SIERRA WIRELESS
HEART OF THE WIRELESS MACHINE®

Date: Jun 14, 2002

Office of Engineering and Technology
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21043
U.S.A.

To Whom It May Concern:

Re: FCC ID N7NAC750 Application for Permissive Change

Sierra Wireless, Inc. makes PC Card wireless modems for use in mobile computing devices including laptops and PDAs. Figure 1 shows a typical example of our PC Card type of product. As they function within Cellular/PCS systems these products fall under parts 22 and 24 of the Commission's Rules. The Commission's current approach in

Figure 1 AirCard 750 PC Card Wireless Modem

dealing with this kind of product requires us to test our modem with every host device to satisfy SAR requirements and to verify maximum output power. We think this approach is impractical. To perform a SAR measurement and file a permissive change for every new host device that our modem will work with will be a huge cost burden to us, an unmanageable volume of work for the Commission and will cause lengthy delay to the product introduction. On May 16, 2002 we met with Mr. Rich Fabina, Mr. Tim Harrington, Mr. Joe Dichoso and Mr. Steve Dayhoff in Columbia and had discussions over these issues. During the meeting we discussed alternative ways of dealing with the problems. The result of that discussion was our plan to file this Class II permissive change application for our product, model AirCard 750 (FCC ID N7NAC750) specifically to get approval for its use with PDAs, a configuration not allowed by the existing grant. As discussed in the meeting we want this application to set a precedent for how to approve our PC Card products in the future. We specifically need to resolve two issues with this application, one being the impracticality of measuring SAR performance on every potential host computer, and the other being the impracticality of using ERP/EIRP as the power output Rating of our products. The impracticality stems

from the fact that both SAR and ERP/EIRP varies depending on the host device that our card is plugged into, yet there are hundreds, perhaps thousands, of potential hosts. We seek to establish "host independent" approval. We define independence to mean that one approval authorizes use in any host that fits within a specific class definition. We offer our definitions of the most common classes in Appendix I. These definitions are based on the physical attributes of conductors and dielectric materials arranged in specifically recognizable shapes and sizes, which are, in general, the factors that determine the EM radiation properties.

1. Proposed RF Exposure Compliance Condition for Host-Independent Approvals

We understand that the SAR value will change to some extent when a different host device is used. A practical way of establishing the range of this variation is to test more than one host. Statistical theory would dictate that many different hosts be tested, perhaps twenty or more. This is impractical. We therefore propose to substantiate compliance with test data from three different hosts within a particular class. We choose hosts from three completely different manufacturers to get the broadest range of size, materials and construction. Therefore, this submission contains three sets of SAR data from three different PDAs for this Class II permissive change application. We request approval of our Class II permissive change to reflect acceptance of the entire PDA class of host.

2. ERP/EIRP Variations due to Change of Host Device

We recognize that ERP/EIRP will vary as our product is used in different hosts. However, the Commission currently uses ERP/EIRP as the Power Output Rating of our product. The Rules require application for a new ID in cases where the power output rating changes. It is impractical to use a different ID for our product for every host that it can be used with, as these may number in the hundreds. We propose that the power output rating of our PC Card products be stated as the conducted power measured at the coax connector present on every card. This value does not change from one host to another. Use of conducted power as the power output rating is historically well established in cases where a coaxial connector is available.

We believe this arrangement will in no way compromise the protection of the RF spectrum because ERP/EIRP are dealt with in Part22/24 and we would continue to measure ERP/EIRP to establish compliance with the rules for maximum ERP/EIRP, but this measurement should not be linked directly to the power output rating. As we propose to measure the radiation from our product when used in three different hosts for purposes of establishing SAR compliance, it would be appropriate to measure ERP/EIRP in the same three hosts to establish compliance with maximum ERP rules for the entire class of host.

In the meeting mentioned above we presented some EIRP data of our device, model AirCard 750 when tested with PDAs, and they were about 5dB lower than the data used

in the initial AirCard 750 filing, which were measured with the AirCard 750 hosted by an IBM laptop. Because of this relatively large difference, we were a little suspicious of the test data and therefore we asked the lab to repeat the EIRP measurement. The results of that investigation are presented in Appendix II to this letter. We conclude that the difference is indeed real and is easily explained.

One more thing to note is that the Commission currently grants host-independent approvals for mobile devices without requesting ERP/EIRP data from different hosts, despite the fact that ERP/EIRP also varies from host to host. We think the same principle should be applied to both mobile and portable devices as long as the ERP/EIRP doesn't exceed the limits set in Part 22/24.

We respectfully request, therefore, that the output power rating of the AirCard 750, FCC ID N7NAC750, be changed to 0.708 watt conducted power, and further request approval for use of this product in the PDA class of host device as defined in the attached report.

Please let me know if you have any questions or suggestions. Thank you very much for your kind consideration!

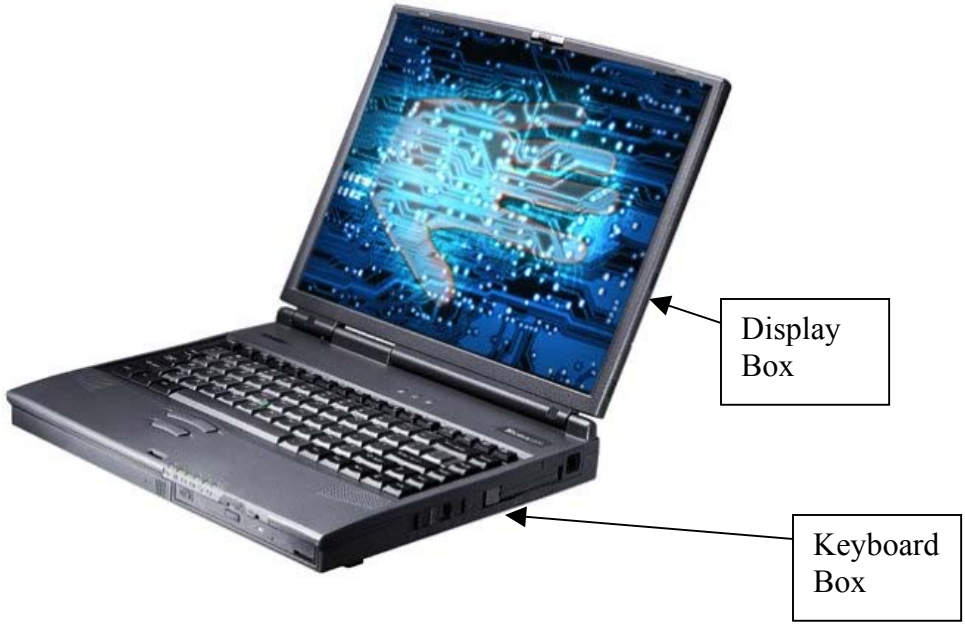
Best regards,

Ying Wang
Senior RF Engineer
Sierra Wireless, Inc.

Appendix I. Definitions of Host Class

Laptop

Typical notebook computer consisting of two rectangular boxes attached along one edge of each by a hinge. Refer to the accompanying figure. One box contains the majority of electronics including CPU, mass storage devices, and keyboard. This box normally lies flat on a desk or the user's lap. The other box contains the LCD display and is usually hinged up to a near vertical orientation to make the display visible to the user. The two boxes are nearly identical in outline dimensions but the display box is usually considerably thinner than the keyboard box. Outline dimensions of the entire assembly when closed, range from 20 cm wide x 16 cm deep x 1 cm thick to 35 cm wide x 30 cm deep x 4 cm thick. The keyboard box accounts for more than 60% of the overall thickness. The PC Card slot holding the wireless modem may be located on either side of the keyboard box at any point along those sides.



PDA

Typical configuration shown in the attached figure. This device is a single unit, roughly rectangular, which is self contained and intended to be used when held in one hand. The unit may be one box containing all necessary electronics and power supply, or it may be an integration of two or three user connectable subassemblies that when connected together form a single roughly rectangular assembly. The dimensions of the assembly range from 80 mm tall x 60 mm wide x 10 mm deep up to 160 mm tall x 100 mm wide x 50 mm deep. This class is characterized by having a large display, often occupying the majority of the front face, and a minimal number of keys. User entry is mostly done via touching the LCD screen rather than using a keyboard or keypad. The PDA is

distinguished from the Laptop by it's a) considerably smaller size suitable for holding in one hand rather than sitting on a surface and b) its integration of the LCD display into the main unit instead of in a separate box attached by a hinge. The PC card slot is exposed on the top end of the device. A wireless modem plugged in to this slot would have its antenna on the top end of the device. Sometimes PDAs are also referred to as Pocket PCs.

Palmtop

This class defines a device that falls somewhat between the Laptop and PDA. It is a two-piece assembly consisting of keyboard section and hinged display section, like the laptop, but is considerably smaller in size, suitable for holding in one hand. See the accompanying figure. The overall dimensions, when closed range from 120 mm wide x 60 mm deep x 10 mm thick up to 200 mm wide x 160 mm deep x 30 mm thick. The PC card slot would be exposed on either side of the keyboard section.

Appendix II. Investigation of EIRP Variations Between PDAs and Laptop

During the preparation of this submission, we noticed a relatively large difference (about 5dB) in EIRP between the EUT being tested with PDAs and with an IBM Laptop. We were a little suspicious of the test data and therefore asked the lab to repeat the test. The lab repeated the measurement on the EUT with three different PDAs (Cassiopeia E200, Compaq iPaq and HP Jornada), and the new data is similar to the previous one. The results are shown in the following table. (The data for the three PDAs is extracted from the attached Part 24 EMC Measurement Report and the data for the laptop is from the AirCard 750 previous filing.)

EIRP Data Measured with Different Hosts

Freq (MHz)	Cassiopeia (dBm)	iPaq (dBm)	Jornada (dBm)	IBM Laptop (dBm)
1850.25	27.71	27.04	26.07	32.19
1880.00	28.21	26.97	25.90	32.54
1909.875	28.61	27.60	26.54	32.52

As we can see the difference in EIRP between the EUT being hosted by three different PDAs and by the IBM Laptop ranges from 3.93dB to 5.98dB, not too much different from the data presented during the meeting.

We then conducted our own investigation. In theory EIRP is the sum of the EUT's conducted power output and the peak gain of the EUT antenna. We measured the peak gain of the EUT antenna with different hosts in our anechoic chamber. The results show that the peak gain varies as much as 3.66dB (See the results in the table below). In other words the EIRP also varies as much as 3.66dB since the conducted power is the same for different hosts.

Antenna Peak Gain Data Measured with Different Hosts

	Compaq iPaq	HP Jornada	IBM Laptop
Peak Gain	0.32dBi	-0.28dBi	3.38dBi

Attached are the plots of the antenna radiation pattern with the peak gain marked. For simplicity, only the polarization in which direction the peak gain appears was plotted. As we can see on the plots, the radiation pattern of the AirCard 750 with PDAs is more like a sphere while the pattern of the AirCard 750 with the laptop is more directional because laptop has some relatively larger parts like screen and keyboard, which reflect the RF energy and help to form a more directional radiation pattern. This explains why the EIRP varies so much from laptop to PDAs.

We therefore conclude that the EIRP difference between PDAs and Laptop is real.

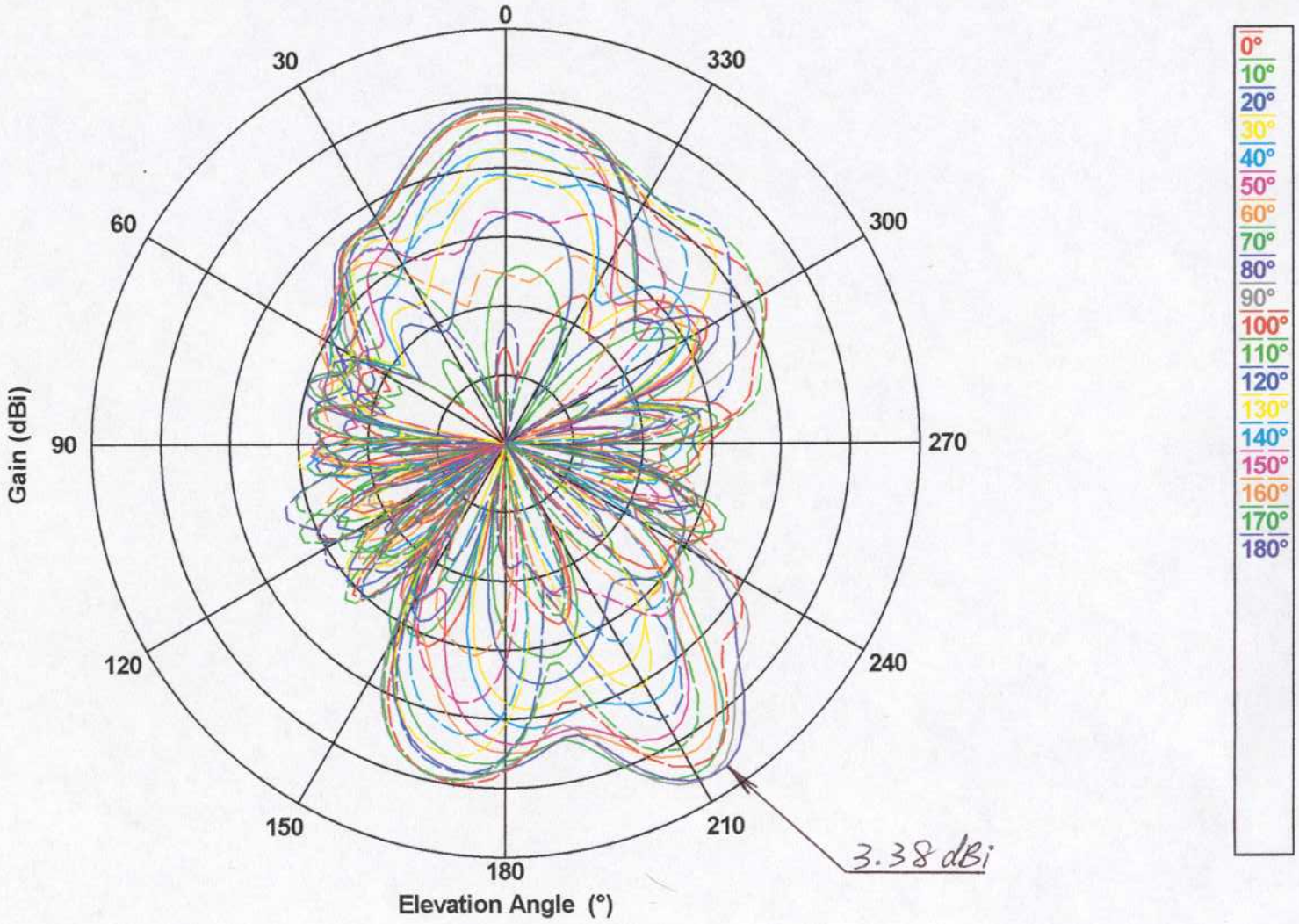
Data generated using AMS-9000 software by:

ETS·LINDGREN
An ESCO Technologies Company

Test Type: Two-Axis Dual-Polarization Pattern Measurement
Test Date: 05/29/2002 16:52:09
Operator: Richard Gu

Comments: (NO DATA)

AC750 Antenna Gain Measurement with IBM Laptop (Horizontal Polarization)



Max: 5
Min: -25
Scale: 5/div

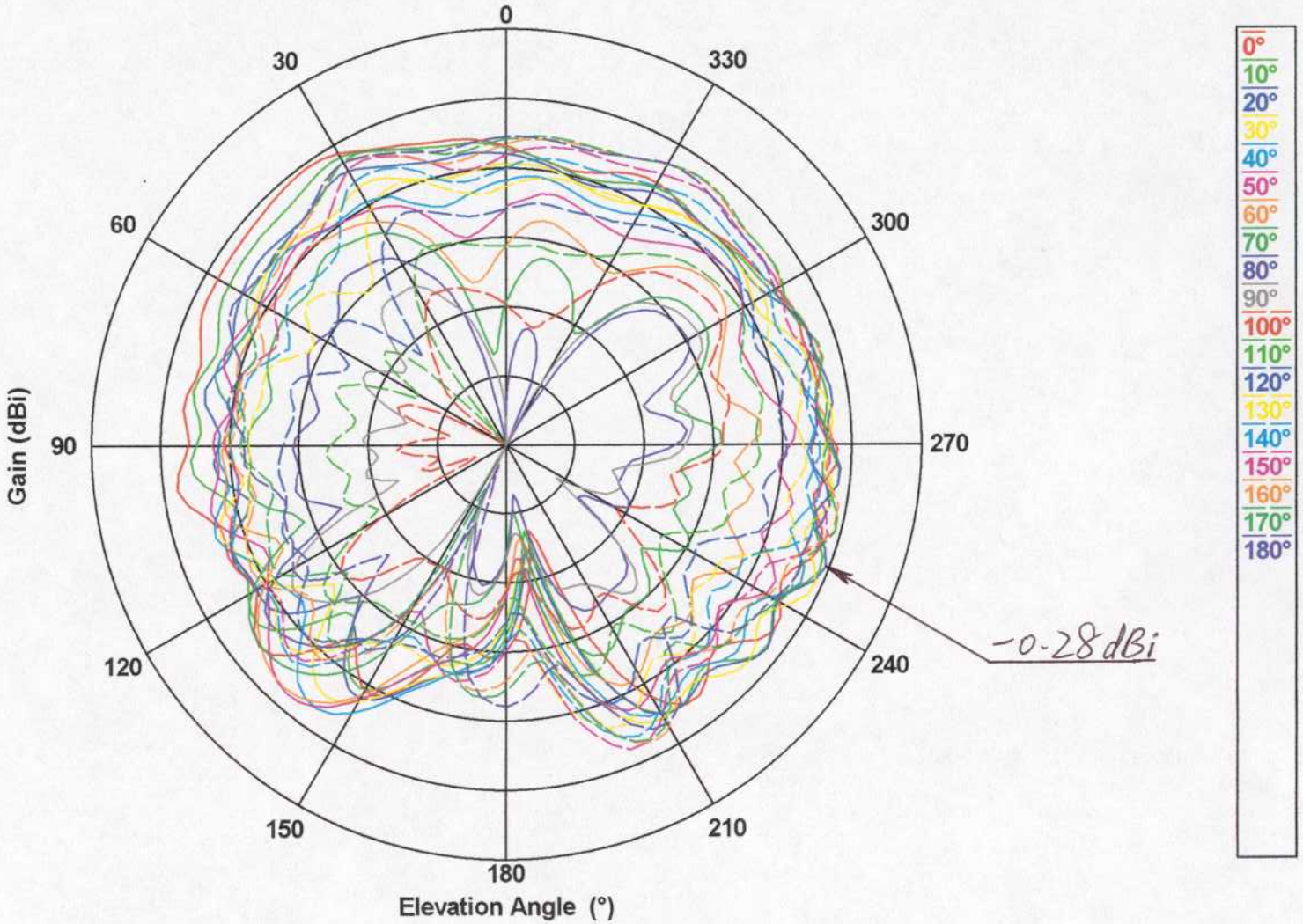
Data generated using AMS-9000 software by:

ETS·LINDGREN
An ESCO Technologies Company

Test Type: Two-Axis Dual-Polarization Pattern Measurement
Test Date: 05/30/2002 08:49:43
Operator: Richard Gu

Comments: (NO DATA)

AC750 Antenna Gain Measurement with HP Jornada (Vertical Polarization)



Max: 5
Min: -25
Scale: 5/div

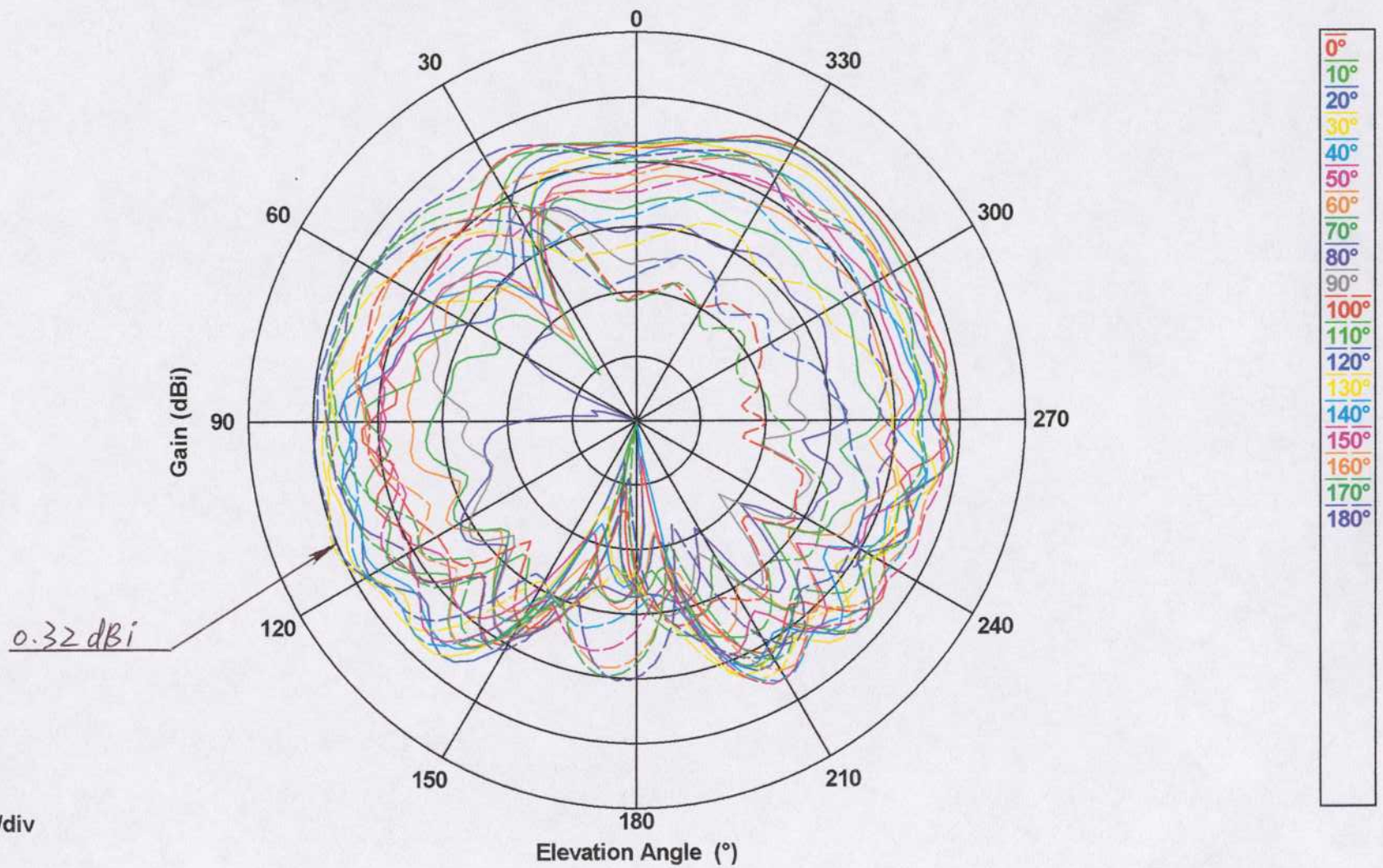
Data generated using AMS-9000 software by:

ETS·LINDGREN
An ESCO Technologies Company

Test Type: Two-Axis Dual-Polarization Pattern Measurement
Test Date: 05/30/2002 09:12:42
Operator: Richard Gu

Comments: (NO DATA)

AC750 Antenna Gain Measurement with Compaq iPaq (Vertical Polarization)



Max: 5
Min: -25
Scale: 5/div