



FCC CERTIFICATION TEST REPORT

Applicant	:	Beijing InHand Networks Technology Co., Ltd.
Address of Applicant	:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing 100102, China
Manufacturer	:	Beijing InHand Networks Technology Co., Ltd.
Address of Manufacturer	:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing 100102, China
Equipment under Test	:	InVehicle Gateway
Model No.	:	VG710, VG710-U, VG710-M, VG710-H, VG710-L
FCC ID	:	2AANYVG710U
Test Standard(s)	:	FCC Rules and Regulations Part 15 Subpart C, ANSI C63.10:2013
Report No.	:	DDT-RE23122506-2E01
Issue Date	:	2024/03/05
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

Table of Contents

1.	Summary of Test Results	7
2.	General Test Information	8
2.1.	Description of EUT	8
2.2.	Accessories of EUT	9
2.3.	Block diagram of EUT configuration for test	9
2.4.	Decision of final test mode	9
2.5.	Deviations of test standard	10
2.6.	Test environment conditions	10
2.7.	Test laboratory	10
2.8.	Measurement uncertainty	11
3.	Equipment Used During Conductive Test	12
4.	6dB Bandwidth	13
4.1.	Block diagram of test setup	13
4.2.	Limits	13
4.3.	Test procedure	13
4.4.	Test result	14
4.5.	Test graphs	15
5.	99% Bandwidth	19
5.1.	Block diagram of test setup	19
5.2.	Limits	19
5.3.	Test procedure	19
5.4.	Test result	20
5.5.	Test graphs	21
6.	Conducted Output Power	25
6.1.	Block diagram of test setup	25
6.2.	Limits	25
6.3.	Test procedure	25
6.4.	Test result average	26
7.	Power Spectral Density	27
7.1.	Block diagram of test setup	27
7.2.	Limits	27
7.3.	Test procedure	27
7.4.	Test result	28
7.5.	Test graphs	29
8.	Band Edge Compliance (Conducted Method)	33
8.1.	Block diagram of test setup	33

8.2.	Limits.....	33
8.3.	Test procedure.....	33
8.4.	Test result	34
8.5.	Test graphs.....	35
9.	RF Conducted Spurious Emissions.....	38
9.1.	Block diagram of test setup	38
9.2.	Limits.....	38
9.3.	Test procedure.....	38
9.4.	Test result	39
9.5.	Test graphs.....	40
10.	Duty Cycle.....	52
10.1.	Block diagram of test setup	52
10.2.	Limit.....	52
10.3.	Test procedure.....	52
10.4.	Test result	53
10.5.	Test graphs.....	54
11.	Radiated Emission.....	58
11.1.	Test equipment	58
11.2.	Block diagram of test setup	59
11.3.	Limits.....	60
11.4.	Assistant equipment used for test	62
11.5.	Test procedure.....	62
11.6.	Test result	63
11.7.	Test data	64
12.	Band Edge Compliance	72
12.1.	Test equipment	72
12.2.	Block diagram of test setup	73
12.3.	Limits.....	73
12.4.	Assistant equipment used for test	73
12.5.	Test procedure.....	73
12.6.	Test result	73
12.7.	Test data	74
13.	Power Line Conducted Emissions.....	90
13.1.	Test equipment	90
13.2.	Block diagram of test setup	90
13.3.	Limits.....	90
13.4.	Assistant equipment used for test	90
13.5.	Test procedure.....	91

13.6. Test result 91

14. Antenna Requirements 92

14.1. Limit..... 92

14.2. Result..... 92

15. Test Setup Photograph..... 93

16. Photos of the EUT 95

Test Report Declare

Applicant	:	Beijing InHand Networks Technology Co., Ltd.
Address of Applicant	:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing 100102, China
Equipment under Test	:	InVehicle Gateway
Model No.	:	VG710, VG710-U, VG710-M, VG710-H, VG710-L
Manufacturer	:	Beijing InHand Networks Technology Co., Ltd.
Address of Manufacturer	:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing 100102, 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-RE23122506-2E01		
Date of Receipt:	2024/02/01	Date of Test:	2024/02/01~2024/02/22

Prepared By:

Jacky Huang

Jacky Huang/Engineer

Approved By:

Damon Hu

Damon Hu/EMC Manager

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	2024/03/05	

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)	/	N/A
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	: InVehicle Gateway
Model Number	: VG710, VG710-U, VG710-M, VG710-H, VG710-L
Difference of model number	: These models are the same in these: appearance, PCB layout and basic software function. The only difference is that the products are used in different markets. The test model is VG710.
EUT Function Description	: Please reference user manual of this device
Power Supply	: DC 9~36V
Hardware Version	: /
Software Version	: /

Note: This EUT support 2.4 GHz WLAN, 5 GHz WLAN and WWAN, 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 IEEE 802.11n HT40: 2422MHz-2452MHz
Modulation	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

Antenna information	
Antenna Type	: External antenna
Antenna Gain (dBi)	: 1.05

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	/	/

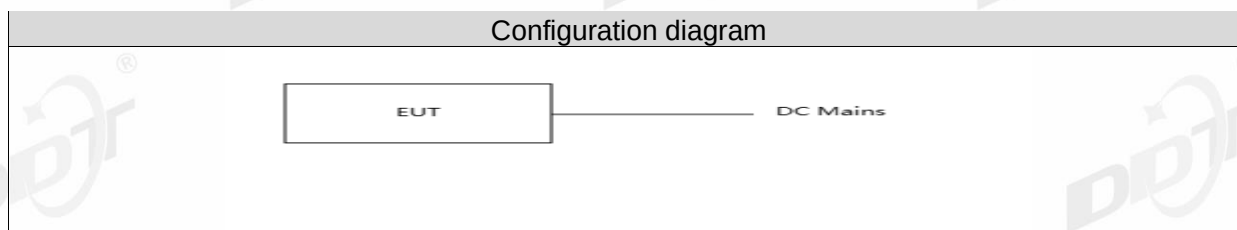
Note: The above EUT information is declared by manufacturer and for more detailed features description please refer to the manufacturer's specifications or User's Manual. The above Antenna information is declared by manufacturer and for more detailed features description please refer to the manufacturer's 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
Power in Cable	/	/	Length: 25cm
CAN0/1 Cable	/	/	Length: 100cm
Ethernet Cable	/	/	Length: 100cm
Serial Cable	/	/	Length: 100cm
WIFI ANT	SHENZHEN GUYANG COMMUNICATION TECHNOLOGY CO.,LTD	GY-BCF-BCL2-GJ	Length: 200cm Quantity: 1
WWAN ANT	SHENZHEN GUYANG COMMUNICATION TECHNOLOGY CO.,LTD	GY-BCL-BCL2-AJ	Length: 200cm Quantity: 2

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: adb.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)
IEEE 802.11b	35	1	LCH: CH1	2412
	35	1	MCH: CH6	2437
	35	1	HCH: CH11	2462
IEEE 802.11g	35	6	LCH: CH1	2412
	35	6	MCH: CH6	2437
	35	6	HCH: CH11	2462
IEEE 802.11n HT20	35	MCS 0	LCH: CH1	2412
	35	MCS 0	MCH: CH6	2437
	35	MCS 0	HCH: CH11	2462
IEEE 802.11n HT40	35	MCS 0	LCH: CH3	2422
	35	MCS 0	MCH: CH6	2437
	35	MCS 0	HCH: CH9	2452

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℃ to +35 ℃
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

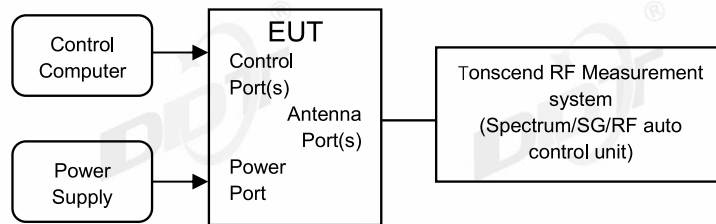
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 1.38 dB ($3.6 \text{ GHz} \leq f < 8 \text{ GHz}$)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB ($10 \text{ MHz} \leq f < 3.6 \text{ GHz}$); 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	Cal. Interval
☑ RF Connected Test (RF Measurement System 1#)					
SIGNAL ANALYZER	R&S	FSQ26	101272	2024/04/26	1 Year
Wideband Radio Communication Tester	R&S	CMW500	120259	2024/07/14	1 Year
MXG Vector Signal Generator	KEYSIGHT	N5182B	MY59100192	2024/04/26	1 Year
MXG Vector Signal Generator	Agilent	N5182A	MY19060405	2024/04/26	1 Year
RF Control Unit	Tonsend	JS0806-2	158060010	2024/04/26	1 Year
TEMP&HUMI Programmable Chamber	ZHIXIANG	ZXGDJS-150L	ZX170110-A	2024/05/14	1 Year
Test Software	Tonscend	JS1120-3	Ver.3.2.22	N/A	NA

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:

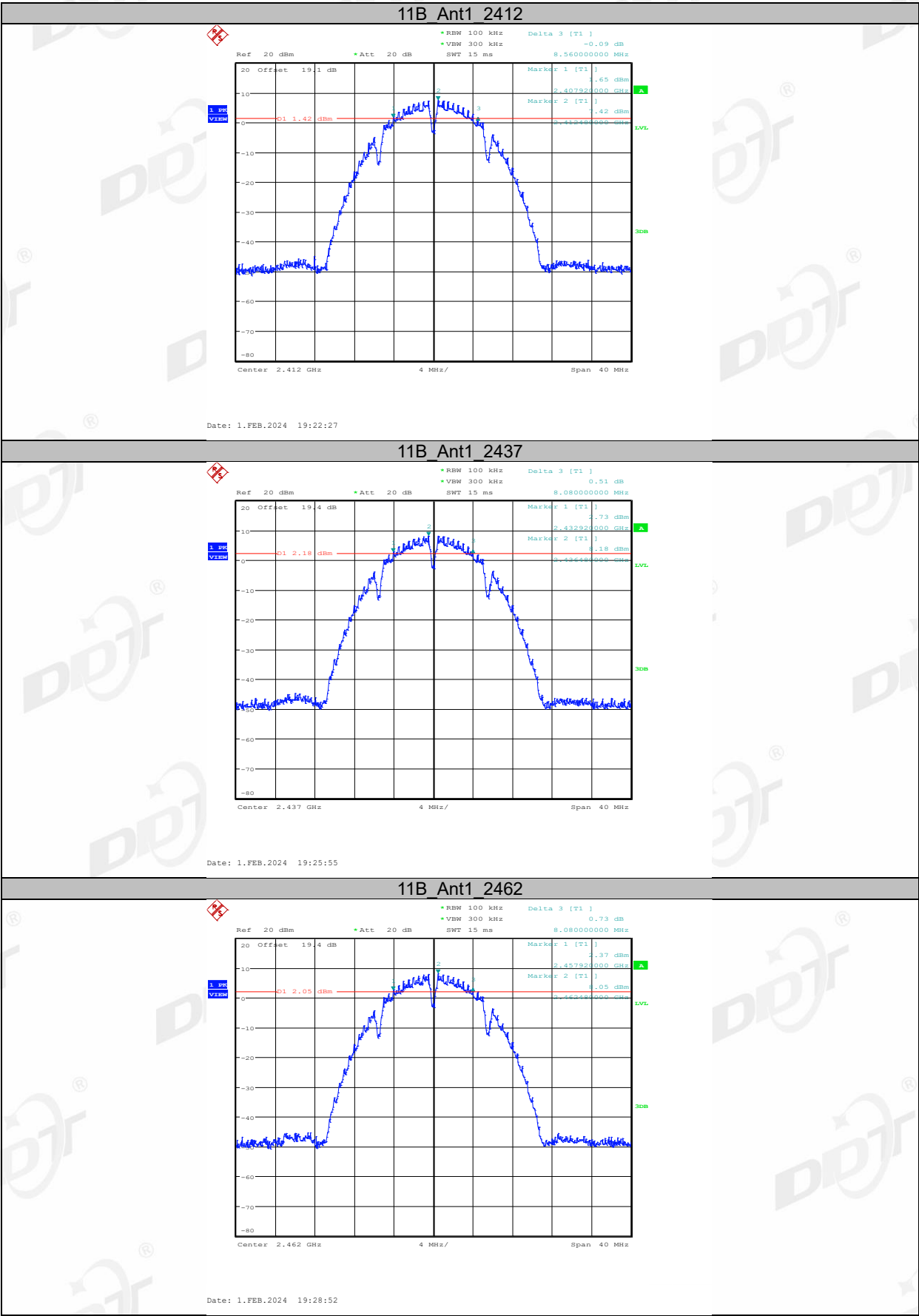
RBW:	100 kHz
VBW:	$\geq [3 \times \text{RBW}]$
Detector Mode:	peak
Sweep time:	auto
Trace mode	max hold
- (5) Allow the trace to stabilize, measure the 6 dB bandwidth of signal, and record the results in the report.

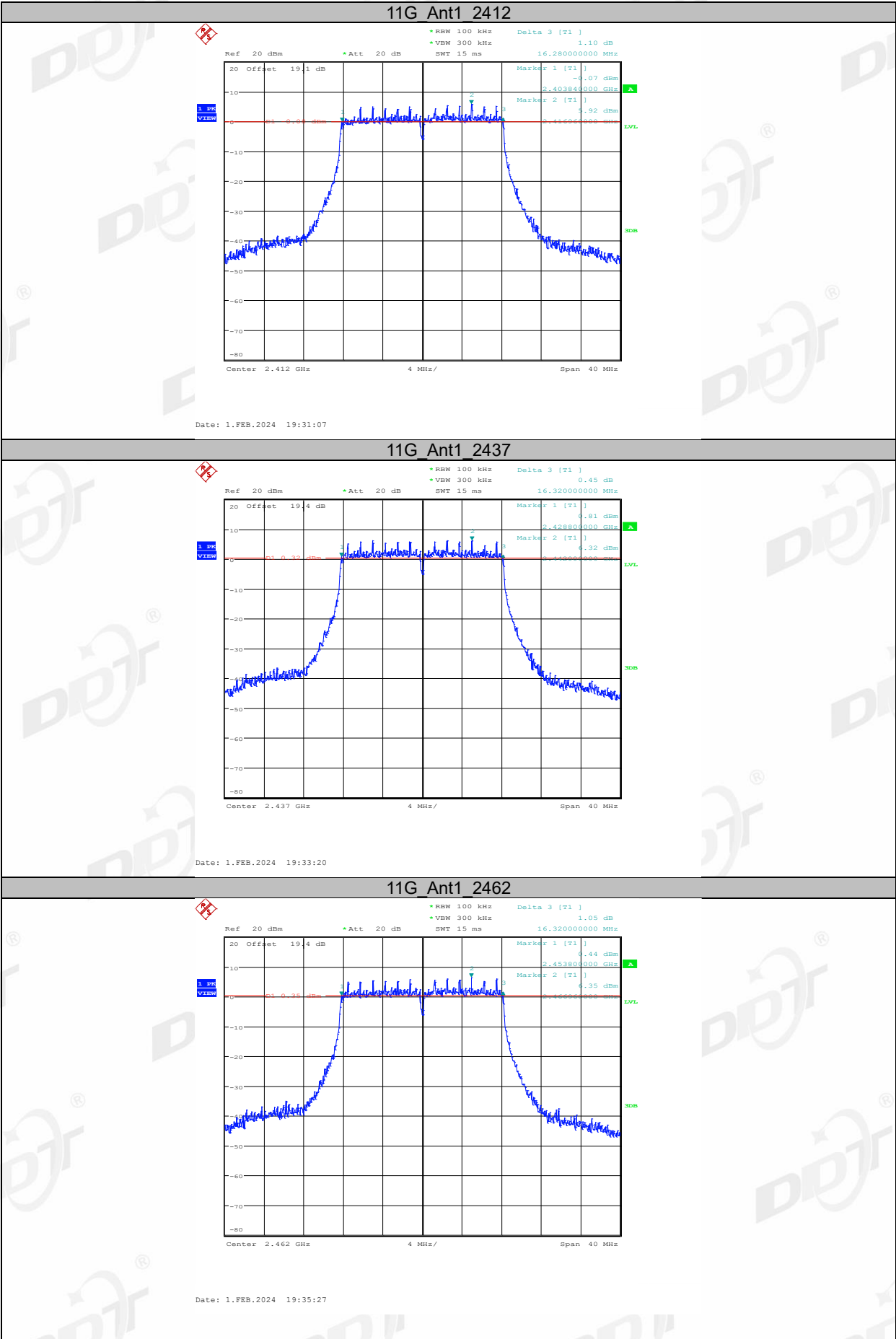
4.4. Test result

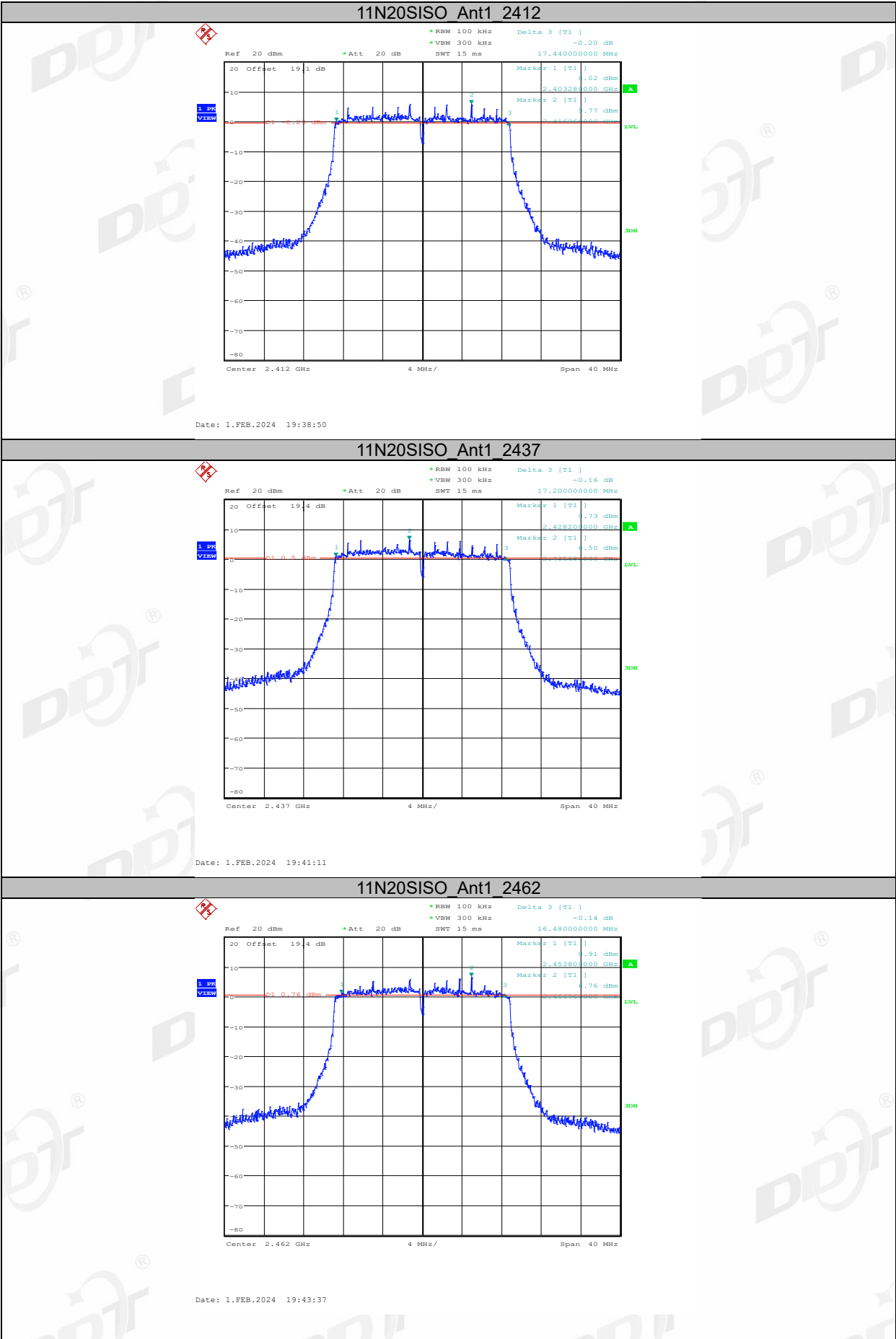
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	23.8℃, 59.2%RH	Test Date:	2024.02.01-2024.02.02
Test Power Supply:	DC 12V	EUT:	InVehicle Gateway
Sample Number:	S23122506-03	Model No.:	VG710

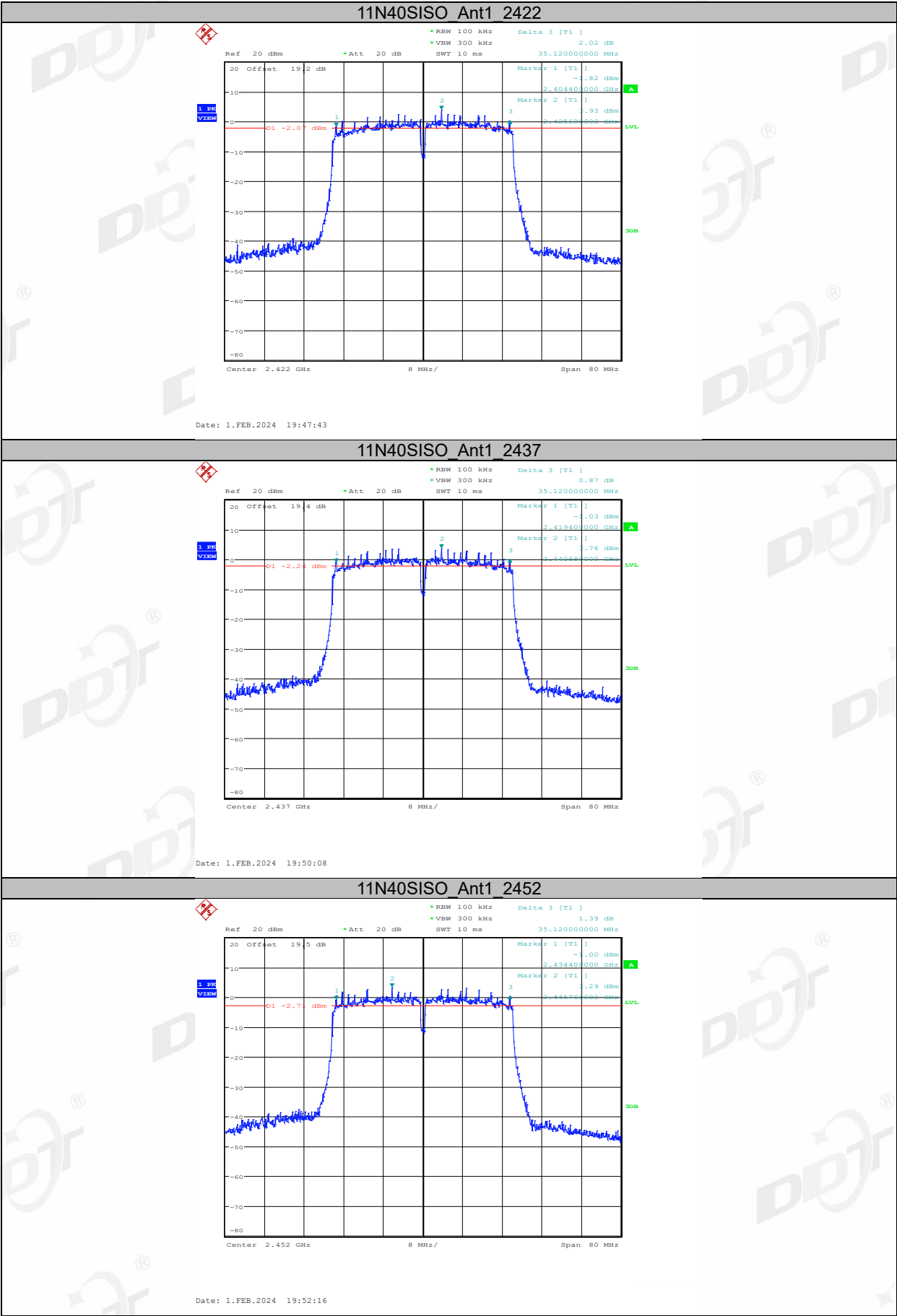
Test Mode	Antenna	Frequency [MHz]	DTS BW [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	8.56	2407.92	2416.48	0.5	PASS
		2437	8.08	2432.92	2441.00	0.5	PASS
		2462	8.08	2457.92	2466.00	0.5	PASS
11G	Ant1	2412	16.28	2403.84	2420.12	0.5	PASS
		2437	16.32	2428.80	2445.12	0.5	PASS
		2462	16.32	2453.80	2470.12	0.5	PASS
11N20SISO	Ant1	2412	17.44	2403.28	2420.72	0.5	PASS
		2437	17.20	2428.20	2445.40	0.5	PASS
		2462	16.48	2453.80	2470.28	0.5	PASS
11N40SISO	Ant1	2422	35.12	2404.40	2439.52	0.5	PASS
		2437	35.12	2419.40	2454.52	0.5	PASS
		2452	35.12	2434.40	2469.52	0.5	PASS

4.5. Test graphs



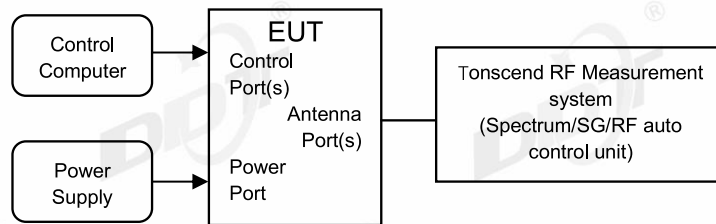






5. 99% Bandwidth

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:

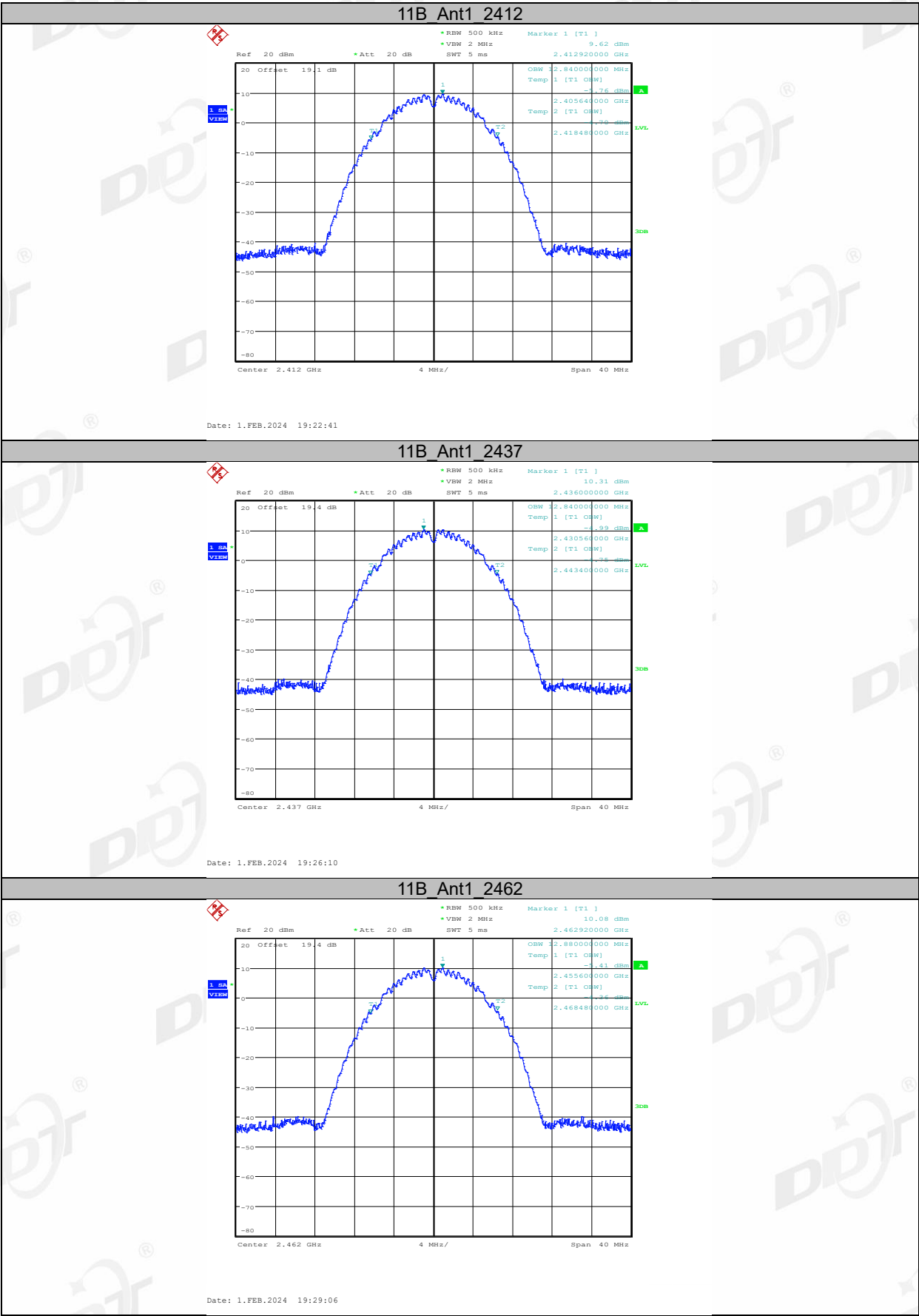
RBW:	1% to 5% of the OBW
VBW:	approximately three times RBW
Span:	between 1.5 times and 5.0 times the OBW
Detector Mode:	peak
Sweep time:	auto
Trace mode	max hold
- (5) Allow the trace to stabilize, measure the 99% bandwidth of signal, and record the results in the report.

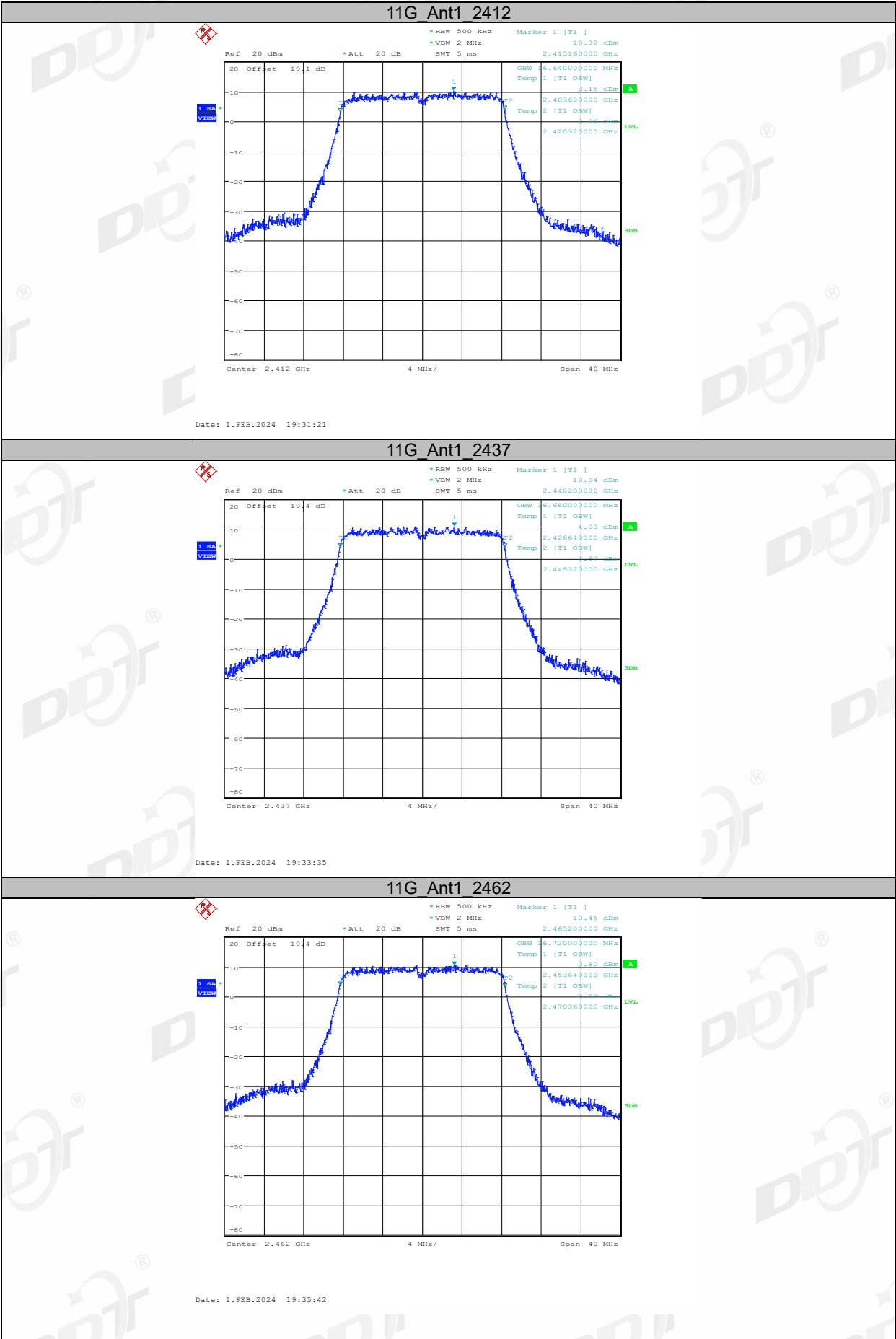
5.4. Test result

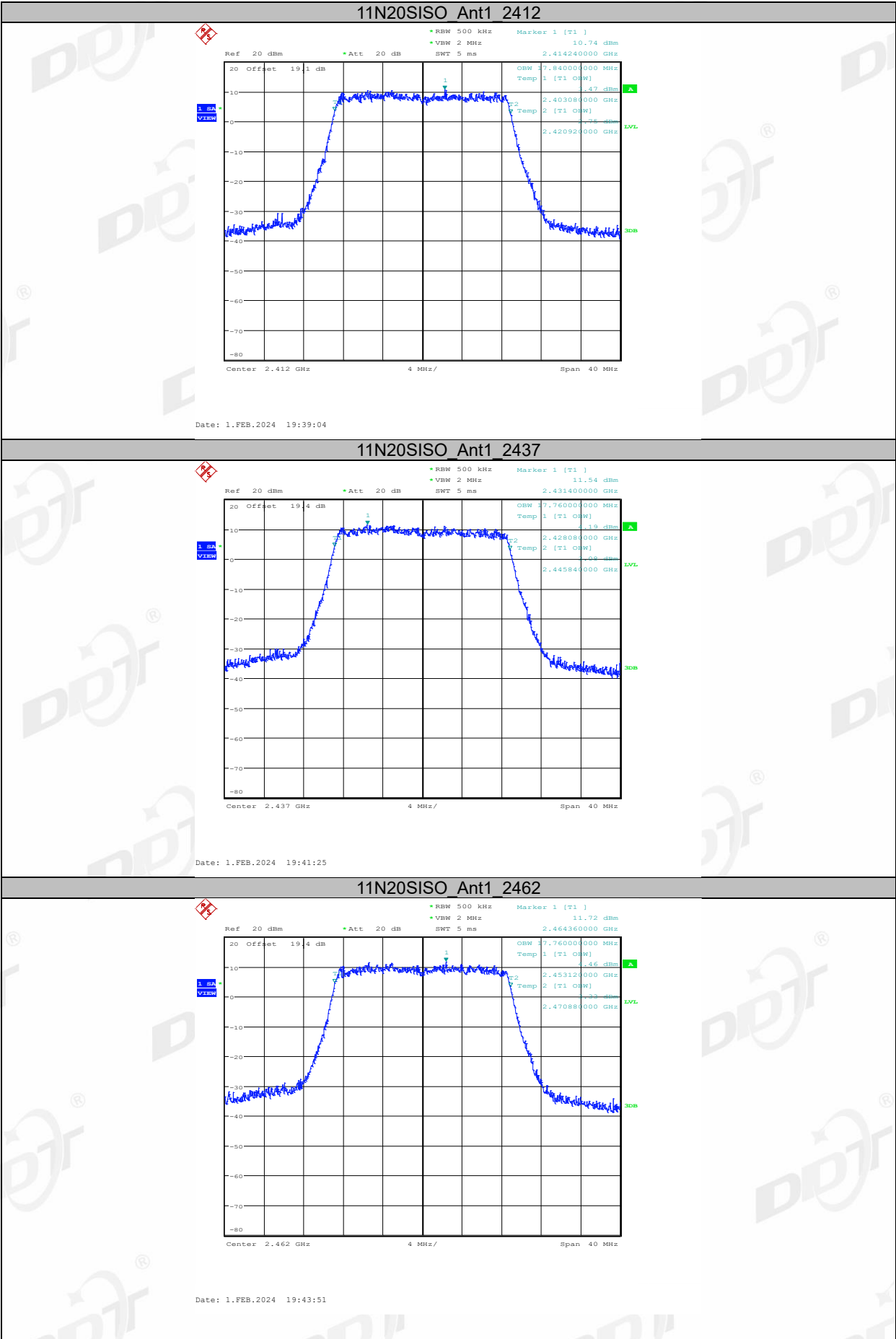
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	23.8℃, 59.2%RH	Test Date:	2024.02.01-2024.02.02
Test Power Supply:	DC 12V	EUT:	InVehicle Gateway
Sample Number:	S23122506-03	Model No.:	VG710

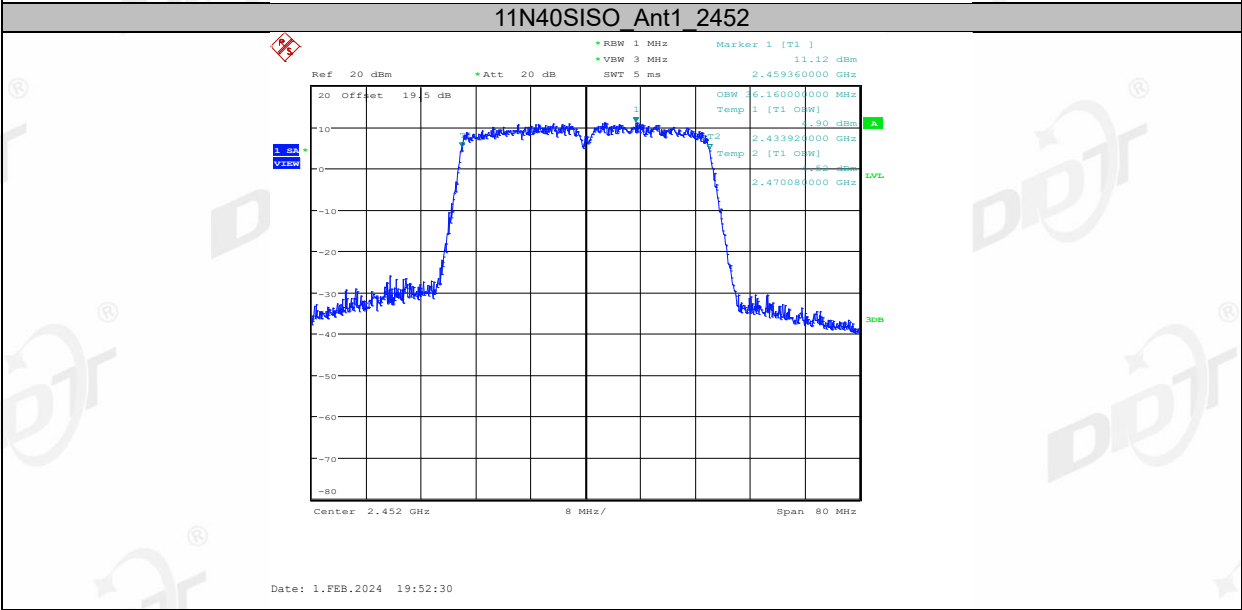
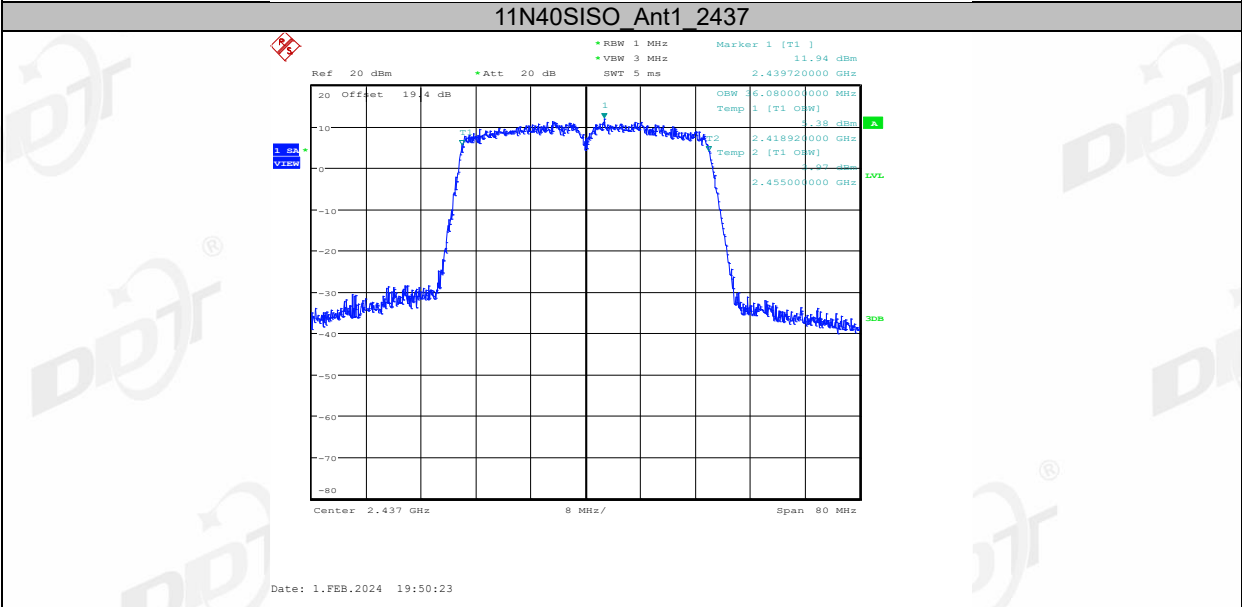
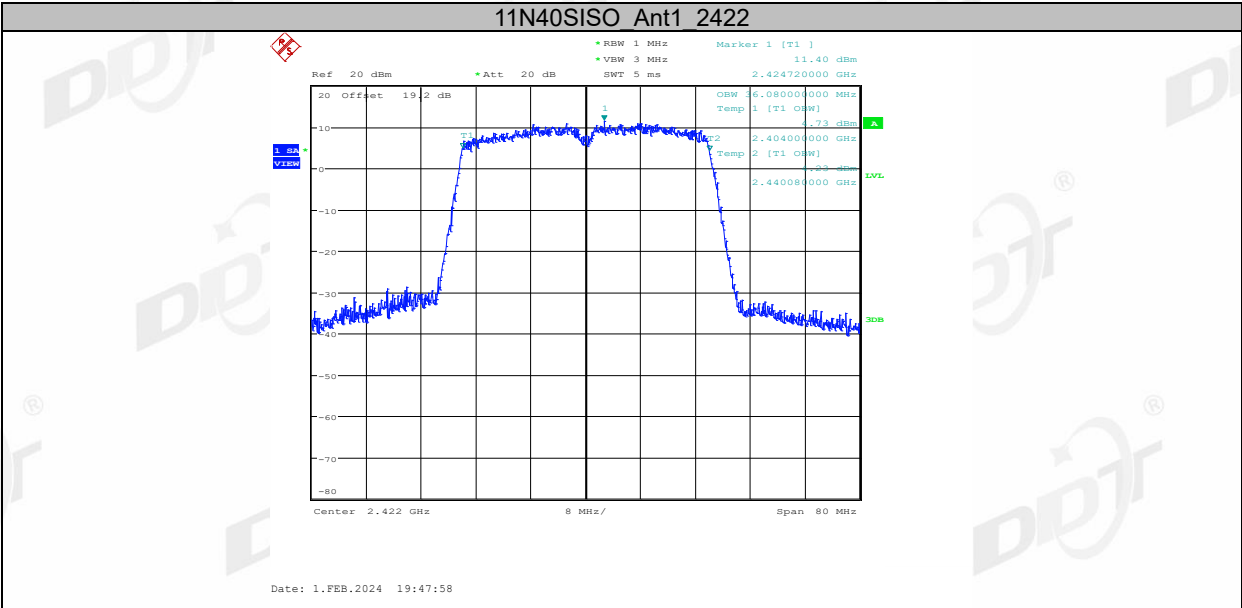
Test Mode	Antenna	Channel Frequency [MHz]	OCB [MHz]	FL [MHz]	FH [MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	12.84	2405.6400	2418.4800	---	---
		2437	12.84	2430.5600	2443.4000	---	---
		2462	12.88	2455.6000	2468.4800	---	---
11G	Ant1	2412	16.64	2403.6800	2420.3200	---	---
		2437	16.68	2428.6400	2445.3200	---	---
		2462	16.72	2453.6400	2470.3600	---	---
11N20SISO	Ant1	2412	17.84	2403.0800	2420.9200	---	---
		2437	17.76	2428.0800	2445.8400	---	---
		2462	17.76	2453.1200	2470.8800	---	---
11N40SISO	Ant1	2422	36.08	2404.0000	2440.0800	---	---
		2437	36.08	2418.9200	2455.0000	---	---
		2452	36.16	2433.9200	2470.0800	---	---

5.5. Test graphs



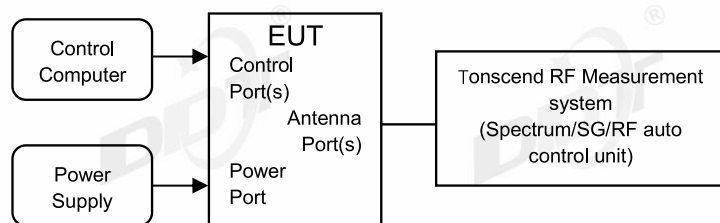






6. Conducted Output Power

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

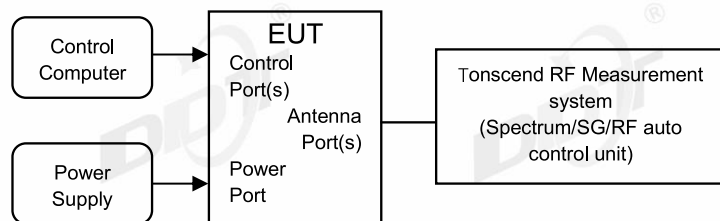
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	23.8℃, 59.2%RH	Test Date:	2024.02.01-2024.02.02
Test Power Supply:	DC 12V	EUT:	InVehicle Gateway
Sample Number:	S23122506-03	Model No.:	VG710

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	17.12	99.44	0.02	17.14	≤30	18.19	≤36	PASS
		2437	17.62	99.20	0.03	17.65	≤30	18.70	≤36	PASS
		2462	17.62	99.20	0.03	17.65	≤30	18.70	≤36	PASS
11G	Ant1	2412	16.78	95.85	0.18	16.96	≤30	18.01	≤36	PASS
		2437	17.29	95.83	0.18	17.47	≤30	18.52	≤36	PASS
		2462	17.29	95.83	0.18	17.47	≤30	18.52	≤36	PASS
11N20 SISO	Ant1	2412	16.78	98.04	0.09	16.87	≤30	17.92	≤36	PASS
		2437	17.17	98.04	0.09	17.26	≤30	18.31	≤36	PASS
		2462	17.44	98.04	0.09	17.53	≤30	18.58	≤36	PASS
11N40 SISO	Ant1	2422	16.40	84.32	0.74	17.14	≤30	18.19	≤36	PASS
		2437	16.57	84.32	0.74	17.31	≤30	18.36	≤36	PASS
		2452	16.66	97.04	0.13	16.79	≤30	17.84	≤36	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
Trace	Employ trace averaging (rms) 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.
- (6) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

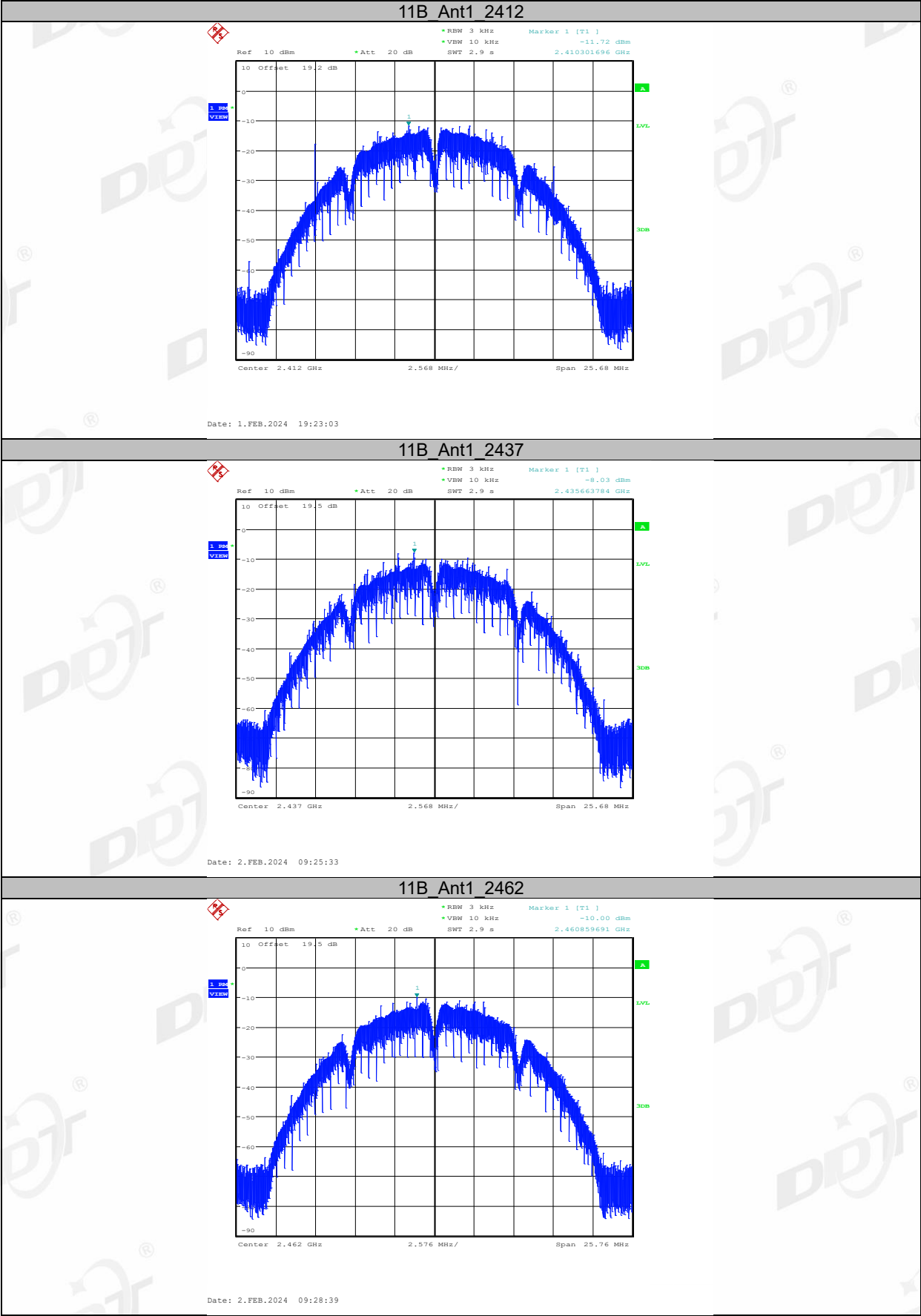
7.4. Test result

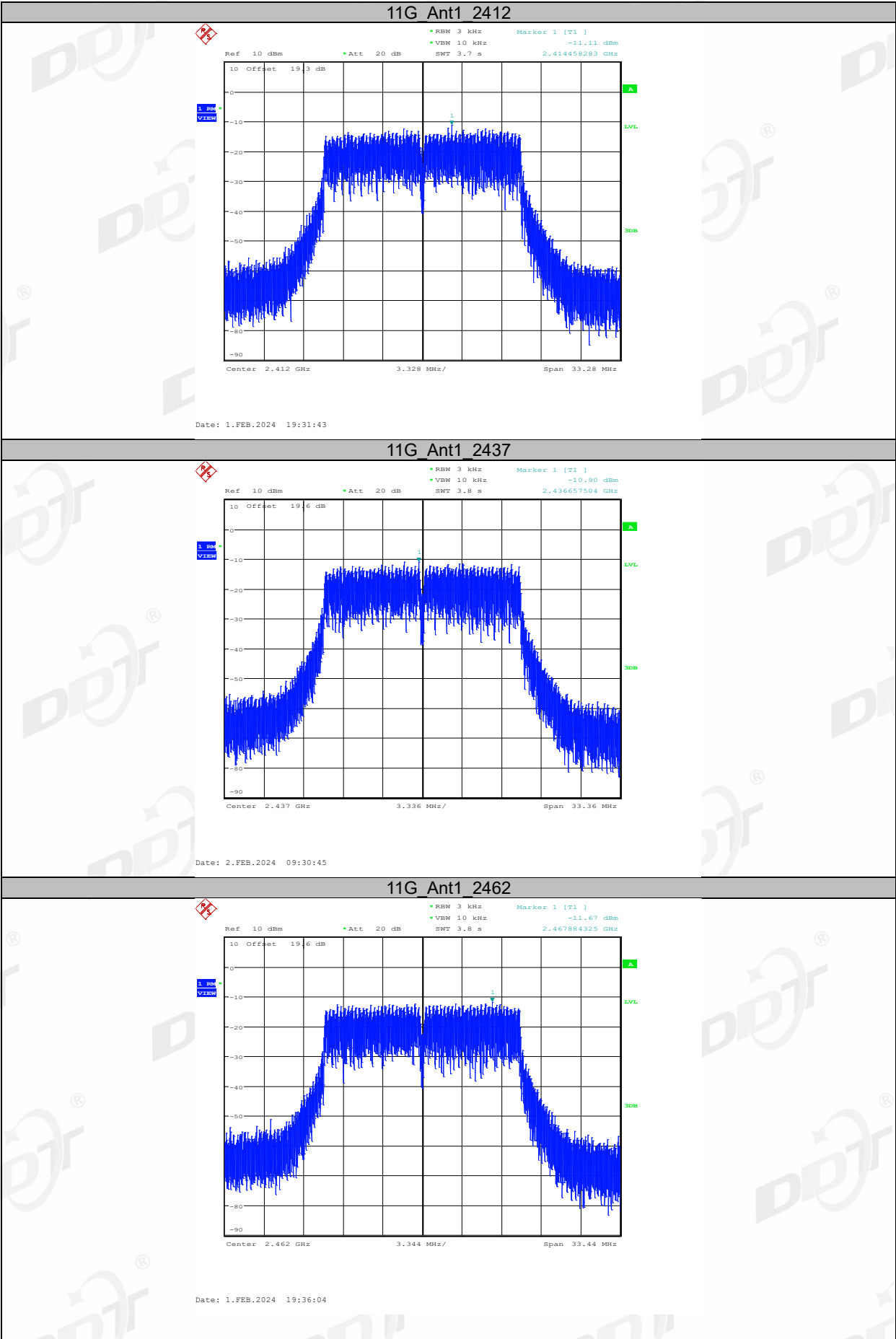
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	23.8℃, 59.2%RH	Test Date:	2024.02.01-2024.02.02
Test Power Supply:	DC 12V	EUT:	InVehicle Gateway
Sample Number:	S23122506-03	Model No.:	VG710

Test Mode	Antenna	Frequency [MHz]	Result [dBm/3-100kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-11.72	≤8.00	PASS
		2437	-8.03	≤8.00	PASS
		2462	-10.00	≤8.00	PASS
11G	Ant1	2412	-11.11	≤8.00	PASS
		2437	-10.90	≤8.00	PASS
		2462	-11.67	≤8.00	PASS
11N20SISO	Ant1	2412	-11.62	≤8.00	PASS
		2437	-10.92	≤8.00	PASS
		2462	-11.48	≤8.00	PASS
11N40SISO	Ant1	2422	-20.75	≤8.00	PASS
		2437	-20.23	≤8.00	PASS
		2452	-21.21	≤8.00	PASS

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

7.5. Test graphs





11G Ant1 2437

Ref 10 dBm

Att 20 dB

RBW 3 kHz

VBW 10 kHz

SWT 3.8 s

Marker 1 [T1]

-10.90 dBm

2.436657504 GHz

10 Offset 19.6 dB

0

-10

-20

-30

-40

-50

-60

-70

-80

-90

Center 2.437 GHz

3.336 MHz/

Span 33.36 MHz

1 30

View

1

20

30

40

50

60

70

80

90

1

20

30

40

50

60

70

80

90

Date: 2.FEB.2024 09:30:45

11G Ant1 2462

Ref 10 dBm

Att 20 dB

RBW 3 kHz

VBW 10 kHz

SWT 3.8 s

Marker 1 [T1]

-11.67 dBm

2.467884325 GHz

10 Offset 19.6 dB

0

-10

-20

-30

-40

-50

-60

-70

-80

-90

Center 2.462 GHz

3.344 MHz/

Span 33.44 MHz

1 30

View

1

20

30

40

50

60

70

80

90

1

20

30

40

50

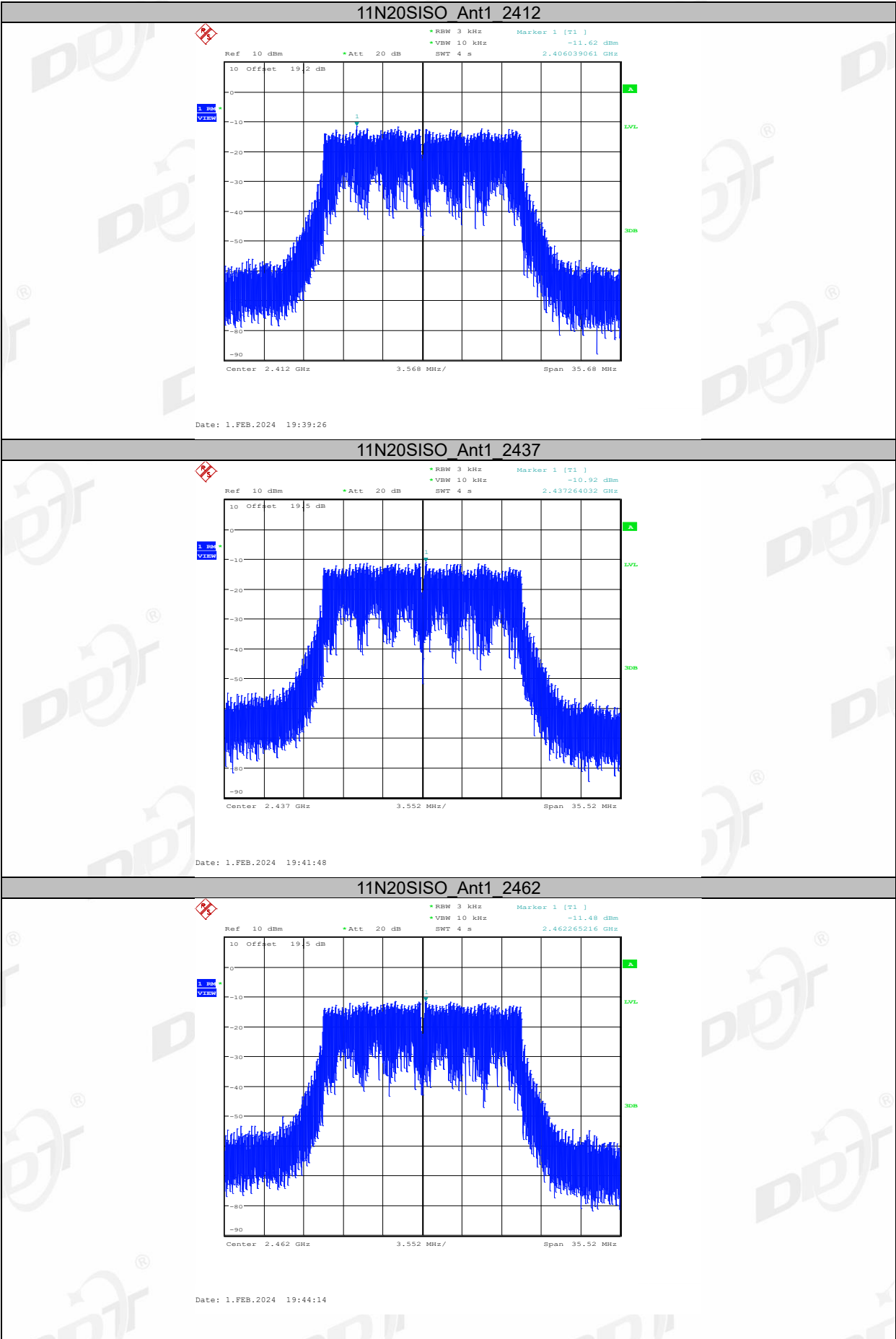
60

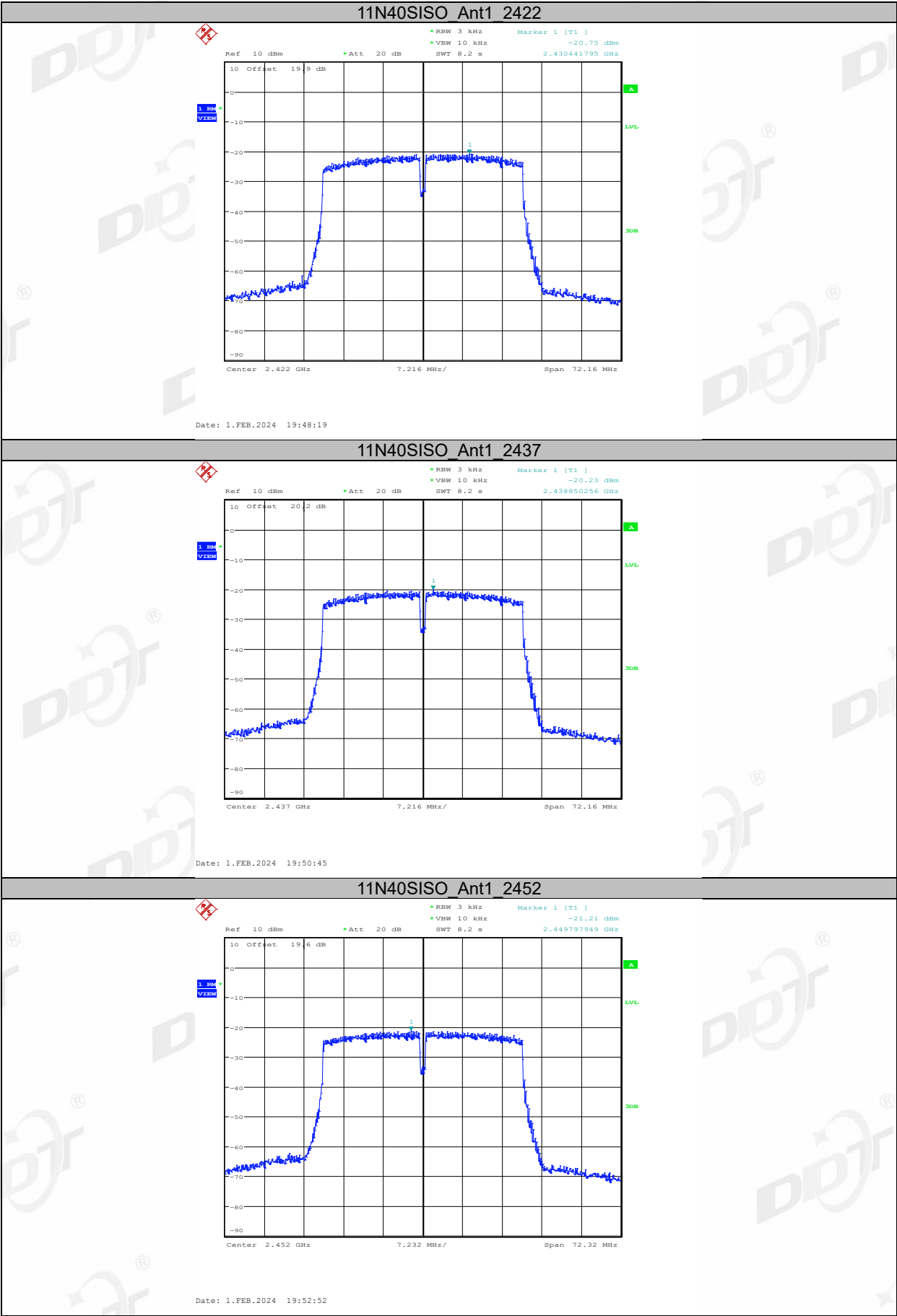
70

80

90

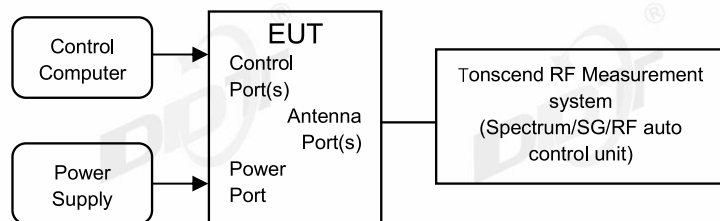
Date: 1.FEB.2024 19:36:04





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:

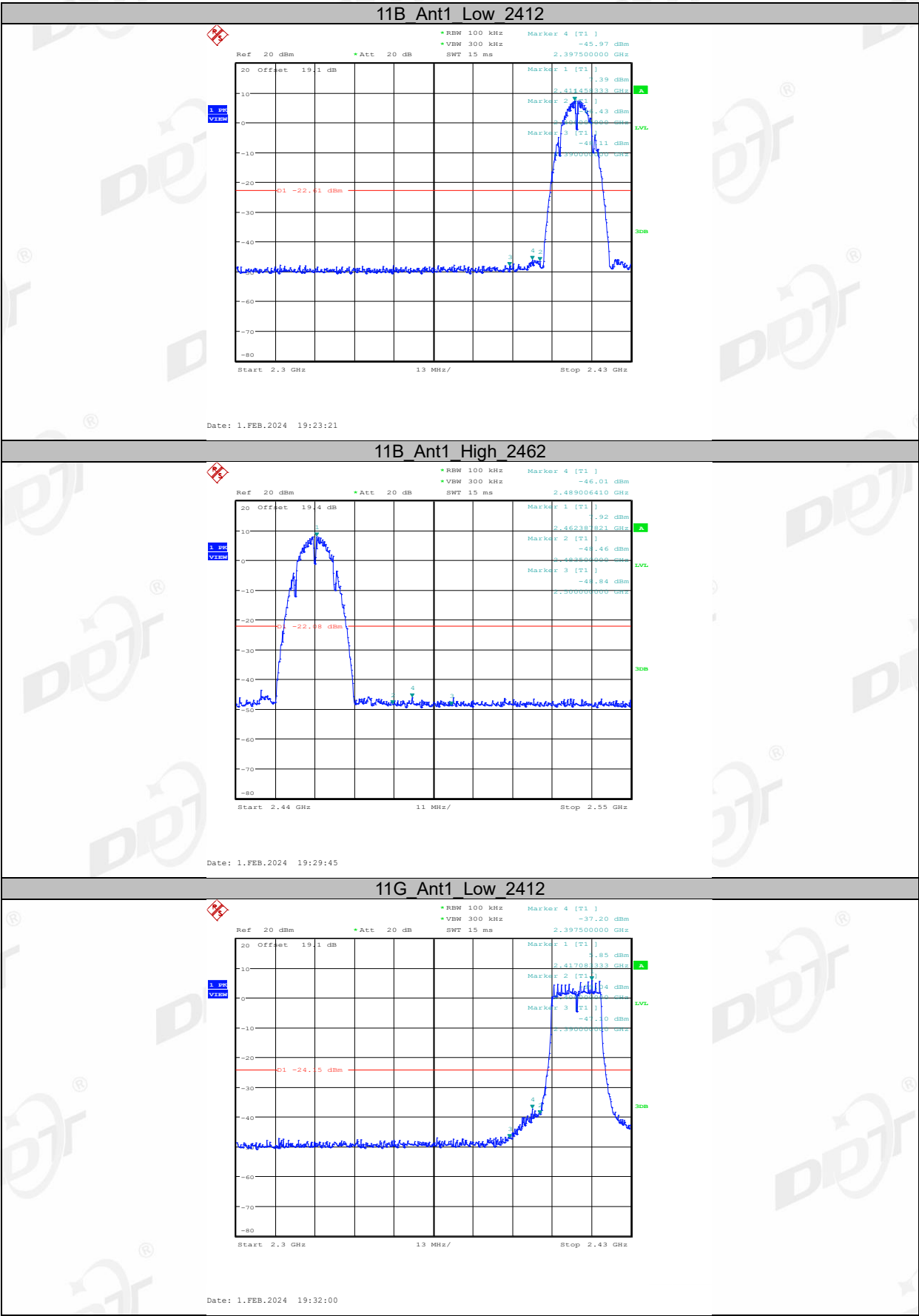
RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold
- (3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.
- (4) Then mark the maximum amplitude 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:	23.8℃, 59.2%RH	Test Date:	2024.02.01-2024.02.02
Test Power Supply:	DC 12V	EUT:	InVehicle Gateway
Sample Number:	S23122506-03	Model No.:	VG710

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	11n HT 40	CH3	Pass
	CH11	Pass		CH9	Pass

8.5. Test graphs

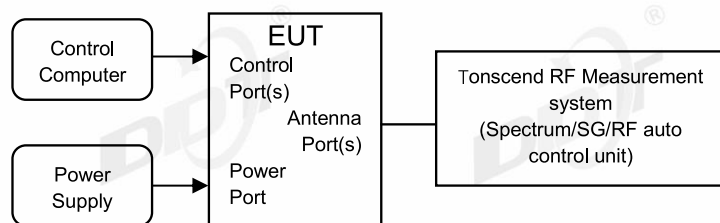






9. RF Conducted Spurious Emissions

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

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) 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
- (3) Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.
- (4) Set the spectrum analyzer as follows:

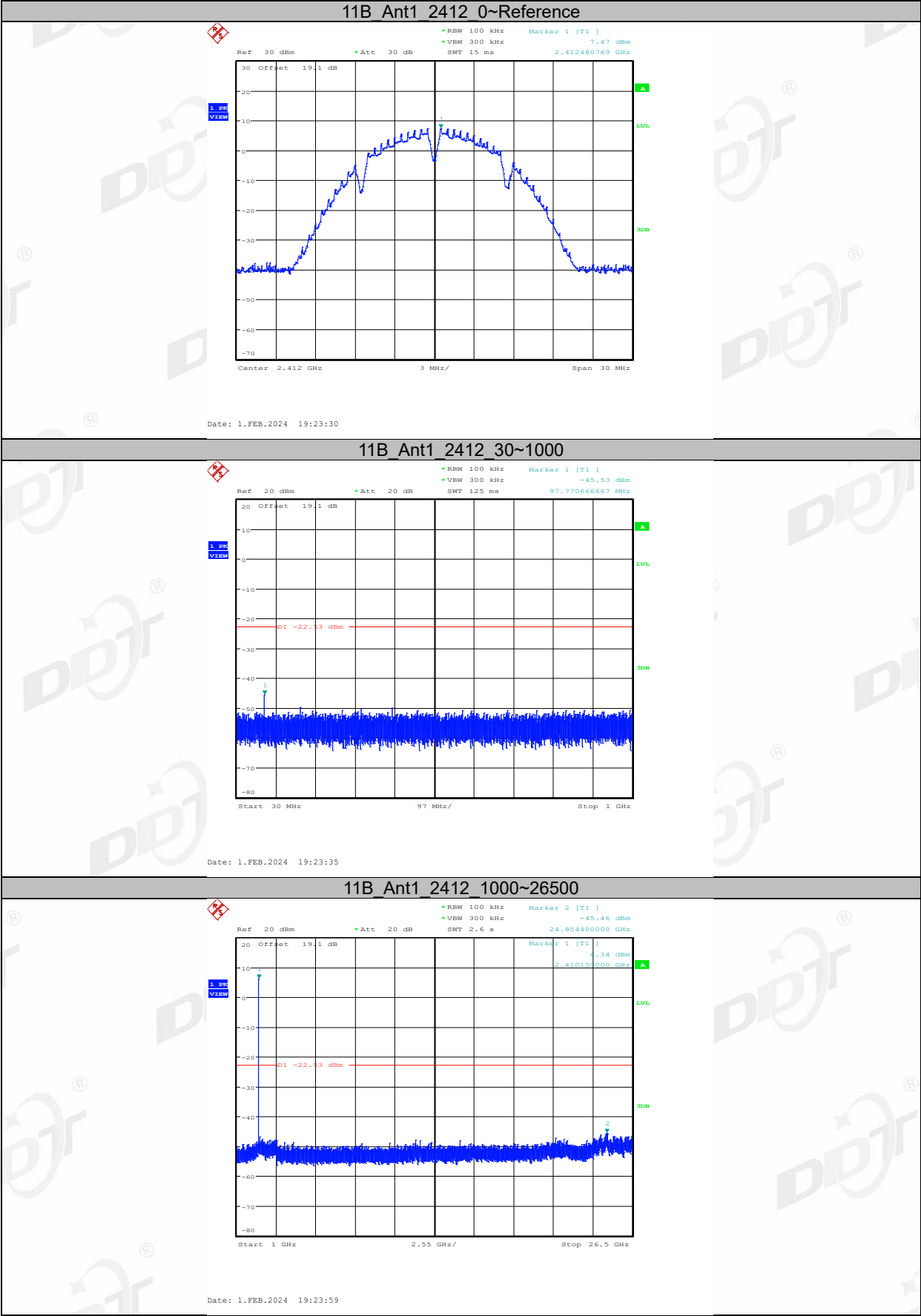
RBW:	100 kHz
VBW:	300 kHz
Span	Encompass frequency range to be measured
Number of measurement points	$\geq \text{Span/RBW}$
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold
- (5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

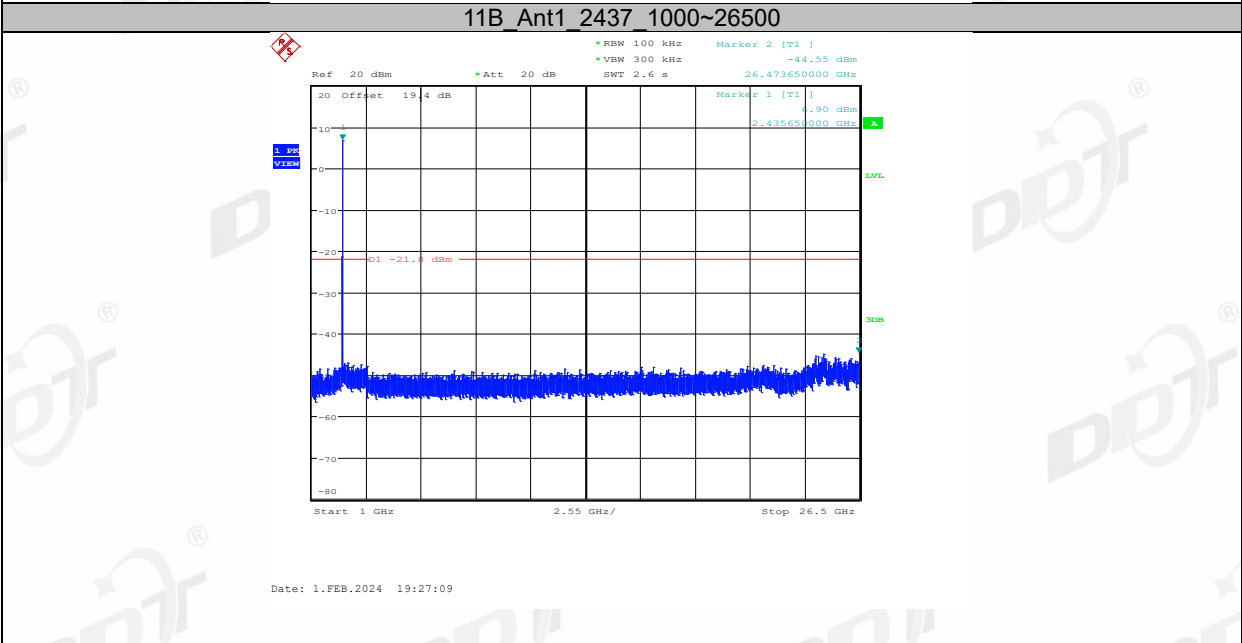
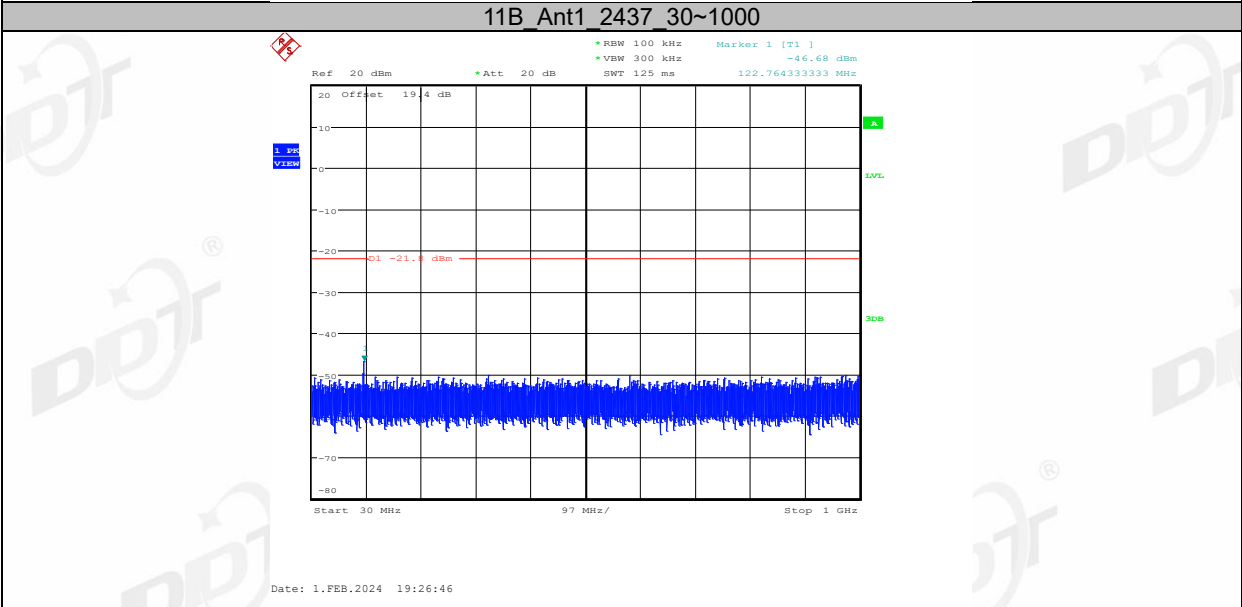
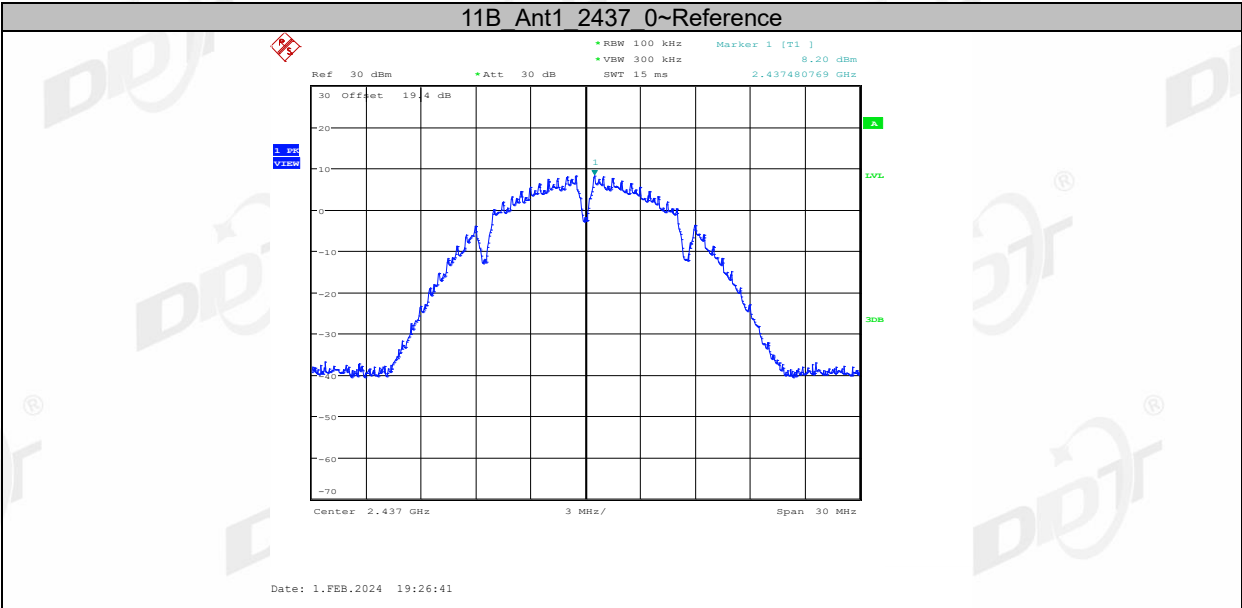
9.4. Test result

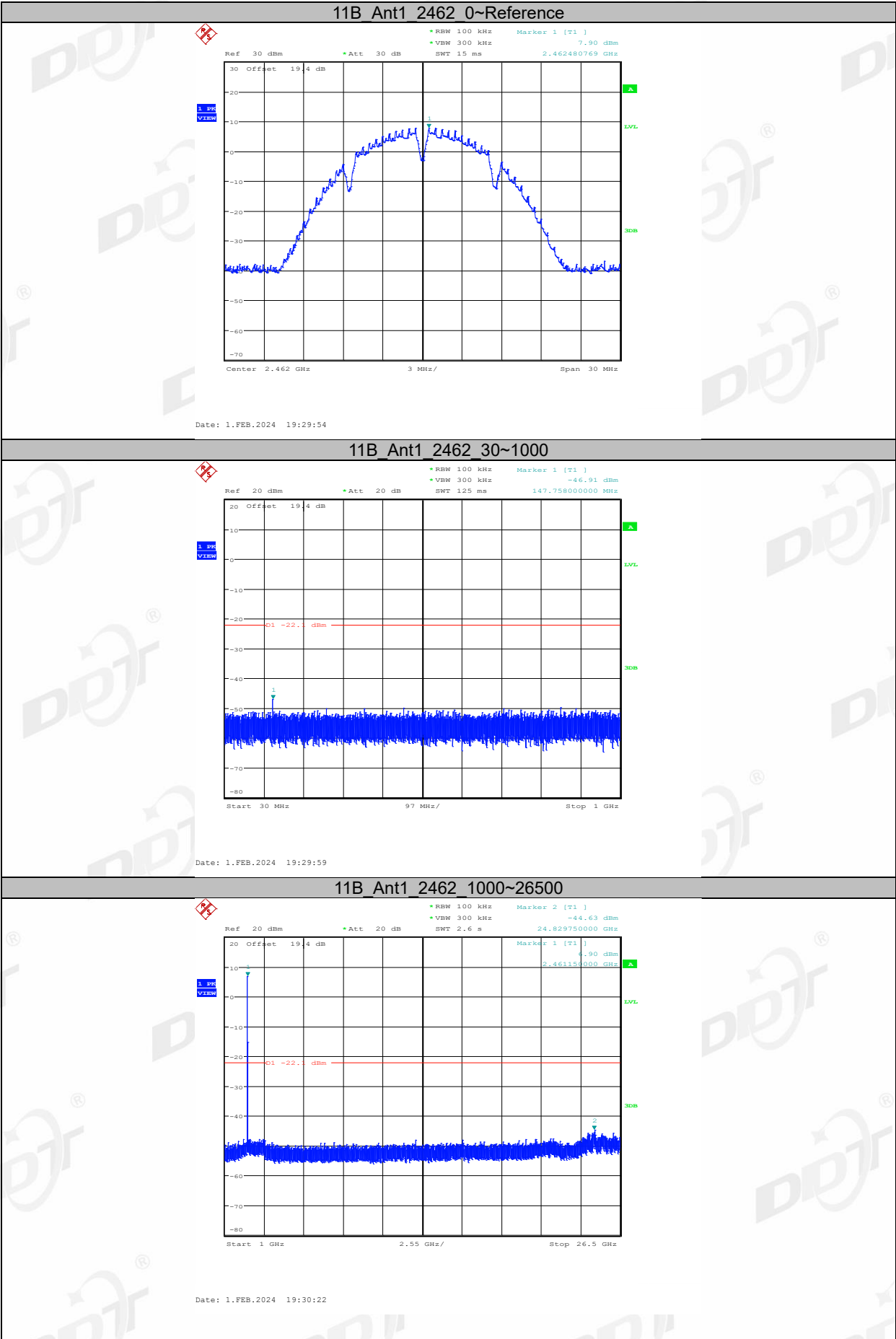
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	23.8℃, 59.2%RH	Test Date:	2024.02.01-2024.02.02
Test Power Supply:	DC 12V	EUT:	InVehicle Gateway
Sample Number:	S23122506-03	Model No.:	VG710

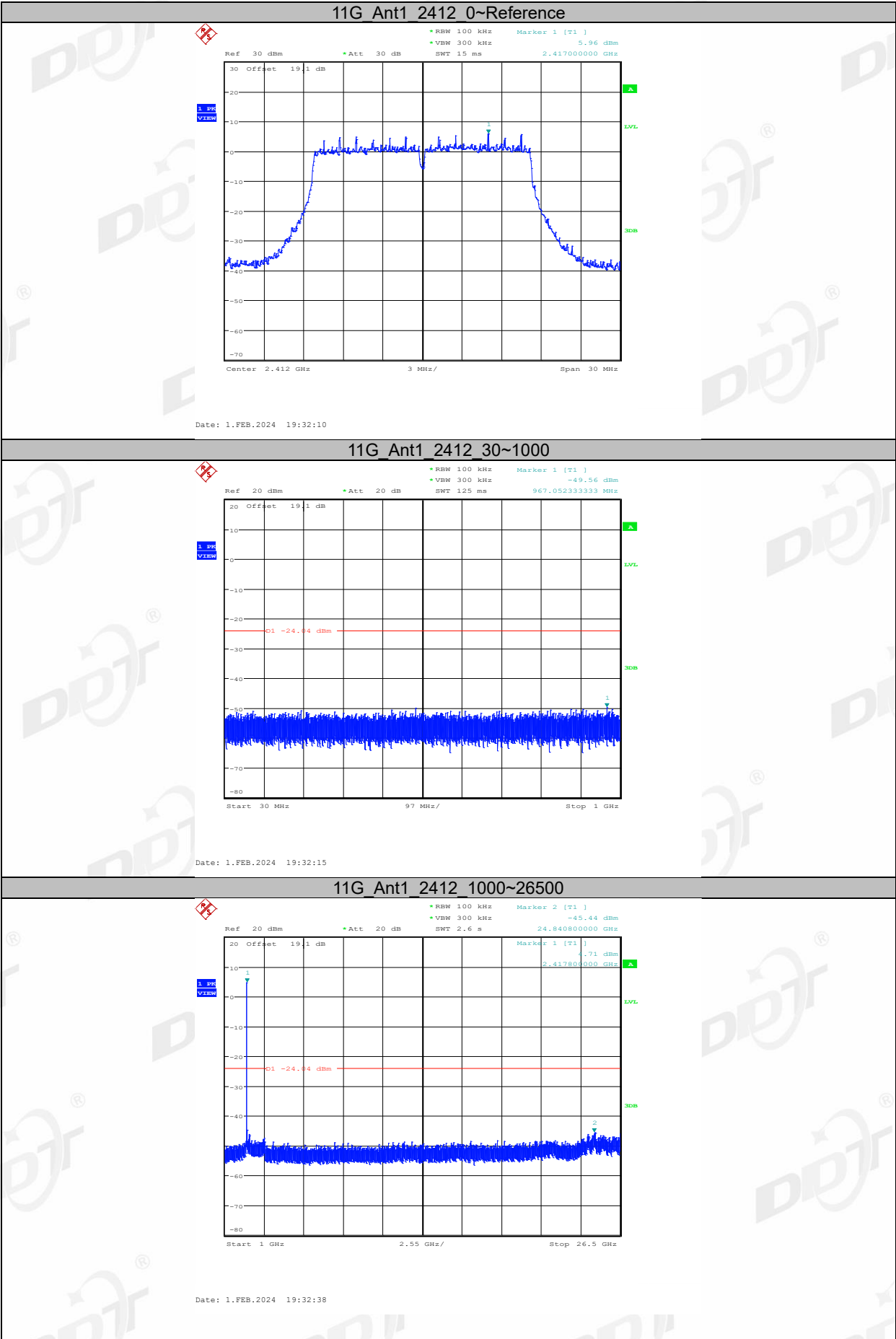
EUT Set Mode	CH or Frequency	Result (dBm)	EUT Set Mode	CH or Frequency	Result (dBm)
11b	CH1	Pass	11g	CH1	Pass
	CH11	Pass		CH11	Pass
11n HT 20	CH1	Pass	11n HT 40	CH3	Pass
	CH11	Pass		CH9	Pass

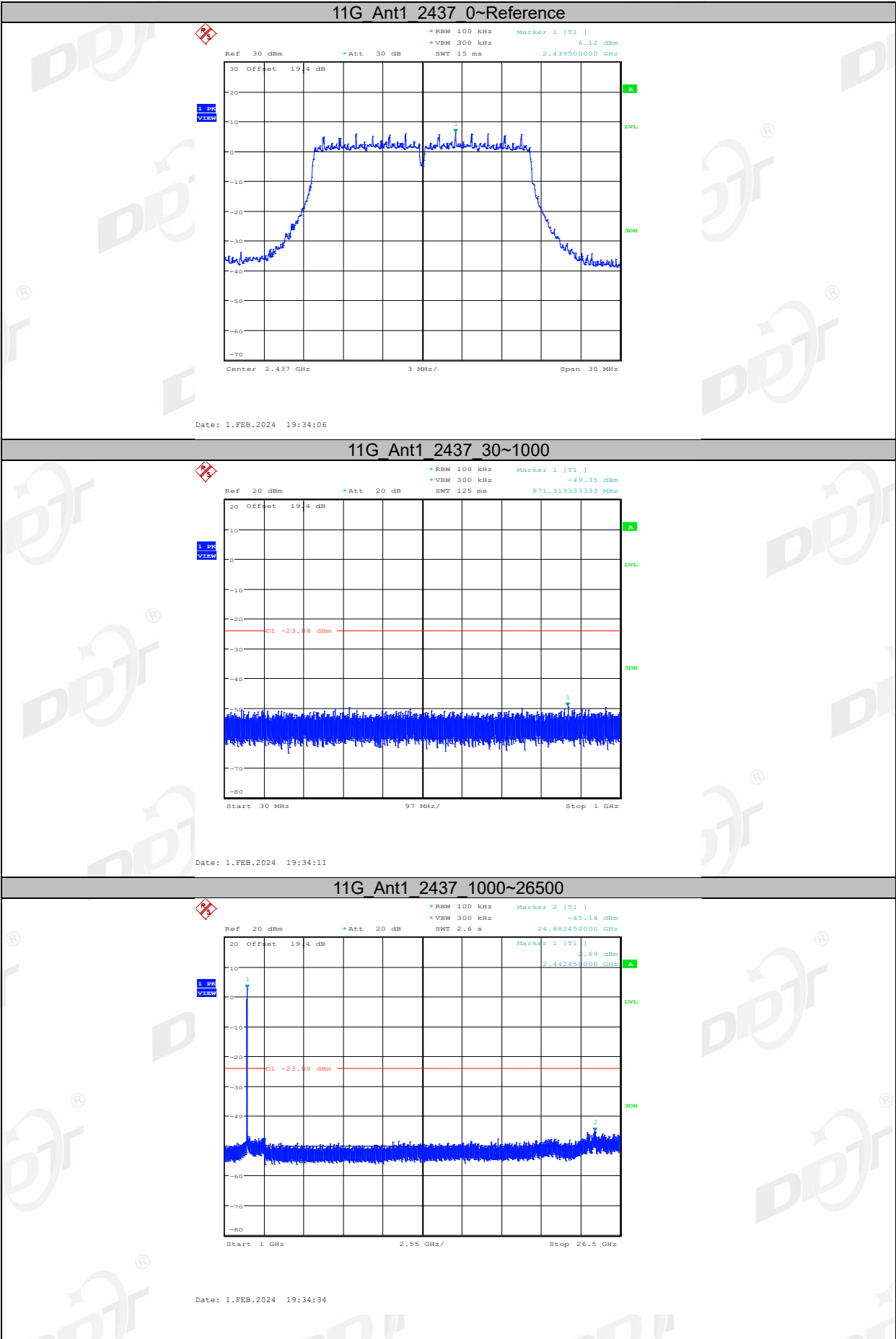
9.5. Test graphs

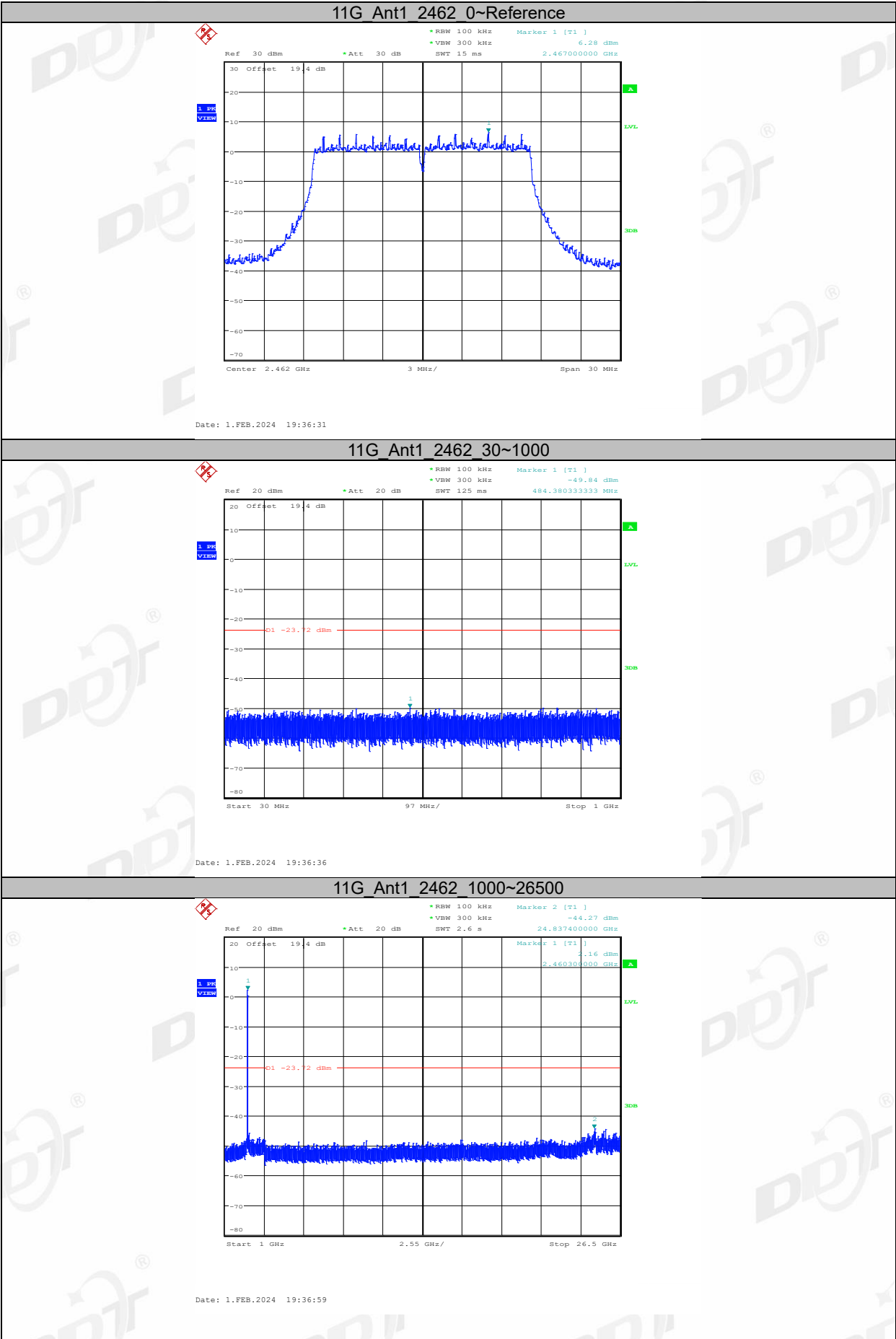


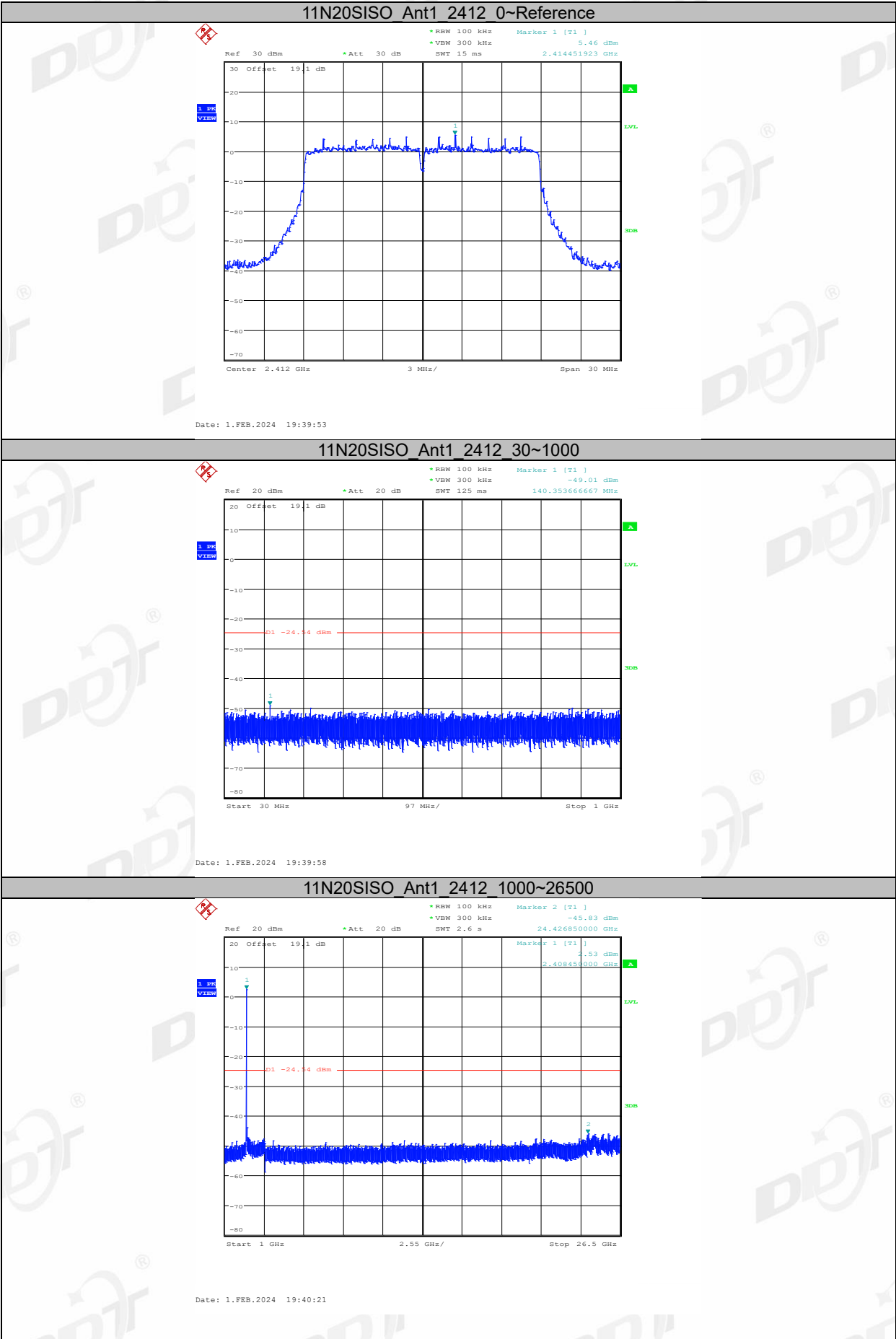


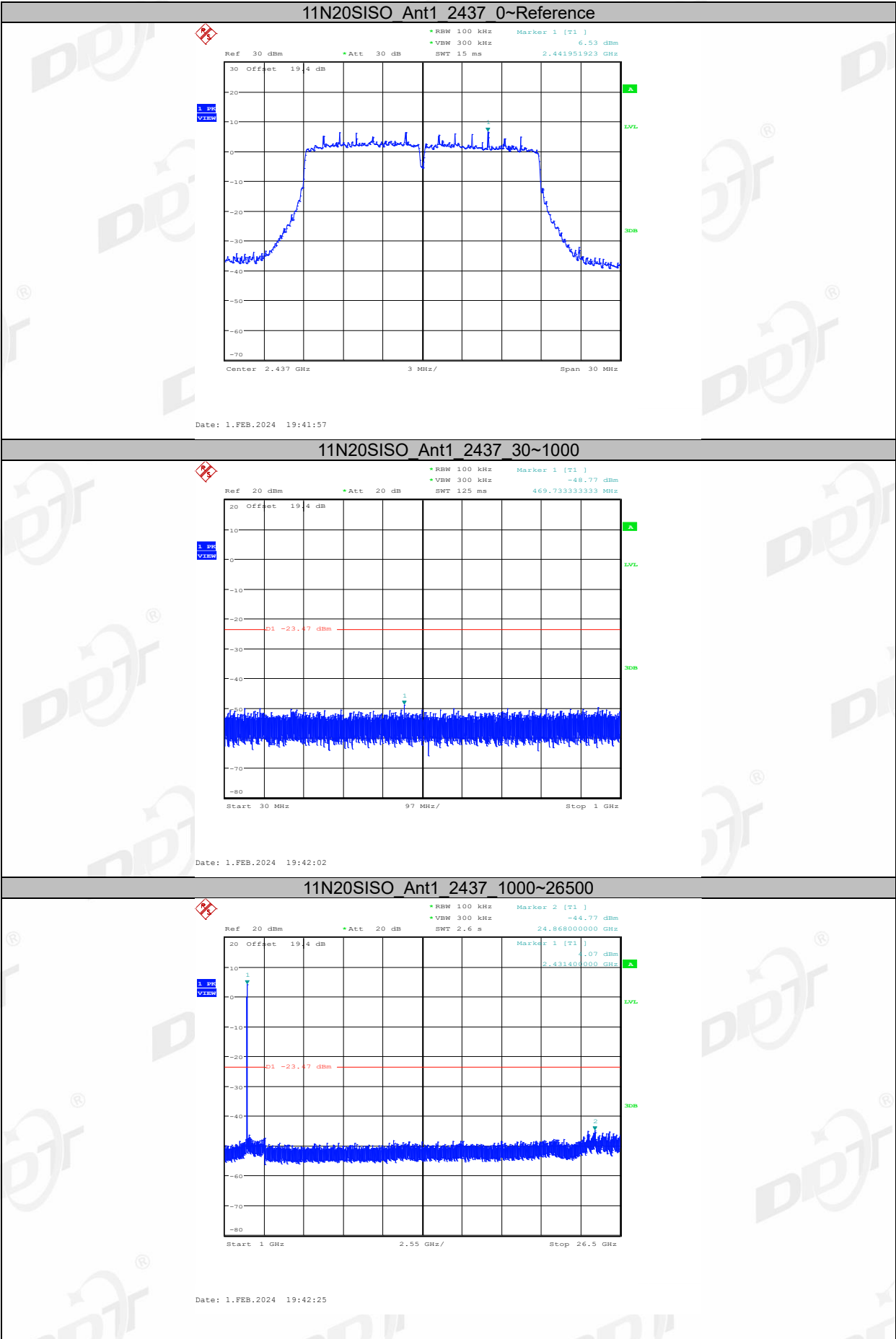


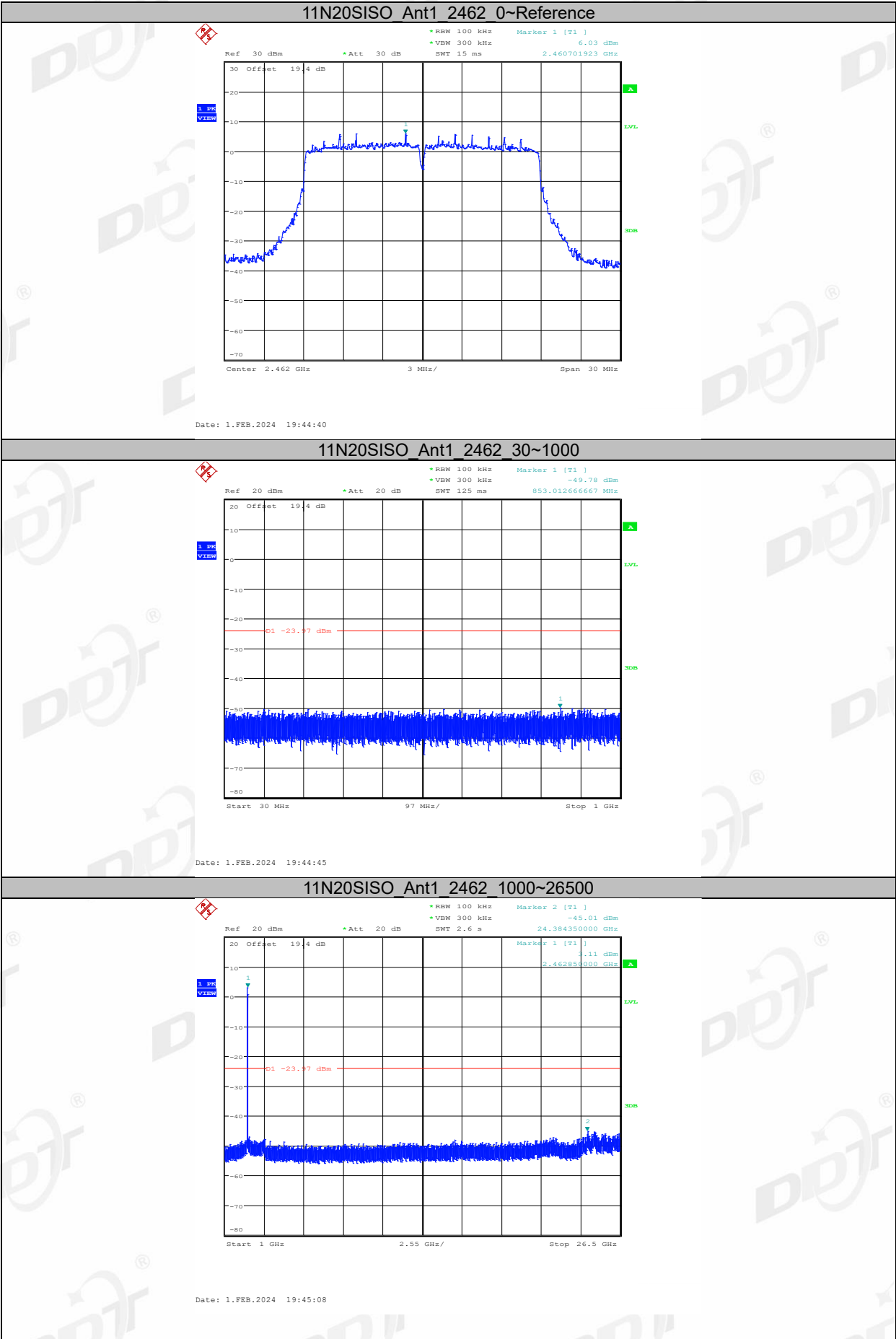


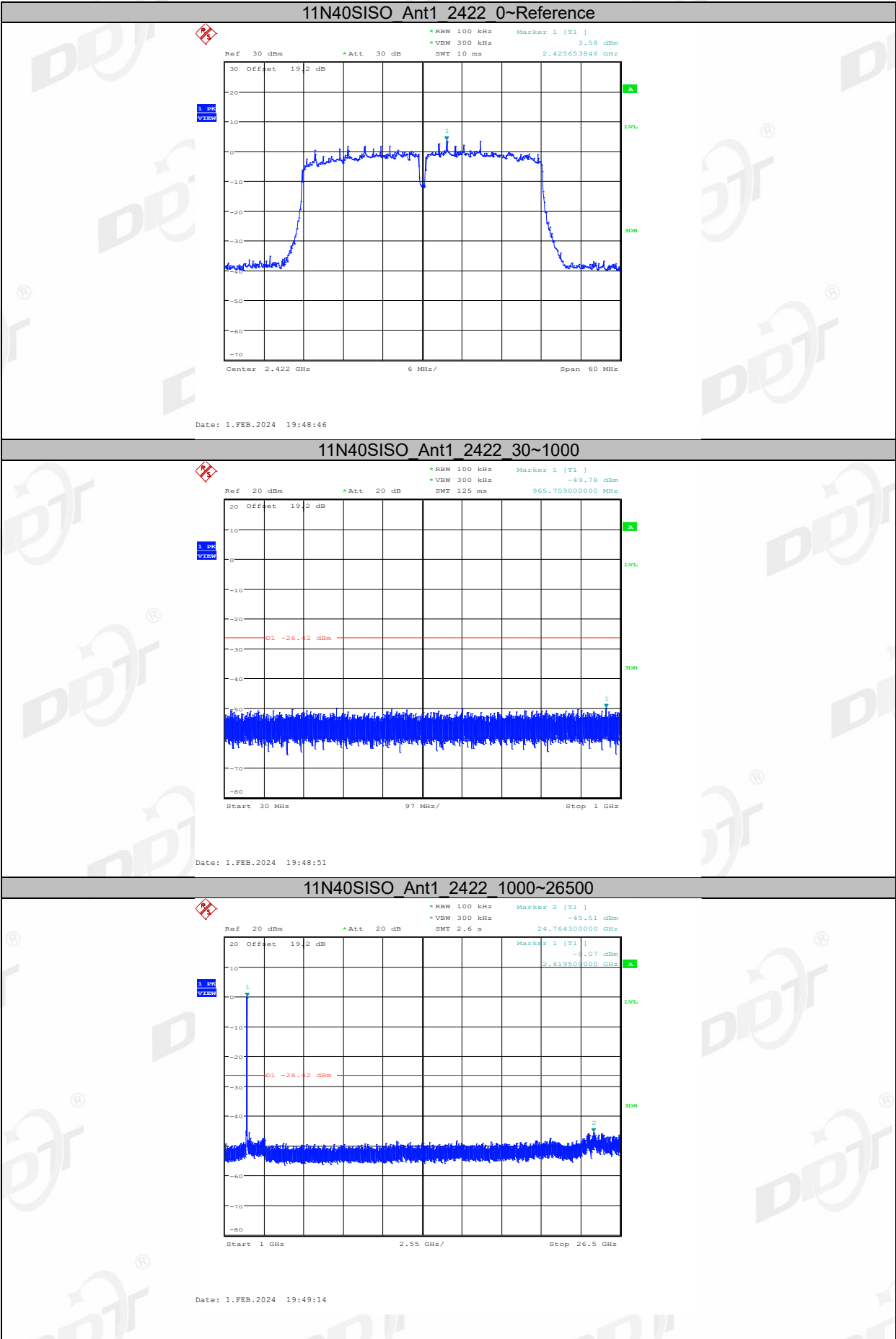


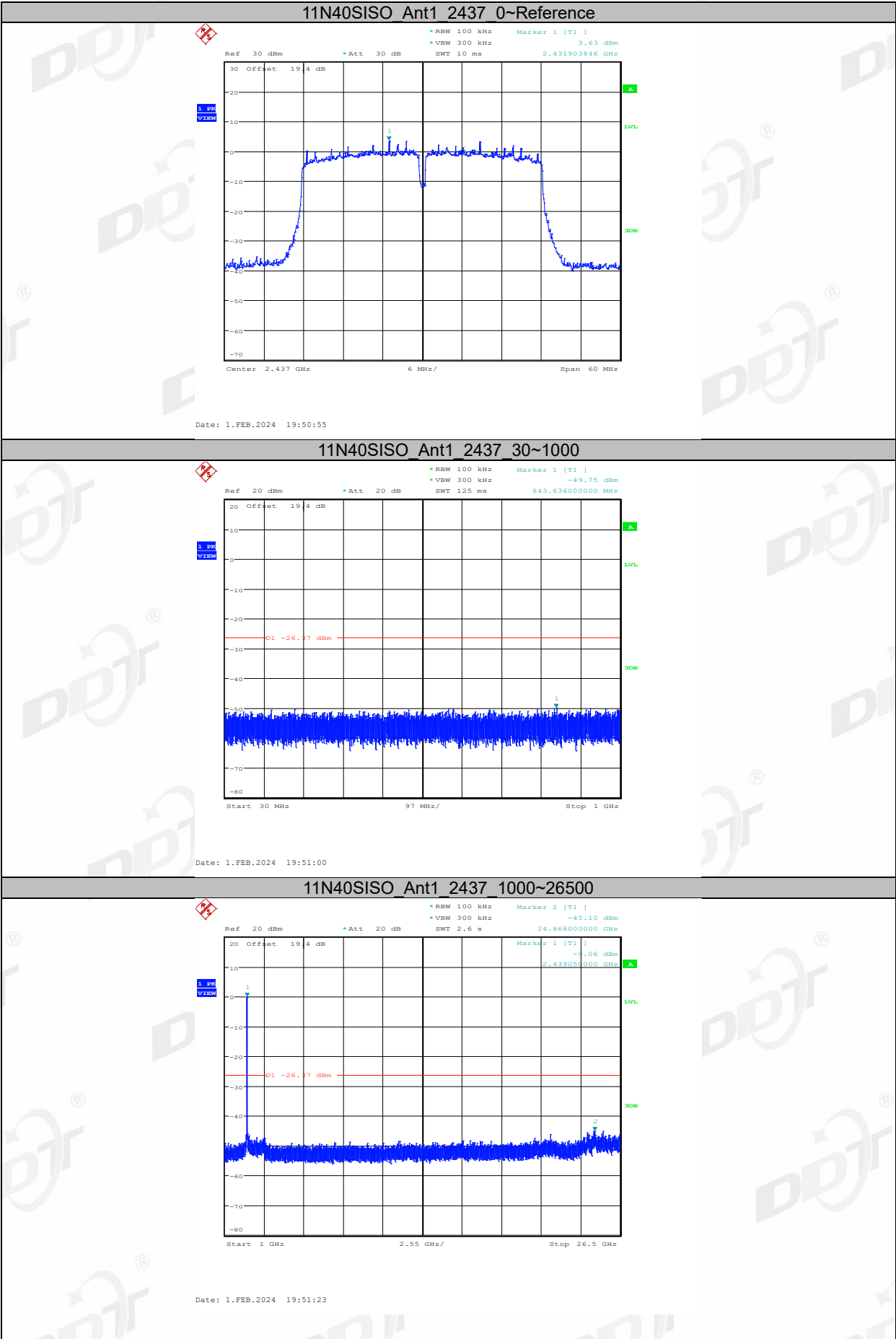








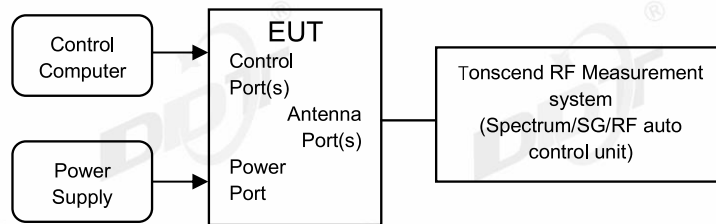






10. Duty Cycle

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:

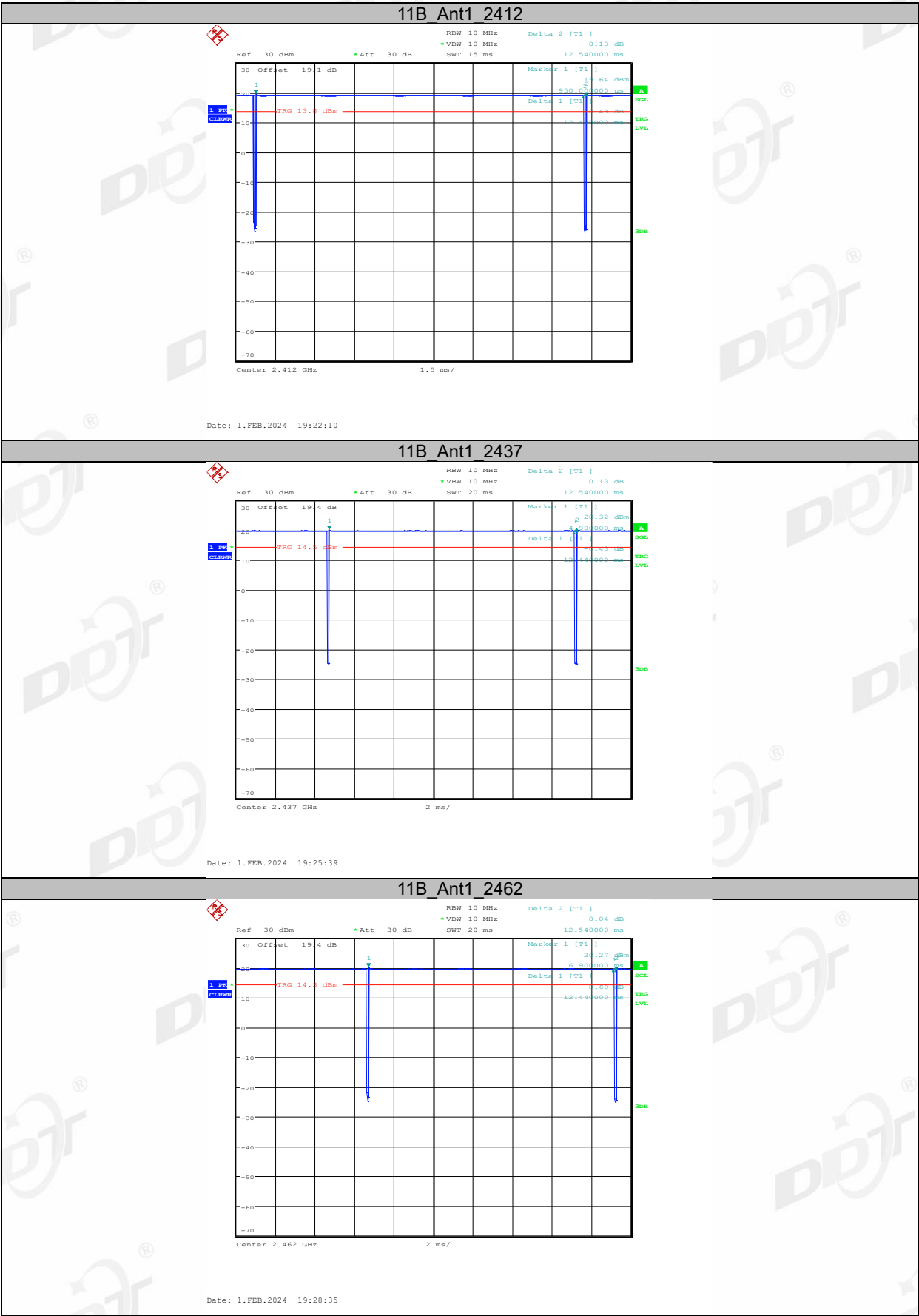
Duty cycle= Pulse's on time / Burst cycle

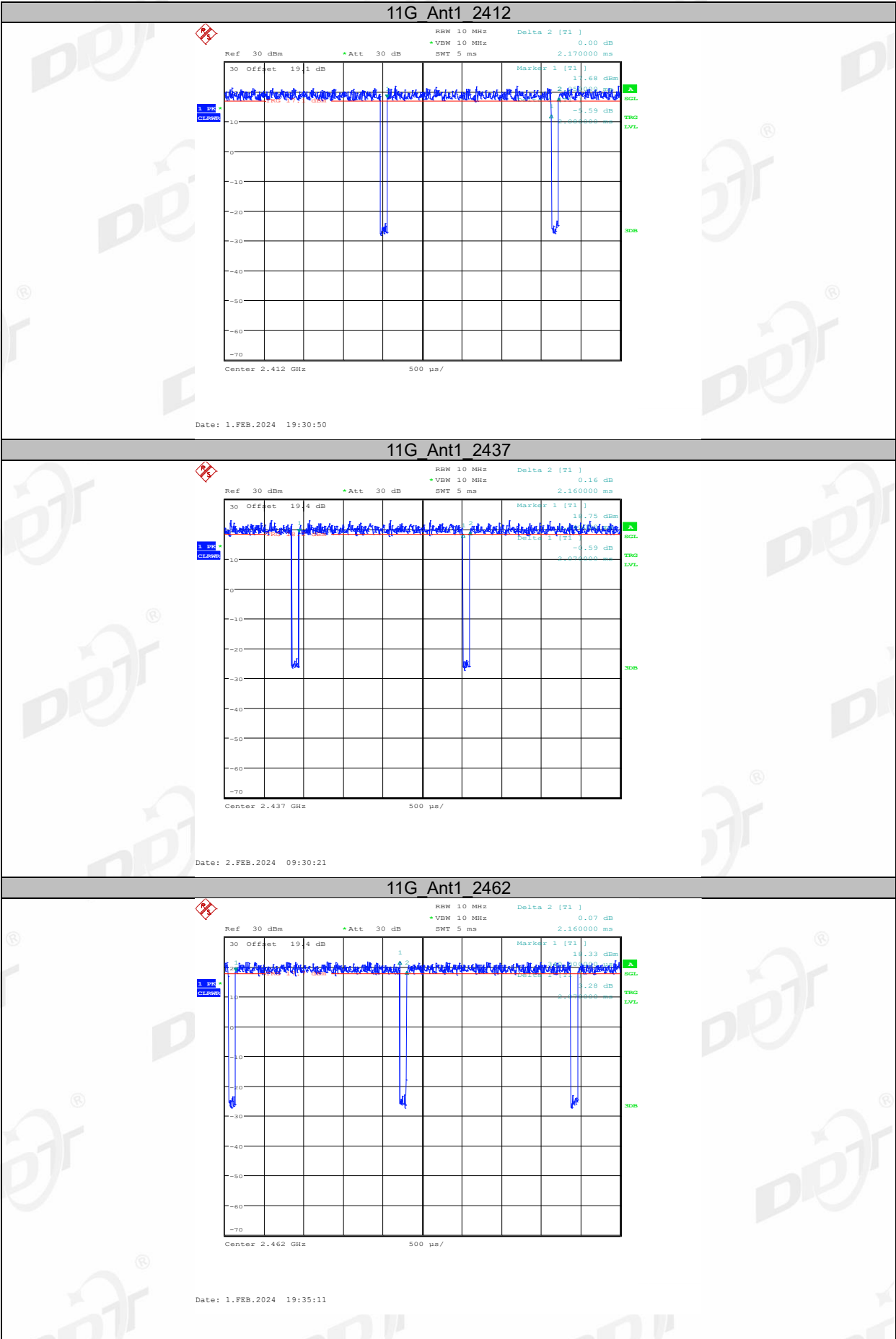
10.4. Test result

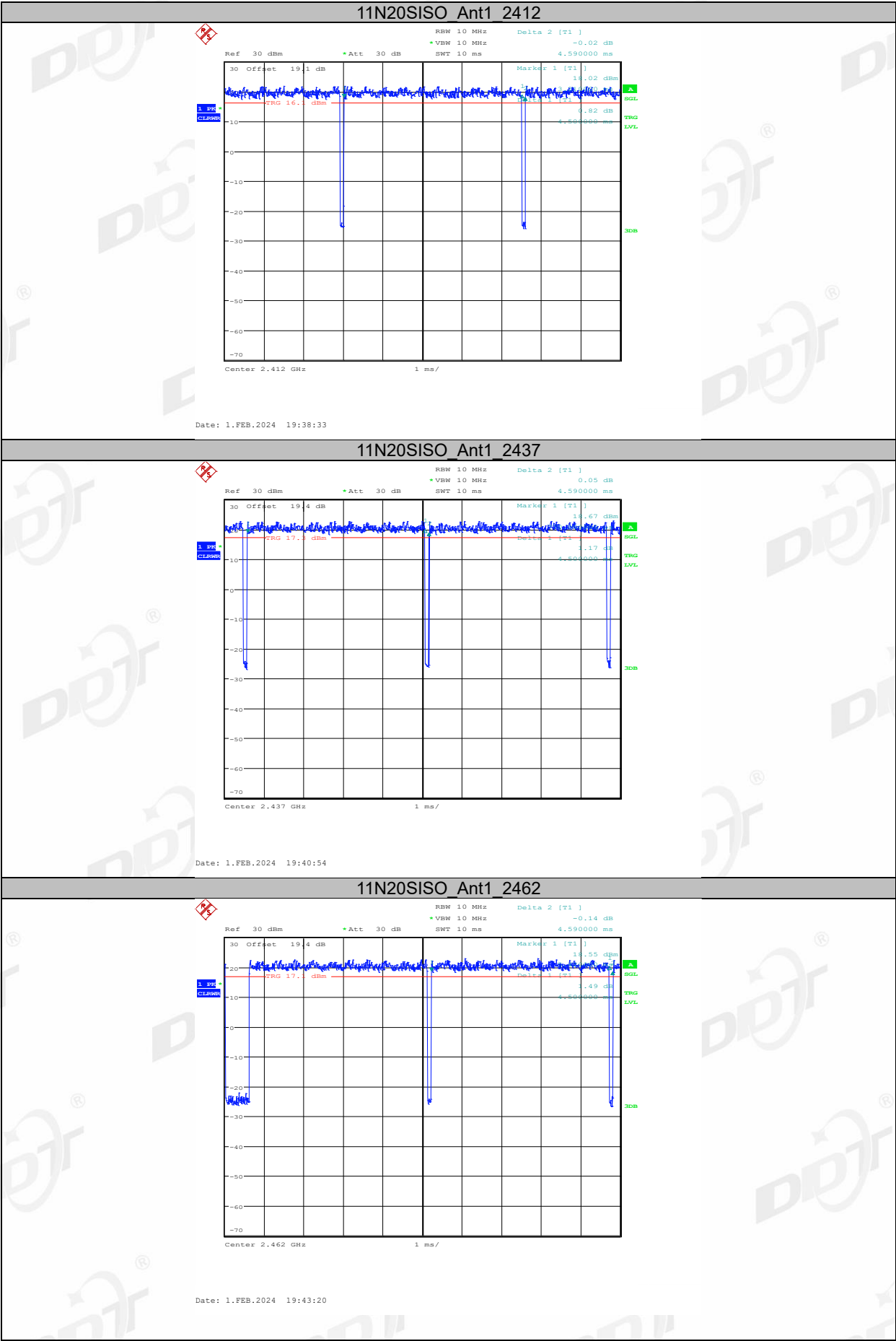
Test Engineer:	Zora Zhang	Test Site:	RF Measurement System 1#
Ambient Condition:	23.8℃, 59.2%RH	Test Date:	2024.02.01-2024.02.02
Test Power Supply:	DC 12V	EUT:	InVehicle Gateway
Sample Number:	S23122506-03	Model No.:	VG710

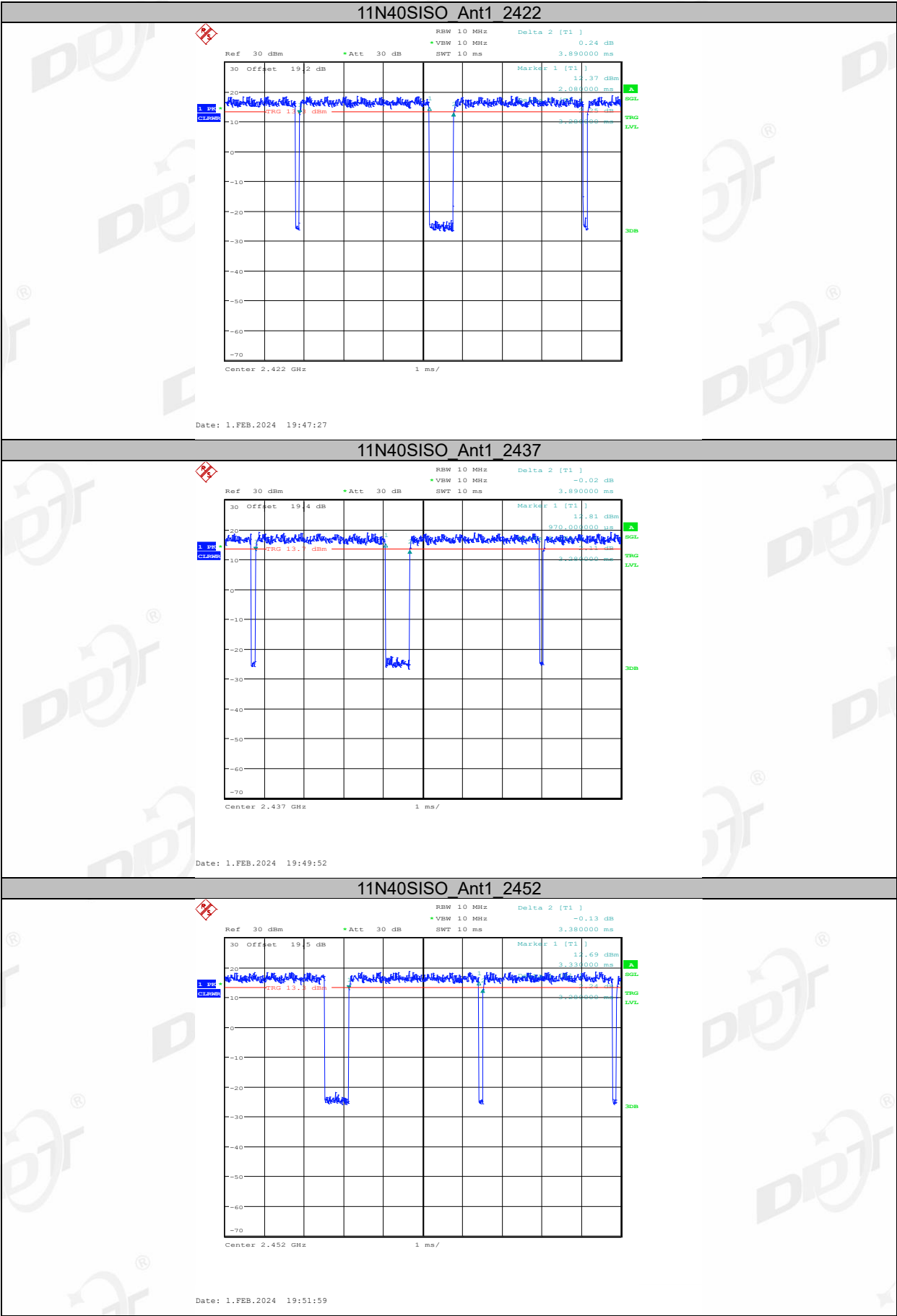
Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2412	12.47	12.54	99.44
		2437	12.44	12.54	99.20
		2462	12.44	12.54	99.20
11G	Ant1	2412	2.08	2.17	95.85
		2437	2.07	2.16	95.83
		2462	2.07	2.16	95.83
11N20SISO	Ant1	2412	4.50	4.59	98.04
		2437	4.50	4.59	98.04
		2462	4.50	4.59	98.04
11N40SISO	Ant1	2422	3.28	3.89	84.32
		2437	3.28	3.89	84.32
		2452	3.28	3.38	97.04

10.5. Test graphs







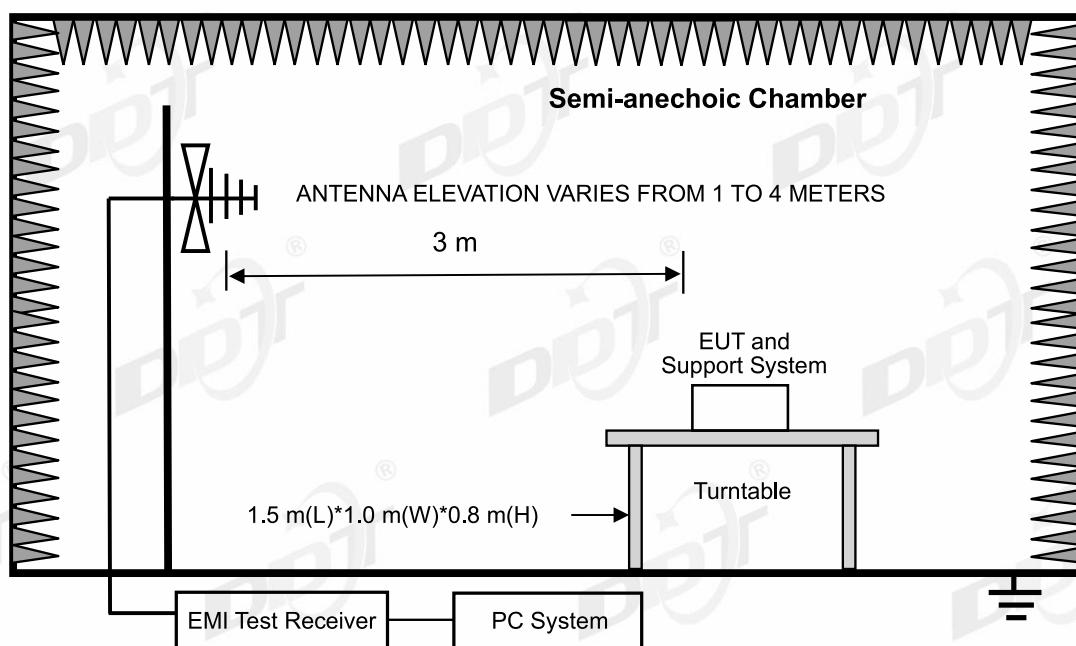
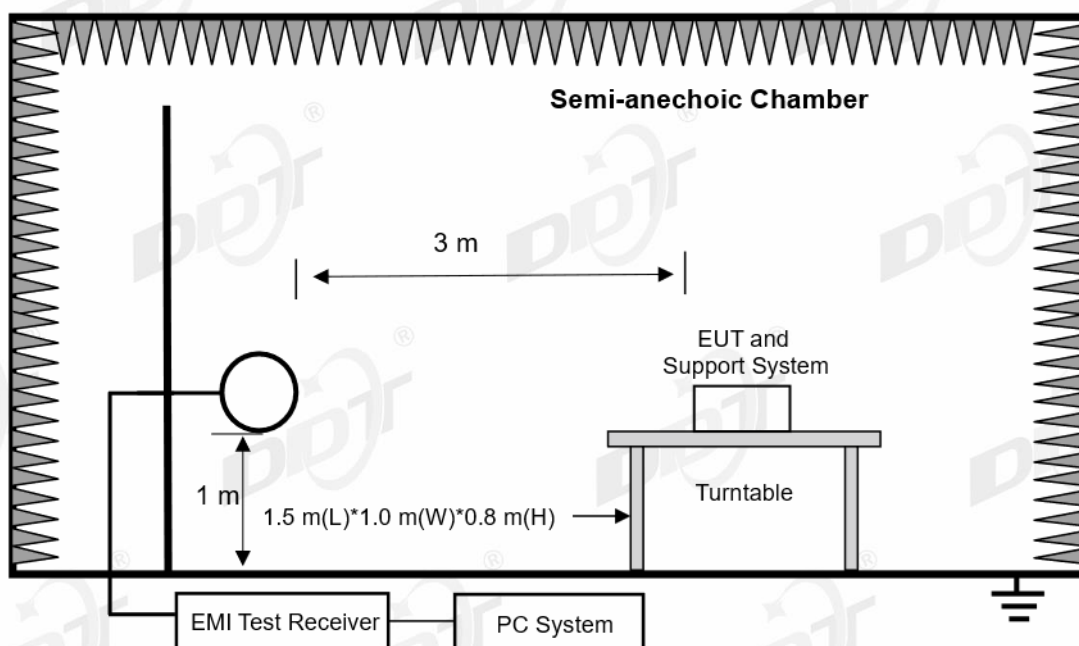


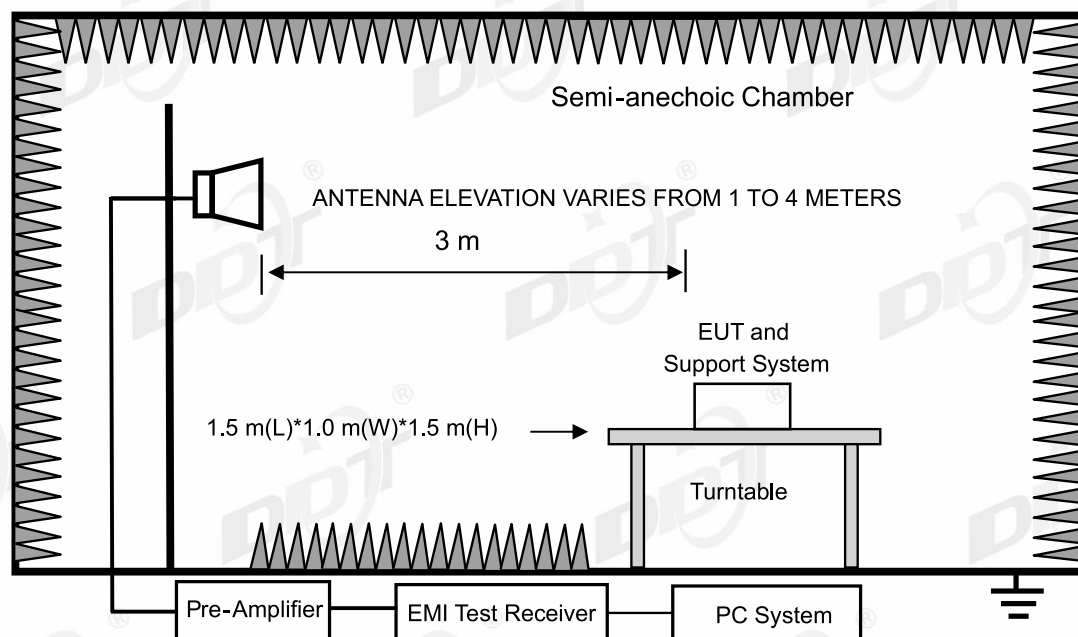
11. Radiated Emission

11.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To	Cal. Interval
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/	NA
RF cable	Yuhu Technology	ZT26S-SMAJ-SMAJ-1M	DDT-ZC02037	2024/04/23	1 Year
RF cable	Yuhu Technology	JCTB810-NJ-NJ-9M	DDT-ZC02538	2024/04/23	1 Year
Active Loop Antenna	Schwarzbeck	FMZB1519	DDT-ZC00524	2024/09/10	1 Year
EMI TEST RECEIVER	R&S	ESU26	DDT-ZC01909	2024/04/23	1 Year
Hochgewinn-Hornantenne	Schwarzbeck Mess-Elektronik	BBHA 9120 D	DDT-ZC02129	2024/09/17	1 Year
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	DDT-ZC00506	2024/04/26	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	DDT-ZC02050	2024/07/11	1 Year
High Pass filter	XIANXINGBO	XBLBQ-GTA67	DDT-ZC02179	2024/05/14	1 Year
Pre-amplifier	COM-POWER	PAM-840A	DDT-ZC01693	2024/04/27	1 Year
PSA Series Spectrum Analyzer	Agilent	E4447A	DDT-ZC00517	2024/04/23	1 Year
RF Cable	N/A	W13.02 AP1-X2	DDT-ZC04023	2024/04/21	1 Year
High pass filter	Micro-Tronics	HPM50102	DDT-ZC00561	2024/05/14	1 Year
RF Cable	N/A	W24.02 HL-562	DDT-ZC04022	2024/04/21	1 Year
Pre-amplifier	COM-POWER	PAM-118A	DDT-ZC01293	2024/07/14	1 Year
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ-1.5M	DDT-ZC02762	2024/04/20	1 Year
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2024/05/14	1 Year
Micro-Tronics filters	REBES	BRM50702	DDT-ZC03242	/	NA

11.2. Block diagram of test setup





11.3. 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

RSS-Gen section 8.10 Restricted frequency bands*

MHz	MHz	MHz	GHz
0.090-0.110	12.51975-12.52025	240-285	3.5-4.4
0.495-0.505	12.57675-12.57725	322-335.4	4.5-5.15
2.1735-2.1905	13.36-13.41	399.9-410	5.35-5.46
3.020-3.026	16.42-16.423	608-614	7.25-7.75
4.125-4.128	16.69475-16.69525	960-1427	8.025-8.5
4.1772&4.17775	16.80425-16.80475	1435-1626.5	9.0-9.2
4.2072&4.20775	25.5-25.67	1645.5-1646.5	9.3-9.5
5.677-5.683	37.5-38.25	1660-1710	10.6-12.7
6.215-6.218	73-74.6	1718.8-1722.2	13.25-13.4
6.26775-6.26825	74.8-75.2	2200-2300	14.47-14.5
6.31175-6.31225	108-138	2310-2390	15.35-16.2
8.291-8.294	149.9-150.05	2483.5-2500	17.7-21.4
8.362-8.366	156.52475-156.52525	2655-2900	22.01-23.12
8.37625-8.38675	156.7-156.9	3260-3267	23.6-24.0
8.41425-8.41475	162.0125-167.17	3332-3339	31.2-31.8
12.29-12.293	167.72-173.2	3345.8-3358	36.43-36.5
			Above 38.6

* Certain frequency bands listed in table 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.

(2) FCC 15.209 Limit & RSS-Gen section 8.9 Limit

FREQUENCY MHz		DISTANCE Meters	FIELD STRENGTHS LIMIT	
			mV/m	dB(mV)/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 dB(mV)/m (Peak) 54.0 dB(mV)/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:

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

(3) Limit for this EUT

The emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, and the emissions appearing within RSS-Gen section 8.10 Restricted frequency bands shall not exceed the limits shown in RSS-Gen section 8.9, all the other emissions shall be at least 20 dB below the fundamental emissions or comply with 15.209 limits and RSS-Gen section 8.9 limits.

11.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	other
DC Power Source	Varied	RU-150-150010B	/

11.5. 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.

11.6. Test result

PASS. (See below detailed test result)

11.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-01-22

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

2.4GWIFI TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

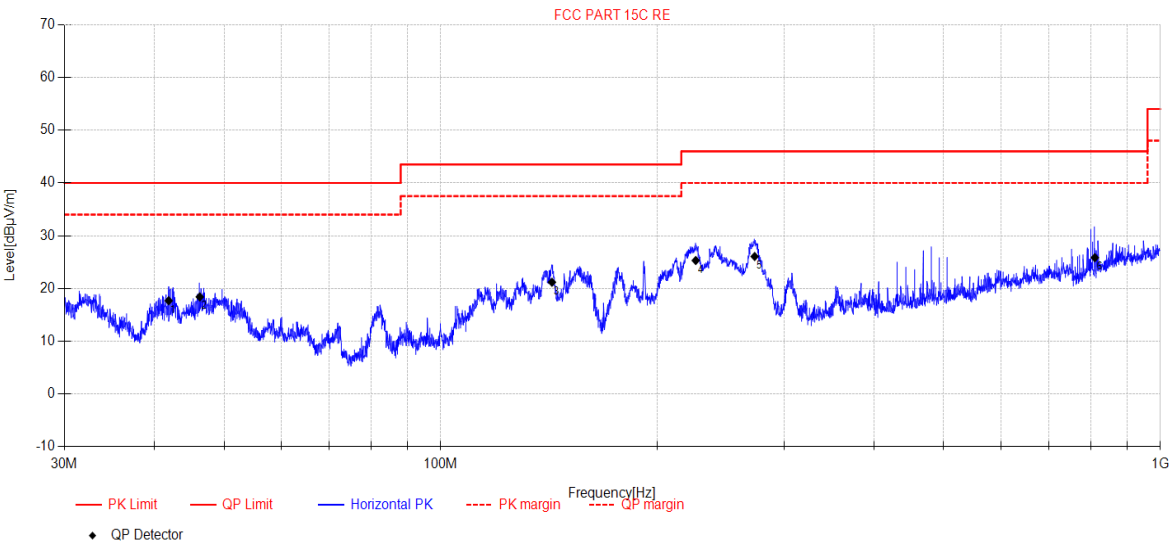
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC BELOW 1G\20240122-235836_H

Memo:

Sample Number:S23122506-03 Power Setting:35



Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	41.89	30.87	13.02	4.62	-30.82	17.69	40.00	22.31	QP	Horizontal
2	46.27	32	12.49	4.68	-30.76	18.41	40.00	21.59	QP	Horizontal
3	142.78	37.71	8.97	5.28	-30.77	21.19	43.50	22.31	QP	Horizontal
4	226.17	38.57	11.42	5.84	-30.52	25.31	46.00	20.69	QP	Horizontal
5	273.11	37.91	12.50	6.04	-30.38	26.07	46.00	19.93	QP	Horizontal
6	810.87	28.17	19.45	8.02	-29.80	25.84	46.00	20.16	QP	Horizontal

Note:

- Result Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
- Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-01-22

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

2.4GWIFI TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

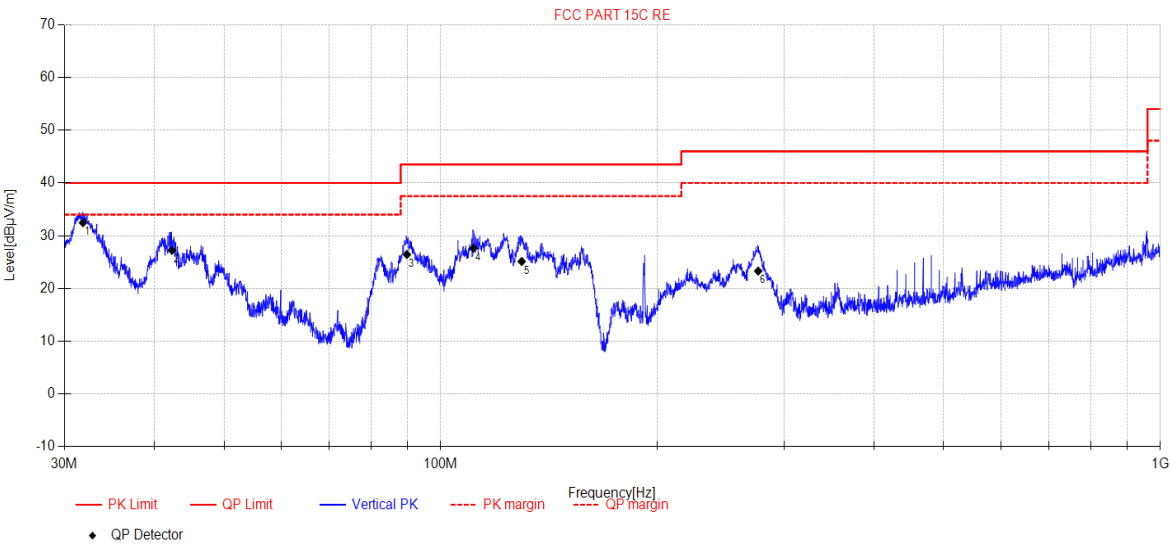
DDT 3# Chamber

File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC BELOW 1G\20240122-235928_V

Memo:

Sample Number:S23122506-03 Power Setting:35



Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity
1	31.84	48.8	10.15	4.49	-30.97	32.47	40.00	7.53	QP	Vertical
2	42.33	40.43	13.00	4.63	-30.82	27.24	40.00	12.76	QP	Vertical
3	89.76	42.75	9.45	4.94	-30.70	26.44	43.50	17.06	QP	Vertical
4	111.08	41.49	11.88	5.13	-30.87	27.63	43.50	15.87	QP	Vertical
5	129.61	41.78	8.93	5.22	-30.81	25.12	43.50	18.38	QP	Vertical
6	276.19	35.14	12.48	6.05	-30.37	23.30	46.00	22.70	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

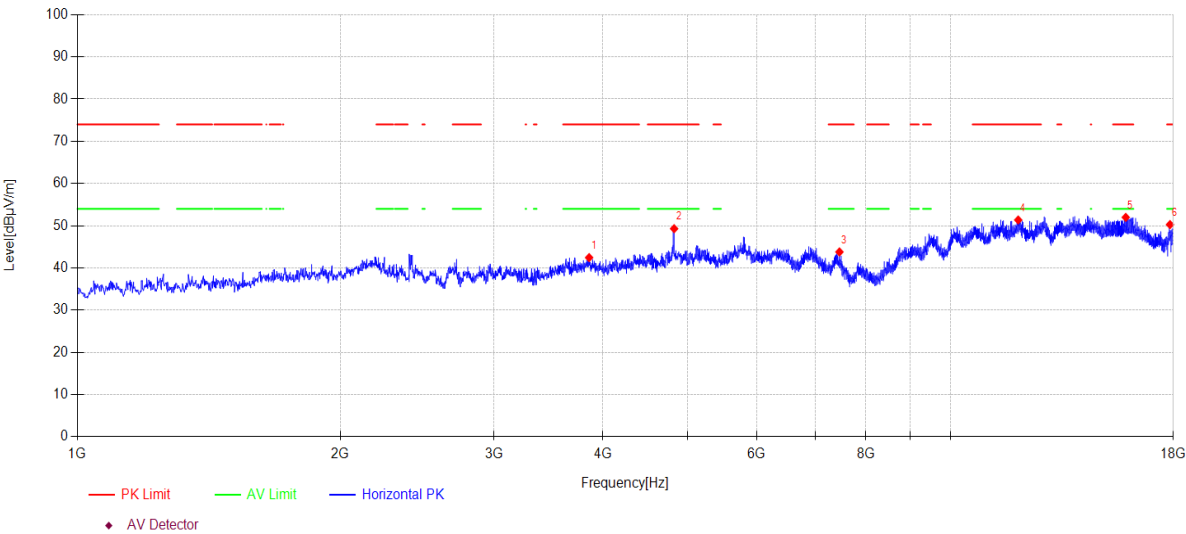
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\7

Memo:

Sample Number:S23122506-03 Power Setting:35

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	3856.00	46.05	30.94	5.82	-40.36	42.45	74.00	31.55	PK	Horizontal
2	4825.00	48.77	33.15	7.52	-40.14	49.30	74.00	24.70	PK	Horizontal
3	7461.70	41.42	36.58	7.64	-41.85	43.79	74.00	30.21	PK	Horizontal
4	11956.50	41.33	39.07	10.50	-39.54	51.36	74.00	22.64	PK	Horizontal
5	15876.70	37.80	38.15	15.32	-39.29	51.98	74.00	22.02	PK	Horizontal
6	17843.60	38.10	41.28	12.94	-42.05	50.27	74.00	23.73	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

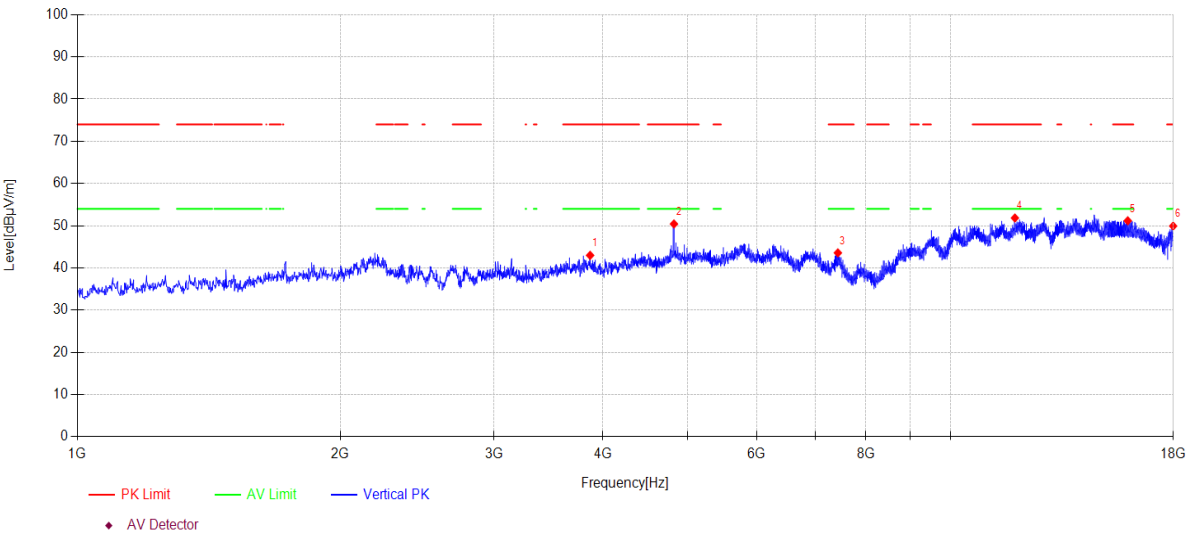
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\8

Memo:

Sample Number:S23122506-03 Power Setting:35

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	3866.20	46.53	31.00	5.82	-40.37	42.98	74.00	31.02	PK	Vertical
2	4823.30	49.95	33.11	7.51	-40.15	50.42	74.00	23.58	PK	Vertical
3	7431.10	41.07	36.64	7.64	-41.78	43.57	74.00	30.43	PK	Vertical
4	11852.80	42.02	38.90	10.41	-39.49	51.84	74.00	22.16	PK	Vertical
5	15961.70	36.76	38.04	15.71	-39.34	51.17	74.00	22.83	PK	Vertical
6	17991.50	36.83	42.36	13.12	-42.38	49.93	74.00	24.07	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2437MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

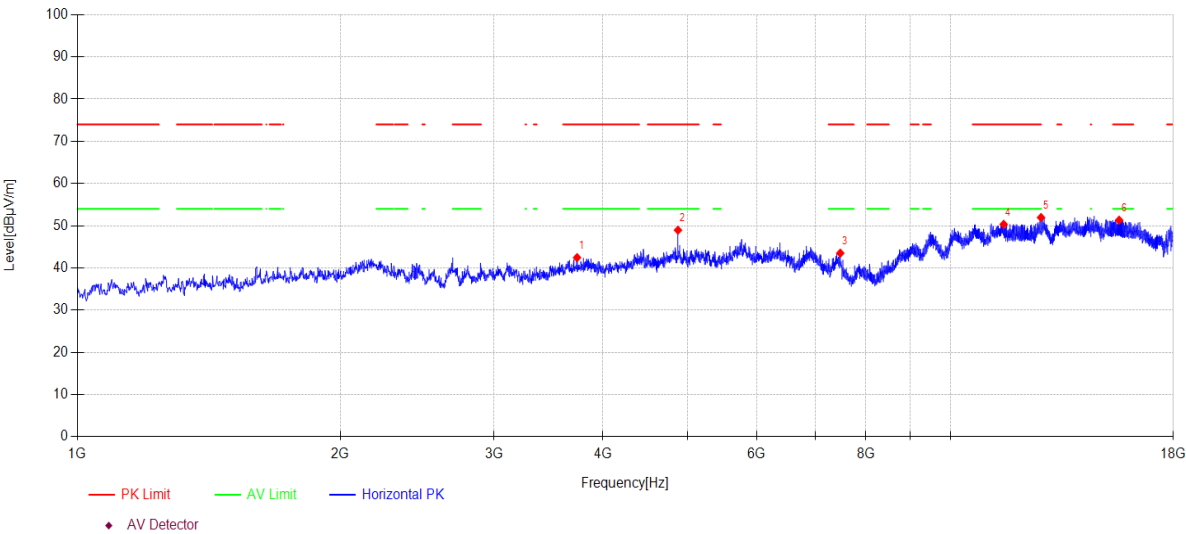
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\9

Memo:

Sample Number:S23122506-03 Power Setting:35

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	3735.30	46.48	30.47	5.79	-40.29	42.45	74.00	31.55	PK	Horizontal
2	4874.30	48.05	33.41	7.62	-40.13	48.95	74.00	25.05	PK	Horizontal
3	7478.70	41.23	36.54	7.64	-41.90	43.51	74.00	30.49	PK	Horizontal
4	11506.00	40.37	39.19	10.10	-39.33	50.33	74.00	23.67	PK	Horizontal
5	12697.70	41.63	39.60	10.54	-39.83	51.94	74.00	22.06	PK	Horizontal
6	15604.70	37.74	38.60	14.09	-39.12	51.31	74.00	22.69	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2437MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

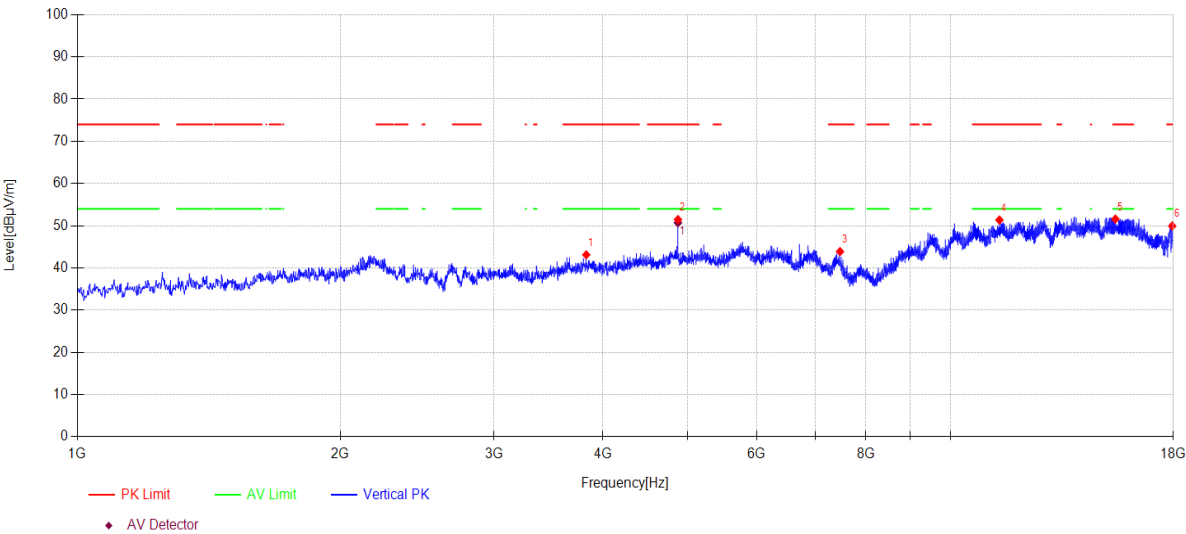
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\10

Memo:

Sample Number:S23122506-03 Power Setting:35

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	3827.10	46.84	30.81	5.81	-40.34	43.12	74.00	30.88	PK	Vertical
2	4874.30	50.57	33.41	7.62	-40.13	51.47	74.00	22.53	PK	Vertical
3	7473.60	41.58	36.55	7.64	-41.88	43.89	74.00	30.11	PK	Vertical
4	11378.50	41.35	39.28	9.99	-39.27	51.35	74.00	22.65	PK	Vertical
5	15450.00	38.33	38.90	13.39	-39.03	51.59	74.00	22.41	PK	Vertical
6	17945.60	37.03	42.13	13.06	-42.28	49.94	74.00	24.06	PK	Vertical

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	4874.30	49.80	33.41	7.62	-40.13	50.70	54.00	3.30	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.

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

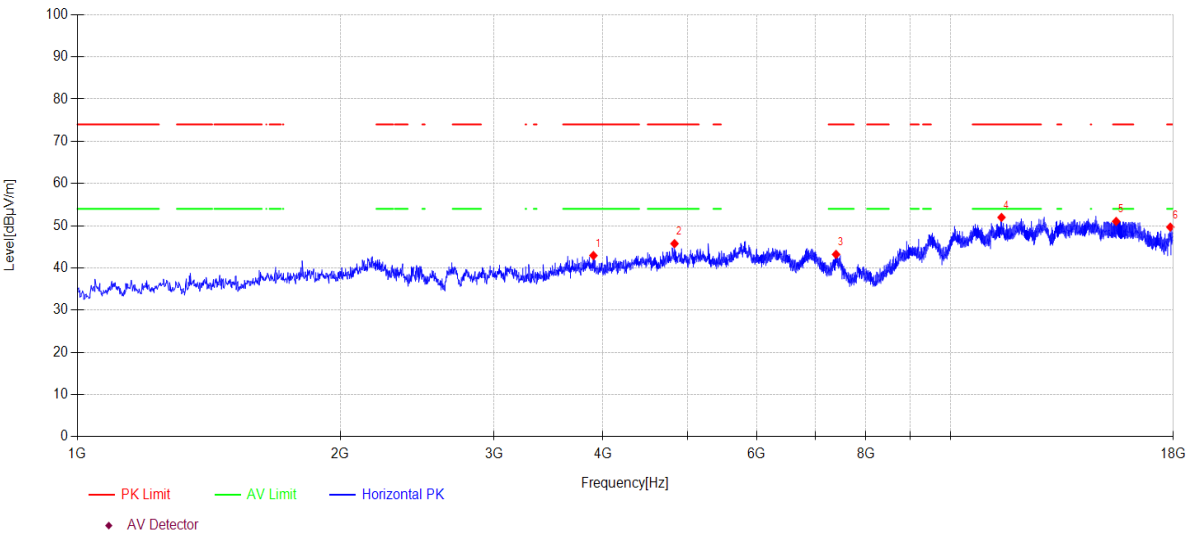
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\11

Memo:

Sample Number:S23122506-03 Power Setting:35

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	3900.20	46.30	31.20	5.83	-40.39	42.94	74.00	31.06	PK	Horizontal
2	4830.10	45.08	33.28	7.53	-40.14	45.75	74.00	28.25	PK	Horizontal
3	7395.40	40.55	36.71	7.64	-41.69	43.21	74.00	30.79	PK	Horizontal
4	11441.40	41.97	39.26	10.04	-39.30	51.97	74.00	22.03	PK	Horizontal
5	15478.90	37.72	38.84	13.52	-39.05	51.03	74.00	22.97	PK	Horizontal
6	17857.20	37.36	41.43	12.96	-42.08	49.67	74.00	24.33	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

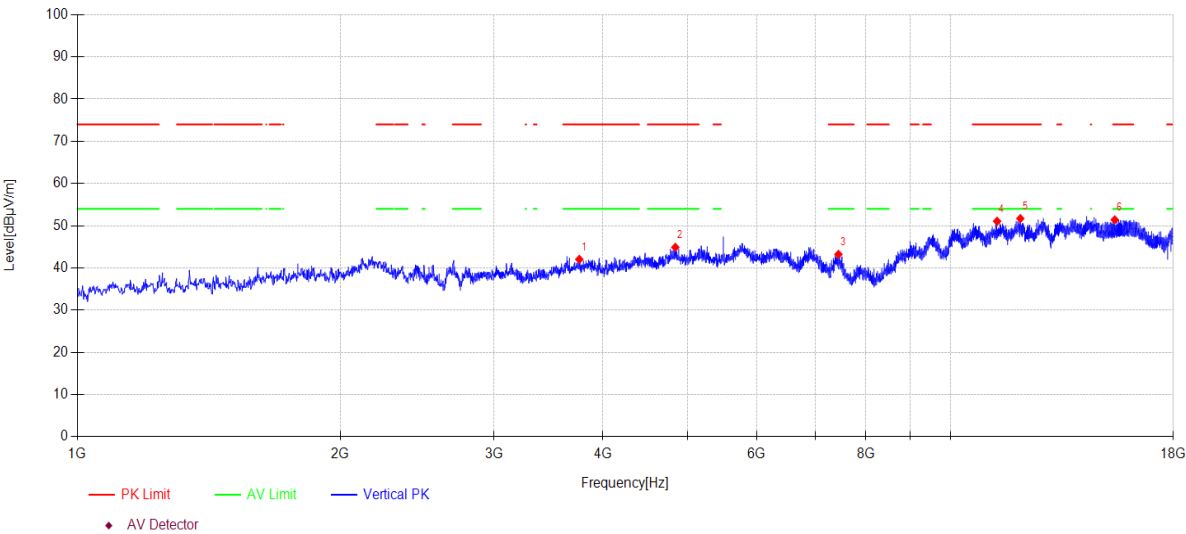
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\12

Memo:

Sample Number:S23122506-03 Power Setting:35

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	3757.40	46.00	30.53	5.80	-40.30	42.03	74.00	31.97	PK	Vertical
2	4840.30	43.93	33.55	7.55	-40.14	44.89	74.00	29.11	PK	Vertical
3	7441.30	40.76	36.62	7.64	-41.80	43.22	74.00	30.78	PK	Vertical
4	11308.80	41.18	39.21	9.92	-39.24	51.07	74.00	22.93	PK	Vertical
5	12022.80	41.50	39.22	10.54	-39.57	51.69	74.00	22.31	PK	Vertical
6	15422.80	38.19	38.95	13.27	-39.01	51.40	74.00	22.60	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.

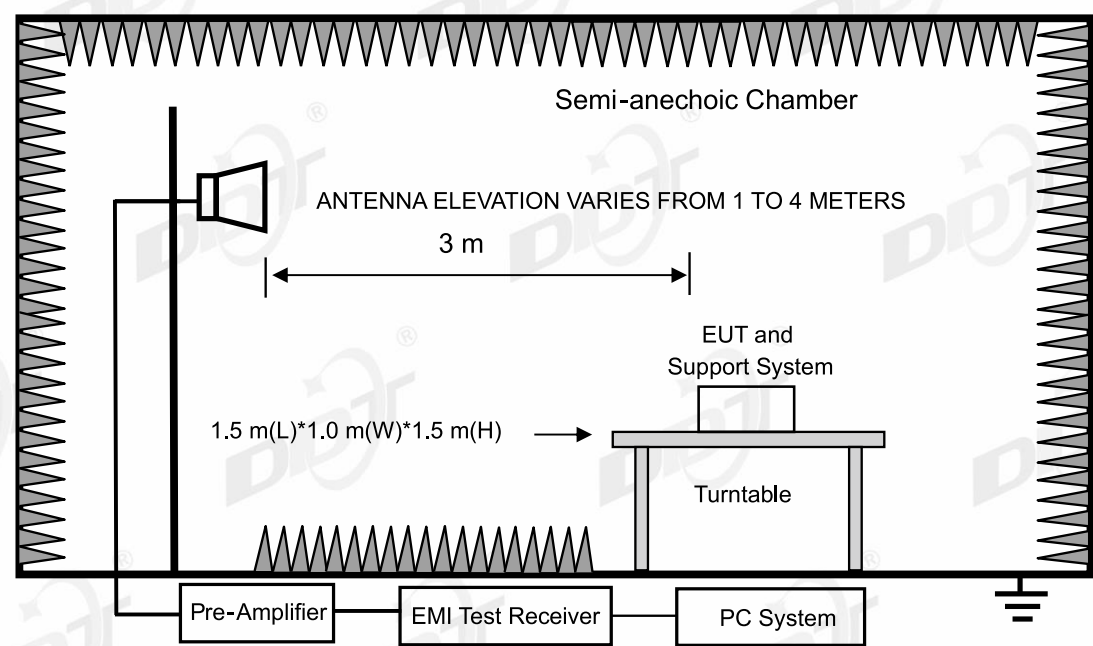
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

12. Band Edge Compliance

12.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To	Cal. Interval
RF cable	Yuhu Technology	ZT26S-SMAJ-SMAJ-1M	DDT-ZC02037	2024/04/23	1 Year
RF cable	Yuhu Technology	JCTB810-NJ-NJ-9M	DDT-ZC02538	2024/04/23	1 Year
Active Loop Antenna	Schwarzbeck	FMZB1519	DDT-ZC00524	2024/09/10	1 Year
Pre-amplifier	COM-POWER	PAM-118A	DDT-ZC01293	2024/07/14	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	DDT-ZC02050	2024/07/11	1 Year
High pass filter	Micro-Tronics	HPM50102	DDT-ZC00561	2024/05/14	1 Year
High pass filter	Micro-Tronics	HPM50108	DDT-ZC00560	2024/05/14	1 Year
PSA Series Spectrum Analyzer	Agilent	E4447A	DDT-ZC00517	2024/04/23	1 Year
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	DDT-ZC00506	2024/04/26	1 Year
High Pass filter	XIANXINGBO	XBLBQ-GTA67	DDT-ZC02179	2024/05/14	1 Year
Pre-amplifier	COM-POWER	PAM-840A	DDT-ZC01693	2024/04/27	1 Year
Hochgewinn-Hornantenne	Schwarzbeck Mess-Elektronik	BBHA 9120 D	DDT-ZC02129	2024/09/17	1 Year
EMI TEST RECEIVER	R&S	ESU26	DDT-ZC01909	2024/04/23	1 Year
Micro-Tronics filters	REBES	BRM50702	DDT-ZC03242	/	NA
RF Cable	N/A	W13.02 AP1-X2	DDT-ZC04023	2024/04/21	1 Year
RF cable	Zhongke Junchuang	JCT26S-NJ-NJ-1.5M	DDT-ZC02762	2024/04/20	1 Year
Micro-Tronics filters	REBES	BRM50716	DDT-ZC03240	/	NA
RF Cable	N/A	W24.02 HL-562	DDT-ZC04022	2024/04/21	1 Year

12.2. Block diagram of test setup



12.3. Limits

All restriction band should comply with 15.209 and RSS-Gen section 8.9 limits, other emission should be at least 20 dB below the fundamental.

12.4. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	other
DC Power Source	Varied	RU-150-150010B	/

12.5. 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.

12.6. Test result

PASS. (See below detailed test result)

12.7. Test data

TR-4-E-009 Radiated Emission Test Result

Test Date:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

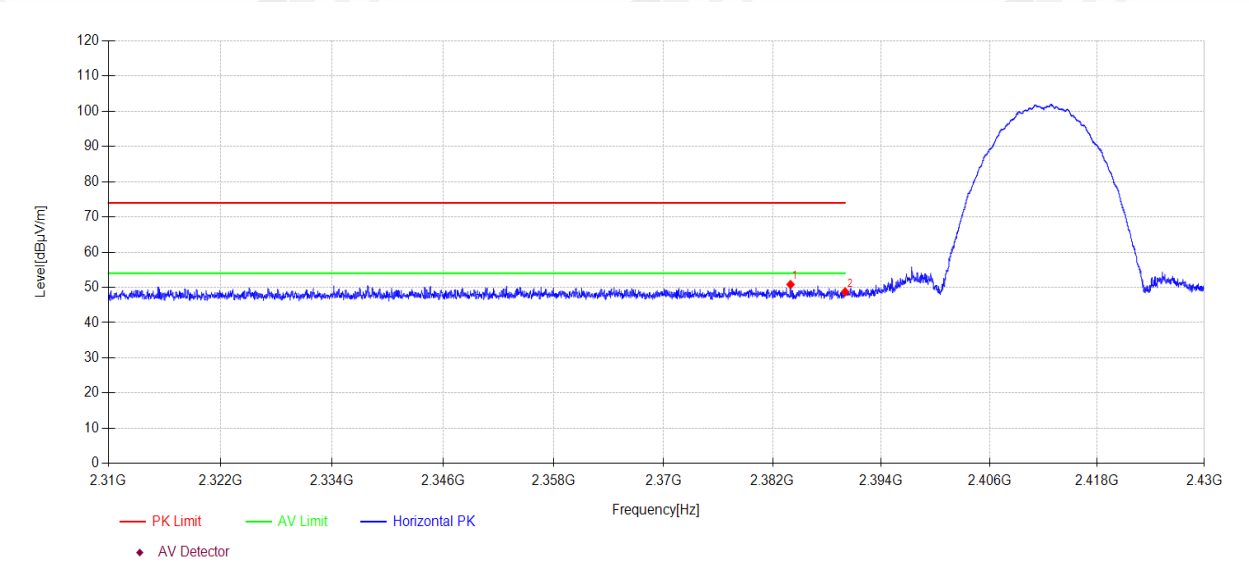
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\13

Memo:

Sample Number:S23122506-03 Power Setting:46

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	2383.98	19.73	27.24	3.86	0.00	50.83	74.00	23.17	PK	Horizontal
2	2390.00	17.60	27.26	3.87	0.00	48.73	-	-	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

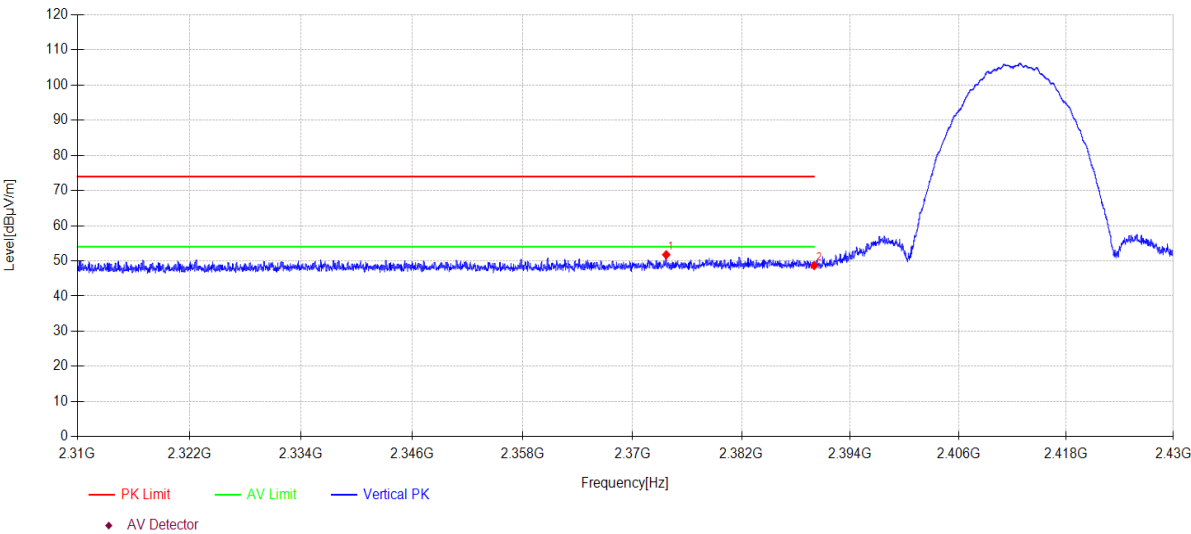
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\14

Memo:

Sample Number:S23122506-03 Power Setting:46

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	2373.72	20.72	27.19	3.85	0.00	51.76	74.00	22.24	PK	Vertical
2	2390.00	17.54	27.26	3.87	0.00	48.67	-	-	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

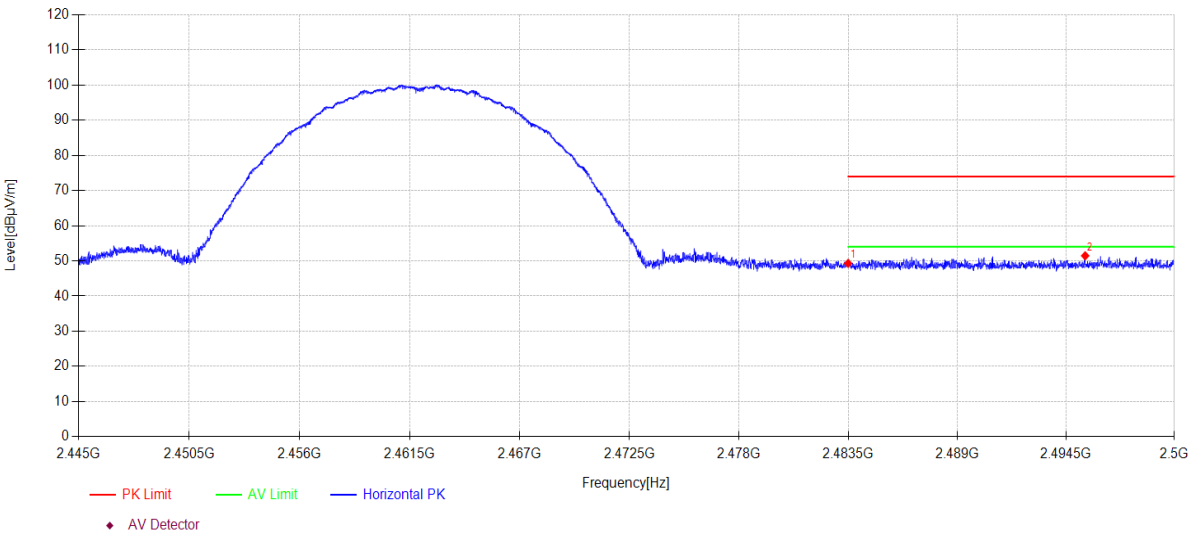
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\15

Memo:

Sample Number:S23122506-03 Power Setting:46

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	2483.50	17.82	27.53	3.94	0.00	49.29	74.00	24.71	PK	Horizontal
2	2495.48	19.92	27.58	3.95	0.00	51.45	74.00	22.55	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11B 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

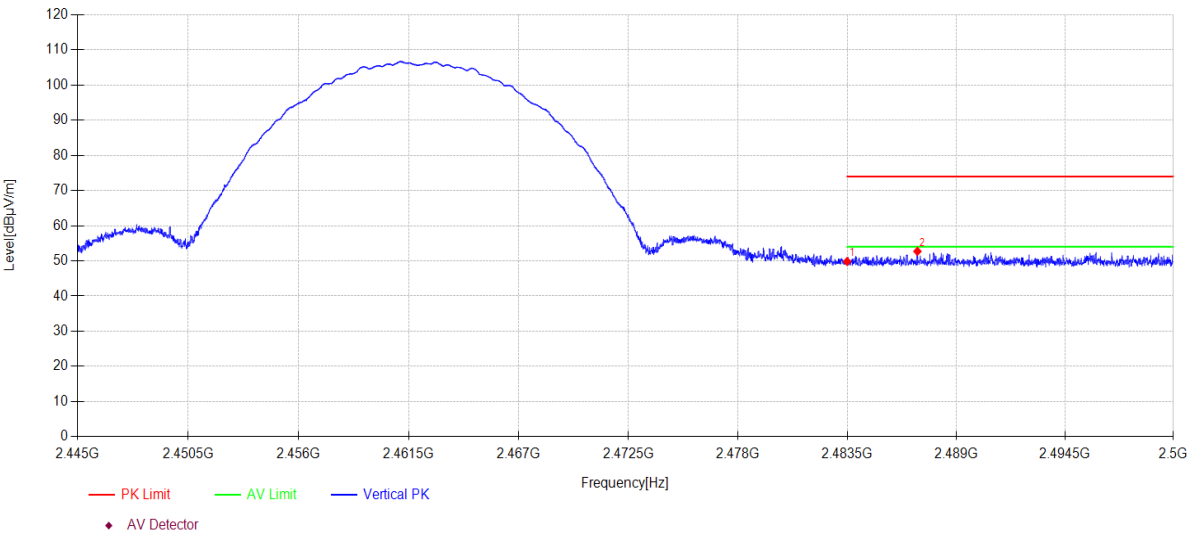
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\16

Memo:

Sample Number:S23122506-03 Power Setting:46

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	2483.50	18.37	27.53	3.94	0.00	49.84	74.00	24.16	PK	Vertical
2	2487.05	21.23	27.55	3.94	0.00	52.72	74.00	21.28	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11G 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

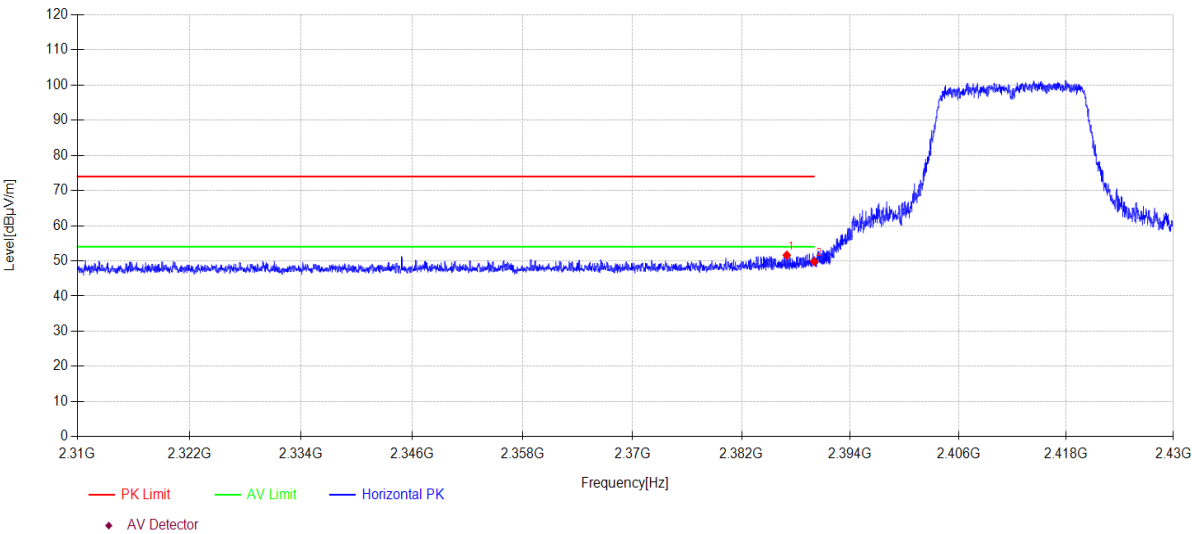
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\17

Memo:

Sample Number:S23122506-03 Power Setting:42

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	2386.98	20.52	27.25	3.86	0.00	51.63	74.00	22.37	PK	Horizontal
2	2390.00	18.67	27.26	3.87	0.00	49.80	-	-	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11G 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

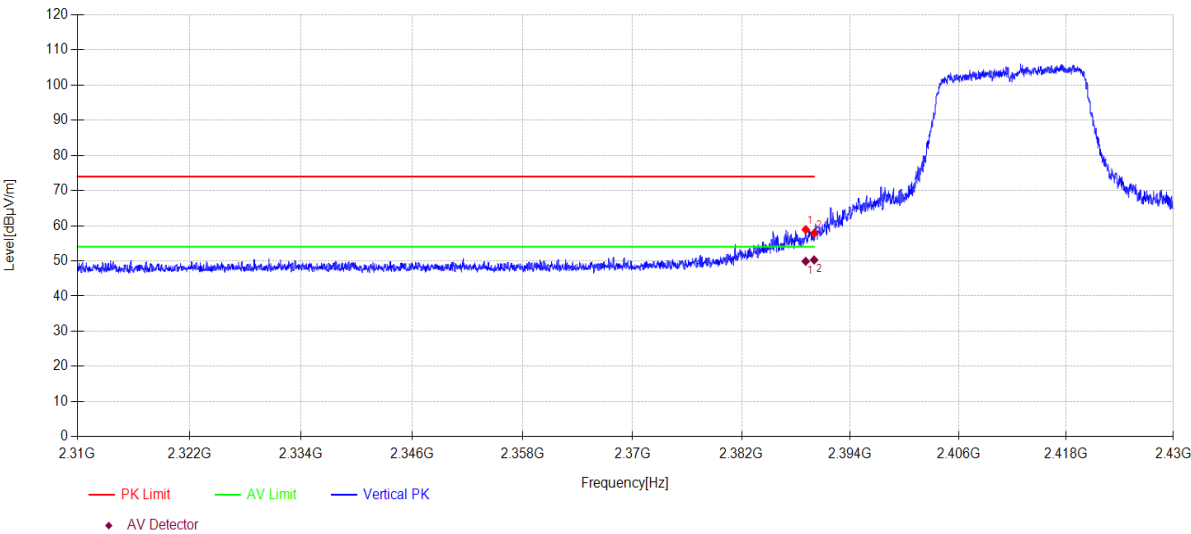
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\18

Memo:

Sample Number:S23122506-03 Power Setting:42

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	2389.07	27.77	27.26	3.87	0.00	58.90	74.00	15.10	PK	Vertical
2	2390.00	26.72	27.26	3.87	0.00	57.85	-	-	PK	Vertical

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	2389.07	18.76	27.26	3.87	0.00	49.89	54.00	4.11	AV	Vertical
2	2390.00	19.14	27.26	3.87	0.00	50.27	54.00	3.73	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11G 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

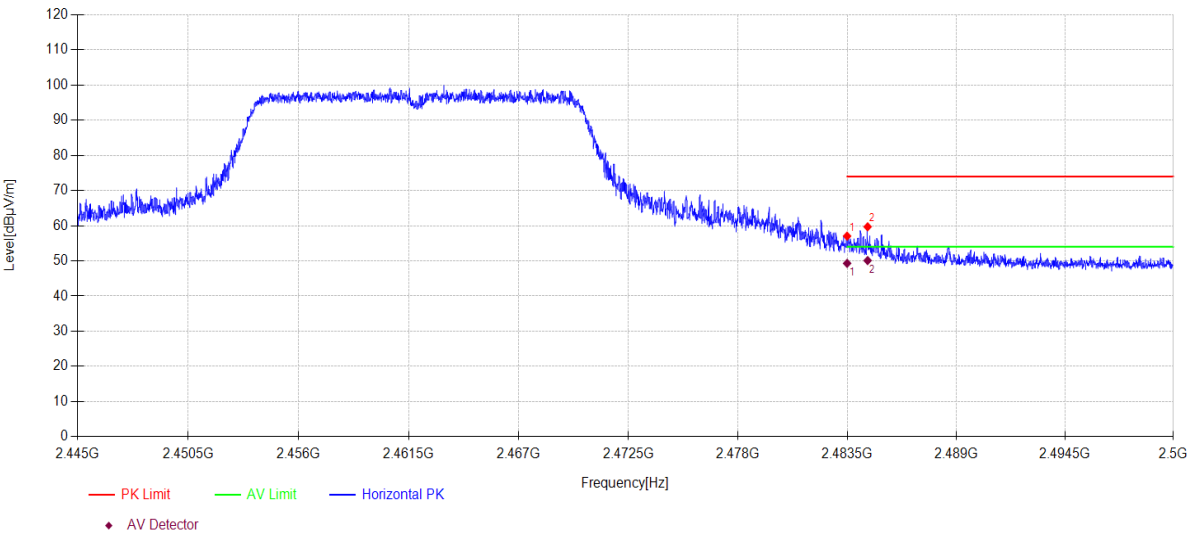
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\19

Memo:

Sample Number:S23122506-03 Power Setting:42

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	2483.50	25.58	27.53	3.94	0.00	57.05	74.00	16.95	PK	Horizontal
2	2484.53	28.22	27.54	3.94	0.00	59.70	74.00	14.30	PK	Horizontal

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	2483.50	17.84	27.53	3.94	0.00	49.31	54.00	4.69	AV	Horizontal
2	2484.53	18.62	27.54	3.94	0.00	50.10	54.00	3.90	AV	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11G 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

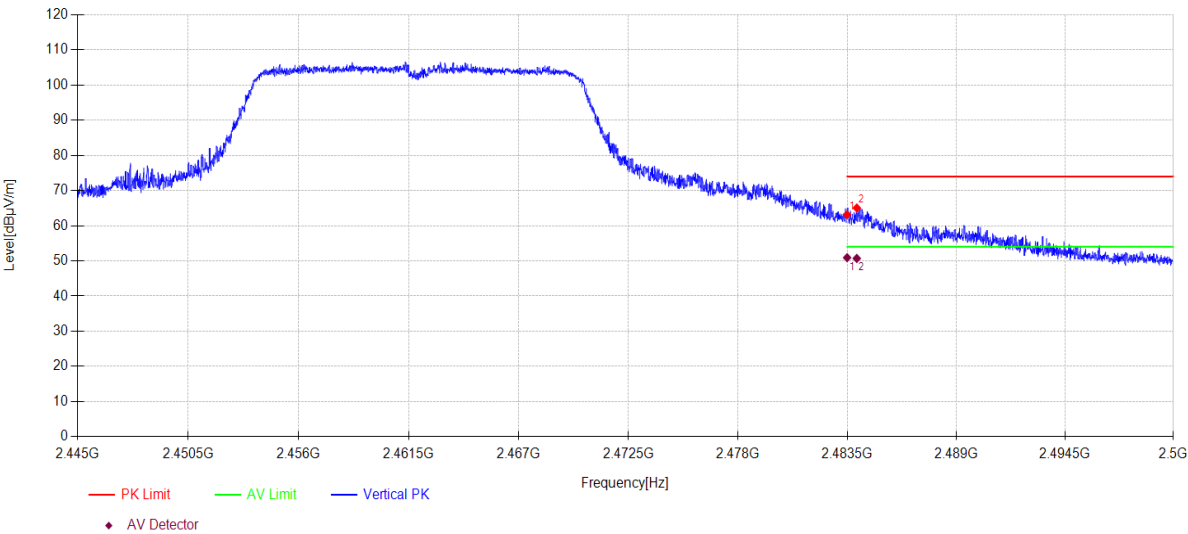
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\20

Memo:

Sample Number:S23122506-03 Power Setting:42

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	2483.50	31.68	27.53	3.94	0.00	63.15	74.00	10.85	PK	Vertical
2	2483.99	33.56	27.54	3.94	0.00	65.04	74.00	8.96	PK	Vertical

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	2483.50	19.45	27.53	3.94	0.00	50.92	54.00	3.08	AV	Vertical
2	2483.99	19.23	27.54	3.94	0.00	50.71	54.00	3.29	AV	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N20 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

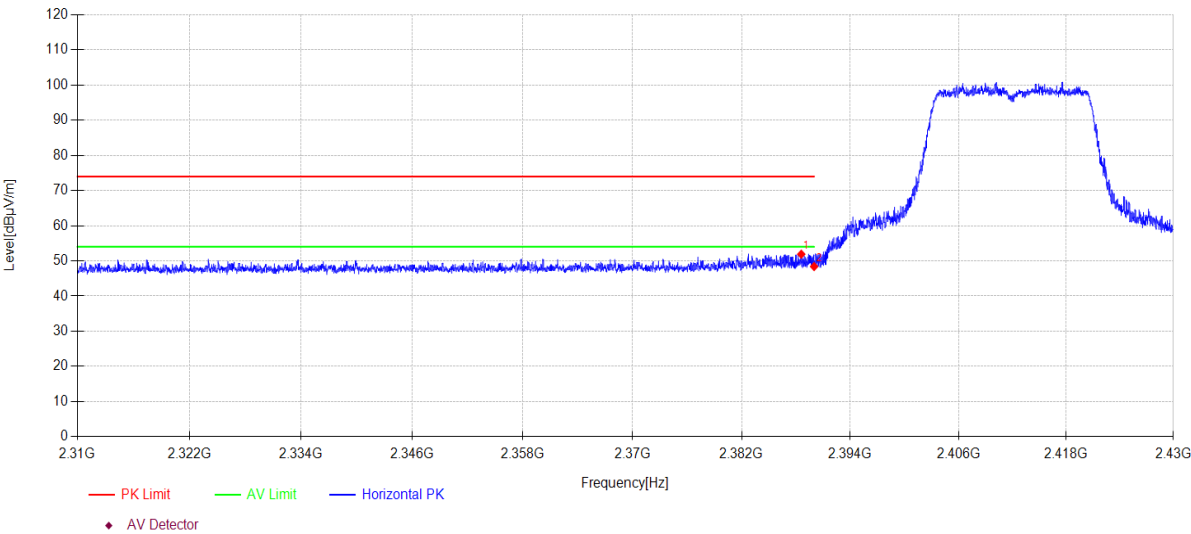
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\21

Memo:

Sample Number:S23122506-03 Power Setting:42

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	2388.58	20.78	27.25	3.87	0.00	51.90	74.00	22.10	PK	Horizontal
2	2390.00	17.27	27.26	3.87	0.00	48.40	-	-	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N20 2412MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

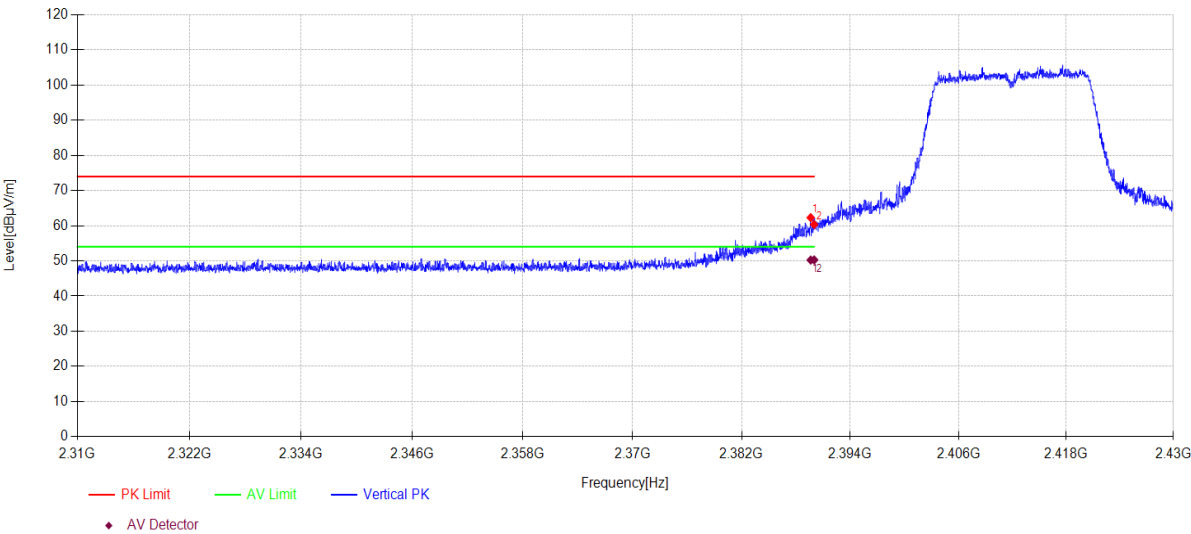
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\22

Memo:

Sample Number:S23122506-03 Power Setting:42

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	2389.62	31.18	27.26	3.87	0.00	62.31	74.00	11.69	PK	Vertical
2	2390.00	29.23	27.26	3.87	0.00	60.36	-	-	PK	Vertical

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	2389.62	19.10	27.26	3.87	0.00	50.23	54.00	3.77	AV	Vertical
2	2390.00	19.15	27.26	3.87	0.00	50.28	54.00	3.72	AV	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N20 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

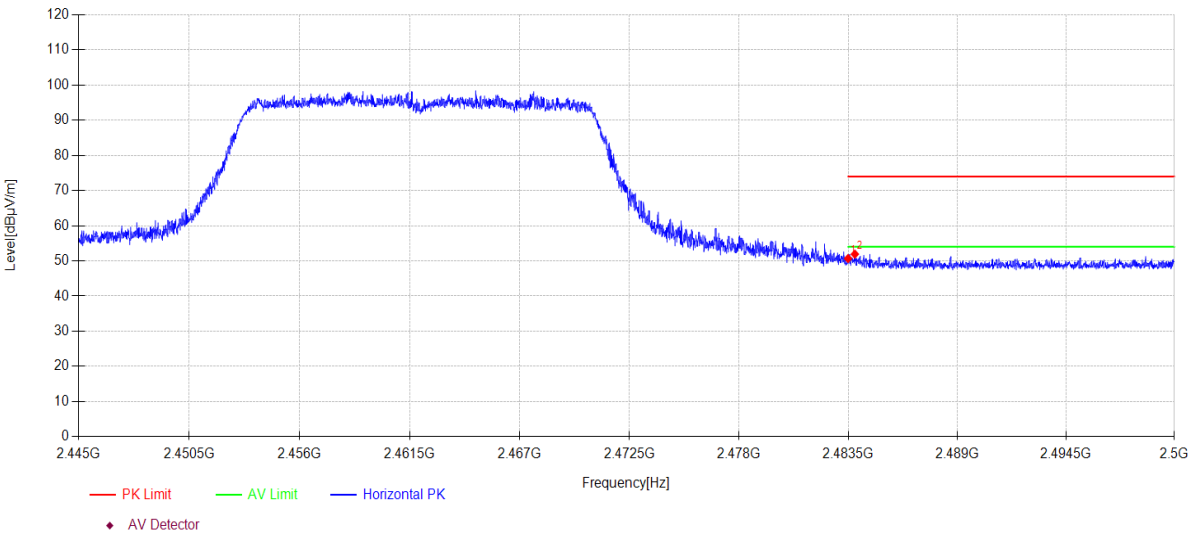
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\23

Memo:

Sample Number:S23122506-03 Power Setting:38

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	2483.50	19.21	27.53	3.94	0.00	50.68	74.00	23.32	PK	Horizontal
2	2483.84	20.44	27.54	3.94	0.00	51.92	74.00	22.08	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N20 2462MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

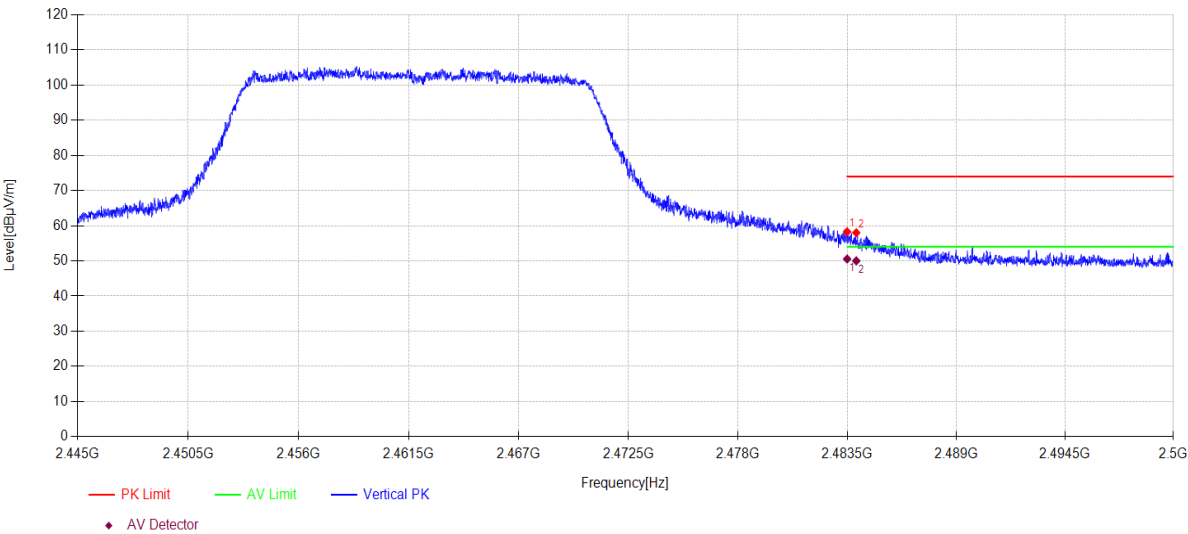
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\24

Memo:

Sample Number:S23122506-03 Power Setting:38

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	2483.50	26.81	27.53	3.94	0.00	58.28	74.00	15.72	PK	Vertical
2	2483.96	26.53	27.54	3.94	0.00	58.01	74.00	15.99	PK	Vertical

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	2483.50	19.07	27.53	3.94	0.00	50.54	54.00	3.46	AV	Vertical
2	2483.96	18.53	27.54	3.94	0.00	50.01	54.00	3.99	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N40 2422MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

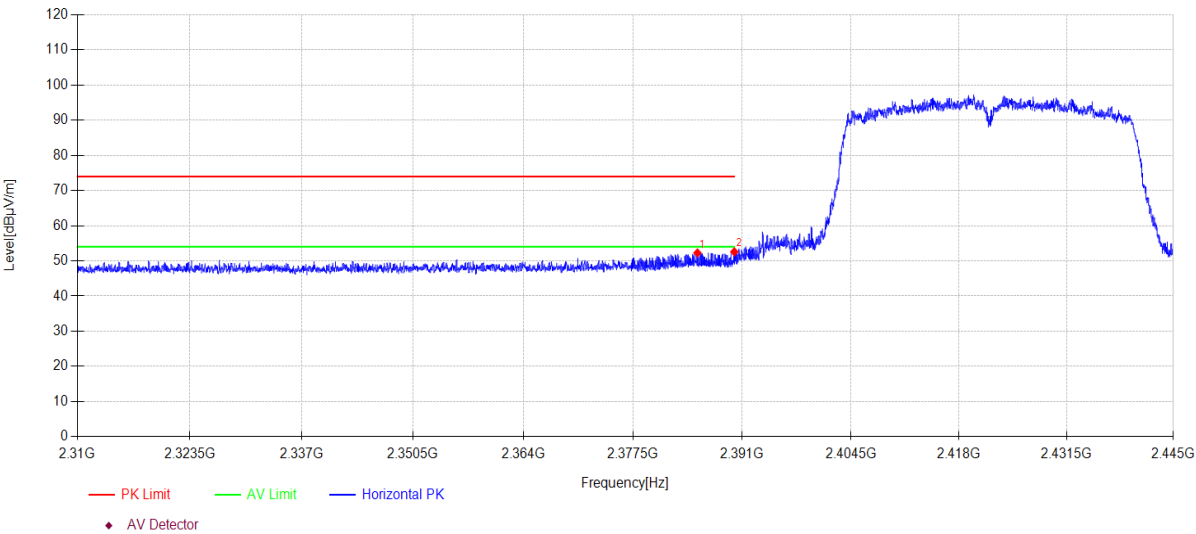
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\25

Memo:

Sample Number:S23122506-03 Power Setting:38

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	2385.44	21.18	27.24	3.86	0.00	52.28	74.00	21.72	PK	Horizontal
2	2390.00	21.45	27.26	3.87	0.00	52.58	-	-	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N40 2422MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

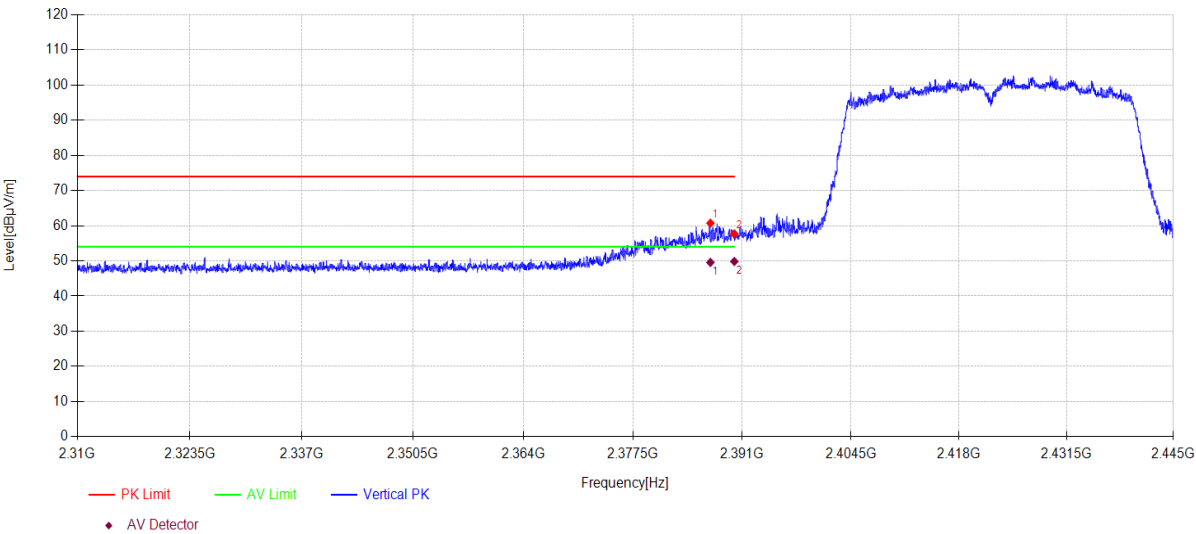
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\26

Memo:

Sample Number:S23122506-03 Power Setting:38

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	2387.04	29.62	27.25	3.86	0.00	60.73	74.00	13.27	PK	Vertical
2	2390.00	26.57	27.26	3.87	0.00	57.70	-	-	PK	Vertical

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	2387.04	18.46	27.25	3.86	0.00	49.57	54.00	4.43	AV	Vertical
2	2390.00	18.72	27.26	3.87	0.00	49.85	54.00	4.15	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N40 2452MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

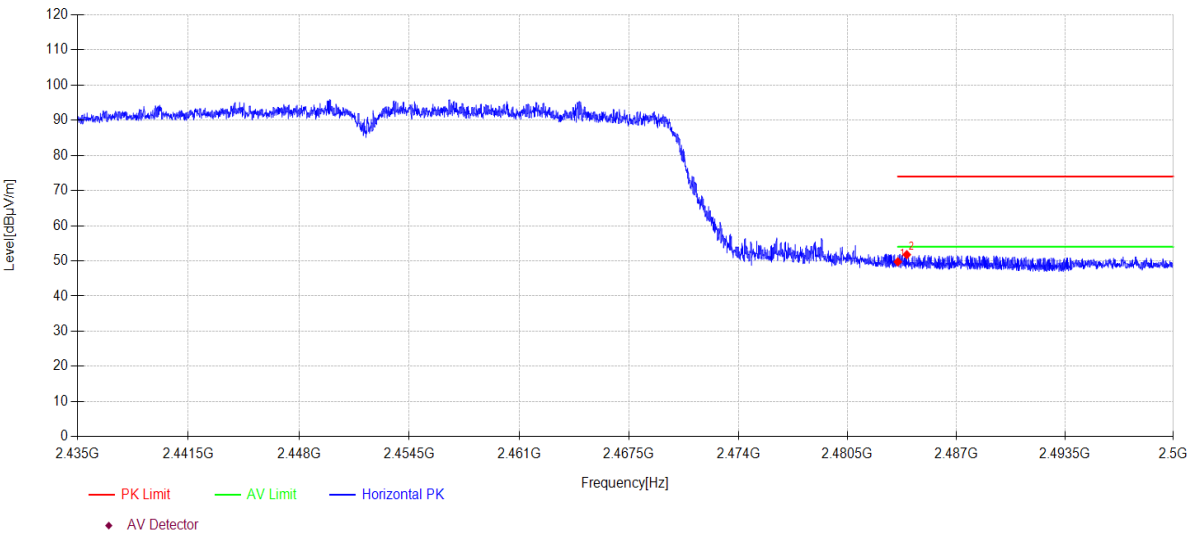
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\27

Memo:

Sample Number:S23122506-03 Power Setting:38

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	2483.50	18.27	27.53	3.94	0.00	49.74	74.00	24.26	PK	Horizontal
2	2484.04	20.30	27.54	3.94	0.00	51.78	74.00	22.22	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:

2024-01-25

Tested By:

Bairong

EUT:

InVehicle Gateway

Model Number:

VG710

Test Mode:

11N40 2452MHz TX

Power Supply:

DC 12V

Condition:

Temp:24.9°C;Humi:66.0%

Test Site:

DDT 3# Chamber

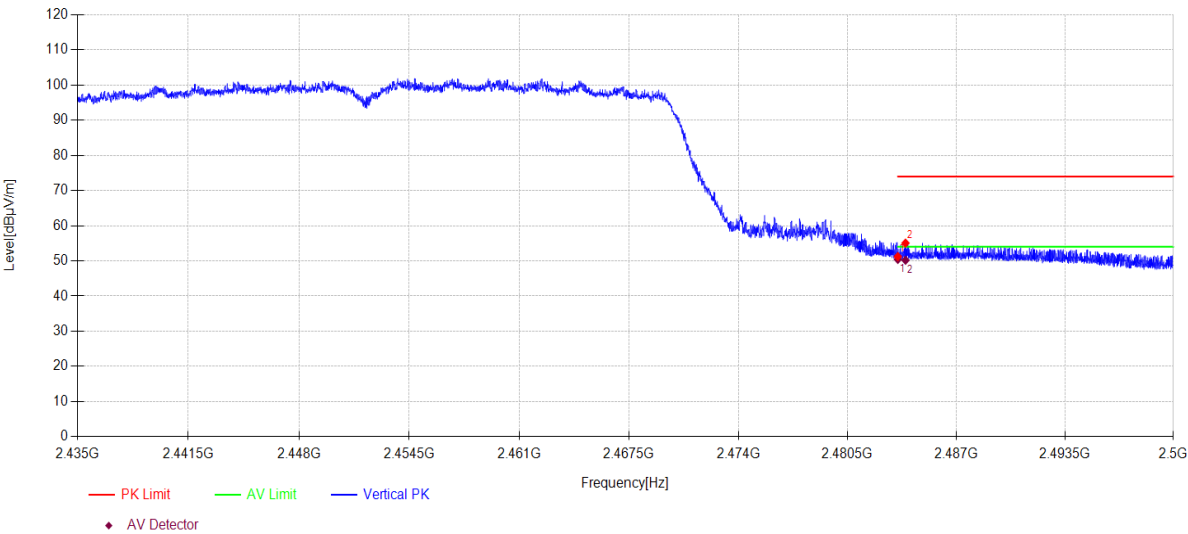
File Path:

d:\ts\2024 report data\Q23122506-2E VG710\FCC ABOVE 1G 2.4GWIFI\28

Memo:

Sample Number:S23122506-03 Power Setting:38

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	2483.50	19.77	27.53	3.94	0.00	51.24	74.00	22.76	PK	Vertical
2	2483.96	23.58	27.54	3.94	0.00	55.06	74.00	18.94	PK	Vertical

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	2483.50	18.95	27.53	3.94	0.00	50.42	54.00	3.58	AV	Vertical
2	2483.96	18.71	27.54	3.94	0.00	50.19	54.00	3.81	AV	Vertical

Note:

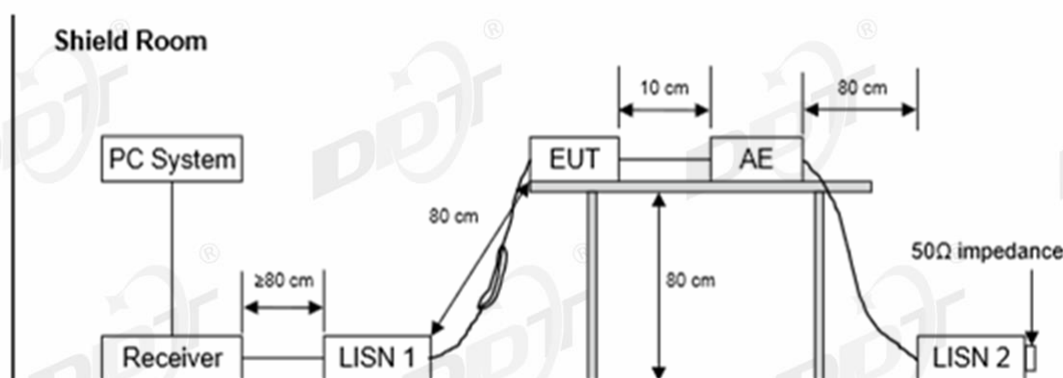
- Level = Reading + Cable loss + Antenna Factor + AMP
- If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
- Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

13. Power Line Conducted Emissions

13.1. Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal Due To	Cal. Interval
CE Cable 1	R&S	ESU8/RF2	DDT-ZC00566	2024/07/14	1 Year
EMI Test Receiver	R&S	ESCI	DDT-ZC00235	2024/07/10	1 Year
Pulse Limiter	SCHWARZBECK	ESH3-Z2	DDT-ZC00539	2024/07/14	1 Year
Artificial mains	R&S	ESH2-Z5	DDT-ZC00538	2024/07/11	1 Year
EMI Test Software	Audix/TW	e3	DDT-ZC01252	/	NA
Two Line V-Network	R&S	ENV216	DDT-ZC00535	2024/07/10	1 Year

13.2. Block diagram of test setup



13.3. Limits

Frequency	Quasi-Peak Level dB(mV)	Average Level dB(mV)
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.

13.4. Assistant equipment used for test

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

13.5. 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.

13.6. Test result

Not applicable. The EUT is DC powered.

14. Antenna Requirements

14.1. 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.

For intentional device, according to RSS-Gen issue 5 section 6.8.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

14.2. 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.

16. Photos of the EUT

Please refer to DDT-Q23122506-1E appendix I

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