CFR 47 FCC PART 15 SUBPART E

TEST REPORT

For

Cetus Lite Brushed Whoop Quadcopter

MODEL NUMBER: Cetus Lite FPV

REPORT NUMBER: E04A23100582F00401

ISSUE DATE: May 8, 2024

FCC ID: 2AT6X-CETUSLITE

Prepared for

Shenzhen Baida Moxing Co., Ltd.
Rm. 1103, Honghua Center, No. 52, Heping Rd., Qinghua Community, Longhua St., Longhua Dist.

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	May 8, 2024	Initial Issue	

Summary of Test Results

Test Item	Clause	Limit/Requirement	Result
ON TIME AND DUTY CYCLE	ANSI C63.10-2013, Clause 12.2	None; for reporting purposes only.	Pass
6dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH	KDB 789033 D02 v02r01 Section C.1	FCC Part 15.407 (a)(2)(5)	Pass
CONDUCTED OUTPUT POWER	KDB 789033 D02 v02r01 Section E.3.a (Method PM)	FCC 15.407 (a)	Pass
POWER SPECTRAL DENSITY	KDB 789033 D02 v02r01 Section F	FCC 15.407 (a)	Pass
AC Power Line Conducted Emission	ANSI C63.10-2013, Clause 6.2.	FCC 15.207	N/A
Radiated Emissions and Band Edge Measurement	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6	FCC 15.407 (b) FCC 15.209 FCC 15.205	Pass
FREQUENCY STABILITY	N/A	FCC 15.407 (g)	Pass
Antenna Requirement	N/A	FCC 47 CFR Part 15.203/ 15.407(a)(1) (2)	Pass

*This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
*The measurement result for the sample received is <Pass> according to <CFR 47 FCC PART 15 SUBPART E> when <Accuracy Method> decision rule is applied.

CONTENTS

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Shenzhen Baida Moxing Co., Ltd.
Address:	Rm. 1103, Honghua Center, No. 52, Heping Rd., Qinghua Community, Longhua St., Longhua Dist.

Manufacturer Information

Company Name:	Shenzhen Baida Moxing Co., Ltd.
Address:	Rm. 1103, Honghua Center, No. 52, Heping Rd., Qinghua Community, Longhua St., Longhua Dist.

Factory Information

Company Name:	Shenzhen Baida Moxing Co., Ltd.
Address:	Rm. 1103, Honghua Center, No. 52, Heping Rd., Qinghua Community, Longhua St., Longhua Dist.

EUT Information

Product Description:	Cetus Lite Brushed Whoop Quadcopter
Model:	Cetus Lite FPV
Brand:	BETAFPV
Sample Received Date:	October 26, 2023
Sample Status:	Normal
Sample ID:	A23100582 001
Date of Tested:	October 26, 2023 to May 8, 2024

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART E	**Pass**

Prepared By:

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Checked By:

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Approved By:

Shawn Wen

Laboratory Manager

2. TEST METHODOLOGY

All tests were performed in accordance with the standard CFR 47 FCC PART 15 SUBPART E

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 6947.01)** Guangdong Global Testing Technology Co., Ltd. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1343)** Guangdong Global Testing Technology Co., Ltd. has been recognized to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification rules **ISED (Company No.: 30714)** Guangdong Global Testing Technology Co., Ltd. has been registered and fully described in a report filed with ISED. The Company Number is 30714 and the test lab Conformity Assessment Body Identifier (CABID) is CN0148.

Note: All tests measurement facilities use to collect the measurement data are located at Room 101-105, 203-210, Building 1, No.2, Keji 8 Road, Songshan Lake Park, Dongguan city, Guangdong, People's Republic of China, 523808

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Items	k	Uncertainty
Emission Bandwidth	1.96	±9.0 PPM
Conduct Output Power	1.96	± 1.12 dB
Power Spectral Density	1.96	± 2.1 dB
Conducted Spurious Emission	1.96	9 kHz-30 MHz: ± 0.95 dB 30 MHz-1 GHz: ± 1.5 dB 1GHz-12.75GHz: ± 1.8 dB 12.75 GHz-26.5 GHz: ± 2.1dB 26.5 GHz-40 GHz: ± 2.6 dB
Frequency Stability	1.96	±9.0 PPM
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.		

Test Item	Frequency Range	k	U(dB)
Conducted emissions from the AC mains power ports (AMN)	150 kHz ~ 30 MHz	2	3.37
Radiated emissions	9 kHz ~ 30 MHz	2	4.16
Radiated emissions	30 MHz ~ 1 GHz	2	3.79
Radiated emissions	1 GHz ~ 18 GHz	2	5.62
Radiated emissions	18 GHz ~ 40 GHz	2	5.54
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name		Cetus Lite Brushed Whoop Quadcopter
Model		Cetus Lite FPV
Hardware Version		V1.0
Software Version		V1.0
Ratings		Battery 3.8V
Power Supply	DC	3.8V

Frequency Band:	5725 MHz to 5850 MHz
Frequency Range:	5733 MHz to 5843 MHz
Type of Modulation:	FM
Number of Channels:	19
Maximum conducted output power:	-13.96dBm
Antenna Type:	Internal Antenna
Antenna Gain:	2.25 dBi
EUT Test software:	/

5.2. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5733	6	5765	11	5800	16	5825
2	5740	7	5771	12	5805	17	5828
3	5745	8	5780	13	5806	18	5840
4	5752	9	5785	14	5809	19	5843
5	5760	10	5790	15	5820		

5.3. MAXIMUM CONDUCTED OUTPUT POWER

Test Mode	Frequency (MHz)	Channel Number	Maximum conducted output power (dBm)
FM	5733 ~ 5843	1-19[19]	-13.96

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
FM	CH 1(Low Channel), CH 10(MID Channel), CH 19(High Channel)	5733 MHz, 5790 MHz, 5843 MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 5725 ~ 5850MHz Band				
Test Software Version		/		
Modulation Type	Transmit Antenna Number	Test Software setting value		
		CH 1	CH 10	CH 19
FM	1	default	default	default

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	5733-5843	Internal Antenna	2.25

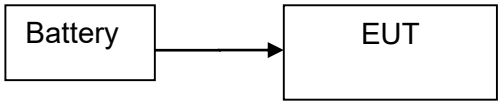
Test Mode	Transmit and Receive Mode	Description
FM	☒1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

5.7. SUPPORT UNITS FOR SYSTEM TEST

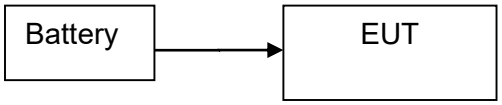
Equipment	**Manufacturer**	**Model No.**
Battery	Shenzhen Baida Moxing Co., Ltd.	/

5.8. SETUP DIAGRAM

Radiated Emission:



RF conducted:



6. MEASURING EQUIPMENT AND SOFTWARE USED

Test Equipment of Conducted RF					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
Spectrum Analyzer	Rohde & Schwarz	FSV40	102257	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51285127	2023/09/18	2024/09/17
EXG Analog Signal Generator	KEYSIGHT	N5173B	MY61253075	2023/09/18	2024/09/17
Vector Signal Generator	Rohde & Schwarz	SMM100A	101899	2023/09/18	2024/09/17
RF Control box	MWRF-test	MW100-RFCB	MW220926GTG	2023/09/18	2024/09/17
Wideband Radio Communication Tester	Rohde & Schwarz	CMW270	102792	2023/09/18	2024/09/17
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	103235	2023/09/18	2024/09/17
temperature humidity chamber	Espec	SH-241	SH-241-2014	2023/09/18	2024/09/17
RF Test Software	MWRF-test	MTS8310E (Ver. V2/0)	N/A	N/A	N/A

Test Equipment of Radiated emissions below 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2146	2022/08/30	2025/08/29
EMI Test Receiver	Rohde & Schwarz	ESCI3	101409	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2023/09/18	2024/09/17
Pre-Amplifier	HzEMC	HPA-9K0130	HYPA21001	2023/09/18	2024/09/17
Biconilog Antenna	Schwarzbeck	VULB 9168	01315	2022/10/10	2025/10/09
Biconilog Antenna	ETS	3142E	00243646	2022/03/23	2025/03/22
Loop Antenna	ETS	6502	243668	2022/03/30	2025/03/29
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE)	N/A	N/A	N/A

Test Equipment of Radiated emissions above 1GHz					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal.**	**Due Date**
3m Semi-anechoic Chamber	ETS	9m*6m*6m	Q2149	2022/08/30	2025/08/29
Spectrum Analyzer	Rohde & Schwarz	FSV40	101413	2023/09/18	2024/09/17
Spectrum Analyzer	KEYSIGHT	N9020A	MY51283932	2023/09/18	2024/09/17
Pre-Amplifier	A-INFO	HPA-1G1850	HYPA21003	2023/09/18	2024/09/17
Horn antenna	A-INFO	3117	246069	2022/03/11	2025/03/10
Pre-Amplifier	ZKJC	HPA-184057	HYPA21004	2023/09/18	2024/09/17

Horn antenna	ZKJC	3116C	246265	2022/03/29	2025/03/28
Test Software	Farad	EZ-EMC (Ver.FA-03A2 RE+)	N/A	N/A	N/A

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

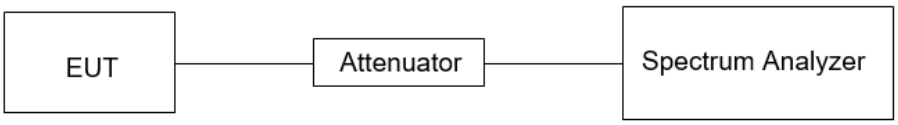
None; for reporting purposes only.

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.B.

The zero-span mode on a spectrum analyzer or EMI receiver, if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T, where T is defined in II.B.1.a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

TEST SETUP



TEST ENVIRONMENT

Temperature	24.3℃	Relative Humidity	54%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.2. 6DB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
6 dB Emission Bandwidth	The minimum 6 dB emission bandwidth shall be 500 kHz.	5725 ~ 5850
99 % Occupied Bandwidth	For reporting purposes only.	5725 ~ 5850

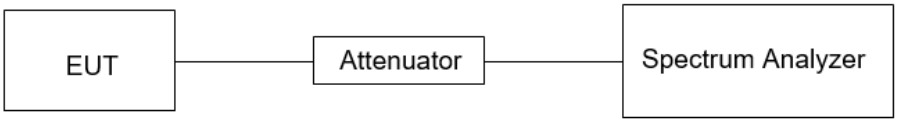
TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.C1. for 26 dB Emission Bandwidth; section II.C2. for 6 dB Emission Bandwidth; section II.D. for 99 % Occupied Bandwidth.
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6 dB Emission Bandwidth: RBW=100 kHz For 99 % Occupied Bandwidth: approximately 1 % ~ 5 % of the OBW.
VBW	For 6 dB Bandwidth: ≥ 3*RBW For 99 % Bandwidth: >3*RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99 % power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.
b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6/26 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.3℃	Relative Humidity	54%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.3. CONDUCTED OUTPUT POWER

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
Conducted Output Power	Shall not exceed 1 Watt (30 dBm).	5725 ~ 5850

Note:
The above limits are based upon the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.E.

Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep):
(i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 %, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
(viii) Trace average at least 100 traces in power averaging (rms) mode.
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

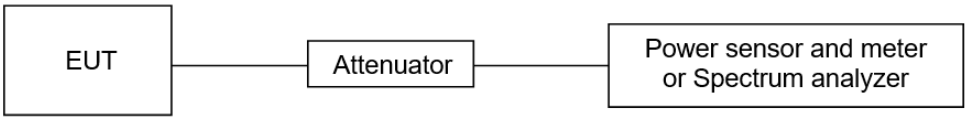
Method PM (Measurement using an RF average power meter):
(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
a. The EUT is configured to transmit continuously or to transmit with a constant duty 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 II.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 %).

Method PM-G (Measurement using a gated RF average power meter):
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Straddle channel power was measured using spectrum analyzer.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.3℃	Relative Humidity	54%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.4. POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
Power Spectral Density	30 dBm/500kHz	5725 ~ 5850

Note:
The above limits are based upon the maximum antenna gain does not exceed 6 dBi.
If transmitting antennas of directional gain greater than 6 dBi are used, maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

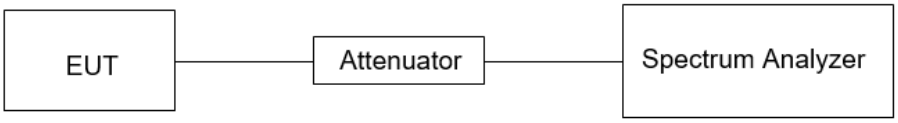
Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.F.

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	RMS
RBW	500 kHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

Allow trace to fully stabilize and Use the peak search function on the instrument to find the peak of the spectrum and record its value.
Add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum, the result is the Maximum PSD over 1 MHz / 500 kHz reference bandwidth.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.3℃	Relative Humidity	54%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

7.5. FREQUENCY STABILITY

LIMITS

The frequency of the carrier signal shall be maintained within band of operation.

TEST PROCEDURE

1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between 0 °C ~ 45 °C (declared by customer).

2. The temperature was incremented by 10 °C intervals and the unit allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

3. The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

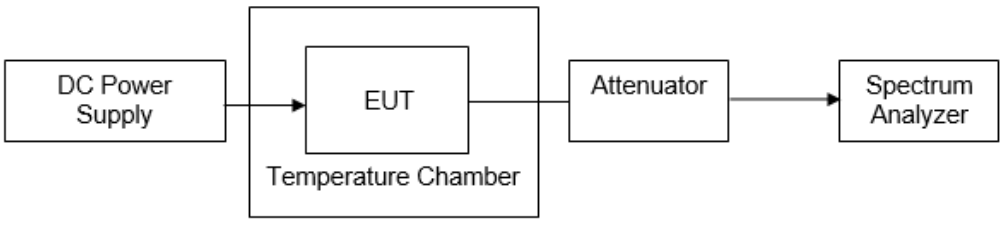
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	10 kHz
VBW	≥3 × RBW
Span	Encompass the entire emissions bandwidth (EBW) of the signal
Trace	Max hold
Sweep time	Auto

4. While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup, and at 2 minutes, 5minutes, and 10 minutes after the EUT is energized.

5. Allow the trace to stabilize, find the peak value of the power envelope and record the frequency, then calculated the frequency drift.

TEST SETUP



TEST ENVIRONMENT

Temperature	20℃	Relative Humidity	52%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section "Test Data" - Appendix A

8. RADIATED TEST RESULTS

LIMITS

Refer to CFR 47 FCC §15.205, §15.209 and §15.407 (b).

Refer to ISED RSS-GEN Clause 8.9, Clause 8.10 and ISED RSS-247 6.2.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz ~ 1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

ISED General field strength limits at frequencies below 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) (µA/m)	Measurement distance (m)
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

ISED Restricted bands refer to ISED RSS-GEN Clause 8.10

Table 7 – Restricted frequency bands[Note 1]		
MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c
Limits of unwanted/undesirable emission out of the restricted bands refer to CFR 47 FCC

§15.407 (b) and ISED RSS-247 6.2.

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1GHz)		
Frequency Range (MHz)	EIRP Limit	Field Strength Limit (dBuV/m) at 3 m
5725~5850 MHz	PK: -27 (dBm/MHz) *1 PK: 10 (dBm/MHz) *2 PK: 15.6 (dBm/MHz) *3 PK: 27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK: 105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK: 122.2 (dBμV/m) *4
Note: *1 beyond 75 MHz or more above of the band edge. *2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. *3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above. *4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.		

TEST PROCEDURE

Below 30 MHz

The setting of the spectrum analyser

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz

The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80 cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1 GHz

The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.G.3 ~ II.G.6.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

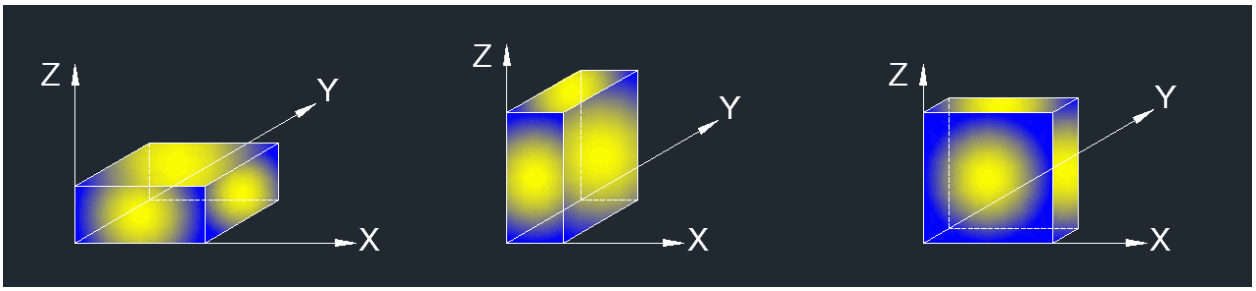
3. The EUT was placed on a turntable with 1.5 m above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

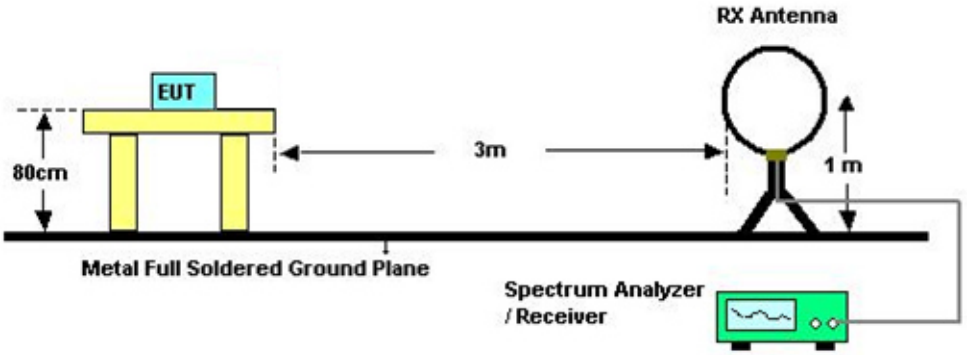
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

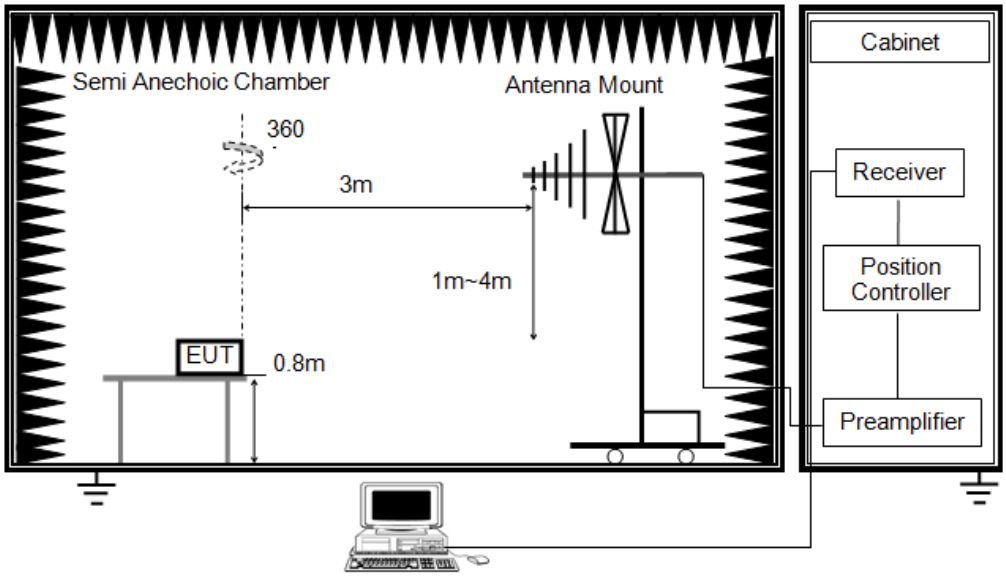
X axis, Y axis, Z axis positions :

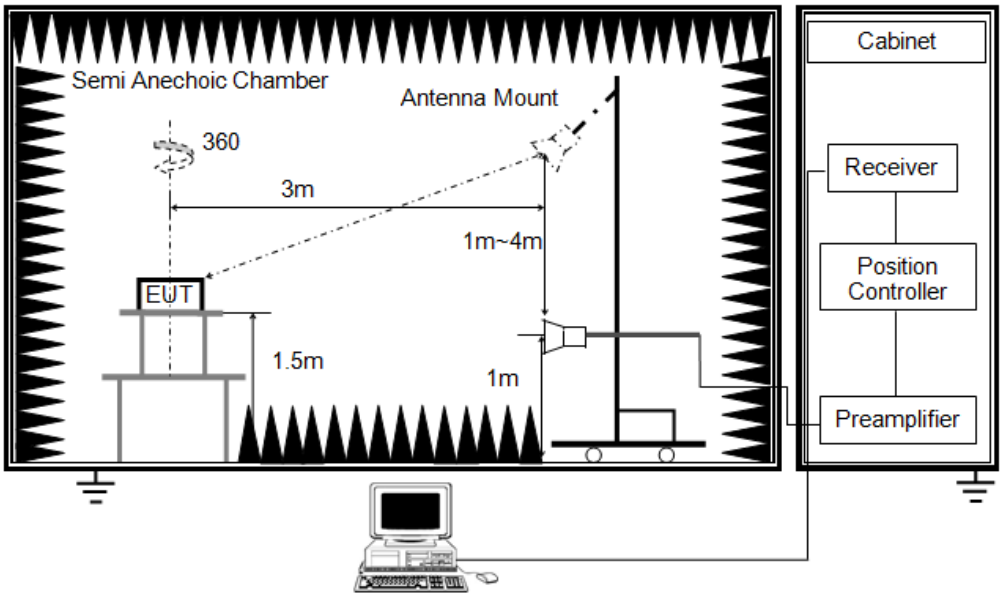


Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

TEST SETUP


RX Antenna
EUT
80cm
3m
1 m
Metal Full Soldered Ground Plane
Spectrum Analyzer
/ Receiver


Semi Anechoic Chamber
Antenna Mount
360
3m
1m~4m
EUT
0.8m
Cabinet
Receiver
Position
Controller
Preamplifier


Semi Anechoic Chamber
Antenna Mount
360
3m
1m~4m
EUT
1.5m
1m
Cabinet
Receiver
Position
Controller
Preamplifier

TEST ENVIRONMENT

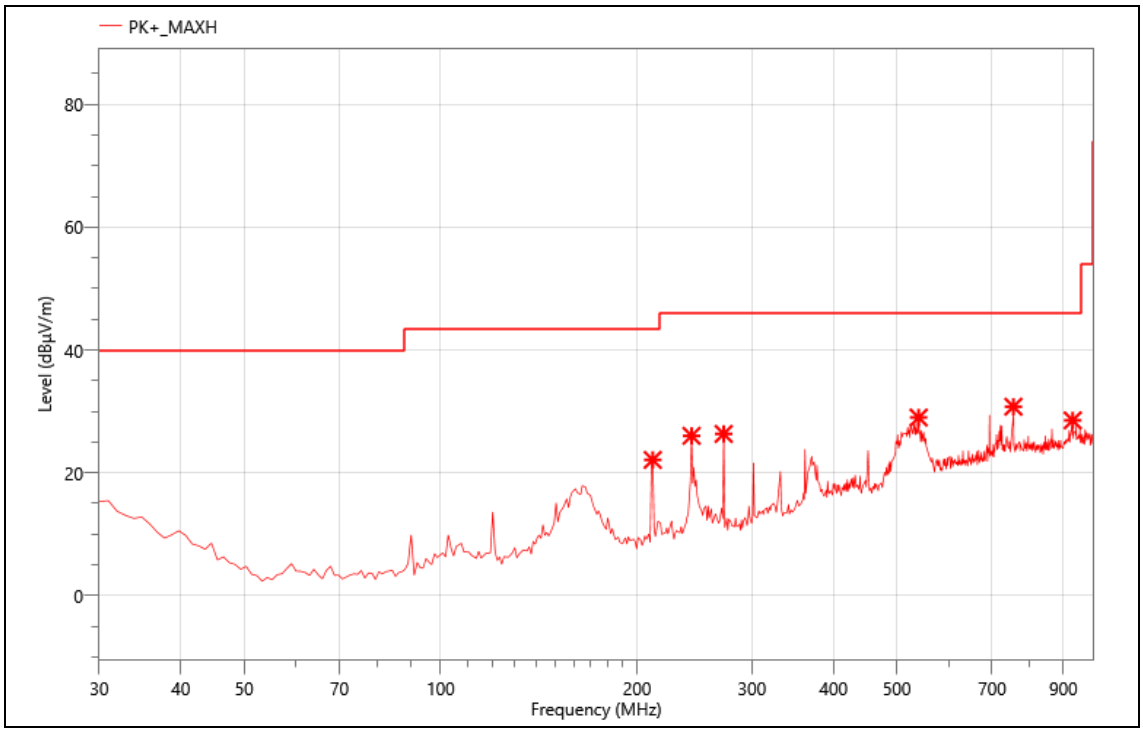
Temperature	24.5℃	Relative Humidity	54%
Atmosphere Pressure	101kPa		

TEST RESULTS

Please refer to section 8.1.

8.1. RADIATED EMISSIONS AND BAND EDGE MEASUREMENT

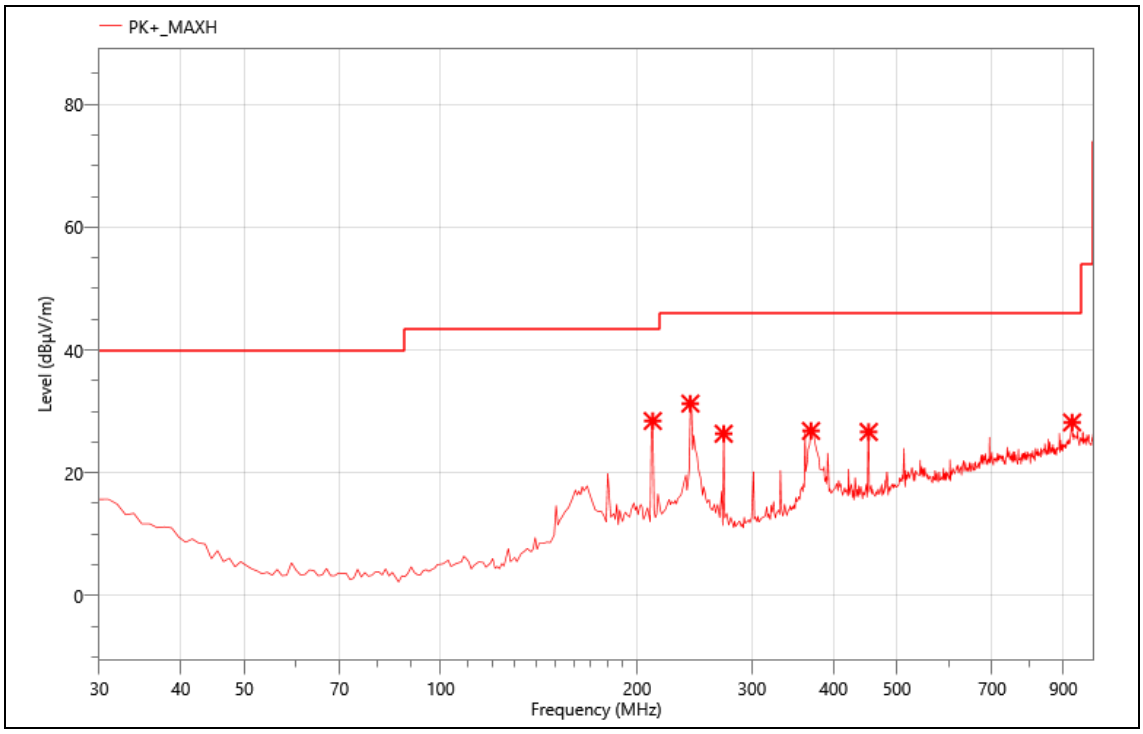
Mode:	5.8G 5790MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	211.390	43.32	22.10	43.50	21.40	PK+	H	-21.22
2	242.430	45.50	26.02	46.00	19.98	PK+	H	-19.48
3	271.530	44.97	26.33	46.00	19.67	PK+	H	-18.64
4	540.220	39.25	29.00	46.00	17.00	PK+	H	-10.25
5	754.590	38.09	30.77	46.00	15.23	PK+	H	-7.32
6	930.160	31.49	28.54	46.00	17.46	PK+	H	-2.95

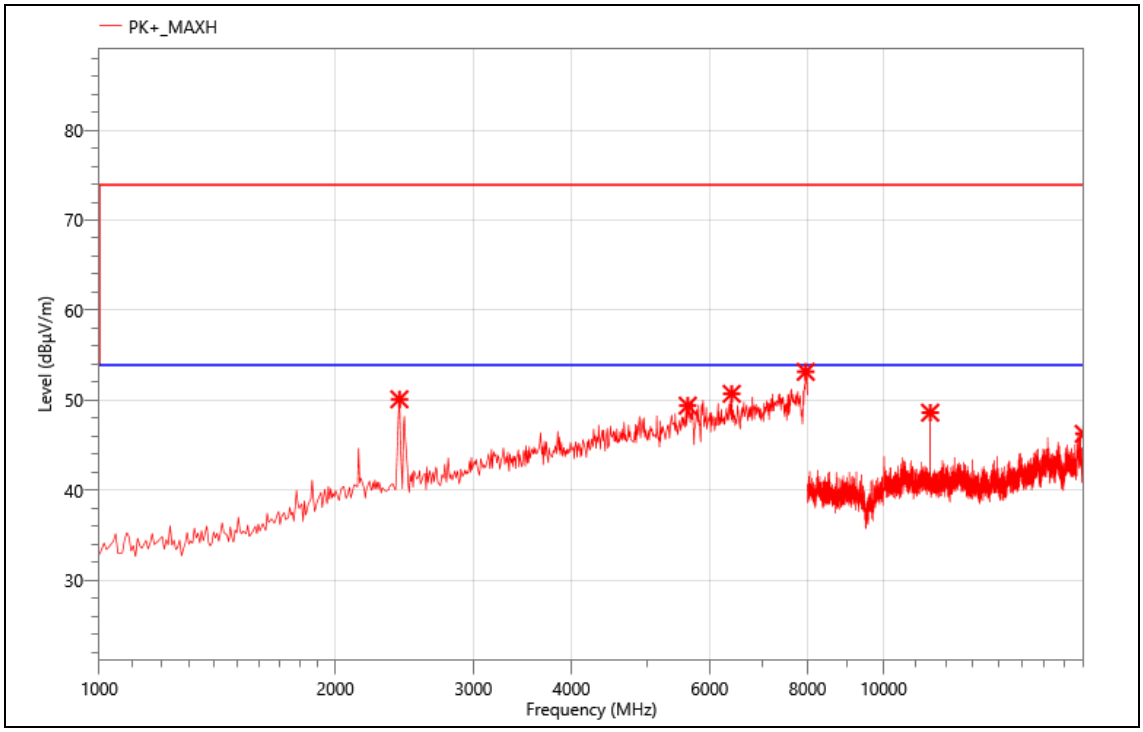
Mode:	5.8G 5790MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	211.390	49.66	28.44	43.50	15.06	PK+	V	-21.22
2	241.460	50.80	31.27	46.00	14.73	PK+	V	-19.53
3	271.530	45.00	26.36	46.00	19.64	PK+	V	-18.64
4	369.500	42.28	26.82	46.00	19.18	PK+	V	-15.46
5	452.920	40.49	26.65	46.00	19.35	PK+	V	-13.84
6	928.220	31.30	28.21	46.00	17.79	PK+	V	-3.09

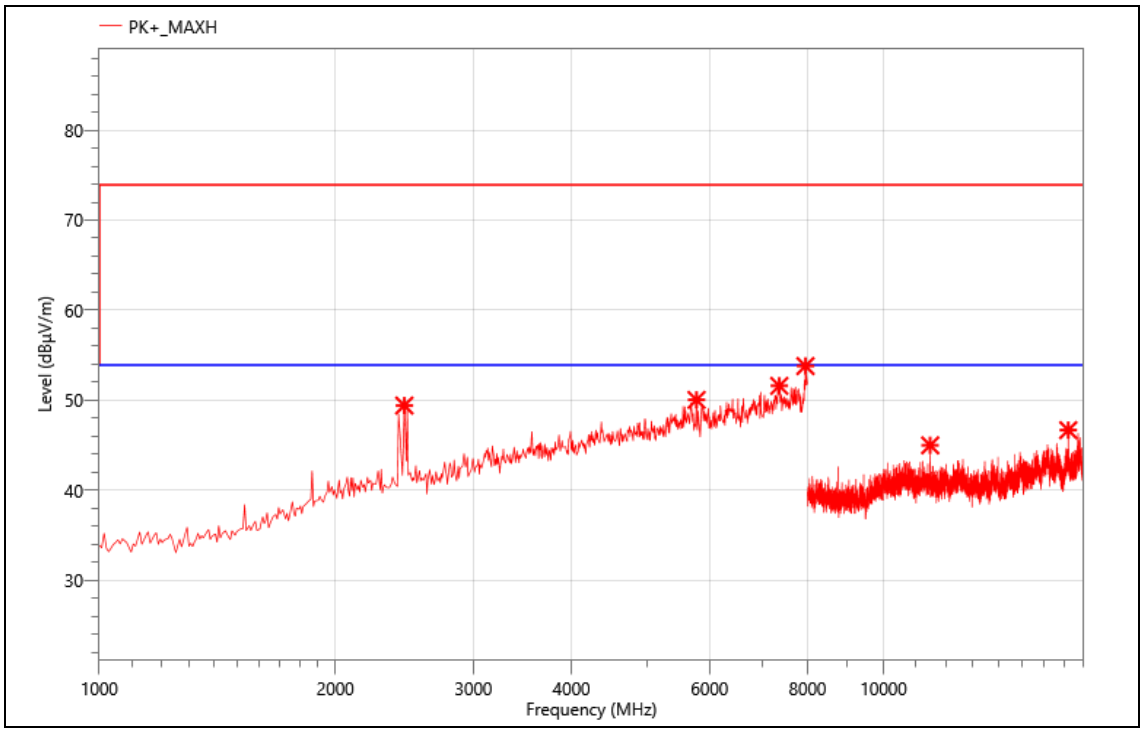
Mode:	5.8G 5733MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	2414.000	58.76	50.10	74.00	23.90	PK+	V	-8.66
2	5627.000	50.98	49.39	74.00	24.61	PK+	V	-1.59
3	6404.000	47.22	50.71	74.00	23.29	PK+	V	3.49
4	7958.000	36.60	53.15	74.00	20.85	PK+	V	16.55
5	11467.000	53.08	48.61	74.00	25.39	PK+	V	-4.47
6	18000.000	45.47	46.26	74.00	27.74	PK+	V	0.79

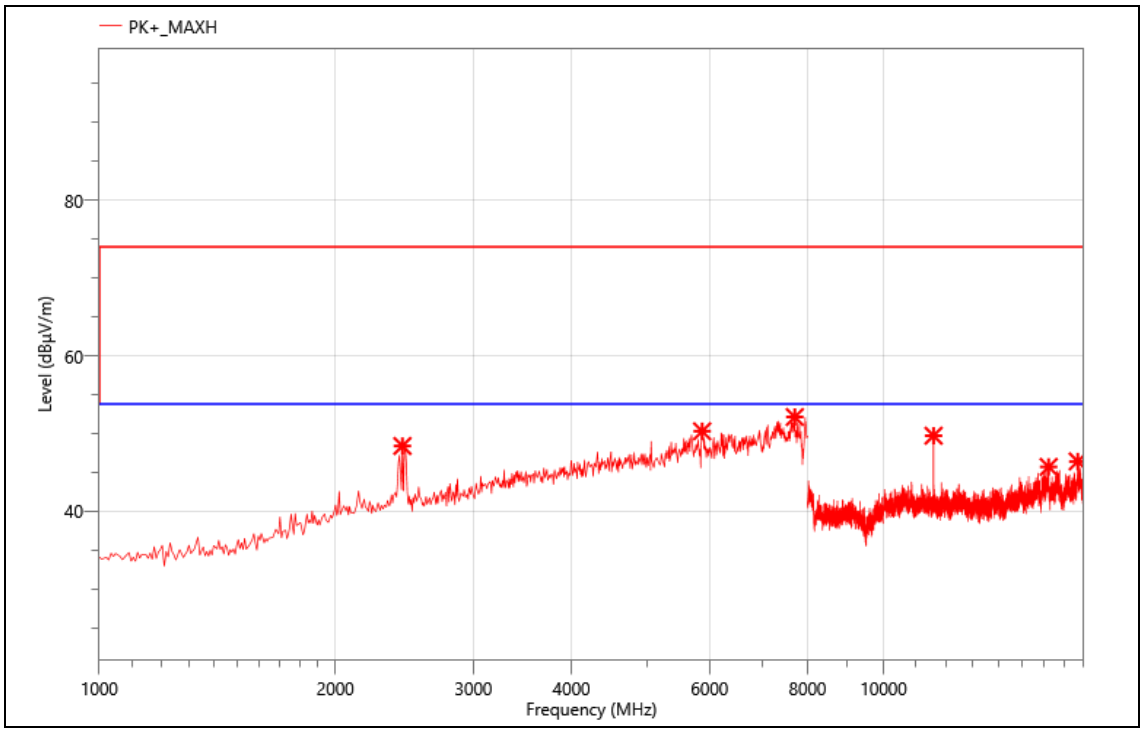
Mode:	5.8G 5733MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	2449.000	58.45	49.40	74.00	24.60	PK+	H	-9.05
2	5774.000	51.25	50.03	74.00	23.97	PK+	H	-1.22
3	7363.000	41.97	51.59	74.00	22.41	PK+	H	9.62
4	7951.000	36.91	53.79	74.00	20.21	PK+	H	16.88
5	11466.000	49.45	44.98	74.00	29.02	PK+	H	-4.47
6	17200.000	47.78	46.67	74.00	27.33	PK+	H	-1.11

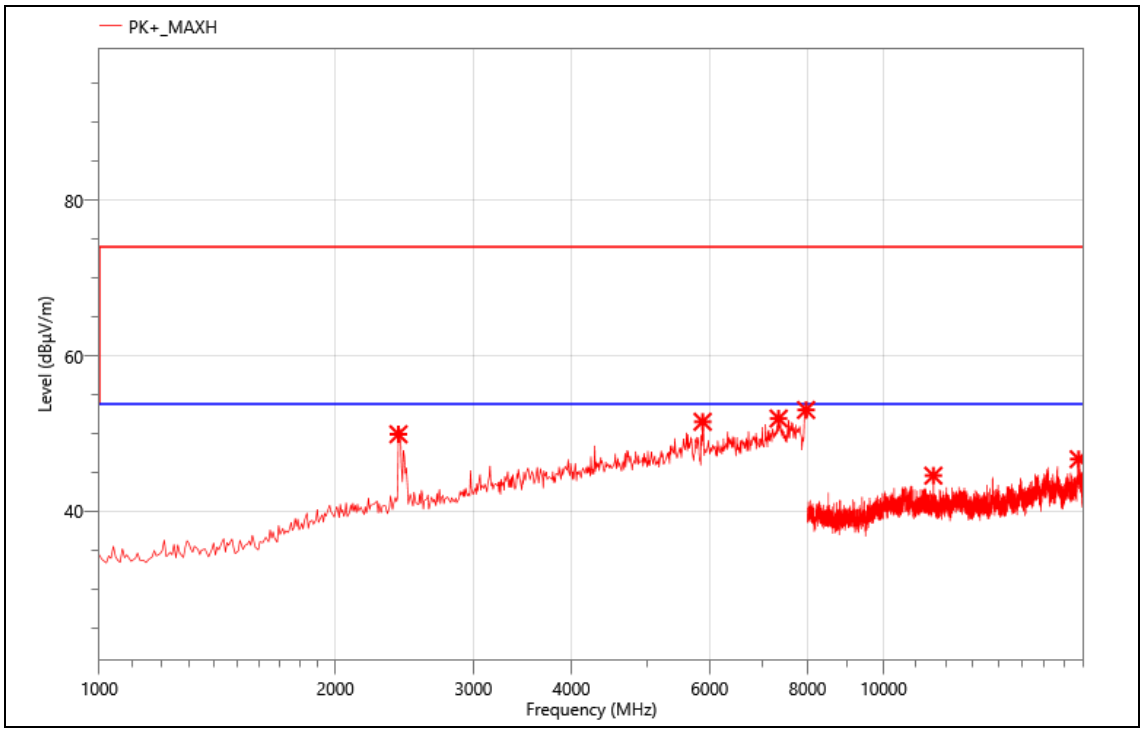
Mode:	5.8G 5790MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	2435.000	57.39	48.42	74.00	25.58	PK+	V	-8.97
2	5872.000	50.26	50.31	74.00	23.69	PK+	V	0.05
3	7706.000	41.63	52.14	74.00	21.86	PK+	V	10.51
4	11581.000	54.61	49.74	74.00	24.26	PK+	V	-4.87
5	16238.000	47.10	45.73	74.00	28.27	PK+	V	-1.37
6	17683.000	46.83	46.43	74.00	27.57	PK+	V	-0.4

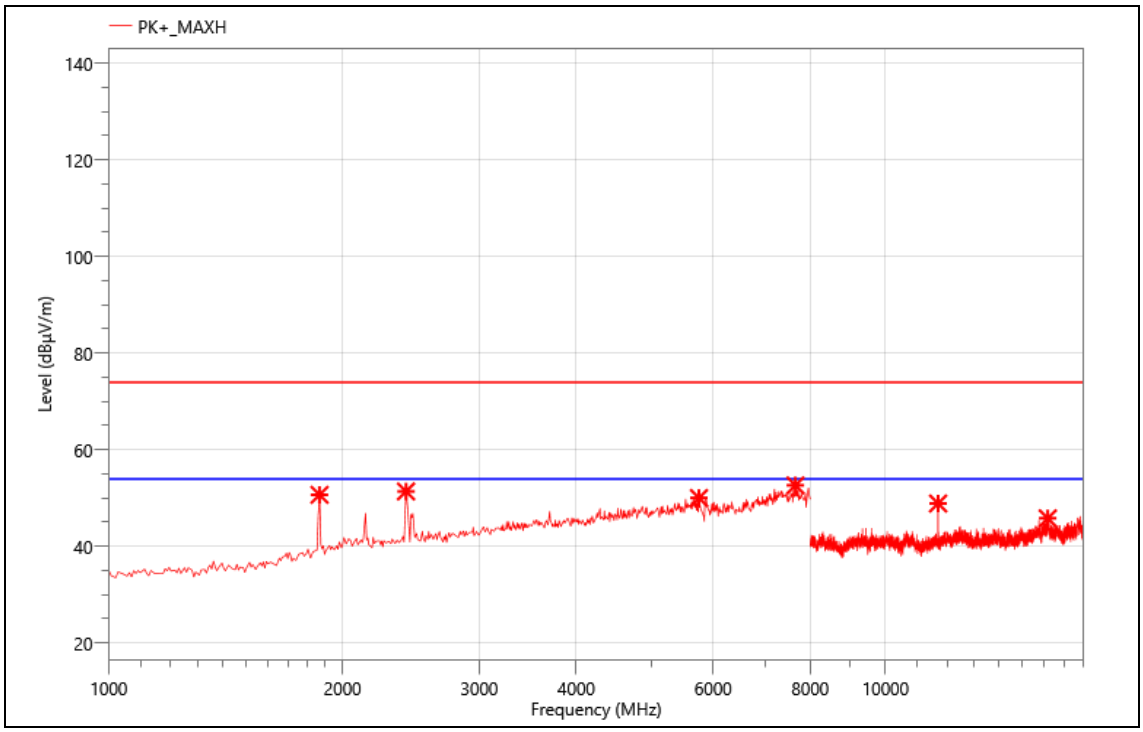
Mode:	5.8G 5790MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	2407.000	58.46	49.92	74.00	24.08	PK+	H	-8.54
2	5879.000	51.86	51.53	74.00	22.47	PK+	H	-0.33
3	7349.000	42.56	51.95	74.00	22.05	PK+	H	9.39
4	7965.000	36.82	53.05	74.00	20.95	PK+	H	16.23
5	11575.000	49.40	44.60	74.00	29.40	PK+	H	-4.8
6	17733.000	47.40	46.72	74.00	27.28	PK+	H	-0.68

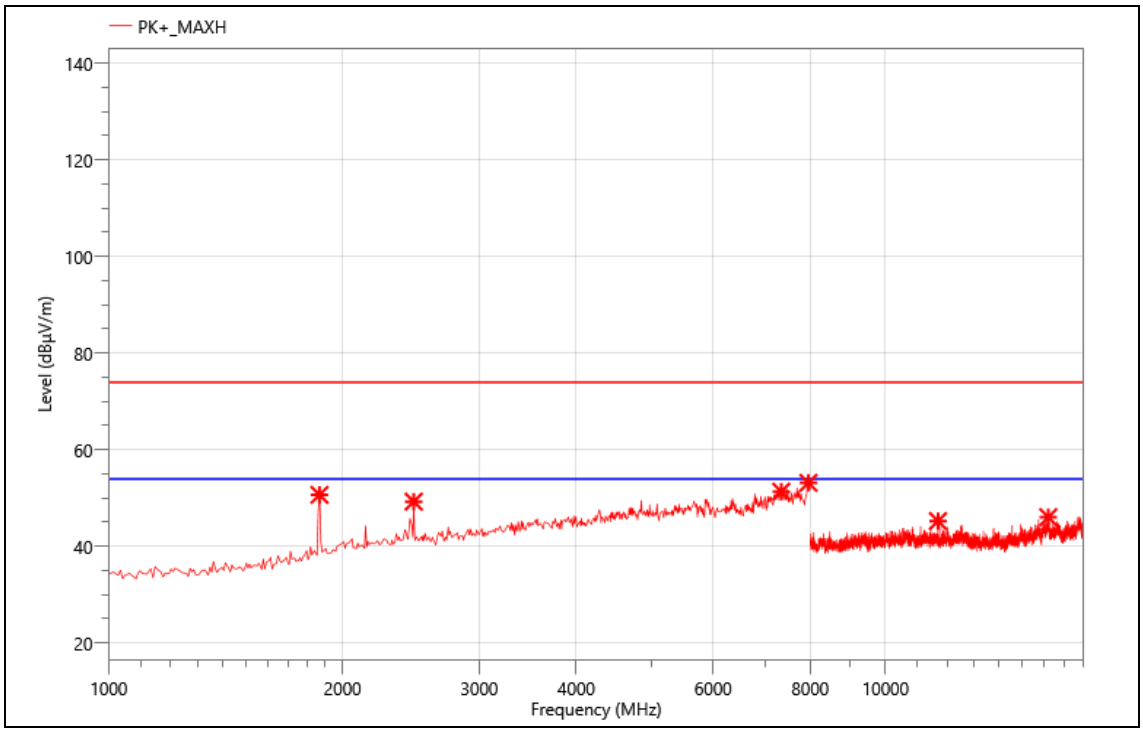
Mode:	5.8G 5843MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	1868.000	61.12	50.66	74.00	23.34	PK+	V	-10.46
2	2414.000	60.02	51.36	74.00	22.64	PK+	V	-8.66
3	5753.000	51.20	50.00	74.00	24.00	PK+	V	-1.2
4	7657.000	41.31	52.61	74.00	21.39	PK+	V	11.3
5	11688.000	53.82	48.86	74.00	25.14	PK+	V	-4.96
6	16178.000	46.05	45.80	74.00	28.20	PK+	V	-0.25

Mode:	5.8G 5843MHz
Power:	Battery 3.8V
TE:	Berny
Date	2024/4/22
T/A/P	24.3℃/54%/101Kpa



Critical_Freqs

No.	Freq. (MHz)	Reading (dBµV)	Meas. (dBµV/m)	Limit (dBµV/m)	Margin (dBµV/m)	Det.	Pol.	Corr. (dB)
1	1868.000	61.11	50.65	74.00	23.35	PK+	H	-10.46
2	2470.000	58.18	49.24	74.00	24.76	PK+	H	-8.94
3	7342.000	42.04	51.32	74.00	22.68	PK+	H	9.28
4	7958.000	36.60	53.15	74.00	20.85	PK+	H	16.55
5	11686.000	50.16	45.22	74.00	28.78	PK+	H	-4.94
6	16205.000	46.74	46.03	74.00	27.97	PK+	H	-0.71

Note:

1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.
5. The frequency, which started from 18 GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

5.725-5.85 GHz

Note: The main frequency is too far away from the restricted band and does not require testing.

9. ANTENNA REQUIREMENT

REQUIREMENT

Please refer to FCC §15.203
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 shall be considered sufficient to comply with the provisions of this section. 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.

Please refer to FCC §15.407(a)(1)(2)(3)
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DESCRIPTION

Pass

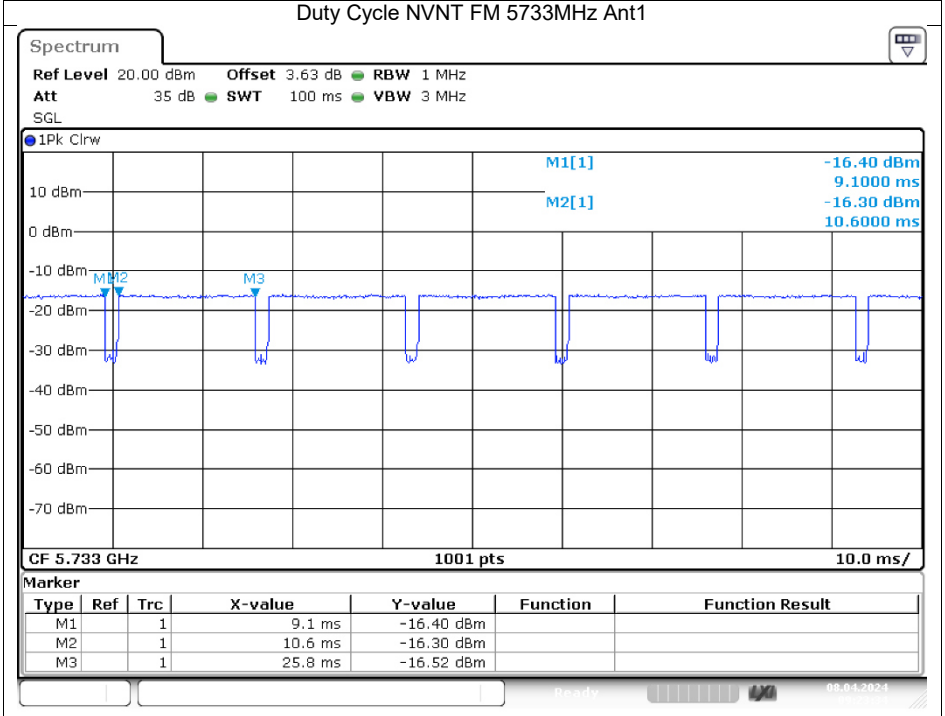
10. TEST DATA - Appendix A

Duty Cycle

Condition	Mode	Frequency (MHz)	Antenna	On Time (ms)	Period (ms)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
NVNT	FM	5733	Ant1	15.2	16.7	91.02	0.41	0.07
NVNT	FM	5790	Ant1	15.3	16.8	91.07	0.41	0.07
NVNT	FM	5843	Ant1	15.2	16.7	91.02	0.41	0.07

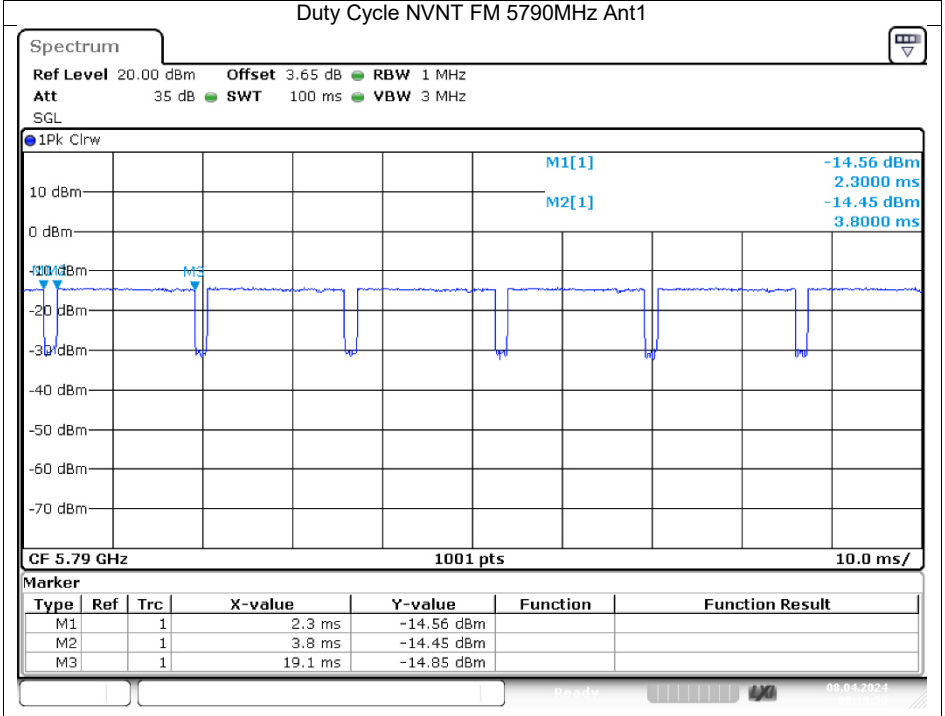
Test Graphs

Duty Cycle NVNT FM 5733MHz Ant1



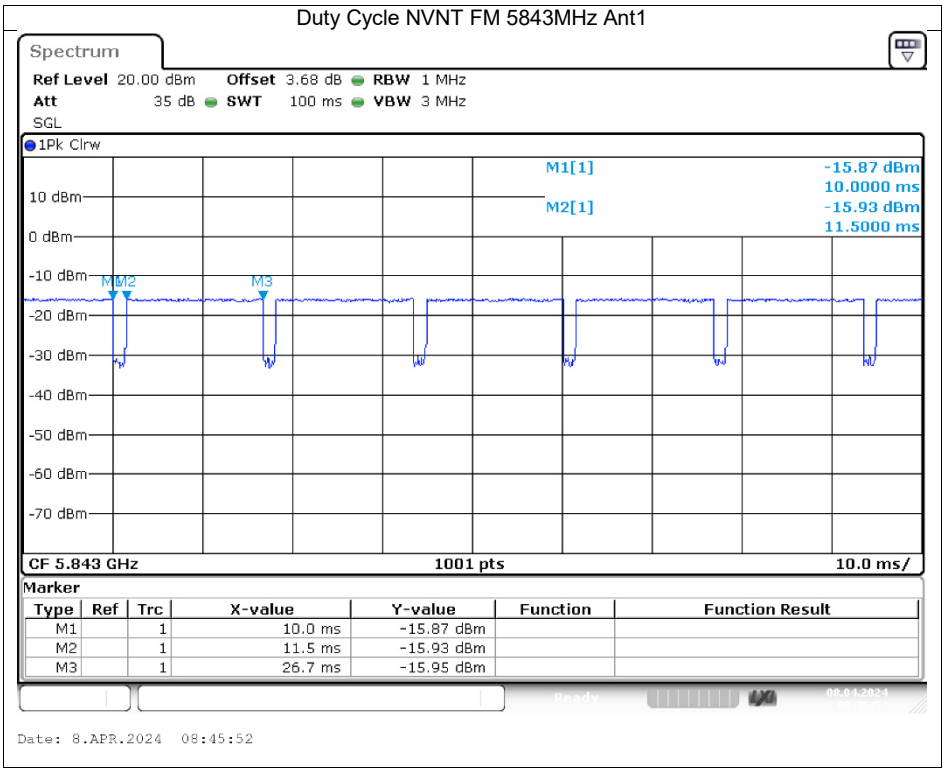
Date: 8.APR.2024 09:23:34

Duty Cycle NVNT FM 5790MHz Ant1



Date: 8.APR.2024 08:19:59

Duty Cycle NVNT FM 5843MHz Ant1



Maximum Conducted Output Power

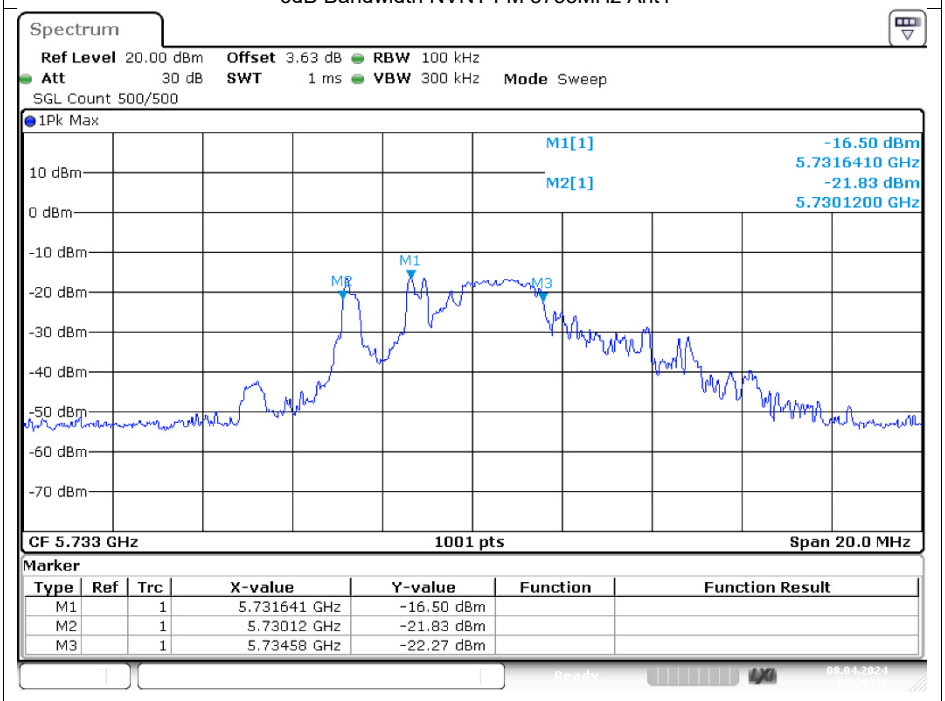
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	FM	5733	Ant1	-14.92	0.41	-14.51	30	Pass
NVNT	FM	5790	Ant1	-14.37	0.41	-13.96	30	Pass
NVNT	FM	5843	Ant1	-14.8	0.41	-14.39	30	Pass

-6dB Bandwidth

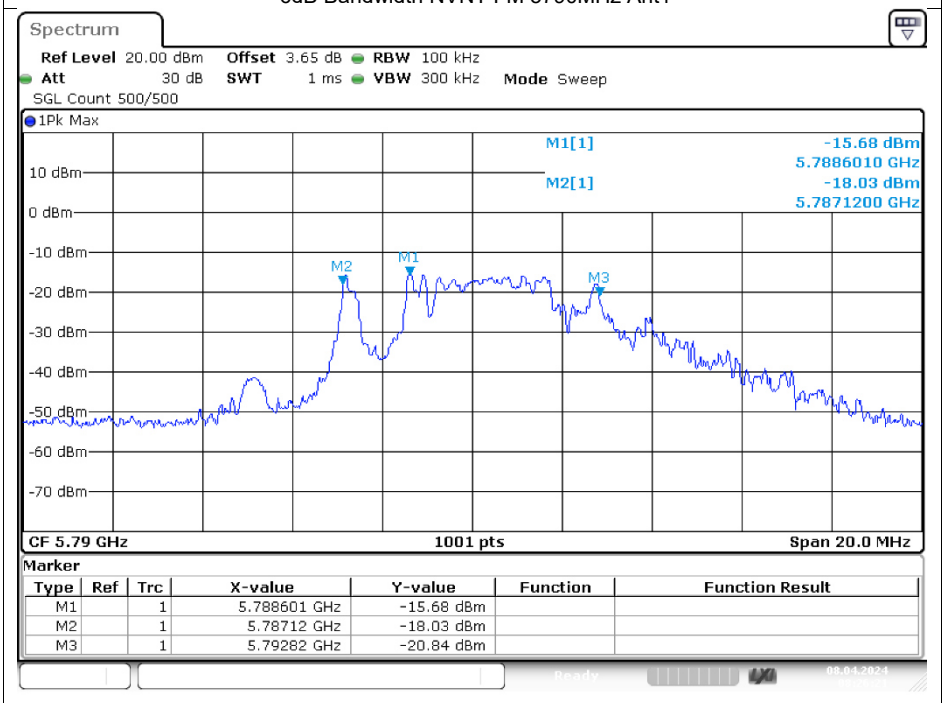
Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	FM	5733	Ant1	4.46	0.5	Pass
NVNT	FM	5790	Ant1	5.7	0.5	Pass
NVNT	FM	5843	Ant1	5.54	0.5	Pass

Test Graphs

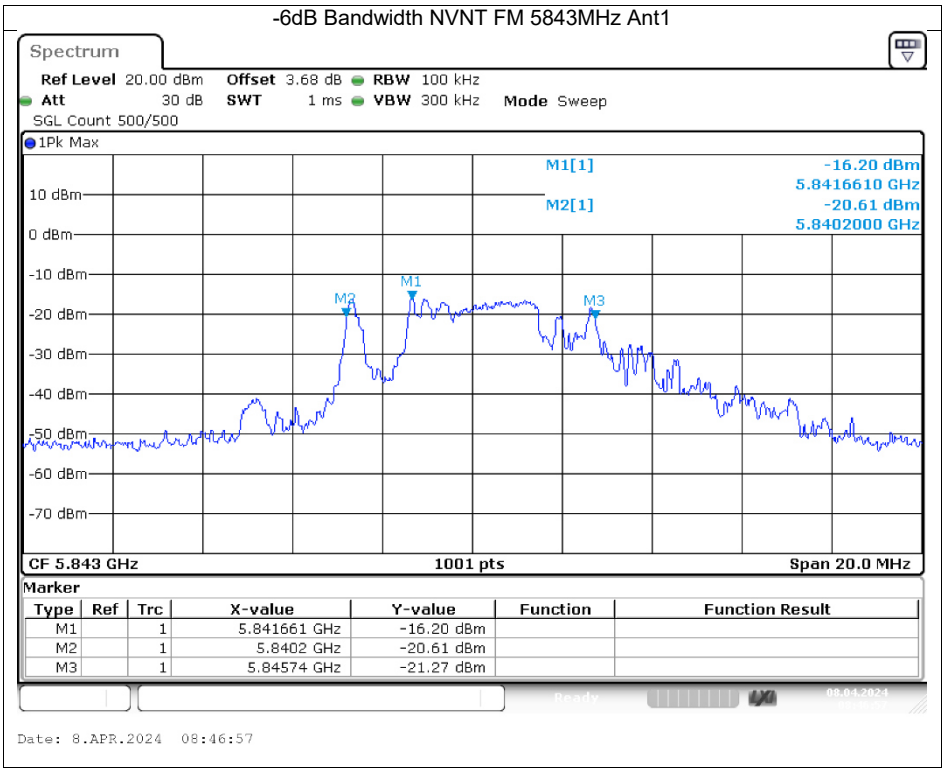
-6dB Bandwidth NVNT FM 5733MHz Ant1



-6dB Bandwidth NVNT FM 5790MHz Ant1



-6dB Bandwidth NVNT FM 5843MHz Ant1

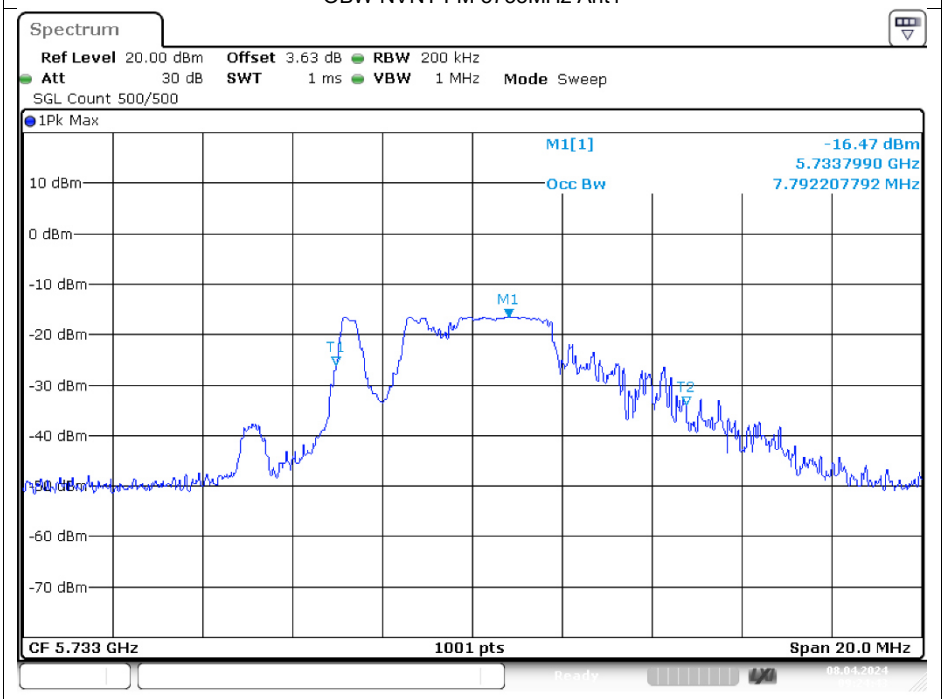


Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	FM	5733	Ant1	7.792
NVNT	FM	5790	Ant1	8.052
NVNT	FM	5843	Ant1	7.872

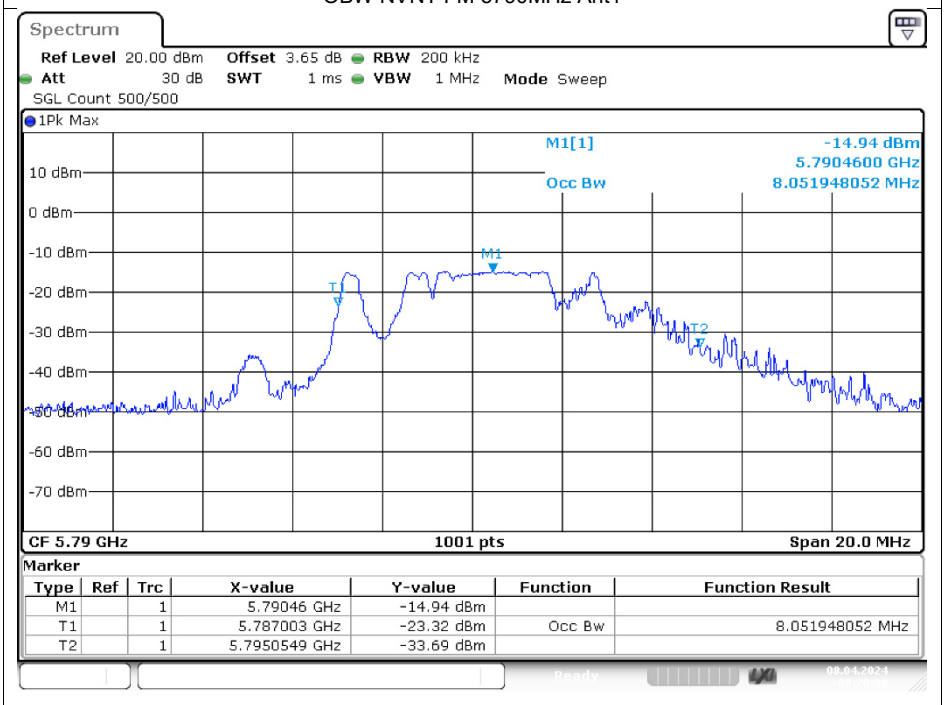
Test Graphs

OBW NVNT FM 5733MHz Ant1



Date: 8.APR.2024 09:24:43

OBW NVNT FM 5790MHz Ant1

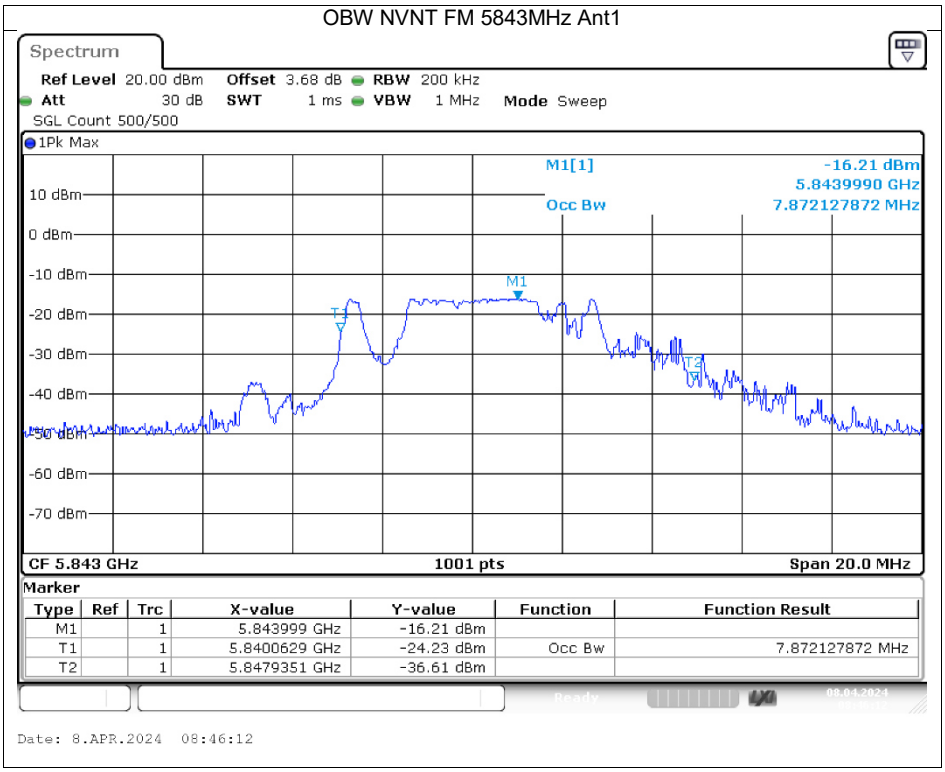


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.79046 GHz	-14.94 dBm		
T1		1	5.787003 GHz	-23.32 dBm	Occ Bw	8.051948052 MHz
T2		1	5.7950549 GHz	-33.69 dBm		

Date: 8.APR.2024 08:20:39

OBW NVNT FM 5843MHz Ant1

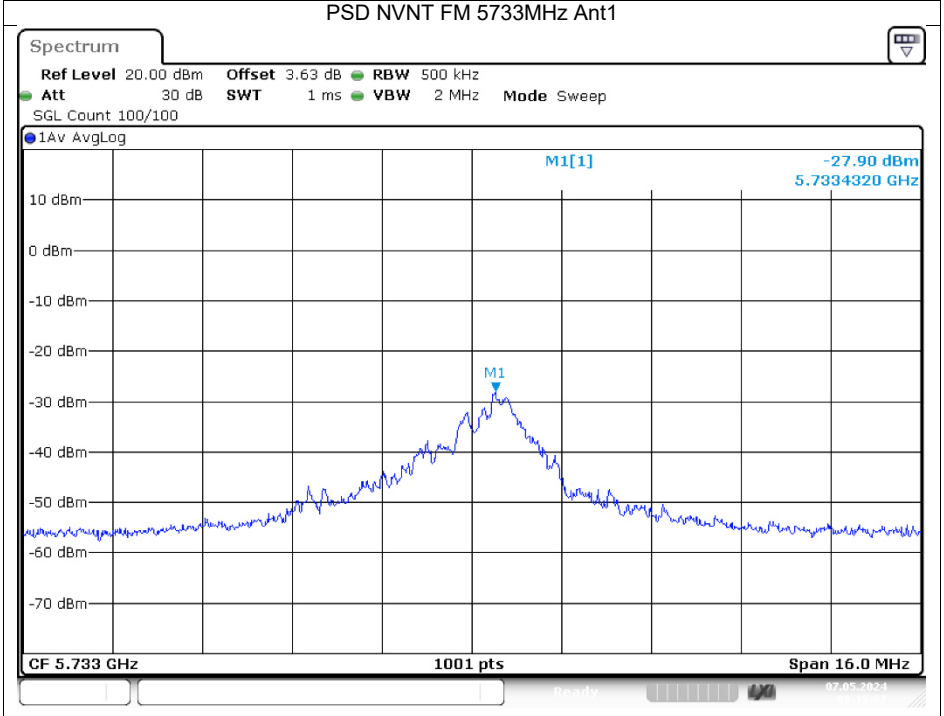


Maximum Power Spectral Density Level

Condition	Mode	Frequency (MHz)	Antenna	Conducted PSD (dBm)	Duty Factor (dB)	Total PSD (dBm)	Limit (dBm)	Verdict
NVNT	FM	5733	Ant1	-27.9	0.41	-27.49	30	Pass
NVNT	FM	5790	Ant1	-30.98	0.41	-30.57	30	Pass
NVNT	FM	5843	Ant1	-32.3	0.41	-31.89	30	Pass

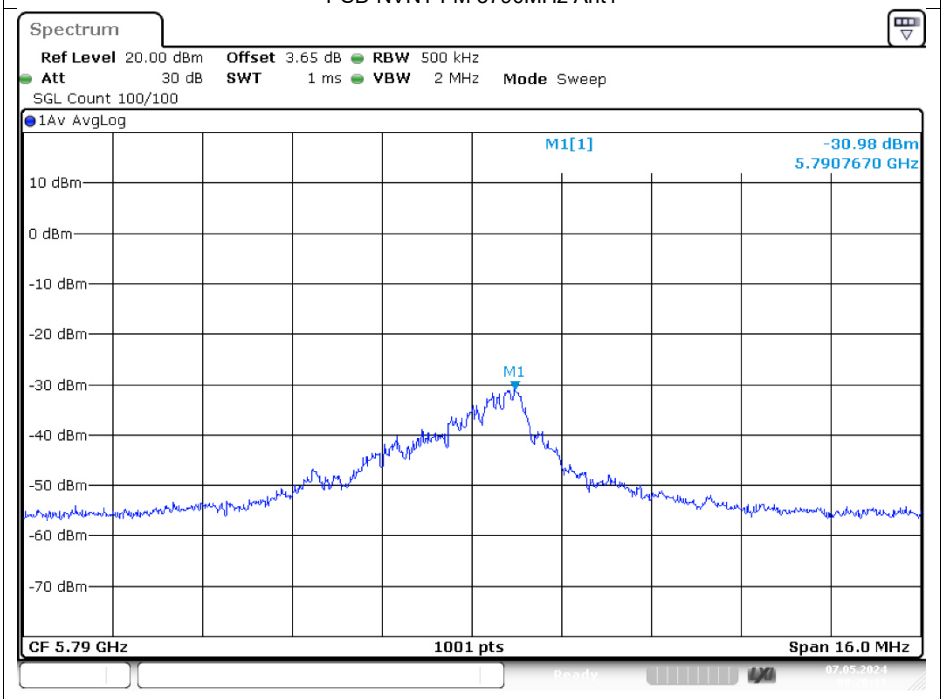
Test Graphs

PSD NVNT FM 5733MHz Ant1



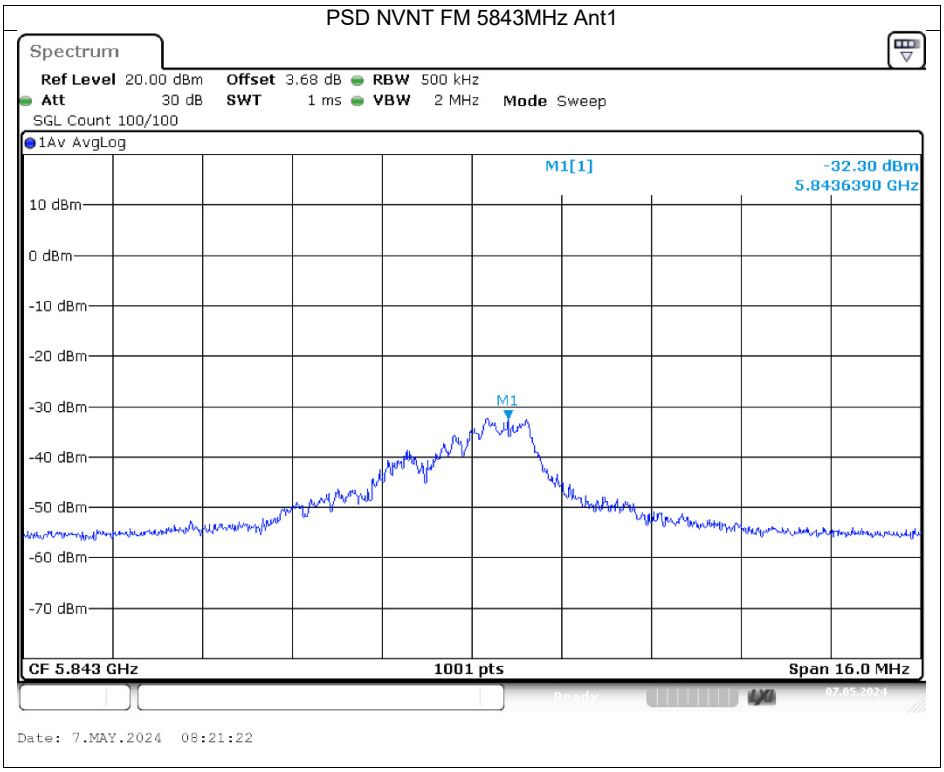
Date: 7.MAY.2024 08:15:07

PSD NVNT FM 5790MHz Ant1



Date: 7.MAY.2024 08:20:11

PSD NVNT FM 5843MHz Ant1

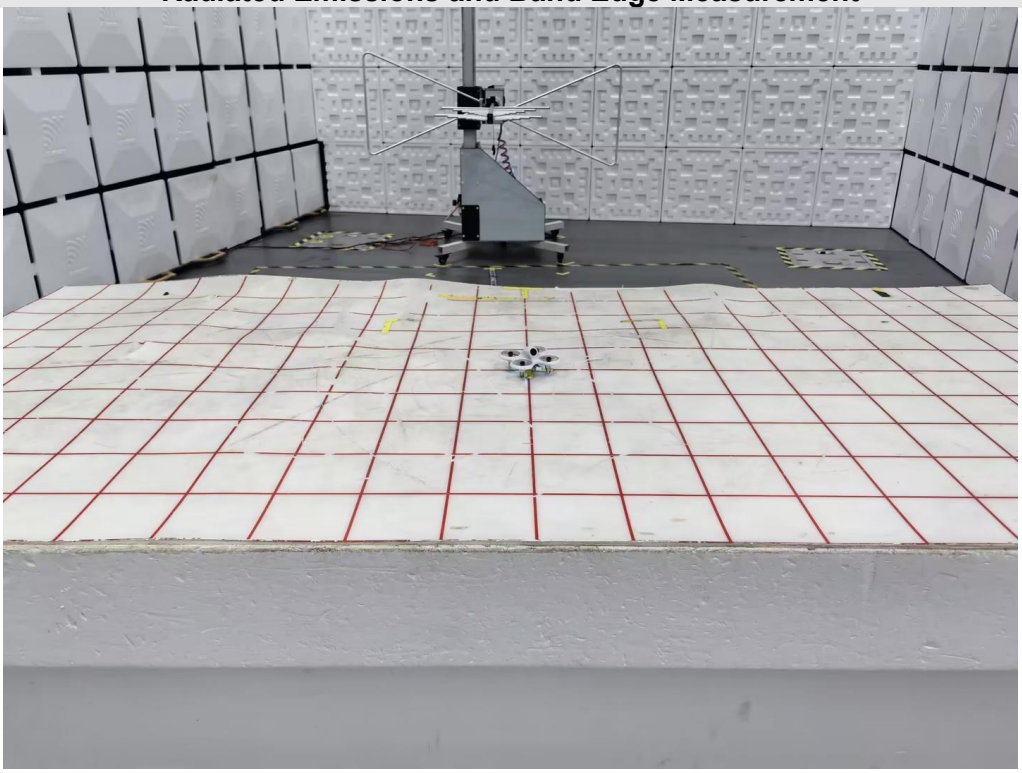


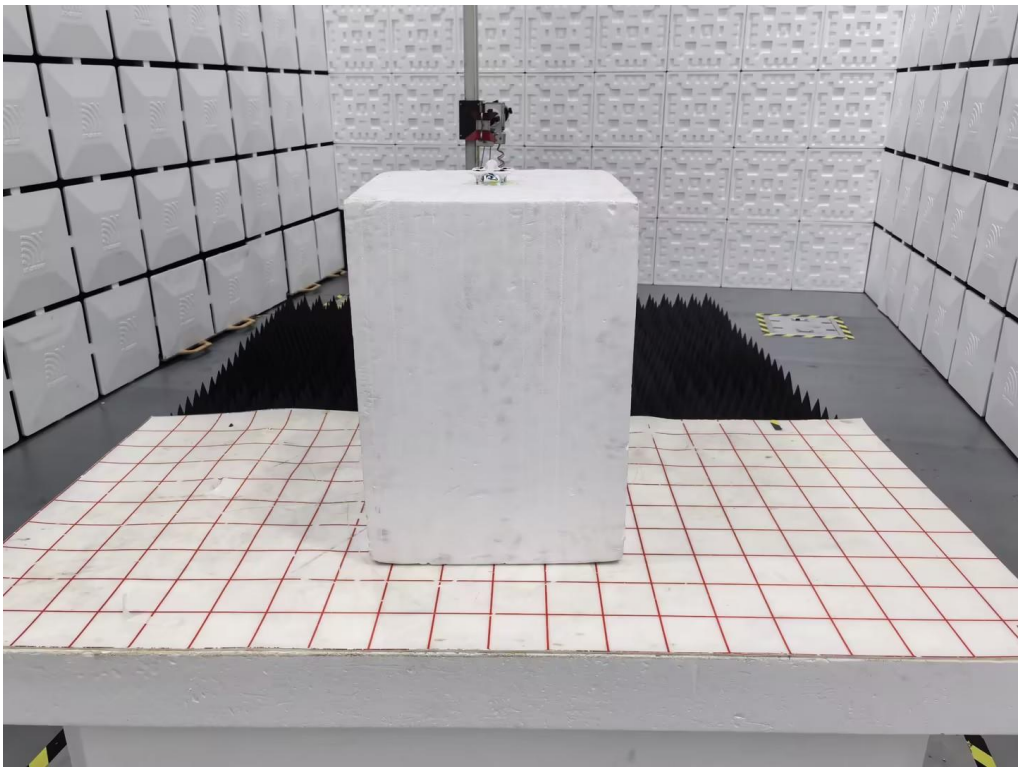
Frequency Stability

Condition	Mode	Time (mins)	Frequency (MHz)	Antenna	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
20C 3.23V	FM	0	5733	Ant1	5732.98	-20000	-3.49	25	Pass
20C 3.8V	FM	0	5733	Ant1	5725.28	40000	7.72	25	Pass
20C 4.37V	FM	0	5733	Ant1	5729.14	20000	3.86	25	Pass
0C 3.8V	FM	0	5733	Ant1	5729.14	20000	3.86	25	Pass
10C 3.8V	FM	0	5733	Ant1	5729.14	20000	3.86	25	Pass
30C 3.8V	FM	0	5733	Ant1	5729.14	20000	3.86	25	Pass
40C 3.8V	FM	0	5733	Ant1	5729.14	20000	3.86	25	Pass
45C 3.8V	FM	0	5733	Ant1	5729.14	20000	3.86	25	Pass
20C 3.23V	FM	0	5790	Ant1	5790.03	30000	5.18	25	Pass
20C 3.8V	FM	0	5790	Ant1	5782.31	40000	7.69	25	Pass
20C 4.37V	FM	0	5790	Ant1	5790	0	0	25	Pass
0C 3.8V	FM	0	5790	Ant1	5790	0	0	25	Pass
10C 3.8V	FM	0	5790	Ant1	5786.15	20000	3.85	25	Pass
30C 3.8V	FM	0	5790	Ant1	5786.15	20000	3.85	25	Pass
40C 3.8V	FM	0	5790	Ant1	5786.15	20000	3.85	25	Pass
45C 3.8V	FM	0	5790	Ant1	5786.15	20000	3.85	25	Pass
20C 3.23V	FM	0	5843	Ant1	5842.99	-10000	-1.71	25	Pass
20C 3.8V	FM	0	5843	Ant1	5839.18	20000	3.82	25	Pass
20C 4.37V	FM	0	5843	Ant1	5839.18	20000	3.82	25	Pass
0C 3.8V	FM	0	5843	Ant1	5835.37	40000	7.63	25	Pass
10C 3.8V	FM	0	5843	Ant1	5839.18	20000	3.82	25	Pass
30C 3.8V	FM	0	5843	Ant1	5839.18	20000	3.82	25	Pass
40C 3.8V	FM	0	5843	Ant1	5839.18	20000	3.82	25	Pass
45C 3.8V	FM	0	5843	Ant1	5839.18	20000	3.82	25	Pass

APPENDIX: PHOTOGRAPHS OF TEST CONFIGURATION

Radiated Emissions and Band Edge Measurement





END OF REPORT