

## ATS - FCC FORM 442 Application Question #7 Answers

(11 December 2019)

### Question #7 (questions 4, 5 & 6 all answered as NO by ATS):

7. If all the answers to Items 4, 5, 6 are "NO", include as an exhibit a narrative statement describing in detail the following items:
- a. The complete program of research and experimentation proposed including description of equipment and theory of operation.
  - b. The specific objectives sought to be accomplished.
  - c. How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion or utilization of the radio art, or is along line not already investigated.

### Answers to Question 7:

Advanced TeleSensors (ATS) is a new start-up developing a family of 24 GHz RF sensor products, beginning with a product family called the ATX2410. When the ATX2410 is in production it will come under FCC 15.245 (intentional radiators used as field disturbance sensors), constrained by accurate frequency synthesis to operate within 24.075 and 24.175 GHz. The combination of transmit power and antenna gain will restrain peak effective radiated power to be within the limits described in FCC 15.245. By the methods described below, average transmit power shall be well under those limits and human exposure and interference shall be minimized. For these prototype/experimental units we have specified 24.0 to 24.25 GHz to allow for prototype development tolerances, but again, the production units will be constrained to 24.075 to 24.175 GHz as described by FCC 15.245.

The fundamental theory of operation is based on using short range Doppler radar to sense Heart Rate & Respiratory Rate in both humans and animals. Patented technology including signal processing algorithms attuned to the very small Doppler shift generated by chest wall movement is used. Distance from the ATX24xx RF sensor to the sensed subject is typically 3 meters or less, depending on subject. It is anticipated the production product will, under active firmware control, reduce transmit power to the minimum needed to reliably measure heart and respiration rates in the particular operating circumstances. Operation of these Units will be very narrow-band, typically using less than 50 Hz of spectrum at a time. Reduction in duty cycle will also be studied under the requested experimental license. Due to its intelligent use of power, frequency, and time the product shall be among the most responsible and least interfering users of the 24 GHz band.

The ATS specific objectives with this experimental license are to advance from design and simulation of the ATX24xx technology to over-the-air testing and product refinement as part the pre-production engineering work. The program of experimentation will actively develop its performance in successfully measuring heartbeat and respiration, as well as its interference limiting features and methods. While vital signs monitoring via Doppler radar has been an area of academic research for some years, it has not led to successful products in the market. The ATS program will contribute to the advancement of the radio art by development of practical methods of signal processing and noise control to allow successful vital signs monitoring via low power short range Doppler radar.