TEST REPORT

According to

CFR 47 Part 15 Subpart C-15.247

Test Report No : CSTPOC13-FCC0009

EQUIPMENT NAME	:	Network AV adapter
MODEL NO.	:	WD-1
APPLICANT	:	Inkel Corporation
MANUFACTURER	:	Inkel Corporation
TEST STANDARD	:	FCC CFR 47, Part 15. Subpart C-15.247
TEST METHOD	:	ANSI C63.4(2003)
FCC ID	:	VNH-WD-1

This report applies only to the product named in the title of this report manufactured at the location indicated.
Test results apply only to the particular equipment and functionality described in this test report.

This is the result of test that was carried out from the submitted type-samples of a product in conformity with the specification of the respective standards.

Date : January 31, 2013

Tested by
Kwang Min, Lee

Date : January 31, 2013

Approved by
Ik Seon, Jeong

CERTIFICATION SERVICE TECHNOLOGY INC.

181, Manhaero, Danwan-gu, Ansan-city, Kyeonggi-do, 425-839, Korea
Tel: +82 31 493 2001 Fax: +82 31 493 2055

Table of Contents

1. General Information

1.1 General Description of EUT

Applicant's Information	
Company Name	Inkel Corporation
Address	3-8, CheongCheon-Dong, Bupyeong-Gu, Incheon, 403-853, Republic of Korea
Name For Contact Purposes	BonKeun, Koo
E-mail	Bkkoo@inkel.co.kr
Telephone no.	+82-32-650-6141
Fax no.	+82-32-650-6466

Manufacturer Information	
Company Name	Inkel Corporation
Address	3-8, CheongCheon-Dong, Bupyeong-Gu, Incheon, 403-853, Republic of Korea

Factory Information	
Factory 1	
Company Name	Dongguan Inkel Electronics Co., Ltd.
Address	Shang qiao Industrial Road No.36, Dongcheng District, Dongguan City, Guangdong Province, 523111, People's Republic of China.
Factory 2	
Company Name	ShenzhenInkel-LanguangElectronicsCo.,Ltd.
Address	3-3 Jinquan Ind., Area Liu Yue Henggang, 518000 Longgang District., Shenzhen, People's Republic of China.

1.2 Basic Description of EUT

Basic Description of EUT		
Equipment Name	:	Network AV adapter
Model NO.	:	WD-1
Serial NO.	:	Proto Type
Frequency Range	:	2412 MHz ~ 2472 MHz (802.11 b, g, n(HT20)), 2422 MHz ~ 2462 MHz (802.11 n(HT40))
Channel	:	13 (802.11 b, g, n(HT20)), 9 (802.11 n(HT40))
Data spreading Method	:	DSSS(802.11b), OFDM (802.11g, n(HT20), n(HT40))
Emission Type	:	G1D, D2D
Communication Type	:	Half duplex
Max. Data Rate	:	11Mbps (802.11b), 54Mbps (802.11g), 120Mbps (802.11n(HT20)) 150Mbps (802.11n(HT40))
Oscillation Type	:	PLL
Occupied Bandwidth	:	Less than 20 MHz (802.11b, g, n(HT20)) Less than 40 MHz (802.11n(HT40))
RF Output Power	:	10.41 dBm (802.11b), 9.06 dBm (802.11g) 7.37 dBm (802.11n(HT20)), 4.92 dBm (802.11n(HT40)) * It is maximum peak conducted power in band
Power Source	:	AC 110V Adaptor (Input : AC 100V~240V, Output : DC +5V 1A)
Dimension	:	110 mm x 110 mm x 32 mm
Poids	:	270g
FCC ID	:	VNH-WD-1

1.3 Antenna Description

Antenna Description		
Type of Antenna	:	Chip ANT.
Connector Type	:	-
Frequency Range	:	2.4 GHz ~ 2.5 GHz
Model Name	:	AT3216-B2R7HAA
Gain	:	0.5 dBi
Polarization	:	Linear Vertical
Length	:	3.2 x 1.6 mm

2. Summary of test results

The EUT has been tested according to the follow specification:

Description of Test	FCC Rule	Reference Clause	Pass/Fail	Test Result
6dB Spectrum Bandwidth	15.247(a)(2)	Clause 5.1	Pass	Compliance
Max. Conducted peak output power	15.247(b)(1)	Clause 5.4	Pass	Compliance
Conducted peak output power spectrum density	15.247(e)	Clause 5.5	Pass	Compliance
Band edge compliance of RF conducted emissions	15.247(d)	Clause 5.6	Pass	Compliance
Band edge compliance of RF radiated emissions	15.247(d) 15.205 & 15.209	Clause 5.7	Pass	Compliance
Spurious RF conducted emissions	15.247(d)	Clause 5.8	Pass	Compliance
Spurious RF radiated emissions	15.247(d), 15.209	Clause 5.9	Pass	Compliance
Antenna requirement	15.203, 15.247	Clause 5.10	Pass	Compliance
AC Power line Conducted emission	15.207	Clause 5.10	Pass	Compliance

Compliance : The EUT complies with the essential requirements in the standard.
Not Compliance : The EUT does not comply with the essential requirements in the standard.
N/A : The test was not applicable in the standard.

- The measurement report and tested in accordance with measurement procedures specified in ANSI C 63.4-2003.

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Name	***Kwang Min, Lee***
Position held	***Engineer / RF Team***
Date	***January 31, 2013***

Begin Test : January 17, 2013
End Test : January 29, 2013

2.1 Measurement uncertainty

Conducted Emissions

TYPE	Contribution	Probability Distribution	Uncertainty	Remark
B	LISN Impedance Voltage Division Factor	 normal(k=2) normal(k=2)	 ±1.3 ±0.12	 CAL. CAL.
	cable	normal (k=2)	±0.2	NONCAL.
	Receiver Input Impedance QP Sine-Wave Voltage Accuracy QP-Pulse Amplitude Sensibility QP-Pulse Frequency Response Random Noise	 normal(k=1.64) normal(k=2) normal(k=2) normal(k=2) normal(k=2)	 ±0.0070 ±0.20 dB ±0.40 dB ±0.57 dB ±0.35 dB	CAL.
	Mismatch AMN to Receiver	U-Shaped	+0.7/-0.8	CISPR Theory
A	System Repeatability	Std deviation	±0.0721	
Combined Standard Uncertainty		normal	± 1.1155 [dB]	
Expanded Uncertainty U		normal(k=2)	*± 2.23*	*95.45 %*

Radiated Emission

TYPE	Contribution	Probability Distribution	Uncertainty 3/10m	Remark
B	Antenna factor frequency interpolation height variation direcvalupsy difference phase center location	 normal(k=2) rectangular rectangular rectangular	 ±0.5 dB ±0.1039 dB +1.5/-2.6 dB +0/-1.0 dB ±1.0 dB	 NPL NAMAS NAMAS
	Cable loss	normal(k=2)	±0.5 dB	
	Receiver Input Impedance QP Sine-Wave Voltage Accuracy QP-Pulse Amplitude Sensibility QP-Pulse Frequency Response Random Noise	 normal(k=1.64) normal(k=2) normal(k=2) normal(k=2) normal(k=2)	 ±0.0070 ±0.20 dB ±0.40 dB ±0.57 dB ±0.35 dB	
	Mismatch : AMN – receiver $\lvert\Gamma_{antenna}\rvert$ =0.33 $\lvert\Gamma_{receiver}\rvert$ =0.33	U-Shaped	+0.9/-1.0 dB	CISPR
A	System repeatibility	Std deviation	±0.1149 dB	
Combined standard Uncertainty		normal	±1.3193 [dB]	
Expanded Uncertainty U		normal(k=2)	*± 2.63*	*95.45 %*

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

2.2 Testing Facility

We , Certification Service Technology Inc. are an independent EMC and RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited by the following accreditation Bodies in compliance with ISO 17025:

Test laboratory and address	Certification Service Technology Inc. (CSTech) 1055, Singil-dong ,Danwon-gu ,Ansan-si, Gyeonggi-do, Korea 425-839
FCC registration number	289252
IC registration number	10024A
KCC registration number (Korea Communication Commission)	KR0074
Contact Person	Ik Seon Jeong Testing Manager
e-mail	isjeong@cstlab.co.kr
Tel	82-31-493-2001
Fax	82-31-493-2055

3. TEST Instruments

No	Description	Model	Manufacturer	S/N	Next Calibration
1	Receiver	ER-265	LIG Nex 1	L0804B002	2013.07.05
2	Receiver	ER-30	LIG Nex 1	861743/024	2013.09.04
3	Bi-Log	3142	EMCO	9701-1128	2014.02.14
4	Biconical ANT.	3104C	EMCO	9012-4380	2014.03.13
5	Log Periodic ANT.	3146	EMCO	9008-2863	2014.03.13
6	LOOP ANT.	HFH2-Z2	Schwarz beck	100187	2013.07.21
7	DC Power Supply	6674A	Agilent	US36372373	2014.01.03
8	Dual Directional Coupler	778D	H.P	18592	2014.01.03
9	Signal Generator	E8257D	Agilent	MY47461024	2014.01.03
10	Signal Generator	E4432B	Agilent	US38441383	2014.01.03
11	Pulse/Pattern Generator	81110A	Agilent	DE41B02781	2014.01.03
12	Universal Radio Communication Tester	CMU200	Rohde &Schwarz	110665	2013.05.25
13	Modulation Analyzer	8901B	H.P	3438A05141	2013.05.25
14	Audio Analyzer	8903B	H.P	3514A16134	2013.06.05
15	Spectrum Analyzer	R3273	Advantest	121100554	2013.05.25
16	Spectrum Analyzer	E7405A	Agilent	US41110271	2014.01.03
17	Attenuator	8498A	H.P	1801A07058	2014.01.03
18	Horn Antenna	BBHA9120D	SCHWARZBECK	0501	2014.10.19
19	Horn Antenna	BBHA9170	SCHWARZBECK	BBHA9170152	2014.10.19
20	Digital Multimeter	45	FLUKE	76669036	2013.07.05
21	Digital Power Meter	ML2495A	Anritsu	824015	2014.01.03
22	High Accuracy Sensor	MA2445D	Anritsu	738191	2014.01.03
23	Highpass Filter	WHKX3.0/18G-10SS	WAINWRIGHT	84	2013.07.05
24	Highpass Filter	WHKX1.0/15G-10SS	WAINWRIGHT	2	2013.07.05
25	Band Reject Filter	WRCG824/849-814/859-80/16SS	WAINWRIGHT	1	2013.07.05
26	Band Reject Filter	WRCG890/915-880/925-80/16SS	WAINWRIGHT	2	2013.07.05
27	Band Reject Filter	WRCG1749.9/1784.9-1730/1805-90/14SS	WAINWRIGHT	6	2013.07.05

28	Band Reject Filter	WRCG1920/1980-1900/2000-80/14SS	WAINWRIGHT	42	2013.07.05
29	Band Reject Filter	WRCJ5125/5825-4950/6000-80/16SS	WAINWRIGHT	1	2013.07.05
30	TURN TABLE	Dail EMC	D-TT 06	N/A	N/A
31	ANT. MASTER	Dail EMC	D-AM 06	N/A	N/A
32	Controller	Dail EMC	D-CTR	N/A	N/A
33	TEMP&HUMID CHAMBER	KR-3001C	GOREAENG.	20080204-01	2013.01.19
34	TEMP&HUMID CHAMBER	SE-CT-02	SukSan Tech.	CST-RF-078	2014.01.03
35	Signal Generator	Agilent	E4438C	MY45093719	2013.12.03
36	POWER DIVIDER	KRYTAR	6010265	111194	2013.07.05
37	POWER DIVIDER	KRYTAR	6010265	111195	2013.07.05
38	POWER DIVIDER	KRYTAR	6010265	111196	2013.07.05

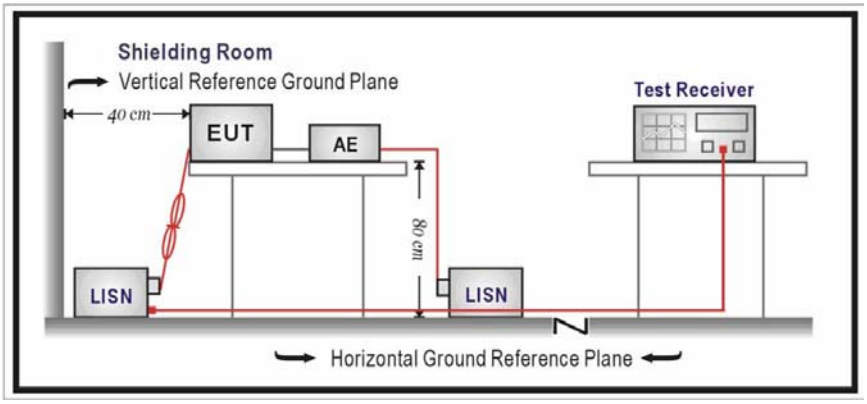
NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRA, KRISS, KTL and HCT.

2. The calibration interval of Horn ant. and Loop, Dipol ant. is 24 months

4. Configuration of system under test

4.1 Conducted Test Setup

AC Power Conducted Test



Limit Of Conducted Emission:

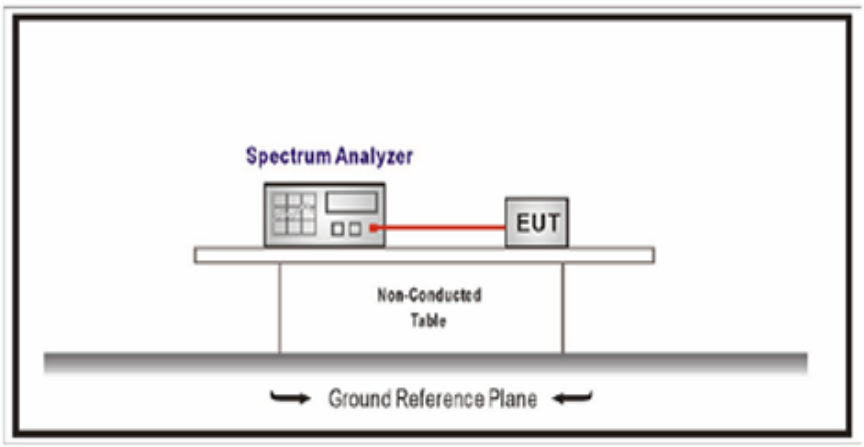
Test Specification
: According to FCC CFR Title 47 Part 15 Subpart C Section 15.207

FREQUENCY (MHz)	Limit	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5.0	56	46
5.0 to 30.0	60	50

*Decreases with the logarithm of the frequency.

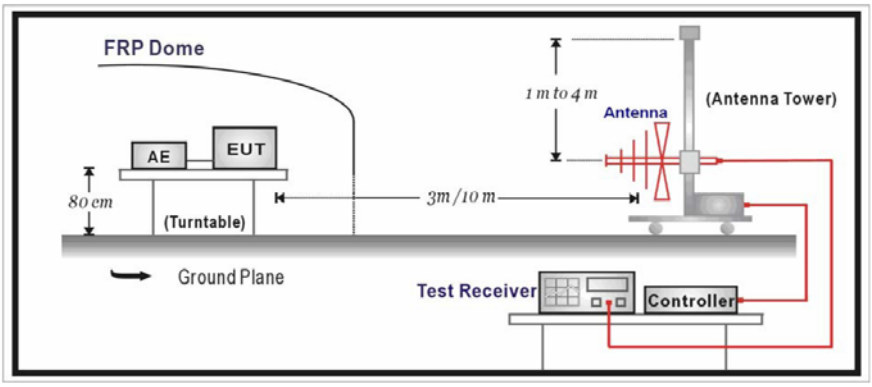
RF Conducted Test

RF Conducted Measurement:

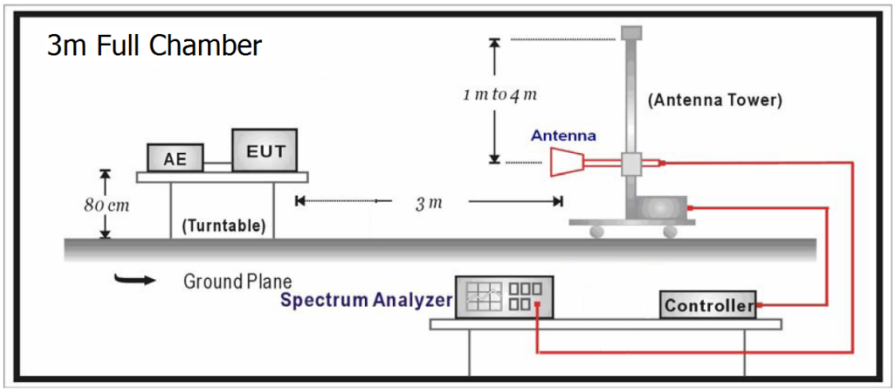


4.2 Radiated Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



Limit Of Radiated Emission :

Test Specification
: According to FCC CFR Title 47 Part 15 Subpart C Section 15.209, 15.247

Limits			
Frequency (MHz)	Field Strength (μV/meter)	Measurement Distance (meters)	dBμV/meter
0.009 – 0.490	2400/F (kHz)	300	88.52 – 53.80
0.490 – 1.705	24000/F (kHz)	30	53.80 – 42.97
1.705 – 30.0	30	30	49.54 – 49.54
30 – 88	100	3	40.00
88 – 216	150	3	43.52
216 – 960	200	3	46.02
Above 960	500	3	53.98

Remarks :

1. RF Voltage(dBuv)=20log RF Voltage(uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring

4.3 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO	PRODUCT	MODEL NO.	SERIAL NO.	Mnufacture
1	Note Book PC	NT-Q46C	BA68-04095A 10	SAMSUNG
2	USB Cable	LL200212	-	-

4.4 Test Software Power Setting. (Power Parameters of IEEE 802.11 b/g/n(HT20))

TEST Mode		2412 MHz(1CH)	2442 MHz(7CH)	2472 MHz(13CH)
Target Power	IEEE802.11b	50	50	50
	IEEE802.11g	56	56	56
	IEEE802.11n(HT20)	51	51	51

4.5 Test Software Power Setting.(Power Parameters of IEEE 802.11 n(HT40))

TEST Mode		2422 MHz(3CH)	2442 MHz(7CH)	2462 MHz(11CH)
Target Power	IEEE802.11n(HT40)	55	55	55

The parameter POWER CONTROL in the test software was set to the values in the table below for IEEE 802.11b/g /n mode

5.Test mode applicability and tested channel detail

Test Items	Mode	Channel NO.	Operated Condition
6dB Spectrum Bandwidth	b/g/n(HT20)	1, 7, 13	Continuous modulation setting mode
	n(HT40)	3, 7, 11	
Conducted peak output power	b/g/n(HT20)	1, 7, 13	Continuous modulation setting mode
	n(HT40)	3, 7, 11	
Band-edge Compliance	b/g/n(HT20)	1, 13	Continuous modulation setting mode
	n(HT40)	3, 11	
Spurious RF conducted emissions	b/g/n(HT20)	1, 7, 13	Continuous modulation setting mode
	n(HT40)	3, 7, 11	
Spurious radiated emissions	b/g/n(HT20)	1, 7, 13	Continuous modulation setting mode
	n(HT40)	3, 7, 11	

*Note : Channel number is selected lowest, middle, highest channel modulation mode operation

6. Measurement Results

6.1 6dB Spectrum Bandwidth Measurement

6.1.1 Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

6.1.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.1.3 Measuring Instruments and Setting

Please refer to section 4 of equipments list in this report. The following table is the setting of the spectrum analyzer.

• Spectrum Parameters Setting

Attenuation : Auto

Span Frequency : > 6dB Bandwidth

RBW : 100 kHz

VBW : 300 kHz

Detector : Peak

Trace : Max Hold

Sweep Time : Auto

6.1.4 Test Procedures

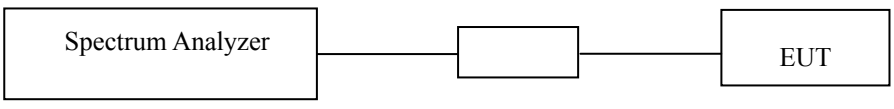
① The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.

② For 6dB Bandwidth the resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were used.

③ Measured the spectrum width with power higher than 6dB below carrier.

④ For 99% Occupied Bandwidth the resolution Bandwidth of 100 kHz and the video bandwidth of 300 kHz were used.

6.1.5 Test Setup Layout



Attenuator

6.1.6 Test Deviation

There is no deviation with the original standard.

6.1.7 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

6.1.8 Measurement Result

1) IEEE 802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (kHz)	Result
1	2412	12.14	15.08	500	Pass
7	2442	12.20	14.98	500	Pass
13	2472	12.74	14.92	500	Pass

2) IEEE 802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (kHz)	Result
1	2412	16.54	16.62	500	Pass
7	2442	16.52	16.60	500	Pass
13	2472	16.52	16.74	500	Pass

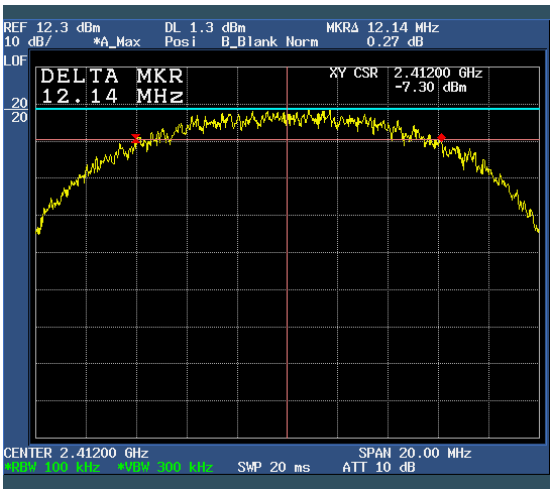
3) IEEE 802.11n(HT20)

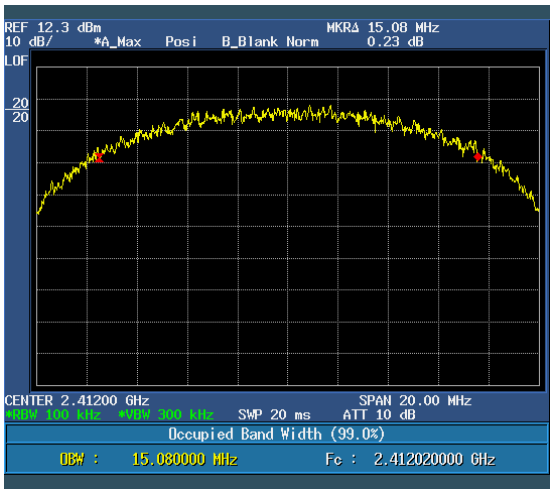
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (kHz)	Result
1	2412	17.78	17.66	500	Pass
7	2442	17.78	17.68	500	Pass
13	2472	17.74	17.66	500	Pass

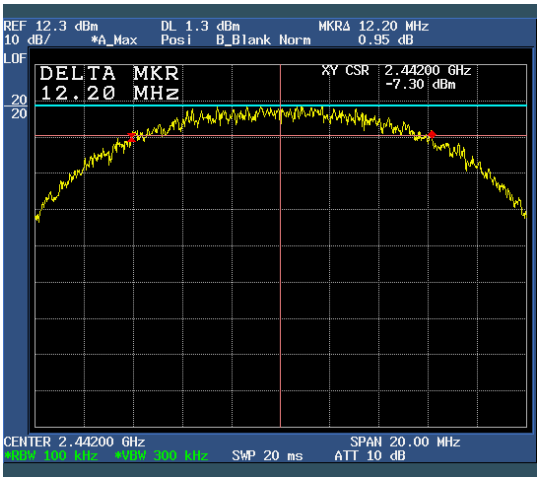
4) IEEE 802.11n(HT40)

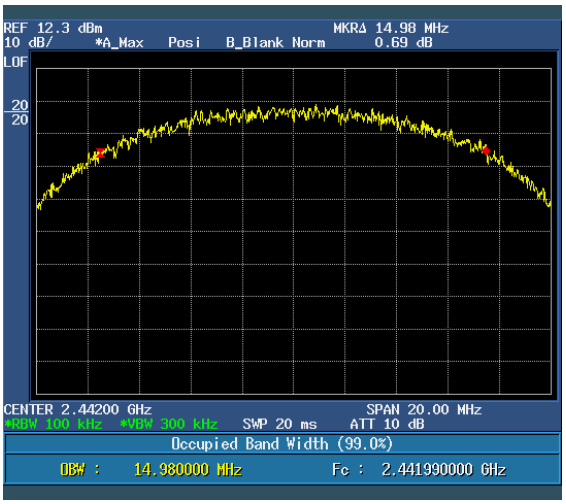
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (kHz)	Result
3	2422	36.40	36.24	500	Pass
7	2442	36.52	36.20	500	Pass
11	2462	36.52	36.20	500	Pass

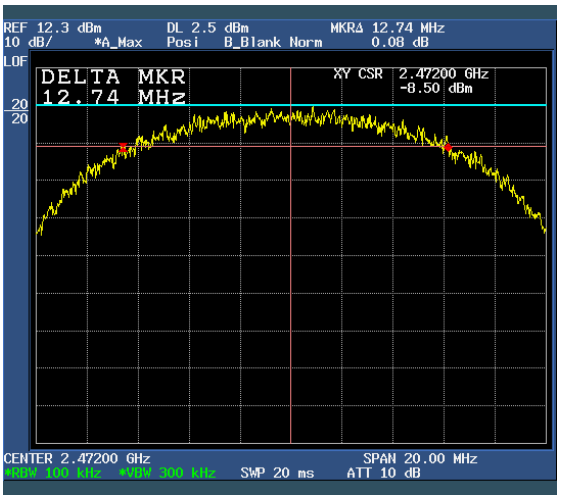
IEEE 802.11b

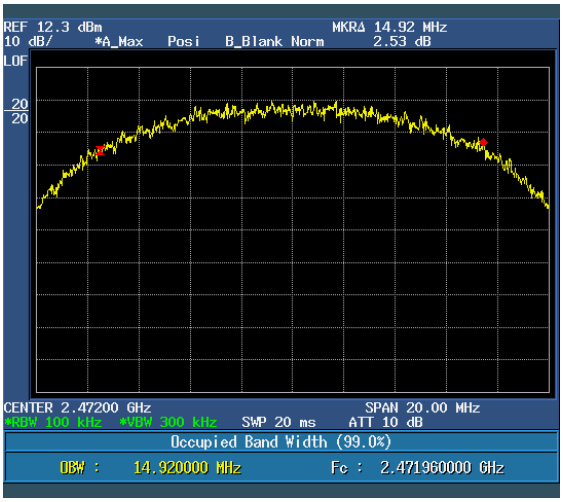

REF 12.3 dBm
DL 1.3 dBm
MKRΔ 12.14 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.27 dB
LOF
DELTA MKR 12.14 MHz
XY CSR 2.41200 GHz -7.30 dBm
CENTER 2.41200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB


REF 12.3 dBm
MKRΔ 15.08 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.23 dB
LOF
CENTER 2.41200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB
Occupied Band Width (99.0%)
OBW : 15.080000 MHz Fc : 2.412020000 GHz

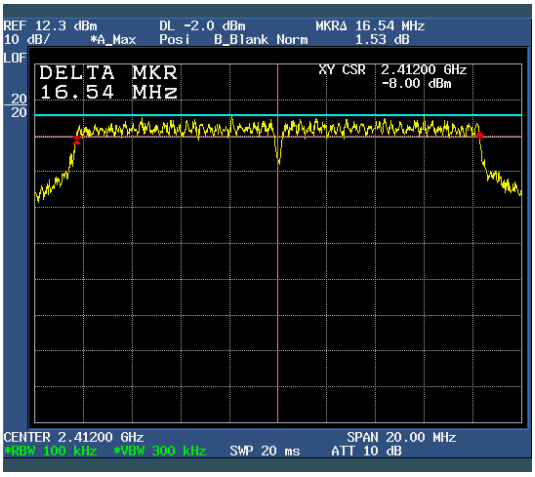

REF 12.3 dBm
DL 1.3 dBm
MKRΔ 12.20 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.95 dB
LOF
DELTA MKR 12.20 MHz
XY CSR 2.44200 GHz -7.30 dBm
CENTER 2.44200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB

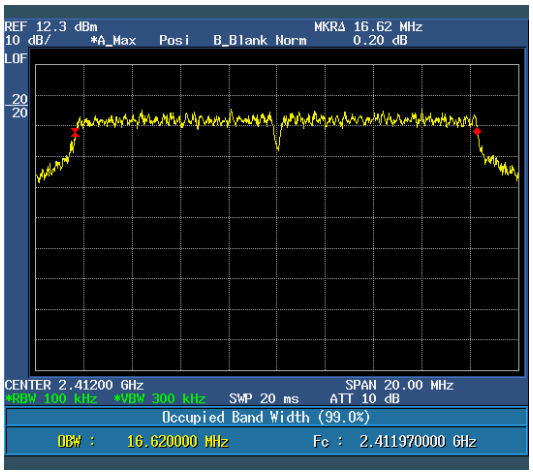

REF 12.3 dBm
MKRΔ 14.98 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.69 dB
LOF
CENTER 2.44200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB
Occupied Band Width (99.0%)
OBW : 14.980000 MHz Fc : 2.441990000 GHz

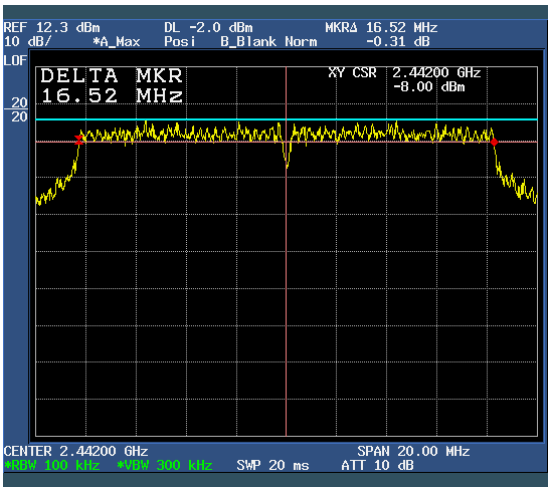

REF 12.3 dBm
DL 2.5 dBm
MKRΔ 12.74 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.08 dB
LOF
DELTA MKR 12.74 MHz
XY CSR 2.47200 GHz -8.50 dBm
CENTER 2.47200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB

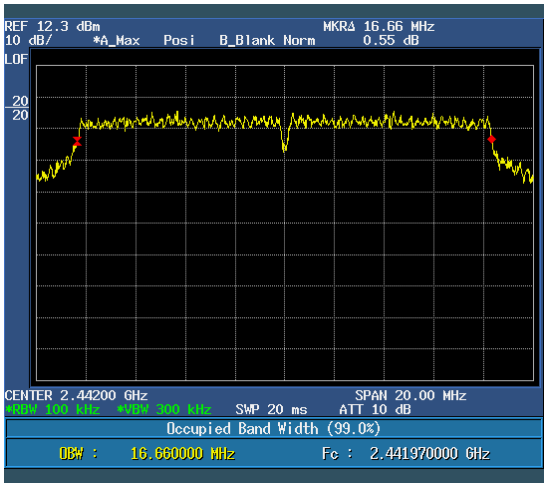

REF 12.3 dBm
MKRΔ 14.92 MHz
10 dB/ *A_Max Posi B_Blank Norm 2.53 dB
LOF
CENTER 2.47200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB
Occupied Band Width (99.0%)
OBW : 14.920000 MHz Fc : 2.471960000 GHz

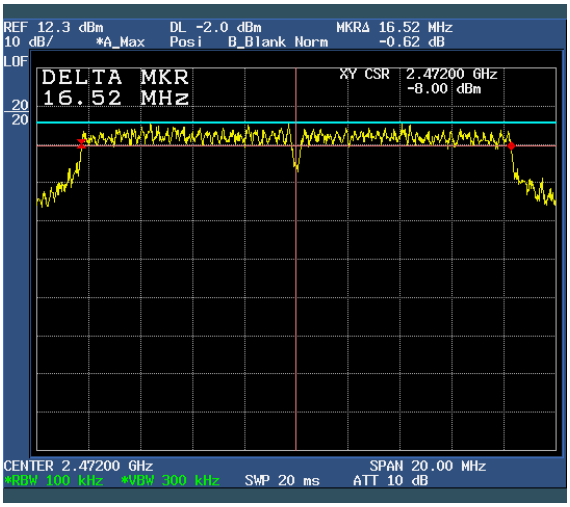
IEEE 802.11g

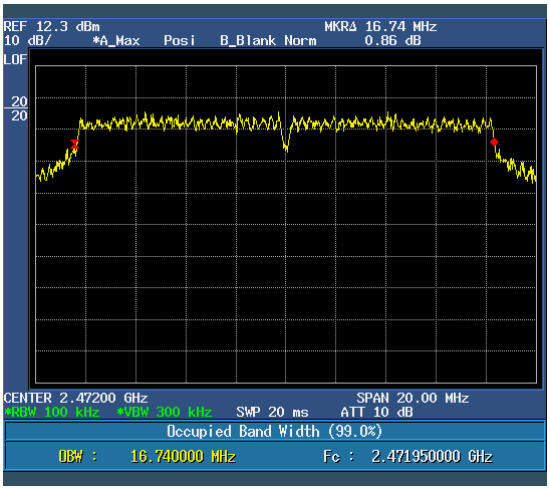

REF 12.3 dBm
DL -2.0 dBm
MKRΔ 16.54 MHz
10 dB/ *A_Max Posi B_Blank Norm 1.53 dB
LOF
DELTA MKR
16.54 MHz
XY CSR 2.41200 GHz
-8.00 dBm
CENTER 2.41200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB


REF 12.3 dBm
MKRΔ 16.62 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.20 dB
LOF
CENTER 2.41200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB
Occupied Band Width (99.0%)
OBW : 16.620000 MHz
Fc : 2.411970000 GHz

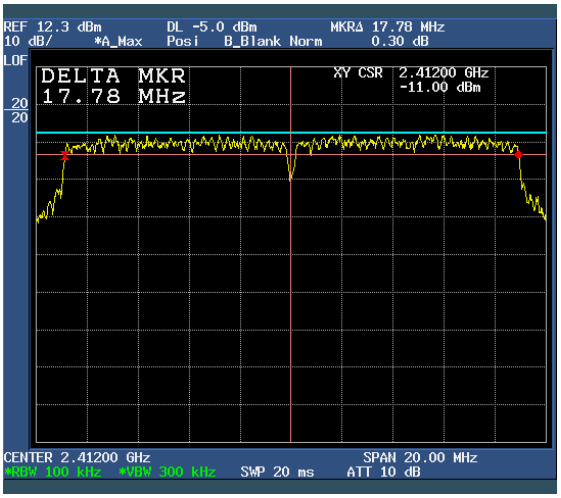

REF 12.3 dBm
DL -2.0 dBm
MKRΔ 16.52 MHz
10 dB/ *A_Max Posi B_Blank Norm -0.31 dB
LOF
DELTA MKR
16.52 MHz
XY CSR 2.44200 GHz
-8.00 dBm
CENTER 2.44200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB

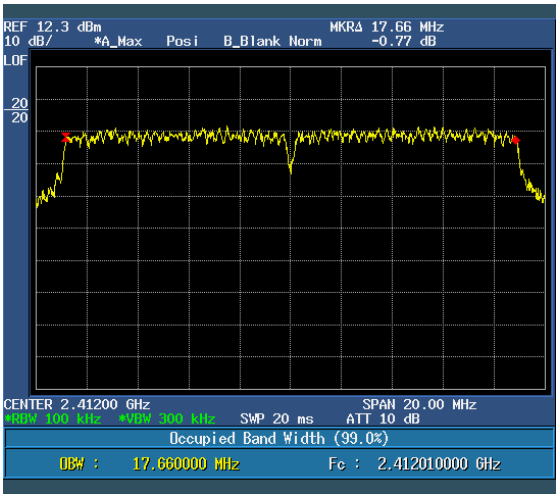

REF 12.3 dBm
MKRΔ 16.66 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.55 dB
LOF
CENTER 2.44200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB
Occupied Band Width (99.0%)
OBW : 16.660000 MHz
Fc : 2.441970000 GHz

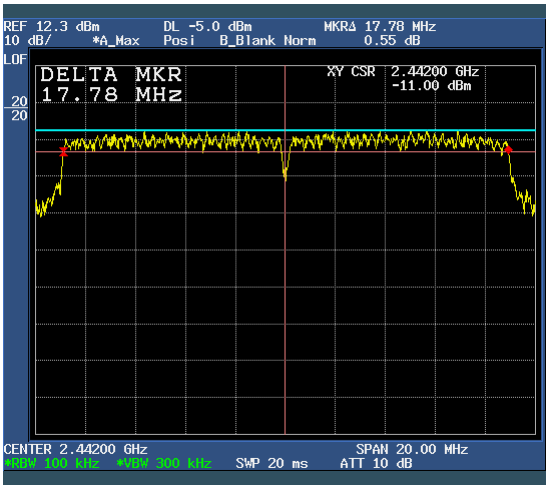

REF 12.3 dBm
DL -2.0 dBm
MKRΔ 16.52 MHz
10 dB/ *A_Max Posi B_Blank Norm -0.62 dB
LOF
DELTA MKR
16.52 MHz
XY CSR 2.47200 GHz
-8.00 dBm
CENTER 2.47200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB

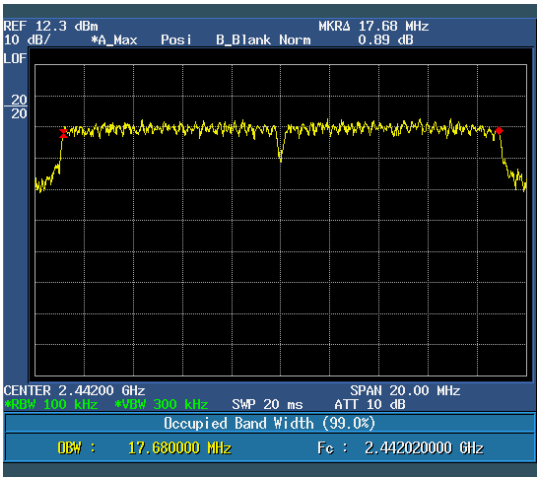

REF 12.3 dBm
MKRΔ 16.74 MHz
10 dB/ *A_Max Posi B_Blank Norm 0.86 dB
LOF
CENTER 2.47200 GHz
SPAN 20.00 MHz
*RBW 100 kHz *VBW 300 kHz SWP 20 ms ATT 10 dB
Occupied Band Width (99.0%)
OBW : 16.740000 MHz
Fc : 2.471950000 GHz

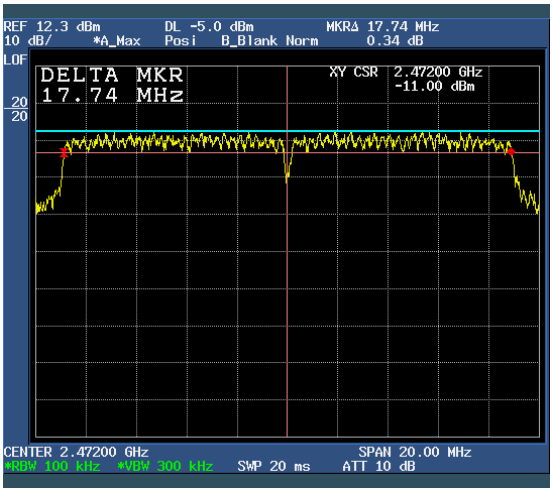
IEE 802.11n(HT20)

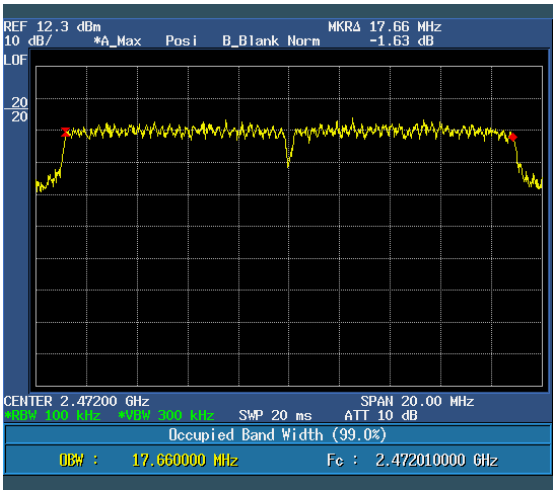




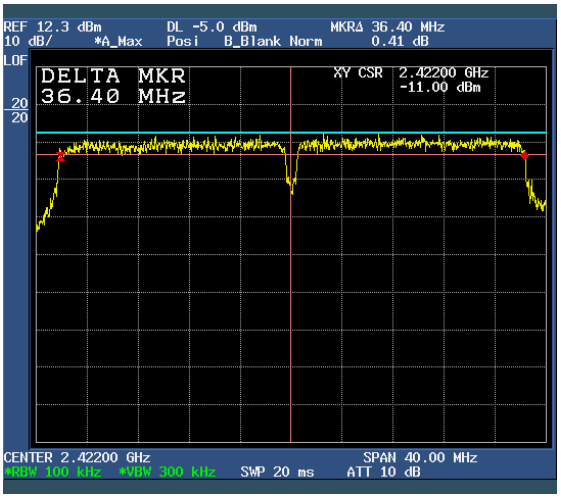


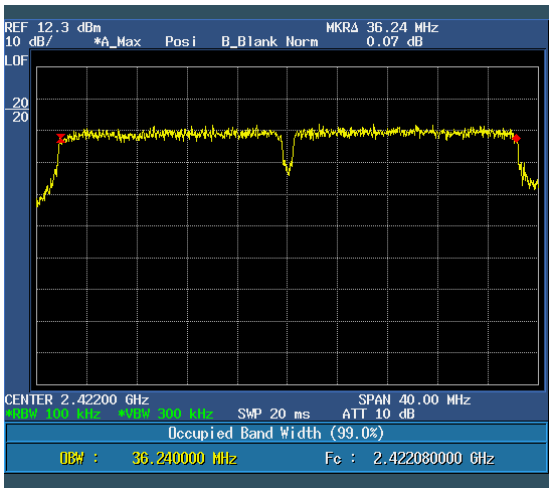


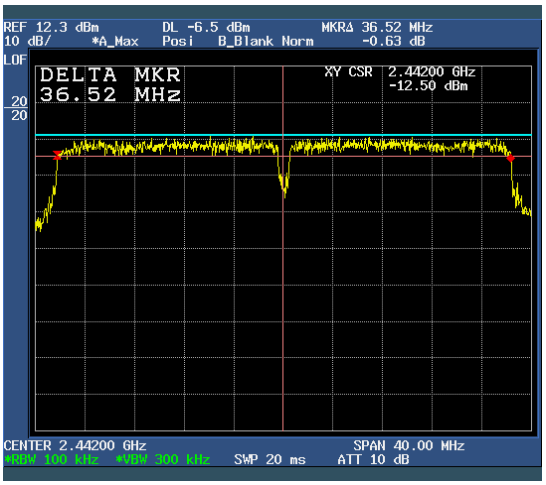


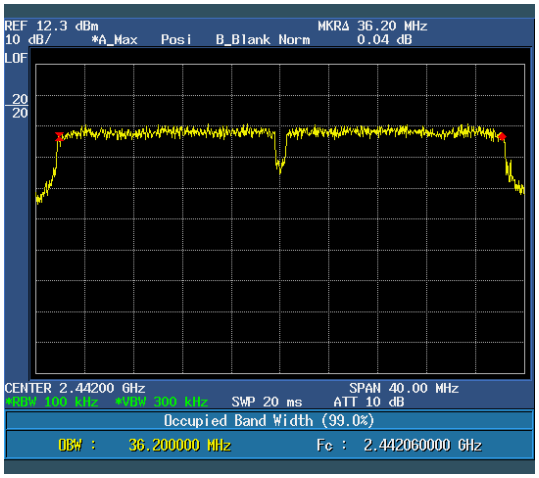


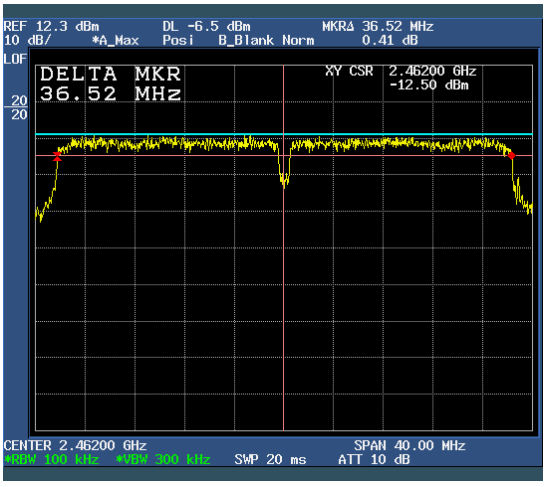
IEE 802.11n(HT40)

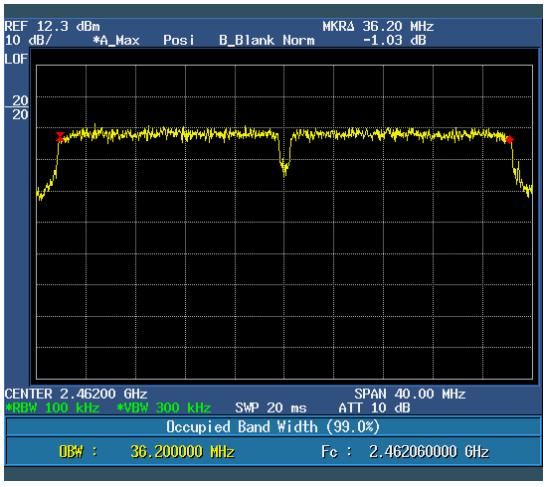












6.2 Max. Conducted peak output power

6.2.1 Standard Applicable [FCC §15.247(b)(1)]

For systems using digital modulation in the 2400 MHz ~ 2 483.5 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.

6.2.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

The maximum peak conducted output power can be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast, average-responding diode type sensor.

6.2.3 Measurement Procedure

① Reference frequency generated from the signal generator is supply to power meter input port via RF cable and attenuator, and then, it's apply to offset value on power meter as follows ;

② Remove the antenna from the EUT and then connected to power meter via a suitable low loss RF cable and attenuator.

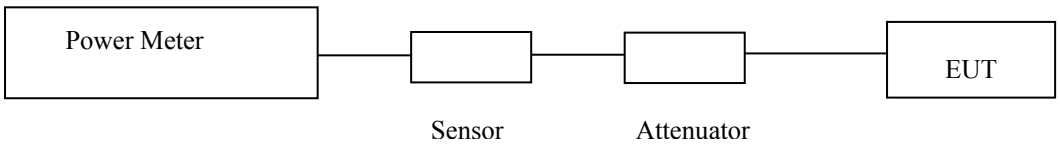
③ Place the EUT on the table and set it function disable at the lowest, middle and the highest available channels.

④ Power meter was used to directly measure the output power from RF output port on the EUT in continuously transmitting modulation

⑤ The indicated level is the peak output power.

⑥ Please refer to the detailed procedure method FCC Public Notice(KDB 558074 D01)

6.2.4 Test Setup Configuration



• Power Meter : ML2495A (Anritsu)

• Power Sensor : MA2445D (Anritsu)

• Detector mode : peak

6.2.5 Measurement Result

1) IEEE 802.11b

Channel No.	Frequency [MHz]	Test Results		
		Measured power [dBm] *	Limit [W]	Result
1	2 412	9.75	≤ 1	Pass
7	2 442	10.06		Pass
13	2 472	10.41		Pass

* it is conducted power

2) IEEE 802.11g

Channel No.	Frequency [MHz]	Test Results		
		Measured power [dBm] *	Limit [W]	Result
1	2 412	8.30	≤ 1	Pass
7	2 442	8.82		Pass
13	2 472	9.06		Pass

* it is conducted power

3) IEEE 802.11n(HT20)

Channel No.	Frequency [MHz]	Test Results		
		Measured power [dBm] *	Limit [W]	Result
1	2 412	6.57	≤ 1	Pass
7	2 442	7.37		Pass
13	2 472	7.16		Pass

* it is conducted power

4) IEEE 802.11n(HT40)

Channel No.	Frequency [MHz]	Test Results		
		Measured power [dBm] *	Limit [W]	Result
3	2 422	4.92	≤ 1	Pass
7	2 442	4.71		Pass
11	2 462	4.75		Pass

* it is conducted power

6.3 Conducted peak power spectral density

6.3.1 Standard Applicable [FCC §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 transmit

6.3.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.3.3 Measurement Procedure

The power spectral density conducted from the intentional radiator was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its function disable at the highest, middle and the lowest available channels. This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum conducted output power was used to demonstrate compliance.

The spectrum analyzer is set to the as follows :

• RBW : ≥ 3 kHz

• VBW : ≥ 3 x RBW

• Sweep : auto

• Detector function : peak

• Trace : max hold

6.3.4 Measurement Result

1) IEEE 802.11b

Channel NO.	Frequency [MHz]	Test Results		
		Measured PSD [dBm]	Limit	Result
1	2 412	-10.96	8 dBm	Pass
7	2 442	-10.36		Pass
13	2 472	-10.02		Pass

2) IEEE 802.11g

Channel NO.	Frequency [MHz]	Test Results		
		Measured PSD [dBm]	Limit	Result
1	2 412	-16.09	8 dBm	Pass
7	2 442	-15.04		Pass
13	2 472	-15.20		Pass

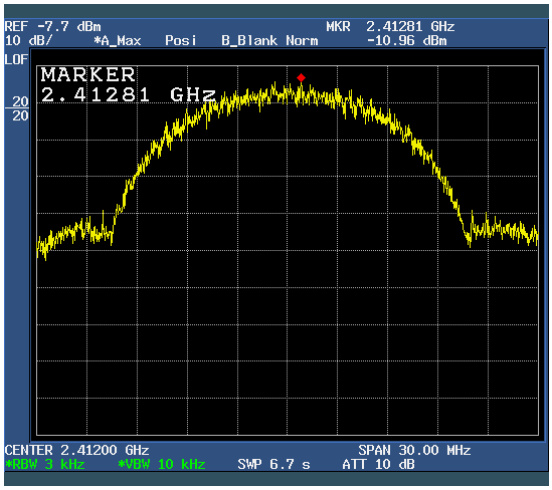
3) IEEE 802.11n(HT20)

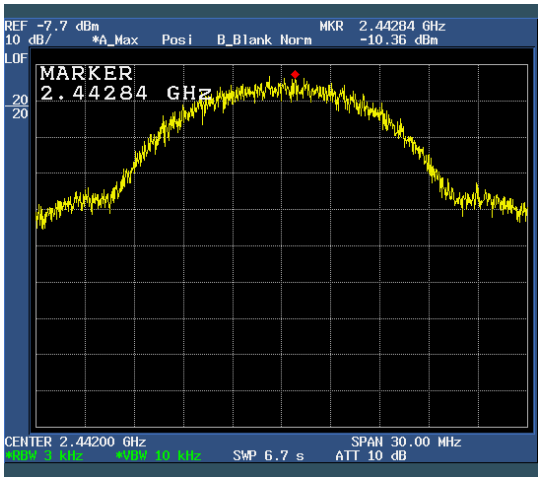
Channel NO.	Frequency [MHz]	Test Results		
		Measured PSD [dBm]	Limit	Result
1	2 412	-18.05	8 dBm	Pass
7	2 442	-17.46		Pass
13	2 472	-17.29		Pass

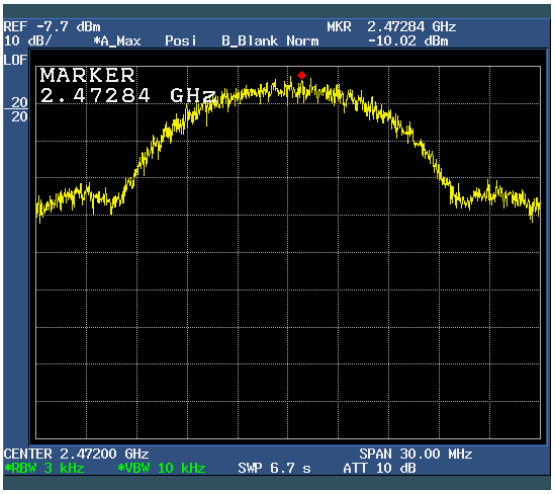
4) IEEE 802.11n(HT40)

Channel NO.	Frequency [MHz]	Test Results		
		Measured PSD [dBm]	Limit	Result
3	2 422	-19.08	8 dBm	Pass
7	2 442	-19.04		Pass
11	2 462	-18.39		Pass

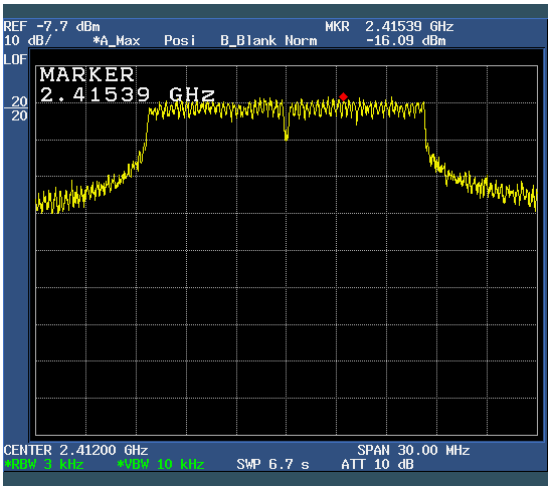
IEEE 802.11b

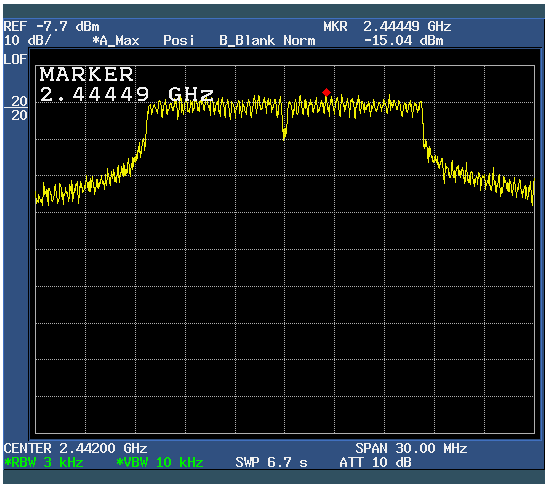

REF -7.7 dBm
MKR 2.41281 GHz
10 dB/ *A_Max Posi B_Blank Norm -10.96 dBm
LOF
MARKER
2.41281 GHz
CENTER 2.41200 GHz
SPAN 30.00 MHz
*RBW 3 kHz *VBW 10 kHz SWP 6.7 s ATT 10 dB

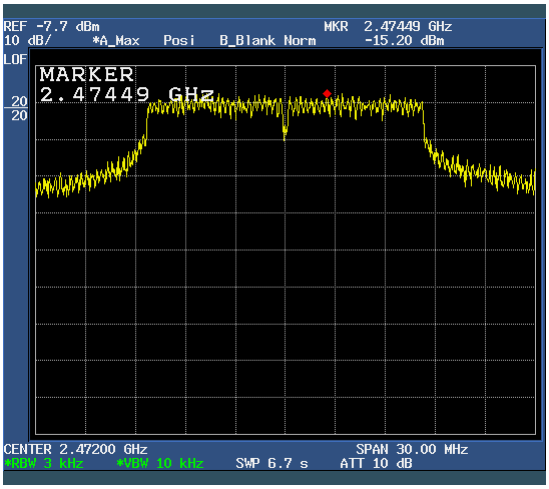

REF -7.7 dBm
MKR 2.44284 GHz
10 dB/ *A_Max Posi B_Blank Norm -10.36 dBm
LOF
MARKER
2.44284 GHz
CENTER 2.44200 GHz
SPAN 30.00 MHz
*RBW 3 kHz *VBW 10 kHz SWP 6.7 s ATT 10 dB


REF -7.7 dBm
MKR 2.47284 GHz
10 dB/ *A_Max Posi B_Blank Norm -10.02 dBm
LOF
MARKER
2.47284 GHz
CENTER 2.47200 GHz
SPAN 30.00 MHz
*RBW 3 kHz *VBW 10 kHz SWP 6.7 s ATT 10 dB

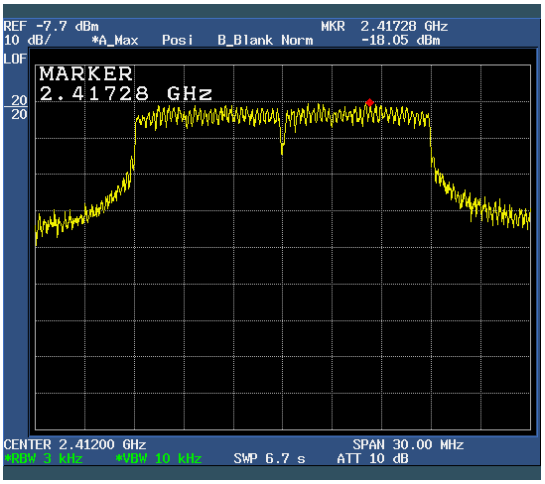
IEEE 802.11g

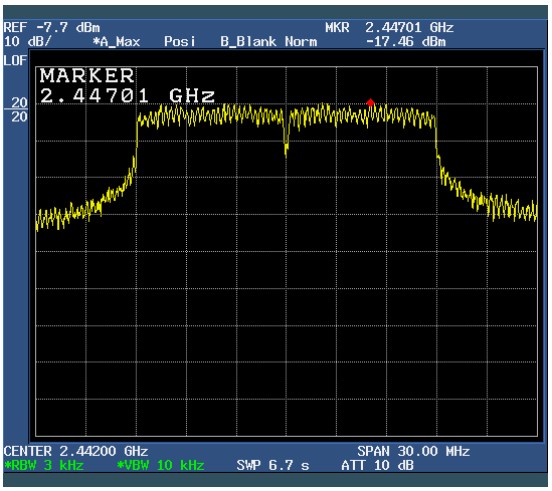

REF -7.7 dBm
MKR 2.41539 GHz
10 dB/ *A_Max Posi B_Blank Norm -16.09 dBm
LOF
MARKER
2.41539 GHz
CENTER 2.41200 GHz
SPAN 30.00 MHz
*RBW 3 kHz *VBW 10 kHz SWP 6.7 s ATT 10 dB

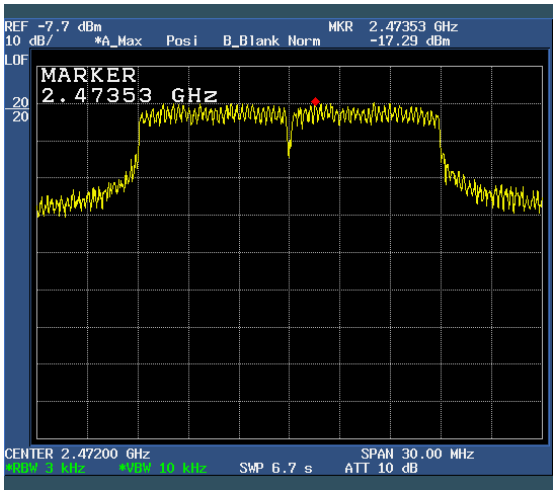

REF -7.7 dBm
MKR 2.44449 GHz
10 dB/ *A_Max Posi B_Blank Norm -15.04 dBm
LOF
MARKER
2.44449 GHz
CENTER 2.44200 GHz
SPAN 30.00 MHz
*RBW 3 kHz *VBW 10 kHz SWP 6.7 s ATT 10 dB


REF -7.7 dBm
MKR 2.47449 GHz
10 dB/ *A_Max Posi B_Blank Norm -15.20 dBm
LOF
MARKER
2.47449 GHz
CENTER 2.47200 GHz
SPAN 30.00 MHz
*RBW 3 kHz *VBW 10 kHz SWP 6.7 s ATT 10 dB

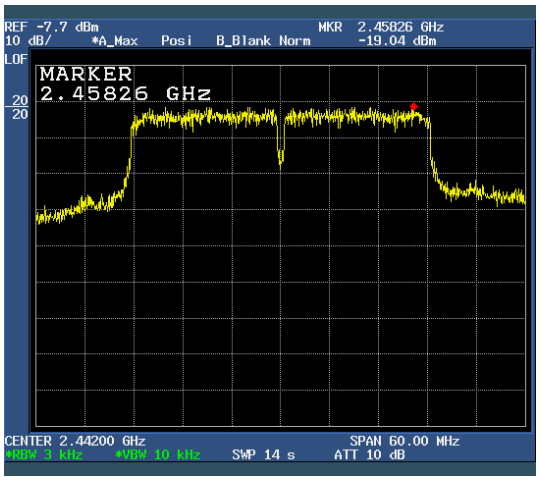
IEEE 802.11n(HT20)

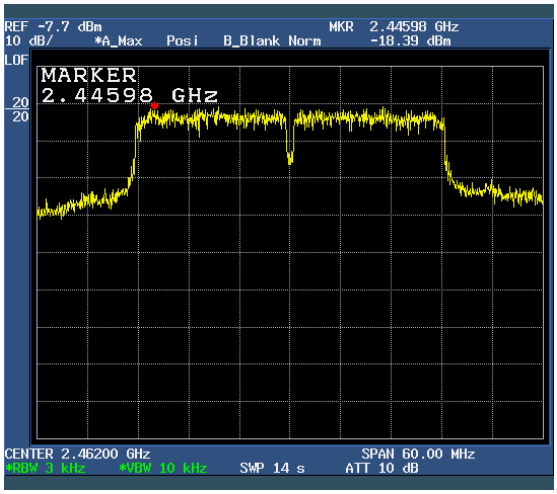






IEEE 802.11n(HT40)





6.4 Band-edge Compliance of RF Conducted emissions

6.4.1 Standard Applicable [FCC §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 RF conducted.

6.4.2 Test Environment conditions

• Ambient temperature : 21 ℃,

• Relative Humidity : (55 ~ 56) % R.H.

6.4.3 Measurement Procedure

① Pre-calibration for the spectrum analyzer has to be done first through a reference CW signal from CAL OUT (-10 dBm)

② Reference frequency generated from the signal generator is supply to spectrum analyzer input port via RF cable and attenuator, and then, it's apply to offset value on spectrum analyzer as follows ;

③ Remove the antenna from the EUT and then, connected to spectrum analyzer via a dc Block, suitable low loss RF cable and attenuator.

④ Place the EUT on the table and set on the emission at the band-edge,

⑤ After the trace being stable, Use the marker-to-peak function to move the marker to the peak of the in-band emission.

⑥ The marker-delta value now displayed must comply with the limit specified in above standard.

⑦ please refer to the detailed procedure method FCC Public Notice(DA 00-705)

The spectrum analyzer is set to the as follows :

• Span : Wide enough to capture the peak level of the emission operating on the channel closet to the Band-edge, as well as any modulation products which fall outside of the authorized band of operation

• RBW : ≥ 1 % of the span

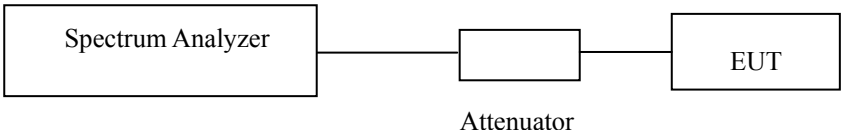
• VBW : ≥ RBW

• Sweep : auto

• Detector function : peak

• Trace : Max hold

6.4.4 Test Setup Configuration



Attenuator

6.4.5 Measurement Result

1) IEEE 802.11b

Setting Channel (NO.)	Frequency [MHz]	Test Results		
		Measured value [dBc]	Limit [dBc]	Result
Lowest channel (1)	2412	-38.16	≤ - 20	Pass
Highest channel (13)	2472	-32.63		Pass

2) IEEE 802.11g

Setting Channel (NO.)	Frequency [MHz]	Test Results		
		Measured value [dBc]	Limit [dBc]	Result
Lowest channel (1)	2412	-27.63	≤ - 20	Pass
Highest channel (13)	2472	-24.78		Pass

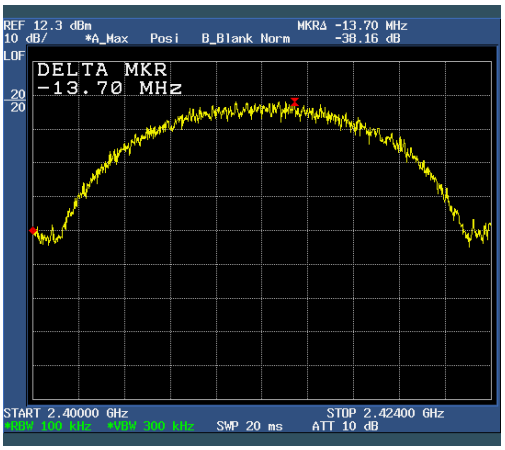
3) IEEE 802.11n(HT20)

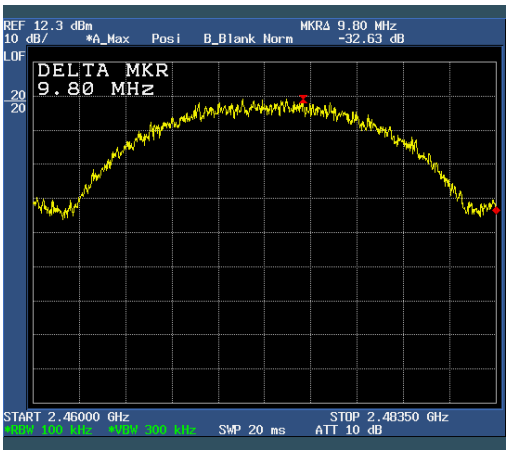
Setting Channel (NO.)	Frequency [MHz]	Test Results		
		Measured value [dBc]	Limit [dBc]	Result
Lowest channel (1)	2412	-30.90	≤ - 20	Pass
Highest channel (13)	2472	-25.20		Pass

4) IEEE 802.11n(HT40)

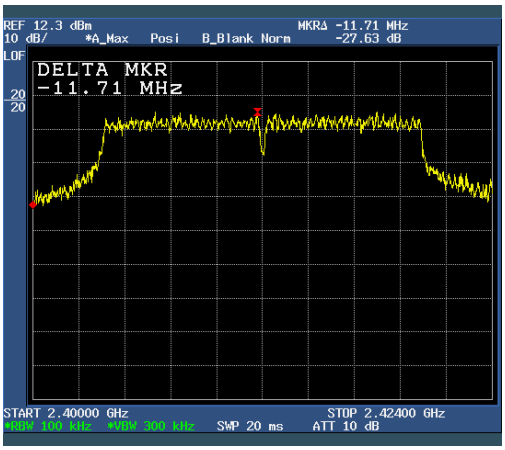
Setting Channel (NO.)	Frequency [MHz]	Test Results		
		Measured value [dBc]	Limit [dBc]	Result
Lowest channel (3)	2422	-28.59	≤ - 20	Pass
Highest channel (11)	2462	-24.85		Pass

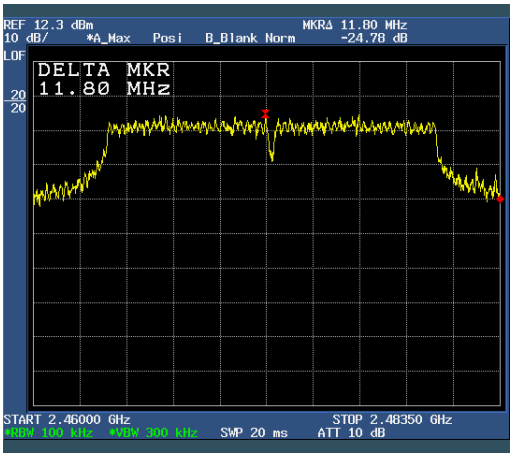
IEEE 802.11b



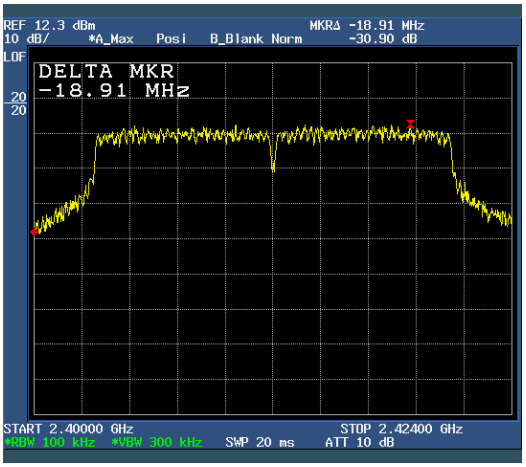


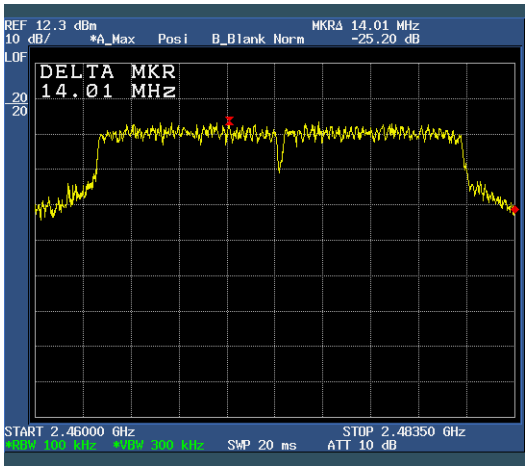
IEEE 802.11g



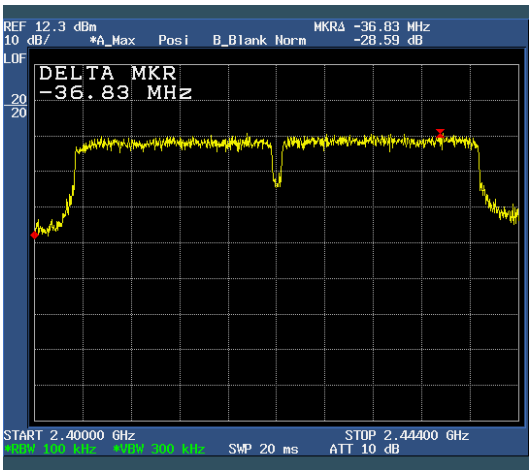


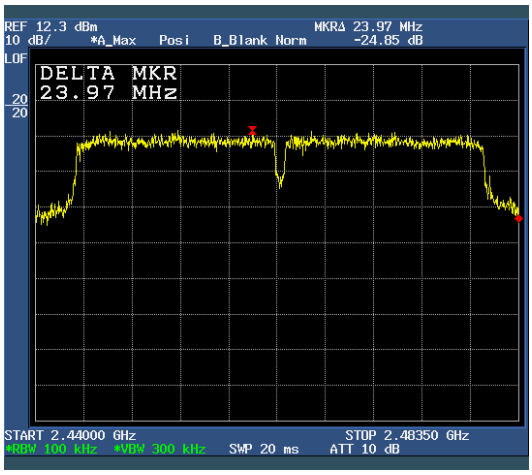
IEEE 802.11n(HT20)





IEEE 802.11n(HT40)





6.5 Band-edge Compliance of RF Radiated emissions

6.5.1 Standard Applicable [FCC §15.247]

The band-edge emissions outside these bands 2400 MHz ~ 2 483.5 MHz in which operating the hopping modulated intentional radiator is required comply with the provisions in above Required standard with respect to emission falling within restricted frequency bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) Above limitation value is refer to Table [1] & [2] of Clause 5.9.1

6.5.2 Test Environment conditions

• Ambient temperature : 21 ℃,

• Relative Humidity : (55 ~ 56) % R.H.

6.5.3 Measurement Procedure

please refer to the clause 5.9.3

6.5.4 Test Setup Configuration

please refer to the clause 5.9.5

6.5.5 Measurement Result

1) IEEE 802.11b

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2398.608	32.62	30.45	74	63.07	Pass	Peak
2398.608	18.22	30.45	54	48.67	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2485.068	34.98	30.63	74	65.61	Pass	Peak
2485.068	18.72	30.63	54	49.35	Pass	Average

Emission Level (dBuV/m) = Reading Level + Correct Factor.

Note : Correct Factor = AF + CL

AF : Antenna Factor

CL : Cable Loss

2) IEEE 802.11g

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2399.059	36.48	30.46	74	66.94	Pass	Peak
2399.059	18.30	30.46	54	48.76	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2483.896	41.32	30.61	74	71.93	Pass	Peak
2483.896	20.24	30.61	54	50.85	Pass	Average

Emission Level(dBuV/m) = Reading Level + Correct Factor.

Note : Correct Factor = AF + CL

AF : Antenna Factor

CL : Cable Loss

3) IEEE 802.11n(HT20)

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2397.338	32.79	30.44	74	63.23	Pass	Peak
2397.338	17.81	30.44	54	48.25	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2483.542	36.82	30.59	74	67.41	Pass	Peak
2483.542	18.65	30.59	54	49.24	Pass	Average

Emission Level(dBuV/m) = Reading Level + Correct Factor.

Note : Correct Factor = AF + CL

AF : Antenna Factor

CL : Cable Loss

4) IEEE 802.11n(HT40)

▣ Low band (2310 MHz ~ 2400 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2377.963	32.34	30.21	74	62.55	Pass	Peak
2377.963	17.37	30.21	54	47.58	Pass	Average

▣ High band (2483.5 MHz ~ 2500 MHz)

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Result (dBuV/m)	Result	Mode
2483.726	32.80	30.60	74	63.40	Pass	Peak
2483.726	18.09	30.60	54	48.69	Pass	Average

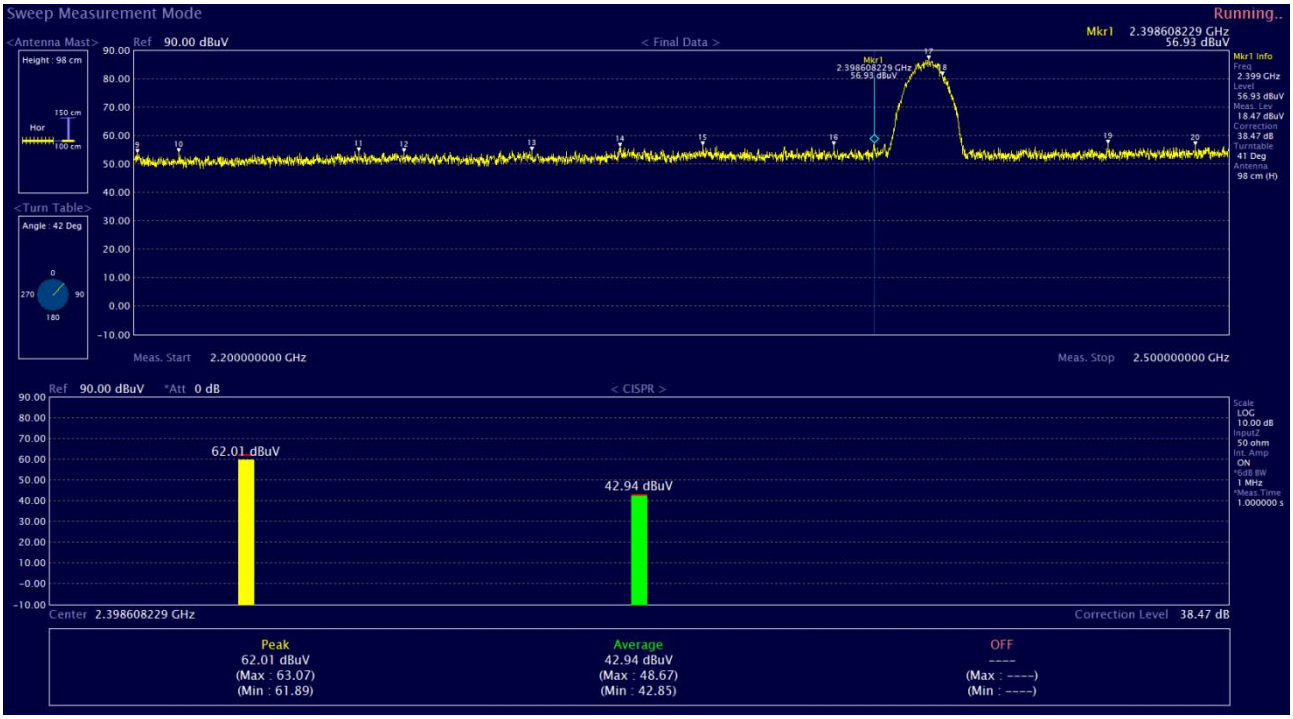
Emission Level(dBuV/m) = Reading Level + Correct Factor.

Note : Correct Factor = AF + CL

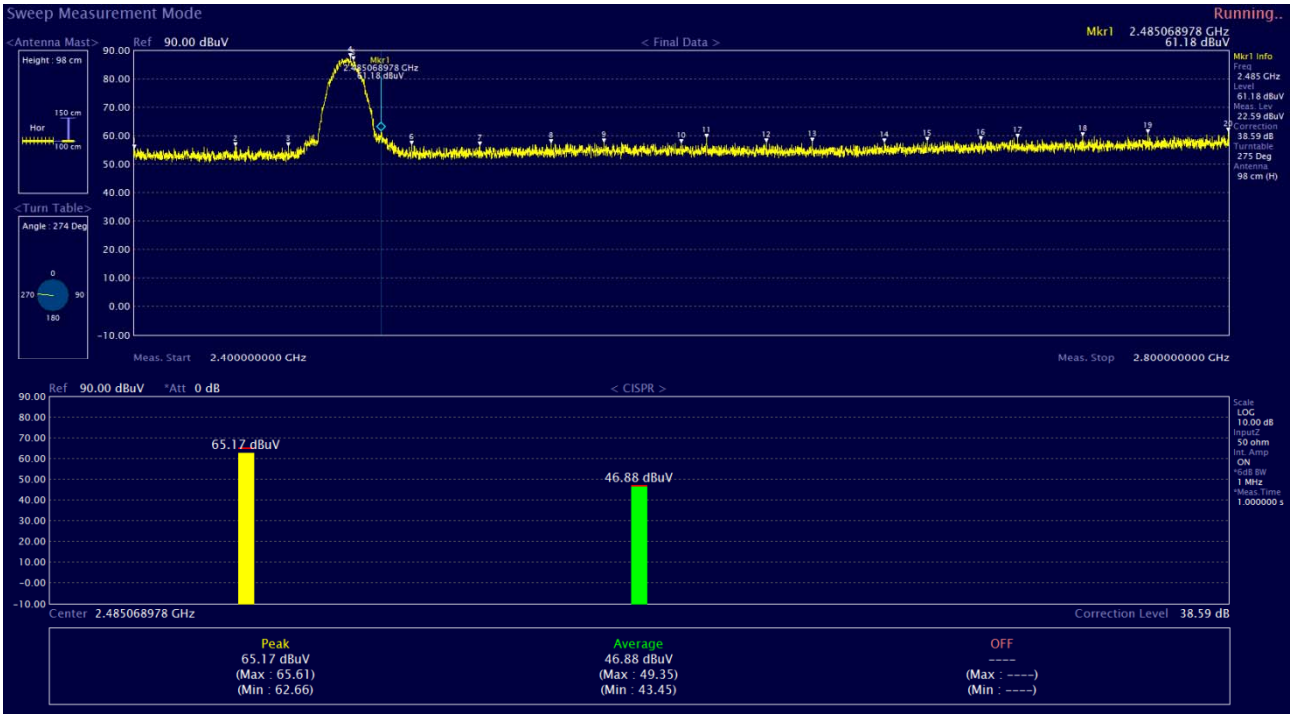
AF : Antenna Factor

CL : Cable Loss

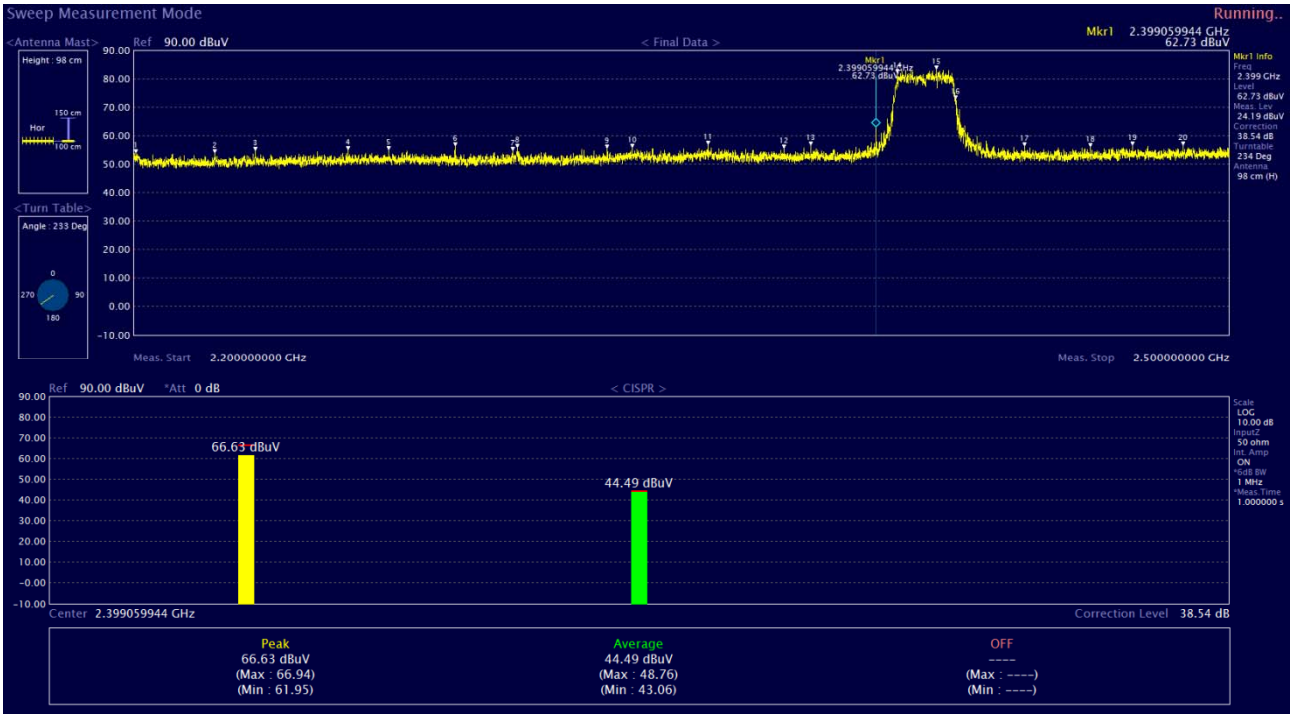
IEEE 802.11b Low band



IEEE 802.11b High band



IEEE 802.11g Low band



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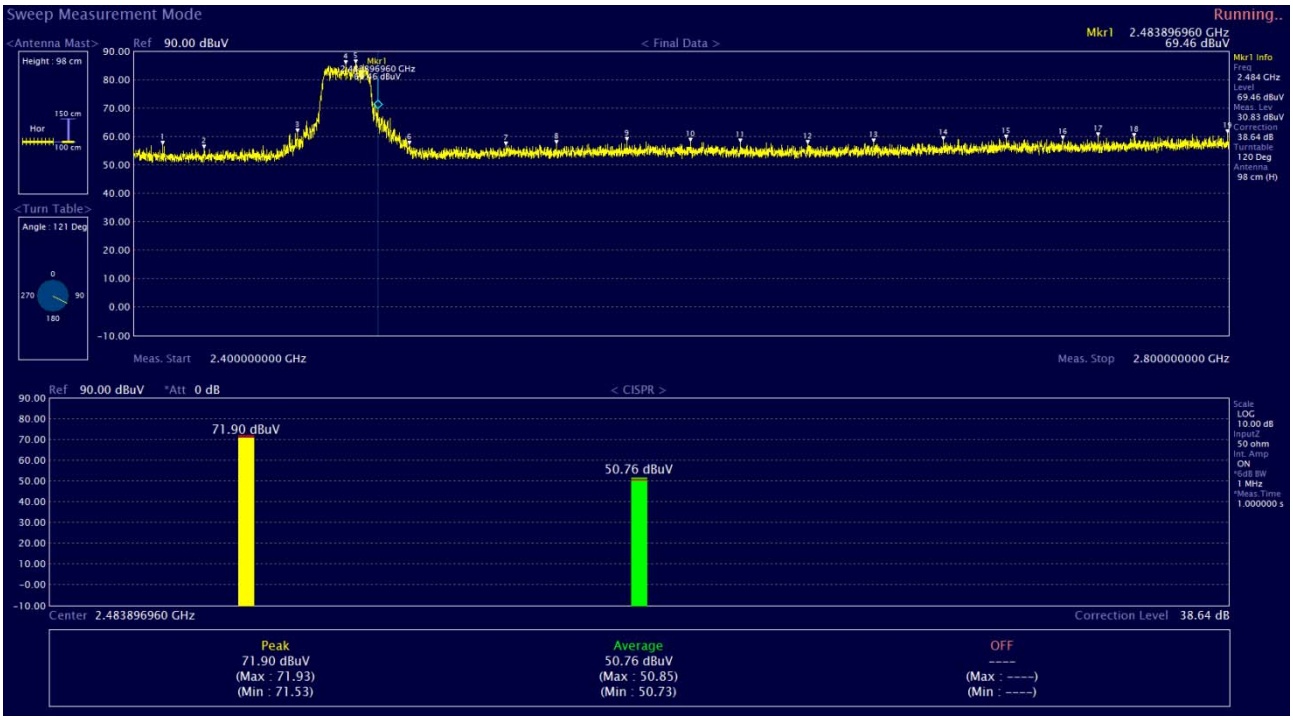
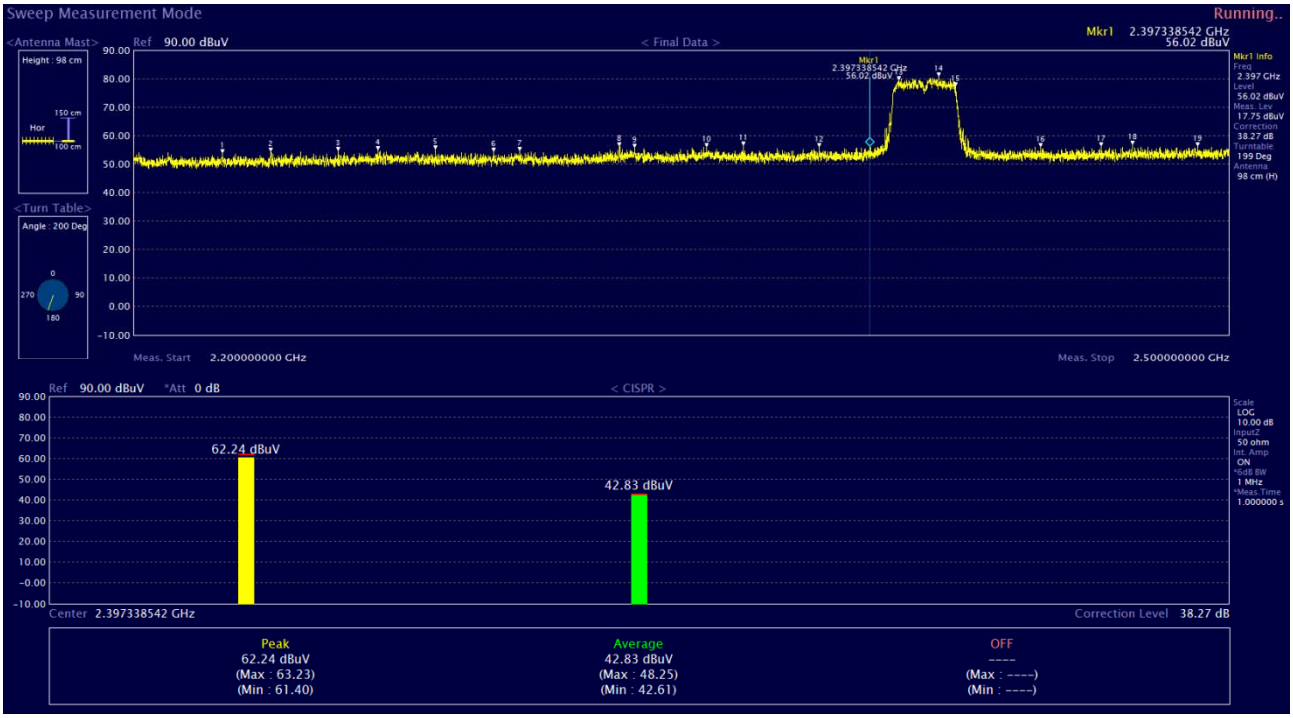


IEEE 802.11n(HT20) Low Band



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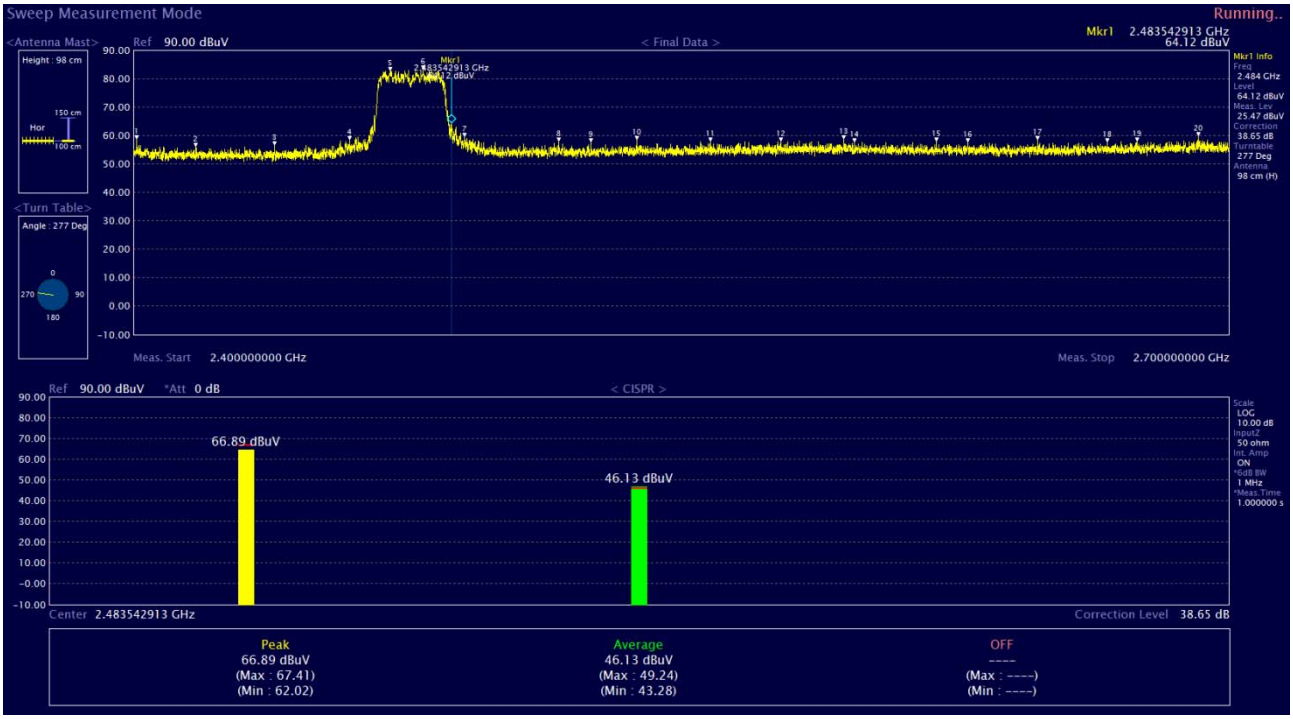
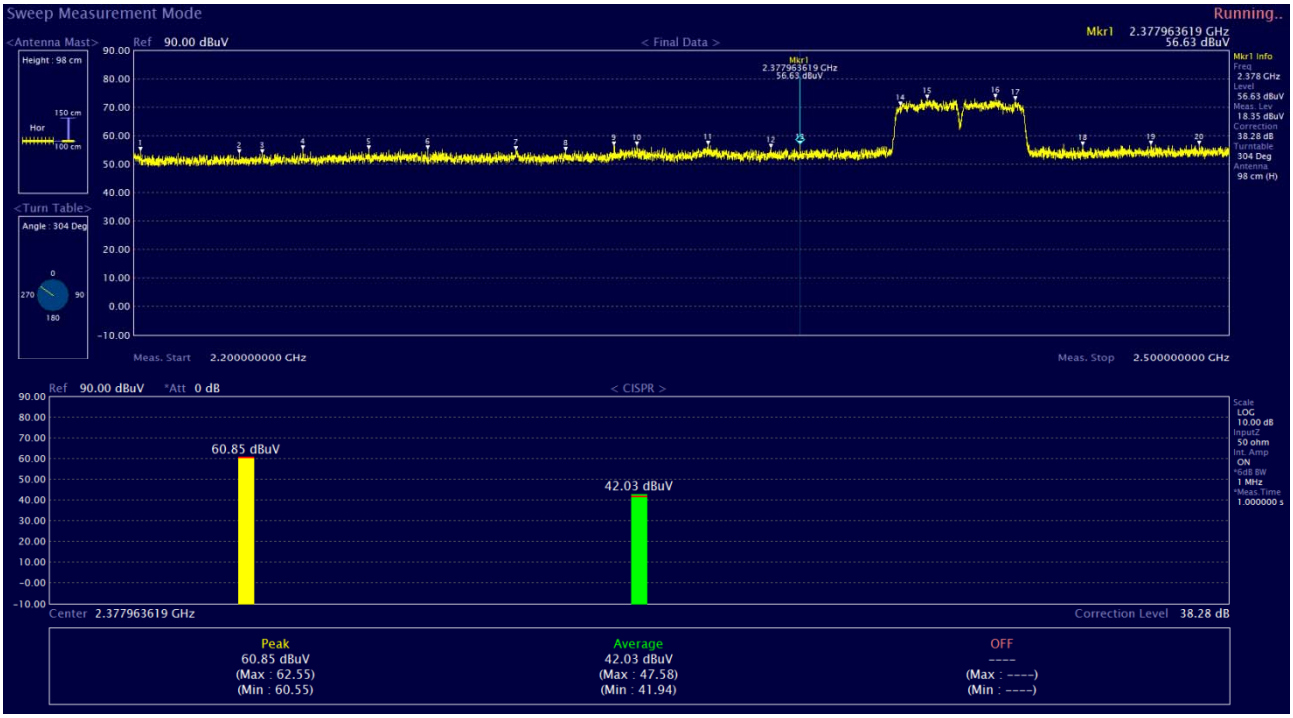
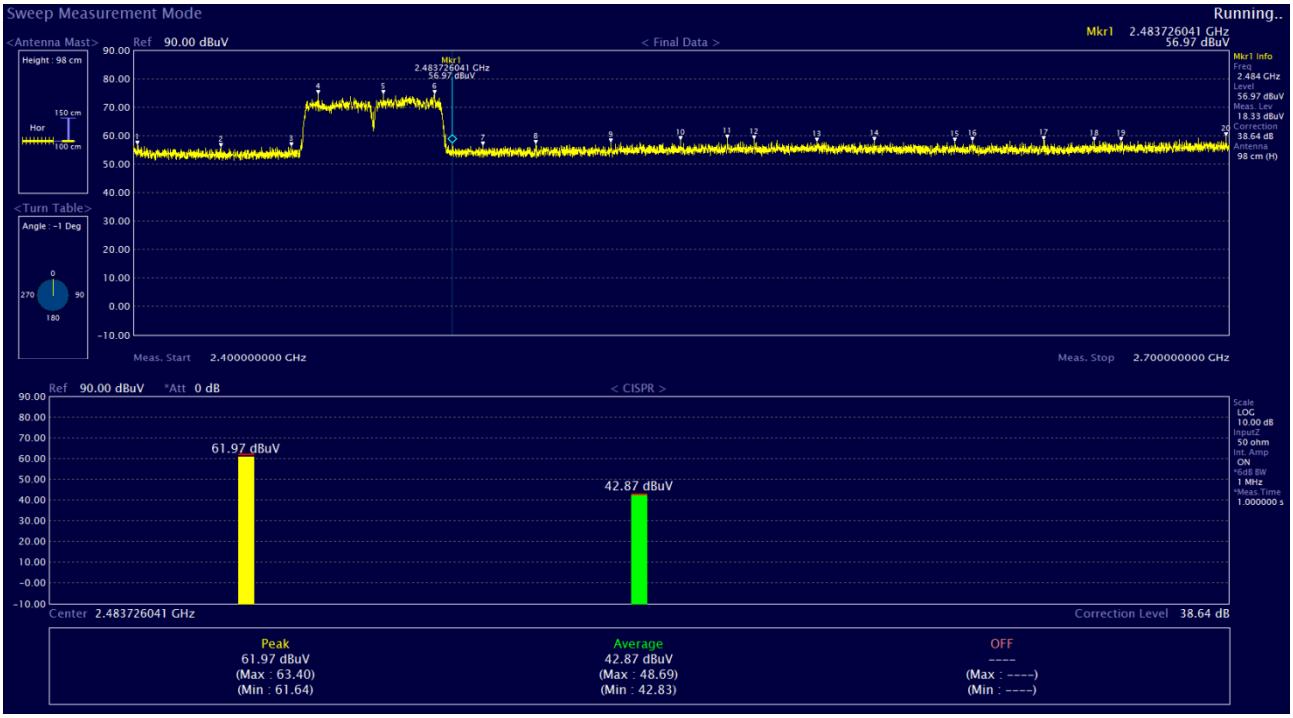


IEEE 802.11n(HT40) Low Band



IEEE 802.11n(HT40) High Band



6.6 Spurious RF Conducted emissions

6.6.1 Standard Applicable [FCC §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.

6.6.2 Test Environment conditions

• Ambient temperature : 22 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.6.3 Measurement Procedure

① Pre-calibration for the spectrum analyzer has to be done first through a reference CW signal from CAL OUT(-10 dBm)

② Reference frequency generated from the signal generator is supply to spectrum analyzer input port via RF cable and attenuator, and then, it's apply to offset value on spectrum analyzer as follows ;

③ Remove the antenna from the EUT and then, connected to spectrum analyzer via a dc Block, suitable low loss RF cable and attenuator.

④ Place the EUT on the table and set on the emission at the out band

⑤ After the trace being stable, Use the marker-to-peak function to move the marker to the peak of the in-band emission.

⑥ The marker-delta value now displayed spurious emission must comply with the limit specified in above standard.

⑦ please refer to the detailed procedure method FCC Public Notice(DA 00-705)

The spectrum analyzer is set to the as follows :

• Span : wide enough to capture the peak level of the in-band emission and all spurious emissions from the Lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

• RBW : 100 kHz

• VBW : ≥ RBW

• Sweep : Auto

• Detector function : Peak

• Trace : Max hold

6.6.4 Measurement Result

1) IEEE 802.11b

Channel NO.	Frequency	Frequency Range	Test Results		
			Measured value [dBc]	Limit [dBc]	Result
1	2412 MHz	30 MHz ~ 2.5 GHz	-59.77	≤ - 20	Pass
		2 GHz ~ 26.5 GHz	-51.89		Pass
7	2442 MHz	30 MHz ~ 2.5 GHz	-58.79		Pass
		2 GHz ~ 26.5 GHz	-50.80		Pass
13	2472 MHz	30 MHz ~ 3.0 GHz	-54.02		Pass
		2 GHz ~ 26.5 GHz	-47.97		Pass

*Note : Continuous modulation mode and Harmonic level is 20dB below within the band that contains the highest level of the desired power

2) IEEE 802.11g

Channel NO.	Frequency	Frequency Range	Test Results		
			Measured value [dBc]	Limit [dBc]	Result
1	2412 MHz	30 MHz ~ 2.5 GHz	-46.63	≤ - 20	Pass
		2 GHz ~ 26.5 GHz	-50.84		Pass
7	2442 MHz	30 MHz ~ 2.5 GHz	-45.02		Pass
		2 GHz ~ 26.5 GHz	-51.82		Pass
13	2472 MHz	30 MHz ~ 3.0 GHz	-44.45		Pass
		2 GHz ~ 26.5 GHz	-52.87		Pass

*Note : Continuous modulation mode and Harmonic level is 20dB below within the band that contains the highest level of the desired power

3) IEEE 802.11n(HT20)

Channel NO.	Frequency	Frequency Range	Test Results		
			Measured value [dBc]	Limit [dBc]	Result
1	2412 MHz	30 MHz ~ 2.5 GHz	-40.99	≤ - 20	Pass
		2 GHz ~ 26.5 GHz	-48.80		Pass
7	2442 MHz	30 MHz ~ 2.5 GHz	-38.98		Pass
		2 GHz ~ 26.5 GHz	-50.38		Pass
13	2472 MHz	30 MHz ~ 3.0 GHz	-36.77		Pass
		2 GHz ~ 26.5 GHz	-50.50		Pass

*Note : Continuous modulation mode and Harmonic level is 20dB below within the band that contains the highest level of the desired power

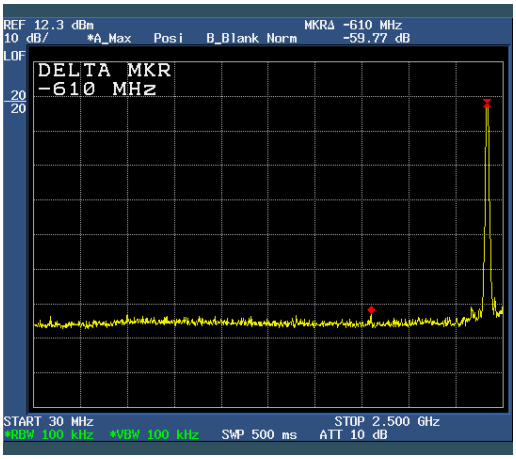
4) IEEE 802.11n(HT40)

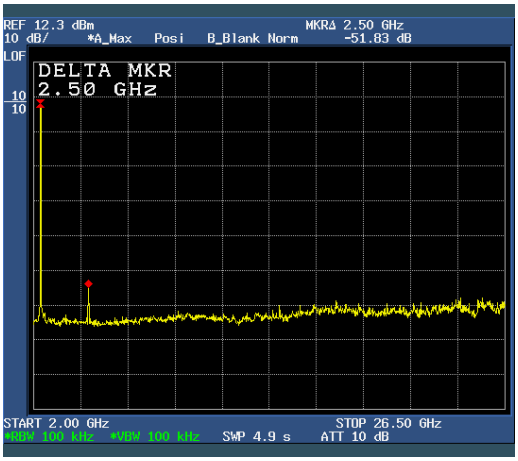
Channel NO.	Frequency	Frequency Range	Test Results		
			Measured value [dBc]	Limit [dBc]	Result
3	2422 MHz	30 MHz ~ 2.5 GHz	-42.63	≤ - 20	Pass
		2 GHz ~ 26.5 GHz	-48.66		Pass
7	2442 MHz	30 MHz ~ 2.5 GHz	-42.45		Pass
		2 GHz ~ 26.5 GHz	-47.95		Pass
11	2462 MHz	30 MHz ~ 3.0 GHz	-38.77		Pass
		2 GHz ~ 26.5 GHz	-47.63		Pass

*Note : Continuous modulation mode and Harmonic level is 20dB below within the band that contains the highest level of the desired power

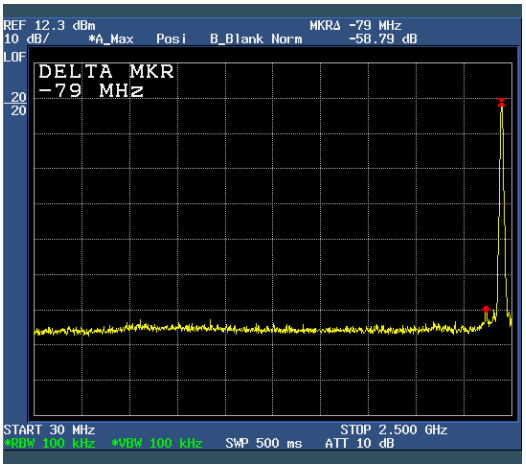
IEEE 802.11b

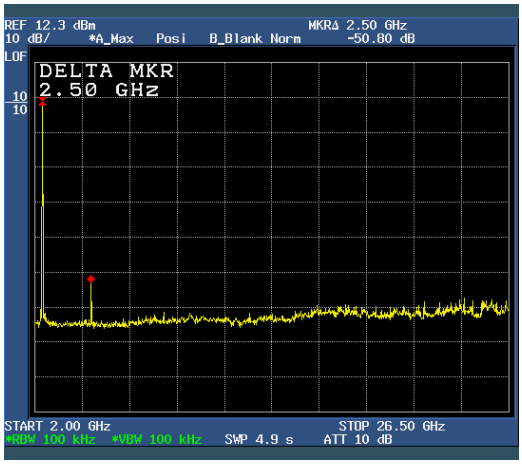
CH 1



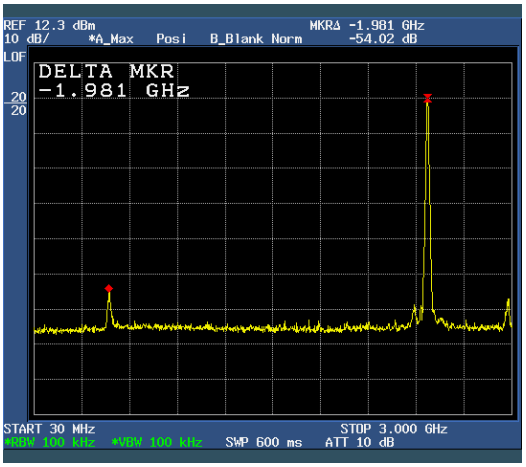


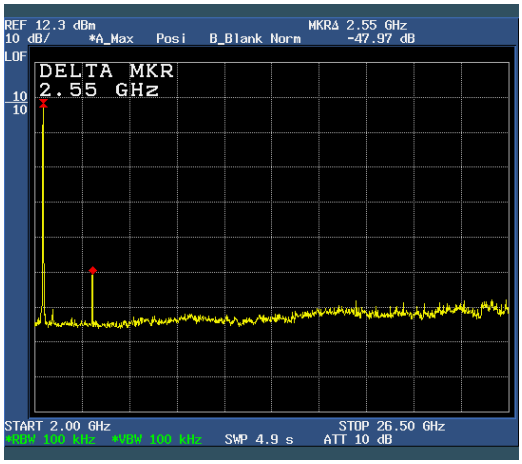
CH 7





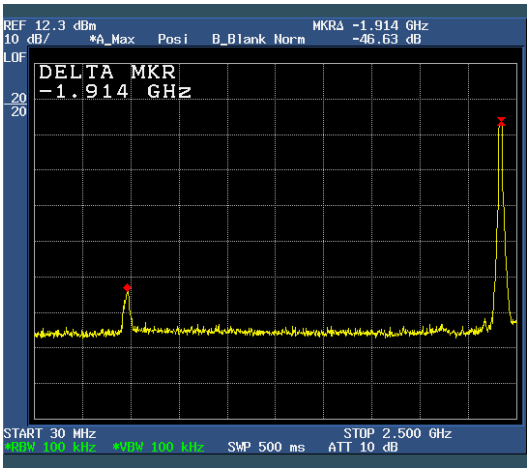
CH 13

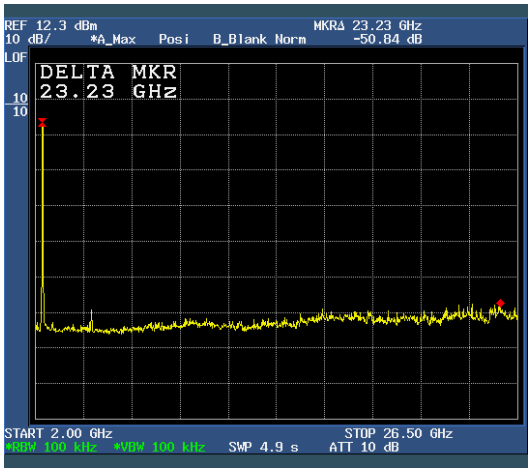




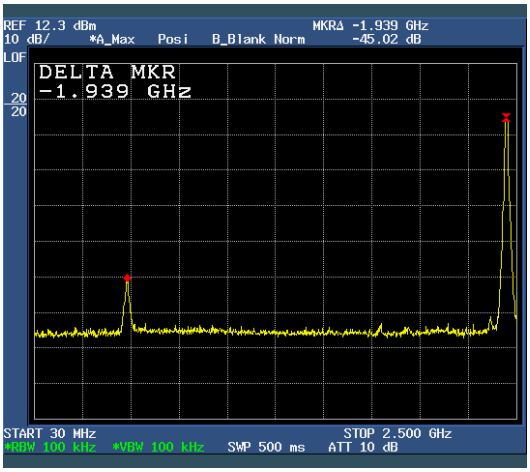
IEEE 802.11g

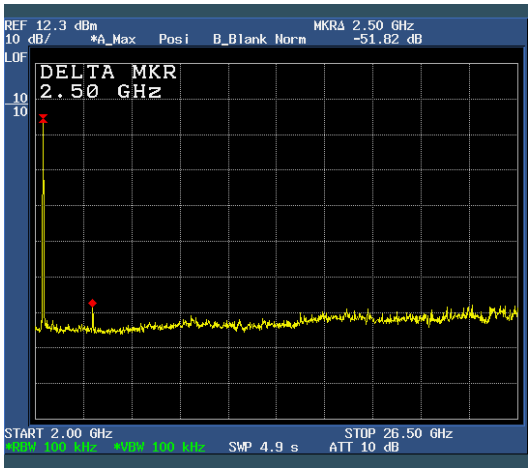
CH 1



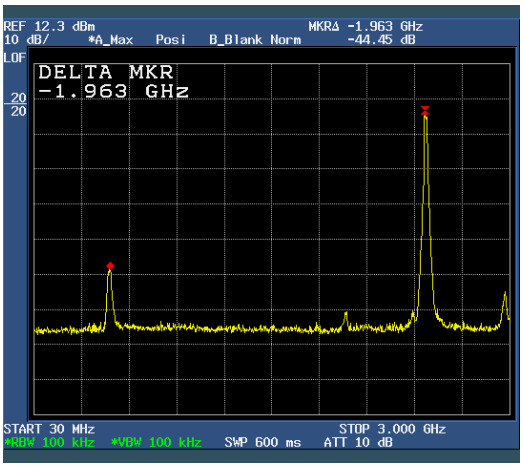


CH 7



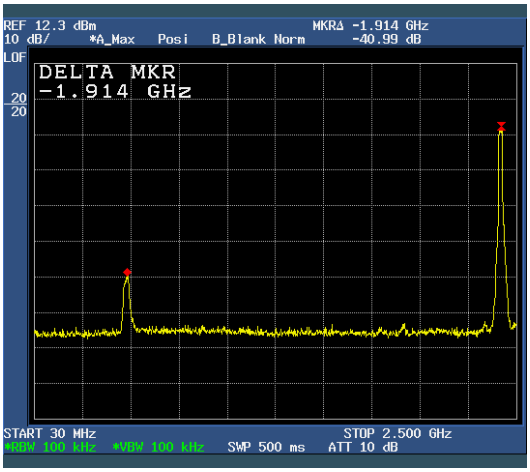


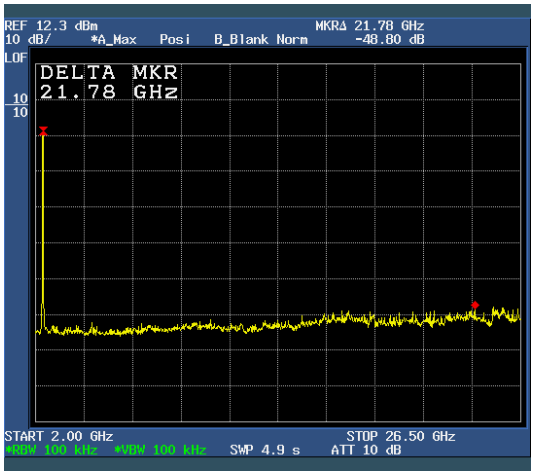
CH 13



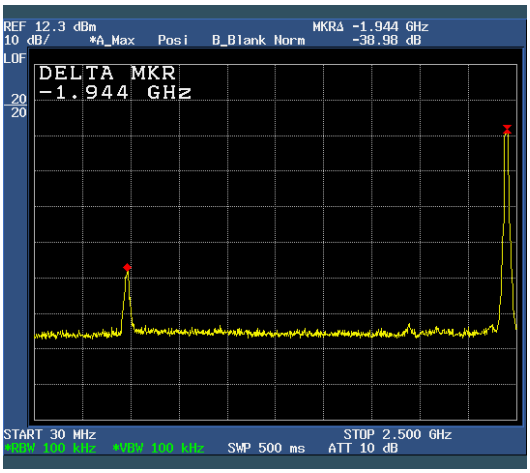
IEEE 802.11n(HT20)

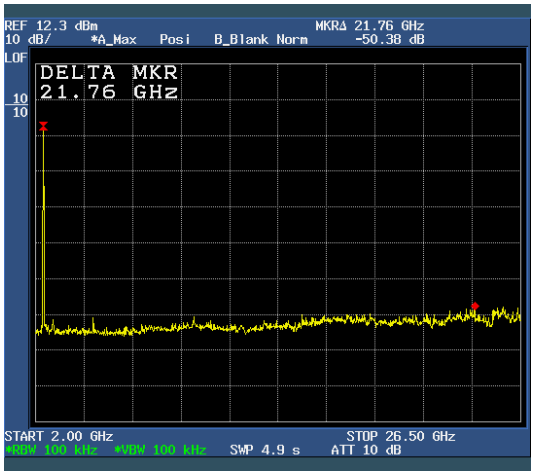
CH 1



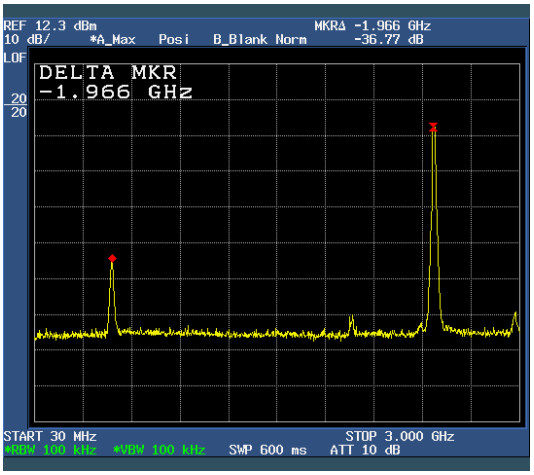


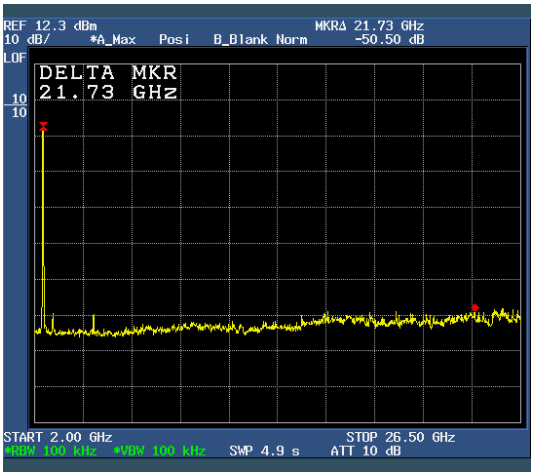
CH 7





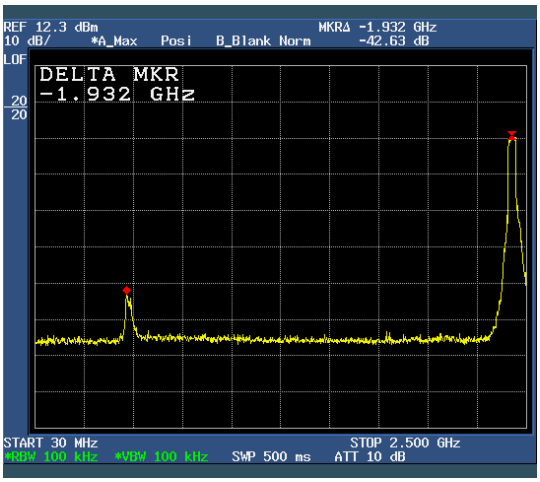
CH 13

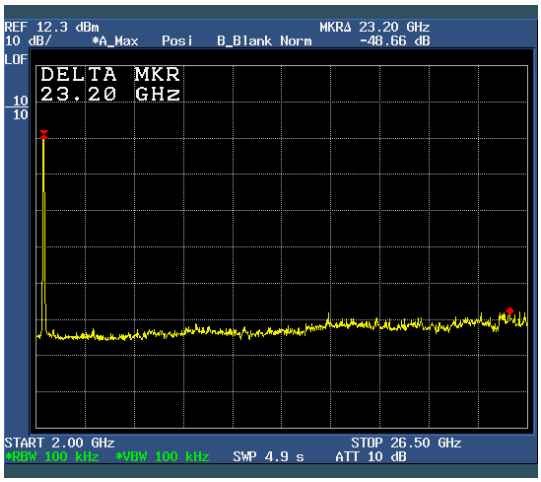




IEEE 802.11n(HT40)

CH 3





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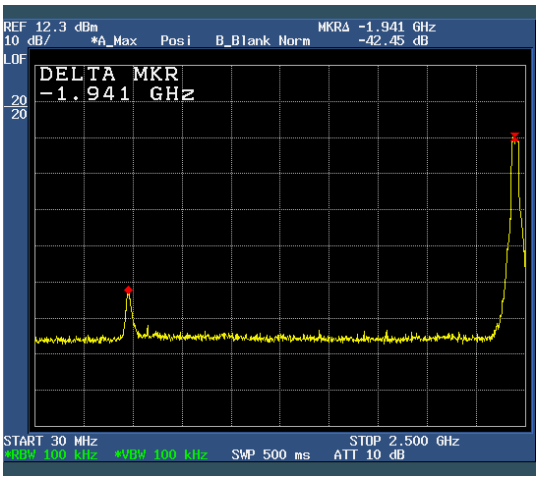
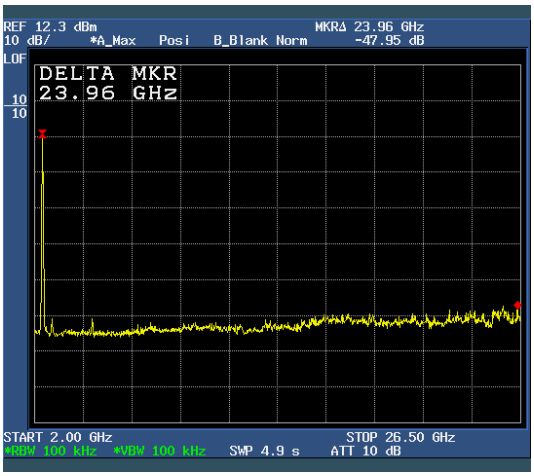
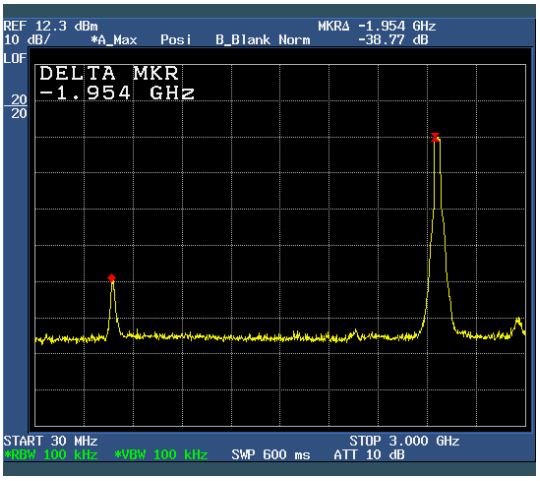




CH 11



6.7 Spurious RF Radiated emissions

6.7.1 Standard Applicable [FCC §15.247(d)]

All other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10 GHz, the frequency Range of measurements : to the tenth harmonic of the highest fundamental frequency or to 40 GHz, Whichever is lower. In addition, radiated emissions which fall in the restricted bands, as defined inSec.15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a)

§15.209. [Table 1] limits for radiated emissions measurements (distance at 3m)

Frequency Band [MHz]	Limit [μV/m]	Limit [dBμV/m]	Detector
30 - 88	100 **	40.00	Quasi peak
88 - 216	150 **	43.52	Quasi peak
216 - 960	200 **	46.02	Quasi peak
Above 960	500	54.00	Average

** fundamental emissions from intentional radiators operation under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz, or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part Section 15.231 and 15.241

§15.205. [Table 2] Restrict Band of Operation

Only spurious emissions are permitted in any of the frequency bands listed below ;			
[MHz]	[MHz]	[MHz]	[GHz]
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505**	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.
4.177 25 - 4.177 75	37.5 -38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 -1 722.2	13.25 - 13.
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.38 6 75	156.7 - 156.9	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 – 4 400	Above 38.6

** Until February 1, 1999, this restricted band shall be 0.490-0.510

6.7.2 Test Environment conditions

• Ambient temperature : 21 ℃,

• Relative Humidity : (54 ~ 55) % R.H.

6.7.3 Measurement Procedure

The measurements procedure of the transmitter radiated E-field is as following describe method.

A pre-scan is performed in a Shield chamber to determine the accurate frequencies before final test, after maximum emissions level will be checked on a open test site and measuring distance is 3 m from EUT to test antenna.(O.A.T.S is ensured that comply with at least 6 dB above the ambient noise level)

① The EUT was powered ON with normal operating mode and placed on a 0.8 meter high non-conductive table on the reference ground plane. If EUT is connected to cables, that were fixed to cause maximum emission.

② For above 1 GHz, the test antenna is used on Horn antenna, and if the below 1 GHz, loop and broad- band antenna were used. It made with the antenna positioned in both the horizontal and vertical plane of polarization.

③ The output of the test antenna will be connected to a measuring receiver, and it is set to tuned over the frequency range according to required standard

④ For emission frequencies measured below 1 GHz, The measuring bandwidth and detector type of the measurement receiver is set on using measurement instrumentation employing a CISPR Quasi Peak detector, and for above 1GHz, set the spectrum analyzer on a 1 MHz resolution bandwidth with average and peak detector for each frequency.

⑤ The frequencies at which a relevant radiated signal component is detected, the test antenna will be raised and lowered through the specified heights range(from 1 to 4 meters) in horizontal polarized orientation, until an maximum signal level is detected on the measuring receiver(or spectrum analyzer).

⑥ Repeat step ⑤ with antennal in vertical polarized orientations.

⑦ The transmitter is position x, y, z axis on turn table rotating through 360 degrees, until the maximum signal level is detected by the measuring receiver.

⑧ The receiver is scanned from requested measuring frequency band and then the maximum meter reading is recorded. The radiated emissions were record the test result.

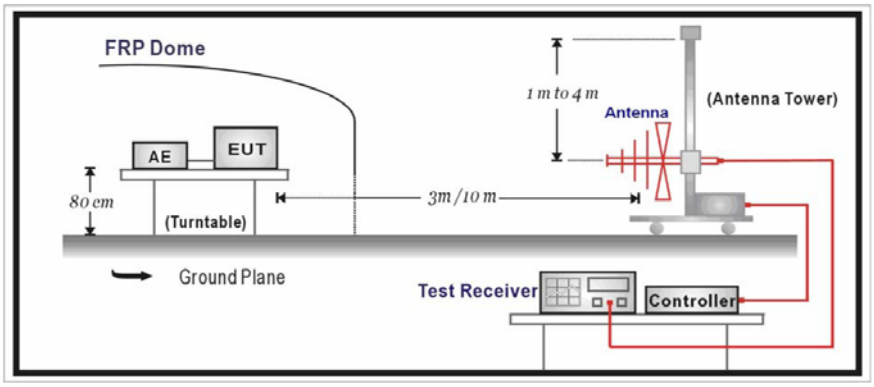
• The measurement results are obtained as described below:

Result(dBμA/m) = Reading(dBμA) + Antenna factor(dB/m)+ CL(dB) + other applicable factor (dB)

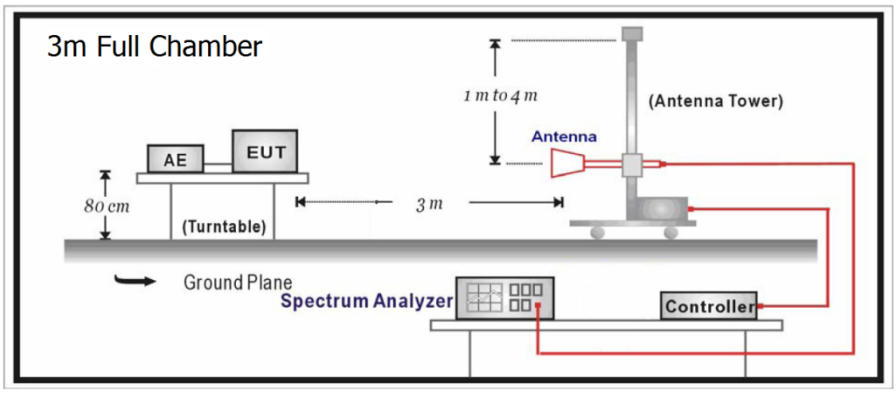
※ if necessary, additionally receiver is adopted high-pass filter and preamp because lower radiated signal

6.7.4 Test Configuration

Below 1GHz Test Setup:



Above 1GHz Test Setup:



6.7.5 Measurement Result

1) IEEE 802.11b

▣ Lowest Channel 1 (2412 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
32.40	19.13	17.46	40.00	36.59	H	Pass
215.18	24.06	13.43	43.52	37.49	H	Pass
600.01	14.79	25.50	46.02	40.29	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	44.55	1.20	74	45.75	H	Pass
1816.00	33.69	1.20	54	34.89	H	Pass
4825.00	39.51	12.15	74	51.66	H	Pass
4825.00	28.53	12.15	54	40.68	H	Pass

▣ Middle Channel 7 (2442 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
35.77	21.04	13.04	40.00	34.08	H	Pass
359.83	20.05	18.49	46.02	38.54	H	Pass
599.99	14.67	25.50	46.02	40.17	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	44.08	1.20	74	45.28	V	Pass
1816.00	33.68	1.20	54	34.88	V	Pass
4910.00	42.87	12.43	74	55.30	V	Pass
4910.00	34.54	12.43	54	46.97	V	Pass

▣ Highest Channel 13 (2472 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
168.07	18.09	11.89	43.52	29.98	H	Pass
287.89	13.51	16.35	46.02	29.86	H	Pass
600.00	15.09	25.50	46.02	40.59	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
7426.00	37.88	18.95	74	56.83	H	Pass
7426.00	27.01	18.95	54	45.96	H	Pass
9534.00	33.58	20.23	74	53.81	H	Pass
9534.00	22.65	20.23	54	42.88	H	Pass

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss+AMP)
2. X axis plane was the worst test result than Y axis plane and Z axis plane.
3. Above 1 GHz is measured average and peak detector mode in accordance with FCC Rule15.35
4. Limit: 54 dBμV/m(Average), 74 dBμV/m(Peak)

2) IEEE 802.11g

▣ Lowest Channel 1 (2412 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
32.32	18.77	14.50	40.00	33.27	H	Pass
359.84	16.94	18.49	46.02	35.43	H	Pass
599.99	15.54	25.50	46.02	41.04	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	44.81	1.20	74	46.01	V	Pass
1816.00	34.49	1.20	54	35.69	V	Pass
4825.00	35.72	12.15	74	47.87	V	Pass
4825.00	24.83	12.15	54	36.98	V	Pass

▣ Middle Channel 7 (2442 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
215.95	22.45	13.48	43.52	35.93	H	Pass
359.80	18.96	18.49	46.02	37.45	H	Pass
599.99	11.21	25.50	46.02	36.71	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	44.41	1.20	74	45.61	V	Pass
1816.00	43.65	1.20	54	44.85	V	Pass
4876.00	39.10	12.32	74	51.42	V	Pass
4876.00	28.51	12.32	54	40.83	V	Pass

▣ Highest Channel 13 (2472 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
215.99	25.07	13.48	43.52	38.55	H	Pass
358.54	16.73	18.44	46.02	35.17	H	Pass
600.01	13.33	25.50	46.02	38.83	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	41.82	1.20	74	43.02	H	Pass
1816.00	31.75	1.20	54	32.95	H	Pass
4944.00	37.36	12.55	74	49.91	H	Pass
4944.00	26.41	12.55	54	38.96	H	Pass

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss+AMP)
2. X axis plane was the worst test result than Y axis plane and Z axis plane.
3. Above 1 GHz is measured average and peak detector mode in accordance with FCC Rule15.35
4. Limit: 54 dBμV/m(Average), 74 dBμV/m(Peak)

3) IEEE 802.11n(HT20)

▣ Lowest Channel 1 (2412 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
32.43	19.76	14.45	40.00	34.21	H	Pass
359.80	19.36	18.49	46.02	37.85	H	Pass
599.98	15.09	25.50	46.02	40.59	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	43.31	1.20	74	44.51	V	Pass
1816.00	32.77	1.20	54	33.97	V	Pass
8004.00	32.95	21.61	74	54.56	V	Pass
8004.00	22.38	21.61	54	43.99	V	Pass

▣ Middle Channel 7 (2442 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
32.11	19.28	14.58	40.00	33.86	H	Pass
540.89	15.05	24.16	46.02	39.31	H	Pass
719.70	10.35	27.51	46.02	37.86	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	44.47	1.20	74	45.67	H	Pass
1816.00	33.83	1.20	54	35.03	H	Pass
9636.00	33.90	20.51	74	54.41	H	Pass
9636.00	24.80	20.51	54	45.31	H	Pass

▣ Highest Channel 13 (2472 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
35.53	19.47	13.16	40.00	32.63	H	Pass
215.97	24.61	13.48	43.52	38.09	H	Pass
599.99	15.51	25.50	46.02	41.01	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	43.32	1.20	74	44.52	H	Pass
1816.00	33.96	1.20	54	35.16	H	Pass
4944.00	34.94	12.55	74	47.49	H	Pass
4944.00	25.33	12.55	54	37.88	H	Pass

Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss+AMP)
2. X axis plane was the worst test result than Y axis plane and Z axis plane.
3. Above 1 GHz is measured average and peak detector mode in accordance with FCC Rule15.35
4. Limit: 54 dBμV/m(Average), 74 dBμV/m(Peak)

3) IEEE 802.11n(HT40)

▣ Lowest Channel 3 (2422 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
32.62	19.24	14.38	40.00	33.62	H	Pass
599.99	16.41	25.50	46.02	41.91	H	Pass
791.81	7.88	28.01	46.02	35.89	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	43.59	1.20	74	44.79	H	Pass
1816.00	33.47	1.20	54	34.67	H	Pass
11030.00	32.21	25.15	74	57.36	H	Pass
11030.00	21.73	25.15	54	46.88	H	Pass

▣ Middle Channel 7 (2442 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
215.89	25.22	13.48	43.52	38.70	H	Pass
600.00	16.74	25.50	46.02	42.24	H	Pass
788.67	7.68	27.99	46.02	35.67	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	44.00	1.20	74	45.20	H	Pass
1816.00	33.68	1.20	54	34.88	H	Pass
14124.00	33.15	27.68	74	60.83	H	Pass
14124.00	23.68	27.68	54	51.36	H	Pass

▣ Highest Channel 11 (2462 MHz)

Below 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
215.95	24.70	13.48	43.52	38.18	H	Pass
600.01	16.26	25.50	46.02	41.76	H	Pass
788.81	8.21	27.99	46.02	36.20	H	Pass

Above 1 GHz

Frequency (MHz)	Reading (dBuV/m)	Factor(dB) CL+AF+AMP	Limits (dBuV/m)	Meas Result (dBuV/m)	P (V/H)	Result
1816.00	43.22	1.20	74	44.42	H	Pass
1816.00	32.65	1.20	54	33.85	H	Pass
14175.00	32.92	27.61	74	60.53	H	Pass
14175.00	23.17	27.61	54	50.78	H	Pass

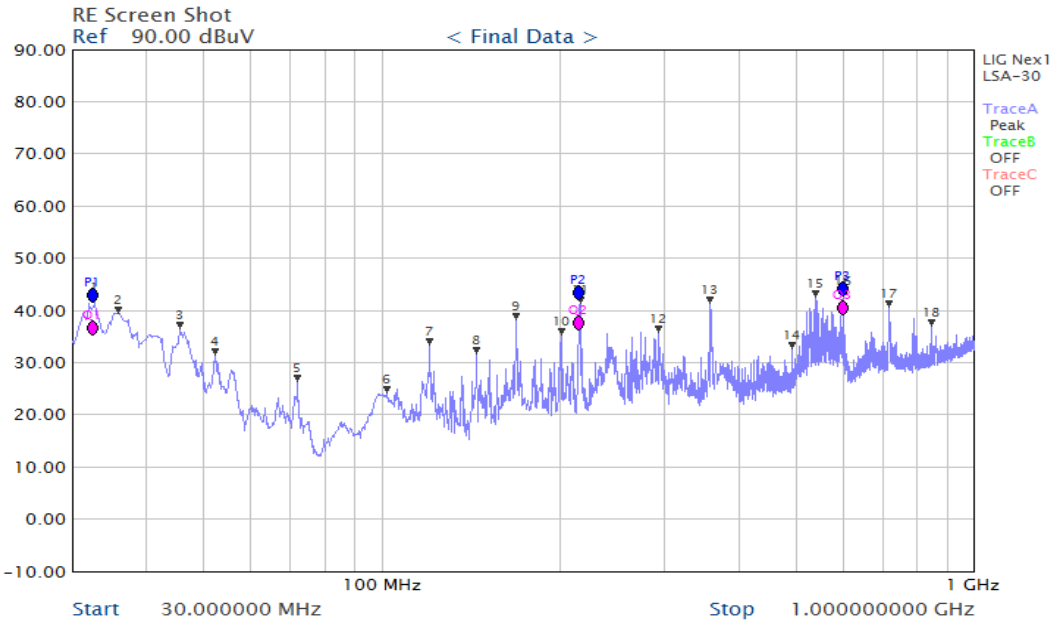
Note : 1. Measurement level = reading level + correct factor (Antenna Factor + Cable loss+AMP)
2. X axis plane was the worst test result than Y axis plane and Z axis plane.
3. Above 1 GHz is measured average and peak detector mode in accordance with FCC Rule15.35
4. Limit: 54 dBμV/m(Average), 74 dBμV/m(Peak)

6.7.6 Test Plot

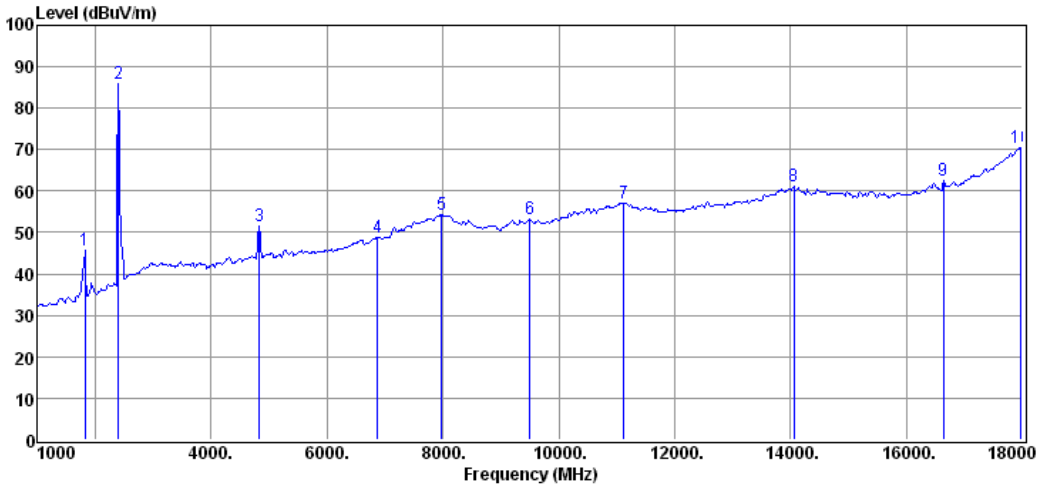
IEEE 802.11b

CH 1

Below 1 GHz

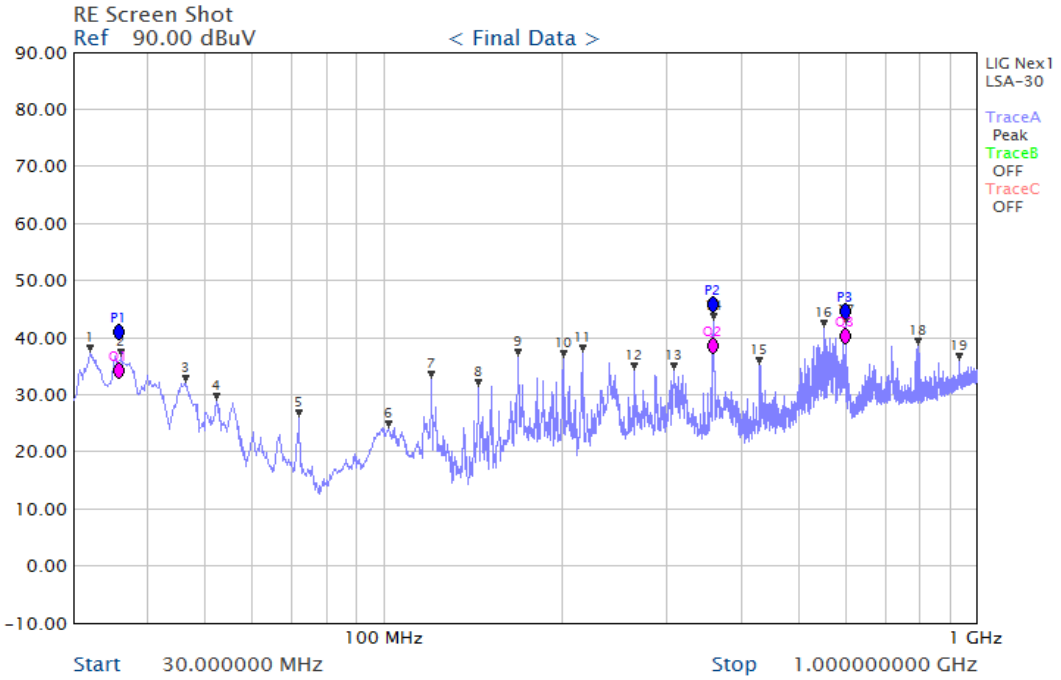


Above 1 GHz



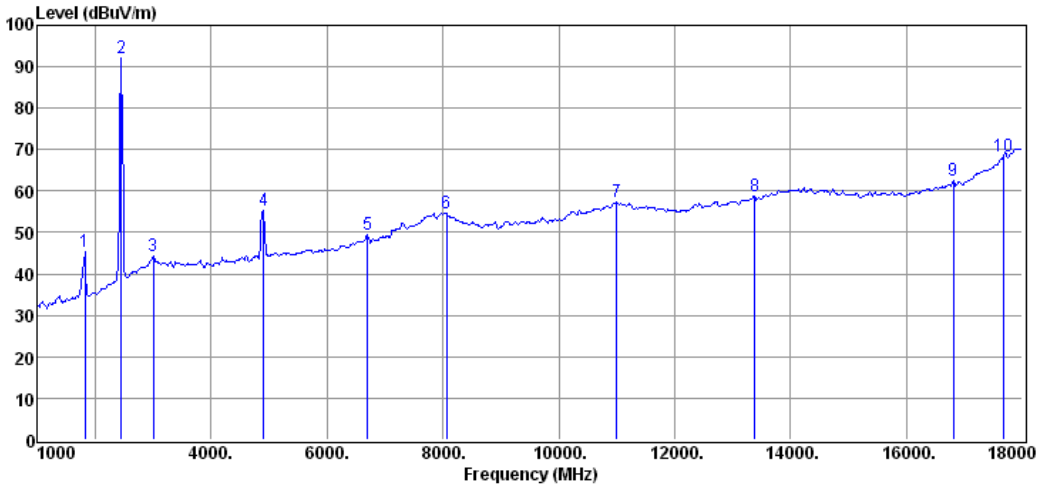
CH 7

Below 1 GHz



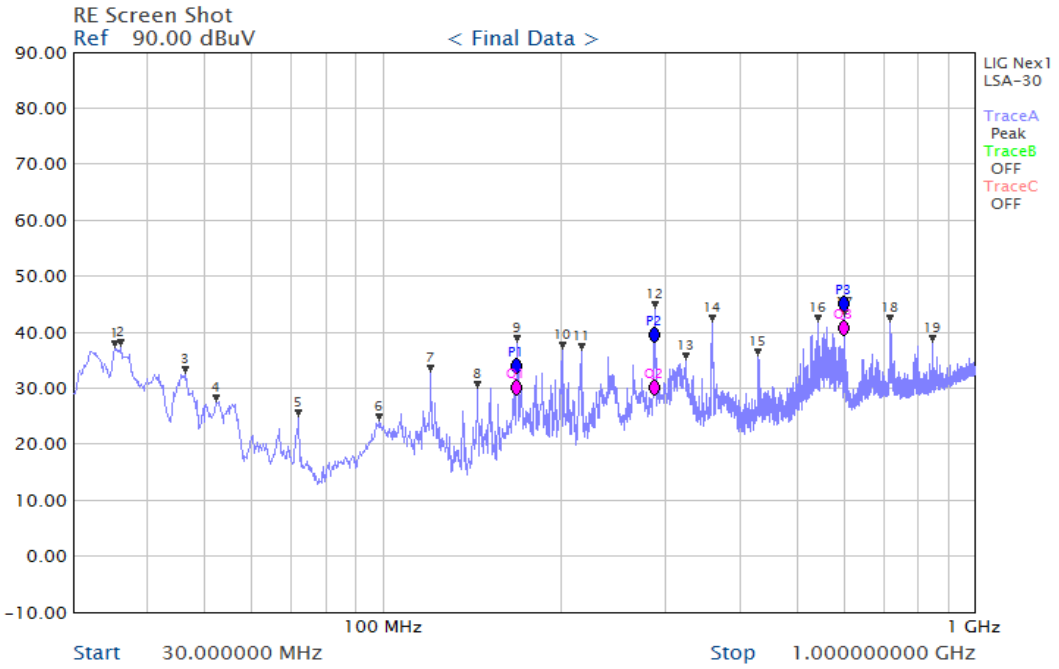
Below 1 GHz

Above 1 GHz

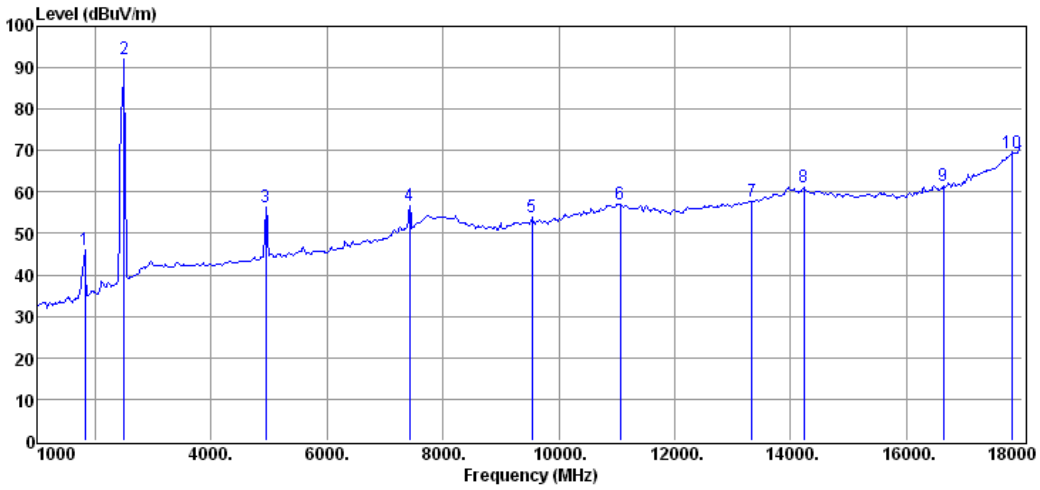


CH 13

Below 1 GHz



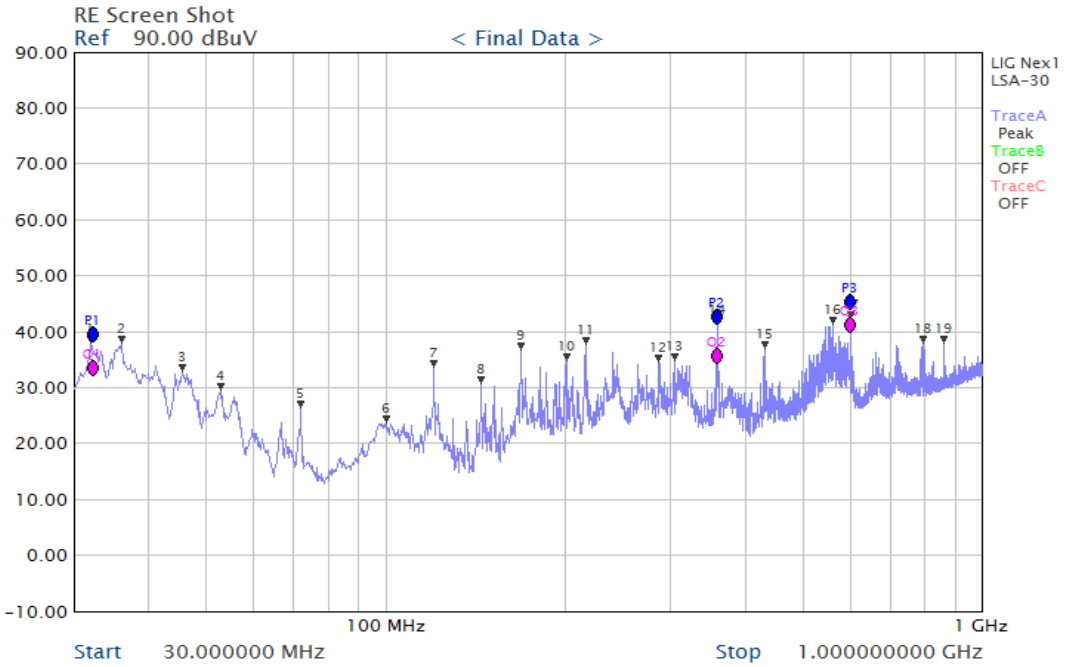
Above 1 GHz



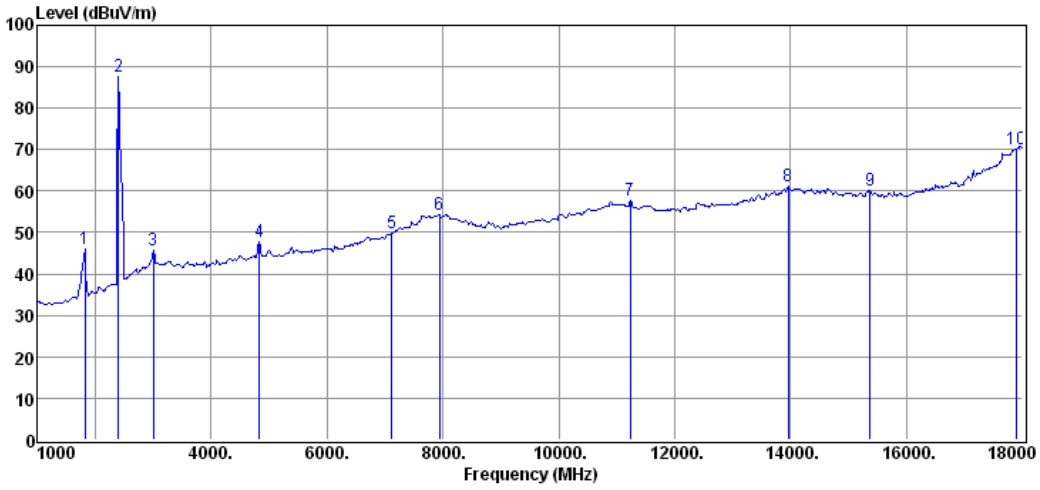
IEEE 802.11g

CH 1

Below 1 GHz

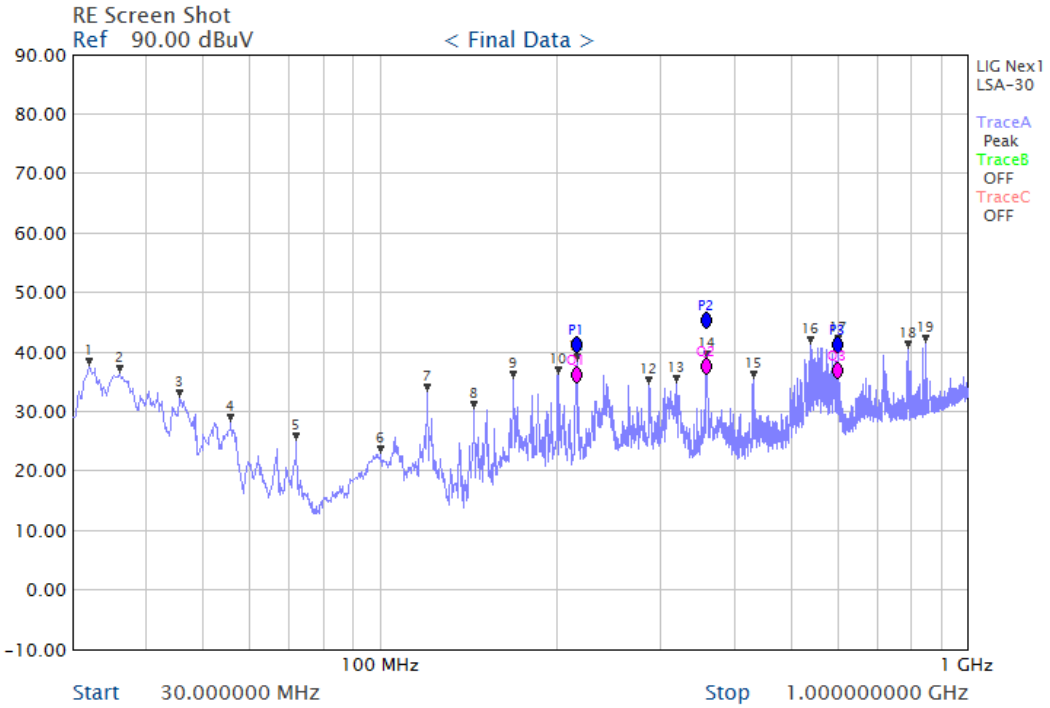


Above 1 GHz

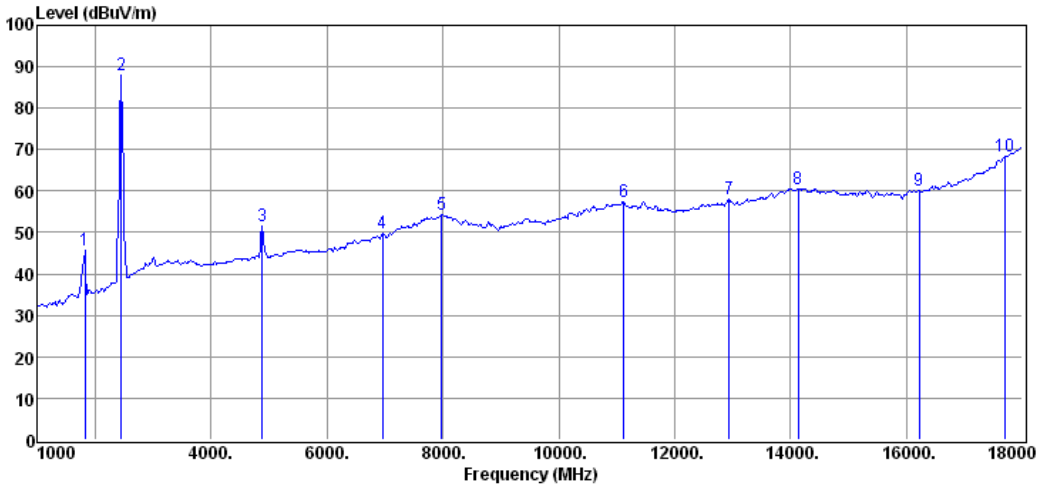


CH 7

Below 1 GHz

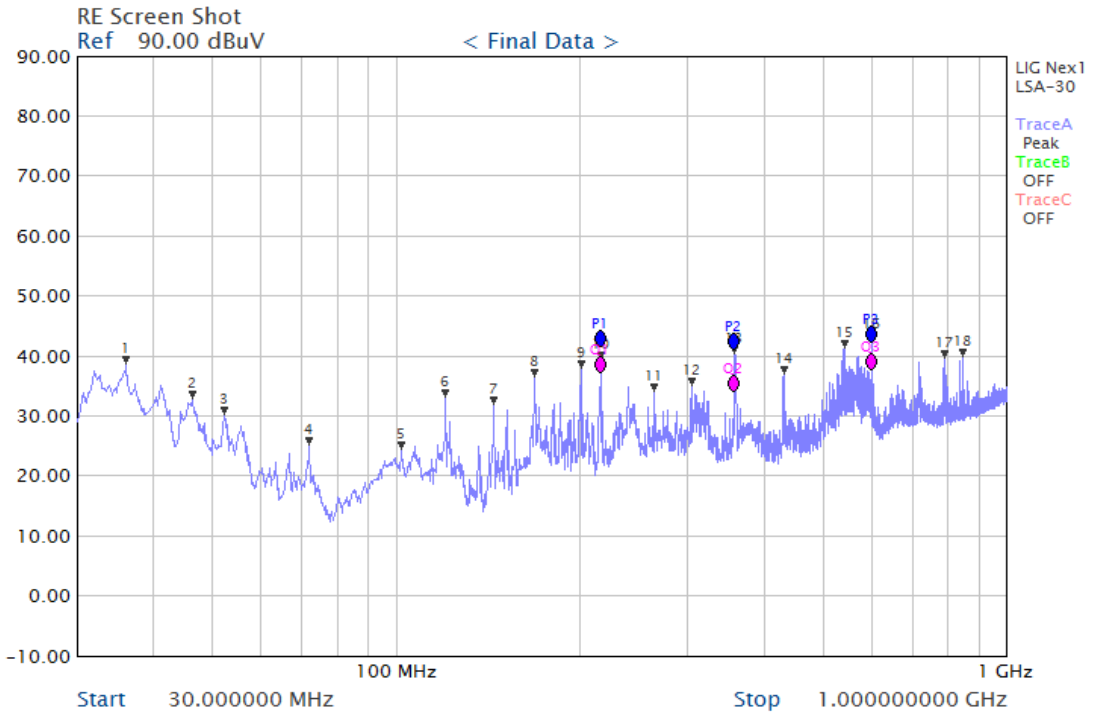


Above 1 GHz

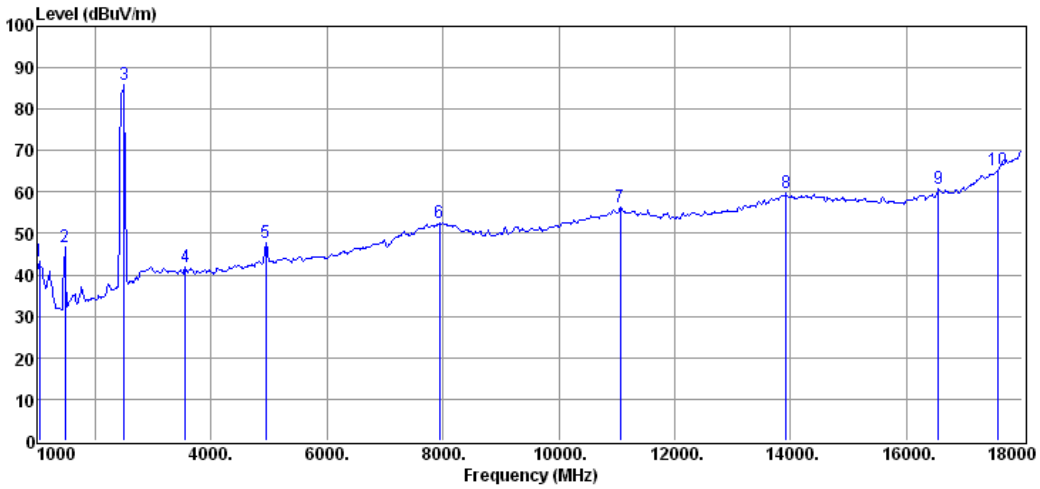


CH 13

Below 1 GHz

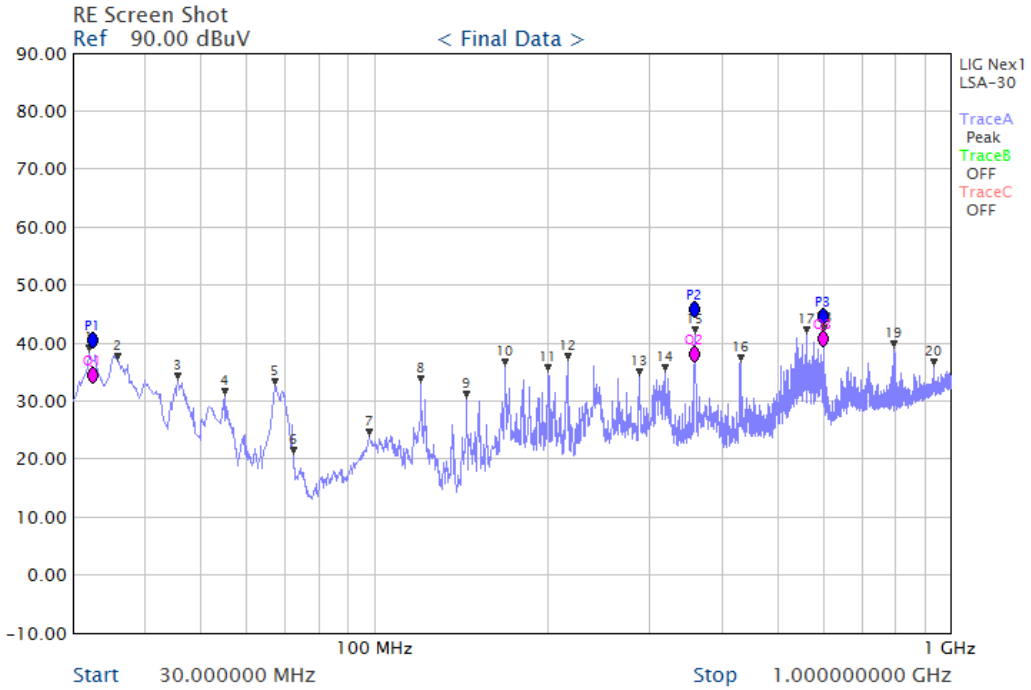


Above 1 GHz

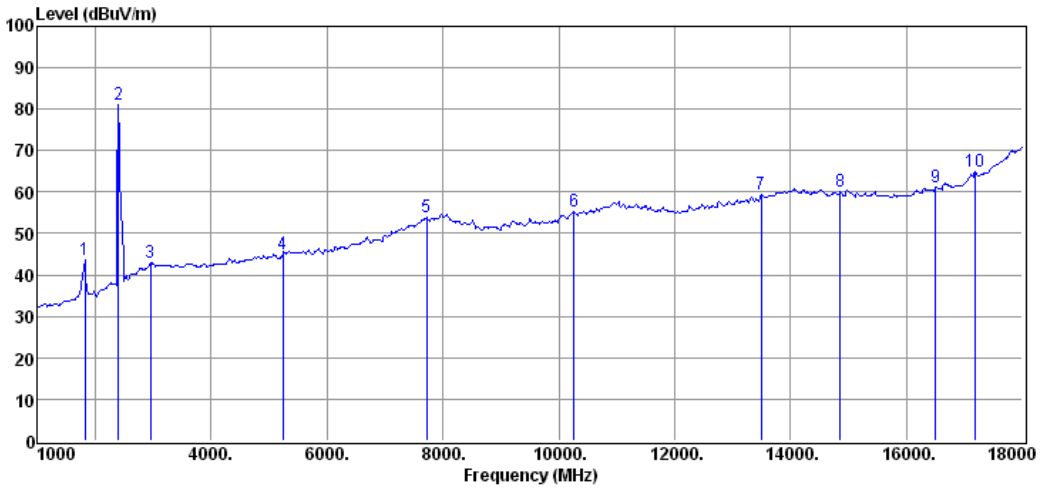


IEEE 802.11n(HT20)

CH 1

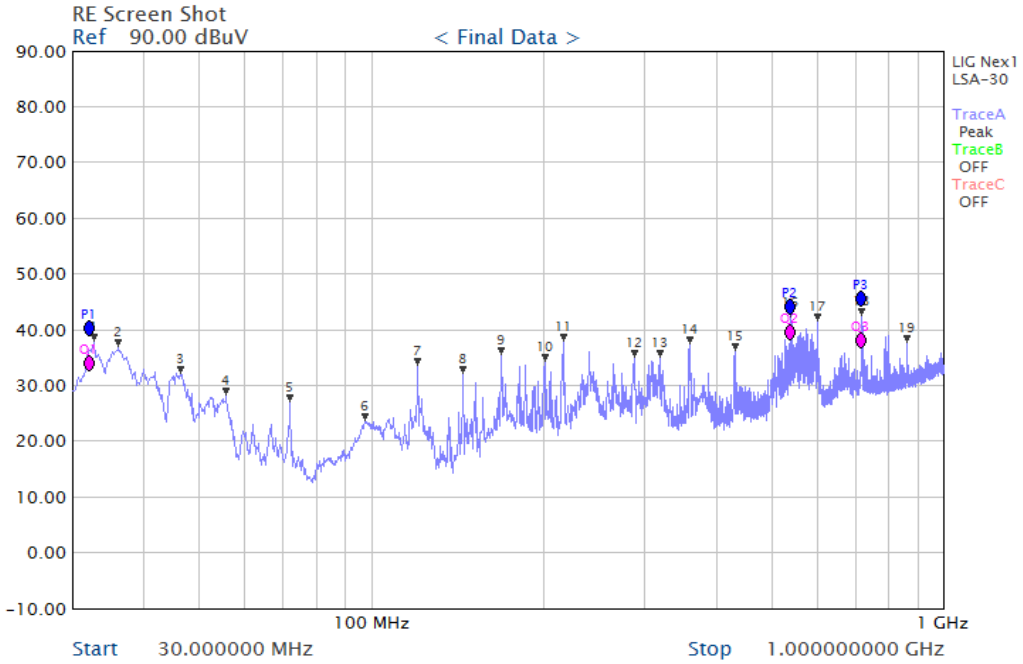


Above 1 GHz

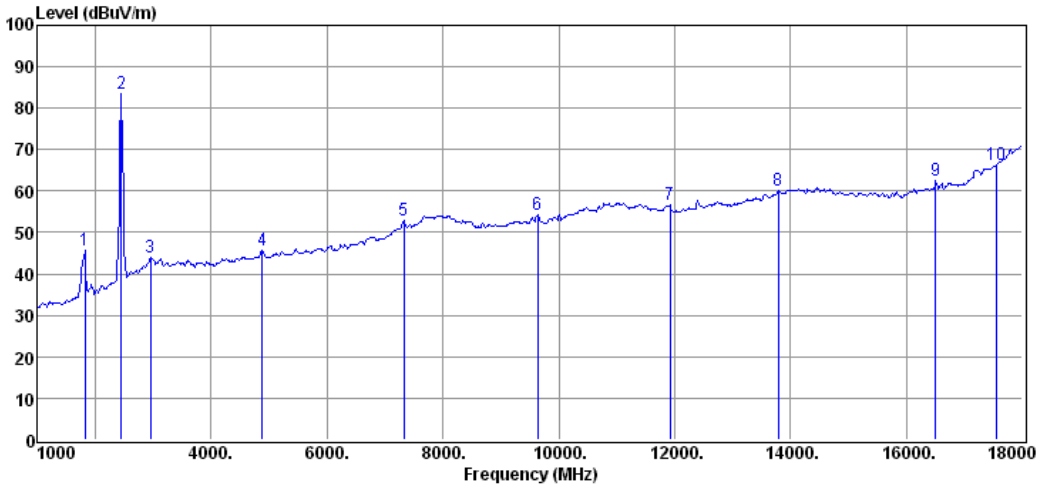


CH 7

Below 1 GHz

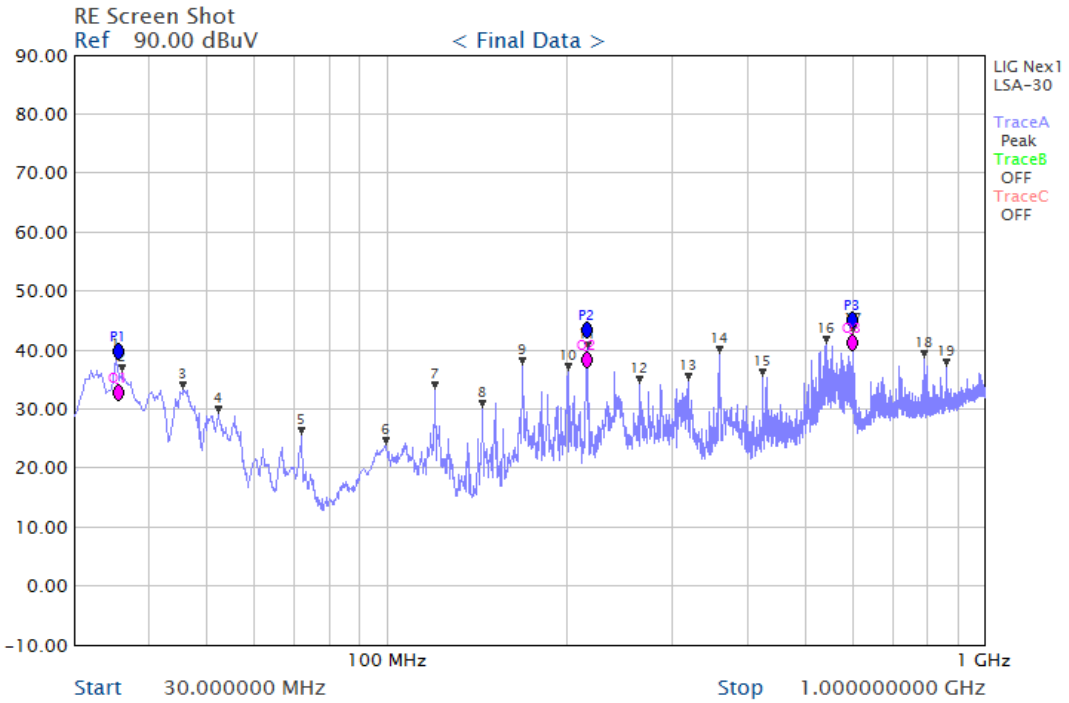


Above 1 GHz

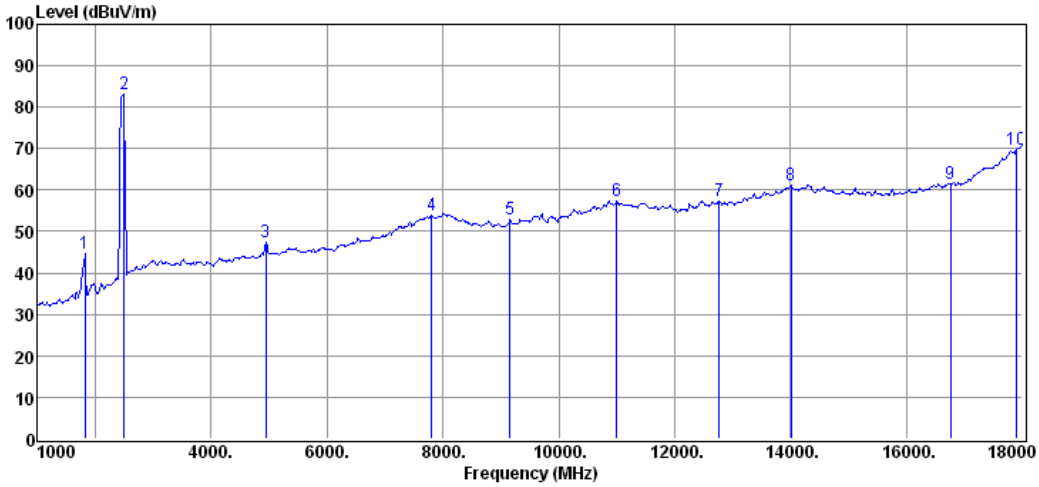


CH 13

Below 1 GHz

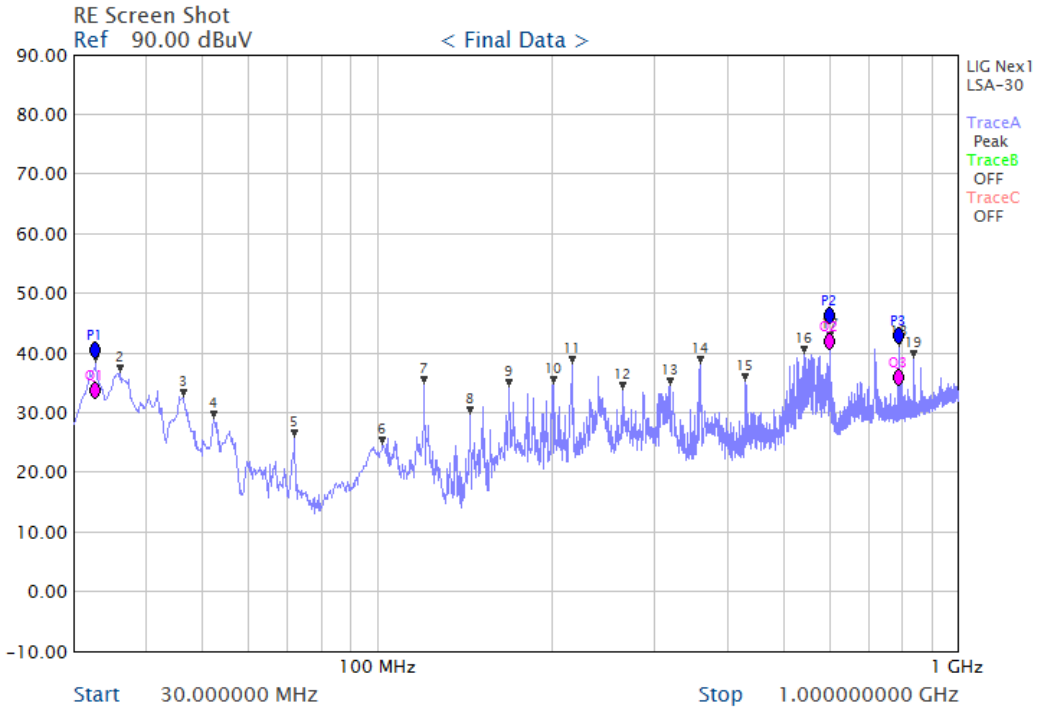


Above 1 GHz

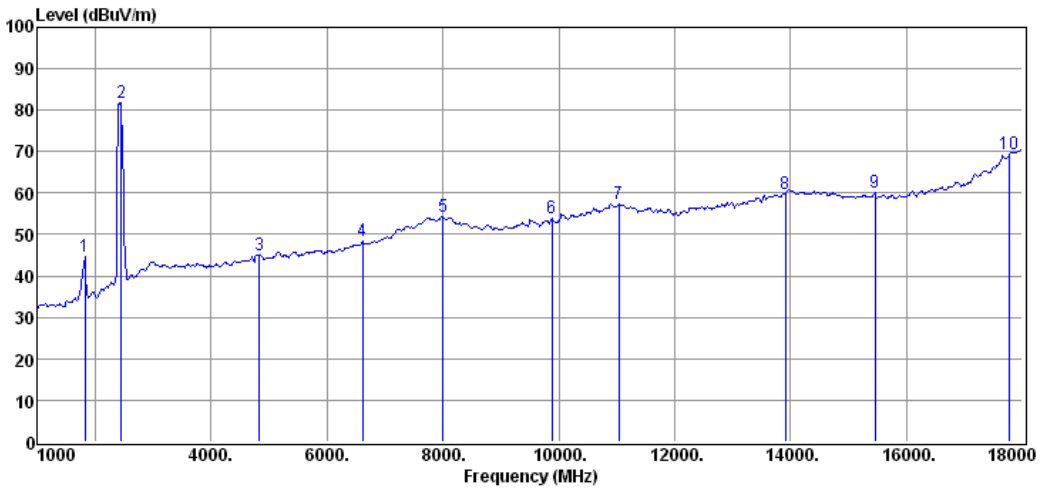


IEEE 802.11n(HT40)

CH 3

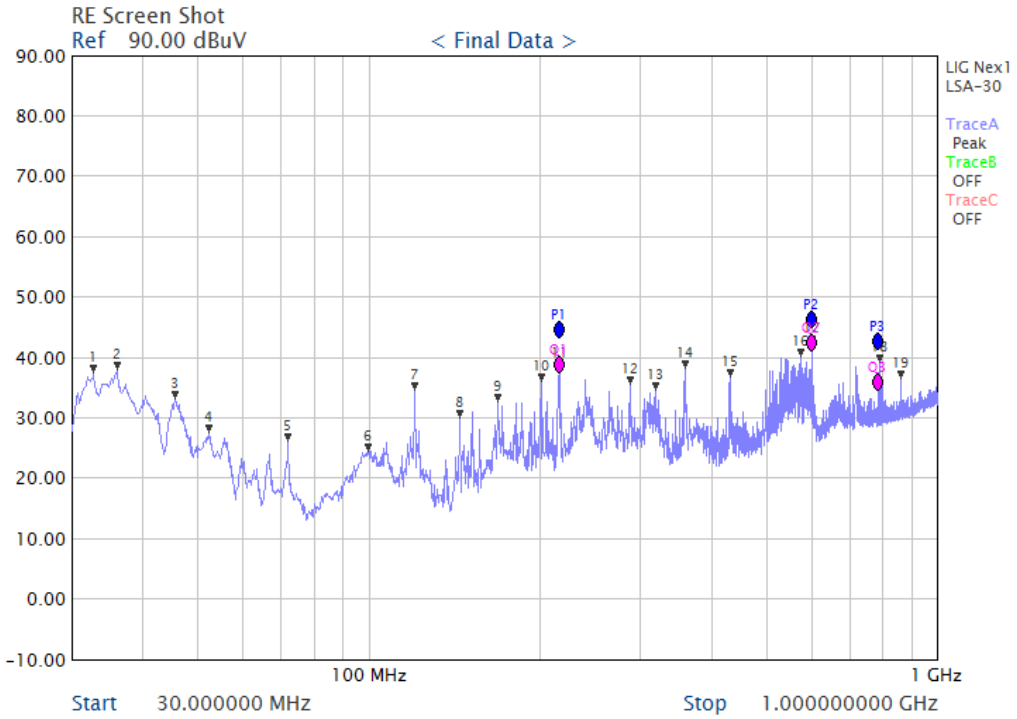


Above 1 GHz

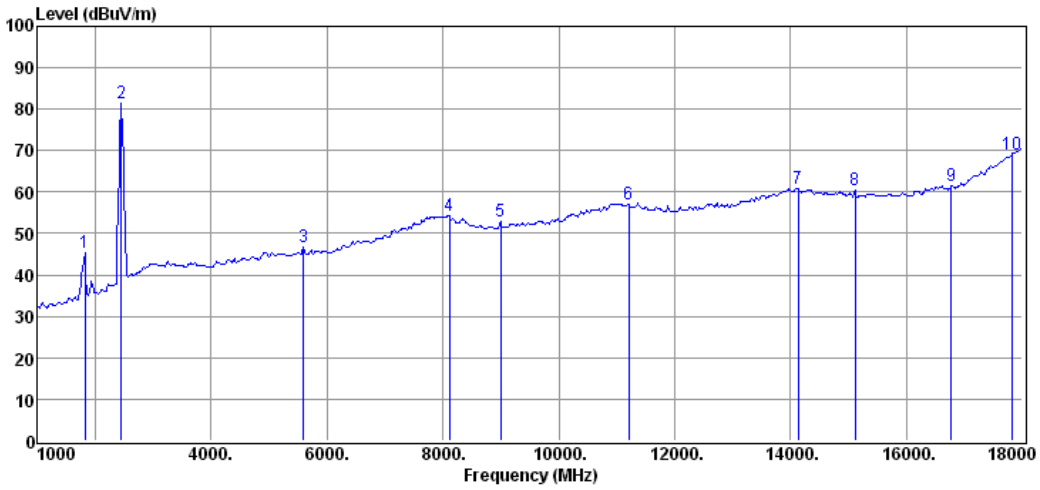


CH 7

Below 1 GHz

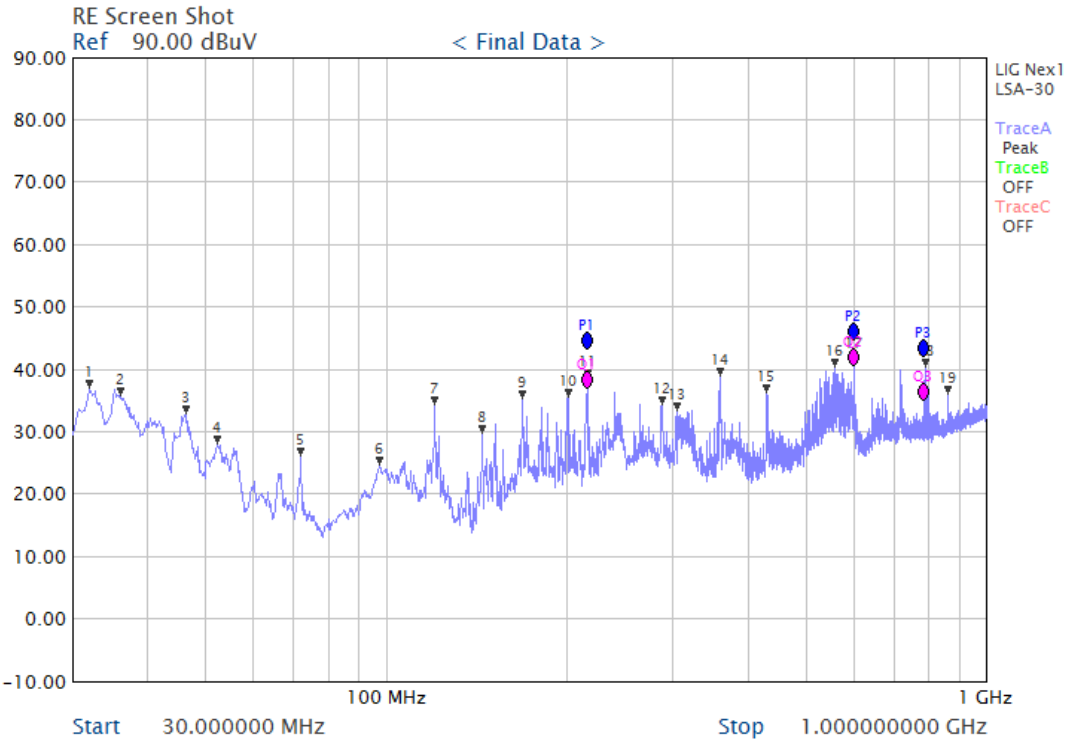


Above 1 GHz

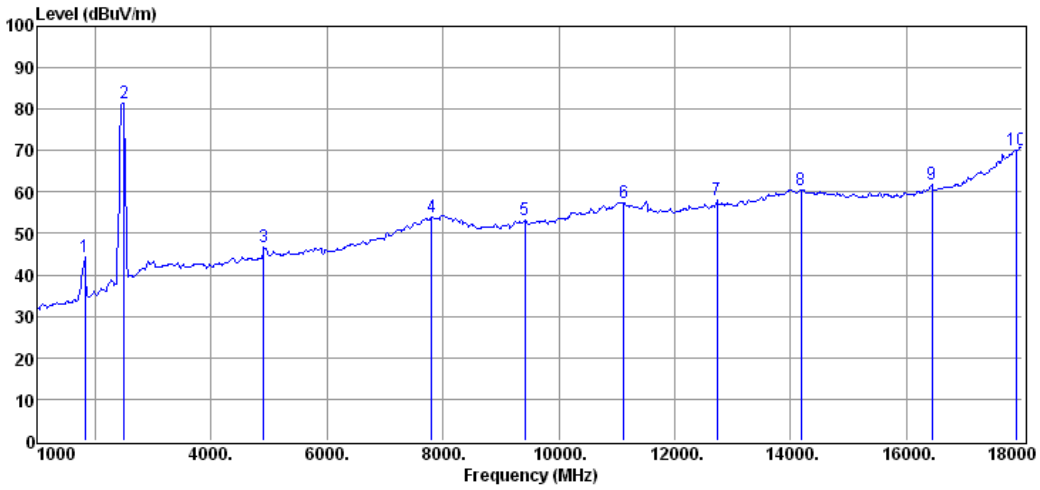


CH 11

Below 1 GHz



Above 1 GHz



6.8 Antenna requirement

6.8.1 Standard applicable [FCC §15.203, §15.247(4)(1)]

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that user 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 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(4)(1), 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 6dBi.

According to above requirement standard's This product's antenna type is an Omni directional type and it's gain is 2 dBi, So radiated emission field strength from EUT is below requirement standard limit

6.8.2 Antenna gain

Frequency Range	Gain [dBi]	Limit [dBi]	Results
2400 MHz ~ 2483.5 MHz	0.5	≤ 6	Pass

6.9 AC Power Conducted emissions

6.9.1 Standard Applicable [FCC §15.207(a)]

For 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 frequencies hopping mode within the band 150kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50uH/50 ohms 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.

§15.207 limits for AC line conducted emissions;

Frequency of Emission(MHz)	Conducted Limit (dBμV)	
	Quasi-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

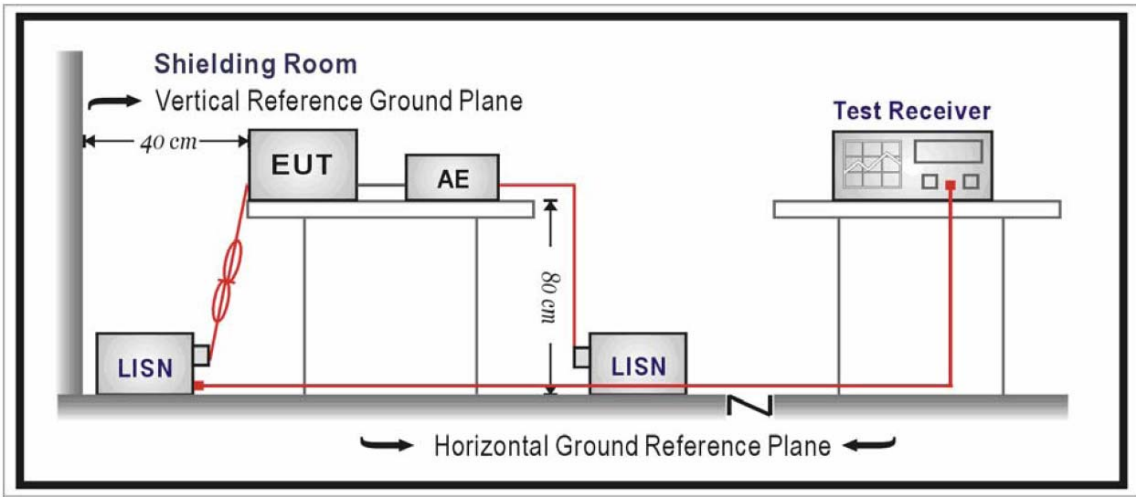
6.9.2 EUT used cable

Cable Type	Shield	Length (m)	Ferrite	Connector	Connection Point 1	Connection Point 2
USB Cable	No	1.0	No	No	E.U.T.	Note book PC

6.9.3 Used Peripherals

NO	PRODUCT	MODEL NO.	SERIAL NO.	Mnufacture
1	Note Book PC	NT-Q46C	BA68-04095A 10	SAMSUNG
2	USB Cable	LL200212	-	-

6.9.4 E.U.T Test Configuration



6.9.5 Measurement Procedure

EUT was placed on a non- metallic table height of 0.8 m above the reference ground plane.

Cables connected to EUT were fixed to cause maximum emission.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane to obtain the Maximum signal strength.

6.9.6 Test environment conditions

• Normal temperature : 22℃

• Relative humidity : (44 ~ 45) % R.H.

• Pressure : 98 k Pa

6.9.7 Measurement Result

Live

Freq. [MHz]	Reading [dBμV]		Limit [dBμV]		Factor [dB]	Meas Result [dBμV]		Result
	Q-peak	Average	Q-peak	Average	[CL+LISN]	Q-peak	Average	
0.165	40.07	20.12	56.68	46.68	9.86	49.93	29.98	Pass
0.240	35.62	15.35	56.00	46.00	9.87	45.49	25.22	Pass
4.862	31.16	23.58	56.00	46.00	10.34	41.50	33.92	Pass
10.175	26.22	19.52	56.00	46.00	10.69	36.91	30.21	Pass
14.592	29.67	20.94	60.00	50.00	10.87	40.54	31.81	Pass
23.999	26.30	17.86	60.00	50.00	10.61	36.91	28.47	Pass

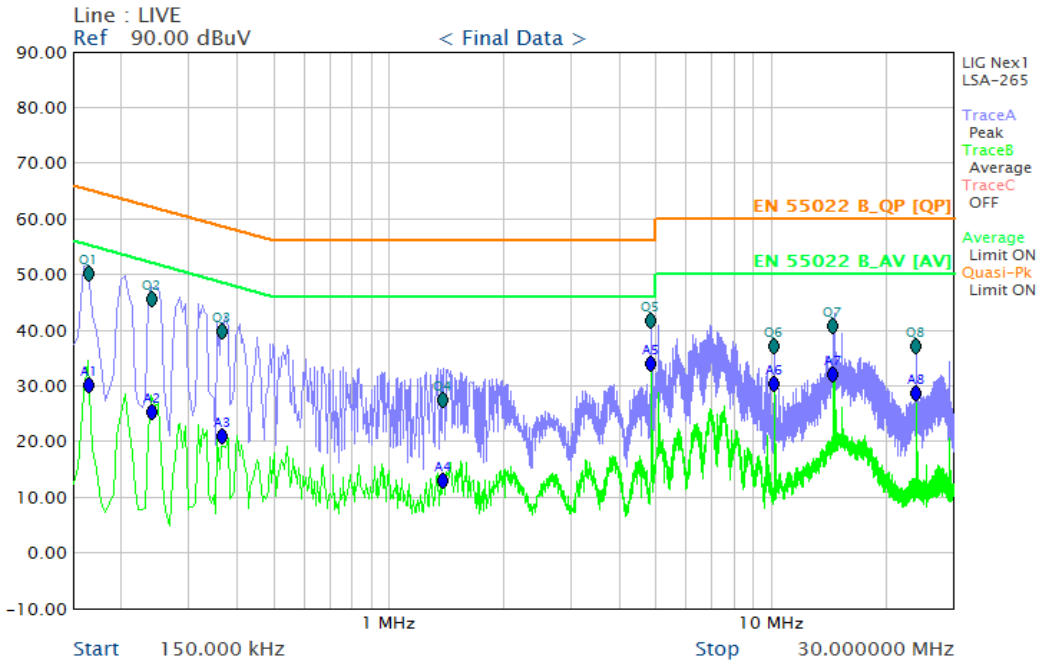
Neutral

Freq. [MHz]	Reading [dBμV]		Limit [dBμV]		Factor [dB]	Meas Result [dBμV]		Result
	Q-peak	Average	Q-peak	Average	[CL+LISN]	Q-peak	Average	
0.163	39.65	20.39	56.68	46.68	9.86	49.51	30.25	Pass
0.285	32.60	15.33	56.00	46.00	9.88	42.48	25.21	Pass
4.862	30.64	24.96	56.00	46.00	10.34	40.98	35.30	Pass
10.175	27.13	22.27	56.00	46.00	10.69	37.82	32.96	Pass
14.589	28.63	22.98	60.00	50.00	10.87	39.50	33.85	Pass
23.999	22.07	16.87	60.00	50.00	10.61	32.68	27.48	Pass

* Meas Result = Reading level + Factor (LISN Insertion Loss + Cable Loss)

6.9.8 Test Plot

Line : Live



Line : Neutral