FCC TEST REPORT

Test report No.:	EMC- FCC- R0125
FCC ID:	A3LSWL-B70F
Type of equipment:	WiFi Full Module
Model Name:	SWL-B70F
Applicant:	Samsung Electronics Co.,Ltd.
Max.RF Output Power:	24.89 dBm
FCC Rule Part(s):	FCC Part 15 Subpart C 15.247
Frequency Range:	2 412 MHz ~ 2 462 MHz
Test result:	Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: May 29, 2013 ~ June 14, 2013

Issued date: December 05, 2013

Tested by: SON, MIN GI

Approved by: YU, SANG HOON

[Contents]

1. Client information

Applicant:	Samsung Electronics Co.,Ltd.
Address:	(Maetan-dong), 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea
Telephone number:	+82-62-950-6474
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Contact person:	Kang Hee Jun / heejun.kang@samsung.com

Manufacturer :	Samsung Electro-Mechanics Co., Ltd.
Address:	314, Maetan3-Dong, Yeongtong-Gu, Suwon-si, Gyunggi-Do 443-743, Korea

2. Laboratory information

Address

EMC compliance Ltd.
65, Sinwon-ro, Yeongtong-gu, Suwon-siy, Gyeonggi-do, 443-390, Korea
Telephone Number: 82-31-336-9919 Facsimile Number: 82-505-299-8311

Certificate

CBTL Testing Laboratory, KOLAS NO.: 231
FCC Filing No.: 508785
VCCI Registration No.: R-3327, G-198, C-3706, T-1849
IC Recognition No.:8035A-2

SITE MAP

3. Description of E.U.T.

3.1 Basic description

Applicant :	Samsung Electronics Co.,Ltd.
Address of Applicant:	(Maetan-dong), 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea
Manufacturer:	Samsung Electro-Mechanics Co., Ltd.
Address of Manufacturer:	314, Maetan3-Dong, Yeongtong-Gu, Suwon-si, Gyunggi-Do 443-743, Korea
Type of equipment:	WiFi Full Module
Basic Model:	SWL-B70F
Serial number:	Proto Type

3.2 General description

Communication	802.11b/g/n_HT20
Frequency Range	2 412 ~ 2 462 MHz
Type of Modulation	Modulation technologies: DSSS, OFDM Modulation : 64QAM, 16QAM, QPSK, BPSK
Number of Channels	13 ch (802.11b/g/n_HT20)
Antenna Gain	3.39 dBi
Type of Antenna	Integral SMD Type Antenna
Firmware version	Dongle Host Driver, version 1.84
Power supply	DC 5 V
Dimension	70mm x 30mm x Max.12 mm (W x D x H)

3.3 Test frequency

For all teset items, the low, middle and high channels of the modes were tested with above worst case data rate.

-802.11b/g/n_HT20

	Frequency
Low frequency	2 412 MHz
Middle frequency	2 437 MHz
High frequency	2 462 MHz

3.4 Test Voltage

mode	Voltage
Norminal voltage	DC 5 V

4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Report Section	Test Result
15.203, 15.247(b)(4)	Antenna Requirement	5.1	C
15.247(b)(3)	Maximum Peak Output Power	5.2	C
15.247(e)	Peak Power Spectral Density	5.3	C
15.247(a)(2)	6 dB Channel Bandwidth	5.4	C
15.247(d), 15.205(a), 15.209(a)	Spurious Emission, Band Edge, and Restricted bands	5.5	C
15.207(a)	Conducted Emissions	5.6	C
15.247(i), 1.1307(b)(1)	RF Exposure	5.7	C
RSS-Gen, Issue 3,6	Receiver Spurious Emission (Radiated)	5.8	NA

Note: C = complies
NC = Not complies
NT = Not tested
NA = Not Applicable

4.2 Uncertainty

Measurement Item	Combined Standard Uncertainty Uc	Expanded Uncertainty U = KUc (K = 2)
Conducted RF power	± 0.29 dB	± 0.58 dB
Radiated disturbance	30 ㎒ ~ 300 ㎒ : + 2.43 dB, - 2.44 dB 300 ㎒~1 000 ㎒ : + 2.49dB, - 2.50 dB 1 ㎓ ~ 6 ㎓ : + 3.10 dB, - 3.10 dB 6 ㎓ ~ 18 ㎓ : + 3.21 dB, - 3.27 dB	30 ㎒ ~ 300 ㎒ : + 4.86 dB, - 4.88 dB 300 ㎒ ~ 1 000 ㎒ + 4.98dB, - 4.99 dB 1 ㎓ ~ 6 ㎓ : + 6.19 dB, - 6.20 dB 6 ㎓ ~ 18 ㎓ : + 6.41 dB, - 6.53 dB

5. Test results

5.1 Antenna Requirement

5.1.1 Regulation

According to §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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.1.2 Result

-Complied

The transmitter has an integral SMD Type Antenna. The directional peak gain of the antenna is 3.39 dBi.

5.2 Maximum Peak Output Power

5.2.1 Regulation

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. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b)(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2.2 Measurement Procedure

These test measurement settings are specified in section 9 of 558074 D01 DTS Meas Guidance.

5.2.2.1 PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter.

The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

5.2.3 Test Result

-Complied

- 802.11b mode

Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	16.96	30.00	13.04
Middle	2 437	17.05	30.00	12.95
High	2 462	17.02	30.00	12.98

- 802.11g mode

Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	24.85	30.00	5.15
Middle	2 437	24.89	30.00	5.11
High	2 462	24.78	30.00	5.22

- 802.11n mode(20 MHz BW)

Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)
Low	2 412	24.42	30.00	5.58
Middle	2 437	24.43	30.00	5.57
High	2 462	24.46	30.00	5.54

-NOTE:

1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT} = 3.39 dBi), does not exceed 6.0 dBi, there was no need to reduce the output power.

5.3 Peak Power Spectral Density

5.3.1 Regulation

According to §15.247(e), 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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.3.2 Measurement Procedure

These test measurement settings are specified in section 10 of 558074 D01 DTS Meas Guidance.

5.3.2.1 Method PKPSD (peak PSD)

Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to : 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple..
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3.3 Test Result

-Complied

- 802.11b mode

Channel	Result [dBm]	Limit [dBm]	Margin [dBm]
Low	-8.22	8.00	16.22
Middle	-7.41	8.00	15.41
High	-7.83	8.00	15.83

- 802.11g mode

Channel	Result [dBm]	Limit [dBm]	Margin [dBm]
Low	-10.65	8.00	18.65
Middle	-10.89	8.00	18.89
High	-10.01	8.00	18.01

- 802.11n mode(20 MHz BW)

Channel	Result [dBm]	Limit [dBm]	Margin [dBm]
Low	-11.16	8.00	19.16
Middle	-11.08	8.00	19.08
High	-12.00	8.00	20.00

-NOTE:

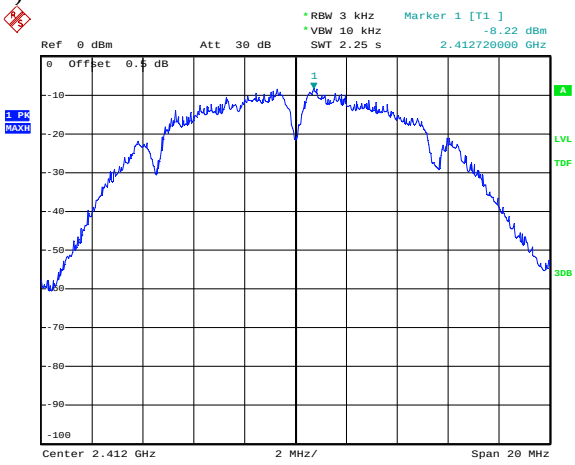
1. Since the directional gain of the integral antenna declared by the manufacturer (G_{ANT} = 3.39 dBi), does not exceed 6.0 dBi, there was no need to reduce the output power.
2. We took the insertion loss of the cable loss into consideration within the measuring instrument.

5.3.4 Test Plot

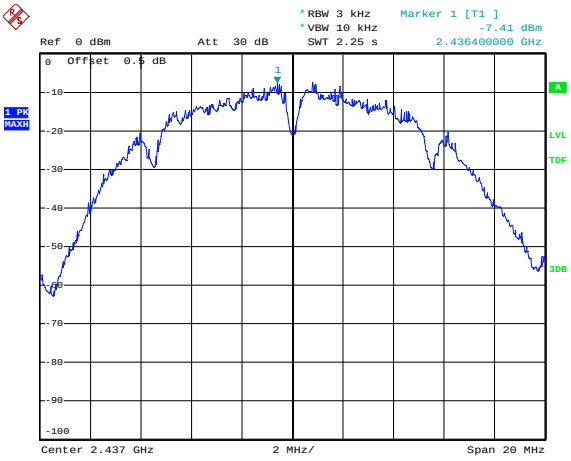
Figure 1. Plot of the Power Density (Conducted)

- 802.11b mode

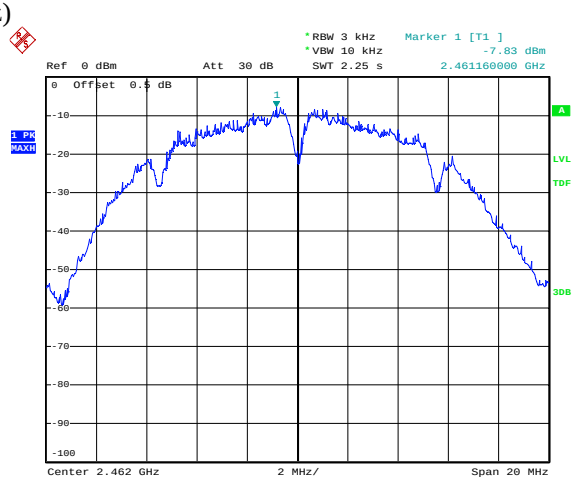
- Lowest Channel(2 412 MHz)



- Middle Chnnel (2 437 MHz)

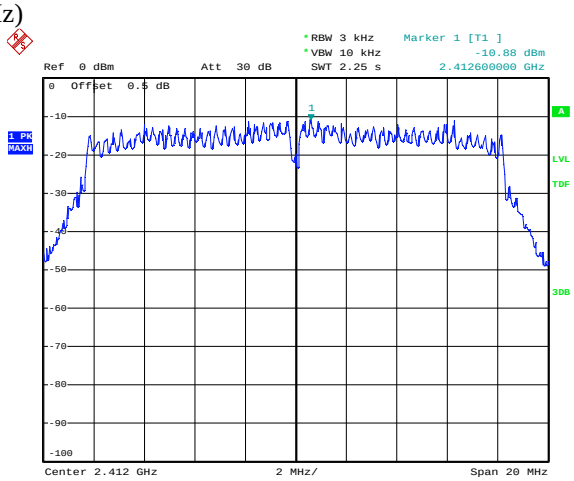


- Highest Chnnel (2 462 MHz)

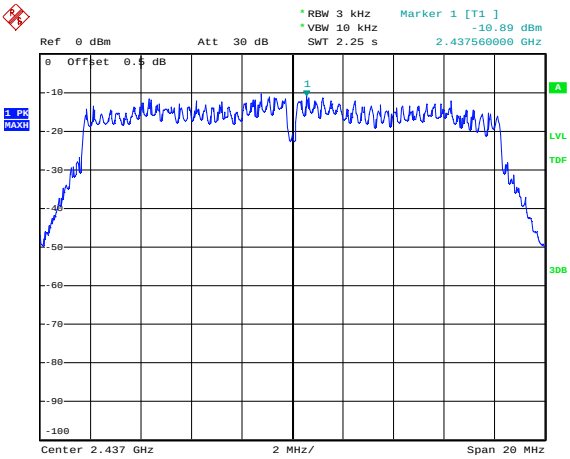


- 802.11g mode

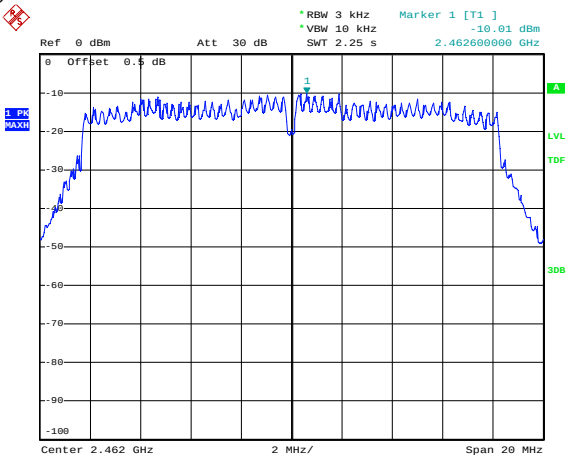
- Lowest Channel(2 412 MHz)



- Middle Chnnel (2 437 MHz)

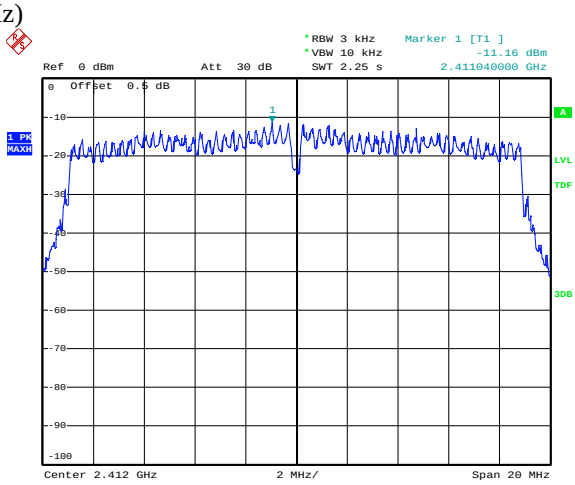


- Highest Chnnel (2 462 MHz)

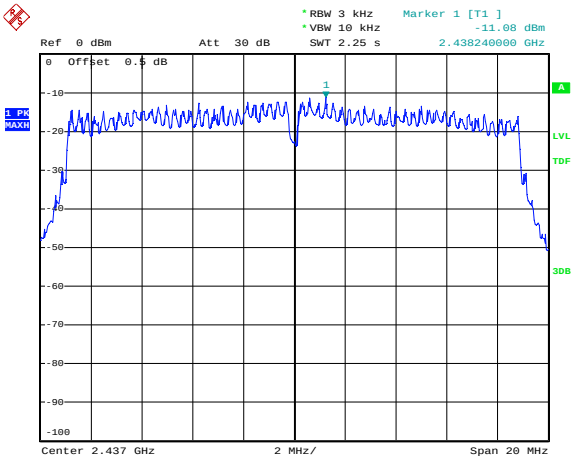


- 802.11n mode(20 MHz BW)

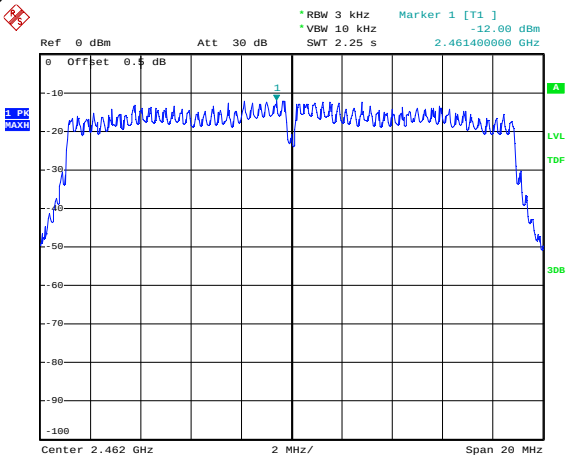
- Lowest Channel(2 412 MHz)



- Middle Chnnel (2 437 MHz)



- Highest Chnnel (2 462 MHz)



5.4 6 dB Bandwidth(DTS Bandwidth)

5.4.1 Regulation

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.

5.4.2 Measurement Procedure

These test measurement settings are specified in section 8.0 of 558074 D01 DTS Meas Guidance.

5.4.2.1 DTS Bandwidth Measurement Procedure -Option 1

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.4.2.2 DTS Bandwidth Measurement Procedure-Option 2

The automatic bandwidth measurement capability of a spectrum analyzer may be employed using the X dB bandwidth mode with X set to 6 dB, if it implements the functionality described above. When using this capability, care should be taken to ensure that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that may be ≥ 6 dB.

5.4.3 Test Result

-Complied

- 802.11b mode

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)
Low	2 412	7.44	500
Middle	2 437	7.72	500
High	2 462	7.88	500

- 802.11g mode

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)
Low	2 412	15.16	500
Middle	2 437	15.52	500
High	2 462	15.20	500

- 802.11n mode(20 MHz BW)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (kHz)
Low	2 412	16.00	500
Middle	2 437	16.08	500
High	2 462	16.00	500

-NOTE:

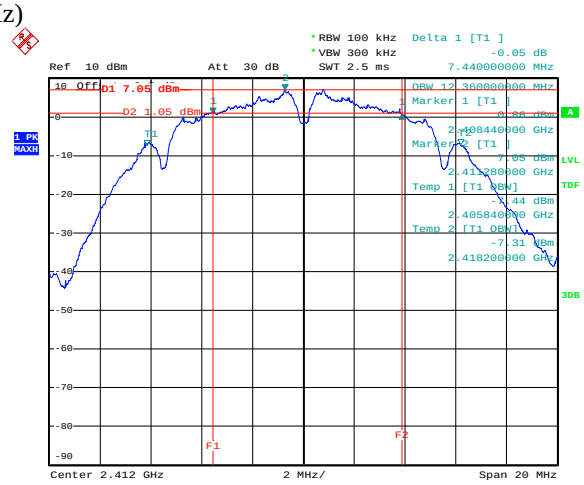
1. We took the insertion loss of the cable loss into consideration within the measuring instrument.

5.4.4 Test Plot

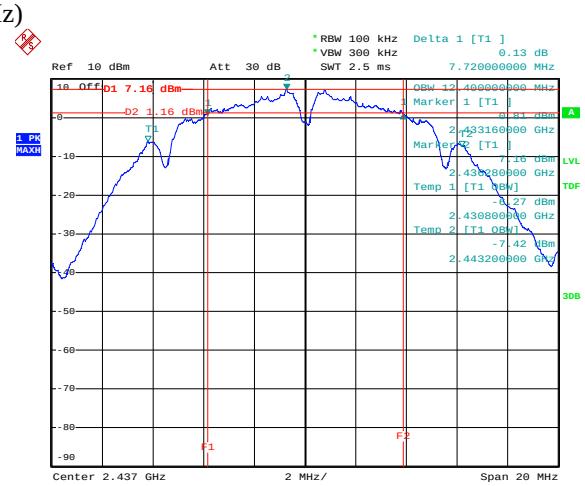
Figure 2. Plot of the 6dB Bandwidth (Conducted)

802.11b mode

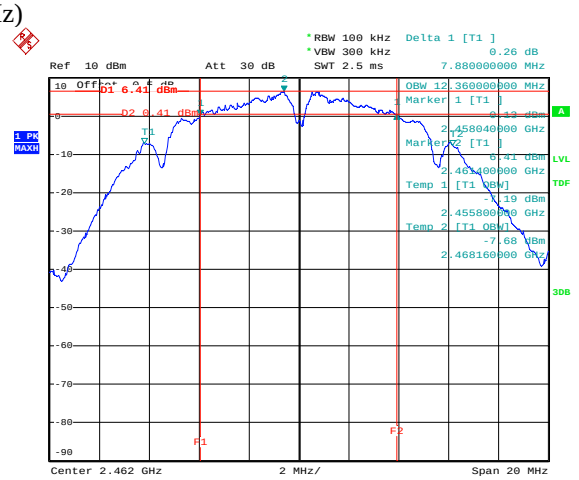
- Lowest Channel (2 412 MHz)



- Middle Channel (2 437 MHz)

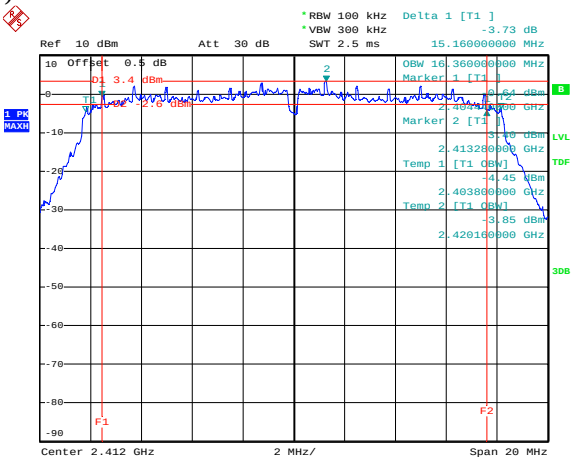


- Highest Channel (2 462 MHz)

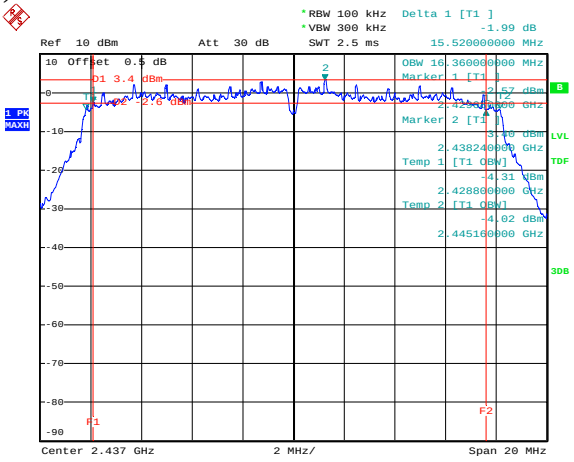


802.11g mode

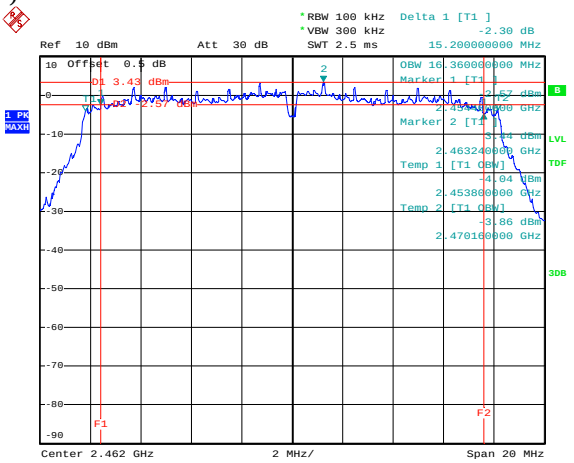
- Lowest Channel (2 412 MHz)



- Middle Channel (2 437 MHz)

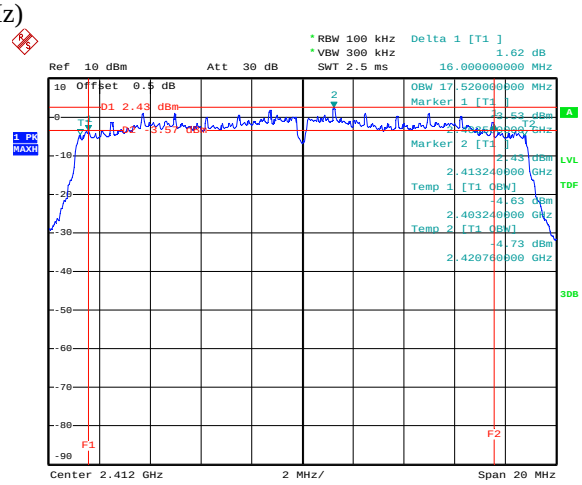


- Highest Channel (2 462 MHz)

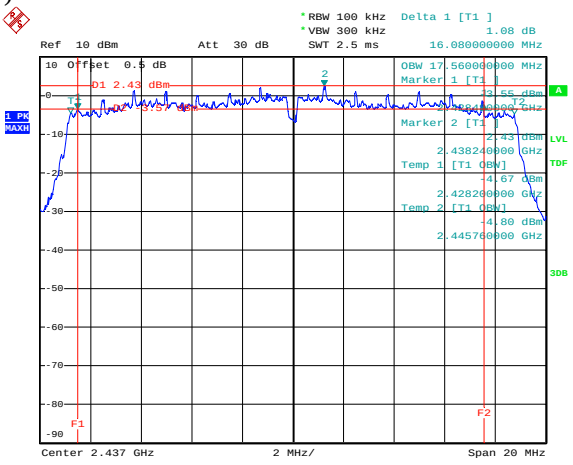


802.11n mode(20 MHz BW)

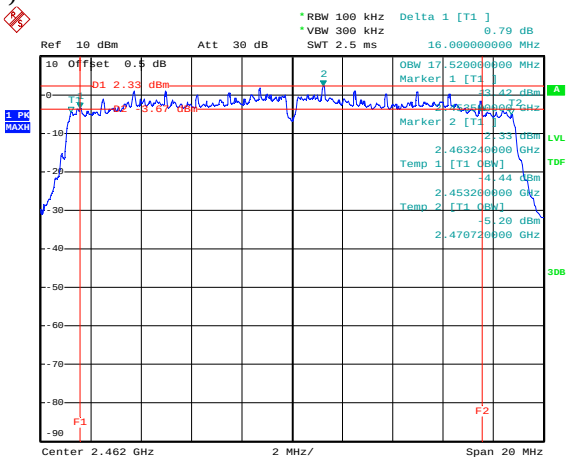
- Lowest Channel (2 412 MHz)



- Middle Channel (2 437 MHz)



- Highest Channel (2 462 MHz)



5.5 SPURIOUS EMISSION, BAND EDGE, AND RESTRICTED BANDS

5.5.1 Regulation

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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

According to §15.209(a), for an intentional device, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Field strength (μV/m @ 3m)	Field strength (dBμV/m @ 3m)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

According to §15.109(a), for an unintentional device, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the above table.

** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 MHz are based on the average value of measured emissions.

5.5.2 Measurement Procedure

5.5.2.1 Band-edge Compliance of RF Conducted Emissions

5.5.2.1.1 Reference Level Measurement

Establish the reference level by using the peak PSD procedure from Section 9.1 to measure the PSD level in any 100 kHz bandwidth (*i.e.*, set RBW = 100 kHz and VBW ≥ 300 kHz) within the DTS channel bandwidth (the channel found to contain the maximum PSD level can be used to establish the reference level).

5.5.2.1.2 Unwanted Emissions Level Measurement

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 ≥ 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.

5.5.2.2 Conducted Spurious Emissions

Set the spectrum analyzer as follows:

1. Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
2. RBW = 100 kHz
3. VBW ≥ RBW
4. Sweep = auto
5. Detector function = peak
6. Trace = max hold
7. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
8. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

5.5.2.1 Radiated Spurious Emissions

1. The preliminary and final rdiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m anechoic chamber. The EUT was tested at a distance 3 meters.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360˚.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1000 MHz using the TRILOG broadband antenna, and from 1 000 MHz to 26 500 MHz using the horn antenna.
4. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

- Sample calculation

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

** The sample calculation is as follow:

Result = M.R + C.F(A.F + C.L +3 dB Att – A.G)
M.R = Meter Reading
C.F = Correction Factor
A.F = Antenna Factor
C.L = Cable Loss
A.G = Amplifier Gain
3 dB Att = 3 dB Attenuator

If M.R is 30 dB, A.F 12 dB, C.L 5 dB, 3 dB, A.G 35 dB
The result is : 30 + 12 + 5 + 3 – 35 = 15 dB(μV/m)

5.5.3 Test Result

-complied

1. Band-edge & Conducted Spurious Emissions was shown in figure 3.
   Note: We took the insertion loss of the cable into consideration within the measuring instrument.
2. Band edge compliance of Radiated Emissions(Restricted Bands) was shown in figure 4.
3. Measured value of the Field strength of spurious Emissions (Radiated)

- 802.11b mode

Low channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
85.29	120	V	32.2	-18.6	13.6	40.0	26.4
112.60	120	V	30.8	-16.5	14.3	43.5	29.2
200.01	120	V	43.2	-15.9	27.3	43.5	16.2
364.71	120	V	37.1	-10.0	27.1	46.0	18.9
529.40	120	V	36.9	-5.7	31.2	46.0	14.8
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11b mode

Middle channel (2 437 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
266.66	120	V	38.7	-13.1	25.6	46.0	20.4
364.71	120	V	36.7	-10.0	26.7	46.0	19.3
482.35	120	V	37.0	-7.0	30.0	46.0	16.0
529.40	120	V	35.8	-5.7	30.1	46.0	15.9
600.00	120	V	37.2	-4.2	33.0	46.0	13.0
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11b mode

High channel (2 462 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
152.95	120	V	37.2	-13.3	23.9	43.5	19.6
223.52	120	V	38.4	-15.2	23.2	46.0	22.8
364.77	120	V	37.8	-10.0	27.8	46.0	18.2
482.38	120	V	35.5	-7.0	28.5	46.0	17.5
600.00	120	V	37.2	-4.2	33.0	46.0	13.0
764.78	120	V	32.1	-1.5	30.6	46.0	15.4
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11g mode

Low channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
176.47	120	V	37.6	-14.1	23.5	43.5	20.0
223.52	120	V	38.7	-15.2	23.5	46.0	22.5
364.77	120	V	39.2	-10.0	29.2	46.0	16.8
482.38	120	V	37.2	-7.0	30.2	46.0	15.8
529.43	120	V	35.8	-5.7	30.1	46.0	15.9
600.00	120	V	36.6	-4.2	32.4	46.0	13.6
623.52	120	V	37.1	-3.9	33.2	46.0	12.8
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11g mode

Middle channel (2 437 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
176.47	120	V	38.20	-14.10	24.10	43.50	19.40
223.52	120	V	38.40	-15.20	23.20	46.00	22.80
364.77	120	V	38.50	-10.00	28.50	46.00	17.50
529.43	120	V	35.10	-5.70	29.40	46.00	16.60
533.43	120	V	34.20	-5.60	28.60	46.00	17.40
600.00	120	V	36.50	-4.20	32.30	46.00	13.70
623.52	120	V	36.60	-3.90	32.70	46.00	13.30
764.78	120	V	32.00	-1.50	30.50	46.00	15.50
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11g mode

High channel (2 462 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
176.47	120	V	37.2	-14.1	23.1	43.5	20.4
223.52	120	V	39.2	-15.2	24.0	46.0	22.0
364.77	120	V	37.4	-10.0	27.4	46.0	18.6
482.38	120	V	35.6	-7.0	28.6	46.0	17.4
529.43	120	V	36.8	-5.7	31.1	46.0	14.9
533.31	120	V	35.2	-5.6	29.6	46.0	16.4
600.00	120	V	36.6	-4.2	32.4	46.0	13.6
623.52	120	V	35.5	-3.9	31.6	46.0	14.4
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11n mode(20 MHz BW)

Low channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
176.47	120	V	38.5	-14.1	24.4	43.5	19.1
364.65	120	V	37.9	-10.0	27.9	46.0	18.1
482.38	120	V	35.6	-7.0	28.6	46.0	17.4
529.43	120	V	34.4	-5.7	28.7	46.0	17.3
552.95	120	V	36.2	-5.2	31.0	46.0	15.0
600.00	120	V	36.4	-4.2	32.2	46.0	13.8
623.52	120	V	36.1	-3.9	32.2	46.0	13.8
764.78	120	V	31.5	-1.5	30.0	46.0	16.0
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11n mode(20 MHz BW)

Middle channel (2 437 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
223.52	120	V	40.1	-15.2	24.9	46.0	21.1
364.77	120	V	38.5	-10.0	28.5	46.0	17.5
482.38	120	V	34.6	-7.0	27.6	46.0	18.4
529.43	120	V	35.1	-5.7	29.4	46.0	16.6
533.31	120	V	34.6	-5.6	29.0	46.0	17.0
600.00	120	V	34.3	-4.2	30.1	46.0	15.9
623.52	120	V	34.5	-3.9	30.6	46.0	15.4
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- 802.11n mode(20 MHz BW)

High channel (2 462 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
176.47	120	V	35.2	-14.1	21.1	43.5	22.4
223.52	120	V	40.3	-15.2	25.1	46.0	20.9
364.65	120	V	37.6	-10.0	27.6	46.0	18.4
533.31	120	V	34.1	-5.6	28.5	46.0	17.5
600.00	120	V	33.6	-4.2	29.4	46.0	16.6
623.52	120	V	39.2	-3.9	35.3	46.0	10.7
764.78	120	V	31.5	-1.5	30.0	46.0	16.0
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-

- With Host Worst case

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz (3m Distance)							
below 30 MHz	**Not Detected**	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1GHz							
43.338	120	V	50.5	-14.3	36.2	40.0	3.8
50.855	120	V	47.7	-13.8	33.9	40.0	6.1
64.193	120	H	44.9	-14.8	30.1	40.0	9.9
71.831	120	V	49.8	-16.2	33.6	40.0	6.4
105.175	120	V	42.9	-16.8	26.1	43.5	17.4
175.500	120	H	45.1	-12.7	32.4	43.5	11.1
383.201	120	V	31.8	-7.2	24.6	46.0	21.4
576.474	120	H	29.8	-1.5	28.3	46.0	17.7
Peak DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
4 344.750	1000	V	41.7	6.7	48.4	74.0	25.6
9 748.624	1000	V	42.8	19.5	62.3	74.0	11.7
Average DATA. Emissions above 1GHz							
Above 1 GHz	**Not Detected**	-	-	-	-	-	-
4 344.750	1000	V	30.7	6.7	37.4	54.0	16.6
9 748.624	1000	V	27.7	19.5	47.2	54.0	6.8

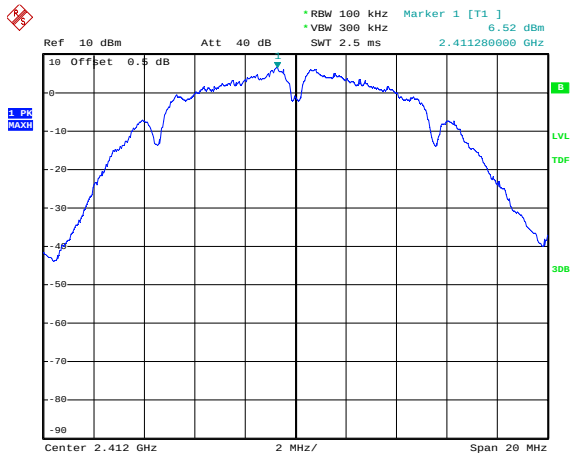
5.5.4 Test Plot

Figure 3. Plot of the Band-edge & Conducted Spurious Emissions

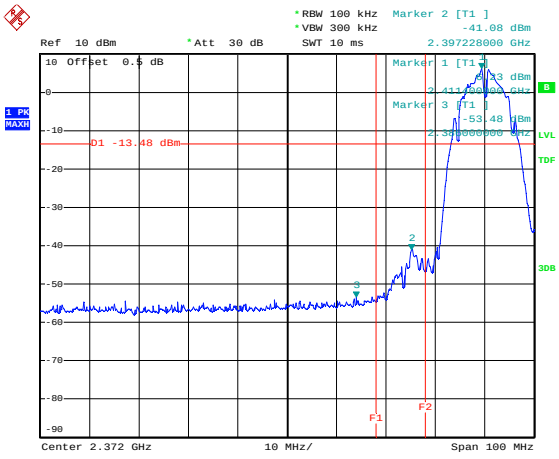
- 802.11b mode

Lowest Channel(2 412 MHz)

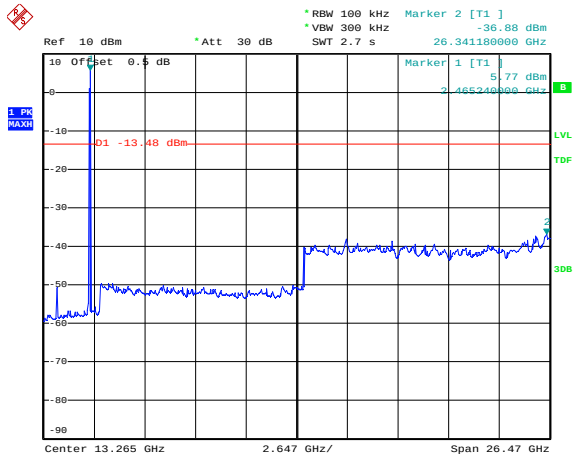
Reference



Band-edge

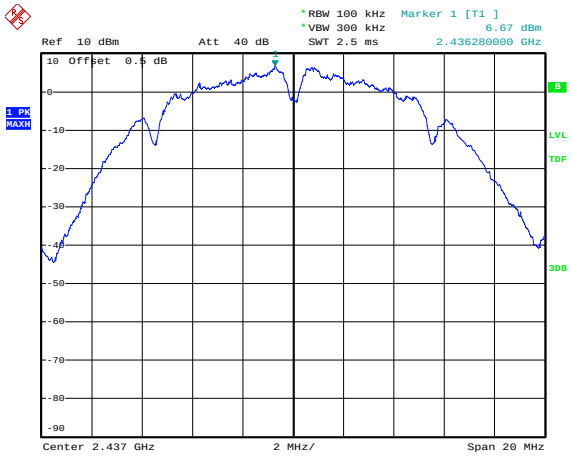


Conducted Spurious Emissions

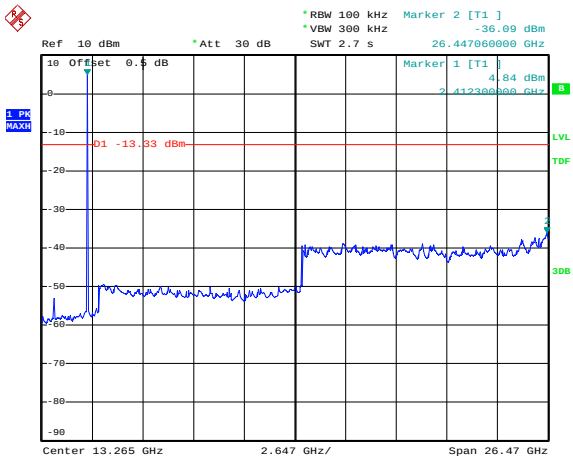


- 802.11b mode

Middle Channel(2 437 MHz)
Reference



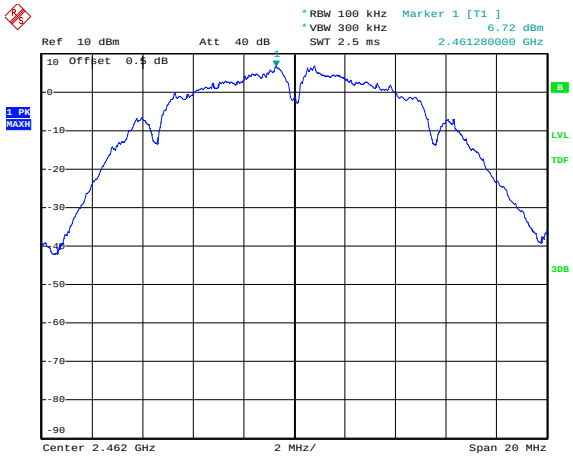
Conducted Spurious Emissions



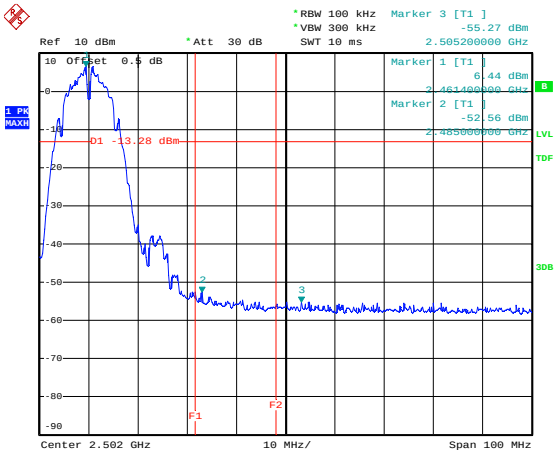
- 802.11b mode

Highest Channel(2 462 MHz)

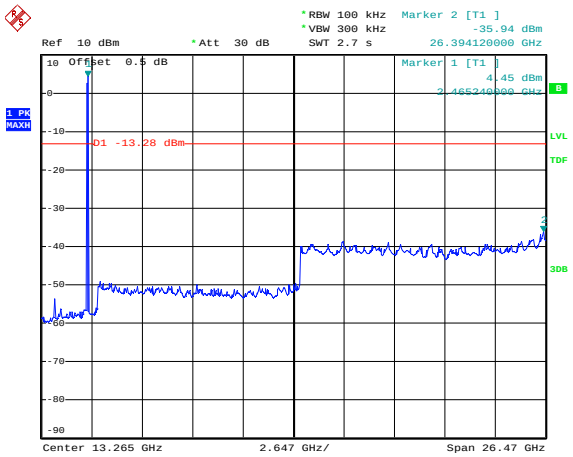
Reference



Band-edge



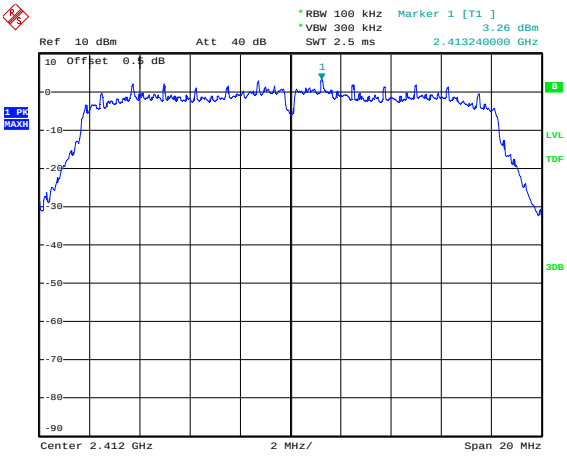
Conducted Spurious Emissions



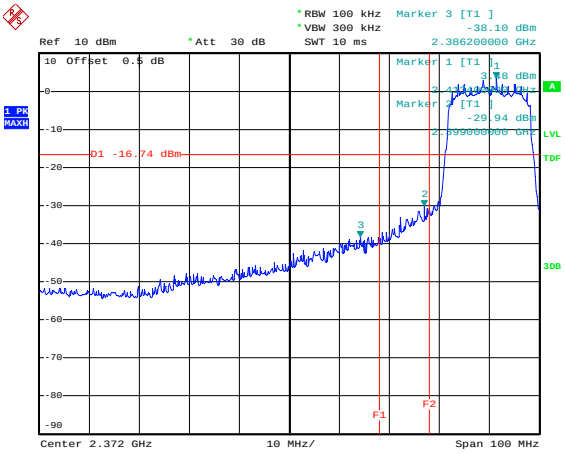
- 802.11g mode

Lowest Channel(2 412 MHz)

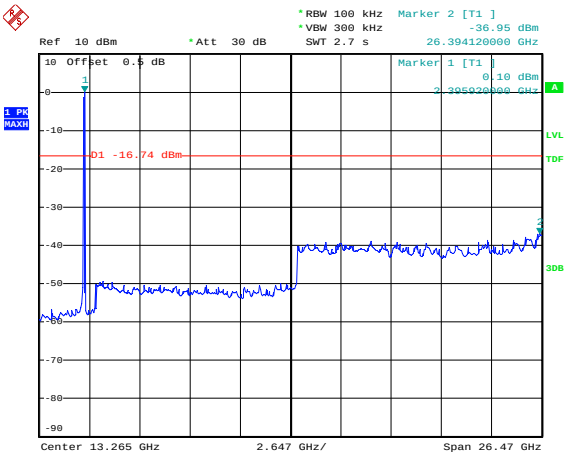
Reference



Band-edge



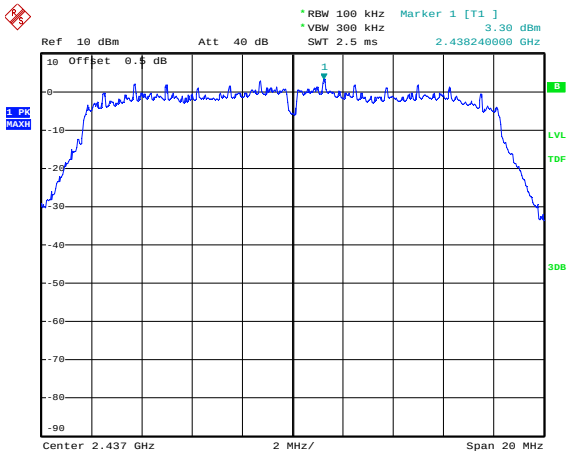
Conducted Spurious Emissions



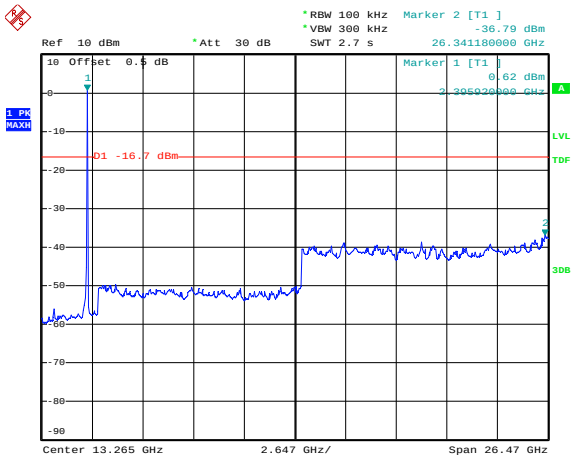
- 802.11g mode

Middle Channel(2 437 MHz)

Reference



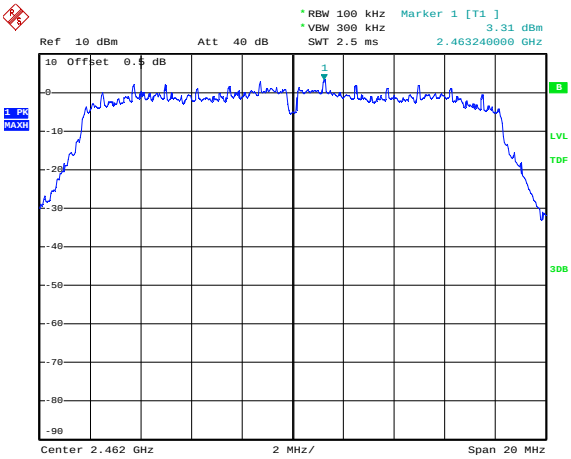
Conducted Spurious Emissions



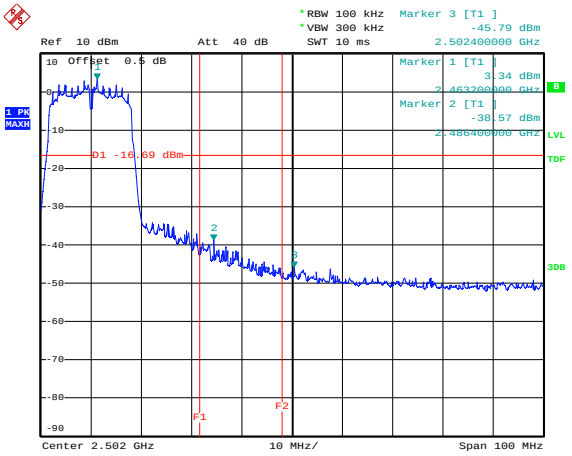
- 802.11g mode

Highest Channel(2 462 MHz)

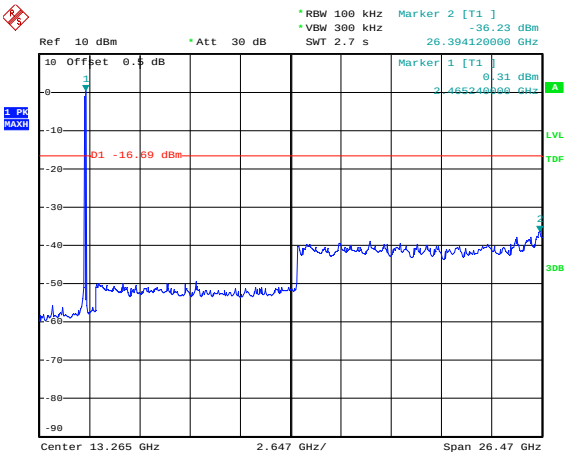
Reference



Band-edge



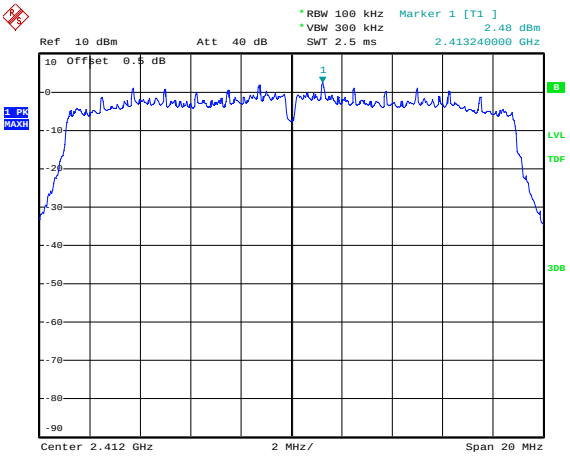
Conducted Spurious Emissions



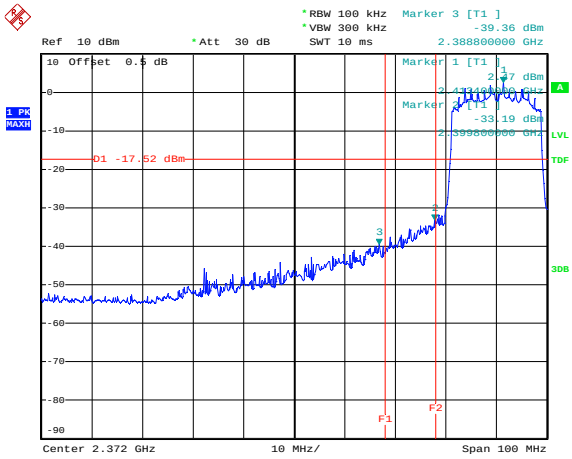
- 802.11n mode(20 MHz BW)

Lowest Channel(2 412 MHz)

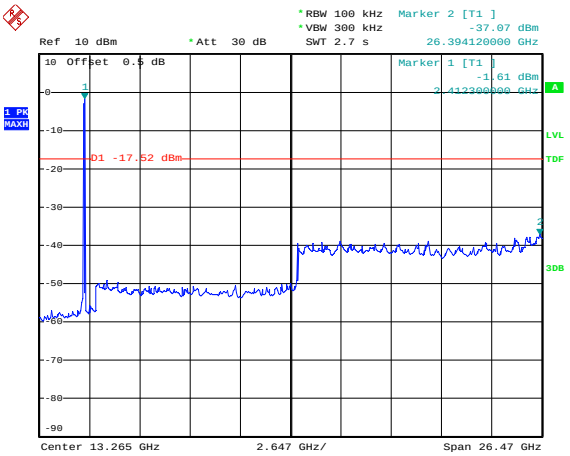
Reference



Band-edge



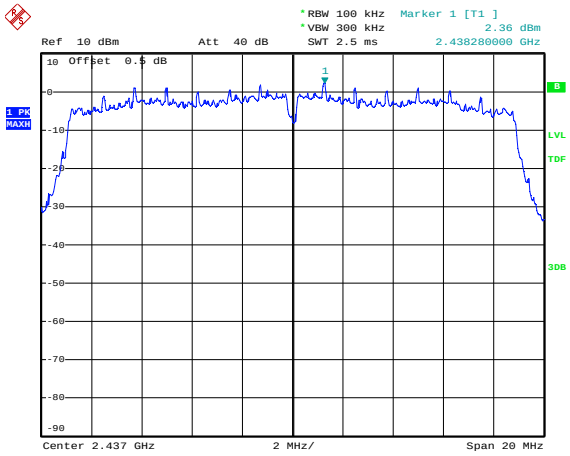
Conducted Spurious Emissions



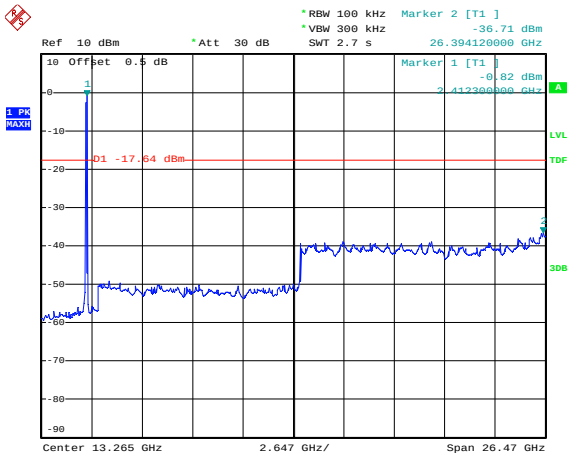
- 802.11n mode(20 MHz BW)

Middle Channel(2 437 MHz)

Reference



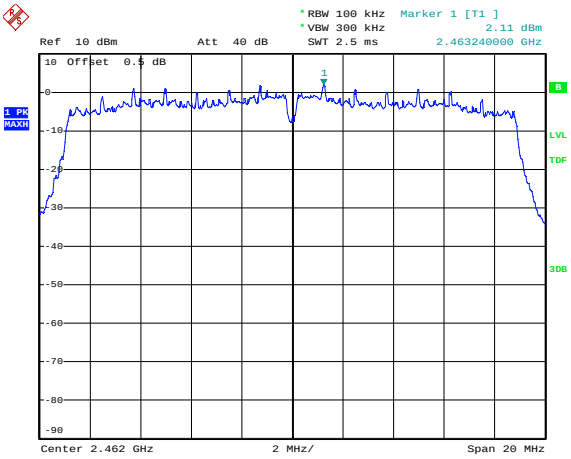
Conducted Spurious Emissions



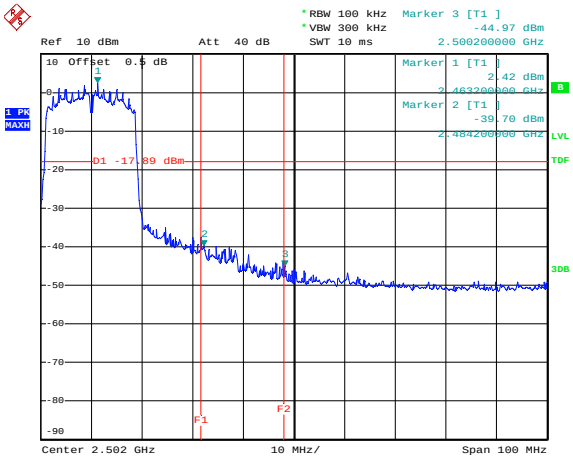
- 802.11n mode(20 MHz BW)

Highest Channel(2 462 MHz)

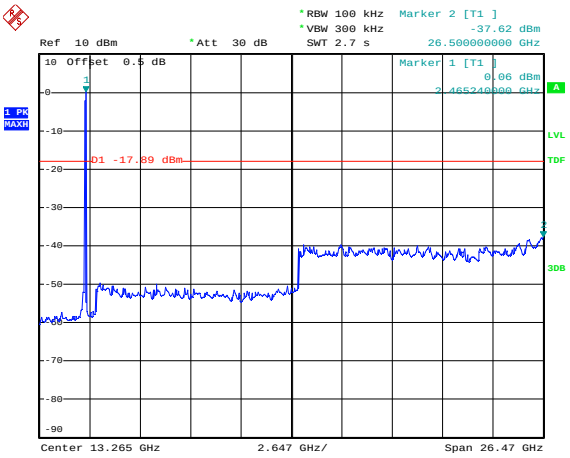
Reference



Band-edge



Conducted Spurious Emissions

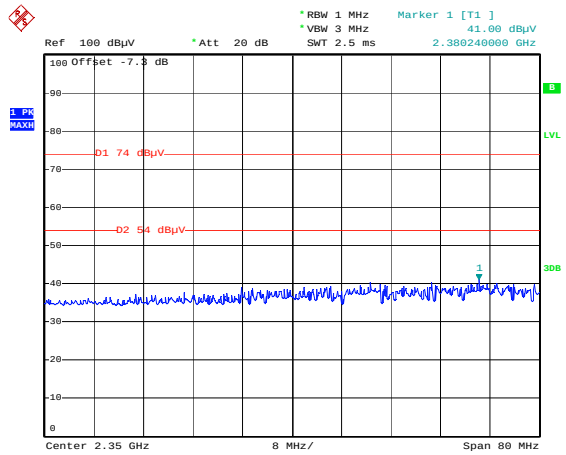


5.5.4 Test Plot (Continue)

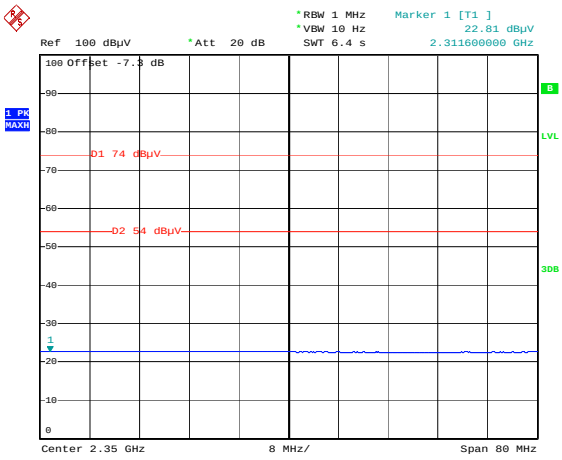
Figure 4. Plot of the Band Edge (Radiated Restricted Bands)

- 802.11b mode

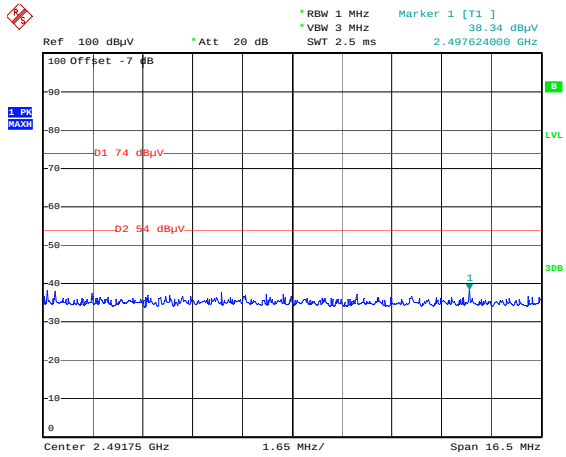
Lowest Channel(2 412 MHz): Peak



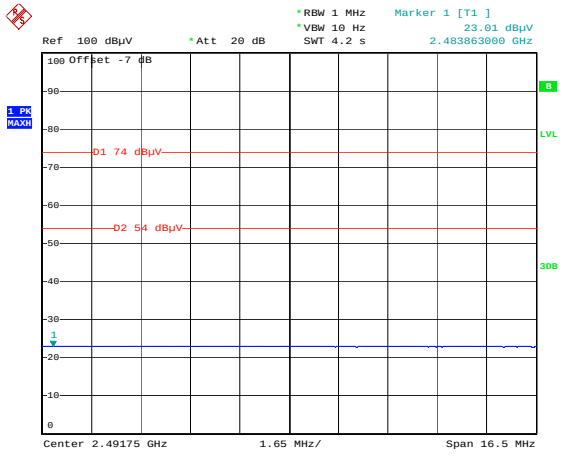
Lowest Channel(2 412 MHz): Average



Highest Channel(2 462 MHz): Peak



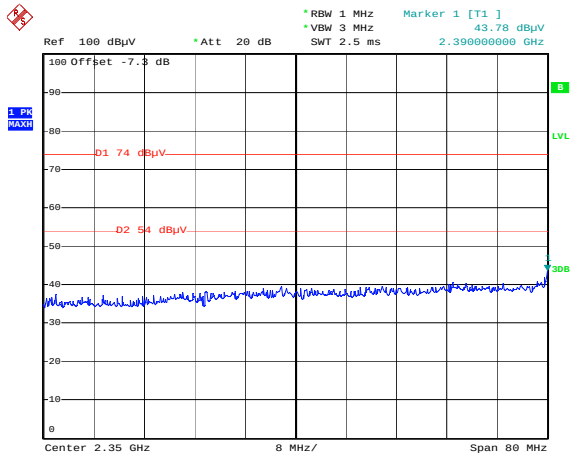
Highest Channel(2 462 MHz): Average



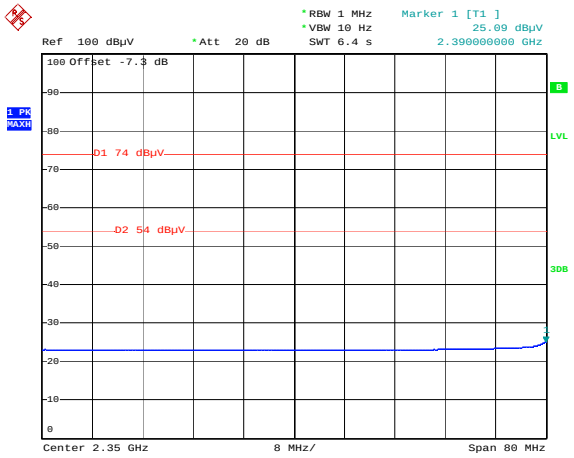
* **offset = Factor (ANT Factor+ Amp Gain + Cable Loss) [dB]**
= -7.3 dB (2 412 MHz)
= -7.0 dB (2 462 MHz)

- 802.11g mode

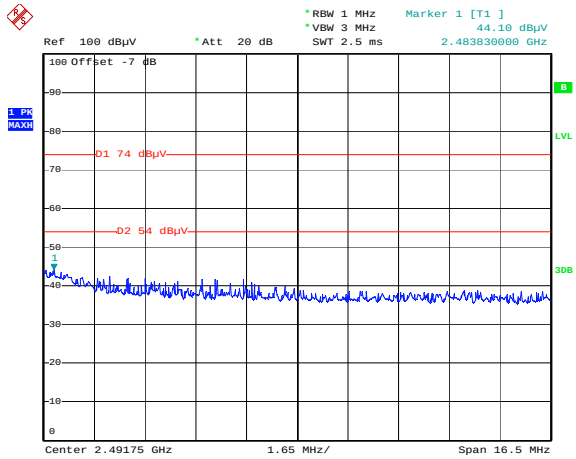
Lowest Channel(2 412 MHz): Peak



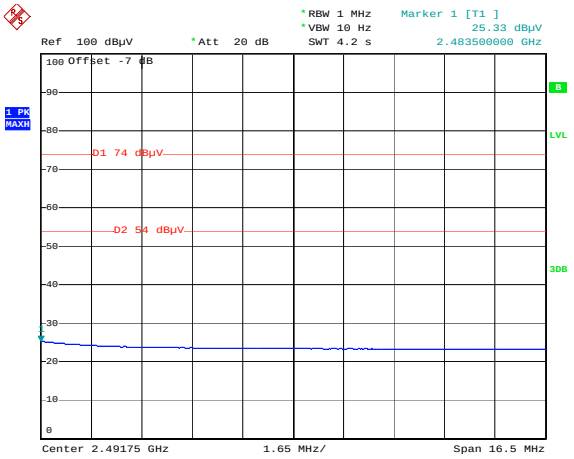
Lowest Channel(2 412 MHz): Average



Highest Channel(2 462 MHz): Peak



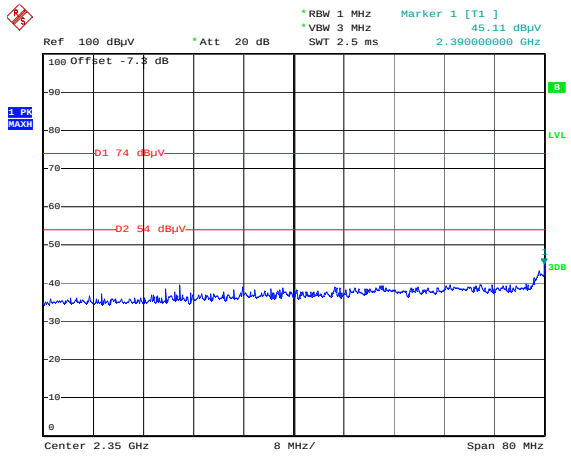
Highest Channel(2 462 MHz): Average



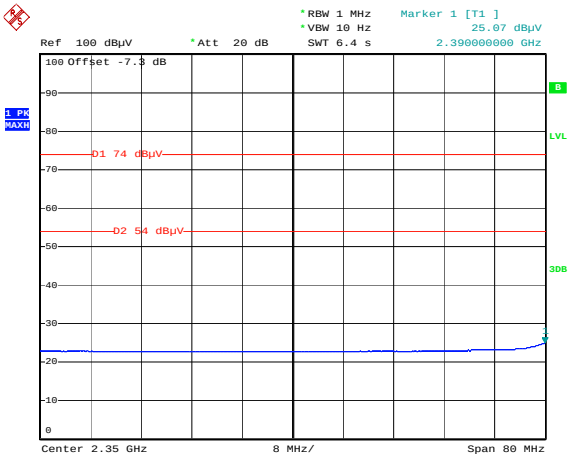
* **offset** = **Factor (ANT Factor+ Amp Gain + Cable Loss) [dB]**
= -7.3 dB (2 412 MHz)
= -7.0 dB (2 462 MHz)

- 802.11n mode(20 MHz BW)

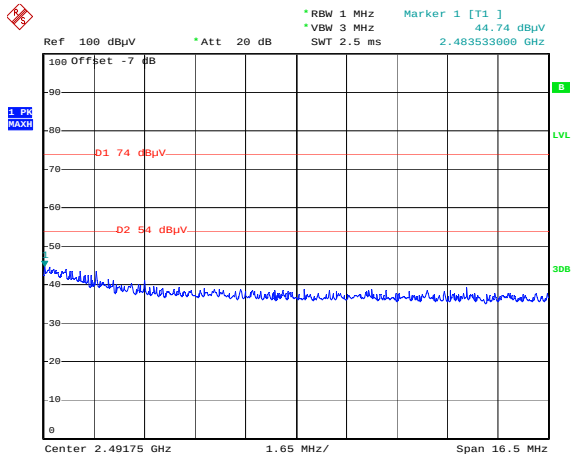
Lowest Channel(2 412 MHz): Peak



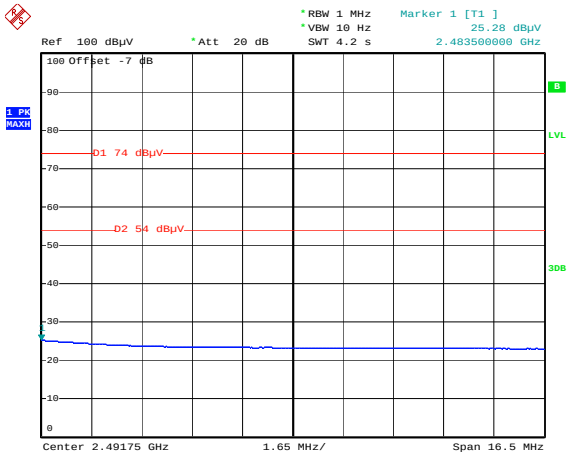
Lowest Channel(2 412 MHz): Average



Highest Channel(2 462 MHz): Peak



Highest Channel(2 462 MHz): Average



* **offset = Factor (ANT Factor+ Amp Gain + Cable Loss) [dB]**
= -7.3 dB (2 412 MHz)
= -7.0 dB (2 462 MHz)

5.6 Conducted Emission

5.6.1 Regulation

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

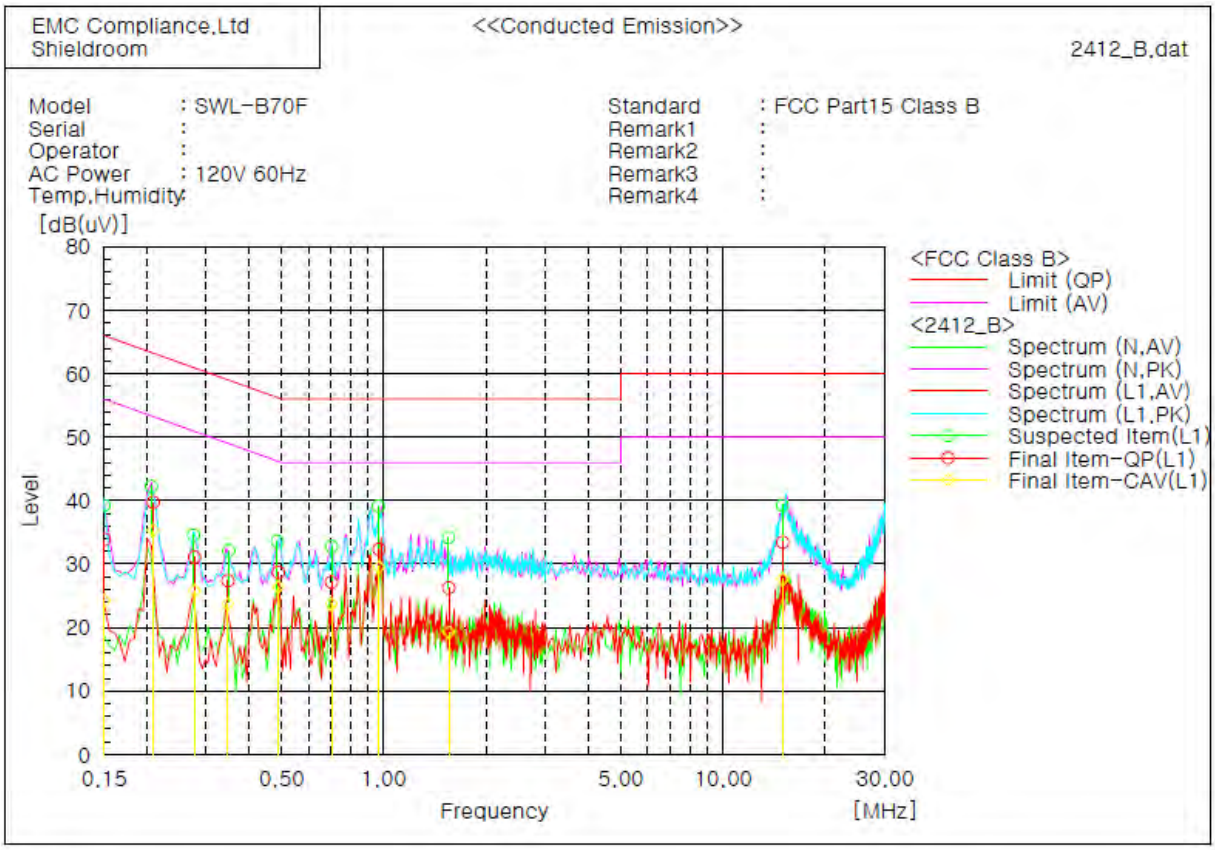
5.6.2 Measurement Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

5.6.3 Test Result
-complied

- 802.11b mode

2 412 MHz



Final Result

--- L1 Phase ---

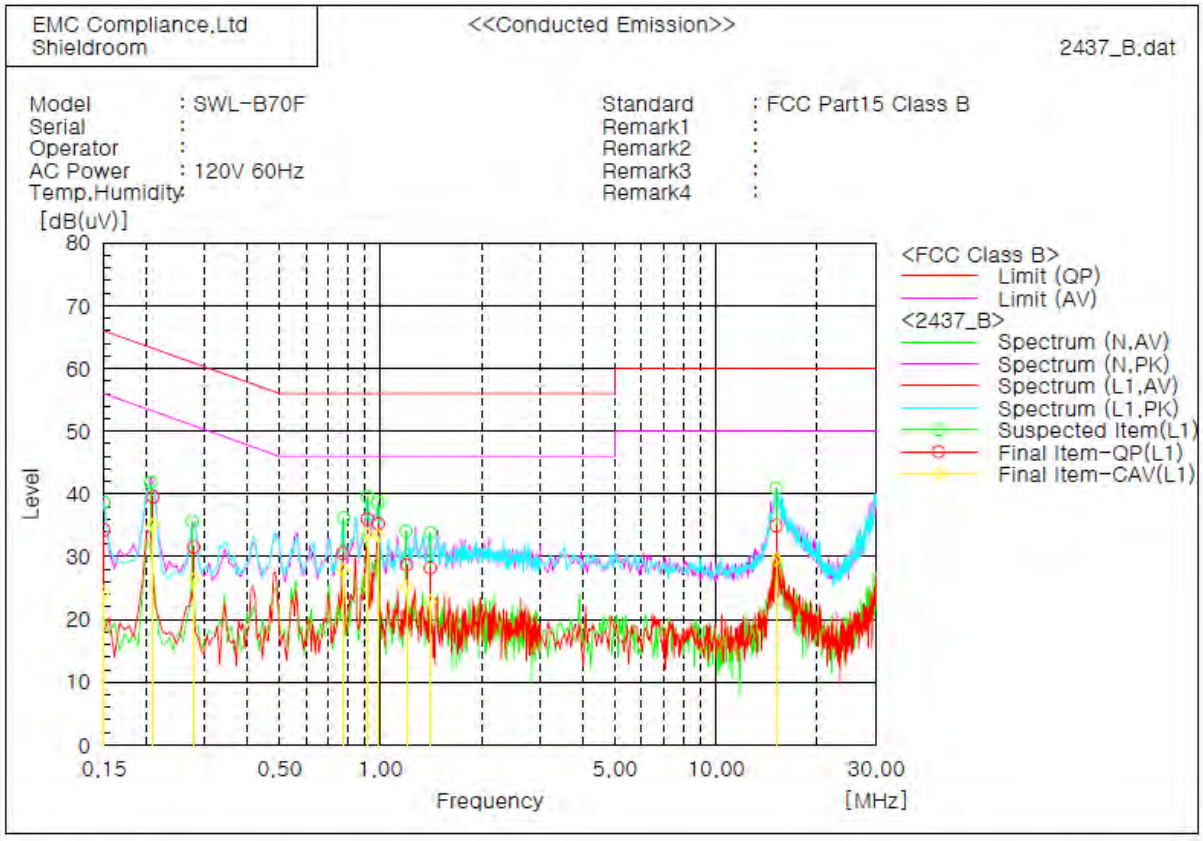
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.15057	24.0	14.4	9.9	33.9	24.3	66.0	56.0	32.1	31.7	
2	0.20956	29.8	25.4	9.9	39.7	35.3	63.2	53.2	23.5	17.9	
3	0.2774	21.2	15.9	9.9	31.1	25.8	60.9	50.9	29.8	25.1	
4	0.34784	17.4	13.7	10.0	27.4	23.7	59.0	49.0	31.6	25.3	
5	0.48962	18.7	16.4	10.0	28.7	26.4	56.2	46.2	27.5	19.8	
6	0.70232	17.2	13.8	9.9	27.1	23.7	56.0	46.0	28.9	22.3	
7	0.96944	22.5	19.7	9.8	32.3	29.5	56.0	46.0	23.7	16.5	
8	1.55524	16.6	9.6	9.7	26.3	19.3	56.0	46.0	29.7	26.7	
9	14.99048	23.7	17.9	9.7	33.4	27.6	60.0	50.0	26.6	22.4	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11b mode

2 437 MHz



Final Result

--- L1 Phase ---

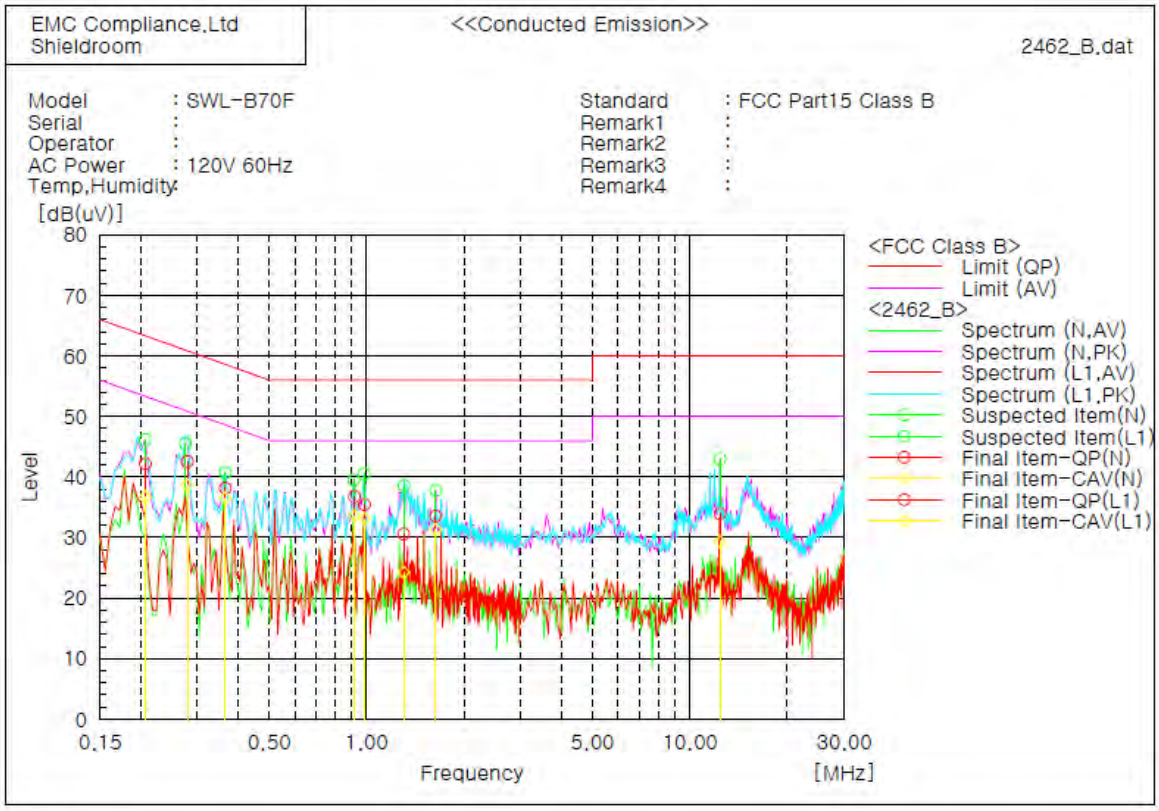
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.15042	24.4	14.5	9.9	34.3	24.4	66.0	56.0	31.7	31.6	
2	0.21022	29.6	25.2	9.9	39.5	35.1	63.2	53.2	23.7	18.1	
3	0.27806	21.6	16.5	9.9	31.5	26.4	60.9	50.9	29.4	24.5	
4	0.77228	20.6	18.0	9.9	30.5	27.9	56.0	46.0	25.5	18.1	
5	0.91402	26.2	23.8	9.8	36.0	33.6	56.0	46.0	20.0	12.4	
6	0.9864	25.5	23.5	9.8	35.3	33.3	56.0	46.0	20.7	12.7	
7	1.19764	19.0	15.4	9.8	28.8	25.2	56.0	46.0	27.2	20.8	
8	1.40858	18.5	13.2	9.7	28.2	22.9	56.0	46.0	27.8	23.1	
9	15.09138	25.2	19.9	9.7	34.9	29.6	60.0	50.0	25.1	20.4	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11b mode

2 462 MHz



Final Result

-- N Phase --

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.20714	32.3	26.8	9.9	42.2	36.7	63.3	53.3	21.1	16.6	
2	0.27956	32.6	28.8	9.9	42.5	38.7	60.8	50.8	18.3	12.1	
3	0.91828	27.0	23.8	9.8	36.8	33.6	56.0	46.0	19.2	12.4	
4	1.30404	20.8	14.4	9.8	30.6	24.2	56.0	46.0	25.4	21.8	
5	1.63726	23.8	21.6	9.7	33.5	31.3	56.0	46.0	22.5	14.7	
6	12.39218	24.2	19.6	9.7	33.9	29.3	60.0	50.0	26.1	20.7	

-- L1 Phase --

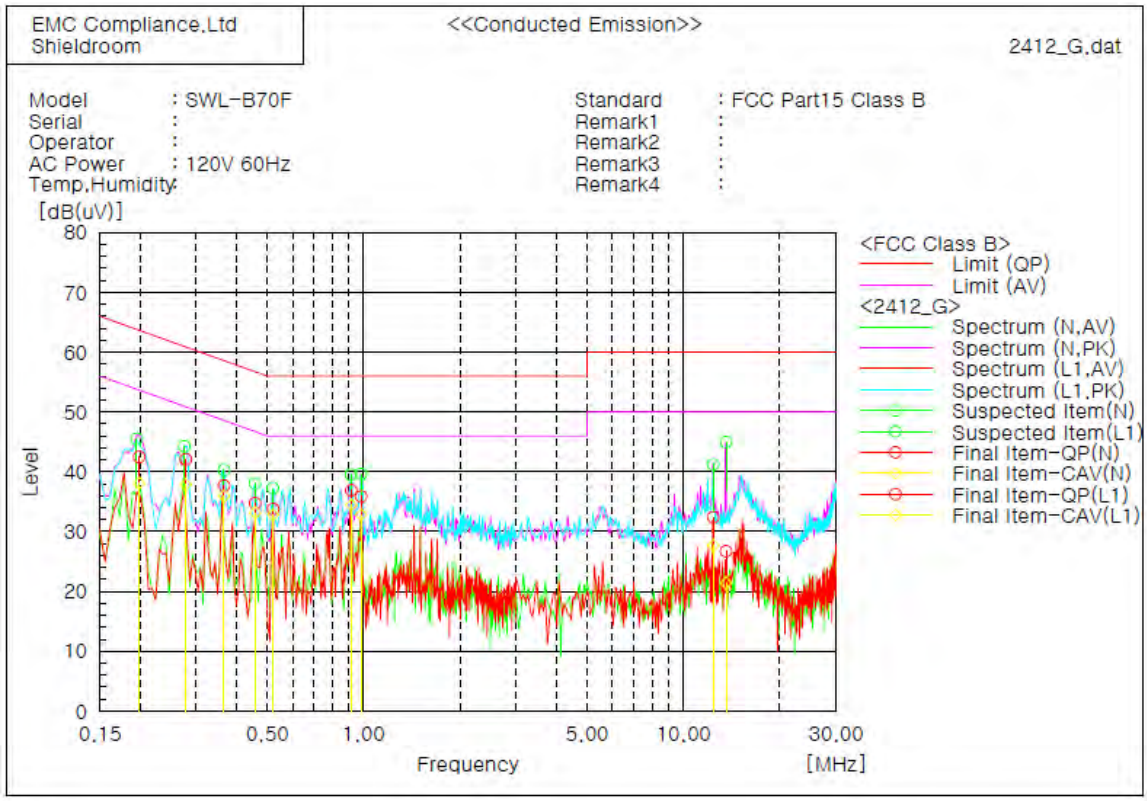
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.36588	28.2	26.5	10.0	38.2	36.5	58.6	48.6	20.4	12.1	
2	0.98606	25.6	23.3	9.8	35.4	33.1	56.0	46.0	20.6	12.9	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11g mode

2 412 MHz



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.91534	27.1	24.6	9.8	36.9	34.4	56.0	46.0	19.1	11.6	
2	0.98386	26.1	23.0	9.8	35.9	32.8	56.0	46.0	20.1	13.2	
3	12.39312	22.7	18.0	9.7	32.4	27.7	60.0	50.0	27.6	22.3	
4	13.586	17.0	11.7	9.7	26.7	21.4	60.0	50.0	33.3	28.6	

--- L1 Phase ---

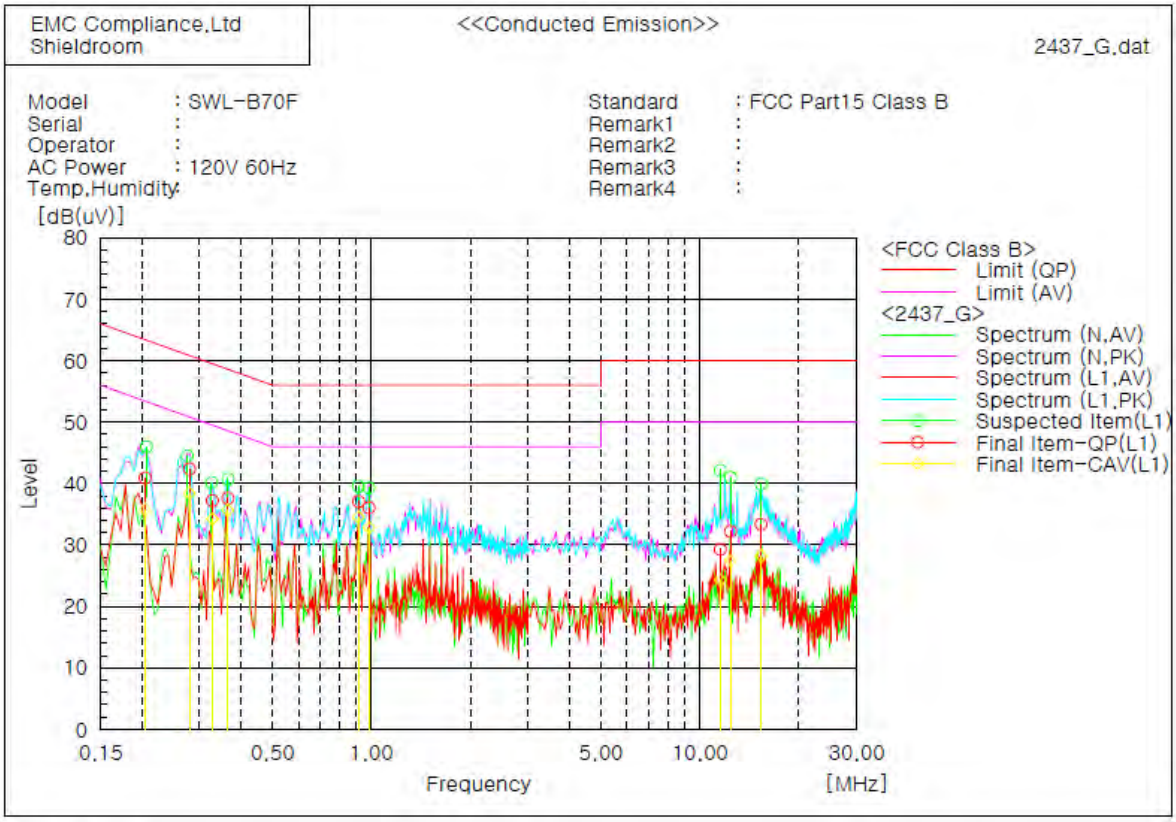
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.19918	32.6	28.2	9.9	42.5	38.1	63.6	53.6	21.1	15.5	
2	0.27844	32.2	27.9	9.9	42.1	37.8	60.9	50.9	18.8	13.1	
3	0.36646	27.7	25.9	10.0	37.7	35.9	58.6	48.6	20.9	12.7	
4	0.45882	24.7	23.1	10.0	34.7	33.1	56.7	46.7	22.0	13.6	
5	0.52178	23.8	22.8	10.0	33.8	32.8	56.0	46.0	22.2	13.2	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11g mode

2 437 MHz



Final Result

--- L1 Phase ---

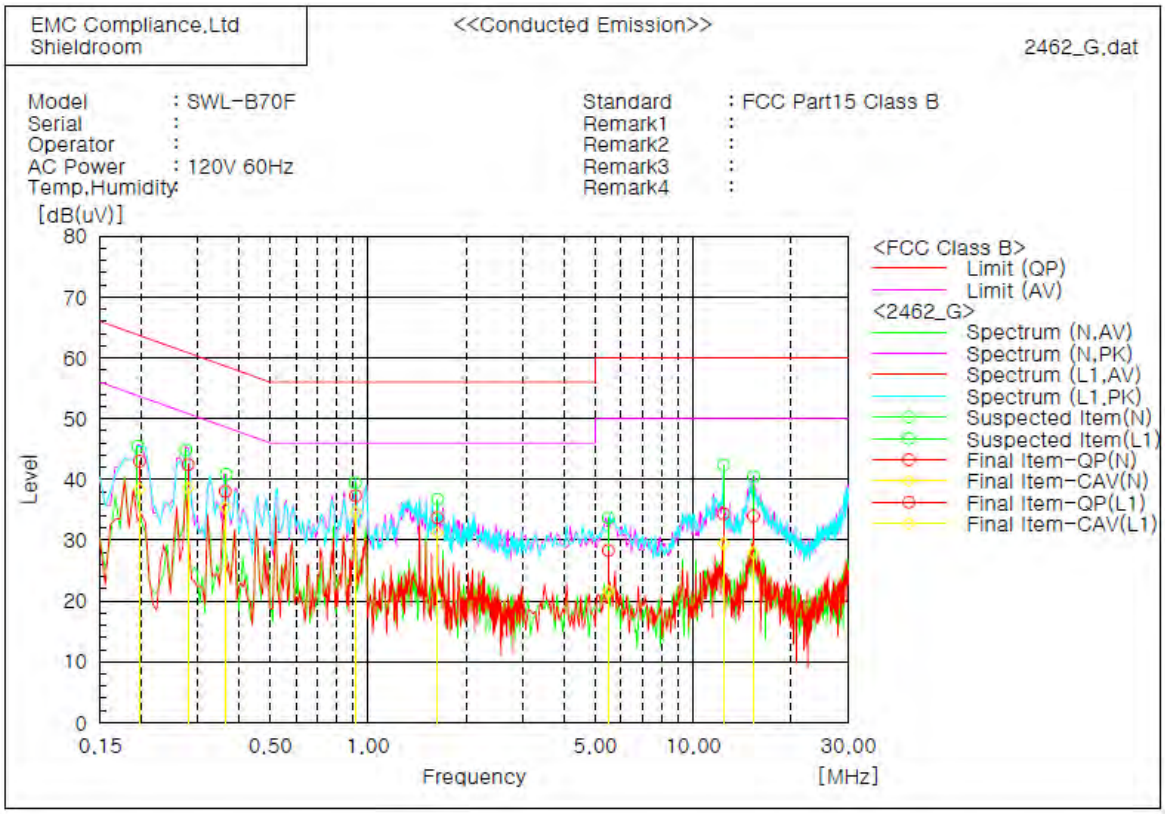
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.20496	31.0	25.9	9.9	40.9	35.8	63.4	53.4	22.5	17.6	
2	0.27958	32.5	28.5	9.9	42.4	38.4	60.8	50.8	18.4	12.4	
3	0.3283	27.2	24.2	10.0	37.2	34.2	59.5	49.5	22.3	15.3	
4	0.36592	27.6	25.7	10.0	37.6	35.7	58.6	48.6	21.0	12.9	
5	0.91516	27.3	24.7	9.8	37.1	34.5	56.0	46.0	18.9	11.5	
6	0.9835	26.2	23.0	9.8	36.0	32.8	56.0	46.0	20.0	13.2	
7	11.5349	19.6	14.6	9.7	29.3	24.3	60.0	50.0	30.7	25.7	
8	12.391	22.5	17.7	9.7	32.2	27.4	60.0	50.0	27.8	22.6	
9	15.3626	23.7	18.5	9.7	33.4	28.2	60.0	50.0	26.6	21.8	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11g mode

2 462 MHz



Final Result

— N Phase —

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.364	28.0	25.4	10.0	38.0	35.4	58.6	48.6	20.6	13.2	
2	0.91586	27.5	24.6	9.8	37.3	34.6	56.0	46.0	18.7	11.4	
3	5.4845	18.6	11.9	9.7	28.3	21.6	60.0	50.0	31.7	28.4	

— L1 Phase —

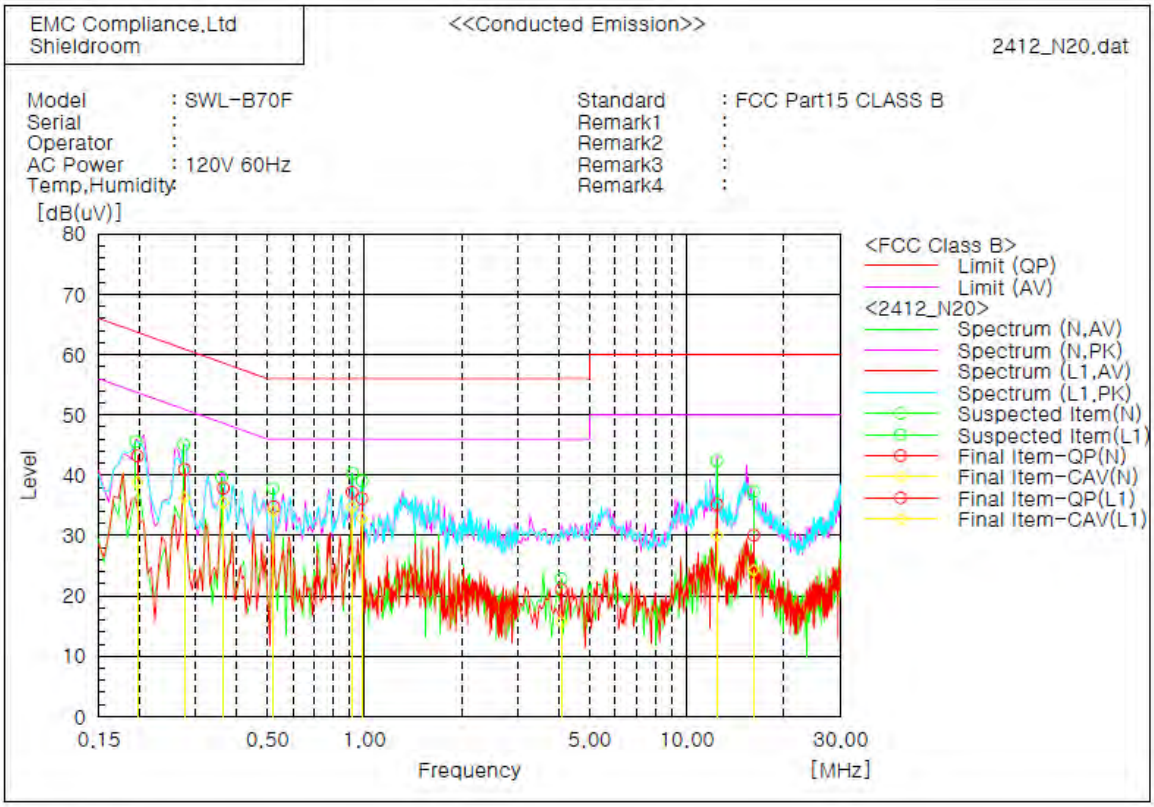
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.1985	33.1	28.5	9.9	43.0	38.4	63.7	53.7	20.7	15.3	
2	0.27972	32.5	28.6	9.9	42.4	38.5	60.8	50.8	18.4	12.3	
3	1.637	24.0	21.6	9.7	33.7	31.3	56.0	46.0	22.3	14.7	
4	12.39158	24.6	19.8	9.7	34.3	29.5	60.0	50.0	25.7	20.5	
5	15.31342	24.3	18.3	9.7	34.0	28.0	60.0	50.0	26.0	22.0	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11n mode (20 MHz BW)

2 412 MHz



Final Result

-- N Phase --

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	16.1224	20.3	14.6	9.7	30.0	24.3	60.0	50.0	30.0	25.7	

-- L1 Phase --

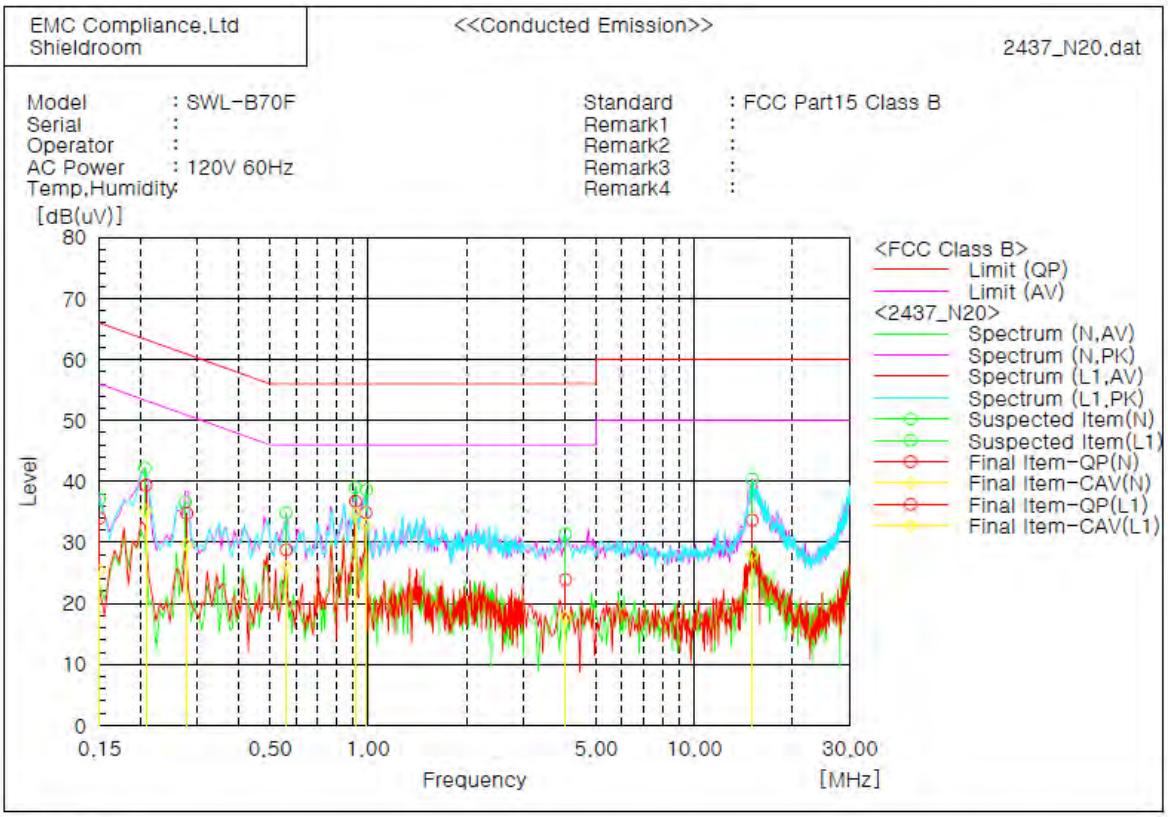
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.19776	33.3	28.9	9.9	43.2	38.8	63.7	53.7	20.5	14.9	
2	0.27676	31.1	26.4	9.9	41.0	36.3	60.9	50.9	19.9	14.6	
3	0.36536	27.9	25.4	10.0	37.9	35.4	58.6	48.6	20.7	13.2	
4	0.52306	24.8	24.1	10.0	34.8	34.1	56.0	46.0	21.2	11.9	
5	0.91578	27.4	24.9	9.8	37.2	34.7	56.0	46.0	18.8	11.3	
6	0.98284	26.3	23.0	9.8	36.1	32.8	56.0	46.0	19.9	13.2	
7	4.07514	11.3	6.0	9.7	21.0	15.7	56.0	46.0	35.0	30.3	
8	12.39132	25.5	20.4	9.7	35.2	30.1	60.0	50.0	24.8	19.9	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11n mode (20 MHz BW)

2 437 MHz



Final Result

— N Phase —

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.20836	29.5	25.2	9.9	39.4	35.1	63.3	53.3	23.9	18.2	
2	0.56114	18.8	16.0	10.0	28.8	26.0	56.0	46.0	27.2	20.0	

— L1 Phase —

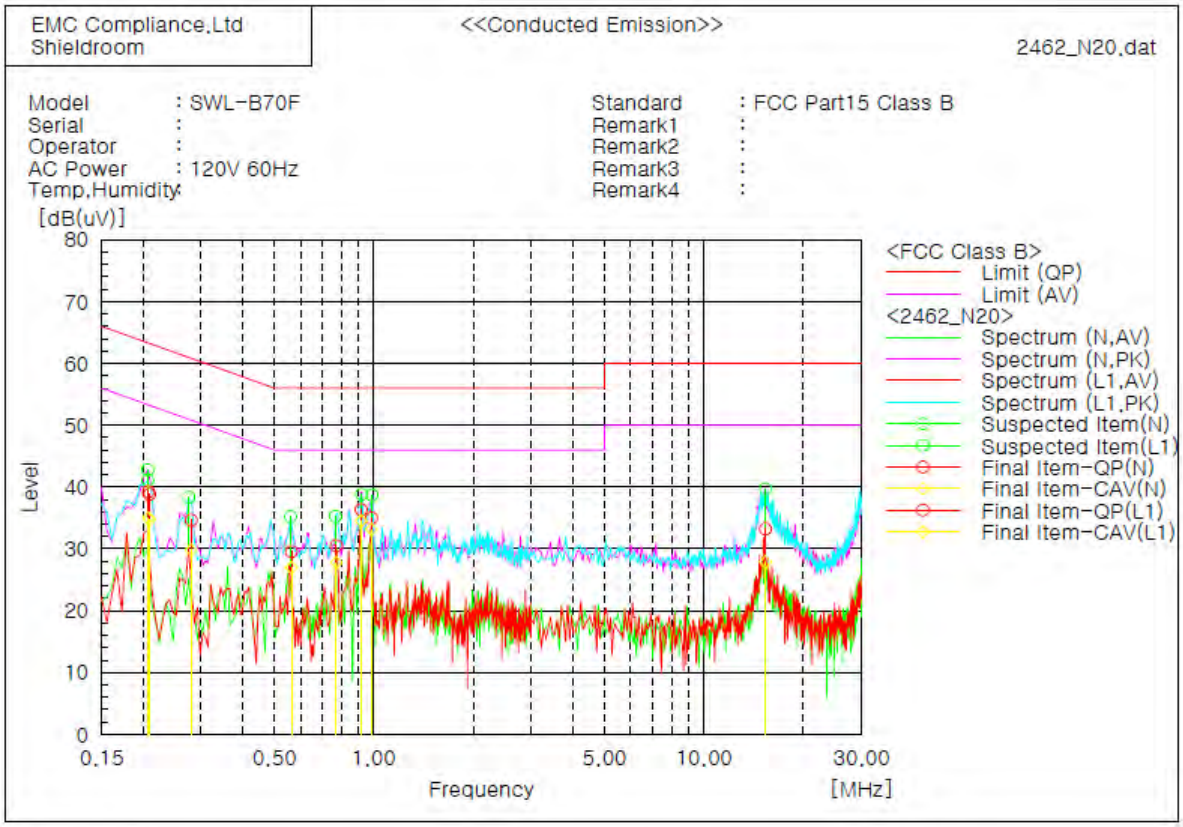
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.15017	24.1	15.4	9.9	34.0	25.3	66.0	56.0	32.0	30.7	
2	0.27826	24.8	19.7	9.9	34.7	29.6	60.9	50.9	26.2	21.3	
3	0.91532	26.9	25.0	9.8	36.7	34.8	56.0	46.0	19.3	11.2	
4	0.98398	25.1	23.1	9.8	34.9	32.9	56.0	46.0	21.1	13.1	
5	4.0275	14.2	8.1	9.7	23.9	17.8	56.0	46.0	32.1	28.2	
6	15.04168	23.9	18.2	9.7	33.6	27.9	60.0	50.0	26.4	22.1	

Note:

1. This measurement was performed the worst case data were reported.

- 802.11n mode (20 MHz BW)

2 462 MHz



Final Result

-- N Phase --

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.20962	28.9	24.8	9.9	38.8	34.7	63.2	53.2	24.4	18.5	

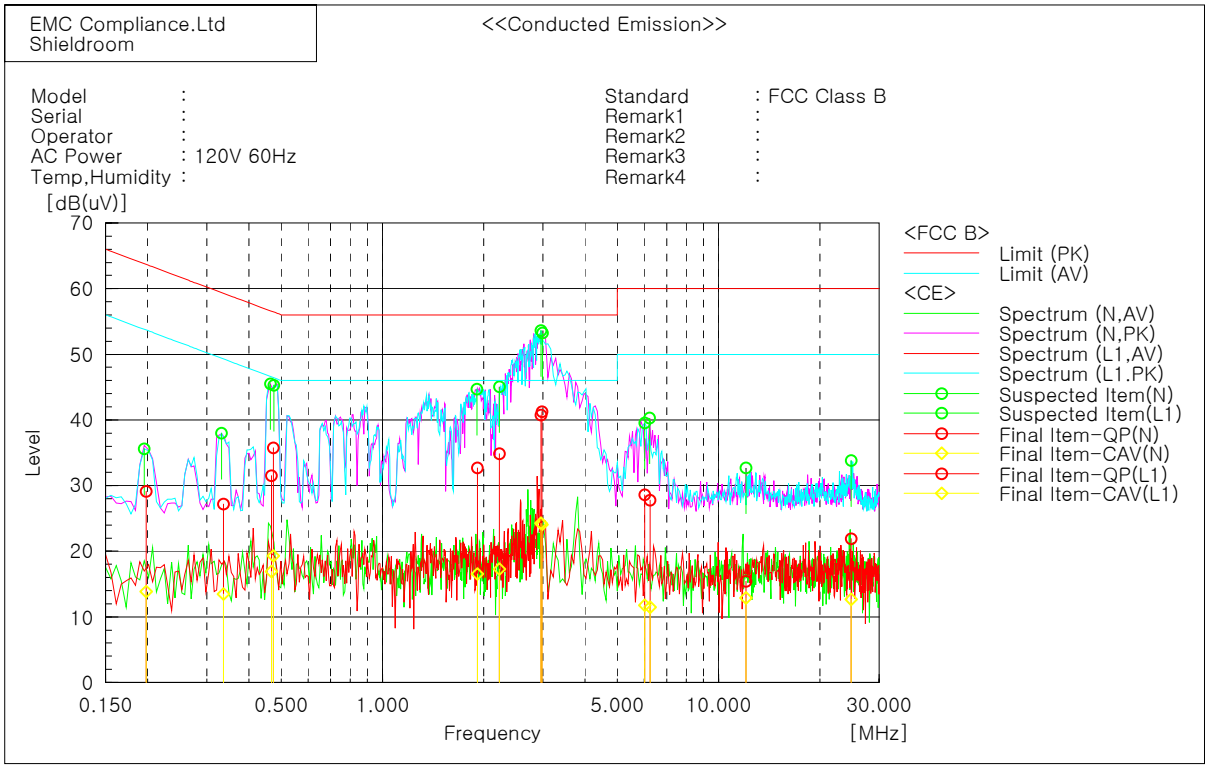
-- L1 Phase --

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.20794	29.4	25.1	9.9	39.3	35.0	63.3	53.3	24.0	18.3	
2	0.2802	24.7	19.9	9.9	34.6	29.8	60.8	50.8	26.2	21.0	
3	0.56382	19.5	17.0	10.0	29.5	27.0	56.0	46.0	26.5	19.0	
4	0.77044	20.6	17.9	9.9	30.5	27.8	56.0	46.0	25.5	18.2	
5	0.91628	26.5	24.7	9.8	36.3	34.5	56.0	46.0	19.7	11.5	
6	0.98484	25.2	23.3	9.8	35.0	33.1	56.0	46.0	21.0	12.9	
7	15.36128	23.5	18.2	9.7	33.2	27.9	60.0	50.0	26.8	22.1	

Note:

1. This measurement was performed the worst case data were reported.

- With Host Worst case



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.46692	21.5	6.9	10.0	31.5	16.9	56.6	46.6	25.1	29.7
2	2.22816	25.1	7.6	9.7	34.8	17.3	56.0	46.0	21.2	28.7
3	2.98532	31.5	14.4	9.7	41.2	24.1	56.0	46.0	14.8	21.9
4	6.24454	18.0	1.7	9.8	27.8	11.5	60.0	50.0	32.2	38.5
5	12.07156	5.6	3.1	9.8	15.4	12.9	60.0	50.0	44.6	37.1

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.19792	19.3	4.1	9.8	29.1	13.9	63.7	53.7	34.6	39.8
2	0.33608	17.3	3.6	9.9	27.2	13.5	59.3	49.3	32.1	35.8
3	0.47372	25.8	9.3	10.0	35.8	19.3	56.4	46.4	20.6	27.1
4	1.9123	23.0	6.8	9.7	32.7	16.5	56.0	46.0	23.3	29.5
5	2.96226	31.0	14.6	9.7	40.7	24.3	56.0	46.0	15.3	21.7
6	6.0272	18.8	1.9	9.8	28.6	11.7	60.0	50.0	31.4	38.3
7	24.81786	12.0	2.7	9.9	21.9	12.6	60.0	50.0	38.1	37.4

5.7 RF Exposure

5.7.1 Regulation

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

Limits for Maximum Permissive Exposure: RF exposure is calculated.

Frequency Range	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm^2]	Averaging Time [minute]
Limits for General Population / Uncontrolled Exposure				
0.3 ~ 1.34	614	1.63	*(100)	30
1.34 ~ 30	824/f	2.19/f	*(180/f^2)	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1 500	/	/	f/1 500	30
1 500 ~ 15 000	/	/	1.0	30

*f=frequency in MHz, *= plane-wave equivalent power density*

MPE (Maximum Permissive Exposure) Prediction
Predication of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad \left(\Rightarrow R = \sqrt{PG/4\pi S}\right)$$

S = power density [mW/cm^2]
P = Power input to antenna [mW]
G = Power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna [cm]

EUT: Maximum peak output power = 308.32 [mW] (24.89 dBm) Antenna gain = 2.18 [mW] (3.39 [dBi])	
100 mW, at 20 cm from an antenna 6 [dBi]	S = PG/4πR² = 100 × 3.98 / (4 × π × 400) = 0.079 2 [mW/cm^2] < 1.0 [mW/cm^2]
308.32 mW, at 20 cm from an antenna 3.39 [dBi]	S = PG/4πR² = 0.133 88 [mW/cm^2] < 1.0 [mW/cm^2]

5.7.2 RF Exposure Compliance Issue

The information should be included in the user's manual:
This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
☐	Temp & humidity chamber	taekwang	TK-04	TK001	13.12.07
☐	Temp & humidity chamber	taekwang	TK-500	TK002	13.09.03
☐	Frequency Counter	HP	53150A	US39250565	13.09.04
☐	Spectrum Analyzer	Agilent	E4440A	MY44303500	13.06.27
☐	Spectrum Analyzer	Agilent	E4440A	MY46186407	14.01.20
■	Spectrum Analyzer	R & S	FSP40	100209	13.10.23
☐	Modulation Analyzer	HP	8901B	3538A05527	13.11.06
☐	Audio Analyzer	HP	8903B	3729A19213	14.01.06
☐	AC Power Supply	KIKUSUI	PCR2000W	GB001619	13.10.23
■	DC Power Supply	Tektronix	PS2520G	TW50517	14.03.12
☐	DC Power Supply	Tektronix	PS2521G	TW53135	13.10.23
☐	Dummy Load	BIRD	8141	7560	13.09.09
☐	Dummy Load	BIRD	8401-025	799	13.09.09
■	Attenuator	HP	11581A	42946 / 29738	14.01.09
☐	Attenuator	HP	8494A	2631A09825	13.10.24
☐	Attenuator	HP	8496A	3308A16640	13.10.24
☐	Attenuator	R&S	RBS1000	D67079	13.10.24
■	WIDEBAND POWER SENSOR	R & S	NRP-Z81	100677	14.05.06
☐	Signal Generator	R & S	SMR40	100007	13.06.27
☐	Power Divider	Weinschel	1580-1	NX380	13.09.09
☐	Power Divider	Weinschel	1594	671	13.09.10
☐	Bluetooth tester	Tescom	TC3000A	3000A310047	14.04.08
■	Highpass Filter	Wainwright	WHKX2.5/18 G-10SS	61	14.04.12
☐	Highpass Filter	Wainwright	WHKX6.5/18 G-10SS	2	14.06.13
■	EMI Test Receiver	R&S	ESCI7	100732	14.02.18
■	LOOP Antenna	EMCO	EMCO6502	9205-2745	14.05.23
■	BILOG Antenna	Schwarzbeck	VULB 9168	440	13.10.04
■	HORN Antenna	ETS	3115	00086706	13.11.21
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Turn Table	Innco Systems	DT2000S-1t	079	-
■	EMI Test Receiver	R&S	ESCI	100001	13.07.10
■	LISN	R & S	ENV216	101358	13.10.22
■	LISN	R & S	ESH3-Z5	100267	13.07.05
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