



FCC CERTIFICATION TEST REPORT

Applicant	:	Guangzhou FiiO Electronics Technology Co., Ltd.
Address of Applicant	:	2/F, F Building, Hougang Industrial Zone, Shigang, Huangshi West Road, Baiyun District, Guangzhou, China
Manufacturer	:	Guangzhou FiiO Electronics Technology Co., Ltd.
Address of Manufacturer	:	2/F, F Building, Hougang Industrial Zone, Shigang, Huangshi West Road, Baiyun District, Guangzhou, China
Equipment under Test	:	Desktop DAC and Headphone Amplifier
Model No.	:	F4161K, F4162K, F4163K, F4164K, F4165K, F4166K, F4167K, F4168K, F4169K
FCC ID	:	R56-F41611
Test Standard(s)	:	FCC Rules and Regulations Part 15 Subpart C, ANSI C63.10:2013
Report No.	:	DDT-RE24110729-1E09
Issue Date	:	2025/01/24
Issue By	:	Guangdong Dongdian Testing Service Co., Ltd. Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808

REPORT

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Test Report Declare

Applicant	:	Guangzhou FiiO Electronics Technology Co., Ltd.
Address of Applicant	:	2/F, F Building, Hougang Industrial Zone, Shigang, Huangshi West Road, Baiyun District, Guangzhou, China
Equipment under Test	:	Desktop DAC and Headphone Amplifier
Model No.	:	F4161K, F4162K, F4163K, F4164K, F4165K, F4166K, F4167K, F4168K, F4169K
Manufacturer	:	Guangzhou FiiO Electronics Technology Co., Ltd.
Address of Manufacturer	:	2/F, F Building, Hougang Industrial Zone, Shigang, Huangshi West Road, Baiyun District, Guangzhou, China

Test Standard Used:
FCC Rules and Regulations Part 15 Subpart C,
ANSI C63.10:2013

We Declare:
The equipment described above is tested by Guangdong Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangdong Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Report No.:	DDT-RE24110729-1E09		
Date of Receipt:	2024/11/12	Date of Test:	2024/11/12 - 2025/01/24

Created: Ziqin Chen	Reviewed: Ella Gong	Approved: Damon Hu
		
2025/01/24	2025/01/24	2025/01/24

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Guangdong Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	2025/01/24	Damon Hu

1. Summary of Test Results

No.	Test Parameter	Clause No.	Condition	Result
1	6 dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.247(a)(2)	/	Pass
2	Peak Output Power	FCC Part 15: 15.247(b)(3)	/	Pass
3	Power Spectral Density	FCC Part 15:15.247(e)	/	Pass
4	RF Conducted Spurious Emissions	FCC Part 15: 15.247(d)	/	Pass
5	Radiated Emission	FCC Part 15: 15.205, FCC Part 15: 15.209, FCC Part 15: 15.247(d)	/	Pass
6	Band Edge Compliance	FCC Part 15: 15.205, FCC Part 15: 15.209, FCC Part 15: 15.247(d)	/	Pass
7	Power Line Conducted Emissions	FCC Part 15: 15.207(a)	/	Pass
8	Antenna Requirement	FCC Part 15: 15.203	/	Pass
Note: N/A is an abbreviation for Not Applicable, and means this item is not applicable for this device or no need to test according to standard.				

2. General Test Information

2.1. Description of EUT

EUT Name	: Desktop DAC and Headphone Amplifier
Model Number	: F4161K, F4162K, F4163K, F4164K, F4165K, F4166K, F4167K, F4168K, F4169K
Difference of model number	: Above models are identical in schematic and structure, only the model number are different, therefore the test performed on the model F4161K
EUT Function Description	: Please reference user manual of this device
Power Supply	: AC 100-120V/220-240V 50/60Hz
Hardware Version	: V00
Software Version	: V24+V44
Antenna Type	: FPC Antenna
Max Antenna Gain(dBi)	: 7.25

Note: This EUT support Bluetooth BR/EDR/LE, 2.4 GHz WLAN, 5 GHz WLAN, this report only for 2.4 GHz WLAN.

Radio Technology	: IEEE 802.11b/g/n
Operation frequency	: IEEE 802.11b: 2412MHz-2462MHz IEEE 802.11g: 2412MHz-2462MHz IEEE 802.11n HT20: 2412MHz-2462MHz
Modulation	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

Channel information					
CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447	/	/

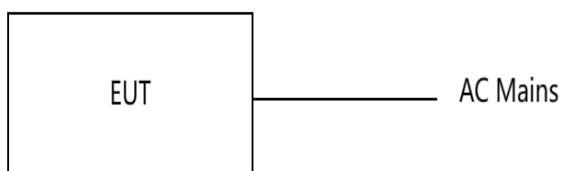
Note: The above EUT information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications or User's Manual. The above Antenna information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

“☑” means to be chosen or applicable; “☐” means don't to be chosen or not applicable; This note applies to entire report.

2.2. Accessories of EUT

Accessories	Manufacturer	Model number	Description
/	/	/	/

2.3. Block diagram of EUT configuration for test



2.4. Decision of final test mode

According pre-test, the worst test modes were reported as below:

Test software: putty.exe

The test software was used to control EUT work in Continuous Tx mode and select test channel, wireless mode as below table.

The pathloss of external cable: 0.5dB (According to the manufacturer's claims)

Tested mode, channel, and data rate information				
Mode	Setting Tx Power	Data rate (Mbps) (see Note)	Channel	Frequency (MHz)
	ANT1			
IEEE 802.11b	9	1	LCH: CH1	2412
	9	1	MCH: CH6	2437
	9	1	HCH: CH11	2462
IEEE 802.11g	9	6	LCH: CH1	2412
	9	6	MCH: CH6	2437
	9	6	HCH: CH11	2462
IEEE 802.11n HT20	9	MCS 0	LCH: CH1	2412
	9	MCS 0	MCH: CH6	2437
	9	MCS 0	HCH: CH11	2462

Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

2.5. Deviations of test standard

No deviation.

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	+15°C to +35 °C
Humidity range:	20% to 75%
Pressure range:	86 kPa to 106 kPa

Note: The specific temperature and humidity information of each test item refers to the temperature and humidity record in the corresponding test data.

2.7. Test laboratory

Guangdong Dongdian Testing Service Co., Ltd.

Add.: Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808.

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118

2.8. Measurement uncertainty

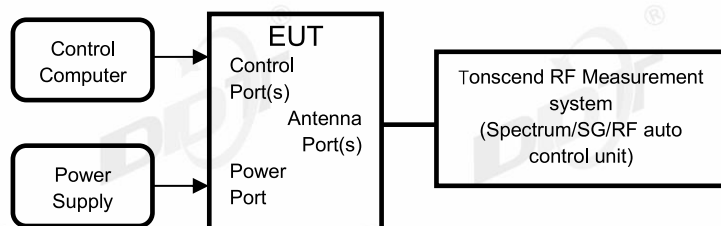
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 1.38 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 1.38 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
Frequencies Stability	6.7×10^{-8} (Antenna couple method) 5.5×10^{-8} (Conducted method)
Conducted spurious emissions	0.86 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 1.40 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$) 1.66 dB ($8 \text{ GHz} \leq f < 26.5 \text{ GHz}$)
Uncertainty for radio frequency (RBW < 20 kHz)	3×10^{-8}
Temperature	0.4 °C
Humidity	2 %
Uncertainty for Radiation Emission test (9 kHz – 30 MHz)	3.44 dB
Uncertainty for Radiation Emission test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V) 4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1 GHz - 40 GHz)	4.10 dB (1 - 6 GHz) 4.40 dB (6 GHz - 18 GHz) 3.54 dB (18 GHz - 26 GHz) 4.30 dB (26 GHz - 40 GHz)
Uncertainty for Power line conduction emission test	3.34dB (150KHz-30MHz) 3.72dB (9KHz-150KHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3. Equipment Used During Conductive Test

Equipment	Manufacturer	Model No.	Serial Number	Due Date
☒ RF Connected Test (RF Measurement System 1#)				
SIGNAL ANALYZER	R&S	FSQ26	101272	2025/03/31
Wideband Radio Communication Tester	R&S	CMW500	120259	2025/07/08
MXG Vector Signal Generator	KEYSIGHT	N5182B	MY59100192	2025/03/31
MXG Vector Signal Generator	Agilent	N5182A	MY19060405	2025/03/31
RF Control Unit	Tonsend	JS0806-2	158060010	2025/03/31
TEMP&HUMI Programmable Chamber	ZHIXIANG	ZXGDJS-150L	ZX170110-A	2025/04/22
Test Software	Tonscend	JS1120-3	Ver.3.2.22	N/A

4. 6dB Bandwidth

4.1. Block diagram of test setup



4.2. Limits

For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz

4.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 11.8.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously
- (4) Use the following spectrum analyzer settings for 6 dB Bandwidth:

RBW:	100 kHz
VBW:	$\geq [3 \times \text{RBW}]$
Detector Mode:	peak
Sweep time:	auto
Trace mode	max hold

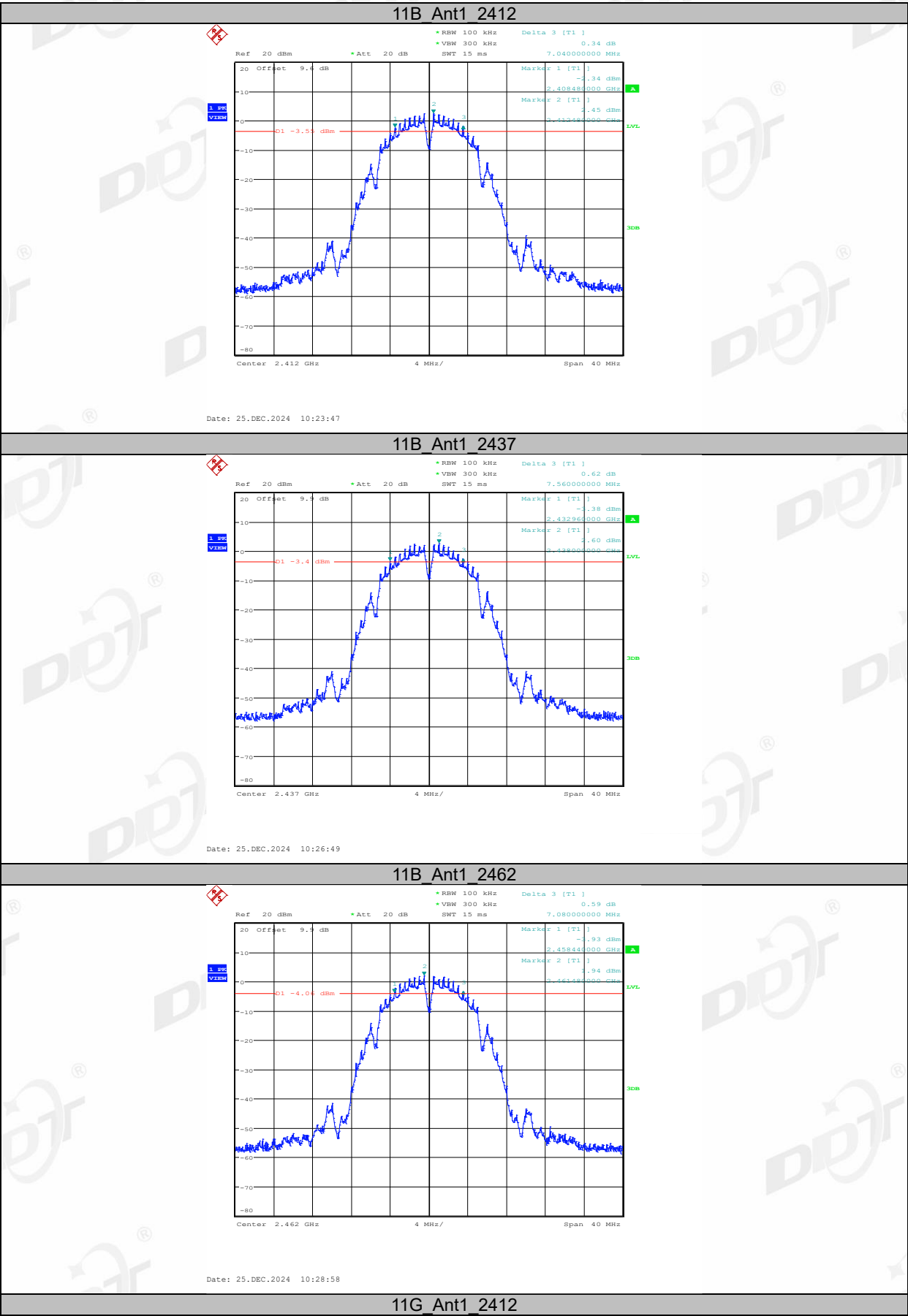
Allow the trace to stabilize, measure the 6 dB bandwidth of signal, and record the results in the report

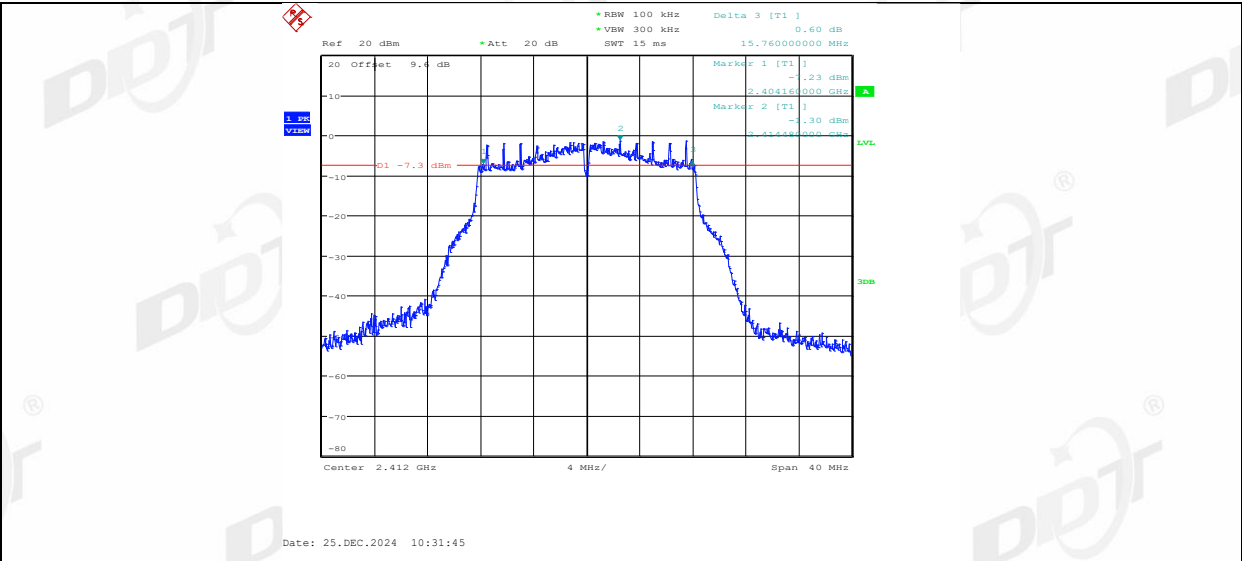
4.4. Test result

Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	24.2℃,55%RH	Test Date:	2024.12.16-2025.01.14
Test Power Supply:	AC230V/50Hz	Sample Number:	S24110729-001

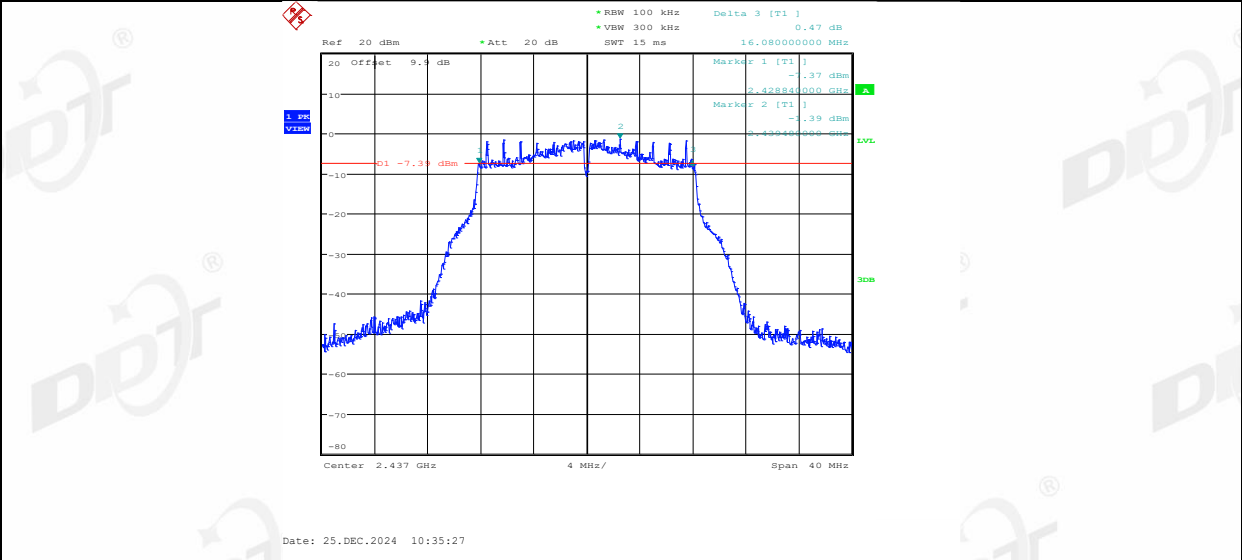
Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	7.04	2408.48	2415.52	0.5	PASS
		2437	7.56	2432.96	2440.52	0.5	PASS
		2462	7.08	2458.44	2465.52	0.5	PASS
11G	Ant1	2412	15.76	2404.16	2419.92	0.5	PASS
		2437	16.08	2428.84	2444.92	0.5	PASS
		2462	15.40	2454.16	2469.56	0.5	PASS
11N20SIS O	Ant1	2412	16.04	2404.44	2420.48	0.5	PASS
		2437	16.76	2428.60	2445.36	0.5	PASS
		2462	15.16	2454.40	2469.56	0.5	PASS

4.5. Test graphs

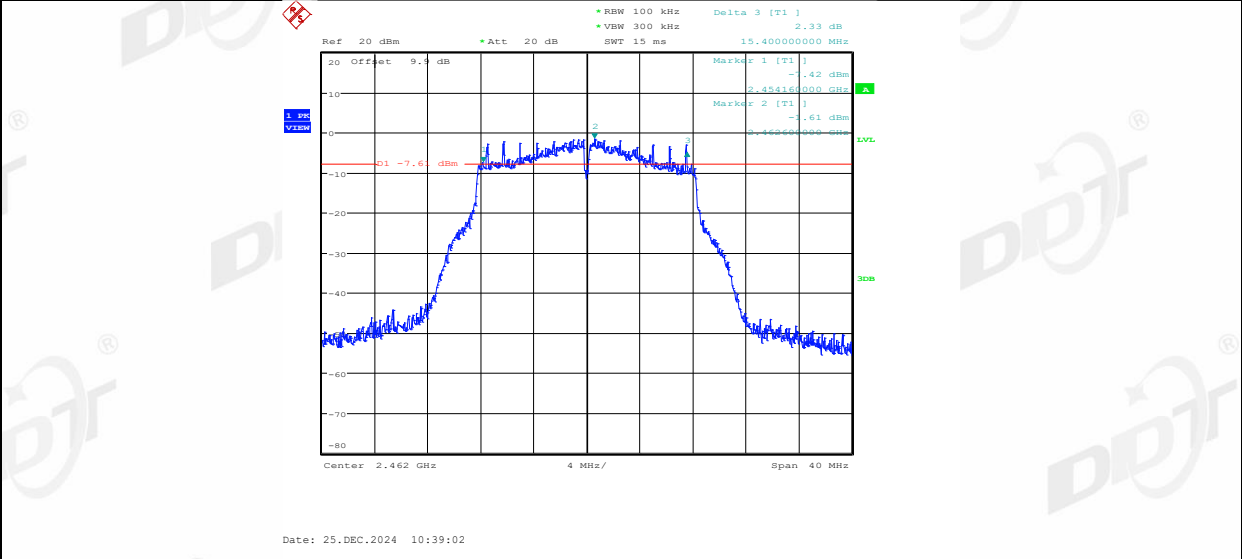




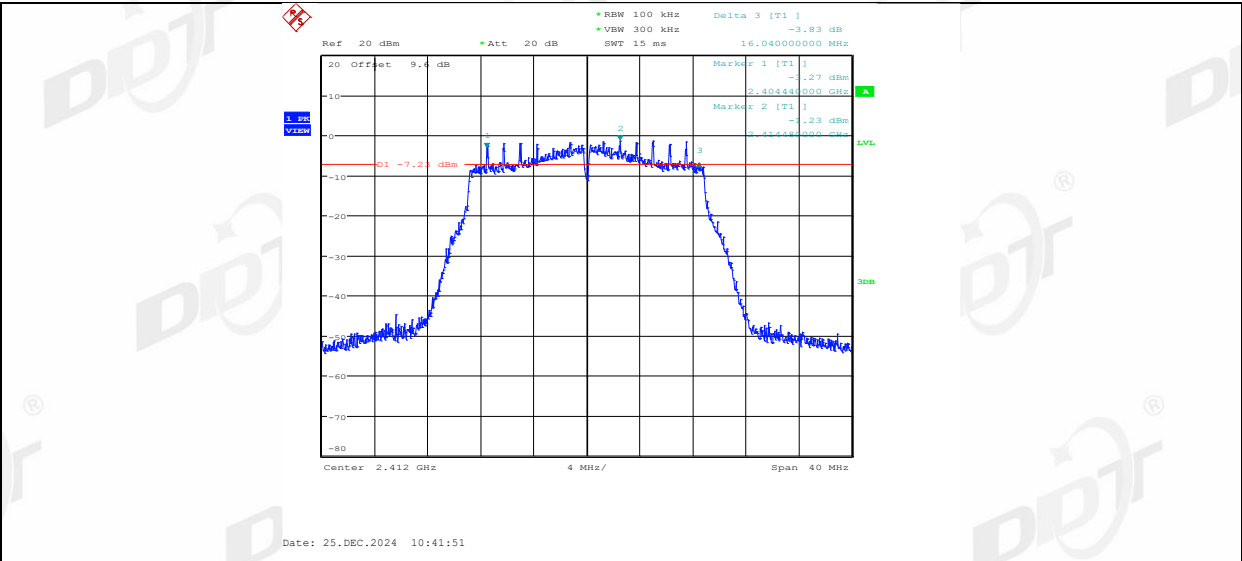
11G_Ant1_2437



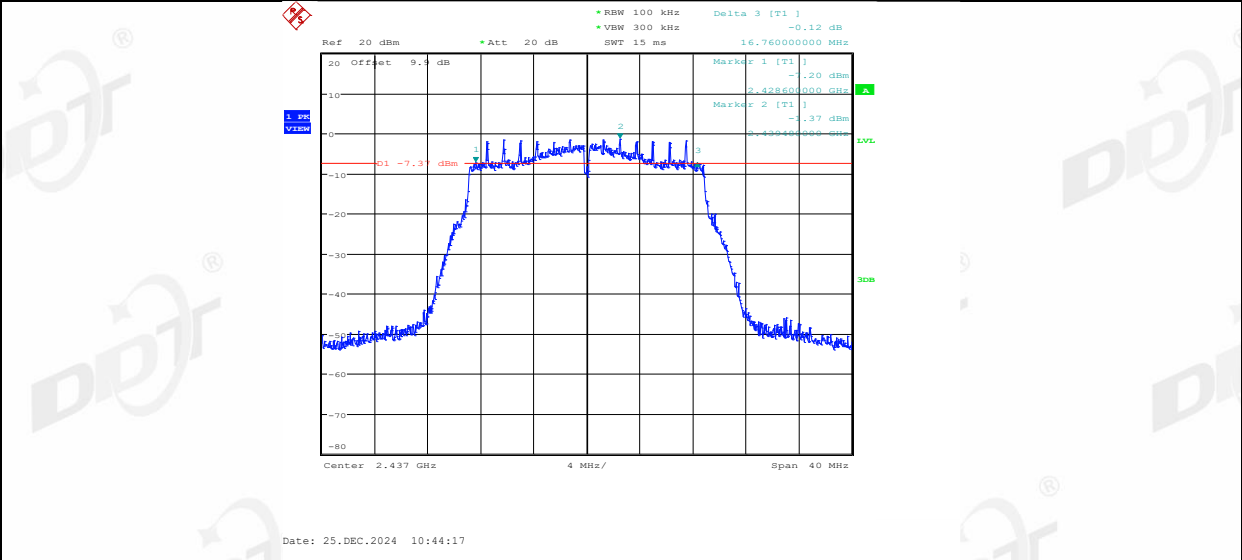
11G_Ant1_2462



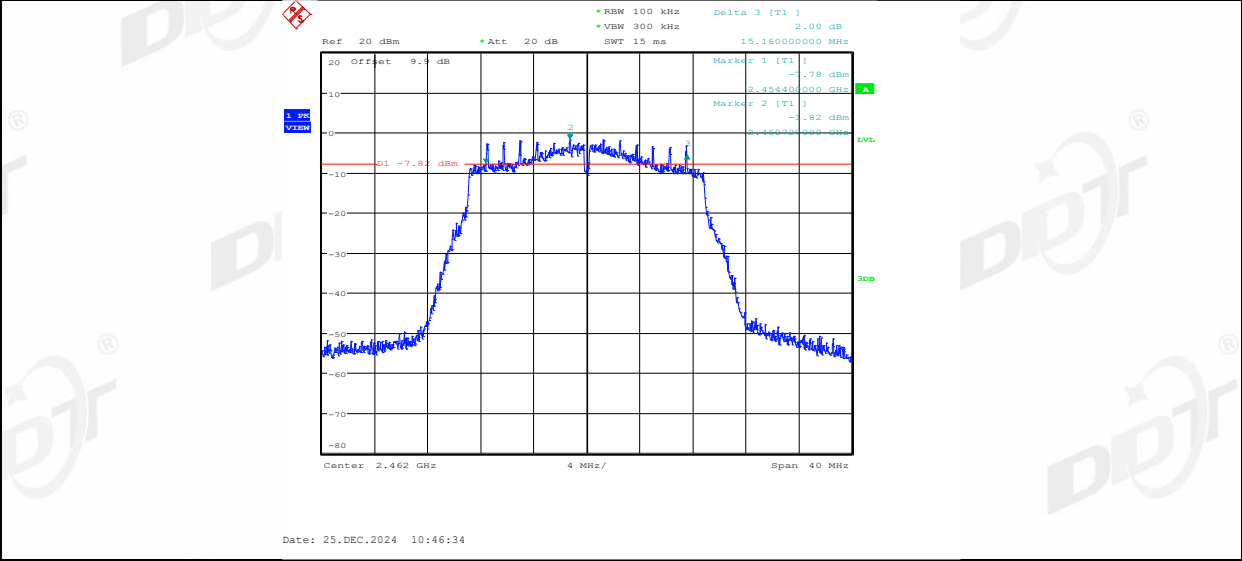
11N20SISO_Ant1_2412



11N20SISO Ant1 2437

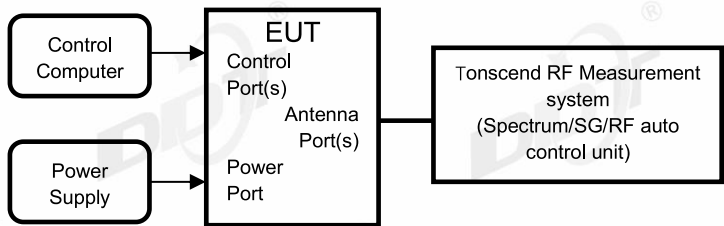


11N20SISO Ant1 2462



5. 99% Bandwidth

5.1. Block diagram of test setup



5.2. Limits

Just for Report.

5.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 6.9.3.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously
- (4) Use the following spectrum analyzer settings for the 99% Bandwidth:

RBW:	1% to 5% of the OBW
VBW:	approximately three times RBW
Span:	between 1.5 times and 5.0 times the OBW
Detector Mode:	peak
Sweep time:	auto
Trace mode	max hold

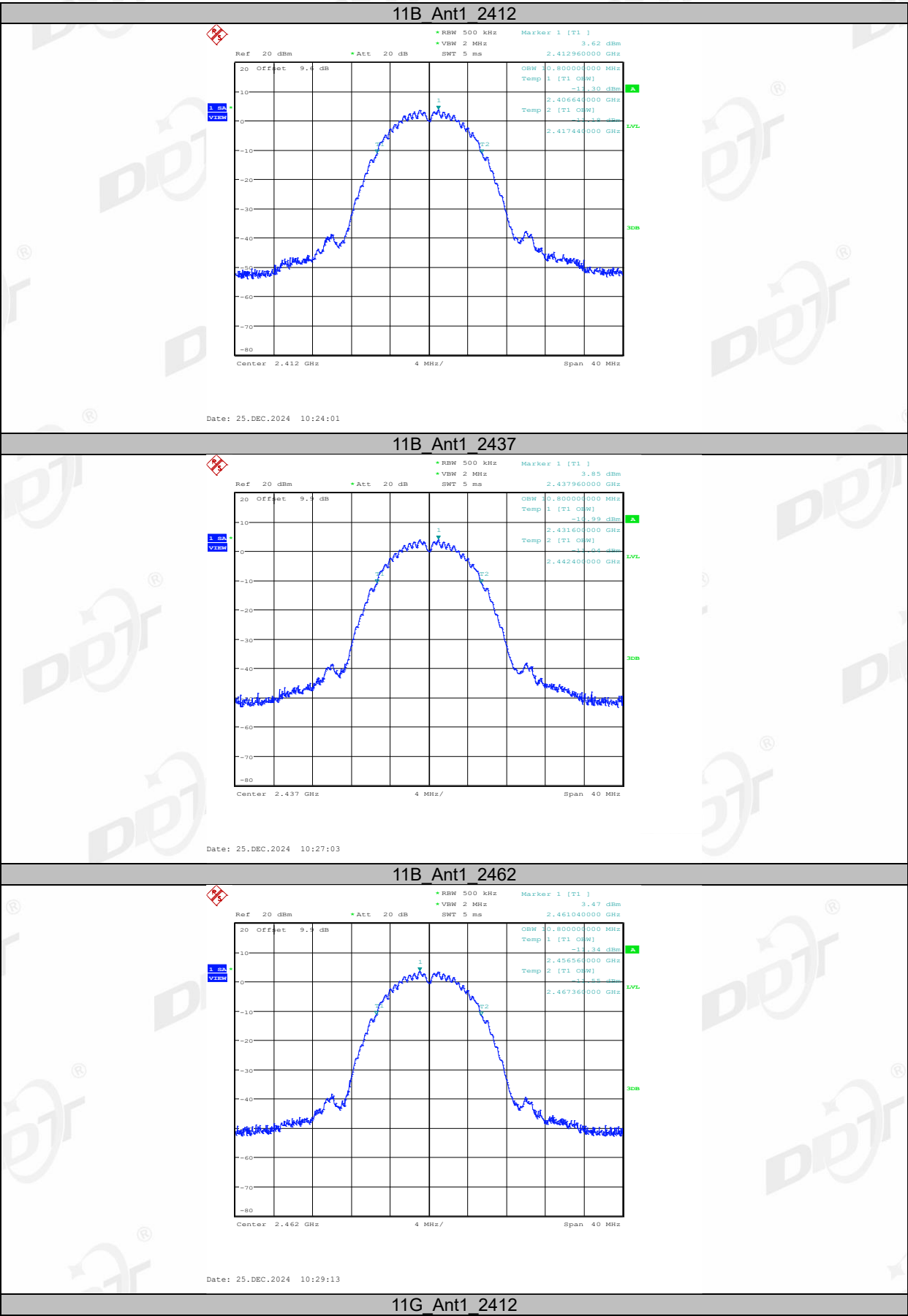
Allow the trace to stabilize, measure the 99% bandwidth of signal, and record the results in the report.

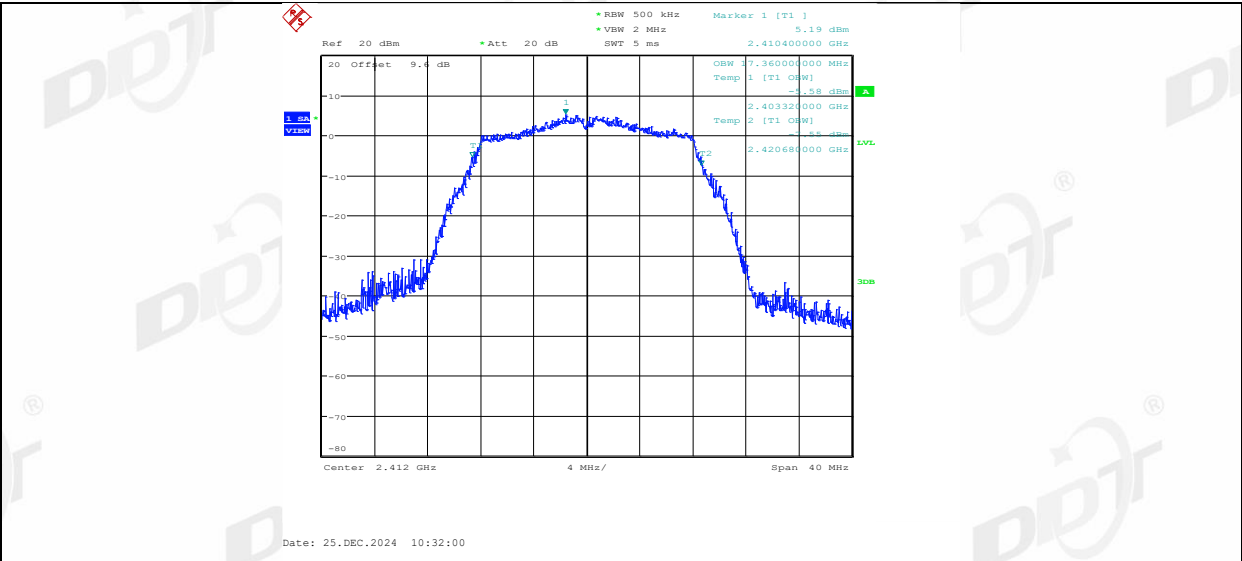
5.4. Test result

Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	24.2℃,55%RH	Test Date:	2024.12.16-2025.01.14
Test Power Supply:	AC230V/50Hz	Sample Number:	S24110729-001

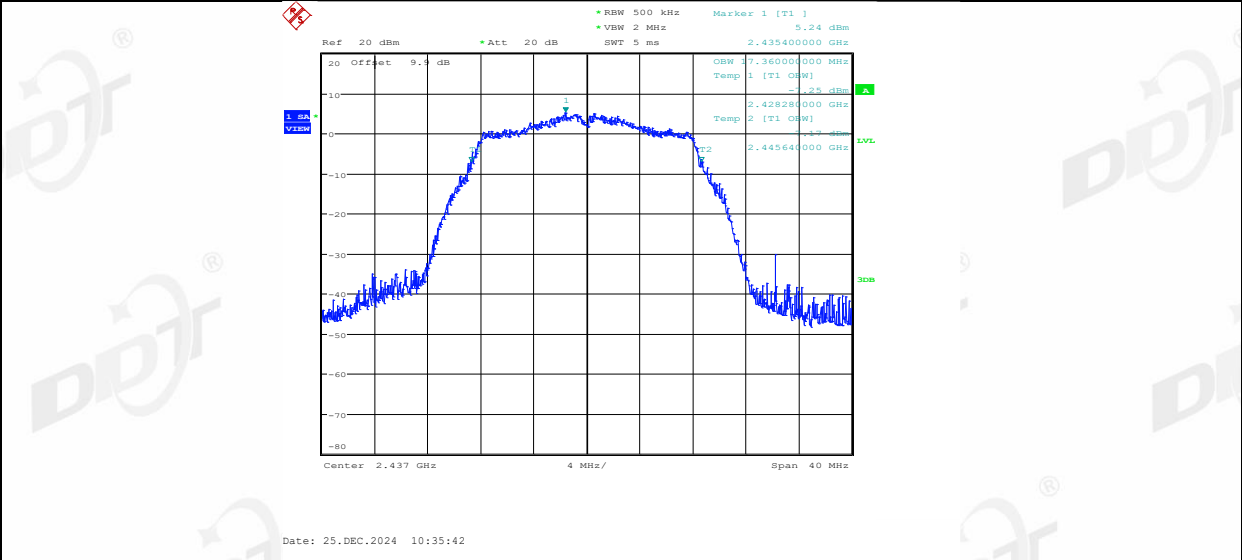
TestMode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	10.8	2406.6400	2417.4400	---	---
		2437	10.8	2431.6000	2442.4000	---	---
		2462	10.8	2456.5600	2467.3600	---	---
11G	Ant1	2412	17.36	2403.3200	2420.6800	---	---
		2437	17.36	2428.2800	2445.6400	---	---
		2462	17.04	2453.3600	2470.4000	---	---
11N20SIS O	Ant1	2412	18.32	2402.8800	2421.2000	---	---
		2437	18.28	2427.8400	2446.1200	---	---
		2462	18.08	2452.8800	2470.9600	---	---

5.5. Test graphs

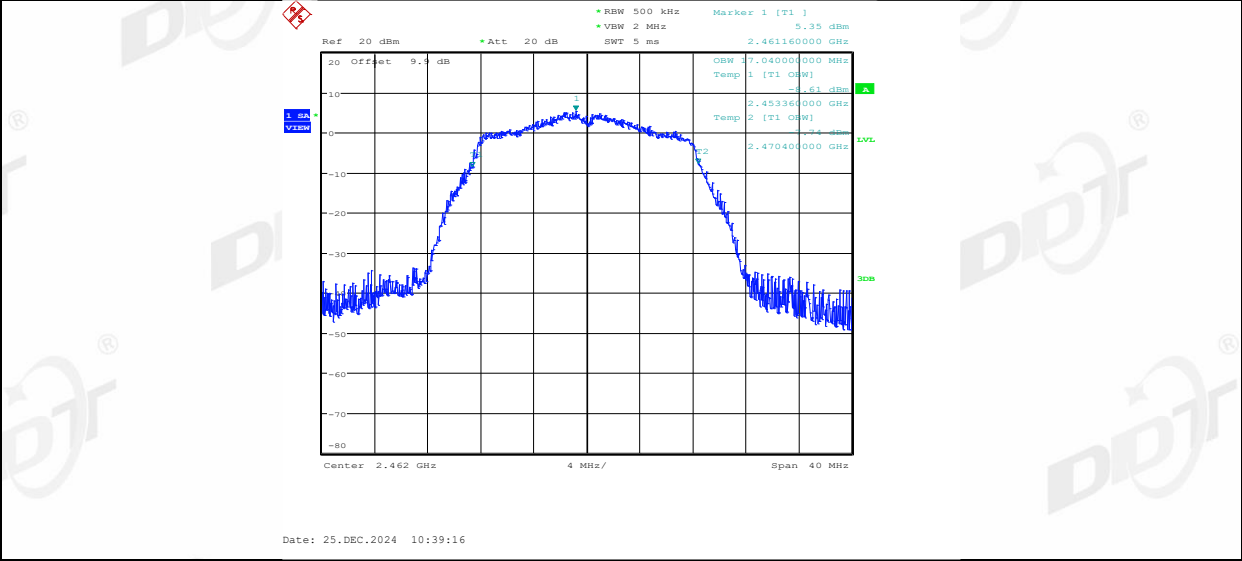




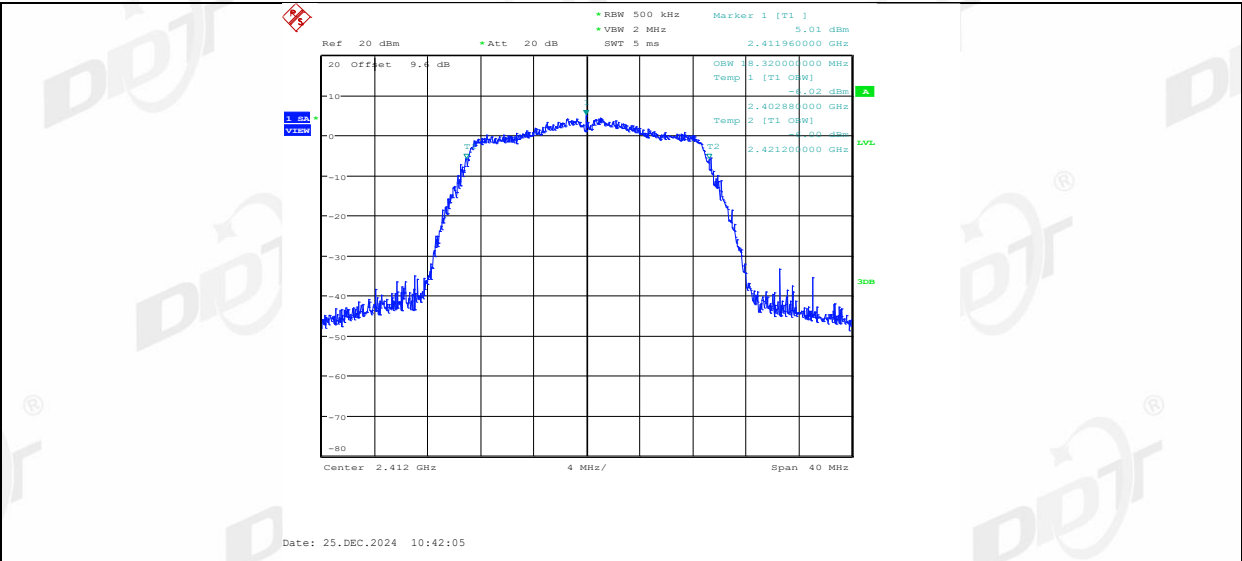
11G_Ant1_2437



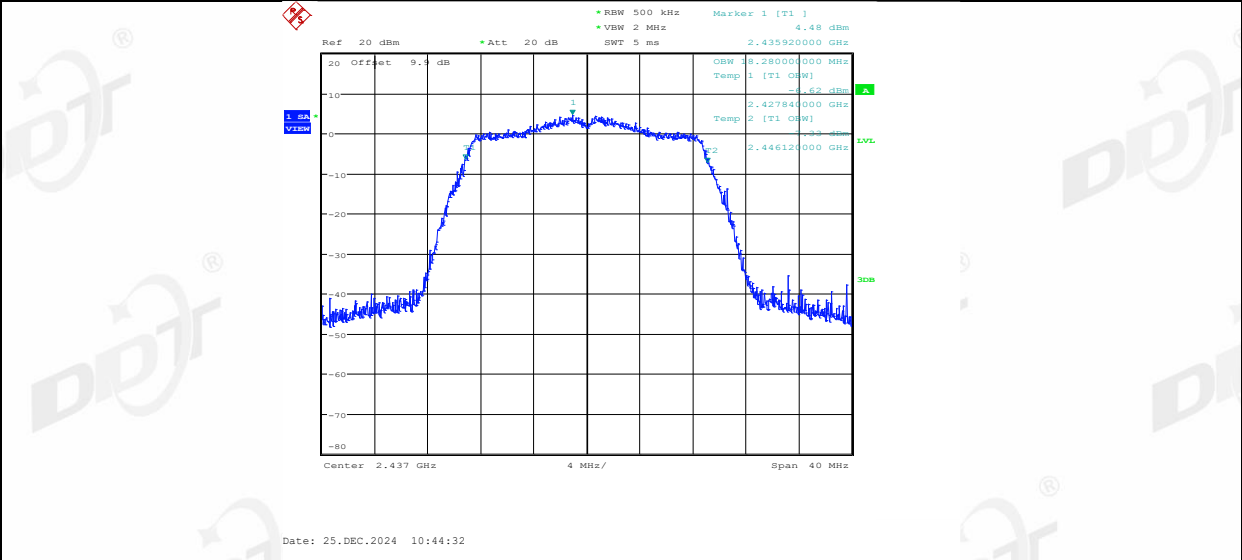
11G_Ant1_2462



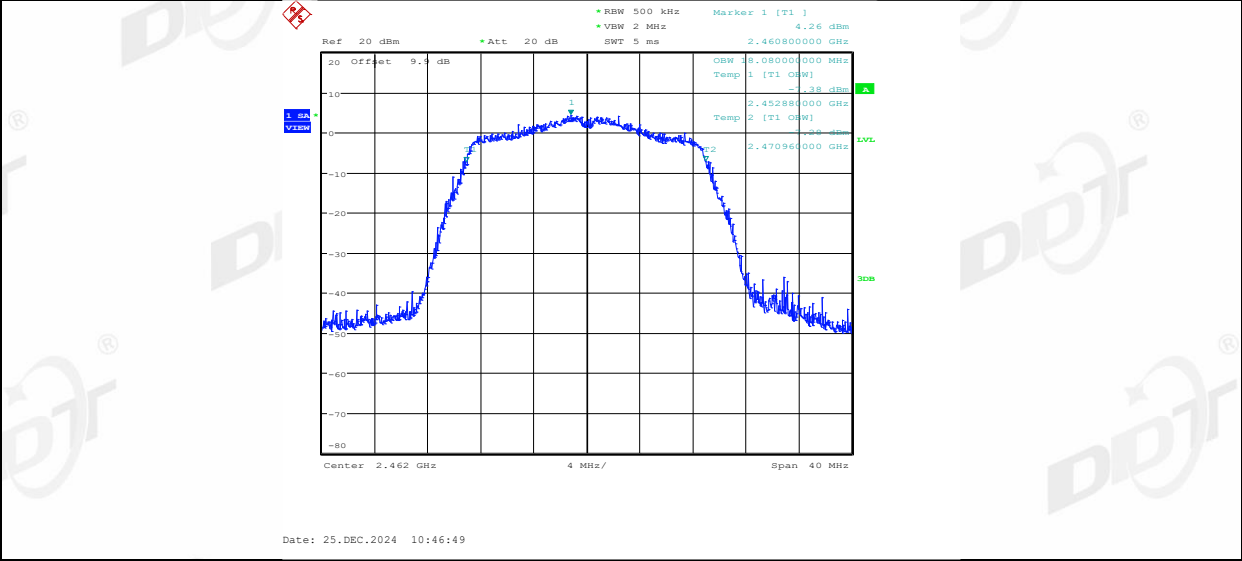
11N20SISO_Ant1_2412



11N20SISO Ant1 2437

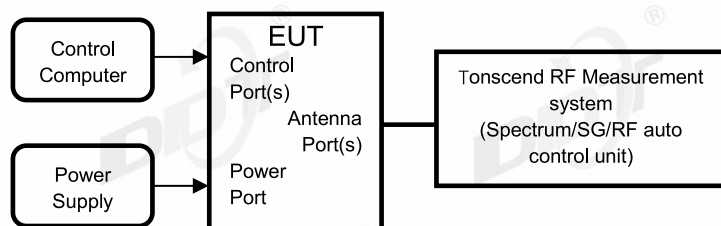


11N20SISO Ant1 2462



6. Conducted Output Power

6.1. Block diagram of test setup



6.2. Limits

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 11.9.2.3.
- (2) Connect EUT's antenna output to RF power meter by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously, If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal.
- (4) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
- (5) Adjust the measurement in dBm by adding $[10 \log (1 / D)]$, where D is the duty cycle.
- (6) Record the RF average power of each antenna port.

6.4. Test result average

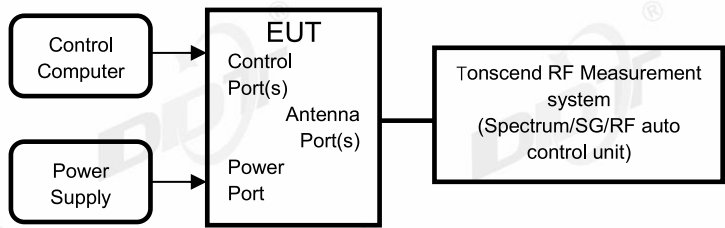
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	24.2℃,55%RH	Test Date:	2024.12.16-2025.01.14
Test Power Supply:	AC230V/50Hz	Sample Number:	S24110729-001

Test Mode	Antenna	Frequency [MHz]	Average power [dBm]	Duty Cycle [%]	DC Factor [dB]	Result [dBm]	Limit [dBm]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11B	Ant1	2412	10.36	98.83	0.05	10.41	≤30.00	17.66	≤36.00	PASS
		2437	10.58	98.94	0.05	10.63	≤30.00	17.88	≤36.00	PASS
		2462	9.87	98.83	0.05	9.92	≤30.00	17.17	≤36.00	PASS
11G	Ant1	2412	10.40	93.33	0.30	10.70	≤30.00	17.95	≤36.00	PASS
		2437	10.21	92.72	0.33	10.54	≤30.00	17.79	≤36.00	PASS
		2462	9.59	92.72	0.33	9.92	≤30.00	17.17	≤36.00	PASS
11N20SISO	Ant1	2412	9.70	92.96	0.32	10.02	≤30.00	17.27	≤36.00	PASS
		2437	9.79	92.96	0.32	10.11	≤30.00	17.36	≤36.00	PASS
		2462	9.10	92.96	0.32	9.42	≤30.00	16.67	≤36.00	PASS

Note: EIRP (dBm)=Conducted Output Power (dBm)+ Antenna Gain (dBi)

7. Power Spectral Density

7.1. Block diagram of test setup



7.2. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.3. Test procedure

- (1) The test according to ANSI C63.10-2013 clause 11.10.5.
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable, the path loss was compensated to the results.
- (3) Set the EUT as maximum power setting and enable the EUT transmit continuously.
- (4) Use the following spectrum analyzer settings for Power Spectral Density measurement:

Center frequency	DTS Channel center frequency
RBW:	$3\text{ kHz} \leq \text{RBW} \leq 100\text{ kHz}$
VBW:	$\geq 3\text{RBW}$
Span	1.5 times the DTS bandwidth
Detector Mode:	RMS
Sweep time:	auto
Trace mode	max hold
	Employ trace averaging (rms)
Trace	mode over a minimum of 100 traces.

(5) Add $[10 \log (1 / D)]$, where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

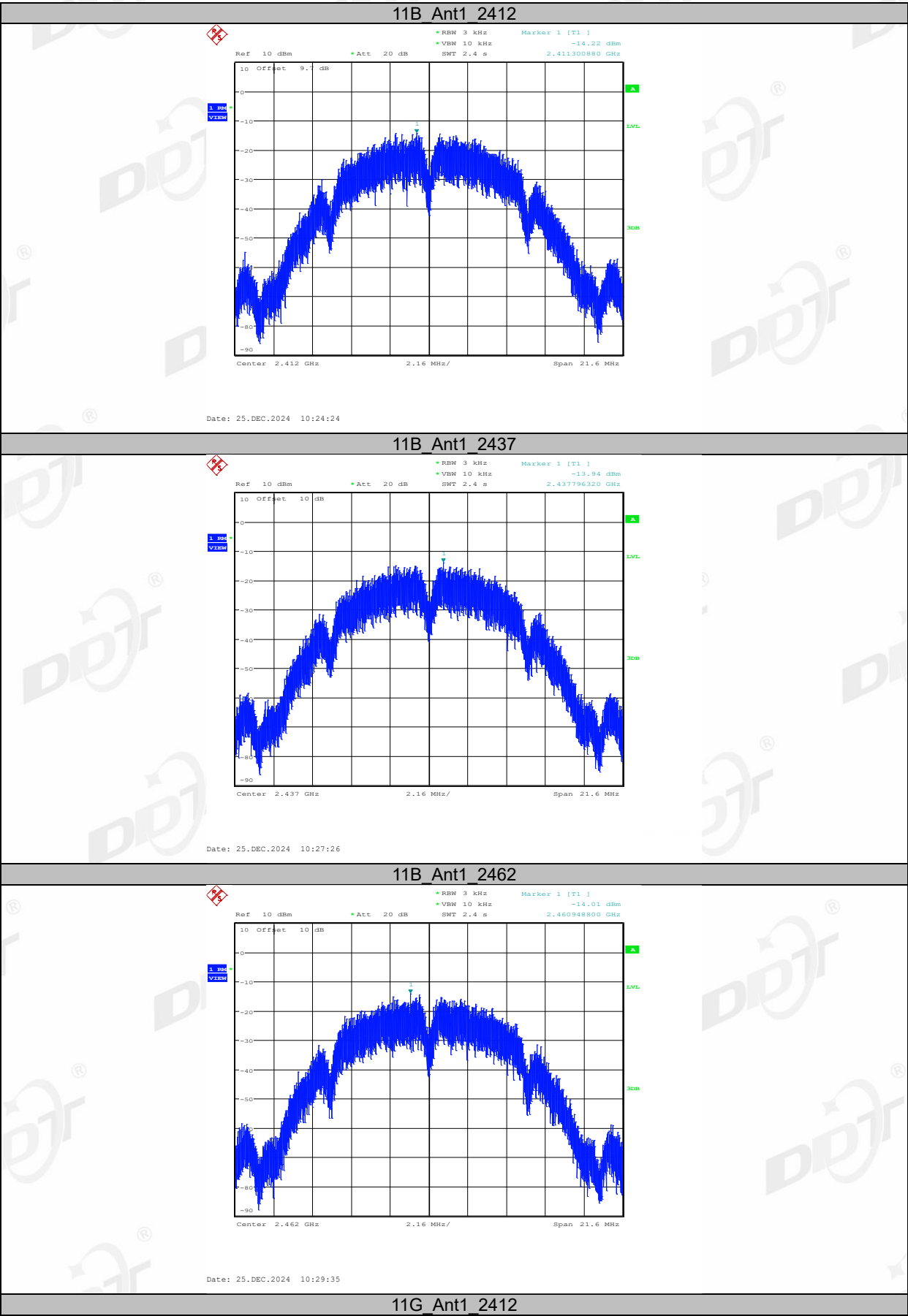
7.4. Test result

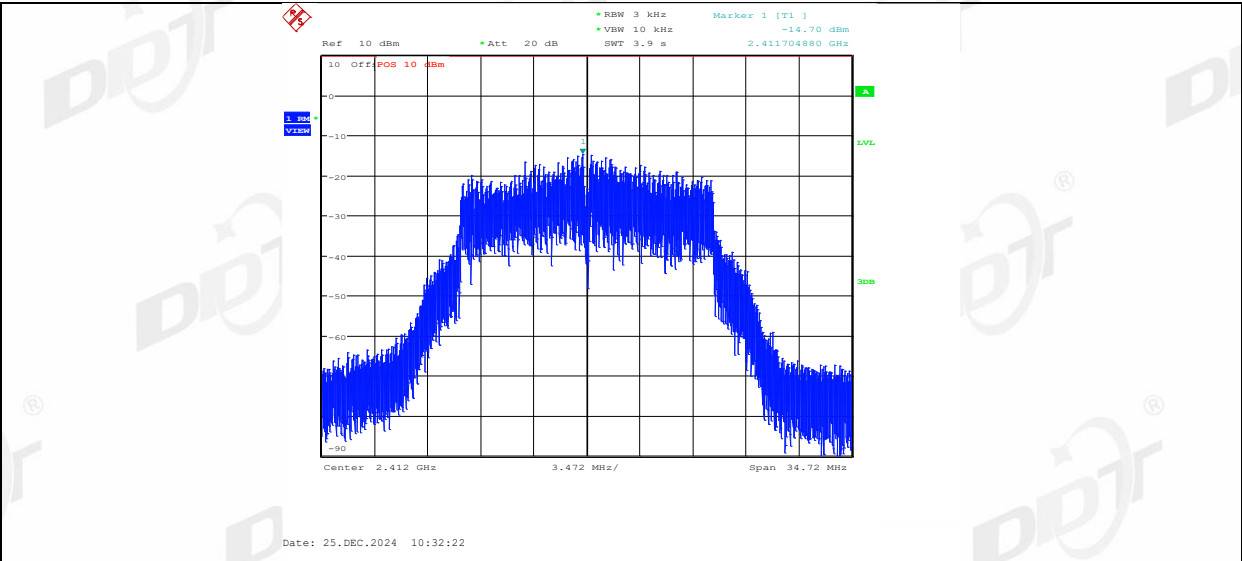
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	24.2℃,55%RH	Test Date:	2024.12.16-2025.01.14
Test Power Supply:	AC230V/50Hz	Sample Number:	S24110729-001

Test Mode	Antenna	Frequency [MHz]	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-14.22	≤8.00	PASS
		2437	-13.94	≤8.00	PASS
		2462	-14.01	≤8.00	PASS
11G	Ant1	2412	-14.70	≤8.00	PASS
		2437	-13.53	≤8.00	PASS
		2462	-15.19	≤8.00	PASS
11N20SISO	Ant1	2412	-16.39	≤8.00	PASS
		2437	-14.68	≤8.00	PASS
		2462	-15.47	≤8.00	PASS

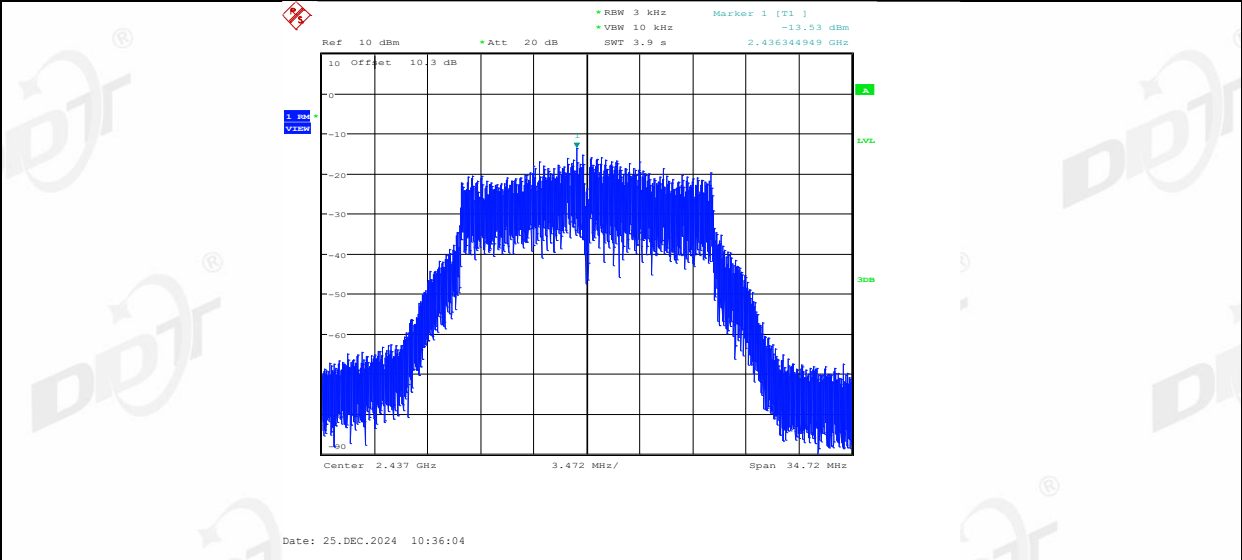
Note: The Duty Cycle Factor is compensated in the graph.

7.5. Test graphs

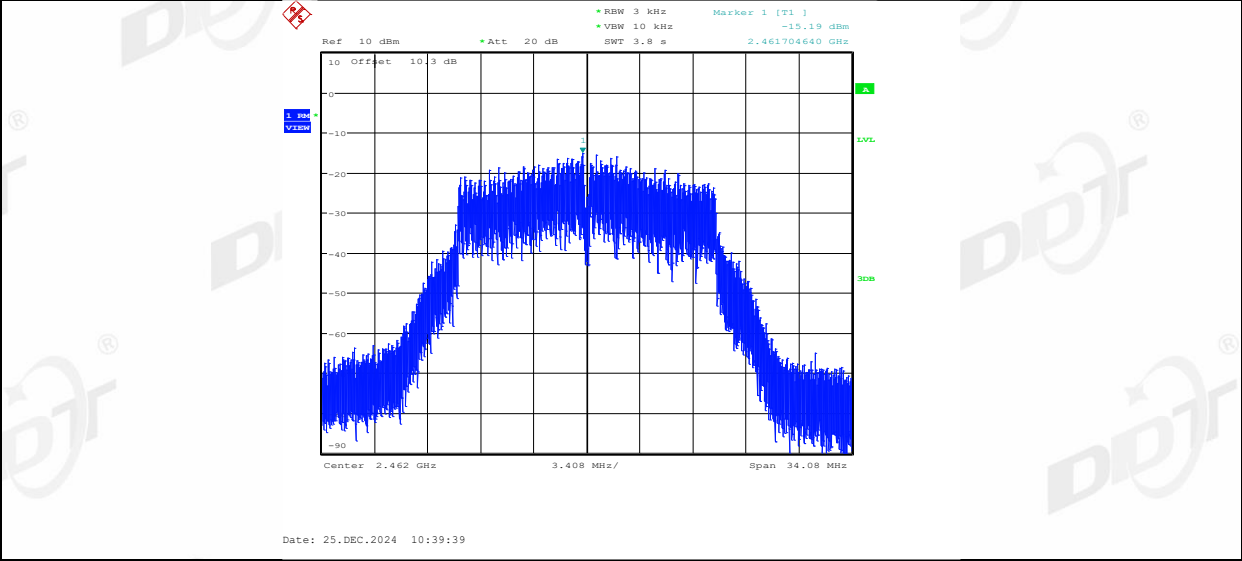




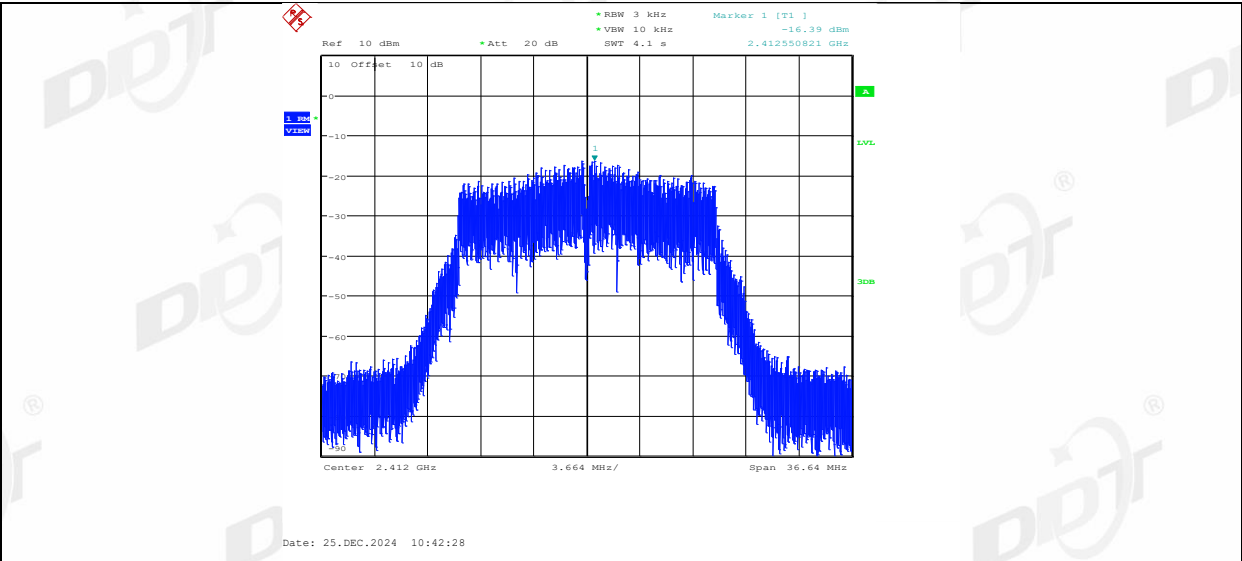
11G_Ant1_2437



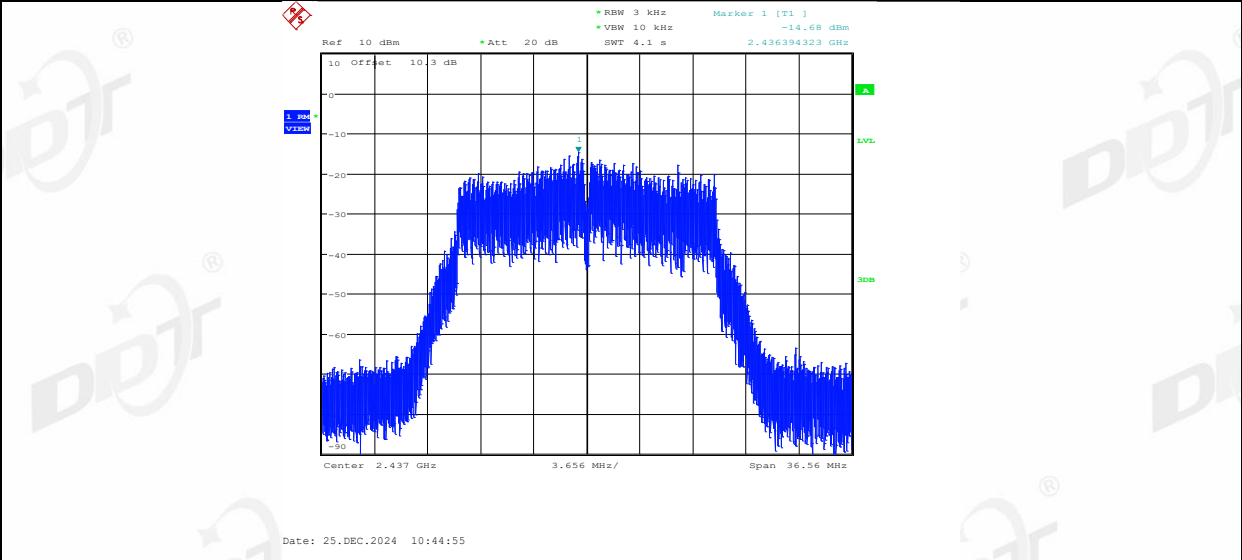
11G_Ant1_2462



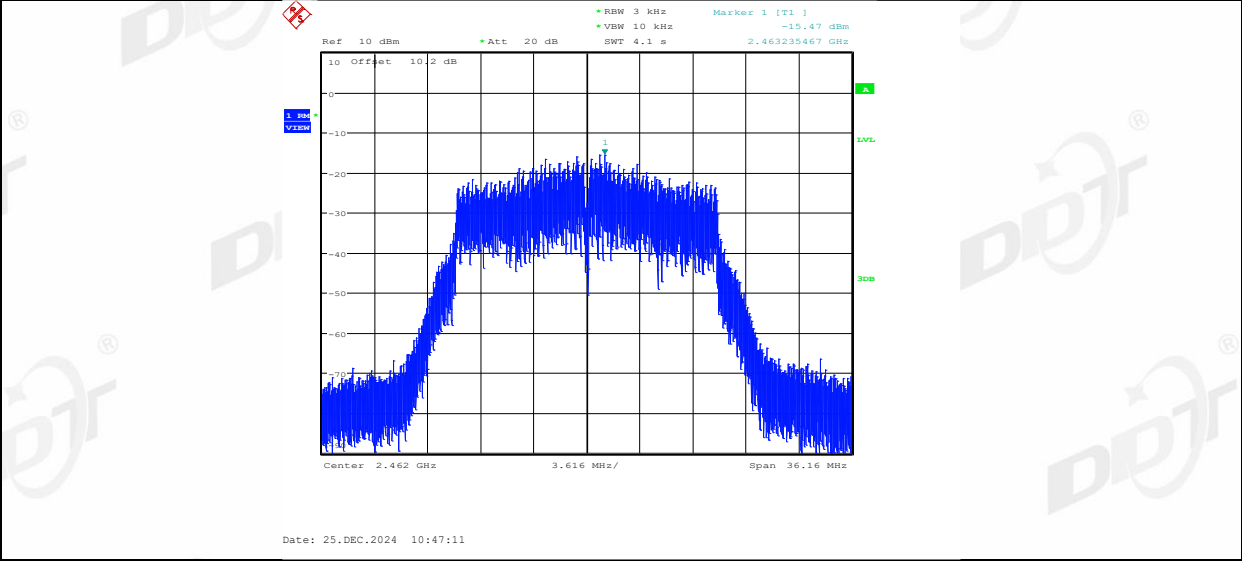
11N20SISO_Ant1_2412



11N20SISO Ant1 2437

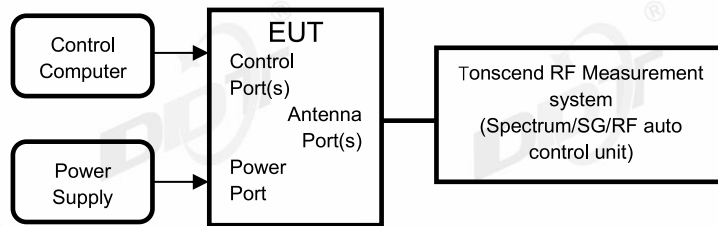


11N20SISO Ant1 2462



8. Band Edge Compliance (Conducted Method)

8.1. Block diagram of test setup



8.2. Limits

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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

8.3. Test procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Establish a reference level by using the following procedure:

RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.

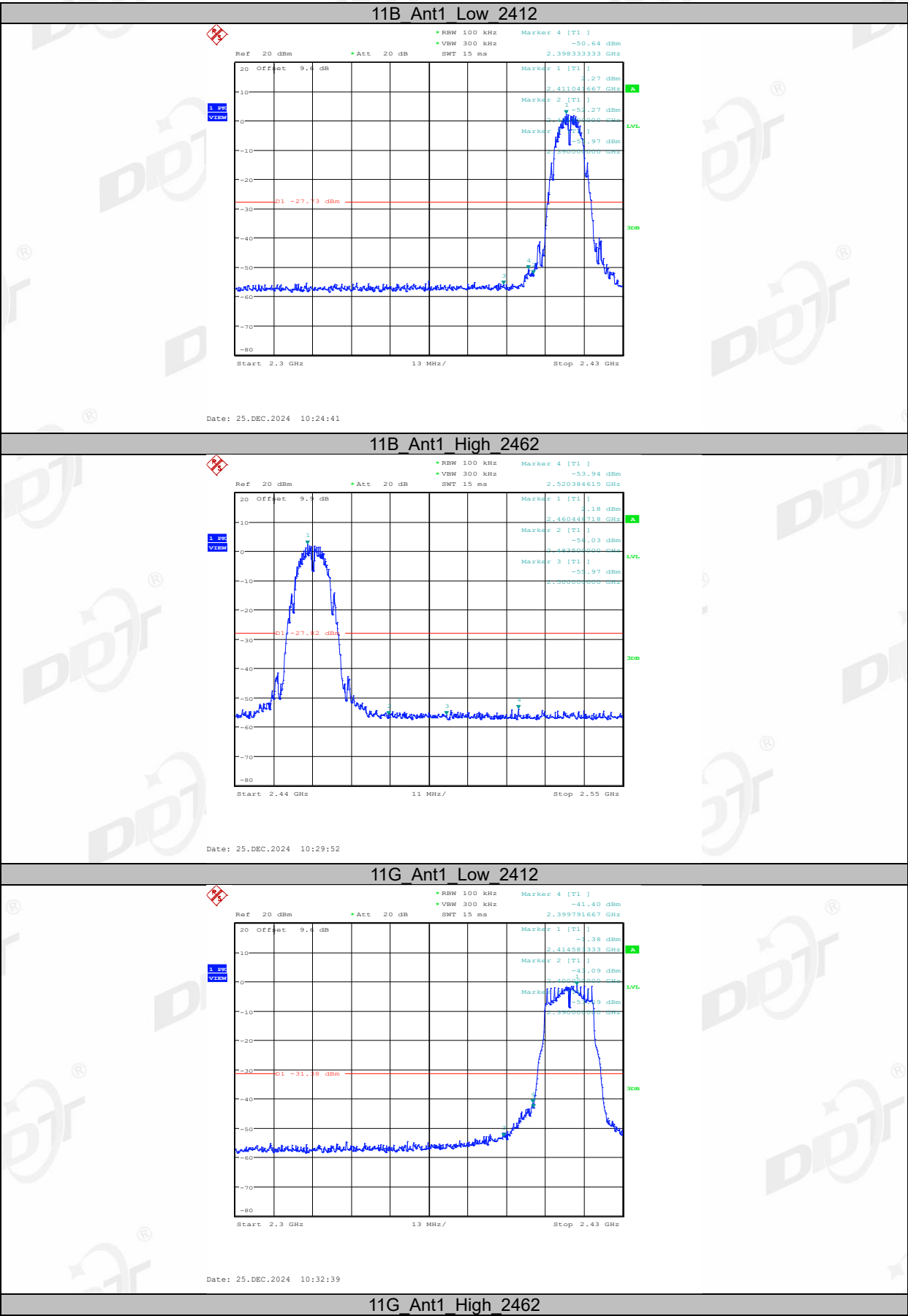
Then mark the maximum amplitude of all unwanted emissions outside of the authorized frequency band.

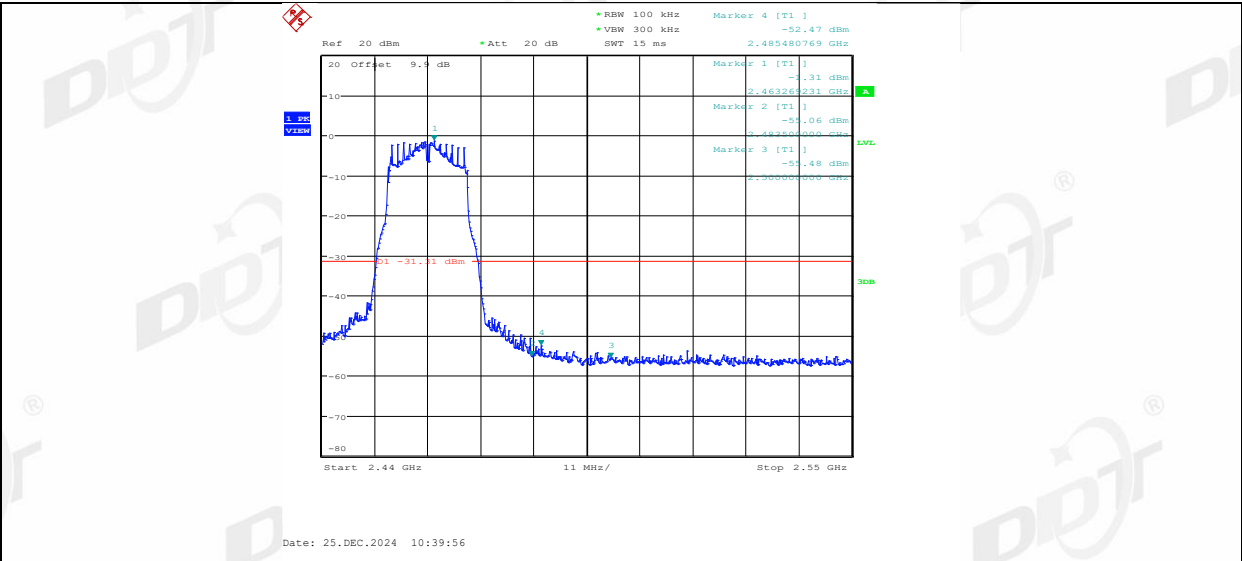
8.4. Test result

Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	24.2℃,55%RH	Test Date:	2024.12.16-2025.01.14
Test Power Supply:	AC230V/50Hz	Sample Number:	S24110729-001

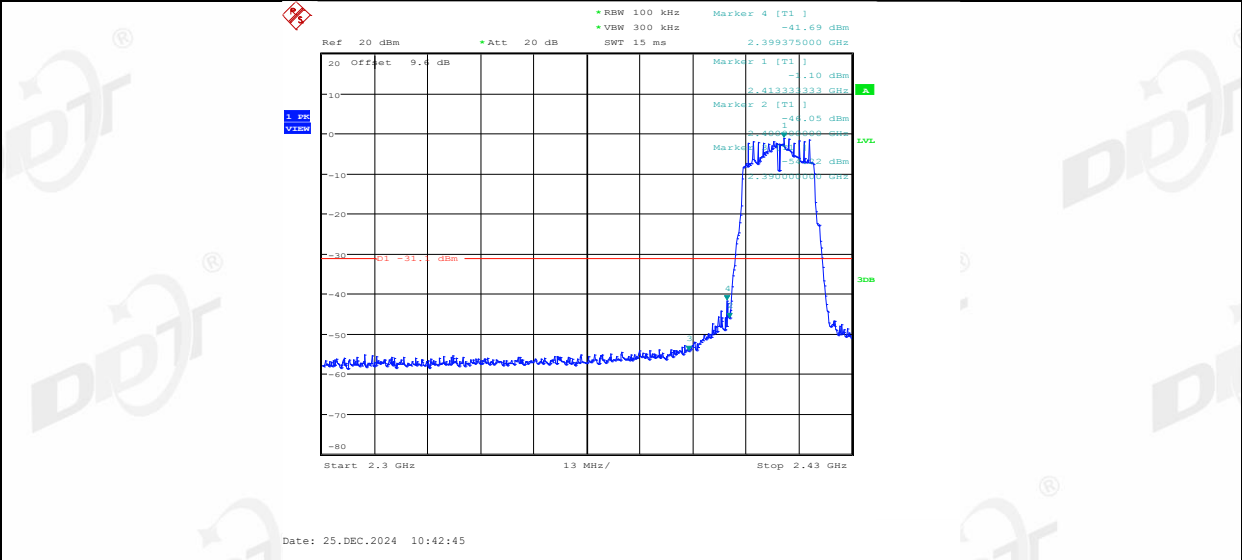
EUT Set Mode	CH or Frequency	Result(dBm)	EUT Set Mode	CH or Frequency	Result (dBm)
11b	CH1	Pass	11g	CH1	Pass
	CH11	Pass		CH11	Pass
11n HT 20	CH1	Pass			
	CH11	Pass			

8.5. Test graphs

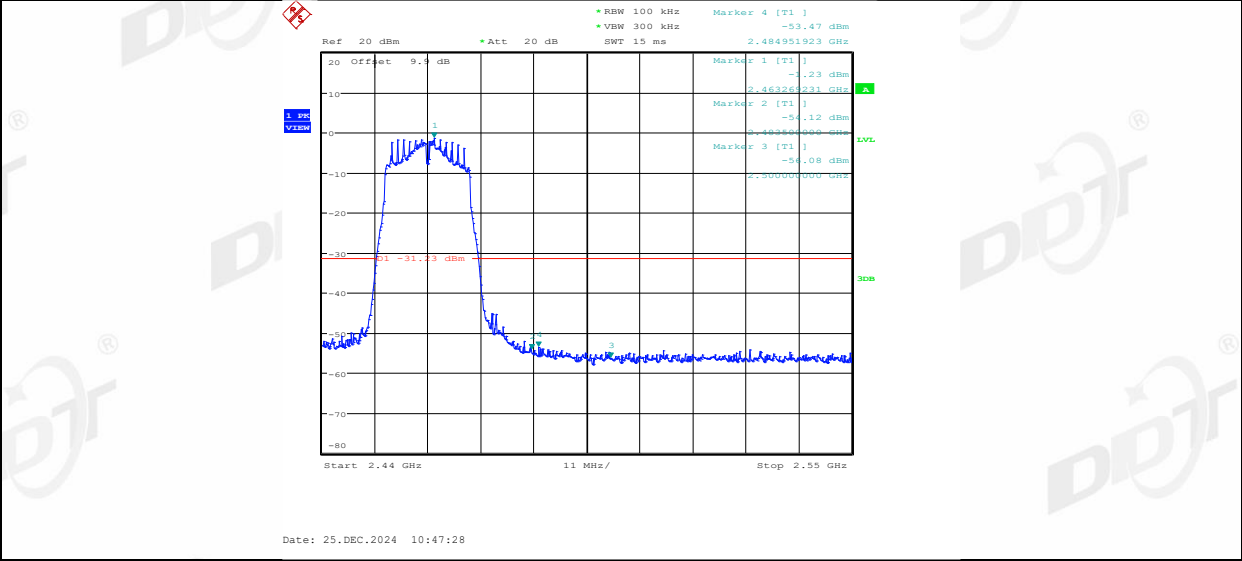




11N20SISO Ant1_Low 2412

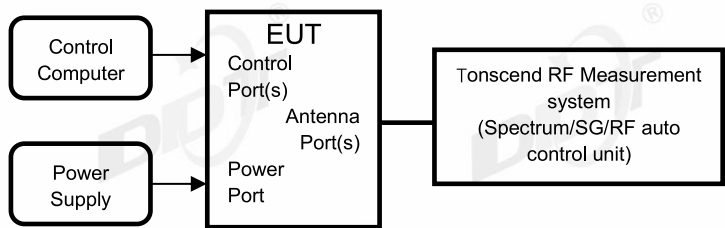


11N20SISO Ant1_High 2462



9. RF Conducted Spurious Emissions

9.1. Block diagram of test setup



9.2. Limits

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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

9.3. Test procedure

- Connect EUT's antenna output to spectrum analyzer by RF cable.
- Establish a reference level by using the following procedure:

Center frequency	Test frequency
RBW:	100 kHz
VBW:	300 kHz
Span	Wide enough to capture the peak level of the in-band emission
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold
- Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.
- Set the spectrum analyzer as follows:

RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Number of measurement points	$\geq \text{Span/RBW}$
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

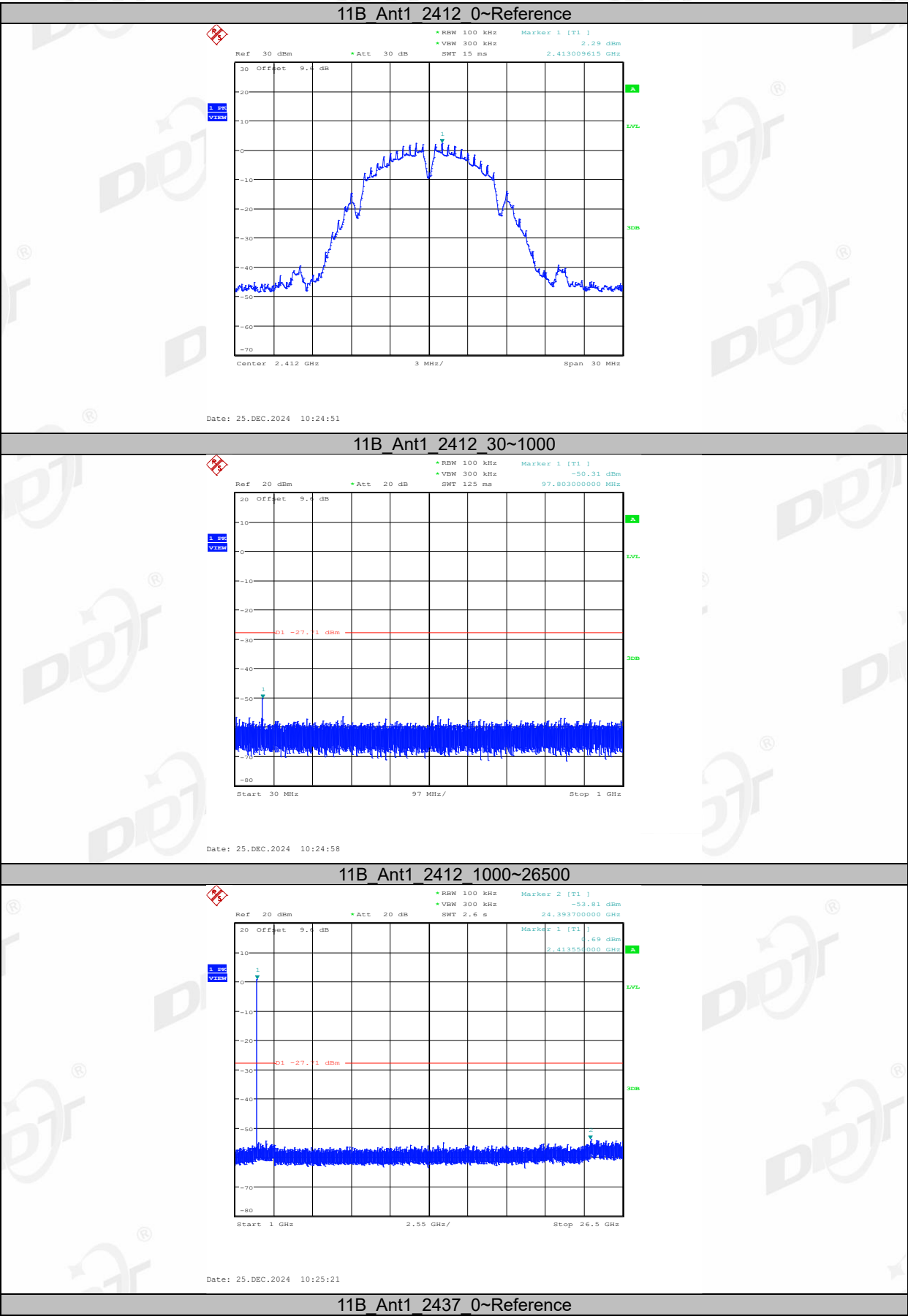
- (5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

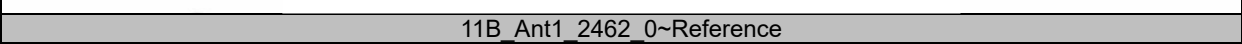
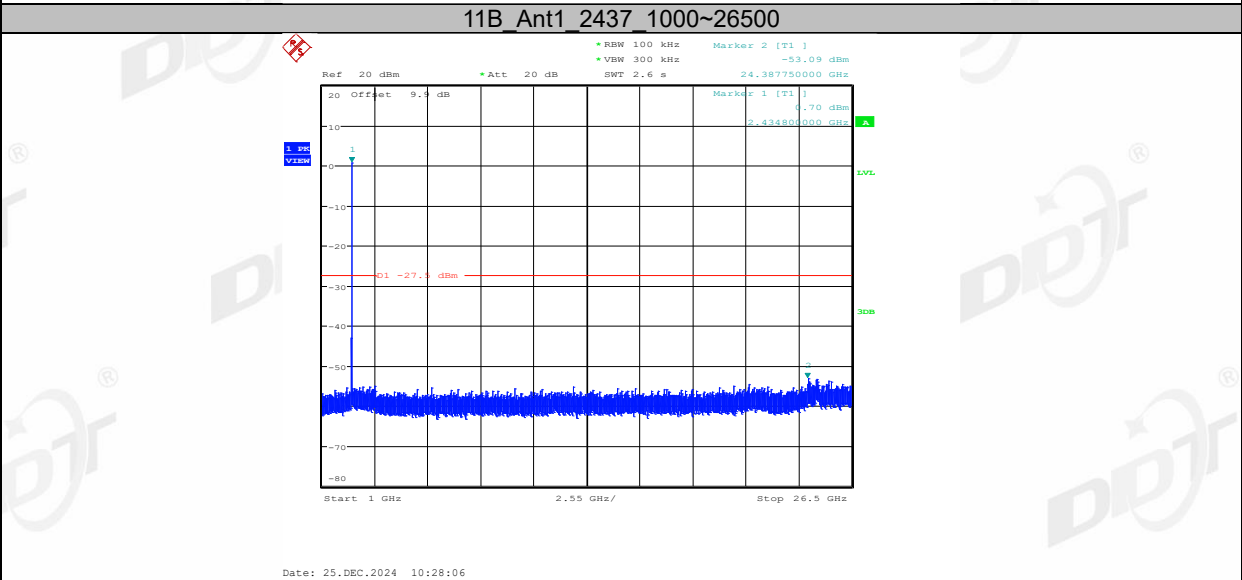
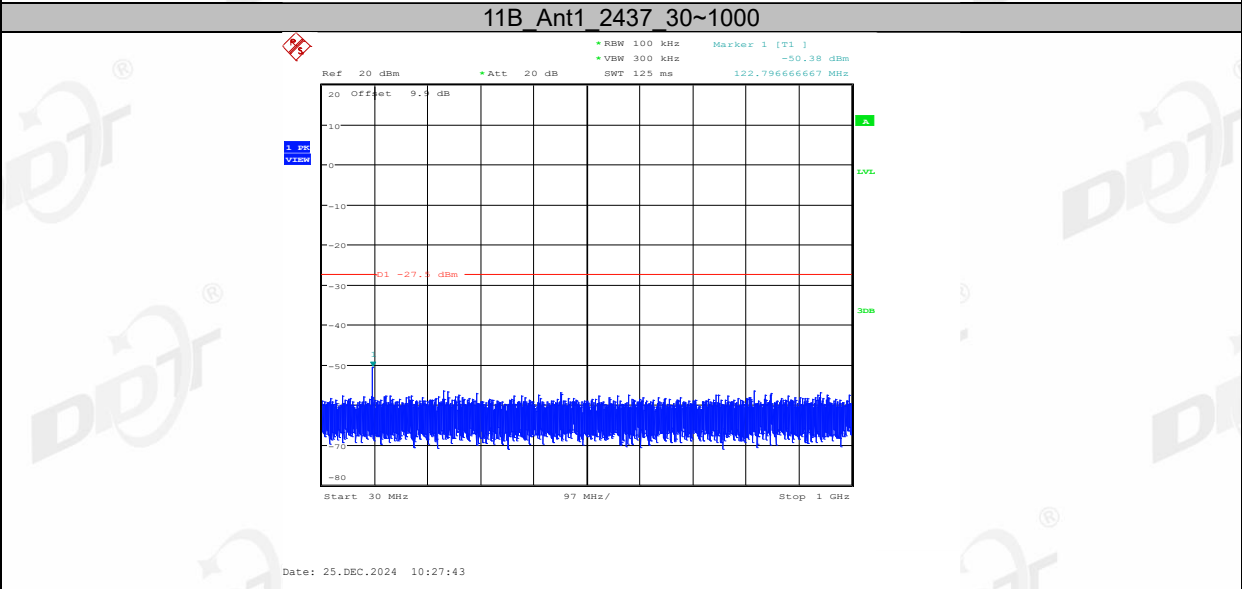
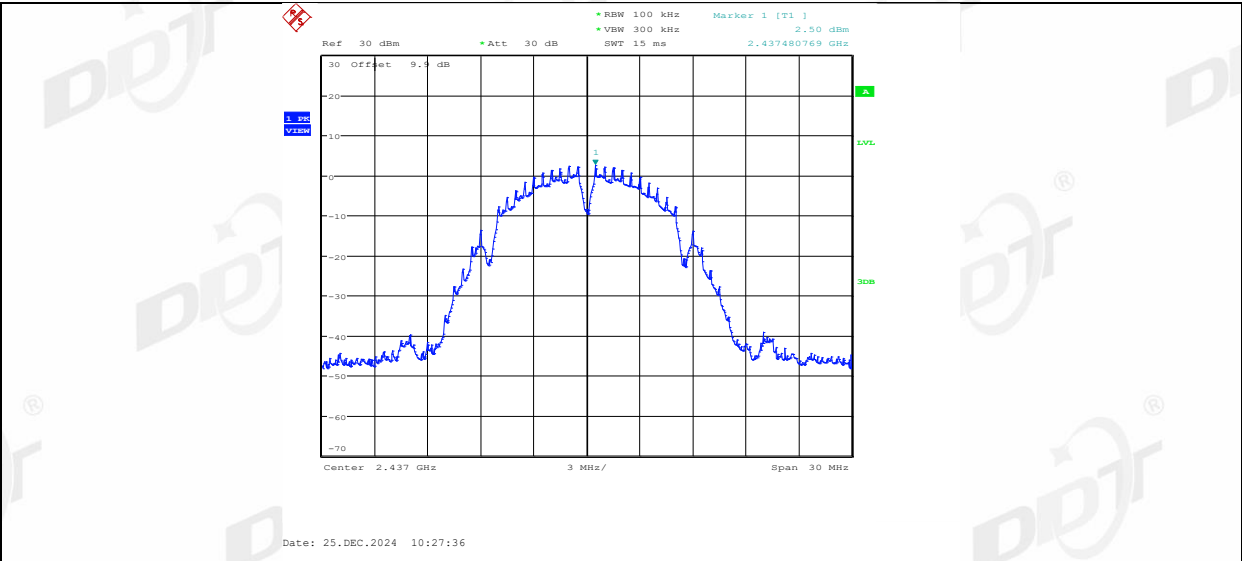
9.4. Test result

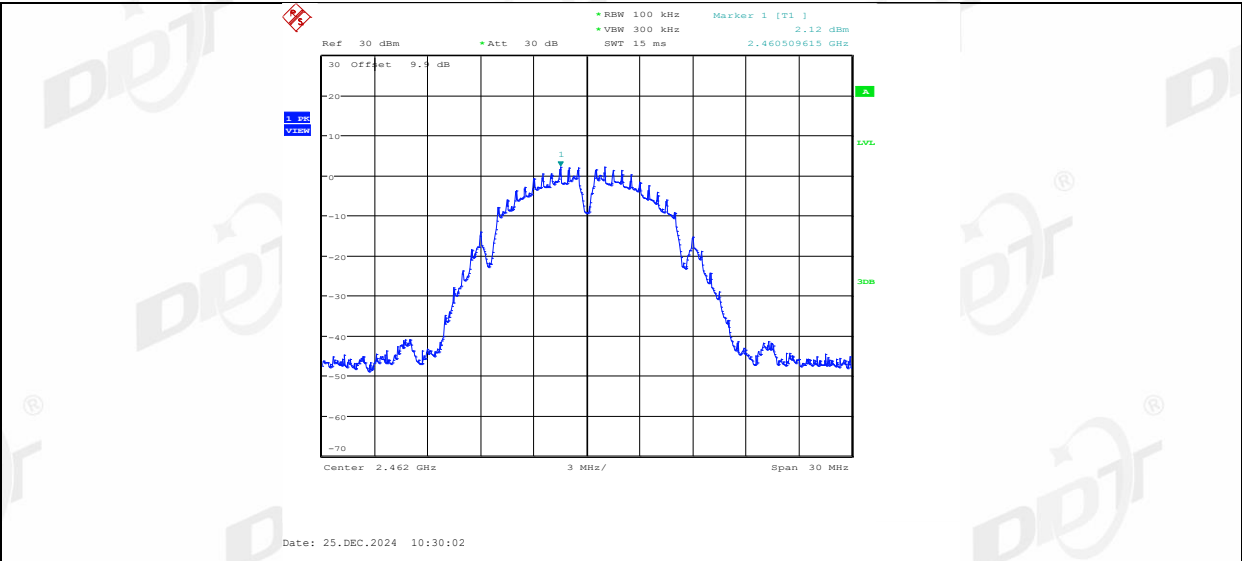
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	24.2℃,55%RH	Test Date:	2024.12.16-2025.01.14
Test Power Supply:	AC230V/50Hz	Sample Number:	S24110729-001

EUT Set Mode	CH or Frequency	Result(dBm)	EUT Set Mode	CH or Frequency	Result (dBm)
11b	CH1	Pass	11g	CH1	Pass
	CH11	Pass		CH11	Pass
11n HT 20	CH1	Pass			
	CH11	Pass			

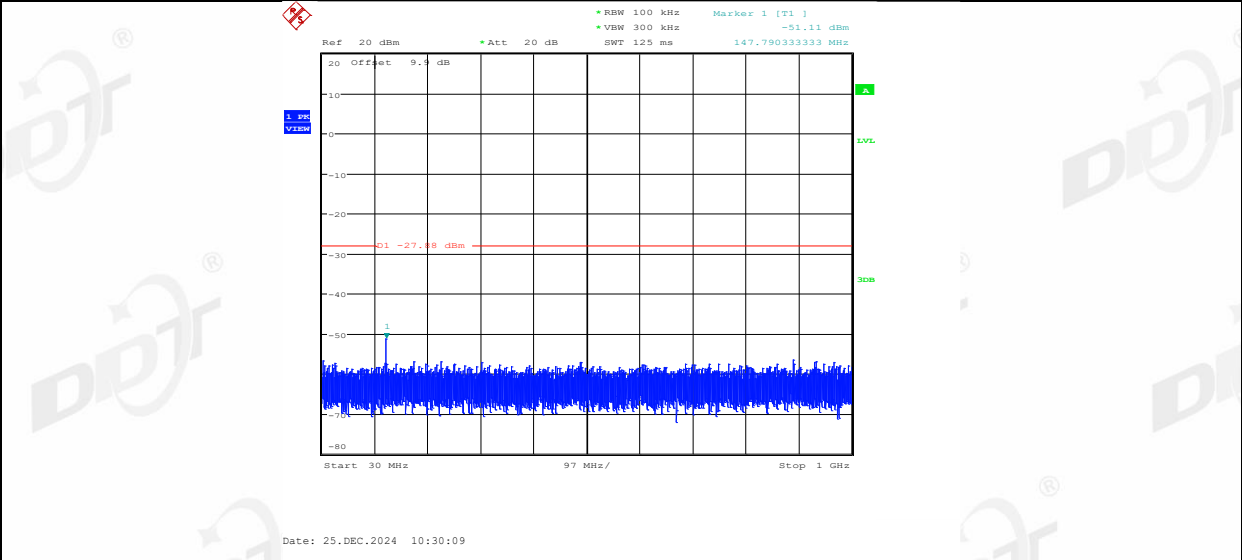
9.5. Test graphs



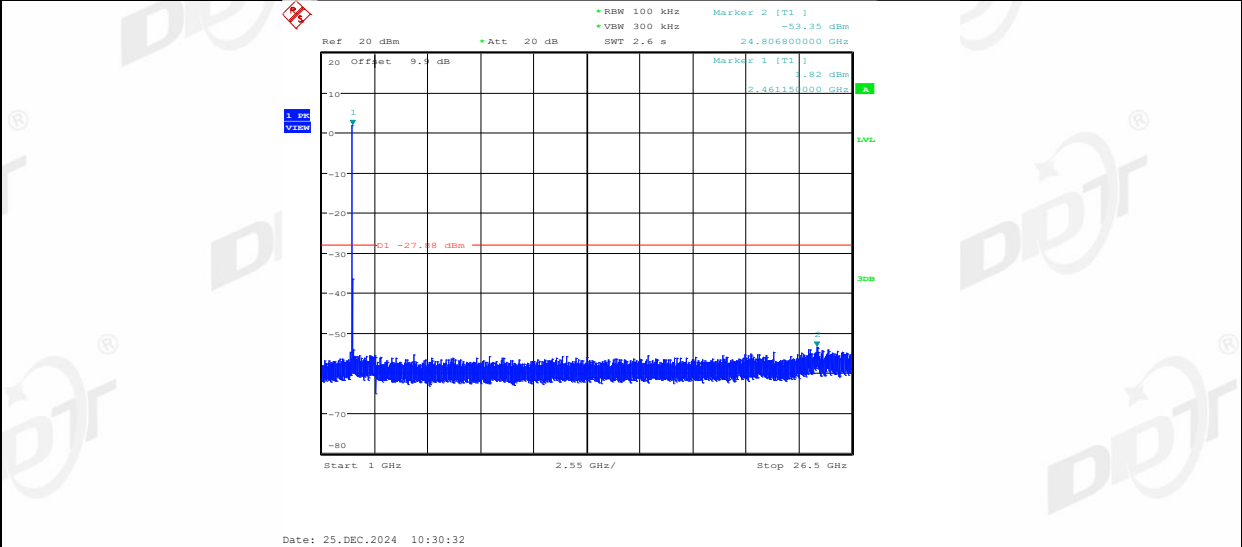




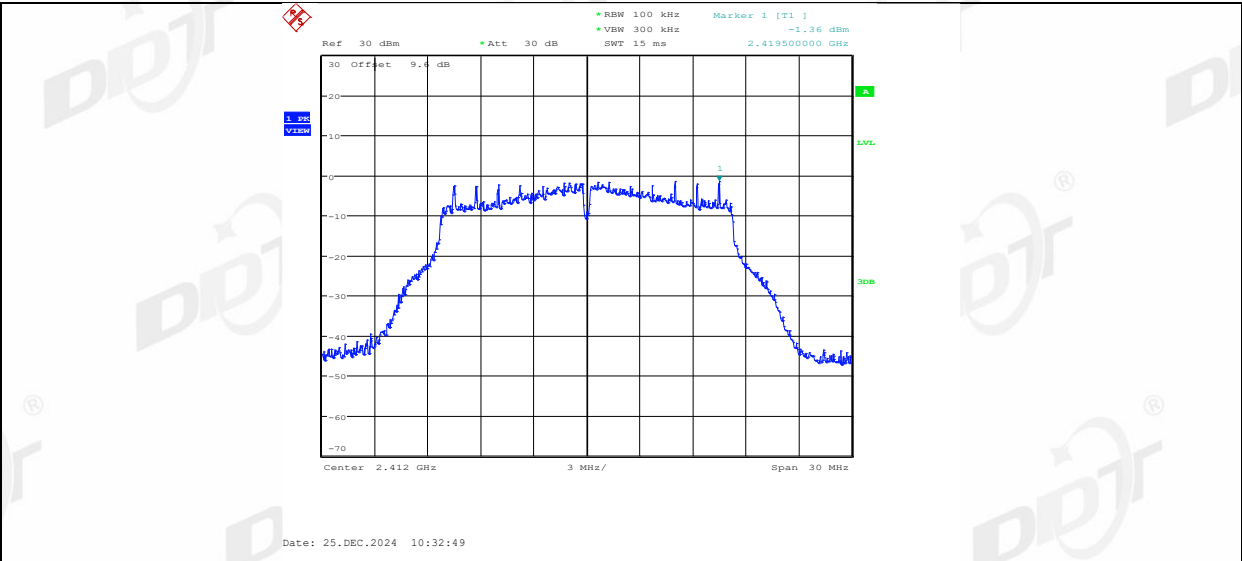
11B_Ant1 2462 30~1000



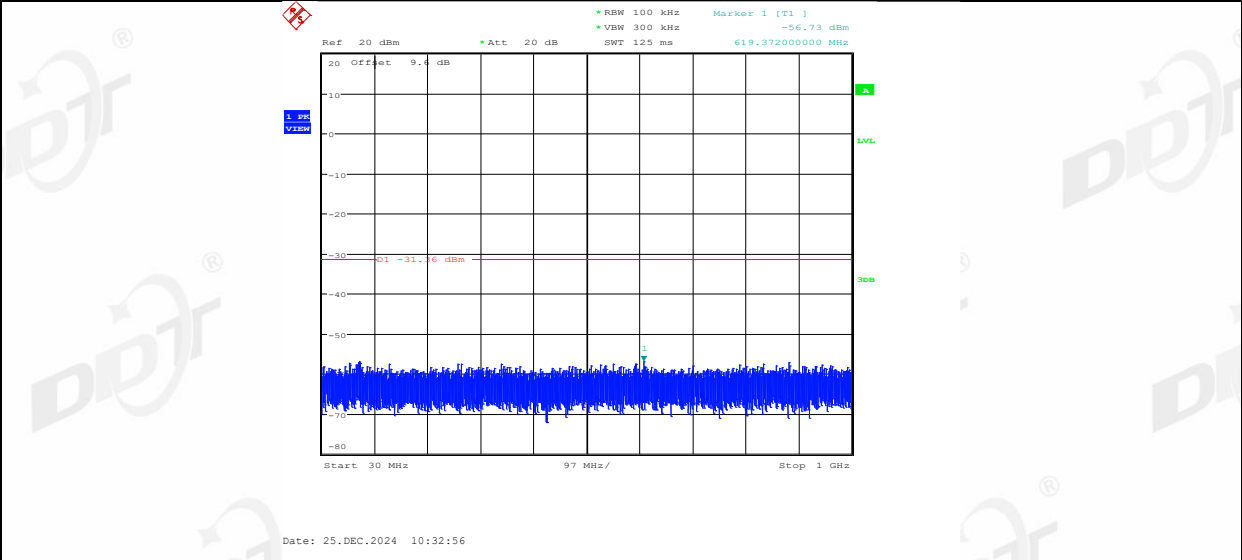
11B_Ant1 2462 1000~26500



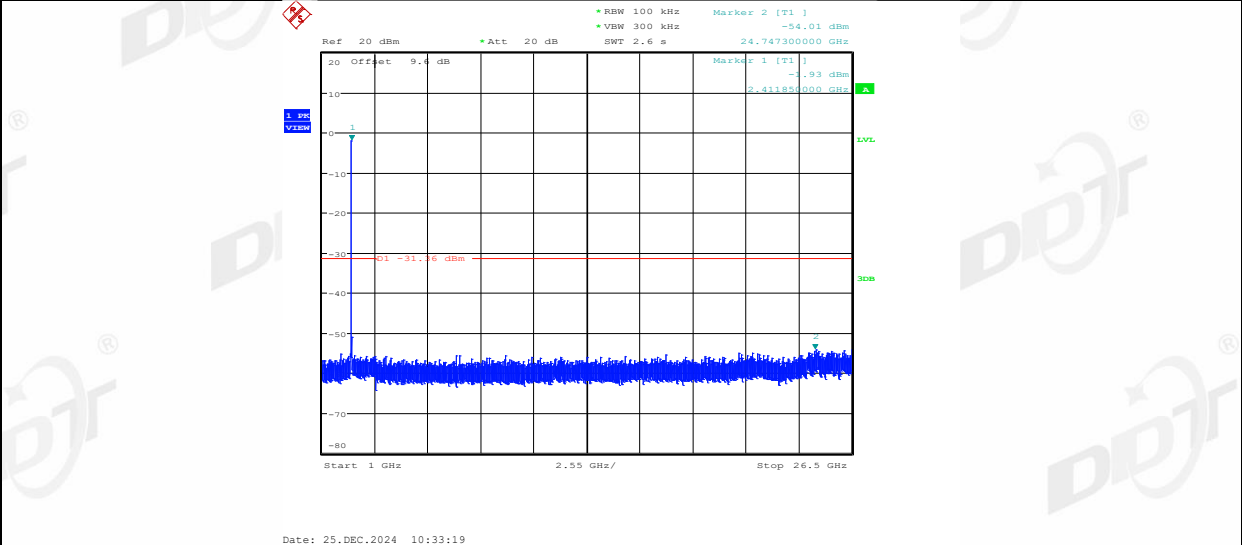
11G_Ant1 2412 0~Reference



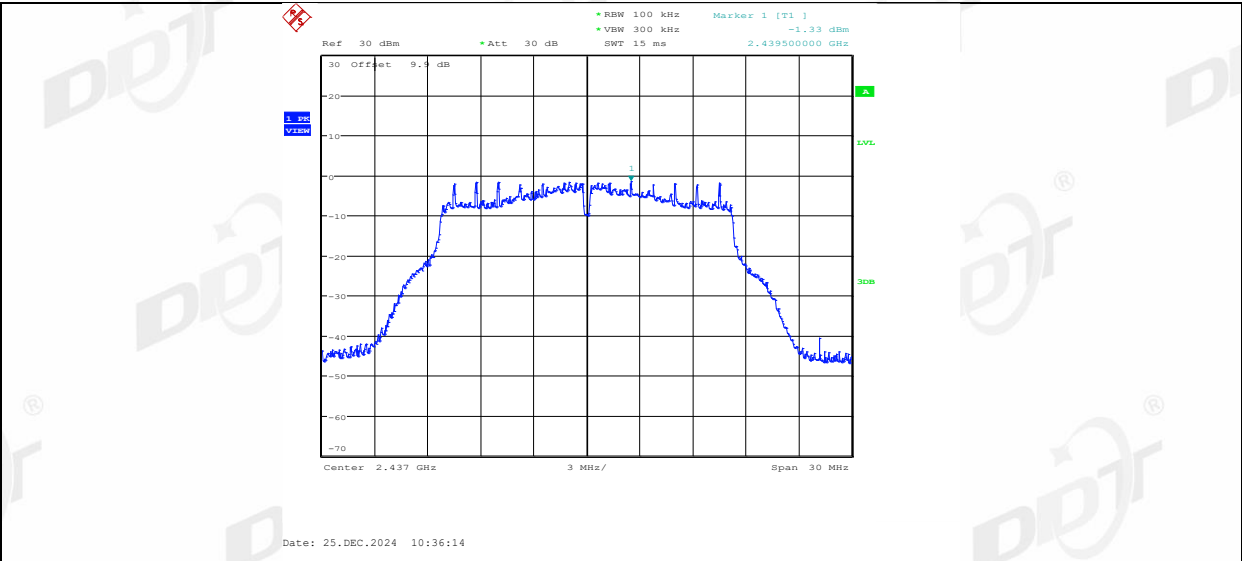
11G_Ant1_2412_30~1000



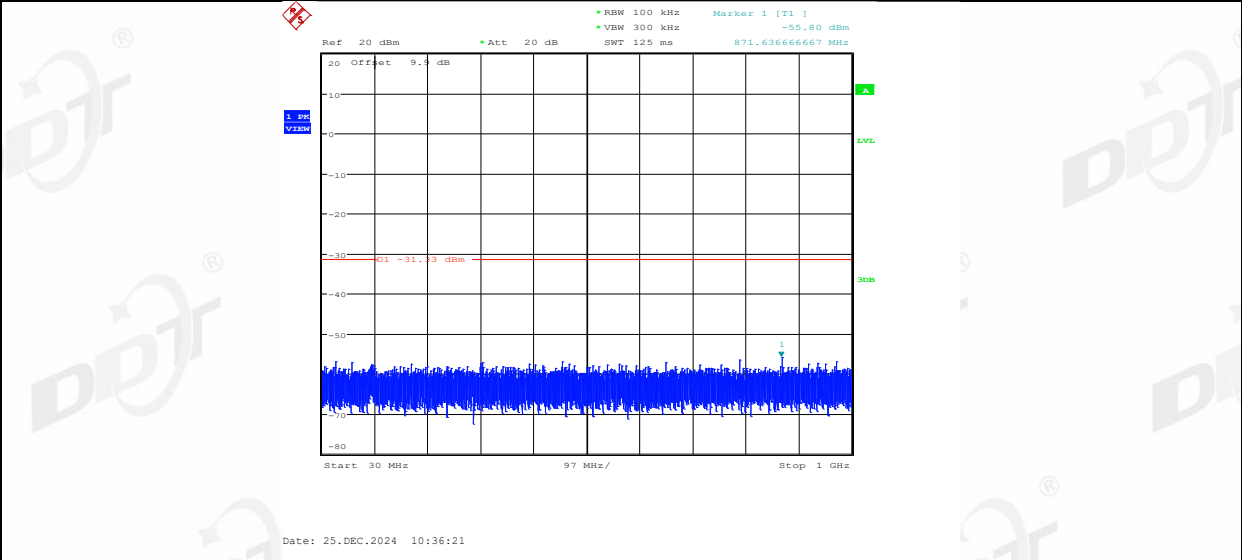
11G_Ant1_2412_1000~26500



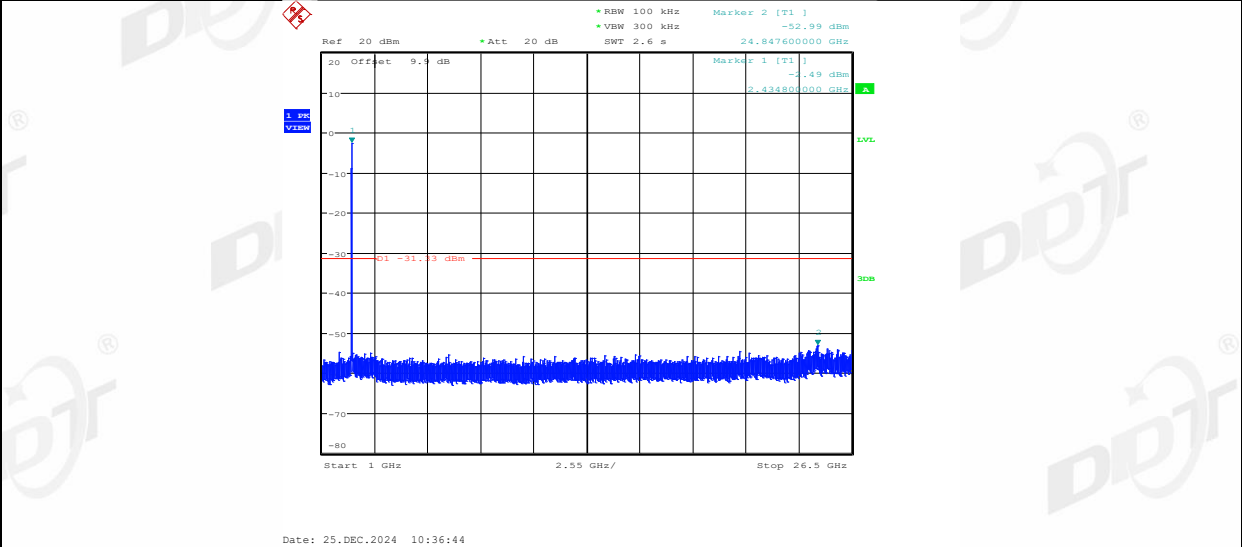
11G_Ant1_2437_0~Reference



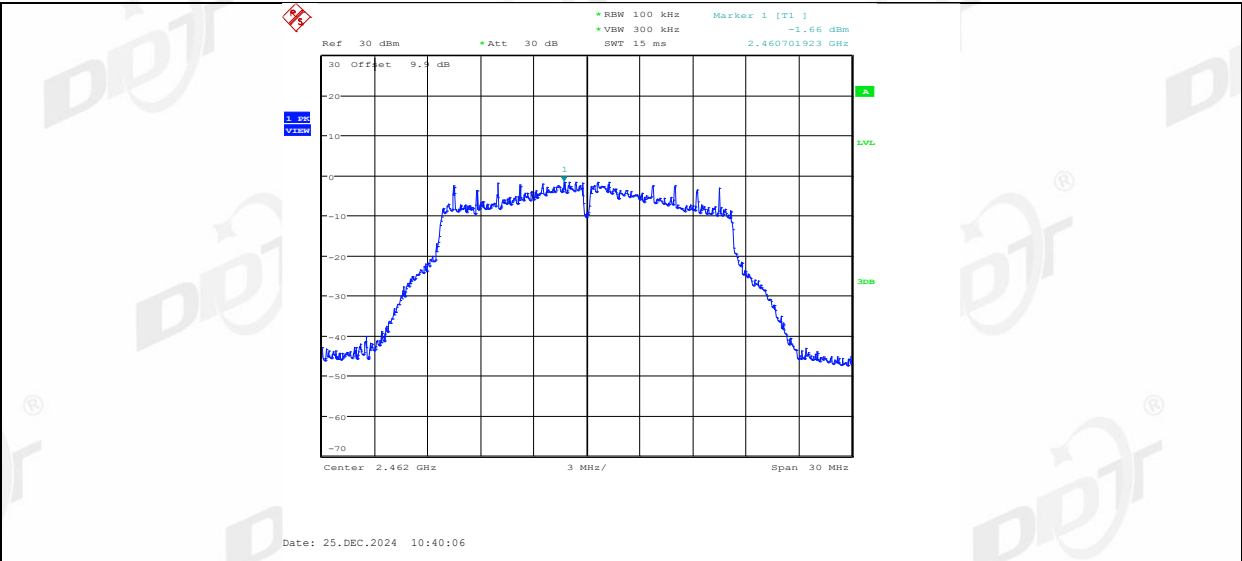
11G_Ant1_2437_30~1000



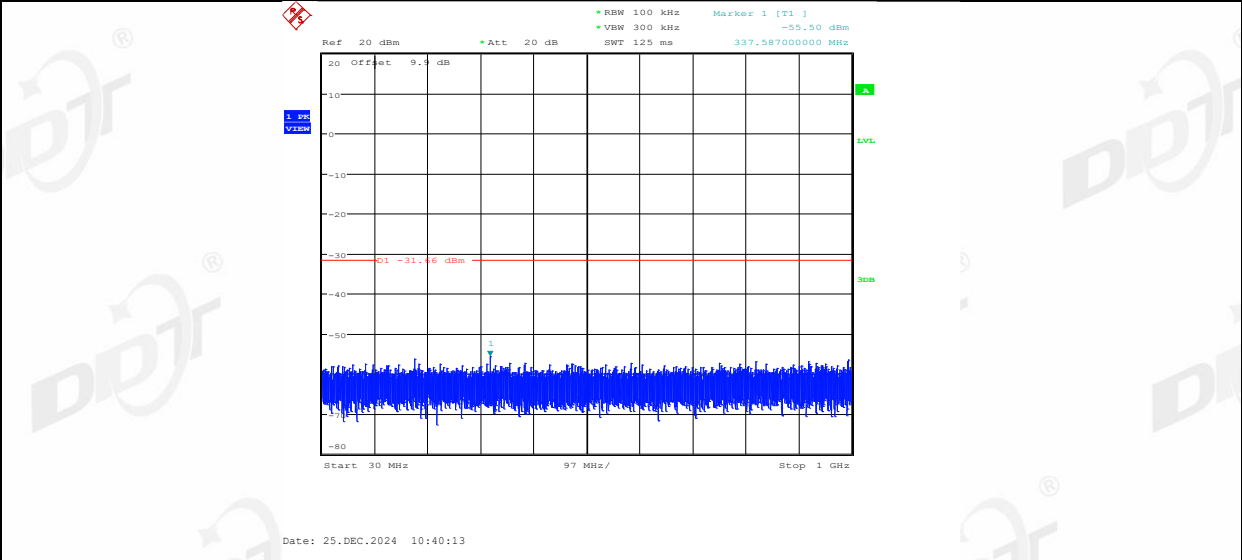
11G_Ant1_2437_1000~26500



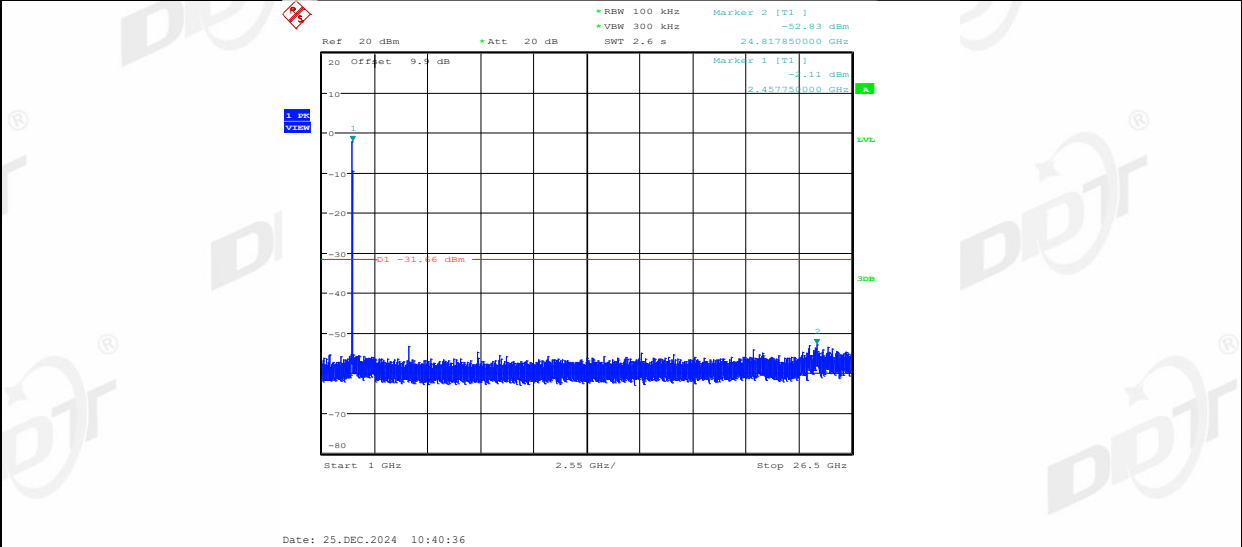
11G_Ant1_2462_0~Reference



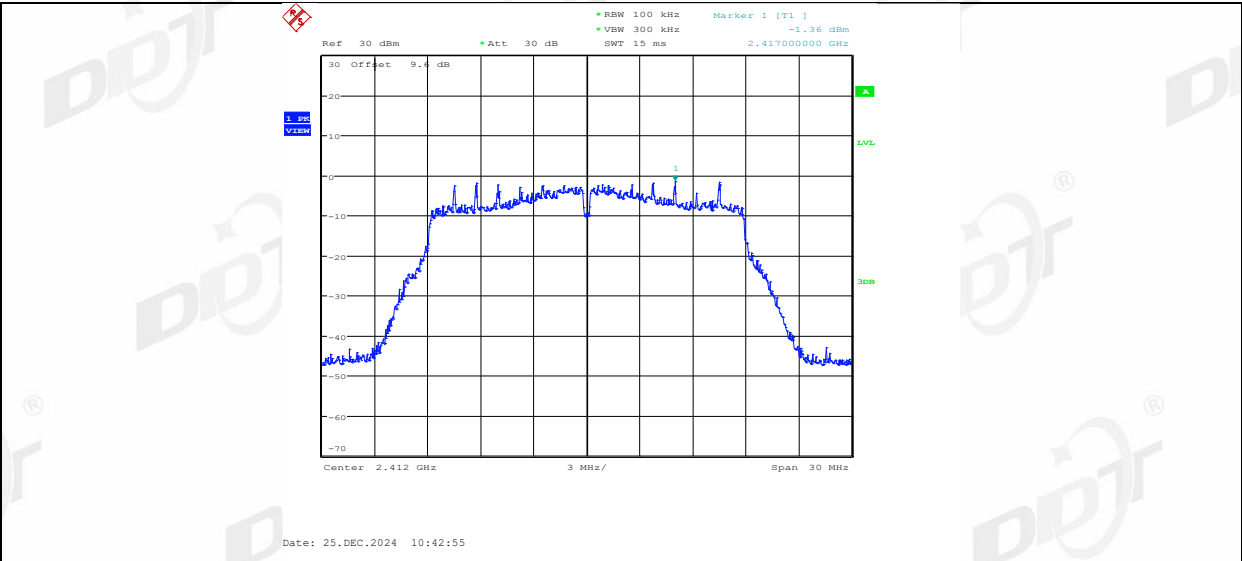
11G_Ant1_2462_30~1000



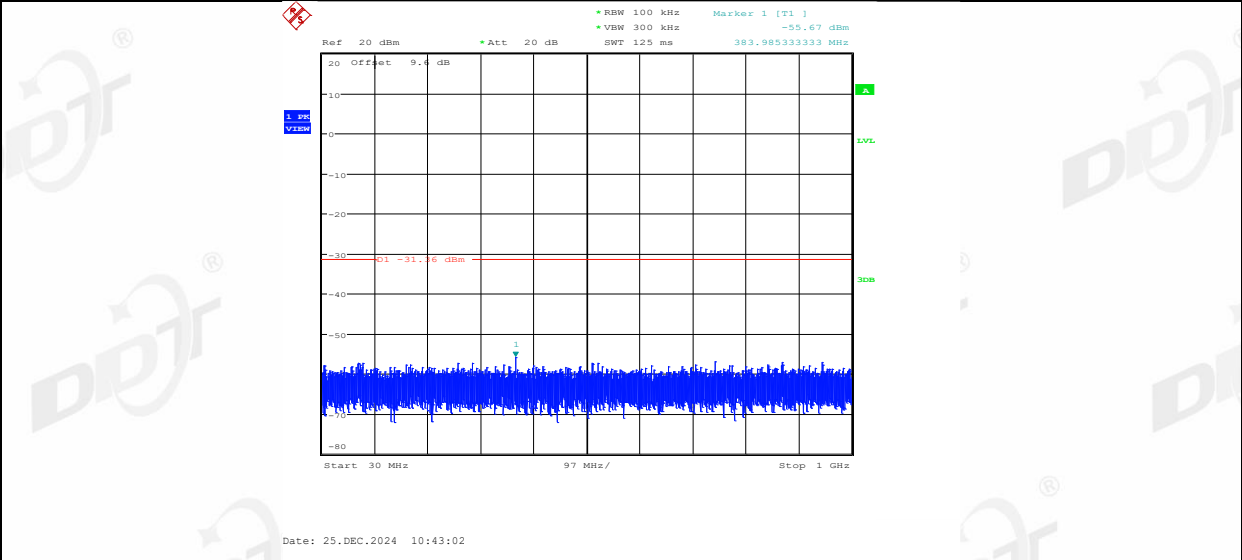
11G_Ant1_2462_1000~26500



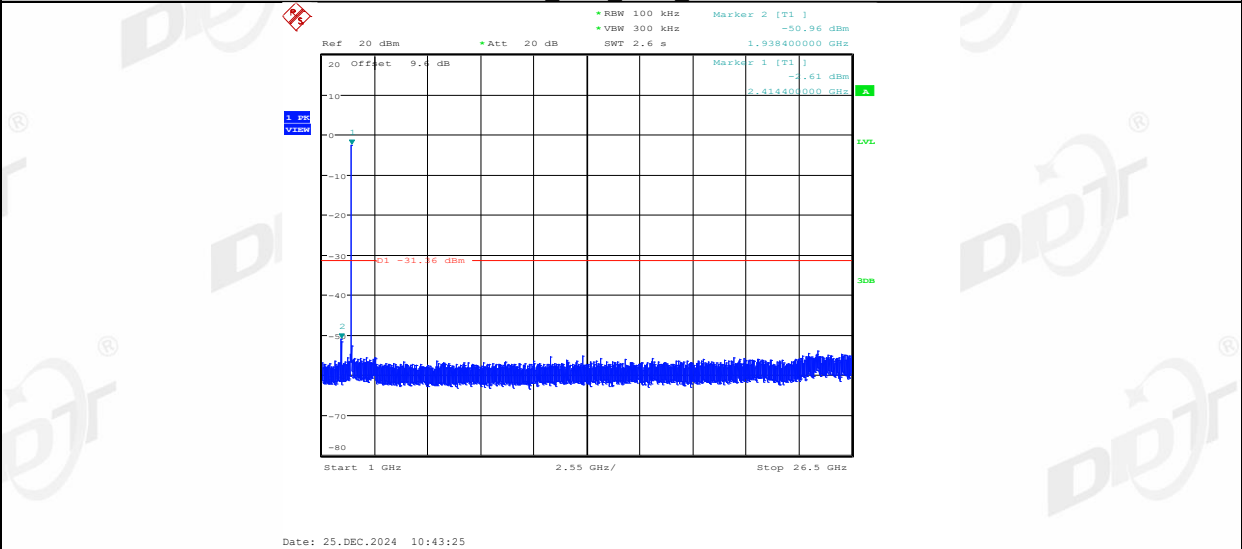
11N20SISO_Ant1_2412_0~Reference



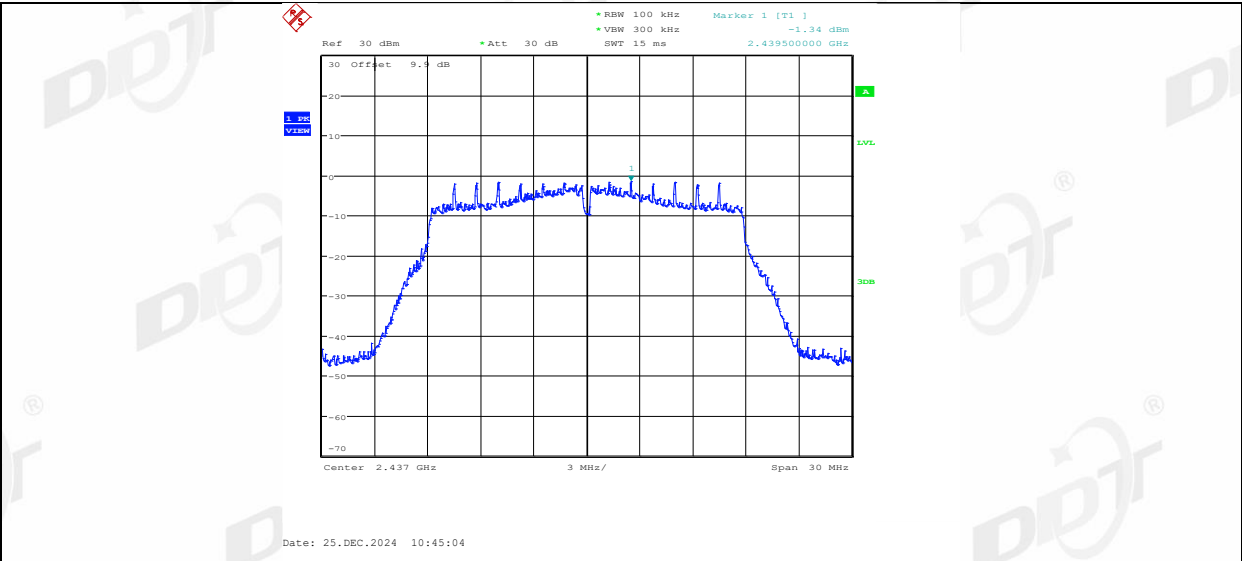
11N20SISO_Ant1_2412_30~1000



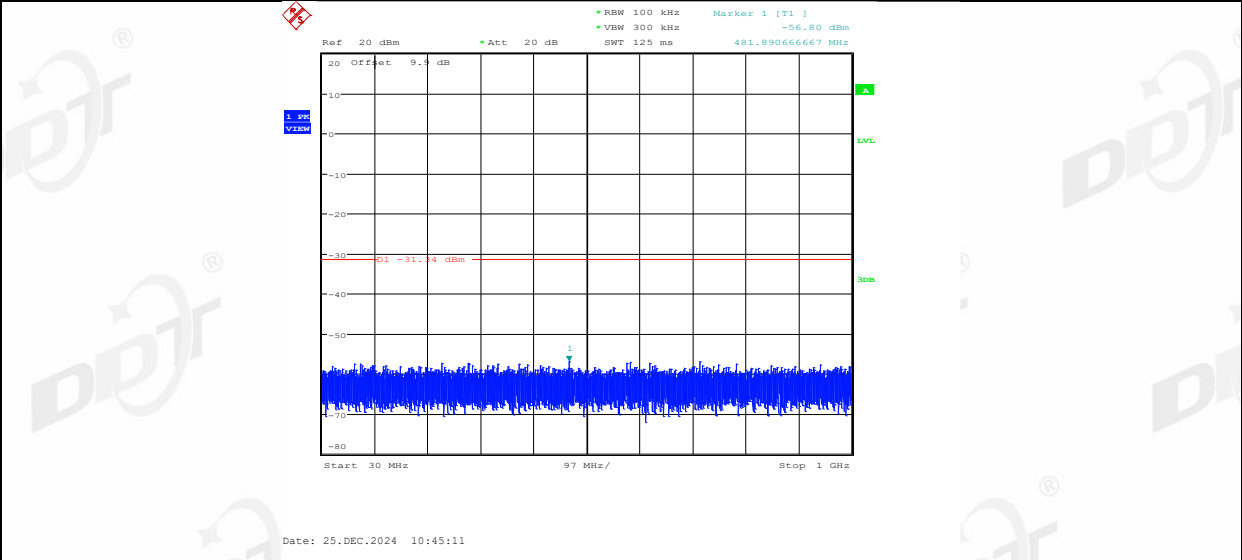
11N20SISO_Ant1_2412_1000~26500



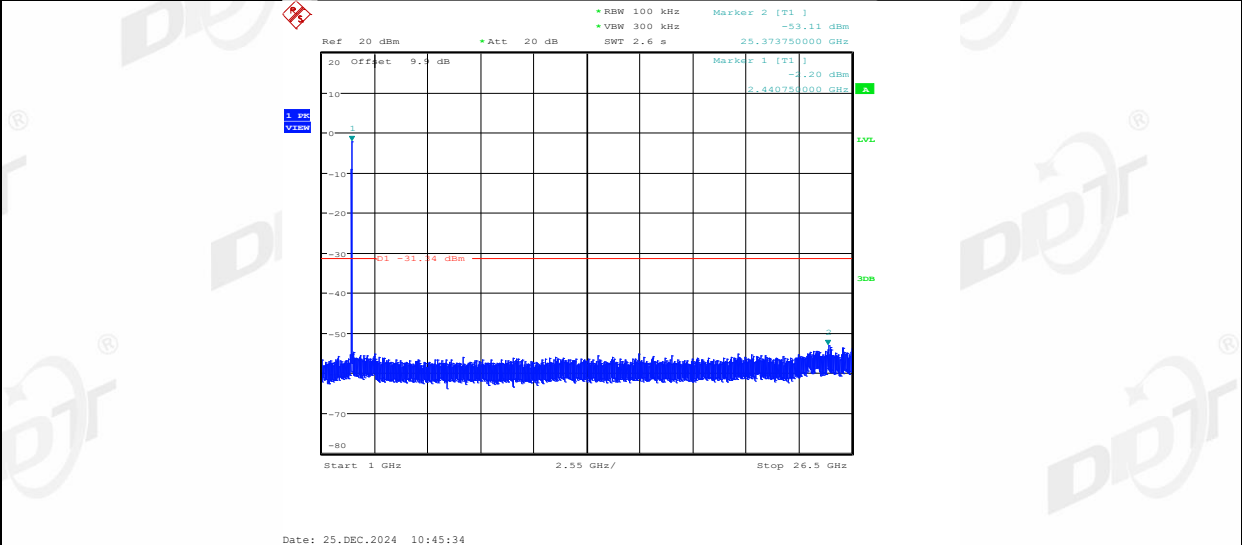
11N20SISO_Ant1_2437_0~Reference



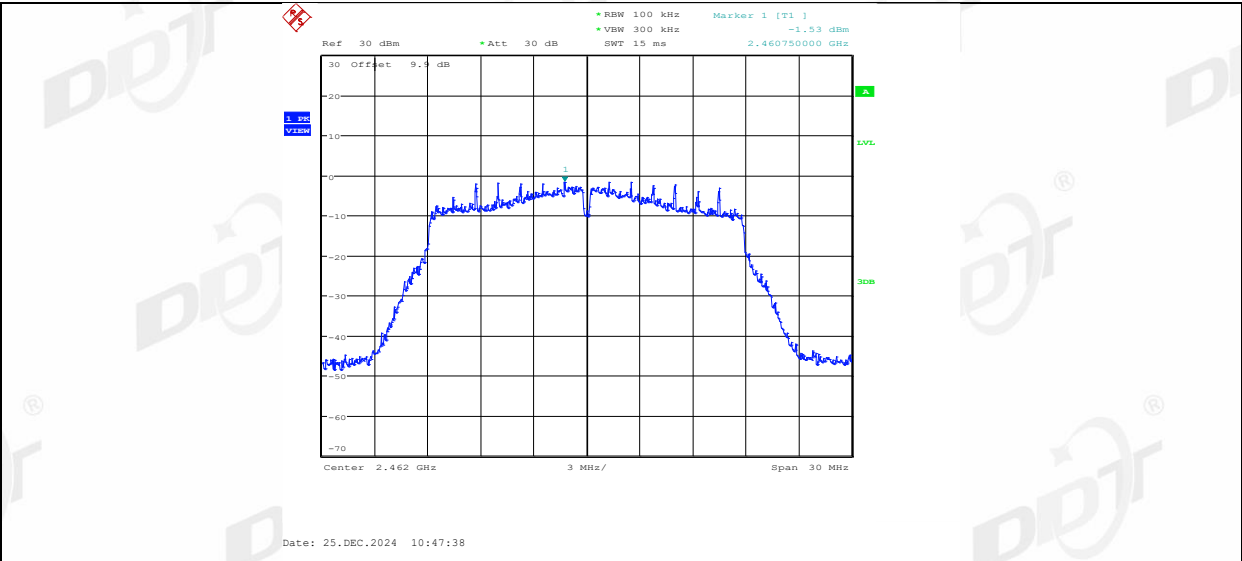
11N20SISO_Ant1_2437_30~1000



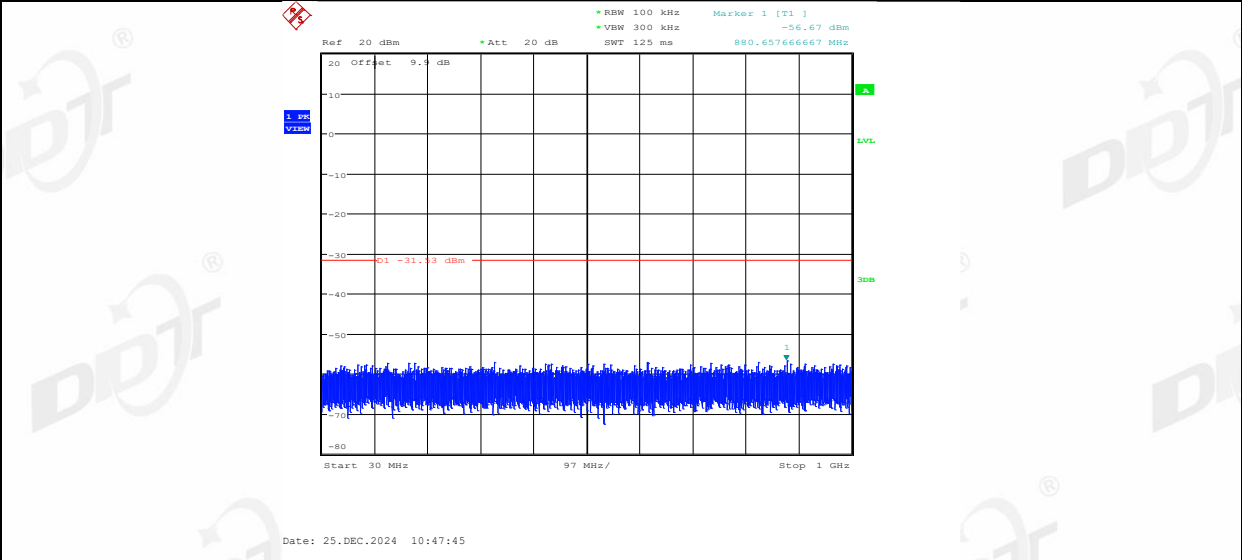
11N20SISO_Ant1_2437_1000~26500



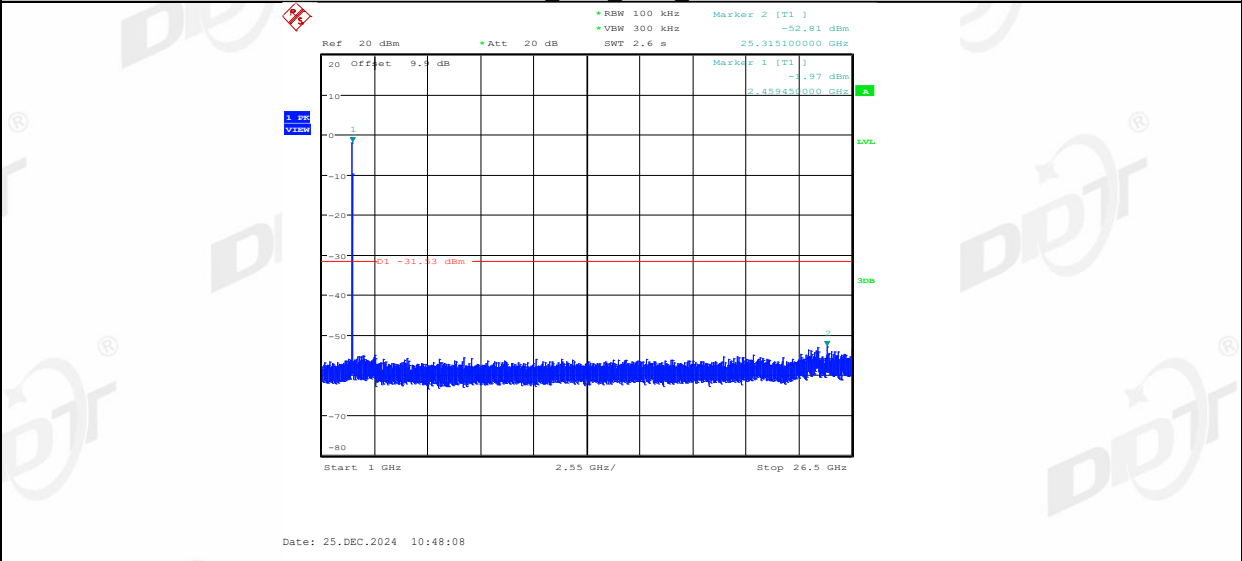
11N20SISO_Ant1_2462_0~Reference



11N20SISO_Ant1_2462_30~1000

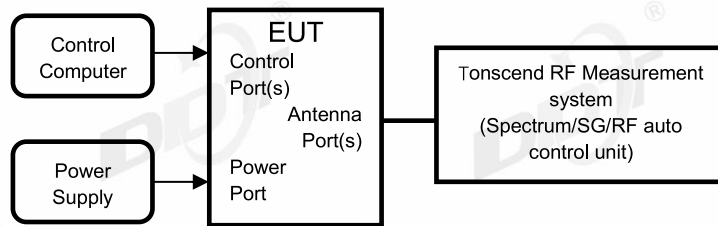


11N20SISO_Ant1_2462_1000~26500



10. Duty Cycle

10.1. Block diagram of test setup



10.2. Limit

Just for Report.

10.3. Test procedure

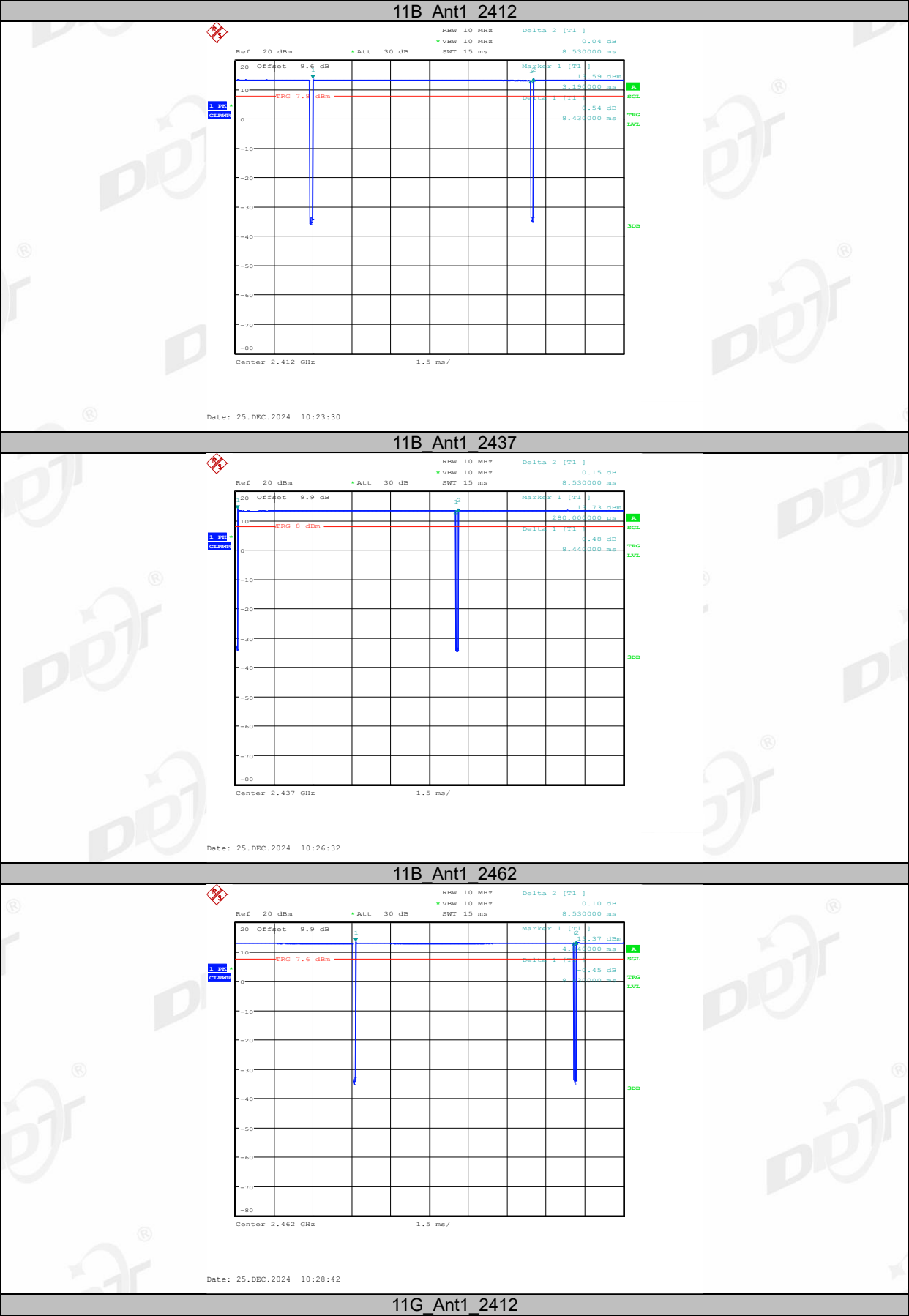
- (1) Connected the EUT's antenna port to the Spectrum Analyzer by suitable attenuator, The cable loss and attenuator loss have been put into spectrum analyzer as amplitude offset.
set the Spectrum Analyzer as below:
 - Centre Frequency: The centre frequency of the middle hopping channel.
 - Resolution BW: 10 MHz.
 - Video BW: 10 MHz.
 - Span: Zero span.
 - Detector: Peak.
 - Trace Mode: Clear Write.
 - Sweep: Video Trigger
- (2) When the trace is complete, measure the sending time of 1 burst and the duty cycle of 1 burst cycle.
- (3) Calculate dwell time follow below formula:
Duty cycle= Pulse's on time / Burst cycle

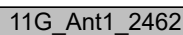
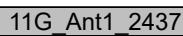
10.4. Test result

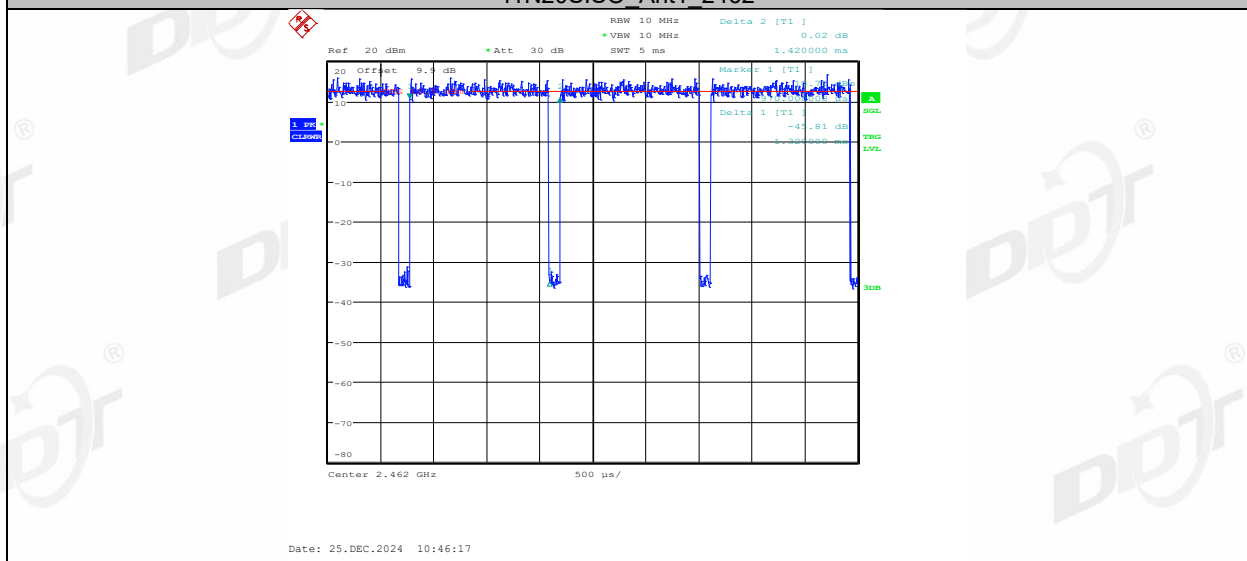
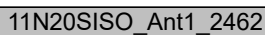
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	24.2℃,55%RH	Test Date:	2024.12.16-2025.01.14
Test Power Supply:	AC230V/50Hz	Sample Number:	S24110729-001

Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2412	8.43	8.53	98.83
		2437	8.44	8.53	98.94
		2462	8.43	8.53	98.83
11G	Ant1	2412	1.40	1.50	93.33
		2437	1.40	1.51	92.72
		2462	1.40	1.51	92.72
11N20SISO	Ant1	2412	1.32	1.42	92.96
		2437	1.32	1.42	92.96
		2462	1.32	1.42	92.96

10.5. Test graphs







11. Antenna Requirements

11.1. Limit

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

11.2. Result

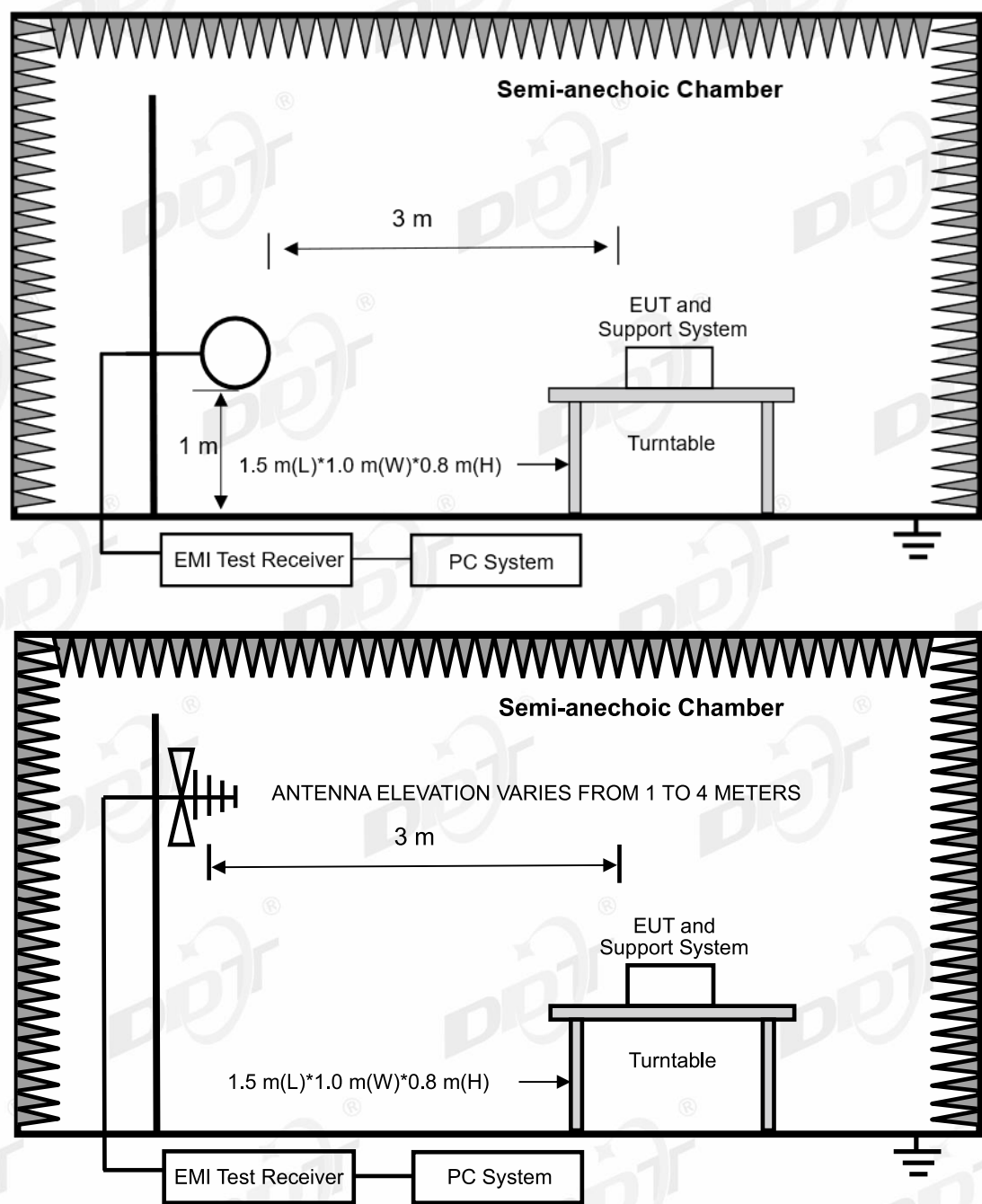
The antenna used for this product as Antenna information described in section 2.1 of the report, and there is no other antenna than that furnished by the responsible party shall be used with the device.

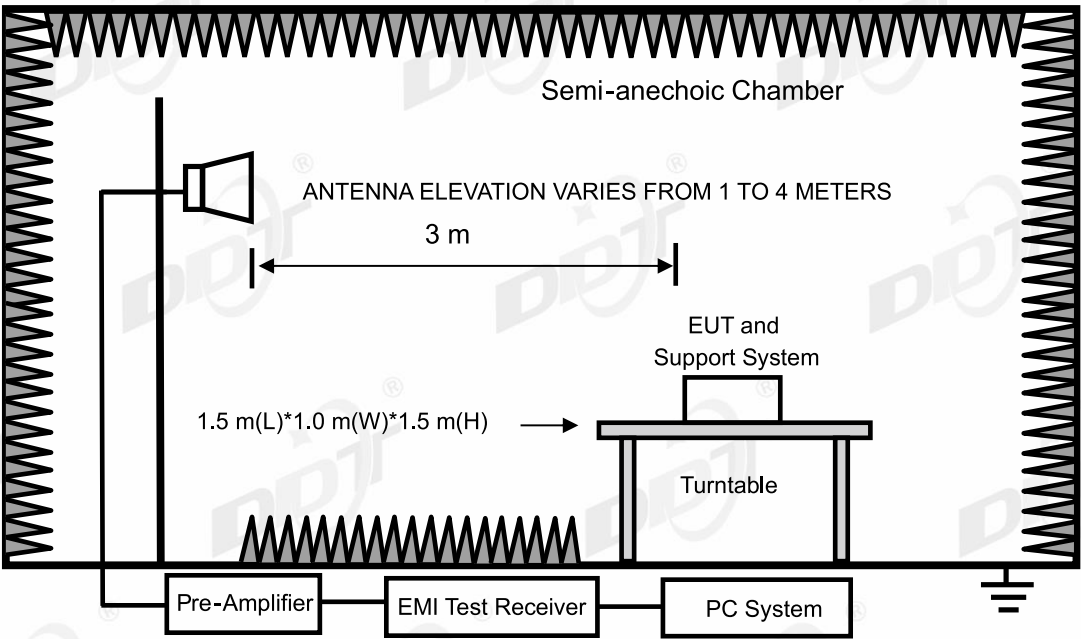
12.Radiated Emission

12.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
RF Cable	N/A	W24.02 HL-562	DDT-ZC04022	2025/03/31
Pre-amplifier	COM-POWER	PAM-840A	DDT-ZC01693	2025/03/31
EMI TEST RECEIVER	R&S	ESU26	DDT-ZC01909	2025/03/31
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ-1.5M	DDT-ZC02762	2025/03/31
Micro-Tronics filters	REBES	BRM50702	DDT-ZC03242	/
Hochgewinn-Hornantenne	SCHWARZBEC K	BBHA 9120 D	DDT-ZC02129	2025/09/18
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/
PSA Series Spectrum Analyzer	Agilent	E4447A	DDT-ZC00517	2025/03/31
RF cable	Yuhu Technology	JCTB810-NJ-NJ-9M	DDT-ZC02538	2025/03/31
RF cable	Yuhu Technology	ZT26S-SMAJ-SMAJ-1M	DDT-ZC02037	2025/03/31
Pre-amplifier	COM-POWER	PAM-118A	DDT-ZC01293	2025/08/25
RF Cable	N/A	W13.02 AP1-X2	DDT-ZC04023	2025/03/31
Active Loop Antenna	Schwarzbeck	FMZB1519	DDT-ZC00524	2025/09/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	DDT-ZC00506	2025/04/26
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2025/04/22
High Pass filter	Xi'an Xingbo	XBLBQ-GTA67	DDT-ZC02179	2025/04/22
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	DDT-ZC02050	2025/07/11
High pass filter	Micro-Tronics	HPM50102	DDT-ZC00561	2025/04/22

12.2. Block diagram of test setup





12.3. Limits

(1) FCC 15.205 Restricted frequency band

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
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&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			

1Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2Above 38.6

(2) FCC 15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		uV/m	dBuV/m
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dBuV/m (Peak) 54.0 dBuV/m (Average)	

Note:

(1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz and above 1000 MHz, radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30 MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3\text{m}}(\text{dBuV/m}) = \text{Limit}_{30\text{m}}(\text{dBuV/m}) + 40\text{Log}(30\text{m}/3\text{m})$$

(3) Limit for this EUT

The emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20 dB below the fundamental emissions or comply with 15.209 limits.

12.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

12.5. Test procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1G and 150 cm above the ground plane inside a fully-anechoic chamber for above 1G.

(2) Test antenna was located 3 m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
9 kHz - 30 MHz	Active Loop antenna	3 m
30 MHz - 1 GHz	Trilog Broadband Antenna	3 m
1 GHz - 18 GHz	Double Ridged Horn Antenna(1 GHz-18 GHz)	3 m
18 GHz - 40 GHz	Horn Antenna(18 GHz-40 GHz)	1 m

According ANSI C63.10:2013 clause 6.4.6 and 6.5.3, for measurements below 30 MHz, Antenna was located 3 m from EUT, the loop antenna was positioned in three antenna orientations (parallel, perpendicular, and round-parallel), for each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable, and the lowest height of the magnetic antenna shall be 1 m above the ground. For measurement above 30MHz, the trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9 kHz to 25 GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1 m to 4 m (Except loop antenna, it's fixed 1 m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9 kHz to 25 GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18 GHz to 25 GHz, so below final test was performed with frequency range from 9 kHz to 18 GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

(5) The emissions from 9 kHz to 1 GHz were measured based on CISPR QP detector except for the frequency bands 9 - 90 kHz, 110 - 490 kHz, for emissions from 9 kHz - 90 kHz, 110 kHz - 490 kHz and above 1 GHz were measured based on average detector, for emissions above 1 GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9 kHz to 1 GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
9 kHz - 150 kHz	200 Hz
150 kHz - 30 MHz	9 kHz
30 MHz - 1 GHz	120 kHz

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz, VBW is set at 3 MHz for Peak measure; According ANSI C63.10:2013 clause 4.1.4.2.2 procedure for average measure.

(8) For portable device, X axis, Y axis, Z axis are tested, and worse setup is reported.

(9) According exploratory test, the emission levels are 20 dB below the limit detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so the final test was performed with frequency range from 30 MHz to 18 GHz and recorded in below.

(10) 30 MHz ~ 25 GHz: (Scan with all mode, the worst case is record and report)

(11) For emissions below 1 GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1 GHz, the final test was only performed with the worst mode.

(12) The worst simultaneous case and was recorded.

12.6. Test result

PASS. (See below detailed test result)

12.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:2025-01-19

Tested By:Zhong Nan

EUT:Desktop DAC and Headphone Amplifier

Model Number:F4161K

Test Mode:TX 2.4GWIFI Mode

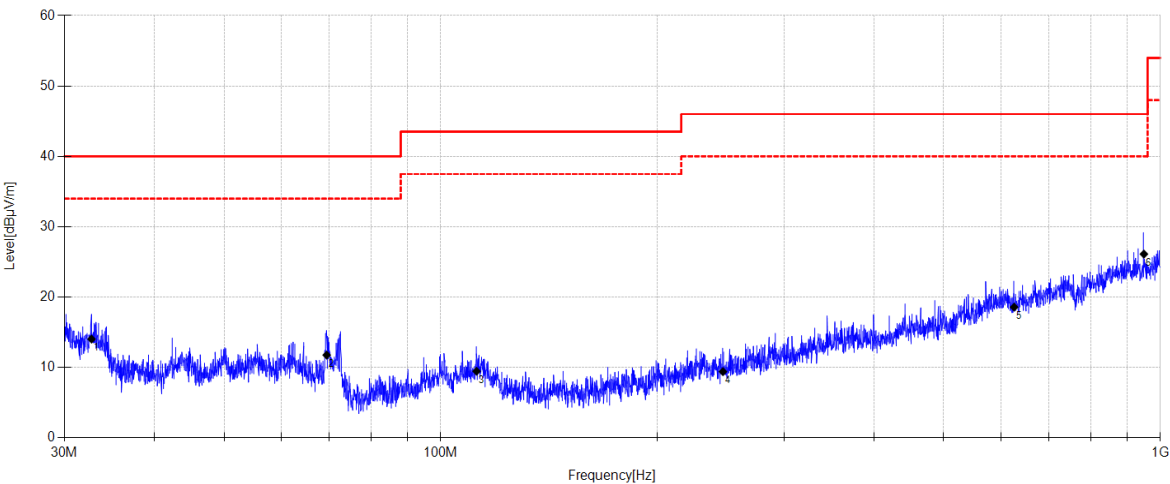
Power Supply:AC 120/60Hz

Condition:Temp:23.3°C;Humi:59.4%

Test Site:DDT 3# Chamber

File Path:d:\ts\2024 report data\Q24110729-1E\FCC BELOW1G\20250119-201905_H

Memo:



Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable Loss [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	32.725	30.67	10.68	3.78	14.03	40.00	25.97	QP	Horizontal
2	69.443	28.65	10.19	4.02	11.76	40.00	28.24	QP	Horizontal
3	112.180	24.65	11.63	4.29	9.46	43.50	34.04	QP	Horizontal
4	246.711	24.15	11.57	4.97	9.40	46.00	36.60	QP	Horizontal
5	626.453	25.15	18.47	6.45	18.57	46.00	27.43	QP	Horizontal
6	948.771	26.71	22.41	7.33	26.11	46.00	19.89	QP	Horizontal

Note:

1. Result Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2025-01-19

Tested By:

Zhong Nan

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 2.4GWIFI Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

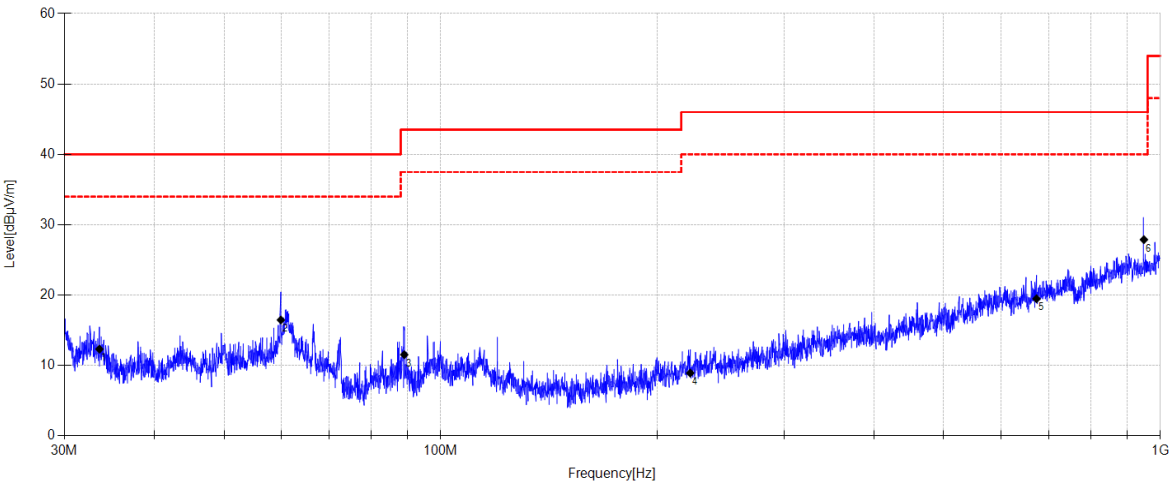
Test Site:

DDT 3# Chamber

File Path:

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Memo:



Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable Loss [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	33.562	28.37	11.27	3.78	12.32	40.00	27.68	QP	Vertical
2	59.977	30.81	12.79	3.96	16.46	40.00	23.54	QP	Vertical
3	89.007	29.19	9.30	4.14	11.53	43.50	31.97	QP	Vertical
4	222.237	24.17	11.13	4.86	8.92	46.00	37.08	QP	Vertical
5	672.898	25.2	19.18	6.60	19.48	46.00	26.52	QP	Vertical
6	948.771	28.48	22.41	7.33	27.88	46.00	18.12	QP	Vertical

- Note:
1. Result Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2412 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

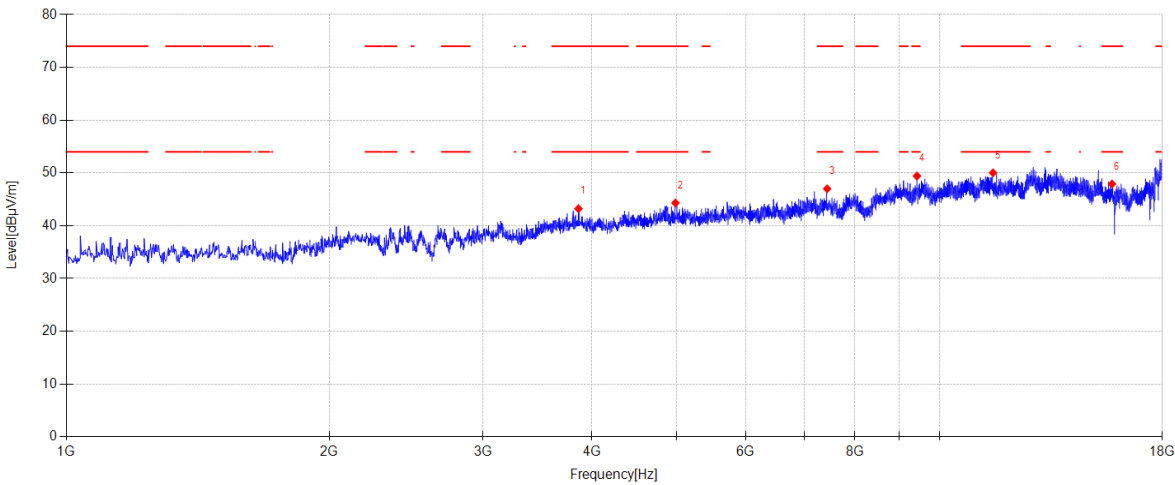
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\10

Memo:

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	3859.400	46.85	30.96	5.07	-39.65	43.23	74.00	30.77	PK	Horizontal
2	4984.800	45.11	33.17	5.64	-39.60	44.32	74.00	29.68	PK	Horizontal
3	7436.200	44.31	36.63	6.67	-40.61	47.00	74.00	27.00	PK	Horizontal
4	9425.200	42.42	38.70	7.44	-39.14	49.42	74.00	24.58	PK	Horizontal
5	11516.200	41.92	39.17	8.46	-39.52	50.03	74.00	23.97	PK	Horizontal
6	15762.800	38.96	38.37	9.99	-39.40	47.92	74.00	26.08	PK	Horizontal

Note:

- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2412 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

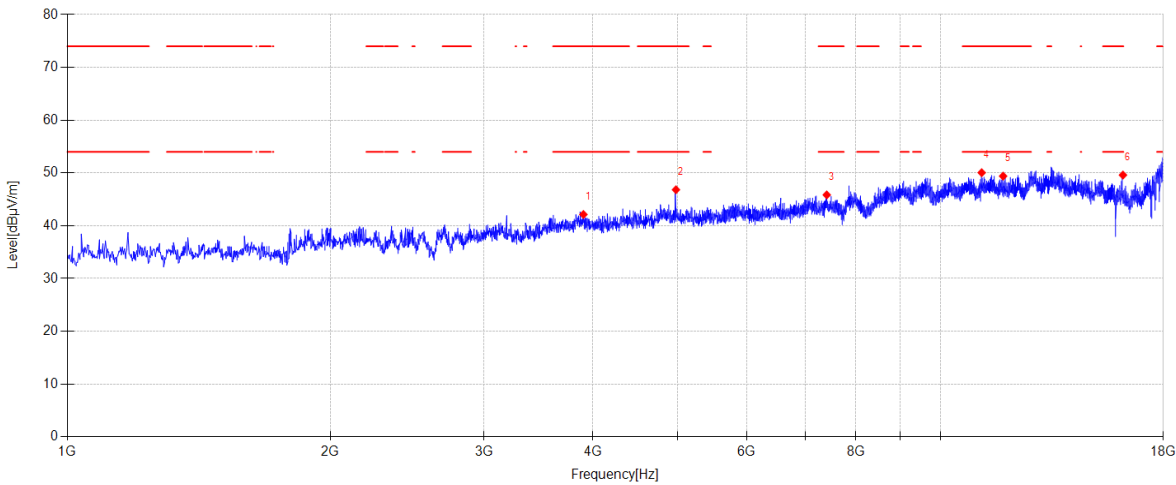
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\11

Memo:

Test Graph



Data List										
NO.	Freq. [MHz]	Reading [dBµV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	3900.200	45.52	31.20	5.07	-39.66	42.13	74.00	31.87	PK	Vertical
2	4978.000	47.62	33.16	5.64	-39.60	46.82	74.00	27.18	PK	Vertical
3	7409.000	43.13	36.68	6.66	-40.63	45.84	74.00	28.16	PK	Vertical
4	11149.000	41.73	39.25	8.22	-39.15	50.05	74.00	23.95	PK	Vertical
5	11796.700	41.67	38.90	8.63	-39.80	49.40	74.00	24.60	PK	Vertical
6	16181.000	41.12	37.82	10.19	-39.53	49.60	74.00	24.40	PK	Vertical

Note:

- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2437 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

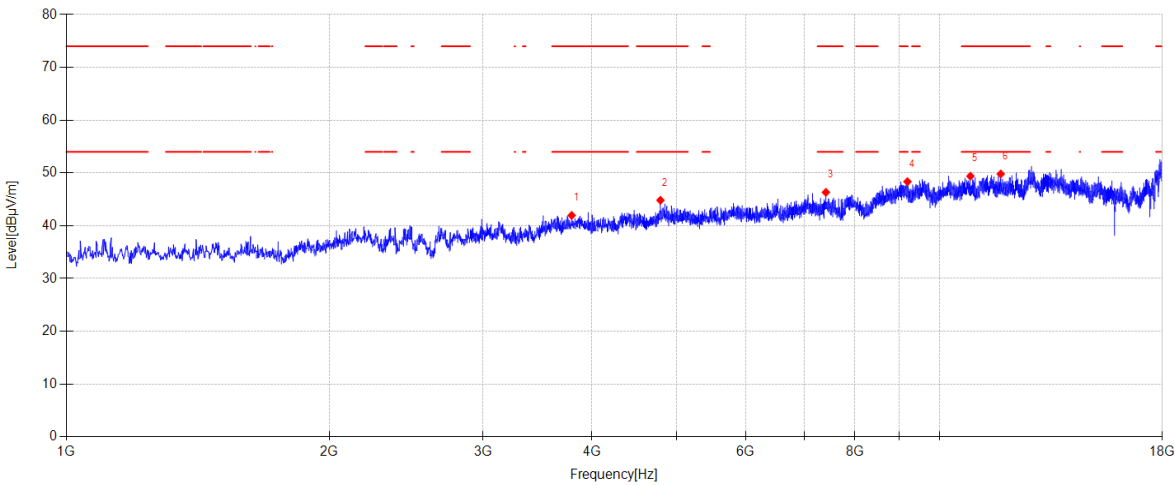
DDT 3# Chamber

File Path:

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Memo:

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	3791.400	45.83	30.67	5.09	-39.63	41.96	74.00	32.04	PK	Horizontal
2	4791.000	46.47	32.46	5.52	-39.62	44.83	74.00	29.17	PK	Horizontal
3	7412.400	43.62	36.68	6.66	-40.63	46.33	74.00	27.67	PK	Horizontal
4	9190.600	41.36	38.58	7.36	-38.95	48.35	74.00	25.65	PK	Horizontal
5	10849.800	41.08	39.35	8.05	-39.09	49.39	74.00	24.61	PK	Horizontal
6	11754.200	42.00	38.95	8.61	-39.75	49.81	74.00	24.19	PK	Horizontal

Note:

- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2437 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

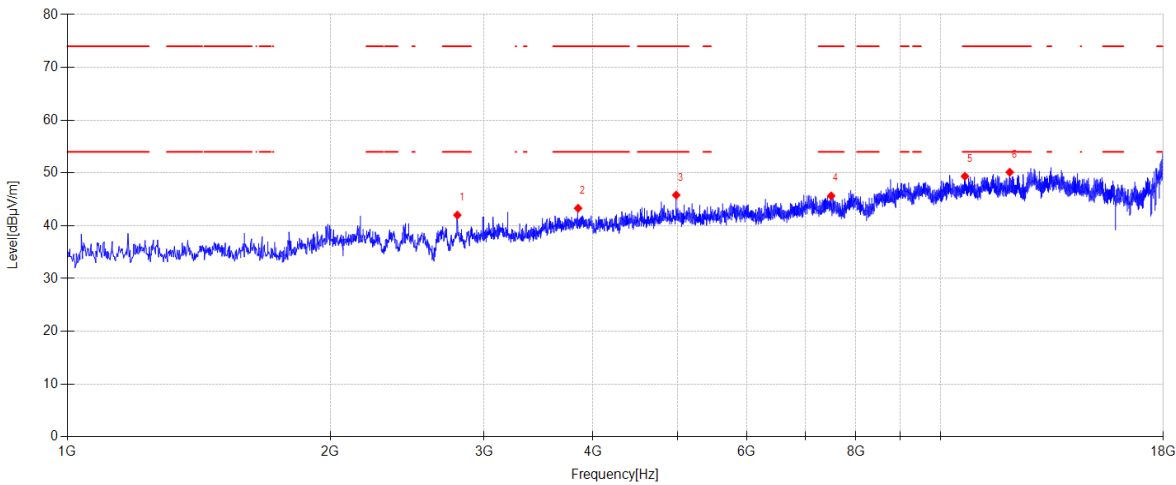
DDT 3# Chamber

File Path:

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Memo:

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2796.900	48.70	27.41	5.09	-39.18	42.02	74.00	31.98	PK	Vertical
2	3845.800	46.99	30.88	5.08	-39.64	43.31	74.00	30.69	PK	Vertical
3	4981.400	46.61	33.16	5.64	-39.60	45.81	74.00	28.19	PK	Vertical
4	7497.400	43.00	36.51	6.70	-40.55	45.66	74.00	28.34	PK	Vertical
5	10666.200	41.28	39.33	7.96	-39.20	49.37	74.00	24.63	PK	Vertical
6	12004.100	42.18	39.20	8.76	-40.00	50.14	74.00	23.86	PK	Vertical

Note:

- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2462 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

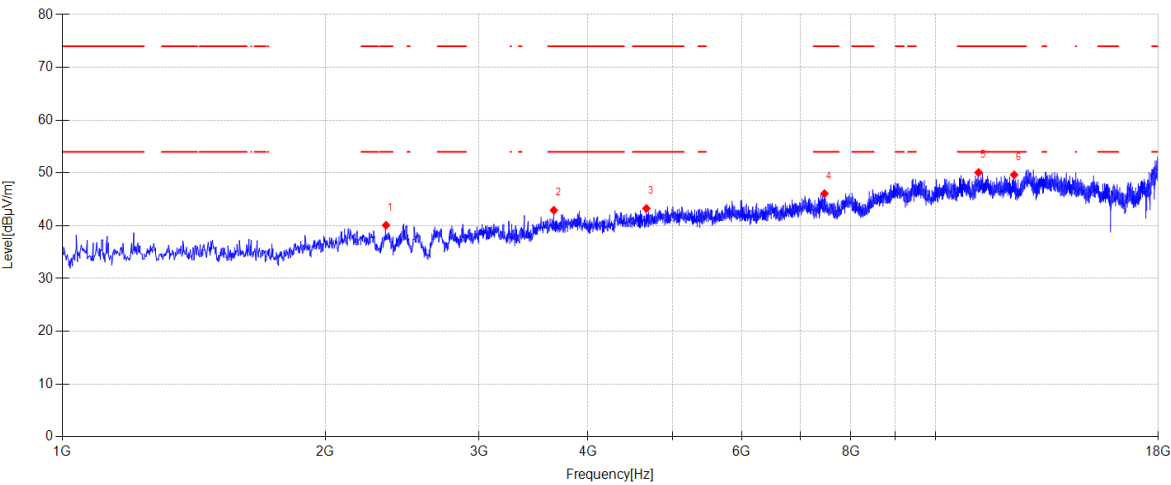
DDT 3# Chamber

File Path:

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Memo:

Test Graph



Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2348.100	46.81	27.09	4.81	-38.62	40.09	74.00	33.91	PK	Horizontal
2	3655.400	47.20	30.22	5.11	-39.60	42.93	74.00	31.07	PK	Horizontal
3	4665.200	45.39	32.06	5.45	-39.63	43.27	74.00	30.73	PK	Horizontal
4	7463.400	43.40	36.57	6.69	-40.58	46.08	74.00	27.92	PK	Horizontal
5	11201.700	41.83	39.20	8.26	-39.20	50.09	74.00	23.91	PK	Horizontal
6	12306.700	41.37	39.30	8.92	-39.94	49.65	74.00	24.35	PK	Horizontal

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2462 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

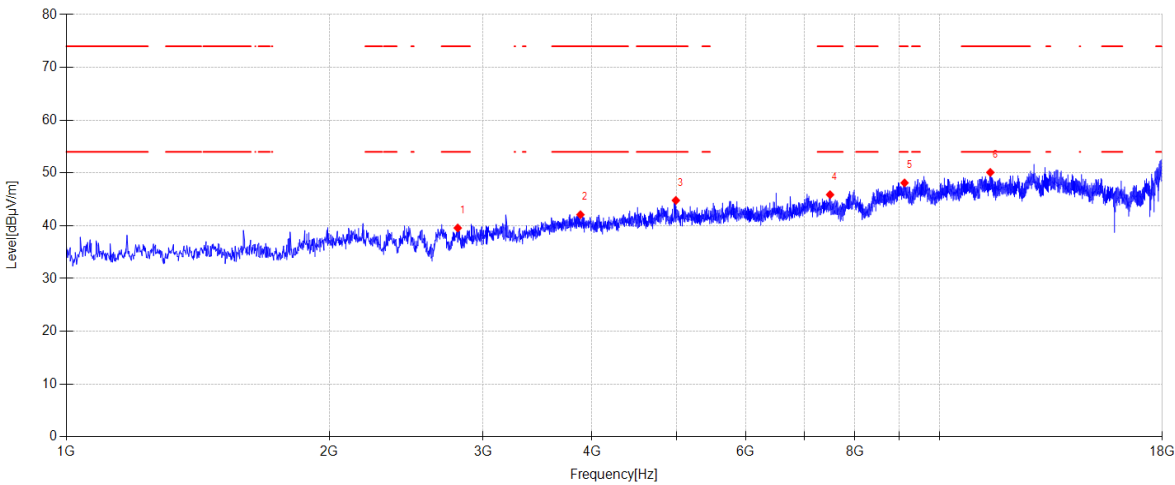
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\15

Memo:

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2807.100	46.21	27.46	5.10	-39.20	39.57	74.00	34.43	PK	Vertical
2	3879.800	45.59	31.08	5.07	-39.65	42.09	74.00	31.91	PK	Vertical
3	4989.900	45.58	33.18	5.64	-39.60	44.80	74.00	29.20	PK	Vertical
4	7494.000	43.23	36.51	6.70	-40.56	45.88	74.00	28.12	PK	Vertical
5	9120.900	41.18	38.50	7.34	-38.90	48.12	74.00	25.88	PK	Vertical
6	11434.600	41.86	39.27	8.40	-39.43	50.10	74.00	23.90	PK	Vertical

Note:

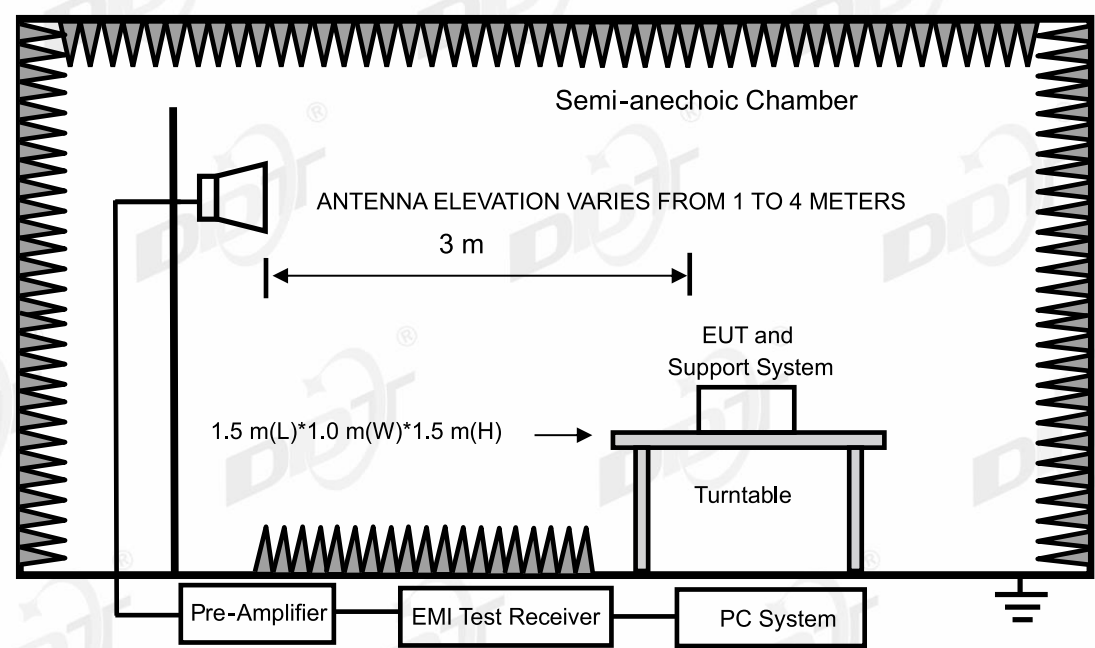
- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

13.Band Edge Compliance

13.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
RF cable	Yuhu Technology	JCTB810-NJ-NJ-9M	DDT-ZC02538	2025/03/31
Pre-amplifier	COM-POWER	PAM-118A	DDT-ZC01293	2025/08/25
High Pass filter	Xi'an Xingbo	XBLBQ-GTA67	DDT-ZC02179	2025/04/22
EMI TEST RECEIVER	R&S	ESU26	DDT-ZC01909	2025/03/31
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ-1.5M	DDT-ZC02762	2025/03/31
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2025/04/22
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	DDT-ZC02050	2025/07/11
High pass filter	Micro-Tronics	HPM50102	DDT-ZC00561	2025/04/22
Pre-amplifier	COM-POWER	PAM-840A	DDT-ZC01693	2025/03/31
RF cable	Yuhu Technology	ZT26S-SMAJ-SMAJ-1M	DDT-ZC02037	2025/03/31
RF Cable	N/A	W13.02 AP1-X2	DDT-ZC04023	2025/03/31
Micro-Tronics filters	REBES	BRM50702	DDT-ZC03242	/
Hochgewinn-Hornantenne	SCHWARZBECK	BBHA 9120 D	DDT-ZC02129	2025/09/18
RF Cable	N/A	W24.02 HL-562	DDT-ZC04022	2025/03/31
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	DDT-ZC00506	2025/04/26
Active Loop Antenna	Schwarzbeck	FMZB1519	DDT-ZC00524	2025/09/11
PSA Series Spectrum Analyzer	Agilent	E4447A	DDT-ZC00517	2025/03/31

13.2. Block diagram of test setup



13.3. Limits

All restriction band should comply with 15.209limits, other emission should be at least 20 dB below the fundamental.

13.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

13.5. Test procedure

Same with Radiated Emission except change investigated frequency range.

Remark: All restriction band have been tested, and only the worst case is shown in report. According to the results of the radiated Emission test, it can be judged that the Vertical direction is the Worst case. Average level were measured with Spectrum Analyzer, and only the worst case is shown in report.

13.6. Test result

PASS. (See below detailed test result)

13.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2462 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

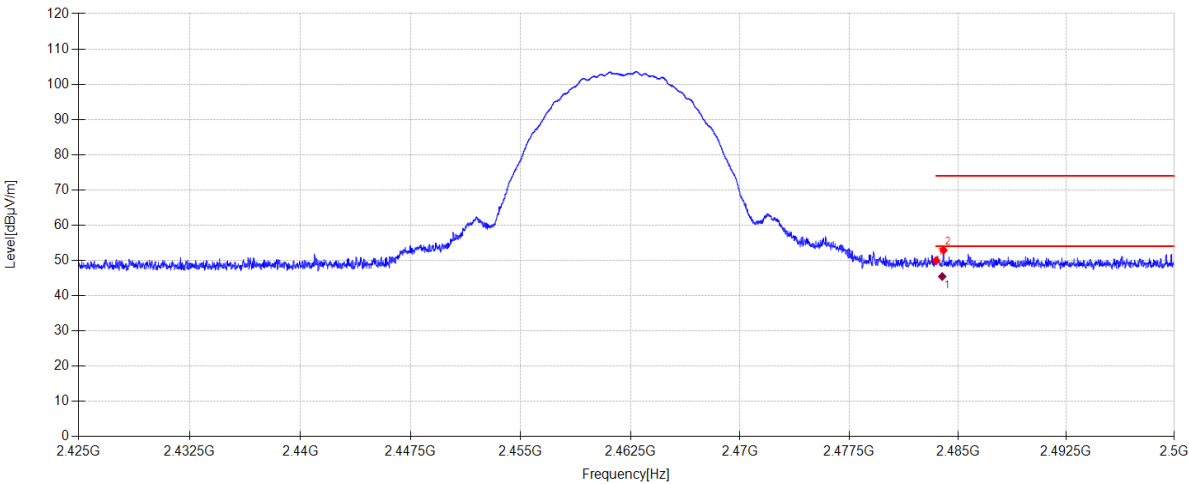
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\4

Memo:

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2483.500	18.81	27.53	3.62	0.00	49.96	74.00	24.04	PK	Vertical
2	2484.018	21.72	27.54	3.62	0.00	52.88	74.00	21.12	PK	Vertical

Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	
1	2483.925	14.26	27.54	3.62	45.42	54.00	8.58	AV	Vertical	

- Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11B 2412 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

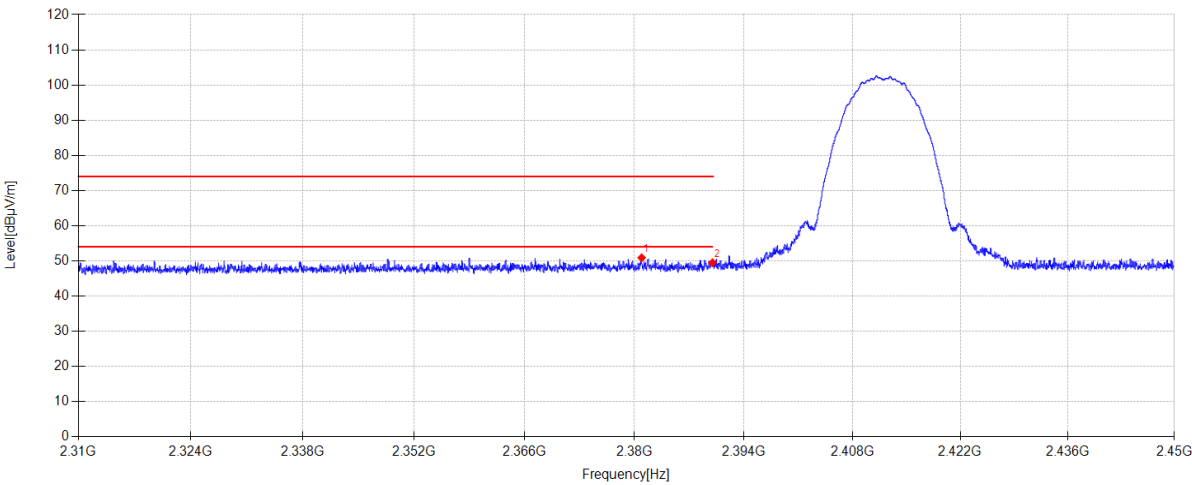
DDT 3# Chamber

File Path:

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Memo:

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2380.924	20.12	27.22	3.56	0.00	50.90	74.00	23.10	PK	Vertical
2	2390.000	18.65	27.26	3.57	0.00	49.48	74.00	24.52	PK	Vertical

Note:

1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11G 2412 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

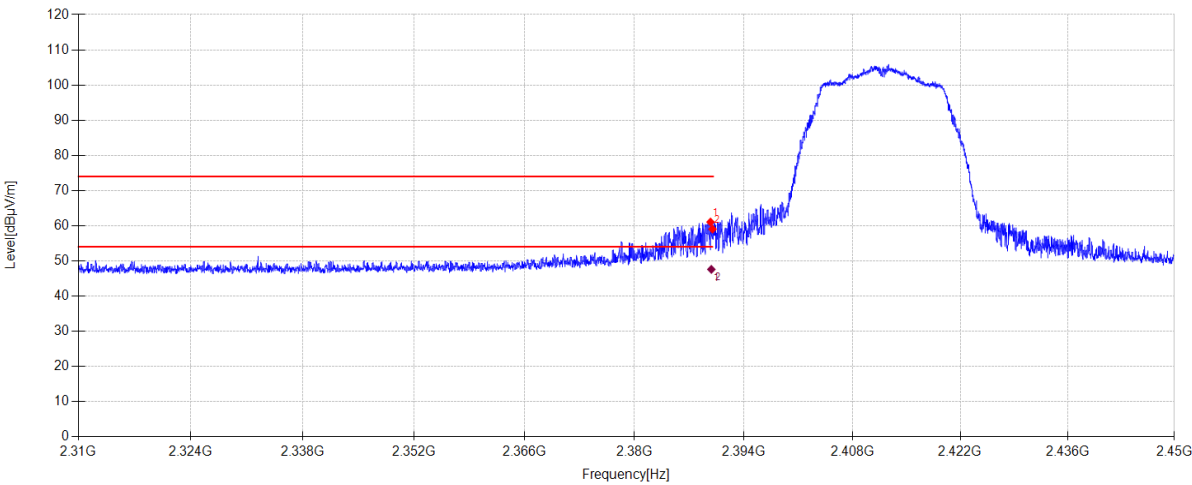
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\6

Memo:

Test Graph



Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2389.744	30.22	27.26	3.57	0.00	61.05	74.00	12.95	PK	Vertical
2	2390.000	28.22	27.26	3.57	0.00	59.05	74.00	14.95	PK	Vertical

Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	
1	2389.851	16.76	27.26	3.57	47.59	54.00	6.41	AV	Vertical	
2	2390.117	16.95	27.26	3.57	47.78	51.97	4.19	AV	Vertical	

- Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11G 2462 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

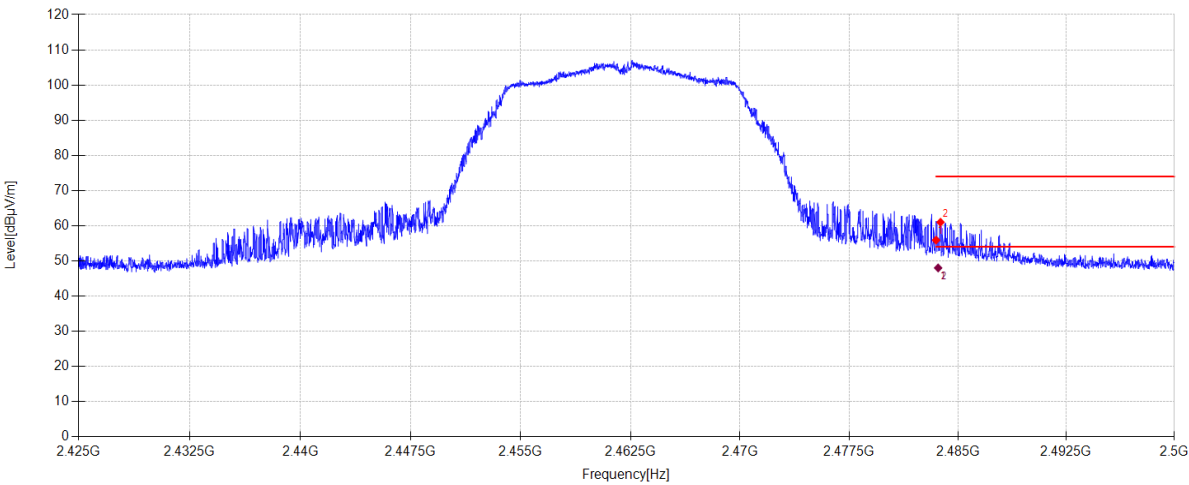
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\7

Memo:

Test Graph



Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2483.500	24.75	27.53	3.62	0.00	55.90	74.00	18.10	PK	Vertical
2	2483.808	29.83	27.54	3.62	0.00	60.99	74.00	13.01	PK	Vertical

Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	
1	2483.642	16.85	27.53	3.62	48.00	54.00	6.00	AV	Vertical	
2	2483.723	16.85	27.54	3.62	48.01	54.00	5.99	AV	Vertical	

- Note:
- 1. Level = Reading + Cable loss + Antenna Factor + AMP
 - 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 - 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11N20 2462 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

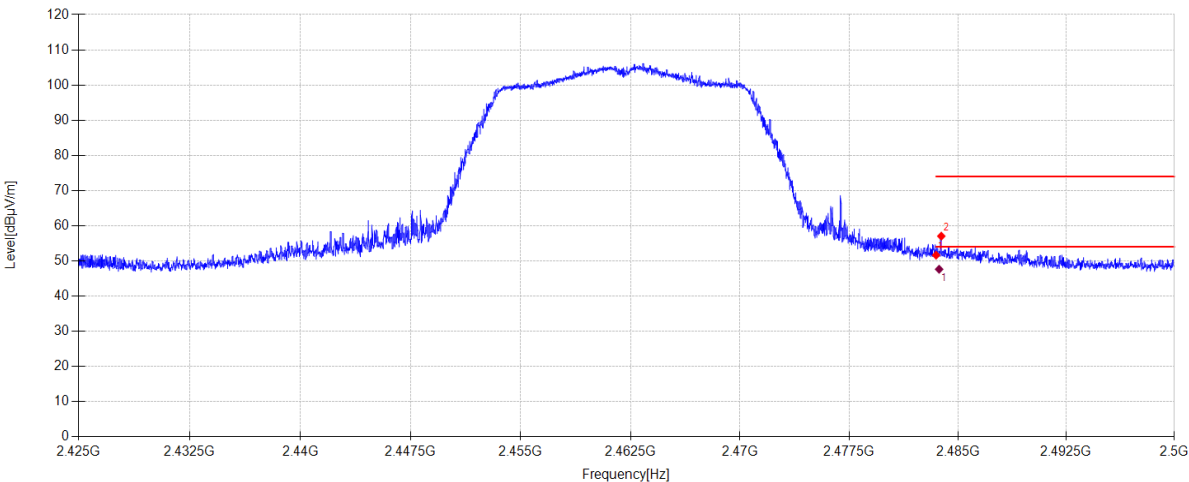
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\8

Memo:

Test Graph



Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2483.500	20.47	27.53	3.62	0.00	51.62	74.00	22.38	PK	Vertical
2	2483.860	25.87	27.54	3.62	0.00	57.03	74.00	16.97	PK	Vertical

Data List										
NO	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	
1	2483.712	16.47	27.54	3.62	47.63	54.00	6.37	AV	Vertical	

- Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-12-13

Tested By:

Guoyuan Lin

EUT:

Desktop DAC and Headphone Amplifier

Model Number:

F4161K

Test Mode:

TX 11N20 2412 MHz Mode

Power Supply:

AC 120/60Hz

Condition:

Temp:23.3°C;Humi:59.4%

Test Site:

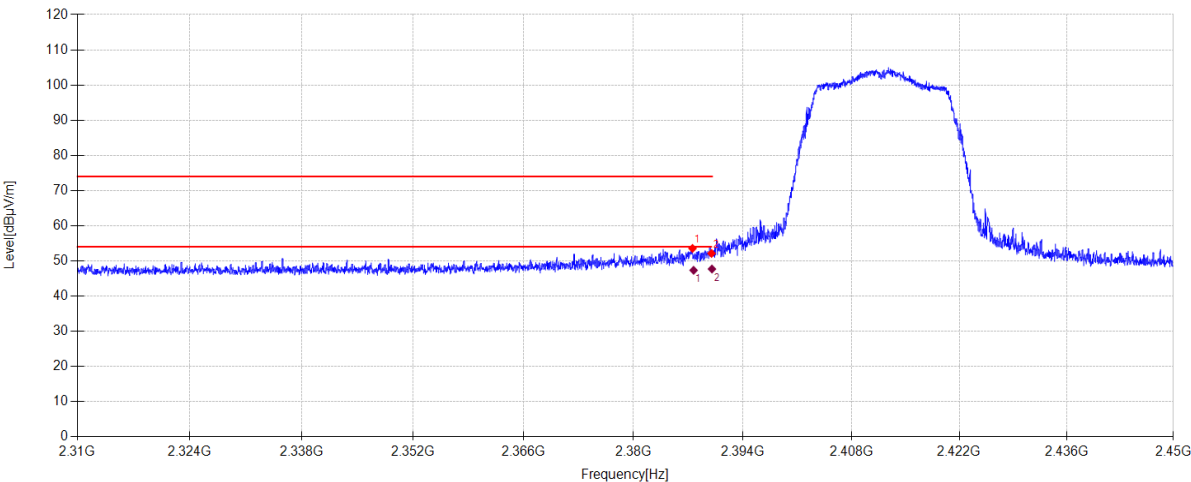
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q24110729-1E\FCC Above 1G 2.4G\9

Memo:

Test Graph



Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	AMP [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	2387.560	22.73	27.25	3.57	0.00	53.55	74.00	20.45	PK	Vertical
2	2390.000	21.31	27.26	3.57	0.00	52.14	74.00	21.86	PK	Vertical

Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable loss [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	
1	2387.706	16.51	27.25	3.57	47.33	54.00	6.67	AV	Vertical	
2	2390.056	16.87	27.26	3.57	47.70	54.00	6.30	AV	Vertical	

- Note:
1. Level = Reading + Cable loss + Antenna Factor + AMP

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

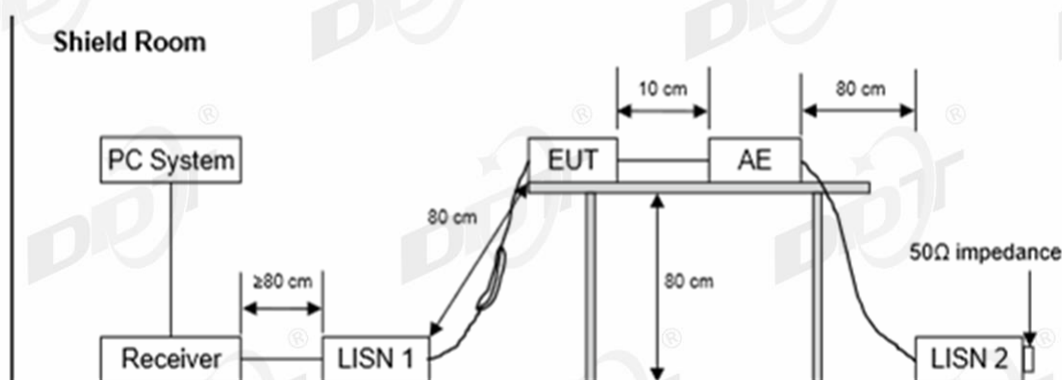
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

14.Power Line Conducted Emissions

14.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To
Conducted Radiated Software	Audix	E3	DDT-ZC00562	/
Three-phase artificial power network	SCHWARZBEC K	NSLK 8163	DDT-ZC01572	2025/07/08
EMI Test Receiver	R&S	ESCI/E3	DDT-ZC01297	2025/07/08
Two Line V-Network	R&S	ENV216	DDT-ZC02059	2025/07/08
Δ-shaped artificial power network	SCHWARZBEC K	PVDC 8301	DDT-ZC03939	2025/03/31
Pulse Limiter	SCHWARZBEC K	VTSD 9561	DDT-ZC02128	2025/07/08
RF Cable	Yuhu Technology	Z806-NJ-NJ-6M	DDT-ZC02004	2025/07/08
Two Line V-Network	R&S	ENV216	DDT-ZC02056	2025/07/08

14.2. Block diagram of test setup



14.3. Limits

Frequency	Quasi-Peak Level dB(uV)	Average Level dB(uV)
150 kHz~500 kHz	66 ~ 56*	56 ~ 46*
500 kHz~5 MHz	56	46
5 MHz~30 MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

14.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Description	other
/	/	/	/	/

14.5. Test procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

14.6. Test result

PASS. (See below detailed test result)

14.7. Test data

TR-4-E-010 Conducted Emission Test Result

Test Site : DDT 6# Shield Room

Test Date : 2025-01-20

EUT : Desktop DAC and Headphone Amplifier

Power Supply : AC 120V/60Hz

Condition : Temp:21.9°C,Humi:49.2%

Memo :

D:\2024 Report Date\Q24110729-2E\250120 CE.EM6

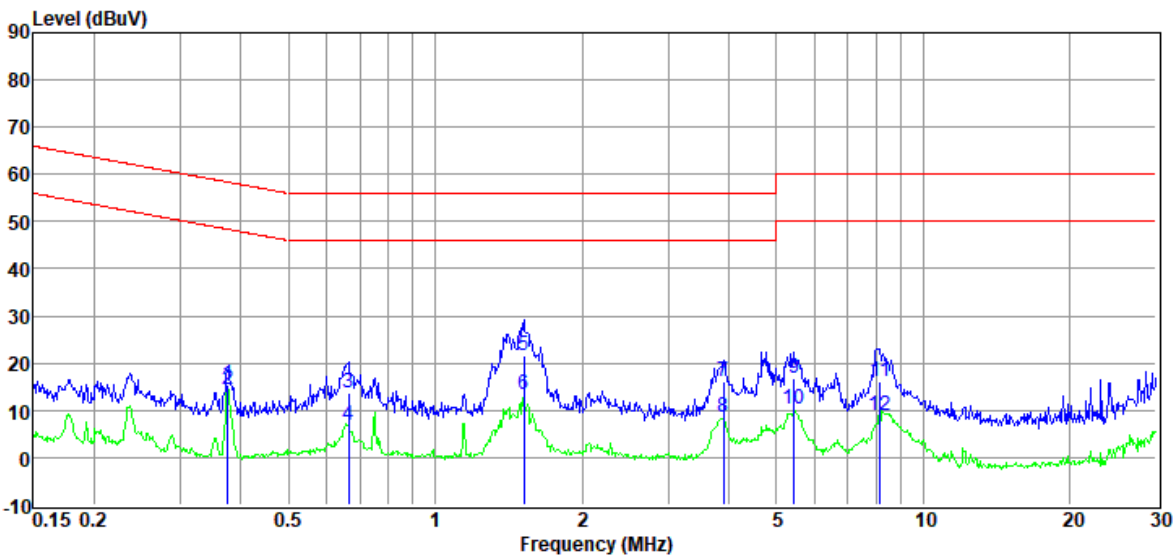
Tested By : Gen Liu

Model Number : F4161K

Test Mode : 2.4G WIFI mode

LISN : 2024 ENV216 3#/LINE

Data: 14



Item	Freq.	Read Level	LISN Factor	Cable Loss	Pulse Limiter Factor	Result Level	Limit Line	Over Limit	Detector	Phase
(Mark)	(MHz)	(dBμV)	(dB)	(dB)	(dB)	(dBμV)	(dBμV)	(dB)		
1	0.38	-4.12	9.77	0.08	9.83	15.56	58.39	-42.83	QP	LINE
2	0.38	-5.27	9.77	0.08	9.83	14.41	48.39	-33.98	Average	LINE
3	0.66	-5.97	9.75	0.07	9.83	13.68	56.00	-42.32	QP	LINE
4	0.66	-12.76	9.75	0.07	9.83	6.89	46.00	-39.11	Average	LINE
5	1.52	1.91	9.75	0.11	9.84	21.61	56.00	-34.39	QP	LINE
6	1.52	-6.24	9.75	0.11	9.84	13.46	46.00	-32.54	Average	LINE
7	3.90	-3.62	9.77	0.10	9.85	16.10	56.00	-39.90	QP	LINE
8	3.90	-11.13	9.77	0.10	9.85	8.59	46.00	-37.41	Average	LINE
9	5.45	-3.03	9.80	0.11	9.85	16.73	60.00	-43.27	QP	LINE
10	5.45	-9.57	9.80	0.11	9.85	10.19	50.00	-39.81	Average	LINE
11	8.15	-3.79	9.82	0.18	9.87	16.08	60.00	-43.92	QP	LINE
12	8.15	-10.85	9.82	0.18	9.87	9.02	50.00	-40.98	Average	LINE

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

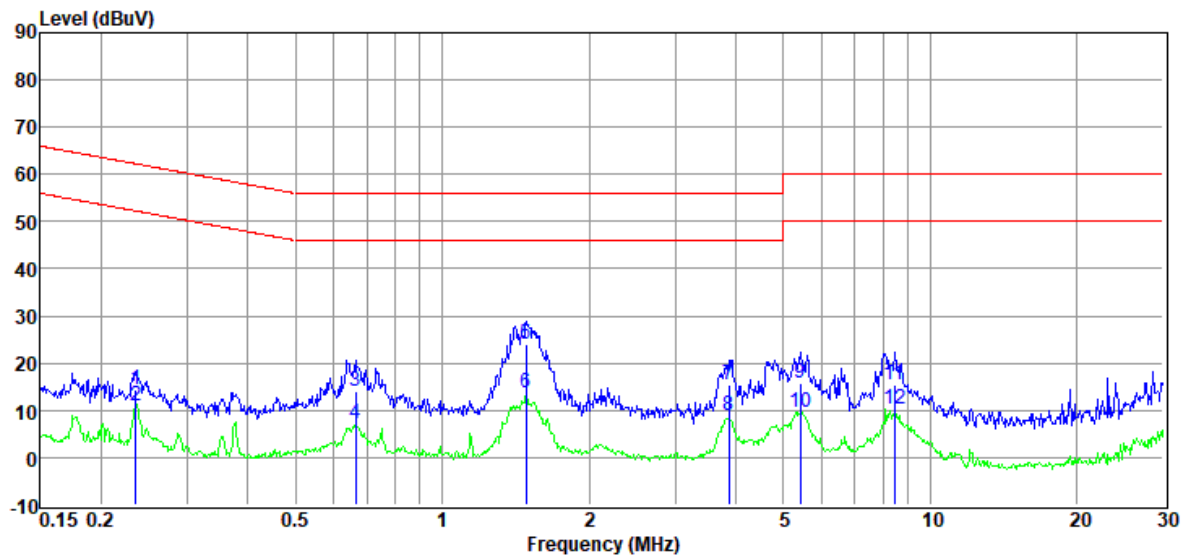
TR-4-E-010 Conducted Emission Test Result

Test Site : DDT 6# Shield Room

D:\2024 Report Date\Q24110729-2E\250120 CE.EM6

Test Date : 2025-01-20**Tested By** : Gen Liu**EUT** : Desktop DAC and Headphone Amplifier**Model Number** : F4161K**Power Supply** : AC 120V/60Hz**Test Mode** : 2.4G WIFI mode**Condition** : Temp:21.9°C,Humi:49.2%**LISN** : 2024 ENV216 3#/NEUTRAL**Memo** :

Data: 16



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.24	-5.39	9.76	0.06	9.83	14.26	62.26	-48.00	QP	NEUTRAL
2	0.24	-8.53	9.76	0.06	9.83	11.12	52.26	-41.14	Average	NEUTRAL
3	0.66	-5.76	9.75	0.07	9.83	13.89	56.00	-42.11	QP	NEUTRAL
4	0.66	-12.62	9.75	0.07	9.83	7.03	46.00	-38.97	Average	NEUTRAL
5	1.49	4.25	9.77	0.12	9.84	23.98	56.00	-32.02	QP	NEUTRAL
6	1.49	-5.99	9.77	0.12	9.84	13.74	46.00	-32.26	Average	NEUTRAL
7	3.86	-4.32	9.78	0.10	9.85	15.41	56.00	-40.59	QP	NEUTRAL
8	3.86	-11.00	9.78	0.10	9.85	8.73	46.00	-37.27	Average	NEUTRAL
9	5.42	-3.93	9.80	0.11	9.85	15.83	60.00	-44.17	QP	NEUTRAL
10	5.42	-10.11	9.80	0.11	9.85	9.65	50.00	-40.35	Average	NEUTRAL
11	8.46	-4.40	9.83	0.18	9.87	15.48	60.00	-44.52	QP	NEUTRAL
12	8.46	-9.75	9.83	0.18	9.87	10.13	50.00	-39.87	Average	NEUTRAL

Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).

4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

16. Photos of the EUT

Please refer to DDT-Q24110729-2E appendix I

-----End Report-----