Federal Communications Commission
Office of Engineering Technology
445 12th Street SW
Washington, DC 20554

Attn: Mr. Julius Knapp, Deputy Chief

Dear Mr. Knapp,

Multispectral Solutions, Inc. (MSSI) currently manufactures and sells an ultra wideband (UWB)-based, radio frequency identification (RFID) and real-time location system (RTLS), Sapphire DART, which has been certified under 47 CFR Part 15.250.

The active (transmitting) component of the system is a small UWB tag (FCC ID: QCIPAL6511X1) which has the following electromagnetic characteristics:

- Bandwidth (-10 dB): \( f_L = 5.937 \) GHz, \( f_H = 7.124 \) GHz, \( f_M = 6.219 \) GHz
- Average Radiated Emission = 47.36 dBμV/m (FCC Limit = 53.9 dBμV/m) at 3 meters
- Peak Radiated Emission = 59.98 dBμV (FCC Limit = 61.2 dBμV) at 3 meters.

The system is used for the real-time identification and tracking of assets and personnel, and has been deployed in over 100 facilities worldwide. These deployments have included thousands of our tags, each transmitting at a 1 Hz rate, without any interference to sensitive medical equipment or other wireless services.

In July 2005, MSSI met with OET to discuss a waiver for the use of slightly higher power limits for two specific applications: (a) the tracking of cattle for infectious disease control and monitoring; and (ii) the tracking of assets and personnel in petrochemical facilities. (MSSI later obtained an experimental license for the latter application.) Each of these applications require higher power tags because of either range limitations (e.g., cattle tracking) or deteriorated signal penetration in dense metallic environments (e.g., petrochemical facilities).

Under Part 15.250, the peak power limit is 0 dBm/50 MHz, and the average power limit is -41.3 dBm/MHz, both of which are expressed as power densities. Under general emission limits for Part 15 (i.e., 15.35(b) and 15.209), the average power limit is also -41.25 dBm/MHz (i.e., 500 μV/m at 3 meters), but the peak limit is expressed as "20 dB above the maximum permitted average emission limit". Without pulse desensitization correction, this peak limit would therefore be -21.25 dBm/MHz, or +12.75 dBm/50 MHz. While Part 15.250 removes the requirement for pulse desensitization correction, Part 15.35(b) currently does not. That is, Part 15.35(b) expresses peak power as full bandwidth peak power, rather than as a power density. Thus, it is presently not possible to operate UWB systems under the general emission limits to achieve the higher peak power density of 12.75 dBm/50 MHz.
It should be noted that Part 15.250 permits UWB operation only in a portion of the non-restricted (Part 15.205) band from 5.46 to 7.25 GHz. For this reason, UWB systems operating under Part 15.250 were given considerable latitude over similar systems operating under the more restrictive UWB regulations (Part 15 Subpart F). Since UWB was a new technology at the time, with little data collected from actual field implementations, the FCC elected to maintain the same peak power limit (i.e., 0 dBm/50 MHz) for operation of systems under Part 15.250.

From extensive data collected during operation of a higher power tag under experimental license in an oil refinery for personnel tracking, it has been determined that an additional 12.75 dB in peak power is adequate to permit effective and reliable operation. During nearly one year of operation, no complaints of interference from the higher power system were received. A second experimental license was granted to Sarnoff Corporation (Princeton, NJ) for the use of MSSI’s higher power tags for soldier tracking applications. Again, no reports of interference were received, and the higher power tags were once again found to be extremely useful for tracking in dense metallic environments.

It is also important to note that:

(i) To enhance safety measures, the Occupational Safety and Health Administration (OSHA) and the Washington Industrial Safety and Health Act (WISA) have now mandated that all oil refineries maintain location awareness of their personnel while working in the refinery; and,

(ii) The U.S. Department of Agriculture’s (USDA) National American Identification System (NAIS) would require that each farmer, stockyard owner and feeder keep an electronic record of every head of cattle as it passes through their businesses. To ensure rapid disease containment and maximum protection of America’s animals, the NAIS program is intended to give officials the ability to track the movements within the past 48 hours of any animal discovered to be diseased or exposed to disease.

Furthermore, in each of these applications (i.e., petrochemical and livestock), each end user which requested an experimental license had used a wide variety of other technologies without success. UWB-based Sapphire DART was the only system to meet operational requirements.

Thus, given the extensive operational experience obtained with higher power UWB devices under two experimental licenses, and the necessity for the use of higher power devices to satisfy the above mandated directives, MSSI respectfully requests a waiver of Part 15.250 of the Commission’s rules as follows:

Modify 15.250(d)(3) to read: “The peak EIRP limit is 12.75 + 20 log (RBW/50) dBm where RBW is the resolution bandwidth in megahertz that is employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz.”

The waiver is requested for operation of MSSI’s Sapphire DART Precision Asset Location System™ (current FCC ID: QCIPAL6511X1) for (i) the tracking and identification of assets and personnel in petrochemical facilities, and (ii) the tracking and identification of livestock.
Respectfully submitted,

[Signature]

Robert J. Fontana, Ph.D.
President

cc: Mr. John Reed