TEST REPORT

No. B15D30040-EMC

For

Client : **Novatel Wireless, Inc.**

Production: **MiFi Hotspot,**

LTE Only, Bands 2, 4, 5 , 12, 17

Model Name : **MiFi M100**

Hardware Version: **P2**

Software Version: **NVTL_USC_1.05**

FCC ID: **PKRNVWM100**

Issued date: **2015-05-11**

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

Add: 7F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: (+86)-021-63843300, E-Mail: welcome@ecit.org.cn

Revision Version

Report Number	Revision	Date	Memo
B15D30040-EMC	00	2015-05-11	Initial creation of test report

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7F, G Area,No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	86-21-63843300
Fax:	86-21-63843301
FCC registration No:	489729

1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	30-60%

1.3. Project data

Project Leader:	Wang Yaqiong
Testing Start Date:	05-09, 2015
Testing End Date:	05-11, 2015

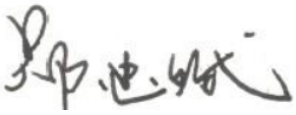
1.4. Signature

You Jinjun

(Prepared this test report)

Yu Naiping

(Reviewed this test report)



Zheng Zhongbin

Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Novatel Wireless, Inc.
Address /Post:	9645 Scranton Road, Suite 205, San Diego, CA 92121, USA
Tel:	+1 858-812-3420
City:	San Diego
Country:	USA

2.2. Manufacturer Information

Company Name:	Asia Telco Technologies Co.
Address /Post:	#289 Bisheng Road, Building-8,3F,Zhangjiang Hi-Tech Park,Pudong,Shanghai 201204,China
Tel:	+82-21-51688806-179
City:	Shanghai
Country:	China

3. Equipment under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	MiFi Hotspot, LTE Only, Bands 2,4,5,12,17
Model name	WiFi M100
Serial Number or IMEI	990003319903791
LTE Frequency Band	FDD 2,4,5,12,17
HW Version	P2
SW Version	NVTL_USC_1.05

3.2. Internal Identification of AE used during the test

AE ID*	Description	Model	SN
AE1	Adapter	ASUC41a-050100	NA
AE2	Battery	40115126	NA
AE3	Data Cable	NA	NA
AE4	Desktop PC	OptiPlex 790 DT	X8RP1 A01 APCC
AE5	Notebook PC	ThinkPad Edge E430	0B65911
AE6	LAN Cable	NA	NA
AE7	VGA Cable	NA	NA
AE8	RS232 Cable	NA	NA
AE9	Keyboard	KB212-B	CN-0Y88XT-65890-12I-005Q-A00
AE10	Mouse	MS111-P	CN-011D3V-71581-19J-1A64

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices	10-1-10 Edition
ANSI C63.4	Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2009

5. Test Results

5.1. Summary of Test Results

Items	Test List	Clause in FCC rules	Verdict
1	Radiated Emission	15.109(a)	Pass
2	Conducted Emission	15.107(a)	Pass

5.2. Statements

The M100 supporting LTE FDD 2,4,5,12,17, manufactured by Asia Telco Technologies Co. is a new product for testing. ECIT only performed test cases which identified with Pass/Fail/Inc result in section 5.1.

ECIT has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Test Equipments Utilized

6.1 Radiated Emission Equipments list

No.	Name	Type	Series Number	Producer	Cal. Date	Cal. interval
1	Universal Radio Communication	CMU200	123102	R&S	2014-07-07	1
2	Test Receiver	ESU40	100307	R&S	2014-07-25	1
3	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2014-11-05	3
4	Double Ridged Guide	ETS-3117	00135885	ETS	2014-05-06	3
5	EMI Test Software	EMC32 V9.15	NA	R&S	NA	NA

6.1 CE Equipments list

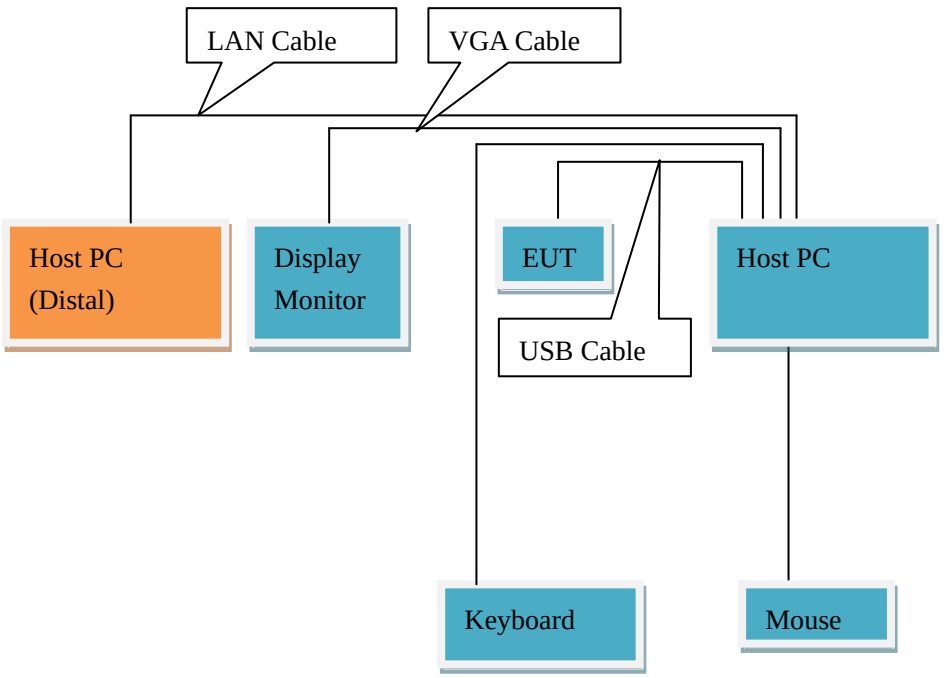
No.	Name	Type	Series Number	Producer	Cal. Date	Cal. interval
1	Universal Radio	CMU200	123124	R&S	2014-07-07	1
2	Test Receiver	ESCI	101235	R&S	2014-07-06	1
3	2-Line V-Network	ENV216	101380	R&S	2014-07-25	1
4	EMI Test Software	EMC32 V9.12	NA	R&S	NA	NA

7. System Configuration during Test

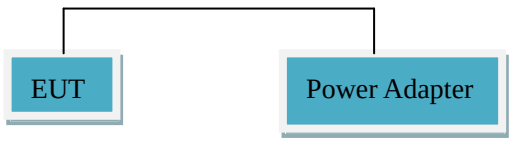
7.1 Test Mode

Test Item	Function Type
AC Conducted Emission	Mode 1: Idle + USB cable (Data Link with PC) <Figure 1> Mode 2: Idle + Adapter charging <Figure 2>
Radiated Emission	Mode 1: Idle + USB cable (Data Link with PC) <Figure 1> Mode 2: Idle + Adapter charging <Figure 2>
Remark: 1. All test modes are performed, only the worst cases test data are recorded in this report. 2. Data Link with PC means data application transferred mode between EUT and PC.	

7.2 Connection Diagram of Test System



<Figure 1>



<Figure 2>

8. Measurement Results

Only the worst test result was shown in this report.

8.1 Radiated Emission 30MHz-12.75GHz

Method of Measurement

For 30-1000MHz, the EUT was placed on the top of a rotating 0.8-m table above the ground at a semi-anechoic chamber. The distance between the EUT and the received antenna was 3 meters. The table was rotated 360 degree and the received antenna mounted on a variable-height antenna tower was varied from 1m to 4m to find the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement. Tested in accordance with the procedures of ANSI C63.4-2009, section 8.3.

For 1000-12750MHz, The maximal emission value was acquired by adjusting the antenna height, The table was rotated 360 degree to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement.

Limits for Radiated Emission at a measuring distance of 3m

Frequency Range (MHz)	Quasi-Peak (dBuV/m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Frequency Range (MHz)	Peak (dBuV/m)	Average (dBuV/m)
Above 1000	74	54

Test conditions

Frequency Range (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120KHz/300KHz	Auto
1000-12750	1MHz/1MHz	Auto

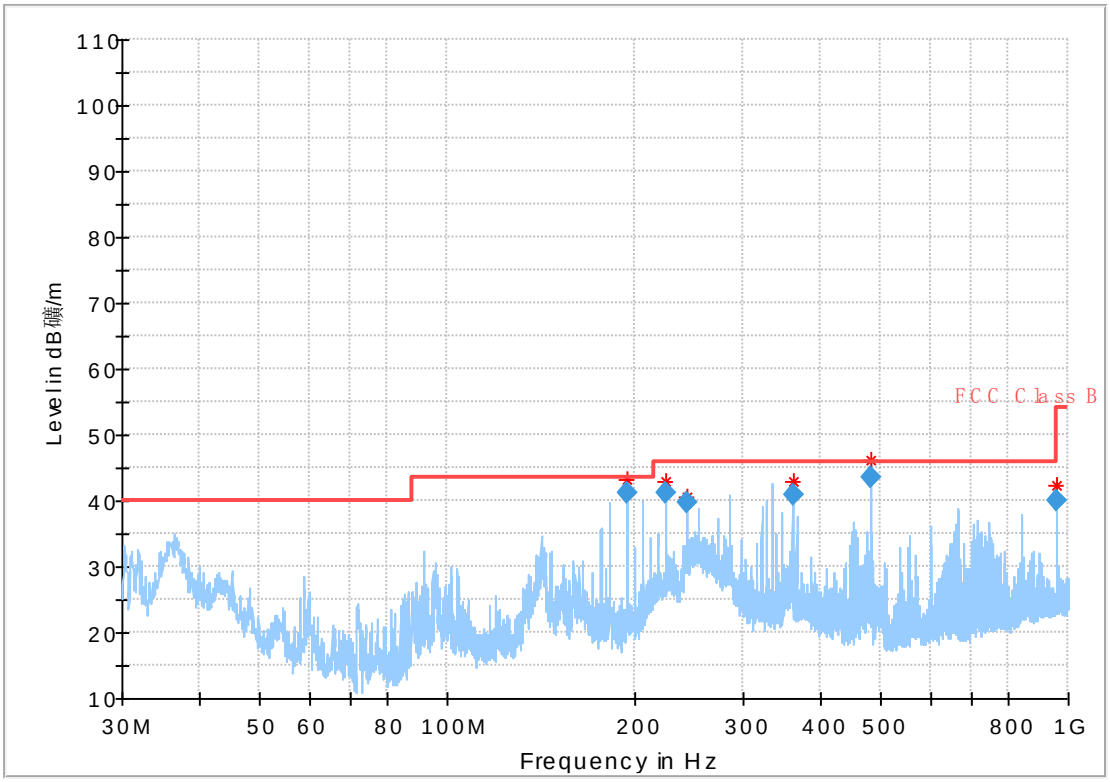
Uncertainty Measurement

The measurement uncertainty is 5.59dB (k=2).

Test Results

Mode 1: Idle + USB cable (Data Link with PC)

Frequency Range:	30MHz – 1GHz



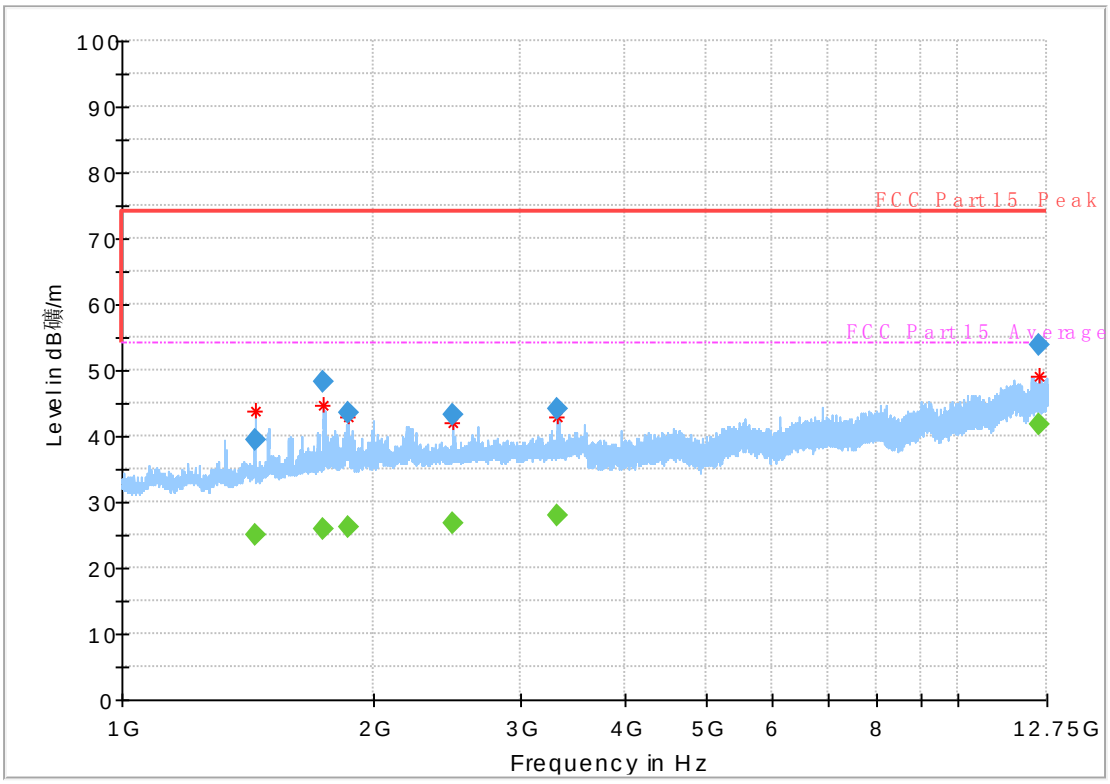
Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
194.989180	41.16	43.50	2.34	1000.0	120.000	100.0	V	122.0	-25.0
224.993904	41.08	46.00	4.92	1000.0	120.000	200.0	H	347.0	-23.5
243.453900	39.84	46.00	6.16	1000.0	120.000	200.0	V	172.0	-22.7
359.999892	40.87	46.00	5.13	1000.0	120.000	100.0	H	175.0	-18.3
479.999760	43.43	46.00	2.57	1000.0	120.000	100.0	H	118.0	-15.5
959.993304	40.02	46.00	5.98	1000.0	120.000	100.0	H	103.0	-7.7

Note:

1. Emission level(QP)=Raw value by receiver + Corr(Antenna factor + cable loss - preamplifier gain)
2. The raw value is used to calculate by software which is not shown in the sheet.
3. Margin=limit value – emission level.

Mode 1: Idle + USB cable (Data Link with PC)

Frequency Range:	1GHz –12.75GHz



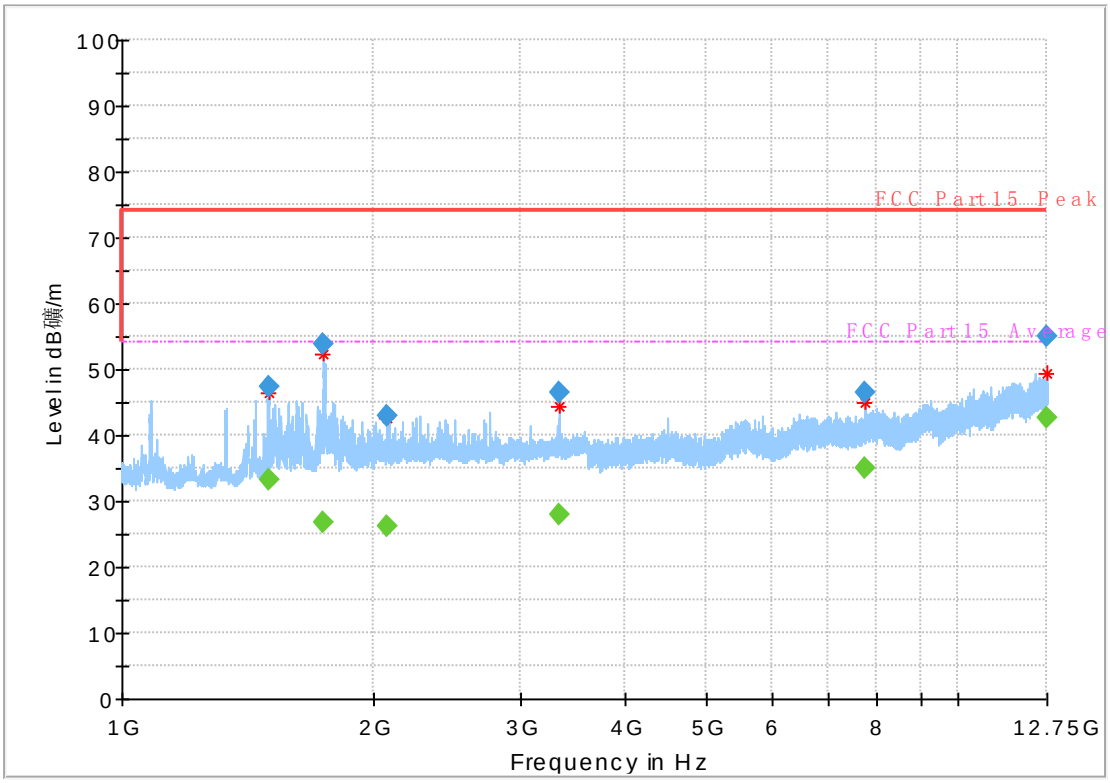
Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1440.459667	---	25.05	54.00	28.95	50.0	1000.000	100.0	H	-2.0
1440.459667	39.30	---	74.00	34.70	50.0	1000.000	100.0	H	-2.0
1743.817534	---	25.99	54.00	28.01	50.0	1000.000	200.0	H	170.0
1743.817534	48.14	---	74.00	25.86	50.0	1000.000	200.0	H	170.0
1862.882866	---	26.28	54.00	27.72	50.0	1000.000	200.0	H	182.0
1862.882866	43.56	---	74.00	30.44	50.0	1000.000	200.0	H	182.0
2481.438867	43.19	---	74.00	30.81	50.0	1000.000	100.0	H	155.0
2481.438867	---	26.90	54.00	27.10	50.0	1000.000	100.0	H	155.0
3319.486533	---	27.91	54.00	26.09	50.0	1000.000	200.0	H	168.0
3319.486533	44.14	---	74.00	29.86	50.0	1000.000	200.0	H	168.0
12480.263333	53.91	---	74.00	20.09	50.0	1000.000	100.0	H	80.0
12480.263333	---	41.80	54.00	12.20	50.0	1000.000	100.0	H	80.0

Note:

1. Emission level(peak or average)=Raw value by receiver + Corr(Antenna factor+ cable loss - preamplifier gain)
2. The raw value is used to calculate by software which is not shown in the sheet.

Margin=limit value – emission level.



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1497.281000	---	33.31	54.00	20.69	50.0	1000.000	200.0	V	8.0
1497.281000	47.44	---	74.00	26.56	50.0	1000.000	200.0	V	8.0
1744.312066	---	26.63	54.00	27.37	50.0	1000.000	200.0	V	0.0
1744.312066	53.91	---	74.00	20.09	50.0	1000.000	200.0	V	0.0
2078.789667	43.03	---	74.00	30.97	50.0	1000.000	200.0	V	51.0
2078.789667	---	26.23	54.00	27.77	50.0	1000.000	200.0	V	51.0
3332.852866	---	28.06	54.00	25.94	50.0	1000.000	200.0	V	336.0
3332.852866	46.38	---	74.00	27.62	50.0	1000.000	200.0	V	336.0
7727.837866	---	35.07	54.00	18.93	50.0	1000.000	100.0	V	122.0
7727.837866	46.44	---	74.00	27.56	50.0	1000.000	100.0	V	122.0
12732.358066	54.89	---	74.00	19.11	50.0	1000.000	200.0	V	34.0
12732.358066	---	42.73	54.00	11.27	50.0	1000.000	200.0	V	34.0

Note:

1. Emission level(peak or average)=Raw value by receiver + Corr(Antenna factor+ cable loss - preamplifier gain)
2. The raw value is used to calculate by software which is not shown in the sheet.

Margin=limit value – emission level.

8.2 Conducted Emission

Method of Measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies with the band 150 kHz to 30MHz shall not exceed the limits. Both lines of the power mains connected to the EUT were checked for maximum conducted interference. Tested in accordance with the procedures of ANSI C63.4-2009, section 7.3

Limit of Conducted Emission

Frequency Range (MHz)	Conducted Limit (dBuV)	
	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		

Test Condition in Charging Mode

Voltage (V)	Frequency (Hz)	RBW	Sweep Time (s)
120	60	9 KHz	Auto

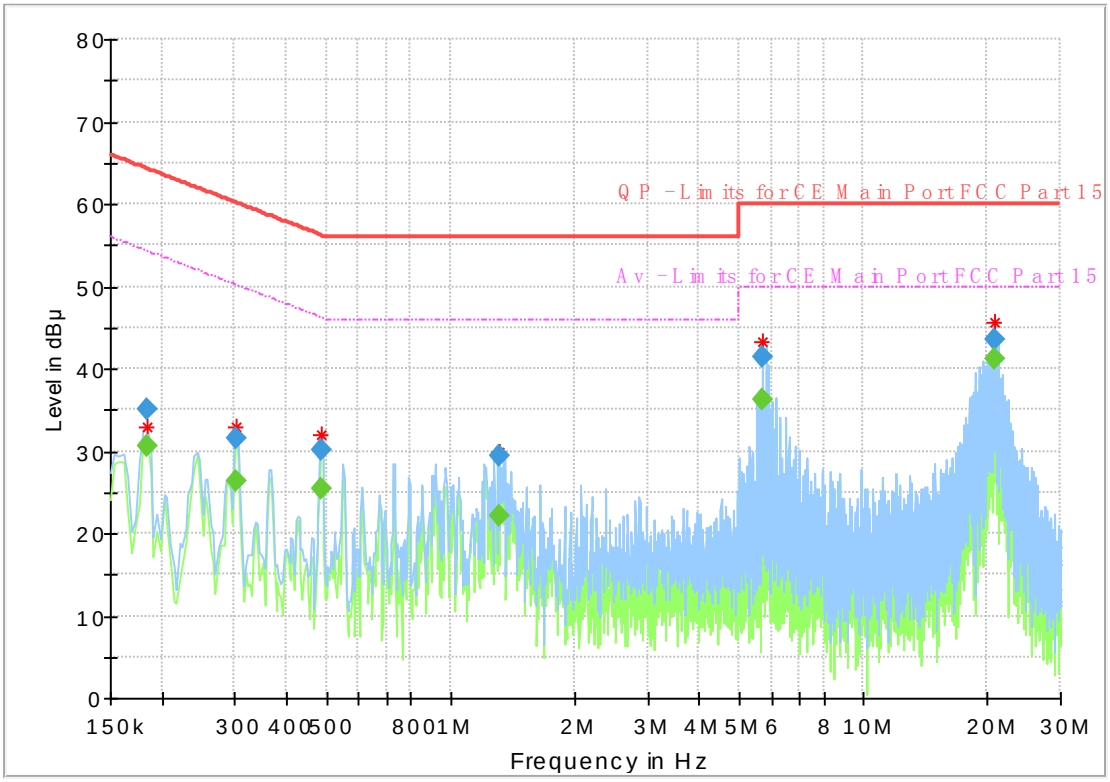
Uncertainty Measurement

The measurement uncertainty is 3.57dB (k=2).

Test Results

Mode 1: Idle + USB cable (Data Link with PC)

Frequency Range:	150kHz – 30MHz



Frequency (MHz)	QuasiPeak (dBµ V)	Average (dBµ V)	Limit (dBµ V)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.183581	---	30.59	54.32	23.73	1000.0	9.000	L1	ON	9.8
0.183581	35.04	---	64.32	29.28	1000.0	9.000	L1	ON	9.8
0.302981	31.54	---	60.16	28.62	1000.0	9.000	N	ON	9.7
0.302981	---	26.31	50.16	23.85	1000.0	9.000	N	ON	9.7
0.485812	30.07	---	56.24	26.17	1000.0	9.000	N	ON	9.6
0.485812	---	25.47	46.24	20.77	1000.0	9.000	N	ON	9.6
1.306688	29.34	---	56.00	26.66	1000.0	9.000	L1	ON	9.8
1.306688	---	22.01	46.00	23.99	1000.0	9.000	L1	ON	9.8
5.675981	41.44	---	60.00	18.56	1000.0	9.000	L1	ON	9.8
5.675981	---	36.30	50.00	13.70	1000.0	9.000	L1	ON	9.8
20.821125	---	41.15	50.00	8.85	1000.0	9.000	N	ON	9.9
20.821125	43.63	---	60.00	16.37	1000.0	9.000	N	ON	9.9

Note:

1. Emission level(quasi-peak or Average peak)=Raw value by receiver + Corr(Insertion loss+ cable loss)
2. The raw value is used to calculate by software which is not shown in the sheet.
3. Margin=limit value – emission level.

**********End the Report**********