



TEST REPORT

Report Number: C21T00131-EMC02-V00

Applicant	Toast, Incorporated
Product Name	On-Counter Guest Facing Display
Model Name	TW200, TW300
Brand Name	Toast
FCC ID	2AMNG-TW200
IC	N/A

Industrial Internet Innovation Center (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in FCC Part 15, Subpart B, ANSI C63.4-2014, ICES-003 Issue 7.

Prepared by	李柳凯	Reviewed by	李五真
Approved by	李柳凯	Issue Date	2021-12-31

Industrial Internet Innovation Center (Shanghai) Co., Ltd.



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Test Laboratory:

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Revision Version

Report Number	Revision	Date	Memo
C21T00131-EMC02-V00	00	2021-12-31	Initial creation of test report



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1. Test Laboratory

1.1. Testing Location

Primary Lab:

Company Name	Industrial Internet Innovation Center (Shanghai) Co., Ltd.
Address	Building 4, No. 766 Jingang Rd, Pudong, Shanghai, China
FCC Registration No.	958356
FCC Designation No.	CN1177
IC designation No.	CN0067

Subcontracting Lab #1:

Company Name	N/A
Address	N/A

1.2. Testing Environment

Normal Temperature	15°C~35°C
Relative Humidity	30%RH~60%RH
Supply Voltage	120V/60Hz

1.3. Project Information

Project Leader	Wang Wenwen
Testing Start Date	2021-11-24
Testing End Date	2021-12-28



2. Client Information

2.1. Applicant Information

Company Name	Toast, Incorporated
Address	401 Park Drive, Suite 801, Boston, MA 02215, USA
Telephone	5625462272

2.2. Manufacturer Information

Company Name	Toast, Incorporated
Address	401 Park Drive, Suite 801, Boston, MA 02215, USA
Telephone	5625462272

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

3.1. About EUT

Product Name	On-Counter Guest Facing Display
Model name	TW200, TW300
Hardware Version	CT541SB40D_V1.1
Software Version	N/A

Note: Photographs of EUT are shown in ANNEX B of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
N02 (Mainly Supply)	LS0921B340902	CT541SB40D_V1.1	N/A	2021/11/24
N05 (Secondary Supply)	LS0921B340778	CT541SB40D_V1.1	N/A	2021/12/7

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	SN/Remark
CA01	Adapter	SOY-2400400	N/A
CB02	Adapter	WTA96-2400400-T	N/A
UA01	Adapter Cable	N/A	N/A
UB02	Adapter Cable	N/A	N/A
EU01	Data Processing Machine	TT203	N/A
UC01	LAN Cable	N/A	N/A
EA01	USB connector	N/A	N/A
EA02	USB connector	N/A	N/A
EB03	Credit card machine	MAGTEK	B4A77E0 5JUN19
EB02	Credit card machine	N/A	N/A
AE1	USB Cable	N/A	N/A
AE2	Mouse	MS111-P	CN-011D3V-71581-19J-1A64
AE3	U-disk	DataTraveler 100 G3 64GB	N/A
AE4	Notebook PC	Lenovo T440P	N/A

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

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	2020/10/1
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
ICES-003	Information Technology Equipment (Including Digital Apparatus)-Limits and Methods of Measurement	Issue 7

5. Test Summary

5.1. Summary of Test Results

Items	Test List	Standard	Verdict
1	Radiated Emission	15.109(a)	Pass
2	AC Conducted Emission	15.107(a)	Pass

5.2. Statements

The TW200, TW300, manufactured by Toast, Incorporated is a variant product for testing.

This project is a variant project based on the original report I19D00159-EMC01 issued by ECIT. For the mainly supply sample, we tested all of them. For the secondary sample, only the cable length was different according to the product change description. We only tested Radiated Emission and recorded the test data in the report.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 5.1.

Industrial Internet Innovation Center (Shanghai) Co., Ltd. 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.

The description of the differences between the models is updated as follows:

Mainly Supply	TW200	
Secondary Supply	TW300	same as TW200, Only the cable becomes 1.5 meters Y-cable

5.3. Decision of final test mode

The EUT was tested together with the above additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The test configuration modes are as the following:

N02 (Mainly Supply):

Test Item	Test setup and operating modes
Radiated emission	Mode 1: Working mode (Full system) + CA01 Mode 2: Working mode (Full system) + CB02
AC Conducted Emission	Mode 1: Working mode (Full system) + CA01 Mode 2: Working mode (Full system) + CB02
Remark: The worst case of radiated emission for 30MHz-1GHz is mode 1 and for 1GHz -18GHz is mode 1. The worst case for conducted emission is mode 1.	

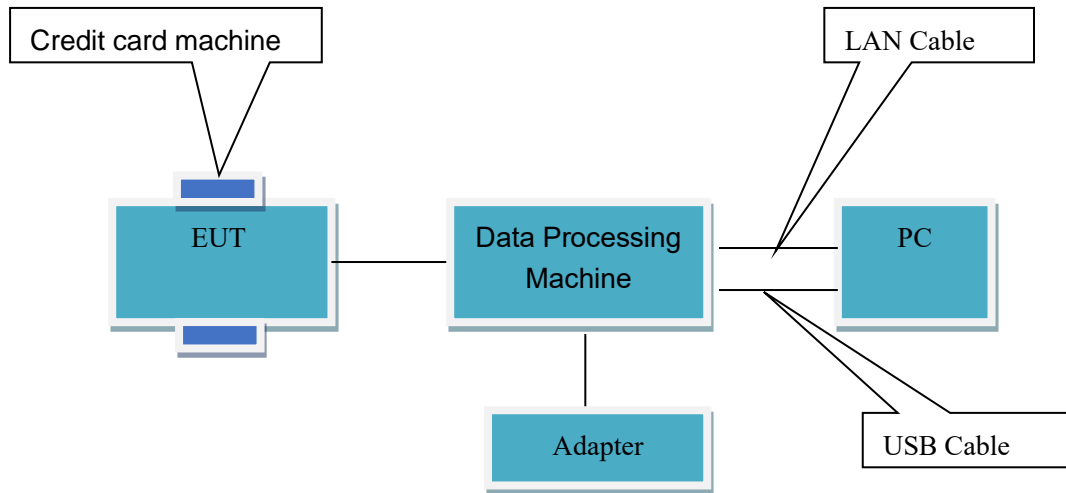
N05 (Secondary Supply):

Test Item	Test setup and operating modes
Radiated emission	Mode 1: Working mode (Full system) + CA01 Mode 2: Working mode (Full system) + CB02
Remark: The worst case of radiated emission for 30MHz-1GHz is mode 1 and for 1GHz -18GHz is mode 1.	

5.4. EUT System Operation

1. Connect the EUT with AE.
2. Setup the EUT according to the standard.
3. Full system mode: EUT is powered by a Data Processing Machine, connected externally with a USB connector and a Credit card machine and turns on the camera to record video. Data Processing Machine connects USB cable to PC for data transmission, and through LAN cable to PC for data exchange of PING command, keep working at maximum load.
4. Start testing and monitoring the function

5.5. EUT Connection Diagram of Test System



<Figure 1> Mode 1,2

6. Measurement Results

6.1. Radiated Emission

Method of Measurement

- a. For 30MHz -1000MHz, the EUT was placed on the top of a rotating 0.8m 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.
- b. 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

Table 1:

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

Table 2:

Frequency Range (MHz)	Peak (dB μ V/m)	Average (dB μ V/m)
Above 1000	74	54

Table 3:

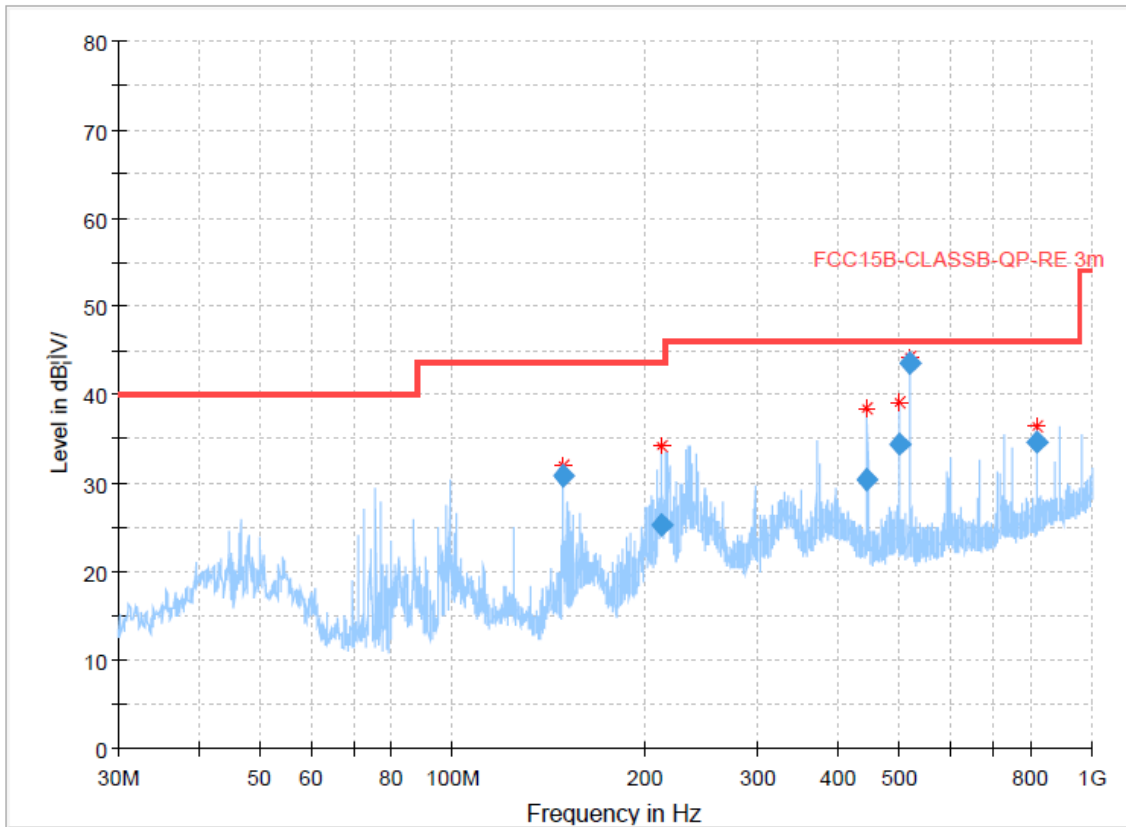
Test conditions

Frequency Range (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120kHz/300kHz	Auto
1000-18000	1MHz/3MHz	Auto

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.

N02 (Mainly Supply):



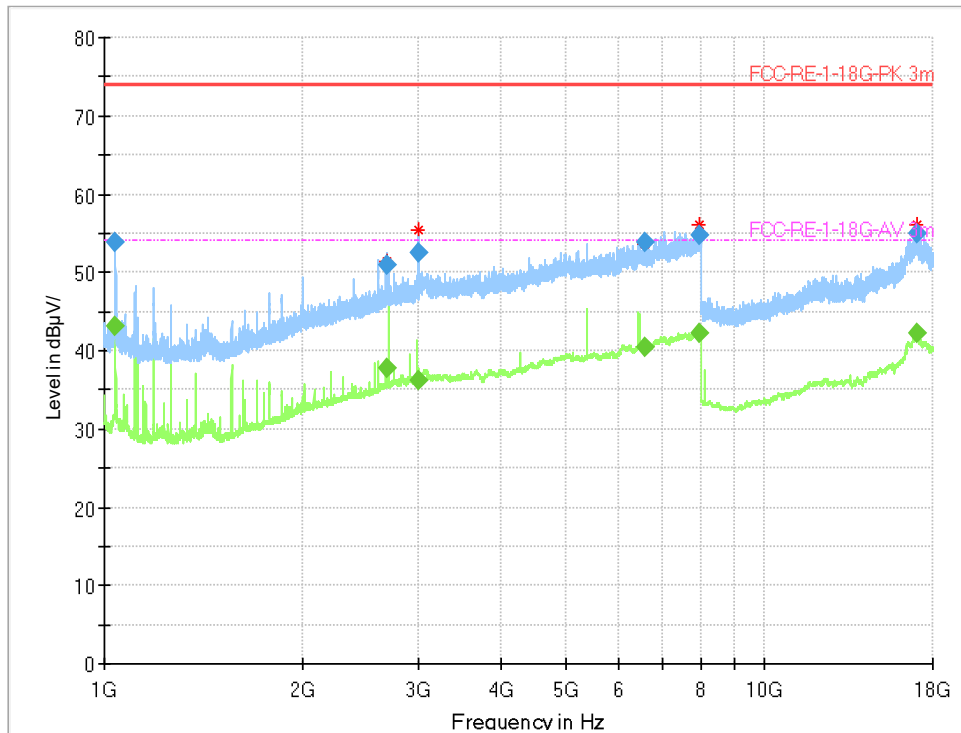
Mode 1 (30M-1GHz)

Final Result 1

Frequency (MHz)	QuasiPeak (dB _i V/m)	Limit (dB _i V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
148.491720	30.81	40.00	9.19	200.0	V	60.0	-16.4
212.709120	25.20	43.50	18.30	100.0	V	188.0	-12.5
445.486040	30.37	46.00	15.63	200.0	V	60.0	-6.5
499.989720	34.52	46.00	11.48	200.0	V	60.0	-5.3
519.740040	43.61	46.00	2.39	200.0	H	6.0	-5.1
816.741200	34.61	46.00	13.39	100.0	V	0.0	0.1

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.



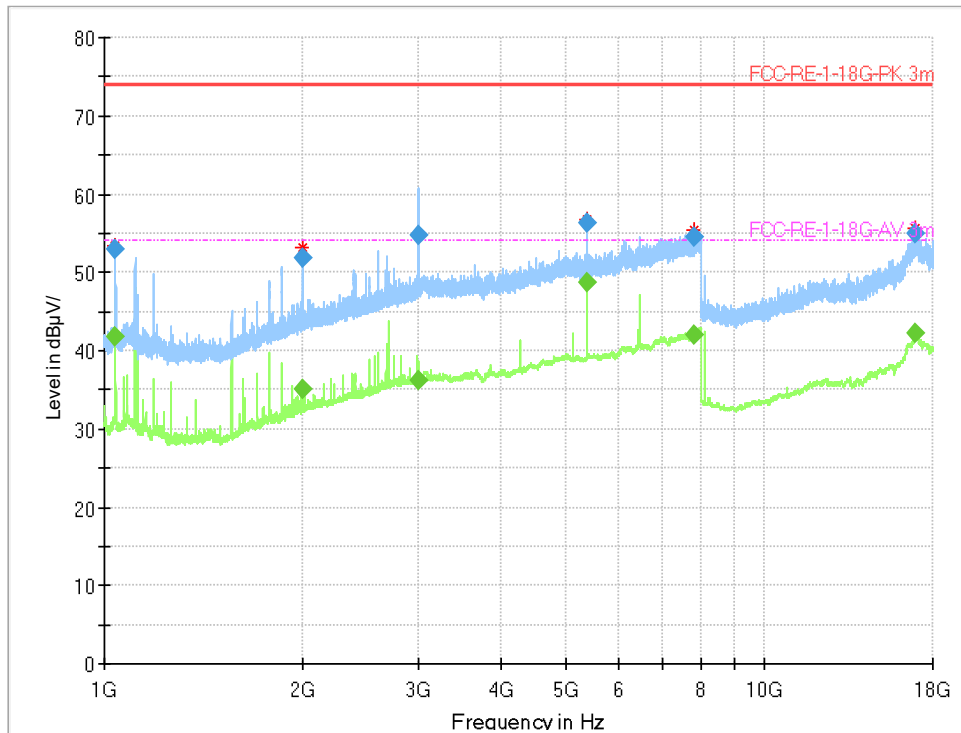
Mode 1_H (1G-18G)

Final Result 1

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Heigh t (cm)	Pol	Azim uth (deg)	Corr. (dB/ m)
1039.495000	---	43.18	54.00	10.82	500.0	1000.000	115.0	H	55.0	1.9
1039.495000	53.92	---	74.00	20.08	500.0	1000.000	115.0	H	55.0	1.9
2672.965000	51.04	---	74.00	22.96	500.0	1000.000	115.0	H	224.0	10.1
2672.965000	---	37.72	54.00	16.28	500.0	1000.000	115.0	H	224.0	10.1
2996.868375	52.60	---	74.00	21.40	500.0	1000.000	103.0	H	280.0	11.6
2996.868375	---	36.31	54.00	17.69	500.0	1000.000	103.0	H	280.0	11.6
6600.272500	---	40.48	54.00	13.52	500.0	1000.000	215.0	H	359.0	18.6
6600.272500	53.75	---	74.00	20.25	500.0	1000.000	215.0	H	359.0	18.6
7952.575000	54.79	---	74.00	19.21	500.0	1000.000	115.0	H	104.0	21.3
7952.575000	---	42.27	54.00	11.73	500.0	1000.000	115.0	H	104.0	21.3
17000.70125	54.95	---	74.00	19.05	500.0	1000.000	215.0	H	105.0	22.6
17000.70125	---	42.24	54.00	11.76	500.0	1000.000	215.0	H	105.0	22.6

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.



Mode 1_V (1G-18G)

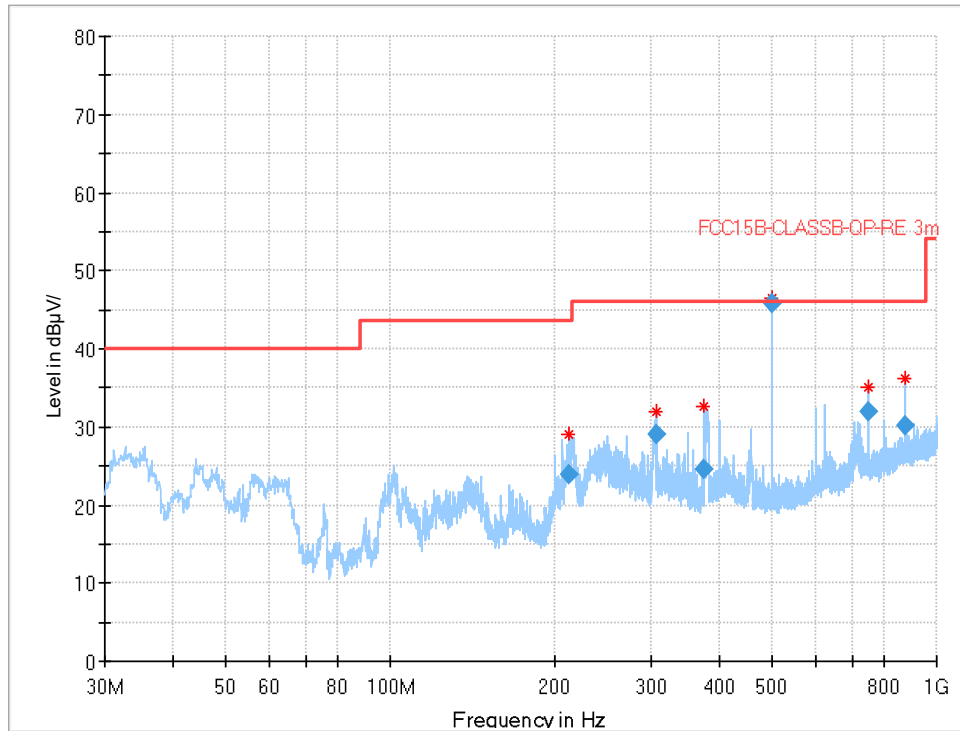
Final Result 1

Frequency (MHz)	MaxPeak (dB µ)	Average (dB µ)	Limit (dB µ)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (h)	Corr. (dB/m)
1039.47000	52.95	---	74.00	21.05	500.0	1000.000	103.0	V	275.0	1.9
1039.47000	---	41.80	54.00	12.20	500.0	1000.000	103.0	V	275.0	1.9
1998.42250	51.94	---	74.00	22.06	500.0	1000.000	100.0	V	49.0	6.8
1998.42250	---	35.11	54.00	18.89	500.0	1000.000	100.0	V	49.0	6.8
2994.15534	---	36.18	54.00	17.82	500.0	1000.000	100.0	V	247.0	11.6
2994.15534	54.79	---	74.00	19.21	500.0	1000.000	100.0	V	247.0	11.6
5399.46875	56.27	---	74.00	17.73	500.0	1000.000	115.0	V	197.0	16.6
5399.46875	---	48.71	54.00	5.29	500.0	1000.000	115.0	V	197.0	16.6
7822.48500	54.52	---	74.00	19.48	500.0	1000.000	115.0	V	197.0	20.8
7822.48500	---	41.90	54.00	12.10	500.0	1000.000	115.0	V	197.0	20.8
16951.9050	---	42.15	54.00	11.85	500.0	1000.000	205.0	V	247.0	22.5
16951.9050	54.94	---	74.00	19.06	500.0	1000.000	205.0	V	247.0	22.5

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.

N05 (Secondary Supply):



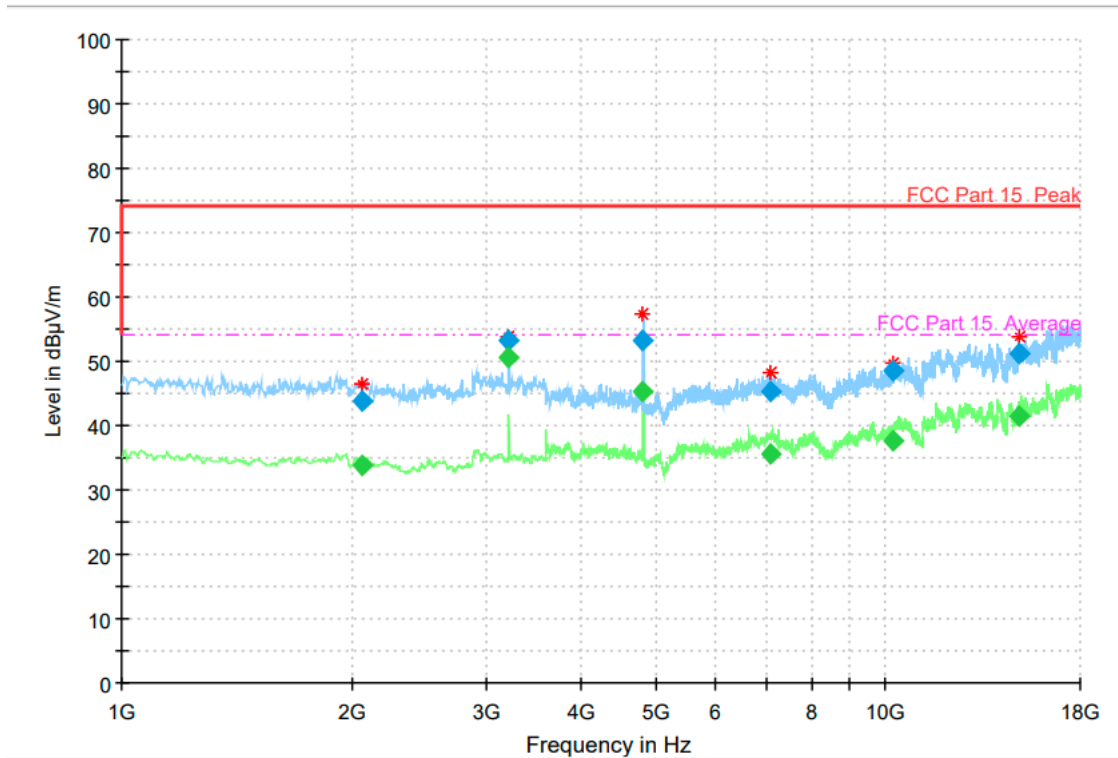
Mode 1 (30M-1GHz)

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
212.150160	23.94	43.50	19.56	100.0	H	318.0	-12.5
306.172200	29.06	46.00	16.94	100.0	H	167.0	-9.9
374.944040	24.48	46.00	21.52	100.0	H	259.0	-7.9
500.014560	45.84	46.00	0.16	100.0	H	349.0	-5.3
750.007480	32.06	46.00	13.94	100.0	V	184.0	-0.5
875.014320	30.17	46.00	15.83	100.0	H	167.0	1.2

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.



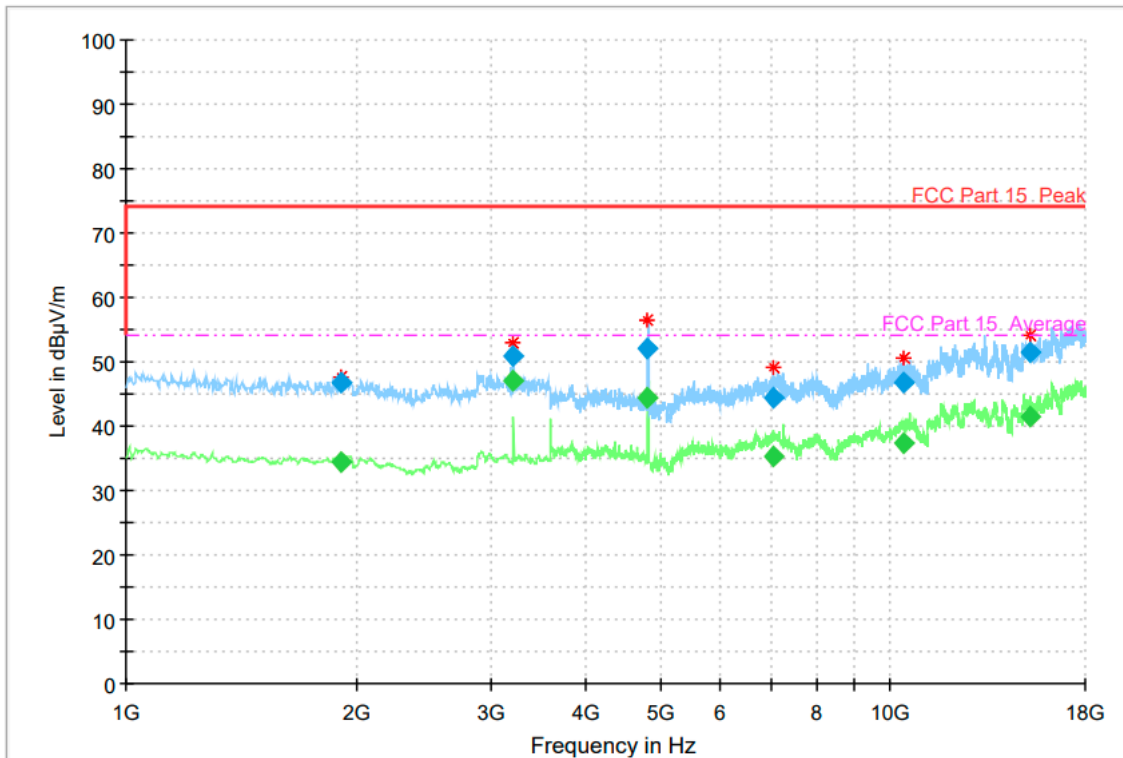
Mode 1_H (1G-18G)

Final Result 1

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2071.20000	---	33.75	54.00	20.25	1.0	1000.	200.0	H	280.0	2071
2071.20000	43.70	---	74.00	30.30	1.0	1000.	200.0	H	280.0	2071
3216.00000	53.24	---	74.00	20.76	1.0	1000.	100.0	H	136.0	3216
3216.00000	---	50.51	54.00	3.49	1.0	1000.	100.0	H	136.0	3216
4820.60000	53.15	---	74.00	20.85	1.0	1000.	100.0	H	194.0	4820
4820.60000	---	45.19	54.00	8.81	1.0	1000.	100.0	H	194.0	4820
7096.00000	45.19	---	74.00	28.81	1.0	1000.	100.0	H	37.0	7096
7096.00000	---	35.66	54.00	18.34	1.0	1000.	100.0	H	37.0	7096
10258.0000	---	37.60	54.00	16.40	1.0	1000.	100.0	H	12.0	1025
10258.0000	48.51	---	74.00	25.49	1.0	1000.	100.0	H	12.0	1025
14937.2000	51.05	---	74.00	22.95	1.0	1000.	100.0	H	95.0	1493
14937.2000	---	41.53	54.00	12.47	1.0	1000.	100.0	H	95.0	1493

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.



Mode 1_V (1G-18G)

Final Result 1

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1917.20000	---	34.50	54.00	19.50	1.0	1000.	100.0	V	0.0	1917
1917.20000	46.66	---	74.00	27.34	1.0	1000.	100.0	V	0.0	1917
3216.20000	50.92	---	74.00	23.08	1.0	1000.	200.0	V	149.0	3216
3216.20000	---	47.14	54.00	6.86	1.0	1000.	200.0	V	149.0	3216
4821.00000	51.95	---	74.00	22.05	1.0	1000.	100.0	V	19.0	4821
4821.00000	---	44.42	54.00	9.58	1.0	1000.	100.0	V	19.0	4821
7025.40000	44.54	---	74.00	29.46	1.0	1000.	100.0	V	202.0	7025
7025.40000	---	35.39	54.00	18.61	1.0	1000.	100.0	V	202.0	7025
10421.4000	---	37.47	54.00	16.53	1.0	1000.	100.0	V	330.0	1042
10421.4000	46.64	---	74.00	27.36	1.0	1000.	100.0	V	330.0	1042
15239.2000	51.50	---	74.00	22.50	1.0	1000.	100.0	V	176.0	1523
15239.2000	---	41.38	54.00	12.62	1.0	1000.	100.0	V	176.0	1523

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.

6.2. 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

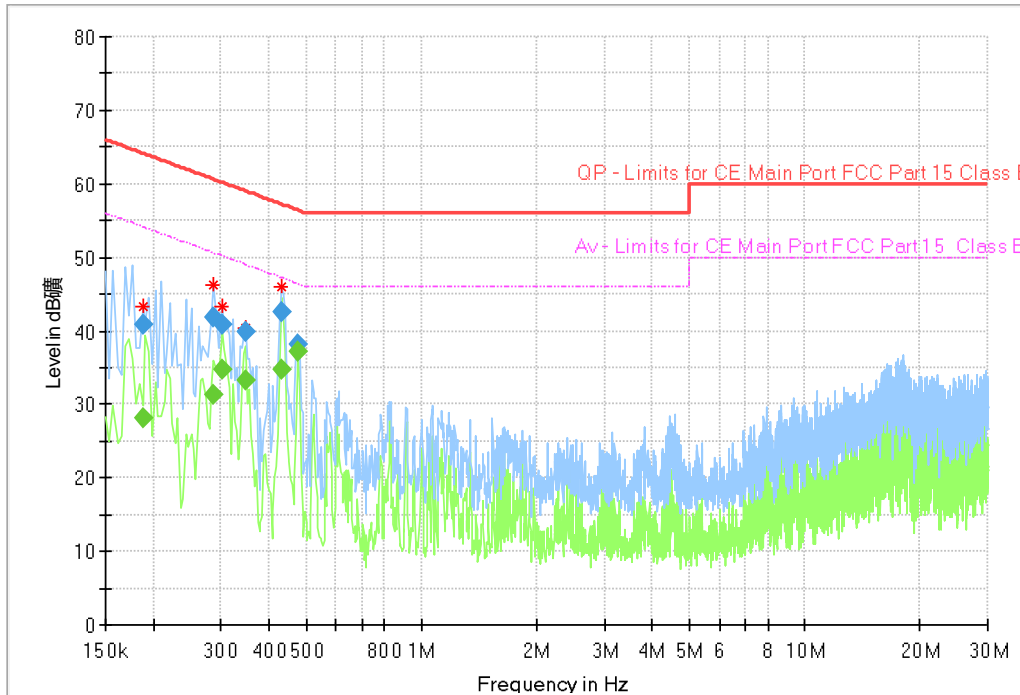
*Decreases with the logarithm of the frequency

Test Condition in Charging Mode

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

Test Results

N02 (Mainly Supply):



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.187313	---	28.24	54.16	25.91	15000.0	9.000	L1	ON	9.6
0.187313	40.83	---	64.16	23.33	15000.0	9.000	L1	ON	9.6
0.288056	---	31.26	50.58	19.32	15000.0	9.000	N	ON	9.6
0.288056	41.87	---	60.58	18.71	15000.0	9.000	N	ON	9.6
0.302981	---	34.80	50.16	15.36	15000.0	9.000	N	ON	9.6
0.302981	40.92	---	60.16	19.24	15000.0	9.000	N	ON	9.6
0.347756	---	33.38	49.02	15.63	15000.0	9.000	N	ON	9.6
0.347756	39.79	---	59.02	19.23	15000.0	9.000	N	ON	9.6
0.429844	---	34.65	47.26	12.60	15000.0	9.000	N	ON	9.6
0.429844	42.56	---	57.26	14.69	15000.0	9.000	N	ON	9.6
0.478350	---	37.23	46.37	9.14	15000.0	9.000	N	ON	9.6
0.478350	38.08	---	56.37	18.29	15000.0	9.000	N	ON	9.6

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.

7. Test Equipment List

7.1. Radiated Emission Equipment list

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Test Receiver	ESU40	100307	R&S	2021-03-03	1 year
2	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2021-02-03	2 years
3	Double Ridged Guide Antenna	ETS-3117	00135890	ETS	2020-02-28	2 years
4	EMI Test Software	EMC32 V9.15	N/A	R&S	N/A	N/A

7.2. AC Conducted Emission Equipment list

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Test Receiver	ESCI	101235	R&S	2021-05-10	1 year
2	2-Line V-Network	ENV216	101380	R&S	2021-03-20	1 year
3	EMI Test Software	EMC32 V10.35.02	N/A	R&S	N/A	N/A



Annex A: Measurement Uncertain

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Case	Uncertainty
Radiated Emission 30MHz-1000MHz	4.96 dB
Radiated Emission 1000MHz-18000MHz	5.18 dB
AC Conducted Emission	3.66 dB

Annex B: Accreditation Certificate



Accredited Laboratory

A2LA has accredited

INDUSTRIAL INTERNET INNOVATION CENTER (SHANGHAI) CO., LTD.

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 12th day of April 2021.



Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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