

ULTRASIGHT 4K

Technical Manual



P/N – TV80 0135: Ultrasight 4K wireless system containing emitter and receiver

P/N – TV80 0132: Ultrasight 4K camera kit

Includes: camera Sony ER8530, 60GHz transmitter, power and communication board, wires and mechanical parts

P/N – TV80 0133: Ultrasight 4K receiver box

Includes: 60GHz receiver, acquisition board, housing and power supply

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Revision History

Date	Revision	Description	Modified by	Note
01/02/24	A	Creation of the document	ABU	
06/02/25	B	Update photos and template	CBO	

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General description

Ultrasight wireless 4K system is composed of a ready to use OEM Camera module, with pre mounted mechanical part to ensure the highest quality of video transmission and a receiver module, integrated into its specific enclosure. Ultrasight system allows video transmission, based on WirelessHD technology, up to 4K video, without any compression and with almost no latency (<5ms).

This system has been designed for surgical light integrated cameras, using high quality 4K Sony camera with specific settings to permits the best video quality in operating room environment. The video will not be disturbed by lower frequency LED control (down to 100Hz) and exposure is corrected to fit power of illumination (up to 160.000 lux).

With its 60GHz carrier frequency, this wireless camera will not be disturbed by already over occupied bandwidths of Wi-Fi, Zigbee, Bluetooth or DECT phones.

Plug and play, with an autonomous connection between the camera and receiver, this solution can be deployed easily in all kinds of operating room, without any intervention. To improve the control by the end customer, a RS232 communication is available on the camera, so VISCA camera functions can be accessed. A simple communication to execute zoom commands, increase exposure, control the focus, Freeze the image or any other camera request may already be compatible with your system.

Key features

- WirelessHD compliant device
- 60GHz interference free
- Up to 4K@30fps video transmission
- Subframe video latency
- Integrated and optimized heat dissipation
- Energy saving available with standby mode
- Plug and play system

Deliverables



Figure 1. OEM Camera Module



Figure 2. Receiver box

Electrical description

Receiver

Interfaces



Figure 3: Receiver interfaces

Electronic specifications

Parameter	Value
Power	
Power Supply Voltage	5V +/- 5%
Consumption (4K Nominal)	5W
Video	
Maximum Pixel Clock	297 MHz
Maximum Video Format	3840 x 2160 30 Hz, YCbCr 4:2:2 8 bits
Temperature	
Operating temperature	0°C – 35°C
Storage temperature	-20°C – 50°C
Radio	
Frequency Range	59.40 GHz to 63.56 GHz
HRP Bandwidth	1.76 GHz per channel
HRP number of channels	2
HRP Radiated Power (EIRP)	24.2 dBm
Receiver Sensitivity	-72 dBm (typical)

Table 1: Receiver specifications

OEM camera
Electronic overview

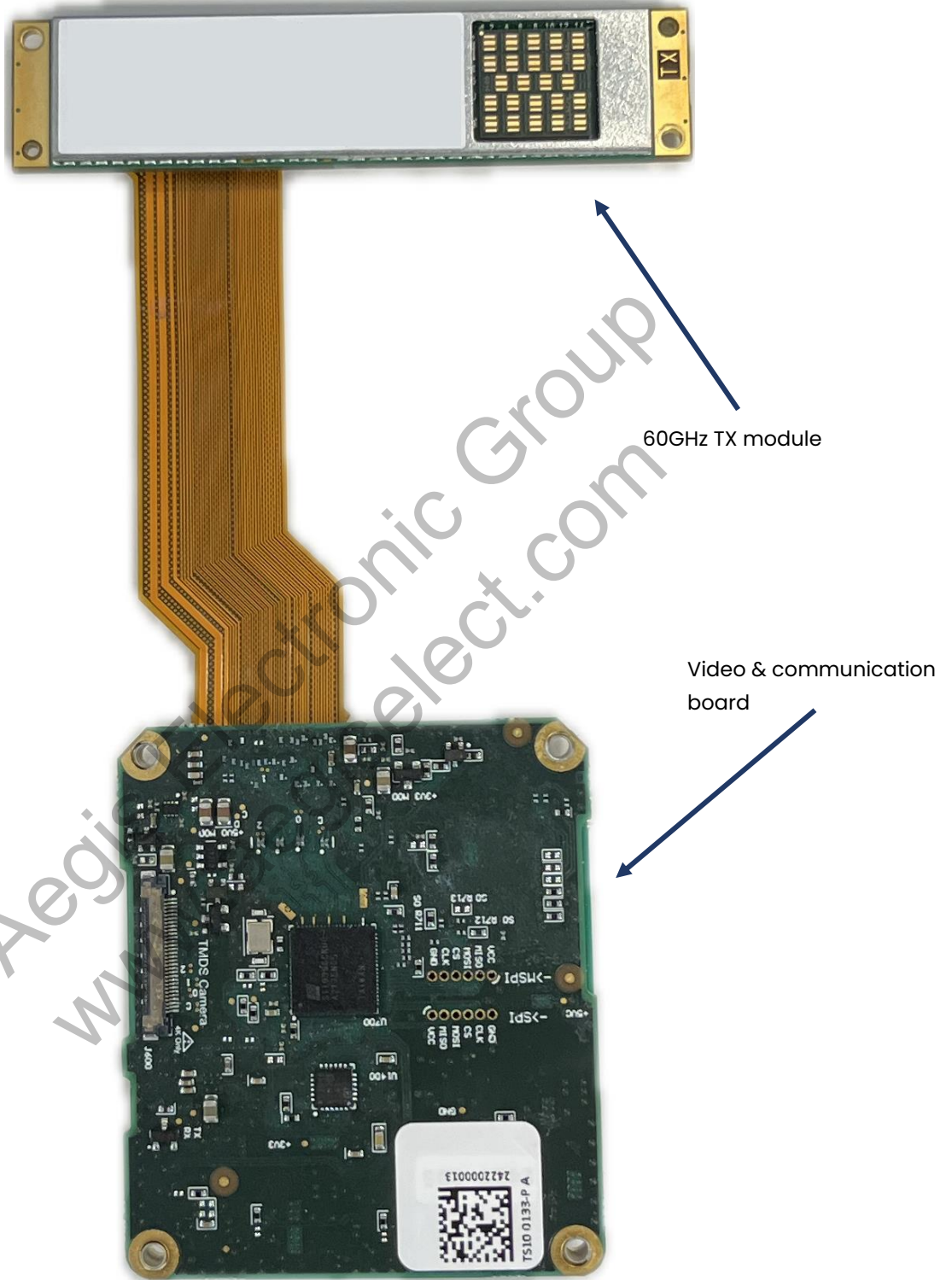


Figure 4: Camera electronic overview

Interfaces

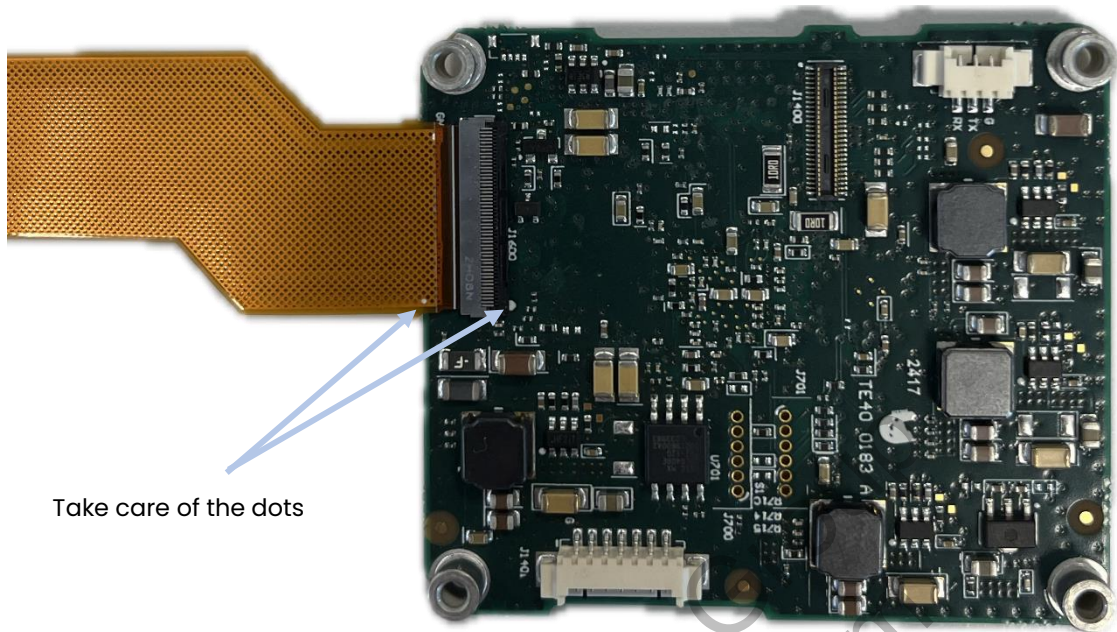


Figure 5: 60GHz module connection

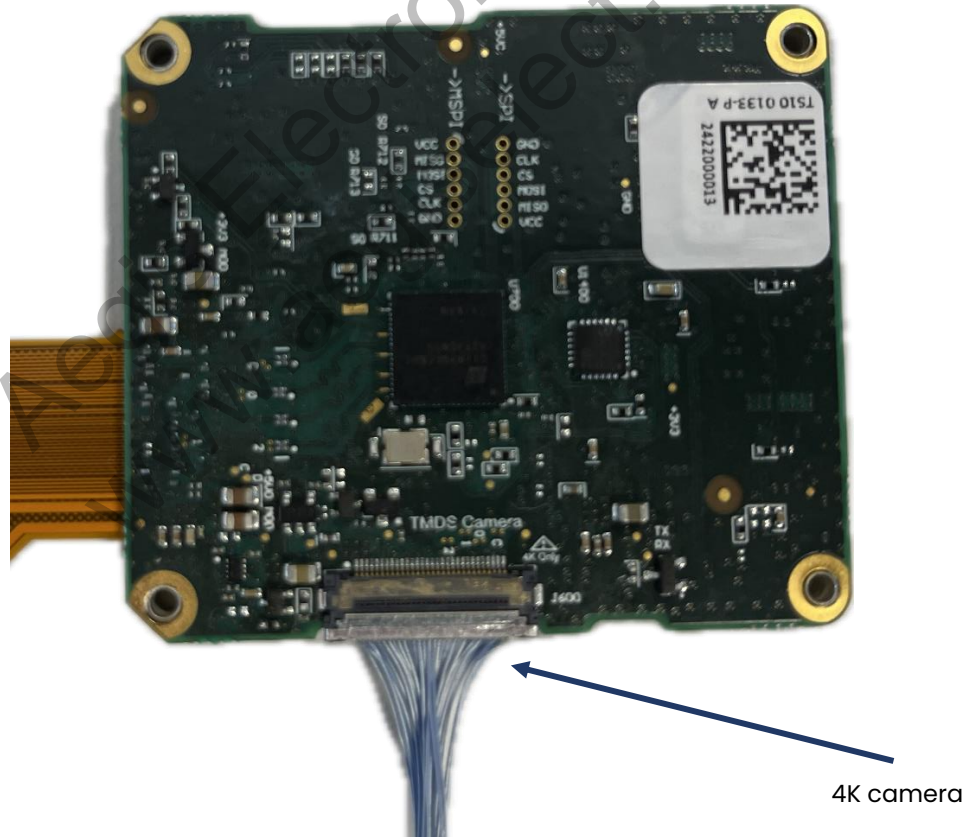


Figure 6: Camera connection

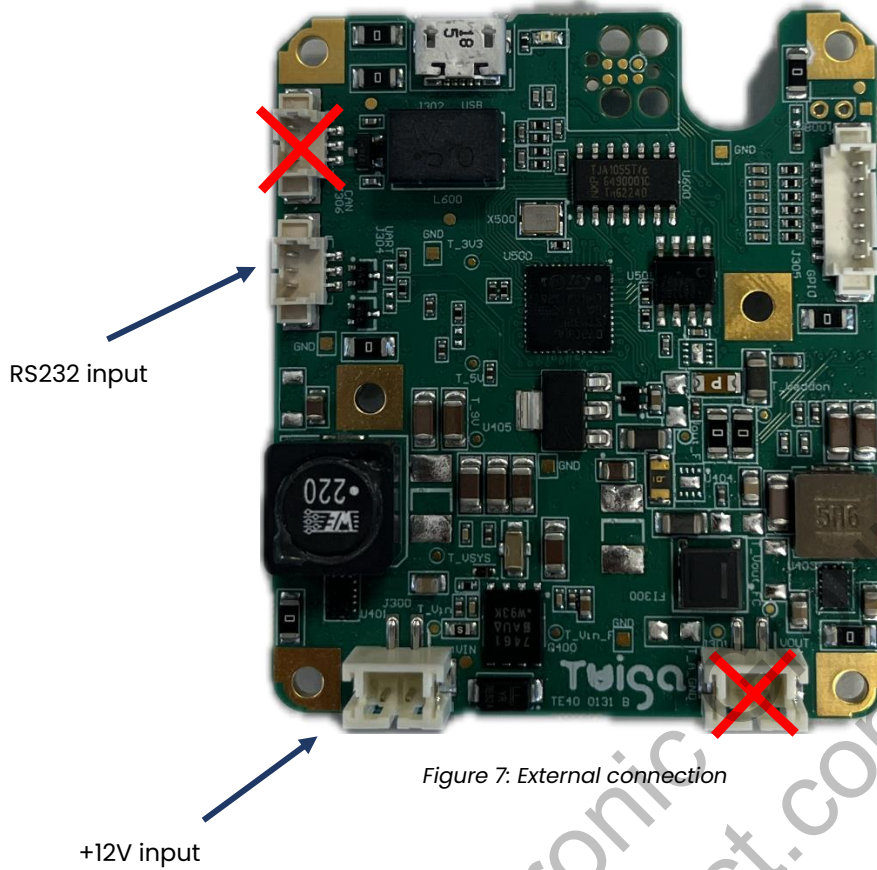


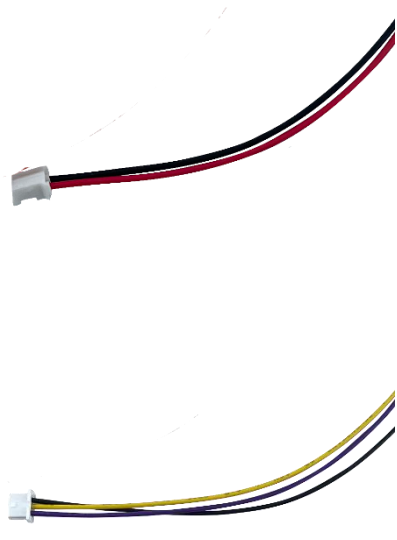
Figure 7: External connection

Signal	Colour
+12V	Red
GND	Black

Table 2: Power supply cable

Signal	Colour
Tx	Purple
Rx	Yellow
GND	Black

Table 3: Communication cable



Electronic specifications

Parameter	Value
Power	
Power Supply Voltage	12 – 28V
Consumption (4K Nominal)	9W
Power Protections	2A UL Fuse (E198545) EMC Filtering Reversed polarity TVS Diode
Power sleep	< 1W
Communication	
Communication Level	RS232
Communication protocol	VISCA
Communication specificity	Off/On VISCA command to shut down the module
GPIO available	Available local GPIO (3.3V Level) to control zoom function
Video	
Maximum Pixel Clock	297 MHz
Maximum Video Format	3840 × 2160 30 Hz, YCbCr 4:2:2 8 bits
Temperature	
Operating temperature	0°C – 35°C
Storage temperature	-20°C – 50°C
Radio	
Frequency Range	59.40 GHz to 63.56 GHz
HRP Bandwidth	1.76 GHz per channel
HRP number of channels	2
HRP Radiated Power (EIRP)	24.2 dBm

Table 4: Camera specifications

Mechanical integration

System dimensions

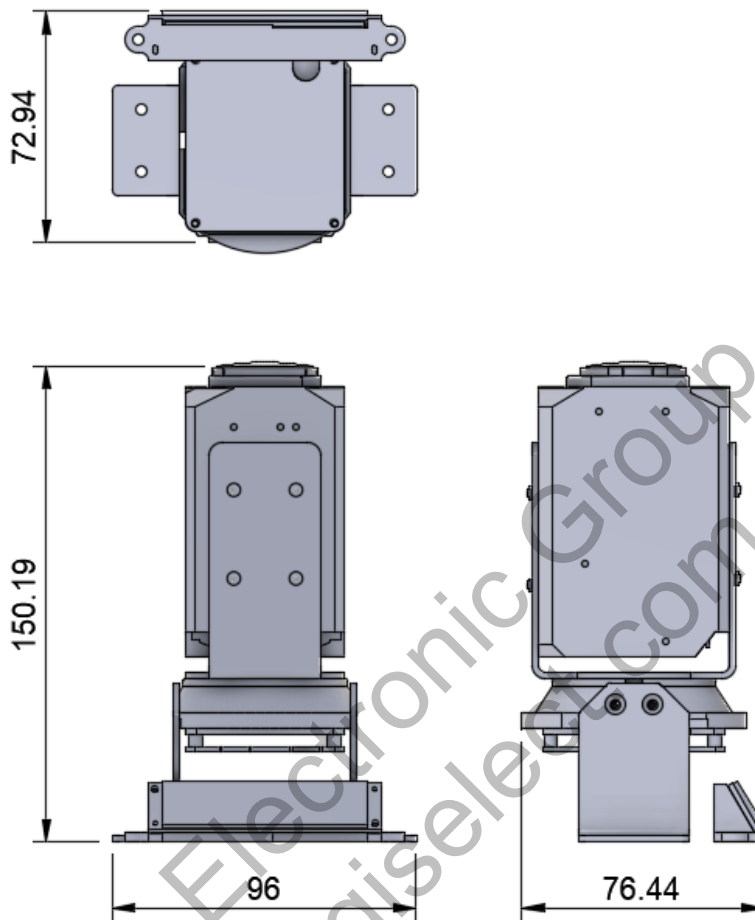


Figure 8: Camera dimensions

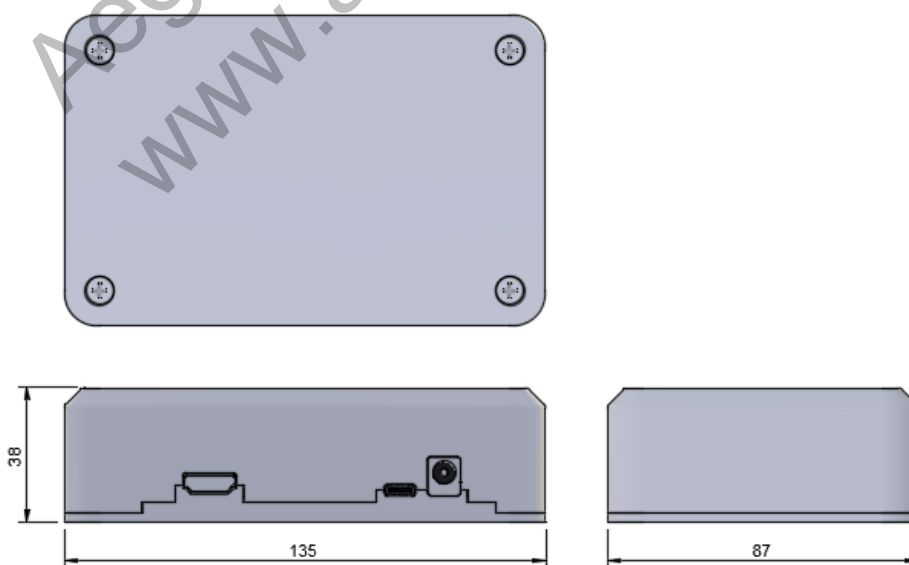


Figure 9: Receiver dimensions

Module specific integration

Placement advice:

- Avoid any metallic item in front of the 60GHz Antenna.
- Any polymer-based enclosure, like ABS, PE, PA material makes particularly good material to cover the 60GHz Antenna.
- Polymer material enclosure wall thickness below 2 mm is nearly transparent to the 60 GHz radio signal.
- Consider placing the module tilted up between 30 and 60 degrees to cover cases where the transmitter is placed below the receiver (considered in provided mechanical parts).
- Consider an air gap of 2 mm or more between the 60GHz module and the covering enclosure.

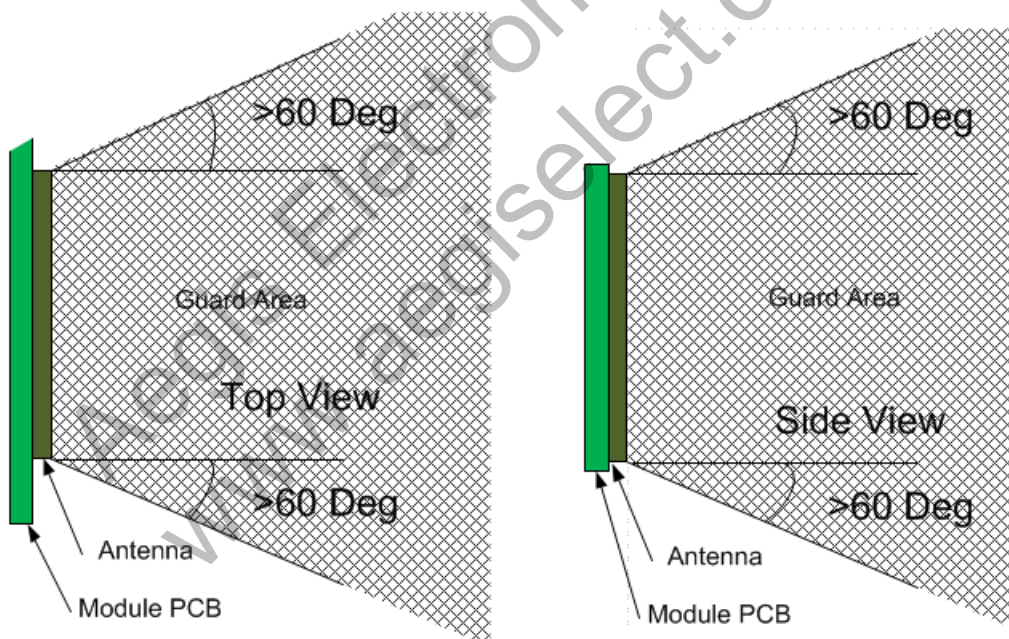


Figure 10: 60GHz guard area

This is the recommended minimum guard area in front of the 60GHz Antenna, to ensure maximum radio performance in the end system.

The guard area is a solid angle where no blocking features should reside.

Blocking features are mechanical items like metallic mounting screws, washers, wire mesh, thick plastic ribs, glass items, metallic paint, metallic stickers and labels, and logos and emblems.

Provided support is designed to improve the Module dissipation with the following characteristics:

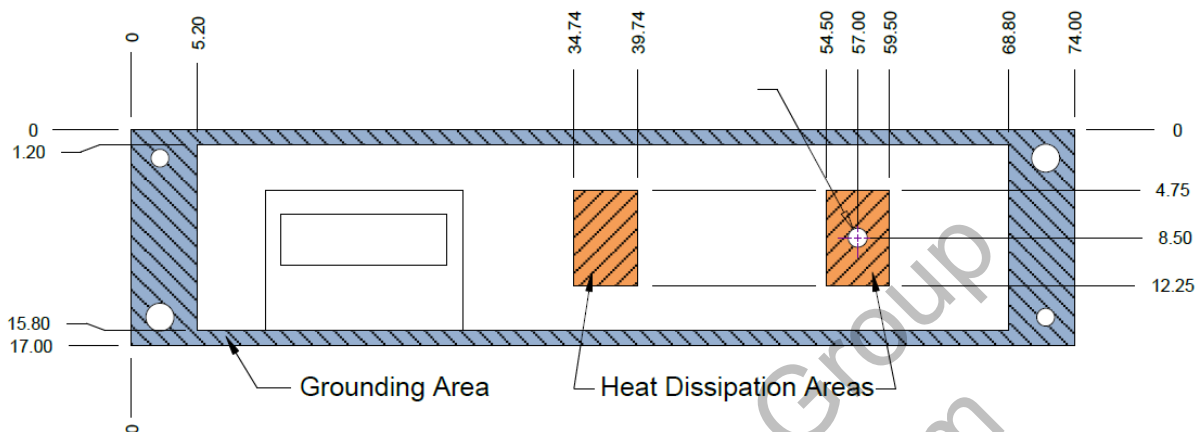


Figure 11: 60GHz module dissipation pads

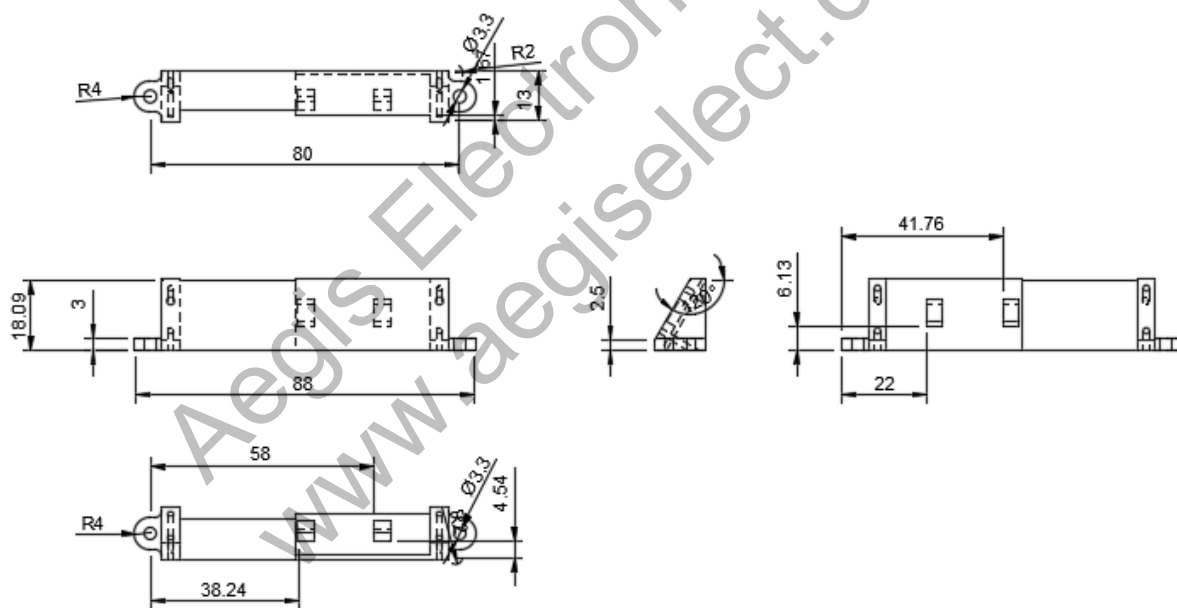


Figure 12: 60GHz mounting plate

2x R4 mounting holes are available to assemble to the camera top plate, which must be in thermal conductive material (i.e. Aluminum) in order to provide the best dissipation for the module.

Wireless transmission specifications

Signal quality

60GHz radio is very directive, to improve the behavior of the system, we selected a dual polarity antenna. Measurement have been done on signal attenuation, which give the information of the best conditions of use. Higher attenuation (-70dB) give the worst case, with some video failure, while Lower attenuation (-50dB) gives stronger connection.

Signal attenuation

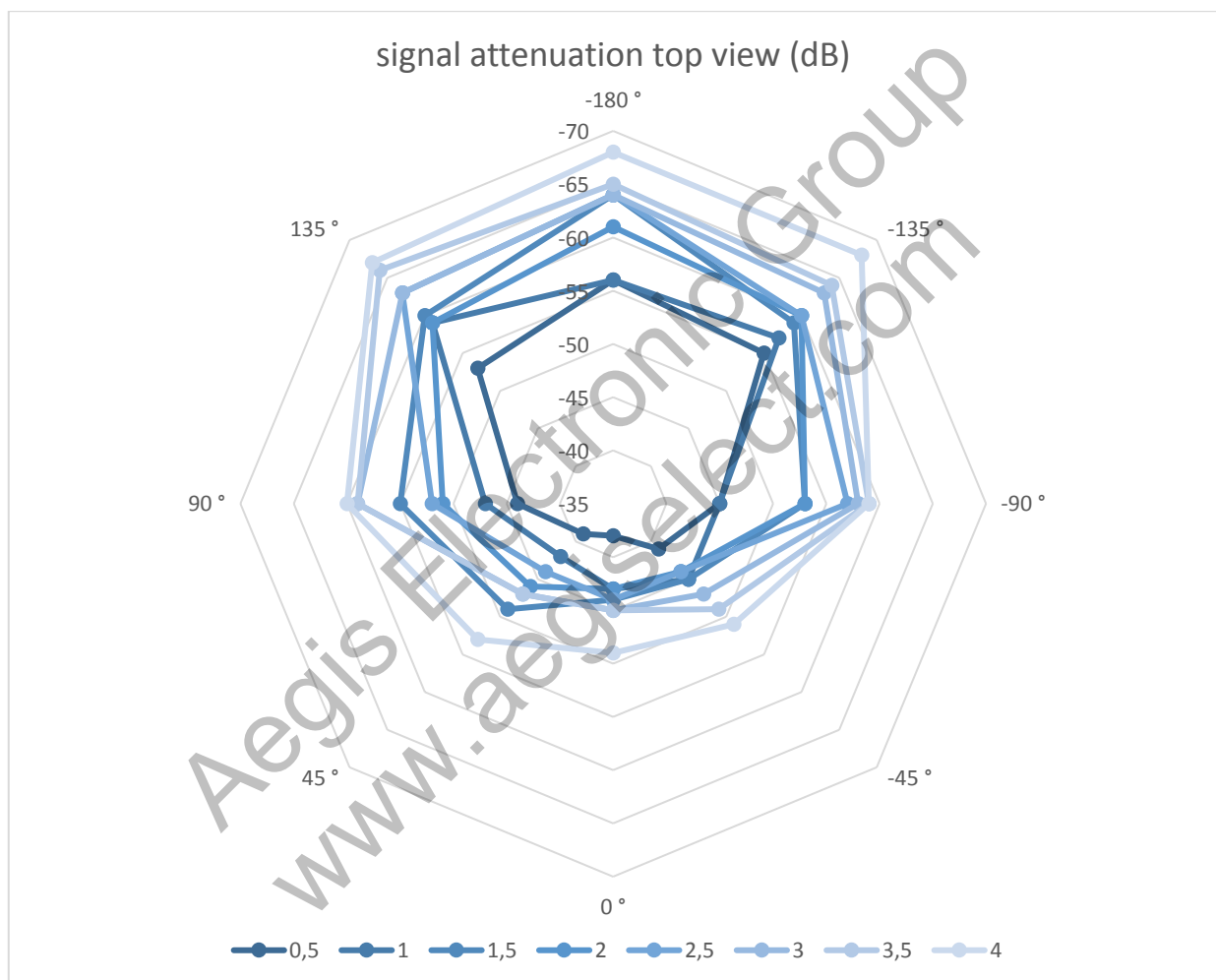


Figure 13: Signal attenuation top view

Measurement of Attenuation between 50cm and 4m. The camera was placed in front of the receiver (0°) and turned around in each direction.

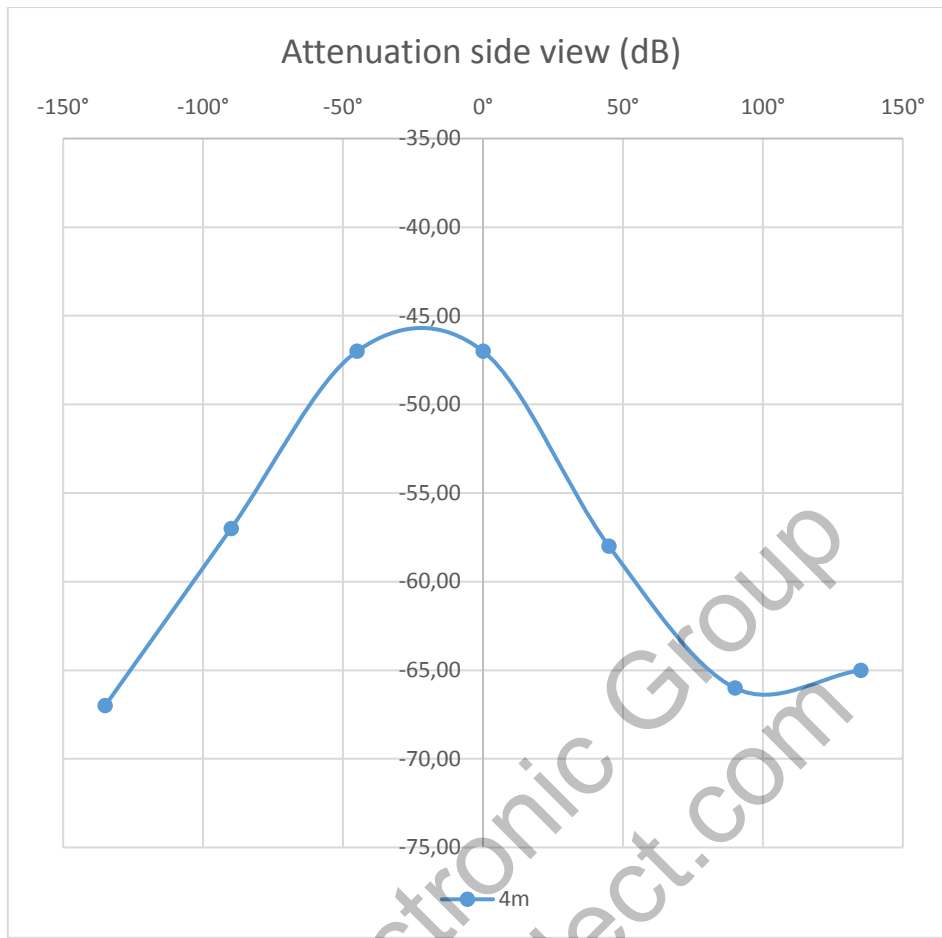


Figure 14. Signal attenuation side view

Measurement of Attenuation at 4m, while the camera is tilted as mounted on a cupola. 0° is when camera antenna and receiver antenna are parallel.

Optimal distances

It is important to consider the following recommendation in order to have the best signal quality:

- Receiver must be placed above the monitor, to avoid any obstacle.
- Receiver must always face the camera.
- Camera mechanical design must be done to avoid any hand obstruction in front of the antenna.

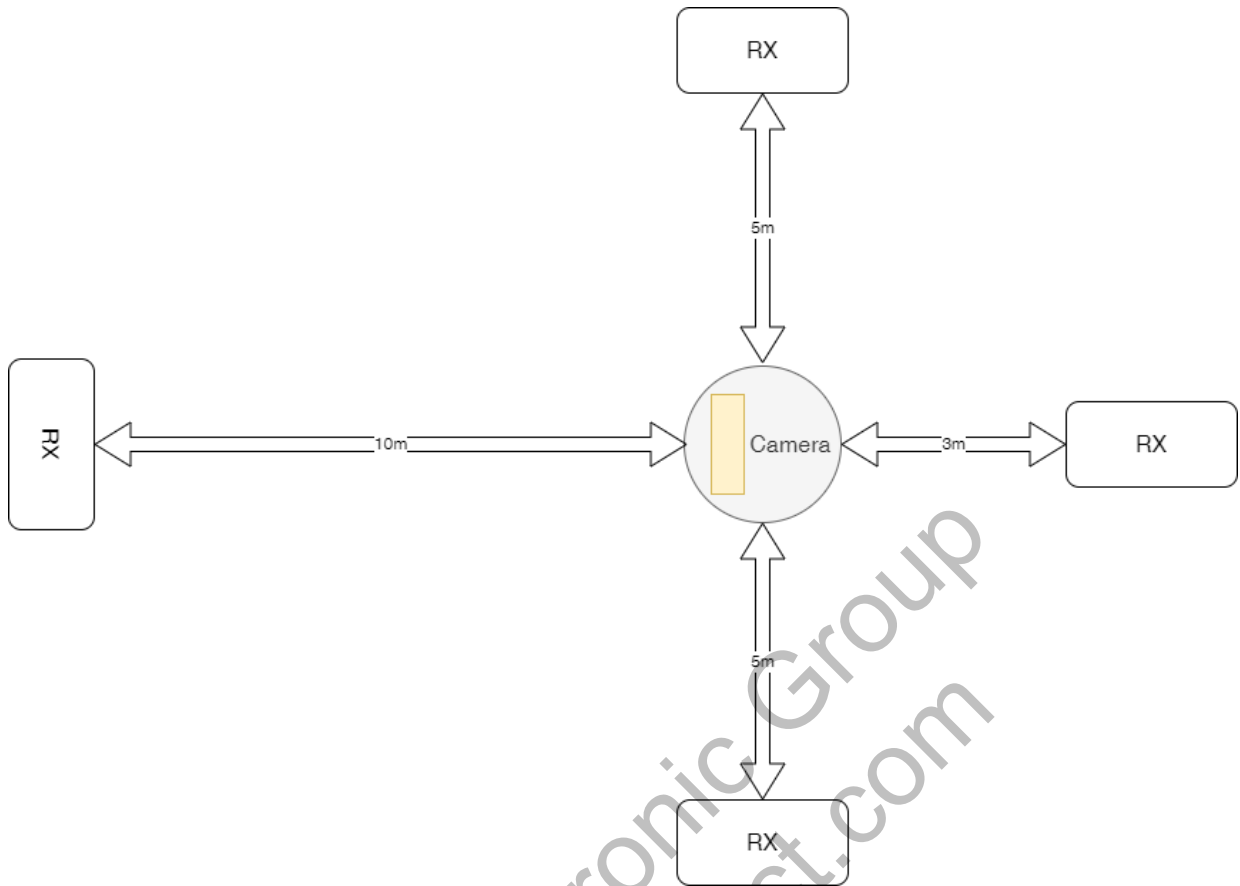


Figure 15: Optimal operating distances

Operational details

- Module Scan:** The module radio is activated and starts listening for beacons continuously. The module stays in this state until it finds a network coordinator and decides to join this network (association per WirelessHD specifications).
- Module Associated:** This state is reached after one coordinator receiver module has accepted the transmitter module in its network. This is accomplished when the station has sent an association request to the coordinator and the coordinator has sent a positive association response back to the station. From this state, the transmitter module can take one of two paths. The module can go to the Module Power Save state if no video connection has been established for a given period of time, or it can go to Module Connected state if a connection request has been requested and is accepted from both ends. The module also returns to this state after a video connection has been disconnected.

- **Module Connected:** In this state, the transmitter module is actively sending audio and video across the WirelessHD high-rate link to an active receiver. A connection request from either side has been granted by the coordinator and all protocol prerequisites for the setup of an audio video connection have been completed.
- **Module Power Save:** The device save power by shutting down some of their internal blocks. The module still listens to beacons to check network activity like pending connect requests, in which case it may wake up.

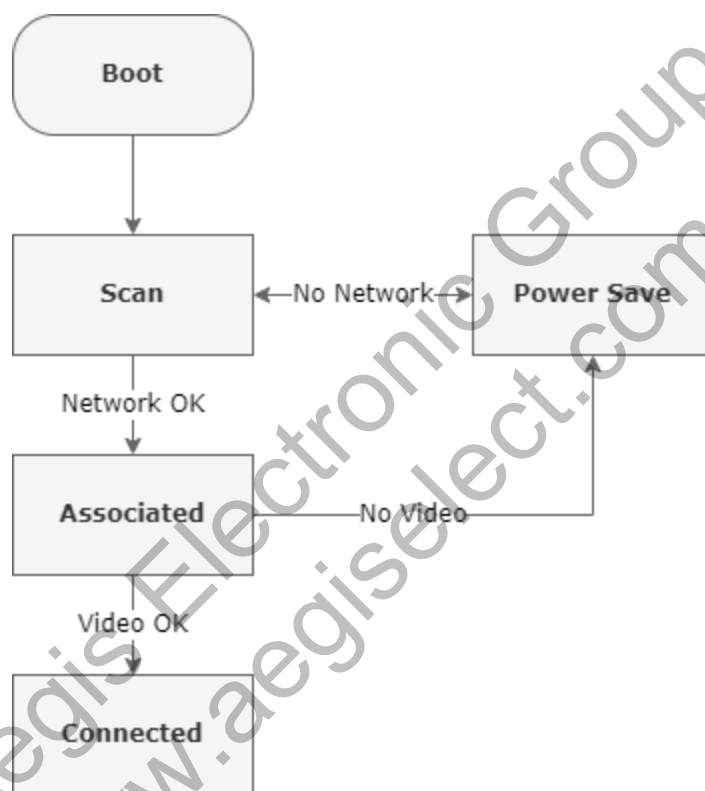


Figure 16: 60GHz working diagram