

FCC TEST REPORT

Client Name : Fusion Sport Proprietary Limited

Address : 76 Neon Street Sumner Park, QLD4074, Australia

Product Name : SmartHUB

Date : Sept. 06, 2021

Shenzhen Anbotech Compliance Laboratory Limited



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TEST REPORT

Applicant : Fusion Sport Proprietary Limited
Manufacturer : Fusion Sport Proprietary Limited
Product Name : SmarthUB
Model No. : SmarthUB
Trade Mark : FUSION SPORT
Rating(s) : Input: DC 5V, 2A (via adapter input: 100-240V~50/60Hz; with DC 3.7V,
1800mAh battery inside)

Test Standard(s) : FCC Part15 Subpart C, Section 15.247

Test Method(s) : ANSI C63.10: 2020, KDB558074 D01 DTS Meas Guidance v05r02

The device described above is tested by Shenzhen Anbotech Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotech Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotech Compliance Laboratory Limited.

Date of Receipt

Jun. 28, 2021

Date of Test

Jun. 28~Aug. 24, 2021

Prepared By



(Ella Liang)

Approved & Authorized Signer



(Kingkong Jin)

1. General Information

1.1. Client Information

Applicant	:	Fusion Sport Proprietary Limited
Address	:	76 Neon Street Sumner Park, QLD4074, Australia
Manufacturer	:	Fusion Sport Proprietary Limited
Address	:	76 Neon Street Sumner Park, QLD4074, Australia
Factory	:	Fusion Sport Proprietary Limited
Address	:	76 Neon Street Sumner Park, QLD4074, Australia

1.2. Description of Device (EUT)

Product Name	:	SmarHUB	
Model No.	:	SmarHUB	
Trade Mark	:	FUSION SPORT	
Test Power Supply	:	AC 120V, 60Hz for Adapter/ AC 240V, 60Hz for Adapter/ DC 3.7V battery inside	
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)	
Product Description	:	Operation Frequency:	BLE: 2402~2480MHz Zigbee: 2405~2480 MHz
	:	Number of Channel:	BLE: 40 Channels Zigbee: 16 Channels
	:	Modulation Type:	BLE/ Zigbee: GFSK
	:	Antenna Type:	BLE&Zigbee: Cylindrical Antenna
	:	Antenna Gain(Peak):	BLE/ Zigbee: 2.1 dBi
	:	Adapter:	Model: BX-0502000 Input: AC 100~240V, 50/60Hz Output:5V=2.0A
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2)This report is for Zigbee module.			

1.3. Auxiliary Equipment Used During Test

N/A	
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1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description	
Mode 1	CH11	TX+ Charging Mode/ TX Only
Mode 2	CH19	
Mode 3	CH26	

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

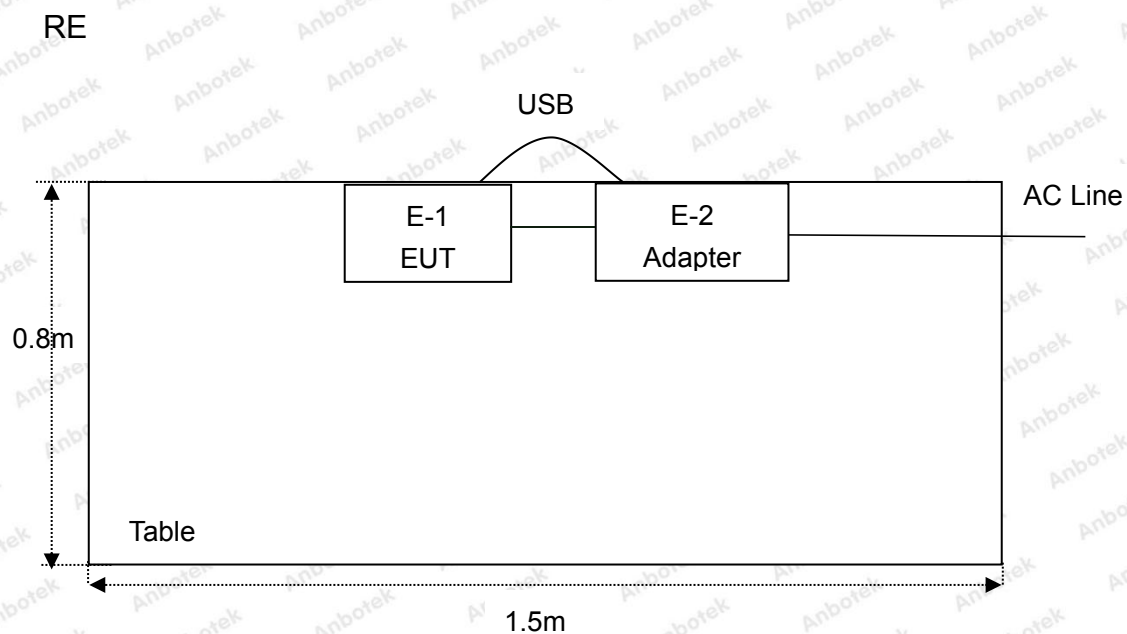
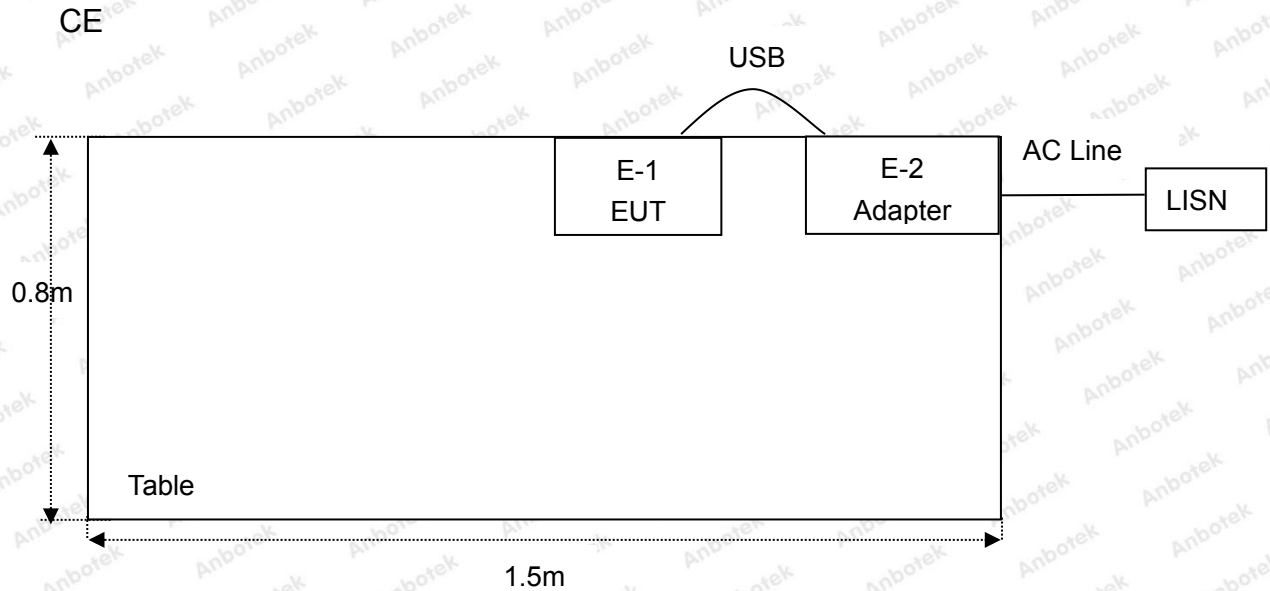
1.5. List of channels

Channel	Freq. (MHz)	Channel	Freq. (MHz)
11	2405	21	2455
12	2410	22	2460
13	2415	23	2465
14	2420	24	2470
15	2425	25	2475
16	2430	26	2480
17	2435		
18	2440		
19	2445		
20	2450		

Note:

1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.
2. EUT built-in battery-powered, fully-charged battery use of the test battery.

1.6. Description Of Test Setup



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 26, 2020	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 26, 2020	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 26, 2020	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 26, 2020	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 02, 2020	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 02, 2020	2 Year
10.	Horn Antenna	A-INFO	LB-180400-K F	J211060628	Nov. 02, 2020	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 26, 2020	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 26, 2020	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 26, 2020	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 26, 2020	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 26, 2020	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 26, 2020	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 26, 2020	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 26, 2020	1 Year

1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

1.9. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, September 30, 2020.

ISED-Registration No.: 8058A

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A, September 30, 2020.

Test Location

Shenzhen Anbotech Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

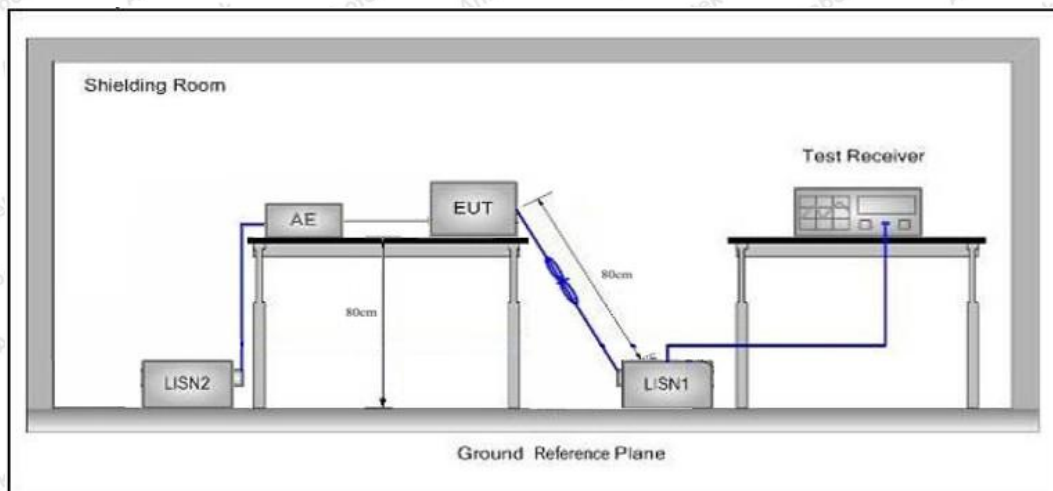
Standard Section	Test Item	Result
15.203/15.247(c)	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.247(b)(3)	Conducted Peak Output Power	PASS
15.247(a)(2)	6dB Occupied Bandwidth	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10: 2020 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

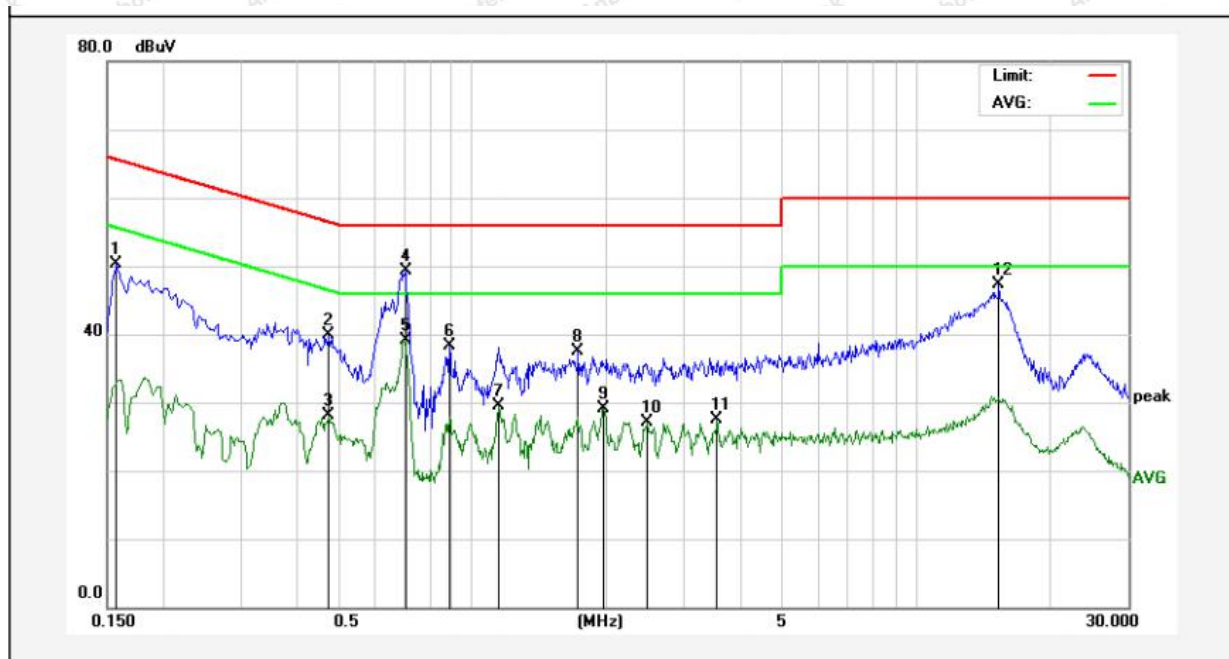
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

During the test, pre-scan all modes, and found the "High CH" which is the worst case, only the worst case is recorded in the report.

Conducted Emission Test Data

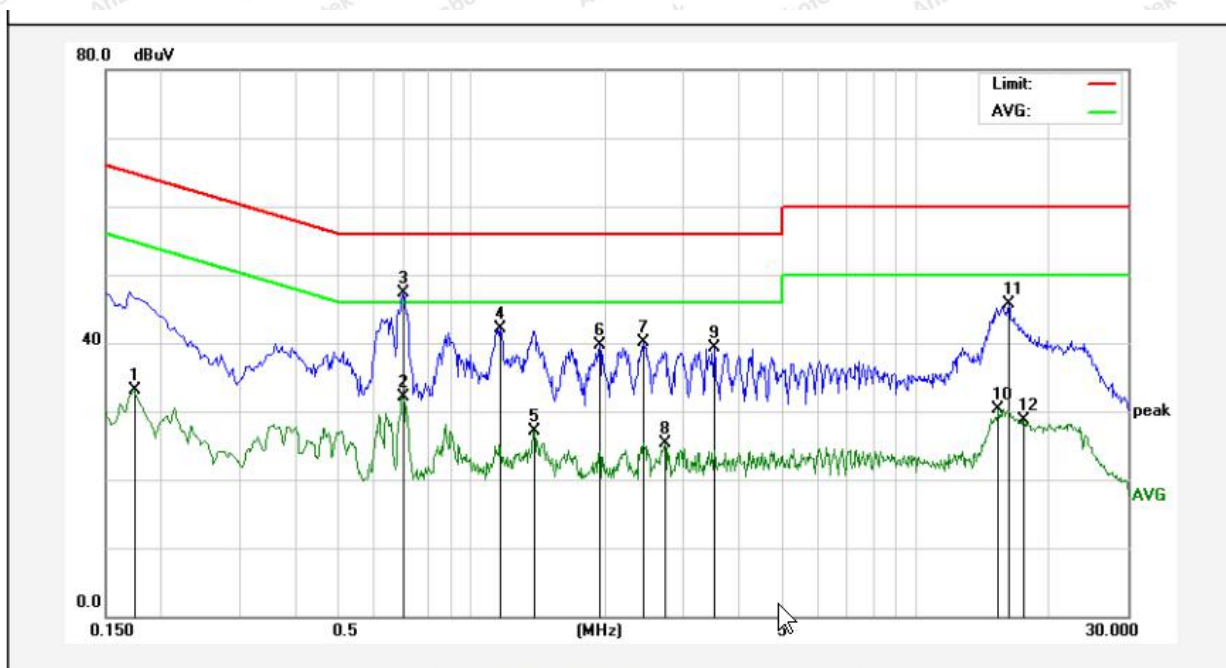
Test Site: 1# Shielded Room
Operating Condition: Mode 3
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.: 24.8℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1580	30.38	19.90	50.28	65.56	-15.28	QP	
2	0.4739	19.84	19.97	39.81	56.45	-16.64	QP	
3	0.4739	8.20	19.97	28.17	46.45	-18.28	AVG	
4	0.7059	29.33	20.04	49.37	56.00	-6.63	QP	
5	0.7059	19.06	20.04	39.10	46.00	-6.90	AVG	
6	0.8860	18.20	20.09	38.29	56.00	-17.71	QP	
7	1.1459	9.45	20.12	29.57	46.00	-16.43	AVG	
8	1.7259	17.33	20.13	37.46	56.00	-18.54	QP	
9	1.9699	8.96	20.14	29.10	46.00	-16.90	AVG	
10	2.4739	7.03	20.15	27.18	46.00	-18.82	AVG	
11	3.5499	7.36	20.17	27.53	46.00	-18.47	AVG	
12	15.3419	27.05	20.27	47.32	60.00	-12.68	QP	

Conducted Emission Test Data

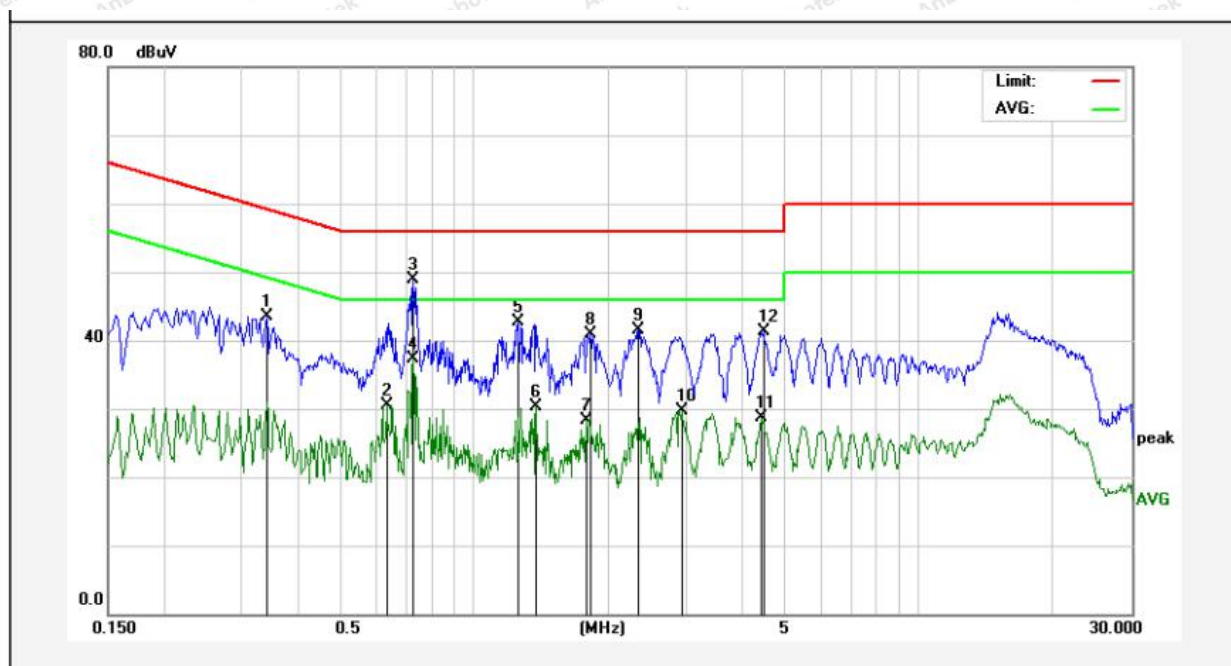
Test Site: 1# Shielded Room
Operating Condition: Mode 3
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Tem.: 24.8℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1739	13.11	19.90	33.01	54.77	-21.76	AVG	
2	0.6979	12.12	20.04	32.16	46.00	-13.84	AVG	
3	0.7019	27.32	20.04	47.36	56.00	-8.64	QP	
4	1.1619	22.07	20.12	42.19	56.00	-13.81	QP	
5	1.3859	6.92	20.13	27.05	46.00	-18.95	AVG	
6	1.9419	19.49	20.14	39.63	56.00	-16.37	QP	
7	2.4420	19.91	20.15	40.06	56.00	-15.94	QP	
8	2.7259	5.16	20.15	25.31	46.00	-20.69	AVG	
9	3.5099	19.10	20.17	39.27	56.00	-16.73	QP	
10	15.3658	10.07	20.27	30.34	50.00	-19.66	AVG	
11	16.2058	25.47	20.28	45.75	60.00	-14.25	QP	
12	17.5619	8.31	20.30	28.61	50.00	-21.39	AVG	

Conducted Emission Test Data

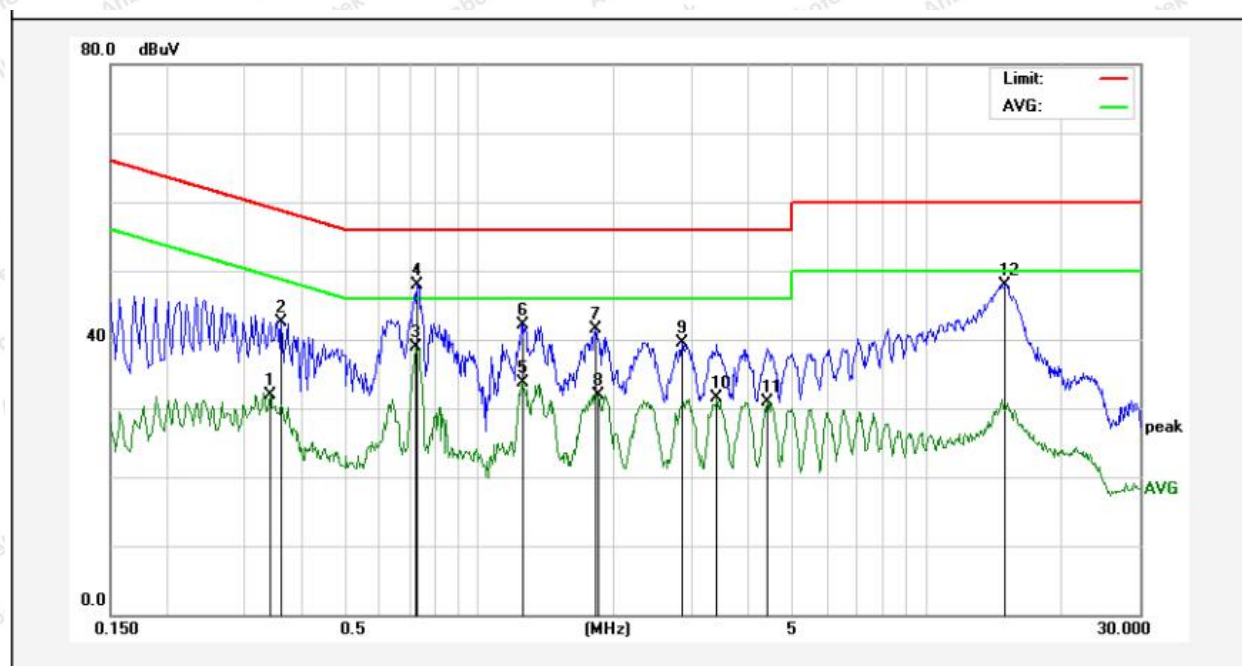
Test Site: 1# Shielded Room
Operating Condition: Mode 3
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.: 24.8℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3420	23.64	19.91	43.55	59.15	-15.60	QP	
2	0.6340	10.55	20.02	30.57	46.00	-15.43	AVG	
3	0.7299	28.91	20.05	48.96	56.00	-7.04	QP	
4	0.7299	17.35	20.05	37.40	46.00	-8.60	AVG	
5	1.2579	22.53	20.13	42.66	56.00	-13.34	QP	
6	1.3779	10.27	20.13	30.40	46.00	-15.60	AVG	
7	1.7820	8.25	20.14	28.39	46.00	-17.61	AVG	
8	1.8260	20.69	20.14	40.83	56.00	-15.17	QP	
9	2.3380	21.41	20.15	41.56	56.00	-14.44	QP	
10	2.9260	9.46	20.16	29.62	46.00	-16.38	AVG	
11	4.4218	8.60	20.19	28.79	46.00	-17.21	AVG	
12	4.4739	21.10	20.19	41.29	56.00	-14.71	QP	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Mode 3
Test Specification: AC 240V, 60Hz for adapter
Comment: Neutral Line
Tem.: 24.8℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3420	12.09	19.91	32.00	49.15	-17.15	AVG	
2	0.3619	22.61	19.92	42.53	58.68	-16.15	QP	
3	0.7219	18.87	20.05	38.92	46.00	-7.08	AVG	
4	0.7299	27.79	20.05	47.84	56.00	-8.16	QP	
5	1.2500	13.58	20.12	33.70	46.00	-12.30	AVG	
6	1.2579	22.07	20.13	42.20	56.00	-13.80	QP	
7	1.8220	21.44	20.14	41.58	56.00	-14.42	QP	
8	1.8540	11.83	20.14	31.97	46.00	-14.03	AVG	
9	2.8420	19.42	20.16	39.58	56.00	-16.42	QP	
10	3.4100	11.28	20.17	31.45	46.00	-14.55	AVG	
11	4.4298	10.81	20.19	31.00	46.00	-15.00	AVG	
12	15.0379	27.70	20.26	47.96	60.00	-12.04	QP	

4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

4.2. Test Setup

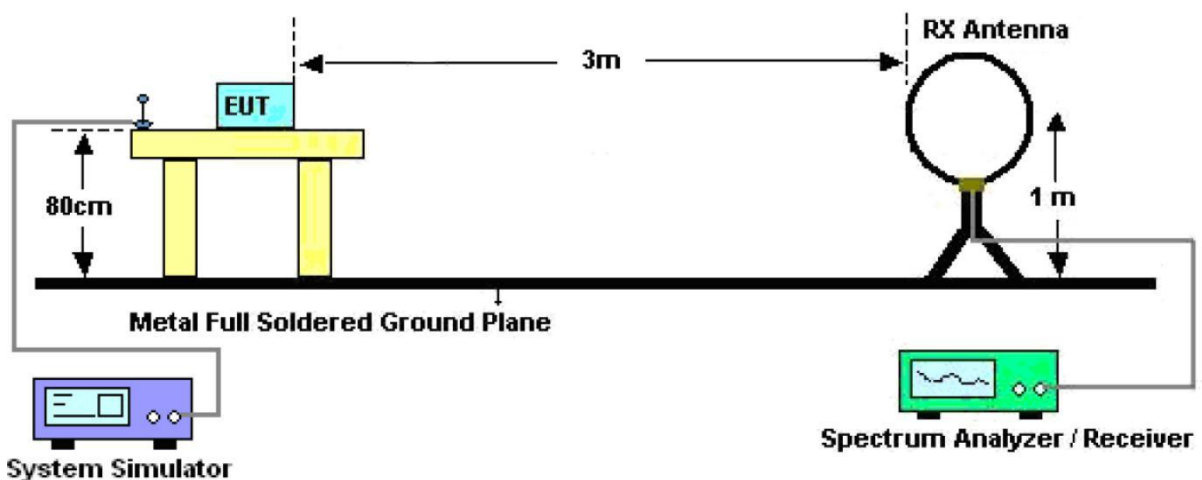


Figure 1. Below 30MHz

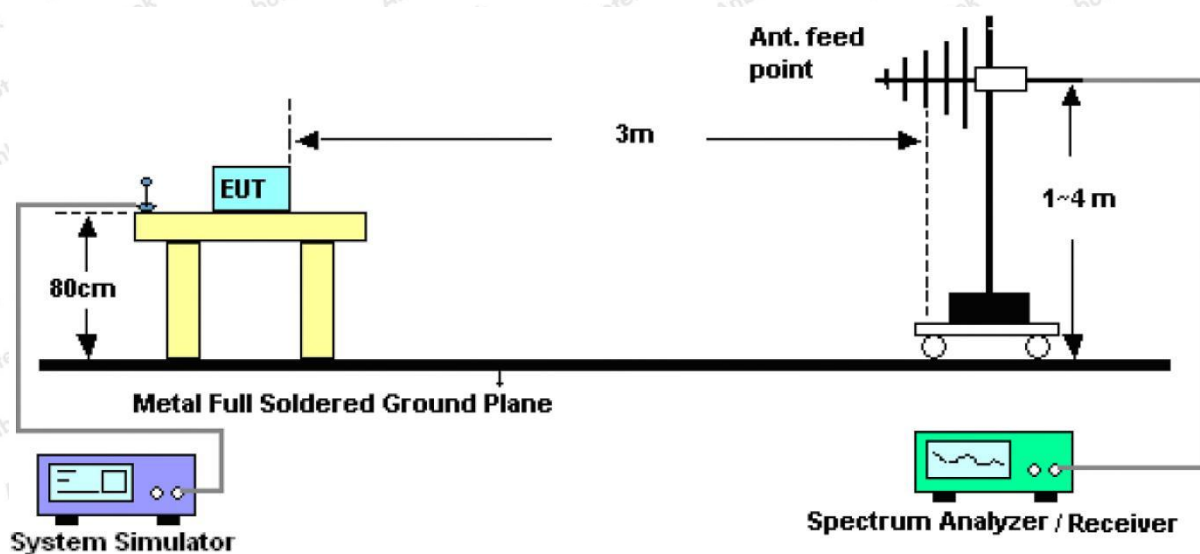


Figure 2. 30MHz to 1GHz

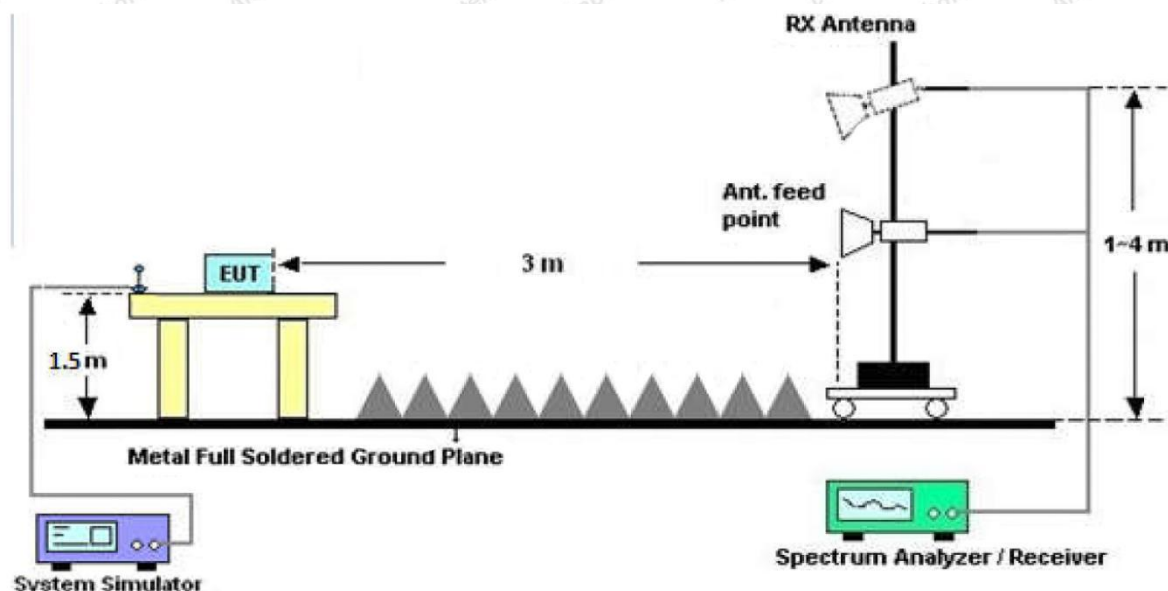


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW = 1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9kHz, VBW = 30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW = 300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz, Set the spectrum analyzer as:

RBW = 1MHz, VBW = 1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

RBW = 1MHz, VBW = 10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

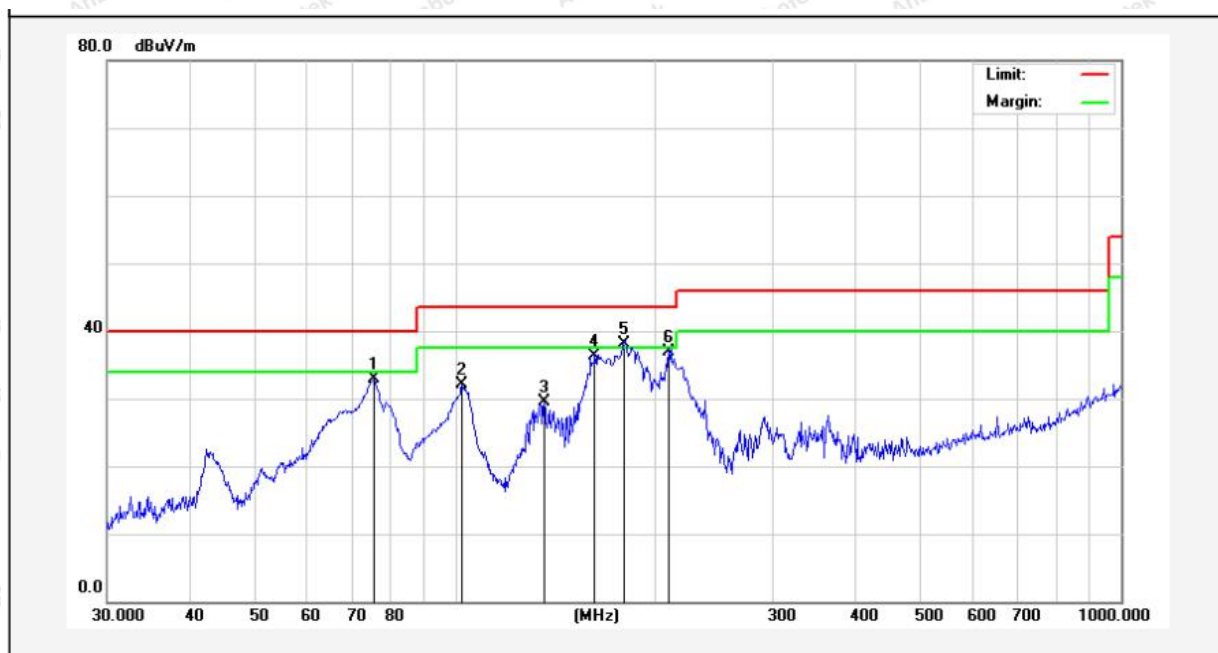
During the test, pre-scan all the modes, and found the high channel(TX+Charging Mode) which is the worst case, only the worst case is recorded in the report.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.



Test Results (30~1000MHz)

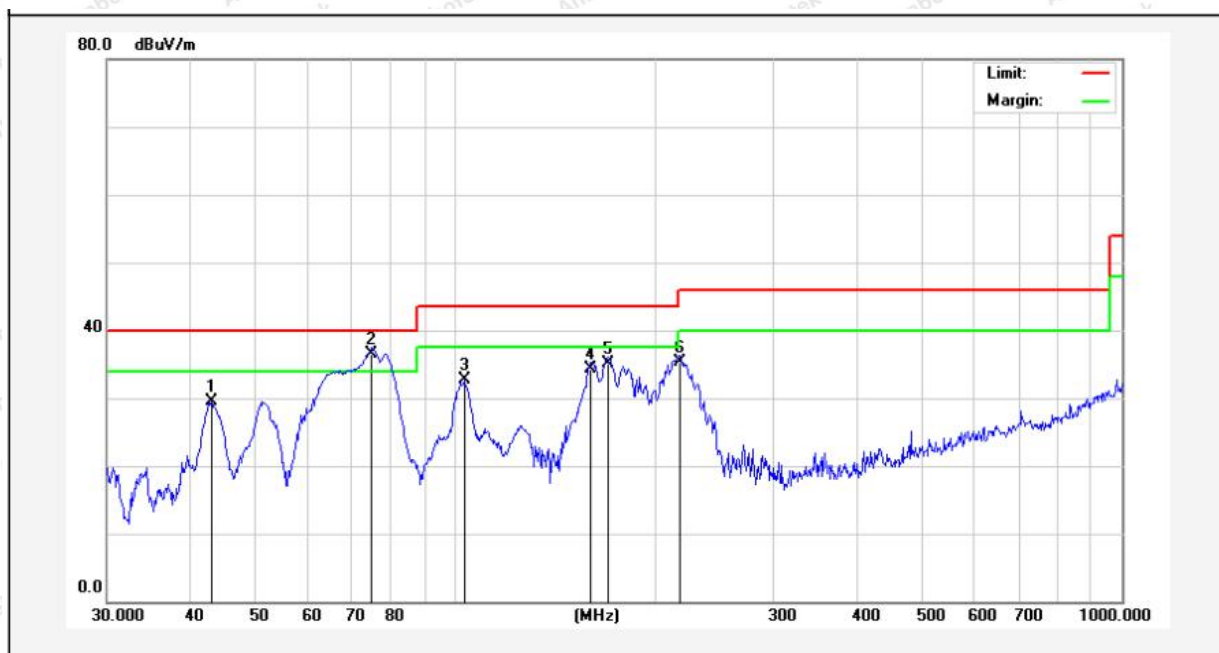
Test Mode: Mode 3
Power Source: AC 120V, 60Hz for Adapter
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 23.4°C/45%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	75.4464	53.51	-20.58	32.93	40.00	-7.07	QP	100	0	
2	102.3597	51.96	-19.81	32.15	43.50	-11.35	QP	100	360	
3	135.9822	50.28	-20.74	29.54	43.50	-13.96	QP	100	0	
4	162.0414	58.05	-21.70	36.35	43.50	-7.15	QP	100	360	
5	179.3664	58.91	-20.87	38.04	43.50	-5.46	QP	100	0	
6	209.3129	56.66	-19.68	36.98	43.50	-6.52	QP	100	0	

Test Results (30~1000MHz)

Test Mode: Mode 3
Power Source: AC 120V, 60Hz for Adapter
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 23.4°C/45%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	43.0505	43.41	-13.90	29.51	40.00	-10.49	QP	100	0	
2	74.9191	54.81	-18.37	36.44	40.00	-3.56	QP	100	0	
3	103.0800	47.85	-15.15	32.70	43.50	-10.80	QP	100	360	
4	159.7844	53.69	-19.44	34.25	43.50	-9.25	QP	100	360	
5	169.5990	53.88	-18.87	35.01	43.50	-8.49	QP	100	0	
6	217.5443	51.79	-16.52	35.27	46.00	-10.73	QP	100	360	

Test Results (1GHz-25GHz)

Test Mode: CH11

Test channel: Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4810.00	27.37	15.27	42.64	74.00	-31.36	Vertical
7215.00	28.50	18.09	46.59	74.00	-27.41	Vertical
9620.00	29.39	23.76	53.15	74.00	-20.85	Vertical
12025.00	*			74.00		Vertical
14430.00	*			74.00		Vertical
4810.00	27.73	15.27	43.00	74.00	-31.00	Horizontal
7215.00	28.75	18.09	46.84	74.00	-27.16	Horizontal
9620.00	28.32	23.76	52.08	74.00	-21.92	Horizontal
12025.00	*			74.00		Horizontal
14430.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4810.00	16.75	15.27	32.02	54.00	-21.98	Vertical
7215.00	17.53	18.09	35.62	54.00	-18.38	Vertical
9620.00	18.41	23.76	42.17	54.00	-11.83	Vertical
12025.00	*			54.00		Vertical
14430.00	*			54.00		Vertical
4810.00	16.08	15.27	31.35	54.00	-22.65	Horizontal
7215.00	17.81	18.09	35.90	54.00	-18.10	Horizontal
9620.00	17.63	23.76	41.39	54.00	-12.61	Horizontal
12025.00	*			54.00		Horizontal
14430.00	*			54.00		Horizontal

Test Results (1GHz-25GHz)

Test Mode: CH19

Test channel: Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4890.00	27.39	15.42	42.81	74.00	-31.19	Vertical
7335.00	28.35	18.02	46.37	74.00	-27.63	Vertical
9780.00	28.40	23.80	52.20	74.00	-21.80	Vertical
12225.00	*			74.00		Vertical
14670.00	*			74.00		Vertical
4890.00	27.43	15.42	42.85	74.00	-31.15	Horizontal
7335.00	28.74	18.02	46.76	74.00	-27.24	Horizontal
9780.00	28.02	23.80	51.82	74.00	-22.18	Horizontal
12225.00	*			74.00		Horizontal
14670.00	*			74.00		Horizontal

Average value:

Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	
4890.00	16.48	15.42	31.90	54.00	-22.10	polarization
7335.00	17.63	18.02	35.65	54.00	-18.35	Vertical
9780.00	18.27	23.80	42.07	54.00	-11.93	Vertical
12225.00	*			54.00		Vertical
14670.00	*			54.00		Vertical
4890.00	15.99	15.42	31.41	54.00	-22.59	Vertical
7335.00	17.37	18.02	35.39	54.00	-18.61	Horizontal
9780.00	18.14	23.80	41.94	54.00	-12.06	Horizontal
12225.00	*			54.00		Horizontal
14670.00	*			54.00		Horizontal

Test Results (1GHz-25GHz)

Test Mode: CH26

Test channel: Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4960.00	27.66	15.58	43.24	74.00	-30.76	Vertical
7440.00	28.36	17.93	46.29	74.00	-27.71	Vertical
9920.00	28.95	23.83	52.78	74.00	-21.22	Vertical
12400.00	*			74.00		Vertical
14880.00	*			74.00		Vertical
4960.00	27.50	15.58	43.08	74.00	-30.92	Horizontal
7440.00	28.77	17.93	46.70	74.00	-27.30	Horizontal
9920.00	28.70	23.83	52.53	74.00	-21.47	Horizontal
12400.00	*			74.00		Horizontal
14880.00	*			74.00		Horizontal

Average value:

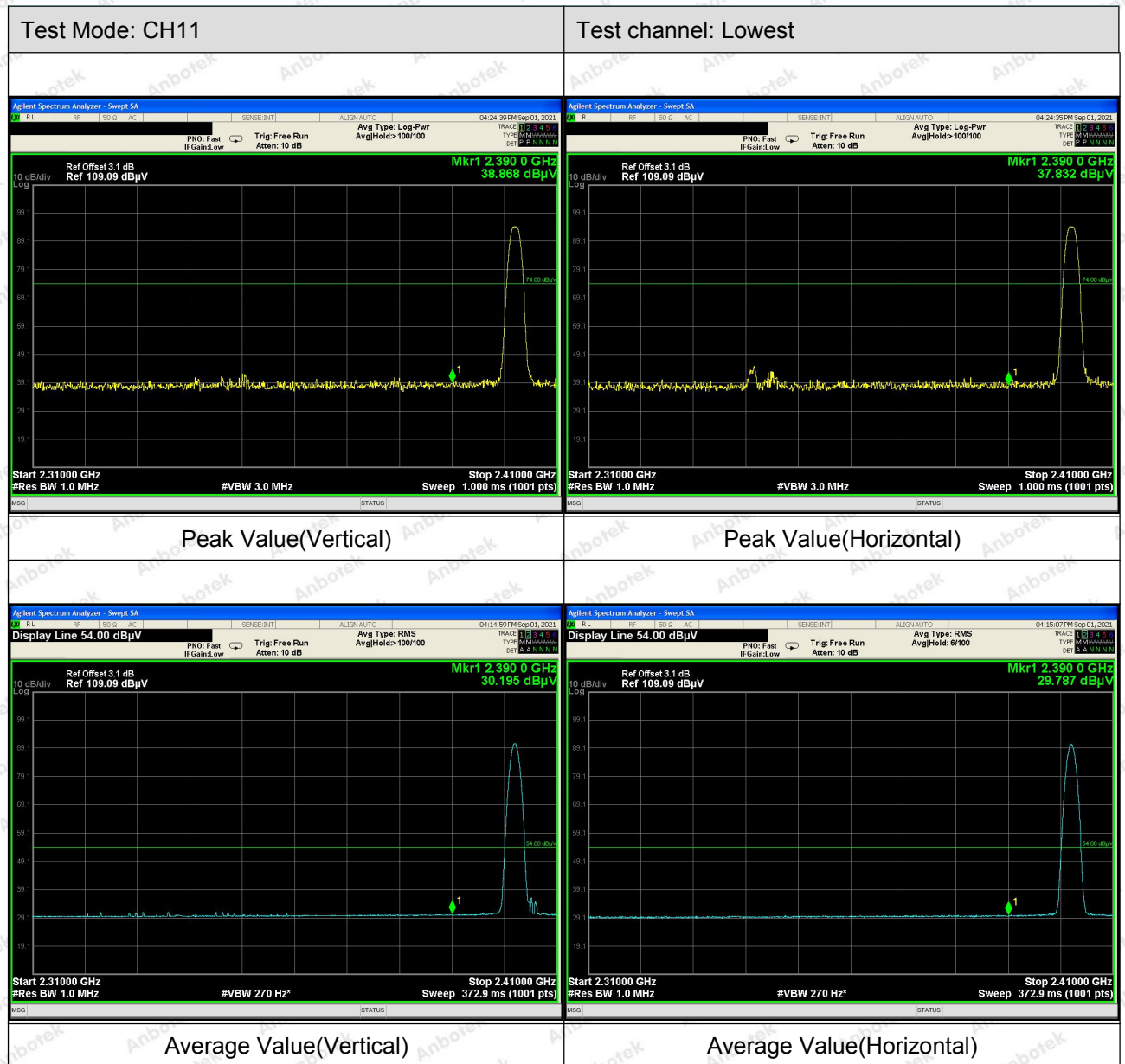
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4960.00	17.60	15.58	33.18	54.00	-20.82	Vertical
7440.00	18.64	17.93	36.57	54.00	-17.43	Vertical
9920.00	18.82	23.83	42.65	54.00	-11.35	Vertical
12400.00				54.00		Vertical
14880.00				54.00		Vertical
4960.00	17.43	15.58	33.01	54.00	-20.99	Horizontal
7440.00	18.74	17.93	36.67	54.00	-17.33	Horizontal
9920.00	18.04	23.83	41.87	54.00	-12.13	Horizontal
12400.00	*			54.00		Horizontal
14880.00	*			54.00		Horizontal

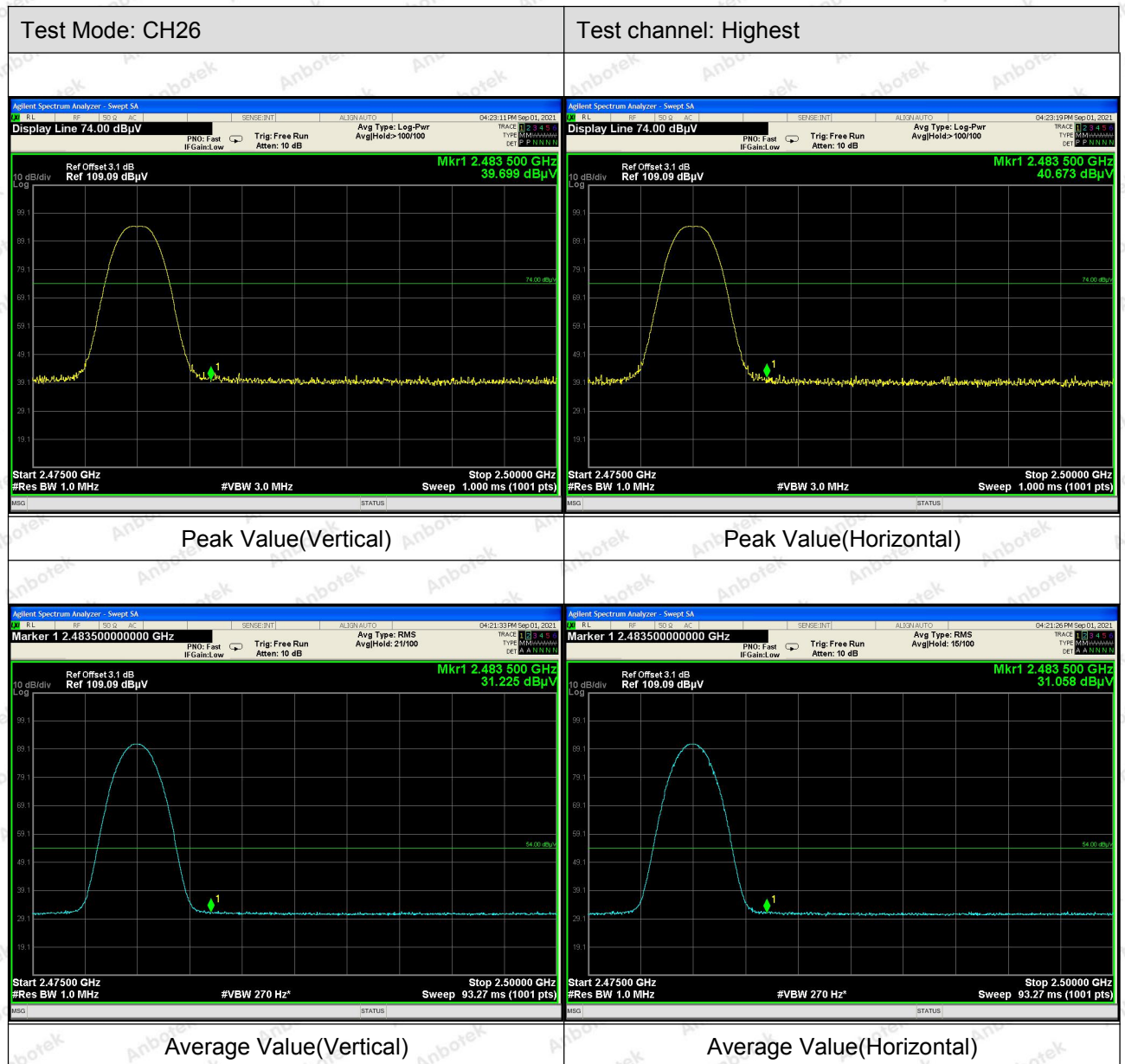
Remark:

1. Level = Read level + Factor

2. "*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Radiated Band Edge:



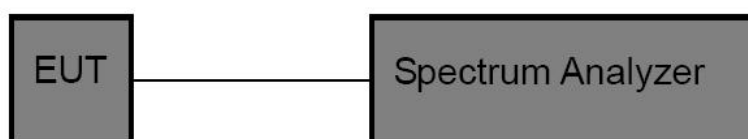


5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(3)
Test Limit	30dBm

5.2. Test Setup



5.3. Test Procedure

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

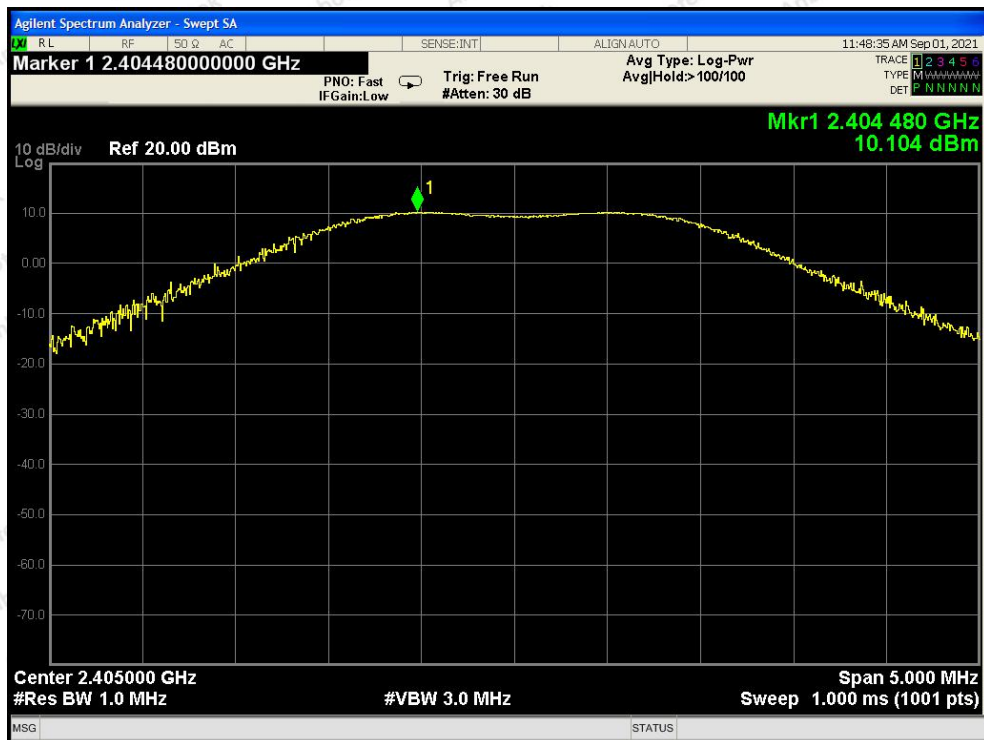
1. Set the RBW $\geq$ DTS bandwidth.
2. Set the VBW $\geq 3 \times$ RBW.
3. Set the span $\geq 3 \times$ RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

5.4. Test Data

Test Item	:	Max. peak output power
Test Voltage	:	DC 3.7V battery inside
Test Result	:	PASS

Test Mode	:	CH Low ~ CH High
Temperature	:	25°C
Humidity	:	55%RH

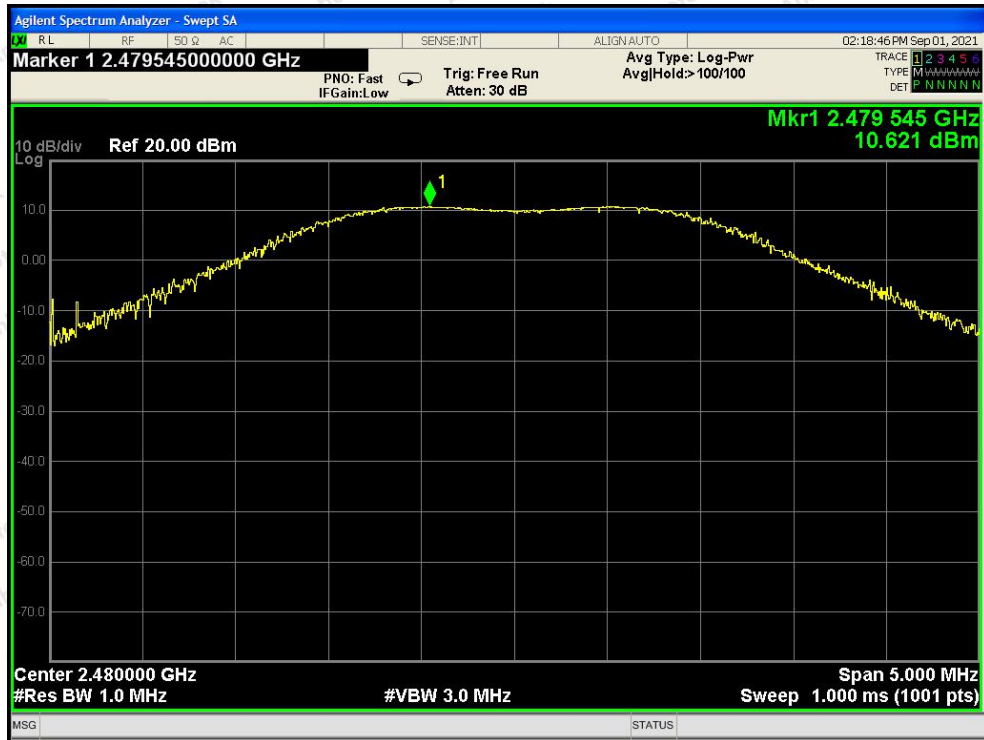
Channel Frequency (MHz)	Peak Power output (dBm)	Limit (dBm)	Results
2405	10.104	30	PASS
2445	10.019	30	PASS
2480	10.621	30	PASS



CH: Low



CH: Middle



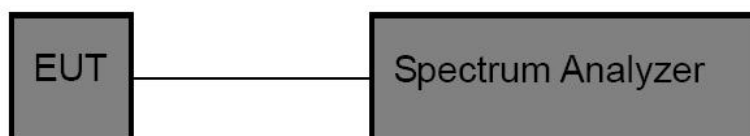
CH: High

6. 6DB Occupy Bandwidth Test

6.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(2)
Test Limit	>500kHz

6.2. Test Setup



6.3. Test Procedure

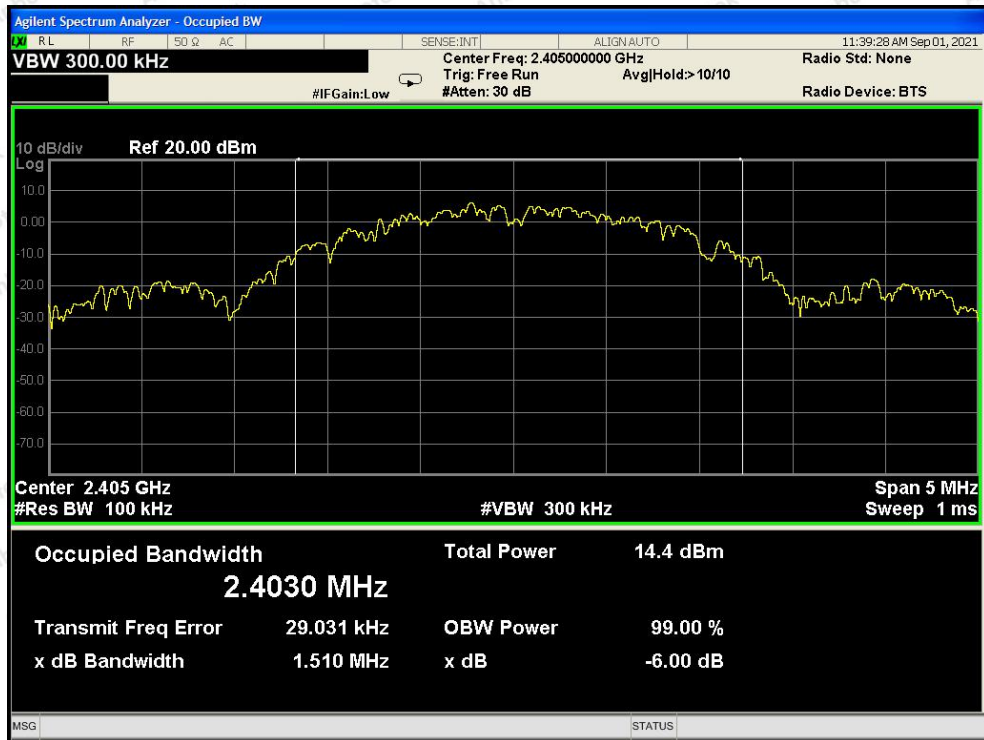
1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
 RBW = 100kHz, VBW $\geq$ 3*RBW =300kHz,
 Detector= Peak
 Trace mode= Max hold.
 Sweep- auto couple.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

6.4. Test Data

Test Item : 6dB Bandwidth
 Test Voltage : DC 3.7V battery inside
 Test Result : PASS

Test Mode : CH Low ~ CH High
 Temperature : 23.5℃
 Humidity : 54%RH

Channel	Frequency(MHz)	Bandwidth (kHz)	Limit (kHz)	Results
Low	2405	1510	>500	PASS
Middle	2445	1451		PASS
High	2480	1573		PASS



CH: Low



CH: Middle



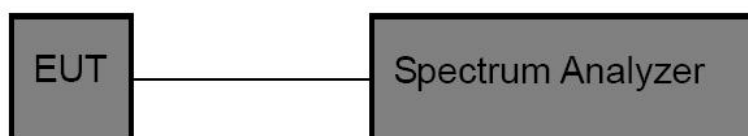
CH: High

7. Power Spectral Density Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (e)
Test Limit	8dBm/3KHz

7.2. Test Setup



7.3. Test Procedure

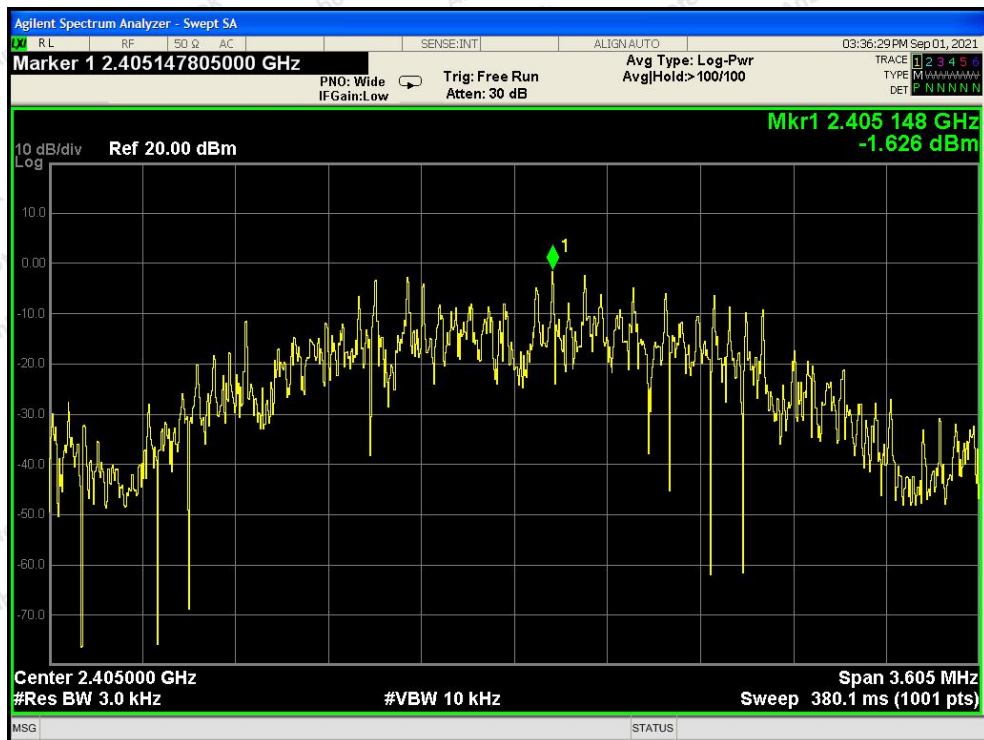
1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 1.5xDTS BW
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

7.4. Test Data

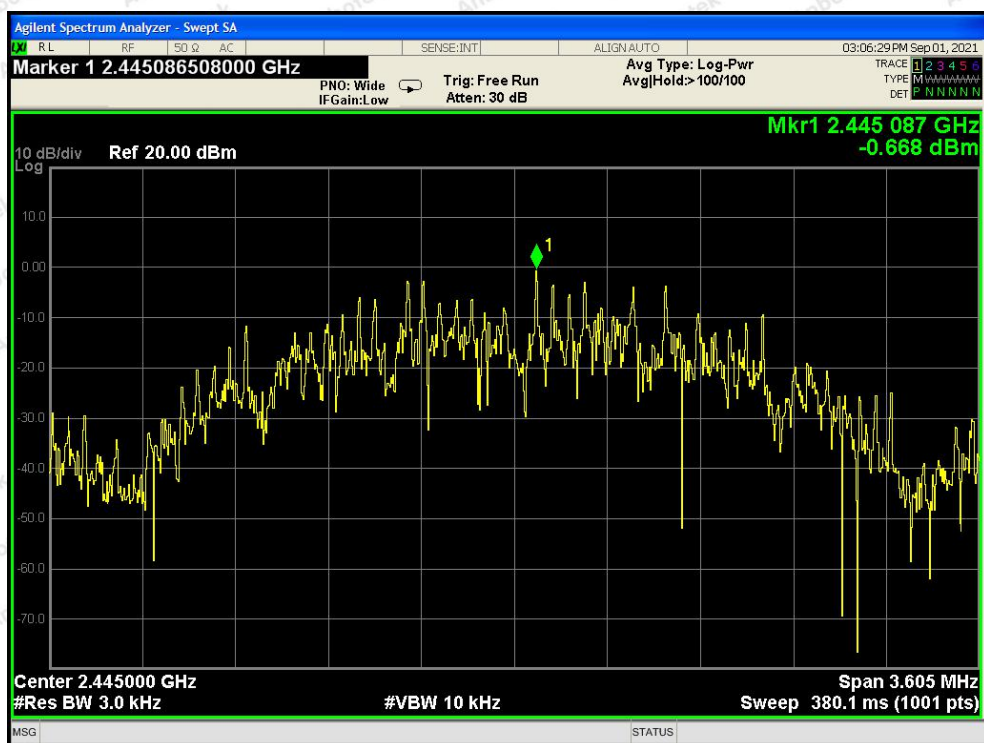
Test Item : Power Spectral Density
 Test Voltage : DC 3.7V battery inside
 Test Result : PASS

Test Mode : CH Low ~ CH High
 Temperature : 23.5℃
 Humidity : 54%RH

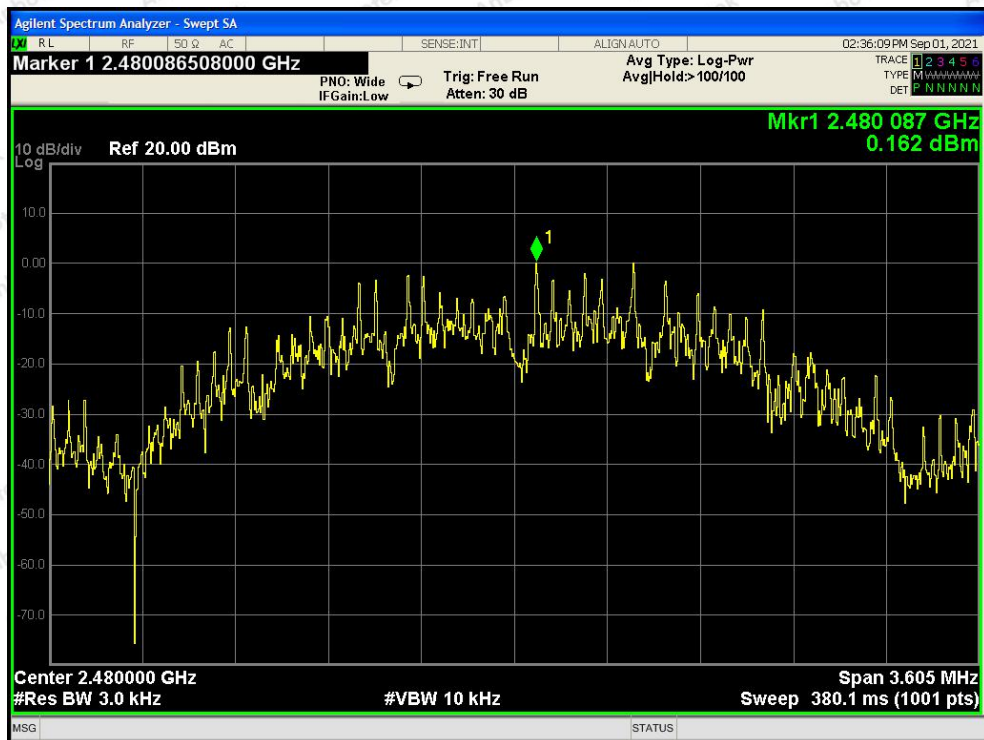
Channel	Frequency (MHz)	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Results
Low	2405	-1.626	8.00	PASS
Middle	2445	-0.668	8.00	PASS
High	2480	0.162	8.00	PASS



CH: Low



CH: Middle



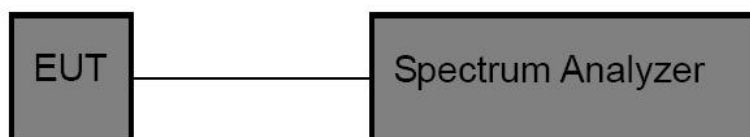
CH: High

8. 100kHz Bandwidth of Frequency Band Edge Requirement

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired 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).

8.2. Test Setup



8.3. Test Procedure

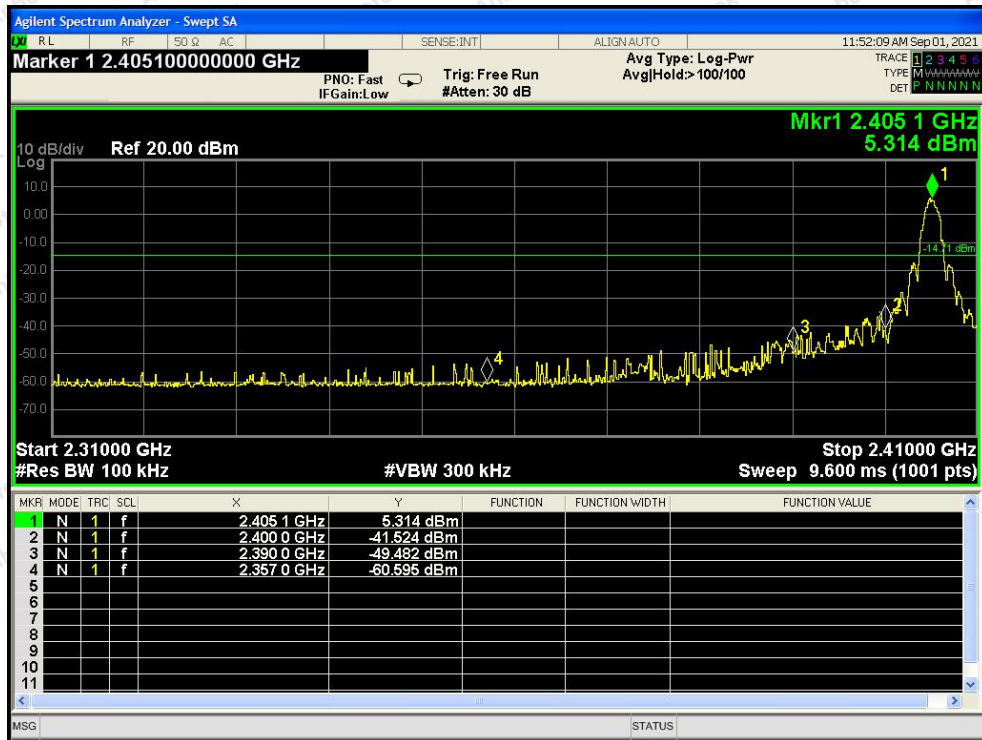
Using the following spectrum analyzer setting:

1. Set the RBW = 100KHz.
2. Set the VBW = 300KHz.
3. Sweep time = auto couple.
4. Detector function = peak.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.

8.4. Test Data

Test Item	:	Band edge
Test Voltage	:	DC 3.7V battery inside
Test Result	:	PASS

Test Mode	:	CH Low ~ CH High
Temperature	:	23.5℃
Humidity	:	54%RH

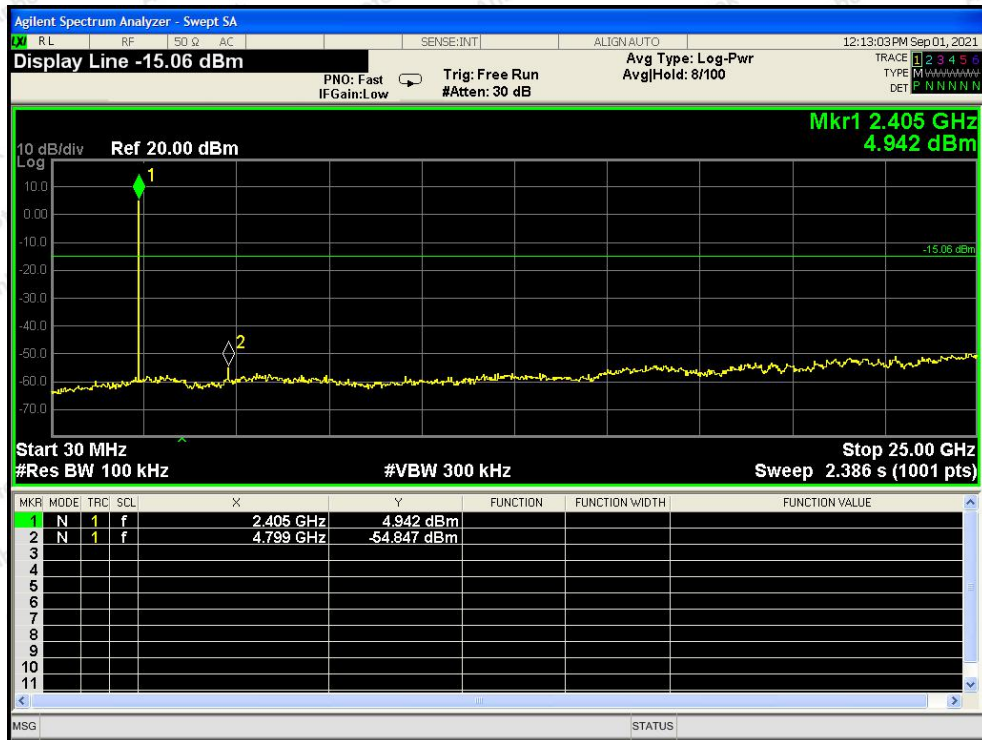


CH: Low

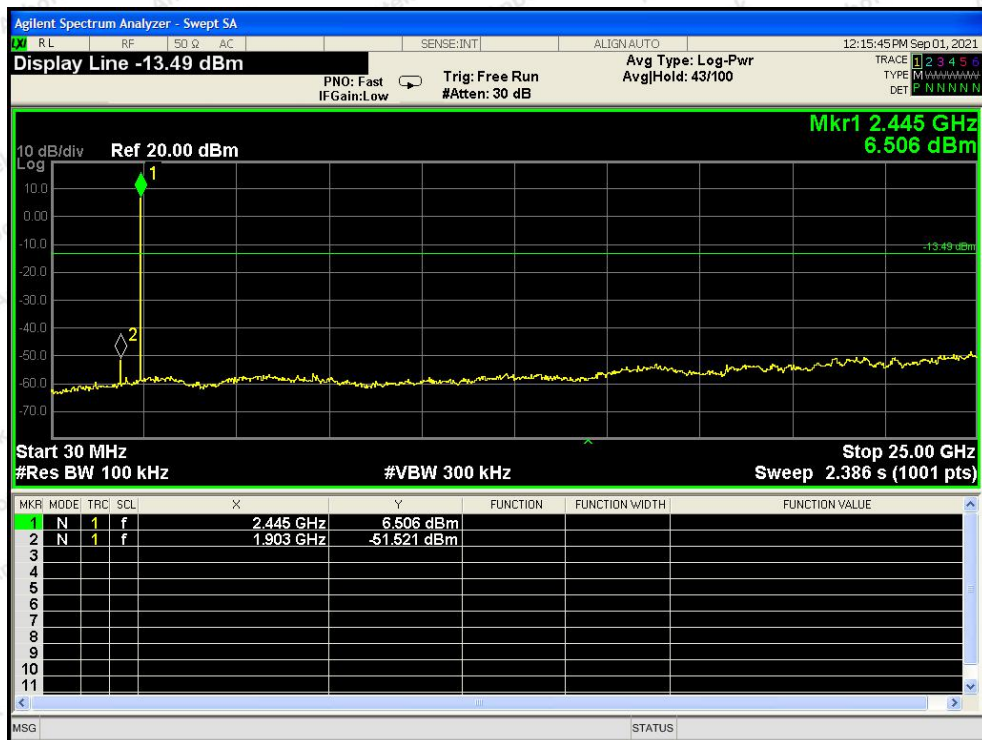


CH: High

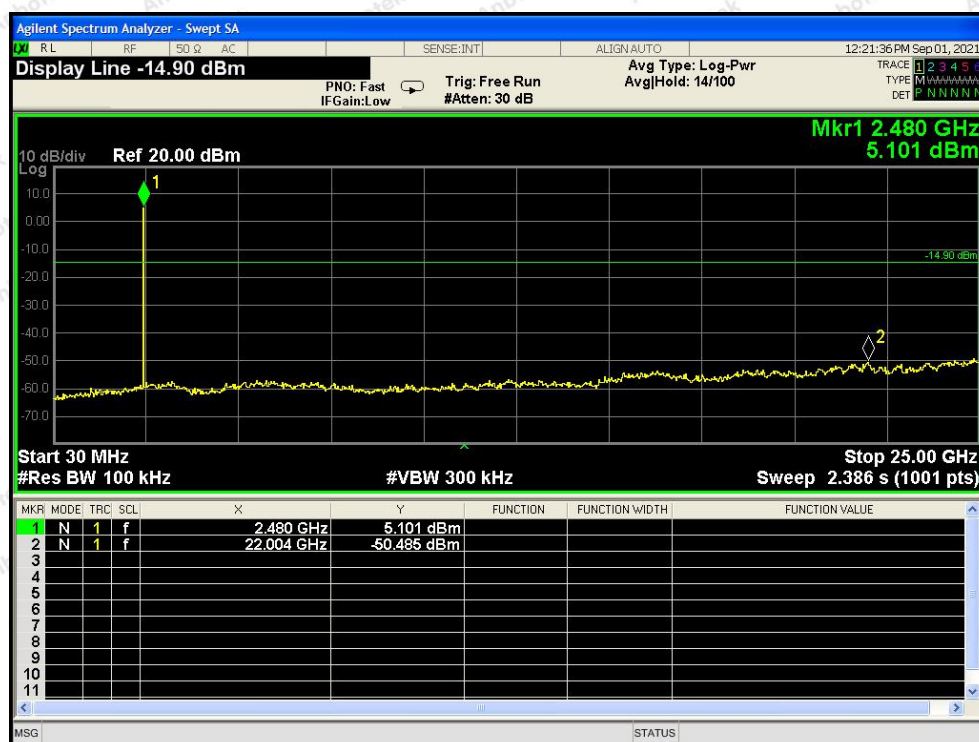
Conducted Emission Method



CH: Low



CH: Middle



CH: High

9. Antenna Requirement

9.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 2) 15.247(c) (1)(i) requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

9.2. Antenna Connected Construction

The antenna is a Cylindrical Antenna which permanently attached, and the best case gain of the antenna is 2.1 dBi . It complies with the standard requirement.

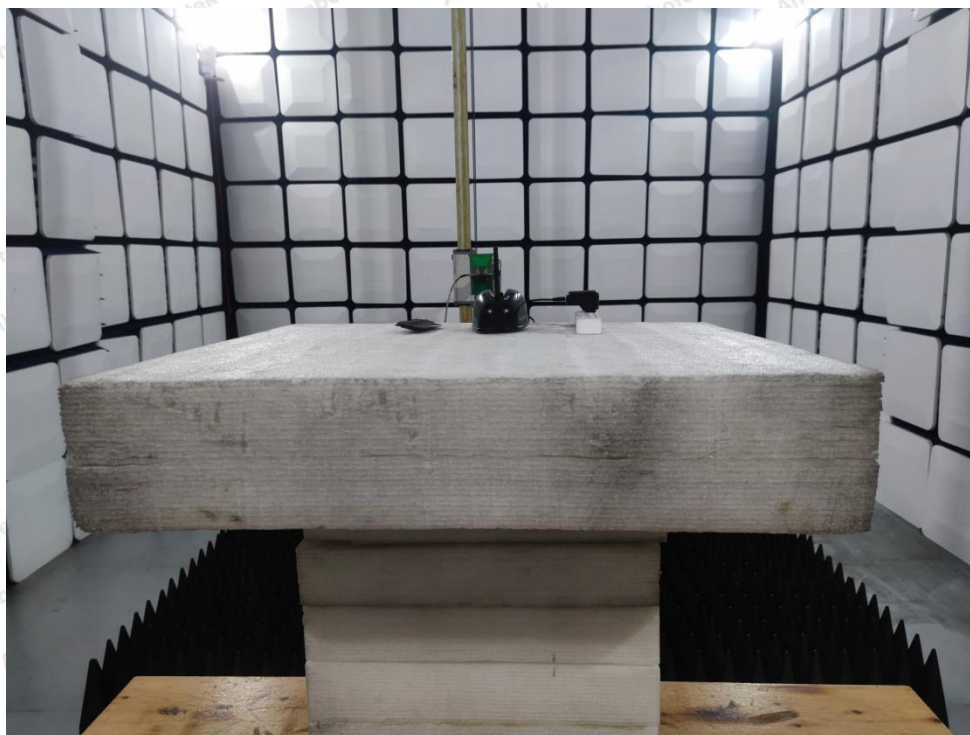
APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement



Photo of Radiation Emission Test





APPENDIX II -- EXTERNAL PHOTOGRAPH

Reference to the test report 18220WC10143401.

APPENDIX III -- INTERNAL PHOTOGRAPH

Reference to the test report 18220WC10143401.

----- End of Report -----