

MEASUREMENT/TECHNICAL REPORT

HYUNDAI ELECTRONICS INDUSTRIES CO.,LTD.

MODEL : B790

This report concerns(check one) : Original grant ☒ Class ☐ ±change ☐

Equipment type : MONITOR

Deferred grant requested per 47 CFR 0.457(d)(1)(☐ ☒ ? yes ☐ no ☒

If yes, defer until: _____

_____ agrees to notify the Commission by _____

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? yes ☐ no ☒

If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-91 Edition] provision.

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1. GENERAL INFORMATION

1.1 Product Description

The Hyundai Electronics Industries Co., Ltd. Model B790(referred to as the EUT in this report) is a 17" COLOR Monitor HOR. Freq. 93.5kHz w/max. Resolution of 1600_i 1200 Non-Interlaced.

Product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	PLASTIC
LIST OF EACH OSC. OR XTAL. FREQ.(FREQ. _i Å1MHz)	16 MHz
CHIPSET BRAND AND PART NO.	SAMSUNG : KA3842 SAMSUNG : KA7812 SAMSUNG : KA7805 SAMSUNG : KA358 SAMSUNG : KA3843 PHILIPS : TDA4856 MITSUBISHI : M52743 NATIONAL : LM2402T MICRO CHIP : 24LC08 WELTREND : WT60P1
POWER REQUIREMENT	100 - 240 VAC(Universal Power) 3A
NUMBER OF LAYERS	MAIN BOARD 1 LAYER CRT SOCKET BOARD 1 LAYER
MAX. RESOLUTION	1600 X 1200 NON-INTERLACED (@ 93.5kHz/75Hz)
H-SYNC FREQUENCY RANGE	30 kHz _i -95 kHz
V-SYNC FREQUENCY RANGE	50 Hz _i -150 Hz
CRT SIZE	17" (SAMSUNG/ Type : M41QAQ261X151)
VIDEO CONNECTOR TYPE	D-SUB 15-PIN

1.2 Related Submittal(s) / Grant(s)

ORIGINAL SUBMITTAL ONLY

1.3 Tested System Details

The Model names for all equipment, plus descriptions used in the tested system (including inserted cards) are:

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
COLOR MONITOR(EUT)	HYUNDAI	B790	CKLB790	HOST
PC(HOST)	H/P	HP BRIO 80XX	DoC	N/A
KEYBOARD	H/P	SK-2501-2D-K	DZL211029	HOST
PRINTER	H/P	C2168A	B94C2121X	HOST
MODEM	HYUNDAI	HMD-2404M	CKL8J7HMD-2404M	HOST
MOUSE	H/P	M-S34	GYUR38SK	HOST

1.4 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 3 meters.

1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO, 467-701,KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission on May 22, 1997 and accepted dated July 25,1997(1300F2)

2.SYSTEM TEST CONFIGURATION

2.1 Justification

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following components and I/O cards inside the E.U.T were used.

DEVICE TYPE	MANUFACTURE	MODEL/PART NUMBER
MAIN BOARD	HYUNDAI	E4208515201
CRT SOCKET BOARD	HYUNDAI	E4208615202

2.2 EUT exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disc, was inserted into drive A and is auto starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is :(1) Display test, (2) RS 232 test (3) Key board test,(4) Printer test,(5) FDD test,(6) HDD test. The complete cycle takes about 20 seconds and is repeated continuously. As the keyboard and mouse are strictly input devices, no data is transmitted to them during test. They are however, continuously scanned for data input activity. The video resolution modes setup and change program was used during the radiated and conducted emission testing.

2.3 Cable Description

	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
PC(HOST)	N	N/A	1.5(P)
COLOR MONITOR(EUT)	N	Y	1.5(P), 1.5(D)
PARALLEL	N	Y	1.5(P), 1.5(D)
KEYBOARD	N/A	Y	1.0(D)
SERIAL	N	Y	1.5(P), 1.5(D)
MOUSE(PS/2)	N/A	Y	1.8(D)

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

2.4 Noise Suppression Parts on Cable.

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
PC(HOST)	N	N/A	N	N/A
COLOR MONITOR(EUT)	Y	PC END	Y	PC END
KEYBOARD	Y	PC END	Y	PC END
PARALLEL	N	N/A	Y	BOTH END
SERIAL	N	N/A	Y	BOTH END
MOUSE(PS/2)	N	N/A	Y	PC END

2.5 Equipment Modifications

N/A

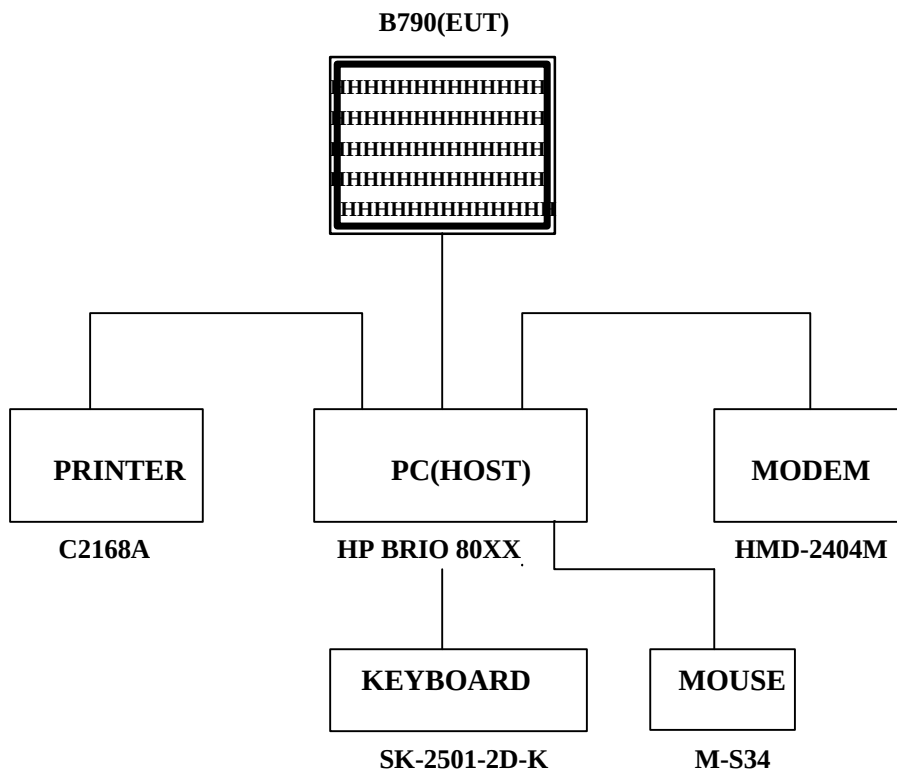
2.6 Configuration of Test system

Line Conducted Test : EUT was connected to LISN, all other supporting equipment were connected to another LISN.

Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test : Preliminary Radiated Emissions tests were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating condition. Final Radiated Emission tests were conducted at 3 meter open area test site.

[Configuration of Tested System]



3. PRELIMINARY TESTS

3.1 AC Power line Conducted Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 75 MHz	1600 x 1200 Non-Interlaced (93.5KHz/75Hz)	X
Pentium 75 MHz	1280 x 1024 Non-Interlaced (91.1KHz/85Hz)	
Pentium 75 MHz	1024 x 768 Non-Interlaced (81.1KHz/100Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (53.6KHz/85Hz)	
Pentium 75 MHz	640 x 480 Non-Interlaced (63.6KHz/120z)	

4.2 Radiated Emission Tests

During Preliminary Tests, the following operating mode were investigated

Processor Speed (MHz)	Video Resolution (w/max)	The worst operating condition
Pentium 75 MHz	1600 x 1200 Non-Interlaced (93.5KHz/75Hz)	X
Pentium 75 MHz	1280 x 1024 Non-Interlaced (91.1KHz/85Hz)	
Pentium 75 MHz	1024 x 768 Non-Interlaced (81.1KHz/100Hz)	
Pentium 75 MHz	800 x 600 Non-Interlaced (53.6KHz/85Hz)	
Pentium 75 MHz	640 x 480 Non-Interlaced (63.6KHz/120z)	

Tested by Sang Jun, Lee

Date : JAN. 19, 1999

4. FINAL CONDUCTED AND RADIATED EMISSION TESTS SUMMARY

4.1 Conducted Emissions Tests

The following table shows the highest levels of conducted emissions on both polarization of hot and neutral line.

Humidity Level : 21% Temperature : 6 ± 1 °C
 Limit apply to : FCC CFR 47, PART 15, SUBPART B
 Type of Tests : CLASS B
 Date : JAN. 20, 1999
 Result : PASSED BY 11.0 dB

EUT : 17" COLOR MONITOR
 Operating Condition : 1600 X 1200 Non-Interlaced (Hf : 93.5KHz, Vf : 75Hz)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth : 9 KHz)

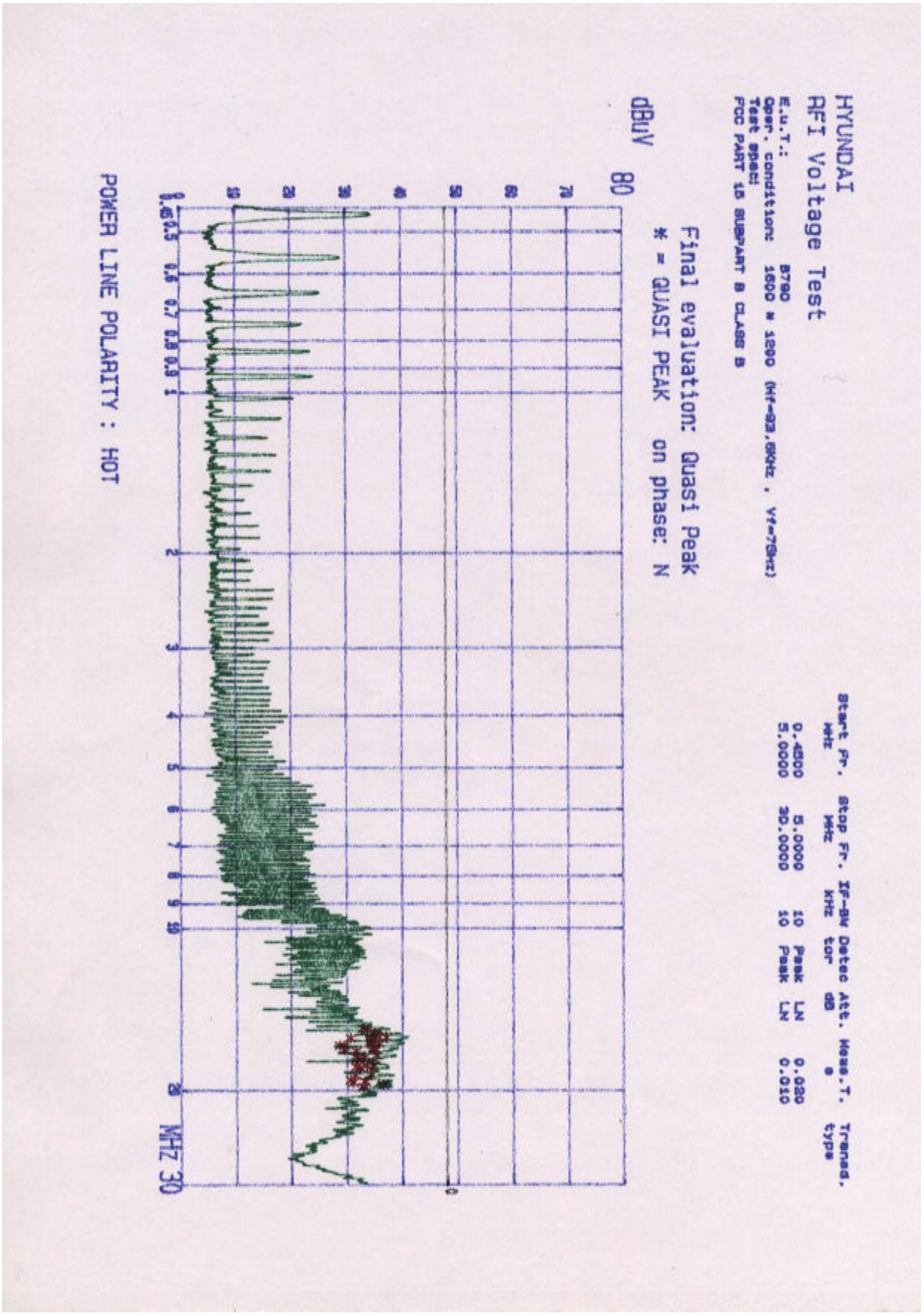
Power Line Conducted Emissions			FCC Class B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)
15.730	35.1	NEUTRAL	48	-12.9
15.920	37.0	HOT	48	-11.0
16.390	35.7	HOT	48	-12.3
17.230	35.2	NEUTRAL	48	-12.8
18.540	36.2	NEUTRAL	48	-11.8
19.380	36.3	NEUTRAL	48	-11.7
20.230	33.2	NEUTRAL	48	-13.3

Line Conducted Emissions Tabulated Data

NOET:

1. All video modes and resolutions were investigated and the worst-case emissions are reported
 Other video modes & resolution were tested and found to be in compliance.
2. The limit for Class B device is 250 uV from 450 kHz to 30 MHz.

Measured by : Sang Jun, Lee / Engineer



HYUNDAI RFI Voltage Test

E.U.T.: 8730
Oper. condition: 1600 W 1200 (Hf=93.8KHz. V_f=75Hz)
Test spec:
FOC PART 15 SUBPART B CLASS B

Exceeding value on phase N			
Frequency MHz	Peak dBuV	0-Peak dBuV	BP-Margin dB
15.3600	39.9	32.9	-15.1
15.4500	37.7	33.5	-14.5
15.6400	37.6	34.8	-13.2
15.7300	39.6	35.2	-12.8
15.8300	38.7	35.2	-12.8
15.9200	41.0	37.0	-11.0
16.0100	40.9	34.2	-13.8
16.0200	36.0	30.6	-17.4
16.1100	38.4	34.3	-13.7
16.2000	39.5	34.3	-13.7
16.2800	39.2	34.2	-13.8
16.3800	40.3	35.7	-12.3
16.4800	39.7	34.5	-13.5
16.5700	37.2	29.5	-18.5
16.6798	38.2	28.7	-19.3
16.6700	39.0	34.5	-13.4
16.7600	38.0	34.8	-13.2
16.8600	37.4	29.5	-18.5
16.9500	38.0	31.6	-16.4
17.2300	38.8	35.2	-12.7
17.3200	38.8	33.0	-15.0
17.4200	36.8	32.1	-15.9
17.5100	36.1	31.8	-16.2
17.6800	36.7	34.7	-13.3
18.0700	37.4	33.5	-14.5
18.1700	37.1	31.6	-16.4
18.2600	37.4	32.3	-15.7
18.7300	37.5	34.2	-13.8
18.8200	38.4	31.5	-16.5
19.2000	38.2	30.7	-17.3
19.2800	38.0	33.3	-14.7
19.3600	36.9	31.0	-17.0
19.5700	37.8	38.4	-14.6
19.7600	36.0	32.9	-15.1

* Limit exceeded

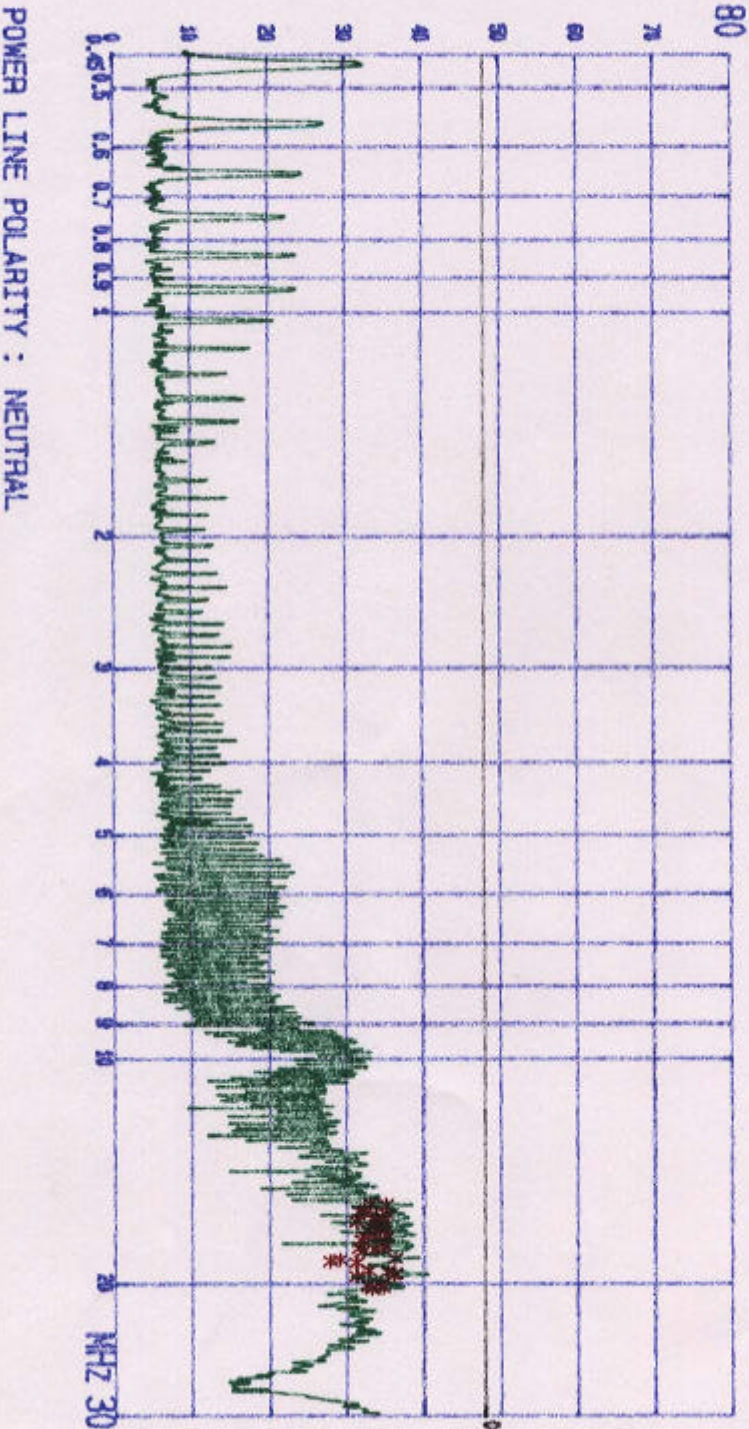
POWER LINE POLARITY : HOT

HYUNDAI
RFI Voltage Test

E.U.T.: 8780
Oper. Condition: 1000 * 1200 (4f-83.8kHz , Vt=75Hz)
Test spec:
FCC PART 15 SUBPART B CLASS B

Start Fr.	Stop Fr.	IF-BW	Detec	Att.	Meas.T.	Trend.
kHz	kHz	kHz	type	dB	s	type
0.4500	5.0000	10	Peak	LN	0.020	
5.0000	30.0000	10	Peak	LN	0.010	

Final evaluation: Quasi Peak
* = QUASI PEAK on phase: L1



HYUNDAI
RFI Voltage Test
E.U.T.: B790
Oper. Condition: 1000 W 1200 (Hf-93.6KHz, Vt-75Hz)
Test spec:
FCC PART 15 SUBPART B CLASS B

Exceeding values on phase L1			
Frequency MHz	Peak dBuV	Q-Peak dBuV	Q-P-Margin dB
15.6400	36.2	33.0	-15.0
15.7300	36.5	30.1	-12.9
15.8200	35.0	32.2	-15.8
16.0100	35.5	31.6	-16.4
16.1100	35.5	32.2	-16.6
16.2000	36.0	33.2	-12.8
16.2800	37.1	33.9	-14.1
16.3900	37.1	34.5	-13.9
16.4800	38.0	34.5	-13.9
16.5700	34.6	31.2	-16.8
16.6700	37.7	34.5	-13.5
16.7500	35.2	33.0	-18.0
16.8600	37.3	34.3	-13.7
17.0400	38.2	34.6	-13.2
17.1400	38.7	33.5	-14.5
17.2300	39.1	35.2	-12.8
17.3200	36.6	32.3	-15.7
17.5100	36.9	31.9	-16.1
17.7000	36.9	34.7	-13.2
17.7980	38.0	34.9	-13.1
17.8900	36.0	31.6	-16.4
17.9800	37.4	33.8	-14.4
18.0700	36.2	32.1	-15.8
18.1600	39.3	36.2	-11.6
18.2500	35.6	32.1	-16.9
18.3400	31.3	27.9	-20.1
18.4300	35.2	31.2	-16.8
18.5200	36.5	32.8	-15.2
18.6100	38.8	35.3	-12.7
18.7000	39.3	36.1	-11.9
18.7900	34.2	31.3	-16.7
18.8800	37.5	34.2	-13.8
18.9700	36.0	32.7	-15.3
19.0600	37.7	34.7	-13.3
19.1500	36.6	33.2	-14.8

POWER LINE POLARITY : NEUTRAL

5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.

The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The 30 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(30 \text{ dBuV/m})/20] = 31.6 \text{ uV/m}$$