

# FCC PART 15.407

## TEST REPORT

For

### Beijing InHand Networks Technology Co., Ltd.

Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

**Tested Model: IG902**  
**FCC ID: 2AANYIG9**

<b>Report Type:</b> Class II Permissive Change	<b>Equipment Name:</b> Edge computing gateway
<b>Report Number:</b>	RSC201123001-0C
<b>Date of Report Issue:</b>	2020-12-10
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## DOCUMENT REVISION HISTORY

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Revision Number	Report Number	Description of Revision	Date of Revision
0	EC1902004RF02	Original Report	2020-01-08
1	RSC201123001-0C	CIIPC Report	2020-12-10

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

- 1) Removing the LTE Module and Disable GPS function
- 2) Removing the SIM card slot

Base on above changes, AC Power Line conducted Emissions and Radiated Emissions were done and MPE was updated, other data was referred to the report number.EC1902004RF02.

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

Applicant	Beijing InHand Networks Technology Co., Ltd.
Product	Edge computing gateway
Tested Model	IG902
Multiple Model(s)	IG912, IG952, IG962, IG992, IG903, IG913, IG953, IG963, IG993, IG904, IG914, IG954, IG964, IG994, IG905, IG915, IG955, IG965, IG995, IG906, IG916, IG956, IG966, IG996
FCC ID	2AANYIG9
Frequency Range*	5150~5250 MHz 5725~5850 MHz
Modulation Type*	OFDM
Voltage Range	DC 12-48V(Typical:12V) from adapter
Measure approximately	135 mm (L) x 120 mm (W) x 45 mm (H)
Sample serial number	201123001/01 (assigned by the BACL, Chengdu)
Sample/EUT Status	The test sample was in good condition and received:2020-11-23

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

### Objective

This type approval report is prepared on behalf of **Beijing InHand Networks Technology Co., Ltd.** in accordance with Part 2-Subpart J, Part 15-Subparts A, C and E of the Federal Communications Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, section subpart C, 15.203, 15.205, 15.207, 15.209 and Subpart E, 15.407 rules.

### Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submissions with FCC ID: 2AANYIG9

### Measurement Uncertainty

Item			Uncertainty
AC power line conducted emission			2.48 dB
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		4.57 dB
	18GHz-40GHz		5.44 dB

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. KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.
3. KDB 662911 D01 Multiple Transmitter Output v02r01.

## **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

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### Description of Test Configuration\*

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

For 5150~5250 MHz band, channels are provided to test as follows:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 802.11a, 802.11ac20, 802.11n-HT20: Channel 36, 40 and 48 were tested; for 802.11ac40, 802.11n-HT40: Channel 38, 46 were tested; for ac80: Channel 42 was tested.

For 5725~5850 MHz band, channels are provided to test as follows:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
155	5775	165	5825

For 802.11a, 802.11ac20, 802.11n-HT20: Channel 149, 157 and 165 were tested.

For 802.11n-HT40, 802.11ac40: Channel 151, 159 were tested; for ac80: Channel 155 was tested.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

**EUT Exercise Software\***

The software “RF test tool” was used for testing, which was provided by manufacturer.  
The setting was as below:

Software		RF test tool			
UNII Band	Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Power Level
5150-5250MHz	802.11a	Low	5180	6	Default
		Middle	5200	6	Default
		High	5240	6	Default
	802.11n-HT20	Low	5180	MCS0	Default
		Middle	5200	MCS0	Default
		High	5240	MCS0	Default
	802.11n-HT40	Low	5190	MCS0	Default
		High	5230	MCS0	Default
	802.11ac20	Low	5180	MCS0	Default
		Middle	5200	MCS0	Default
		High	5240	MCS0	Default
	802.11ac40	Low	5190	MCS0	Default
High		5230	MCS0	Default	
802.11ac80	Middle	5210	MCS0	Default	
5725-5850MHz	802.11a	Low	5745	6	Default
		Middle	5785	6	Default
		High	5825	6	Default
	802.11n-HT20	Low	5745	MCS0	Default
		Middle	5785	MCS0	Default
		High	5825	MCS0	Default
	802.11n-HT40	Low	5755	MCS0	Default
		High	5795	MCS0	Default
	802.11ac20	Low	5745	MCS0	Default
		Middle	5785	MCS0	Default
		High	5825	MCS0	Default
	802.11ac40	Low	5755	MCS0	Default
		High	5795	MCS0	Default
	802.11ac80	Middle	5775	MCS0	Default

### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Laptop 1	Latitude E5430	BTXWLX1
DELL	Laptop 2	E6410	353854366585
IBM	PC	8176	99Y7315
SHENZHEN FRECOM ELECTRONICS CO.,LTD.	Adapter	F24W5-120200SPAU	01460146600R
Kingston	U Disk	16G	Unknown
Kingston	Micro SD card	16G	Unknown
Unknown	PLC Terminal	Unknown	Unknown

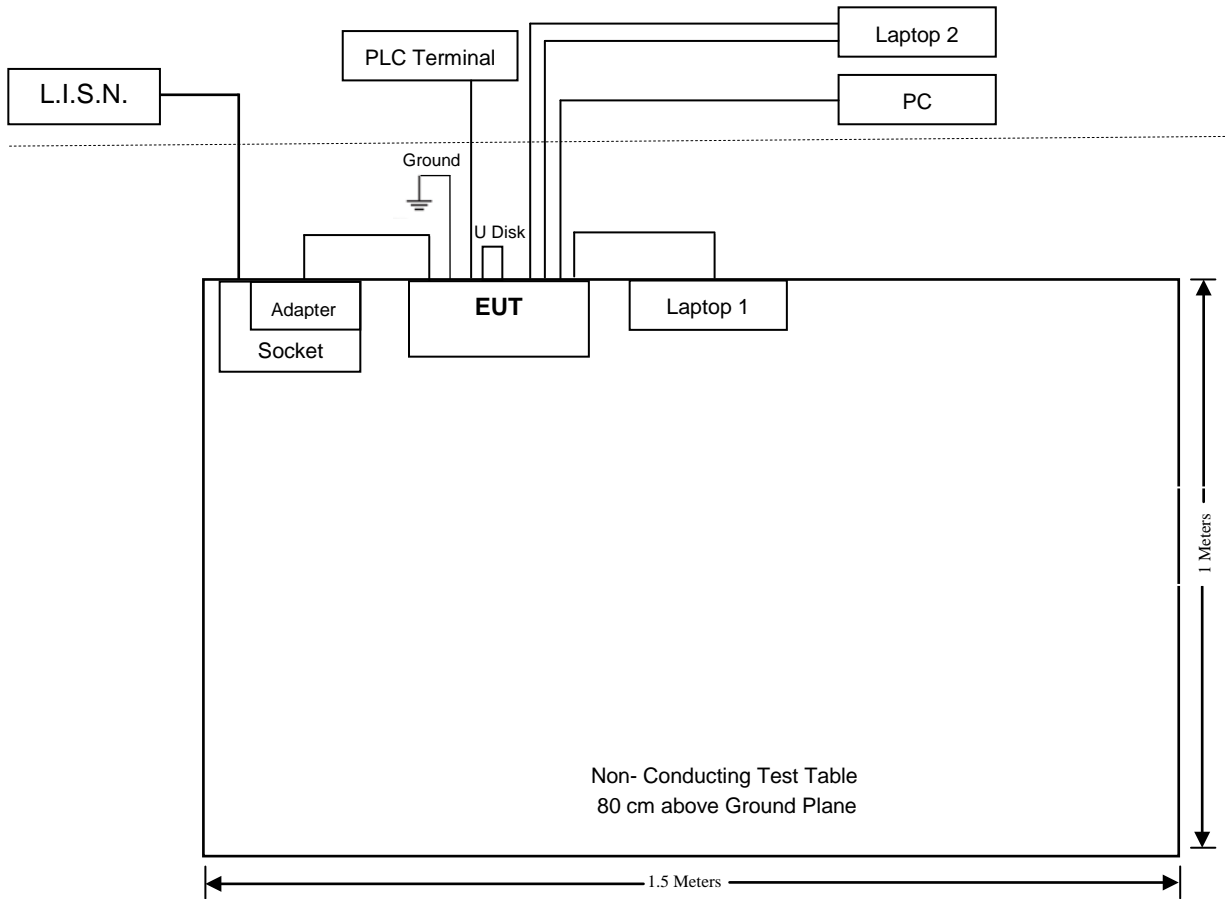
### External I/O Cable

Cable Description	Length (m)	From	To
Unshielded DC Power Cable	1.50	Adapter	EUT
Unshielded Ethernet Cable	10.0	EUT	Laptop 1
Unshielded Ethernet Cable	10.0	EUT	Laptop 2
Unshielded RS232 Cable	10.0	EUT	Laptop 2
Unshielded RS285 Cable	10.0	EUT	PC
Unshielded Serial Cable	10.0	EUT	PLC Terminal

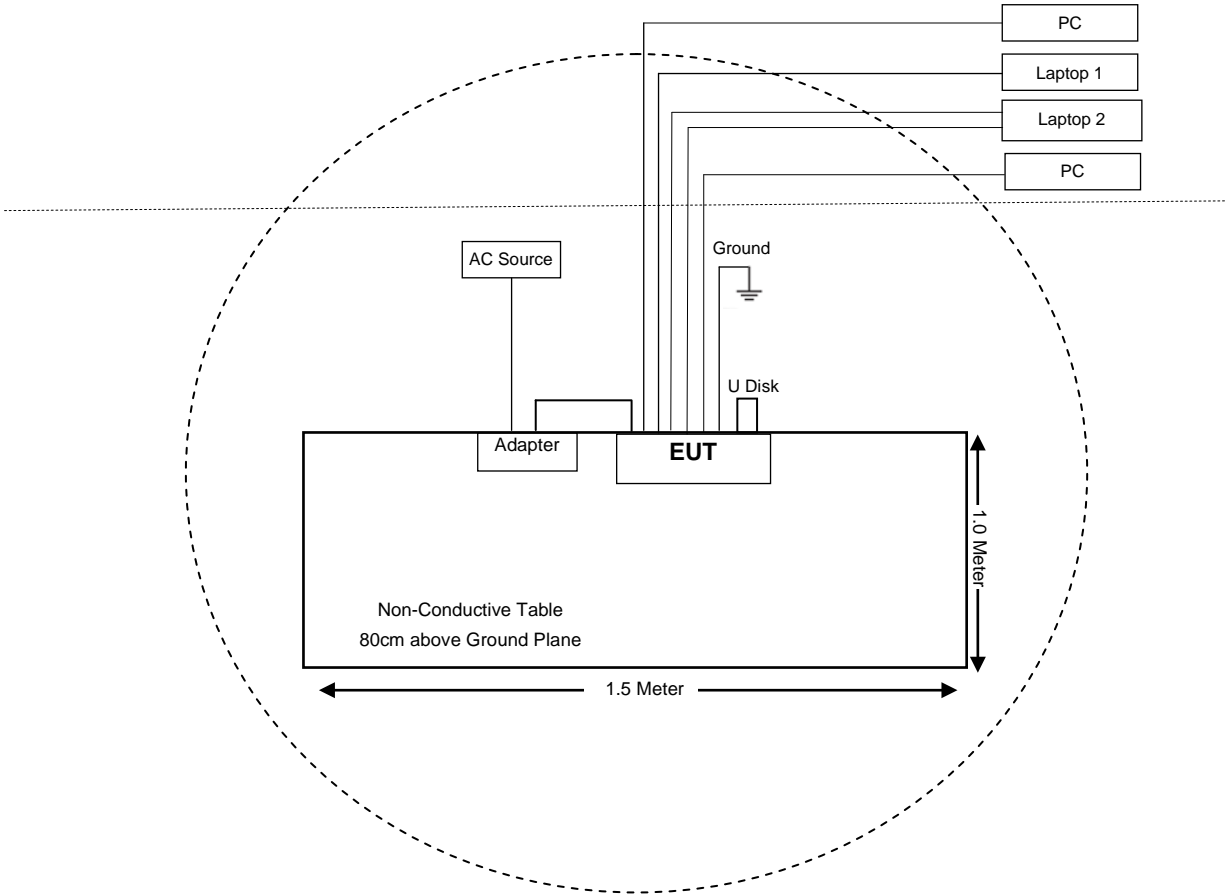


## Block Diagram of Test Setup

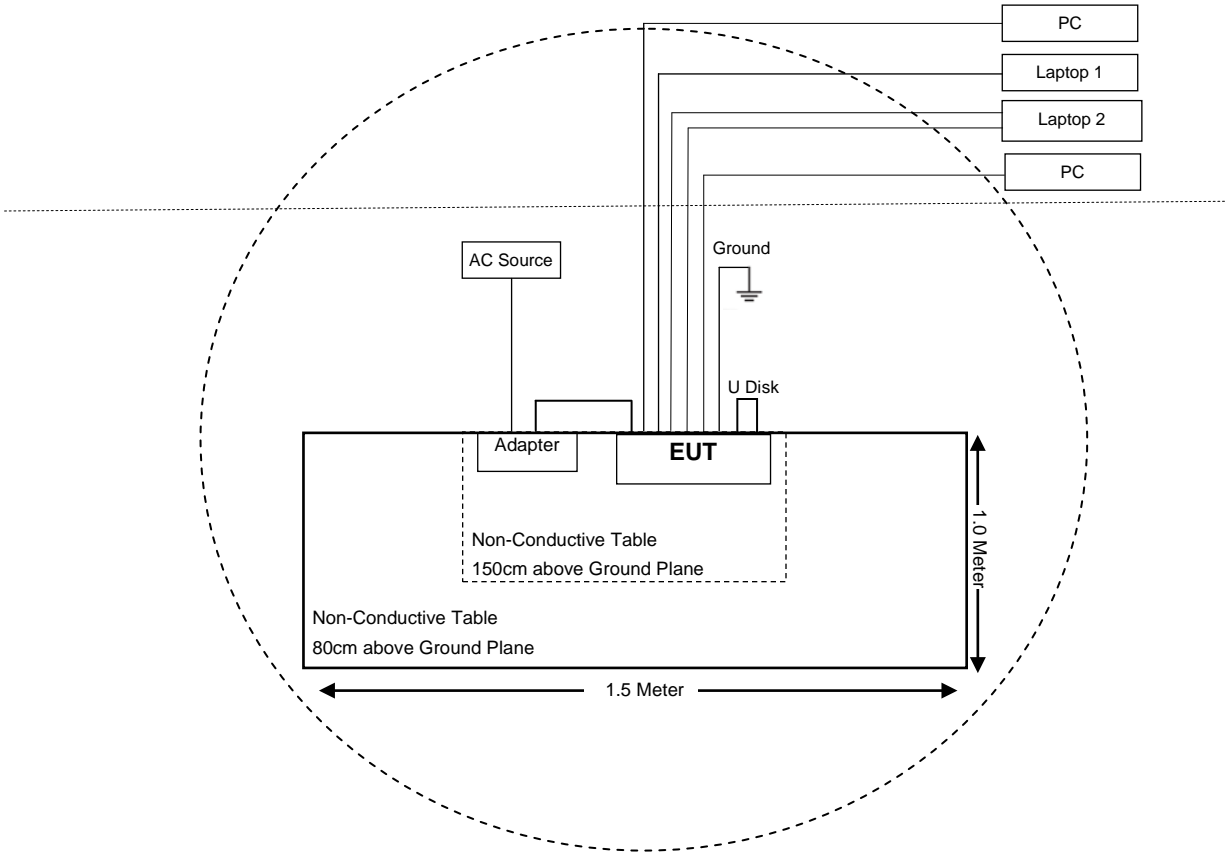
For Conducted Emissions:



For Radiated Emissions(30MHz-1GHz):



For Radiated Emissions (Above 1GHz):



## SUMMARY OF TEST RESULTS

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FCC Rules	Description of Test	Result
§15.407(f) & §1.1310 & §2.1091	Maximum Permissive Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6) & §15.207(a)	Conducted Emissions	Compliance
§15.205 & §15.209 §15.407(b) (1), (4)(i), (6), (7)	Undesirable Emission & Restricted Bands	Compliance
§15.407(a) (1),(3) & (e)	26dB & 6dB Bandwidth	Compliance <sup>*</sup>
§15.407(a)(1),(3)	Conducted Transmitter Output Power	Compliance <sup>*</sup>
§15.407 (a)(1),(3),(5)	Power Spectral Density	Compliance <sup>*</sup>

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

Compliance<sup>\*</sup>: This product (Model Number: IG902) has been certified, refer to the certified product, FCC ID: 2AANYIG9, Report No.: EC1902004RF02 (Issued on 2020-01-08 and released by Hunan Ecloud Testing Technology Co., Ltd.)

## TEST EQUIPMENTS LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission					
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2020-04-13	2021-04-12
ROHDE&SCHWARZ	L.I.S.N.	ENV216	3560.6550.16	2020-01-13	2021-01-12
HP	RF Limiter	11947A	3107A01270	2020-08-13	2021-08-12
Unknown	Conducted Cable	L-E-003	000003	2020-08-04	2021-08-03
Rohde & Schwarz	EMC32	EMC32	V 8.52.0	NCR	NCR
Radiated Emission					
EMCT	Semi-Anechoic Chamber	966	001	2017-05-18	2022-05-17
SONOMA INSTRUMENT	Amplifier	310 N	186684	2020-08-10	2021-08-09
SUNOL SCIENCES	Broadband Antenna	JB3	A121808	2019-12-10	2022-12-09
INMET	Attenuator	18N-6dB	000186	2019-12-10	2022-12-09
Rohde & Schwarz	EMI Test Receiver	ESR3	102456	2020-04-13	2021-04-12
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
Rohde & Schwarz	Spectrum Analyzer	FSU26	200835	2020-04-13	2021-04-12
EM Electronics	RF Pre-Amplifier	EM18G40	060725	2020-07-23	2021-07-22
EMCO	Horn Antenna	3115	2192	2019-09-25	2021-09-24
Mini-circuits	Pre-Amplifier	ZVA-183-S+	771001215	2020-09-20	2021-09-19
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
MICRO-TRONICS	5 GHz Notch Filter	BRM50716	G284	2020-02-22	2021-02-21
SUHNER+HUBER	RF Cable (Above 1GHz)	SUCOFLEX 104PE	93533/4PE	2020-05-18	2021-05-17
IW-MICROWAVE	RF Cable (Above 1GHz)	SPS-2301	111503	2020-08-31	2021-08-30
SUHNER+HUBER	RF Cable (Above 18GHz)	T-E222	2551/2	2020-07-18	2021-07-17
FLORIDA RF LABS	RF Cable (Above 18GHz)	T-E210	1042	2020-07-18	2021-07-17
Rohde & Schwarz	EMC32	EMC32	V9.10.00	NCR	NCR

## **FCC §15.407 (f) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE**

### **Applicable Standard**

According to §15.407(f) and §1.1310 & §2.1091, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission’s guideline.

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

<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
<b>Frequency Range (MHz)</b>	<b>Electric Field Strength (V/m)</b>	<b>Magnetic Field Strength (A/m)</b>	<b>Power Density (mW/cm<sup>2</sup>)</b>	<b>Averaging Time (minutes)</b>
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f <sup>2</sup> )	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<sup>2</sup>);

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);

### **Calculated Data:**

<b>Radio Mode</b>	<b>Frequency Range (MHz)</b>	<b>Antenna Gain</b>		<b>Tune-up Conducted Power</b>		<b>Evaluation Distance (cm)</b>	<b>Power Density (mW/cm<sup>2</sup>)</b>	<b>MPE Limit (mW/cm<sup>2</sup>)</b>
		<b>(dBi)</b>	<b>(numeric)</b>	<b>(dBm)</b>	<b>(mW)</b>			
WLAN	2412-2462	2.0	1.58	15.0	31.62	20	0.01	1.0
WLAN	5150-5250	2.0	1.58	15.0	31.62	20	0.01	1.0
WLAN	5725-5850	2.0	1.58	15.0	31.62	20	0.01	1.0

Note: 2.4G Wi-Fi and 5G Wi-Fi can’t support transmission simultaneously.

**Result:** The device meets FCC MPE at 20cm distance.

## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **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 Information\***

The EUT has one external Wi-Fi antenna which connected by reverse SMA connector, fulfill the requirement of this section. Please refer to the table below and EUT photos.

<b>Frequency (MHz)</b>	<b>Impedance</b>	<b>Max. Antenna Gain</b>	<b>Antenna Type</b>
2400-5850	50 ohm	2.0	Reverse SMA

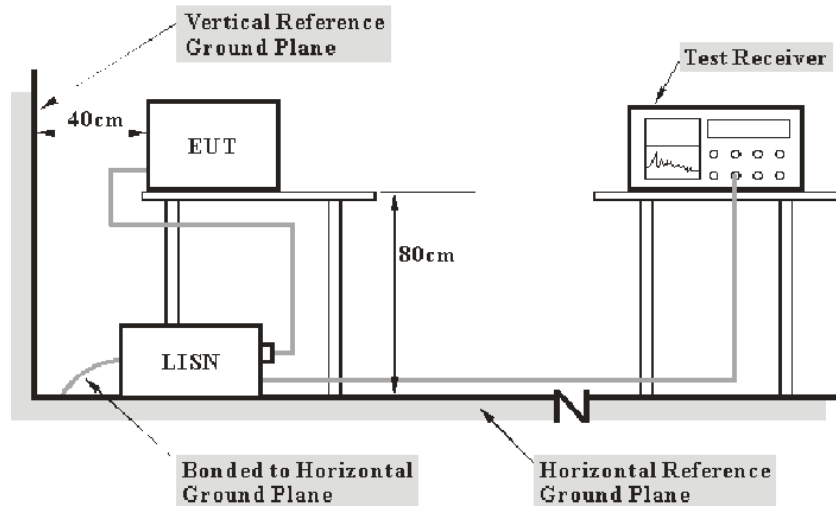
**Result:** Compliance.

## FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

### Applicable Standard

FCC §15.207, §15.407(b) (6)

### EUT Setup



Note: 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

### EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

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

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz



## Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$
$$C_f = A_C + VDF$$

Herein,

$V_C$  (cord. Reading): corrected voltage amplitude

$V_R$ : reading voltage amplitude

$A_C$ : attenuation caused by cable loss

VDF: voltage division factor of AMN

$C_f$ : Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within 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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Procedure

During the conducted emission test, the adapter was connected to the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

## Test Data

### Environmental Conditions

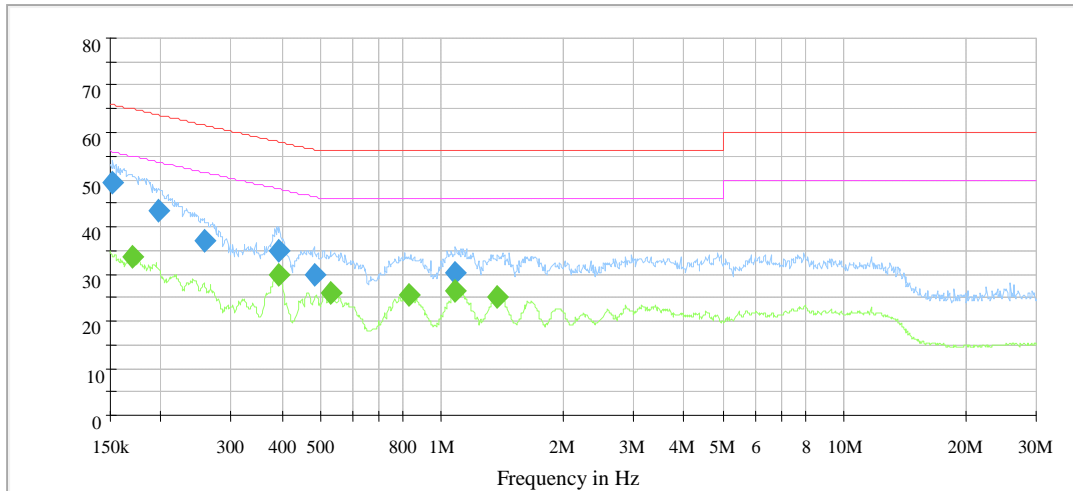
<b>Temperature:</b>	20 °C
<b>Relative Humidity:</b>	60 %
<b>ATM Pressure:</b>	95.7kPa

The testing was performed by Winfred Wang on 2020-11-23.

Test Mode: Transmitting

5725-5850MHz band: 802.11a-low channel - worst case

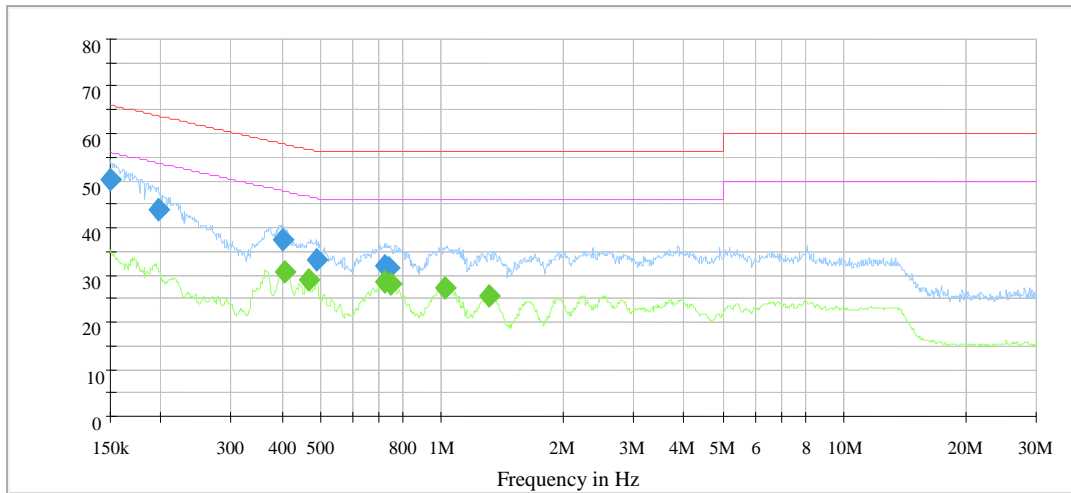
**AC120V/60Hz, Line**



Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.152261	49.4	200.0	9.000	L1	19.6	16.5	65.9
0.197344	43.6	200.0	9.000	L1	19.7	20.1	63.7
0.257055	36.8	200.0	9.000	L1	19.7	24.7	61.5
0.394737	35.1	200.0	9.000	L1	19.7	22.9	58.0
0.481892	29.7	200.0	9.000	L1	19.7	26.6	56.3
1.081065	30.1	200.0	9.000	L1	19.6	25.9	56.0

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.169919	33.5	200.0	9.000	L1	19.6	21.5	55.0
0.392773	29.9	200.0	9.000	L1	19.7	18.1	48.0
0.529792	25.8	200.0	9.000	L1	19.7	20.2	46.0
0.825819	25.7	200.0	9.000	L1	19.7	20.3	46.0
1.081065	26.2	200.0	9.000	L1	19.6	19.8	46.0
1.373482	25.1	200.0	9.000	L1	19.6	20.9	46.0

**AC120V/60Hz, Neutral**



Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150000	50.1	200.0	9.000	N	19.6	15.9	66.0
0.197344	43.9	200.0	9.000	N	19.6	19.8	63.7
0.400687	37.4	200.0	9.000	N	19.7	20.5	57.8
0.486723	33.1	200.0	9.000	N	19.7	23.1	56.2
0.721774	31.9	200.0	9.000	N	19.6	24.1	56.0
0.736318	31.6	200.0	9.000	N	19.6	24.4	56.0

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.404704	30.7	200.0	9.000	N	19.7	17.1	47.8
0.465358	29.0	200.0	9.000	N	19.7	17.6	46.6
0.718183	28.4	200.0	9.000	N	19.6	17.6	46.0
0.743699	27.9	200.0	9.000	N	19.6	18.1	46.0
1.018261	27.2	200.0	9.000	N	19.6	18.8	46.0
1.313193	25.4	200.0	9.000	N	19.6	20.6	46.0

**Note:**

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter
- 3) Margin = Limit – Corrected Amplitude

## **FCC §15.209, §15.205 & §15.407(b) (1) (4)(i) (6) (7) – UNDESIRABLE EMISSION, RESTRICTED BANDS**

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### **Applicable Standard**

FCC §15.407 (b) (1) (4)(i), (6), (7); §15.209; §15.205

FCC 15.407 (b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
  - (i) All emissions shall be limited to a level of  $-27$  dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
  - (ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

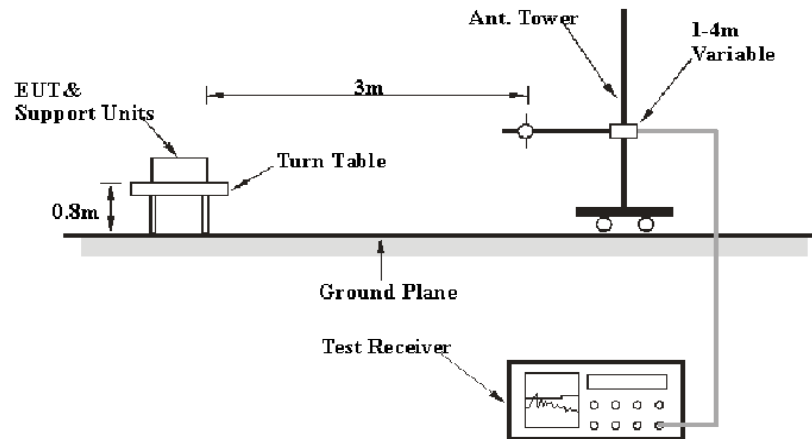
According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as:

$$E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2, \text{ for } d = 3 \text{ meters.}$$

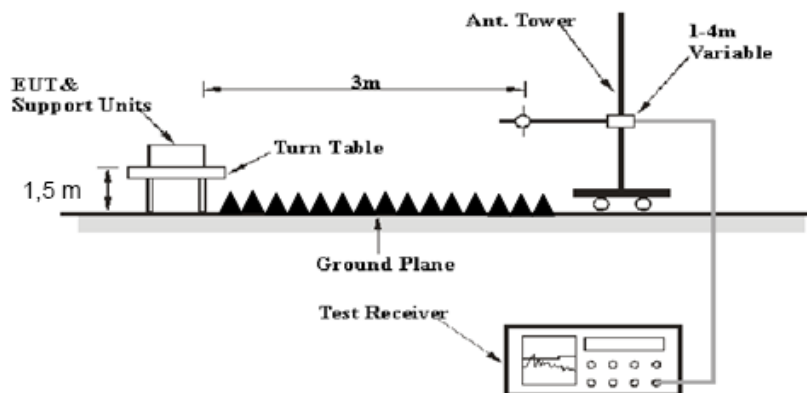
- 1) For 75 MHz above or below the band edge, a level of -27 dBm/MHz (68.2dB $\mu$ V/m) was applied.
- 2) For 25MHz-75 MHz above or below the band edge, a level of 10 dBm/MHz (105.2dB $\mu$ V/m) was applied.
- 3) For 5MHz-25 MHz above or below the band edge, a level of 15.6 dBm/MHz (110.8dB $\mu$ V/m) was applied.
- 4) For 0 MHz-5 MHz above or below the band edge, a level of 27 dBm/MHz (122.2dB $\mu$ V/m) was applied.

## EUT Setup

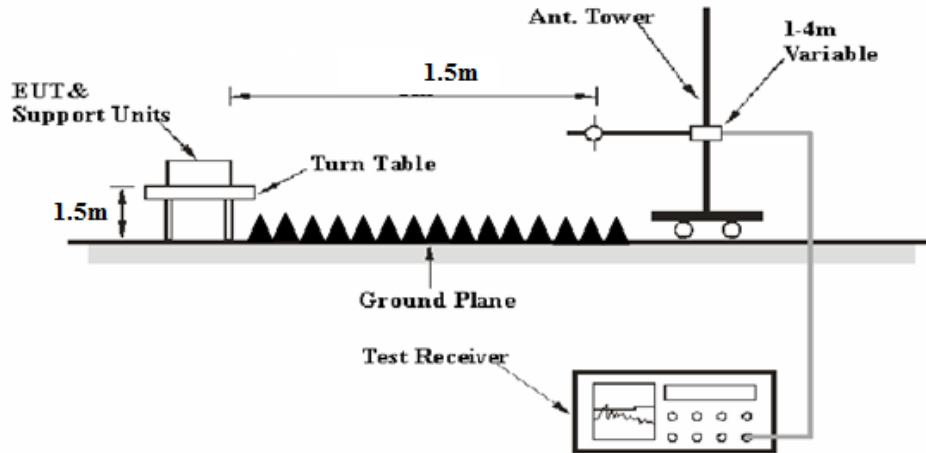
### Below 1 GHz:



### 1-18 GHz:



**Above 18 GHz:**



The radiated emission tests were performed in the 3 meters semi-anechoic chamber, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.407 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 40 GHz.

During the radiated emission test, the EMI test receiver or Spectrum Analyzer is 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-1GHz, peak and Average detection modes for frequencies above 1 GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, emission shall be computed as:  $E \text{ [dB}\mu\text{V/m]} = \text{EIRP[dBm]} + 95.2$ , for  $d = 3$  meters.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor =  $20 \log(\text{specific distance [3m]}/\text{test distance [1.5m]}) \text{ dB}$

Extrapolation result = Corrected Amplitude (dB $\mu$ V/m) - distance extrapolation factor (6dB)

### Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Receiver Reading + Cable loss + Antenna Factor – Amplifier Gain

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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, Section 15.205 and 15.209, Subpart E, Section 15.407.

### Test Data

#### Environmental Conditions

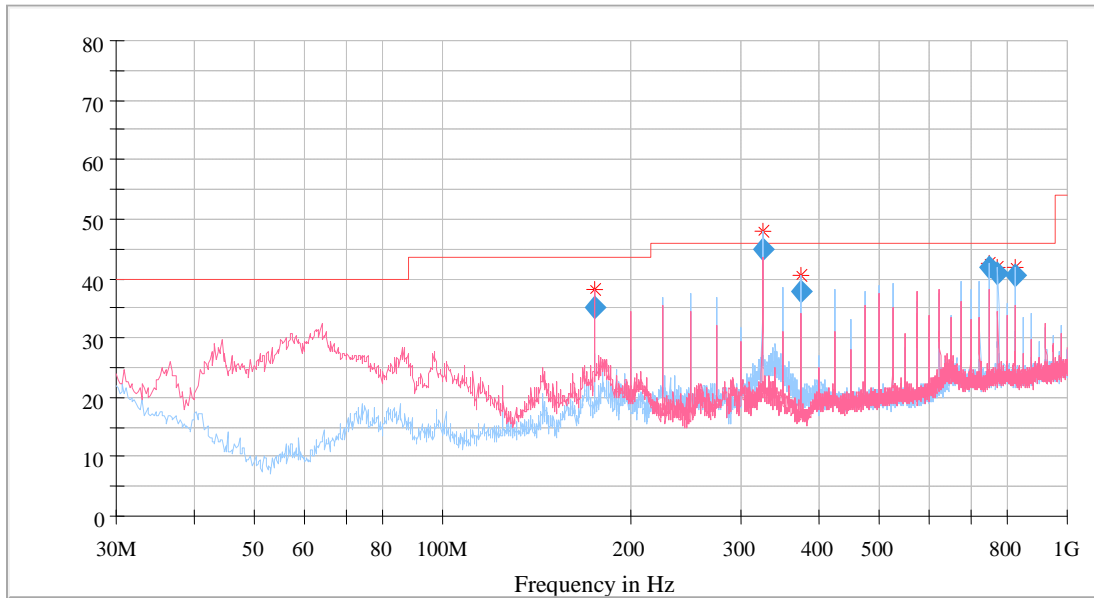
<b>Temperature:</b>	21 °C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	95.6 kPa

The testing was performed by Winfred Wang on 2020-11-28.

Test mode: Transmitting

5150-5250MHz band: 802.11a-high channel - worst case

1) 30 MHz to 1 GHz:

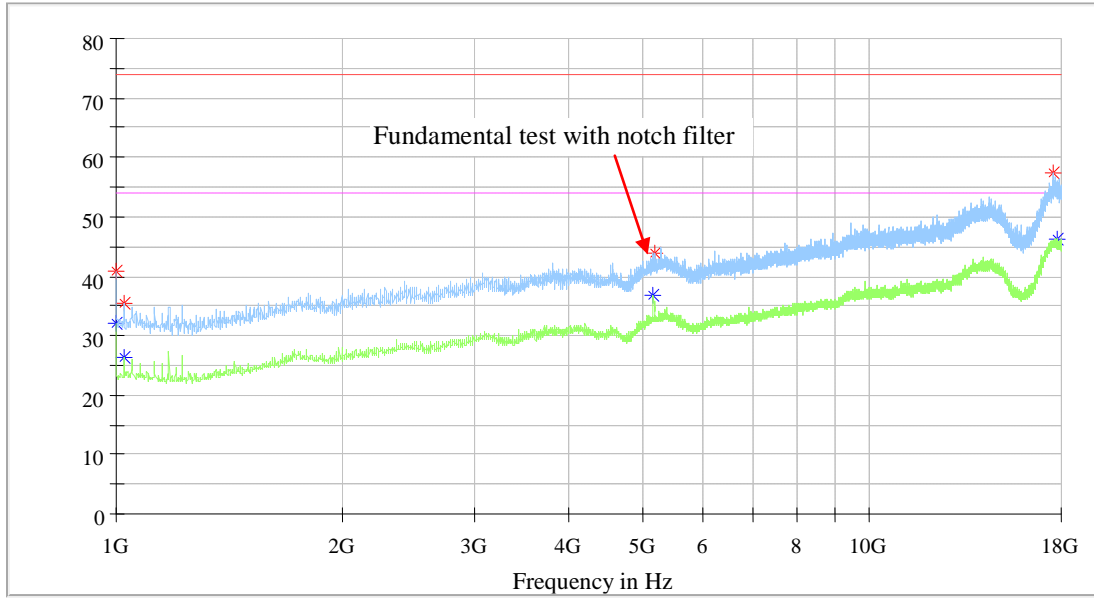


Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
174.988125	35.22	43.50	8.28	200.0	120.000	108.0	V	248.0	-13.6
324.992125	45.05	46.00	0.95	200.0	120.000	112.0	H	211.0	-10.8
375.002500	37.91	46.00	8.09	200.0	120.000	121.0	H	205.0	-10.3
750.030125	41.89	46.00	4.11	200.0	120.000	114.0	H	313.0	-3.0
775.015500	40.90	46.00	5.10	200.0	120.000	109.0	H	3.0	-2.6
824.979750	40.57	46.00	5.43	200.0	120.000	103.0	H	19.0	-2.5



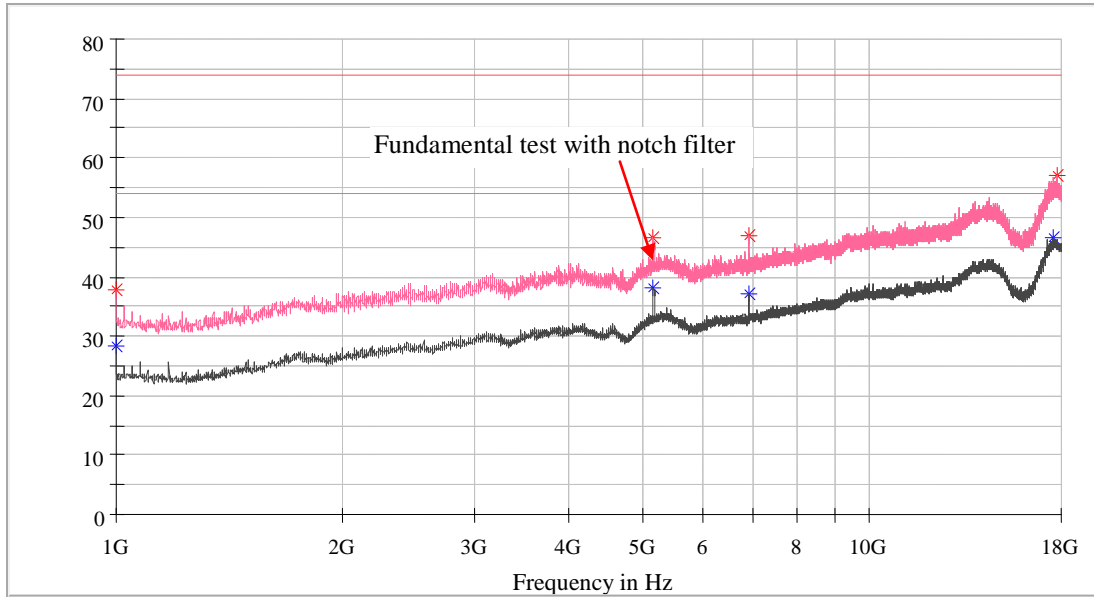
2) 1GHz-40GHz

Horizontal\_1GHz-18GHz



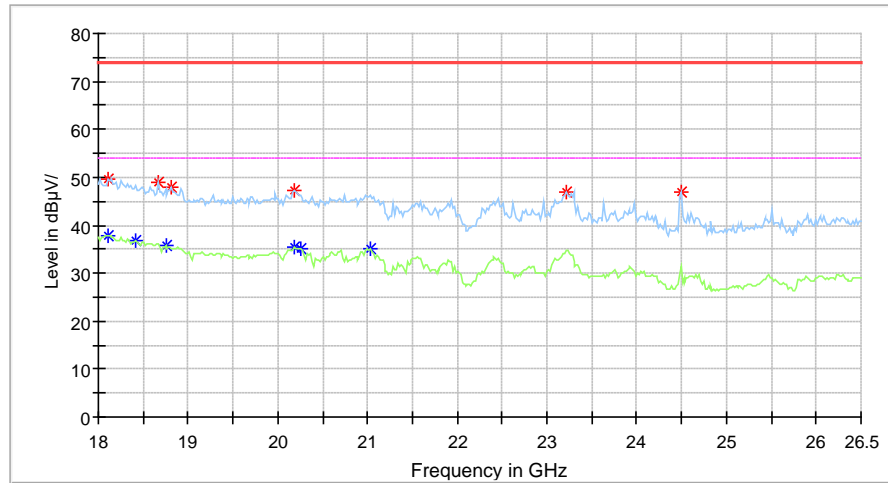
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1000.000000	40.70	---	74.00	33.30	150.0	H	288.0	-0.4
1000.000000	---	32.06	54.00	21.94	150.0	H	288.0	-0.4
1023.800000	35.36	---	74.00	38.64	150.0	H	277.0	-0.3
1023.800000	---	26.38	54.00	27.62	150.0	H	277.0	-0.3
5175.200000	---	36.70	54.00	17.30	150.0	H	140.0	12.8
5182.000000	43.97	---	74.00	30.03	150.0	H	129.0	12.8
17590.300000	57.22	---	74.00	16.78	150.0	H	47.0	29.2
17796.000000	---	46.41	54.00	7.59	150.0	H	1.0	29.2

Vertical\_1GHz-18GHz



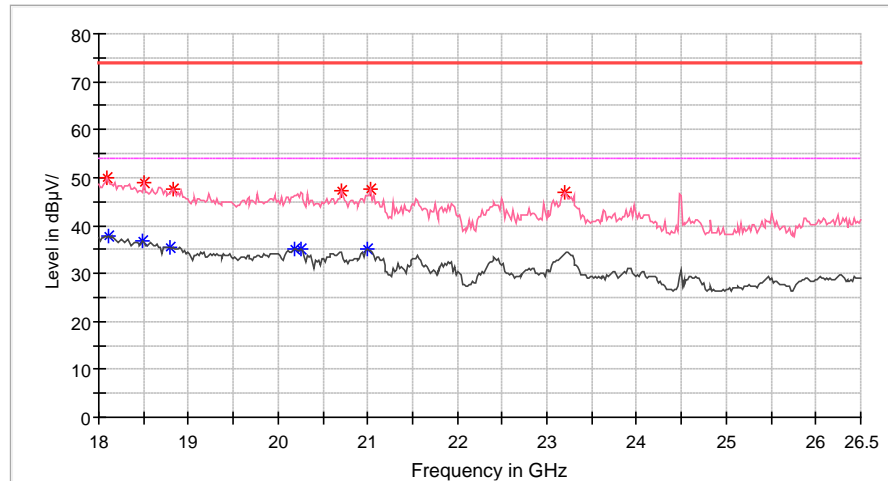
Frequency (MHz)	MaxPeak (dB $\mu$ V/m)	Average (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1000.000000	---	28.36	54.00	25.64	150.0	V	303.0	-0.4
1000.000000	37.69	---	74.00	36.31	150.0	V	303.0	-0.4
5173.500000	46.41	---	74.00	27.59	150.0	V	22.0	12.8
5173.500000	---	38.28	54.00	15.72	150.0	V	22.0	12.8
6907.500000	46.94	---	74.00	27.06	150.0	V	354.0	14.6
6907.500000	---	37.23	54.00	16.77	150.0	V	354.0	14.6
17595.400000	---	46.54	54.00	7.46	150.0	V	196.0	29.2
17728.000000	57.02	---	74.00	16.98	150.0	V	293.0	29.2

### Horizontal\_18GHz-26.5GHz



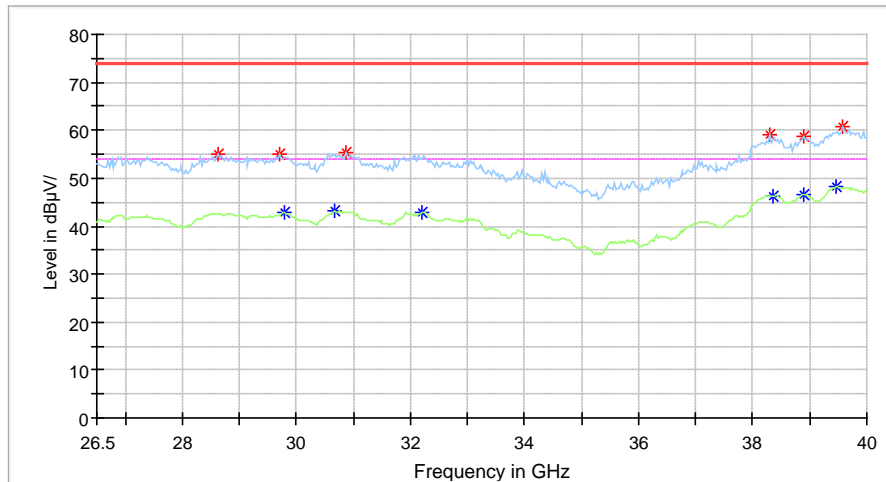
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
23212.424850	46.84	---	74.00	27.16	100.0	H	276.0	5.8
24489.979960	46.76	---	74.00	27.24	100.0	H	245.0	5.5

### Vertical\_18GHz-26.5GHz



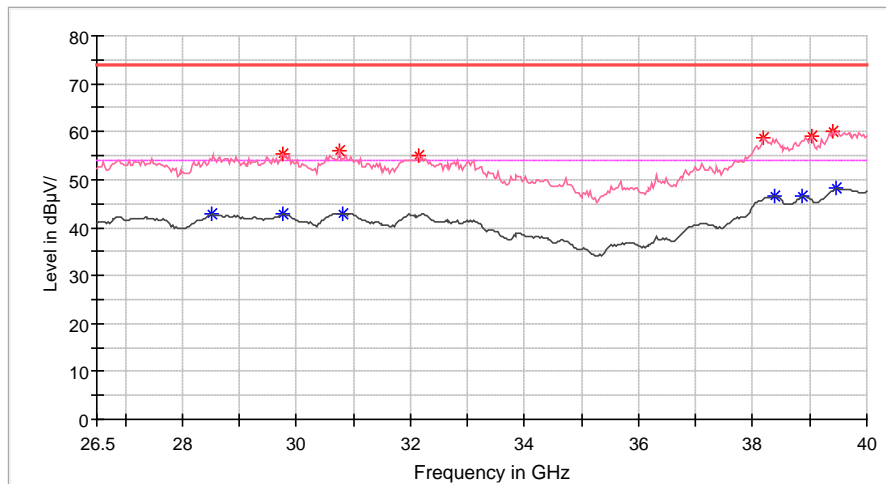
Frequency (MHz)	MaxPeak (dB µ)	Average (dB µ)	Limit (dB µ)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
21032.064128	47.50	---	74.00	26.50	100.0	V	140.0	3.2
23195.390782	47.08	---	74.00	26.92	100.0	V	309.0	5.8

**Horizontal\_26.5GHz-40GHz**



Frequency (MHz)	MaxPeak (dB µ)	Average (dB µ)	Limit (dB µ)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38349.699399	---	46.39	54.00	7.61	100.0	H	100.0	9.8
38890.781563	---	46.58	54.00	7.42	100.0	H	278.0	11.6
38890.781563	58.68	---	74.00	15.32	100.0	H	278.0	11.6
39458.917836	---	48.22	54.00	5.78	100.0	H	327.0	11.4
39567.134269	60.72	---	74.00	13.28	100.0	H	0.0	11.4
38349.699399	---	46.39	54.00	7.61	100.0	H	100.0	9.8

**Vertical\_26.5GHz-40GHz**



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)
38187.374750	58.67	---	74.00	15.33	100.0	V	358.0	9.8
38376.753507	---	46.46	54.00	7.54	100.0	V	354.0	9.8
38863.727455	---	46.70	54.00	7.30	100.0	V	161.0	11.4
39026.052104	58.95	---	74.00	15.05	100.0	V	271.0	12.0
39404.809619	60.23	---	74.00	13.77	100.0	V	52.0	11.5
39458.917836	---	48.16	54.00	5.84	100.0	V	210.0	11.4

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit- Corr. Amplitude

**END OF REPORT**