MEASUREMENT REPORT
of
WIRELESS LAN PCI CARD

Applicant	**:**	ASUSTeK COMPUTER INC.
Model No.	**:**	WL-230
EUT	**:**	ASUS SpaceLink WL-230 PCI Card
FCC ID	**:**	MSQWL230
Report No.	**:**	A5415072

Tested by :

Training Research Co., Ltd.

TEL : 886-2-26935155 **FAX : 886-2-26934440**

255 Nanyang Street., Shijr, Taipei Hsien, Taiwan, R.O.C.

CERTIFICATION

We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (1992) as a reference. All testes were conducted by ***Training Research Co., Ltd.***, 255 Nanyang Street, Shijr, Taipei Hsien, Taiwan, R.O.C. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.247.

Applicant	:	ASUSTeK COMPUTER INC.
Model No.	:	WL-230
EUT	:	ASUS SpaceLink WL-230 PCI Card
FCC ID	:	MSQWL230
Report No.	:	A5415072
Test Date	:	Dec 16th, 2002

Prepared by: Eric Wong

Eric Wong

Approved by: Frank Tsai

Frank Tsai

Tested by :

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Ⅰ. GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of Applicant in support of a *Wireless LAN PCI card* certification in accordance with Part 2 Subpart J and Part 15 Subpart A and C of the Commission's Rules and Regulations.

1.2 Description of EUT

EUT	**:**	ASUS SpaceLink WL-230 PCI Card
Model No.	**:**	WL-230
FCC ID	**:**	MSQWL230
Frequency Range	**:**	2.4GHz-2.4835GHz / 5.725GHz-5.85GHz
Modulation Skill	**:**	DBPSK, DQPSK, CCK / OFDM
Interface	**:**	PCI interface
Power Type	**:**	By PCI slot of the client’ s device
Applicant	**:**	ASUSTeK COMPUTER INC.
		4/F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.

1.3 Description of Support Equipment

In order to construct the minimum testing, following equipment were used as the support units.

PC	**:**	**HP Brio 85xx 6/350**
Model No.	:	D6928A
Serial No.	:	SG91801535
FCC ID	:	N/A, DoC (Declaration of Confirmation) Approved
檢磁	:	3872H013
Power type	:	100 ~ 230VAC / 50 ~ 60Hz, 5A, Switching
Power cord	:	Non-shielded, 2.33m long, Plastic, No ferrite core

Monitor	**:**	**HP 15' Color Monitor**
Model No.	:	D2827A
Serial No.	:	KR91161717
FCC ID	:	C5F7NFCMC1518X
檢磁	:	3872B039
Power type	:	100 ~ 240 VAC / 50 ~ 60 Hz, Switching
Power cord	:	Shielded, 1.83m long, No ferrite core
Data cable	:	Shielded, 1.46m long, with two ferrite cores

Keyboard	**:**	**HP**
Model No.	:	SK-2501K
Serial No.	:	M990308909
FCC ID	:	GYUR38SK
檢磁	:	3862A621
Power type	:	By PC
Data cable	:	Shielded, 1.73m long, with ferrite core

Mouse	**:**	**HP**
Model No.	:	M-S34
Serial No.	:	LZB90714122
FCC ID	:	DZL211029
檢磁	:	4862A011
Power type	:	By PC
Power cord	:	Non-shielded, 1.88m long, No ferrite core

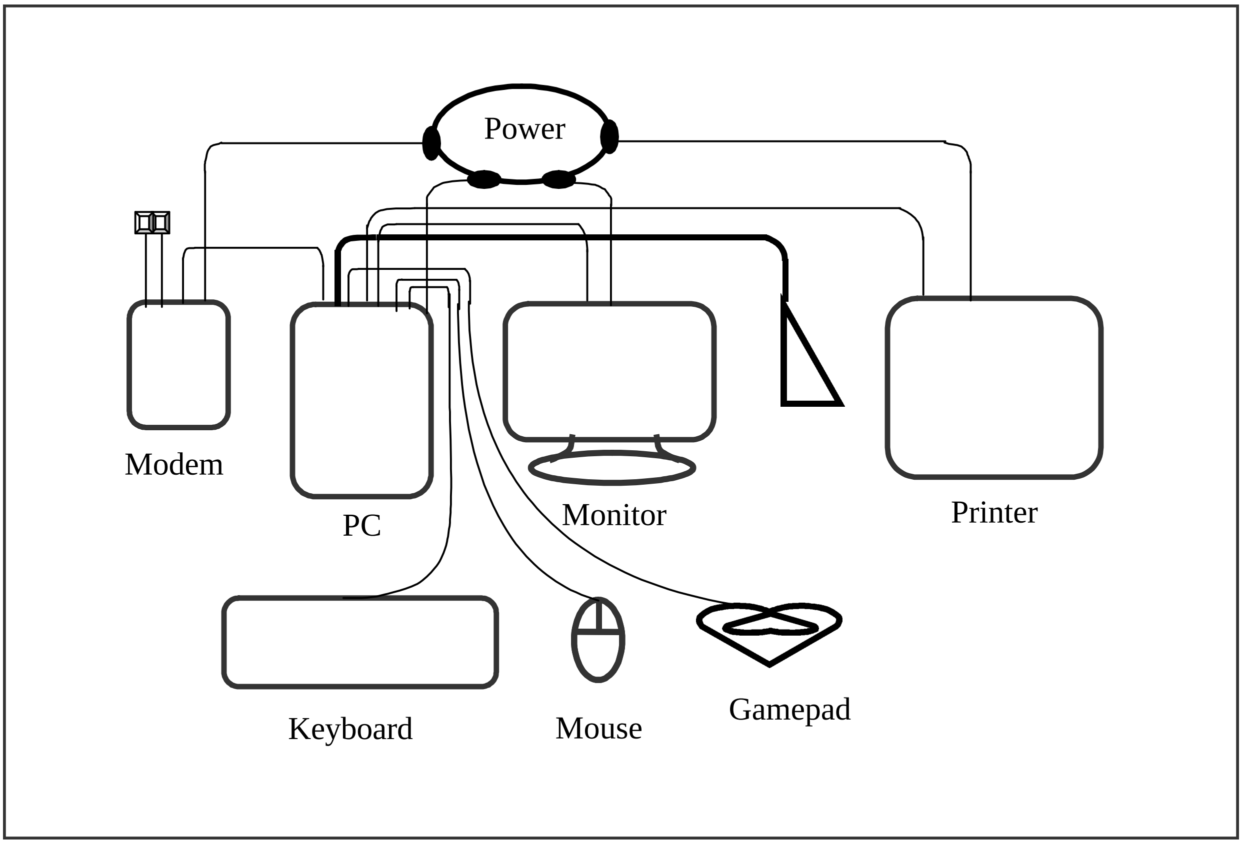
USB Gamepad	**:**	**Padix**
Model No.	:	QF-606U
Serial No.	:	None
FCC ID	:	DoC Approval
Power type	:	Powered by PC
Power Cable	:	Shielded, 1.5m long, No ferrite bead data cable

Prineter	**:**	**HEWLETT-PACKARD**
Type No.	:	C4562A (Deskjet 690C)
Serial No.	:	SG73E1B2GY
FCC ID	:	B94C2164X

AC Adaptor	**:**	**NMB**
Model No.	:	C2175A
Serial No.	:	1607496
FCC ID	:	DoC Approved
Power Core	:	Shielded, Plastic hoods, w/o ferrite bead
Power type	:	120VAC, 60Hz, 0.22A / 30VDC, 400mA

Modem	**:**	**Acer Communication & Multimedia Inc**
Model No.	:	AcerModem 56K Surf
Serial No.	:	None
FCC ID	:	DoC Approval
Power type	:	Powered by AC Adapter (120VAC 60Hz / 9VAC 800mA

1.4 Configuration of System Under Test



The EUT was inserted into the PCI slot of the personal computer. The EUT is controlled in selection of output power level and channel number by the utilities installed in the personal computer.

The setting up procedure was recorded in <Appendix A>.

1.5 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 (1992) and the pre-setup was written on Appendix A, the detail setup was written on each test item.

1.6 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter**, **Anechoic Chamber (Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F, No. 255 Nanyang Street., Shijr, Taipei Hsien, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in a anechoic chamber also located at Training Research Co., Ltd.

No. 255 Nanyang Street., Shijr, Taipei Hsien, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.7 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal uses were investigated.

II. Section 15.101(a): Equipment authorization of unintentional radiators

The EUT equipped with a PCI interface and should be operated with the PCI slot of the personal computer. It was categorized to *Class B personal computers and peripherals* as cannot be operated stand-alone. The authorization requires Certification and the items required such as Sect.15.107 (Conducted limits) and Sect.15.109 (Radiated emission limits) is same as Sect.15.207 and 15.247(C) we' d performed respectively. We dropped this part, as the result will be repeated as the part we mentioned above.

III. Section 15.203: Antenna requirement

The EUT has an integrated antenna (with the “locktite” property). It is an external antenna connected through a cable with a MCX connector. It deems a unique connector as the connector is passed the “RadioShack” evaluation and satisfies the antenna requirement stated in Rules Sect.15.203.

IV. Section 15.207: Power Line Conducted Emissions for AC Powered Units

4.1 Test Condition & Setup

The power line conducted emission measurements were performed in an anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPER quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 2.4.

The test condition applies in this test item, the test procedure description as the following:

The setting up procedure is recorded on <Appendix A>.

4.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	Jun/29/02	Nov6/29/03
RF Filter Section	85460A	H P	3448A00217	Jun/29/02	Nov/29/03
LISN (EUT)	LISN-01	TRC	9912-03,04	Dec/09/02	Nov/09/03
LISN (Support E.)	LISN-01	TRC	9912-05	Jan/04/02	Nov/04/03
Switch/Control Unit (< 30MHz)	3488A	HP	N/A	Nov/20/02	Nov/20/03
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	Nov/20/02	Nov/20/03

4.3 Test configuration

Conducted Emissions Test Configuration

4.4 Test Result of Conducted Emissions

IEEE 802.11b mode

Testing Condition: Temperature: 22.5° C Humidity: 55.8 % RH

Line 1

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBmV/m)	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	
183.000	52.31	---	---	65.06	55.06	-2.75
461.000	45.03	---	---	57.11	47.11	-2.08
674.000	41.67	---	---	56.00	46.00	-4.33
773.760	44.75	44.49	43.89	56.00	46.00	-2.11
926.490	44.11	43.31	42.03	56.00	46.00	-3.97
1113.000	41.99	---	---	56.00	46.00	-4.01
1550.000	38.70	---	---	56.00	46.00	-7.30
2308.000	34.59	---	---	56.00	46.00	-11.41
6080.000	33.47	---	---	60.00	50.00	-16.53
20580.000	38.92	---	---	60.00	50.00	-11.08

Line 2

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBmV/m)	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	
185.000	49.47	---	---	65.00	55.00	-5.53
370.000	36.65	---	---	59.71	49.71	-13.06
461.000	41.99	---	---	57.11	47.11	-5.12
674.000	38.40	---	---	56.00	46.00	-7.60
774.000	40.89	---	---	56.00	46.00	-5.11
919.000	41.38	---	---	56.00	46.00	-4.62
1155.000	38.86	---	---	56.00	46.00	-7.14
1451.000	35.26	---	---	56.00	46.00	-10.74
2308.000	32.04	---	---	56.00	46.00	-13.96
21300.000	35.04	---	---	60.00	50.00	-14.96

(NOTE: Margin = Peak Amplitude – Limit)

IEEE 802.11a mode

Testing Condition: Temperature: 22.5° C Humidity: 55.8 % RH

Line 1

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBmV/m)	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	
185.000	52.68	---	---	65.00	55.00	-2.32
366.000	38.91	---	---	59.83	49.83	-10.92
463.310	45.24	44.62	41.32	57.11	47.11	-5.79
674.000	41.36	---	---	56.00	46.00	-4.64
775.250	44.65	44.56	43.63	56.00	46.00	-2.37
928.160	44.02	43.85	43.26	56.00	46.00	-2.74
1155.000	41.26	---	---	56.00	46.00	-4.74
1451.000	39.12	---	---	56.00	46.00	-6.88
3030.000	32.39	---	---	56.00	46.00	-13.61
20300.000	39.01	---	---	60.00	50.00	-10.99

Line 2

Frequency (KHz)	*READING AMPLITUDE*			*LIMIT*		*Margin (dB)*
	Peak (dBmV/m)	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	*Quasi-Peak (dBmV/m)*	*Average (dBmV/m)*	
185.000	49.83	---	---	65.00	55.00	-5.17
370.000	35.92	---	---	59.71	49.71	-13.79
461.000	41.69	---	---	57.11	47.11	-5.42
674.000	38.11	---	---	56.00	46.00	-7.89
774.000	41.26	---	---	56.00	46.00	-4.74
928.000	41.12	---	---	56.00	46.00	-4.88
1155.000	37.80	---	---	56.00	46.00	-8.20
1550.000	34.70	---	---	56.00	46.00	-11.30
2308.000	31.50	---	---	56.00	46.00	-14.50
21520.000	34.90	---	---	60.00	50.00	-15.10

(NOTE: Margin = Peak Amplitude – Limit)

Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440

V. Section 15.247 (a): Technical description of the EUT

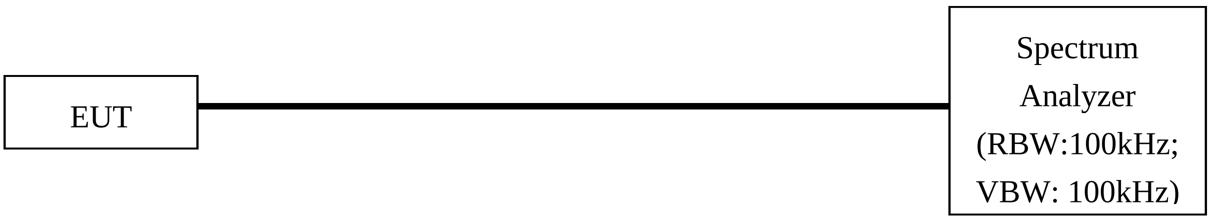
Based on the Section 2.1, *Direct Sequence System* is a spread spectrum system in which the carrier has been modulated by a high speed spreading code and an information data stream. The high speed code sequence dominates the “modulating function” and is the direct cause of the wide spreading of the transmitted signal. Operational Description demonstrates the operation principles of the base-band processor employed by the EUT, shows that which is a complete DSSS base-band processor and meets the definition of the Direct sequence spread spectrum system. Further information about the operation of the OFDM and DSSS, please refer to the Operation Description as a separate exhibit uploaded.

VI. Section 15.247(a)(2): 6dB and 26dB Bandwidth Measurement

6.1 Test Condition & Setup

The transmitter bandwidth measurements were performed by the contact manner. The EUT was set to transmit continuously, also various channels were investigated to find the maximum occupied bandwidth.. The output of the EUT was connected to the spectrum analyzer. The bandwidth of the fundamental frequency is observed by the spectrum analyzer with 100kHz RBW and 100kHz VBW.

6.2 Test Instruments Configuration



Test Configuration of Bandwidth for Direct Sequence System

P.S.: Notebook computer to control the EUT at maximal power output and channel Number and set antenna kit

6.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	8594EM	H P	3619A00198	Jul/04/02	Jul/04/03

6.4 Test Result of 6dB Bandwidth

2.4GHz Band, Base mode

	Frequency (MHz)	Bandwidth (MHz)	Limit (MHz)
Lowest	2412	11.83	0.5
Middle	2437	11.80	0.5
Highest	2462	11.87	0.5

5.8GHz Band, Base mode

	Frequency (MHz)	Bandwidth (MHz)	Limit (MHz)
Lowest	5745	16.60	0.5
Middle	5785	16.57	0.5
Highest	5825	16.50	0.5

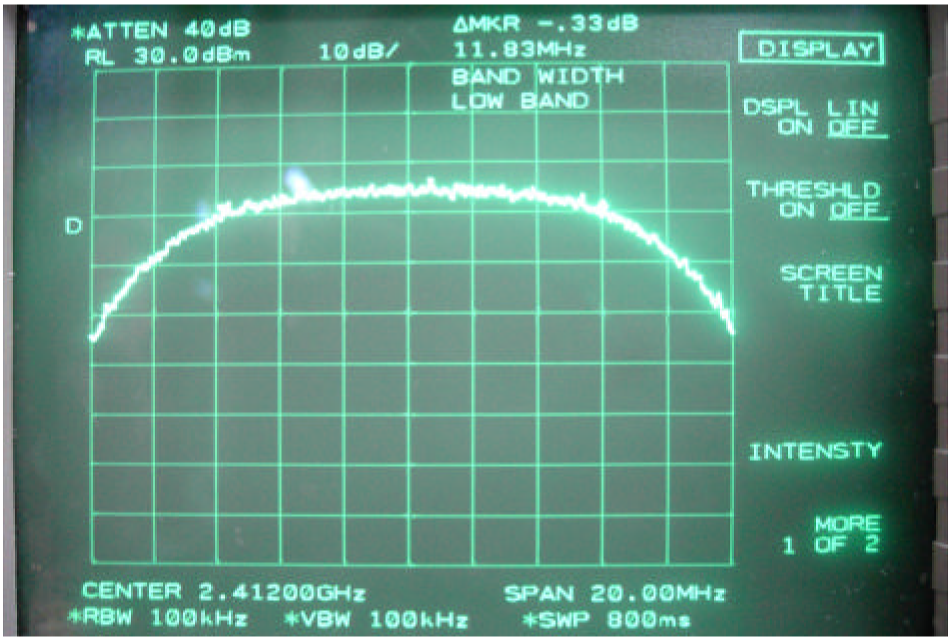
5.8GHz Band, Turbo mode

	Frequency (MHz)	Bandwidth (MHz)	Limit (MHz)
Lowest	5760	33.08	0.5
Middle	N/A	N/A	N/A
Highest	5800	33.00	0.5

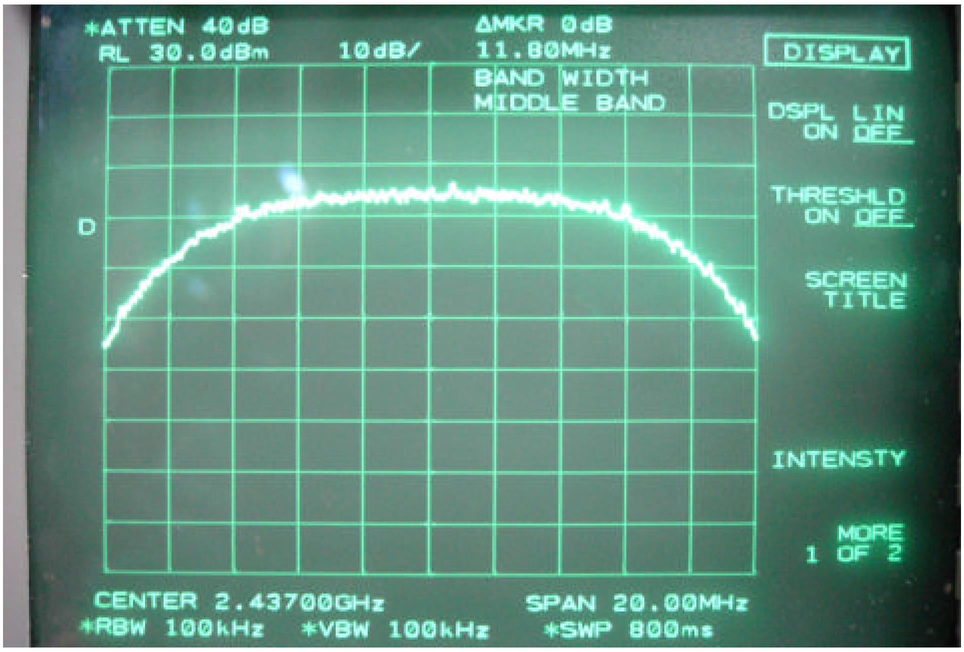
Note:

1. The data in the above table are summarizing the following attachment spectrum analyzer hard copy. According to the guidance, we' d made the measurement with the spectrum analyzer' s resolution bandwidth *(RBW)=100kHz* and set the *span>>RBW*. The results show the measured 6dB bandwidth comply with the minimum 500kHz requirement.
2. The attachments show these on the following pages.

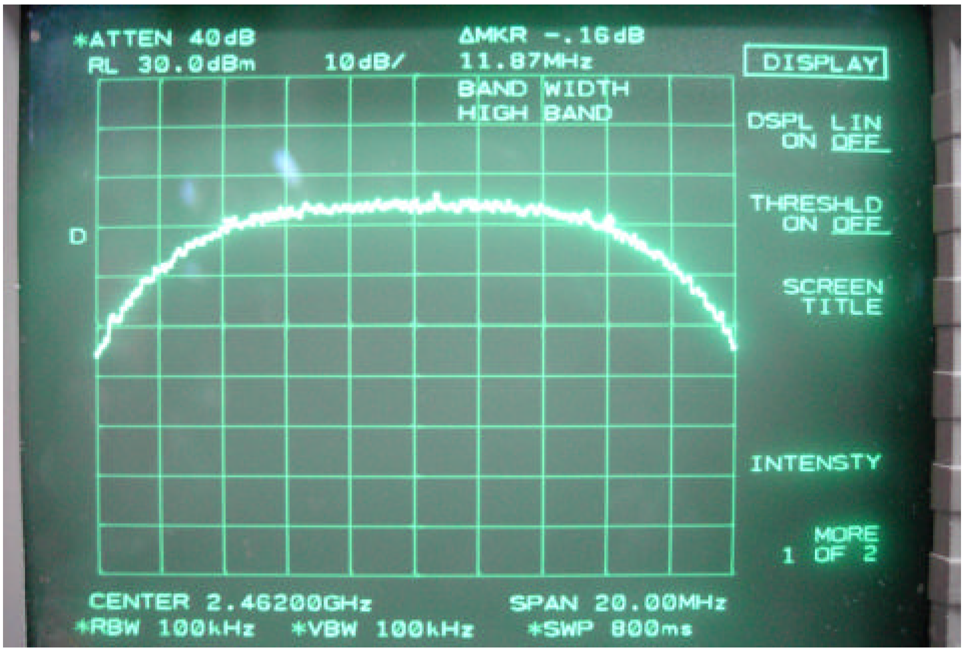
6 dB Bandwidth of Lowest Channel (2.4GHz Base mode)



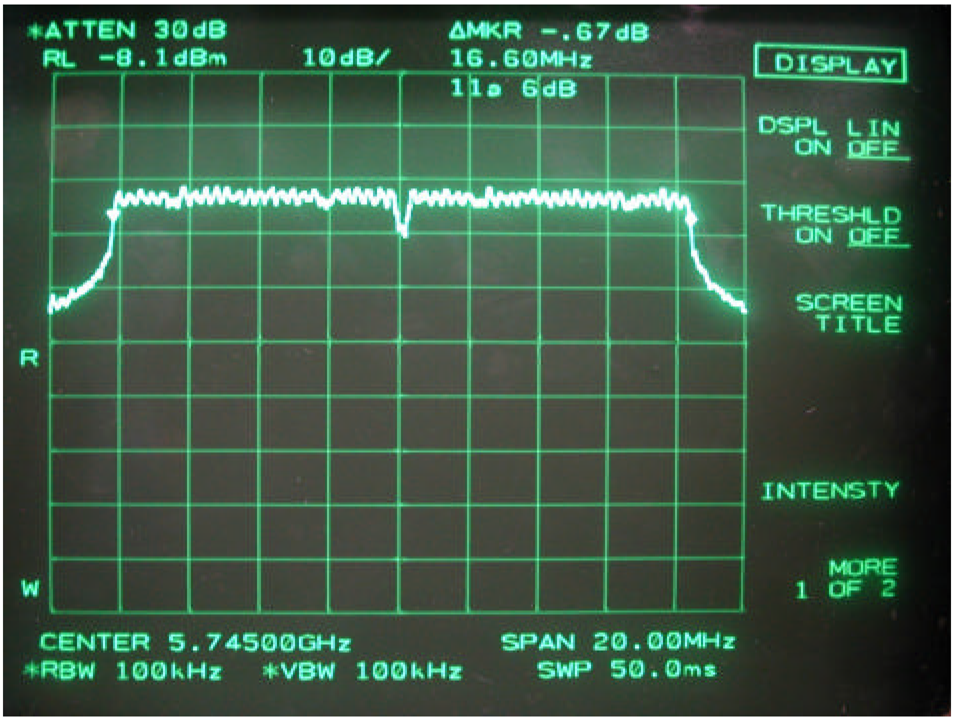
6 dB Bandwidth of Middle Channel (2.4GHz Base mode)



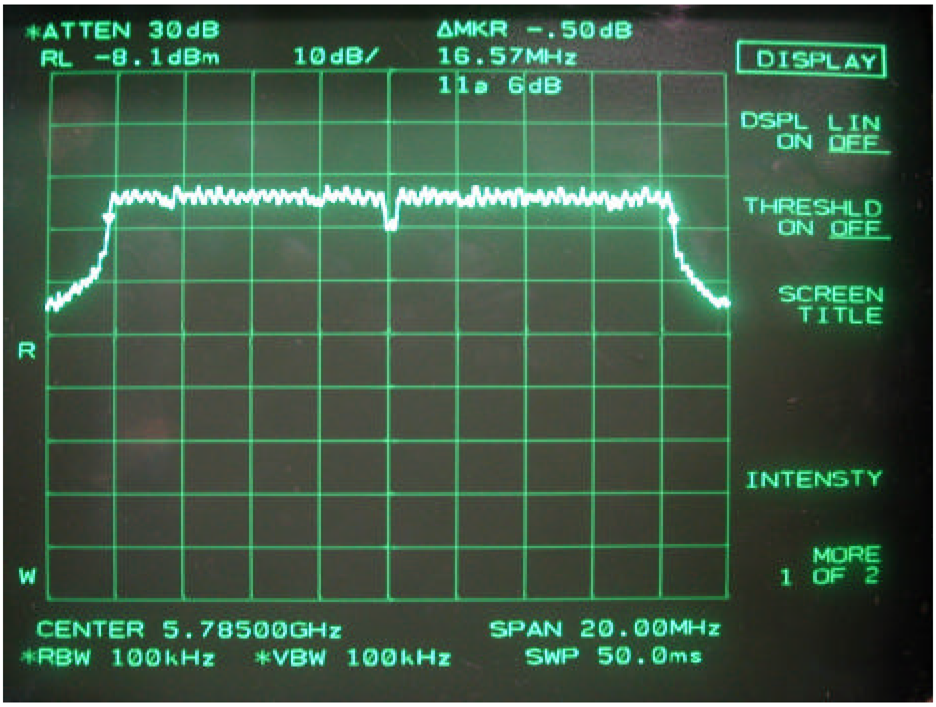
6 dB Bandwidth of Highest Channel (2.4GHz Base mode)



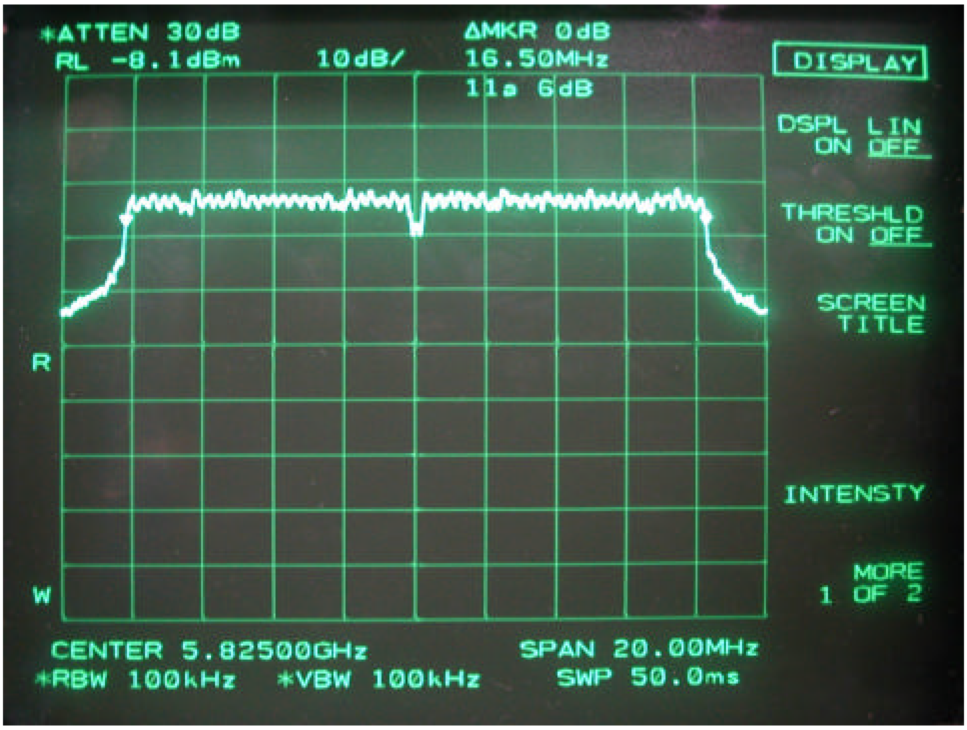
6 dB Bandwidth of Lowest Channel (5.8GHz Base mode)



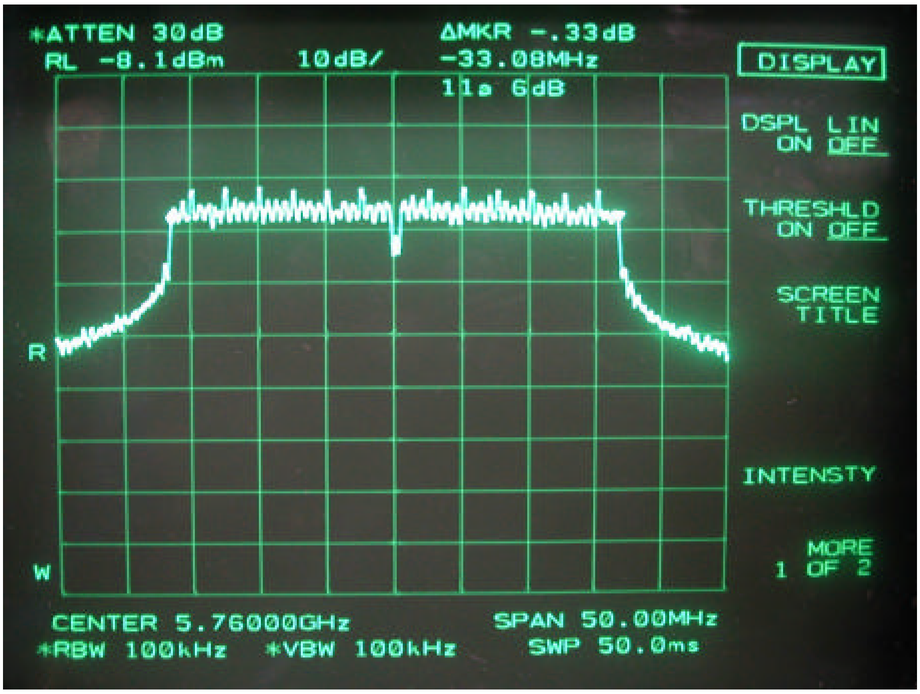
6 dB Bandwidth of Middle Channel (5.8GHz Base mode)



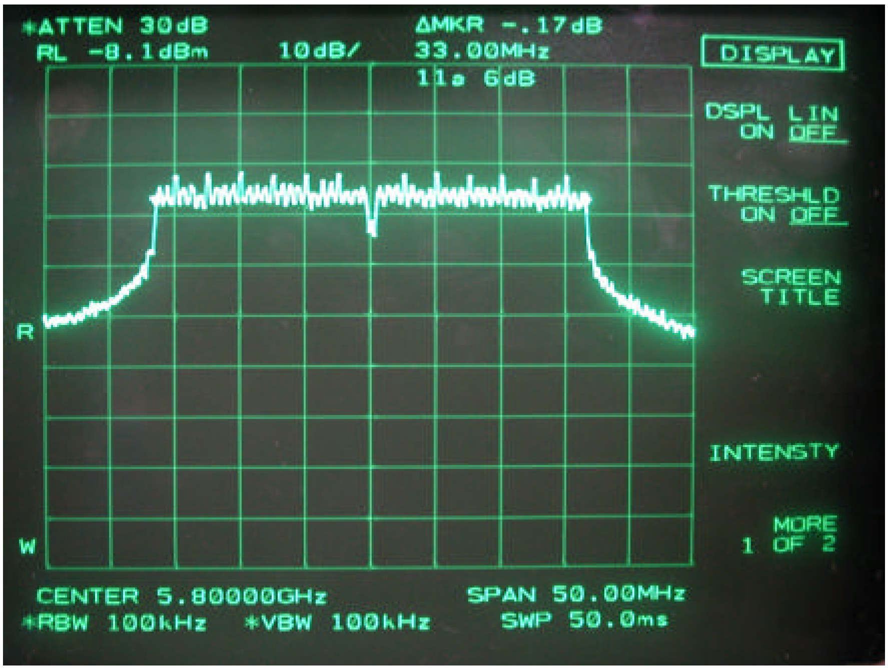
6 dB Bandwidth of Highest Channel (5.8GHz Base mode)



6 dB Bandwidth of Lowest Channel (5.8GHz OFDM mode)



6 dB Bandwidth of Highest Channel (5.8GHz OFDM mode)



6.5 Test Result of 26dB Bandwidth

2.4GHz Band, Base mode

	Frequency (MHz)	Bandwidth (MHz)
Lowest	2412	19.67
Middle	2437	19.92
Highest	2462	19.83

5.8GHz Band, Base mode

	Frequency (MHz)	Bandwidth (MHz)
Lowest	5745	28.00
Middle	5785	27.33
Highest	5805	27.00

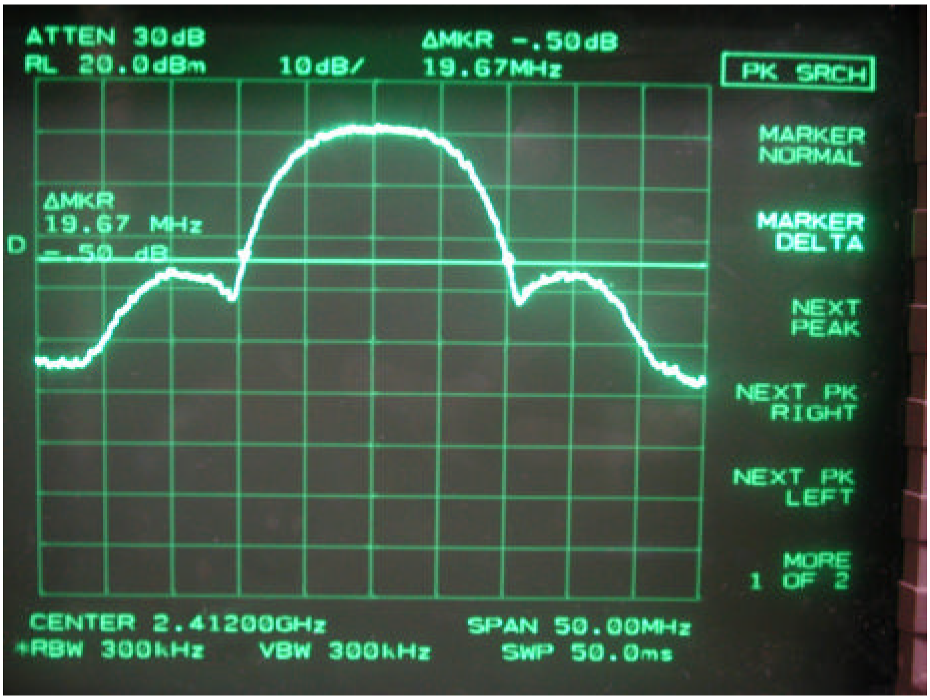
5.8GHz Band, Turbo mode

	Frequency (MHz)	Bandwidth (MHz)
Lowest	5760	47.00
Middle	N/A	N/A
Highest	5800	47.70

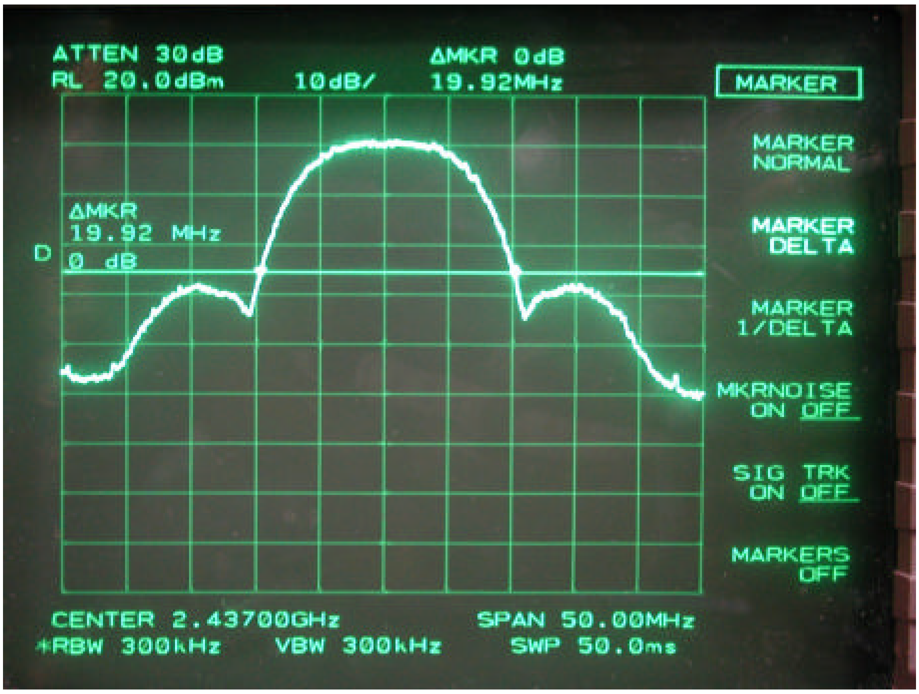
Note:

1. The data in the above table are summarizing the following attachment spectrum analyzer hard copy. According to the guidance, we' d made the measurement with the spectrum analyzer' s resolution bandwidth *(RBW)=300kHz* and set the *span>>RBW*. The results show the measured 26dB bandwidth comply with the minimum 500kHz requirement.
2. The attachments show these on the following pages.

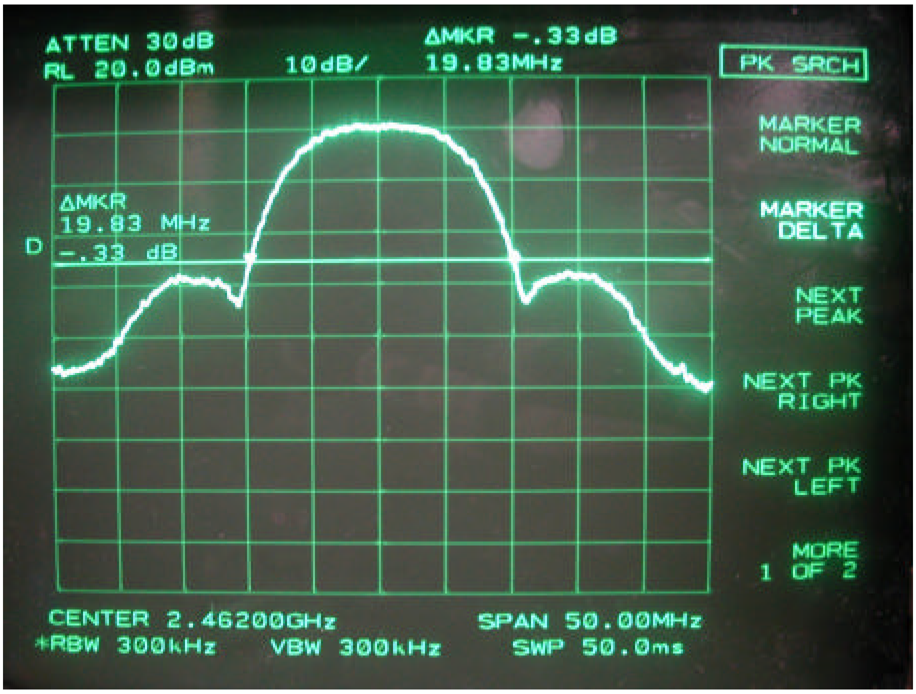
26 dB Bandwidth of Lowest Channel (2.4GHz Base mode)



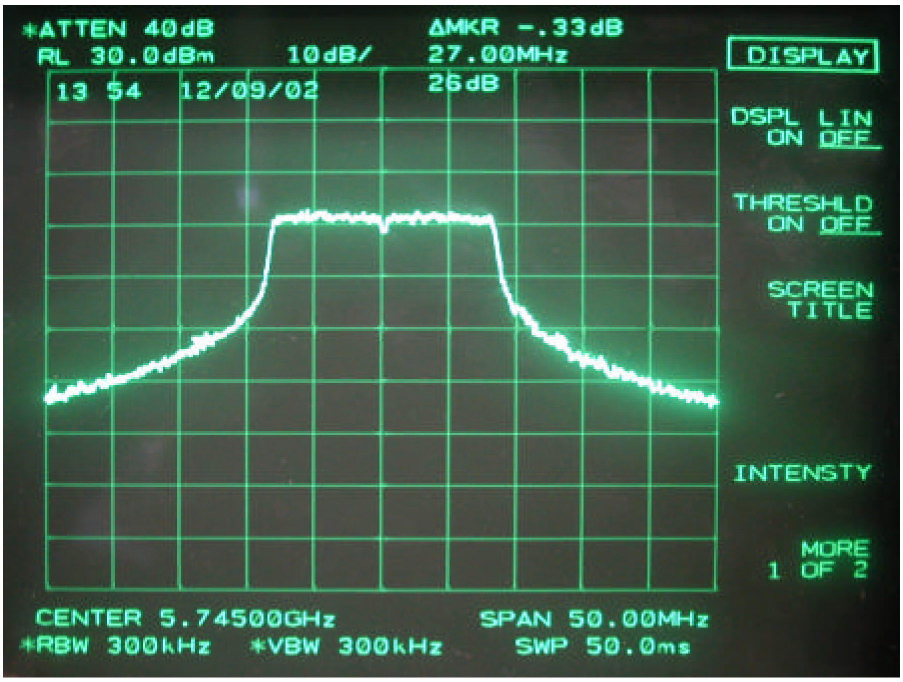
26 dB Bandwidth of Middle Channel (2.4GHz Base mode)



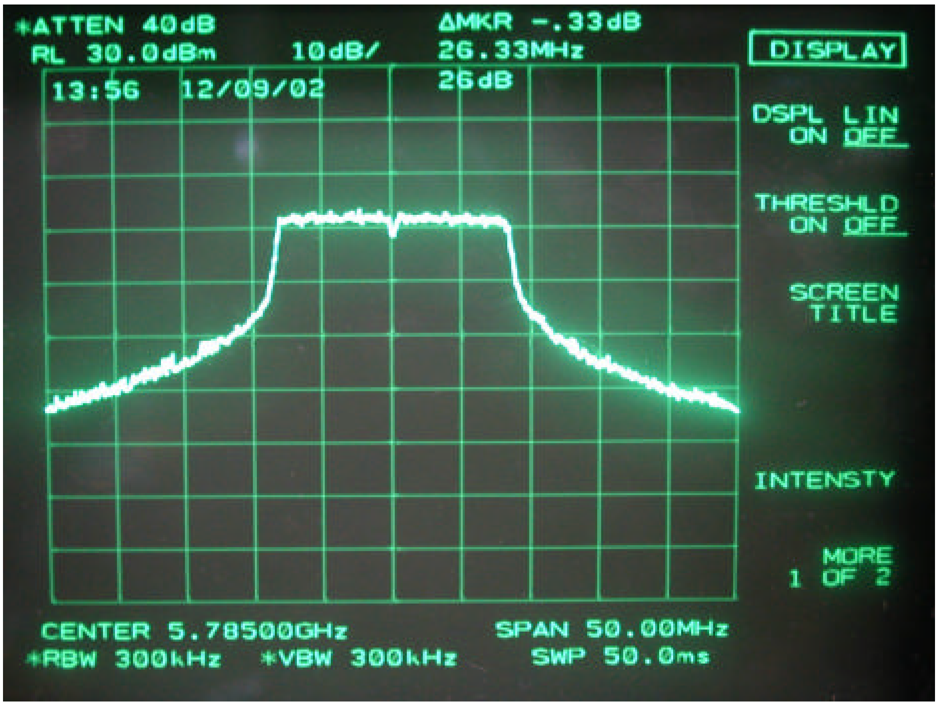
26 dB Bandwidth of Highest Channel (2.4GHz Base mode)



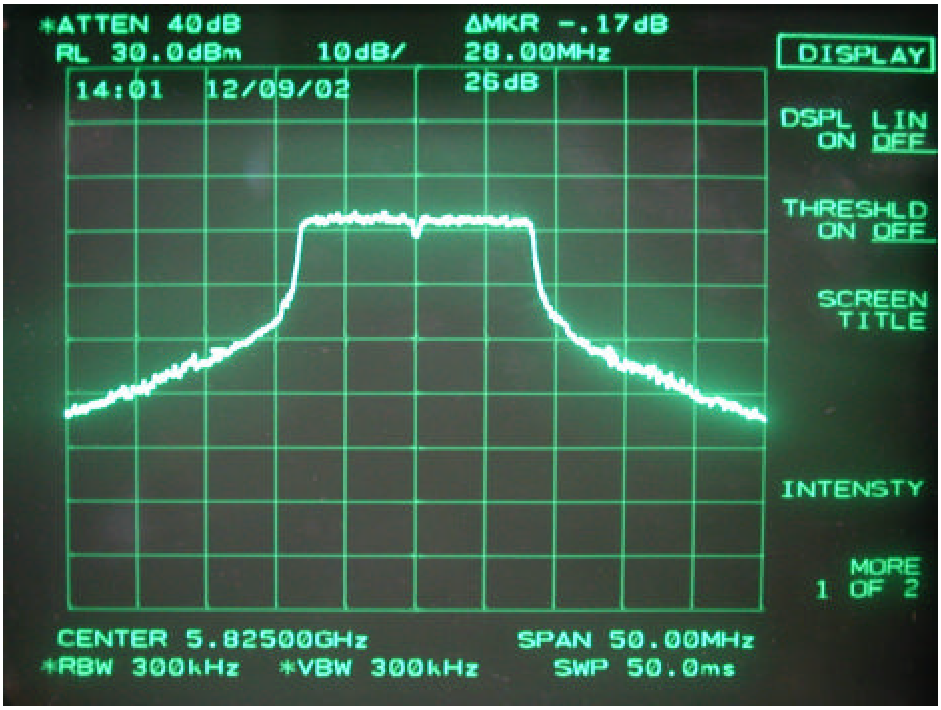
26 dB Bandwidth of Lowest Channel (5.8GHz Base mode)



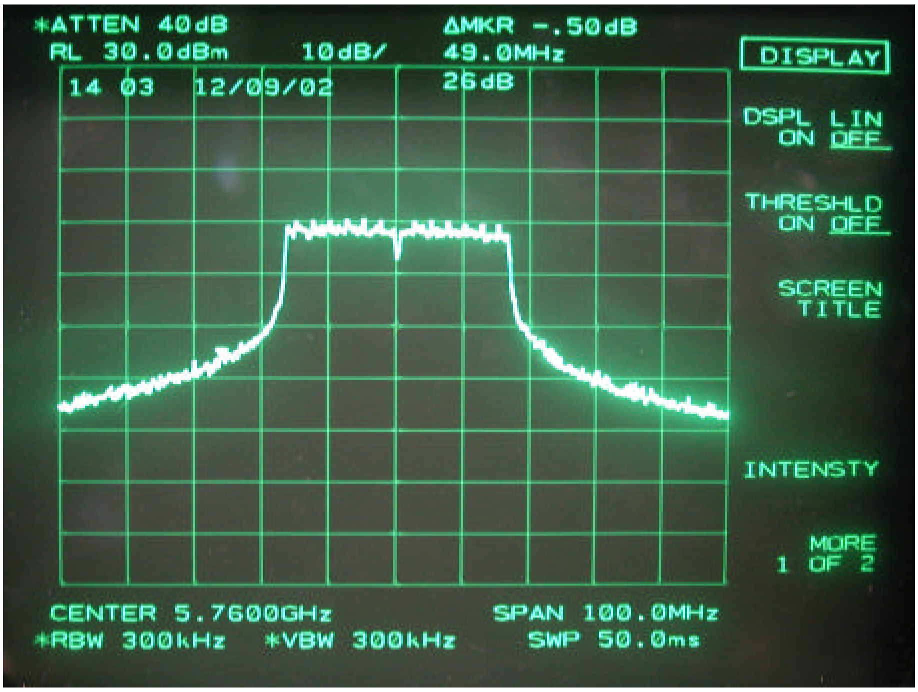
26 dB Bandwidth of Middle Channel (5.8GHz Base mode)



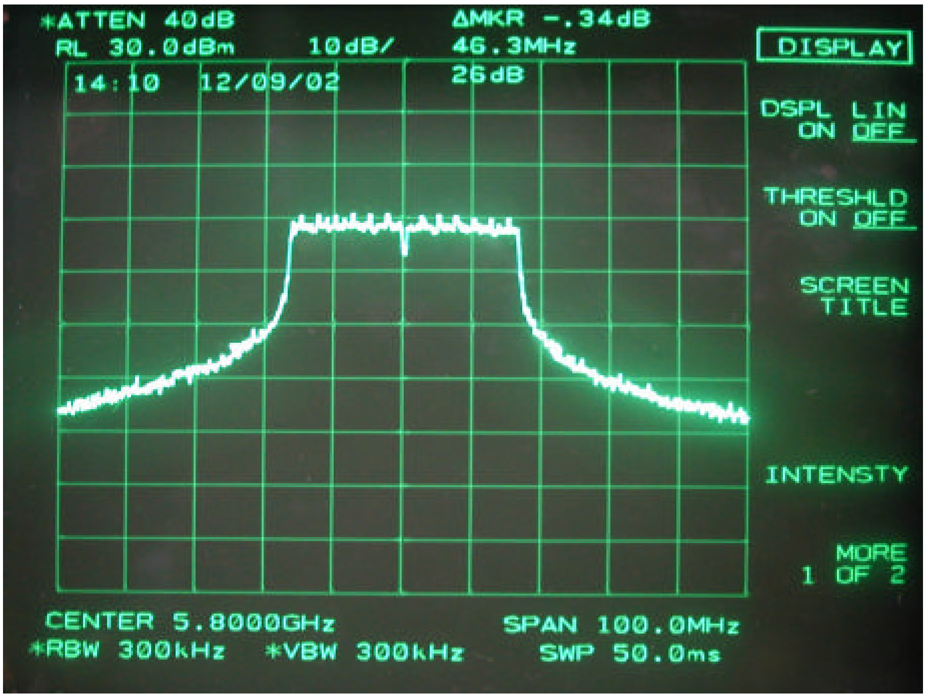
26 dB Bandwidth of Highest Channel (5.8GHz Base mode)



26 dB Bandwidth of Lowest Channel (5.8GHz OFDM mode)

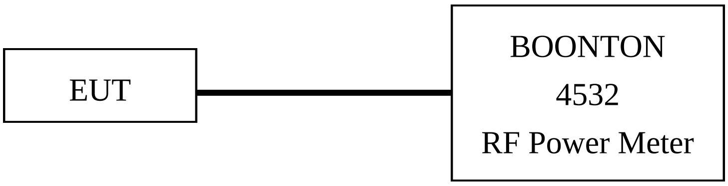


26 dB Bandwidth of Highest Channel (5.8GHz OFDM mode)



VII. Section 15.247(b): Power Output

7.1 Test Condition & Setup



1. The output of the transmitter is connected to the BOONTON RF Power Meter.
2. The calibration is performed before every testes. The values of the output power of the EUT will shown in the dBm directly are the transmitter output peak power. Recording as follows.

7.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last Cali.	Due On
RF Power Meter	4532	BOONTON	117501	Mar/21/02	Mar/21/03

7.3 Test Result

2.4GHz Band, Base mode

Channel	Frequency	Power Meter Reading	Cable Loss	Limit	Output peak power	
	MHz	dBm	dBi	dBm	dBm	mW
Lowest	2412	17.72	0.20	30.00	17.92	61.94
Middle	2437	17.42	0.20	30.00	17.62	57.81
Highest	2462	17.37	0.20	30.00	17.57	57.15

5.8GHz Band, Base mode

Channel	Frequency	Power Meter Reading	Cable Loss	Limit	Output peak power	
	MHz	dBm	dBi	dBm	dBm	mW
Lowest	5745	20.26	0.20	30.00	20.46	111.17
Middle	5785	20.10	0.20	30.00	20.30	107.15
Highest	5825	19.51	0.20	30.00	19.71	93.54

5.8GHz Band, Turbo mode

Channel	Frequency	Power Meter Reading	Cable Loss	Limit	Output peak power	
	MHz	dBm	dBi	dBm	dBm	mW
Lowest	5760	20.07	0.20	30.00	20.27	106.41
Highest	5800	19.31	0.20	30.00	19.51	89.33

VIII. Section 15.247 (C): Spurious Emissions (Radiated)

8.1 Test Condition & Setup

We' d performed the test by the *radiated emission* skill: The EUT was placed in an anechoic chamber, and set the EUT transmitting continuously and scanned at 3-meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions was noted so it could be reproduced later during the final tests. For the measurement above 1GHz, according to the guidance we' d set the spectrum analyzer' s 6dB bandwidth RBW to 1MHz.

This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 85460A EMI Receiver, Schaffner whole range Bi-Log antenna (Model No.: CBL6141A) is used to measure frequency from 30 MHz to 1GHz.The final test is used the spectrum HP 85460A and spectrum was examined from 1GHz to 18GHz using an Hewlett Packard 8564E Spectrum Analyzer, EMCO Horn Antenna (Model 3115) for 1G ~ 18GHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 18GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 18GHz) and the analyzer was operated in the maximum hold mode. There is a test condition apply in this test item, the test procedure description as the following:

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to upper, middle and bottom channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency. Since the EUT was set to transmit continuously, no *duty cycle* is present.

For frequency between 30MHz to 1000MHz

FIa (dBuV/m) = FIr (dBμV) – Correction Factors

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

For frequency between 1 GHz to 18 GHz

FIa (dBμV/m) = FIr (dBμV) + Correction Factor

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

The setting up procedure is recorded on Appendix A.

8.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last	Due
EMI Receiver	8546A	H P	3520A00242	Jun/29/02	Jun/29/03
RF Filter Section	85460A	H P	3448A00217	Jun/29/02	Jun/29/03
Bi-log Antenna	CBL6141A	Schaffner	4206	Mar/09/02	Mar/09/03
Switch/Control Unit (> 30MHz)	3488A	HP	N/A	Nov/20/02	Nov/20/03
Auto Switch Box (> 30MHz)	ASB-01	TRC	9904-01	Nov/20/02	Nov/20/03
Spectrum Analyzer	8564E	HP	US36433002	Nov/21/02	Nov/21/03
Microwave Preamplifier	83051A	HP	3232A00347	Nov/21/02	Nov/21/03
Horn Antenna	3115	EMCO	9704 – 5178	Dec/27/01	Dec/27/02
Anechoic Chamber (cable calibrated together)				May/20/02	May/20/03

8.3 Test Instruments Configuration

Front View of the Test Configuration

Rear View of the Test Configuration

The test configuration for frequency between 1GHz to 18GHz is same as above.

8.4 Test Result of Spurious Radiated Emissions

EUT's transmit only

The highest peak values of radiated emissions form the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

Test Conditions: Testing room : Temperature : 25.0 ° C Humidity : 50.2 % RH

Table 5 Radiated Emissions for 30MHz 1GHz [2.4GHz Base mode, Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBmV/m)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBmV/m)*	*Limit (dBmV/m)*	*Margin (dB)*
148.94	26.06	1.30	141	1.96	28.02	43.50	-15.48
237.94	34.82	1.00	290	1.64	36.46	46.00	-9.54
398.60	24.07	1.00	80	5.03	29.10	46.00	-16.90
433.76	22.03	1.00	178	6.57	28.60	46.00	-17.40
672.13	17.71	2.09	190	16.07	33.78	46.00	-12.22

Note:

1.Margin = Corrected Amplitude – Limit.

2.Peak Amplitude + |Correction Factors| = Corrected Amplitude

Table 6 Radiated Emissions For 30MHz 1GHz [2.4GHz Base mode, Vertical]

Radiated Emission				***Correction Factors***	***Corrected Amplitude***	***FCC Class B (3 m)***	
Frequency (MHz)	***Amplitude (dBmV/m)***	***Ant. H. (m)***	***Table (°)***	***(dB)***	***(dBmV/m)***	***Limit (dBmV/m)***	***Margin (dB)***
84.47	21.44	1.02	132	4.57	26.01	40.00	-13.99
139.12	29.18	1.00	101	2.20	31.38	43.50	-12.12
238.55	29.40	1.00	204	1.65	31.05	46.00	-14.95
374.35	23.02	1.00	137	4.08	27.10	46.00	-18.90
480.44	21.70	1.00	233	8.21	29.91	46.00	-16.09
672.13	23.16	1.00	42	16.07	39.23	46.00	-6.77

Table 7 Open Field Radiated Emissions For 1GHz 18GHz [2.4GHz Base mode, Horizontal]

Radiated Emission				***Correction Factors***	***Corrected Amplitude***		***FCC Class B (3m)***		
Frequency (GHz)	***Amplitude (dBmV/m)***	***Ant. H. (m)***	***Table (°)***	***(dB)***	***Peak***	***Average***	***Limit***		***Margin (dB)***
							Peak	***Ave.***	
2.412	84.34	1.00	241	3.03	87.37	---	---	---	---
*4.824	37.44	1.00	297	3.76	41.20	---	74.0	54.0	-12.80
6.336	45.27	1.00	117	7.63	52.90	---	74.0	---	-21.10
7.241	36.11	1.00	19	10.11	46.22	---	74.0	---	-27.78
9.648	34.61	1.00	249	11.46	46.07	---	74.0	---	-27.93

Table 8 Open Field Radiated Emissions For 1GHz 18GHz [2.4GHz Base mode, Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude		FCC Class B (3m)		
Frequency (GHz)	Amplitude (dBmV/m)	Ant. H. (m)	Table (°)	(dB)	Peak	Average	Limit Peak	Limit Ave.	Margin (dB)
*2.336	47.33	1.00	217	2.63	49.96	---	74.0	54.0	-4.04
2.412	99.32	1.00	115	3.03	102.35	---	---	---	---
2.464	50.00	1.00	241	3.31	53.31	---	74.0	---	-20.69
*4.824	35.94	1.00	224	3.76	39.70	---	74.0	54.0	-14.30
6.336	45.27	1.00	197	7.63	52.90	52.40	74.0	---	-21.10
7.241	38.44	1.00	28	10.11	48.55	---	74.0	---	-25.45
9.648	35.94	1.00	281	11.46	47.40	---	74.0	---	-26.60

Note:

1. Margin = Corrected - Limit.
2. The “ * “ means restricted bands.
3. The EUT utilizes a *permanently attached antenna*. In addition the spurious RF conducted emissions levels do comply with the *20dBc limit* both at its bandedges and other spurious emissions.
4. As stated in Section 15.35(b), for any frequencies above 1000MHz, radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. As the results of our test, the peak amplitudes are already below the FCC limit. Thus the average amplitudes of the rest are omitted.

Table 9 Radiated Emissions for 30MHz 1GHz [5.8GHz Base mode, Horizontal]

Radiated Emission				***Correction Factors***	***Corrected Amplitude***	***FCC Class B (3 m)***	
Frequency (MHz)	***Amplitude (dBmV/m)***	***Ant. H. (m)***	***Table (°)***	***(dB)***	***(dBmV/m)***	***Limit (dBmV/m)***	***Margin (dB)***
147.06	25.75	1.00	125	2.01	27.76	43.50	-15.74
239.16	32.57	1.00	298	1.66	34.23	46.00	-11.77
399.21	23.52	1.00	91	5.05	28.57	46.00	-17.43
434.37	22.19	1.00	165	6.59	28.78	46.00	-17.22
672.13	17.01	1.65	174	16.07	33.08	46.00	-12.92

Table 10 Radiated Emissions for 30MHz 1GHz [5.8GHz Base mode, Vertical]

Radiated Emission				***Correction Factors***	***Corrected Amplitude***	***FCC Class B (3 m)***	
Frequency (MHz)	***Amplitude (dBmV/m)***	***Ant. H. (m)***	***Table (°)***	***(dB)***	***(dBmV/m)***	***Limit (dBmV/m)***	***Margin (dB)***
37.01	20.78	1.00	64	10.00	30.78	40.00	-9.22
63.95	23.11	1.00	23	6.59	29.70	40.00	-10.30
143.97	30.22	1.00	299	2.10	32.32	43.50	-11.18
239.16	33.28	1.00	84	1.66	34.94	46.00	-11.06
576.84	21.02	1.00	256	12.92	33.94	46.00	-12.06

Table 11　Open Field Radiated Emissions For 1GHz　　26.5GHz [5.8GHz Base mode, Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude		FCC　Class B (3m)		
							Limit		
Frequency (GHz)	Amplitude (dBmV/m)	Ant. H. (m)	Table (°)	(dB)	Peak	Average	Peak	Ave.	Margin (dB)
5.744	77.32	1.00	276	14.89	92.21	---	---	---	---
*11.488	42.77	1.00	218	4.52	47.29	---	74.0	54.0	-6.71

Table 12　Open Field Radiated Emissions For 1GHz　　26.5GHz [5.8GHz Base mode, Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude		FCC　Class B (3m)		
							Limit		
Frequency (GHz)	Amplitude (dBmV/m)	Ant. H. (m)	Table (°)	(dB)	Peak	Average	Peak	Ave.	Margin (dB)
5.738	82.85	1.00	24	15.87	98.72	---	---	---	---
*11.488	43.74	1.00	117	4.52	48.29	---	74.0	54.0	-5.71

Table 13 Radiated Emissions for 30MHz 1GHz [5.8GHz Turbo mode, Horizontal]

Radiated Emission				***Correction Factors***	***Corrected Amplitude***	***FCC Class B (3 m)***	
Frequency (MHz)	***Amplitude (dBmV/m)***	***Ant. H. (m)***	***Table (°)***	***(dB)***	***(dBmV/m)***	***Limit (dBmV/m)***	***Margin (dB)***
146.62	25.54	1.00	133	2.02	27.56	43.50	-15.94
239.16	32.78	1.00	305	1.66	34.44	46.00	-11.56
398.60	23.10	1.00	88	5.03	28.13	46.00	-17.87
434.37	23.26	1.00	180	6.59	29.85	46.00	-16.15
672.13	19.91	1.00	162	16.07	35.98	46.00	-10.02

Table 14 Radiated Emissions for 30MHz 1GHz [5.8GHz Turbo mode, Vertical]

Radiated Emission				***Correction Factors***	***Corrected Amplitude***	***FCC Class B (3 m)***	
Frequency (MHz)	***Amplitude (dBmV/m)***	***Ant. H. (m)***	***Table (°)***	***(dB)***	***(dBmV/m)***	***Limit (dBmV/m)***	***Margin (dB)***
148.06	21.22	1.00	295	1.98	23.20	43.50	-20.30
*242.19	31.91	1.00	188	1.62	33.53	46.00	-12.47
341.01	26.53	1.00	57	2.93	29.46	46.00	-16.54
*401.02	27.00	1.00	6	5.13	32.13	46.00	-13.87
576.84	20.70	1.00	251	12.92	33.62	46.00	-12.38
672.13	19.14	1.00	353	16.07	35.21	46.00	-10.79

Table 15　Open Field Radiated Emissions For 1GHz　　26.5GHz [5.8GHz Turbo mode, Horizontal]

Radiated Emission				Correction Factors	Corrected Amplitude		FCC　Class B (3m)		
							Limit		
Frequency (GHz)	Amplitude (dBmV/m)	Ant. H. (m)	Table (°)	(dB)	Peak	Average	Peak	Ave.	Margin (dB)
5.770	74.66	1.00	286	14.97	89.63	---	---	---	---
*11.505	41.27	1.00	21	4.52	45.79	---	74.0	54.0	-8.21

Table 16　Open Field Radiated Emissions For 1GHz　　26.5GHz [5.8GHz Turbo mode, Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude		FCC　Class B (3m)		
							Limit		
Frequency (GHz)	Amplitude (dBmV/m)	Ant. H. (m)	Table (°)	(dB)	Peak	Average	Peak	Ave.	Margin (dB)
5.745	80.52	1.00	112	15.90	96.42	---	---	---	---
*11.516	42.44	1.00	219	4.43	46.87	---	74.0	54.0	-11.56

8.5 Test Result of the Band-edge Compliance

If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified id §15.209(a),

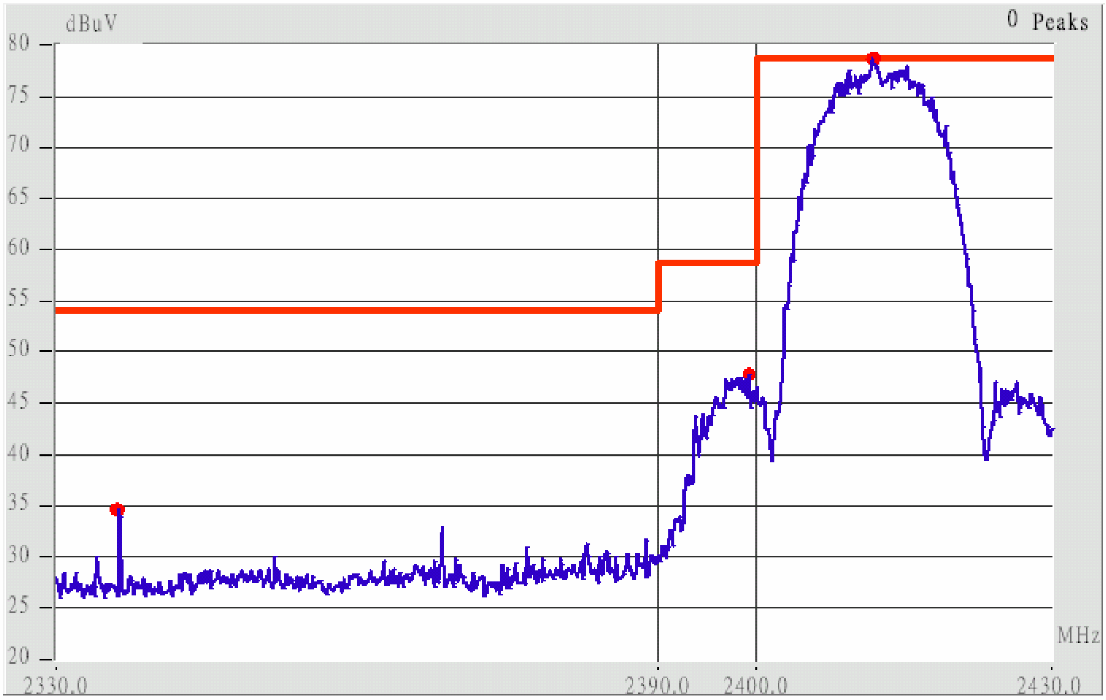
We perform this section by the RADIATED manner, the RBW is set to 100kHz and VBW>RBW. We' d made the observation up to 10th harmonics and the criterion is all the harmonic/spurious emissions must be 20dB below the highest emission level measured. If the emissions fall in the restricted bands stated in the Part15.205(a) must also comply with the radiated emission limits specified in Part15.209(a).

The following pages show our observations referring to the lowest channel and highest channel respectively. They are the hard copy of our band-edge measurement generated by our band-edge testing program.

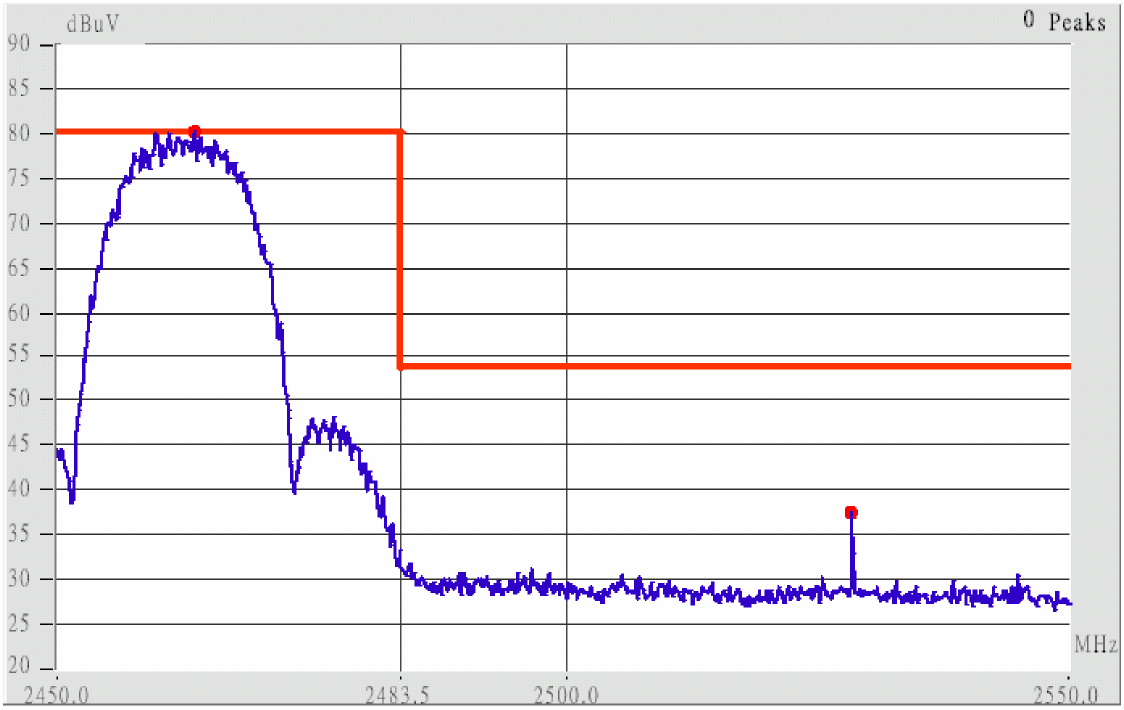
Test Condition & Setup: same as 8.1

2.4GHz Base mode

Lowest channel

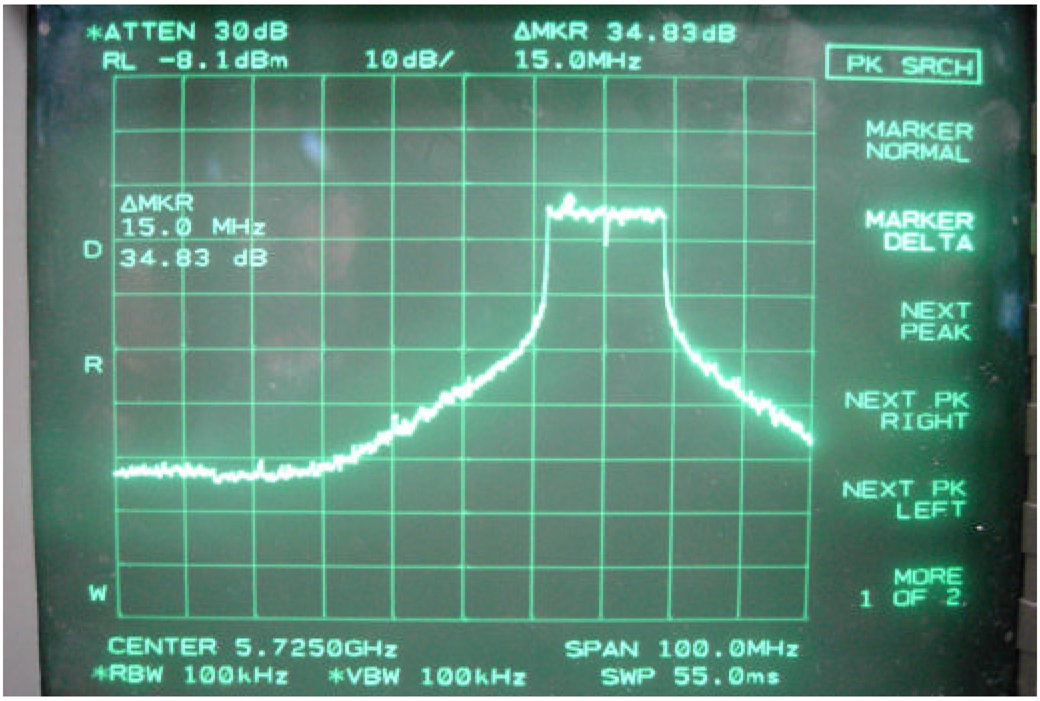


Highest channel

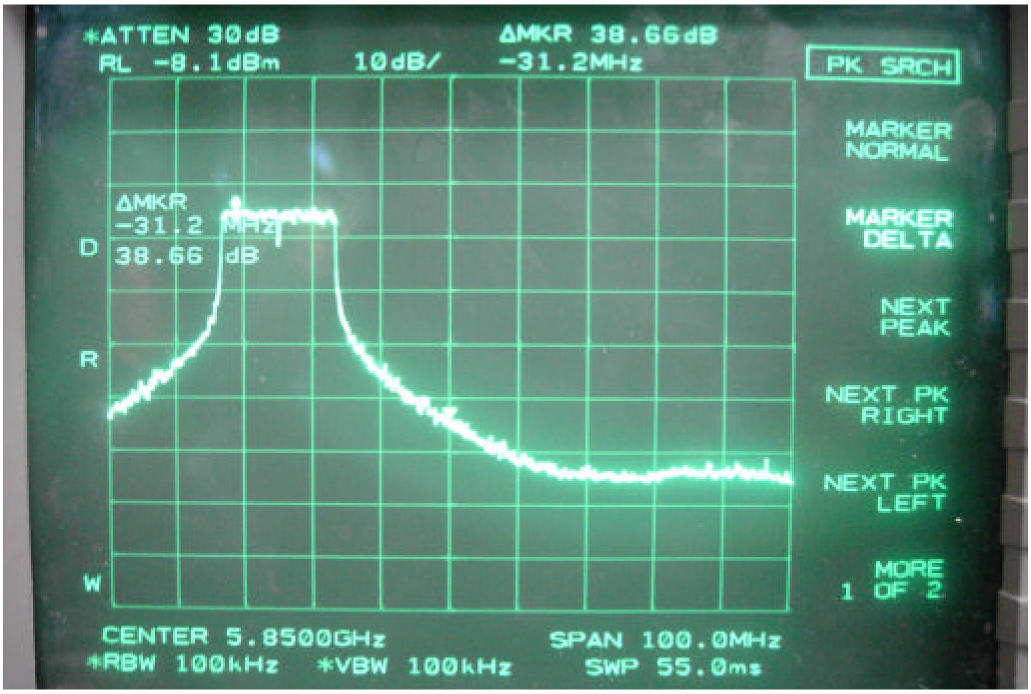


5.8GHz Base mode

Lowest channel



Highest channel



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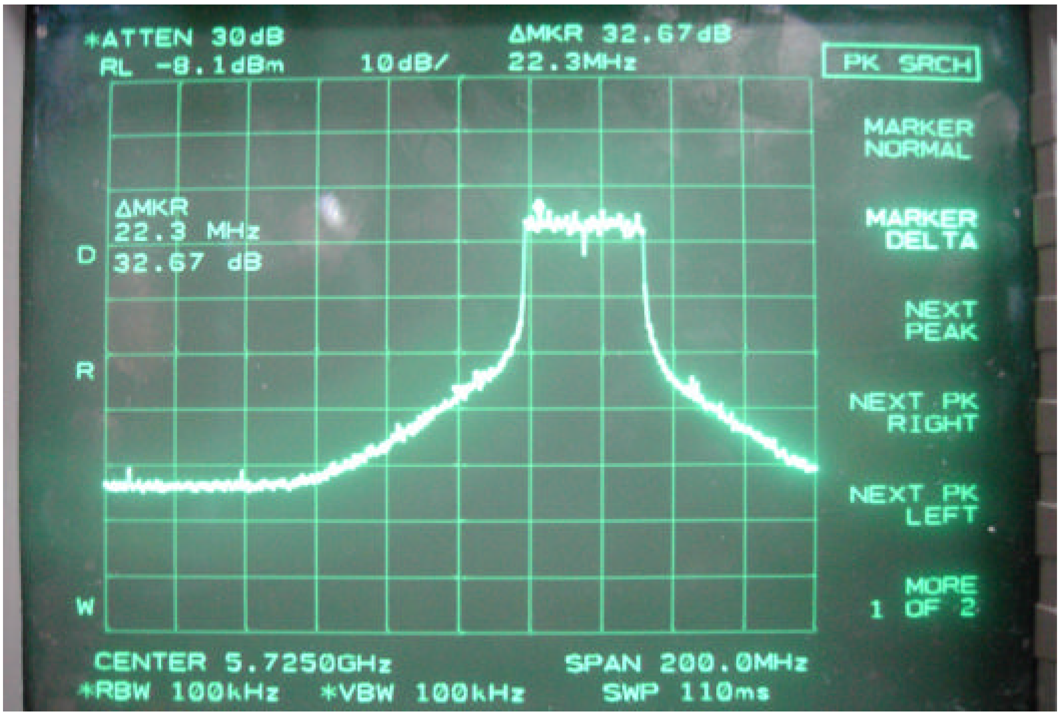
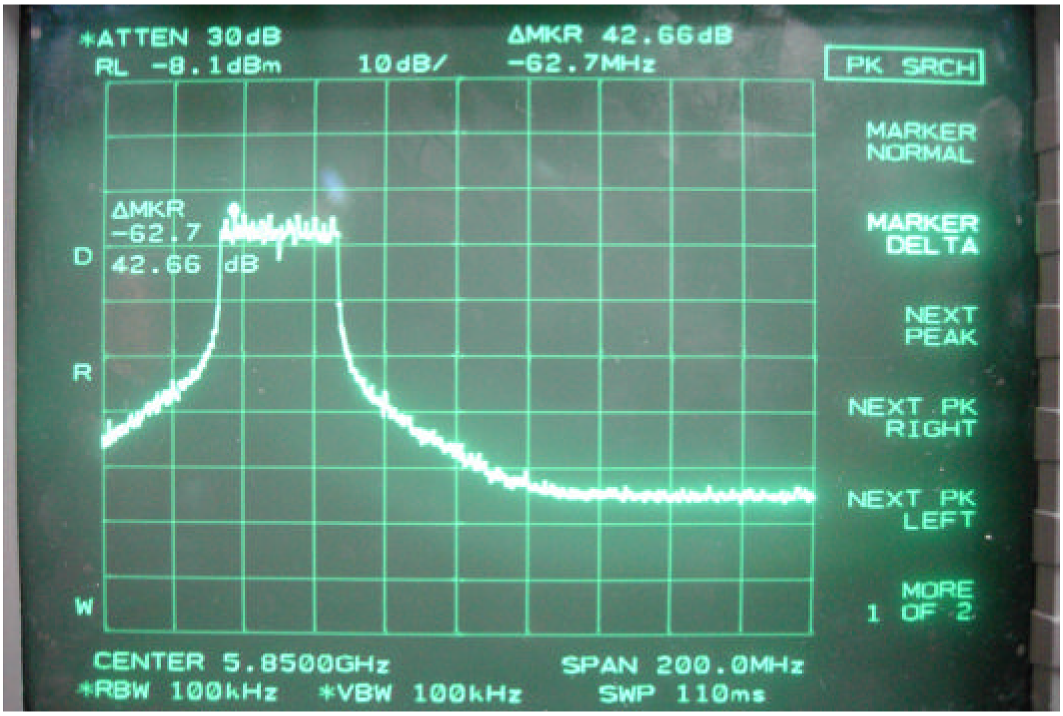
5.8GHz Turbo mode

Lowest channel



Highest channel



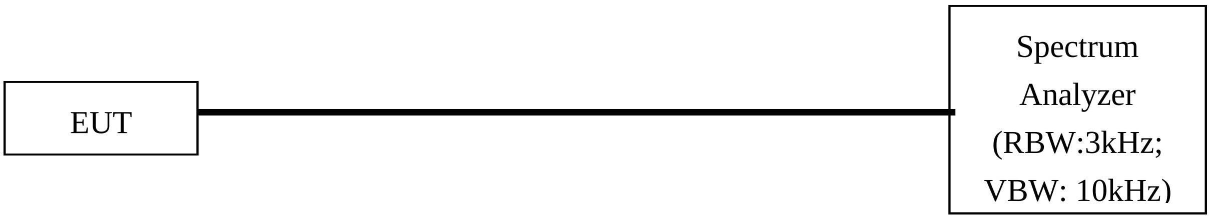
IX. Section 15.247(d): Power Spectral Density

9.1 Test Condition & Setup

The tests below are running with the EUT transmitter set at high power in TDD mode .A LAN port from a notebook computer connect to the EUT. The EUT is needed to force selection of output power level and channel number. While testing, the EUT was set to transmit continuously and to be tested by the contact manner with the spectrum analyzer.

The attachments below show our observation.

9.2 Test Instruments Configuration



Test Configuration of Power Spectral Density

P.S.: Notebook computer to control the EUT at maximal power output and channel Number and set antenna kit

9.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	8594EM	H P	3619A00198	Jul/04/02	Jul/04/03

9.4 Test Result of Power spectral density

The following table shows a summary of the test results of the Power Spectral Density.

2.4GHz Band, Base mode

	Frequency (MHz)	Ppr (dBm)	Cable loss (dBm)	Ppq (dBm)	Limit (dBm)	Margin (dB)
Lowest	2412	-7.33	0.20	-7.13	8.00	-15.13
Middle	2437	-7.00	0.20	-6.80	8.00	-14.80
Highest	2462	-7.00	0.20	-6.80	8.00	-14.80

5.8GHz Band, Base mode

	Frequency (MHz)	Ppr (dBm)	Cable loss (dBm)	Ppq (dBm)	Limit (dBm)	Margin (dB)
Lowest	5745	-15.67	0.20	-15.47	8.00	-23.47
Middle	5785	-15.67	0.20	-15.47	8.00	-23.47
Highest	5805	-16.83	0.20	-16.63	8.00	-24.63

5.8GHz Band, Turbo mode

	Frequency (MHz)	Ppr (dBm)	Cable loss (dBm)	Ppq (dBm)	Limit (dBm)	Margin (dB)
Lowest	5760	-7.33	0.20	-7.13	8.00	-15.13
Middle	N/A	N/A	N/A	N/A	N/A	N/A
Highest	5800	-7.33	0.20	-7.13	8.00	-15.13

Note:

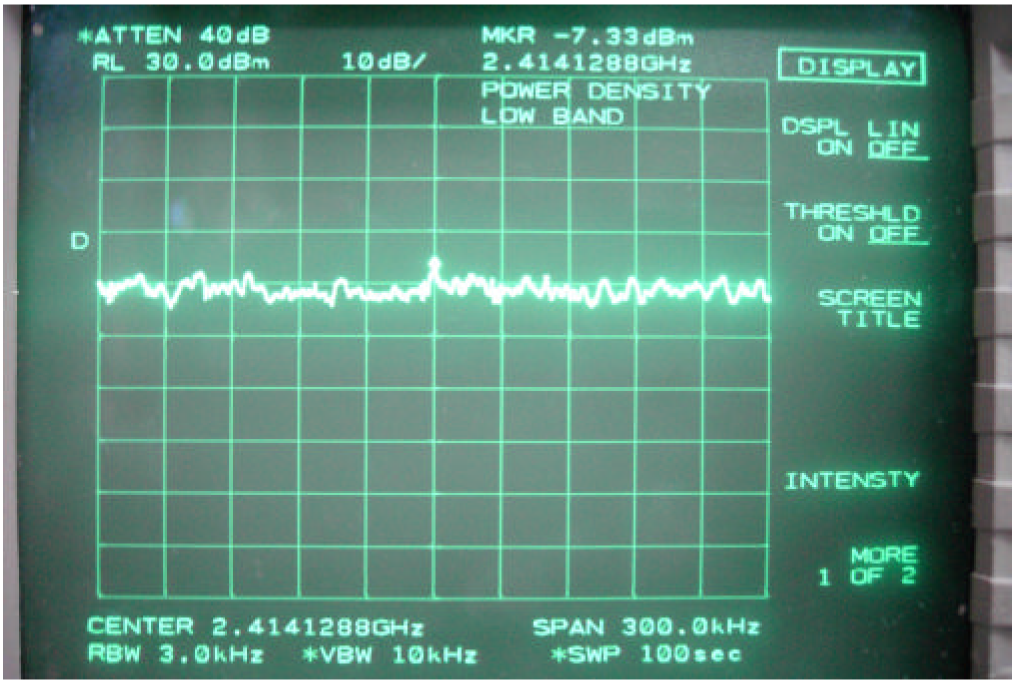
1.Ppr: spectrum read power density (using peak search mode),

Ppq: actual peak power density in the spread spectrum band.

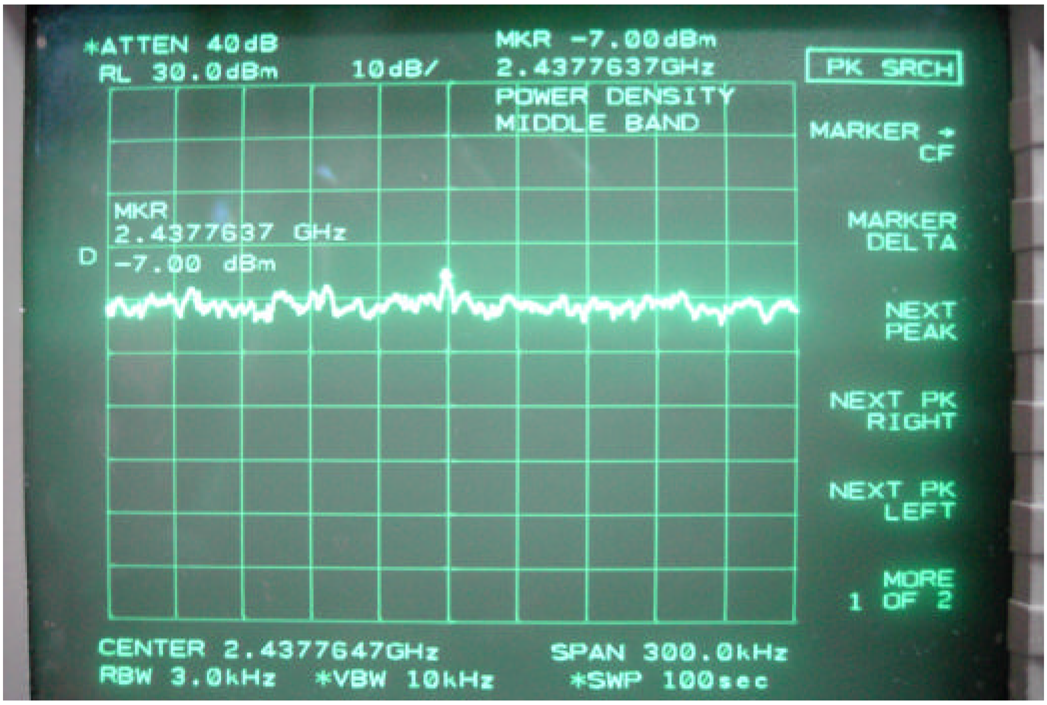
2.Ppq = Ppr + |Cable Loss|

2.4GHz Base mode

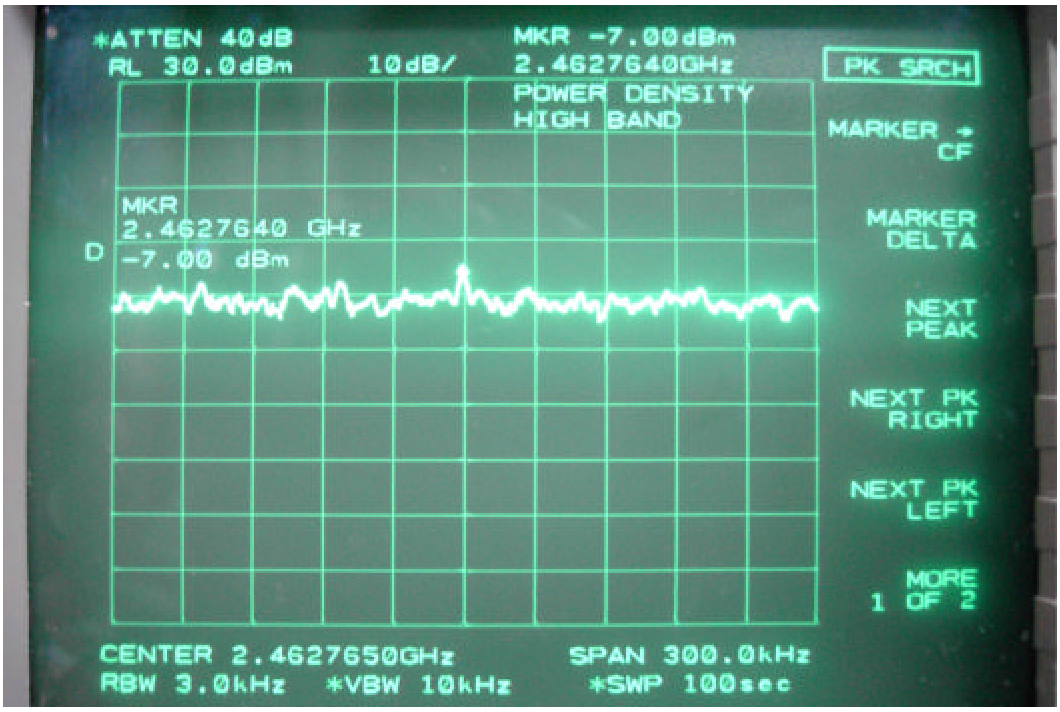
Lowest channel



Middle channel

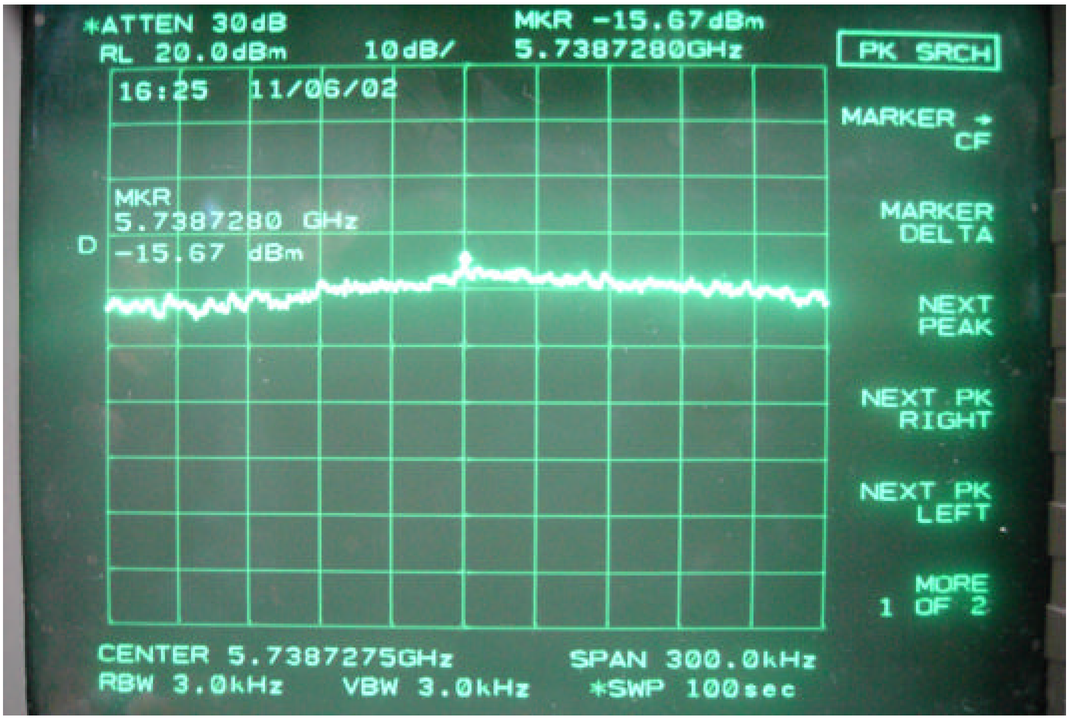


Highest channel

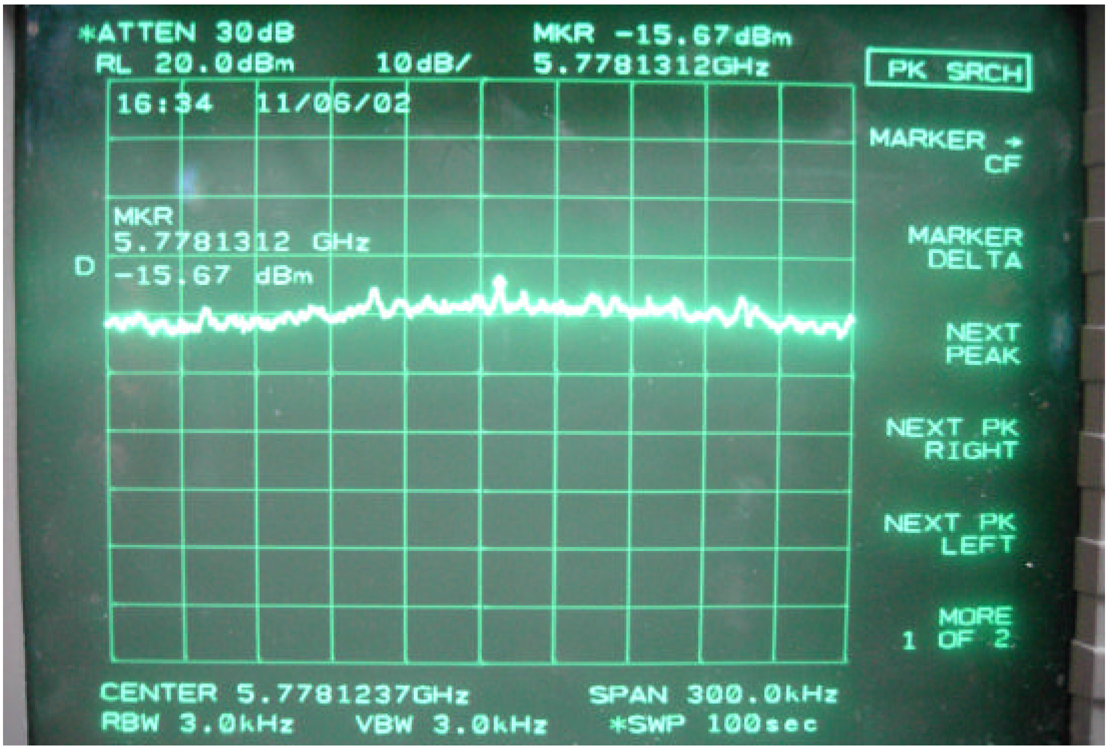


5.8GHz Base mode

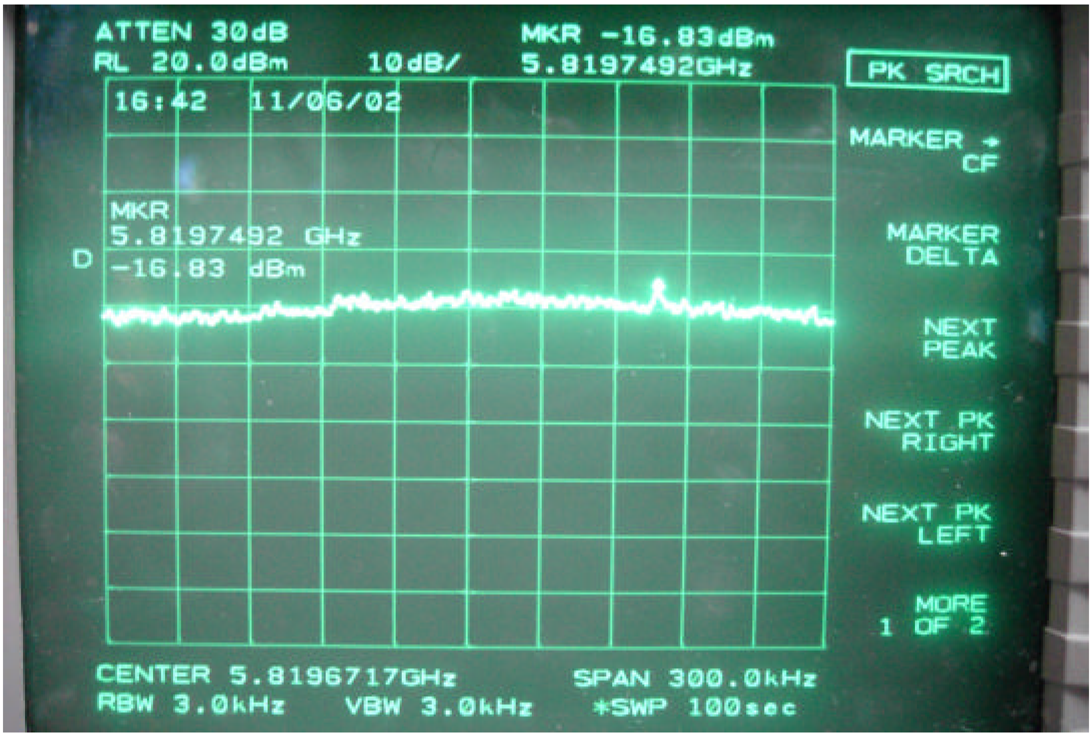
Lowest channel



Middle channel

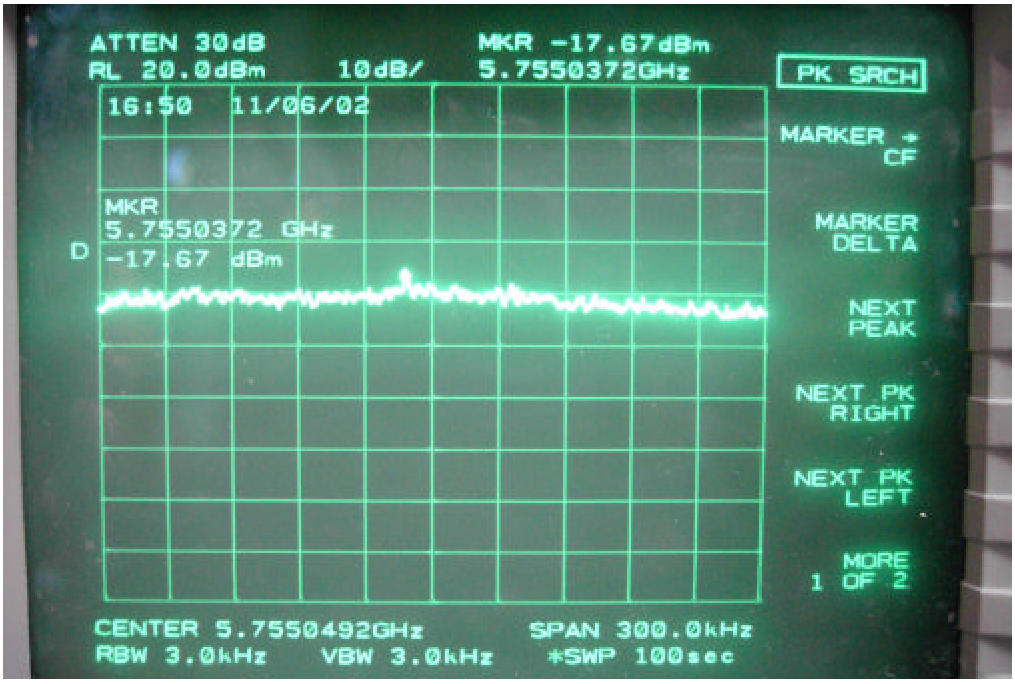


Highest channel

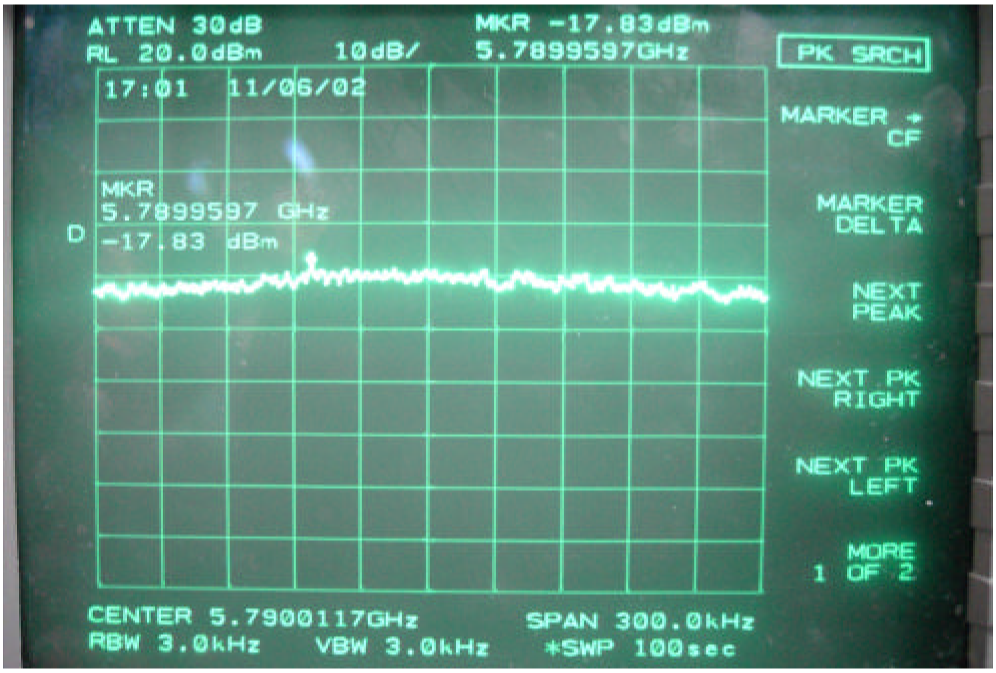


5.8GHz Turbo mode

Lowest channel



Highest channel



Appendix A

Setting up Procedure

1. The EUT inserted into the PCI slot of the personal computer..

2. Use the software that is given by the manufacturer to control the EUT at specific mode of transmission.

3. Then making access to the mode of continuous transmission and set the testing channel.

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