

**Exhibit C - Measurement Report**



# ELECTROMAGNETIC INTERFERENCE TEST REPORT

Company : ZyXEL COMMUNICATIONS CORPORATION.  
Address : NO.6, Innovation Rd. II, Science- Based Industrial Park,  
Hsin-Chu, Taiwan , R.O.C.  
Sample Name : 56Kbps Data Remote Access Modem Router  
Model : RM356-R / RM356-T  
Date Received : JUL. 15, 1998  
Date Tested : JUL. 20, 1998

## MEASUREMENT PROCEDURE USED :

CISPR 22, CLASS B, 1996  
FCC RULE PART 15,1996

WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.

	Name	Signature	Date
Testing Engineer	C.F.Wu/NVLAP	<i>C.F. Wu</i>	<i>Aug. 05, 1998</i>
Approving Manager	Paul Y. Liau/NVLAP	<i>Paul Y. Liau</i>	<i>Aug. 06, 1998</i>

### Notes :

1. This report will be invalid if duplicated or photocopied in part.
2. This report refers only to the specimen(s) submitted to test, and is invalid as seperately used.
3. This report is invalid without examination stamp and signature of this institute.
4. The tested specimen(s) will be preserved for thirty days from the date issued.
5. This is a NIST/NVLAP accredited report but not constituted and endorsed by US government.



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## **1. GENERAL INFORMATION**

### **1.1 DESCRIPTION OF EUT**

MANUFACTURER : ZYXEL COMMUNICATIONS CORPORATION.

SAMPLE NAME : 56Kbps Data Remote Access Modem Router

MODEL NUMBER : RM356-R / RM356-T

SERIAL NO. : -----

POWER SUPPLY : 18VAC(From Power Adaptor)



## 1.2 DESCRIPTION OF PERIPHERALS

### (1) PC

MODEL NUMBER : NetServer Ldpro 6/180  
SERIAL NUMBER : SG70100104  
MANUFACTURER : HP CORP.  
F.C.C. ID : B94HPLS107  
POWER CORD : Unshielded , Detachable , 1.8m

### (2) MONITOR

MODEL NUMBER : JC-1571VMA-2  
SERIAL NUMBER : 6Z01162EA  
MANUFACTURER : NEC CORP.  
F.C.C. ID : A3DJC-1571VMA-2  
POWER CORD : Unshielded , Detachable , 1.8m

### (3) KEYBOARD

PRODUCT NUMBER : C1405#ABO  
SERIAL NUMBER : 3625M60145  
MANUFACTURER : HP CORP.  
F.C.C. ID : B94C1405X  
POWER CABLE : +5VDC ( From PC )

### (4) PRINTER

MODEL NUMBER : 5152-002  
SERIAL NUMBER : 0754365  
MANUFACTURER : IBM CORP.  
F.C.C. ID : BKM9A85152002



**(5) WAN Router**

MODEL NUMBER : Prestige 153X  
SERIAL NUMBER : R2P00I000ZZ  
MANUFACTURER : ZyXEL Communications Corp.  
FCC ID : I88PRESTIGE153X  
POWER SOURCE : 16VAC(from Power Adapter)

**(6) PSTN HUB Router**

MODEL NUMBER : Prestige 100MH  
SERIAL NUMBER : R2P00I000ZZ  
MANUFACTURER : ZyXEL Communications Corp.  
FCC ID : I88PRESTIGE100MH  
POWER SOURCE : 16VAC(from Power Adapter)

**(7) Telephone**

MODEL NUMBER : RS-802HF  
SERIAL NUMBER : -----  
MANUFACTURER : SWEETONE CORP.

**(8) Telephone Line Emulator**

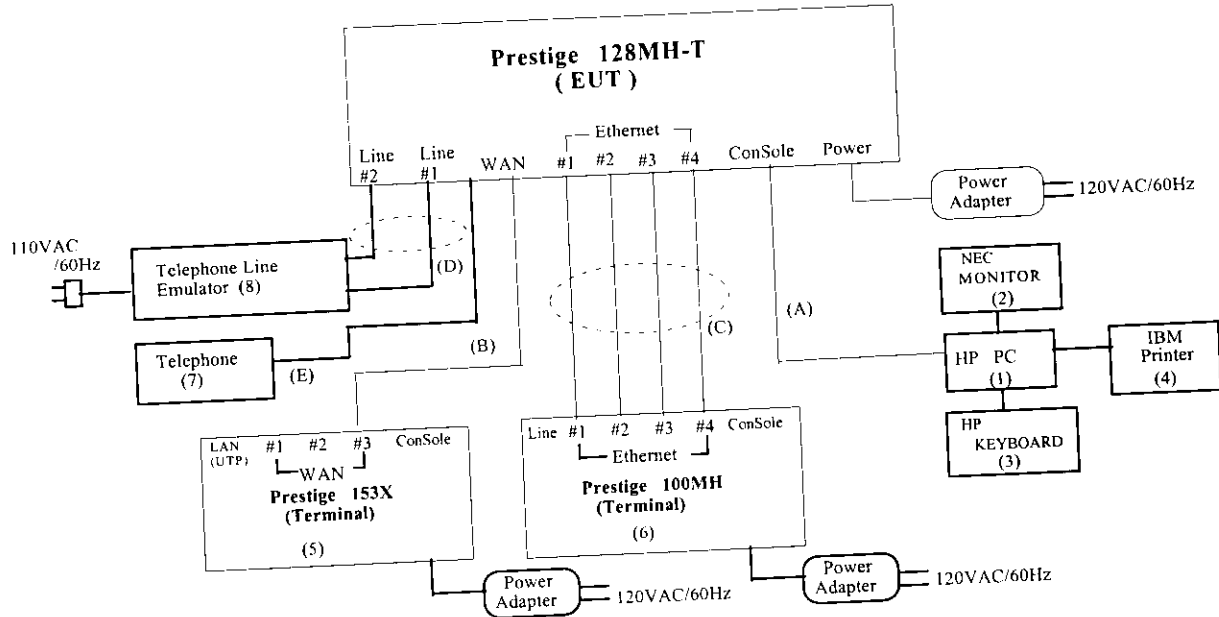
MODEL NUMBER : TLE101-11  
SERIAL NUMBER : -----  
MANUFACTURER : ASCII CORP.

**(9) Cable**

NO.	TYPE	Connector	Shielded	Length
A	D Type	RS232, metal	No	1.5m
B	WAN cable	RJ-45, plastic	No	10m
C	LAN cable	RJ-45, plastic	No	10m
D	Line cable	RJ-45, plastic	No	10m
E	Telephone Line	RJ-11, plastic	No	1.5m



### 1.3 EUT & PERIPHERALS SETUP DIAGRAM



The indicated numbers (1)(2)(A)(B)----please refer to item 1.2.



## 1.4 EUT OPERATING CONDITION

1. Turned on EUT's power.
2. EUT will send/receive packets to/from Terminal via WAN cable.
3. EUT will send/receive packets to/from Terminal via Ethernet#1 cable.
4. EUT will send/receive packets to/from Terminal via Ethernet#2 cable.
5. EUT will send/receive packets to/from Terminal via Ethernet#3 cable.
6. EUT will send/receive packets to/from Terminal via Ethernet#4 cable.
7. EUT will send/receive packets to/from Line#1 via Telephone Line Emulator.
8. EUT will send/receive packets to/from Line#2 via Telephone Line Emulator.
9. EUT will show statistics message to PC via RS-232 cable.
10. Repeat step 2~6.

## 1.5 DESCRIPTION OF TEST SITE

SITE DESCRIPTION : FCC certificate NO. :31040/SIT  
DNV certificate NO. :510-96-1016  
TUV certificate NO. : I9664582-9610  
Lloyd's certificate NO. :LA003  
BCIQ certificate NO. :SL2-IN-E-02  
NVLAP Lab code : 200118-0  
CNLA certificate NO. : CNLA-ZL97018  
VCCI certificate NO. : R-706, C-650

NAME OF SITE : Electronics Research & Service Organization  
Industrial Technology Research Institute

SITE LOCATION : K500, 195-4 , sec. 4, Chung Hsing Rd.,  
Chu-Tung Chen, Hsin-Chu, Taiwan 31015 R.O.C.





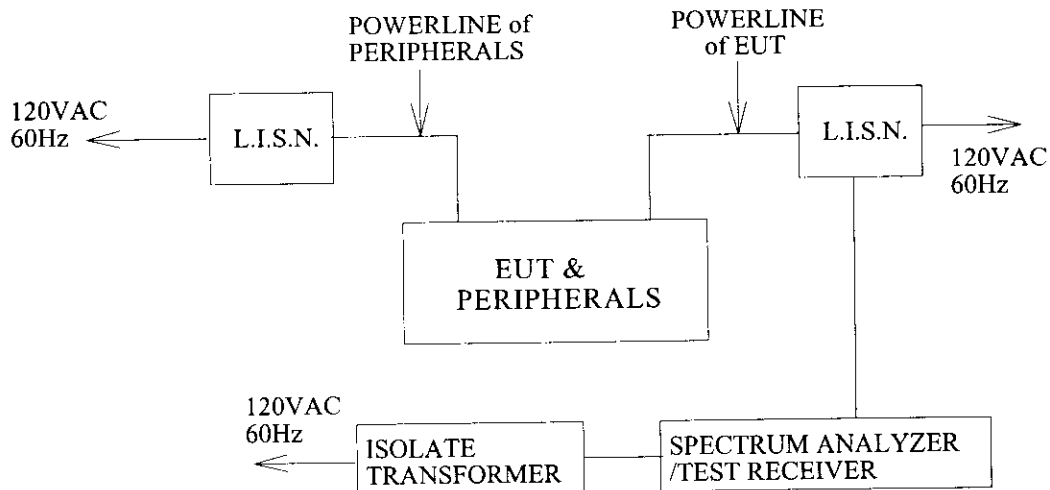
## 2. CONDUCTED POWERLINE TEST

### 2.1 TEST EQUIPMENTS

The following test equipments are used during the conducted powerline tests :

MANUFACTURER OR TYPE	MODEL No	SERIAL NO.	DATE OF CALIBRATION
SPECTRUM ANALYZER & DISPLAY	HP 8568A	2235A02320	MAR. 05, 1998
QUASI-PEAK ADAPTER	HP 85650 A	2341A00672	MAR. 05, 1998
ISOLATION TRANSFORMER	SOLAR 7032-1	N/A	N/A
L.I.S.N.	EMCO 3850/2	9311-1025 9401-1028	MAR. 24, 1998
TEST RECEIVER	R/S ESH3	8720791118	MAR. 13, 1998
SHIELDED ROOM	KEENE 5983	N/A	N/A

### 2.2 TEST SETUP





## 2.6 LINE CONDUCTED RF VOLTAGE MEASUREMENT

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

All readings are Quasi-peak values.

Temperature : 24 °C

Humidity : 57 % RH

FREQUENCY (MHz)	READING(dB $\mu$ V)				LIMITS (dB $\mu$ V)	
	ONE END & GRD'D		THE OTHER END & GRD'D		Q.P.	Ave.
	Q.P.	Ave.	Q.P.	Ave.		
0.150	*	*	*	*	66.00	56.00
0.686	*	*	23.52	*	56.00	46.00
0.690	24.42	*	*	*	56.00	46.00
1.388	24.35	*	22.95	*	56.00	46.00
1.552	23.26	*	*	*	56.00	46.00
5.005	31.21	*	37.31	*	60.00	50.00
6.285	37.22	*	37.12	*	60.00	50.00
6.878	36.23	*	*	*	60.00	50.00
7.526	40.43	*	*	*	60.00	50.00
7.566	*	*	40.13	*	60.00	50.00
8.148	40.44	*	40.74	*	60.00	50.00
8.776	41.34	*	40.54	*	60.00	50.00
9.401	39.54	*	39.04	*	60.00	50.00
10.019	38.65	*	39.45	*	60.00	50.00
11.933	39.55	*	39.05	*	60.00	50.00
12.516	40.96	*	39.66	*	60.00	50.00
13.768	38.76	*	37.96	*	60.00	50.00
15.066	37.77	*	37.57	*	60.00	50.00
20.162	37.98	*	*	*	60.00	50.00
30.000	*	*	*	*	60.00	50.00

REMARKS : 1. \* Undetectable or the Q.P. value is lower than Ave. limit.

2. For Rockwell Module(RM356-R)



## 2.6 LINE CONDUCTED RF VOLTAGE MEASUREMENT

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

All readings are Quasi-peak values.

Temperature : 24 °C

Humidity : 57 % RH

FREQUENCY (MHz)	READING(dB $\mu$ V)				LIMITS (dB $\mu$ V)	
	ONE END & GRD'D		THE OTHER END & GRD'D		Q.P.	Ave.
	Q.P.	Ave.	Q.P.	Ave.		
0.150	*	*	*	*	66.00	56.00
0.848	*	*	49.90	27.10	56.00	46.00
0.894	*	*	49.90	29.50	56.00	46.00
0.914	49.90	29.60	*	*	56.00	46.00
1.878	41.17	*	43.06	*	56.00	46.00
7.526	37.93	*	39.23	*	60.00	50.00
8.149	37.64	*	*	*	60.00	50.00
8.729	38.74	*	*	*	60.00	50.00
8.776	*	*	40.84	*	60.00	50.00
10.676	36.25	*	*	*	60.00	50.00
11.317	*	*	39.15	*	60.00	50.00
12.516	37.96	*	40.46	*	60.00	50.00
13.768	*	*	38.96	*	60.00	50.00
30.000	*	*	*	*	60.00	50.00

REMARKS : 1. \* Undetectable or the Q.P. value is lower than Ave. limit.

2. For TI Module(RM356-T)



### 3. RADIATED EMISSION TEST

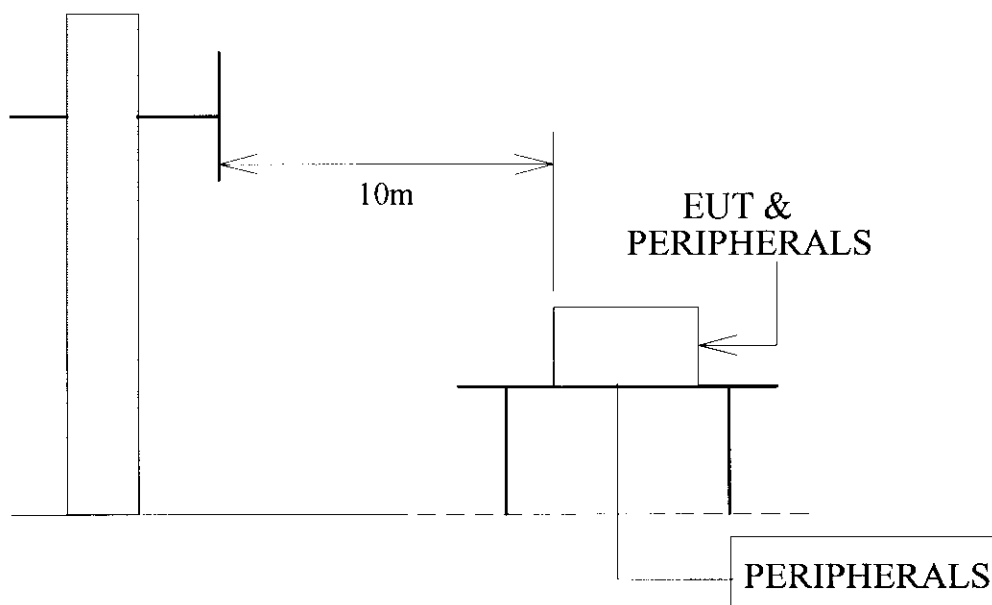
#### 3.1 TEST EQUIPMENTS

The following test equipments are utilized in making the measurements contained in this report.

MANUFACTURER OR TYPE	MODEL NO	SERIAL NO	DATE OF CALIBRATION
CHASE BI-LOG ANTENNA	CBL6111A	1546	MAY.23, 1998
R/S TEST RECEIVER	ESMI	842088/005 841978/008	MAY.29, 1998
OPEN SITE	-----	No.2	AUG. 23, 1997

#### 3.2 TEST SETUP

The diagram below shows the test setup which is utilized to make these measurements.



Antenna Elevation Variable



### 3.3 RADIATION LIMIT

All emanation from a class B computing device or system , including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below :

FREQUENCY (MHz)	DISTANCE (METERS)	FIELD STRENGTHS(dB $\mu$ V/M)	
		CLASS A	CLASS B
30-230	10	40	30
230-1000	10	47	37

Note : (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 closest point of any part of the device or system.

### 3.4 TEST PROCEDURE

The devices under test were placed on a rotatable table top 0.8 meter above ground. The table was rotated 360 degrees to determine the position of the highest radiation. EUT is set 10 meters from the interference receiving antenna which is mounted on the top of a variable height mast. The antenna height is varied between one meter and four meters above ground to find the maximum value of the field strength Both horizontal polarization and vertical polarization of the antenna are set to make the measurement.

The bandwidth setting on the E.M.I. meter (R/S TEST RECEIVER ESMI) is 120 KHz.

The levels are quasi peak value readings. The frequency spectrum from 30MHz to 1000MHz was investigated.

### 3.5 UNCERTAINTY OF RADIATED EMISSION

The uncertainty of radiated emission is  $\pm 2.72$ dB.



### 3.6 RADIATED RF NOISE MEASUREMENT

The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

All readings are quasi-peak values.

Temperature : 35 °C

Humidity : 70% RH

FREQ- UENCY  (MHz)	ANTENNA FACTOR  (dB)	CABLE LOSS  (dB)	METER READING AT10m (dB $\mu$ V/M)		LIMITS  (dB $\mu$ V/M)	EMISSION LEVEL AT10m (dB $\mu$ V/M)	
			HORIZON- TAL	VERTICAL		HORIZON- TAL	VERTICAL
30.00	*	*	*	*	30.00	*	*
38.72	13.60	1.48	*	7.16	30.00	*	22.24
169.35	9.89	3.12	14.16	10.52	30.00	27.17	23.53
180.00	8.94	3.20	*	11.08	30.00	*	23.22
184.19	8.92	3.24	15.28	4.08	30.00	27.44	16.24
200.00	8.85	3.40	10.80	*	30.00	23.05	*
200.47	8.85	3.40	*	12.48	30.00	*	24.73
214.15	9.79	3.51	*	3.24	30.00	*	16.54
245.77	11.95	3.77	18.36	8.28	37.00	34.08	24.00
254.30	12.27	3.83	10.52	6.32	37.00	26.62	22.42
1000.00	*	*	*	*	37.00	*	*

REMARKS : 1. \* Undetectable

2. Emission level (dB  $\mu$  V/M) = Antenna Factor (dB) + Cable loss (dB)  
 + Meter Reading (dB  $\mu$  V/M).

3. For Rockwell Module(RM356-R)



### 3.6 RADIATED RF NOISE MEASUREMENT

The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

All readings are quasi-peak values.

Temperature : 35 °C

Humidity : 70% RH

FREQ- UENCY  (MHz)	ANTENNA FACTOR  (dB)	CABLE LOSS  (dB)	METER READING AT10m (dB $\mu$ V/M)		LIMITS  (dB $\mu$ V/M)	EMISSION LEVEL AT10m (dB $\mu$ V/M)	
			HORIZON- TAL	VERTICAL		HORIZON- TAL	VERTICAL
30.00	*	*	*	*	30.00	*	*
184.33	8.92	3.24	4.64	*	30.00	16.80	*
199.25	8.85	3.39	*	4.64	30.00	*	16.88
200.50	8.92	3.41	6.32	*	30.00	18.65	*
215.05	9.86	3.52	6.32	*	30.00	19.70	*
216.23	9.93	3.53	14.44	*	30.00	27.90	*
245.77	11.95	3.77	18.36	4.64	37.00	34.08	20.36
254.30	12.27	3.83	11.92	2.12	37.00	28.02	18.22
1000.00	*	*	*	*	37.00	*	*

REMARKS : 1. \* Undetectable

2. Emission level (dB  $\mu$  V/M) = Antenna Factor (dB) + Cable loss (dB)  
 + Meter Reading (dB  $\mu$  V/M).

3. For TI Module(RM356-T)