Spektrum AR6250 User Guide

Spektrum's AR6250 6-channel full range receiver is designed for installations in compact airplanes constructed of carbon fiber. Carbon fiber can create an RF shielding effect that can significantly reduce radio range when using conventional receivers and antennas. The AR6250 features an antenna design that overcomes RF issues in these critical environments.

Compatibility

The AR6250 receiver features DSM2™ technology and is compatible with all Spektrum™ and JR® aircraft radios that support DSM2 technology including:

    JR12X
    JRX9303
    Spektrum DX7
    Spektrum DX6i
    Spektrum DX5e
    Spektrum Module Systems

Note: The AR6250 receiver is not compatible with the Spektrum DX6 parkflyer transmitter.

Features
- 6-channel receiver optimized for carbon fiber fuselage installations
- Compact endpin design is ideal for F5D and hand launch sailplanes with small cross sections
- Offers superior RF coverage with through-the-fuselage feeder antennas
- Includes one internal receiver with two 4-inch (101mm) feeder antennas
- Red LED indicates number of holds
- Preset failsafe system on throttle aileron and elevator optimized for sailplane and F5D applications
- QuickConnect™ with Brownout Detection

Applications
Compact airplanes with carbon structure including:
- Carbon/ Composite F5D electrics
- Carbon hand launch and DLH gliders
- Carbon Hot-liners
- Compact aircraft with significant conductive materials (carbon, aluminum or other metals) that could weaken the signal

Specifications
   Type: DSM2 Full Range receiver for carbon aircraft
        Channels: 6
        Modulation: DSM2
        Dimensions: 35mm x 18mm x 10mm
        Weight: 4 grams
        Voltage Range: 3.5 to 9.6
        Resolution: 1024
        Compatibility: All DSM2 aircraft transmitters

Receiver Installation
Airplanes with significant carbon fiber construction can create an RF shielding effect, reducing range. The AR6250 is designed to overcome these critical RF issues in carbon airplanes by outfitting the aircraft with two external antennas at specific points that will ensure secure RF coverage from all angles of the aircraft.

Feeder Antennas
The AR6250 incorporates two feeder antennas, which are designed to be easily mounted through the fuselage in carbon airplanes. The receiver has two 4-inch feeder antennas. Each feeder antenna includes a coaxial portion (which can be thought of as an extension) and an exposed 31mm tip antenna. The last 31mm is the active portion of the antenna.


31mm   70mm
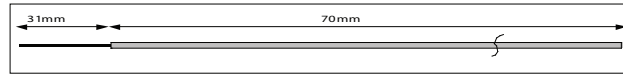
Red LED Hold Indicator
The AR6250 features a red LED (labeled with H) that indicates the number of holds that have occurred since the receiver was last powered on. The LED will flash the number of holds then pause (e.g., flash, flash, flash, pause, flash, flash, flash, pause indicates three holds occurred since the receiver was last turned on). Note that holds are reset to zero when the receiver is turned off. During the first flights of a new airplane, it's recommended to check the red LED hold indicator. If it's flashing, it's important to optimize the installation (move or reposition antennas) until no hold occurs. On later flights, the LED Hold Indicator can be used to confirm RF link performance.

Step 1. Identifying the Type of Carbon Aircraft
While some Hand Launch Gliders and F5D airplanes are full carbon construction, many only use carbon in areas that require extra strength. Some of the latest aircraft are constructed with 2.4GHz friendly fuselages, meaning that the forward section of the fuselage is constructed from non-conductive materials like fiberglass and Kevlar that don't affect RF. The first step in a proper installation is identifying the type of fuselage.
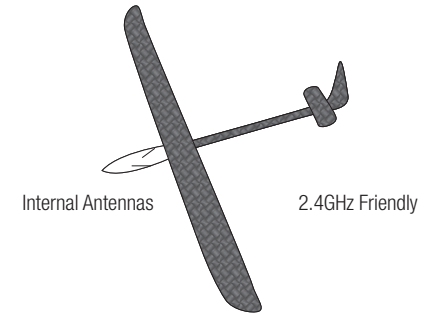
A- Full Carbon
All components of the airplane including the entire fuselage, the wing and tail are constructed of carbon fiber or have a carbon fiber weave throughout the aircraft.


External Antennas   Full Carbon
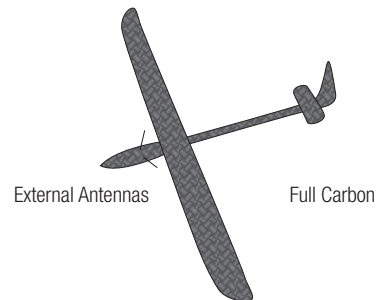
B- 2.4GHz Friendly Fuselage
The section forward of the wing is constructed of non-conductive materials like fiberglass, Kevlar, etc. but the wing and possibly the tail section have carbon or carbon weave construction.

Internal Antennas   2.4GHz Friendly

Step 2. Determining Antenna Mounting Positions
After determining which type of aircraft from the list above, use the above illustrations as a guideline as to where the feeder antennas should be mounted. Note that full carbon aircraft requires externally mounted antennas while the 2.4GHz-friendly fuselage can have the antennas mounted internally. The goal is to mount the antennas in a location so that at least one will always be in the RF visual line of sight of the transmitter (e.g. not blocked by carbon fiber structures) in all attitudes. This can easily be visualized by having a helper stand about 20 feet away and rotate the airplane in all attitudes confirming that in all positions there is a direct line between you and at least one receiver antenna that isn't blocked by carbon fiber structure.
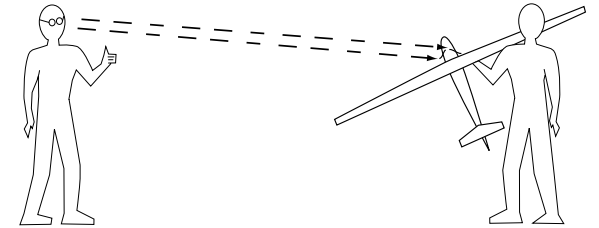
Step 3. Installing the Receivers
Install the receiver in the normal position recommended by the airplane's manufacturer. Double-sided tape or foam can be used to secure the main receiver in place.

Step 4. Mounting the Antennas

To install the antennas; drill a 1/16-inch hole in the desired antenna mounting position.

Slide the feeder antenna through the hole until the 31mm tip, and about 2mm of coaxial, completely exit the fuselage. Using a drop of CA, glue the antenna to the fuselage making sure that the 31mm active portion of the antenna tip is fully exposed.

Note: If the antenna is to be mounted internally (in the front of a 2.4GHz fuse), the coaxial can be taped into position. Be sure the 31mm tip is located at least 2 inches from any significant carbon structure.

Step 5. Plugging in the Servo Leads

Plug the servo leads into the appropriate servo ports in the receiver, noting the polarity of the servo connector. Consult your radio's manual for specific details as to which servo plugs into which servo port channel.

Step 6. Binding the Receiver

The AR6250 must be bound to the transmitter before it will operate. Binding is the process of teaching the receiver the specific code of the transmitter so it will only connect to that specific transmitter.

1. To bind an AR6250 to a DSM2 transmitter, insert the bind plug in the BATT/BIND port on the receiver.
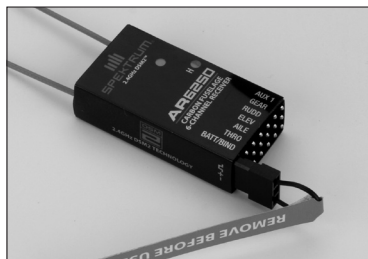
2. Power the receiver through any other port. Note that the orange LED on the receiver should be flashing, indicating that the receiver is in bind mode and ready to be bound to the transmitter.

3. Move the sticks and switches on the transmitter to the desired failsafe positions for the throttle, elevator and aileron channels.

4. Follow the procedures of your specific transmitter to enter Bind Mode; the system will connect within a few seconds. Once connected, the orange LED on the receiver will go solid indicating the system is connected.

5. Remove the bind plug from the BATT/BIND port on the receiver before you power off the transmitter and store it in a convenient place.

IMPORTANT: Remove the bind plug to prevent the system from entering bind mode the next time the power is turned on.

Step 7. Radio Setup and Programming

Following the instructions in your radio manual, program your airplane.

Step 8. Rebinding the Receiver

After you've programmed your model, it's important to rebind the system so the true failsafe control surface positions are set.

Step 9. Ground Range Testing and Verification Red LED

Advanced Range Testing

In airplanes that have significant carbon fiber construction, it is imperative to first do an advanced ground range check. This ground range check will confirm that the receiver is operating optimally and that the antennas are properly mounted in a position that will give positive RF coverage in all attitudes. This advanced range check allows the RF performance of the receiver and the positions of each antenna to be verified and to optimize the locations of the antennas.

Advanced Range Test

1. Turn on the system (Tx and Rx).
2. Have a helper hold your aircraft while observing the red LED (labeled with H) located on the receiver.
3. Standing 30 paces away from the model, face the model with the transmitter in your normal flying position and put your transmitter into range test mode. This causes reduced power output from the transmitter.
4. Have your helper position the model covering all orientations (nose up, nose down, nose toward the Tx, nose away from the Tx, etc.) while watching the red LED, noting any correlation between the aircraft's orientation and when holds

occur. Do this for one minute. The timer on the transmitter can be used here.
5. After one minute, release the range test button. A successful installation will yield the following: no holds, no flashing red LED.

If any holds occur redo the test, noting the orientation of the aircraft when the holds occur. This will allow you to change and optimize the antenna position(s) to a better location.

Step 10. Short Test Flight Verification with Hold Indicator

When the system tests successfully, it's time for a short near test flight. This first flight should be close (in less than 200 feet) and about five minutes or less. After the flight, land near yourself and check that no holds occurred. A successful flight will result in 0 holds. Extend the flight distance and times, checking the Hold data after every flight until you are confident with the results.

IMPORTANT: Y-Harnesses and Servo Extensions

When using Y-harness or servo extensions, it's important to use standard non-amplified Y-harnesses and servo extensions as they can/will cause the servos to operate erratically or not function at all. Amplified Y-harnesses were developed several years ago to boost the signal for some older PCM systems and should not be used with Spektrum equipment. Note that when converting an existing model to Spektrum, be certain that all amplified Y-harnesses and/or servo extensions are replaced with conventional non-amplified versions.

Preset Failsafe

The AR6250 features preset failsafe only on throttle, aileron and elevator channels. Preset failsafe is ideal for sailplanes, allowing the aircraft to automatically dethermalize if the signal is lost. With preset failsafe, the throttle, aileron and elevator channels go to their preset failsafe positions if the signal is lost, preventing a flyaway.

Receiver Power Only

• When the receiver only is turned on (no transmitter signal is present), all channels have no output signal, to avoid overdriving the servos and linkages.

Note: Some analog servos may drift slightly during power-up even though no signal is present. This is normal.

After Connection

• When the transmitter is turned on and after the receiver connects to the transmitter, normal control of all channels occurs.
• After the system makes a connection, if loss of signal occurs Preset Failsafe drives the throttle, aileron and elevator servos to their preset failsafe position set during binding.

Receiver Power System Requirements

Inadequate power systems that are unable to provide the necessary minimum voltage to the receiver during flight have become the number one cause of in-flight failures. Some of the power system components that affect the ability to properly deliver adequate power include:

• Receiver battery pack (number of cells, capacity, cell type, state of charge)
• The switch harness, battery leads, servo leads, regulators, etc.

- The BEC used in the speed controller won't support the current required by the servos.

The AR6250 has a minimum operational voltage of 3.5 volts; it is highly recommended the power system be tested per the guidelines below.

Recommended Power System Test Guidelines
If a questionable power system is being used (e.g. a small or old battery that may not support high-current draw, etc.), it is recommended that a voltmeter be used to perform the following test.

Note: The Spektrum Flight Log (SPM9540) is the perfect tool to monitor voltage in the test below. The Flight Log is not compatible with the AR6250 for recording flight data.

Plug the Flight Log into an open channel port in the receiver and with the system on, load the control surfaces (apply pressure with your hand) while monitoring the voltage at the receiver. The voltage should remain above 4.8 volts even when all servos are heavily loaded.

Note: The latest generations of Nickel-Metal Hydride batteries incorporate a new chemistry mandated to be more environmentally friendly. These batteries, when charged with peak detection fast chargers, have tendencies to false peak (not fully charge) repeatedly. These include all brands of NiMH batteries. If using NiMH packs, be especially cautious when charging, making absolutely sure that the battery is fully charged. It is recommended to use a charger that can display total charge capacity. Note the number of mAh put into a discharged pack to verify it has been charged to full capacity.

QuickConnect™ With Brownout Detection
Your AR6250 features QuickConnect with Brownout Detection.

- Should an interruption of power occur (brownout), the system will reconnect immediately when power is restored (QuickConnect).
- The orange LED on the receiver will flash slowly indicating a power interruption (brownout) has occurred.
- Brownouts can be caused by an inadequate power supply (weak battery or regulator), a loose connector, a bad switch, an inadequate BEC when using an electronic speed controller, etc.
- Brownouts occur when the receiver voltage drops below 3.5 volts thus interrupting control as the servos and receiver require a minimum of 3.5 volts to operate.

How QuickConnect With Brownout Detection Works
- When the receiver voltage drops below 3.5 volts the system drops out (ceases to operate).
- When power is restored the receiver immediately attempts to reconnect to the last two frequencies that it was connected to.
- If the two frequencies are present (the transmitter was left on) the system reconnects typically in about a fraction of a second.

QuickConnect with Brownout Detection is designed to allow you to fly safely through most short-duration power interruptions; however, the root cause of these interruptions must be corrected before the next flight to prevent catastrophic safety issues.

Note: If a brownout occurs in flight, it is vital that the cause of the brownout be determined and corrected.

ModelMatch™
Some Spektrum and JR transmitters offer a feature called ModelMatch that prevents the possibility of operating a model using the wrong model memory, potentially preventing a crash. With ModelMatch, each model memory has its own unique code (GUID) and during the binding process the code is programmed into the receiver. Later, when the system is turned on, the receiver will only connect to the transmitter if the corresponding model memory is programmed onscreen.

Note: If at any time you turn on the system and it fails to connect, check to be sure the correct model memory is selected in the transmitter. Please note that the Spektrum Aircraft Modules do not have ModelMatch.

Tips On Using 2.4GHz
While your DSM equipped 2.4GHz system is intuitive to operate, functioning nearly identically to 72MHz systems, following are a few common questions from customers.

1. Q: Which do I turn on first, the transmitter or the receiver?

   A: If the receiver is turned on first—all channels have no output pulses. When the transmitter is then turned on, the transmitter scans the 2.4GHz band and acquires two open channels. Then the receiver that was previously bound to the transmitter scans the band and finds the GUID (Globally Unique Identifier code) stored during binding. The system then connects and operates normally.

   If the transmitter is turned on first—the transmitter scans the 2.4GHz band and acquires two open channels. When the receiver is then turned on for a short period (the time it takes to connect) all channels have no output pulses. The receiver scans the 2.4GHz band looking for the previously stored GUID. When it locates the specific GUID code, it confirms the uncorrupted repeatable packet information, the system connects and normal operation takes place. Typically this takes 2 to 6 seconds.

2. Q: Sometimes the system takes longer to connect and sometimes it doesn't connect at all?

   A: In order for the system to connect (after the receiver is bound) the receiver must receive a large number of consecutive uninterrupted perfect packets from the transmitter. This process is purposely critical of the environment ensuring that it's safe to fly when the system does connect. If the transmitter is too close to the receiver (less than 4 feet) or if the transmitter is located near metal objects (metal Tx case, the bed of a truck, the top of a metal work bench, etc.), connection will take longer and in some cases connection will not occur as the system is receiving reflected 2.4GHz energy from itself and is interpreting this as unfriendly noise. Moving the system away from metal objects or moving the transmitter away from the receiver and powering the system again will cause

a connection to occur. This only happens during the initial connection. Once connected, the system is locked in and should a loss of signal occur (failsafe), the system connects immediately when the signal is regained.

3. Q: I've heard that the DSM system is less tolerant of low voltage. Is this correct?

   A: All DSM receivers have an operational voltage range of 3.5 to 9.6 volts. With most systems this is not a problem as, in fact, most servos cease to operate at around 3.8 volts. When using multiple high-current draw servos with a single or inadequate battery/ power source, heavy momentary loads can cause the voltage to dip below this 3.5-volt threshold thus causing the entire system (servos and receiver) to brown out. When the voltage drops below the low voltage threshold (3.5 volts), the DSM receiver must reboot (go through the startup process of scanning the band and finding the transmitter) and this can take several seconds. Please read the receiver power requirement section as this explains how to test for and prevent this occurrence.

4. Q: Sometimes my receiver loses its bind and won't connect requiring rebinding. What happens if the bind is lost in flight?

   A: The receiver will never lose its bind unless it's instructed to. It's important to understand that during the binding process the receiver not only learns the GUID (code) of the transmitter, but the transmitter learns and stores the type of receiver that it's bound to. If the transmitter is placed into bind mode, the transmitter looks for the binding protocol signal from a receiver. If no signal is present, the transmitter no longer has the correct information to connect to a specific receiver and in essence the transmitter has been "unbound" from the receiver. We've had several DX7 customers that use transmitter stands or trays that unknowingly depress the bind button and the system is then turned on, losing the necessary information to allow the connection to take place. We've also had DX7 customers that didn't fully understand the range test process and pushed the bind button before turning on the transmitter also causing the system to "lose its bind."

Warranty Period

Exclusive Warranty- Horizon Hobby, Inc., (Horizon) warranties that the Products purchased (the "Product") will be free from defects in materials and workmanship for a period of 1 year from the date of purchase by the Purchaser.

Limited Warranty

(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(b) Limitations- HORIZON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than Horizon. Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

Damage Limits

HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

Law: These Terms are governed by Illinois law (without regard to conflict of law principals).

Safety Precautions

This is a sophisticated hobby Product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the Product or other property. This Product is not intended for use by children without direct adult supervision. The Product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

Questions, Assistance, and Repairs

Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the Product has been started, you must contact Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please direct your email to productsupport@horizonhobby.com, or call 877.504.0233 toll free to speak to the Product Support department.

Inspection or Repairs

If this Product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the Product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as Horizon is not responsible for merchandise until it arrives and is accepted at our facility. A Service Repair Request is available at www.horizonhobby.com on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

Warranty Inspection and Repairs

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

Non-Warranty Repairs

Should your repair not be covered by warranty the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. Please note: non-warranty repair is only available on electronics and model engines.

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822

All other Products requiring warranty inspection or repair should be shipped to the following address:

Horizon Product Support
4105 Fieldstone Road
Champaign, Illinois 61822

Please call 877-504-0233 or e-mail us at productsupport@horizonhobby.com with any questions or concerns regarding this product or warranty.

European Union:

Electronics and engines requiring inspection or repair should be shipped to one of the following addresses:

Horizon Hobby UK
Units 1-4 Ployters Rd
Staple Tye, Harlow
Essex CM18 7NS
United Kingdom

Please call +44 (0) 1279 641 097 or email sales@horizonhobby.co.uk with any questions or concerns regarding this product or warranty.

Horizon Technischer Service
Hamburger Str. 10
25335 Elmshorn
Germany

Please call +49 4121 46199 66 or email service@horizonhobby.de with any questions or concerns regarding this product or warranty.

FCC Information

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.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This product contains a radio transmitter with wireless technology which has been tested and found to be compliant with the applicable regulations governing a radio transmitter in the 2.400GHz to 2.4835GHz frequency range.

CE Compliance information for the European Union

Instructions for Disposal of WEEE by Users in the European Union

This product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

Declaration of Conformity

(in accordance with ISO/IEC 17050-1)

No. HH20090109

Product(s):   Spektrum AR6250 Receiver
Item Number(s):   SPMAR6250

Equipment class: 1

The objects of declaration described above are in conformity with the requirements of the specifications listed below, following the provisions of the European R&TTE directive 1999/5/EC:

EN 301 489-1 v.1.6.1   General EMC requirements for Radio equipment
EN 301 489-17 v.1.2.1

Signed for and on behalf of:
Horizon Hobby, Inc.
Champaign, IL USA
Jan 9, 2009

Steven A. Hall
Vice President
International Operations and Risk Management
Horizon Hobby, Inc.