:2:2, 10-bit	**SDI:** YCbCr 4:2:2, 10-bit **HDMI:** RGB 4:4:4, 8-bit | YCbCr 4:2:2, 10-bit
Delay (TX to RX)	<0.001sec (without format conversions)	<0.001sec (without format conversions)
Supported Resolutions	1080p 23.98/24/25/29.97/30/50/59.94/60 1080psf23.98/24/25/29.97/30 1080i50/59.94/60 720p50/59.94/60 480p59.94/576p50 (via HDMI ports only) 480i (NTSC)/576i (PAL)	
Input Cross Conversion	Yes, HDMI to SDI	N/A
Output Video Scaling	N/A	Yes, Framerate and Resolution Scaling
VIDEO PROCESSING		
Video Compression	Uncompressed	Uncompressed
Test Pattern Generator	N/A	Yes
Video Format Conversion Support	Yes	Yes
Spectrum Analyzer	Yes (via Launchpad App)	Yes
AUDIO		
Audio Compression	48kHz 24-bit PCM	48kHz 24-bit PCM
Audio Input	Embedded SDI/HDMI Audio Input (2 channel)	N/A
Audio Output	N/A	Embedded SDI/HDMI Audio Input (2 channel)
PHYSICAL ATTRIBUTES		
Dimensions	5.9" x 3.6" x 1.2" (149 x 91 x 30mm)	5.5" x 5.3" x 1.2" (140 x 133 x 30mm)
Weight	19.1oz (544g)	23.2oz (658g)
Construction	Milled aluminum (chassis), regulation-compliant PCB	Milled aluminum (chassis), regulation-compliant PCB

	RANGER TX	RANGER RX
INTERFACES		
Configuration Interface	OSD Screen with Menu Joystick Navigation	OSD Screen with Menu Joystick Navigation
Switches	On/Off Switch	On/Off Switch
Desktop App	Launchpad application for OSX & Windows	Launchpad application for OSX & Windows
Mobile App	Launchpad app (iOS and Android) configuration via Bluetooth	Launchpad app (iOS and Android) configuration via Bluetooth
USB Interface	Upgrade via Micro-USB	Upgrade via Micro-USB
Bluetooth Compatibility	Bluetooth 5 LE	Bluetooth 5 LE
NETWORK		
Wireless	**Licensed Frequencies*:** 4.850 ~ 5.150 GHz 5.350 ~ 5.470 GHz 5.850 ~ 5.925 GHz **Unlicensed Frequencies:** 5.150 ~ 5.250 GHz (**Non-DFS)** 5.250 ~ 5.350 GHz (**DFS**) 5.470 ~ 5.725 GHz (**DFS**) 5.725 ~ 5.850 GHz (**Non-DFS)** **By using this product in the licensed frequencies, you acknowledge and agree to comply with all applicable regulations and rules, and to only operate this system in compliance with the applicable license requirements.*	
RF Channel Selection	Auto, Manual (Manual available for non-DFS, DFS and Licensed Frequencies)	Auto, Manual (Manual available for non-DFS, DFS and Licensed Frequencies)
Encryption	AES-256, RSA-1024 key exchange	AES-256, RSA-1024 key exchange
RF power	21 dbm	18 dbm
Antennas	**1**x Horizontal N-Type 2dbi antenna **1**x Vertical N-Type 2dbi antenna	3x Vertical 2dbi antennas 2x Horizontal 2dbi antennas
Range	Up to 1500 ft line of sight	
Noise Rejection	Can coexist with WiFi and 5GHz cordless phones, Can operate up to 6 sets in same location	Can coexist with WiFi and 5GHz cordless phones, Can operate up to 6 sets in same location
POWER		
Power Input	2-Pin Circular locking connector 7-28 VDC	2-Pin Circular locking connector 7-28 VDC
Nominal Power Consumption	19 Watts	15 Watts
Operating Temperature	0~40 deg-C	0~40 deg-C
GENERAL		
Mountability	Integrated Gold or V Battery Mount, Multiple mounting options with M3, 3/8" and 1/4-20" holes	Integrated Gold or V Battery Mount, Multiple mounting options with M3, 3/8" and 1/4-20" holes

4K ARRAY ANTENNA

WIRELESS

Frequency Range	5.1 - 5.8 GHz
Gain	14 and 16dBi
Protocol Support	802.11n MIMO standard
Polarization	2x Horizontal and 5x Vertical for polarization.
Beam-width deg horizontal	38°
Beam-width deg vertical	38°
VSWR	<1,8
Impedance	50 ohm
Front to back ratio	> 35 dB

PHYSICAL ATTRIBUTES

Dimensions	13.78 x 13.78 x 1.25 in (35 x 35 x 3.18 cm)
Weight	39oz [1111.3g]
Construction	UV-protected plastic with aluminum alloy (construction grade)
Connectors	RP-SMA
Operating temperature	-40°C to 80°C

REGULATORY INFORMATION

PRODUCT INFORMATION

This product is designed to be compliant with rules and regulations in the country it is sold to and therefore is marked as required. These markings signify the countries the device is approved in. Operating the product without regulatory approval is illegal. Any changes or modifications to the product not expressly approved by Teradek could void the user's authority to operate the equipment and its regulatory approvals. Please make sure you use the latest revision of this document which is available at https://teradek.com.

⚠ SAFETY INSTRUCTIONS

- Keep these instructions in a safe and accessible place for future use.
- When operating this equipment, read and follow all the instructions in this manual.
- Do not open the unit.
- Do not block the air ventilation openings, and provide proper ventilation for the units to allow it to cool down during operation.
- Use only accessories/batteries/chargers specified or recommended by Teradek.
- When devices are switched ON, keep away at least 20 cm (7.9 in) from your body.
- People with pacemakers should **ALWAYS** keep the device at the listed distance from their pacemaker when turned ON. Should you have any reason to suspect that interference is taking place, you should turn your device OFF.
- Do not expose to moisture, excessive heat or fire.
- Keep away from water and other liquids.
- Clean with a dry cloth only.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- To reduce the risk of fire or electric shock, refer servicing to qualified service personnel.
- Declared maximum operating temperature: +40°C
- Please avoid electrostatic discharge from the antenna ports for proper operation

⚠ WARNING

Ranger devices contain sensitive electronic components that can be damaged by electrostatic discharge (ESD). When handling, care must be taken so that the device is not damaged. Damage due to inappropriate handling is not covered by the warranty. For complete warranty information, please see the warranty card that arrived with the device, or visit **www.teradek.com/pages/warranty-information.**

ANTENNA

The product is provided with an approved antenna. Use only supplied or approved antennas by Teradek. Any changes or modifications to the antenna may void the regulatory approvals obtained for the product.

⚠ USING THE AC POWER ADAPTER

- All components must be dry before connecting to an external power source
- Use ONLY a UL/IEC 62368 or UL/IEC 60950-1 2nd revision approved AC/DC power adapter class LPS with electrical output ratings range of 6-28 V DC, 3A, with ambient temperature range of 0°C to 40°C.
- Use of an alternative AC/DC power adapter will invalidate any approvals given to this unit and may be dangerous.

⚠ BATTERY

This device is not supplied with batteries. In case a battery is used, please adhere to the following general battery usage guidelines:

- Use batteries with the rated voltage and current characteristics as listed in the manual.
- Use IEC 62133 approved lithium batteries such as the **Anton Bauer Digital Battery (Dionic XT 150/Dionic XT 90).**
- Verify battery temperature is within the range specified.
- Do not use incompatible/incorrect batteries. Use of an incompatible battery may present a risk of fire, explosion, leakage, or other hazard.
- Severe impact from dropping any battery-operated device on a hard surface could cause the battery to overheat.

RF MODULES

These devices contain the following approved radio modules:

DEVICE	DESCRIPTION	IC	FCC ID
AMN41012	HD Video Transmitter	7680A-AMN41012	VQSAMN41012
AMN42012	HD Video Receiver	7680A-AMN42012	VQSAMN42012
2832	BT Module	4492A-2832	HSW2832

RF EXPOSURE

The product complies with internationally recognized standards covering human exposure to electromagnetic fields from radio devices. To satisfy local RF exposure regulation requirements, the transmitting product must operate with a minimum separation distance of 20 cm or more from a person's body.

FCC RF EXPOSURE STATEMENT

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

IC RADIATION EXPOSURE STATEMENT
Important Note: Radiation Exposure Statement
This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Note Importante: Déclaration d'exposition aux radiations
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Antenna Information

The radio transmitters **7680A-AMN41012 (HD Transmitter), 7680A-AMN42012 (HD Receiver), and 4492A-2832 (BT Module)** have been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device. Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Informations sur l'antenne

Les présent émetteur radios **7680A-AMN41012 (HD Transmitter), 7680A-AMN42012 (HD Receiver), and 4492A-2832 (BT Module)** ont été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur. Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

MODULES IC	ANTENNA	MAX. PERMISSIBLE GAIN	LOCATION	ANTENNA IMPEDANCE
7680A-AMN41012	Dipole	2dBi Typical at 5GHz	External	50Ω
7680A-AMN41012	Dipole	5dBi Typical at 5GHz	External	50Ω
7680A-AMN42012	Dipole	2dBi Typical at 5GHz	External	50Ω
7680A-AMN42012	Printed	11dBi typical at 5GHz	External	50Ω
4492A-2832	Internal antenna		Internal	

UNINTENTIONAL RADIO INTERFERENCE

FCC COMPLIANCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment complies with **Part 15** of the FCC rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

IC COMPLIANCE STATEMENT - CAN ICES-3 (A)/NMB-3 (A)

This device complies with the Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RADIO TRANSMITTERS

FCC STATEMENT

Radio Transmitters (Part 15) – Class A Digital Devices

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

IC STATEMENT

This device complies with RSS-247 of the Industry Canada Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Ce dispositif est conforme à la norme CNR-247 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes:

1. Le dispositif ne doit pas produire de brouillage préjudiciable, et
2. Ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

IC STATEMENT - OPERATION AT 5GHZ RANGE

Caution:

1. The device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
2. Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.
3. The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
4. The maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.

Avertissement:

1. Les dispositifs fonctionnant dans la bande 5 150-5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
2. De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5 250-5 350 MHz et 5 650-5 850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.
3. Le gain d'antenne maximum autorisé pour les appareils fonctionnant sous les bandes de fréquences 5250-5350 MHz et 5470-5725 MHz doit être tel que l'équipement est toujours conforme à la limite PIRE;
4. Le gain d'antenne maximum autorisé pour les appareils fonctionnant sous les bandes de fréquences 5725-5850 MHz doit être tel que l'équipement est toujours conforme à la limite PIRE spécifiée pour un fonctionnement point à point et non point à point, le cas échéant.

EC DECLARATION OF CONFORMITY

This equipment may be operated in all EU countries with the following restrictions:

• 5.15-5.35GHz frequencies for indoor use only

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

English: Waste electrical and electronic equipment should not be disposed of with household waste. Please recycle where facilities exist. Check with your local authority or retailer for recycling advice.

Français: Déchets d'équipements électriques et électroniques ne doit pas être jeté avec les ordures ménagères. S'il vous plaît recycler où les installations existent. consultez auprès de votre autorité locale ou le détaillant pour obtenir des conseils de recyclage.

Deutsch: Elektro- und Elektronik-Altgeräte dürfen nicht mit dem Hausmüll entsorgt werden. Bitte recyceln, wo Anlage vorhanden sind. Beraten Sie sich bei Ihren lokale Behörde oder händler über Recycling information.

SUPPORT RESOURCES

In addition to this Reference Guide, you can find more information on Ranger devices' features and operation by visiting **www.teradek.com**. If you are unable to find what you need online, please contact Teradek's support staff.
E-mail: **support@teradek.com** | Phone: (888) 941-2111 ext. 2 (available M-F 7am-6pm PST)

DISCLAIMER

This manual is intended for user information only. Every effort has been made to ensure that the contents within are accurate at the time of printing, and that updates are made in a timely manner. Teradek cannot be held responsible for inaccuracies, typographical errors, or out-of-date information contained within this manual.