

## FCC PART 15B, CLASS B TEST REPORT

For

**Grandstream Networks, Inc.**

126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

**FCC ID: YZZWP820**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Enterprise Portable Wi-Fi Phone
<b>Report Number:</b> RSZ180404001-00A	
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**Note:** This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA\* or any agency of the Federal Government. \* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk

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## GENERAL INFORMATION

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

The *Grandstream Networks, Inc.*'s product, model number: *WP820 (FCC ID: YZZWP820)* in this report was a *Enterprise Portable Wi-Fi Phone*, which was measured approximately: 168.5 mm (L) \*52.5 mm (W) \* 21.8 mm (H) for phone part, 76 mm (L) \*73 mm (W) \* 81mm (H) for charger part, rated with input voltage: DC 3.8 V from rechargeable Li-ion battery or DC 5.0 V from adapter. The highest operating frequency is 5825 MHz.

Adapter 1 Information (MASS POWER):

Model: NBS05B050100VU

Input: AC 100-240V, 50/60Hz, 0.2A

Output: DC 5.0 V, 1.0A

Adapter 2 Information (SHENZHEN FRECOM ELECTRONICS CO., LTD.):

Model: F05L5-050100SPAU

Input: AC 100-240V, 50/60Hz, 0.2A

Output: DC 5.0 V, 1.0A

Adapter 3 Information (Shenzhen Sunlight Electronic Technology Co., Ltd):

Model: F06US0500100A

Input: AC 100-240V, 50/60Hz, 0.2A

Output: DC 5.0 V, 1.0A

*\*All measurement and test data in this report was gathered from production sample serial number: 1800470 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2018-04-04.*

### Objective

This test report is prepared on behalf of *Grandstream Networks, Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of the EUT with FCC Part 15 B.

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

FCC Part 15.247 DSS&DTS and Part 15.407 NII submissions with FCC ID: YZZWP820.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

**Measurement Uncertainty**

Parameter		uncertainty
Conducted Emissions		±1.95dB
Emissions, radiated	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB

**Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

### EUT Exercise Software

“BurnIn test v5.3” exercise software was used.

### Special Accessories

No special accessory.

### Equipment Modifications

No modification was made to the EUT tested.

### Support Equipment List and Details

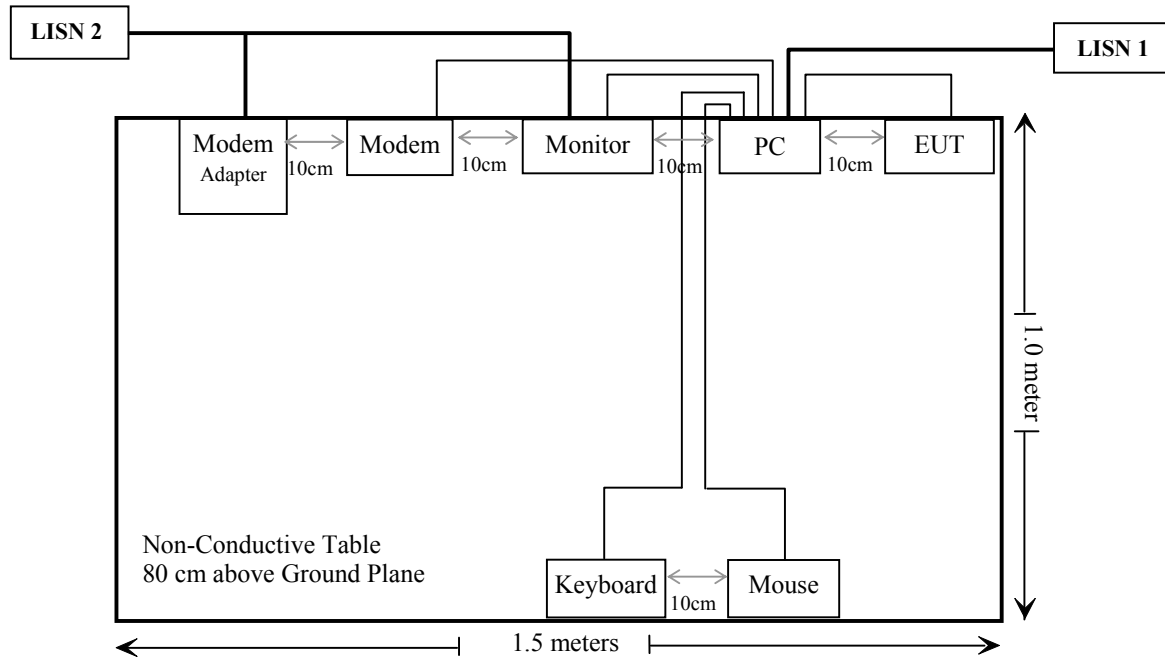
Manufacturer	Description	Model	Serial Number
BULL	Socket	GN-415K	5503290068073
DELL	PC	VOSTRO 220S	127BP2X
DELL	LCD Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
DELL	Keyboard	L100	CNORH656658907BL05DC
DELL	Mouse	MOC5UO	G1900NKD
SAST	Modem	AEM-2100	0293

### External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-Shielding Detachable USB Cable	1.5	Host PC	Mouse
Shielding Detachable Serial Cable	1.2	Host PC	Modem
Shielding Detachable K/B Cable	1.5	Host PC	Keyboard
Shielding Detachable VGA Cable	1.5	Host PC	LCD Monitor
Un-Shielding Detachable USB Cable	1.0	EUT	Host PC
Un-shielding Detachable Earphone Cable	1.2	EUT	Earphone

**Block Diagram of Test Setup**

For conducted emission:



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Compliance
§15.109	Radiated Spurious Emissions	Compliance

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>AC Line Conducted Emission Test</b>					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-05-17	2018-11-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
N/A	Conducted Emission Cable	N/A	UF A210B-1-0720-504504	2018-05-12	2018-11-12
<b>Radiated Emission Test</b>					
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2018-04-24	2019-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2017-12-17	2020-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-05-21	2019-05-21
HP	Amplifier	HP8447E	1937A01046	2018-05-17	2018-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
UTiFLEX MICRO-C0AX	RF Cable	UFA147A-2362-100100	MFR64639 231029-003	2018-04-01	2018-10-01
Ducommun technologies	RF Cable	104PEA	218124002	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	1	2018-05-21	2018-11-19
Ducommun technologies	RF Cable	RG-214	2	2018-05-21	2018-11-19
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR
Agilent	Spectrum Analyzer	8564E	3943A01781	2018-01-04	2019-01-04
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2017-12-29	2020-12-28
Ducommun Technologies	Horn Antenna	ARH-2823-02	1007726-04	2017-12-29	2020-12-28

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).



## FCC §15.107 – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

According to FCC §15.107

### 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 measurement procedure of EUT setup is according with per ANSI C63.4-2014. The related limit was specified in FCC Part 15.107 Class B.

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

### Test Procedure

During the conducted emission test, the PC was connected to the first LISN and the other relevant equipments were connected to the second 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.

## Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Correction Factor} = \text{LISN VDF} + \text{Cable Loss} + \text{Transient Limiter Attenuation}$$

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

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

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.107,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

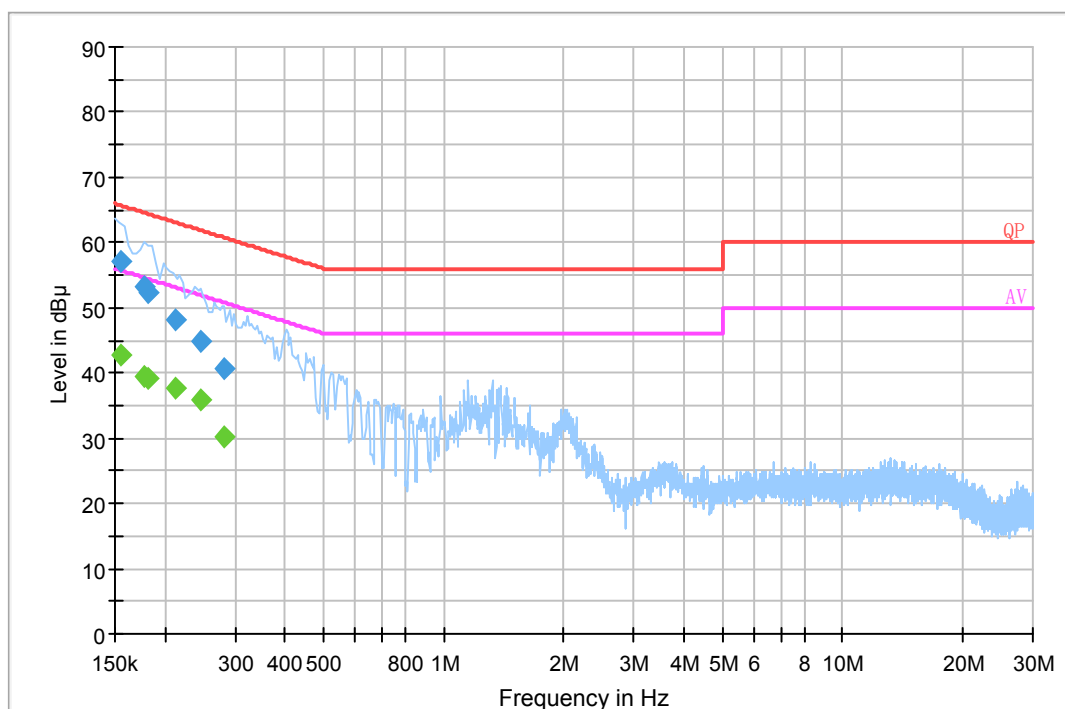
## Test Data

### Environmental Conditions

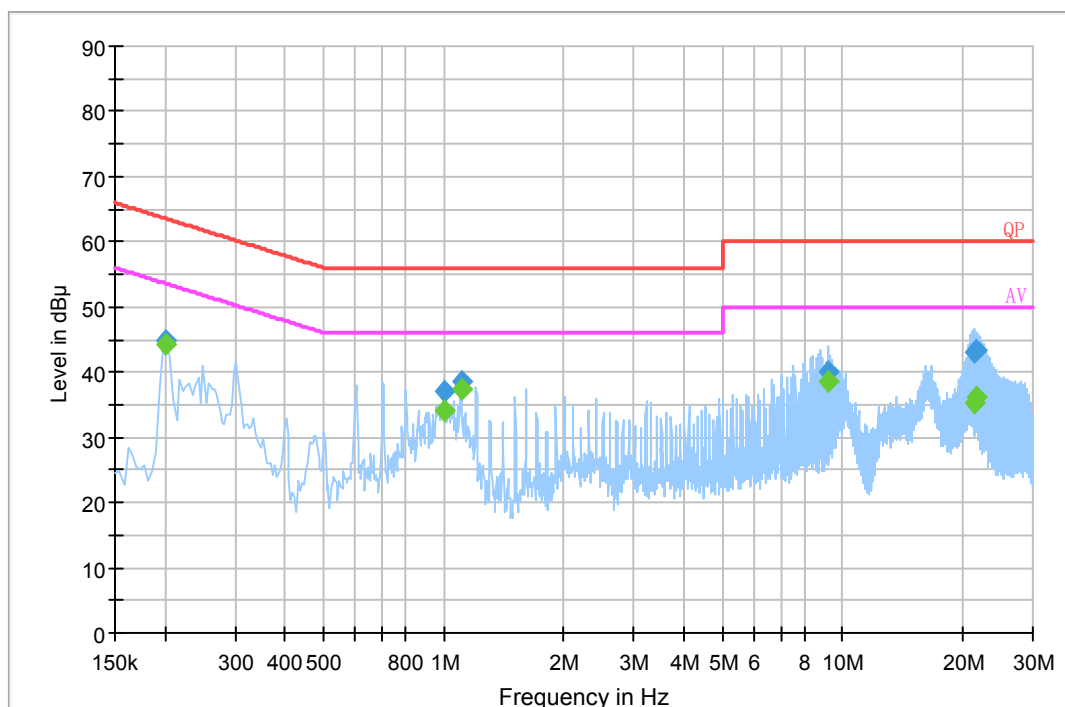
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	101.0 kPa

*The testing was performed by Jacob Kong on 2018-07-06.*

EUT Operation Mode: Downloading

**AC 120V/60 Hz, Line**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
1.002910	37.5	20.0	56.0	18.5	QP
1.105410	39.1	20.0	56.0	16.9	QP
8.949370	42.2	19.9	60.0	17.8	QP
8.951750	41.2	19.9	60.0	18.8	QP
9.247310	42.3	19.9	60.0	17.7	QP
9.248930	42.4	19.9	60.0	17.6	QP
1.002910	35.0	20.0	46.0	11.0	Ave.
1.105410	38.6	20.0	46.0	7.4	Ave.
8.949370	41.4	19.9	50.0	8.6	Ave.
8.951750	39.2	19.9	50.0	10.8	Ave.
9.247310	40.8	19.9	50.0	9.2	Ave.
9.248930	41.9	19.9	50.0	8.1	Ave.

**AC 120V/60 Hz, Neutral**

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/Ave./QP)
0.201500	44.8	20.1	63.5	18.7	QP
1.006910	37.0	20.0	56.0	19.0	QP
1.105410	38.4	20.0	56.0	17.6	QP
9.251310	39.9	19.9	60.0	20.1	QP
21.308730	42.9	20.0	60.0	17.1	QP
21.711670	43.3	20.0	60.0	16.7	QP
0.201500	44.1	20.1	53.5	9.4	Ave.
1.006910	34.2	20.0	46.0	11.8	Ave.
1.105410	37.3	20.0	46.0	8.7	Ave.
9.251310	38.6	19.9	50.0	11.4	Ave.
21.308730	35.3	20.0	50.0	14.7	Ave.
21.711670	36.1	20.0	50.0	13.9	Ave.

**Note:**

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

## FCC §15.109 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

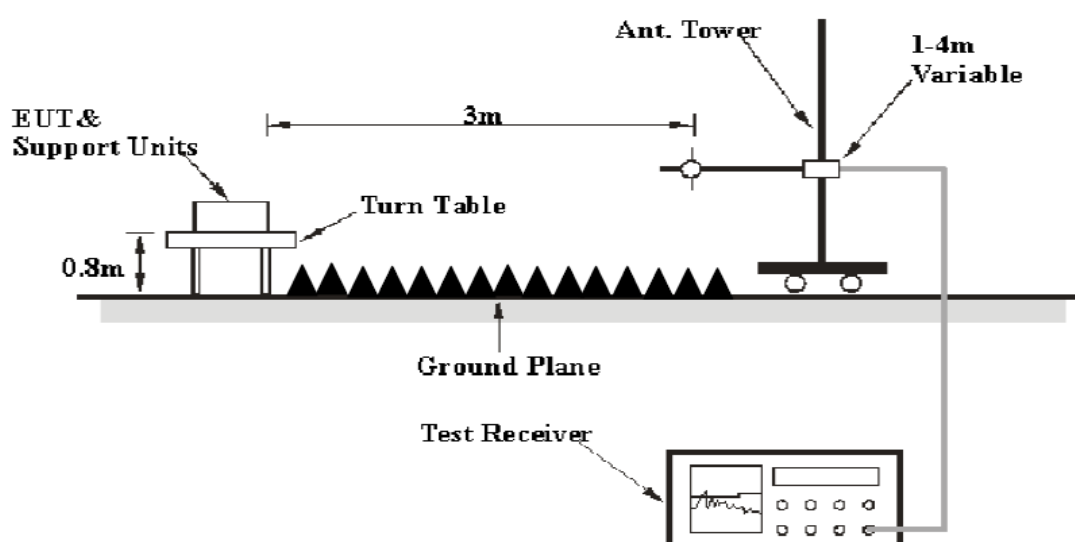
FCC §15.109

### 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 C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.  
Note: The distance is 1m when the radiated emission above 25GHz is investigated.

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 Setup

The system was investigated from 30 MHz to 30 GHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Measurment
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

### Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

### 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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

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

### Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL,  $U_{(Lm)}$  is less than  $U_{cispr}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

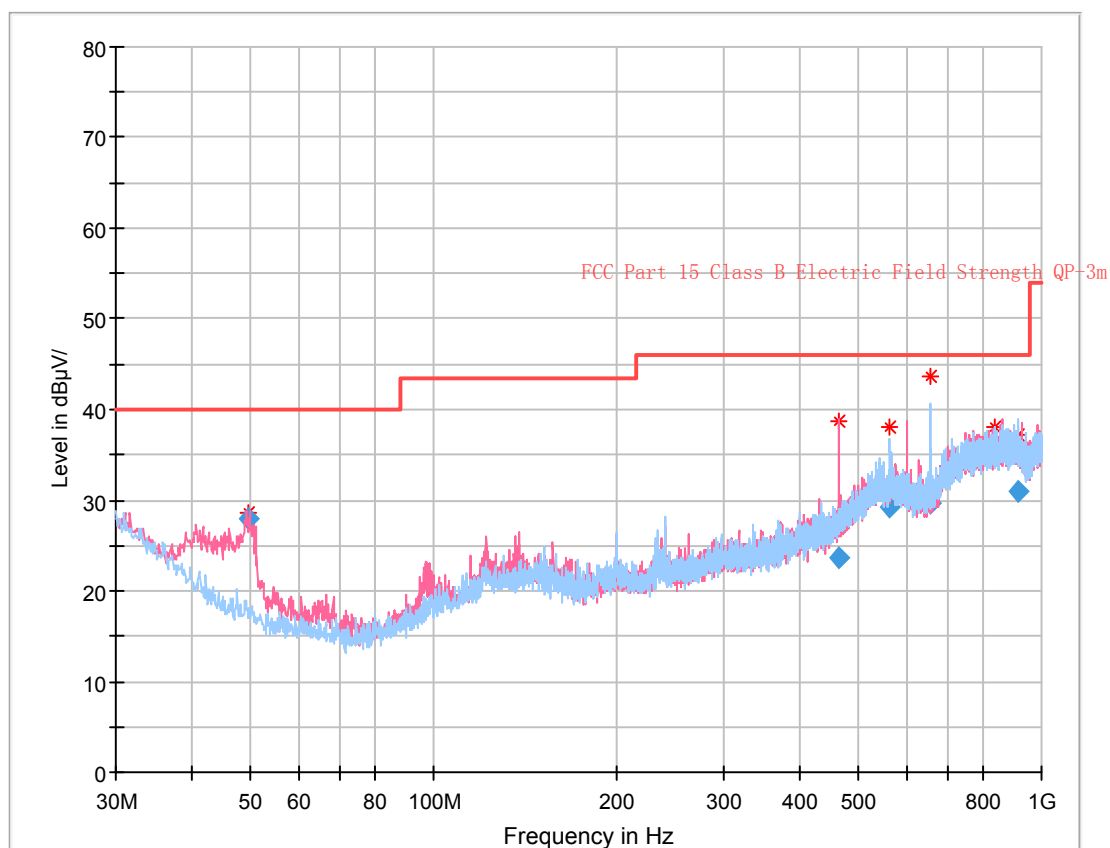
### Test Data

#### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

*The testing was performed by Jacob Kong on 2018-07-08.*

EUT Operation Mode: Downloading

**30 MHz~1 GHz:**

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBμV/m)	Margin (dB)
49.687125	28.02	127.0	V	242.0	-10.6	40.00	11.98
462.810125	23.65	154.0	V	198.0	1.0	46.00	22.35
564.118875	29.33	162.0	H	0.0	5.1	46.00	16.67
655.401125	29.68	114.0	H	355.0	4.0	46.00	16.32
754.142342	35.65	400.0	H	128.0	9.5	46.00	15.11
918.098750	30.89	400.0	H	128.0	9.5	46.00	15.11

**1 GHz – 30 GHz:**

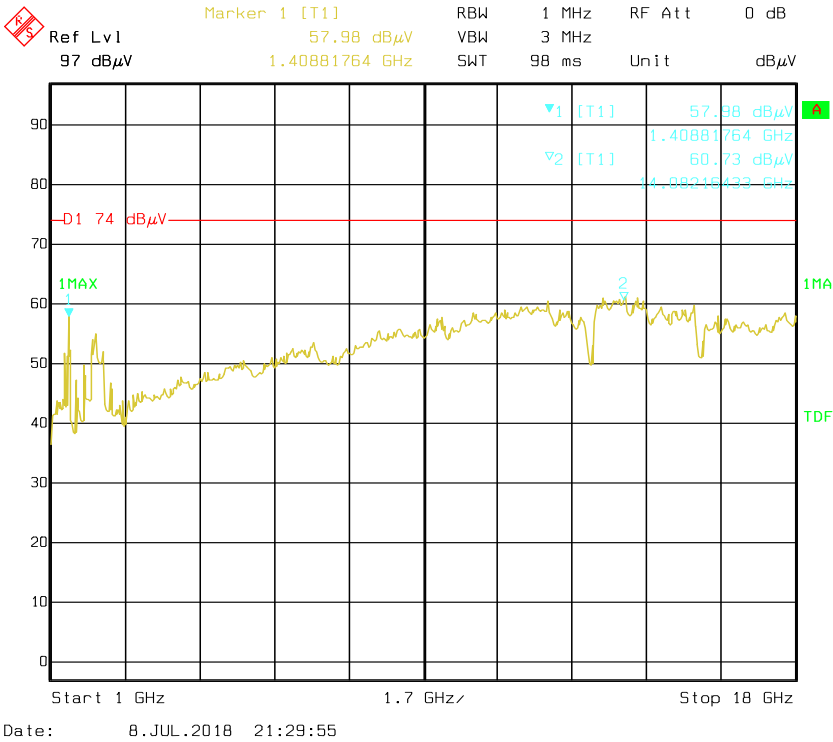
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBuV/m)	FCC Part 15B	
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H / V)			Limit (dBuV/m)	Margin (dB)
1408.80	65.37	PK	23	1.8	H	-7.89	57.48	74	16.52
1408.80	34.00	Ave.	23	1.8	H	-7.89	26.11	54	27.89
1657.20	46.35	PK	67	1.1	V	-5.23	41.12	74	32.88
1657.20	29.34	Ave.	67	1.1	V	-5.23	24.11	54	29.89
1997.50	47.89	PK	351	1.6	H	-0.99	46.90	74	27.10
1997.50	30.05	Ave.	351	1.6	H	-0.99	29.06	54	24.94

**Note:**

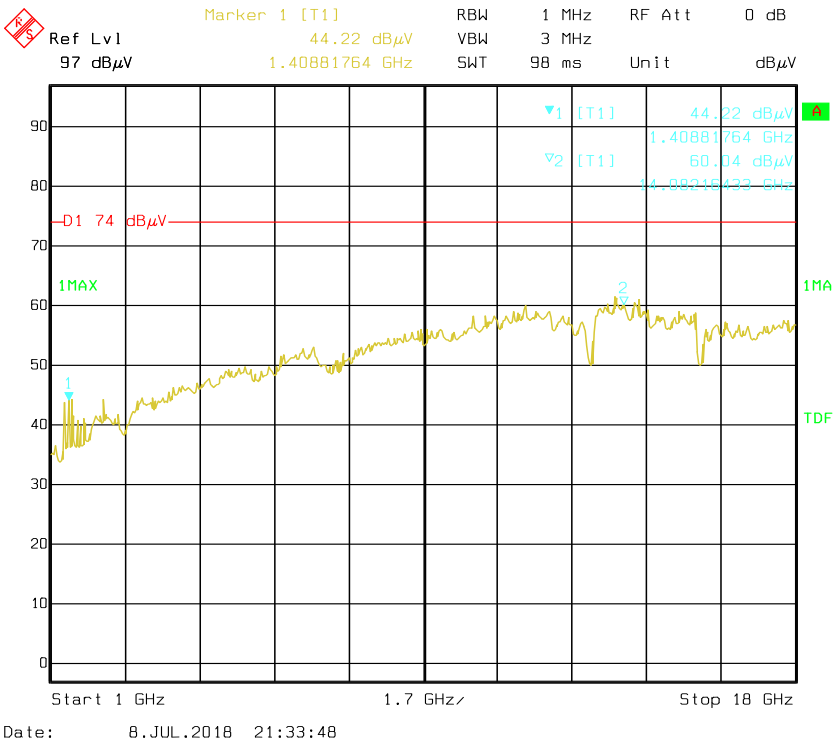
- 1) Correction Factor=Antenna factor (RX) + cable loss – amplifier factor
- 2) Corrected Amplitude = Correction Factor + Reading
- 3) Margin = Limit - Corrected Amplitude



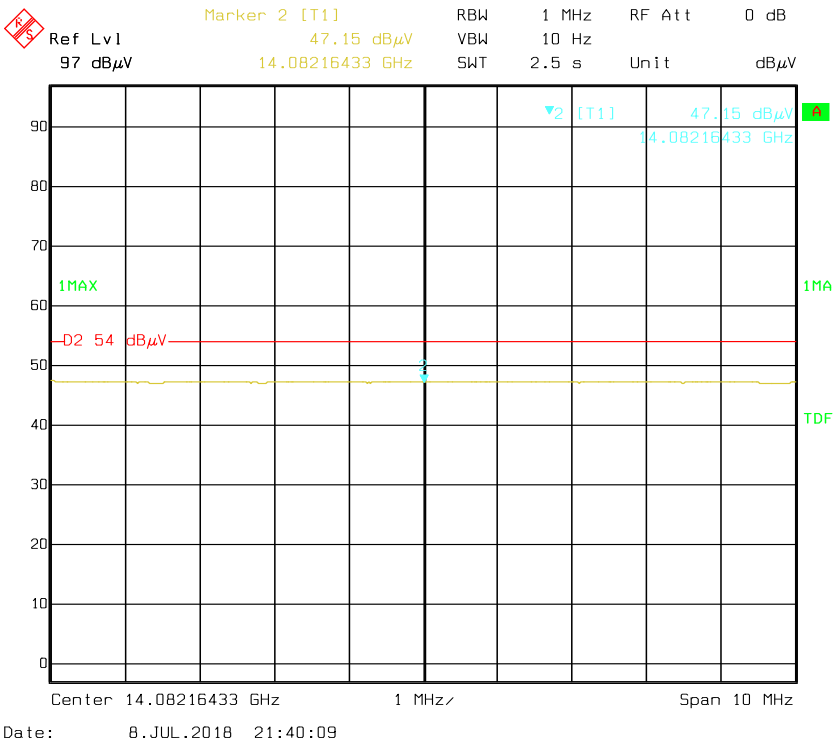
Pre-scan  
Horizontal - Peak



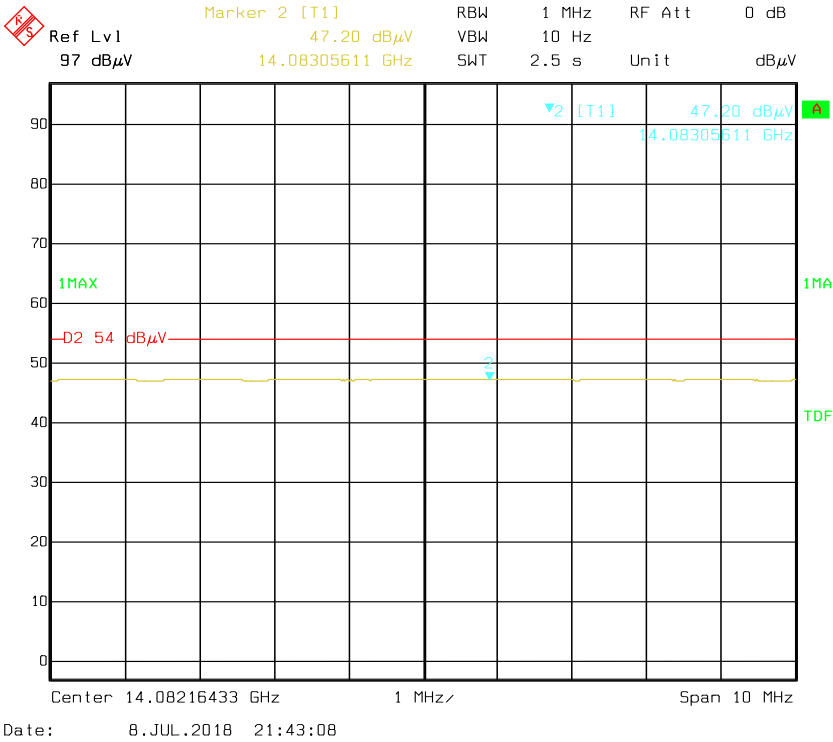
Vertical - Peak



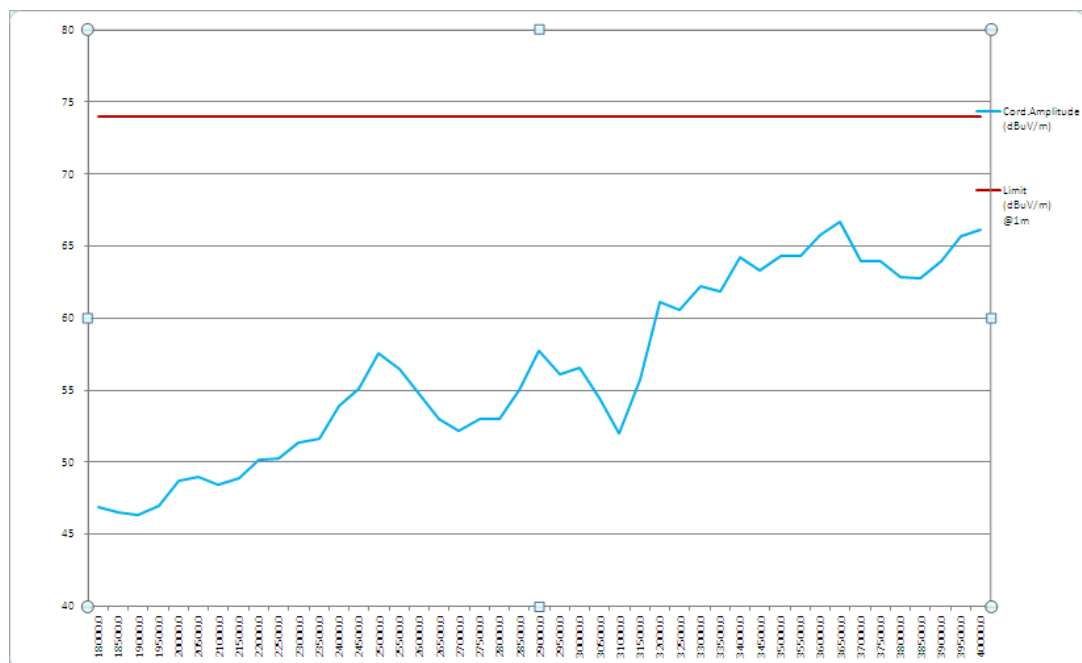
Horizontal – Average



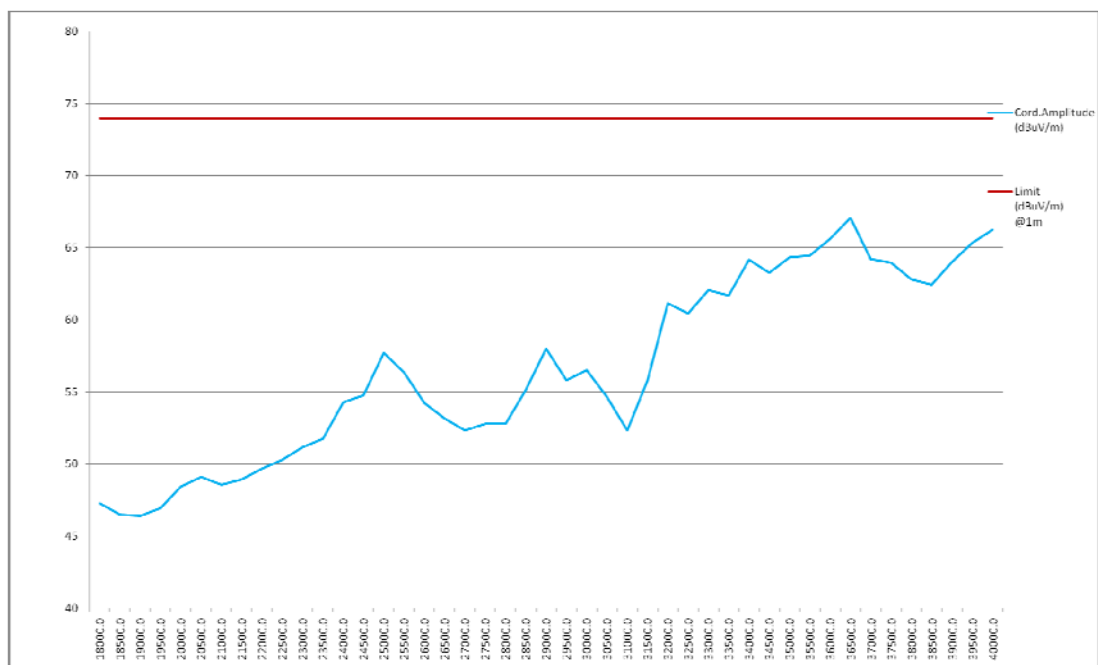
Vertical - Average



### Above 18GHz@3m- Horizontal



### Above 18GHz@3m- Vertical



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