June 6, 2003

RESPONSES TO FCC QUESTIONS ON THE SAR REPORT FOR ASKEY COMPUTER CORPORATION MODEL WLL220 MINI PCI CARD BUILT INTO COMPAL MODEL ACY NOTEBOOK COMPUTER

FCC ID# H8NWLL220C

SAR Report originally submitted March 20, 2003

1. ***User manual for the laptop computer.***

Response:

Has been submitted to you.

2. ***Update RF safety statement. Please move "indoor only" statement to a more appropriate location. It is not RF safety related. It is recommended that language easy for a typical user to understand be used. Terms such as "uncontrolled" and "co-located" may not be understood by typical users.***

Response:

Yes, indoor restriction has been moved to chapter 1 and the "co-located" statement has been re-wroding.

3. ***System uncertainty using P1528 template.***

Response:

The measurement system uncertainty analysis originally submitted as Appendix B.1 has been rewritten using P1528 template and is attached here as Table a.

4. ***Additional SAR data as follows: Sample of other data rates at worst-case configuration to demonstrate suitability of probe calibration for these modulations.***

Response:

The client provided a special software program to drive the EUT to transmit continuously at the specific maximum power and to alter the EUT to operate at various channels. To demonstrate that the probe calibration with CW signal applies to modulated signals in filing, the procedure was as follows.

For the microvoltmeters in our SAR system (HP34401A Multimeters), we use an AC signal filter with a passband of 20 Hz to 300 kHz (1 reading/second). This allows faithful readings of the rectified values of voltage outputs from the three pickup antennas (proportional to E^2) of the E-field probe used for SAR measurements. For a variety of modulated signals often used for wireless PCs including the present Askey Computer Corporation Model WLL220 Mini PCI (FCC ID# H8NWLL220C), the multimeter passband of 20 Hz to 300 kHz is more than sufficient to read all of the frequency components. We have tested the validity of using this AC signal filter by applying signals from a Hewlett Packard Model 83620A synthesized sweeper operating at 5.25 and 5.8 GHz in the CW mode as well as the pulse mode with pulse repetition rates for the latter variable from 50 to 500 Hz and pulse durations variable from 0.5 to 1 msec. For a fixed location of the E-field probe, the SAR readings are proportional to the time-averaged power into the waveguide (from 2.5 to 100 mW) with a probe calibration factor of 2.98 (mW/kg)/μV ± 2%.

5. ***Details of power measurement made during the SAR measurement. Are these peak or average ? What is BW of measurement equipment.***

Response:

We used the peak power meter to measure the peak output power before and after SAR testing. Theoretically we should use the diode-detector SG substitution method for peak power measurement which guarantee almost no BW limit, but we found that the measured result via the Narda shottky diode-detector in this case is only 0.5dB higher than that of peak power meter. So, for convenience, we use peak power meter, and the power variation before and after SAR testing is the key point we need to know.

6. ***Updated SAR plots. Please include data, liquid parameters, temperatures and probe factors.***

Response:

The various required parameters such as date, temperatures, probe factors etc. should have been included in the summary SAR data given in Table 11 of the SAR Report submitted on March 20, 2003 but were instead included in the various sections of the text of the report. The required information is as follows:

Date:	March 17, 2003
Liquid parameters:	Same as those given in Section V of the SAR test report dated March 20, 2003.
Temperatures:	Given on p. 8 Section VI of the SAR test report dated March 20, 2003; 23.2 ± 0.2°C.
Probe Factors:	Given on p. 4 Section III of the previously submitted SAR test report; 2.98 (mW/kg)/μV with a variability of less than ± 2% for repeated measurements both at 5.25 and 5.8 GHz.

Table a. Uncertainty analysis of the University of Utah SAR Measurement System.

Uncertainty Component	Uncertainty Value ± %	Probability Distribution	Divisor	C_i 1-g	Standard Unc. u_i ± %	ν_i
Measurement System						
Probe calibration	2.0	N	1	1	2.0	∞
Axial isotropy of the probe	4.0	R	√3	$(1\text{-cp})^{1/2}$	1.6	∞
Hemispherical isotropy of the probe	5.5	R	√3	$\sqrt{c_p}$	0.0	∞
Boundary effect	0.8	R	√3	1	0.5	∞
Probe linearity	3.0	R	√3	1	1.7	∞
System detection limits	1.0	R	√3	1	0.6	∞
Readout electronics	1.0	N	1	1	1.0	∞
Response time	0.0	R	√3	1	0.0	∞
Integration time	0.5	R	√3	1	0.3	∞
RF ambient conditions	0	R	√3	1	0	∞
Probe positioner mechanical tolerance	0.5	R	√3	1	0.3	∞
Probe positioning with respect to phantom shell	2.0	R	√3	1	1.2	∞
Extrapolation, interpolation, & integration algorithms for maximum SAR evaluation	5.0	R	√3	1	2.9	∞
Test Sample Related						
Device positioning	3	R	√3	1	1.7	11
Device holder uncertainty	3	R	√3	1	1.7	7
Output power variation – SAR drift measurement	5	R	√3	1	2.9	∞

Phantom and Tissue Parameters						
Phantom uncertainty – base thickness tolerance	10.0	R	√3	1	5.8	∞
Liquid conductivity – deviation from target values	0.4	R	√3	0.7	0.2	∞
Liquid conductivity – measurement uncertainty	1.5	R	√3	0.7	0.6	∞
Liquid permittivity – deviation from target values	0.8	R	√3	0.6	0.3	∞
Liquid permittivity – measurement uncertainty	3.5	R	√3	0.6	1.2	∞
Combined Standard Uncertainty		RSS			8.3	
Expanded Uncertainty (95% Confidence Level)					± 16.6	