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August 20, 2003

Mr. Tim Johnson
American Telecommunications Certification Body Inc.
6731 Whittier Ave
McLean, VA 22101

RE: Comments of July 12, 2003
APPLICATION: Q5L-ZRC-20 Zeus Technology Systems, Inc.

Dear Mr. Johnson:

Below are the comments that you have provided regarding the application for certification referenced above. Our responses to those comments are in ***bold italic***. Many responses refer you to additional exhibit(s) which has been uploaded to the application folder at the ATCB website.

Thank you for your attention. Please feel free to contact us for any additional information that you may require.

Regards,

Gregory M. Snyder
Chief EMC Engineer, Wireless/Telco Services Manager

Brian J. Dettling
Documentation Specialist

WLL Project: 7580

July 12, 2003
RE: Zeus Technology Systems, Inc.
FCC ID: Q5L-ZRC-20

1) The device appears to be a TX module and not an end use device and from the users manual appears to be desiring a modular approval. However a modular request letter has not been submitted. Please explain and if applicable provide a modular request letter that addresses the issues given in the FCC docket provided in the attachment. Note that due to the power levels of this device, it may only be approved for use as a module in RF categories considered as mobile or fixed. Portable conditions would not be allowed.

R. Please see exhibit “ZRC-20 Modular Approval Letter.pdf” for a request for modular approval.

2) Please provide photographs of each of the proposed antenna(s) as part of your external photograph exhibit. Note that the user manual mentions 5 different antennas (page 3).

R. Please see exhibit “ZRC-20 Revised Operational Description.pdf” that includes additional antenna information.

3) Please provide further information regarding the 5 proposed antennas for use with this device (types, gain, etc.). Note that the FCC requires that the highest gain of each type (monopole, dipole, yagi, dish, patch, etc.) be tested and that all available antennas be listed in the filing.

R. Please see exhibit “ZRC-20 Revised Operational Description.pdf” that includes additional antenna information.

4) Device authorized under 15.247 are required to submit information in regards to RF exposure (ref. 15.247(b)(4)). This information has not been provided. Please provide.

R. Please see exhibit “ZRC-20 MPE Report.pdf” for the RF Exposure information.

5) The block diagram appears to show an RF switch at the output to the antenna, however the schematic does not appear to show a switch. Please confirm that the block diagram and schematic are correct for this device and correct if necessary.

R. The switch is shown on page 3 of 6 schematics provided. The control circuit including Q16A/B controls the diodes CR5 and CR6 switching between the transmit and receive paths.

6) The test report only lists one measurement antenna, yet testing is required up to approximately 25 GHz. Please update the test equipment list for all antenna used.

R. The test report has been updated to include all test equipment used during testing.

7) The test report section 4 takes advantage of a duty cycle correction for the TX dwell time. However, it is uncertain if this dwell time is set or if it may be variable. Please provide further information from the manufacturer regarding possible dwell times and if necessary adjust the test report.

R. The dwell time is fixed and the duty cycle correction factor has been corrected in the revised test report.

8) 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.

R. As indicated on the submitted schematics and block diagrams, filtering with a bandwidth that matches the channel bandwidth, exists in the receiver portion of each transceiver. Also as indicated in the Operational Description a transceiver transmits a packet and the receiving

transceiver replies with a short acknowledgement thus keeping the two synchronized within the list of the preprogrammed 75 frequencies.

9) The duty cycle shown in section 4 of the report show a 3.67 ms dwell time. However if the device uses each frequency equally on the average, it is uncertain how it can dwell on 1 frequency twice in 100 msec if the device is using 75 channels

R. An incorrect plot was used for the duty cycle correction. This plot has been corrected and a new duty cycle correction has been calculated in exhibit “ZRC-20 Test Report Revision 1.pdf”.

10) Measurements of low, middle, and high channels should be made to show that each channel is used equally on the average, and that this time is less than 400 msec per 30 seconds.

R. The exhibit “ZRC-20 Revised Operational Description.pdf” now lists the 75 hopping channels and the revised test report shows the correct dwell time of each hop for a channel. Based on the correct dwell time of 3.25ms and each channel being used equally, the maximum dwell time per channel in a 30 second period is be 399.75ms.

11) From the plots showing the number of channels, only 74 channels can be counted (vs. 75). Note that since the 20 dB bandwidth is < 1 MHz, 75 channels is the minimum allowed per 15.247(a)(1)(ii). Please explain.

R. For clarity, the plot was split into two sections. One of the channels was plotted on the edge of the scan view, in effect splitting it in two as well. Also, the revised Operational Description now lists the 75 channels.

12) The users manual mentions 5 different antennas, although the test configuration photographs only appear to show one antenna as being tested.

R. Only the highest-gain antenna was tested as all the antennas are of the same type. See revised Operational Description.

13) Please explain why the Cable, Antenna and Amplifier are consistent for all frequencies between peak and average except for 12.009 GHz.

R. During the extraction of the data from the data spreadsheet some of the columns for all the average measurements around 12 GHz were shifted by one row resulting in different correction factors. This has been corrected and a new data sheet is located in exhibit “ZRC-20 Test Report Revision 1.pdf”.

14) Please explain the RBW and VBW setting used for all radiated emissions tests.

R. For measurements below 1000MHz: RBW= 120kHz and VBW = 1MHz. Above 1GHz (Peak): RBW = 1MHz and VBW = 1MHz. Above 1GHz (Avg.): RBW = 1MHz and VBW = < 30Hz. This information has been added to the revised test report.

15) Please explain the use of the AVG detector. Frequency hopping systems must be measured using a hop-stopped carrier (frequency stopped, plus with a non pulsing carrier) when possible. The difference

between peak and average readings suggests that the carrier may not have been in continuous TX. Frequency hopping systems are measured hop stopped for PEAK and AVG emissions, but if they normally would TX < 100 msec per channel they may be additionally corrected for time of occupancy per channel as shown in section 4 of your report. If the device was not appropriately hop stopped, then the use of the AVG detector using standard RBW = 1 MHz and VBW = 10 Hz may not be allowed. Note that if the device has a duty cycle as given in this report, then further average measurements are not necessarily needed since the correction factor exceeds 20 dB. Additionally note, that as long as peak emissions were taken properly with a RBW and VBW of 1 MHz, you may correct for averaging by the actual duty cycle even if greater than 20 dB. This is a common misconception regarding this issue. Please call to discuss if you have any questions regarding this issue.

R. The data in the test report has been corrected to show only the peak measurements with the applied duty cycle for comparison to the average limit.

16) This device shall use a pseudorandomly ordered list of hopping frequencies. Please explain how this device accomplishes this and also provide sample hopping tables (minimum of 2 if the device is capable of having multiple hopping tables).

R. This information is now included in the revised Operational Description.

17) Please provide information showing compliance with 15.247(g)/(h).

R. Information pertaining to the compliance with 15.247(g)(h) is located in the revised Operational Description.

18) If this device is being approved in a modular fashion, then the manual should provide further information to the user regarding labeling, RF exposure conditions, EMC responsibility, etc. The manual does not appear to provide enough information to the manufacturer and additionally the labeling should suggest "contains TX module". I have enclosed sample text suggested for some types of devices that can be used and/or reworded as necessary.

R. Please see exhibit "ZRC-20 User Manual Revision 2.pdf".