



FCC PART 15.407 TEST REPORT

On Behalf of

Shenzhen ZO Video Technology Co., Ltd.

2c, 2 / F, building 6, longbi Industrial Zone, 27 Dafa Road, Bantian street, Longgang District,
Shenzhen

FCC ID: 2A2RJ-TPMINIRX

Model: TP Mini RX, TP Max RX, TP Max Pro RX, TP Mini 2 RX,
TP Max 2 RX, TP Max Pro 2 RX

July 9, 2024

This Report Concerns:

☒ Original Report

Equipment Type:

Wireless video system

Test Engineer:

LBI Li / LBI Li

Report Number:

QCT24FR-1703E-02

Test Date:

June 12, 2024 ~ July 5, 2024

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Report Number

Description

Issued Date

QCT24FR-1703E-02

Initial Issue

2024-7-9



1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Description	Wireless video system
Model No.	TP Mini RX, TP Max RX, TP Max Pro RX, TP Mini 2 RX, TP Max 2 RX, TP Max Pro 2 RX
Model Difference	All models in each series have similar construction with the same diagram circuit and PCB layout, but different from model names. All tests were conducted on the models (TP Mini RX) and the test result was passed.
Tested Model	TP Mini TX
Software Version	HD_MIN_RX_V1.0-20231205
Hardware Version	22495060
Sample(s) Status	Engineer sample
Operation Frequency:	U-NII-3: 5745MHz~5825MHz
Channel numbers:	IEEE 802.11a/n 20MHz: 5
Modulation type:	802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type:	Built-in antenna
Antenna gain*1:	2.5dBi
Power supply:	DC 5V (Powered by adapter)
USB port:	Type-C
Trade Mark:	SHIMBOL
Applicant	Shenzhen ZO Video Technology Co., Ltd.
Address	2c, 2 / F, building 6, longbi Industrial Zone, 27 Dafa Road, Bantian street, Longgang District, Shenzhen
Manufacturer	Shenzhen ZO Video Technology Co., Ltd.
Address	2c, 2 / F, building 6, longbi Industrial Zone, 27 Dafa Road, Bantian street, Longgang District, Shenzhen
Sample No.	Y24F1703E01WC (Model: TP Mini RX)

Note: *1This information provided by Manufacturer, SZ QC Lab is not responsible for the accuracy of this information.



1.2 System Test Configuration

1.2.1 Channel List

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5745~5825MHz (U-NII-3)	149	5745 MHz	165	5825 MHz
	153	5765 MHz		
	157	5785 MHz		
	161	5805 MHz		
For 20 MHz Bandwidth, use channel 36, 40, 44, 48.				

Note: In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)	
	802.11a	802.11n(HT20)
Lowest channel	5745MHz	5745MHz
Middle channel	5785MHz	5785MHz
Highest channel	5825MHz	5825MHz

1.2.2 EUT Exercise Software

The test software (RTL8733BU) was used to control EUT work in Continuous TX mode, and select test channel, wireless mode:

Mode	Data Rate (Mbps)	Power Level
802.11 a	6	95
802.11 n20	MCS0	95

1.2.3 Support Equipment

Manufacturer	Description	Model	Remark
Lenovo	Notebook	ThinkPad E15	S/N: PF-26227L 20/04
Vivo	Adapter	BK-T-01Q	Input:110-240V~, 50/60Hz Output:5V/1A

1.2.4 Test mode

Transmitting mode: Keep the EUT in continuously transmitting.



1.3 Test Facility

Test Firm : Shenzhen QC Testing Laboratory Co., Ltd.

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19. The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

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

CNAS – Registration No.: L8464

The EMC Laboratory has been accredited by CNAS, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

A2LA Certificate Number: 6759.01

The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 561109

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 29628

CAB identifier: CN0141

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.4 Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 1.42 \times 10^{-4}\%$
RF output power, conducted	$\pm 1.06\text{dB}$
Power Spectral Density, conducted	$\pm 1.06\text{dB}$
Unwanted Emissions, conducted	$\pm 2.51\text{dB}$
AC Power Line Conducted Emission	$\pm 1.80\text{dB}$
Radiated Spurious Emission test (9kHz-30MHz)	$\pm 2.66\text{dB}$
Radiated Spurious Emission test (30MHz-1000MHz)	$\pm 4.04\text{dB}$
Radiated Spurious Emission test (1000MHz-18000MHz)	$\pm 4.70\text{ dB}$
Radiated Spurious Emission test (18GHz-40GHz)	$\pm 4.80\text{dB}$
Temperature	$\pm 0.8^{\circ}\text{C}$
Humidity	$\pm 3.2\%$
DC and low frequency voltages	$\pm 0.1\%$
Time	$\pm 5\%$
Duty cycle	$\pm 5\%$

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



2. Summary of Test Results

Test Item	Section	Result
Antenna Requirement	FCC part 15.203	Pass
AC Power Line Conducted Emission	FCC part 15.207	Pass
Conducted Average Output Power	15.407(a)(3)	Pass
Channel Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407(a)(3)	Pass
Band Edge	15.407(b)(4)	Pass
Spurious Emission	15.205/15.209/15.407(b)(4)	Pass

- Note:
1. Pass: The EUT complies with the essential requirements in the standard,
 2. Test according to ANSI C63.10:2013,
 3. The Frequency Stability item is declared by the manufacturer,
 4. All indications of Pass/Fail in this report are opinions expressed by Shenzhen QC Testing Laboratory Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.



3. List of Test and Measurement Instruments

3.1 Conducted Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1	EMI Test Receiver	R&S	ESIB 7	2277573376	2024.03.14	2025.03.13
2	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101820	2023.08.21	2024.08.20
3	Artificial Mains Network	SCHWARZBECK	NSLK8126	8126200	2024.03.14	2025.03.13
4	PULSE LIMITER	R&S	ESH3-Z2	100058	2024.03.14	2025.03.13

Conducted Emission Measurement Software: TS

3.2 Radiated Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Spectrum Analyzer	ROHDE&SCHWARZ	FSV 40	101458	2024.03.14	2025.03.13
2.	Loop Antenna	EMCO	6502	2133	2022.07.23	2024.07.22
3.	Logarithmic compound broadband Antenna	SCKWARZBECK	VULB9168	VULB9168-1-588	2023.04.01	2025.03.31
4.	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB 7	2277573376	2024.03.14	2025.03.13
5.	EMI Test Receiver	R&S	ESPI	101131	2024.03.14	2025.03.13
6.	Horn Antenna	SCHWARZBECK	BBHA9120D	02069	2023.04.01	2025.03.31
7.	Horn Antenna	COM-MW	ZLB7-18-40G-950	12221225	2023.01.12	2025.01.09
8.	Amplifier	R&S	BBV9721	9721-031	2024.03.14	2025.03.13
9.	Amplifier	HPX	BP-01G-18G	210902	2024.03.14	2025.03.13
10.	Pre-amplifier	COM-MW	DLAN-18000-40000-02	10229104	2024.03.14	2025.03.13
11.	966 Chamber	ZhongYu Electron	9*6*6	/	2022.07.25	2025.07.24

Radiated Emission Measurement Software: EZ_EMC



3.3 RF Conducted test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Wideband Radio Communication Tester	Rohde & Schwarz	CW500	151583	2024.03.14	2025.03.13
2.	Spectrum Analyzer	ROHDE&SCHWARZ	FSV 40	101458	2024.03.14	2025.03.13
3.	Signal Generator	Agilent	N5182A	MY50141563	2024.03.14	2025.03.13
4.	RF Automatic Test System	MW	MW100-RFCB/ MW100-PSB	MW2007004	2024.03.14	2025.03.13
RF Conducted Measurement Software: MTS 8310						



4. Antenna requirement

Standard requirement: FCC Part15 C Section 15.203

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.

EUT Antenna: The Ant is Built-in antenna, the best case gain of the antenna is 2.5dBi, reference to the Internal photo for details.

5. Conducted Emissions

5.1 Applicable Standard

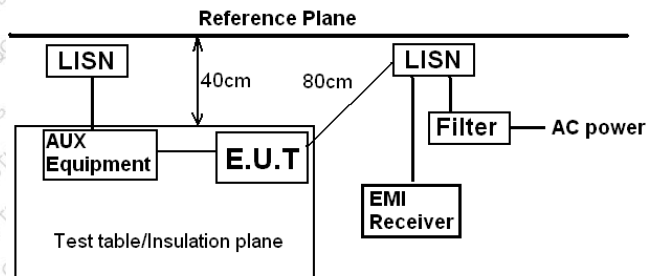
FCC Part15 C Section 15.207

5.2 Limit

Frequency range (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Note *: The level decreases linearly with the logarithm of the frequency.

5.3 Test setup



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedance Stabilization Network
Test table height=0.8m

5.4 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.
RBW=9 kHz, VBW=30 kHz, Sweep time=auto

5.5 Test procedure

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

5.6 Test Data

Temperature	24.5 °C	Humidity	51.1%
ATM Pressure	101.1kPa	Antenna Gain	2.5dBi
Test by	LBi Li	Test result	PASS

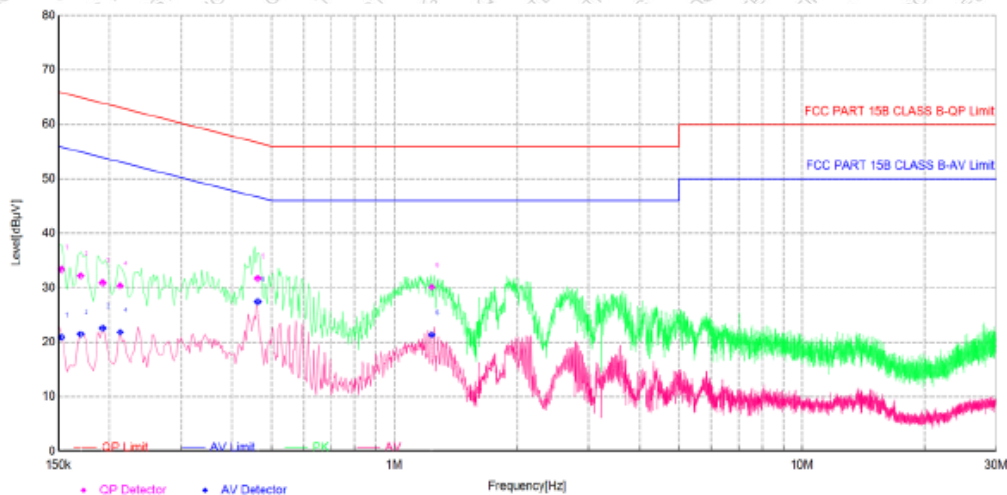
Test Voltage: AC 120V/60Hz



Measurement data:

Pre-scan all test modes, found worst case at 802.11a mode 5745MHz, and so only show the test result of 802.11a mode 5745MHz

Line:

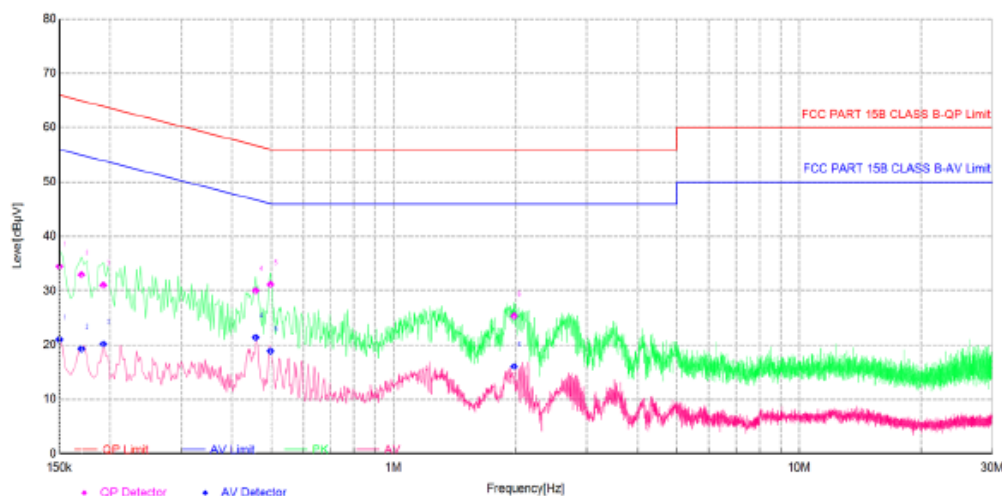


Final Data List

NO.	Freq. [MHz]	Factor[dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Phase	Verdict
1	0.1525	10.47	33.38	65.88	32.50	20.91	55.88	34.95	L	PASS
2	0.17	10.54	32.20	64.98	32.78	21.50	54.98	33.48	L	PASS
3	0.1925	10.63	30.93	63.93	33.00	22.60	53.93	31.33	L	PASS
4	0.2125	10.66	30.37	63.11	32.74	21.85	53.11	31.26	L	PASS
5	0.4825	10.70	31.69	56.65	24.96	27.42	46.65	19.23	L	PASS
6	1.235	10.63	30.11	56.00	25.89	21.34	46.00	24.66	L	PASS



Neutral:



Final Data List

NO.	Freq. [MHz]	Factor[dB]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Phase	Verdict
1	0.15	10.36	34.47	66.00	31.53	21.02	56.00	34.98	N	PASS
2	0.17	10.41	32.94	64.96	32.02	19.30	54.96	35.66	N	PASS
3	0.1925	10.46	31.03	63.93	32.90	20.21	53.93	33.72	N	PASS
4	0.4575	10.55	29.98	56.74	26.76	21.39	46.74	25.35	N	PASS
5	0.4975	10.54	31.17	56.04	24.87	18.91	46.04	27.13	N	PASS
6	1.9825	10.60	25.35	56.00	30.65	16.06	46.00	29.94	N	PASS

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

6. Channel Bandwidth

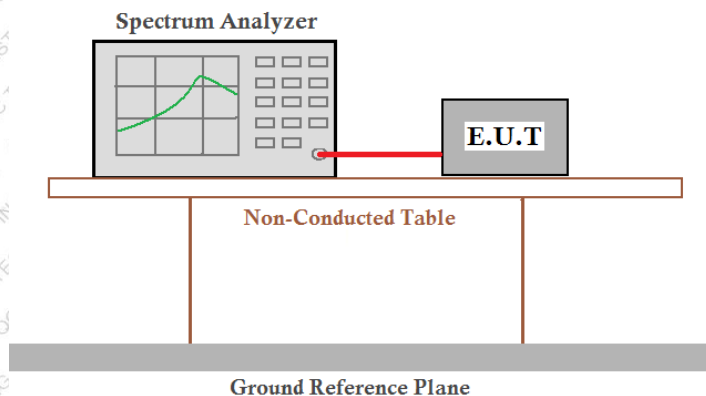
6.1 Applicable Standard

FCC Part15 E Section 15.407(e)

6.2 Limit

>500KHz

6.3 Test setup



6.4 Test Procedure

According to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.

6.5 Test Data

Temperature	22 °C	Humidity	50%
ATM Pressure	101.1kPa	Antenna Gain	2.5dBi
Test by	LBi Li	Test result	PASS

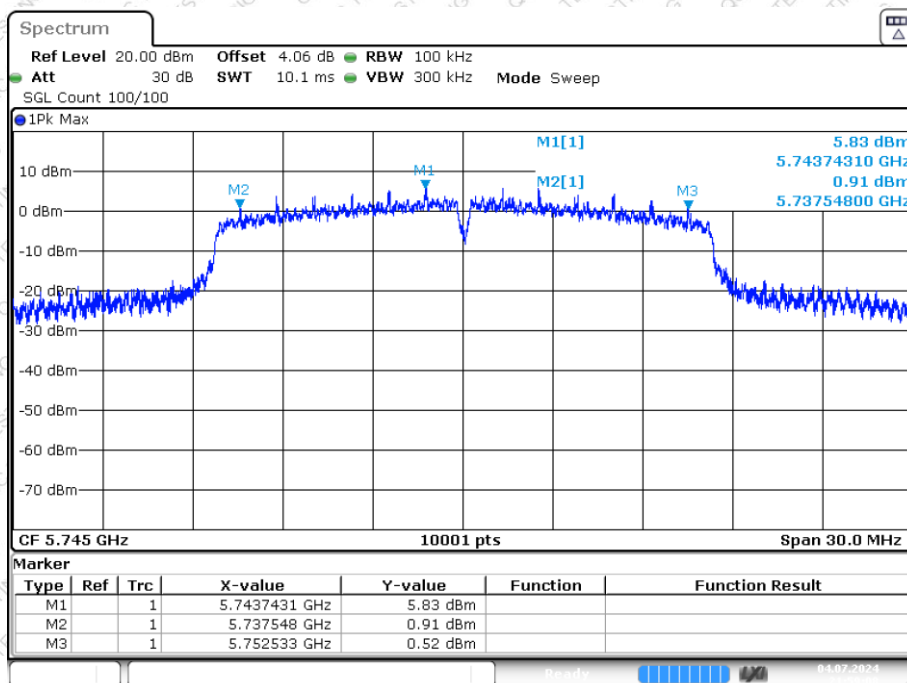
Please refer to following table and plots.

Measurement Data:

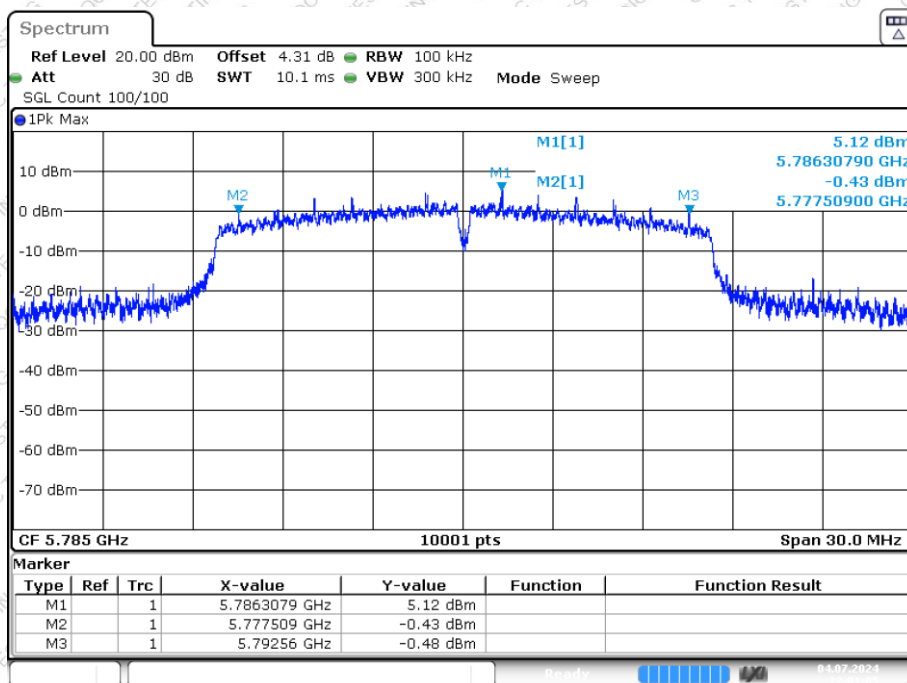
Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	99% OBW (MHz)	Verdict
802.11a	5745	Ant1	14.985	16.414	Pass
	5785	Ant1	15.051	16.504	Pass
	5825	Ant1	15.087	16.366	Pass
802.11n20	5745	Ant1	15.006	17.518	Pass
	5785	Ant1	12.924	17.548	Pass
	5825	Ant1	14.994	17.47	Pass



-6dB Bandwidth NVNT a 5745MHz Ant1

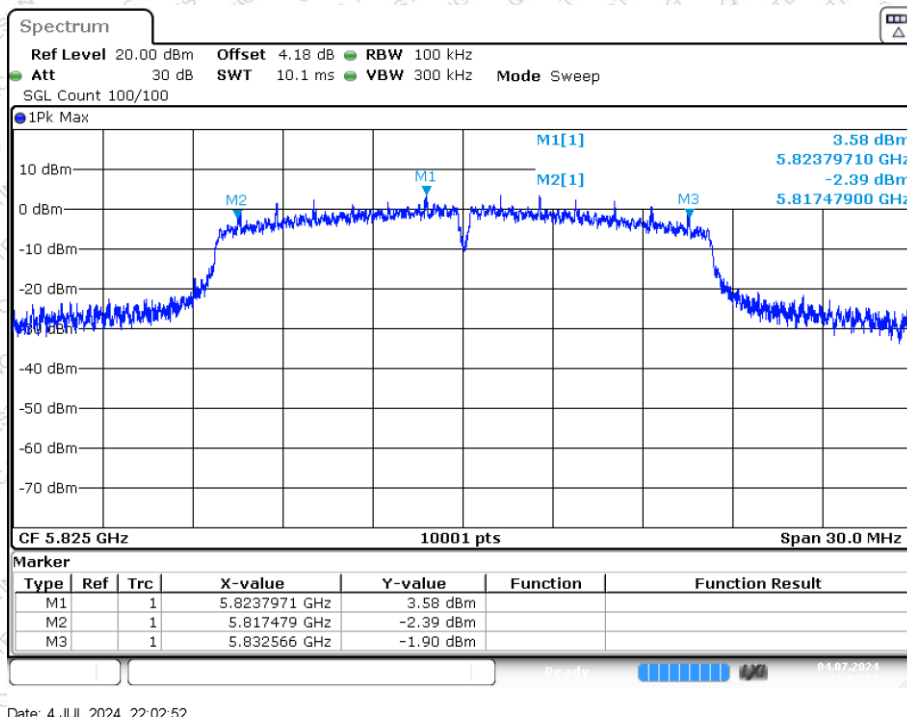


-6dB Bandwidth NVNT a 5785MHz Ant1

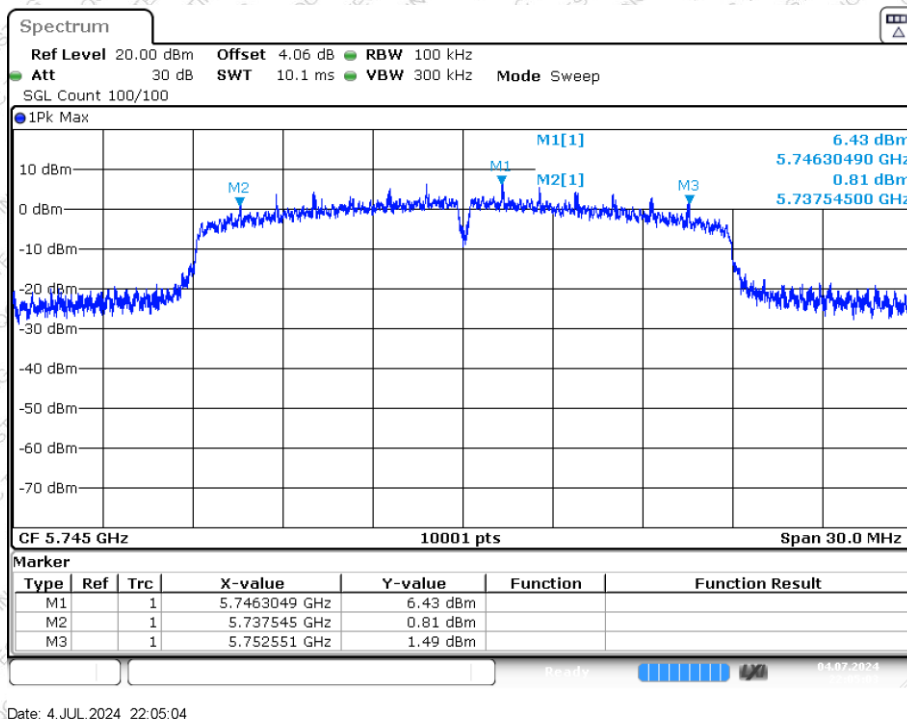




-6dB Bandwidth NVNT a 5825MHz Ant1

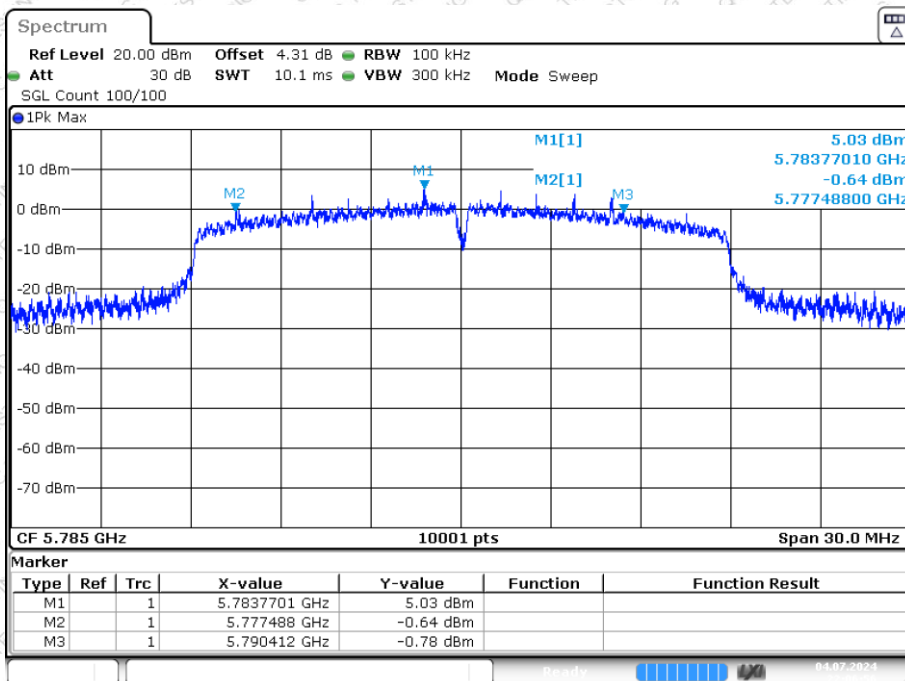


-6dB Bandwidth NVNT n20 5745MHz Ant1

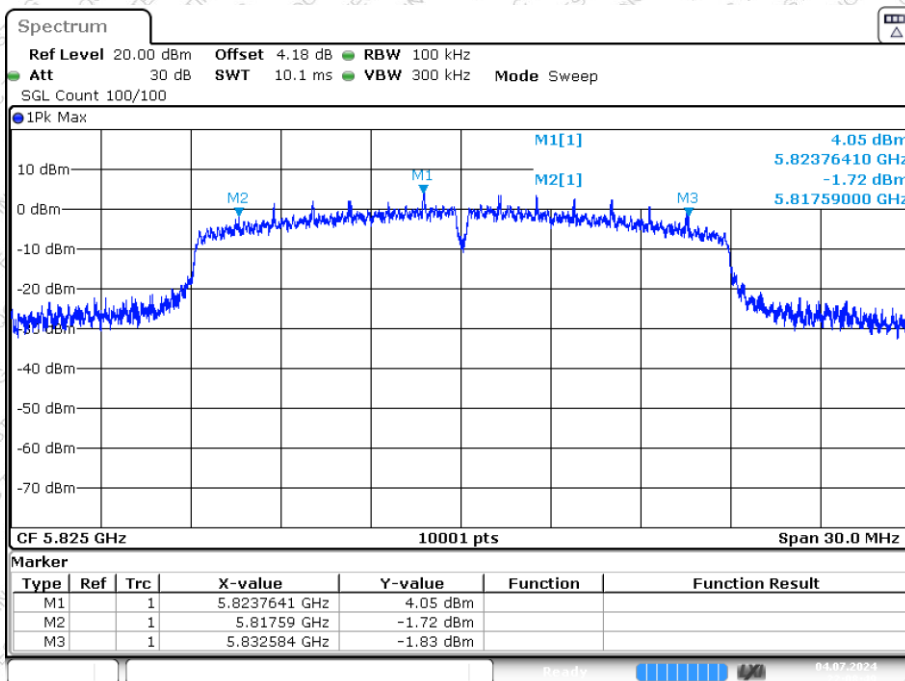




-6dB Bandwidth NVNT n20 5785MHz Ant1

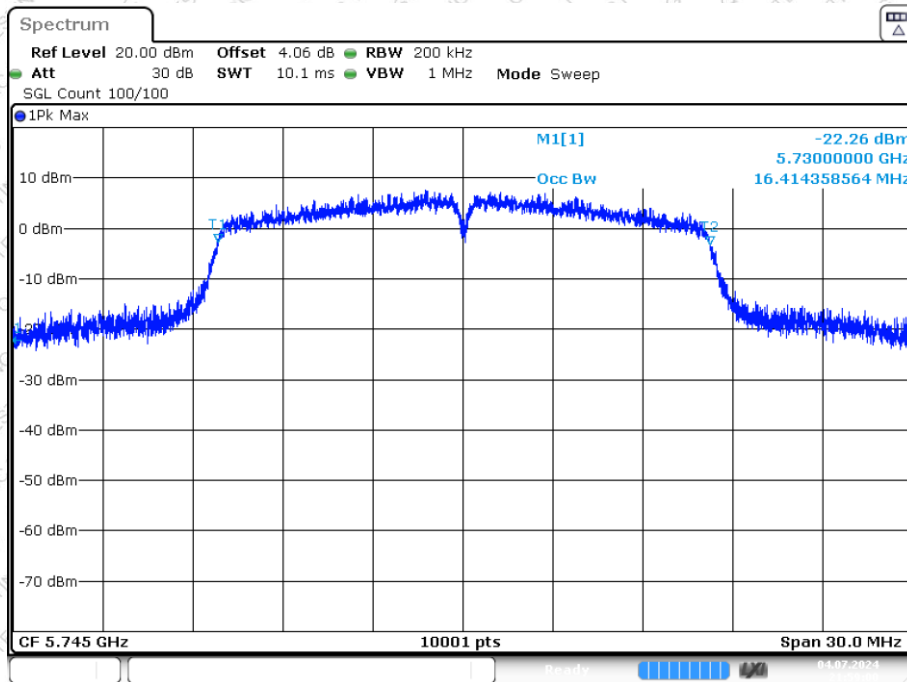


-6dB Bandwidth NVNT n20 5825MHz Ant1



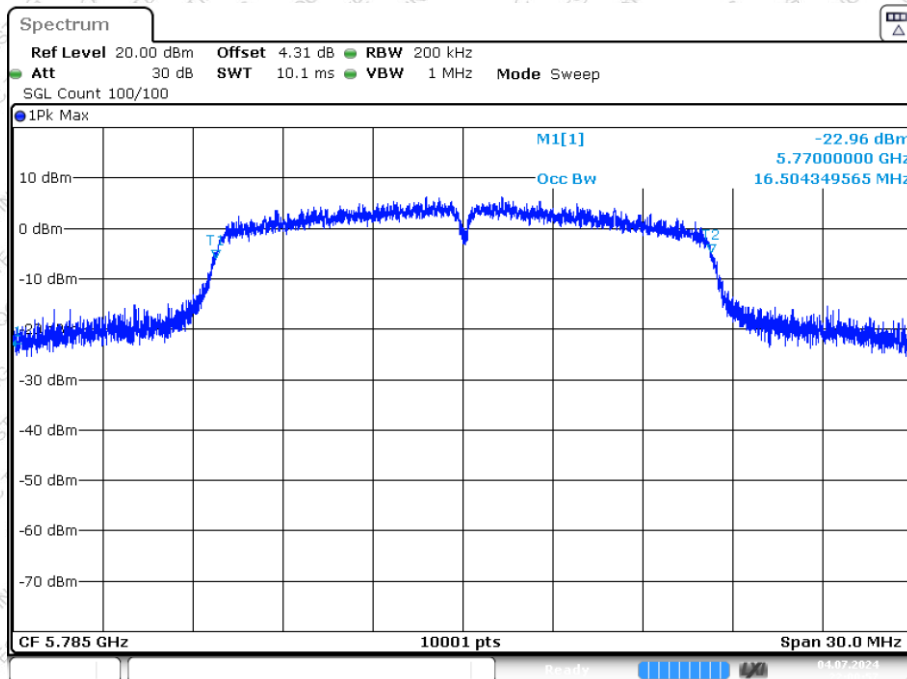


OBW NVNT a 5745MHz Ant1



Date: 4 JUL 2024 21:59:01

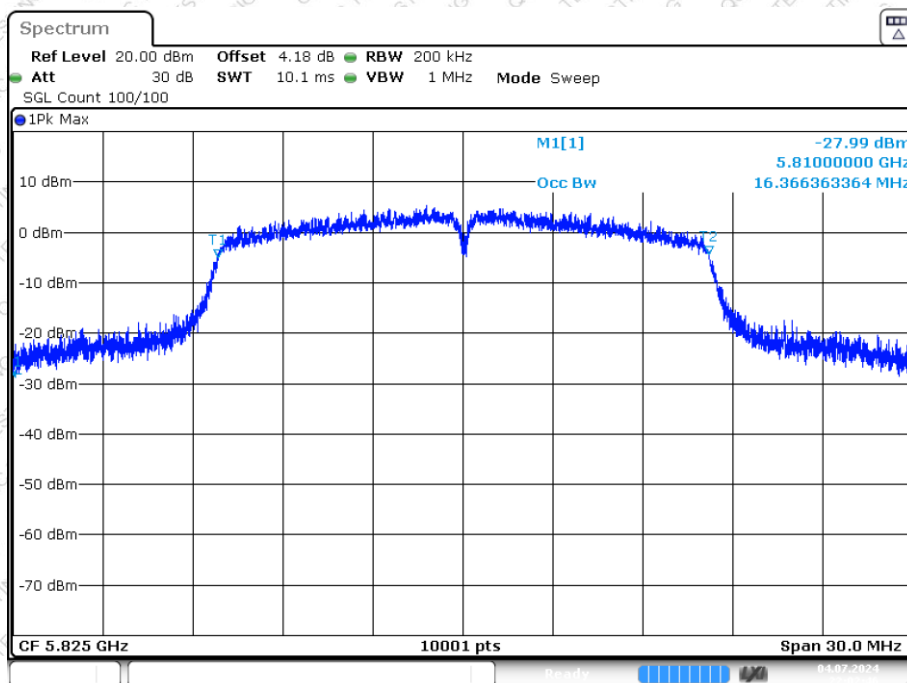
OBW NVNT a 5785MHz Ant1



Date: 4 JUL 2024 22:00:58

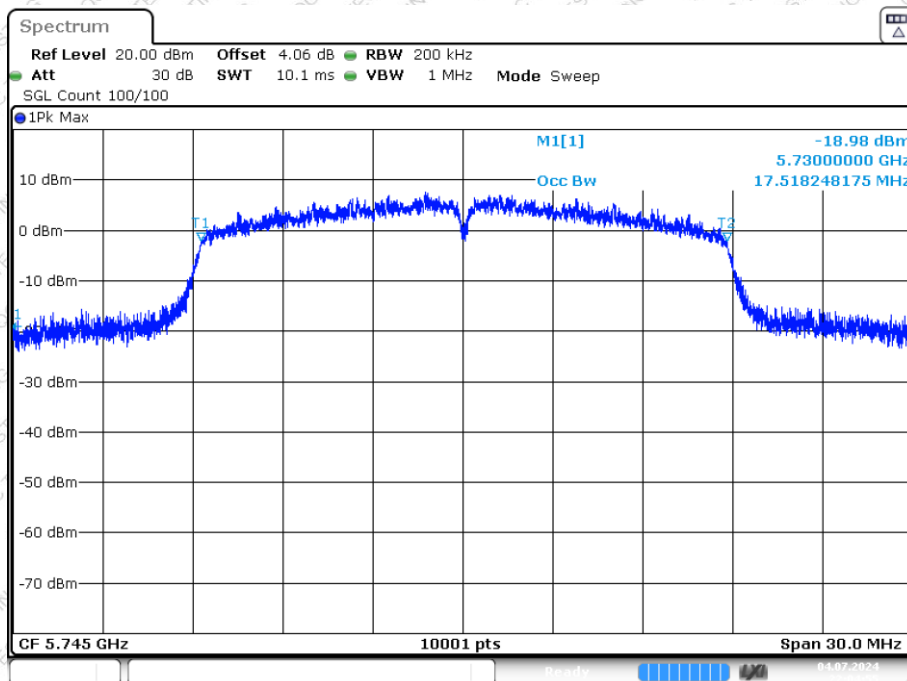


OBW NVNT a 5825MHz Ant1



Date: 4 JUL 2024 22:02:45

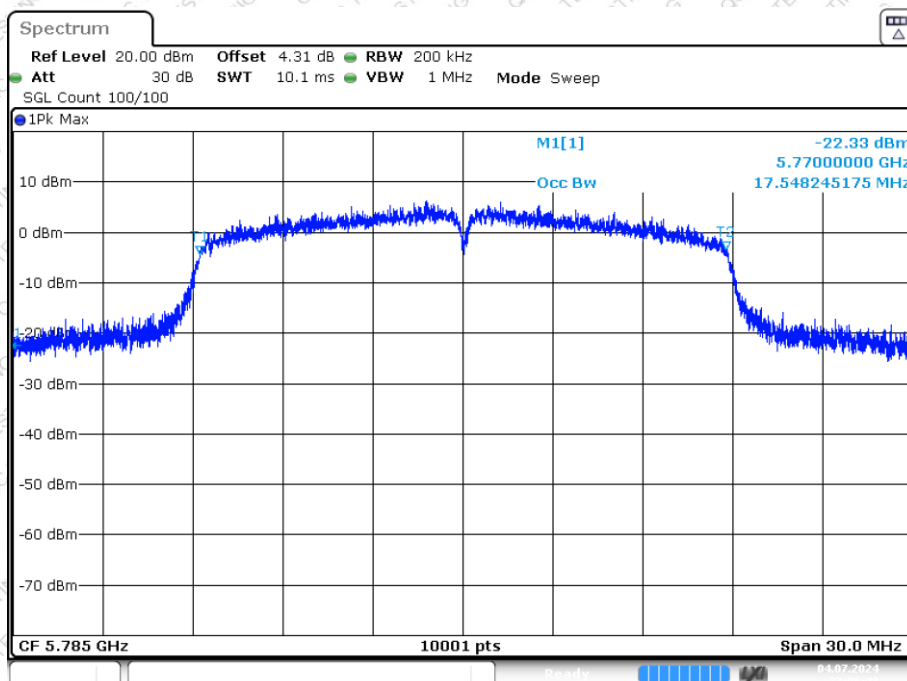
OBW NVNT n20 5745MHz Ant1



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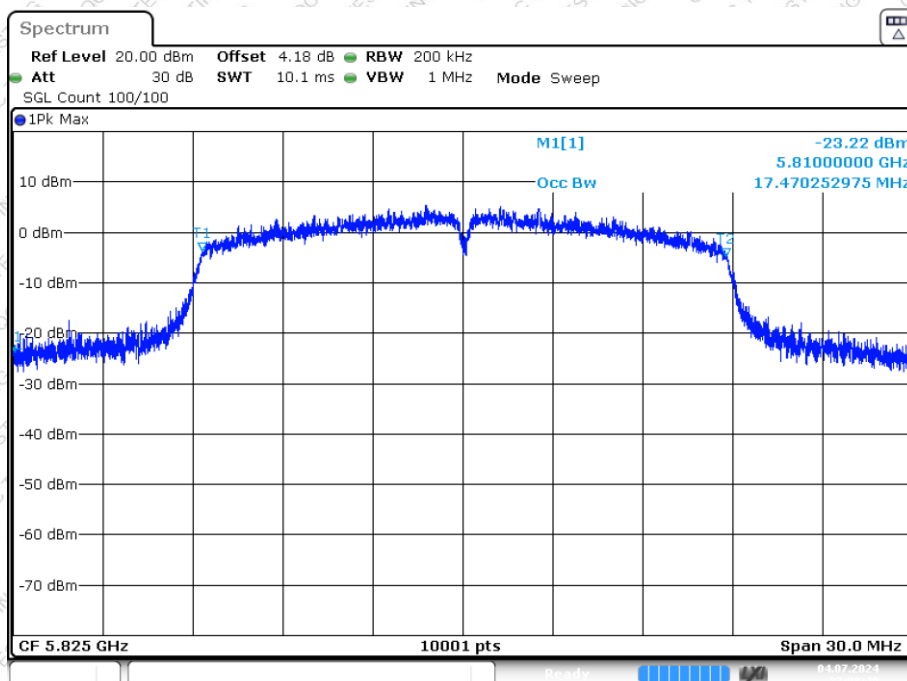


OBW NVNT n20 5785MHz Ant1



Date: 4 JUL 2024 22:06:48

OBW NVNT n20 5825MHz Ant1



Date: 4 JUL 2024 22:08:41

7. Conducted Transmitter Output Power

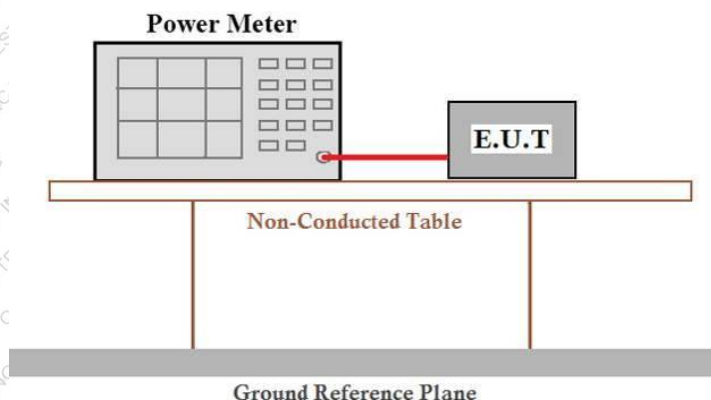
7.1 Applicable Standard

FCC Part15 E Section 15.407(a)(3)

7.2 Limit

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

7.3 Test setup



7.4 Test Procedure

Measurement using an RF average power meter

- (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied
 - a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
 - b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
 - c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- (ii) If the transmitter does not transmit continuously, measure the duty cycle, x , of the transmitter output signal as described in section B).
- (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- (iv) Adjust the measurement in dBm by adding $10 \log(1/x)$ where x is the duty cycle (e.g., $10 \log(1/0.25)$ if the duty cycle is 25 percent).

7.5 Test Data

Temperature	22 °C	Humidity	50%
ATM Pressure	101.1kPa	Antenna Gain	2.5dBi
Test by	LBi Li	Test result	PASS

Please refer to following table and plots.



Measurement Data

Duty Cycle:

Mode	Frequency (MHz)	Antenna	Duty Cycle (%)	Correction Factor (dB)
802.11a	5745	Ant1	87.96	0.56
	5785	Ant1	83.74	0.77
	5825	Ant1	88.83	0.51
802.11n20	5745	Ant1	87.78	0.57
	5785	Ant1	83.02	0.81
	5825	Ant1	86.96	0.61

Note: Duty Factor = $10 \log (1/\text{Duty Cycle})$

Maximum Conducted Output Power

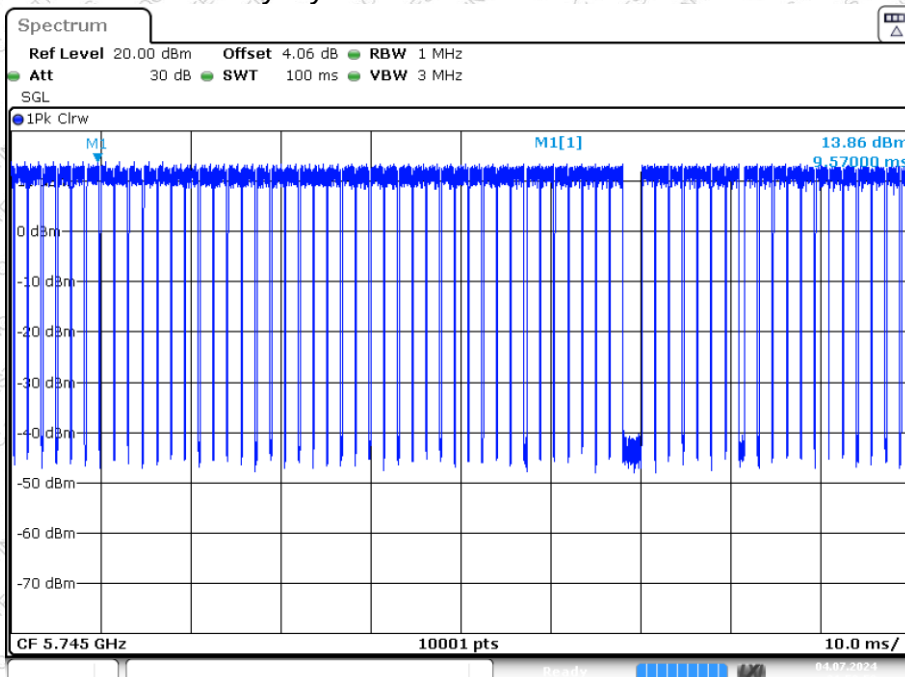
Mode	Frequency (MHz)	Conducted Power (dBm)	Duty Cycle (%)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
802.11a	5745	16.05	87.96	0.56	16.61	30	Pass
	5785	14.5	83.74	0.77	15.27	30	Pass
	5825	13.85	88.83	0.51	14.36	30	Pass
802.11n20	5745	16.03	87.78	0.57	16.6	30	Pass
	5785	14.58	83.02	0.81	15.39	30	Pass
	5825	13.72	86.96	0.61	14.33	30	Pass

Note: Output Power = Measured Power + Duty Factor



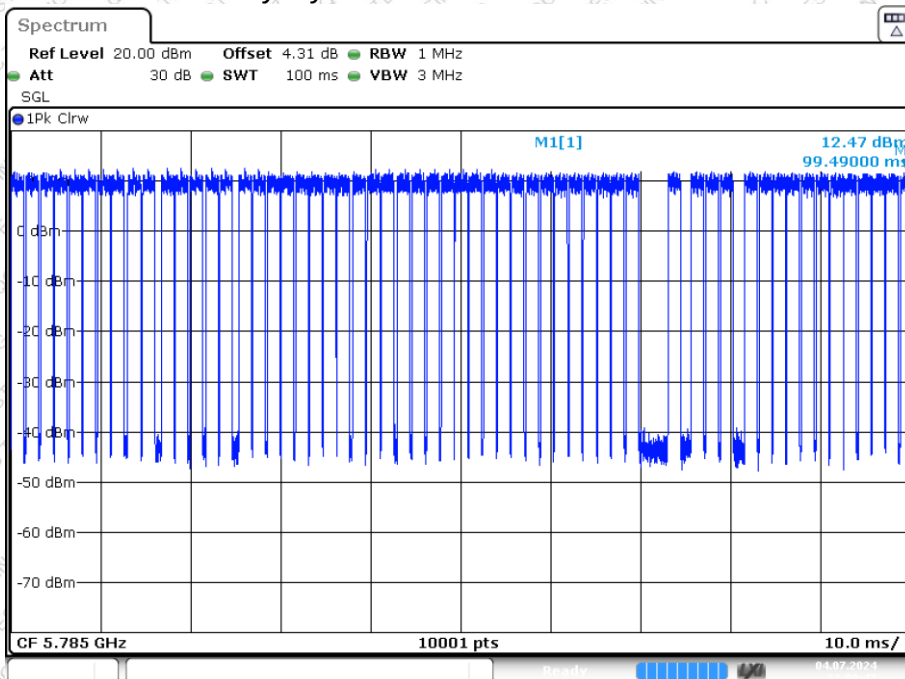
Test plots as followed:

Duty Cycle NVNT a 5745MHz Ant1



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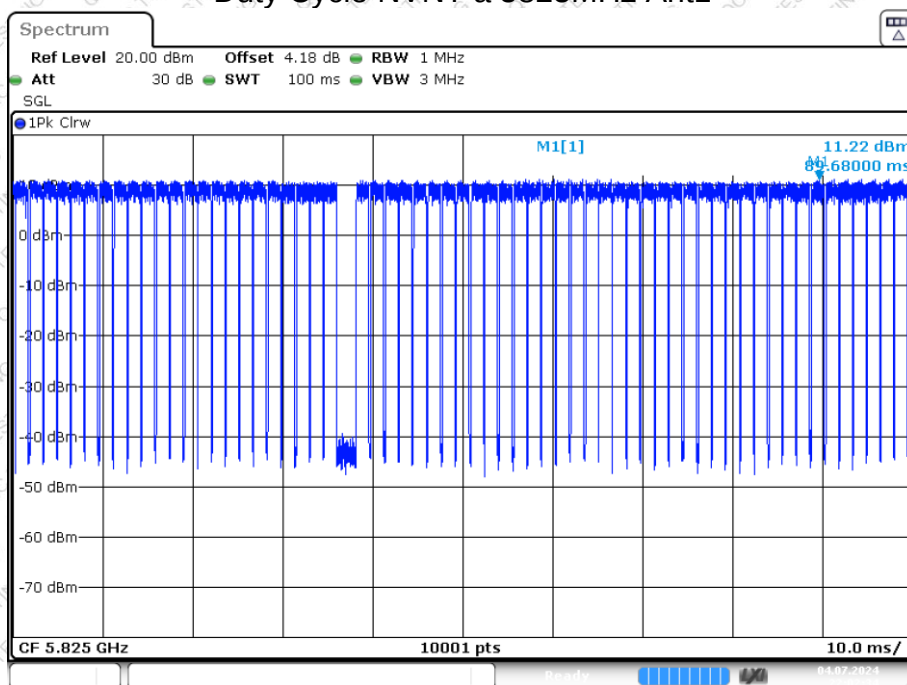
Duty Cycle NVNT a 5785MHz Ant1



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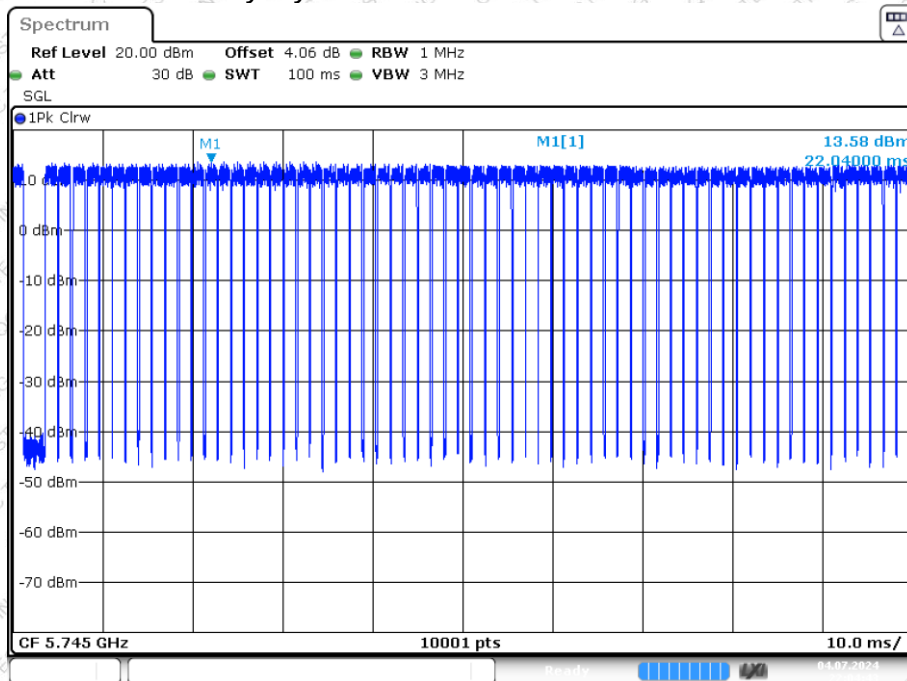


Duty Cycle NVNT a 5825MHz Ant1



Date: 4 JUL 2024 22:02:35

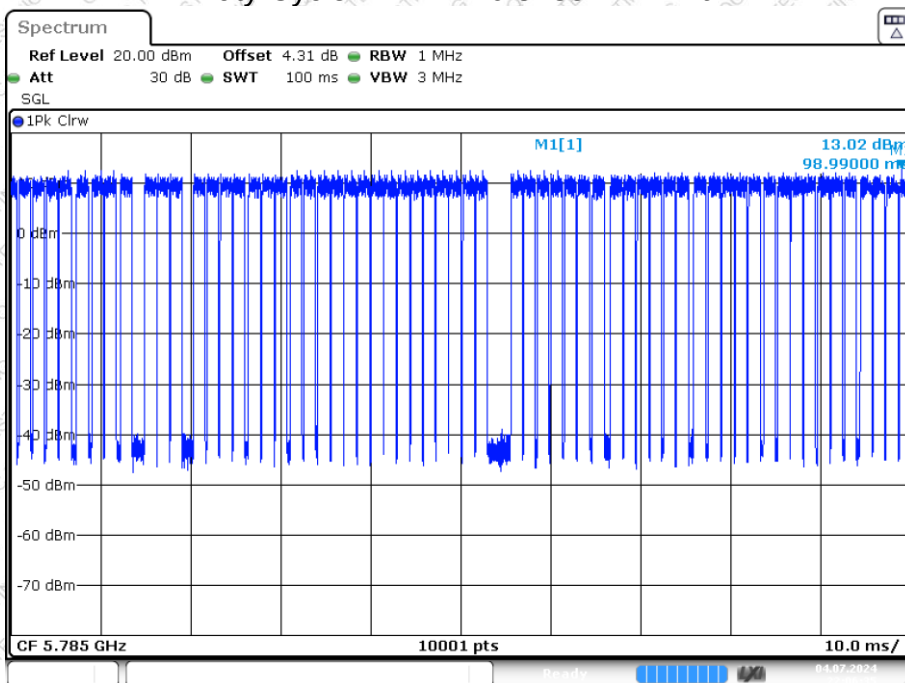
Duty Cycle NVNT n20 5745MHz Ant1



Date: 4 JUL 2024 22:04:44

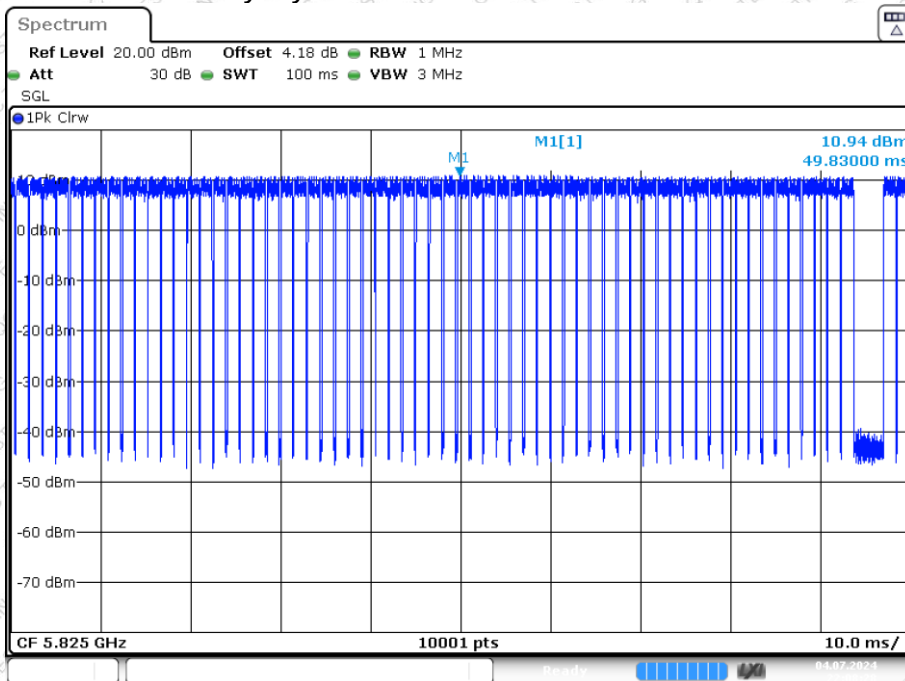


Duty Cycle NVNT n20 5785MHz Ant1



Date: 4 JUL 2024 22:06:36

Duty Cycle NVNT n20 5825MHz Ant1



Date: 4 JUL 2024 22:08:28

8. Power Spectral Density

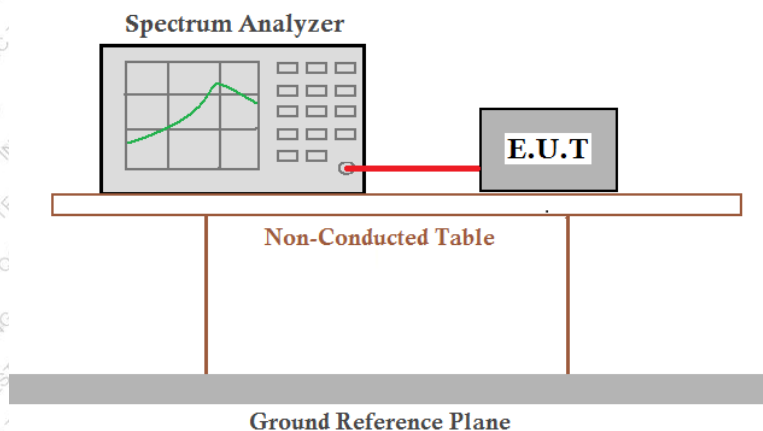
8.1 Applicable Standard

FCC Part15 E Section 15.407(a)(3)

8.2 Limit

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500kHz band.

8.3 Test setup



8.4 Test Procedure

- Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power..."
- Use the peak search function on the instrument to find the peak of the spectrum.
- Make the following adjustments to the peak value of the spectrum, if applicable:
 - If Method SA-2 or SA-2 Alternative was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.
 - If Method SA-3 Alternative was used and the linear mode was used in step E2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- The result is the PSD.

8.5 Test Data

Temperature	22 °C	Humidity	50%
ATM Pressure	101.1kPa	Antenna Gain	2.5dBi
Test by	LBi Li	Test result	PASS

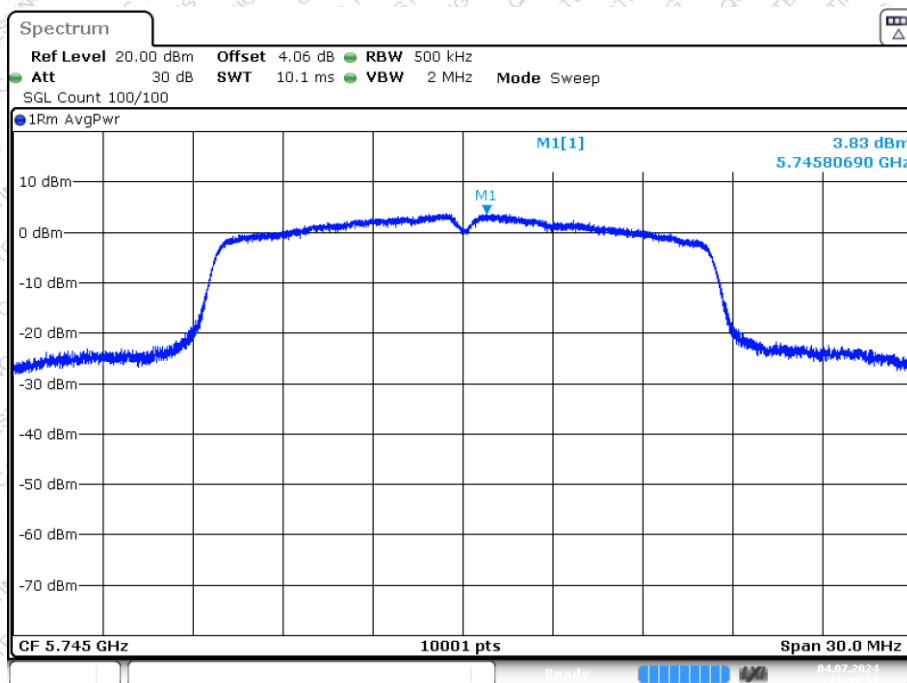
Please refer to following table and plots.



Mode	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Cycle (%)	Duty Factor (dB)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Verdict
802.11a	5745	3.83	87.96	0.56	4.39	30	Pass
	5785	2.5	83.74	0.77	3.27	30	Pass
	5825	1.51	88.83	0.51	2.02	30	Pass
802.11n20	5745	3.53	87.78	0.57	4.10	30	Pass
	5785	2.37	83.02	0.81	3.18	30	Pass
	5825	1.62	86.96	0.61	2.23	30	Pass

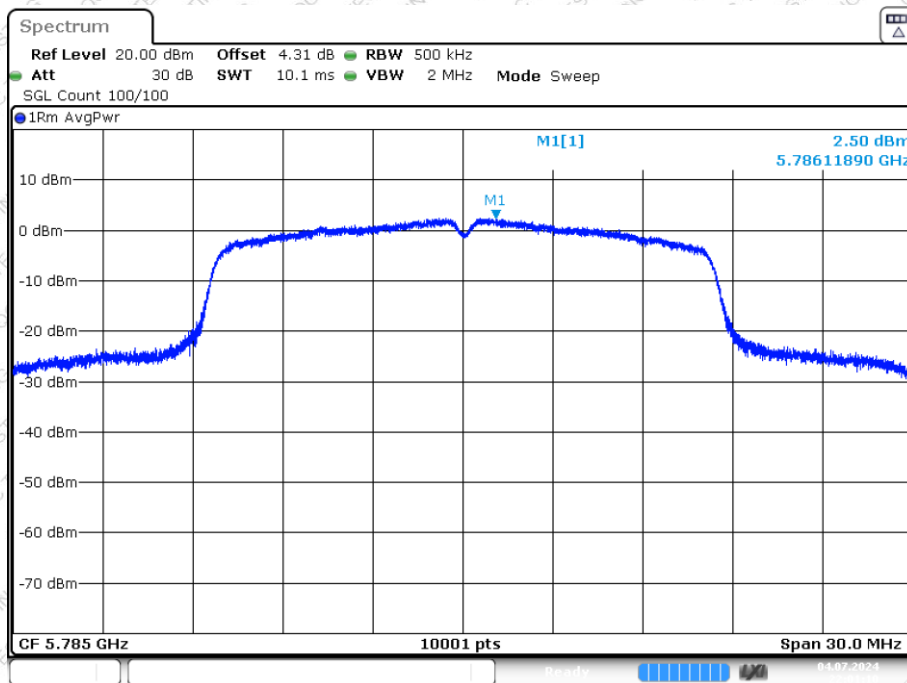


PSD NVNT a 5745MHz Ant1



Date: 4 JUL 2024 21:59:13

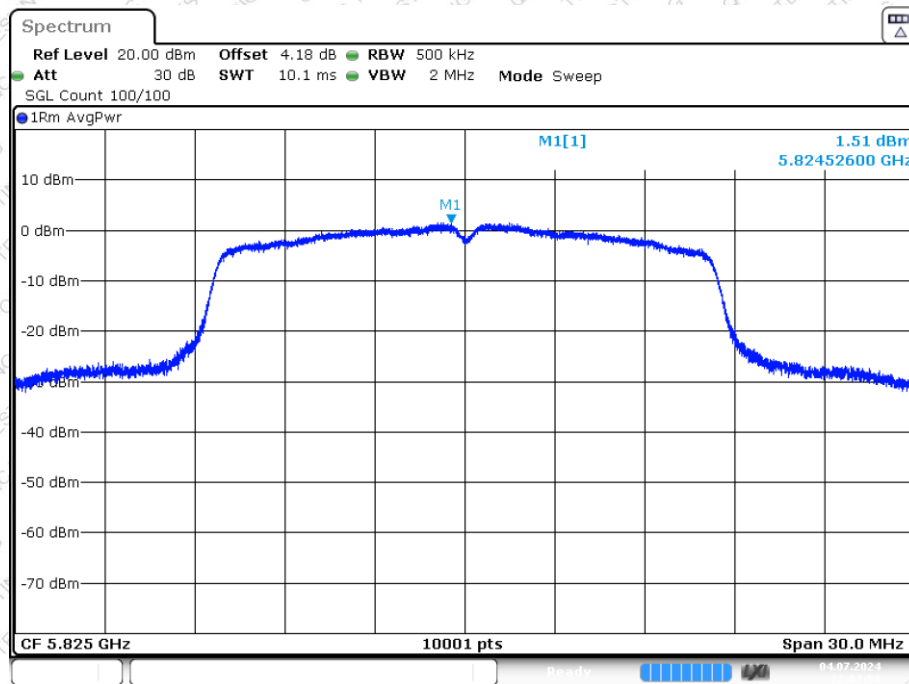
PSD NVNT a 5785MHz Ant1



Date: 4 JUL 2024 22:01:11

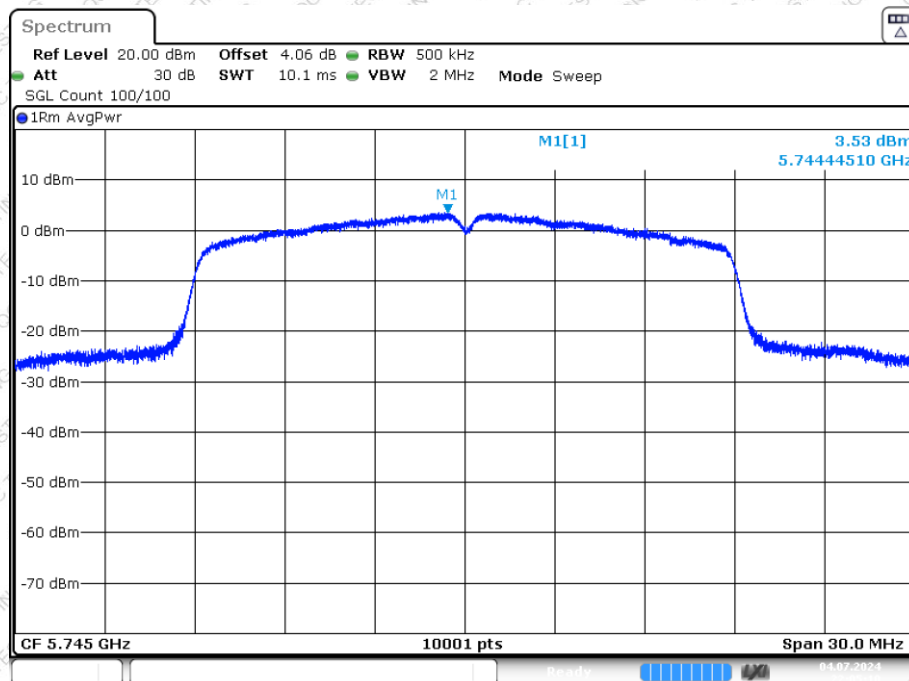


PSD NVNT a 5825MHz Ant1



Date: 4 JUL 2024 22:02:58

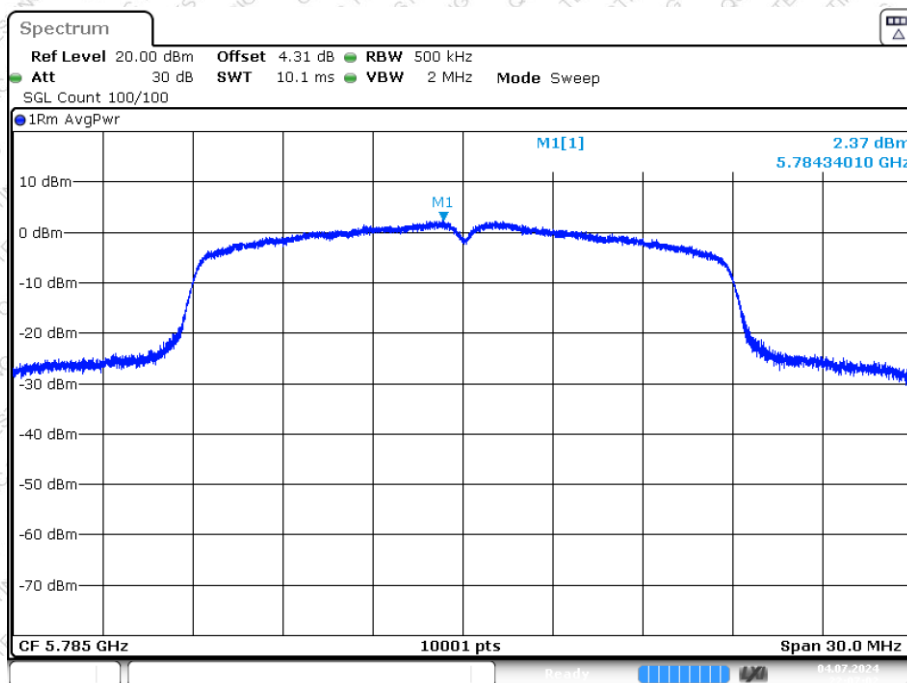
PSD NVNT n20 5745MHz Ant1



Date: 4 JUL 2024 22:05:10

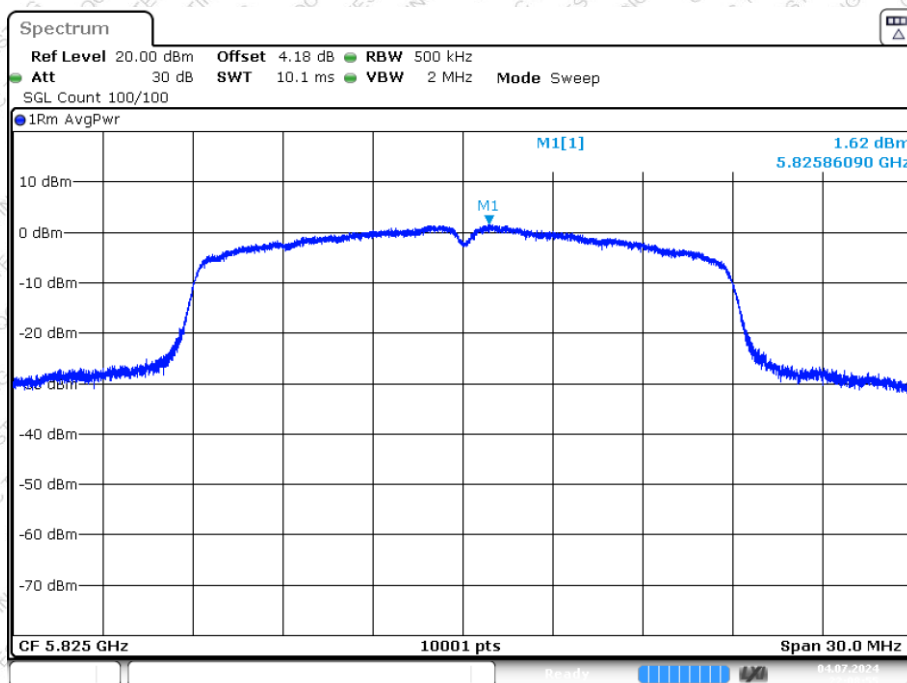


PSD NVNT n20 5785MHz Ant1



Date: 4 JUL 2024 22:07:03

PSD NVNT n20 5825MHz Ant1



Date: 4 JUL 2024 22:08:55

9. Band Edge

9.1 Applicable Standard

FCC Part15 C Section 15.209 / 15.205/ 15.407(b)

9.2 Limit

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

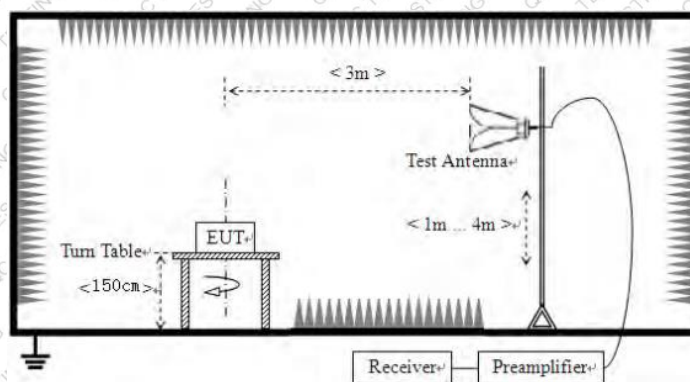
9.3 EMI Test Receiver Setup

Frequency	RBW	VBW	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	10 Hz Note 1	/	Average
1MHz	1MHz	> 1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

9.4 Test setup



9.5 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

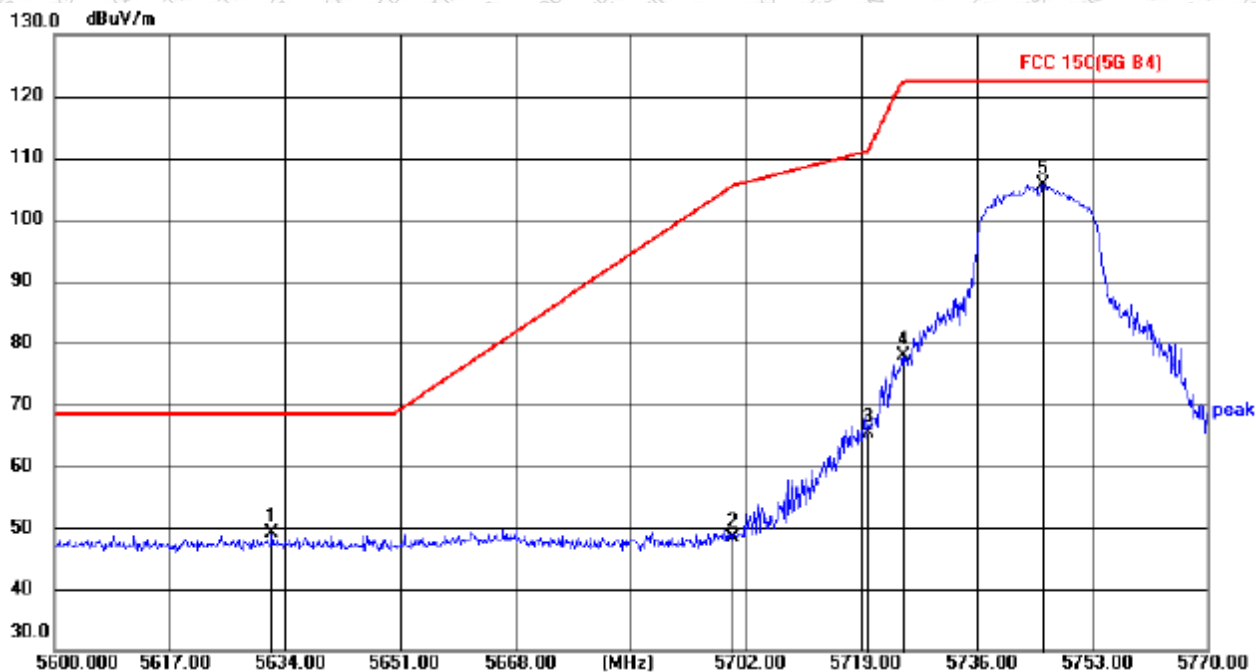
9.6 Test Data



Temperature	26 °C	Humidity	54%
ATM Pressure	101.1kPa	Antenna Gain	2.5dBi
Test by	LBi Li	Test result	PASS

Test Voltage: AC 120V/60Hz

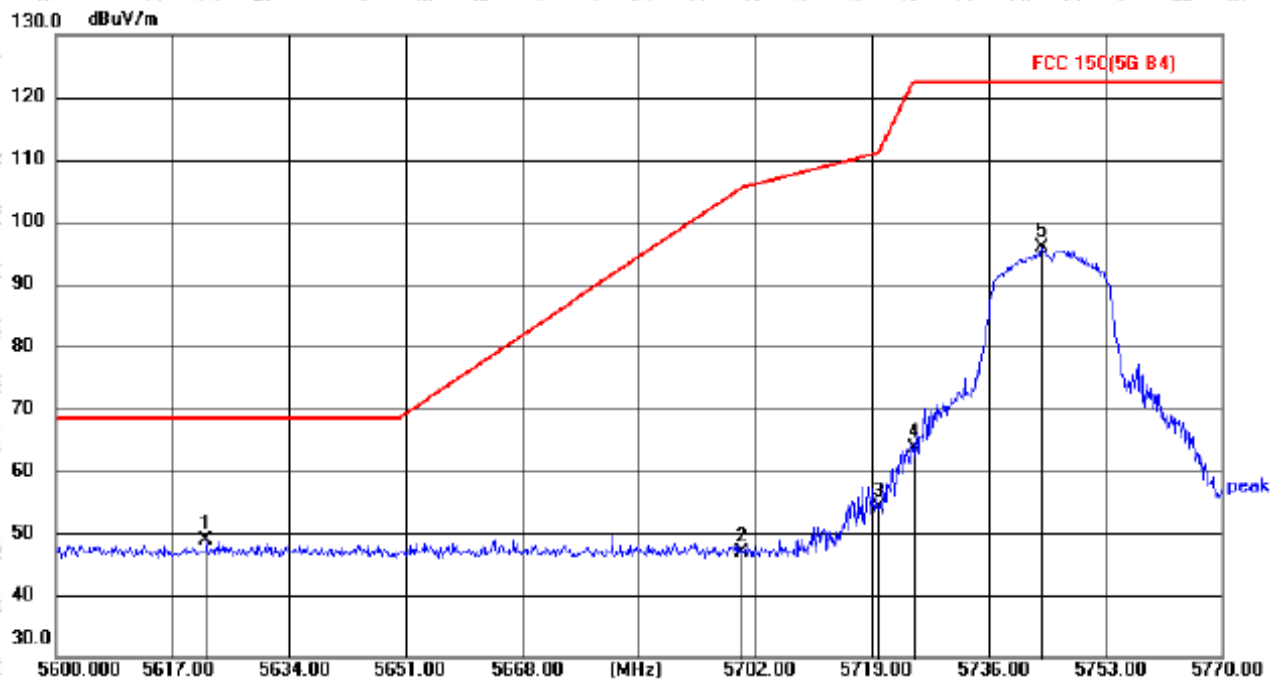
11a 5745MHz – Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	5632.130	52.63	-3.62	49.01	68.23	19.22	peak
2	5700.000	51.94	-3.55	48.39	105.23	56.84	peak
3	5720.000	68.90	-3.54	65.36	110.83	45.47	peak
4	5725.000	81.41	-3.52	77.89	122.23	44.34	peak
5 *	5745.860	109.20	-3.51	105.69	122.23	16.54	peak



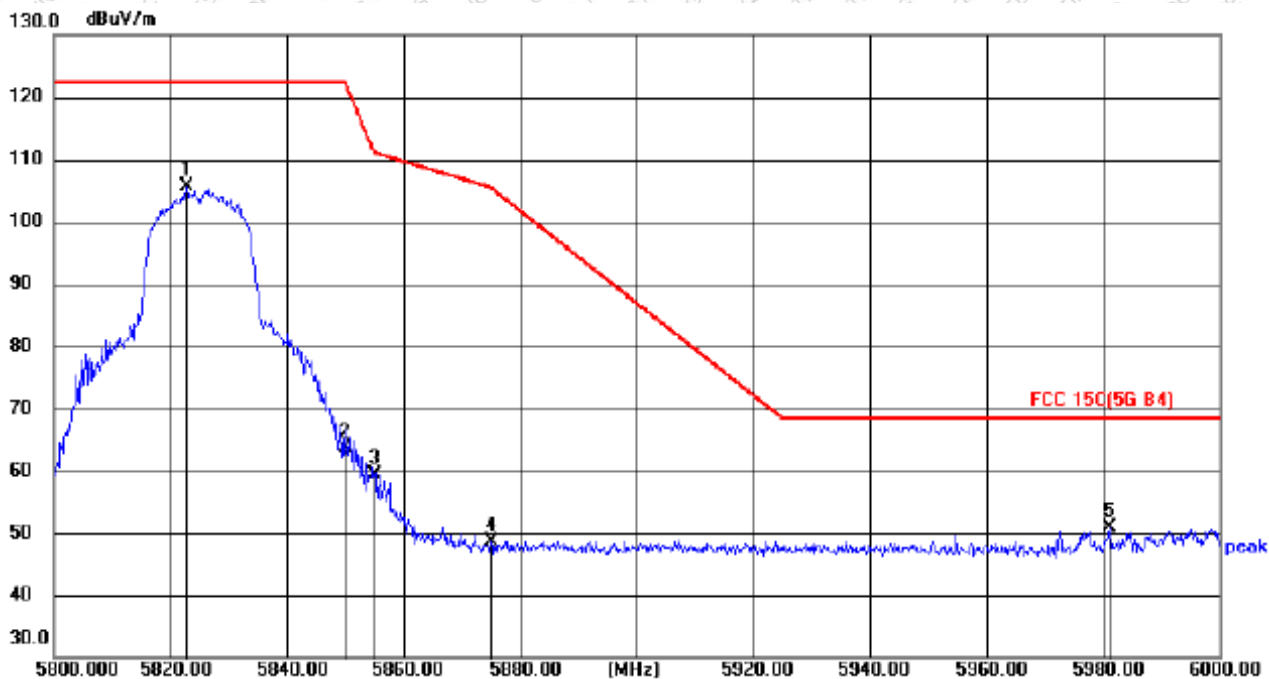
11a 5745MHz – Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	5621.930	52.38	-3.55	48.83	68.23	19.40	peak
2	5700.000	50.30	-3.49	46.81	105.23	58.42	peak
3	5720.000	57.56	-3.48	54.08	110.83	56.75	peak
4	5725.000	67.18	-3.47	63.71	122.23	58.52	peak
5	5743.820	99.40	-3.46	95.94	122.23	26.29	peak



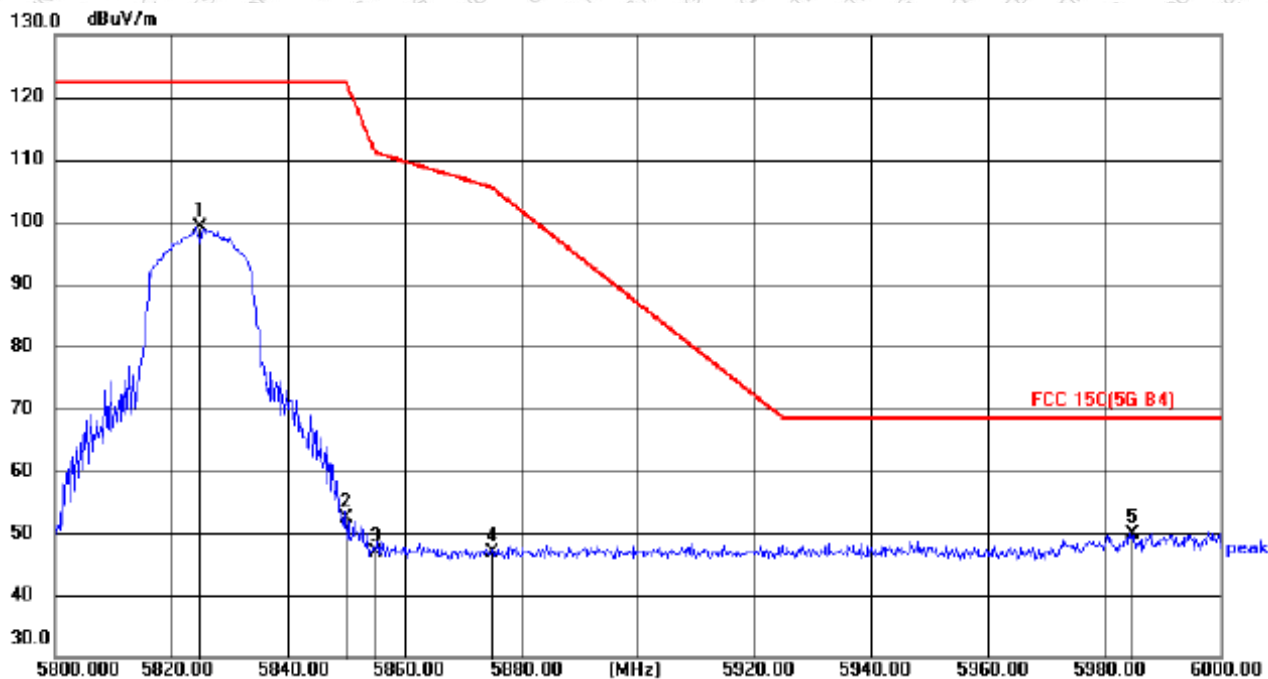
11a 5825MHz – Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	5822.800	109.03	-3.44	105.59	122.23	16.64	peak
2	5850.000	67.01	-3.41	63.60	122.23	58.63	peak
3	5855.000	62.68	-3.41	59.27	110.83	51.56	peak
4	5875.000	52.07	-3.39	48.68	105.23	56.55	peak
5	5981.200	54.26	-3.29	50.97	68.23	17.26	peak



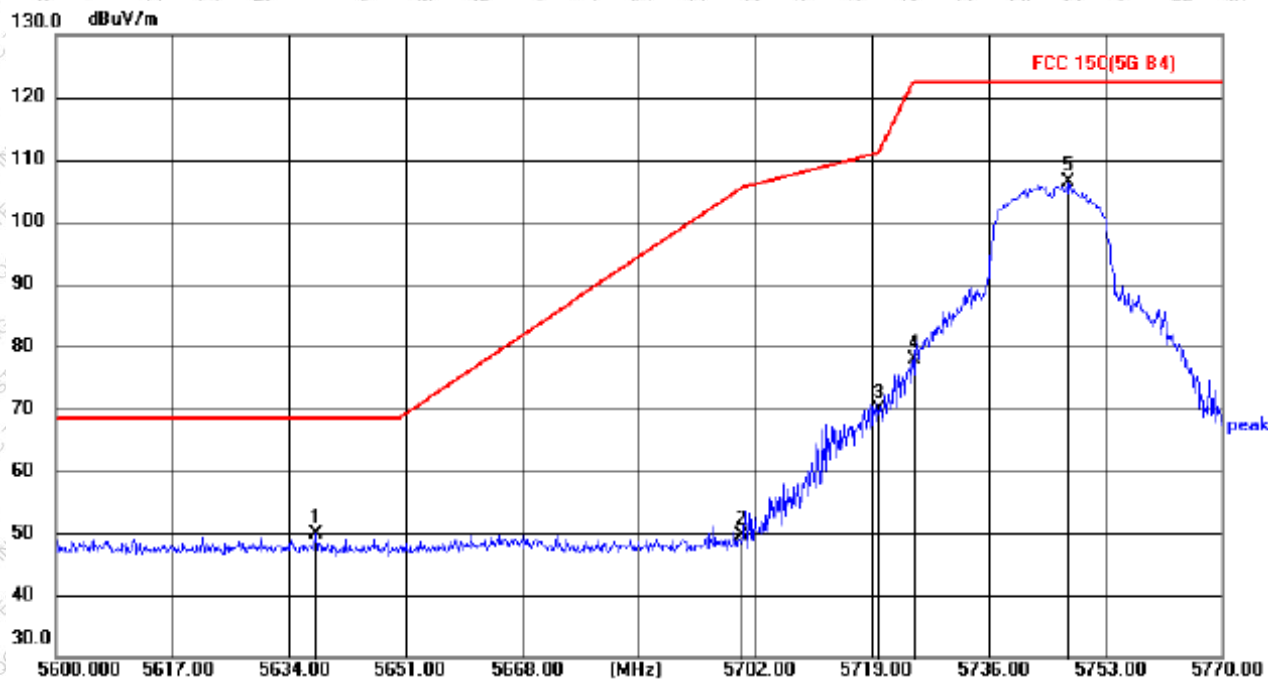
11a 5825MHz – Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	5825.000	102.47	-3.40	99.07	122.23	23.16	peak
2	5850.000	55.64	-3.38	52.26	122.23	69.97	peak
3	5855.000	50.20	-3.38	46.82	110.83	64.01	peak
4	5875.000	50.15	-3.37	46.78	105.23	58.45	peak
5 *	5985.000	53.29	-3.29	50.00	68.23	18.23	peak



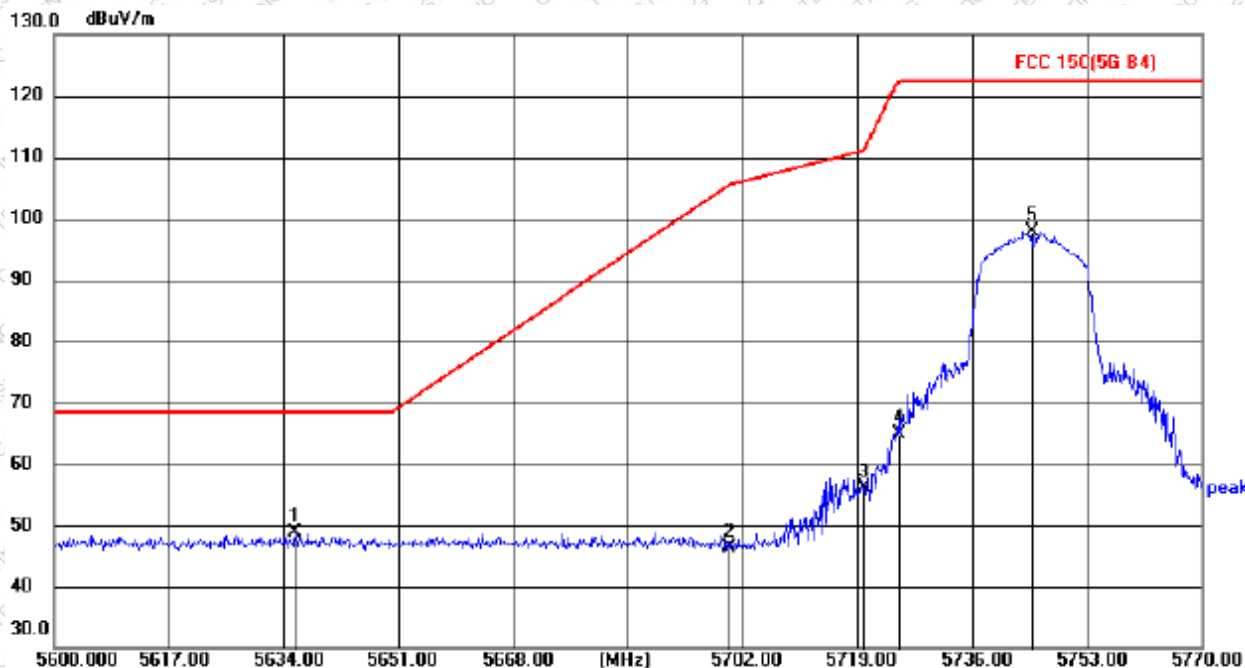
11n20 5745MHz – Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	5637.910	53.49	-3.61	49.88	68.23	18.35	peak
2	5700.000	53.17	-3.55	49.62	105.23	55.61	peak
3	5720.000	73.48	-3.54	69.94	110.83	40.89	peak
4	5725.000	81.35	-3.52	77.83	122.23	44.40	peak
5 *	5747.560	109.95	-3.51	106.44	122.23	15.79	peak



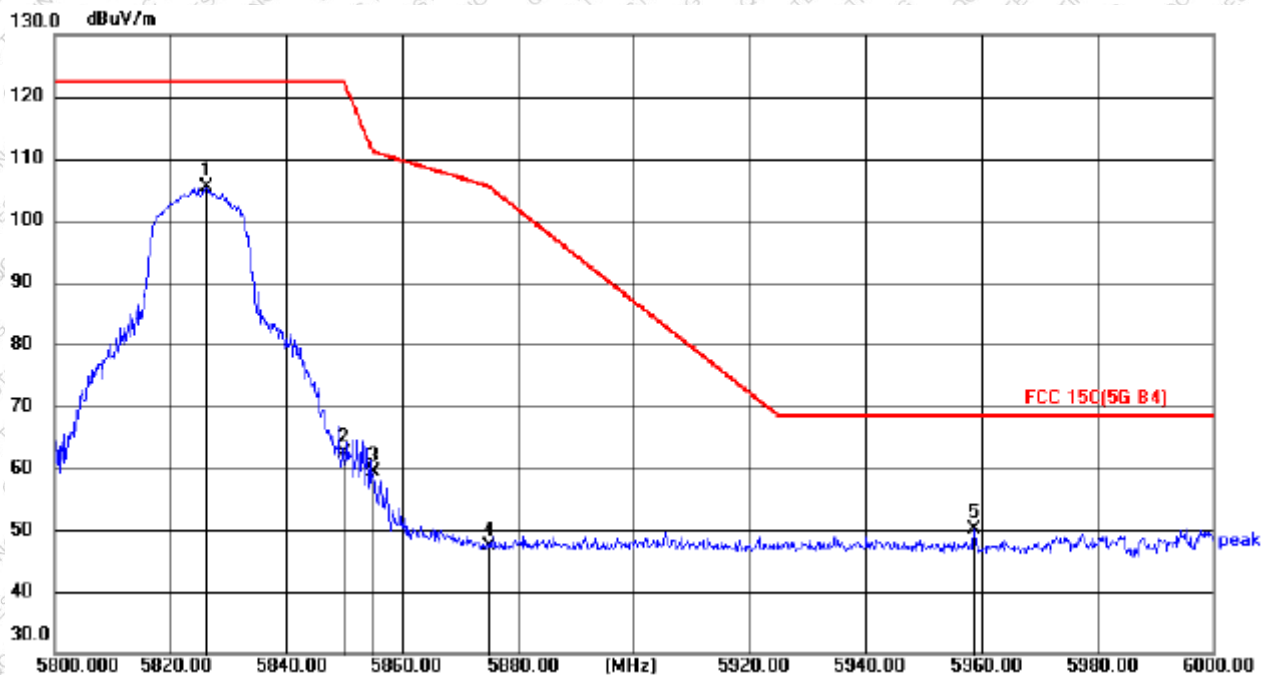
11n20 5745MHz – Vertical



No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1 *	5635.700	52.33	-3.54	48.79	68.23	19.44	peak
2	5700.000	49.95	-3.49	46.46	105.23	58.77	peak
3	5720.020	59.56	-3.48	56.08	110.88	54.80	peak
4	5725.000	68.35	-3.47	64.88	122.23	57.35	peak
5	5745.000	101.36	-3.46	97.90	122.23	24.33	peak



11n20 5825MHz – Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	5826.200	108.73	-3.43	105.30	122.23	16.93	peak
2	5850.000	65.75	-3.41	62.34	122.23	59.89	peak
3	5855.000	62.75	-3.41	59.34	110.83	51.49	peak
4	5875.000	50.76	-3.39	47.37	105.23	57.86	peak
5	5958.800	53.36	-3.30	50.06	68.23	18.17	peak



11n20 5825MHz – Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	5826.200	102.81	-3.40	99.41	122.23	22.82	peak
2	5850.000	59.10	-3.38	55.72	122.23	66.51	peak
3	5855.000	50.53	-3.38	47.15	110.83	63.68	peak
4	5875.000	50.46	-3.37	47.09	105.23	58.14	peak
5 *	5991.200	53.65	-3.28	50.37	68.23	17.86	peak

Remark:

According to KDB 789033 D02v02r01 section G) 1) d), for measurements above 1000 MHz @3m distance, the limit of field strength is computed as follows:

$$E[\text{dBuV/m}] = \text{EIRP}[\text{dBm}] + 95.2;$$

$$E[\text{dBuV/m}] = -27 + 95.2 = 68.2\text{dBuV/m.}$$

$$E[\text{dBuV/m}] = 10 + 95.2 = 105.2\text{dBuV/m.}$$

$$E[\text{dBuV/m}] = 15.6 + 95.2 = 110.8\text{dBuV/m.}$$

$$E[\text{dBuV/m}] = 27 + 95.2 = 122.2\text{dBuV/m}$$

10. Radiated Emission Method

10.1 Applicable Standard

FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)

10.2 Limit

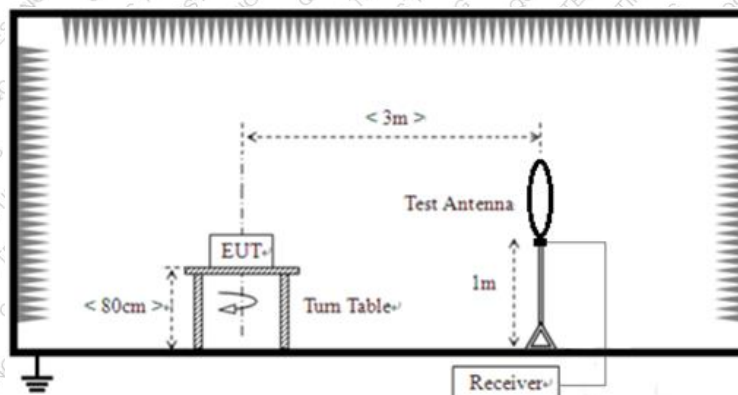
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m

Frequency	Field Strengths Limits (uV/m at 3 m)	Field Strengths Limits (dBuV/m at 3 m)	Remark
30 – 88	100	40.0	Quasi-peak
88 – 216	150	43.5	Quasi-peak
216 – 960	200	46.0	Quasi-peak
Above 960	500	54.0	Quasi-peak
Above 1GHz	/	54.0	Peak
		74.0	Average

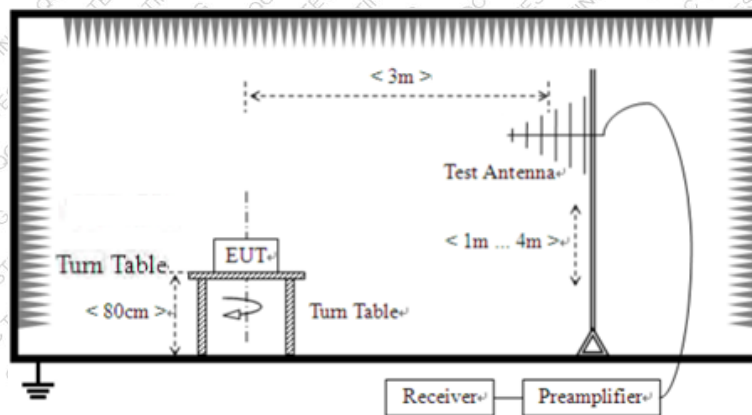
Note: $\text{dBuV/m} = 20\log(\mu\text{V/m})$

10.3 Test setup

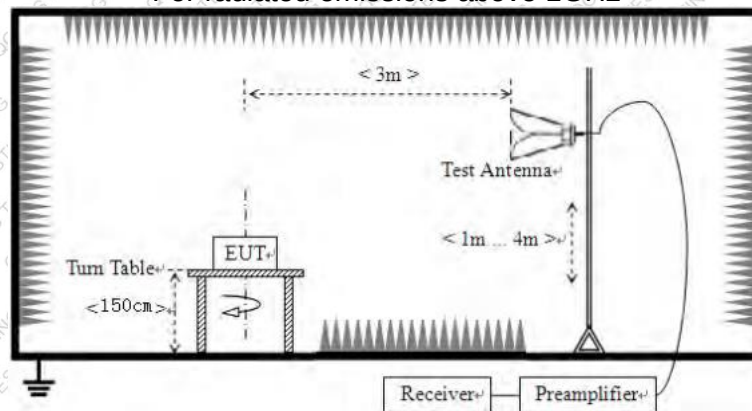
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



10.4 EMI Test Receiver Setup

Frequency	RBW	VBW	IF B/W	Measurement
9KHz-150KHz	200Hz	600Hz	/	QP
150KHz-30MHz	9KHz	30KHz	/	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	10 Hz ^{Note 1}	/	Average
1MHz	1MHz	> 1/T ^{Note 2}	/	Average

Note 1: when duty cycle is no less than 98%

Note 2: when duty cycle is less than 98%

Remark: For the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission test in these three bands are based on measurements employing an average detector.

10.5 Test procedure

- The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.



- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

10.6 Test Data

Temperature	26 °C	Humidity	54%
ATM Pressure	101.1kPa	Antenna Gain	2.5dBi
Test by	LBi Li	Test result	PASS

Test Voltage: AC 120V/60Hz

Remarks:

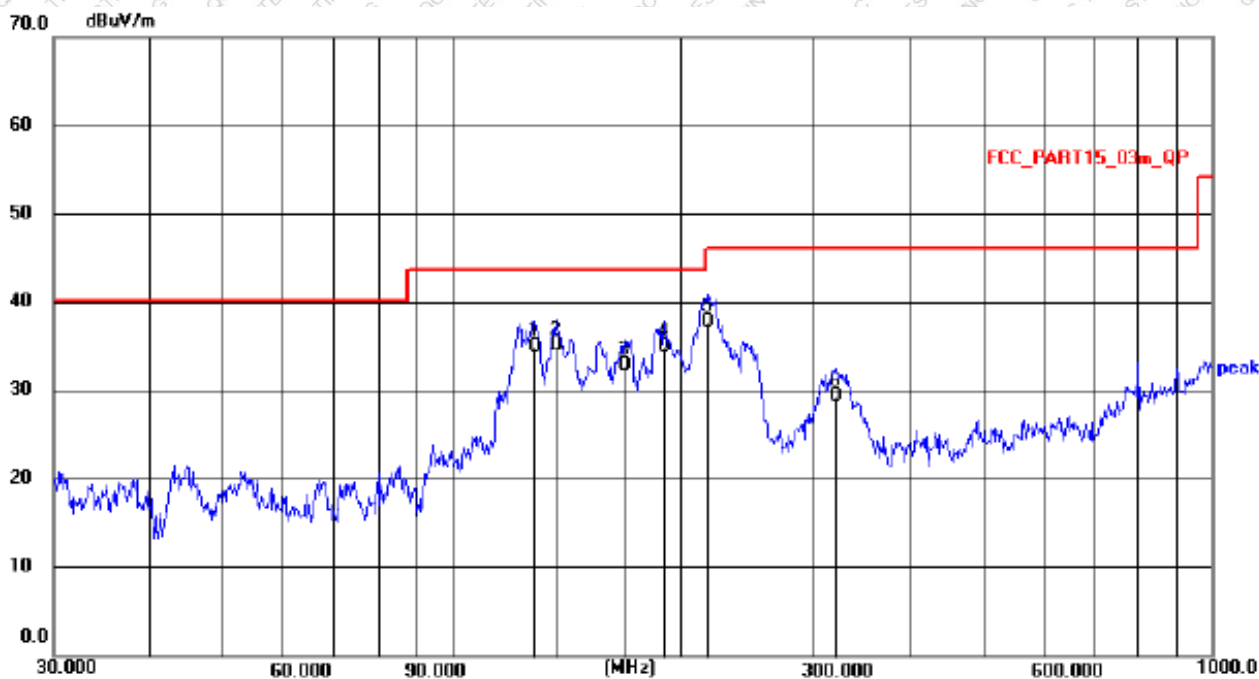
- Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.
- The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.



Below 1GHz

Pre-scan all test modes, found worst case at 802.11a mode 5745MHz, and so only show the test result of 802.11a mode 5745MHz

Horizontal:

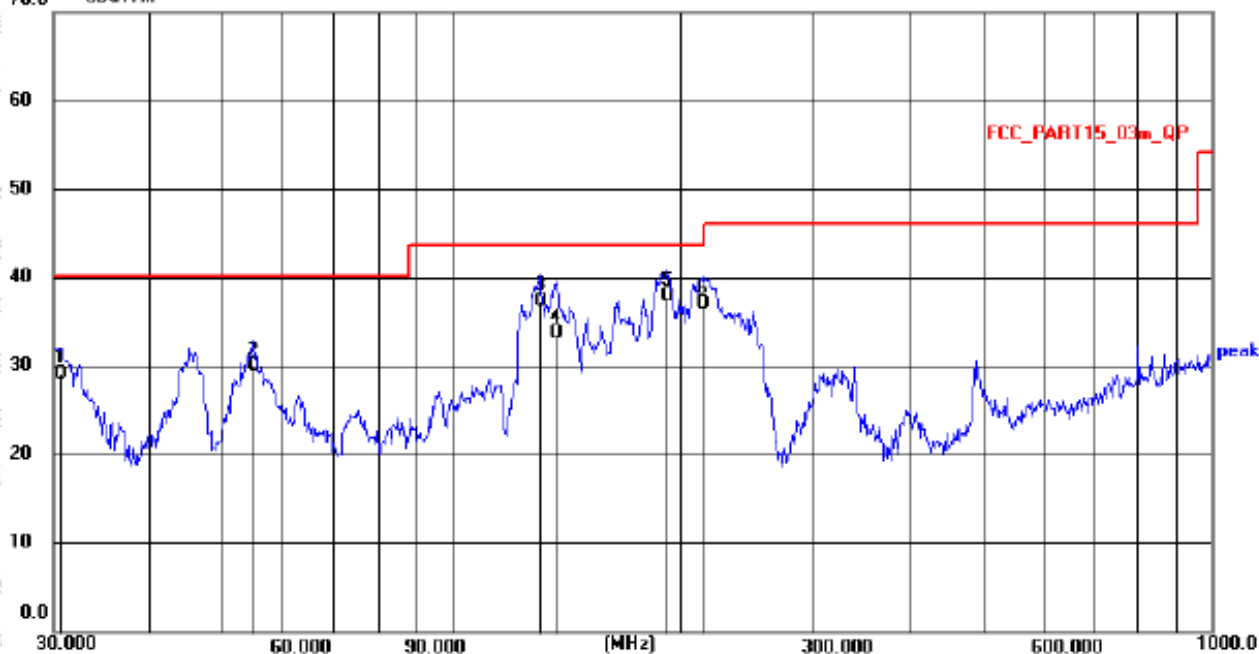


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	128.5629	21.07	13.90	34.97	43.50	8.53	QP
2	137.4200	20.82	14.29	35.11	43.50	8.39	QP
3	168.4137	19.08	13.75	32.83	43.50	10.67	QP
4	190.4050	23.08	11.86	34.94	43.50	8.56	QP
5 *	216.7828	25.61	12.18	37.79	46.00	8.21	QP
6	319.9368	14.18	15.21	29.39	46.00	16.61	QP



Vertical:

70.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.6371	16.61	12.56	29.17	40.00	10.83	QP
2	54.8348	15.98	14.03	30.01	40.00	9.99	QP
3	130.8369	23.56	13.76	37.32	43.50	6.18	QP
4	137.4200	19.46	14.16	33.62	43.50	9.88	QP
5 *	192.4182	26.47	11.45	37.92	43.50	5.58	QP
6	213.7632	25.29	11.79	37.08	43.50	6.42	QP



Above 1GHz

Frequency (MHz)	Read Level (dBμV)	polarization	Factor (dB/m)	Level (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)	Detector
a Low Channel							
11490	42.48	H	7.62	50.10	68.2	18.10	peak
11490	41.37	V	7.42	48.79	68.2	19.41	peak
a Middle Channel							
11570	41.33	H	7.67	49.00	68.2	19.20	peak
11570	40.76	V	7.47	48.23	68.2	19.97	peak
a High Channel							
11650	41.65	H	7.72	49.37	68.2	18.83	peak
11650	40.89	V	7.53	48.42	68.2	19.78	peak
n20 Low Channel							
11490	42.76	H	7.62	50.38	68.2	17.82	peak
11490	41.65	V	7.42	49.07	68.2	19.13	peak
n20 Middle Channel							
11570	40.88	H	7.67	48.55	68.2	19.65	peak
11570	40.42	V	7.47	47.89	68.2	20.31	peak
n20 High Channel							
11650	41.52	H	7.72	49.24	68.2	18.96	peak
11650	40.86	V	7.53	48.39	68.2	19.81	peak

Remarks:

1. Level = Receiver Read level + Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

----- THE END OF TEST REPORT -----