

QTK 98-F008

**FCC Test Report
Application for Certification
On Behalf Of
D-Link Corporation
Cardbus Fast Ethernet PC Card
Model # : DFE 660 TX rev. B1, ETHER C32 TX rev. B1**

FCC ID : KA2FEPC66002

**Prepared For:
D-Link Corporation
No. 20, Park Ave. II, Science-Based
Industrial Park, Hsin-Chu, Taiwan, R.O.C.**

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The test results are traceable to the national or international standards
Test results given in this report only relate to the specimen(s) tested or measured.
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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

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1. Test Report Certification

QTR 98- F008

Applicant : D-Link Corporation

Manufacturer : D-Link Corporation

EUT Description

Model Name : Cardbus Fast Ethernet PC Card

Model No. : DFE 660 TX rev. B1, ETHER C32 TX rev. B1

Serial Number : N/A

FCC ID. : KA2FEPC66002

Power : 120V/60Hz AC

MEASUREMENT STANDARD USED :

CISPR 22 Limits and methods of measurement of radio disturbance characteristics of information technology equipment: 1993

MEASUREMENT PROCEDURE USED :

ANSI C63.4 Methods of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz. :1992

The device described above was tested by QuieTek Corporation to determine the maximum emission levels emanating from the device. The maximum emission levels were compared to the CISPR 22 limits for both radiated and conducted emissions.

The measurement results are contained in this test report and QuieTek Corporation is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the CISPR 22 limits.

Sample Received Date : November 19, 1998

Test Date : November 23, 1998

Documented by : Kathy Lee



Test Engineer:

Approve & Authorized Signer:

Neil Huang

Gene Chang

2. General Information

2.1 Production Description

Description : Carbus Fast Ethernet PC Card
 Model Number : DFE 660 TX rev. B1, ETHER C32 TX rev. B1
 Serial Number : N/A
 FCC ID. : KA2FEP66002
 Applicant : D-Link Corporation
 Address : No. 20, Park Ave. II, Science-Based Industrial Park, Hsin-Chu, Taiwan, R.O.C.
 Manufacturer : D-Link Corporation
 Address : No. 20, Park Ave. II, Science-Based Industrial Park, Hsin-Chu, Taiwan, R.O.C.
 Speed : 10/100 Megabit/sec.
 Data Cable : Shielded, Detachable, 15cm
 Test Mode : 100 Megabit/sec. Transmission and Reception

Note: The data show in this test report reflects the worst-case data for each operation mode.

2.2 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

The types for all peripheral devices

Notebook

Model Number : ThinkPad 560X
 Manufacturer : IBM
 Serial No. : SP0095
 FCC ID : Doc
 Cardbus Fast Ethernet : DFE 660 TX rev. B1, ETHER C32 TX rev. B1,S/N : None
 PC Card (EUT) : FCC ID.: KA2FEPC66002
 Power Adapter : The power adapter with a ferrite core is made by IBM.
 Cable: Shielded, Undetachable, 1m
 Power Cord : Shielded, Detachable, 1.5m

Mouse

Model Number : M-S34
 Serial Number : LZB75078478
 FCC ID : DZL211029
 Manufacturer : HP
 Data Cable : Shielded, Undetachable, 1.8m

Keyboard

Model Number : SCORPIUS 980N plus/980
 Serial Number : 808000124
 FCC ID : F2Q4NE980
 Manufacturer : QTRONIX
 Data Cable : Shielded, Undetachable, 1.8m

Printer

Model Number : C2642A
Serial Number : MY75J1D1D0
FCC ID : B94C2642X
Manufacturer : HP
Data Cable : Shielded, Detachable, 1.2m
Power Adapter : NMB, M/N: C2175A
Cable for AC IN: Non-shielded, Undetachable, 0.7m
Cable for AC Out: Non-shielded, Undetachable, 1.5m

 Modem

Model Number : 1414
Serial Number : 980033038
FCC ID : IFAXDM1414
Manufacturer : ACEEX
Data Cable : Shielded, Detachable, 1.5m
Power Adapter : ACCEX, M/N: SCP41-91000A
Cable Output : Shielded, Undetachable, 1.5m

 Mouse

Model Number : M-S34
Serial Number : LZB75078465
FCC ID : DZL211029
Manufacturer : HP
Data Cable : Shielded, Undetachable, 1.8m

2.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-1992.

Radiated testing was performed at an antenna to EUT distance of 10 meters.

2.4 Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	24-27
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description : November 3, 1998 File on

Federal Communications Commission

FCC Engineering Laboratory

7435 Oakland Mills Road

Columbia, MD 21046

Reference 31040/SIT1300F2

NVLAP Lab Code: 200347-0

United States Department of commerce

National Institute of Standards and Technology

National Voluntary Laboratory Accreditation Program

Name of firm : QuieTek Corporation

Site location : No.75-1, Wang-Yeh Valley, Yung-Hsing Tsuen,
Chiung-Lin, Hsin-Chu County, Taiwan, R.O.C.

3. Conducted Power Line Test

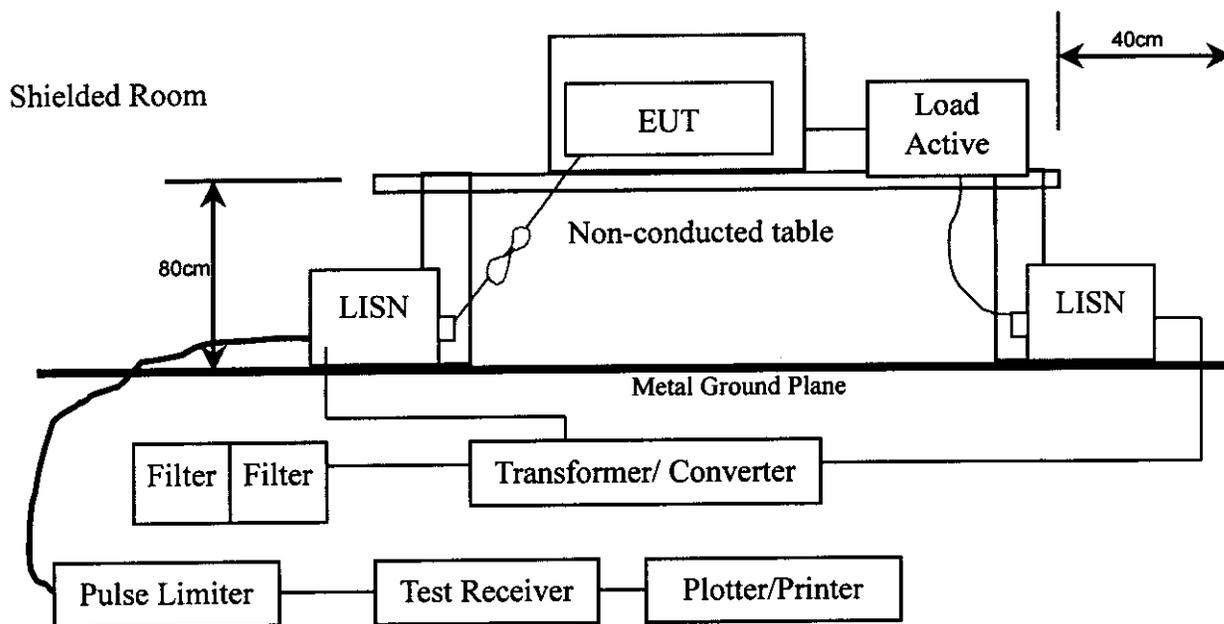
3.1 Test Equipments

The following test equipments are used during the conducted power line tests:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal..	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 1998	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 1998	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 1998	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	N/A	
5	N0.2 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

3.2 Block Diagram of Test Setup



3.3 Conducted Powerline Emission Limit

> CISPR 22 Limits

Frequency	Maximum RF Line Voltage dB(uV)			
	Class A		Class B	
	QUASI-PEAK	AVERAGE	QUASI-PEAK	AVERAGE
MHz				
0.15 - 0.50	79	66	66-56	56-46
0.50-5.0	73	60	56	46
5.0 - 30	73	60	60	50

Remarks : In the Above Table, the tighter limit applies at the band edges.

3.4 EUT Configuration on Measurement

The equipments which is listed 3.2 are installed on Conducted Power Line Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.5 EUT Exercise Software

The EUT exercise program used during conducted testing was designed to exercise the EUT in a manner similar to a typical use. The exercise sequence is listed as below:

- 3.5.1 Setup the EUT and simulators as shown on 3.2
- 3.5.2 Turn on the power of all equipment.
- 3.5.3 Boot the PC from Hard Disk .
- 3.5.4 Data will communicate between notebook personal computer and partner personal computer through Cardbus Fast Ethernet PC Card (EUT) that is within Notebook PC.
- 3.5.5 4 The notebook personal computer's and partner computer's monitor will show the transmitting and receiving characteristics when the communication is success.
- 3.5.6 Printer and modem will keep at standby mode during Scanner operation.
- 3.5.7 Repeat the above procedure 3.5.4 to 3.5.7

3.6 Test Procedure

The EUT is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables must be changed according to ANSI C63.4-1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 10Khz.

The frequency range from **0.15 MHz to 30 MHz** is checked.

3.7 Conducted Emission Data

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

The uncertainty is calculated in accordance with NAMAS NIS 81. The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured: $< \pm 2.0$ dB

CONDUCTED EMISSION DATA

Date of Test	:	Nov. 21, 1998	Temperature	:	24.3 °C
EUT	:	Cardbus Fast Ethernet PC Card	Humidity	:	61 %
Test Mode	:	Normal	Display Pattern	:	Data Transfer
Detector Mode	:	Quasi-Peak & Average			

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level Line1 dBuV	Measurement Level Line1 dBuV	Limits dBuV
0.157	0.00	0.10	43.03	43.03	65.63
0.262	0.03	0.10	32.92	32.95	61.36
0.369	0.05	0.10	28.58	28.63	58.53
* 2.951	0.17	0.15	40.42	40.59	56.00
13.330	0.31	0.30	40.29	40.60	60.00
21.660	0.36	0.48	35.33	35.69	60.00

Average:

0.157	0.00	0.10	41.60	41.60	55.63
0.262	0.03	0.10	32.70	32.73	51.37
0.369	0.05	0.10	28.50	28.55	48.52
2.950	0.17	0.15	27.50	27.67	46.00
13.330	0.31	0.30	33.80	34.11	50.00
21.660	0.36	0.48	29.80	30.16	50.00

Remarks :

1. " * " means that this data is the worse emission level.
2. All readings are Quasi-peak and average values.

CONDUCTED EMISSION DATA

Date of Test	: Nov. 21, 1998	Temperature	: 24.3 °C
EUT	: Cardbus Fast Ethernet PC Card	Humidity	: 61 %
Test Mode	: Normal	Display Pattern	: Data Transfer
Detector Mode	: Quasi-Peak & Average		

Frequency	Cable	LISN	Reading Level	Measurement Level	
MHz	Loss	Factor	Line2	Line2	
	dB	dB	dBuV	dBuV	dBuV
0.154	0.00	0.10	39.93	39.93	65.78
0.160	0.00	0.10	42.59	42.59	65.49
0.263	0.03	0.10	33.03	33.06	61.33
2.380	0.15	0.14	29.32	29.47	56.00
2.790	0.16	0.14	34.31	34.47	56.00
* 11.420	0.29	0.25	38.90	39.19	60.00

Average:

0.154	0.00	0.10	38.60	38.60	55.78
0.160	0.00	0.10	41.00	41.00	55.49
0.263	0.03	0.10	33.00	33.03	51.33
2.380	0.15	0.14	14.00	14.15	46.00
2.790	0.16	0.14	24.50	24.66	46.00
11.420	0.29	0.25	32.30	32.59	50.00

Remarks :

1. " * " Means that this data is the worse emission level.
2. All readings are Quasi-peak and average values.

4. Radiation Emission Test

QTK98-F008

4.1 Test Equipment

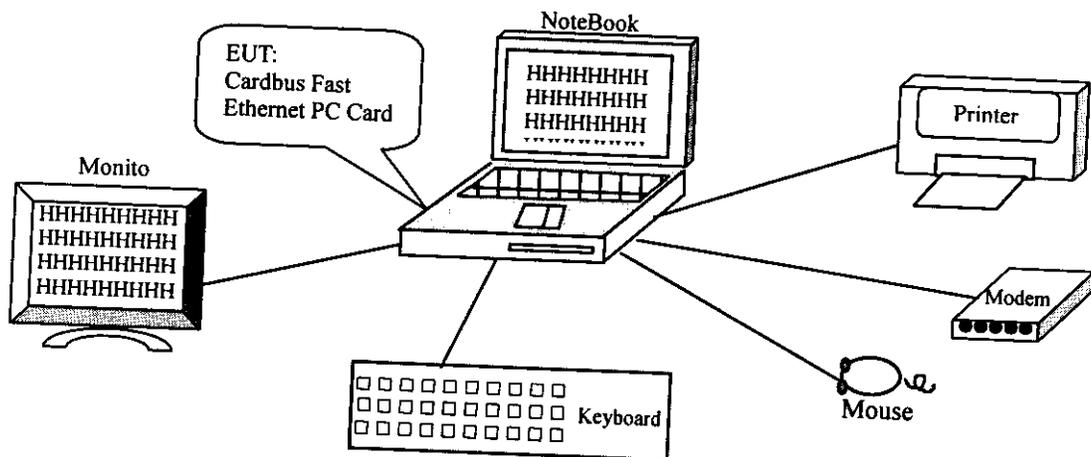
The following test equipments are used during the radiated emission tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
SITE # 1	X	Test Receiver	R & S	ESCS 30 / 825442/14	May, 1998
		Spectrum Analyzer	Advantest	R3261C / 71720140	May, 1998
		Pre-Amplifier	HP	8447D/3307A01812	May, 1998
	X	Bilog Antenna	Chase	CBL6112B / 12452	Sep., 1998
	X	Horn Antenna	EM	EM6917 / 103325	May, 1998
SITE # 2	X	Test Receiver	R & S	ESCS 30 / 825442/17	May, 1998
		Spectrum Analyzer	Advantest	R3261C / 71720609	May, 1998
		Pre-Amplifier	HP	8447D/3307A01814	May, 1998
	X	Bilog Antenna	Chase	CBL6112B / 2455	Sep., 1998
	X	Horn Antenna	EM	EM6917 / 103325	May, 1998

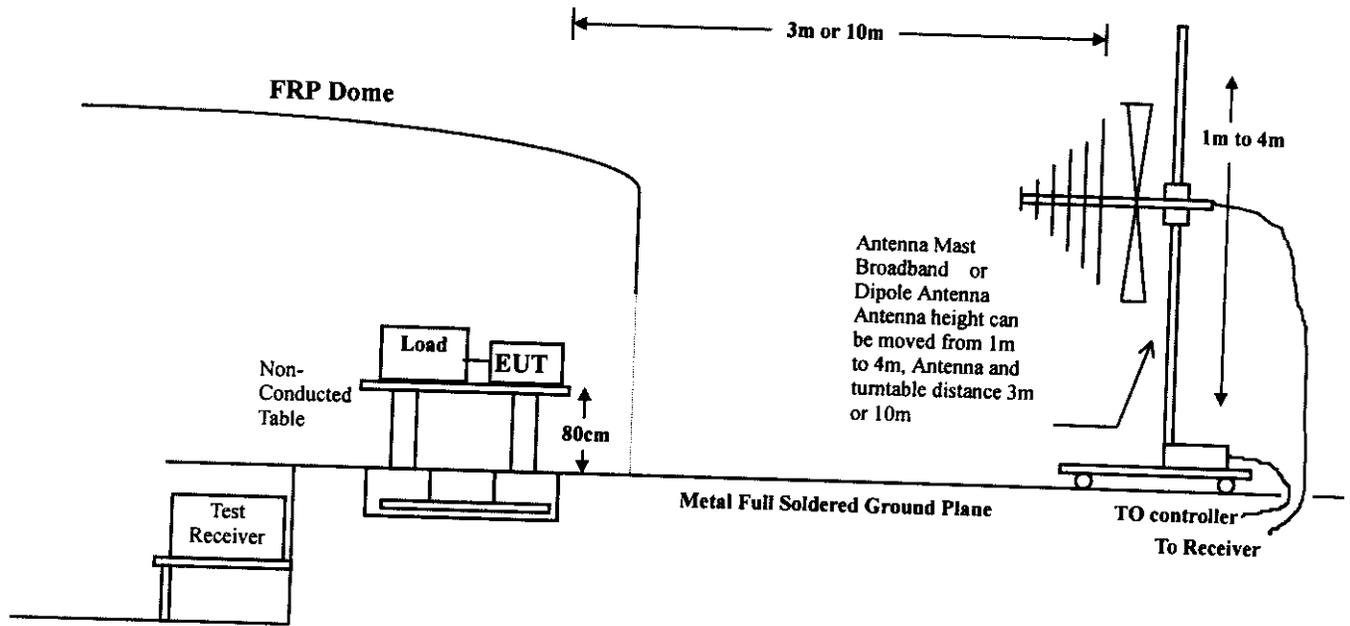
- Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.
 2. Mark "X" test instruments are used to measure the final test results.
 2. Test Site : Site #1 , Site #2

4.2 Test Setup

4.2.1 Block Diagram of Connections between EUT and simulators



4.2.2 Open Test Site Setup Diagram



4.3 Radiated Emission Limit

➤ CISPR 22 Limits:

Frequency MHz	Class A		Class B	
	Distance (m)	Limits (dBuV/m)	Distance (m)	Limits (dBuV/m)
30 – 230	10	40	10	30
230 – 1000	10	47	10	37

- Remark: 1. The tighter limit shall apply at the edge between two frequency bands.
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4 EUT Configuration

The equipments which is listed 4.2.1 are installed on Radiated Emission Test to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

4.5 Operating Condition of EUT

Same as Conducted Power Line Test which is listed in 3.5.

4.6 Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 10eters away from the receiving antenna which is mounted on a antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Broadband antenna (calibrated bi-log and horn antenna) are used as a eceiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4-1992 on radiated measurement.

The bandwidth below 1Ghz setting on the field strength meter (R&S Test Receiver ESCS 30) is 120 KHz, above 1Ghz are 1 MHz.

The frequency range from 30Mhz to 1000Mhz is checked.

4.7 Radiated Emission Data

The initial step in collecting radiated data is a spectrum analyzer peak scan of the measurement range for all the test modes. Then the worst modes were reported the following data pages.

The uncertainty is calculated in accordance with Namas NIS 81. The total uncertainty for this test is as follows:

- Uncertainty in the field strength measured: $< \pm 4.0$ dB

Radiated Emission Data

Date of Test	Nov. 23, 1998	Temperature	24.3 °C
EUT	Cardbus Fast Ethernet PC Card	Humidity	61 %
Test Mode	Normal	Display Pattern	Data Transfer

Frequency MHz	Cable Loss Factor dB	Ant Reading Level dB/m	Emission Level		Limits		Ant Table	
			Horizontal dBuV/m	Horizontal dBuV/m	dBuV/m	cm	Pos deg	Pos
199.686	2.78	9.07	6.89	18.75	30.00	401	25	
230.430	3.07	10.23	4.52	17.83	37.00	401	62	
266.482	3.43	13.56	8.61	25.60	37.00	309	77	
299.850	3.76	13.56	3.43	20.74	37.00	310	203	
332.970	3.92	14.59	0.55	19.06	37.00	401	41	
* 480.009	4.69	17.20	8.04	29.93	37.00	162	28	
493.650	4.77	17.37	2.22	24.36	37.00	172	15	

Remarks:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " * ", means this data is the worse emission level.
3. Emission Level = Reading Level + Antenna Factor + Cable loss

Radiated Emission Data

Date of Test	Nov. 23, 1998	Temperature	24.3 °C
EUT	Cardbus Fast Ethernet PC Card	Humidity	61 %
Test Mode	Normal	Display Pattern	Data Transfer

Frequency	Cable	Ant	Reading Level	Emission Level	Limits	Ant	Table
MHz	Loss Factor dB	dB/m	Vertical dBuV/m	Vertical dBuV/m	dBuV/m	Pos cm	Pos deg
* 32.000	1.17	17.49	9.64	28.30	30.00	99	129
50.001	1.35	7.39	11.58	20.32	30.00	99	203
75.001	1.58	6.83	9.49	17.90	30.00	99	203
125.002	2.07	11.49	7.70	21.26	30.00	99	203
150.001	2.31	10.43	7.21	19.95	30.00	99	17
175.001	2.55	9.32	10.29	22.16	30.00	99	37
200.001	2.78	9.07	12.64	24.50	30.00	99	135
225.002	3.03	9.68	12.16	24.86	30.00	99	172
230.360	3.07	10.23	5.25	18.56	37.00	99	203
250.001	3.27	12.26	3.19	18.72	37.00	99	165
400.006	4.28	16.05	1.71	22.04	37.00	99	116
500.006	4.79	17.14	0.26	22.19	37.00	99	104
875.006	6.75	19.66	1.95	28.36	37.00	181	18

Remarks:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " * ", means this data is the worse emission level.
3. Emission Level = Reading Level + Antenna Factor + Cable loss

5. Summarization of Test Results

The test results in the conducted and radiated emission were performed according to the requirements of measurement standard and process. QuieTek Corporation is assumed full responsibility for the accuracy and completeness of these measurements. The summarization of the worst value of conducted and radiated emission test is described as below:

➤ The worse value of Conducted Emission Test

Frequency (MHz)	Line	Measurement Level dB(uV)	Limit Level dB(uV)	Comment
2.951	L1	40.59	56.00	Pass
11.420	L2	39.19	60.00	Pass

➤ The worse value of Radiated Emission Test

Frequency (MHz)	Polarization	Measurement Level dB(uV)	Limit Level dB(uV)	Comment
480.009	H	29.93	37.00	Pass
32.000	V	28.30	30.00	Pass

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.