

FCC RADIO TEST REPORT

Applicant's company	SYMBOL Technologies, Inc.
Applicant Address	One Symbol Plaza Holtsville, New York, 11742-1300 U.S.A
FCC ID	H9PMC3090BT
Manufacturer's company	Universal Scientific Industrial Co., Ltd.
Manufacturer Address	141, Lane 351, Taiping Rd., Sec.1, Tsao Tuen, Nan-Tou,Taiwan, R.O.C.

Product Name	Mobile Computer
Brand Name	SYMBOL
Model Name	MC3090BT
Multiple Listing	MC3070BT; MC3000BT; MC3070; MC3090
Test Rule Part(s)	47 CFR Part 15 Subpart C 15.407
Test Freq. Range	5180 ~ 5240MHz 5260 ~ 5320MHz 5745 ~ 5805MHz
Receive Date	Sep. 15, 2005
Test Date	Sep. 21, 2005
Submission Type	Original Equipment



Statement

Test result included in this report is only for the 802.11 a part of the product.

The test result in this report refers exclusively to the presented test model / sample. There are 5 models listed on the report.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full. The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart E**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Table of Contents

1. CERTIFICATE OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Configuration of the Host.....	4
3.3. Accessories.....	5
3.4. Table for Filed Antenna.....	5
3.5. Table for Carrier Frequencies	5
3.6. Table for Test Modes	6
3.7. Difference between Each Model	6
3.8. Table for Testing Locations.....	7
3.9. Table for Supporting Units	7
3.10. Table for Parameters of Test Software Setting	7
3.11. Test Configurations	8
4. TEST RESULT	10
4.1. AC Power Line Conducted Emissions Measurement.....	10
4.2. 99% Occupied Bandwidth Measurement	14
4.3. Maximum Conducted Output Power Measurement.....	19
4.4. Power Spectral Density Measurement	24
4.5. Peak Excursion Measurement.....	29
4.6. Radiated Emissions Measurement	34
4.7. Band Edge Emissions Measurement	69
4.8. Frequency Stability Measurement	84
4.9. Antenna Requirements	86
5. LIST OF MEASURING EQUIPMENTS	87
6. SPORTON COMPANY PROFILE	89
6.1. Test Location.....	89
7. CERTIFICATE OF NVLAP ACCREDITATION	90
APPENDIX A. PHOTOGRAPHS OF EUT.....	A1 ~ A143
APPENDIX B. TEST PHOTOS.....	A1 ~ A4

History of This Test Report

Original Issue Date: Sep. 22, 2005

Report No.: FR591501

☒ No additional attachment.

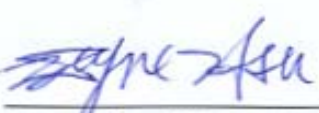
☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. CERTIFICATE OF COMPLIANCE

Product Name : Mobile Computer
Brand Name : SYMBOL
Model Name : MC3090BT
Multiple-Listing : MC3070BT; MC3000BT; MC3070; MC3090
Applicant : SYMBOL Technologies, Inc.
Test Rule Part(s) : 47 CFR Part 15 Subpart C 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Sep. 15, 2005 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Wayne Hsu / Supervisor
Sporton International Inc.



2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E			
Part	Rule Section	Description of Test	Result
4.1	15.207	AC Power Line Conducted Emissions	Complies
4.2	15.407(a)	26dB Spectrum Bandwidth	Complies
4.3	15.407(a)	Maximum Conducted Output Power	Complies
4.4	15.407(a)	Power Spectral Density	Complies
4.5	15.407(a)	Peak Excursion	Complies
4.6	15.407(b)	Radiated Emissions	Complies
4.7	15.407(b)	Band Edge Emissions	Complies
4.8	15.407(g)	Frequency Stability	Complies
4.9	15.203	Antenna Requirements	Complies

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	$\pm 2.26\text{dB}$	Confidence levels of 95%
Maximum Conducted Output Power	$\pm 0.71\text{dB}$	Confidence levels of 95%
Power Spectral Density	$\pm 0.71\text{dB}$	Confidence levels of 95%
Peak Excursion	$\pm 0.71\text{dB}$	Confidence levels of 95%
26dB Spectrum Bandwidth / Frequency Stability	$\pm 6.25 \times 10^{-7}$	Confidence levels of 95%
Radiated Emissions/ Band Edge Emissions	$\pm 3.72\text{dB}$	Confidence levels of 95%



3. GENERAL INFORMATION

3.1. Product Details

EUT is a multi-function Mobile Computer with IEEE 802.11a/b/g and Bluetooth radio function. Only the radio detail of **IEEE 802.11a** is shown in the table below.

Items	Description
Product Type	Mobile Computer
Radio Type	Intentional Transceiver
Power Type	AC Adapter, DC Battery
Interface Type	NA
Modulation	OFDM for IEEE 802.11a
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	OFDM (6/9/12/18/24/36/48/54)
Frequency Range	5180 ~ 5240MHz 5260 ~ 5320MHz 5745 ~ 5805MHz
Channel Number	11a: 12
Channel Band Width (99%) (Maximum)	11a: 16.96 MHz
Conducted Output Power (Maximum)	18.95 dBm
Carrier Frequencies	Please refer to section 3.5
Antenna	Please refer to section 3.4



3.2. Configuration of the Host

There are 3 different configurations, Gun type, Brick and Rotating.

Mechanical	GUN type	Brick
Processor	Intel 520MHz	Intel 520MHz
Flash	64MB	64MB
SDRAM	64MB	128MB
LCD Panel	Sharp LQ030B7DD01 (Color)	Sharp LQ030B7DD01 (Color)
Touch Panel	Liyitec TR4-030F-14G	Liyitec TR4-030F-14G
Option Board	BT Only	BT & Audio
Keypad	48 Key	38 Key
Scanning	Symbol PICO Imager (20-60000-XX)	Symbol PICO Imager (20-60000-XX)
WLAN	Symbol Photon 802.11b/g/a (21-21160)	Symbol Photon 802.11b/g/a (21-21160)
Battery	Symbol 55-060112-86 3.7V 4400mAh	Symbol 55-060112-86 3.7V 4400mAh
Accessory	USB Charge, Slave cable (25-67868-01)	USB Charge, Slave cable (25-67868-01)
Power Adapter	Delta ADP-16GB A, Symbol 50-14000-147	Delta ADP-16GB A, Symbol 50-14000-147

Mechanical	Rotating	
Processor	Intel 520MHz	
Flash	64MB	
SDRAM	128MB	
LCD Panel	Sharp LQ030B7DD01 (Color)	
Touch Panel	Liyitec TR4-030F-14G	
Option Board	BT & Audio	
Keypad	38 Key	
Scanning	Symbol SE800	
WLAN	Symbol Photon 802.11b/g/a (21-21160)	
Battery	Symbol 55-060112-86 3.7V 4400mAh	
Accessory	USB Charge, Slave cable (25-67868-01)	
Power Adapter	Delta ADP-16GB A, Symbol 50-14000-147	

3.3. Accessories

Power	Brand	Model	Rating
Adapter	Delta	ADP-16GB A	AC input 100~240V, DC output 5.4V
Battery	Symbol	55-060112-86	3.7V 4400mAh
Others	Description		
USB Charge	This is a desktop charger.		
Slave cable	This cable enables USB communication between EUT and a host PC.		

3.4. Table for Filed Antenna

Ant.	Ver.	Antenna Type	Connector	Gain (dBi)	Remark
1	-	Chip Antenna	NA	2.70	For Bluetooth
2	V1.7 (for Brick and Rotating type)	PIFA Antenna	MHF	3.00	At 2.4GHz band
				5.00	At 5GHz band
3	V 2.1 (for Gun type)	PIFA Antenna	MHF	2.70	At 2.4GHz
				4.90	At 5GHz band

3.5. Table for Carrier Frequencies

EUT is a multi-function Mobile Computer with IEEE 802.11a/b/g and Bluetooth radio function. Only the carrier frequencies of **IEEE 802.11a** are shown in the table below.

Frequency Band	Channel No.	Frequency
5150~5250 MHz (USA) Band 1	36	5180 MHz
	40	5200 MHz
	44	5220 MHz
	48	5240 MHz
5250~5350 MHz (USA) Band 2	52	5260 MHz
	56	5280 MHz
	60	5300 MHz
	64	5320 MHz
5725~5825 MHz (USA) Band 4	149	5745 MHz
	153	5765 MHz
	157	5785 MHz
	161	5805 MHz



3.6. Table for Test Modes

MC3090 in Gun-type configuration and MC3090BT in Brick configuration were chosen as representatives for all models. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Conducted Emission	Normal Link	54Mbps	64	2/3
26dB Spectrum Bandwidth	Band 1~2/BPSK	6Mbps	36/52/64	N/A
Max. Conducted Output Power	Band 4/BPSK	6Mbps	149/157/161	N/A
Power Spectral Density				
Peak Excursion				
Radiated Emission Below 1GHz	BPSK	6Mbps	64	2/3
Radiated Emission Above 1GHz	Band 1~2/BPSK	6Mbps	36/52/64	2/3
Band Edge Emission	Band 4/BPSK	6Mbps	149/157/161	2/3
Frequency Stability	Un-modulation	-	64/157	N/A

3.7. Difference between Each Model

Function Model	Configuration	Bluetooth	WLAN b/g	WLAN	Audio
MC3090 BT	R	✓	✓	✓	✓
	B	✓	✓	✓	✓
	G	✓	✓	✓	N/A
MC3070BT	R	✓	✓	N/A	✓
	B	✓	✓	N/A	✓
	G	✓	✓	N/A	N/A
MC3090	R	N/A	✓	✓	N/A
	B	N/A	✓	✓	N/A
	G	N/A	✓	✓	N/A
MC3070	R	N/A	✓	N/A	N/A
	B	N/A	✓	N/A	N/A
	G	N/A	✓	N/A	N/A
MC300BT	R	✓	N/A	N/A	✓
	B	✓	N/A	N/A	✓
	G	✓	N/A	N/A	N/A

Different models have different functions. The differences between each model are shown above. MC3090BT in Brick configuration was chosen in all final test items because it is the full function version. Symbol Photon 802.11b/g/a (21-21160) was configured to have 802.11 a/b/g or 802.11 b/g function. 802.11a function was terminated while the EUT is with only 802.11 b/g function.

G: Gun Type; B: Brick; R: Rotating



3.8. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH03-HY	SAC	Hwa Ya	101377	IC 4088	-
CO04-HY	Conduction	Hwa Ya	101377	IC 4088	-
TH01-HY	OVEN Room	Hwa Ya	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

3.9. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
N/A	-	-	-

3.10. Table for Parameters of Test Software Setting

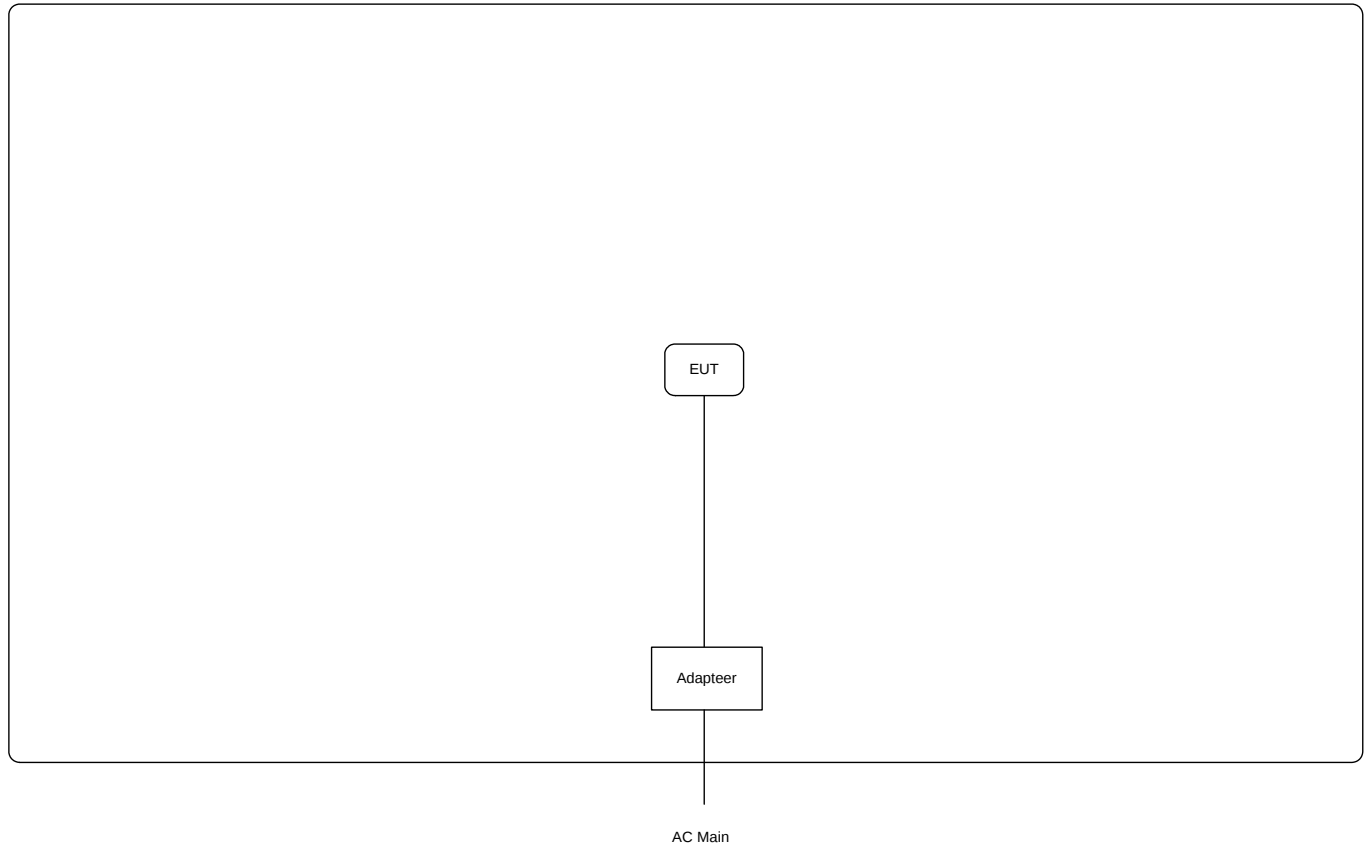
During testing, Channel & Power Controlling Software provided by the customer to control the operating channel as well as the output power level. The RF output power is set by the customer and the power setting parameters are identical to the ones in the firmware of the end product.

Power Parameters of IEEE 802.11a

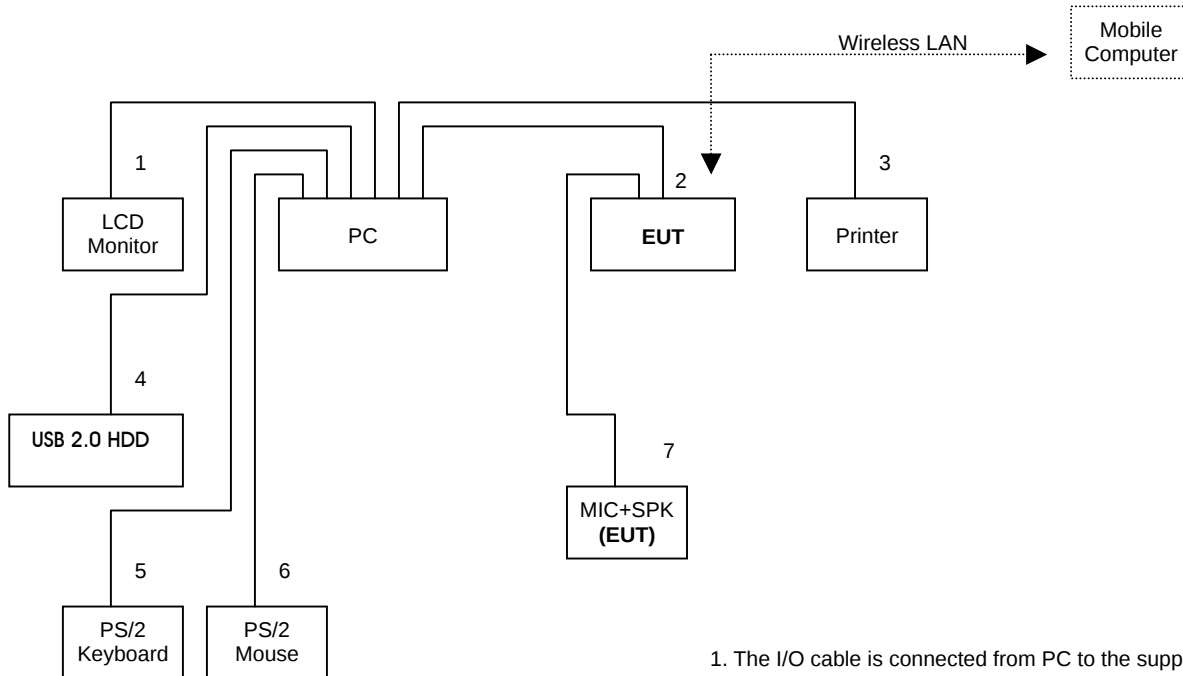
Test Software Version	ART					
Frequency	5180 MHz	5260 MHz	5320 MHz	5745 MHz	5785 MHz	5805 MHz
IEEE 802.11a	86	107	131	177	167	171

3.11. Test Configurations

3.11.1. Radiation Emissions Test Configuration



3.11.2. AC Power Line Conduction Emissions Test Configuration



1. The I/O cable is connected from PC to the support unit 1.
2. The RS232 cable is connected from PC to the EUT.
3. The I/O cable is connected from PC to the support unit 2.
4. The I/O cable is connected from PC to the support unit 3.
5. The I/O cable is connected from PC to the support unit 4.
6. The I/O cable is connected from PC to the support unit 5.
7. The Audio cable is connected to EUT.

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For a Low-power Radio-frequency Device which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

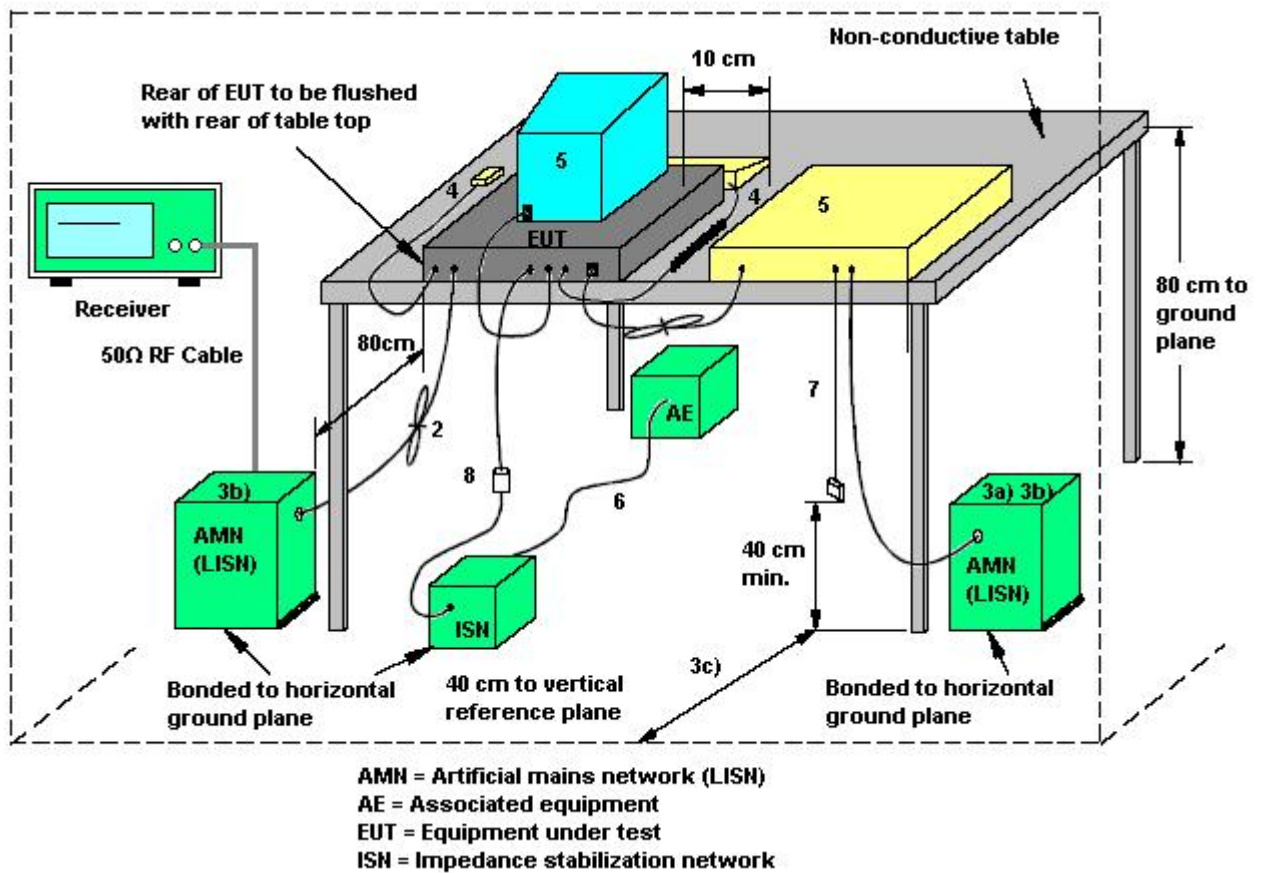
Please refer to section 6 in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



1. If cables, which hang closer than 40 cm to the horizontal metal groundplane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
2. Excess mains cord shall be bundled in the centre or shortened to appropriate length.
3. EUT is connected to one artificial mains network (AMN). All AMNs and ISNs may alternatively be connected to a vertical reference plane or metal wall.
4. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
5. AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
6. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
7. Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.
8. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
9. I/O signal cable intended for external connection.
10. The end of the I/O signal cables which are not connected to an AE may be terminated, if required, using correct terminating impedance.
11. If used, the current probe shall be placed at 0,1 m from the ISN.

4.1.5. Test Deviation

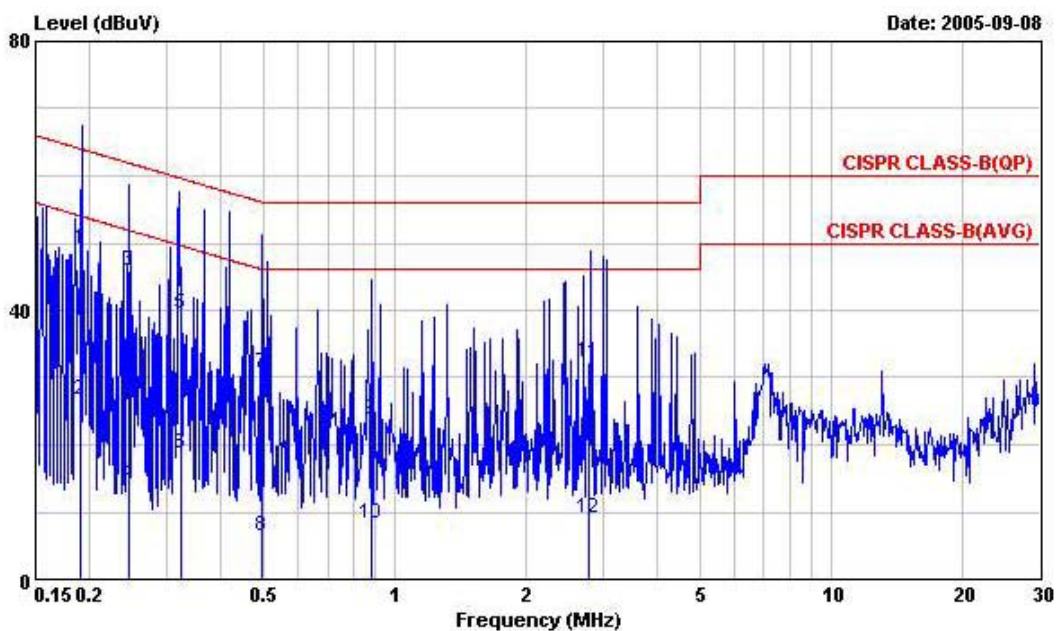
There are no deviations with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

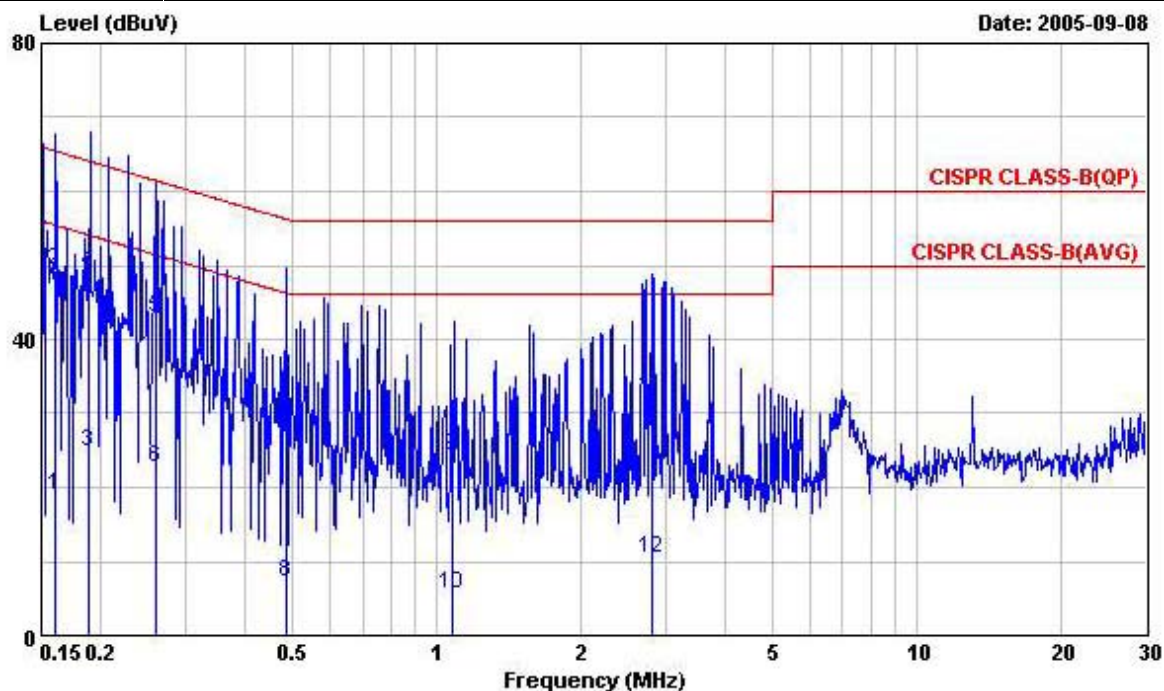
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	20°C	Humidity	70%
Test Engineer	Sky Wu	Phase	Line
Configuration	802.11a / Channel 64 / Adapter 1		



	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Cable Loss	LISN Factor	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.191	49.15	-14.84	63.99	49.00	0.15	0.05	0.10	QP
2	0.191	26.57	-27.42	53.99	26.42	0.15	0.05	0.10	Average
3	0.246	45.83	-16.06	61.89	45.63	0.20	0.10	0.10	QP
4	0.246	14.24	-37.65	51.89	14.04	0.20	0.10	0.10	Average
5	0.322	39.52	-20.14	59.66	39.42	0.10	0.00	0.10	QP
6	0.322	18.59	-31.07	49.66	18.49	0.10	0.00	0.10	Average
7	0.494	30.70	-25.40	56.10	30.60	0.10	0.00	0.10	QP
8	0.494	6.45	-39.65	46.10	6.35	0.10	0.00	0.10	Average
9	0.885	23.65	-32.35	56.00	23.47	0.18	0.08	0.10	QP
10	0.885	8.28	-37.72	46.00	8.10	0.18	0.08	0.10	Average
11	2.790	32.36	-23.64	56.00	32.11	0.25	0.10	0.15	QP
12	2.790	8.98	-37.02	46.00	8.73	0.25	0.10	0.15	Average

Temperature	20°C	Humidity	70%
Test Engineer	Sky Wu	Phase	Neutral
Configuration	802.11a / Channel 64 / Adapter 1		



	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Cable Loss	LISN Factor	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	dB	
1	0.161	18.84	-36.57	55.41	18.74	0.10	0.00	0.10	Average
2	0.161	49.42	-15.99	65.41	49.32	0.10	0.00	0.10	QP
3	0.189	24.71	-29.37	54.08	24.56	0.15	0.05	0.10	Average
4	0.189	49.03	-15.05	64.08	48.88	0.15	0.05	0.10	QP
5	0.259	42.92	-18.54	61.46	42.77	0.15	0.05	0.10	QP
6	0.259	22.65	-28.81	51.46	22.50	0.15	0.05	0.10	Average
7	0.484	29.24	-27.03	56.27	29.14	0.10	0.00	0.10	QP
8	0.484	7.07	-39.20	46.27	6.97	0.10	0.00	0.10	Average
9	1.080	24.19	-31.81	56.00	24.01	0.18	0.08	0.10	QP
10	1.080	5.48	-40.52	46.00	5.30	0.18	0.08	0.10	Average
11	2.810	32.30	-23.70	56.00	32.05	0.25	0.10	0.15	QP
12	2.810	10.40	-35.60	46.00	10.15	0.25	0.10	0.15	Average

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. 99% Occupied Bandwidth Measurement

4.2.1. Limit

No restriction limits. But resolution bandwidth within band edge measurement is 1% of the 99% occupied bandwidth.

4.2.2. Measuring Instruments and Setting

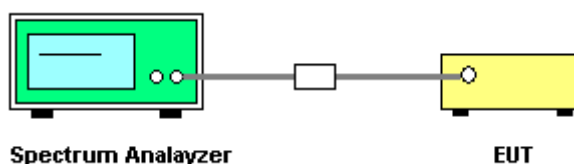
Please refer to section 6 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RB	300 kHz
VB	1000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 300 kHz and the video bandwidth of 1000 kHz were used.
3. Measured the spectrum width with power higher than 26dB below carrier.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There are no deviations with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.



4.2.7. Test Result of 99% Occupied Bandwidth

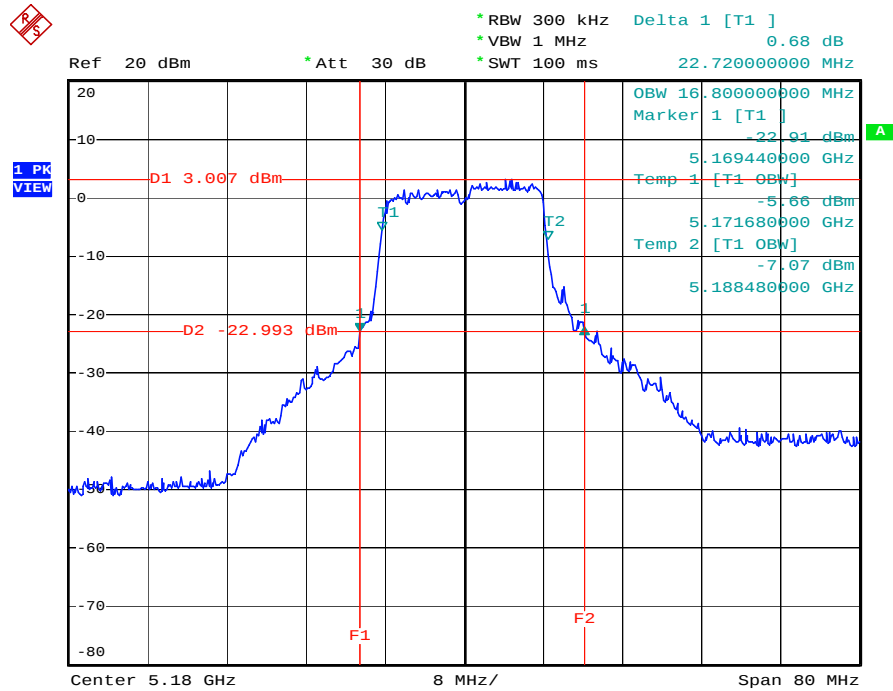
Temperature	20°C	Humidity	70%
Test Engineer	Eason Lu	Configurations	802.11a

Configuration IEEE 802.11a

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	22.72	16.80
52	5260 MHz	21.76	16.80
64	5320 MHz	21.44	16.80
149	5745 MHz	26.40	16.96
157	5785 MHz	21.60	16.80
161	5805 MHz	22.08	16.80

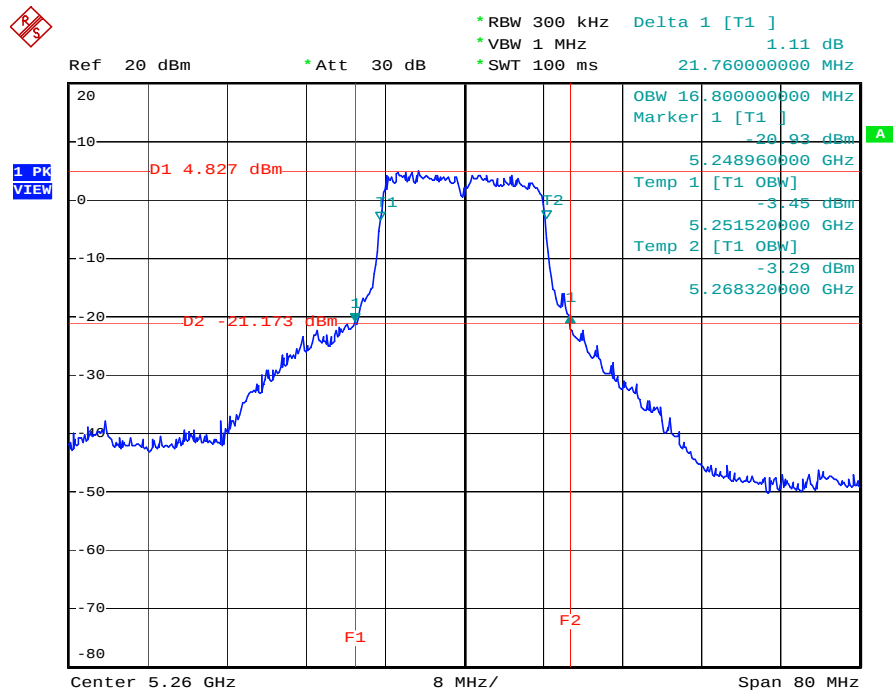


26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5180 MHz



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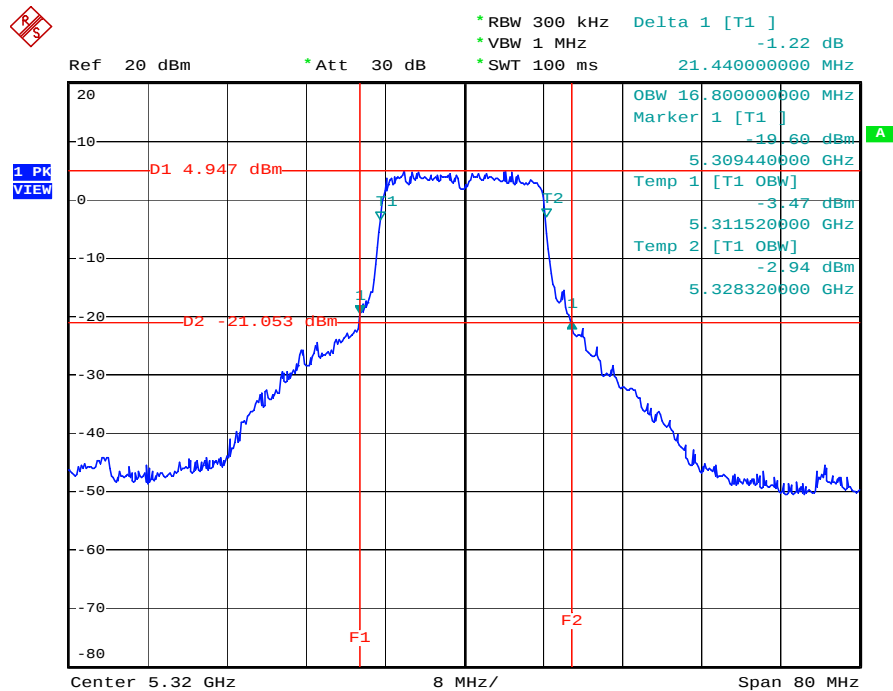
26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5260 MHz



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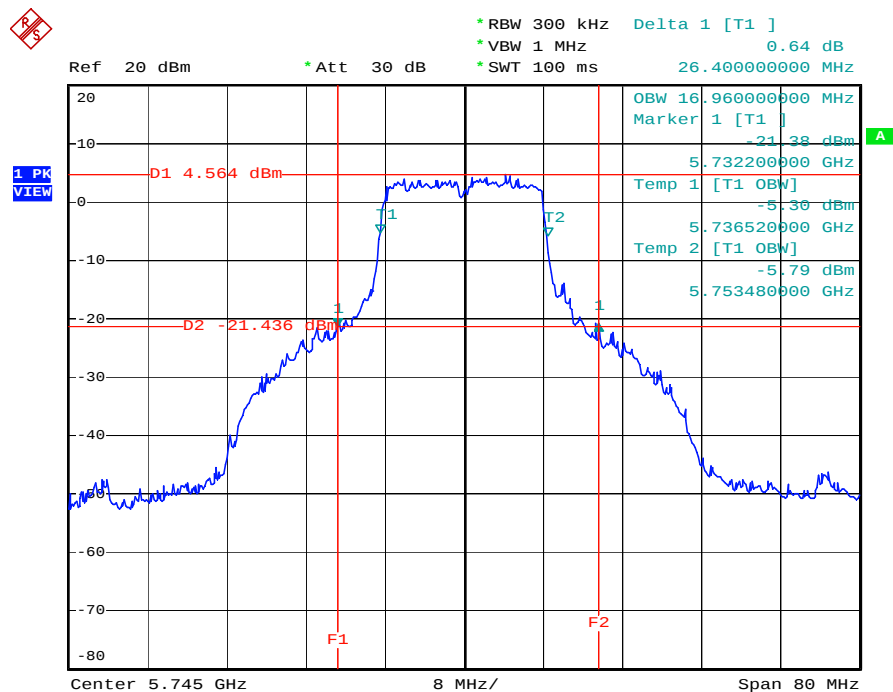


26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5320 MHz



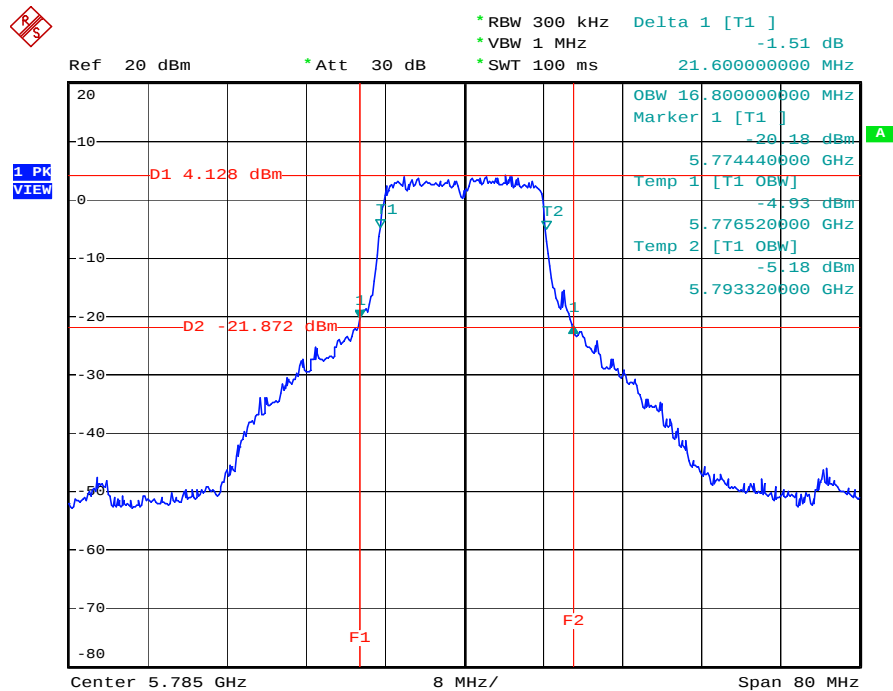
Date: 14.SEP.2005 10:17:42

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5745 MHz



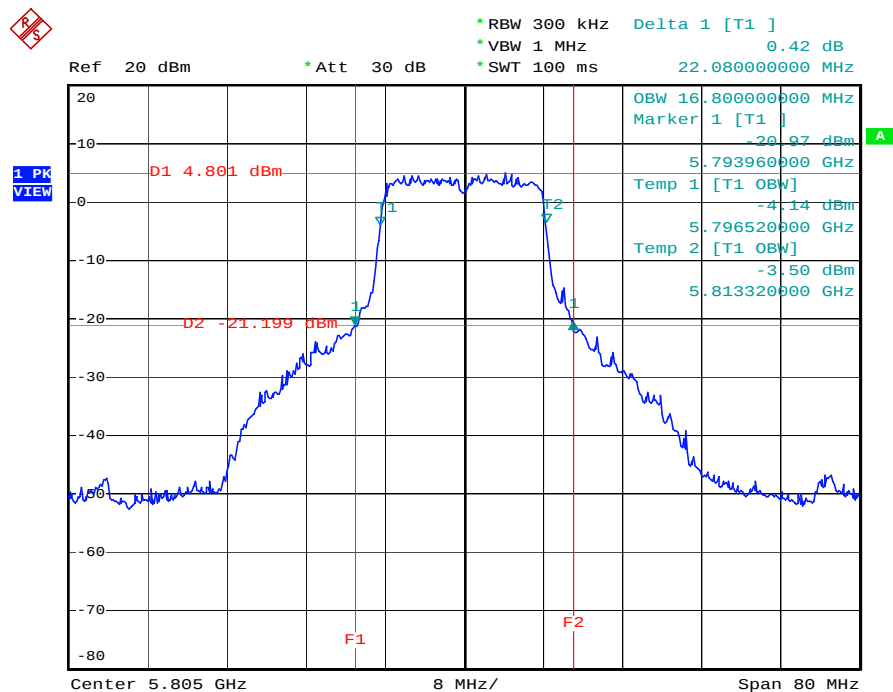
Date: 14.SEP.2005 10:19:05

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5785 MHz



Date: 14.SEP.2005 10:20:40

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5805 MHz



Date: 14.SEP.2005 10:22:10



4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

For the band 5.15~5.25 GHz , the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or $4 \text{ dBm} + 10\log B$, where B is the 26 dB emissions bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW (24dBm) or $11 \text{ dBm} + 10\log B$. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W (30dBm) or $17 \text{ dBm} + 10\log B$. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain up to 23 dBi without any corresponding reduction in the transmitter peak output power or peak power spectral density. For fixed, point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in peak transmitter power and peak power spectral density for each 1 dB of antenna gain in excess of 23 dBi would be required.

4.3.2. Measuring Instruments and Setting

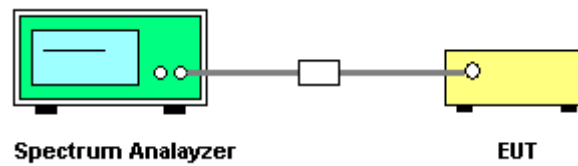
Please refer to section 6 in this report. The following table is the setting of the spectrum.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	300 kHz
Detector	Sample
Trace	Max Hold
Sweep Time	60s

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with method #3 of FCC Public Notice DA-02-2138.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There are no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

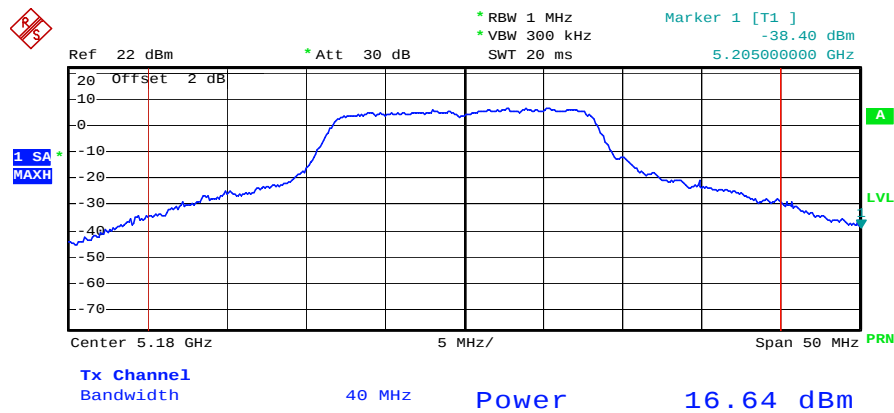
4.3.7. Test Result of Maximum Conducted Output Power

Temperature	20°C	Humidity	70%
Test Engineer	Eason Lu	Configurations	802.11a

Configuration IEEE 802.11a

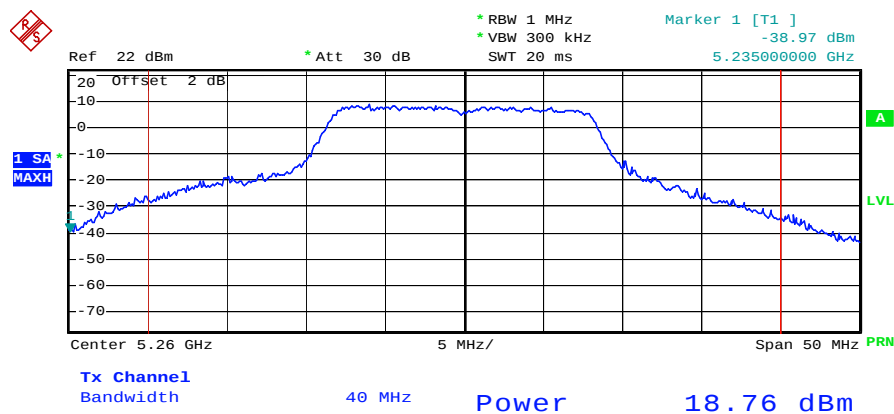
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	16.64	17.00	Complies
52	5260 MHz	18.76	24.00	Complies
64	5320 MHz	18.57	24.00	Complies
149	5745 MHz	18.35	30.00	Complies
157	5785 MHz	18.24	30.00	Complies
161	5805 MHz	18.65	30.00	Complies

Channel Output Power Plot on Configuration IEEE 802.11a / 5180 MHz



Date: 14.SEP.2005 10:53:29

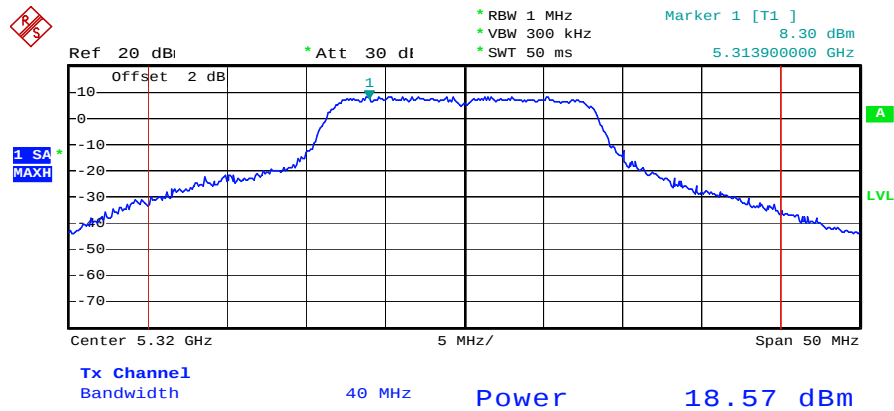
Channel Output Power Plot on Configuration IEEE 802.11a / 5260 MHz



Date: 14.SEP.2005 10:55:28

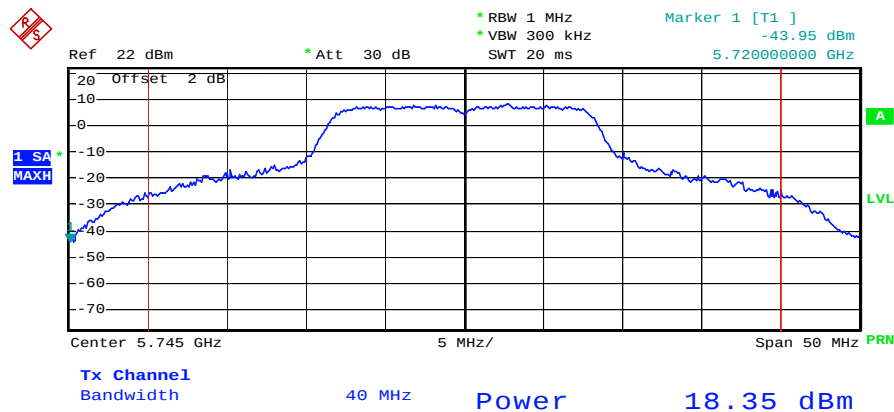


Channel Output Power Plot on Configuration IEEE 802.11a / 5320 MHz



Date: 14.SEP.2005 10:18:24

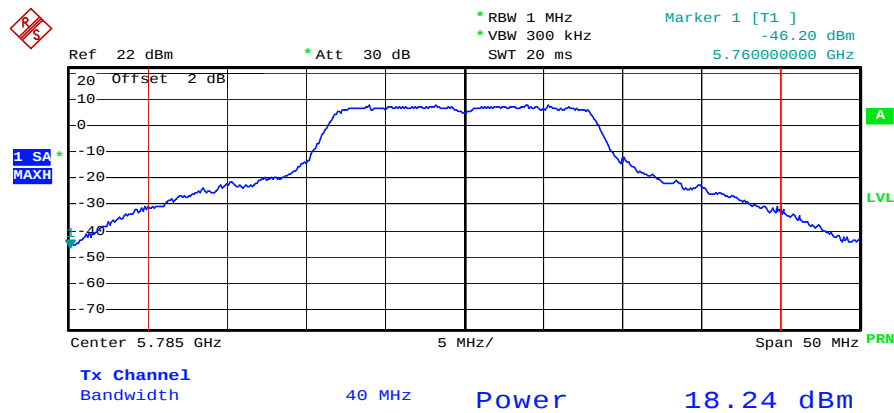
Channel Output Power Plot on Configuration IEEE 802.11a / 5745 MHz



Date: 14.SEP.2005 10:57:37

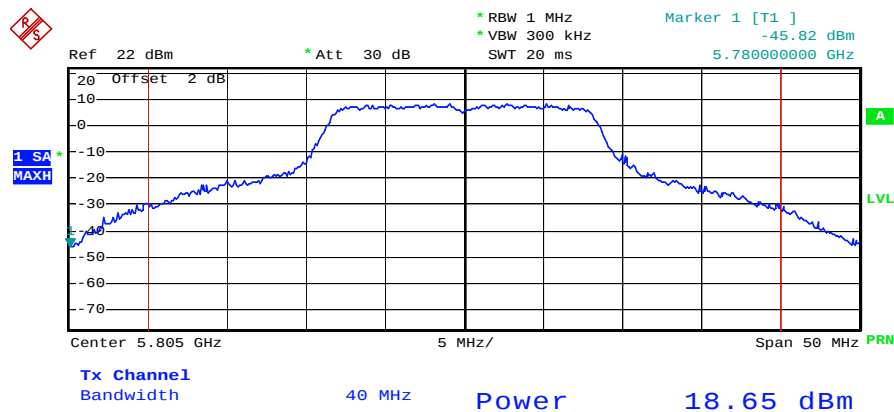


Channel Output Power Plot on Configuration IEEE 802.11a / 5785 MHz



Date: 14.SEP.2005 10:59:09

Channel Output Power Plot on Configuration IEEE 802.11a / 5805 MHz



Date: 14.SEP.2005 11:00:38

4.4. Power Spectral Density Measurement

4.4.1. Limit

The power spectral density is defined as the highest level of power in dBm per MHz generated by the transmitter within the power envelope. The following table is power spectral density limits.

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.15~5.25 GHz	4
5.25-5.35 GHz	11
5.725-5.825	17

4.4.2. Measuring Instruments and Setting

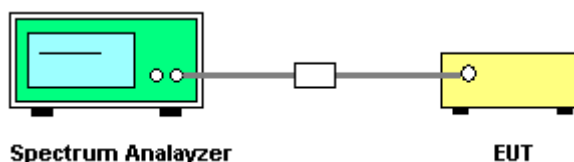
Please refer to section 6 in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 1000kHz and VBW to 3000kHz. Set Detector to Peak, Trace to Max Hold. Mark the frequency with maximum peak power as the center of the display of the spectrum.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There are no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Power Spectral Density

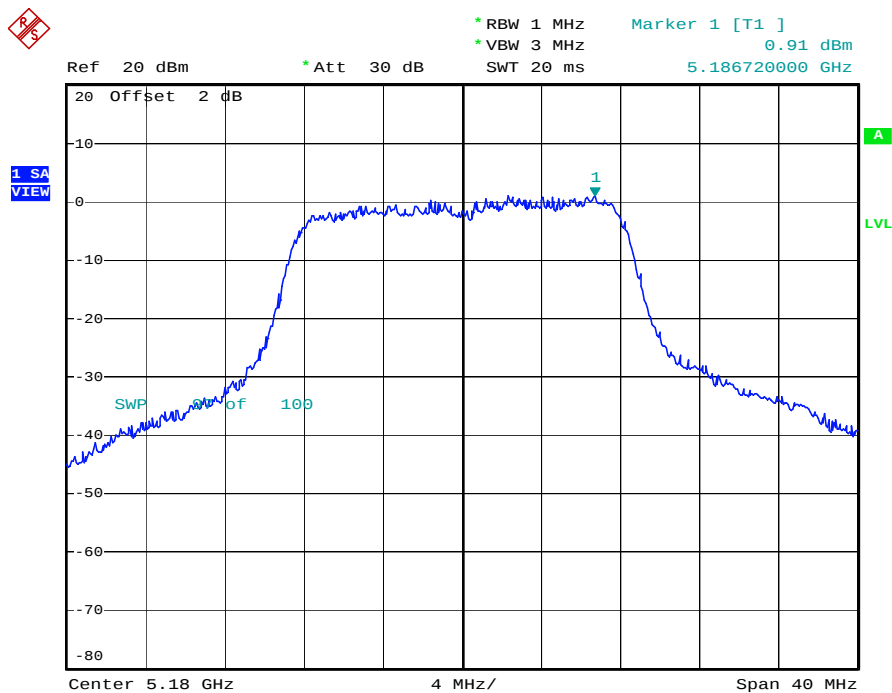
Temperature	20°C	Humidity	70%
Test Engineer	Eason Lu	Configurations	802.11b/g

Configuration IEEE 802.11a

Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
5180 MHz	0.91	4.00	Complies
5260 MHz	3.44	11.00	Complies
5320 MHz	3.56	11.00	Complies
5745 MHz	3.40	17.00	Complies
5785 MHz	2.18	17.00	Complies
5805 MHz	4.26	17.00	Complies

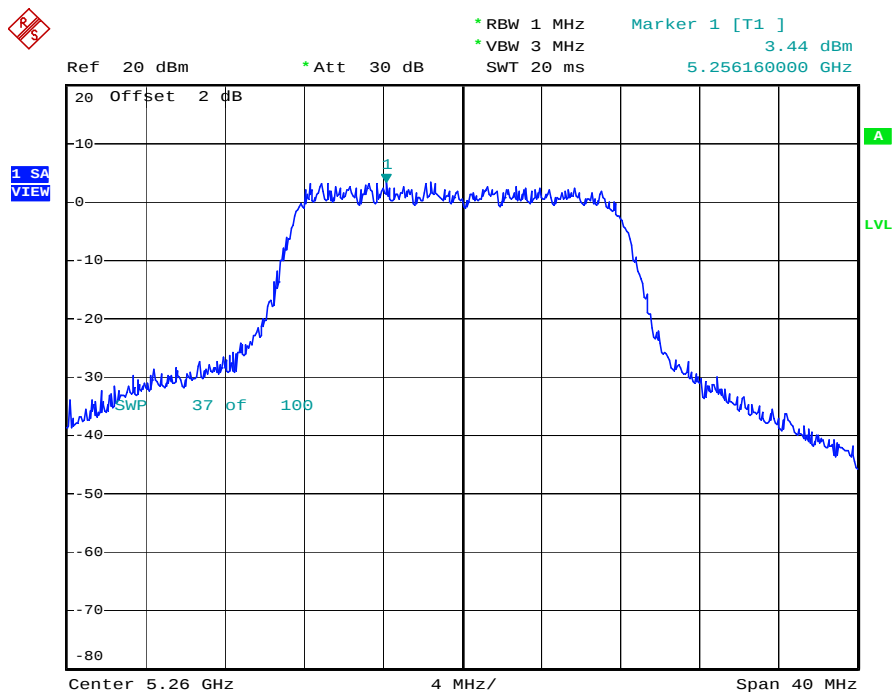


Power Density Plot on Configuration IEEE 802.11a / 5180 MHz



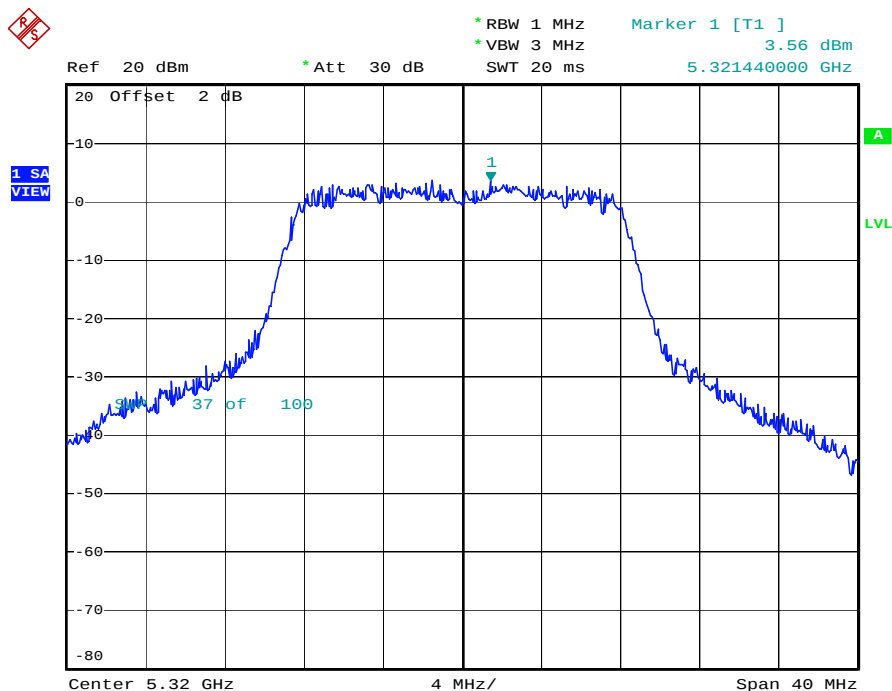
Date: 14.SEP.2005 10:14:01

Power Density Plot on Configuration IEEE 802.11a / 5260 MHz



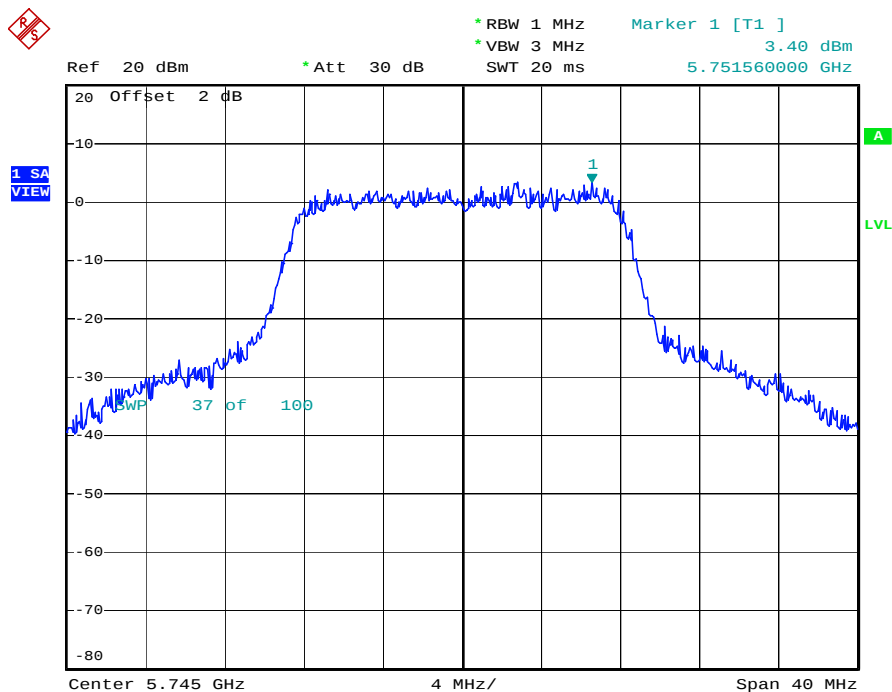
Date: 14.SEP.2005 10:16:19

Power Density Plot on Configuration IEEE 802.11a / 5320 MHz



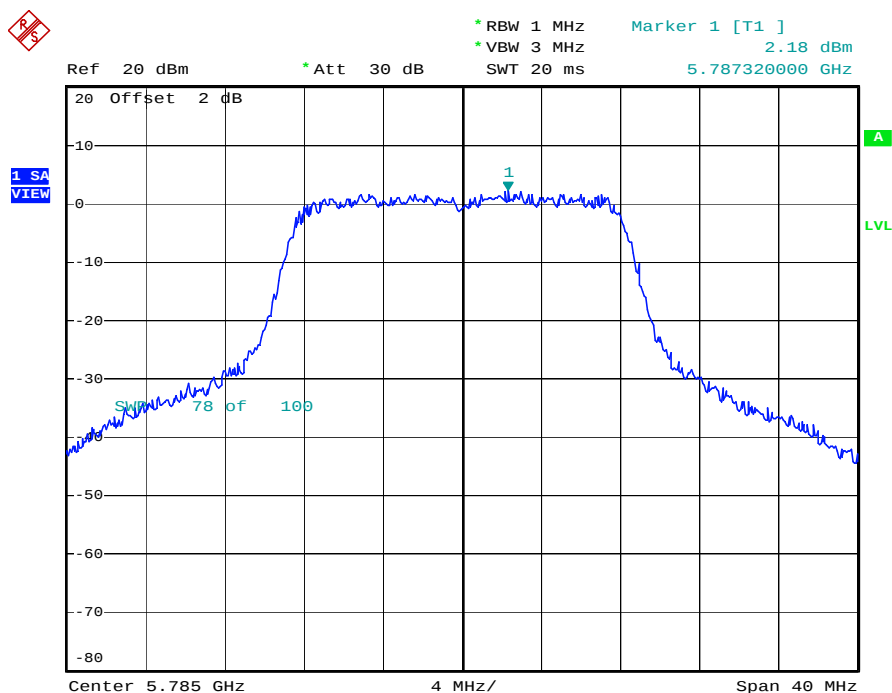
Date: 14.SEP.2005 10:17:49

Power Density Plot on Configuration IEEE 802.11a / 5745 MHz



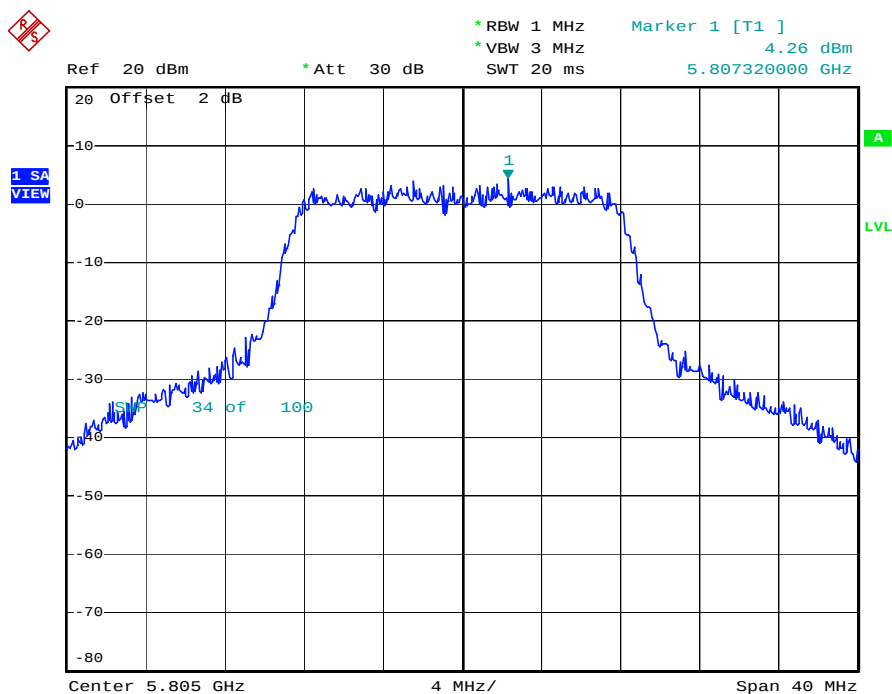
Date: 14.SEP.2005 10:19:11

Power Density Plot on Configuration IEEE 802.11a / 5785 MHz



Date: 14.SEP.2005 10:20:47

Power Density Plot on Configuration IEEE 802.11a / 5805 MHz



Date: 14.SEP.2005 10:22:17

4.5. Peak Excursion Measurement

4.5.1. Limit

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emissions bandwidth whichever is less.

4.5.2. Measuring Instruments and Setting

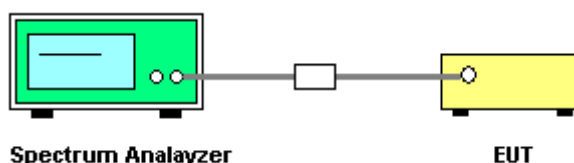
Please refer to section 6 in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz (Peak Trace) / 1000 kHz (Average Trace)
VB	3000 kHz (Peak Trace) / 300 kHz (Average Trace)
Detector	Peak (Peak Trace) / Sample (Average Trace)
Trace	Max Hold
Sweep Time	60s

4.5.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
2. Set the spectrum analyzer span to view the entire emissions bandwidth. The largest difference between the following two traces (Peak Trace and Average Trace) must be ≤ 13 dB for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace: Set RBW = 1 MHz, VBW ≥ 3 MHz with peak detector and maxhold settings.
4. Average Trace: Method #3—video averaging with max hold--and sum power across the band. Set span to encompass the entire emissions bandwidth (EBW) of the signal. Set sweep trigger to "free run". Set RBW = 1 MHz. Set VBW $\geq 1/T$ (IEEE 802.11a VBW = 300kHz $\geq 1/4 \mu$ s). Use sample detector mode if bin width (i.e., span/number of points in spectrum) < 0.5 RBW. Otherwise use peak detector mode. Set max hold. Allow max hold to run for 60 seconds.

4.5.4. Test Setup Layout



4.5.5. Test Deviation

There are no deviation with the original standard.



4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Peak Excursion

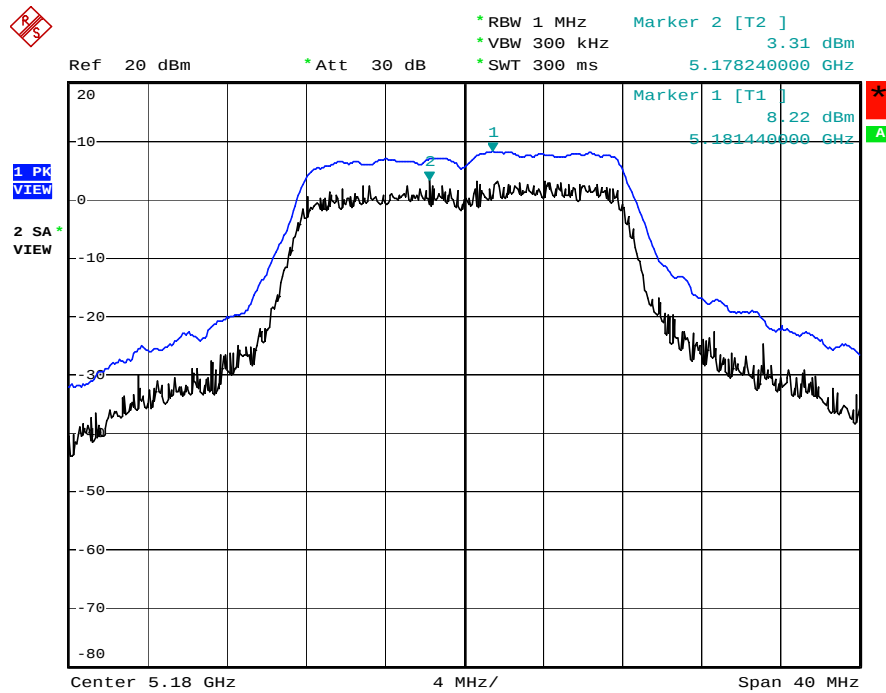
Temperature	20°C	Humidity	70%
Test Engineer	Eason Lu	Configurations	802.11b/g

Configuration IEEE 802.11a

Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
5180 MHz	4.91	13	Complies
5260 MHz	4.87	13	Complies
5320 MHz	5.00	13	Complies
5745 MHz	4.42	13	Complies
5785 MHz	4.38	13	Complies
5805 MHz	4.54	13	Complies

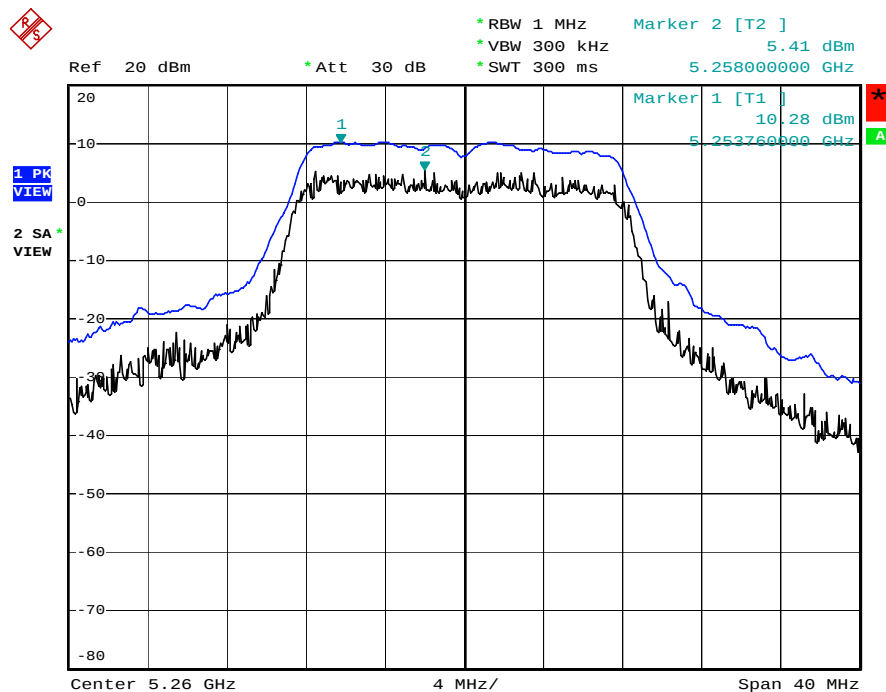


Peak Excursion Plot on Configuration IEEE 802.11a / 5180 MHz



Date: 14.SEP.2005 10:14:48

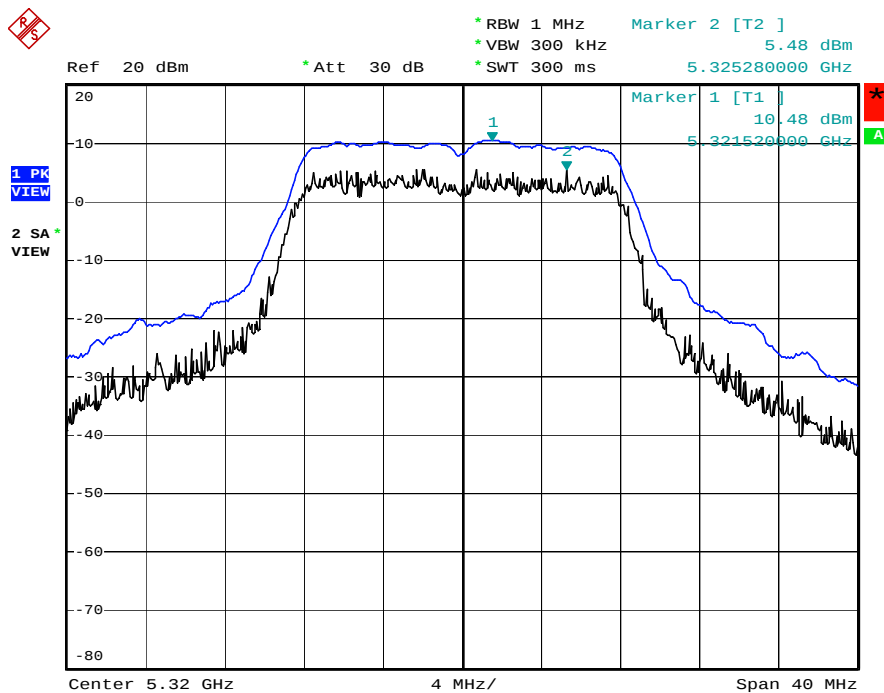
Peak Excursion Plot on Configuration IEEE 802.11a / 5260 MHz



Date: 14.SEP.2005 10:17:06

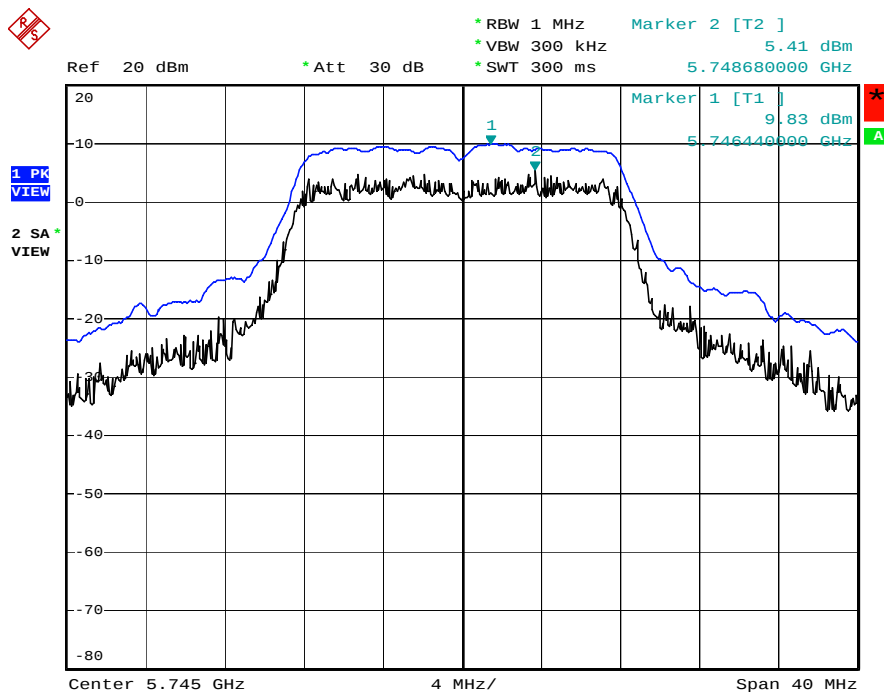


Peak Excursion Plot on Configuration IEEE 802.11a / 5320 MHz



Date: 14.SEP.2005 10:18:36

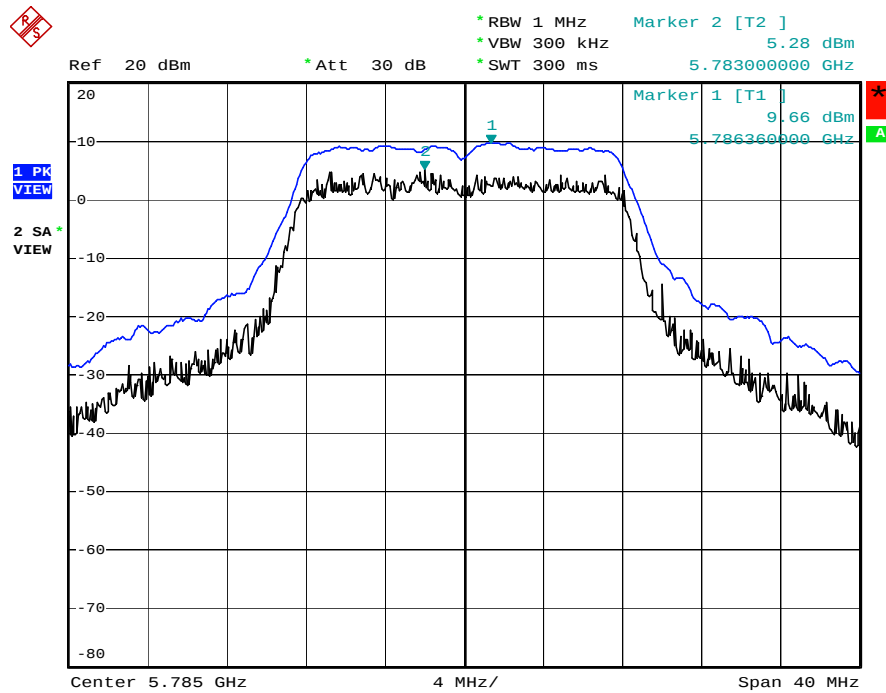
Peak Excursion Plot on Configuration IEEE 802.11a / 5745 MHz



Date: 14.SEP.2005 10:19:59

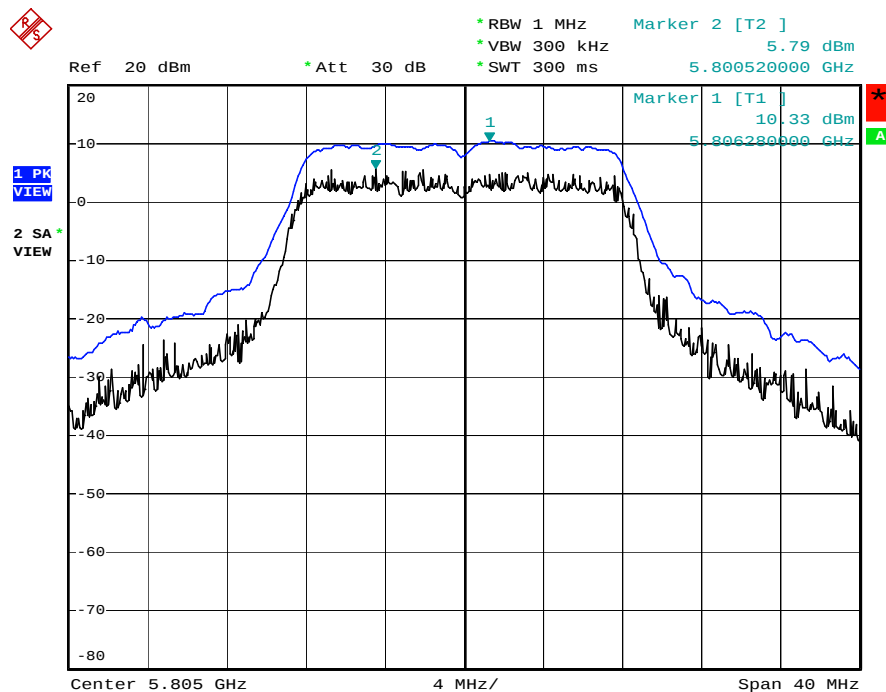


Peak Excursion Plot on Configuration IEEE 802.11a / 5785 MHz



Date: 14.SEP.2005 10:21:34

Peak Excursion Plot on Configuration IEEE 802.11a / 5805 MHz



Date: 14.SEP.2005 10:23:04

4.6. Radiated Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.6.2. Measuring Instruments and Setting

Please refer to section 6 in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	100KHz / 100KHz for peak

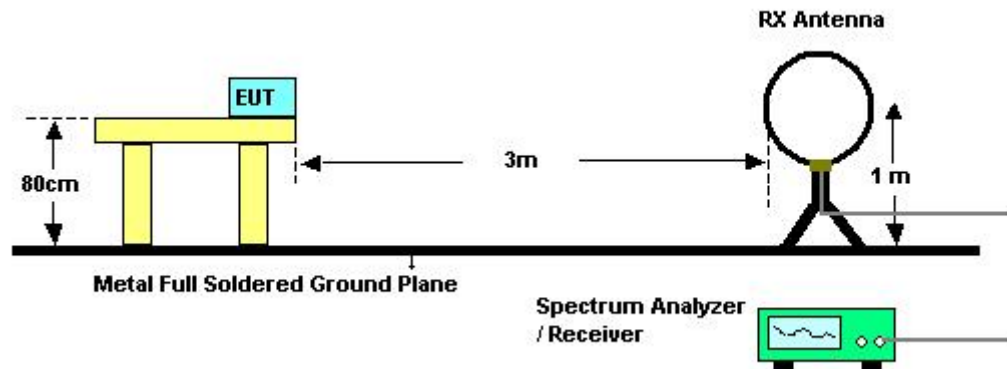
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.6.3. Test Procedures

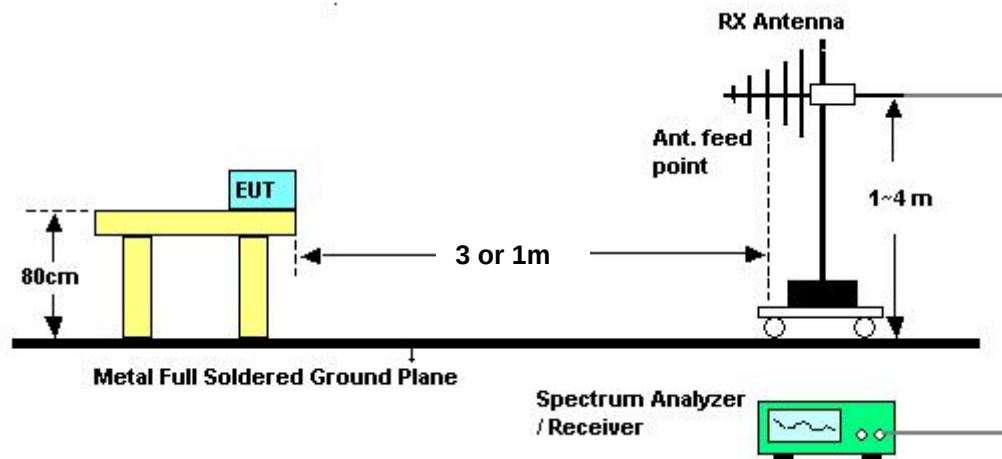
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.6.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

4.6.5. Test Deviation

There are no deviations with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	802.11a channel 64

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

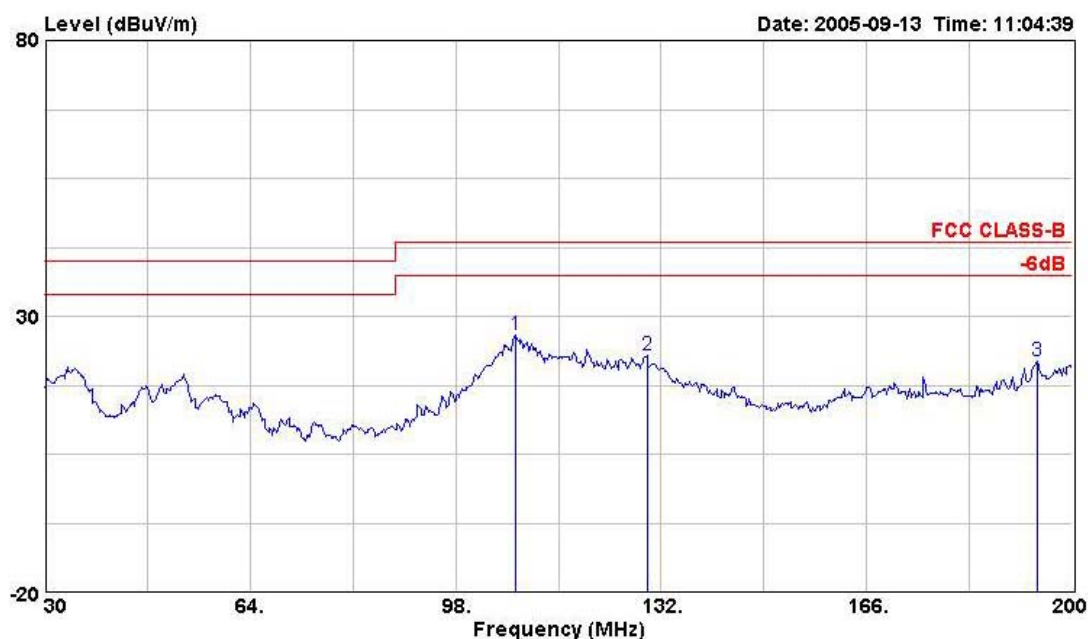
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

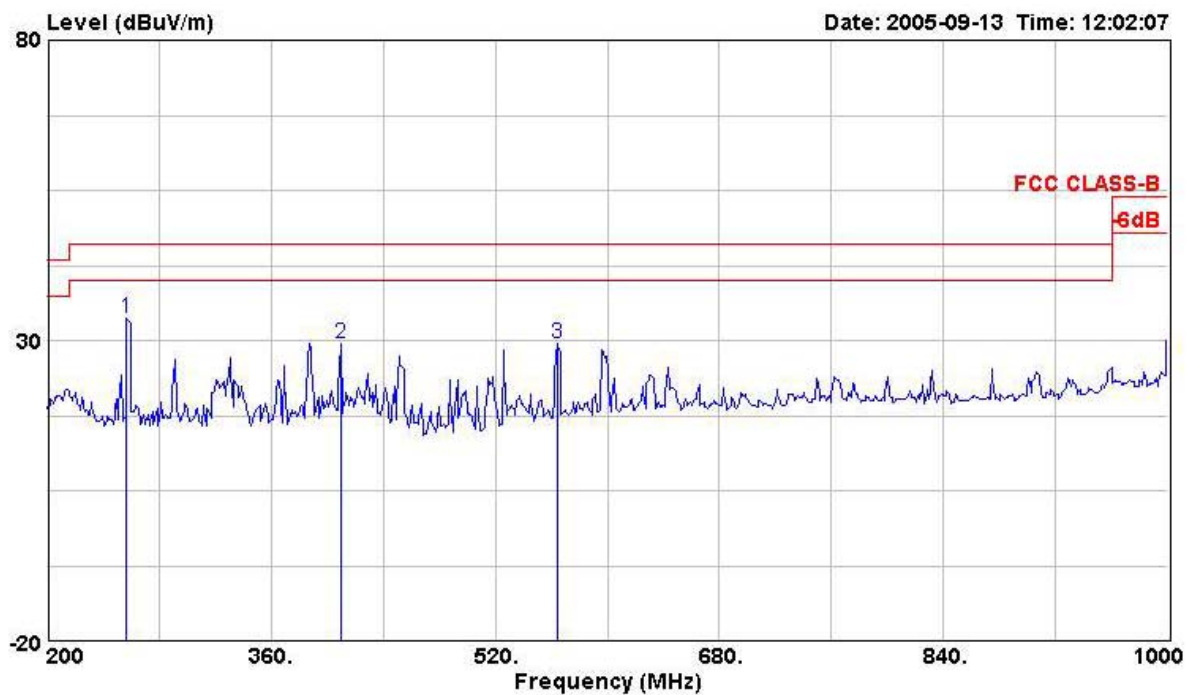
4.6.8. Results of Radiated Emissions (30MHz~1GHz)

Test Mode	802.11a / ch 64		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick

Horizontal

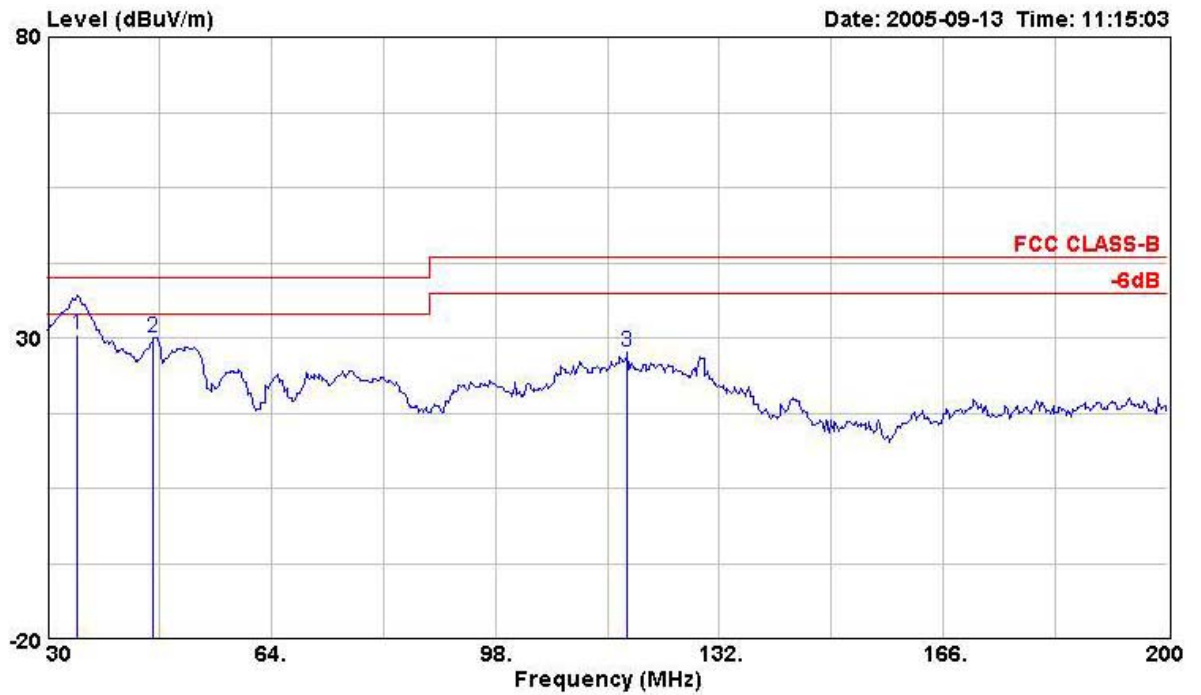


	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	107.860	26.67	-16.83	45.90	43.50	1.01	10.12	30.36	Peak	---	---
2	129.620	22.83	-20.67	40.03	43.50	1.13	12.32	30.65	Peak	---	---
3	194.220	21.92	-21.58	35.85	43.50	1.30	15.33	30.56	Peak	---	---

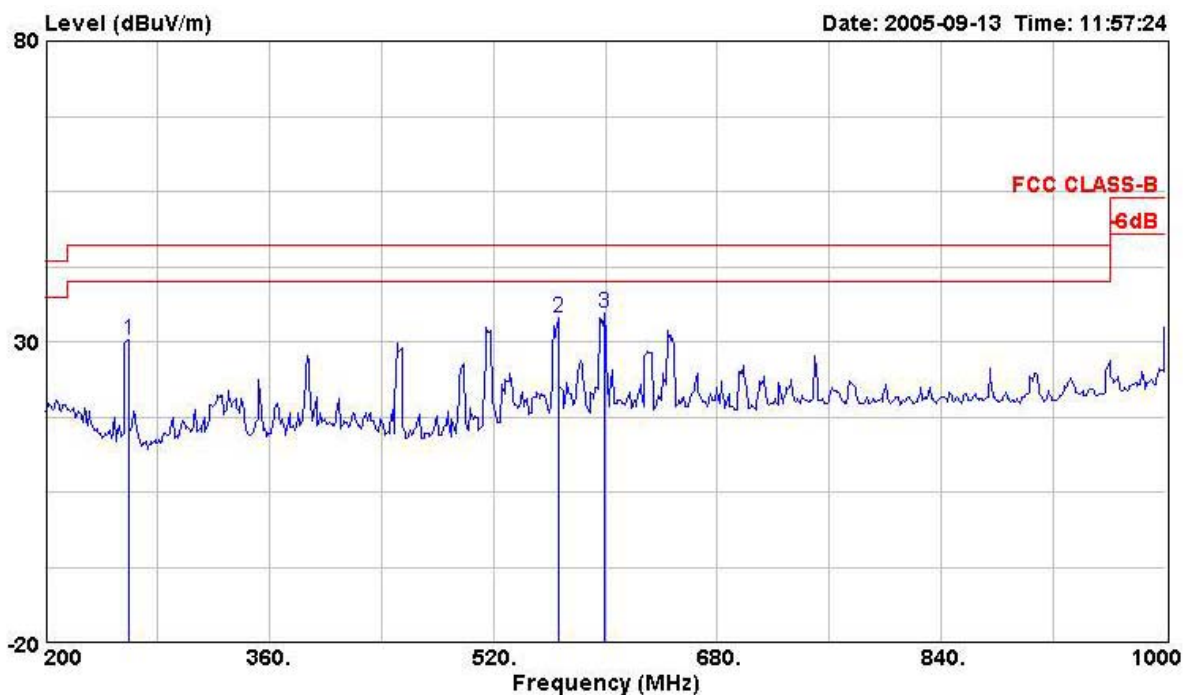


	Freq	Level	Over Limit	Read Level	Limit Line	CableAntenna Loss Factor	Preampl Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1 @	256.800	33.68	-12.32	49.81	46.00	1.59	12.52	30.24 Peak	---	---
2 @	409.600	29.48	-16.52	41.69	46.00	1.96	16.72	30.89 Peak	---	---
3 @	564.000	29.37	-16.63	39.42	46.00	2.29	18.81	31.15 Peak	---	---

Vertical



	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	34.590	30.41	-9.59	48.39	40.00	0.55	11.98	30.51	QP	---
2	46.150	30.13	-9.87	47.54	40.00	0.66	12.16	30.23	Peak	---
3	118.060	27.54	-15.96	45.13	43.50	1.07	11.62	30.28	Peak	---



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	259.200	30.30	-15.70	46.30	46.00	1.60	12.60	30.19	Peak	---	---
2	566.400	33.83	-12.17	43.76	46.00	2.29	18.92	31.14	Peak	---	---
3	599.200	34.79	-11.21	43.12	46.00	2.40	20.36	31.09	Peak	---	---

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

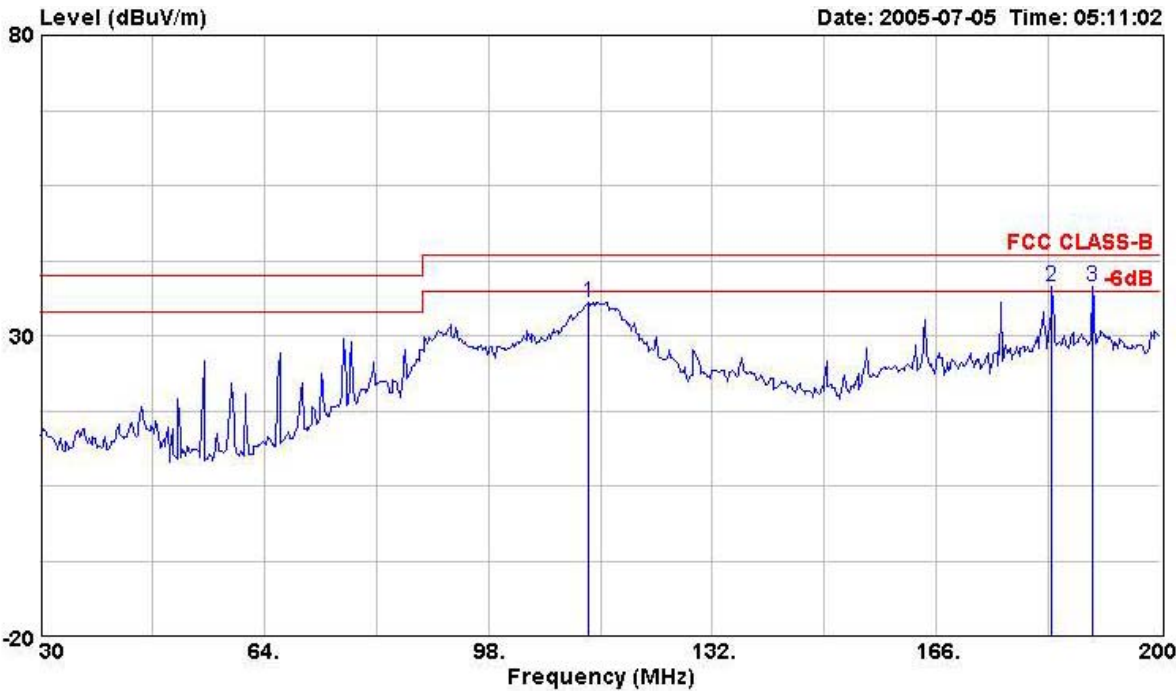
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Pol. : V is Vertical Polarization ; H is Horizontal Polarization.

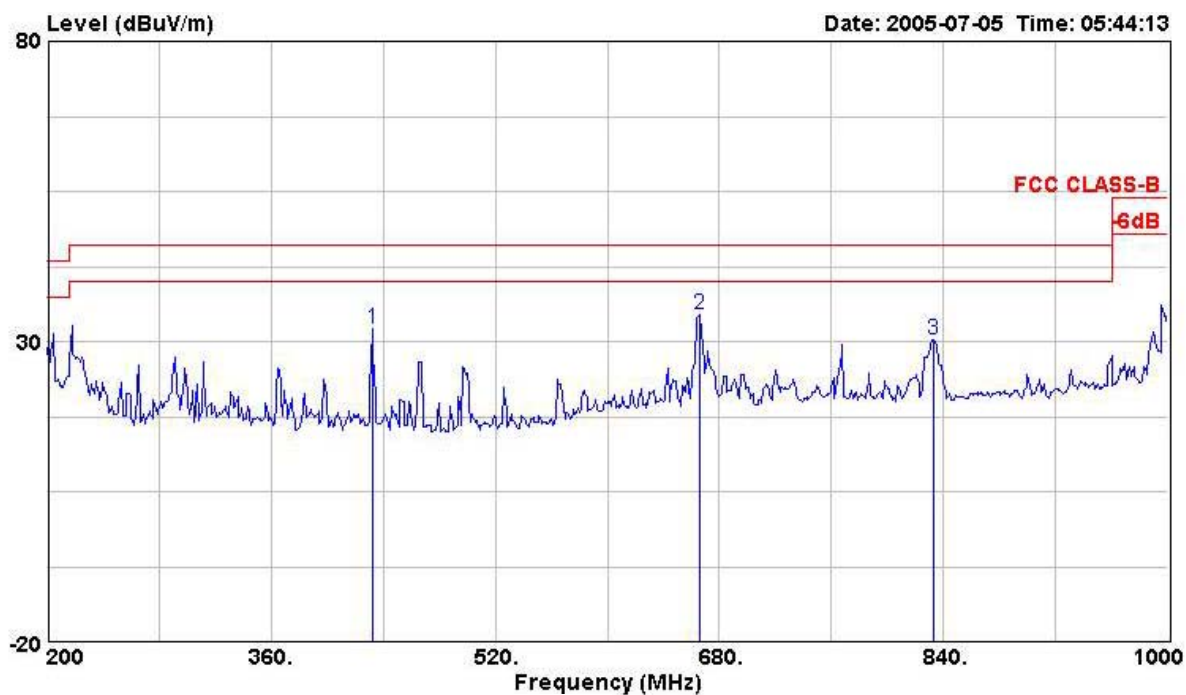


Test Mode	802.11a / ch 64		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN type

Horizontal

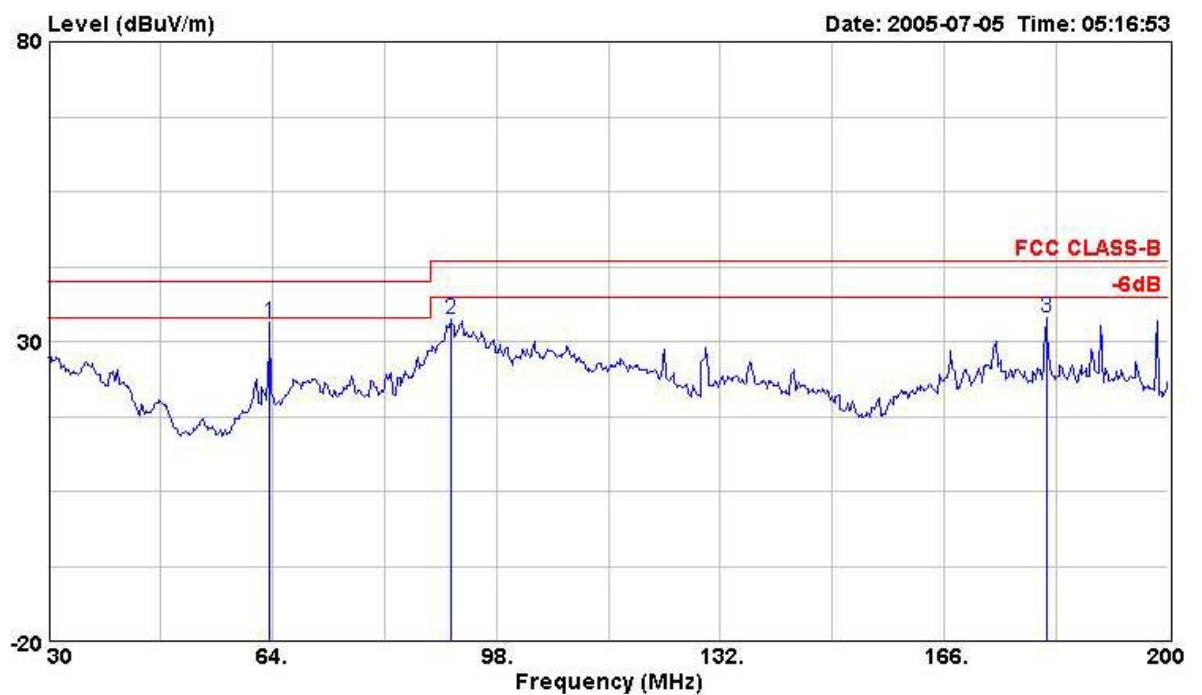


	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Table	Ant
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB	deg	cm
1	113.300	35.63	-7.87	53.93	43.50	1.05	10.93	30.29	Peak	---
2	183.510	38.16	-5.34	52.46	43.50	1.27	14.48	30.05	Peak	---
3	189.630	38.13	-5.37	51.99	43.50	1.27	14.97	30.10	Peak	---

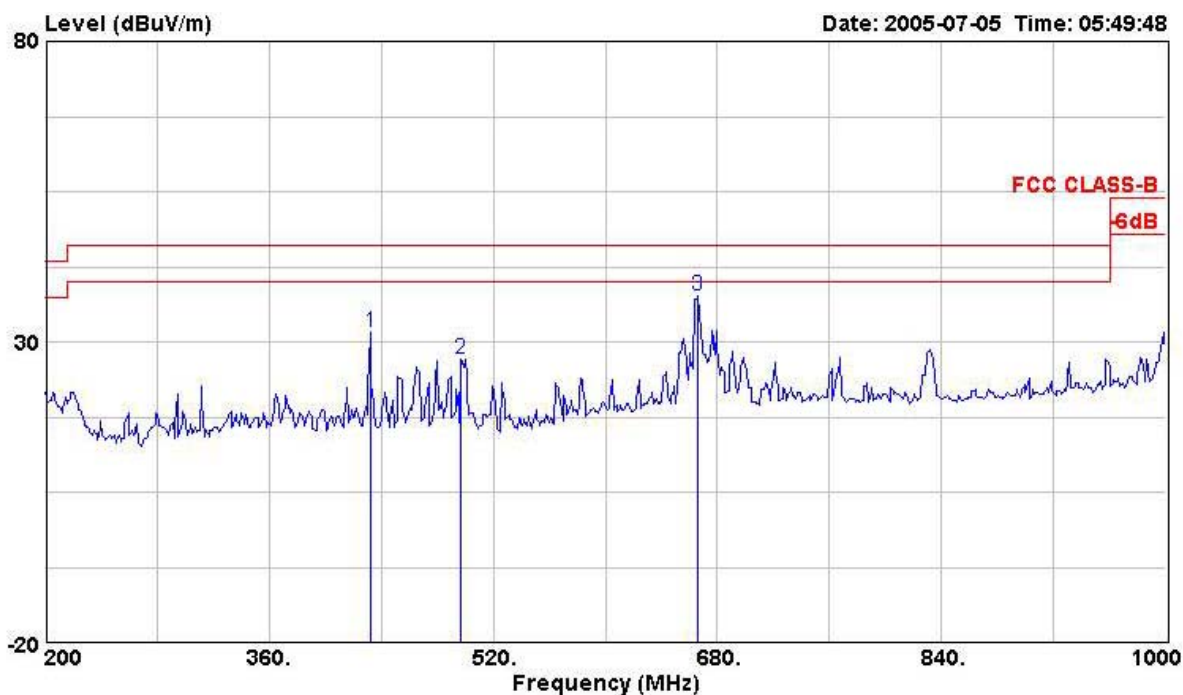


	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Table	Ant
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	deg	cm
1	432.000	32.19	-13.81	44.27	46.00	2.04	16.54	30.66	Peak	---
2	665.600	34.47	-11.53	41.90	46.00	2.52	20.60	30.54	Peak	---
3	832.800	30.35	-15.65	36.05	46.00	2.88	21.83	30.41	Peak	---

Vertical



	Freq	Level	Over Limit	Read Level	Limit Line	CableAntenna Loss Factor	Preamp Factor	Remark	Table Pos	Ant Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	deg	cm
1	63.660	33.16	-6.84	52.65	40.00	0.81	10.24	30.54	Peak	---
2	91.030	33.59	-9.91	53.62	43.50	0.91	8.55	29.49	Peak	---
3	181.470	33.96	-9.54	48.41	43.50	1.27	14.31	30.03	Peak	---



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Table	Ant
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		deg	cm
1	432.000	31.52	-14.48	43.60	46.00	2.04	16.54	30.66	Peak	---	---
2	496.800	27.24	-18.76	39.82	46.00	2.17	16.03	30.78	Peak	---	---
3	666.400	37.65	-8.35	45.08	46.00	2.52	20.60	30.54	Peak	---	---

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

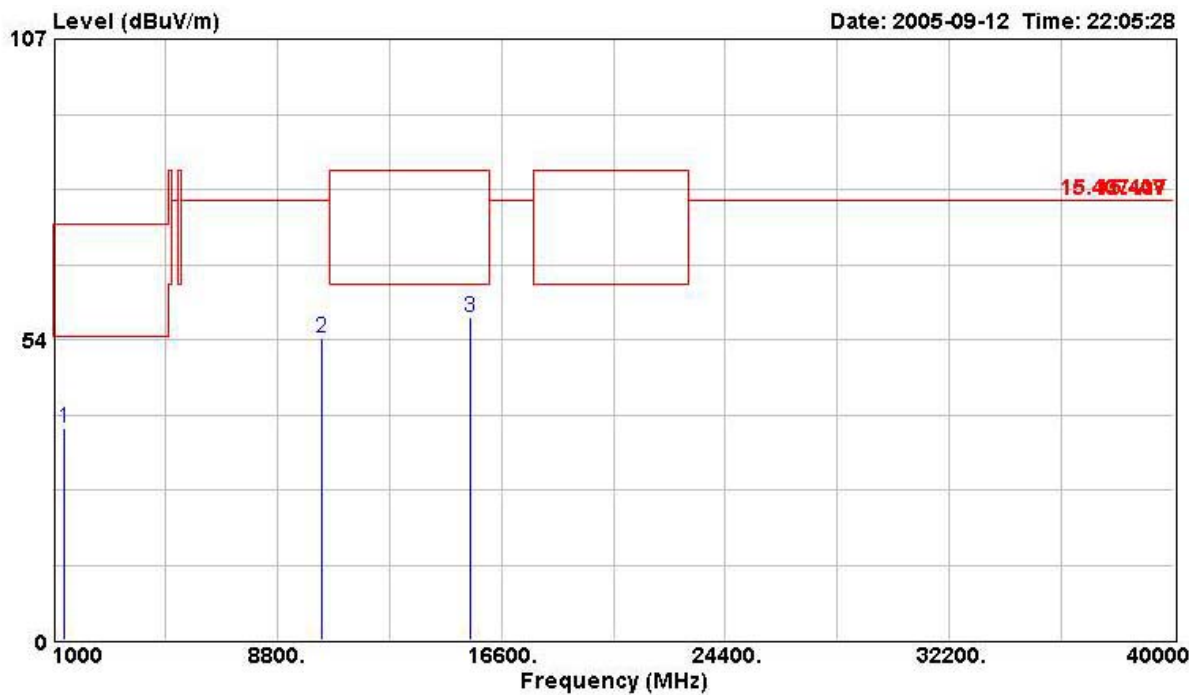
Pol. : V is Vertical Polarization ; H is Horizontal Polarization.



4.6.9. Results for Radiated Emissions (1GHz~40GHz)

Test Mode	802.11a / ch 36		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick

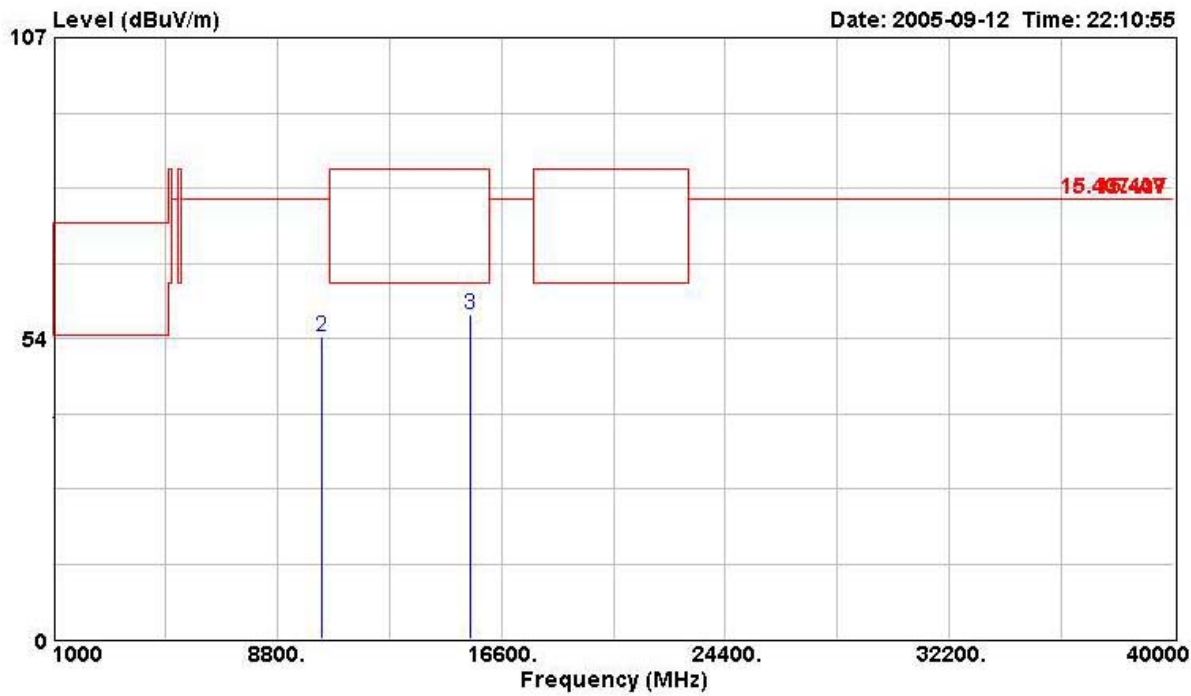
Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1404.000	37.72	-36.28	44.44	74.00	1.41	25.13	33.26	PEAK	---	---
2 @	10360.000	53.65	-24.65	42.37	78.30	5.51	38.93	33.15	PEAK	---	---
3 @	15540.000	57.51	-25.99	45.57	83.50	6.89	37.84	32.79	PEAK	---	---



Vertical

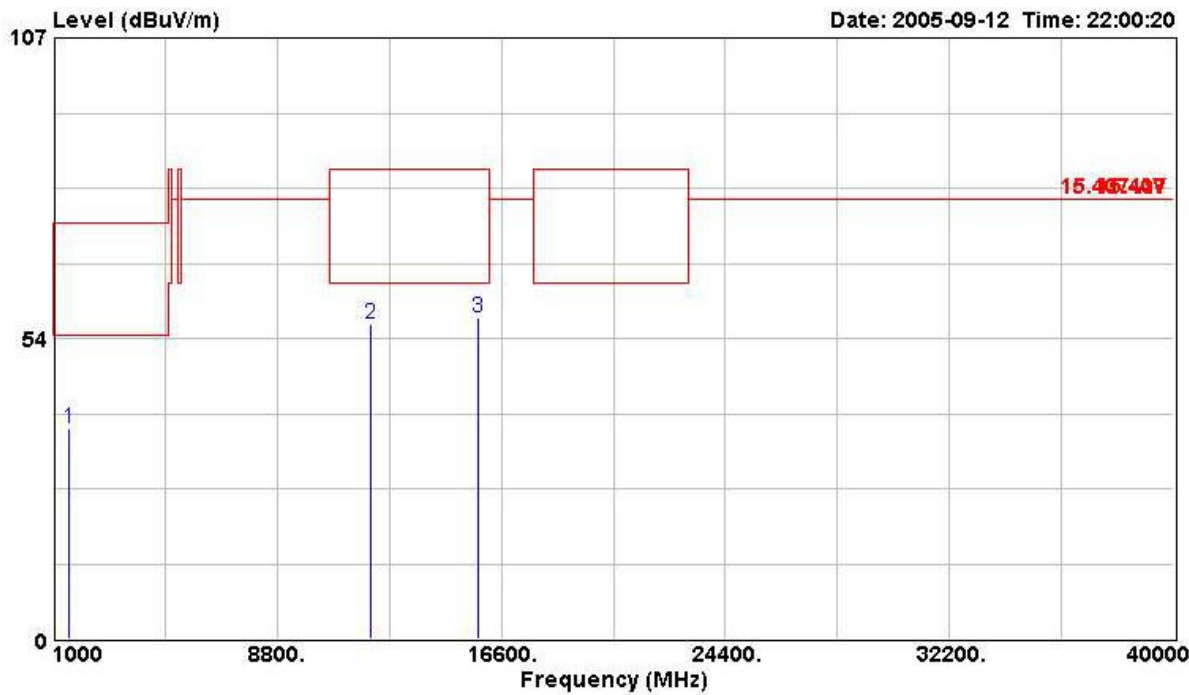


	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1048.000	36.00	-38.00	44.58	74.00	1.03	24.40	34.01	PEAK	---	---
2 @	10360.000	53.93	-24.37	42.64	78.30	5.51	38.93	33.15	PEAK	---	---
3 @	15540.000	57.61	-25.89	45.67	83.50	6.89	37.84	32.79	PEAK	---	---



Test Mode	802.11a / ch 52		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick

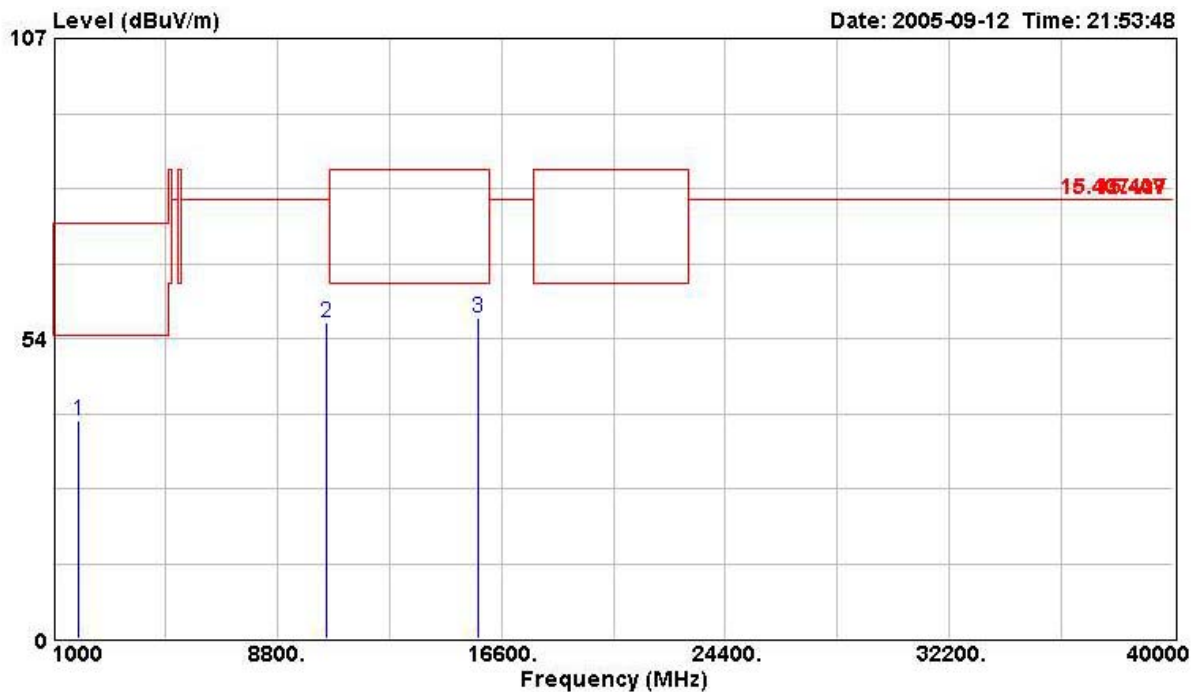
Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1560.000	37.52	-36.48	43.31	74.00	1.62	25.59	33.00	PEAK	---	---
2 @	12052.000	55.91	-27.59	43.51	83.50	5.53	39.25	32.38	PEAK	---	---
3 @	15780.000	57.07	-26.43	45.62	83.50	6.91	37.40	32.87	PEAK	---	---



Vertical

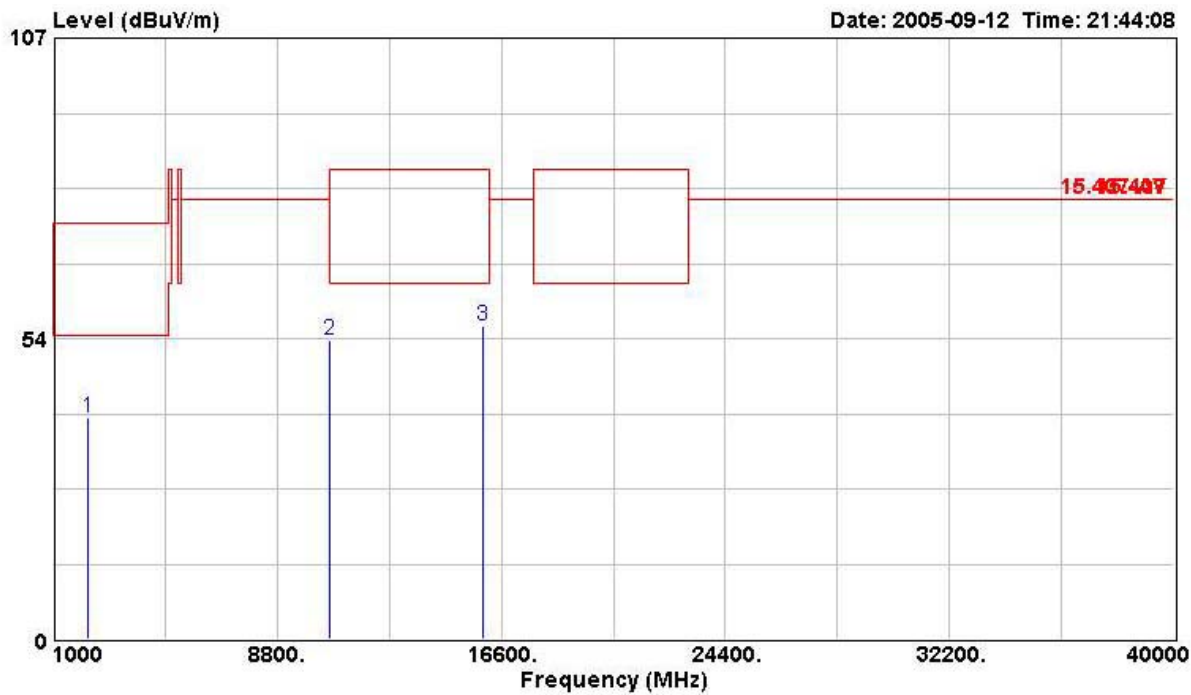


	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1864.000	38.87	-35.13	42.83	74.00	1.90	26.91	32.77	PEAK	---	---
2	10520.000	56.31	-21.99	44.82	78.30	5.61	38.89	33.01	PEAK	---	---
3	15780.000	57.22	-26.28	45.78	83.50	6.91	37.40	32.87	PEAK	---	---



Test Mode	802.11a / ch 64		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick

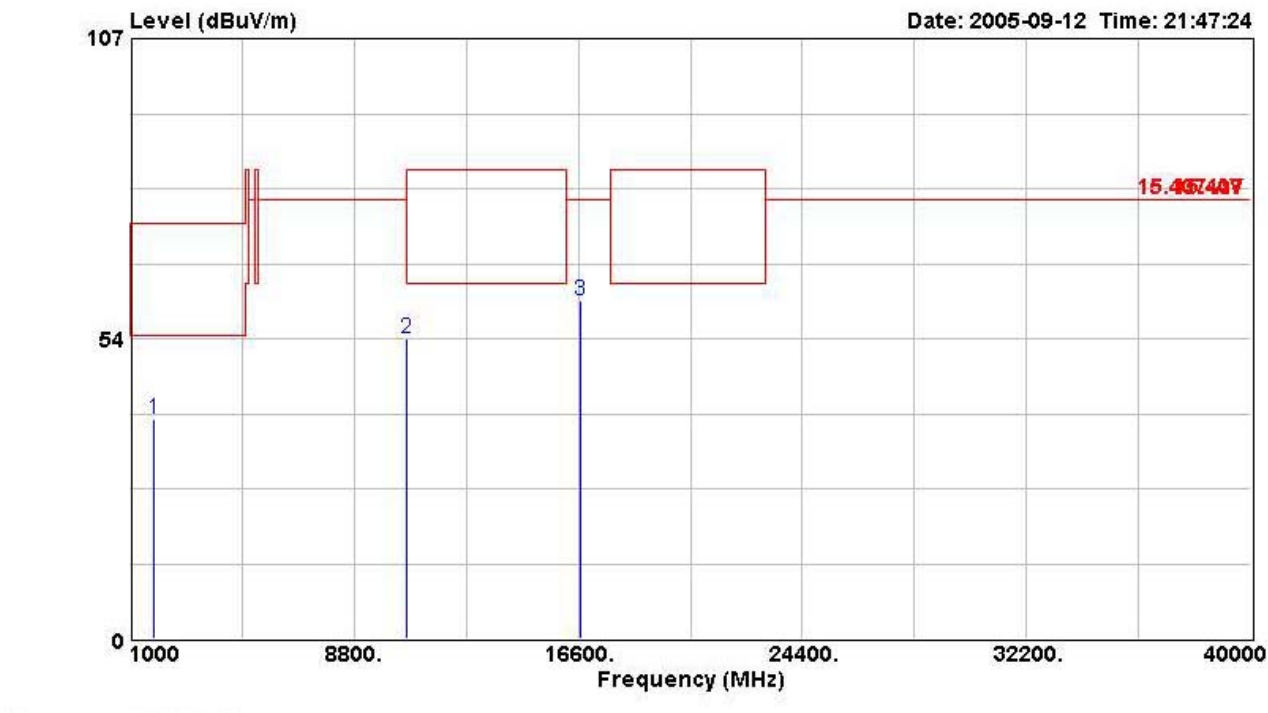
Horizontal



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2192.000	39.35	-34.65	42.23	74.00	2.17	27.84	32.89	PEAK	---	---
2	10640.000	53.33	-30.17	41.74	83.50	5.59	38.82	32.82	PEAK	---	---
3	15960.000	55.67	-27.83	44.62	83.50	6.93	37.06	32.93	PEAK	---	---



Vertical

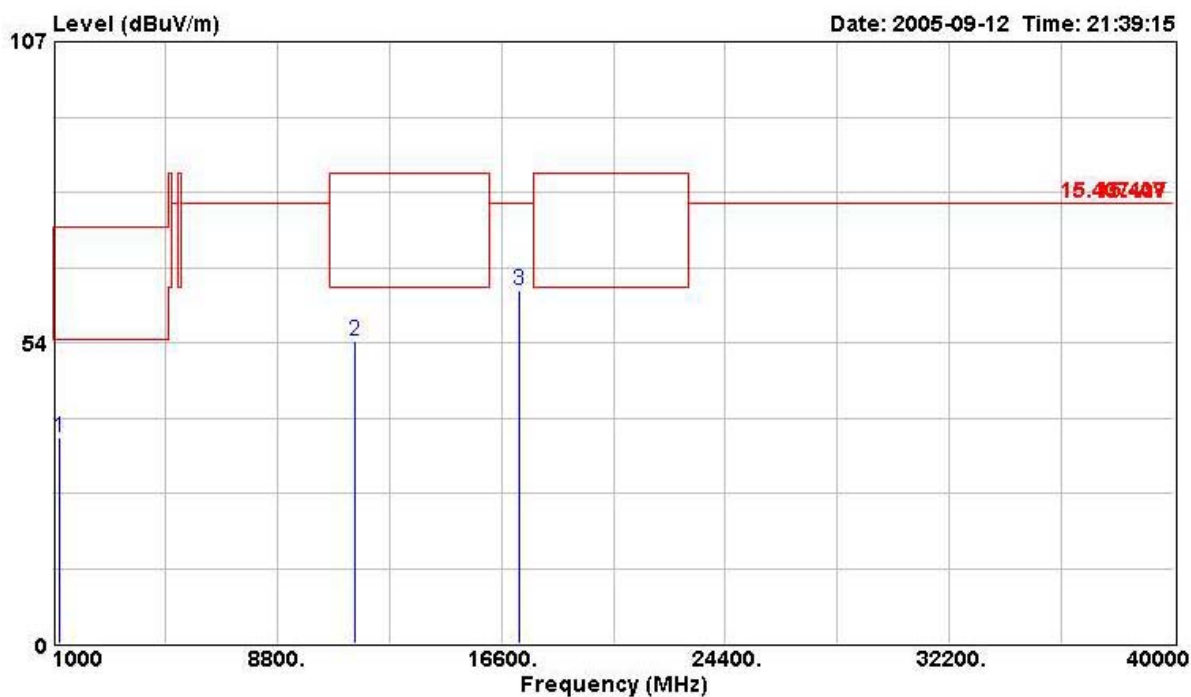


	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1816.000	39.22	-34.78	43.48	74.00	1.86	26.69	32.81	PEAK	---	---
2	10640.000	53.43	-30.07	41.84	83.50	5.59	38.82	32.82	PEAK	---	---
3 0	16690.000	60.27	-18.03	46.52	78.30	7.26	38.77	32.29	PEAK	---	---



Test Mode	802.11a / ch 149		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick

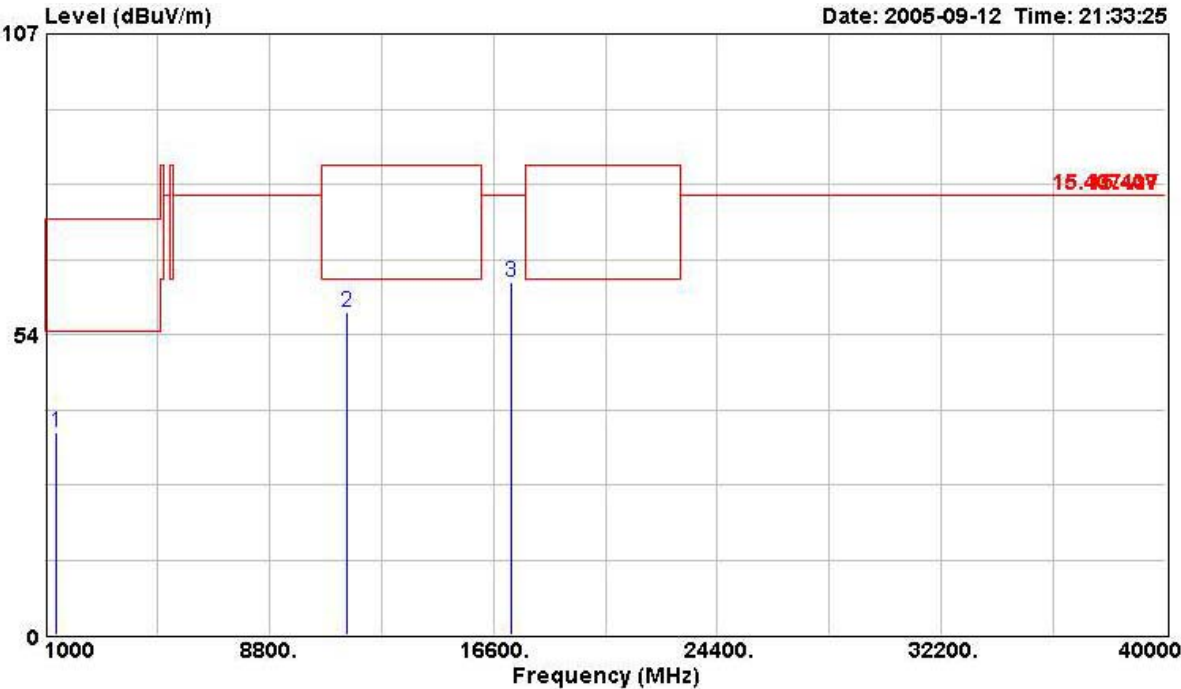
Horizontal



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1240.000	36.65	-37.35	44.26	74.00	1.24	24.78	33.63	PEAK	---	---
2 @	11490.000	53.93	-29.57	41.89	83.50	5.14	39.28	32.38	PEAK	---	---
3 @	17235.000	62.67	-15.63	45.44	78.30	7.31	41.93	32.01	PEAK	---	---



Vertical

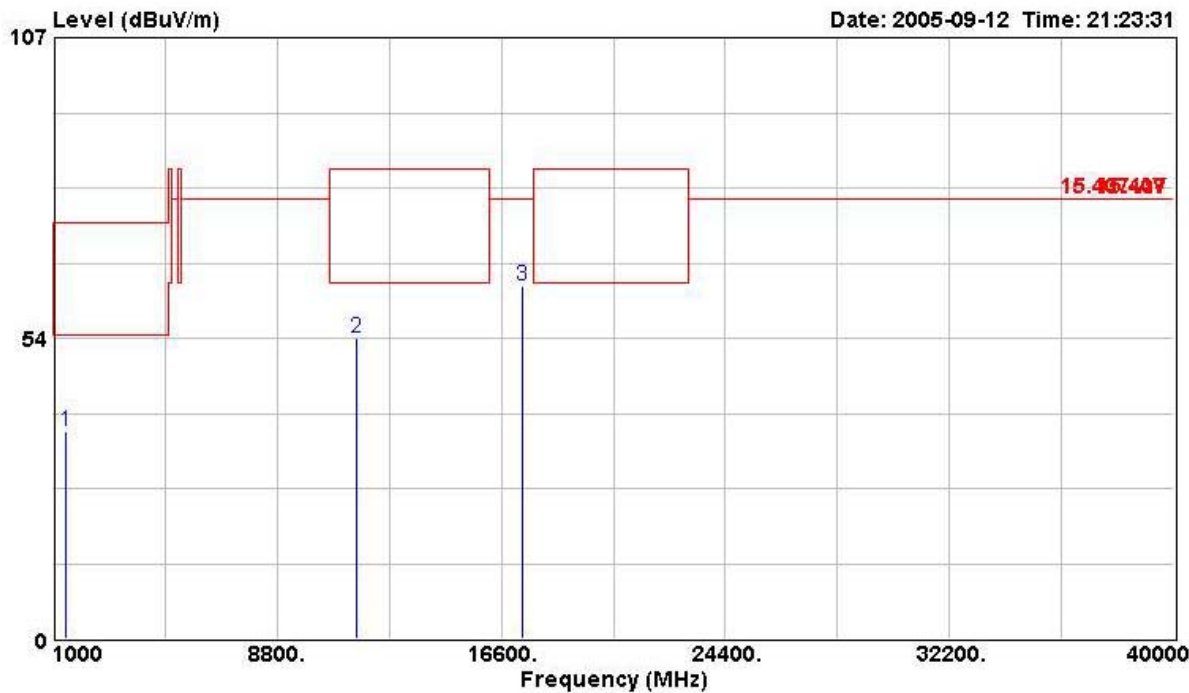


	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1404.000	36.16	-37.84	42.88	74.00	1.41	25.13	33.26	PEAK	---	---
2	11488.000	57.49	-26.01	45.44	83.50	5.14	39.28	32.38	PEAK	---	---
3	17235.000	62.69	-15.61	45.46	78.30	7.31	41.93	32.01	PEAK	---	---



Test Mode	802.11a / ch 157		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick

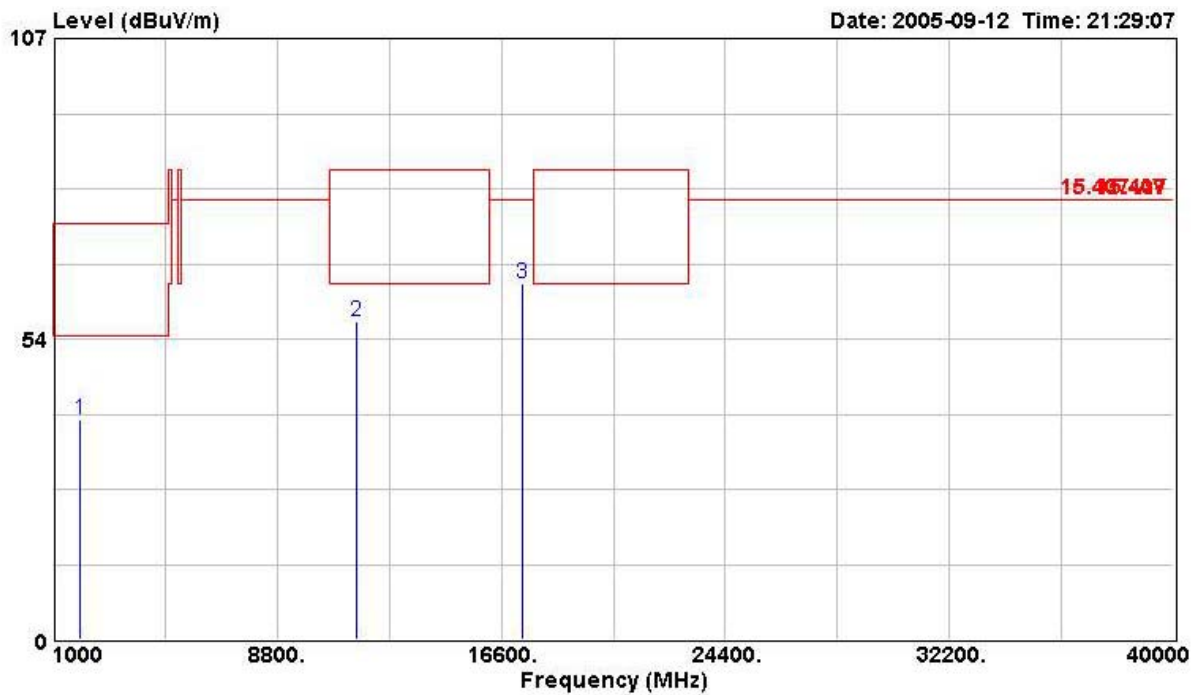
Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1464.000	36.98	-37.02	43.40	74.00	1.50	25.23	33.15	PEAK	---	---
2	11570.000	53.61	-29.89	41.53	83.50	5.17	39.30	32.40	PEAK	---	---
3 0	17355.000	62.93	-15.37	44.64	78.30	7.46	42.79	31.96	PEAK	---	---



Vertical

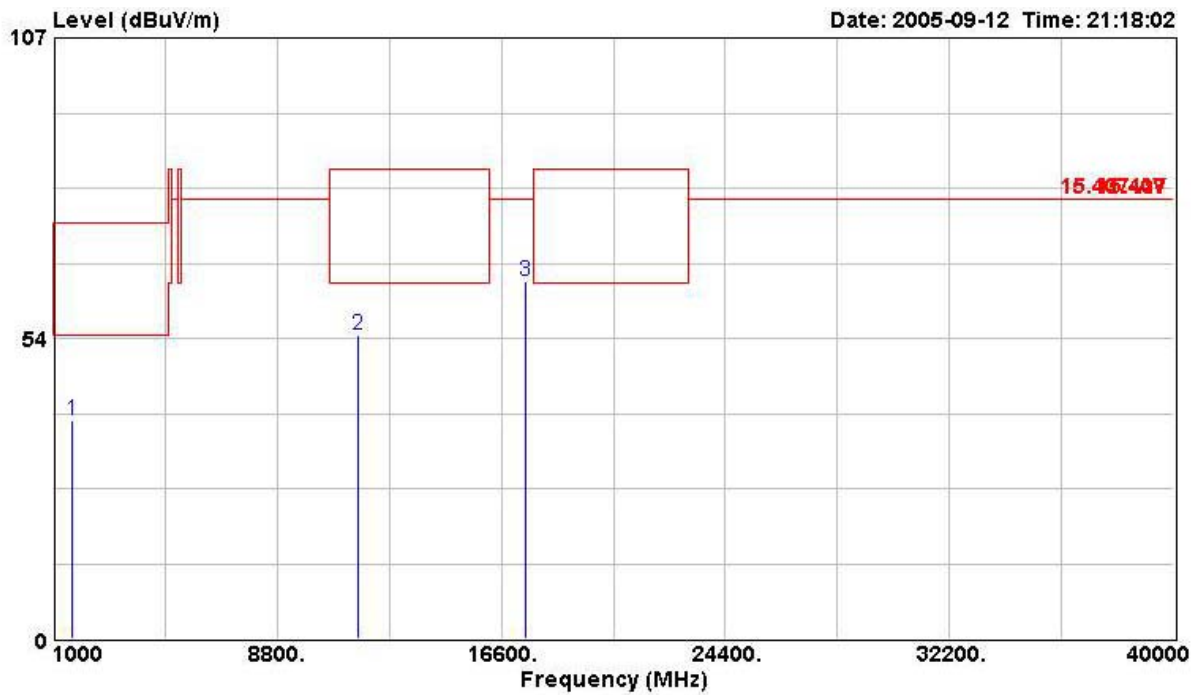


	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1924.000	39.14	-34.86	42.76	74.00	1.98	27.13	32.74	PEAK	---	---
2	11568.000	56.56	-26.94	44.51	83.50	5.14	39.30	32.39	PEAK	---	---
3	17355.000	63.44	-14.86	45.15	78.30	7.46	42.79	31.96	PEAK	---	---



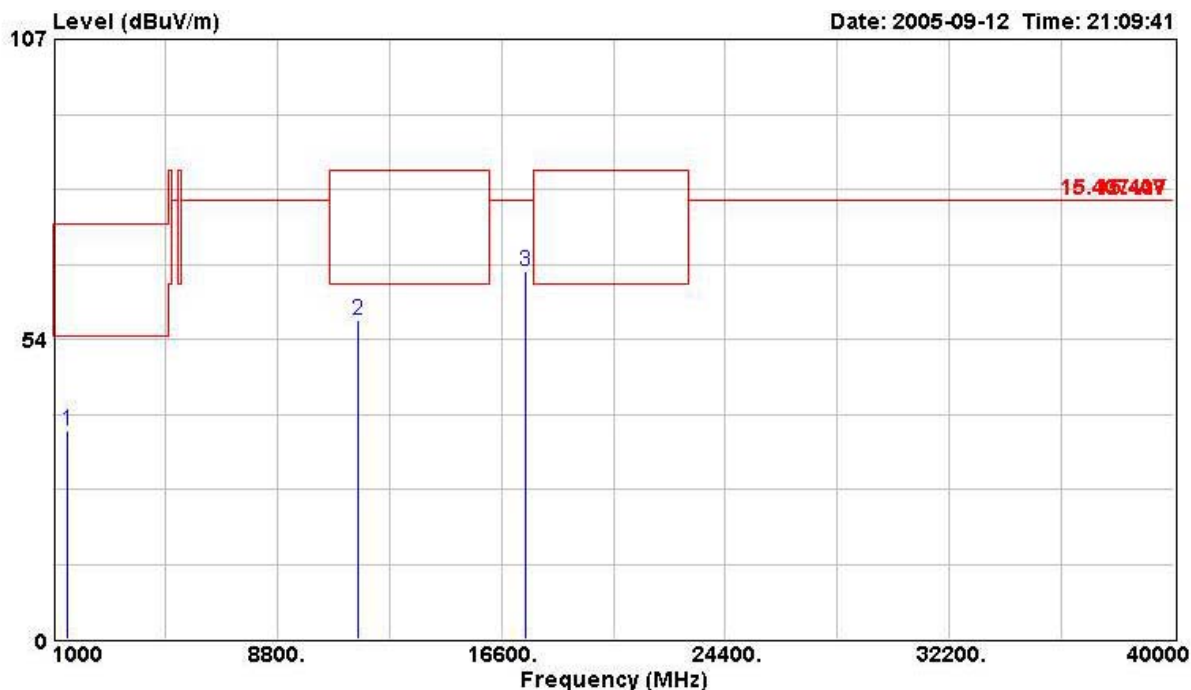
Test Mode	802.11a / ch 161		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick

Horizontal



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	1648.000	38.74	-35.26	44.02	74.00	1.70	25.96	32.95	PEAK	---	---
2 0	11610.000	54.09	-29.41	41.99	83.50	5.21	39.30	32.40	PEAK	---	---
3 0	17451.000	63.59	-14.71	44.41	78.30	7.57	43.53	31.92	PEAK	---	---

Vertical



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBUV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
	MHz	dBUV/m	dB	dBuV	dBUV/m	dB	dB/m	dB		cm	deg
1	1496.000	37.11	-36.89	43.37	74.00	1.54	25.30	33.09	PEAK	---	---
2 @	11608.000	56.85	-26.65	44.75	83.50	5.21	39.30	32.40	PEAK	---	---
3 @	17451.000	65.67	-12.63	46.50	78.30	7.57	43.53	31.92	PEAK	---	---

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBUV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Pol. : V is Vertical Polarization ; H is Horizontal Polarization.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

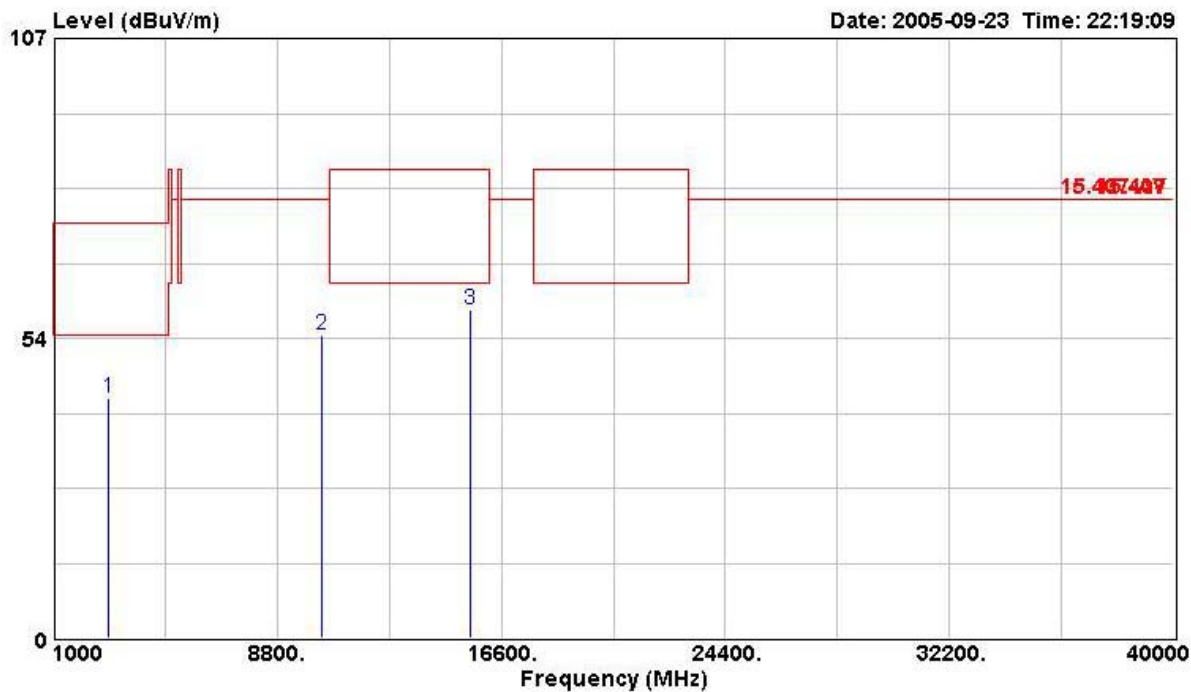
Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBUV) + distance extrapolation factor [9.54 dB].



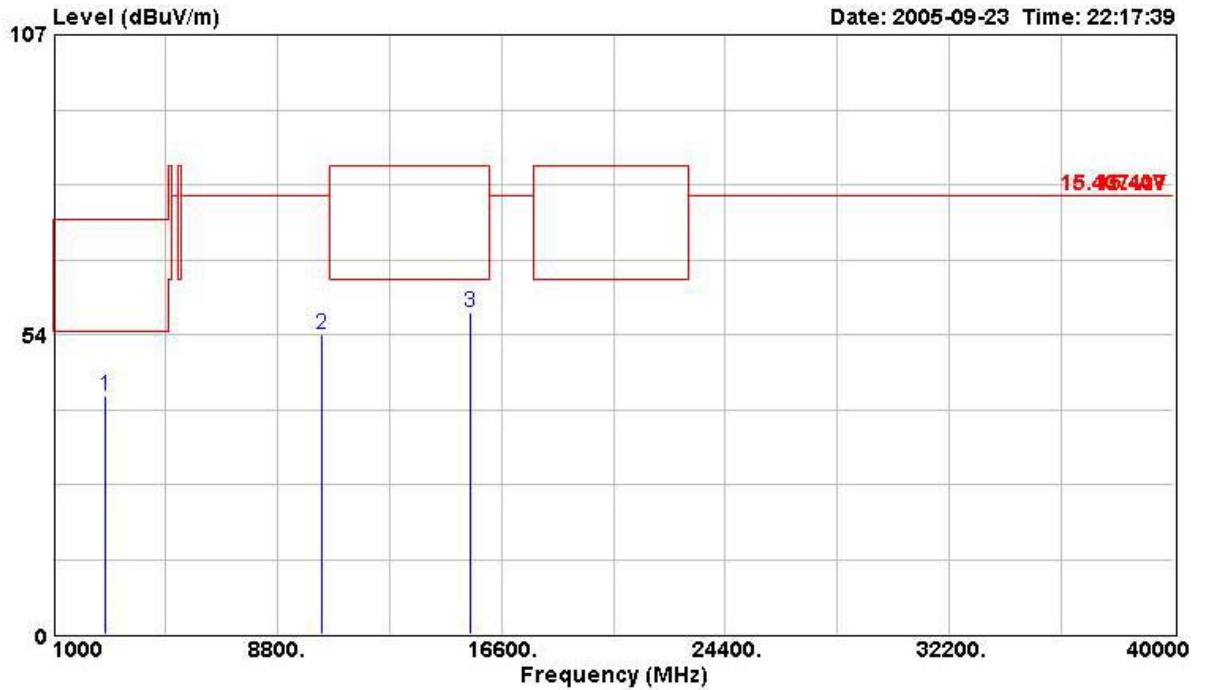
Test Mode	802.11a / ch 36		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN type

Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2908.000	42.78	-31.22	43.16	74.00	2.63	29.76	32.76	Peak	---	---
2	10360.000	54.00	-24.30	42.72	78.30	5.51	38.93	33.15	PEAK	---	---
3	15540.000	58.66	-24.84	46.72	83.50	6.89	37.84	32.79	PEAK	---	---

Vertical

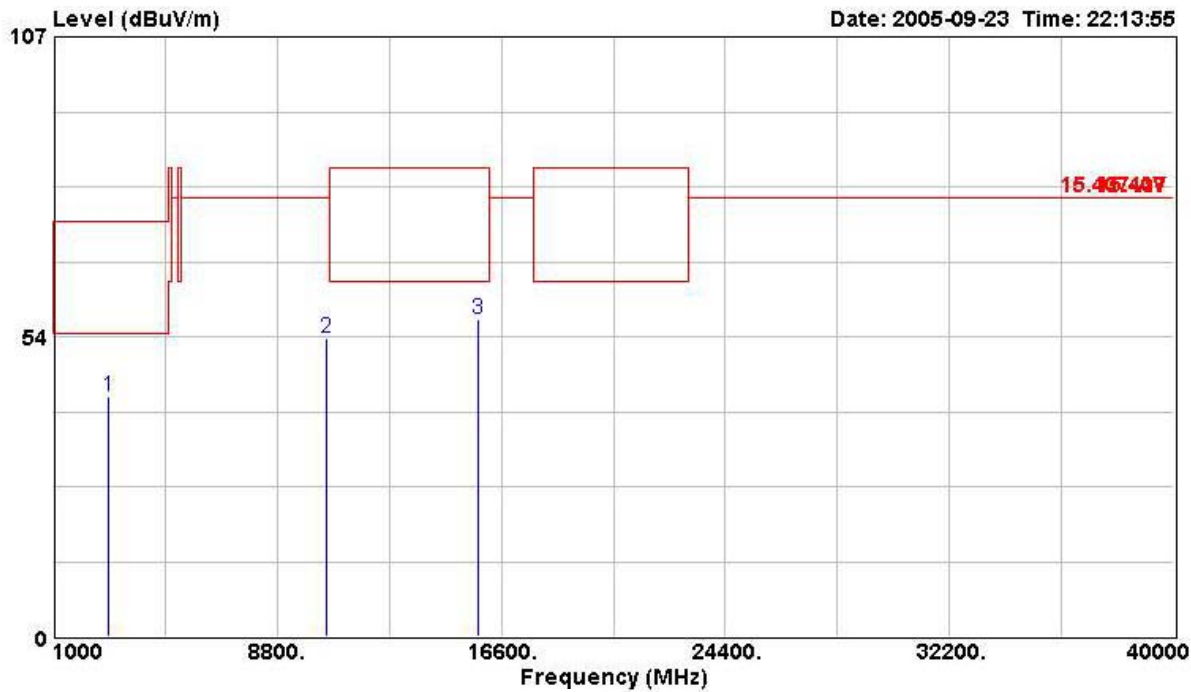


	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	2838.000	42.55	-31.45	43.29	74.00	2.58	29.53	32.85	Peak	---
2	10360.000	53.57	-24.73	42.29	78.30	5.51	38.93	33.15	PEAK	---
3	15540.000	57.48	-26.02	45.54	83.50	6.89	37.84	32.79	PEAK	---



Test Mode	802.11a / ch 52		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN type

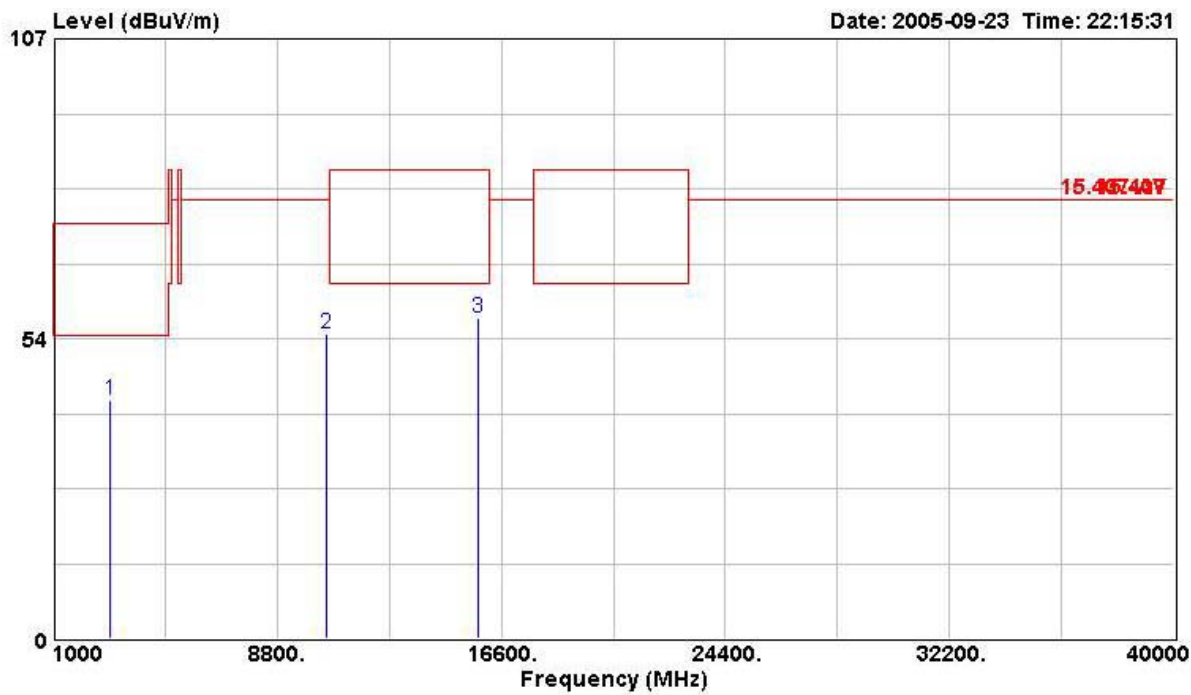
Horizontal



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2910.000	42.71	-31.29	43.09	74.00	2.63	29.76	32.76	Peak	---	---
2	10520.000	53.26	-25.04	41.77	78.30	5.61	38.89	33.01	PEAK	---	---
3	15780.000	56.69	-26.81	45.25	83.50	6.91	37.40	32.87	PEAK	---	---



Vertical

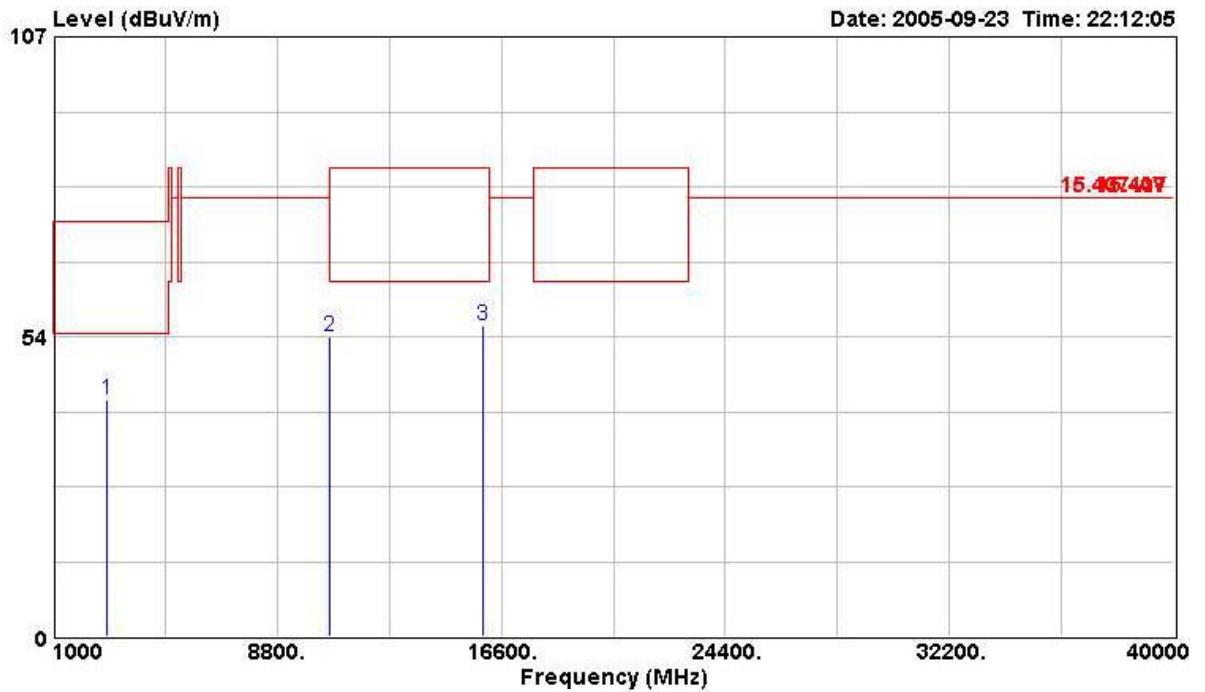


	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	2956.000	42.52	-31.48	42.64	74.00	2.65	29.93	32.71	Peak	---
2	10520.000	54.37	-23.93	42.88	78.30	5.61	38.89	33.01	PEAK	---
3	15780.000	57.23	-26.27	45.79	83.50	6.91	37.40	32.87	PEAK	---



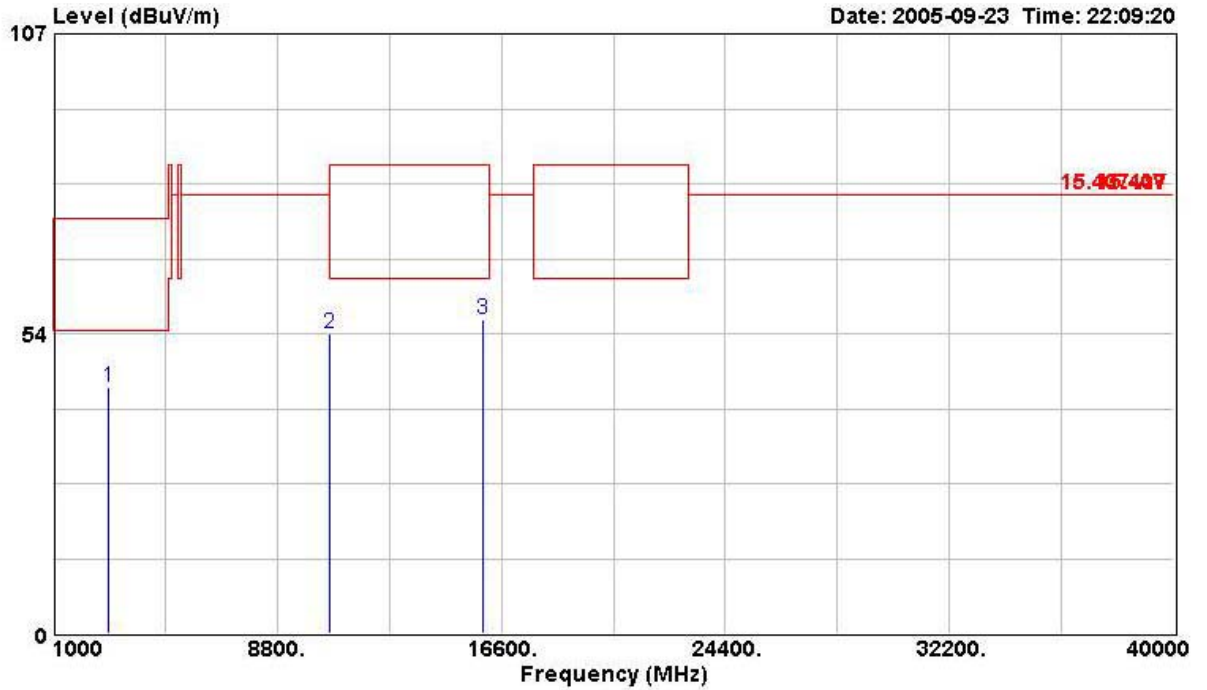
Test Mode	802.11a / ch 64		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN type

Horizontal



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2894.000	42.24	-31.76	42.73	74.00	2.60	29.70	32.79	Peak	---	---
2	10640.000	53.61	-29.89	42.03	83.50	5.59	38.82	32.82	PEAK	---	---
3	15960.000	55.47	-28.03	44.41	83.50	6.93	37.06	32.93	PEAK	---	---

Vertical

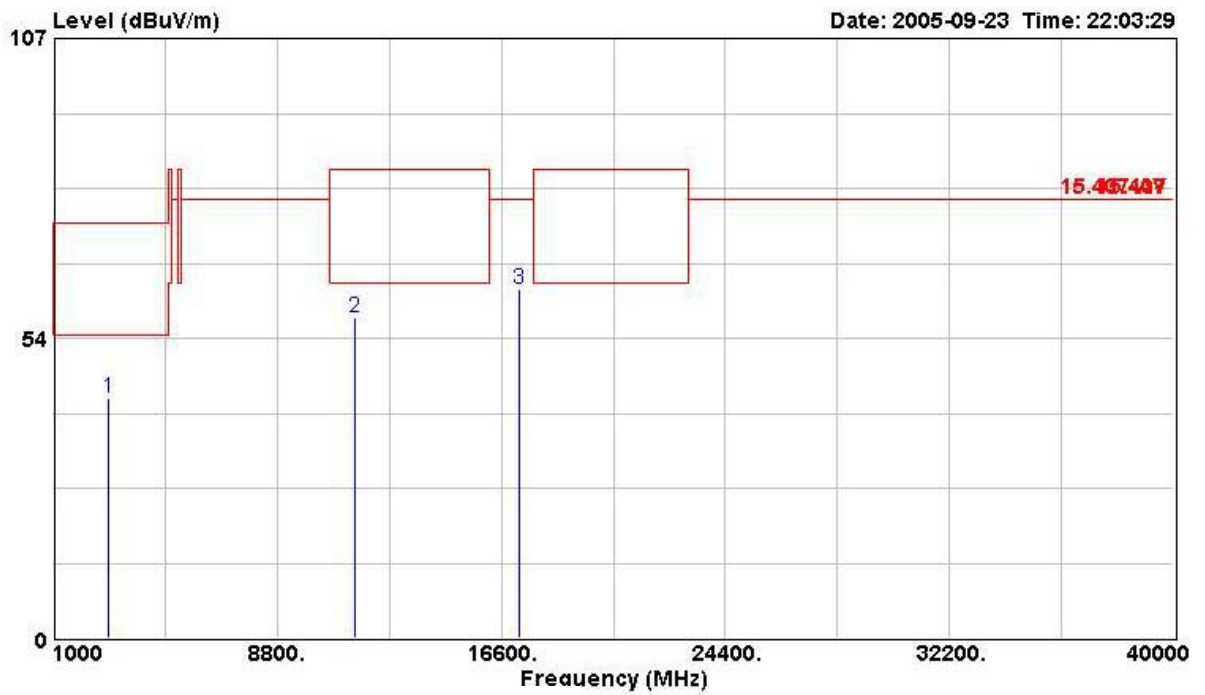


	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	2918.000	43.96	-30.04	44.28	74.00	2.63	29.82	32.76	Peak	---
2	10640.000	53.50	-30.00	41.91	83.50	5.59	38.82	32.82	PEAK	---
3	15960.000	55.96	-27.54	44.91	83.50	6.93	37.06	32.93	PEAK	---



Test Mode	802.11a / ch 149		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN type

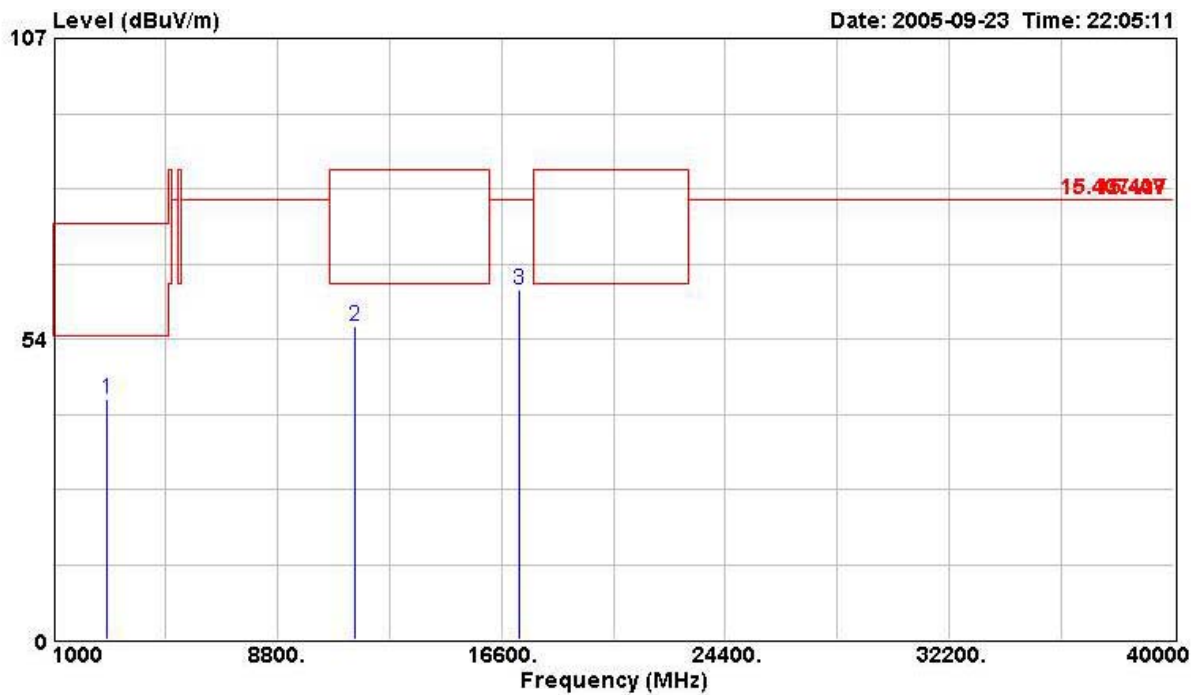
Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	CableAntenna Loss Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	2934.000	42.84	-31.16	43.07	74.00	2.63	29.87	32.74	Peak	---
2	11488.000	57.13	-26.37	45.08	83.50	5.14	39.28	32.38	PEAK	---
3	17236.000	62.30	-16.00	45.07	78.30	7.31	41.93	32.01	PEAK	---



Vertical

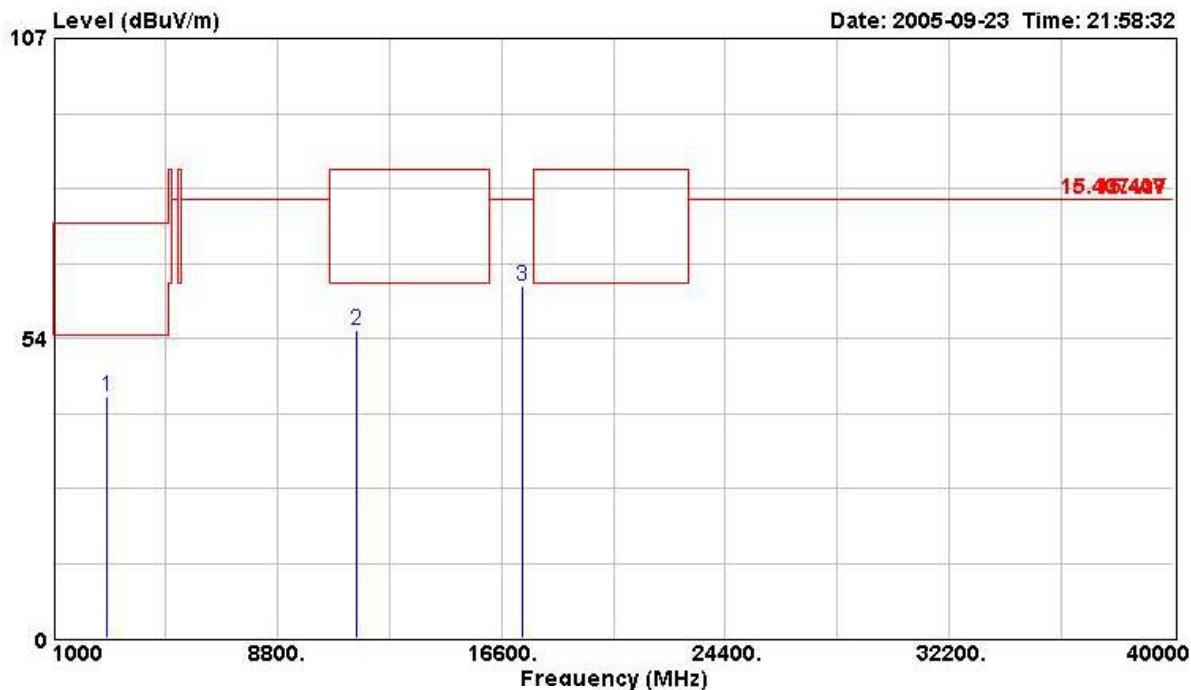


	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2844.000	42.76	-31.24	43.50	74.00	2.58	29.53	32.85	Peak	---	---
2	11488.000	55.67	-27.83	43.63	83.50	5.14	39.28	32.38	PEAK	---	---
3	17236.000	62.29	-16.01	45.06	78.30	7.31	41.93	32.01	PEAK	---	---



Test Mode	802.11a / ch 157		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN type

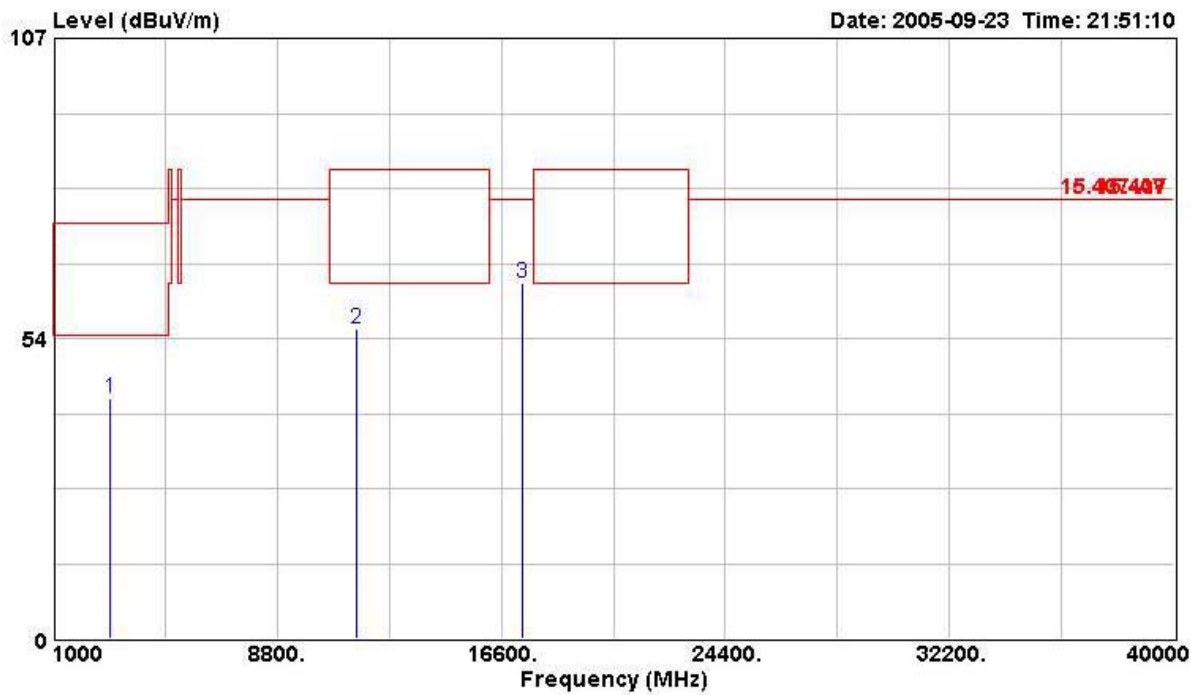
Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2860.000	43.09	-30.91	43.74	74.00	2.58	29.59	32.82	Peak	---	---
2	11568.000	54.97	-28.53	42.92	83.50	5.14	39.30	32.39	PEAK	---	---
3	17356.000	62.79	-15.51	44.50	78.30	7.46	42.79	31.96	PEAK	---	---



Vertical

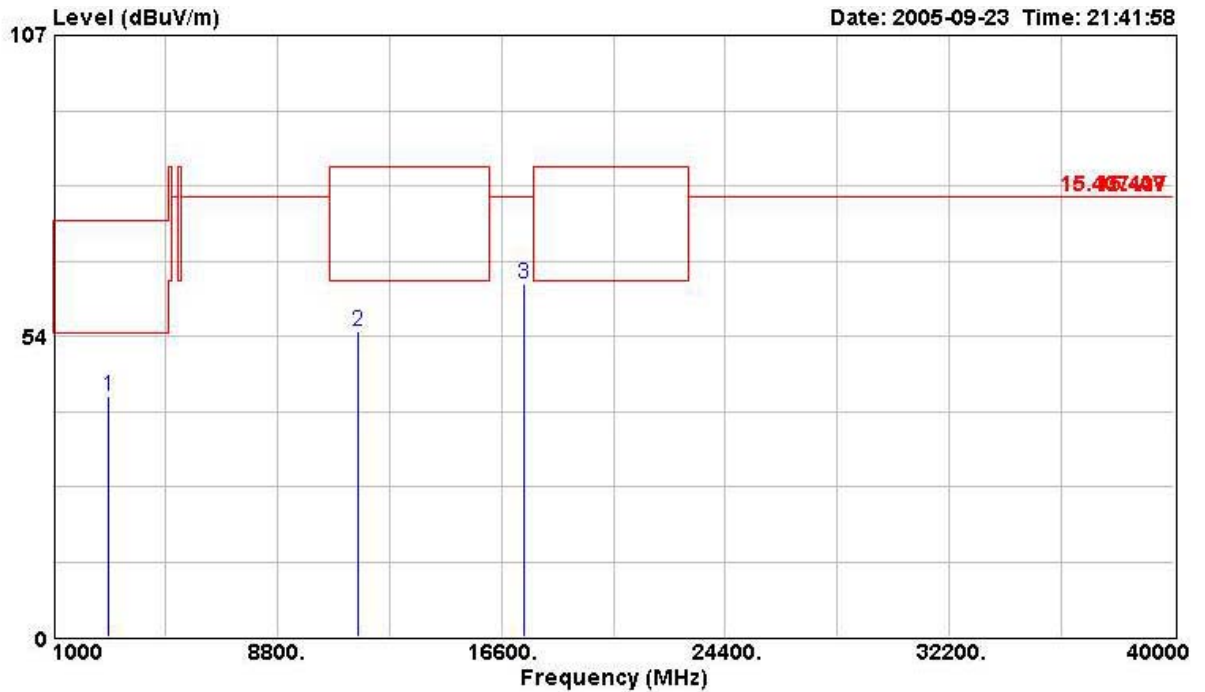


	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	2956.000	42.70	-31.30	42.82	74.00	2.65	29.93	32.71	Peak	---
2	11568.000	55.29	-28.21	43.24	83.50	5.14	39.30	32.39	PEAK	---
3	17356.000	63.35	-14.95	45.06	78.30	7.46	42.79	31.96	PEAK	---



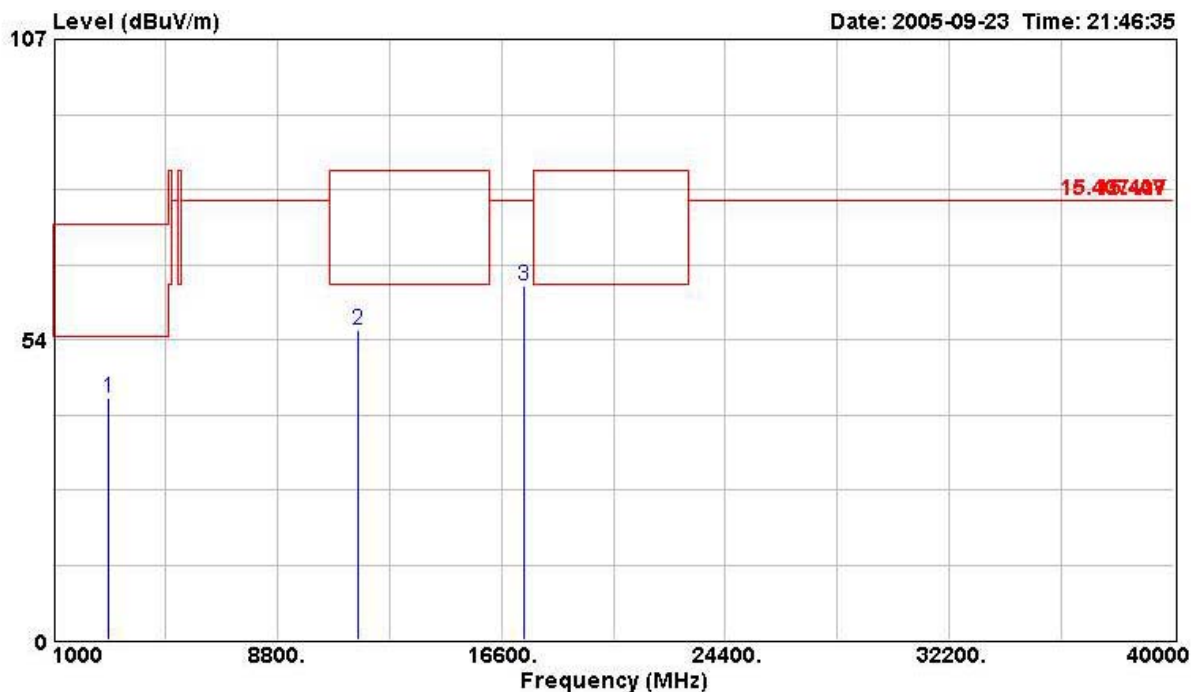
Test Mode	802.11a / ch 161		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN type

Horizontal



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2926.000	42.80	-31.20	43.09	74.00	2.63	29.82	32.74	Peak	---	---
2	11608.000	54.48	-29.02	42.38	83.50	5.21	39.30	32.40	PEAK	---	---
3	17416.000	62.92	-15.38	44.05	78.30	7.52	43.28	31.93	PEAK	---	---

Vertical



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	2902.000	43.07	-30.93	43.47	74.00	2.60	29.76	32.76	Peak	---	---
2	11608.000	55.10	-28.40	43.00	83.50	5.21	39.30	32.40	PEAK	---	---
3	17416.000	63.09	-15.21	44.22	78.30	7.52	43.28	31.93	PEAK	---	---

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Pol. : V is Vertical Polarization ; H is Horizontal Polarization.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

4.7. Band Edge Emissions Measurement

4.7.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz (78.3dBuV/m at 3m); for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.7.2. Measuring Instruments and Setting

Please refer to section 6 in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (emission in restricted band)	1 MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	1 MHz / 1 MHz for Peak

4.7.3. Test Procedures

1. The test procedure is the same as section 4.6.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

4.7.5. Test Deviation

There is no deviation with the original standard.

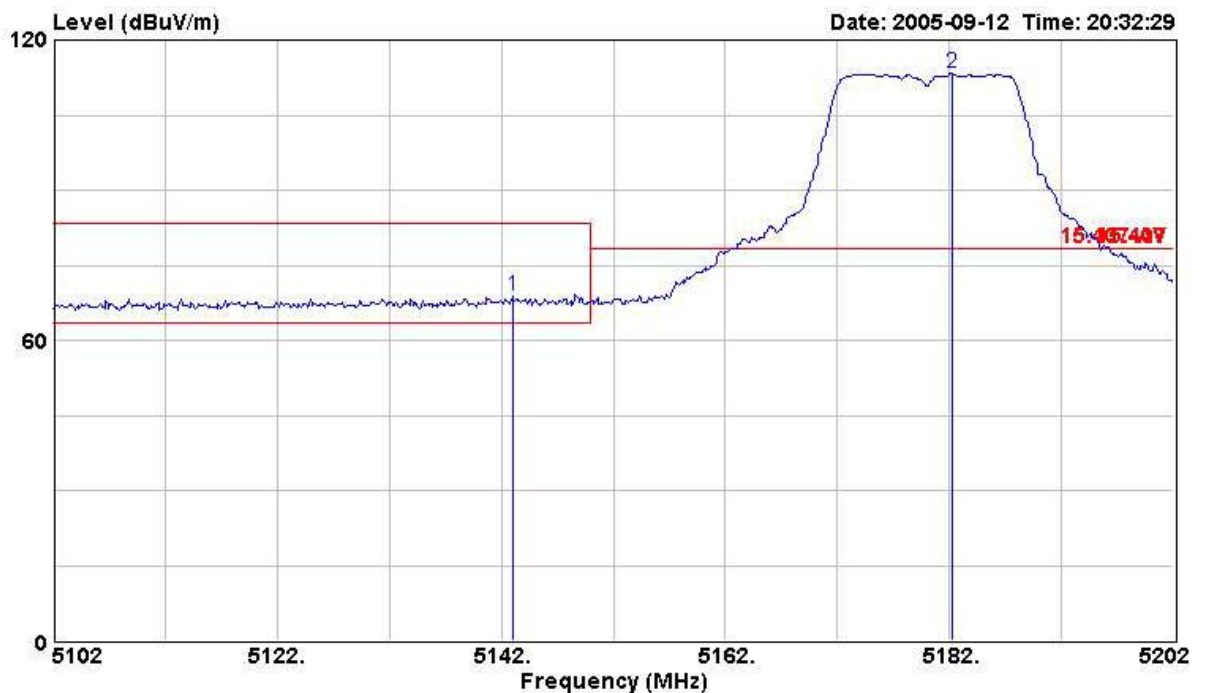
4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.7.7. Test Result of Band Edge Emissions

For Emission in Restricted Band

Test Mode	802.11a / ch 36, 64		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 0	5143.000	68.76	-14.74	31.83	83.50	3.29	33.64	0.00	Peak	---	---



	Freq	Level	Over Limit	Read Level	Limit Line	CableAntenna Loss Factor	Preampl Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1 0	5143.000	55.99	-7.51	19.06	63.50	3.29	33.64	0.00 Average	---	---

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Receiving maximum band edge emissions are Vertical Polarization.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

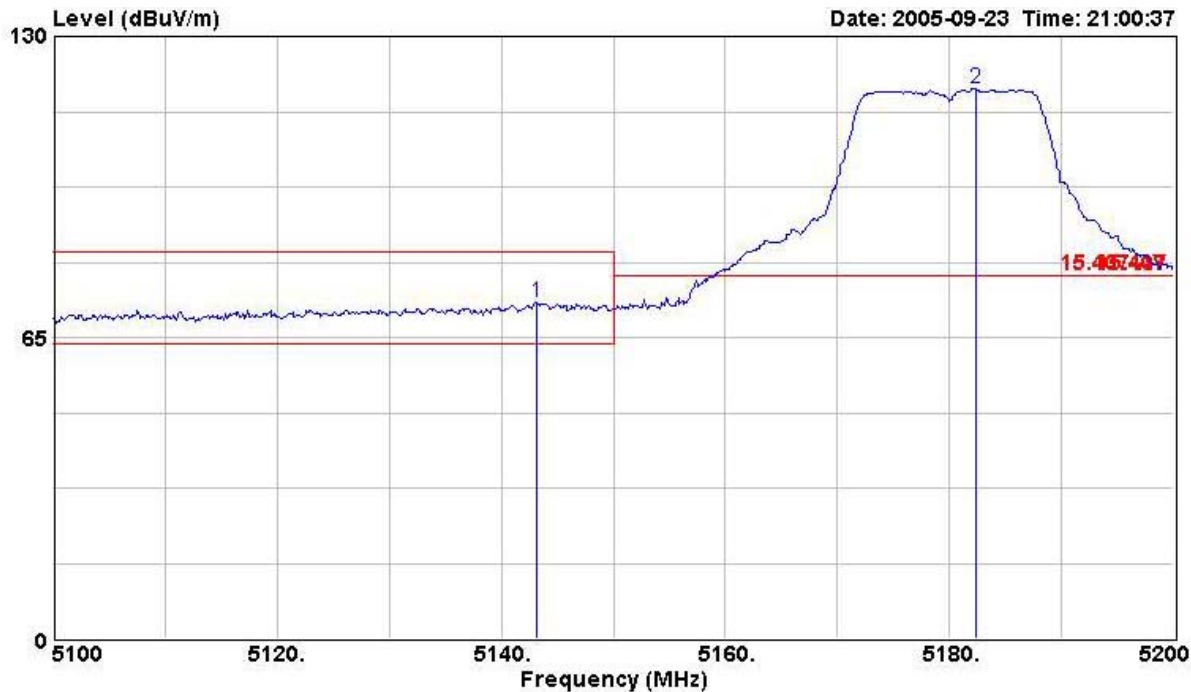
Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

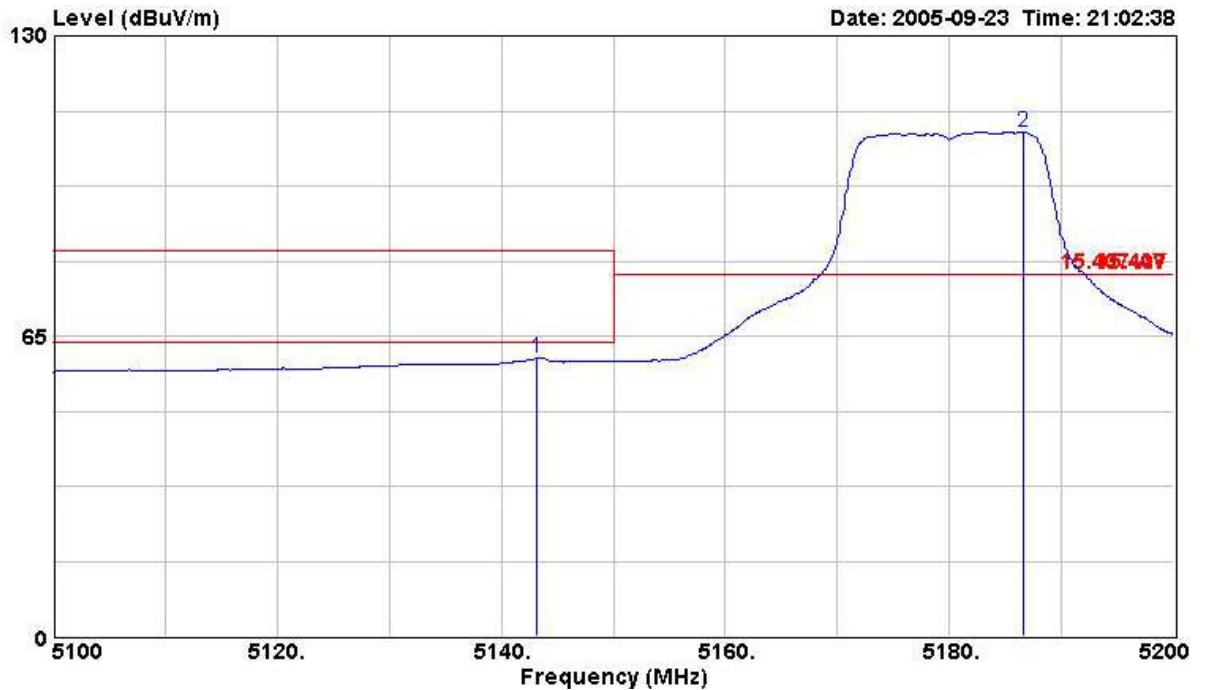


For Emission in Restricted Band

Test Mode	802.11a / ch 36, 64		
Temperature	28℃	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN Type



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	5143.100	72.58	-10.92	35.65	83.50	3.29	33.64	0.00	Peak	---	---



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	5143.100	60.18	-3.32	23.25	63.50	3.29	33.64	0.00	Average	---	---

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Receiving maximum band edge emissions are Vertical Polarization.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

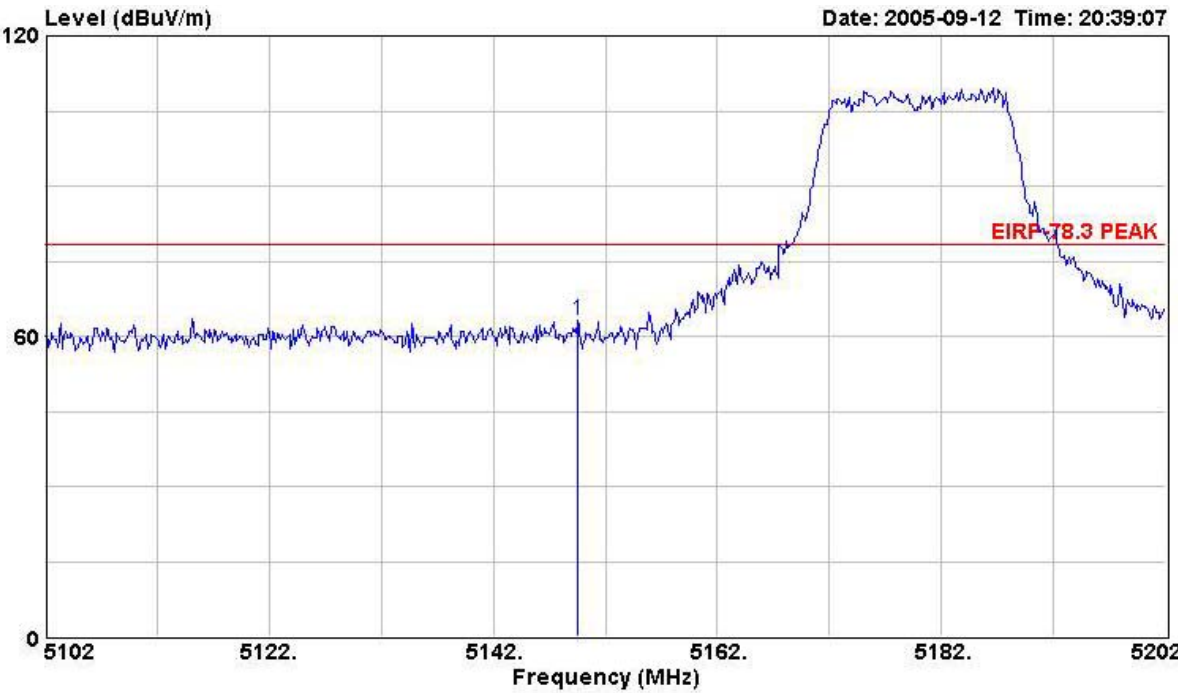
Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

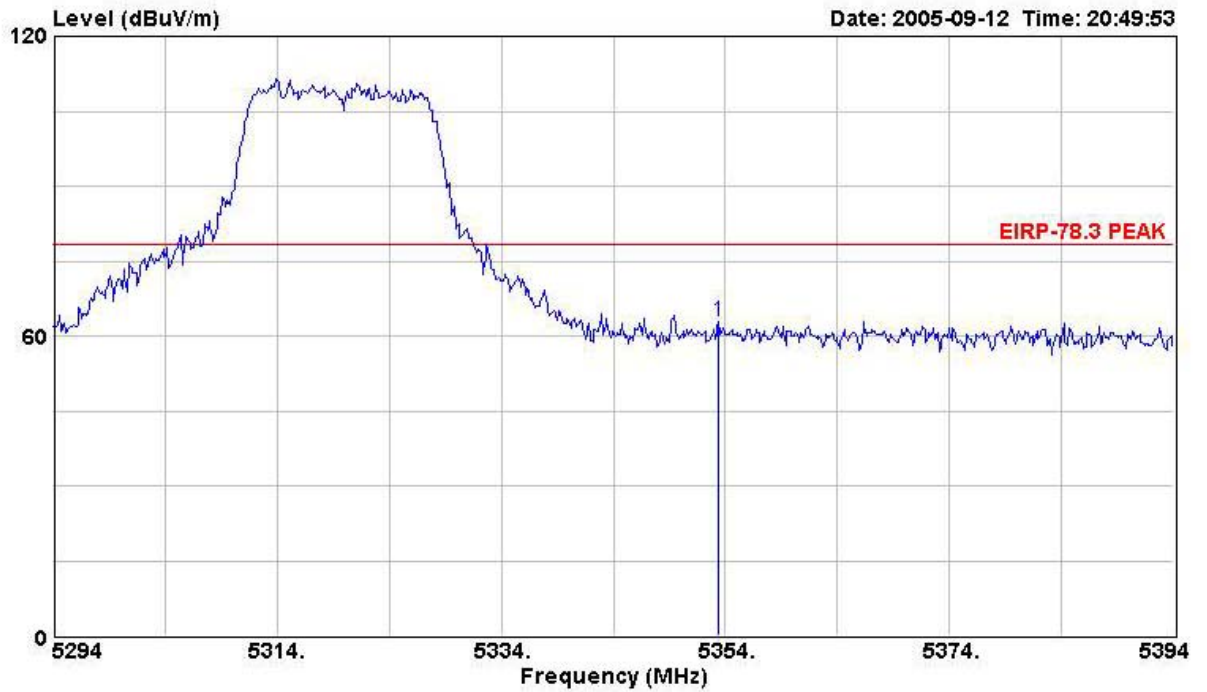


For EIRP Emission in Band

Test Mode	802.11a / ch 36, 64		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick



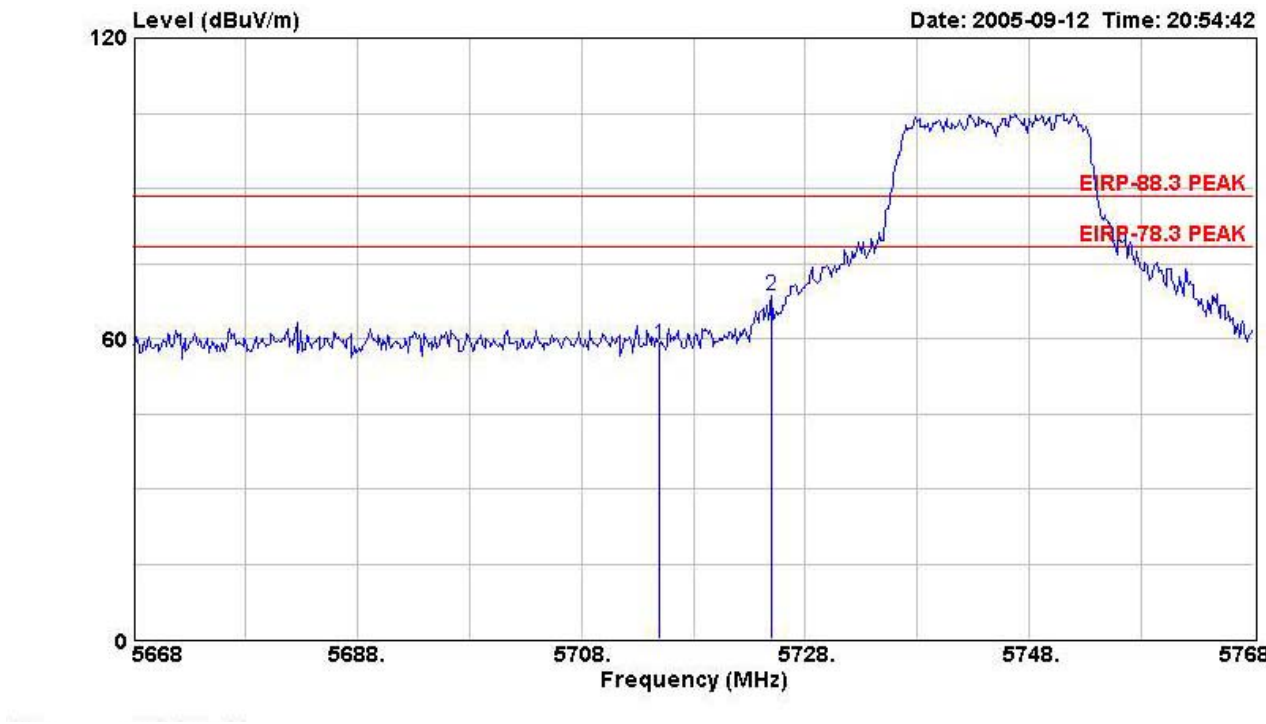
	Freq	Level	Over Limit	Read Level	Limit Line	CableAntenna Loss Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1 0	5149.500	63.20	-15.10	26.27	78.30	3.29	33.64	0.00 Peak	---	---



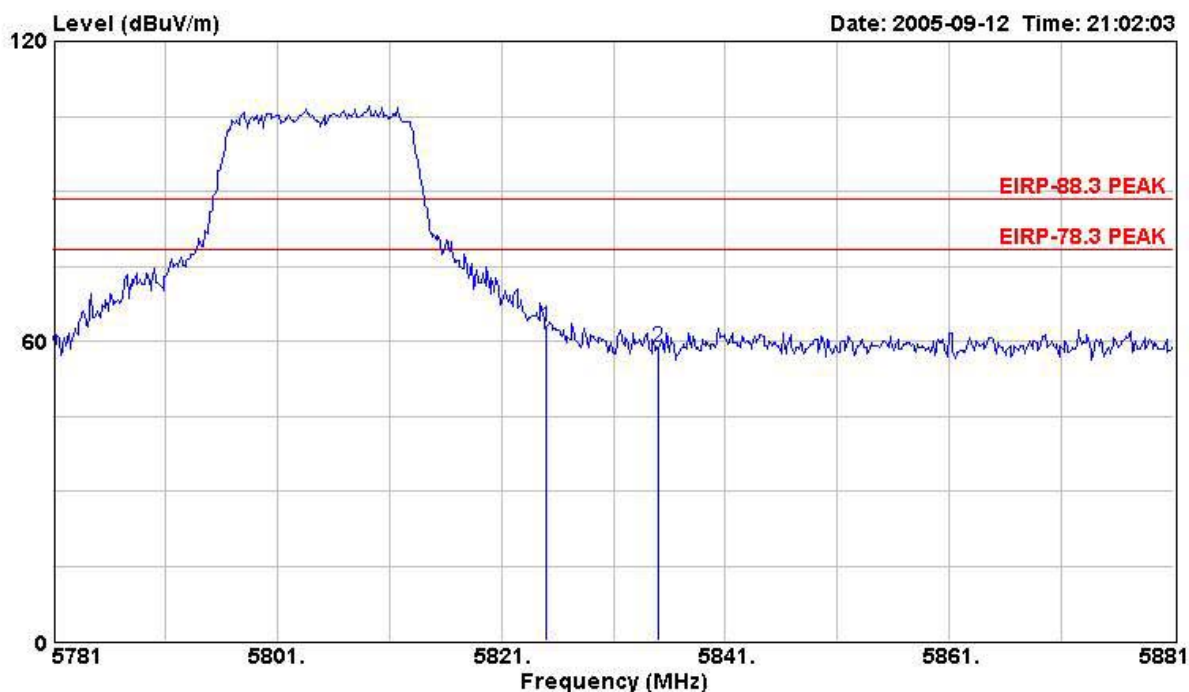
	Freq	Level	Over Limit	Reqd Level	Limit Line	Cable Loss	Antenna Factor	Preamplifier	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 0	5353.400	63.00	-15.30	25.55	78.30	3.49	33.96	0.00	Peak	---	---



Test Mode	802.11a / ch 149, 161		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	Brick



	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	5715.000	58.68	-19.62	20.81	78.30	3.63	34.24	0.00	Peak	---	---
2	5725.000	68.62	-9.68	30.74	78.30	3.63	34.24	0.00	Peak	---	---



	Freq	Level	Over	Read	Limit	Cable	Antenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Remark	Pos	Pos
			dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1 @	5825.000	62.82	-15.48	24.93	78.30	3.63	34.27	0.00	Peak	---	---
2 @	5835.000	58.80	-19.50	20.91	78.30	3.63	34.27	0.00	Peak	---	---

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Receiving maximum band edge emissions are Vertical Polarization.

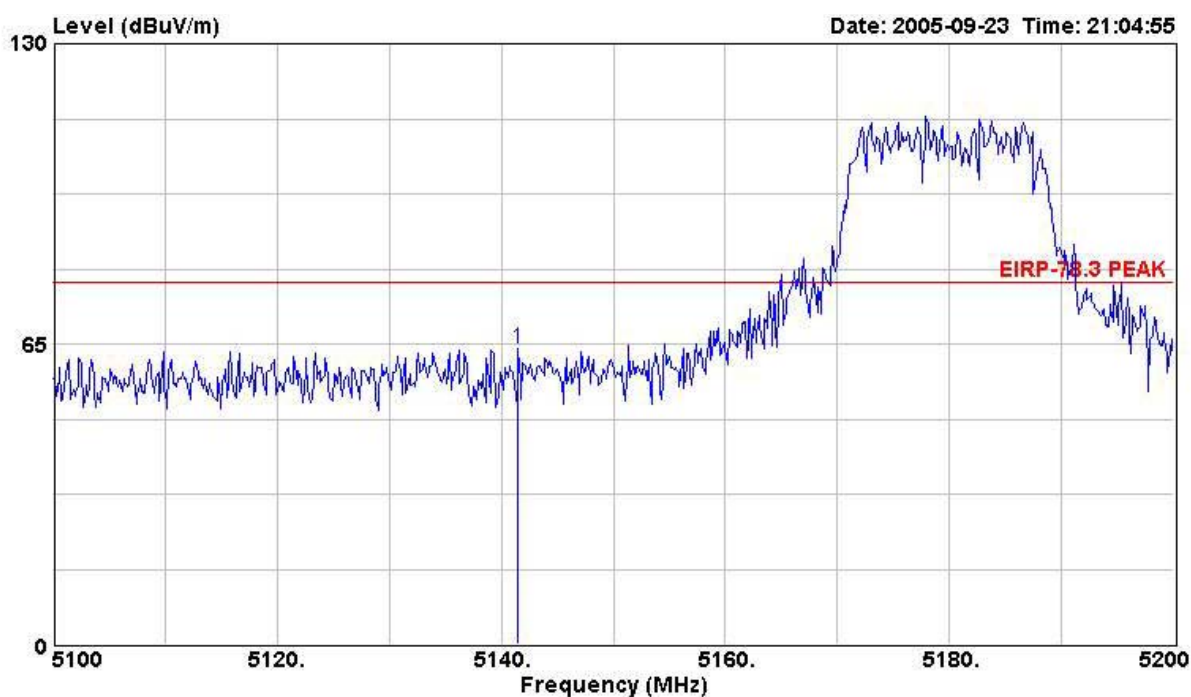
The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);

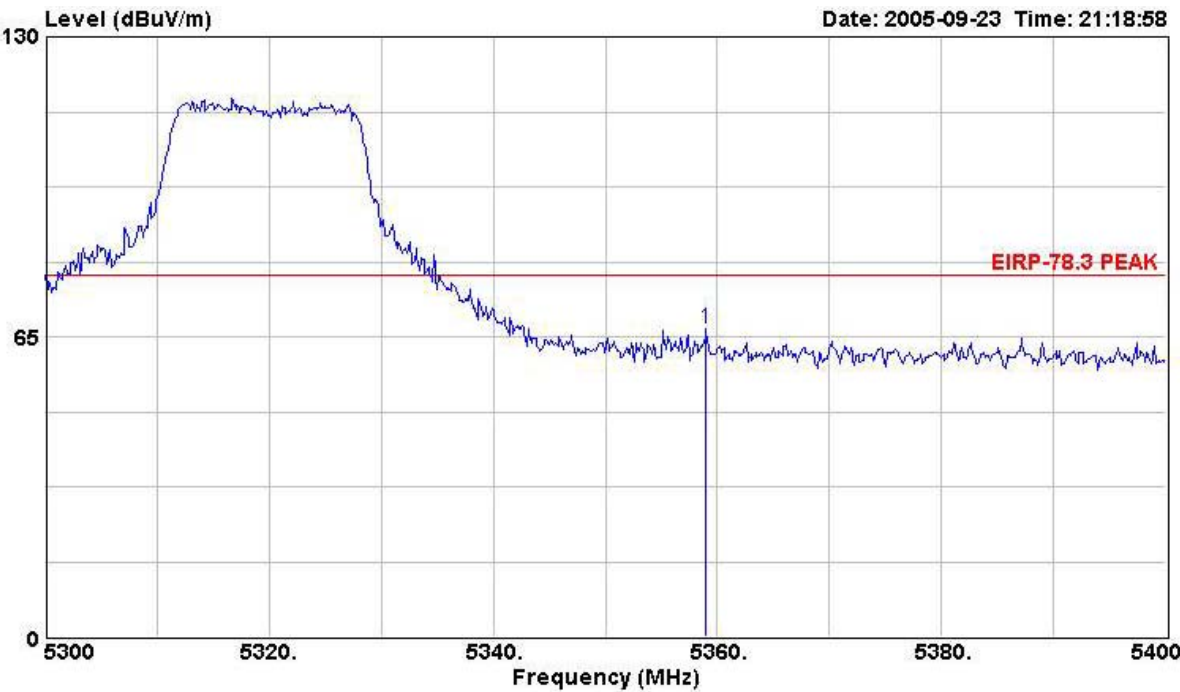
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

For EIRP Emission in Band

Test Mode	802.11a / ch 36, 64		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN Type



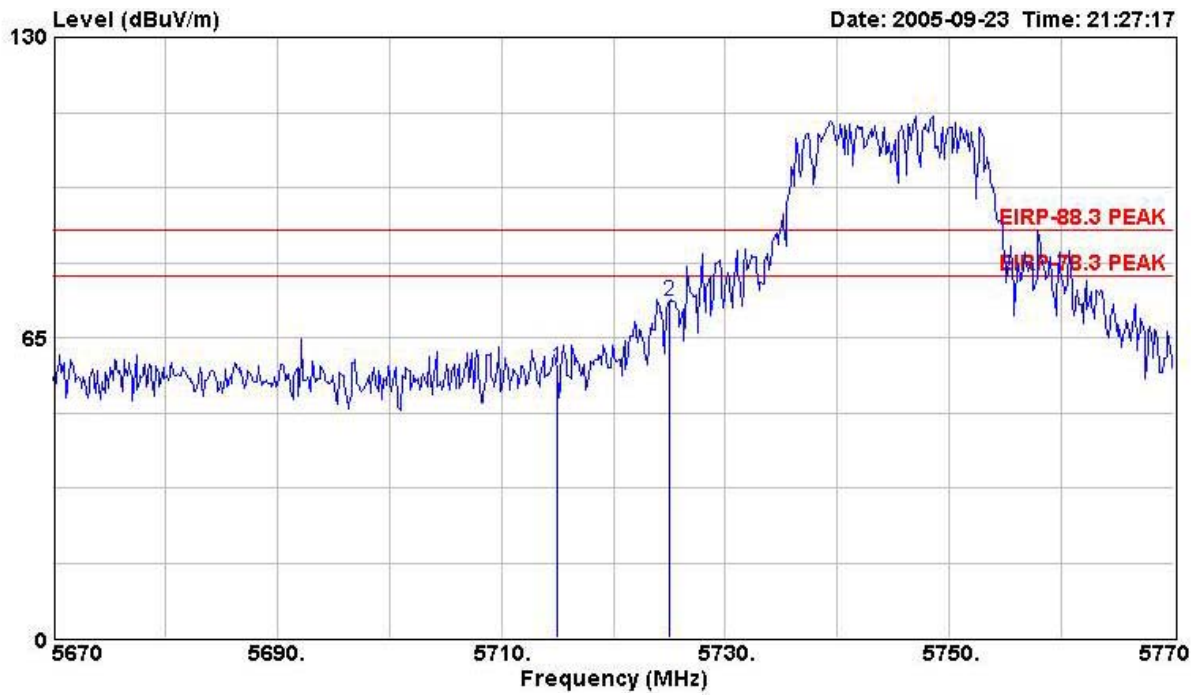
	Freq	Level	Over Limit	Read Level	Limit Line	Cable Loss	Antenna Factor	Preamplifier	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB		cm	deg
1	5141.500	63.82	-14.48	26.89	78.30	3.29	33.64	0.00	Peak	---	---



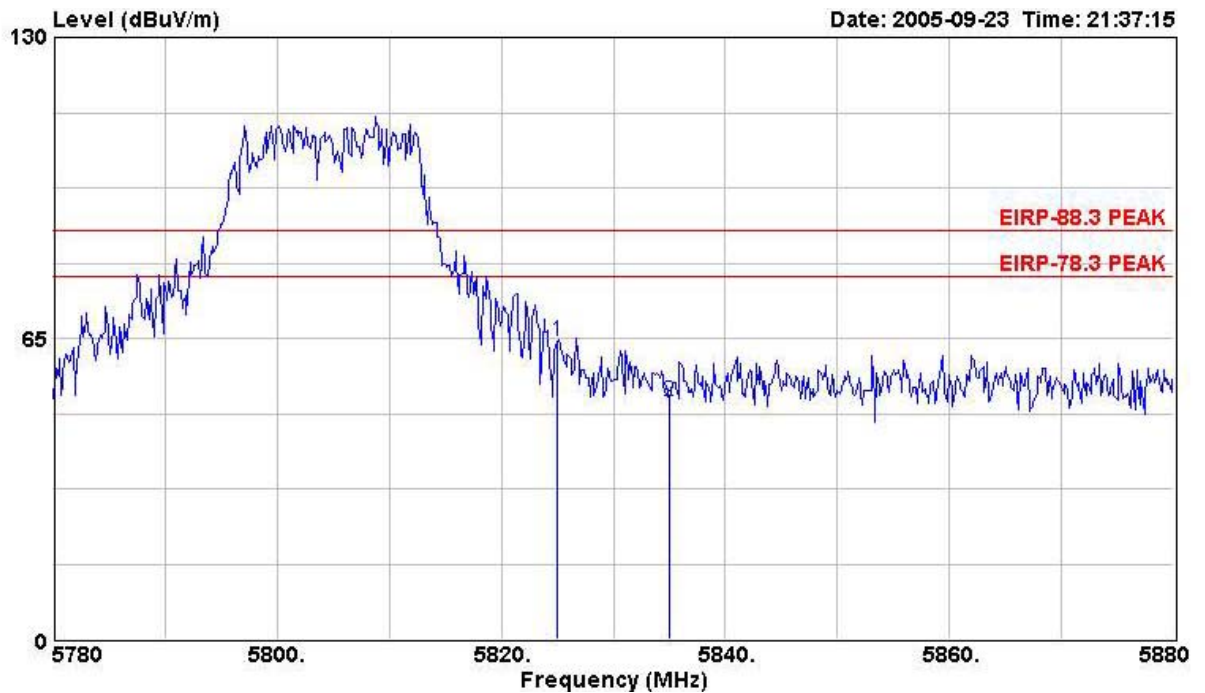
	Freq	Level	Over Limit	Read Level	Limit Line	CableAntenna Loss Factor	Preamplifier Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	5359.000	66.59	-11.71	29.14	78.30	3.49	33.96	0.00 Peak	---	---



Test Mode	802.11a / ch 149, 161		
Temperature	28°C	Humidity	54%
Test Engineer	Ted Chiu	Configurations	GUN Type



	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1	5715.000	58.38	-29.92	20.51	88.30	3.63	34.24	0.00	Peak	---
2	5725.000	72.98	-15.32	35.10	88.30	3.63	34.24	0.00	Peak	---



	Freq	Level	Over	Read	Limit	CableAntenna	Preamp		Ant	Table
	MHz	dBuV/m	Limit	Level	Line	Loss	Factor	Factor	Pos	Pos
	MHz	dBuV/m	dB	dBuV	dBuV/m	dB	dB/m	dB	cm	deg
1 @	5825.000	64.33	-23.97	26.44	88.30	3.63	34.27	0.00	---	---
2	5835.000	51.49	-36.81	13.60	88.30	3.63	34.27	0.00	---	---

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

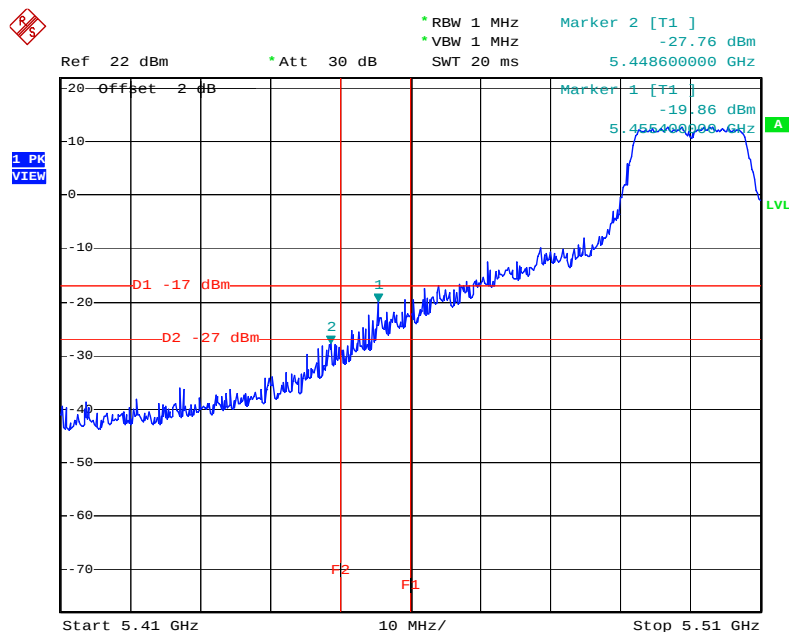
Receiving maximum band edge emissions are Vertical Polarization.

The limits above 5GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);

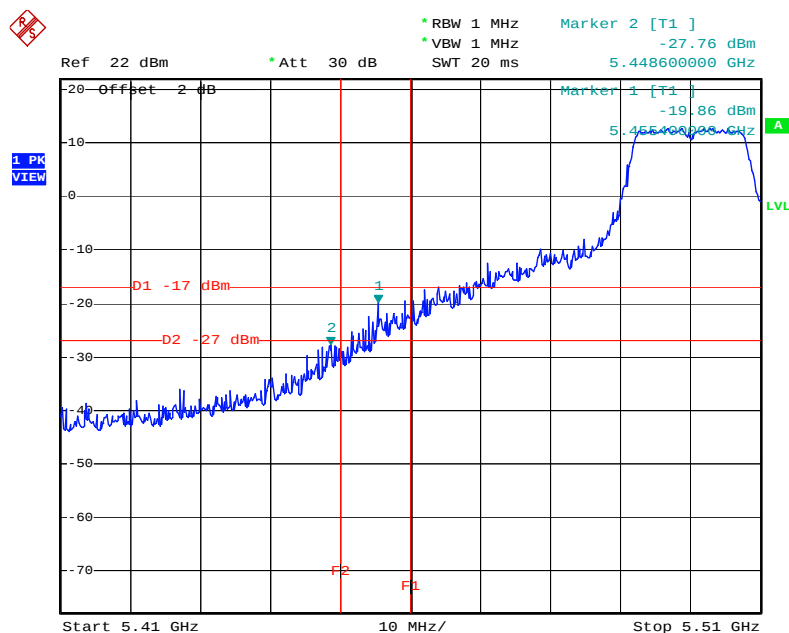
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

EIRP Emission in Band on Configuration IEEE 802.11a / 5180 MHz



Date: 2.JUL.2004 00:10:26

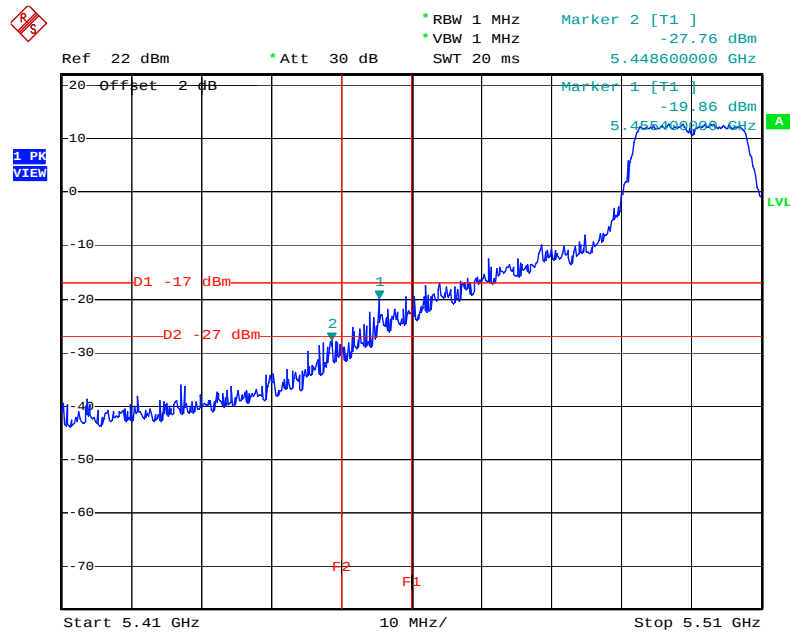
EIRP Emission in Band on Configuration IEEE 802.11a / 5320 MHz



Date: 2.JUL.2004 00:10:26

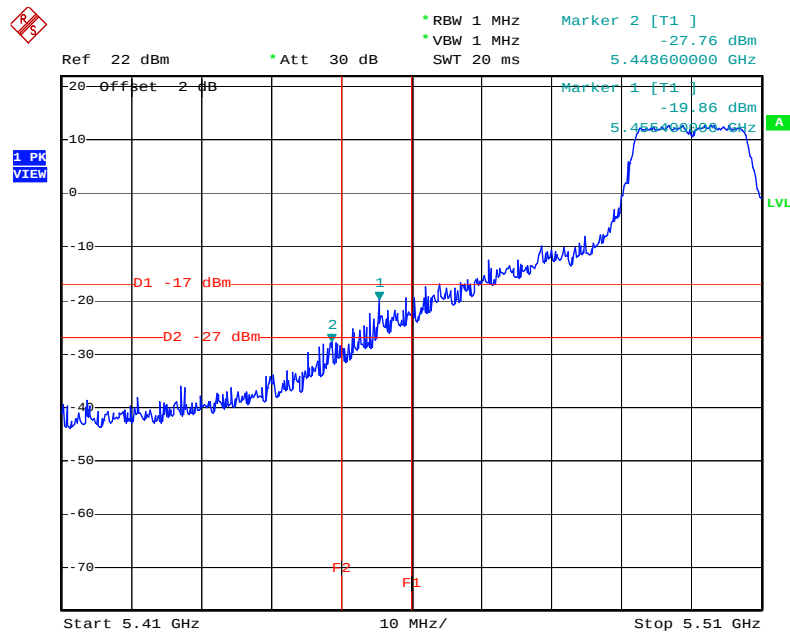


EIRP Emission in Band on Configuration IEEE 802.11a / 5745 MHz



Date: 2.JUL.2004 00:10:26

EIRP Emission in Band on Configuration IEEE 802.11a / 5805 MHz



Date: 2.JUL.2004 00:10:26

4.8. Frequency Stability Measurement

4.8.1. Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or $\pm 20\text{ppm}$ (IEEE 802.11a specification).

4.8.2. Measuring Instruments and Setting

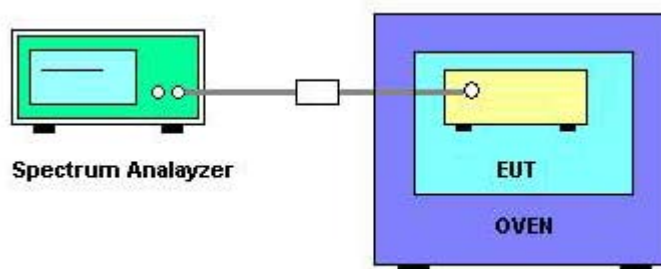
Please refer to section 6 in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RB	10 kHz
VB	10 kHz
Sweep Time	Auto

4.8.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than $\pm 20\text{ppm}$ (IEEE 802.11a specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is $-30^\circ\text{C} \sim 50^\circ\text{C}$.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

4.8.7. Test Result of Frequency Stability

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5260
126.50	5259.9845
110.00	5259.9858
93.50	5259.9851
Max. Deviation (MHz)	0.0155
Max. Deviation (ppm)	2.9468

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5260
-30	5260.0110
-20	5260.0084
-10	5260.0049
0	5259.9826
10	5259.9848
20	5259.9857
30	5259.9868
40	5259.9877
50	5259.9889
Max. Deviation (MHz)	0.0174
Max. Deviation (ppm)	3.3080



4.9. Antenna Requirements

4.9.1. Limit

Standard antenna jack or electrical connector is prohibited.

4.9.2. Antenna Connector Construction

Please refer to section 3.4 in this test report, all antenna connectors comply with the requirements.



5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Feb. 16, 2005	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	2001/004	9kHz – 30MHz	Apr. 20, 2005	Conduction (CO04-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	99041	9kHz – 30MHz	May. 05, 2005	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2005	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Jun. 16, 2005	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100019	9KHZ~40GHz	Jul. 21, 2005	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	CPA9231A	18667	9KHz ~ 2GHz	Jan. 10, 2005	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	May 31, 2005	Radiation (03CH03-HY)
Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz ~ 200MHz	Jul. 22, 2005	Radiation (03CH03-HY)
Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz ~ 1GHz	Jul. 22, 2005	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 22, 2005	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz ~ 1GHz	Feb. 22, 2005	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Dec.01, 2004	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100019	9KHZ~40GHz	Jul. 21, 2005	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 06, 2005	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z55	100049	DC ~ 40GHz	Jul. 06, 2005	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Apr. 28, 2005	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 – 300V	Apr. 21, 2005	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V – 60V	Dec. 28, 2004	Conducted (TH01-HY)
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2004	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz – 7GHz	Jan. 01, 2005	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz – 1GHz	Jan. 01, 2005	Conducted (TH01-HY)
Data Generator	Tektronix	J310345	J310345	400Mbps	Dec. 21, 2004	Conducted (TH01-HY)
OscilloScope	Tektronix	TDS1012	C038520	100MHz-1Gs/s	Jan. 02, 2005	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	MITEQ	AMF-6F-260400	923364	26.5GHz ~ 40GHz	Jan. 05, 2004*	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9kHz ~ 30MHz	May 24, 2004*	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jun. 09, 2004*	Radiation (03CH03-HY)

Note: Calibration Interval of instruments listed above is two year.

6. SPORTON COMPANY PROFILE

SPORTON Lab. was established in 1986 with one shielded room: the first private EMI test facility, offering local manufacturers an alternative EMI test facility apart from ERSO. In 1988, one 3M and 10M/3M open area test site were setup and also obtained official accreditation from FCC, VCCI and NEMKO. In 1993, a Safety laboratory was founded and obtained accreditation from UL of USA, CSA of Canada and TUV (Rhineland & PS) of Germany. In 1995, one EMC lab, including EMI and EMS test facilities was setup. In 1997, SPORTON Group has provided financial expense to relocate the headquarter to Orient Scientific Park in Taipei Hsien to offer more comprehensive, more qualified and better service to local suppliers and manufactures. In 1999, Safety Group and Component Group were setup. In 2001, SPORTON has established 3M/10M chamber in Hwa Ya Technology Park.

6.1. Test Location

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 02-2696-2468 FAX : 02-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 03-327-3456 FAX : 03-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 02-2601-1640 FAX : 02-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 02-2631-4739 FAX : 02-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 02-8227-2020 FAX : 02-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 02-2794-8886 FAX : 02-2794-9777
JHUBEI	ADD : No.8, Lane 728, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C. TEL : 03-656-9065 FAX : 03-656-9085

7. CERTIFICATE OF NVLAP ACCREDITATION

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ISO/IEC 17025:1999
ISO 9002:1994

Certificate of Accreditation

DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA

SPORTON INTERNATIONAL, INC.
TAIPEI HSIEN 221
TAIWAN

*is recognized by the National Voluntary Laboratory Accreditation Program
for satisfactory compliance with criteria set forth in NIST Handbook 150:2001,
all requirements of ISO/IEC 17025:1999, and relevant requirements of ISO 9002:1994.
Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:*

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

December 31, 2005
Effective through


For the National Institute of Standards and Technology
NVLAP Lab Code: 200079-0

NVLAP-01C (06-01)