

FCC Part 15C

Measurement and Test Report

For

Esselte Leitz GmbH & Co. KG

c/o Esselte Holdings, Inc., 5 High Ridge Park, Suite 101, Stamford,

CT 06905

FCC ID: 2ABUI70010000

FCC Rule(s): FCC Part 15C

Product Description: The Leitz Icon Printer

Tested Model: 70010000

Report No.: STR13108141I-1

Tested Date: 2013-10-17 to 2013-11-01

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Esselte Leitz GmbH & Co. KG
Address of applicant: c/o Esselte Holdings, Inc., 5 High Ridge Park, Suite 101,
Stamford, CT 06905
Manufacturer: Shenzhen Guowei Electronics Co., Ltd.
Address of manufacturer: Qiaonan Industrial Park, Zhangkengjin Community, Guanlan
Town, Shenzhen

General Description of EUT

Product Name:	The Leitz Icon Printer
Trade Name:	LEITZ
Model No.:	70010000
Adding Model:	70011000, 70013000
Rated Voltage:	DC 24V Adapter
Power Adapter Model:	ZF120A-2404000

Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model 70010000, but the circuit and the electronic construction do not change, declared by the manufacturer.

Technical Characteristics of EUT

Support Standards:	802.11b, 802.11g
Frequency Range:	2412-2462MHz
RF Output Power:	7.52dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK
Data Rate:	1-11Mbps, 6-54Mbps
Quantity of Channels:	11
Channel Separation:	5MHz
Type of Antenna:	PCB
Antenna Gain:	2dBi
Lowest Internal Frequency	12MHz

1.2 Test Standards

The following report is prepared on behalf of the Esselte Leitz GmbH & Co. KG in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The public notice KDB 558074 D01 V03 for digital transmission systems shall be performed also.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11b	2412MHz, 2437MHz, 2462MHz
TM2	802.11g	2412MHz, 2437MHz, 2462MHz

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC power Cable	1.6	Unshielded	With Ferrite

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E23	/

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	Compliant
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.247(e)	Power Spectral Density	Compliant
§ 15.247(a)(2)	6 dB Bandwidth	Compliant
§ 15.247(b)(3)	RF Output Power	Compliant
§ 15.209(a)(d)	Radiated Emission	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has a integral antenna, fulfill the requirement of this section.

5. Power Spectral Density

5.1 Standard Applicable

According to 15.247(a)(1)(iii), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

5.3 Test Procedure

According to the KDB 558074 D01 V03, the test method of power spectral density as below:

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set analyzer center frequency to DTS channel center frequency.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW ≥ 3 kHz.
5. Set the VBW $\geq 3 \times$ RBW.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.
11. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.4 Environmental Conditions

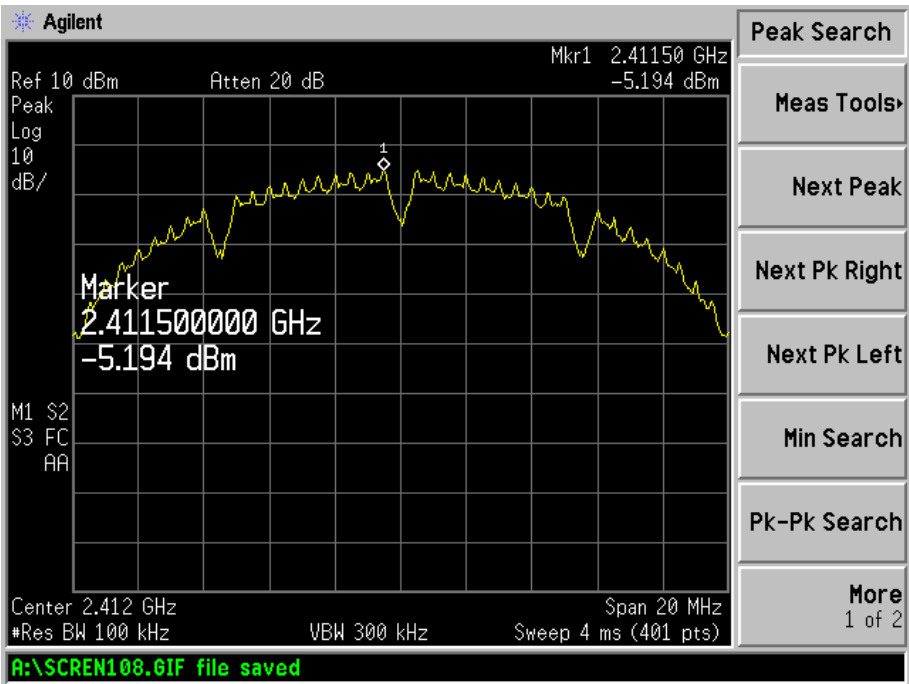
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

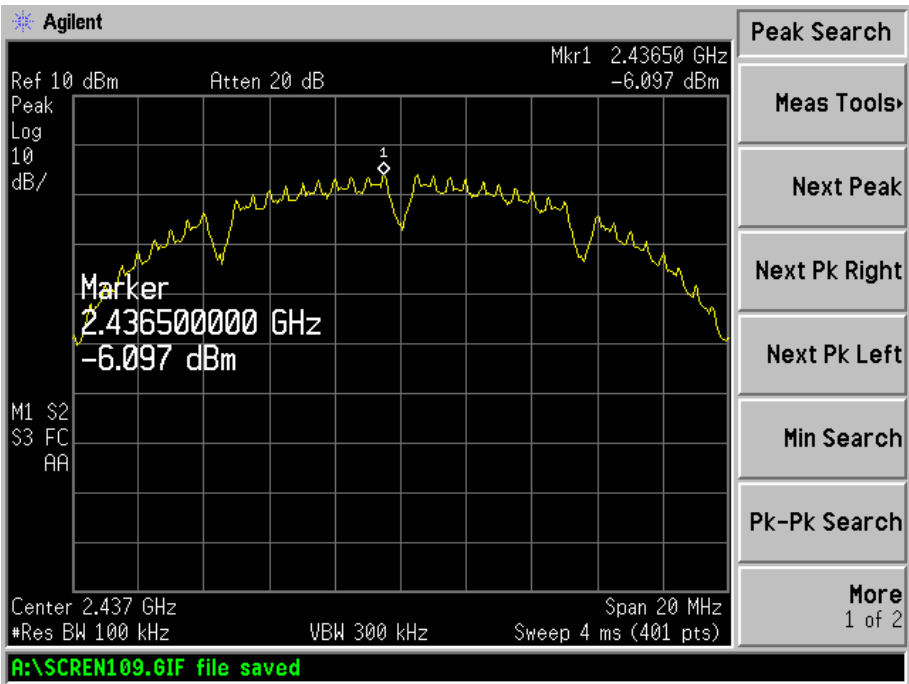
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
802.11b	2412	-5.194	8
	2437	-6.097	8
	2462	-7.031	8
802.11g	2412	-9.487	8
	2437	-9.764	8
	2462	-10.250	8

Please refer to the following test plots:

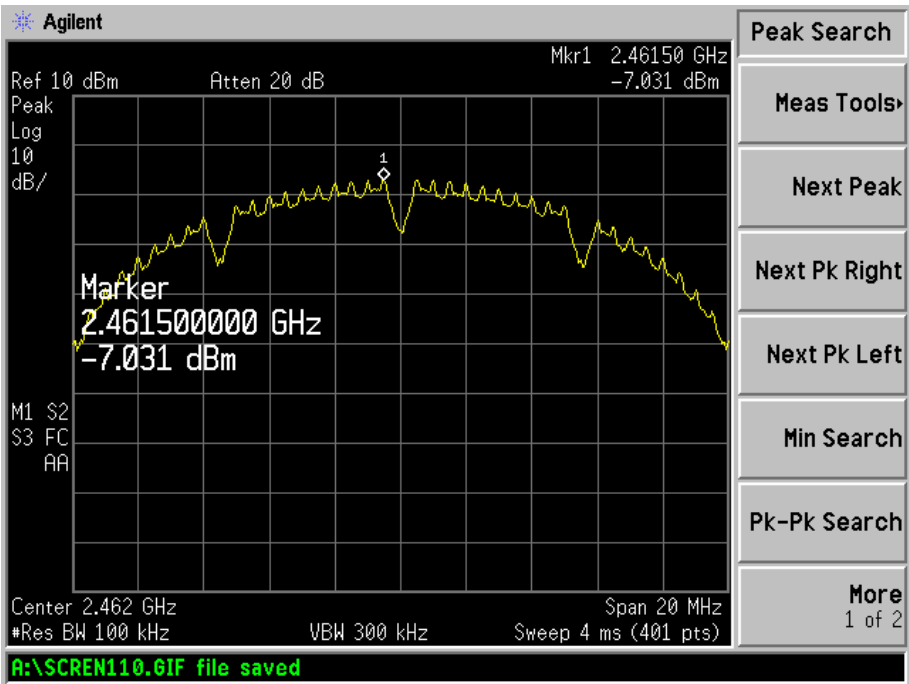
802.11b-Low Channel



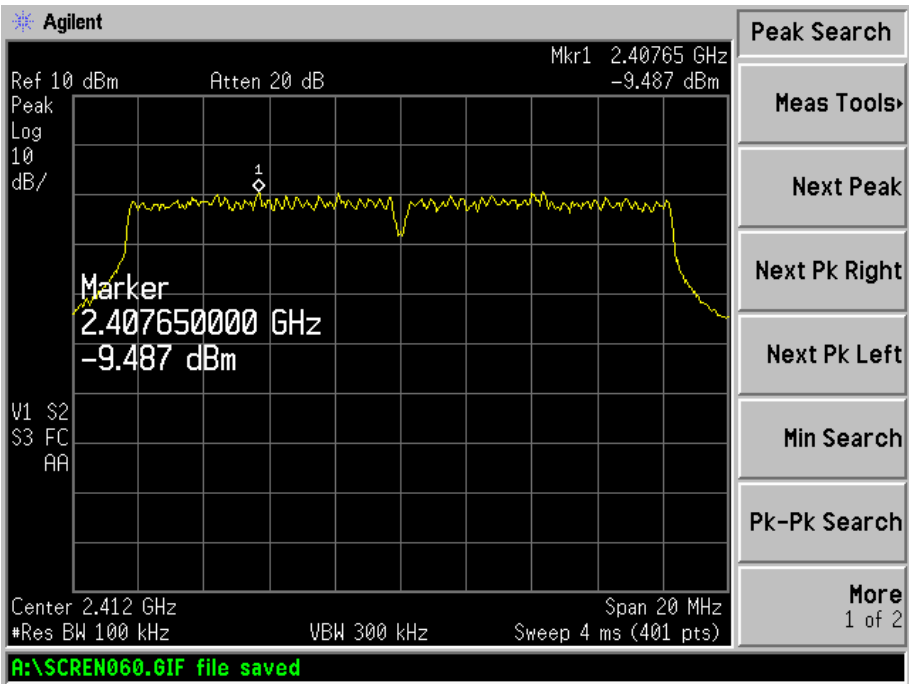
802.11b-Middle Channel



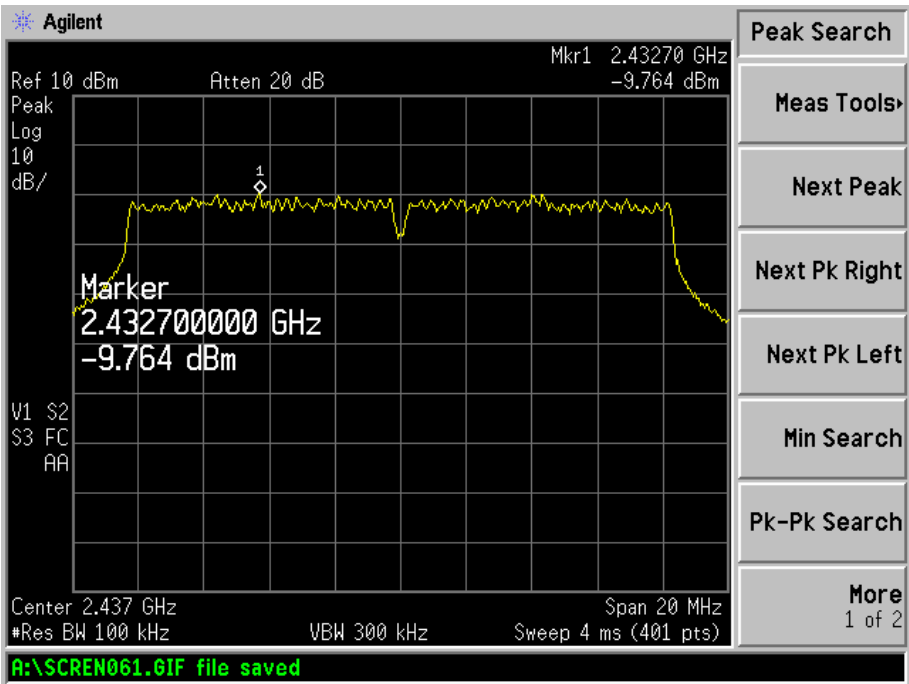
802.11b-High Channel



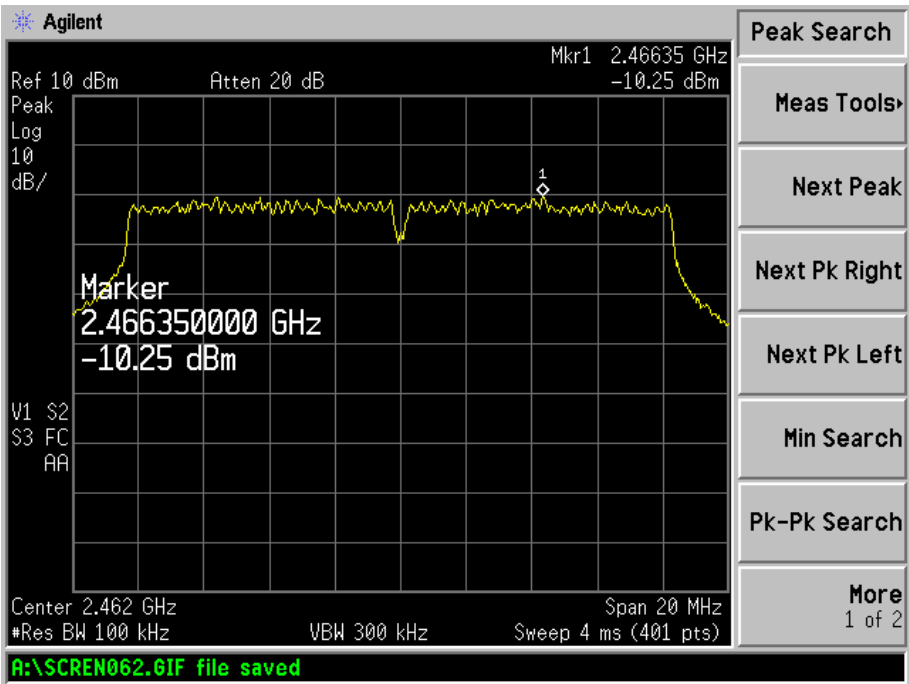
802.11g-Low Channel



802.11g-Middle Channel



802.11g-High Channel



6. 6dB Bandwidth

6.1 Standard Applicable

According to 15.247(a)(2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

6.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.
3. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission..

6.4 Environmental Conditions

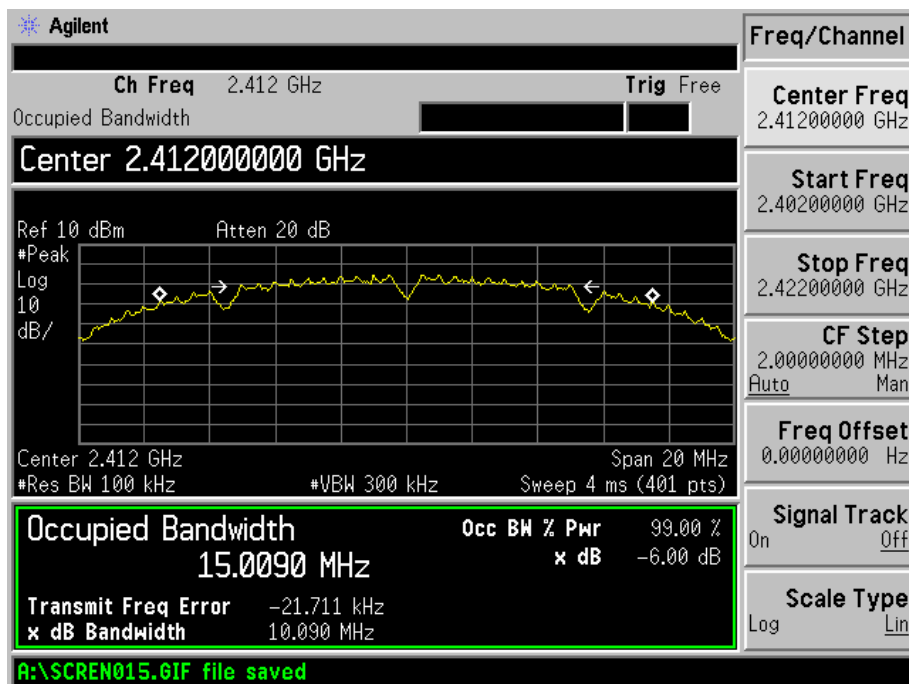
Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.5 Summary of Test Results/Plots

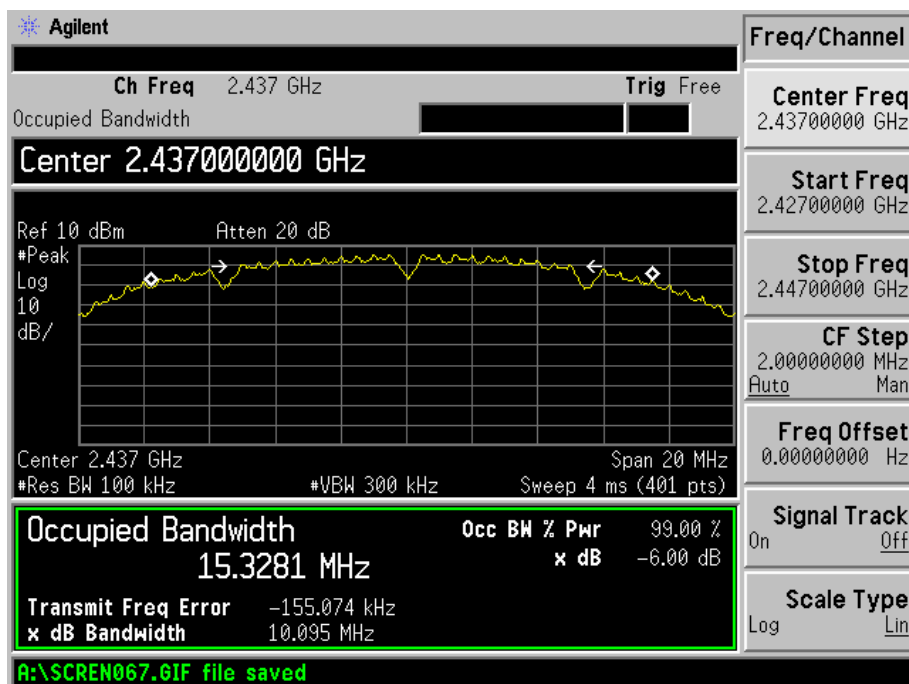
Test Mode	Test Channel MHz	6 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz
802.11b	2412	10090	15009.0	500
	2437	10095	15382.1	500
	2462	10081	15028.3	500
802.11g	2412	16533	16434.5	500
	2437	16547	16480.9	500
	2462	16576	16472.0	500

Please refer to the following test plots:

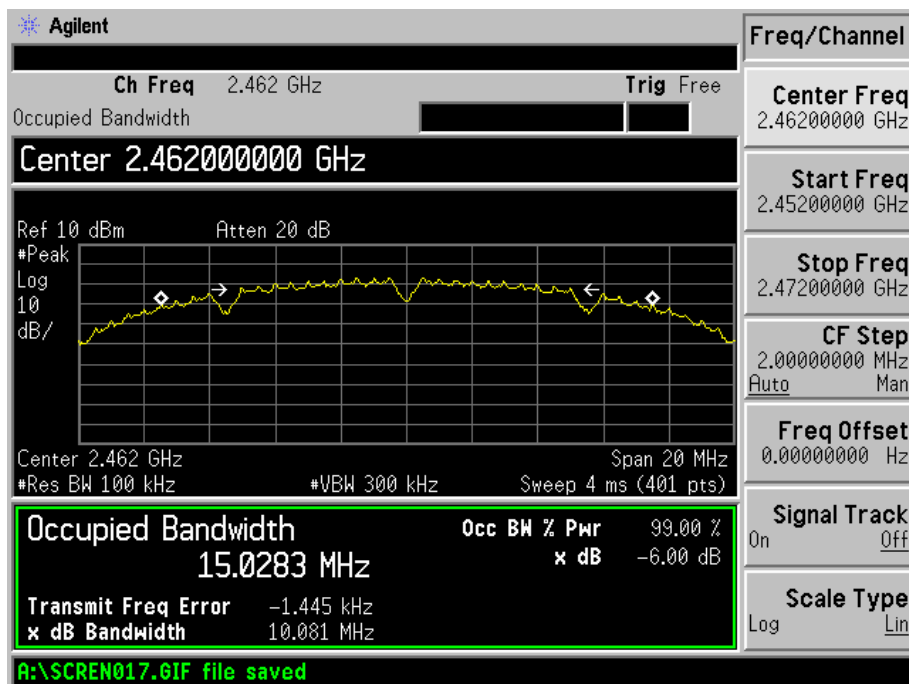
802.11b-Low Channel



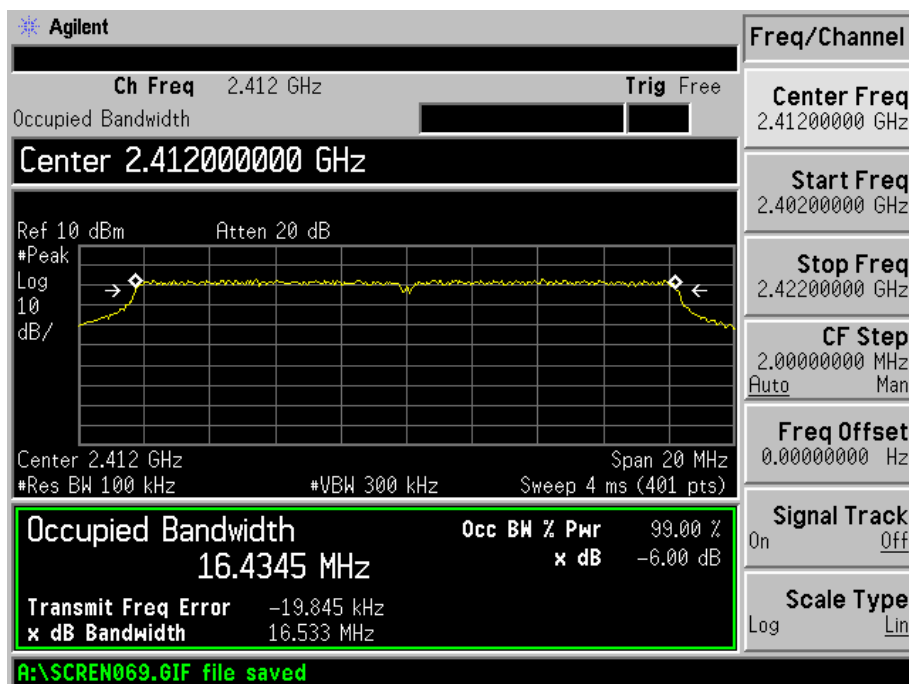
802.11b-Middle Channel



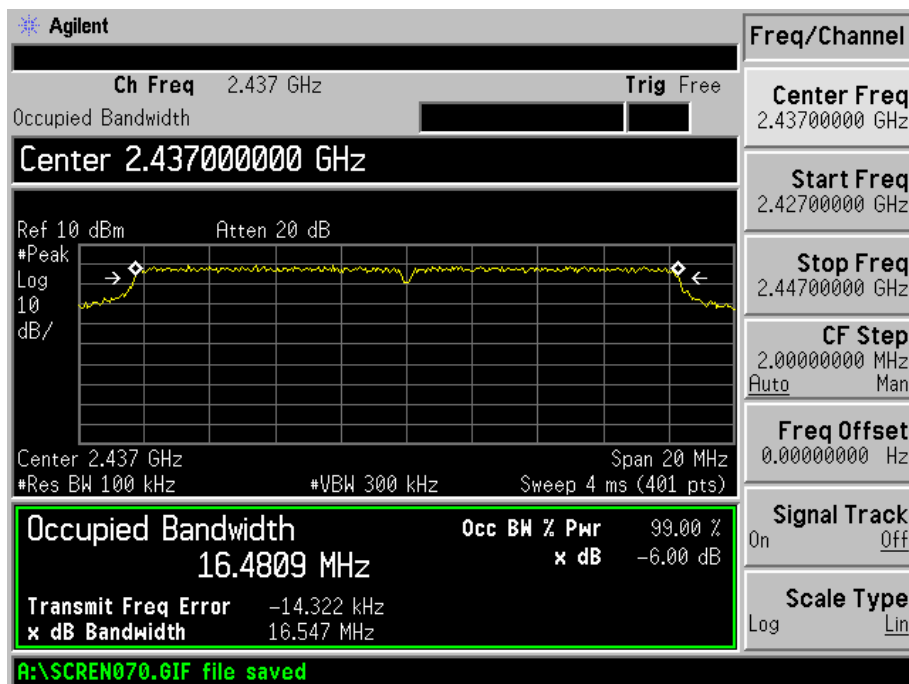
802.11b-High Channel



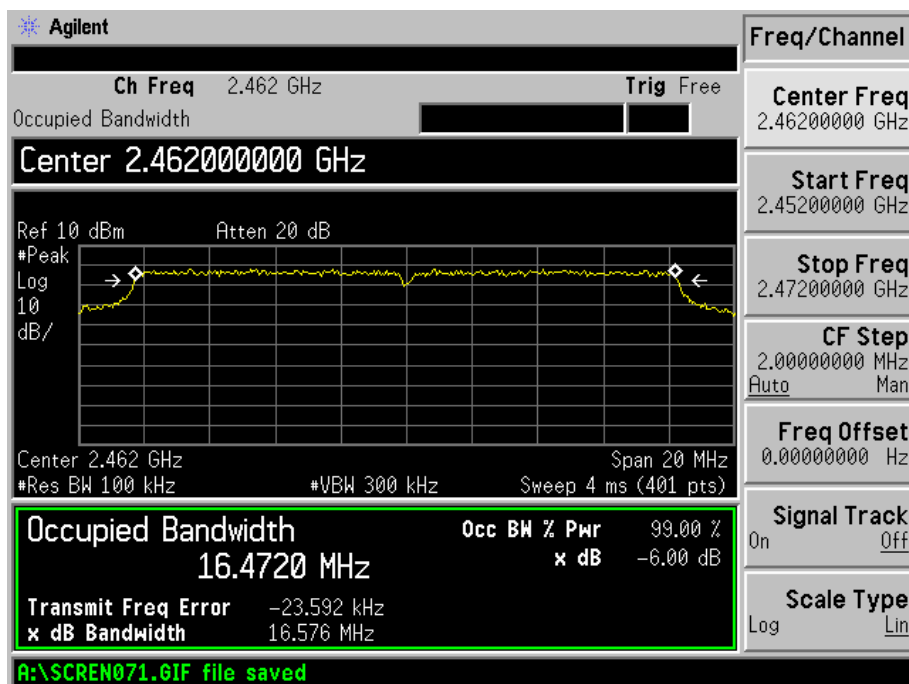
802.11g-Low Channel



802.11g-Middle Channel



802.11g-High Channel



7. RF Output Power

7.1 Standard Applicable

According to 15.247(b)(3). For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

7.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

7.3 Test Procedure

According to section 15.247(b)-power output of the KDB-558074 D01 V03 (2013), 8.1.2 Option 2 (channel integration method) this procedure should only be used when the maximum available RBW of the spectrum/signal analyzer is less than the DTS bandwidth.

1. Set the RBW = maximum available (at least 1 MHz).
2. Set the VBW = 3 x RBW or maximum available setting (must be $\geq$ RBW).
3. Set the span to fully encompass the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector).

7.4 Environmental Conditions

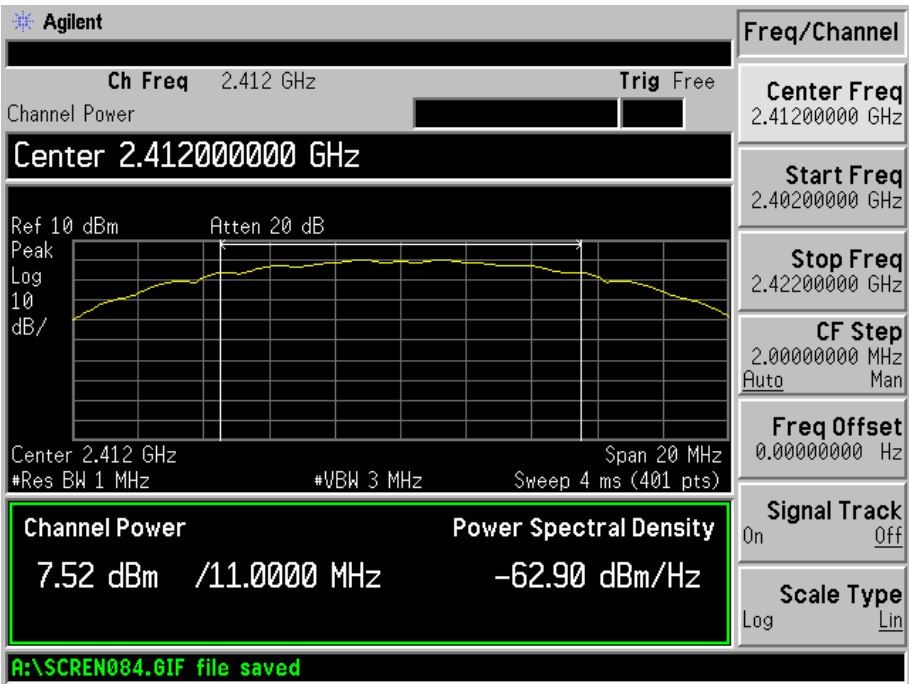
Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

7.5 Summary of Test Results/Plots

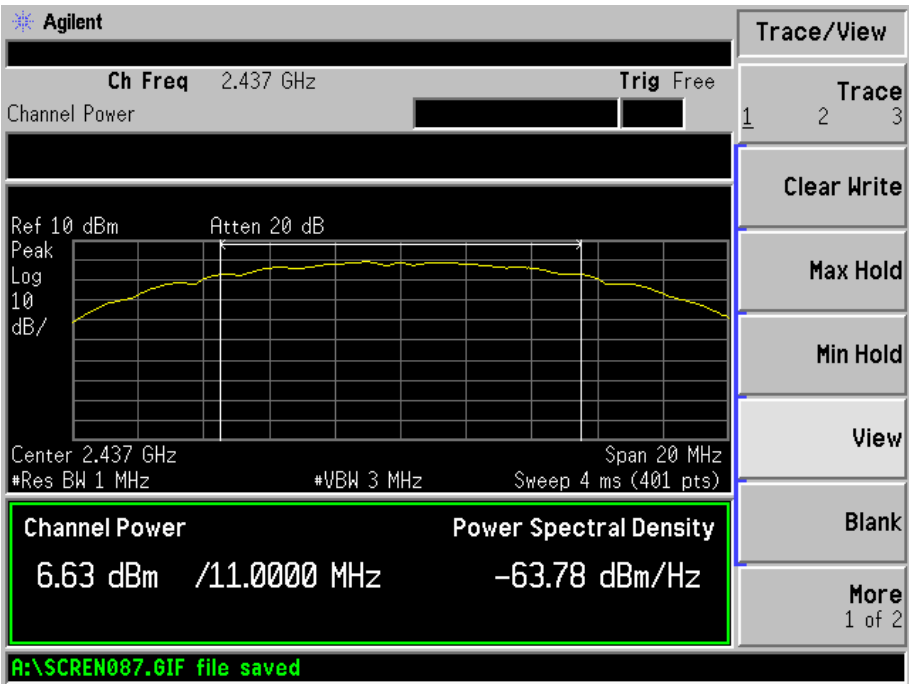
Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
802.11b _ 1Mbps	2412	7.52	5.6494	1000
	2437	6.63	4.6026	1000
	2462	6.71	4.6881	1000
802.11g_6Mbps	2412	7.10	5.1286	1000
	2437	6.24	4.2073	1000
	2462	6.32	4.2855	1000

Please refer to the following test plots:

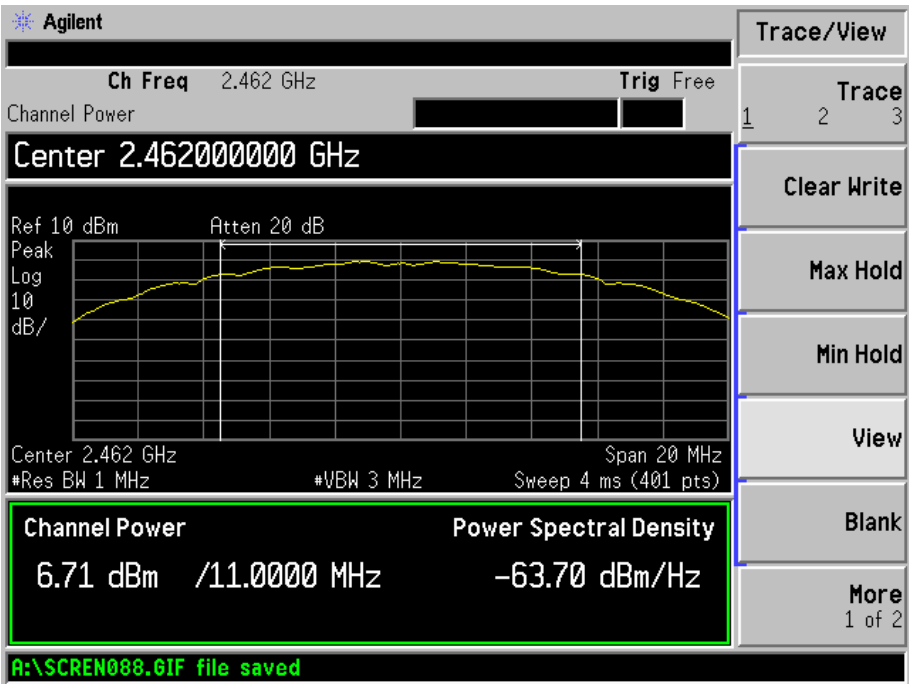
802.11b-1Mbps-Low Channel



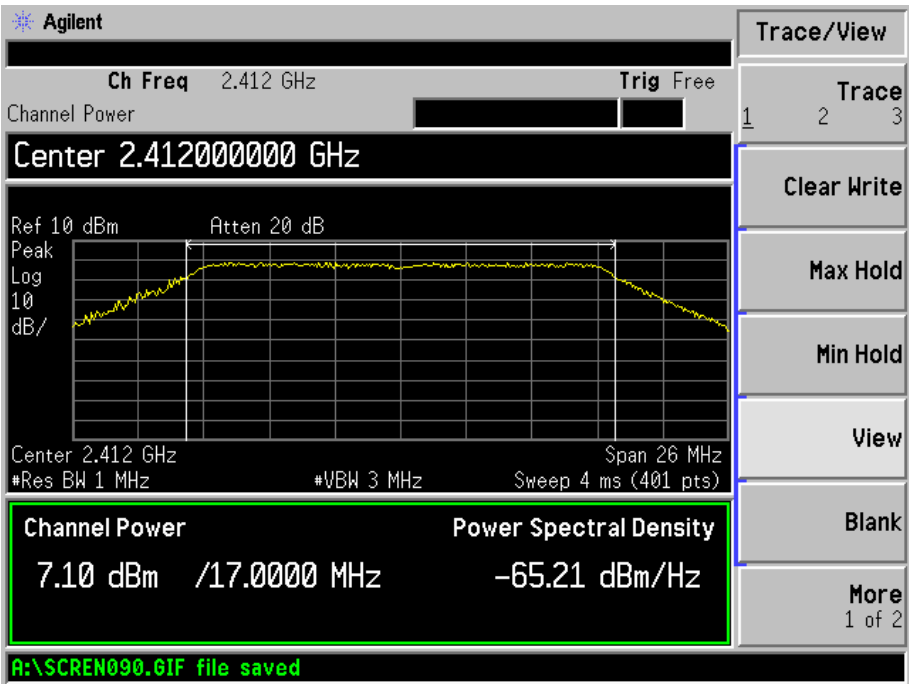
802.11b -1Mbps-Middle Channel



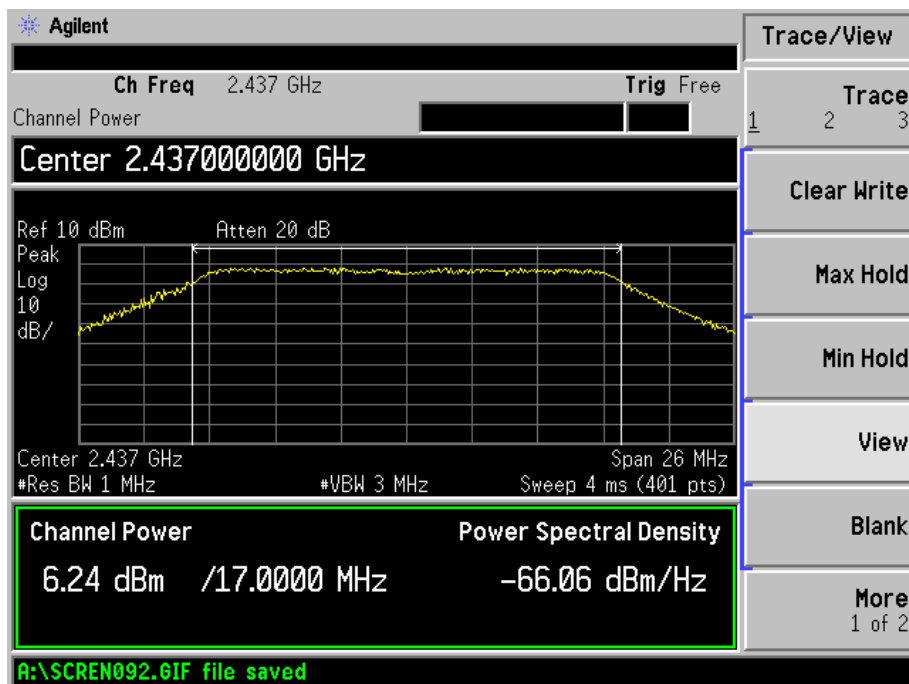
802.11b -1Mbps-High Channel



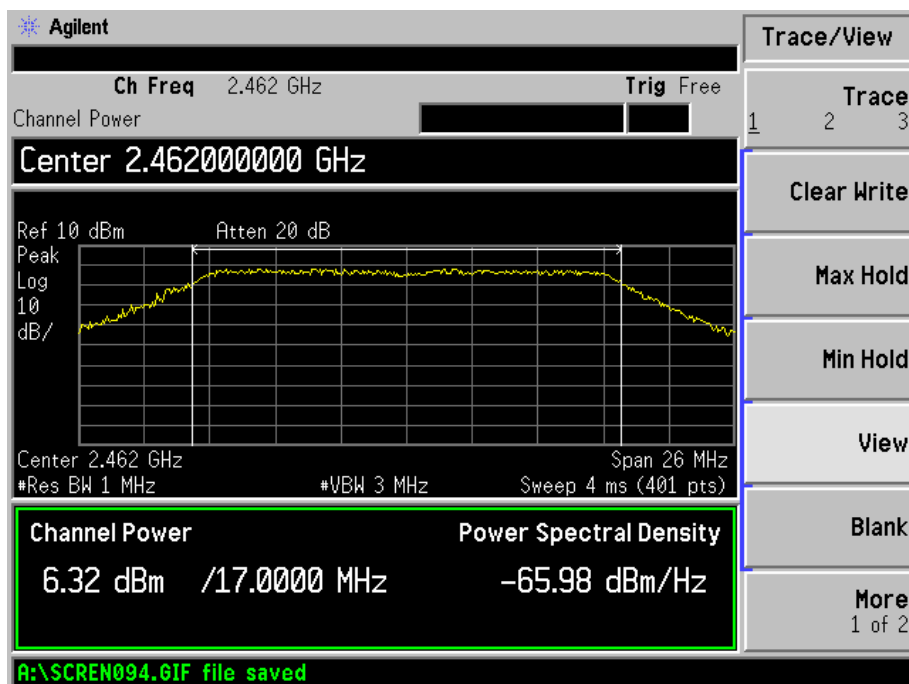
802.11g-6Mbps-Low Channel



802.11g-6Mbps-Middle Channel



802.11g-6Mbps-High Channel



8. Field Strength of Spurious Emissions

8.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 5.10 dB.

8.2 Standard Applicable

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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).

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

8.3 Test Equipment List and Details

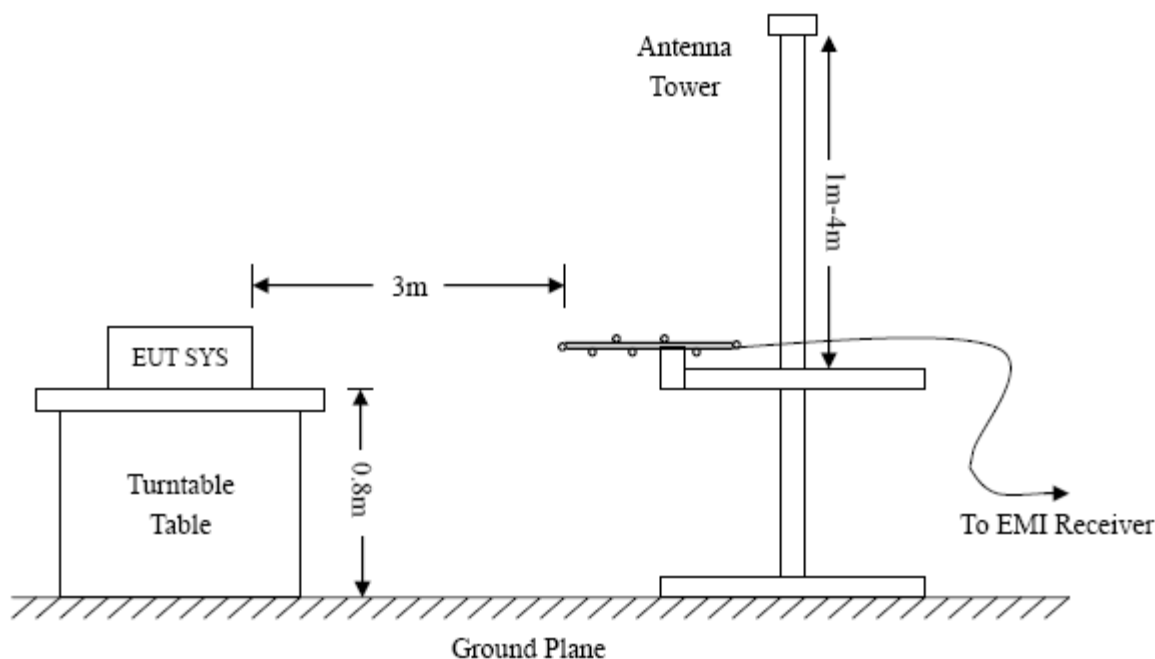
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-05-07	2014-05-06
EMI Test Receiver	R&S	ESVB	825471/005	2013-05-07	2014-05-06
Pre-amplifier	Agilent	8447F	3113A06717	2013-05-07	2014-05-06
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-05-07	2014-05-06
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-04-20	2014-04-19
Horn Antenna	ETS	3117	00086197	2013-04-20	2014-04-19
Horn Antenna	ETS	3116B	00088203	2013-04-20	2014-04-19
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2013-04-20	2014-04-19

8.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



Frequency :9kHz-30MHz

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

8.6 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.7 Summary of Test Results/Plots

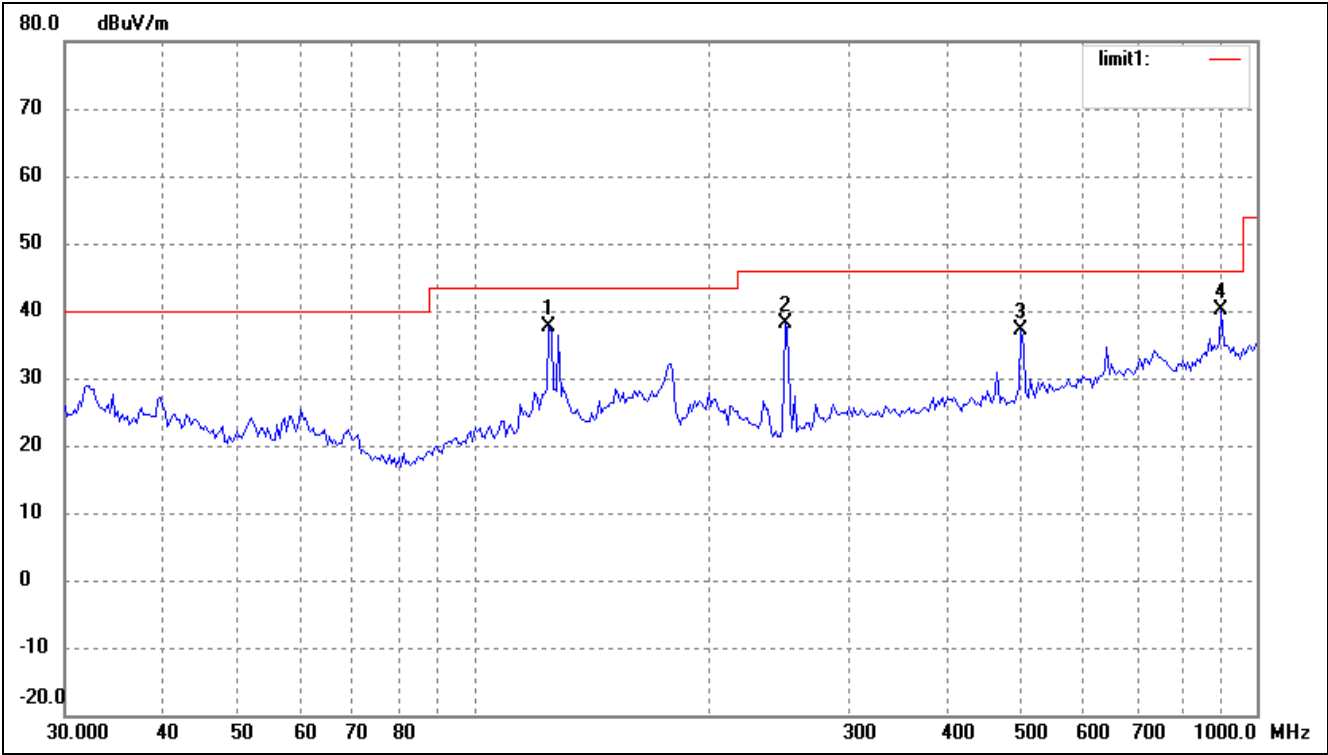
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

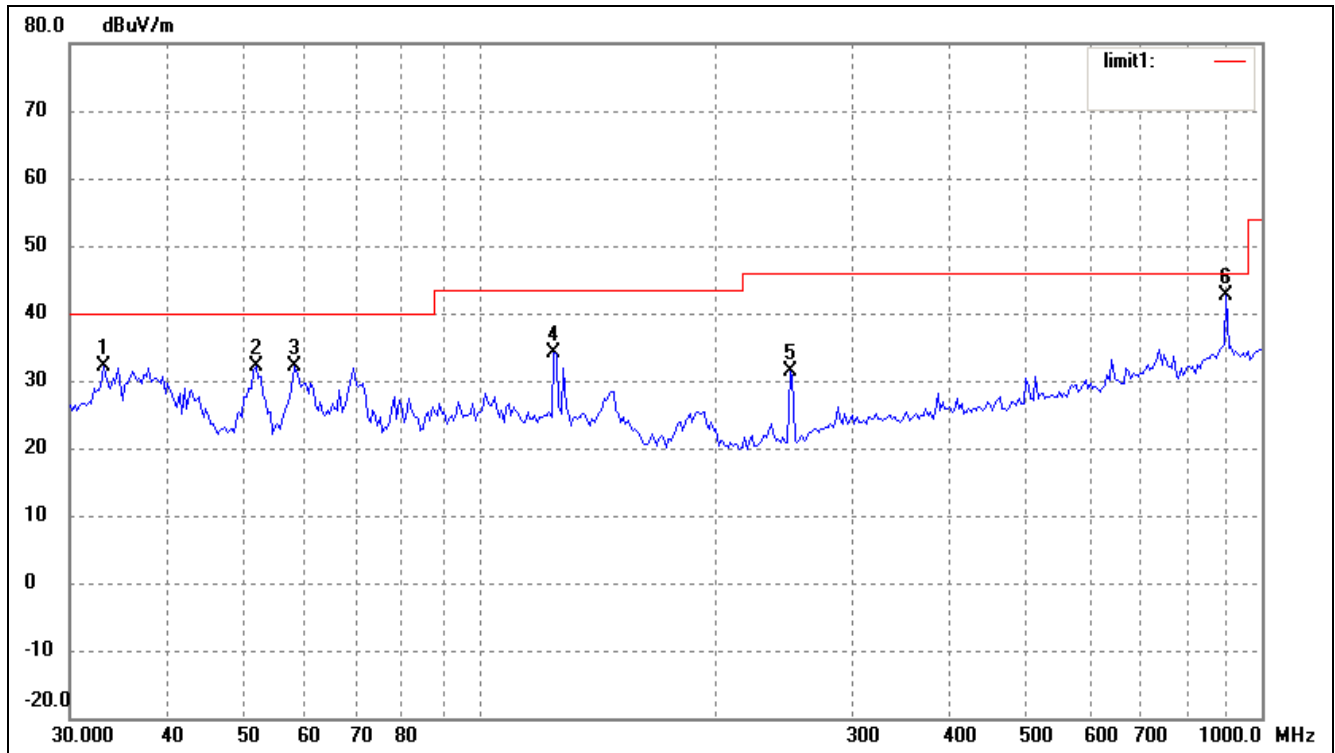
EUT: The Leitz Icon Printer
Tested Model: 70010000
Operating Condition: 802.11b Transmitting Low Channel-2412MHz
Comment: AC 120V/60Hz; adapter DC 24V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	124.5690	33.14	4.53	37.67	43.50	-5.83	114	100	peak
2	249.4250	30.76	7.27	38.03	46.00	-7.97	270	100	peak
3	499.4247	24.92	12.18	37.10	46.00	-8.90	360	100	peak
4	900.1474	20.81	19.38	40.19	46.00	-5.81	116	100	peak

Test Specification: Vertical

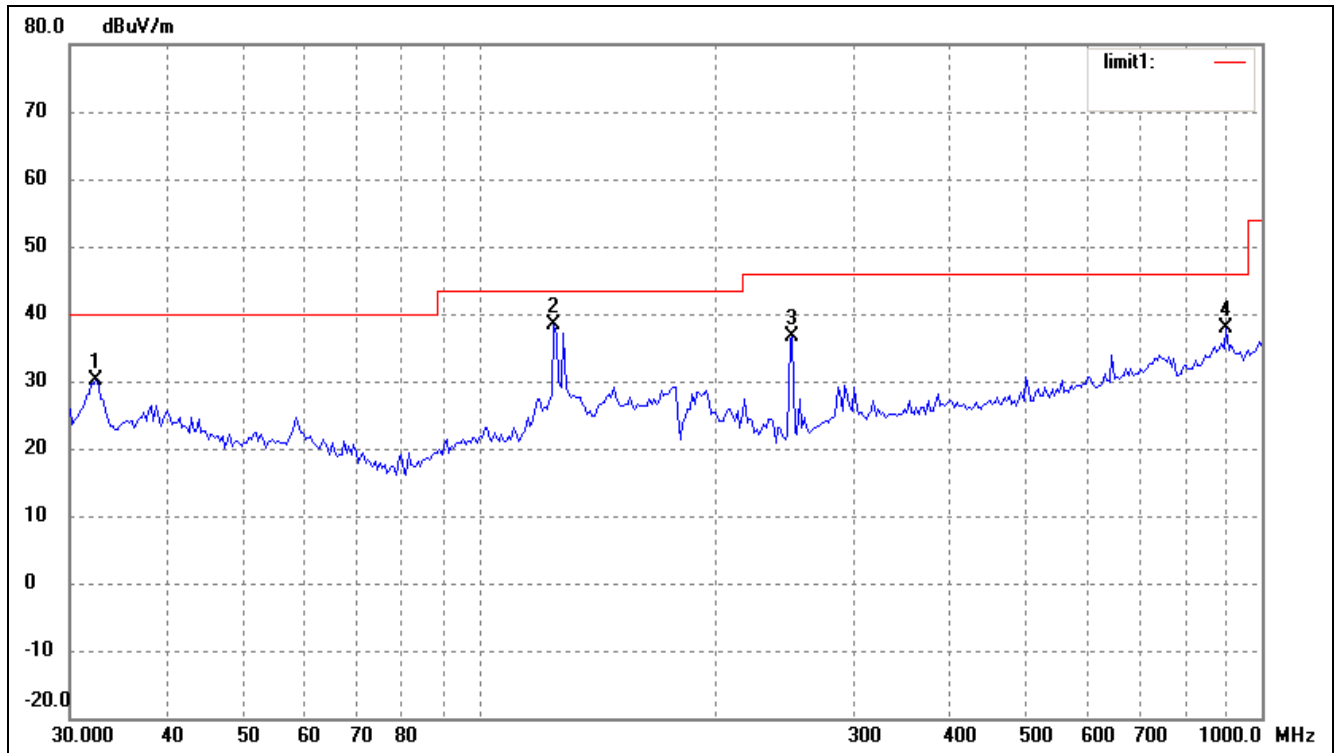


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.0950	23.60	8.56	32.16	40.00	-7.84	178	100	peak
2	51.8430	25.64	6.45	32.09	40.00	-7.91	224	100	peak
3	57.9993	26.15	5.87	32.02	40.00	-7.98	160	100	peak
4	124.5690	29.64	4.53	34.17	43.50	-9.33	290	100	peak
5	249.4250	24.00	7.27	31.27	46.00	-14.73	147	100	peak
6	900.1474	23.21	19.38	42.59	46.00	-3.41	253	100	peak

Operating Condition: 802.11b Transmitting Middle Channel-2437MHz

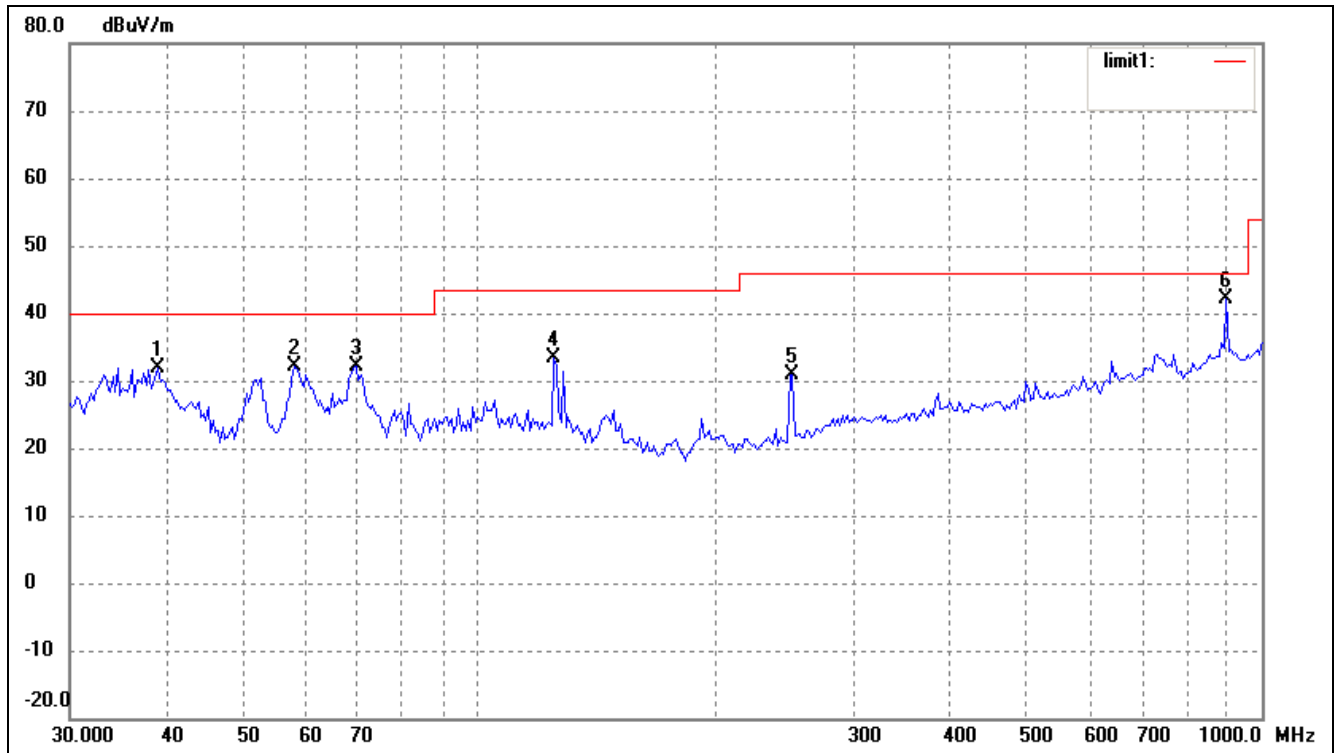
Comment: AC 120V/60Hz; adapter DC 24V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.4059	21.81	8.44	30.25	40.00	-9.75	256	100	peak
2	124.5690	33.95	4.53	38.48	43.50	-5.02	360	100	peak
3	251.1804	29.26	7.34	36.60	46.00	-9.40	360	100	peak
4	900.1474	18.39	19.38	37.77	46.00	-8.23	360	100	peak

Test Specification: Vertical

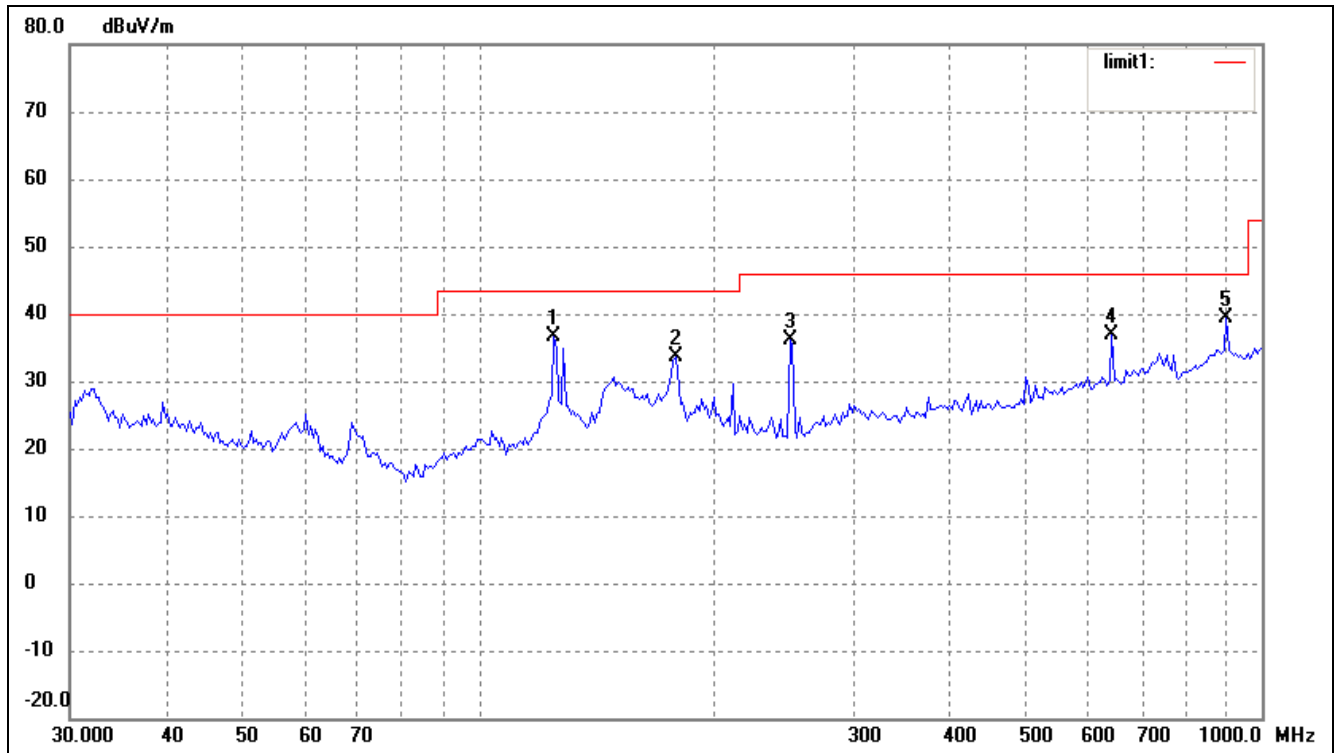


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	38.8879	22.49	9.50	31.99	40.00	-8.01	176	100	peak
2	57.9993	26.19	5.87	32.06	40.00	-7.94	255	100	peak
3	69.6005	29.57	2.65	32.22	40.00	-7.78	360	100	peak
4	124.5690	28.84	4.53	33.37	43.50	-10.13	178	100	peak
5	251.1804	23.56	7.34	30.90	46.00	-15.10	123	100	peak
6	900.1474	22.73	19.38	42.11	46.00	-3.89	255	100	peak

Operating Condition: 802.11b Transmitting High Channel-2462MHz

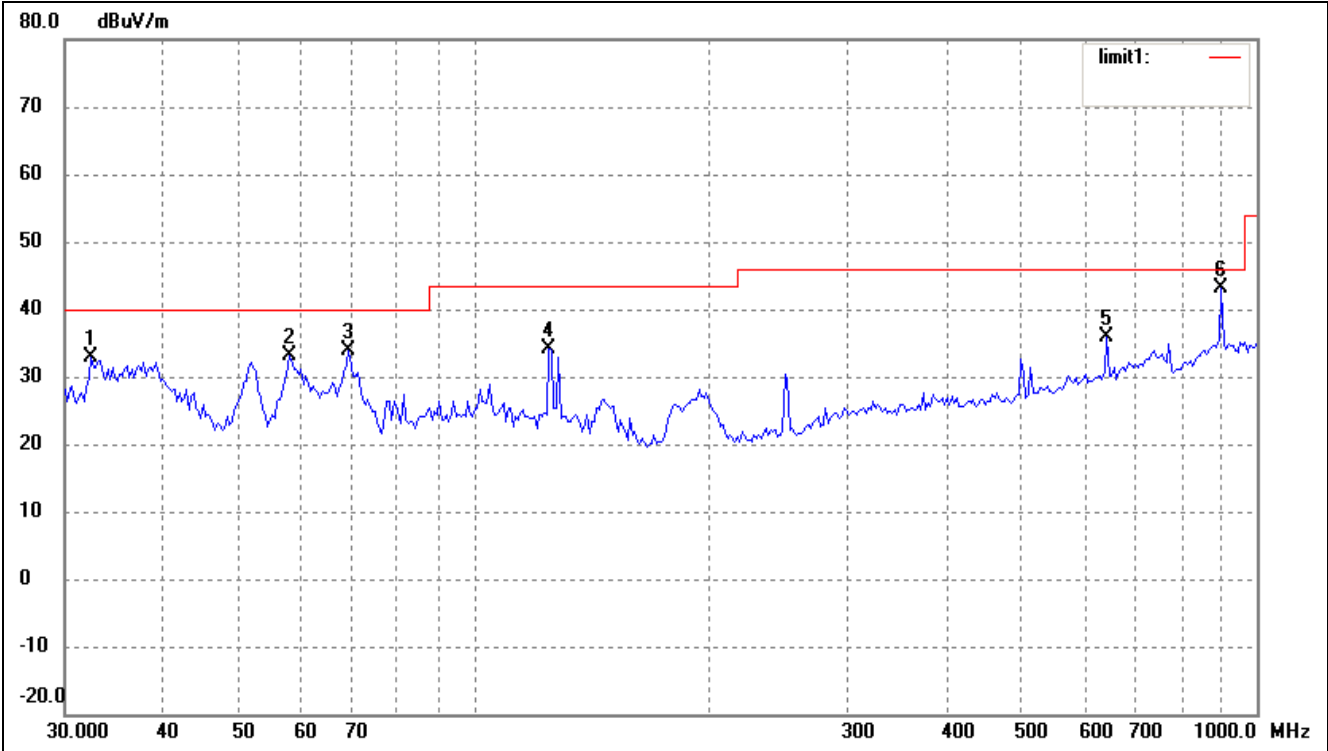
Comment: AC 120V/60Hz; adapter DC 24V

Test Specification: Horizontal

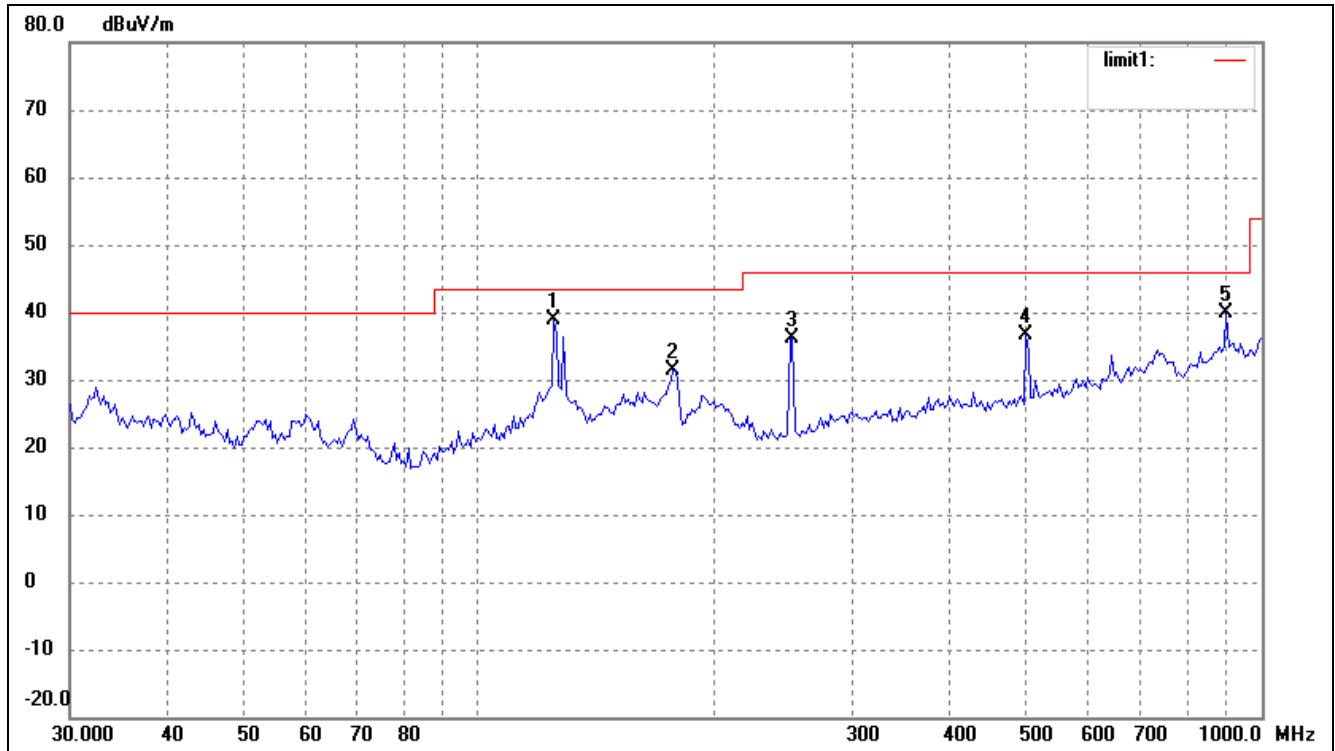


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	124.5690	32.14	4.53	36.67	43.50	-6.83	360	100	peak
2	178.1327	29.90	3.74	33.64	43.50	-9.86	225	100	peak
3	249.4250	28.84	7.27	36.11	46.00	-9.89	160	100	peak
4	642.8613	21.67	15.14	36.81	46.00	-9.19	310	100	peak
5	900.1474	19.88	19.38	39.26	46.00	-6.74	148	100	peak

Test Specification: Vertical

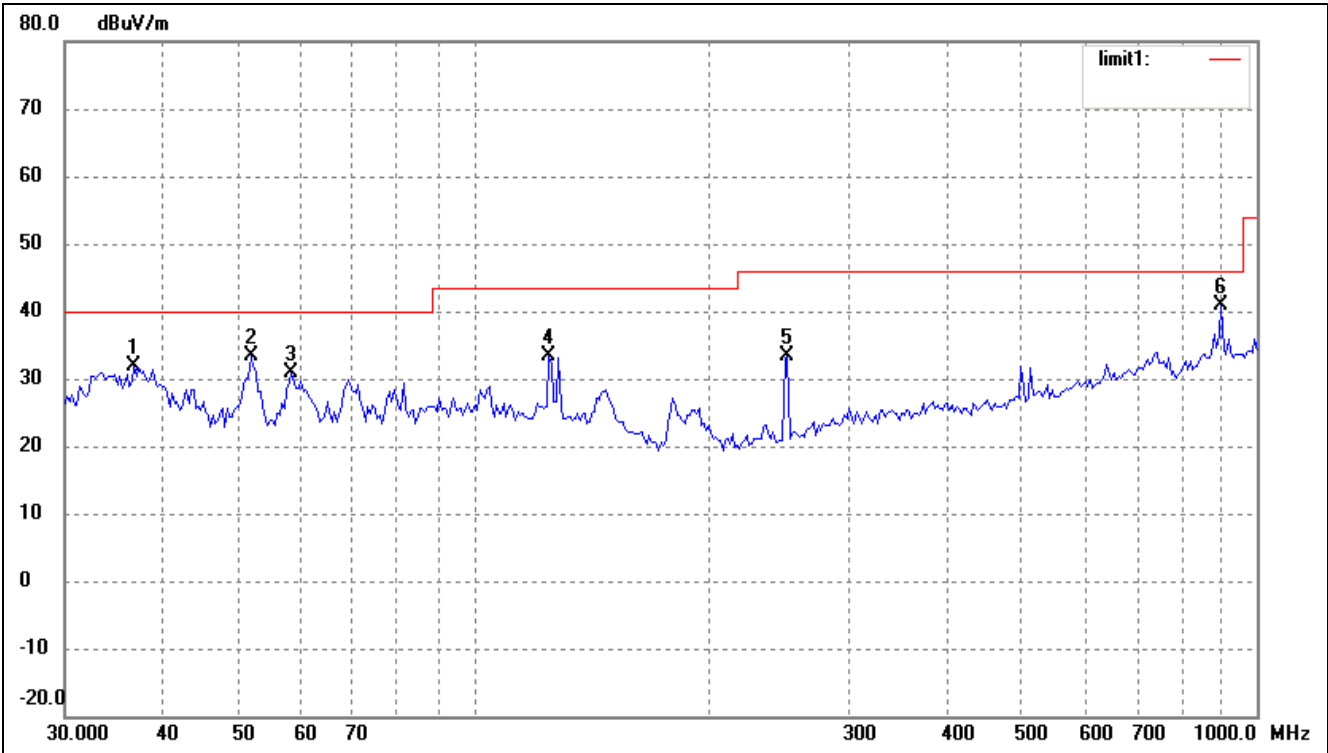


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	32.4059	24.36	8.44	32.80	40.00	-7.20	174	100	peak
2	57.9993	27.14	5.87	33.01	40.00	-6.99	160	100	peak
3	69.1141	31.09	2.80	33.89	40.00	-6.11	320	100	peak
4	124.5690	29.49	4.53	34.02	43.50	-9.48	360	100	peak
5	642.8613	20.82	15.14	35.96	46.00	-10.04	152	100	peak
6	900.1474	23.67	19.38	43.05	46.00	-2.95	37	100	peak

Plot of Radiated Emissions Test Data (30MHz to 1GHz)EUT: *The Leitz Icon Printer*Tested Model: *70010000*Operating Condition: *802.11g Transmitting Low Channel-2412MHz*Comment: *AC 120V/60Hz; adapter DC 24V*Test Specification: *Horizontal*

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	124.5690	34.29	4.53	38.82	43.50	-4.68	177	100	peak
2	176.8878	27.59	3.73	31.32	43.50	-12.18	90	100	peak
3	251.1804	28.84	7.34	36.18	46.00	-9.82	336	100	peak
4	499.4247	24.34	12.18	36.52	46.00	-9.48	360	100	peak
5	900.1474	20.57	19.38	39.95	46.00	-6.05	244	100	peak

Test Specification: Vertical

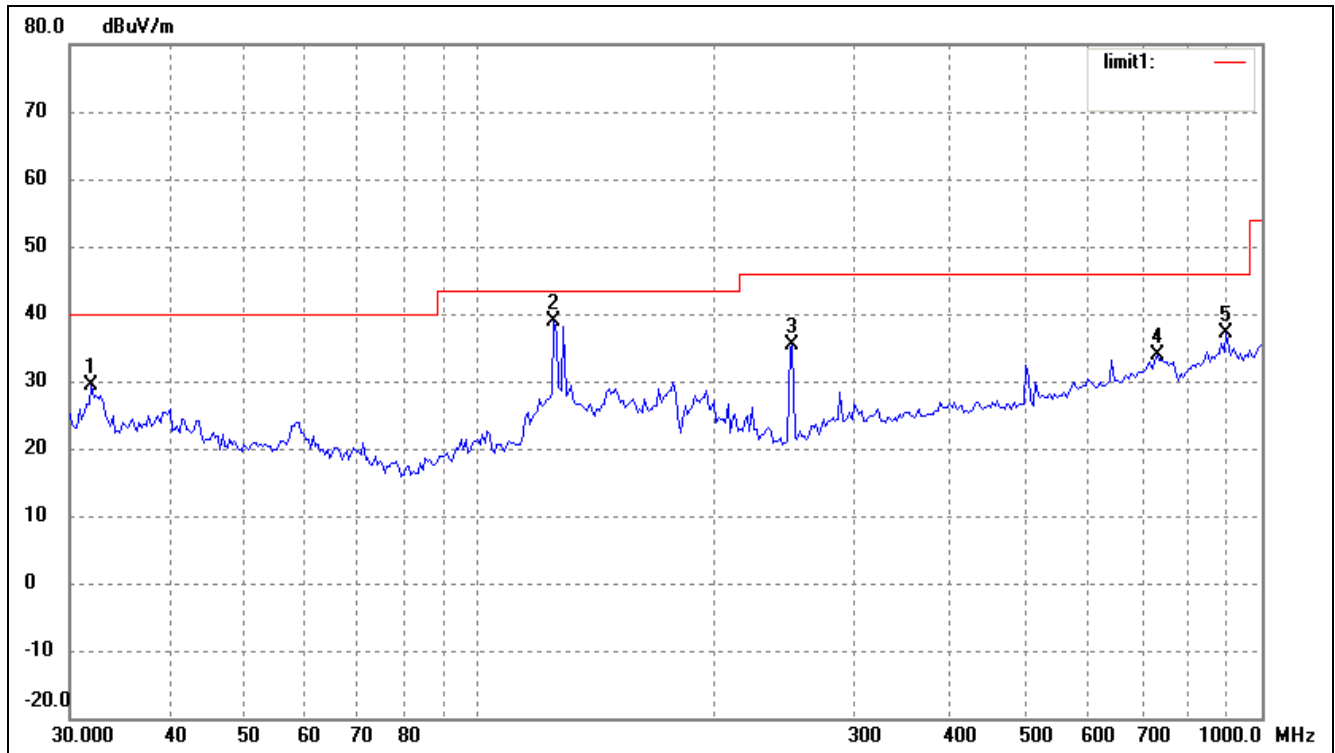


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	36.7662	22.64	9.16	31.80	40.00	-8.20	270	100	peak
2	51.8430	27.03	6.45	33.48	40.00	-6.52	164	100	peak
3	58.4074	25.01	5.83	30.84	40.00	-9.16	228	200	peak
4	124.5690	28.97	4.53	33.50	43.50	-10.00	130	200	peak
5	251.1804	25.94	7.34	33.28	46.00	-12.72	360	100	peak
6	900.1474	21.53	19.38	40.91	46.00	-5.09	143	100	peak

Operating Condition: 802.11g Transmitting Middle Channel-2437MHz

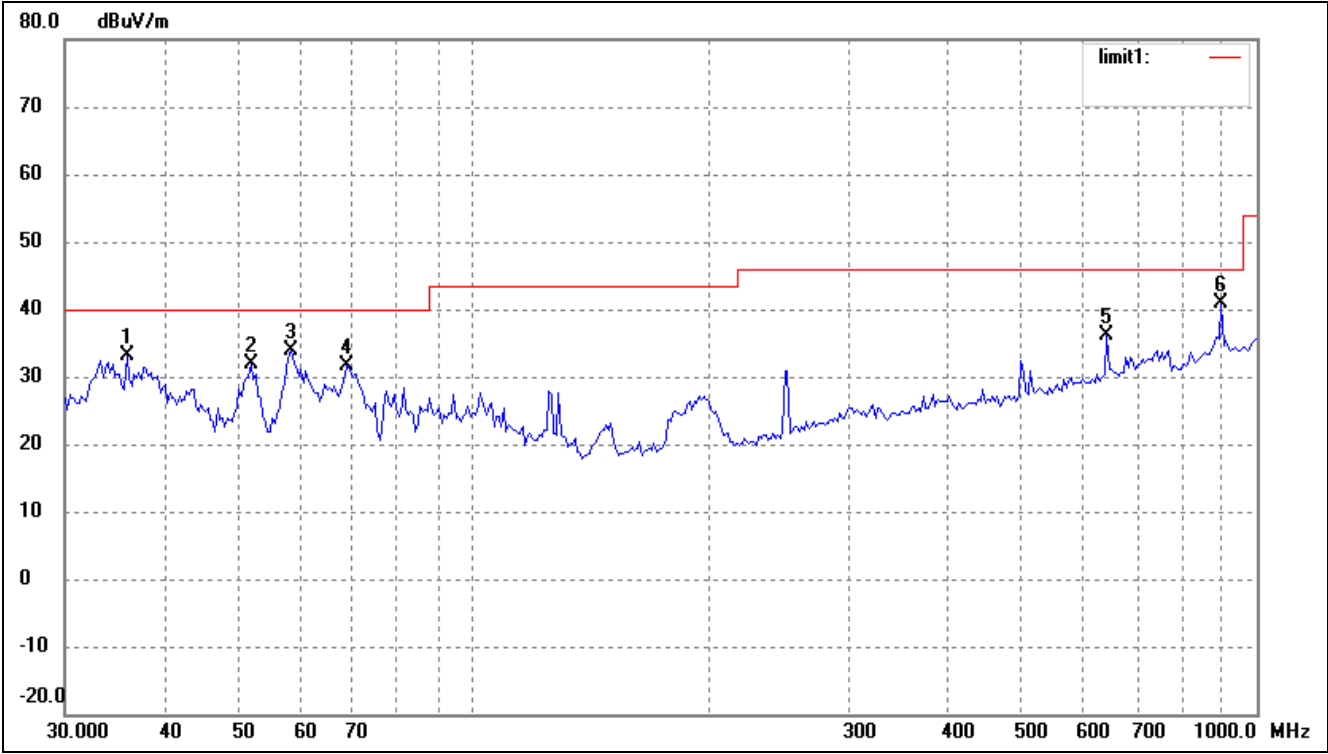
Comment: AC 120V/60Hz; adapter DC 24V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	31.9546	20.93	8.37	29.30	40.00	-10.70	360	100	peak
2	124.5690	34.27	4.53	38.80	43.50	-4.70	255	100	peak
3	251.1804	27.97	7.34	35.31	46.00	-10.69	270	100	peak
4	734.4913	16.10	17.68	33.78	46.00	-12.22	180	100	peak
5	900.1474	17.67	19.38	37.05	46.00	-8.95	230	100	peak

Test Specification: Vertical

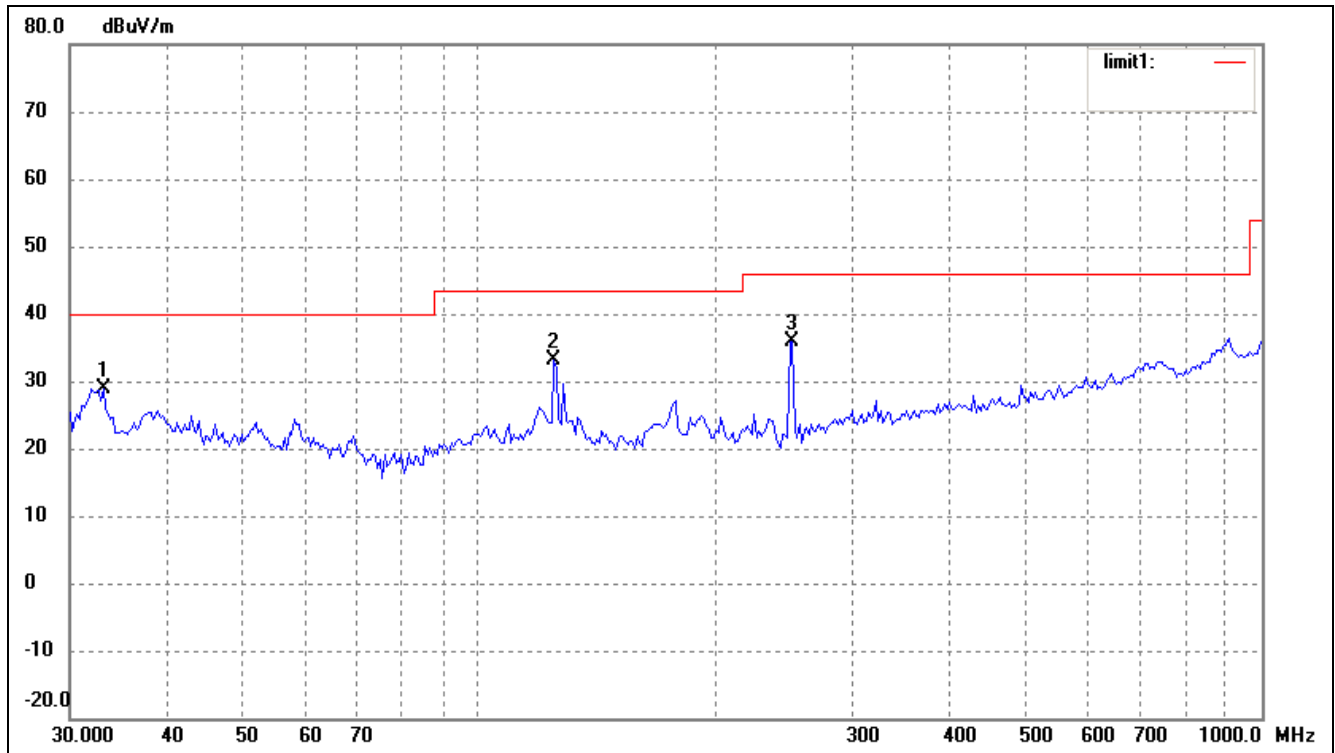


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	36.0007	24.04	9.04	33.08	40.00	-6.92	270	100	peak
2	51.8430	25.38	6.45	31.83	40.00	-8.17	51	200	peak
3	58.4074	27.98	5.83	33.81	40.00	-6.19	360	200	peak
4	68.6310	28.74	2.96	31.70	40.00	-8.30	360	100	peak
5	642.8613	20.98	15.14	36.12	46.00	-9.88	152	100	peak
6	900.1474	21.45	19.38	40.83	46.00	-5.17	314	100	peak

Operating Condition: 802.11g Transmitting High Channel-2462MHz

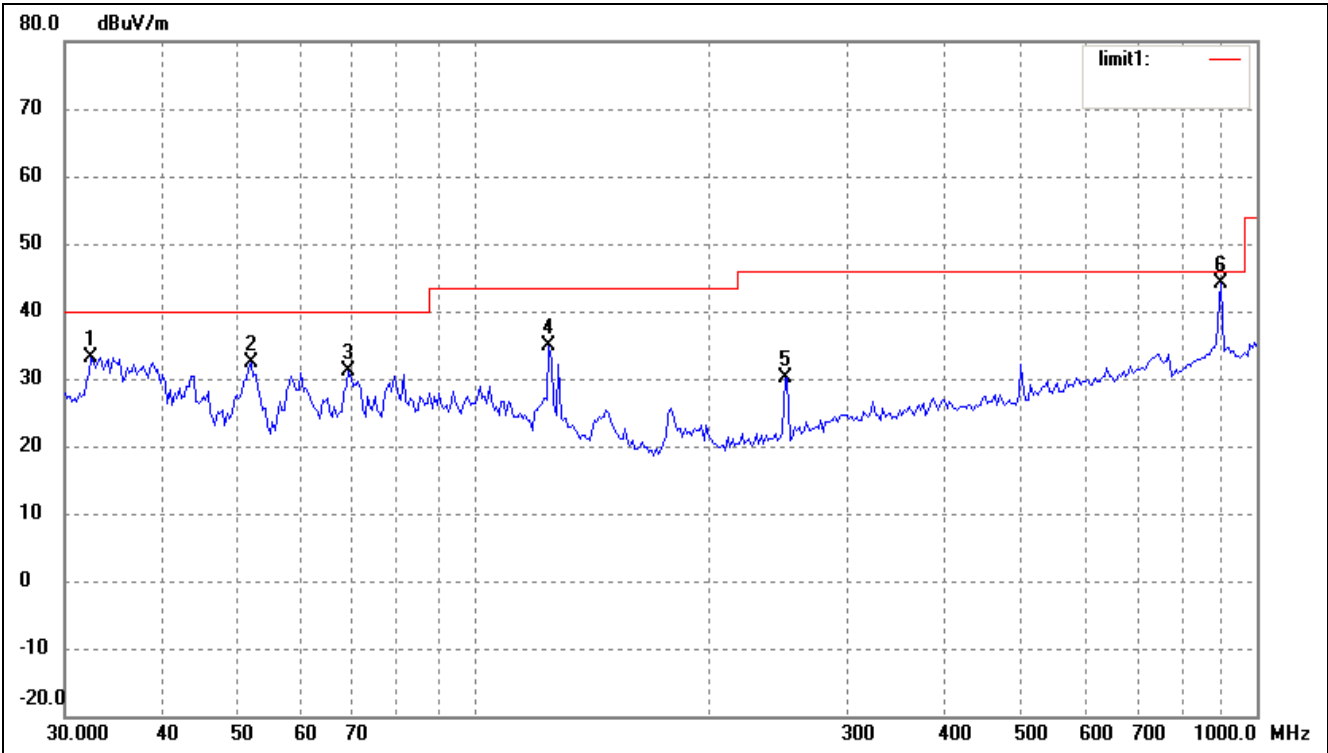
Comment: AC 120V/60Hz; adapter DC 24V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.0950	20.31	8.56	28.87	40.00	-11.13	360	100	peak
2	124.5690	28.48	4.53	33.01	43.50	-10.49	180	100	peak
3	251.1804	28.48	7.34	35.82	46.00	-10.18	225	100	peak

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	32.4059	24.76	8.44	33.20	40.00	-6.80	260	100	peak
2	51.8430	25.83	6.45	32.28	40.00	-7.72	131	200	peak
3	69.1141	28.37	2.80	31.17	40.00	-8.83	285	200	peak
4	124.5690	30.28	4.53	34.81	43.50	-8.69	224	100	peak
5	249.4250	22.95	7.27	30.22	46.00	-15.78	177	100	peak
6	900.1474	24.82	19.38	44.20	46.00	-1.80	82	100	peak

*Spurious Emissions Above 1GHz**Test Mode: 802.11b*

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824.000	50.63	0.57	51.20	74.00	-21.80	H	PK
4824.000	35.80	0.57	36.37	54.00	-17.63	H	AV
7236.000	41.69	3.69	45.38	74.00	-28.62	H	PK
7236.000	30.76	3.69	34.45	54.00	-19.55	H	AV
4824.000	52.45	0.57	53.02	74.00	-20.98	V	PK
4824.000	37.30	0.57	37.87	54.00	-16.13	V	AV
7236.000	41.86	3.69	45.55	74.00	-28.45	V	PK
7236.000	30.75	3.69	34.44	54.00	-19.56	V	AV
Middle Channel-2437MHz							
4874.000	51.18	0.64	51.82	74.00	-22.18	H	PK
4874.000	41.02	0.64	41.66	54.00	-12.34	H	AV
7311.000	42.88	3.75	46.63	74.00	-27.37	H	PK
7311.000	31.48	3.75	35.23	54.00	-18.77	H	AV
4874.000	48.16	0.64	48.80	74.00	-25.20	V	PK
4874.000	36.70	0.64	37.34	54.00	-16.66	V	AV
7311.000	42.50	3.75	46.25	74.00	-27.75	V	PK
7311.000	31.37	3.75	35.12	54.00	-18.88	V	AV
High Channel-2462MHz							
4924.000	52.19	0.72	52.91	74.00	-21.09	H	PK
4924.000	38.64	0.72	39.36	54.00	-14.64	H	AV
7386.000	44.28	3.81	48.09	74.00	-25.91	H	PK
7386.000	31.50	3.81	35.31	54.00	-18.69	H	AV
4924.000	48.76	0.72	49.48	74.00	-24.52	V	PK
4924.000	36.13	0.72	36.85	54.00	-17.15	V	AV
7386.000	43.13	3.81	46.94	74.00	-27.06	V	PK
7386.000	31.33	3.81	35.14	54.00	-18.86	V	AV

Test Mode: 802.11g

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824.000	44.05	0.57	44.62	74.00	-29.38	H	PK
4824.000	32.53	0.57	33.10	54.00	-20.90	H	AV
7236.000	42.07	3.69	45.76	74.00	-28.24	H	PK
7236.000	30.98	3.69	34.67	54.00	-19.33	H	AV
4824.000	49.67	0.57	50.24	74.00	-23.76	V	PK
4824.000	36.05	0.57	36.62	54.00	-17.38	V	AV
7236.000	42.16	3.69	45.85	74.00	-28.15	V	PK
7236.000	31.08	3.69	34.77	54.00	-19.23	V	AV
Middle Channel-2437MHz							
4874.000	45.23	0.64	45.87	74.00	-28.13	H	PK
4874.000	34.02	0.64	34.66	54.00	-19.34	H	AV
7311.000	42.52	3.75	46.27	74.00	-27.73	H	PK
7311.000	31.55	3.75	35.30	54.00	-18.70	H	AV
4874.000	57.02	0.64	57.66	74.00	-16.34	V	PK
4874.000	42.33	0.64	42.97	54.00	-11.03	V	AV
7311.000	45.59	3.75	49.34	74.00	-24.66	V	PK
7311.000	31.31	3.75	35.06	54.00	-18.94	V	AV
High Channel-2462MHz							
4924.000	45.12	0.72	45.84	74.00	-28.16	H	PK
4924.000	33.29	0.72	34.01	54.00	-19.99	H	AV
7386.000	42.83	3.81	46.64	74.00	-27.36	H	PK
7386.000	31.53	3.81	35.34	54.00	-18.66	H	AV
4924.000	52.45	0.72	53.17	74.00	-20.83	V	PK
4924.000	40.15	0.72	40.87	54.00	-13.13	V	AV
7386.000	43.28	3.81	47.09	74.00	-26.91	V	PK
7386.000	31.47	3.81	35.28	54.00	-18.72	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz.

9. Out of Band Emissions

9.1 Standard Applicable

According to §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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).

9.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-05-07	2014-05-06
EMI Test Receiver	R&S	ESVB	825471/005	2013-05-07	2014-05-06
Pre-amplifier	Agilent	8447F	3113A06717	2013-05-07	2014-05-06
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-05-07	2014-05-06
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-04-20	2014-04-19
Horn Antenna	ETS	3117	00086197	2013-04-20	2014-04-19

9.3 Test Procedure

According to the KDB 558074, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)

RBW = 1MHz, VBW = 1MHz for peak value measured

RBW = 1MHz, VBW = 10Hz for average value measured

Sweep = auto; Detector function = peak/average; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074 D01 V03, the conducted spurious emissions test method as follows:

1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW $\geq$ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

9.4 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.5 Summary of Test Results/Plots

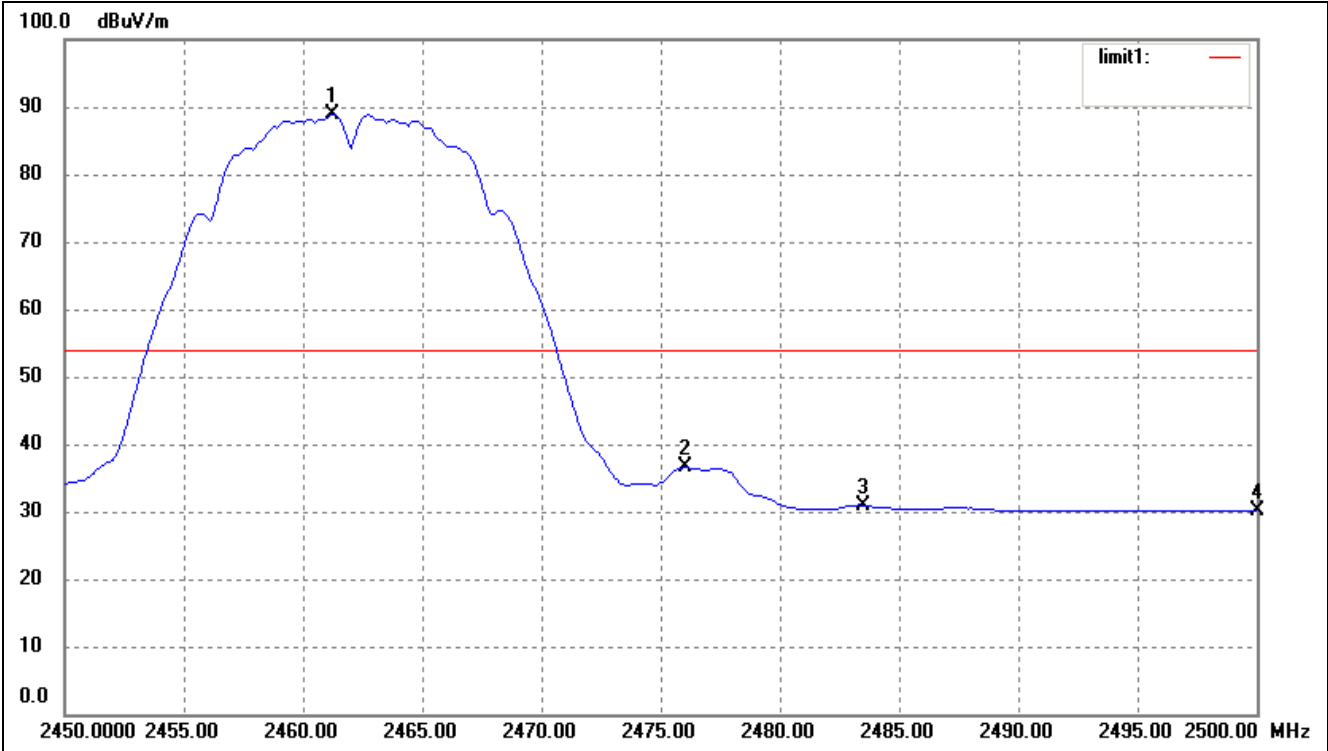
Please refer to the test plots as below.

802.11b-Lowest Bandedge
Horizontal (Worst case)



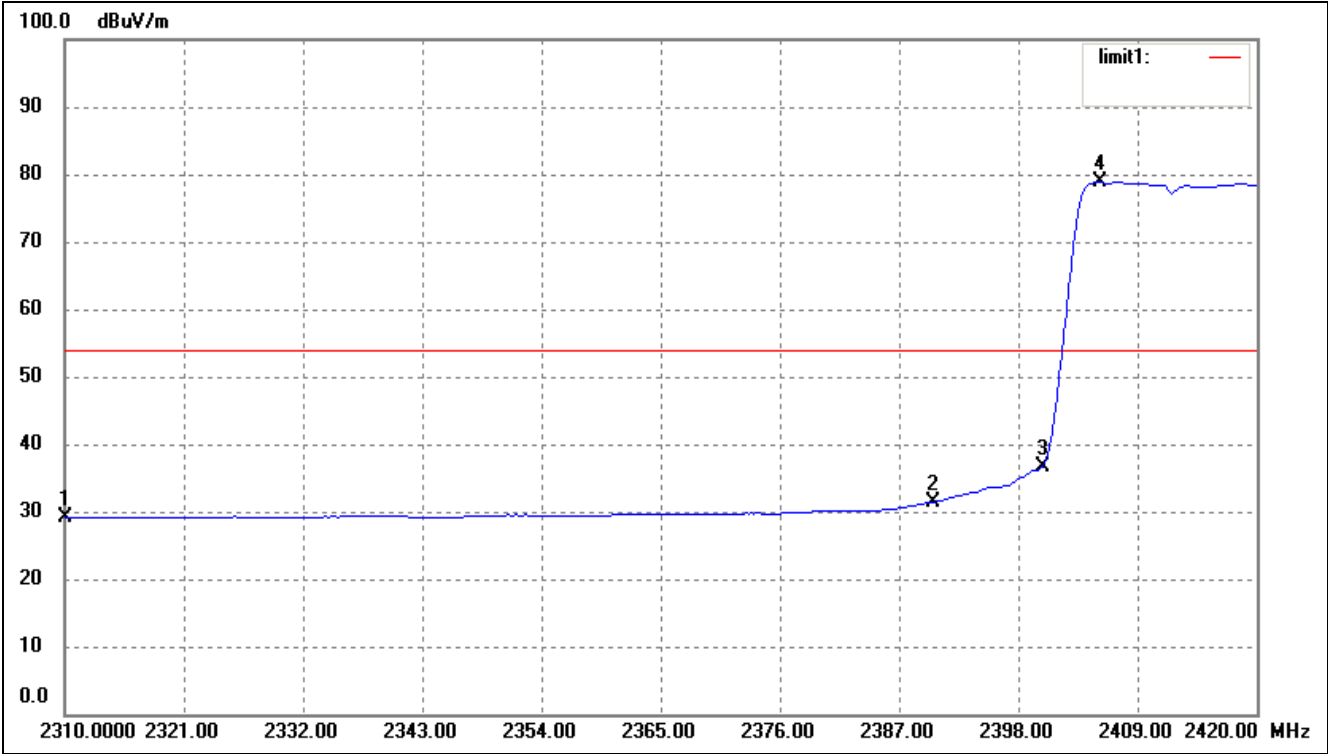
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	33.01	-3.71	29.30	54.00	-24.70	Average Detector
	2310.000	45.66	-3.71	41.95	74.00	-32.05	Peak Detector
2	2390.000	34.50	-3.54	30.96	54.00	-23.04	Average Detector
	2390.000	47.16	-3.54	43.62	74.00	-30.38	Peak Detector
3	2400.000	36.58	-3.51	33.07	Delta=54.22		Average Detector
4	2411.420	90.77	-3.48	87.29			Average Detector

802.11b-Highest Bandedge
Horizontal (Worst case)



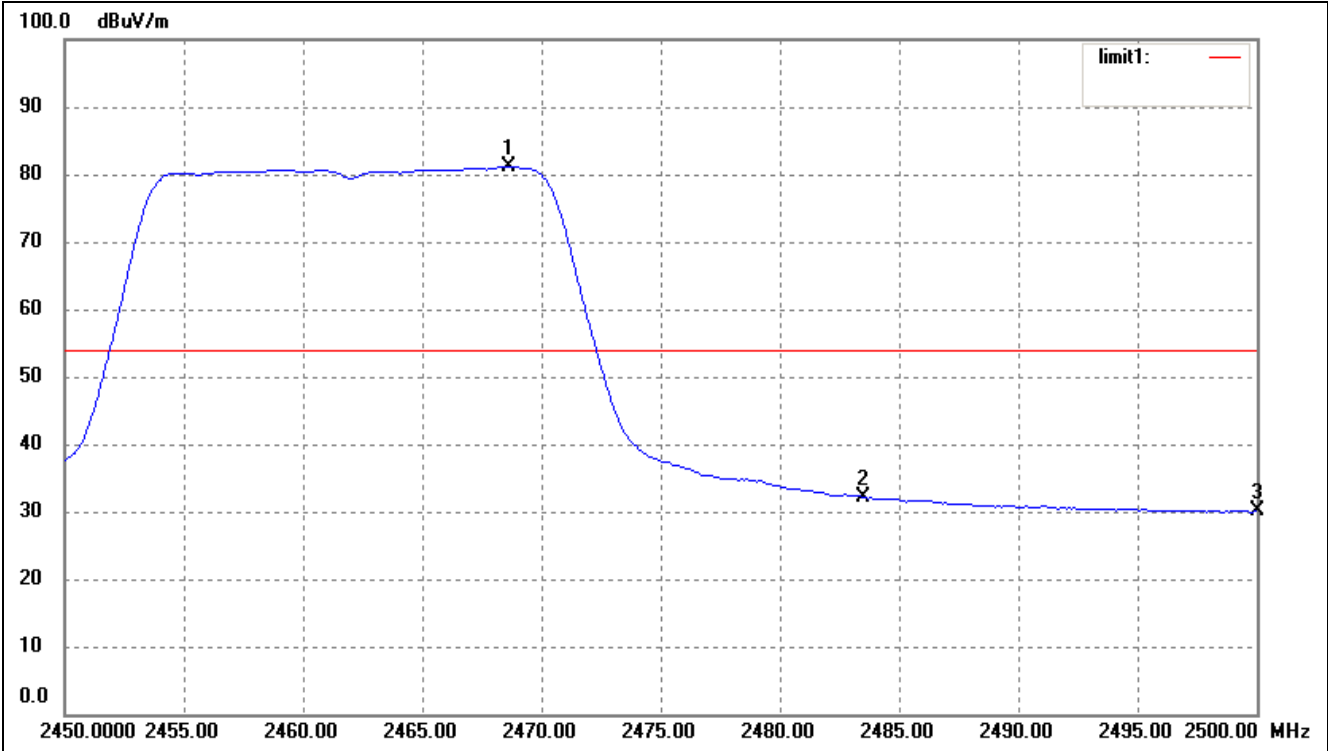
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2461.200	92.17	-3.37	88.80	/	/	Average Detector
	2461.200	96.90	-3.37	93.53	/	/	Peak Detector
2	2476.000	39.86	-3.34	36.52	54.00	-17.48	Average Detector
	2476.000	50.92	-3.34	47.58	74.00	-26.42	Peak Detector
3	2483.500	Delta=39.05		30.98	54.00	-23.02	Average Detector
	2483.500			43.44	74.00	-30.56	Peak Detector
4	2500.000	33.29	-3.28	30.01	54.00	-23.99	Average Detector
	2500.000	46.95	-3.28	43.67	74.00	-30.33	Peak Detector

802.11g-Lowest Bandedge
Horizontal (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	32.73	-3.71	29.02	54.00	-24.98	Average Detector
	2310.000	46.01	-3.71	42.30	74.00	-31.70	Peak Detector
2	2390.000	34.94	-3.54	31.40	54.00	-22.60	Average Detector
	2390.000	48.92	-3.54	45.38	74.00	-28.62	Peak Detector
3	2400.000	40.12	-3.51	36.61	Delta=42.23		Average Detector
4	2405.480	82.34	-3.50	78.84			Average Detector

802.11g-Highest Bandedge
Horizontal (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2468.600	84.46	-3.35	81.11	/	/	Average Detector
	2468.600	80.76	-3.35	77.41	/	/	Peak Detector
2	2483.500	Delta=42.29		32.14	54.00	-21.86	Average Detector
	2483.500			45.47	74.00	-28.53	Peak Detector
3	2500.000	33.29	-3.28	30.01	54.00	-23.99	Average Detector
	2500.000	46.48	-3.28	43.20	74.00	-30.80	Peak Detector

10. Conducted Emissions

10.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

10.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2013-05-07	2014-05-06
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2013-05-07	2014-05-06
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2013-05-07	2014-05-06

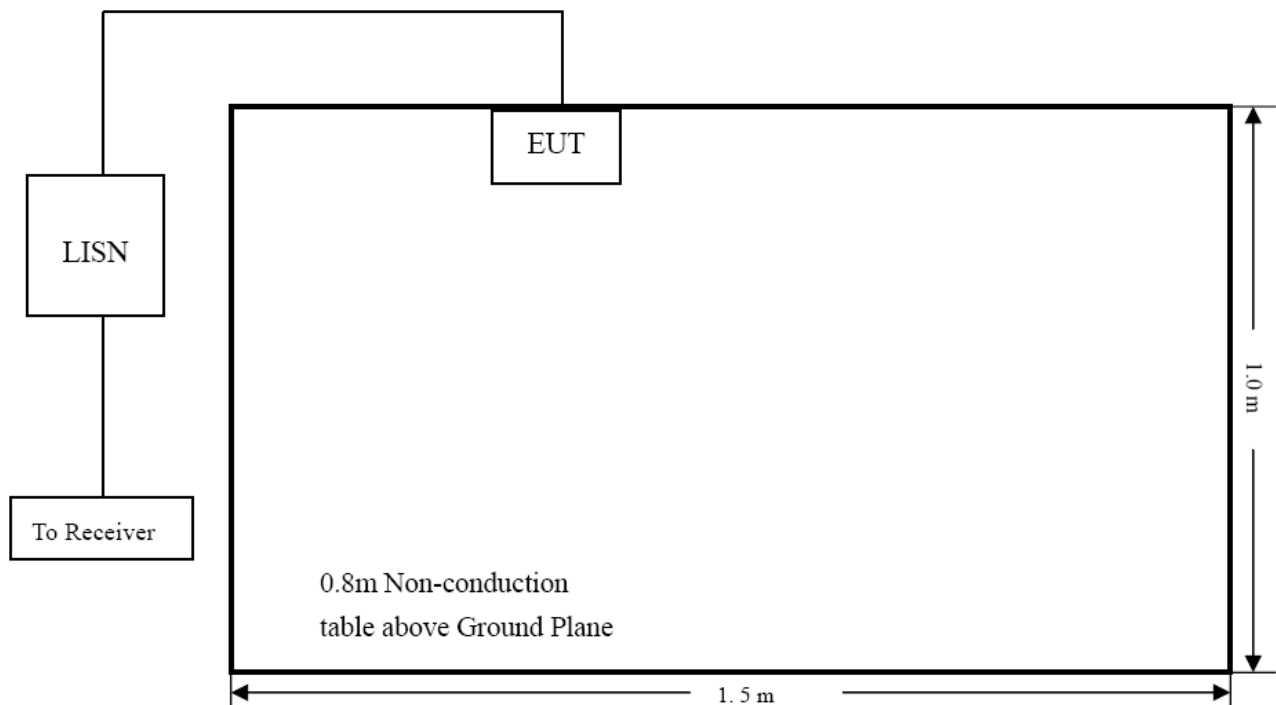
10.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

10.4 Basic Test Setup Block Diagram



10.5 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

10.6 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency 150 kHz
Stop Frequency..... 30 MHz
Sweep Speed Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth 9 kHz
Quasi-Peak Adapter Mode Normal

10.7 Summary of Test Results/Plots

According to the data in section 9.8, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

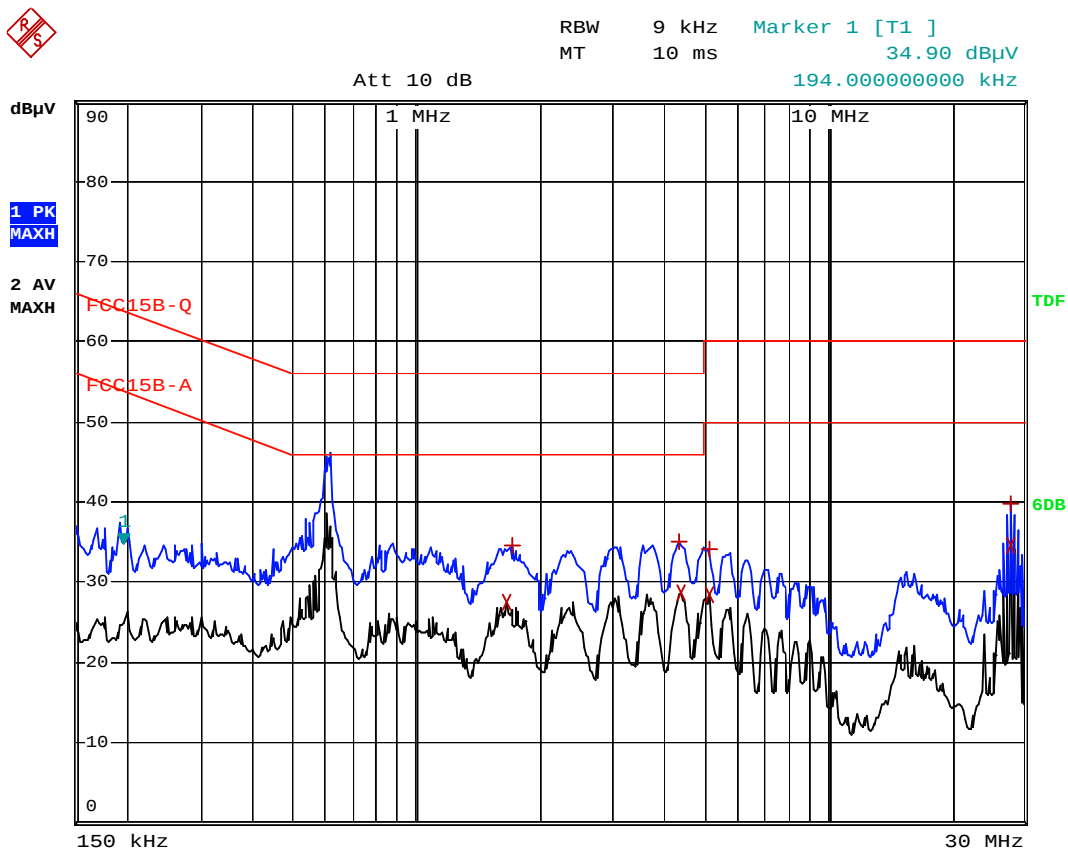
-10.47 dB at 0.614 MHz in the Line mode, Peak detector, 0.15-30MHz

10.8 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

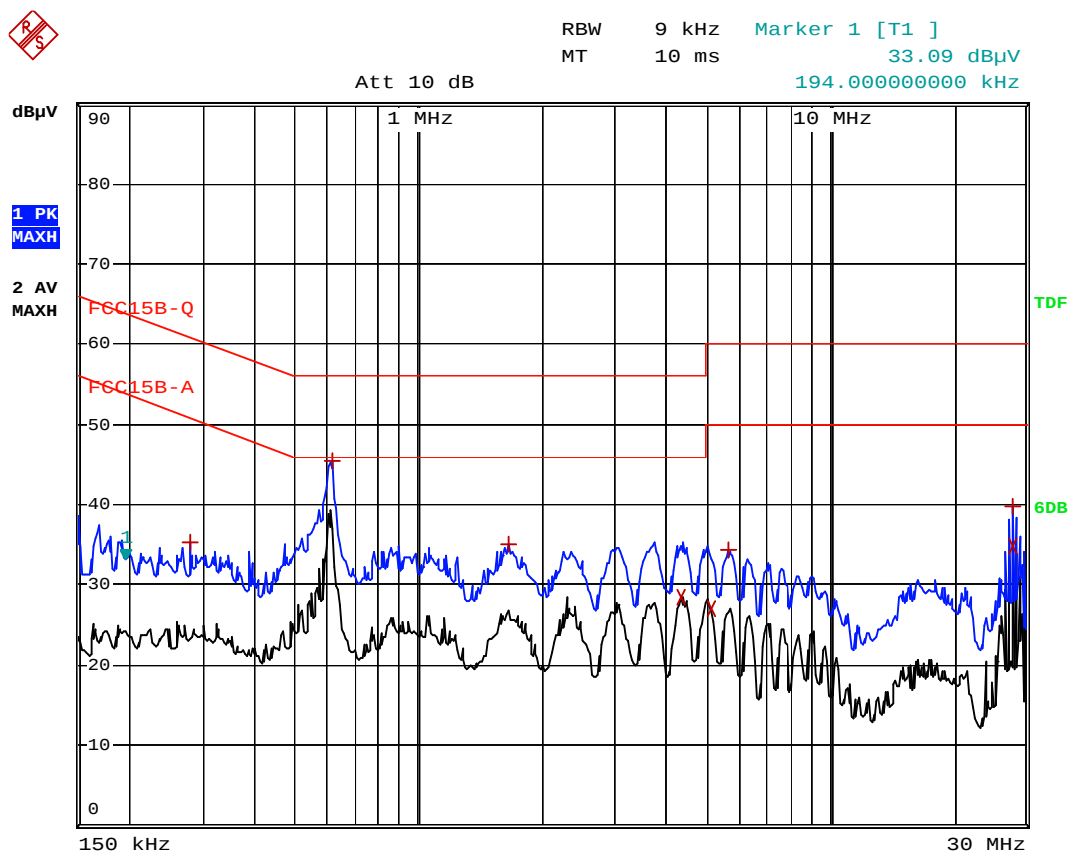
EUT: The Leitz Icon Printer
Tested Model: 70010000
Operating Condition: Transmitting(Wi-Fi)
Comment: AC 120V/60Hz; adapter DC 24V

Test Specification: Neutral



EDIT PEAK LIST (Prescan Results)			
Trace1:	FCC15B-Q		
Trace2:	FCC15B-A		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	1.666 MHz	27.56	-18.43
1 Max Peak	1.714 MHz	34.63	-21.36
1 Max Peak	4.342 MHz	35.13	-20.86
2 Average	4.418 MHz	28.61	-17.38
1 Max Peak	5.134 MHz	34.08	-25.91
2 Average	5.142 MHz	28.51	-21.48
1 Max Peak	27.766 MHz	39.70	-20.29
2 Average	27.766 MHz	34.67	-15.32

Test Specification:	Line
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EDIT PEAK LIST (Prescan Results)			
Trace1:		FCC15B-Q	
Trace2:		FCC15B-A	
Trace3:		---	
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Max Peak	278 kHz	35.35	-25.52
1 Max Peak	614 kHz	45.52	-10.47
1 Max Peak	1.654 MHz	35.11	-20.88
2 Average	4.35 MHz	28.52	-17.48
2 Average	5.138 MHz	27.16	-22.83
1 Max Peak	5.666 MHz	34.35	-25.64
2 Average	27.762 MHz	34.93	-15.06
1 Max Peak	27.774 MHz	39.76	-20.24

***** END OF REPORT *****