FCC PART 15.247

TEST REPORT

For

Proton Products International Ltd.

10 Aylesbury End, Beaconsfield, Bucks HP9 1LW, United Kingdom

FCC ID: 2AKS2PTCC3200

Report Type:	**Product Name:**
CIIPC	WiFi Module

Report Number:	RSC210507002
Date of Report Issue:	2021-05-14
Reviewed By:	Sula Huang
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: +86-28-65525123 Fax: +86-28-65525125 www.baclcorp.com

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DOCUMENT REVISION HISTORY

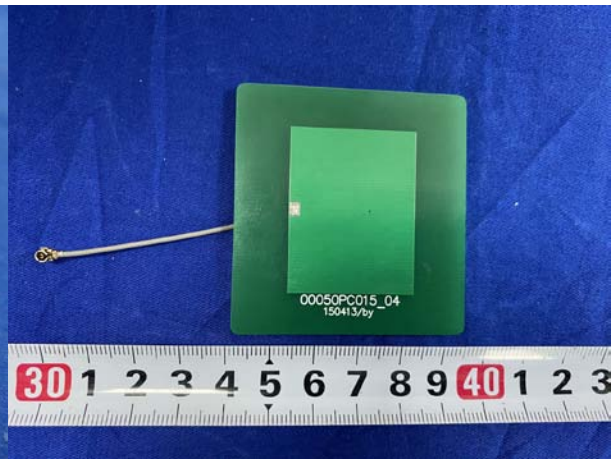
Revision Number	Report Number	Description of Revision	Date of Revision
0	RSC191122001-0B	Original Report	2020-03-27
1	RSC210507002	CIIPC Report	2021-05-14

Note: This report was the CIIPC report, which was identical to the previously certified except for the changes as below for details.

1. Changing antenna type, Original Antenna: Monopole Antenna, Current Antenna: PCB Antenna, Detail below

Original

Current



Base on the above change, the radiated emission was performed to test.

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Proton Products International Ltd.
Product	WIFI Module
Tested Model	PT_CC3200
FCC ID	2AKS2PTCC3200
Frequency*	2412 MHz-2462 MHz (802.11b/g/n20)
RF Output Power*	802.11b:14.35 dBm 802.11g:18.78 dBm 802.11n20:18.56 dBm
Modulation Type*	802.11b: DSSS 802.11g/n20: OFDM
Antenna Specification*	PCB Antenna/Gain: 2.0 dBi (max)
Voltage Range	DC 3.3V
Measure approximately	25.5 mm (L) x 15.5 mm (W) x 1.0m (H)
Sample serial number	210507002/01 (assigned by the BACL, Chengdu)
Sample/EUT Status	The test sample was in good condition and received: 2021-05-07

Note: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Objective

This report is prepared on behalf of **Proton Products International Ltd.** in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the compliance of the EUT with FCC Part 15 Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

N/A

Measurement Uncertainty

Item			Uncertainty
Radiated Emission(Field Strength)	30MHz-200MHz	H	4.31 dB
		V	4.57 dB
	200MHz-1GHz	H	4.68 dB
		V	5.78 dB
	1GHz-6GHz		4.56 dB
	6GHz-18GHz		4.57dB
	18GHz-40GHz		5.44dB

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the corresponding inclusion factor K when the inclusion probability is about 95%.

Test Methodology

All measurements contained in this report were conducted with:

1. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

2. KDB558074 D01 DTS Meas Guidance v05r02.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Chengdu) to collect test data is located No.5040, Huilongwan Plaza, No. 1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Bay Area Compliance Laboratories Corp. (Chengdu) lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4324.01) and the FCC designation No. CN1186 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured in testing mode, which was provided by manufacturer.

For WiFi mode, 802.11b, 802.11g, and 802.11n-HT20 mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	-	-

EUT were tested with Channel 1, 6 and 11.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

The setting by the software as following table:

Test Mode	Test Software Version	CC3200		
802.11b	Test Frequency	2412 MHz	2437 MHz	2462 MHz
	Data Rate	1Mbps	1Mbps	1Mbps
	Power Level	5	5	5
802.11g	Test Frequency	2412 MHz	2437 MHz	2462 MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level	5	5	5
802.11n-HT20	Test Frequency	2412 MHz	2437 MHz	2462 MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level	5	5	5

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

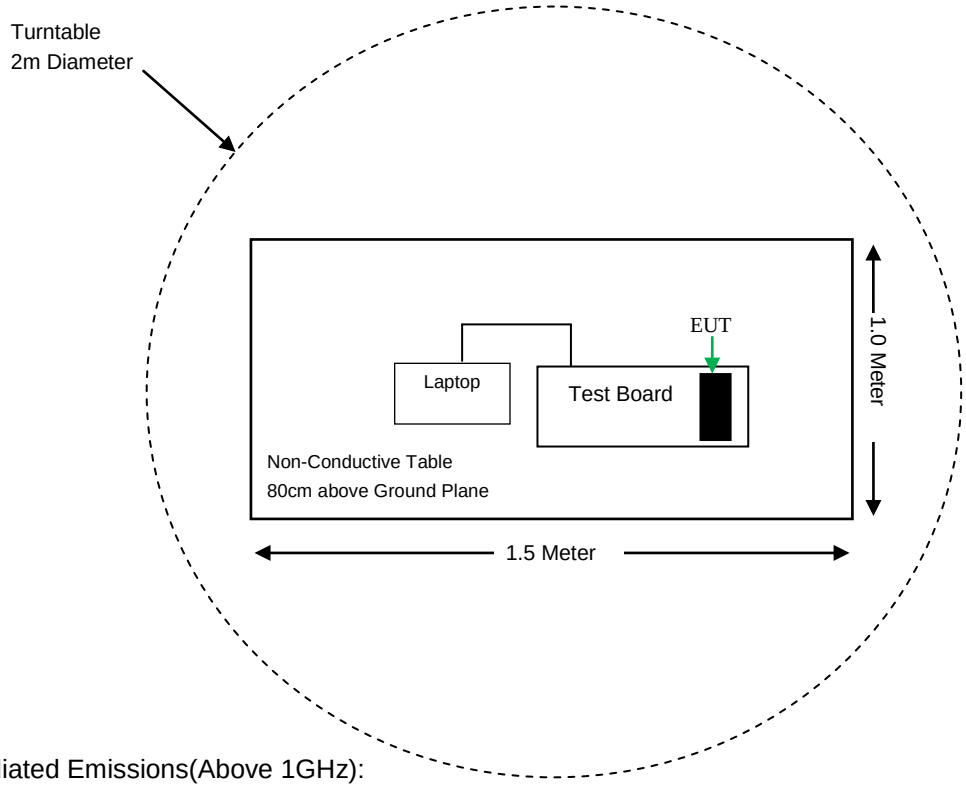
Manufacturer	Description	Model	Serial Number
DELL	Laptop	Latitude E5430	BTXWLX1
Proton	Test Board	Unknown	Unknown

External I/O Cable

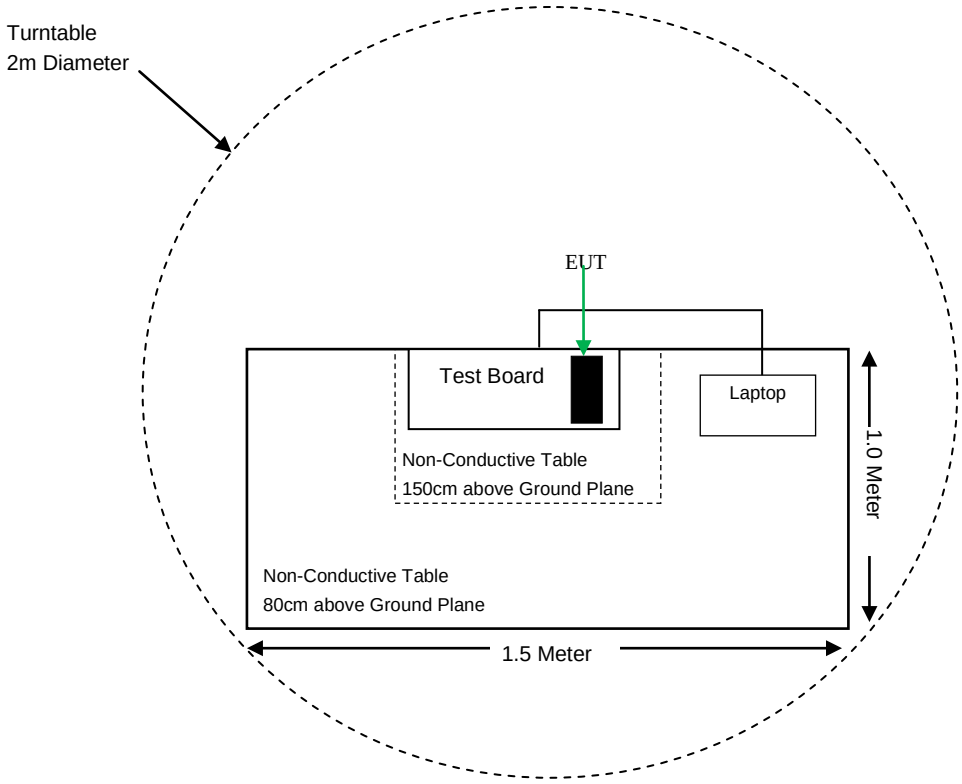
Cable Description	Length (m)	From	To
Unshielded USB Cable	1.0	Test Board	Laptop

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.247 & §1.1310 & §2.1091	Maximum Permissible exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance◆
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance◆
§15.247(b)(3)	Maximum conducted output power	Compliance◆
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance◆
§15.247(e)	Power Spectral Density	Compliance◆

Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Compliance◆: Refer to the certified product (FCC ID: 2AKS2PTCC3200, Granted Date: 2020-06-01), Report No.: RSC191122001-0B, Issuance Date: 2020-03-27.

TEST EQUIPMENTS LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission (30 MHz-1 GHz)					
EMCT	Semi-Anechoic Chamber	966	001	2020-07-24	2025-07-23
SONOMA INSTRUMENT	Amplifier	310 N	186684	2020-08-10	2021-08-09
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2019-12-10	2022-12-09
Rohde & Schwarz	EMI Test Receiver	ESR3	102456	2021-04-12	2022-04-11
INMET	Attenuator	18N-6dB	NA	2019-12-10	2022-12-09
Unknown	RF Cable (Below 1GHz)	L-E-005	000005	2020-09-04	2021-09-03
Unknown	RF Cable (Below 1GHz)	T-E128	000128	2020-10-16	2021-10-15
MICRO-COAX	RF Cable (Below 1GHz)	T-E237	233522-001	2020-07-17	2021-07-16
Radiated Emission (1 GHz-25 GHz)					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200835	2021-04-12	2022-04-11
EMCO	Horn Antenna	3115	2192	2019-09-25	2021-09-24
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2020-09-20	2021-09-19
MICRO-TRONICS	2.4GHz Notch Filter	BRM50702	G396	2021-02-21	2022-02-20
SUHNER+HUBER	RF Cable (Above 1GHz)	SUCOFLEX 104PE	93533/4PE	2020-05-18	2021-05-17
IW-MICROWAVE	RF Cable (Above 1GHz)	SPS-2301	NA	2020-08-31	2021-08-30
Rohde & Schwarz	EMI Test Receiver	ESIB 40	100215	2021-04-12	2022-04-11
EM Electronics	Pre-Amplifier	EM18G40	060725	2020-07-23	2021-07-22
A.H. Systems, Inc	Horn Antenna	SAS-574	510	2019-09-02	2021-09-01
HUBER+SUHNER	RF Cable (Above 1GHz)	T-E222	2551/2	2020-07-18	2021-07-17
ORIDA RF Labs	RF Cable (Above 1GHz)	T-E210	1042	2020-07-18	2021-07-17
Rohde & Schwarz	EMC32	EMC32	V9.10.00	NCR	NCR

FCC §15.247 & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE

Applicable Standard

According to subpart 15.247 and subpart §1.1310, 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 level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
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
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Per 447498 D01 General RF Exposure Guidance v06**,** simultaneous transmission MPE test exclusion applies when the sum of the MPE for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.
Calculated Formulary:

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

Where:
S = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
802.11b	2412-2462	2.0	1.58	14.5	28.18	20	0.009	1.0
802.11g	2412-2462	2.0	1.58	19.0	79.43	20	0.025	1.0
802.11n20	2412-2462	2.0	1.58	19.0	79.43	20	0.025	1.0

Result: The device meets RF exposure evaluation greater than 20cm distance specified in §2.1091. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by §2.1093.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

Antenna Connector Construction*

The EUT has one PCB antenna, fulfill the requirement of this section. Please refer to the EUT photos.

Manufacturer	Model Number	Antenna Size	Antenna Gain	Nominal Impedance	Antenna Connector	Antenna Type
Low Power Radio Solutions Ltd	ANT-SS2.4G	62mmx8mm	2.0 dBi	50 ohm	IPEX	PCB

Result: Compliance

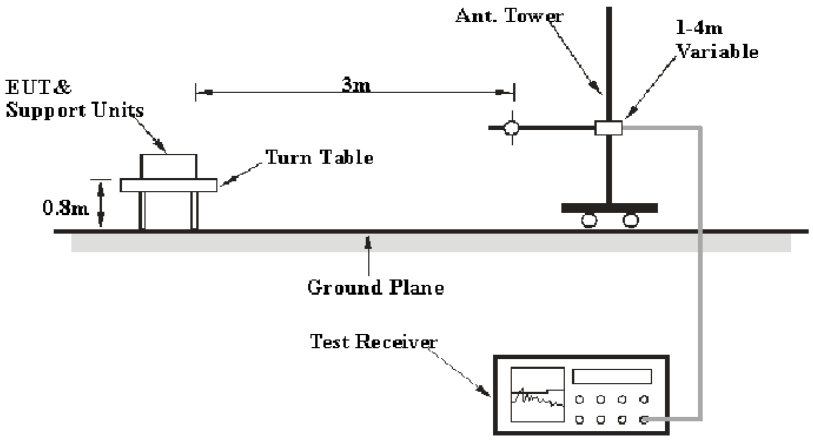
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

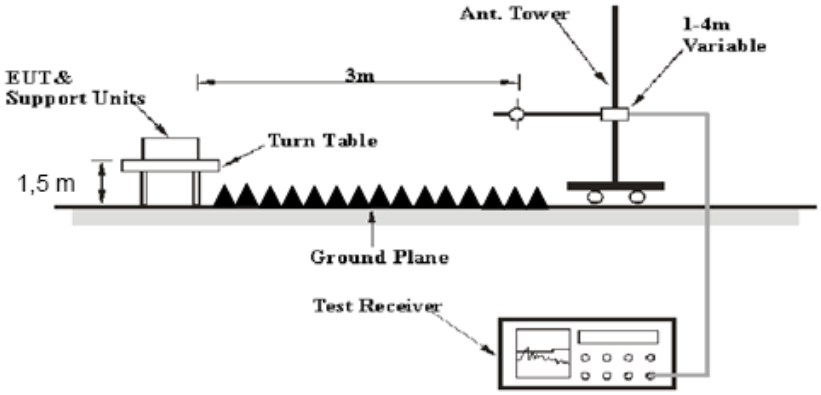
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

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

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	QP
Above 1 GHz	1MHz	3 MHz	PK
	1MHz	3 MHz	AV

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

or

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

Test Data

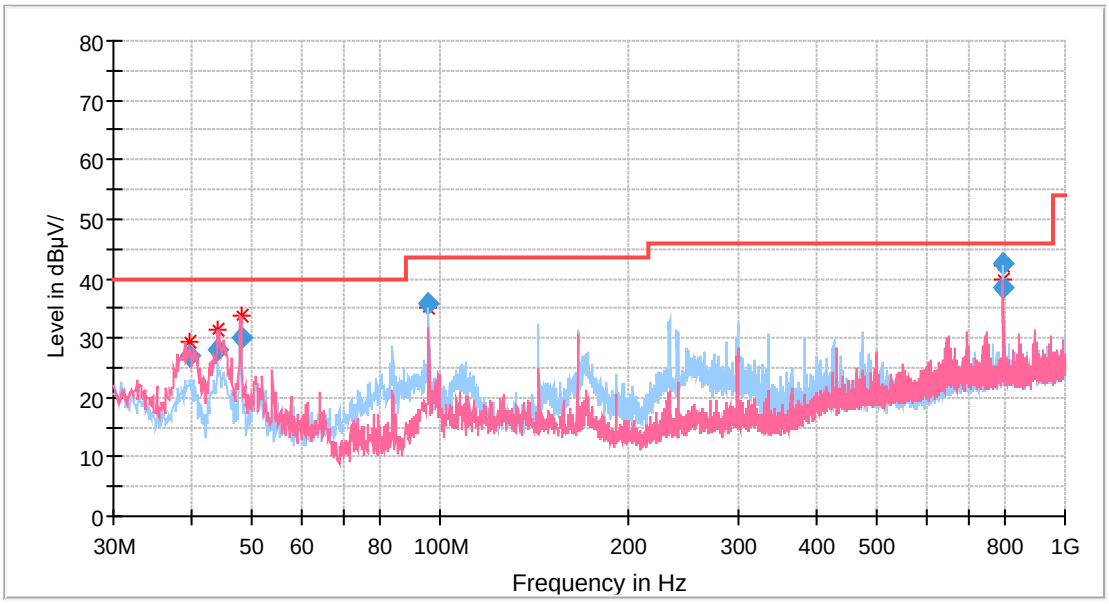
Test Environment Conditions

Temperature:	25 °C
Relative Humidity:	49 %
ATM Pressure:	95.8 kPa

The testing was performed by Winfred Wang on 2021-05-10.

Test Mode: Transmitting

30 MHz to 1 GHz： 802.11b_Low Channel-Worst case)

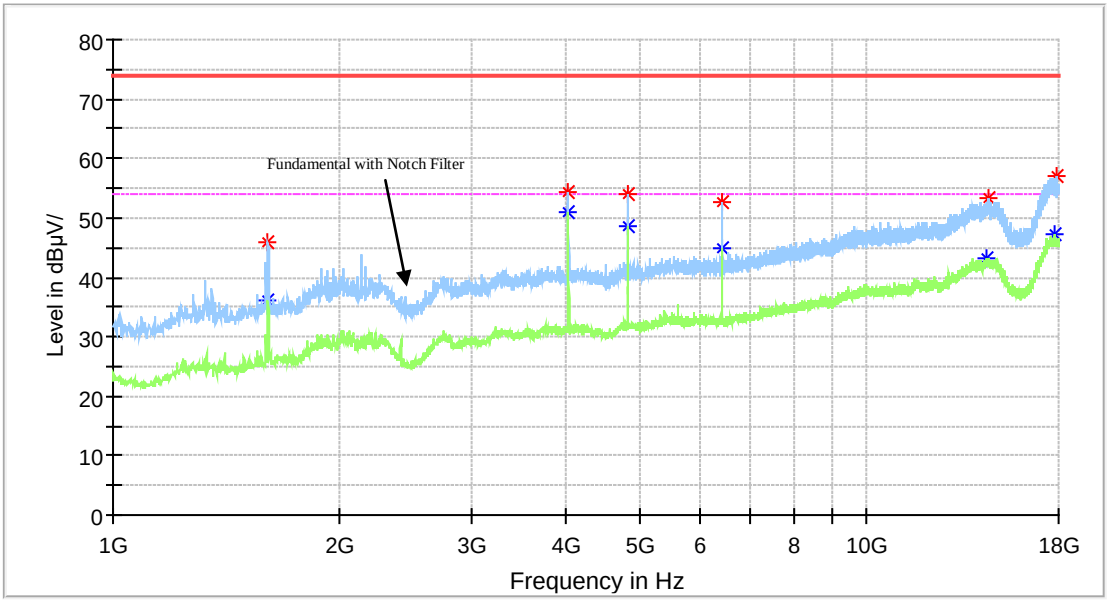


Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
39.777750	27.16	40.00	12.84	1000.0	120.000	108.0	V	112.0	-10.7
44.090750	28.06	40.00	11.94	1000.0	120.000	103.0	V	107.0	-13.8
48.030750	29.90	40.00	10.10	1000.0	120.000	105.0	V	127.0	-16.3
95.817375	35.88	43.50	7.62	1000.0	120.000	123.0	H	354.0	-16.2
796.621250	42.63	46.00	3.37	1000.0	120.000	124.0	H	268.0	-2.3
798.185250	38.62	46.00	7.38	1000.0	120.000	103.0	V	10.0	-2.3

1 GHz to 18 GHz:

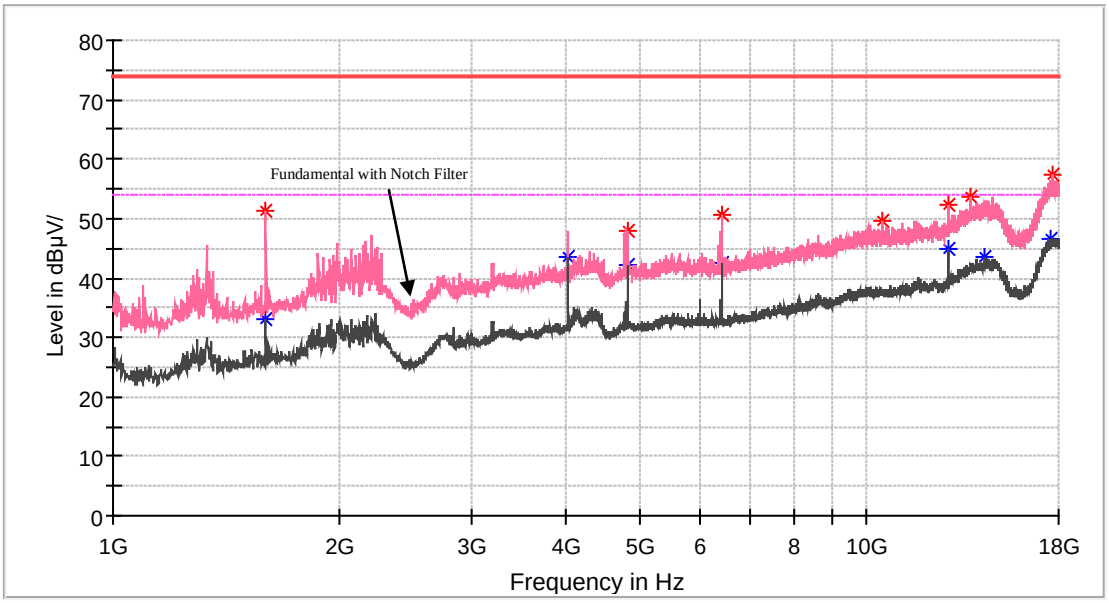
802.11b Mode

2412 MHz (Horizontal)



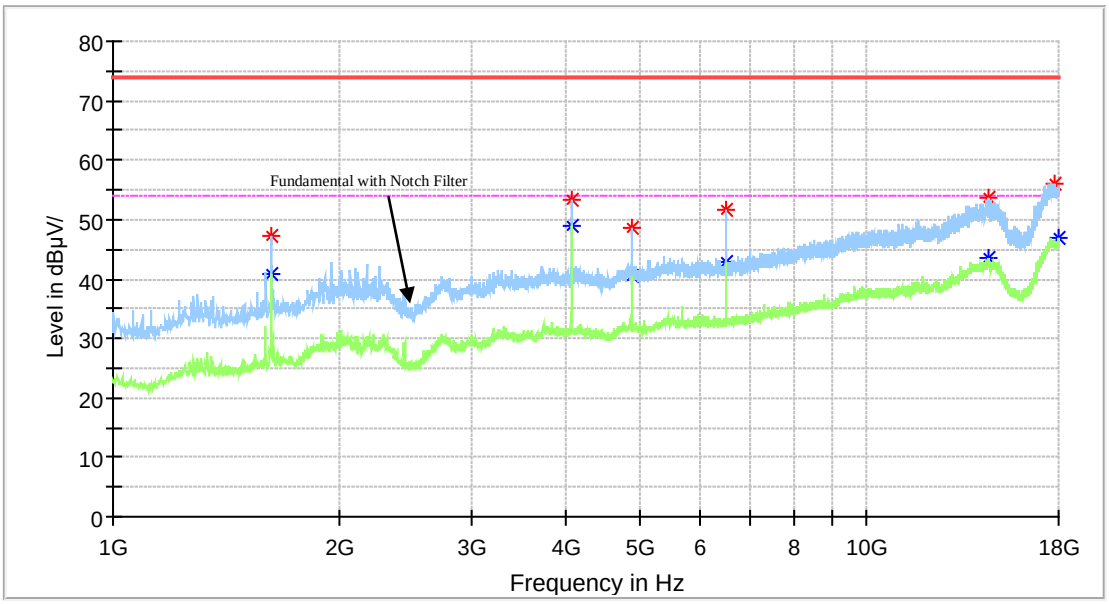
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1606.900000	---	36.00	54.00	18.00	150.0	H	359.0	2.5
1606.900000	45.79	---	74.00	28.21	150.0	H	359.0	2.5
4020.900000	54.19	---	74.00	19.81	100.0	H	279.0	11.0
4020.900000	---	50.99	54.00	3.01	100.0	H	279.0	11.0
4823.300000	---	48.69	54.00	5.31	150.0	H	290.0	11.9
4823.300000	54.15	---	74.00	19.85	150.0	H	290.0	11.9
6431.500000	52.64	---	74.00	21.36	150.0	H	46.0	13.9
6431.500000	---	44.91	54.00	9.09	150.0	H	46.0	13.9
14479.300000	---	43.23	54.00	10.77	150.0	H	13.0	25.5
14566.000000	53.50	---	74.00	20.50	150.0	H	35.0	25.5
17792.600000	---	47.10	54.00	6.90	150.0	H	6.0	29.2
17872.500000	57.16	---	74.00	16.84	100.0	H	323.0	29.2

2412 MHz (Vertical)



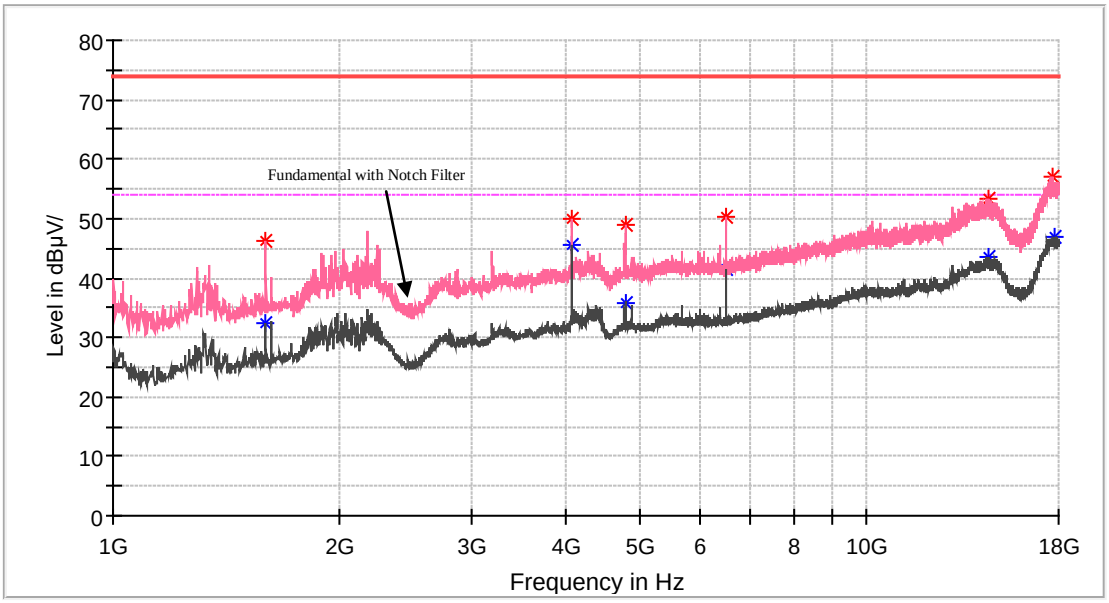
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1595.000000	---	33.05	54.00	20.95	150.0	V	71.0	2.4
1595.000000	51.21	---	74.00	22.79	150.0	V	71.0	2.4
4019.200000	---	43.53	54.00	10.47	100.0	V	310.0	11.0
4823.300000	---	42.23	54.00	11.77	100.0	V	220.0	11.9
4823.300000	48.09	---	74.00	25.91	150.0	V	195.0	11.9
6431.500000	---	42.60	54.00	11.40	100.0	V	310.0	13.9
6431.500000	50.50	---	74.00	23.50	100.0	V	310.0	13.9
10489.400000	49.66	---	74.00	24.34	150.0	V	162.0	20.0
12864.300000	52.33	---	74.00	21.67	100.0	V	60.0	22.1
12864.300000	---	44.92	54.00	9.08	100.0	V	60.0	22.1
13727.900000	53.78	---	74.00	20.22	100.0	V	141.0	24.5
14394.300000	---	43.39	54.00	10.61	150.0	V	94.0	25.4
17539.300000	---	46.64	54.00	7.36	100.0	V	2.0	29.2
17658.300000	57.43	---	74.00	16.57	100.0	V	60.0	29.2

2437 MHz (Horizontal)



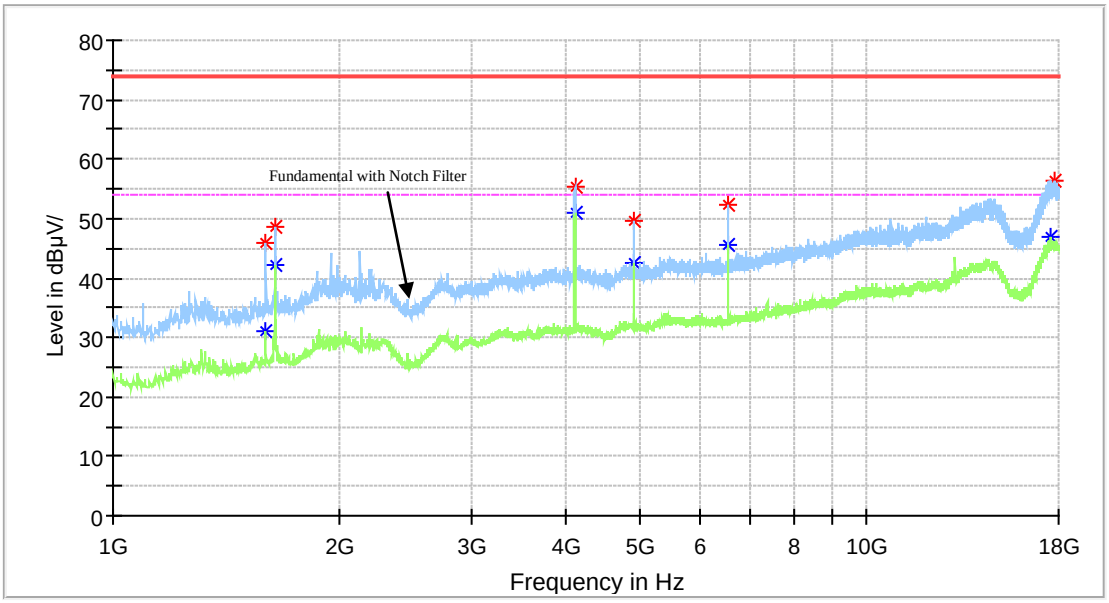
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1623.900000	47.18	---	74.00	26.82	150.0	H	5.0	2.6
1623.900000	---	40.85	54.00	13.15	150.0	H	5.0	2.6
4060.000000	---	49.09	54.00	4.91	150.0	H	0.0	11.0
4060.000000	53.35	---	74.00	20.65	150.0	H	0.0	11.0
4874.300000	---	40.45	54.00	13.55	150.0	H	287.0	12.0
4874.300000	48.54	---	74.00	25.46	150.0	H	287.0	12.0
6497.800000	51.66	---	74.00	22.34	150.0	H	44.0	13.9
6499.500000	---	43.02	54.00	10.98	150.0	H	264.0	13.9
14491.200000	---	43.45	54.00	10.55	100.0	H	142.0	25.5
14504.800000	53.83	---	74.00	20.17	150.0	H	44.0	25.5
17739.900000	56.19	---	74.00	17.81	150.0	H	21.0	29.2
17991.500000	---	46.92	54.00	7.08	150.0	H	32.0	29.2

2437 MHz (Vertical)



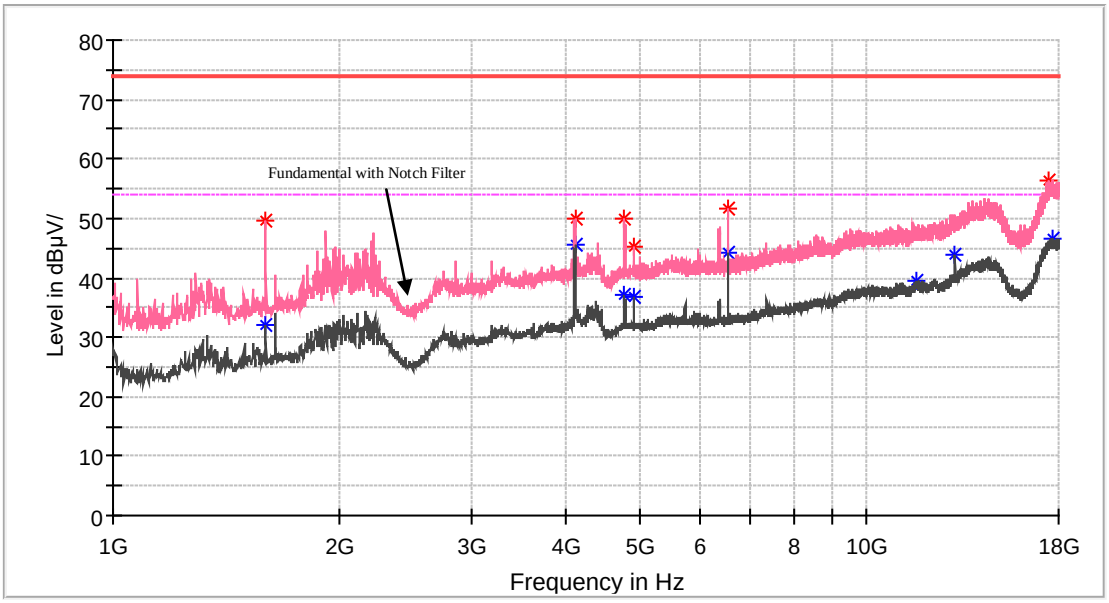
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1595.000000	---	32.52	54.00	21.48	150.0	V	112.0	2.4
1595.000000	46.29	---	74.00	27.71	150.0	V	112.0	2.4
4060.000000	49.92	---	74.00	24.08	150.0	V	311.0	11.0
4060.000000	---	45.50	54.00	8.50	150.0	V	311.0	11.0
4785.900000	---	35.76	54.00	18.24	100.0	V	283.0	11.8
4785.900000	48.86	---	74.00	25.14	100.0	V	283.0	11.8
6499.500000	---	41.60	54.00	12.40	100.0	V	153.0	13.9
6499.500000	50.14	---	74.00	23.86	100.0	V	153.0	13.9
14526.900000	53.33	---	74.00	20.67	100.0	V	60.0	25.5
14557.500000	---	43.68	54.00	10.32	150.0	V	299.0	25.5
17678.700000	57.16	---	74.00	16.84	150.0	V	145.0	29.2
17731.400000	---	46.84	54.00	7.16	150.0	V	190.0	29.2

2462 MHz (Horizontal)



Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1595.000000	---	31.03	54.00	22.97	100.0	H	295.0	2.4
1595.000000	45.90	---	74.00	28.10	100.0	H	295.0	2.4
1640.900000	---	42.16	54.00	11.84	150.0	H	0.0	2.8
1640.900000	48.55	---	74.00	25.45	150.0	H	0.0	2.8
4102.500000	55.37	---	74.00	18.63	150.0	H	56.0	10.9
4104.200000	---	51.07	54.00	2.93	150.0	H	56.0	10.9
4923.600000	49.52	---	74.00	24.48	150.0	H	283.0	12.2
4923.600000	---	42.51	54.00	11.49	150.0	H	283.0	12.2
6565.800000	---	45.51	54.00	8.49	150.0	H	45.0	14.0
6565.800000	52.43	---	74.00	21.57	150.0	H	45.0	14.0
17595.400000	---	46.76	54.00	7.24	150.0	H	5.0	29.2
17736.500000	56.49	---	74.00	17.51	150.0	H	283.0	29.2

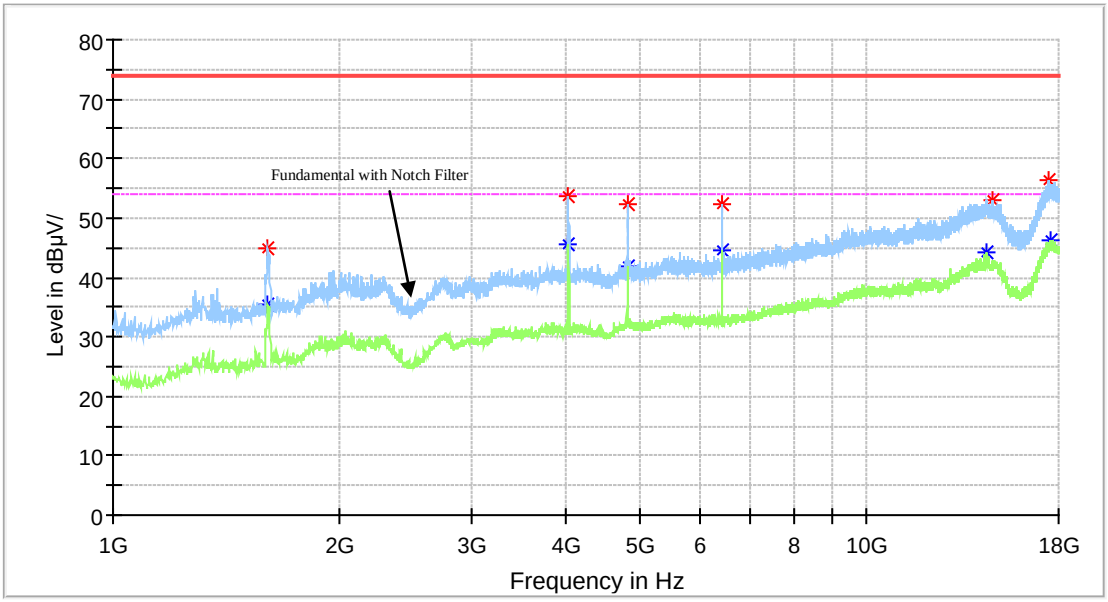
2462 MHz (Vertical)



Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1593.300000	49.49	---	74.00	24.51	150.0	V	119.0	2.3
1595.000000	---	31.91	54.00	22.09	150.0	V	119.0	2.4
4104.200000	---	45.72	54.00	8.28	100.0	V	306.0	10.9
4104.200000	49.90	---	74.00	24.10	100.0	V	306.0	10.9
4779.100000	---	37.16	54.00	16.84	100.0	V	283.0	11.7
4779.100000	50.08	---	74.00	23.92	100.0	V	283.0	11.7
4923.600000	---	36.66	54.00	17.34	100.0	V	260.0	12.2
4923.600000	45.38	---	74.00	28.62	100.0	V	260.0	12.2
6565.800000	---	44.18	54.00	9.82	100.0	V	176.0	14.0
6565.800000	51.58	---	74.00	22.42	100.0	V	176.0	14.0
11655.600000	---	39.40	54.00	14.60	150.0	V	86.0	20.9
13131.200000	---	43.86	54.00	10.14	100.0	V	260.0	22.8
17510.400000	56.42	---	74.00	17.58	150.0	V	1.0	29.2
17671.900000	---	46.60	54.00	7.40	150.0	V	10.0	29.2

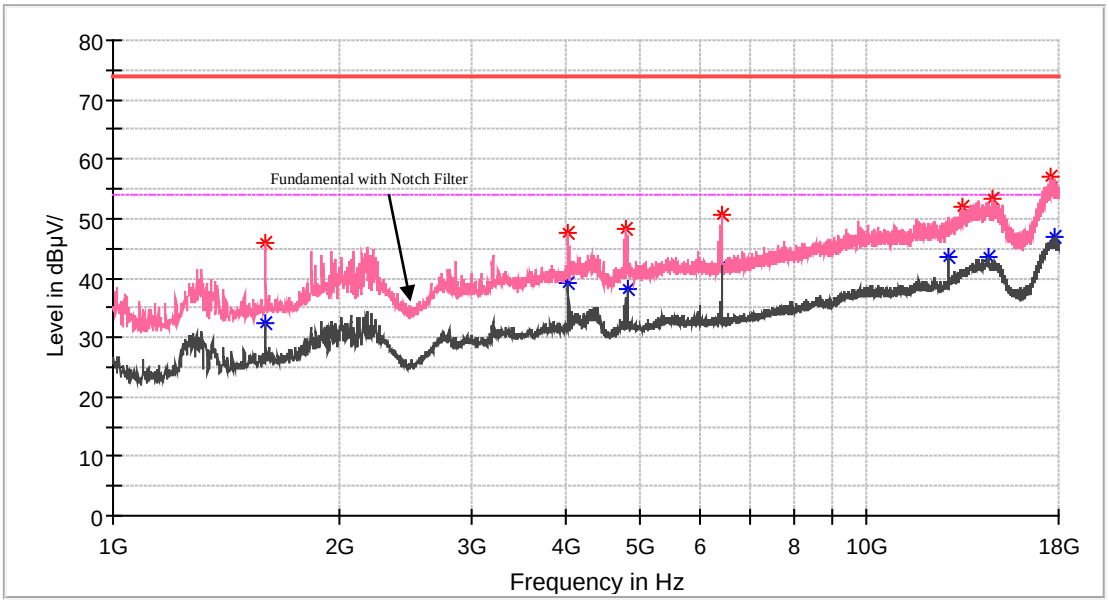
802.11g Mode

2412 MHz (Horizontal)



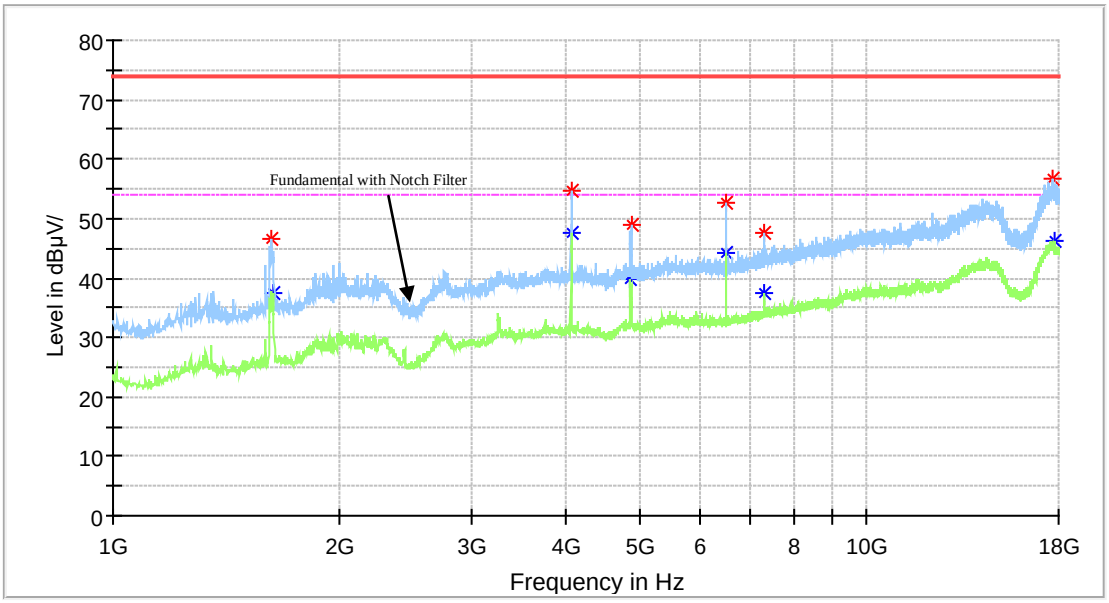
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1606.900000	---	35.39	54.00	18.61	150.0	H	0.0	2.5
1606.900000	44.95	---	74.00	29.05	150.0	H	0.0	2.5
4017.500000	---	45.64	54.00	8.36	100.0	H	279.0	11.0
4017.500000	53.73	---	74.00	20.27	100.0	H	279.0	11.0
4816.500000	52.26	---	74.00	21.74	100.0	H	290.0	11.8
4818.200000	---	41.99	54.00	12.01	100.0	H	290.0	11.8
6431.500000	---	44.44	54.00	9.56	150.0	H	44.0	13.9
6431.500000	52.41	---	74.00	21.59	150.0	H	44.0	13.9
14450.400000	---	44.32	54.00	9.68	150.0	H	0.0	25.5
14727.500000	52.97	---	74.00	21.03	100.0	H	279.0	25.4
17413.500000	56.21	---	74.00	17.79	100.0	H	301.0	28.7
17535.900000	---	46.24	54.00	7.76	150.0	H	33.0	29.2

2412 MHz (Vertical)



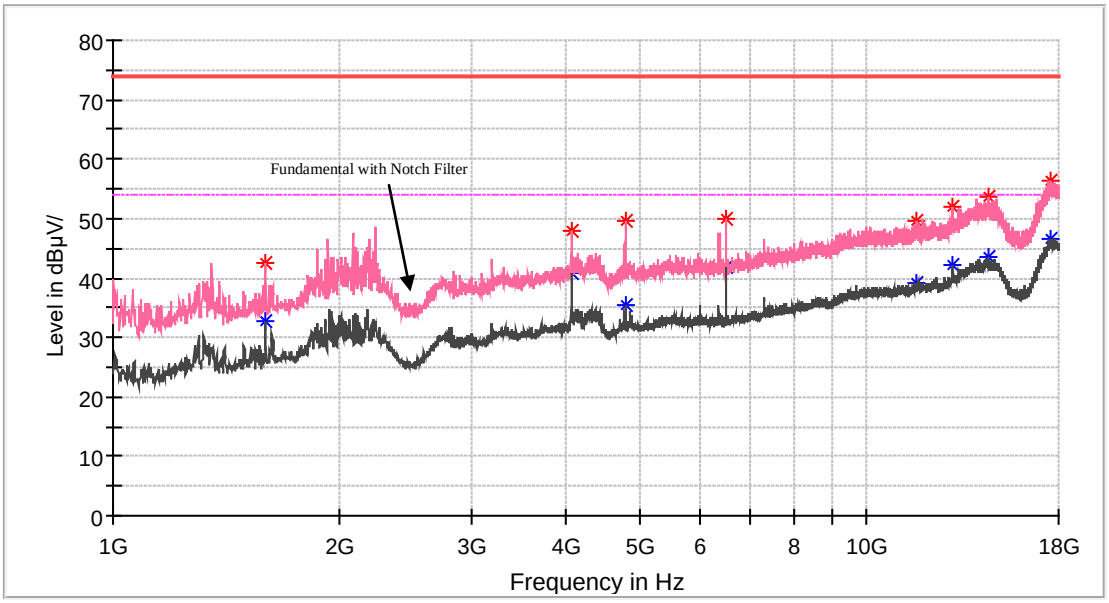
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1595.000000	---	32.39	54.00	21.61	150.0	V	282.0	2.4
1595.000000	45.93	---	74.00	28.07	150.0	V	282.0	2.4
4022.600000	---	39.28	54.00	14.72	100.0	V	301.0	11.0
4024.300000	47.66	---	74.00	26.34	100.0	V	301.0	11.0
4785.900000	48.35	---	74.00	25.65	100.0	V	268.0	11.8
4825.000000	---	38.24	54.00	15.76	150.0	V	189.0	11.9
6431.500000	---	42.33	54.00	11.67	100.0	V	268.0	13.9
6431.500000	50.68	---	74.00	23.32	100.0	V	268.0	13.9
12864.300000	---	43.53	54.00	10.47	150.0	V	246.0	22.1
13452.500000	52.07	---	74.00	21.93	150.0	V	6.0	23.9
14504.800000	---	43.56	54.00	10.44	100.0	V	346.0	25.5
14713.900000	53.34	---	74.00	20.66	100.0	V	108.0	25.4
17556.300000	56.89	---	74.00	17.11	100.0	V	154.0	29.2
17775.600000	---	46.82	54.00	7.18	150.0	V	189.0	29.2

2437 MHz (Horizontal)



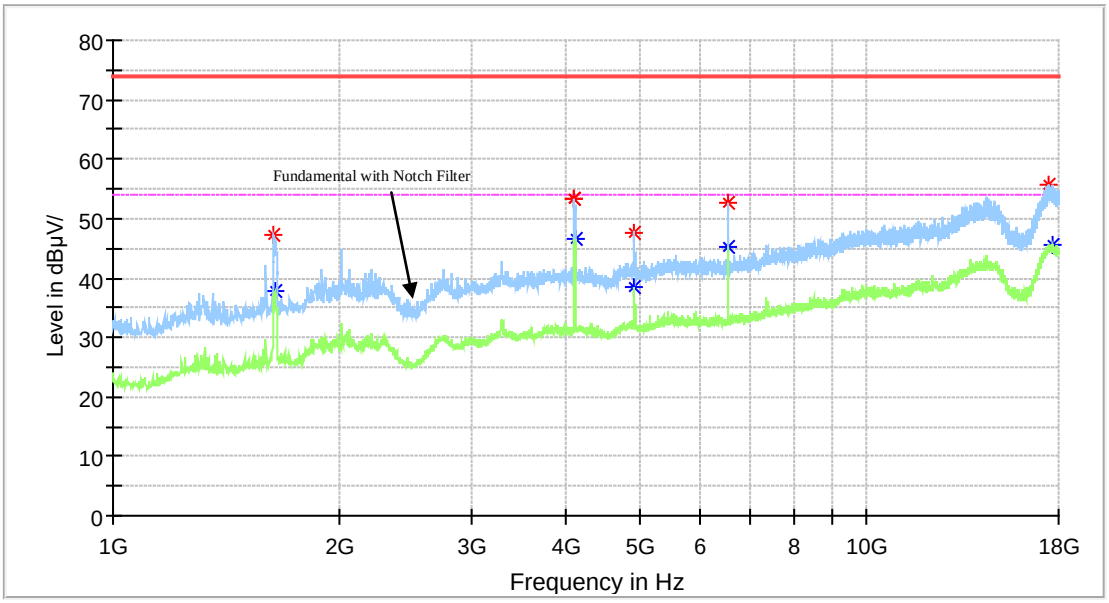
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1622.200000	46.46	---	74.00	27.54	150.0	H	0.0	2.6
1629.000000	---	37.49	54.00	16.51	150.0	H	4.0	2.7
4060.000000	54.78	---	74.00	19.22	100.0	H	48.0	11.0
4060.000000	---	47.70	54.00	6.30	100.0	H	48.0	11.0
4867.500000	---	39.75	54.00	14.25	150.0	H	285.0	12.0
4870.900000	49.10	---	74.00	24.90	150.0	H	285.0	12.0
6499.500000	52.78	---	74.00	21.22	100.0	H	36.0	13.9
6499.500000	---	44.26	54.00	9.74	100.0	H	36.0	13.9
7313.800000	---	37.49	54.00	16.51	100.0	H	260.0	15.5
7320.600000	47.70	---	74.00	26.30	100.0	H	260.0	15.5
17670.200000	56.75	---	74.00	17.25	100.0	H	326.0	29.2
17756.900000	---	46.24	54.00	7.76	150.0	H	65.0	29.2

2437 MHz (Vertical)



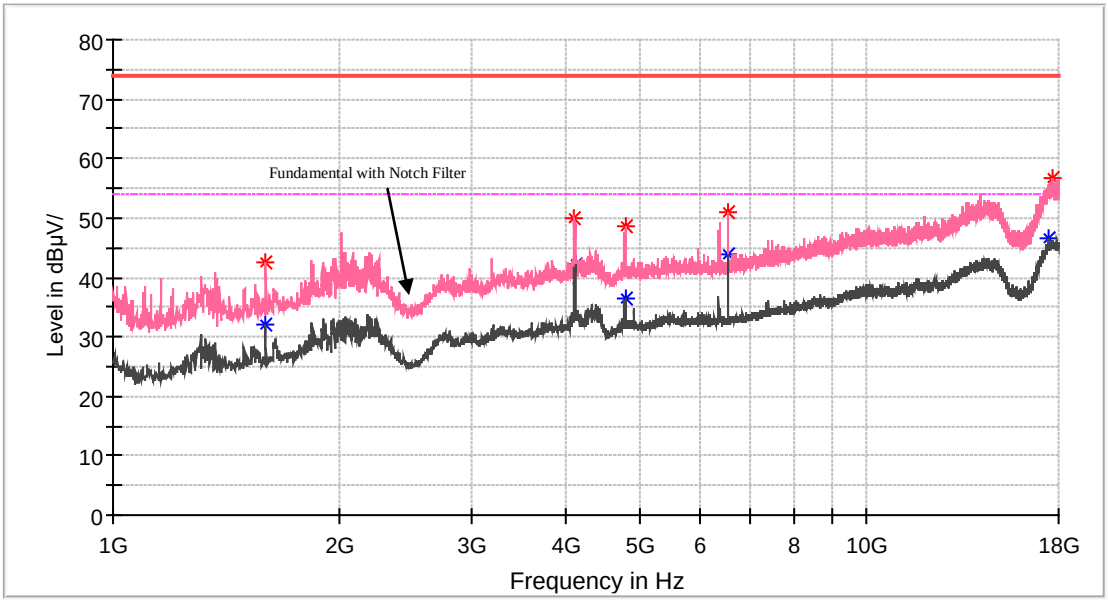
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1593.300000	---	32.78	54.00	21.22	150.0	V	274.0	2.3
1595.000000	42.48	---	74.00	31.52	100.0	V	62.0	2.4
4060.000000	---	40.77	54.00	13.23	100.0	V	255.0	11.0
4060.000000	47.98	---	74.00	26.02	100.0	V	255.0	11.0
4782.500000	---	35.39	54.00	18.61	100.0	V	278.0	11.7
4789.300000	49.60	---	74.00	24.40	100.0	V	278.0	11.8
6499.500000	---	41.79	54.00	12.21	100.0	V	154.0	13.9
6499.500000	50.09	---	74.00	23.91	100.0	V	154.0	13.9
11626.700000	---	39.29	54.00	14.71	150.0	V	22.0	20.9
11660.700000	49.51	---	74.00	24.49	100.0	V	166.0	20.9
12996.900000	51.90	---	74.00	22.10	150.0	V	215.0	22.4
12998.600000	---	42.31	54.00	11.69	100.0	V	74.0	22.4
14516.700000	53.82	---	74.00	20.18	150.0	V	274.0	25.5
14540.500000	---	43.42	54.00	10.58	150.0	V	337.0	25.5
17520.600000	---	46.69	54.00	7.31	150.0	V	251.0	29.2
17575.000000	56.38	---	74.00	17.62	100.0	V	340.0	29.2

2462 MHz (Horizontal)



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1635.800000	47.21	---	74.00	26.79	150.0	H	1.0	2.7
1637.500000	---	37.80	54.00	16.20	150.0	H	1.0	2.8
4099.100000	53.42	---	74.00	20.58	150.0	H	54.0	10.9
4099.100000	53.42	---	74.00	20.58	150.0	H	54.0	10.9
4104.200000	---	46.57	54.00	7.43	100.0	H	356.0	10.9
4920.200000	47.56	---	74.00	26.44	100.0	H	339.0	12.2
4923.600000	---	38.49	54.00	15.51	100.0	H	339.0	12.2
6565.800000	52.72	---	74.00	21.28	150.0	H	54.0	14.0
6565.800000	---	45.22	54.00	8.78	150.0	H	54.0	14.0
17459.400000	55.83	---	74.00	18.17	150.0	H	10.0	29.0
17649.800000	---	45.72	54.00	8.28	150.0	H	133.0	29.2

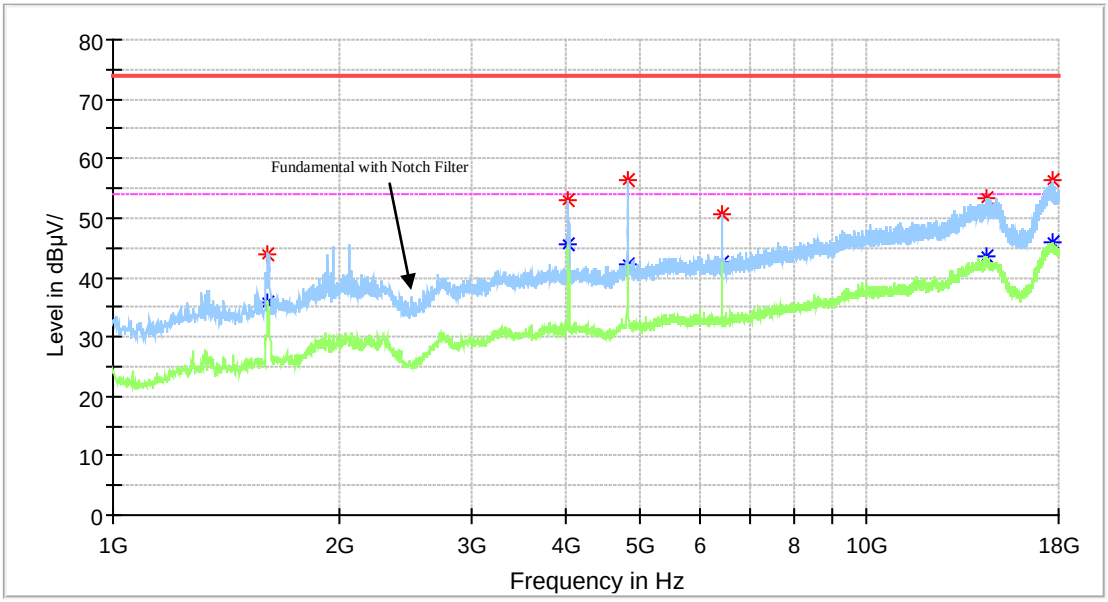
2462 MHz (Vertical)



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1593.300000	42.55	---	74.00	31.45	100.0	V	271.0	2.3
1595.000000	---	32.05	54.00	21.95	100.0	V	271.0	2.4
4100.800000	49.91	---	74.00	24.09	100.0	V	306.0	10.9
4104.200000	---	42.12	54.00	11.88	100.0	V	306.0	10.9
4782.500000	48.45	---	74.00	25.55	100.0	V	271.0	11.7
4789.300000	---	36.58	54.00	17.42	100.0	V	283.0	11.8
6565.800000	50.97	---	74.00	23.03	100.0	V	159.0	14.0
6565.800000	---	43.76	54.00	10.24	100.0	V	159.0	14.0
17507.000000	---	46.55	54.00	7.45	150.0	V	102.0	29.2
17660.000000	56.74	---	74.00	17.26	150.0	V	80.0	29.2

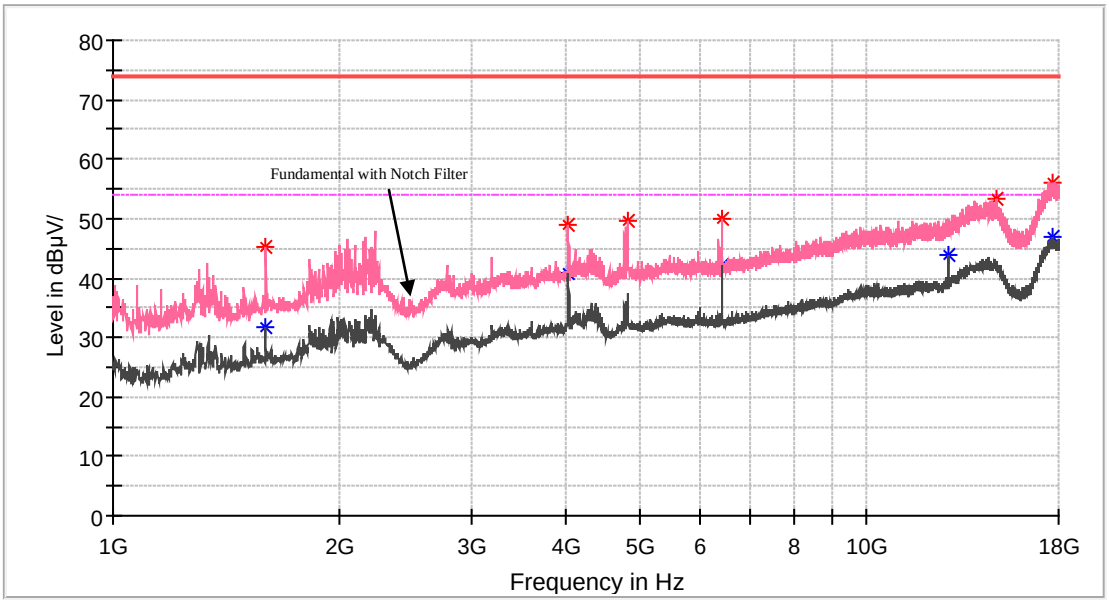
802.11n-HT20 Mode

2412 MHz (Horizontal)



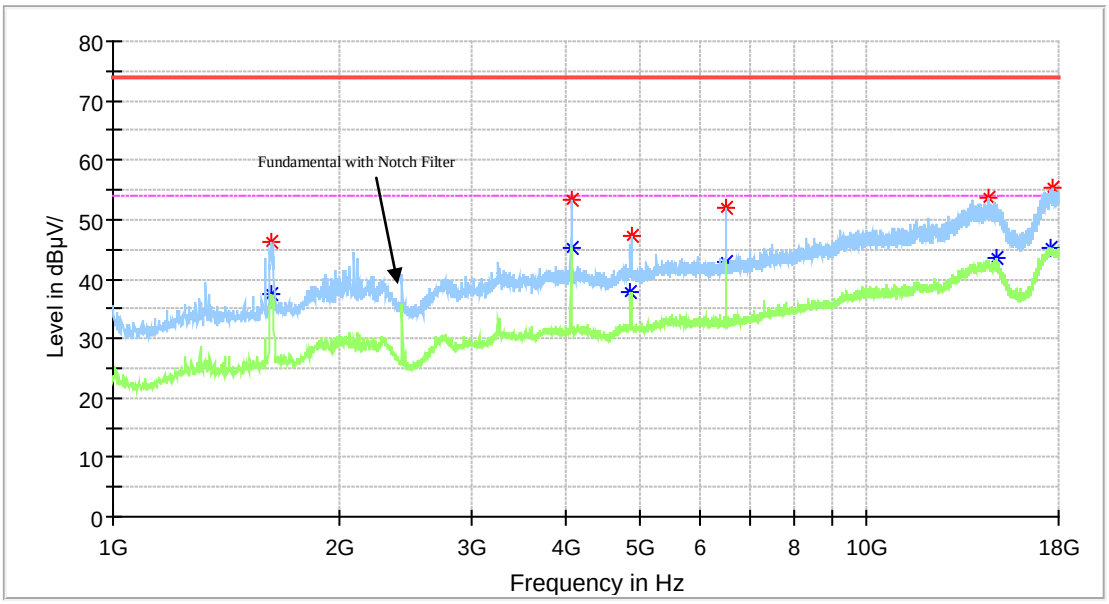
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1603.500000	43.88	---	74.00	30.12	150.0	H	2.0	2.4
1605.200000	---	35.64	54.00	18.36	150.0	H	2.0	2.5
4017.500000	---	45.57	54.00	8.43	100.0	H	60.0	11.0
4020.900000	52.84	---	74.00	21.16	100.0	H	60.0	11.0
4821.600000	---	42.03	54.00	11.97	100.0	H	343.0	11.9
4821.600000	56.25	---	74.00	17.75	100.0	H	343.0	11.9
6431.500000	50.64	---	74.00	23.36	100.0	H	233.0	13.9
6431.500000	---	42.48	54.00	11.52	100.0	H	233.0	13.9
14469.100000	53.29	---	74.00	20.71	100.0	H	358.0	25.5
14475.900000	---	43.59	54.00	10.41	100.0	H	299.0	25.5
17656.600000	56.22	---	74.00	17.78	150.0	H	0.0	29.2
17663.400000	---	45.78	54.00	8.22	150.0	H	276.0	29.2

2412 MHz (Vertical)



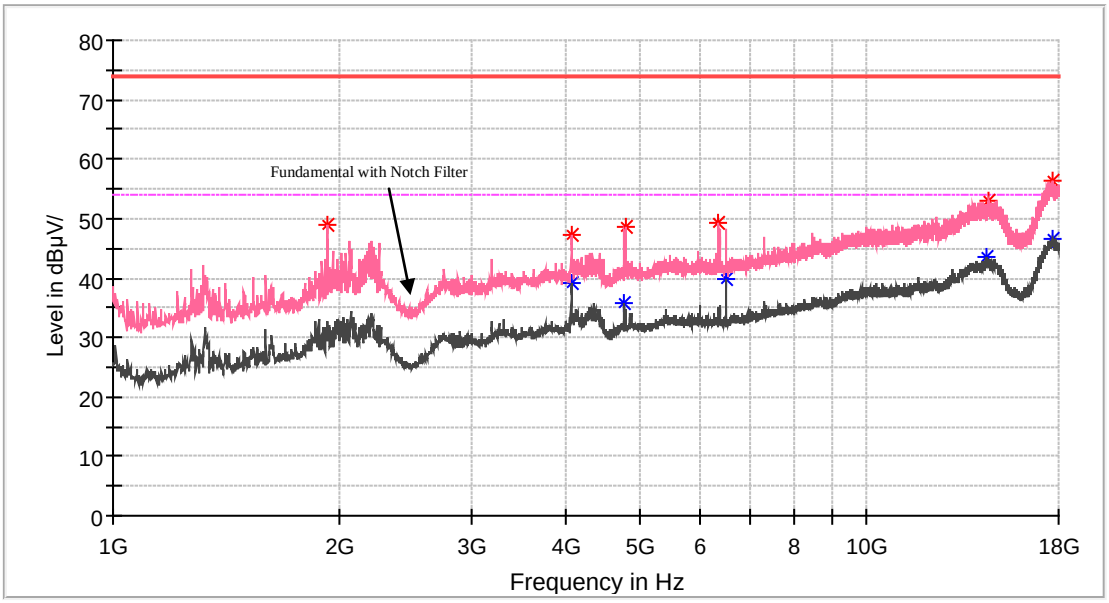
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1593.300000	---	31.68	54.00	22.32	150.0	V	274.0	2.3
1596.700000	45.31	---	74.00	28.69	150.0	V	54.0	2.4
4015.800000	---	40.83	54.00	13.17	100.0	V	305.0	11.0
4017.500000	48.91	---	74.00	25.09	100.0	V	305.0	11.0
4819.900000	49.57	---	74.00	24.43	100.0	V	24.0	11.9
6431.500000	---	42.23	54.00	11.77	100.0	V	165.0	13.9
6431.500000	49.80	---	74.00	24.20	100.0	V	165.0	13.9
12864.300000	---	43.77	54.00	10.23	100.0	V	36.0	22.1
14914.500000	53.37	---	74.00	20.63	100.0	V	278.0	25.4
17699.100000	---	46.77	54.00	7.23	100.0	V	245.0	29.2
17709.300000	56.15	---	74.00	17.85	150.0	V	3.0	29.2

2437 MHz (Horizontal)



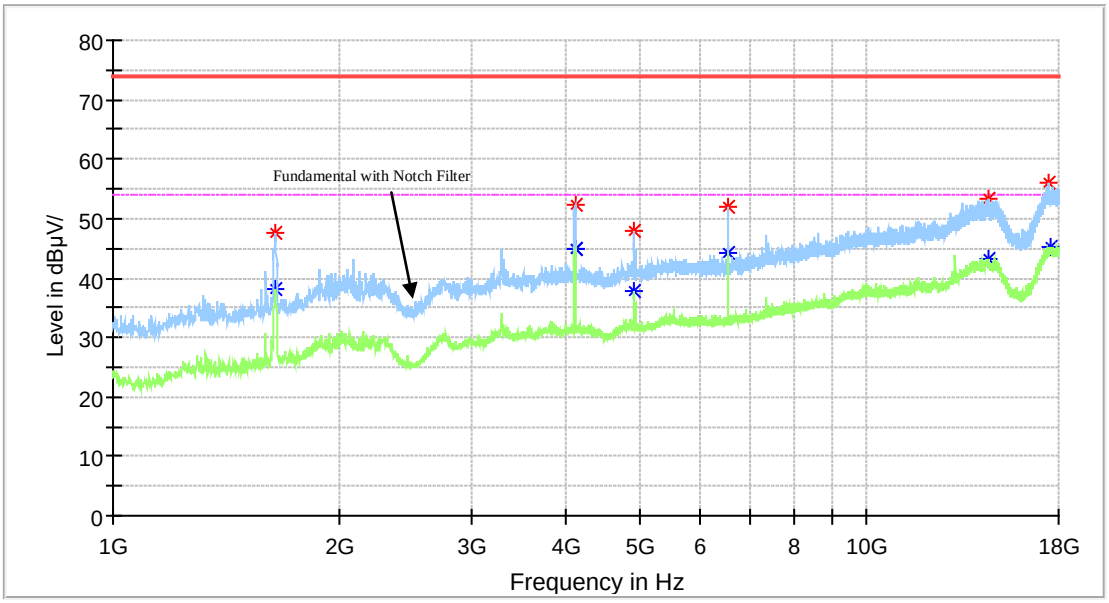
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1622.200000	---	37.43	54.00	16.57	150.0	H	0.0	2.6
1622.200000	46.41	---	74.00	27.59	150.0	H	0.0	2.6
4060.000000	53.33	---	74.00	20.67	100.0	H	49.0	11.0
4060.000000	---	45.31	54.00	8.69	100.0	H	49.0	11.0
4867.500000	---	37.97	54.00	16.03	150.0	H	287.0	12.0
4874.300000	47.23	---	74.00	26.77	150.0	H	263.0	12.0
6497.800000	51.86	---	74.00	22.14	150.0	H	263.0	13.9
6499.500000	---	43.00	54.00	11.00	150.0	H	263.0	13.9
14545.600000	53.55	---	74.00	20.45	150.0	H	182.0	25.5
14895.800000	---	43.45	54.00	10.55	150.0	H	287.0	25.4
17593.700000	---	45.34	54.00	8.66	150.0	H	46.0	29.2
17722.900000	55.30	---	74.00	18.70	100.0	H	346.0	29.2

2437 MHz (Vertical)



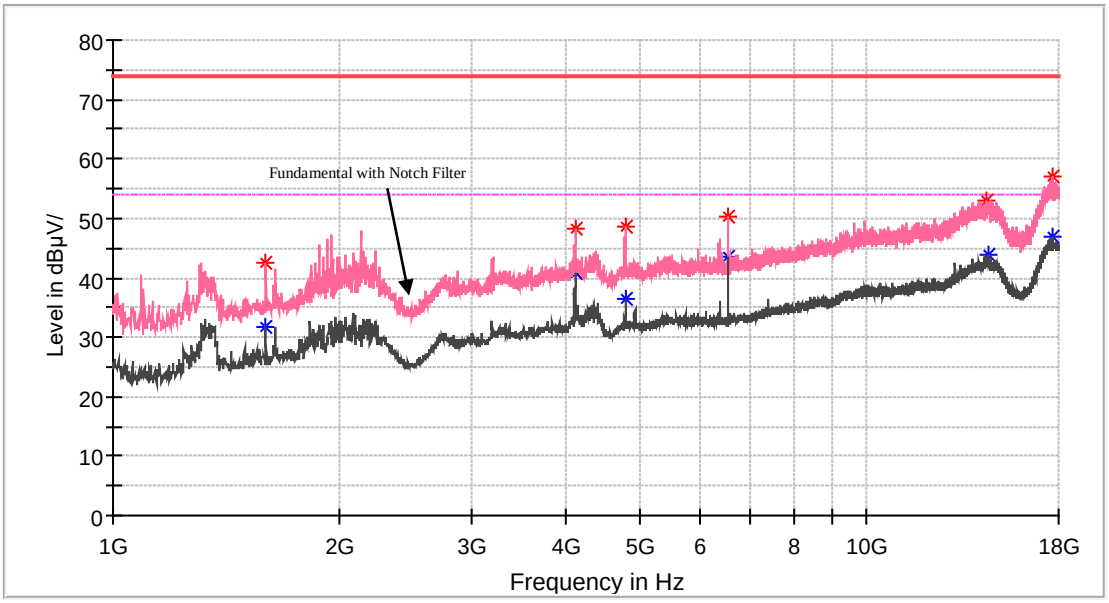
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1928.200000	49.00	---	74.00	25.00	100.0	V	290.0	5.3
4061.700000	47.41	---	74.00	26.59	100.0	V	245.0	11.0
4065.100000	---	39.20	54.00	14.80	100.0	V	245.0	11.0
4779.100000	---	35.86	54.00	18.14	100.0	V	267.0	11.7
4789.300000	48.73	---	74.00	25.27	100.0	V	290.0	11.8
6373.700000	49.36	---	74.00	24.64	100.0	V	278.0	13.9
6499.500000	---	39.97	54.00	14.03	100.0	V	119.0	13.9
14457.200000	---	43.46	54.00	10.54	150.0	V	148.0	25.5
14530.300000	53.03	---	74.00	20.97	150.0	V	136.0	25.5
17677.000000	---	46.58	54.00	7.42	150.0	V	337.0	29.2
17695.700000	56.21	---	74.00	17.79	100.0	V	222.0	29.2

2462 MHz (Horizontal)



Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1640.900000	---	38.08	54.00	15.92	150.0	H	4.0	2.8
1644.300000	47.58	---	74.00	26.42	150.0	H	0.0	2.8
4102.500000	52.31	---	74.00	21.69	150.0	H	0.0	10.9
4107.600000	---	44.96	54.00	9.04	150.0	H	0.0	10.9
4920.200000	---	37.69	54.00	16.31	150.0	H	287.0	12.2
4925.300000	48.06	---	74.00	25.94	150.0	H	259.0	12.2
6565.800000	51.84	---	74.00	22.16	150.0	H	21.0	14.0
6565.800000	---	44.25	54.00	9.75	150.0	H	21.0	14.0
14508.200000	---	43.29	54.00	10.71	100.0	H	355.0	25.5
14515.000000	53.44	---	74.00	20.56	150.0	H	4.0	25.5
17447.500000	55.97	---	74.00	18.03	100.0	H	281.0	28.9
17513.800000	---	45.40	54.00	8.60	150.0	H	110.0	29.2

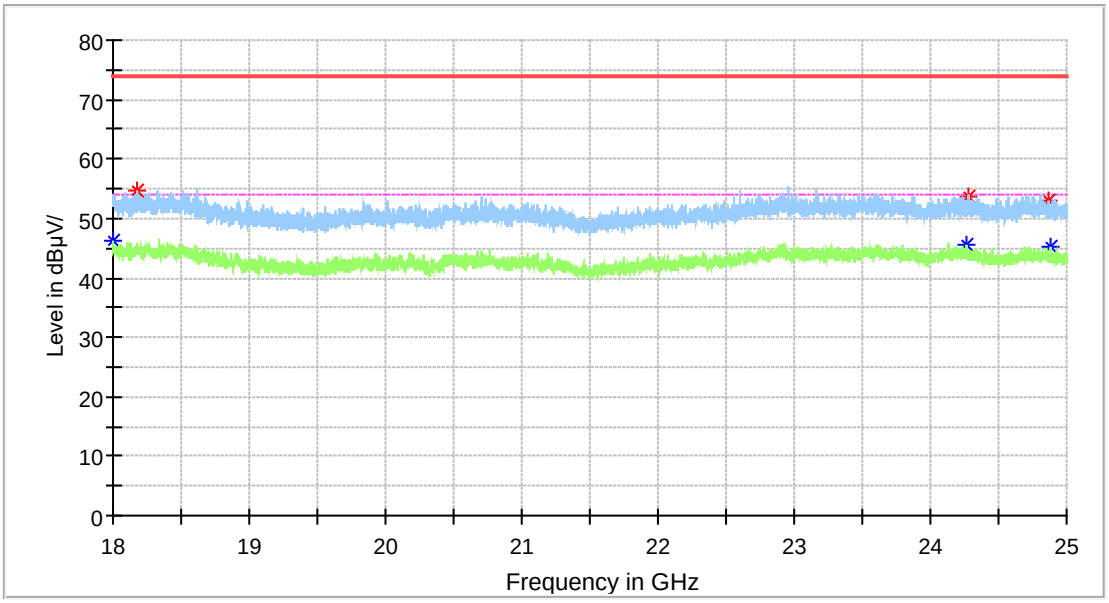
2462 MHz (Vertical)



Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1593.300000	---	31.82	54.00	22.18	150.0	V	281.0	2.3
1593.300000	42.65	---	74.00	31.35	100.0	V	262.0	2.3
4107.600000	48.16	---	74.00	25.84	150.0	V	310.0	10.9
4107.600000	---	40.94	54.00	13.06	100.0	V	307.0	10.9
4782.500000	48.46	---	74.00	25.54	100.0	V	274.0	11.7
4782.500000	---	36.57	54.00	17.43	100.0	V	274.0	11.7
6565.800000	50.13	---	74.00	23.87	100.0	V	160.0	14.0
6565.800000	---	43.46	54.00	10.54	100.0	V	160.0	14.0
14399.400000	53.08	---	74.00	20.92	100.0	V	359.0	25.4
14509.900000	---	44.02	54.00	9.98	100.0	V	148.0	25.5
17651.500000	---	46.98	54.00	7.02	150.0	V	131.0	29.2
17651.500000	56.90	---	74.00	17.10	150.0	V	131.0	29.2

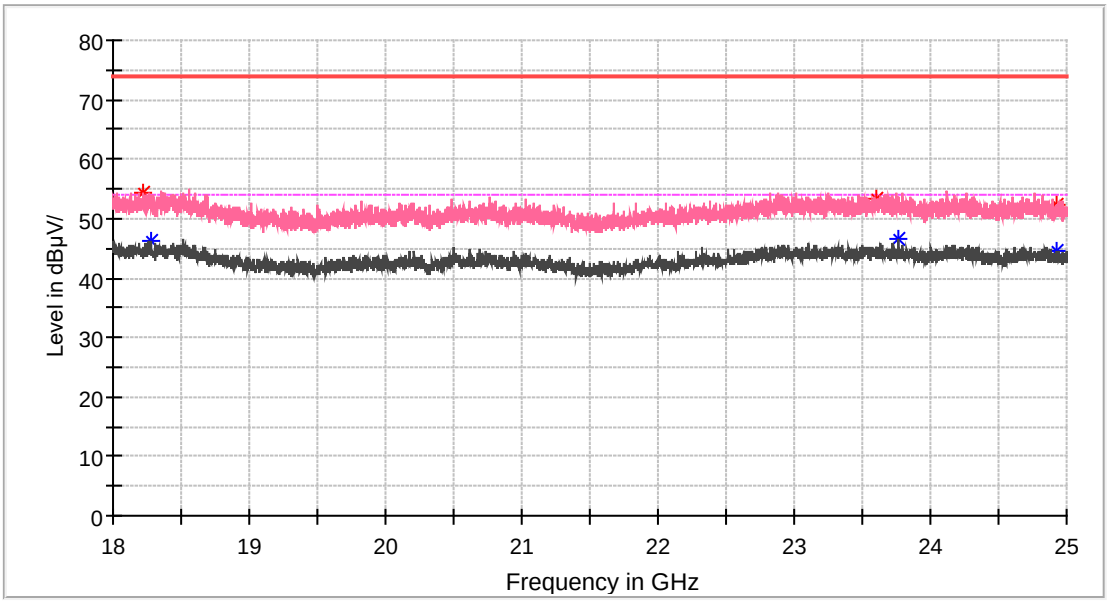
18 GHz to 25 GHz: 802.11g_High Channel-Worst Case

Horizontal



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18006.300000	---	46.10	54.00	7.90	100.0	H	347.0	9.3
18183.400000	54.62	---	74.00	19.38	100.0	H	186.0	9.5
24260.100000	---	45.50	54.00	8.50	100.0	H	238.0	11.5
24272.700000	53.82	---	74.00	20.18	100.0	H	124.0	11.5
24873.300000	52.88	---	74.00	21.12	100.0	H	0.0	11.5
24882.400000	---	45.27	54.00	8.73	100.0	H	13.0	11.5

Vertical



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18221.900000	54.45	---	74.00	19.55	100.0	V	142.0	9.5
18274.400000	---	46.14	54.00	7.86	100.0	V	330.0	9.5
23598.600000	53.40	---	74.00	20.60	100.0	V	338.0	11.8
23766.600000	---	46.54	54.00	7.46	100.0	V	150.0	11.7
24925.800000	---	44.50	54.00	9.50	100.0	V	304.0	11.5
24932.100000	52.43	---	74.00	21.57	100.0	V	254.0	11.5

Band Edge Emission:

802.11b Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	dB(1/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency: 2412 MHz									
2390	28.36	PK	H	29.15	3.01	0.00	60.52	74.00	13.48
2390	14.55	AV	H	29.15	3.01	0.00	46.71	54.00	7.29
Frequency: 2462 MHz									
2483.5	27.67	PK	H	29.02	3.07	0.00	59.76	74.00	14.24
2483.5	14.62	AV	H	29.02	3.07	0.00	46.71	54.00	7.29

802.11g Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	dB(1/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency: 2412 MHz									
2390	27.56	PK	H	29.15	3.01	0.00	59.72	74.00	14.28
2390	14.62	AV	H	29.15	3.01	0.00	46.78	54.00	7.22
Frequency: 2462 MHz									
2483.5	28.99	PK	H	29.02	3.07	0.00	61.08	74.00	12.92
2483.5	15.05	AV	H	29.02	3.07	0.00	47.14	54.00	6.86

802.11n-HT20 Mode

Frequency	Receiver		Rx Antenna		Cable loss	Amplifier Gain	Corrected Amplitude	Limit	Margin
	Reading	Measurement	Polar	Factor					
MHz	dBμV	PK/AV	H/V	dB(1/m)	dB	dB	dBμV/m	dBμV/m	dB
Frequency: 2412 MHz									
2390	28.86	PK	H	29.15	3.01	0.00	61.02	74.00	12.98
2390	14.64	AV	H	29.15	3.01	0.00	46.80	54.00	7.20
Frequency: 2462 MHz									
2483.5	28.87	PK	H	29.02	3.07	0.00	60.96	74.00	13.04
2483.5	15.03	AV	H	29.02	3.07	0.00	47.12	54.00	6.88

Note:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor
Margin = Limit- Corr. Amplitude

END OF REPORT