

Application for FCC Certificate
On Behalf of
LG Electronics U.S.A Inc.

Color Monitor

Model No.: F17LE-*

Serial No.: 44TAE26990474

FCC ID : BEJF17LE

Prepared For :LG Electronics U.S.A Inc.
2000 Millbrook Dr.Lincolnshire,
IL 60069 United States

Prepared By :Audix Technology (Shanghai) Co., Ltd.
3F 34Bldg 680 Guiping Rd,
Caohejing Hi-Tech Park,
Shanghai, China 200233

Tel: +86-21-64955500
Fax: +86-21-64955491

Report No. : ACI-F04038
Date of Test : May 13-24, 2004
Date of Report : Jun 03, 2004

TABLE OF CONTENTS

	Page
1 GENERAL INFORMATION.....	4
1.1 Description of Equipment Under Test.....	4
1.2 Supported Simulators	4
1.3 Description of Test Facility	5
1.4 Measurement Uncertainty	5
2 CONDUCTED EMISSION TEST	6
2.1 Test Equipment.....	6
2.2 Block Diagram of Test Setup	6
2.3 Conducted Emission Limit.....	7
2.4 Test Configuration.....	7
2.5 Operating Condition of EUT	7
2.6 Test Procedures	8
2.7 Test Results	8
3 RADIATED EMISSION TEST	12
3.1 Test Equipment.....	12
3.2 Block Diagram of Test Setup	12
3.3 Radiated Emission Limit	13
3.4 Test Configuration.....	13
3.5 Operating Condition of EUT	13
3.6 Test Procedures	13
3.7 Test Results	14
4 DEVIATION TO TEST SPECIFICATIONS	18

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test

Description : Color Monitor

Type of EUT : ☒ Production ☐ Pre-product ☐ Pro-type

Model No. : F17LE-*

Serial No. : 44TAE26990474

Applicant : LG Electronics U.S.A Inc.
2000 Millbrook Dr.Lincolnshire,
IL 60069 United States

Manufacturer : Nanjing LG-Tontru Color Display System
Co., Ltd.
No.346, YaoXin Road, Nanjing China

1.2 Supported Simulators

1.2.1 PC

Manufacturer : HP

Model Number : d530CMT

P/N : CNG3470BD9

CPU : 2.6GHz.

Power Cable : Unshielded, detachable ,1.8m..

Certificate : FCC DoC, MIC(E-A011-03-2204CB),
VCCI, C-Tick, CE/EMC

1.2.2 Keyboard (PS2)

Manufacturer : Logitech

Model Number : KB-0133

Assy. P/N : 323686-AA1

CT : B69350MVBPF3DI

Data Cable : Unshielded, undetachable, 1.9m

Certificate : FCC DoC, VCCI, CE/EMC, MIC,
C-Tick (N119).

1.2.3 Mouse (PS2)

Manufacturer : HP

Model Number : M-S69

Assy. P/N : 323614-001

CT : F6AB70S5BPI1G60

Data Cable : Unshielded ,undetachable, 1.85m

Certificate : FCC ID:JNZ21-1443, VCCI, CE/EMC,
MIC, C-Tick(N231)

1.2.4 Printer

Manufacturer : HP
Model Number : C3990A
Serial Number : JPZX020487
Data Cable : Unshielded, detachable, 1.5m
Certification : GS, CE, C-Tick, FCC DoC

1.2.5 Modem

Manufacturer : Aceex
Model Number : 1414
Serial Number : 980013576
Data Cable : Unshielded, Detachable, 1.8m
FCC ID : IFAXDM1414

1.3 Description of Test Facility

Site Description (Semi-Anechoic Chamber) : Sept. 17, 1998 file on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F 34Bldg 680 Guiping Rd,
Caohejing Hi-Tech Park,
Shanghai, China 200233

NVLAP Lab Code : 200371-0

1.4 Measurement Uncertainty

Conducted Emission Uncertainty : $U=\pm 2.66\text{dB}$
Radiated Emission Uncertainty : $U=\pm 4.26\text{dB}$

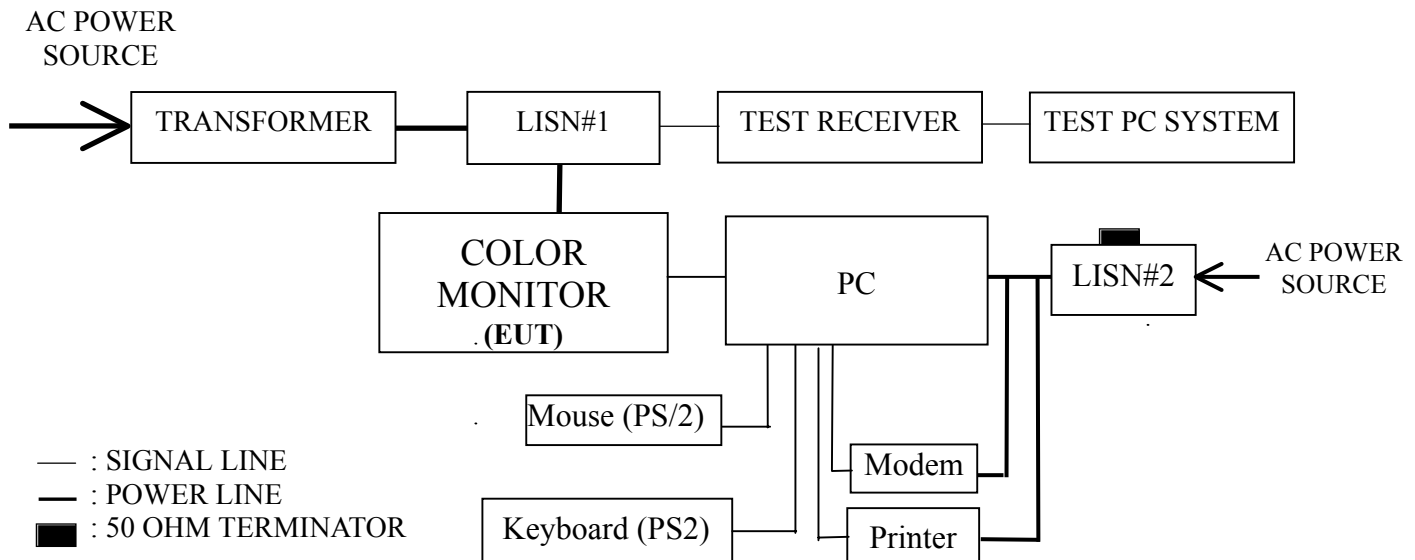
2 CONDUCTED EMISSION TEST

2.1 Test Equipment

The following test equipment are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS10	844077/020	Apr 20, 2004	1 Year
2.	Line Impedance Stabilization Network (LISN#1)	Kyoritsu	KNW-407	8-1280-4	Apr 20, 2004	1 Year
3.	Line Impedance Stabilization Network (LISN#2)	Kyoritsu	KNW-407	8-1280-5	Apr 27, 2004	1 Year
4.	50Ω Coaxial Switch	Anritsu	MP59B	M73389	Mar 21, 2004	1/2 Year
5.	50Ω Terminator	No.26 Factory	BNC	No.1	Mar 11, 2004	1/2 Year
6.	Software	Audix	E3	SET00200 9804M592	-	-

2.2 Block Diagram of Test Setup



2.3 Conducted Emission Limit

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50
NOTE 1 – The lower limit shall apply at the transition frequencies. NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz NOTE 3 – If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.		

2.4 Test Configuration

The EUT (listed in Sec.1.1) and the simulators (listed in Sec1.2) were installed as shown on Sec.2.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

2.5 Operating Condition of EUT

- 2.5.1 Setup the EUT and simulators as shown in Sec. 2.2
- 2.5.2 Turn on the power of all equipment and the EUT.
- 2.5.3 Set the contrast control to maximum.
- 2.5.4 Set the brightness control to maximum or at raster extinction if raster extinction occurs at less than maximum brightness.
- 2.5.5 For color monitors, use white letters on a black background to represent all color.
- 2.5.6 Select the worse case of positive or negative video if both alternatives are available.
- 2.5.7 Set character size and number of characters per line so that typically the greatest number of characters per screen is displayed.
- 2.5.8 For monitors with graphics capabilities, a pattern consisting of all scrolling Hs should be displayed. For monitors with text only capability, a pattern consisting of random text shall be displayed. If neither of the above apply, use a typical display.
- 2.5.9 Set the EUT on the test mode, and then test.

2.6 Test Procedures

The EUT was connected to the power mains through a Line Impedance Stabilization Network (LISN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line (VA & VB) were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to FCC Part 15 during conducted emission test.

The bandwidth of Test Receiver ESHS10 was set at 10 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test mode (800*600 75Hz, 1024*768 85Hz, 1280*1024 60Hz) was done on conducted disturbance test and all the test results are listed in Sec. 2.7.

2.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

The worse case is for 800*600 75Hz mode. The worst emission is detected at 0.151 MHz with corrected signal level of 54.88 dB(μ V) (limit is 65.96 dB(μ V)), when the VB of the EUT is connected to LISN.

EUT : Color Monitor Temperature : 23°C

Model No. : F17LE-* Humidity : 56%

Serial No. : 44TAE26990474

Test Mode : 800*600 75Hz Date of Test : May 24, 2004

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.152	53.40	0.22	53.62	65.87	12.25
	0.188	47.25	0.22	47.47	64.11	16.64
	0.223	41.51	0.21	41.72	62.70	20.98
	0.751	34.66	0.13	34.79	56.00	21.21
	1.160	33.85	0.12	33.97	56.00	22.03
	1.753	32.57	0.14	32.71	56.00	23.29
VB	0.151	54.62	0.26	54.88	65.96	11.08
	0.187	47.43	0.22	47.65	64.15	16.50
	0.224	41.19	0.20	41.39	62.66	21.27
	0.300	34.99	0.21	35.20	60.24	25.04
	0.751	34.14	0.18	34.32	56.00	21.68
	1.381	31.98	0.19	32.17	56.00	23.83
NOTE 1 - Emission Level = Meter Reading + Factor. NOTE 2 - Factor = Cable Loss + Probe Factor. NOTE 3 - Probe Factor means insertion loss of LISN. NOTE 4 - All reading are Quasi-Peak Values.						

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 23°C

Model No. : F17LE-* Humidity : 56%

Serial No. : 44TAE26990474

Test Mode : 1024*768 85Hz Date of Test : May 24, 2004

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.204	49.87	0.22	50.09	63.45	13.36
	0.274	41.27	0.17	41.44	60.98	19.54
	0.549	36.73	0.13	36.86	56.00	19.14
	0.755	36.84	0.13	36.97	56.00	19.03
	1.716	37.27	0.14	37.41	56.00	18.59
	5.898	37.14	0.22	37.36	60.00	22.64
VB	0.204	50.19	0.21	50.40	63.45	13.05
	0.274	41.29	0.20	41.49	60.98	19.49
	0.549	36.74	0.16	36.90	56.00	19.10
	0.755	37.03	0.18	37.21	56.00	18.79
	1.374	36.55	0.19	36.74	56.00	19.26
	7.213	37.58	0.31	37.89	60.00	22.11
NOTE 1 - Emission Level = Meter Reading + Factor. NOTE 2 - Factor = Cable Loss + Probe Factor. NOTE 3 - Probe Factor means insertion loss of LISN. NOTE 4 - All reading are Quasi-Peak Values.						

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 23°C

Model No. : F17LE-* Humidity : 56%

Serial No. : 44TAE26990474

Test Mode : 1280*1024 60Hz Date of Test : May 24, 2004

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.190	51.83	0.22	52.05	64.02	11.97
	0.256	42.05	0.18	42.23	61.56	19.33
	0.510	34.93	0.13	35.06	56.00	20.94
	0.767	35.59	0.12	35.71	56.00	20.29
	2.044	35.50	0.15	35.65	56.00	20.35
	7.025	38.78	0.25	39.03	60.00	20.97
VB	0.190	52.45	0.22	52.67	64.02	11.35
	0.256	42.27	0.19	42.46	61.56	19.10
	0.510	36.49	0.16	36.65	56.00	19.35
	0.767	34.56	0.18	34.74	56.00	21.26
	1.276	33.57	0.18	33.75	56.00	22.25
	7.025	36.15	0.31	36.46	60.00	23.54
NOTE 1 - Probe Factor means insertion loss of LISN. NOTE 2 - Factor = Cable Loss + Probe Factor. NOTE 3 - Emission Level = Meter Reading + Factor. NOTE 4 - All reading are Quasi-Peak Values.						

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

3 RADIATED EMISSION TEST

3.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

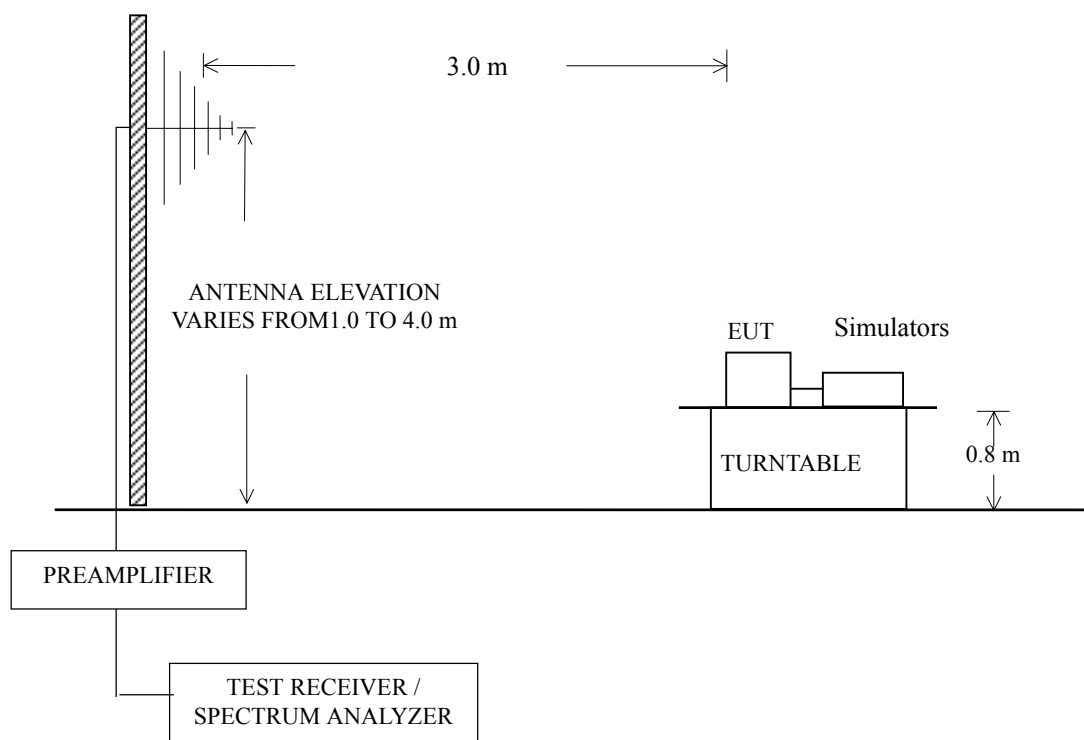
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593EM	3628A00167	Apr 22, 2004	1 Year
2.	Bilog Antenna	Chase	CBL6111	1145	Mar 20, 2004	1/2 Year
3.	Test Receiver	Rohde & Schwarz	ESVS10	832699/004	Apr 26, 2004	1 Year
4.	Preamplifier	HP	8447D	2944A06849	Mar 22, 2004	1/2 Year
5.	50Ω Coaxial Switch	Anritsu	MP59B	M74689	Mar 21, 2004	1/2 Year
6.	Software	Audix	E3	SET00200 9912M295-2	-	-

3.2 Block Diagram of Test Setup

3.2.1 EUT and simulators

Same as Sec.2.2.

3.2.2 Radiated emission test setup



3.3 Radiated Emission Limit

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
NOTE 1 - Emission Level dB(μV/m) = 20 log Emission Level (μV/m) NOTE 2 - The tighter limit applies at the band edges. NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.			

3.4 Test Configuration

The configuration of the EUT and simulators are same as those used in conducted emission test.

Please refer to Sec.2.4.

3.5 Operating Condition of EUT

Same as conducted emission test which is listed in Sec.2.5, except the test setup replaced by Sec.3.2.

3.6 Test Procedures

The EUT and simulators were placed on a turntable which is 0.8 meter above ground. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) was used as receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to FCC Part 15 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESVS10 was set at 120 kHz.

The frequency range from 30 MHz to 1000 MHz was checked.

The test mode (800*600 75Hz, 1024*768 85Hz, 1280*1024 60Hz) was done on radiated disturbance test and all the test results are listed in Sec.3.7.

3.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

The worse case is for 1024*768 85Hz mode. The worst emission at horizontal polarization was detected at 754.590 MHz with corrected signal level of 37.05 dB(μ V/m) (limit is 46.00 dB(μ V/m)), when the antenna was 1.20m height and the turn table was at 210°. The worst emission at vertical polarization was detected at 118.125 MHz with corrected signal level of 42.57 dB(μ V/m) (limit is 43.50 dB(μ V/m)), when the antenna was 1.00m height and the turn table was at 165°.

0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

EUT : Color Monitor Temperature : 20.7°C

Model No. : F17LE-* Humidity : 53%

Serial No. : 44TAE26990474

Test Mode : 800*600 75Hz Date of Test : May 13, 2004

Polarization	Frequency (MHz)	Meter Reading dB(μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	46.490	40.02	10.57	0.96	28.45	23.10	40.00	16.90
	75.590	41.82	7.73	1.19	28.36	22.38	40.00	17.62
	211.390	44.63	11.09	2.06	27.74	30.04	43.50	13.46
	235.640	40.34	12.67	2.17	27.67	27.51	46.00	18.49
	754.590	38.04	23.61	4.22	28.55	37.32	46.00	8.68
	926.280	33.85	25.37	4.68	27.67	36.23	46.00	9.77
Vertical	62.980	46.20	6.36	1.14	28.41	25.29	40.00	14.71
	111.480	43.86	10.77	1.53	28.25	27.91	43.50	15.59
	187.140	44.28	10.68	1.97	27.88	29.05	43.50	14.45
	371.440	36.83	16.71	2.79	28.06	28.27	46.00	17.73
	754.590	38.38	23.61	4.22	28.55	37.66	46.00	8.34
	851.590	35.25	24.19	4.42	28.29	35.57	46.00	10.43
NOTE 1 - Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor. NOTE 2 - All reading are Quasi-Peak values.								

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 20.7°C

Model No. : F17LE-* Humidity : 53%

Serial No. : 44TAE26990474

Test Mode : 1024*768 85Hz Date of Test : May 13, 2004

Polarization	Frequency (MHz)	Meter Reading dB(μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	72.680	53.56	6.92	1.18	28.38	33.28	40.00	6.72
	94.990	53.32	6.98	1.33	28.29	33.34	43.50	10.16
	118.227	43.78	13.25	1.52	28.20	30.35	43.50	13.15
	213.330	46.85	11.19	2.07	27.72	32.39	43.50	11.11
	754.590	37.77	23.61	4.22	28.55	37.05	46.00	8.95
	929.190	32.81	25.51	4.70	27.74	35.28	46.00	10.72
Vertical	33.880	44.14	11.44	0.80	28.47	27.91	40.00	12.09
	45.520	42.72	11.54	0.96	28.46	26.76	40.00	13.24
	72.680	49.50	6.92	1.18	28.38	29.22	40.00	10.78
	118.125	56.00	13.25	1.52	28.20	42.57	43.50	0.93
	189.080	44.51	10.62	1.95	27.88	29.20	43.50	14.30
	754.590	37.74	23.61	4.22	28.55	37.02	46.00	8.98

NOTE 1 - Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor.

NOTE 2 - All reading are Quasi-Peak values.

NOTE 3 - At the frequency 118.125 MHz (Vertical polarization), the measured results are below the specification limit by a margin less than the measurement uncertainty, it is not therefore possible to determine compliance at a level of confidence of 95%. However, the measured result indicates a higher probability that the product tested complies with the specification limit.

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 20.7°C

Model No. : F17LE-* Humidity : 53%

Serial No. : 44TAE26990474

Test Mode : 1280*1024 60Hz Date of Test : May 13, 2004

Polarization	Frequency (MHz)	Meter Reading dB(μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	67.830	53.27	6.28	1.16	28.38	32.33	40.00	7.67
	101.780	48.61	6.97	1.37	28.29	28.66	43.50	14.84
	135.730	46.25	10.90	1.67	28.12	30.70	43.50	12.80
	203.630	48.56	10.54	2.02	27.78	33.34	43.50	10.16
	237.580	47.80	12.77	2.18	27.64	35.11	46.00	10.89
	754.590	38.43	23.61	4.22	28.55	37.71	46.00	8.29
Vertical	33.880	49.26	11.44	0.80	28.47	33.03	40.00	6.97
	67.830	48.96	6.28	1.16	28.38	28.02	40.00	11.98
	119.240	48.03	13.69	1.54	28.19	35.07	43.50	8.43
	237.580	45.86	12.77	2.18	27.64	33.17	46.00	12.83
	371.440	42.07	16.71	2.79	28.06	33.51	46.00	12.49
	754.590	37.58	23.61	4.22	28.55	36.86	46.00	9.14
NOTE 1 - Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor. NOTE 2 - All reading are Quasi-Peak values.								

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

4 DEVIATION TO TEST SPECIFICATIONS

The following components are used during the countermeasure procedures:

Name	Model Number	Specifications (mm)			Manufacturer	Location
		Length	Internal diameter	External diameter		
Magnetic core	125-074J	28.2±0.8	9.5±0.4	18.2±0.5	FEELUX Co., Ltd. BOAM R&D Co., Ltd.	See Appendix II Figure 5, 6
Magnetic core	70-1601708001	17.0±0.5	8.0±0.3	16.0±0.5	URITE&EQ Co., Ltd.	See Appendix II Figure 5, 6
Magnetic core	125-074K	15.0±0.5	6.9±0.3	13.9±0.3	FEELUX Co., Ltd. BOAM R&D Co., Ltd.	See Appendix II Figure 5, 6
Note: The Manufacturer had to add the magnetic cores to the cables in the production of this EUT in order that complies with the limits.						