

EMC TEST REPORT

Report No. : TS08120011-EME

Model No. : SDW3100

Issued Date : Feb. 09, 2009

Applicant: AboCom System, Inc
77, Yu-Yih Rd., Chu-Nan Chen, Miao-Lih Hsuan,
Taiwan

Test Method/ Standard: CFR 47 FCC Part 15.247 & ANSI C63.4 2003

Test By: Intertek Testing Services Taiwan Ltd.
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
Shiang-Shan District, Hsinchu City, Taiwan

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Sammi Liu/ Assistant

These measurements were taken by: Sign on File
Jacky Chen/ Engineer

The test report was reviewed by:

Name Kevin Chen
Title Chief Engineer

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1. Summary of Test Data

Test/Requirement Description	Applicable Rule	Result
Minimum 6 dB Bandwidth	15.247(a)(2)	Pass
Maximum Output Power	15.247(b)	Pass
Power Spectral Density	15.247(e)	Pass
RF Antenna Conducted Spurious	15.247(d)	Pass
Radiated Spurious Emission	15.247(d), 15.205, 15.209	Pass
Emission on the Band Edge	15.247(d)	Pass
AC Power Line Conducted Emission	15.207	Pass

2. General Information

Identification of the EUT

Applicant:	AboCom System, Inc
Product:	802.11a/b/g Wireless SDIO Card
Model No.:	SDW3100
FCC ID.:	MQ4SDW3100
Frequency Range:	1. 2412 ~ 2462 MHz for 802.11b/g 2. 5745 ~ 5825 MHz for 802.11a
Channel Number:	1. 11 Channels for 2412 ~ 2462 MHz 2. 5 Channels for 5745 ~ 5825 MHz
Rated Power:	DC 3.3 V from PC PCI Card
Power Cord:	N/A
Data Cable:	N/A
Sample Received:	Dec. 24, 2008
Test Date(s):	Dec. 29 , 2008 ~ Jan. 06, 2009
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

Description of EUT

The EUT is an 802.11a/b/g Wireless SDIO Card, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

For Printed antenna (2.4 GHz Gain)

The EUT uses a permanently connected antenna.

Antenna Gain : -1.23 dBi max
Antenna Type : Printed antenna
Connector Type : N/A

For Printed antenna (5 GHz Gain)

Antenna Gain : 2.09 dBi max
Antenna Type : Printed antenna
Connector Type : N/A

Operation mode

The EUT was supplied with DC 3.3 V from PC PCI Card and it was run in TX mode that was controlled by “ART” program.

The EUT was transmitted continuously during the test.

With individual verifying, the maximum output power was found out 1Mbps data rate for 802.11b mode, 6Mbps data rate for 802.11g/a mode. The final tests were executed under these conditions and recorded in this report individually.

802.11b ch6		802.11g ch6		802.11a ch149	
Data rate (Mbps)	PK(dBm)	Data rate (Mbps)	PK(dBm)	Data rate (Mbps)	PK(dBm)
1M	17.44	6M	20.26	6M	17.91
2M	16.99	9M	19.69	9M	17.66
5.5M	16.33	12M	19.23	12M	16.98
11M	16.02	18M	18.69	18M	16.48
		24M	18.39	24M	16.21
		36M	18.15	36M	15.69
		48M	17.84	48M	15.32
		54M	17.23	54M	14.88

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 802.11b/g

Test Software Version	ART		
Frequency	2412 MHz	2437 MHz	2462 MHz
802.11b	14.5	14.5	13
802.11g	10.5	11	10

Power Parameters of 802.11a

Test Software Version	ART		
Frequency	5745 MHz	5785 MHz	5825 MHz
802.11a	10	10	10

3. Maximum 6 dB Bandwidth

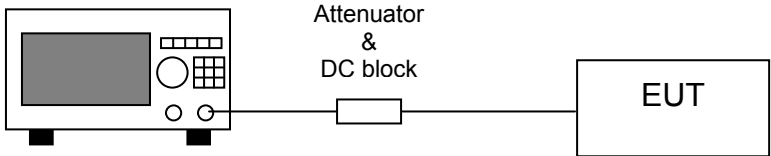
Name of Test	Maximum 6 dB Bandwidth
Base Standard	FCC 15.247 (a)(2)

Test Result: Complies
Measurement Data: See Table & plots below

Method of Measurement:
Reference FCC document: KDB558074

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1 % of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

Test Diagram:



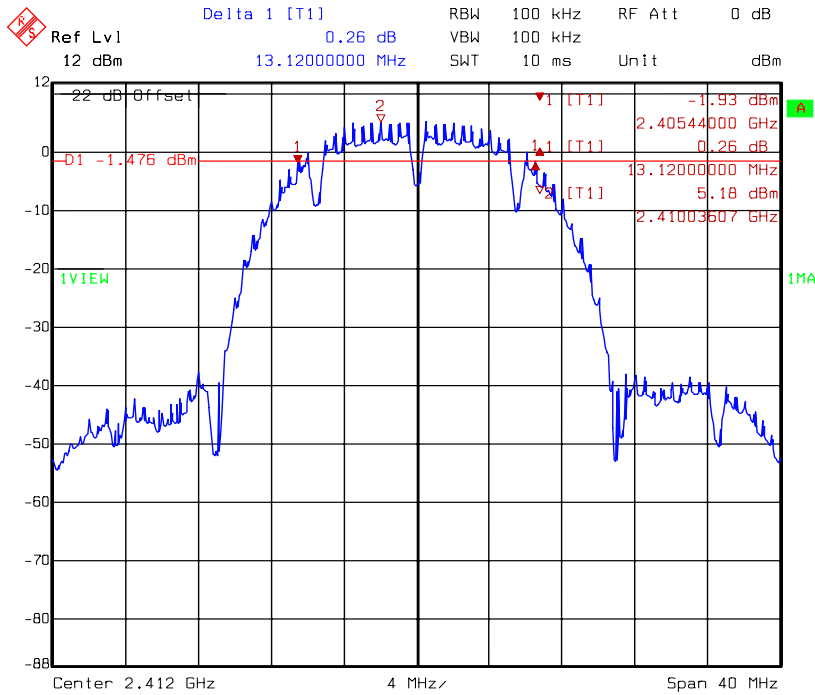
Spectrum Analyzer

Note: The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11a/ 11g. The EUT was tuned to a low, middle and high channel.

Table 1. Maximum 6 dB Bandwidth

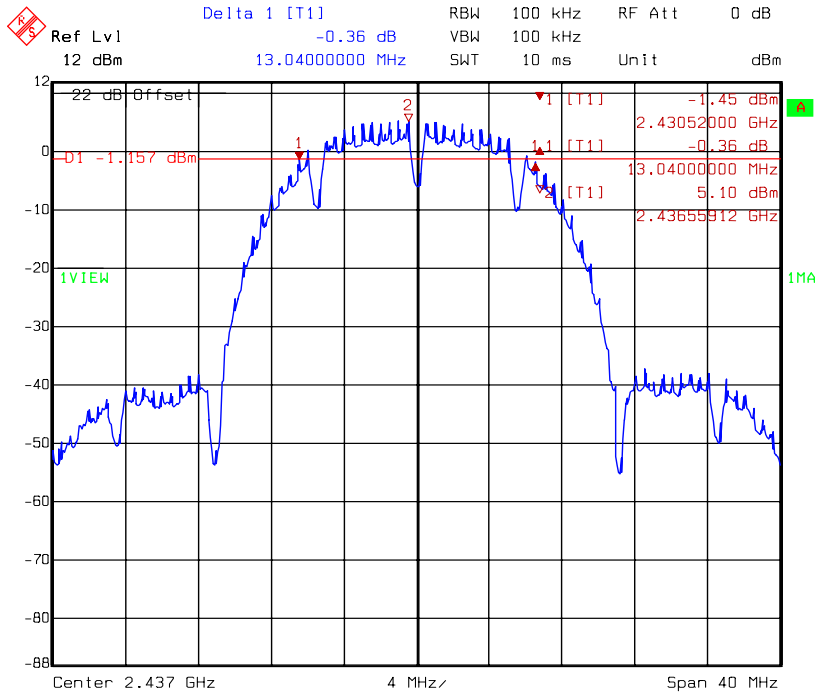
Mode	Channel	Frequency (MHz)	Data rate (Mbps)	6dB Bandwidth (MHz)	Limit (MHz)
802.11b	1	2412	1	13.12	0.5
	6	2437		13.04	0.5
	11	2462		12.24	0.5
802.11g	1	2412	6	16.56	0.5
	6	2437		16.56	0.5
	11	2462		16.64	0.5
802.11a	149	5745	6	16.64	0.5
	157	5785		16.64	0.5
	165	5825		16.64	0.5

6 dB Bandwidth @ 802.11b mode channel 1



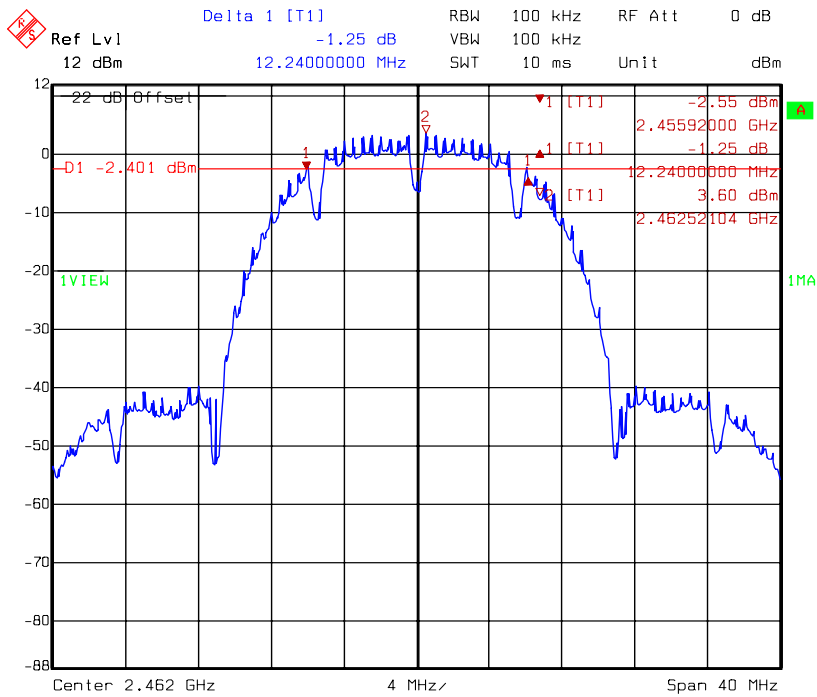
Title: 6dB Band-Width
 Comment A: CH 1 at 802.11b mode
 Date: 06.FEB.2009 15:45:22

6 dB Bandwidth @ 802.11b mode channel 6



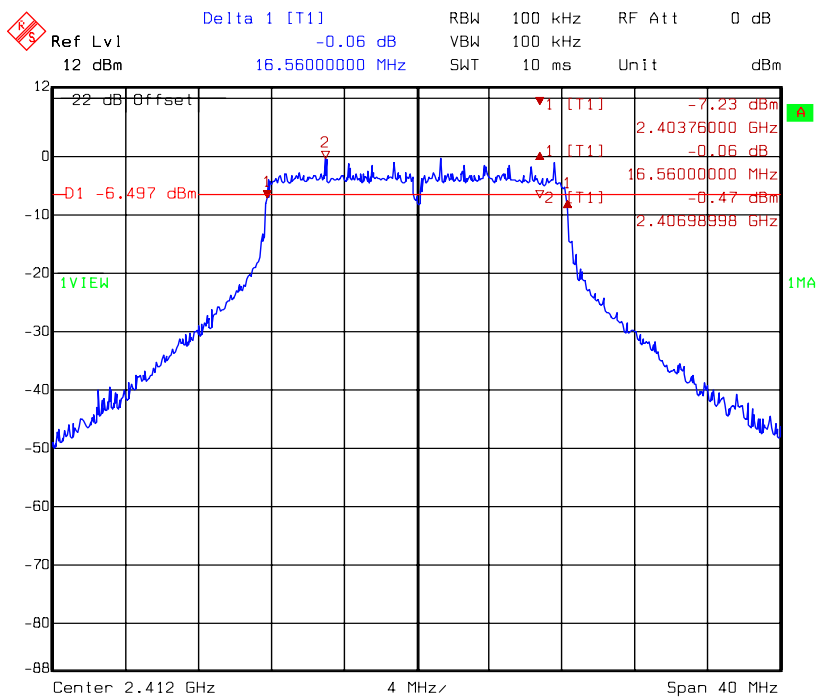
Title: 6dB Band-Width
 Comment A: CH 6 at 802.11b mode
 Date: 06.FEB.2009 15:48:19

6 dB Bandwidth @ 802.11b mode channel 11



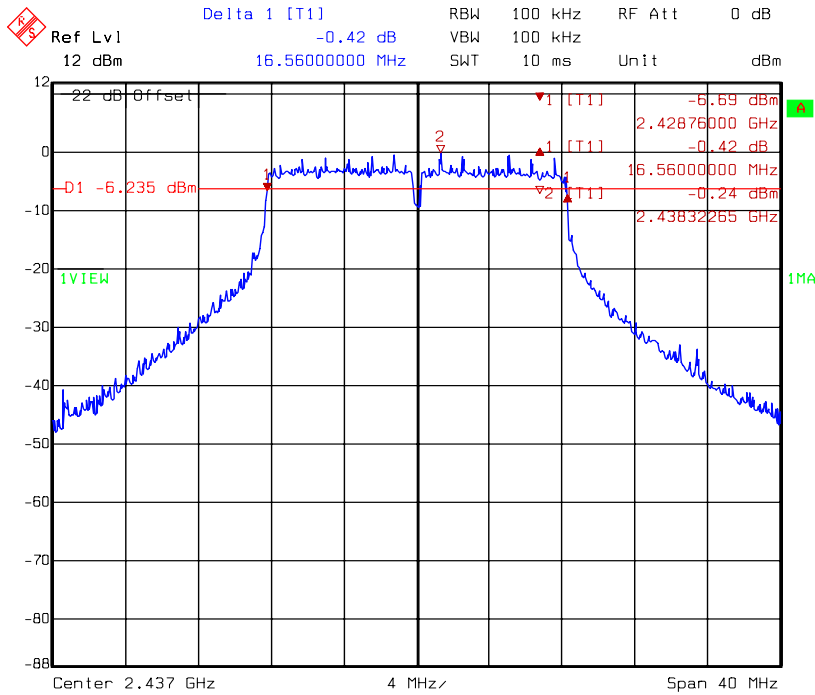
Title: 6dB Band-Width
 Comment A: CH 11 at 802.11b mode
 Date: 06.FEB.2009 15:51:15

6 dB Bandwidth @ 802.11g mode channel 1



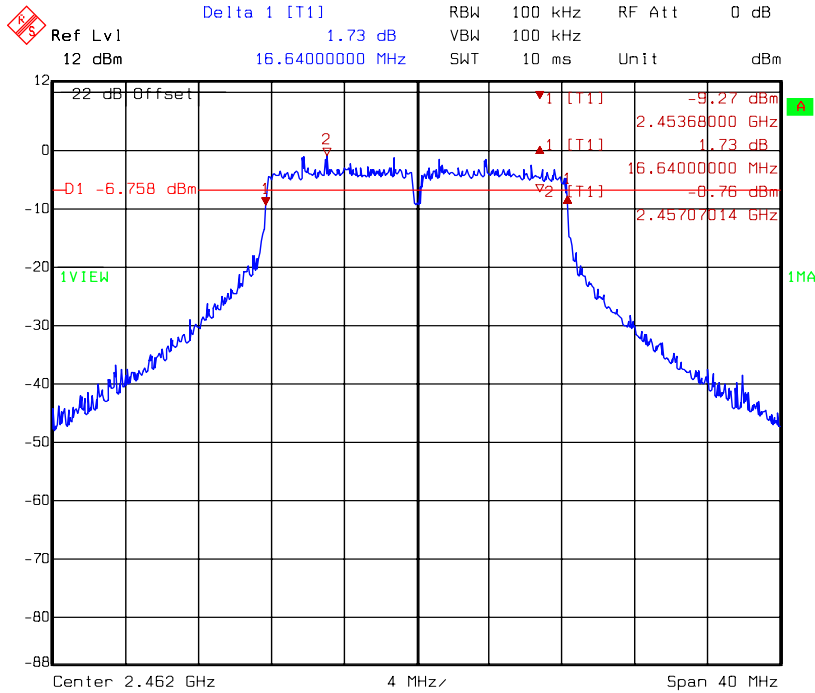
Title: 6dB Band-Width
 Comment A: CH 1 at 802.11g mode
 Date: 06.FEB.2009 15:54:23

6 dB Bandwidth @ 802.11g mode channel 6



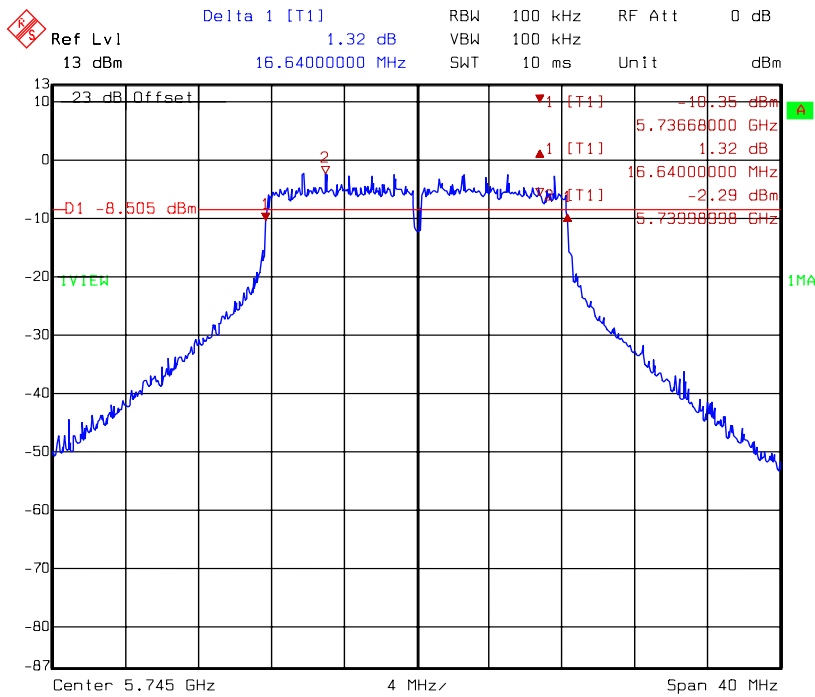
Title: 6dB Band-Width
 Comment A: CH 6 at 802.11g mode
 Date: 06.FEB.2009 15:57:08

6 dB Bandwidth @ 802.11g mode channel 11



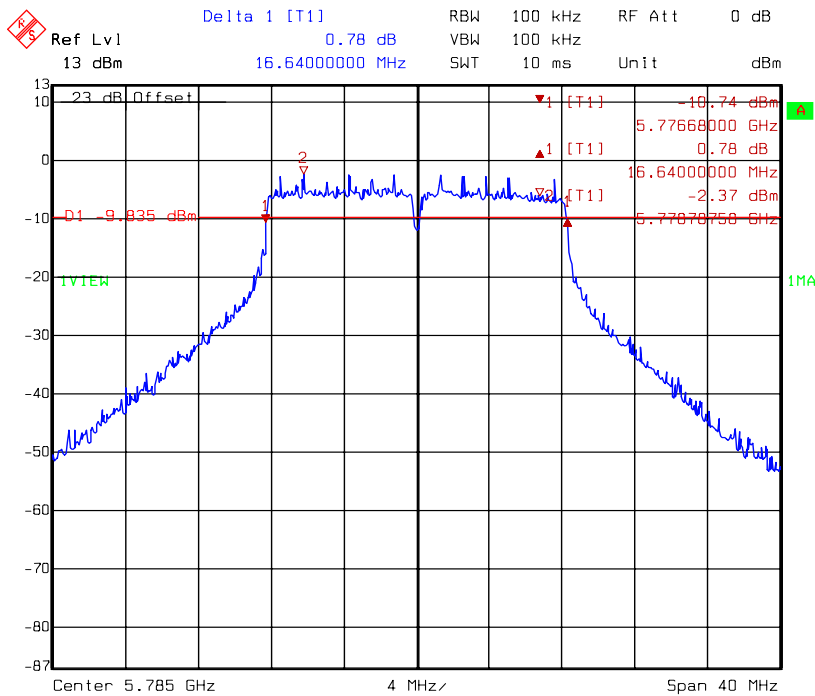
Title: 6dB Band-Width
 Comment A: CH 11 at 802.11g mode
 Date: 06.FEB.2009 15:59:42

6 dB Bandwidth @ 802.11a mode channel 149



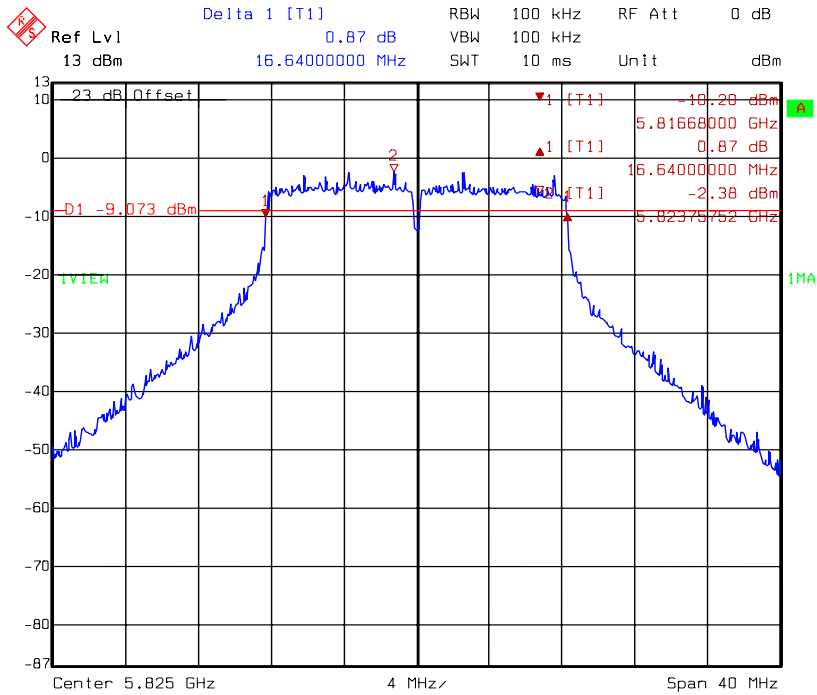
Title: 6dB Band-Width
Comment A: CH 149 at 802.11a mode
Date: 06.FEB.2009 21:25:59

6 dB Bandwidth @ 802.11a mode channel 157



Title: 6dB Band-Width
Comment A: CH 157 at 802.11a mode
Date: 06.FEB.2009 21:26:52

6 dB Bandwidth @ 802.11a mode channel 165



Title: 6dB Band-Width
 Comment A: CH 165 at 802.11a mode
 Date: 06.FEB.2009 21:27:41

4. 99 % Occupied Bandwidth

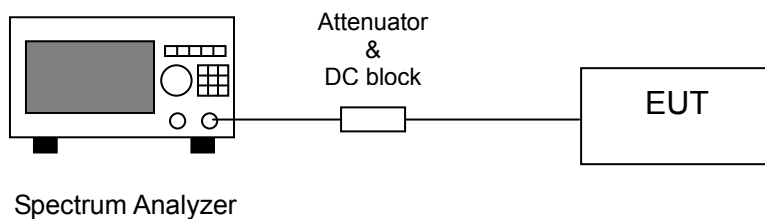
Name of Test	99 % Occupied Bandwidth
Base Standard	None; for reporting purposes only

Test Result: Complies
Measurement Data: See Table & plots below

Method of Measurement:
Reference FCC document: KDB558074

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1 % of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

Test Diagram:



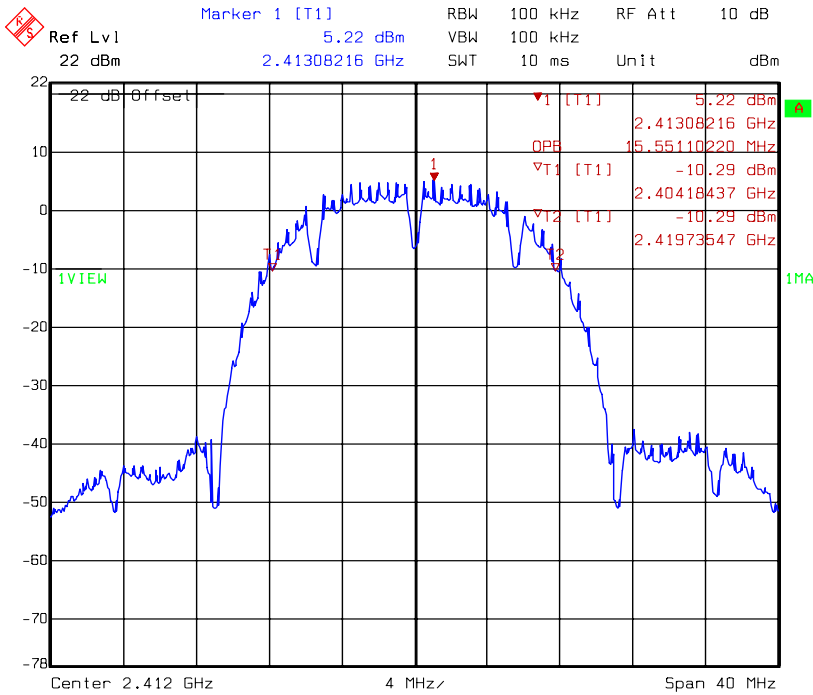
Note: The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11a/ 11g. The EUT was tuned to a low, middle and high channel.

Table 2. 99 % Occupied Bandwidth

Test Condition:

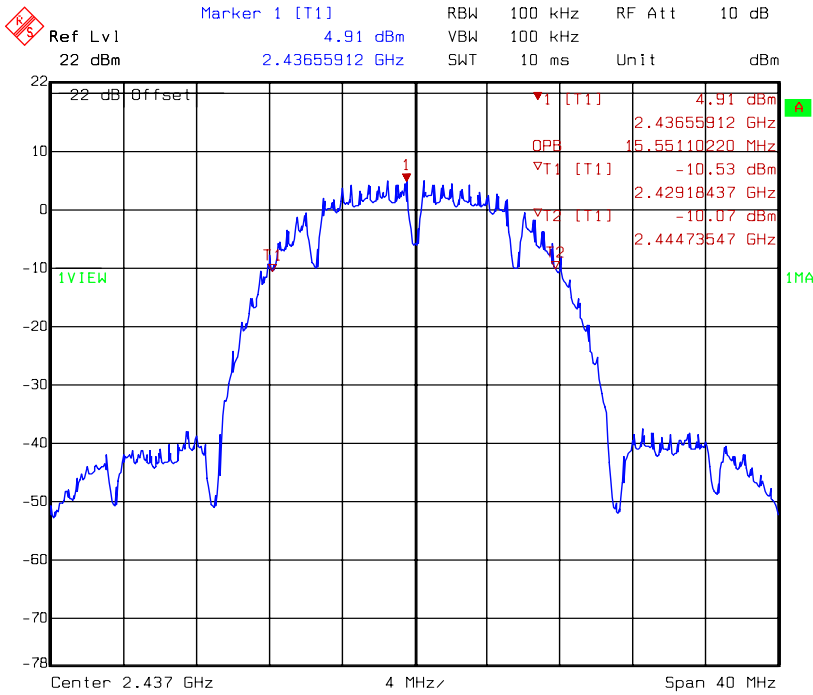
Mode	Channel	Frequency (MHz)	Data rate	99% Bandwidth (MHz)
			(Mbps)	
80.11b	1	2412	1	15.55
	6	2437		15.55
	11	2462		15.63
802.11g	1	2412	6	16.59
	6	2437		16.59
	11	2462		16.59
802.11a	149	5745	6	16.59
	157	5785		16.59
	165	5825		16.59

99 % Occupied Bandwidth @ 802.11b mode channel 1



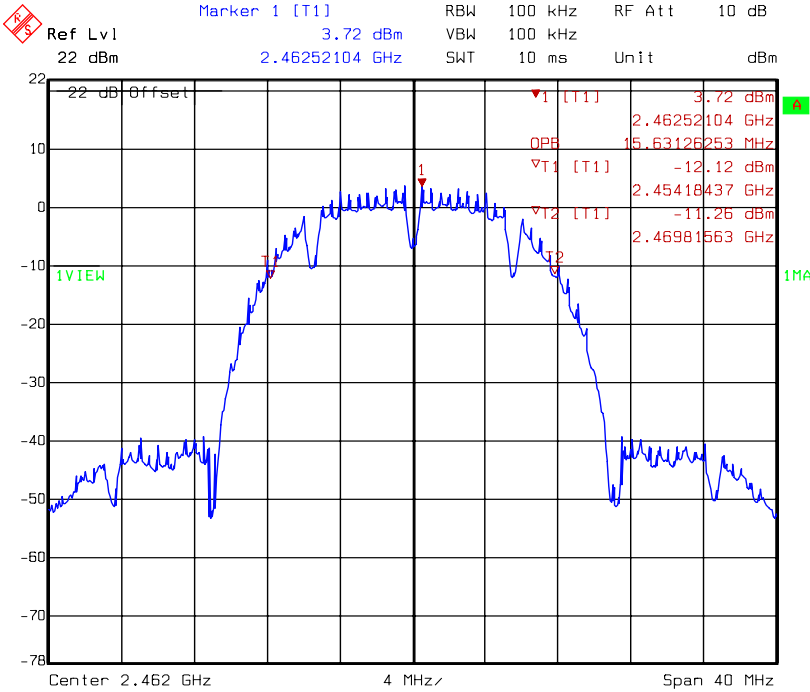
Title: Occupied Band-Width
Comment A: CH 1 at 802.11b mode
Date: 06.FEB.2009 15:47:11

99 % Occupied Bandwidth @ 802.11b mode channel 6



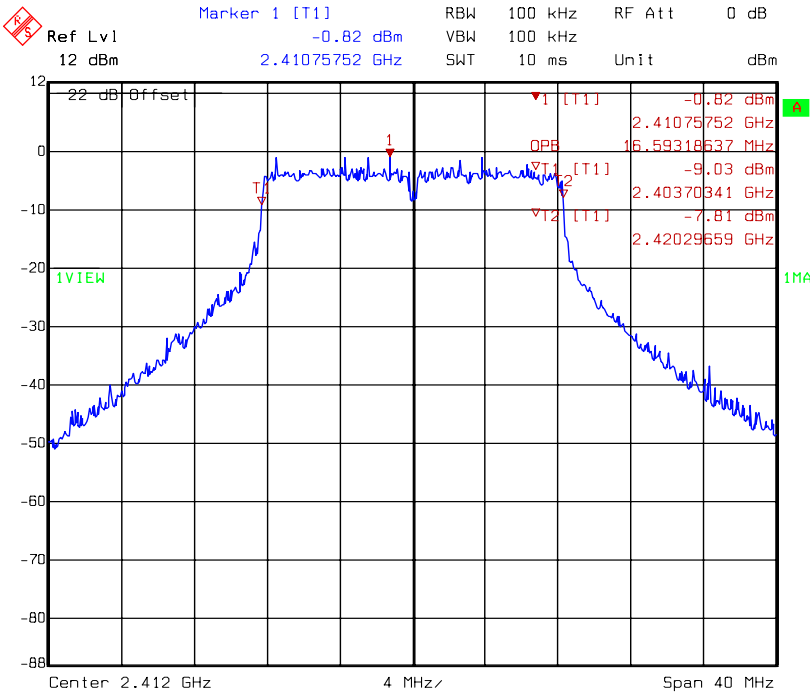
Title: Occupied Band-Width
Comment A: CH 6 at 802.11b mode
Date: 06.FEB.2009 15:50:09

99 % Occupied Bandwidth @ 802.11b mode channel 11



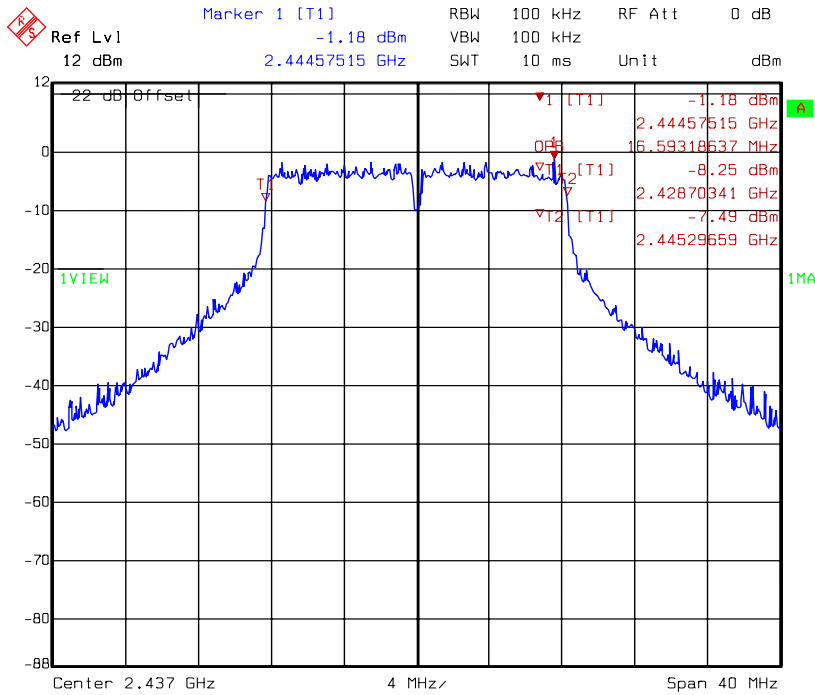
Title: Occupied Band-Width
 Comment A: CH 11 at 802.11b mode
 Date: 06.FEB.2009 15:53:04

99 % Occupied Bandwidth @ 802.11g mode channel 1



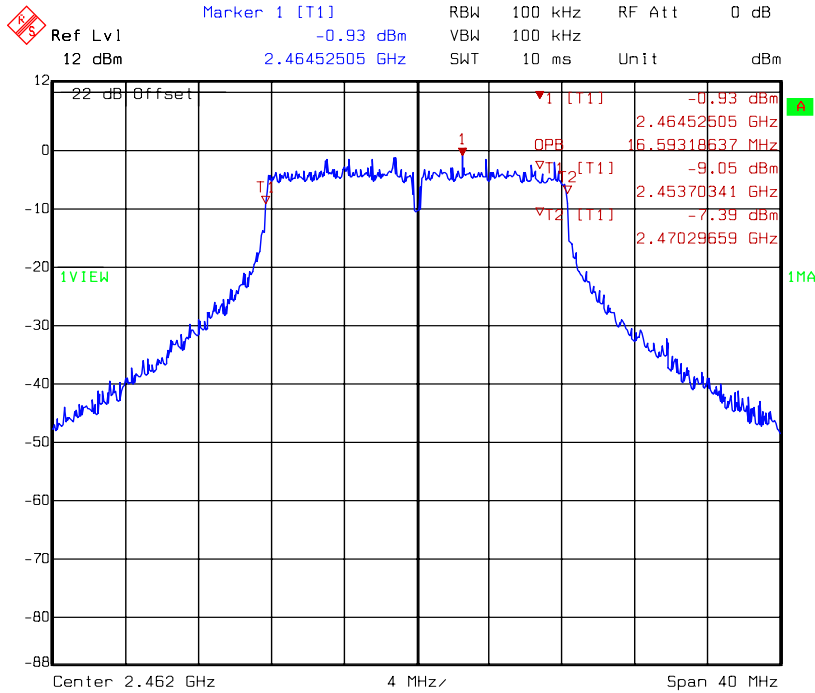
Title: Occupied Band-Width
 Comment A: CH 1 at 802.11g mode
 Date: 06.FEB.2009 15:56:06

99 % Occupied Bandwidth @ 802.11g mode channel 6



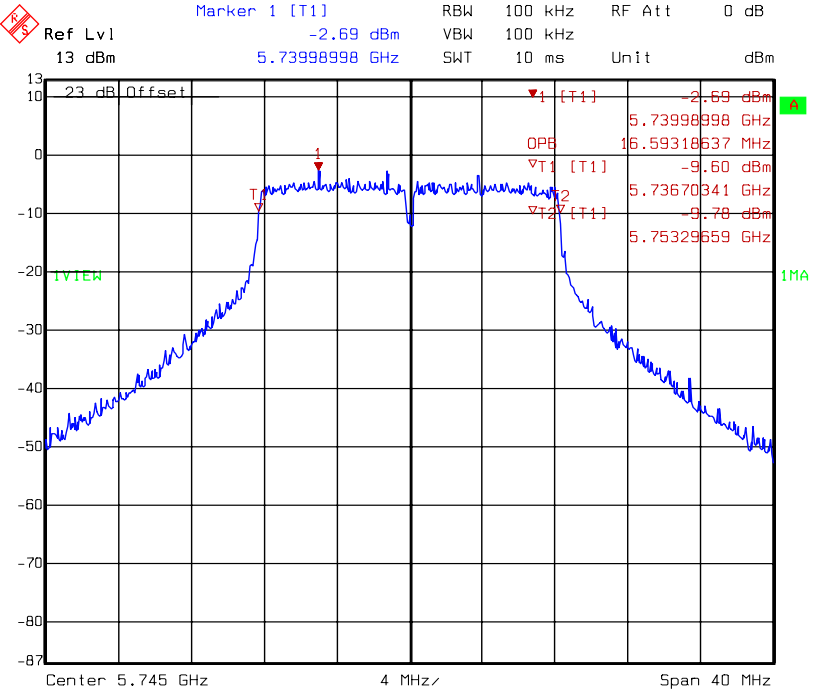
Title: Occupied Band-Width
Comment A: CH 6 at 802.11g mode
Date: 06.FEB.2009 15:58:51

99 % Occupied Bandwidth @ 802.11g mode channel 11



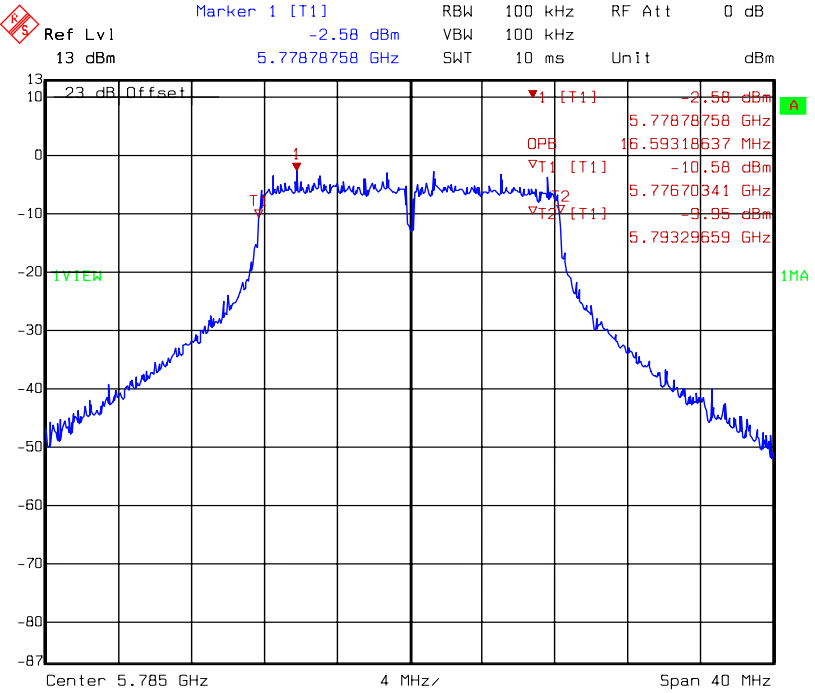
Title: Occupied Band-Width
Comment A: CH 11 at 802.11g mode
Date: 06.FEB.2009 16:01:25

99 % Occupied Bandwidth @ 802.11a mode channel 149



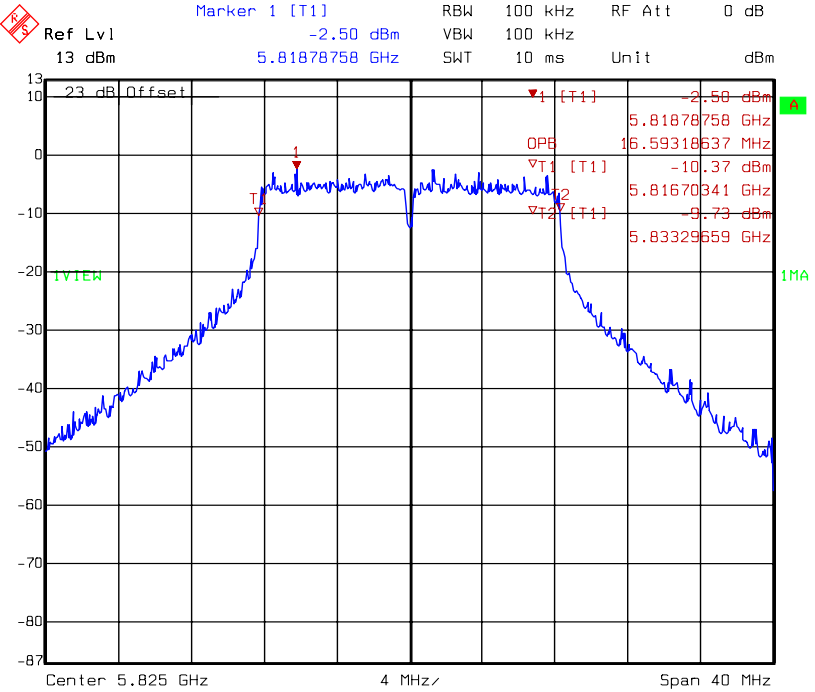
Title: Occupied Band-Width
 Comment A: CH 149 at 802.11a mode
 Date: 06.FEB.2009 16:10:05

99 % Occupied Bandwidth @ 802.11a mode channel 157



Title: Occupied Band-Width
 Comment A: CH 157 at 802.11a mode
 Date: 06.FEB.2009 16:13:52

99 % Occupied Bandwidth @ 802.11a mode channel 165



Title: Occupied Band-Width
 Comment A: CH 165 at 802.11a mode
 Date: 06.FEB.2009 16:18:24

5. Maximum Output Power

Name of Test	Maximum output power
Base Standard	FCC 15.247(b)

Measurement Uncertainty: $\pm 2\text{dB}$ (k=2)

Test Result: Complies

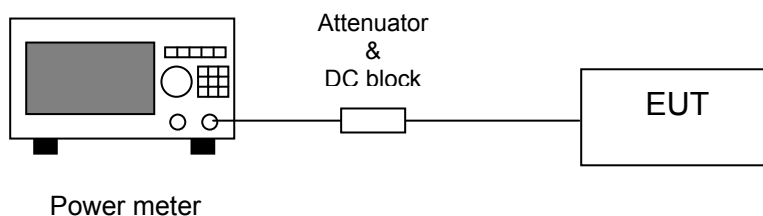
Measurement Data: See Table below

Method of Measurement:

Reference FCC document: KDB558074

The peak power at antenna terminals is measured using a Wideband Peak Power Meter. Power output is measured with the maximum rated input level.

Test Diagram:



Note 1: The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11a/ 11g. The EUT was tuned to a low, middle and high channel.

Note 2: §15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note 3: §15.247 (b) (4) (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Table 3. Maximum output power

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)		Limit (dBm)
				Printed		
				PK	AV	
802.11b	1	2412	1	17.53	15.32	30
	6	2437		17.44	15.13	30
	11	2462		16.88	13.92	30
802.11g	1	2412	6	20.06	11.38	30
	6	2437		20.26	11.75	30
	11	2462		19.82	11.16	30
802.11a	149	5745	6	18.16	9.53	30
	157	5785		17.91	9.43	30
	165	5825		18.41	9.86	30

6. Power Spectral Density

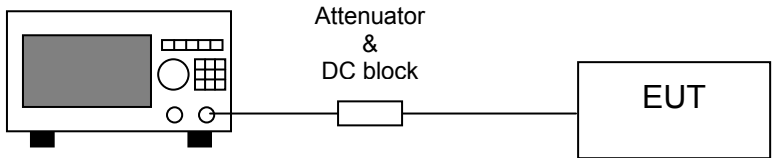
Name of Test	Power Spectral Density
Base Standard	FCC 15.247(e)

Test Result: Complies
Measurement Data: See Table & plots below

Method of Measurement:
Reference FCC document: KDB558074

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1 % of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

Test Diagram:



Spectrum Analyzer

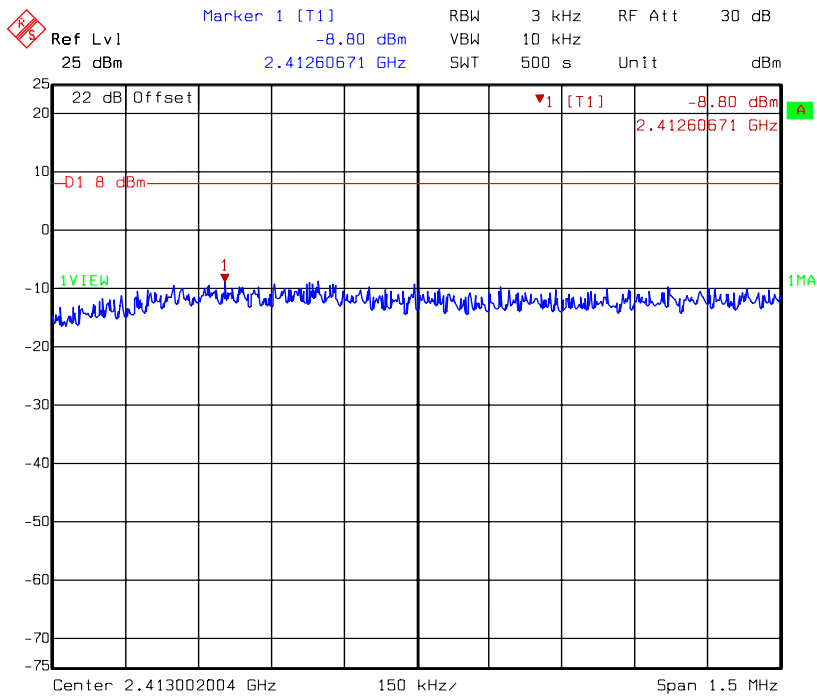
Note: The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11a/ 11g. The EUT was tuned to a low, middle and high channel.

Table 4. Power Spectral Density

Test Condition:

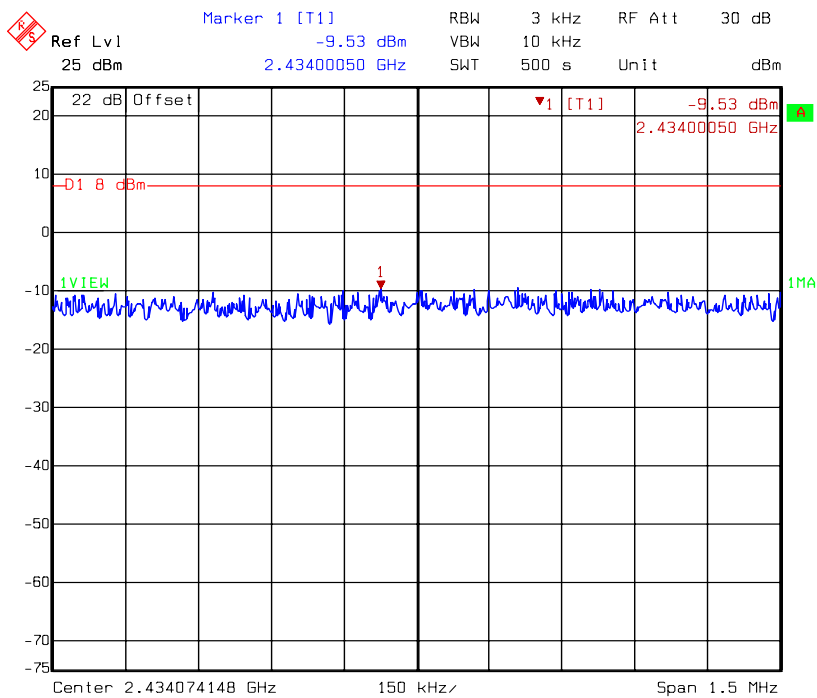
Mode	Channel	Frequency (MHz)	Data rate (Mbps)	PPSD (dBm)	Limit (dBm)
802.11b	1	2412	1	-8.8	8
	6	2437		-9.53	8
	11	2462		-10.44	8
802.11g	1	2412	6	-13.01	8
	6	2437		-12.79	8
	11	2462		-14.46	8
802.11a	149	5745	6	-14.65	8
	157	5785		-13.65	8
	165	5825		-15.94	8

Power Spectral Density @ 802.11b mode channel 1



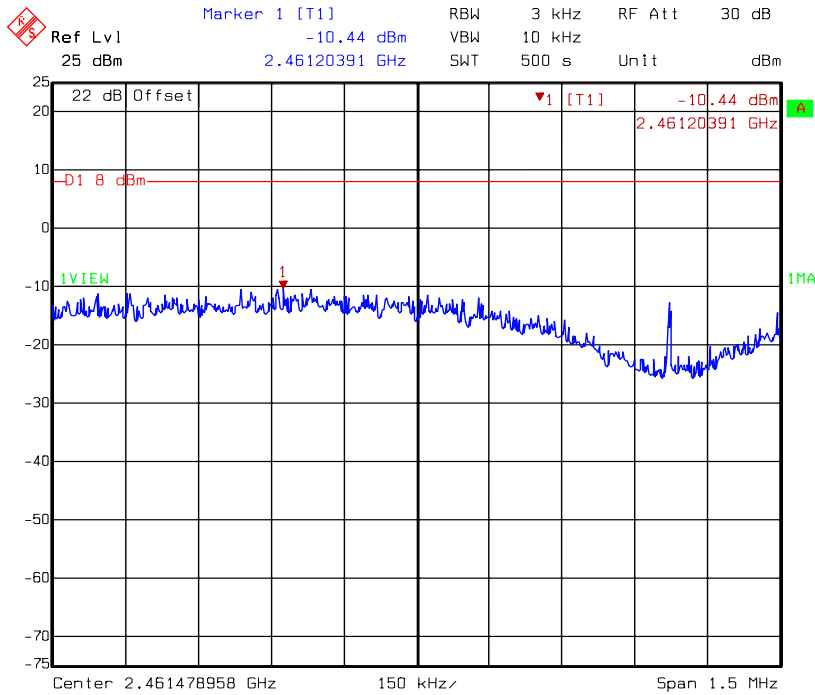
Title: Power density
 Comment A: CH 1 at 802.11b mode
 Date: 06.FEB.2009 15:45:37

Power Spectral Density @ 802.11b mode channel 6



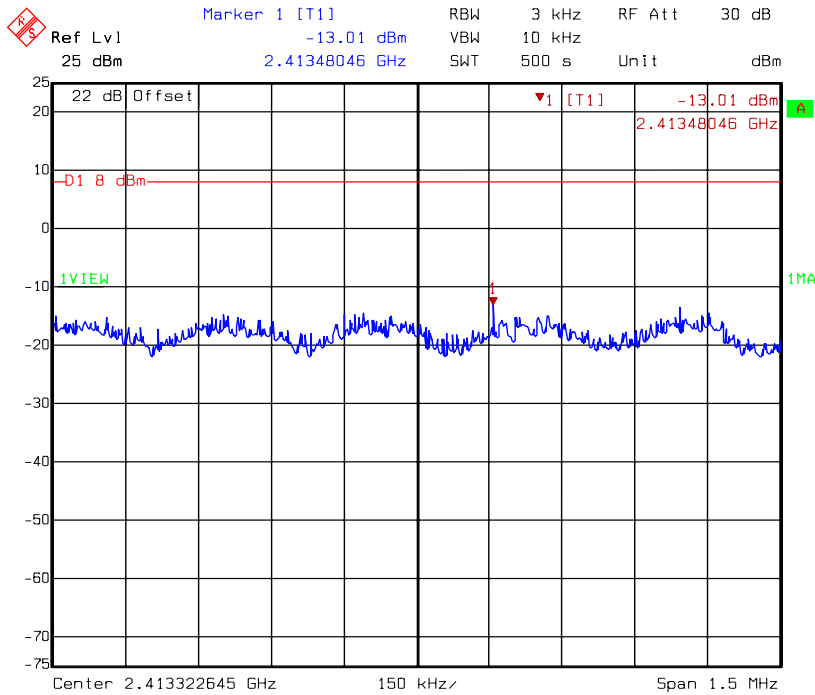
Title: Power density
 Comment A: CH 6 at 802.11b mode
 Date: 06.FEB.2009 15:48:35

Power Spectral Density @ 802.11b mode channel 11



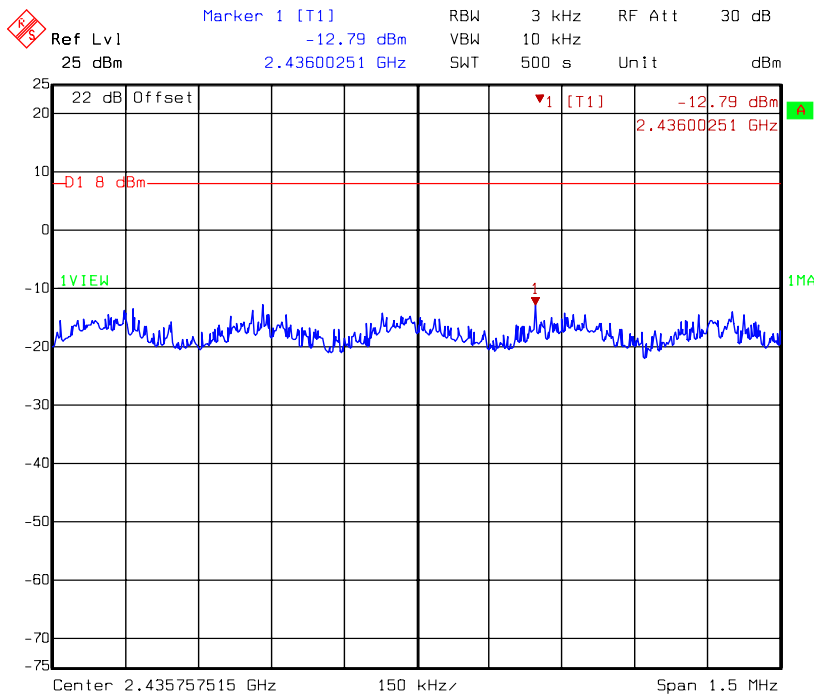
Title: Power density
 Comment A: CH 11 at 802.11b mode
 Date: 06.FEB.2009 15:51:30

Power Spectral Density @ 802.11g mode channel 1



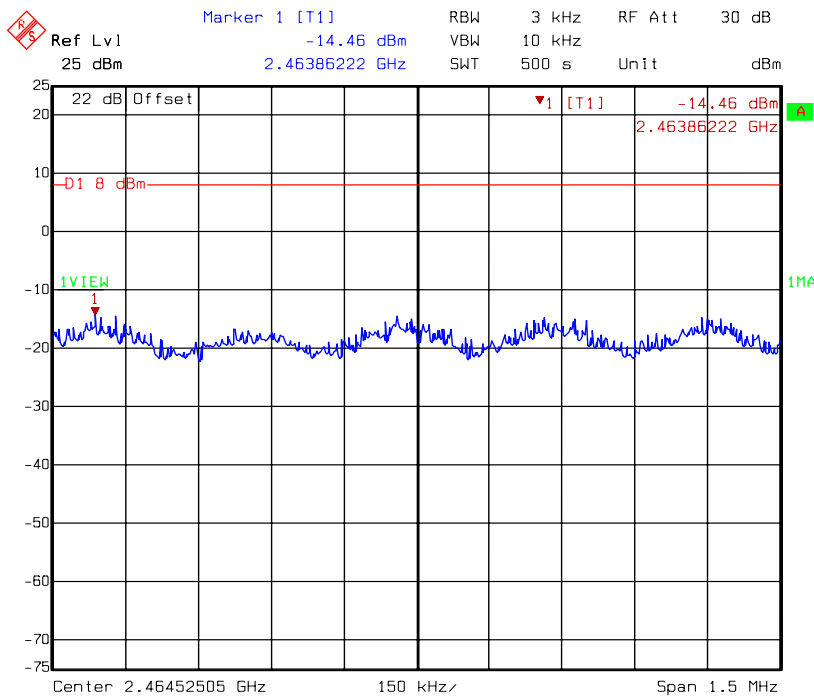
Title: Power density
 Comment A: CH 1 at 802.11g mode
 Date: 06.FEB.2009 15:54:38

Power Spectral Density @ 802.11g mode channel 6



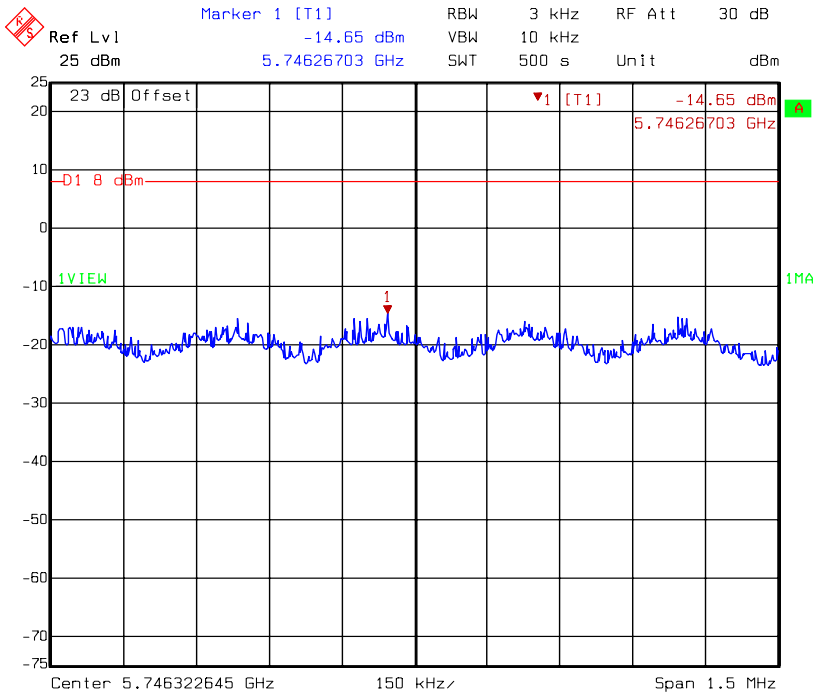
Title: Power density
 Comment A: CH 6 at 802.11g mode
 Date: 06.FEB.2009 15:57:23

Power Spectral Density @ 802.11g mode channel 11



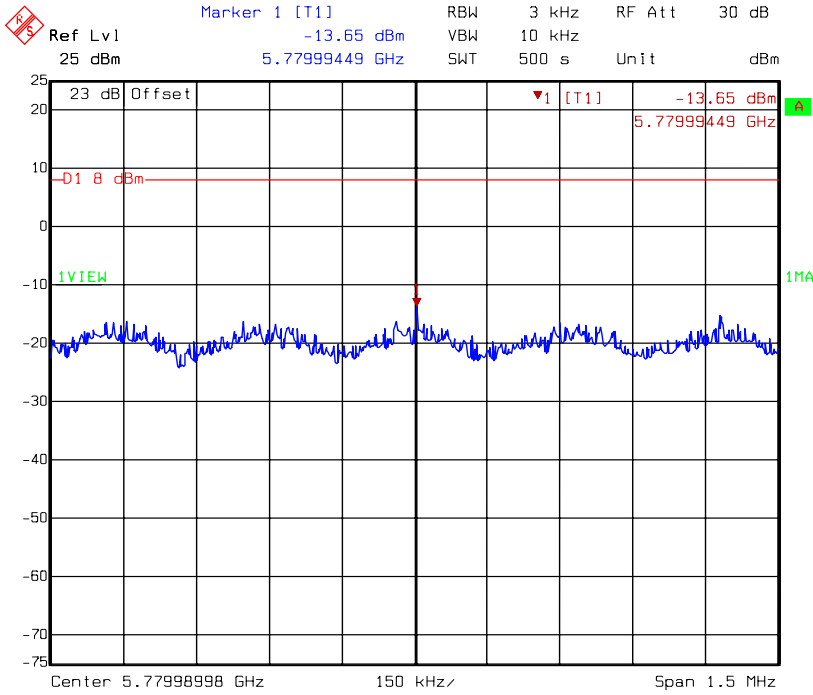
Title: Power density
 Comment A: CH 11 at 802.11g mode
 Date: 06.FEB.2009 15:59:58

Power Spectral Density @ 802.11a mode channel 149



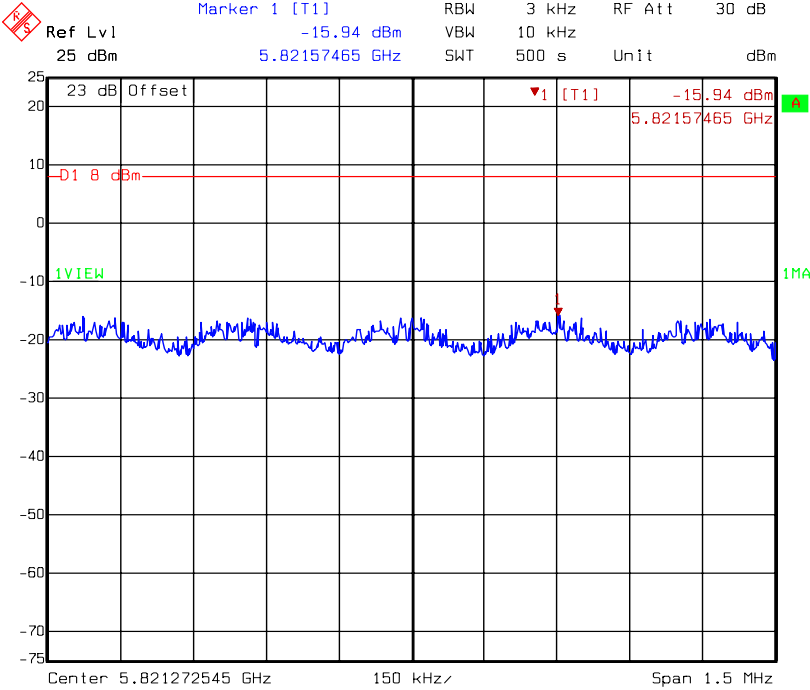
Title: Power density
 Comment A: CH 149 at 802.11a mode
 Date: 06.FEB.2009 16:08:16

Power Spectral Density @ 802.11a mode channel 157



Title: Power density
 Comment A: CH 157 at 802.11a mode
 Date: 06.FEB.2009 16:12:03

Power Spectral Density @ 802.11a mode channel 165



Title: Power density
Comment A: CH 165 at 802.11a mode
Date: 06.FEB.2009 16:16:36

7. RF Antenna conducted Spurious

Name of Test	RF Antenna Conducted Spurious
Base Standard	FCC 15.247(d)

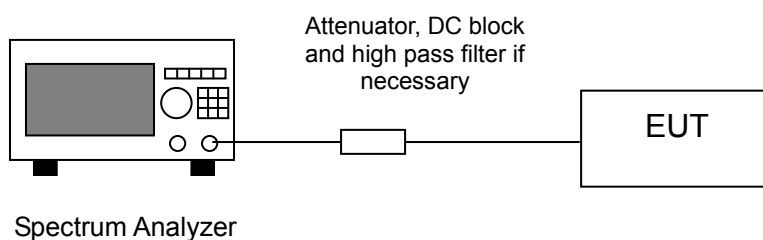
Test Result: Complies
Measurement Data: See plots below

Method of Measurement:

Reference FCC document: KDB558074

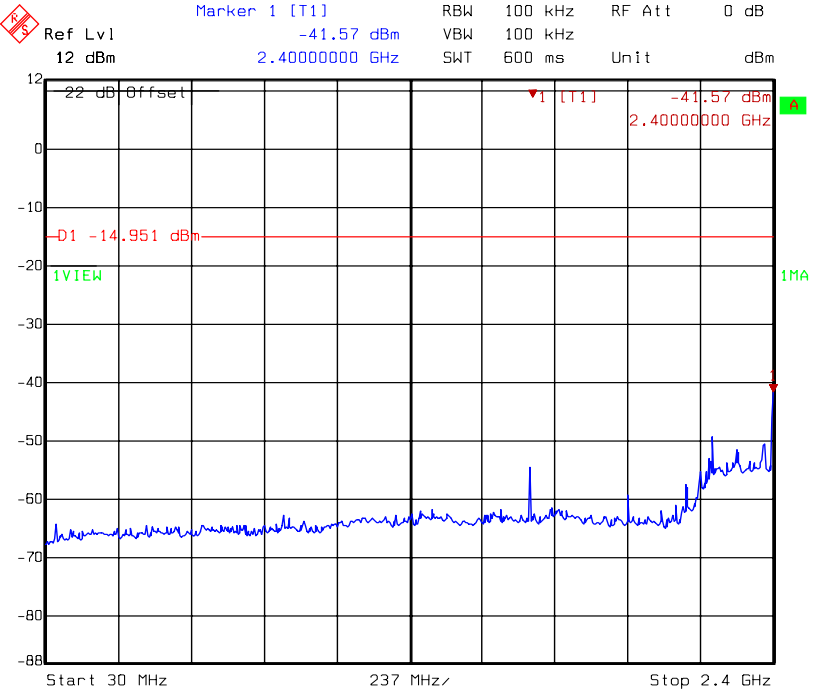
The measurements were performed from 30 MHz to 25 GHz(for 2.4G) and 30 MHz to 40 GHz(for 5.8G)RF antenna conducted per FCC 15.247 (d) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. Harmonics and spurious noise must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel.

Test Diagram:



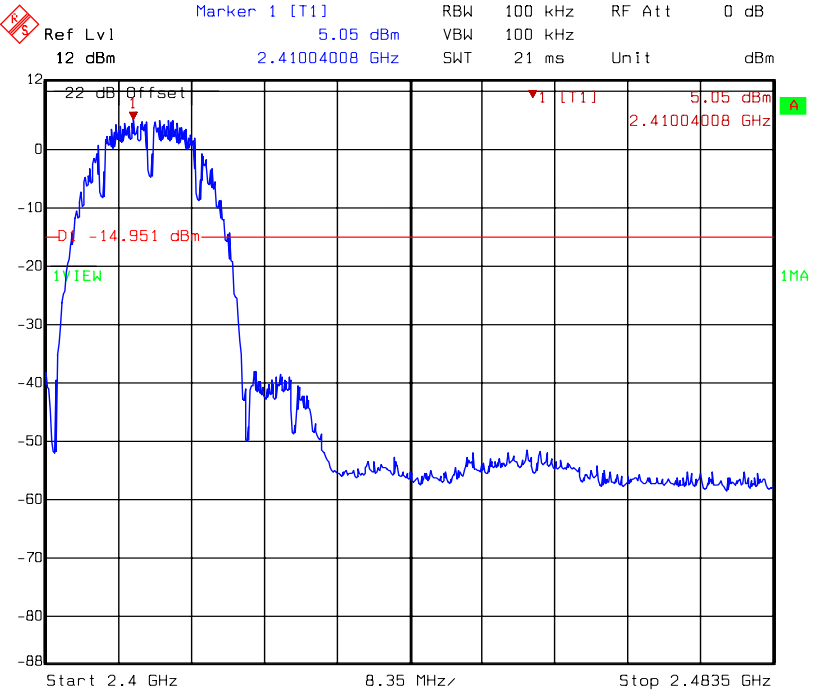
- Note:**
- (1) The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11a/ 11g. The EUT was tuned to a low, middle and high channel.
 - (2) The EUT operating at 2.4 GHz ISM band. Frequency Range scanned from 30 MHz to 25 GHz.

conducted spurious @ 802.11b mode channel 1 (1 of 3)



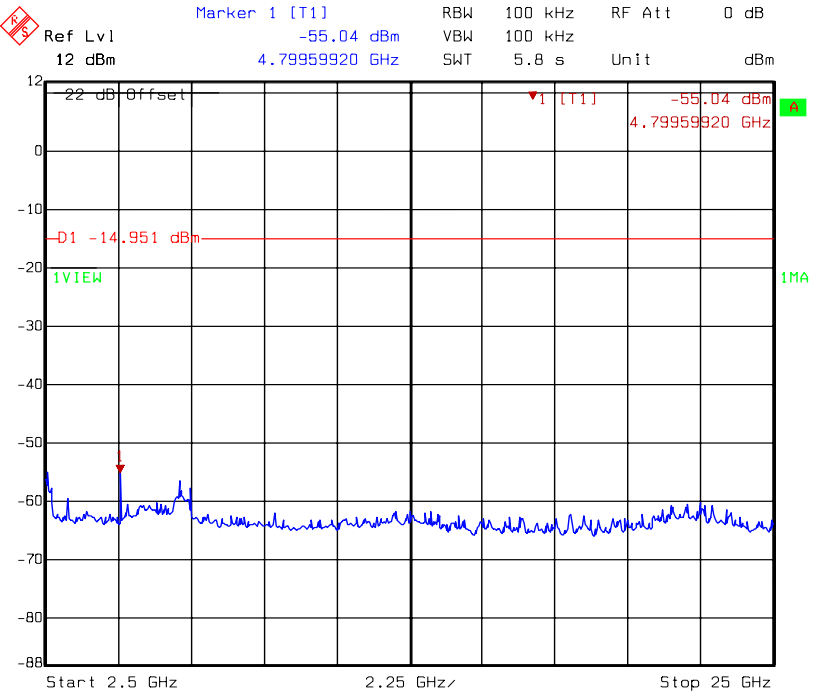
Title: Conductive-Spurious
Comment A: CH 1 at 802.11b mode 30MHz~2400MHz
Date: 06.FEB.2009 15:46:18

conducted spurious @ 802.11b mode channel 1 (2 of 3)



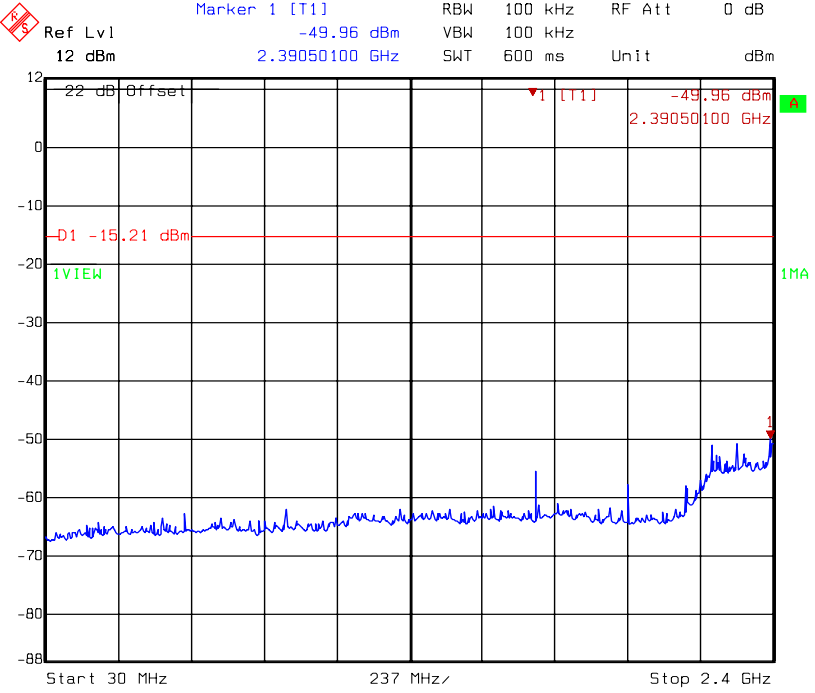
Title: Conductive-Spurious
Comment A: CH 1 at 802.11b mode 2400MHz~2483.5MHz
Date: 06.FEB.2009 15:45:57

conducted spurious @ 802.11b mode channel 1 (3 of 3)



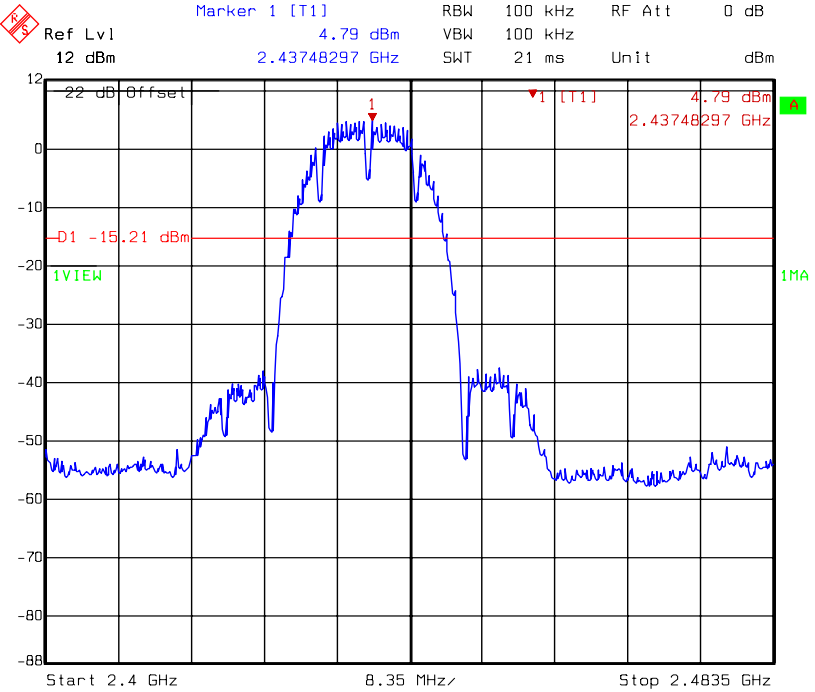
Title: Conductive-Spurious
 Comment A: CH 1 at 802.11b mode 2483.5MHz~25GHz
 Date: 06.FEB.2009 15:46:45

conducted spurious @ 802.11b mode channel 6 (1 of 3)



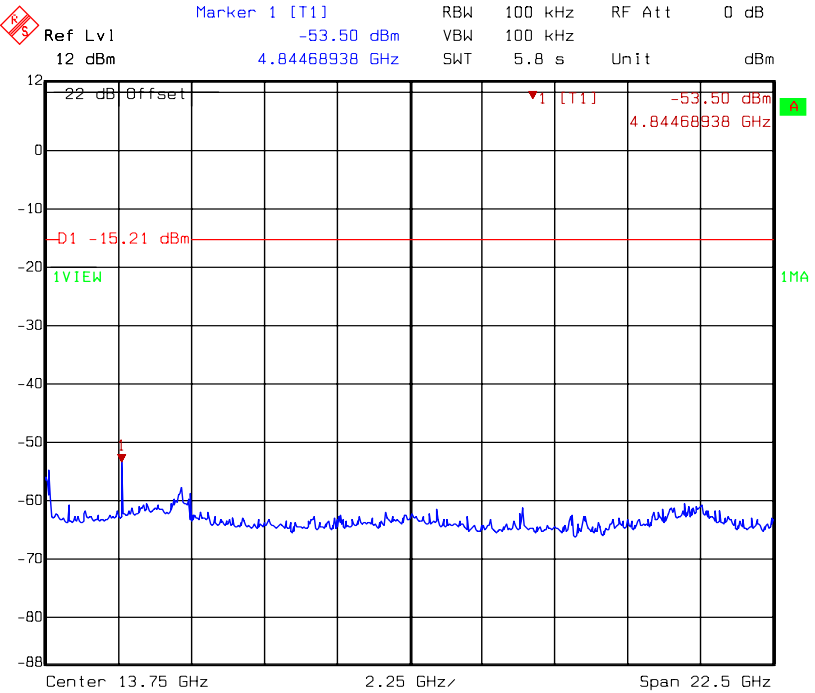
Title: Conductive-Spurious
 Comment A: CH 6 at 802.11b mode 30MHz~2400MHz
 Date: 06.FEB.2009 15:49:16

conducted spurious @ 802.11b mode channel 6 (2 of 3)



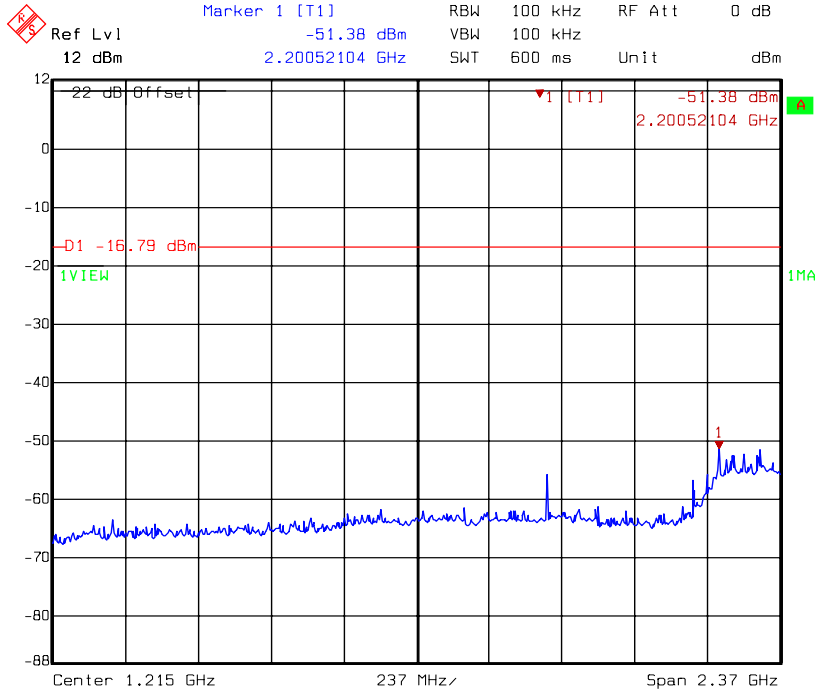
Title: Conductive-Spurious
 Comment A: CH 6 at 802.11b mode 2400MHz~2483.5MHz
 Date: 06.FEB.2009 15:48:55

conducted spurious @ 802.11b mode channel 6 (3 of 3)



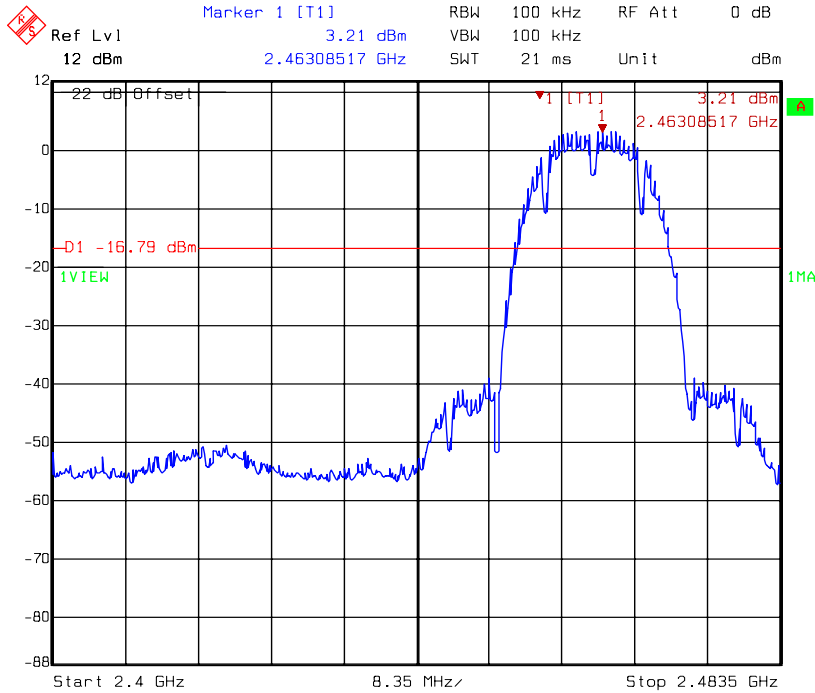
Title: Conductive-Spurious
 Comment A: CH 6 at 802.11b mode 2483.5MHz~256GHz
 Date: 06.FEB.2009 15:49:43

conducted spurious @ 802.11b mode channel 11 (1 of 3)



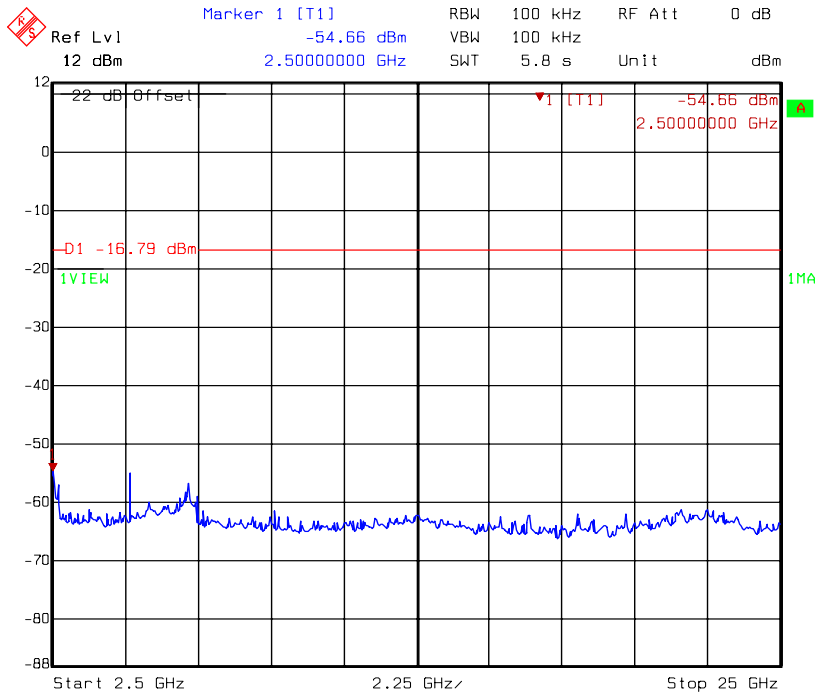
Title: Conductive-Spurious
 Comment A: CH 11 at 802.11b mode 30MHz~2400MHz
 Date: 06.FEB.2009 15:52:12

conducted spurious @ 802.11b mode channel 11 (2 of 3)



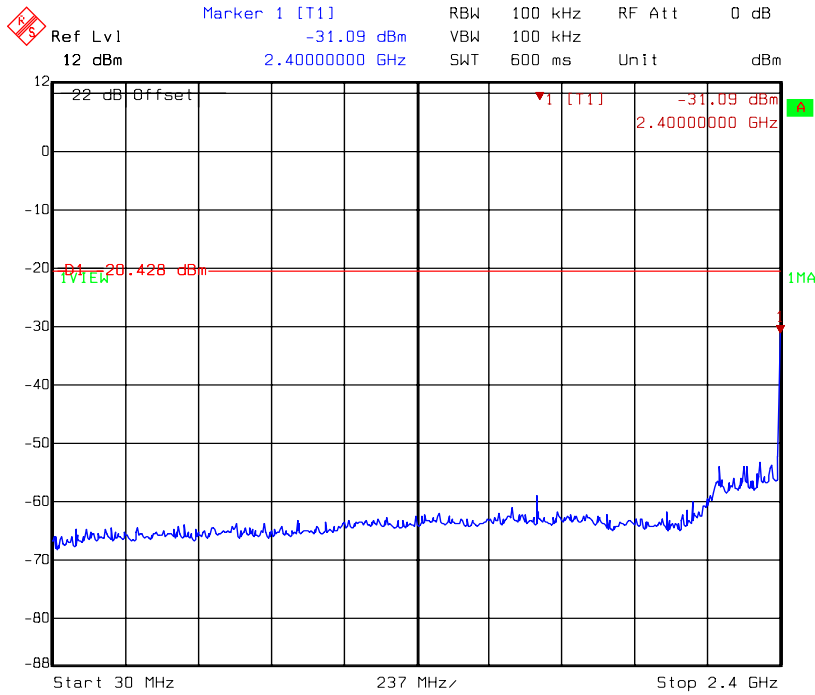
Title: Conductive-Spurious
 Comment A: CH 11 at 802.11b mode 2400MHz~2483.5MHz
 Date: 06.FEB.2009 15:51:50

conducted spurious @ 802.11b mode channel 11 (3 of 3)



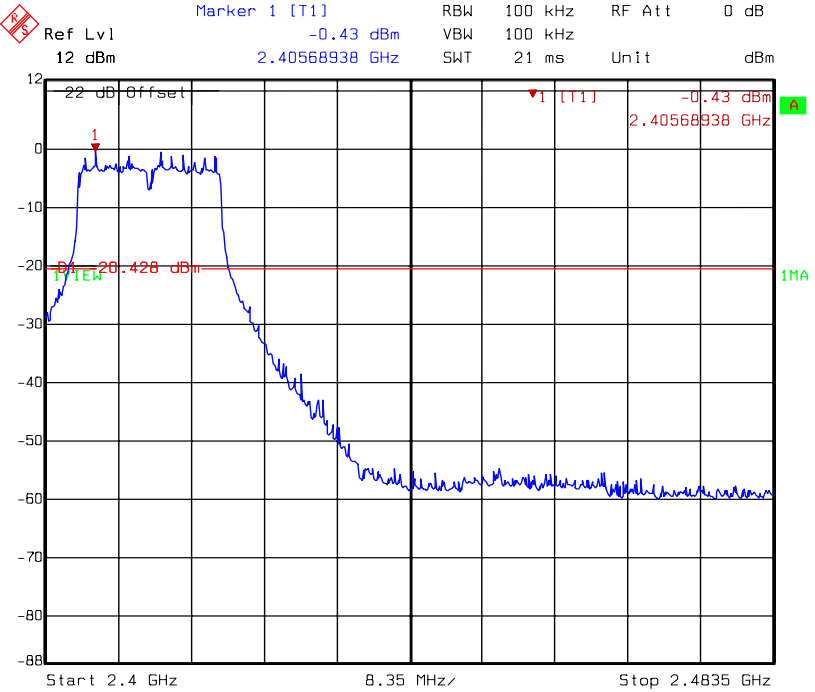
Title: Conductive-Spurious
 Comment A: CH 11 at 802.11b mode 2483.5MHz~25GHz
 Date: 06.FEB.2009 15:52:38

conducted spurious @ 802.11g mode channel 1 (1 of 3)



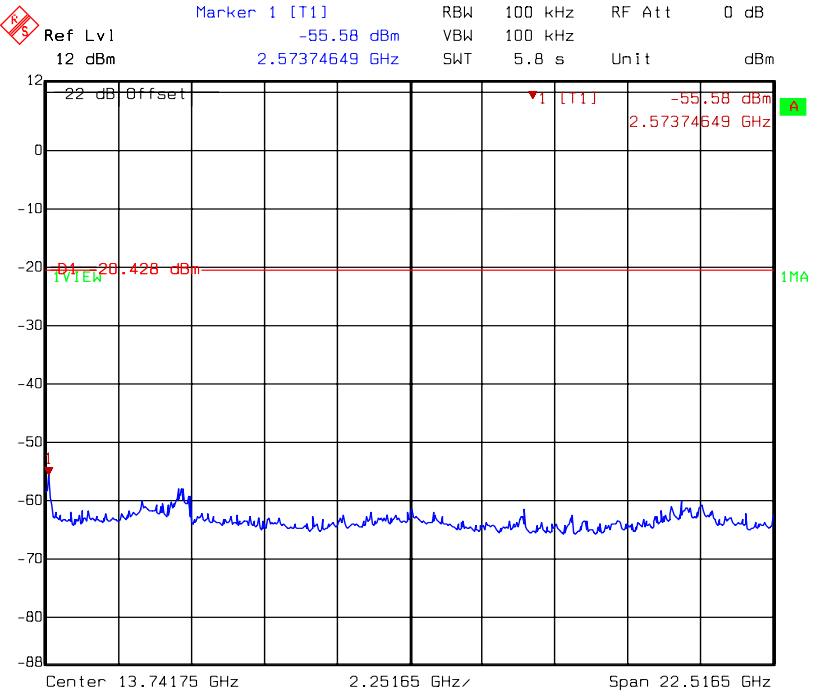
Title: Conductive-Spurious
 Comment A: CH 1 at 802.11g mode 30MHz~2400MHz
 Date: 06.FEB.2009 15:55:20

conducted spurious @ 802.11g mode channel 1 (2 of 3)



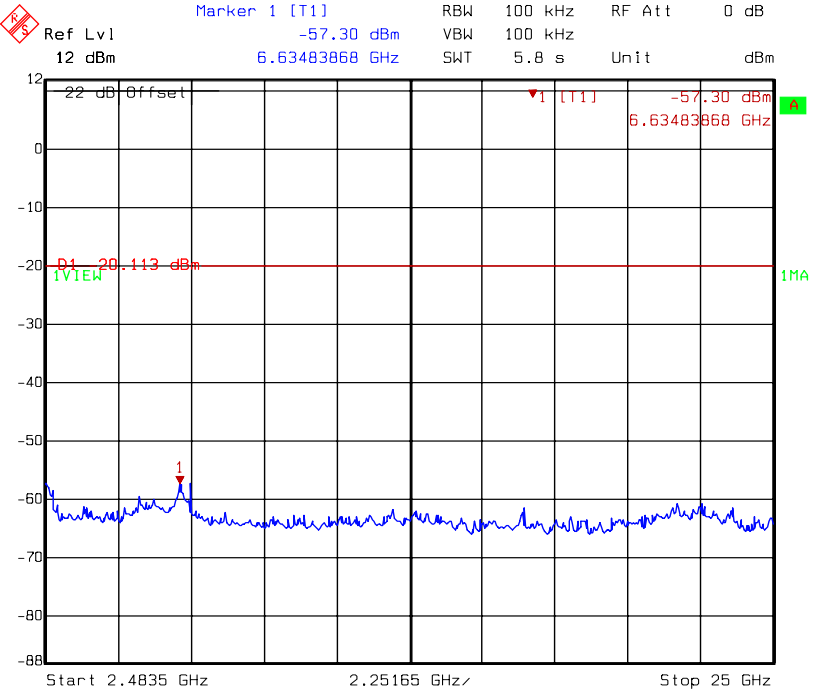
Title: Conductive-Spurious
 Comment A: CH 1 at 802.11g mode 2400MHz~2483.5MHz
 Date: 06.FEB.2009 15:54:59

conducted spurious @ 802.11g mode channel 1 (3 of 3)



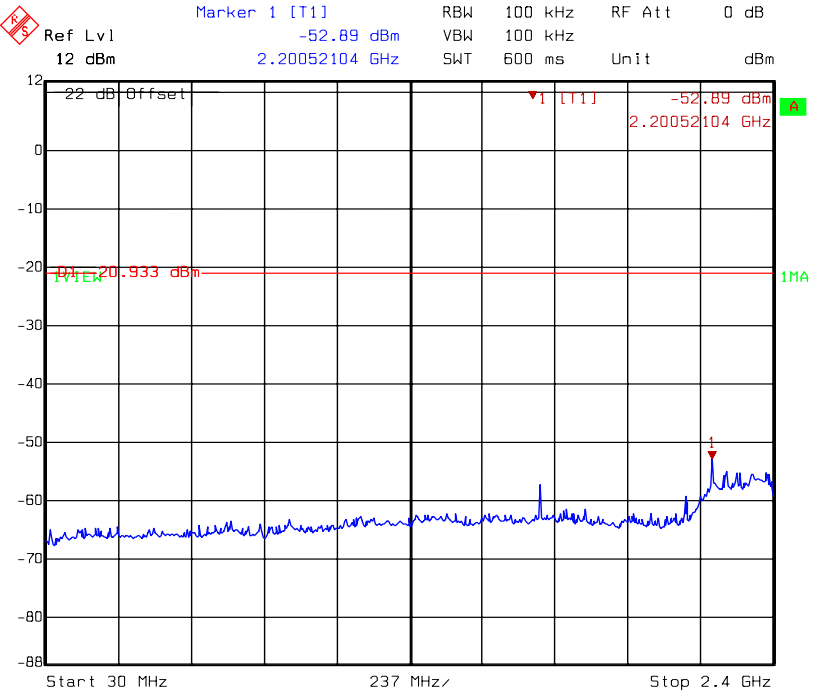
Title: Conductive-Spurious
 Comment A: CH 1 at 802.11g mode 2483.5MHz~25000MHz
 Date: 06.FEB.2009 15:55:47

conducted spurious @ 802.11g mode channel 6 (3 of 3)



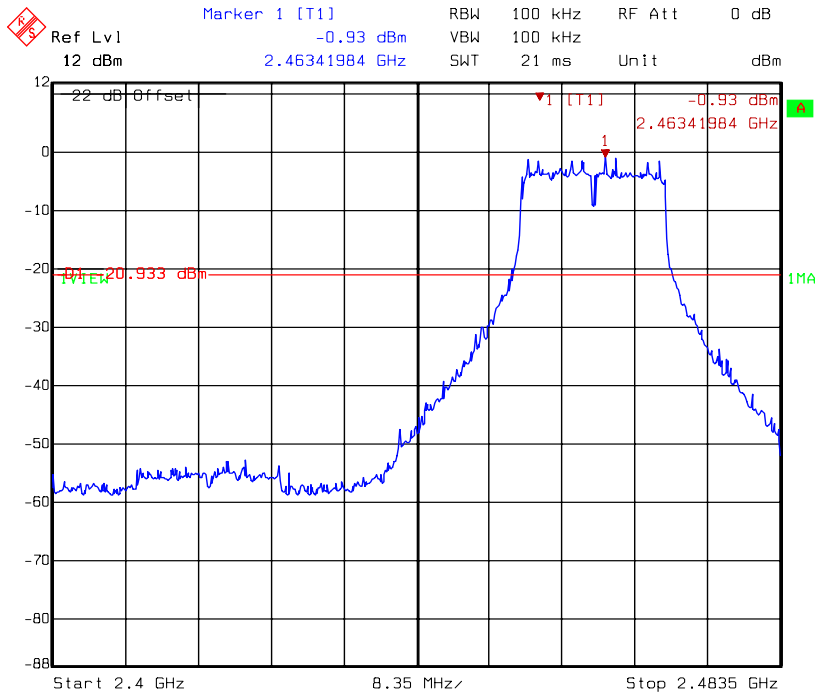
Title: Conductive-Spurious
Comment A: CH 6 at 802.11g mode 2483.5MHz~25000MHz
Date: 06.FEB.2009 15:58:32

conducted spurious @ 802.11g mode channel 11 (1 of 3)



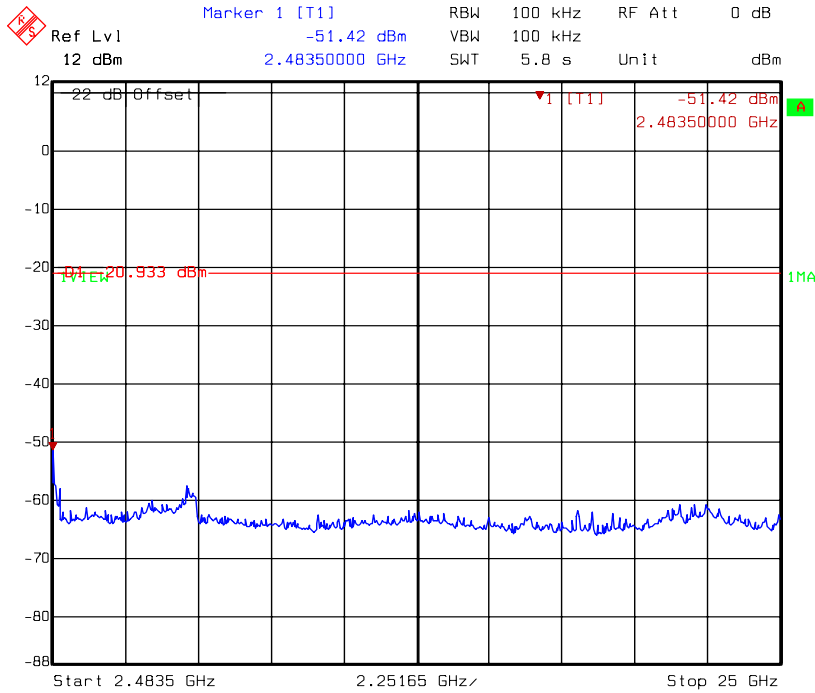
Title: Conductive-Spurious
Comment A: CH 11 at 802.11g mode 30MHz~2400MHz
Date: 06.FEB.2009 16:00:39

conducted spurious @ 802.11g mode channel 11 (2 of 3)



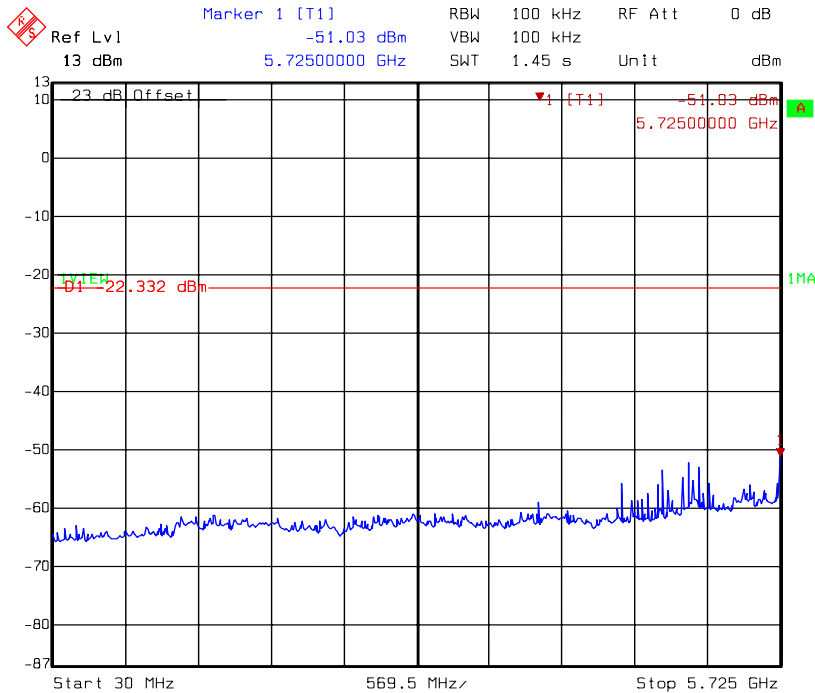
Title: Conductive-Spurious
 Comment A: CH 11 at 802.11g mode 2400MHz~2483.5MHz
 Date: 06.FEB.2009 16:00:18

conducted spurious @ 802.11g mode channel 11 (3 of 3)



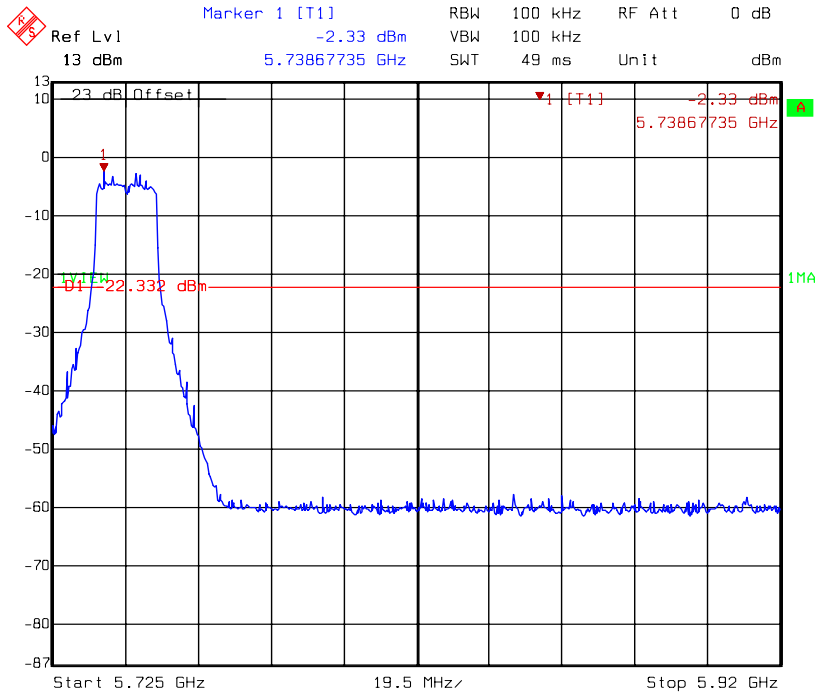
Title: Conductive-Spurious
 Comment A: CH 11 at 802.11g mode 2483.5MHz~25000MHz
 Date: 06.FEB.2009 16:01:06

conducted spurious @ 802.11a mode channel 149 (1 of 4)



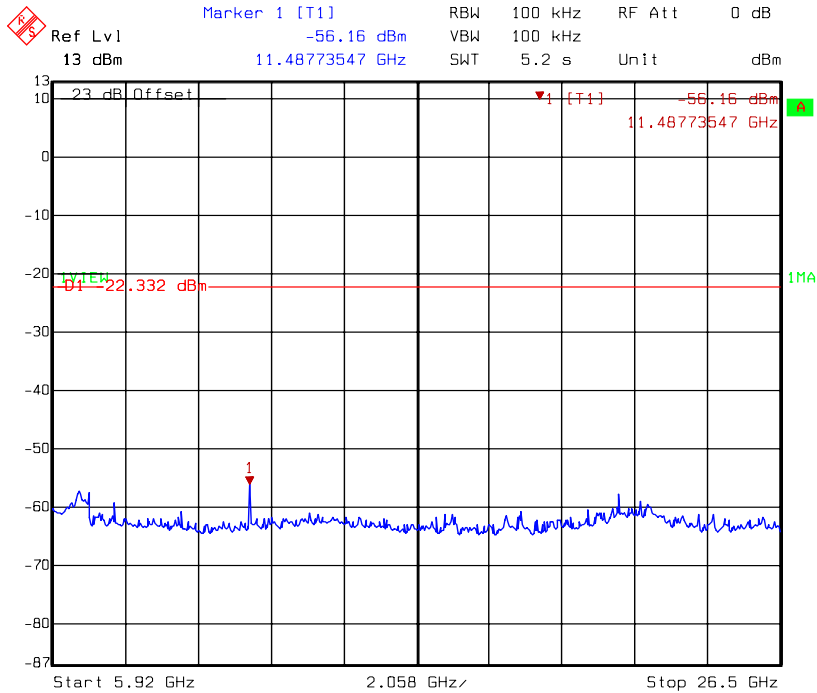
Title: Conductive-Spurious
Comment A: CH 149 at 802.11a mode 30MHz~5725MHz
Date: 06.FEB.2009 16:08:57

conducted spurious @ 802.11a mode channel 149 (2 of 4)



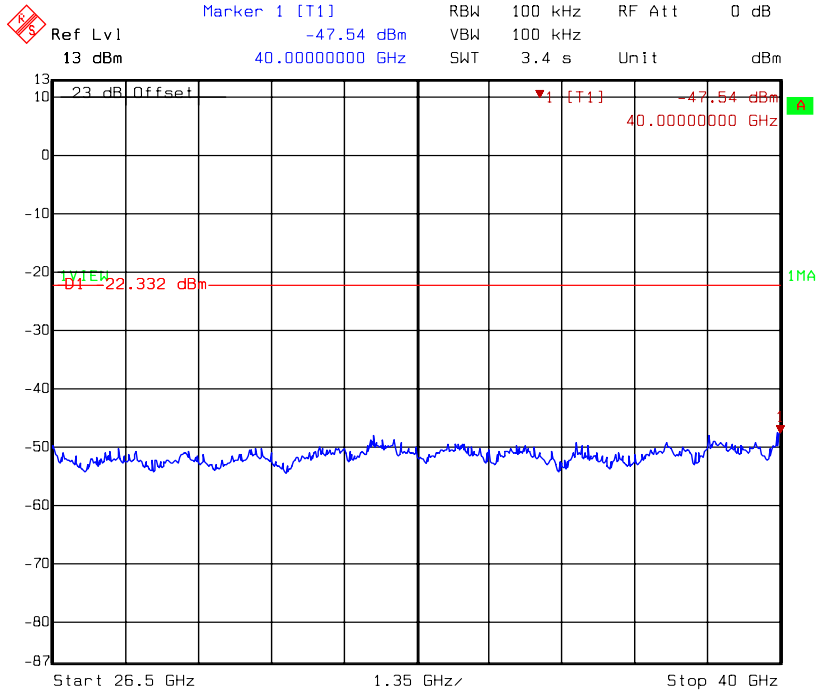
Title: Conductive-Spurious
Comment A: CH 149 at 802.11a mode 5725MHz~5920MHz
Date: 06.FEB.2009 16:08:36

conducted spurious @ 802.11a mode channel 149 (3 of 4)



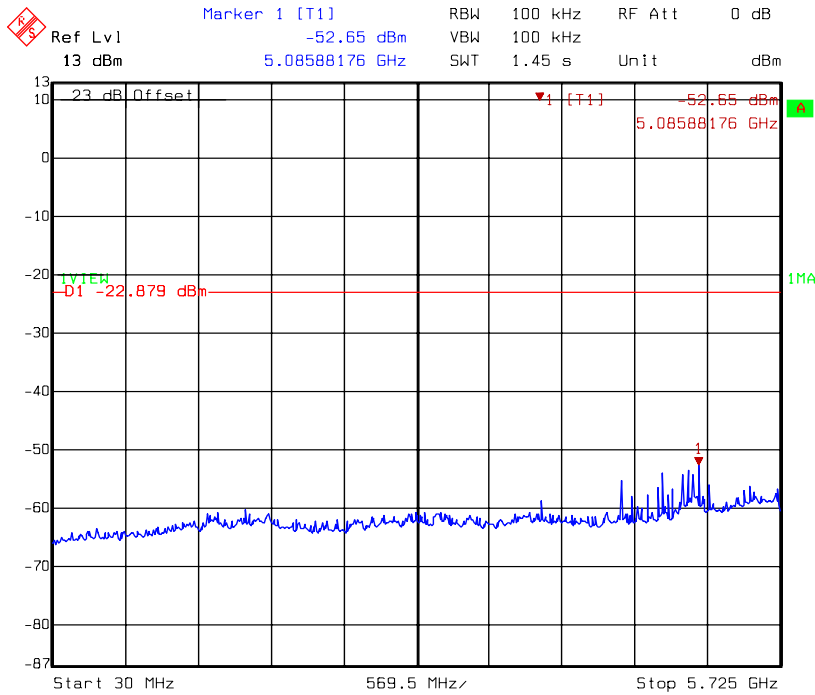
Title: Conductive-Spurious
 Comment A: CH 149 at 802.11a mode 5925MHz~26500MHz
 Date: 06.FEB.2009 16:09:23

conducted spurious @ 802.11a mode channel 149 (4 of 4)



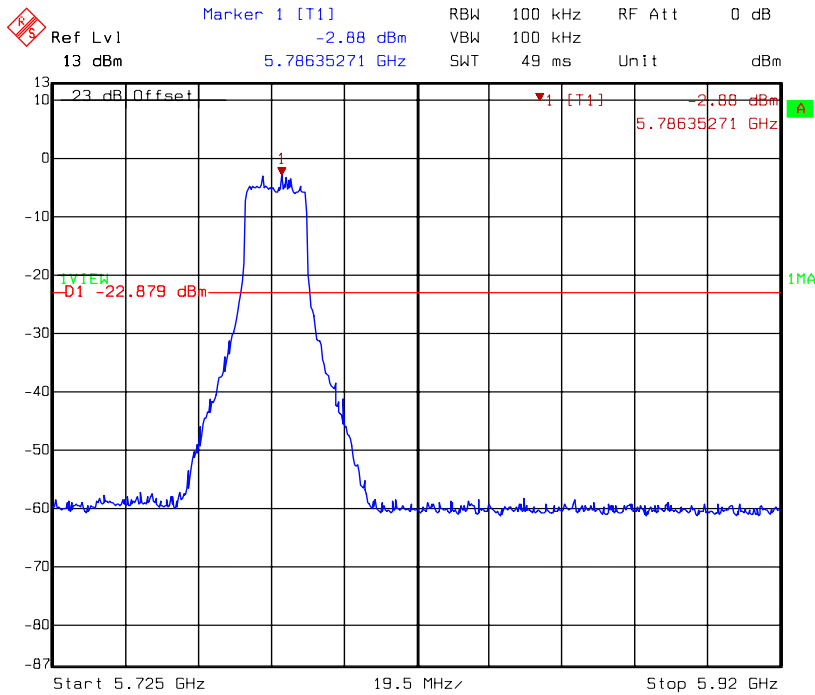
Title: Conductive-Spurious
 Comment A: CH 149 at 802.11a mode 26500MHz~40000MHz
 Date: 06.FEB.2009 16:09:45

conducted spurious @ 802.11a mode channel 157 (1 of 4)



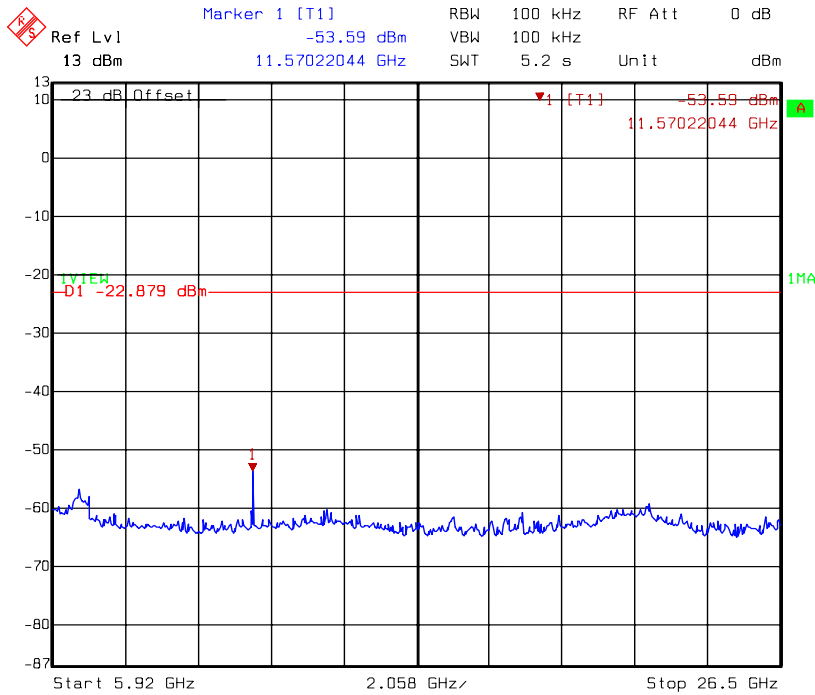
Title: Conductive-Spurious
 Comment A: CH 157 at 802.11a mode 30MHz~5725MHz
 Date: 06.FEB.2009 16:12:44

conducted spurious @ 802.11a mode channel 157 (2 of 4)



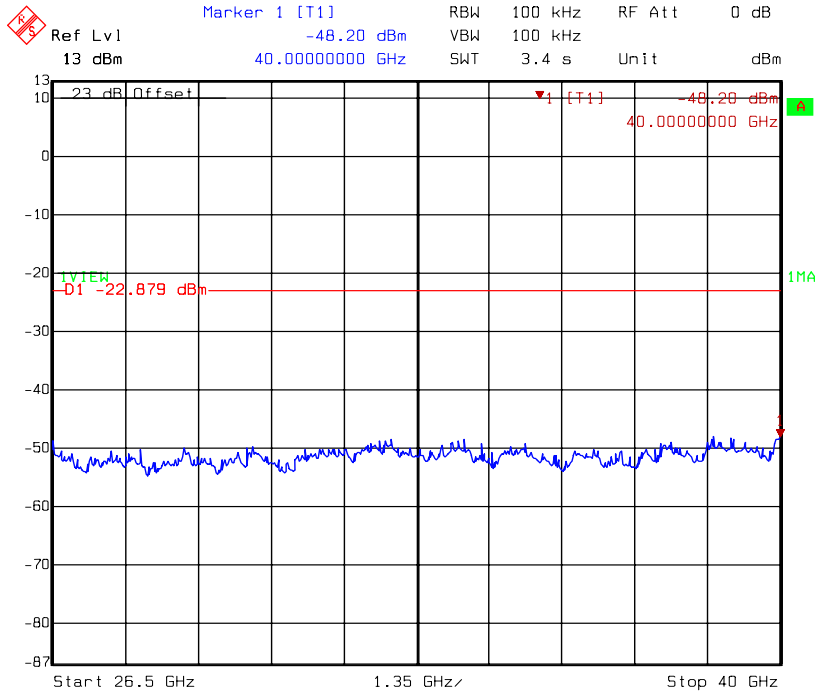
Title: Conductive-Spurious
 Comment A: CH 157 at 802.11a mode 5725MHz~5920MHz
 Date: 06.FEB.2009 16:12:23

conducted spurious @ 802.11a mode channel 157 (3 of 4)



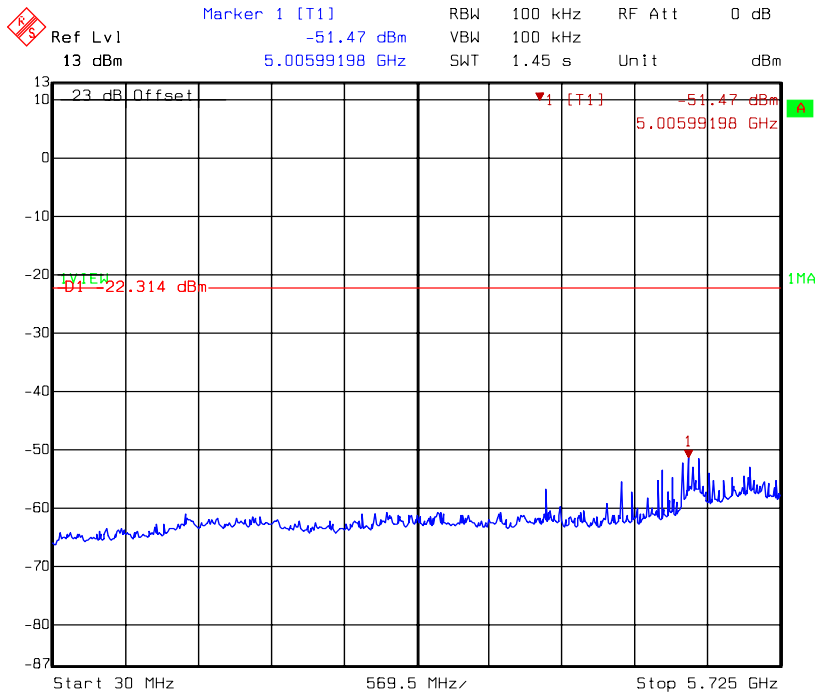
Title: Conductive-Spurious
 Comment A: CH 157 at 802.11a mode 5925MHz~26500MHz
 Date: 06.FEB.2009 16:13:10

conducted spurious @ 802.11a mode channel 157 (4 of 4)



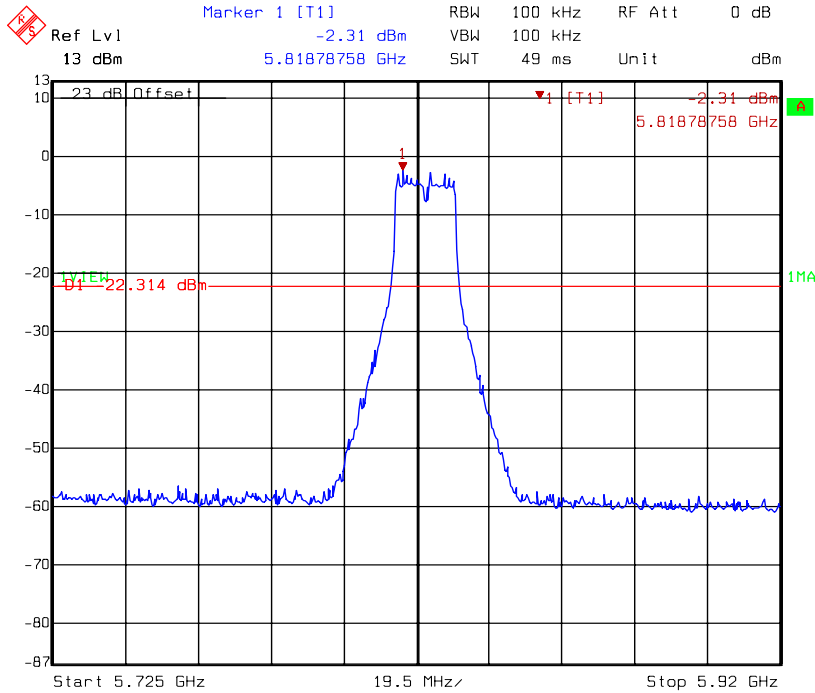
Title: Conductive-Spurious
 Comment A: CH 157 at 802.11a mode 26500MHz~40000MHz
 Date: 06.FEB.2009 16:13:32

conducted spurious @ 802.11a mode channel 165 (1 of 4)



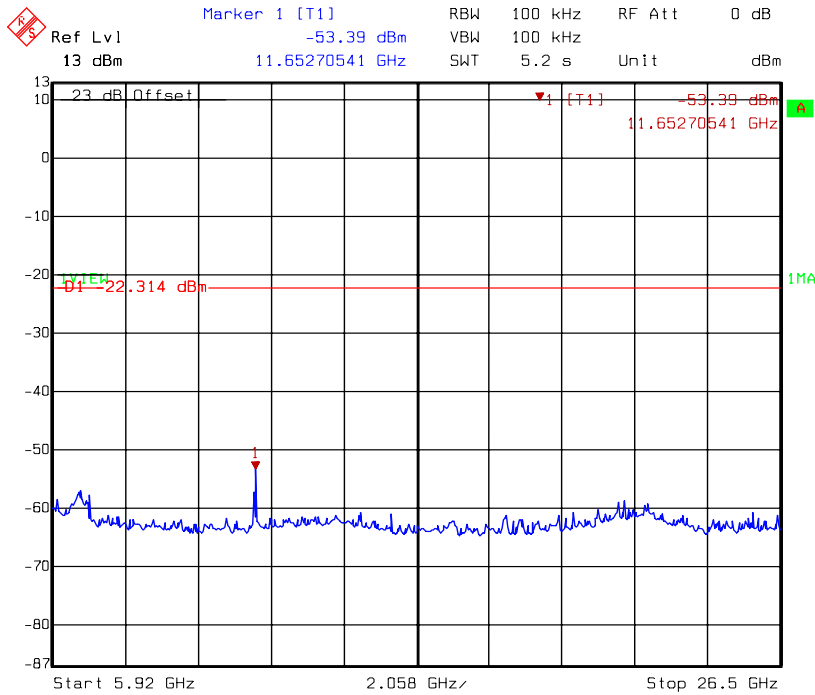
Title: Conductive-Spurious
 Comment A: CH 165 at 802.11a mode 30MHz~5725MHz
 Date: 06.FEB.2009 16:17:17

conducted spurious @ 802.11a mode channel 165 (2 of 4)



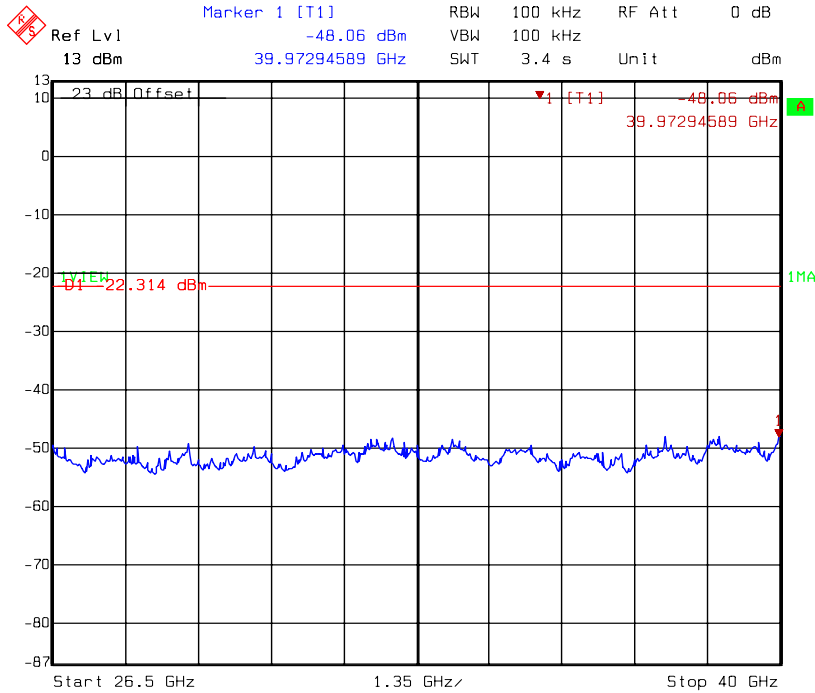
Title: Conductive-Spurious
 Comment A: CH 165 at 802.11a mode 5725MHz~5920MHz
 Date: 06.FEB.2009 16:16:56

conducted spurious @ 802.11a mode channel 165 (3 of 4)



Title: Conductive-Spurious
Comment A: CH 165 at 802.11a mode 5925MHz~26500MHz
Date: 06.FEB.2009 16:17:43

conducted spurious @ 802.11a mode channel 165 (4 of 4)



Title: Conductive-Spurious
Comment A: CH 165 at 802.11a mode 26500MHz~40000MHz
Date: 06.FEB.2009 16:18:05

8. Radiated Spurious Emission

Name of Test	Radiated Spurious Emission
Base Standard	FCC 15.247(d), 15.209, 15.205

Test Result: Complies
Measurement Data: See Tables below

Method of Measurement:

Reference FCC document: KDB558074, ANSI C63.4

The frequency range from 30 MHz to 1000 MHz using Bilog Antenna.
The frequency range over 1 GHz using Horn Antenna.

Radiated emissions were investigated cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter. The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meters reading using inverse scaling with distance.

The signal is maximized through rotation and placement in the three orthogonal axes.



Setup 1



Setup 2

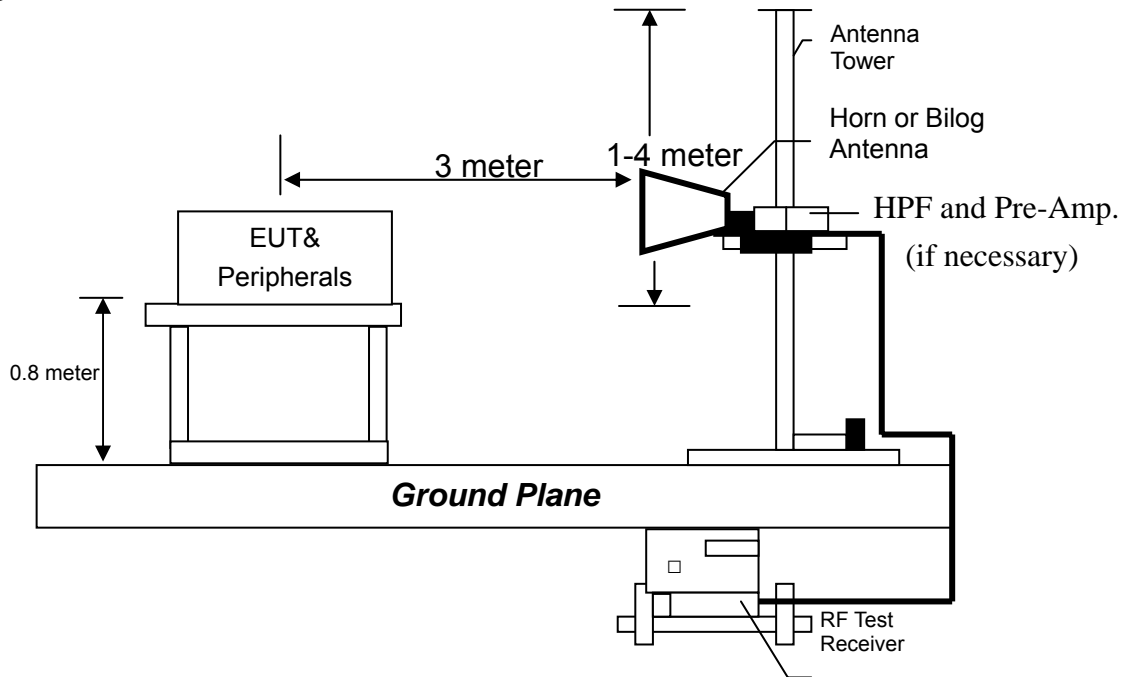


Setup 3

After verifying three axes, we found the maximum electromagnetic field was occurred at setup 1 configuration. The final test data was executed under this configuration.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

Test Diagram:



Emission Limit:

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dBµV/m@ 3 meter)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

- Note:** (1) The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11a/ 11g. The EUT was tuned to a low, middle and high channel.
- (2) The EUT operating at 2.4 GHz ISM band. Frequency Range scanned from 30 MHz to 25 GHz.

Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under 802.11b, 802.11g, 802.11a continuously transmitting mode. The worst case occurred at 802.11b Tx channel 1.

EUT : SDW3100
Worst Case : 802.11b Tx at channel 1 with

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
V	33.880	QP	12.60	24.46	37.06	40.00	-2.95
V	108.570	QP	7.64	22.56	30.20	43.50	-13.30
V	365.620	QP	15.06	12.77	27.83	46.00	-18.17
V	799.210	QP	23.19	18.92	42.11	46.00	-3.89
V	881.660	QP	24.35	12.59	36.94	46.00	-9.07
V	897.180	QP	24.35	11.70	36.05	46.00	-9.96
H	137.670	QP	12.32	16.15	28.47	43.50	-15.03
H	480.080	QP	18.64	19.94	38.58	46.00	-7.42
H	639.160	QP	21.55	14.30	35.85	46.00	-10.16
H	799.210	QP	23.52	21.19	44.71	46.00	-1.29
H	812.790	QP	23.62	11.25	34.87	46.00	-11.13
H	830.250	QP	24.04	13.64	37.68	46.00	-8.33

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

Measurement results: frequency above 1GHz

EUT : SDW3100
 Test Condition : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1162.40	PK	V	-	27.33	17.71	45.04	54	-8.96
1162.40	PK	H	-	27.33	14.57	41.90	54	-12.10
3990.00	PK	V	35.62	34.57	44.48	43.43	54	-10.57
4824.00	PK	V	36.07	37.77	46.56	48.26	54	-5.74
4980.00	PK	V	36.07	37.77	15.17	16.87	54	-37.13
6000.00	PK	V	36.65	40.87	41.32	45.54	54	-8.46
4824.00	PK	H	36.07	37.77	44.17	45.87	54	-8.13
4980.00	PK	H	36.07	37.77	42.98	44.68	54	-9.32

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
Test Condition : 802.11b Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3990.00	PK	V	35.62	34.57	43.53	42.48	54	-11.52
4874.00	PK	V	36.07	37.77	47.38	49.08	54	-4.92
4980.00	PK	V	36.07	37.77	44.17	45.87	54	-8.13
6000.00	PK	V	36.65	40.87	41.96	46.18	54	-7.82
3990.00	PK	H	35.62	34.57	43.14	42.09	54	-11.91
4874.00	PK	H	36.07	37.77	43.19	44.89	54	-9.11
4980.00	PK	H	36.07	37.77	41.84	43.54	54	-10.46
9748.00	PK	H	34.28	48.31	38.58	52.61	54	-1.39

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
 Test Condition : 802.11b Tx at channel 11 with Printed antenna

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	47.24	48.94	54	-5.06
4980.00	PK	V	36.07	37.77	44.90	46.60	54	-7.40
3990.00	PK	H	35.62	34.57	43.32	42.27	54	-11.73
4924.00	PK	H	36.07	37.77	43.76	45.46	54	-8.54
4980.00	PK	H	36.07	37.77	42.22	43.92	54	-10.08
9848.00	PK	H	34.28	48.31	42.91	56.94	74	-17.06
9848.00	AV	H	34.28	48.31	38.58	52.61	54	-1.39

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
 Test Condition : 802.11g Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3990.00	PK	V	35.62	34.57	43.52	42.47	54	-11.53
4980.00	PK	V	36.07	37.77	44.49	46.19	54	-7.81
6000.00	PK	V	36.65	40.87	41.49	45.71	54	-8.29
3960.00	PK	H	35.62	34.57	42.97	41.92	54	-12.08
4824.00	PK	H	36.07	37.77	39.78	41.48	54	-12.52
4980.00	PK	H	36.07	37.77	42.64	44.34	54	-9.66

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
 Test Condition : 802.11g Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3990.00	PK	V	35.62	34.57	42.97	41.92	54	-12.08
4874.00	PK	V	36.07	37.77	42.28	43.98	54	-10.02
4980.00	PK	V	36.07	37.77	45.38	47.08	54	-6.92
6000.00	PK	V	36.65	40.87	40.33	44.55	54	-9.45
3990.00	PK	H	35.62	34.57	42.41	41.36	54	-12.64
4980.00	PK	H	36.07	37.77	43.12	44.82	54	-9.18

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
Test Condition : 802.11g Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	42.23	43.93	54	-10.07
4980.00	PK	V	36.07	37.77	44.27	45.97	54	-8.03
6000.00	PK	V	36.65	40.87	41.06	45.28	54	-8.72
3990.00	PK	H	35.62	34.57	42.8	41.75	54	-12.25
4980.00	PK	H	36.07	37.77	72.01	43.71	54	-10.29

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
Test Condition : 802.11a Tx at channel 149

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
11490.00	PK	V	33.53	49.96	44.39	60.82	74	-13.18
11490.00	AV	V	33.53	49.96	30.30	46.73	54	-7.27
11490.00	PK	H	33.53	49.96	47.79	64.22	74	-9.78
11490.00	AV	H	33.53	49.96	33.52	49.95	54	-4.05

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
Test Condition : 802.11a Tx at channel 157

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
11570.00	PK	V	34.55	50.03	44.70	60.18	74	-13.82
11570.00	AV	V	34.55	50.03	31.08	46.56	54	-7.44
11570.00	PK	H	34.55	50.03	48.19	63.67	74	-10.33
11570.00	AV	H	34.55	50.03	33.98	49.46	54	-4.54

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : SDW3100
Test Condition : 802.11a Tx at channel 165

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
11650.00	PK	V	34.55	50.03	47.13	62.61	74	-11.39
11650.00	AV	V	34.55	50.03	32.65	48.13	54	-5.87
11650.00	PK	H	34.55	50.03	49.01	64.49	74	-9.51
11650.00	AV	H	34.55	50.03	35.57	51.05	54	-2.95

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

9. Emission on Band Edge

Name of Test	Emission Band Edge
Base Standard	FCC 15.247(d)

Test Result: Complies
Measurement Data: See Tables & plots below

Method of Measurement:

Reference FCC document: KDB558074, ANSI C63.4

The frequency range from 30 MHz to 1000 MHz using Bilog Antenna.
The frequency range over 1 GHz using Horn Antenna.

Radiated emissions were investigated cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/VBW) recorded also on the report.

Note: The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11a/ 11g. The EUT was tuned to a low, middle and high channel.

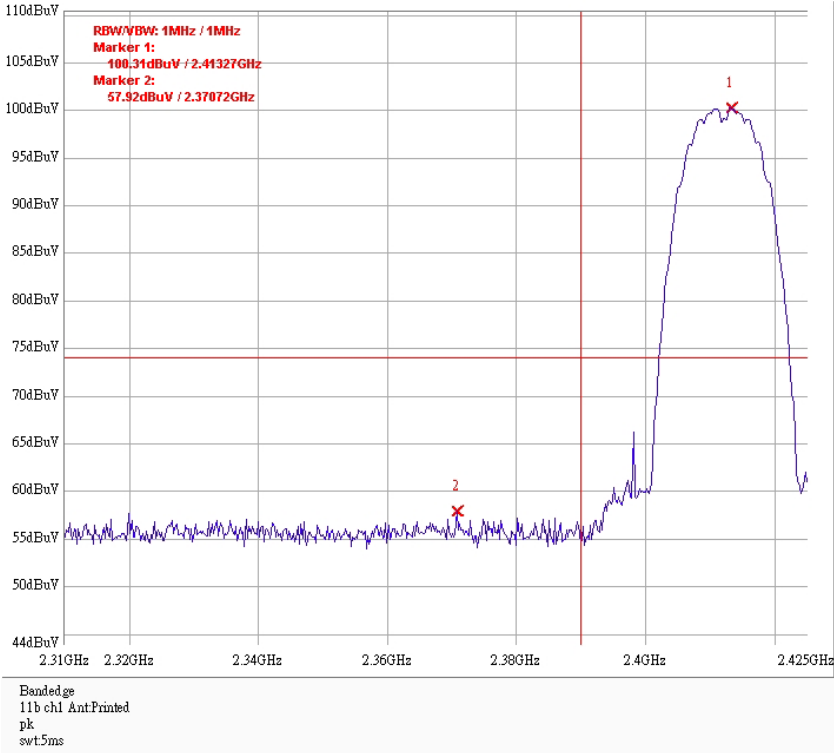
Test Mode: 802.11b mode

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	57.92	74	-16.08
		AV	46.29	54	-7.71
11 (highest)	2483.5-2500	PK	58.31	74	-15.69
		AV	46.57	54	-7.43

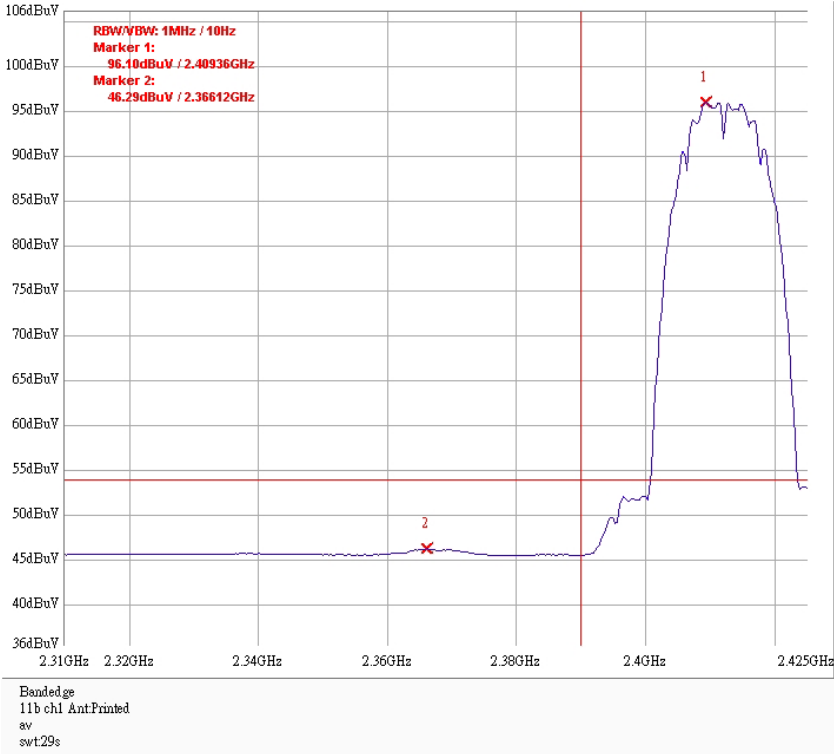
Test Mode: 802.11g mode

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	57.80	74	-16.20
		AV	45.83	54	-8.17
11 (highest)	2483.5-2500	PK	57.77	74	-16.23
		AV	46.56	54	-7.44

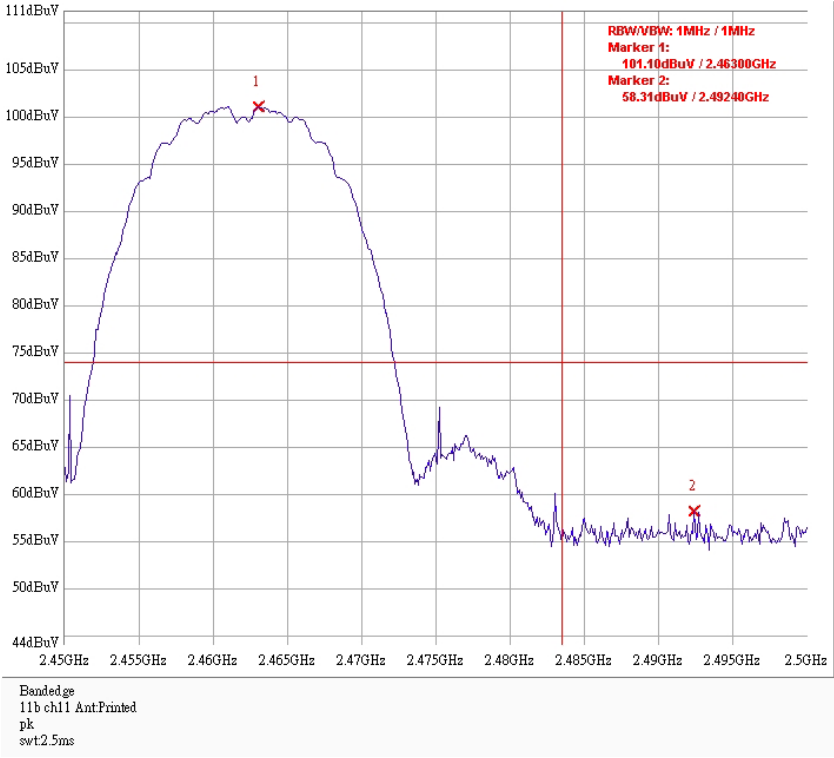
Band edge @ 802.11b mode channel 1 PK



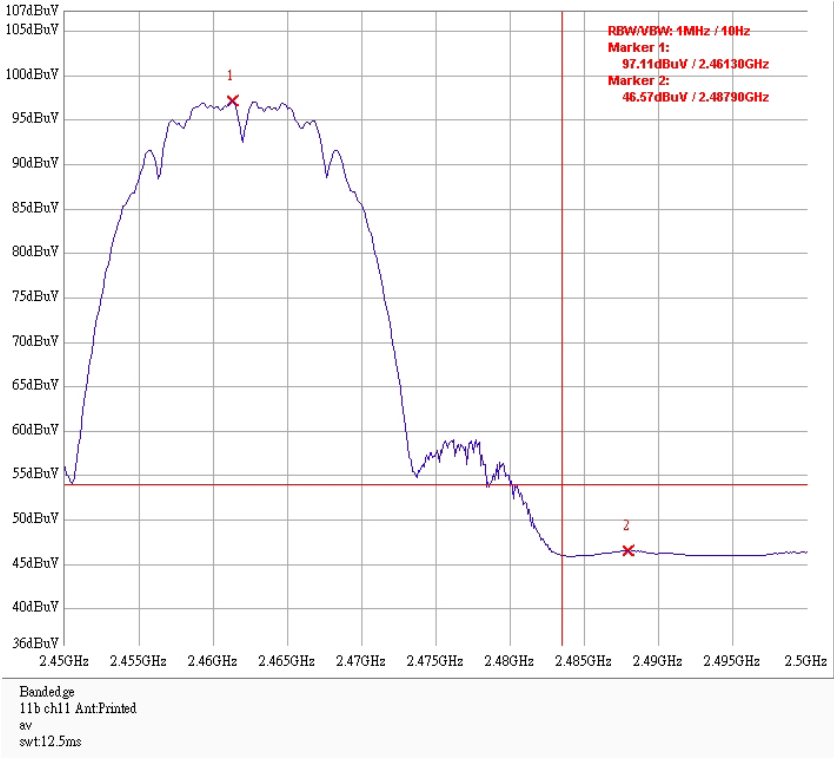
Band edge @ 802.11b mode channel 1 AV



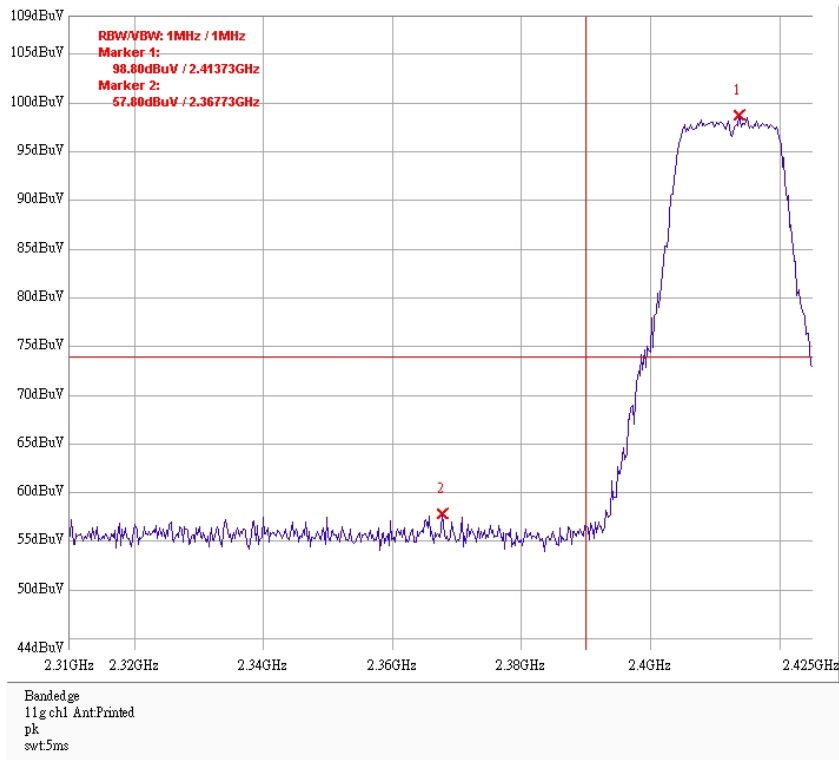
Band edge @ 802.11b mode channel 11 PK



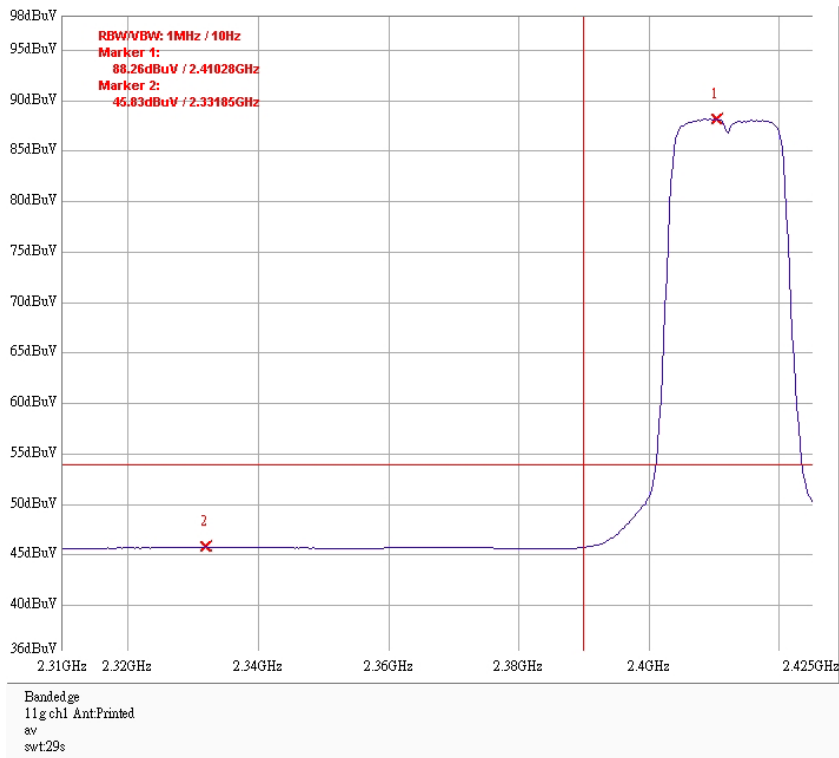
Band edge @ 802.11b mode channel 11 AV



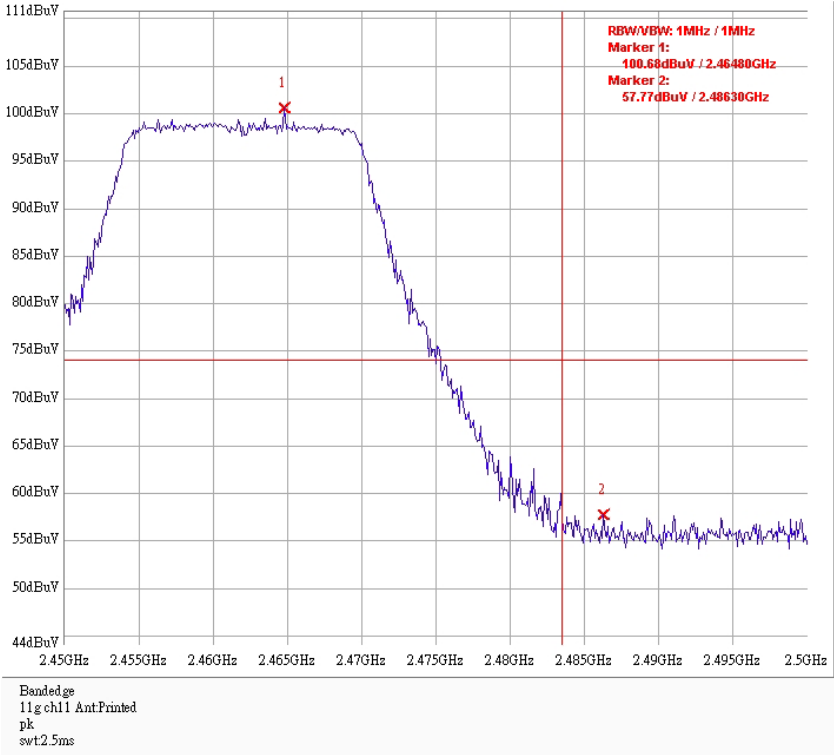
Band edge @ 802.11g mode channel 1 PK



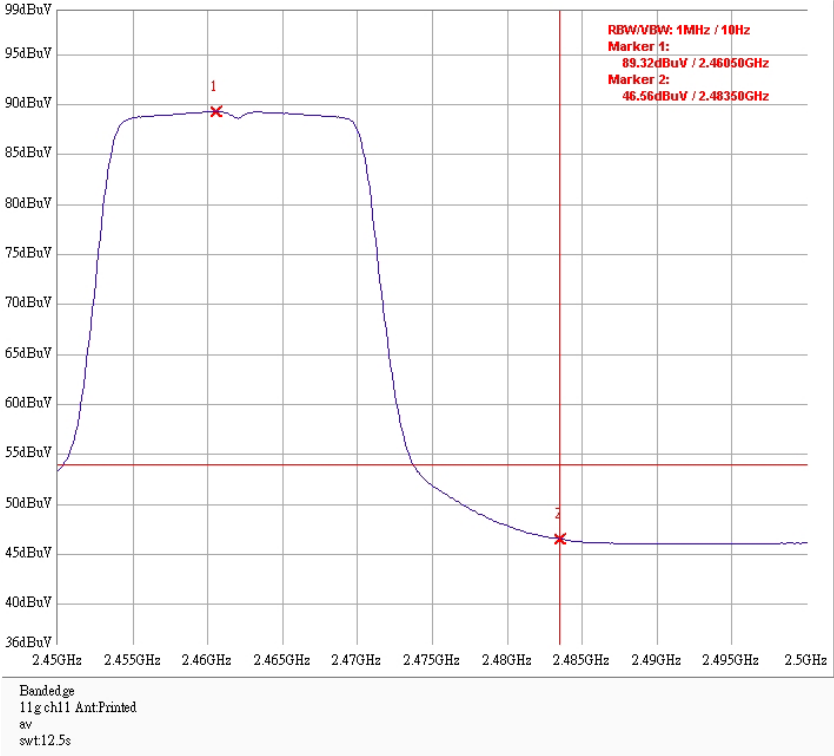
Band edge @ 802.11g mode channel 1 AV



Band edge @ 802.11g mode channel 11 PK



Band edge @ 802.11g mode channel 11 AV



10. AC power line conducted emission

Name of Test	AC power line conducted emission
Base Standard	FCC 15.207

Test Result: Complies
Measurement Data: See Tables & plots below

Method of Measurement:

Reference FCC document: KDB558074, ANSI C63.4

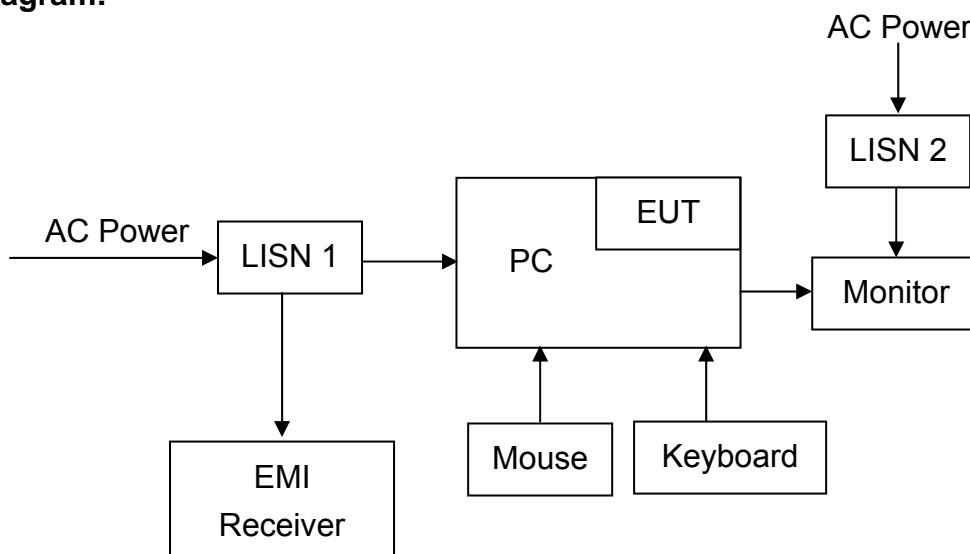
The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50 uH coupling impedance with 50 ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9 kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

Test Diagram:



Emission Limit:

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

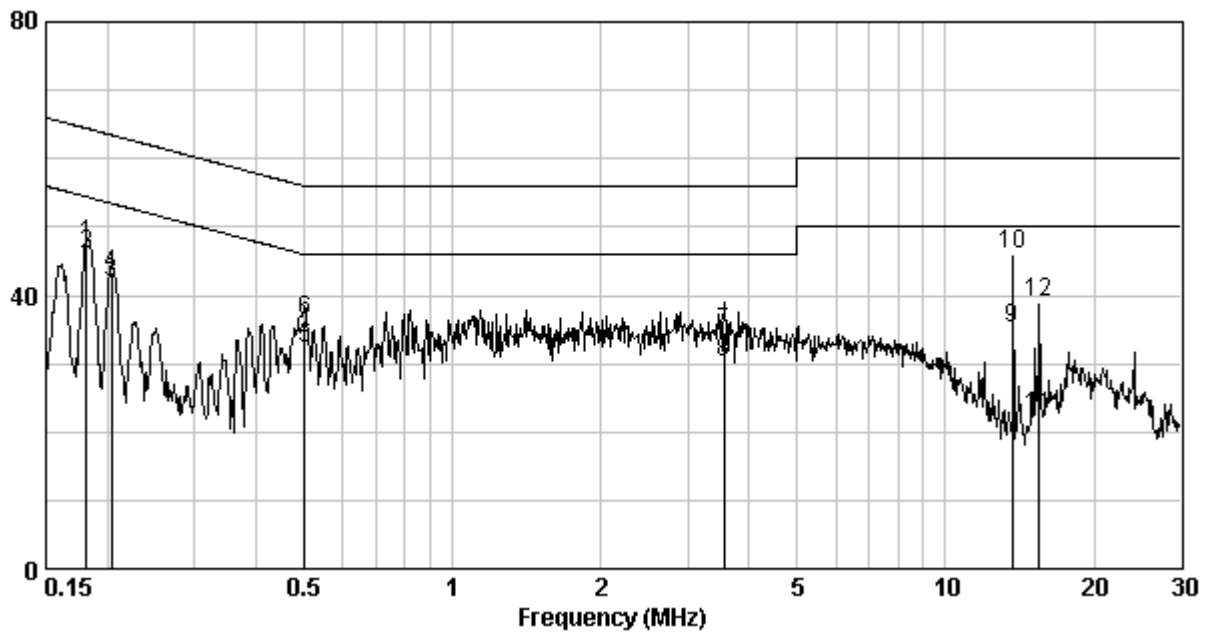
Note: The EUT was tested while in normal communication mode.

Phase : Line
EUT : SDW3100
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.18	0.81	47.37	64.42	45.89	54.42	-17.05	-8.53
0.20	0.78	43.14	63.45	41.83	53.45	-20.31	-11.62
0.50	0.11	36.46	56.00	32.20	46.00	-19.54	-13.80
3.56	0.27	34.59	56.00	30.17	46.00	-21.41	-15.83
13.65	0.75	45.87	60.00	35.11	50.00	-14.13	-14.89
15.44	0.82	38.91	60.00	22.13	50.00	-21.09	-27.87

Remark:

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

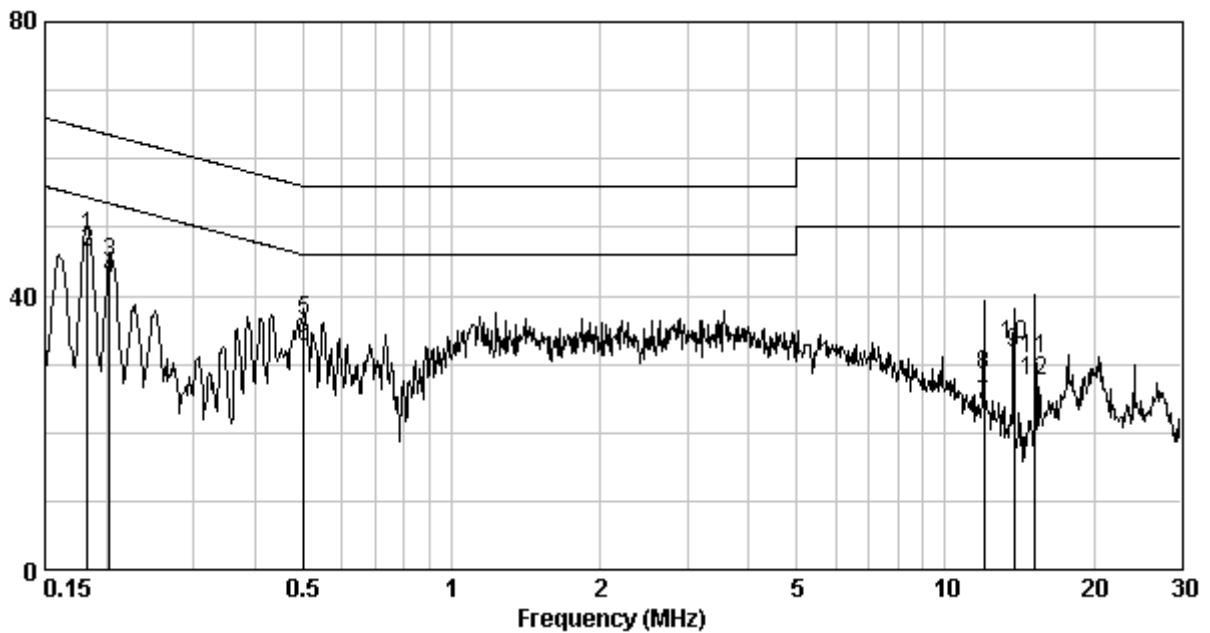


Phase : Neutral
EUT : SDW3100
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.18	0.11	48.74	64.34	46.26	54.34	-15.61	-8.09
0.20	0.11	44.71	63.49	42.44	53.49	-18.79	-11.06
0.50	0.11	36.26	56.00	32.42	46.00	-19.74	-13.58
11.97	0.45	28.49	60.00	24.13	50.00	-31.51	-25.87
13.77	0.49	31.67	60.00	32.72	50.00	-28.33	-17.28
15.21	0.51	30.79	60.00	27.48	50.00	-29.21	-22.52

Remark:

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



APPENDICES

Appendix A: Test Equipment List

Equipment	Brand	Model No.
EMI Test Receiver	Rohde & Schwarz	ESCS 30
Spectrum Analyzer	Rohde & Schwarz	FSP 30
Spectrum Analyzer	Rohde & Schwarz	FSEK 30
Signal Generator	Rohde & Schwarz	SMR27
Horn Antenna	SCHWARZBECK	BBHA 9120 D
Horn Antenna	SCHWARZBECK	BBHA 9170
Bilog Antenna	SCHWARZBECK	VULB 9168
Pre-Amplifier	MITEQ	919981
Pre-Amplifier	MITEQ	828825
Controller	HDGmbH	CM 100
Antenna Tower	HDGmbH	MA 2400
LISN	Rohde & Schwarz	ESH3-Z5
Wideband Peak Power Meter/ Sensor	Anritsu	ML2495A/ MA2411B
Temperature Humidity Test Chamber	Juror	TR-4010

- Note: 1. The above equipments are within the valid calibration period.
2. The test antennas (receiving antenna) are calibration per 3 years.

Measurement Uncertainty:

Measurement uncertainty was calculated in accordance with NAMAS NIS 81.

Parameter	Uncertainty
Radiated Emission	±4.98 dB
Conducted Emission	±2.6 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.