



# SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.  
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

## FCC RADIO TEST REPORT

Applicant's company	Siemens Communications, Inc.
Applicant Address	1700 Technology Drive, Mailstop 130, San Jose, California 95110
FCC ID	AY3-AP36V1A
Manufacturer's company	Accton Technology Corporation
Manufacturer Address	No. 1 Creation Rd., Ill, Science-based Industrial Park, Hsinchu 300, Taiwan, R.O.C.

Product Name	HiPath Wireless Access Point, Altitude 450, Altitude 451
Brand Name	SIEMENS, Extreme
Model Name	HiPath Wireless AP3610, HiPath Wireless AP3620, 15800 Altitude 450, 15801 Altitude 451
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250MHz
Received Date	Jan. 16, 2008
Final Test Date	Mar. 12, 2008
Submission Type	Original Equipment
Operating Mode	Master
Multiple Listing	Please refer to section 3.7



### Statement

**Test result included is only for the Draft n (5150 ~ 5250MHz) of the product.**

The test result in this report refers exclusively to the presented test model / sample.

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.



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## History of This Test Report

Original Issue Date: Mar. 28, 2008

Report No.: FR811608AB

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



## 1. CERTIFICATE OF COMPLIANCE

Product Name : HiPath Wireless Access Point,  
Altitude 450, Altitude 451

Brand Name : SIEMENS, Extreme

Model Name : HiPath Wireless AP3610,  
HiPath Wireless AP3620,  
15800 Altitude 450,  
15801 Altitude 451

Applicant : Siemens Communications, Inc.

Test Rule Part(s) : 47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jan. 16, 2008 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.

A handwritten signature in blue ink that reads 'Wayne Hsu 3/28/08'. The signature is written in a cursive style.

Wayne Hsu

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	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	Complies	2.00 dB
4.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.06 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.56 dB
4.5	15.407(a)	Peak Excursion	Complies	6.74 dB
4.6	15.407(b)	Radiated Emissions	Complies	1.80 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.06 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.5dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
Peak Excursion	±0.5dB	Confidence levels of 95%
26dB Spectrum Bandwidth / Frequency Stability	±8.5×10 <sup>-8</sup>	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7°C	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

### 3. GENERAL INFORMATION

#### 3.1. Product Details

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	POE & Power Adapter
Modulation	see the below table for draft n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for Draft n
Frequency Range	5150 ~ 5250MHz
Channel Number	4 for 20MHz bandwidth ; 2 for 40MHz bandwidth
Channel Band Width (99%)	MCS16 (20MHz) : 17.94 MHz ; MCS16 (40MHz) : 36.41 MHz
Conducted Output Power	MCS16 (20MHz) : 16.83 dBm ; MCS16 (40MHz) : 16.94 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

#### Antenna & Band width

Antenna	Single (TX)		Three (TX)	
	20 MHz	40 MHz	20 MHz	40 MHz
802.11a	X	X	V	X
802.11b	X	X	V	X
802.11g	X	X	V	X
Draft n	X	X	V	V

## Draft n spec

MCS Index		Modulation		NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0
8	2	BPSK	1/2	1	104	216	52	108	13.0	27.0
9	2	QPSK	1/2	2	208	432	104	216	26.0	54.0
10	2	QPSK	3/4	2	208	432	156	324	39.0	81.0
11	2	16-QAM	1/2	4	416	864	208	432	52.0	108.0
12	2	16-QAM	3/4	4	416	864	312	648	78.0	162.0
13	2	64-QAM	2/3	6	624	1296	416	864	104.0	216.0
14	2	64-QAM	3/4	6	624	1296	468	972	117.0	243.0
15	2	64-QAM	5/6	6	624	1296	520	1080	130.0	270.0
16	3	BPSK	1/2	1	156	324	78	162	19.5	40.5
17	3	QPSK	1/2	2	312	648	156	324	39	81
18	3	QPSK	3/4	2	312	648	234	486	58.5	121.5
19	3	16-QAM	1/2	4	624	1296	312	648	78	162
20	3	16-QAM	3/4	4	624	1296	468	972	117	243
21	3	64-QAM	2/3	6	936	1944	624	1296	156	324
22	3	64-QAM	3/4	6	936	1944	702	1458	175.5	364.5
23	3	64-QAM	5/6	6	936	1944	780	1620	195	4055

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	guard interval

### 3.2. Accessories

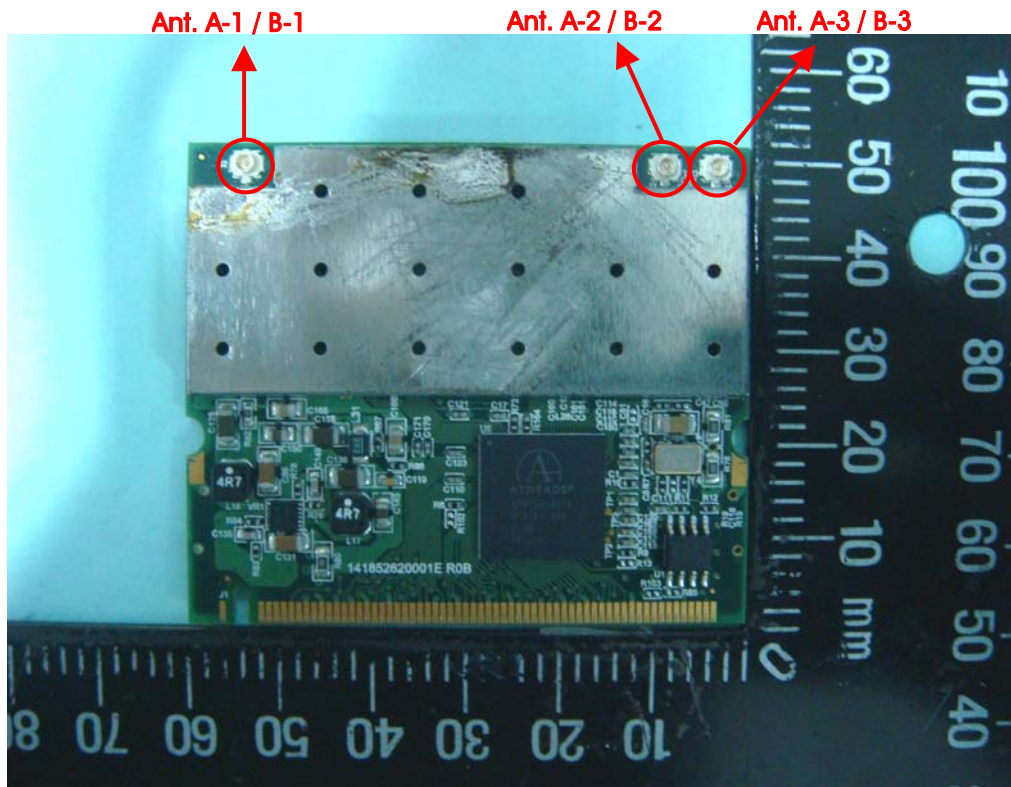
N/A

### 3.3. Table for Filed Antenna

#### 5GHz Band

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Remark
A-1	JOYMAX	FWX-614RSXXX-514	Dipole Antenna	Reversed-SMA	5	TX/RX
A-2	JOYMAX	FWX-614RSXXX-514	Dipole Antenna	Reversed-SMA	5	TX/RX
A-3	JOYMAX	FWX-614RSXXX-514	Dipole Antenna	Reversed-SMA	5	TX/RX
B-1	WYA YU	NP-7041	Embedded Antenna	NA	6	TX/RX
B-2	WYA YU	NP-7041	Embedded Antenna	NA	6	TX/RX
B-3	WYA YU	NP-7041	Embedded Antenna	NA	6	TX/RX

Note: Ant. A-1, Ant. A-2, Ant. A-3, Ant. B-1, Ant. B-2, Ant. B-3 could transmit/receive simultaneously.





### 3.4. Table for Carrier Frequencies

There are two bandwidth systems for draft n.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48.

For 40MHz bandwidth systems, use Channel 38, 46.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5250 MHz (USA/Canada) Band 1	36	5180 MHz	44	5220 MHz
	38	5190 MHz	46	5230 MHz
	40	5200 MHz	48	5240 MHz

### 3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. 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		Auto	-	-
Max. Conducted Output Power	MCS16/20MHz	Band 1	13Mbps	36/40/48	A-1+A-2+A-3 / B-1+B-2+B-3
	MCS16/40MHz	Band 1	27Mbps	38/46	A-1+A-2+A-3 / B-1+B-2+B-3
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Power Spectral Density Peak Excursion	MCS16/20MHz	Band 1	13Mbps	36/40/48	N/A
	MCS16/40MHz	Band 1	27Mbps	38/46	N/A
Radiated Emission Below 1GHz	Normal Link		Auto	-	-
Radiated Emission Above 1GHz	MCS16/20MH z	Band 1	13Mbps	36/40/48	A/B
	MCS16/40MH z	Band 1	27Mbps	38/46	A/B
Band Edge Emission	MCS16/20MH z	Band 1	13Mbps	36/48	A/B
	MCS16/40MH z	Band 1	27Mbps	38/54	A/B
Frequency Stability	Un-modulation		-	40	N/A

Test Mode:

<For Ant. A Dipole Antenna>

Adapter Mode: EUT with Ant. A + Adapter

POE Mode: EUT with Ant. A + POE

For Conducted Emissions test:

Due to Adapter Mode generated the worst test result, so it was recorded in this report.

For Radiated Emissions test:

Adapter Mode and POE Mode for Radiated emission test were performed at Horizontal and Vertical and the worst-case was found at Horizontal. So it was recorded in this report.

Due to POE Mode (Horizontal) generated the worst test result, so it was recorded in this report.

<For Ant. B Embedded Antenna>

Adapter Mode: EUT with Ant. B + Adapter

POE Mode: EUT with Ant. B + POE

For Conducted Emissions test:

Due to Adapter Mode generated the worst test result, so it was recorded in this report.

For Radiated Emissions test:

Adapter Mode and POE Mode for Radiated emission test were performed at Horizontal and Vertical and the worst-case was found at Vertical. So it was recorded in this report.

Due to POE Mode (Horizontal) generated the worst test result, so it was recorded in this report.

### 3.6. 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).

Please refer section 6 for Test Site Address.

### 3.7. Table for Multiple Listing & Existing Change

The brand/model names in the following table are all refer to the identical product.

Product Name	Brand Name	Model Name	Description
HiPath Wireless Access Point	SIEMENS	AP3610	EUT with internal antennas
		AP3620	EUT with external antennas
Altitude 450	Extreme	15800 Altitude 450	EUT with internal antennas
Altitude 451	Extreme	15801 Altitude 451	EUT with external antennas

Note: All the models are identical, the difference model for difference brand served as marketing strategy.

### 3.8. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	D400	E2K24GBRL
Modem	ACEEX	DM1414	IFAXDM1414
Mouse	QSKY	Lx-619B	DoC
Printer	EPSON	LQ-300+	DoC

### 3.9. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

#### Power Parameters of Draft n MCS16 20MHz

Test Software Version	ART		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11a Ant. A	14.5	15	14.5
IEEE 802.11a Ant. B	11	11	11

#### Power Parameters of Draft n MCS16 40MHz

Test Software Version	ART	
Frequency	5190 MHz	5230 MHz
IEEE 802.11a Ant. A	10.5	14.5
IEEE 802.11a Ant. B	10	11

During the test, the following programs under WIN XP were executed:

Executed "ping.exe" to link with the remote workstation to receive and transmit signal by LAN and WLAN.

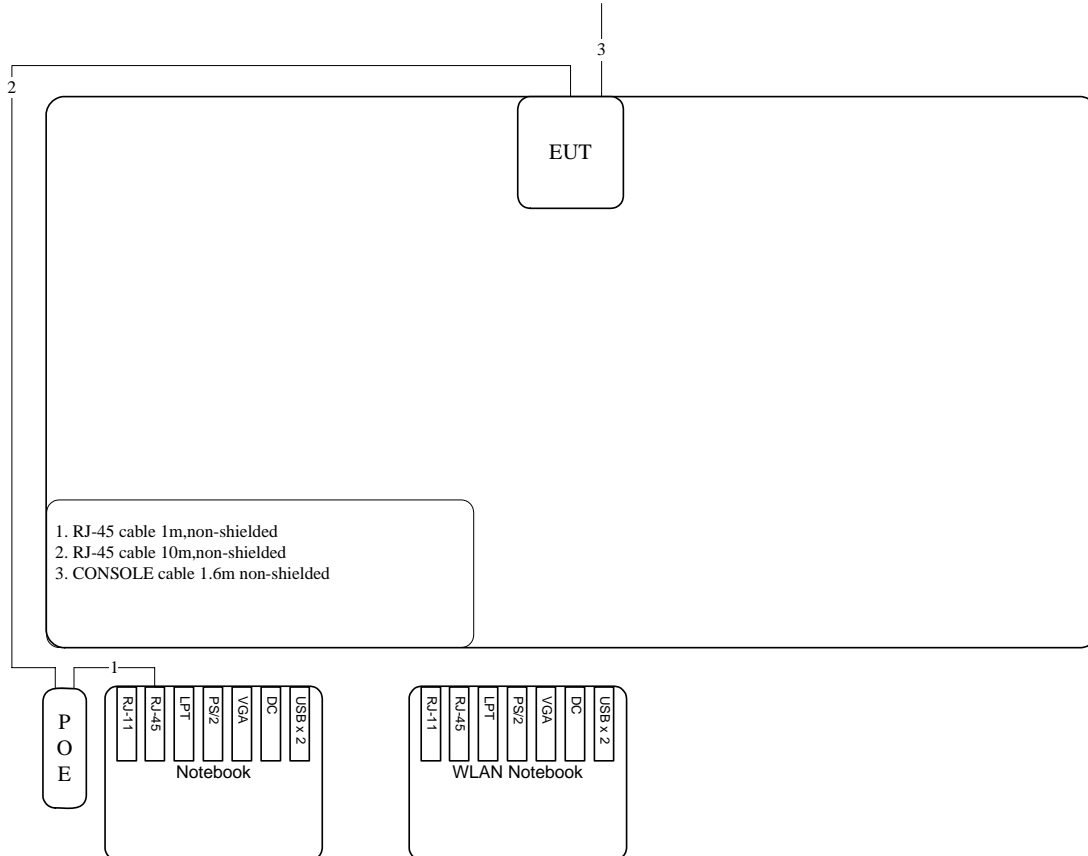
Executed "LAN Test" to traffic packet data generated software and keep 10% traffic load to link with the remote workstation by LAN and WAN.

### 3.10. Test Configurations

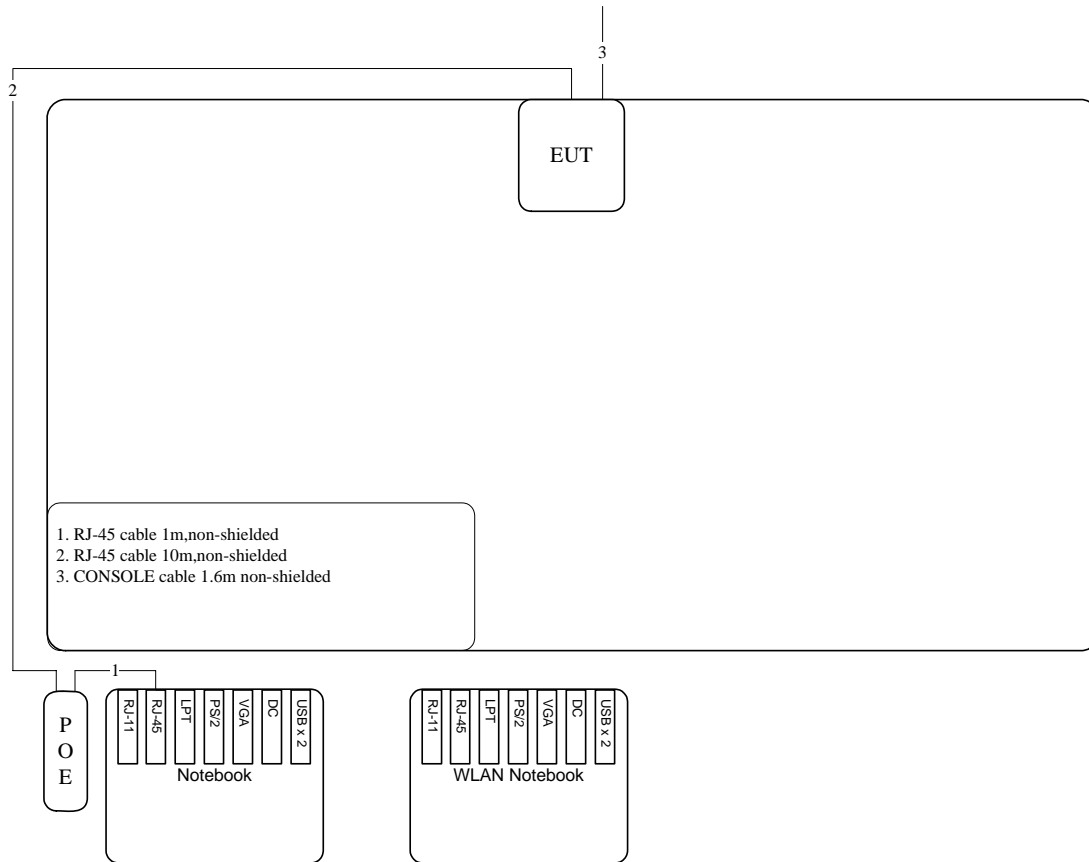
#### 3.10.1. Radiation Emissions Test Configuration

Test Configuration: 9KHz~1GHz

Test Mode: Ant. A POE Mode (Horizontal)

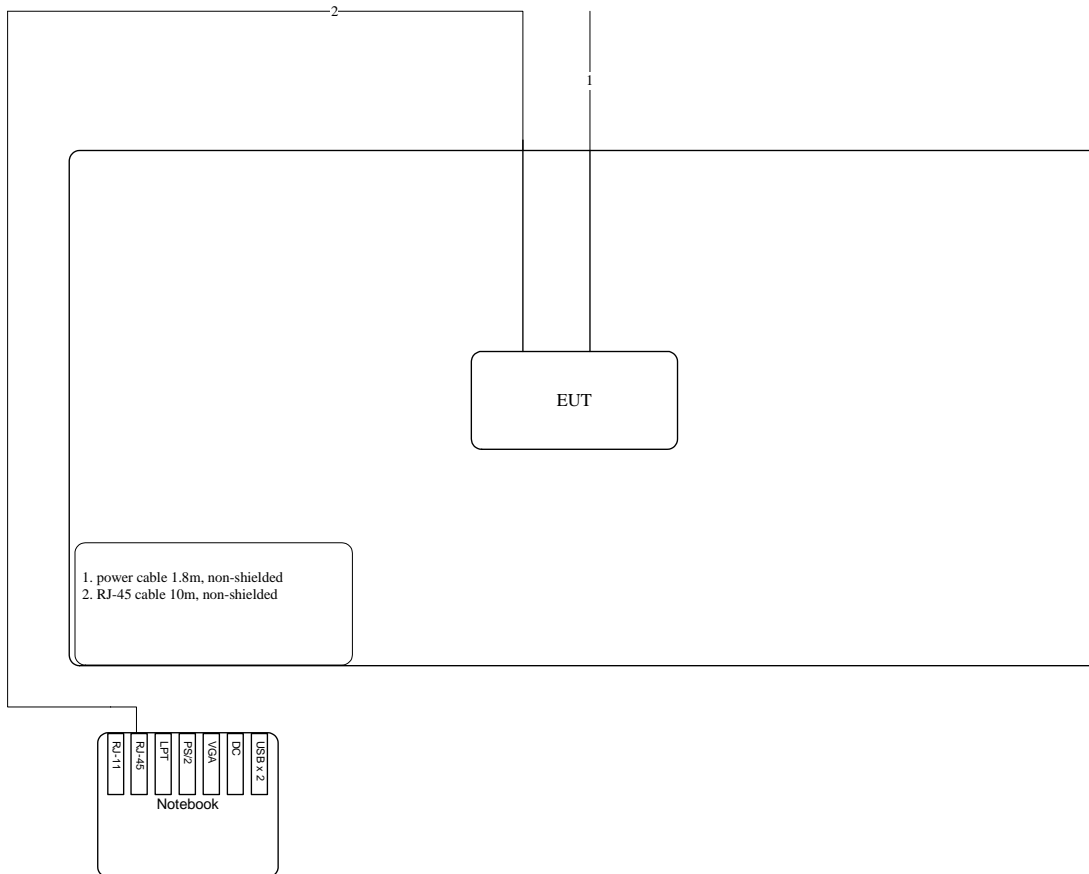


Test Mode: Ant. B POE Mode (Horizontal)

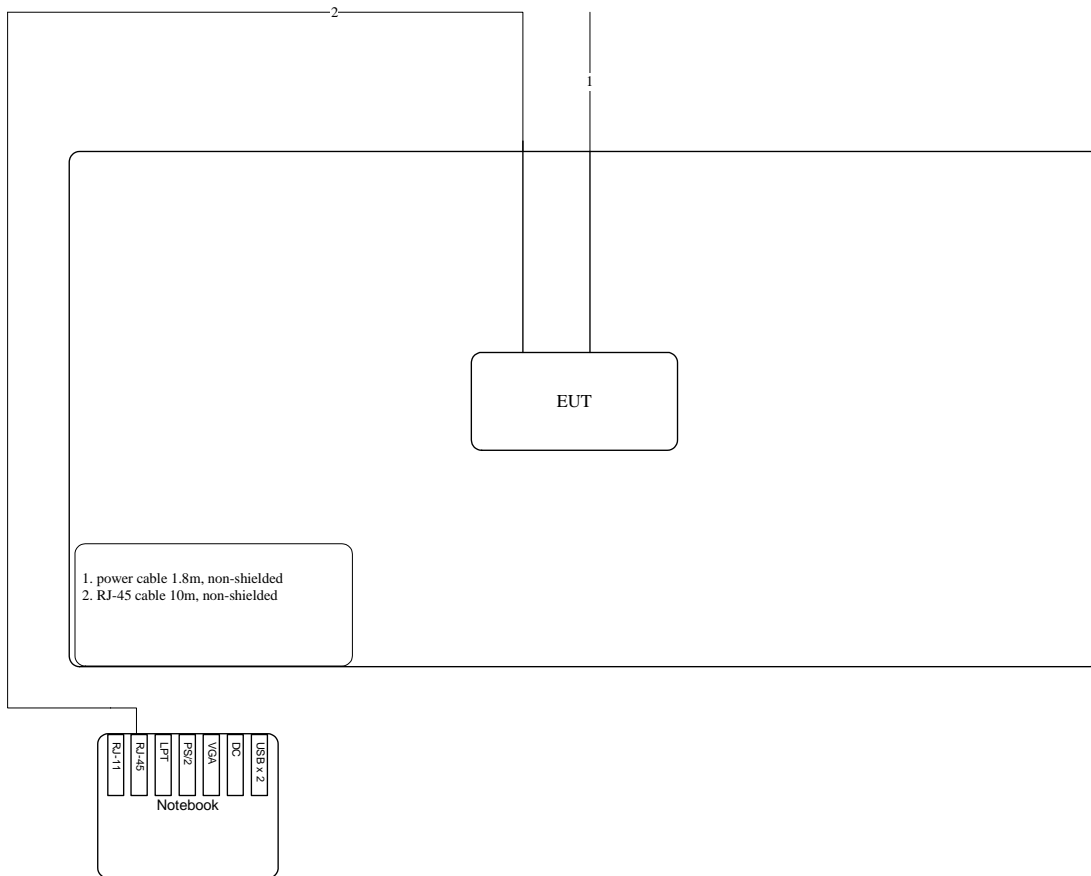


Test Configuration: above 1GHz

Ant. A

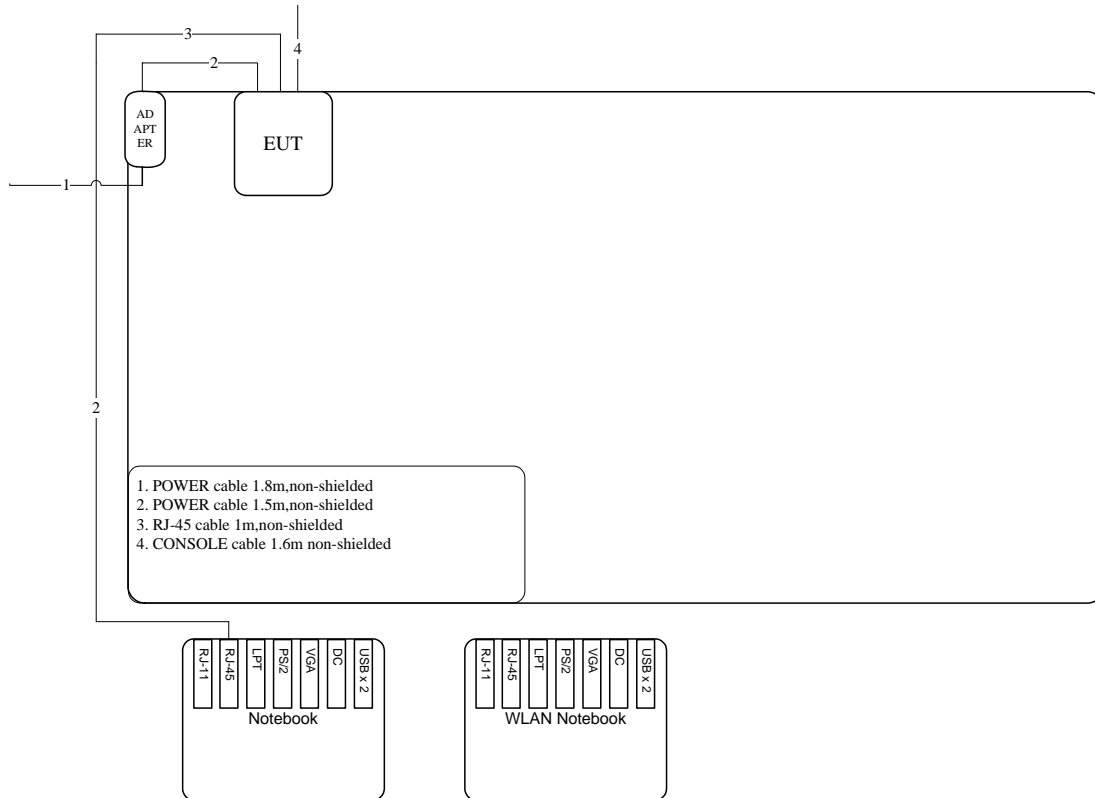


Ant. B

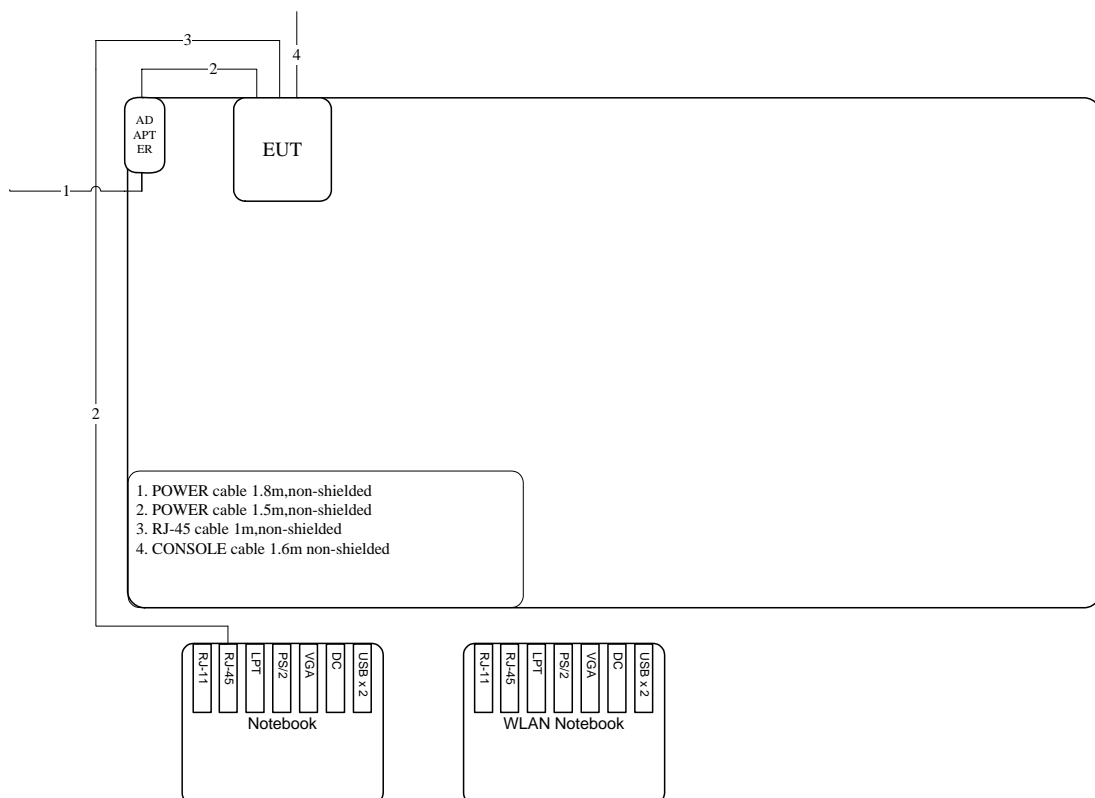


### 3.10.2. AC Power Line Conduction Emissions Test Configuration

Test Mode: Ant. A Adapter Mode



Test Mode: Ant. B Adapter Mode





## 4. TEST RESULT

### 4.1. AC Power Line Conducted Emissions Measurement

#### 4.1.1. Limit

For this product that is designed to connect 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

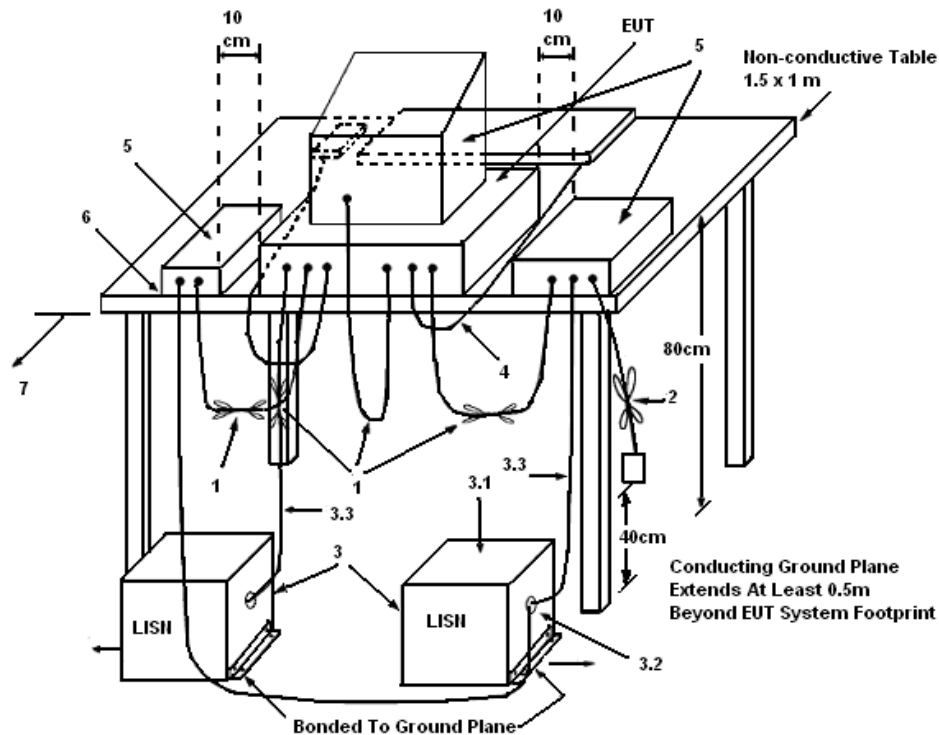
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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



#### LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in  $50 \Omega$ . LISN can be placed on top of, or immediately beneath, reference ground plane.
  - (3.1) All other equipment powered from additional LISN(s).
  - (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
  - (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

#### 4.1.5. Test Deviation

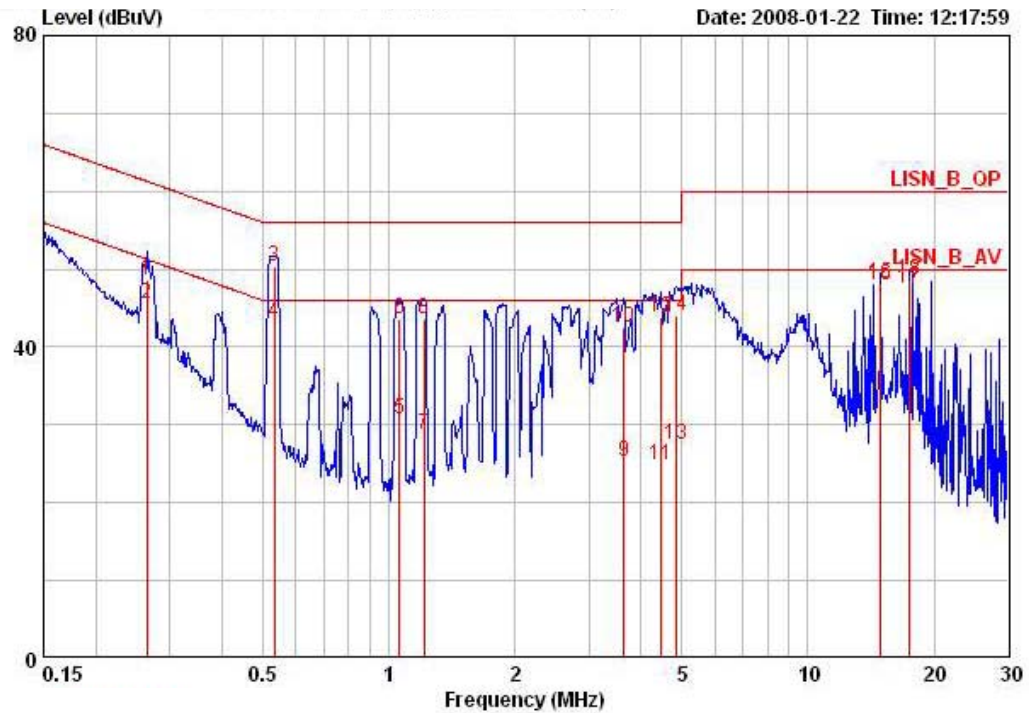
There is no deviation with the original standard.

#### 4.1.6. EUT Operation during Test

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

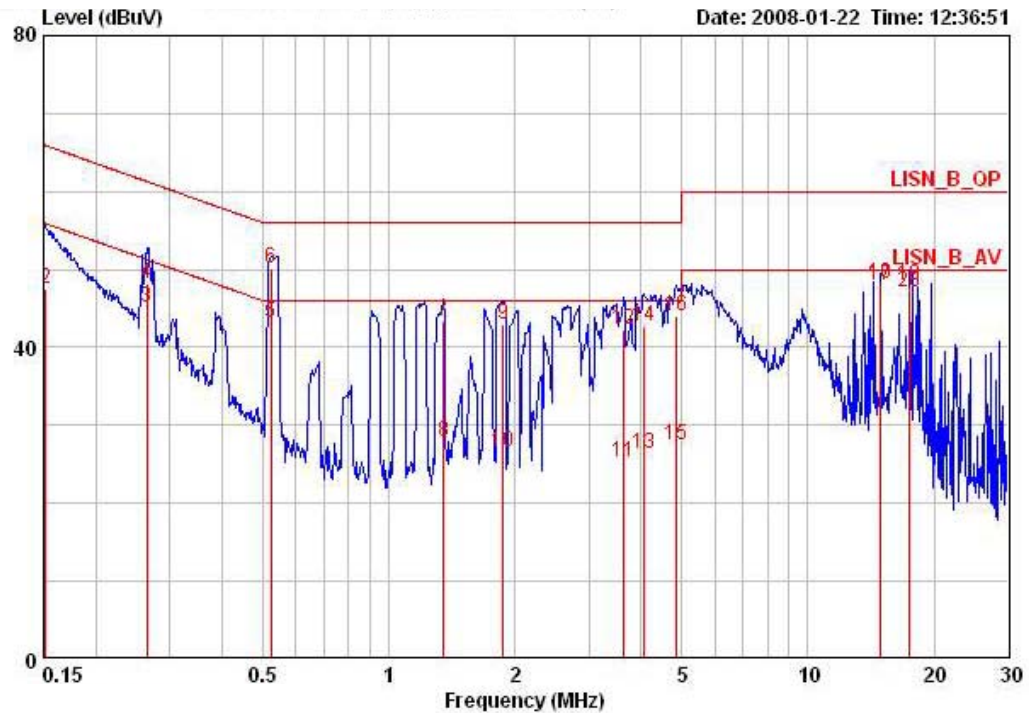
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	21°C	Humidity	60%
Test Engineer	Andy Tsai	Phase	Line
Configuration	Ant. A Adapter Mode		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.26442	48.55	-12.74	61.29	48.25	0.10	0.20	QP	LINE
2	0.26442	45.49	-5.80	51.29	45.19	0.10	0.20	AVERAGE	LINE
3	0.53215	50.27	-5.74	56.00	49.99	0.08	0.20	QP	LINE
4	0.53215	43.18	-2.83	46.00	42.90	0.08	0.20	AVERAGE	LINE
5	1.060	30.76	-15.24	46.00	30.57	0.00	0.19	AVERAGE	LINE
6	1.060	43.55	-12.45	56.00	43.36	0.00	0.19	QP	LINE
7	1.216	28.78	-17.22	46.00	28.63	0.00	0.15	AVERAGE	LINE
8	1.216	43.54	-12.46	56.00	43.39	0.00	0.15	QP	LINE
9	3.642	25.23	-20.77	46.00	24.93	0.00	0.30	AVERAGE	LINE
10	3.642	42.53	-13.47	56.00	42.23	0.00	0.30	QP	LINE
11	4.472	24.93	-21.07	46.00	24.62	0.01	0.30	AVERAGE	LINE
12	4.472	43.86	-12.14	56.00	43.55	0.01	0.30	QP	LINE
13	4.848	27.39	-18.61	46.00	27.08	0.01	0.30	AVERAGE	LINE
14	4.848	44.11	-11.89	56.00	43.80	0.01	0.30	QP	LINE
15	14.903	48.08	-11.92	60.00	47.58	0.10	0.40	QP	LINE
16	14.903	47.94	-2.06	50.00	47.44	0.10	0.40	AVERAGE	LINE
17	17.418	47.49	-2.51	50.00	46.89	0.10	0.50	AVERAGE	LINE
18	17.418	48.66	-11.34	60.00	48.06	0.10	0.50	QP	LINE

Temperature	21°C	Humidity	60%
Test Engineer	Andy Tsai	Phase	Neutral
Configuration	Ant. A Adapter Mode		

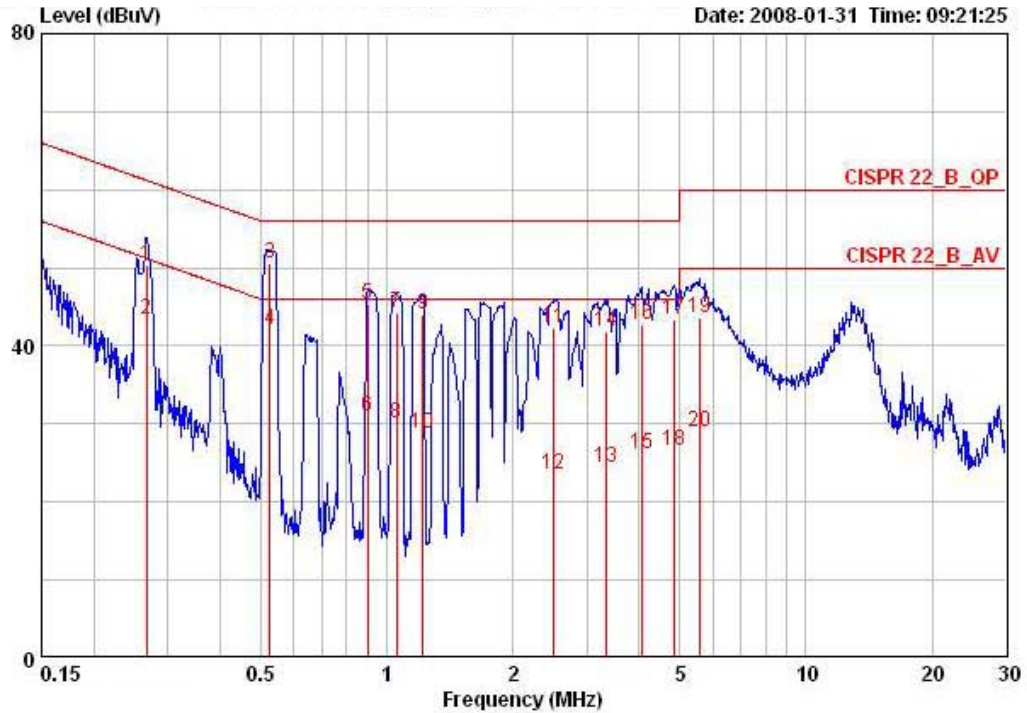


	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.15160	22.48	-33.43	55.91	21.98	0.30	0.20	AVERAGE	NEUTRAL
2	0.15160	47.61	-18.30	65.91	47.11	0.30	0.20	QP	NEUTRAL
3	0.26442	45.16	-6.13	51.29	44.79	0.17	0.20	AVERAGE	NEUTRAL
4	0.26442	48.26	-13.03	61.29	47.89	0.17	0.20	QP	NEUTRAL
5	0.52376	43.09	-2.91	46.00	42.79	0.10	0.20	AVERAGE	NEUTRAL
6	0.52376	50.19	-5.81	56.00	49.89	0.10	0.20	QP	NEUTRAL
7	1.352	43.35	-12.65	56.00	43.12	0.10	0.13	QP	NEUTRAL
8	1.352	27.95	-18.05	46.00	27.72	0.10	0.13	AVERAGE	NEUTRAL
9	1.878	42.90	-13.10	56.00	42.62	0.10	0.18	QP	NEUTRAL
10	1.878	26.57	-19.43	46.00	26.29	0.10	0.18	AVERAGE	NEUTRAL
11	3.642	25.27	-20.73	46.00	24.87	0.10	0.30	AVERAGE	NEUTRAL
12	3.642	42.38	-13.62	56.00	41.98	0.10	0.30	QP	NEUTRAL
13	4.049	26.46	-19.54	46.00	26.06	0.10	0.30	AVERAGE	NEUTRAL
14	4.049	42.80	-13.20	56.00	42.40	0.10	0.30	QP	NEUTRAL
15	4.848	27.48	-18.52	46.00	27.08	0.10	0.30	AVERAGE	NEUTRAL
16	4.848	44.08	-11.92	56.00	43.68	0.10	0.30	QP	NEUTRAL
17	14.907	48.00	-2.00	50.00	47.50	0.10	0.40	AVERAGE	NEUTRAL
18	17.423	48.14	-11.86	60.00	47.64	0.10	0.40	QP	NEUTRAL
19	17.423	47.95	-12.05	60.00	47.35	0.10	0.50	QP	NEUTRAL
20	17.423	47.03	-2.97	50.00	46.43	0.10	0.50	AVERAGE	NEUTRAL

Note:

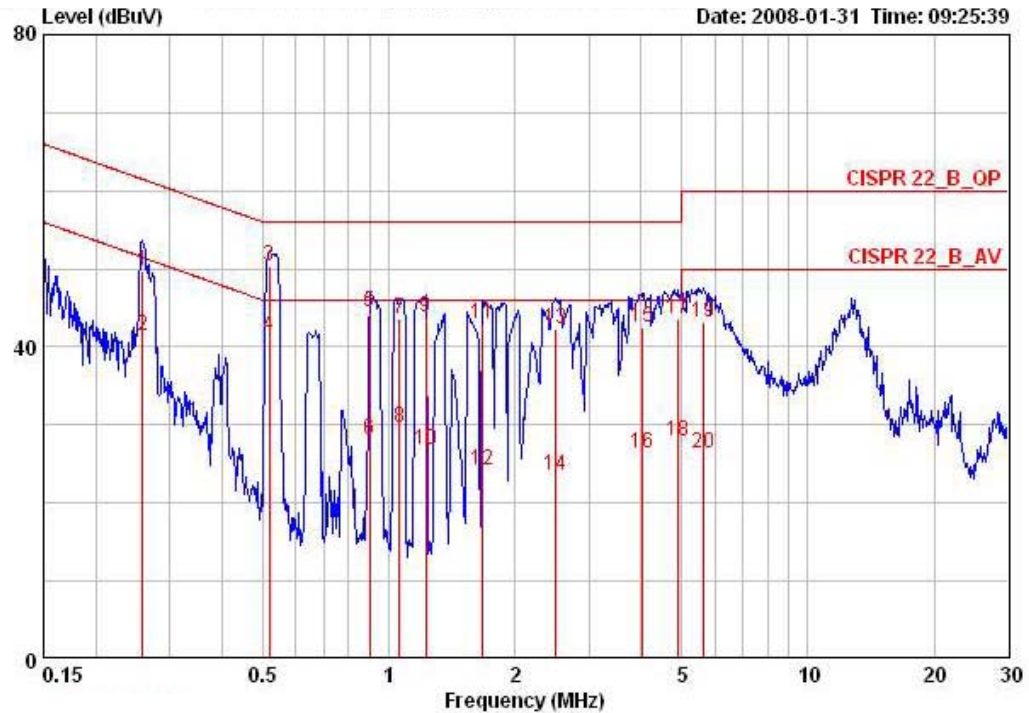
Level = Read Level + LISN Factor + Cable Loss.

Temperature	21°C	Humidity	60%
Test Engineer	Andy Tsai	Phase	Line
Configuration	Ant. B Adapter Mode		



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.26724	50.46	-10.74	61.20	50.16	0.10	0.20	QP	LINE
2	0.26724	43.38	-7.82	51.20	43.08	0.10	0.20	AVERAGE	LINE
3	0.52655	50.61	-5.40	56.00	50.33	0.08	0.20	QP	LINE
4	0.52655	42.03	-3.97	46.00	41.75	0.08	0.20	AVERAGE	LINE
5	0.89917	45.34	-10.67	56.00	45.12	0.02	0.20	QP	LINE
6	0.89917	30.89	-15.12	46.00	30.67	0.02	0.20	AVERAGE	LINE
7	1.054	44.24	-11.76	56.00	44.05	0.00	0.19	QP	LINE
8	1.054	30.09	-15.91	46.00	29.90	0.00	0.19	AVERAGE	LINE
9	1.217	44.01	-11.99	56.00	43.86	0.00	0.15	QP	LINE
10	1.217	28.73	-17.27	46.00	28.58	0.00	0.15	AVERAGE	LINE
11	2.500	42.34	-13.66	56.00	42.14	0.00	0.20	QP	LINE
12	2.500	23.44	-22.56	46.00	23.24	0.00	0.20	AVERAGE	LINE
13	3.346	24.49	-21.51	46.00	24.22	0.00	0.27	AVERAGE	LINE
14	3.346	41.87	-14.13	56.00	41.60	0.00	0.27	QP	LINE
15	4.070	26.22	-19.78	46.00	25.92	0.00	0.30	AVERAGE	LINE
16	4.070	42.82	-13.18	56.00	42.52	0.00	0.30	QP	LINE
17	4.848	43.37	-12.63	56.00	43.06	0.01	0.30	QP	LINE
18	4.848	26.61	-19.39	46.00	26.30	0.01	0.30	AVERAGE	LINE
19	5.564	43.66	-16.34	60.00	43.33	0.03	0.30	QP	LINE
20	5.564	29.00	-21.00	50.00	28.67	0.03	0.30	AVERAGE	LINE

Temperature	21°C	Humidity	60%
Test Engineer	Andy Tsai	Phase	Neutral
Configuration	Ant. B Adapter Mode		



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.25888	49.79	-11.68	61.47	49.42	0.17	0.20	QP	NEUTRAL
2	0.25888	41.50	-9.97	51.47	41.13	0.17	0.20	AVERAGE	NEUTRAL
3	0.51824	50.36	-5.64	56.00	50.06	0.10	0.20	QP	NEUTRAL
4	0.51824	41.32	-4.68	46.00	41.02	0.10	0.20	AVERAGE	NEUTRAL
5	0.89917	44.42	-11.58	56.00	44.12	0.10	0.20	QP	NEUTRAL
6	0.89917	28.08	-17.92	46.00	27.78	0.10	0.20	AVERAGE	NEUTRAL
7	1.060	43.65	-12.35	56.00	43.36	0.10	0.19	QP	NEUTRAL
8	1.060	29.59	-16.41	46.00	29.30	0.10	0.19	AVERAGE	NEUTRAL
9	1.223	43.76	-12.24	56.00	43.51	0.10	0.15	QP	NEUTRAL
10	1.223	26.77	-19.23	46.00	26.52	0.10	0.15	AVERAGE	NEUTRAL
11	1.671	42.94	-13.06	56.00	42.70	0.10	0.14	QP	NEUTRAL
12	1.671	24.26	-21.74	46.00	24.02	0.10	0.14	AVERAGE	NEUTRAL
13	2.487	42.30	-13.70	56.00	42.00	0.10	0.20	QP	NEUTRAL
14	2.487	23.46	-22.54	46.00	23.16	0.10	0.20	AVERAGE	NEUTRAL
15	4.027	42.47	-13.53	56.00	42.07	0.10	0.30	QP	NEUTRAL
16	4.027	26.35	-19.65	46.00	25.95	0.10	0.30	AVERAGE	NEUTRAL
17	4.900	43.62	-12.38	56.00	43.22	0.10	0.30	QP	NEUTRAL
18	4.900	27.91	-18.09	46.00	27.51	0.10	0.30	AVERAGE	NEUTRAL
19	5.623	43.08	-16.92	60.00	42.68	0.10	0.30	QP	NEUTRAL
20	5.623	26.33	-23.67	50.00	25.93	0.10	0.30	AVERAGE	NEUTRAL

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

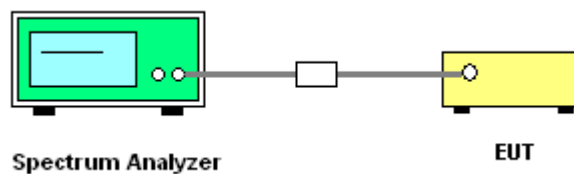
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 analyzer 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. Measuring multiple antennas, the connector is required to link with spectrum analyzer through a combiner.

### 4.2.4. Test Setup Layout



### 4.2.5. Test Deviation

There is no deviation 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

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Jacky Ho	<b>Configurations</b>	Draft n

##### Configuration Draft n MCS16 20MHz Ant. A-1+A-2+A-3

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	23.07	17.94
40	5200 MHz	22.82	17.94
48	5240 MHz	22.69	17.94

##### Configuration Draft n MCS16 40MHz Ant. A-1+A-2+A-3

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	44.35	36.41
46	5230 MHz	43.97	36.41

##### Configuration Draft n MCS16 20MHz Ant. B-1+B-2+B-3

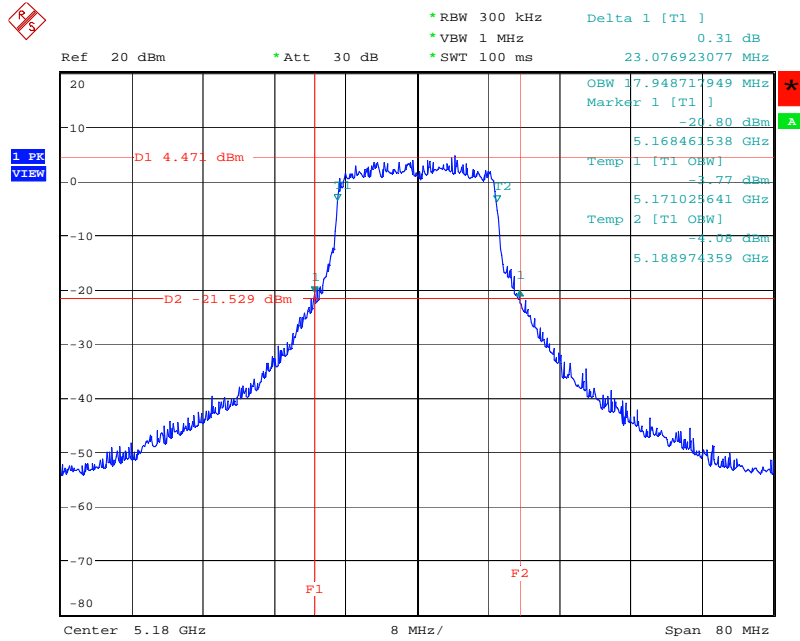
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	23.46	17.94
40	5200 MHz	22.43	17.94
48	5240 MHz	22.17	17.94

##### Configuration Draft n MCS16 40MHz Ant. B-1+B-2+B-3

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	43.07	36.41
46	5230 MHz	44.35	36.41

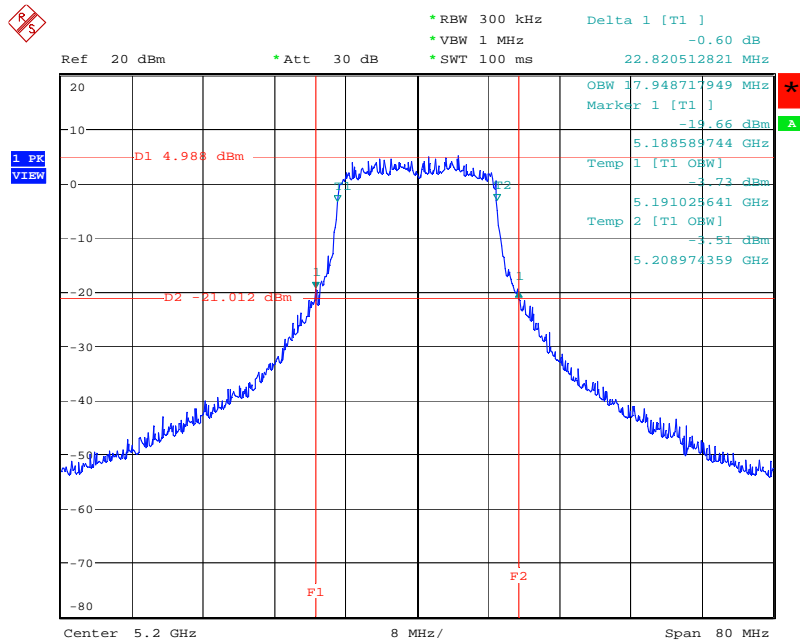


26 dB Bandwidth Plot on Configuration Drafft n MCS16 20MHz Ant. A-1 +A-2+A-3 / 5180 MHz



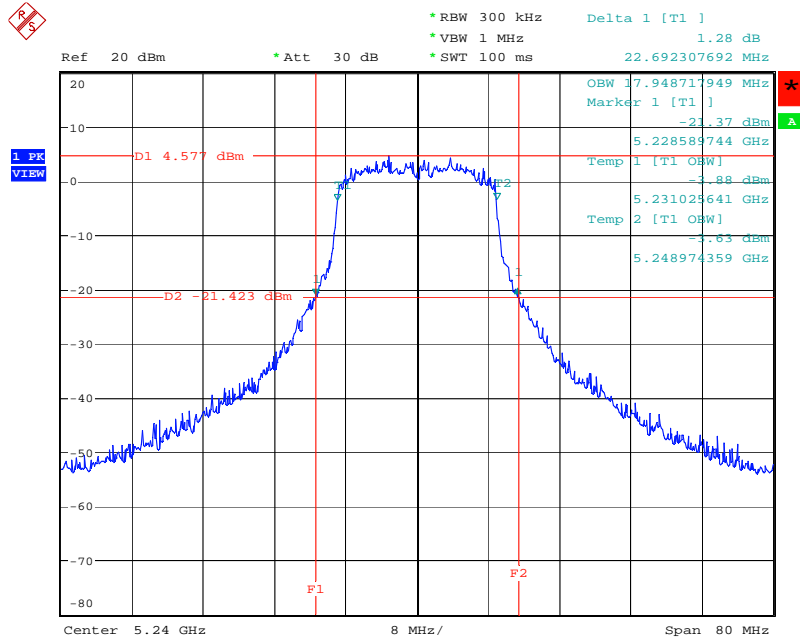
Date: 12.MAR.2008 20:21:27

26 dB Bandwidth Plot on Configuration Drafft n MCS16 20MHz Ant. A-1 +A-2+A-3 / 5200 MHz



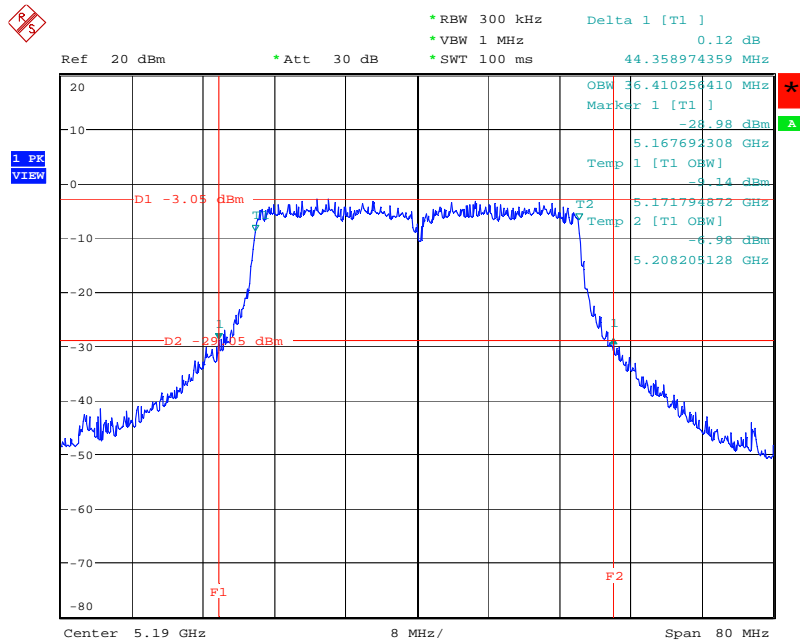
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26 dB Bandwidth Plot on Configuration Drafft n MCS16 20MHz Ant. A-1 +A-2+A-3 / 5240 MHz



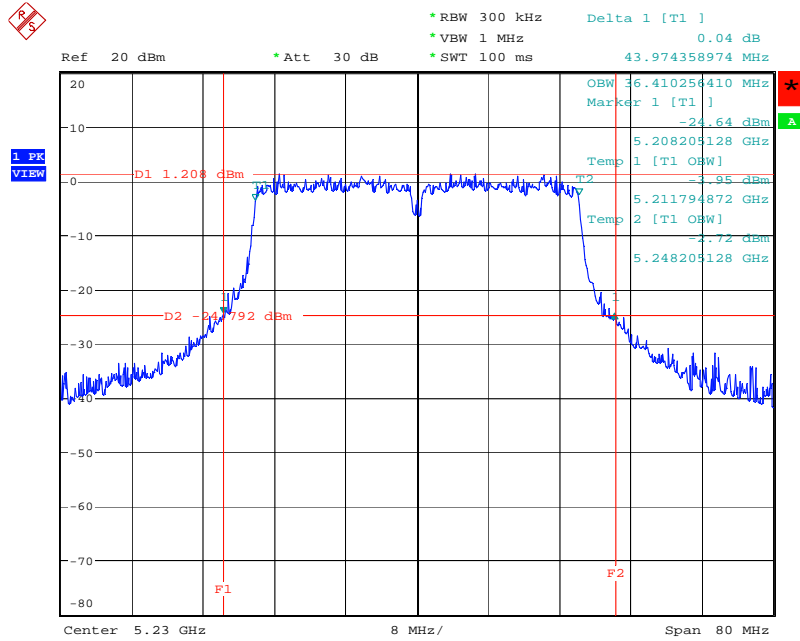
Date: 12.MAR.2008 20:18:42

26 dB Bandwidth Plot on Configuration Drafft n MCS16 40MHz Ant. A-1 +A-2+A-3 / 5190 MHz



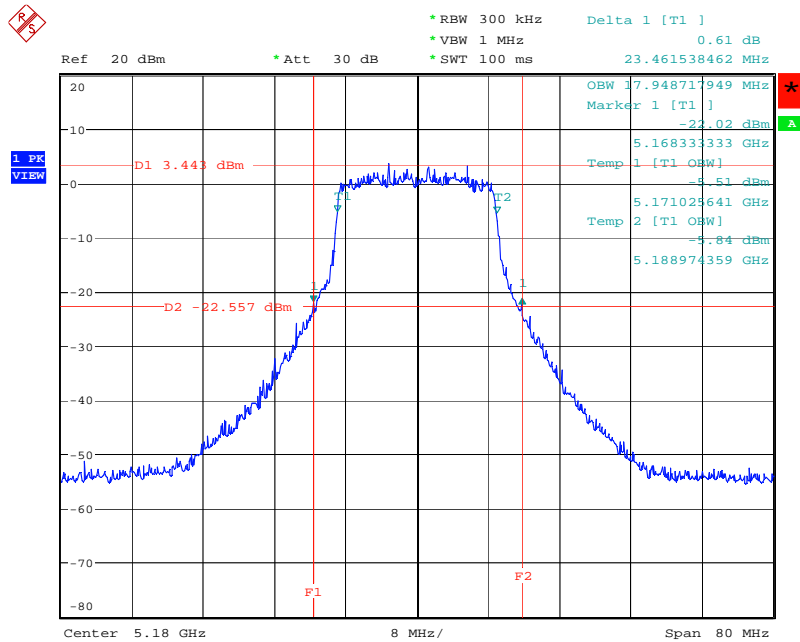
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26 dB Bandwidth Plot on Configuration Drafft n MCS16 40MHz Ant. A-1+A-2+A-3 / 5230 MHz



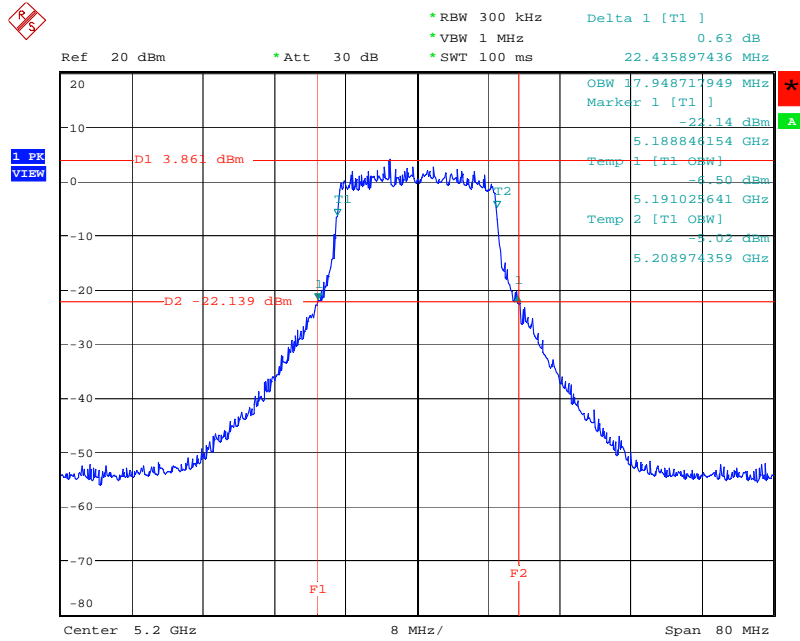
Date: 12.MAR.2008 20:15:04

26 dB Bandwidth Plot on Configuration Drafft n MCS16 20MHz Ant. B-1+B-2+B-3 / 5180 MHz



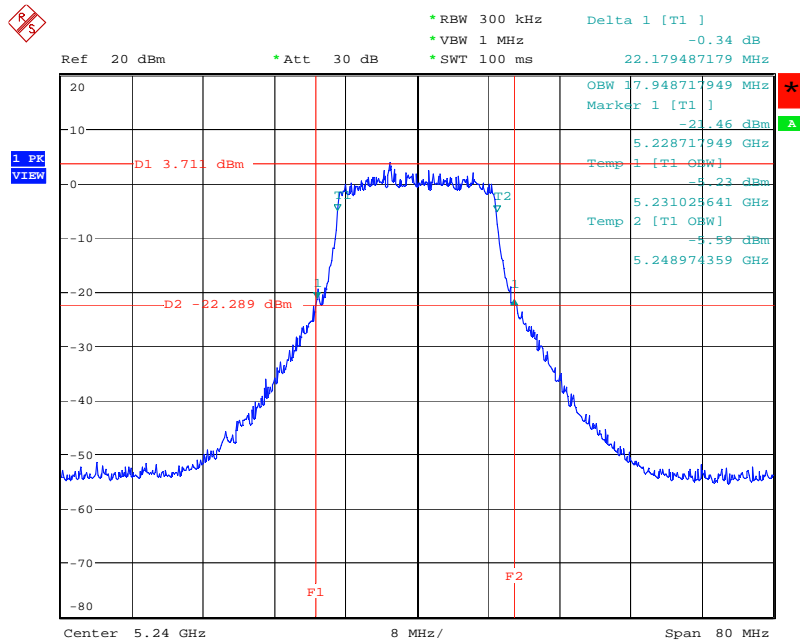
Date: 12.FEB.2008 14:14:19

26 dB Bandwidth Plot on Configuration Drafft n MCS16 20MHz Ant. B-1+B-2+B-3 / 5200 MHz



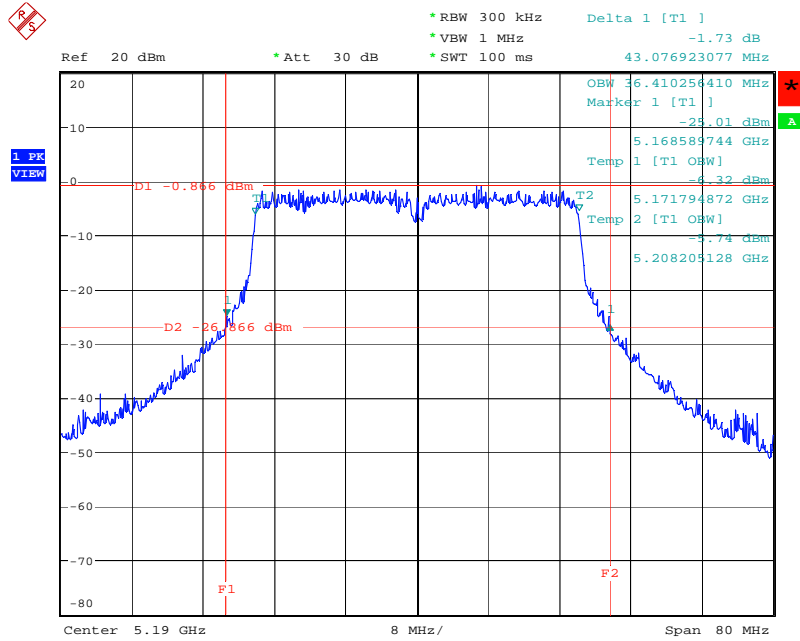
Date: 12.FEB.2008 14:17:23

26 dB Bandwidth Plot on Configuration Drafft n MCS16 20MHz Ant. B-1+B-2+B-3 / 5240 MHz



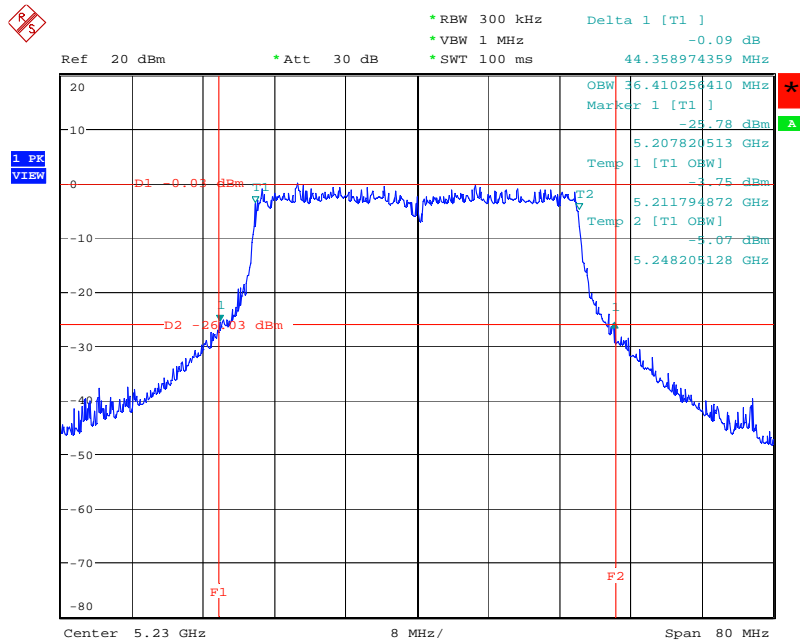
Date: 12.FEB.2008 14:18:58

26 dB Bandwidth Plot on Configuration Drafft n MCS16 40MHz Ant. B-1+B-2+B-3 / 5190 MHz



Date: 12.FEB.2008 13:54:54

26 dB Bandwidth Plot on Configuration Drafft n MCS16 40MHz Ant. B-1+B-2+B-3 / 5230 MHz



Date: 12.FEB.2008 13:56:42

### 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 and power density 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 5.470-5.725 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 and power density 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 and power density 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 and 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

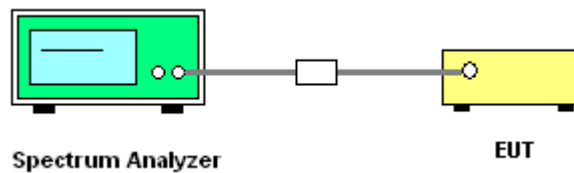
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	20ms

#### 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.
3. When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

#### 4.3.4. Test Setup Layout



#### 4.3.5. Test Deviation

There is 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	23°C	Humidity	61%
Test Engineer	Jacky Ho	Configurations	Draft n

##### Configuration Draft n MCS16 20MHz Ant. A-1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	9.50	17.00	Complies
40	5200 MHz	10.10	17.00	Complies
48	5240 MHz	9.96	17.00	Complies

##### Configuration Draft n MCS16 20MHz Ant. A-2

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.74	17.00	Complies
40	5200 MHz	12.92	17.00	Complies
48	5240 MHz	12.66	17.00	Complies

**Configuration Draft n MCS16 20MHz Ant. A-3**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.25	17.00	Complies
40	5200 MHz	12.63	17.00	Complies
48	5240 MHz	12.22	17.00	Complies

**Configuration Draft n MCS16 20MHz Ant. A-1+A-2+A-3**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	16.48	17.00	Complies
40	5200 MHz	16.83	17.00	Complies
48	5240 MHz	16.54	17.00	Complies

**Configuration Draft n MCS16 40MHz Ant. A-1**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	6.09	17.00	Complies
46	5230 MHz	10.97	17.00	Complies

**Configuration Draft n MCS16 40MHz Ant. A-2**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	8.87	17.00	Complies
46	5230 MHz	12.61	17.00	Complies

**Configuration Draft n MCS16 40MHz Ant. A-3**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	8.62	17.00	Complies
46	5230 MHz	12.72	17.00	Complies



**Configuration Draft n MCS16 40MHz Ant. A-1+A-2+A-3**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	12.80	17.00	Complies
46	5230 MHz	16.94	17.00	Complies

**Configuration Draft n MCS16 20MHz Ant. B-1**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	12.92	17.00	Complies
40	5200 MHz	12.51	17.00	Complies
48	5240 MHz	11.84	17.00	Complies

**Configuration Draft n MCS16 20MHz Ant. B-2**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	11.92	17.00	Complies
40	5200 MHz	11.87	17.00	Complies
48	5240 MHz	12.40	17.00	Complies

**Configuration Draft n MCS16 20MHz Ant. B-3**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	10.88	17.00	Complies
40	5200 MHz	10.58	17.00	Complies
48	5240 MHz	11.08	17.00	Complies

**Configuration Draft n MCS16 20MHz Ant. B-1+B-2+B-3**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	16.76	17.00	Complies
40	5200 MHz	16.50	17.00	Complies
48	5240 MHz	16.58	17.00	Complies

**Configuration Draft n MCS16 40MHz Ant. B-1**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	11.43	17.00	Complies
46	5230 MHz	12.03	17.00	Complies

**Configuration Draft n MCS16 40MHz Ant. B-2**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	11.17	17.00	Complies
46	5230 MHz	12.83	17.00	Complies

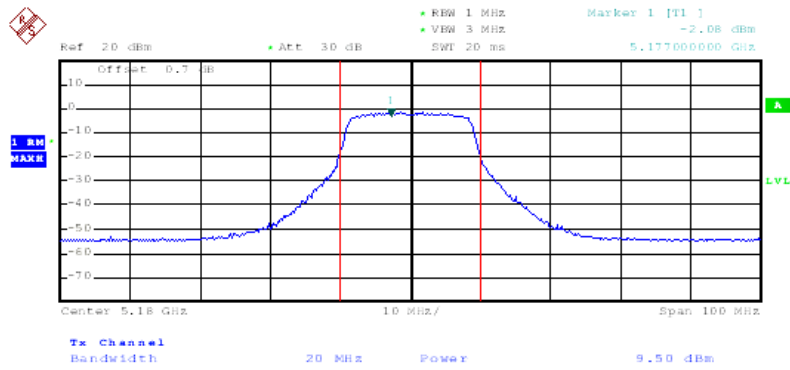
**Configuration Draft n MCS16 40MHz Ant. B-3**

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	10.09	17.00	Complies
46	5230 MHz	11.26	17.00	Complies

**Configuration Draft n MCS16 40MHz Ant. B-1+B-2+B-3**

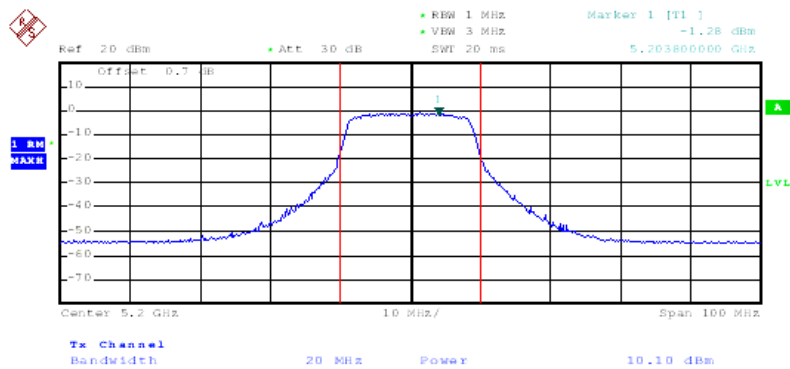
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	15.71	17.00	Complies
46	5230 MHz	16.86	17.00	Complies

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-1 / 5180 MHz



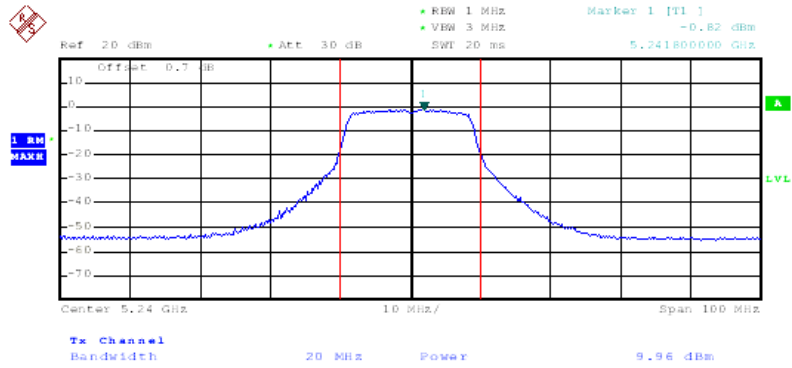
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Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-1 / 5200 MHz



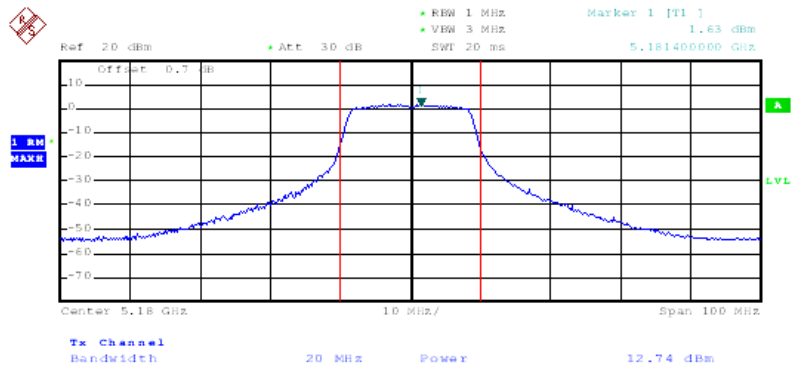
Date: 11.MAR.2008 18:29:08

**Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-1 / 5240 MHz**



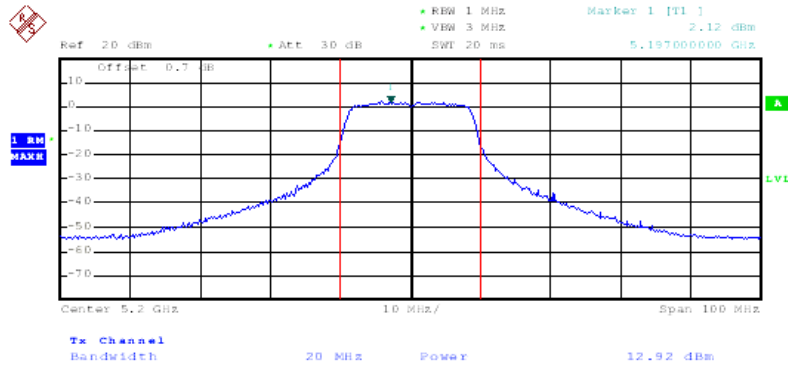
Date: 11.MAR.2008 18:30:22

**Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-2 / 5180 MHz**



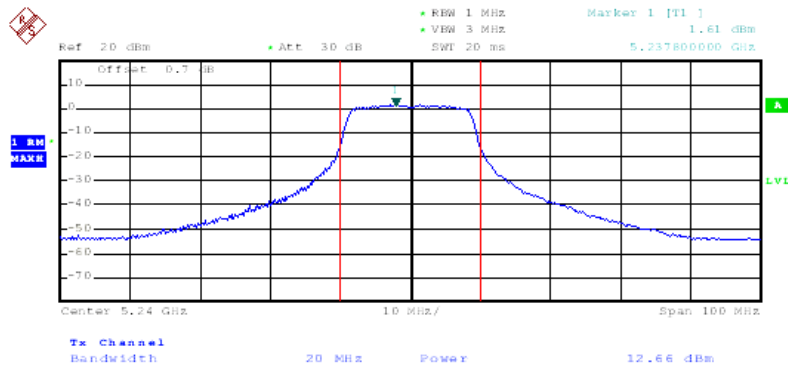
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Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-2 / 5200 MHz



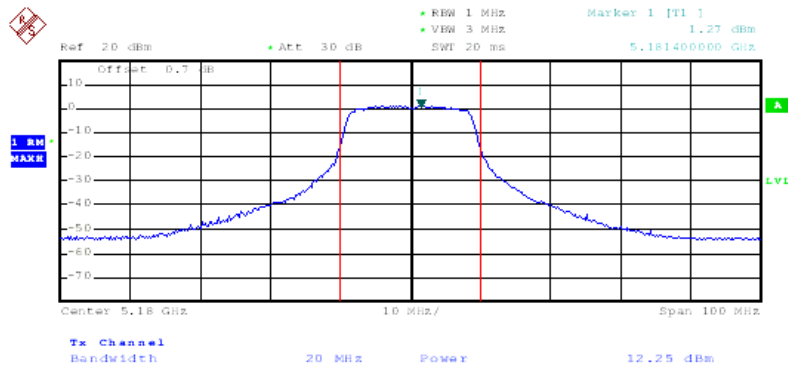
Date: 11.MAR.2008 18:26:24

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-2 / 5240 MHz



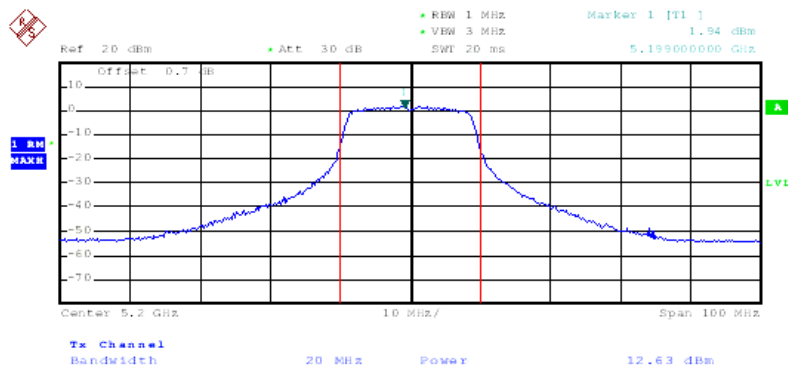
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Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-3 / 5180 MHz



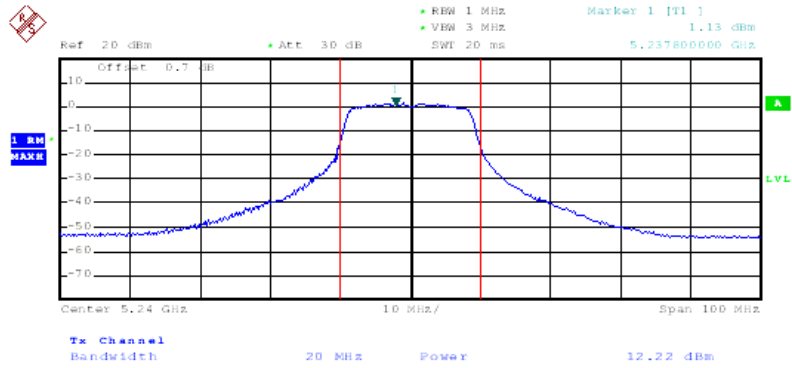
Date: 11.MAR.2008 18:23:27

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-3 / 5200 MHz



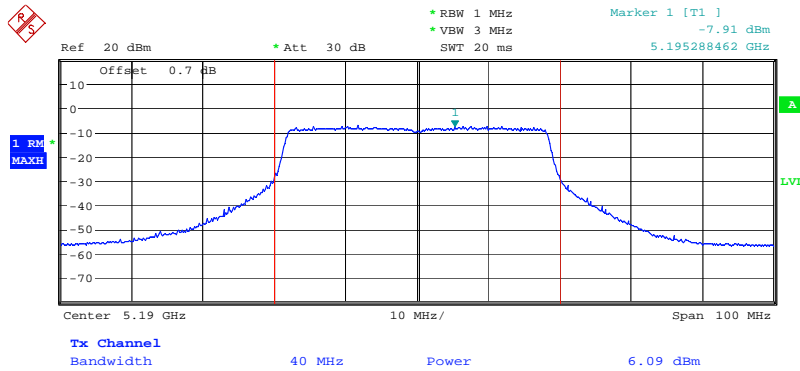
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**Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. A-3 / 5240 MHz**



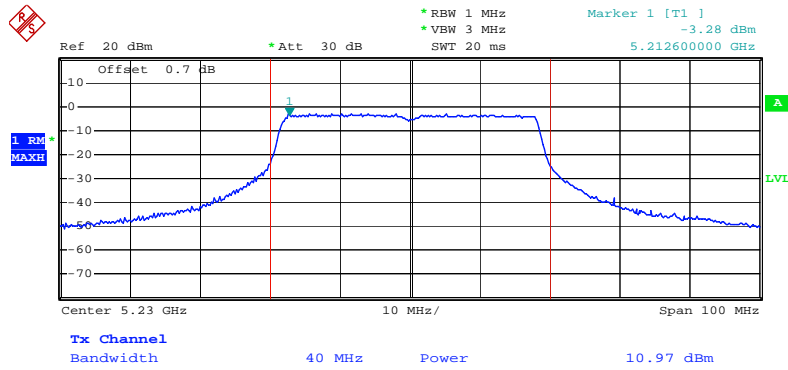
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**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. A-1 / 5190 MHz**



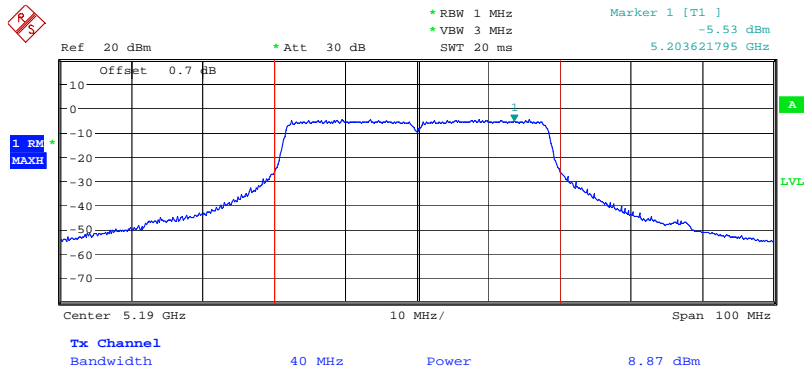
Date: 12.MAR.2008 20:10:23

Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. A-1 / 5230 MHz



Date: 11.MAR.2008 18:54:05

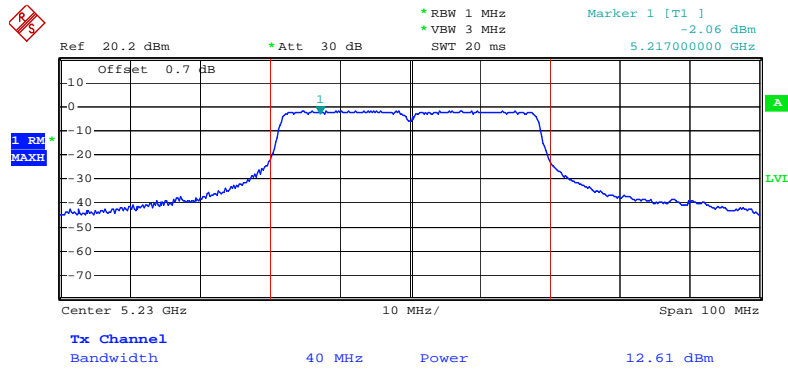
Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. A-2 / 5190 MHz



Date: 12.MAR.2008 20:09:27

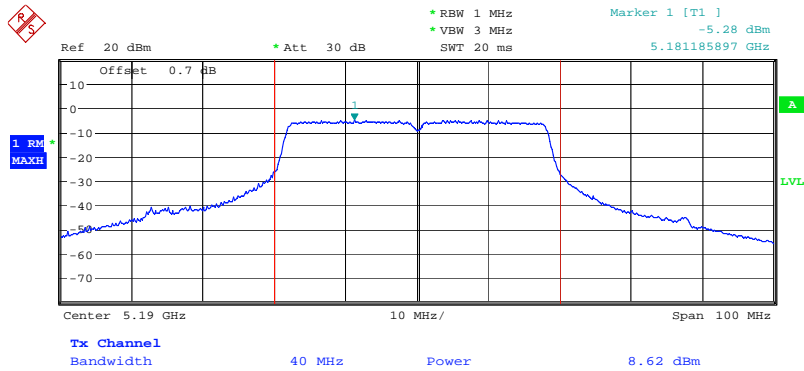


**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. A-2 / 5230 MHz**



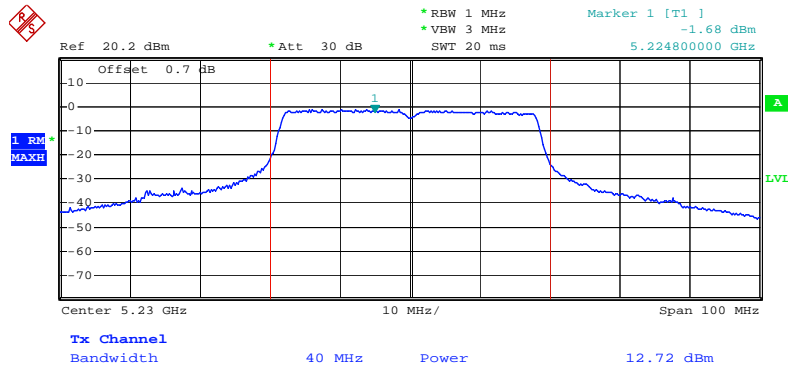
Date: 11.MAR.2008 18:49:06

**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. A-3 / 5190 MHz**



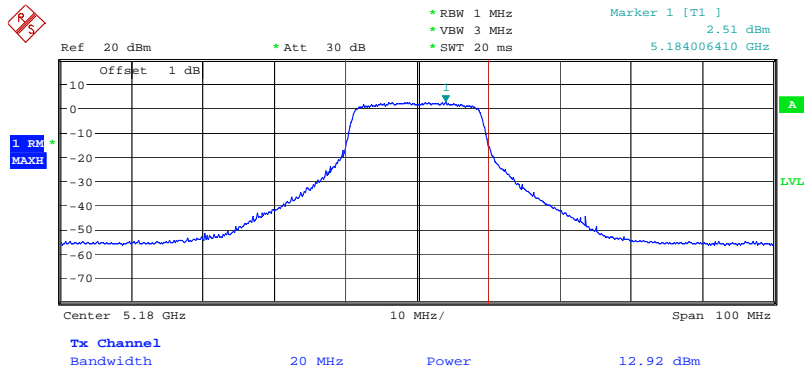
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**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. A-3 / 5230 MHz**



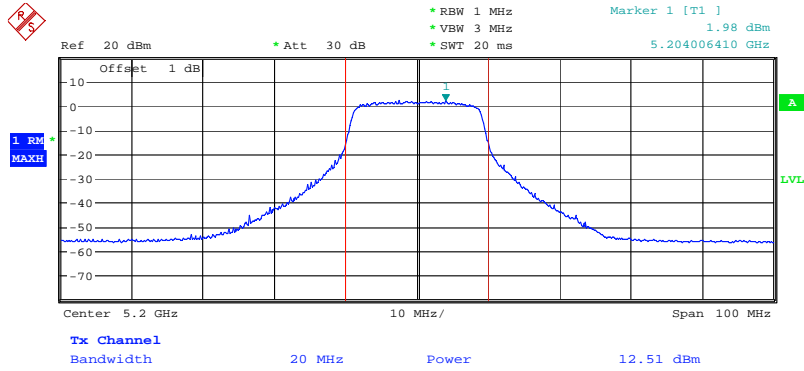
Date: 11.MAR.2008 18:47:45

**Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-1 / 5180 MHz**



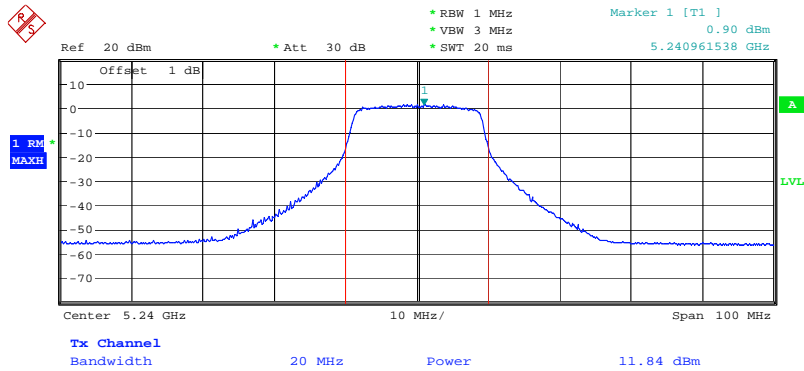
Date: 12.FEB.2008 09:36:04

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-1 / 5200 MHz



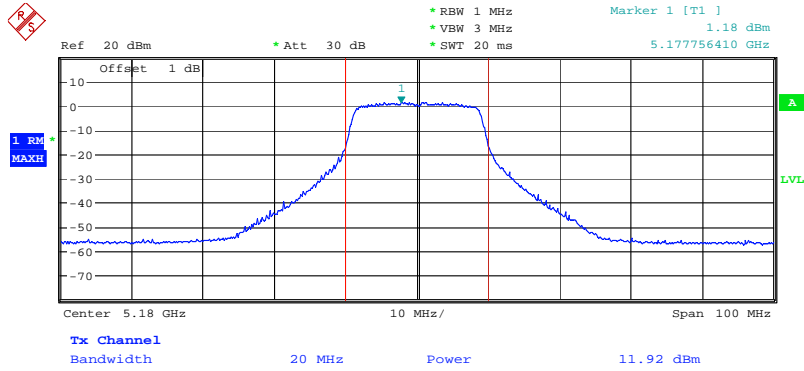
Date: 12.FEB.2008 09:36:53

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-1 / 5240 MHz



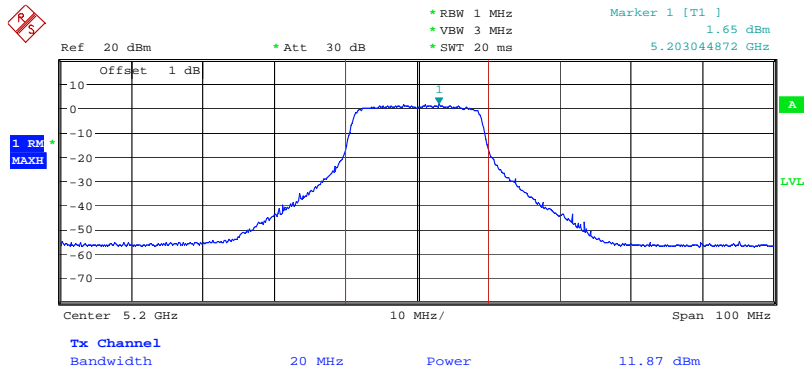
Date: 12.FEB.2008 09:40:16

**Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-2 / 5180 MHz**



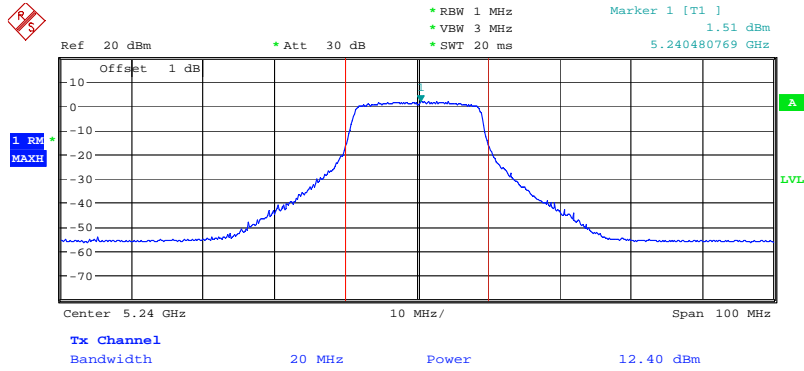
Date: 12.FEB.2008 09:35:17

**Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-2 / 5200 MHz**



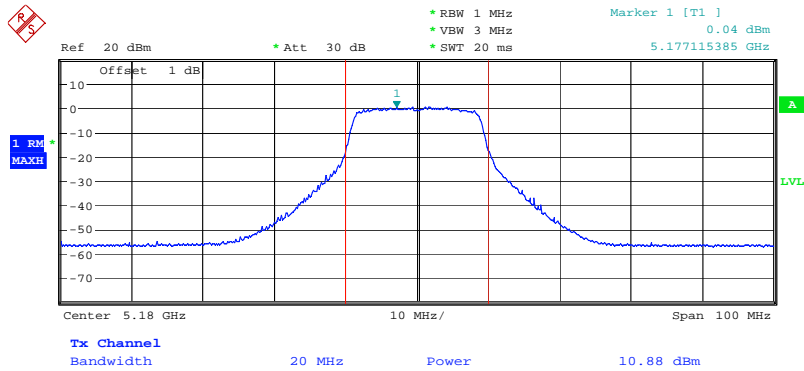
Date: 12.FEB.2008 09:37:17

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-2 / 5240 MHz



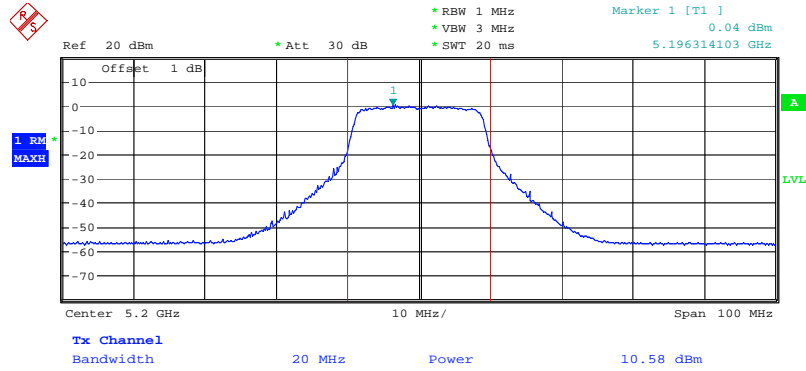
Date: 12.FEB.2008 09:39:17

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-3 / 5180 MHz



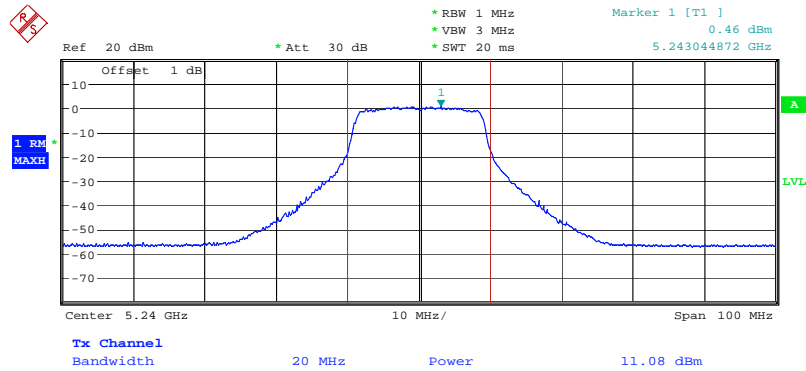
Date: 12.FEB.2008 09:34:45

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-3 / 5200 MHz



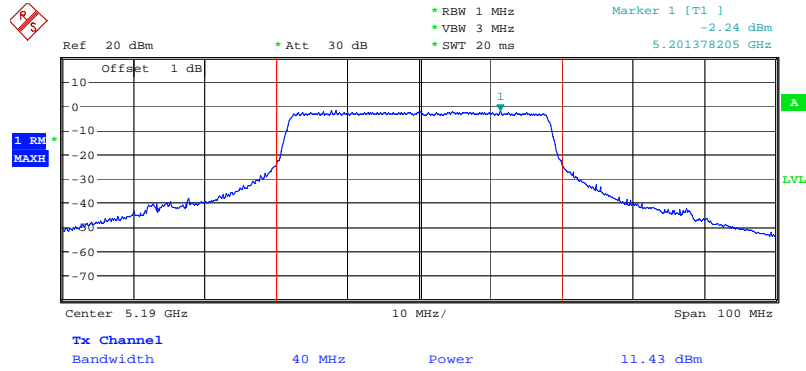
Date: 12.FEB.2008 09:37:46

Channel Output Power Plot on Configuration Draft n MCS16 20MHz Ant. B-3 / 5240 MHz



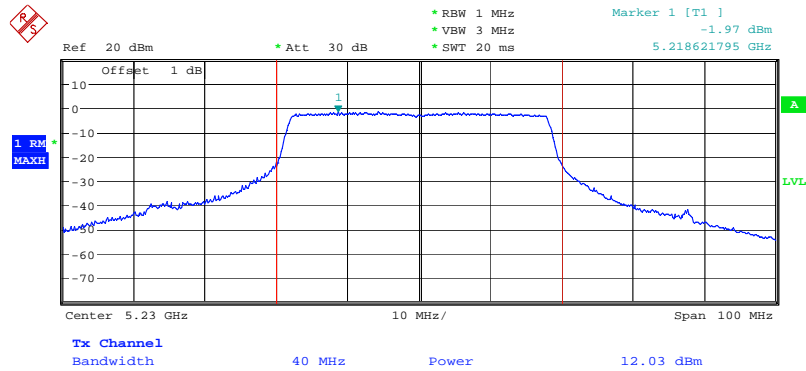
Date: 12.FEB.2008 09:38:38

**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. B-1 / 5190 MHz**



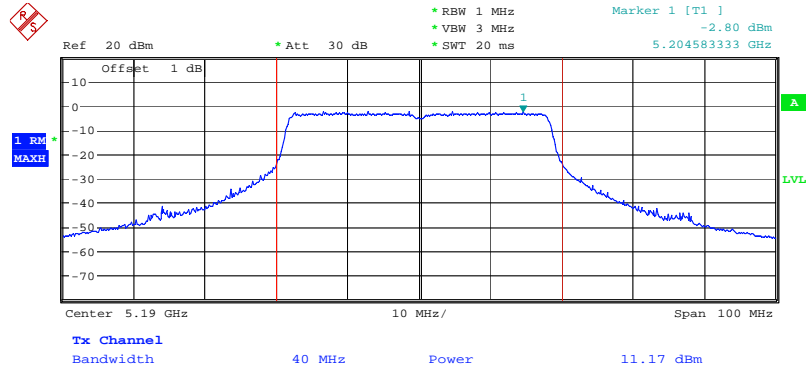
Date: 12.FEB.2008 13:51:36

**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. B-1 / 5230 MHz**



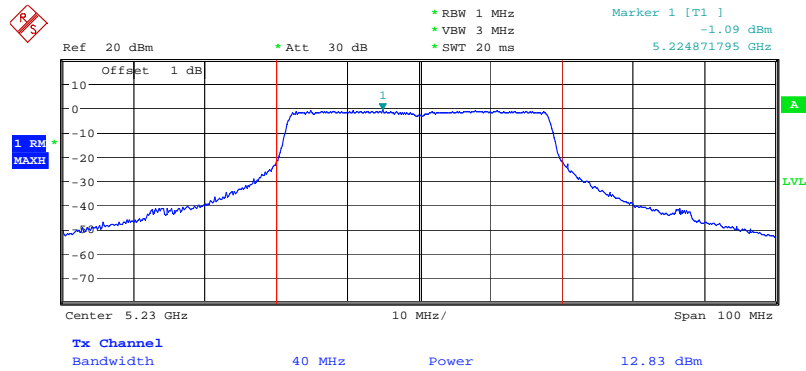
Date: 12.FEB.2008 13:49:31

**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. B-2 / 5190 MHz**



Date: 12.FEB.2008 13:51:18

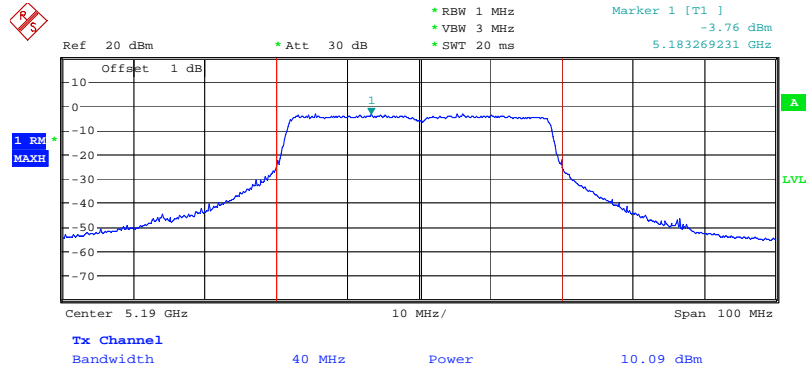
**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. B-2 / 5230 MHz**



Date: 12.FEB.2008 13:49:55

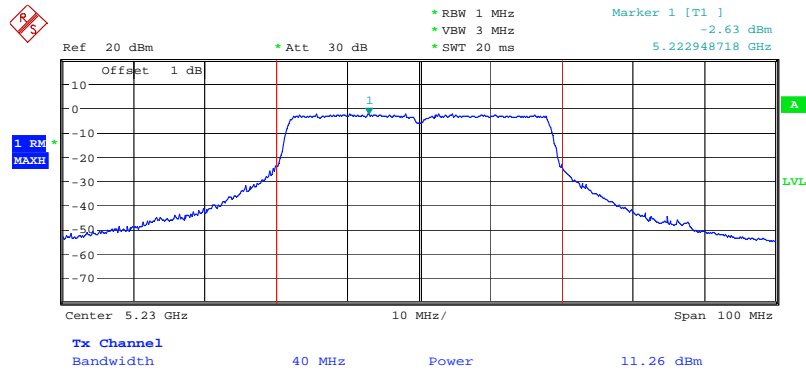


**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. B-3 / 5190 MHz**



Date: 12.FEB.2008 13:51:00

**Channel Output Power Plot on Configuration Draft n MCS16 40MHz Ant. B-3 / 5230 MHz**



Date: 12.FEB.2008 13:50:20

## 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 and decrease power density limit rule refer to section 4.3.1.

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.15~5.25 GHz	4
5.25-5.35 GHz	11
5470-5725	11

### 4.4.2. Measuring Instruments and Setting

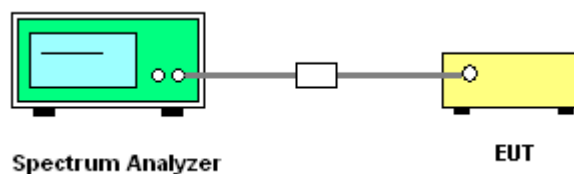
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	40MHz
RB	1000 kHz
VB	3000 kHz
Detector	Sample
Trace	Average
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.
3. Measuring multiple antennas, the connector is required to link with spectrum analyzer through a combiner.

### 4.4.4. Test Setup Layout



### 4.4.5. Test Deviation

There is 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

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Jacky Ho	<b>Configurations</b>	Draft n

##### Configuration Draft n MCS16 20MHz Ant. A-1+A-2+A-3

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	3.38	4.00	Complies
40	5200 MHz	3.44	4.00	Complies
48	5240 MHz	3.42	4.00	Complies

##### Configuration Draft n MCS16 40MHz Ant. A-1+A-2+A-3

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	-4.54	4.00	Complies
46	5230MHz	0.02	4.00	Complies

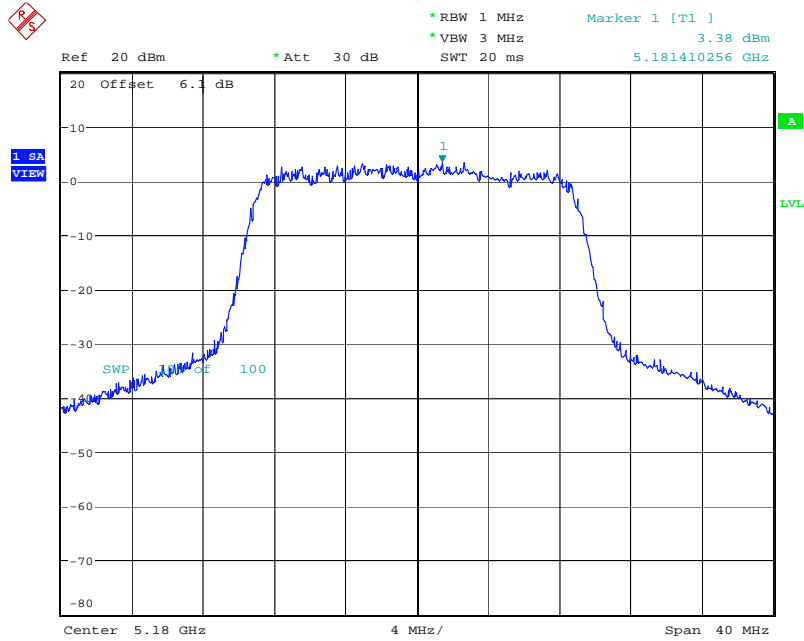
##### Configuration Draft n MCS16 20MHz Ant. B-1+B-2+B-3

Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	1.77	4.00	Complies
40	5200 MHz	1.42	4.00	Complies
48	5240 MHz	1.24	4.00	Complies

##### Configuration Draft n MCS16 40MHz Ant. B-1+B-2+B-3

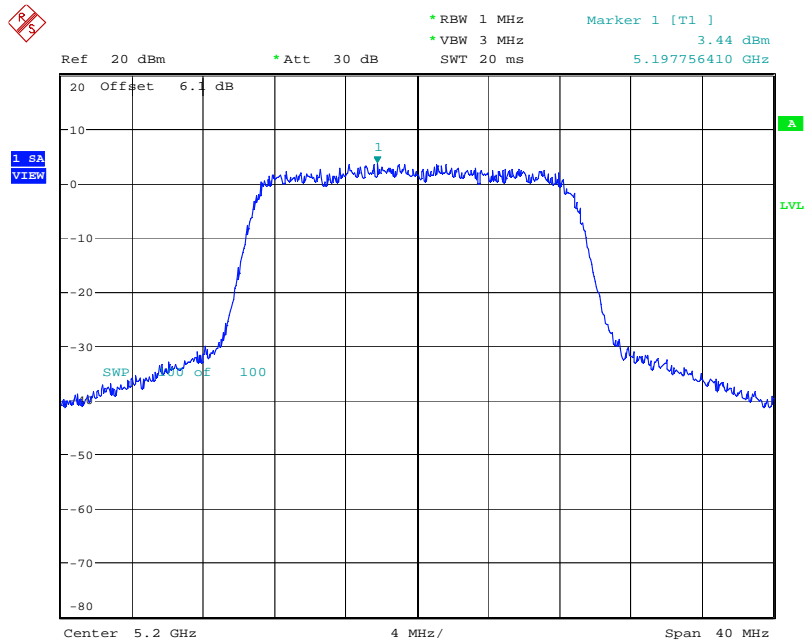
Channel	Frequency	Power Density (dBm)	Max. Limit (dBm)	Result
38	5190 MHz	-2.22	4.00	Complies
46	5230MHz	-1.69	4.00	Complies

Power Density Plot on Configuration Drafft n MCS16 20MHz Ant. A-1+A-2+A-3 / 5180 MHz



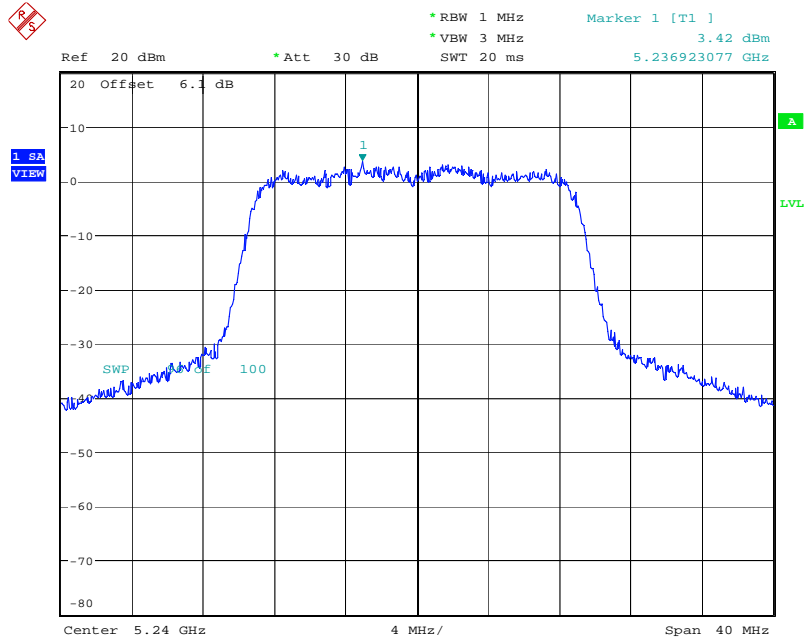
Date: 12.MAR.2008 20:21:35

Power Density Plot on Configuration Drafft n MCS16 20MHz Ant. A-1+A-2+A-3 / 5200 MHz



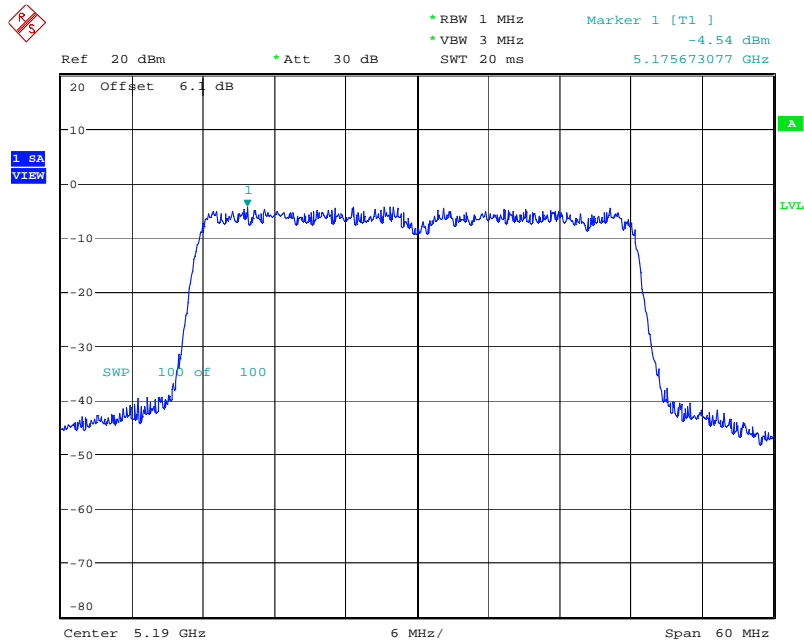
Date: 12.MAR.2008 20:20:08

**Power Density Plot on Configuration Drafft n MCS16 20MHz Ant. A-1+A-2+A-3 / 5240 MHz**



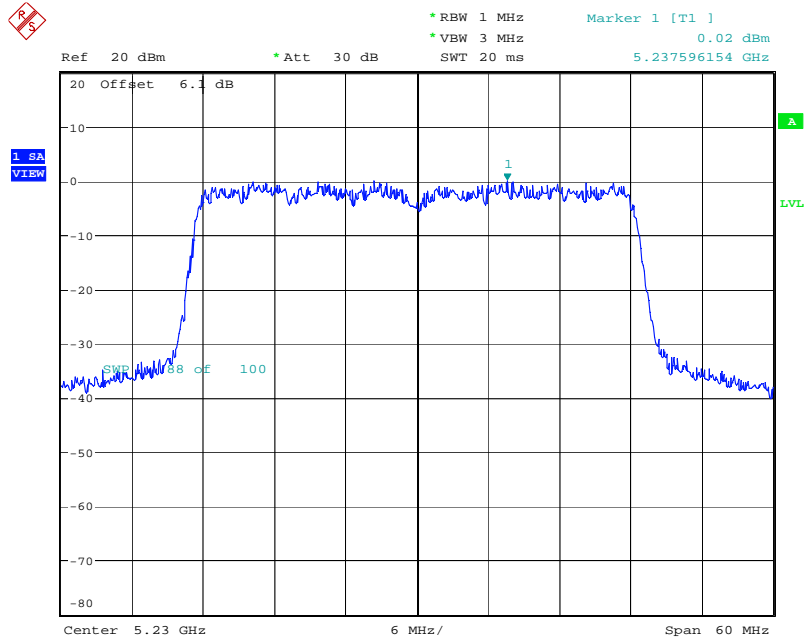
Date: 12.MAR.2008 20:18:49

**Power Density Plot on Configuration Drafft n MCS16 40MHz Ant. A-1+A-2+A-3 / 5190 MHz**



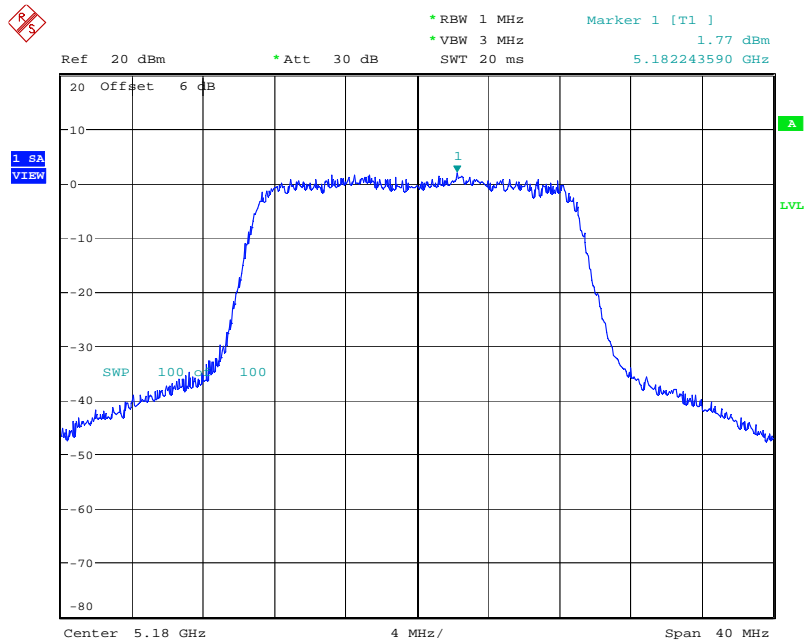
Date: 12.MAR.2008 20:13:17

**Power Density Plot on Configuration Drafft n MCS16 40MHz Ant. A-1+A-2+A-3 / 5230 MHz**



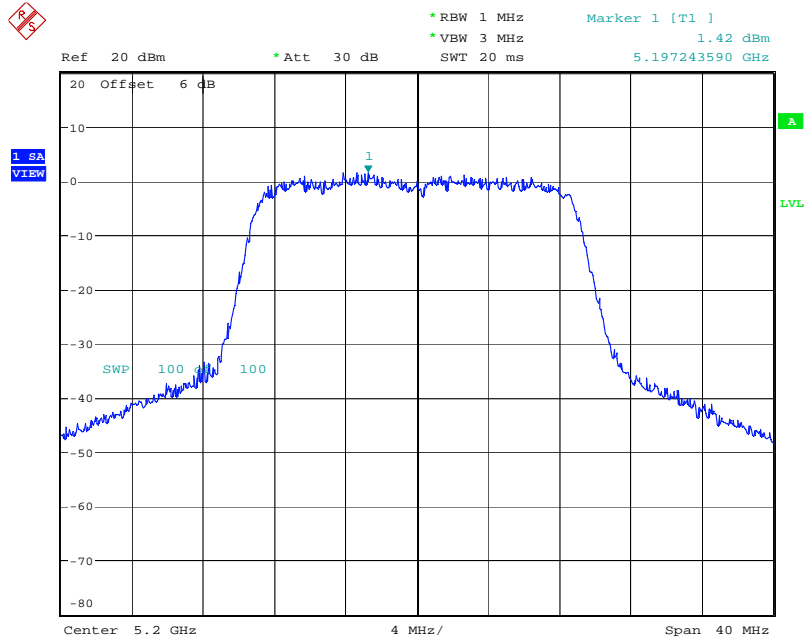
Date: 12.MAR.2008 20:15:11

**Power Density Plot on Configuration Drafft n MCS16 20MHz Ant. B-1+B-2+B-3 / 5180 MHz**



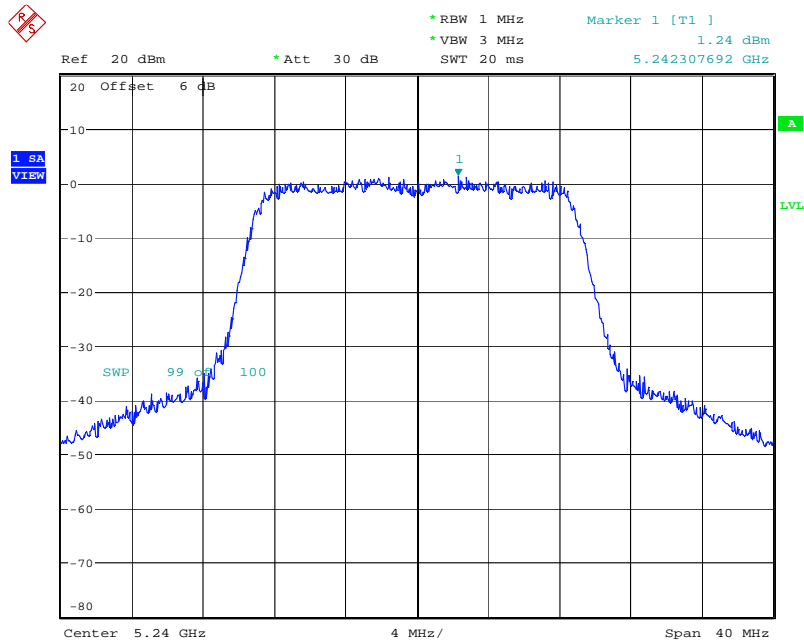
Date: 12.FEB.2008 14:14:26

Power Density Plot on Configuration Drafft n MCS16 20MHz Ant. B-1+B-2+B-3 / 5200 MHz



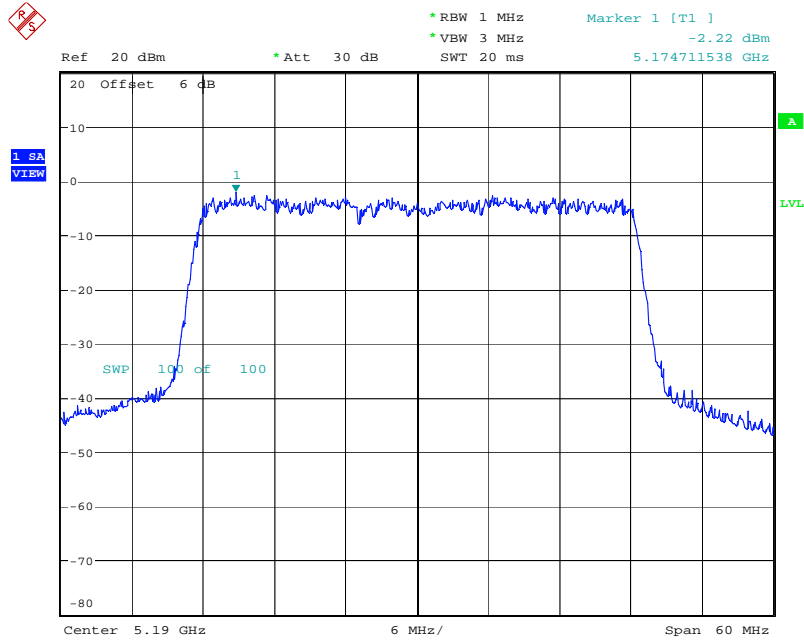
Date: 12.FEB.2008 14:17:30

Power Density Plot on Configuration Drafft n MCS16 20MHz Ant. B-1+B-2+B-3 / 5240 MHz



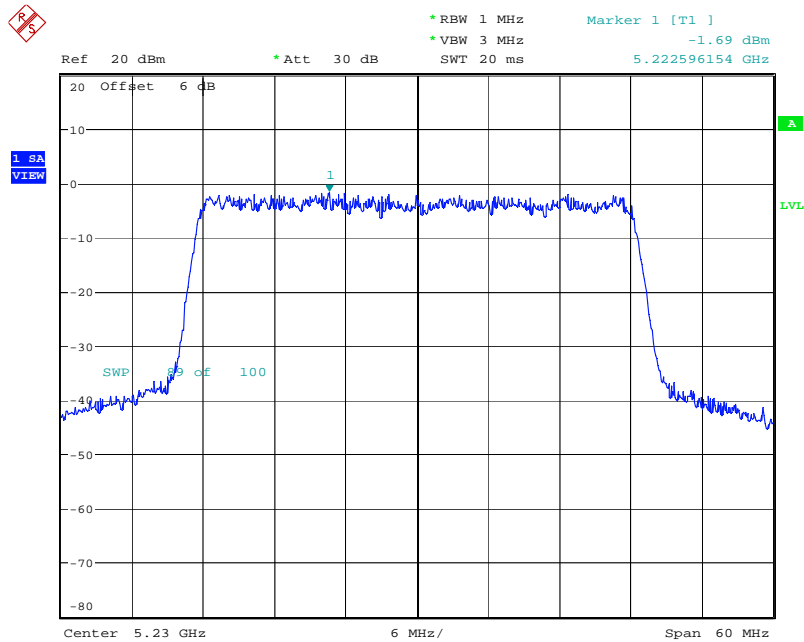
Date: 12.FEB.2008 14:19:05

**Power Density Plot on Configuration Drafft n MCS16 40MHz Ant. B-1+B-2+B-3 / 5190 MHz**



Date: 12.FEB.2008 13:55:02

**Power Density Plot on Configuration Drafft n MCS16 40MHz Ant. B-1+B-2+B-3 / 5230 MHz**



Date: 12.FEB.2008 13:56:50



## 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

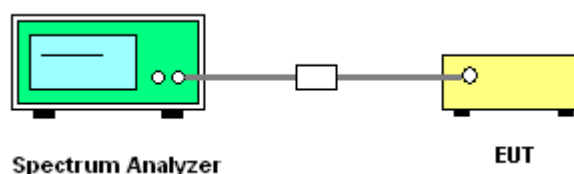
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 analyzer.
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  $\leq 13$  dB for all frequencies across the emissions bandwidth. Submit a plot.
3. Peak Trace: Set RBW = 1 MHz, VBW  $\geq 3$  MHz with peak detector and max-hold 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  $\geq 1/T$  (Draft n 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.
5. Measuring multiple antennas, the connector is required to link with spectrum analyzer through a combiner.

### 4.5.4. Test Setup Layout



#### 4.5.5. Test Deviation

There is 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

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Jacky Ho	<b>Configurations</b>	Draft n

##### Configuration Draft n MCS16 20MHz Ant. A-1+A-2+A-3

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
36	5180 MHz	3.91	13	Complies
40	5200 MHz	4.61	13	Complies
48	5240 MHz	5.90	13	Complies

##### Configuration Draft n MCS16 40MHz Ant. A-1+A-2+A-3

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
38	5190 MHz	4.67	13	Complies
46	5230 MHz	5.35	13	Complies

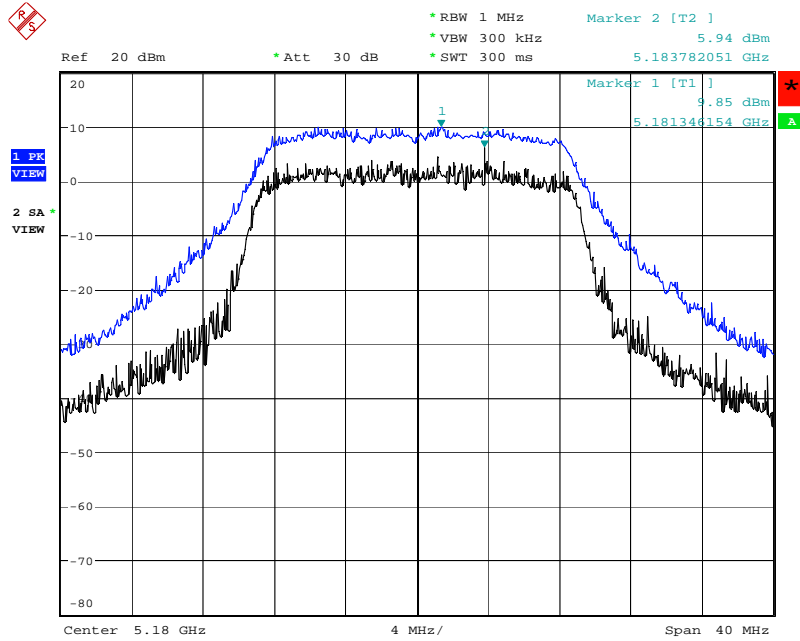
##### Configuration Draft n MCS16 20MHz Ant. B-1+B-2+B-3

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
36	5180 MHz	6.06	13	Complies
40	5200 MHz	5.89	13	Complies
48	5240 MHz	6.26	13	Complies

##### Configuration Draft n MCS16 40MHz Ant. B-1+B-2+B-3

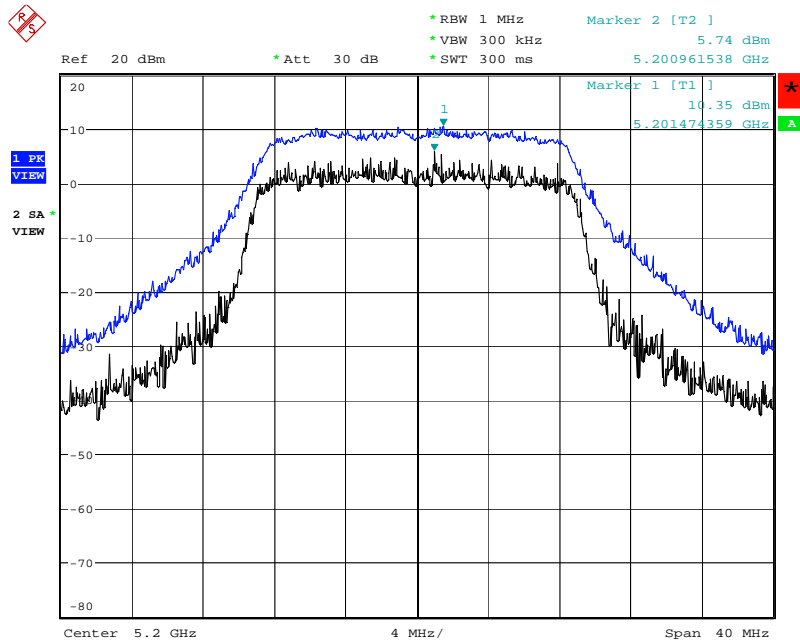
Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
38	5190 MHz	5.69	13	Complies
46	5230 MHz	4.62	13	Complies

Peak Excursion Plot on Configuration Drafft n MCS16 20MHz Ant. A-1+A-2+A-3 / 5180 MHz



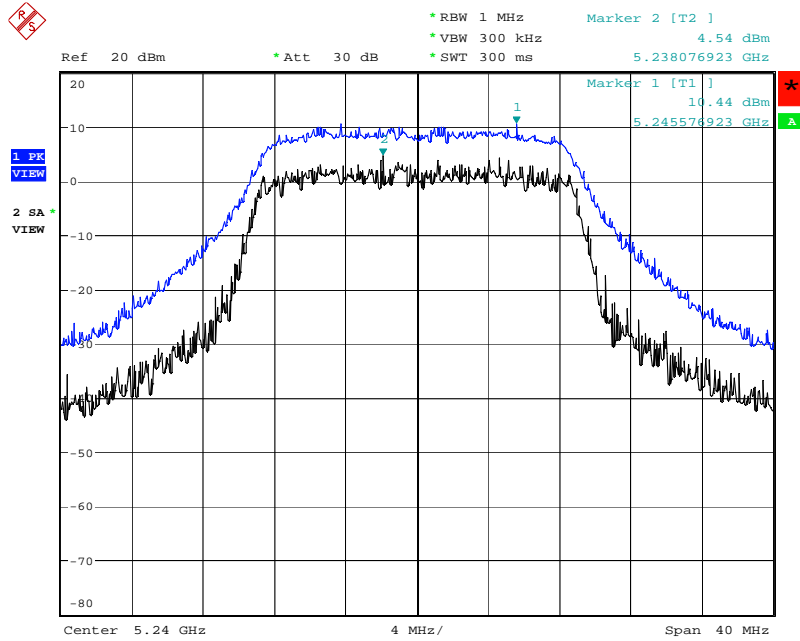
Date: 12.MAR.2008 20:21:47

Peak Excursion Plot on Configuration Drafft n MCS16 20MHz Ant. A-1+A-2+A-3 / 5200 MHz



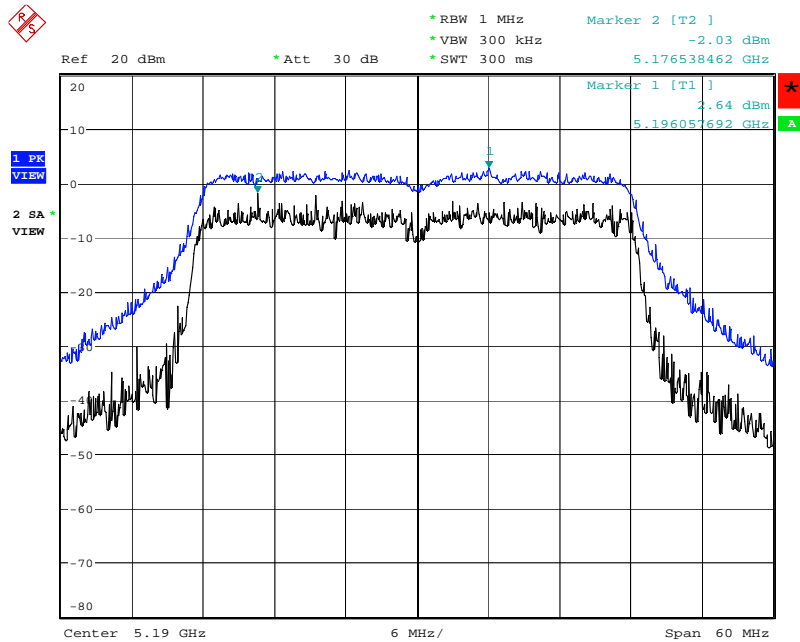
Date: 12.MAR.2008 20:20:20

Peak Excursion Plot on Configuration Drafft n MCS16 20MHz Ant. A-1+A-2+A-3 / 5240 MHz



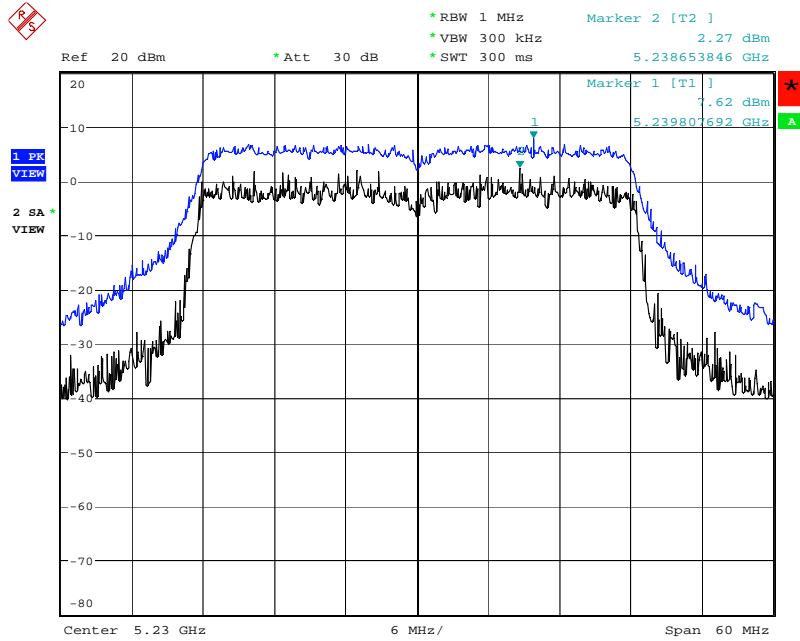
Date: 12.MAR.2008 20:19:01

Peak Excursion Plot on Configuration Drafft n MCS16 40MHz Ant. A-1+A-2+A-3 / 5190 MHz



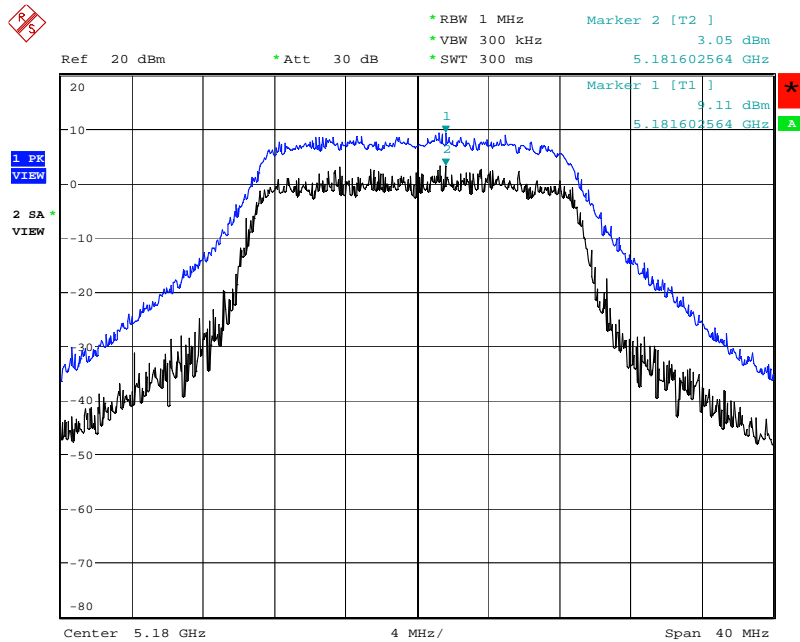
Date: 12.MAR.2008 20:13:30

Peak Excursion Plot on Configuration Drafft n MCS16 40MHz Ant. A-1+A-2+A-3 / 5230 MHz



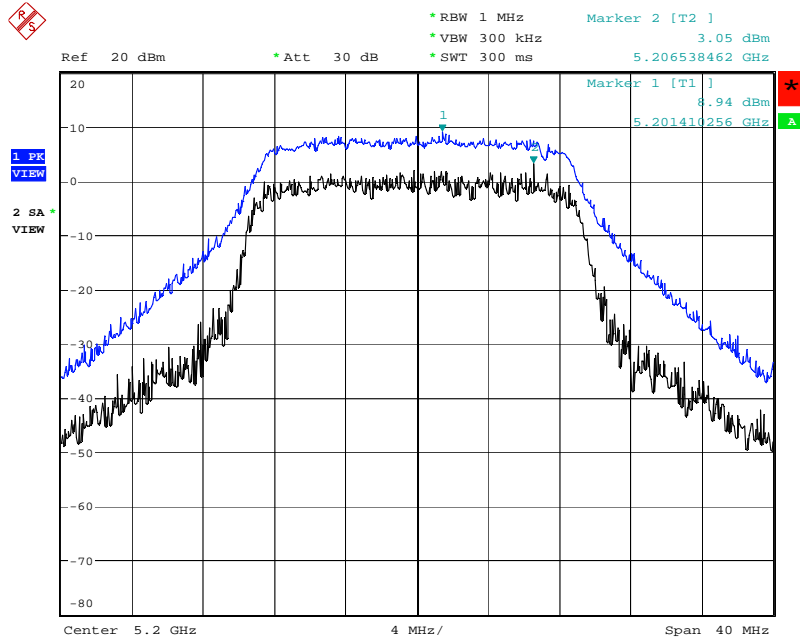
Date: 12.MAR.2008 20:15:24

Peak Excursion Plot on Configuration Drafft n MCS16 20MHz Ant. B-1+B-2+B-3 / 5180 MHz



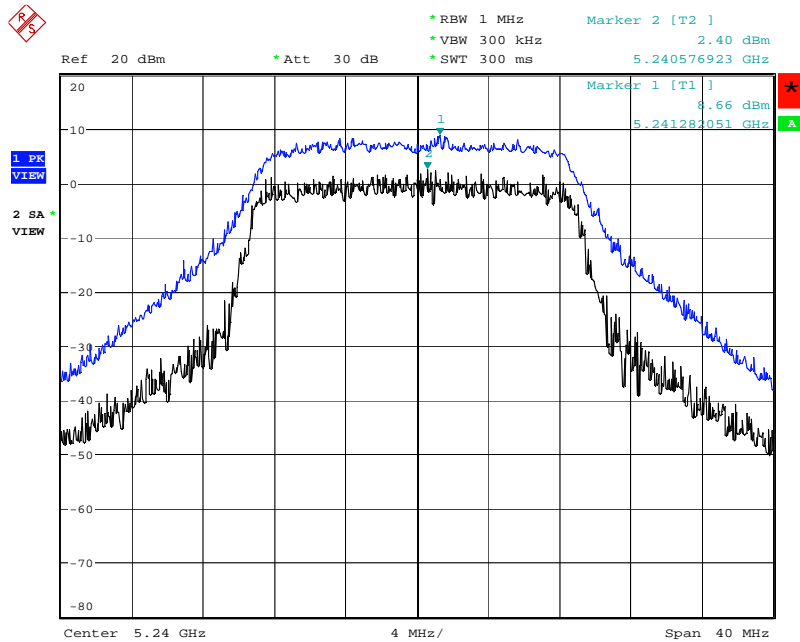
Date: 12.FEB.2008 14:15:12

Peak Excursion Plot on Configuration Drafft n MCS16 20MHz Ant. B-1 +B-2+B-3 / 5200 MHz



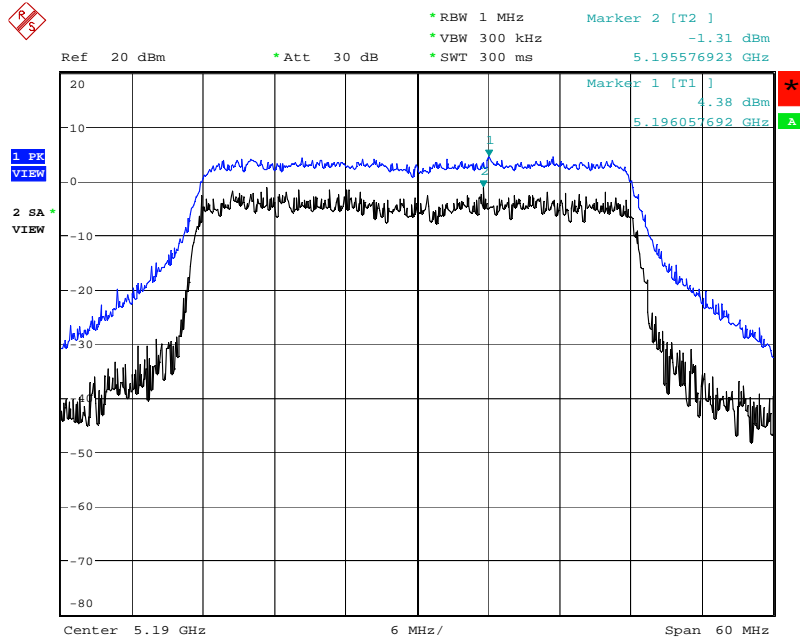
Date: 12.FEB.2008 14:18:17

Peak Excursion Plot on Configuration Drafft n MCS16 20MHz Ant. B-1 +B-2+B-3 / 5240 MHz



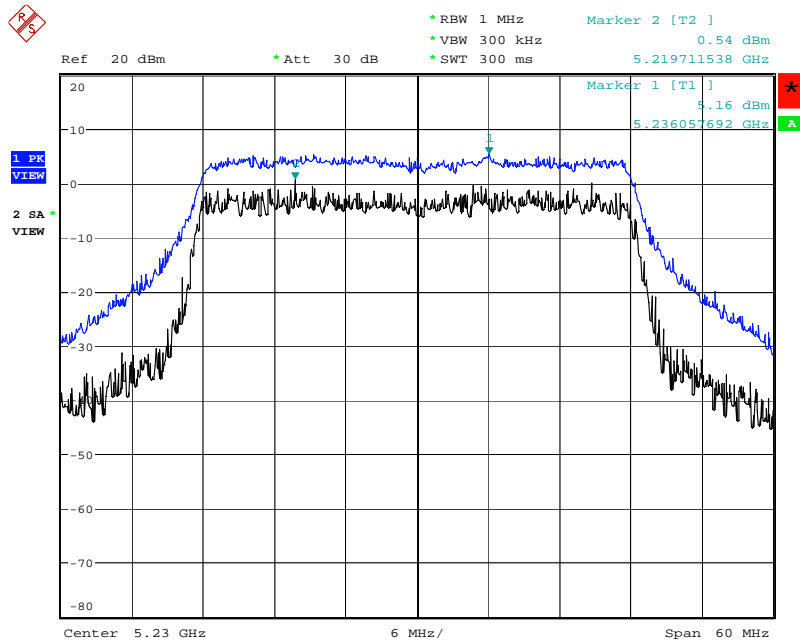
Date: 12.FEB.2008 14:19:52

Peak Excursion Plot on Configuration Drafft n MCS16 40MHz Ant. B-1 +B-2+B-3 / 5190 MHz



Date: 12.FEB.2008 13:55:49

Peak Excursion Plot on Configuration Drafft n MCS16 40MHz Ant. B-1 +B-2+B-3 / 5230 MHz



Date: 12.FEB.2008 13:57:36

## 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 5.470-5.725 GHz band: all emissions outside of the 5.470-5.725 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 falls 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 (microrvolts/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 5 of equipments list 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	40 GHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1000KHz / 1000KHz 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

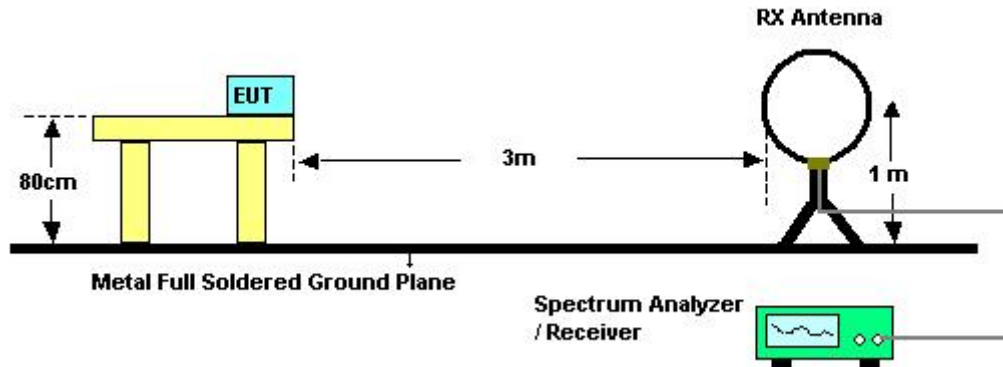


#### 4.6.3. Test Procedures

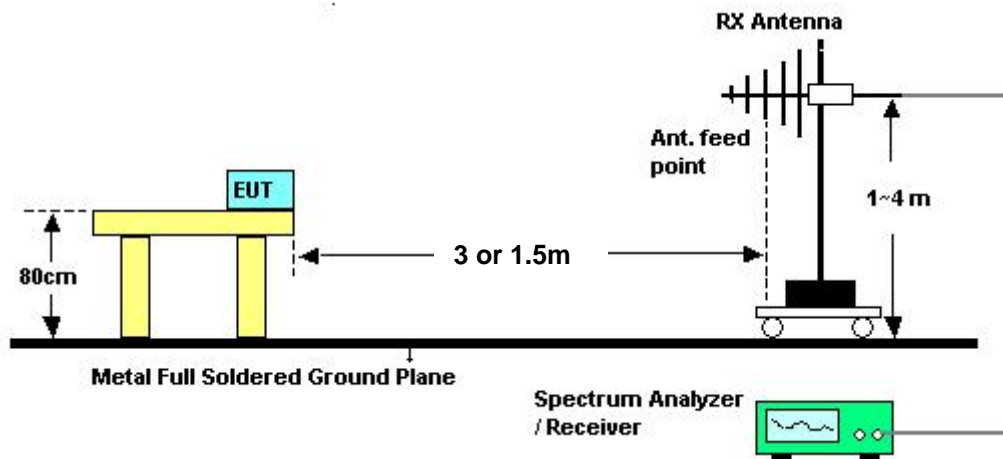
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 1.5m.

Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

#### 4.6.5. Test Deviation

There is no deviation 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)

<b>Temperature</b>	18°C	<b>Humidity</b>	63%
<b>Test Engineer</b>	Aric Li	<b>Configurations</b>	Normal Link

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

Note:

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

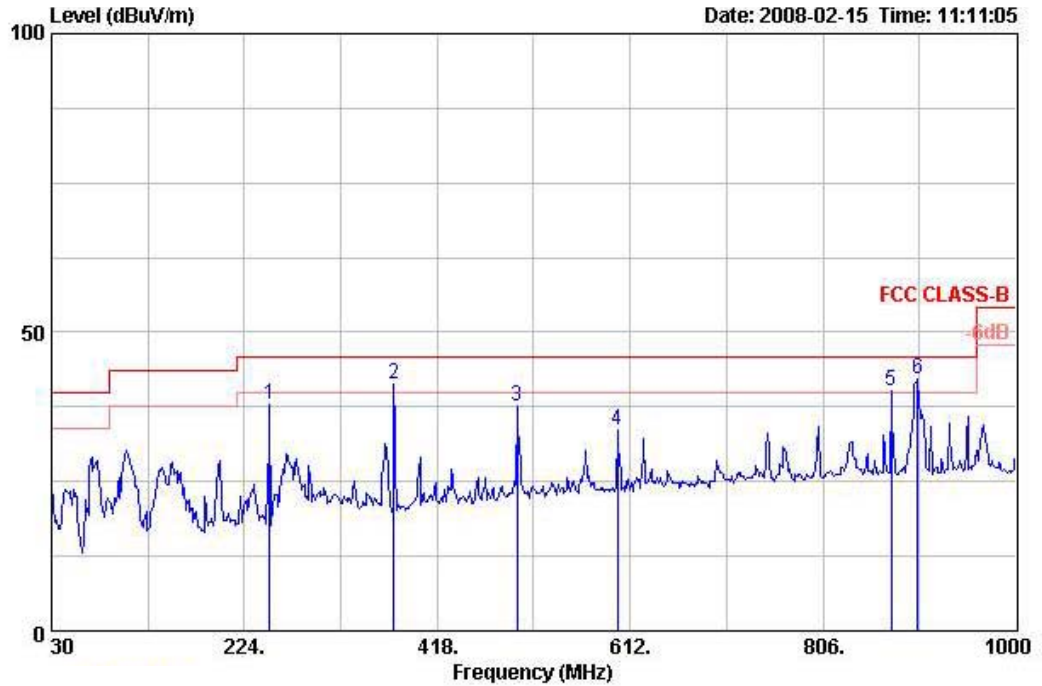
Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

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

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

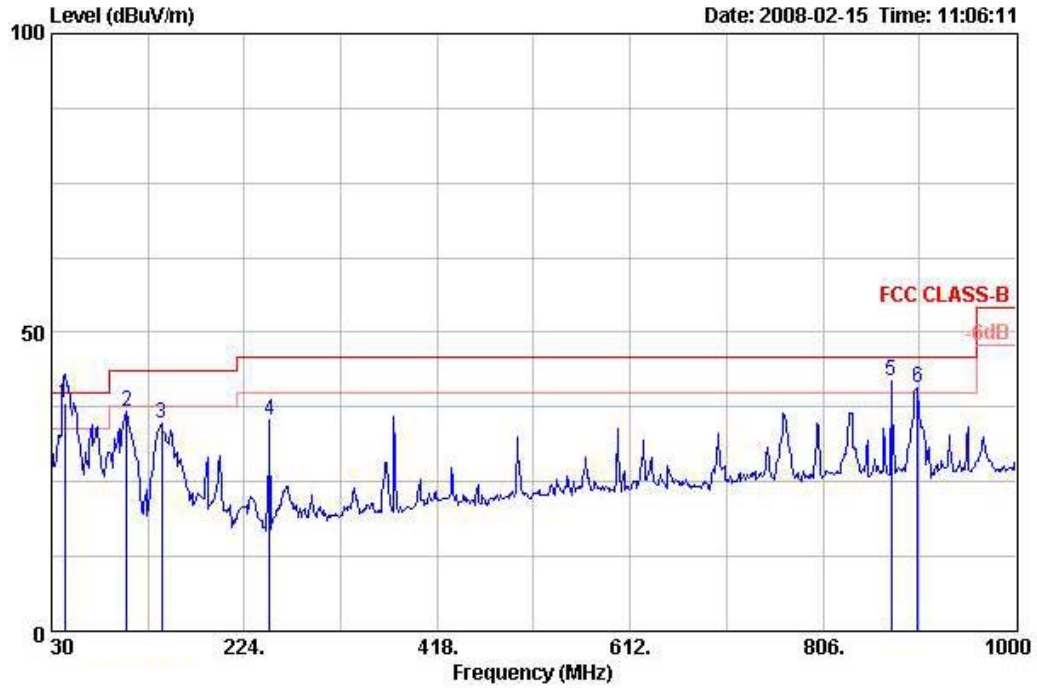
Temperature	18°C	Humidity	63%
Test Engineer	Aric Li	Configurations	Ant. A POE Mode (Horizontal)

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	249.220	37.89	-8.11	46.00	51.43	11.56	27.00	1.90	Peak	0	100	HORIZONTAL
2 !	374.350	41.37	-4.63	46.00	51.75	14.79	27.42	2.25	Peak	254	100	HORIZONTAL
3	498.510	37.57	-8.43	46.00	45.72	17.24	28.09	2.70	Peak	0	100	HORIZONTAL
4	599.390	33.53	-12.47	46.00	40.40	18.33	28.10	2.90	Peak	0	100	HORIZONTAL
5 !	874.870	40.22	-5.78	46.00	43.75	20.42	27.45	3.50	Peak	0	100	HORIZONTAL
6 B	901.060	42.24	-3.76	46.00	45.61	20.43	27.39	3.60	Peak	0	100	HORIZONTAL

**Vertical**



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	43.580	38.20	-1.80	40.00	55.55	9.75	27.80	0.70	QP	46	100	VERTICAL
2	105.660	36.67	-6.83	43.50	52.10	10.94	27.57	1.20	Peak	0	400	VERTICAL
3	140.580	34.85	-8.65	43.50	50.43	10.41	27.39	1.40	Peak	0	400	VERTICAL
4	249.220	35.23	-10.77	46.00	48.77	11.56	27.00	1.90	Peak	0	400	VERTICAL
5	874.870	41.80	-4.20	46.00	45.34	20.42	27.45	3.50	Peak	0	400	VERTICAL
6	901.060	40.76	-5.24	46.00	44.13	20.43	27.39	3.60	Peak	0	400	VERTICAL

**Note:**

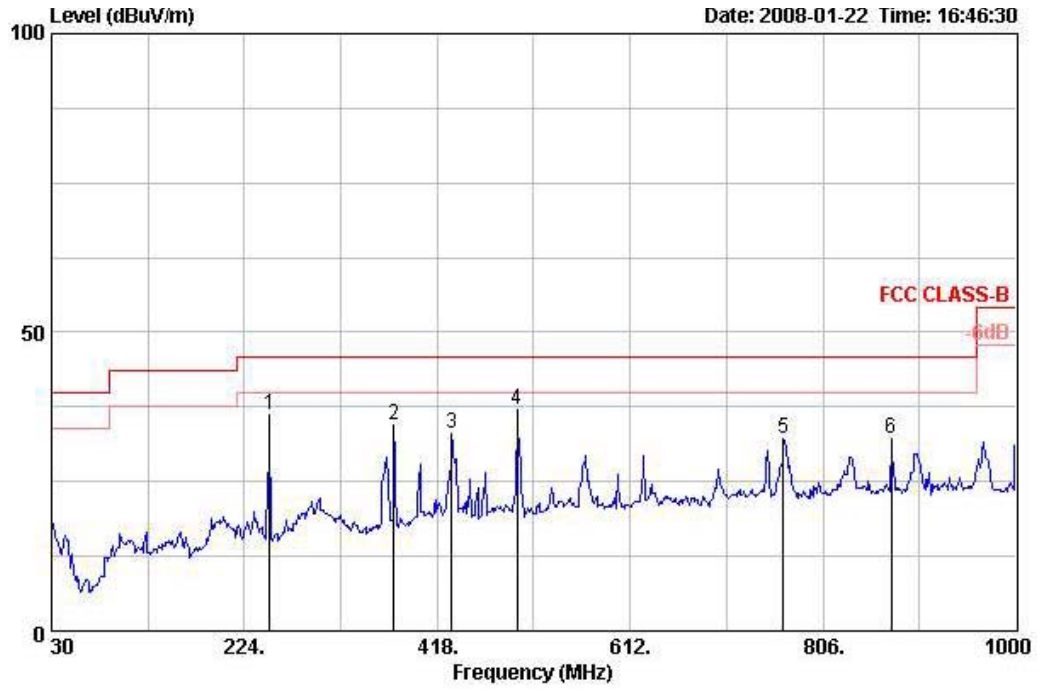
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

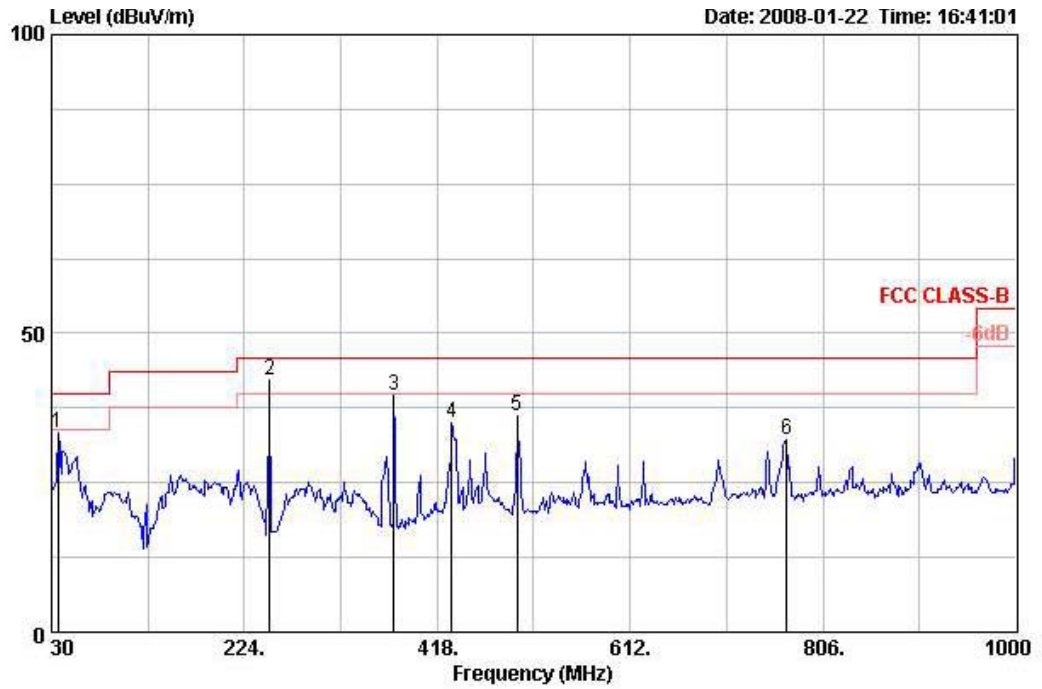
Temperature	18°C	Humidity	63%
Test Engineer	Aric Li	Configurations	Ant. B POE Mode (Horizontal)

**Horizontal**



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		deg	cm	
1	249.220	36.28	-9.72	46.00	49.82	11.56	27.00	1.90	Peak	0	100	HORIZONTAL
2	374.350	34.49	-11.51	46.00	44.87	14.79	27.42	2.25	Peak	0	100	HORIZONTAL
3	432.550	32.96	-13.04	46.00	41.86	16.37	27.76	2.50	Peak	0	100	HORIZONTAL
4	498.510	36.98	-9.02	46.00	45.13	17.24	28.09	2.70	Peak	0	100	HORIZONTAL
5	766.230	32.07	-13.93	46.00	36.50	19.87	27.74	3.43	Peak	0	100	HORIZONTAL
6	874.870	32.11	-13.89	46.00	35.64	20.42	27.45	3.50	Peak	0	100	HORIZONTAL

**Vertical**



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Remark	Table Pos	Ant Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		deg	cm	
1	36.790	33.35	-6.65	40.00	46.97	13.60	27.80	0.58	Peak	0	400	VERTICAL
2	249.220	42.29	-3.71	46.00	55.83	11.56	27.00	1.90	Peak	135	125	VERTICAL
3	374.350	39.67	-6.33	46.00	50.05	14.79	27.42	2.25	Peak	0	400	VERTICAL
4	432.550	35.10	-10.90	46.00	43.99	16.37	27.76	2.50	Peak	0	400	VERTICAL
5	498.510	36.21	-9.79	46.00	44.36	17.24	28.09	2.70	Peak	0	400	VERTICAL
6	769.140	32.06	-13.94	46.00	36.43	19.93	27.72	3.42	Peak	0	400	VERTICAL

**Note:**

The amplitude of spurious emissions that are attenuated by more than 20dB 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.