



TEST REPORT

No. I19D00115-EMC01

For

Client : Toast, Inc.

Production: Toast Hub

Model Name : TH200

Brand Name: Toast

FCC ID: 2AMNG-TH200

Hardware Version: CT541HB40D

Software Version: /

Issued date: 2019-08-14

NOTE

1. The test results in this test report relate only to the devices specified in this report.
2. This report shall not be reproduced except in full without the written approval of East China Institute of Telecommunications.
3. The measurement uncertainty is not taken into account when deciding conformity, and the results of measurement (or the average of measurement results) are directly used as the criterion for the stating conformity.

Test Laboratory:

East China Institute of Telecommunications

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Revision Version

Report Number	Revision	Date	Memo
I19D00115-EMC01	00	2019-08-14	Initial creation of test report

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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: 958356

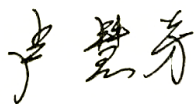
1.2. Testing Environment

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

1.3. Project data

Project Leader: Zhou Yan
Testing Start Date: 2019-07-23
Testing End Date: 2019-08-09

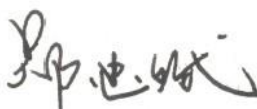
1.4. Signature



Lu Huifang
(Prepared this test report)



You Jinjun
(Reviewed this test report)



Zheng Zhongbin
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name	Toast, Inc.
Address	401 Park Drive, Suite 801, Boston, MA 02215, USA
Telephone	/
Postcode	/

2.2. Manufacturer Information

Company Name	Toast, Inc.
Address	401 Park Drive, Suite 801, Boston, MA 02215, USA
Telephone	/
Postcode	/

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

3.1. About EUT

ProductName	Toast Hub
Model name	TH200
Additional Communication Function	/

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N01	/	CT541HB40D	/	2019-07-15

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN
CA01	Adapter	SOY-2400400	/
UA01	Printer PWR Cable	/	/
UB01	USB-USB Cable	/	/
UC01	USB Cable	/	/
UD01	LAN Cable	/	/
EA01	Printer		/
EB01	Data Processing Machine	TT201	/
AE1	Notebook PC	DELL Latitude E6510	/
AE2	Keyboard	KB212-B	CN-0Y88XT-65890-12I-005Q-A00
AE3	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	2019/6/21
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	2014

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	AC Conducted Emission	15.107(a)	Pass

5.2. Statements

The TH200 manufactured by Toast, Inc. 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

Item	Instrument Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication	CMU200	123126	R&S	2019-05-10	1 year
2	Test Receiver	ESU40	100307	R&S	2019-05-10	1 year
3	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-02-25	3 years
4	Double Ridged Guide	ETS-3117	00135890	ETS	2017-01-11	3 years
5	EMI Test Software	EMC32 V9.15	NA	R&S	NA	NA

6.2 AC Conducted Emission Equipments list

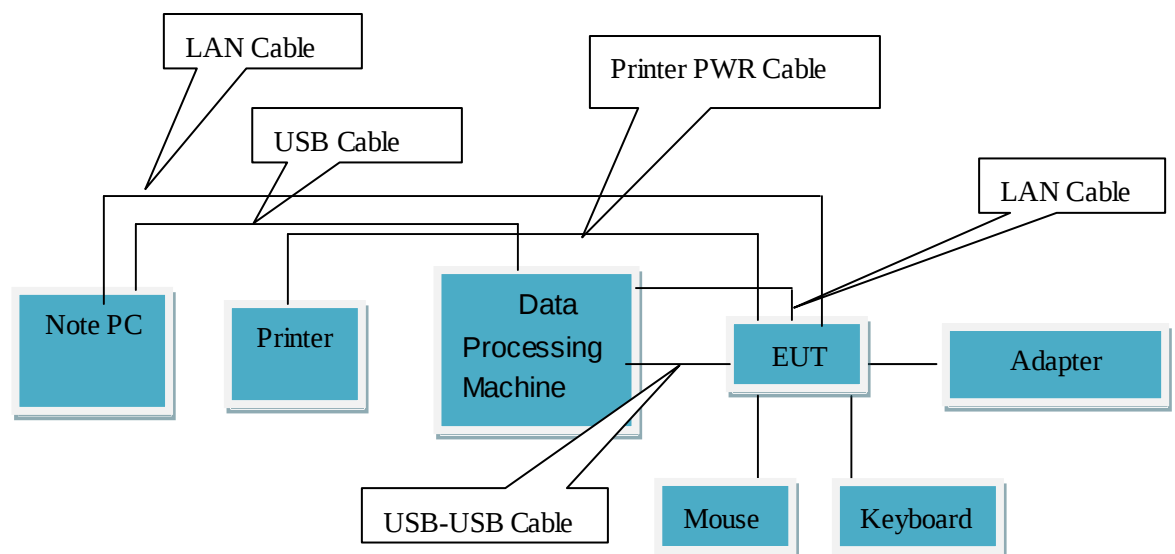
Item	Instrument Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication	CMU200	123123	R&S	2019-05-10	1 year
2	Test Receiver	ESCI	101235	R&S	2019-05-10	1 year
3	2-Line V-Network	ENV216	101380	R&S	2019-05-10	1 year
4	EMI Test Software	EMC32 V10.35.02	NA	R&S	NA	NA

7. System Configuration during Test

7.1 Test Mode

Test Item	Function Type
AC Conducted Emission	Mode 1: Working mode (Full system)<Figure 1>
Radiated Emission	Mode 1: Working mode (Full system)<Figure 1>
Remark: 1. All test modes are performed, only the worst cases test data are recorded in this report. 2. Full system : EUT is connected to the corresponding Auxiliary equipment via cables and is at maximum load for data transmission and PING command data exchange.	

7.2 Connection Diagram of Test System



<Figure 1> Mode 1

8. Measurement Results

Only the worst test result was shown in this report.

8.1 Radiated Emission 30MHz-18GHz

Method of Measurement

For 30MHz -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 C63.4-2014, section 8.3.

For 1000MHz-18000MHz, 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
1000-18000	1MHz/3MHz	Auto

Uncertainty Measurement

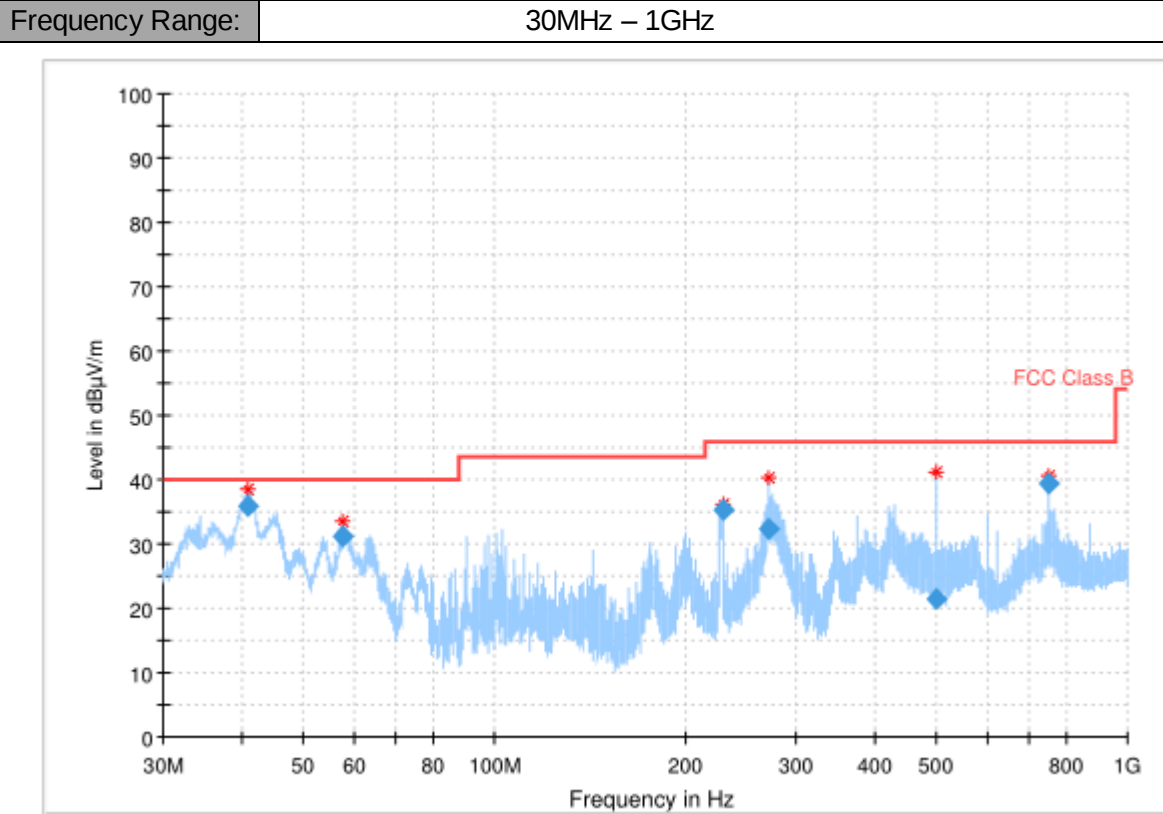
The measurement uncertainty (30MHz-1000MHz) is 4.98 dB (k=2).

The measurement uncertainty (1000MHz-18000MHz) is 5.06 dB (k=2).

Test Results

Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier, the Emissions in the frequency band 18GHz-40GHz is more than 20dB below the limit are not report.

Mode 1: Working mode (Full system)<Figure 1>



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.905875	36.01	40.00	3.99	1000.0	120.000	100.0	V	130.0	-25.8
57.779776	31.28	40.00	8.72	1000.0	120.000	100.0	V	244.0	-26.7
229.601528	35.24	46.00	10.76	1000.0	120.000	125.0	V	304.0	-27.3
270.898123	32.29	46.00	13.71	1000.0	120.000	125.0	H	43.0	-26.1
500.110269	21.41	46.00	24.59	1000.0	120.000	175.0	V	-30.0	-21.8
749.994080	39.28	46.00	6.72	1000.0	120.000	100.0	V	244.0	-16.6

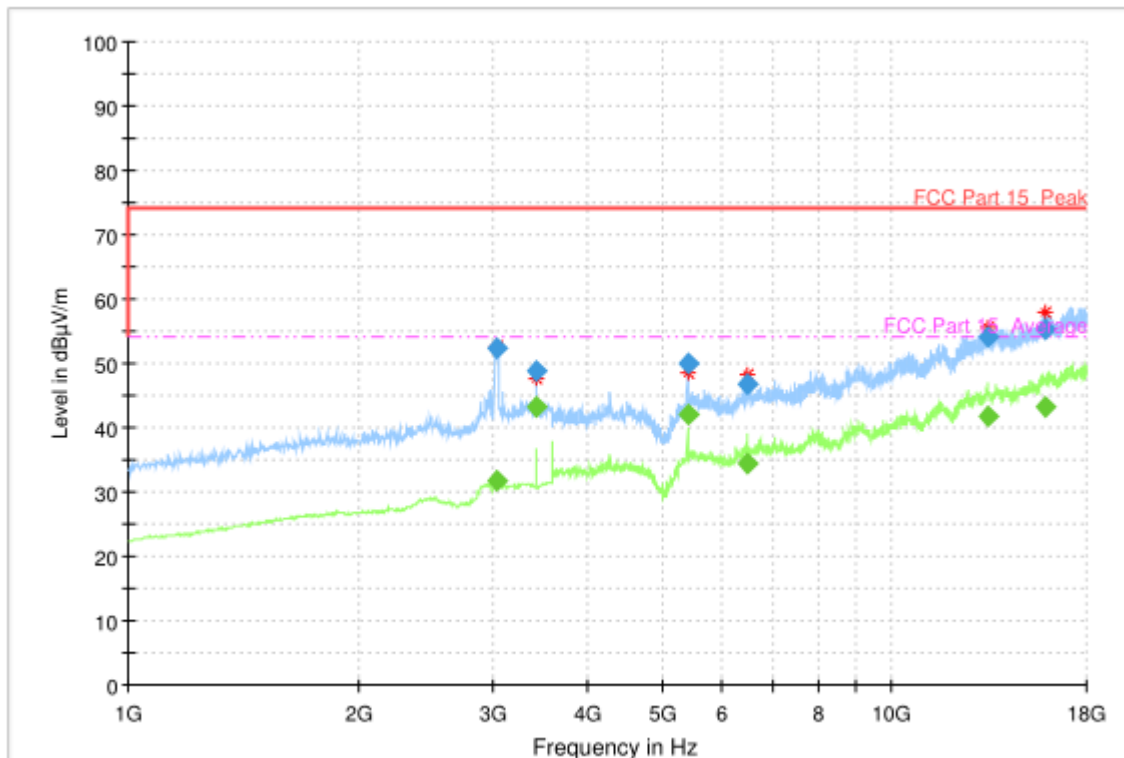
Note:

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: Working mode (Full system)<Figure 1>

Frequency Range:

1GHz –18GHz, Horizontal



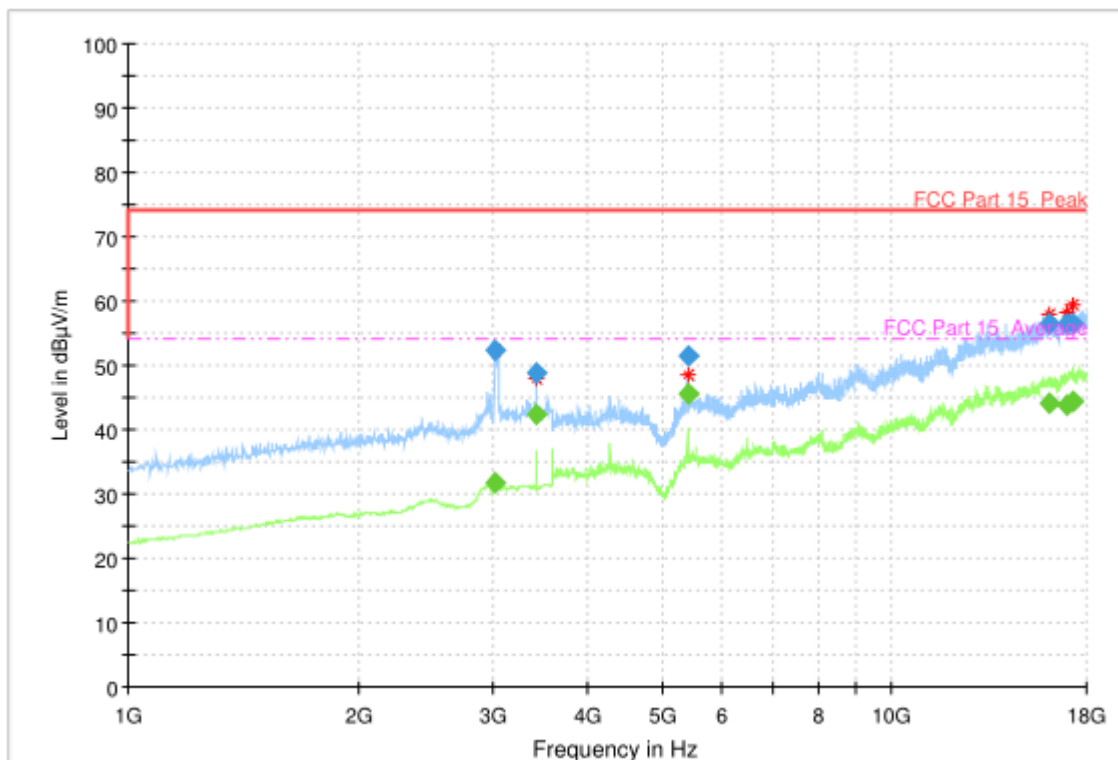
Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin	Meas. Time	Bandwidth (Hz)	Height	Polarization	Azimuth	Corr. (dB)
3049.400000	---	31.84	54.00	22.16	100.0	1000.000	100.0	H	286.0	-1.1
3049.400000	52.34	---	74.00	21.66	100.0	1000.000	100.0	H	286.0	-1.1
3424.000000	---	43.21	54.00	10.79	100.0	1000.000	100.0	H	246.0	-0.3
3424.000000	48.84	---	74.00	25.16	100.0	1000.000	100.0	H	246.0	-0.3
5400.200000	50.00	---	74.00	24.00	100.0	1000.000	200.0	H	219.0	4.3
5400.200000	---	42.05	54.00	11.95	100.0	1000.000	200.0	H	219.0	4.3
6477.800000	---	34.30	54.00	19.70	100.0	1000.000	200.0	H	271.0	6.0
6477.800000	46.63	---	74.00	27.37	100.0	1000.000	200.0	H	271.0	6.0
13385.400000	---	41.69	54.00	12.31	100.0	1000.000	100.0	H	316.0	17.9
13385.400000	54.07	---	74.00	19.93	100.0	1000.000	100.0	H	316.0	17.9
15877.400000	55.18	---	74.00	18.82	100.0	1000.000	200.0	H	261.0	21.9
15877.400000	---	43.14	54.00	10.86	100.0	1000.000	200.0	H	261.0	21.9

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.
3. Margin=limit value – emission level.

Frequency Range: 1GHz –18GHz, Vertical



Final Result

Frequency (MHz)	MaxPeak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time	Bandwidth (Hz)	Height	Po	Azim	Corr.
3026.000000	52.47	---	74.00	21.53	100.0	1000.000	200.0	V	282.0	-1.2
3026.000000	---	31.71	54.00	22.29	100.0	1000.000	200.0	V	282.0	-1.2
3424.200000	48.94	---	74.00	25.06	100.0	1000.000	100.0	V	243.0	-0.3
3424.200000	---	42.47	54.00	11.53	100.0	1000.000	100.0	V	243.0	-0.3
5399.800000	51.36	---	74.00	22.64	100.0	1000.000	100.0	V	231.0	4.3
5399.800000	---	45.47	54.00	8.53	100.0	1000.000	100.0	V	231.0	4.3
16096.600000	56.59	---	74.00	17.41	100.0	1000.000	100.0	V	201.0	22.5
16096.600000	---	44.11	54.00	9.89	100.0	1000.000	100.0	V	201.0	22.5
16923.000000	---	43.87	54.00	10.13	100.0	1000.000	100.0	V	18.0	23.5
16923.000000	56.45	---	74.00	17.55	100.0	1000.000	100.0	V	18.0	23.5
17249.600000	---	44.36	54.00	9.64	100.0	1000.000	100.0	V	180.0	24.2
17249.600000	56.60	---	74.00	17.40	100.0	1000.000	100.0	V	180.0	24.2

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.
3. Margin=limit value – emission level.

8.2 AC 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 C63.4-2014, section 7.3

Limit of AC 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

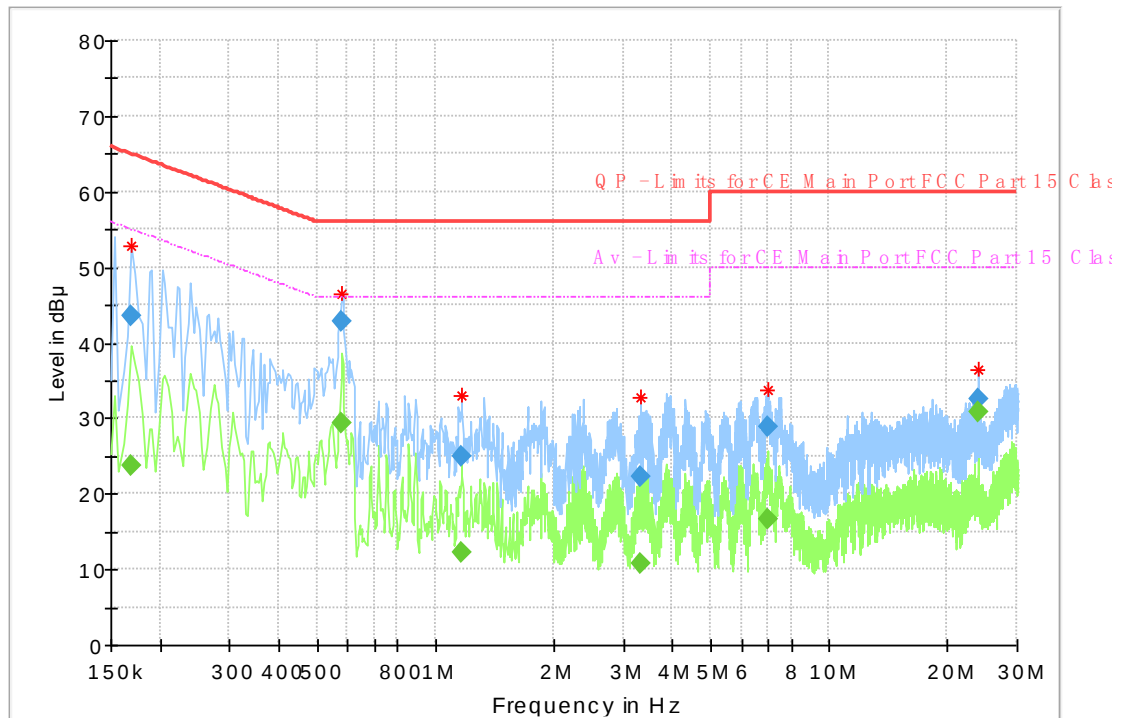
Uncertainty Measurement

The measurement uncertainty is 3.66dB (k=2).

Test Results

Mode 1: Working mode (Full system)<Figure 1>

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)
0.168656	---	23.82	55.03	31.21	15000.	9.000	L1	ON	9.6
0.168656	43.59	---	65.03	21.44	15000.	9.000	L1	ON	9.6
0.579094	---	29.31	46.00	16.69	15000.	9.000	N	ON	9.8
0.579094	42.88	---	56.00	13.12	15000.	9.000	N	ON	9.8
1.164900	---	12.11	46.00	33.89	15000.	9.000	L1	ON	9.7
1.164900	25.04	---	56.00	30.96	15000.	9.000	L1	ON	9.7
3.325294	---	10.65	46.00	35.35	15000.	9.000	N	ON	9.9
3.325294	22.24	---	56.00	33.76	15000.	9.000	N	ON	9.9
7.004306	---	16.64	50.00	33.36	15000.	9.000	L1	ON	9.9
7.004306	28.90	---	60.00	31.10	15000.	9.000	L1	ON	9.9
23.862094	---	30.84	50.00	19.16	15000.	9.000	L1	ON	10.2
23.862094	32.64	---	60.00	27.36	15000.	9.000	L1	ON	10.2

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.
4. L1 and N line is all have been tested, the result of them is synthesized in the above data diagram.

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