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March 7, 2007

Mr. Tim Johnson
American TCB
6731 Whittier Avenue, Suite C110
McLean, VA 22101

RE: Emailed comments

APPLICATION: UT650289BA8800UL (ATCB4546)

Dear Mr. Johnson:

Below are the questions regarding this application posed to Washington Laboratories, Ltd. via email, and our responses.

Please do not hesitate to contact us, should you have any questions.

Sincerely,

Steven D. Koster
EMC Operations Manager

Brian J. Dettling
Documentation Specialist

WLL Project #: 9520

1) It appears that frequency translation is possible from looking at the block diagram, however operational description suggests that the TX frequency is same as incoming. However tables in the manual suggest only 8 channels can be output, but the software screens shown a large number of any 25 kHz channels as possible. The information is confusing and solid understanding on the operation and if it incorporates translation can not be determined. This should be clear as to understand how the device operates. Note that if it does translate frequencies, then frequency stability is required.

a.) The device does not translate frequencies. The incoming signal is mixed with an LO to down-convert to 90 MHz and after filtering and amplification, the 90MHz is mixed with the same LO so the input and output frequencies remain the same.

b.) The output RF will, therefore, not change with temperature or voltage variation.

c.) The software is Airorlite's general software. The frequencies for this device are listed in the table on page 2 of the manual.

2) The test report and other documentation states this is a bi-directional booster. If it were bi-directional we would expect to see the uplink data. Uplink info is in the other application, so apparently both applications make up the bi-directional aspect. If this is the case then the terminology is not correct as each device being certified would only be a directional booster/repeater and not bi-directional booster. The operational description, manual and test report and other documentation must make this fact clear. Currently the operational description will red-flag this application because it discusses a bi-directional amplifier. At a minimum, a note should be added to the PDF file that only the downlink amplifier portion of this system is being Certified. Otherwise first impressions are that what is Certified and what the operational description is are two different items. A similar problem can be assumed about the block diagram. The block diagram is actually system level but was not clearly understood what part of it covers the application until deep into the application itself. It would be best for the block diagram to have a note or markings showing what part of the system the application is covering.

The report in each case has been edited to show that there are two applications: One is for a downlink booster and the other is for an uplink booster.

The system as a whole is a Bi-directional booster; this application is for the uplink channels.

3) I did not find any information regarding the emissions the device/system is designed to use in the manual or operational description. The test report simply cited "depends on system". Amplifier guidance "attached" clearly states investigation of the different modulations is required for certain tests (i.e. power, conducted spurious, intermodulation,

and input/output bandwidths - but see guidance for complete detail). Therefore justification as to the F1E designator should be provided and depending on intended use of the device - additional emissions may need to be investigated for certain tests. As is, this device could only be used for F1E signals.

The Form 731 (50289UL Application Form - 731 revised 3.07) has been revised accordingly:

The emission designator has been changed to "F8E". The system is employed to augment analogue, frequency modulated voice communications. The device is capable of 8 channels of operation. Hence, from FCC 2.201:

F: Frequency Modulation
8: One or more channels containing analogue information
E: Telephony

4) Frequency tolerance should cite "amp" unless frequency translation occurs (as mentioned above).

The Form 731 has been revised accordingly.

5) Given the uplink/downlink are separate, to clarify this and how the device is used, the grant notes should contain: "Part of booster system used with FCC ID: xxxyyy."

Acknowledged.

6) Booster rules cites: – Include exhibit or correspondence showing applicant was informed that boosters must meet all criteria stated in Sections 90.219 and 22.383 for related booster/inbuilding operations. NOTE: THIS APPEARS TO BE A CLASS B DEVICE UNDER 90.219, AND IF SO, SHOULD ADEQUATELY JUSTIFY AS SUCH.

The applicant is informed. See letter (Airorlite Pt90.219 Letter).

7) While radiated spurious may use a CW signal, conducted spurious requires to test all modulation types [TDMA, CDMA, and FM (covers GSM andF1D)] at low, mid. and high frequency. Given 3) above, it is uncertain if this is covered appropriately.

This device is designed to be used with FM input/output signals. Other modulation types are not required to be characterized.

8) There does not appear to be information to support that input drive level is at maximum input rating and maximum gain settings for all tests. Given this is basically and amplifier, this should

be documented/justified....Additionally an explanation of what keeps the device from going into saturation should be provided...Generally amplifiers, booster, and repeaters must justify the levels used for test and document them as appropriate. See attached guidance as well...

The drive level was supplied by the customer. The optimal drive level was derived from empirical measurements provided by the customer on actual installations. A -50dBm level was found to represent the highest incoming stimulus signal.

9) Power on grant should be clearly understood as either composite of multi-channels or per carrier. If power is composite include in comments field: "Power output listed is composite for multi-channel operation." It appears single channel power was tested...But how is output affected for multi-carriers given this device is clearly going to operate using 8 channels? Also, since the downlink would be classified as mobile and not fixed (i.e. in-building operation) MPE must be addressed with the maximum power and highest gain antenna. It is not clear from the report if the power out of this device is a per-channel power or a composite power. Depending on which power designation it is the actual output power of the device may exceed that listed in the excluded rf category and may in fact have to have measured MPE performed. See 10). Additionally, the output power was about 180 mW conducted per carrier, but the manual cites 25 dBm per carrier MINIMUM. Maybe this is due to difference of EIRP and conducted, but the way the manual cites this appears to be conducted. Therefore a difference between what was measured and expected may be present, which would also suggest drive levels were not properly set.

The device is intended to operate with eight (8) channels simultaneously.

The uplink and downlink are rack-mounted equipment with fixed antennas. Mobile evaluation does not apply. The cutsheet originally supplied by the client mistakenly cited 25dB MINIMUM. A new sheet (52500-FCC_03_06_07R2 Model (1)) reflects the actual which states 25dB MAXIMUM.

The composite output power is limited to 31dBm through AGC in the amplifier. See 50289UL Block Diagram 3.07

10) Given 9 above, it is uncertain if the RF exposure is adequate. For instance, is it possible that the output can be 8* 22.6 dBm (182 mW) + 5 dBi. This would yield and EIRP of 4.6 Watts or ERP of 2.81 W. This would exceed the allowed 1.5 W under 1.1091 and would therefore Require RF exposure evaluation (measurements). Clear understanding of RF exposure, power output, etc. must be shown. Also addition of the antenna gain (or net gain) for this device should be added to grant notes.

The 5 dBd antenna is the rooftop mounted antenna that will not have RF exposure issues as it is fixed installation. The in-building/tunnel radiators are "leaky coax" with 60dB coupling. Assuming operation at the highest composite output power of 21dBm the radiating elements are emitting at a -29dBm level, which is well below accepted RF hazard levels.

11) Current RF exposure shows 25.7 dBm while report shows 22.6. Why the difference? Also note concern with 9) & 10) above which affects this issue.

See response to Question 13.

12) I've not looked at the schematics in detail, but they should be separated appropriately so only the downlink path is included with this application.

The Schematics files as supplied by the customer are locked from editing.

13) The manual states that a 15cm separation is required. Remember that the FCC MANDATES mobile devices must maintain a minimum 20cm separation otherwise they are classified as portable for rf exposure regardless of the type device. The manual must be changed to reflect this.

Unit is fixed, not mobile, for the uplink roof antenna. The inter-building/tunnel antenna is a leaky coax with 60 dB coupling. Thus the mobile separation distance requirement is not applicable. We would appreciate guidance as to properly addressing separation distance for a fixed installation.

14) It is not clear if the plots labeled "**High Channel with Signal Generator Output"** is the booster/repeater input signal. While it may be assumed this is the case, the test report needs to make it clear. Remember, the TCB cannot make assumptions as to what a confusing statement may or may not mean. The report must be clear and unambiguous.

Figure captions have been revised in the test report.

15) Per Dennis: The schematics mention a "cellular 10W amplifier". This indicates use in the part 22 area. This device could not be used for part 22 cell band without specifically listing part 22 and testing in accordance with part 22. Consequently, while part 90 operation would be allowed, under no circumstances can this be used as a cell phone repeater.

The device is FM only; there is no usage that falls under FCC Part 22.