FCC PART 15 Subpart C

EMI MEASUREMENT AND TEST REPORT

For

LiveTV, LLC

1000 Charles Herbert Drive
Palm Bay, Florida 32905

FCC ID: PIHWADL-A01

March 17, 2003

This Report Concerns:	**Equipment Type:**
☒ Original Report	Wireless Aircraft Data Link

Test Engineer:	Jerry Wang
Report Number:	R0302112
Test Date:	March 6, 2003
Reviewed By:	Hans Mellberg
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

LiveTV, LLC's product, FCC ID: PIHWADL-A01, or the "EUT" as referred to in this report is a wireless aircraft data link. The EUT was composed of 4 parts listed as follows:

1. Wireless LAN Card (AIR-LMC352): 3.3"Lx2.1"Wx0.1"H
2. Bias Tee (ZFBT-2R5G-3B: 2.2"x1.3"Wx0.7"H
3. GDL RF Assembly: 9.2"Lx5.5'Wx1.0"H
4. Antenna (CI 150-32-L): 5.5"Lx2.0"Wx3.0"H

The EUT was fed by the HP DC Power Supply, M/N: 6236B.

** The test data gathered is from typical production samples provided by the manufacturer.*

1.2 Objective

This type approval report is prepared on behalf of. *LiveTV, LLC* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power density, 100 kHz Bandwidth of Band Edges Measurement and Conducted and Spurious Radiated Emission.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22: 1997, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2610A02165	12/6/03
HP	Spectrum Analyzer	8593B	2919A00242	12/20/03
HP	Amplifier	8349B	2644A02662	12/20/03
HP	Quasi-Peak Adapter	85650A	917059	12/6/03
HP	Amplifier	8447E	1937A01046	12/6/03
A.H. System	Horn Antenna	SAS0200/571	261	12/27/03
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/03
Com-Power	Biconical Antenna	AB-100	14012	11/2/03
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/03
Com-Power	LISN	LI-200	12208	12/20/03
Com-Power	LISN	LI-200	12005	12/20/03
BACL	Data Entry Software	DES1	0001	12/20/03

*** Statement of Traceability: Bay Area Compliance Laboratory Corp.** certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

1.7 Local Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
SONY	Notebook PC	PCG-885L	N/A	DoC
HP	DC Power Supply	6236B	N/A	DoC

1.8 Remote Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Cisco	Wireless Access Point	AIR-AP4800-E	99000129	LDK-102035
Compaq	PC System	4112	N/A	DoC

1.9 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shield Cable	0.25	RF Port/ WLAN Card	RF Port / Bias Tee
Shield Cable	10.0	RF & DC Port / Bias Tee	J2 Port / GDL RF Assembly
Shield Cable	1.0	J1 Port / GDL RF Assembly	Antenna
Cable	0.5	DC 6V / Power supply	DC Port / Bias Tee

2 - SYSTEM TEST CONFIGURATION

2.1 Description of Test Configuration

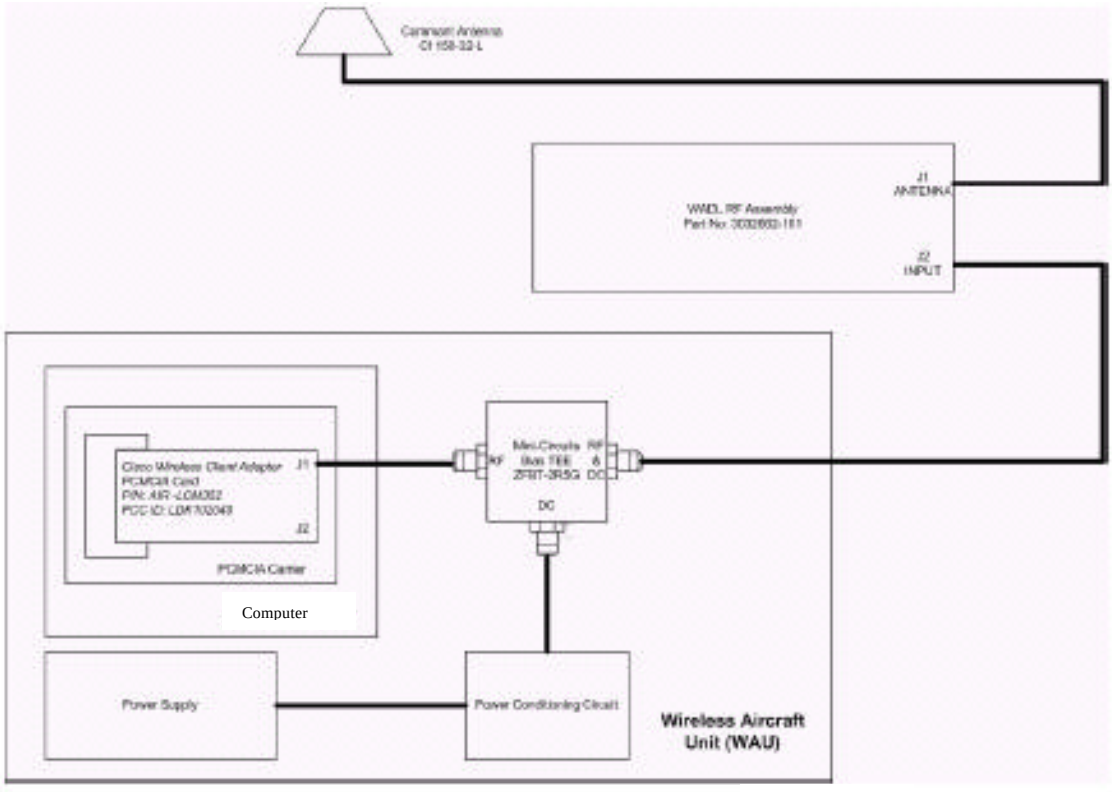
The host system was configured for testing in a typical fashion (as normally used by a typical user).

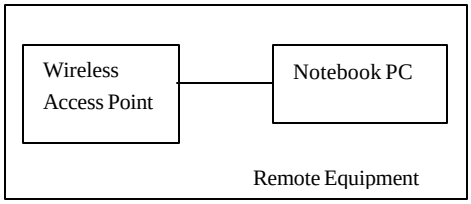
The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

2.2 Equipment Modifications

No modification(s) was made by BACL Corp. to ensure the EUT complies with the applicable limits and standards.

2.3 Test Setup Block Diagram





3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	Section Reference
§ 15.205	Restricted Bands	Compliant	Section 12
§ 2.1091	RF Safety Requirements	Compliant	Section 10
§15.203	Antenna Requirement	Compliant	Section 9
§15.207 (a)	Conducted Emission	Compliant	Section 12
§15.209 (a)	Radiated Emission	Compliant	Section 11
§15.209 (f)	Spurious Emission	Compliant	Section 6
§15.247 (a) (2)	6 dB Bandwidth	Compliant	Section 5
§15.247 (b) (3)	Peak Output Power	Compliant	Section 4
§15.247 (b) (5)	RF Exposure	Compliant	Section 10
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edges	Compliant	Section 7
§15.247 (d)	Peak Power Spectral Density	Compliant	Section 8

4 - CONDUCTED OUTPUT POWER MEASUREMENT

4.1 Standard Applicable

According to §15.247(b) (3), for all direct sequence systems, the maximum peak output power of the intentional radiator shall not exceed 1 Watt.

4.2 Measurement Procedure

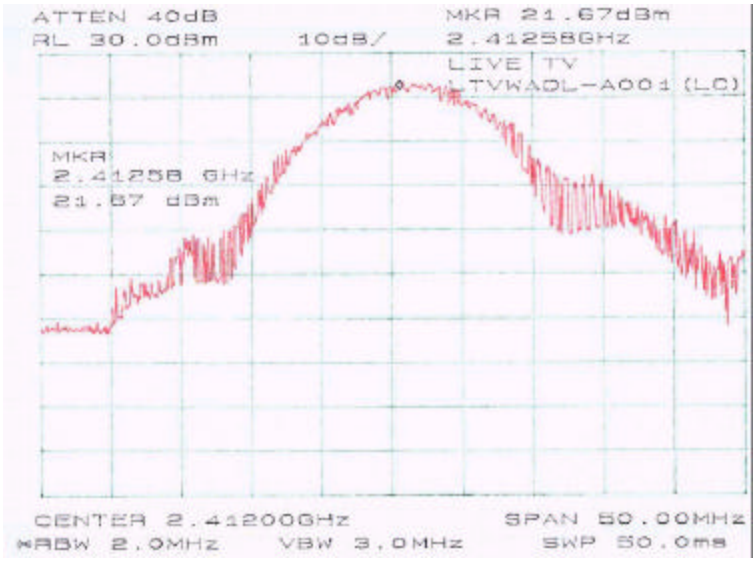
1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

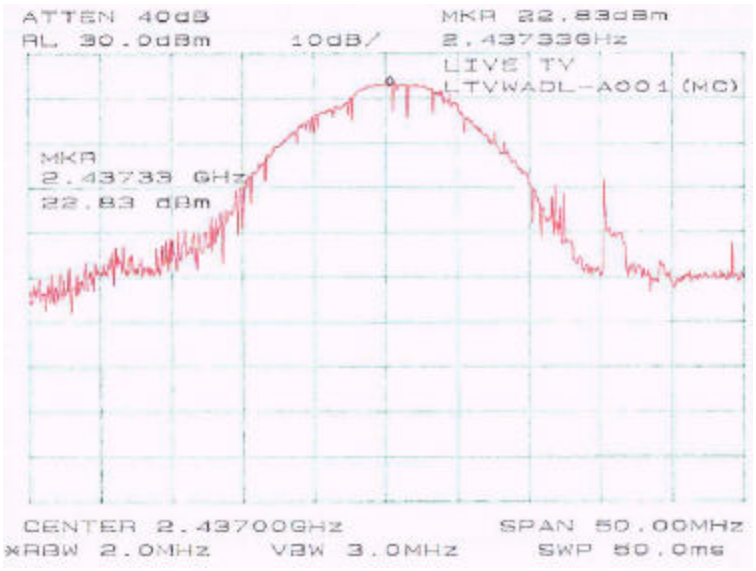
4.3 Measurement Result

Frequency (MHz)	Peak Output Power (dBm)	Correction Factor (dBm)	Corrected Factor (dBm)	Output Power (W)	Standard (W)	Result
2412	21.67	6.3	27.93	0.62	≤ 1W	Compliant
2437	22.83	6.3	29.13	0.82	≤ 1W	Compliant
2462	22.33	6.3	28.63	0.73	≤ 1W	Compliant

Note: Correction Factor = 10 log (BW6dB/RBW) = 10 log (8.6/2.0) = 6.3 dBm

Please see the attached plots for more details.


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 21.67dBm
2.41258GHz
LIVE TV
LTVWADL-A001 (LC)
MKR
2.41258 GHz
21.67 dBm
CENTER 2.41200GHz
SPAN 50.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 22.83dBm
2.43733GHz
LIVE TV
LTVWADL-A001 (MC)
MKR
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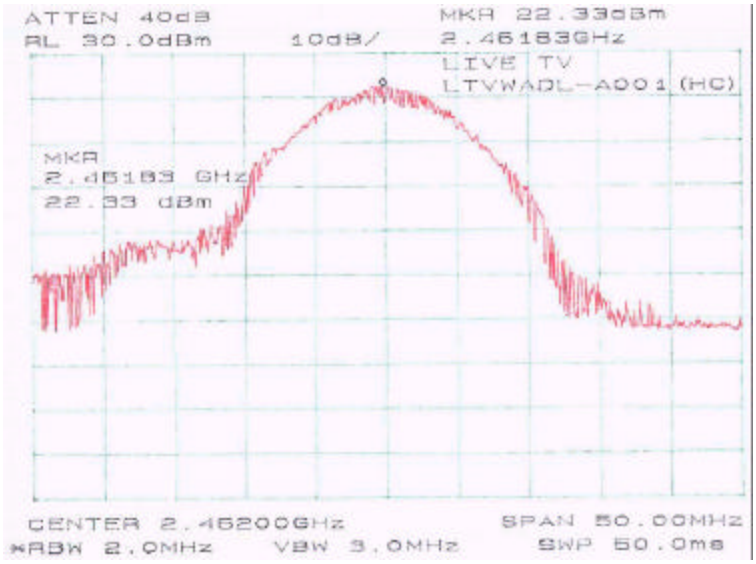
22.83 dBm
CENTER 2.43700GHz
SPAN 50.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 22.33dBm
2.46183GHz
LIVE TV
LTVWADL-A001 (HC)
MKR
2.46183 GHz
22.33 dBm
CENTER 2.46200GHz
SPAN 50.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms

5 - 6 DB BANDWIDTH

5.1 Standard Applicable

According to §15.247(a)(2), for DTS, the minimum 6 dB bandwidth shall be at least 500 kHz.

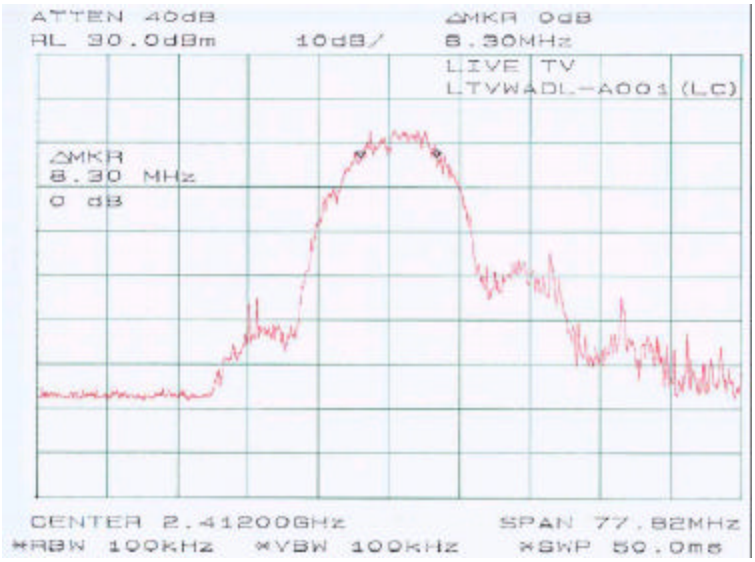
5.2 Measurement Procedure

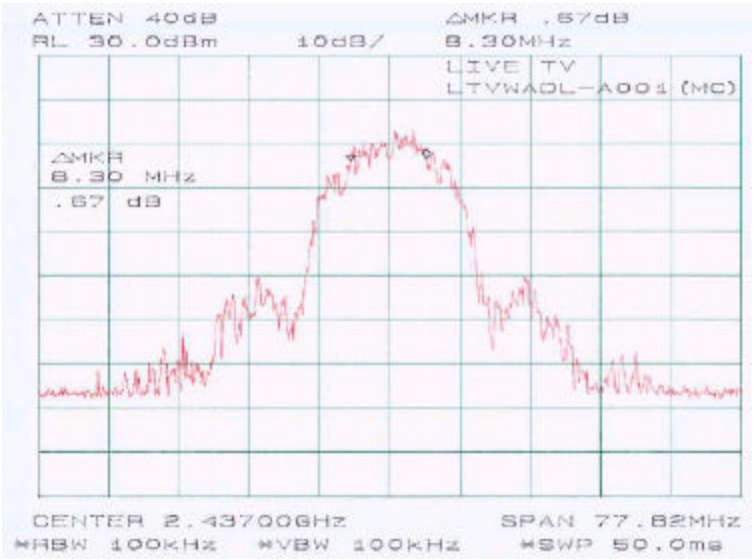
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

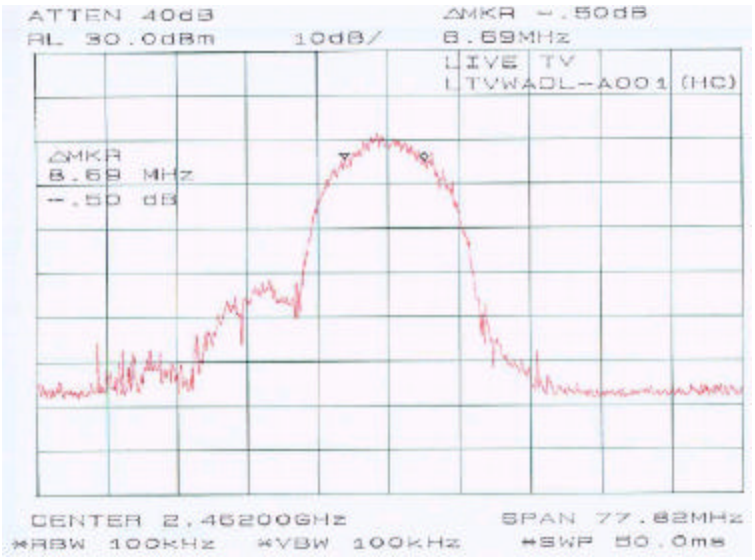
5.3 Measurement Data

Please refer to the following pages.

Channel Bandwidth	Test Result (Base and Handset)
Low Channel	Compliant
Middle Channel	Compliant
High Channel	Compliant


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR 0dB
8.30MHz
LIVE TV
LTVWADL-A001 (LC)
ΔMKR
8.30 MHz
0 dB
CENTER 2.412000GHz
SPAN 77.82MHz
*RBW 100KHz
*VBW 100KHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR .67dB
8.30MHz
LIVE TV
LTVWADL-A001 (MC)
ΔMKR
8.30 MHz
.67 dB
CENTER 2.437000GHz
SPAN 77.82MHz
*RBW 100KHz
*VBW 100KHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -.50dB
8.69MHz
LIVE TV
LTVWADL-A001 (HC)
ΔMKR
8.69 MHz
-.50 dB
CENTER 2.462000GHz
SPAN 77.82MHz
*RBW 100KHz
*VBW 100KHz
*SWP 50.0ms

6 - SPURIOUS EMISSION

6.1 Standard Applicable

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation f a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

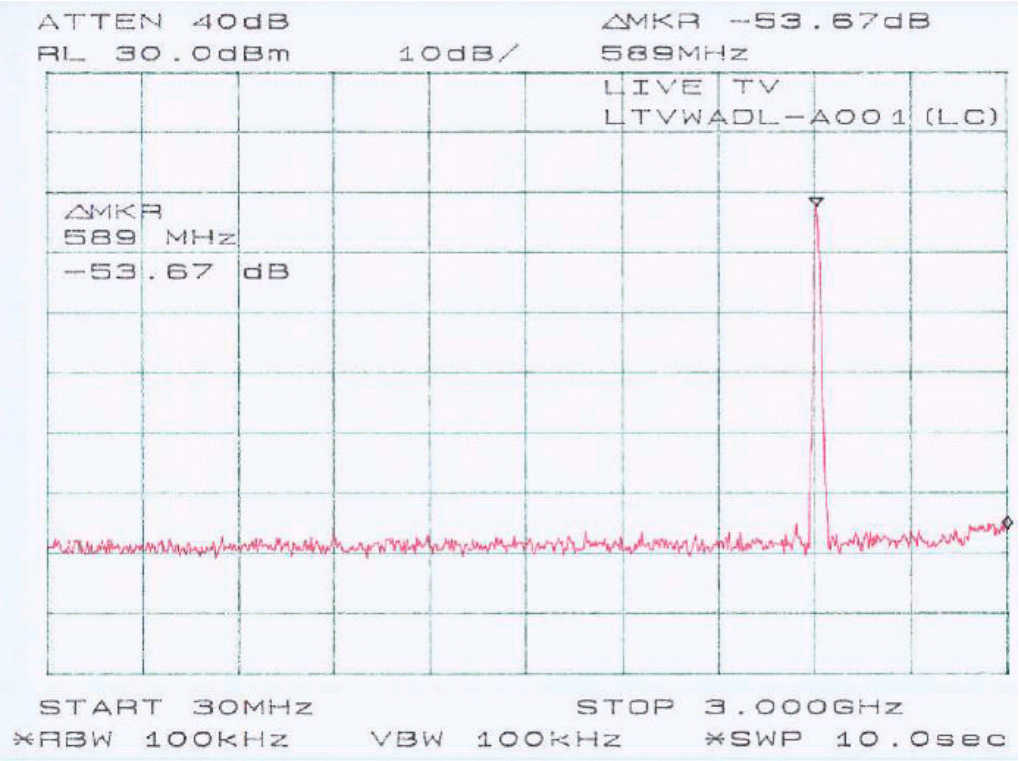
6.2 Measurement Procedure

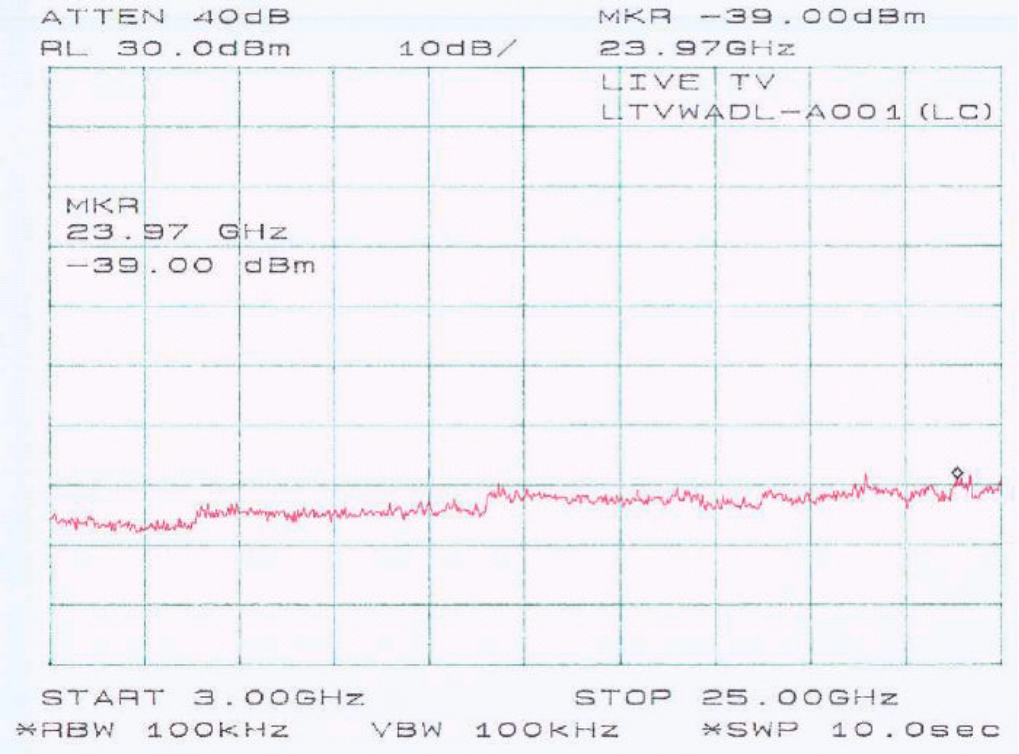
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

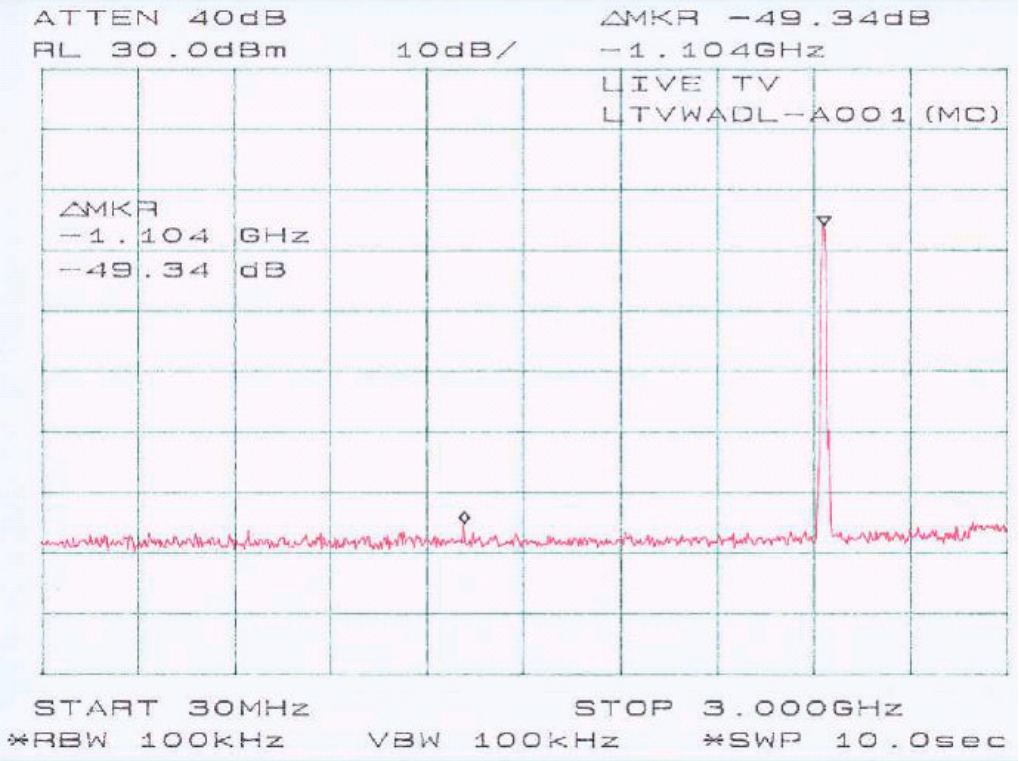
6.3 Measurement Data

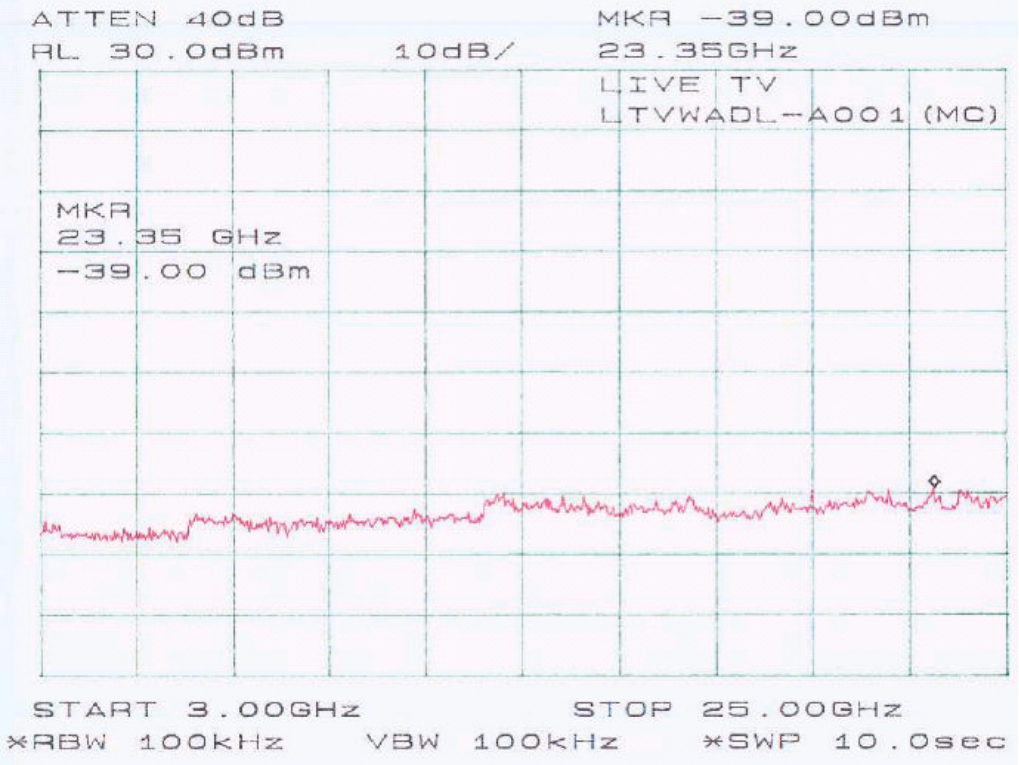
Please refer to the following pages.

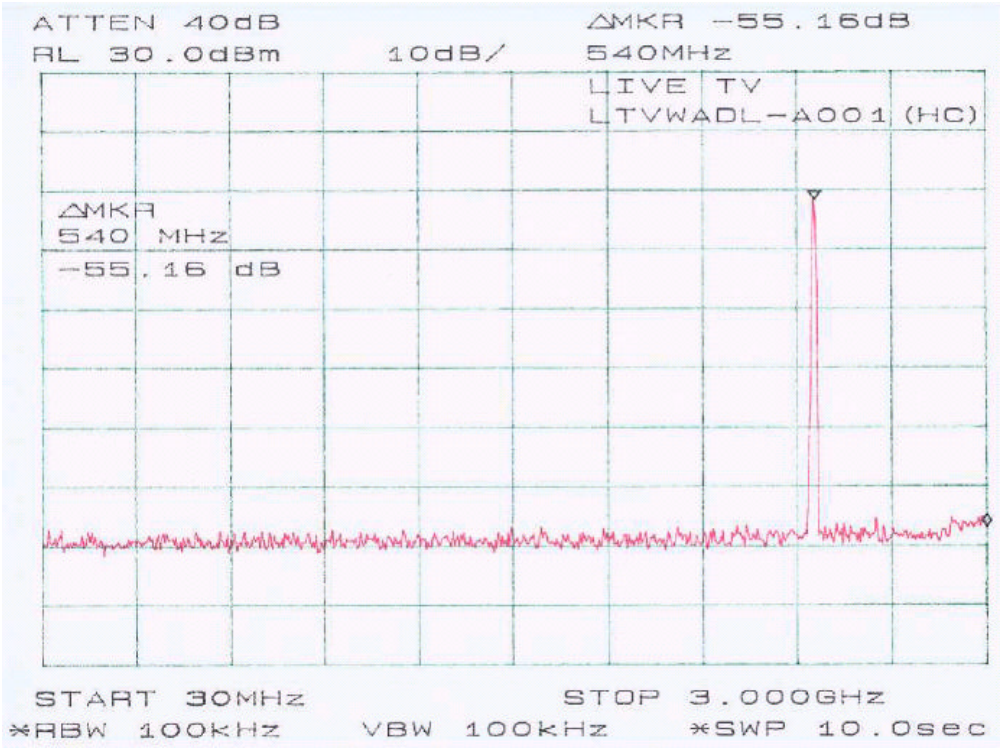
Spurious Emission	Test Result (base and handset)
Low Channel	Compliant
Middle Channel	Compliant
High Channel	Compliant

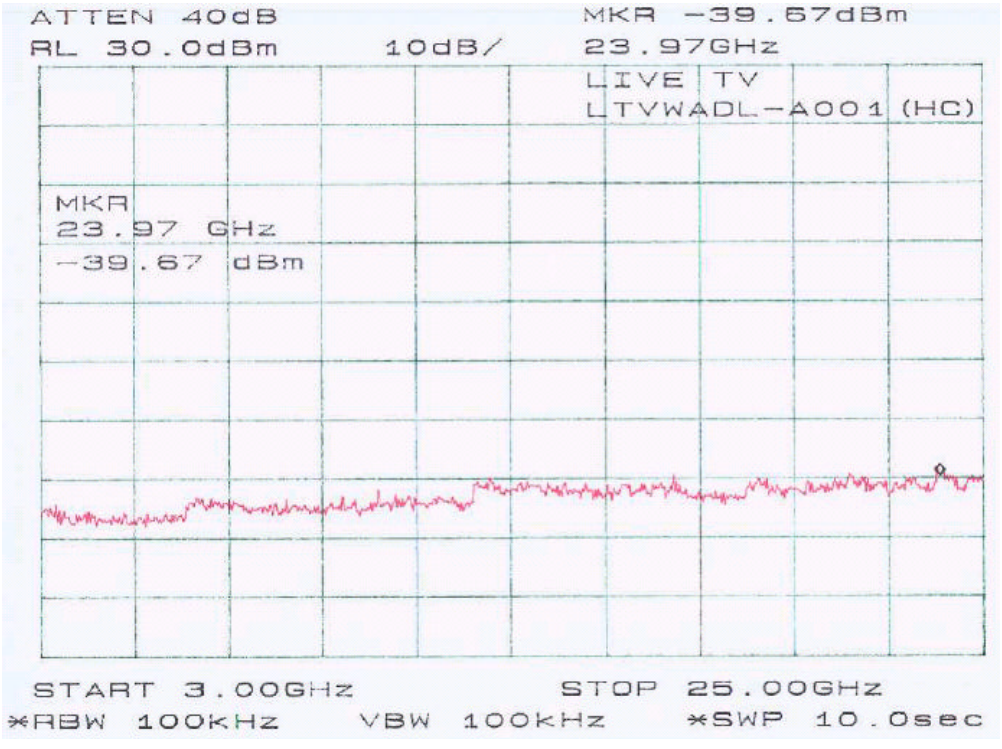

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -53.67dB
589MHz
LIVE TV
LTVWADL-A001 (LC)
ΔMKR
589 MHz
-53.67 dB
START 30MHz
STOP 3.000GHz
*RBW 100KHz
VBW 100KHz
*SWP 10.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -39.00dBm
23.97GHz
LIVE TV
LTVWADL-A001 (LC)
MKR
23.97 GHz
-39.00 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100KHz
VBW 100KHz
*SWP 10.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -49.34dB
-1.104GHz
LIVE TV
LTVWADL-A001 (MC)
ΔMKR
-1.104 GHz
-49.34 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -39.00dBm
23.35GHz
LIVE TV
LTVWADL-A001 (MC)
MKR
23.35 GHz
-39.00 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -55.16dB
540MHz
LIVE TV
LTVWADL-A001 (HC)
ΔMKR
540 MHz
-55.16 dB
START 30MHz
STOP 3.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -39.67dBm
23.97GHz
LIVE TV
LTVWADL-A001 (HC)
MKR
23.97 GHz
-39.67 dBm
START 3.00GHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec

7 - 100 KHZ BANDWIDTH OF BAND EDGES MEASUREMENT

7.1 Standard Applicable

According to §15.247(c), if *any* 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in § 15.209(a), whichever results in the lesser attenuation.

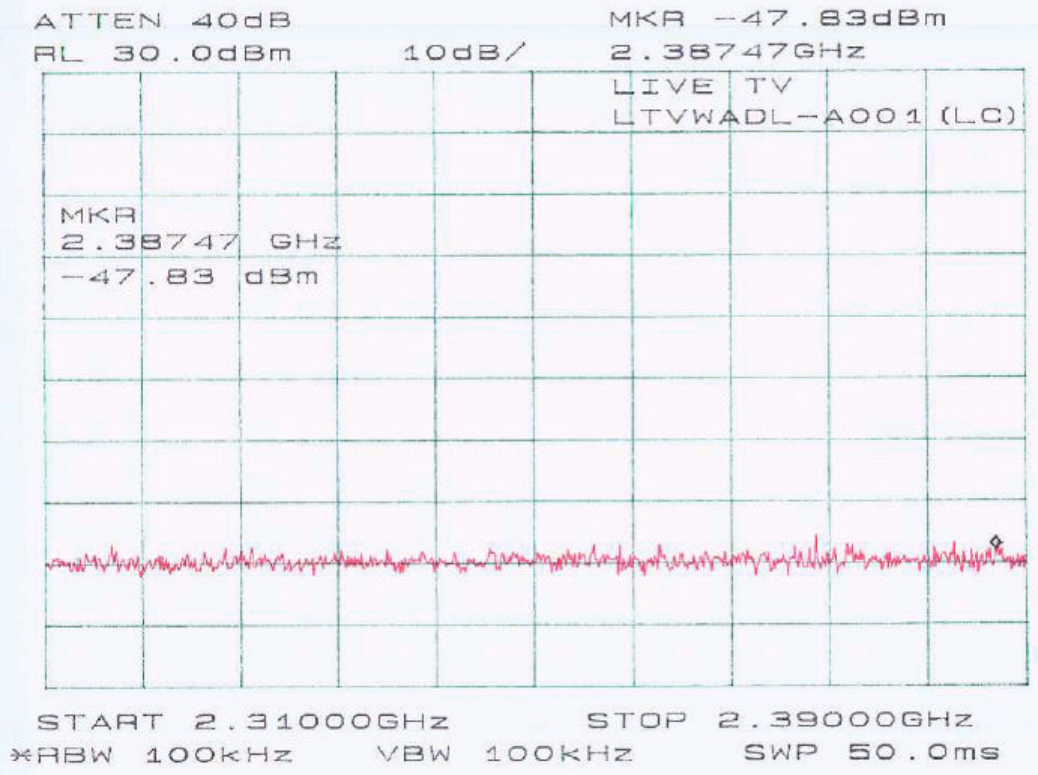
7.2 Measurement Procedure

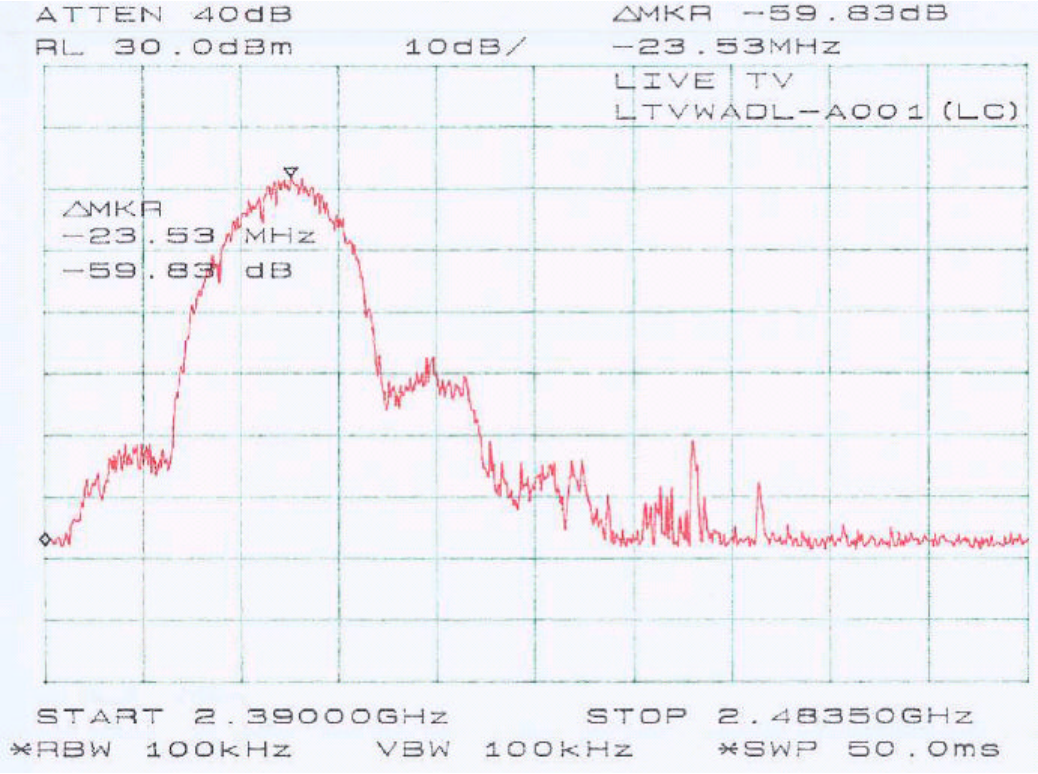
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

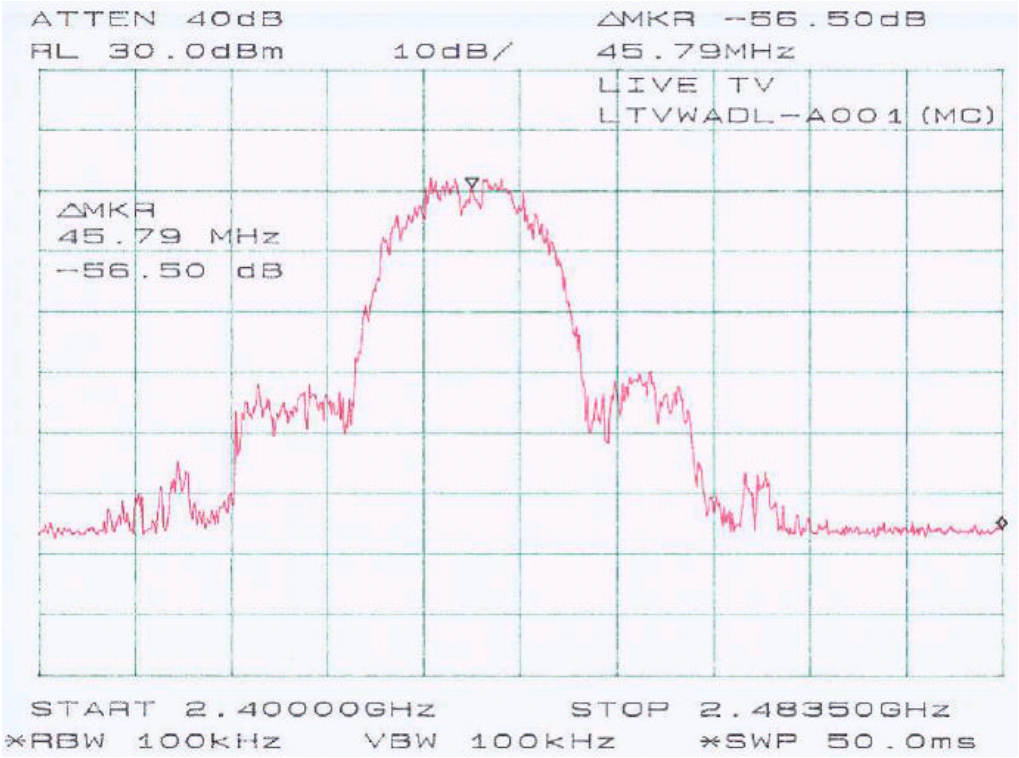
7.3 Test Results

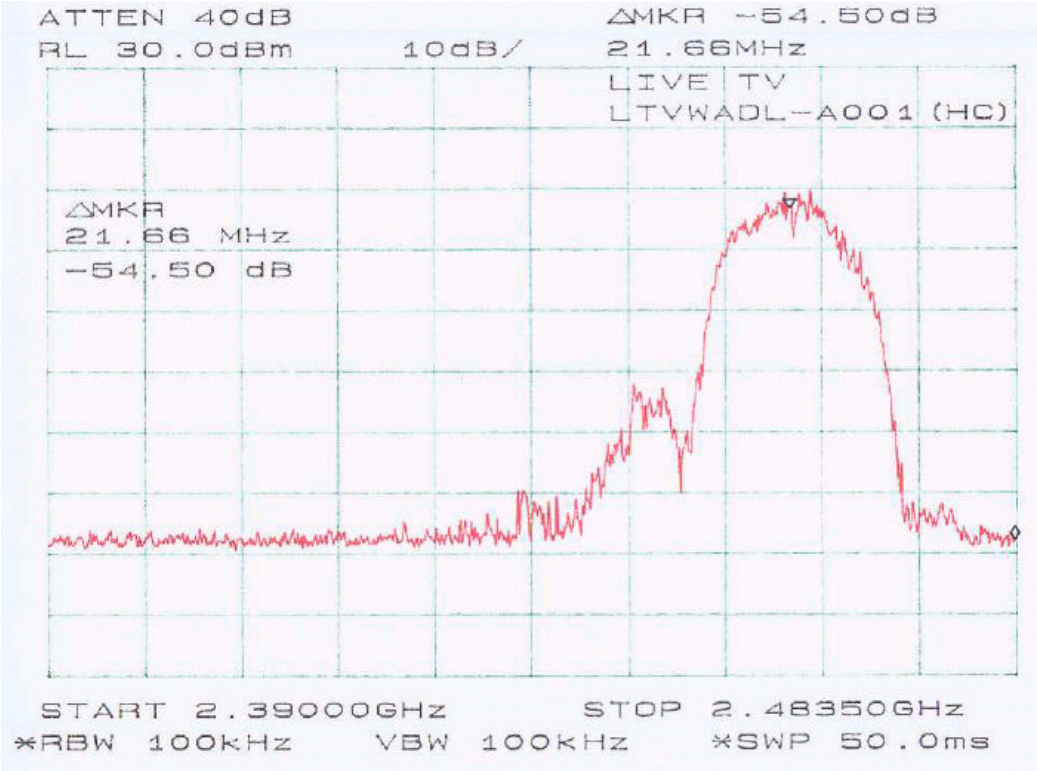
Please refer to the following pages.

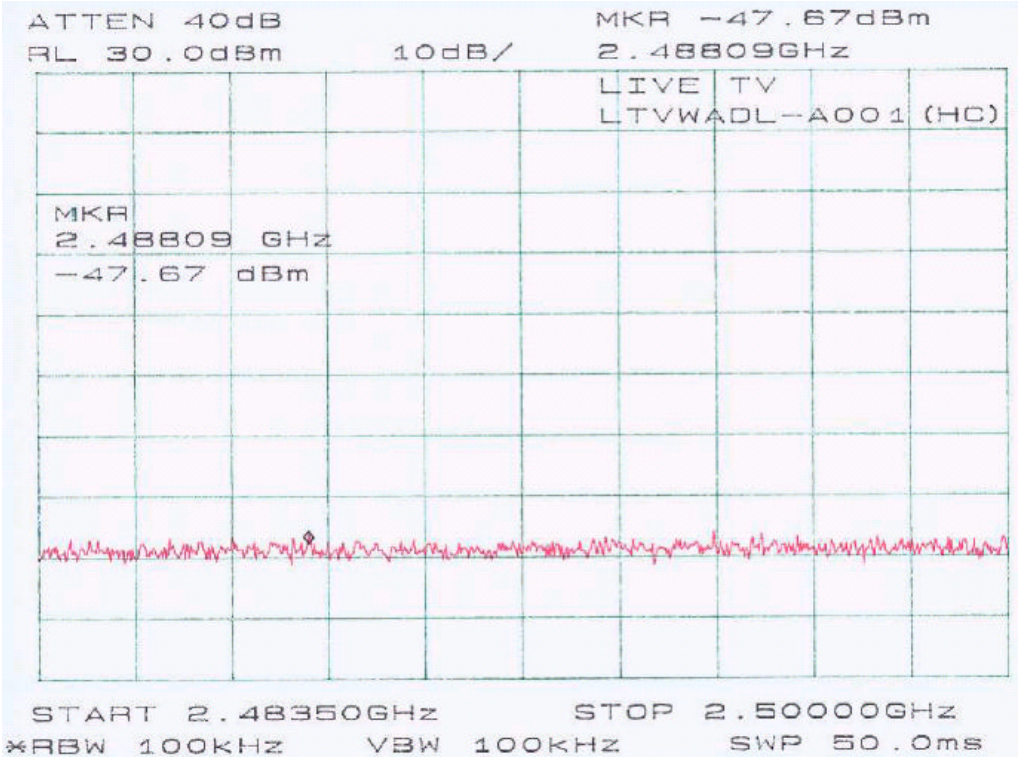
Band Edge Bandwidth	Test Result (base and handset)
Low Channel	Compliant
Middle Channel	Compliant
High Channel	Compliant


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -47.83dBm
2.38747GHz
LIVE TV
LTVWADL-A001 (LC)
MKR
2.38747 GHz
-47.83 dBm
START 2.31000GHz
STOP 2.39000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -59.83dB
-23.53MHz
LIVE TV
LTVWADL-A001 (LC)
ΔMKR
-23.53 MHz
-59.83 dB
START 2.39000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -56.50dB
45.79MHz
LIVE TV
LTVWADL-A001 (MC)
ΔMKR
45.79 MHz
-56.50 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -54.50dB
21.66MHz
LIVE TV
LTVWADL-A001 (HC)
ΔMKR
21.66 MHz
-54.50 dB
START 2.39000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -47.67dBm
2.48809GHz
LIVE TV
LTVWADL-A001 (HC)
MKR
2.48809 GHz
-47.67 dBm
START 2.48350GHz
STOP 2.50000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

8 - POWER SPECTRAL DENSITY

8.1 Standard Applicable

According to §15.247 (d), for DTS, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

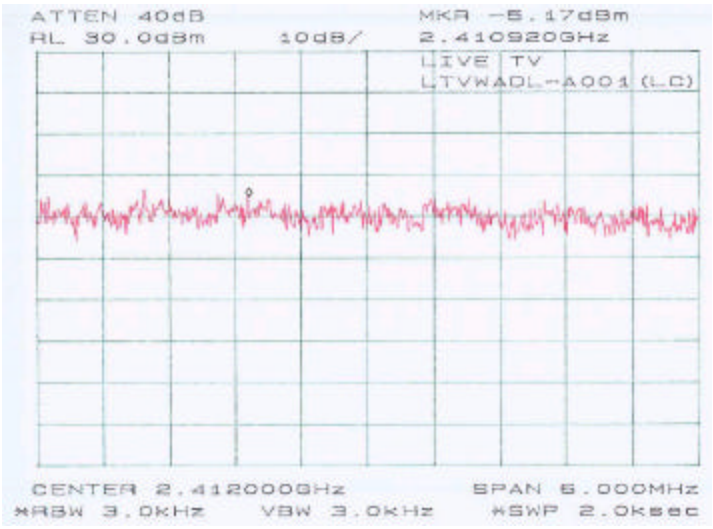
8.2 Measurement Procedure

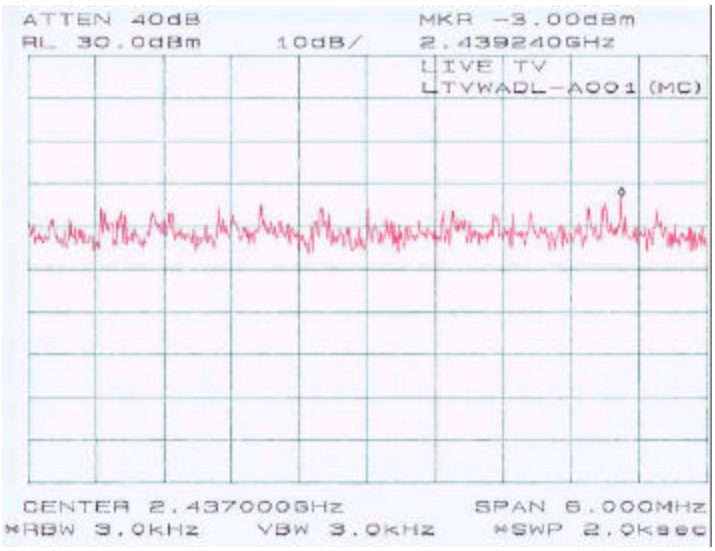
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

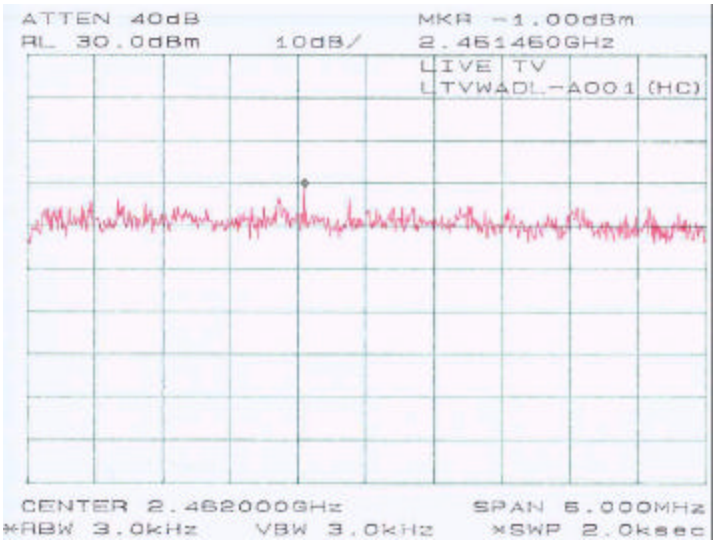
8.3 Test Results

Please refer to the following plot(s).

Power Density	Test Result (Base and Handset)
Low Channel	Compliant
Middle Channel	Compliant
High Channel	Compliant


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -5.17dBm
2.410920GHz
LIVE TV
LTVWADL-A001 (LC)
CENTER 2.412000GHz
SPAN 6.000MHz
*RBW 3.0kHz
VBW 3.0kHz
*SWP 2.0ksec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -3.00dBm
2.439240GHz
LIVE TV
LTVWADL-A001 (MC)
CENTER 2.437000GHz
SPAN 6.000MHz
*RBW 3.0kHz
VBW 3.0kHz
*SWP 2.0ksec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -1.00dBm
2.461460GHz
LIVE TV
LTVWADL-A001 (HC)
CENTER 2.462000GHz
SPAN 6.000MHz
*RBW 3.0kHz
VBW 3.0kHz
*SWP 2.0ksec

9 - ANTENNA REQUIREMENT

9.1 Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

9.2 Antenna Connected Construction

This is a part 15 amplifier with a part 15.247 transmitter. Please refer to the antenna specification for further detail.

10 - SPURIOUS RADIATED EMISSION DATA

10.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

10.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4 - 1992. The specification used was the FCC 15 Subpart C limits.

The EUT was connected to a 110 VAC / 60 Hz power source.

The spacing between the peripherals was 10 centimeters.

Input / Output cables were draped along the edge of the test table and bundle when necessary.

10.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10KHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

10.4 Test Procedure

For the radiated emissions test, both the EUT and all support equipment power cords were connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBµV of specification limits), and are distinguished with a "**Qp**" in the data table.

10.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBµV means the emission is 7dBµV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

10.6 Summary of Test Results

According to the data in section 11.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.247, and had the worst margin of:

Low channel, -8.5 dBµV at 7236.90 MHz in the Horizontal polarization
Middle channel, -11.5 dBµV at 7311.09 MHz in the Horizontal polarization
High channel, -11.5 dBµV at 7386.00 MHz in the Vertical polarization
Unwanted Emission, -3.2 dBµV at 208.41 MHz in the Vertical polarization

30MHz to 25000MHz, 3 meters

Indicated			Table	Antenna		Correction Factor			Corrected Amplitude	FCC 15 Subpart C	
Frequency	Ampl.	Comments	Angle	Height	Polar	Antenna	Cable	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBµV/m		Degree	Meter	H/V	dBµV/m	DB	DB	dBµV/m	dBµV/m	dB
Low Channel											
2412.30	115.2	FUND./Peak	90	2.0	V	28.1	3.4	30.0	116.6	/	/
2412.30	73.7	FUND./Avg.	90	2.0	V	28.1	3.4	30.0	75.2	/	/
2412.88	110.0	FUND./Peak	120	1.8	H	28.1	3.4	30.0	111.5	/	/
2412.88	72.9	FUND./Avg.	120	1.8	H	28.1	3.4	30.0	74.4	/	/
7236.90	34.8	Avg.	90	2.0	H	35.1	5.6	30.0	45.5	54	-8.5
7236.59	32.8	Avg.	90	1.2	V	35.1	5.6	30.0	43.6	54	-10.4
4824.00	35.3	Avg.	30	1.5	V	32.5	4.9	30.0	42.7	54	-11.3
4824.60	30.5	Avg.	0	2.0	H	32.5	4.9	30.0	37.9	54	-16.1
4824.60	49.2	Peak	0	2.0	H	32.5	4.9	30.0	56.6	74	-17.4
7236.90	45.9	Peak	90	2.0	H	35.1	5.6	30.0	56.6	74	-17.4
7236.59	45.5	Peak	90	1.2	V	35.1	5.6	30.0	56.2	74	-17.8
4824.00	47.7	Peak	30	1.5	V	32.5	4.9	30.0	55.1	74	-18.9
Middle Channel											
2437.00	112.0	FUND./Peak	270	2.0	H	28.1	3.4	30.0	113.5	/	/
2437.00	72.9	FUND./Avg.	270	2.0	H	28.1	3.4	30.0	74.4	/	/
2437.10	107.2	FUND./Peak	90	1.5	V	28.1	3.4	30.0	108.6	/	/
2437.02	70.9	FUND./Avg.	90	1.5	V	28.1	3.4	30.0	72.4	/	/
7311.09	31.8	Avg.	200	1.8	H	35.1	5.6	30.0	42.5	54	-11.5
7311.10	30.9	Avg.	60	1.2	V	35.1	5.6	30.0	41.6	54	-12.4
4873.58	31.9	Avg.	180	2.0	H	32.5	4.9	30.0	39.3	54	-14.7
4874.02	30.8	Avg.	45	1.5	V	32.5	4.9	30.0	38.2	54	-15.8
7311.10	44.7	Peak	200	1.8	H	35.1	5.6	30.0	55.4	74	-18.6
7311.10	42.5	Peak	60	1.2	V	35.1	5.6	30.0	53.2	74	-20.8
4873.58	40.7	Peak	180	2.0	H	32.5	4.9	30.0	48.1	74	-25.9
4874.01	39.5	Peak	45	1.5	V	32.5	4.9	30.0	46.9	74	-27.1

High Channel											
2461.80	122.5	FUND./Peak	90	1.5	V	28.1	3.4	30.0	124.0	/	/
2461.90	90.8	FUND./Avg.	90	1.5	V	28.1	3.4	30.0	92.3	/	/
2460.80	109.2	FUND./Peak	200	2.5	H	28.1	3.4	30.0	110.6	/	/
2460.80	74.2	FUND./Avg.	200	2.5	H	28.1	3.4	30.0	75.7	/	/
7386.00	31.8	Peak	45	1.2	V	35.1	5.6	30.0	42.5	54	-11.5
7386	31.8	Peak	90	2	H	35.1	5.6	30.0	42.5	54	-11.5
4924.00	31.8	Avg.	120	1.2	V	32.5	4.9	30.0	39.2	54	-14.8
4924.00	30.7	Peak	270	1.5	H	32.5	4.9	30.0	38.1	54	-15.9
7386.00	45.8	Peak	45	1.2	V	35.1	5.6	30.0	56.5	74	-17.5
7386	43.67	Peak	90	2	H	35.1	5.6	30.0	54.4	74	-19.6
4924.00	45.7	Peak	120	1.2	V	32.5	4.9	30.0	53.1	74	-20.9
4924.00	41.8	Peak	270	1.5	H	32.5	4.9	30.0	49.2	74	-24.8
Unintentional Emission, 30MHz to 1000MHz											
208.41	48.3	/	300	1.5	V	12.4	4.6	25.0	40.3	43.5	-3.2
225.90	50.6	/	225	1.5	H	12.1	3.9	25.0	41.6	46	-4.4
479.98	44.8	/	30	1.2	V	18.3	3.4	25.0	41.5	46	-4.5
576.03	42.1	/	120	2.5	H	20.1	3.4	25.0	40.6	46	-5.4
480.03	44.2	/	45	1.5	V	18.7	2.5	25.0	40.4	46	-5.6
192.00	44.7	/	270	1.0	V	14.4	2.7	25.0	36.8	43.5	-6.7
576.10	40.1	/	225	1.0	H	20.1	3.4	25.0	38.6	46	-7.4
128.00	46.3	/	45	1.0	V	12.3	1.8	25.0	35.4	43.5	-8.1
225.03	45.8	/	90	3.0	H	12.1	3.9	25.0	36.8	46	-9.2
72.03	43.9	/	120	1.2	V	9.6	1.6	25.0	30.1	40	-9.9
122.02	44.2	/	90	1.2	V	12.1	2.2	25.0	33.5	43.5	-10.0
192.03	41.2	/	0	1.2	V	14.4	2.7	25.0	33.3	43.5	-10.2
550.02	38.7	/	180	2.5	H	19.1	2.7	25.0	35.5	46	-10.5
312.09	40.6	/	200	3.0	H	15.9	3.7	25.0	35.2	46	-10.8
172.09	42.9	/	45	1.2	V	13.3	1.4	25.0	32.6	43.5	-10.9
240.03	45.2	/	30	1.5	V	12.6	2.3	25.0	35.1	46	-10.9
420.03	39.7	/	30	1.2	V	17.2	3.0	25.0	34.9	46	-11.1
144.02	43.2	/	30	1.2	V	13.2	1.0	25.0	32.4	43.5	-11.1
144.02	42.8	/	45	1.5	V	13.2	1.0	25.0	32.0	43.5	-11.5
225.03	42.6	/	300	2.5	H	12.1	3.9	25.0	33.6	46	-12.4
66.03	40.9	/	270	2.0	H	9.6	1.2	25.0	26.7	40	-13.3

12 – CONDUCTED EMISSIONS

12.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

12.2 EUT Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4 – 1992 measurement procedure. The specification used was FCC Class B limits.

The EUT was connected to a 110 VAC / 60 Hz power source.

The spacing between the peripherals was 10 centimeters.

Input / Output cables were draped along the edge of the test table and bundle when necessary.

12.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

12.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within –4 dBµV of specification limits). Quasi-peak readings are distinguished with a "**Qp**".

12.5 Summary of Test Results

According to the data in section 12.6, the EUT complied with the FCC Conducted margin, with the *worst* margin reading of:

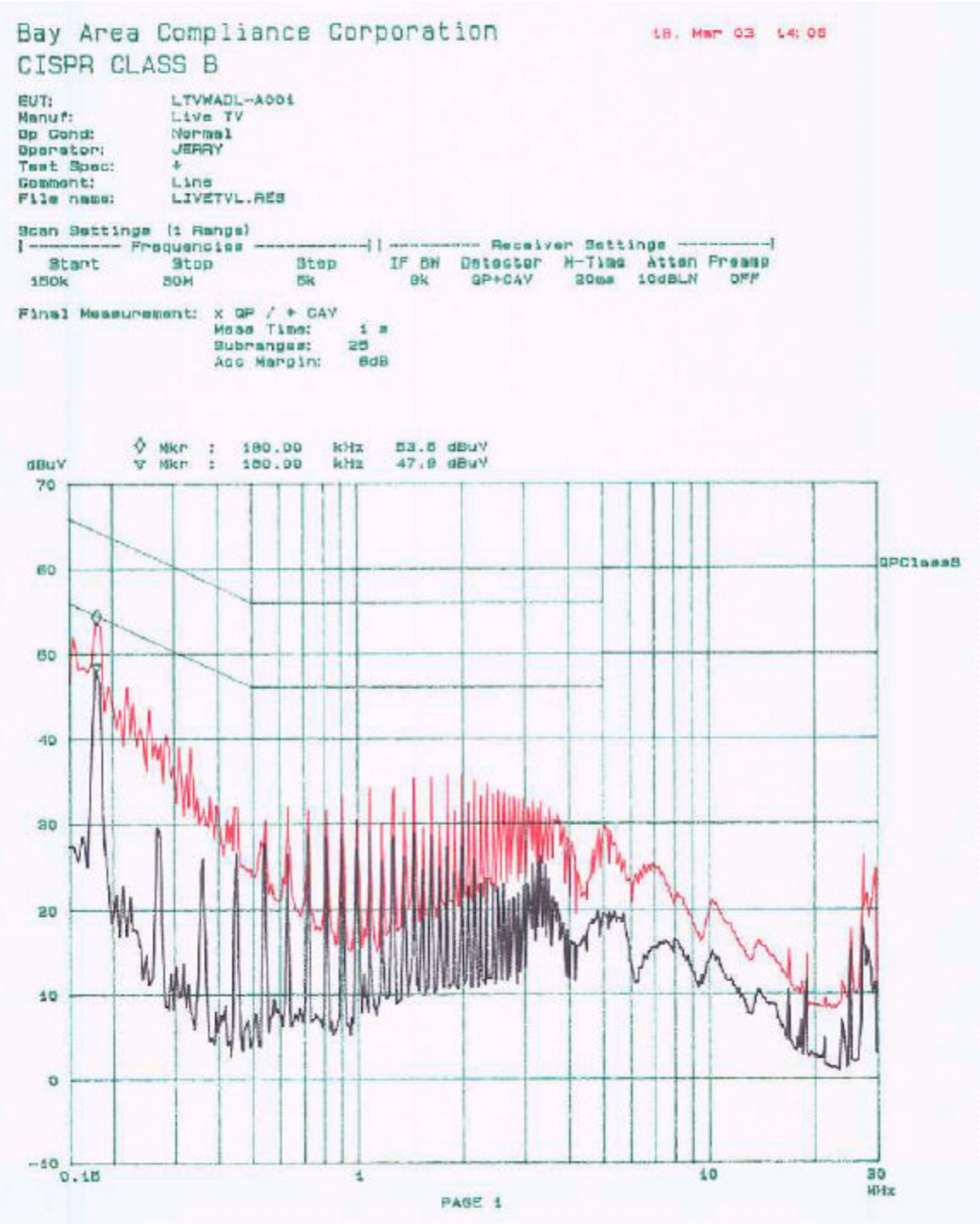
-8.0 dBµV at 0.180 MHz in the Line mode, 150kHz – 30 MHz

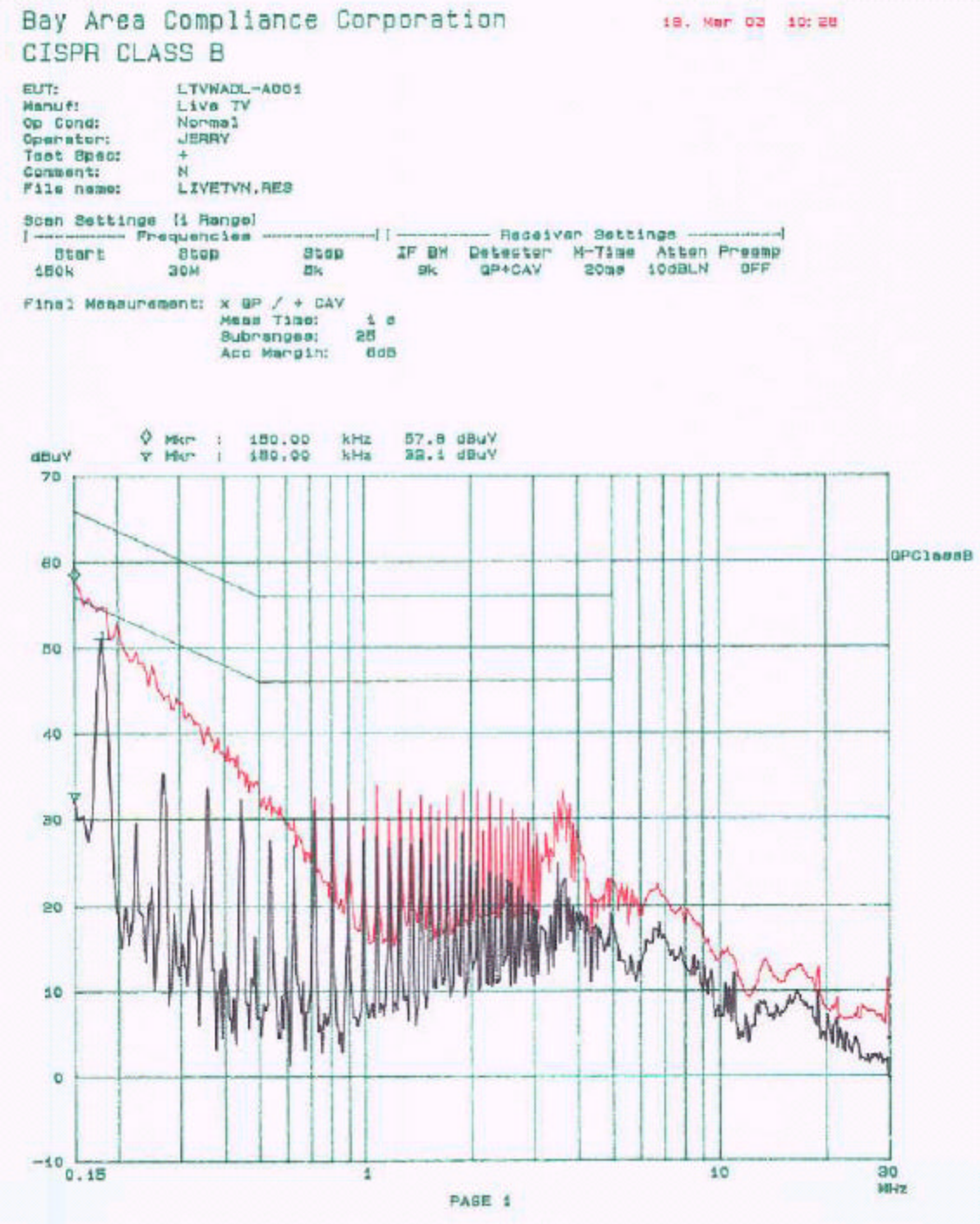
12.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBµV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBµV	Margin dB
0.180	48.0	Ave	Line	56	-8.0
0.150	57.8	QP	Neutral	66	-8.2
0.180	53.6	QP	Line	66	-12.4
0.720	30.9	Ave	Neutral	46	-15.1
0.220	46.2	QP	Line	63	-16.6
1.810	27.0	Ave	Line	50	-23.0
0.720	32.6	QP	Neutral	56	-23.4
0.160	32.2	Ave	Neutral	56	-23.8
3.610	22.2	Ave	Neutral	50	-27.8
1.810	35.6	QP	Line	60	-28.8
3.610	33.2	QP	Neutral	60	-28.8
0.220	17.0	Ave	Line	46	-29.0

12.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.


Bay Area Compliance Corporation
18. Mar 03 14:08
CISPR CLASS B
EUT: LTVWADL-A001
Manuf: Live TV
Op Cond: Normal
Operator: JERRY
Test Spec: +
Comment: Line
File name: LIVETVL.AES
Scan Settings (1 Range)
Frequencies
Start Stop Step
150k 30M 5k
Receiver Settings
IF BW Detector M-Time Atten Preamp
9k QP+CAV 20ms 10dBLN OFF
Final Measurement: x QP / + CAV
Meas Time: 1 s
Subranges: 25
Acc Margin: 8dB
◊ Mkr : 180.00 kHz 53.6 dBuV
▽ Mkr : 180.00 kHz 47.9 dBuV
dBuV
70
60
50
40
30
20
10
0
-10
0.15
1
10
30
MHz
QPClassB
PAGE 1


Bay Area Compliance Corporation
19. Mar 03 10:28
CISPR CLASS B
EUT: LTVWADL-A001
Manuf: Live TV
Op Cond: Normal
Operator: JERRY
Test Spec: +
Comment: N
File name: LIVETVN.RES
Scan Settings (1 Range)
Frequencies
Receiver Settings
Start Stop Step IF BW Detector M-Time Atten Preamp
150k 30M 5k 9k QP+CAV 20ms 10dBLN OFF
Final Measurement: x QP / + CAV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB
Mkr : 150.00 kHz 57.8 dBuV
Mkr : 189.00 kHz 32.1 dBuV
dBuV
70
60
50
40
30
20
10
0
-10
0.15
1
10
30
MHz
QPClassB
PAGE 1