

Electromagnetic Emission

F C C M E A S U R E M E N T R E P O R T

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT : LCD Color TV/Monitor
MODEL/TYPE NO : LT-20AMP
FCC ID : QDBLT20XMP
APPLICANT : SEVIT Co., Ltd.
4F 1029-11 Weon-pyeong 1Dong, Gumi city,
Gyeong-sang-buk Do, 730-924 Korea
Attn. : Jea-min Cho / Principal Engineer.
FCC CLASSIFICATION : Class B personal computers and peripherals
FCC RULE PART(S) : FCC Part 15 Subpart B
FCC PROCEDURE : Certification
TRADE NAME : SEVIT
TEST REPORT No. : E02.0711.FCC.419N
DATES OF TEST : July 08~09, 2002
DATES OF ISSUE : July 11, 2002
TEST LABORATORY : ETL Inc (FCC Registration Number : 95422)
#584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do,
469-880, Korea
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This LCD Color TV/Monitor, Model LT-20AMP has been tested in accordance with the measurement procedures specified in ANSI C63.4-1992 at the ETL/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart B Class B personal computers and peripherals.

I attest to the accuracy of data. All measurements herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results of testing in this report apply to the product / system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

yo han, Park

Name : Yo Han, Park

Title : Chief Engineer & Lab.Manager

E-RAE Testing Laboratory Inc.
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FCC MEASUREMENT REPORT

Scope – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name : SEVIT Co., Ltd.
Address : 4F 1029-11 Weon-pyeong 1Dong, Gumi city,
Gyeong-sang-buk Do, 730-924 Korea
Attention : Jae-min Cho / Principal Engineer.

- **EUT Type :** LCD Color TV/Monitor
- **Model Number :** LT-20AMP
- **FCC Identifier :** QDBLT20XMP
- **S/N :** N/A
- **FCC Rule Part(s) :** FCC Part 15 Subpart B
- **Test Procedure :** ANSI C63.4-1992
- **FCC Classification :** Class B computers and peripherals
- **Dates of Tests :** July 11, 2002
- **Place of Tests :**
ETL Inc
EMC Testing Lab (FCC Registration Number : 95422)
584, Sangwhal-Ri, Kanam-Myun, Yoju-Kun,
Kyounggi-Do, Korea
Tel : (031) 885-0072 Fax : (031) 885-0074
- **Test Report No. :** E02.0711.FCC.419N

1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratory Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Youju-kun, Kyoungki-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-1992 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meters site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission (Registration Number: 95422).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-1992) was used in determining radiated and conducted emissions from the SEVIT Co., Ltd. Model: LT-20AMP

2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the SEVIT Co., Ltd. LCD Color TV/ Monitor, LT-20AMP
Please refer to Users manual

2.2 General Specification

- Chassis Type : Plastic
- List of Each OSC. Or X-Tal. Freq. (>=1MHz) : X-Tal. 18.432, 14.31818, 6.000, 20.250MHz
- Chipset Brand & Part No. : MX / MX88C284AEC, SAMSUNG / K4S161622D-TC80, ANALOG DEVICES / AD9884A, MICRONAS / VPC 3230D B4, MICRONAS / MSP 3420 B8
- Tube : LG Philips LCD 20.1" LCD panel
- Audio output : 3W x 4
- Television system : PAL-BG, I, DK, / SECAM-BG, DK, L / AV NTSC
- Television Program : VHF: 2~12, UHF: 21~69, Cable: S1~S41
- External antenna impedance : 75
- AC Power Adaptor : AC 100-240V, 1.6-0.7A, 50/60Hz
- Power requirements : DC 15V/4.5A
- Power Consumption : Max. 70W
- Main body size : 580mm X 504mm X 80mm(Horizontal X Height X Thickness)
- Main body weight : 11.45Kg

3. DESCRIPTION OF TESTS

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with § 12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment ". The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50 /50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

- Procedure of Test

The line-conducted facility is located inside a shielded room 1m X 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the side wall of the shielded room. Two EMCO 3825/2 LISN are bonded to the shielded room. The EUT is powered from the EMCO LISN and the support equipment is powered from the another EMCO LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the EMCO LISN. Non-inductive bundling to a 1m length shortened all interconnecting cables more than 1m. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the R3261A Spectrum Analyzer to determine the frequency producing the max. emission from the EUT. The frequency producing the max. level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

3. DESCRIPTION OF TESTS

3.2 Radiated Emission Measurement

Radiated emission measurements were in accordance with § 12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment ". The measurements were performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Quasi-peak" within a bandwidth of 120KHz.

- Procedure of Test

Preliminary measurements were made at 3 meter using broadband antennas, and spectrum analyzer to determined the frequency producing the max. emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using SchwarzBeck Log-Bicon antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 3-meters. The test equipment was placed on a wooden turn-table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR Quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the max. emission. Each emission was maximized by: varying the mode of operation to the EUT and/or support equipment and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

4.2 EUT operation

Operating Mode	The worst operating condition
640 x 480 60Hz Full "H" Pattern Display (VGA Mode)	
640 x 480 67Hz Full "H" Pattern Display (VGA Mode)	
640 x 480 75Hz Full "H" Pattern Display (VGA Mode)	
640 x 480 85Hz Full "H" Pattern Display (VGA Mode)	O
TV Receiving Mode	
Composite Video Input Mode	

O: Worst case investigated during the Test and it was tested in max resolution 640 x 480, 85Hz by manufacture requirement.

4.3 Support Equipment Used

Following peripheral devices and interface cables were connected during the measurement:

EUT – LCD Color TV/ Monitor (SEVIT)

FCC ID : QDBLT20XMP
Model Name : LT-20AMP
Serial No. : N/A
Manufacturer : SEVIT Co., Ltd.
Power Supply Type : Switching
Power Cord : Non-Shielded, Detachable, 1.2m
Data Cable : 1.5m Unshielded A/V RCA cable, 1.2m Shielded 15pin D-sub Cable
1.5m Shielded S-VHS Cable.

Support Unit 1-Personal computer (DELL)

FCC ID : N/A (DoC)
Model Name : MMP
Serial No. : 2LL11S
Manufacturer : DELL
Power Supply Type : Switching
Power Cord : Non-shielded, Detachable: 1.2m
Data Cable : Shielded, Detachable:1.5m



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Support Unit 2-Keyboard (DELL)

FCC ID	: N/A (DoC)
Model Name	: SK-8000
Serial No.	: 2965
Manufacturer	: DELL
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: Shielded, 1.5m

Support Unit 3-Mouse (LOGITECH)

FCC ID	: DZL211029
Model Name	: M-S34
Serial No.	: LZC01002314
Manufacturer	: LOGITECH
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: None-Shielded, 1.2m

Support Unit 4- EAR- MIC (JETECH)

FCC ID	: N/A
Model Name	: JE101
Serial No.	: N/A
Manufacturer	: JETECH
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: Shielded, 1.5m

Support Unit 5- USB Mouse (N/A)

FCC ID	: N/A
Model Name	: HL898W
Serial No.	: HL08011837
Manufacturer	: N/A
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: None-Shielded, 1.2m

Support Unit 6- Serial Mouse (PETRA)

FCC ID	: JKGMUS5S01
Model Name	: MUS5S
Serial No.	: E183027
Manufacturer	: PETRA
Power Supply Type	: N/A
Power Cord	: N/A
Data Cable	: Shielded, 1.2m



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Support Unit 7- Printer (EPSON)

FCC ID : N/A
Model Name : STYLUS PHOTO 750
Serial No. : BRL0005620
Manufacturer : SEIKO EPSON CORP.
Power Supply Type : Switching
Power Cord : Non-Shield, 1.5m
Data Cable : Shielded, 1.5m

Support Unit 8- DVD PLAYER (AlphaCast)

FCC ID : N/A
Model Name : DVDP-M100
Serial No. : N/A
Manufacturer : AlphaCast
Power Supply Type : DC 12V From Adaptor
Power Cord : Non-Shield, 1.5m
Data Cable : Shielded, 1.5m

5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

Test Rule Parts	Measurement Required	Result
15.107	Conducted Emissions Measurement	Passed by -3.80dB
15.109	Radiated Emissions Measurement	Passed by -3.30dB

The data collected shows that the SEVIT Co., Ltd. LCD Color TV/Monitor, LT-20AMP complies with technical requirements of above rules part 15.107 and 15.109 Class B Limits

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

5. TEST RESULTS

5.2 Conducted Emissions Measurement

EUT	LCD Color TV/Monitor / LT-20AMP (S/N:NONE)
Limit apply to	FCC Part 15 subpart B
Test Date	July 08, 2002
Operating Condition	640 x 480 85Hz Full "H" Pattern Display
Environment Condition	Humidity Level : 53%RH, Temperature : 29
Result	Passed by -3.80dB

Conducted Emission Test Data

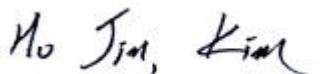
The following table shows the highest levels of conducted emissions on both polarization of live and neutral line.

Detector mode: CISPR Quasi-Peak mode (6dB Bandwidth : 9 KHz)

Frequency [MHz]	Reading [dB μ V]		Phase (*H/**N)	Limit [dB μ V]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Q.Peak	Average
0.605	29.6	-	H	48.0	-	18.4	-
0.910	31.3	-				16.7	-
2.245	32.9	-				15.1	-
3.520	33.2	-				14.8	-
4.370	32.7	-				15.3	-
6.800	36.8	-				11.2	-
10.50	37.4	-				10.6	-
13.15	42.3	-				5.70	-
15.36	44.2	-				3.80	-
17.36	44.0	-				4.00	-
28.30	35.6	-				12.4	-

NOTES :

1. * H : HOT Line , **N : Neutral Line
2. Margin value = Limit – Reading
3. Measurement were performed at the AC/DC Power Inlet in the frequency band of 450kHz ~ 30MHz according to the FCC Part 15 subpart B



Test Engineer : H. J. Kim

5. TEST RESULTS

Line: NETURAL Line

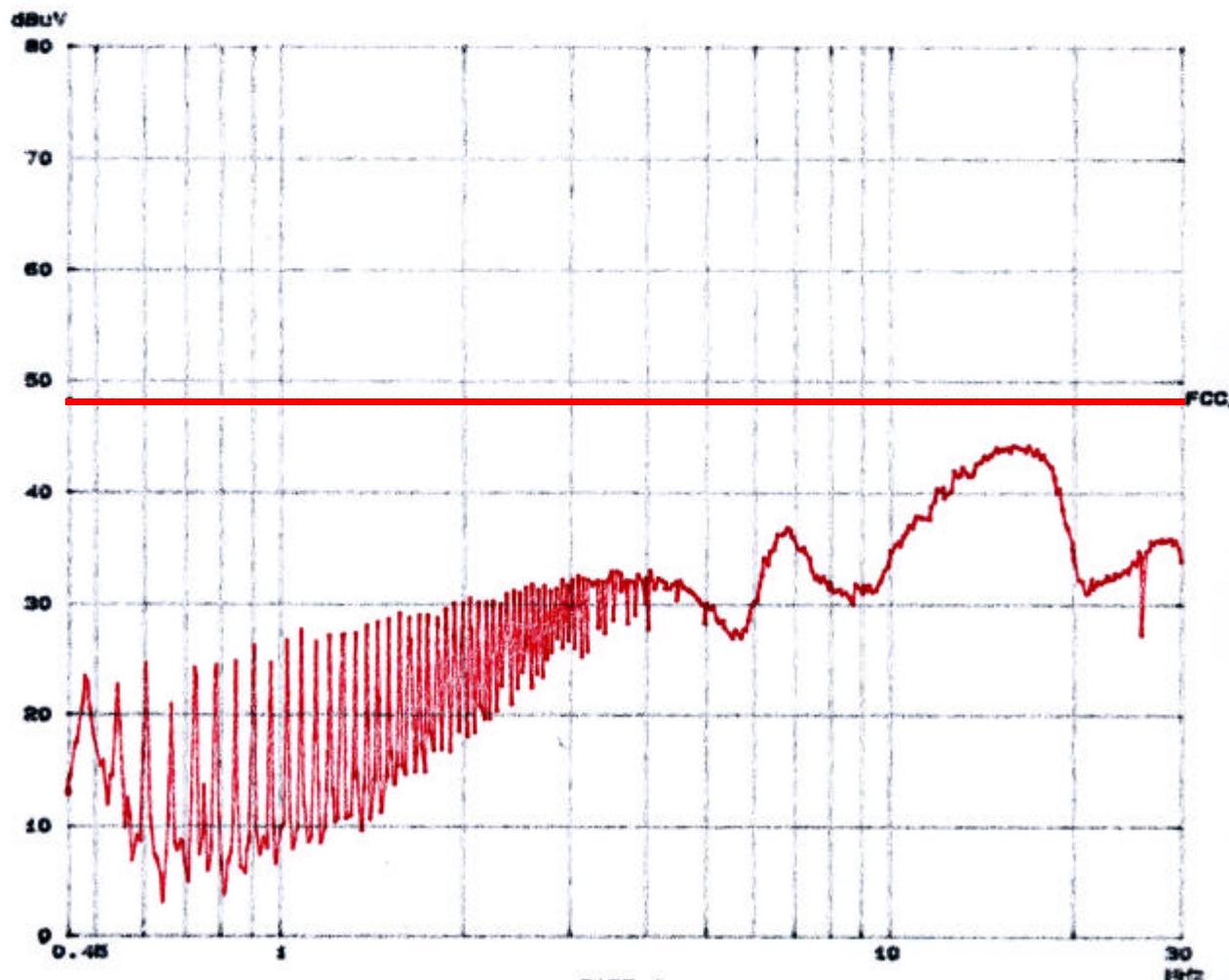
ETL Inc. CONDUCTED EMISSION

EUT: LT-20AMP
Op Cond: FULL H PATTERN DISPLAY
Operator: Ho Jin, Kim
Test Spec: FCC Part 15 CLASS B
Comment: NETURAL
110V

Scan Settings (3 Ranges)

Frequencies			Receiver Settings						
Start	Stop	Step	IF	BW	Detector	M-Time	Atten	Preamp	OpRange
450k	500k	2k	10k	PK	20ms	AUTO	LN OFF	60dB	
500k	5M	5k	10k	PK	20ms	AUTO	LN OFF	60dB	
5M	30M	10k	10k	PK	20ms	AUTO	LN OFF	60dB	

Final Measurement: x QP Transducer No. 1 Start 150k Stop 30M Name EN55022
Meas Time: 1 s Subranges: 50
Acc Margin: 3dB



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5. TEST RESULTS

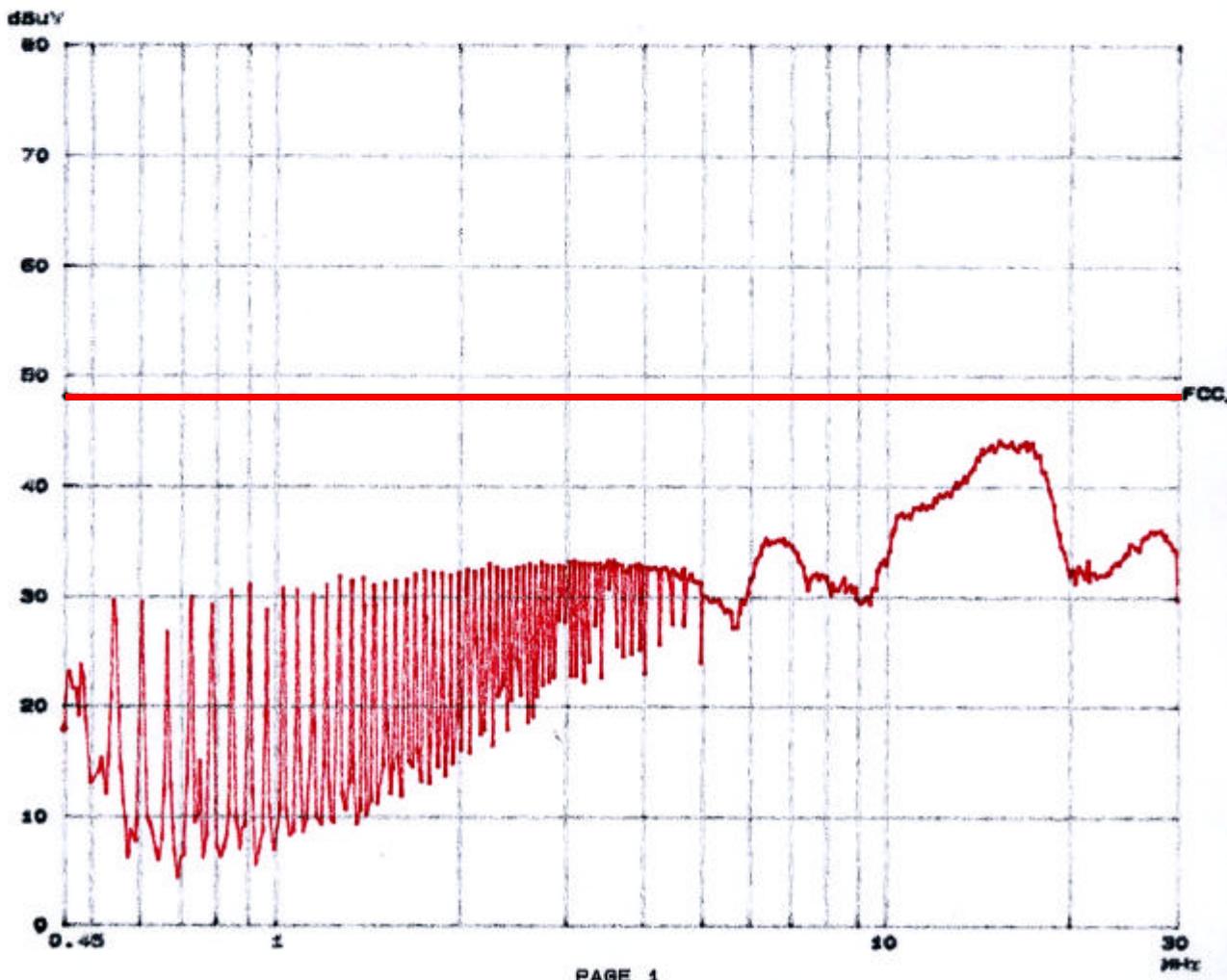
Line: HOT Line

ETL Inc. CONDUCTED EMISSION

EUT: LT-20AMP
Op Cond: FULL H PATTERN DISPLAY
Operator: Ho Jin, Kim
Test Spec: FCC Part 15 CLASS B
Comment: HOT
110V

Scan Settings (3 Ranges)
|----- Frequencies -----| |----- Receiver Settings -----|
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge
450k 500k 2k 10k PK 20ms AUTO LN OFF 60dB
500k 5M 5k 10K PK 20ms AUTO LN OFF 60dB
5M 30M 10k 10K PK 20ms AUTO LN OFF 60dB

Final Measurement: x QP Transducer No. Start Stop Name
Meas Time: 1 s 1 150k 30M EN55022
Subranges: 50
Acc Margin: 3dB



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5. TEST RESULTS

5.3 Radiated Emissions Measurement

EUT	LCD Color TV/Monitor / LT-20AMP (S/N:NONE)
Limit apply to	FCC Part 15 subpart B
Test Date	July 09, 2002
Operating Condition	640 x 480 85Hz Full "H" Pattern Display
Environment Condition	Humidity Level : 49%RH, Temperature : 31
Result	Passed by -3.30dB

Radiated Emission Test Data

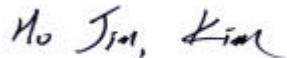
The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 120 kHz)

Frequency [MHz]	Reading [dB μ V]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Emission Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
115.25	20.01	H	10.78	2.70	33.49	43.5	10.01
135.28	20.29	H	12.12	2.90	35.31	43.5	8.19
175.38	24.30	H	11.50	3.70	39.50	43.5	4.00
180.43	21.95	H	10.88	3.70	36.53	43.5	6.97
185.42	22.30	H	10.88	3.70	36.88	43.5	6.62
195.44	23.50	H	9.93	3.80	37.23	43.5	6.27
200.45	26.79	H	9.51	3.90	40.20	43.5	3.30
220.25	21.01	H	9.75	4.00	34.76	46.0	11.24
851.90	11.85	V	22.29	8.40	42.54	46.0	3.46
878.10	7.52	H	22.46	8.60	38.58	46.0	7.42
952.00	9.54	V	23.78	8.80	42.12	46.0	3.88

NOTES :

1. * H : Horizontal polarization , ** V : Vertical polarization
2. Emission Level = Reading + Antenna factor + Cable loss
3. Margin value = Limit - Emission Level
4. The measurement was performed for the frequency range 30MHz ~ 1000MHz according to the FCC Part 15 subpart B



Test Engineer : H. J. Kim

6. SAMPLE CALCULATION

Sample 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

$$dB(\mu V/m) = 20 \log_{10} (\mu V / m) : \text{Equation 1}$$

$$dB\mu V = dBm + 107 : \text{Equation 2}$$

Example 1 : @ 15.36MHz

Class B Limit	=	250 μV	=	48.0 dB μV
Reading	=	44.2 dB μV		
Convert to uV	=	162.18 μV		
Margin	=	44.2 - 48.00	=	-3.80 dB μV
			=	-3.80 dB μV below Limit

Example 2 : @ 200.45 MHz

Class B Limit	=	150 μV	=	43.5 dB μV
Reading	=	26.79 dB μV		
Antenna Factor + Cable Loss	=	9.51 dB μV	+ 3.90 dB μV	
Total	=	40.20 dB μV		
Margin	=	40.20 - 43.5	=	-3.30 dB μV
			=	-3.30 dB μV below Limit

7. TEST EQUIPMENT LIST

List of Test Equipments Used for Measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
<input checked="" type="checkbox"/>	Spectrum Analyzer	R3261A	Advantest	21720033	02-10-26
<input checked="" type="checkbox"/>	Receiver	ESVS 10	R & S	835165/001	03-04-06
<input checked="" type="checkbox"/>	EMI Test Receiver	ESHS 30	R & S	040190/002	03-03-19
<input checked="" type="checkbox"/>	Preamplifier	HP8447D	HP	2944A07626	03-01-10
<input type="checkbox"/>	Preamplifier	HP 8347A	HP	2834A00544	03-05-23
<input checked="" type="checkbox"/>	LISN	3825/2	EMCO	9006-1669	02.12.27
<input checked="" type="checkbox"/>	LISN	3825/2	EMCO	9208-1995	02.12.27
<input checked="" type="checkbox"/>	TriLog Antenna	VULB9160	Schwarz Beck	3082	03-06-25
<input type="checkbox"/>	LogBicon	VULB9165	Schwarz Beck	2023	03-06-19
<input type="checkbox"/>	Dipole Antenna	VHAP	Schwarz Beck	964	03-05-03
<input type="checkbox"/>	Dipole Antenna	VHAP	Schwarz Beck	965	03-05-03
<input type="checkbox"/>	Dipole Antenna	UHAP	Schwarz Beck	949	03-05-03
<input type="checkbox"/>	Dipole Antenna	UHAP	Schwarz Beck	950	03-05-03
<input type="checkbox"/>	Broad band Horn Antenna	BBHA 9120 D	Schwarz Beck	277	02-11-03
<input checked="" type="checkbox"/>	Turn-Table	DETT-03	Daeil EMC	-	N/A
<input checked="" type="checkbox"/>	Antenna Master	DEAM-03	Daeil EMC	-	N/A
<input type="checkbox"/>	Plotter	7440A	H.P	2725A 75722	N/A
<input checked="" type="checkbox"/>	Chamber	DTEC01	DAETONG	-	N/A
<input checked="" type="checkbox"/>	Impedance Matching Pad	6001.01.A	SUNNER	3252	02-09-22
<input type="checkbox"/>	Thermo Hygrograph	3-3122	ISUZU	3312201	02-12-20
<input type="checkbox"/>	BaroMeter	-	Regulus	-	-