

RE: Microwave Data Systems, Inc.

FCC ID: E5MDS-EL806-24

1) Please provide detailed information regarding the antennas for use with this device (gain, model, manufacturer, etc.). Although some specifications are given in the users manual, it appears the antennas may not be provided. For approval under part 15, please note that the device is expected to ship with an approved antenna. Additionally, please provide photographs or similar information to show the antennas to be approved with this application.

**Response: Picture of the antenna(s) has been uploaded. Also specification sheets from the manufacture website has been uploaded.**

2) Some of the calculations given in the RF exposure (EIRP/Pd) exhibit do not appear correct. Please review and correct as necessary (i.e., for 27 dBm, 10 dBi, Pd = 0.997). Please note that while a distance < 20 cm may be calculated, this is not implied as the safe distance and the FCC has been asking that distance calculation information no longer be presented in mobile RF exposure exhibits.

**Response: Understood. We will only provide what the Power density values are at 20cm distance only. A new MPE calculation documents has been uploaded with the correct values.**

3) It appears that professional installation will be used and is being justified, but the modular request letter mentions providing an adapter cable containing an N connector to customers. It is uncertain how professional installation will be maintained if a standard connector is being provided to customers. In addition, the users manual page 7 of 76 (labeled v) mentions all connections are non-standard while page 14 of 76 (labeled 6) offers additional cables with N connectors . This information appears contradictory. Please explain and/or correct exhibits as necessary.

**Response: An updated Module request letter and the revised manual have been uploaded for your review.**

4) The modular approval letter states the device depends on its laptop host for shielding. The users manual mentions this device is for use in RTU's, PLC's, etc and examples do not appear to show the device installed in a laptop. Normally if a device is approved as a LMA due to shielding, the host will be limited to a specific laptop model series or host as tested since shielding characteristics from device to device are difficult to quantify. Additionally the device also appears to have been tested in a stand alone configuration as shown in the test configuration photos. Please justify the shielding requirement mentioned in the modular approval letter.

**Response: The module depending on the laptop for shielding statement has been removed. This module will never be installed inside a laptop. A new Modular letter has been uploaded to reflect the change.**

5) The modular approval letter mentions a MiniPCI card, but the EUT does not appear to be of this form factor. Please explain.

**Response: The "MiniPCI" word has been removed. The module is not a PC peripheral device. A new Modular letter has been uploaded to reflect the change.**

6) Information in the modular approval letter mentions, "The devices containing the module will be labeled with the FCC ID of the module". Information on page 7 of 76 (labeled v) in the users manual mentions " When this device is placed inside an enclosure, a durable label must be affixed to the outside of that enclosure indicating the unit's FCC ID Number". Please note that the label on the exterior of the device must not simply be labeled with "FCC ID: E5MDS-EL806-24", as this label denotes the device as approved (which is not the case once it is integrated). The label on any final assembled device should indicate that the approved transmitter is internal by using a format such as "Contains TX FCC ID: E5MDS-EL806-24" or similar. Please adjust the documentation to make this clear. 7) Page 24 of 76 (labeled 24) of the users manual mentions the users ensuring that certain antennas have 1 dB loss in the feedline. This is not consistent with the professional installation mentioned throughout the application, as this is a professional installer issue, not the end users.

**Response: An updated manual has been uploaded for your review.**

7) Page 24 of 76 (labeled 24) of the users manual mentions the users ensuring that certain antennas have 1 dB loss in the feedline. This is not consistent with the professional installation mentioned throughout the application as this is a professional installer issue, not the end users.

**Response: An updated manual has been uploaded for your review.**

8) The users manual should instruct the OEM that their manual should NOT be provided any instructions on how to remove or install the device.

**Response: An updated manual has been uploaded for your review.**

9) System receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals (2.1033(b)(10)/15.247(a)(1)). Please provide information that shows this device complies with this.

**Response: The mode master unit sends out a synchronizing message at a precise instant on each channel, which allow the remotes to know where time Zero is, and when they should move to the next channel in the table. If additional details are required please refer to the MDS TransNet 2400 "Theory of Operations and Block Diagram" dated 3/3/04 which was supplied with the original submission package. Specifically, Section 3 "Description of Device Operation" Paragraphs 4 and 5 describe the hopping and synchronization process in detail (For further details please see 11 below)**

10) This device shall use a pseudorandomly ordered list of hopping frequencies. The theory of operation mentions the method of accomplishing this. To show compliance, please provide sample hopping tables (minimum of 2 if the device is capable of having multiple hopping tables).

**Response: 3 text tables have been uploaded, these list all 3 bands available and the hopping frequencies available for each.**

11) Please provide information explaining compliance to 15.247(g)/(h).

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

**Response: for (g) The software initiates the hopping pattern automatically based in the mode of operation, M master or R remote. In both cases the unit is DSP based and never will dwell on a channel when continuous data is presented. The DSP and micro will buffer the data and distribute over the band A, B C, which one is selected. The unit is NOT capable of continuous transmission on a single channel.**

**for (h) we do not coordinate the hop patterns, they truly are random, and we only employ avoidance by allowing the choice of a frequency hopping band (A, B, or C) to be chosen**

**The TransNET2400 operates in half-duplex mode, typically in a poll/response fashion. The master station "mode M" transmits a synchronization message pseudo-randomly on all channels at precise regular intervals. The synchronization message allows the remotes to know where time Zero is, and when they should move to the next pseudo-random channel in the table. All remotes synchronized to a given master, hop to the same frequency on the same channel at the same time and they change this frequency all together. These radios will occupy just one channel at a time, but not the whole frequency band, or a significant portion of it.**

12) Some pages in the test report appear to show the FCC ID with "2.4" vs "24". Please correct.

**Response: The report has been updated to reflect the 2.4 to 24 correction on the FCC ID.**

13) The minimum channel spacing shown on page 8 of 34 of the test report appears incorrect. Shouldn't this be the maximum 20 dB bandwidth measured?

**Response: Per section 15.247 (a)(1) "Frequency hopping systems shall have hopping channel carrier frequencies separated by a "minimum" of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater."**

**The paragraph states the minimum not the maximum 20-dB bandwidth. The minimum measured 20-dB bandwidth was 160kHz. The maximum measured channel separation was 200kHz.**

**The same is stated by section 15.247 (a)(2) "The minimum 6 dB bandwidth shall be at least 500 kHz", but most DSSS have a maximum bandwidth's of 9MHz or more.**

14) For the Channel Occupancy test, it appears the device was hopping on more channels than will typically be used during actual use. The theory of operation mentions between 64 and 128 channels. This test should have been performed using the smallest number of channels possible during actual use.

**Response: The lab plotted all 128 channels in one band, and used that as reference. There are 8 zones in each band plan "Zone 1-8". The end user can command the radio to skip zone # "s to a maximum of 4 zones which is 64 channels. Each zone consists of 16 channels. The software command ZONE function's as a block command to not hop on channels where interference is causing undesired degradation in performance. The attached plot to this email shows a 64 channel operating mode. As a factory default all zones are enabled, this is the desired operating mode. Only if there is interference will the ZONE command be used, this is described in detail in the manual.**

15) Page 19 of 34 of the test report appears to show numbers of 88.74 and 88.47. Which is correct?

**Response: This has been corrected. Revised report has been uploaded.**

16) Antenna conducted scans were shown up to 26 GHz, but the test equipment used does not appear capable of this.

**Response: This has been corrected. Revised report has been uploaded.**

17) It is assumed that the EUT obtains its power from host equipment. Therefore compliance with conducted emissions (15.107 & 15.207) still needs to be shown. See 15.107 (f) & 15.207 (d) for details.

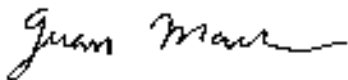
**Response: This has been performed. Data is included in the revised report. AC conducted Test configuration photos has also been uploaded**

18) FYI...Proposed grant notes (assuming there is not a dependency on shielding from a laptop) Limited Modular Approval (LMA).

Power Output listed is conducted. This device must be installed by Grantee, OEM integrator or professional installers - user installation is prohibited. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. OEM integrators and professional installers must be provided with antenna installation instructions. OEM integrators and end-users must be provided with transmitter operation conditions for satisfying RF exposure compliance. This grant is valid only when the device is sold to OEM integrators and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device..

**Response: This device is "not intended to be installed in a Laptop computer". It is professional installation for industrial customers only, examples, SCADA applications in gas, oil, traffic monitors etc. The grant limitations above are totally acceptable.**

Regards,



Juan Martinez  
Sr. EMC Engineer