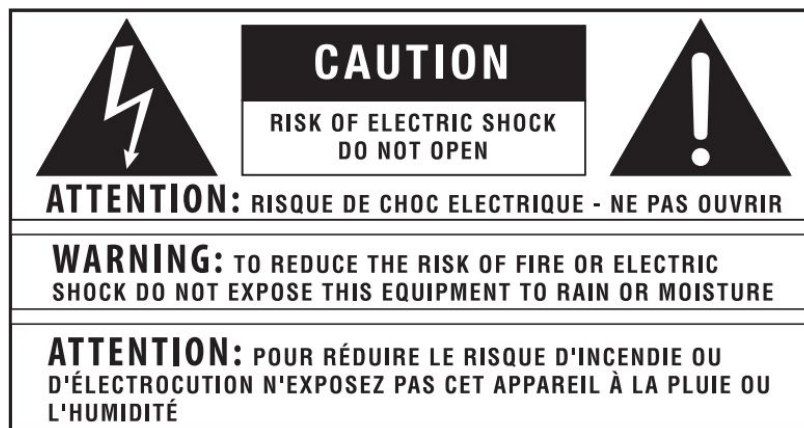


SAFETY WARNING



The symbols shown above are internationally accepted symbols that warn of potential hazards with electrical products. The lightning flash with arrowpoint in an equilateral triangle means that there are dangerous voltages present within the unit. The exclamation point in an equilateral triangle indicates that it is necessary for the user to refer to the owner's manual.

These symbols warn that there are no user serviceable parts inside the unit. Do not open the unit. Do not attempt to service the unit yourself. Refer all servicing to qualified personnel. Opening the chassis for any reason will void the manufacturer's warranty. Do not get the unit wet. If liquid is spilled on the unit, shut it off immediately and take it to a dealer for service. Disconnect the unit during storms to prevent damage.

WARNING FOR YOUR PROTECTION READING THE FOLLOWING:

READ THESE INSTRUCTIONS

KEEP THESE INSTRUCTIONS

HEED ALL WARNINGS

FOLLOW ALL INSTRUCTIONS

INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS is damaged

ONLY USE ATTACHMENTS/ACCESSORIES SPECIFIED BY THE MANUFACTURER.

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

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, does not operate normally, or has been dropped.

“Changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment”.

NOTE: 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.

Radar Safety and Transmit Exposure

The Fortem TrueView radar is an electronic device that produces radio frequency (RF) emissions to perform RADIO Detection And Ranging (RADAR). Care should be taken to ensure two safety factors:

1. Personnel safety: Ensure the radar is pointing in a safe direction where people in close proximity (within 3 ft) are not directly exposed to the RF energy for sustained periods of time (>30 min).
2. Equipment safety: Ensure that the radar is not too close (within 6 ft) to other materials that produce strong RF reflections back into the receive (RX) antenna, particularly during indoor testing. This includes sheet metal, steel reinforced walls, corner reflectors etc.

A transmitting radar can also get warm to the touch. For this reason, evaluation units are shipped with an evaluation stand that provides a small amount of airflow to reduce the exterior temperature of the unit in indoor or static testing scenarios. Suggested best practice is to use the TrueView user interface to turn off transmit when not actively testing radar detection.

Note, TrueView radar is designed to operate between -20°C to 50°C (-4°F to 122°F) ambient temperature.

Please do not hesitate to contact customer support if you have any questions regarding setup or operation of your TrueView Radar.

Email: support@fortemtech.com
Phone: +1 (385) 375-3233



Fortem TrueView Radar

Model R20

Quick Start Guide

Version 2.2.3
4/03/2018

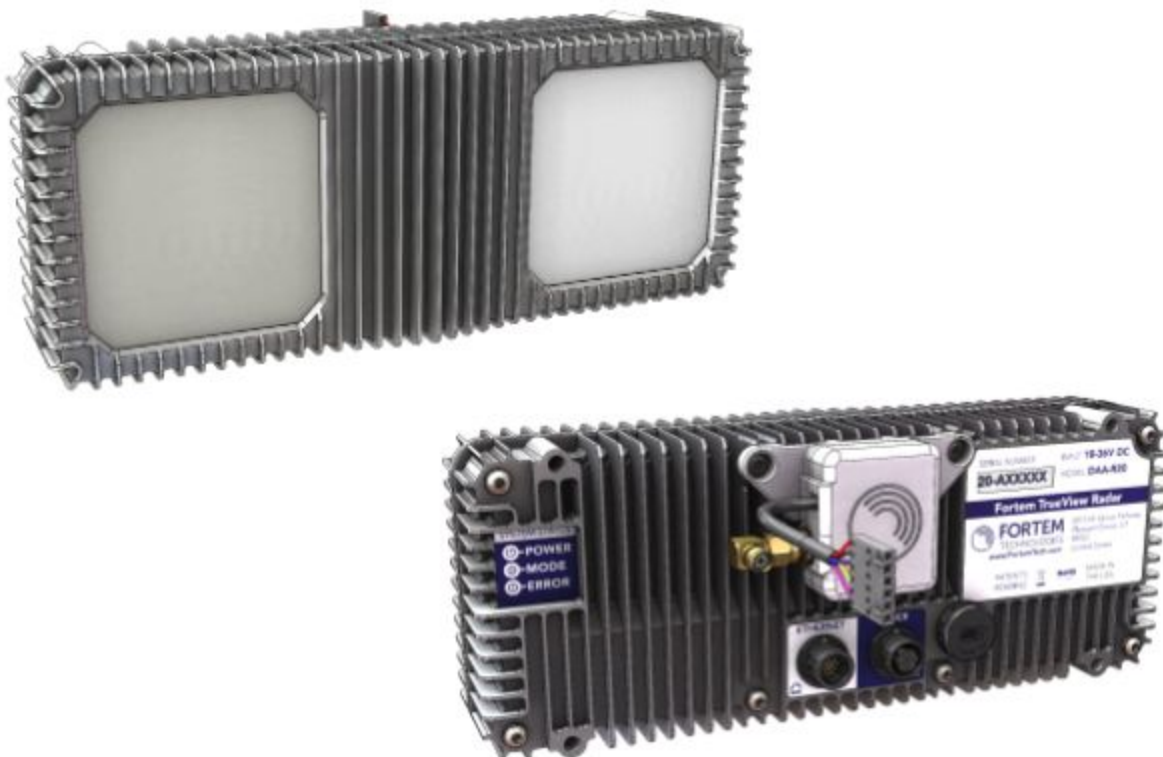


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1 Overview

1.1 Audience

For customers and partners who are using the Fortem TrueView Radar for the first time. This guide will walk users through initial setup and configuration.

1.2 Related Reference Documents

API Documentation: This document describes the API, how to use it to connect to the radar, receive data, send data to the radar, and how to parse the data output formats.

DRD Format and Parsing: This document is intended for individuals who will program systems to parse raw radar binary data produced by the radar. Otherwise known as the Descriptive Radar Data (DRD) format.

Mechanical and Electrical ICD: This document describes the radars electrical and mechanical interface, wiring diagrams, center of mass and mounting holes.

GUI Guide: This document describes the interface, output views, configuration, software update, and file retrieval using the Fortem TrueView Radar Graphical User Interface.

PDF versions of documentation for your radar can be at support.fortemtech.com

1.3 End User License Agreement

In order to use the TrueView radar, you must first accept the End User License Agreement.

End-User Software License Agreement

Fortem Technologies

+1 (385) 375 3233 support@fortemtech.com

This End-User Software License Agreement ("Agreement") is a legal agreement between you, the licensed user ("You", "Your", or "End-User") and Fortem Technologies, Inc. with offices at 2015 W. Grove Parkway Suite H, Pleasant Grove, UT 84062 ("Fortem"), for a license to the proprietary Software (defined below) that accompanies this Agreement and governs Your use of the Software (defined in Section 1 below). If You are an individual acting as a representative of, or are employed by a corporation or other legal entity or government agency that wishes to use the Software, then You represent and agree to enter into this Agreement on behalf of such entity and that all provisions of this Agreement shall bind that entity as if it were named in this Agreement in place of You. By accepting this Agreement or by accessing any portion of the Software, You irrevocably agree to the terms of this Agreement, and You represent and warrant that You have all authority necessary to bind Yourself and that entity. If You do not agree with the terms of this Agreement, do not access the Software because accessing and using the Software means You have accepted these terms and conditions. This Agreement is effective on the date You access or use the Software.

1) DEFINITIONS.

a) "Software" means any and all of the following if applicable:

i) embedded software that runs on Fortem hardware;

ii) additional software to the extent included under Section 6 and

iii) any associated printed or electronic documentation.

b) "Update" means bug fixes, error corrections or minor releases to release of Software which may be provided from time to time to End-Users who have a current maintenance and support agreement with Fortem.

c) "Upgrade" means a new release of, or major changes or significant new functionality to, Software for which Fortem charges a separate license fee.

2) GRANT OF LICENSE. Subject to End-User's full compliance with all provisions of this Agreement, Fortem grants End-User a limited, non-exclusive, non-transferable license to install, use, access, display and run the Software, solely for its own internal business purposes solely in accordance with the documentation provided by Fortem for the Software. Software that is provided on or for use with Fortem hardware is licensed only for use on or with Fortem hardware owned by You in accordance with the respective documentation. End-User agrees to insure compliance by its employees, agents, and authorized users with respect to its obligations under this Agreement.

Decline

Accept

Package Contents

The Fortem TrueView Radar evaluation unit ships with the following components:

1. The TrueView Radar unit
2. Power Cable (Herosi to Barrel Connector)
 - a. Note: This cable has a pigtail to connect to the INS unit on the back of the radar
 - b. Note: This cable is also designed for use in airborne applications with an XT30 connector. The barrel connector can be removed, leaving only an XT30 connector on one end to allow power connection in drone-based applications.
3. GPS Antenna for INS unit
4. Ethernet Cable (Herosi to RJ-45 Connectors)
5. Power Supply Brick & Power Cable (120 V AC - Input, 24 V DC Output)
6. Power Supply Splitter (Y Cable) for use with evaluation stand

Required Materials (Not Supplied)

1. Laptop with web browser (Chrome, Firefox, Safari, Internet Explorer)
2. DHCP Router / Ethernet Hub (optional)
3. Additional Ethernet Cables

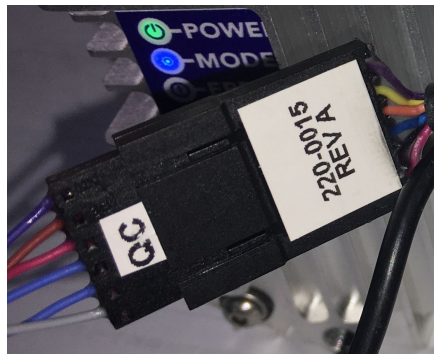
2 Physical Set Up

The following steps will walk you through the initial setup of your radar for bench testing:

1. Attach the supplied Ethernet and power cables to the back of the radar unit
 - a. Be sure to line up the arrows on the connectors as shown:



- b. Connect the flat 6-pin connector to the INS unit, as shown:



2. Connect the GPS antenna to the INS unit by screwing it onto the SMA connector



3. Plug in the external power supply to a wall outlet
 - a. Use the other end to plug into the power cable for the radar

1. The radar unit will begin boot up when connected to power via the DC power connector.
4. Connect the Ethernet cable by plugging in the Hirose end into the radar and the RJ-45 end of the ethernet cable directly to your computer/laptop or to a DHCP enabled router. (See the [FAQ](#) for more details)
5. Turn on the computer and open a web browser and navigate to the radars IP address (see below)

3 Fortem TrueView Radar Graphical User Interface

Once the radar unit is powered on and connected via ethernet to your computer, you can connect to the TrueView Graphical User Interface to interact with the radar. The TrueView GUI is accessed through a web browser. The latest versions of Chrome, Firefox, Safari have all been tested and are supported. The URL for the TrueView GUI is:

`http://[Radar IP Address]:3030`

3.1 Connecting to your radar

In order to connect to your radar via the ethernet port you will need to know the IP address of the radar. The Fortem TrueView Radar is shipped with three IP address settings:

- Static IPv4 Address
- Static IPv6 Address
- DHCP IPv4

Connecting to the Static IPv4 Address

Your TrueView Radar is configured with a static IPv4 address on the following network:

IP Address Range: $172.16+n.0xx.0yy$ where the serial number is in the format R20-Anxxxy as seen in the figure below.



So using the example in the picture below, the IPv4 Address would be:

- 172.16.0.4

Connecting to the Static IPv6 address

Your Fortem TrueView Radar is also configured with a static IPv6 address on the following network:

IP Address Range: fd46:6f72:746d::1:0:<serial number>
Prefix Length: /64

Connecting to a DHCP address

To connect to your TrueView radar via DHCP, you will need the following:

- A DHCP enabled router
 - You will need a username and password to login to your router
- Ethernet cable(s) to connect to your computer
- A DHCP enabled computer

To determine the IP address of your radar unit, as assigned by DHCP, follow these steps:

1. Plug both the radar unit and your computer into the router
2. Log in to your router's admin page via a web browser
 - If you are unsure how to do this, see the following:
<http://www.broadbandexpert.com/wireless-internet/networking-advice/finding-and-accessing-your-routers-admin-panel-console>
3. Find the page that lists devices connected to your router
4. Find the IP address assigned to the device named "Fortem-R20-Anxxyy", where nxyy are the 5 digits of your TrueView radar serial number

Once you know what IP address it was assigned, you can connect to the TrueView Graphical User Interface using the same URL as above:

`http://[Radar IP Address]:3030`

Also note, the Radar User Interface will allow you to setup one other custom Static IPv4 address of your choosing. Please refer to the Radar User Interface for instructions if you require a custom IP address for your situation.

3.2 Connecting to the radar web interface

Use your browser to navigate to the IP address of the radar on port 3030.

`http://[Radar IP Address]:3030`

When you initially connect to the TrueView GUI, you will be brought to the **EULA** page, as shown below:

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Fortem Technologies

+1 (385) 375 3233 support@fortemtech.com

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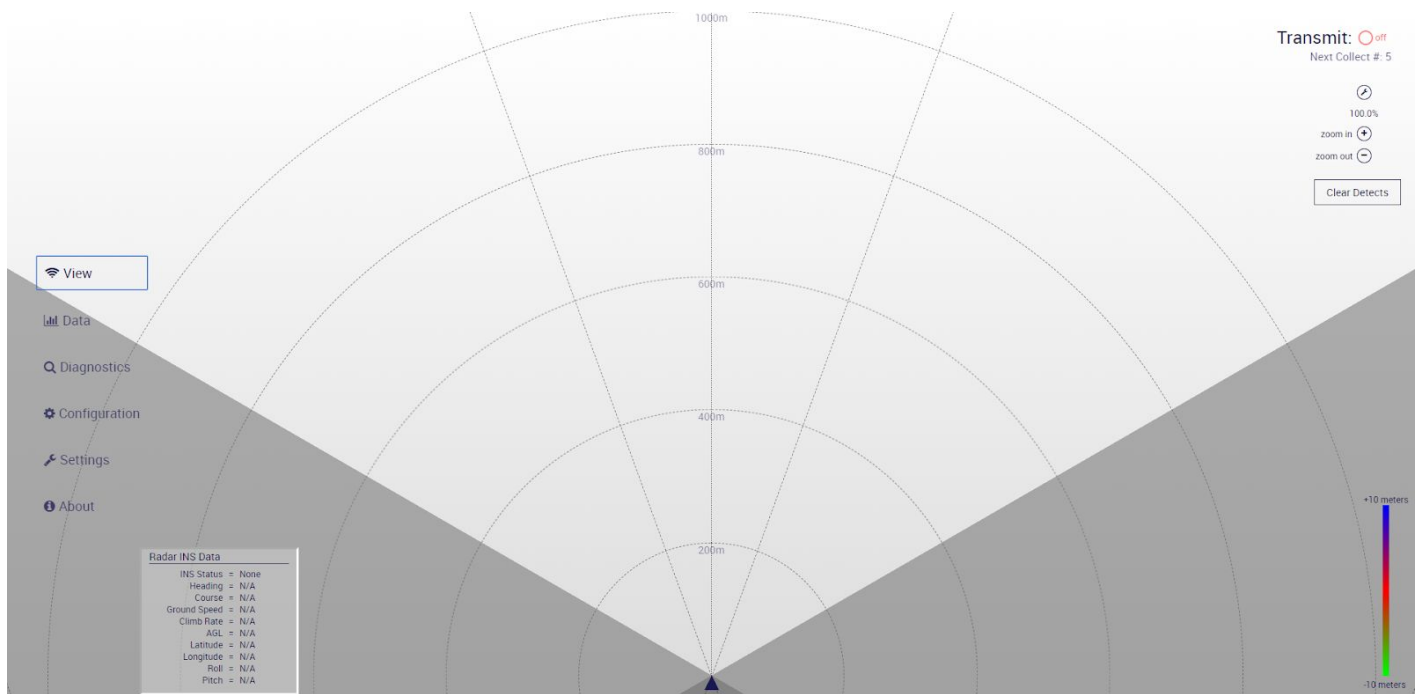
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Decline

Accept

You must accept the End User License Agreement before the radar will be able to function.

After you accept the End User License Agreement , you will be brought to the **View** page, as shown below:



NOTE: The Radar GUI defaults to display in dark blue. You can easily toggle to “day mode” (shown above) by pressing the ‘d’ key on your keyboard.

When the TrueView radar is off the screen will remain blank. If the unit is in Transmit mode, radar detections can be seen on this screen.

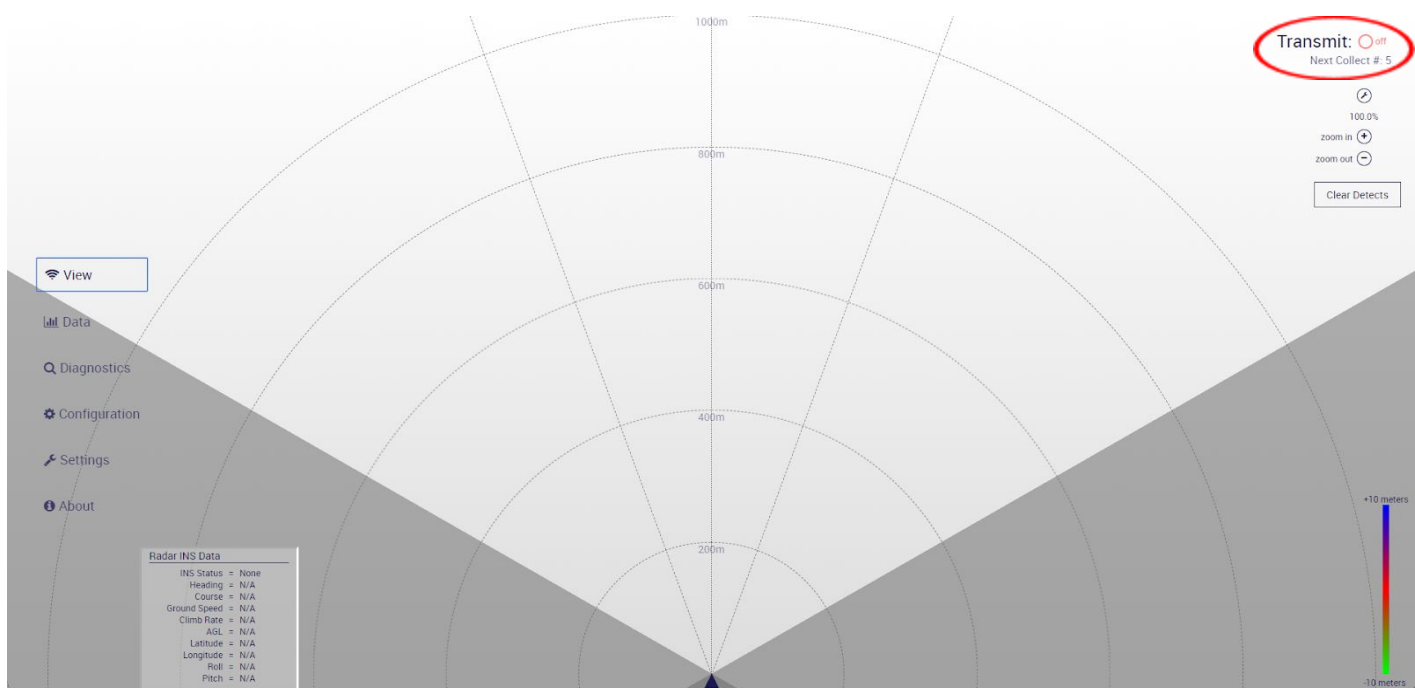
NOTE: Radar detections will not show on this screen if “Show Detects” is set to “Off” when clicking on the wrench icon in the top right corner of the “View” screen.

4 Radar Configuration and Data Collection

The TrueView Graphical User Interface Guide document details how to configure the radar and start collecting radar data.

As a quick start, to begin transmitting, simply click on the toggle button that is labeled “Transmit” located at the top right corner of your screen.

NOTE: Please ensure you are transmitting in a safe direction. See the [FAQ](#) for more details.



By toggling the *Transmit* switch, the TrueView radar will begin transmitting and collecting data. This data can be seen and analyzed on the **View** and **Data** displays. The **View** screen shows radar detections, and the Data screen shows graphical representations of the data. Radar transmit, receive, and processing settings can be modified from the **Settings** page

NOTE: The additional configurations and settings for the radar cannot be changed while the TrueView radar is actively transmitting.

5 FAQ

5.1 Where do I point the unit? Which side is up?

The blue labels on the back panel of the radar can help you easily orient the device. For more detailed information, please see the radar Mechanical and Electrical ICD.

5.2 Is it safe to stand near the radar?

It is always safe to stand near and handle the TrueView radar when NOT in transmit mode. While the radar is transmitting, it is safe to stand behind the radar. If it is necessary for you to be in front of the radar while it is transmitting, please follow the exposure guidelines listed in [Radar Exposure section](#) of this document.

5.3 How do I know if it's working?

- Check the LED light indicators on the unit - see [What do the lights mean?](#) For more info.
- Check for detect updates on the dashboard of the TrueView GUI (see TrueView GUI Guide)

5.4 How do I receive detect data from my radar?

See the Detect Data API documentation for detailed instructions about subscribing to the radar API and receiving JSON formatted radar detect data.

5.5 What do the LED lights mean?

Green on, Blue / White alternate blinking	Booting
Green on, Blue blinks slowly, White off	Ready
Green on, Blue blinks quickly, White off	Collecting data
Green on, Blue slowly, White blinks moderately	Temperature warning
Green on, Blue quickly, White blinks moderately	Temperature warning during collect
Green on, Blue slowly, White blinks quickly:	Over temperature, collect disabled
Yellow Light in place of Green Light	Low power. Check power supplied to Radar
Green, Blue, and White stay on	Critical error, contact Fortem

6 WARNING: Radar Exposure

The FCC has provided guidelines for Maximum Permissible Exposure limits to RF signals (See Table Below). The Fortem TrueView Radar operates between 15-16 Ghz (15000 Mhz).

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

For General Population/Uncontrolled Exposure, The FCC recommends not exceed a power density of 1.0 mW/cm² for up to 30 minutes. In order to ensure you are not exceeding this power density, **please ensure the radar is not transmitting within 0.7 Meters** of a person.

For Occupational/Controlled Exposure, The FCC recommends not exceed a power density of 5.0 mW/cm² for up to 6 minutes. In order to ensure you are not exceeding this power density, **please ensure the radar is not transmitting within 0.32 Meters** of a person.