Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA

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FCC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Samsung Electronics Co., Ltd.
314, Maetan3-Dong, Youngtong-Gu,
Suwon-Shi, Kyunggi-Do, Korea.
(Post code : 442-600)
Attn. : Mr. Jei-soon,Kang

Dates of Issue : Apr 19, 2006
Test Report No. : NK2GR075
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

FCC ID	***A3LSNCL200W***
Brand Name	***SAMSUNG***
CONTACT PERSON	**Samsung Electronics Co., Ltd.** **314, Maetan3-Dong, Youngtong-Gu, Suwon-Shi,** **Kyunggi-Do, Korea, 442-600.** **Mr. Jei-soon,Kang** **Telephone No. : +82-31-277-3695**

Applied Standard:	FCC 47 CFR Part 15, Subpart C : 2004
Classification :	FCC Class B Device
EUT Type:	Network Camera

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003.

I attest to the accuracy of data and all measurements reported 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.

Tested By : S.Lee
Engineer

Reviewed By : H.H. Kim
Manager & Chief Engineer

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SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

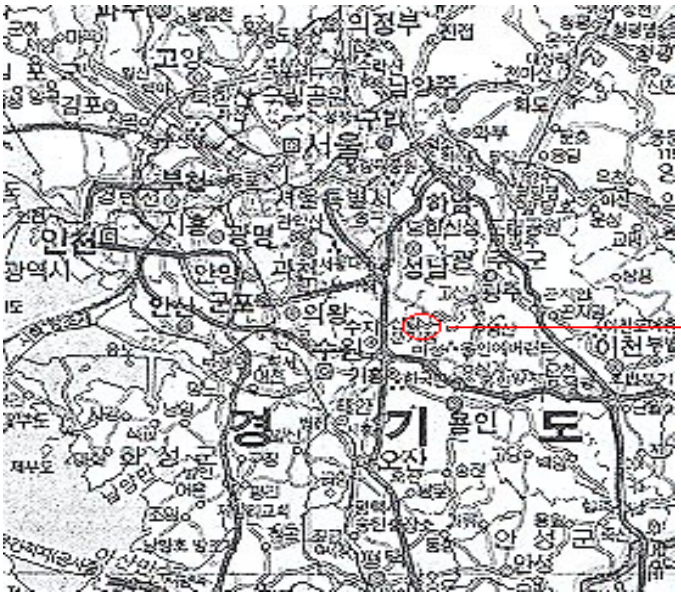
Responsible Party :	Samsung Electronics Co., Ltd.
Contact Person :	Mr. Jei-soon,Kang
Manufacturer :	Tianjin Samsung Electronics Co.,Ltd. TSEC12, 4th Avenue, TEDA, Tianjin, China

- FCC ID: A3LSNCL200W
- Model: SNC-L200W
- Brand Name: SAMSUNG
- EUT Type: Network Camera
- Classification: FCC Class B
- Applied Standard: FCC 47 CFR Part 15, Subpart C
- Test Procedure(s): ANSI C63.4 (2003)
- Dates of Test: Apr 6, 2006 ~ Apr 15, 2006
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK2GR075

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions emanating from **Samsung Electronics Co., Ltd.**
FCC ID : **A3LSNCL200W**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address is 300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 2003.



Nemko Korea Co., Ltd.
EMC Lab.
300-2, Osan-Ri, Mohyun-Myun, Yongin-City Kyungki-Do,KOREA 449-852
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Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

TEST CONDITIONS & EUT INFORMATION

Operating During Test

The EUT was monitored from a remote PC through various networks (Cable LAN, Wireless LAN) and video was remotely monitored through a Viewer program the manufacturer supported exclusively.
The test was performed during the data transmission at communication link mode through networks.
Support equipments other than EUT are placed out of test area.

Support Equipment

Network Camera (EUT)	Samsung Electronics Co., Ltd. FCC ID: A3LSNCL200W 10m unshielded LAN cable Adaptor : Samsung Model : AA-E8 1.2m unshielded AC cable, 1.5m shielded DC cable with ferrite core (two turn) at DC jack end.	S/N: N/A S/N:6CAY507336
Notebook Computer	Dell Computer Corporation. Model : PPT(Latitude D400) DOC Adaptor : ASTEC Model : AA22830 1.2m unshielded AC cable, 1.5m shielded DC cable with ferrite core (two turn) at DC jack end.	S/N: N/A S/N: N/A
Wireless Router	NETGEAR, Model : MR814 V2 FCC ID : PY3MR814V2 3m unshielded LAN cable Adaptor : NETGEAR Model: AD-121AB 1.2m unshielded AC cable, 1.5m shielded DC cable with ferrite core (two turn) at DC jack end.	S/N:MR85652SA 000153 S/N: N/A

EUT Information

Clock	32.768kHz(X1), 4MHz(Z451), 25MHz(Y1)
Clock(RF Card)	40MHz(U6)
Chipset	U1(S1S65010), U451(uPD16835), U6(ICS1893BFLF)
Chipset(RF Card)	U1(88W8015)
RF Frequency(Center Frequency)	2412 ~ 2462MHz (11 CH)
RF output power	Maximum of 17.4dBm
Size(with stand)	105(width) X 45(length) X 75(height)mm
Weight	0.4Kg
Power	AC/DC adaptor (100-240V/8.4V)

SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	Paragraph No.	Result	Remark
Power line Conducted Emission	15.207	Complies	
Radiated Emission (Spurious)	15.209	Complies	
Modulated Bandwidth (6dB Bandwidth)	15.247(a)(2)	Complies	
Peak Power Output	15.247(b)	Complies	
Conducted Spurious Emission	15.247(c)	Complies	
Radiated Spurious Emission	15.247(c)	Complies	
Power Spectral Density	15.247(d)	Complies	
Maximum Permissible Exposure	1.1307(b)	Complies	

RECOMMENDATION/CONCLUSION

The data collected shows that the **Samsung Electronics Co., Ltd.**
FCC ID : **A3LSNCL200W, Network Camera.**
The highest emission observed was at **0.19 MHz** for conducted emissions with a Q.P margin of **4.0 dB,** at **351.98 MHz** for radiated emissions with a margin of **2.1 dB.**

SAMPLE CALCULATION

$$\text{dB}\,\mu N = 20 \log_{10} (\mu N/\text{m})$$

$$\mu N = 10^{(\text{dB}\,\mu N/20)}$$

EX. 1.

@57.7 MHz Class B limit = 100 μN/m = 40.0 dB μN/m

Reading = 19.1 dB μN(calibrated level)
Antenna factor + Cable Loss + Amplifier Gain = 10.12 dB
Total = 29.22 dB μN/m
Margin = 40.0 – 29.22 = 10.78
10.78 dB below the limit

DESCRIPTION OF TESTS

Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found.

The spectrum was scanned from 27 to 1000MHz using Biconical log Antenna(ARA, LPB-2520/A). Above 1GHz, Doppels Teg Horn antenna (EMCO, DAA-37121:upto 1~18GHz) was used.

Final Measurements were made outdoors at 3 or 10m test range using Logbicon Super Antenna(Schwarzbeck, VULB9166) or Doppels Teg Horn antenna.(EMCO, DAA-37121)

The test equipment was placed on a wooden 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 reexamined and investigated using EMI test receiver.(ESCS30)

The detector function was set to CISPR peak mode or quasi-peak mode or average mode and the bandwidth of the receiver was set to 120KHz or 1MHz depending on the frequency or type of signal.

The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements.

The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non- metallic 1.0X 1.5 meter table.

The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.

The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.

Each EME reported was calibrated using the R/S signal generator.

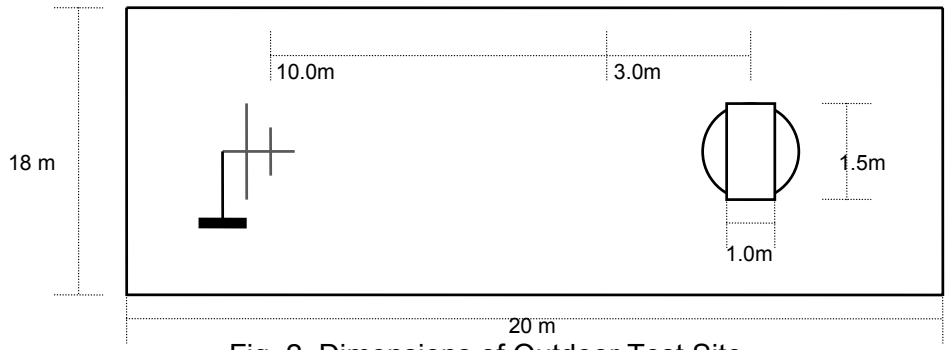
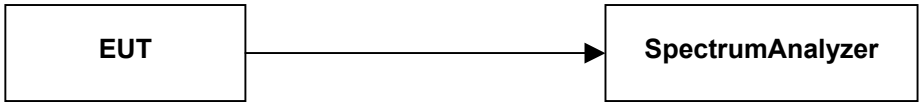


Fig. 2. Dimensions of Outdoor Test Site

DESCRIPTION OF TESTS

Modulated Bandwidth (6dB Bandwidth)

Test Setup

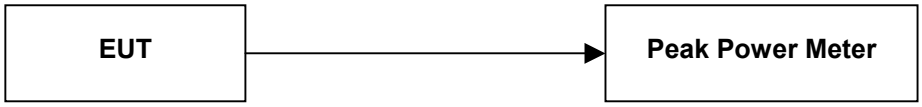


Test Procedure

The transmitter is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to 100KHz and VBW is set to the 100KHz.
The sweep time is coupled.

Peak Power Output

Test Setup



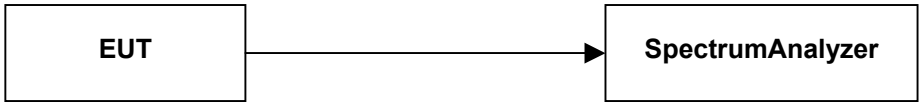
Test Procedure

The transmitter is connected to the Peak power meter.

DESCRIPTION OF TESTS

Conducted Spurious Emission

Test Setup

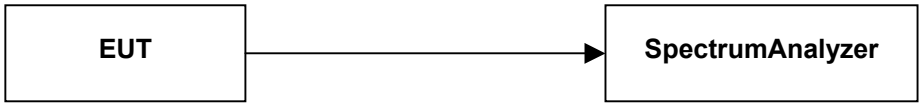


Test Procedure

The transmitter is connected to the spectrum analyzer.
The RBW of spectrum analyzer is set to 100KHz and VBW is set to the 100KHz.
Measurements are made over the 30MHz to 26.5GHz range with the transmitter set to the Lowest, Middle, and highest channels within the 2.4GHz band.

Peak Power Spectral Density

Test Setup



Test Procedure

The transmitter is connected to the Spectrum analyzer.
The maximum level in a 3KHz bandwidth is measured with the spectrum analyzer.
The RBW of spectrum analyzer is set to 3KHz and VBW is set to 10KHz.
The sweep time is set to Span/3KHz and video averaging is turned off.
The PPSD is the highest level found across the emission in any 3KHz band.

TEST DATA

Conducted Emissions

FCC ID : A3LSNCL200W

▶Communication link mode via LAN connection

Frequency (MHz)	Level(dBμV)		Line	Limit(dBμV)		Margin(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.19	59.4	47.1	N	64.0	54.0	4.6	6.9
0.25	51.2	38.1	N	61.8	51.8	10.6	13.7
0.32	42.8	28.4	N	59.7	49.7	16.9	21.3
0.46	36.2	26.1	N	56.7	46.7	20.5	20.6
1.48	33.5	21.0	N	56.0	46.0	22.5	25.0
3.37	35.1	21.8	L	56.0	46.0	20.9	24.2

Table 1. Line Conducted Emissions Tabulated Data

▶ Communication link mode via wireless LAN connection

Frequency (MHz)	Level(dBμV)		Line	Limit(dBμV)		Margin(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.19	60.0	46.2	N	64.0	54.0	4.0	7.8
0.20	55.2	45.6	L	63.6	53.6	8.4	8.0
0.26	52.9	37.8	N	61.4	51.4	8.5	13.6
0.32	48.0	29.4	N	59.7	49.7	11.7	20.3
0.45	41.9	30.3	L	56.9	46.9	15.0	16.6
0.57	38.6	19.7	L	56.0	46.0	17.4	26.3

Table 2. Line Conducted Emissions Tabulated Data

NOTES:

1. ***Measurements using CISPR quasi-peak mode & average mode.***
2. ***All modes of operation were investigated and the worst -case emission are reported. See attached Plots.***
3. ***LINE : L =Line , N = Neutral***
4. ***The limit is on the FCC Part section 15.207(a).***

PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Communication link mode via LAN connection, Line)***

NEMKO KOREA (NK-2G-R-075) 11 Apr 2006 15:31

Conducted Emissions

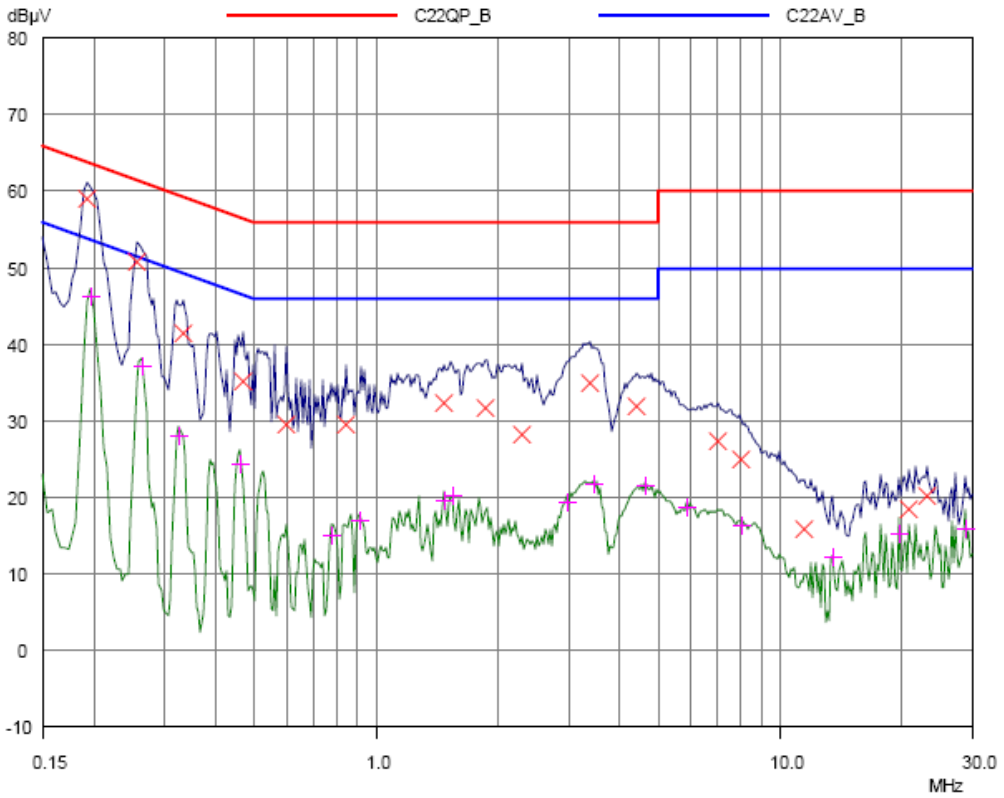
EUT:	Network Camera
Manuf:	Samsung Electronics Co., Ltd.
Op Cond:	AC 120V / 60Hz (Communication Link Mode via lan connection)
Operator:	Lee, Sub
Test Spec:	FCC Part 15 Subpart B & C Class B
Comment:	MODEL : SNC-L200W
	LINE : LINE-PE
Result File:	r075l1.dat : SNC-L200W_LAN Connection

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	100msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	16
	Acc Margin:	60 dB



PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Communication link mode via LAN connection, Neutral)***

NEMKO KOREA (NK-2G-R-075) 11 Apr 2006 15:05

Conducted Emissions

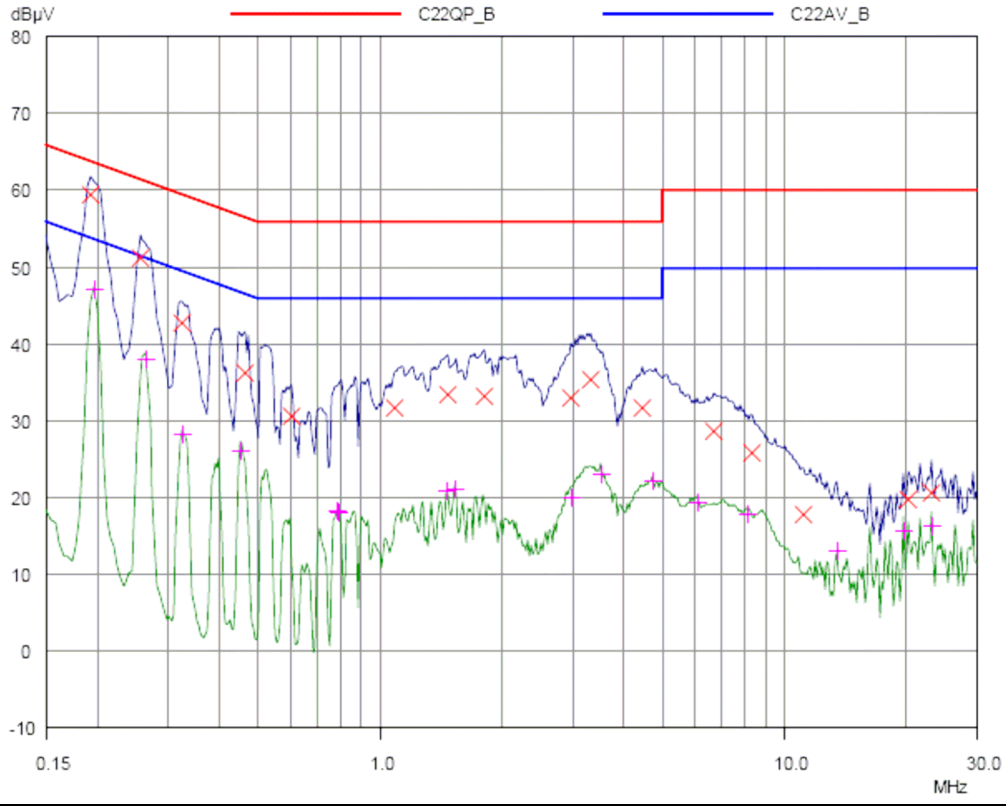
EUT:	Network Camera
Manuf:	Samsung Electronics Co., Ltd.
Op Cond:	AC 120V / 60Hz (Communication Link Mode via lan connection)
Operator:	Lee, Sub
Test Spec:	FCC Part 15 Subpart B & C Class B
Comment:	MODEL : SNC-L200W
	LINE : NEUTRAL-PE
Result File:	r075n1.dat : SNC-L200W_LAN Connection

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	100msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	16
	Acc Margin:	60 dB



PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Communication link mode via wireless LAN connection, Line)***

NEMKO KOREA (NK-2G-R-075) 11 Apr 2006 16:32

Conducted Emissions

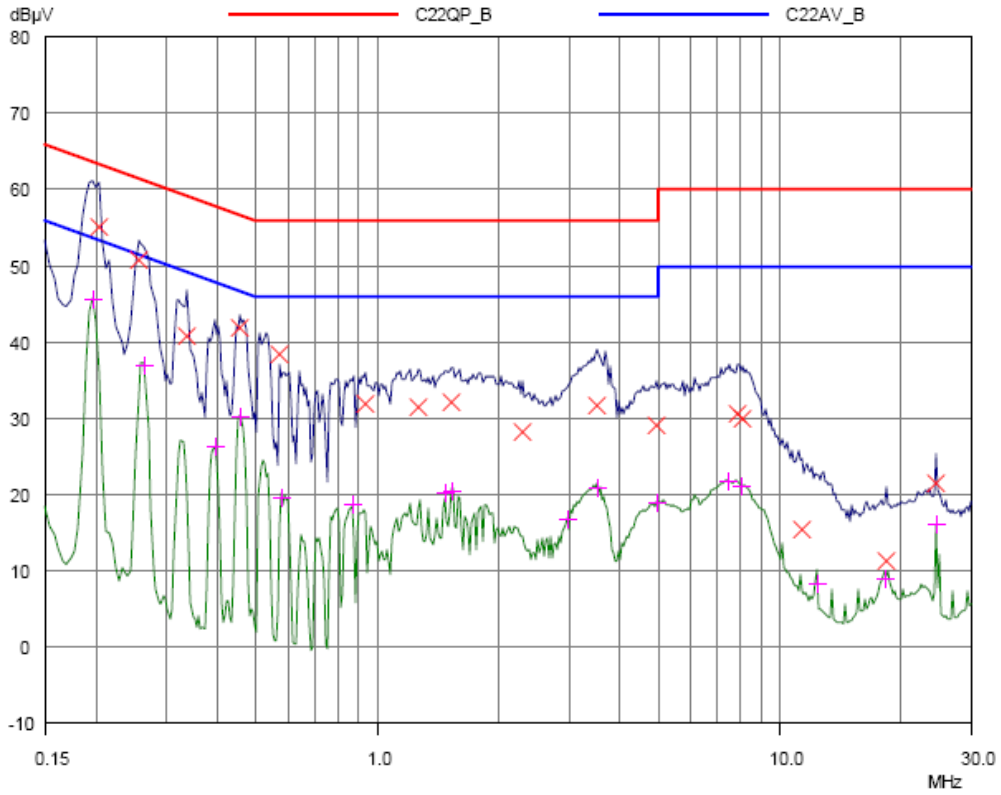
EUT:	Network Camera
Manuf:	Samsung Electronics Co., Ltd.
Op Cond:	AC 120V / 60Hz (Communication Link Mode via wireless lan connection)
Operator:	Lee, Sub
Test Spec:	FCC Part 15 Subpart B & C Class B
Comment:	MODEL : SNC-L200W LINE : LINE-PE
Result File:	r075l2.dat : SNC-L200W_Wireless LAN Connection

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	100msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	16
	Acc Margin:	60 dB



PLOTS OF EMISSIONS

- ***Conducted Emission at the Mains port (Communication link mode via wireless LAN connection, Neutral)***

NEMKO KOREA (NK-2G-R-075) 11 Apr 2006 16:55

Conducted Emissions

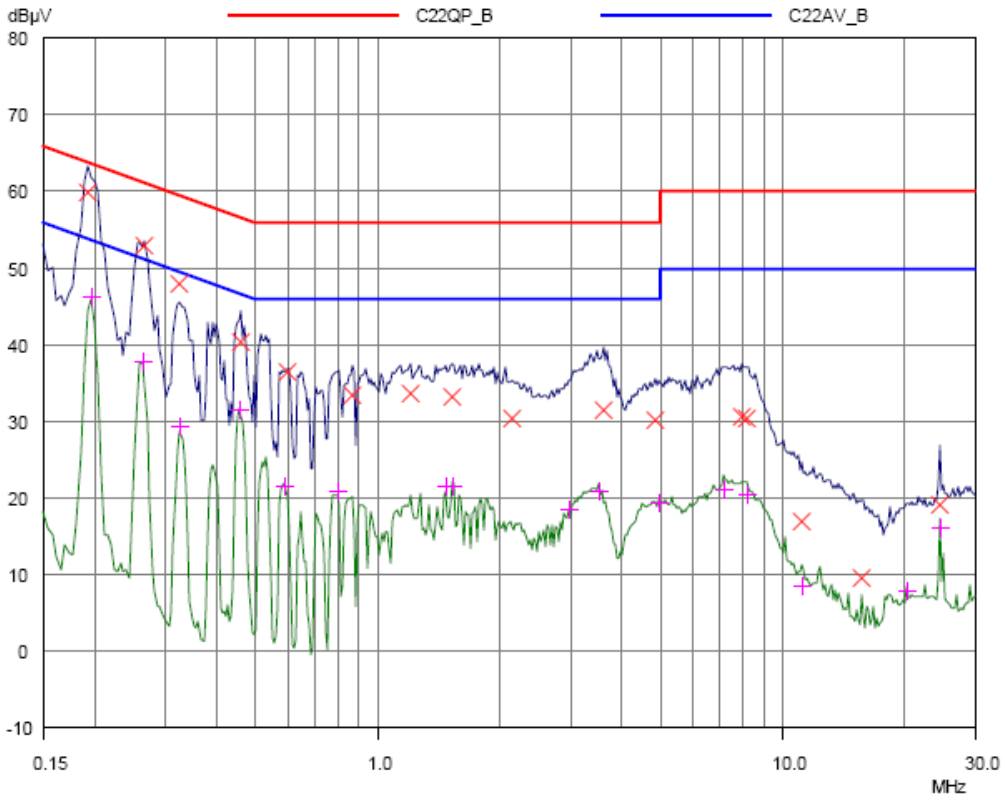
EUT:	Network Camera
Manuf:	Samsung Electronics Co., Ltd.
Op Cond:	AC 120V / 60Hz (Communication Link Mode via wireless lan connection)
Operator:	Lee, Sub
Test Spec:	FCC Part 15 Subpart B & C Class B
Comment:	MODEL : SNC-L200W
	LINE : NEUTRAL-PE
Result File:	r075n2.dat : SNC-L200W_Wireless LAN Connection

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	100msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	16
	Acc Margin:	60 dB



TEST DATA

Radiated Emissions

FCC ID : A3LSNCL200W

▶Communication link mode via LAN connection

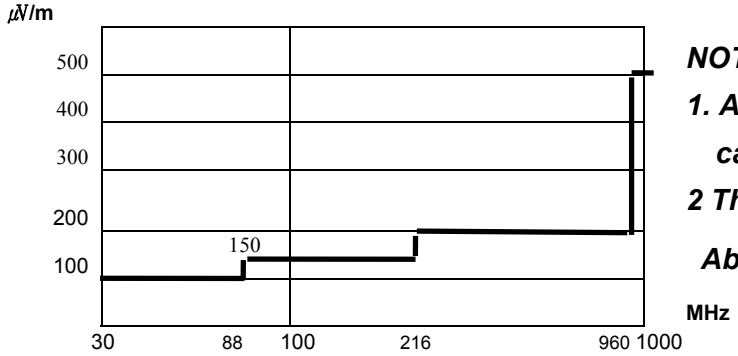
Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
48.00	51.7	V	-21.4	30.3	40.0	9.7
62.96	51.9	V	-21.5	30.4	40.0	9.6
85.50	51.6	V	-19.8	31.8	40.0	8.2
171.42	41.6	H	-13.1	28.5	43.5	15.0
318.34	45.0	H	-10.8	34.2	46.0	11.8
636.26	36.8	H	-2.6	34.2	46.0	11.8

Table 3. Radiated Measurements at 3meters

▶ Communication link mode via wireless LAN connection

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
132.00	53.0	V	-15.4	37.6	43.5	5.9
351.98	53.9	V	-10.0	43.9	46.0	2.1
395.98	51.2	V	-8.8	42.4	46.0	3.6
538.68	45.3	H	-5.3	40.0	46.0	6.0
659.99	40.6	V	-2.0	38.6	46.0	7.4
923.99	36.3	H	4.3	40.6	46.0	5.4

Table 4. Radiated Measurements at 3meters



NOTES:

1. All modes were measured and the worst-case emission was reported.

2 The radiated limits are shown on Figure 4.

Above 1GHz the limit is 500 μV/m.

Fig. 4. Limits at 3 meters

NOTES:

1. *Pol. H =Horizontal V=Vertical

2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.

3. Measurements using CISPR quasi-peak mode.

4. No significant emissions were detected in frequency range from 1GHz to 2GHz.

5. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

6. The limit is on the FCC Part section 15.209(a).

TEST DATA

Modulated Bandwidth (6dB Bandwidth)- 15.247(a)(2)

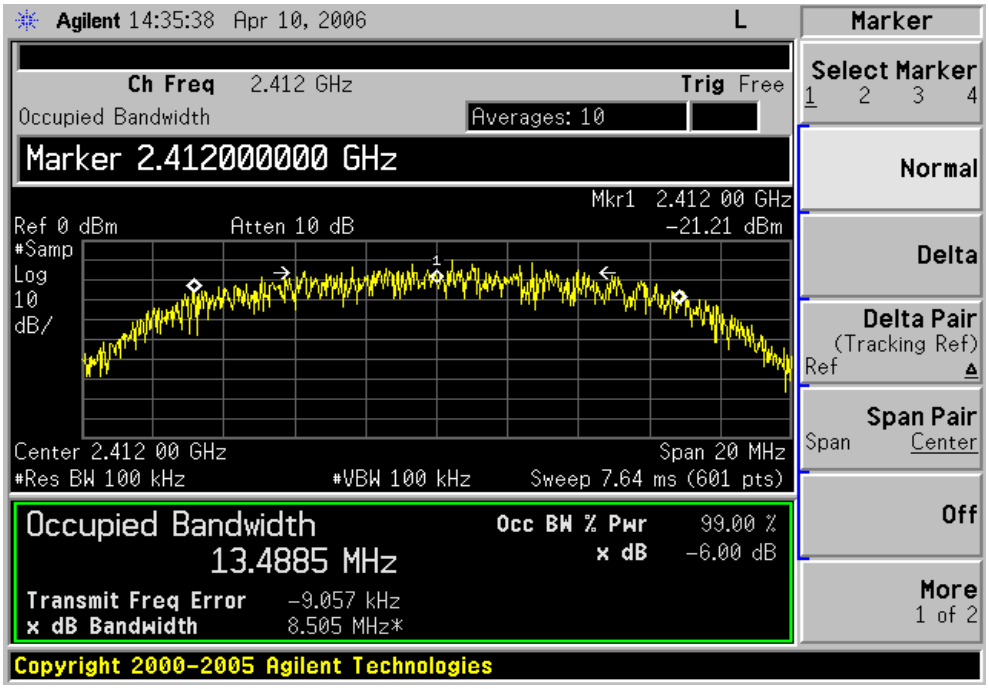
FCC ID : A3LSNCL200W
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

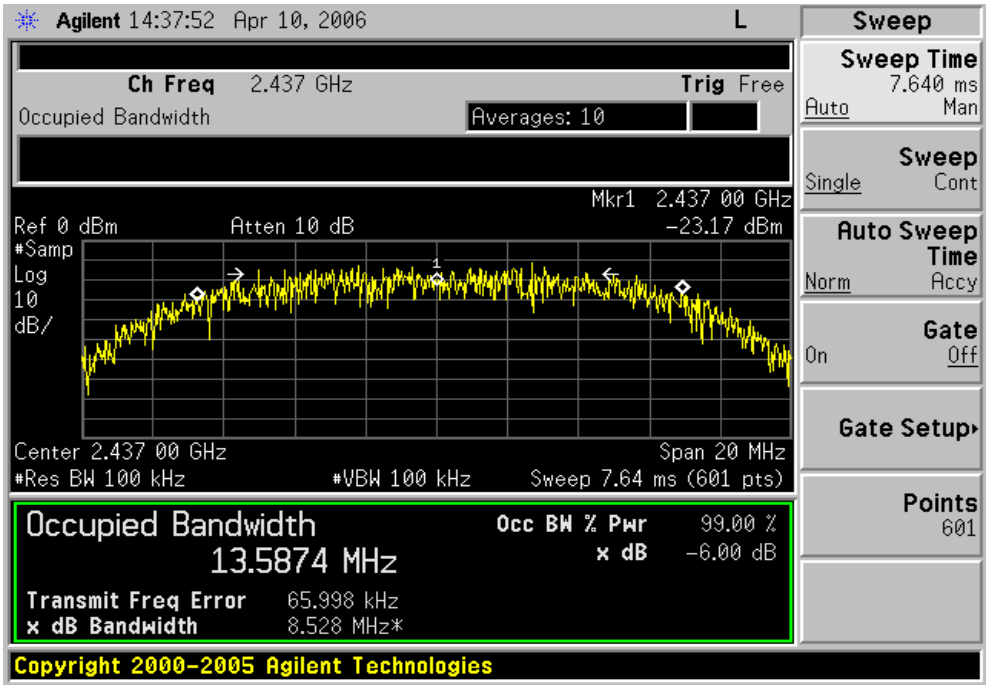
Channel	Frequency(MHz)	Result(KHz)	Limit(KHz)	Margin(KHz)
1	2412	8505	500	8005
6	2437	8528	500	8028
11	2462	9047	500	8547

PLOTS OF EMISSIONS

6dB Bandwidth, Lowest Channel (2412MHz)

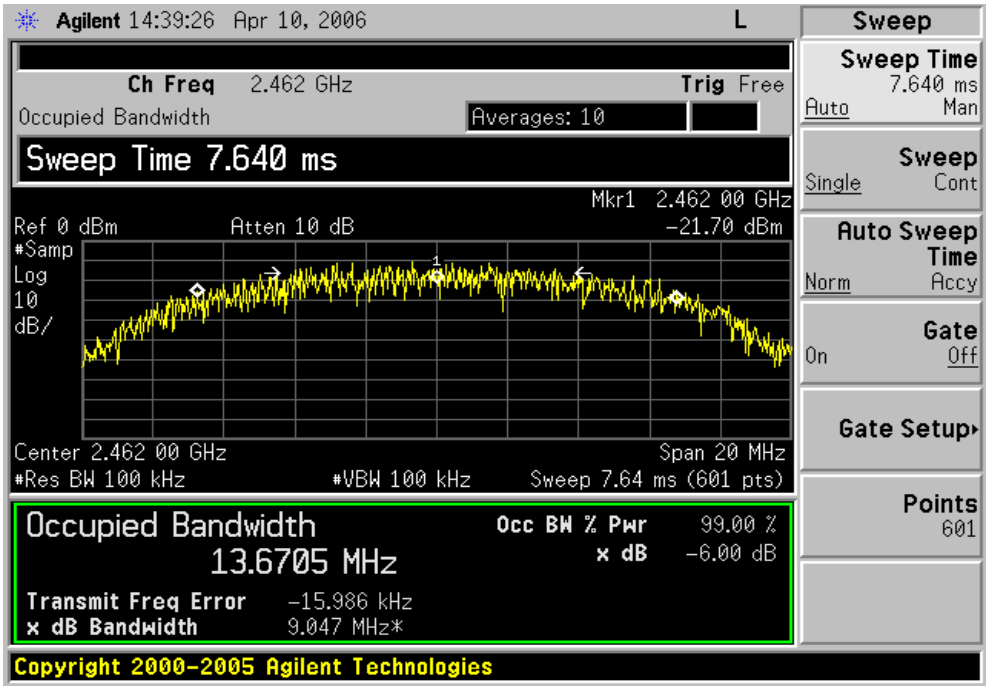


6dB Bandwidth, Middle Channel (2437MHz)



PLOTS OF EMISSIONS

6dB Bandwidth, Highest Channel (2462MHz)



TEST DATA

Peak Power Output – 15.247(b)

FCC ID : A3LSNCL200W
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

Channel	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dB)
1	2412	16.70	30	13.30
6	2437	16.50	30	13.50
11	2462	17.40	30	12.60

TEST DATA

Conducted Spurious Emission – 15.247(c)

FCC ID : A3LSNCL200W
Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result:

Channel	Frequency(MHz)	Result(dBc)	Limit(dBc)	Margin(dB)
1	2412	More than 40dBc	20	
6	2437	More than 40dBc	20	
11	2462	More than 40dBc	20	

Radiated Spurious Emission – 15.247(c)

FCC ID : A3LSNCL200W
Test Mode : Set to Lowest channel, Middle channel and Highest channel

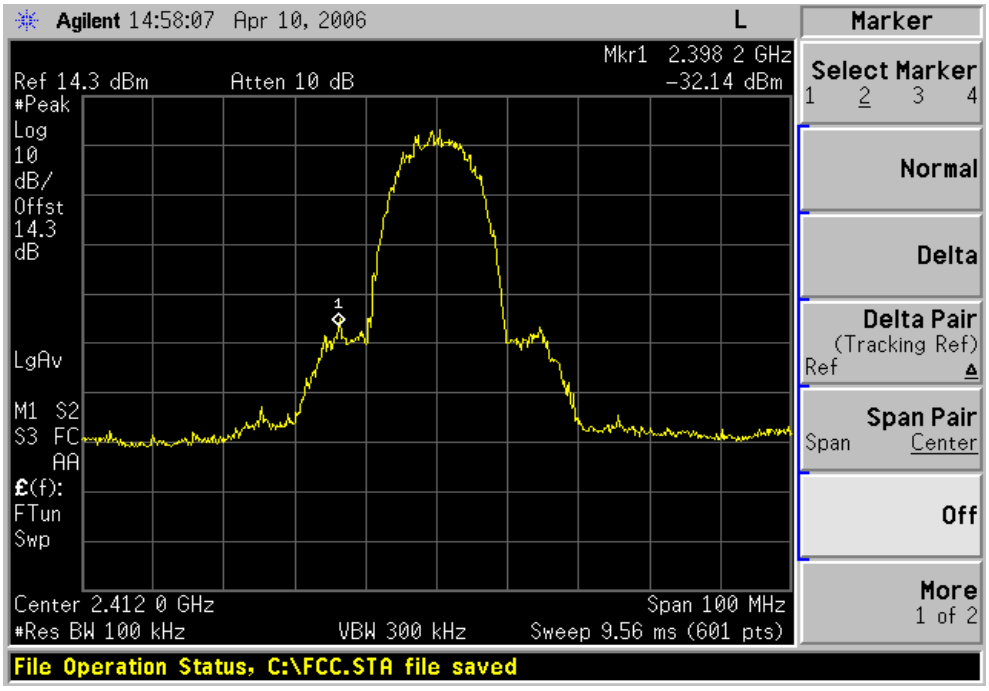
Result:

Channel	Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1	4824	41.6	H	peak	9.95	51.6	74.0	22.45
1	4824	30.8	H	average	9.95	40.8	54.0	13.25
6	4874	43.6	H	peak	10.22	53.8	74.0	20.18
6	4874	32.0	H	average	10.22	42.2	54.0	11.78
11	4923	45.6	H	peak	10.48	56.1	74.0	17.92
11	4923	33.1	H	average	10.48	43.6	54.0	10.42

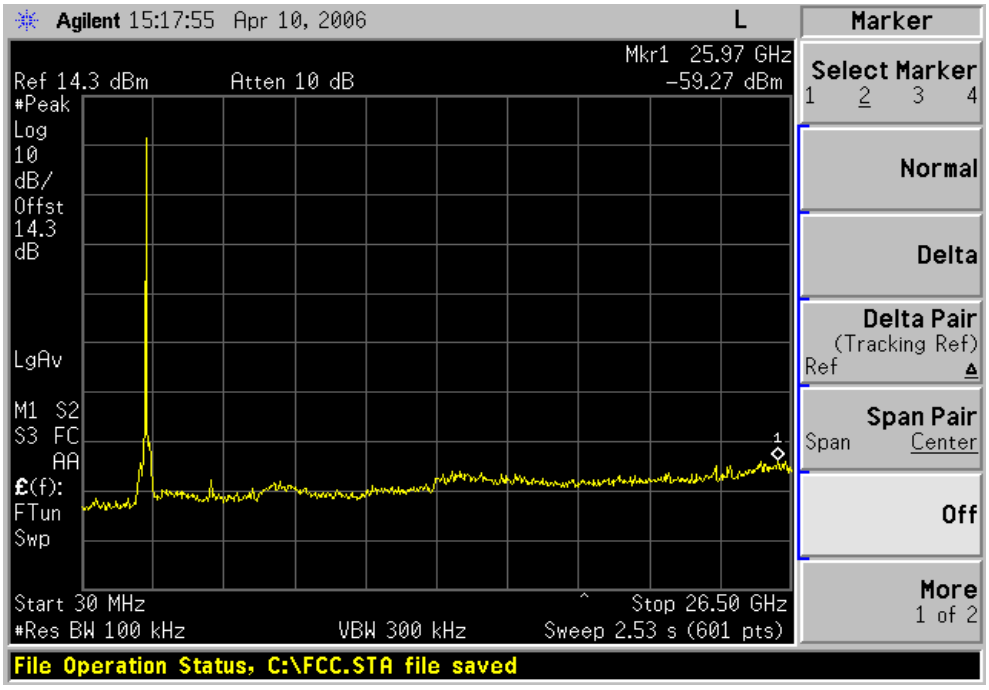
1. *Pol. H =Horizontal V=Vertical
2. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.
3. Other spurious are under 20dB below Fundamental.

PLOT OF TEST DATA

Band edge at 2.4GHz, Lowest Channel

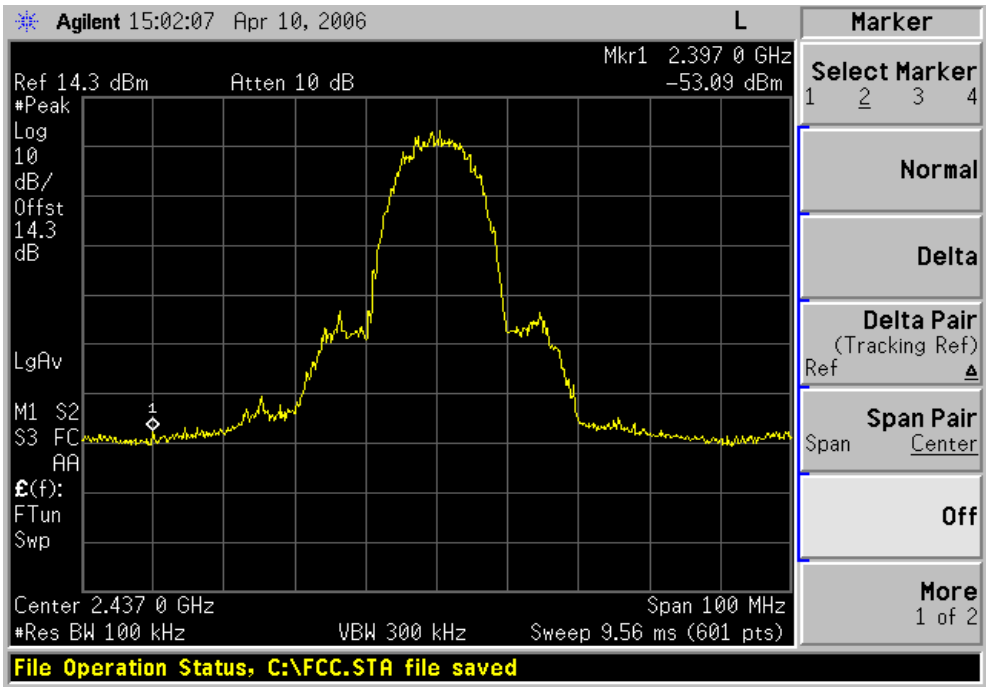


Conducted Spurious Emissions, Lowest Channel

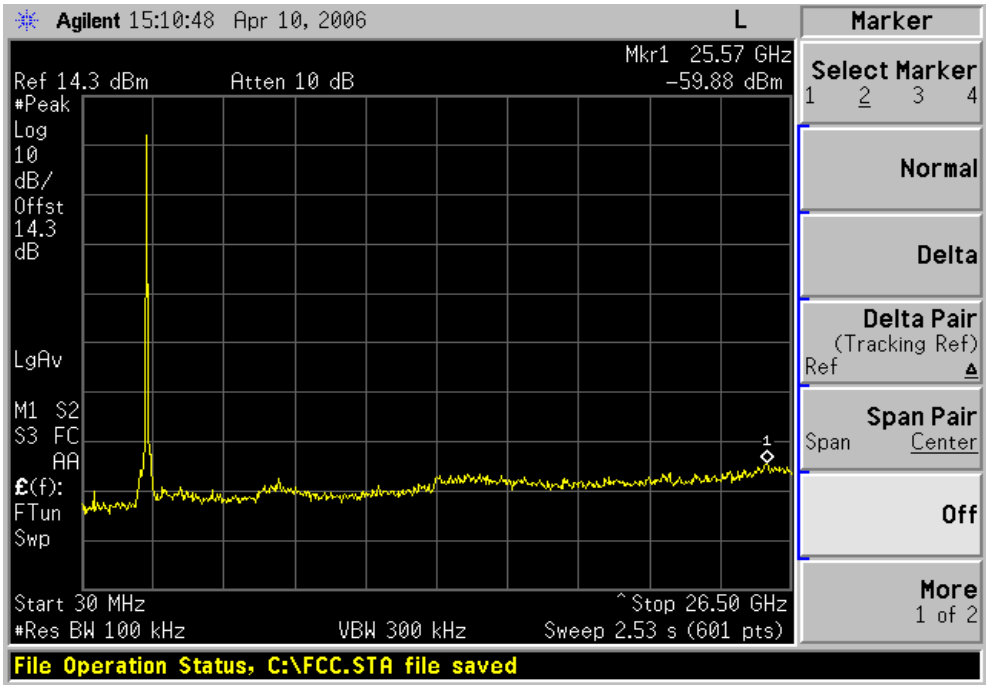


PLOT OF TEST DATA

Band edge at 2.4GHz, Middle Channel

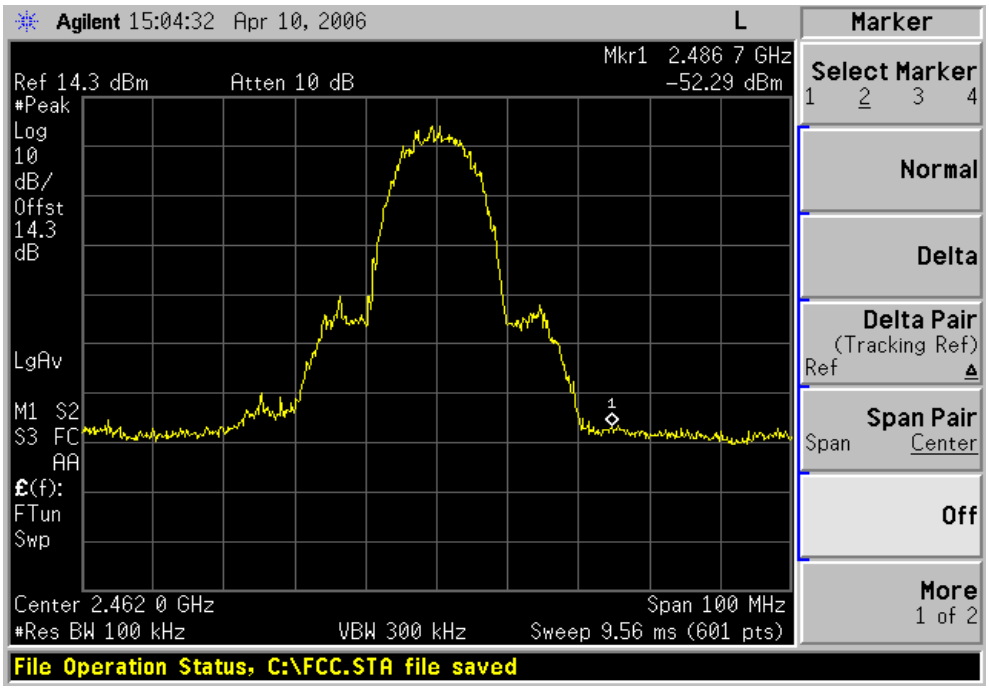


Conducted Spurious Emissions, Middle channel

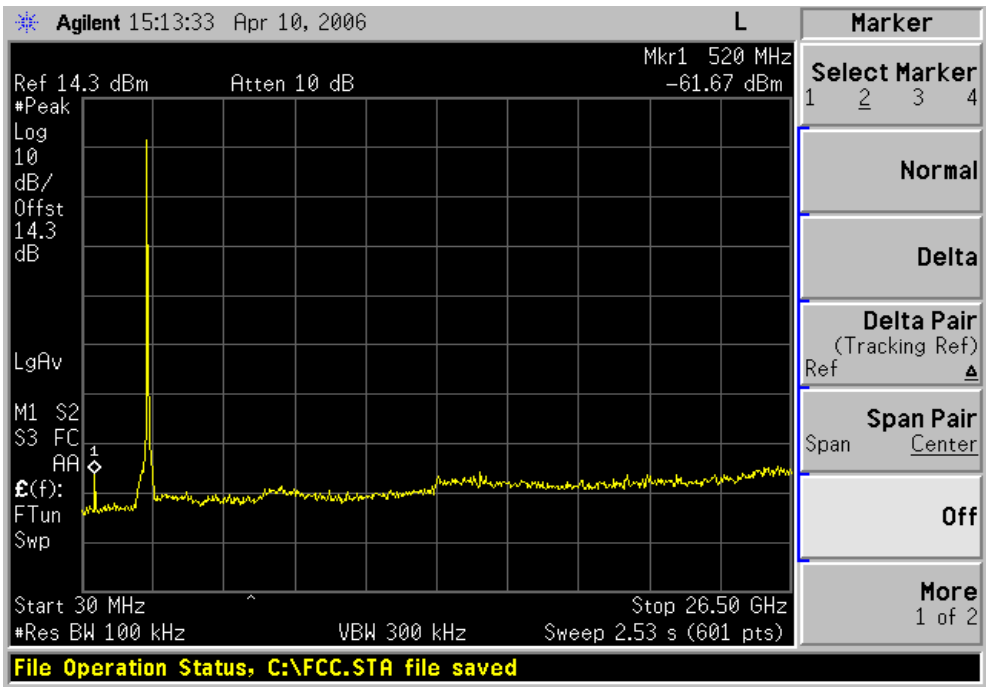


PLOT OF TEST DATA

Band edge at 2.4GHz, Highest Channel

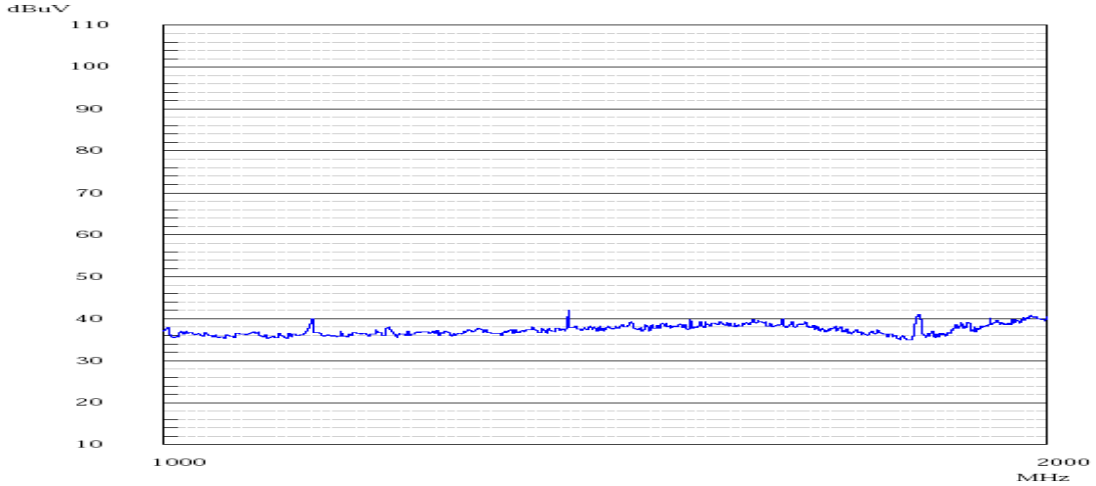


Conducted Spurious Emissions, Highest Channel

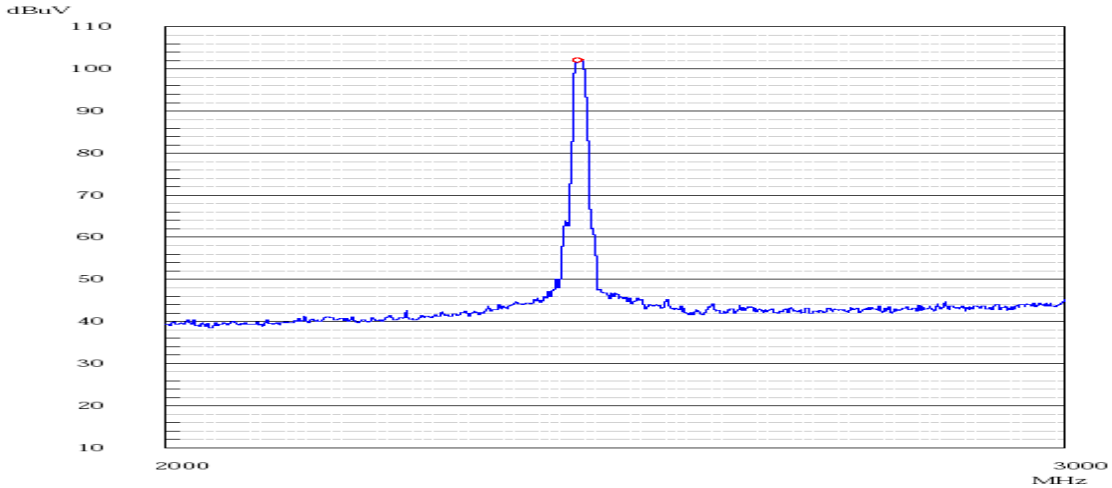


PLOT OF TEST DATA

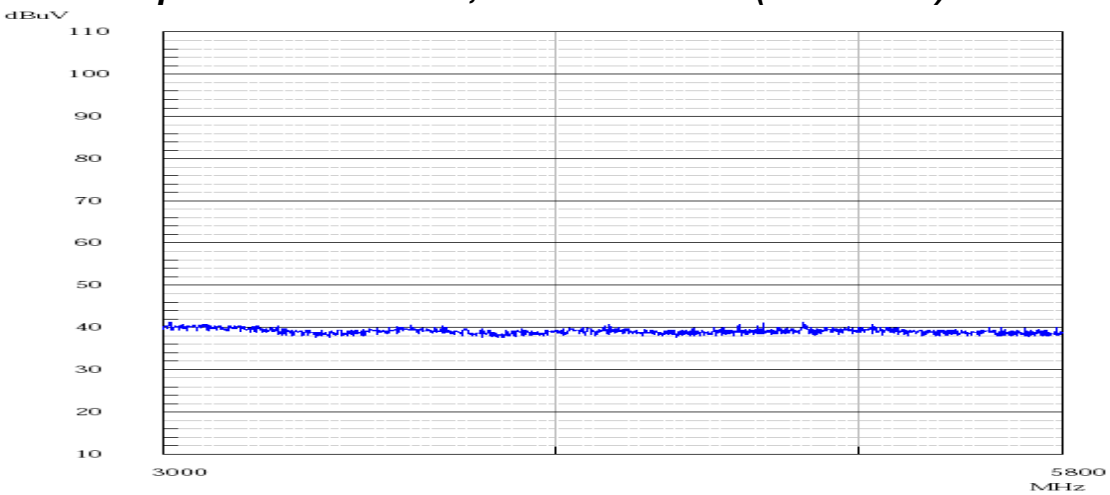
Radiated Spurious Emissions, Lowest Channel(Horizontal)



Radiated Spurious Emissions, Lowest Channel(Horizontal)

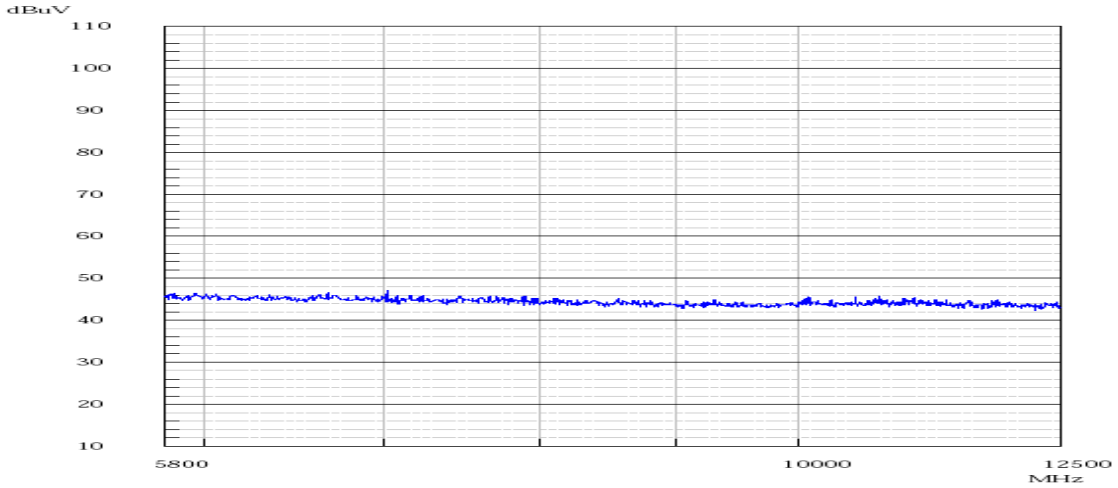


Radiated Spurious Emissions, Lowest Channel(Horizontal)

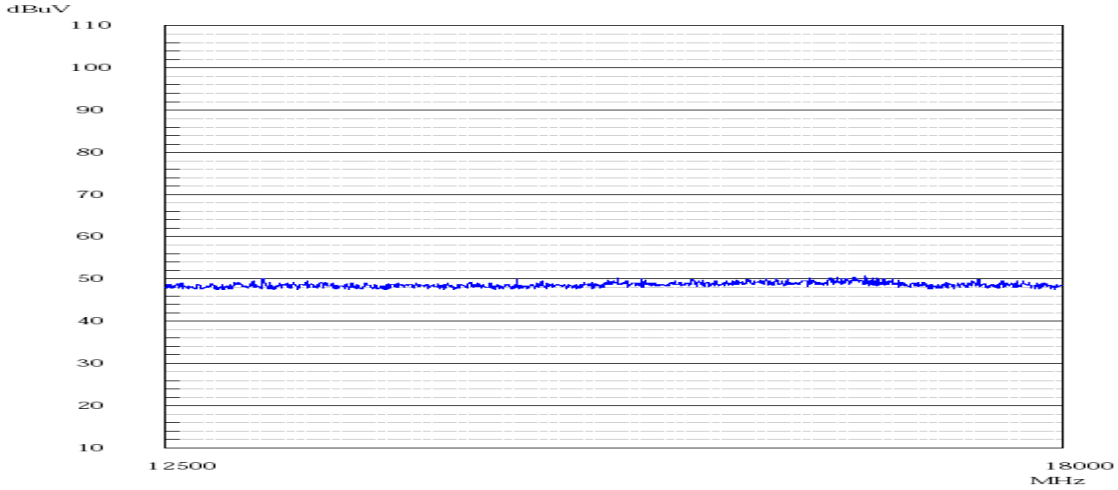


PLOT OF TEST DATA

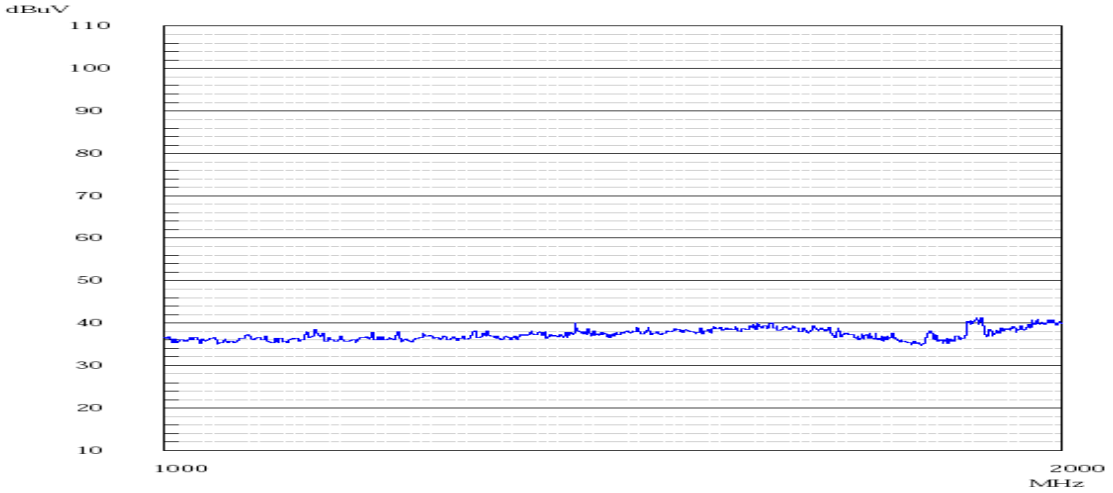
Radiated Spurious Emissions, Lowest Channel(Horizontal)



Radiated Spurious Emissions, Lowest Channel(Horizontal)

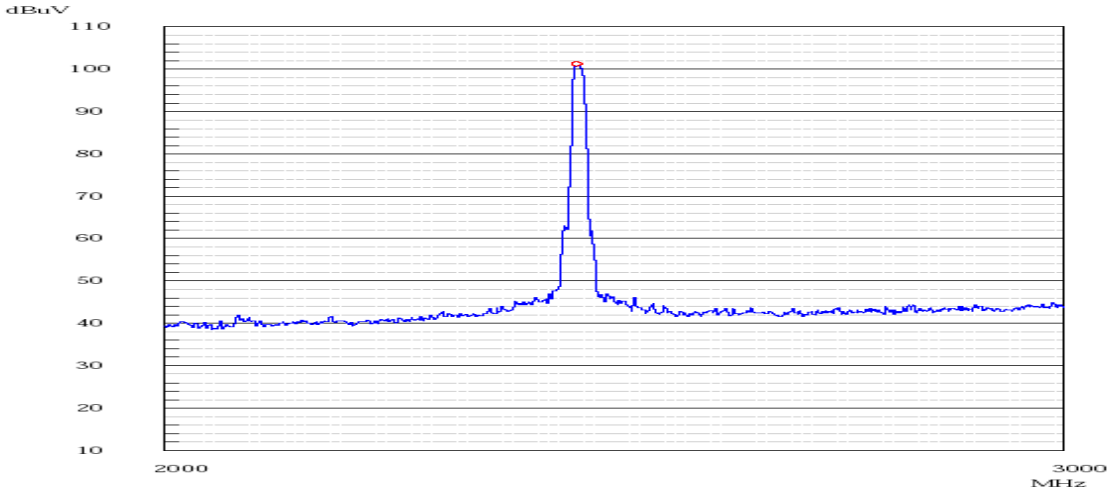


Radiated Spurious Emissions, Lowest Channel(Vertical)

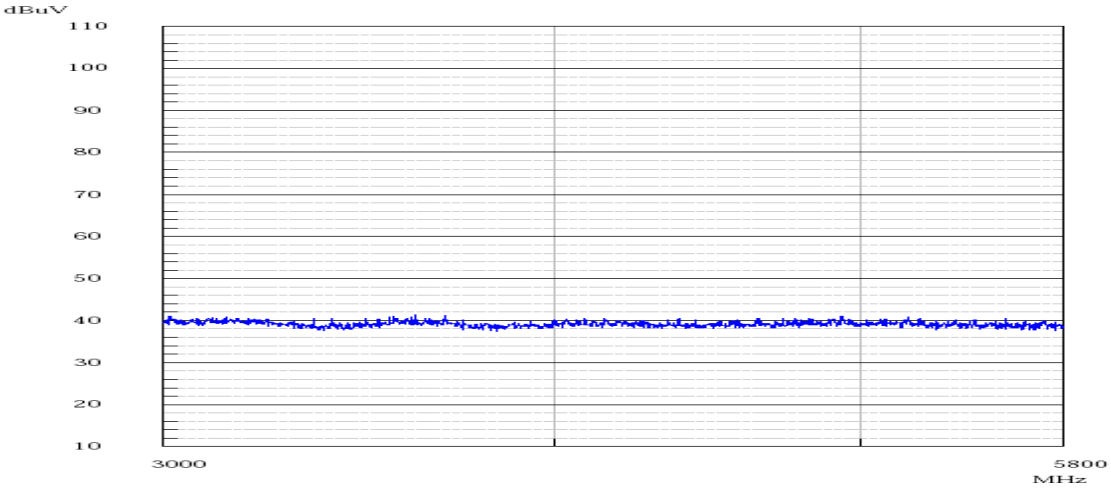


PLOT OF TEST DATA

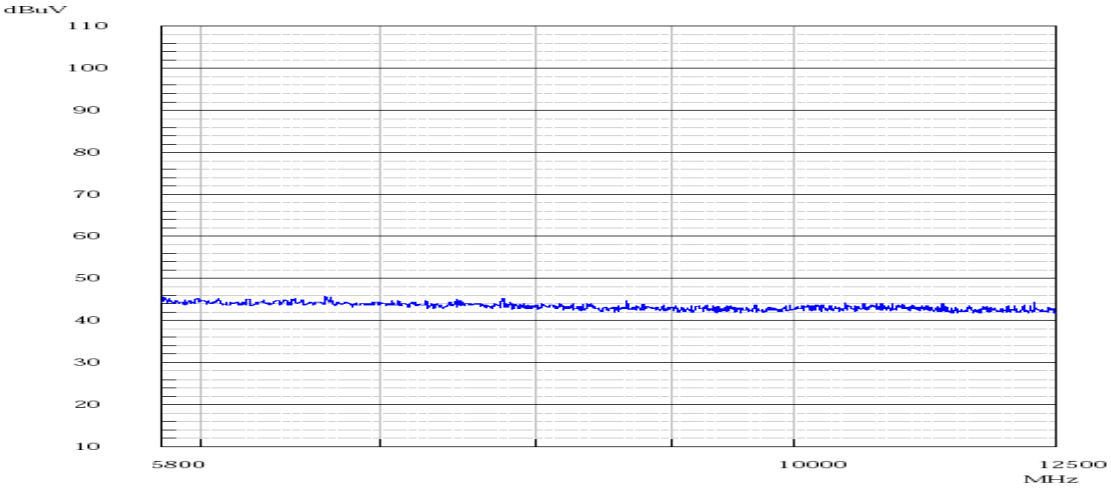
Radiated Spurious Emissions, Lowest Channel(Vertical)



Radiated Spurious Emissions, Lowest Channel(Vertical)

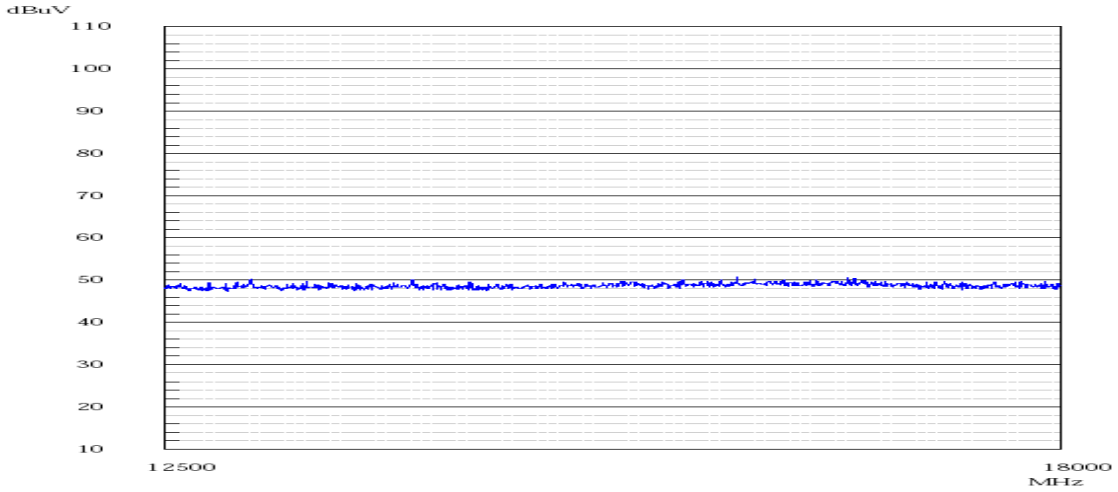


Radiated Spurious Emissions, Lowest Channel(Vertical)

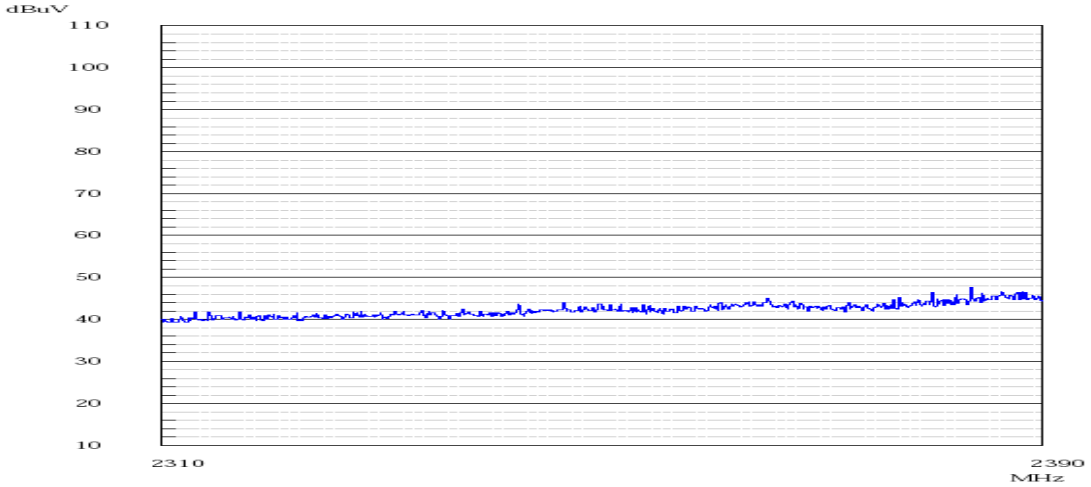


PLOT OF TEST DATA

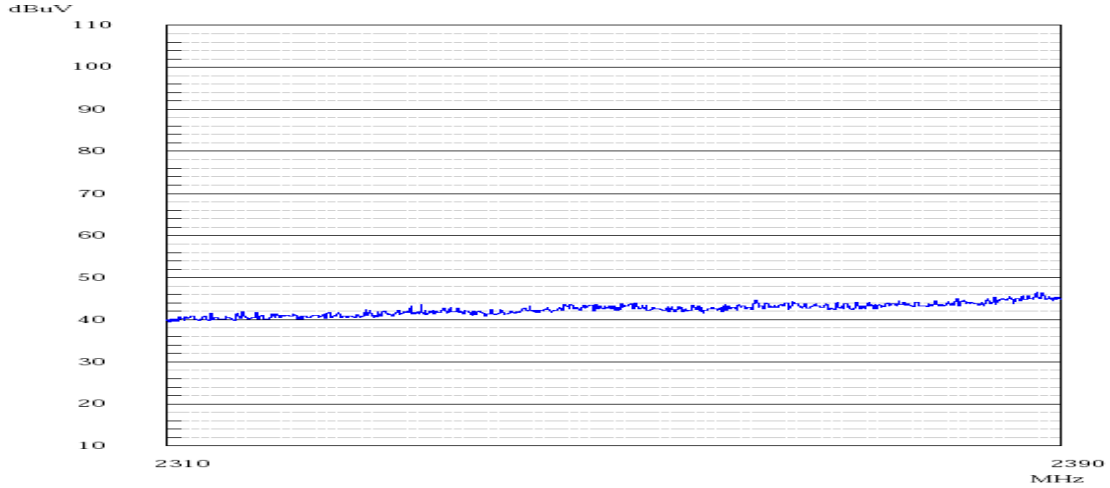
Radiated Spurious Emissions, Lowest Channel(Vertical)



Restricted Band Spurious Emissions, Lowest channel(Horizontal, Peak)

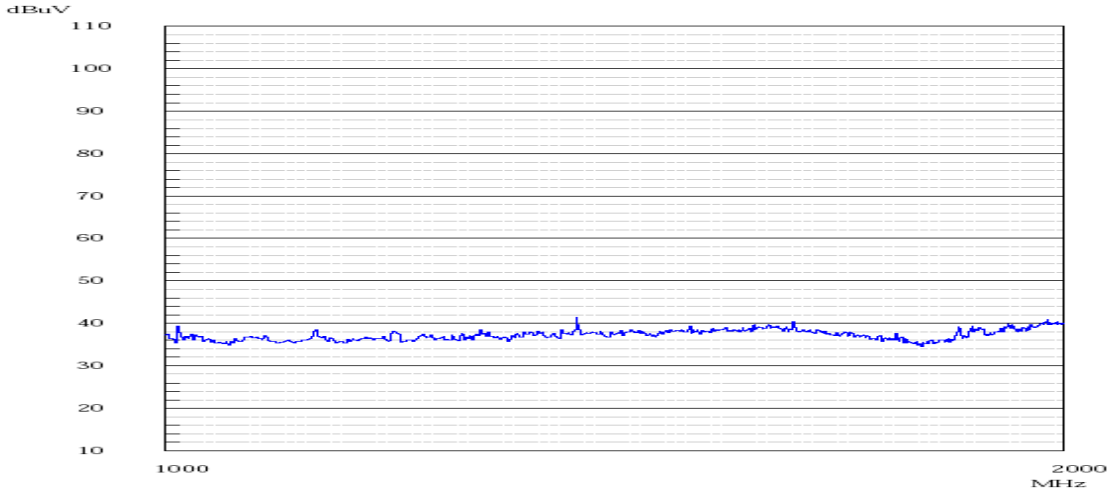


Restricted Band Spurious Emissions, Lowest channel(Vertical, Peak)

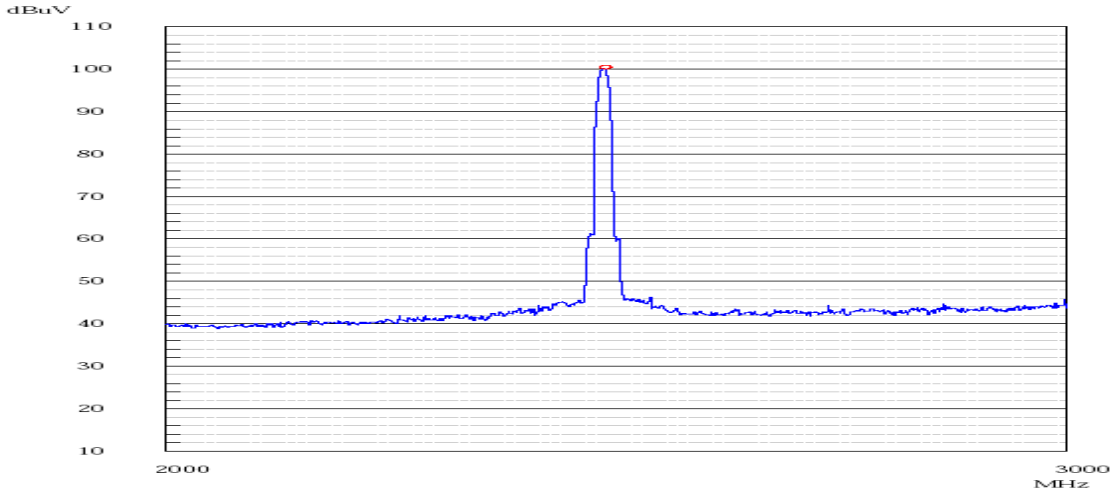


PLOT OF TEST DATA

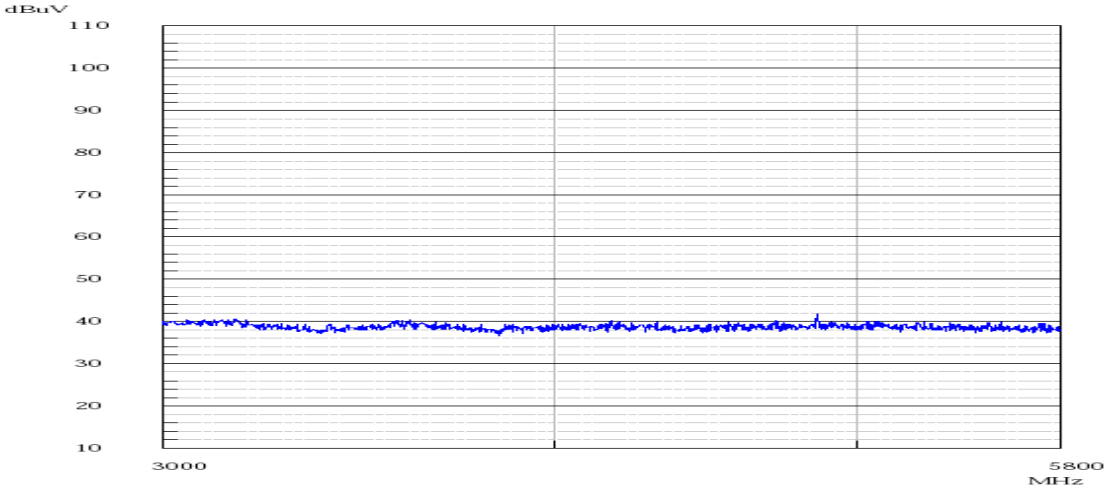
Radiated Spurious Emissions, Middle Channel(Horizontal)



Radiated Spurious Emissions, Middle Channel(Horizontal)

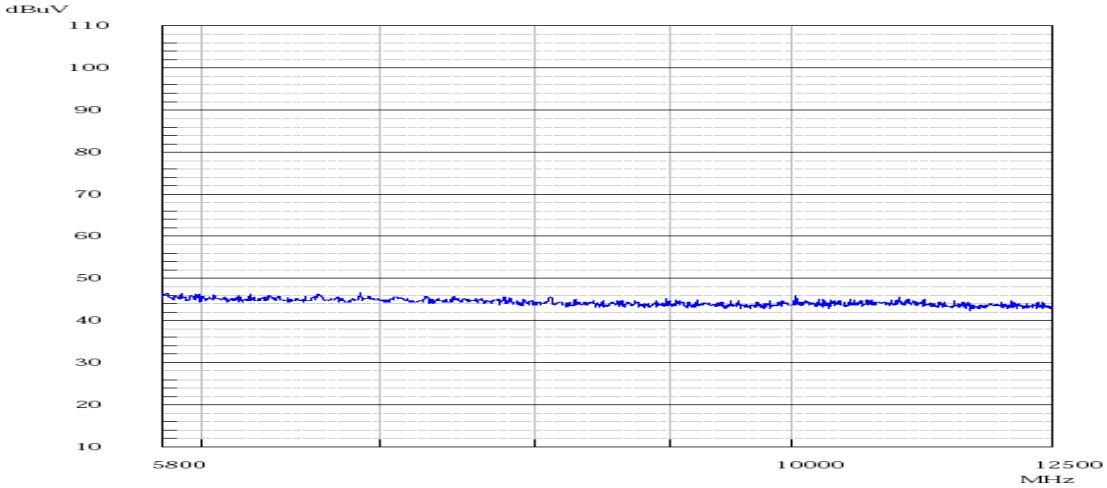


Radiated Spurious Emissions, Middle Channel(Horizontal)

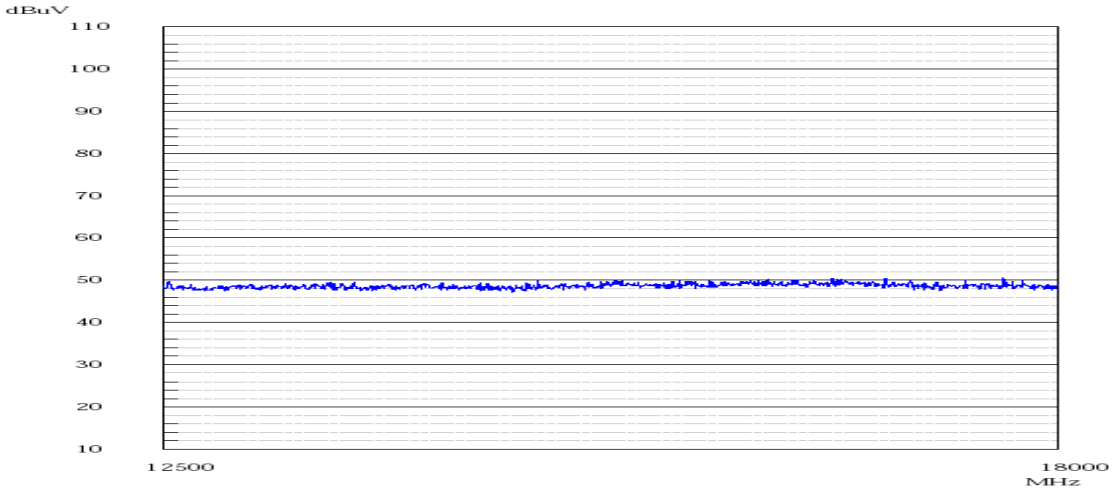


PLOT OF TEST DATA

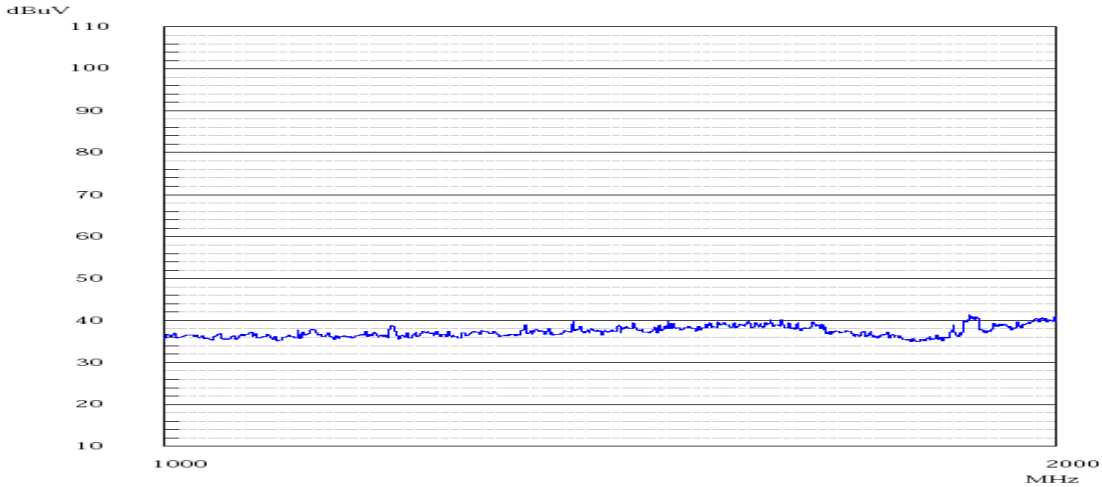
Radiated Spurious Emissions, Middle Channel(Horizontal)



Radiated Spurious Emissions, Middle Channel(Horizontal)

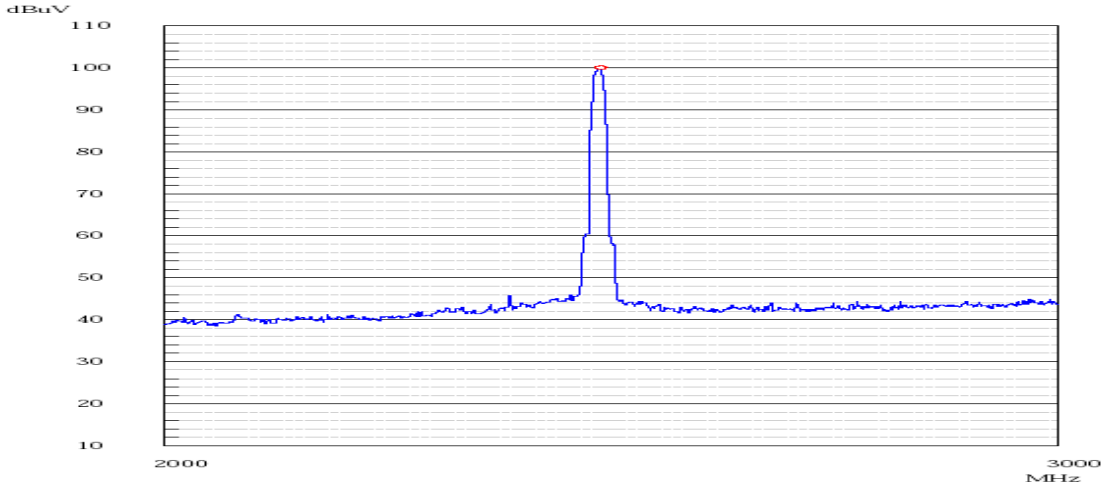


Radiated Spurious Emissions, Middle Channel(Vertical)

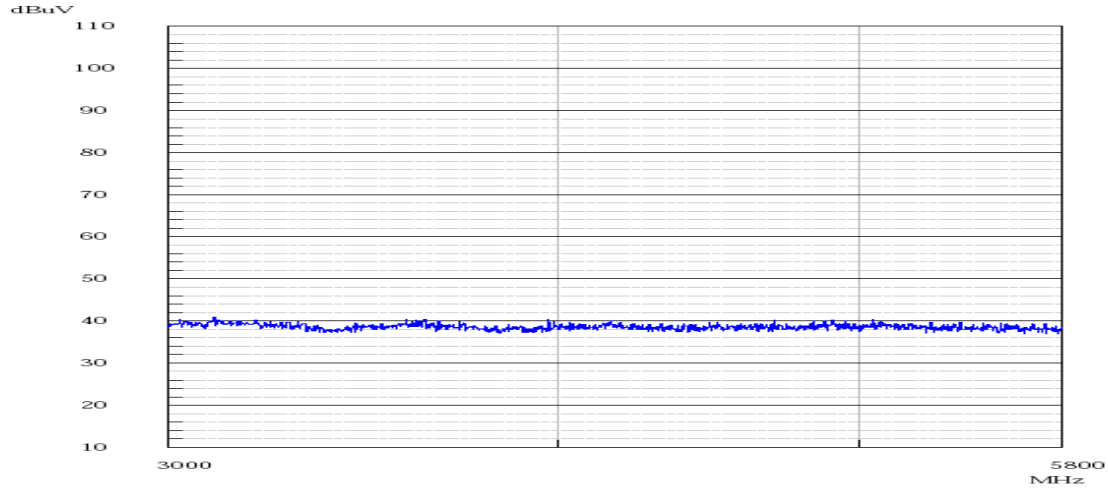


PLOT OF TEST DATA

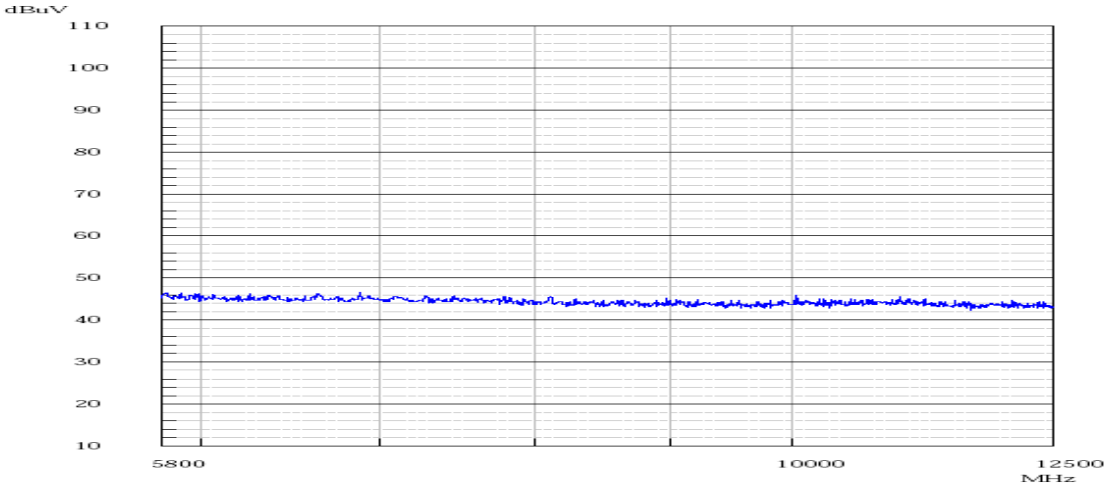
Radiated Spurious Emissions, Middle Channel(Vertical)



Radiated Spurious Emissions, Middle Channel(Vertical)

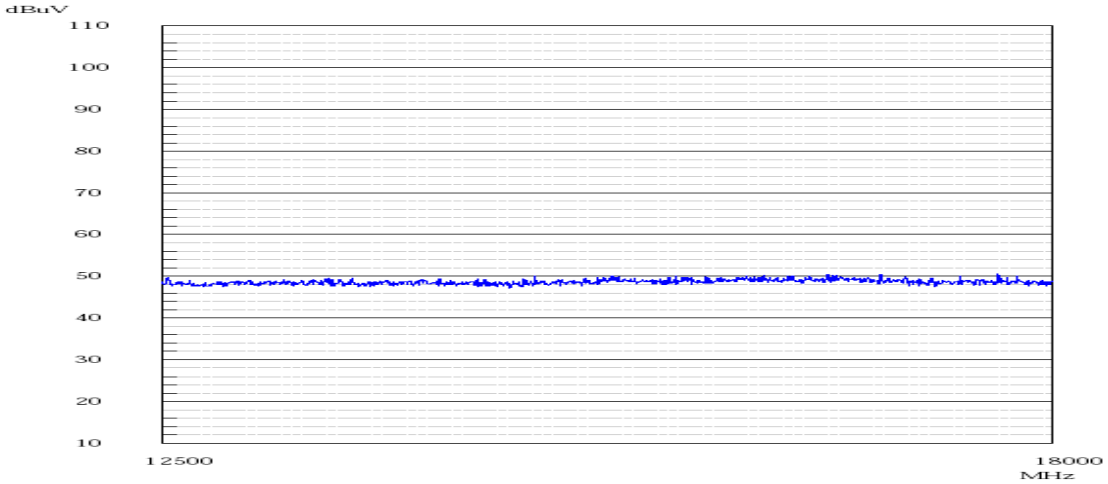


Radiated Spurious Emissions, Middle Channel(Vertical)

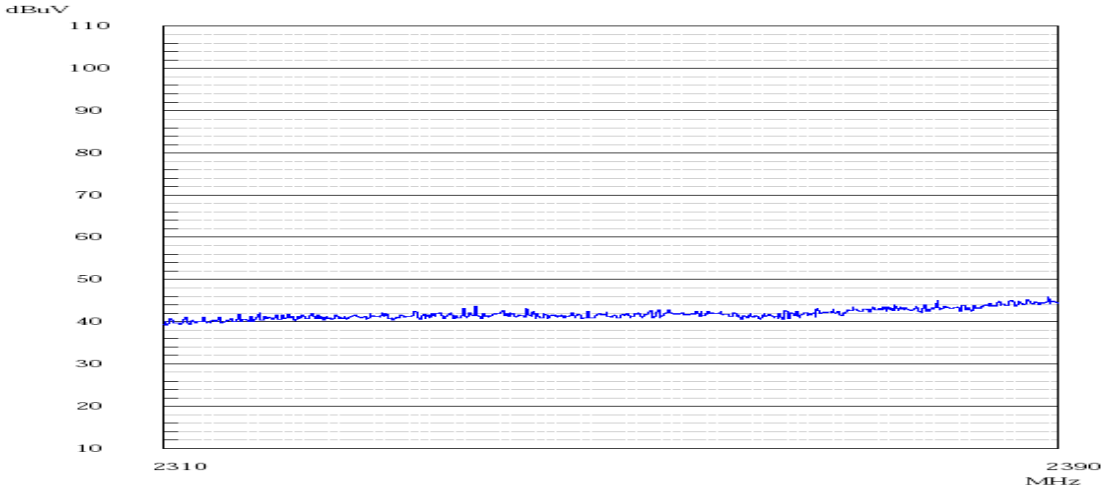


PLOT OF TEST DATA

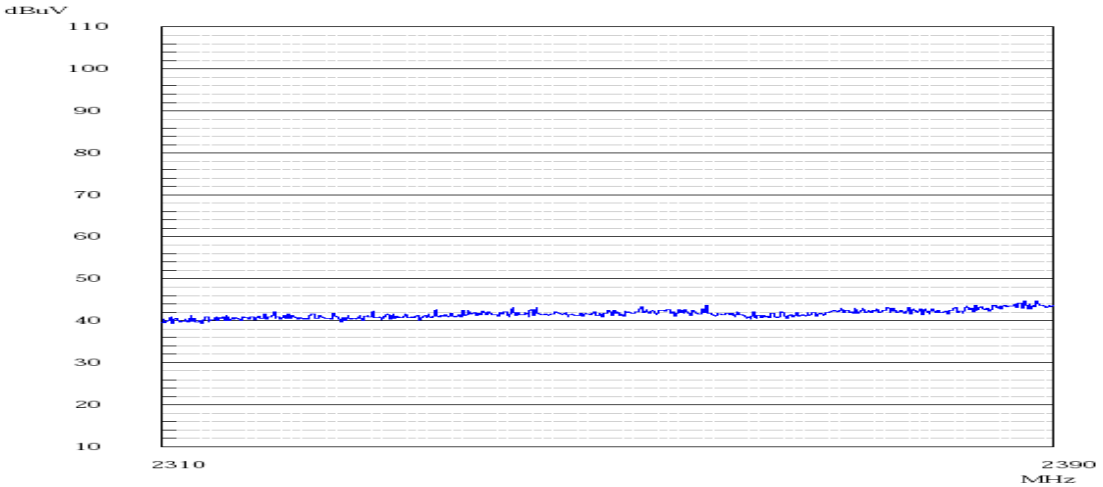
Radiated Spurious Emissions, Middle Channel(Vertical)



Restricted Band Spurious Emissions, Lowest channel(Horizontal Peak)

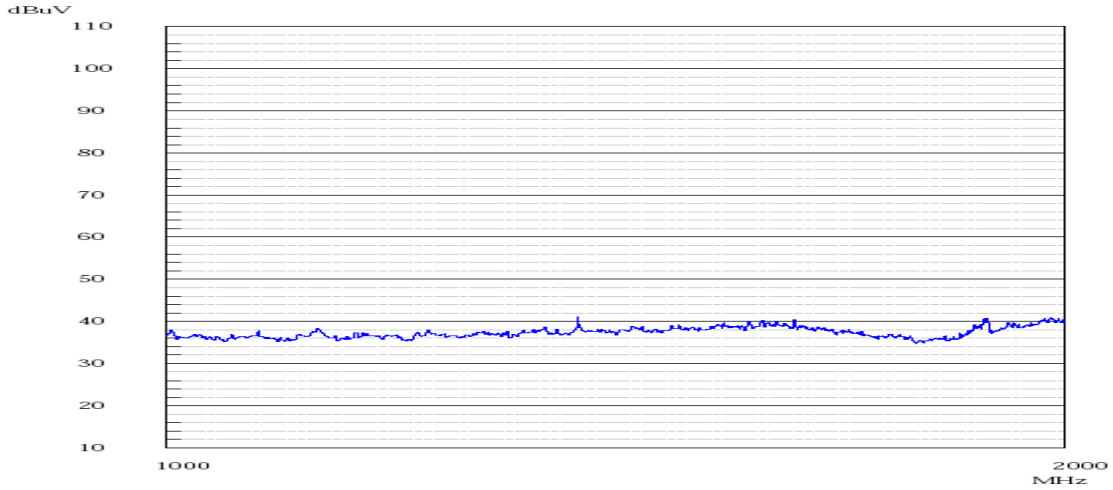


Restricted Band Spurious Emissions, Lowest channel(Vertical Peak)

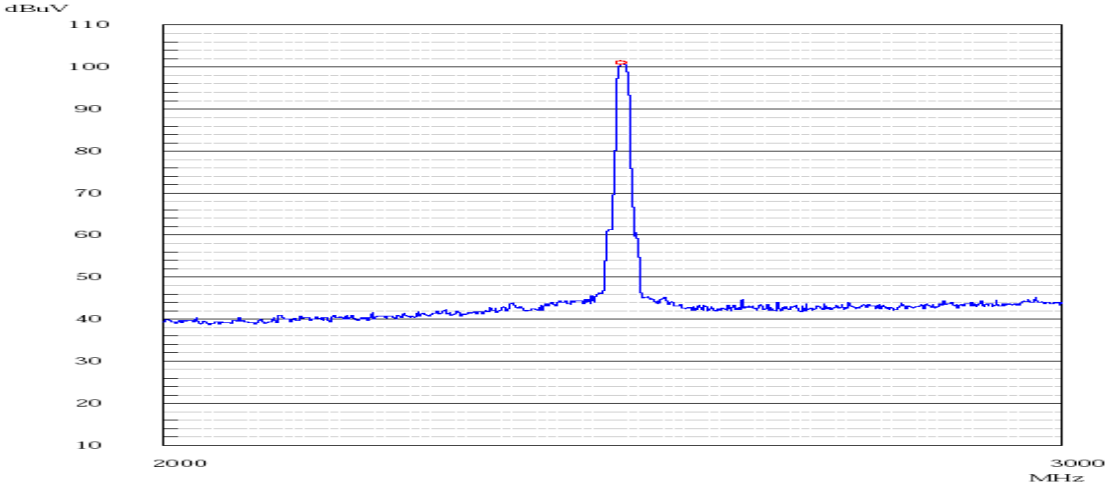


PLOT OF TEST DATA

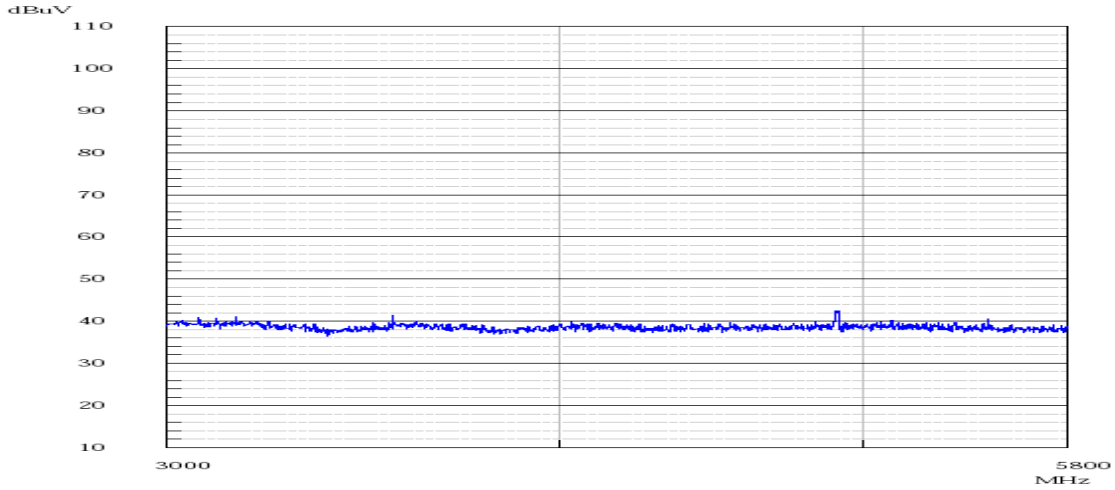
Radiated Spurious Emissions, Highest Channel(Horizontal)



Radiated Spurious Emissions, Highest Channel(Horizontal)

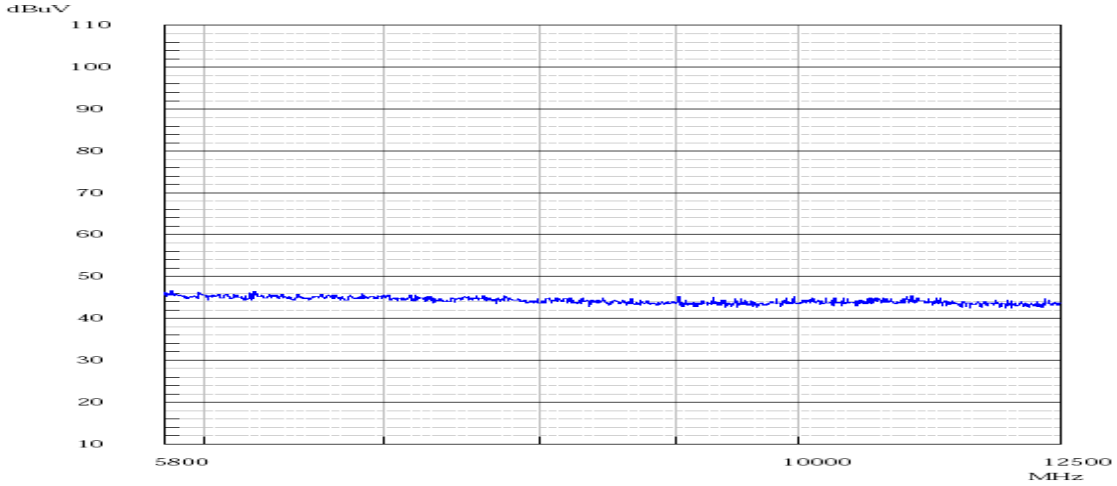


Radiated Spurious Emissions, Highest Channel(Horizontal)

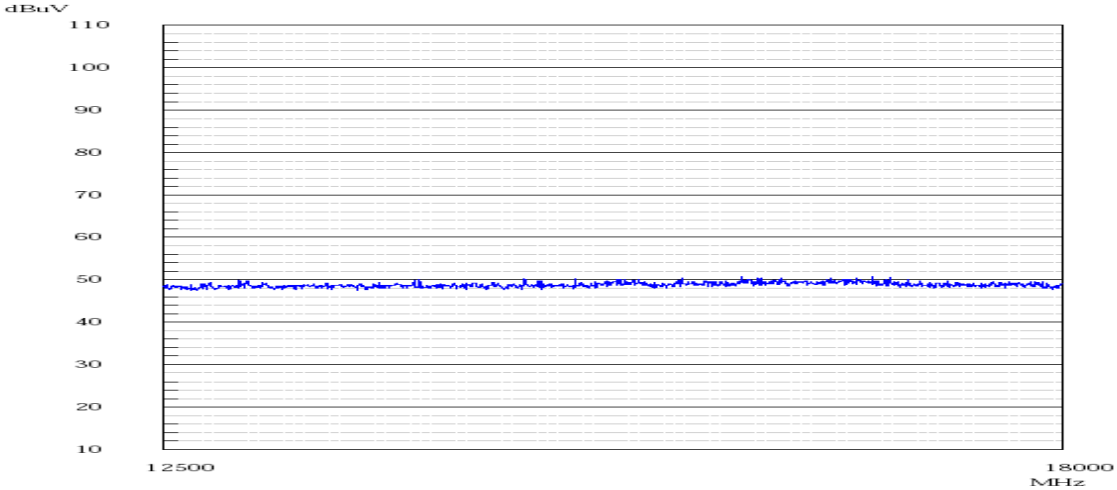


PLOT OF TEST DATA

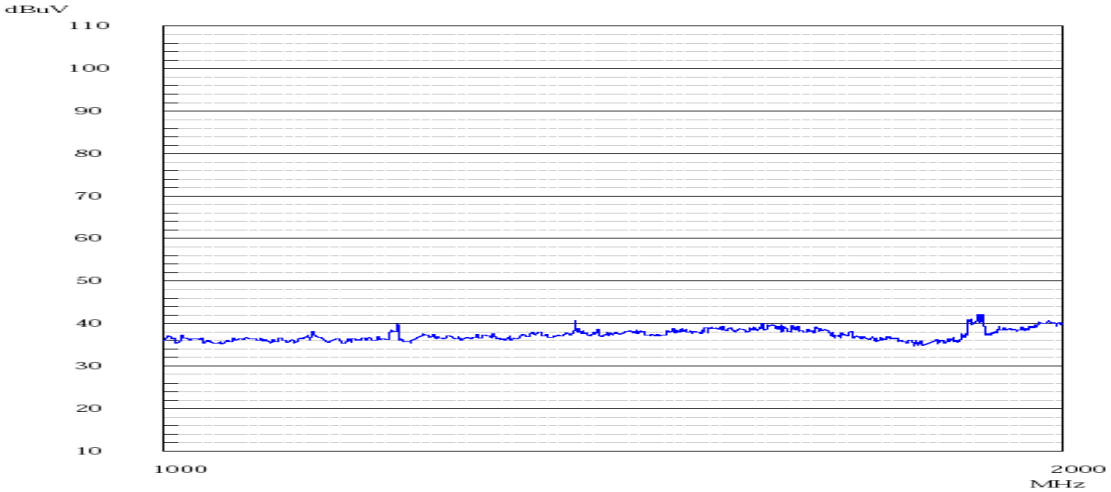
Radiated Spurious Emissions, Highest Channel(Horizontal)



Radiated Spurious Emissions, Highest Channel(Horizontal)

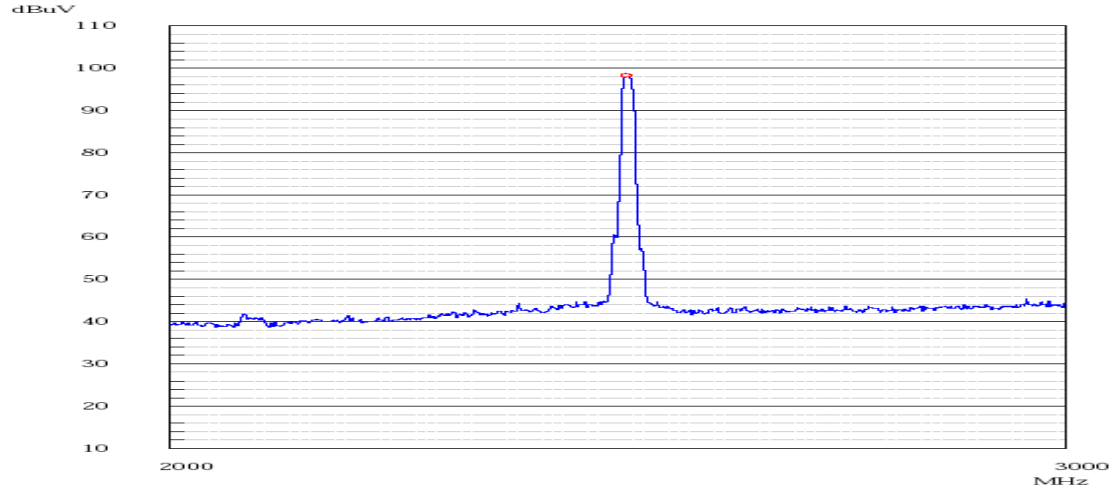


Radiated Spurious Emissions, Highest Channel(Vertical)

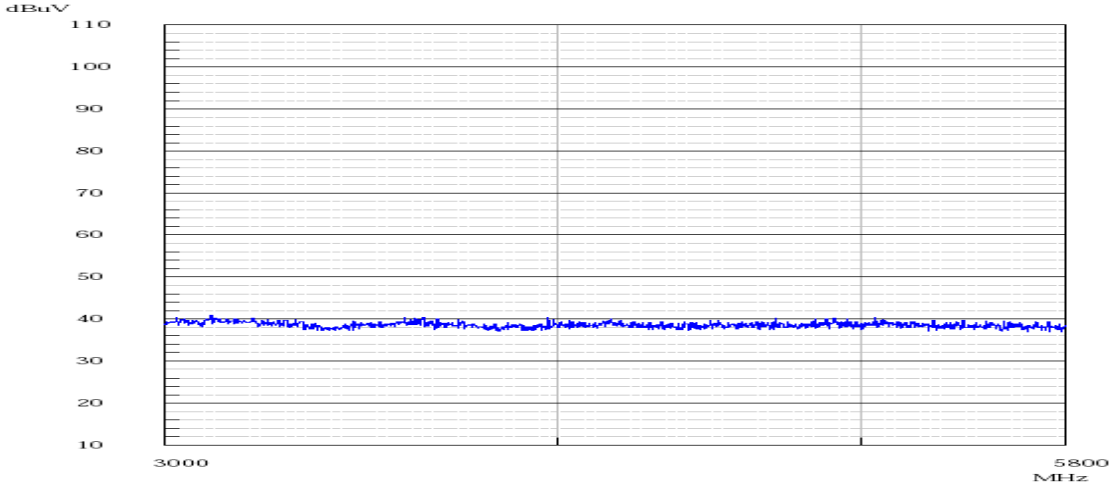


PLOT OF TEST DATA

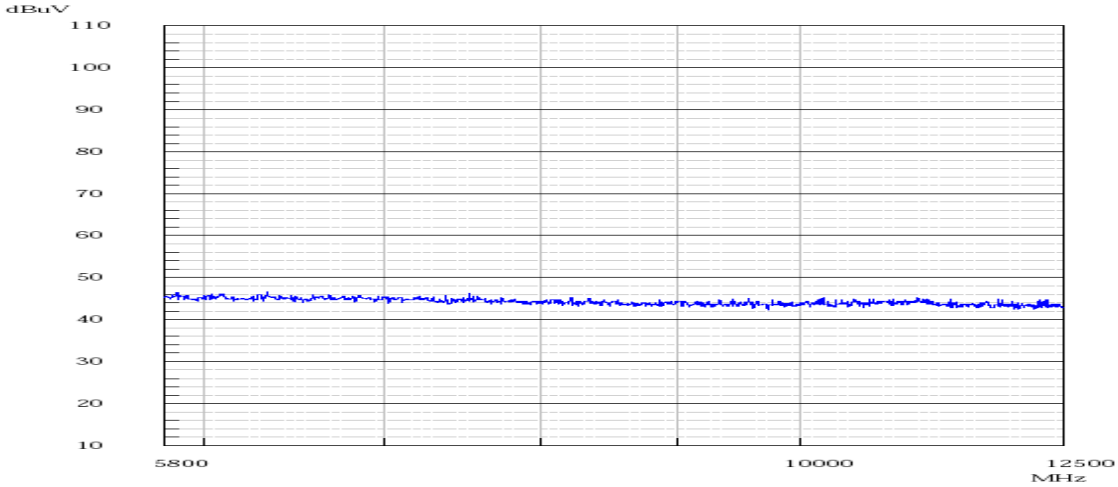
Radiated Spurious Emissions, Highest Channel(Vertical)



Radiated Spurious Emissions, Highest Channel(Vertical)

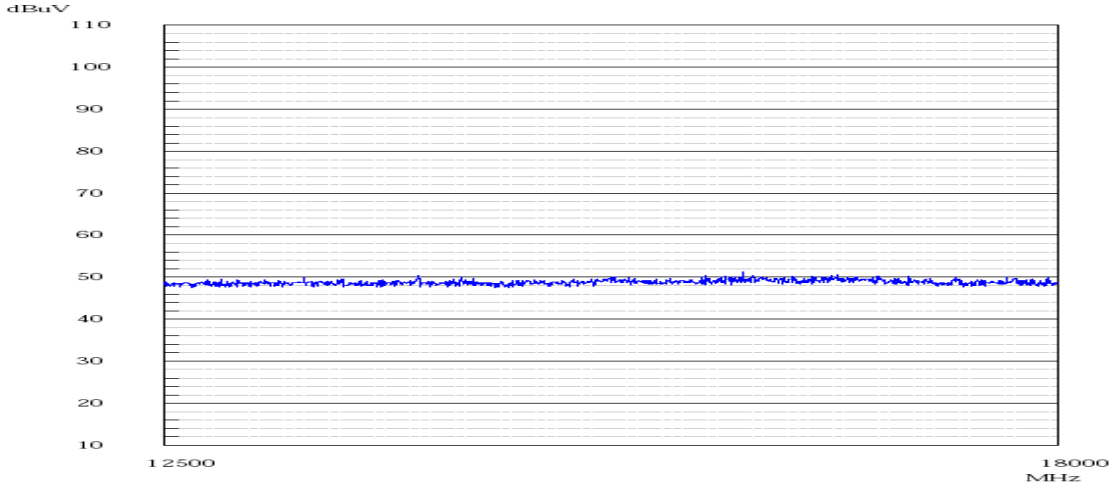


Radiated Spurious Emissions, Highest Channel(Vertical)

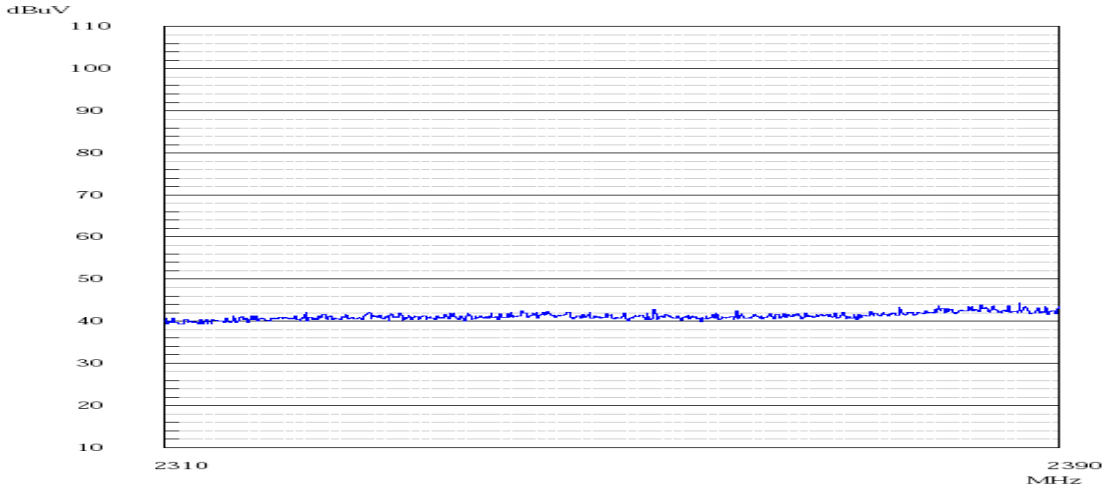


PLOT OF TEST DATA

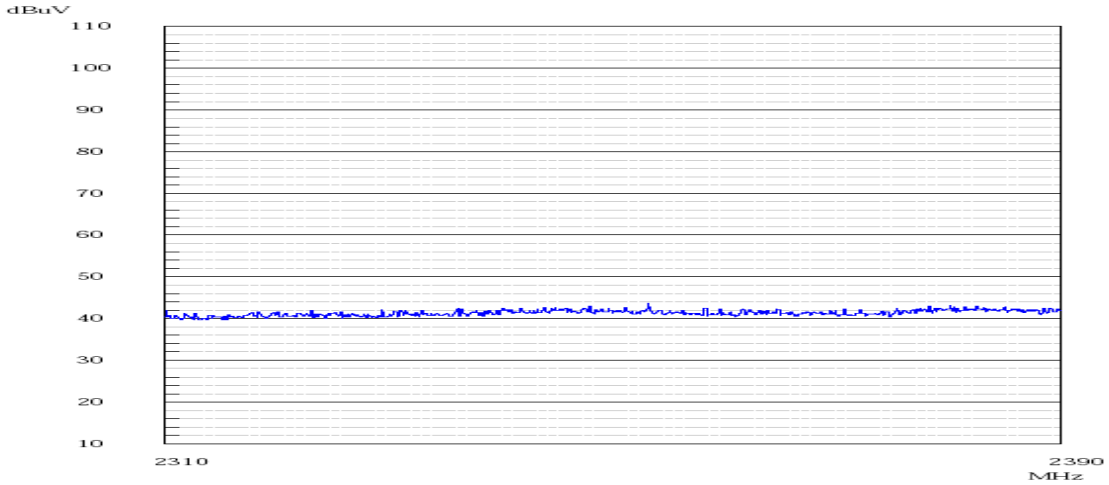
Radiated Spurious Emissions, Highest Channel(Vertical)



Restricted Band Spurious Emissions, Lowest channel(Horizontal, Peak)



Restricted Band Spurious Emissions, Lowest channel(Vertical, Peak)



TEST DATA

Peak Power Spectral Density – 15.247(d)

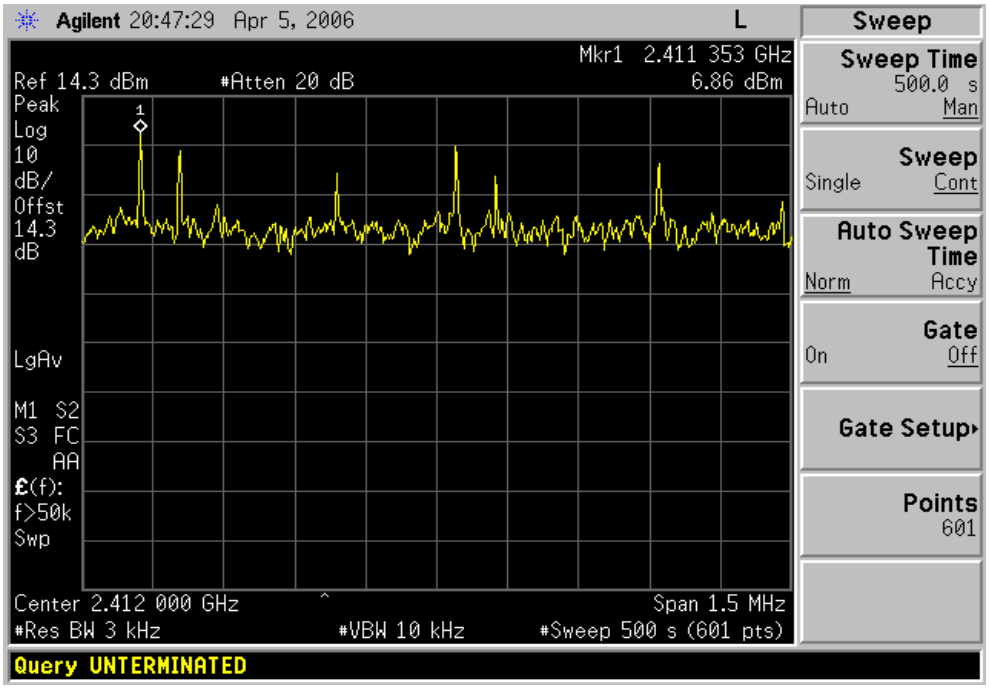
FCC ID : A3LSNCL200W
Test Mode : Set to Lowest channe, Middle channel and Highest channel.

Result:

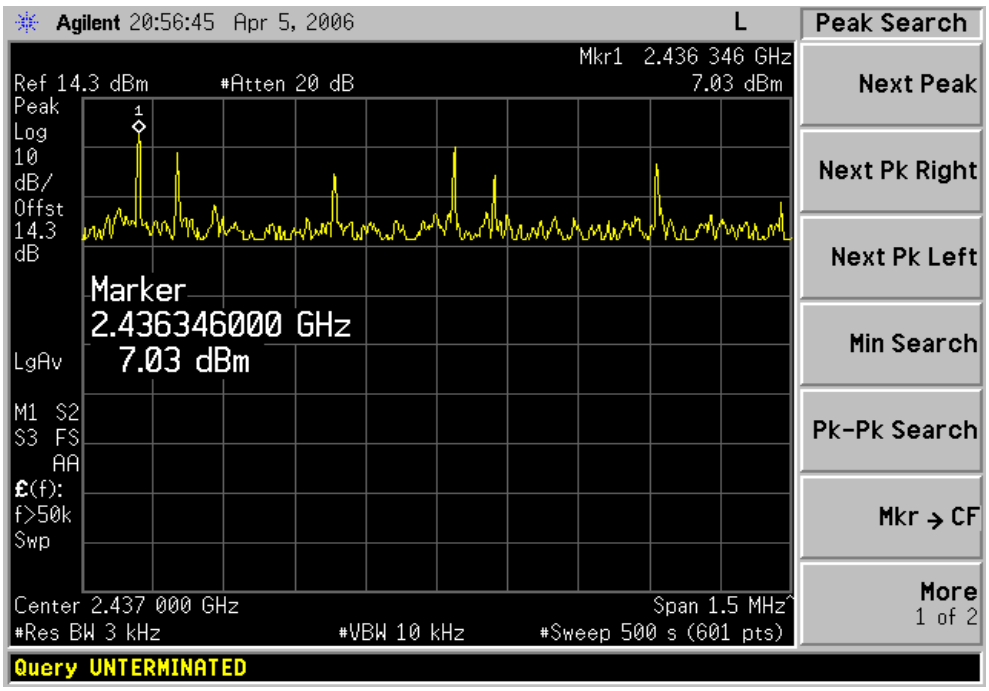
Channel	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dB)
1	2412	6.86	8	1.14
6	2437	7.03	8	0.97
11	2462	7.59	8	0.41

PLOT OF TEST DATA

Peak Power Spectral Density, Lowest Channel

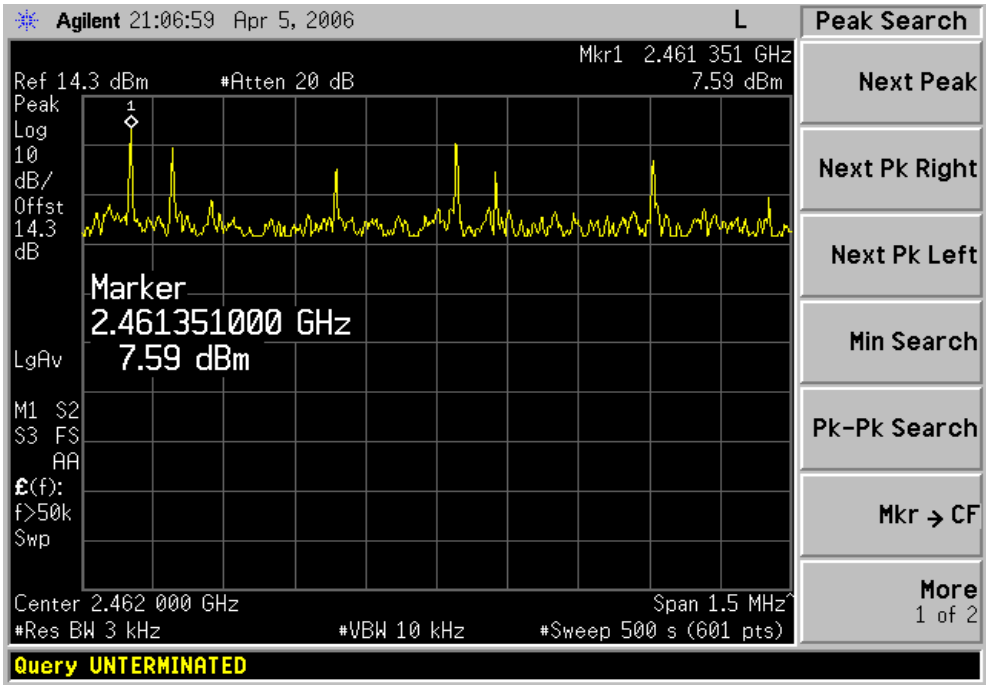


Peak Power Spectral Density, Middle Channel



PLOT OF TEST DATA

Peak Power Spectral Density, Highest Channel



TEST DATA

MAXIMUM PERMISSIBLE EXPOSURE

RF Exposure Limit

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the Environmental of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm^2)	Averaging Time (Minutes)
(A) Limits for occupational / Contral Exposure				
30 - 300	61.4	0.163	1	6
300 - 1500	…	…	F/300	6
1500 - 100000	…	…	5	6
(B) Limits for General Population / Uncontrolled Exposure				
30 - 300	27.5	0.073	0.2	30
300 - 1500	…	…	F/1500	30
1500 - 100000	…	…	1	30

F = Frequency (MHz)

Fries formula

Fries transmission formula : $Pd = (Pout * G) / (4 * \pi * r^2)$

$r = \sqrt{((Pout * G) / 4 * \pi * Pd)}$

Where

Pd = Power density in mW/cm²

Pout = Output power to antenna in mW

G = Gain of antenna in linear scale

$\pi = 3.1416$

r = Distance between observation point center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm². If we know the Maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

TEST DATA

Test Result

The maximum antenna gain is 1dBi or 1.26(Numeric)

Output power into antenna and RF Exposure Distance

Channel	Frequency (MHz)	Output Power to Antenna(mW)	RF Exposure Distance (cm)
1	2412	46.77	2.17
6	2437	44.67	2.12
11	2462	54.95	2.35

MPE Safe Distance =2.35cm

ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95%

1. Radiation Uncertainty Calculation

Contribution	Probability Distribution	Uncertainty(+/-dB)
Antenna Factor	Normal (k=2)	± 0.5
Cable Loss	Normal (k=2)	± 0.04
Receiver Specification	Rectangular	± 2.0
Antenna directivity	Rectangular	± 1.0
Antenna Factor variation with Height		
Antenna Phase Center Variation		
Antenna Factor Frequency Interpolation		
Measurement Distance Variation		
Site Inperfections	Rectangular	± 2.0
Mismatch:Receiver VRC ri=0.3 Antenna VRC rR=0.1(Bi)0.4(Lp) Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	+ 0.25 / - 0.26
System Repeatibilty	Std.deviation	± 0.05
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.77
Expended Uncertainty U	Normal (k=2)	± 3.5

2. Conducted Uncertainty Calculation

Contribution	Probability Distribution	Uncertainty(+/-dB)
Receiver Specification	Normal (k=2)	± 2.0
LISN coupling spec.	Normal (k=2)	± 0.4
Cable and input attenuator cal.	Rectangular	± 0.4
Mismatch:Receiver VRC ri=0.3 LISN vrc rg=0.1 Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	± 0.26
System Repeatibilty	Std.deviation	± 0.68
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.18
Expended Uncertainty U	Normal (k=2)	± 2.4

TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Calibration Date
1	*Test Receiver	R & S	ESCS 30	2005.08
2	*Test Receiver	R & S	ESCS 30	2005.12
3	*Amplifier	HP	8447F	2005.08
4	*Amplifier	HP	8447F	2005.10
5	*Amplifier	HP	8449F	2006.03
6	*Spectrum Analyzer	HP	8568B	2005.10
7	*Spectrum Analyzer	Anritsu	MS2668C	2005.12
8	*Spectrum Analyzer	HP	8593E	2005.12
9	*Logbicon Super Antenna	Schwarzbeck	VULB9166	2005.05
10	*Biconical Log Antenna	ARA	LPB-2520/A	2006.01
11	*Horn Antenna	Schwarzbeck	BBHA 9120D	2006.04
12	*Horn Antenna	Schwarzbeck	BBHA 9120D	2005.10
13	*Signal Generater	R & S	SMP02	2005.08
14	*Signal Generater	HP	E4436B	2005.12
15	*LISN	R & S	ESH3-Z5	2005.10
16	*LISN	Kyoritsu	KNW-407	2006.03
17	*Position Controller	EM Eng.	N/A	N/A
18	*Turn Table	EM Eng.	N/A	N/A
19	*Antenna Mast	EM Eng.	N/A	N/A
20	*Anechoic Chamber	EM Eng.	N/A	N/A
21	*Shielded Room	EM Eng.	N/A	N/A
22	*Power Meter	R & S	NRVS	2005.12
23	*Peak Power Sensor	R & S	NRV-Z32	2005.12
24	*Spectrum Analyzer	Agilent	E4440A	2005.12

*) Test equipment used during the test