



# Test Report

## Class II Change

For

**Applicant** : ZyXEL Communications Corporation  
**Equipment Type** : LAN Router  
**Model** : Prestige 310  
**FCC ID** : I88PRESTIGE310

**Report No. :** 999H019FI



# Test Report Certification

## Quietek Corporation

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Accredited by NIST(NVLAP), VCCI, BSMI, DNV, TUV

Applicant : ZyXEL Communications Corporation

Address : No.6, Innovation Rd II, Science-Based Industrial Park,  
Hsin-Chu, Taiwan, R.O.C.

Equipment Type : LAN Router

Model : Prestige 310

FCC ID. : I88PRESTIGE310

Measurement Standard : CISPR 22/1994

Measurement Procedure : ANSI C63.4 /1992

Operation Voltage : 120Vac/60Hz

Classification : Class B

Test Result : Complied

Test Date : Sep.16, 1999

Report No. : 999H019FI



The Test Results relate only to the samples tested.  
The test report shall not be reproduced except in full without the written approval of Quietek Corporation.  
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented by: Lisa Chen	Test Engineer: Calien Kang	Approved: Gene Chang
<i>Lisa Chen</i>	<i>Calien Kang</i>	<i>Gene Chang</i>

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## REFERENCE

LABORATORY OF LICENSE



# 1. General Information

## 1.1 EUT Description

Applicant : ZyXEL Communications Corporation

Address : No.6, Innovation Rd II, Science-Based Industrial  
Park, Hsin-Chu, Taiwan, R.O.C.

Equipment Type : LAN Router

Model : Prestige 310

FCC ID : I88PRESTIGE310

Operation Voltage : 120Vac/60Hz

Power Adaptor : ZyXEL, AD 48-1201200DU

RS232 Cable : Shielded, 1.9m, 1PCS

Lan Cable : Shielded, 1.9m, 2PCS

### Remark:

- 1.This application is for class II change of LAN Router, ID I88PRESIGE318.
- 2.The modification were
  - a) The 33.1776MHz crystal circa it was substituted by oscillator circuit.
  - b) The DIP type package of 20MHz crystal was replaced by SMD type package.
  - c) The DIP type package of 25MHz crystal was replaced by SMD type package.
- 3.all the modification were shown in the report.

## 1.2 Tested System Details

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

### 1.2.1 Host Personal Computer(b)

Model Number : P2L97  
Serial Number : 9837  
FCC ID : DoC  
Manufacturer : ASUS  
Power Cord : Non-Shielded, 1.8m

### 1.2.2 Monitor

Model Number : CM752ET-311  
Serial Number : T8F006364  
FCC ID : DoC  
Manufacturer : HITACHI  
Data Cable : Shielded, 1.5m  
Power Cord : Shielded, 1.8m

### 1.2.3 Keyboard

Model Number : 6311-TW2C  
Serial Number : N/A  
FCC ID : DoC  
Manufacturer : ACER  
Data Cable : Shielded, 1.8m

### 1.2.4 Modem

Model Number : 1414  
Serial Number : 980033033  
FCC ID : IFAXDM1414  
Manufacturer : ACEEX  
Data Cable : Shielded, 1.5m  
Power Adapter : ACCEX, M/N: SCP41-91000A  
Cable Output : Shielded, 1.5m

### 1.2.5 Printer

Model Number : C2642A  
Serial Number : MY75J1D1D2  
FCC ID : B94C2642X  
Manufacturer : HP  
Data Cable : Shielded, 1.2m  
Power Adapter : NMB, M/N: C2175A  
Cable for AC IN: Non-Shielded, 0.7m  
Cable for AC Out: Non-Shielded, 1.5m

### 1.2.6 Mouse

Model Number : M-S34  
Serial Number : LZB71178588  
FCC ID : DZL211029  
Manufacturer : HP  
Data Cable : Shielded, 1.8m

### 1.2.7 Joystick

Model Number : JPD110  
Serial Number : 9814A15646  
FCC ID : DoC  
Manufacturer : Maxxtro  
Data Cable : Shielded, 1.7m

### 1.2.8 Video Camera

Model Number : Wcam 3X  
Serial Number : N/A  
FCC ID : DoC  
Manufacturer : Mustek  
Data Cable (USB) : Shielded, 1.5m

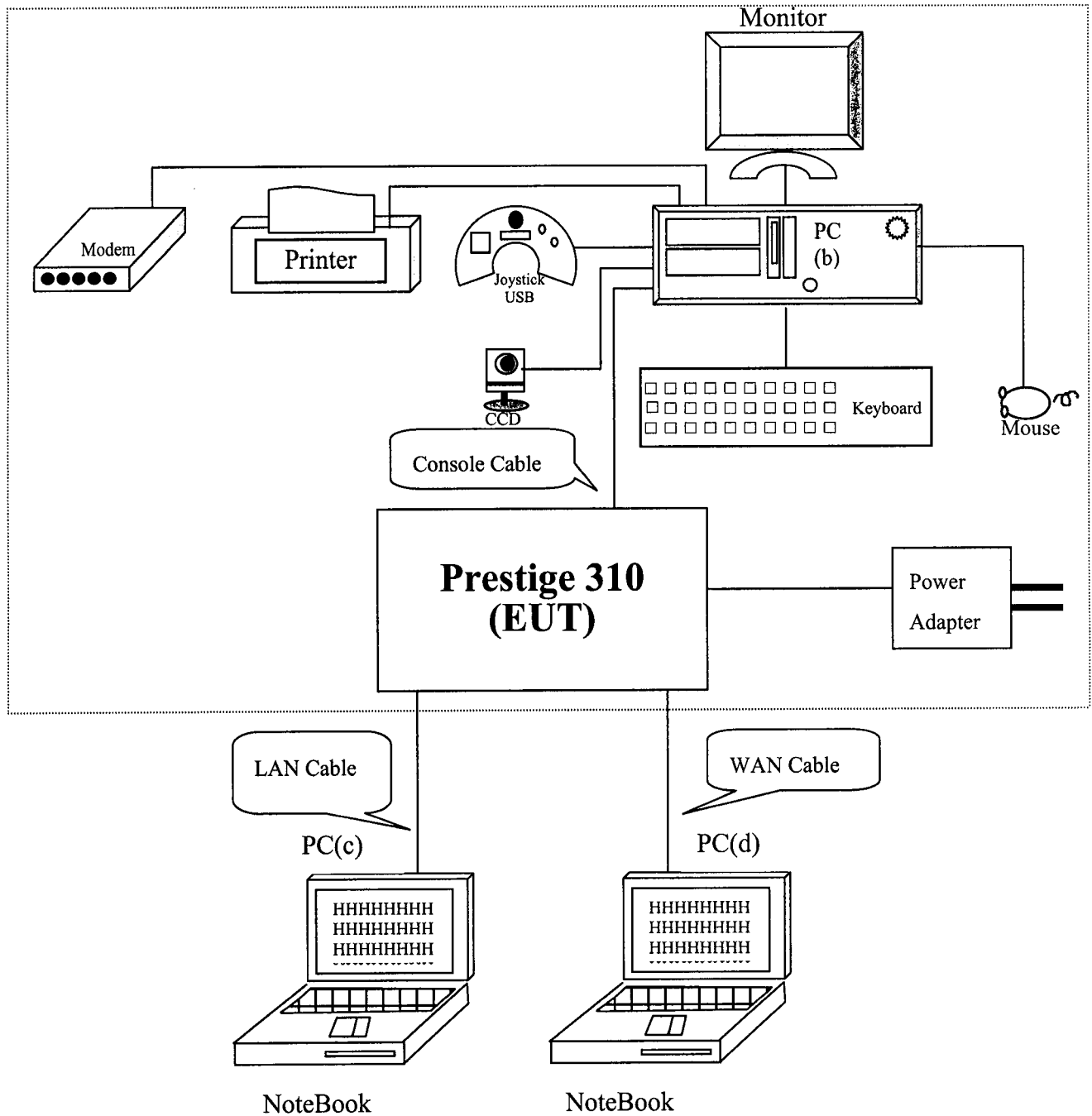
### 1.2.9 PC(c)NoteBook

Model Number : EXTENSA 503  
Serial Number : 9145B0160C91400C1DM  
DC Rating : 19V 2.4A  
Manufacturer : Acer Corp.

**1.2.10 PC(d)NoteBook**

Model Number : DESIGNote 5600  
Serial Number : N18901056  
DC Rating : 19V 2.1A  
Manufacturer : LEO Corp.  
FCC ID : EUNDESIGNOTE61

**1.3 EUT Configuration**



## 1.4 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:

1.4.1 Turned on EUT's power.

1.4.2 IP Setup:

PC(b) 192.168.10.2

PC(c) 192.168.20.2

PC(d) 192.168.30.2

EUT's WAN Port 192.168.20.1

EUT's LAN Port 192.168.30.1

1.4.3 Setup PC:

PC(b) Server type

PC(a) Client type

1.4.4 Using the FTP application S/W, PC(d) will transmit data to PC(c) via EUT's.

1.4.5 EUT's will show statistics message to message to PC(b) via Console port (RS-232).

1.4.6 LAN transmitted rate: about 500~600K Bytes/Sec.

1.4.7 Repeat step 2~5

## 1.5 Test performed

Conducted emissions were investigated over the frequency range from **0.15MHz to 30MHz** using a receiver bandwidth of 9kHz.

Radiated emissions were investigated over the frequency range from **30MHz to 1000MHz** using a receiver bandwidth of 120kHz. Radiated testing was performed at an antenna to EUT distance of 10 meters



**1.6 Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
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



September 30, 1998 Accreditation on NVLAP  
 NVLAP Lab Code: 200347-0

February 23, 1999 Accreditation on DNV  
 Statement No. : 413-99-LAB11



December 8, 1998 Registration on VCCI  
 Registration No. for No.2 Shielded Room C-858  
 Registration No. for No.1 Open Area Test Site R-823  
 Registration No. for No.2 Open Area Test Site R-835



January 04, 1999 Accreditation on TÜV Rheinland  
 Certificate No.: I9865712-9901



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.

## 2. Conducted Emission

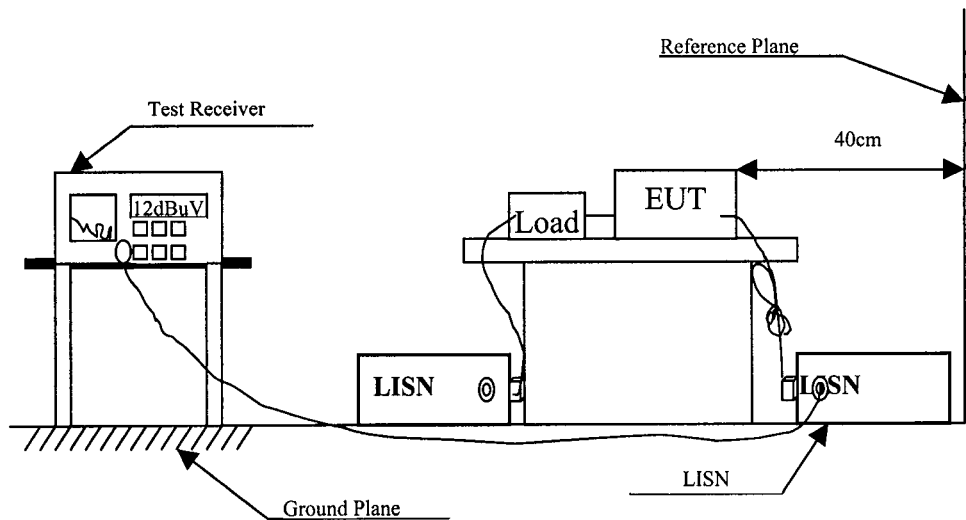
### 2.1 Test Equipment List

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal..	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 1999	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 1999	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 1999	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.

### 2.2 Test Setup



### 2.3 Limits

CISPR 22 Limits (dBuV)					FCC Part 15 Subpart B (dBuV)				
Frequency MHz	Class A		Class B		Frequency MHz	Class A		Class B	
	QP	AV	MHz	AV		uV	dBuV	uV	dBuV
0.15 - 0.50	79	66	66-56	56-46	0.45-1.705	1000	60.0	250	48.0
0.50-5.0	73	60	56	46	1.705-30	3000	69.5	250	48.0
5.0 - 30	73	60	60	50					

Remarks : In the above table, the tighter limit applies at the band edges.

## 2.4 Test Procedure

The EUT and simulators are 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 refers 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 equipment 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 9kHz.

## 2.5 Test Results

The conducted emission from the EUT is measured and shown in attachment 1 of test report. The acceptance criterion was met and the EUT passed the test.

### 3.3 Limits

CISPR 22 Limits (dBuV)					FCC Part 15 Subpart B (dBuV)				
Frequency MHz	Class A		Class B		Frequency	Class A		Class B	
	Distance (m)	dBuV/m	Distance (m)	dBuV/m		uV	dBuV	uV	dBuV
30 – 230	10	40	10	30	30 – 88	90	39	100	40.0
230 – 1000	10	47	10	37	88 – 216	150	43.5	150	43.5
					216 – 960	210	46.5	200	46.0
					960 - 2000	300	49.5	500	54.0

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.

3. RF Line Voltage (dBuV) = 20 log RF Line Voltage (uV)

### 3.4 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. The EUT was positioned such that the distance from antenna to the EUT was 10 meters . The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

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.

### 3.5 Test Results

The radiated emission from the EUT is measured and shown in attachment 1 of test report. The acceptance criterion was met and the EUT passed the test.

#### 4. **EMI Reduction Method During Compliance Testing**

No modification was made during testing.

## 5. Attachment

Attachment 1: Summary of Test Results	Number of Pages: 5
Attachment 2: EUT Test Photographs	Number of Pages: 2
Attachment 3: EUT detail photographs	Number of Pages: 5

## Attachment 1 : Summary of Test Results

The test results in the emission and immunity 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 test data of the emission and immunity are listed as the attached data.

All the tests were carried out with the EUT in normal operation, which was defined as:

(1) Mode 1 : Normal Operation (Prestige 310)

### **The EUT passed all the tests.**

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

#### ➤ **Emission Test**

- Uncertainty in the Conducted Emission Test:  $< \pm 2.0 \text{ dB}$
- Uncertainty in the field strength measured:  $< \pm 4.0 \text{ dB}$



# CONDUCTED EMISSION DATA

Date of Test : Sep.16, 1999 EUT : LAN Router  
 Test Mode : Mode 1 Detect Mode : Quasi-Peak & Average

Frequency	Cable	LISN	Reading Level	Measurement Level	Limits
MHz	Loss	Factor	Line1	Line1	
	dB	dB	dBuV	dBuV	dBuV
*0.210	0.02	0.10	45.56	45.68	63.19
0.245	0.03	0.10	44.06	44.19	61.91
0.263	0.03	0.10	43.42	43.55	61.35
0.278	0.03	0.10	42.74	42.87	60.87
0.340	0.04	0.10	40.44	40.58	59.21
0.414	0.05	0.10	38.06	38.21	57.58

**Average:**

0.210	0.02	0.10	15.50	15.62	53.21
0.245	0.03	0.10	14.50	14.63	51.92
0.263	0.03	0.10	13.70	13.83	51.34
0.278	0.03	0.10	13.40	13.53	50.88
0.340	0.04	0.10	11.10	11.24	49.20

**Remarks :**

1. “ \* ” means that this data is the worst emission level.



# CONDUCTED EMISSION DATA

Date of Test : Sep.16, 1999 EUT : LAN Router  
 Test Mode : Mode 1 Detect Mode : Quasi-Peak & Average

Frequency MHz	Cable Loss dB	LISN Factor dB	Reading Level Line2 dBuV	Measurement Level Line2 dBuV	Limits dBuV
0.177	0.01	0.10	46.94	47.05	64.63
0.191	0.01	0.10	46.29	46.40	64.01
0.201	0.02	0.10	46.15	46.27	63.58
0.220	0.02	0.10	45.63	45.75	62.81
*0.349	0.04	0.10	42.35	42.49	58.99
0.748	0.08	0.10	39.27	39.45	56.00

**Average:**

0.177	0.01	0.10	17.40	17.51	54.63
0.191	0.01	0.10	17.40	17.51	53.99
0.201	0.02	0.10	16.70	16.82	53.57
0.220	0.02	0.10	17.30	17.42	52.82
0.349	0.04	0.10	13.30	13.44	48.99
0.748	0.08	0.10	10.50	10.68	46.00

**Remarks :**

1. " \* " means that this data is the worst emission level.

# RADIATED EMISSION DATA

Date of Test : Sep.16, 1999 EUT : LAN Router  
 Test Mode : Mode 1

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Measurement Horizontal	Margin	Limit	Ant	Turn
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	cm	deg
150.000	2.31	10.72	0.00	8.53	21.56	8.44	30.00	396	117
175.000	2.55	9.76	0.00	3.35	15.66	14.34	30.00	396	41
200.000	2.78	9.30	0.00	11.64	23.72	6.28	30.00	396	160
250.000	3.27	12.61	0.00	7.78	23.66	13.34	37.00	396	138
300.000	3.76	13.36	0.00	8.61	25.72	11.28	37.00	396	173
325.000	3.88	13.64	0.00	5.95	23.48	13.52	37.00	396	133
500.000	4.79	17.34	0.00	3.75	25.88	11.12	37.00	343	168
600.000	5.31	18.85	0.00	1.08	25.24	11.76	37.00	343	64
862.628	6.69	20.73	0.00	3.45	30.87	6.13	37.00	99	164
895.811	6.87	20.88	0.00	2.08	29.83	7.17	37.00	99	164
*928.989	7.03	21.21	0.00	4.75	33.00	4.00	37.00	99	19

Remarks:

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

# RADIATED EMISSION DATA

Date of Test : Sep.16, 1999 EUT : LAN Router  
 Test Mode : Mode 1

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Measurement Vertical	Margin	Limit	Ant	Turn
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m	cm	deg
66.353	1.50	5.83	0.00	19.06	26.39	3.61	30.00	99	50
75.000	1.58	6.83	0.00	15.07	23.48	6.52	30.00	99	138
150.000	2.31	10.43	0.00	12.72	25.46	4.54	30.00	99	121
200.000	2.78	9.07	0.00	11.09	22.95	7.05	30.00	99	71
275.000	3.51	12.64	0.00	16.83	32.98	4.02	37.00	99	182
300.000	3.76	13.56	0.00	12.55	29.86	7.14	37.00	99	174
325.000	3.88	14.29	0.00	11.48	29.65	7.35	37.00	99	107
*400.000	4.28	16.05	0.00	14.53	34.86	2.14	37.00	99	203
425.000	4.40	16.66	0.00	11.49	32.55	4.45	37.00	99	144
450.000	4.53	16.51	0.00	12.13	33.17	3.83	37.00	100	162
550.000	5.06	18.76	0.00	7.64	31.46	5.54	37.00	348	170
600.000	5.31	18.42	0.00	8.59	32.33	4.67	37.00	272	203
696.735	5.82	18.68	0.00	5.32	29.82	7.18	37.00	239	93
763.088	6.17	19.10	0.00	5.35	30.62	6.38	37.00	252	96
796.270	6.34	19.22	0.00	7.18	32.74	4.26	37.00	227	173
829.448	6.52	19.62	0.00	4.41	30.54	6.46	37.00	206	121
862.625	6.69	19.77	0.00	6.42	32.88	4.12	37.00	178	38
895.790	6.87	19.88	0.00	8.02	34.77	2.23	37.00	188	102
928.972	7.03	20.22	0.00	5.55	32.80	4.20	37.00	188	171

Remarks:

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