



TEST REPORT

Report Number: C21T00132-SRD07-V00

Applicant	Toast, Incorporated
Product Name	Data Processing machine
Model Name	TT204W, T204, TT202W, TT203, TK200, TT203W, TK300
Brand Name	Toast
FCC ID	2AMNG-TT200B
IC	23177-TT200B

Industrial Internet Innovation Center (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in FCC Part15, ANSI C63.10, KDB 558074, RSS-247, RSS-Gen.

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Approved by 范宇航

Issue Date 2021-12-30

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

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Test Laboratory:

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

Report Number	Revision	Date	Memo
C21T00132-SRD07-V00	00	2021-12-30	Initial creation of test report

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1. Test Laboratory

1.1. Testing Location

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

1.2. Testing Environment

Normal Temperature	15°C~35°C
Relative Humidity	25%RH~75%RH
Supply Voltage	230V/50Hz

1.3. Project Information

Project Leader	Wang Wenwen
Testing Start Date	2021-11-17
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	Data Processing machine
Model name	TT204W, TT204, TT202W, TT203, TK200, TT203W, TK300
Supported Radio Technology and Bands	BT 4.2 WLAN 802.11b,g,n WLAN 802.11a,n,ac
Hardware Version	CT541MB80C 20210430
Software Version	Sunmi-ct541-v3.0.33p033
BT Frequency	2402MHz-2480MHz
BT Channel	Ch0-78
BT type of modulation	GFSK/π/4 DQPSK/8DPSK
FCC ID	2AMNG-TT200B
IC	23177-TT200B
Nominal Voltage	230V
Extreme High Voltage	253V
Extreme Low Voltage	207V

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
N01 (Mainly Supply)	N/A	CT541MB80C 20210430	Sunmi-ct541- v3.0.33p033	2021/11/17
N02 (Thirdly Supply)	N/A	CT541MB80C 20210430	Sunmi-ct541- v3.0.33p033	2021/11/17
N04 (Secondary Supply)	N/A	CT541MB80C 20210430	Sunmi-ct541- v3.0.33p033	2021/11/17

*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
AE1	RF cable	N/A	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 Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.	2020
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013
KDB 558074 D01	Guidance for Performing Compliance Measurements on Frequency Hopping Spread Spectrum systems (DSS) Operating Under §15.247	2019
RSS-247 Issue 2	Digital Transmission Systems (DTSSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices	2017
RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus	2019

4.2. Reference Information from client

Information of the test sample provided by the client.

5. Test Summary

5.1. Summary of Test Results

Measurement Items	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247(b)	RSS-247 5.4	N/A
20dB Occupied Bandwidth	15.247(a)	RSS-247 5.1	N/A
99% Occupied Bandwidth	N/A	RSS-Gen 6.7	N/A
Band Edges Compliance	15.247 (d)	RSS-247 5.5	Pass
Time Of Occupancy (Dwell Time)	15.247(a)	RSS-247 5.1	N/A
Carrier Frequency Separation	15.247(a)	RSS-247 5.1	N/A
Number Of Hopping Channels	15.247(a)	RSS-247 5.1	N/A
Transmitter Spurious Emission-Conducted	15.247(d)	RSS-247 5.5	N/A
Transmitter Spurious Emission-Radiated	15.247,15.209,15.205	RSS-Gen 8.9,8.10	Pass

Note: please refer to Annex A in this test report for the detailed test results.

Test Conditions

Tnom	Normal Temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	25℃
Voltage	Vnom	230 V
Humidity	Hnom	48%
Air Pressure	Anom	1010hPa

Note:

- All the test data for each data were verified, but only the worst case was reported.
- The GFSK, $\pi/4$ DQPSK and 8DPSK were set in DH1 for GFSK, 2-DH1 for $\pi/4$ DQPSK, 3-DH1 for 8DPSK.
- The DC and low frequency voltages' measurement uncertainty is $\pm 2\%$.



5.2. Statements

The TT204W, TT204, TT202W, TT203, TK200, TT203W, TK300 supporting BT/WLAN, manufactured by Toast, Incorporated are variant products for testing.

This project is a variant project based on the original report C21T00056-SRD01-V02, We tested the worst case radiation data, and the test data of the worst mode was recorded in the report. The rest of the data are reference prototype report data.

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	TT204	Main LCD panel Terminal + Sub LCD panel Terminal + Attached base support
	TT204W	The same with TT204, just the color is White
Secondary Supply	TT203	Main LCD panel Terminal + Attached base support
	TT202W, TT203W	The same with TT203, just the color is White
Thirdly Supply	TK200	Main LCD panel Terminal + Add POE module + Add one speaker
Fourth Supply	TK300	Main LCD panel Terminal + Add POE module + Add one speaker + Add one bracket

6. Measurement Results

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB, 30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

6.1. Radiated Emission

6.1.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see 15.205(c)).

Limit in restricted band:

Frequency of emission	Field strength (uV/m)	Field strength (dBuV/m)
30~88	100	40
88~216	150	43.5
216~960	200	46
Above 960	500	54

6.1.2 Test Method

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.10-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission	RBW/VBW	Sweep Time (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/3MHz	15
4000~18000	1MHz/3MHz	40
18000~26500	1MHz/3MHz	20

6.1.3 Measurement Results:

A “reference path loss” is established and A_{Rpi} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

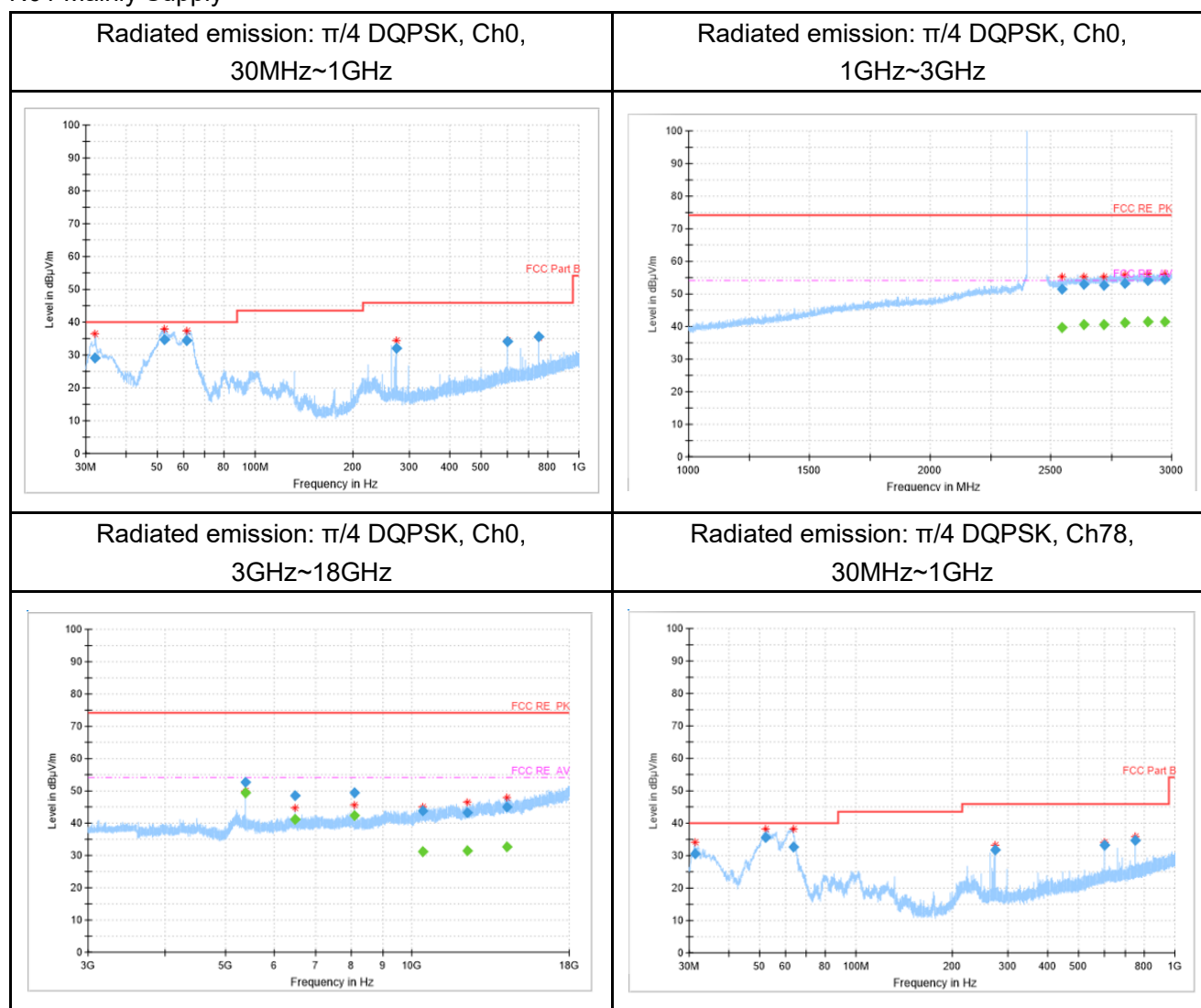
The measurement results are obtained as described below:

A_{Rpi} = Cable loss + Antenna Gain - Preamplifier gain

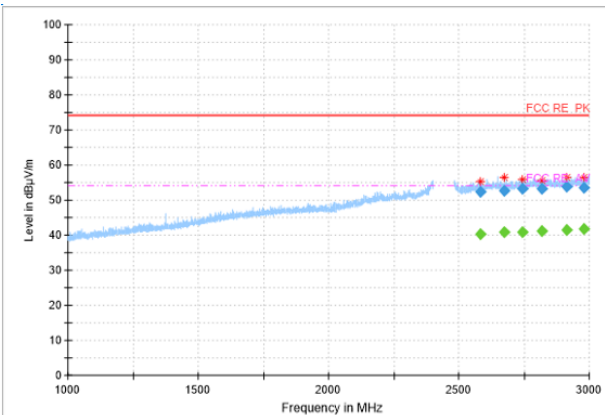
Result = $P_{Mea} + A_{Rpi}$

Tests results:

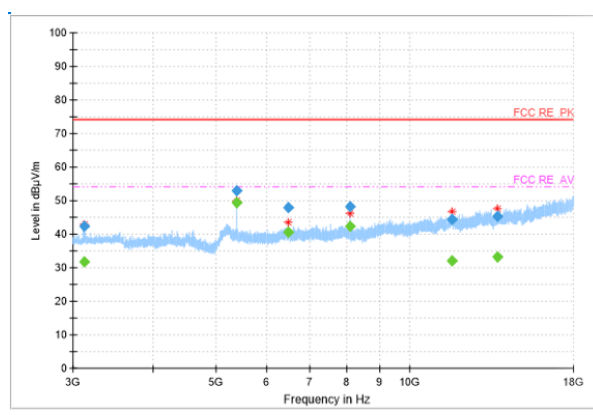
N01 Mainly Supply



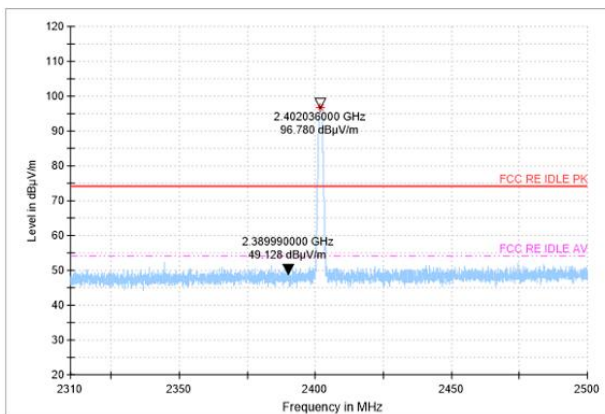
Radiated emission: $\pi/4$ DQPSK, Ch78,
1GHz~3GHz



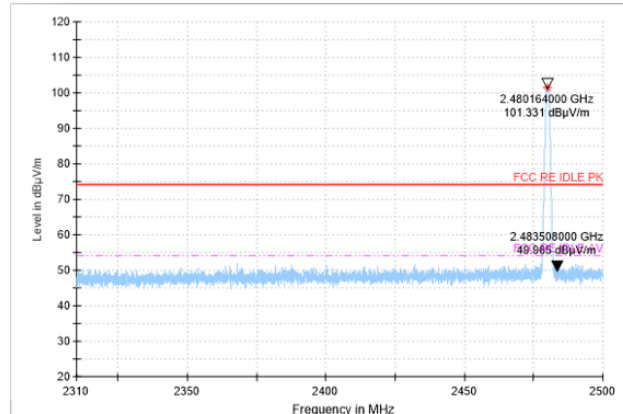
Radiated emission: $\pi/4$ DQPSK, Ch78,
3GHz~18GHz



Bandedge (Low): $\pi/4$ DQPSK, low channel



Bandedge (High): $\pi/4$ DQPSK, high channel



$\pi/4$ DQPSK Ch0 30MHz-1GHz

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
32.0	29.02	-14.3	43.32	V
52.4	34.58	-12	46.58	V
61.3	34.43	-12.8	47.23	V
272.2	32.17	-11.1	43.27	H
600.0	34.24	-3.5	37.74	V
750.0	35.57	-2.1	37.67	H

$\pi/4$ DQPSK Ch0 1GHz-3GHz

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
2545.3	51.37	15	36.37	V

2638.2	52.83	15.8	37.03	H
2717.3	52.71	16	36.71	H
2807.5	53.15	16.6	36.55	V
2901.5	54	16.7	37.3	H
2970.8	54.47	17	37.47	V

$\pi/4$ DQPSK Ch0 1GHz-3GHz (Average)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2901.5	41.53	16.7	24.83	H
2970.8	41.4	17	24.4	V

$\pi/4$ DQPSK Ch0 3GHz-18GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
5399.9	52.51	-3.3	55.81	V
6479.6	48.42	-2.6	51.02	H
8099.5	49.38	-1.5	50.88	V
10424.0	43.93	0.7	43.23	H
12318.9	43.36	1.9	41.46	V
14290.1	44.98	5.4	39.58	V

$\pi/4$ DQPSK Ch78 30MHz-1GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
31.3	30.73	-14.3	45.03	V
52.2	35.65	-12	47.65	V
63.5	32.62	-13.5	46.12	V
272.2	31.73	-11.1	42.83	H
600.0	33.33	-3.5	36.83	V
750.0	34.62	-2.1	36.72	H

$\pi/4$ DQPSK Ch78 1GHz-3GHz

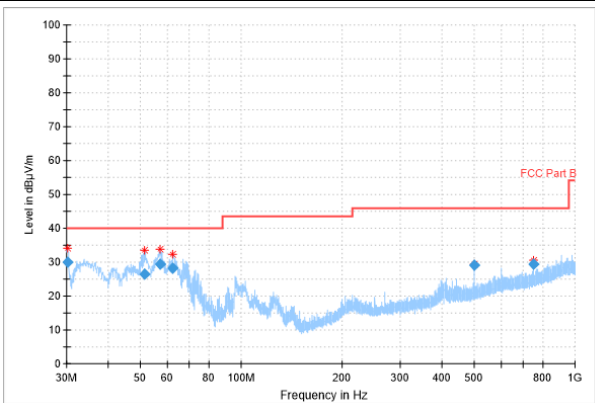
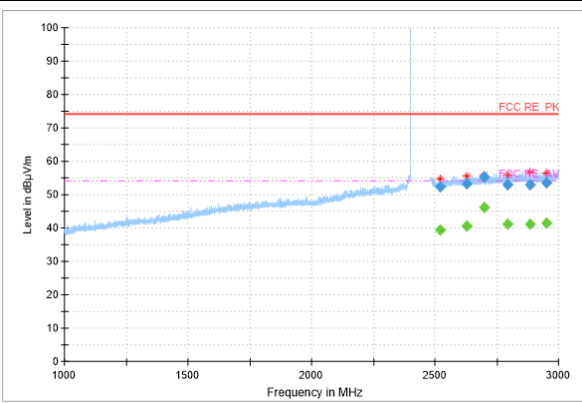
Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2581.2	52.48	15.4	37.08	H

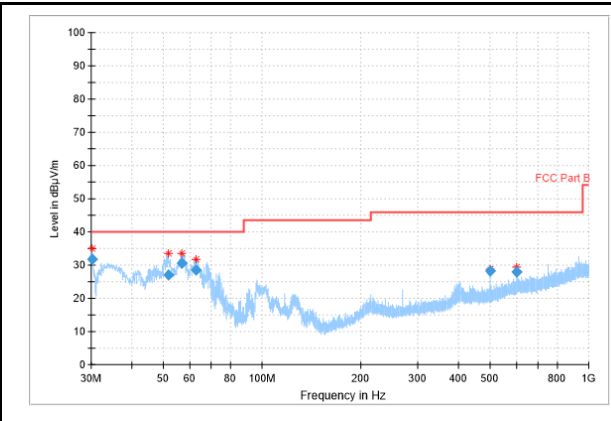
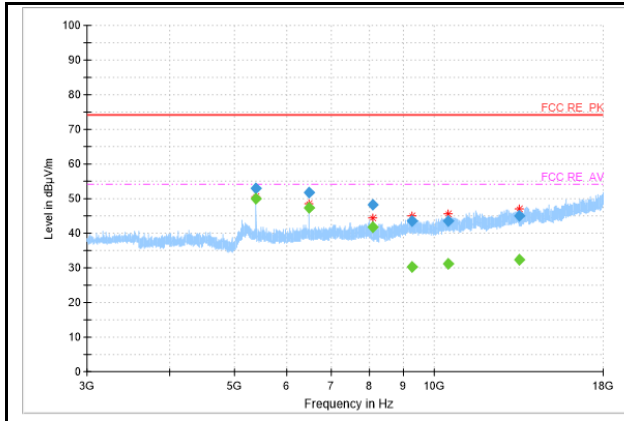
2674.8	52.68	15.9	36.78	H
2742.0	53.26	16.2	37.06	H
2818.2	53.18	16.6	36.58	H
2914.8	53.73	16.8	36.93	H
2980.5	53.62	17.1	36.52	H

$\pi/4$ DQPSK Ch78 3GHz-18GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
3118.6	42.24	-7.5	49.74	H
5400.0	52.8	-3.3	56.1	V
6480.0	47.9	-2.6	50.5	V
8099.8	48.09	-1.5	49.59	H
11644.6	44.41	2.2	42.21	H
13707.0	45.3	4.1	41.2	H

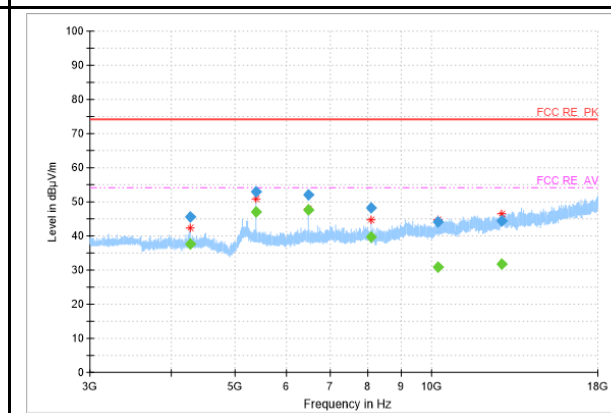
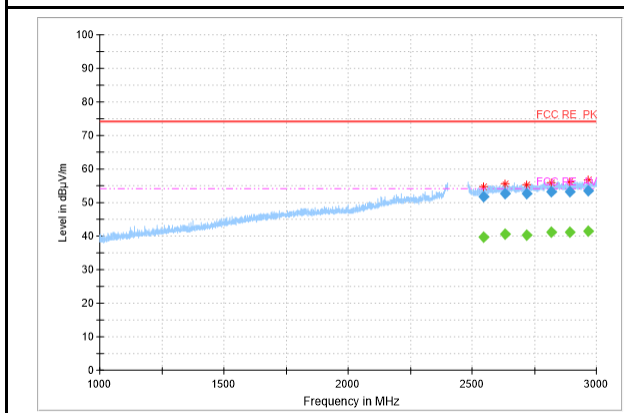
N04 Secondary Supply

Radiated emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz	Radiated emission: $\pi/4$ DQPSK, Ch0, 1GHz~3GHz
	
Radiated emission: $\pi/4$ DQPSK, Ch0, 3GHz~18GHz	Radiated emission: $\pi/4$ DQPSK, Ch78, 30MHz~1GHz



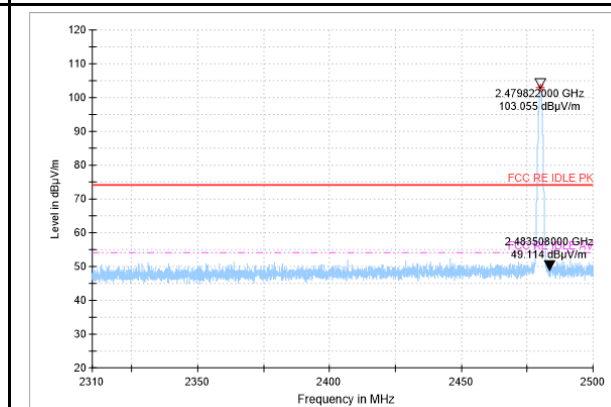
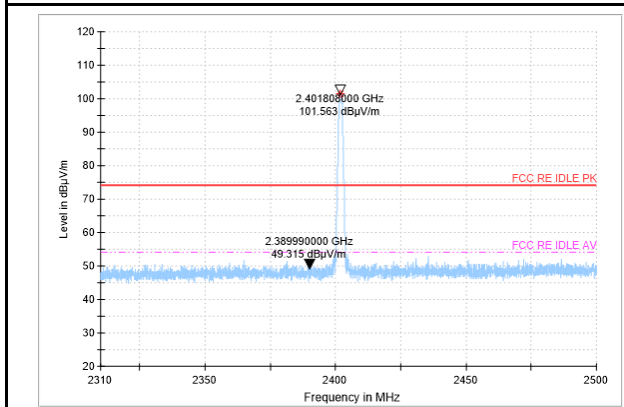
Radiated emission: $\pi/4$ DQPSK, Ch78,
1GHz~3GHz

Radiated emission: $\pi/4$ DQPSK, Ch78,
3GHz~18GHz



Bandedge (Low): $\pi/4$ DQPSK, low channel

Bandedge (High): $\pi/4$ DQPSK, high channel



$\pi/4$ DQPSK Ch0 30MHz-1GHz

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
30.2	30.04	-14.4	44.44	V
51.4	26.35	-12	38.35	V
57.0	29.28	-12.2	41.48	V
62.5	28.38	-13.2	41.58	V

500.0	28.98	-6.4	35.38	H
750.0	29.29	-2.1	31.39	H

$\pi/4$ DQPSK Ch0 1GHz-3GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2521.4	52.47	14.6	37.87	H
2627.9	53.37	15.7	37.67	H
2699.8	55.37	15.9	39.47	V
2792.4	53.08	16.5	36.58	V
2883.2	52.82	16.7	36.12	V
2951.7	53.59	16.8	36.79	V

$\pi/4$ DQPSK Ch0 1GHz-3GHz (Average)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2699.8	46.15	15.9	30.25	V

$\pi/4$ DQPSK Ch0 3GHz-18GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
5399.9	53.04	-3.3	56.34	V
6480.1	51.91	-2.6	54.51	H
8099.7	48.15	-1.5	49.65	V
9284.4	43.45	-0.2	43.65	H
10511.0	43.42	0.9	42.52	V
13435.5	44.92	3.6	41.32	V

$\pi/4$ DQPSK Ch78 30MHz-1GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
30.2	31.62	-14.4	46.02	V
51.6	26.97	-12	38.97	V
56.8	30.45	-12.2	42.65	V
62.9	28.39	-13.3	41.69	V
500.0	28.23	-6.4	34.63	H

600.0	27.87	-3.5	31.37	V
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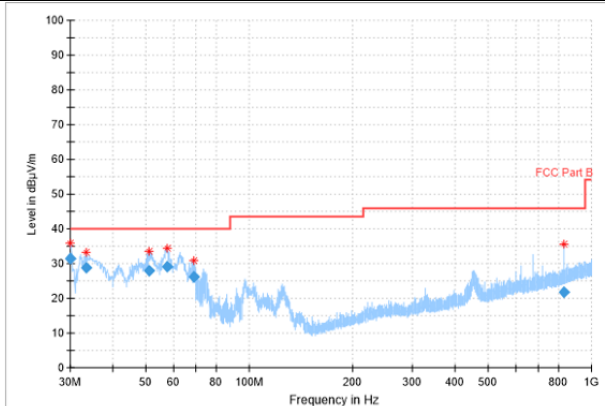
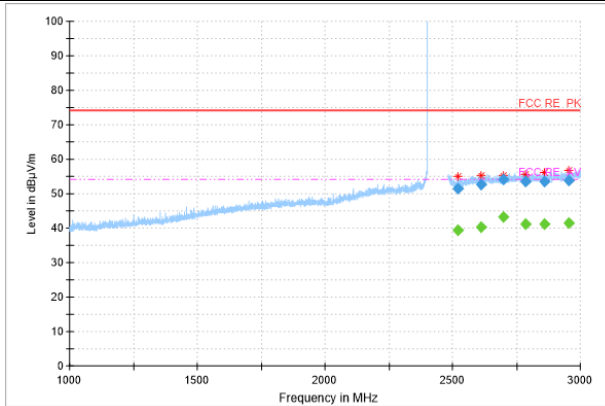
$\pi/4$ DQPSK Ch78 1GHz-3GHz

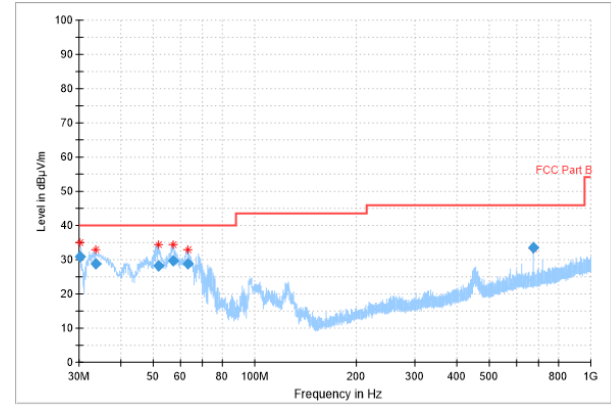
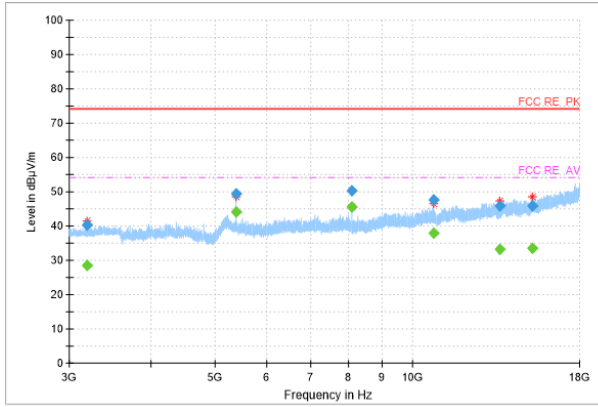
Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2544.3	51.8	15	36.8	V
2633.1	52.79	15.8	36.99	V
2720.5	52.59	16	36.59	H
2819.0	53.24	16.6	36.64	H
2894.1	53.35	16.7	36.65	V
2965.4	53.45	17	36.45	H

$\pi/4$ DQPSK Ch78 3GHz-18GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
4280.0	45.59	-5.3	50.89	V
5400.3	52.95	-3.3	56.25	V
6480.0	52.04	-2.6	54.64	H
8099.4	48.18	-1.5	49.68	V
10256.5	44.05	0.1	43.95	H
12823.3	44.31	3.1	41.21	H

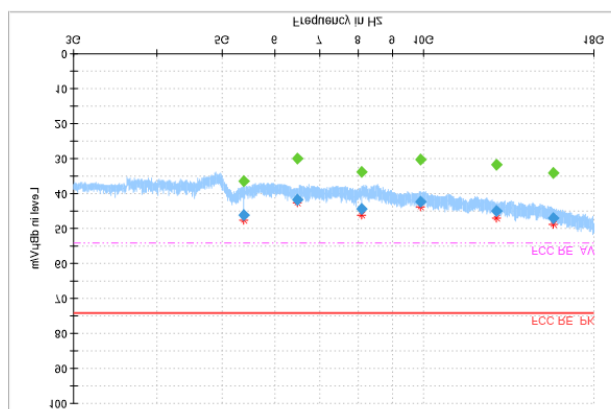
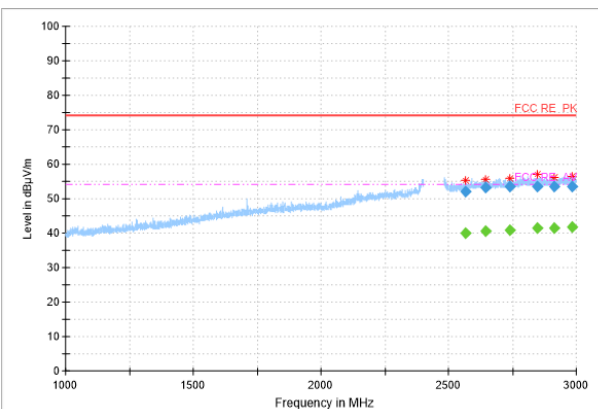
N02 Thirdly Supply

Radiated emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz 	Radiated emission: $\pi/4$ DQPSK, Ch0, 1GHz~3GHz 
Radiated emission: $\pi/4$ DQPSK, Ch0, 3GHz~18GHz	Radiated emission: $\pi/4$ DQPSK, Ch78, 30MHz~1GHz



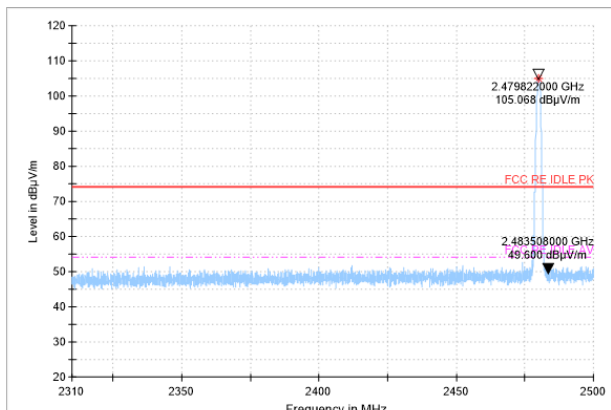
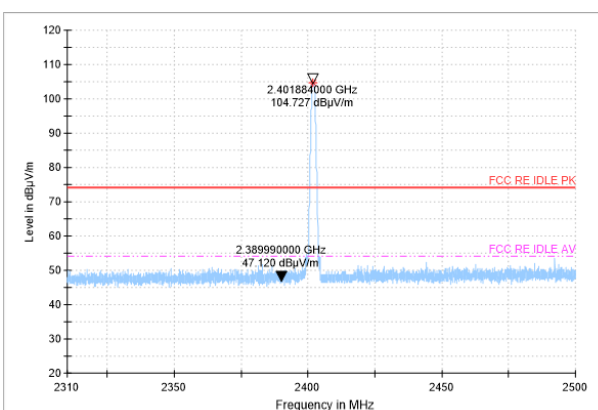
Radiated emission: $\pi/4$ DQPSK, Ch78,
1GHz~3GHz

Radiated emission: $\pi/4$ DQPSK, Ch78,
3GHz~18GHz



Bandedge (Low): $\pi/4$ DQPSK, low channel

Bandedge (High): $\pi/4$ DQPSK, high channel



$\pi/4$ DQPSK Ch0 30MHz-1GHz

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
30.1	31.53	-14.4	45.93	V
33.3	28.81	-14.2	43.01	V

50.8	28.08	-11.9	39.98	V
57.7	29.09	-12.2	41.29	V
68.8	26.16	-15.3	41.46	V
831.4	21.72	-1	22.72	V

$\pi/4$ DQPSK Ch0 1GHz-3GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2521.6	51.52	14.6	36.92	V
2610.8	52.69	15.6	37.09	V
2700.0	54.16	15.9	38.26	V
2785.3	53.63	16.5	37.13	H
2860.2	53.41	16.7	36.71	V
2952.5	53.69	16.8	36.89	V

$\pi/4$ DQPSK Ch0 1GHz-3GHz (Average)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2700.0	43.32	15.9	27.42	V

$\pi/4$ DQPSK Ch0 3GHz-18GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
3199.7	40.22	-7.5	47.72	V
5400.1	49.36	-3.3	52.66	V
8099.7	50.29	-1.5	51.79	V
10800.1	47.68	1.1	46.58	V
13592.4	45.94	3.8	42.14	V
15262.9	45.77	6.2	39.57	H

$\pi/4$ DQPSK Ch78 30MHz-1GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
30.2	30.95	-14.4	45.35	V
33.7	28.93	-14.1	43.03	V
51.6	28.11	-12	40.11	V

57.3	29.6	-12.2	41.8	V
63.3	28.85	-13.5	42.35	V
672.0	33.39	-2.8	36.19	H

$\pi/4$ DQPSK Ch78 1GHz-3GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
2565.1	52.08	15.2	36.88	H
2645.2	53.36	15.8	37.56	H
2739.6	53.42	16.2	37.22	H
2846.4	53.67	16.6	37.07	H
2913.4	53.41	16.8	36.61	H
2982.3	53.39	17.2	36.19	V

$\pi/4$ DQPSK Ch78 3GHz-18GHz

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
5399.5	46.11	-3.3	49.41	H
6484.5	41.9	-2.6	44.5	H
8099.8	44.49	-1.5	45.99	H
9892.2	42.44	-0.5	42.94	H
12847.7	45.08	3.2	41.88	H
15666.2	47.06	6.7	40.36	V

Note: Only the worst case is written in the report.

7. Test Equipment List

7.1. Radiated Emission Test System

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2021-05-10	1 year
2	EMI Test Receiver	ESU40	100307	R&S	2021-05-10	1 year
3	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	2020-02-28	2 years
4	Double- ridged Waveguide Antenna	ETS-3117	00135890	ETS	2020-02-28	2 years
5	2-Line V-Network	ENV216	101380	R&S	2021-05-10	1 year
6	EMI Test Software	EMC32 V 9.15.00	N/A	R&S	N/A	N/A

Anechoic chamber

Fully anechoic chamber by ETS.

Annex A: Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents.
The detailed measurement uncertainty is defined in 3IN documents.

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	5.66dB
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	4.98dB
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	5.06dB
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	5.20dB

Annex B: Accreditation Certificate



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