FCC RF Test Report

APPLICANT	:	Quectel Wireless Solutions Co., Ltd.
EQUIPMENT	:	Wi-Fi & Bluetooth Module
BRAND NAME	:	Quectel
MODEL NAME	:	FCS866R
FCC ID	:	XMR2023FCS866R
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System
TEST DATE(S)	:	Jan. 09, 2024 ~ Feb. 26, 2024

We, Sporton International Inc. (ShenZhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

This report contains data that were produced under subcontract by Sporton International Inc. (Kunshan).

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (ShenZhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3D2611C	Rev. 01	Initial issue of report	Feb. 29, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	99% Bandwidth	-	Report Only	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 30dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.43 dB at 675.05 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 10.05 dB at 0.404 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

1.2 Manufacturer

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Wi-Fi & Bluetooth Module
Brand Name	Quectel
Model Name	FCS866R
FCC ID	XMR2023FCS866R
SN Code	Conducted: E1M23KL03000093 Conduction: E1M23KL03000085 Radiation: E1M23KL03000054
HW Version	R1.0
SW Version	NA
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Average) Output Power to antenna	**<MIMO Ant.0+1>** 802.11b : 22.96 dBm (0.1977 W) 802.11g : 22.71 dBm (0.1866 W) 802.11n HT20 : 26.33 dBm (0.4295 W) 802.11n HT40 : 17.76 dBm (0.0597 W) 802.11ax HE20 : 22.76 dBm (0.1888 W) 802.11ax HE40 : 16.26 dBm (0.0423 W)
99% Occupied Bandwidth	802.11b : 15.03MHz 802.11g : 16.43MHz 802.11n HT20 : 17.58MHz 802.11n HT40 : 36.56MHz 802.11ax HE20 : 18.93MHz 802.11ax HE40 : 38.16MHz
Antenna Type / Gain	<Ant.0/1>: Dipole Antenna with gain -0.1 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK) / CCK 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ax : OFDM/OFDMA (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)

Note:

1. The device supports WLAN MIMO CDD mode.
2. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher normal output power.
3. 802.11ax support OFDMA full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) test output power/PSD, the full RU power/PSD > partial RU, therefore the full RU perform full, and partial RU verify bandedge/spurious.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS	CN1257	314309

Test data subcontracted: Conducted emission test case in section 3.6 of this report.

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	CO01-KS	AUDIX	E3	6.2009-8-24
2.	03CH04-SZ	AUDIX	E3	6.2009-8-24
3.	CO01-SZ	AUDIX	E3	6.120613b

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table, for details refer to Appendix C.

MIMO Antenna

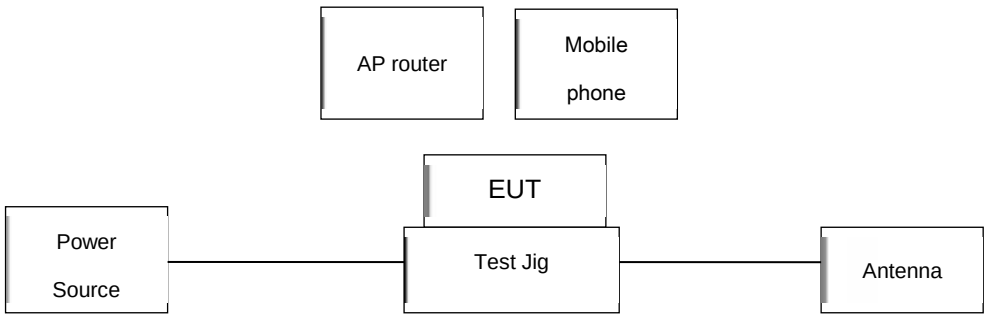
Modulation	Data Rate
802.11b	**1 Mbps**
802.11g	**6 Mbps**
802.11n HT20	**MCS0**
802.11n HT40	**MCS0**
802.11ax HE20	**MCS0**
802.11ax HE40	**MCS0**

Test Cases	
AC Conducted Emission	Mode 1 :Bluetooth Link + WLAN Link (2.4G) Link + USB Cable (Charging From EVB Adaptor)

Remark:

1. For Radiated Test Cases, the tests were performance with Adapter and Test jig.
2. For radiated simultaneous transmission test mode, the combination testing was assessed from the worst RSE link mode of BT & WLAN 2.4G.

2.3 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
2.	Mobile phone	MOTO	XT1952-1	N/A	N/A	N/A
3.	Antenna	N/A	N/A	N/A	N/A	N/A
4.	Test Jig	N/A	N/A	N/A	N/A	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 1.0 dB and 20dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 1.0 + 20 = 21.0 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

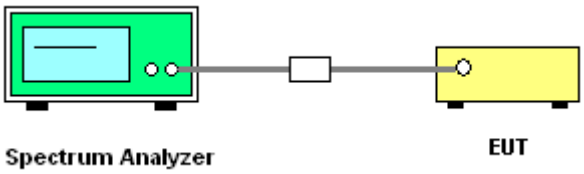
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.8
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1%~5% of OBW and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

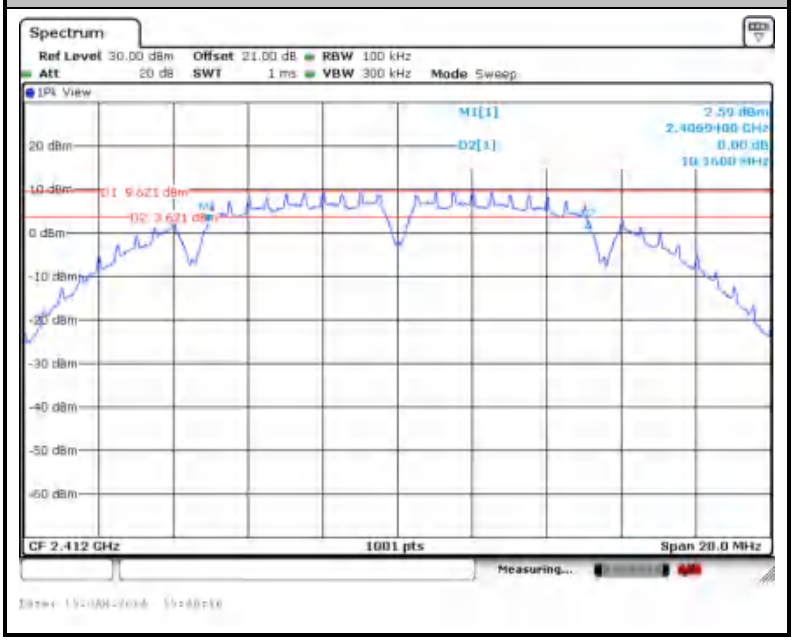
3.1.4 Test Setup



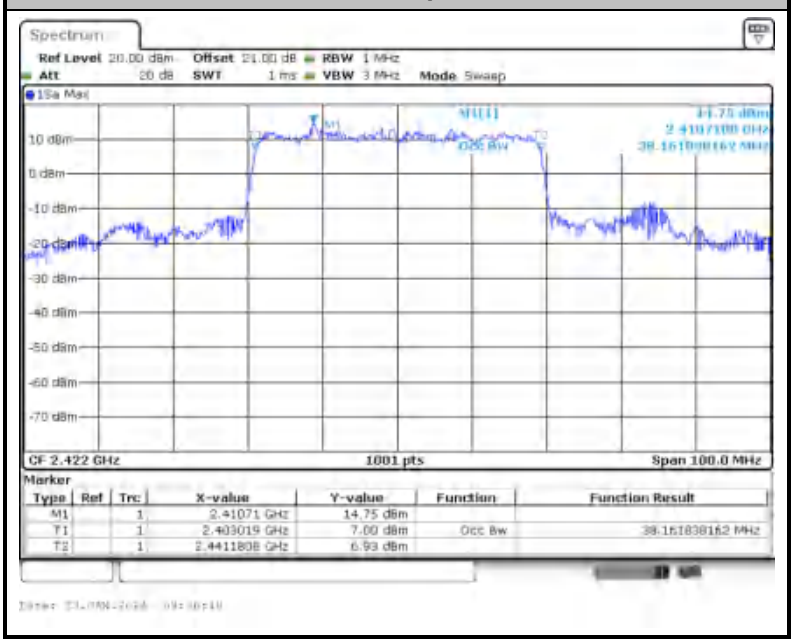
3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

Minimum 6dB Bandwidth



Maximum 99% Occupied Bandwidth



Note : The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

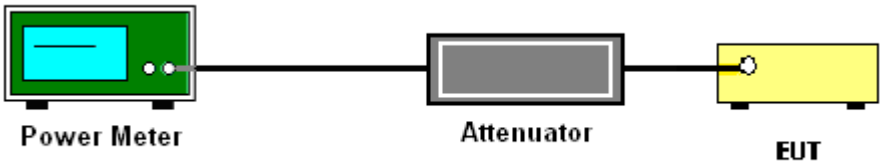
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of ANSI C63.10-2013 clause 11.9.1.3 PKPM1 Peak power meter or ANSI C63.10-2013 clause 11.9.2.3.1 Method AVGPM method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Average Output Power

Please refer to Appendix A.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure of ANSI C63.10-2013 clause 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01:

   Method (a): Measure and sum the spectra across the outputs.

   The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

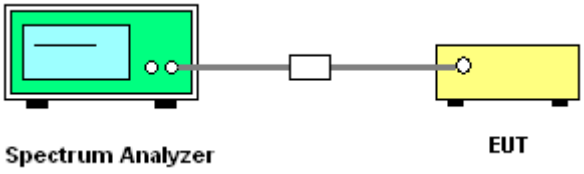
   Method (b): Measure and sum spectral maxima across the outputs.

   The measurement on each individual output were performed with the same span and number on each individual output. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs.

   Method (c): Measure and add 10 log(N_{ANT}) dB, where N_{ANT} is the number of outputs.

   The measurement on each individual output were performed with the same span and number on each individual output. The quantity 10 log(N_{ANT}) dB is added to each spectrum value before comparing to the emission limit.

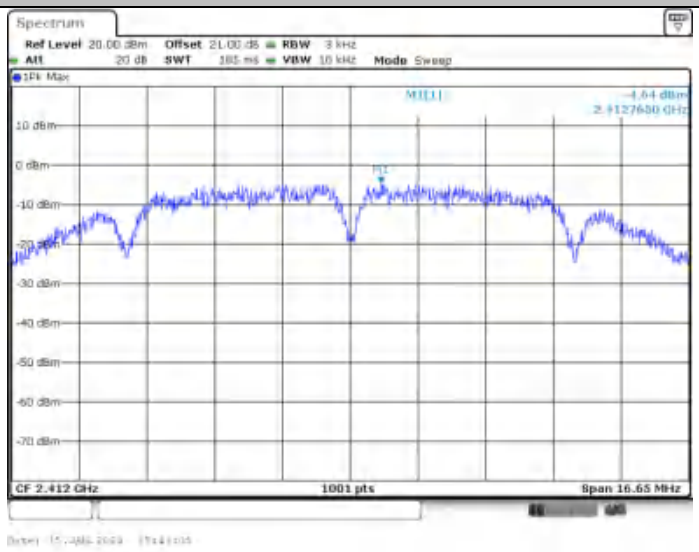
3.3.4 Test Setup



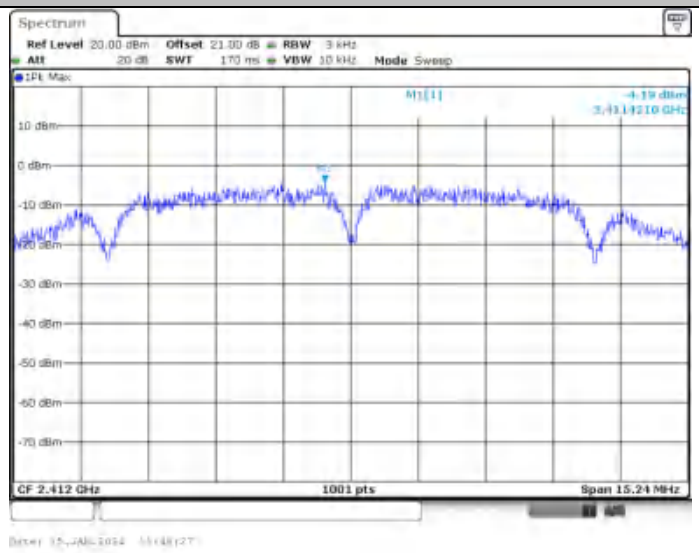
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

Worst Case Power Density (dBm/3kHz) for MIMO Ant. 0

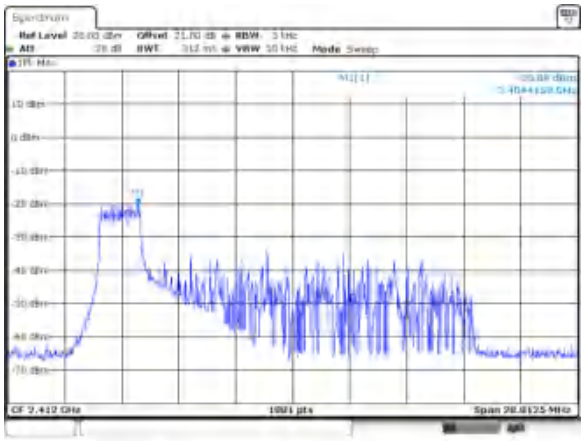
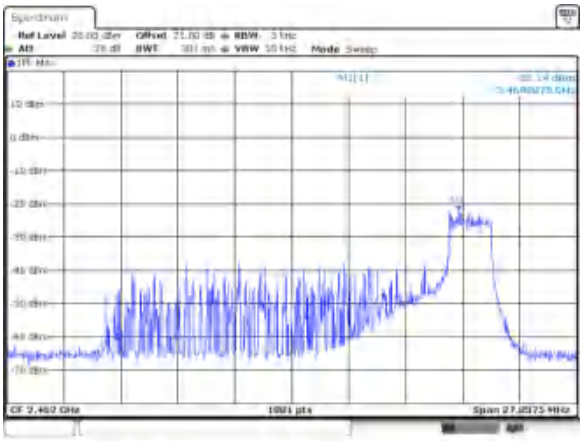
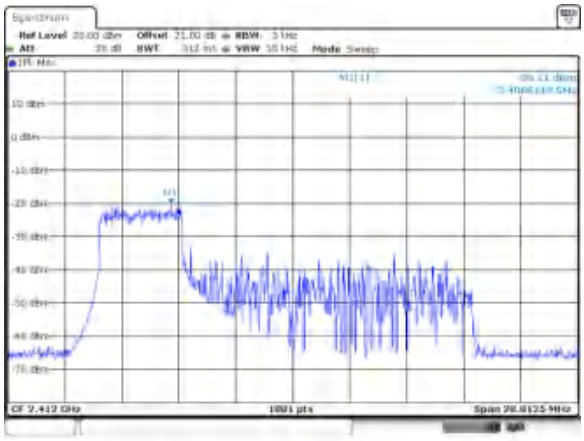
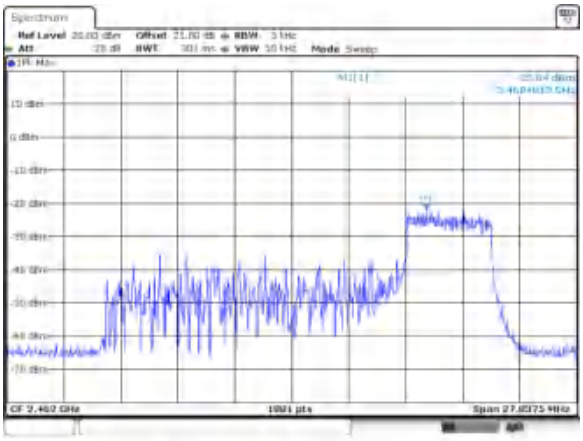
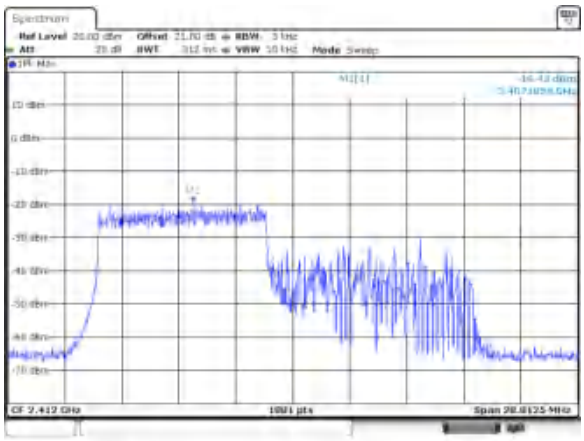
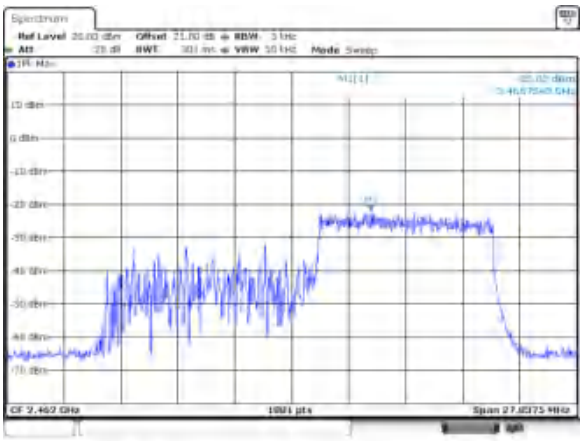


Worst Case Power Density (dBm/3kHz) for MIMO Ant. 1

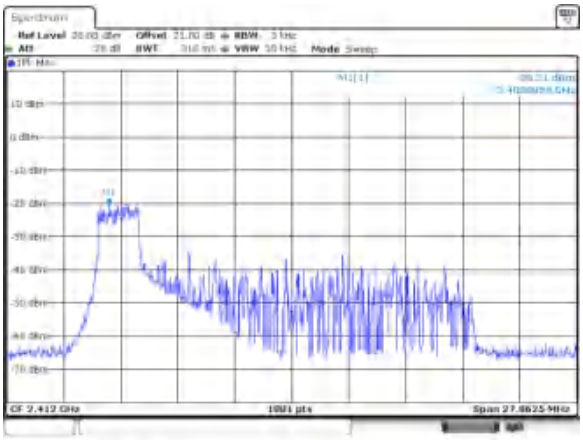
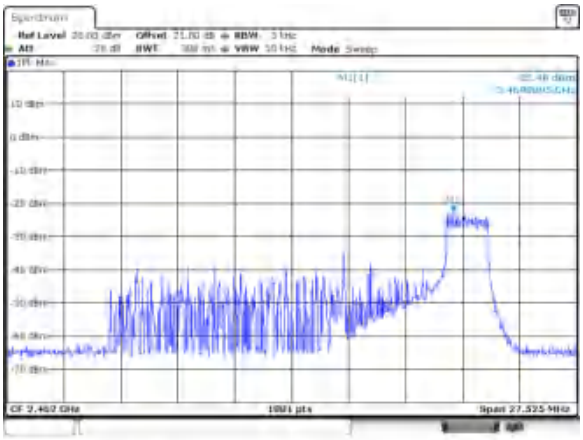
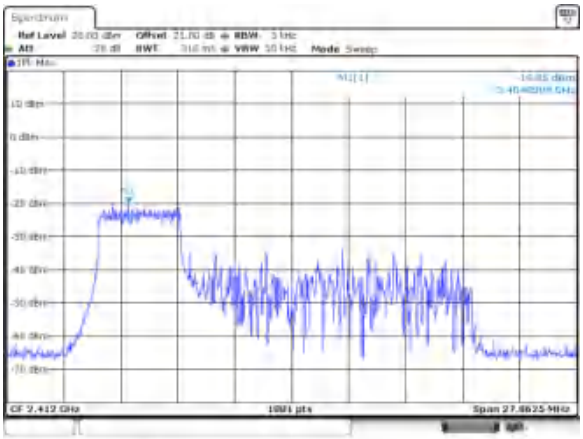
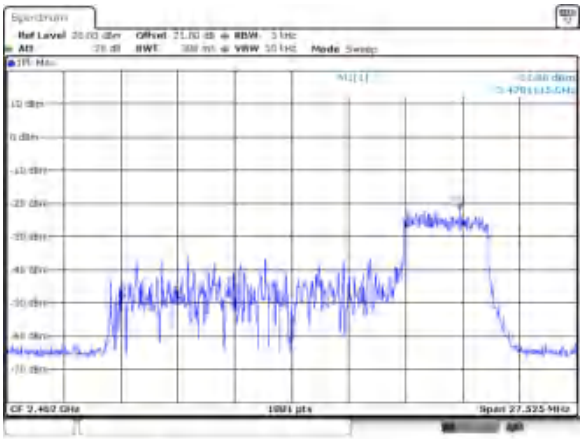
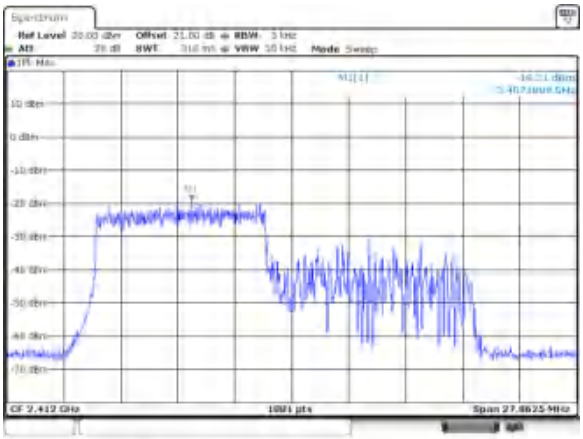
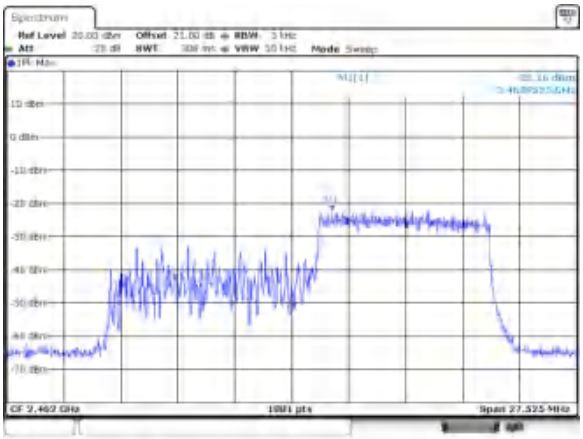


11ax Partial RU Plots:

<MIMO Ant.0+1(0)>:

802.11ax HE20 Partial RU	
Low CH01 2412MHz 26RU0	**High CH11 2462MHz 26RU8**
	
Low CH01 2412MHz 52RU37	**High CH11 2462MHz 52RU40**
	
Low CH01 2412MHz 106RU53	**High CH11 2462MHz 106RU54**
	

<MIMO Ant.0+1(1)>:

802.11ax HE20 Partial RU	
Low CH01 2412MHz 26RU0	**High CH11 2462MHz 26RU8**
	
Low CH01 2412MHz 52RU37	**High CH11 2462MHz 52RU40**
	
Low CH01 2412MHz 106RU53	**High CH11 2462MHz 106RU54**
	

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

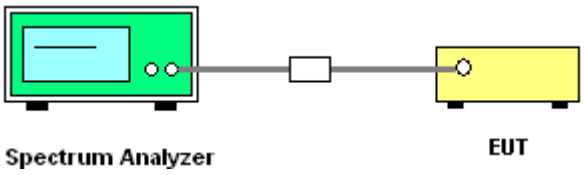
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.11
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

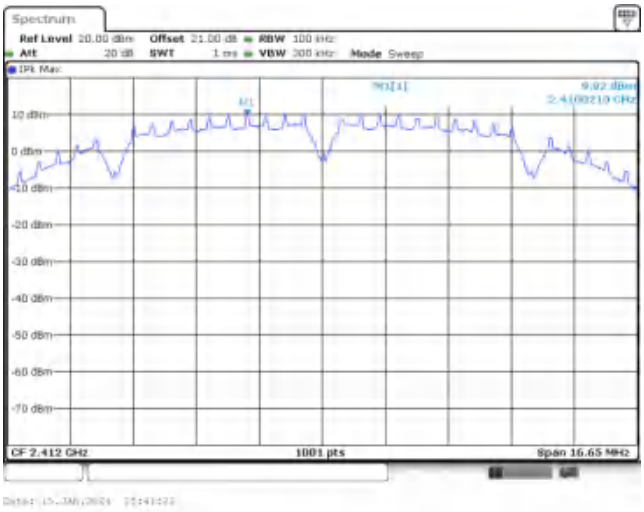
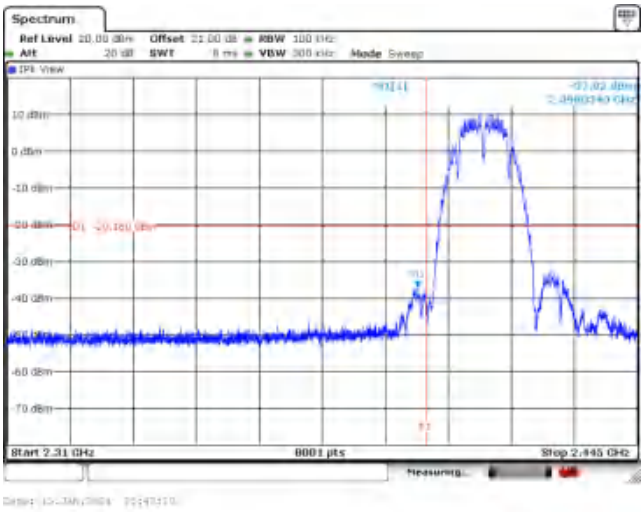
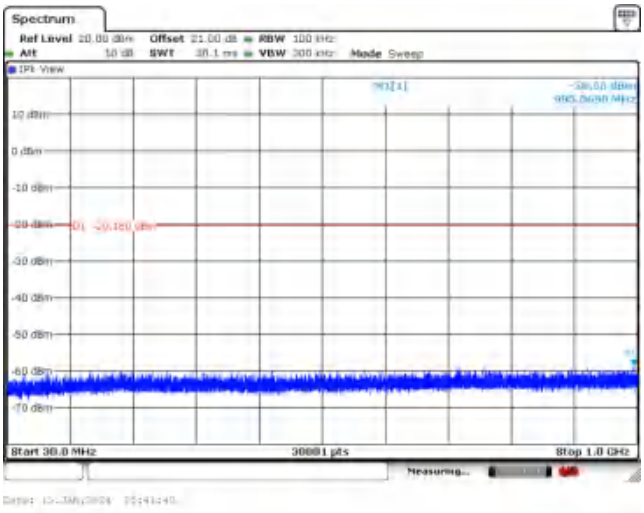
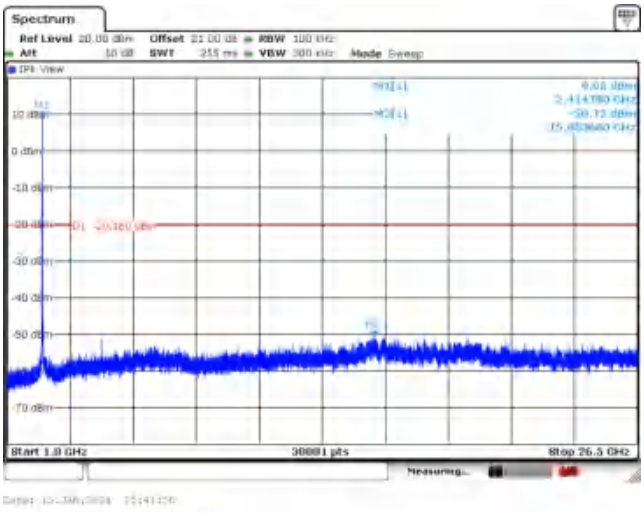


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

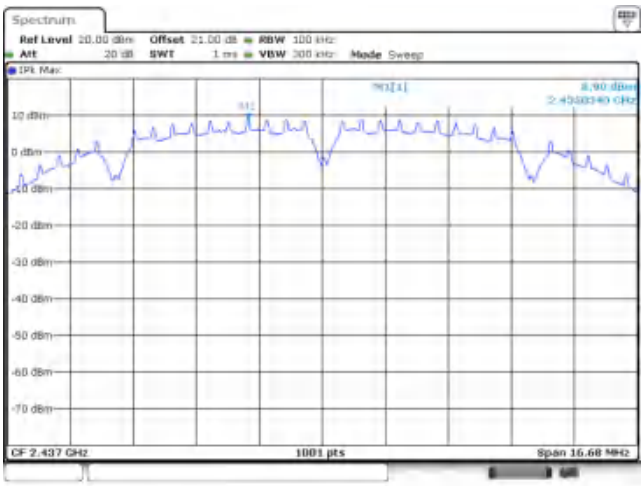
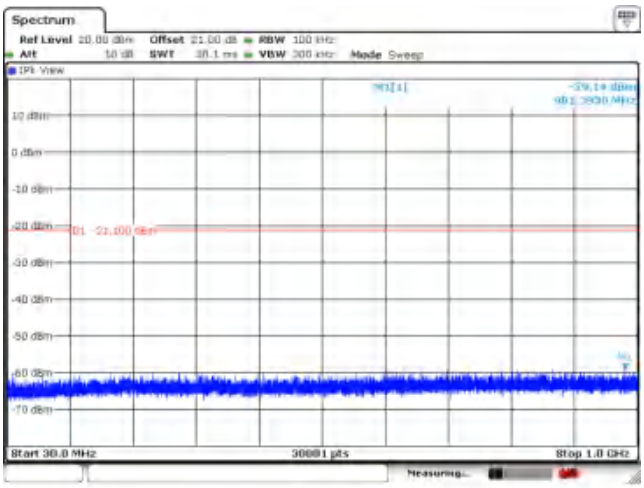
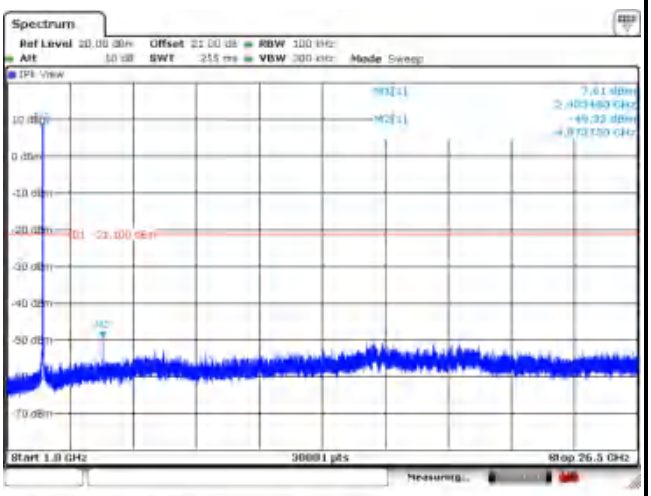
Test Engineer :	Chen ZhiQiang	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

Number of TX = 2, Ant. 0 (Measured)

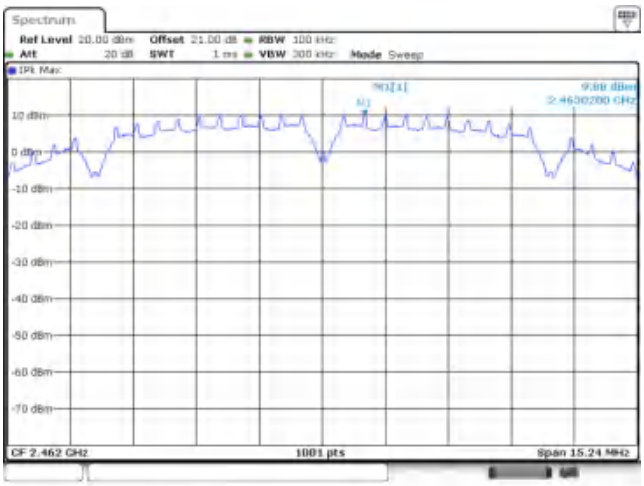
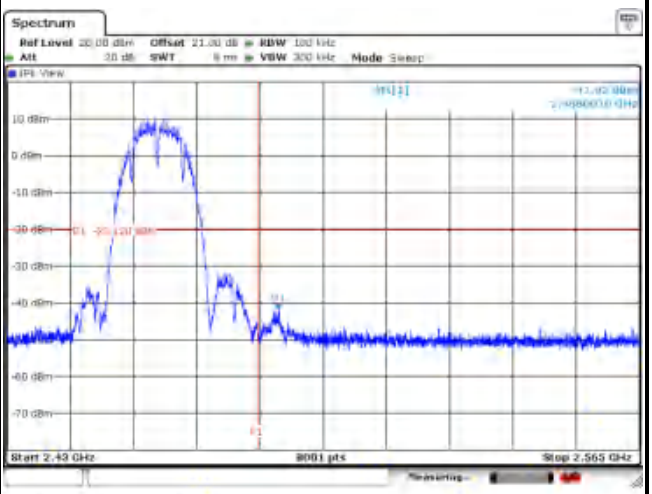
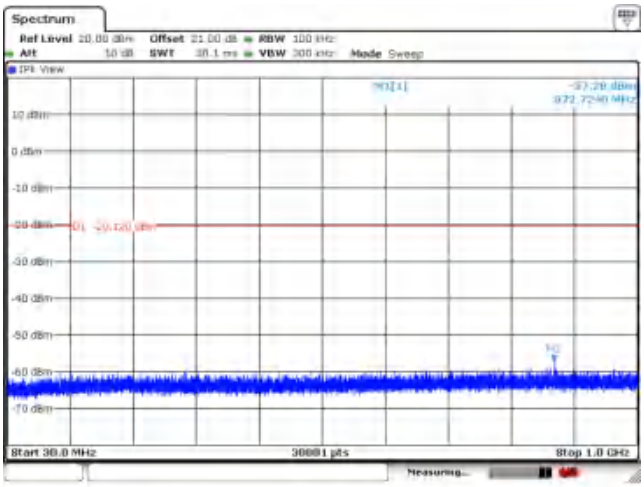
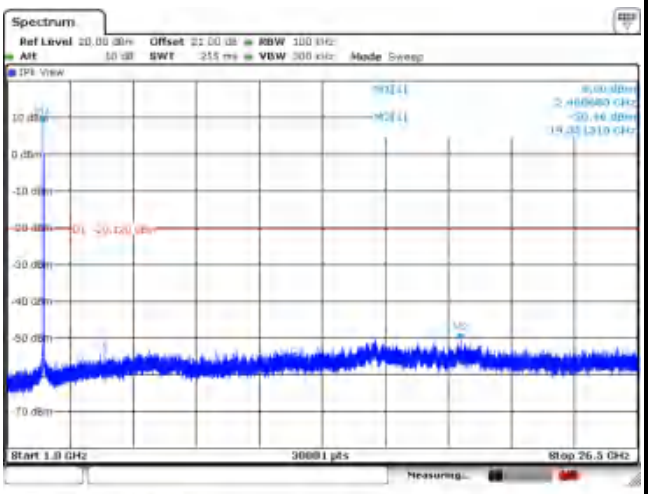
Test Mode :	802.11b	**Test Channel :**	01

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

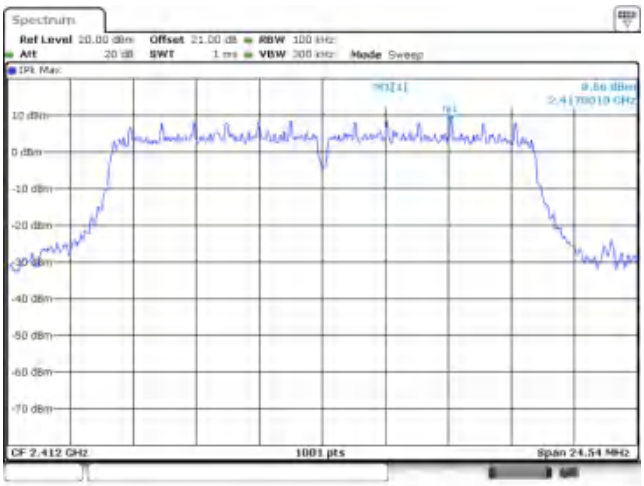
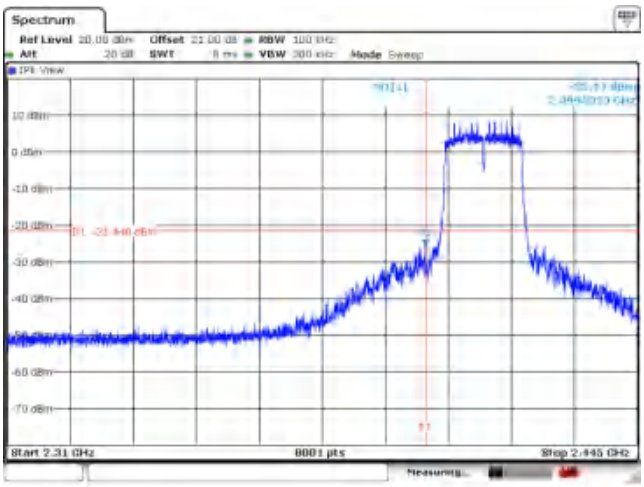
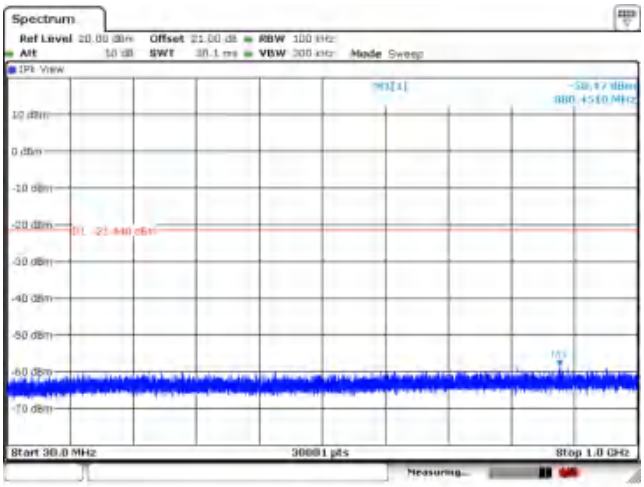
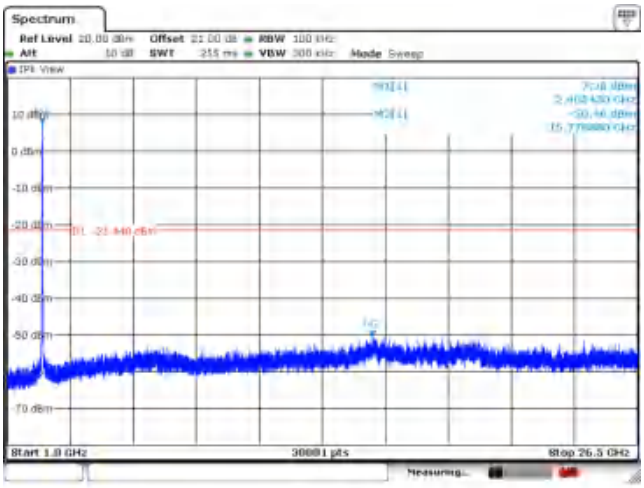
Test Mode :	802.11b	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

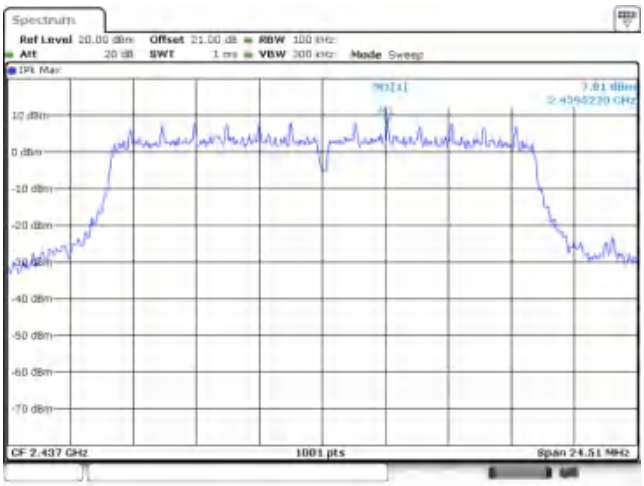
Test Mode :	802.11b	Test Channel :	11

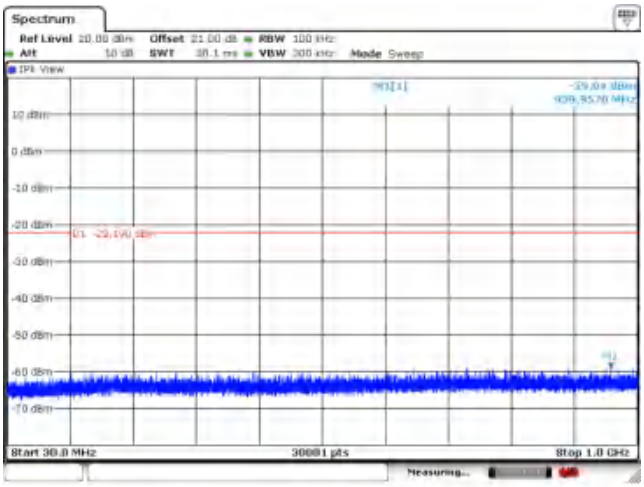
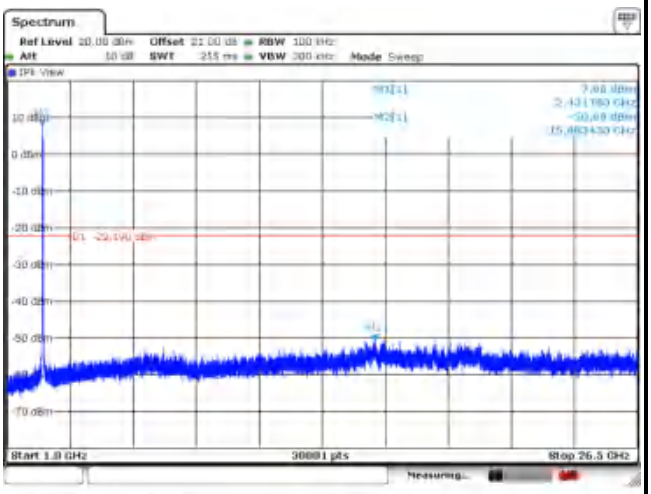
100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11g	Test Channel :	01

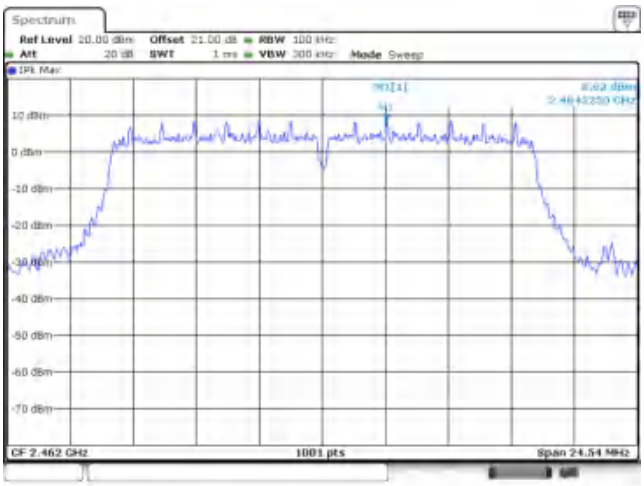
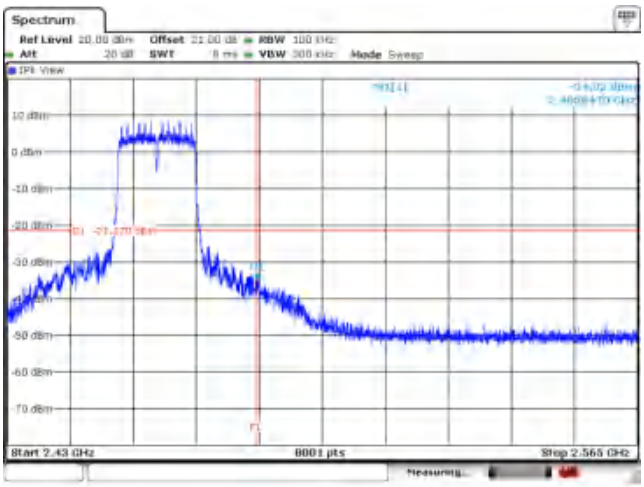
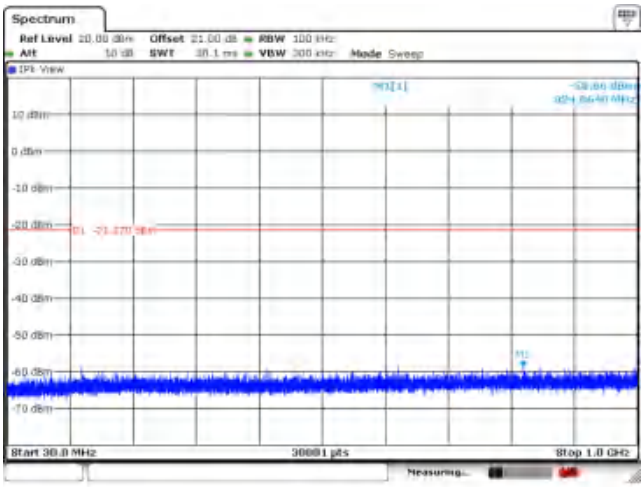
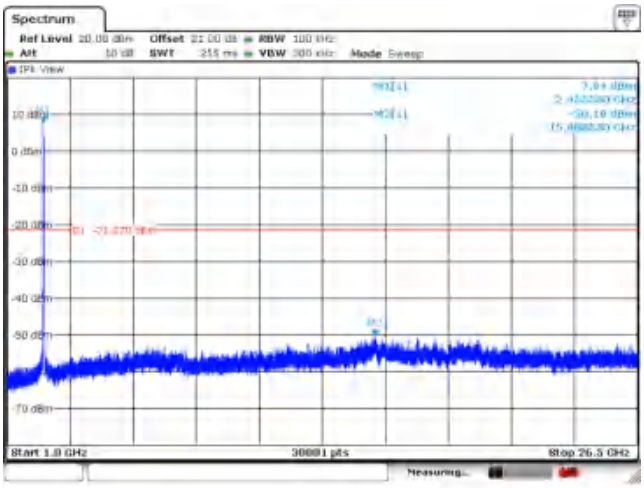
100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11g	Test Channel :	06

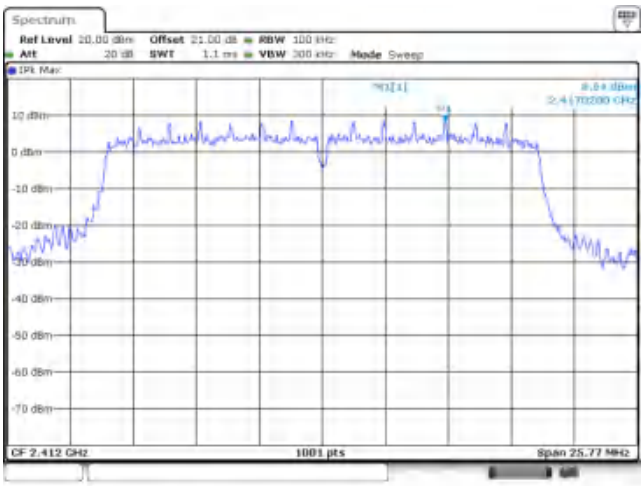
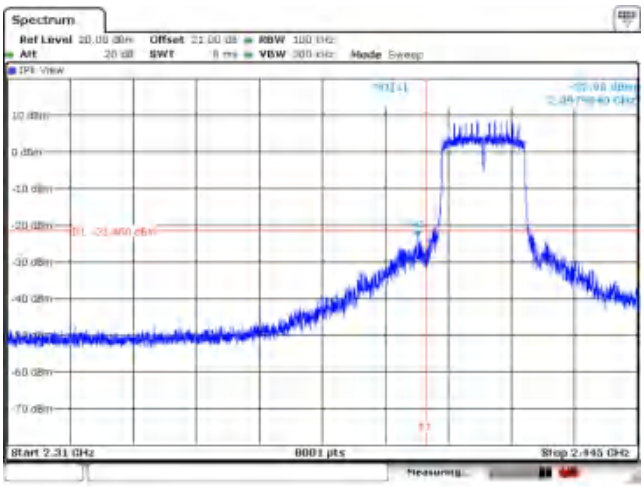
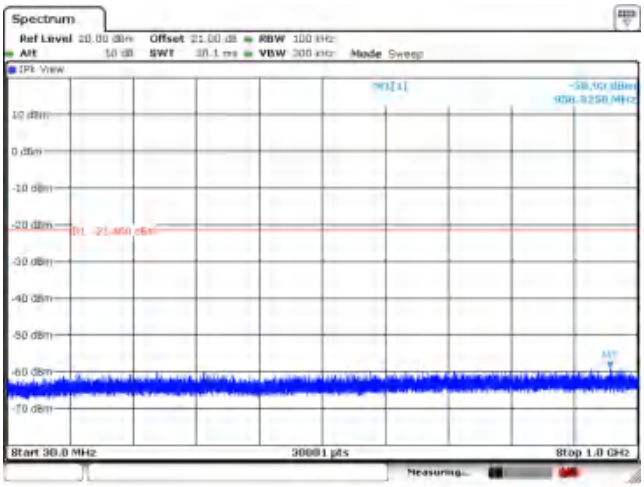
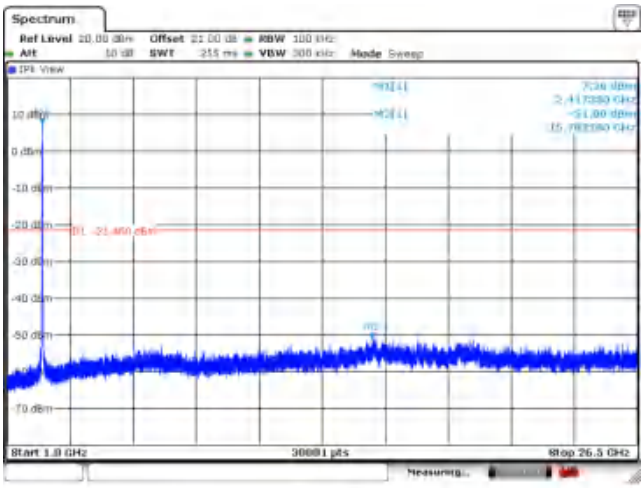
100kHz PSD reference Level	
	

Spurious Emission Plot-1	Spurious Emission Plot-2
	

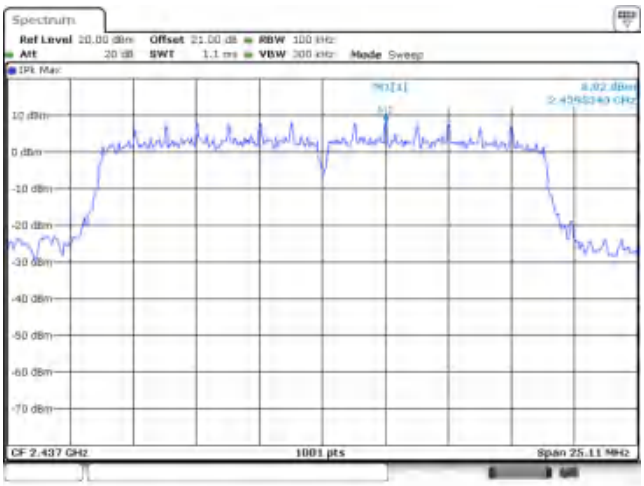
Test Mode :	802.11g	Test Channel :	11

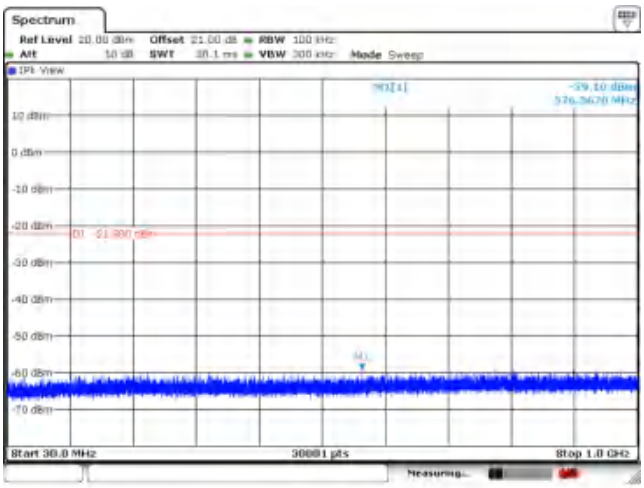
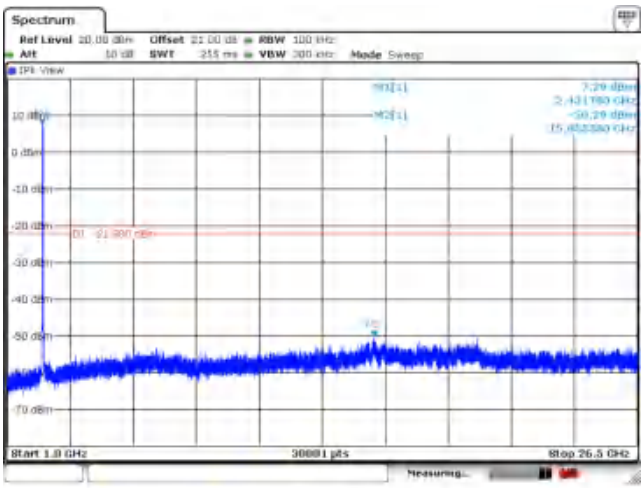
100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11n HT20	Test Channel :	01

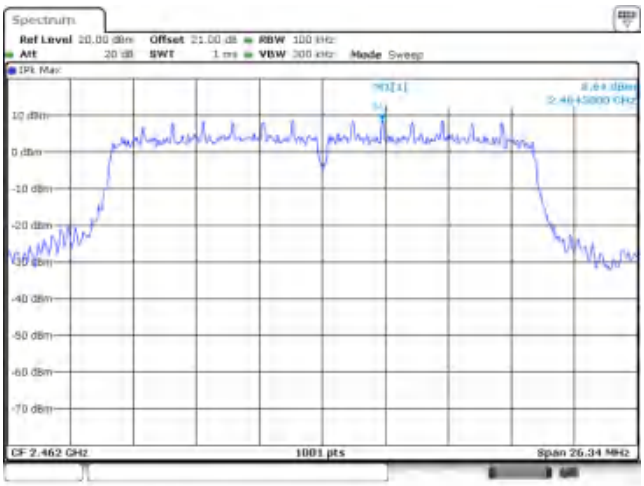
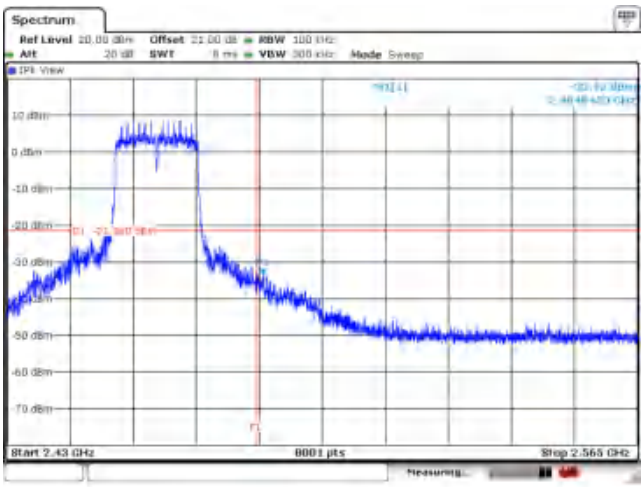
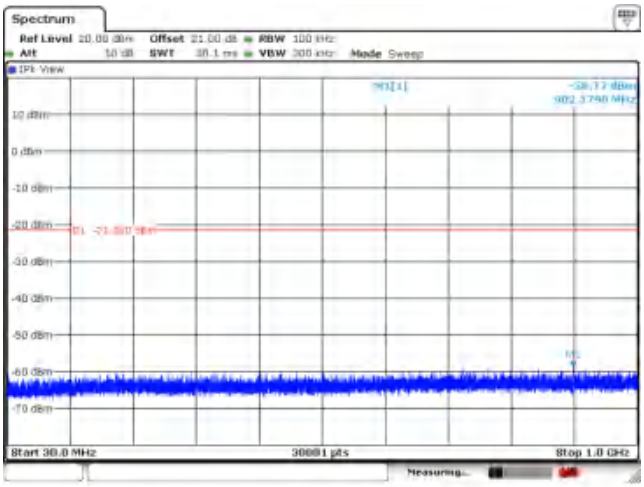
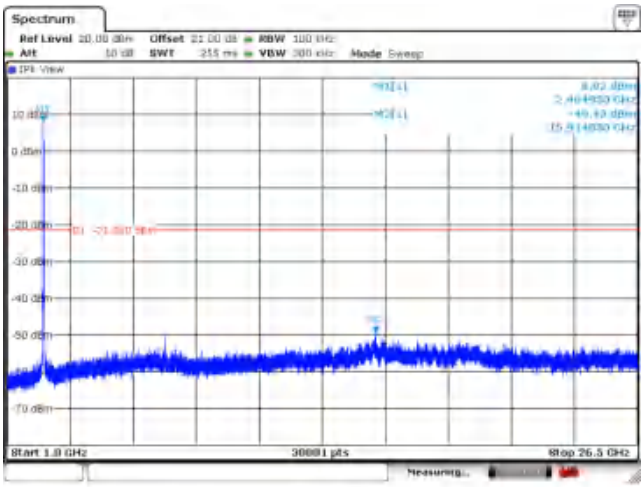
100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11n HT20	Test Channel :	06

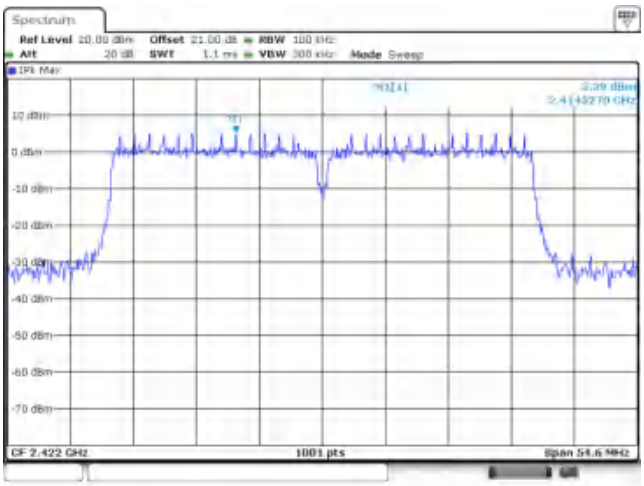
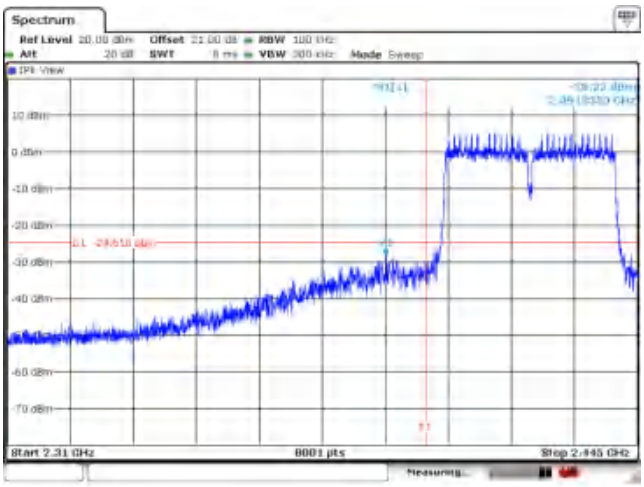
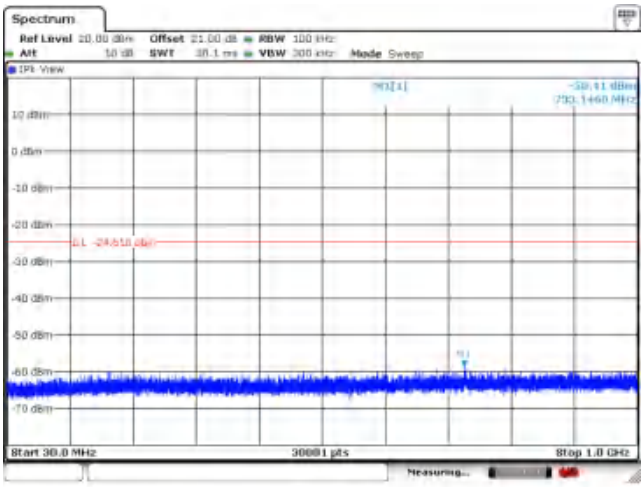
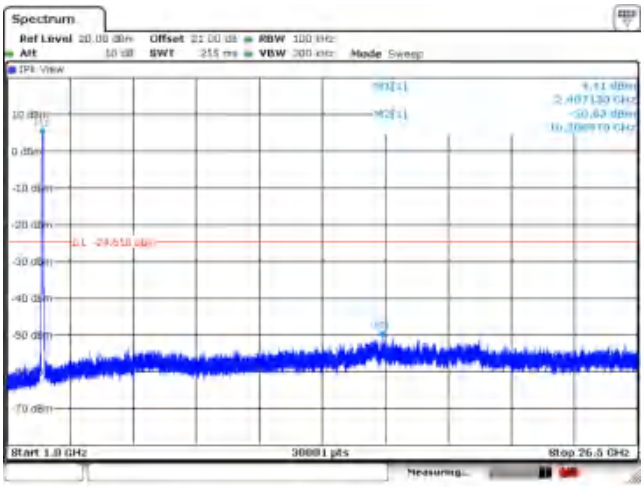
100kHz PSD reference Level	
	

Spurious Emission Plot-1	Spurious Emission Plot-2
	

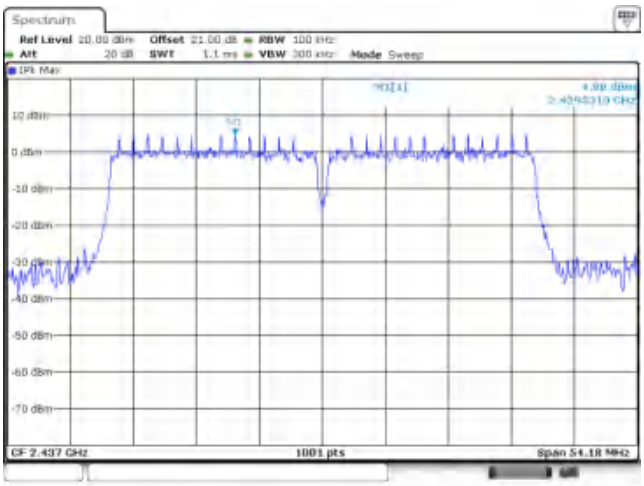
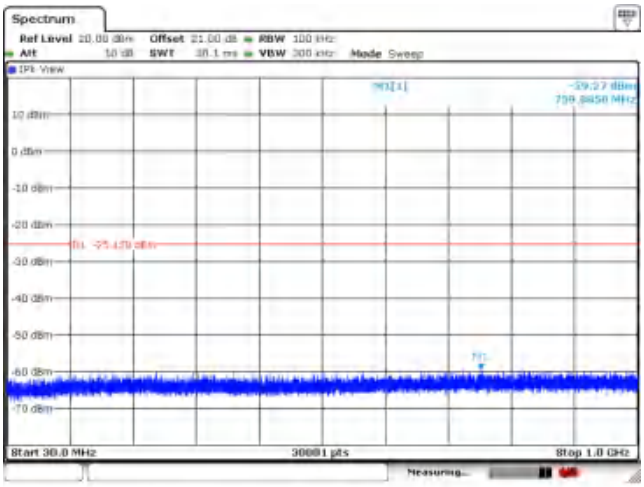
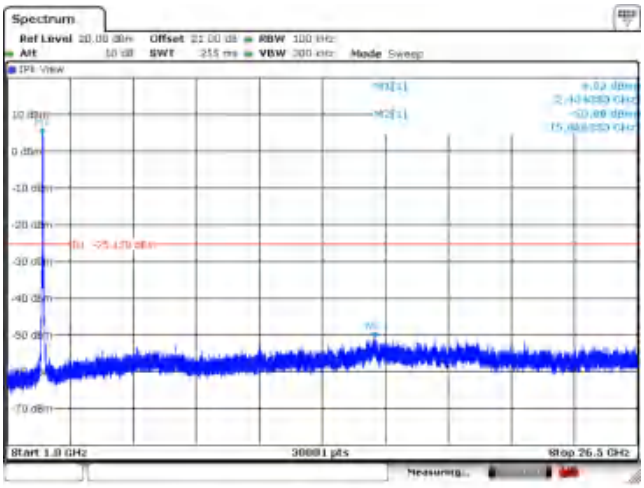
Test Mode :	802.11n HT20	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

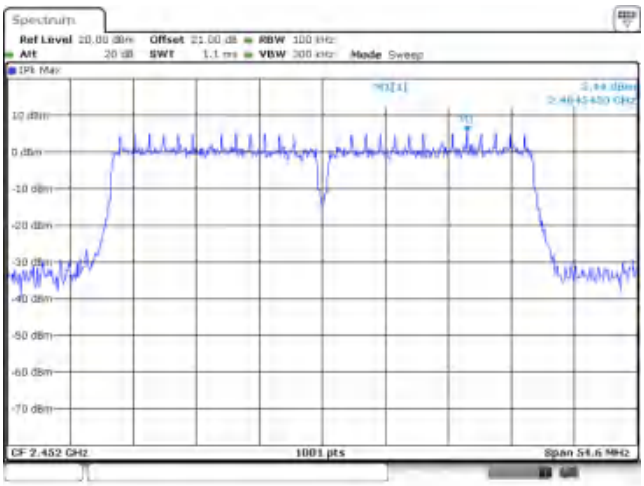
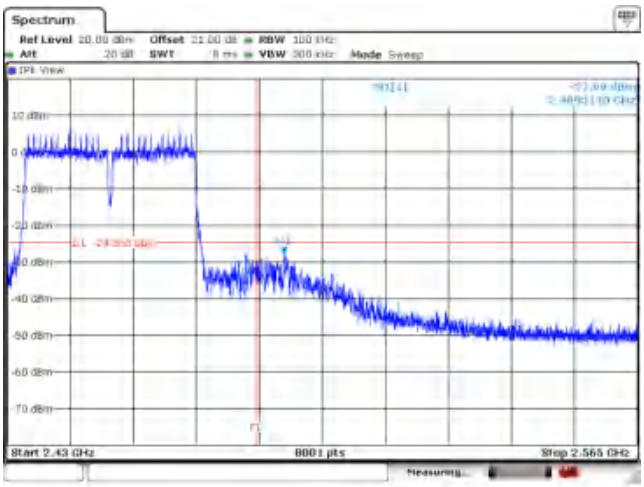
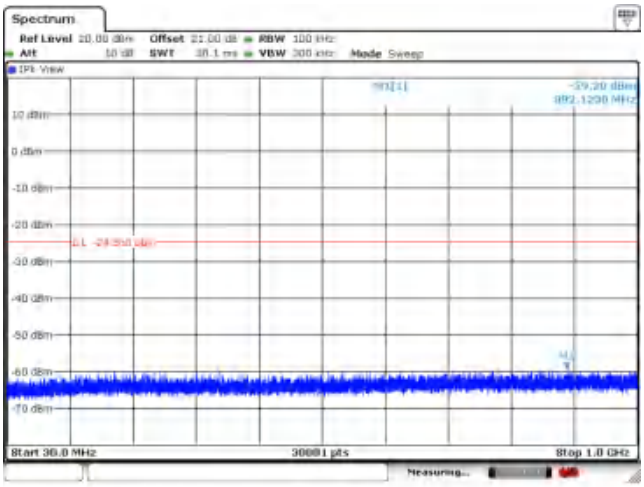
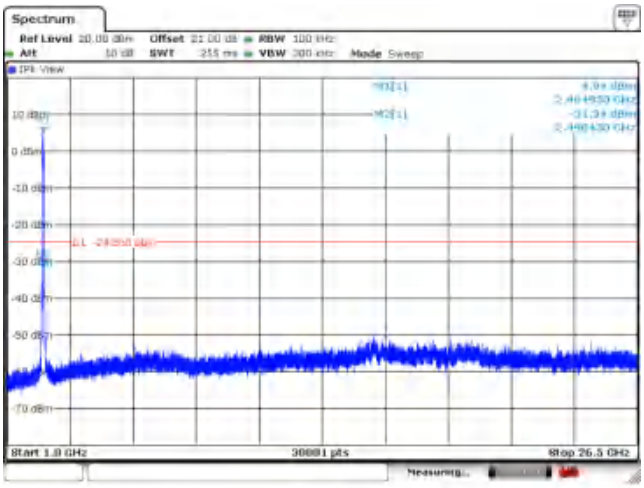
Test Mode :	802.11n HT40	Test Channel :	03

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

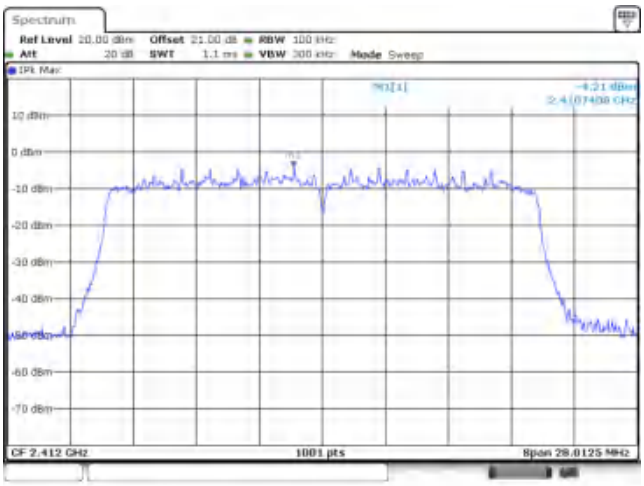
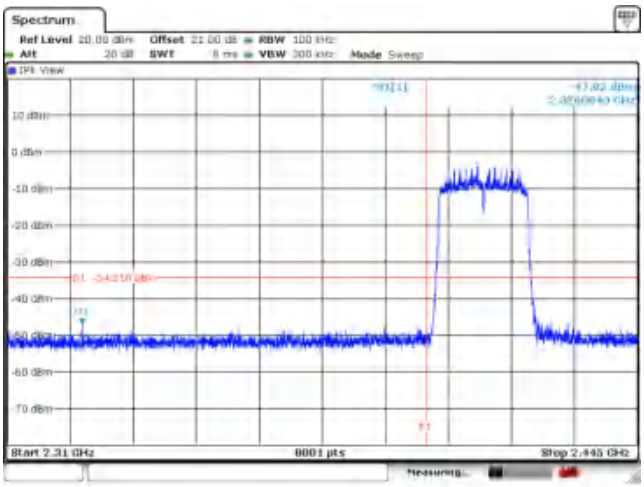
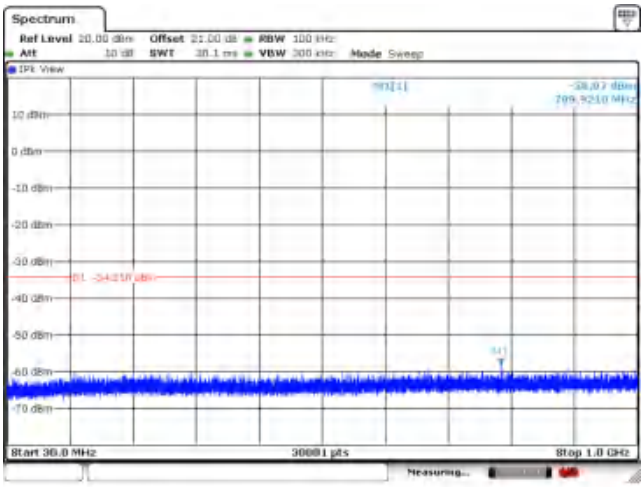
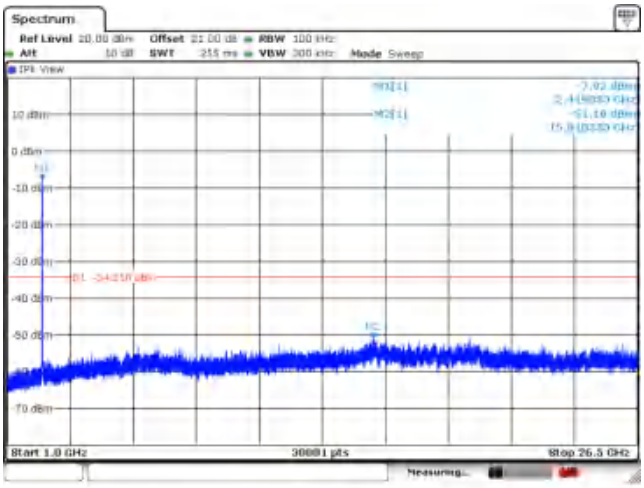
Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

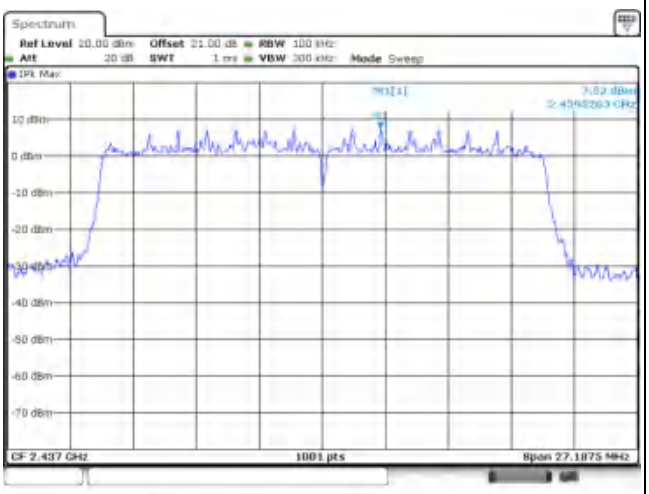
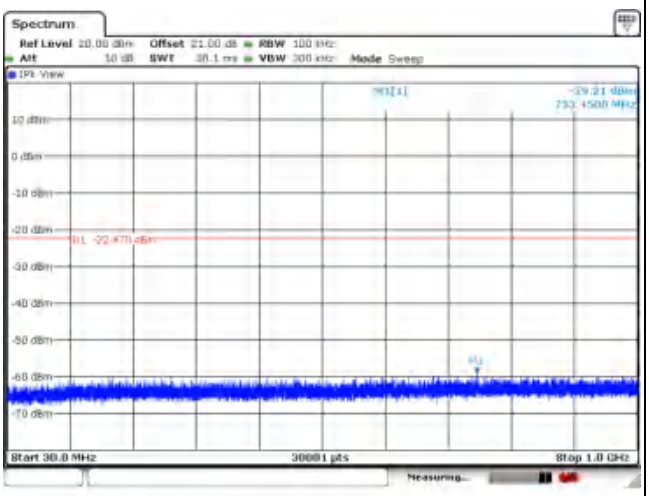
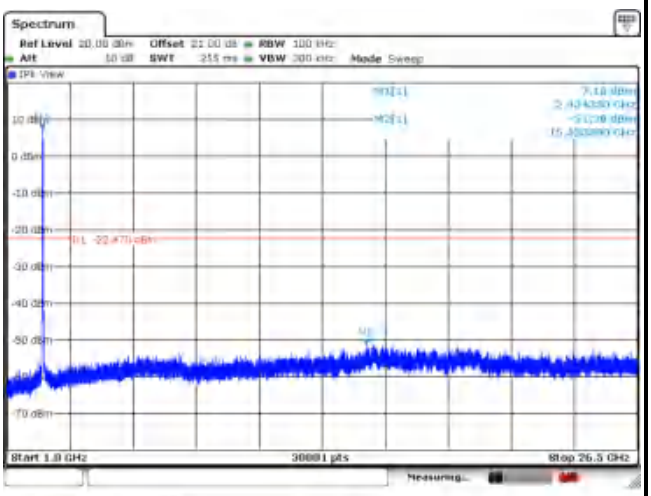
Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

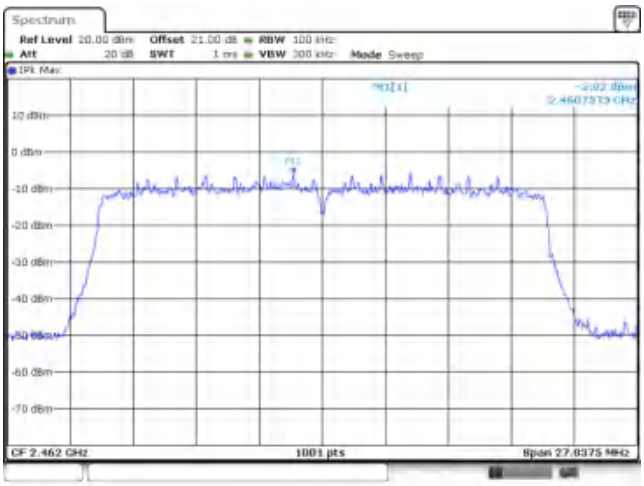
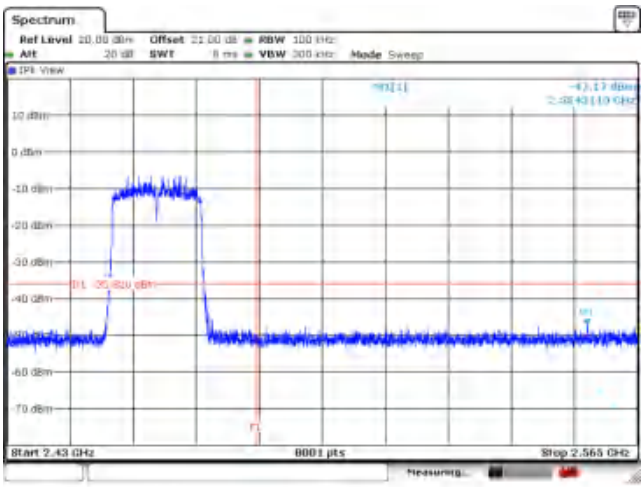
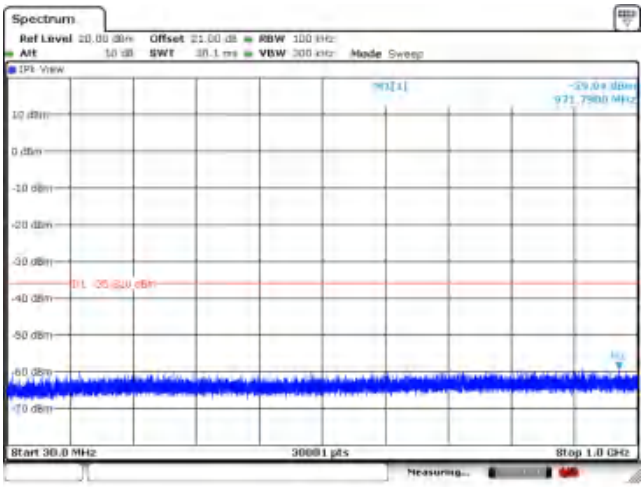
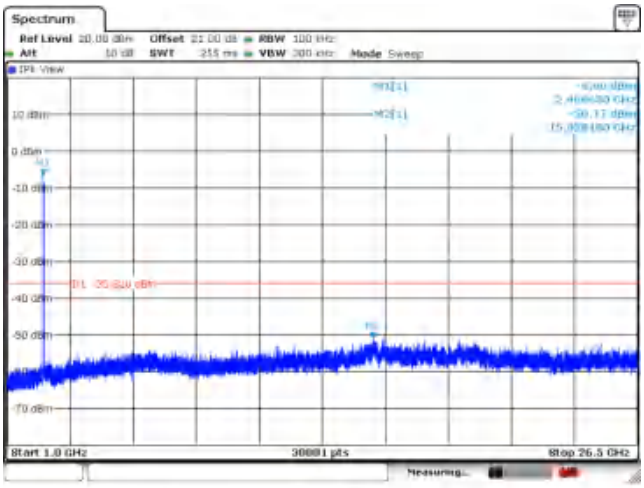
Test Mode :	802.11ax HE20	Test Channel :	01

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

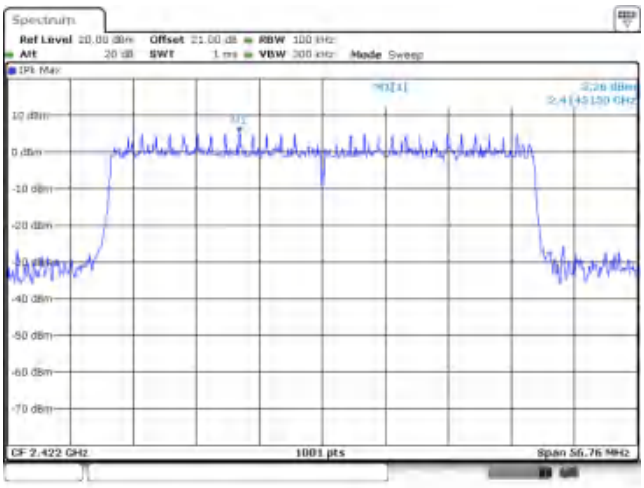
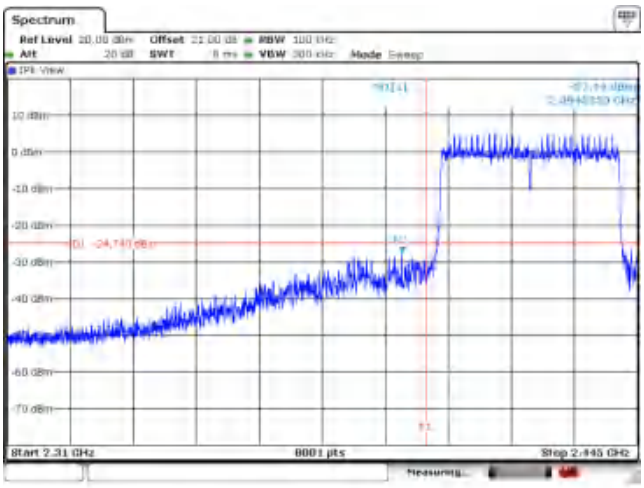
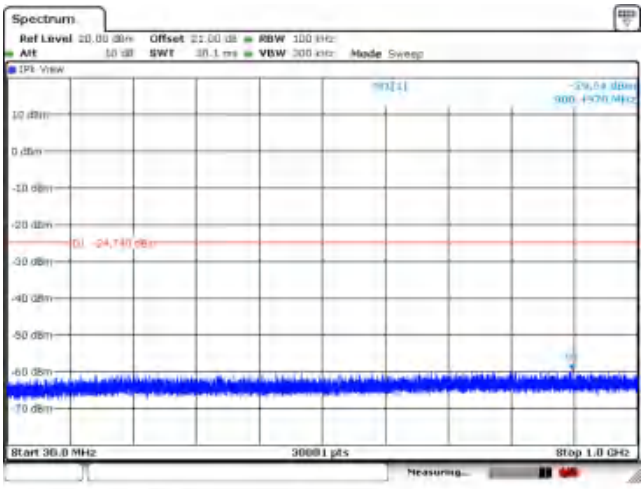
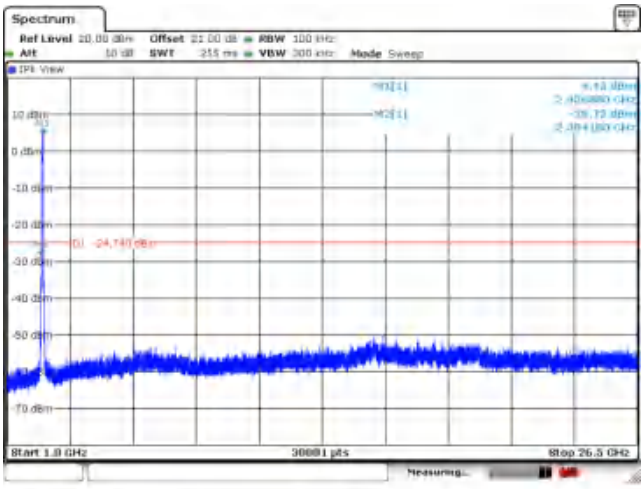
Test Mode :	802.11ax HE20	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

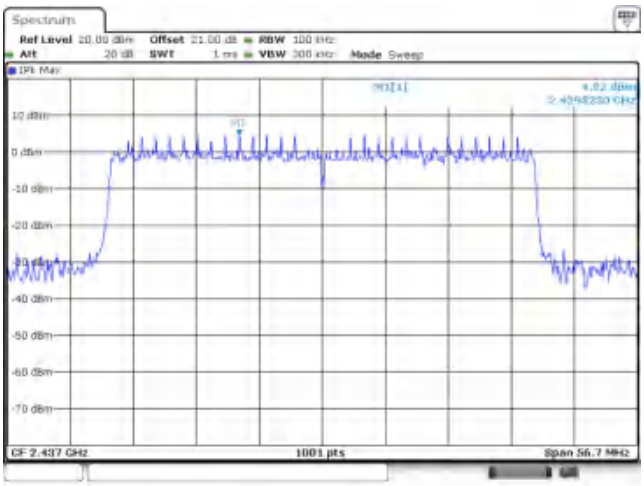
Test Mode :	802.11ax HE20	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11ax HE40	Test Channel :	03

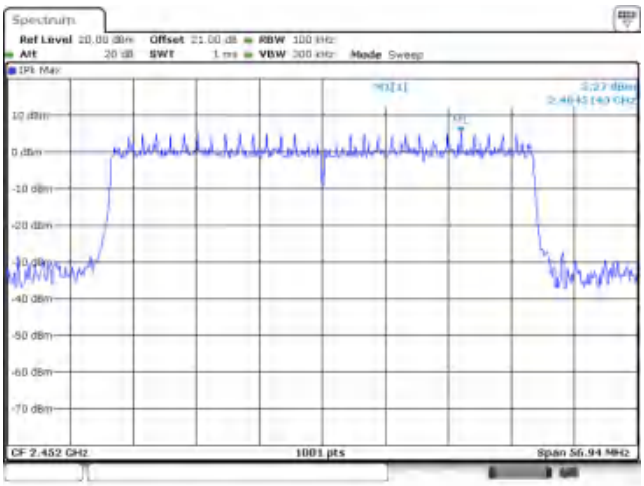
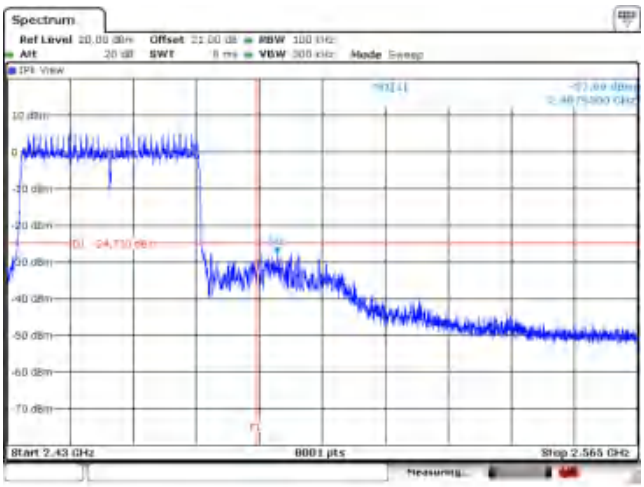
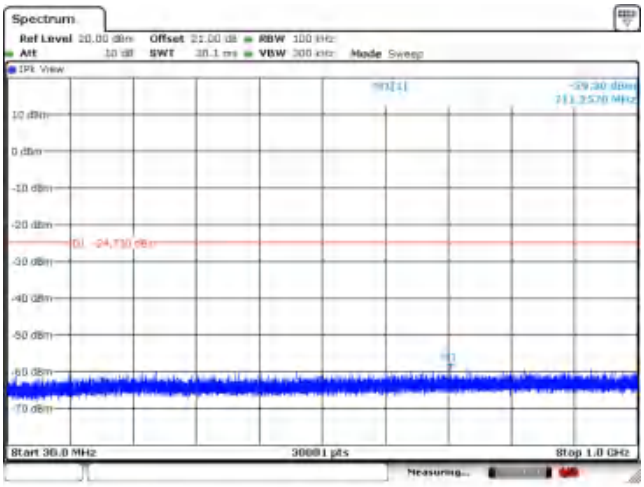
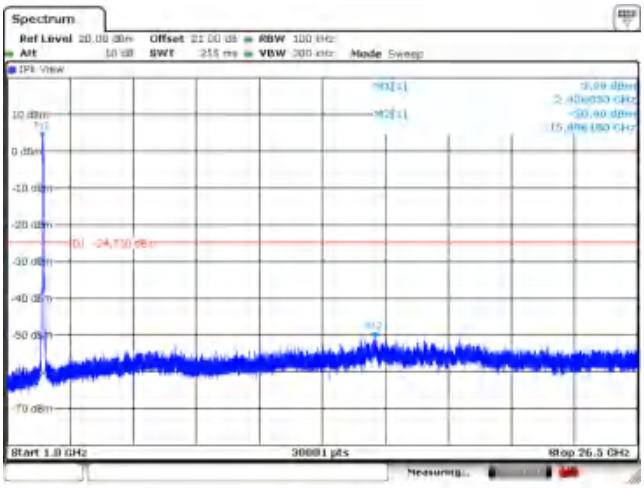
100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11ax HE40	Test Channel :	06

100kHz PSD reference Level	
	

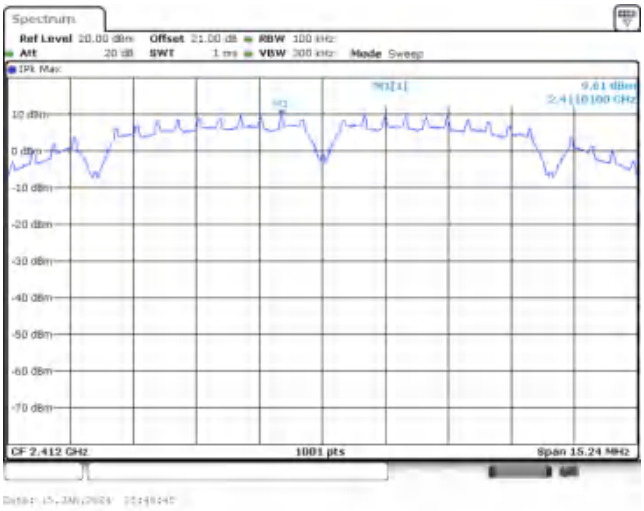
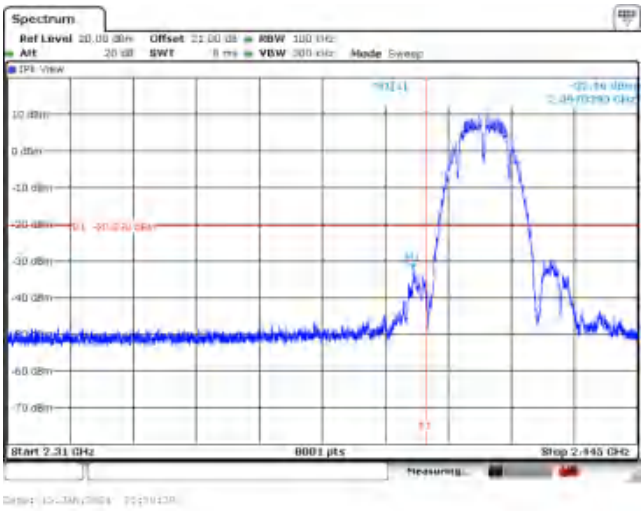
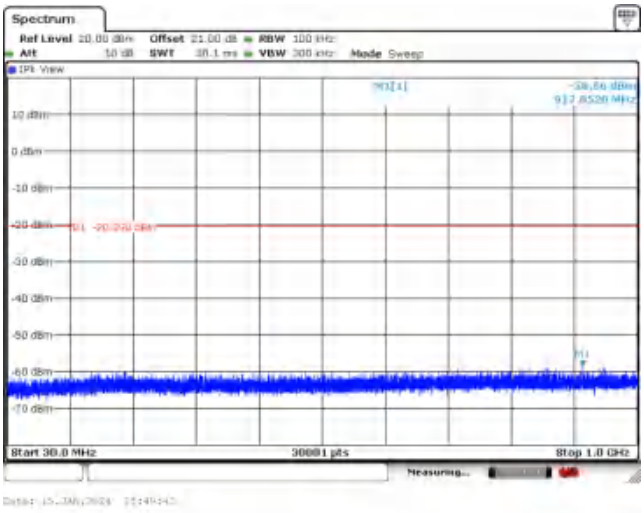
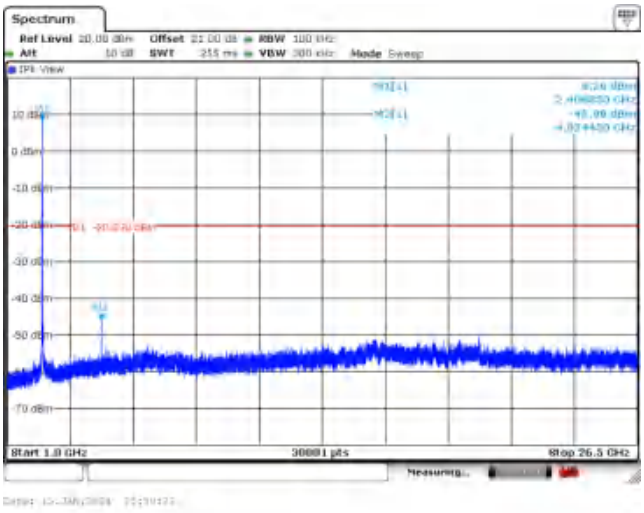
Spurious Emission Plot-1	Spurious Emission Plot-2

Test Mode :	802.11ax HE40	Test Channel :	09

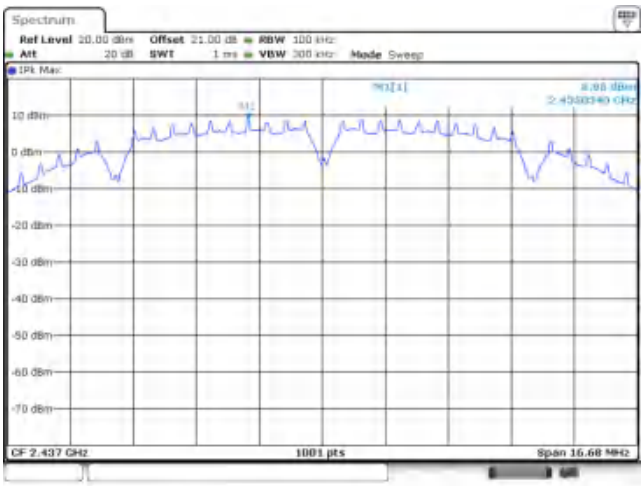
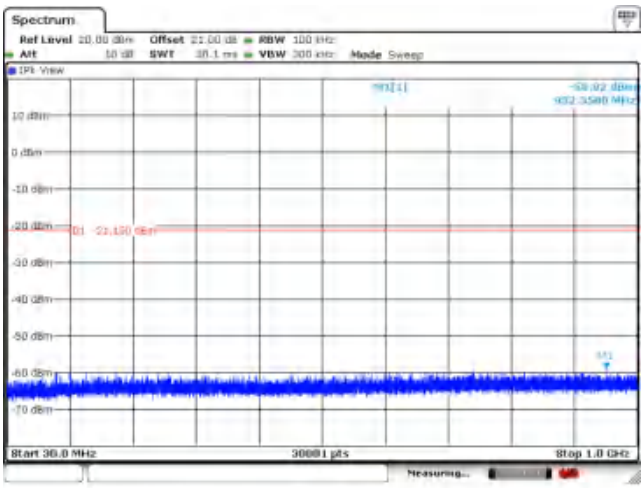
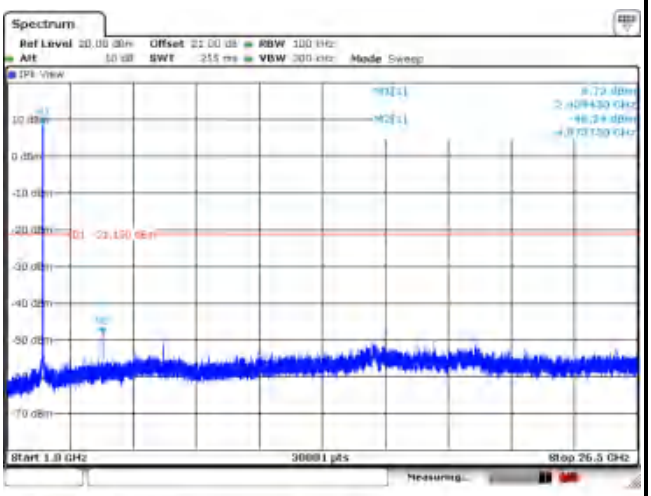
100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Number of TX = 2, Ant. 1 (Measured)

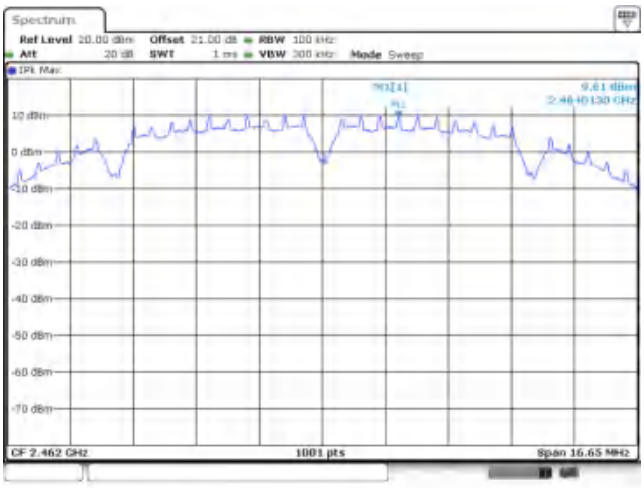
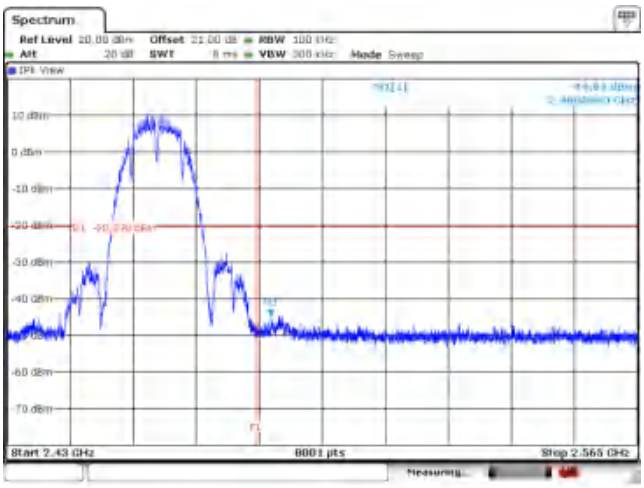
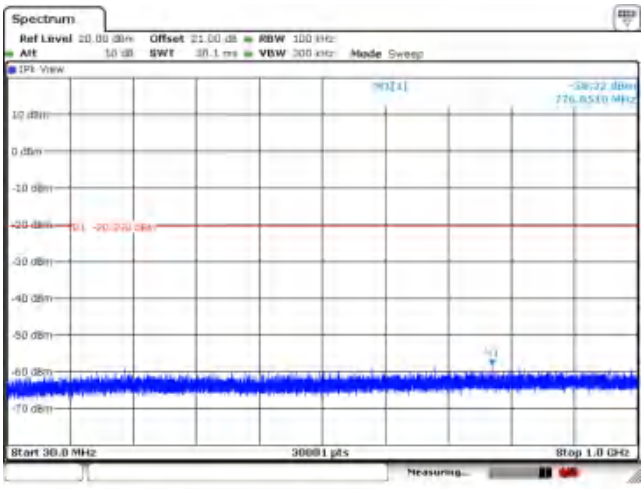
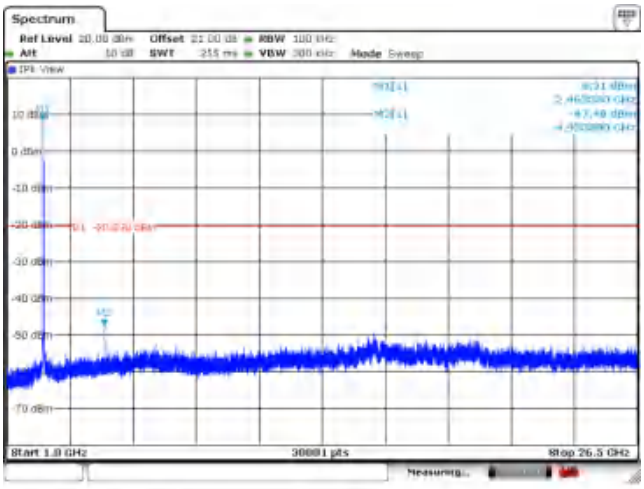
Test Mode :	802.11b	Test Channel :	01

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

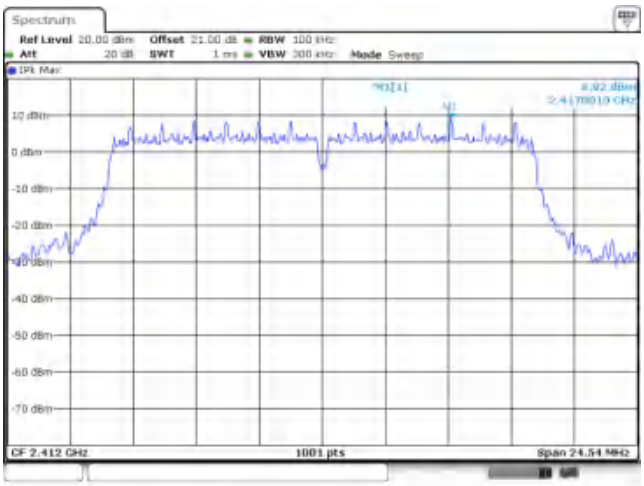
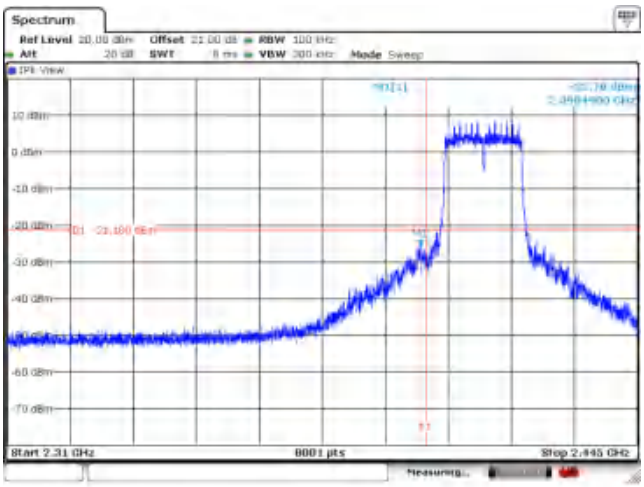
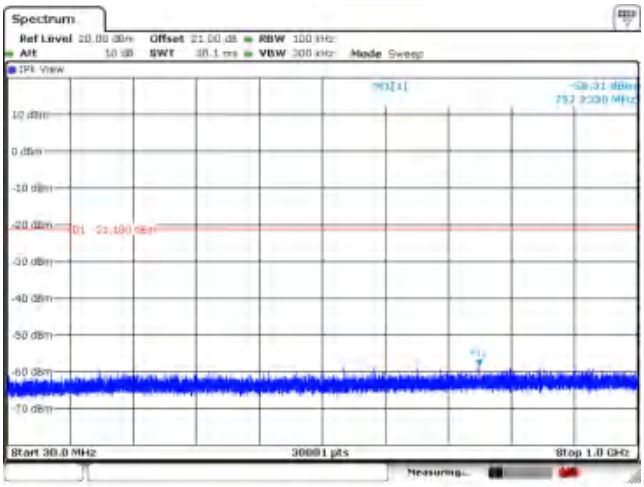
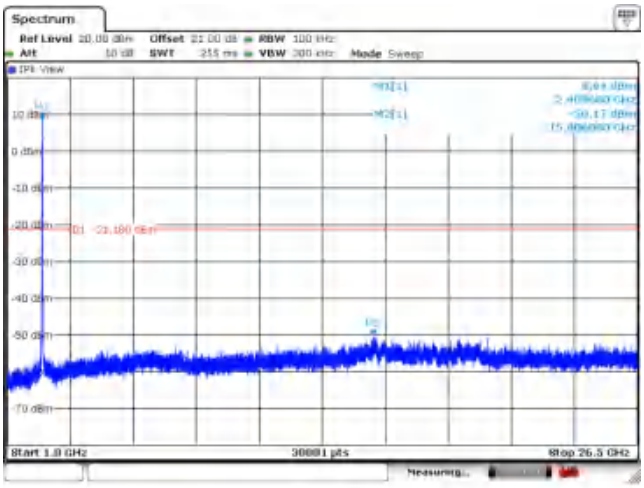
Test Mode :	802.11b	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

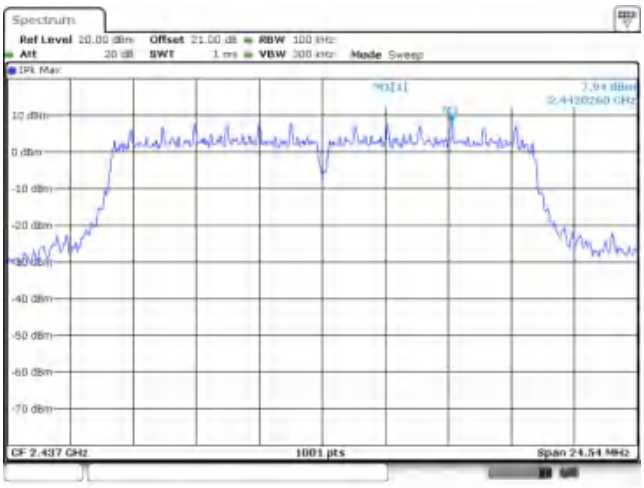
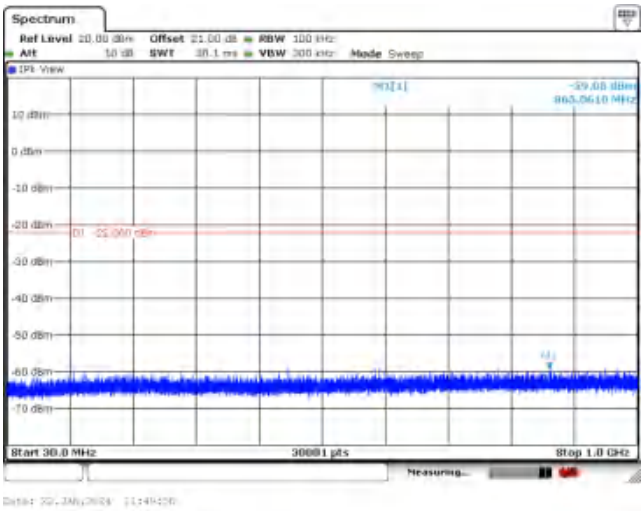
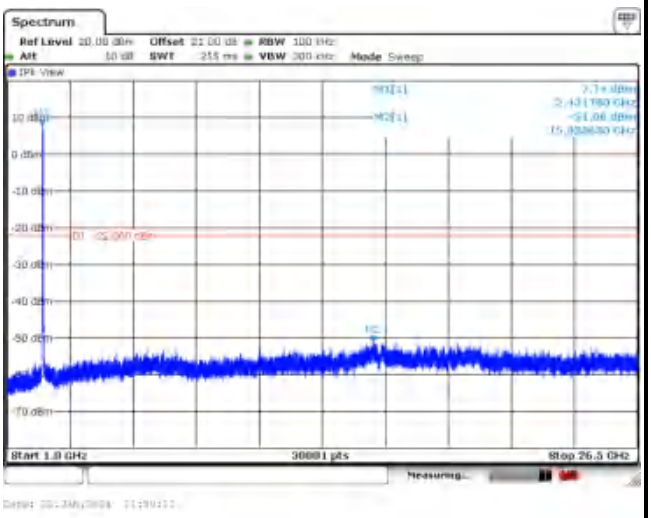
Test Mode :	802.11b	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

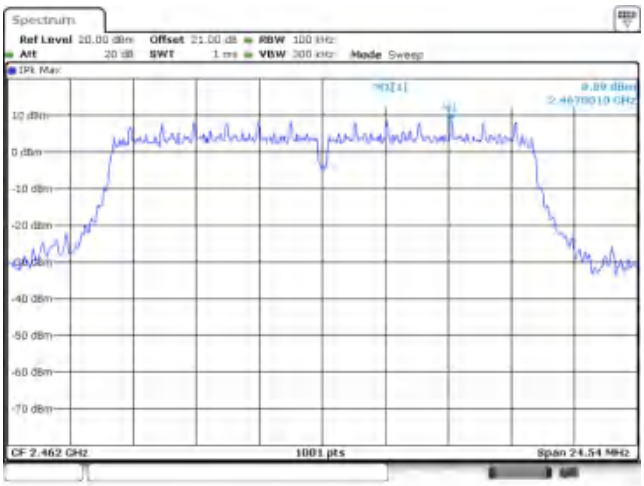
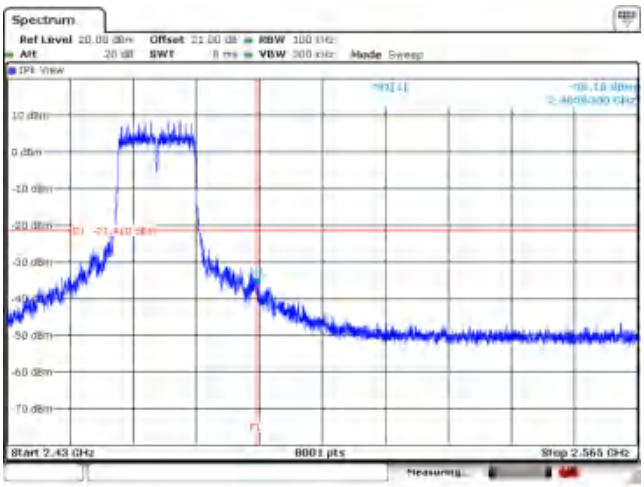
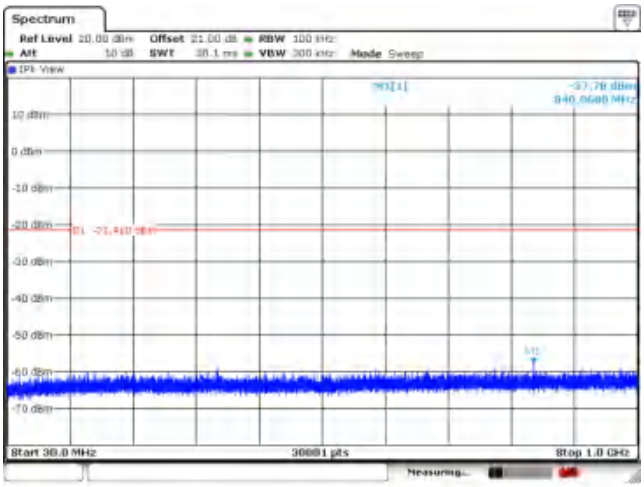
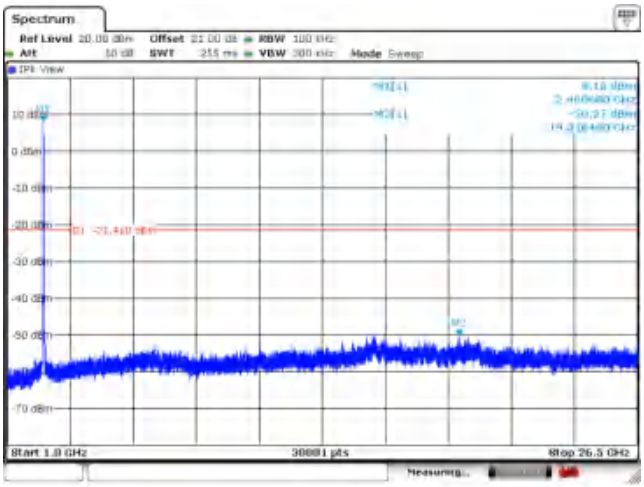
Test Mode :	802.11g	Test Channel :	01

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

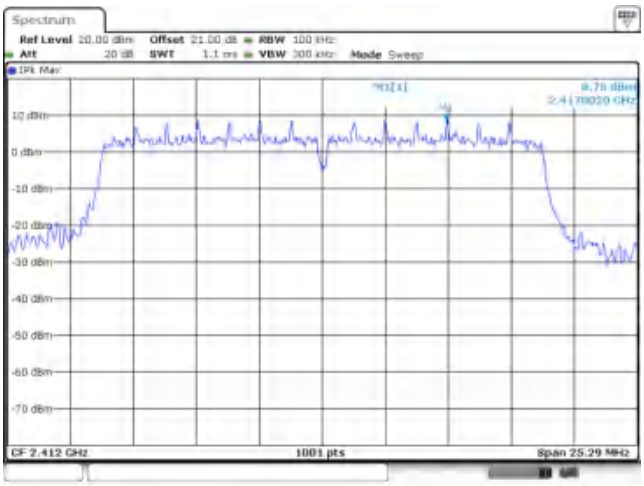
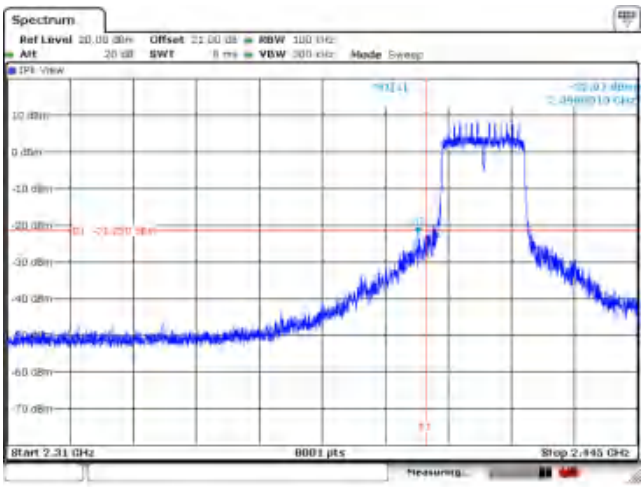
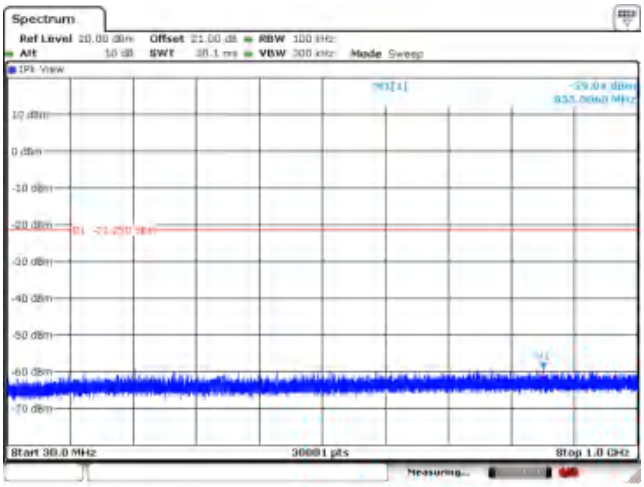
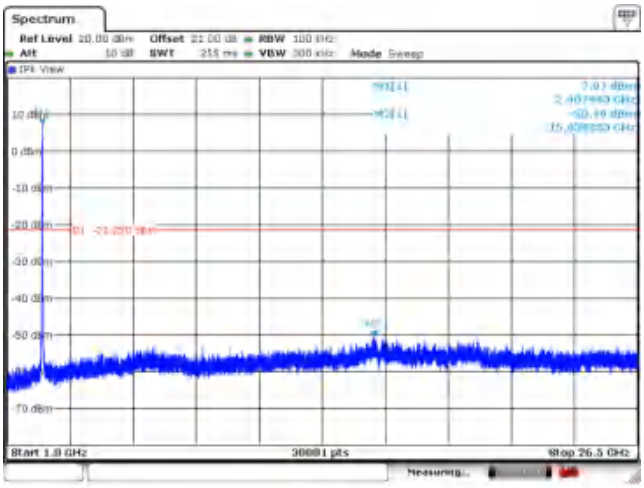
Test Mode :	802.11g	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

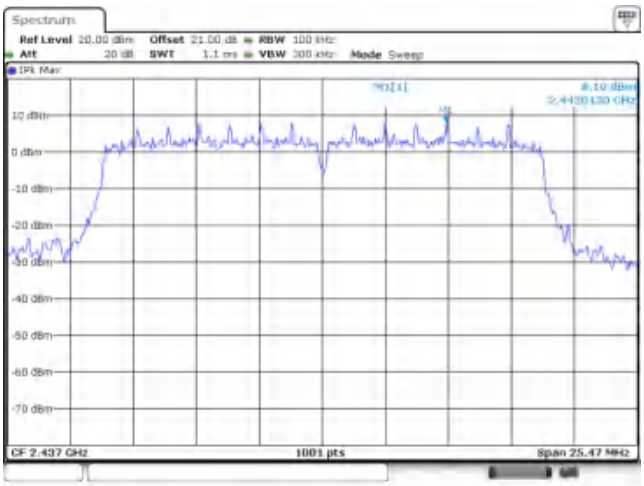
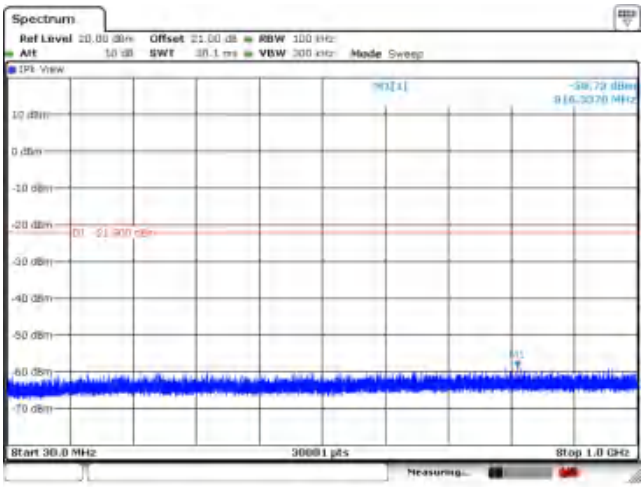
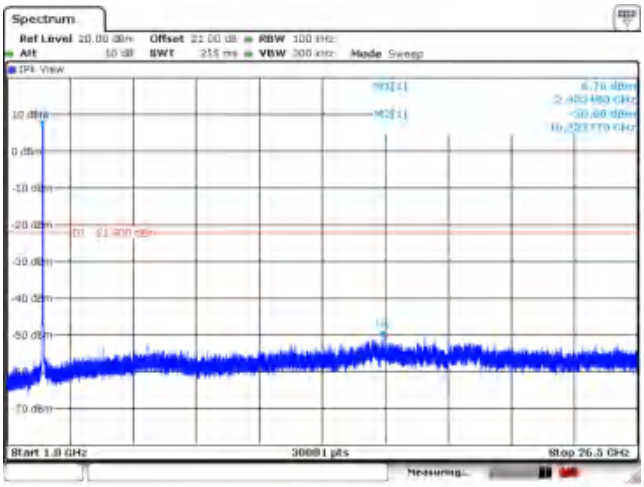
Test Mode :	802.11g	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

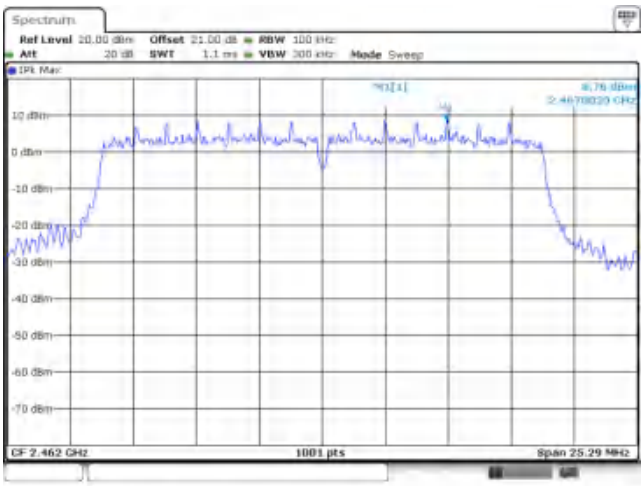
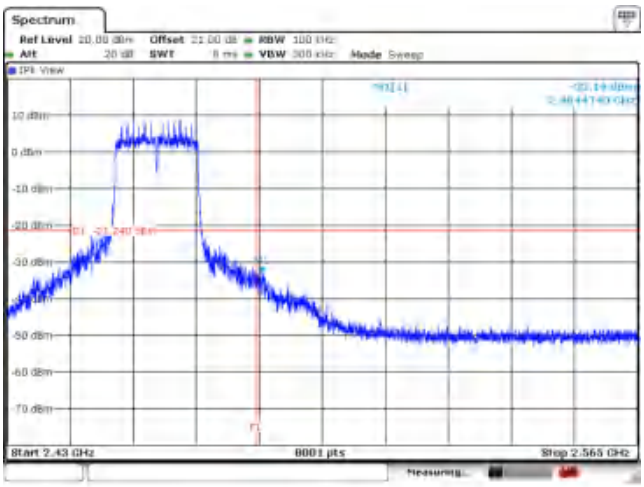
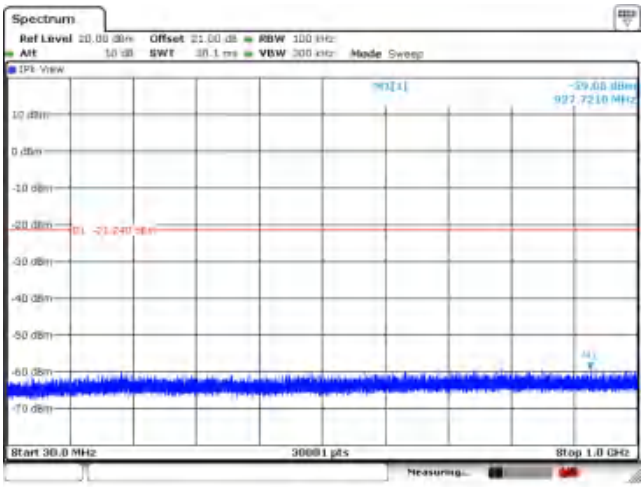
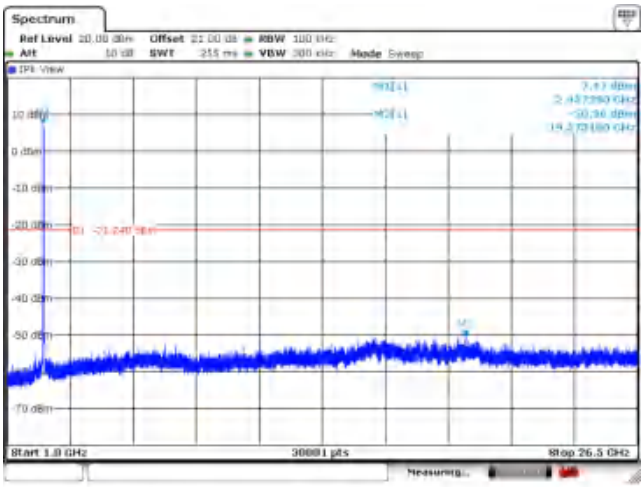
Test Mode :	802.11n HT20	Test Channel :	01

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

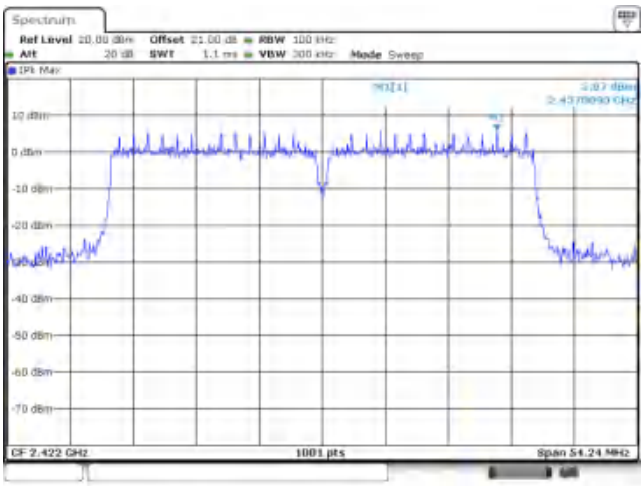
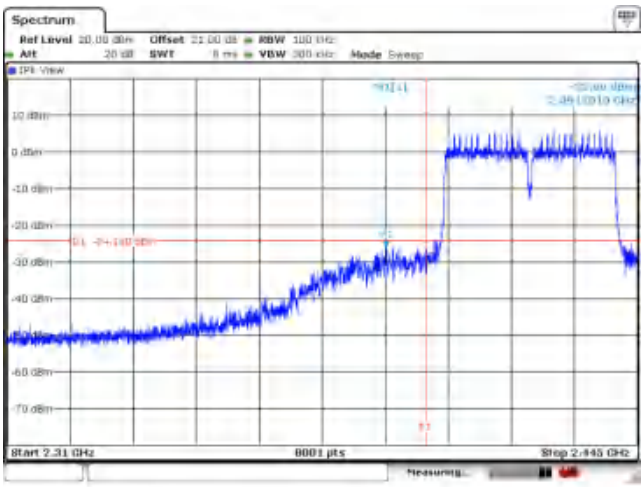
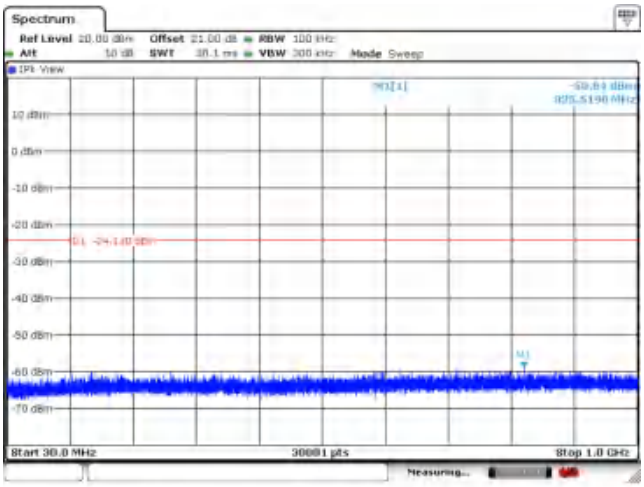
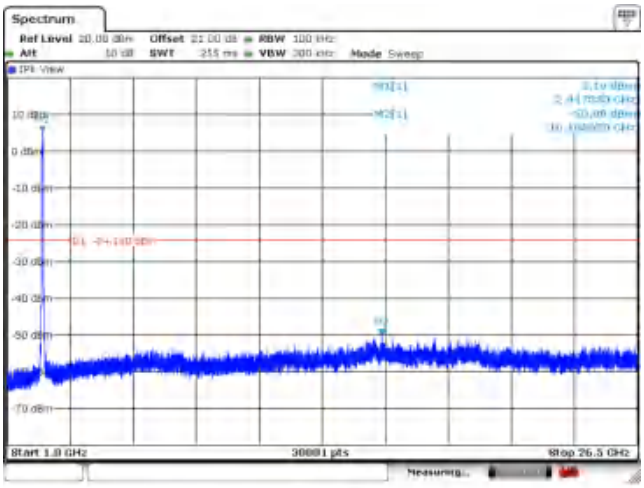
Test Mode :	802.11n HT20	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

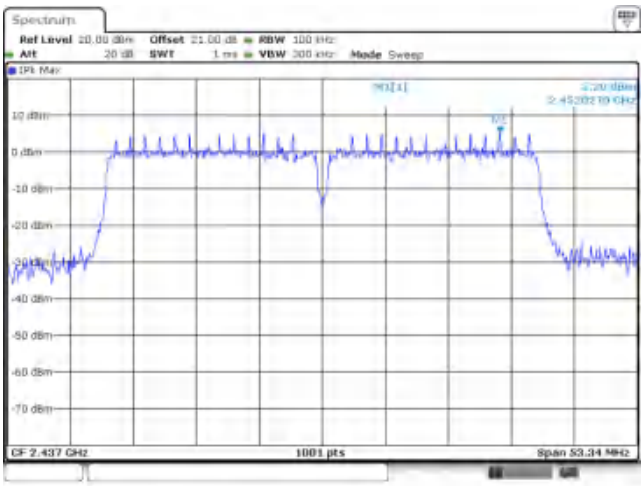
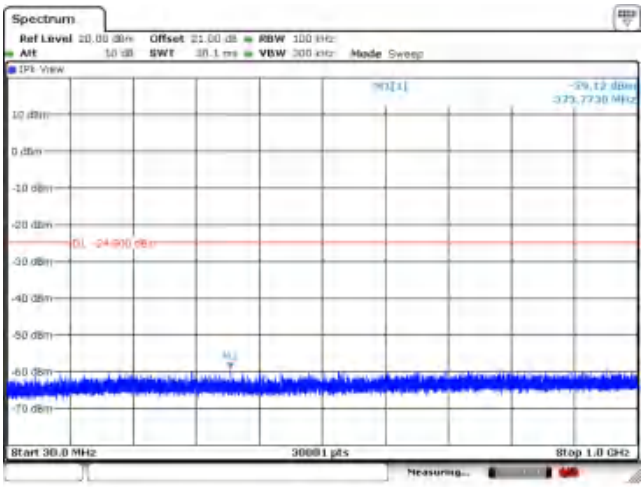
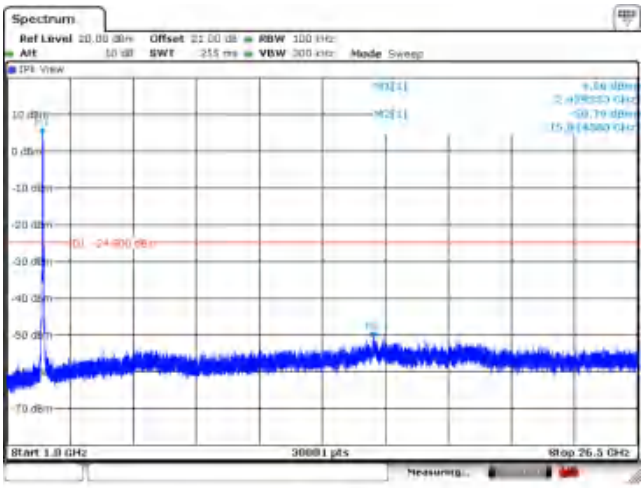
Test Mode :	802.11n HT20	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

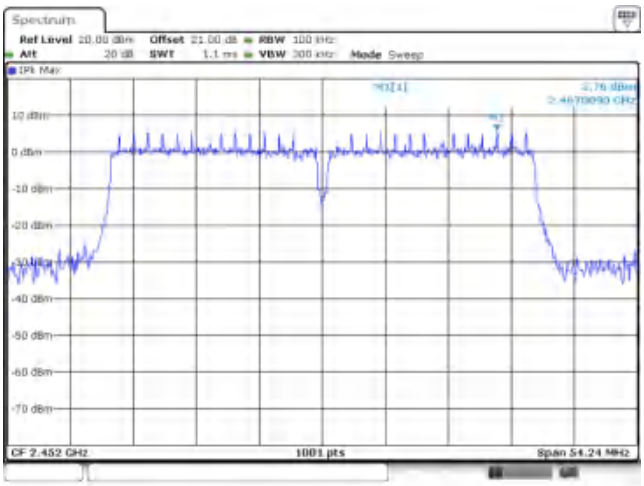
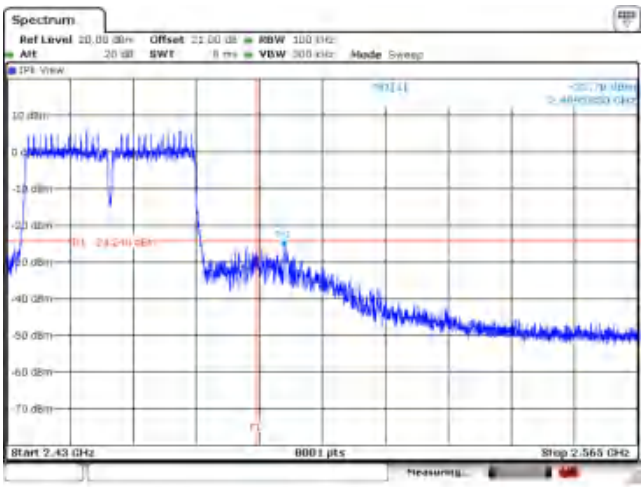
Test Mode :	802.11n HT40	Test Channel :	03

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
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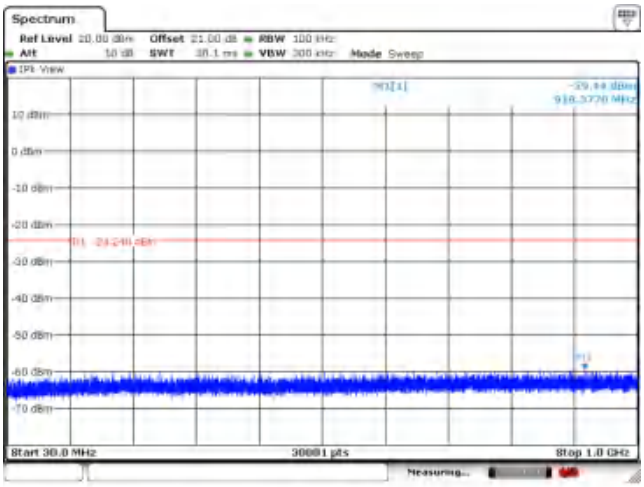
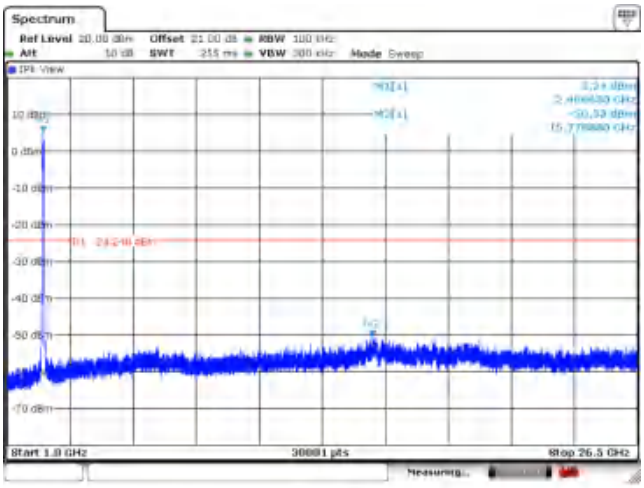
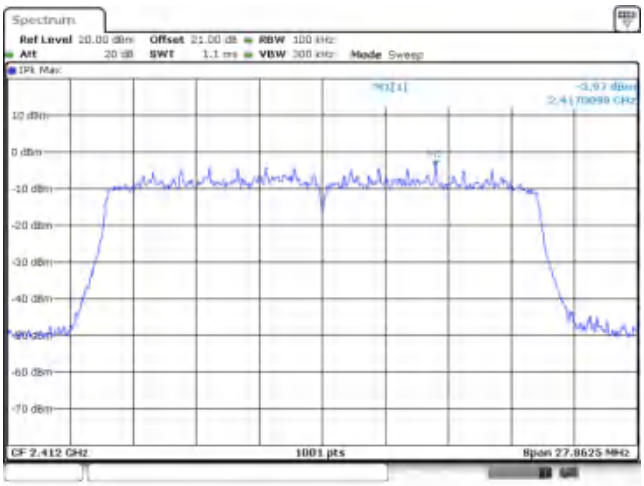
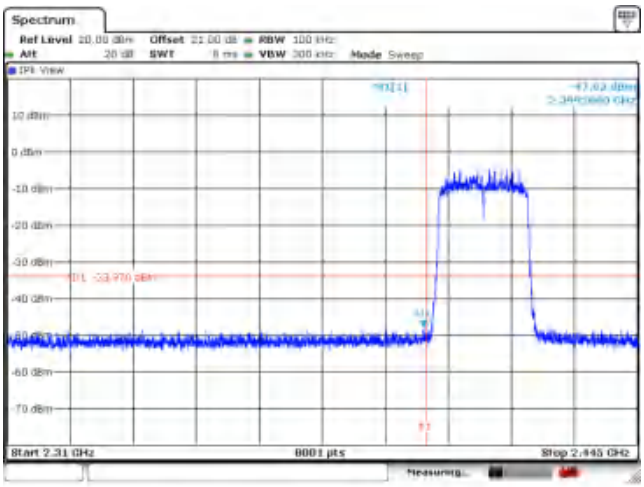
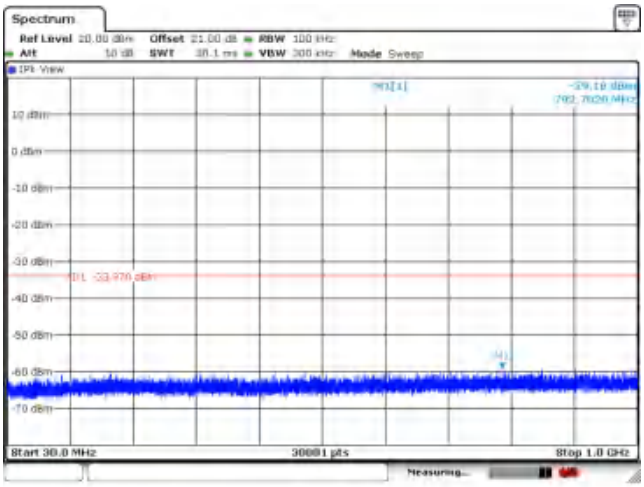
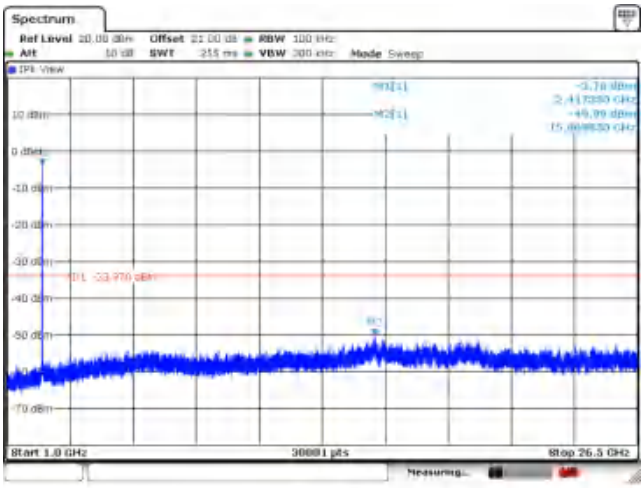
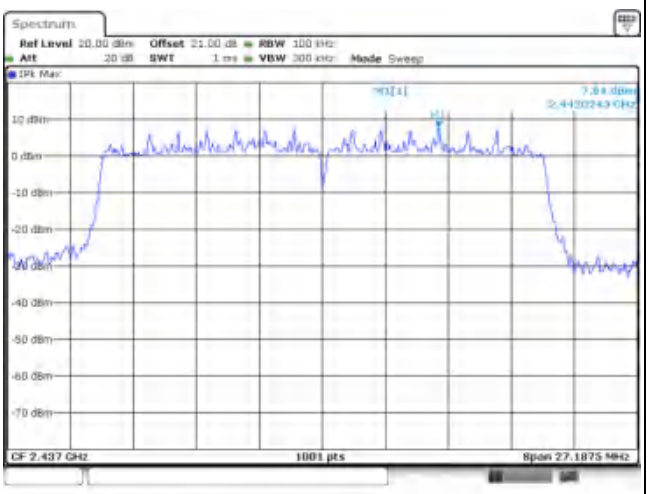
	

Test Mode :	802.11ax HE20	Test Channel :	01

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11ax HE20	Test Channel :	06

100kHz PSD reference Level	
	
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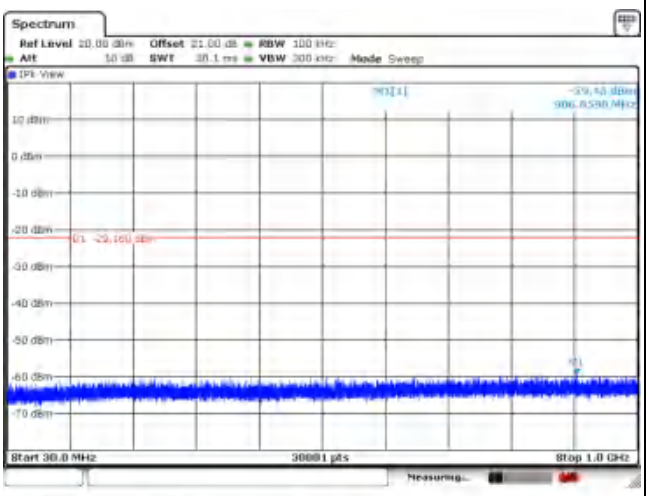
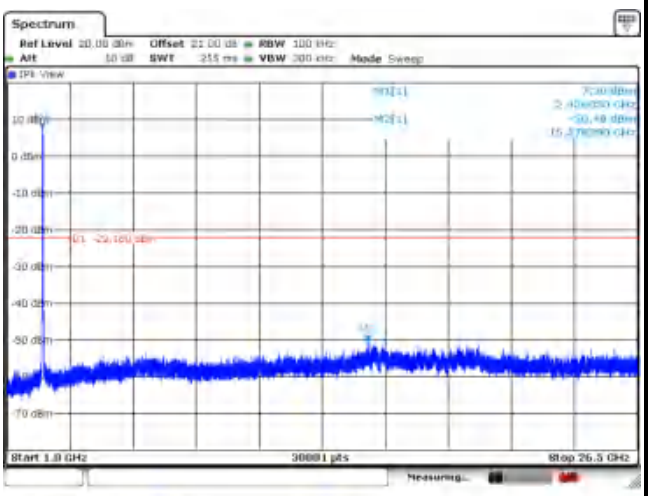
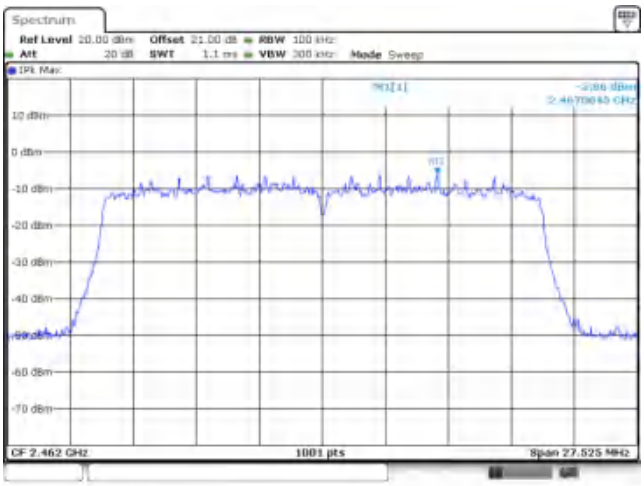
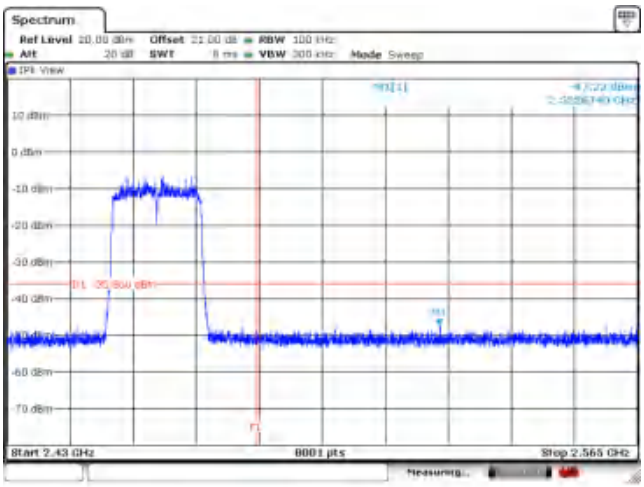
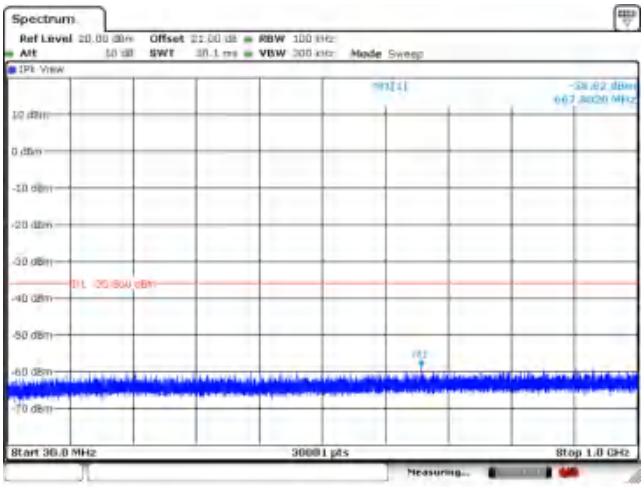
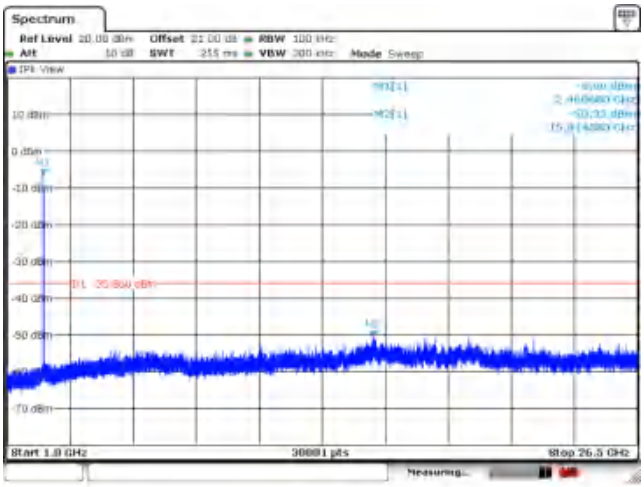
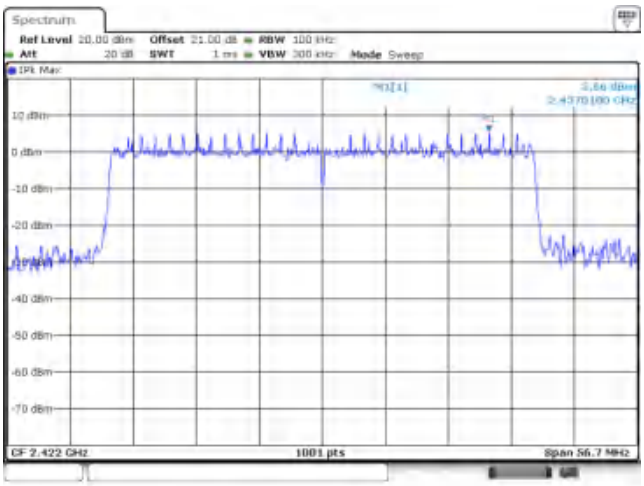
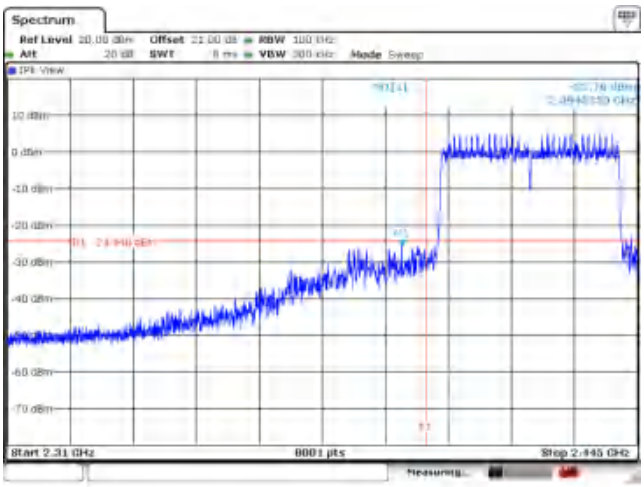
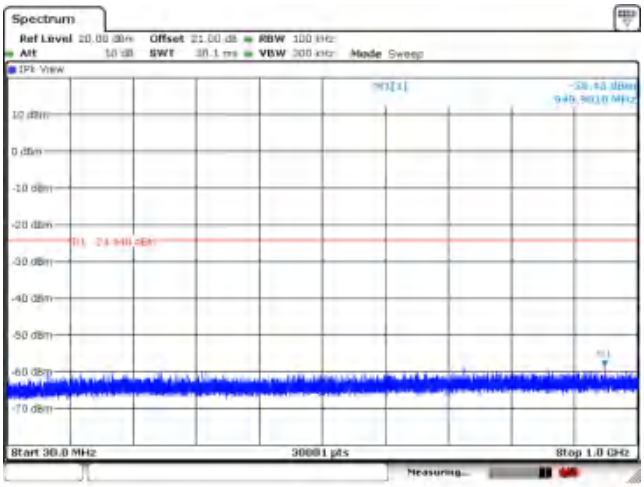
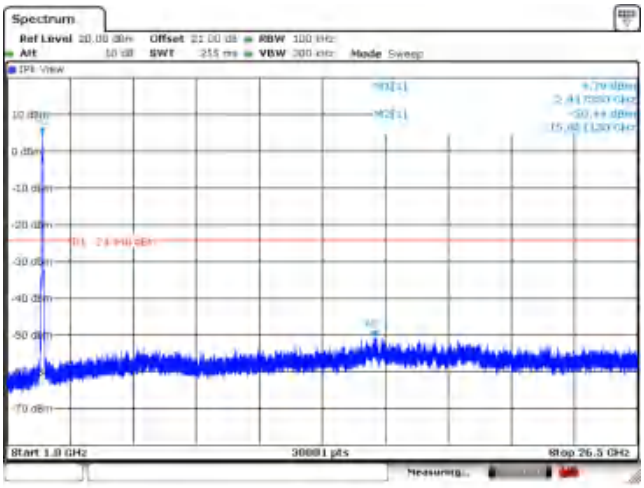
	

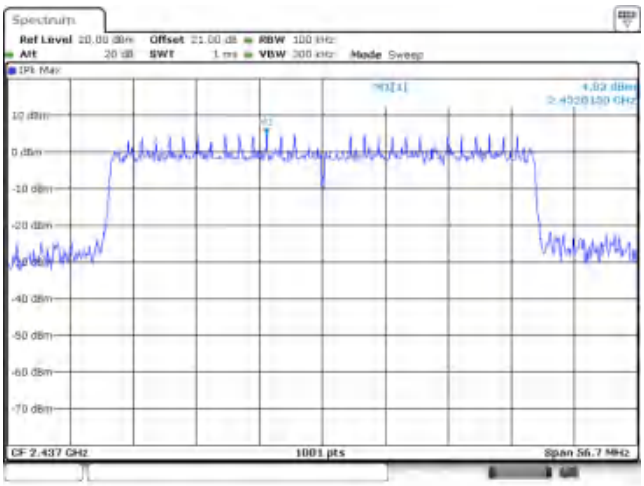
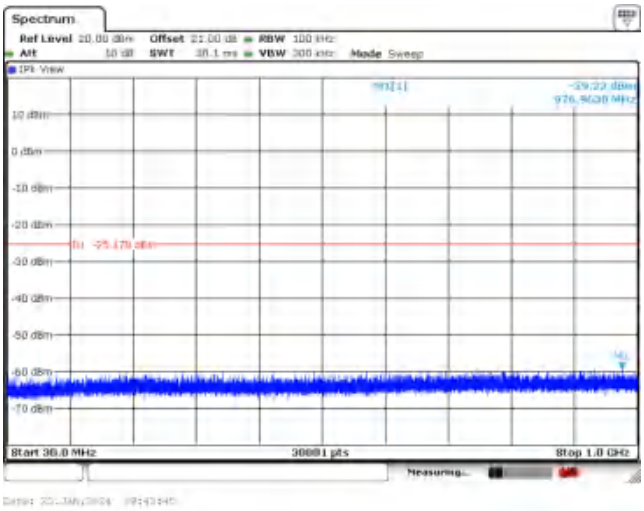
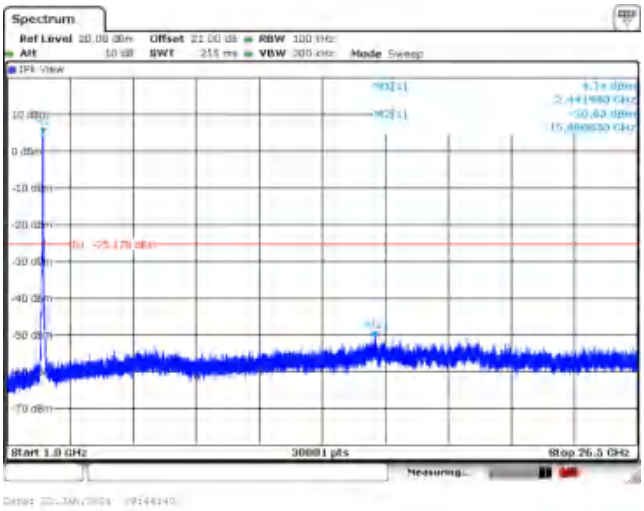
Test Mode :	802.11ax HE20	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

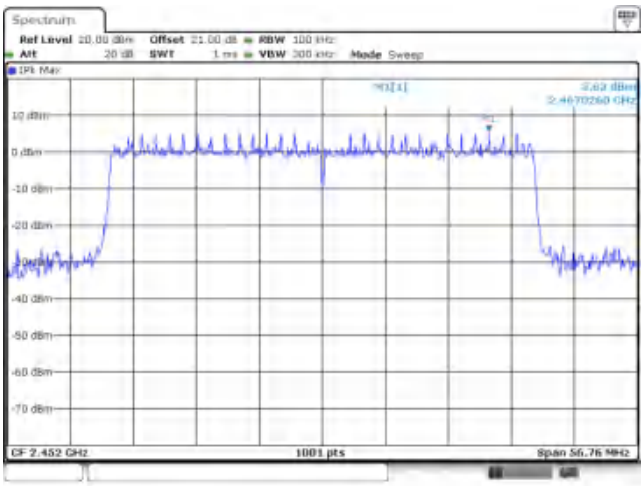
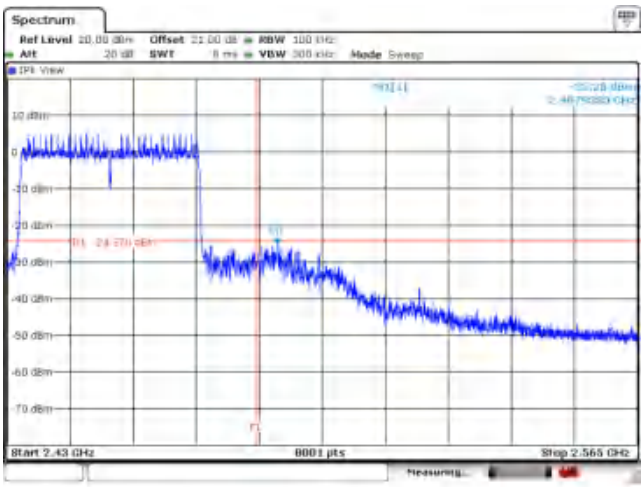
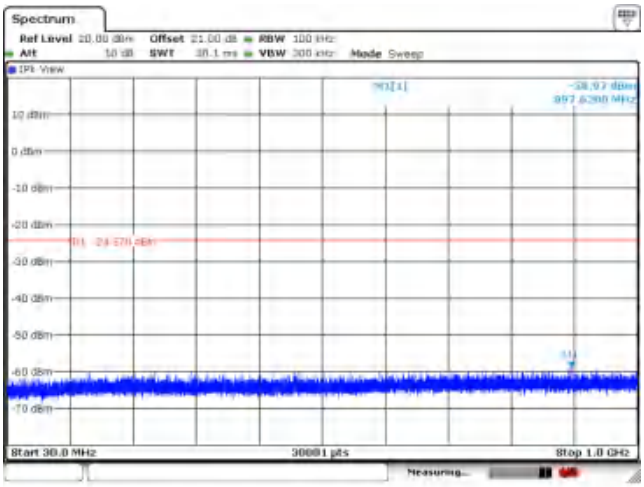
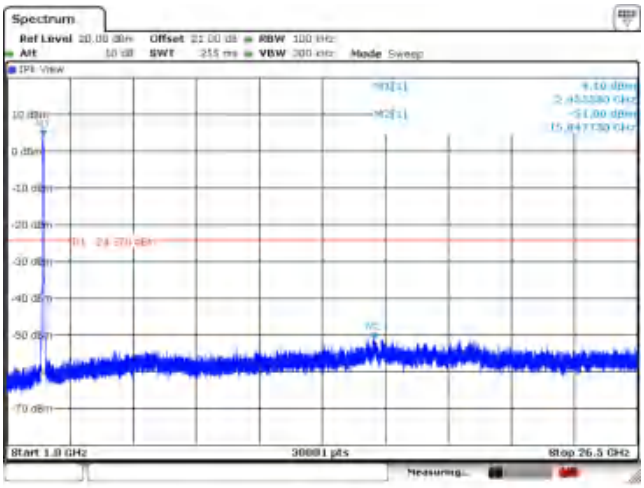
Test Mode :	802.11ax HE40	Test Channel :	03

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11ax HE40	Test Channel :	06

100kHz PSD reference Level	
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

Test Mode :	802.11ax HE40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Spurious Emission Plot-1	**Spurious Emission Plot-2**
	

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

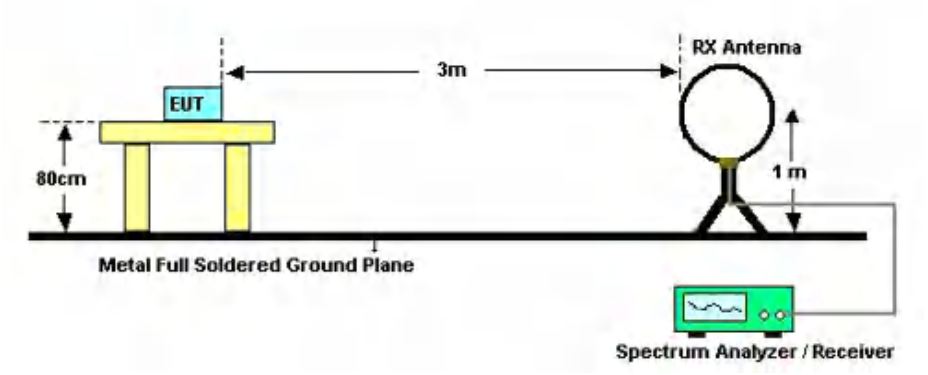
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

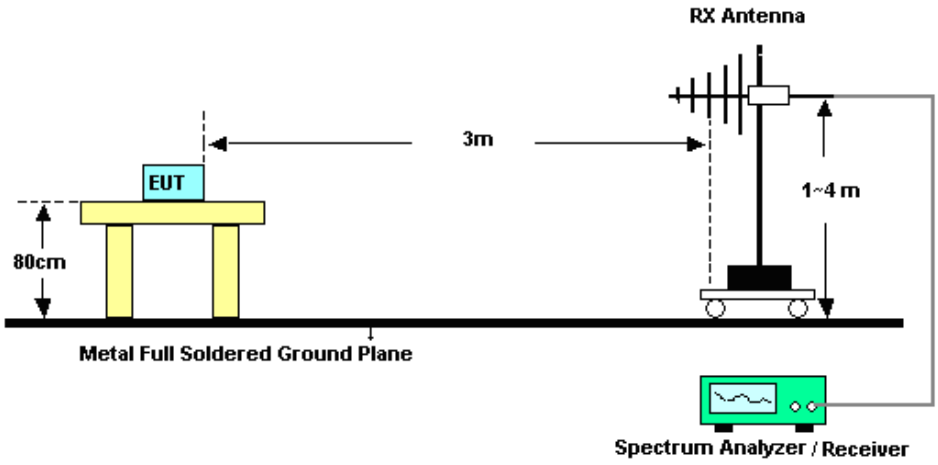
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

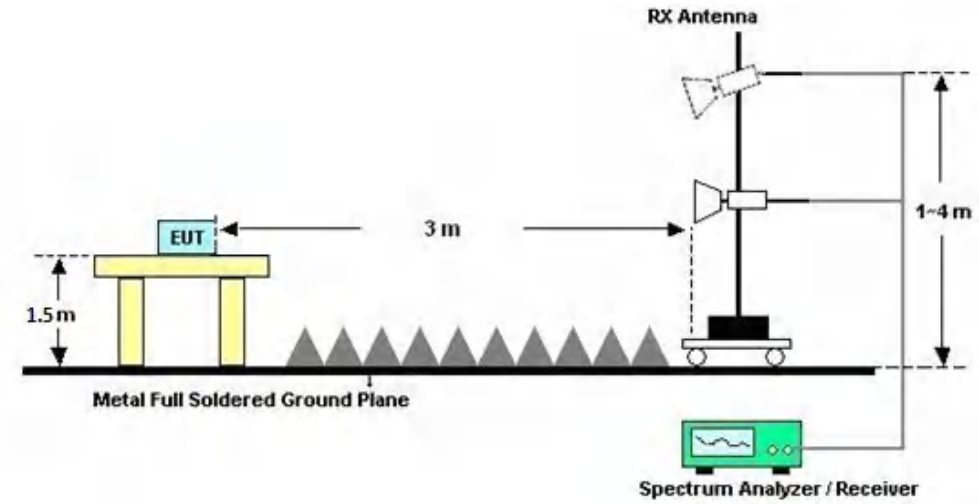
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

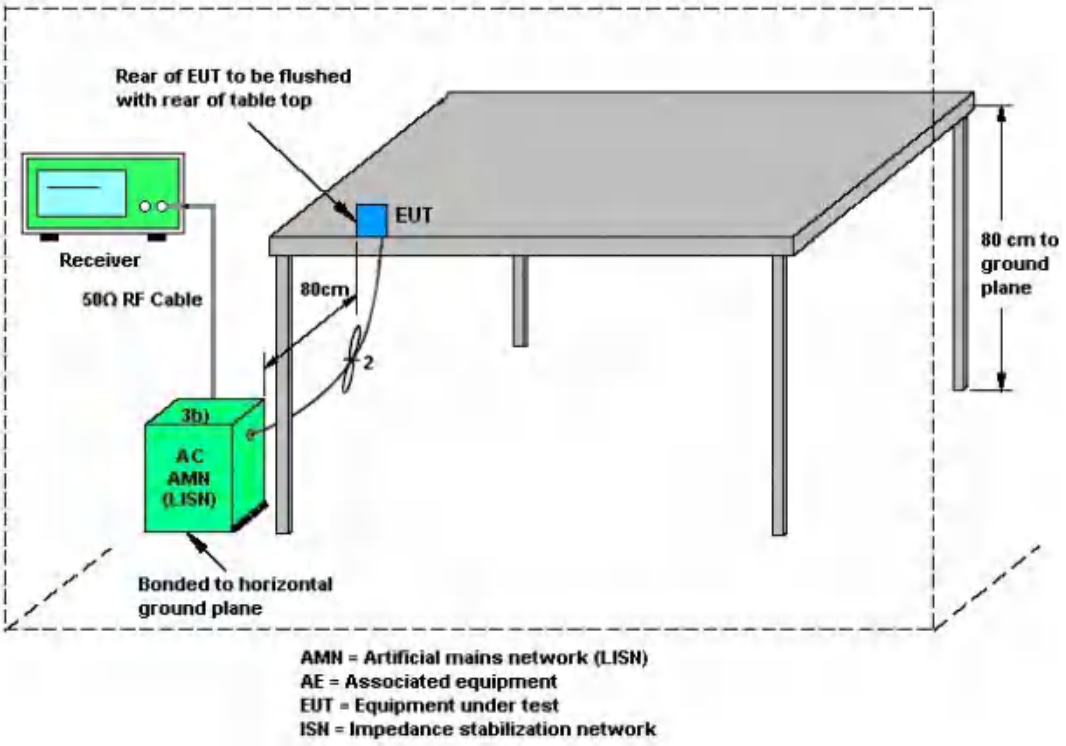
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

<CDD Modes>

	Ant. 0 (dBi)	Ant. 1 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	-0.10	-0.10	-0.10	2.91	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Jan. 15, 2024~ Feb. 06, 2024	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 29, 2023	Jan. 15, 2024~ Feb. 06, 2024	Dec. 28, 2024	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Aug. 21, 2023	Jan. 15, 2024~ Feb. 06, 2024	Aug. 20, 2024	Conducted (TH01-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz	Oct. 18, 2023	Jan. 16, 2024~ Feb. 26, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 07, 2023	Jan. 16, 2024~ Feb. 26, 2024	Jul. 06, 2024	Radiation (03CH04-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 28, 2022	Jan. 16, 2024~ Feb. 26, 2024	Jun. 27, 2024	Radiation (03CH04-SZ)
Bilog Antenna	TeseQ	CBL6111D	41909	30MHz~1GHz	May 14, 2023	Jan. 16, 2024~ Feb. 26, 2024	May 13, 2024	Radiation (03CH04-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1474	1GHz~18GHz	Jul. 07, 2023	Jan. 16, 2024~ Feb. 26, 2024	Jul. 06, 2024	Radiation (03CH04-SZ)
Horn Antenna	SCHWARZBECK	BBHA9170	9170#679	15GHz~40GHz	Jul. 08, 2023	Jan. 16, 2024~ Feb. 26, 2024	Jul. 07, 2024	Radiation (03CH04-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Jan. 16, 2024~ Feb. 26, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2023	Jan. 16, 2024~ Feb. 26, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 07, 2023	Jan. 16, 2024~ Feb. 26, 2024	Jul. 06, 2024	Radiation (03CH04-SZ)
Amplifier	Agilent Technologies	83017A	MY57280136	500MHz~26.5GHz	Aug. 21, 2023	Jan. 16, 2024~ Feb. 26, 2024	Aug. 20, 2024	Radiation (03CH04-SZ)
AC Power Source	APC	AFV-S-600B	F119050019	N/A	Oct. 18, 2023	Jan. 16, 2024~ Feb. 26, 2024	Oct. 17, 2024	Radiation (03CH04-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 16, 2024~ Feb. 26, 2024	NCR	Radiation (03CH04-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 16, 2024~ Feb. 26, 2024	NCR	Radiation (03CH04-SZ)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 16, 2023	Jan. 09, 2024	May 15, 2024	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Jan. 09, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 16, 2023	Jan. 09, 2024	May 15, 2024	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Jan. 09, 2024	Oct. 10, 2024	Conduction (CO01-KS)

NCR: No Calibration Required

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	±1.34 dB
Occupied Channel Bandwidth	±0.1 %
Conducted Power	±1.34 dB
Conducted Power Spectral Density	±1.32 dB
Frequency	±1.3 Hz

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.84 dB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1 dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.8 dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1 dB

---------- THE END ----------

Appendix A. Conducted Test Results

A1. Conducted Test Results

Test Engineer:	Chen ZhiQiang	Temperature:	21~25	°C
Test Date:	2024/1/15~2024/2/6	Relative Humidity:	51~54	%

Report Number : FR3D2611C

TEST RESULTS DATA
Average Output Power

2.4GHz Band MIMO																		
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail	Setting	
					Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1		Ant 0	Ant 1
11b	1Mbps	2	1	2412	19.90	20.00	22.96	30.00		-0.10		22.86		36.00		Pass	Patha=10	
11b	1Mbps	2	6	2437	19.90	19.90	22.91	30.00		-0.10		22.81		36.00		Pass	Patha=10	
11b	1Mbps	2	11	2462	18.70	18.70	21.71	30.00		-0.10		21.61		36.00		Pass	Patha=20	
11g	6Mbps	2	1	2412	16.50	16.40	19.46	30.00		-0.10		19.36		36.00		Pass	Patha=30	
11g	6Mbps	2	2	2417	17.00	17.00	20.01	30.00		-0.10		19.91		36.00		Pass	Patha=25	
11g	6Mbps	2	6	2437	19.80	19.60	22.71	30.00		-0.10		22.61		36.00		Pass	Patha=5	
11g	6Mbps	2	10	2457	17.50	17.50	20.51	30.00		-0.10		20.41		36.00		Pass	Patha=20	
11g	6Mbps	2	11	2462	15.80	15.70	18.76	30.00		-0.10		18.66		36.00		Pass	Patha=35	
HT20	MCS0	2	1	2412	11.30	11.20	14.26	30.00		-0.10		14.16		36.00		Pass	Patha=70	
HT20	MCS0	2	2	2417	14.90	14.90	17.91	30.00		-0.10		17.81		36.00		Pass	Patha=40	
HT20	MCS0	2	3	2422	16.10	25.90	26.33	30.00		-0.10		26.23		36.00		Pass	Patha=30	
HT20	MCS0	2	6	2437	19.80	19.60	22.71	30.00		-0.10		22.61		36.00		Pass	Patha=5	
HT20	MCS0	2	9	2452	16.70	16.70	19.71	30.00		-0.10		19.61		36.00		Pass	Patha=25	
HT20	MCS0	2	10	2457	16.10	16.10	19.11	30.00		-0.10		19.01		36.00		Pass	Patha=30	
HT20	MCS0	2	11	2462	9.10	9.00	12.06	30.00		-0.10		11.96		36.00		Pass	Patha=85	
HT40	MCS0	2	3	2422	10.80	10.90	13.86	30.00		-0.10		13.76		36.00		Pass	Patha=70	
HT40	MCS0	2	4	2427	14.50	14.50	17.51	30.00		-0.10		17.41		36.00		Pass	Patha=40	
HT40	MCS0	2	6	2437	14.70	14.80	17.76	30.00		-0.10		17.66		36.00		Pass	Patha=40	
HT40	MCS0	2	7	2442	13.20	13.20	16.21	30.00		-0.10		16.11		36.00		Pass	Patha=50	
HT40	MCS0	2	8	2447	6.60	6.70	9.66	30.00		-0.10		9.56		36.00		Pass	Patha=100	
HT40	MCS0	2	9	2452	6.00	6.10	9.06	30.00		-0.10		8.96		36.00		Pass	Patha=105	

Note: Measured power (dBm) has offset with cable loss.

Report Number : FR3D2611C

TEST RESULTS DATA
Average Output Power

2.4GHz Band MIMO																				
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail	Setting	
						Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1		Ant 0	Ant 1
HE20	MCS0	2	1	2412	Full	8.40	8.40	11.41	30.00		-0.10		11.31		36.00		Pass	Patha=90	
HE20	MCS0	2	1	2412	26/0	-2.70	-2.90	0.21	30.00		-0.10		0.11		36.00		Pass	dbm=2，patha=40	
HE20	MCS0	2	1	2412	52/37	-0.10	-0.10	2.91	30.00		-0.10		2.81		36.00		Pass	dbm=5，patha=40	
HE20	MCS0	2	1	2412	106/53	3.30	3.40	6.36	30.00		-0.10		6.26		36.00		Pass	dbm=6，patha=20	
HE20	MCS0	2	2	2417	Full	15.50	15.50	18.51	30.00		-0.10		18.41		36.00		Pass	Patha=35	
HE20	MCS0	2	3	2422	Full	16.70	16.70	19.71	30.00		-0.10		19.61		36.00		Pass	Patha=25	
HE20	MCS0	2	6	2437	Full	19.70	19.80	22.76	30.00		-0.10		22.66		36.00		Pass	Patha=5	
HE20	MCS0	2	9	2452	Full	16.70	16.70	19.71	30.00		-0.10		19.61		36.00		Pass	Patha=25	
HE20	MCS0	2	10	2457	Full	15.50	15.50	18.51	30.00		-0.10		18.41		36.00		Pass	Patha=35	
HE20	MCS0	2	11	2462	Full	6.20	6.20	9.21	30.00		-0.10		9.11		36.00		Pass	Patha=105	
HE20	MCS0	2	11	2462	26/8	-4.90	-5.10	-1.99	30.00		-0.10		-2.09		36.00		Pass	dbm=2，patha=60	
HE20	MCS0	2	11	2462	52/40	-2.40	-2.50	0.56	30.00		-0.10		0.46		36.00		Pass	dbm=5，patha=60	
HE20	MCS0	2	11	2462	106/54	1.10	1.00	4.06	30.00		-0.10		3.96		36.00		Pass	dbm=6，patha=35	
HE40	MCS0	2	3	2422	Full	5.50	5.30	8.41	30.00		-0.10		8.31		36.00		Pass	Patha=110	
HE40	MCS0	2	4	2427	Full	12.60	12.60	15.61	30.00		-0.10		15.51		36.00		Pass	Patha=55	
HE40	MCS0	2	6	2437	Full	12.70	12.80	15.76	30.00		-0.10		15.66		36.00		Pass	Patha=55	
HE40	MCS0	2	7	2442	Full	13.30	13.20	16.26	30.00		-0.10		16.16		36.00		Pass	Patha=60	
HE40	MCS0	2	8	2447	Full	9.30	9.40	12.36	30.00		-0.10		12.26		36.00		Pass	Patha=80	
HE40	MCS0	2	9	2452	Full	4.60	4.70	7.66	30.00		-0.10		7.56		36.00		Pass	Patha=115	

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band MIMO										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant0	Ant1	Ant0	Ant1		
11b	1Mbps	2	1	2412	14.79	14.89	11.10	10.16	0.50	Pass
11b	1Mbps	2	6	2437	14.89	15.03	11.12	11.12	0.50	Pass
11b	1Mbps	2	11	2462	14.84	14.99	10.16	11.10	0.50	Pass
11g	6Mbps	2	1	2412	16.43	16.38	16.36	16.36	0.50	Pass
11g	6Mbps	2	6	2437	16.38	16.43	16.34	16.36	0.50	Pass
11g	6Mbps	2	11	2462	16.38	16.38	16.36	16.36	0.50	Pass
HT20	MCS0	2	1	2412	17.58	17.58	17.18	16.86	0.50	Pass
HT20	MCS0	2	6	2437	17.58	17.58	16.74	16.98	0.50	Pass
HT20	MCS0	2	11	2462	17.58	17.53	17.56	16.86	0.50	Pass
HT40	MCS0	2	3	2422	36.16	36.46	36.40	36.16	0.50	Pass
HT40	MCS0	2	6	2437	36.46	36.56	36.12	35.56	0.50	Pass
HT40	MCS0	2	9	2452	36.46	36.46	36.40	36.16	0.50	Pass

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band MIMO											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
						Ant0	Ant1	Ant0	Ant1		
HE20	MCS0	1	1	2412	Full	18.88	18.88	18.675	18.575	0.50	Pass
HE20	MCS0	1	6	2437	Full	18.93	18.93	18.125	18.125	0.50	Pass
HE20	MCS0	1	11	2462	Full	18.88	18.93	18.025	18.350	0.50	Pass
HE40	MCS0	1	3	2422	Full	38.06	38.16	37.84	37.80	0.50	Pass
HE40	MCS0	1	6	2437	Full	38.06	38.16	37.80	37.80	0.50	Pass
HE40	MCS0	1	9	2452	Full	38.06	38.16	37.96	37.84	0.50	Pass

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TEST RESULTS DATA
Average Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average PSD (dBm/3kHz)			DG (dBi)		Average PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 0	Ant 1	Worse + 3.01	Ant 0	Ant 1	Ant 0	Ant 1	
11b	1Mbps	2	1	2412	-4.64	-4.19	-1.18	2.91		8.00		Pass
11b	1Mbps	2	6	2437	-4.96	-4.99	-1.95	2.91		8.00		Pass
11b	1Mbps	2	11	2462	-4.31	-4.43	-1.30	2.91		8.00		Pass
11g	6Mbps	2	1	2412	-6.73	-6.65	-3.64	2.91		8.00		Pass
11g	6Mbps	2	6	2437	-8.15	-7.60	-4.59	2.91		8.00		Pass
11g	6Mbps	2	11	2462	-6.90	-7.00	-3.89	2.91		8.00		Pass
HT20	MCS0	2	1	2412	-7.14	-5.65	-2.64	2.91		8.00		Pass
HT20	MCS0	2	6	2437	-6.83	-5.48	-2.47	2.91		8.00		Pass
HT20	MCS0	2	11	2462	-7.17	-5.66	-2.65	2.91		8.00		Pass
HT40	MCS0	2	3	2422	-7.14	-7.86	-4.13	2.91		8.00		Pass
HT40	MCS0	2	6	2437	-9.72	-9.81	-6.71	2.91		8.00		Pass
HT40	MCS0	2	11	2462	-9.75	-9.75	-6.74	2.91		8.00		Pass

Measured power density (dBm) has offset with cable loss.

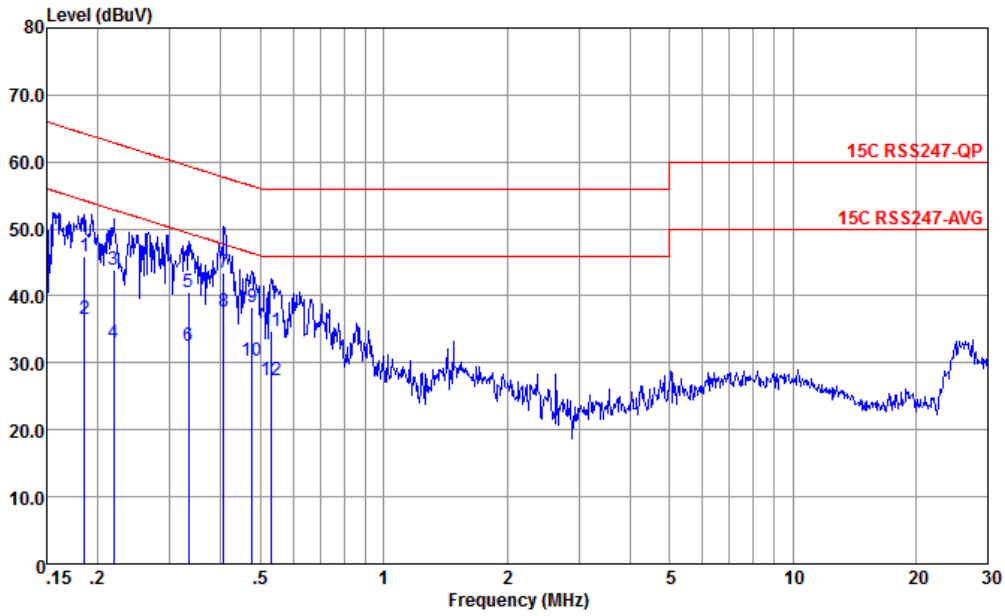
TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
						Ant0	Ant1	Worse + 3.01	Ant0	Ant1	Ant0	Ant1	
HE20	MCS0	2	1	2412	Full	-19.30	-19.11	-16.10	2.91		8.00		Pass
HE20	MCS0	2	1	2412	26/0	-20.09	-20.21	-17.08	2.91		8.00		Pass
HE20	MCS0	2	1	2412	52/37	-20.11	-19.85	-16.84	2.91		8.00		Pass
HE20	MCS0	2	1	2412	106/53	-19.43	-19.21	-16.20	2.91		8.00		Pass
HE20	MCS0	2	6	2437	Full	-7.09	-7.19	-4.08	2.91		8.00		Pass
HE20	MCS0	2	11	2462	Full	-21.40	-21.55	-18.39	2.91		8.00		Pass
HE20	MCS0	2	11	2462	26/8	-22.14	-22.48	-19.13	2.91		8.00		Pass
HE20	MCS0	2	11	2462	52/40	-22.04	-21.88	-18.87	2.91		8.00		Pass
HE20	MCS0	2	11	2462	106/54	-22.02	-22.16	-19.01	2.91		8.00		Pass

Measured power density (dBm) has offset with cable loss.

Appendix B. AC Conducted Emission Test Results

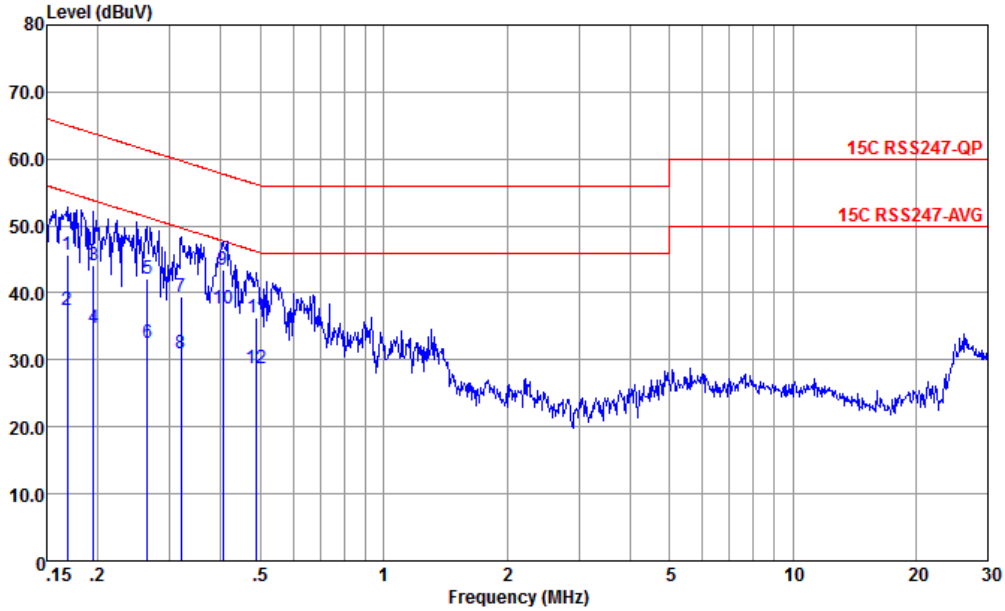
Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-L 2023 LINE

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.185	45.95	-18.29	64.24	35.50	0.04	10.41	QP
2		0.185	36.65	-17.59	54.24	26.20	0.04	10.41	Average
3		0.219	43.93	-18.95	62.88	33.51	0.03	10.39	QP
4		0.219	33.03	-19.85	52.88	22.61	0.03	10.39	Average
5		0.334	40.54	-18.81	59.35	30.20	0.03	10.31	QP
6		0.334	32.64	-16.71	49.35	22.30	0.03	10.31	Average
7		0.406	43.47	-14.26	57.73	33.19	0.00	10.28	QP
8	*	0.406	37.57	-10.16	47.73	27.29	0.00	10.28	Average
9		0.476	38.41	-18.00	56.41	28.20	-0.02	10.23	QP
10		0.476	30.41	-16.00	46.41	20.20	-0.02	10.23	Average
11		0.532	34.67	-21.33	56.00	24.50	-0.04	10.21	QP
12		0.532	27.47	-18.53	46.00	17.30	-0.04	10.21	Average

Test Engineer :	Amos Zhang	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-N 2023 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.169	45.66	-19.37	65.03	35.20	0.04	10.42	QP
2	0.169	37.36	-17.67	55.03	26.90	0.04	10.42	Average
3	0.195	44.06	-19.74	63.80	33.60	0.05	10.41	QP
4	0.195	34.66	-19.14	53.80	24.20	0.05	10.41	Average
5	0.264	42.14	-19.15	61.29	31.79	-0.01	10.36	QP
6	0.264	32.64	-18.65	51.29	22.29	-0.01	10.36	Average
7	0.320	39.48	-20.23	59.71	29.20	-0.04	10.32	QP
8	0.320	30.88	-18.83	49.71	20.60	-0.04	10.32	Average
9	0.404	43.42	-14.35	57.77	33.20	-0.06	10.28	QP
10 *	0.404	37.72	-10.05	47.77	27.50	-0.06	10.28	Average
11	0.489	36.36	-19.83	56.19	26.20	-0.07	10.23	QP
12	0.489	28.76	-17.43	46.19	18.60	-0.07	10.23	Average

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)

Appendix C. Radiated Spurious Emission

Test Engineer :	ZhangXu	Relative Humidity :	50%
		Temperature :	20-22C°

Radiated Spurious Emission Test Modes

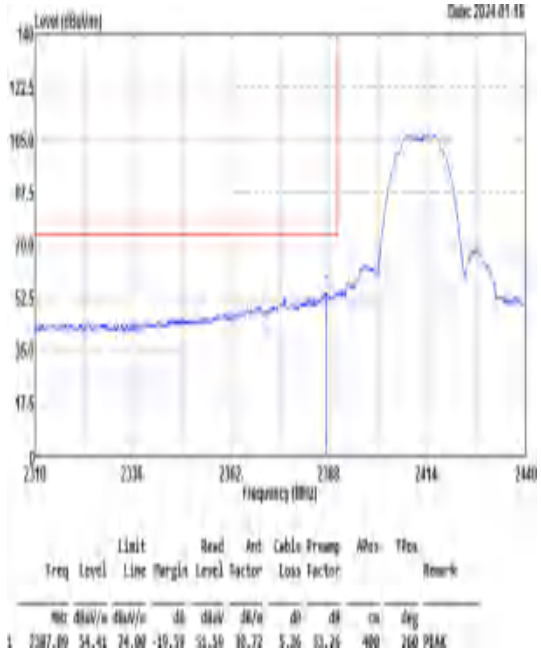
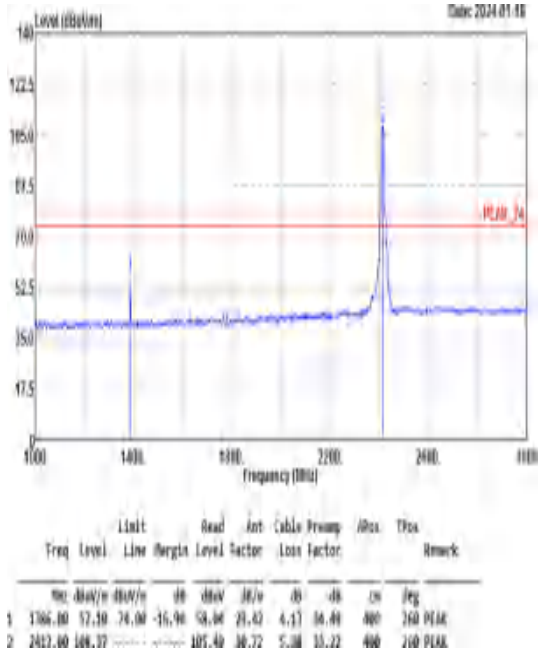
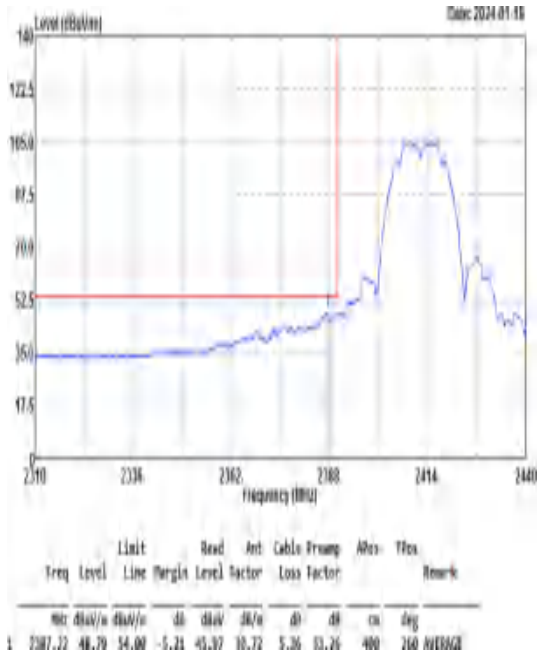
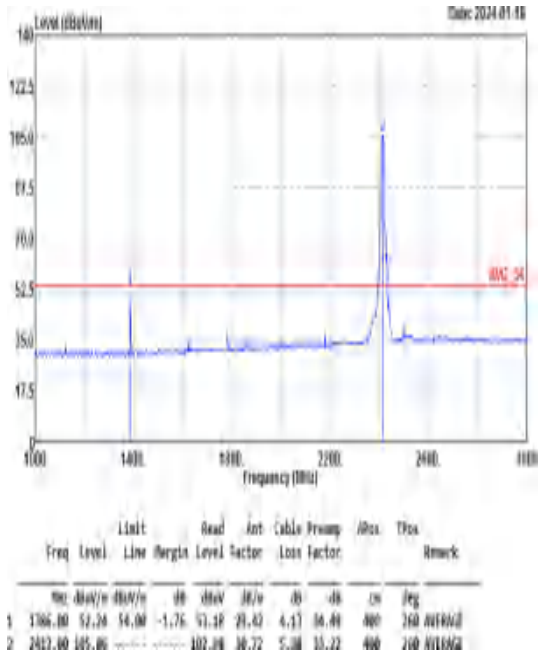
Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	CDD 0+1	802.11b	01	2412	1Mbps	-	-
Mode 2	2400-2483.5	CDD 0+1	802.11b	06	2437	1Mbps	-	-
Mode 3	2400-2483.5	CDD 0+1	802.11b	11	2462	1Mbps	-	-
Mode 4	2400-2483.5	CDD 0+1	802.11g	01	2412	6Mbps	-	-
Mode 5	2400-2483.5	CDD 0+1	802.11g	06	2437	6Mbps	-	-
Mode 6	2400-2483.5	CDD 0+1	802.11g	11	2462	6Mbps	-	-
Mode 7	2400-2483.5	CDD 0+1	802.11n HT20	01	2412	MCS0	-	-
Mode 8	2400-2483.5	CDD 0+1	802.11n HT20	06	2437	MCS0	-	-
Mode 9	2400-2483.5	CDD 0+1	802.11n HT20	11	2462	MCS0	-	-
Mode 11	2400-2483.5	CDD 0+1	802.11n HT40	03	2422	MCS0	-	-
Mode 11	2400-2483.5	CDD 0+1	802.11n HT40	06	2437	MCS0	-	-
Mode 12	2400-2483.5	CDD 0+1	802.11n HT40	09	2452	MCS0	-	-
Mode 13	2400-2483.5	CDD 0+1	802.11ax HE20	01	2412	MCS0	Full	-
Mode 14	2400-2483.5	CDD 0+1	802.11ax HE20	06	2437	MCS0	Full	-
Mode 15	2400-2483.5	CDD 0+1	802.11ax HE20	11	2462	MCS0	Full	-
Mode 16	2400-2483.5	CDD 0+1	802.11ax HE20	01	2412	MCS0	Partial	RU26/0
Mode 17	2400-2483.5	CDD 0+1	802.11ax HE20	01	2412	MCS0	Partial	RU52/37
Mode 18	2400-2483.5	CDD 0+1	802.11ax HE20	01	2412	MCS0	Partial	RU106/53
Mode 18	2400-2483.5	CDD 0+1	802.11ax HE20	11	2462	MCS0	Partial	RU26/8
Mode 20	2400-2483.5	CDD 0+1	802.11ax HE20	11	2462	MCS0	Partial	RU52/40
Mode 21	2400-2483.5	CDD 0+1	802.11ax HE20	11	2462	MCS0	Partial	RU106/54
Mode 22	2400-2483.5	CDD 0+1	802.11ax HE40	03	2422	MCS0	-	-
Mode 23	2400-2483.5	CDD 0+1	802.11ax HE40	06	2437	MCS0	-	-
Mode 24	2400-2483.5	CDD 0+1	802.11ax HE40	09	2452	MCS0	-	-
Mode 25	2400-2483.5	CDD 0+1	802.11n HT20	01	2412	MCS0		
		CDD 0+1	Bluetooth-LE	38	2478	2Mbps	-	-
Mode 26	2400-2483.5	CDD 0+1	802.11n HT20	01	2412	MCS0	-	LF
Mode 27	2400-2483.5	CDD 0+1	802.11g	02	2417	6Mbps	-	-
Mode 28	2400-2483.5	CDD 0+1	802.11g	10	2457	6Mbps	-	-
Mode 29	2400-2483.5	CDD 0+1	802.11n HT20	02	2417	MCS0	-	-
Mode 30	2400-2483.5	CDD 0+1	802.11n HT20	03	2422	MCS0	-	-

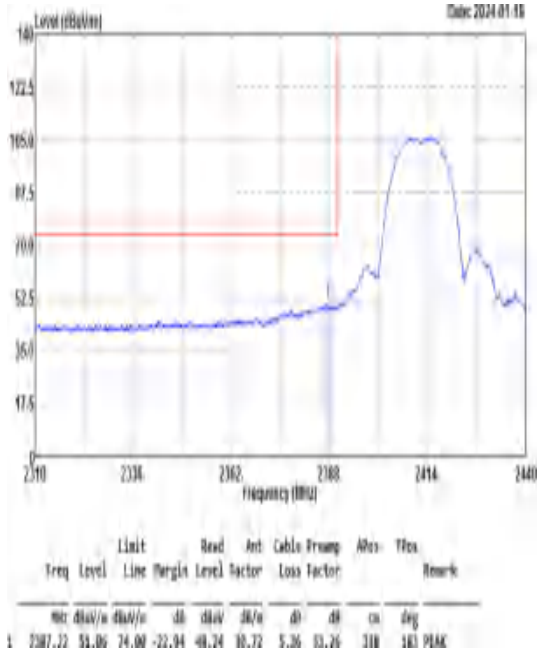
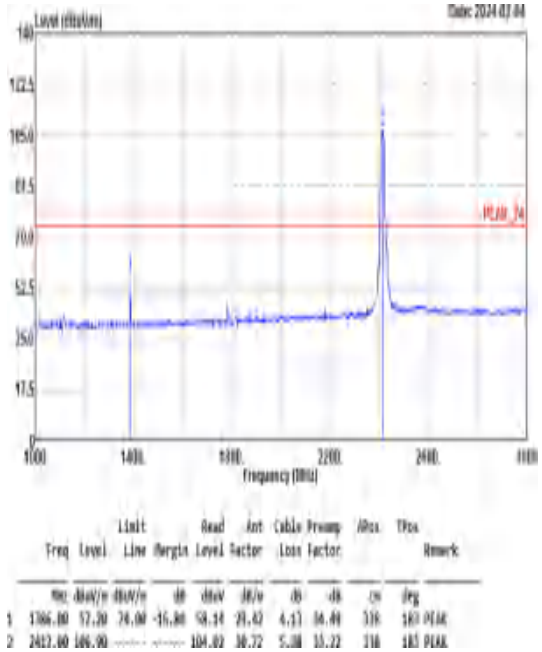
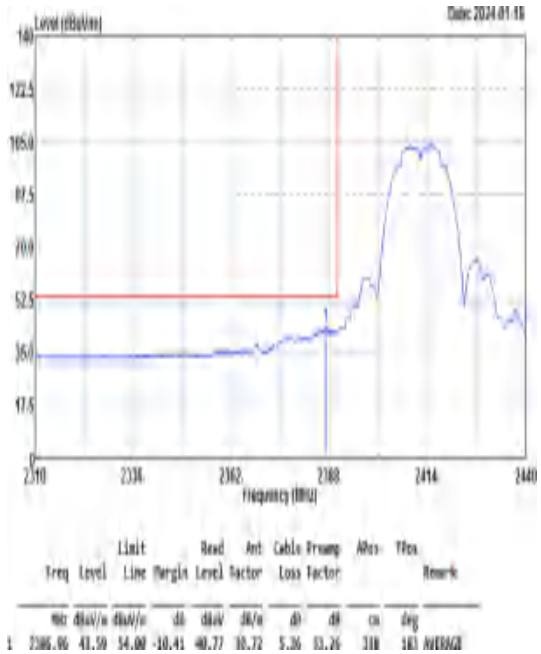
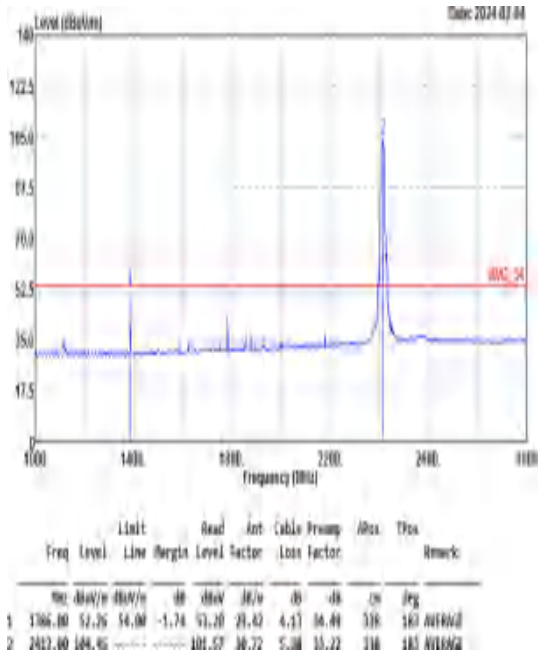
Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 31	2400-2483.5	CDD 0+1	802.11n HT20	04	2427	MCS0	-	-
Mode 32	2400-2483.5	CDD 0+1	802.11n HT20	10	2457	MCS0	-	-
Mode 33	2400-2483.5	CDD 0+1	802.11n HT20	09	2452	MCS0	-	-
Mode 34	2400-2483.5	CDD 0+1	802.11n HT40	07	2442	MCS0	-	-
Mode 35	2400-2483.5	CDD 0+1	802.11n HT40	04	2427	MCS0	-	-
Mode 36	2400-2483.5	CDD 0+1	802.11n HT40	08	2447	MCS0	-	-
Mode 37	2400-2483.5	CDD 0+1	802.11ax HE20	02	2417	MCS0	-	-
Mode 38	2400-2483.5	CDD 0+1	802.11ax HE20	03	2422	MCS0	-	-
Mode 39	2400-2483.5	CDD 0+1	802.11ax HE20	10	2457	MCS0	-	-
Mode 40	2400-2483.5	CDD 0+1	802.11ax HE20	09	2452	MCS0	-	-
Mode 41	2400-2483.5	CDD 0+1	802.11ax HE40	04	2427	MCS0	-	-
Mode 42	2400-2483.5	CDD 0+1	802.11ax HE40	08	2447	MCS0	-	-
Mode 43	2400-2483.5	CDD 0+1	802.11ax HE40	07	2442	MCS0	-	-

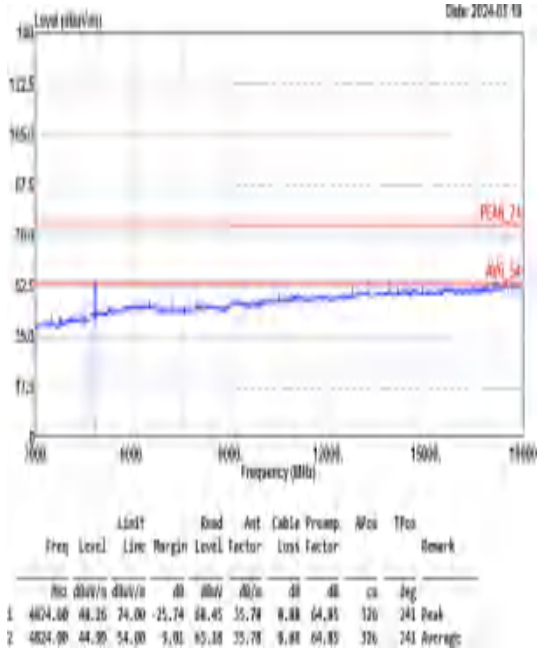
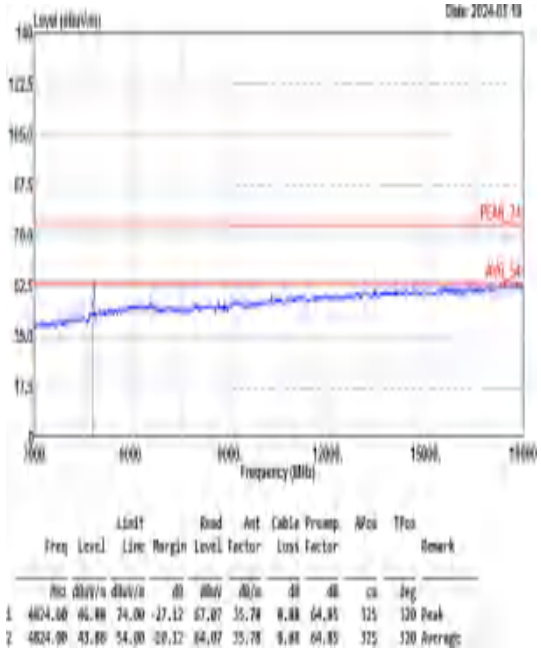
Summary of each worse mode

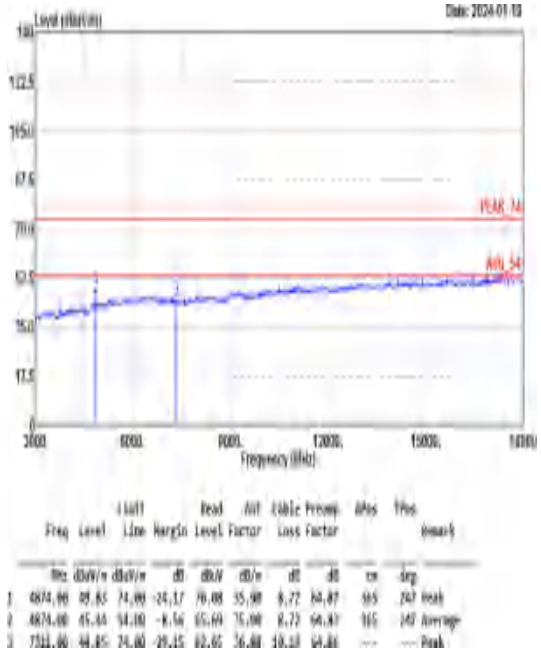
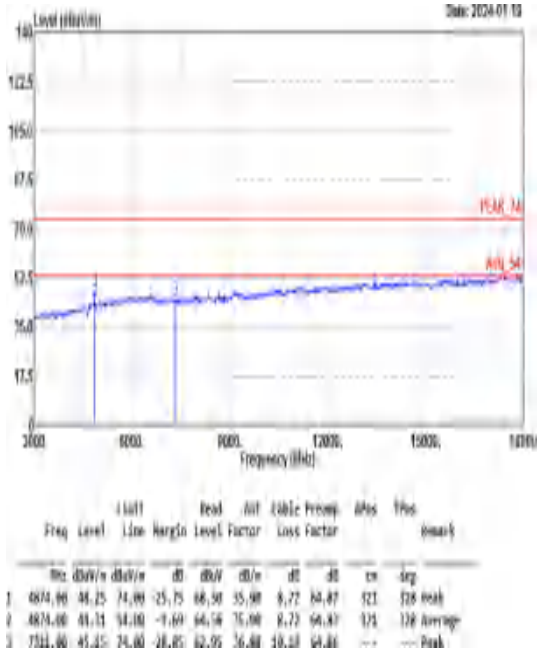
Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	802.11b	01	1386.00	52.26	54.00	-1.74	V	AVERAGE	Pass	Band Edge
1	802.11b	01	4824.00	44.99	54.00	-9.01	H	Average	Pass	Harmonic
2	802.11b	06	-	-	-	-	-	-	-	Band Edge
2	802.11b	06	4874.00	45.44	54.00	-8.56	H	Average	Pass	Harmonic
3	802.11b	11	1386.00	52.31	54.00	-1.69	H	AVERAGE	Pass	Band Edge
3	802.11b	11	4924.00	41.24	54.00	-12.76	H	Average	Pass	Harmonic
4	802.11g	01	1386.00	51.58	54.00	-2.42	V	AVERAGE	Pass	Band Edge
4	802.11g	01	4824.00	42.47	74.00	-31.53	H	Peak	Pass	Harmonic
5	802.11g	06	1386.00	51.95	54.00	-2.05	H	AVERAGE	Pass	Band Edge
5	802.11g	06	7311.00	46.96	74.00	-27.04	V	Peak	Pass	Harmonic
6	802.11g	11	1386.00	51.51	54.00	-2.49	V	AVERAGE	Pass	Band Edge
6	802.11g	11	7386.00	44.19	74.00	-29.81	V	Peak	Pass	Harmonic
7	802.11n HT20	01	1386.00	52.52	54.00	-1.48	H	AVERAGE	Pass	Band Edge
7	802.11n HT20	01	4824.00	42.99	74.00	-31.01	V	Peak	Pass	Harmonic
8	802.11n HT20	06	1386.00	51.74	54.00	-2.26	V	AVERAGE	Pass	Band Edge
8	802.11n HT20	06	7311.00	45.00	74.00	-29.00	H	Peak	Pass	Harmonic
9	802.11n HT20	11	1386.00	51.81	54.00	-2.19	H	AVERAGE	Pass	Band Edge
9	802.11n HT20	11	7386.00	44.07	74.00	-29.93	H	Peak	Pass	Harmonic
10	802.11n HT40	03	1386.00	51.59	54.00	-2.41	V	AVERAGE	Pass	Band Edge
10	802.11n HT40	03	7266.00	44.43	74.00	-29.57	V	Peak	Pass	Harmonic
11	802.11n HT40	06	1386.00	51.02	54.00	-2.98	H	AVERAGE	Pass	Band Edge
11	802.11n HT40	06	7311.00	45.29	74.00	-28.71	V	Peak	Pass	Harmonic
12	802.11n HT40	09	1386.00	52.27	54.00	-1.73	V	Peak	Pass	Band Edge
12	802.11n HT40	09	7356.00	44.39	74.00	-29.61	H	Peak	Pass	Harmonic
13	802.11ax HE20	01	1386.00	51.57	54.00	-2.43	H	Peak	Pass	Band Edge
13	802.11ax HE20	01	4824.00	42.75	74.00	-31.25	V	Peak	Pass	Harmonic
14	802.11ax HE20	06	1444.00	51.89	54.00	-2.11	V	AVERAGE	Pass	Band Edge
14	802.11ax HE20	06	7311.00	46.27	54.00	-7.73	V	Average	Pass	Harmonic
15	802.11ax HE20	11	1386.00	52.35	54.00	-1.65	V	Peak	Pass	Band Edge
15	802.11ax HE20	11	7386.00	44.55	74.00	-29.45	V	Peak	Pass	Harmonic
16	802.11ax HE20	01	2387.74	45.51	54.00	-8.49	H	AVERAGE	Pass	Band Edge
16	802.11ax HE20	01	-	-	-	-	-	-	-	Harmonic
17	802.11ax HE20	01	2389.82	44.79	54.00	-9.21	H	AVERAGE	Pass	Band Edge
17	802.11ax HE20	01	-	-	-	-	-	-	-	Harmonic
18	802.11ax HE20	01	2389.30	47.78	54.00	-6.22	H	AVERAGE	Pass	Band Edge
18	802.11ax HE20	01	-	-	-	-	-	-	-	Harmonic
19	802.11ax HE20	11	2483.51	50.11	54.00	-3.89	H	AVERAGE	Pass	Band Edge
19	802.11ax HE20	11	-	-	-	-	-	-	-	Harmonic
20	802.11ax HE20	11	2483.66	50.63	54.00	-3.37	H	AVERAGE	Pass	Band Edge
20	802.11ax HE20	11	-	-	-	-	-	-	-	Harmonic
21	802.11ax HE20	11	2483.55	50.62	54.00	-3.38	H	AVERAGE	Pass	Band Edge
21	802.11ax HE20	11	-	-	-	-	-	-	-	Harmonic
22	802.11ax HE40	03	1386.00	51.39	54.00	-2.61	H	AVERAGE	Pass	Band Edge
22	802.11ax HE40	03	7266.00	44.72	74.00	-29.28	H	Peak	Pass	Harmonic

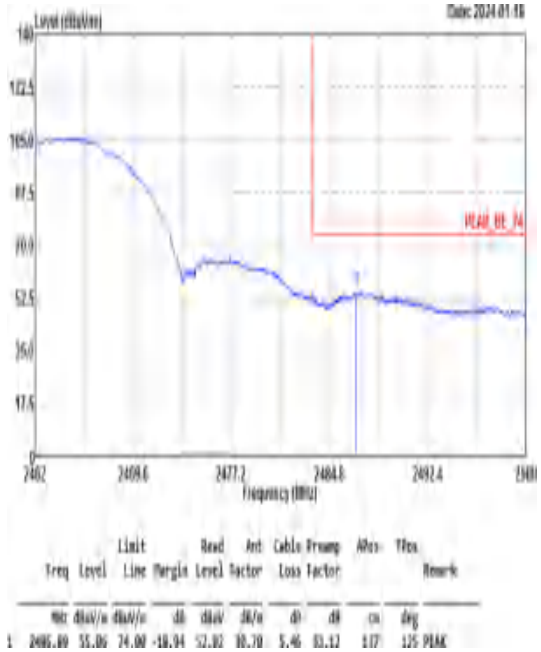
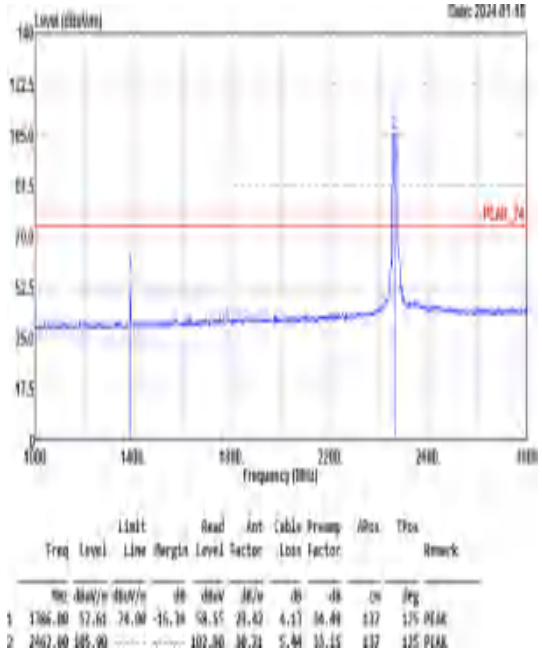
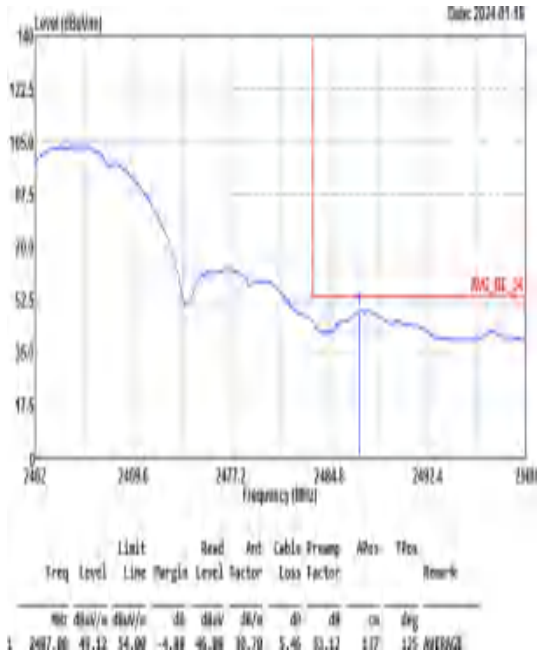
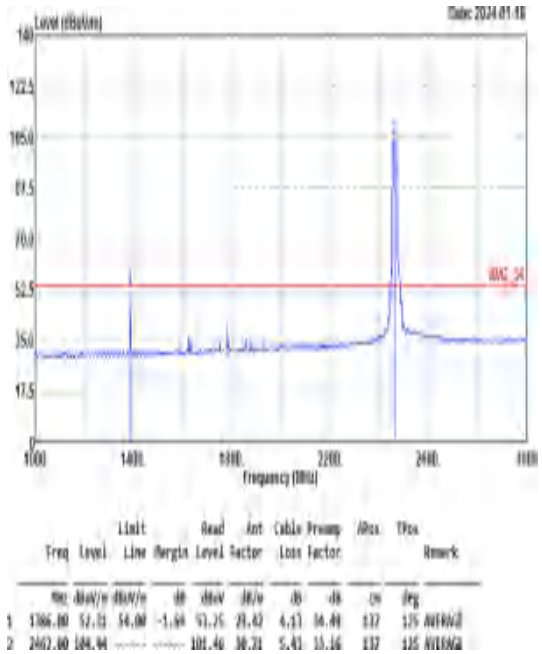
Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
23	802.11ax HE40	06	1386.00	51.67	54.00	-2.33	H	AVERAGE	Pass	Band Edge
23	802.11ax HE40	06	7311.00	44.86	74.00	-29.14	V	Peak	Pass	Harmonic
24	802.11ax HE40	09	1386.00	51.57	54.00	-2.43	H	AVERAGE	Pass	Band Edge
24	802.11ax HE40	09	7356.00	44.49	74.00	-29.51	V	Peak	Pass	Harmonic
25	11n20 & BLE Co-location	01	1386.00	51.43	54.00	-2.57	H	AVERAGE	Pass	Band Edge
		38	4956.00	43.78	74.00	-30.22	V	Peak	Pass	Harmonic
26	802.11n HT20	01	675.05	45.57	46.00	-0.43	V	Peak	Pass	LF
27	802.11g	02	2389.82	47.96	54.00	-6.04	H	AVERAGE	Pass	Band Edge
27	802.11g	02	-	-	-	-	-	-	-	Harmonic
28	802.11g	10	2483.83	50.91	54.00	-3.09	H	AVERAGE	Pass	Band Edge
28	802.11g	10	-	-	-	-	-	-	-	Harmonic
29	802.11n HT20	02	2389.82	48.68	54.00	-5.32	H	AVERAGE	Pass	Band Edge
29	802.11n HT20	02	-	-	-	-	-	-	-	Harmonic
30	802.11n HT20	03	2389.82	50.00	54.00	-4.00	H	AVERAGE	Pass	Band Edge
30	802.11n HT20	03	-	-	-	-	-	-	-	Harmonic
31	802.11n HT20	04	2389.17	50.20	54.00	-3.80	H	AVERAGE	Pass	Band Edge
31	802.11n HT20	04	-	-	-	-	-	-	-	Harmonic
32	802.11n HT20	10	2483.83	49.60	54.00	-4.40	H	AVERAGE	Pass	Band Edge
32	802.11n HT20	10	-	-	-	-	-	-	-	Harmonic
33	802.11n HT20	09	2483.54	49.97	54.00	-4.03	H	AVERAGE	Pass	Band Edge
33	802.11n HT20	09	-	-	-	-	-	-	-	Harmonic
34	802.11n HT40	07	2486.06	50.60	54.00	-3.40	H	AVERAGE	Pass	Band Edge
34	802.11n HT40	07	-	-	-	-	-	-	-	Harmonic
35	802.11n HT40	04	2389.33	50.95	54.00	-3.05	H	AVERAGE	Pass	Band Edge
35	802.11n HT40	04	-	-	-	-	-	-	-	Harmonic
36	802.11n HT40	08	2484.74	50.74	54.00	-3.26	H	AVERAGE	Pass	Band Edge
36	802.11n HT40	08	-	-	-	-	-	-	-	Harmonic
37	802.11ax HE20	02	2389.30	49.50	54.00	-4.50	H	AVERAGE	Pass	Band Edge
37	802.11ax HE20	02	-	-	-	-	-	-	-	Harmonic
38	802.11ax HE20	03	2389.95	49.16	54.00	-4.84	V	AVERAGE	Pass	Band Edge
38	802.11ax HE20	03	-	-	-	-	-	-	-	Harmonic
39	802.11ax HE20	10	2483.53	50.74	54.00	-3.26	H	AVERAGE	Pass	Band Edge
39	802.11ax HE20	10	-	-	-	-	-	-	-	Harmonic
40	802.11ax HE20	09	2483.93	50.18	54.00	-3.82	H	AVERAGE	Pass	Band Edge
40	802.11ax HE20	09	-	-	-	-	-	-	-	Harmonic
41	802.11ax HE40	04	2389.56	48.20	54.00	-5.80	H	AVERAGE	Pass	Band Edge
41	802.11ax HE40	04	-	-	-	-	-	-	-	Harmonic
42	802.11ax HE40	08	2483.94	50.29	54.00	-3.71	H	AVERAGE	Pass	Band Edge
42	802.11ax HE40	08	-	-	-	-	-	-	-	Harmonic
43	802.11ax HE40	07	2483.75	50.82	54.00	-3.18	H	AVERAGE	Pass	Band Edge
43	802.11ax HE40	07	-	-	-	-	-	-	-	Harmonic

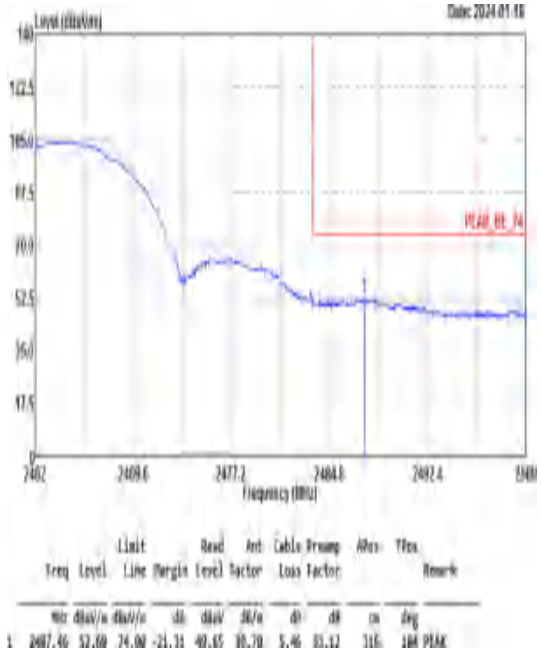
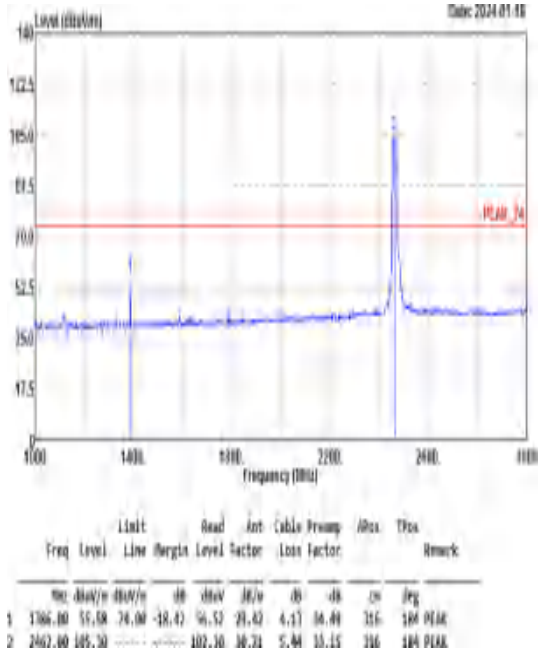
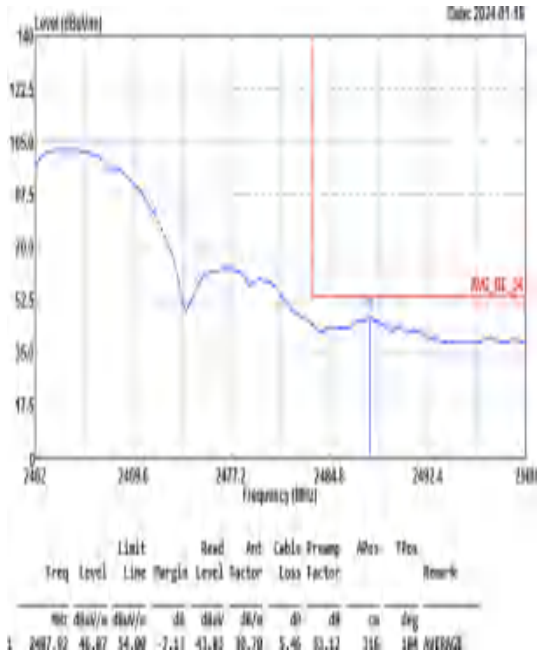
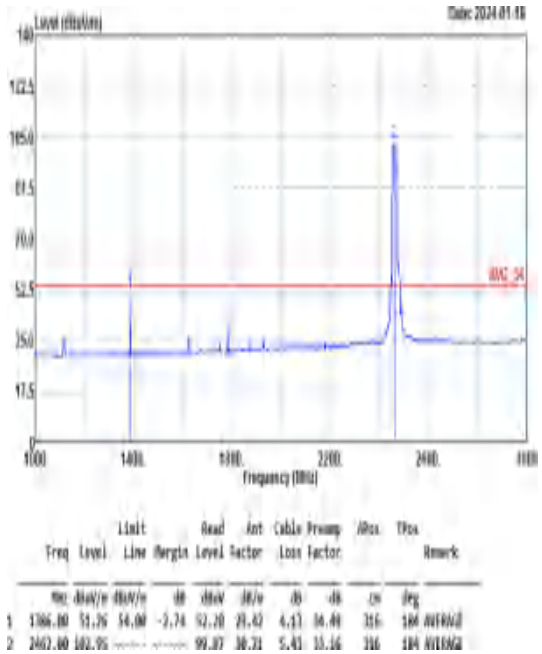
Mode	**1**	
	Band Edge	
	2400-2483.5_802.11b_CH01_2412MHz	
ANT	**CDD 0+1**	
Pol.	**Horizontal**	**Fundamental**
Peak		
Avg		

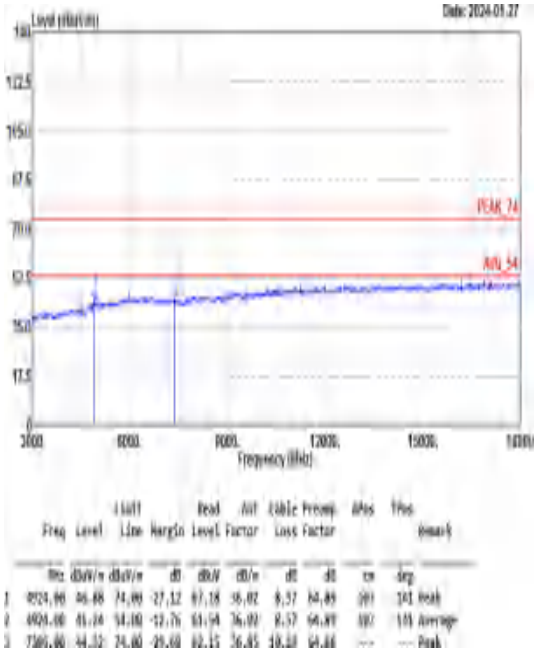
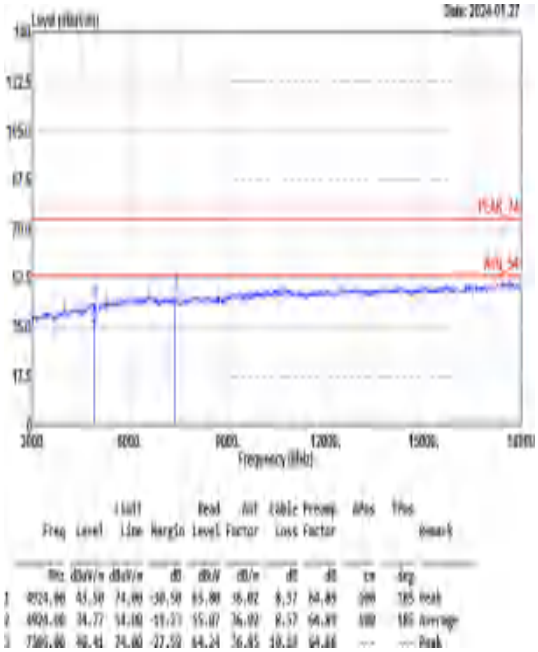
Mode	**1**	
	Band Edge	
	2400-2483.5_802.11b_CH01_2412MHz	
ANT	**CDD 0+1**	
Pol.	**Vertical**	**Fundamental**
Peak		
Avg		

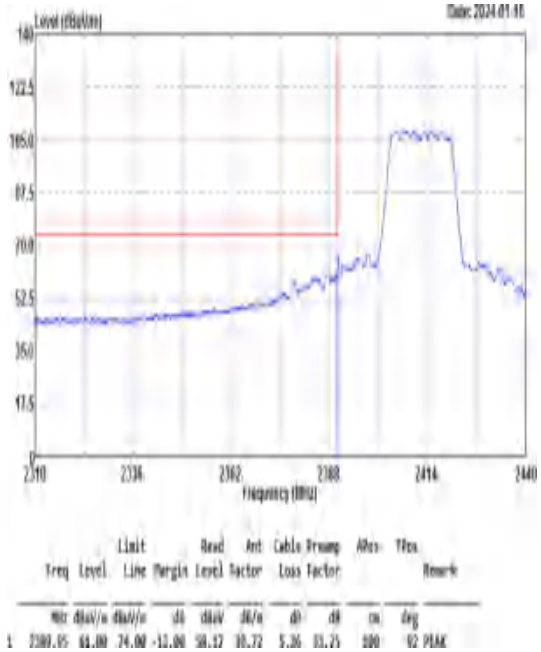
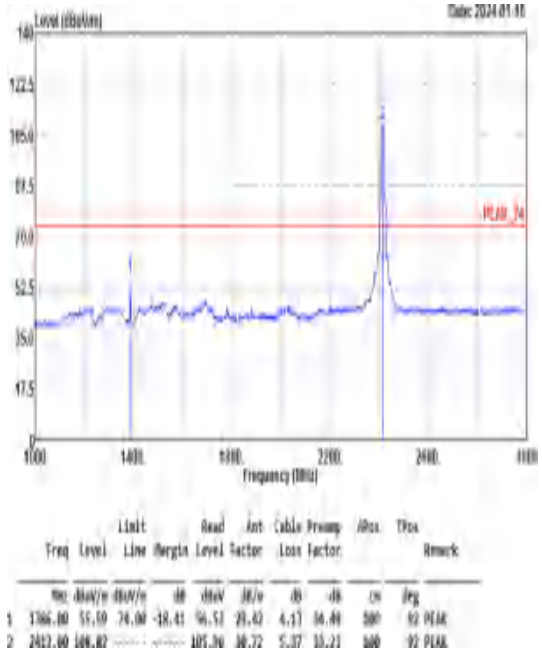
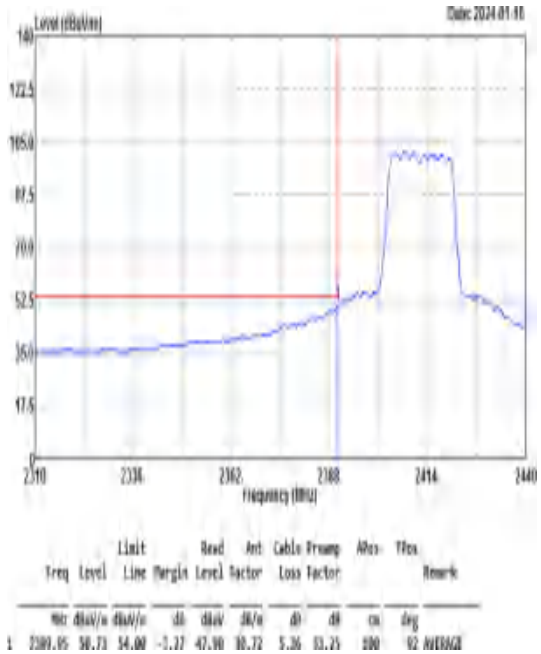
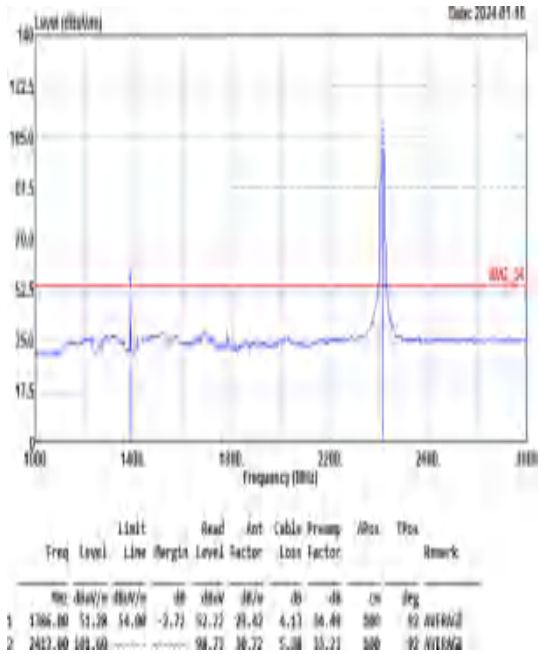
Mode	1	
	Harmonic	
	2400-2483.5_802.11b_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg	 	

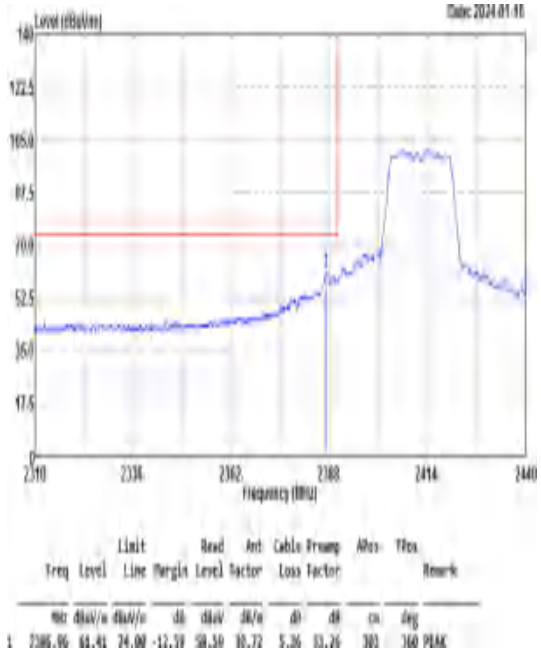
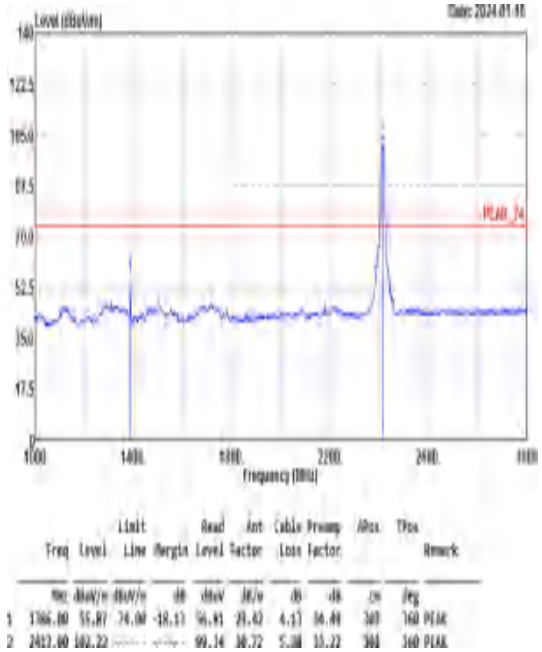
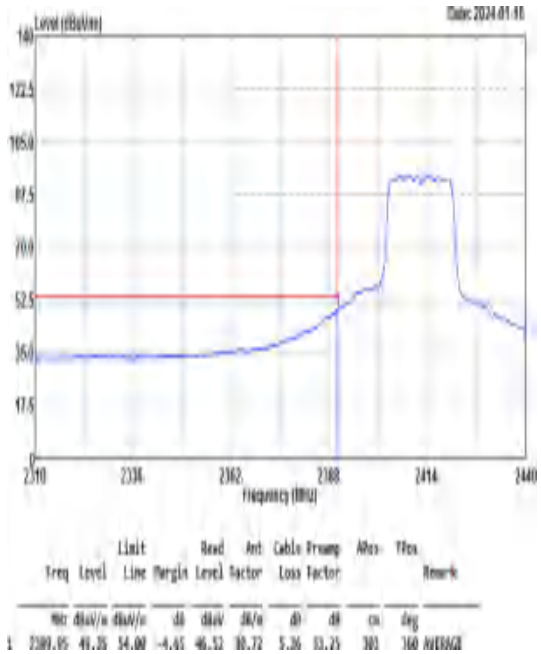
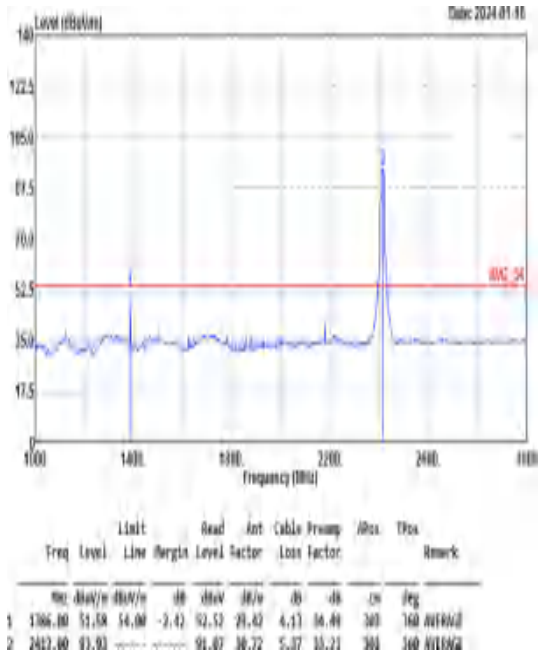
Mode	**2**	
	Harmonic	
	2400-2483.5_802.11b_CH06_2437MHz	
ANT	**CDD 0+1**	
Pol.	**Horizontal**	**Vertical**
Peak **Avg**		

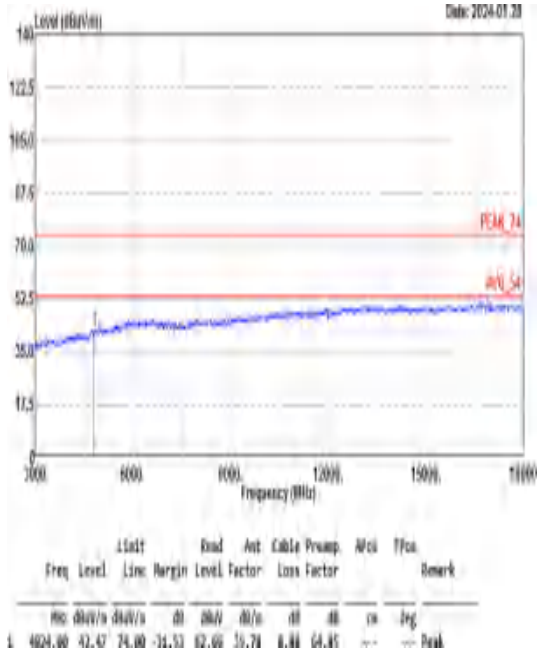
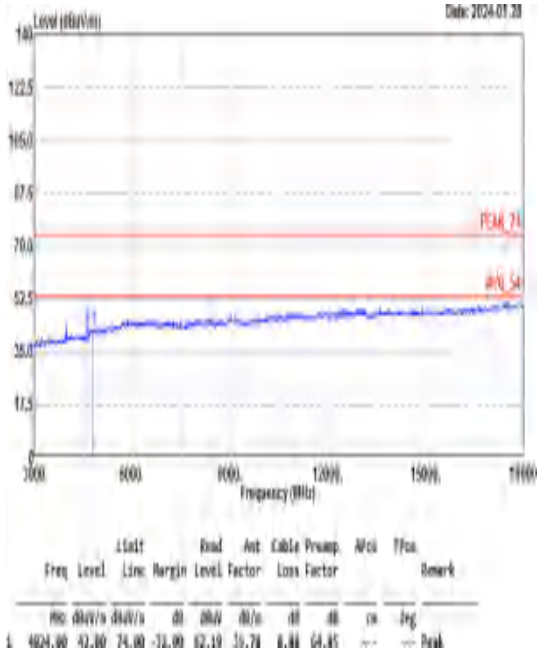
Mode	3	
	Band Edge	
	2400-2483.5_802.11b_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

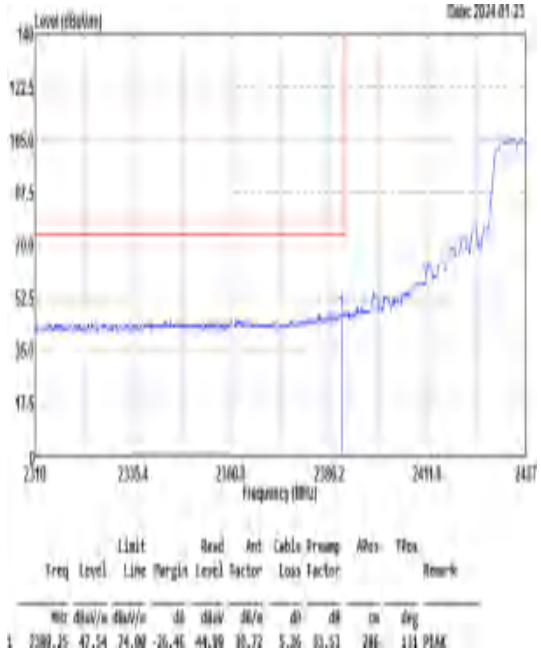
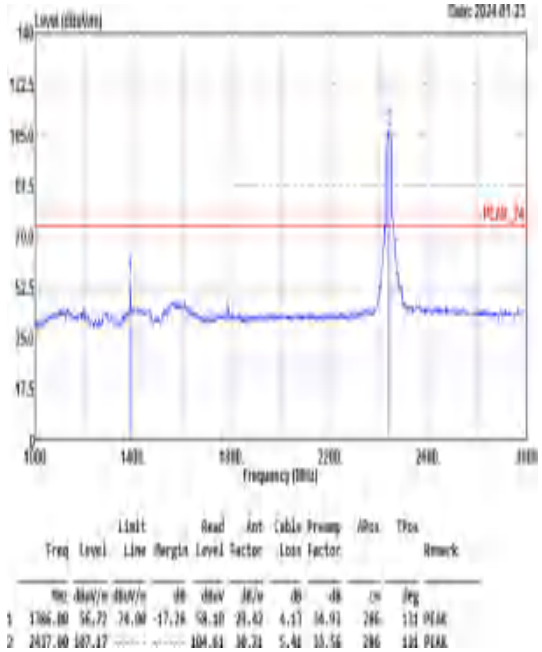
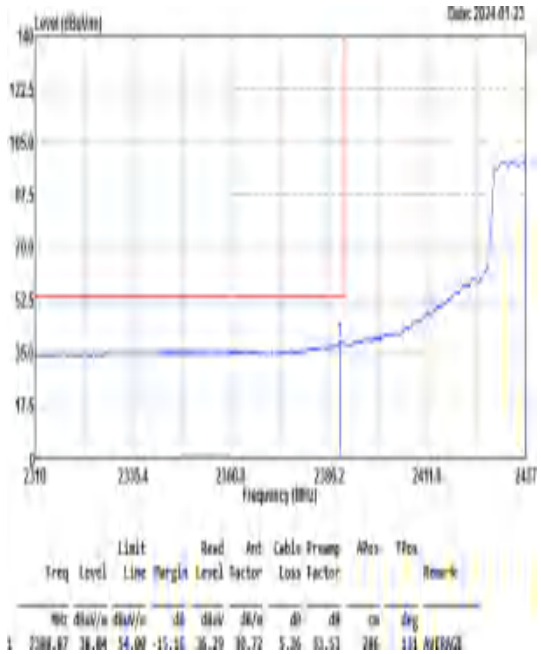
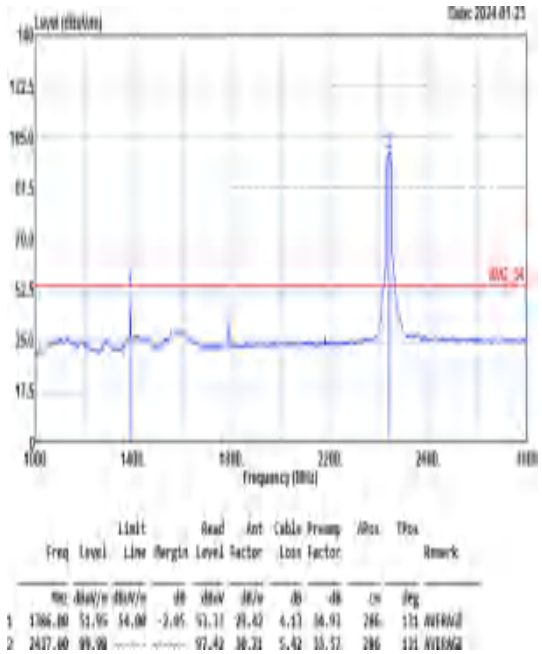
Mode	**3**	
	Band Edge	
	2400-2483.5_802.11b_CH11_2462MHz	
ANT	**CDD 0+1**	
Pol.	**Vertical**	**Fundamental**
Peak		
Avg		

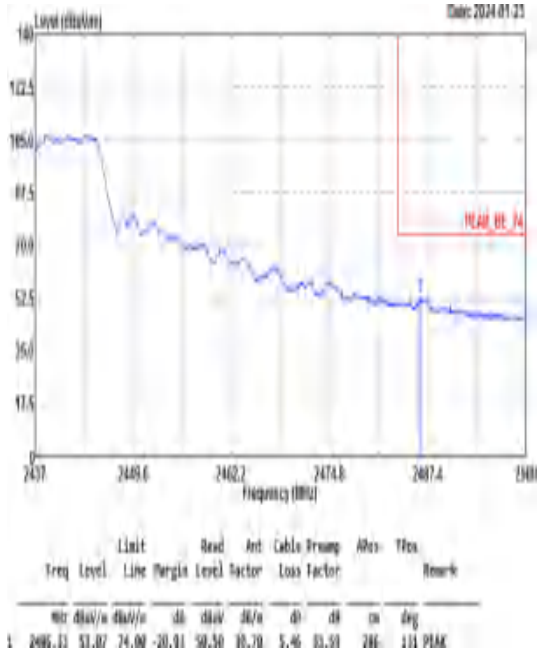
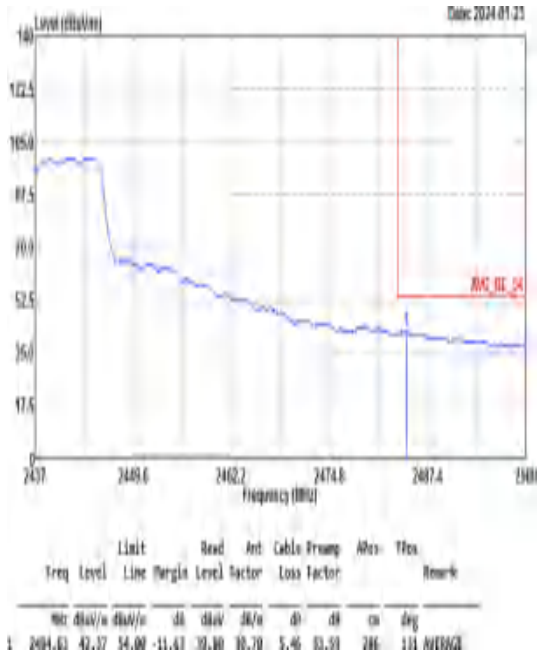
Mode	3	
	Harmonic	
	2400-2483.5_802.11b_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

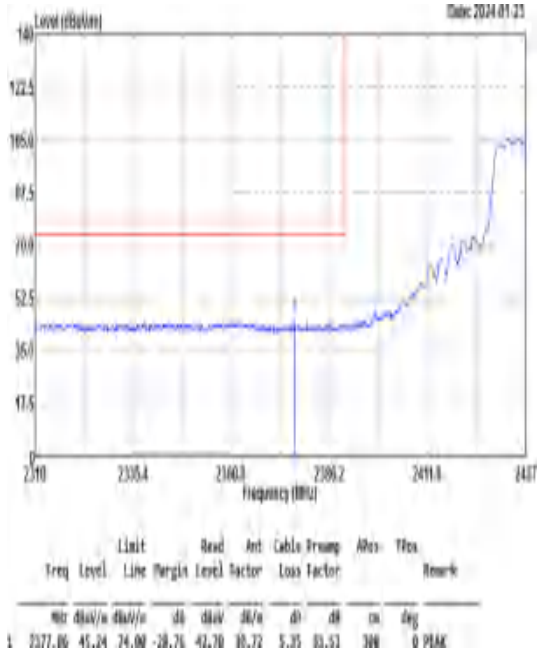
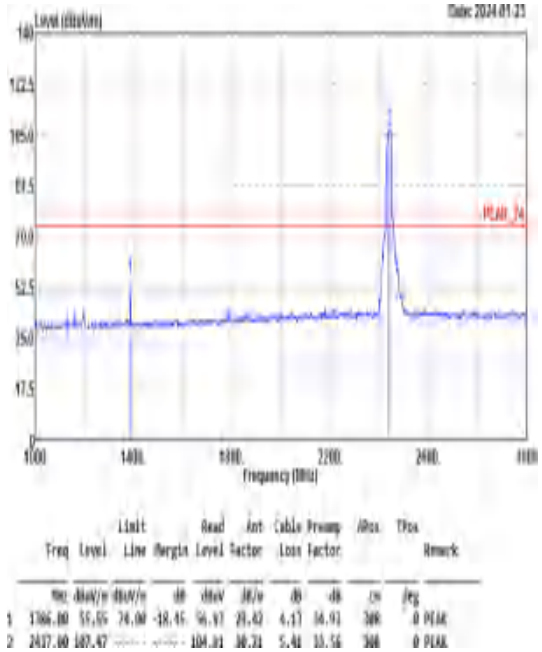
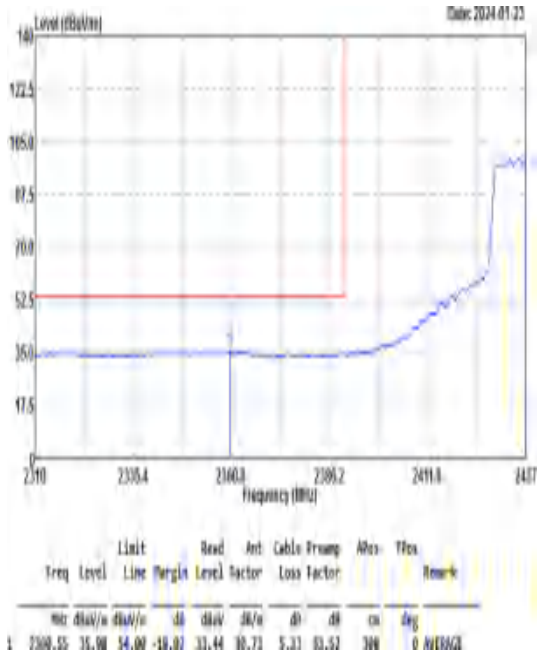
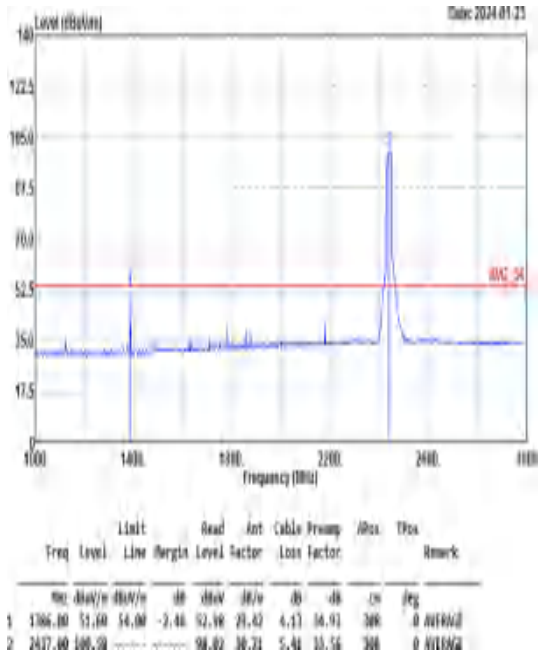
Mode	**4**	
	Band Edge	
	2400-2483.5_802.11g_CH01_2412MHz	
ANT	**CDD 0+1**	
Pol.	**Horizontal**	**Fundamental**
Peak		
Avg		

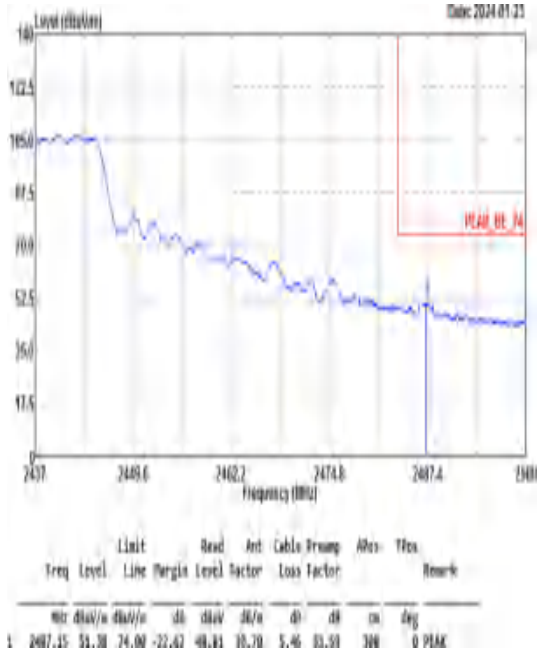
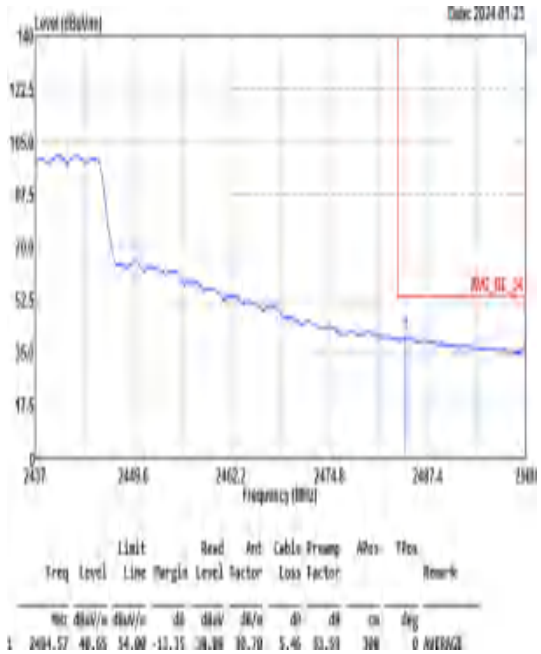
Mode	**4**	
	Band Edge	
	2400-2483.5_802.11g_CH01_2412MHz	
ANT	**CDD 0+1**	
Pol.	**Vertical**	**Fundamental**
Peak		
Avg		

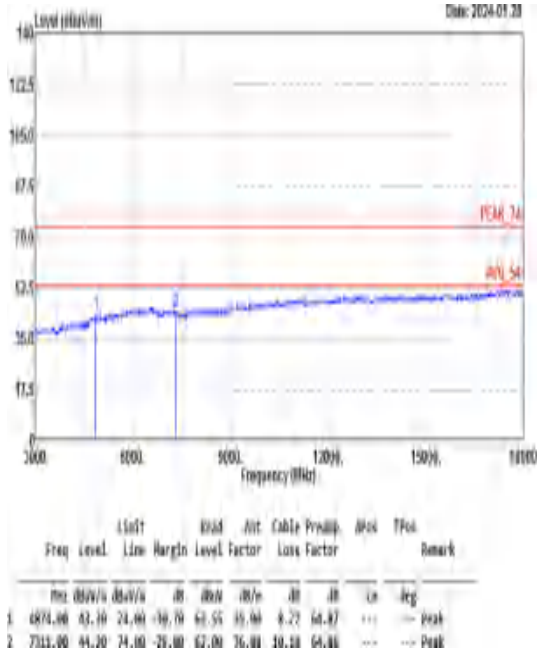
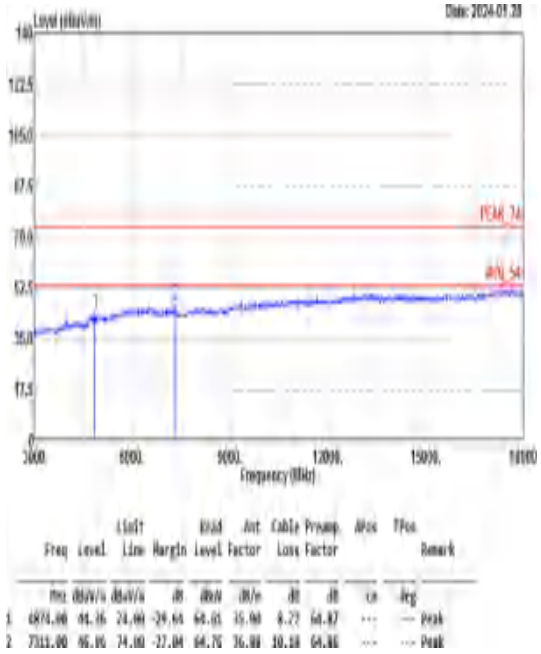
Mode	4	
	Harmonic	
	2400-2483.5_802.11g_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

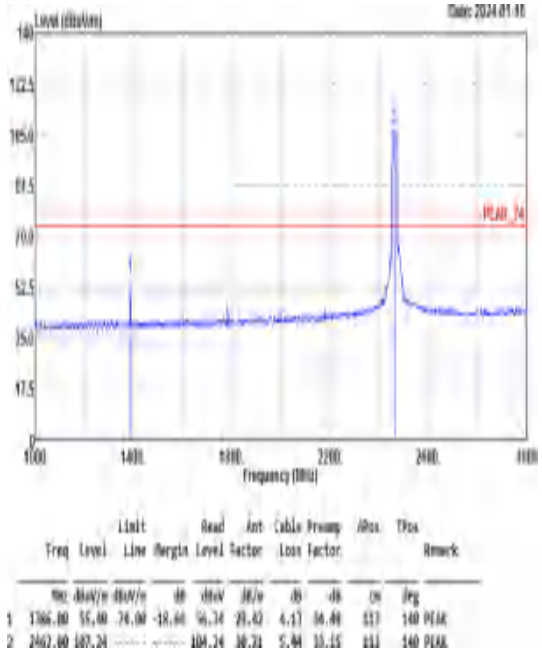
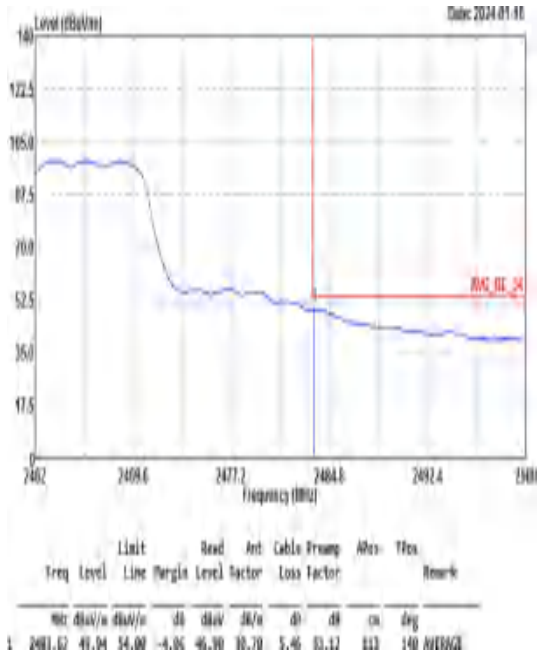
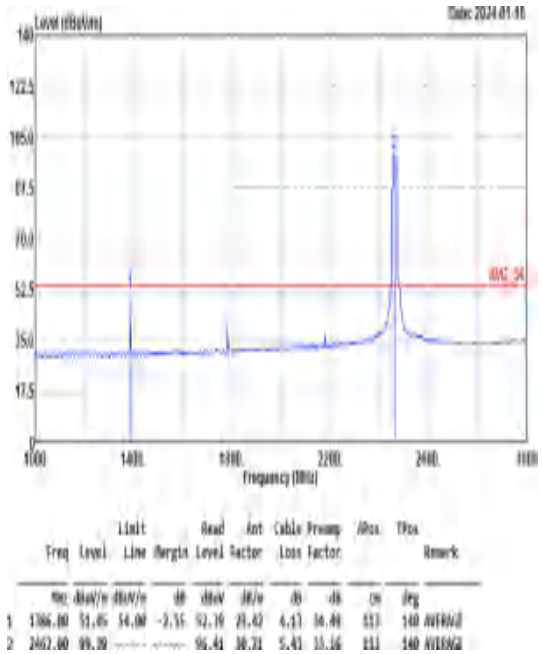
Mode	5	
	Band Edge - L	
	2400-2483.5_802.11g_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

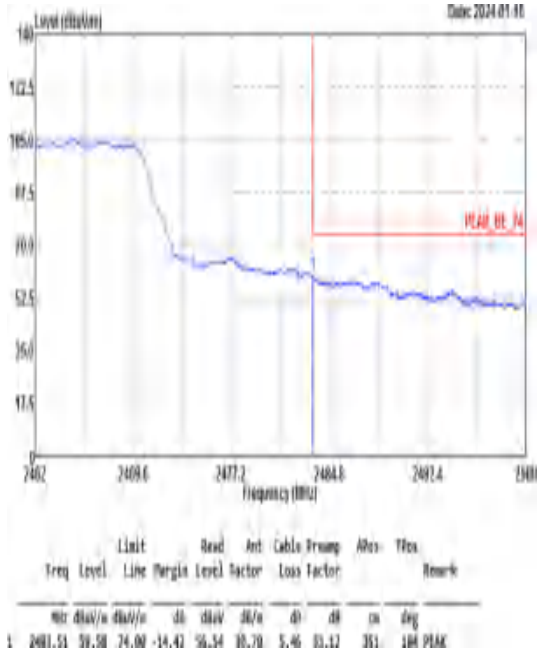
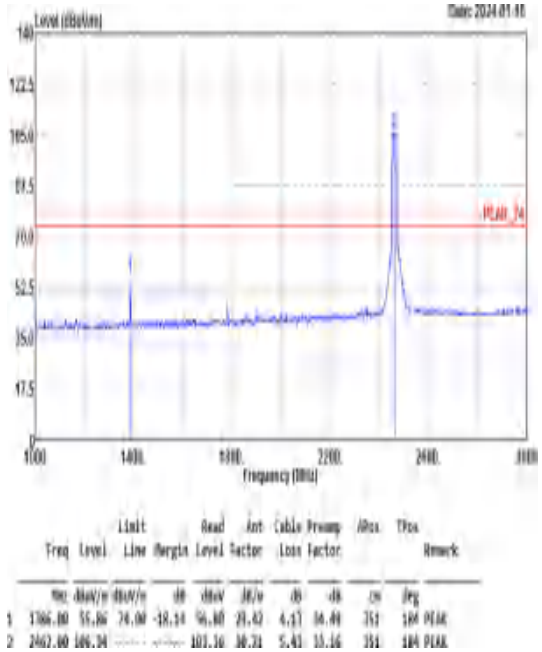
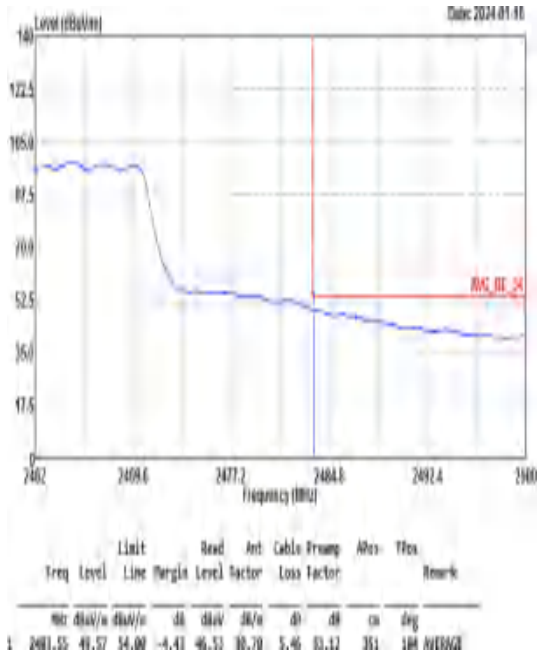
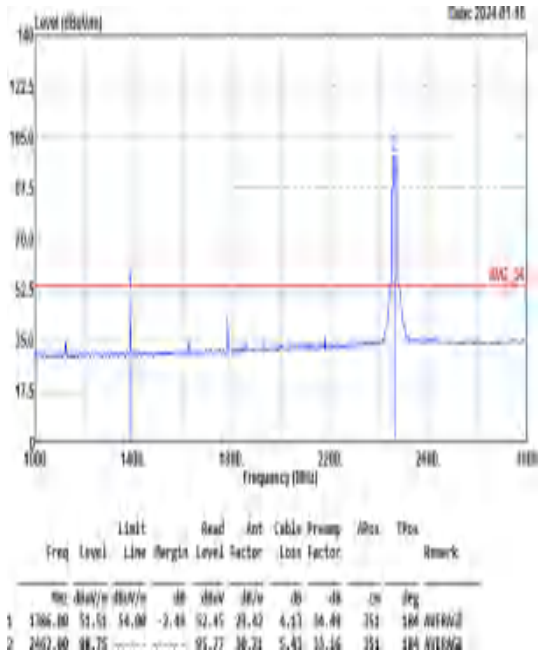
Mode	5	
	Band Edge - R	
	2400-2483.5_802.11g_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

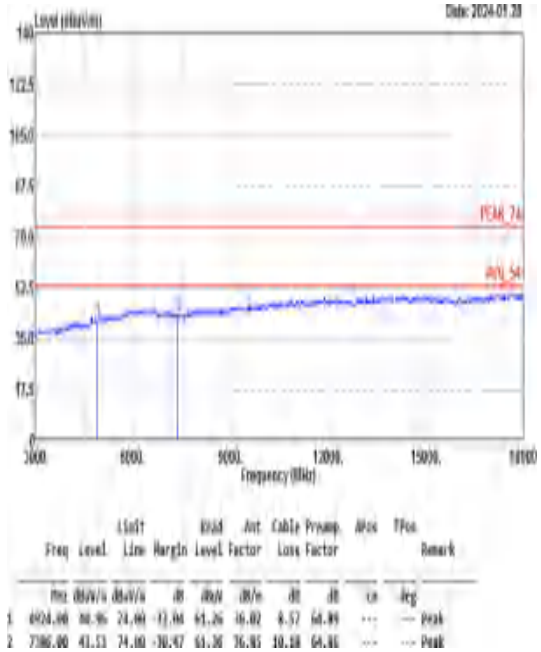
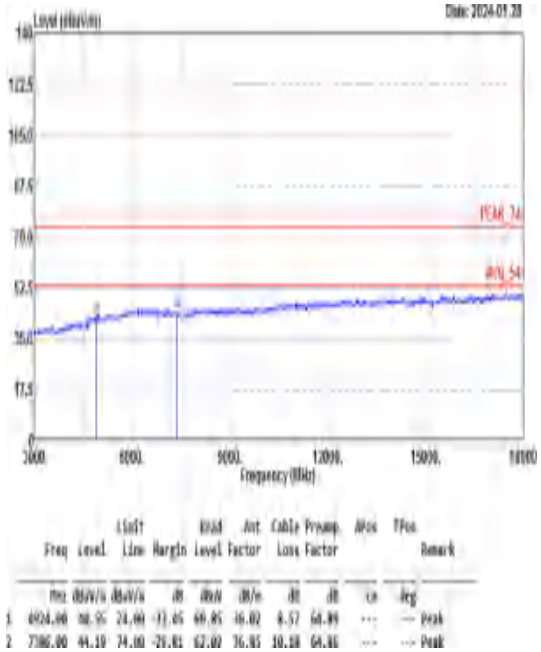
Mode	**5**	
	Band Edge - L	
	2400-2483.5_802.11g_CH06_2437MHz	
ANT	**CDD 0+1**	
Pol.	**Vertical**	**Fundamental**
Peak		
Avg		

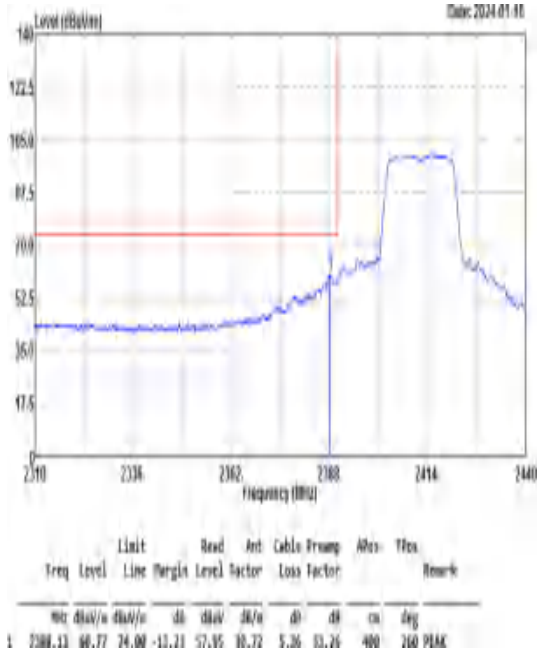
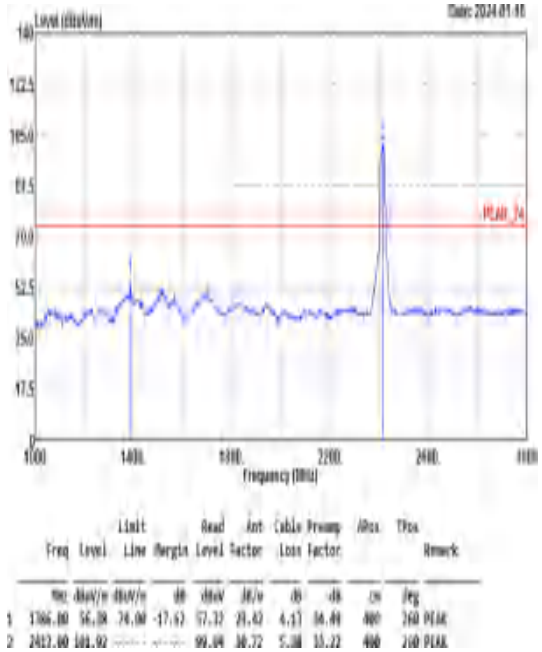
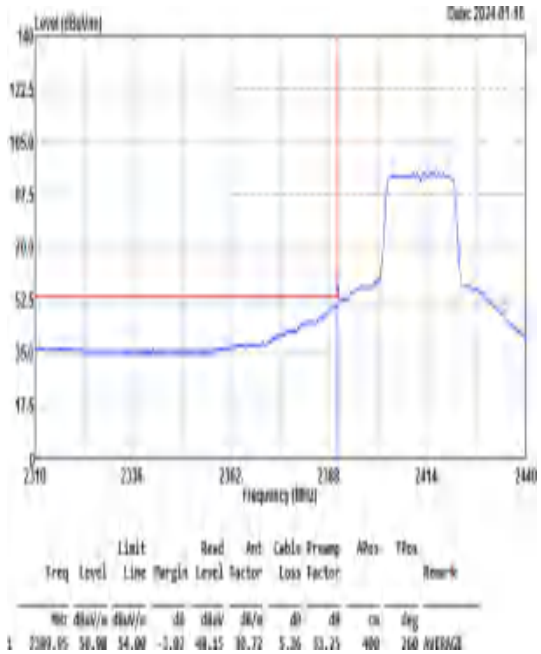
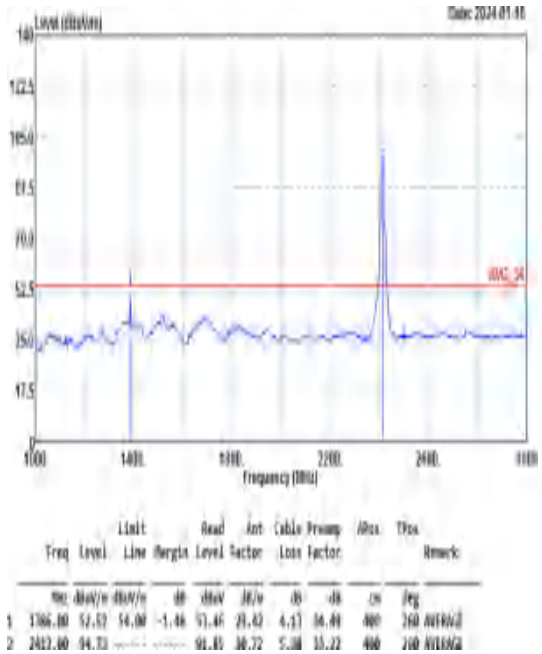
Mode	5	
	Band Edge - R	
	2400-2483.5_802.11g_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

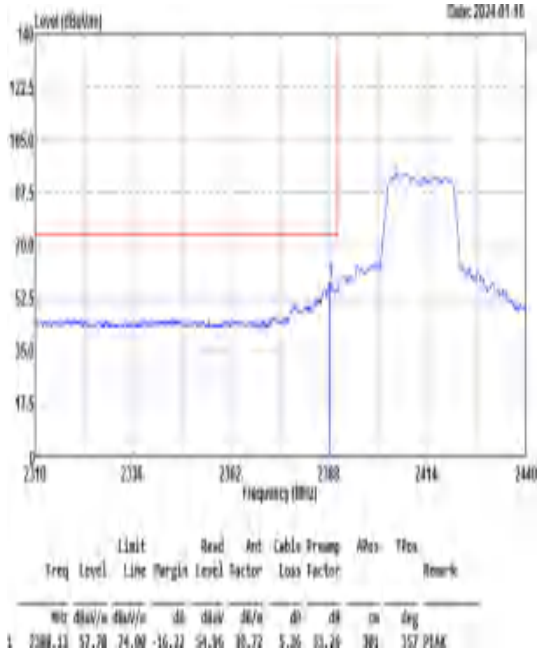
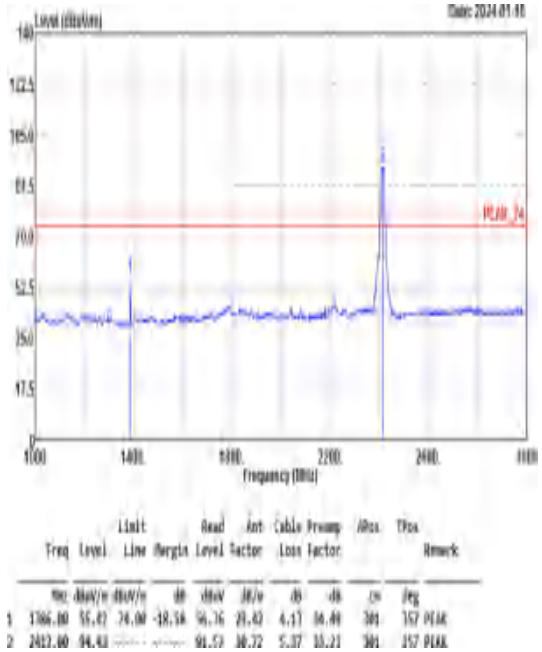
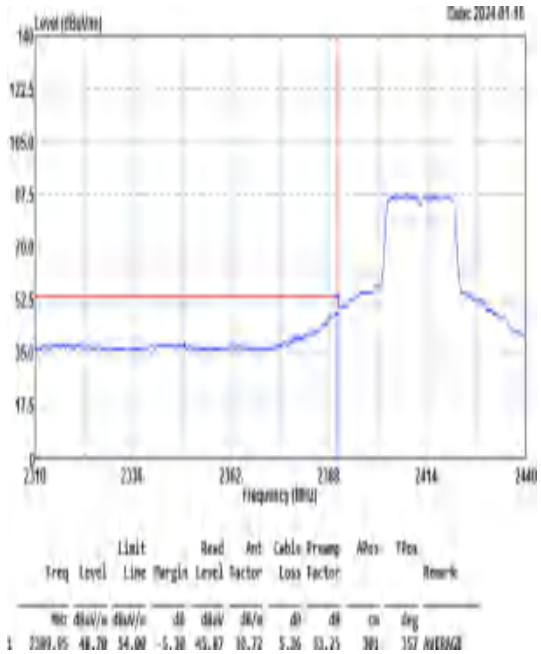
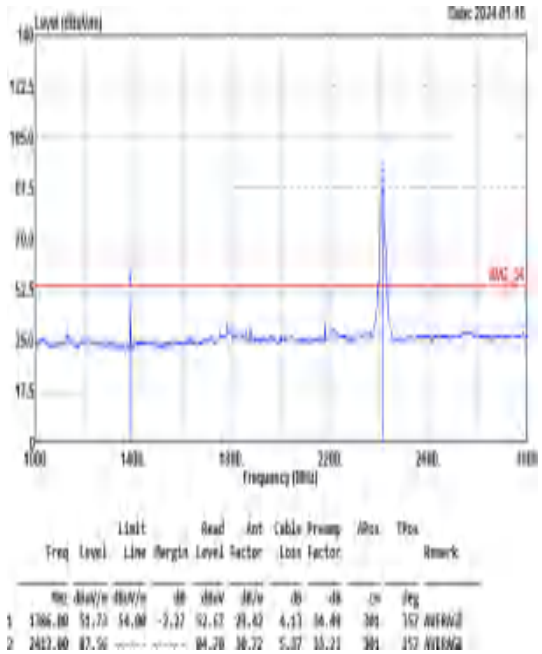
Mode	5	
	Harmonic	
	2400-2483.5_802.11g_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

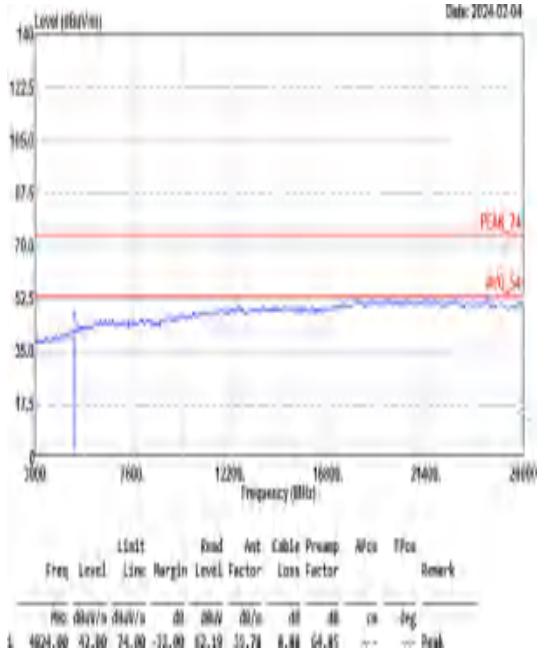
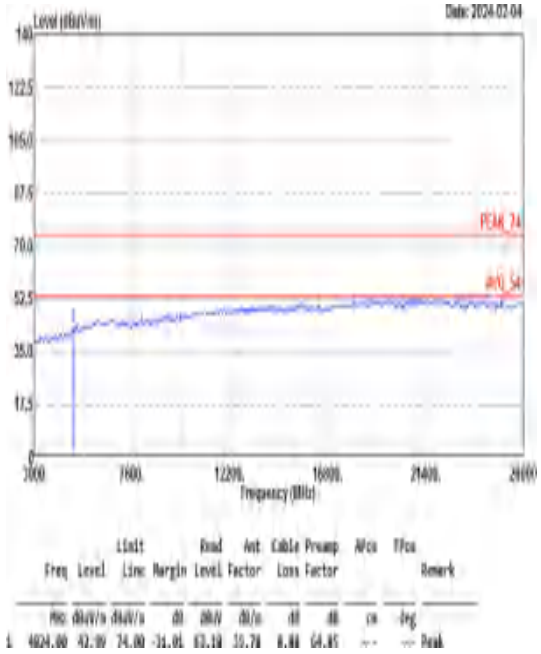
Mode	6	
	Band Edge	
	2400-2483.5_802.11g_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

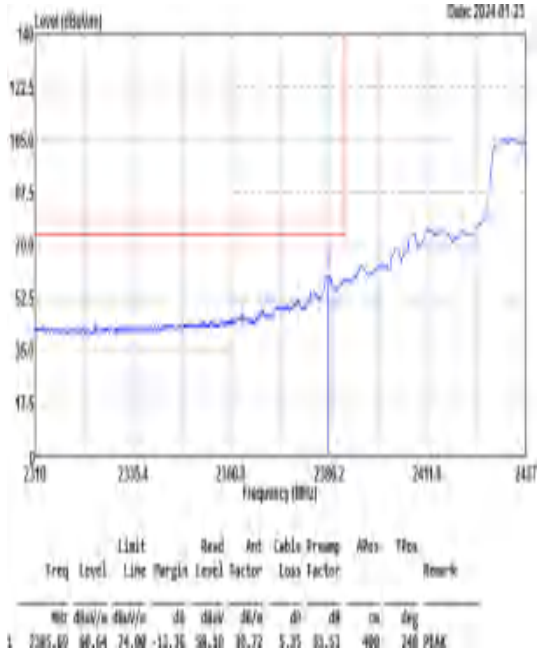
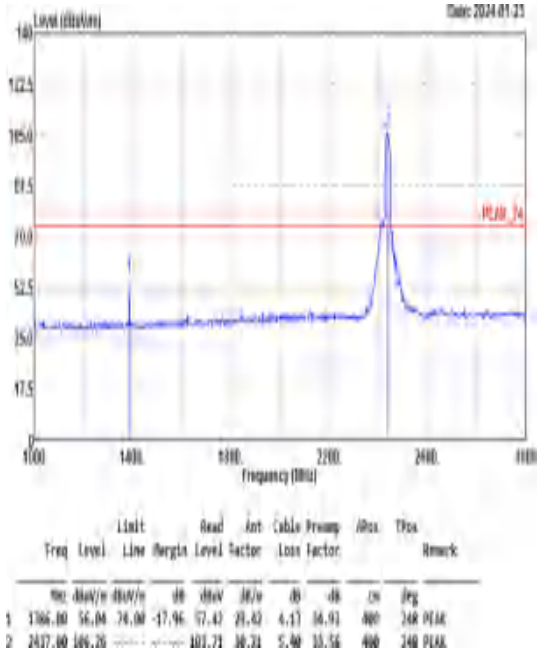
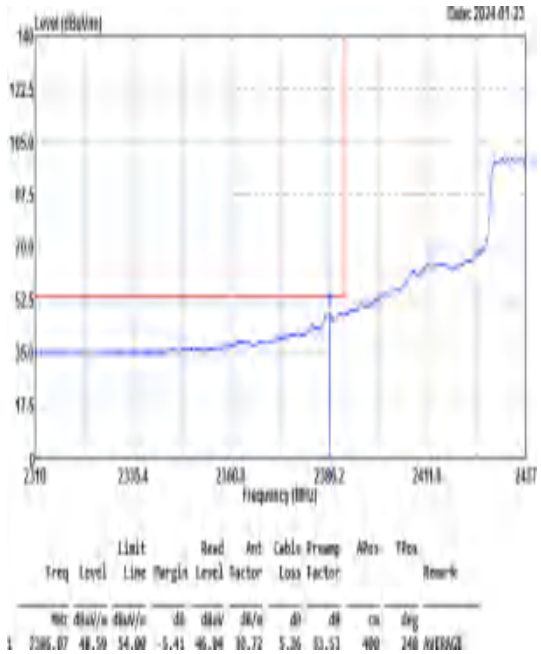
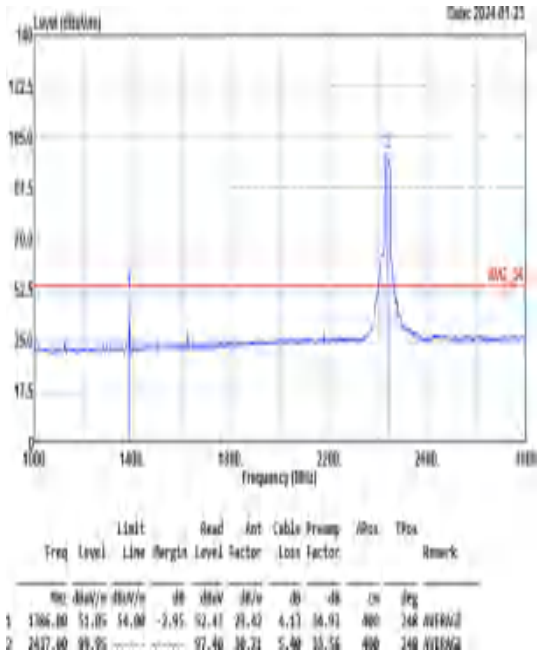
Mode	6	
	Band Edge	
	2400-2483.5_802.11g_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

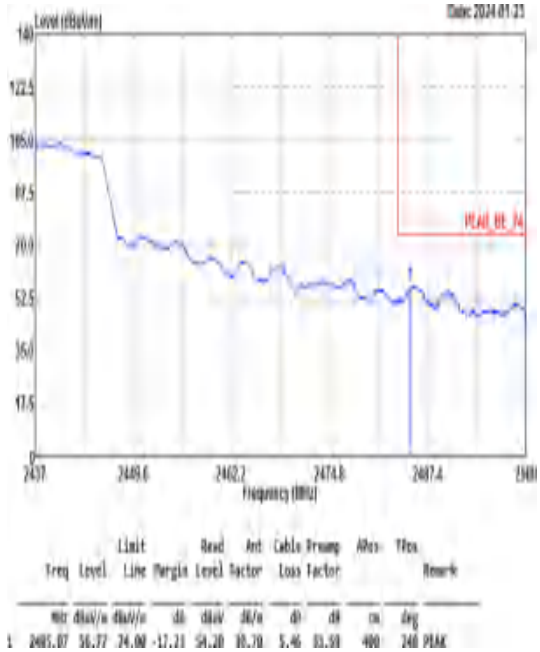
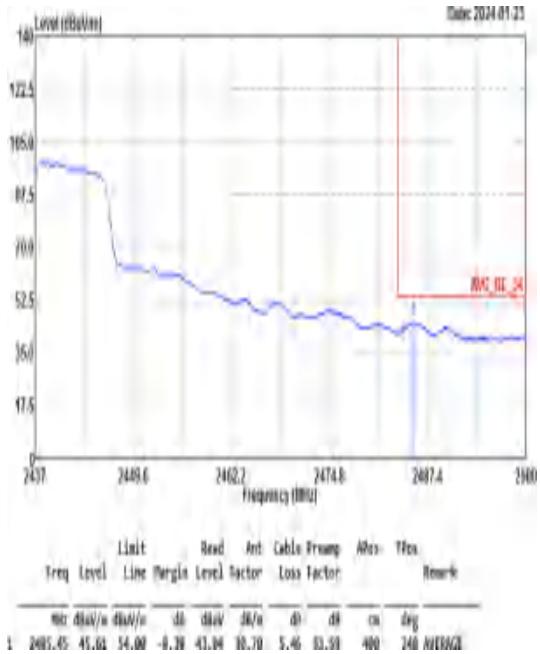
Mode	6	
	Harmonic	
	2400-2483.5_802.11g_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

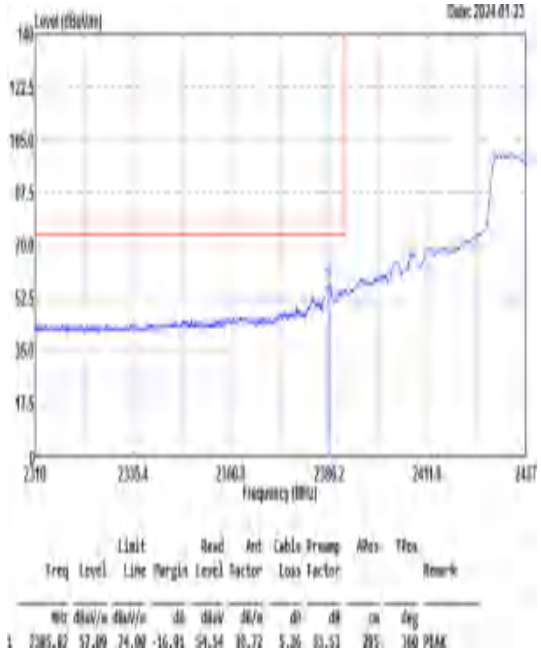
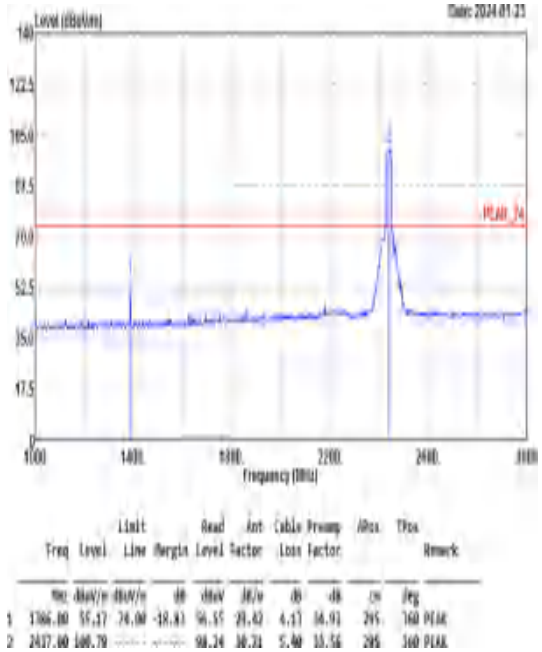
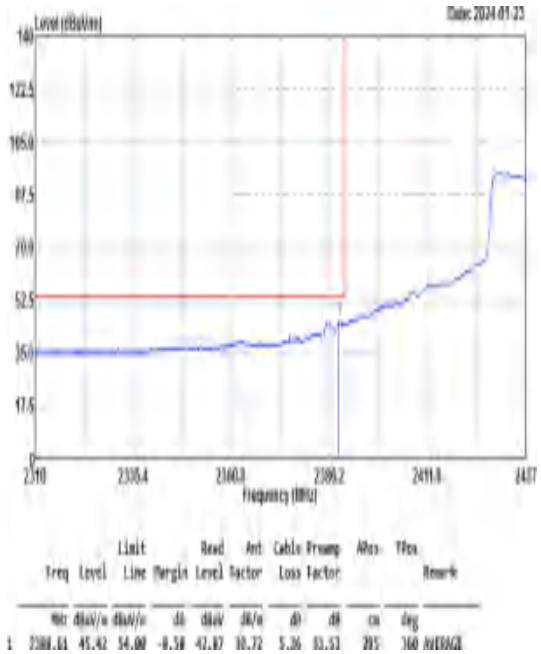
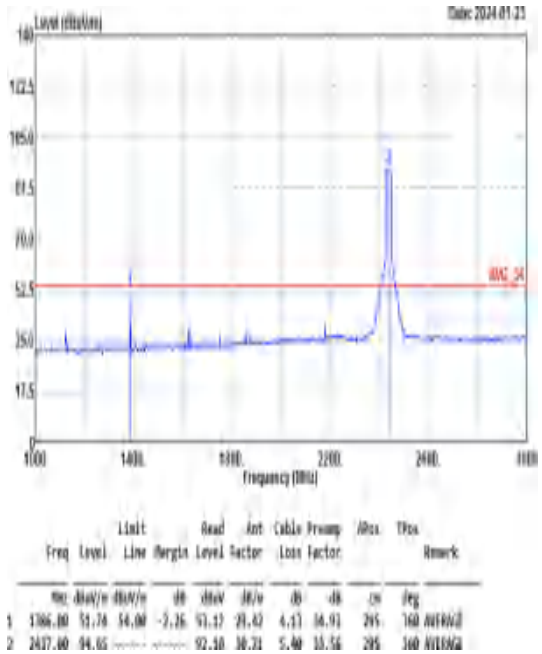
Mode	7	
	Band Edge	
	2400-2483.5_802.11n HT20_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

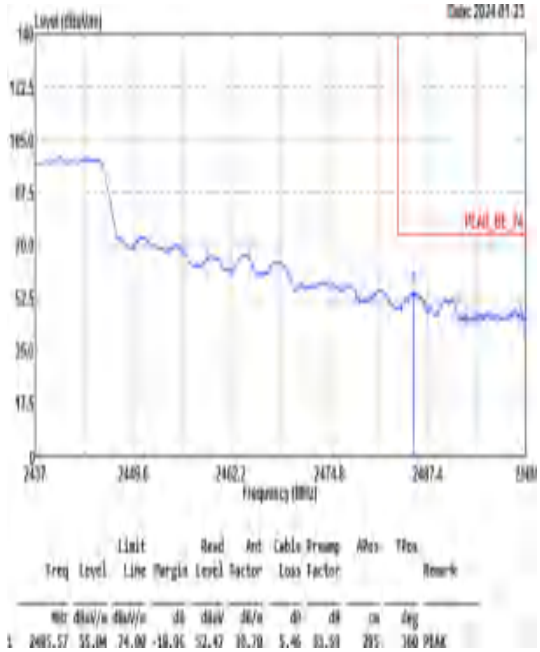
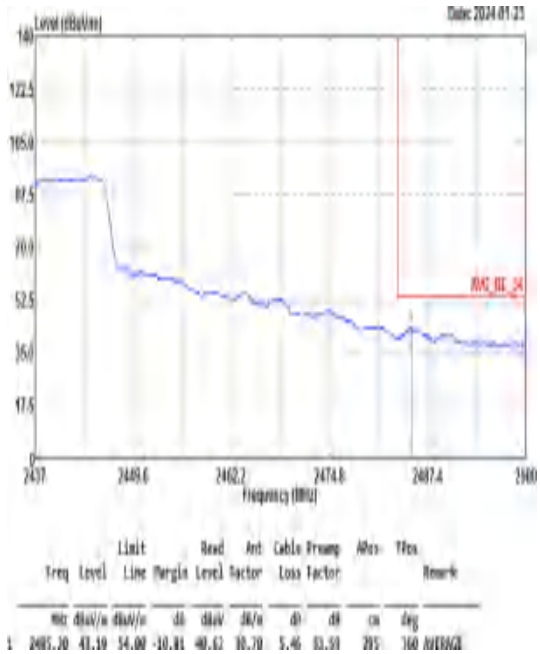
Mode	7	
	Band Edge	
	2400-2483.5_802.11n HT20_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

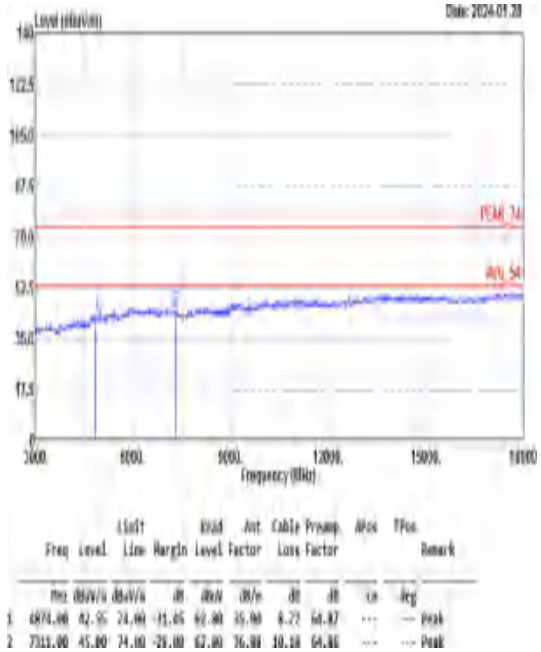
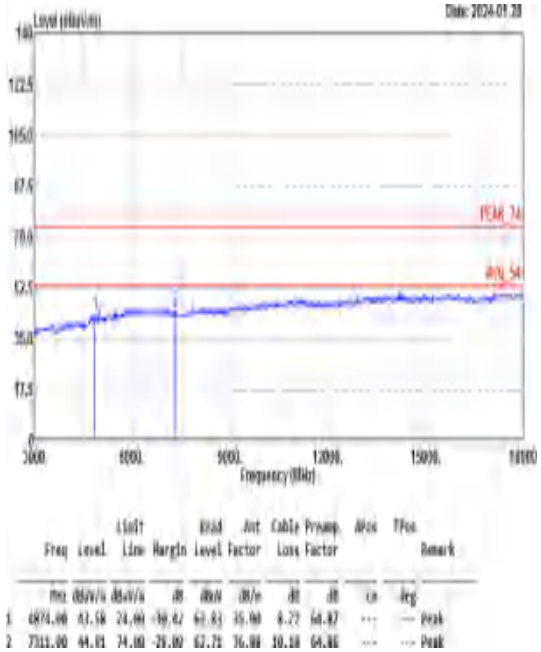
Mode	7	
	Harmonic	
	2400-2483.5_802.11n HT20_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

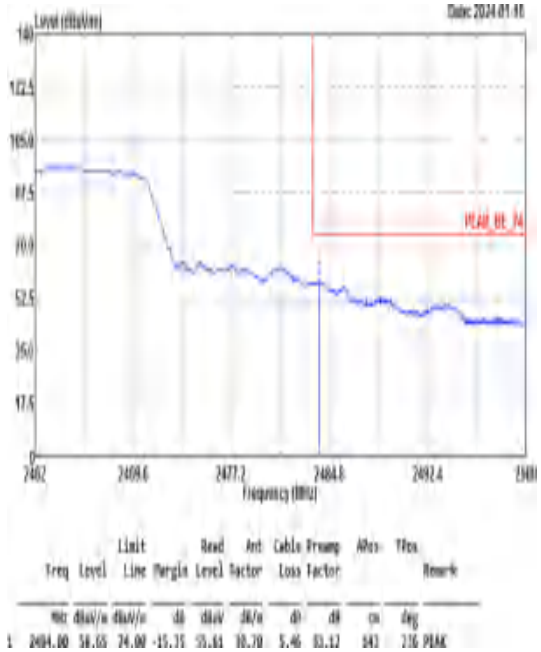
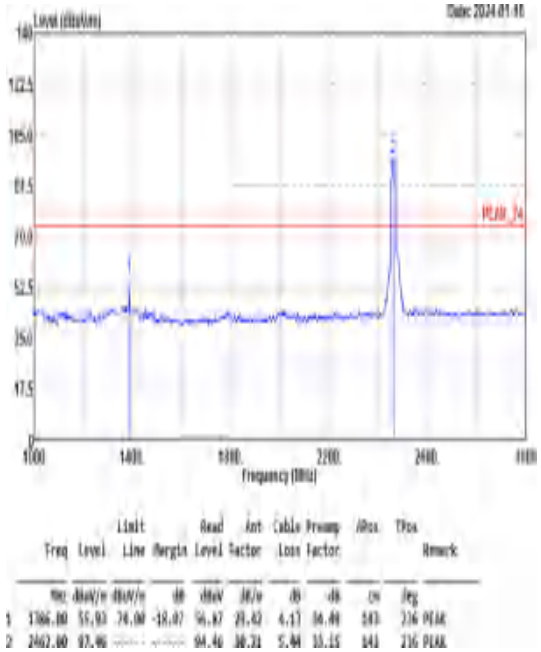
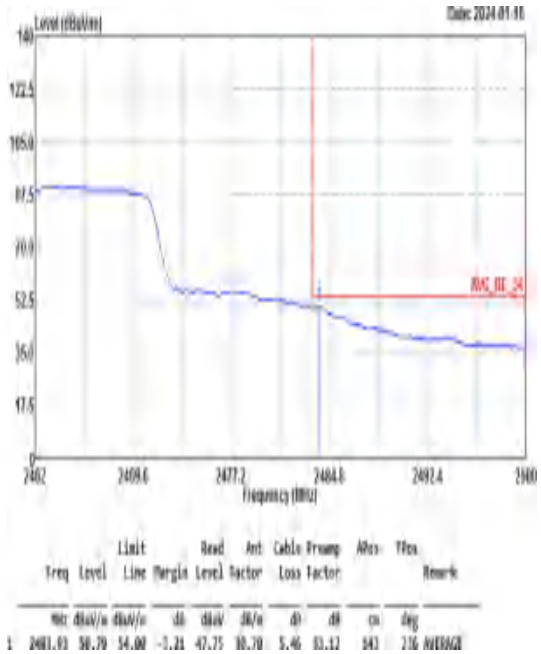
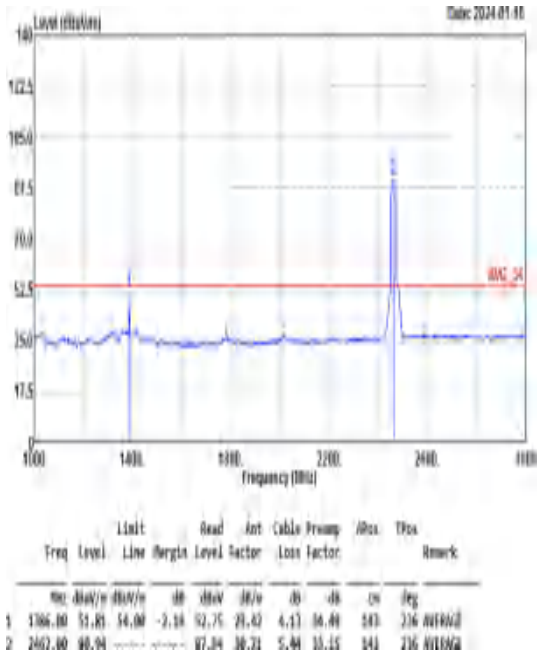
Mode	8	
	Band Edge - L	
	2400-2483.5_802.11n HT20_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

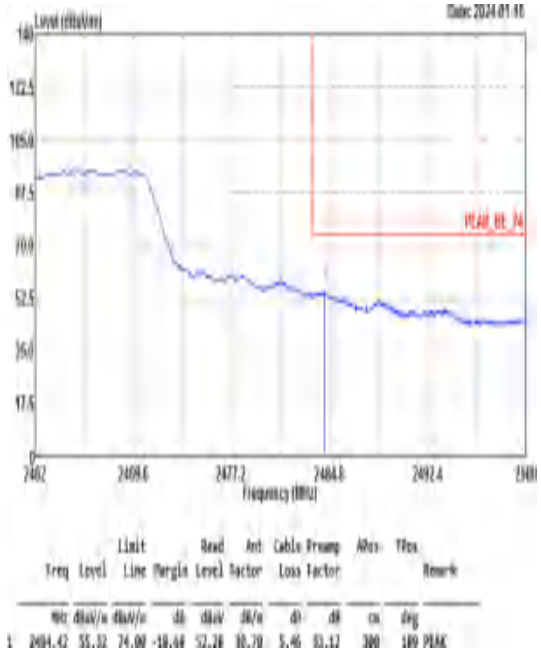
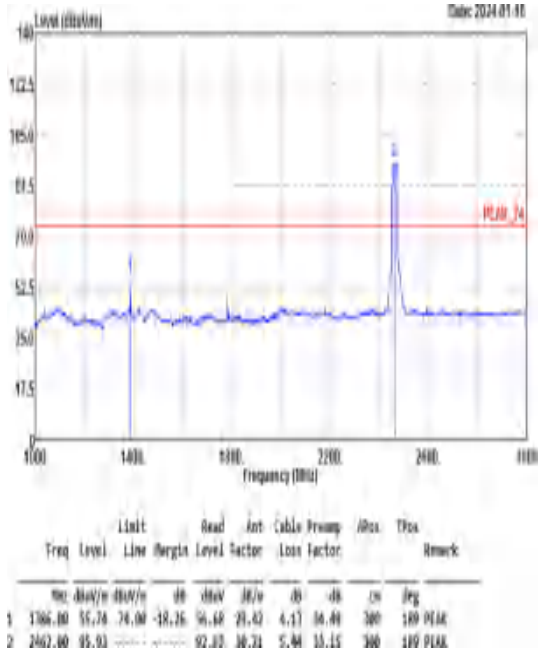
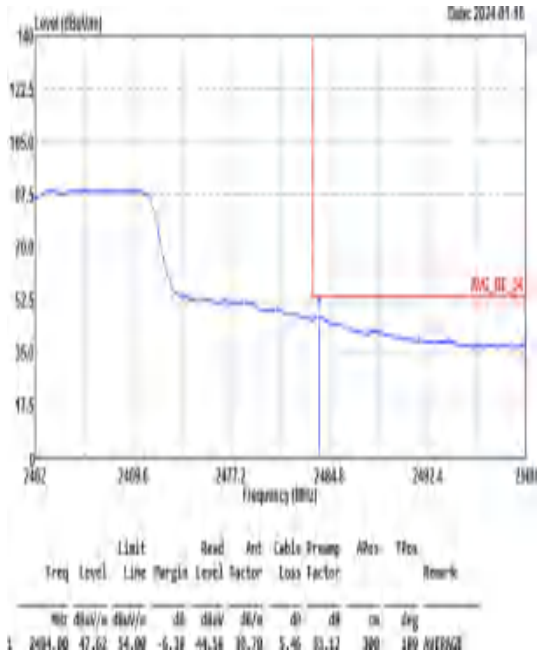
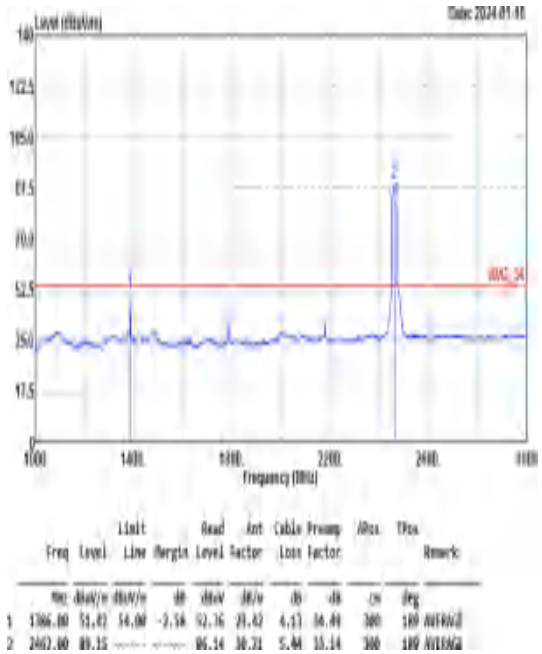
Mode	8	
	Band Edge - R	
	2400-2483.5_802.11n HT20_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

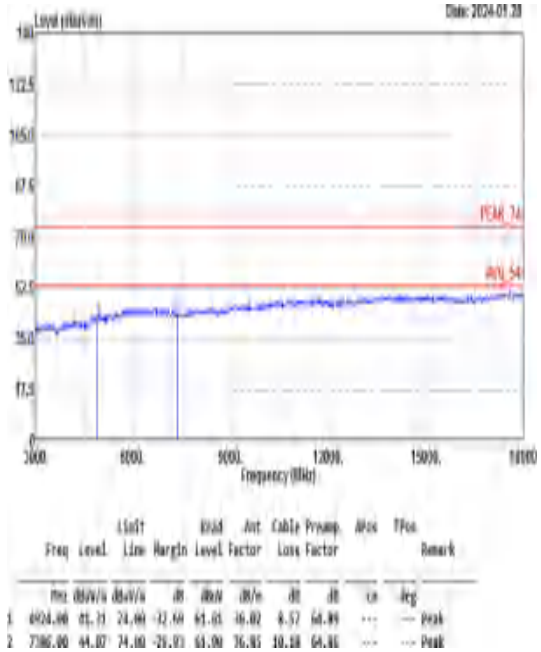
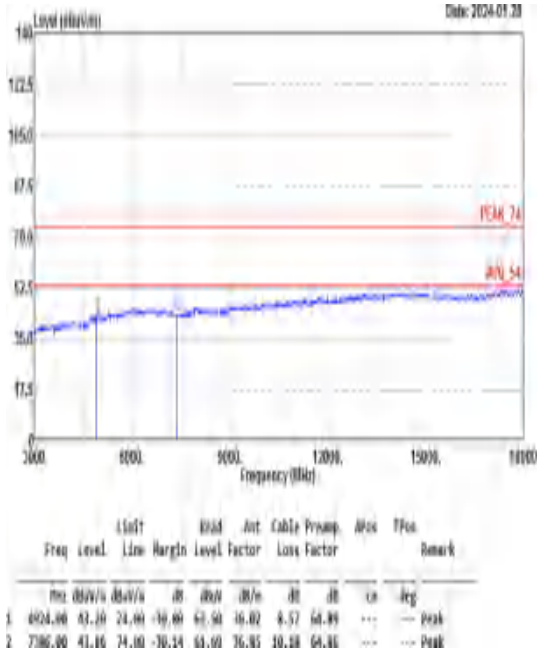
Mode	8	
	Band Edge - L	
	2400-2483.5_802.11n HT20_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

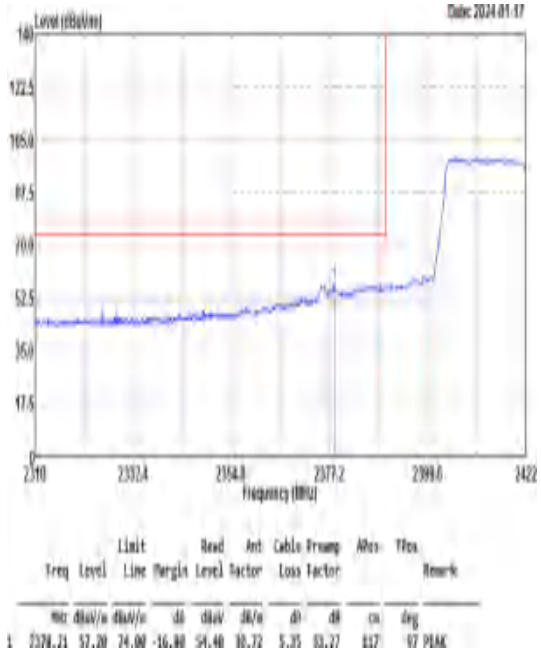
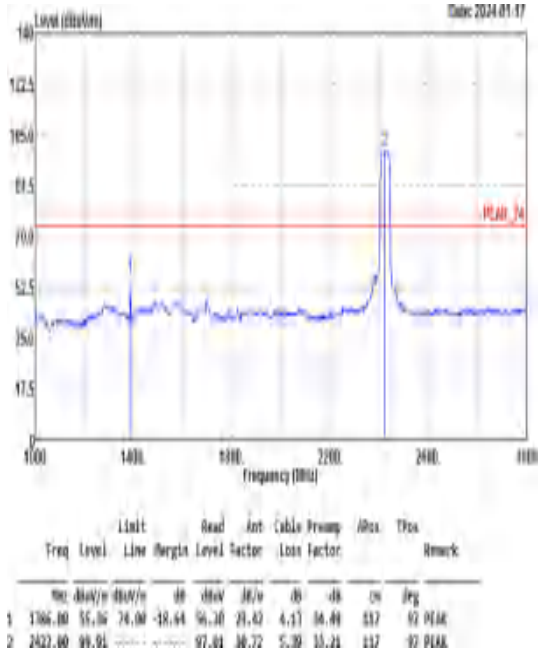
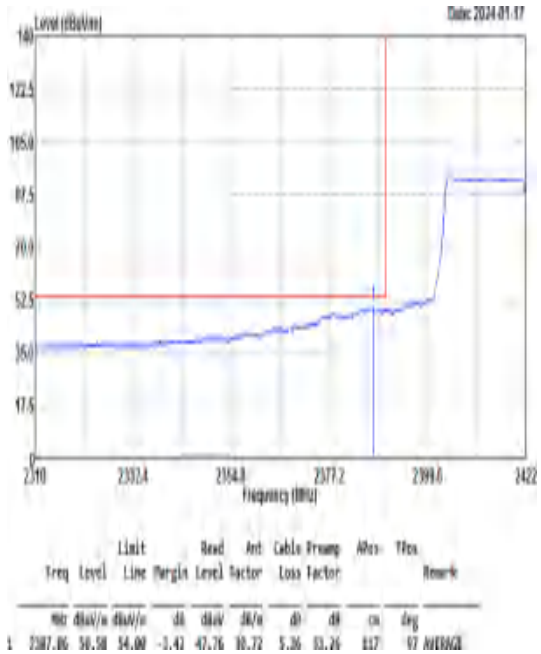
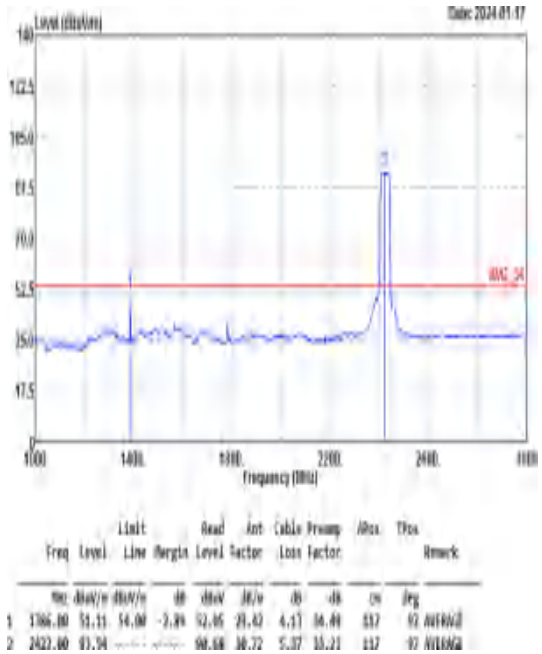
Mode	8	
	Band Edge - R	
	2400-2483.5_802.11n HT20_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

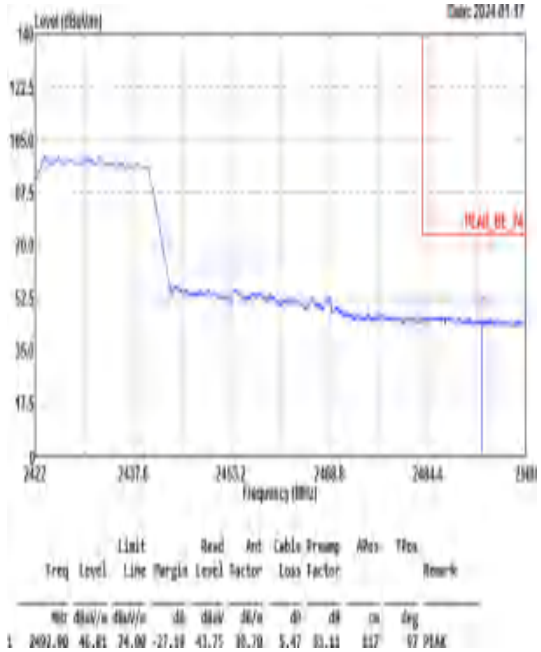
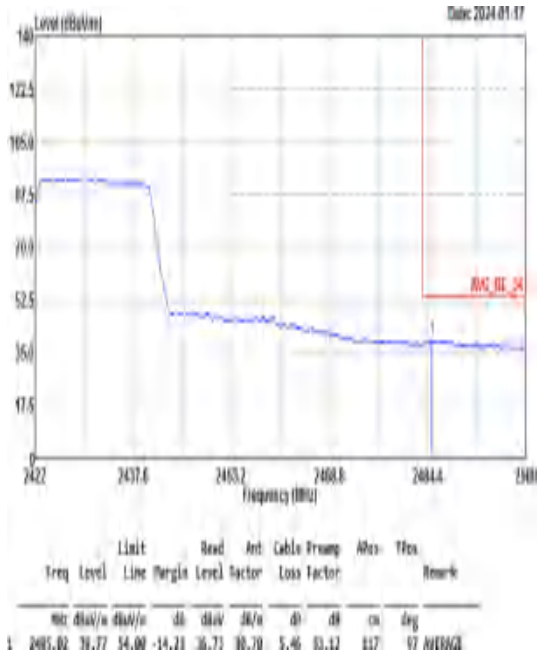
Mode	**8**	
	Harmonic	
	2400-2483.5_802.11n HT20_CH06_2437MHz	
ANT	**CDD 0+1**	
Pol.	**Horizontal**	**Vertical**
Peak **Avg**		

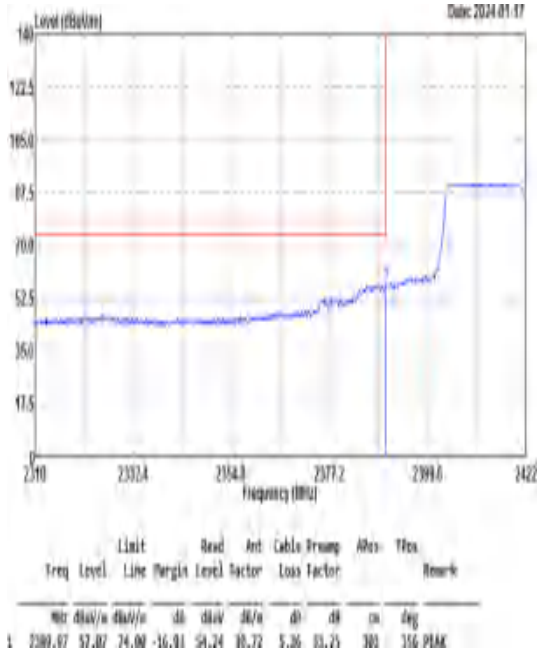
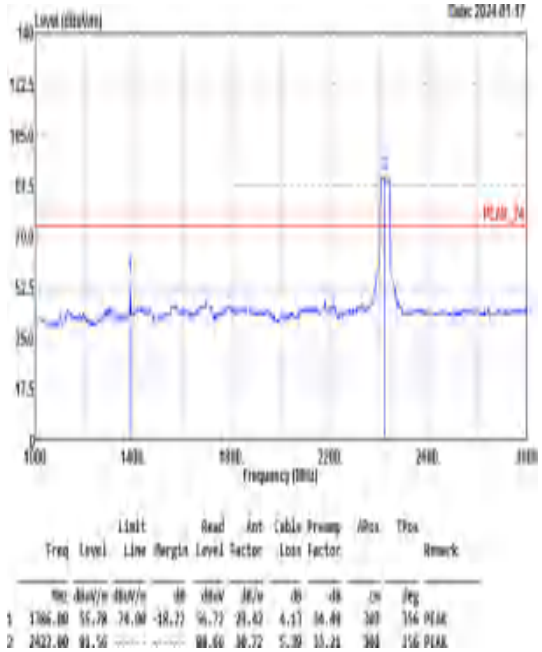
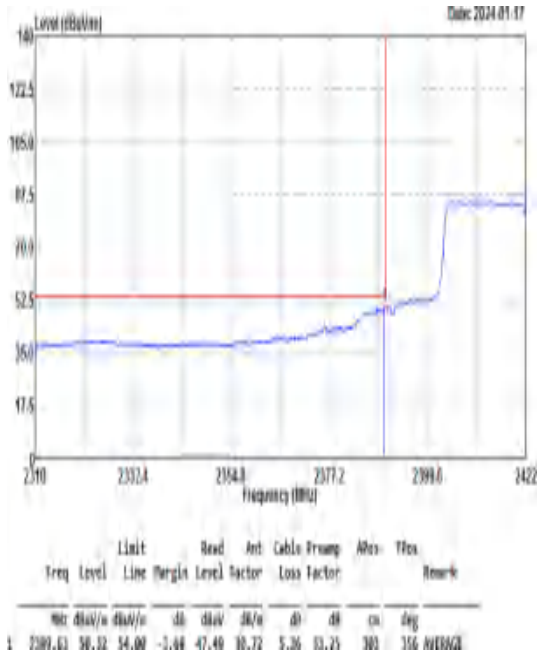
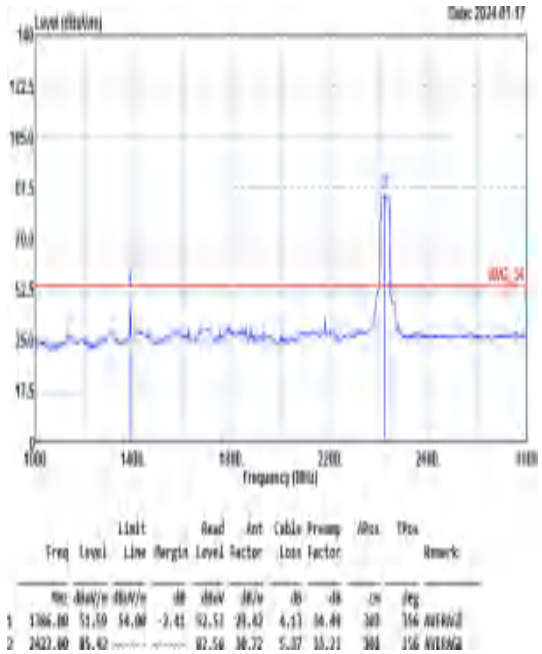
Mode	9	
	Band Edge	
	2400-2483.5_802.11n HT20_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

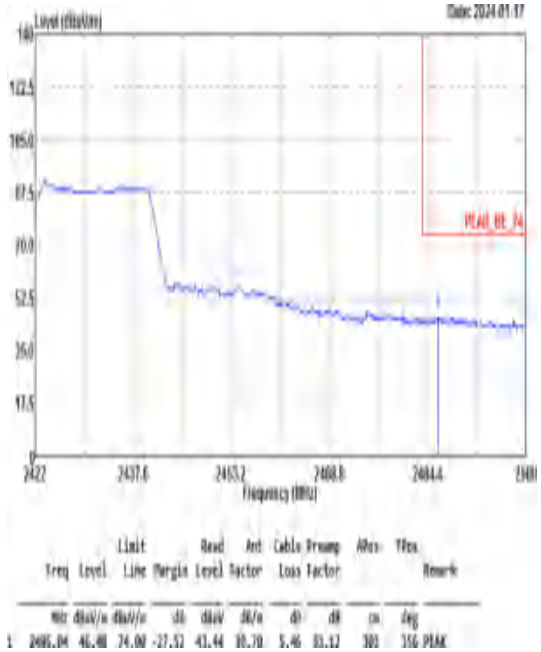
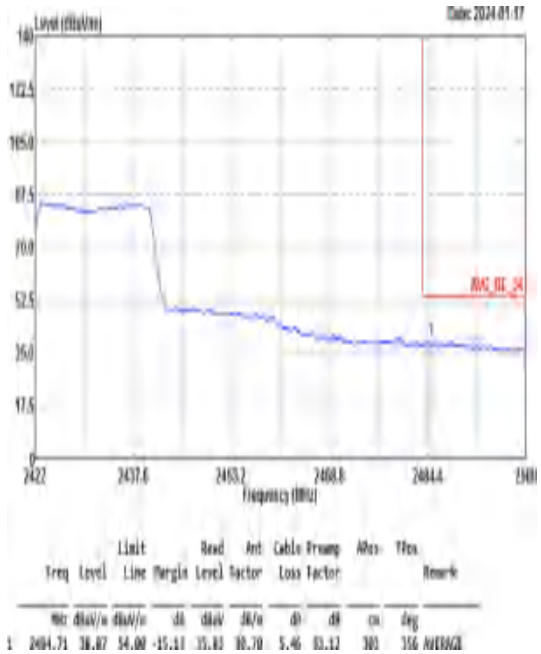
Mode	9	
	Band Edge	
	2400-2483.5_802.11n HT20_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

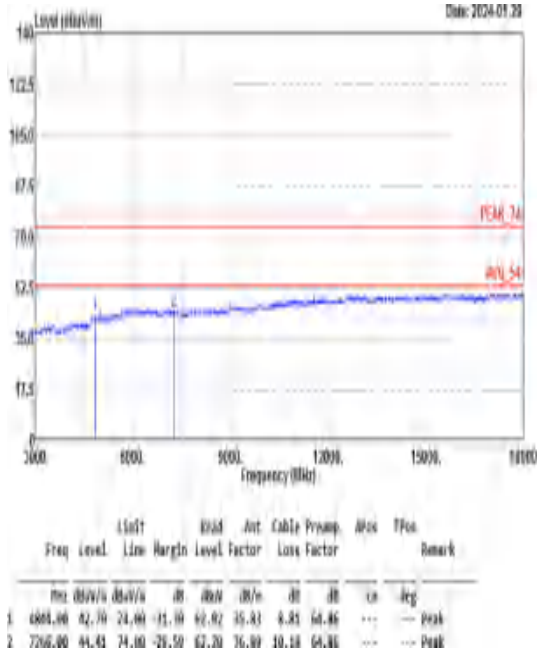
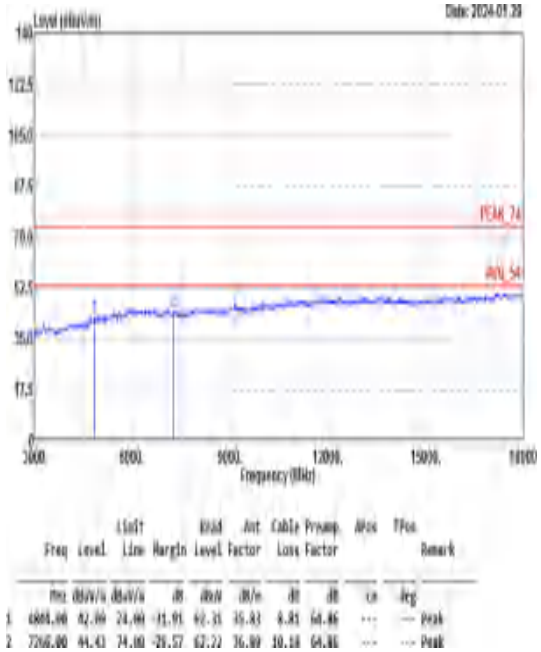
Mode	9	
	Harmonic	
	2400-2483.5_802.11n HT20_CH11_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

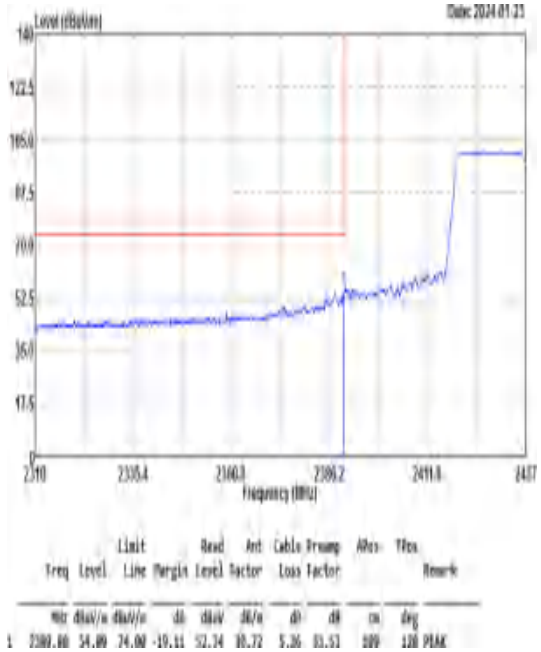
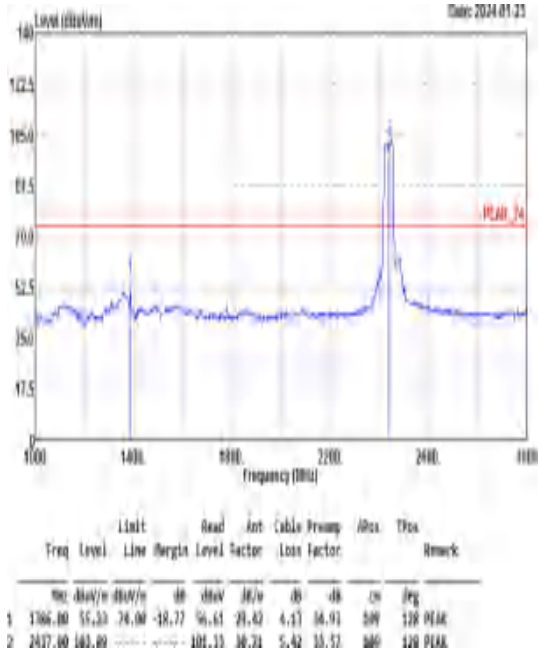
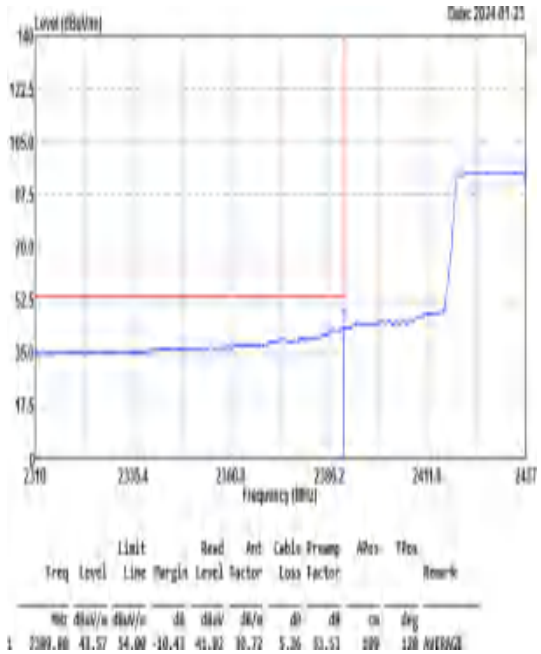
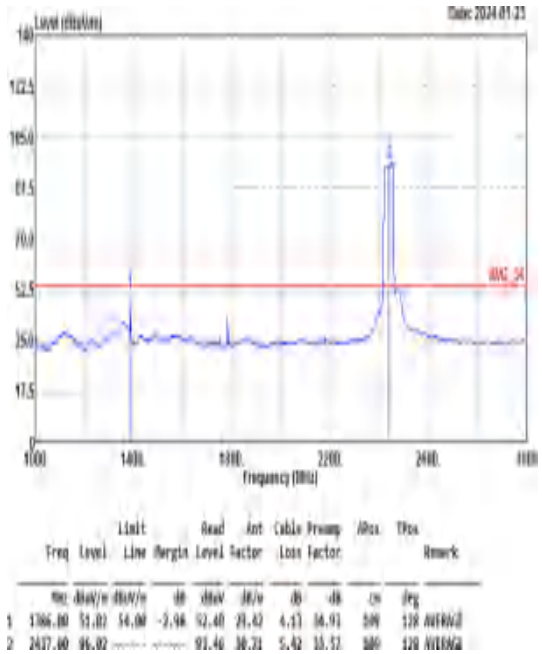
Mode	10	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

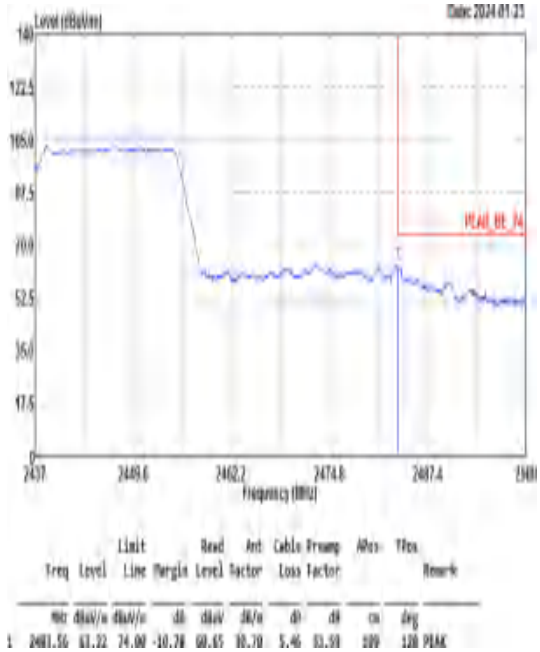
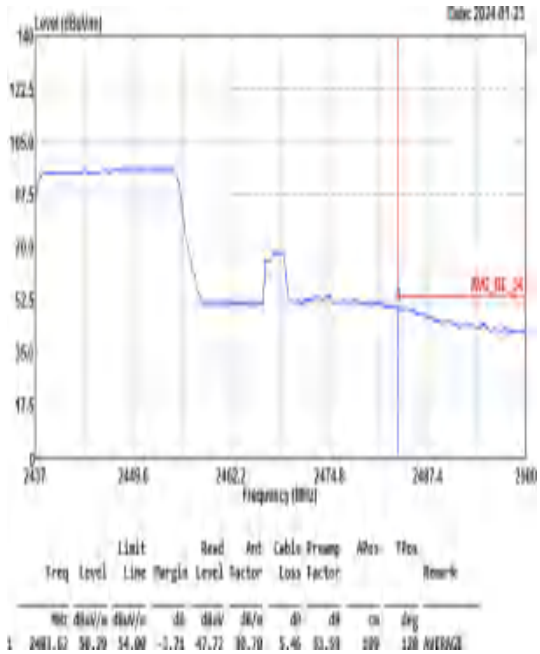
Mode	10	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

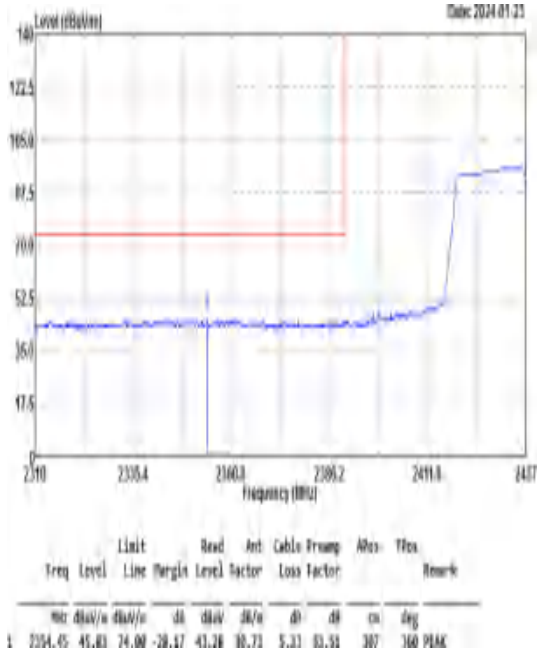
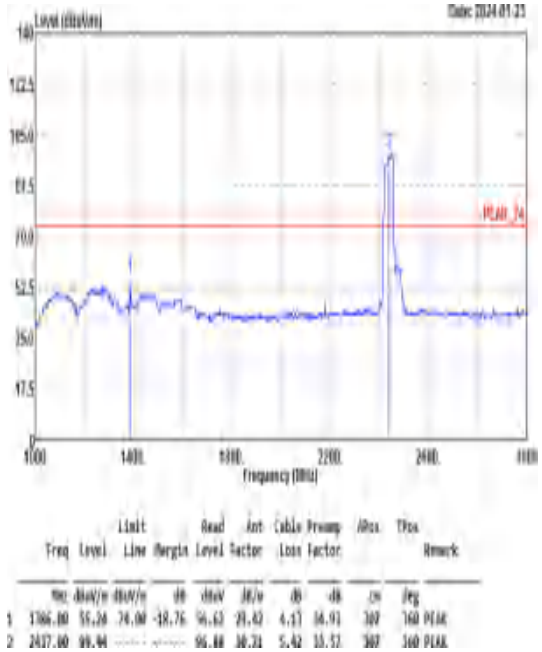
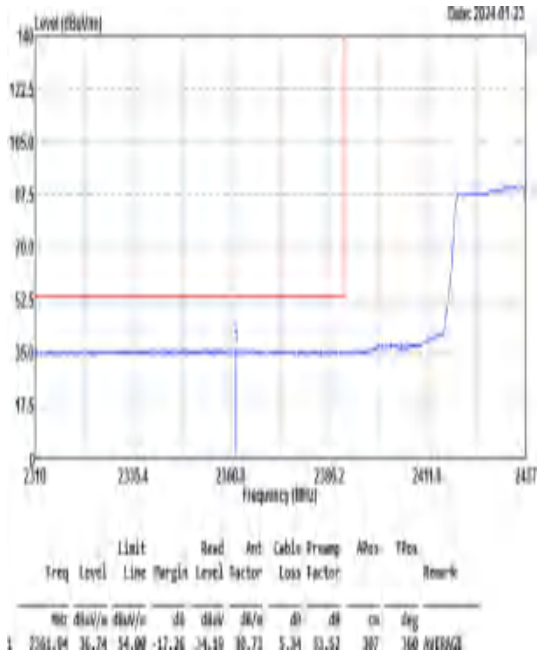
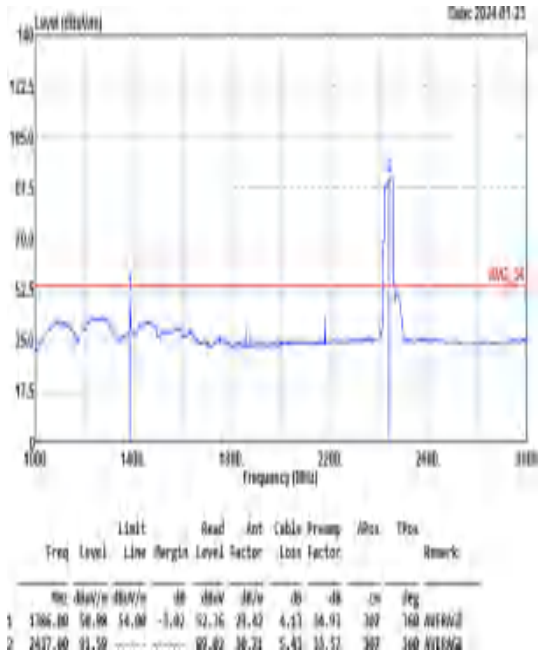
Mode	10	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

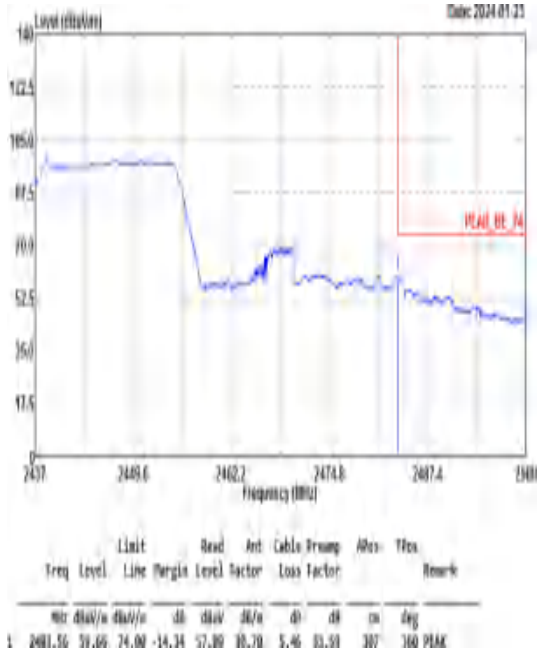
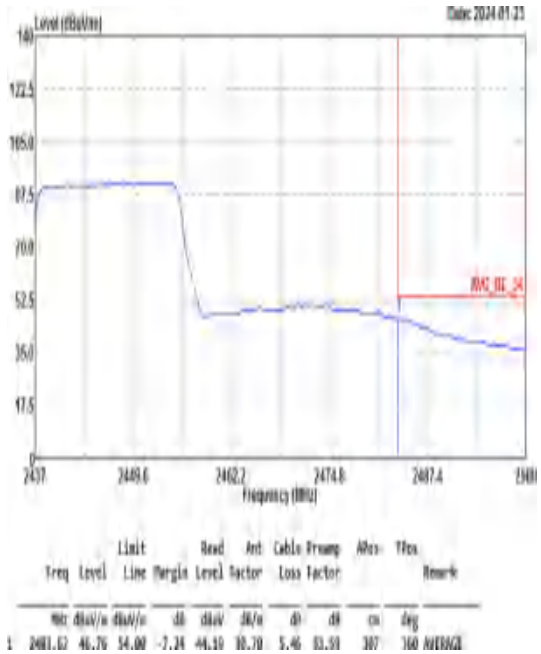
Mode	10	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

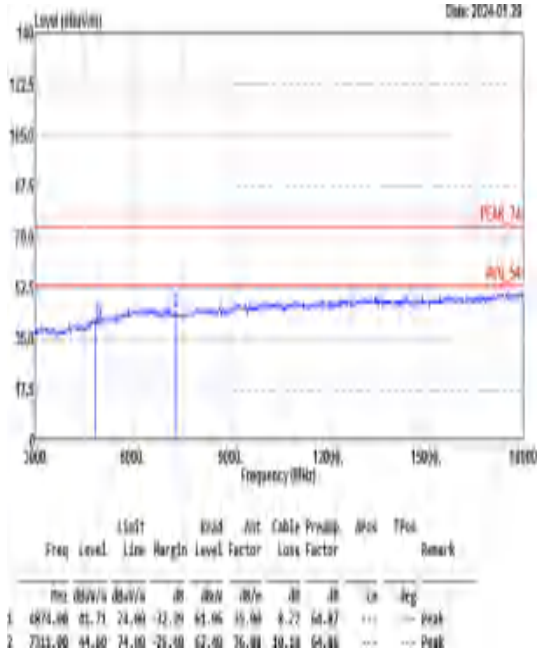
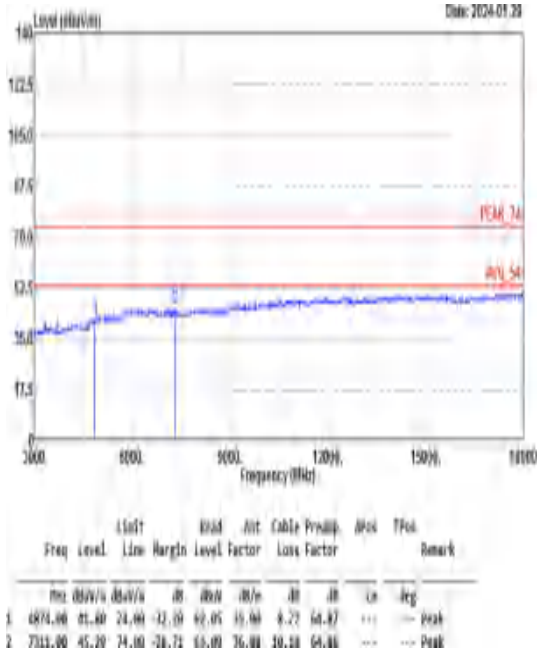
Mode	10	
	Harmonic	
	2400-2483.5_802.11n HT40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

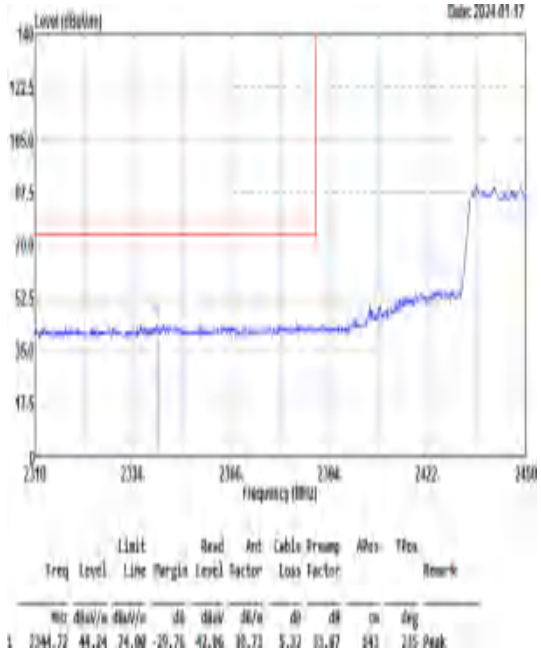
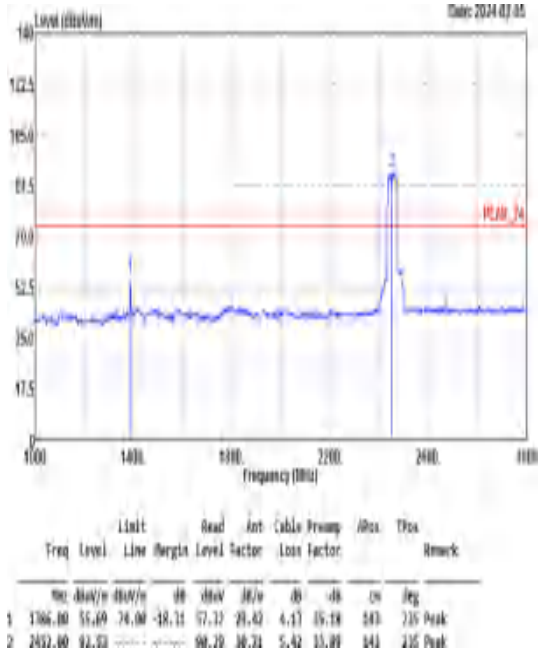
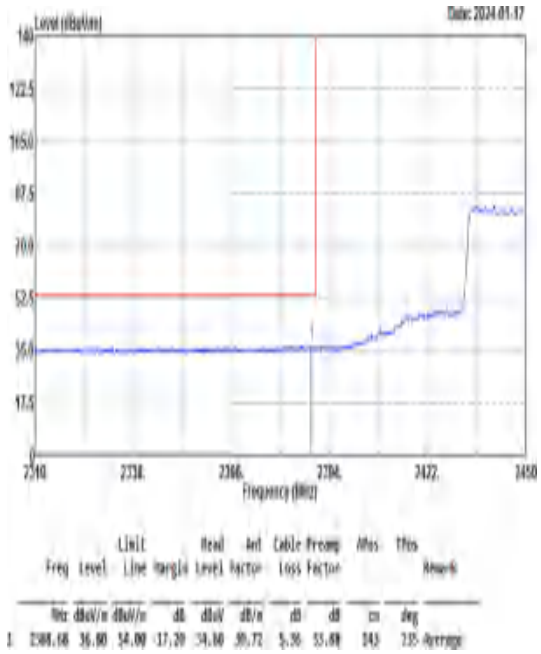
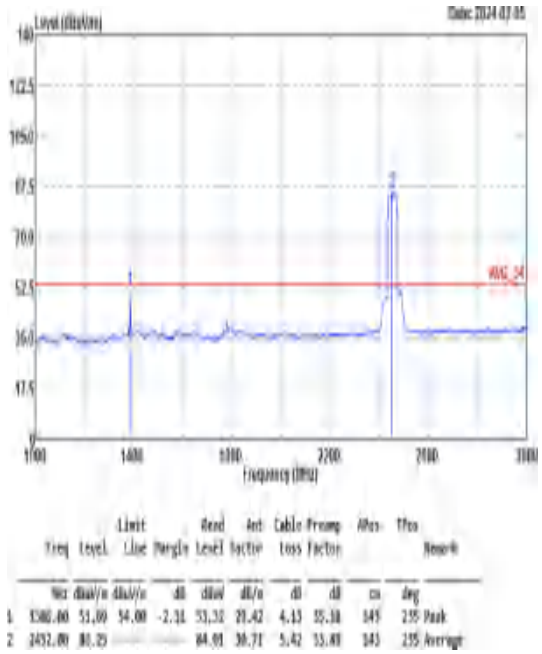
Mode	11	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

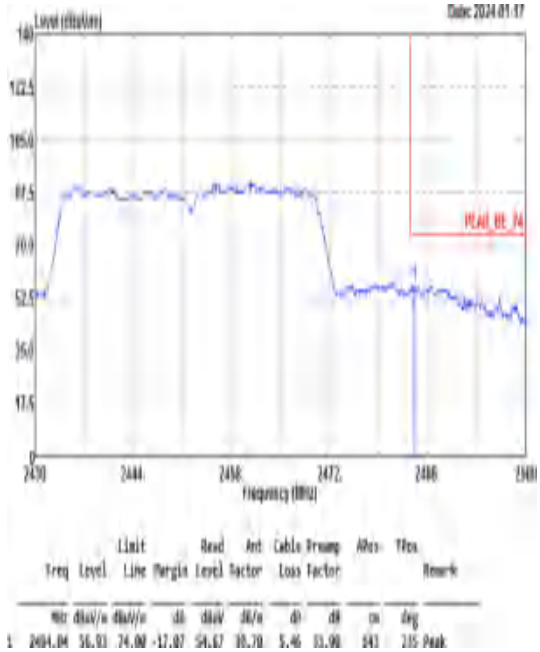
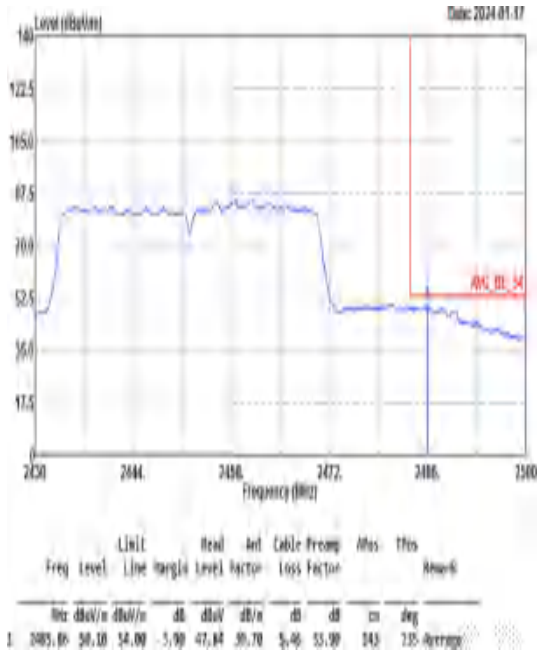
Mode	11	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

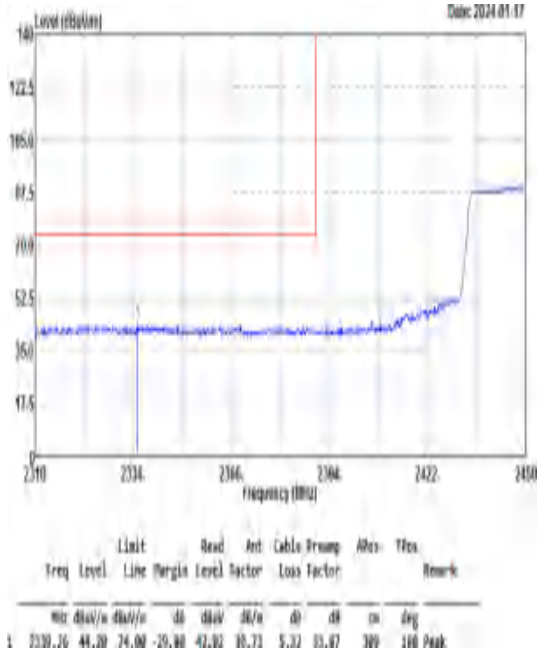
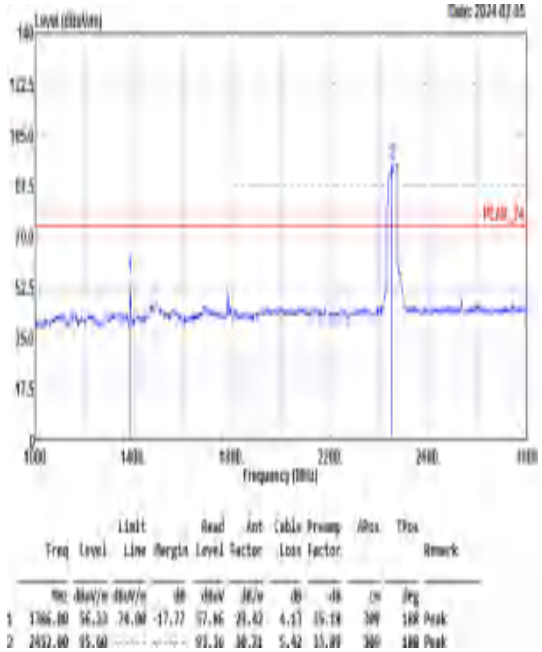
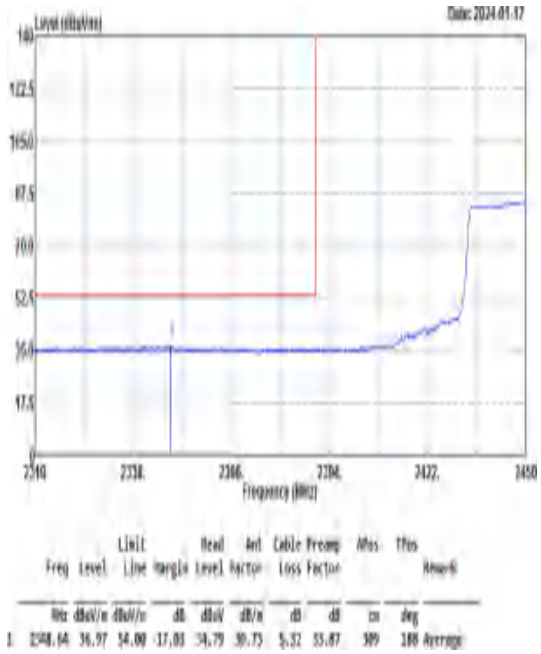
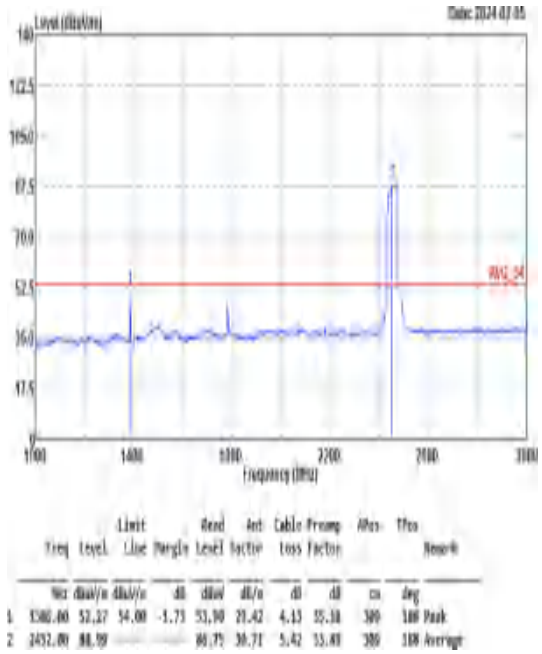
Mode	11	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

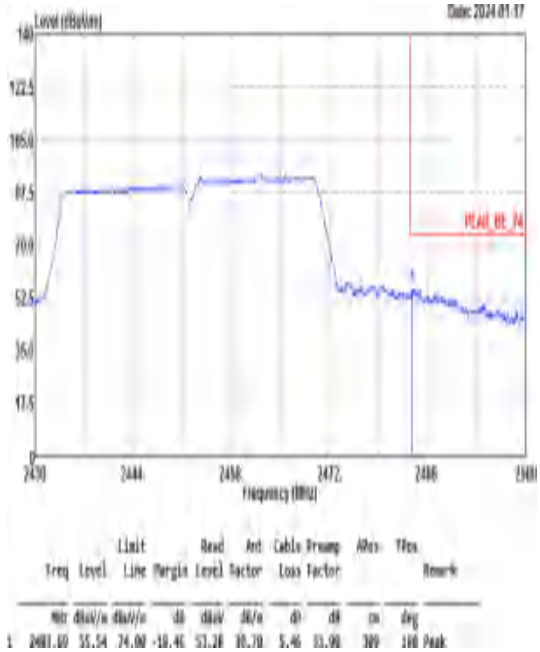
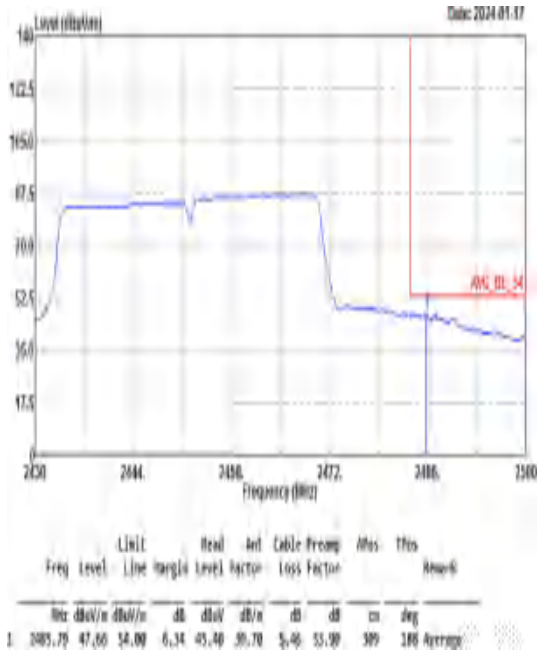
Mode	11	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

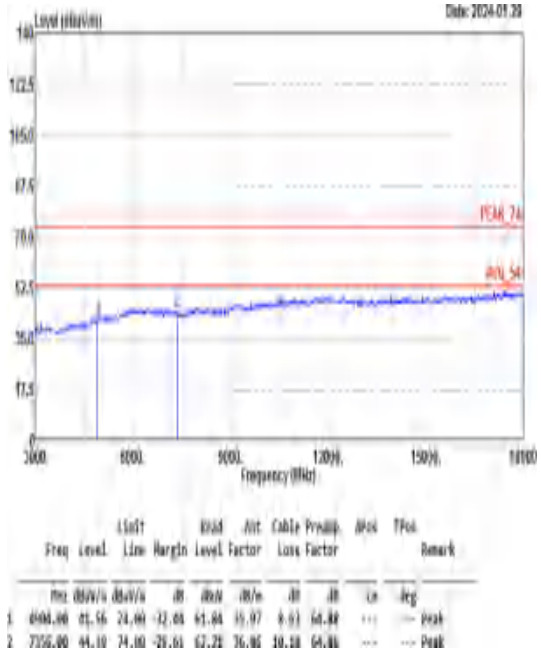
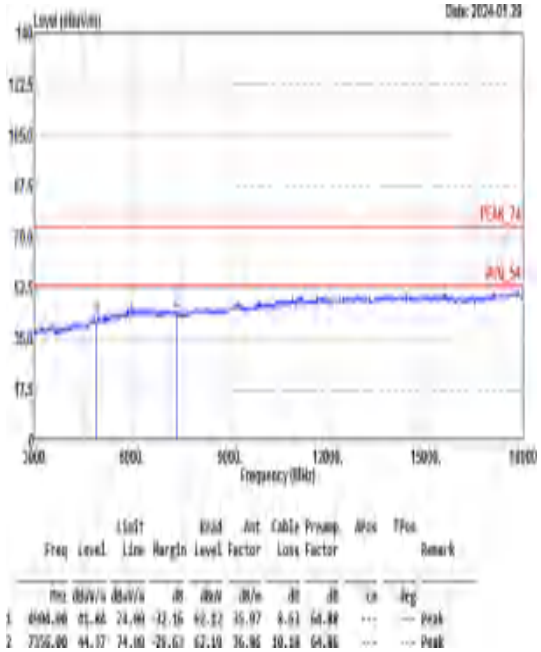
Mode	11	
	Harmonic	
	2400-2483.5_802.11n HT40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

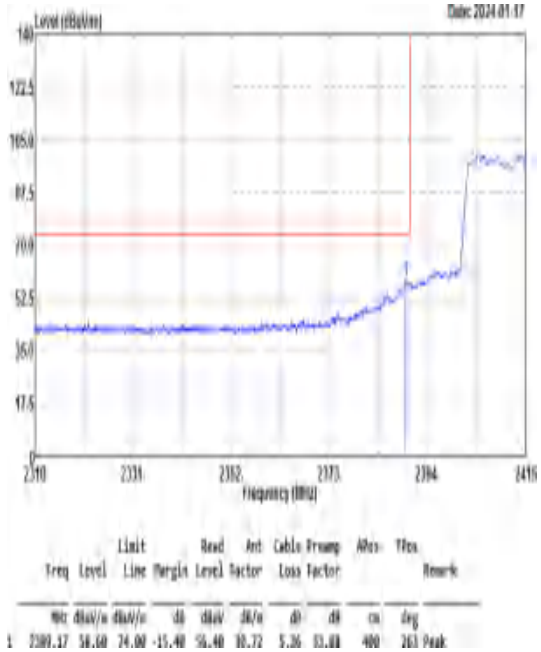
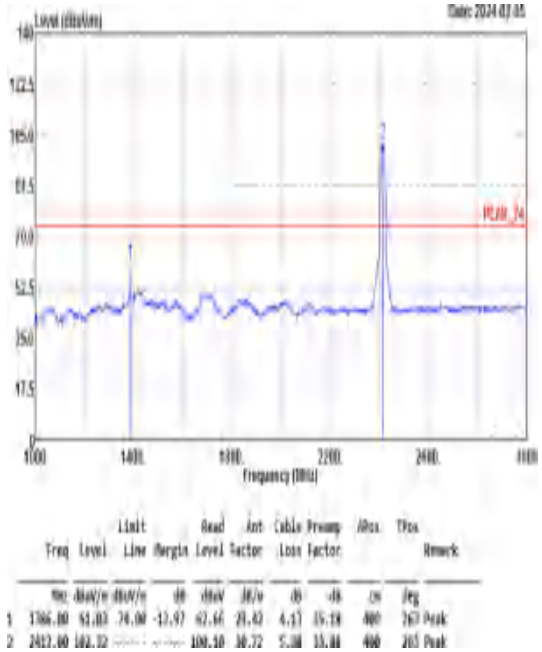
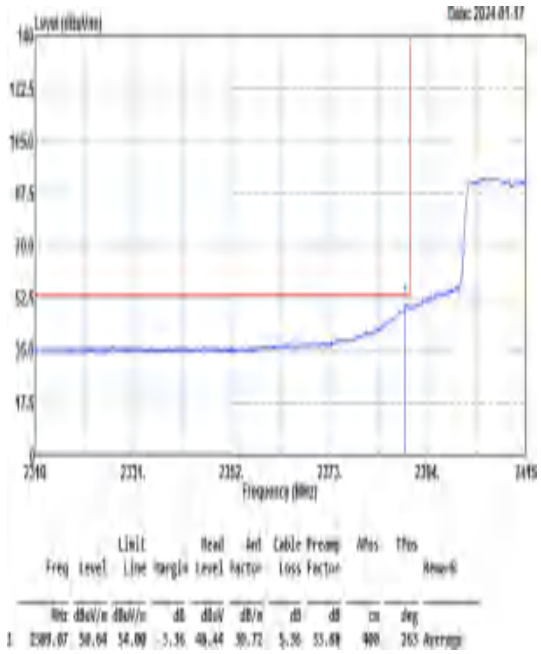
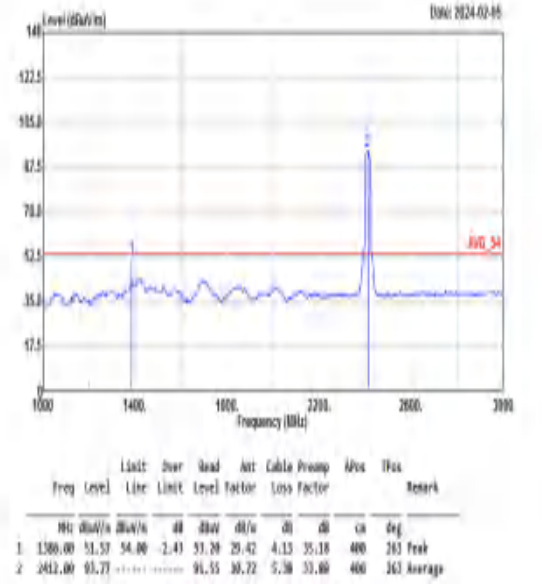
Mode	12	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

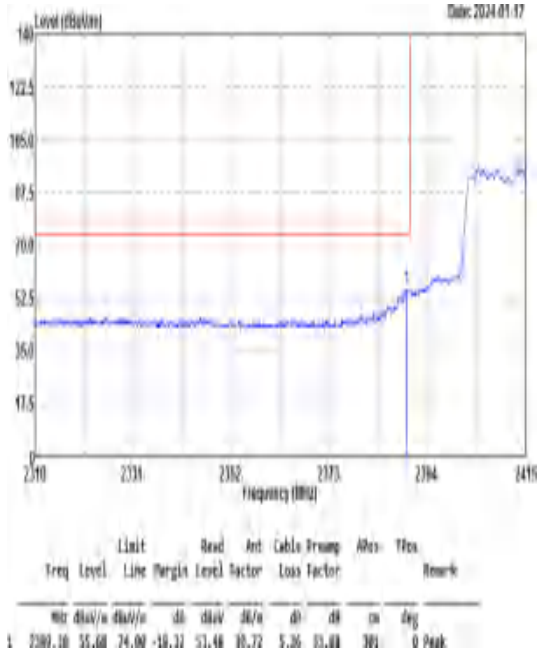
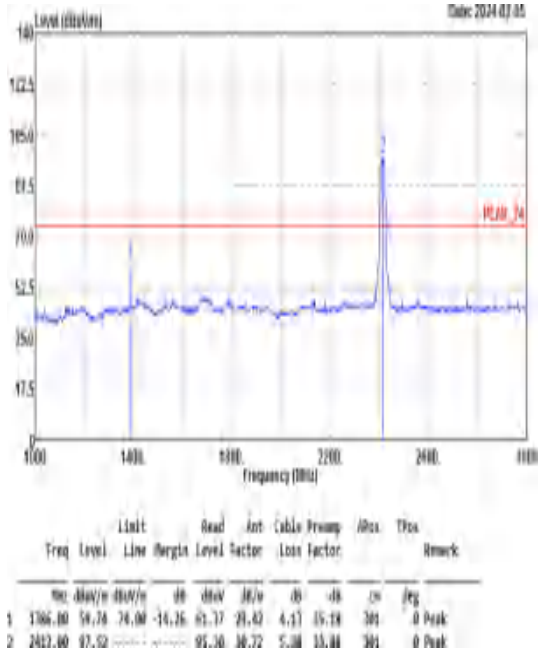
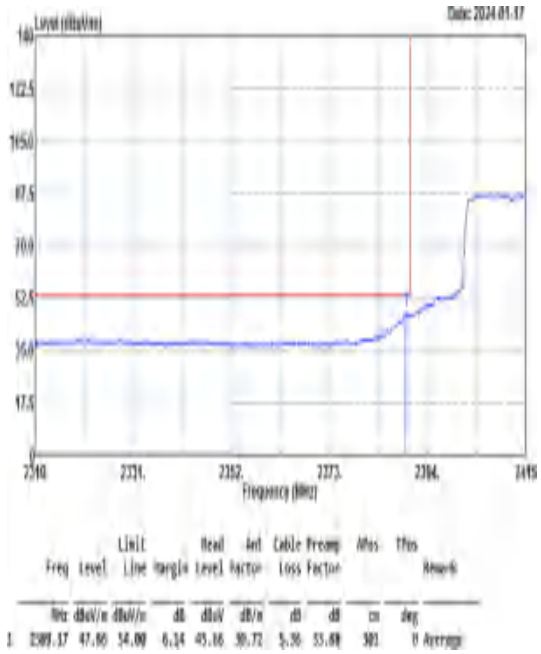
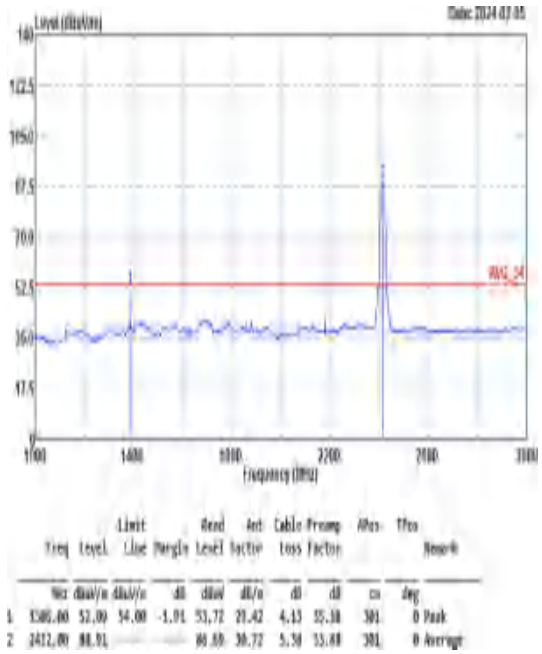
Mode	12	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

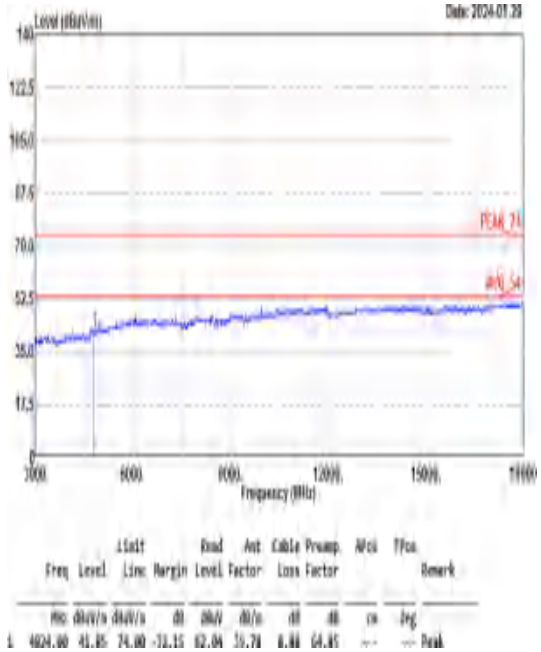
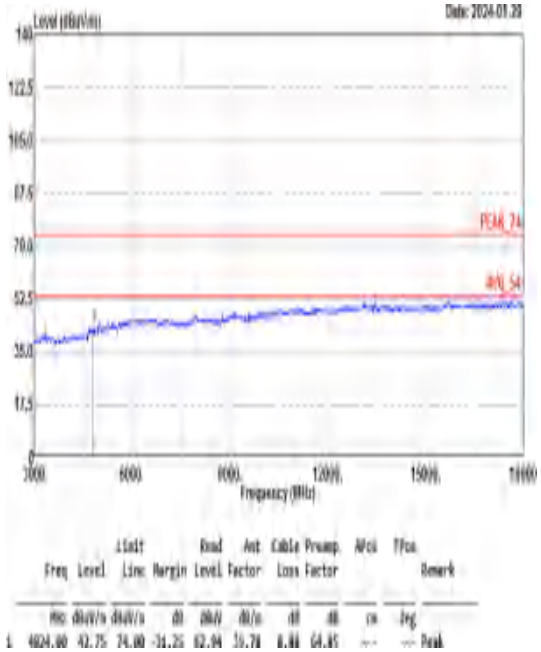
Mode	**12**	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH09_2452MHz	
ANT	**CDD 0+1**	
Pol.	**Vertical**	**Fundamental**
Peak		
Avg		

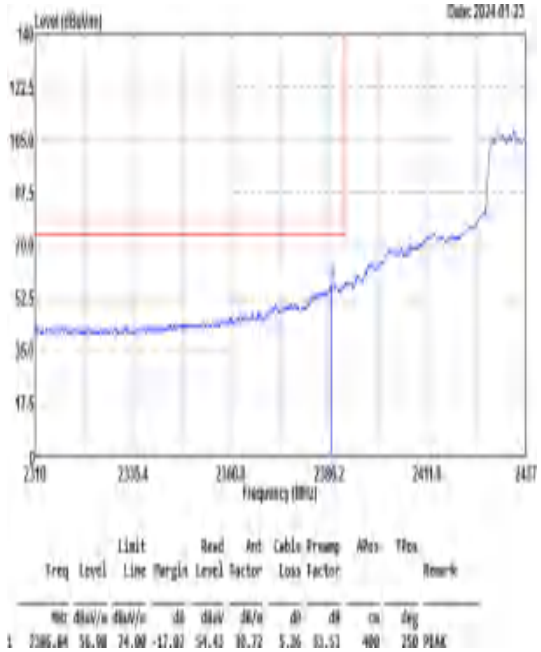
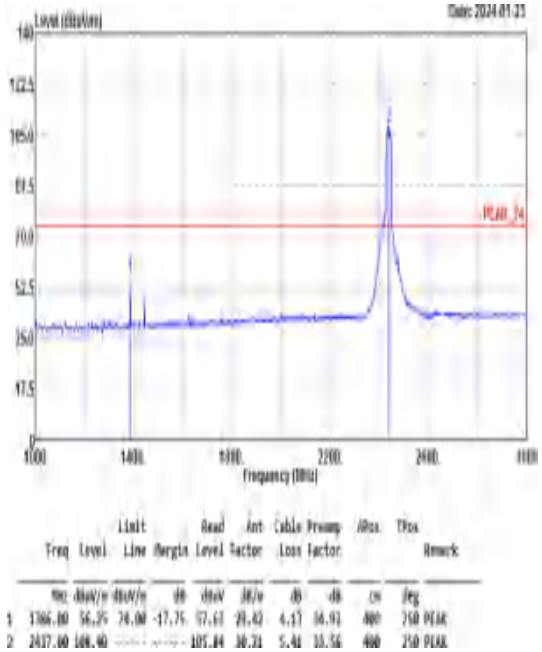
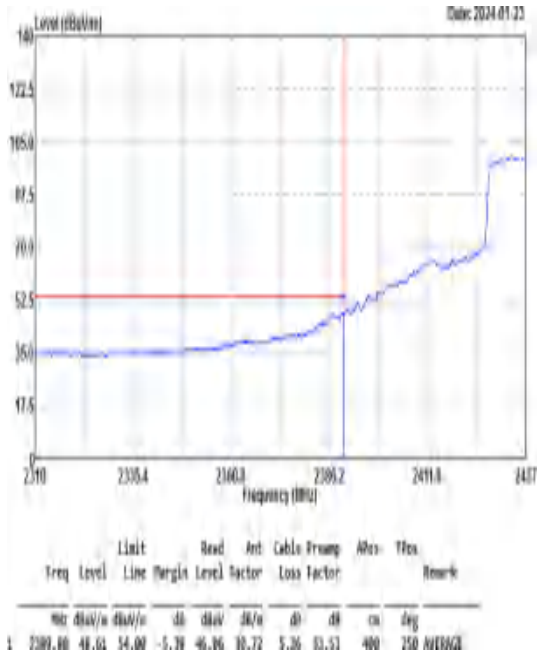
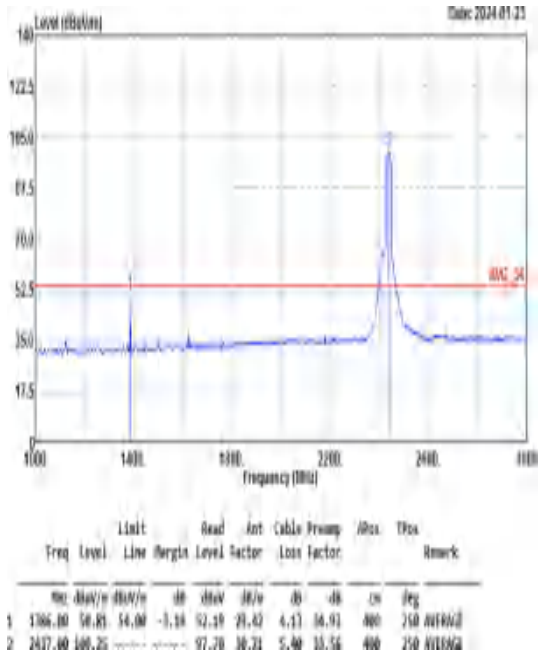
Mode	12	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

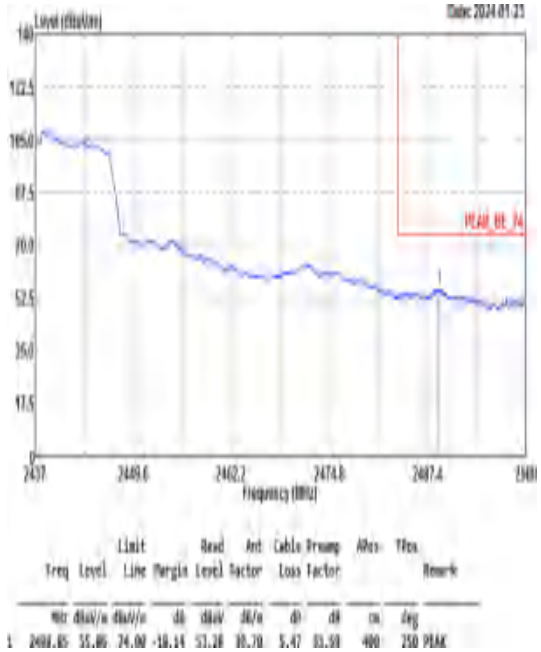
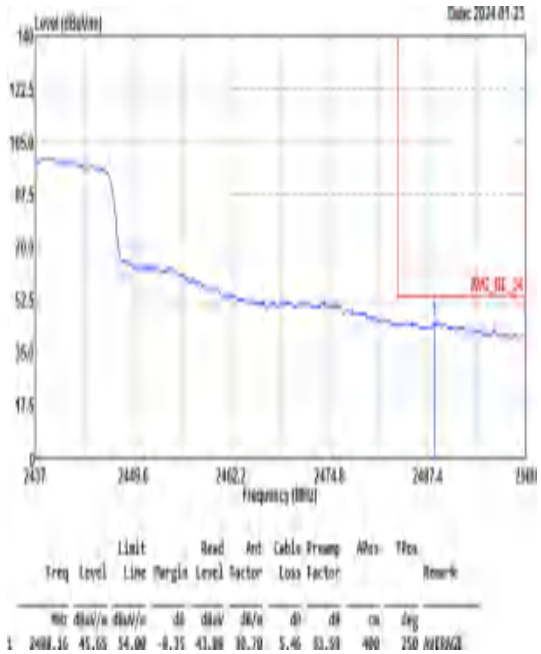
Mode	12	
	Harmonic	
	2400-2483.5_802.11n HT40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

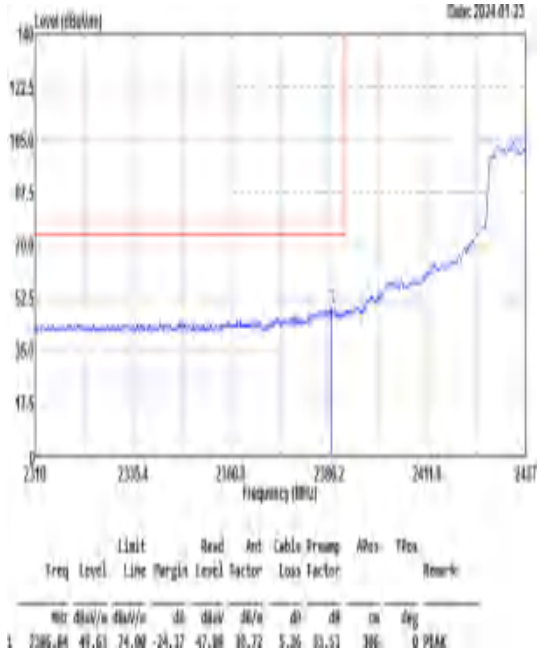
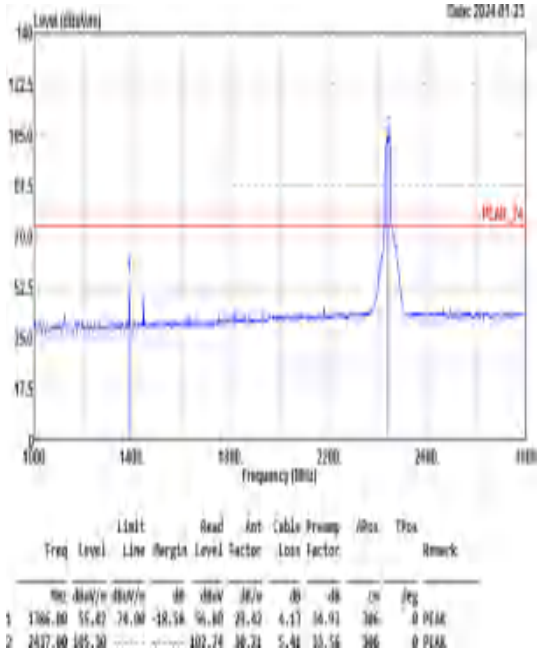
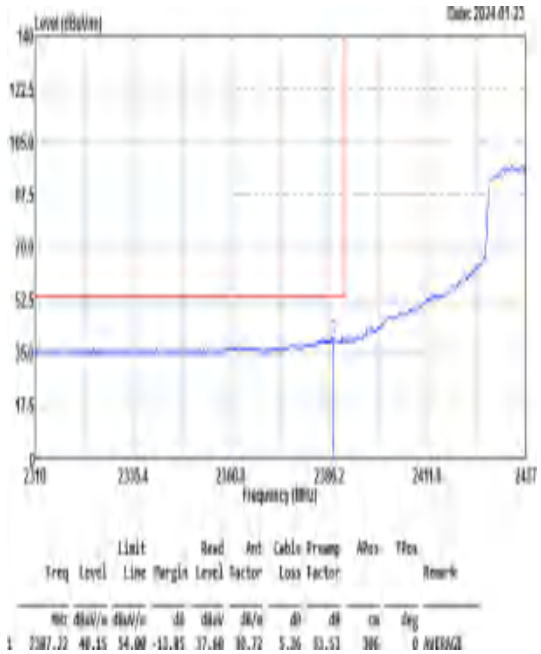
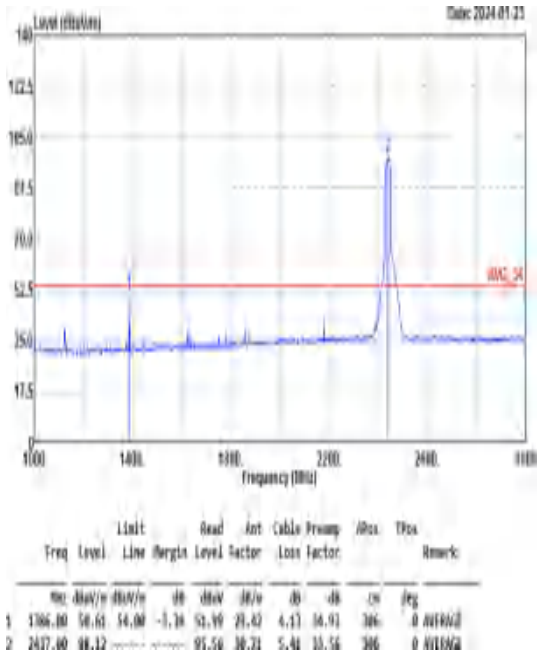
Mode	13	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Full_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

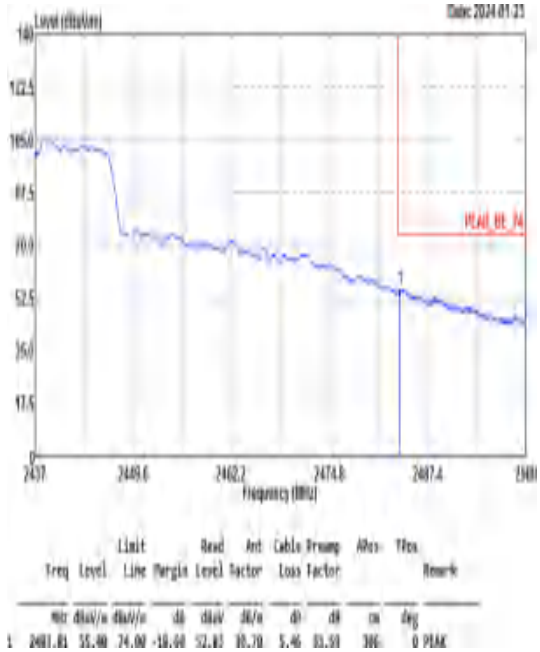
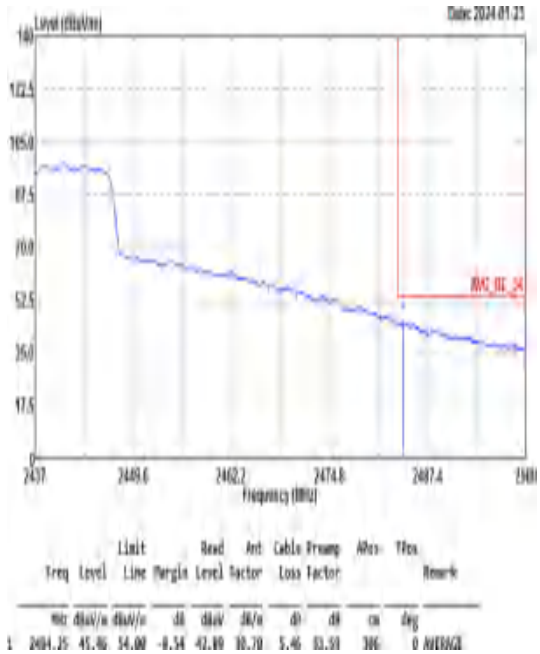
Mode	13	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Full_2412MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

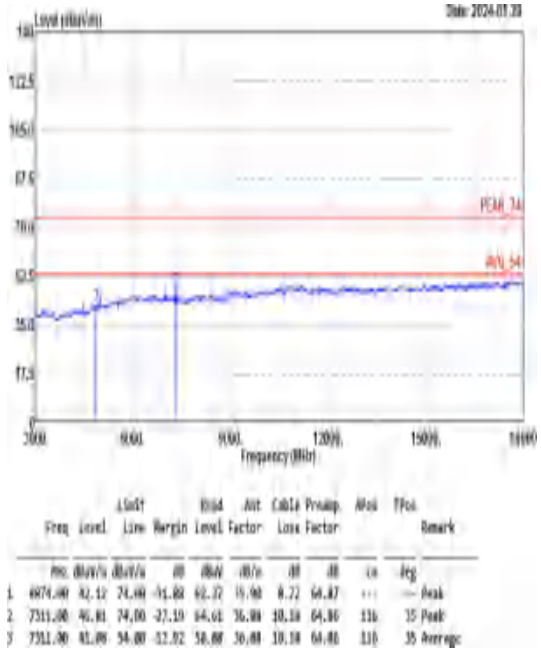
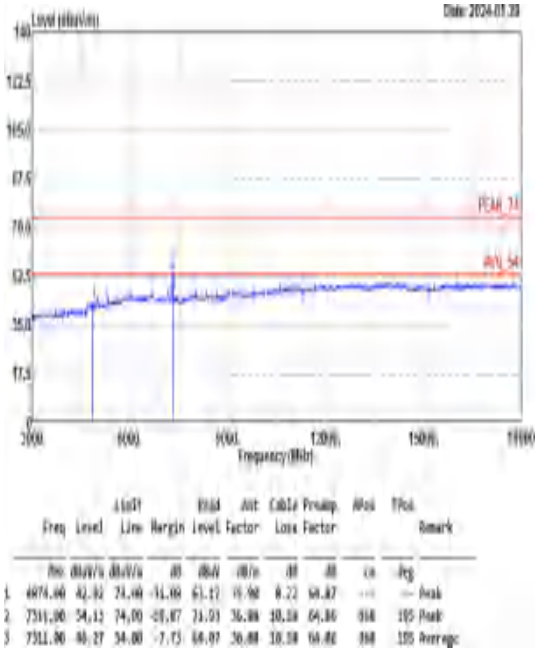
Mode	13	
	Harmonic	
	2400-2483.5_802.11ax HE20_CH01_Full_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

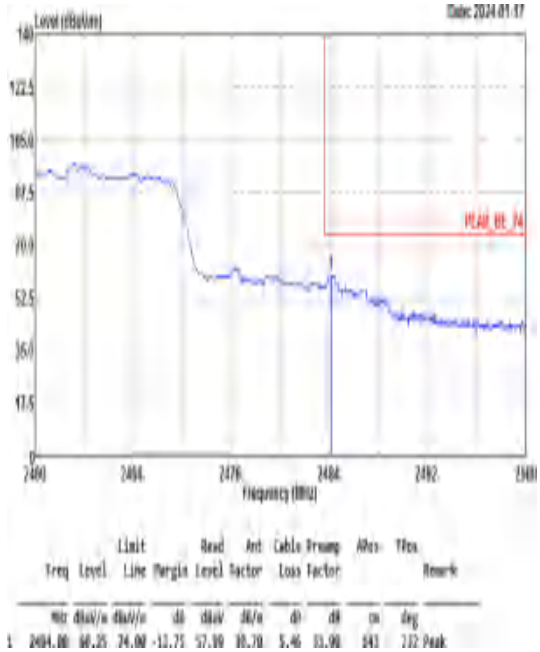
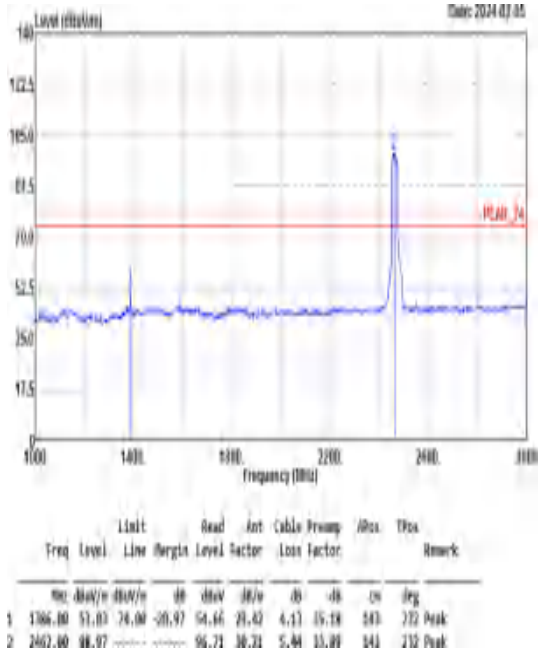
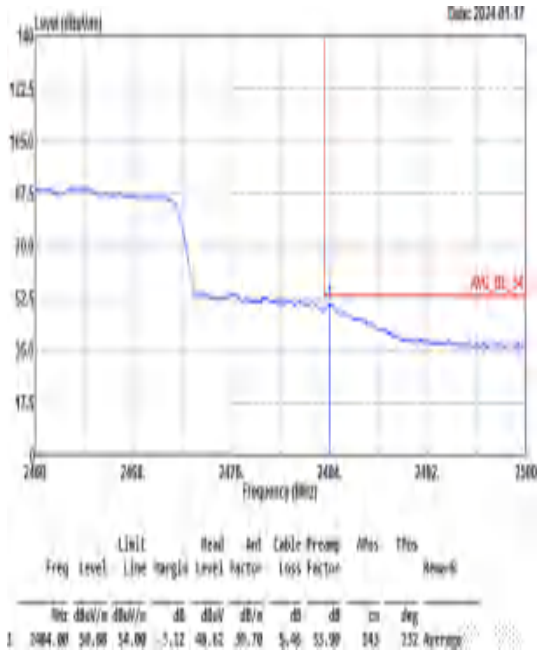
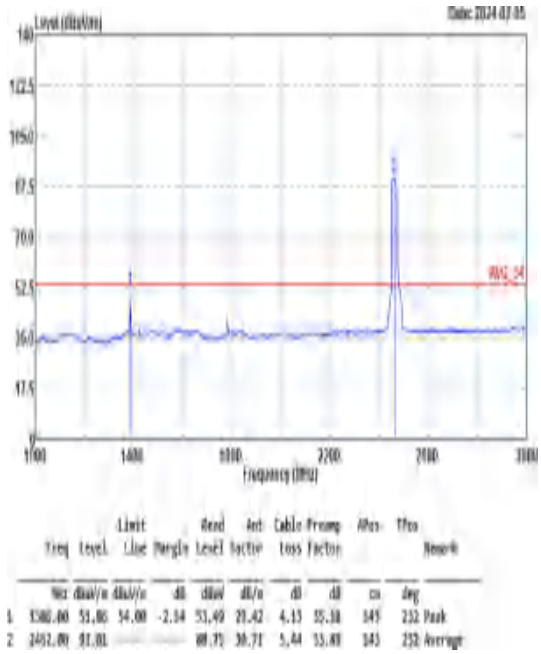
Mode	14	
	Band Edge - L	
	2400-2483.5_802.11ax HE20_CH06_Full_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

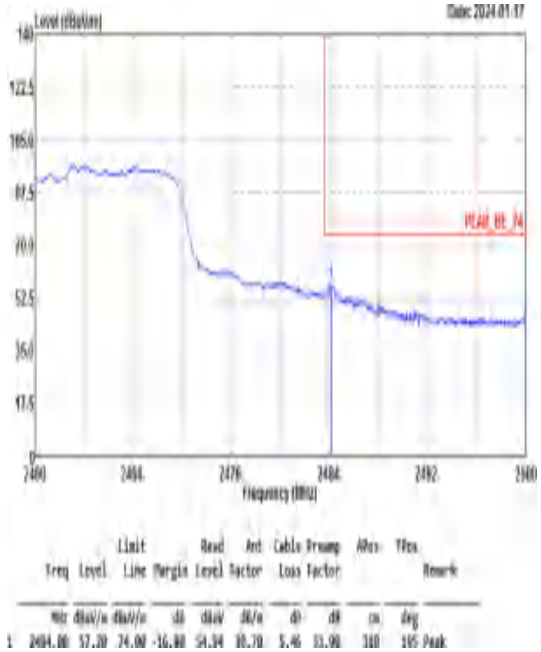
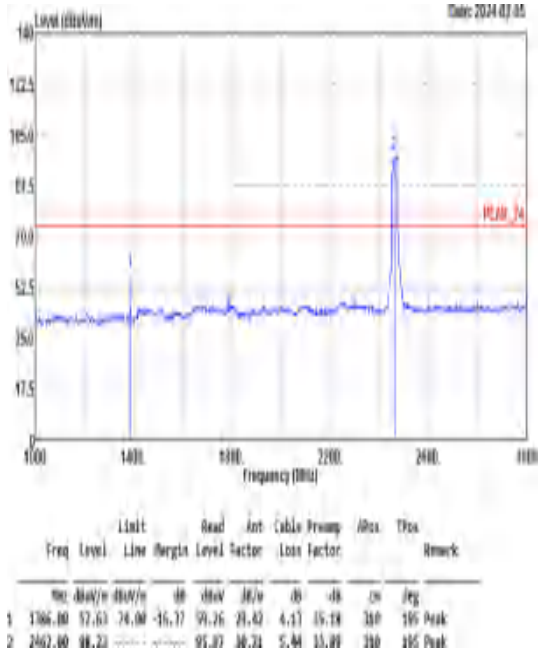
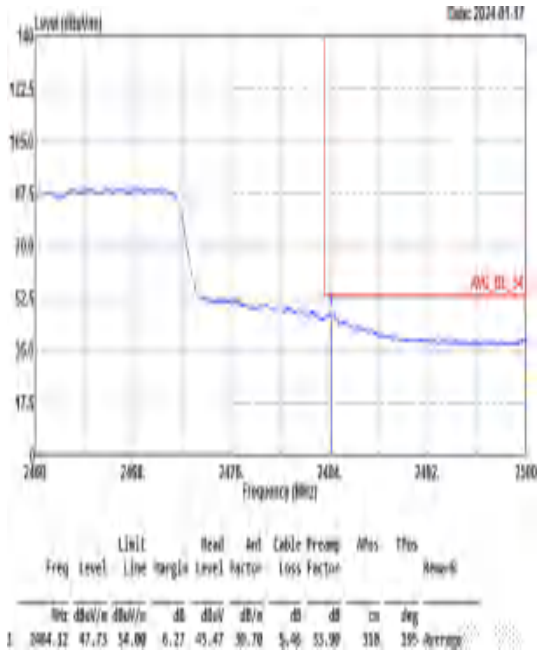
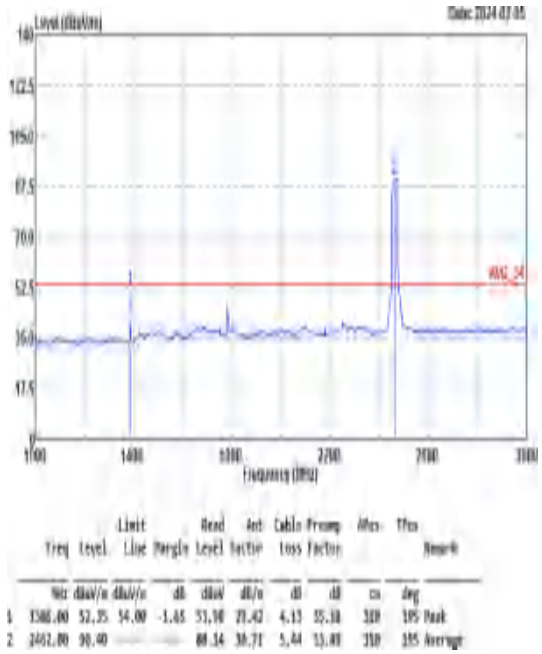
Mode	14	
	Band Edge - R	
	2400-2483.5_802.11ax HE20_CH06_Full_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

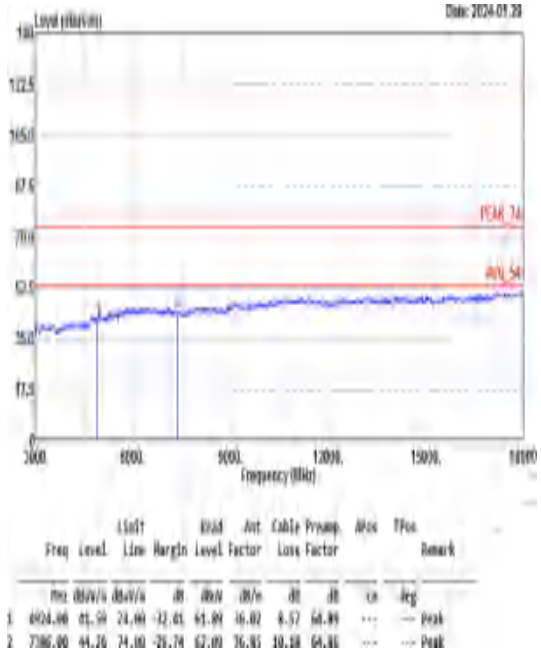
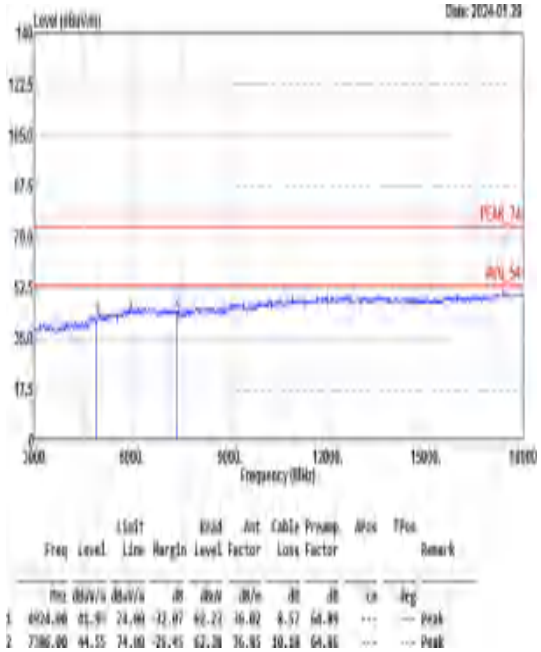
Mode	14	
	Band Edge - L	
	2400-2483.5_802.11ax HE20_CH06_Full_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

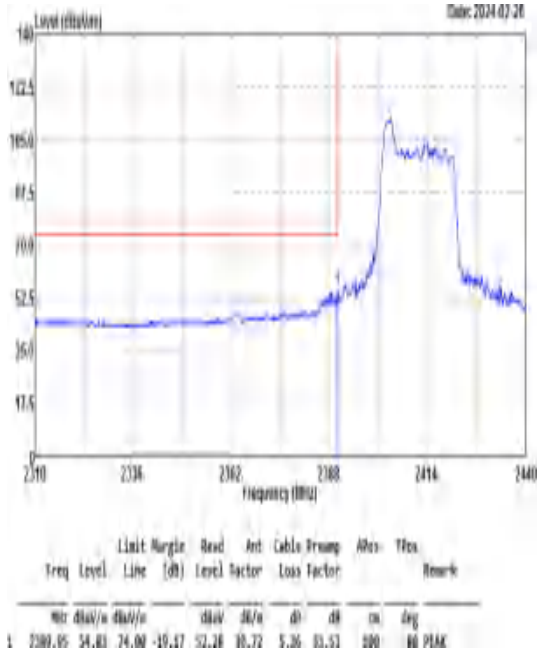
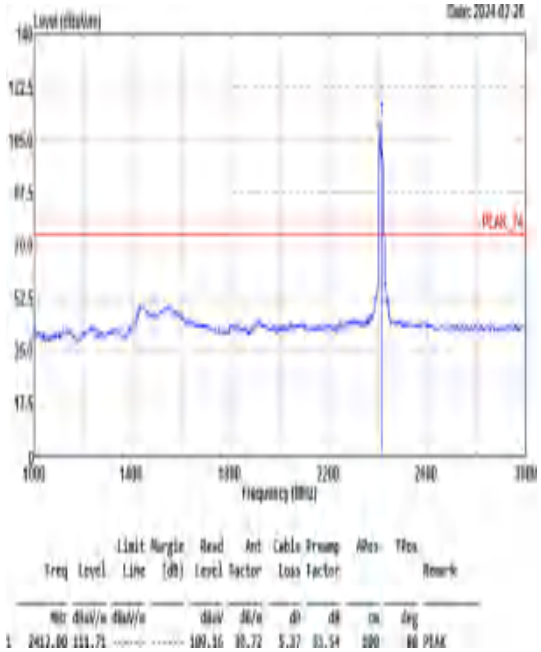
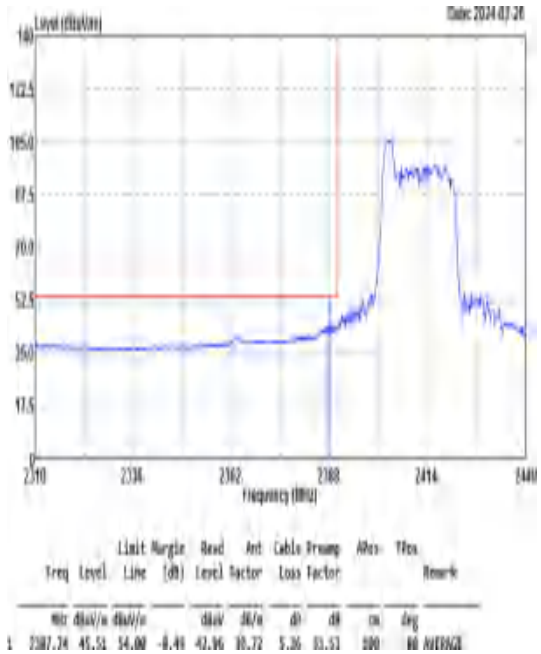
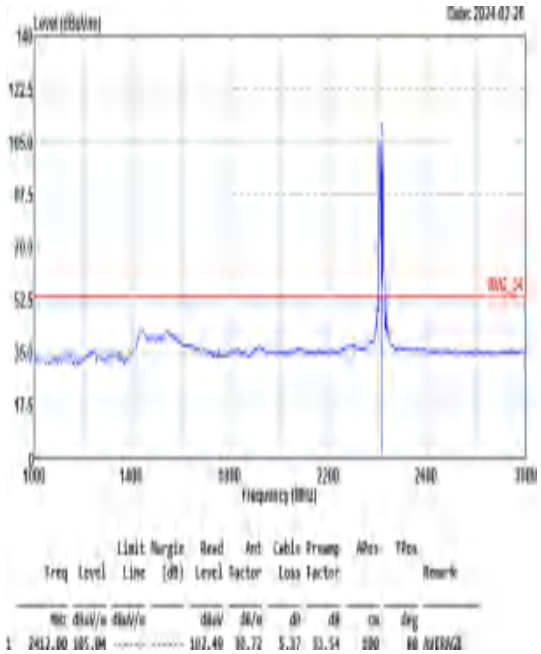
Mode	14	
	Band Edge - R	
	2400-2483.5_802.11ax HE20_CH06_Full_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

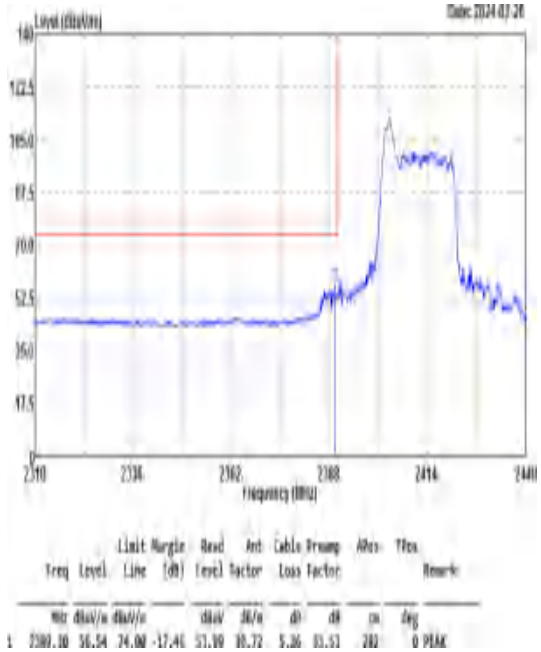
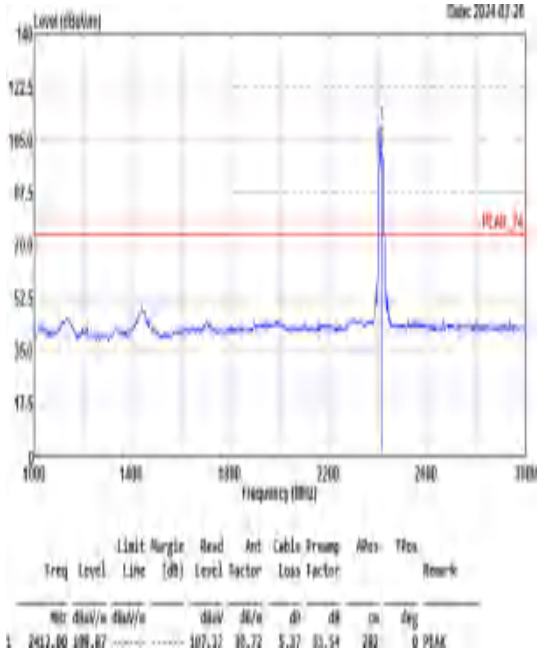
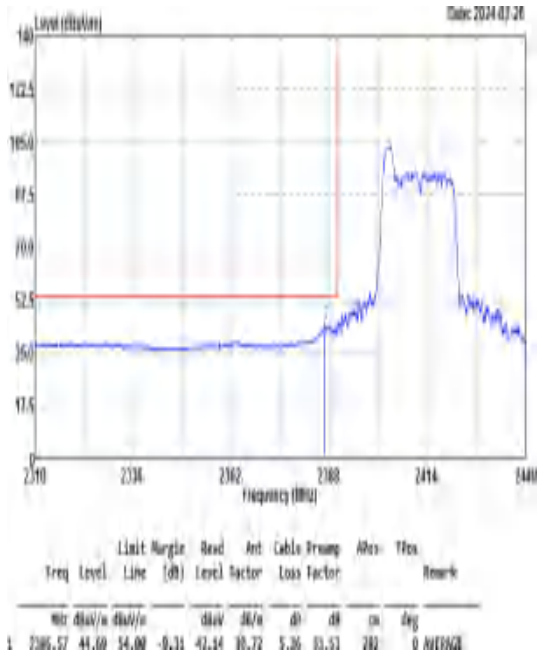
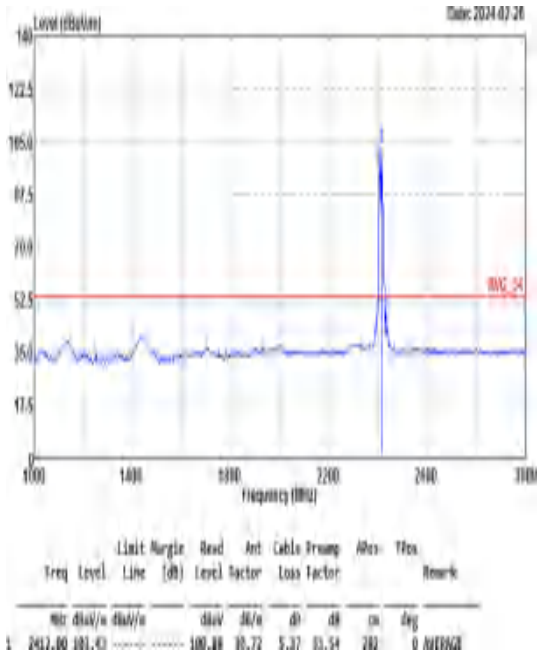
Mode	14	
	Harmonic	
	2400-2483.5_802.11ax HE20_CH06_Full_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

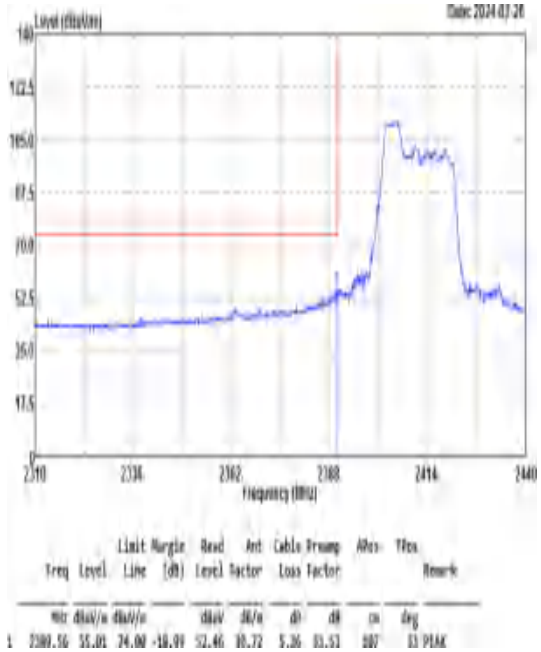
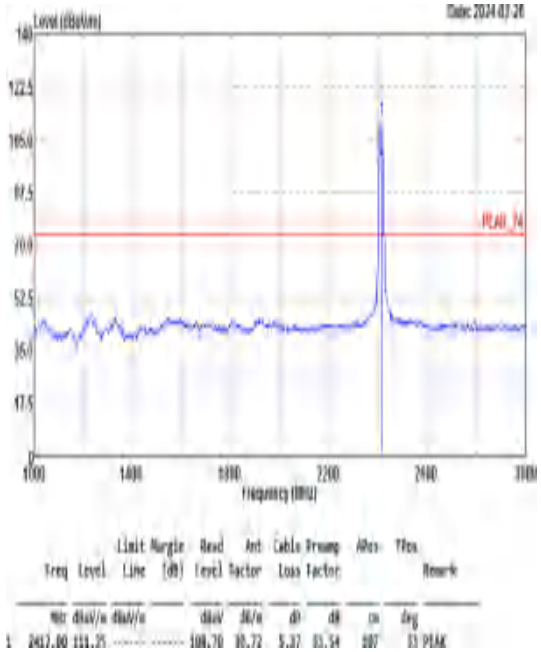
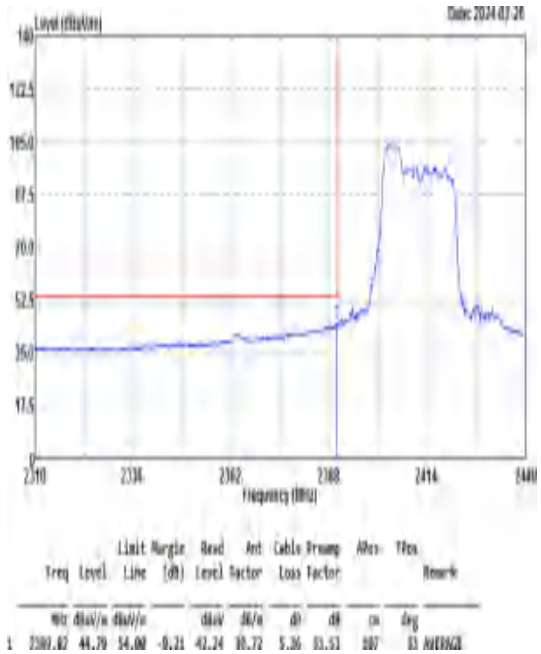
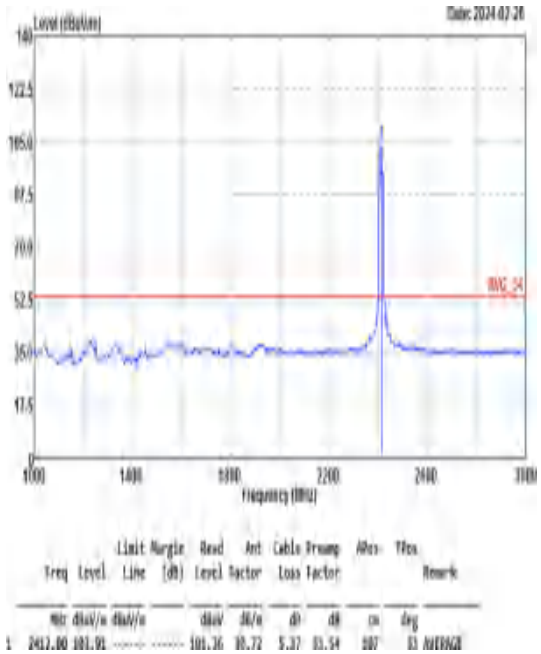
Mode	15	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Full_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

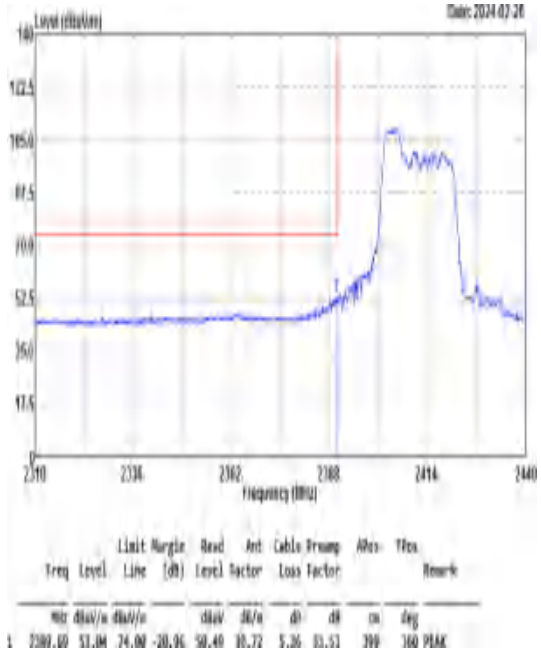
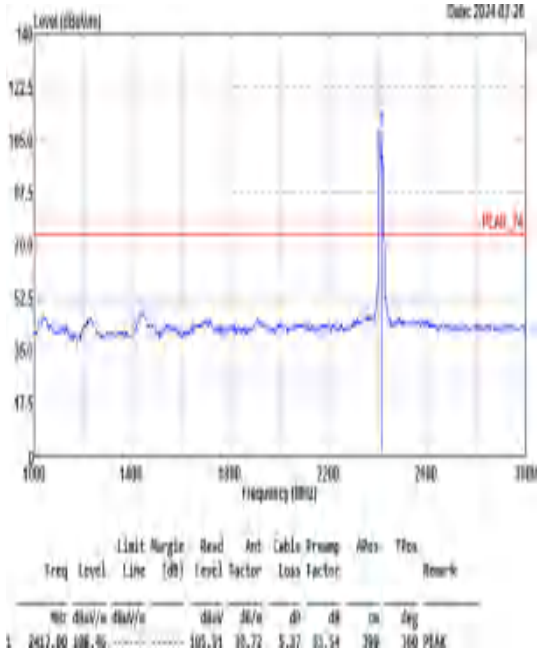
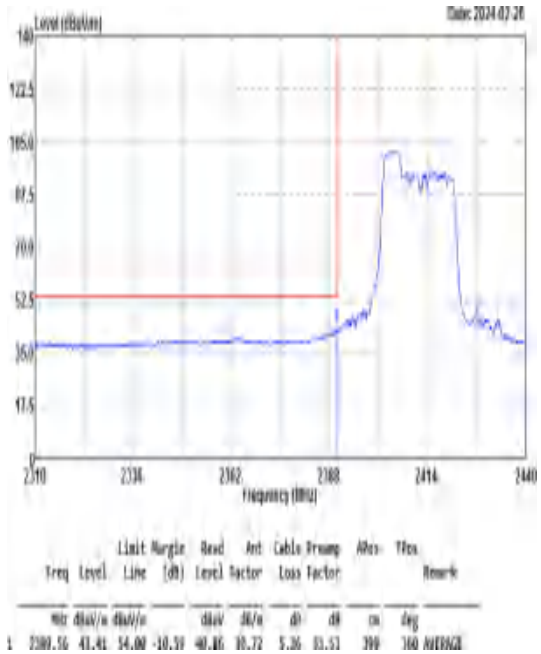
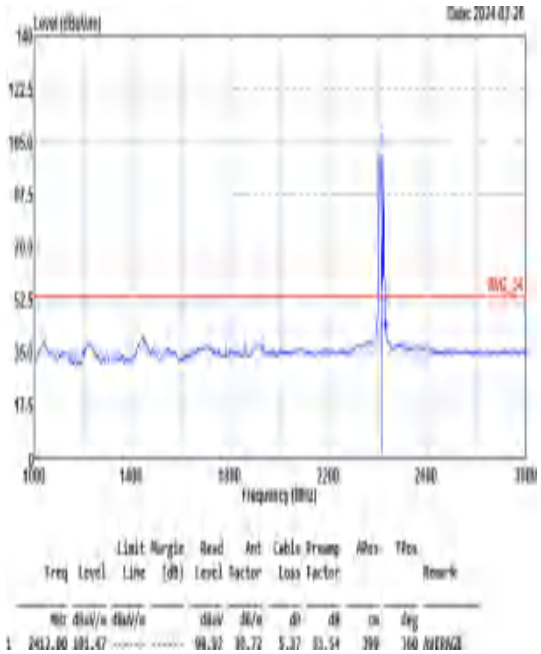
Mode	15	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Full_2462MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

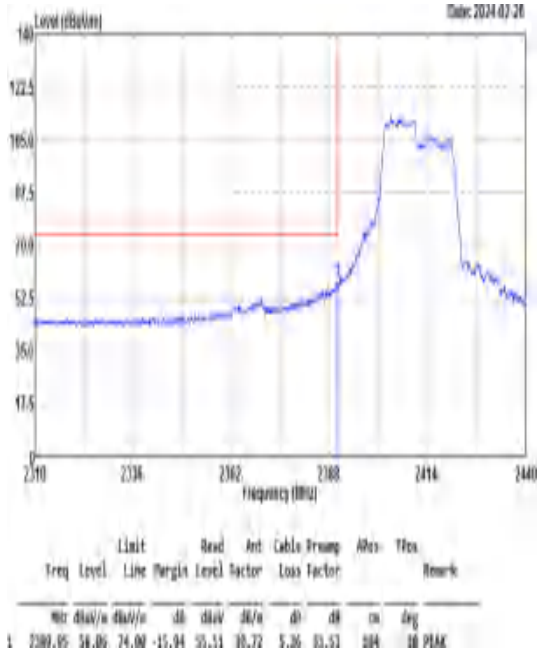
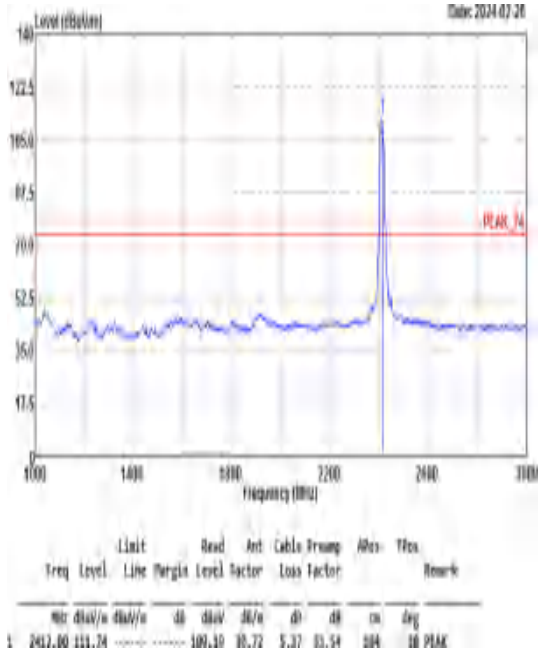
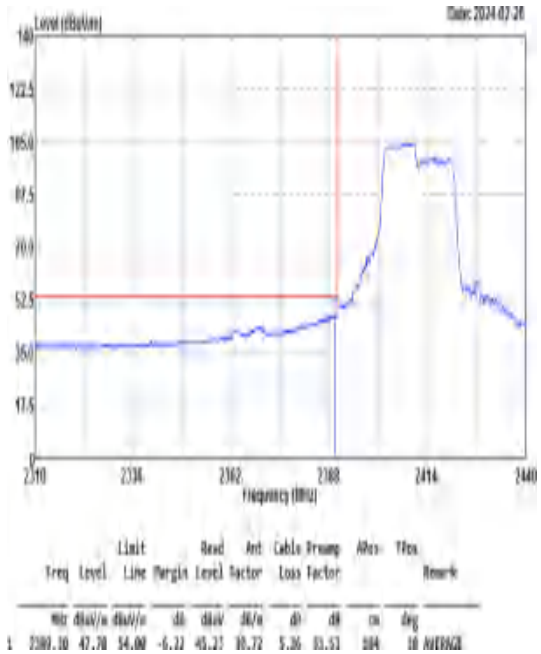
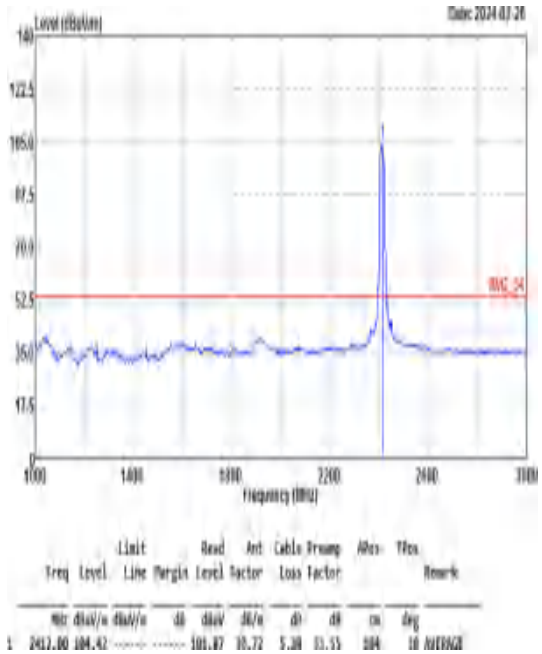
Mode	15	
	Harmonic	
	2400-2483.5_802.11ax HE20_CH11_Full_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

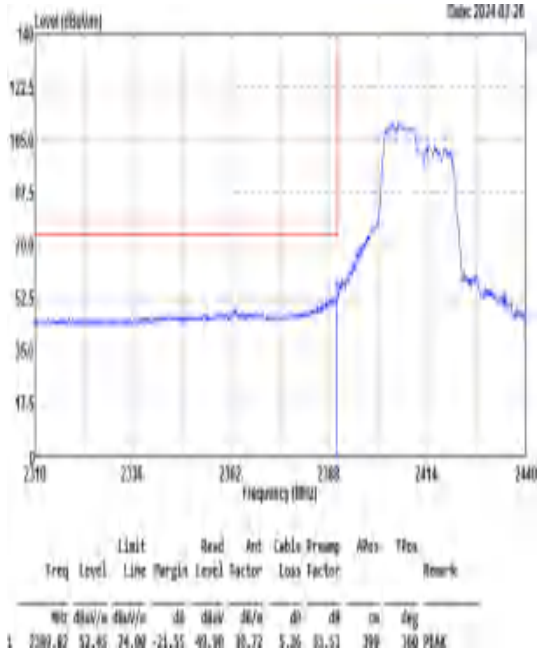
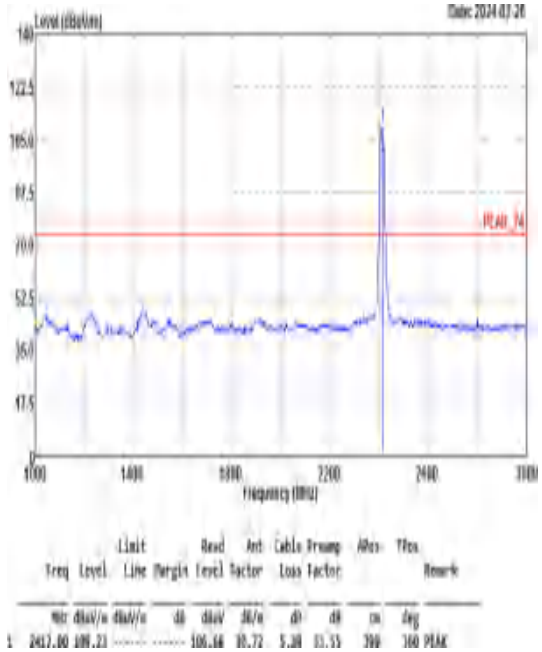
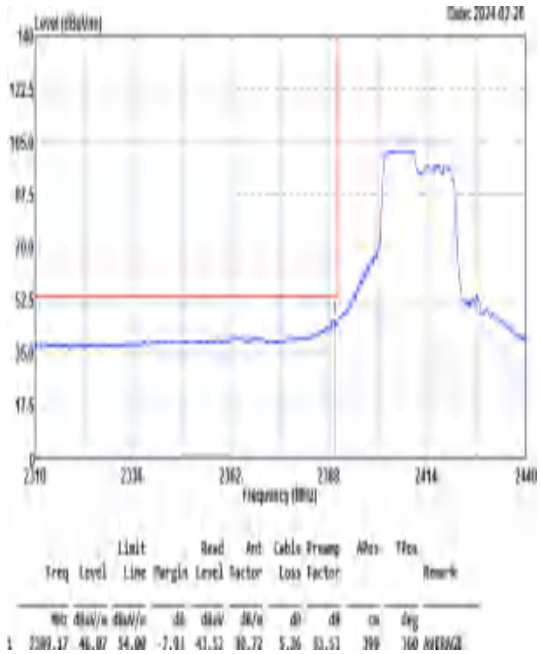
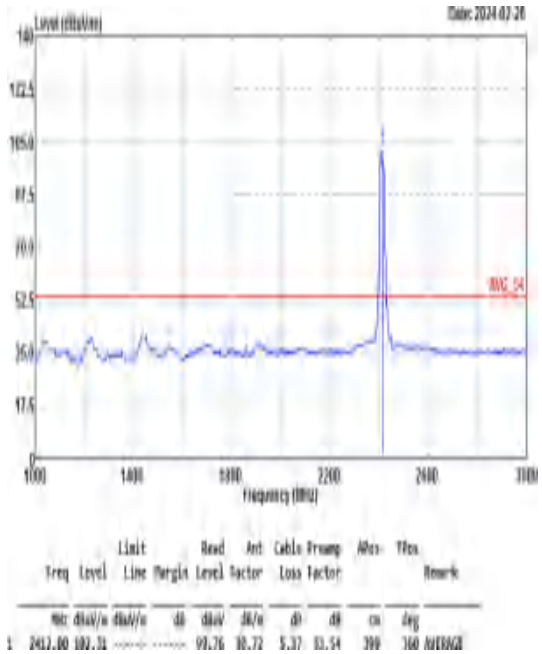
Mode	16	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Partial RU26/0_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

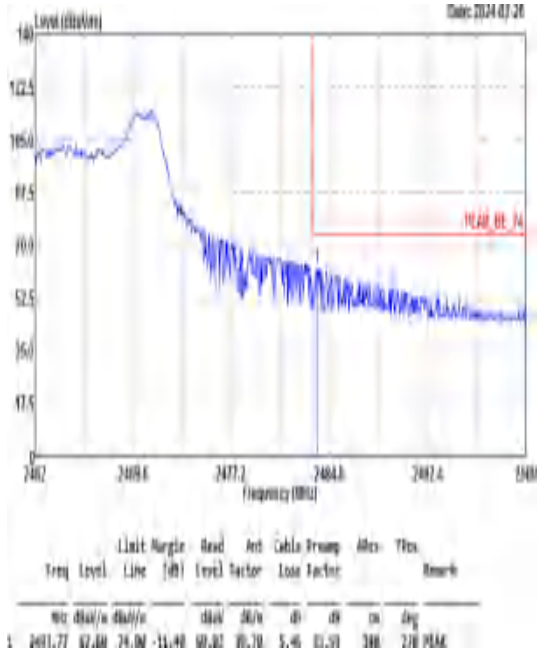
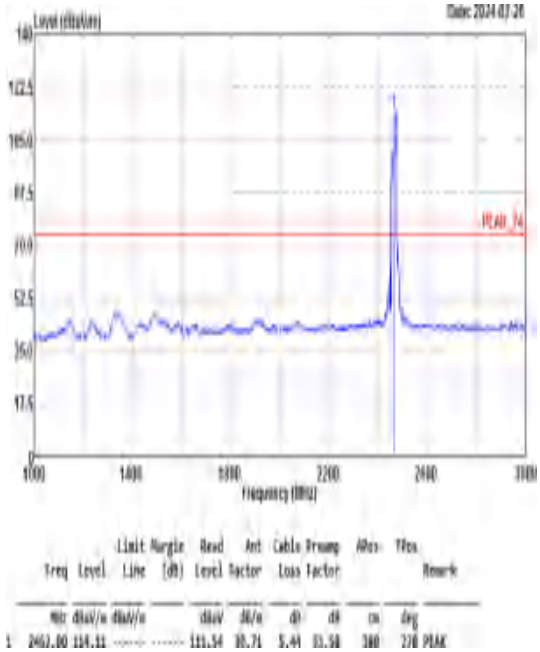
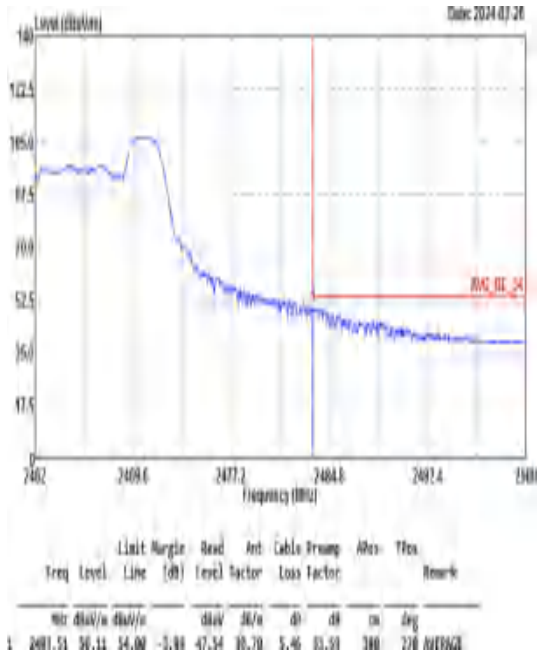
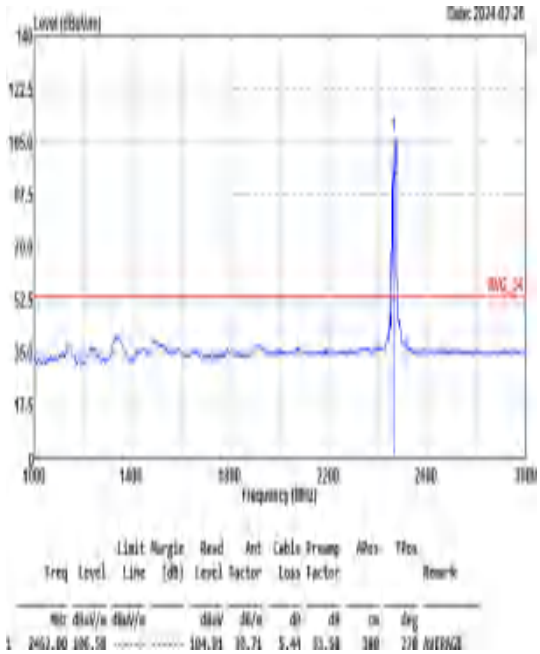
Mode	16	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Partial RU26/0_2412MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

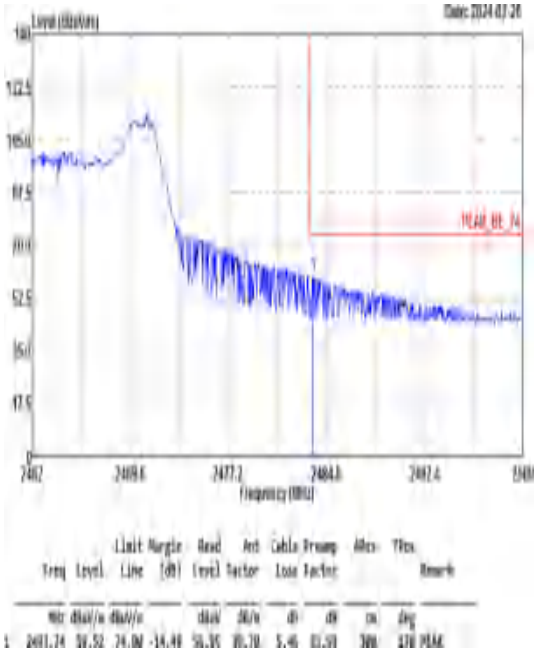
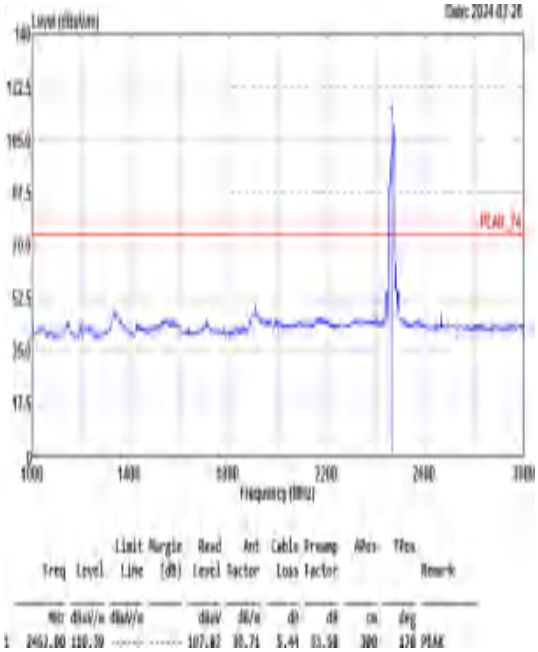
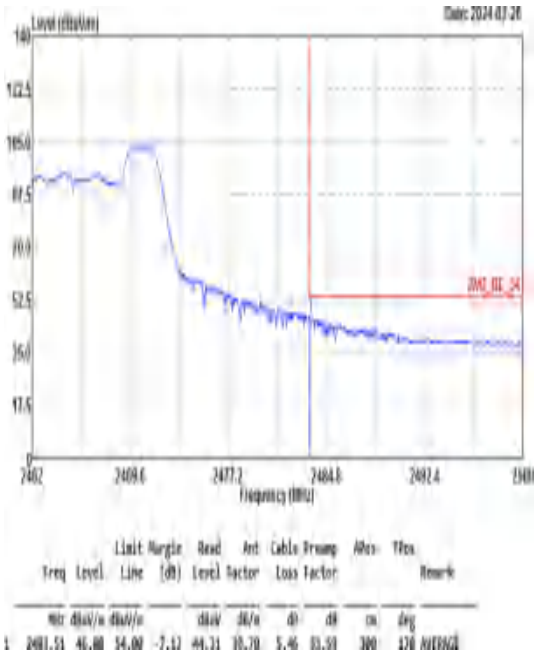
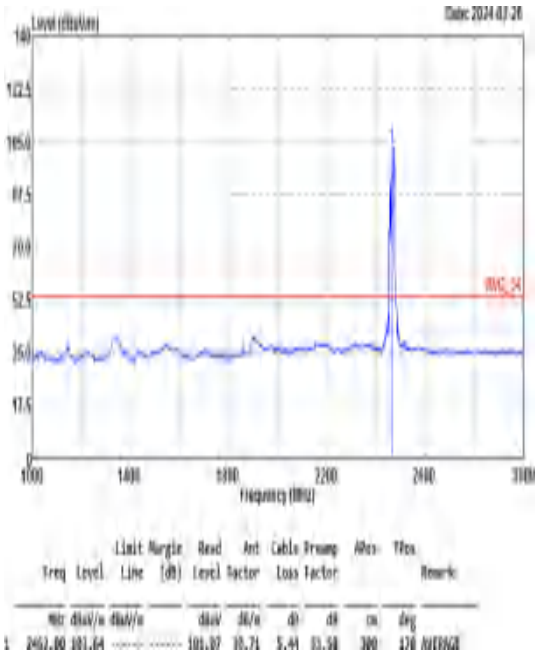
Mode	17	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Partial RU52/37_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

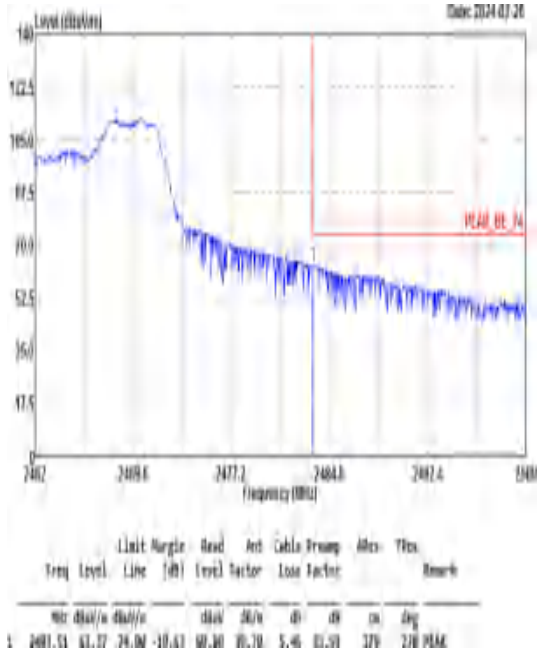
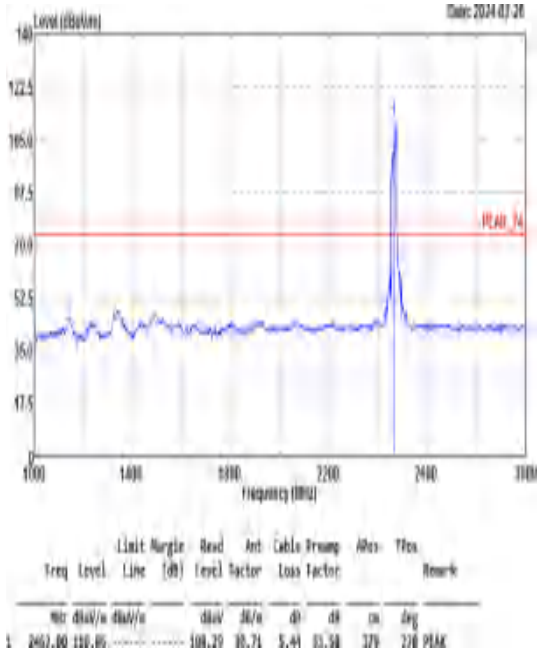
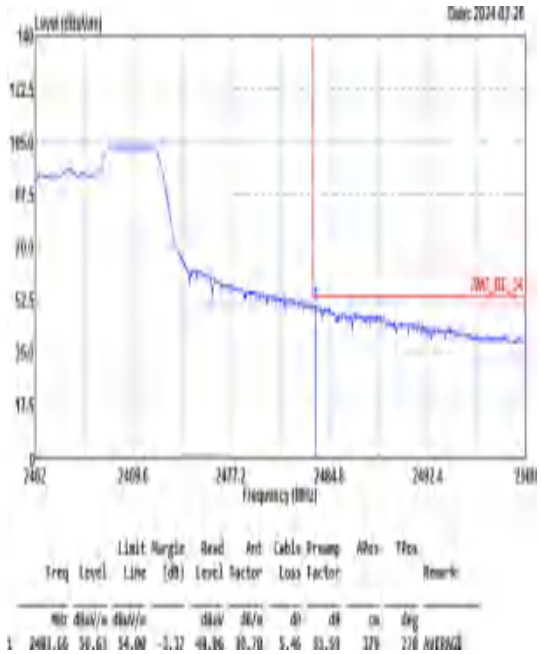
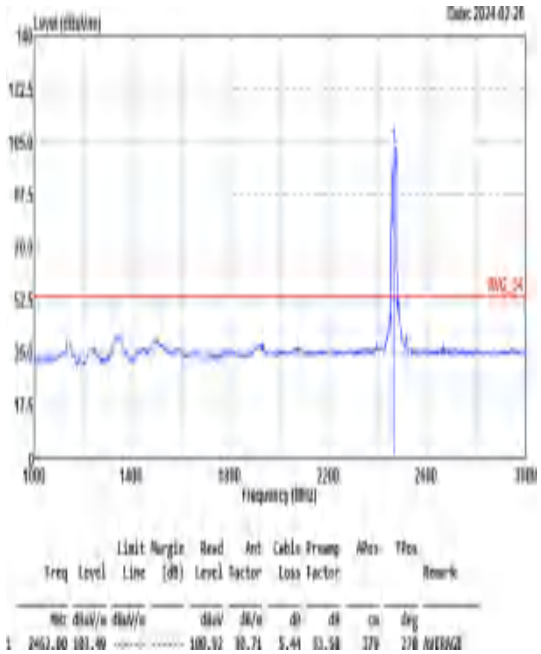
Mode	17	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Partial RU52/37_2412MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

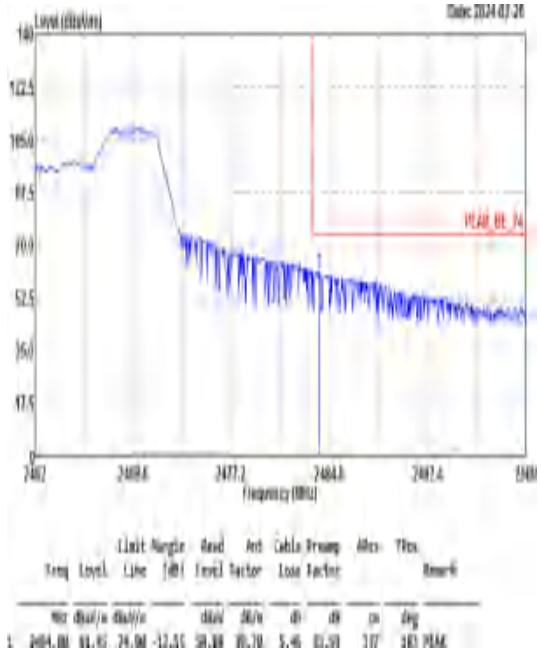
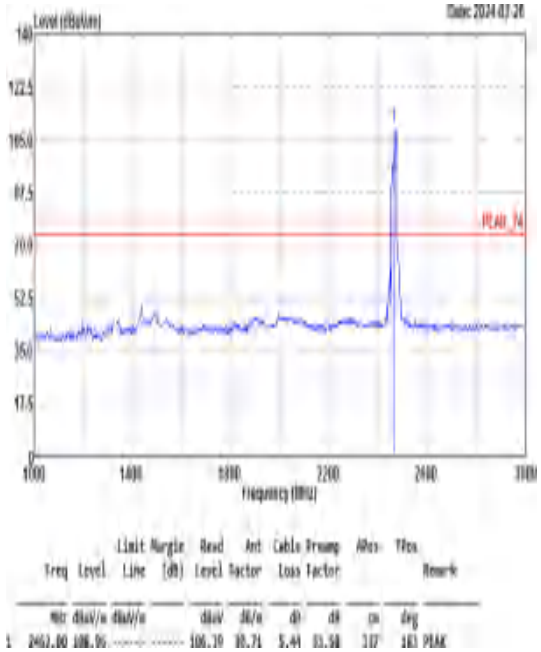
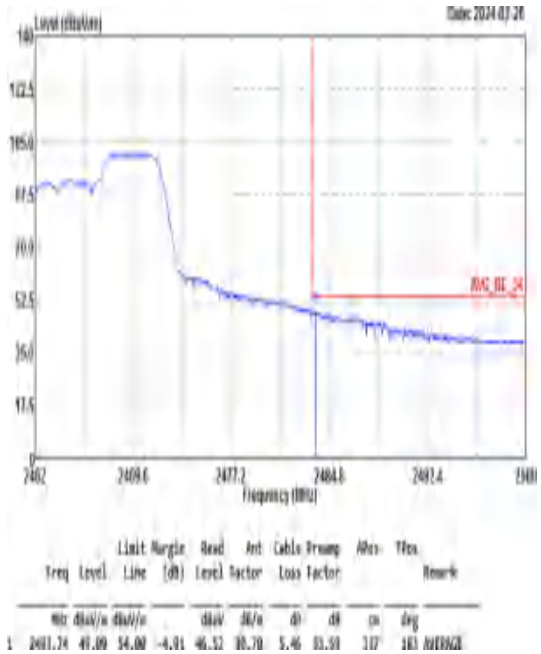
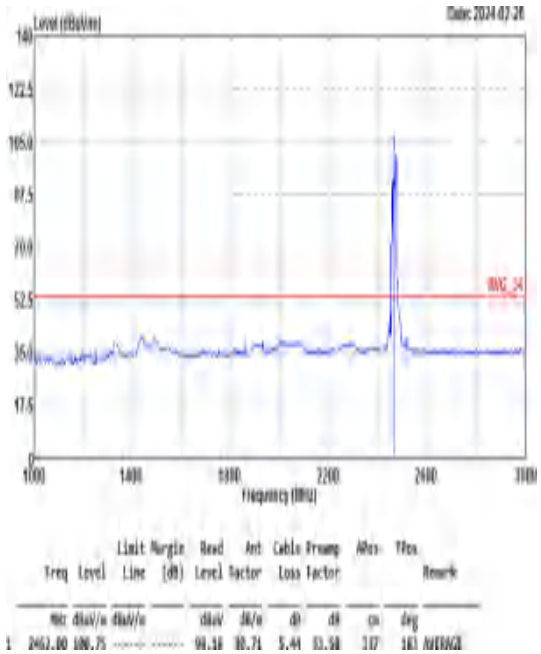
Mode	18	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Partial RU106/53_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

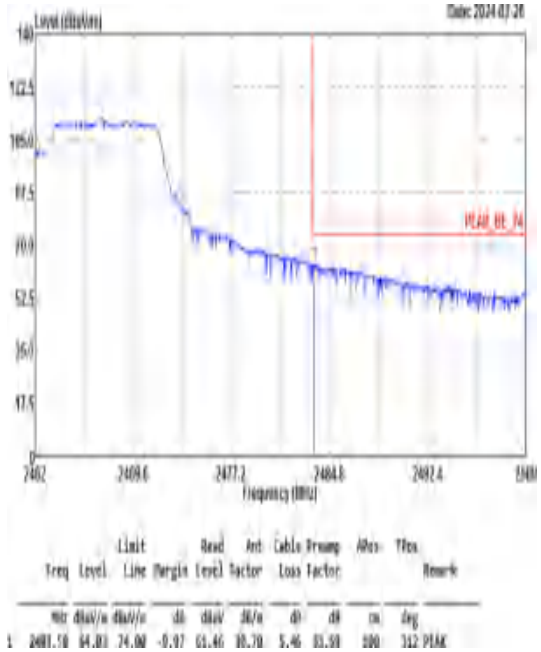
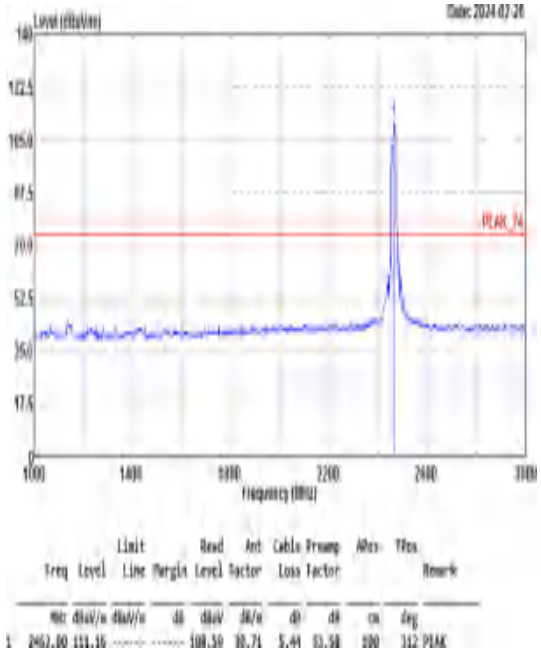
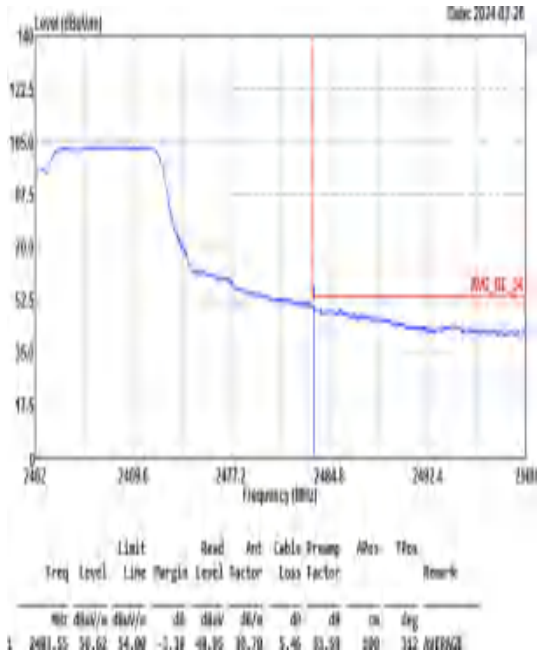
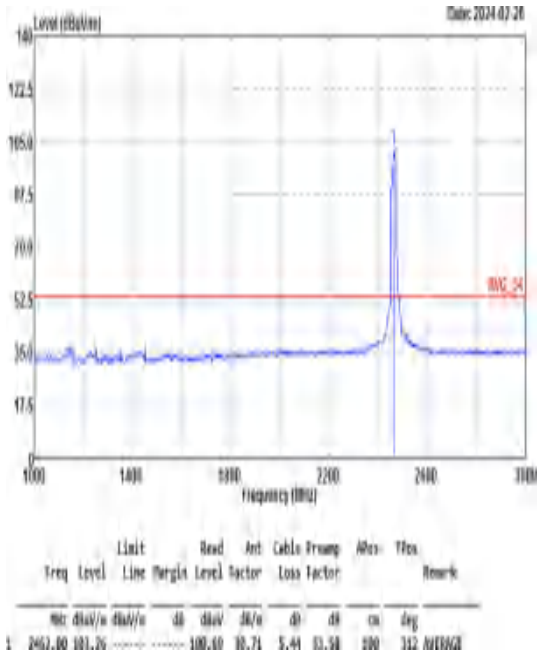
Mode	18	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH01_Partial RU106/53_2412MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

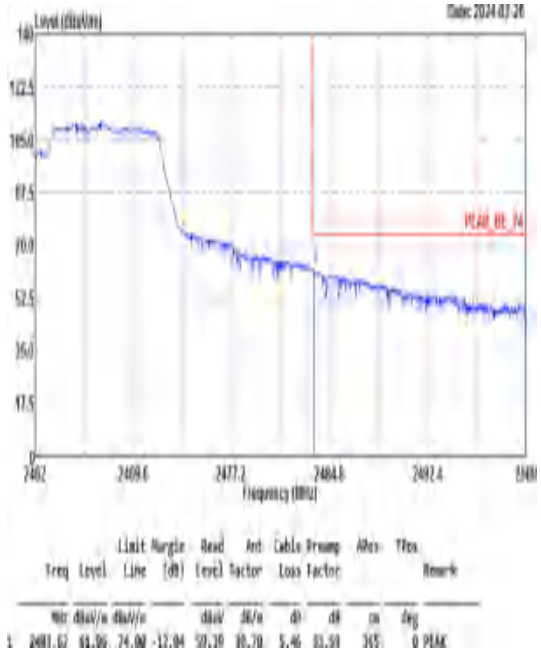
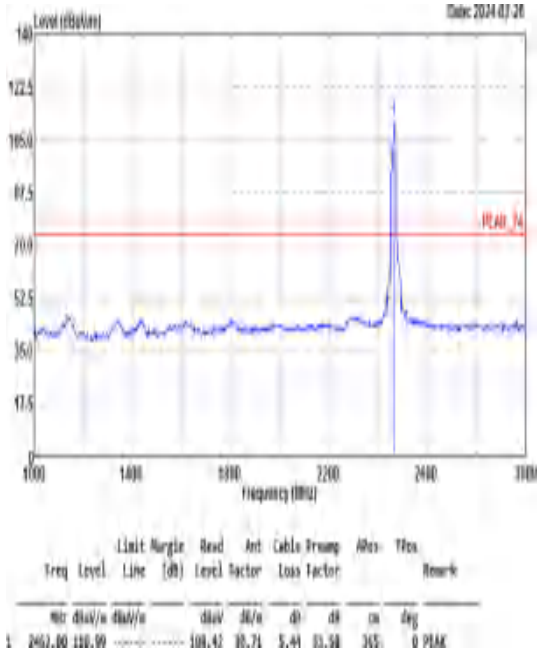
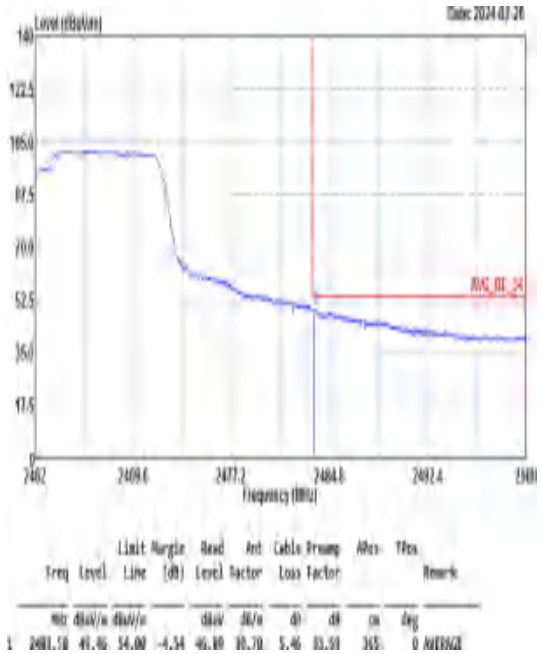
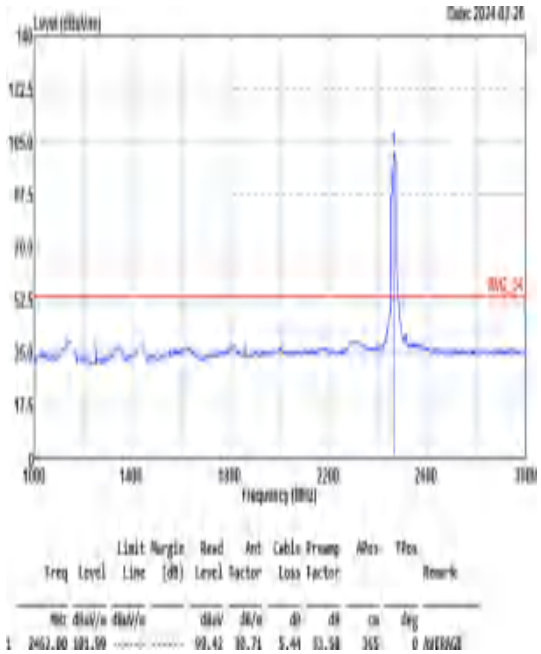
Mode	19	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Partial RU26/8_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

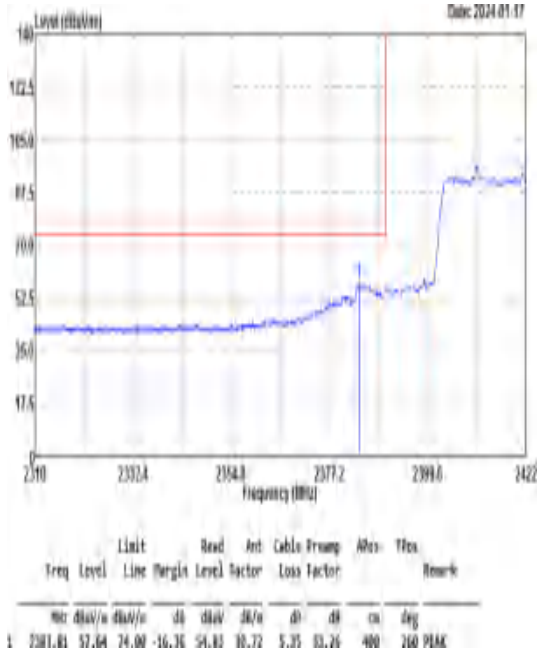
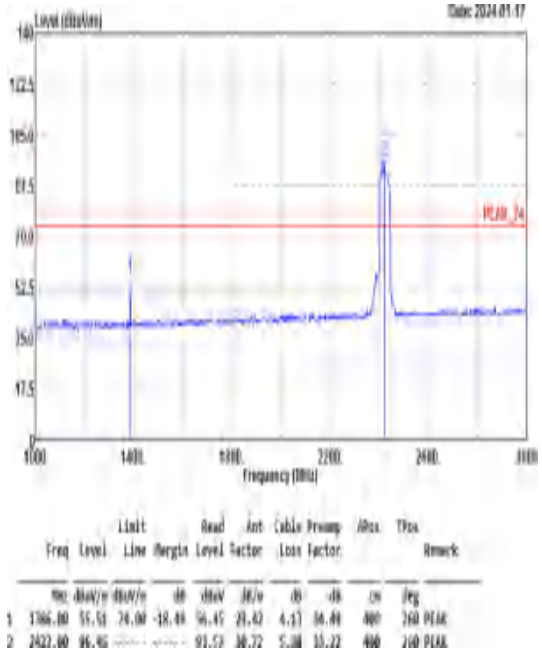
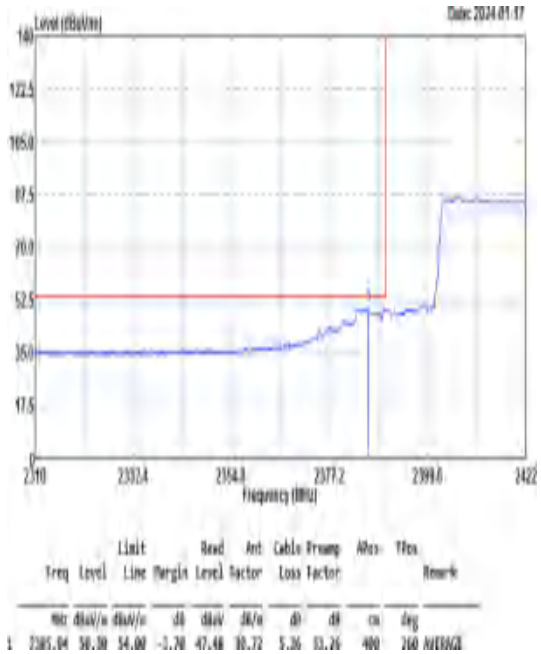
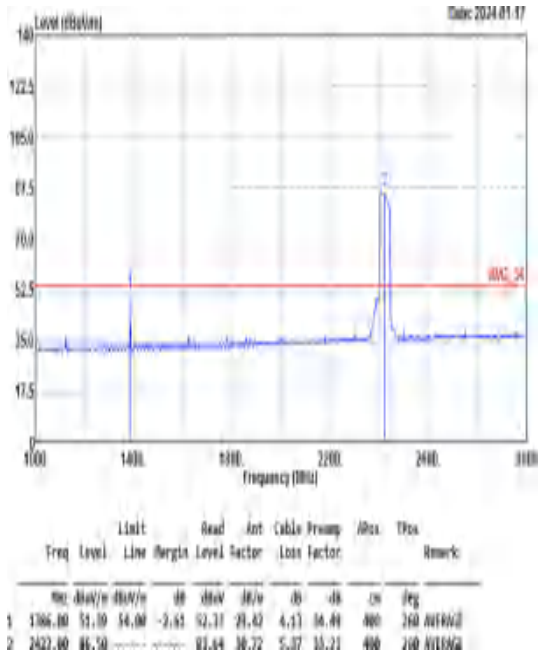
Mode	19	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Partial RU26/8_2462MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

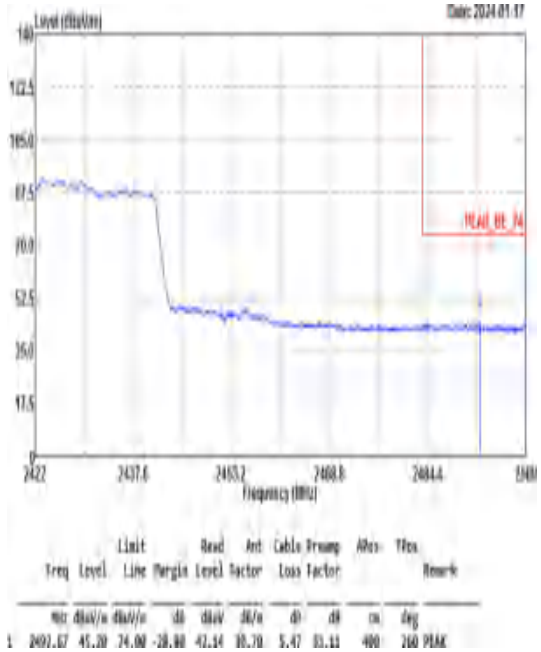
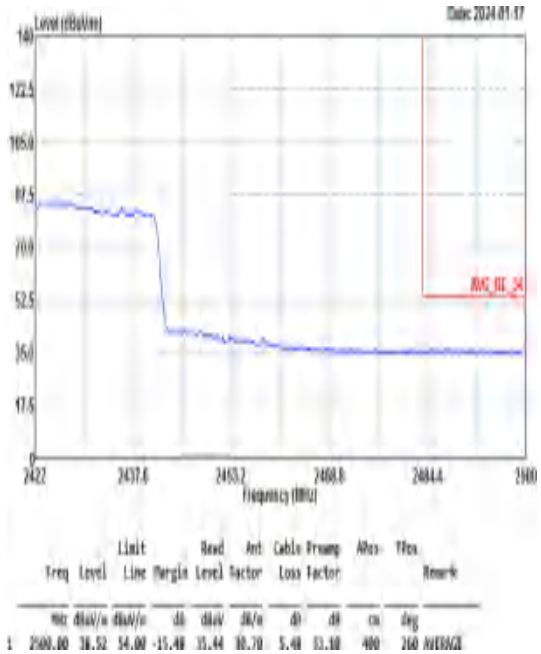
Mode	20	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Partial RU52/40_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

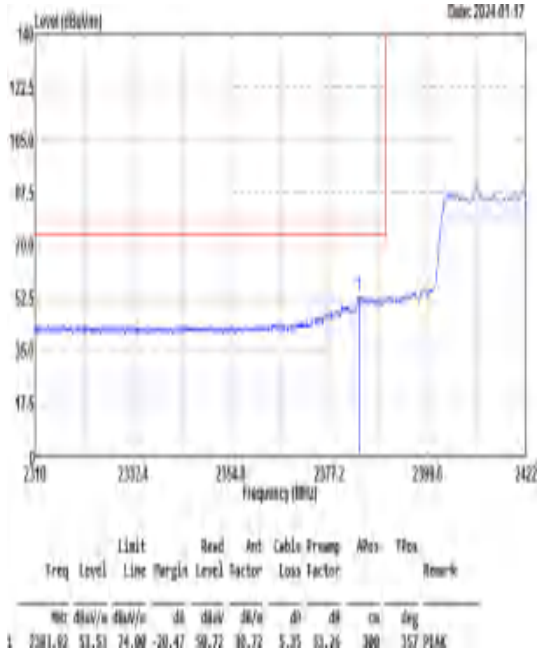
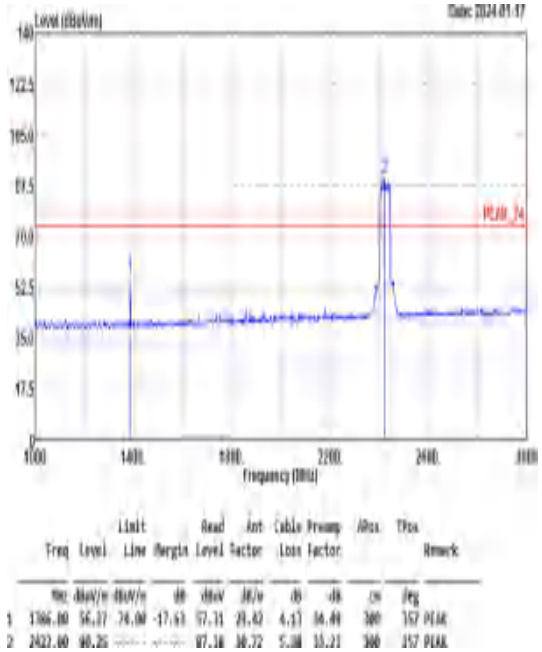
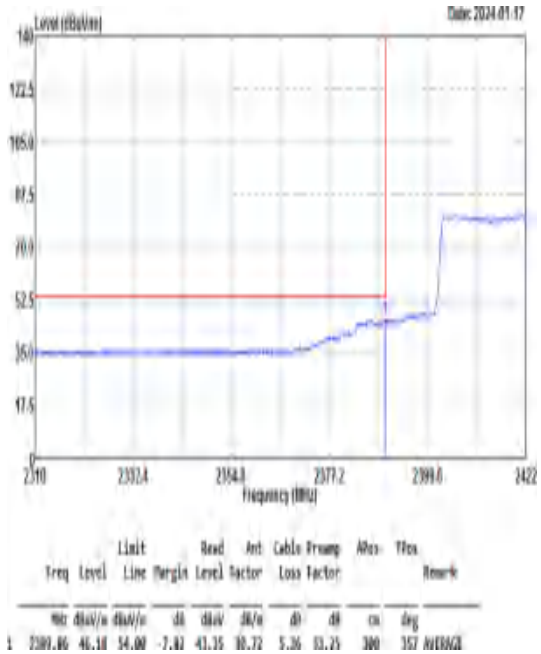
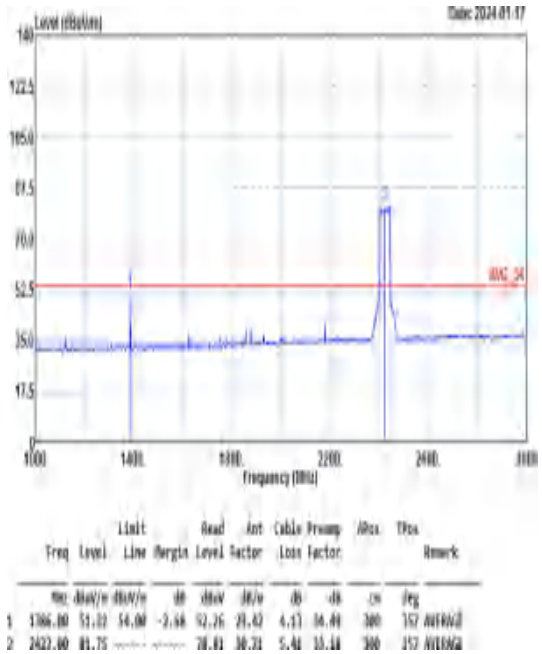
Mode	20	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Partial RU52/40_2462MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

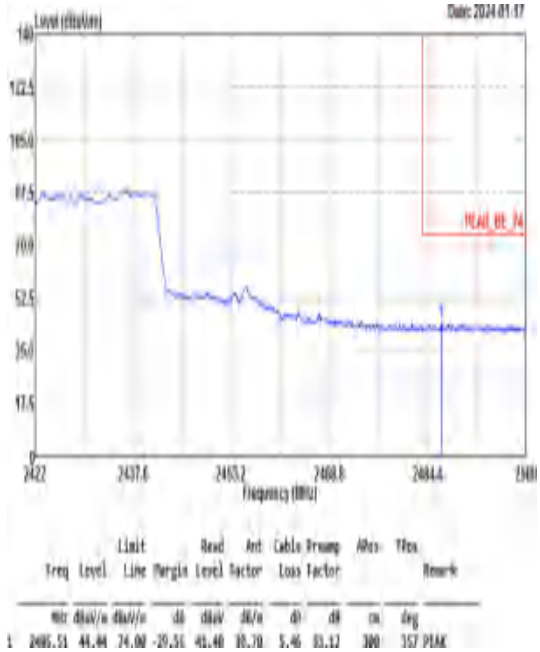
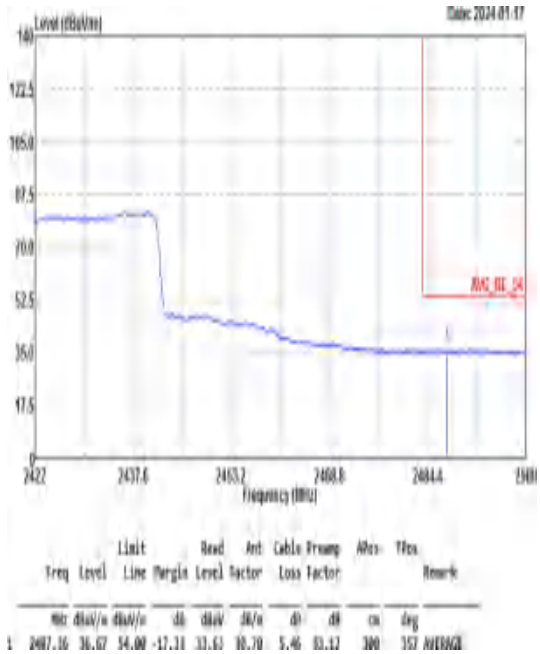
Mode	21	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Partial RU106/54_2462MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

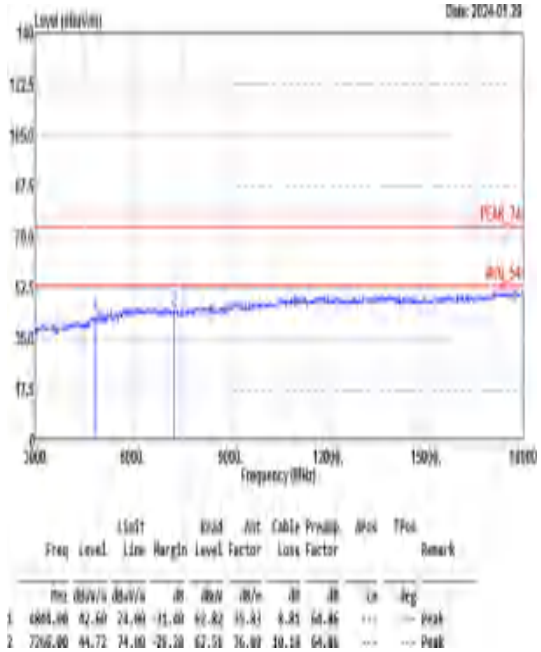
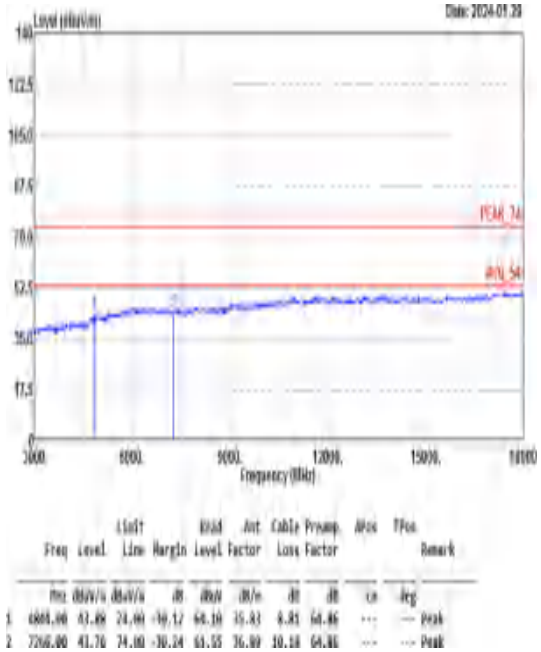
Mode	21	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH11_Partial RU106/54_2462MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

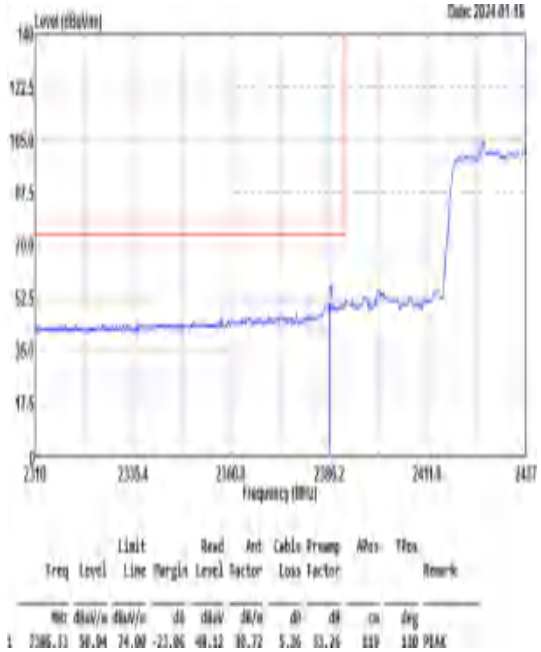
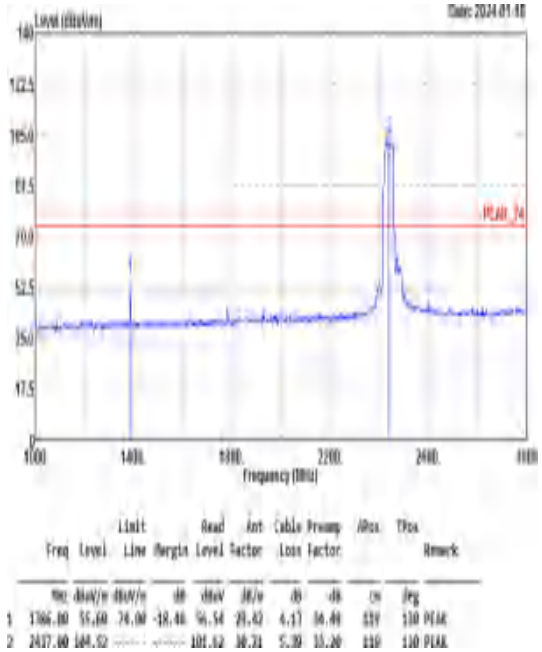
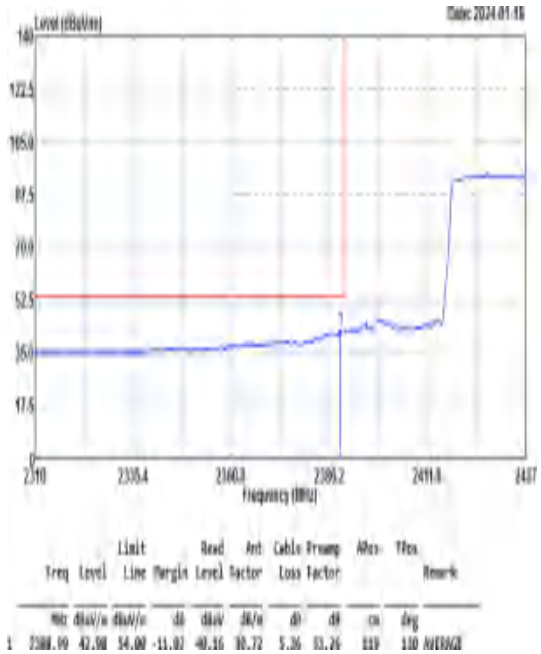
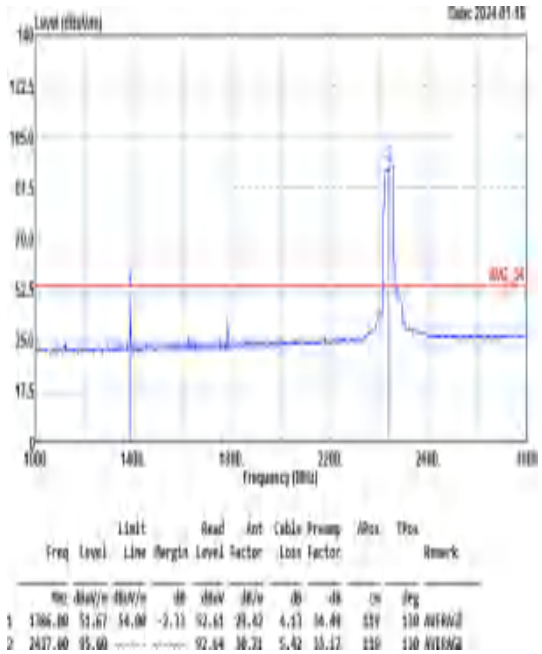
Mode	22	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

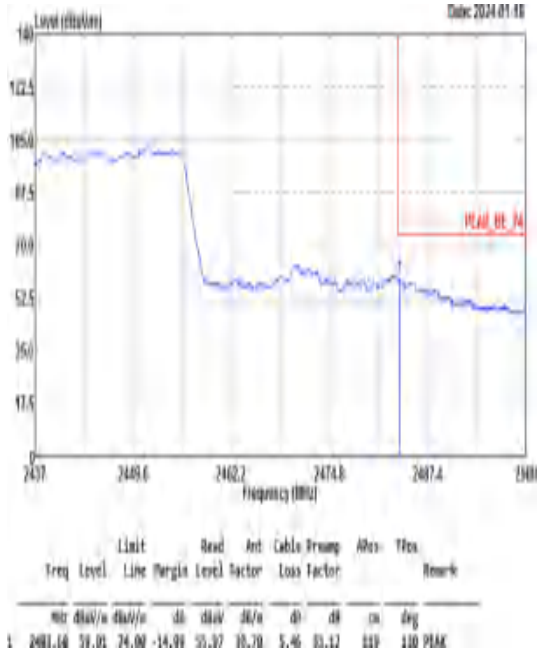
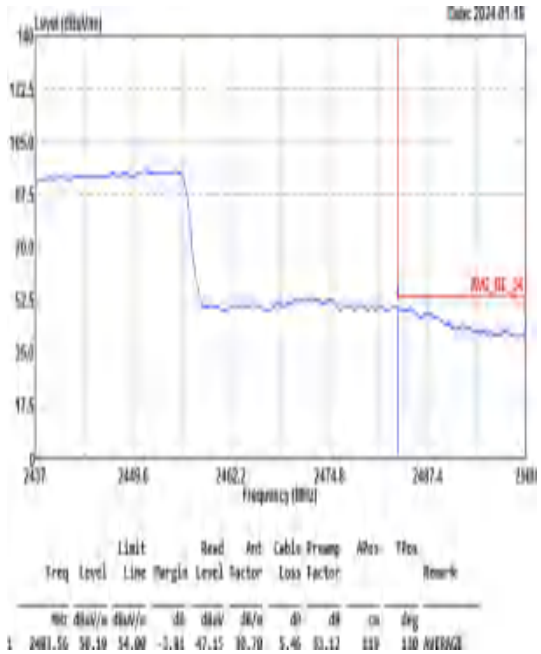
Mode	22	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

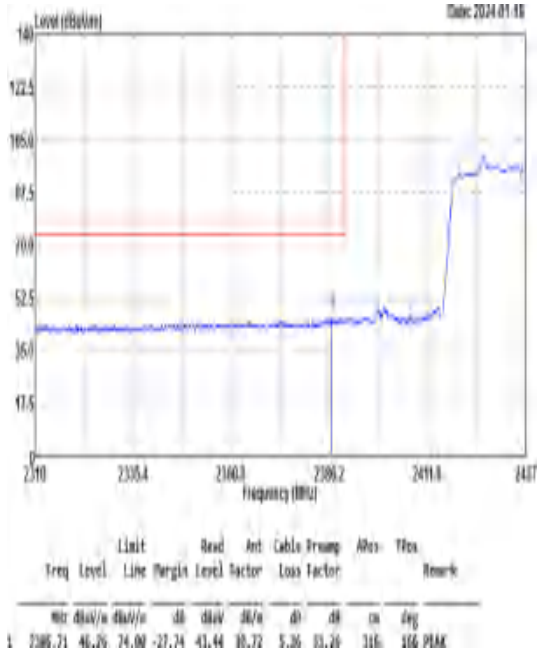
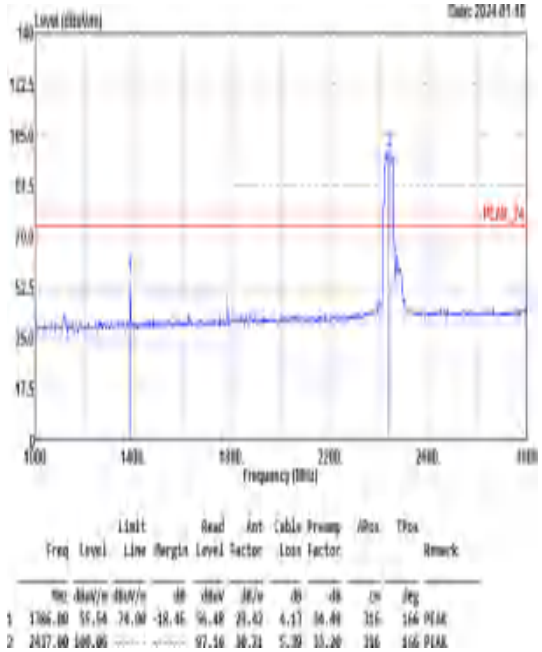
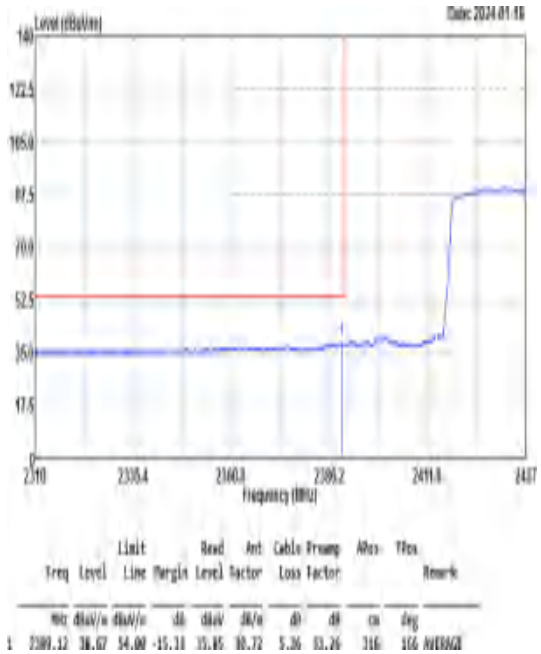
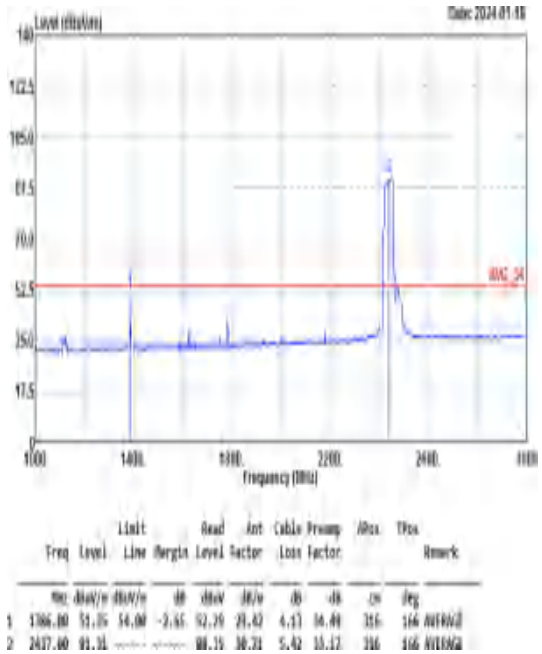
Mode	22	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

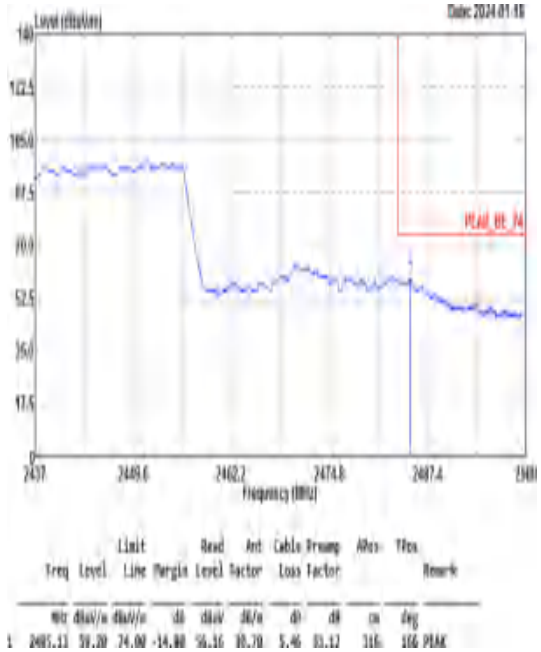
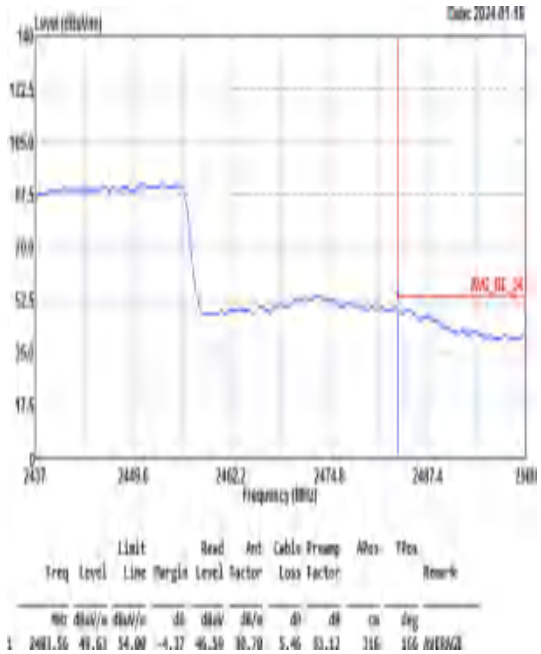
Mode	22	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

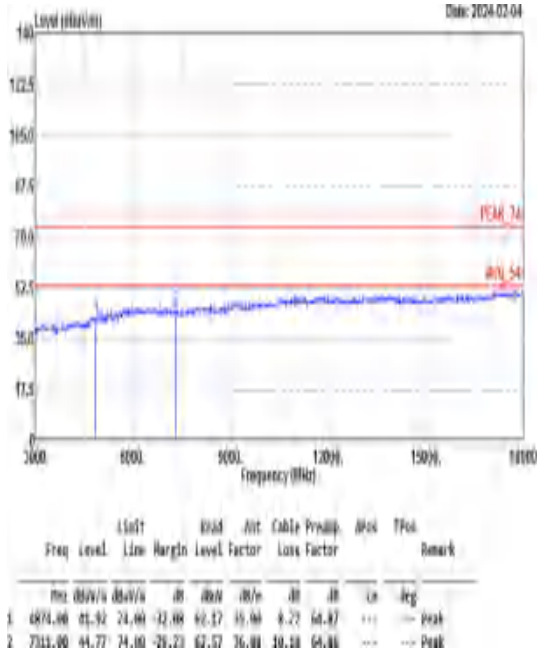
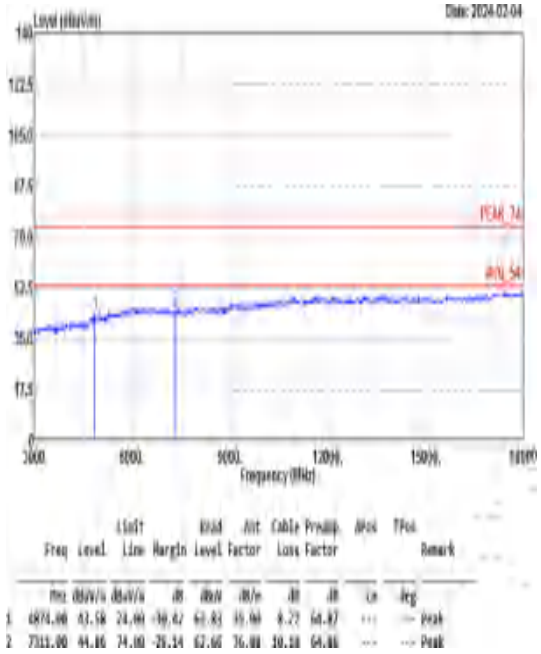
Mode	22	
	Harmonic	
	2400-2483.5_802.11ax HE40_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

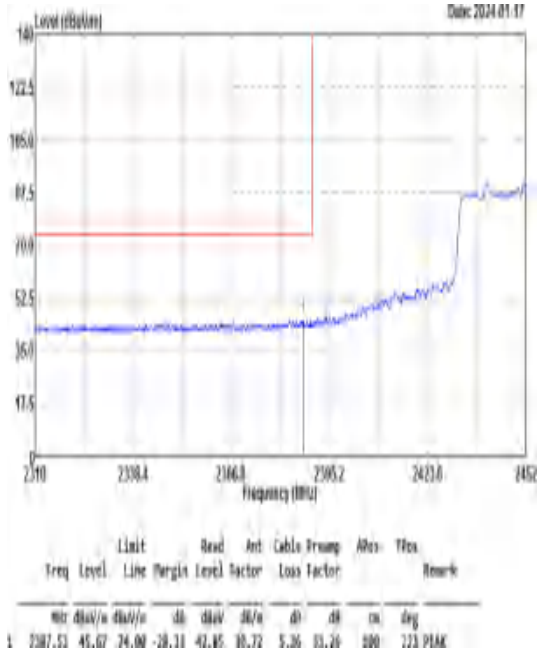
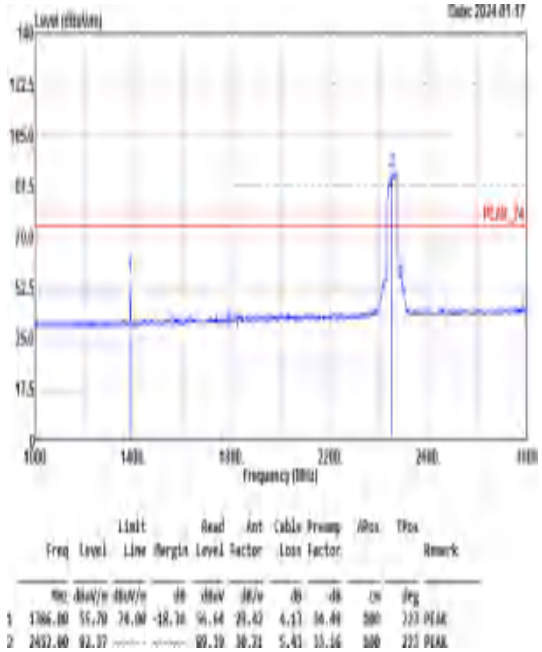
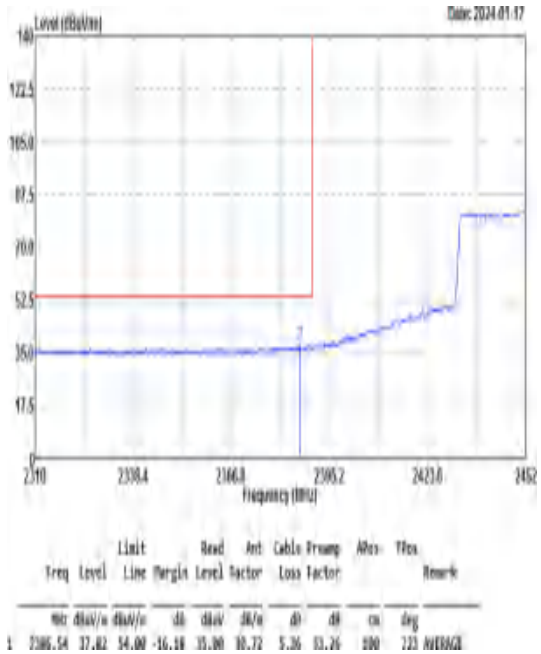
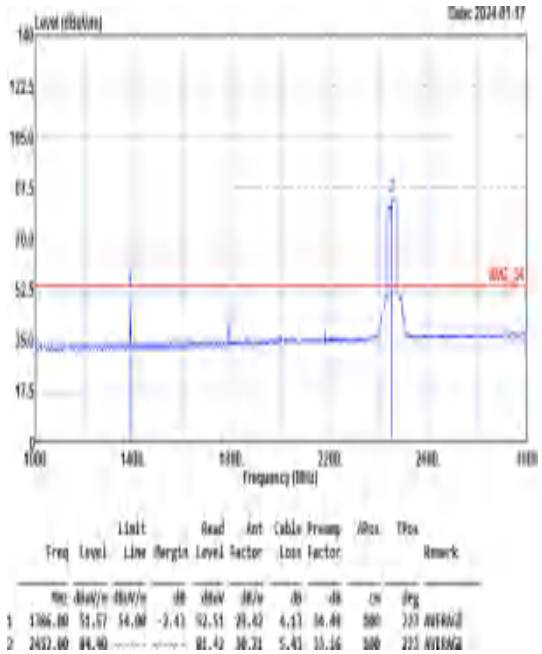
Mode	23	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

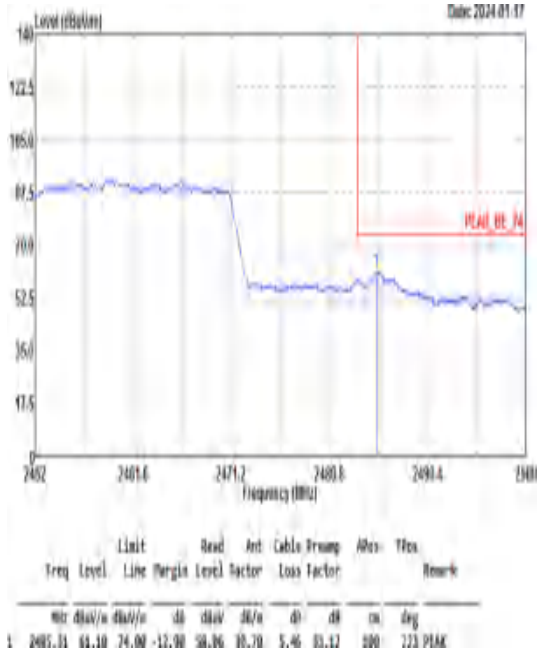
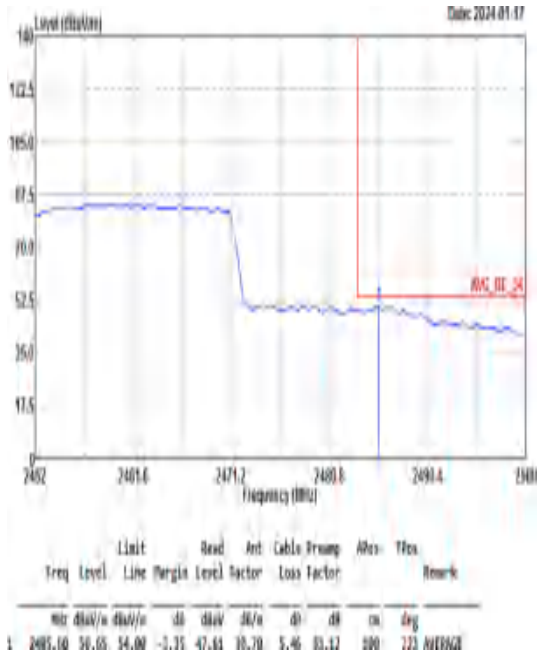
Mode	23	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

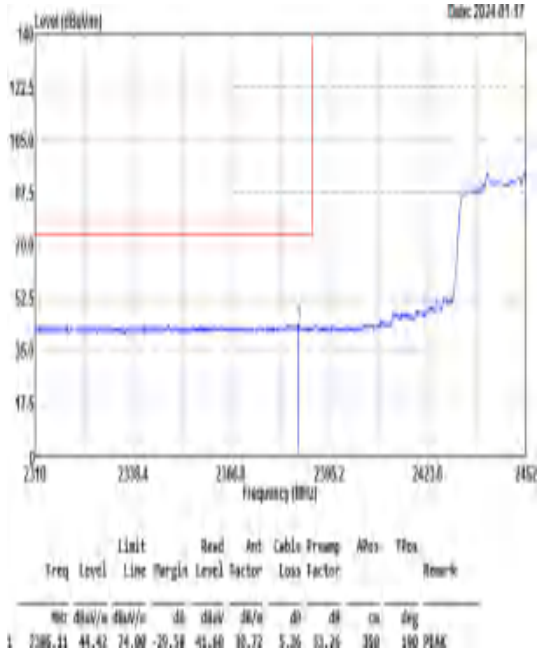
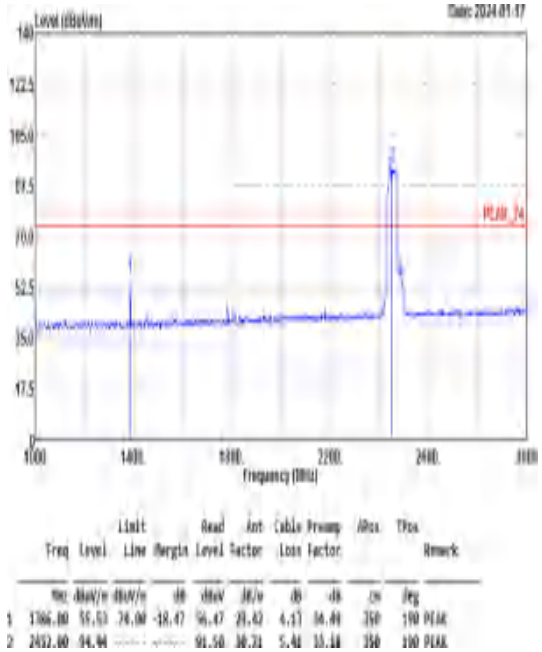
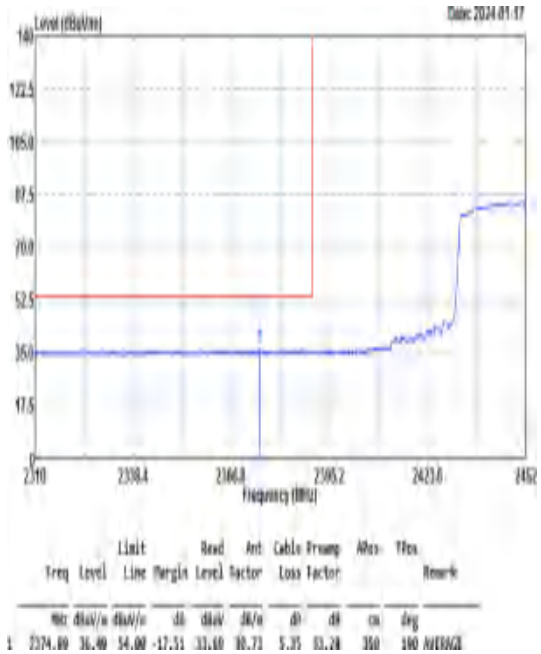
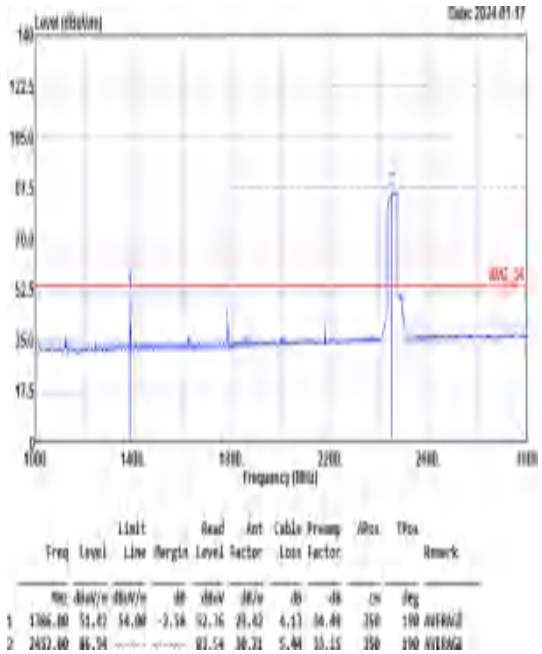
Mode	23	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

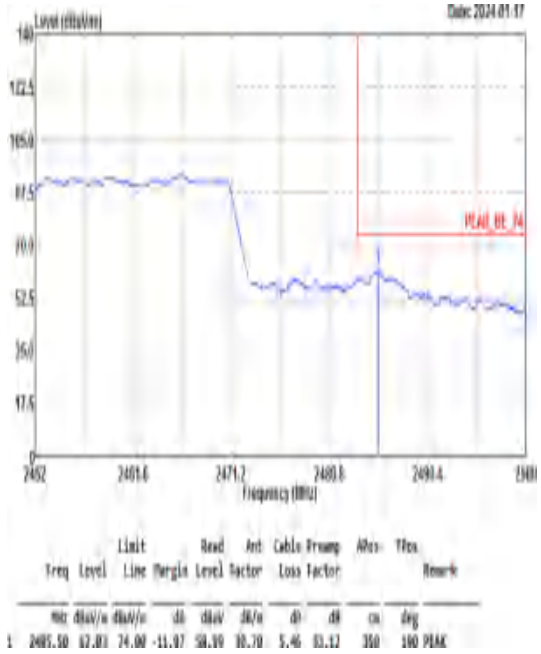
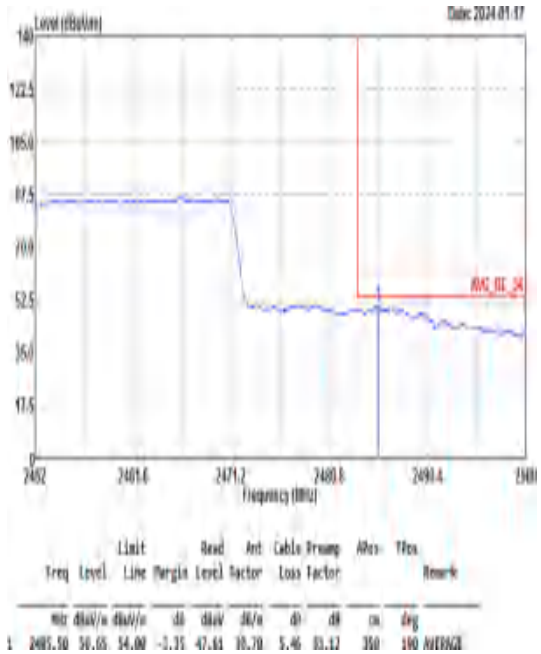
Mode	23	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

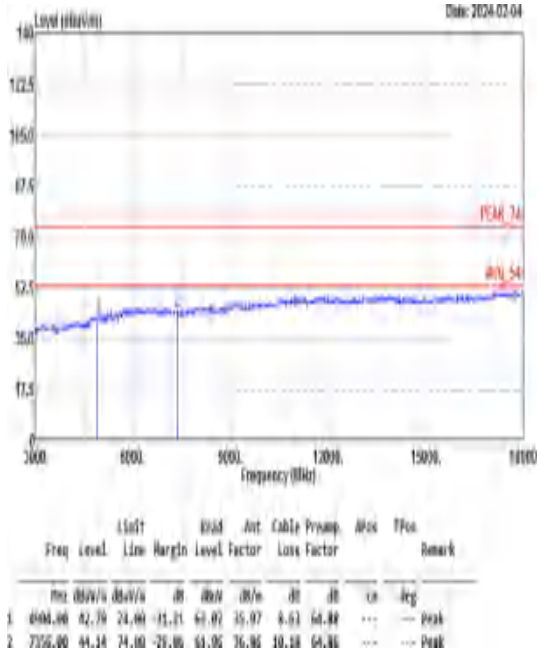
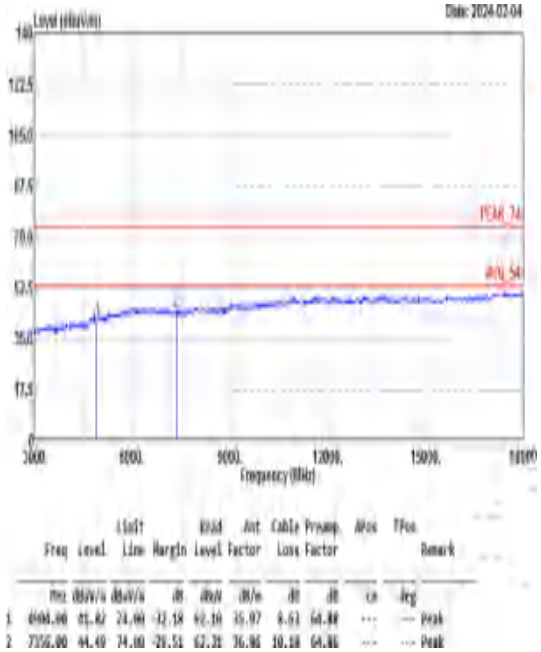
Mode	23	
	Harmonic	
	2400-2483.5_802.11ax HE40_CH06_2437MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

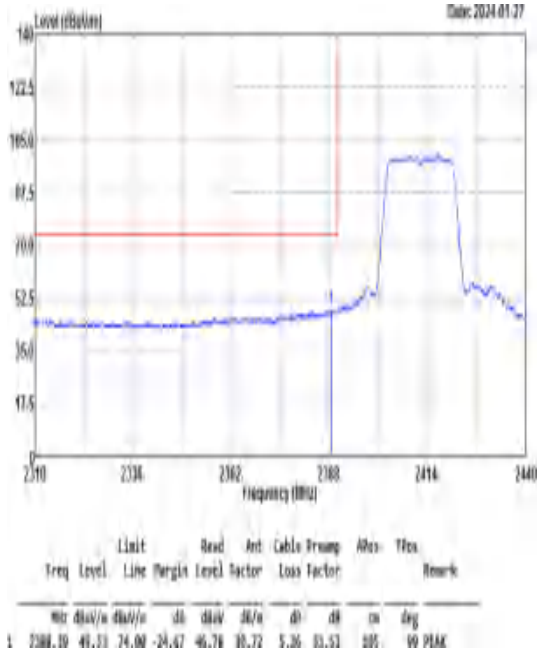
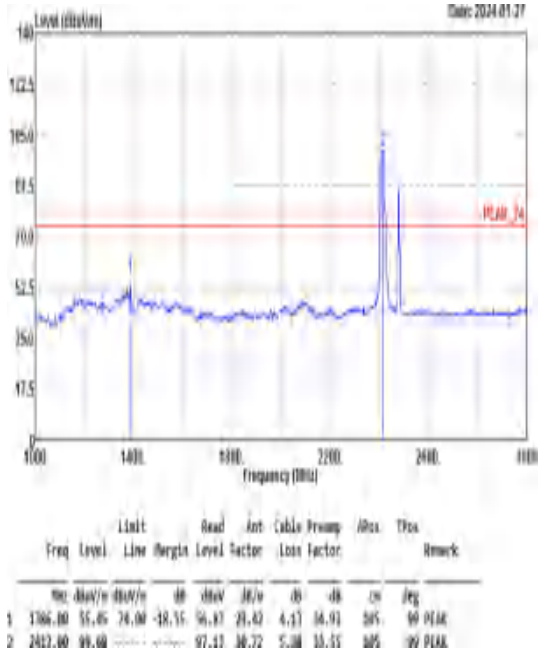
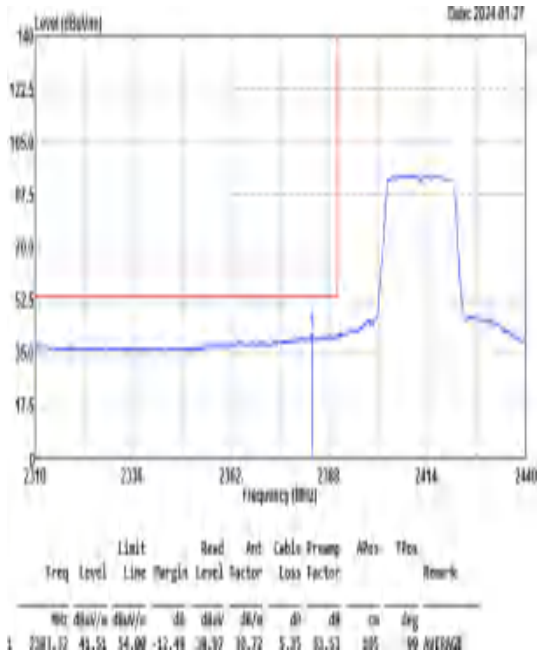
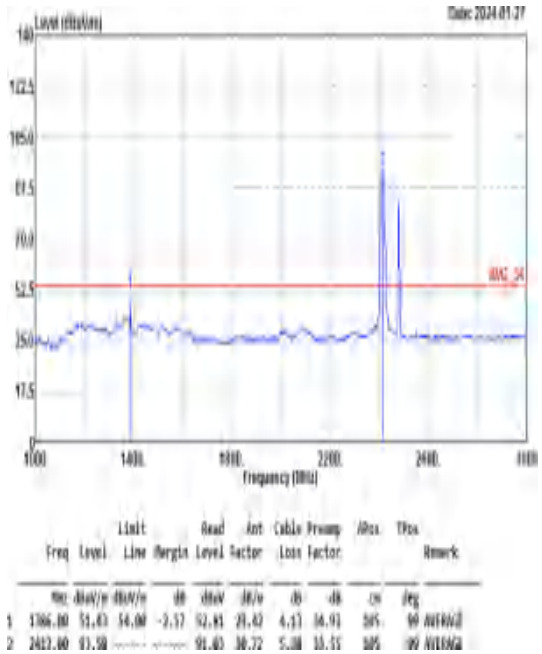
Mode	24	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

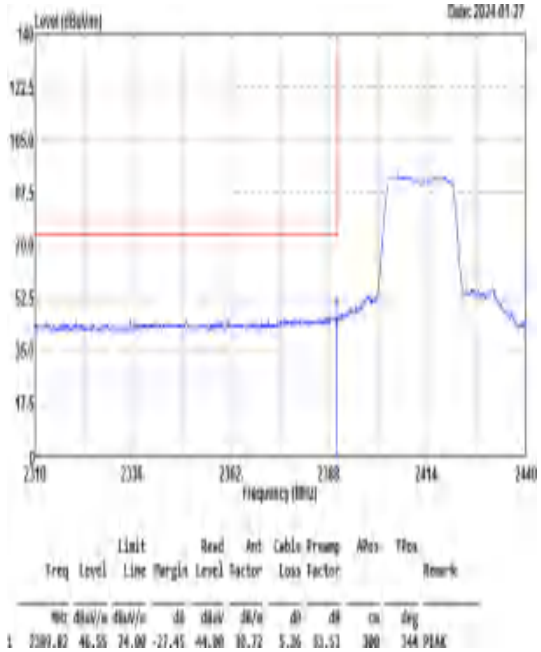
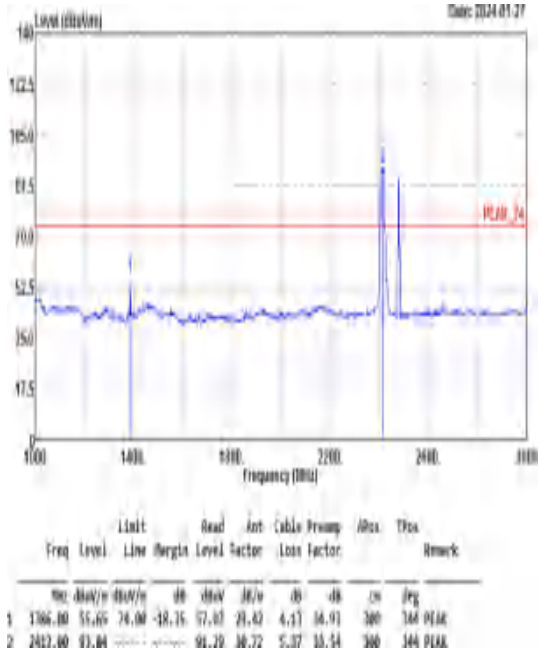
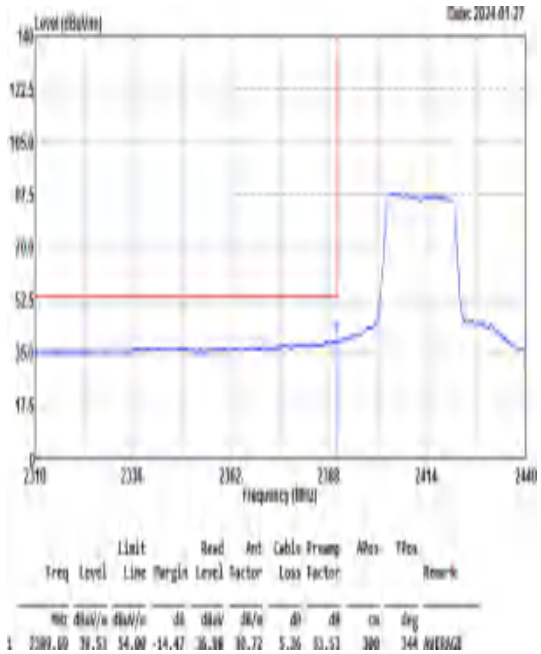
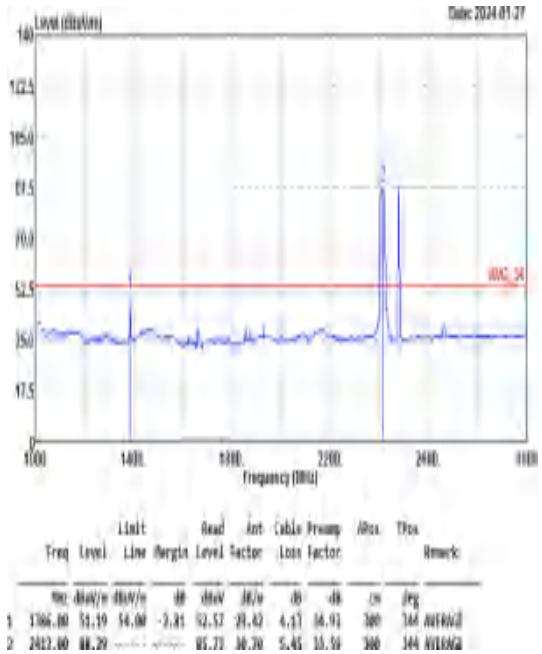
Mode	24	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

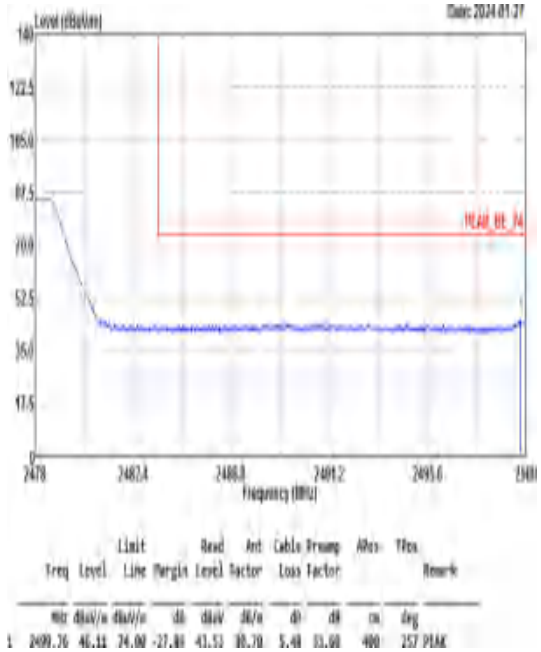
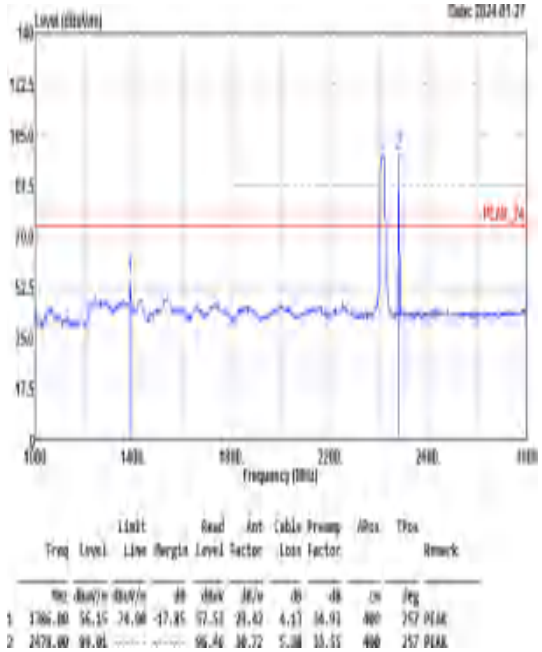
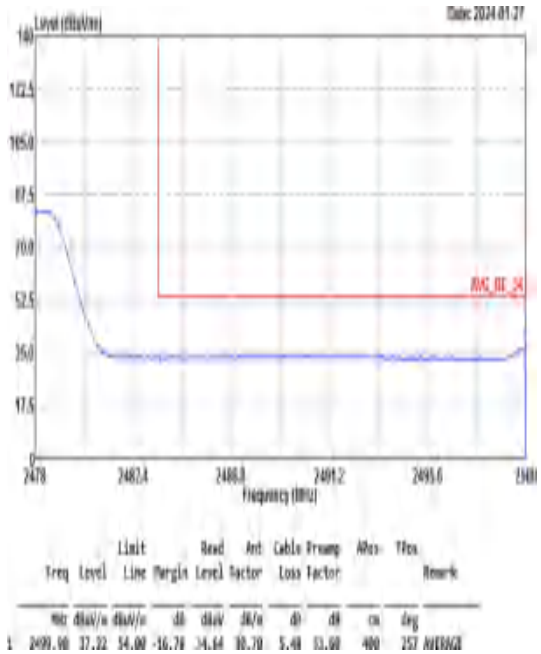
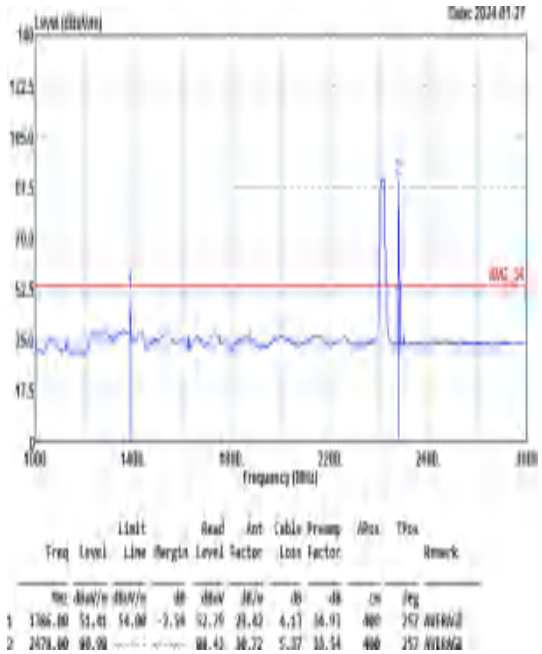
Mode	24	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

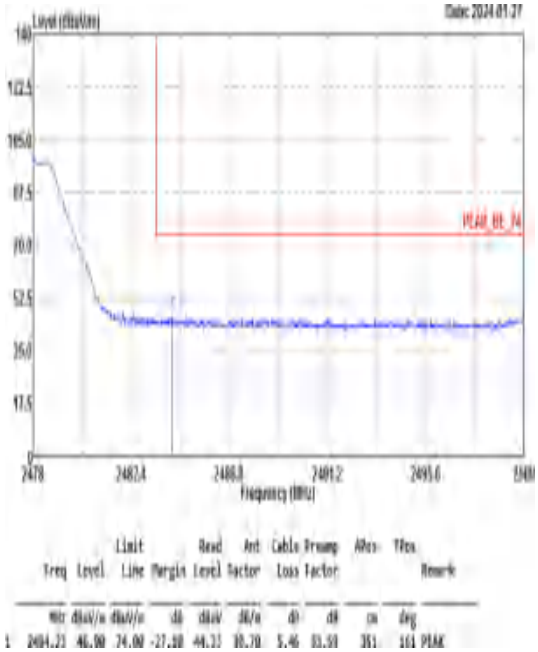
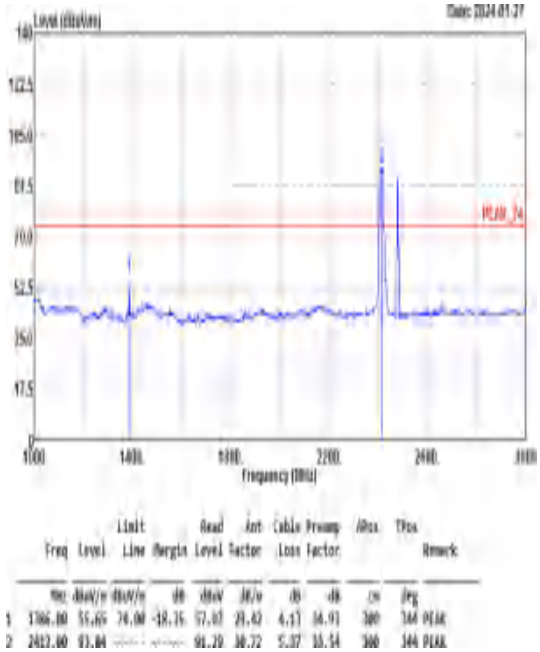
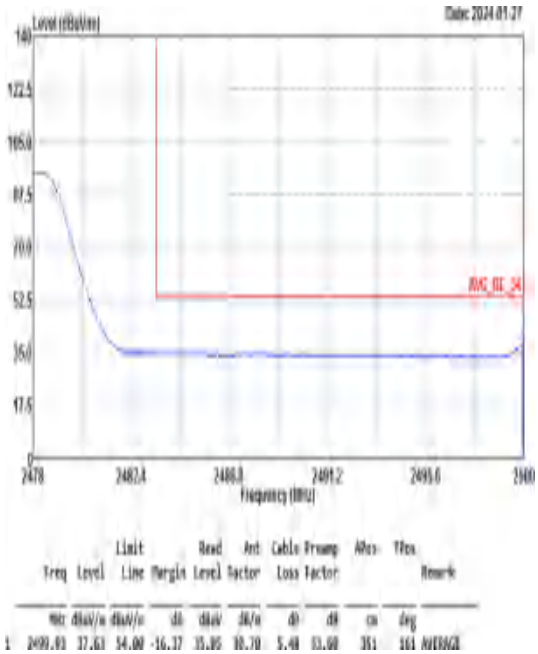
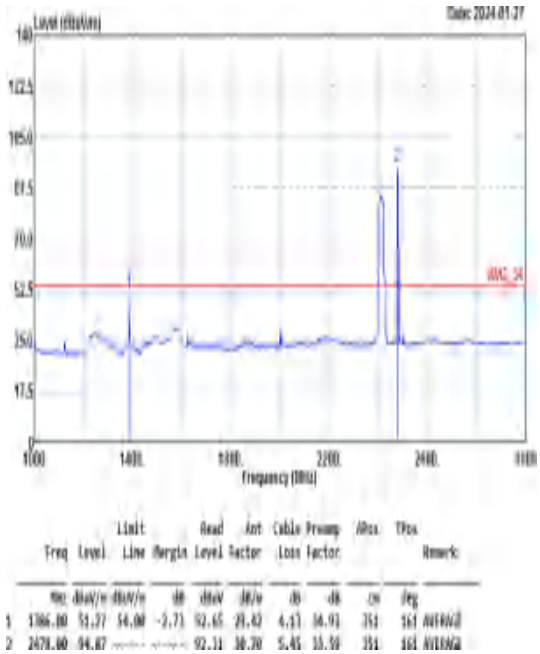
Mode	24	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

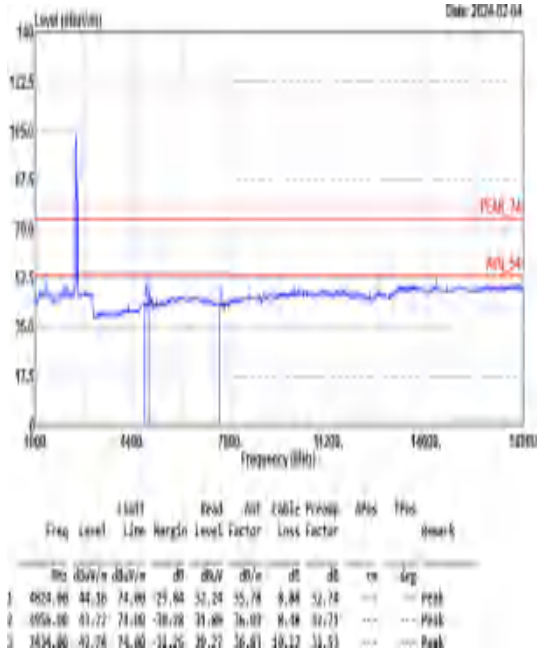
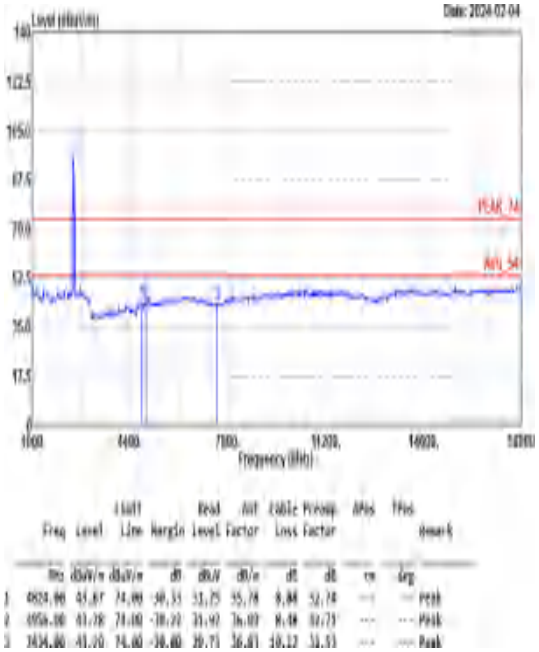
Mode	4	
	Harmonic	
	2400-2483.5_802.11ax HE40_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

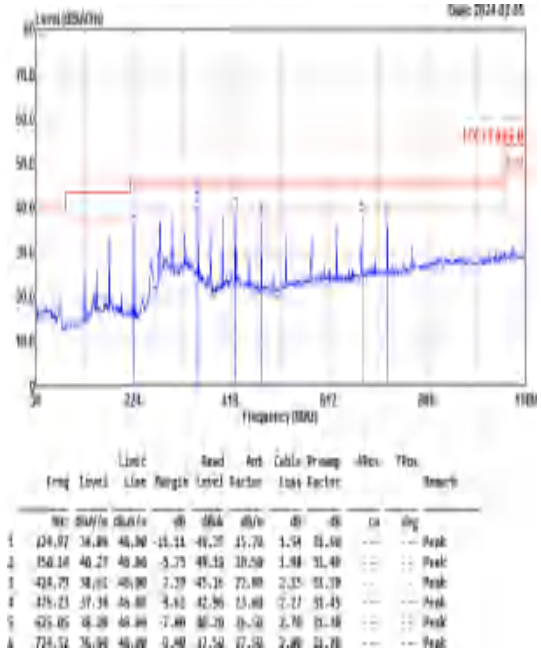
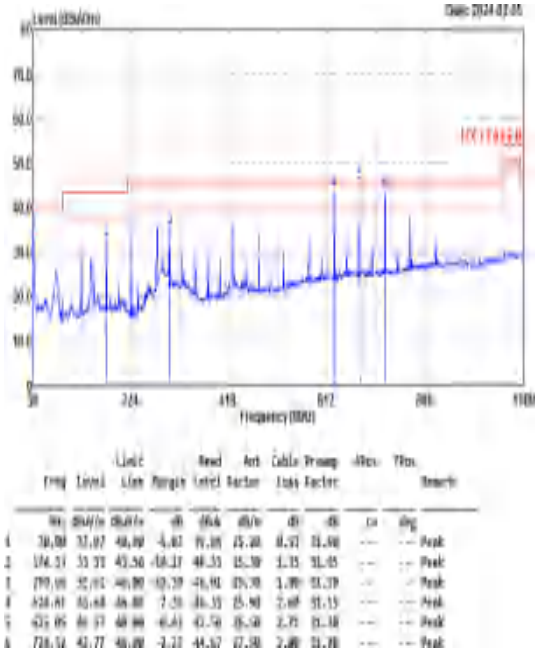
Mode	25	
	Band Edge - L	
	2400-2483.5_802.11n HT20_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

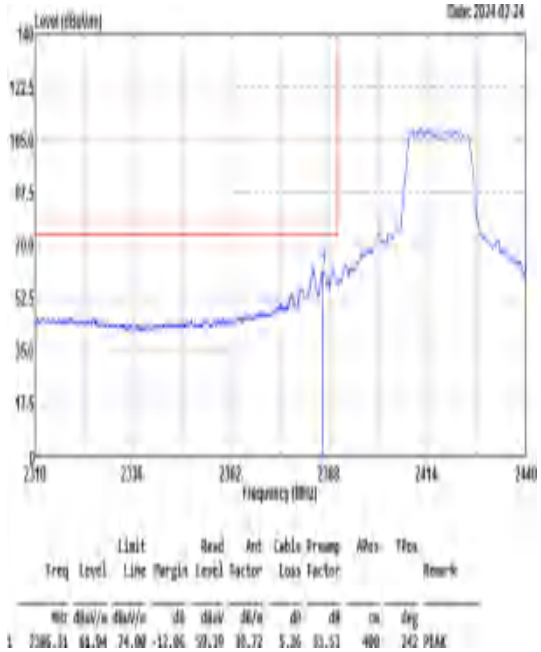
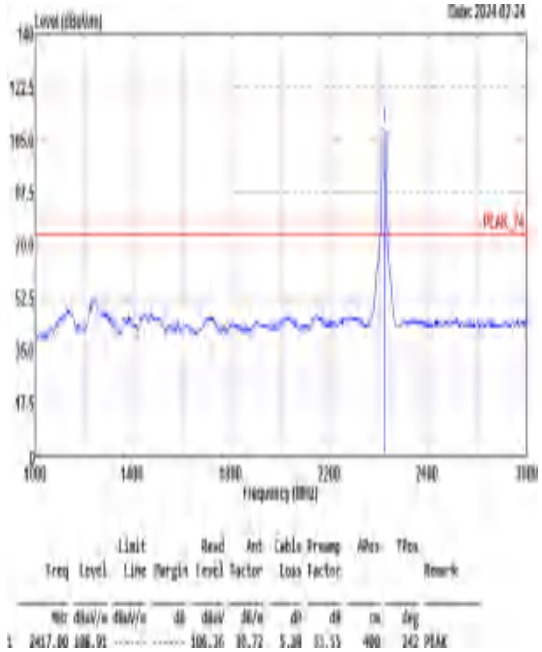
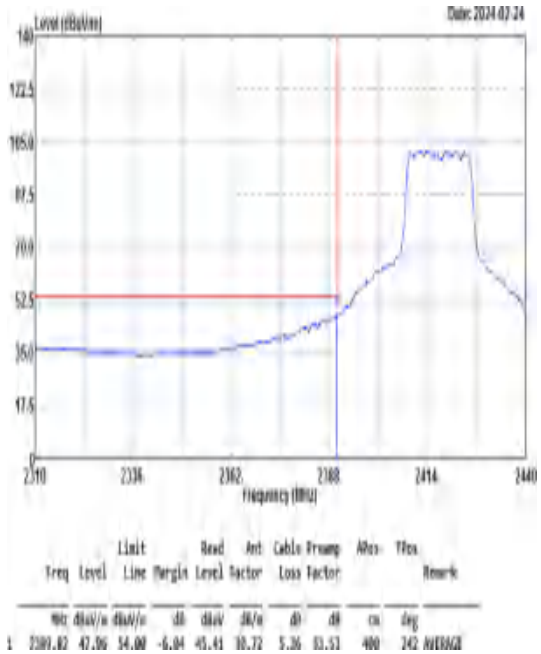
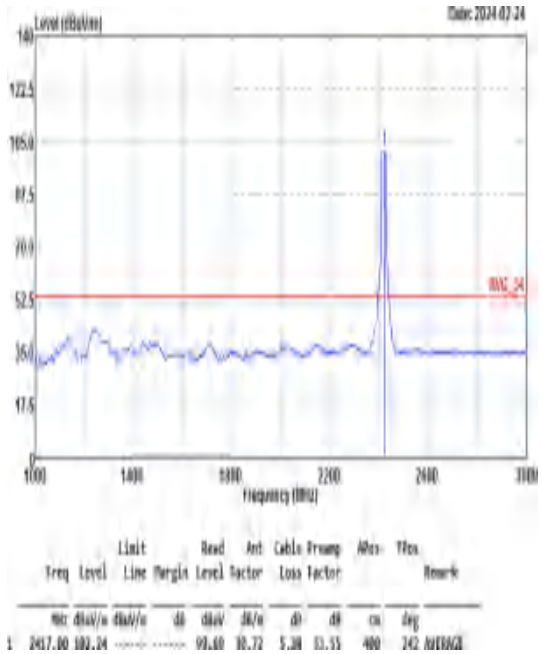
Mode	25	
	Band Edge - L	
	2400-2483.5_802.11n HT20_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

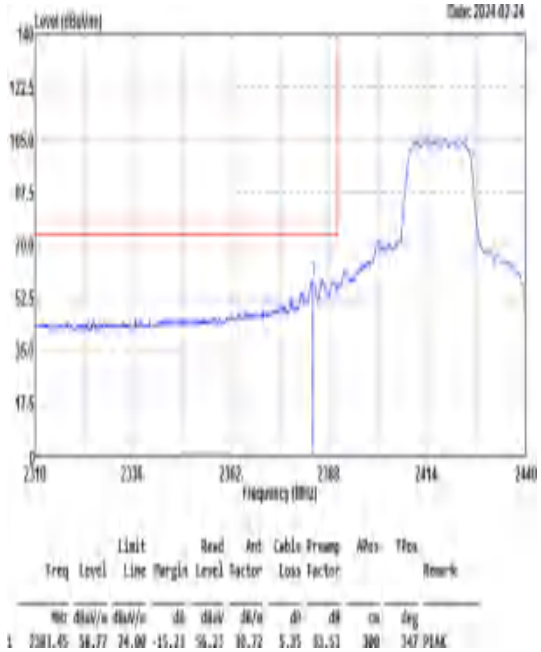
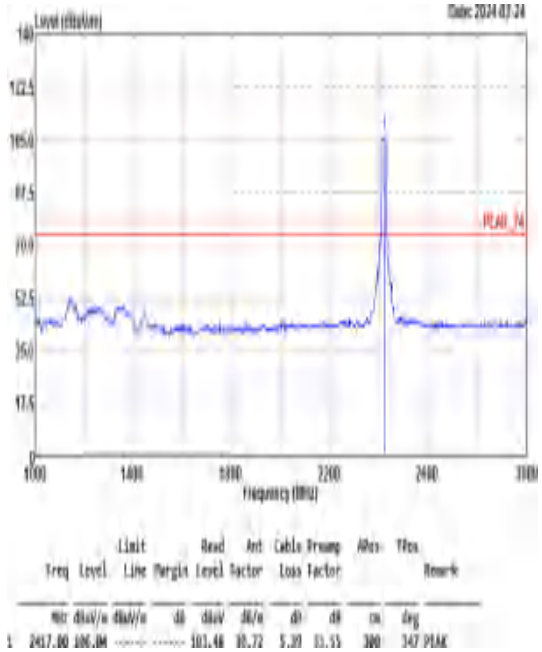
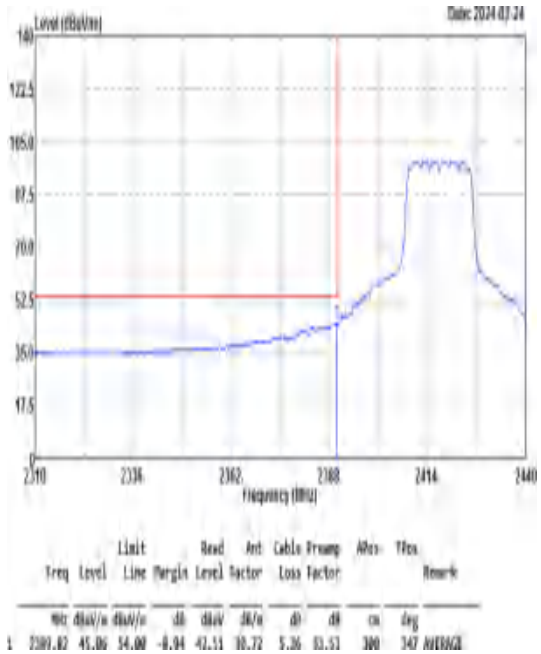
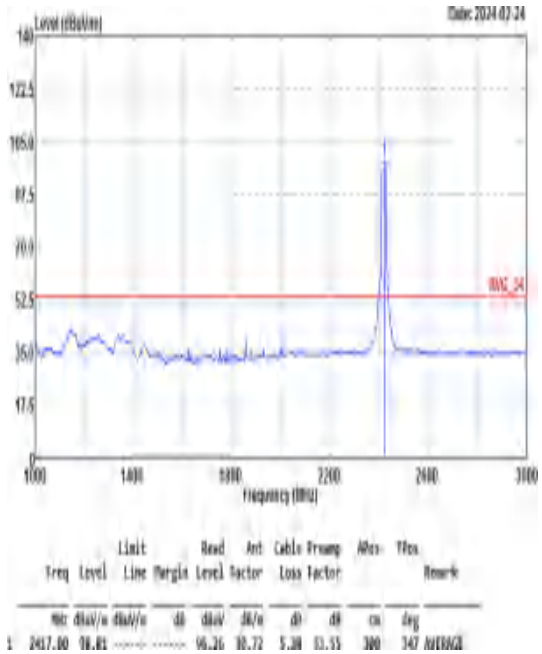
Mode	25	
	Band Edge - R	
	2400-2483.5_Bluetooth-LE_CH38_2478MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

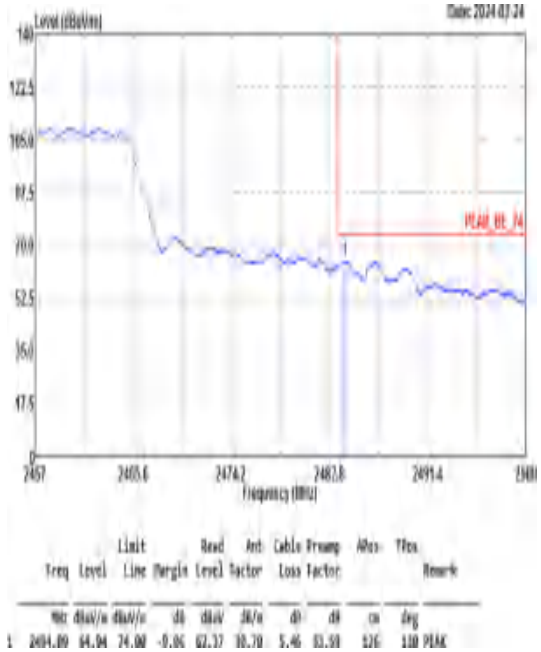
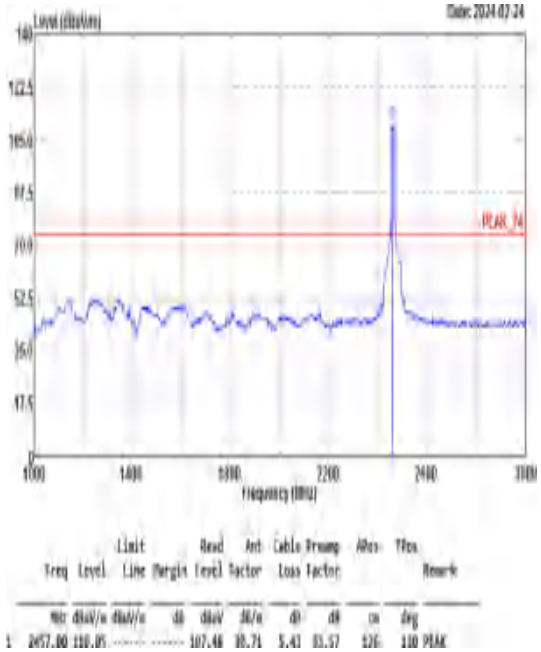
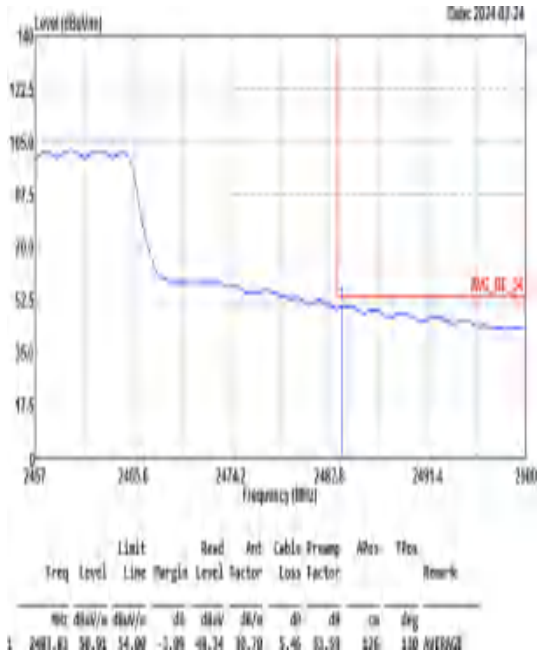
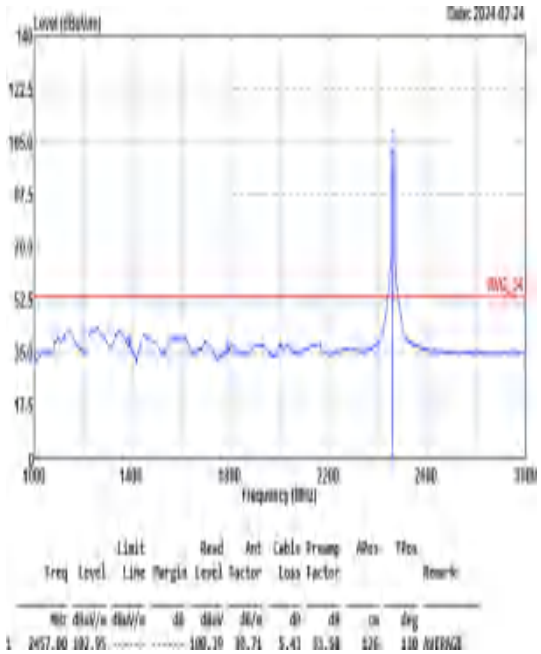
Mode	25	
	Band Edge - R	
	2400-2483.5_Bluetooth-LE_CH38_2478MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

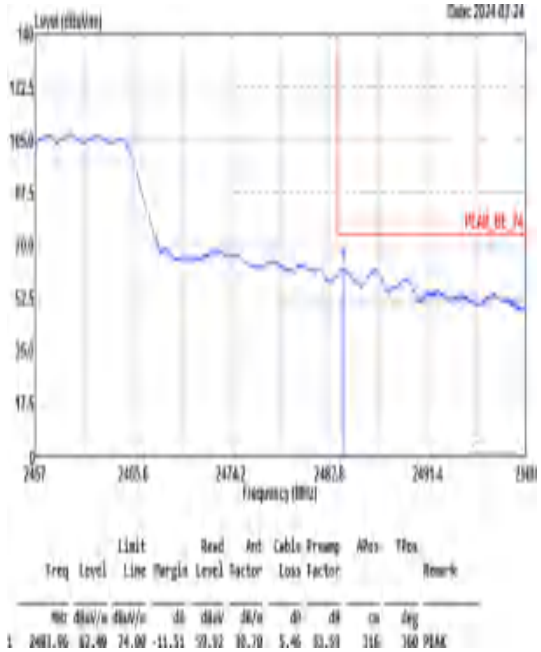
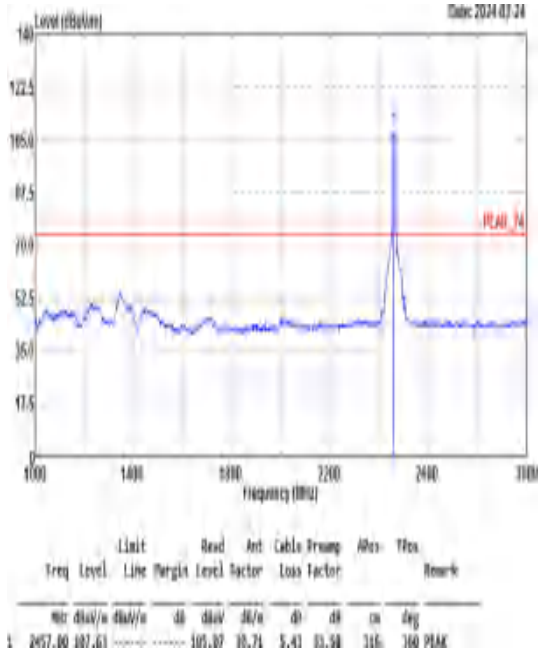
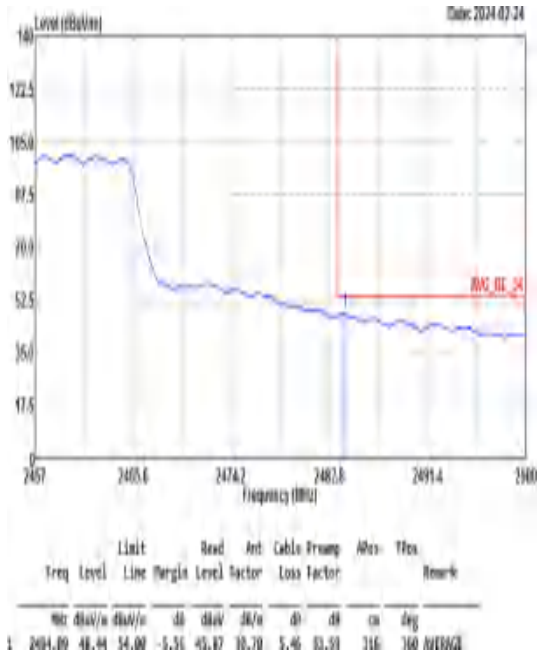
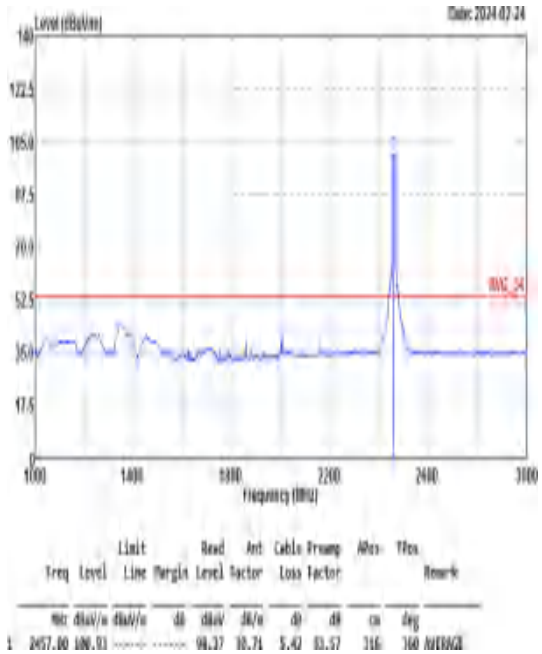
Mode	25	
	Harmonic	
	2400-2483.5_Bluetooth-LE_CH38_2478MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
Peak Avg		

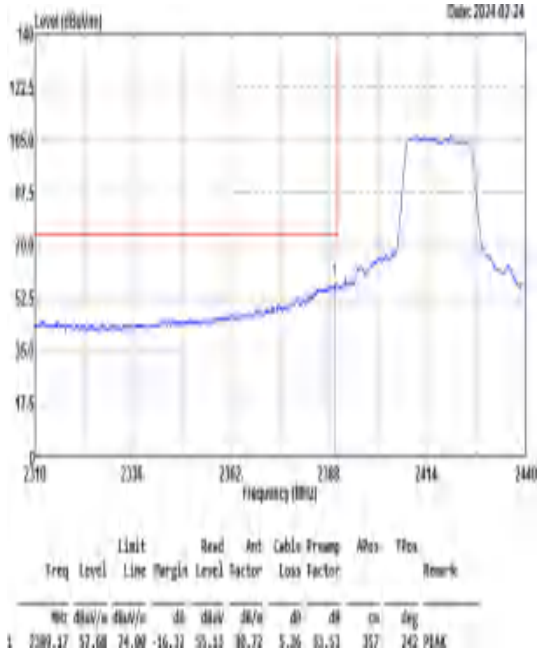
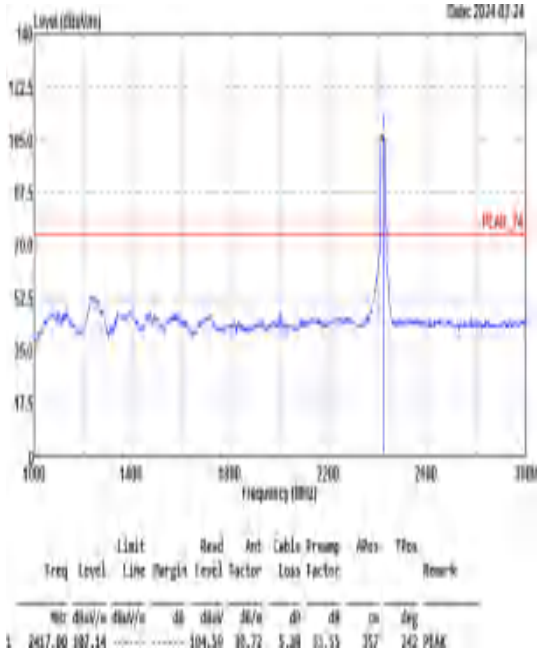
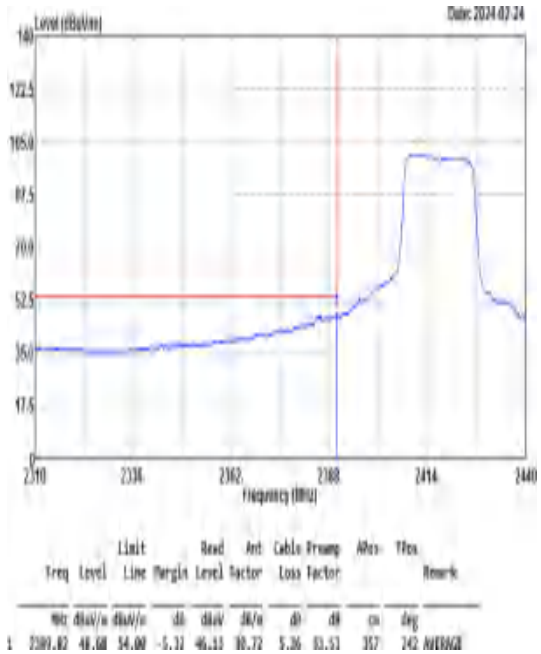
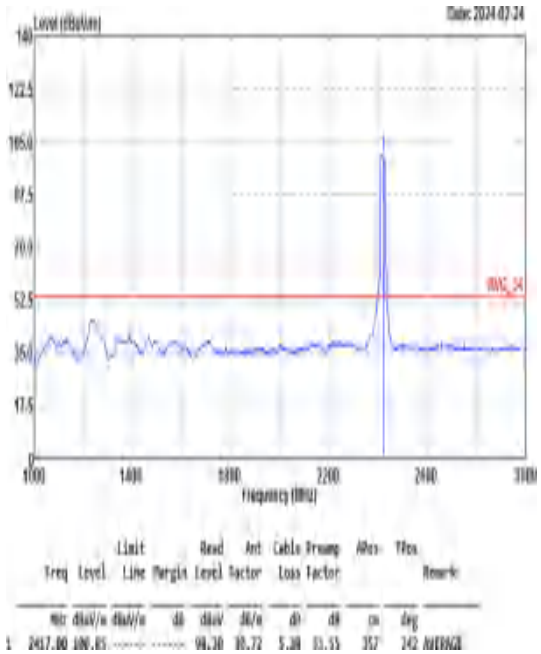
Mode	26	
	LF	
	LF_2400-2483.5_802.11n HT20_CH01_2412MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Vertical
QP/ Peak		

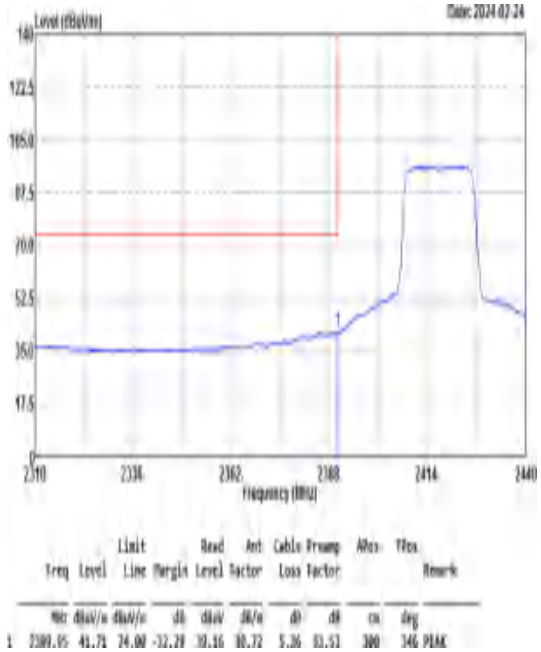
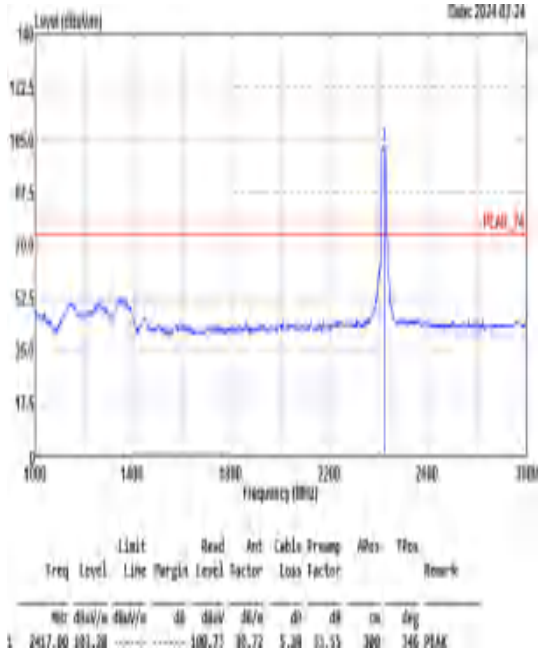
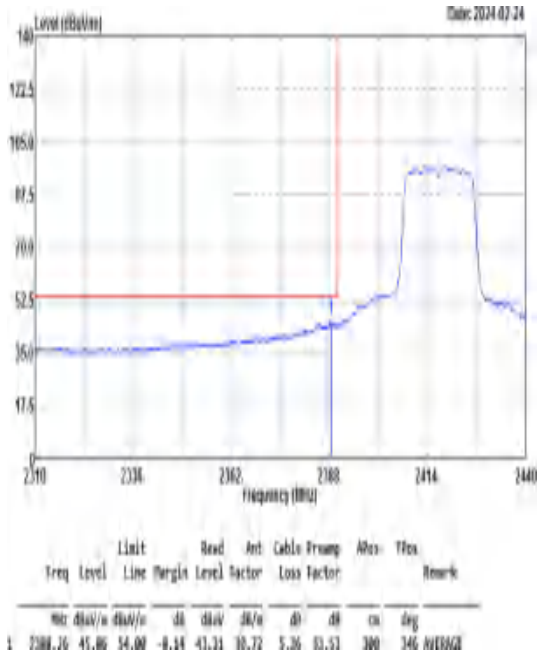
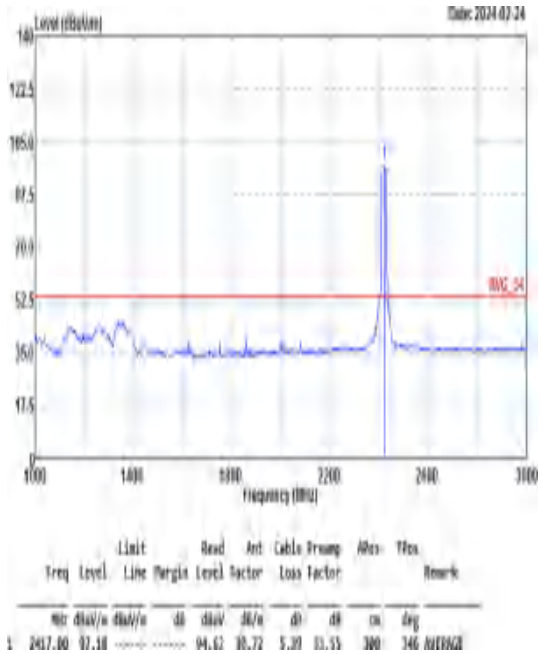
Mode	27	
	Band Edge	
	2400-2483.5_802.11g_CH02_2417MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

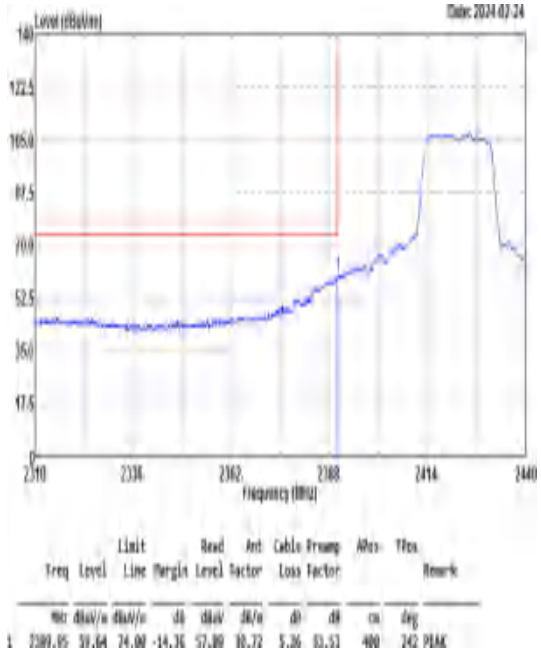
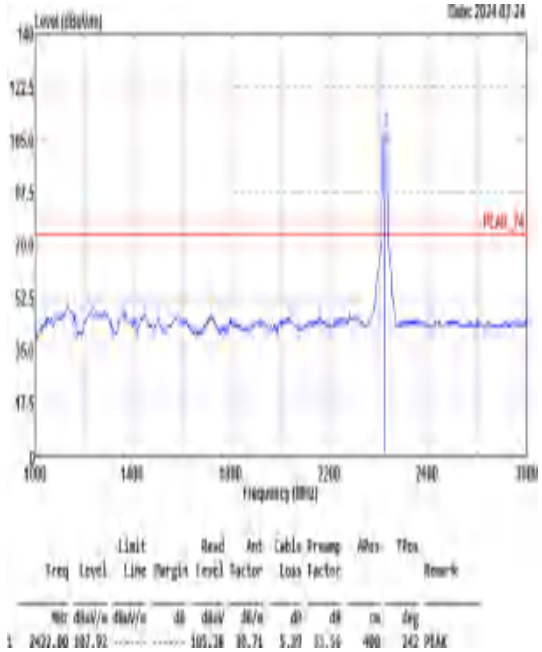
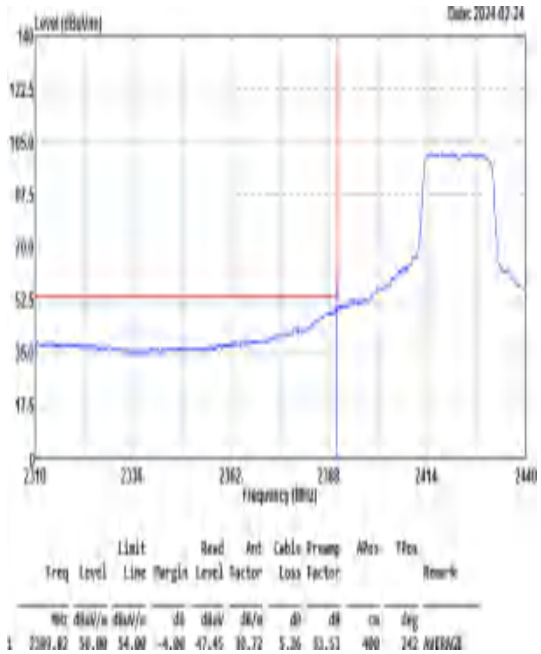
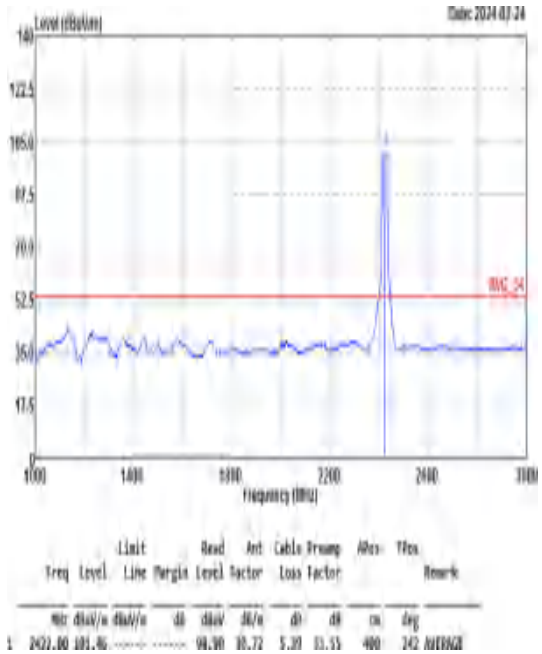
Mode	27	
	Band Edge	
	2400-2483.5_802.11g_CH02_2417MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

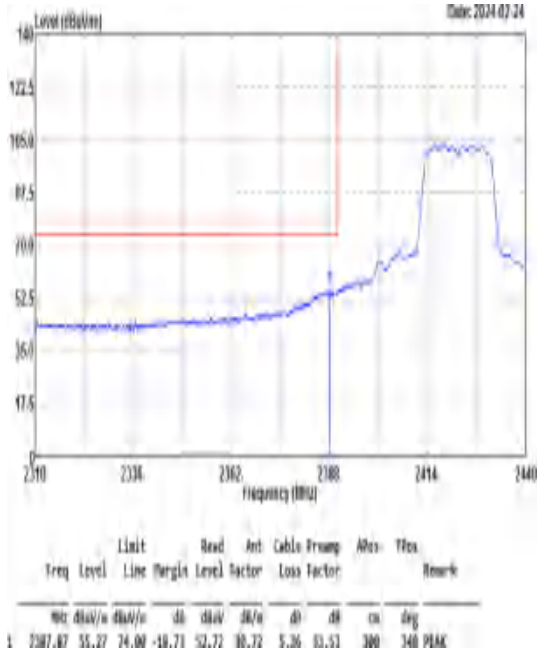
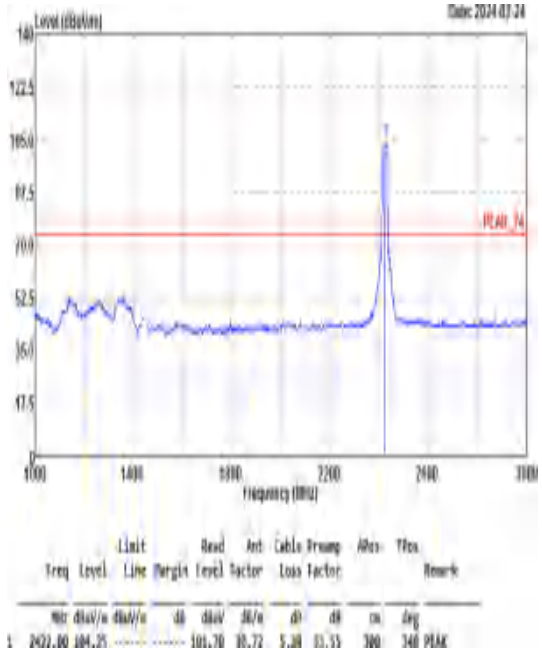
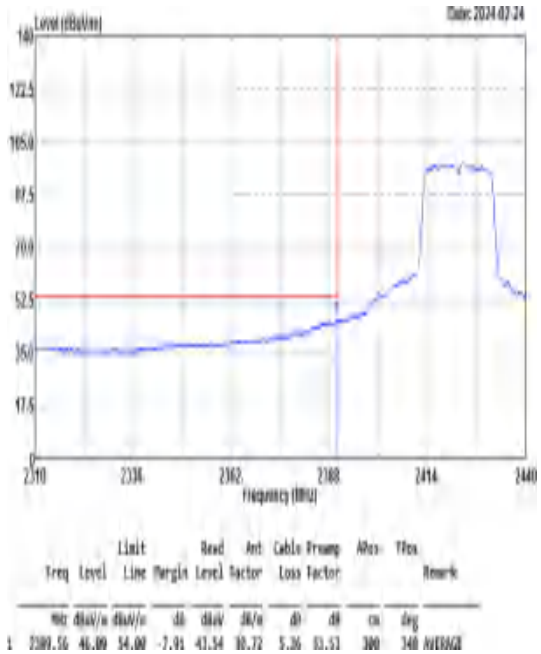
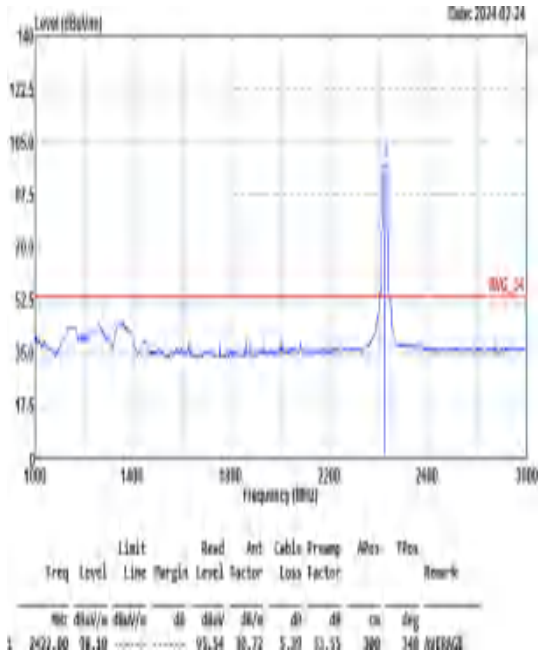
Mode	28	
	Band Edge	
	2400-2483.5_802.11g_CH10_2457MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

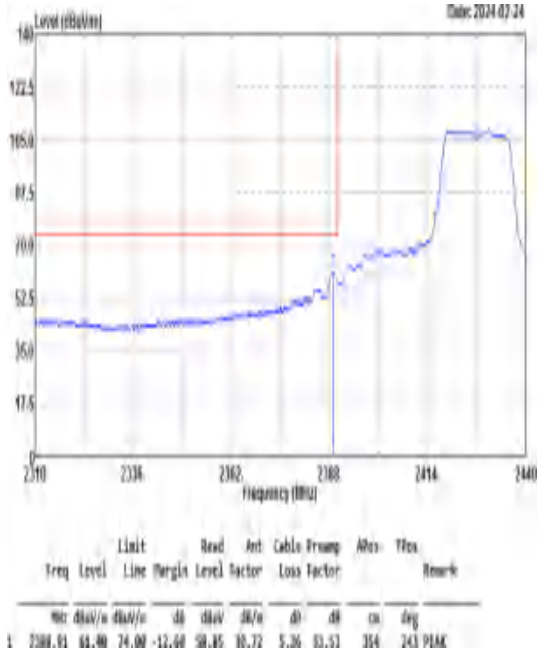
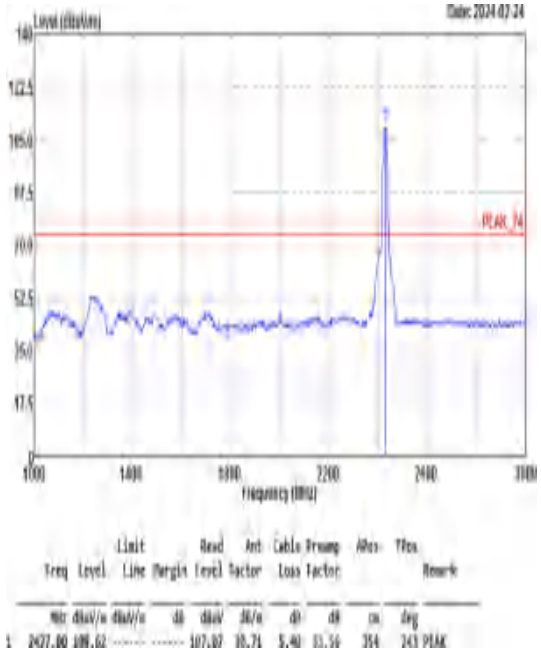
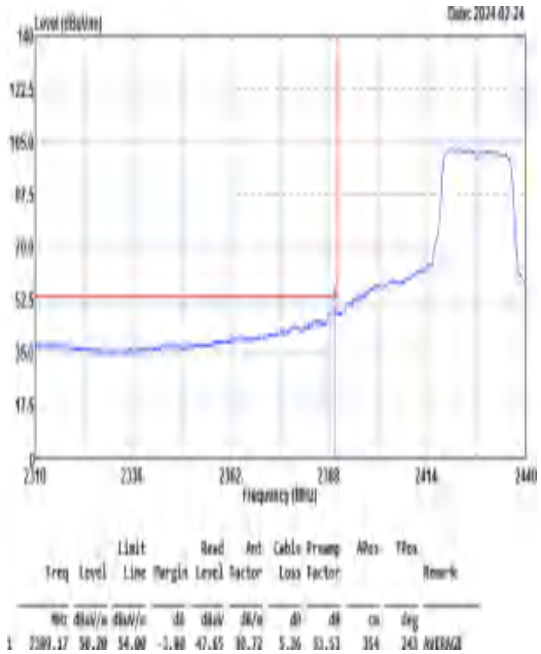
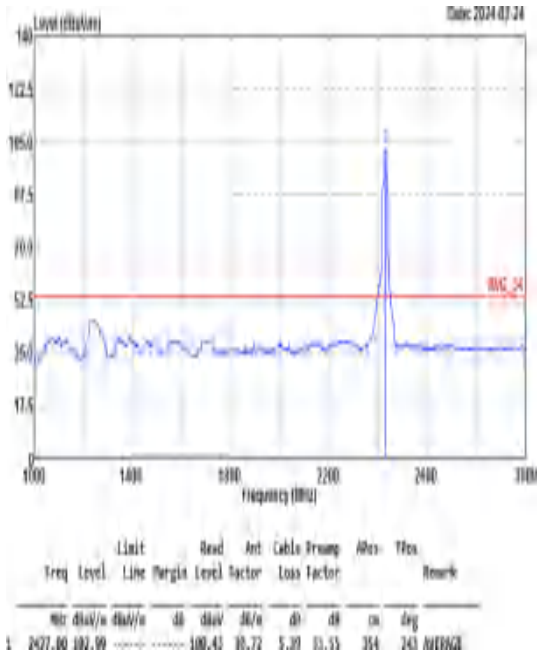
Mode	28	
	Band Edge	
	2400-2483.5_802.11g_CH10_2457MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

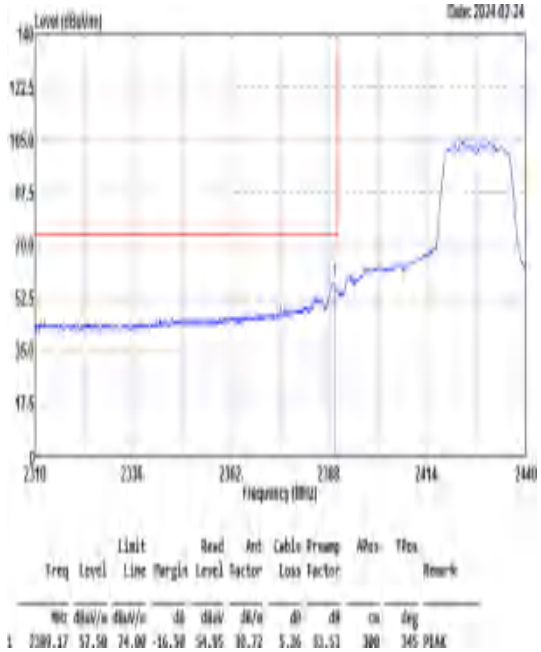
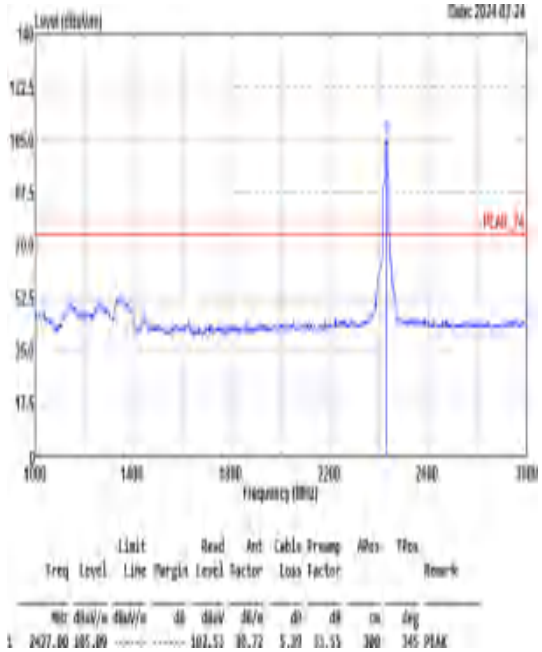
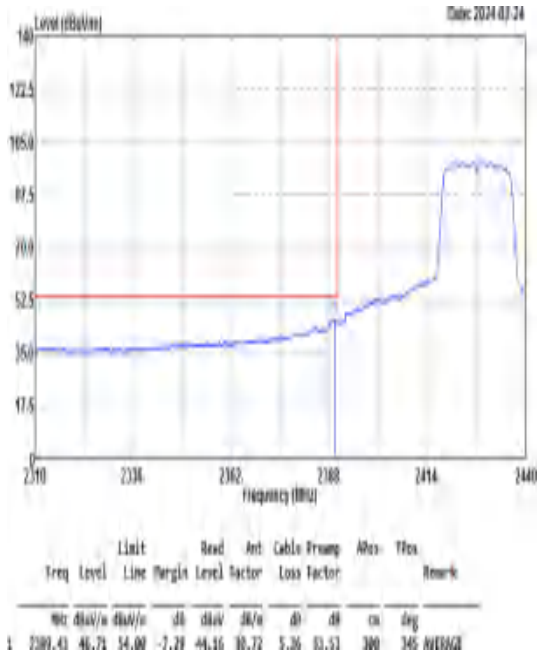
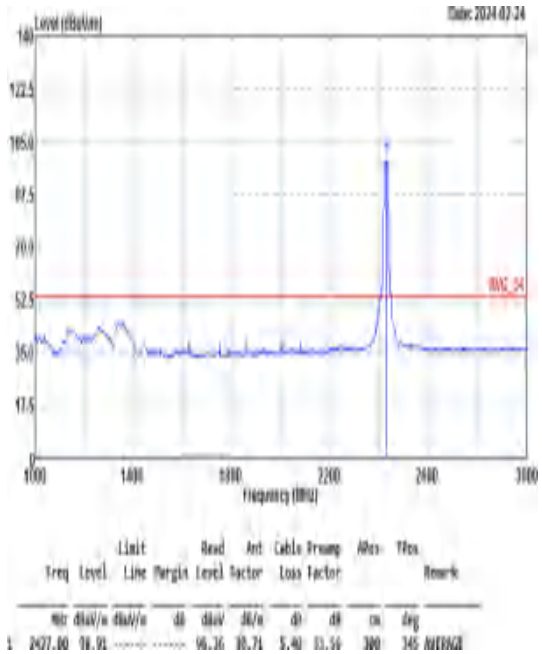
Mode	29	
	Band Edge	
	2400-2483.5_802.11n HT20_CH02_2417MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

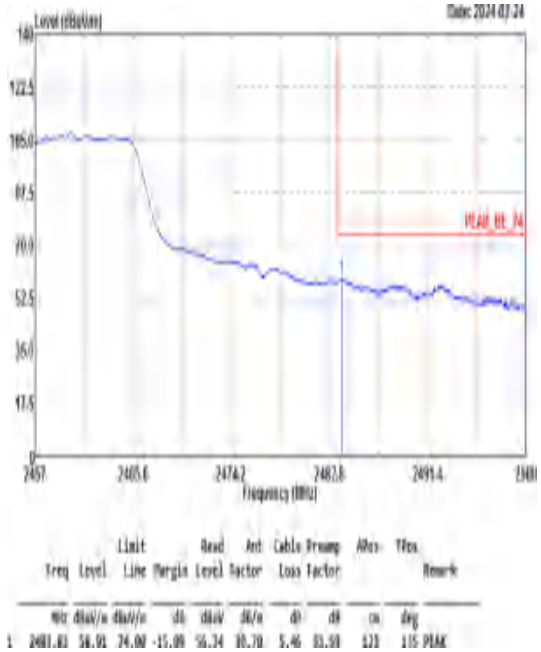
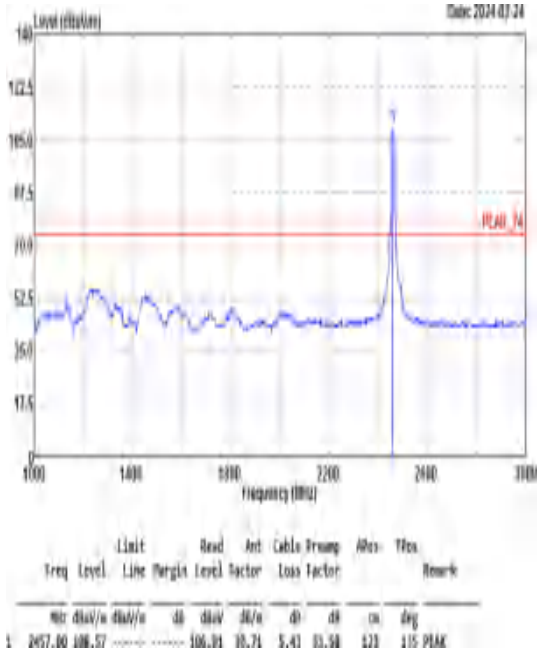
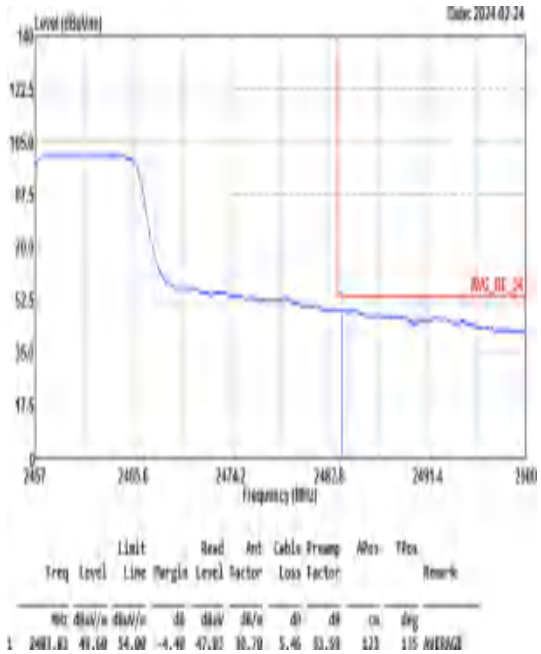
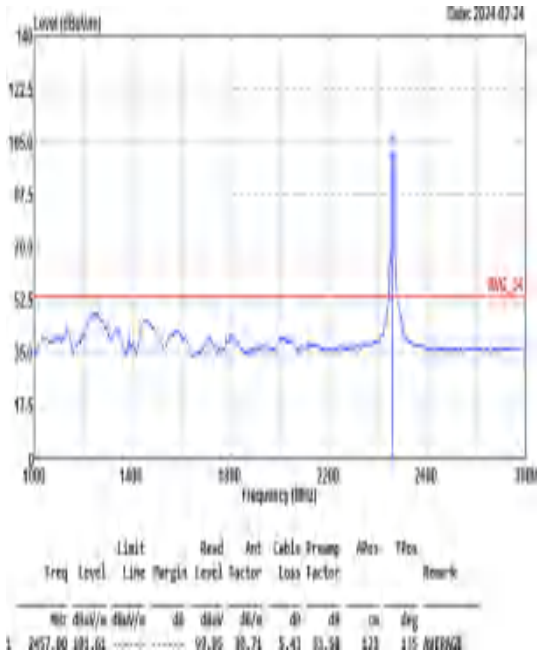
Mode	29	
	Band Edge	
	2400-2483.5_802.11n HT20_CH02_2417MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

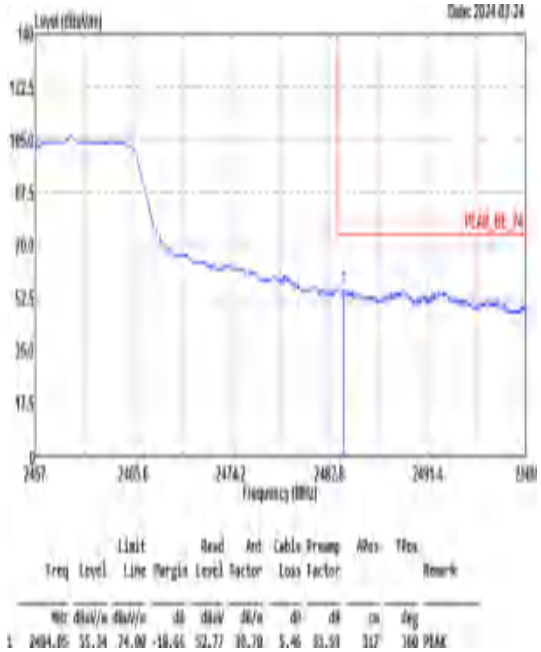
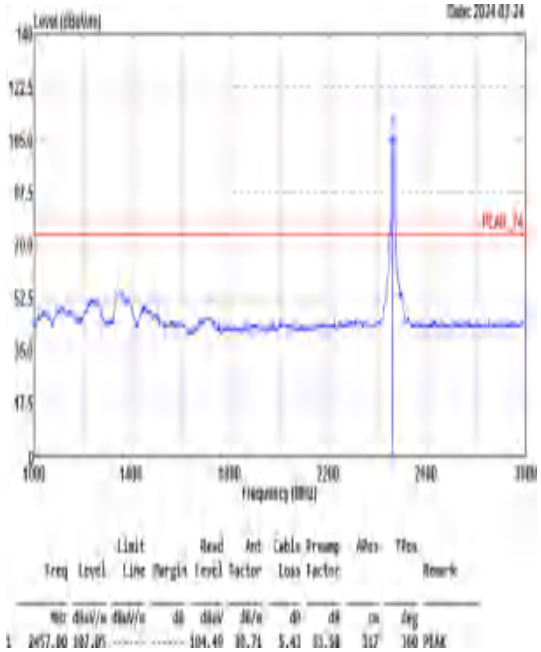
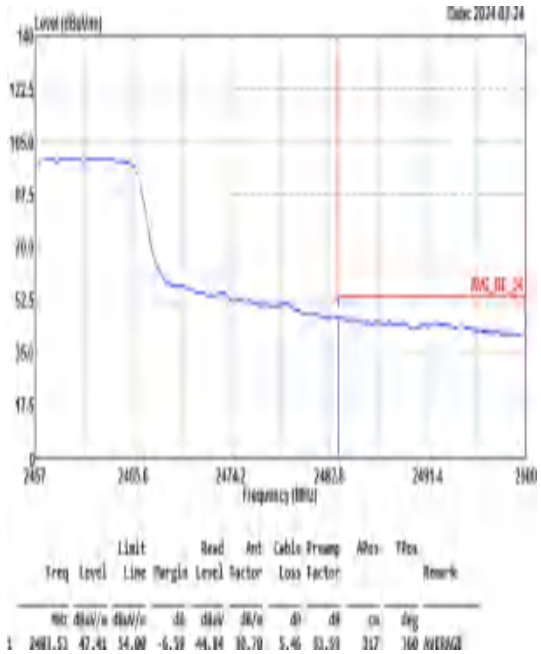
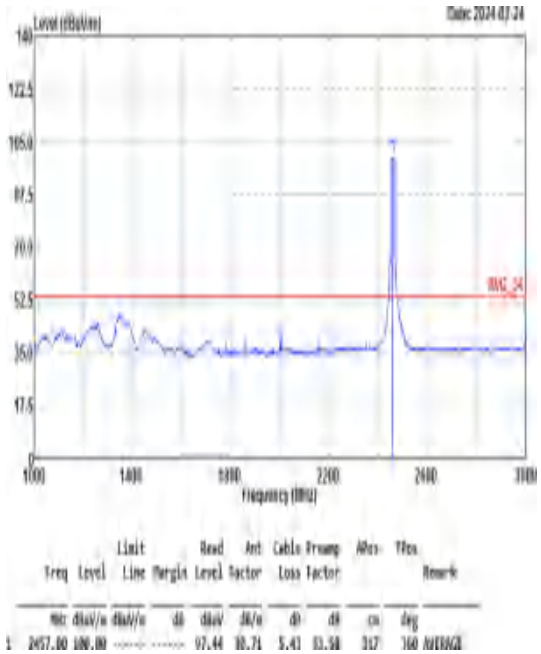
Mode	30	
	Band Edge	
	2400-2483.5_802.11n HT20_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

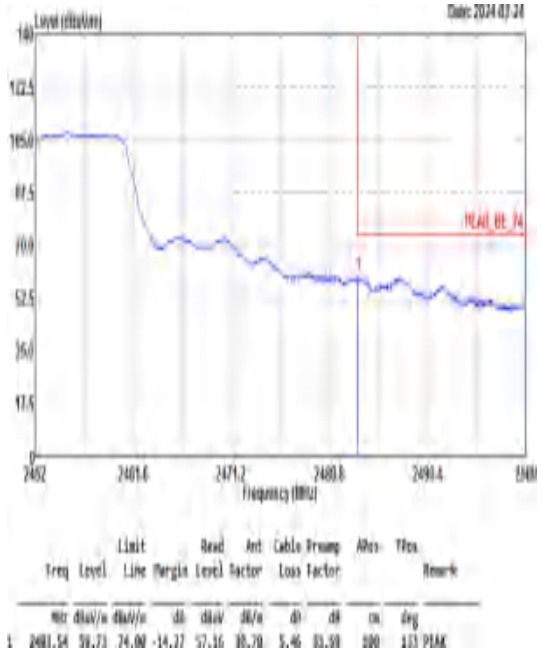
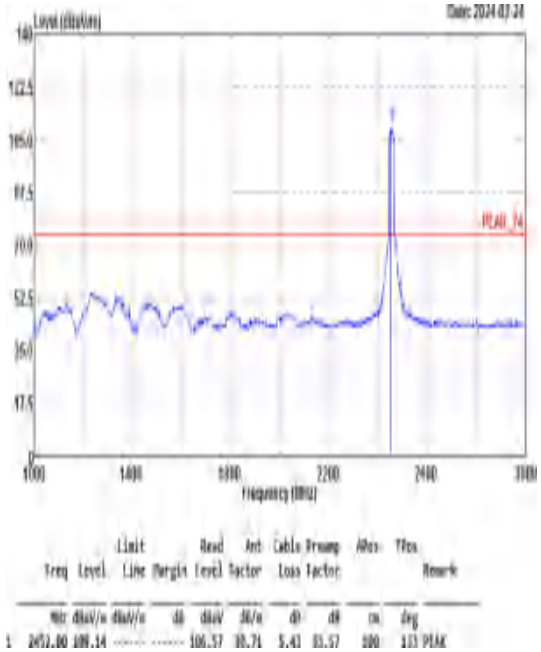
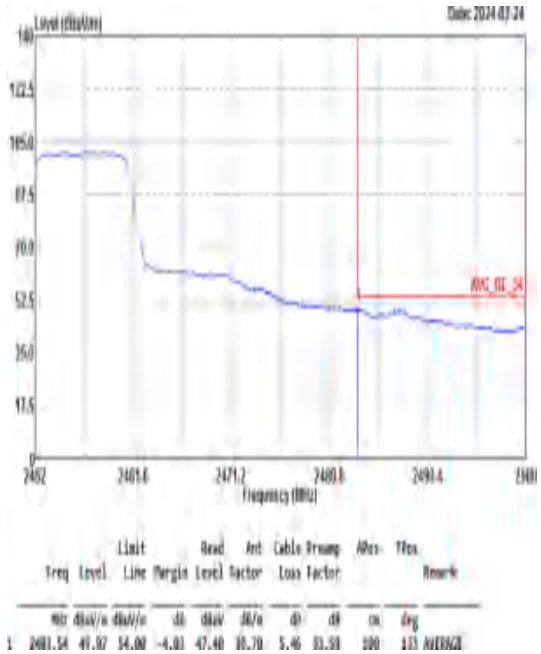
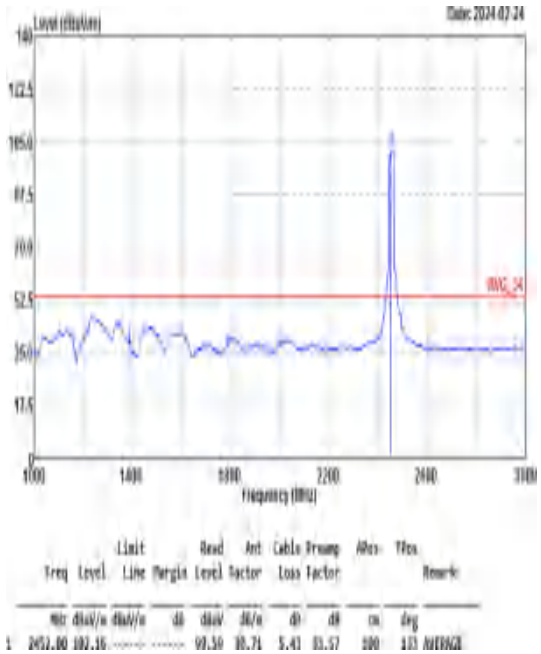
Mode	30	
	Band Edge	
	2400-2483.5_802.11n HT20_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

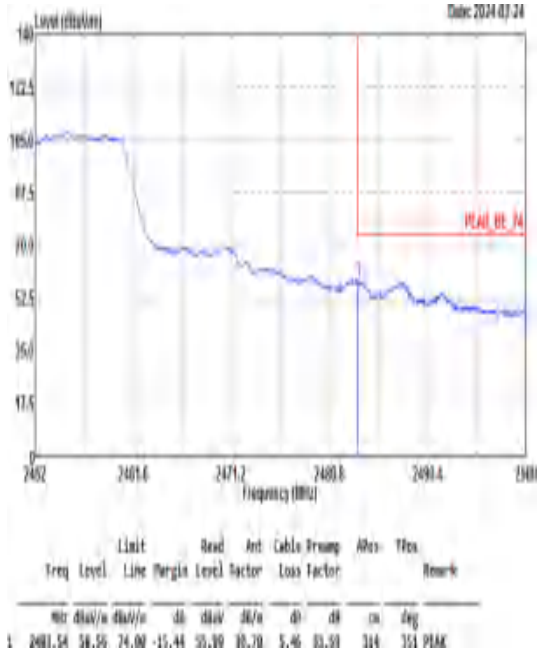
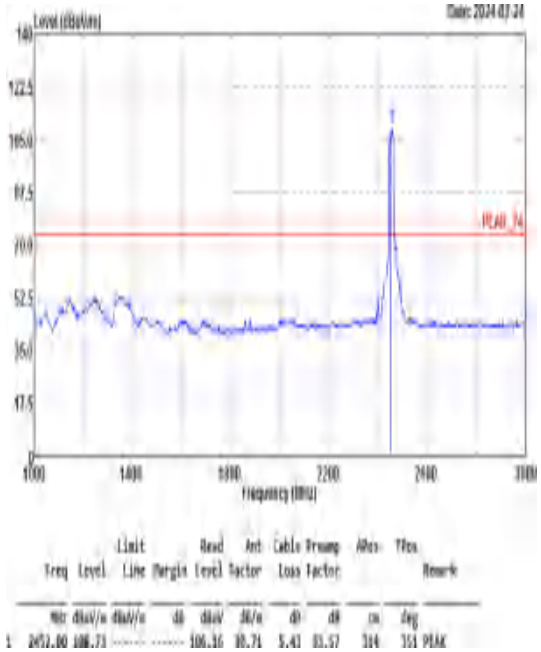
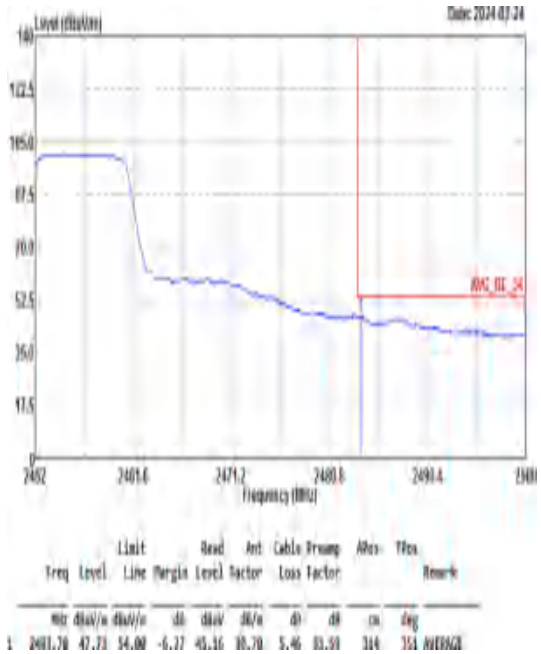
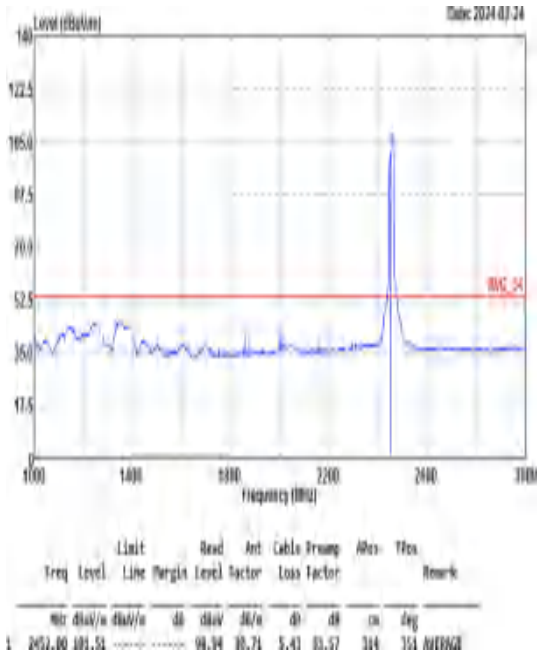
Mode	31	
	Band Edge	
	2400-2483.5_802.11n HT20_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

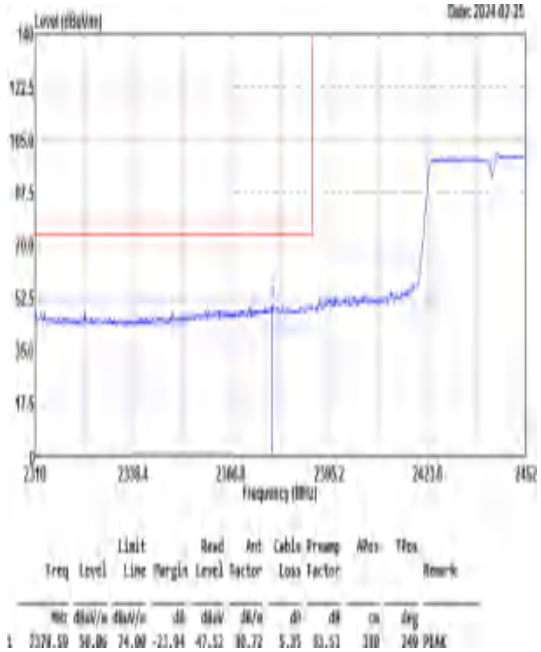
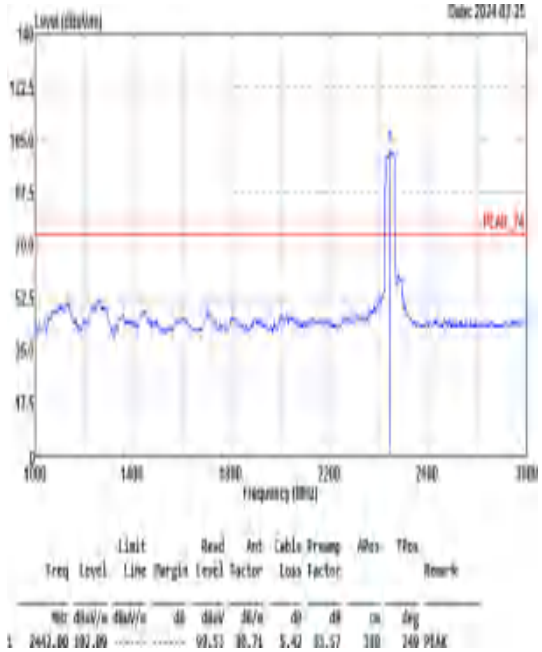
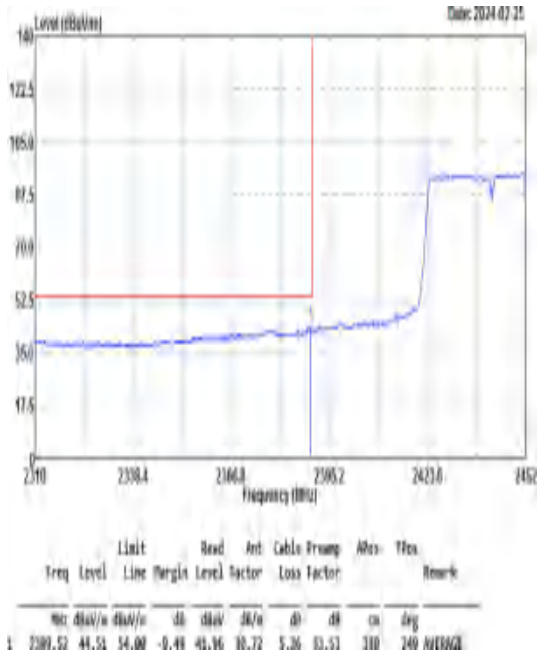
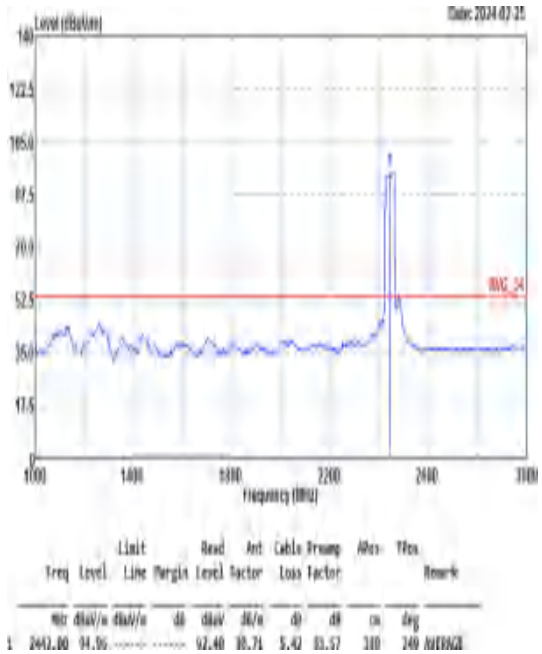
Mode	31	
	Band Edge	
	2400-2483.5_802.11n HT20_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

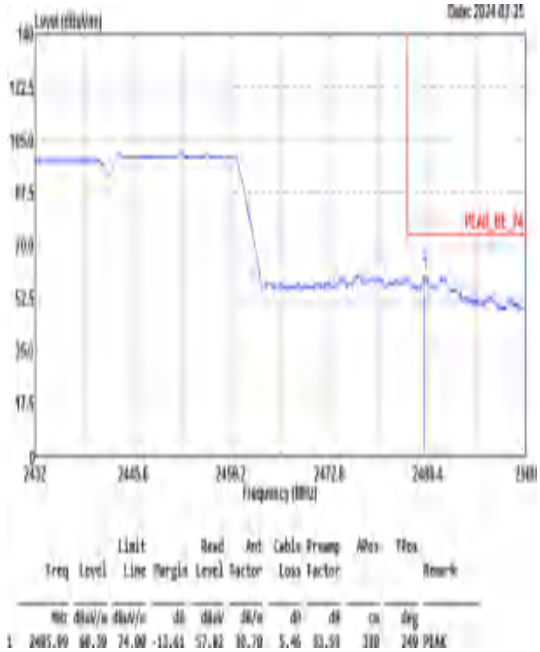
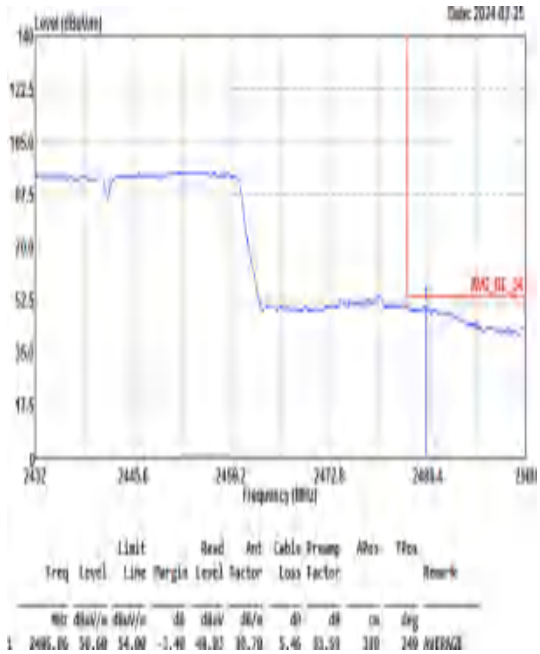
Mode	32	
	Band Edge	
	2400-2483.5_802.11n HT20_CH10_2457MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

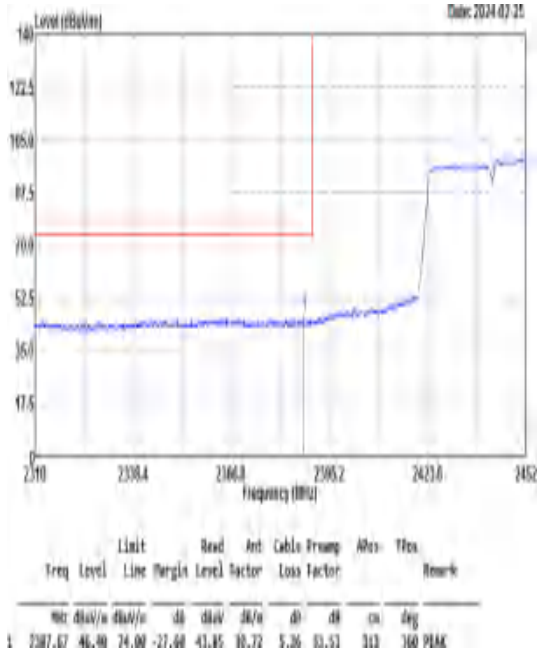
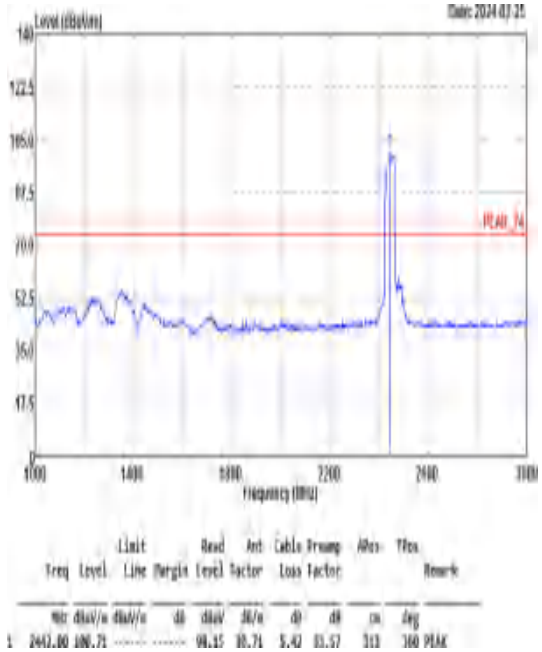
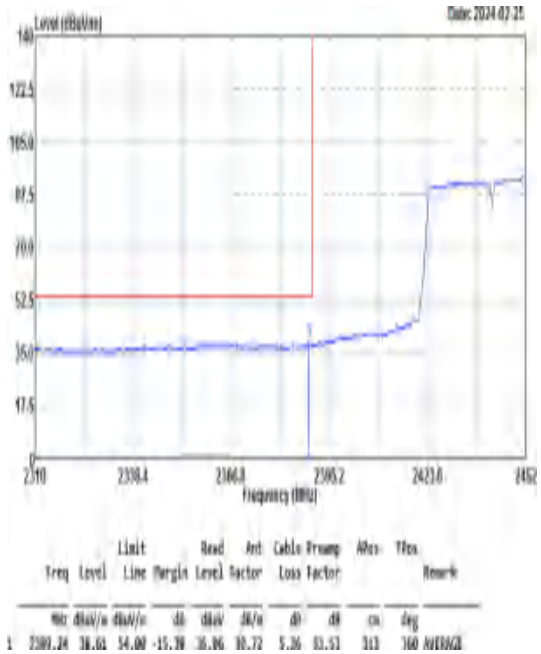
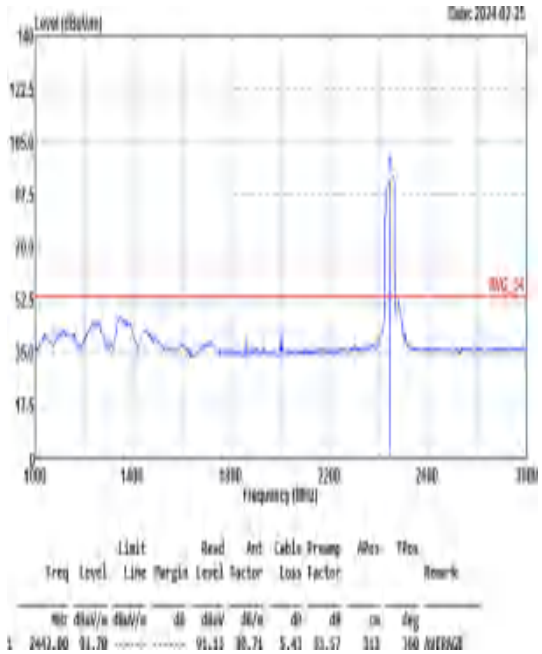
Mode	32	
	Band Edge	
	2400-2483.5_802.11n HT20_CH10_2457MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

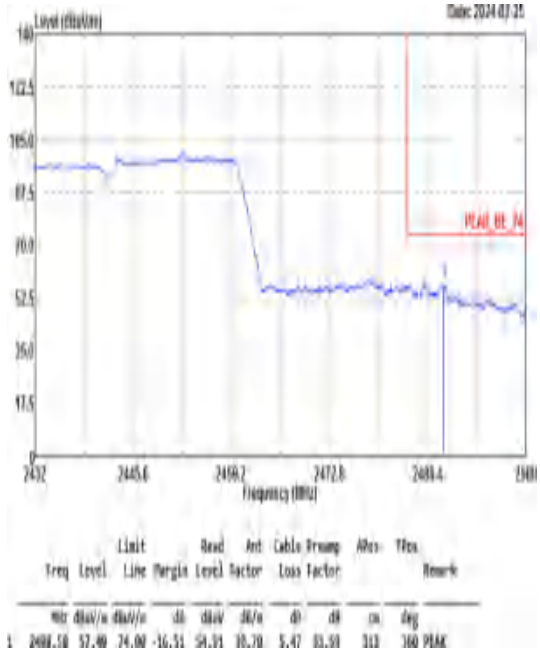
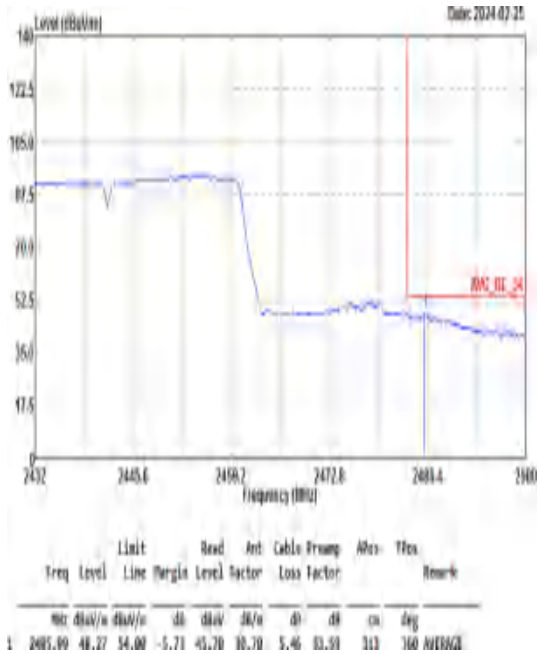
Mode	33	
	Band Edge	
	2400-2483.5_802.11n HT20_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

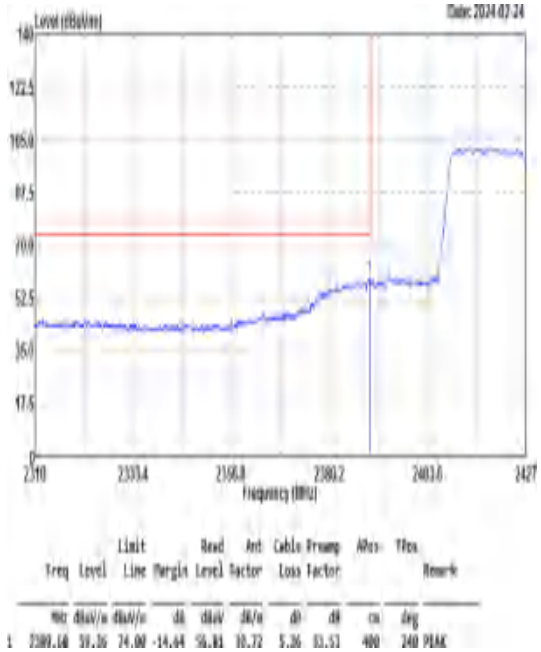
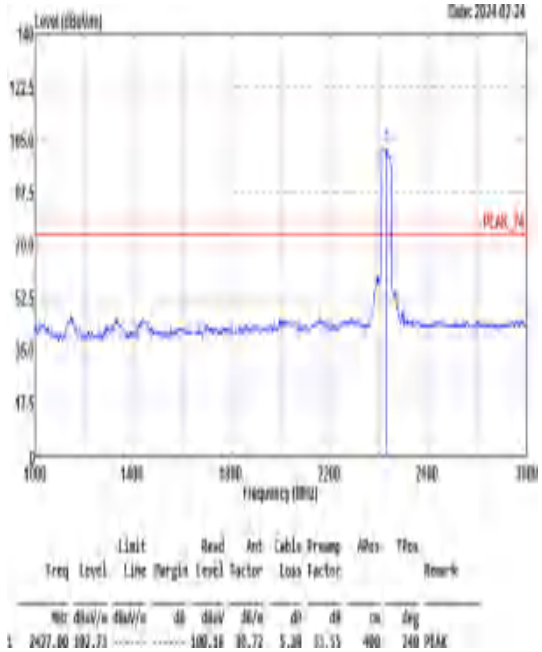
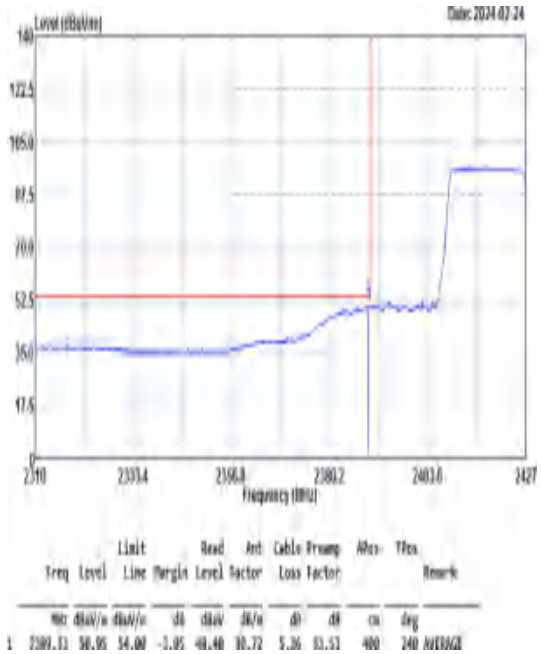
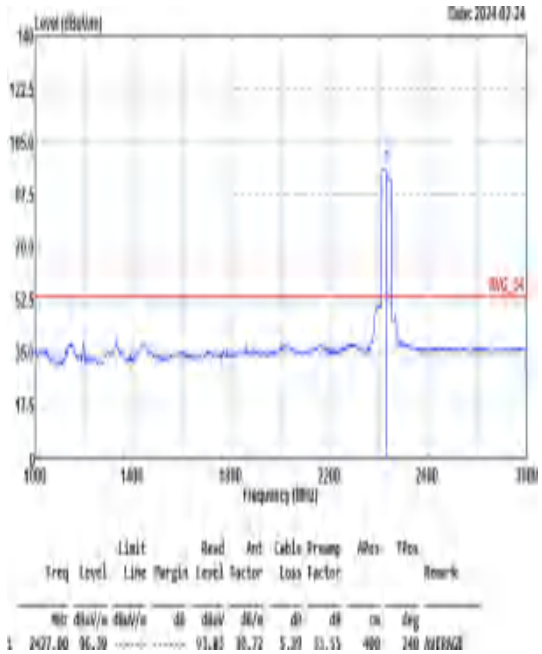
Mode	33	
	Band Edge	
	2400-2483.5_802.11n HT20_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

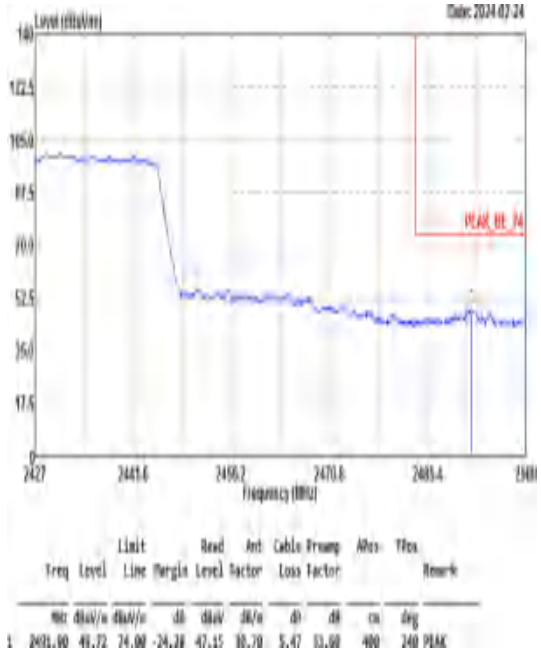
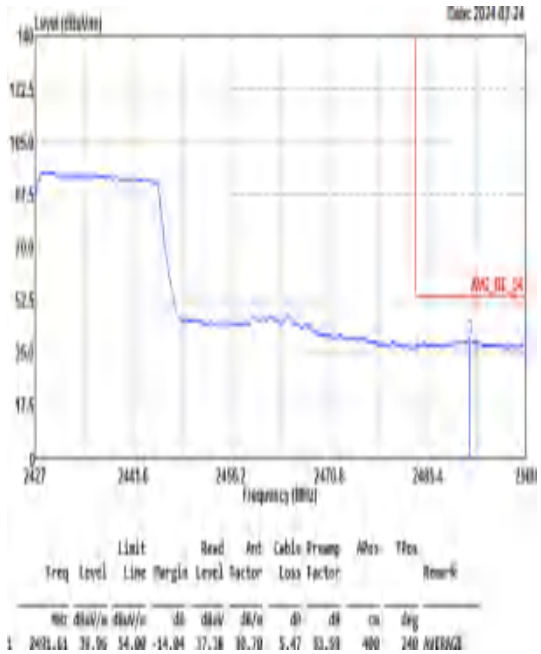
Mode	34	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH07_2442MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

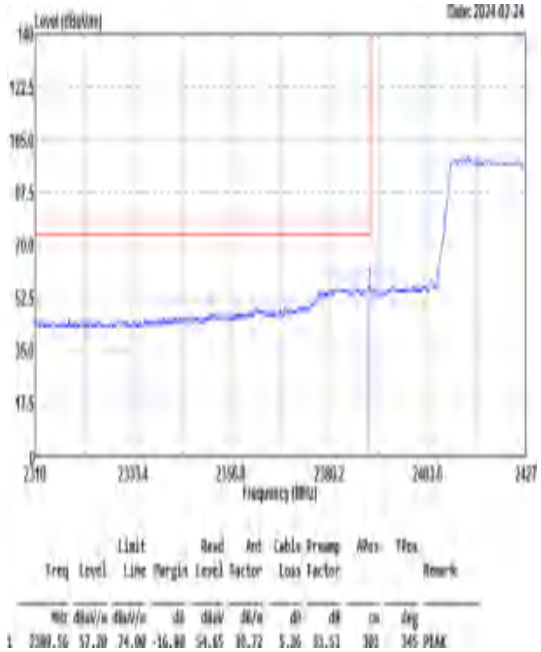
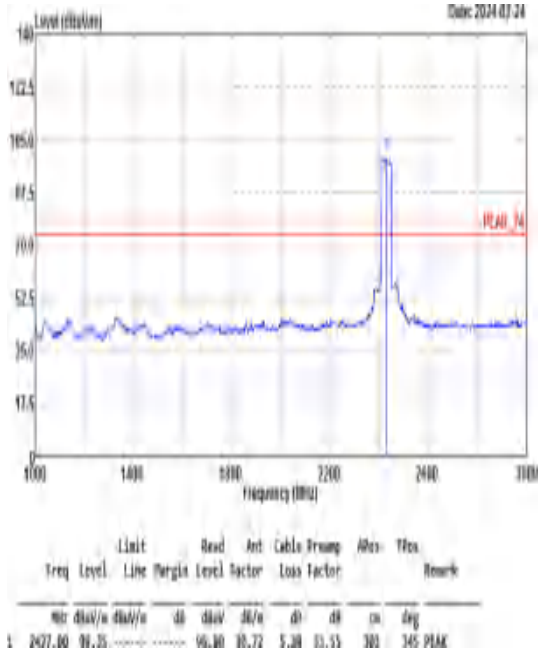
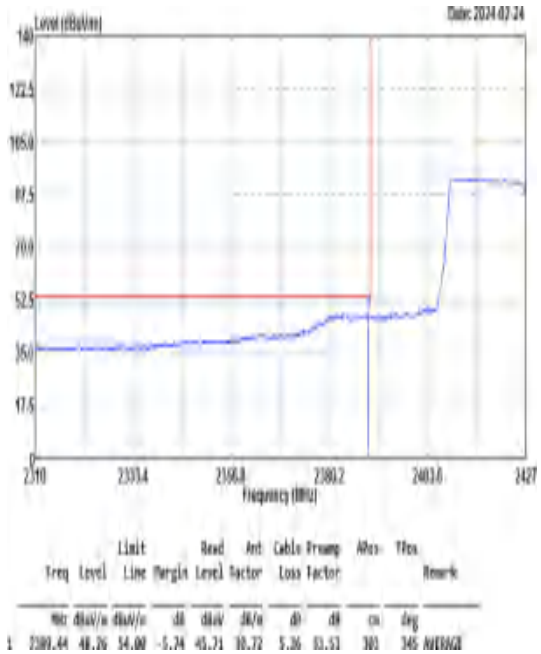
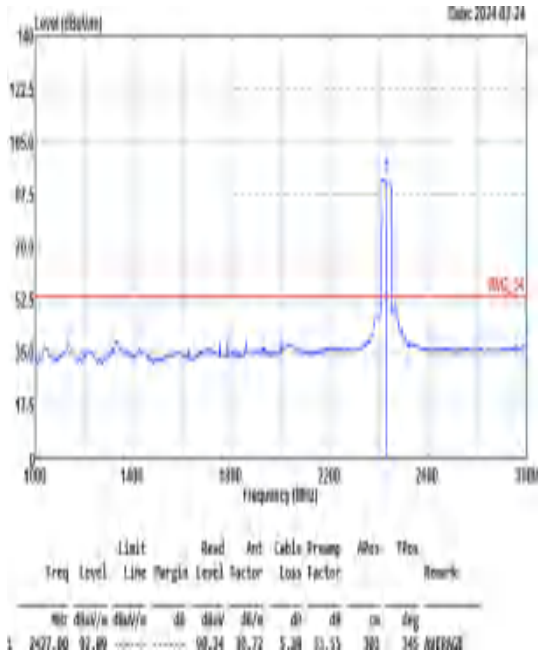
Mode	34	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH07_2442MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

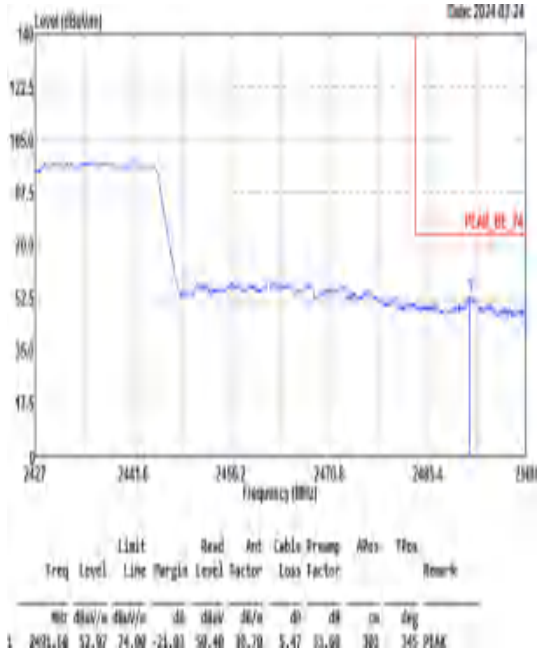
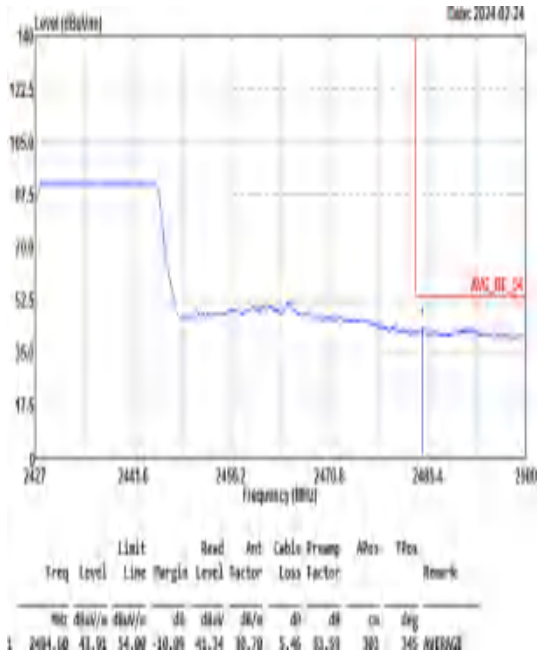
Mode	**34**	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH07_2442MHz	
ANT	**CDD 0+1**	
Pol.	**Vertical**	**Fundamental**
Peak		
Avg		

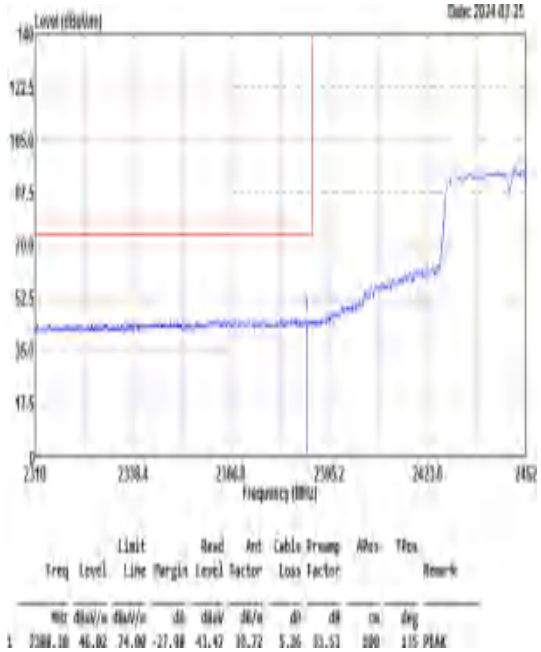
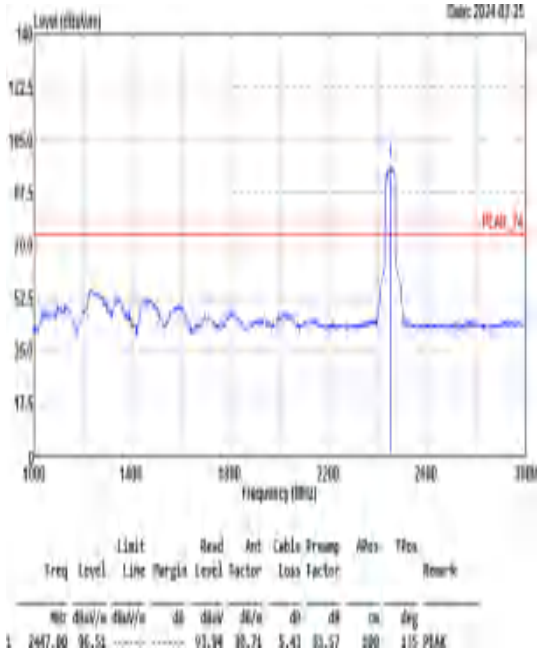
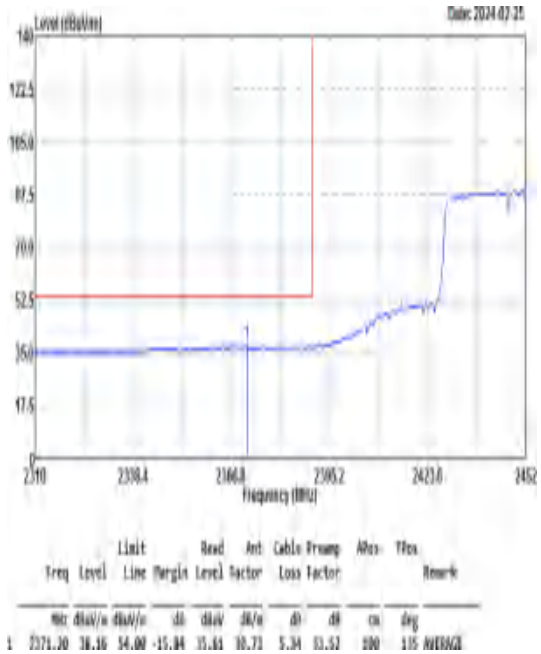
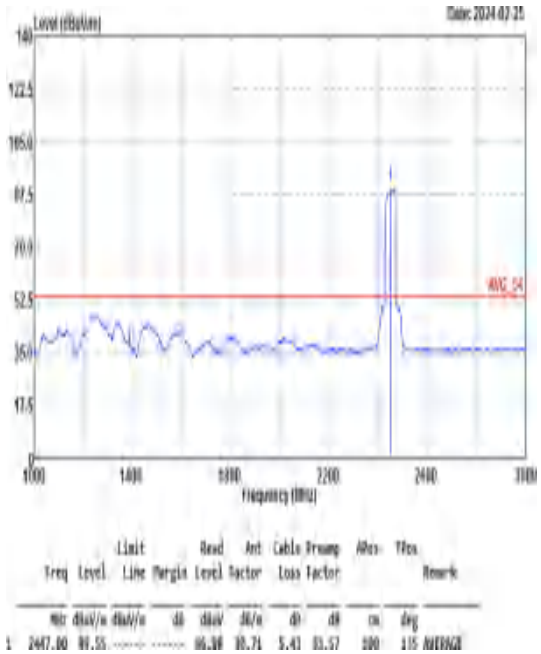
Mode	34	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH07_2442MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

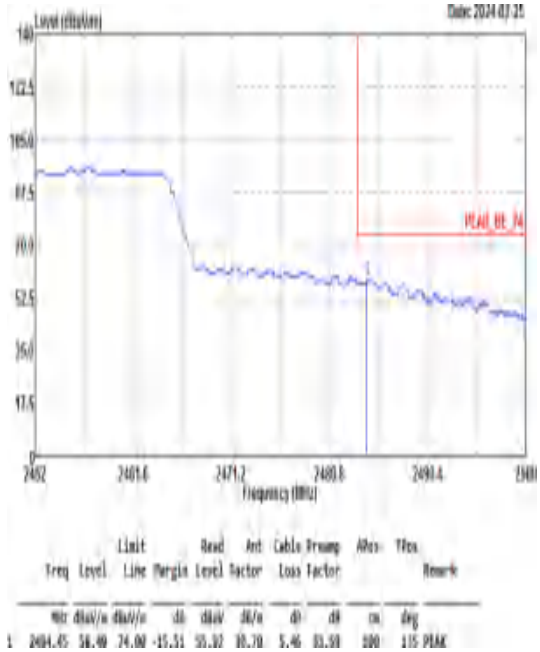
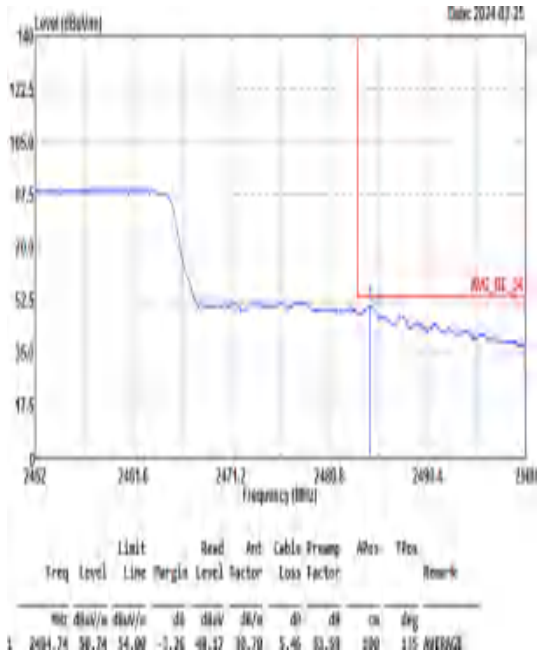
Mode	35	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

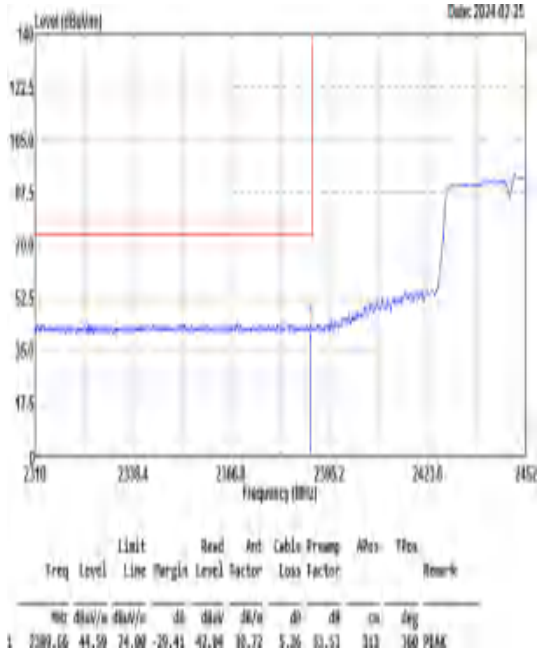
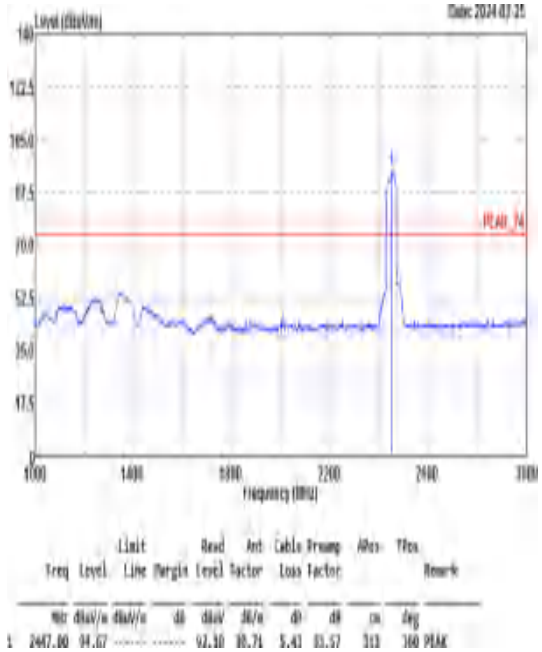
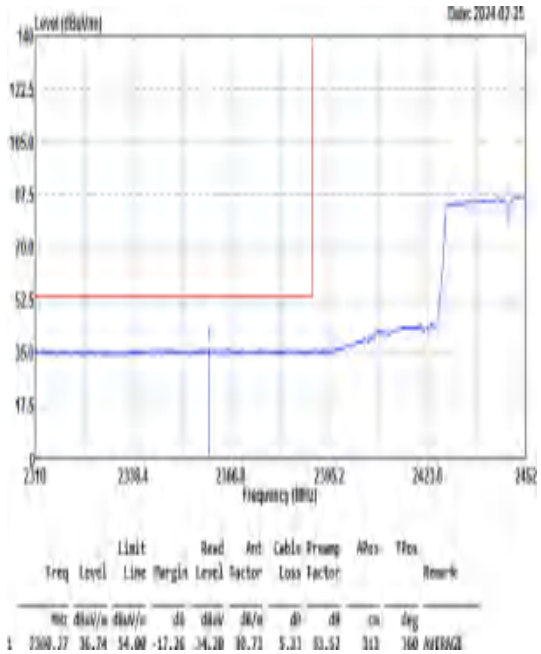
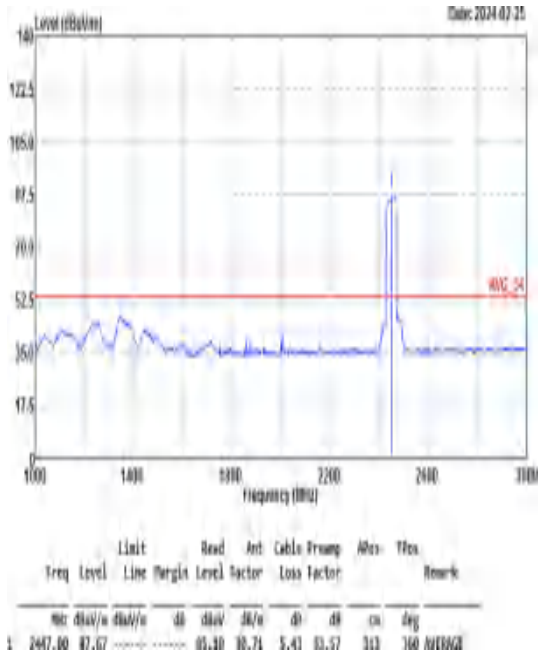
Mode	35	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

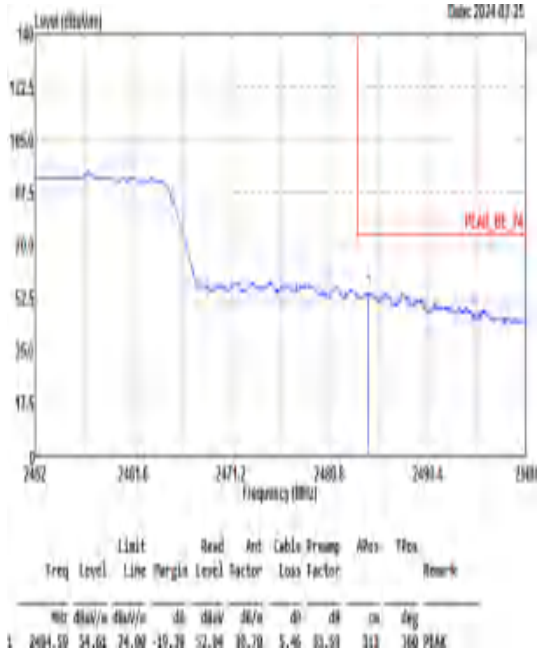
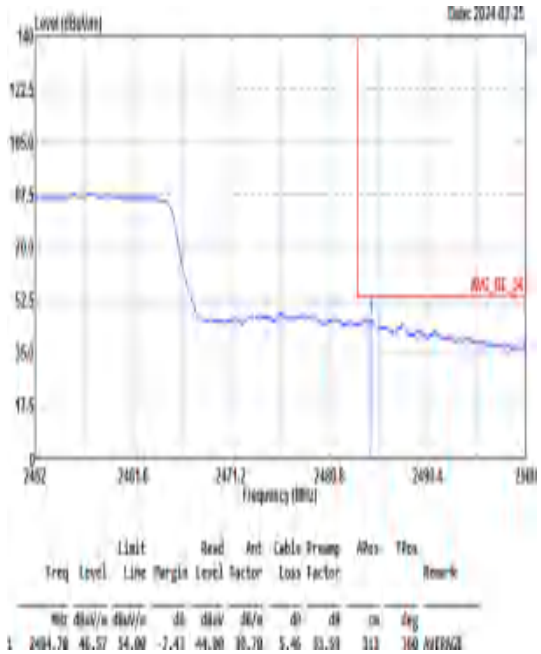
Mode	35	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

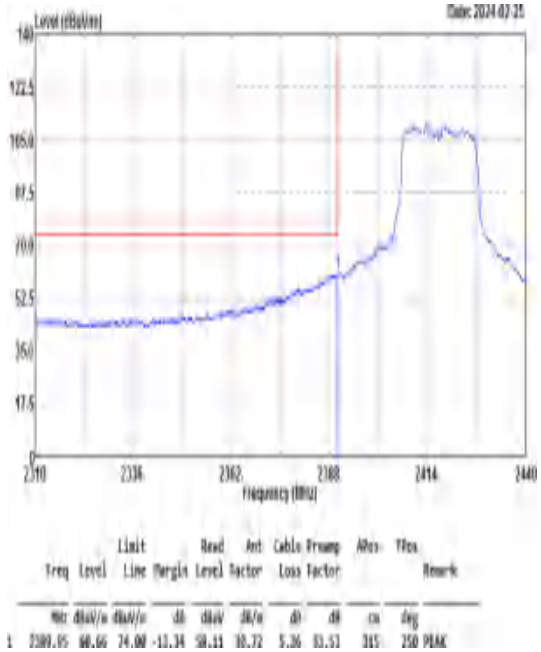
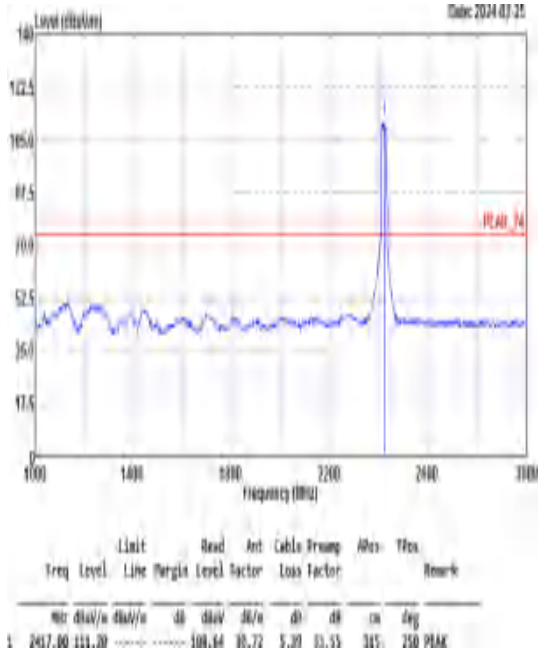
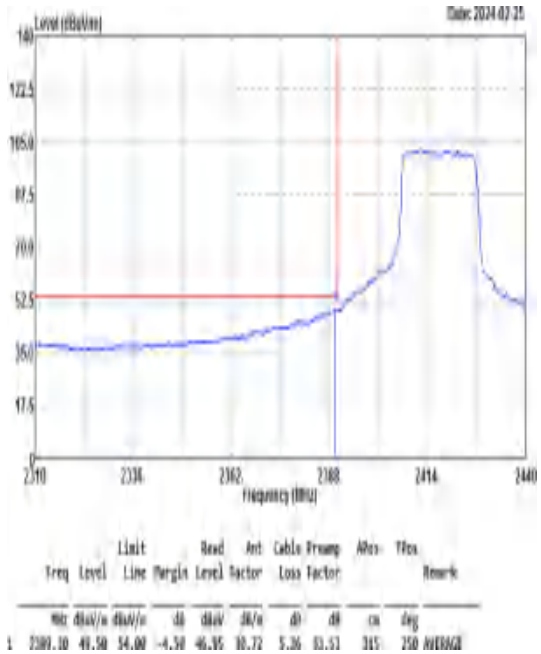
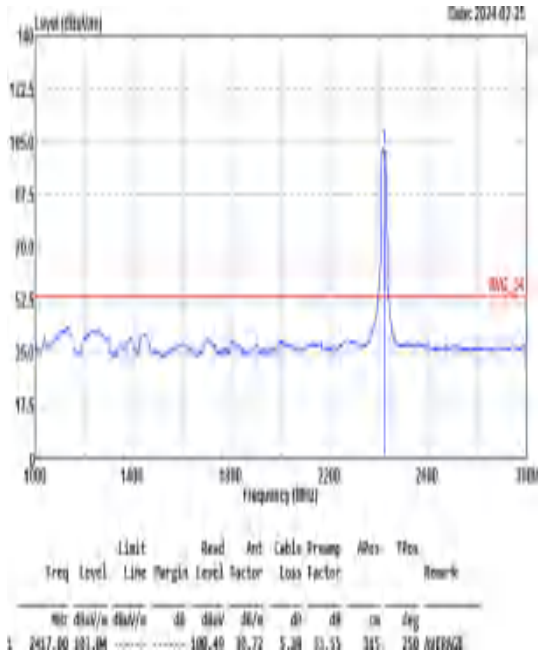
Mode	35	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

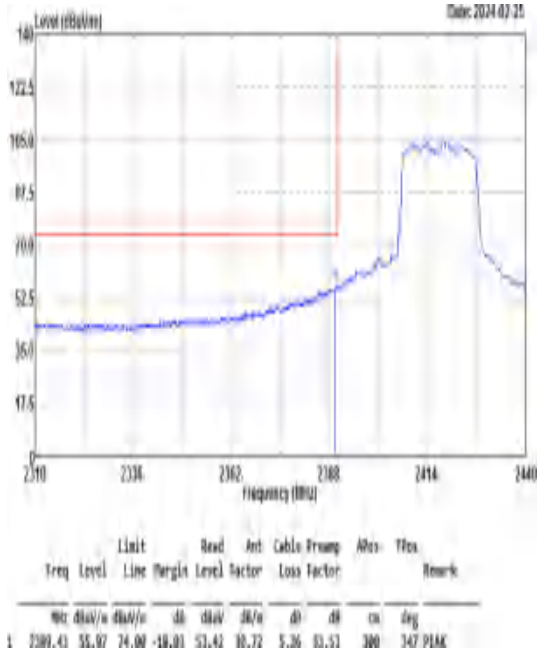
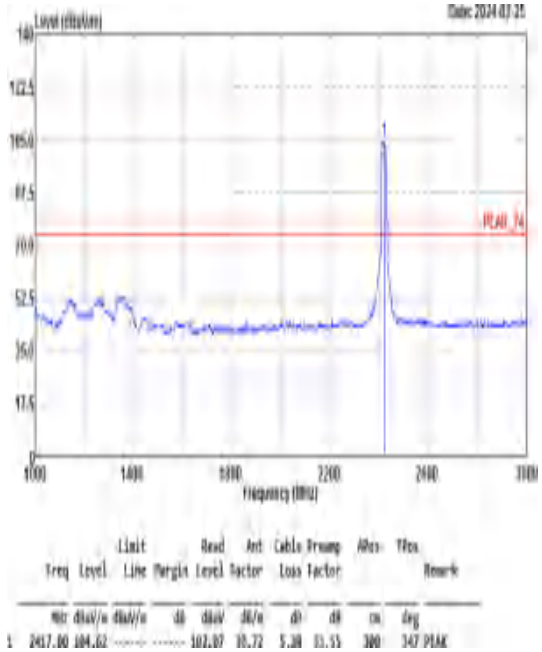
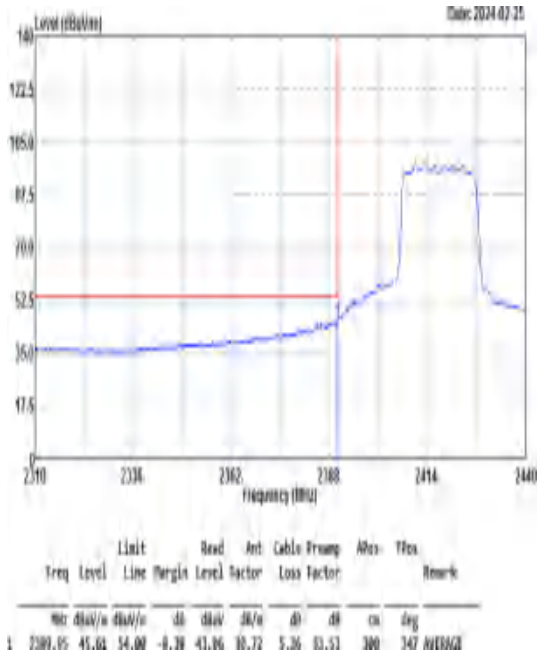
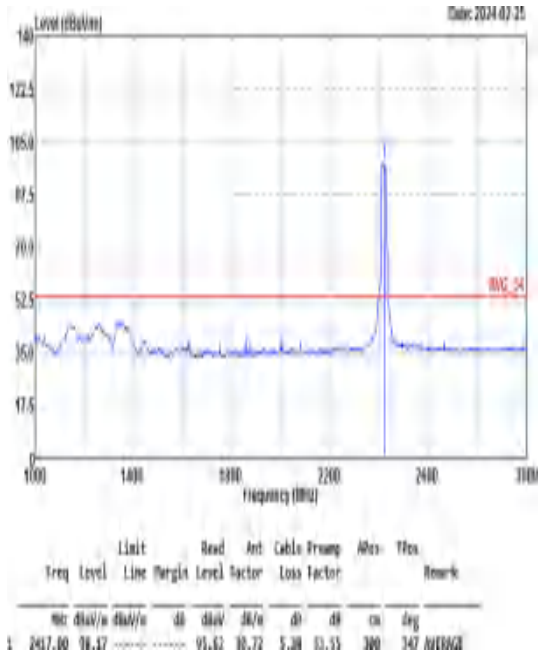
Mode	36	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

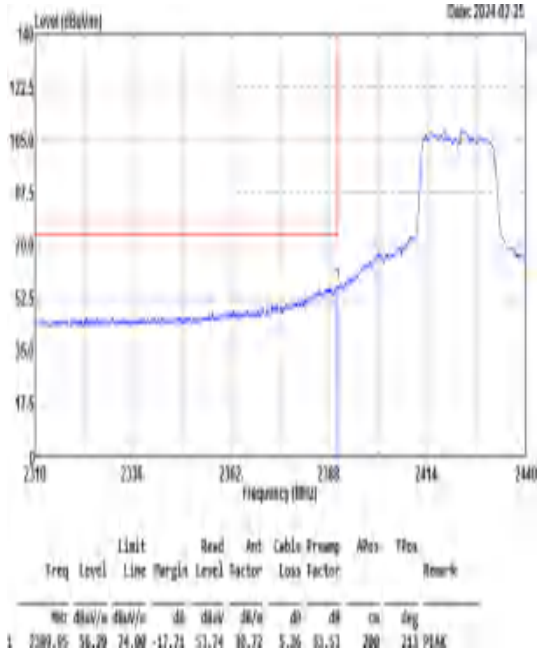
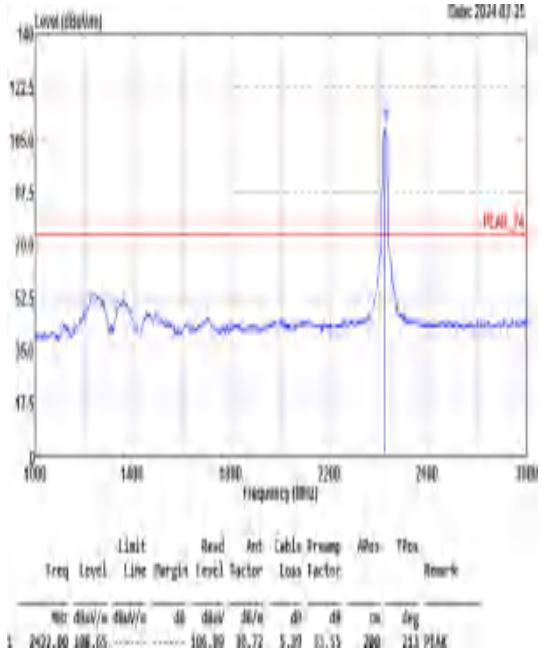
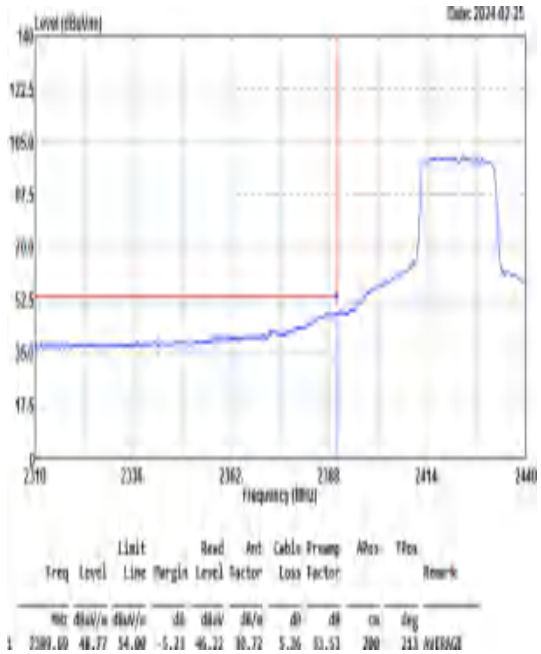
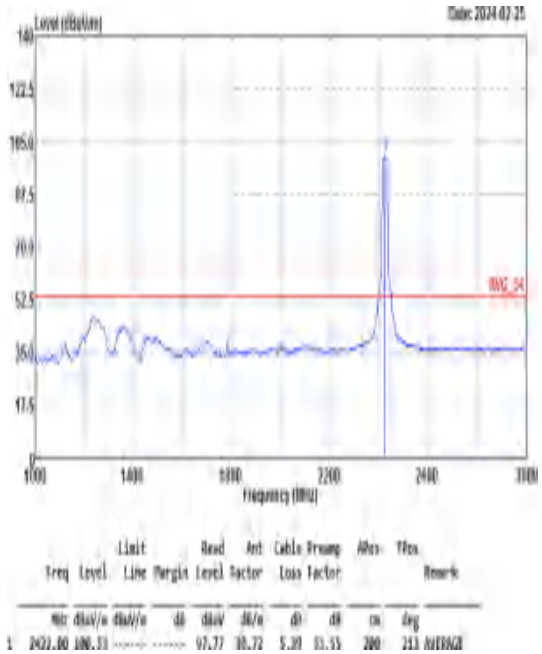
Mode	36	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

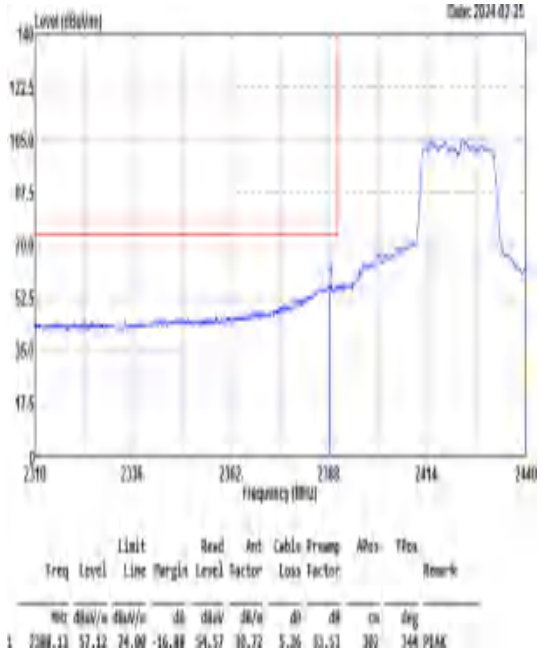
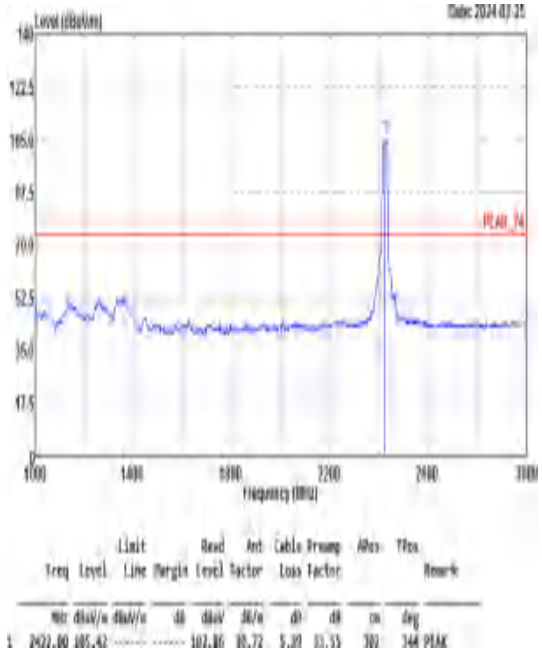
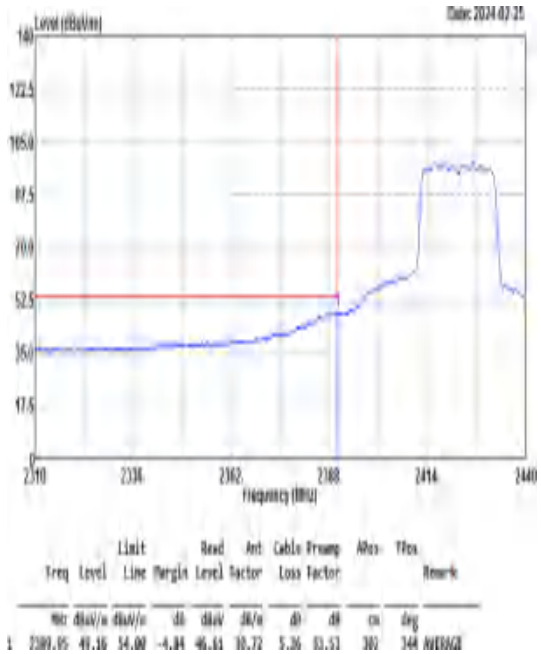
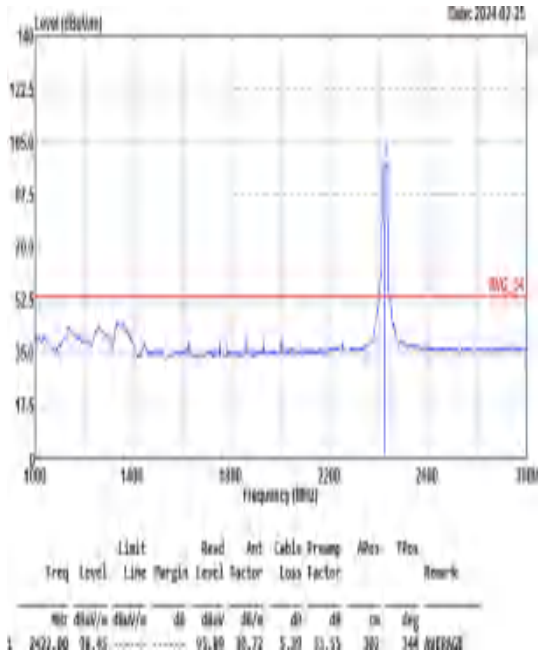
Mode	36	
	Band Edge - L	
	2400-2483.5_802.11n HT40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

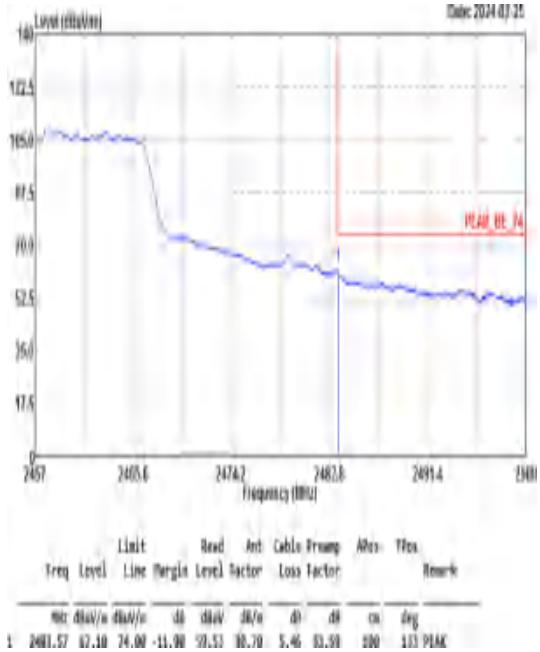
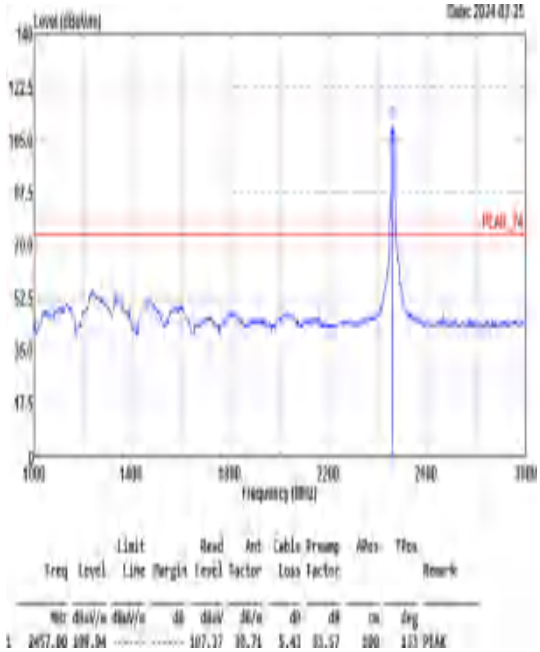
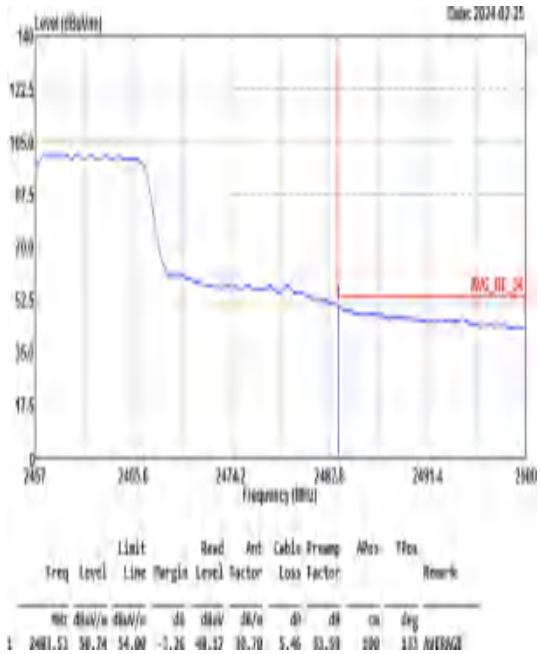
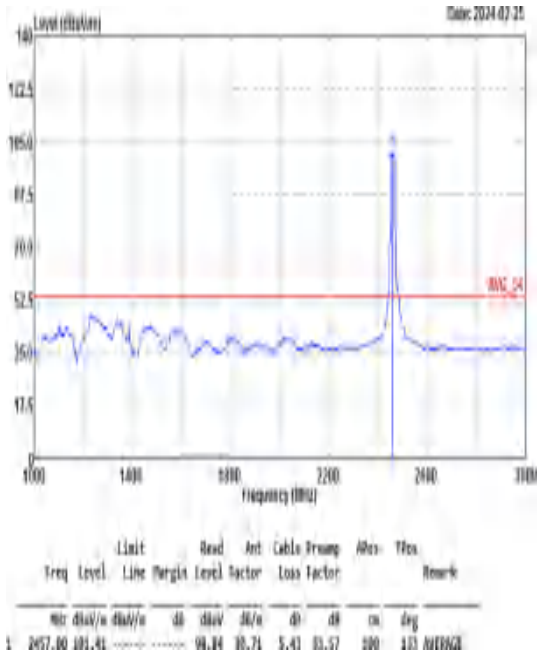
Mode	36	
	Band Edge - R	
	2400-2483.5_802.11n HT40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

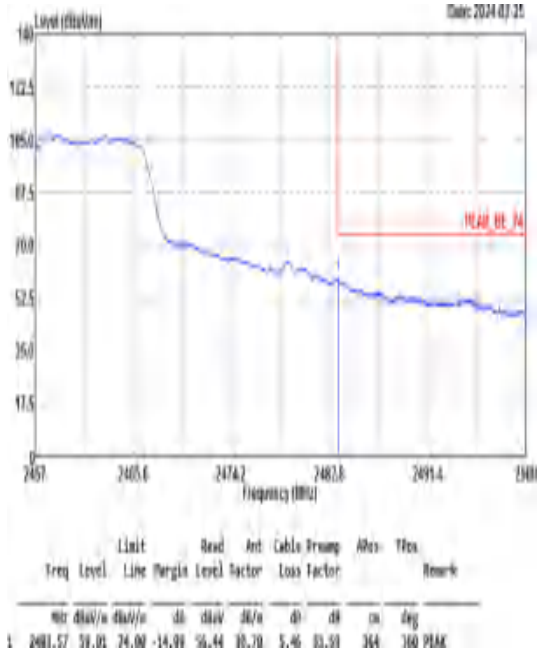
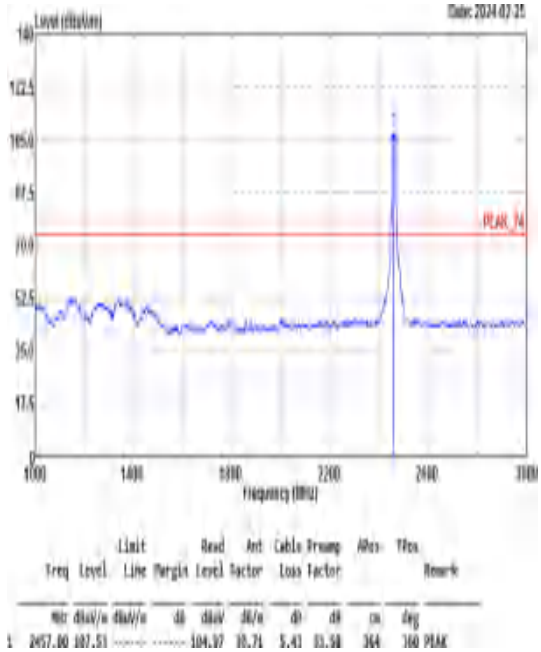
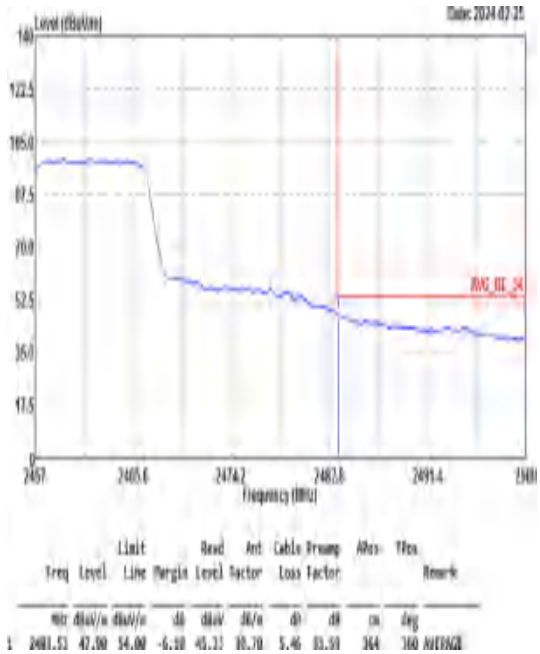
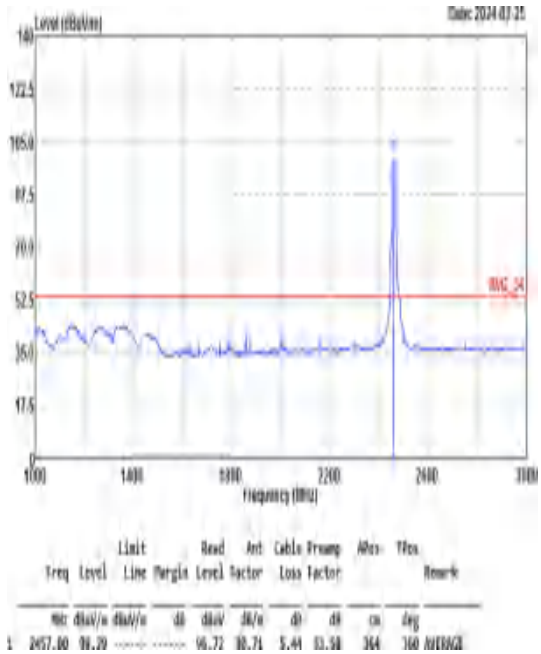
Mode	37	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH02_2417MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

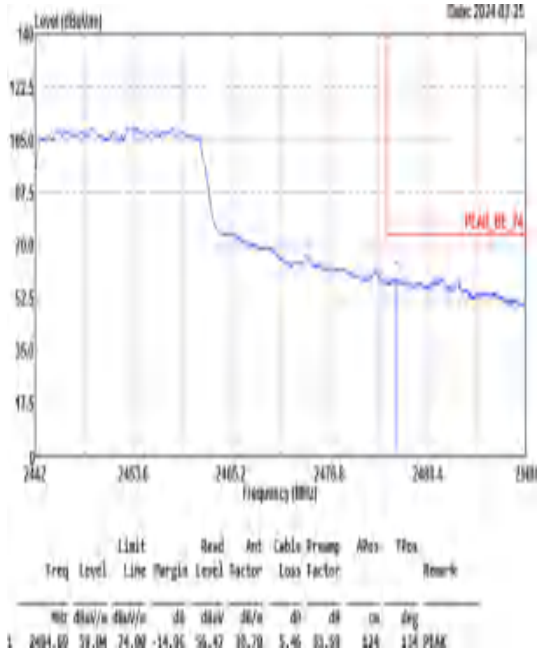
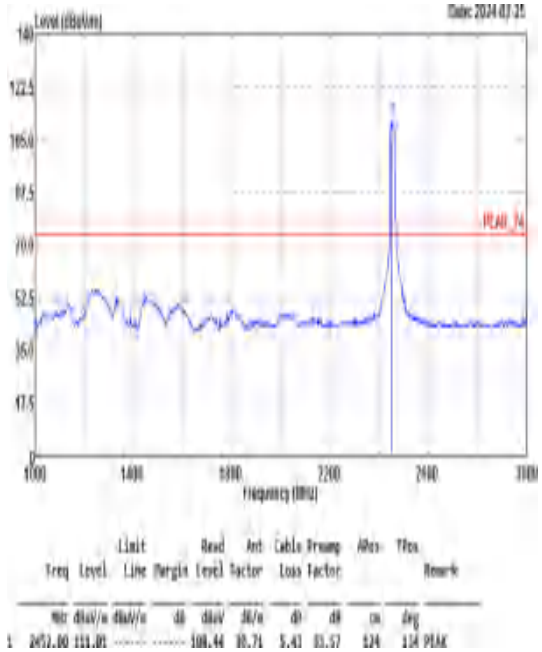
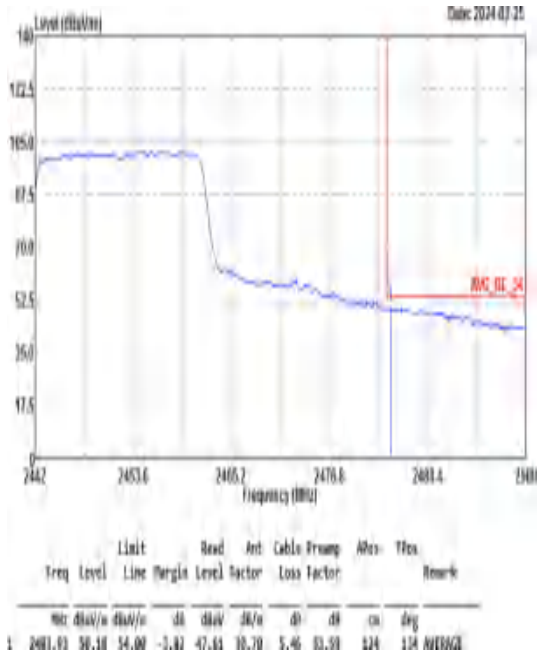
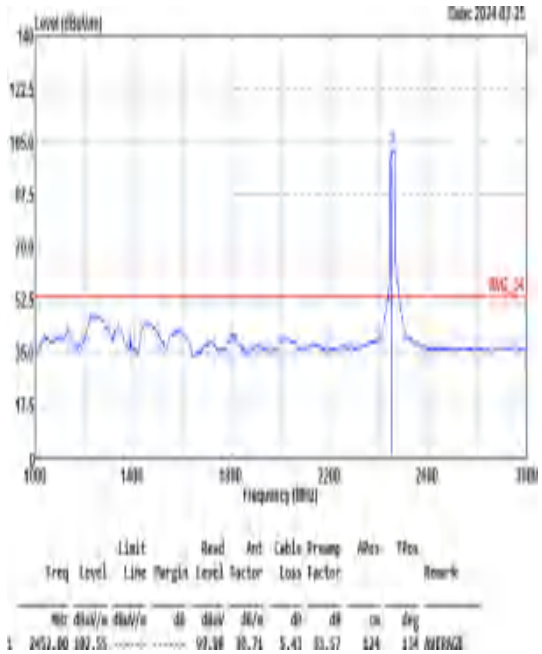
Mode	37	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH02_2417MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

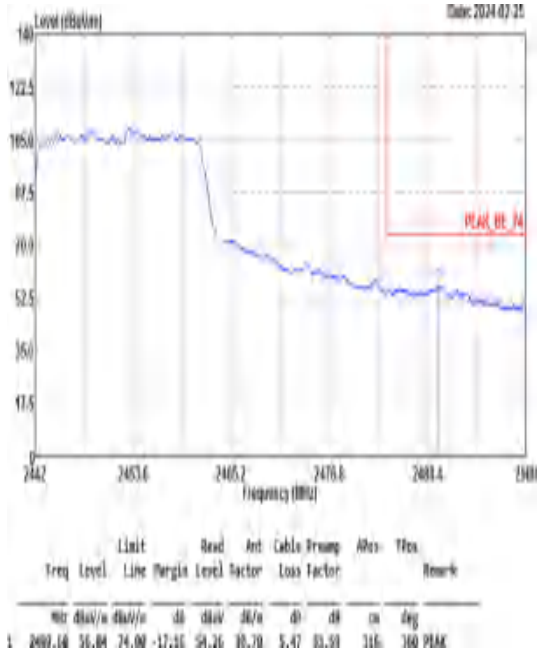
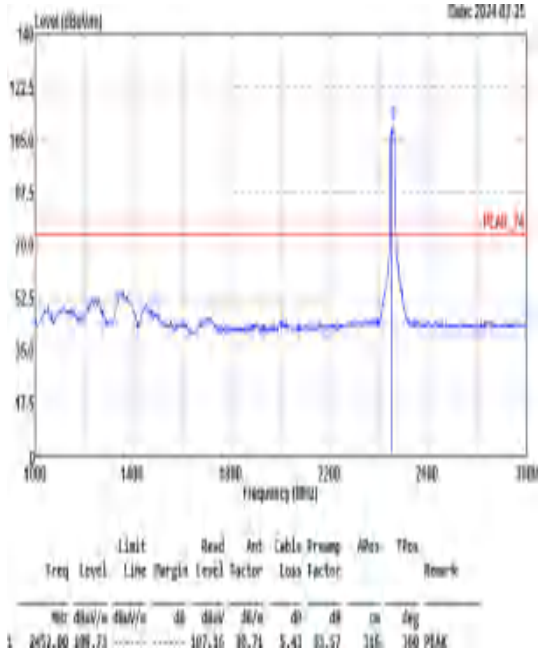
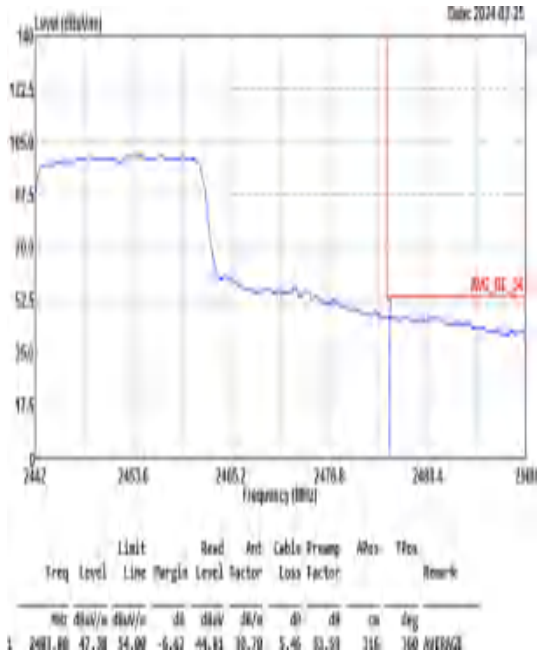
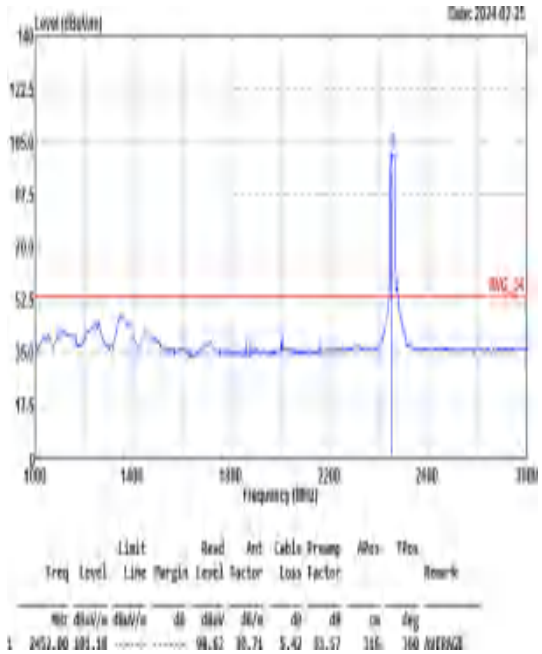
Mode	38	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

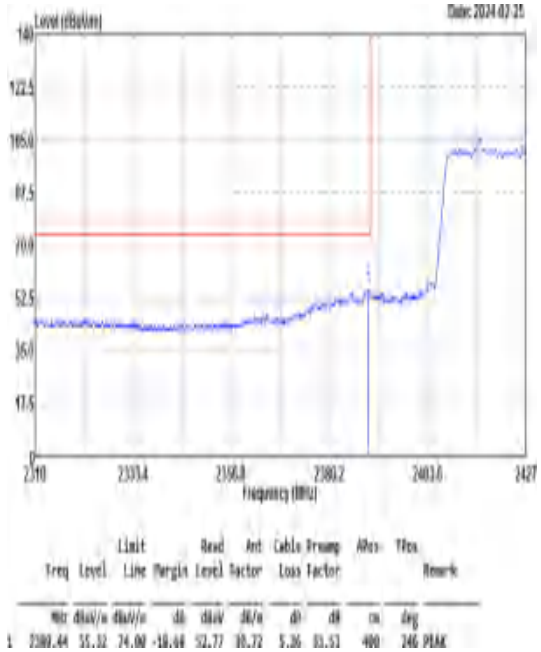
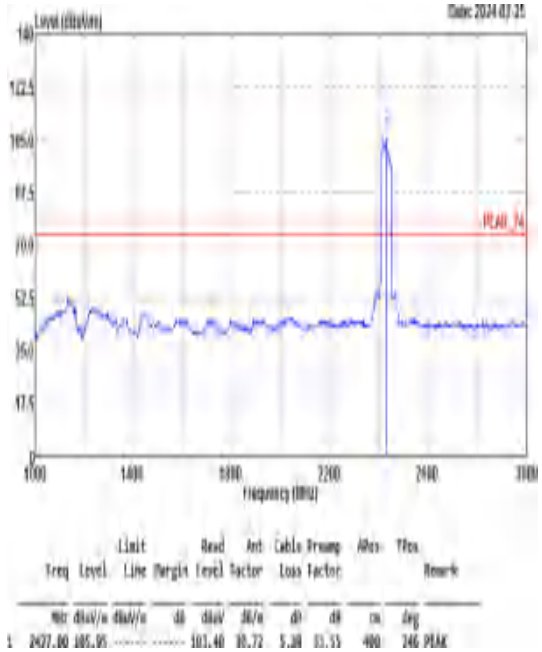
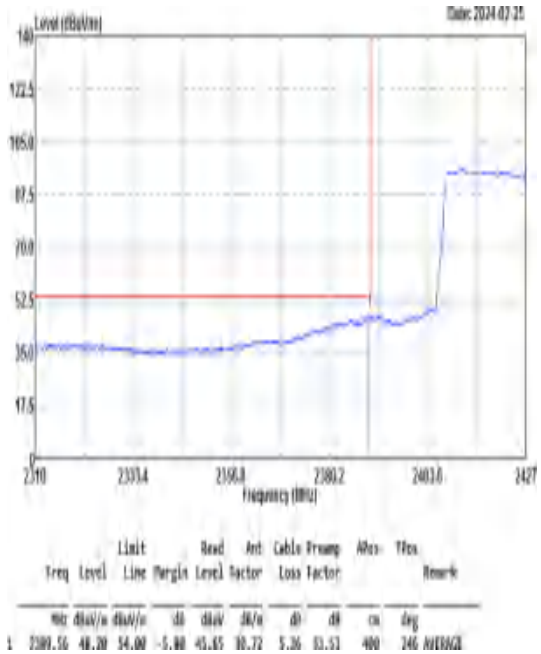
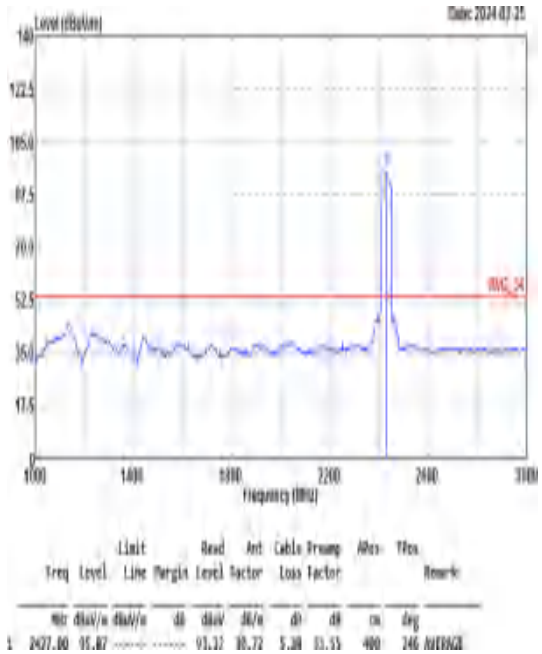
Mode	38	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH03_2422MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

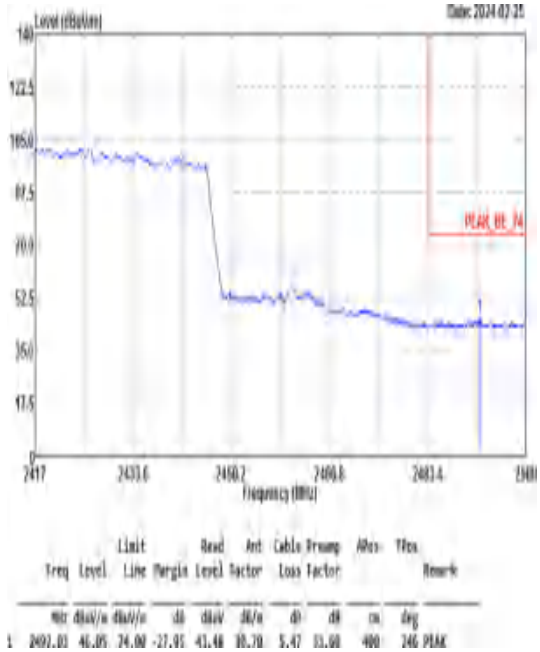
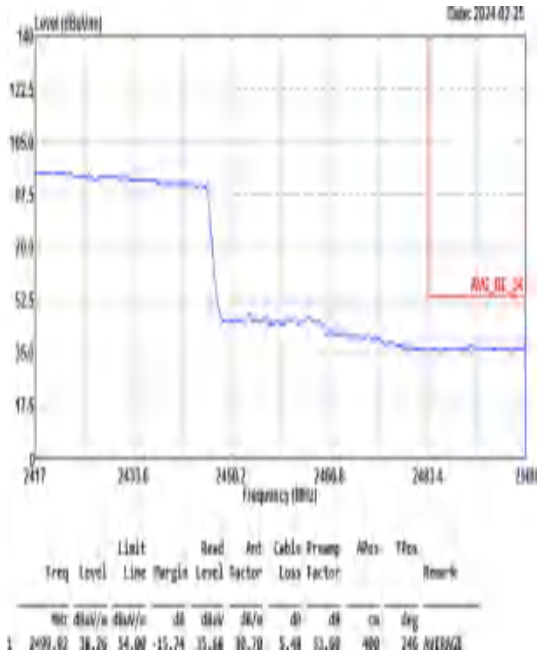
Mode	39	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH10_2457MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

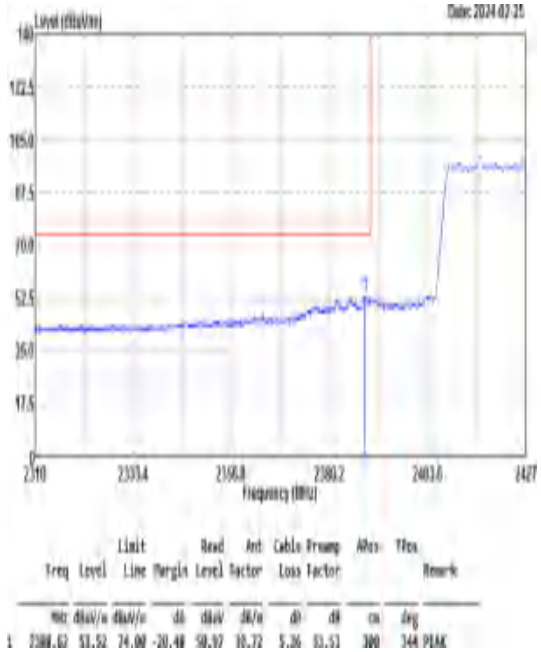
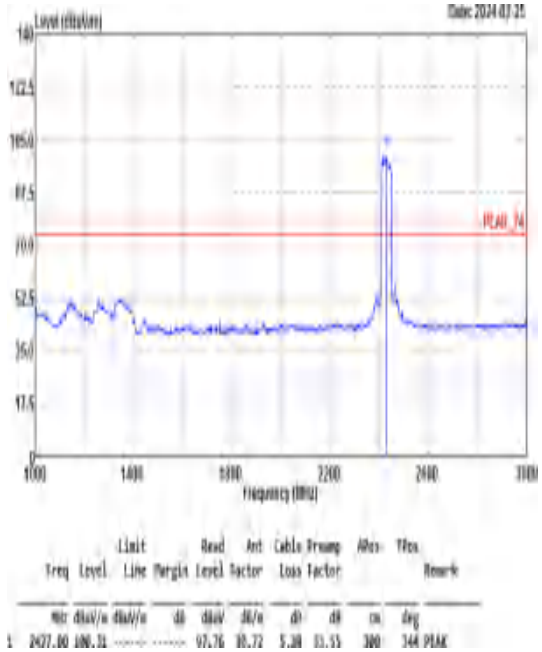
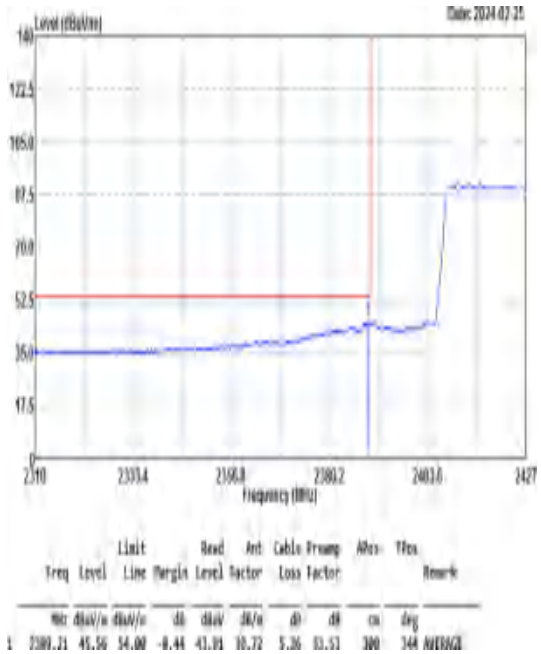
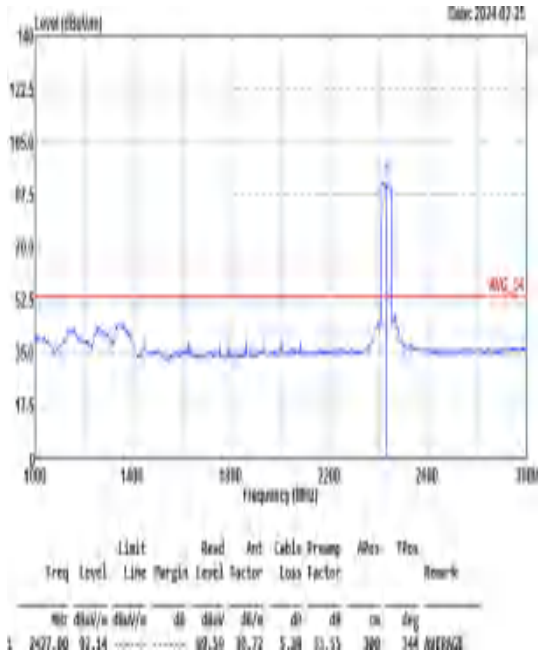
Mode	39	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH10_2457MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

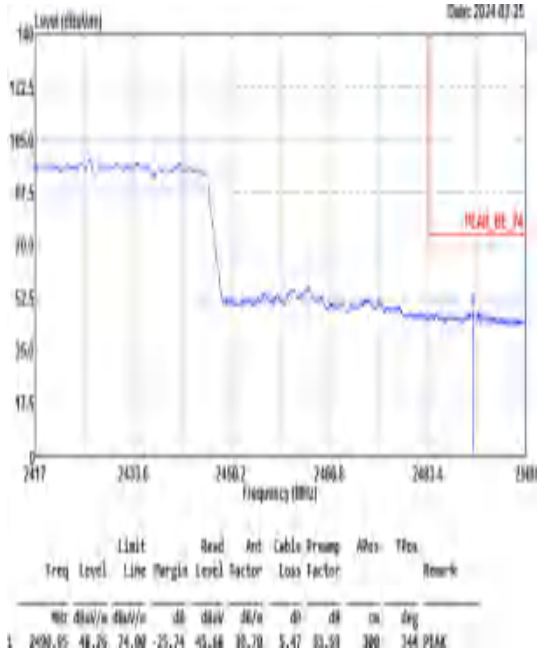
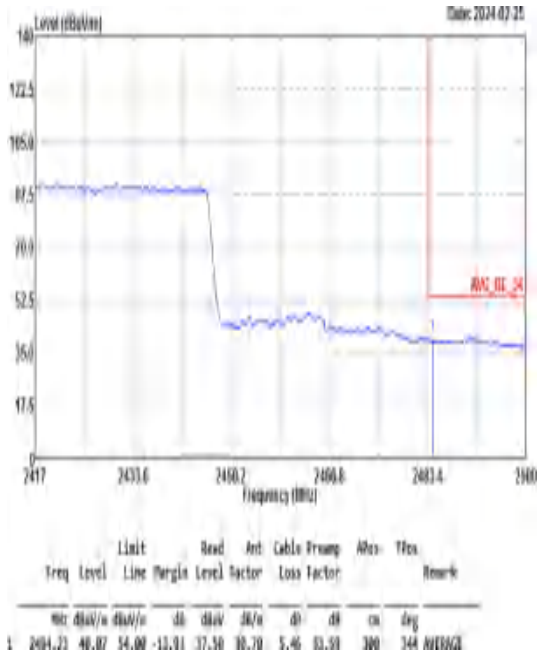
Mode	40	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

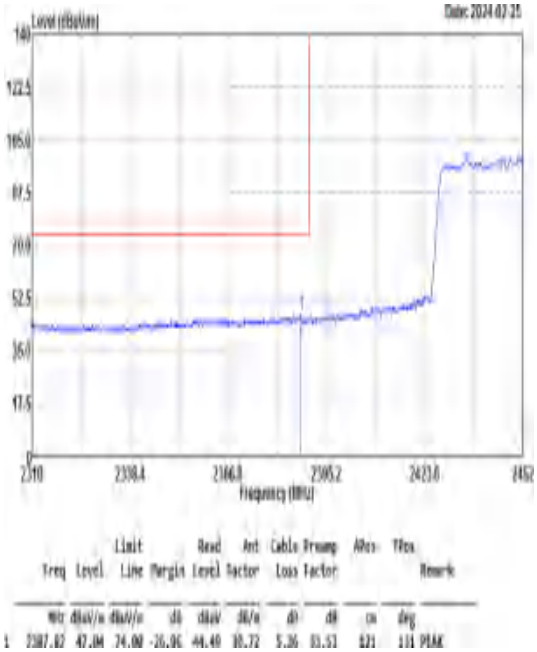
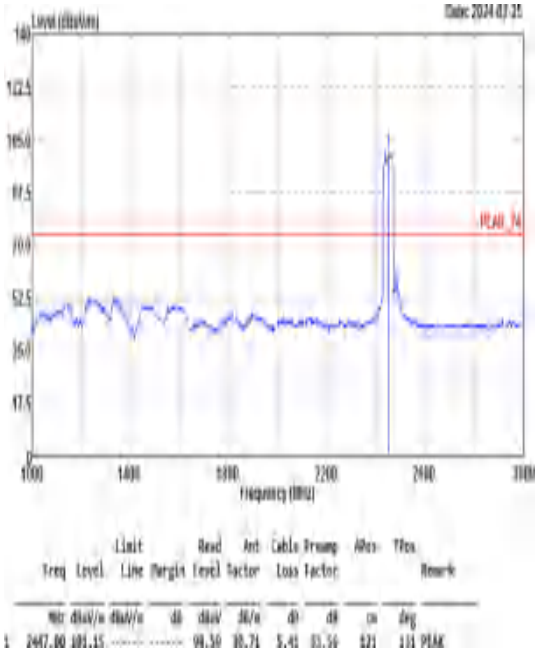
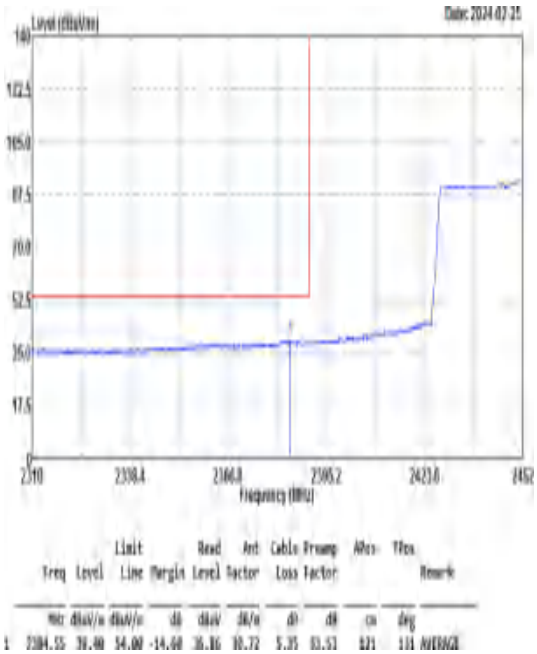
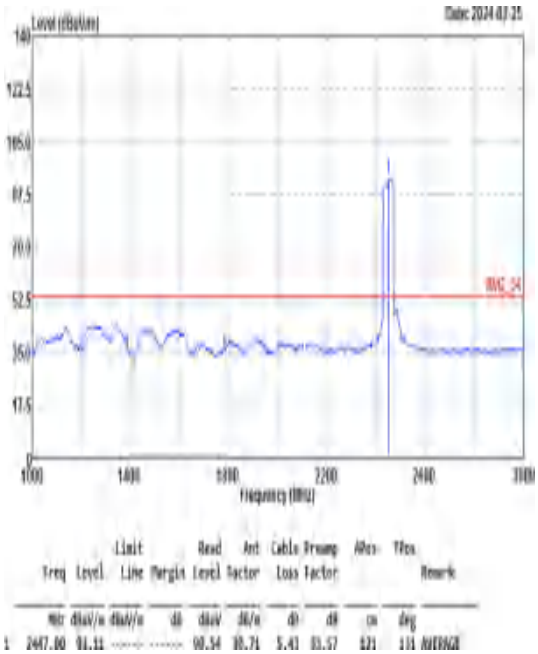
Mode	40	
	Band Edge	
	2400-2483.5_802.11ax HE20_CH09_2452MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

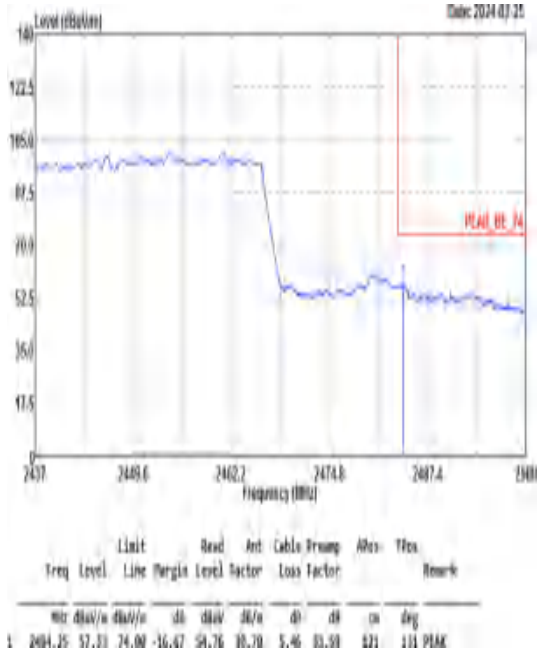
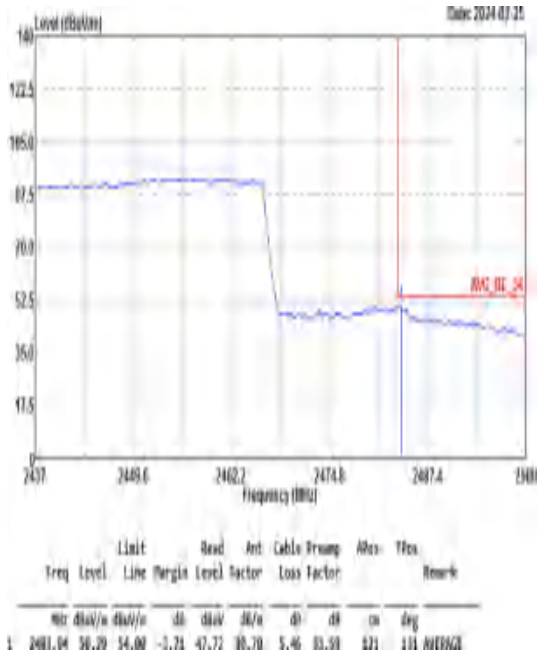
Mode	**41**	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH04_2427MHz	
ANT	**CDD 0+1**	
Pol.	**Horizontal**	**Fundamental**
Peak		
Avg		

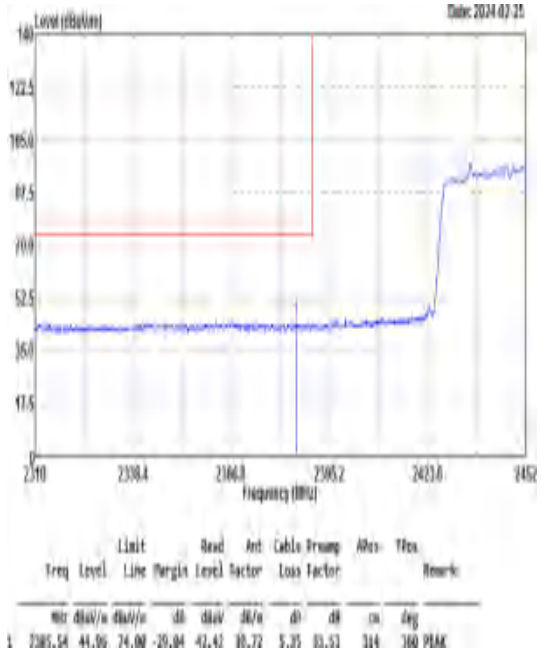
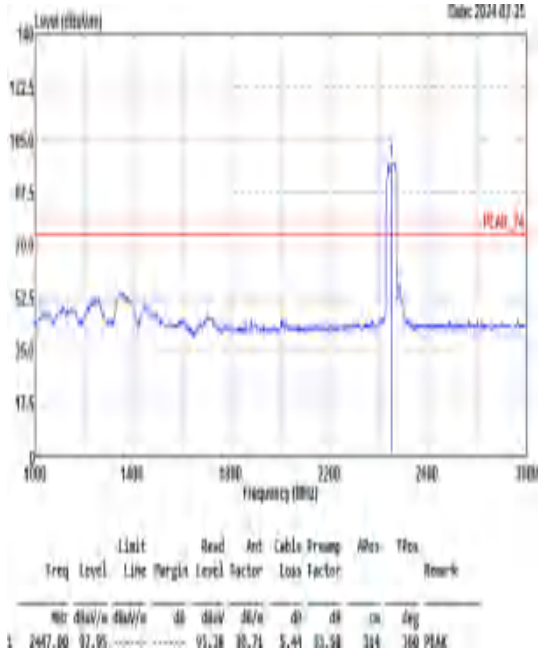
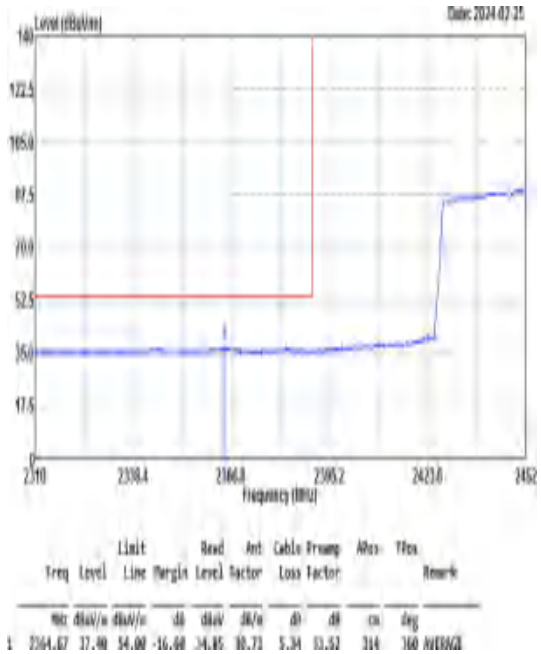
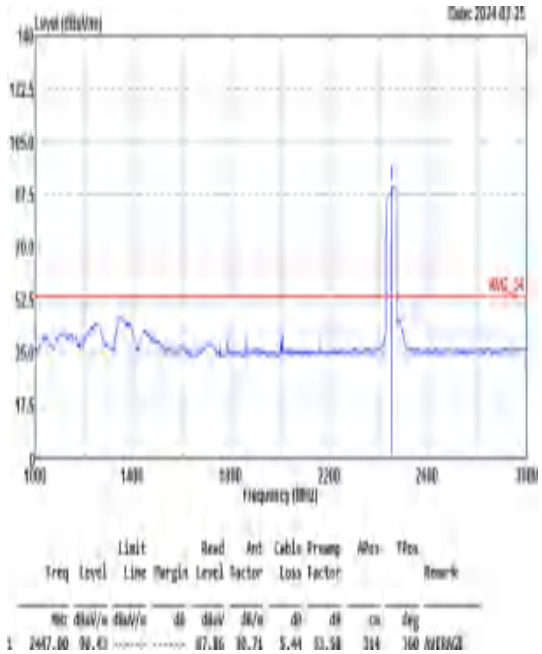
Mode	41	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

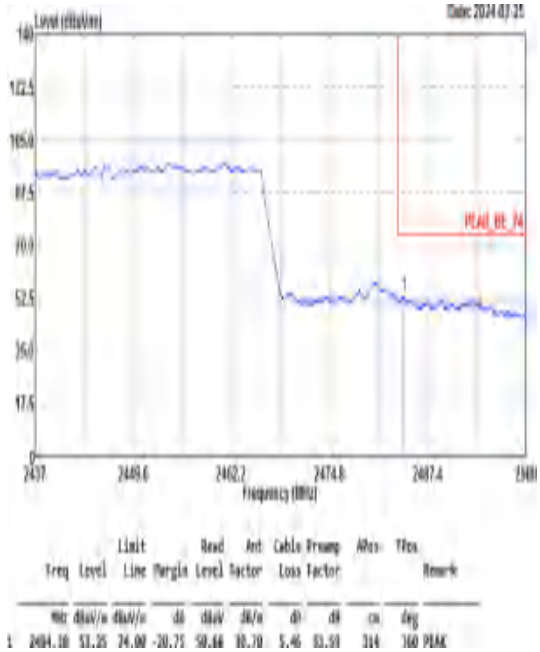
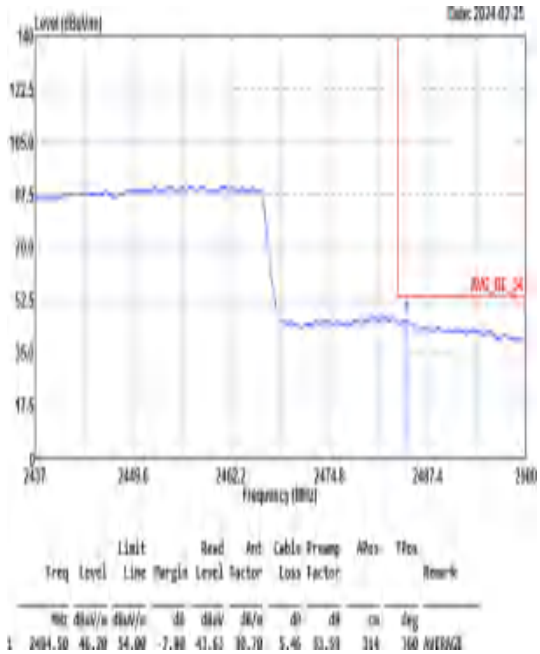
Mode	41	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

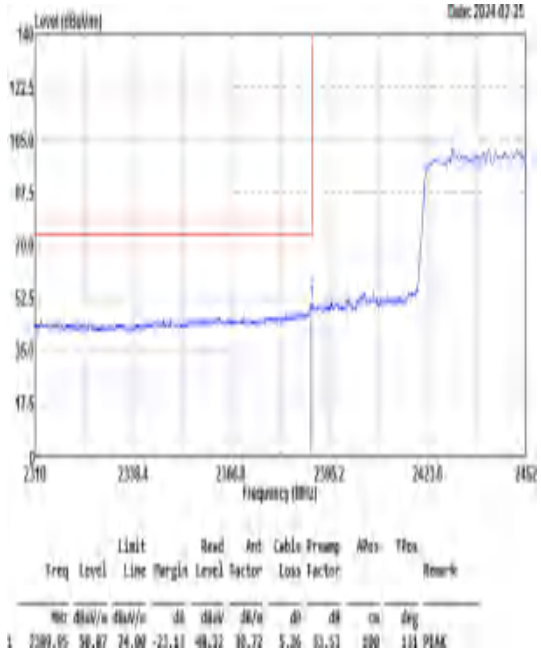
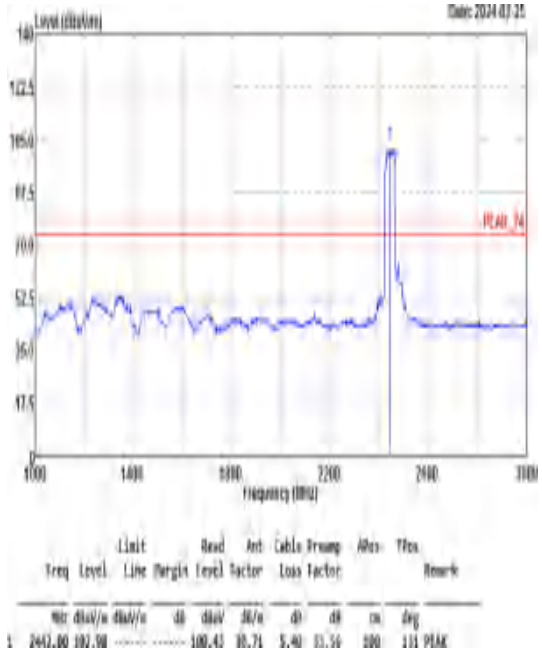
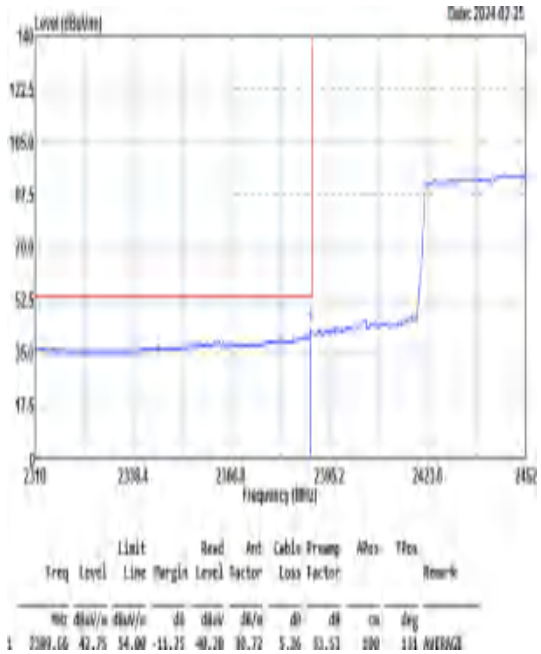
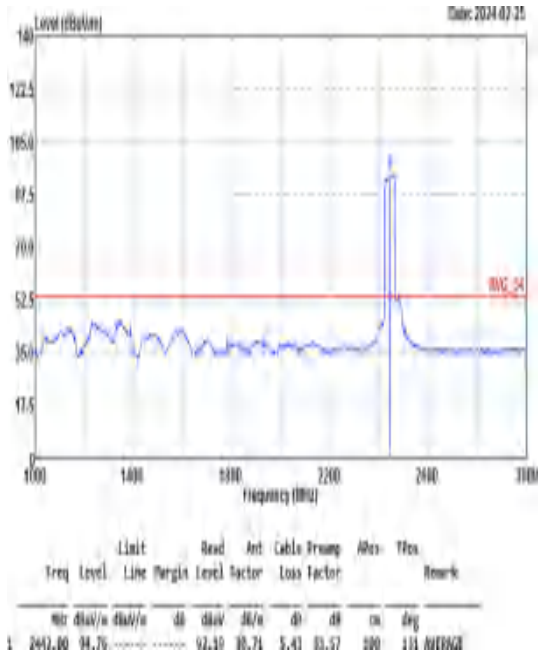
Mode	41	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH04_2427MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

Mode	42	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

Mode	42	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

Mode	42	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

Mode	42	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH08_2447MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

Mode	43	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH07_2442MHz	
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		
Avg		

Mode	43	
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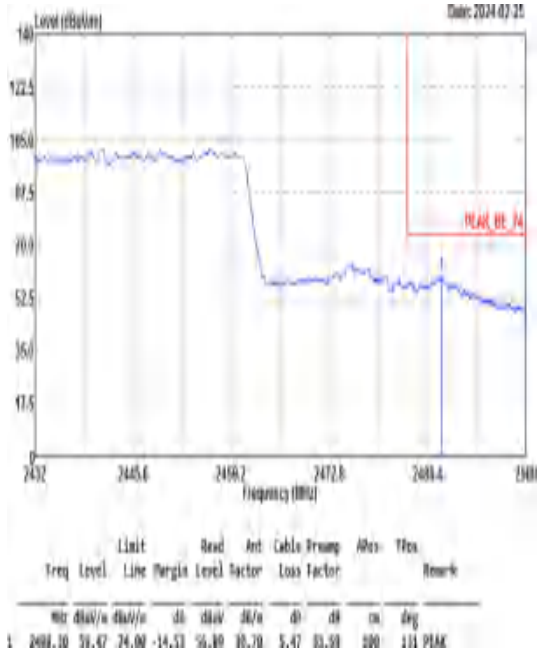
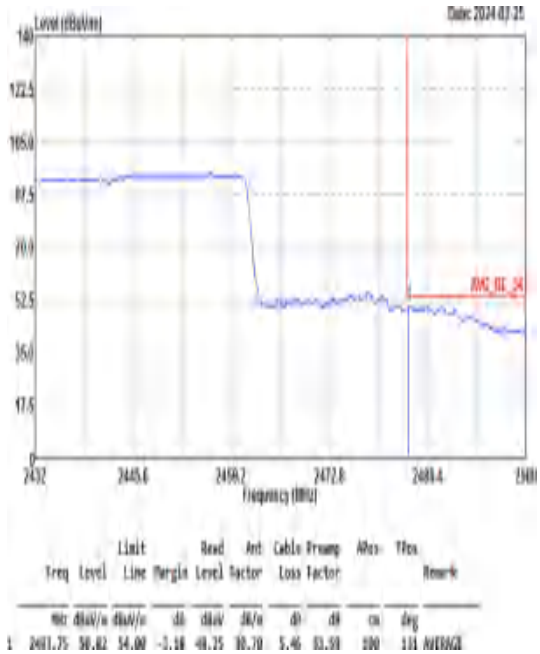
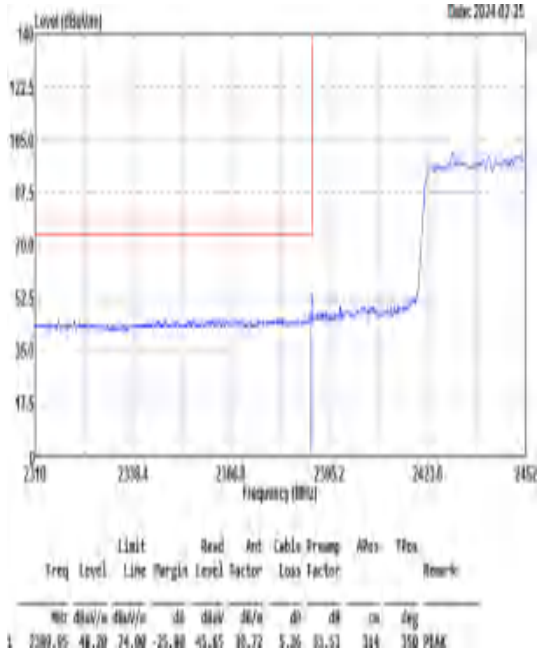
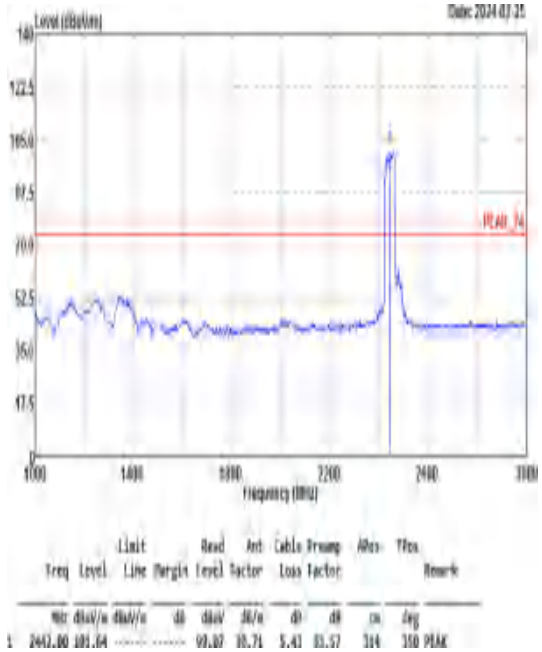
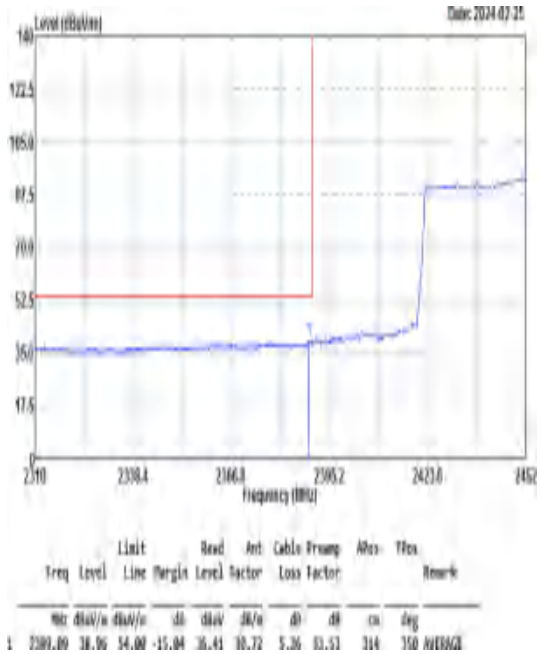
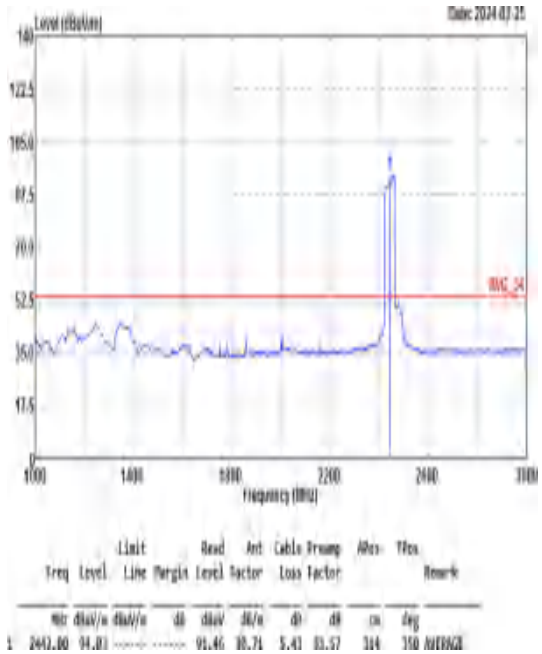
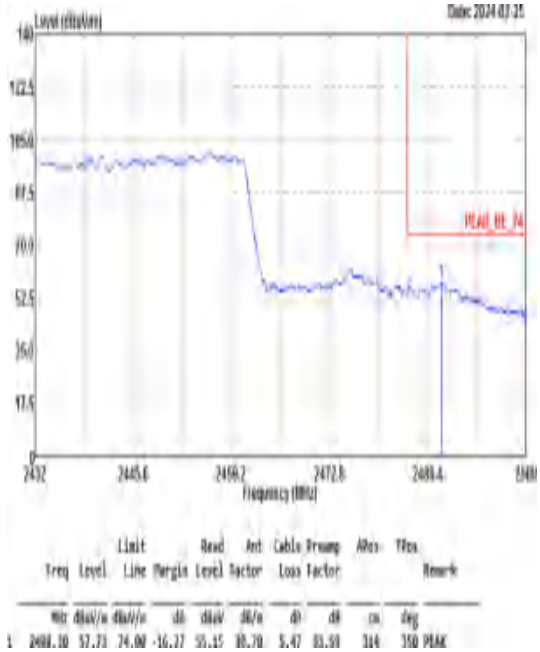
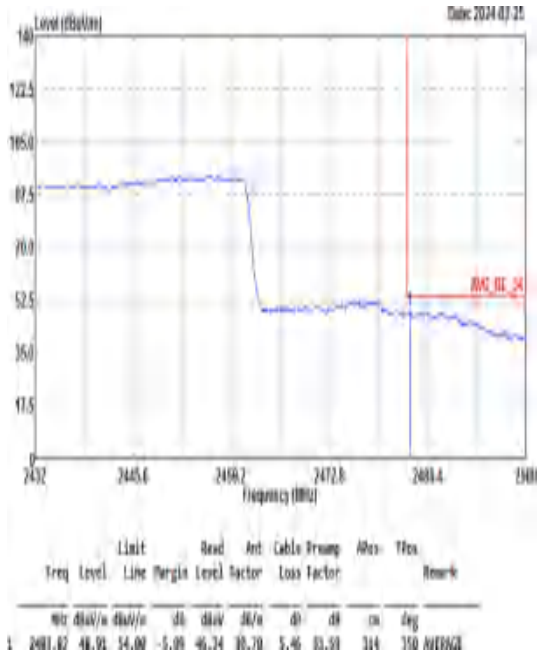
ANT	CDD 0+1	
Pol.	Horizontal	Fundamental
Peak		Blank
Avg		Blank

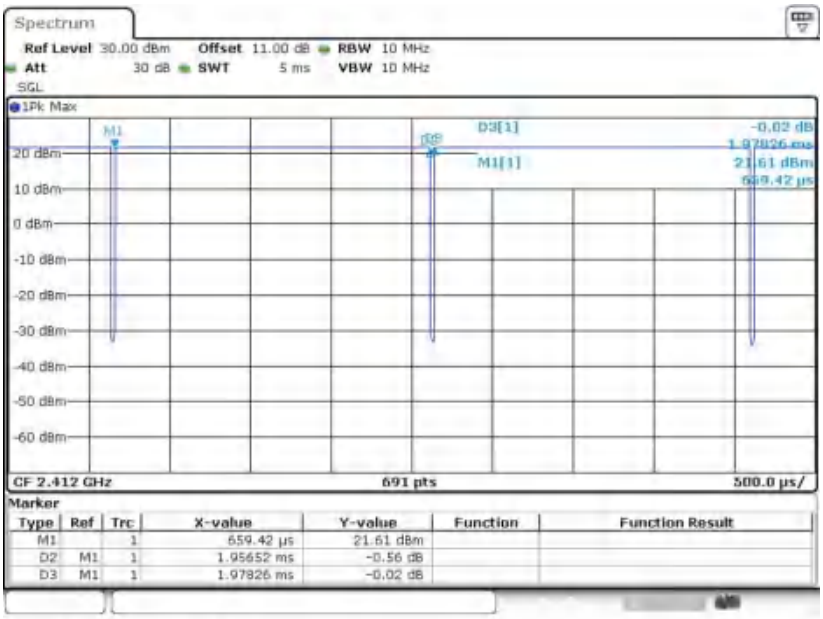
Mode	43	
	Band Edge - L	
	2400-2483.5_802.11ax HE40_CH07_2442MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		
Avg		

Mode	43	
	Band Edge - R	
	2400-2483.5_802.11ax HE40_CH07_2442MHz	
ANT	CDD 0+1	
Pol.	Vertical	Fundamental
Peak		Blank
Avg		Blank

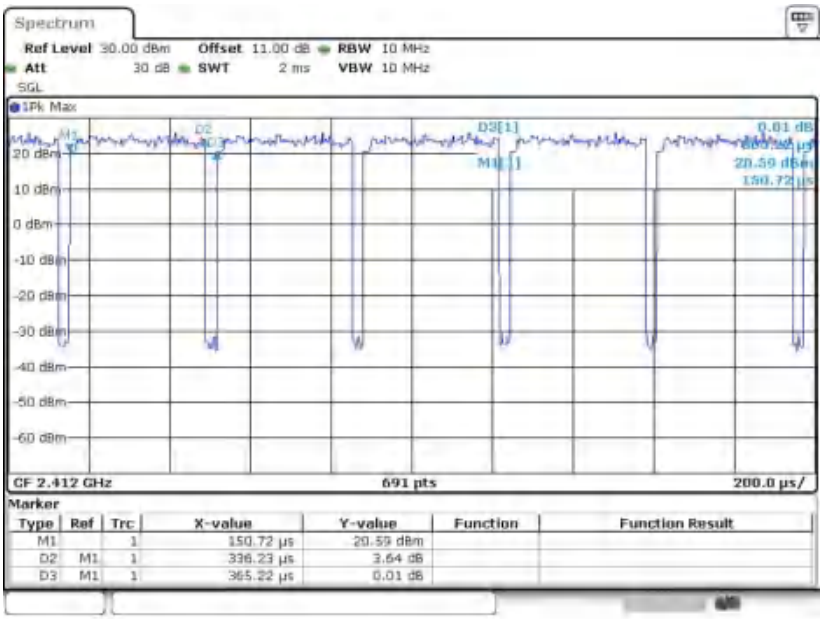
Appendix D. Duty Cycle Plots

Ant.	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
0/1	802.11b	98.90	-	-	10Hz
0/1	802.11g	92.06	0.3362	2.9742	3kHz
0/1	802.11n HT20	92.56	0.3246	3.0803	10kHz
0/1	802.11n HT40	86.43	0.1754	5.7026	10kHz
0/1	802.11ax HE20	91.35	0.2754	3.6316	10kHz
0/1	802.11ax HE40	85.72	0.1652	6.0525	10kHz

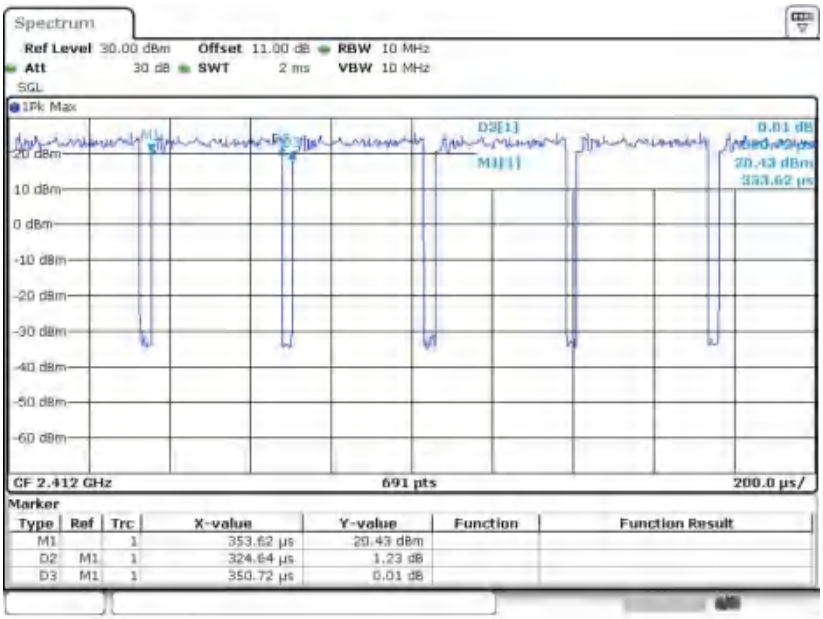
802.11b



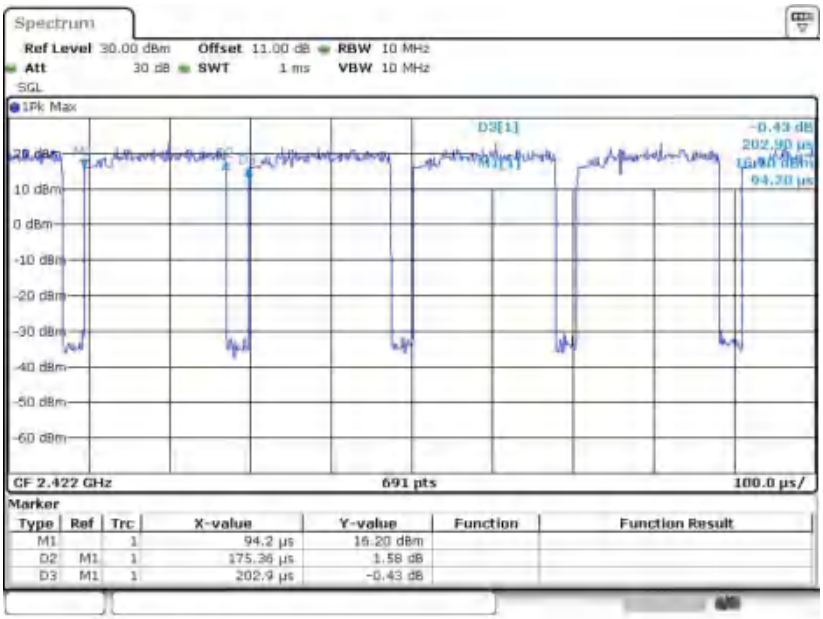
802.11g



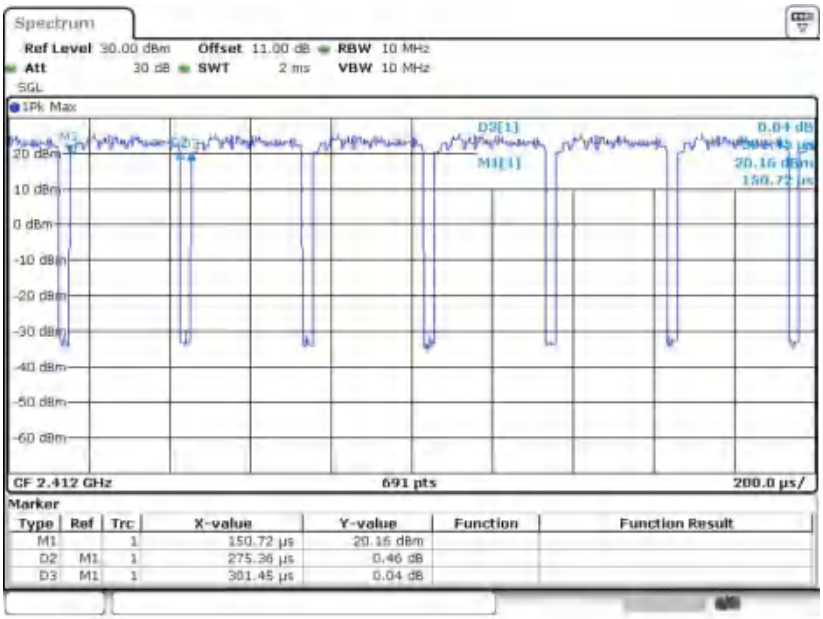
802.11n HT20



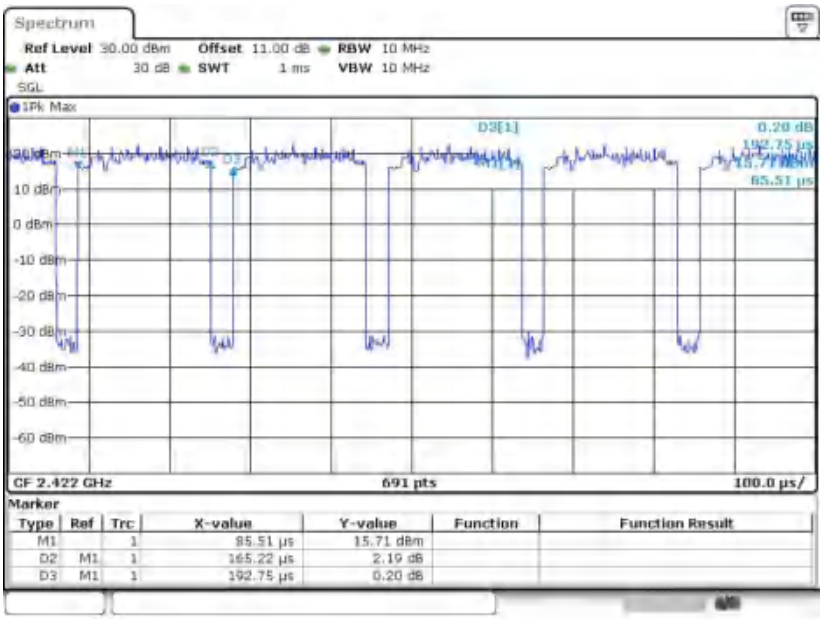
802.11n HT40



802.11ax HE20



802.11ax HE40



Appendix E. Setup Photographs

<AC Conducted Emission>

Mode 1

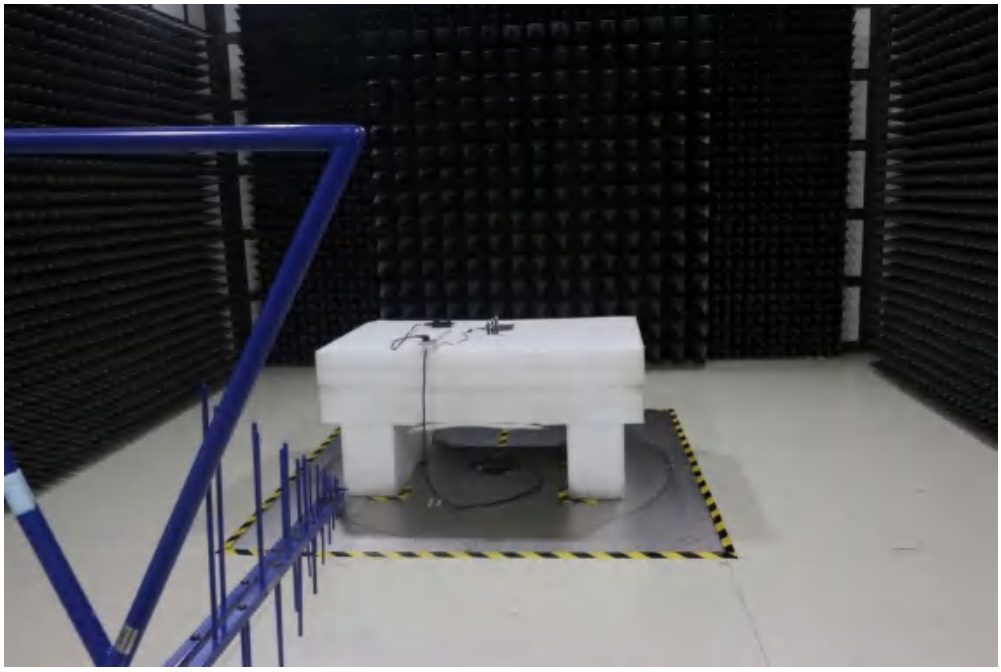
Remote View

Rear View

<Radiated Emission>

X Plane

LF



HF