Attachment 2 RF exposure statement

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Attention: Reviewing Engineer

The HZB-S58-25 radio is a full duty-cycle product exclusively designed for fixed-mount point-to-point applications (Please refer to Page 1-1 of the *Installation and Maintenance Manual*). Each radio's inputs are connected to external equipment through the radio's interfaces. The RF output port is connected to a RF cable or a waveguide, which connects on the other side to an antenna usually installed on top of a building or a tower. It is impossible to use the radio in any mobile applications.

The HZB-S58-25 radios need to be professionally installed outdoor either on top of a tower or a tall building. The installation sites are inaccessible to the general public. Only installation engineers may get close to the radio antenna during system installation. For the safety concern of the professional installers, we put a warning message on Page 3-20 (section 3.10) of the product manual recommending installers stay at least 5 meters away from the antenna during system operation.

The maximum output power tested for the HZB-S58-25 is 420 mW (+26.2 dBm), and the biggest antenna to be used with our 5.8 GHz radios is of 8' diameter (41dB gain). Due to the fact that the HZB-S58-25 radio is used for fix-mount point-to-point communication that requires line-of –sight clearance in the path and that the radio is single-unit in-door equipment, the antenna sites are always far away from the radio equipment room. The typical length of RF cable that runs from the output of the radio to the antenna input is over 100 feet. In situations where an antenna site is extremely far from the equipment room, waveguide may be used as a means to reduce the loss from RF transmission. A typical distance between antenna and radio when waveguide is used is over 200 feet. To give a worst example, let's assume 100 feet Andrew 5/8" foam coax cable or 200 feet Andrew waveguide is used. Given 0.5dB loss for the connectors on each end, the loss introduced by RF cabling is at least 3.5-5.5 dB (please refer to the table below for Loss/100' data). As for the majority of cases, the transmission line loss is usually in the range of over 10dB.

When the transmission line loss is taken into consideration, the maximum possible EIRP will be: Maximum Output power + Maximum Antenna Gain – Minimum Implementation Loss = 26.2 + 41 – 3.5 = 63.7 dBm. the power density at 5 meters from an antenna is:

$$S = EIRP/4\pi R^2 = 7.5\ W/m^2 = 0.75\ mW/cm^2 < 1\ mW/cm^2$$

Where: S = Power density
R = distance to the center of radiation of the antenna

In the cases of using 2', 4', 6' and 8' parabolic antennas,

The near field power density is : $S_{nf} = 16\eta P/\pi D^2$. The worst case of near-field power density is when the radio output at the certified power, η=1, and the antenna diameter D=2 ft.

$$S_{nf}\,max = 16x0.42/\pi\,(2x0.3048)^2 = = 5.7\ W/m^2 = 0.57\ mW/cm^2 < 1\ mW/cm^2$$

Where: S_{nf} = maximum near –field power density
P = power fed to the antenna
η = aperture efficiency
D = antenna diameter

So in all the above-mentioned situations, the power density is compliant with the limit for General Population/ Uncontrolled Exposure as specified in rule 1.1310.

If you should have any questions regarding this submission, please feel free to contact the undersigned.

Table 1: Feeder Loss

Feeder Loss Type	Manufacturer	Model Number	Loss/100'
1/2" foam coax	Andrew	LDF 4-50	6.6 dB
5/8" foam coax	Andrew	LDF 4.5-50	4.7 dB
Waveguide	Andrew	EW-52	1.2 dB

Yours truly,

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