January 27, 2003

RESPONSES TO QUESTIONS FROM FCC ON THE SAR COMPLIANCE TESTING OF ASKEY COMPUTER CORPORATION 802.11 a/b CARDBUS CARD (FCC ID# H8NWLC221-D4) INSERTED INTO (IBM MODEL 2628*) LAPTOP COMPUTER

This SAR test report was submitted on November 21, 2002. The two questions asked and our response is given in the following:

Q9. *Additional calibration information for 5 GHz testing. Please include photographs of the key steps taken.*

Response:

As suggested in the Draft standard P1528 [a], a waveguide (WR159) filled with the tissue-simulant fluid was maintained vertically. Two photographs of the rectangular waveguide filled to a depth of 15 cm with the tissue-simulant fluid are given as Figs. A and B. To prevent leaking of the fluid, the vertical waveguide section was sealed at the bottom by means of a 2 mm thick rectangular plastic plug. The Narda Model 8021 Miniature Broadband Electric Field Probe is inserted from the top and moved up or down vertically by the vertical stepper motor which is one of three motors for the SAR measurement setup (given as Fig. 3 of the SAR Test Report). As mentioned in Section II (The SAR Measurement System), the positioning repeatability of the stepper motor system moving the E-field probe has been measured to be within ±0.1 mm [b]. From waveguide theory, one can write the expression for the decay of the fundamental TE_{10} mode fields in a rectangular waveguide filled with a lossy fluid [see e.g. ref. c]. By comparing the SAR (σE^2) associated with the square of the decaying electric fields for the TE_{10} mode with the measured output voltage (in μV) of the square-law detector of the E-field probe as a function of height above the bottom of the waveguide, we can obtain the calibration factor of the E-field probe for measurement frequencies of 5.2, 5.3, 5.7, and 5.8 GHz. The calibration factor thus obtained was 2.98 (mW/kg)/ μV with a variability of less than ±2% for these measurement frequencies.

Q10. *Additional photographs of the measurement setup for 5 GHz testing. Please provide improved quality photographs of the device against the phantom. Please provide additional perspective angles.*

Response:

An improved quality photograph of the Askey Corporation 802.11 a/b Cardbus Card inserted into an IBM Model 2628* laptop computer with its bottom pressed against the bottom of

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* IBM Model 2628-21T S/N 97-051T6 07/00, manufactured by IBM Japan, Tokyo, Japan.

the planar tissue-simulant phantom to simulate "above-lap" placement of the wireless PC is attached here as Fig. C. This is a redone version of Fig. 5 previously included in the SAR Test Report.

Similarly, a redone version of Fig. 6 of the SAR Test Report is included here as Fig. D. This photograph was taken for the Askey Corporation 802.11 a/b Cardbus Card inserted into the IBM Model 2628* portable computer placed with the card edge at 90° pressed against the bottom of the phantom i.e. with a separation of 0 cm for "end-on" testing of SAR. Note the reflection of the Cardbus Card in the tissue-simulant fluid.

References

a. IEEE Draft Standard P1528, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communication Devices: Experimental Techniques," Draft CBD1.0, April 4, 2002 (IEEE Standards Coordinating Committee 34).

b. Q. Yu, O. P. Gandhi, M. Aronsson, and D. Wu, "An Automated SAR Measurement System for Compliance Testing of Personal Wireless Devices," *IEEE Transactions on Electromagnetic Compatibility,* Vol. 41(3), pp. 234-245, August 1999 (attached with the SAR Test Report as Appendix A).

c. O. P. Gandhi, *Microwave Engineering and Applications,* Pergamon Press, New York, 1981.

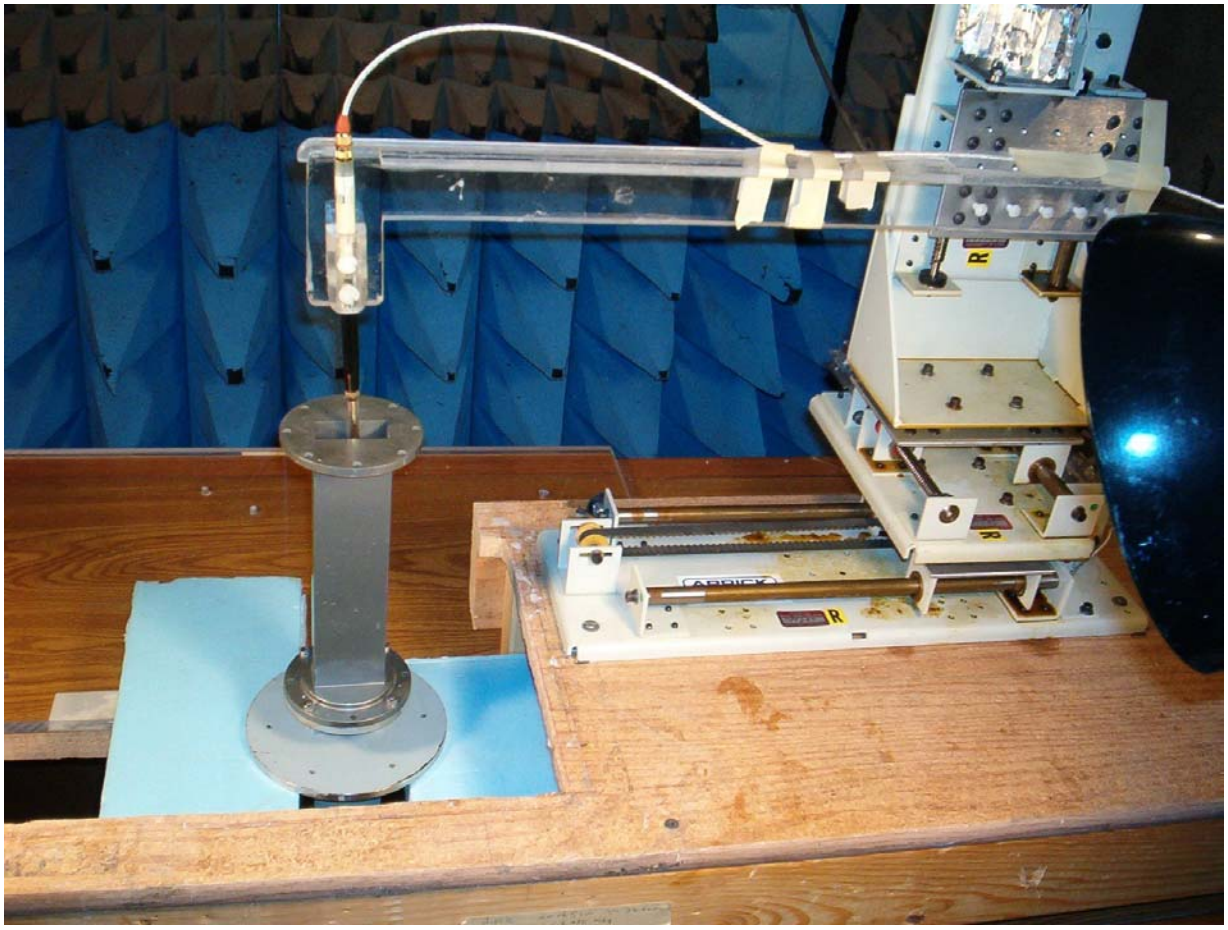

Fig. A. A photograph of the waveguide setup used for calibration of the Narda Model 8021 E-field probe in the frequency band 5.2-5.8 GHz.

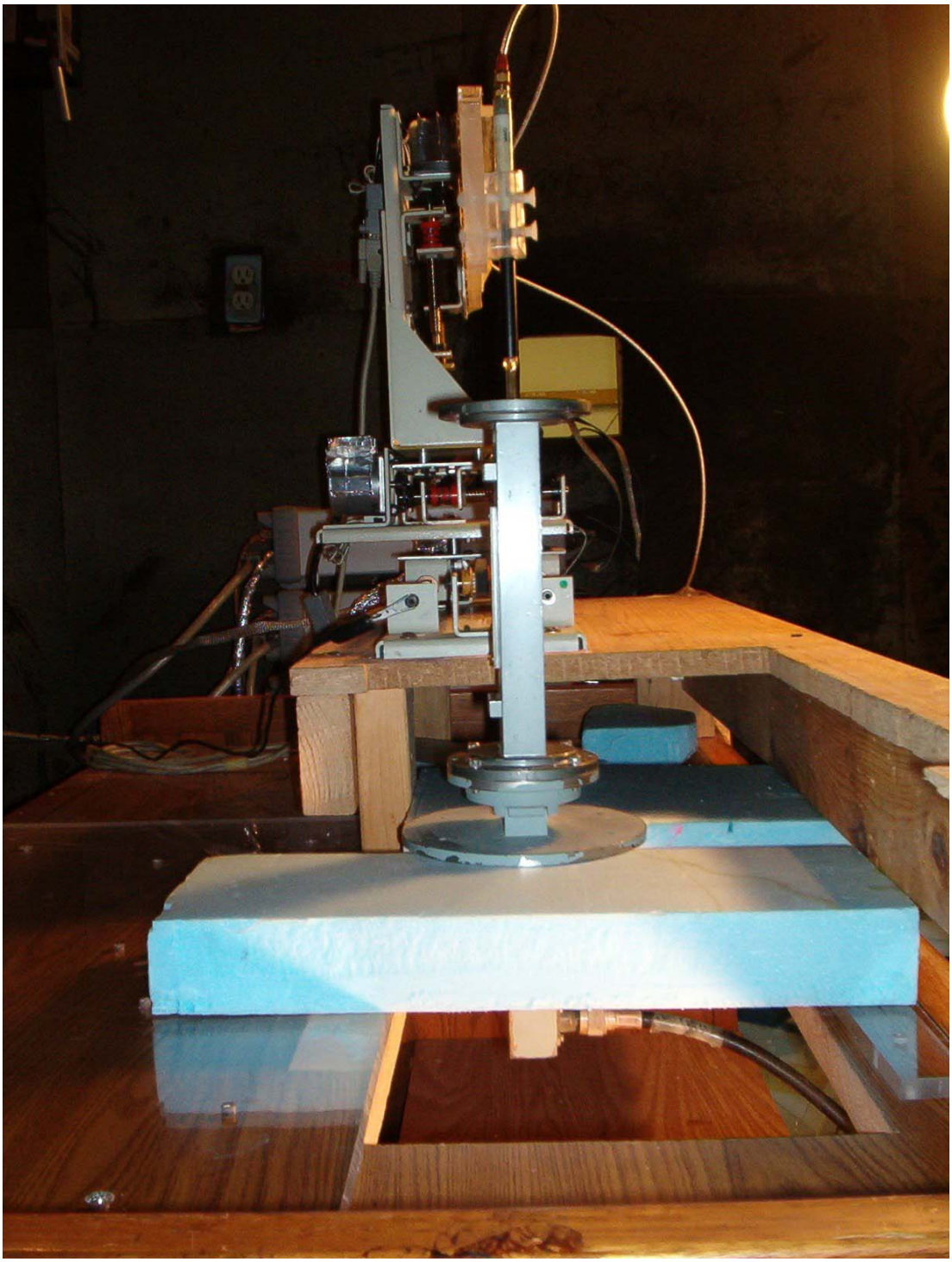

Fig. B. Photograph of the waveguide setup showing also the coax to waveguide coupler at the bottom used to feed power to the vertical waveguide containing the tissue-simulant fluid.

Fig. C. Photograph of the Askey Corporation 802.11 a/b Cardbus Card inserted into the IBM Model 2628 laptop computer with the PC bottom pressed against the bottom of the planar tissue-simulant phantom to simulate "above-lap" placement of the wireless PC. (This is a redone version of Fig. 5 of the SAR Test Report submitted November 21, 2002).

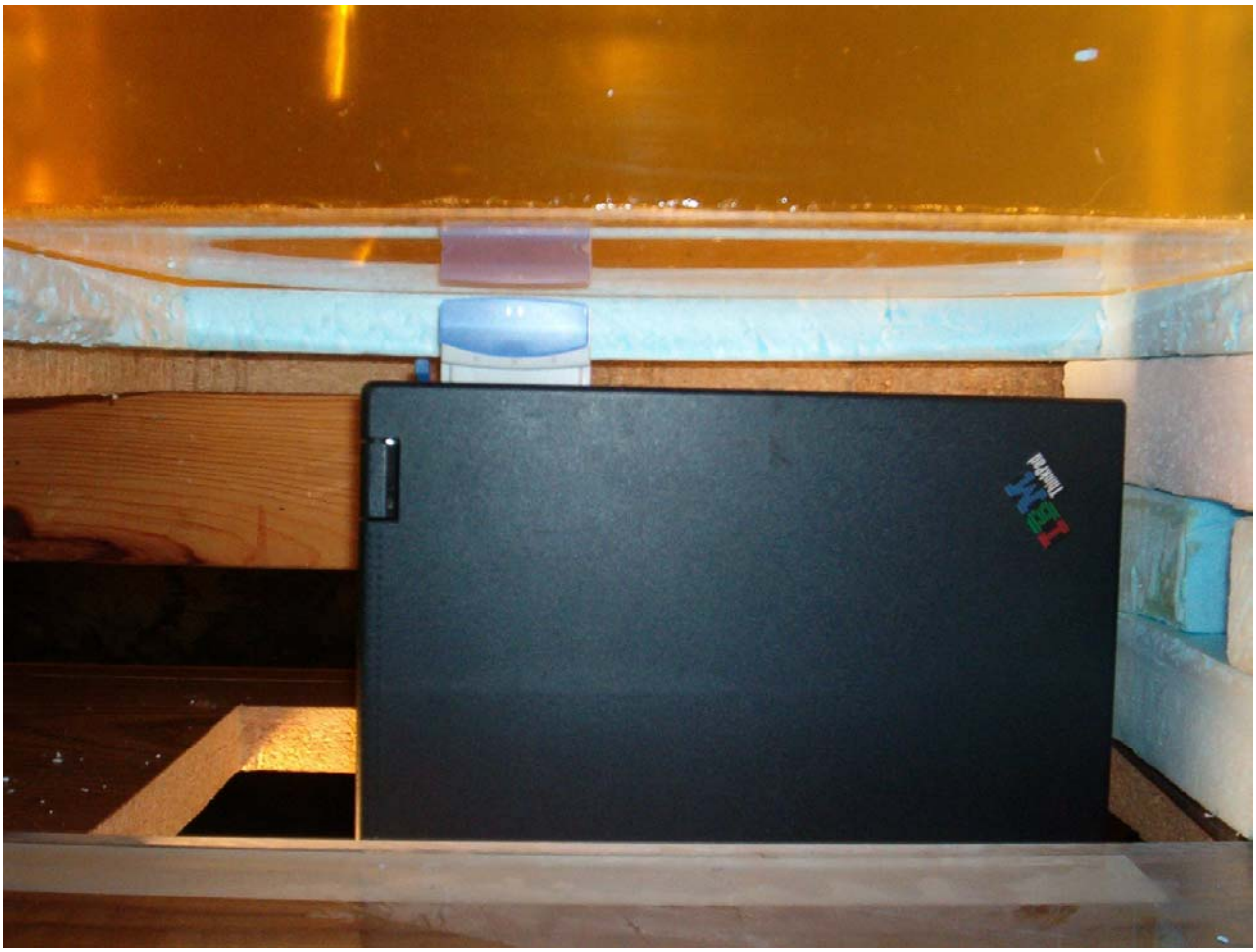

Fig. D. Photograph of the Askey Corporation 802.11 a/b Cardbus Card inserted into the IBM Model 2628 laptop computer placed with the card edge at 90° and separated from the bottom of the phantom by 0 cm for "end-on" testing of SAR. Note the reflection of the card edge in the tissue-simulant fluid. (This is a redone version of Fig. 6 of the SAR Test Report submitted November 21, 2002).