Certificate #6613.01

FCC TEST REPORT

(Part 15, Subpart C)

Applicant:	HMD Global Oy
Address:	Bertel Jungin aukio 9,02600 Espoo,Finland

Manufacturer or Supplier:	HMD Global Oy
Address:	Bertel Jungin aukio 9,02600 Espoo,Finland
Product:	Mobile phone
Brand Name:	NOKIA
Model Name:	TA-1541
FCC ID:	2AJOTTA-1541
Date of tests:	Jan. 16, 2023 ~ Feb. 23, 2023

The tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 15, Subpart C, Section 15.247**

☒ **ANSI C63.10-2013**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Chao Wu	Approved by Peibo Sun
Engineer / Mobile Department	Manager / Mobile Department
Chao Wu	Sun Peibo
Date: Feb. 23, 2023	Date: Feb. 23, 2023

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P23010004-2RF06	Original release	Feb. 23, 2023

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**Test lab***
15.207	AC Power Conducted Emission	Compliance	A
15.205 15.209	Radiated Emissions	Compliance	A
15.247(d)	Out of band Emission Measurement	Compliance	A
15.247(a)(2)	6dB bandwidth	Compliance	A
15.247(b)	Conducted Output power	Compliance	A
15.247(e)	Power Spectral Density	Compliance	A
15.203	Antenna Requirement	Compliance	A

Note:

1.Except RSE，other data please refer to Appendix 1 (for WIFI-2.4G) and Appendix 2 (for BLE)

2. Only the worse data were report

3.This report refers to the data of W7L-P23010004-1RF04(model:TA-1536, FCC ID: 2AJOTTA-1536), the difference of TA-1536 and TA-1541 is TA-1541 change model name, TA-1536 is dual card, TA-1541 is single card, and functions are realized through softwareIn. This report verify CE worse case and replaces CE test data, other test data of this report is copied from the report W7L-P23010004-1RF04(model:TA-1536, FCC ID: 2AJOTTA-1536).

***Test Lab Information Reference**

Lab A:

Huarui 7Layers High Technology (Suzhou) Co., Ltd.

Lab Address:

Tower N, Innovation Center, 88 Zhuyi Road, High-tech District, Suzhou City, Anhui Province

Accredited Test Lab Cert 6613.01

The FCC Site Registration No. is 434559; The Designation No. is CN1325.

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	UNCERTAINTY
AC Power Conducted emissions	±2.70dB
Radiated emissions (30MHz~1GMHz)	±4.98dB
Radiated emissions (1GMHz ~6GMHz)	±4.70dB
Radiated emissions (6GMHz ~18GMHz)	±4.60dB
Radiated emissions (18GMHz ~40GMHz)	±4.12dB
Conducted emissions	±4.01dB
Occupied Channel Bandwidth	±43.58KHz
Conducted Output power	±2.06dB
Power Spectral Density	±0.85 dB

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

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile phone
BRAND NAME	NOKIA
MODEL NAME	TA-1541
NOMINAL VOLTAGE	5.0Vdc(adapter) 3.85Vdc (Li-ion, battery)
MODULATION	DSSS, OFDM, GFSK
TRANSMISSION RATE	802.11b: 11/ 5.5/ 2.0 / 1.0 Mbps 802.11g: 54/ 48/ 36 / 24 / 18 / 9/ 6 Mbps 802.11n20: up to 72.2 Mbps BT_LE: 1 Mbps
OPERATING FREQUENCY	2412-2462MHz for 11b/g/n(HT20) 2402-2480MHz for BT-LE(GFSK)
MAX. OUTPUT POWER	WLAN: 333.43mW (Maximum) BT-LE: 1.22mW (Maximum)
ANTENNA TYPE	PIFA Antenna with 1.2dBi gain
HW VERSION	SPR_S63Q0
SW VERSION	00WW_0_090
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB cable1: non-shielded cable, with w/o ferrite core, 1 meter USB cable2: non-shielded cable, with w/o ferrite core, 1 meter USB cable3: non-shielded cable, with w/o ferrite core, 1 meter Earphone: non-shielded cable, with w/o ferrite core, 1.2 meter

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. The EUT incorporates a SISO function. Physically, the EUT provides one transmitter and one receiver.

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX /1RX
802.11g	1TX /1RX
802.11n (20MHz)	1TX /1RX
BT_LE(1MHz)	1TX /1RX

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

4. The product of TA-1541(FCC ID: 2AJOTTA-1541) have version and components manufacturer from a second supplier. The first version is 090, the second one is 103, only the version changes, and the RF parameters do not change, components manufacturer with following changes as below:

NO.	Change Description		specificatons	first supplier	specificatons	second supplier
1	PCBA	64GB EMMC	FEMDNN064G-A3 A56 BWCTARV11X64G	Longsys	FEMDNN064G-A3 A56 BWCTARV11X64G	Biwin
2		2GB LPDDR	FLXC2002G-N2 BWMZEX32H2A-16G-X	Longsys	FLXC2002G-N2 BWMZEX32H2A-16G-X	Biwin
3		3GB LPDDR	FLXC4003G-50 BWMEXX32H2A-24Gb-X	Longsys	FLXC4003G-50 BWMEXX32H2A-24Gb-X	Biwin
4		4GB LPDDR	FLXC2004G-30 BWMZCX32H2A-32G-X	Longsys	FLXC2004G-30 BWMZCX32H2A-32G-X	Biwin
5		PCB	/	KINGSHINE	/	WUZHU
6	LCM	LCD	6.517 HKC，360min,400typ, 2.5D	TCL	6.517 BOE（B8），360min,400typ, 2.5D	Lian Chuang
7	Front camera	Camera	8M FF COM	Lian Heyingxiang	8M FF COM	Shijia
8	Rear camera	Camera	13M-AF COB	Lian Heyingxiang	13M-AF COB	Ruicheng

9	Macro CAM	Camera	2M FF	Shijia	2M FF	Lian Heying xiang
10	fingerprint	module	Back fingerprint	Hedayuan	Back fingerprint	Sanyin gxin
11	Speaker		1712 1W	Dong Sheng	1712 1W	Xin Rongd a
12	Vibrator		1027 FPC	Kai Long	1027 FPC	Chao Yin
13	Receiver		0809	Dong Sheng	0809	Xin Rongd a
14	FPC		/	Lante	/	Kaihon gxing
15	Battery		5000MAH	Gaoyuan	5000MAH	Feng Hua
16	Data cable		2A typeC	Yuwei	2A typeC	Juwei

List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
LCD Panel 1	HKC	MianYang HKC Optoelectronics Technology Co., Ltd.	QM065HS03-1	6.517
LCD Panel 2	BOE	BOE	BV065WBQ-L1B	6.517
Battery 1	Nokia	Guangdong Fenghua New Energy Co.,Ltd.	WT510	Capacity：3.85 Vdc, 4900mAh
Battery 2	Nokia	HUNAN GAOYUAN BATTERY Co., Ltd.	WT510	Capacity：3.85 Vdc, 4900mAh
AC Adapter	Nokia	SHENZHEN BAIJUNDA ELECTRONICS.,LTD	AD-010U	I/P: 100-240Vac, 0.35A, O/P: 5.0Vdc, 2.0A
Earphone	Juwei Electronics Co., LTD	Juwei Electronics Co., LTD	JWEP1252-H21H	Signal Line, 1.2meter
USB Cable 1	Juwei Electronics Co., LTD	Juwei Electronics Co., LTD	JWUB1536-H21H	Signal Line, 1.0meter
USB Cable 2	Yu Wei	Dongguan Yuwei Electronic Technology Co., Ltd.	CH2212TC	Signal Line, 1.0meter
USB Cable 3	Sai bao	Saibao (Jiangxi) Industrial Co., Ltd	SHM1-A003A	Signal Line, 1.0meter

2.2 DESCRIPTION OF TEST MODES

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

40 channels are provided for BT-LE (GFSK):

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

2.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photographs of the test configuration for reference.

2.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.
The worst case was found when positioned on Y axis for radiated emission. Following test modes were selected for the final test, and the final worst case is marked in boldface and recorded in the report:

EUT CONFIGURE MODE	APPLICABLE TO				MODE
	RE<1G	RE≥1G	PLC	APCM	
-	√	√	√	√	-

Where **RE<1G:** Radiated Emission below 1GHz **RE≥1G:** Radiated Emission above 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: No need to concern of Conducted Emission due to the EUT is powered by battery.

RADIATED EMISSION TEST (BELOW 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11b	1 to 11	6	OFDM	MCS0
BT-LE	0 to 39	19	GFSK	1.0

RADIATED EMISSION TEST (ABOVE 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1.0
802.11g	1 to 11	1, 6, 11	OFDM	6.0
802.11n HT20	1 to 11	1, 6, 11	OFDM	MCS0
BT-LE	0 to 39	0,19, 39	GFSK	1

POWER LINE CONDUCTED EMISSION TEST

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11n HT20	1 to 11	6	OFDM	MCS0

BANDEDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1.0
802.11g	1 to 11	1, 6, 11	OFDM	6.0
802.11n HT20	1 to 11	1, 6, 11	OFDM	MCS0
BT-LE	0 to 39	0,19, 39	GFSK	1

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1.0
802.11g	1 to 11	1, 6, 11	OFDM	6.0
802.11n HT20	1 to 11	1, 6, 11	OFDM	MCS0
BT-LE	0 to 39	0,19, 39	GFSK	1

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	23deg. C, 70%RH	DC 5V By Adapter	Chao Wu
RE≥1G	23deg. C, 70%RH	DC 5V By Adapter	Chao Wu
PLC	25deg. C, 52%RH	DC 5V By Adapter	Chao Wu
APCM	25deg. C, 60%RH	DC 3.85V By Battery	Chao Wu

2.3 Duty Cycle of Test Signal

Please Refer to Appendix1/2 Of this test report.

WORST-CASE DATA:

Measured Duty Cycle		
Mode		Duty Cycle [%]
		ANT0+1
WIFI 2.4GHz	11B	99.52
	11G	97.49
	11N20	96.59
BT LE	BT4.0	86.98

Note:

Duty cycle of test signal is < 98%, duty factor shall be considered.

2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C, Section 15.247

KDB 558074 D01 DTS Meas Guidance v05r02

ANSI C63.10-2013

Note：

1. All test items have been performed and recorded as per the above standards.
2. The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Certification). The test report has been issued separately.

2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

3 TEST TYPES AND RESULTS

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

NOTE: 1.The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	102749	Feb.25,22	Feb.24,24
ELEKTRA test software	Rohde&Schwarz	ELEKTRA	NA	N/A	N/A
LISN network	Rohde&Schwarz	ENV216	102640	Feb.17,22	Feb.16,24
CABLE	Rohde&Schwarz	W61.01	N/A	Oct.31,22	Apr.29,23
CABLE	Rohde&Schwarz	W601	N/A	Oct.31,22	Apr.29,23

NOTE:

1. The test was performed in CE shielded room.
2. The calibration interval of the above test instruments is 6 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

3.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

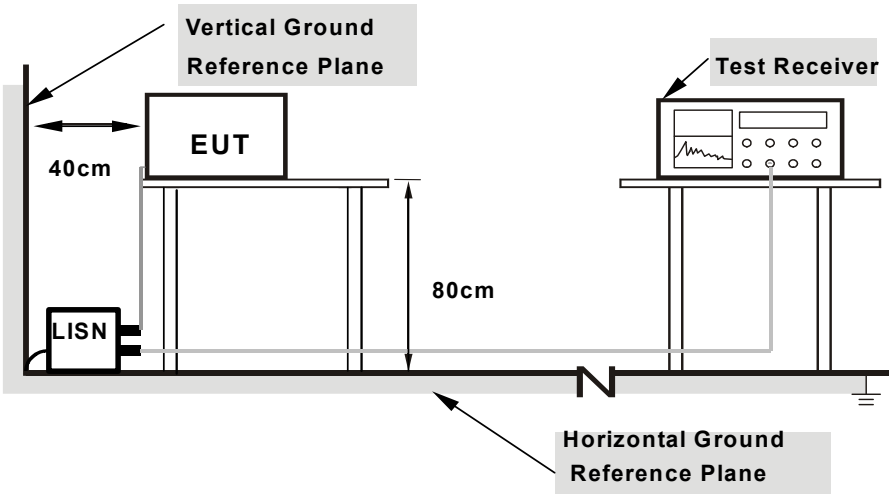
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation.

3.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.1.6 EUT OPERATING CONDITIONS

a. Turned on the power and connected of all equipment.
b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

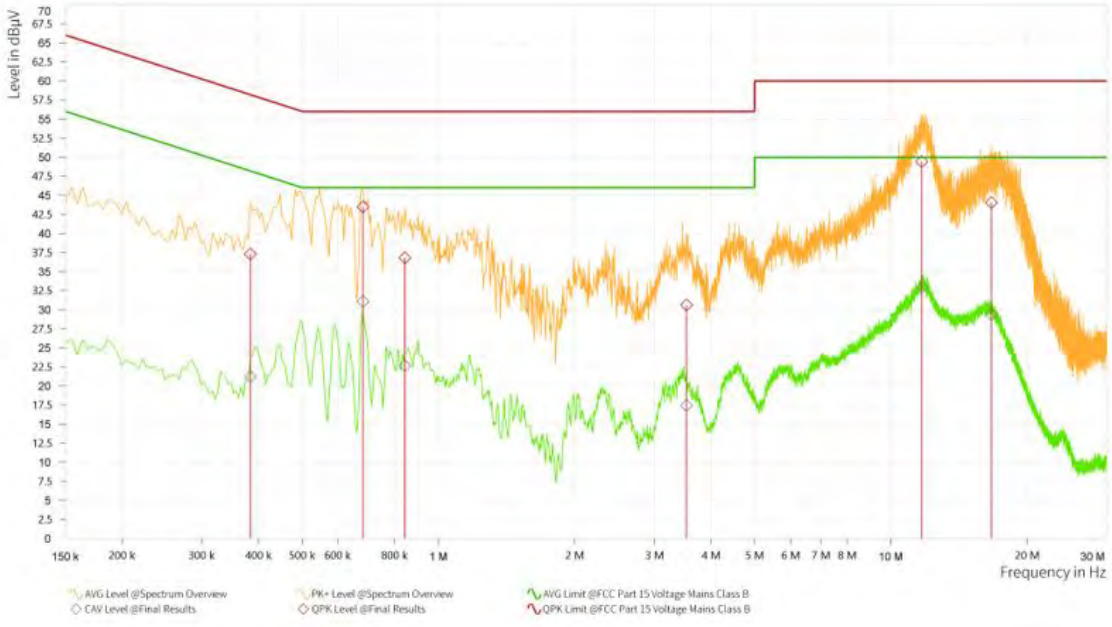
3.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA:

Frequency Range	150KHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25deg. C, 55%RH
Tested By	Chao Wu		

Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.384	37.31	58.19	20.88	21.21	48.19	26.98	10.01	L1	9.000
1	0.681	43.51	56.00	12.49	31.10	46.00	14.90	9.99	L1	9.000
1	0.843	36.81	56.00	19.19	22.65	46.00	23.35	9.92	L1	9.000
1	3.534	30.59	56.00	25.41	17.45	46.00	28.55	9.79	L1	9.000
1	11.702	49.40	60.00	10.60	32.90	50.00	17.10	9.98	L1	9.000
1	16.692	44.05	60.00	15.95	29.33	50.00	20.67	10.08	L1	9.000

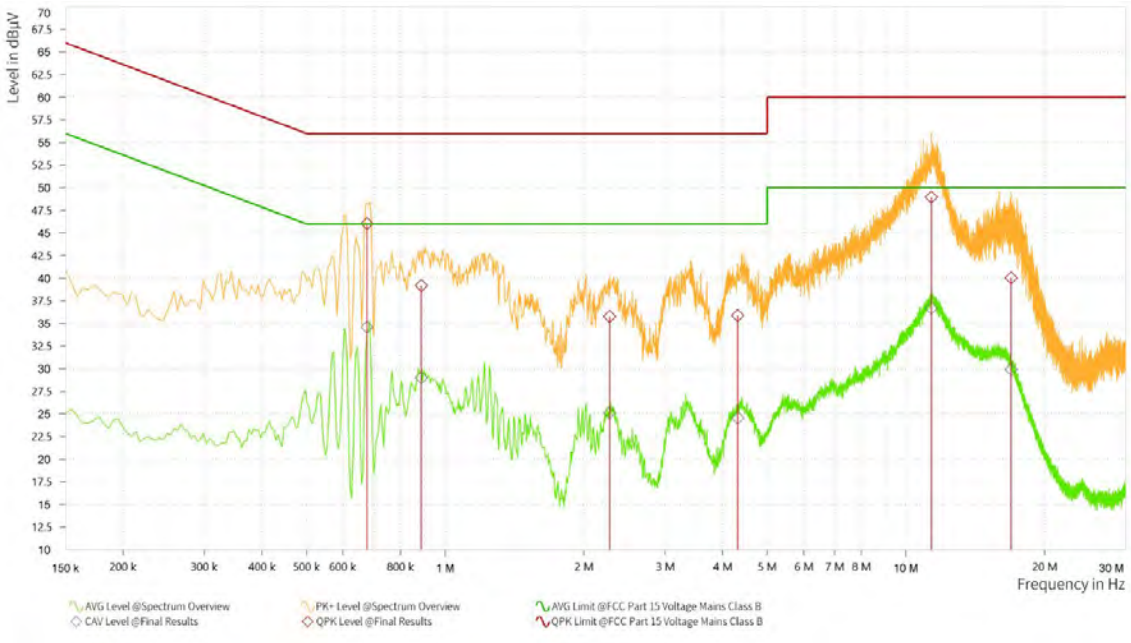
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Limit value -Emission level
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



Frequency Range	150KHz ~ 30MHz	**Detector Function & Resolution Bandwidth**	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120Vac, 60Hz	**Environmental Conditions**	25deg. C, 55%RH
Tested By	Chao Wu		

Rg	Frequency [MHz]	QPK Level [dBµV]	QPK Limit [dBµV]	QPK Margin [dB]	CAV Level [dBµV]	CAV: AVG Limit [dBµV]	CAV Margin [dB]	Correction [dB]	Line	Meas. BW [kHz]
1	0.677	46.04	56.00	9.96	34.60	46.00	11.40	10.00	N	9.000
1	0.888	39.19	56.00	16.81	28.99	46.00	17.01	9.91	N	9.000
1	2.274	35.76	56.00	20.24	25.13	46.00	20.87	9.78	N	9.000
1	4.313	35.86	56.00	20.14	24.56	46.00	21.44	9.81	N	9.000
1	11.360	48.95	60.00	11.05	36.70	50.00	13.30	10.00	N	9.000
1	16.935	40.05	60.00	19.95	29.93	50.00	20.07	10.14	N	9.000

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Limit value -Emission level
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

FREQUENCIES (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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Pre-Amplifier	R&S	SCU18F1	100815	Aug.30,22	Aug.29,23
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,23
Signal Generator	R&S	SMB100A	182185	Feb.16,22	Fed.15,23
Signal Generator	R&S	SMB100A	182185	Feb.15,23	Fed.14,24
3m Fully-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-01Chamber	Nov.12,22	Nov.11,24
3m Semi-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-02Chamber	Nov.12,22	Nov.11,24
EMI TEST Receiver	R&S	ESW44	101973	Feb.25,22	Feb.24,23
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Feb.28,22	Feb.27,23
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,22	Aug.21,23
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.23,22	Feb.22,23
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.22,23	Feb.21,24
Horn Antenna	Steatite Q-par Antennas	QMS 00208	23485	Aug.22,22	Aug.21,23
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.23,22	Feb.22,23
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.22,23	Feb.21,24
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.27,22	Jun.26,23
Test Software	ELEKTRA	ELEKTRA4.32	N/A	N/A	N/A
Open Switch and Control Unit	R&S	OSP220	101964	N/A	N/A
DC Source	HYELEC	HY3010B	551016	Aug.31,22	Aug.30,23
Hygrothermograph	DELI	20210528	SZ014	Sep.06,22	Sep.05,23
PC	LENOVO	E14	HRSW0024	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-7.00M	N/A	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-4.00M	N/A	N/A	N/A
CABLE	R&S	W13.02	N/A	Oct.31,22	Apr.29,23
CABLE	R&S	W12.14	N/A	Oct.31,22	Apr.29,23

NOTE: 1. The calibration interval of the above test instruments is 6 months or 24 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in 3m Chamber.

3. The FCC Site Registration No. is 525120; The Designation No. is CN1171.

3.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

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

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

Note:

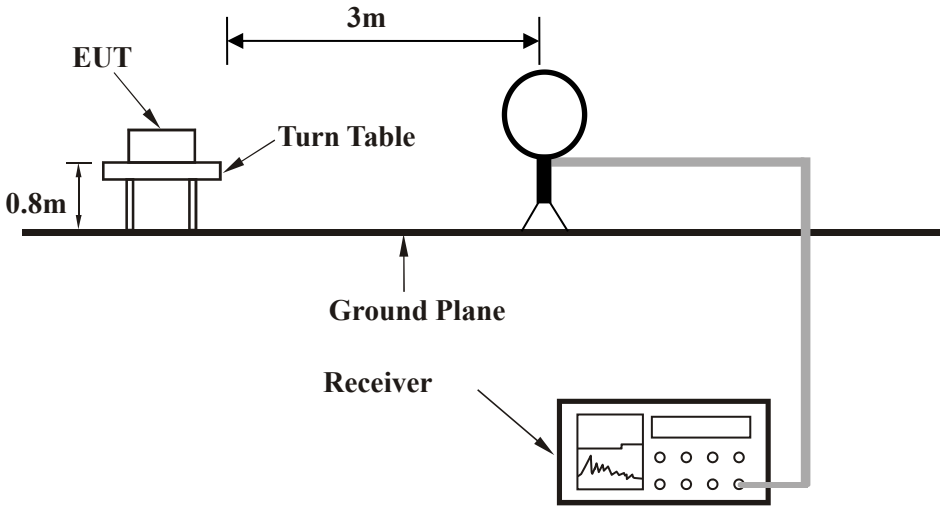
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

3.2.4 DEVIATION FROM TEST STANDARD

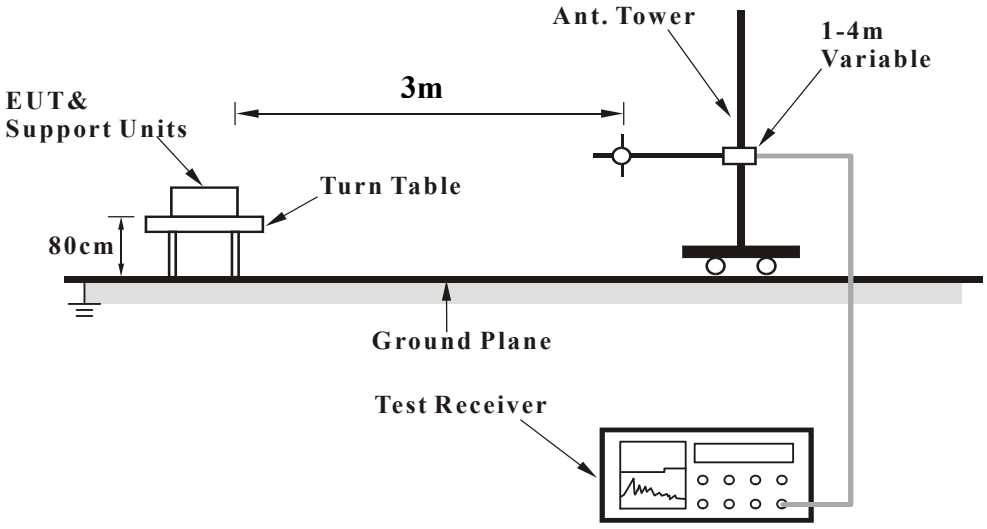
No deviation

3.2.5 TEST SETUP

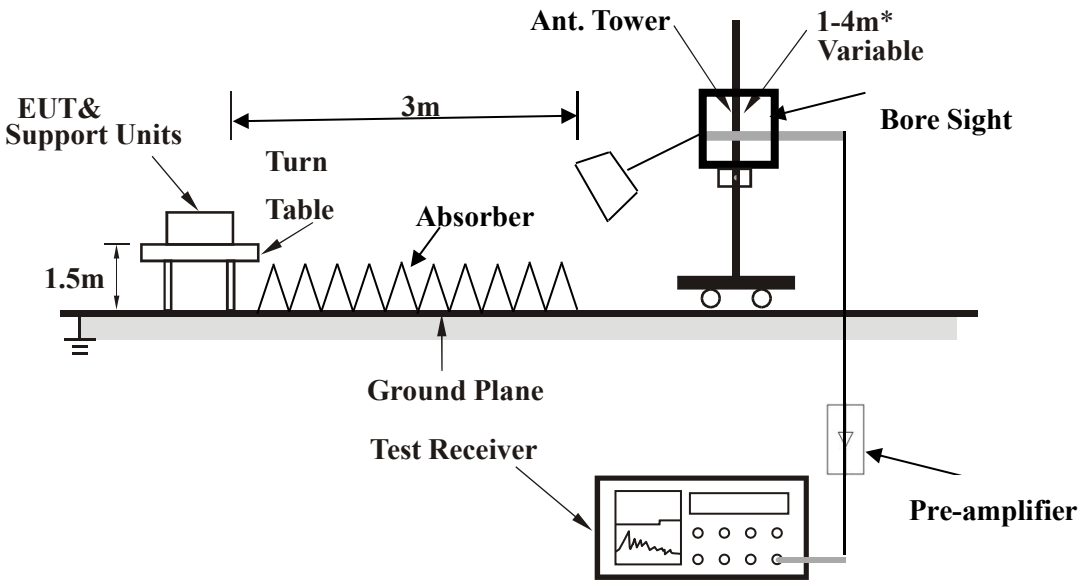
<Frequency Range 9KHz~30MHz >



< Frequency Range 30MHz~1GHz >



<Frequency Range above 1GHz>



Note: Above 1G is a directional antenna

Depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.2.6 EUT OPERATING CONDITIONS

a. Set the EUT under full load condition and placed them on a testing table.

b. Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

c. The necessary accessories enable the EUT in full functions.

3.2.7 TEST RESULTS

NOTE : The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

BELOW 1GHz WORST-CASE DATA:

30 MHz – 1GHz data:

802.11b

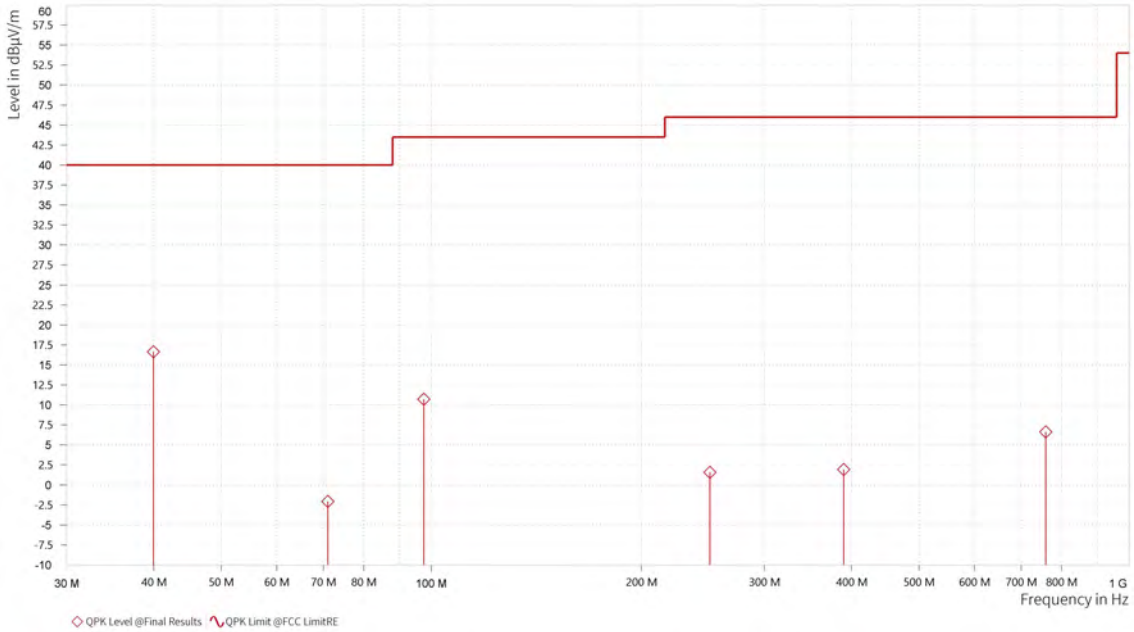
CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	39.943	16.65	40.00	23.35	-18.43	H	8.9	1	120.000
1	71.031	-2.07	40.00	42.07	-24.25	H	251.6	2	120.000
1	97.561	10.71	43.50	32.79	-21.46	H	355	2	120.000
1	250.772	1.58	46.00	44.42	-23.18	H	251.6	2	120.000
1	389.919	1.93	46.00	44.07	-20.05	H	144.2	2	120.000
1	759.392	6.63	46.00	39.37	-14.37	H	359.1	1	120.000

REMARKS:

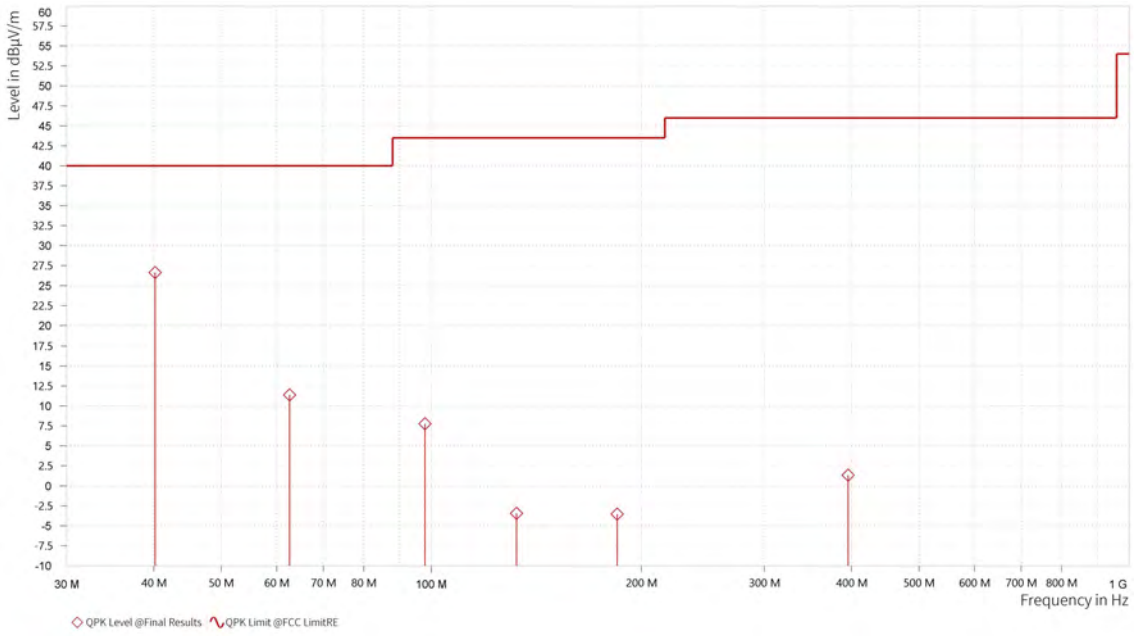
1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.



CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	40.185	26.63	40.00	13.37	-18.29	V	217.6	1	120.000
1	62.641	11.39	40.00	28.61	-19.72	V	217.6	1	120.000
1	97.900	7.76	43.50	35.74	-21.37	V	0.9	2	120.000
1	132.384	-3.46	43.50	46.96	-25.32	V	217.6	1	120.000
1	184.667	-3.54	43.50	47.04	-24.76	V	250.7	2	120.000
1	395.690	1.33	46.00	44.67	-20.50	V	5	1	120.000



REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.

ABOVE 1GHz WORST-CASE DATA:

Note: 1. For radiated emissions testing，the full testing range of different modes have been scanned，only the worst case harmonic data is reported in the sheet.

2. All other emissions were greater than 20dB below the limit was not recorded

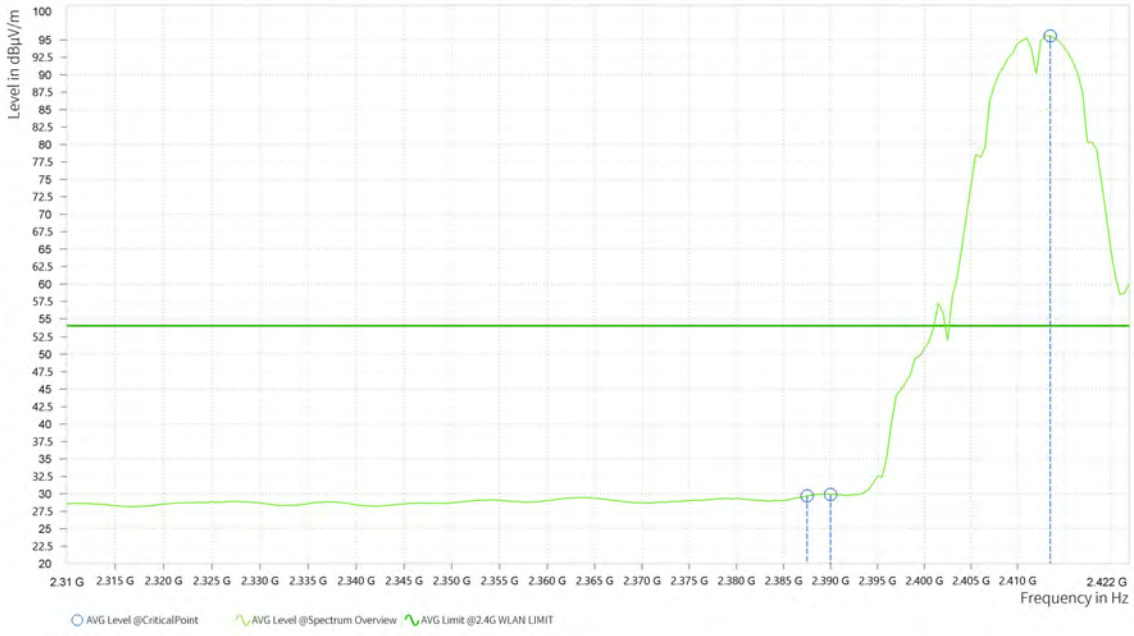
802.11b:

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,388.000	45.54	74.00	28.46	9.82	H	1	1
1	2,390.000	43.51	74.00	30.49	9.84	H	203.9	2
1	2,413.500	102.54			9.87	H	250.4	2

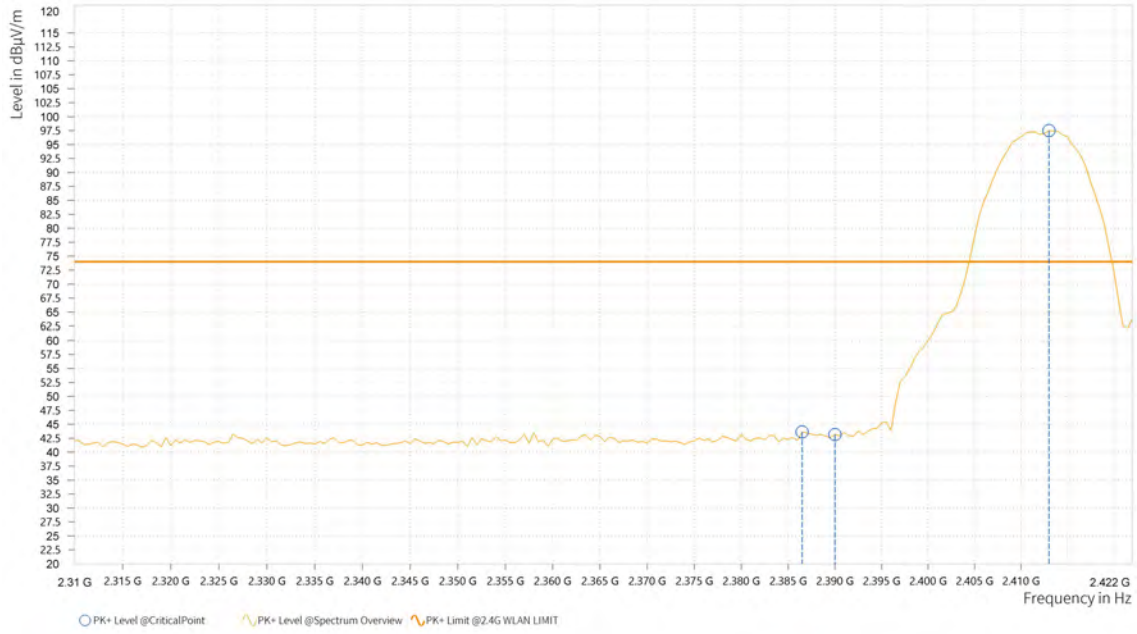
Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,387.500	29.70	54.00	24.30	9.82	H	7.3	1
1	2,390.000	29.91	54.00	24.09	9.84	H	7.3	1
1	2,413.500	95.57			9.87	H	7.3	1



CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,386.500	43.61	74.00	30.39	9.81	V	87.9	1
1	2,390.000	43.16	74.00	30.84	9.84	V	178.7	2
1	2,413.000	97.52			9.87	V	181.1	1



Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,387.500	29.64	54.00	24.36	9.82	V	0.9	2
1	2,390.000	29.84	54.00	24.16	9.84	V	5.1	1
1	2,411.000	86.58			9.87	V	0.9	2

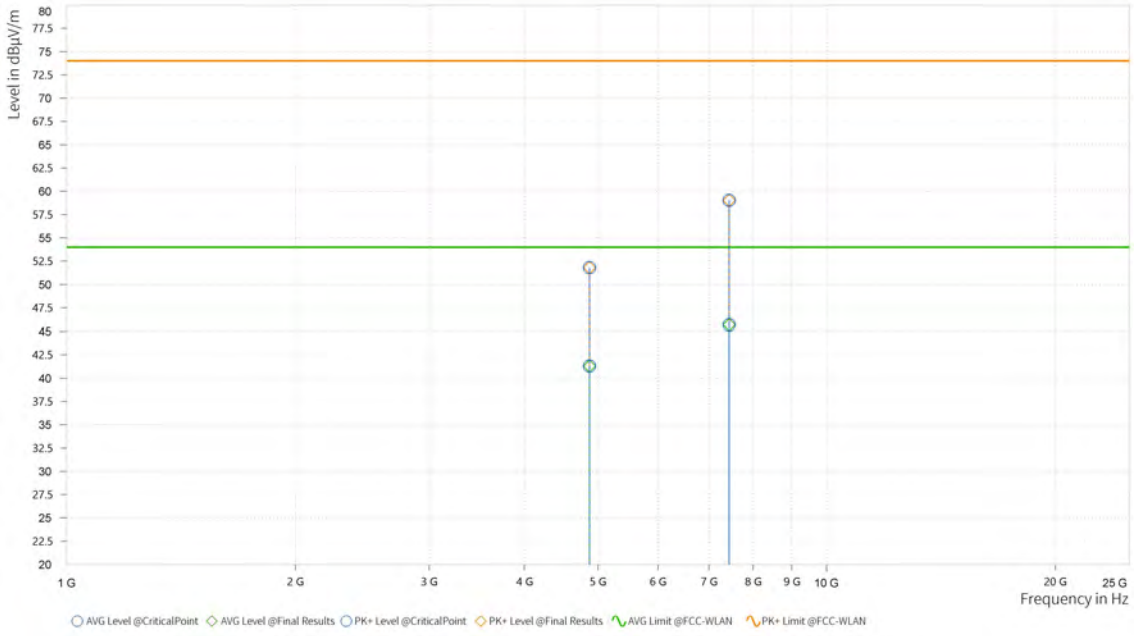
REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level..
2. 2412MHz: Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

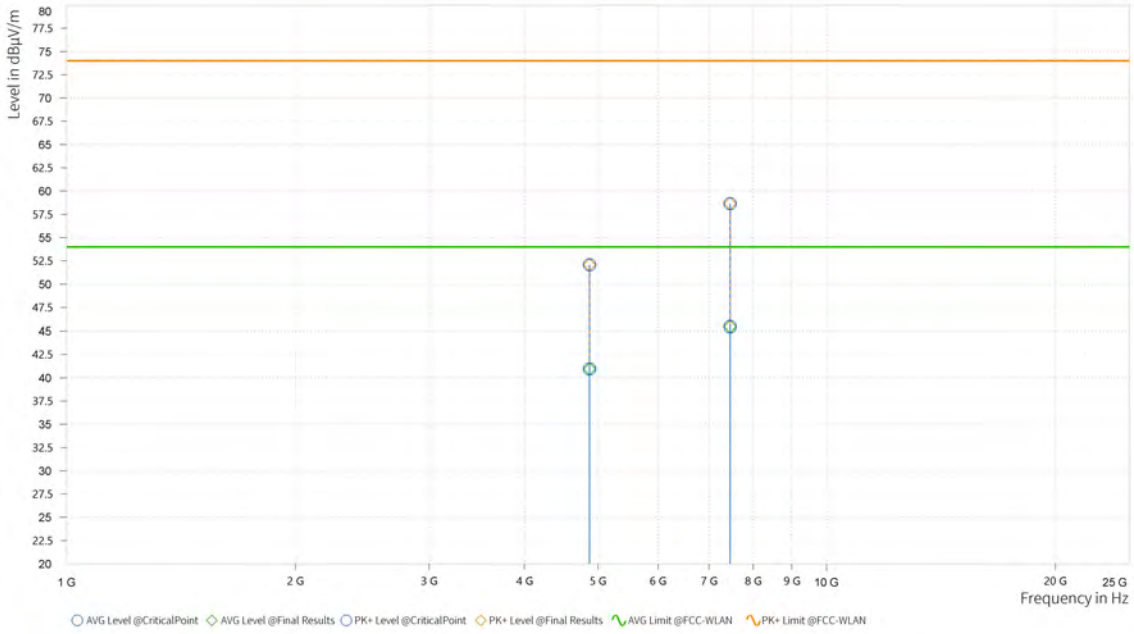
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,873.721	51.81	74.00	22.19	41.30	54.00	12.70	15.94	H	1	1
4	7,441.125	59.02	74.00	14.98	45.68	54.00	8.32	23.91	H	359.1	1



CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,874.206	52.07	74.00	21.93	40.95	54.00	13.05	15.94	V	125	2
4	7,461.525	58.64	74.00	15.36	45.46	54.00	8.54	23.82	V	1	2



REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
   2. 2437MHz: Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

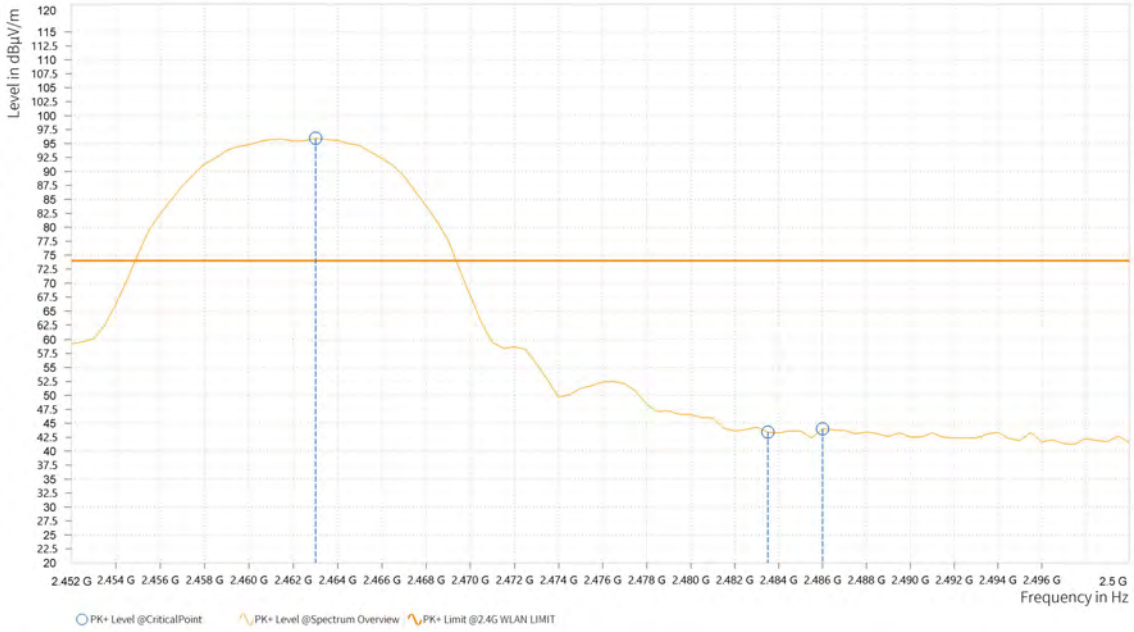
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,463.000	102.11			9.96	H	225.4	2
1	2,483.500	45.60	74.00	28.40	9.88	H	225.4	2
1	2,484.000	46.61	74.00	27.39	9.88	H	249.3	2

Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,463.500	92.82			9.96	H	4.5	1
1	2,483.500	32.99	54.00	21.01	9.88	H	4.5	1
1	2,484.000	31.25	54.00	22.75	9.88	H	4.5	1

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,463.000	95.94			9.96	V	205.1	1
1	2,483.500	43.42	74.00	30.58	9.88	V	317.3	2
1	2,486.000	44.00	74.00	30.00	9.87	V	152.3	2



Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,461.000	88.50			9.97	V	4.6	1
1	2,483.500	30.38	54.00	23.62	9.88	V	355.4	2
1	2,484.000	30.03	54.00	23.97	9.88	V	355.4	2

REMARKS:

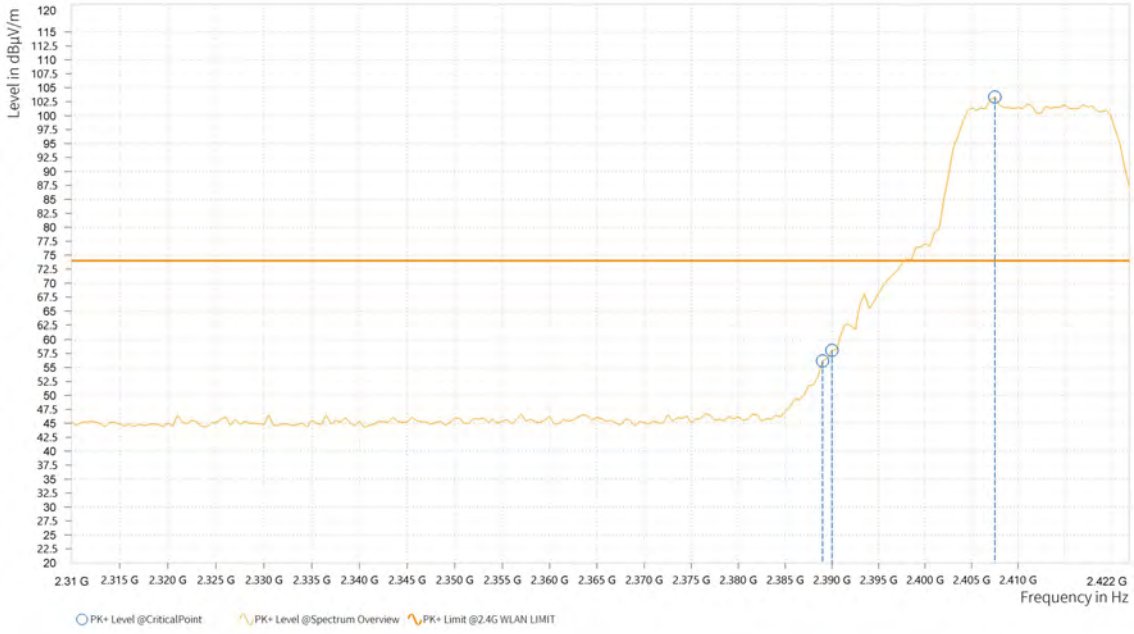
1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2462MHz: Fundamental frequency.

802.11g

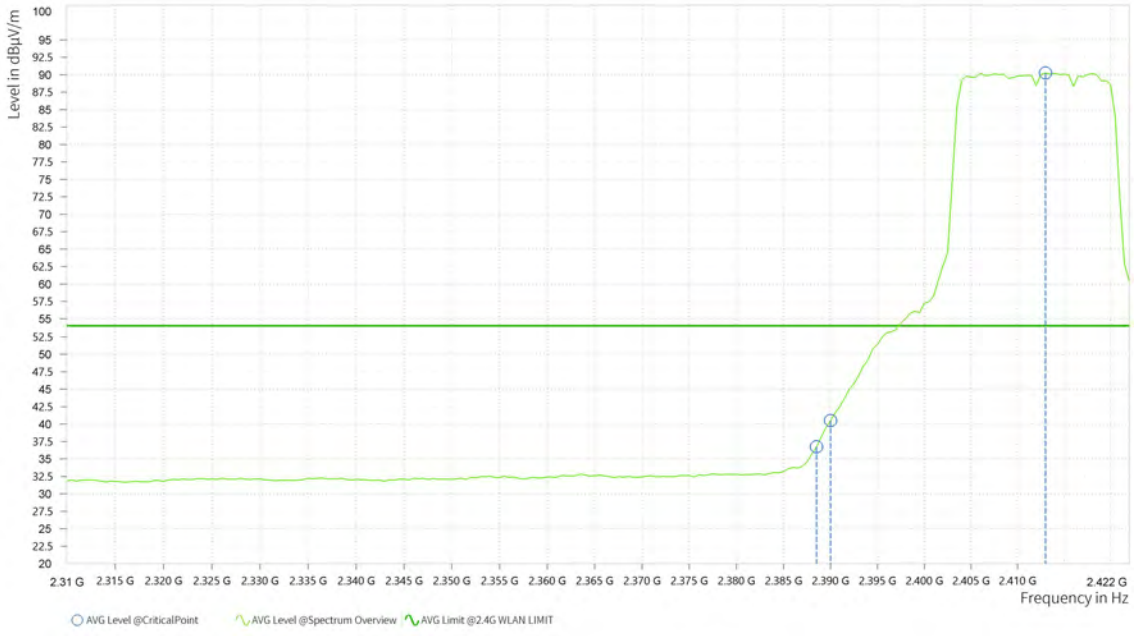
CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,389.000	56.19	74.00	17.81	9.83	H	158.4	1
1	2,390.000	58.07	74.00	15.93	9.84	H	200.3	2
1	2,407.500	103.34			9.86	H	200.3	2



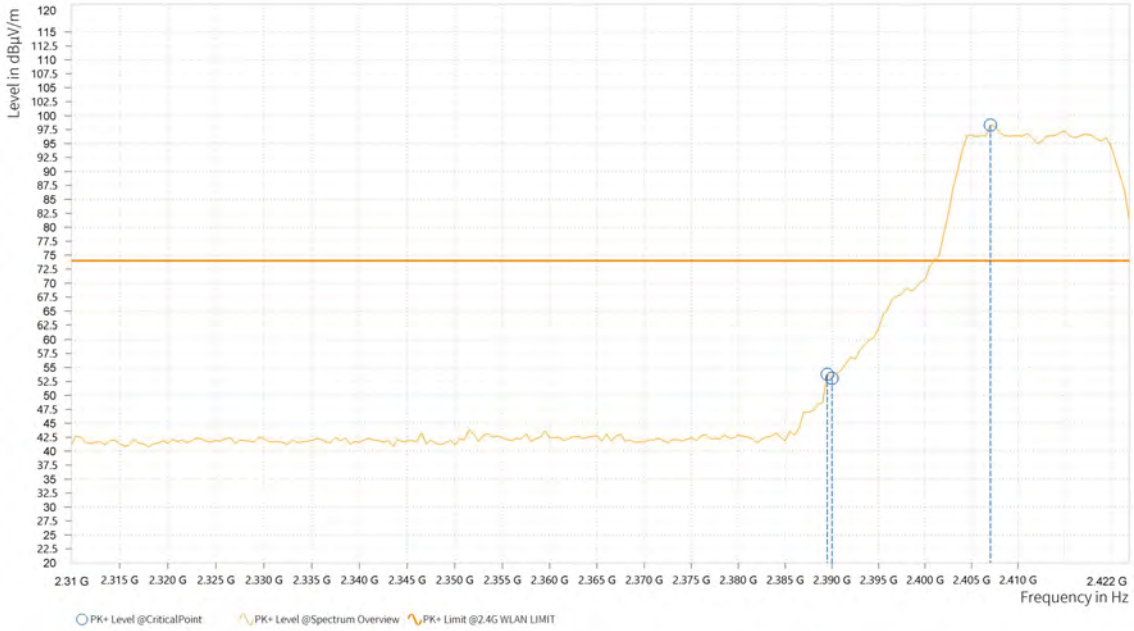
Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,388.500	36.74	54.00	17.26	9.83	H	254	2
1	2,390.000	40.52	54.00	13.48	9.84	H	254	2
1	2,413.000	90.26			9.87	H	254	2



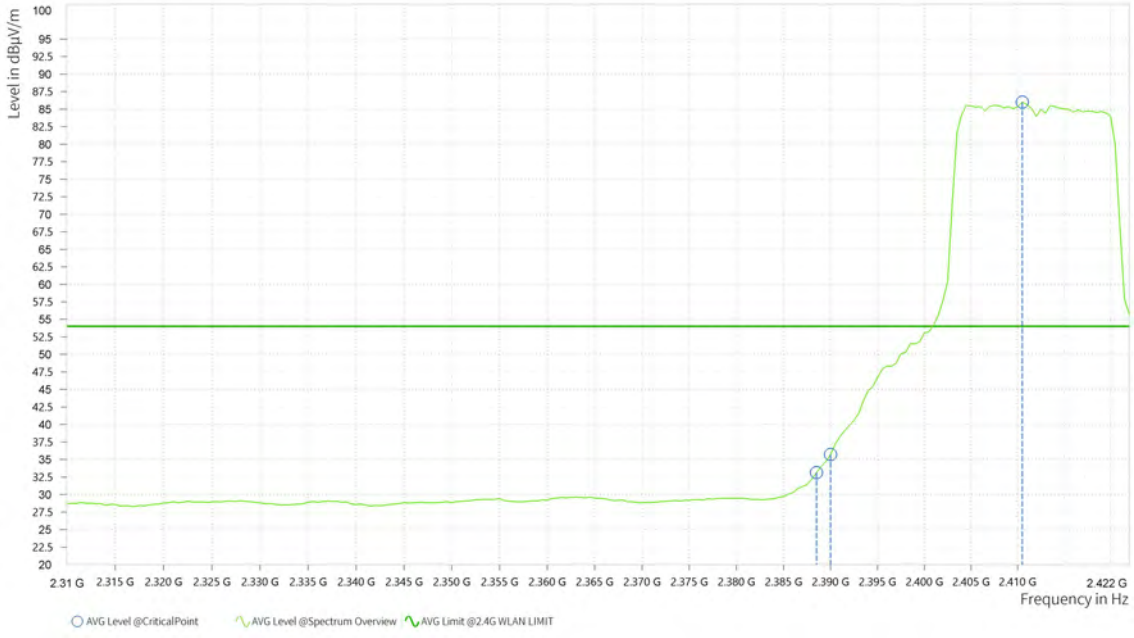
CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,389.500	53.79	74.00	20.21	9.83	V	137	1
1	2,390.000	53.05	74.00	20.95	9.84	V	137	1
1	2,407.000	98.30			9.86	V	159.6	1



Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,388.500	33.12	54.00	20.88	9.83	V	140.6	1
1	2,390.000	35.72	54.00	18.28	9.84	V	140.6	1
1	2,410.500	86.02			9.86	V	140.6	1



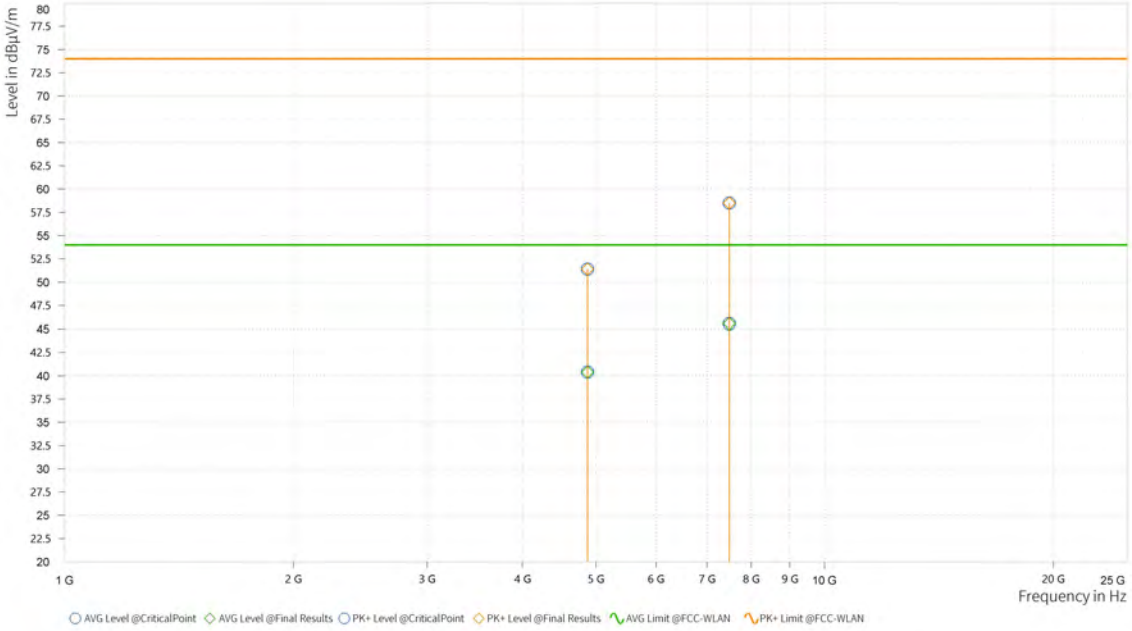
REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2412MHz: Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

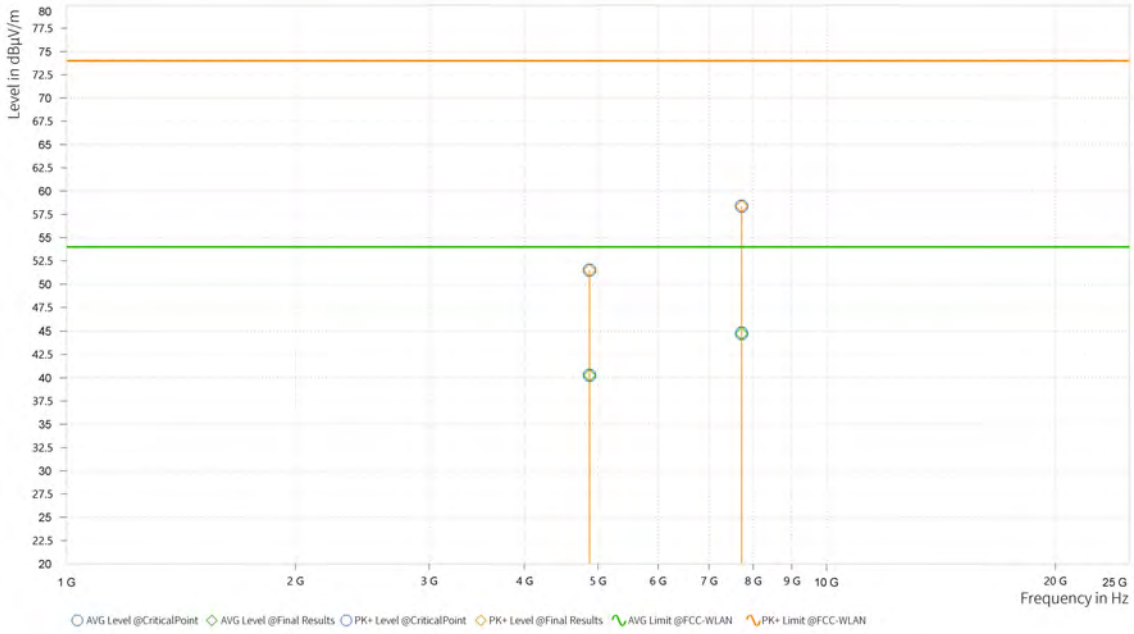
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,874.206	51.40	74.00	22.60	40.39	54.00	13.61	15.94	H	359	2
4	7,488.725	58.50	74.00	15.50	45.54	54.00	8.46	23.87	H	12.6	2



CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,874.206	51.50	74.00	22.50	40.27	54.00	13.73	15.94	V	0.9	2
4	7,726.725	58.37	74.00	15.63	44.76	54.00	9.24	24.24	V	0.9	2



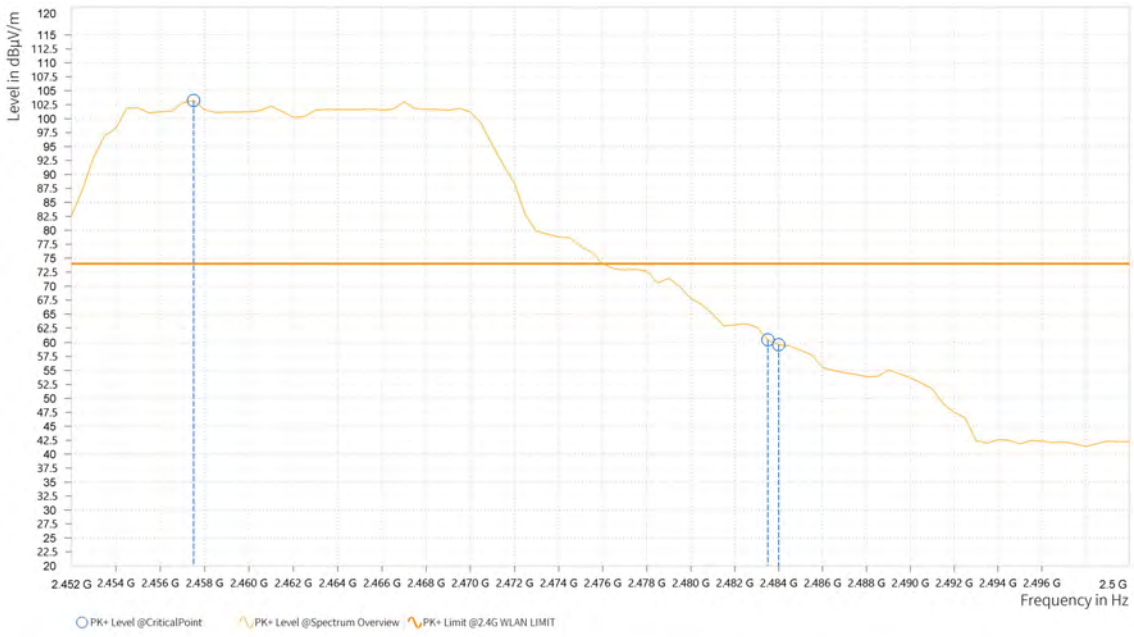
REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2437MHz: Fundamental frequency.

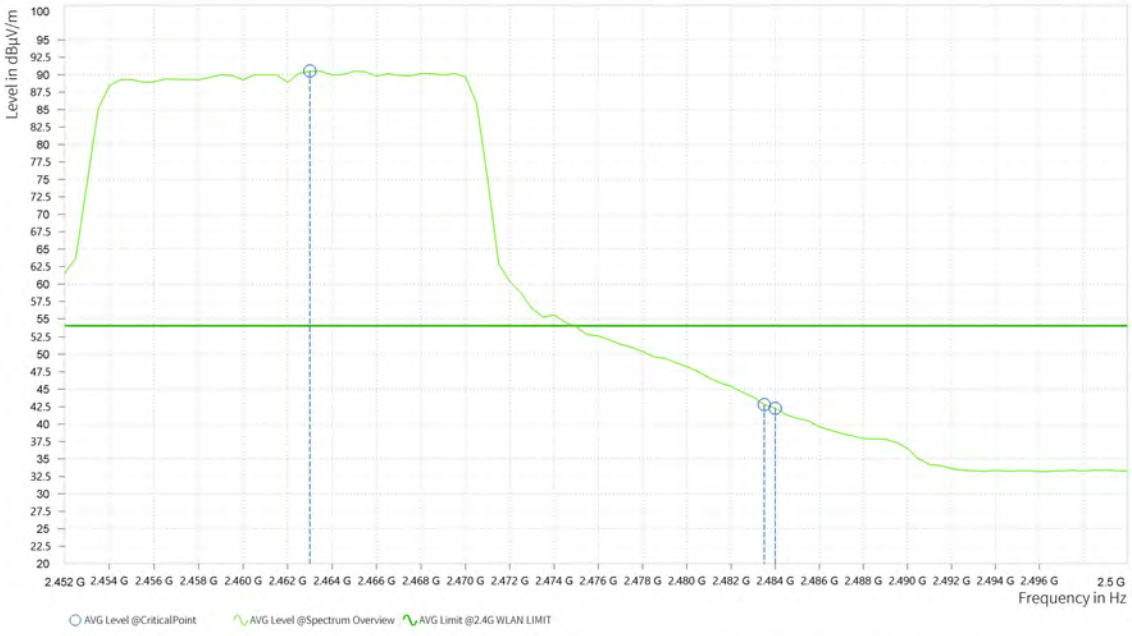
CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,457.500	103.26			9.97	H	221.7	2
1	2,483.500	60.49	74.00	13.51	9.88	H	221.7	2
1	2,484.000	59.61	74.00	14.39	9.88	H	221.7	2



Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,463.000	90.52			9.96	H	143	1
1	2,483.500	42.79	54.00	11.21	9.88	H	143	1
1	2,484.000	42.27	54.00	11.73	9.88	H	143	1



CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,457.500	97.07			9.97	V	137	1
1	2,483.500	54.81	74.00	19.19	9.88	V	160.8	1
1	2,485.000	54.14	74.00	19.86	9.88	V	160.8	1

Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,467.000	83.63			9.95	V	141.8	1
1	2,483.500	38.08	54.00	15.92	9.88	V	141.8	1
1	2,484.000	37.38	54.00	16.62	9.88	V	141.8	1

REMARKS:

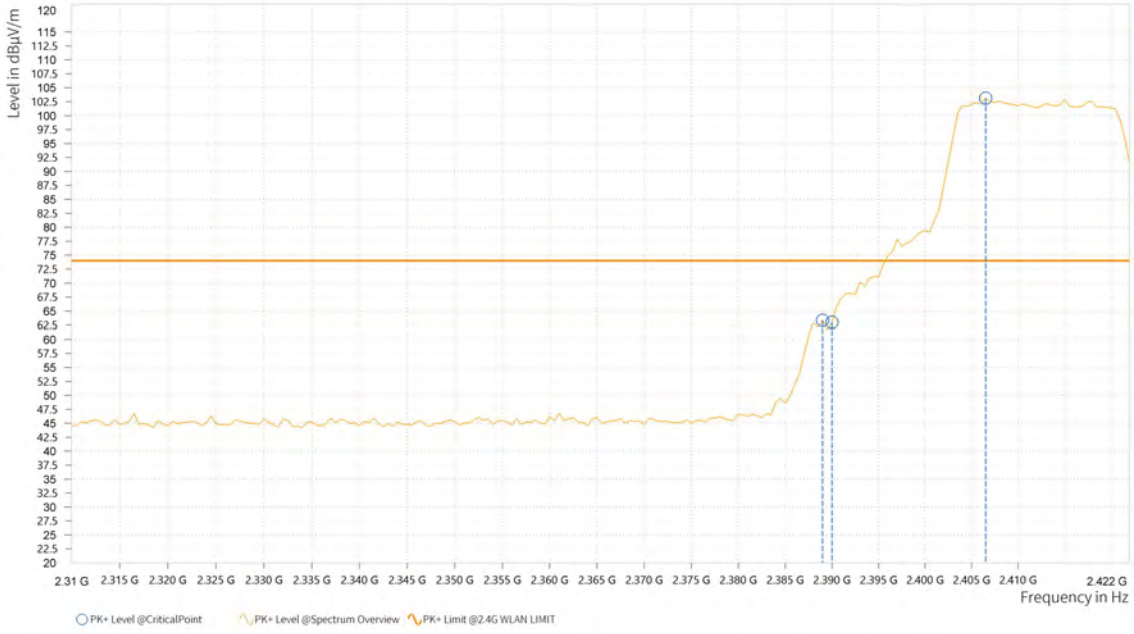
1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2462MHz: Fundamental frequency.

802.11n (20MHz)

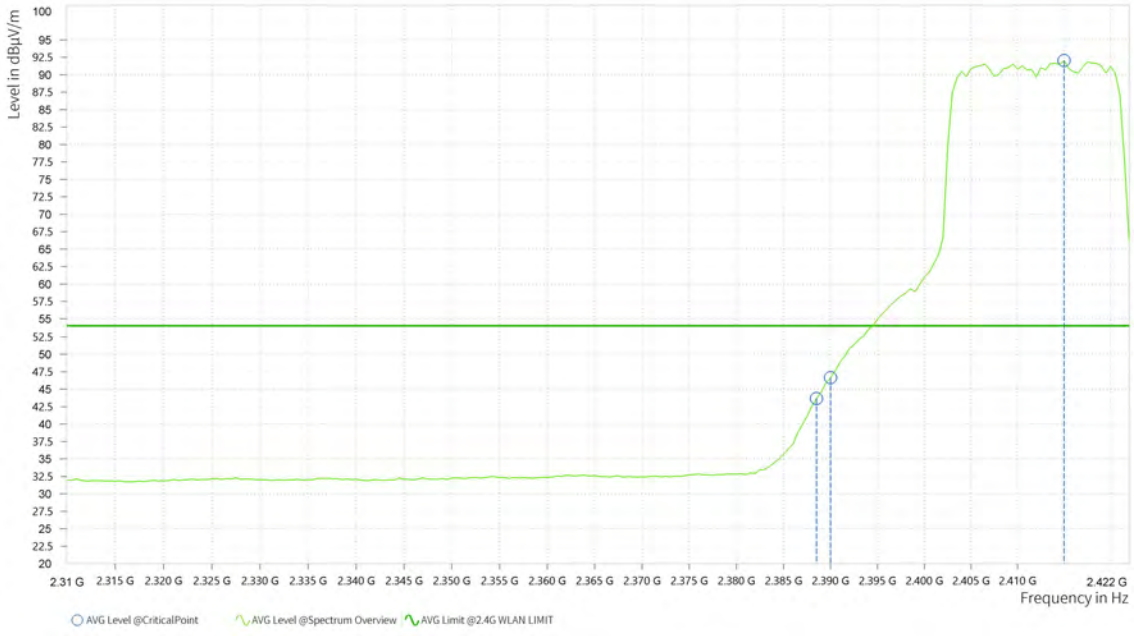
CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,389.000	63.33	74.00	10.67	9.83	H	220.6	2
1	2,390.000	62.99	74.00	11.01	9.84	H	220.6	2
1	2,406.500	103.15			9.86	H	165.7	1



Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,388.500	43.66	54.00	10.34	9.83	H	252.8	2
1	2,390.000	46.65	54.00	7.35	9.84	H	252.8	2
1	2,415.000	92.03			9.87	H	252.8	2

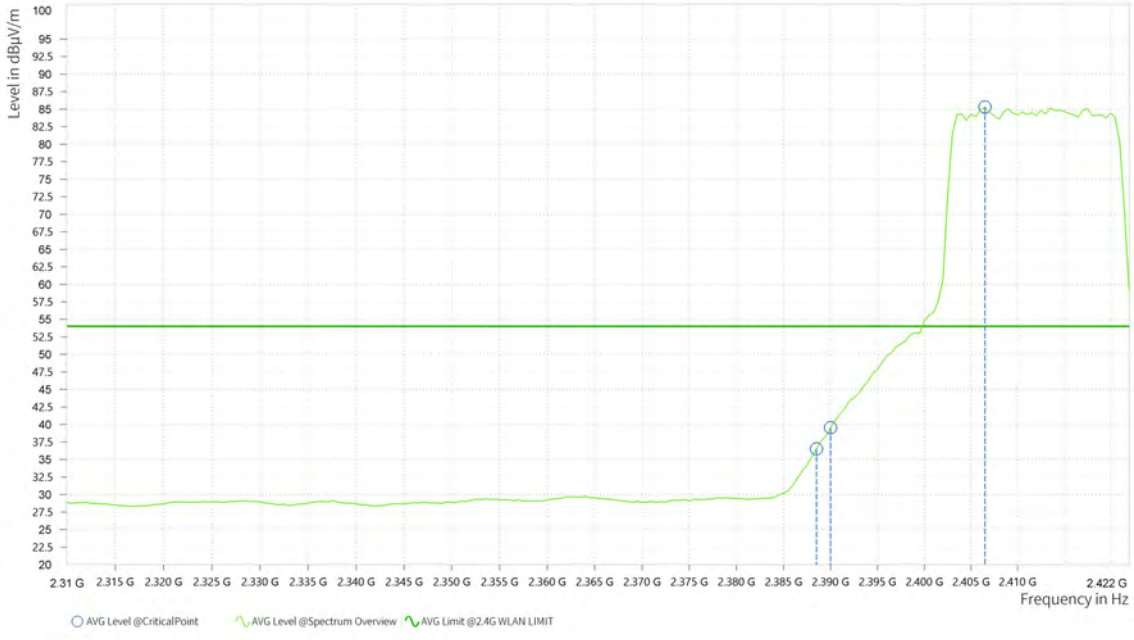


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,388.500	58.07	74.00	15.93	9.83	V	169.3	1
1	2,390.000	57.70	74.00	16.30	9.84	V	169.3	1
1	2,406.500	99.11			9.86	V	169.3	1

Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,388.500	36.51	54.00	17.49	9.83	V	141.8	1
1	2,390.000	39.54	54.00	14.46	9.84	V	141.8	1
1	2,406.500	85.28			9.86	V	141.8	1



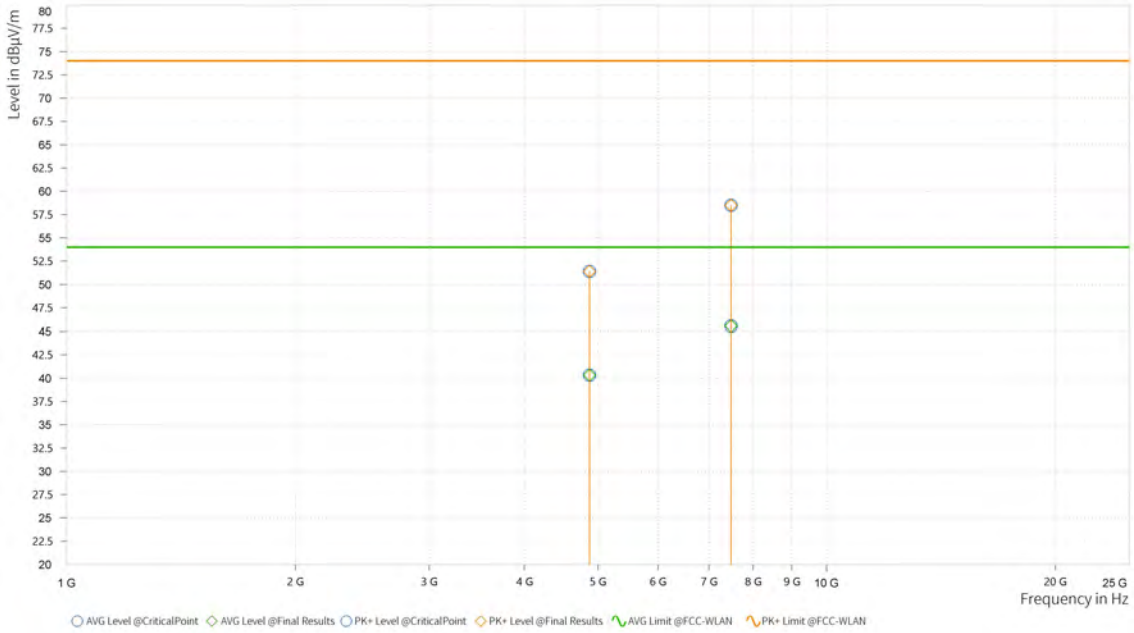
REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2412MHz: Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

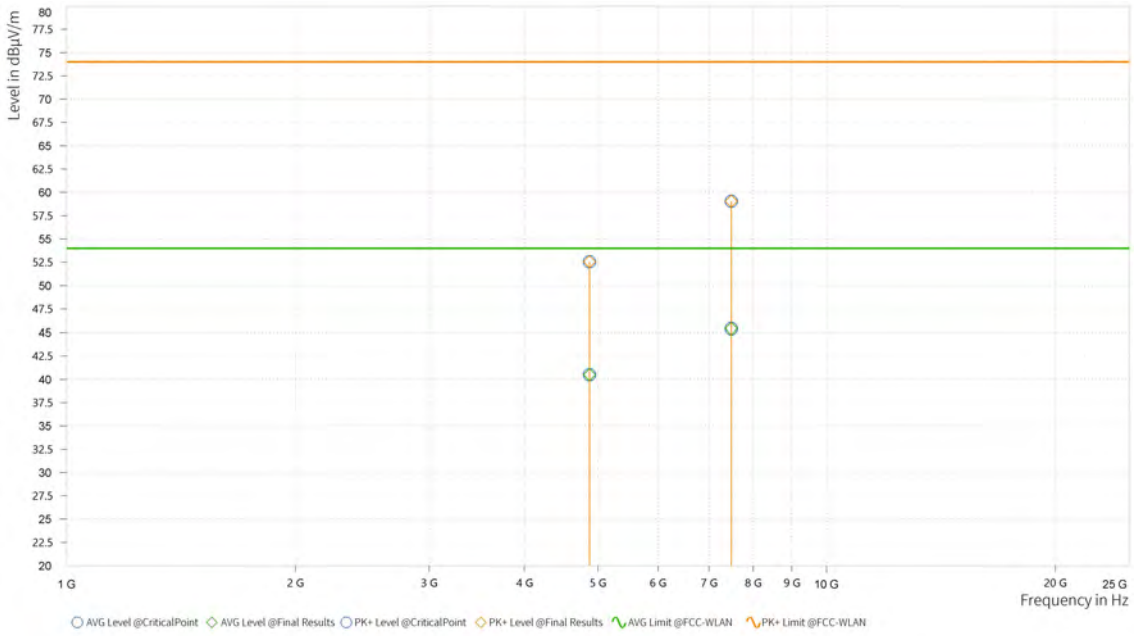
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,874.206	51.39	74.00	22.61	40.33	54.00	13.67	15.94	H	359	2
4	7,484.475	58.51	74.00	15.49	45.56	54.00	8.44	23.86	H	359	2



CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,874.206	52.57	74.00	21.43	40.49	54.00	13.51	15.94	V	122.6	2
4	7,492.975	59.06	74.00	14.94	45.41	54.00	8.59	23.88	V	348.1	1



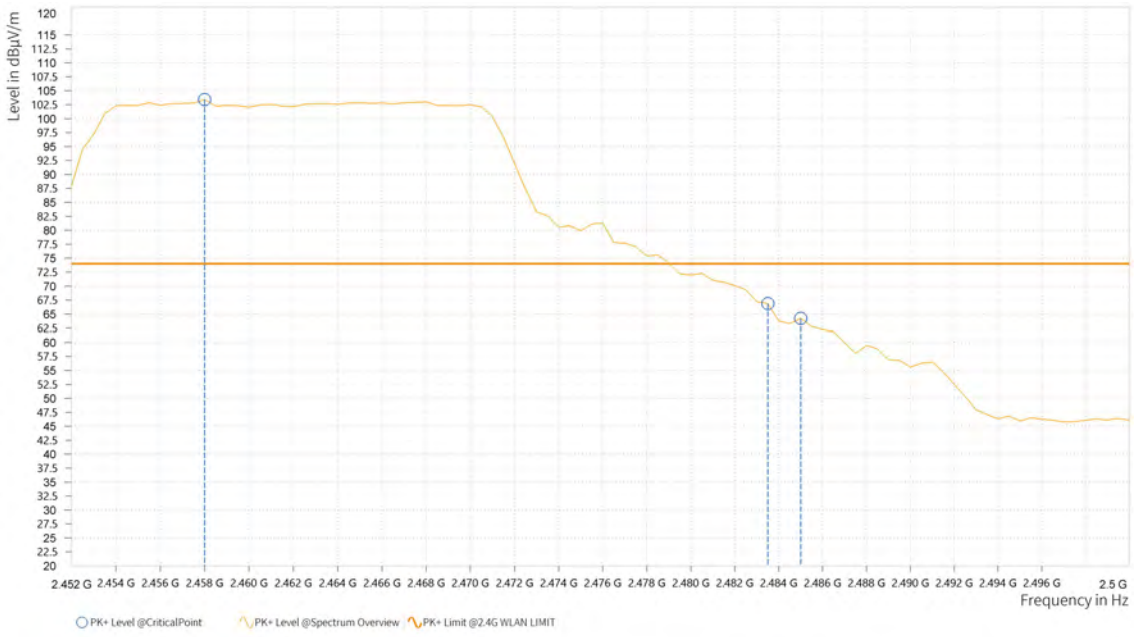
REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2437MHz: Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,458.000	103.43			9.97	H	218.2	2
1	2,483.500	66.88	74.00	7.12	9.88	H	218.2	2
1	2,485.000	64.25	74.00	9.75	9.88	H	166.8	1



Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,456.500	93.52			9.97	H	222.9	2
1	2,483.500	48.96	54.00	5.04	9.88	H	222.9	2
1	2,484.000	48.25	54.00	5.75	9.88	H	222.9	2

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,458.000	96.14			9.97	V	139.4	1
1	2,483.500	57.98	74.00	16.02	9.88	V	139.4	1
1	2,484.000	57.00	74.00	17.00	9.88	V	139.4	1

Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,456.500	85.63			9.97	V	132.3	1
1	2,483.500	40.28	54.00	13.72	9.88	V	132.3	1
1	2,484.000	39.85	54.00	14.15	9.88	V	132.3	1

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2462MHz: Fundamental frequency.

BELOW 1GHz WORST-CASE DATA:

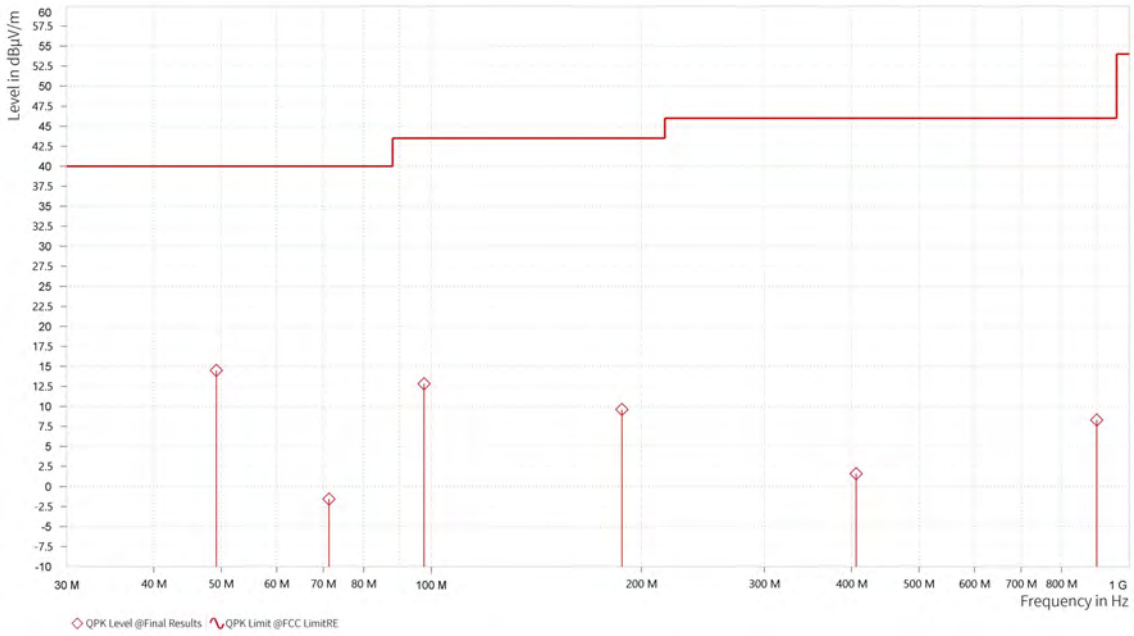
30 MHz – 1GHz data:

BT-LE _1M

CHANNEL	TX Channel 19	**0DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	49.158	14.51	40.00	25.49	-17.57	H	36.6	2	120.000
1	71.322	-1.56	40.00	41.56	-24.41	H	250.6	2	120.000
1	97.609	12.81	43.50	30.69	-21.44	H	355	2	120.000
1	187.528	9.61	43.50	33.89	-24.17	H	252.6	1	120.000
1	406.215	1.61	46.00	44.39	-19.70	H	355	2	120.000
1	898.393	8.29	46.00	37.71	-12.70	H	353.8	1	120.000



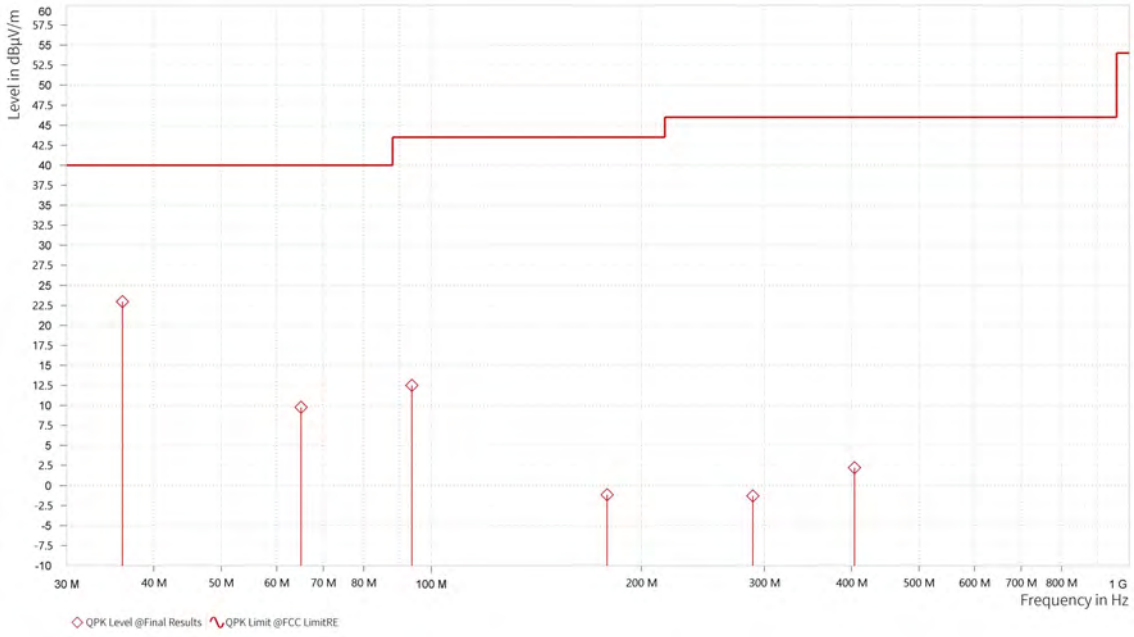
REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission level.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	QPK Level [dBµV/m]	QPK Limit [dBµV/m]	QPK Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]	Meas. BW [kHz]
1	36.063	22.97	40.00	17.03	-19.89	V	227.5	1	120.000
1	65.017	9.78	40.00	30.22	-20.43	V	335.9	1	120.000
1	93.729	12.51	43.50	30.99	-22.79	V	227.5	1	120.000
1	178.653	-1.15	43.50	44.65	-25.78	V	227.5	1	120.000
1	288.796	-1.29	46.00	47.29	-22.60	V	120.9	1	120.000
1	403.935	2.22	46.00	43.78	-19.73	V	355	2	120.000



REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission level.

ABOVE 1GHz TEST DATA

Note: 1. For radiated emissions testing，the full testing range of different modes have been scanned，only the worst case harmonic data is reported in the sheet.

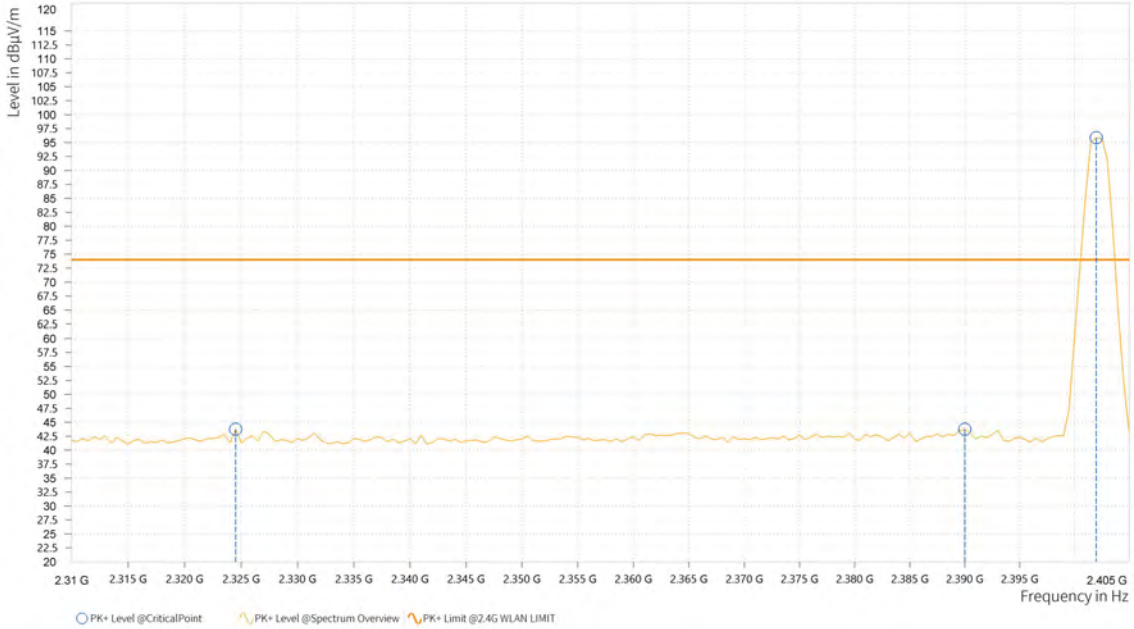
2. All other emissions were greater than 20dB below the limit was not recorded

BT-LE _1M

CHANNEL	TX Channel 0	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,324.500	43.76	74.00	30.24	9.45	H	1	2
1	2,390.000	43.75	74.00	30.25	9.84	H	243.3	2
1	2,402.000	95.86			9.85	H	219.4	2

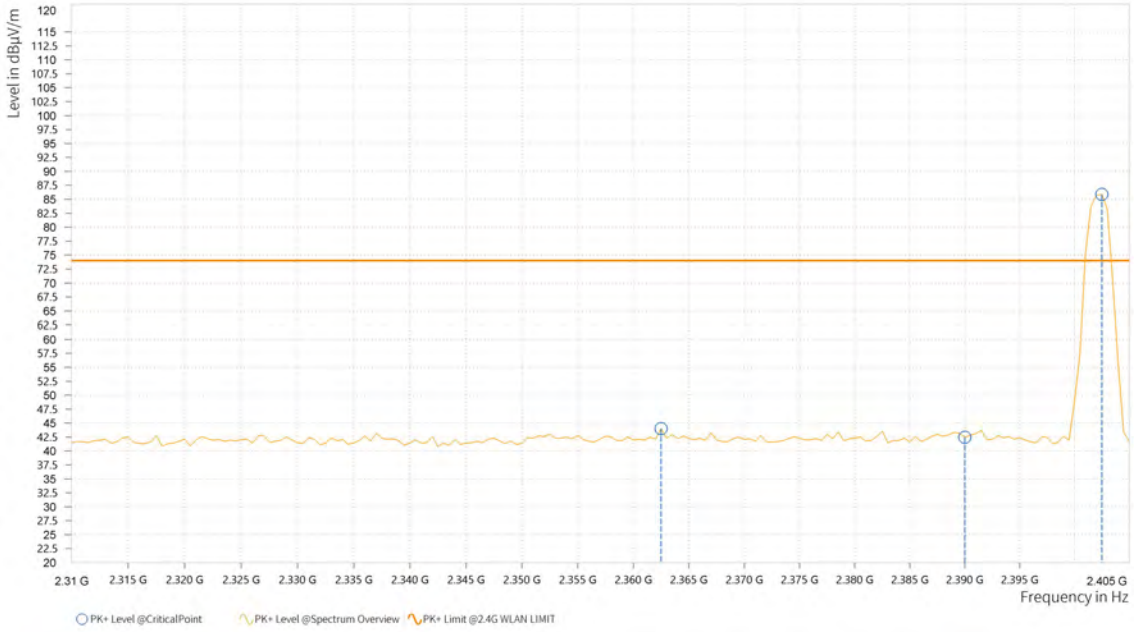


Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,363.500	29.71	54.00	24.29	9.64	H	355.4	2
1	2,390.000	29.93	54.00	24.07	9.84	H	291.1	2
1	2,402.000	89.96			9.85	H	215.8	2

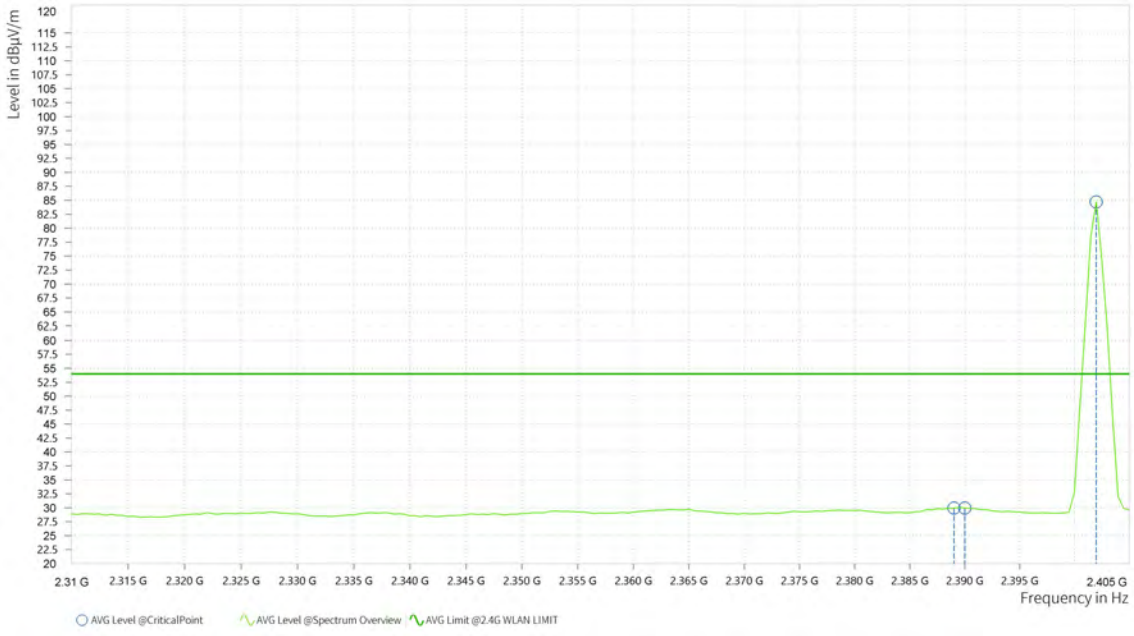
CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,362.500	44.00	74.00	30.00	9.63	V	341.4	2
1	2,390.000	42.45	74.00	31.55	9.84	V	229	1
1	2,402.500	85.87			9.85	V	150.2	1



Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,389.000	29.93	54.00	24.07	9.83	V	108.2	1
1	2,390.000	29.96	54.00	24.04	9.84	V	359	2
1	2,402.000	84.72			9.85	V	146.6	1



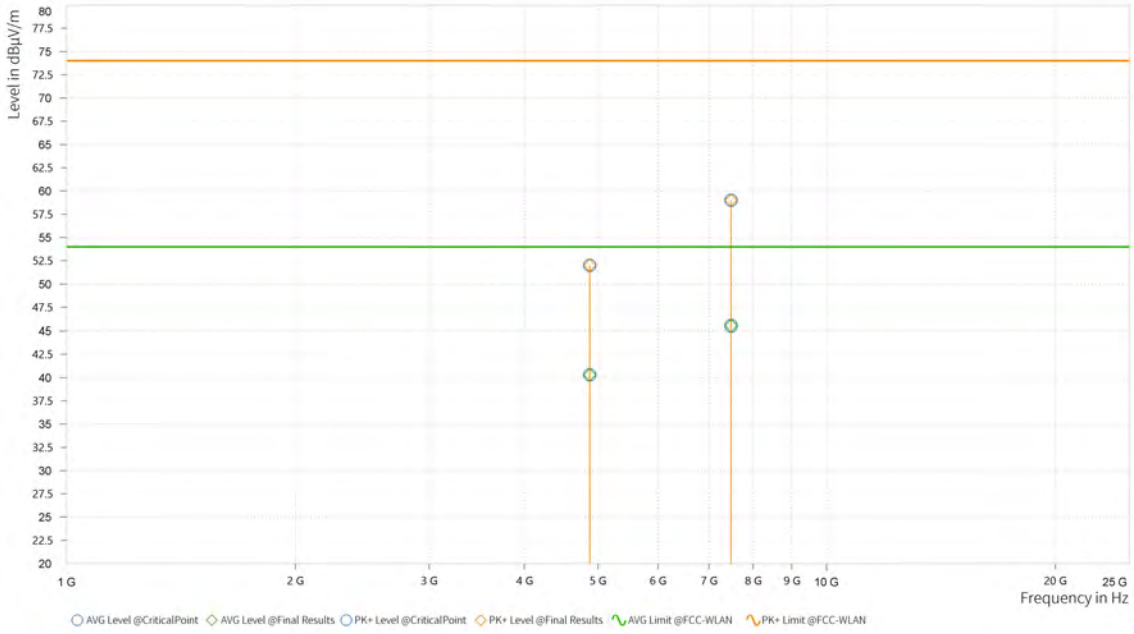
REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2402MHz: Fundamental frequency.

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

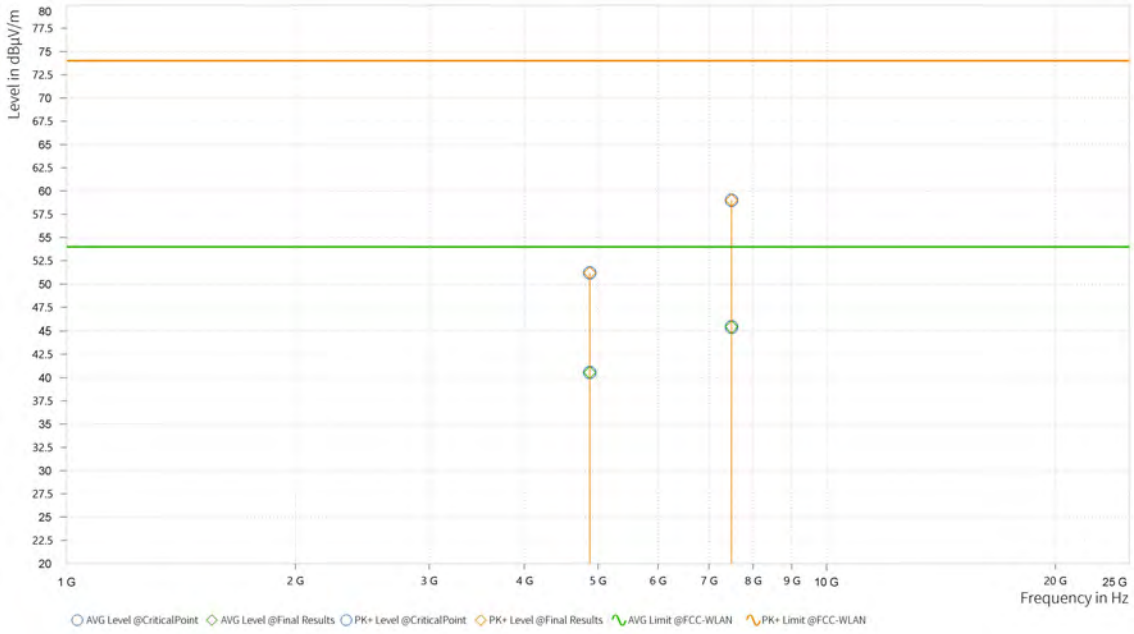
Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,880.029	52.00	74.00	22.00	40.30	54.00	13.70	15.95	H	359	1
4	7,486.175	59.00	74.00	15.01	45.52	54.00	8.48	23.87	H	11.2	2



CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
3	4,879.544	51.19	74.00	22.81	40.54	54.00	13.46	15.95	V	359.1	1
4	7,498.500	59.00	74.00	15.00	45.39	54.00	8.61	23.89	V	10.6	2



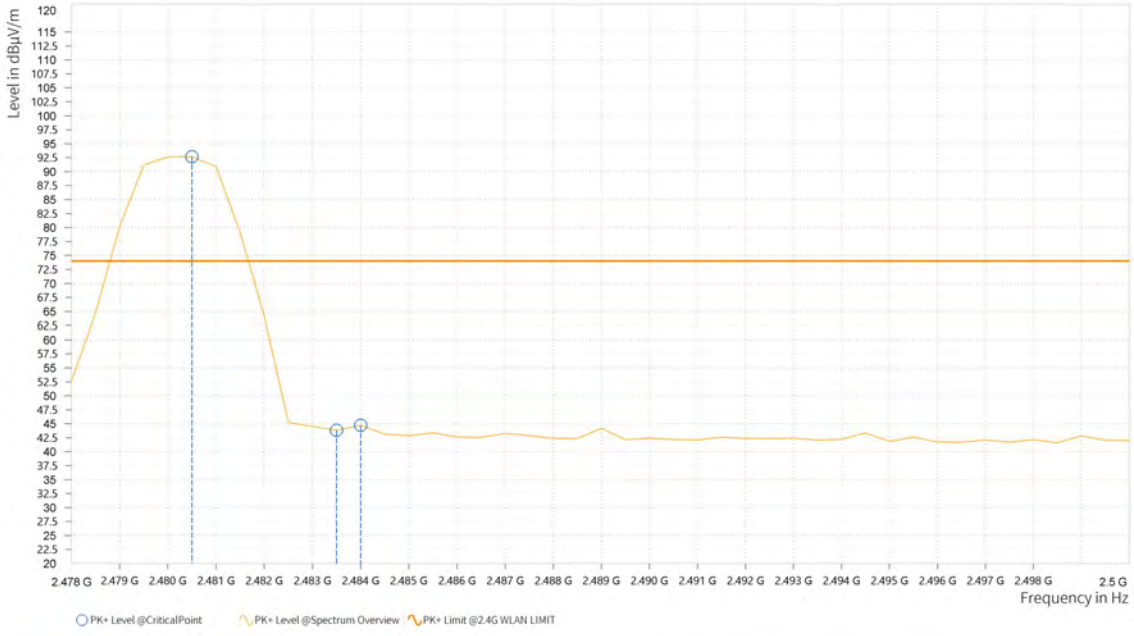
REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2440MHz: Fundamental frequency.

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,480.500	92.66			9.89	H	242.1	2
1	2,483.500	43.82	74.00	30.18	9.88	H	359	2
1	2,484.000	44.71	74.00	29.29	9.88	H	242.1	2



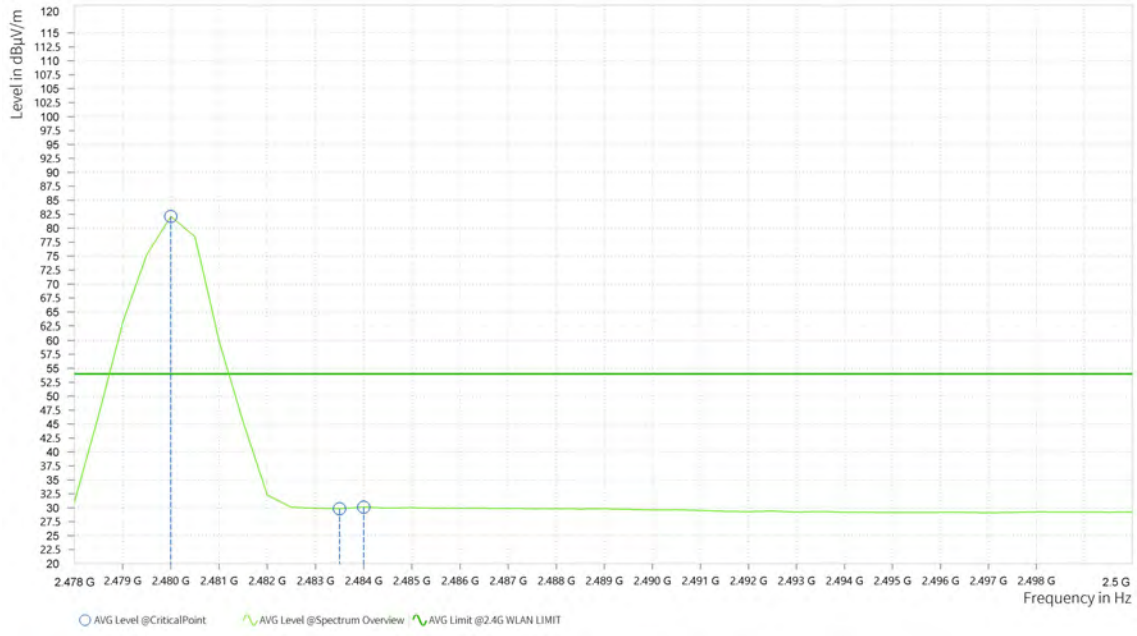
Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,480.000	88.48			9.89	H	160.8	1
1	2,483.500	29.97	54.00	24.03	9.88	H	160.8	1
1	2,484.000	30.08	54.00	23.92	9.88	H	160.8	1

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

Rg	Frequency [MHz]	PK+ Level [dBµV/m]	PK+ Limit [dBµV/m]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,480.500	87.08			9.89	V	145.4	1
1	2,483.500	43.16	74.00	30.84	9.88	V	358.2	1
1	2,485.000	43.84	74.00	30.16	9.88	V	1	2

Rg	Frequency [MHz]	AVG Level [dBµV/m]	AVG Limit [dBµV/m]	AVG Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	2,480.000	82.12			9.89	V	145.4	1
1	2,483.500	29.84	54.00	24.16	9.88	V	70.1	1
1	2,484.000	30.12	54.00	23.88	9.88	V	256.6	1



REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
   Margin value = Limit value – Emission level.
2. 2480MHz: Fundamental frequency.

3.3 6 dB BANDWIDTH MEASUREMENT

3.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

3.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	R&S	ESW 44	101973	Feb.25,22	Feb.24,24
Open Switch and Control Unit	R&S	OSP-B157W 8	100836	N/A	N/A
Vector Signal Generator	R&S	SMBV100B	102176	Feb.16,22	Feb.15,24
Signal Generator	R&S	SMB100A03	182185	Feb.16,22	Feb.15,24
Wideband Radio Communication	R&S	CMW500	169399	Jun.26,22	Jun.25,24
Hygrothermograph	DELI	20210528	SZ015	Sep.06,22	Sep.05,24
PC	LENOVO	E14	HRSW0024	N/A	N/A
CABLE	R&S	J12J103539-00-1	SEP-03-20-069	Oct.31,22	Apr.29,23
CABLE	R&S	J12J103539-00-1	SEP-03-20-070	Oct.31,22	Apr.29,23
Test Software	EMC32	EMC32	N/A	N/A	N/A
Temperature Chamber	votsch	VT4002	58566078100050	May.31,22	May.30,24

NOTE:

1. The calibration interval of the above test instruments is 6 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.

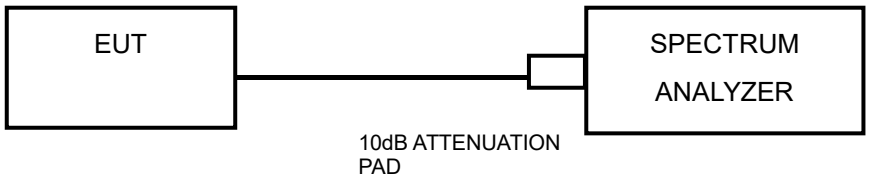
3.3.3 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.3.4 DEVIATION FROM TEST STANDARD

No deviation.

3.3.5 TEST SETUP



3.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.3.7 TEST RESULTS

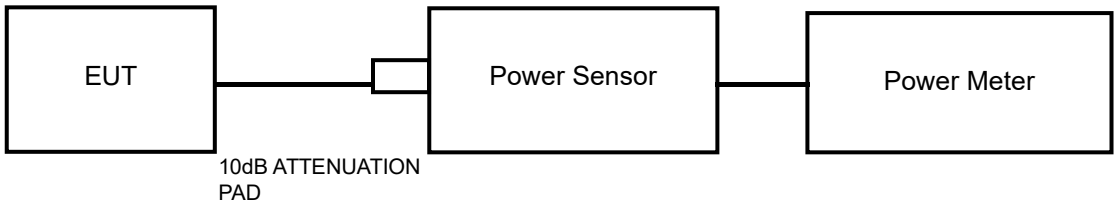
Please Refer to Appendix1/2 Of this test report.

3.4 CONDUCTED OUTPUT POWER

3.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

3.4.2 TEST SETUP



3.4.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.4.4 TEST PROCEDURES

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

3.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.4.7 TEST RESULTS

3.4.7.1 MAXIMUM PEAK OUTPUT POWER

Please Refer to Appendix1/2 Of this test report.

3.4.7.2 AVERAGE OUTPUT POWER (FOR REFERENCE)

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

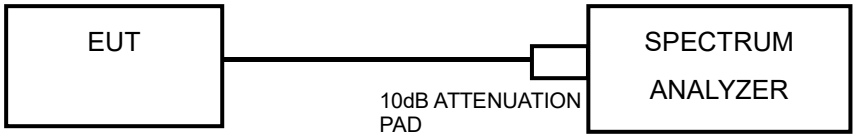
Please Refer to Appendix1/2 Of this test report.

3.5 POWER SPECTRAL DENSITY MEASUREMENT

3.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

3.5.2 TEST SETUP



3.5.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.5.4 TEST PROCEDURE

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW ≥ 3 x RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

3.5.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.5.7 TEST RESULTS

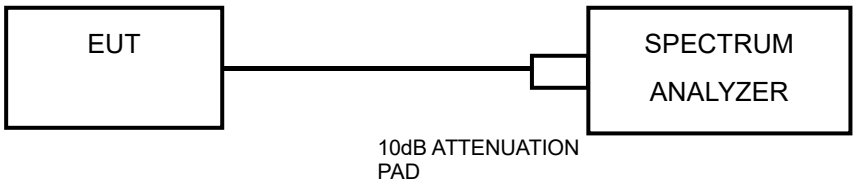
Please Refer to Appendix1/2 Of this test report.

3.6 OUT OF BAND EMISSION MEASUREMENT

3.6.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

3.6.2 TEST SETUP



3.6.3 TEST INSTRUMENTS

Refer to section 3.3.2 to get information of above instrument.

3.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

3.6.5 DEVIATION FROM TEST STANDARD

No deviation.

3.6.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

3.6.7 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

Please Refer to Appendix1/2 Of this test report.

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

6 Appendix 1 WLAN 2.4G

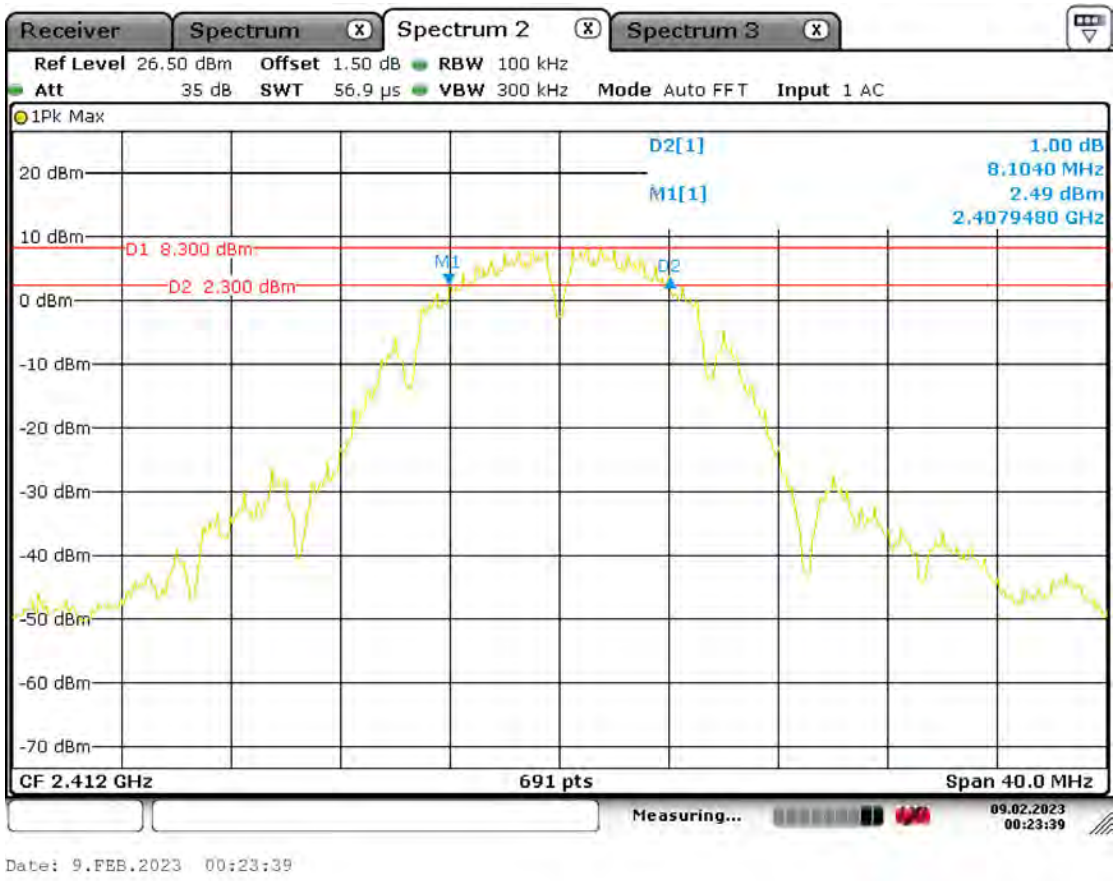
DTS BANDWIDTH

TEST RESULT

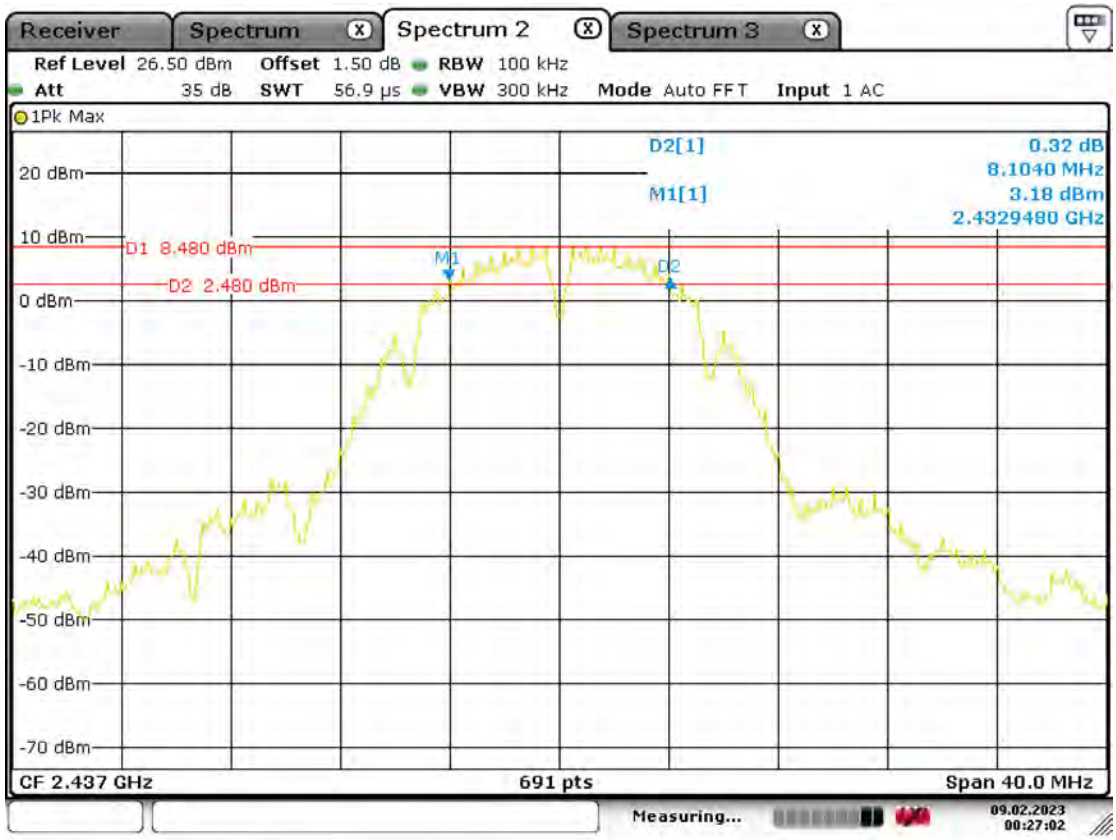
TestMode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant0	2412	8.1040	2407.948	2416.052	0.5	PASS
	Ant0	2437	8.1040	2432.948	2441.052	0.5	PASS
	Ant0	2462	8.5090	2457.485	2465.994	0.5	PASS
11G	Ant0	2412	16.035	2404.127	2420.162	0.5	PASS
	Ant0	2437	16.151	2429.012	2445.163	0.5	PASS
	Ant0	2462	15.687	2453.838	2469.525	0.5	PASS
11N20	Ant0	2412	16.035	2404.417	2420.452	0.5	PASS
	Ant0	2437	17.250	2428.491	2445.741	0.5	PASS
	Ant0	2462	16.331	2453.201	2469.532	0.5	PASS

TEST GRAPHS

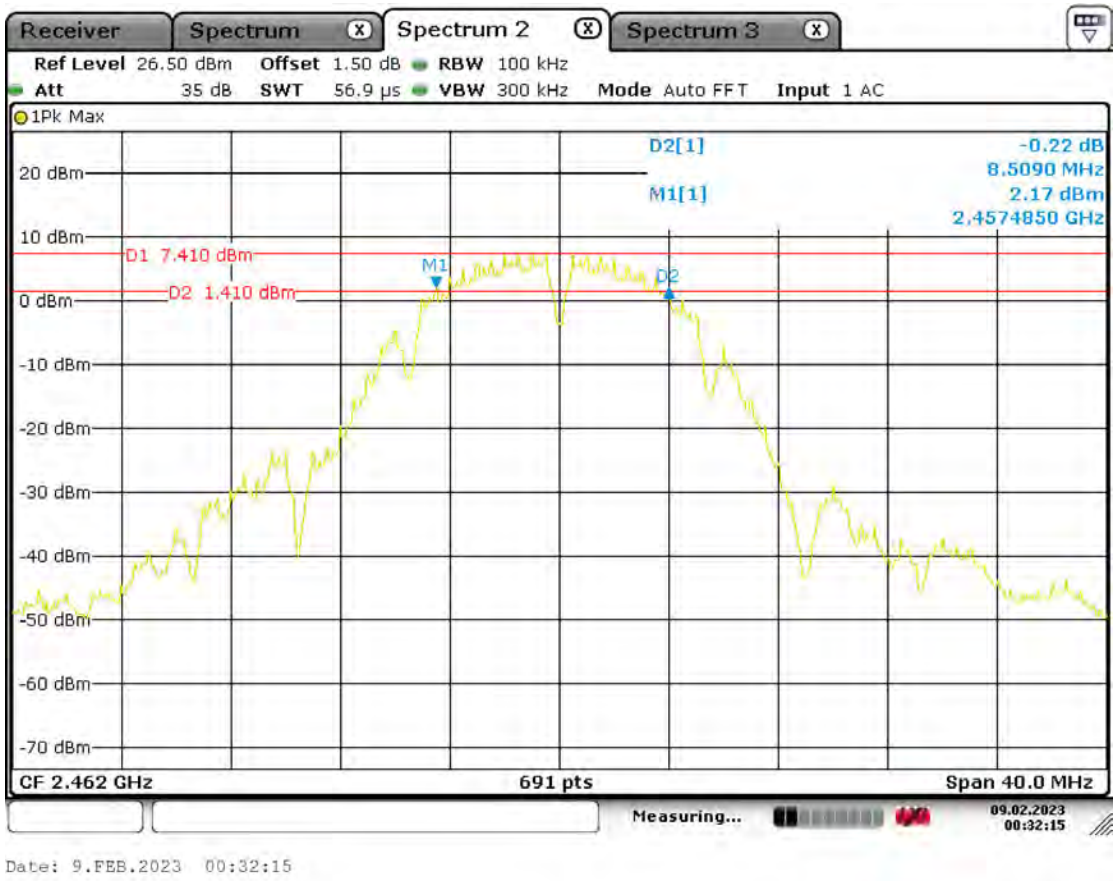
11B-CDD_Ant0_2412



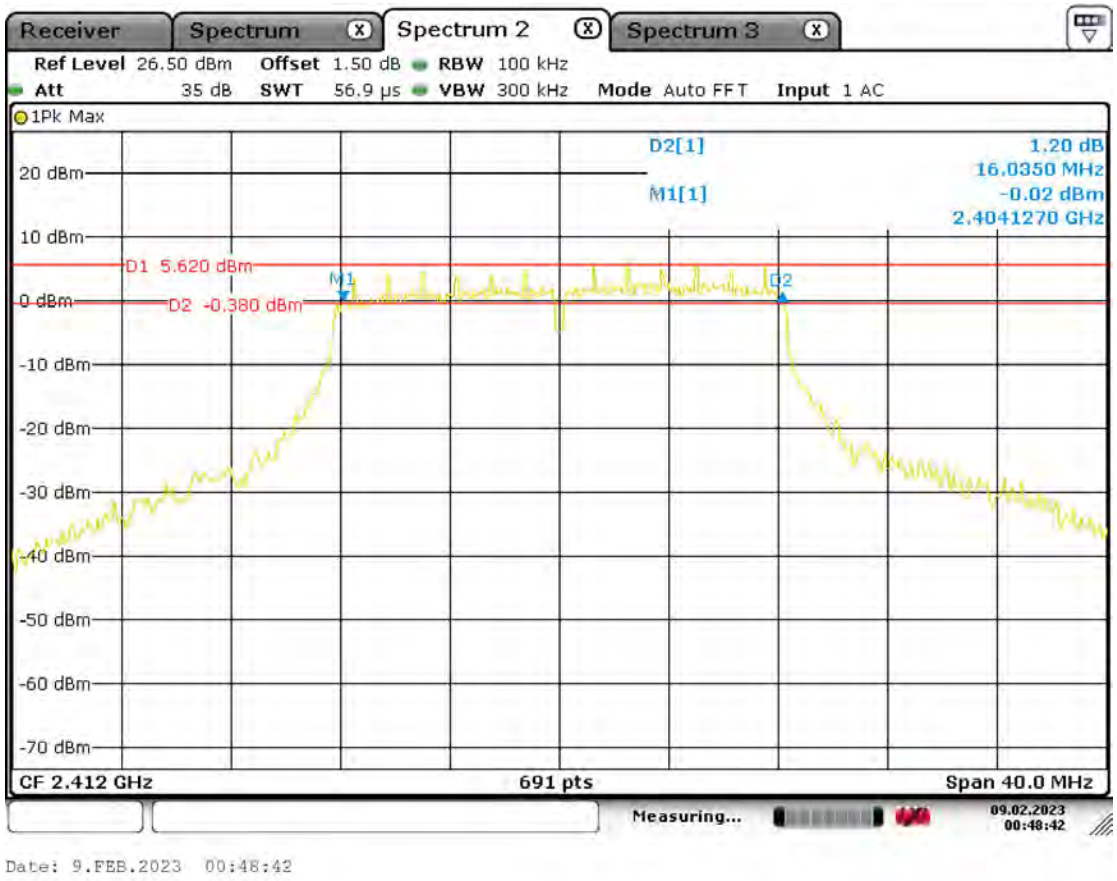
11B_Ant0_2437



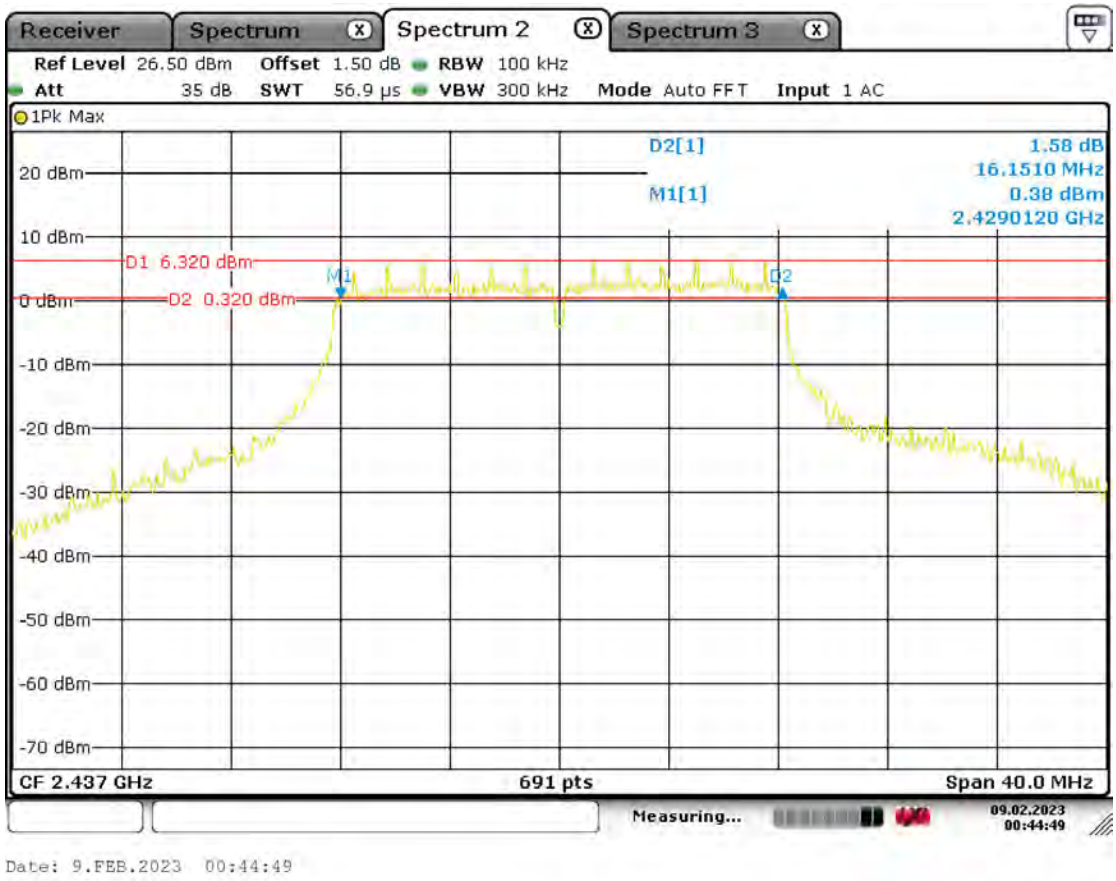
11B_Ant0_2462



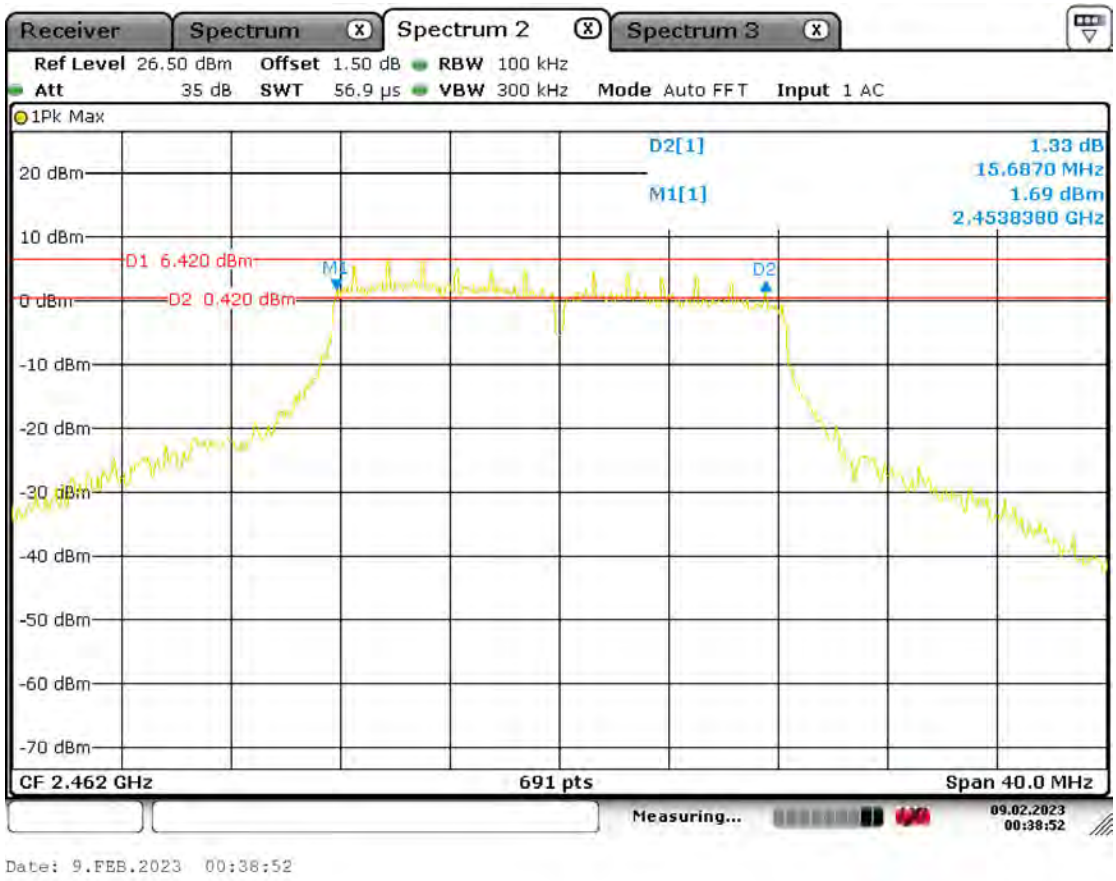
11G_Ant0_2412



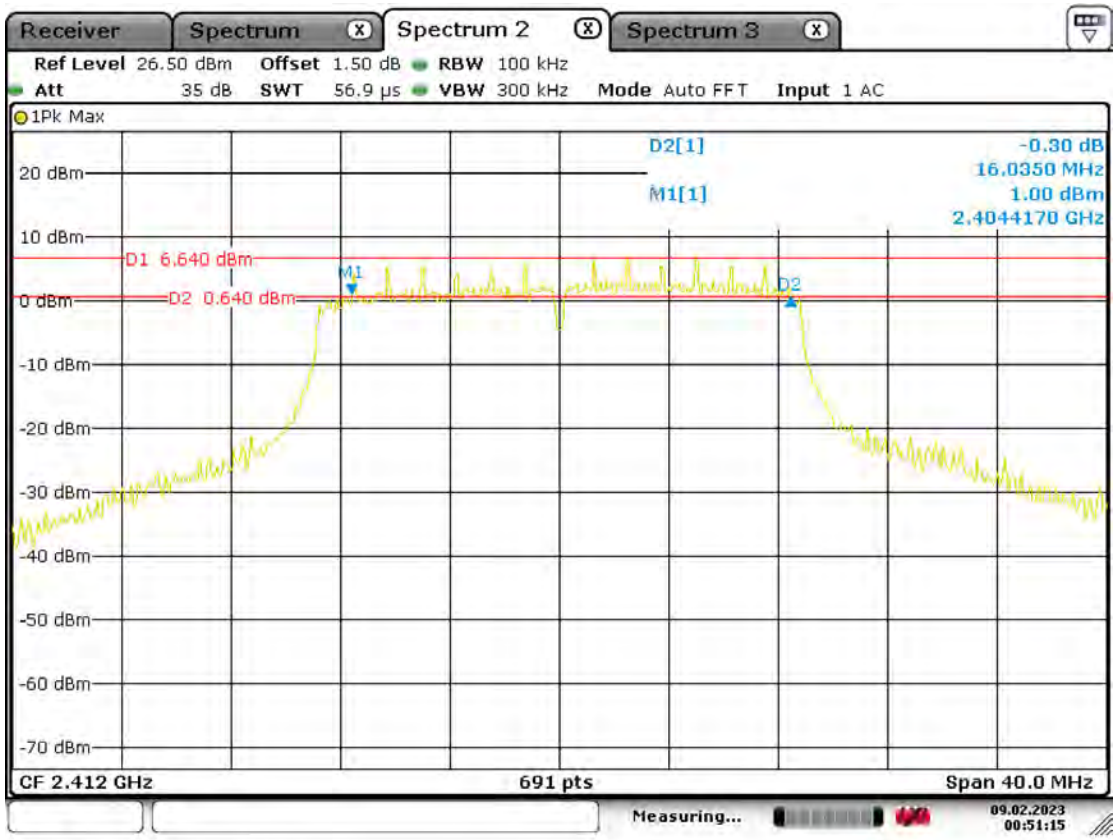
11G_Ant0_2437



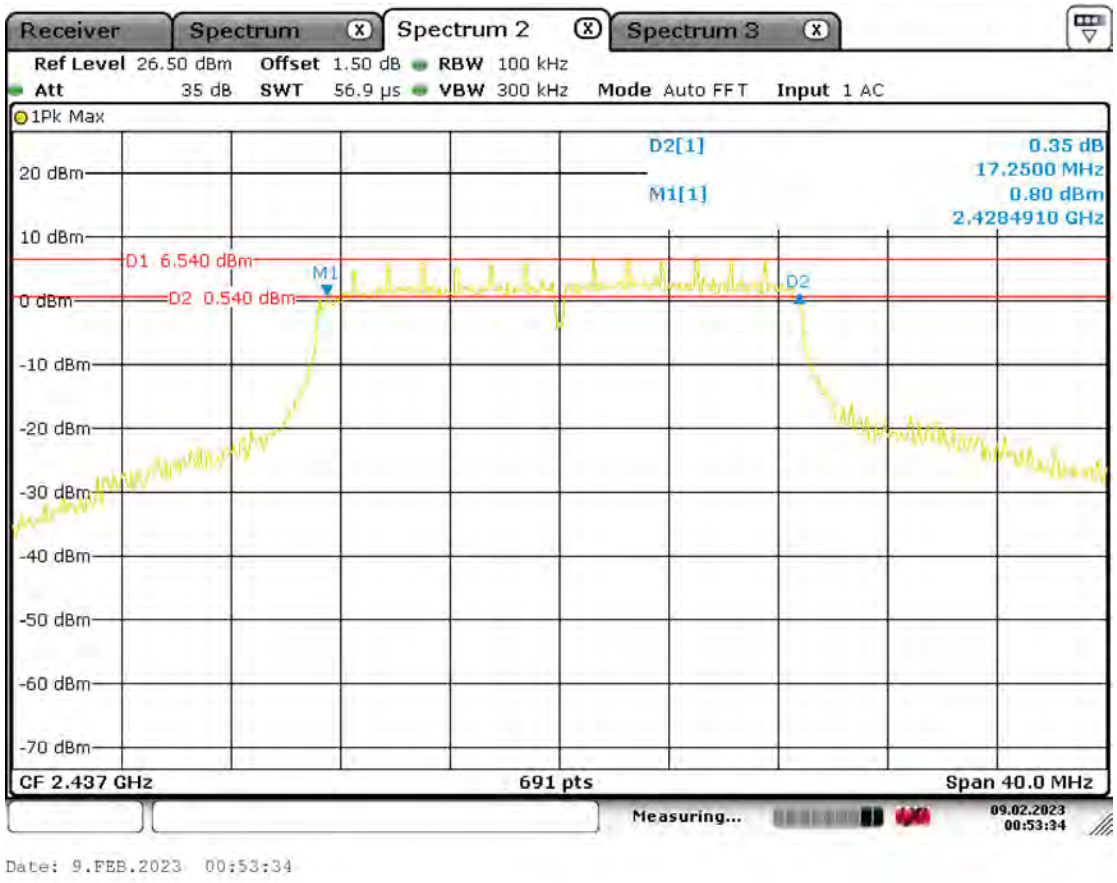
11G_Ant0_2462



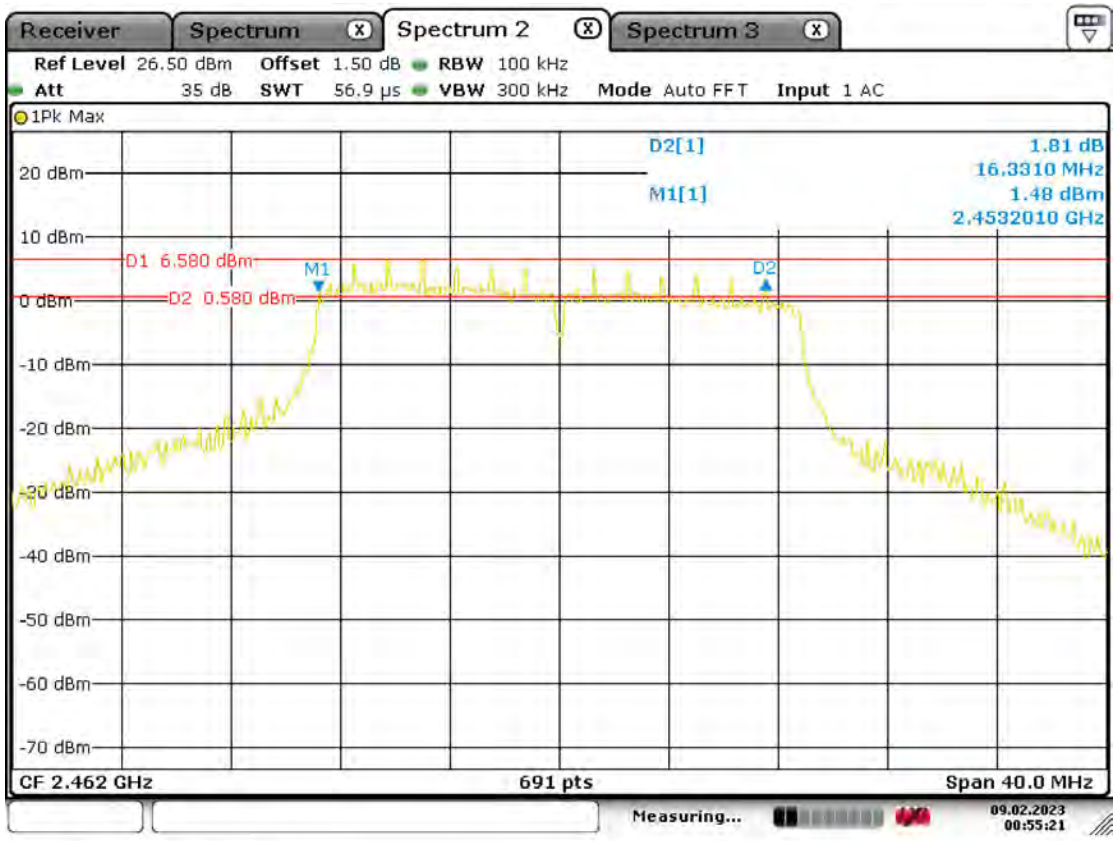
11N20_Ant0_2412



11N20_Ant0_2437



11N20_Ant0_2462


Receiver
Spectrum
Spectrum 2
Spectrum 3
Ref Level 26.50 dBm Offset 1.50 dB RBW 100 kHz
Att 35 dB SWT 56.9 µs VBW 300 kHz Mode Auto FFT Input 1 AC
1Pk Max
D2[1] 1.81 dB
16.3310 MHz
M1[1] 1.48 dBm
2.4532010 GHz
D1 6.580 dBm
D2 0.580 dBm
M1
D2
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.462 GHz
691 pts
Span 40.0 MHz
Measuring...
09.02.2023
00:55:21
Date: 9.FEB.2023 00:55:21

MAXIMUM CONDUCTED OUTPUT POWER

TEST RESULT PEAK

TestMode	Antenna	Frequency [MHz]	Peak power [dBm]	Peak power [mw]	Limit [dBm]	Verdict	Power Setting
11B	Ant0	2412	20.11	102.57	≤30.00	PASS	18
	Ant0	2437	22.24	167.49	≤30.00	PASS	18
	Ant0	2462	20.20	104.71	≤30.00	PASS	18
11G	Ant0	2412	23.66	232.27	≤30.00	PASS	17
	Ant0	2437	25.23	333.43	≤30.00	PASS	17
	Ant0	2462	23.80	239.88	≤30.00	PASS	17
11N20-	Ant0	2412	23.34	215.77	≤30.00	PASS	16
	Ant0	2437	24.90	309.03	≤30.00	PASS	16
	Ant0	2462	23.33	215.28	≤30.00	PASS	16

TEST RESULT AVERAGE

Test Mode	Antenna	Frequency [MHz]	Average power [dBm]	Limit [dBm]	Verdict	Power Setting
11B -SISO	Ant0	2412	15.89	/	PASS	18
	Ant0	2437	18.31	/	PASS	18
	Ant0	2462	16.22	/	PASS	18
11G -SISO	Ant0	2412	15.28	/	PASS	17
	Ant0	2437	17.16	/	PASS	17
	Ant0	2462	15.34	/	PASS	17
11N20 -SISO	Ant0	2412	15.72	/	PASS	16
	Ant0	2437	17.60	/	PASS	16
	Ant0	2462	15.80	/	PASS	16

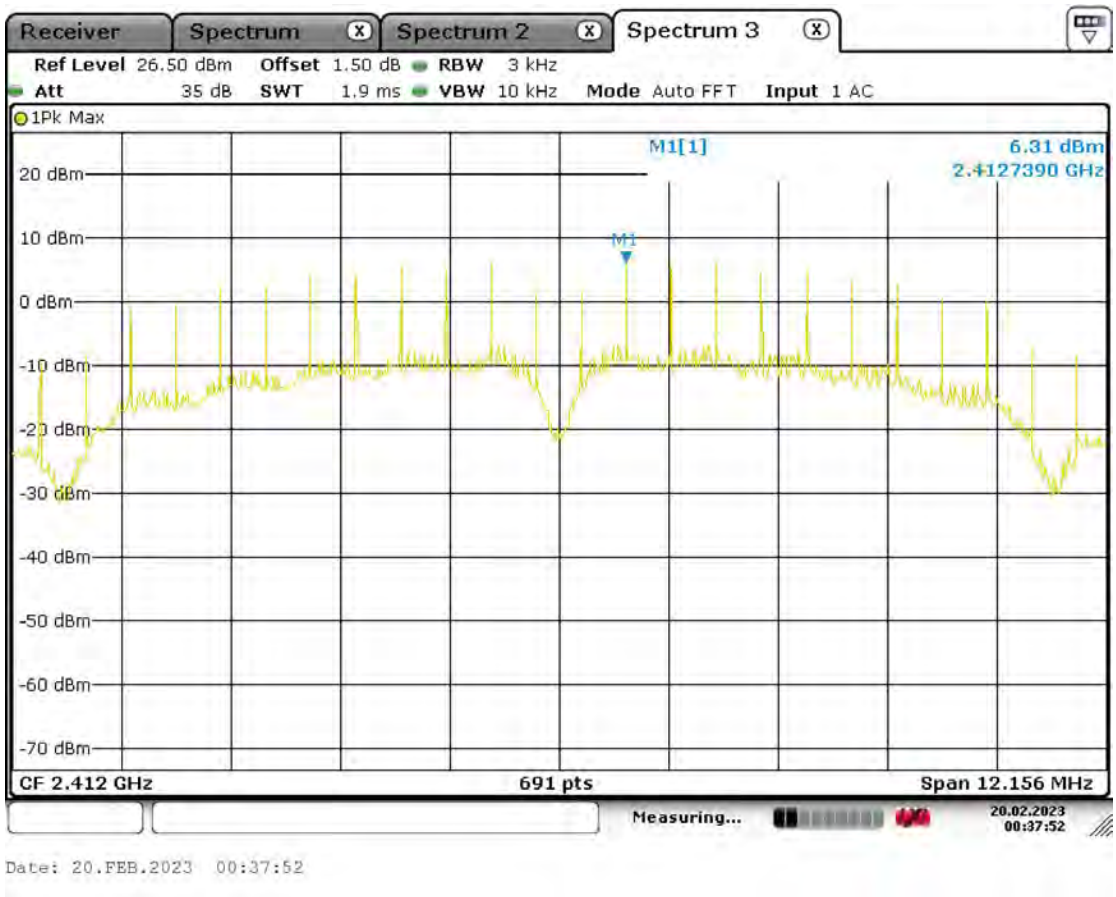
MAXIMUM POWER SPECTRAL DENSITY

TEST RESULT

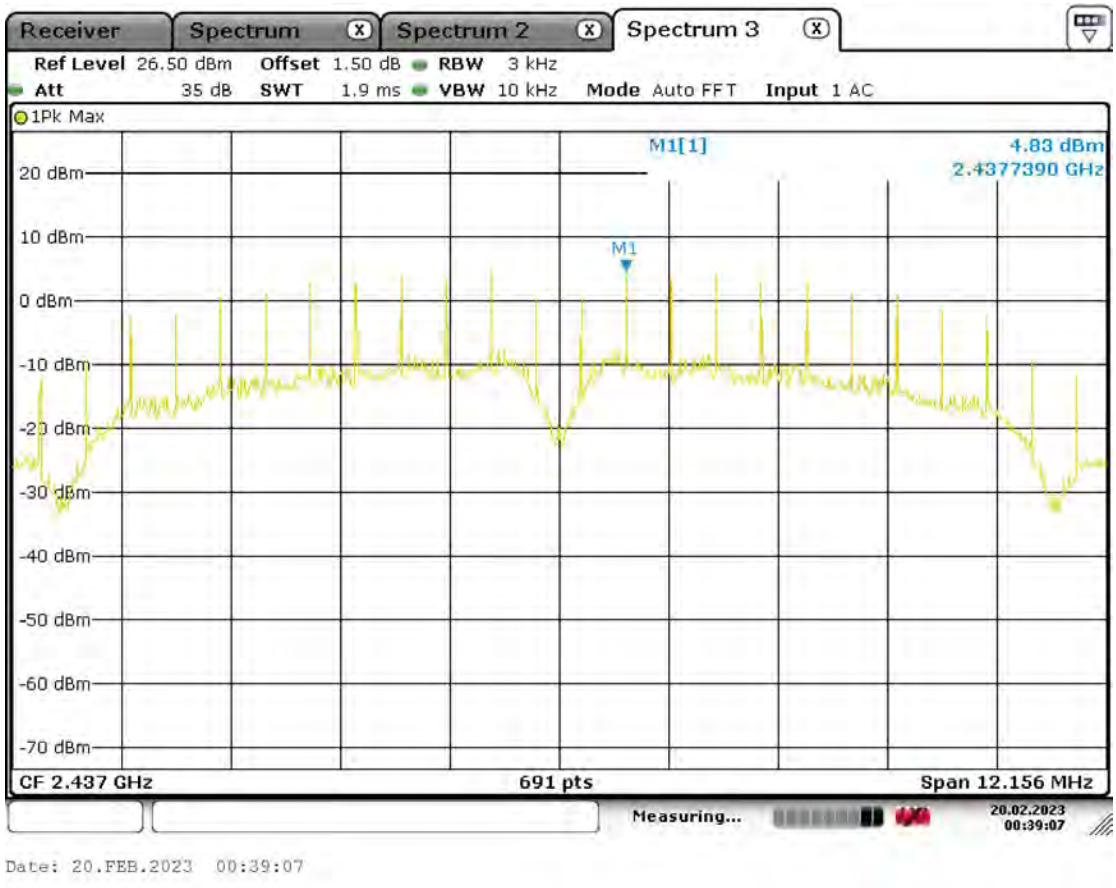
TestMode	Antenna	Frequency [MHz]	Result [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant0	2412	6.31	≤8.00	PASS
	Ant0	2437	4.83	≤8.00	PASS
	Ant0	2462	6.78	≤8.00	PASS
11G	Ant0	2412	-7.52	≤8.00	PASS
	Ant0	2437	-7.70	≤8.00	PASS
	Ant0	2462	-9.39	≤8.00	PASS
11N20	Ant0	2412	-7.41	≤8.00	PASS
	Ant0	2437	-6.62	≤8.00	PASS
	Ant0	2462	-8.41	≤8.00	PASS

TEST GRAPHS

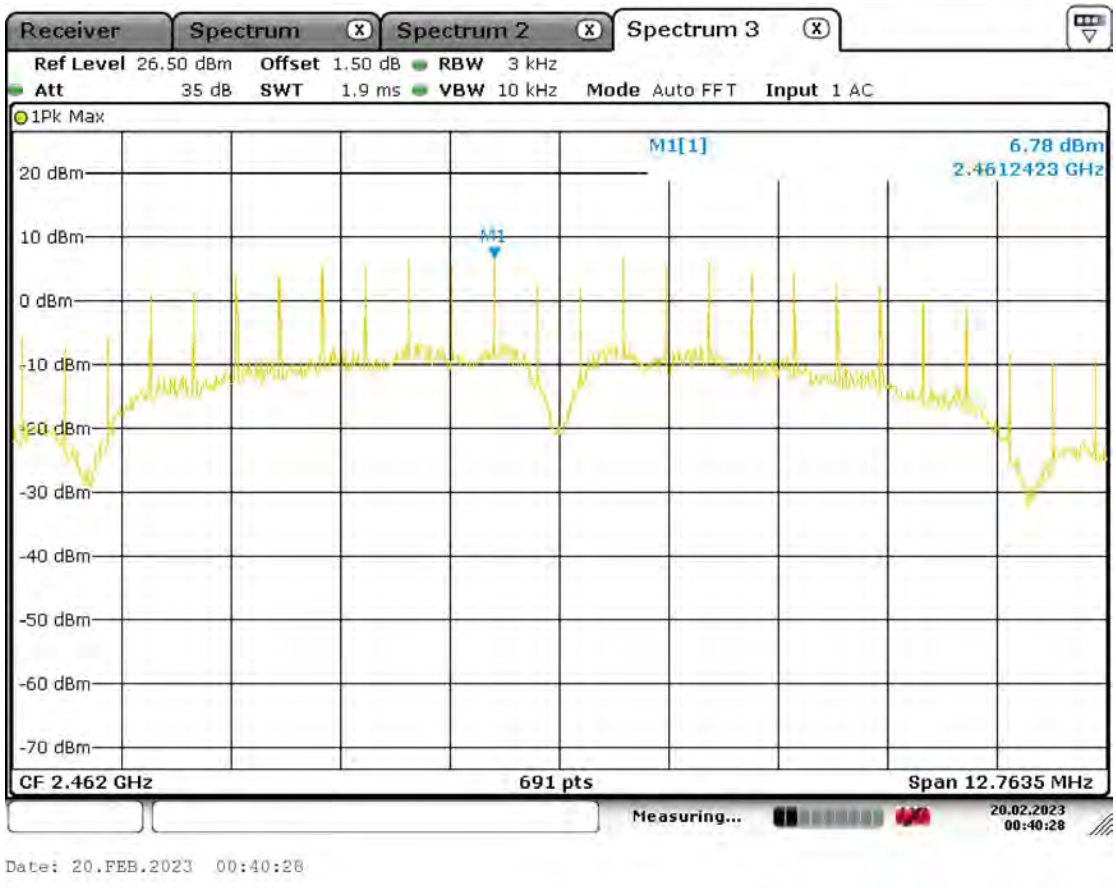
11B_Ant0_2412



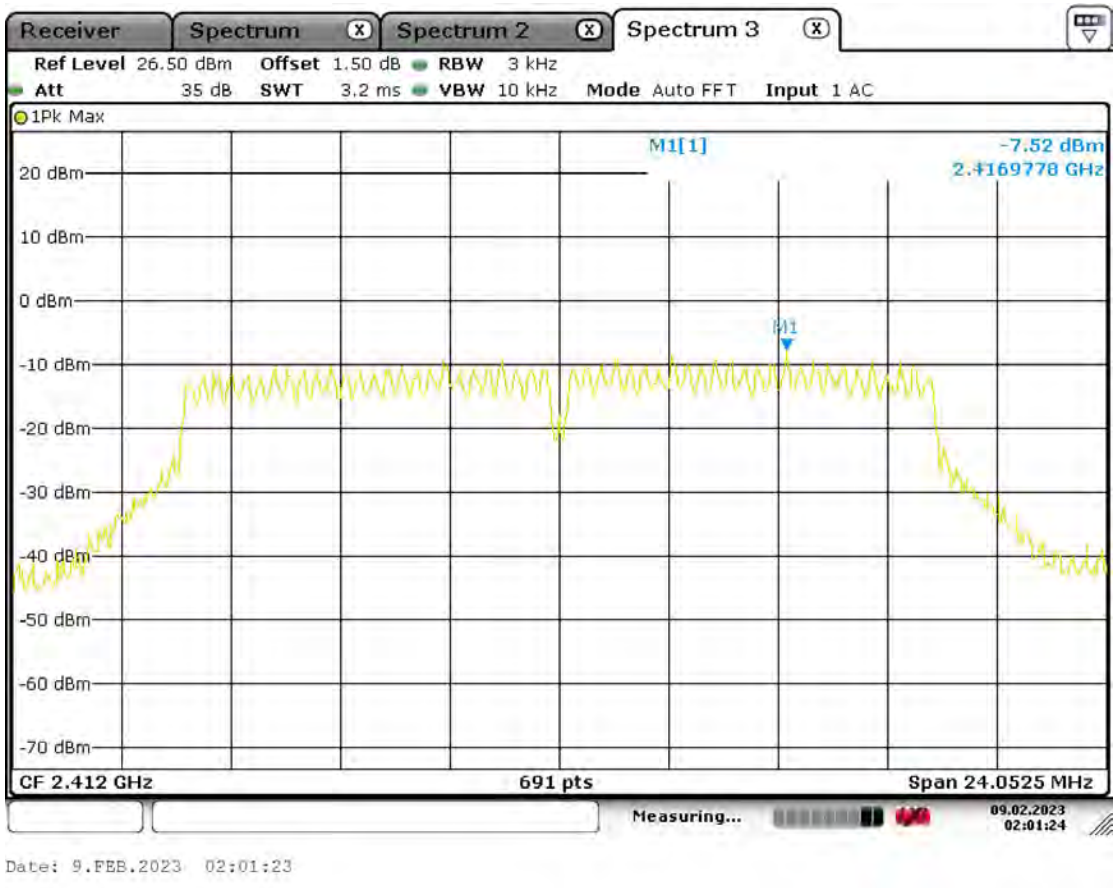
11B_Ant0_2437



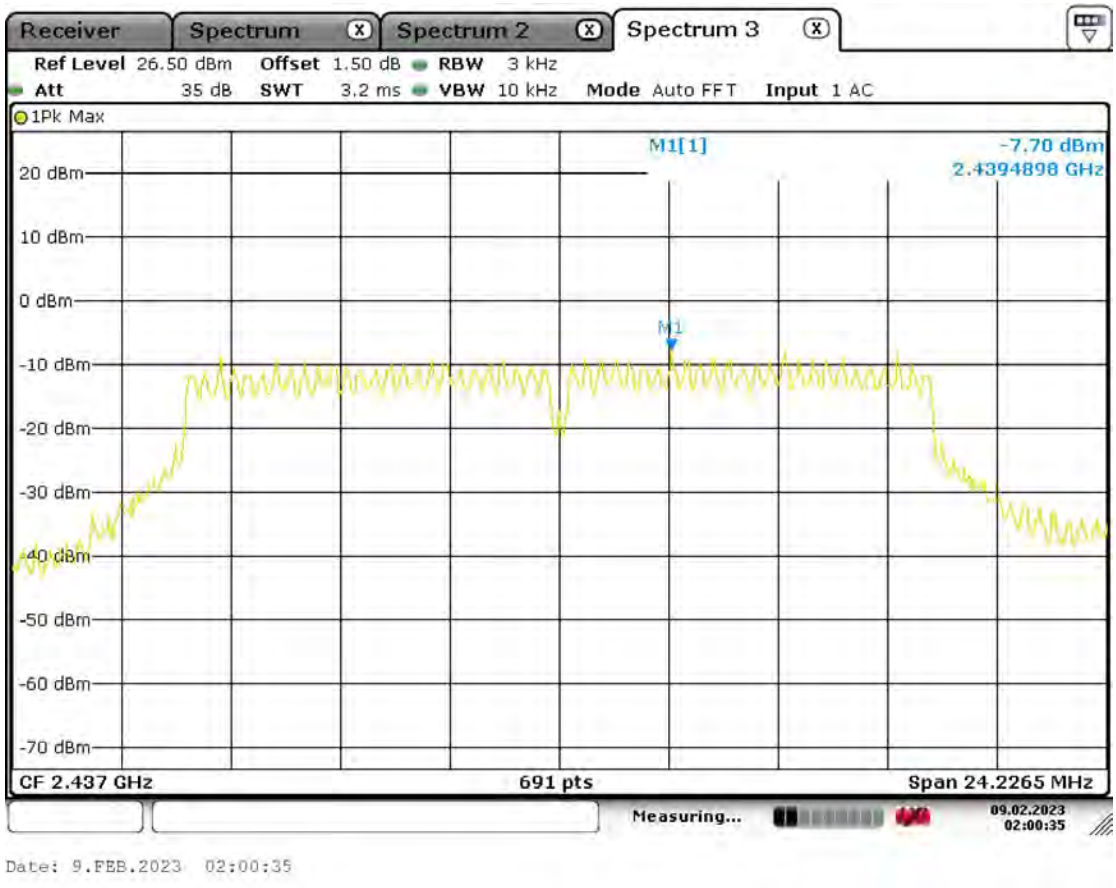
11B_Ant0_2462



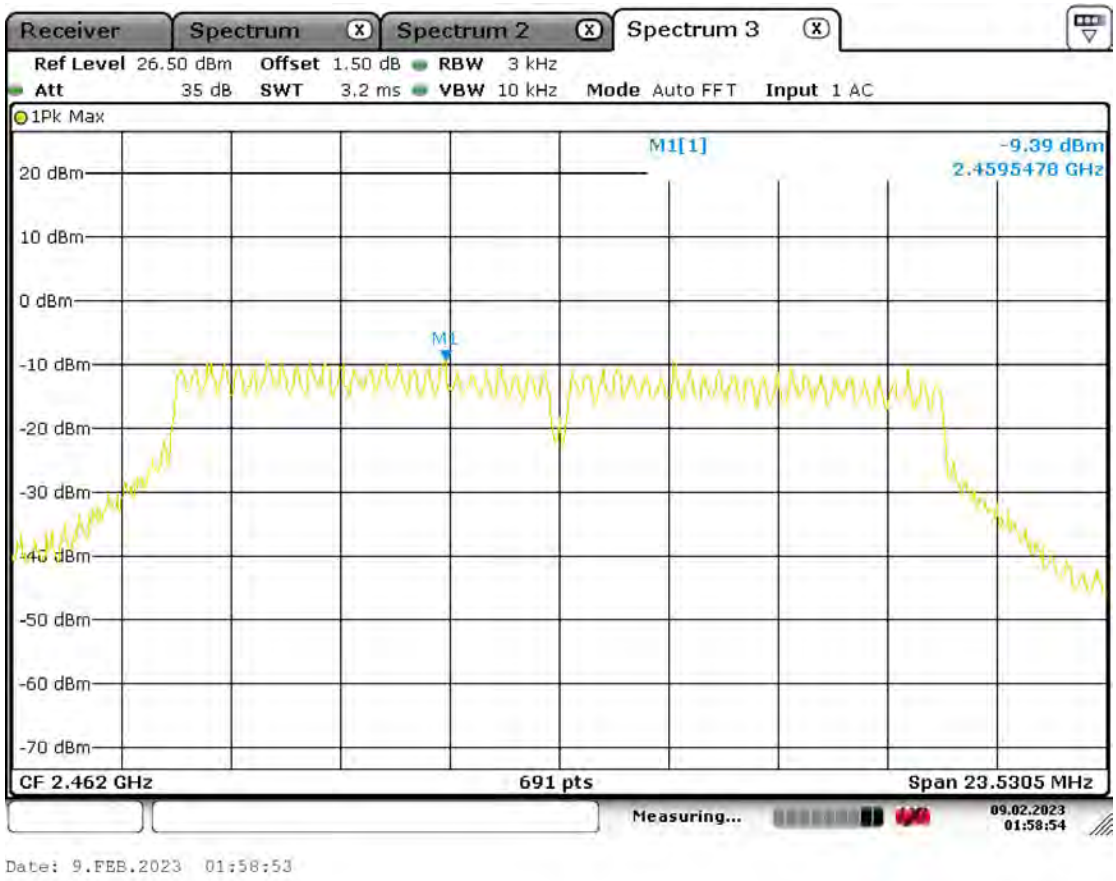
11G_Ant0_2412



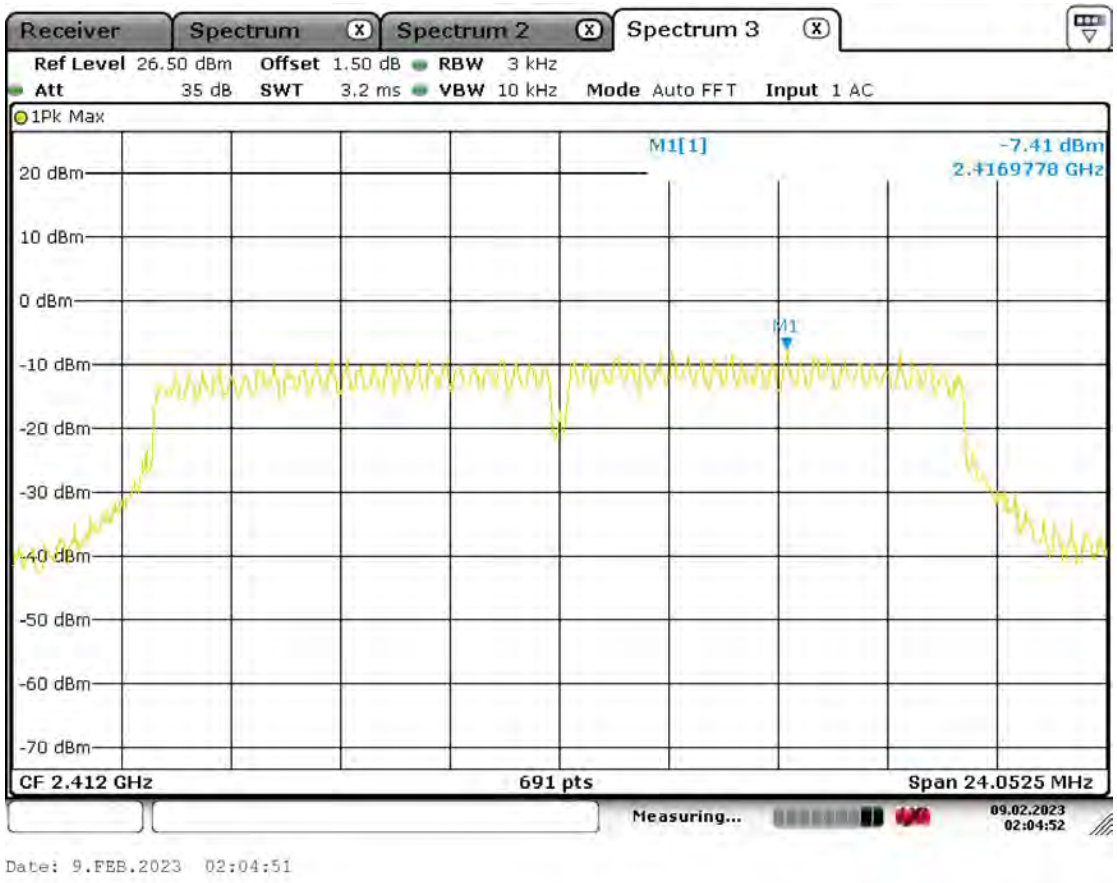
11G_Ant0_2437



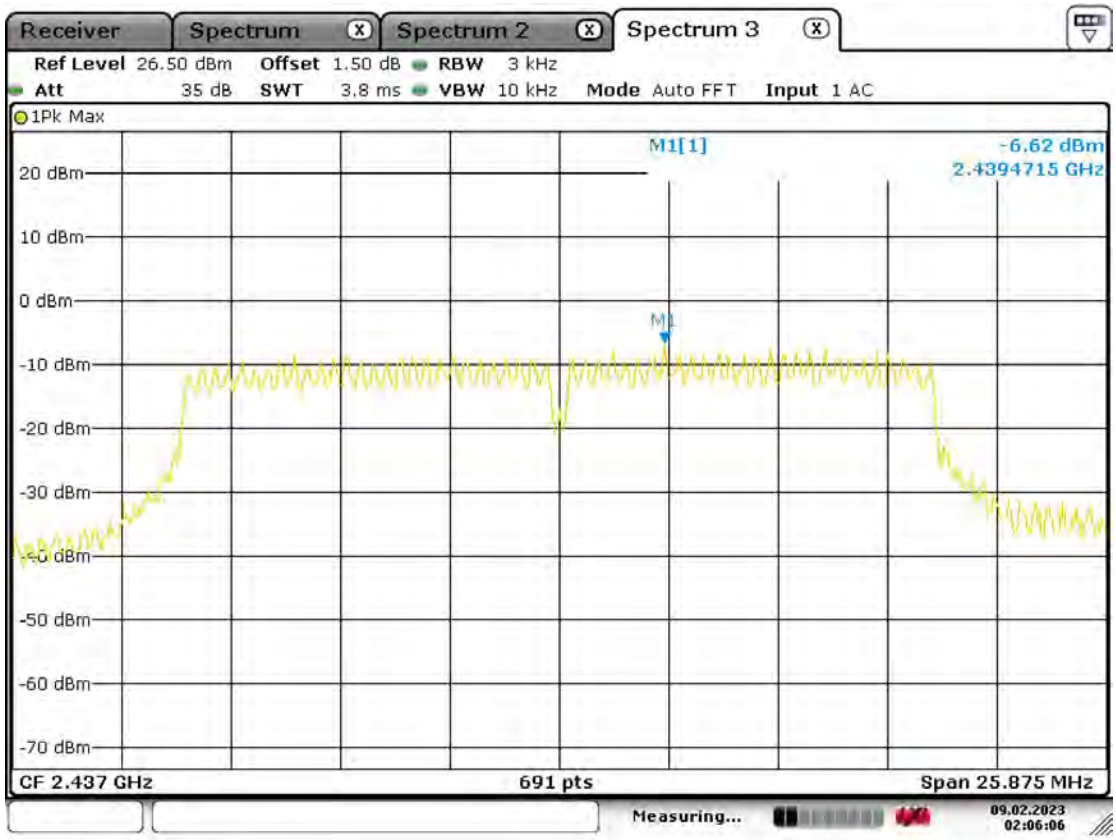
11G_Ant0_2462



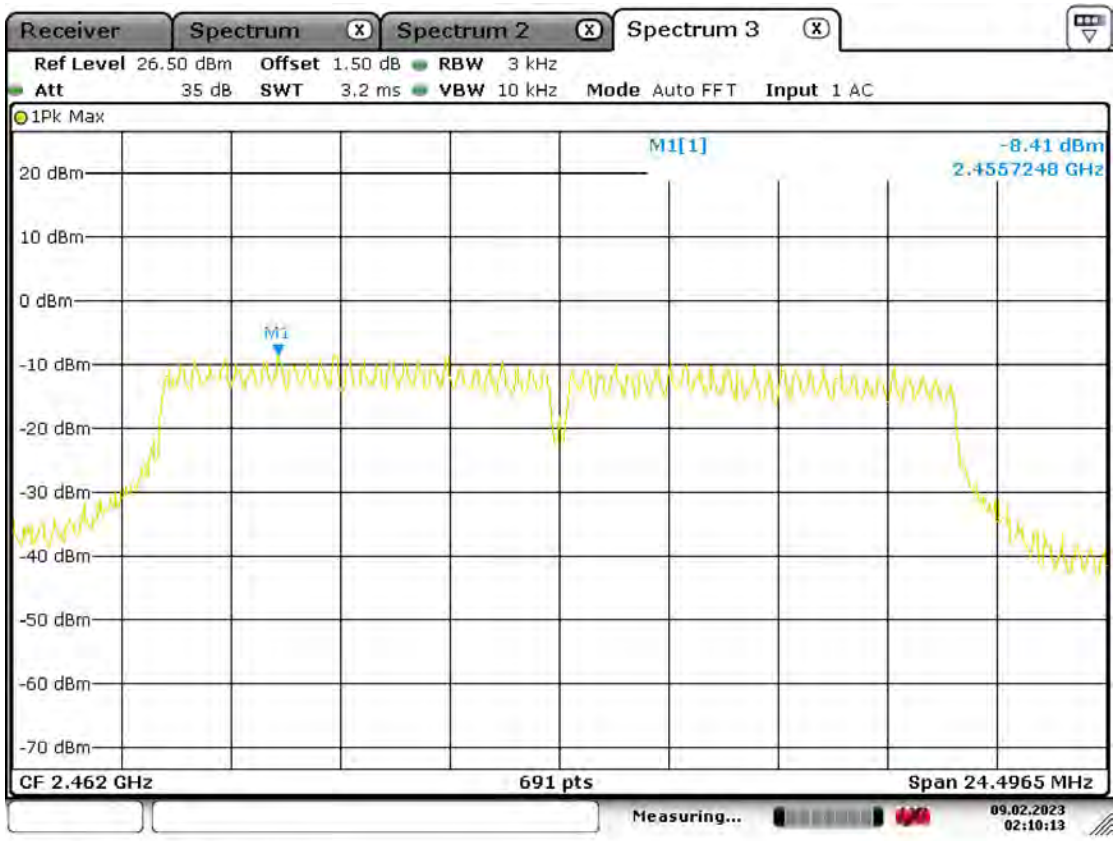
11N20_Ant0_2412



11N20_Ant0_2437



11N20_Ant0_2462

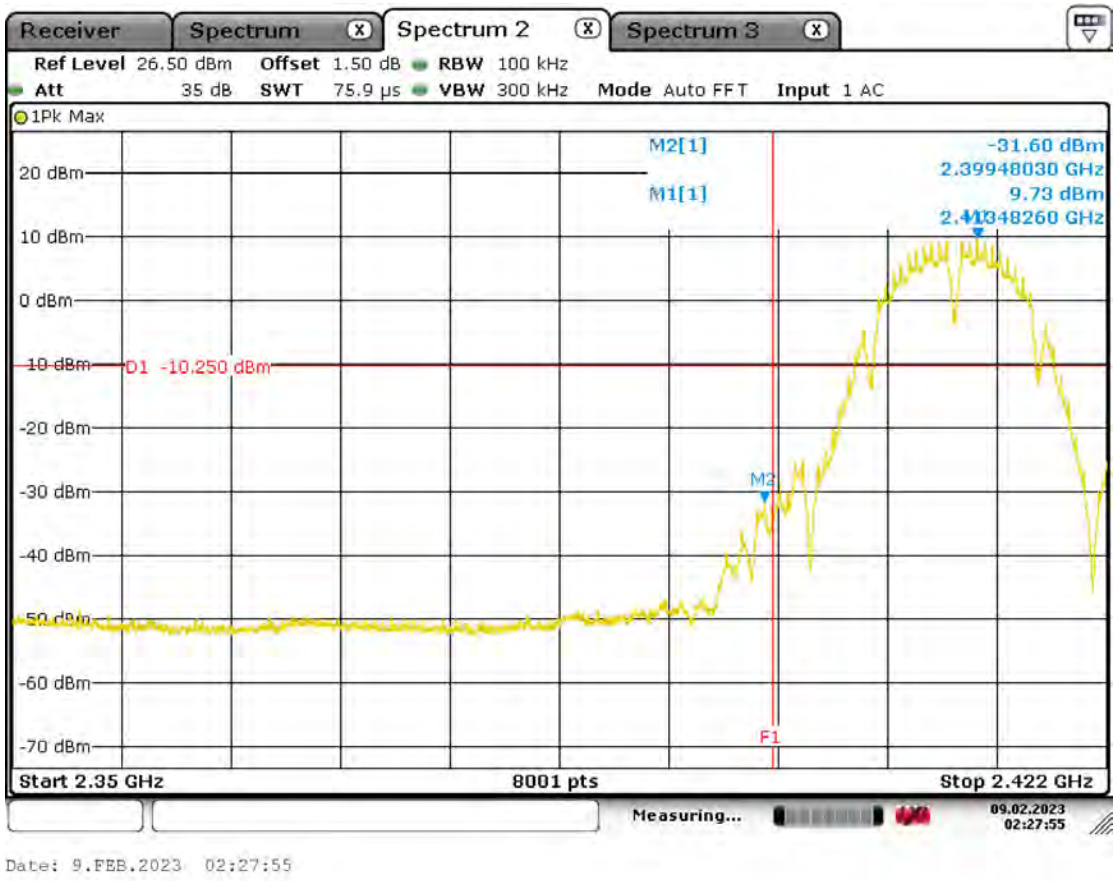

Receiver
Spectrum
Spectrum 2
Spectrum 3
Ref Level 26.50 dBm Offset 1.50 dB RBW 3 kHz
Att 35 dB SWT 3.2 ms VBW 10 kHz Mode Auto FFT Input 1 AC
1Pk Max
M1[1]
-8.41 dBm
2.4557248 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 2.462 GHz
691 pts
Span 24.4965 MHz
Measuring...
09.02.2023
02:10:13
Date: 9.FEB.2023 02:10:13

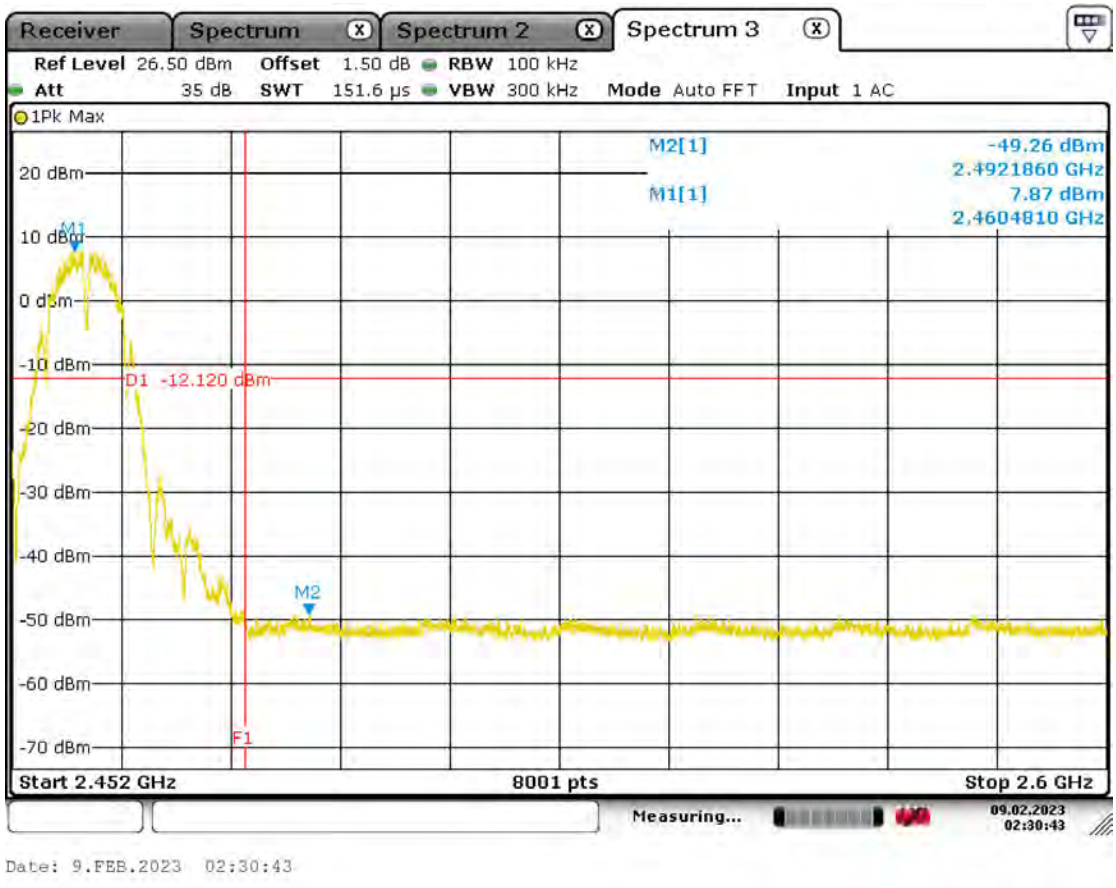
BAND EDGE MEASUREMENTS

TEST RESULT

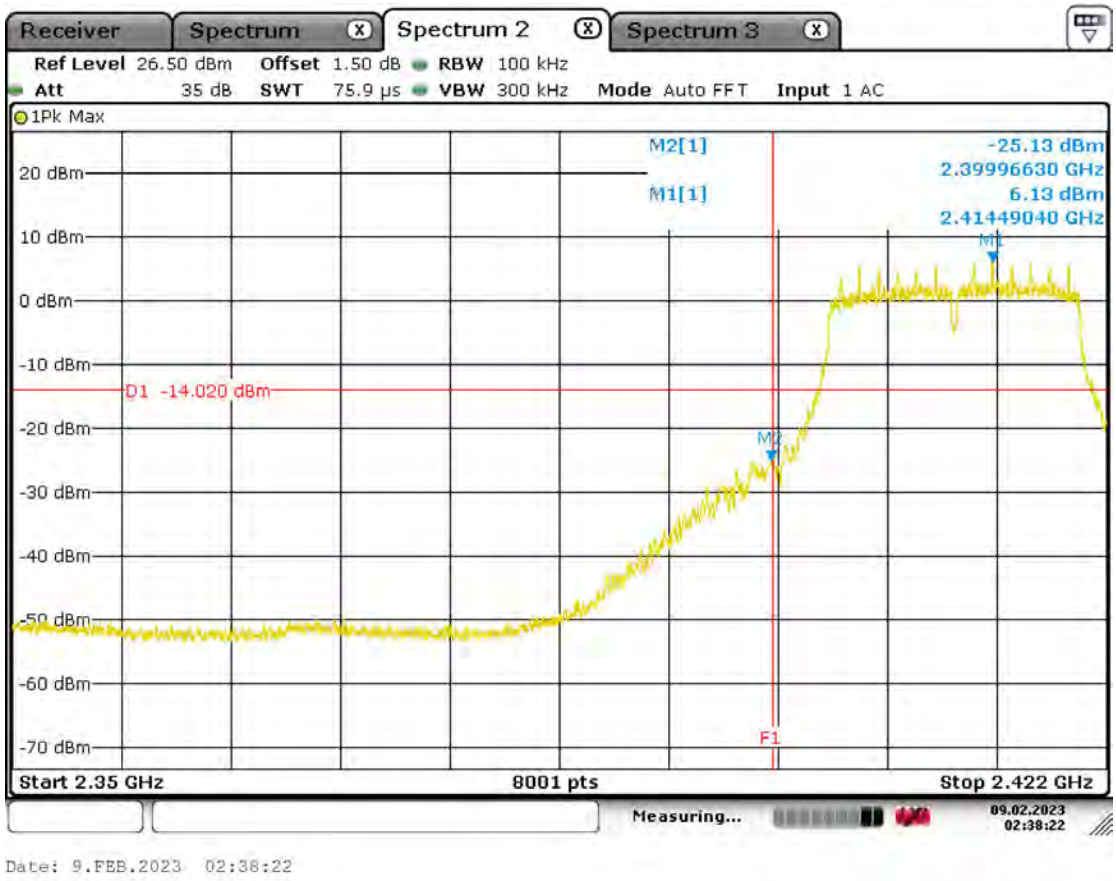
TestMode	Antenna	ChName	Frequency [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant0	Low	2412	9.75	-31.60	≤-10.25	PASS
	Ant0	High	2462	7.88	-49.26	≤-12.12	PASS
11G	Ant0	Low	2412	5.98	-25.13	≤-14.02	PASS
	Ant0	High	2462	6.35	-43.23	≤-13.65	PASS
11N20	Ant0	Low	2412	6.65	-22.80	≤-13.35	PASS
	Ant0	High	2462	6.92	-37.97	≤-13.08	PASS

TEST GRAPHS

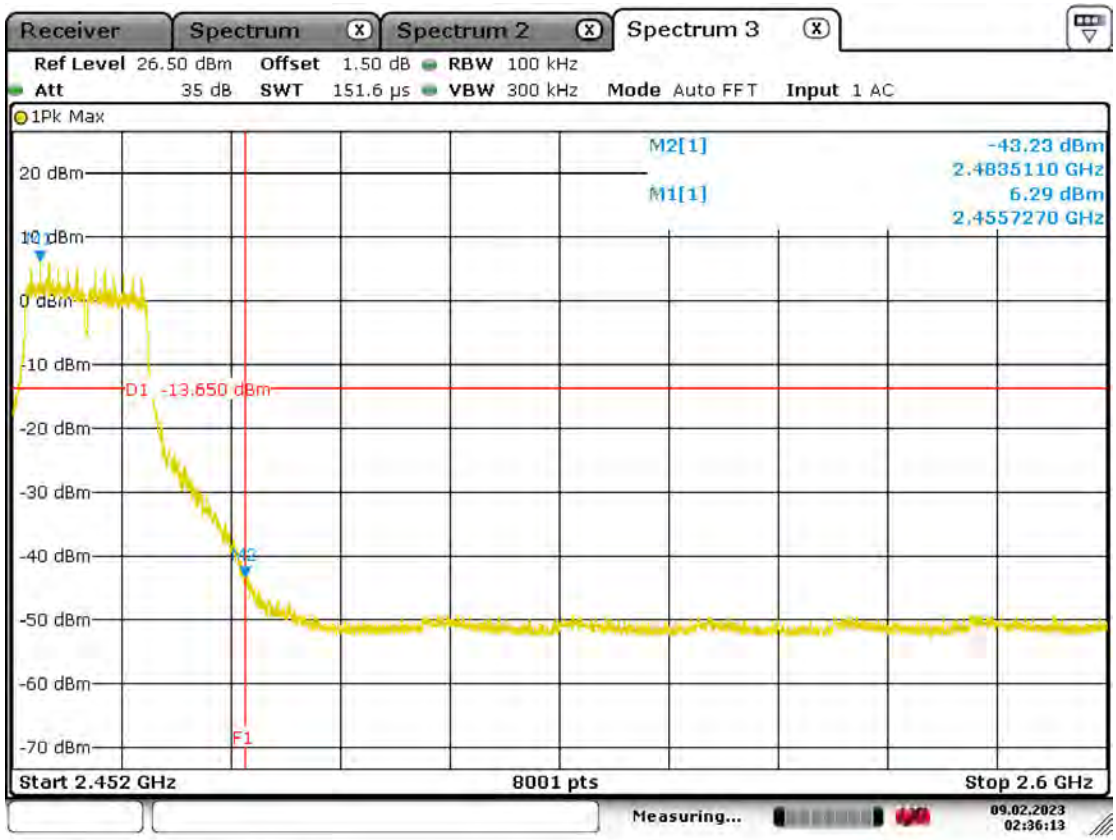
11B-CDD_Ant0_Low_2412

11B-CDD_Ant0_High_2462



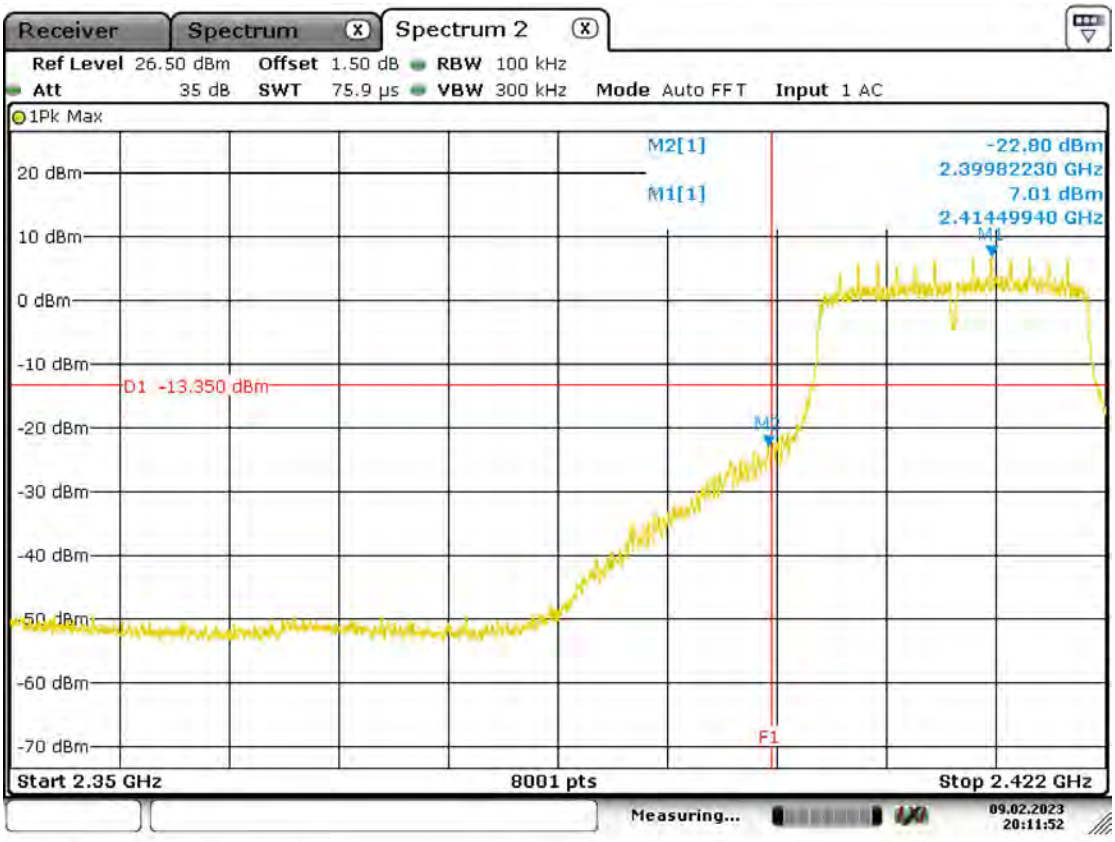
11G-CDD_Ant0_Low_2412



11G-CDD_Ant0_High_2462

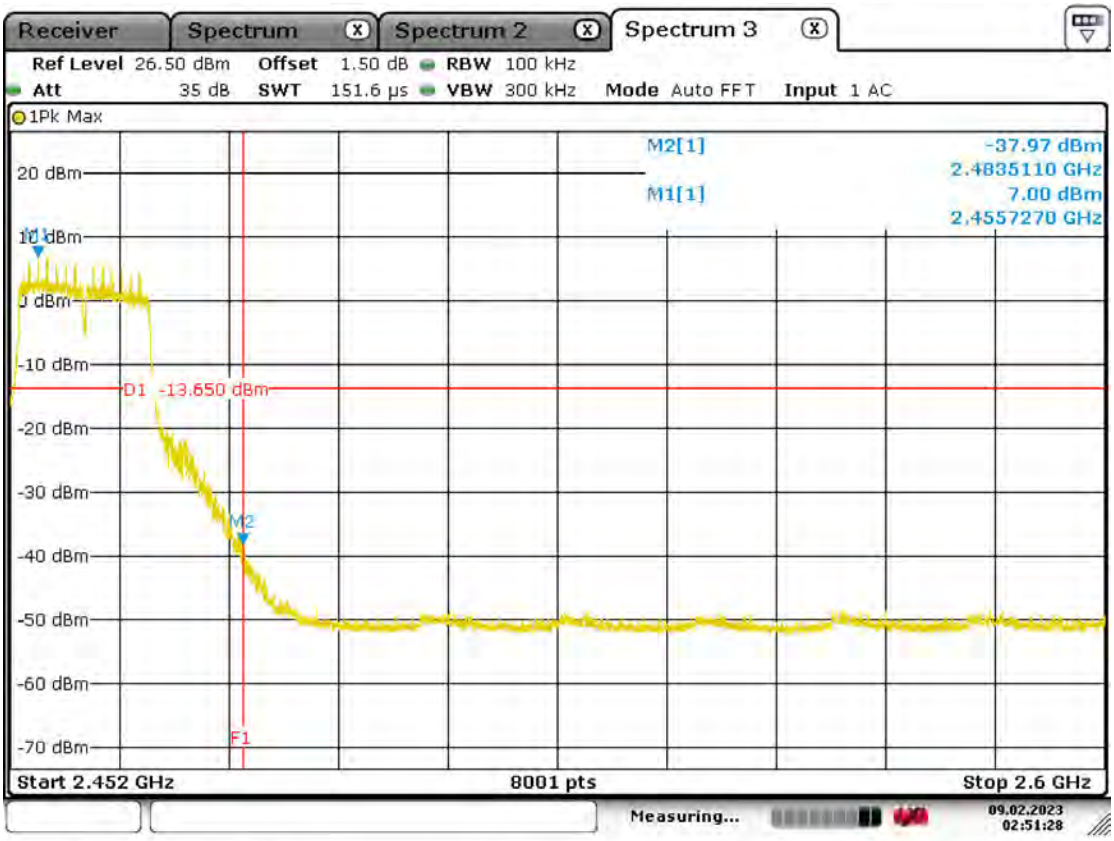


11N20MIMO_Ant0_Low_2412



7.

11N20MIMO_Ant0_High_2462


Receiver
Spectrum
Spectrum 2
Spectrum 3
Ref Level 26.50 dBm Offset 1.50 dB RBW 100 kHz
Att 35 dB SWT 151.6 µs VBW 300 kHz Mode Auto FFT Input 1 AC
1Pk Max
M2[1] -37.97 dBm
2.4835110 GHz
M1[1] 7.00 dBm
2.4557270 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
D1 -13.650 dBm
-20 dBm
-30 dBm
M2
-40 dBm
-50 dBm
-60 dBm
-70 dBm
F1
Start 2.452 GHz
8001 pts
Stop 2.6 GHz
Measuring...
09.02.2023
02:51:28
Date: 9.FEB.2023 02:51:28

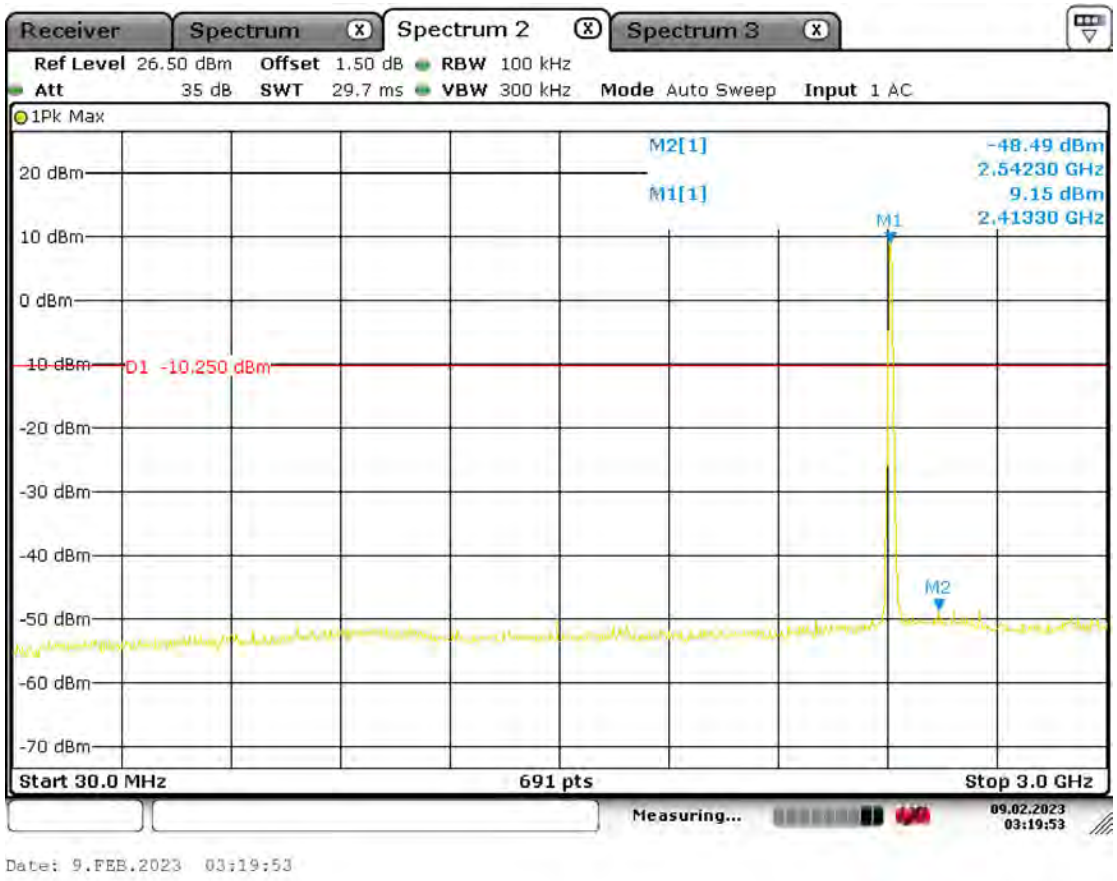
CONDUCTED SPURIOUS EMISSION

TEST RESULT

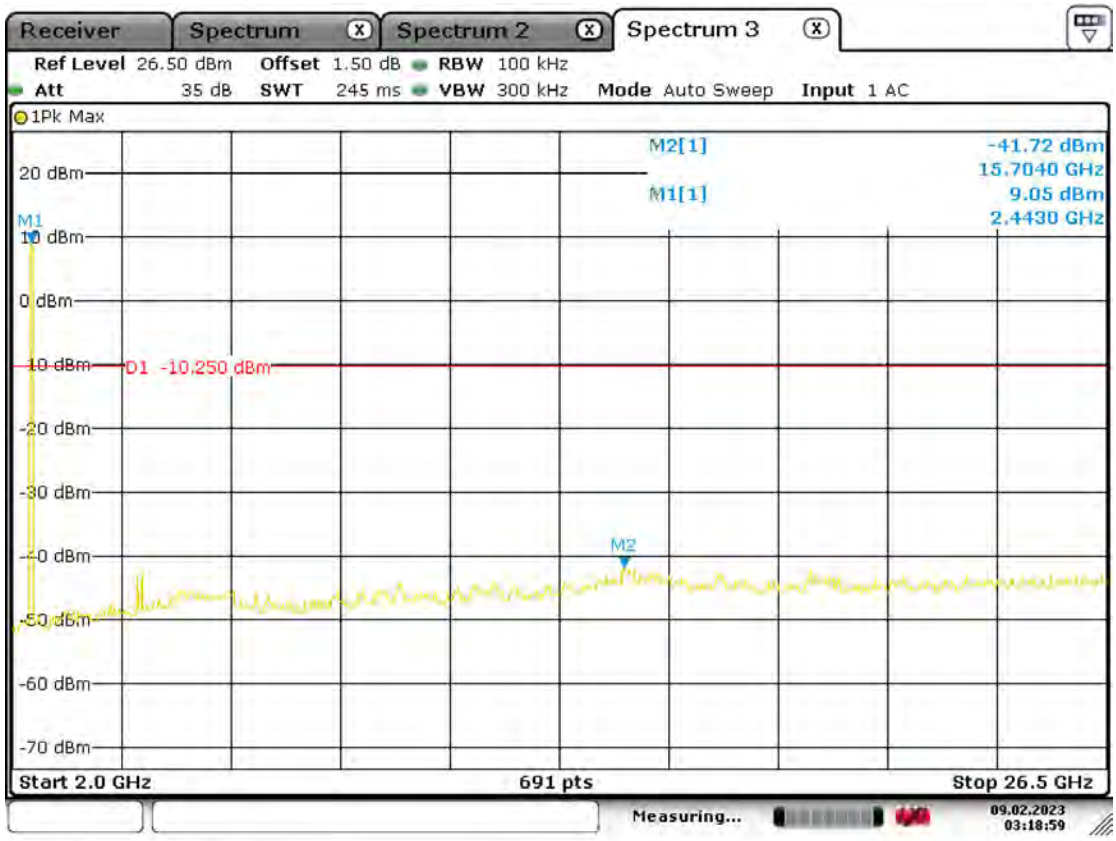
TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant0	2412	30~3000	9.75	-48.49	≤-10.25	PASS
			2000~26500	9.75	-41.72	≤-10.25	PASS
	Ant0	2437	30~3000	9.18	-48.31	≤-10.82	PASS
			2000~26500	9.18	-42.87	≤-10.82	PASS
	Ant0	2462	30~3000	7.88	-49.39	≤-12.12	PASS
			2000~26500	7.88	-41.55	≤-12.12	PASS
11G	Ant0	2412	30~3000	5.98	-49.19	≤-14.02	PASS
			2000~26500	5.98	-41.87	≤-14.02	PASS
	Ant0	2437	30~3000	6.62	-48.79	≤-13.38	PASS
			2000~26500	6.62	-42.23	≤-13.38	PASS
	Ant0	2462	30~3000	6.35	-49.20	≤-13.65	PASS
			2000~26500	6.35	-42.21	≤-13.65	PASS
11N20	Ant0	2412	30~3000	6.65	-48.36	≤-13.35	PASS
			2000~26500	6.65	-41.94	≤-13.35	PASS
	Ant0	2437	30~3000	7.21	-48.81	≤-12.79	PASS
			2000~26500	7.21	-41.74	≤-12.79	PASS
	Ant0	2462	30~3000	6.92	-48.12	≤-13.08	PASS
			2000~26500	6.92	-41.79	≤-13.08	PASS

TEST GRAPHS

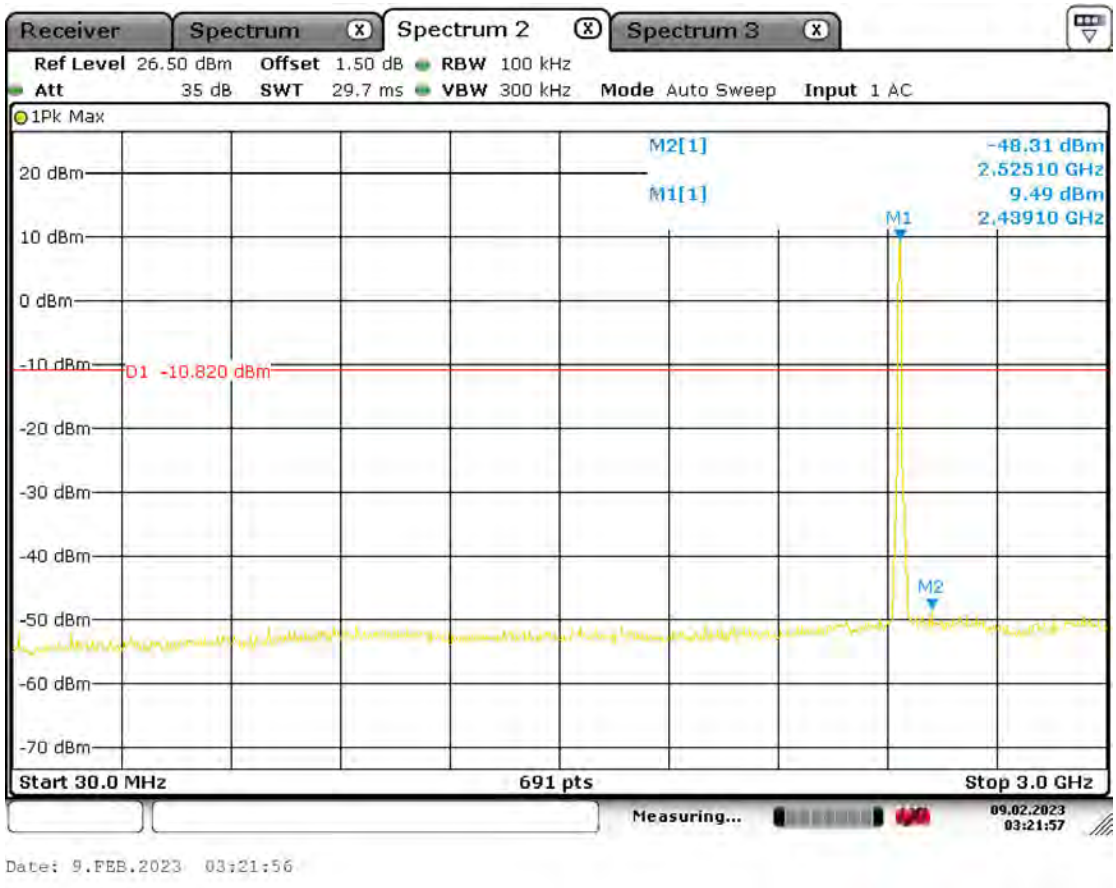
11B-CDD_Ant0_2412_30~3000



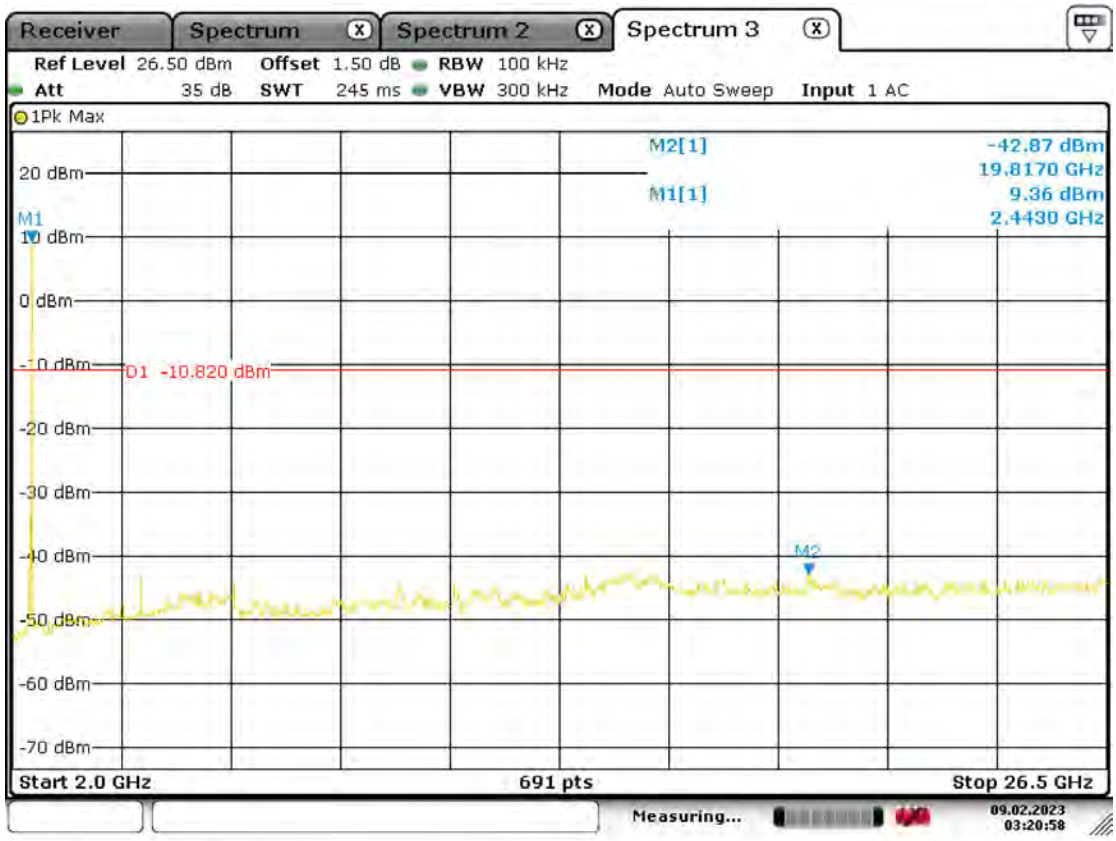
11B_Ant0_2412_2000~26500



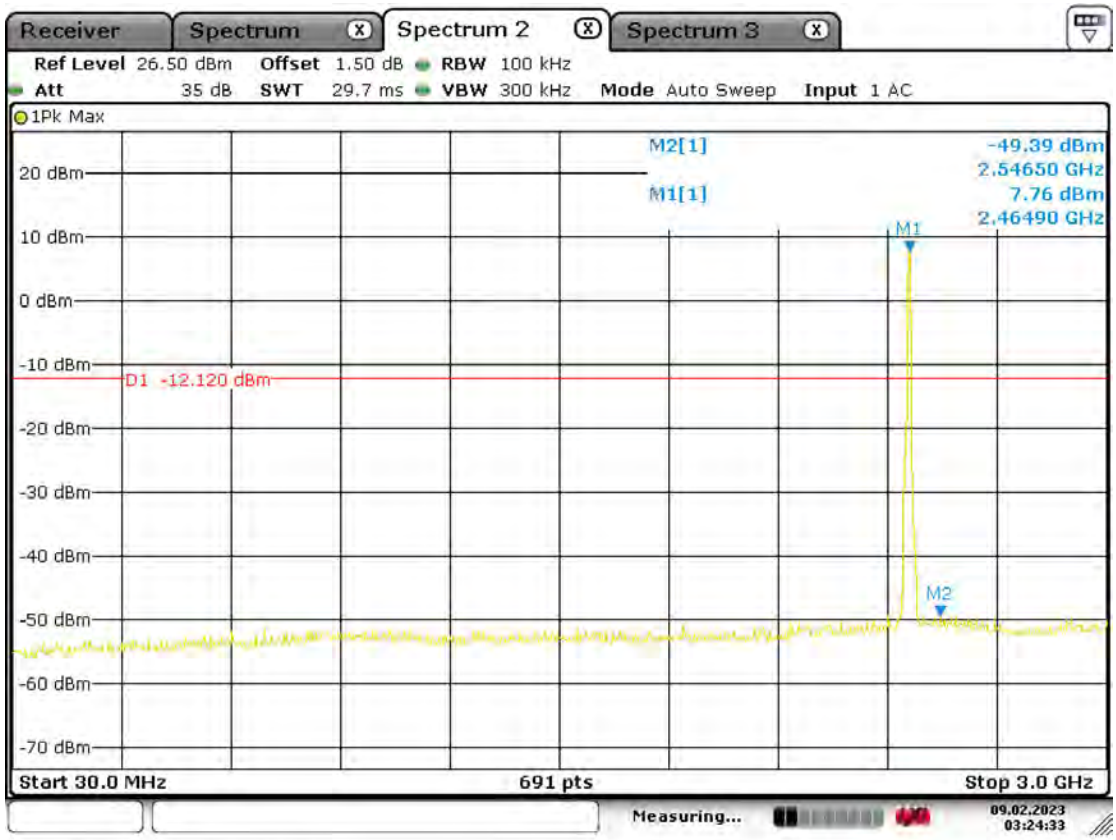
11B_Ant0_2437_30~3000



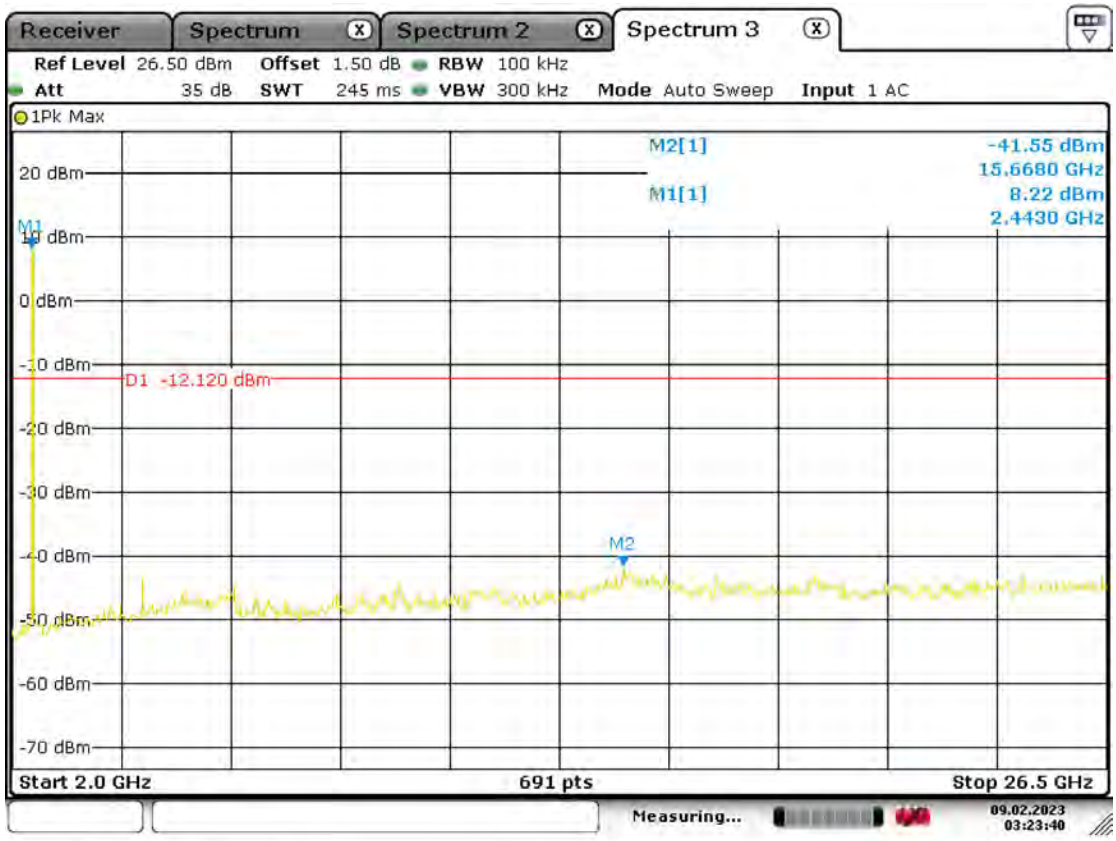
11B_Ant0_2437_2000~26500



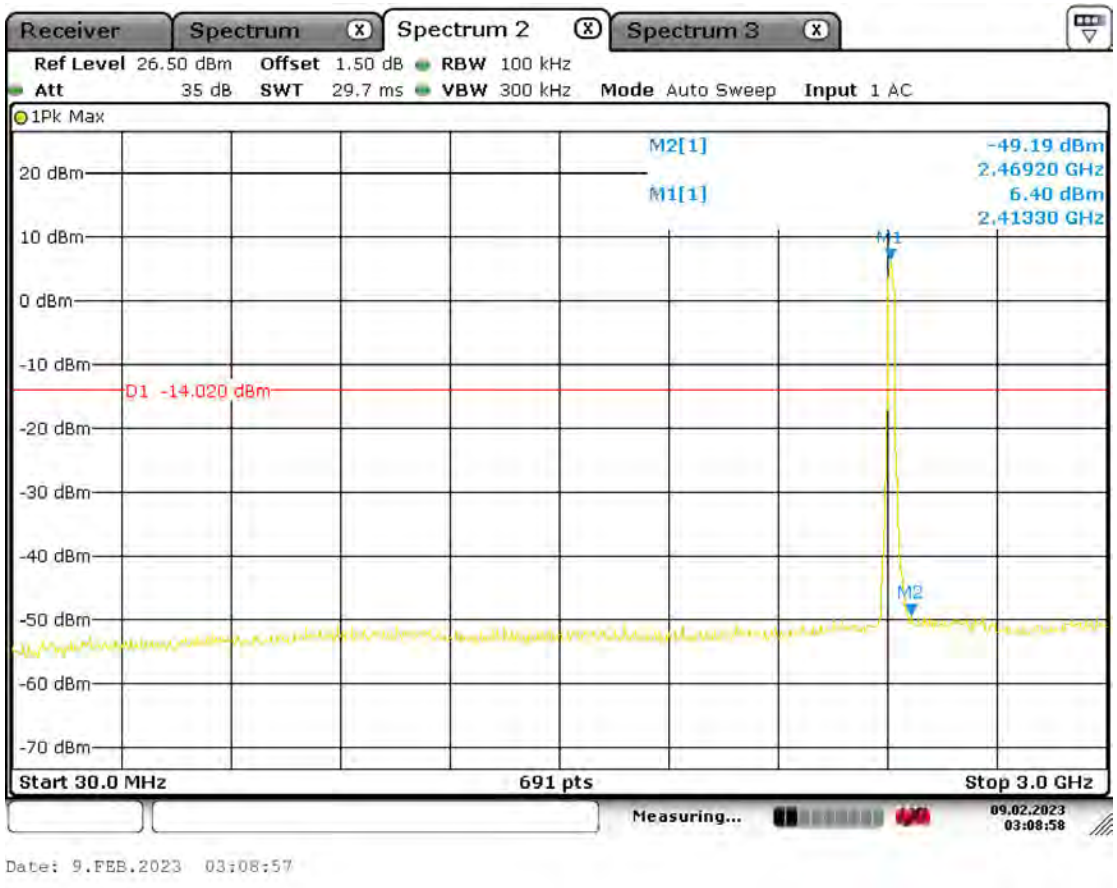
11B_Ant0_2462_30~3000



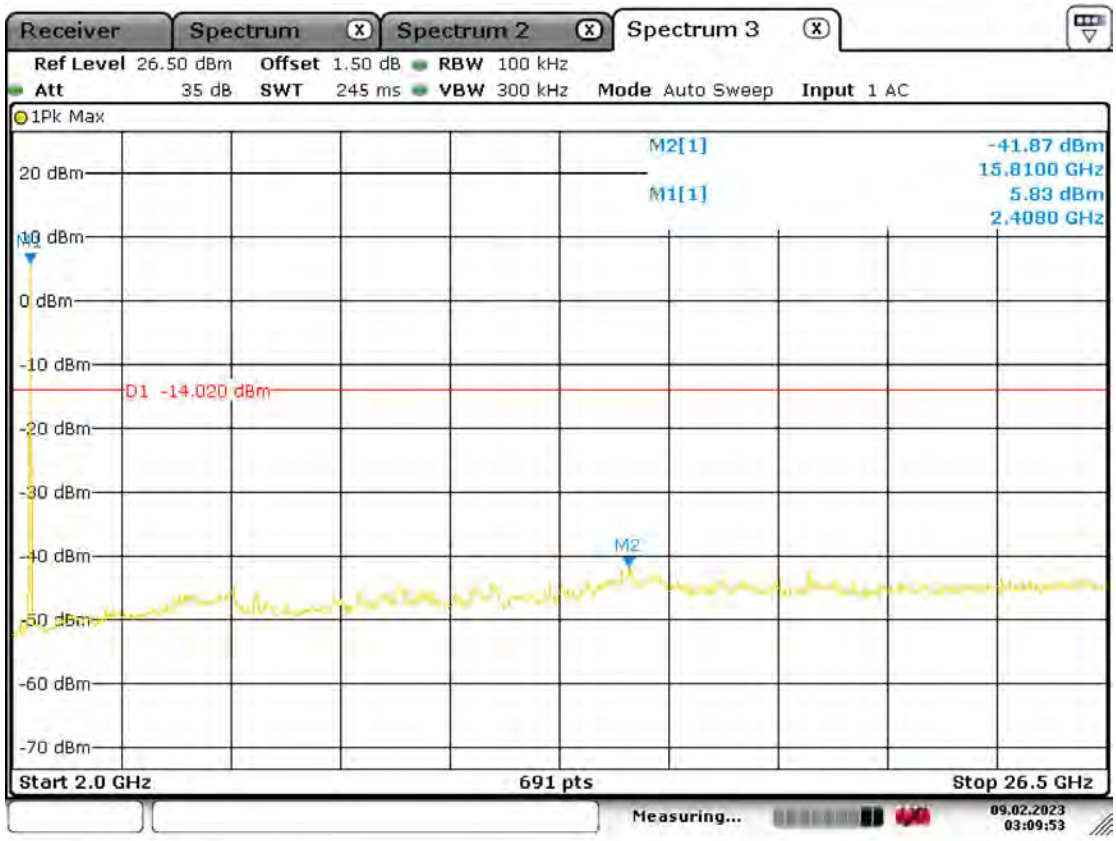
11B_Ant0_2462_2000~26500



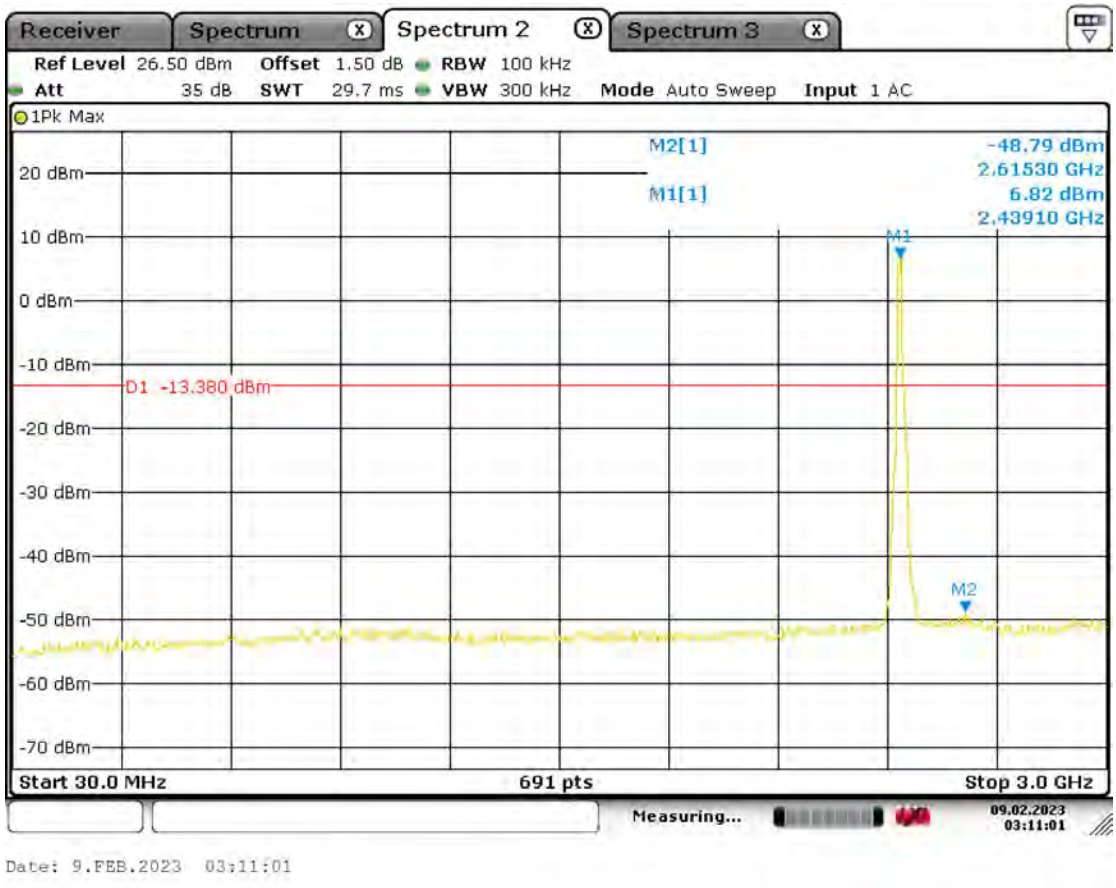
11G_Ant0_2412_30~3000



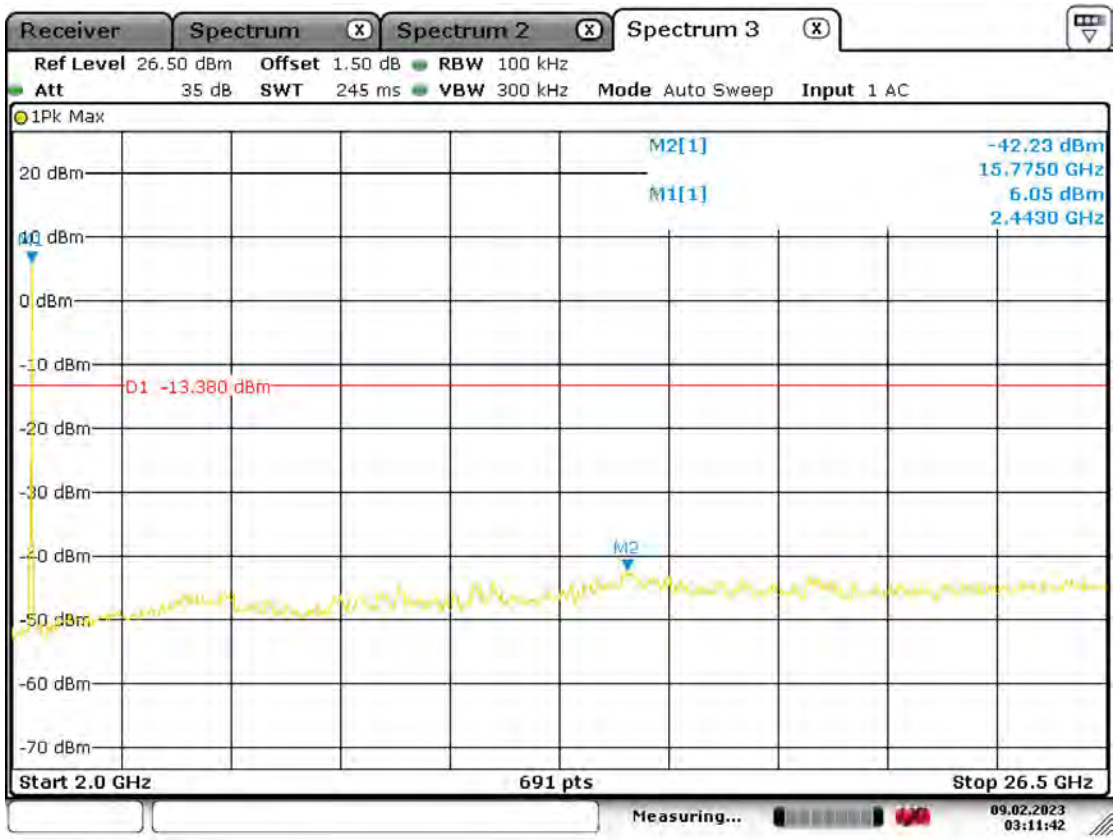
11G_Ant0_2412_2000~26500



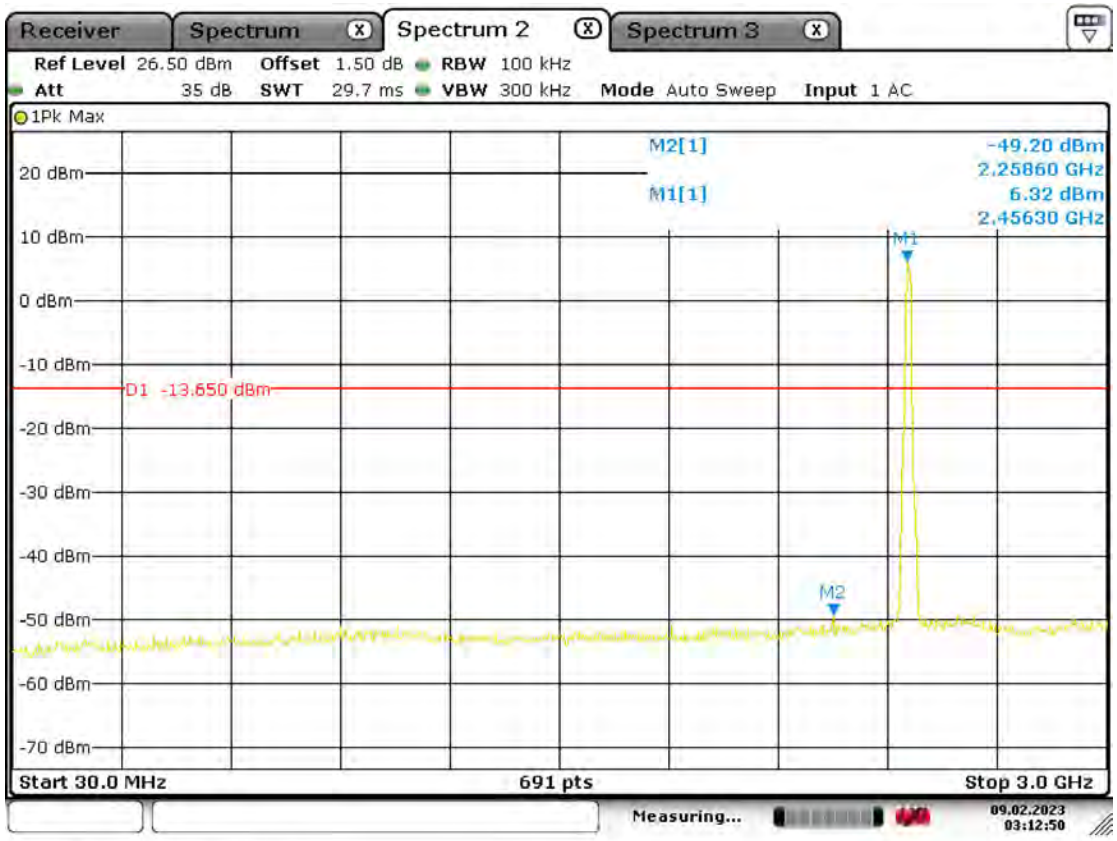
11G_Ant0_2437_30~3000



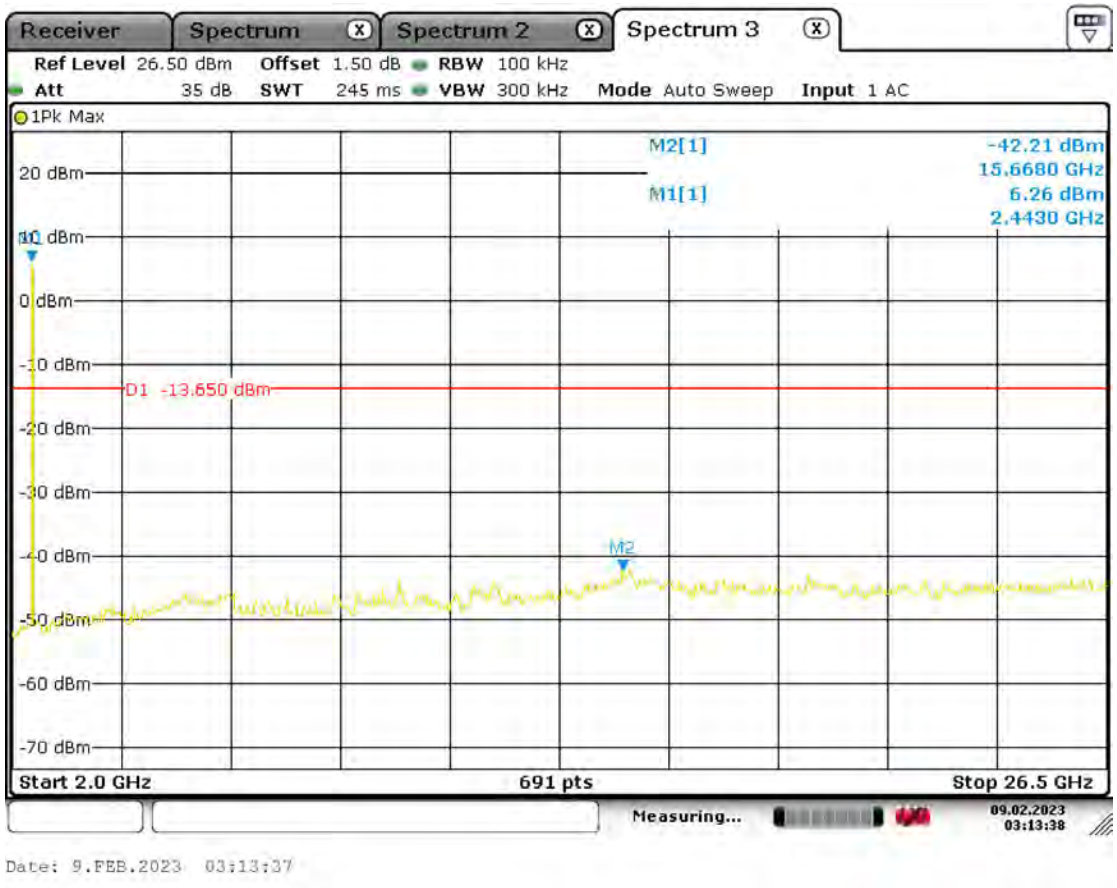
11G_Ant0_2437_2000~26500



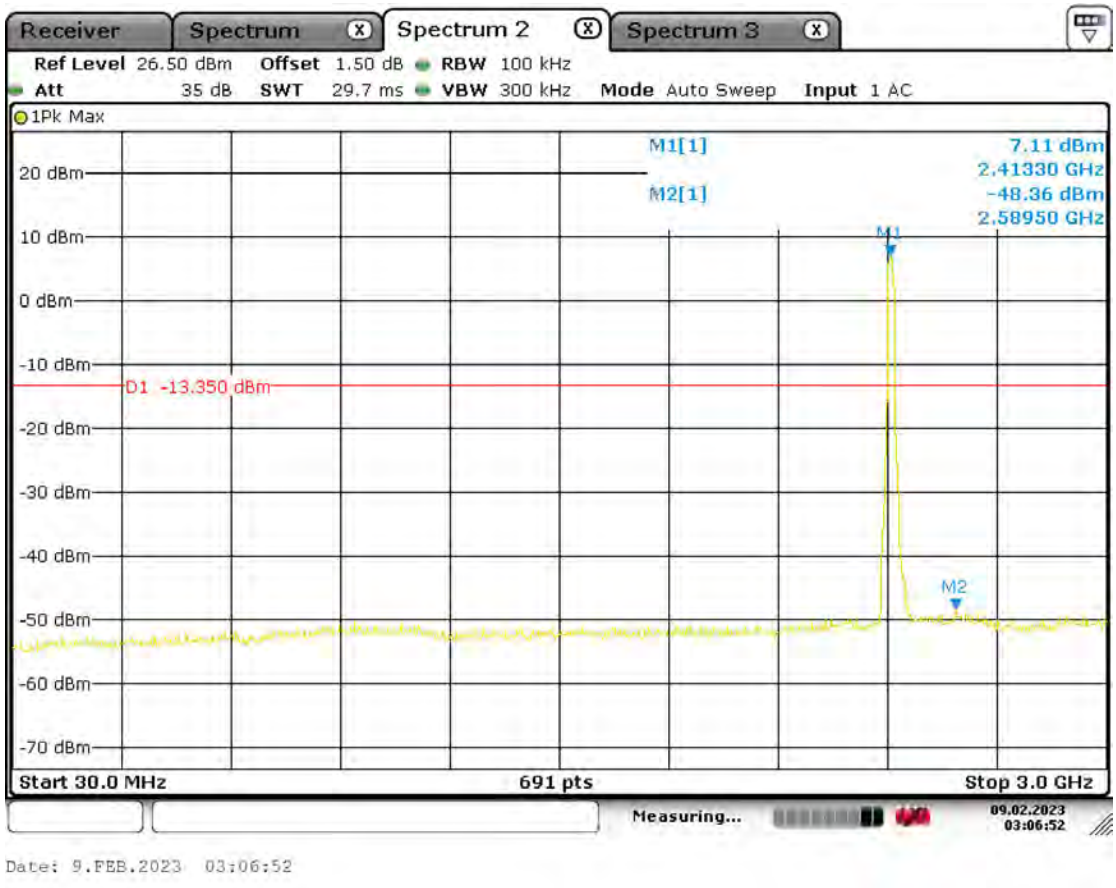
11G_Ant0_2462_30~3000



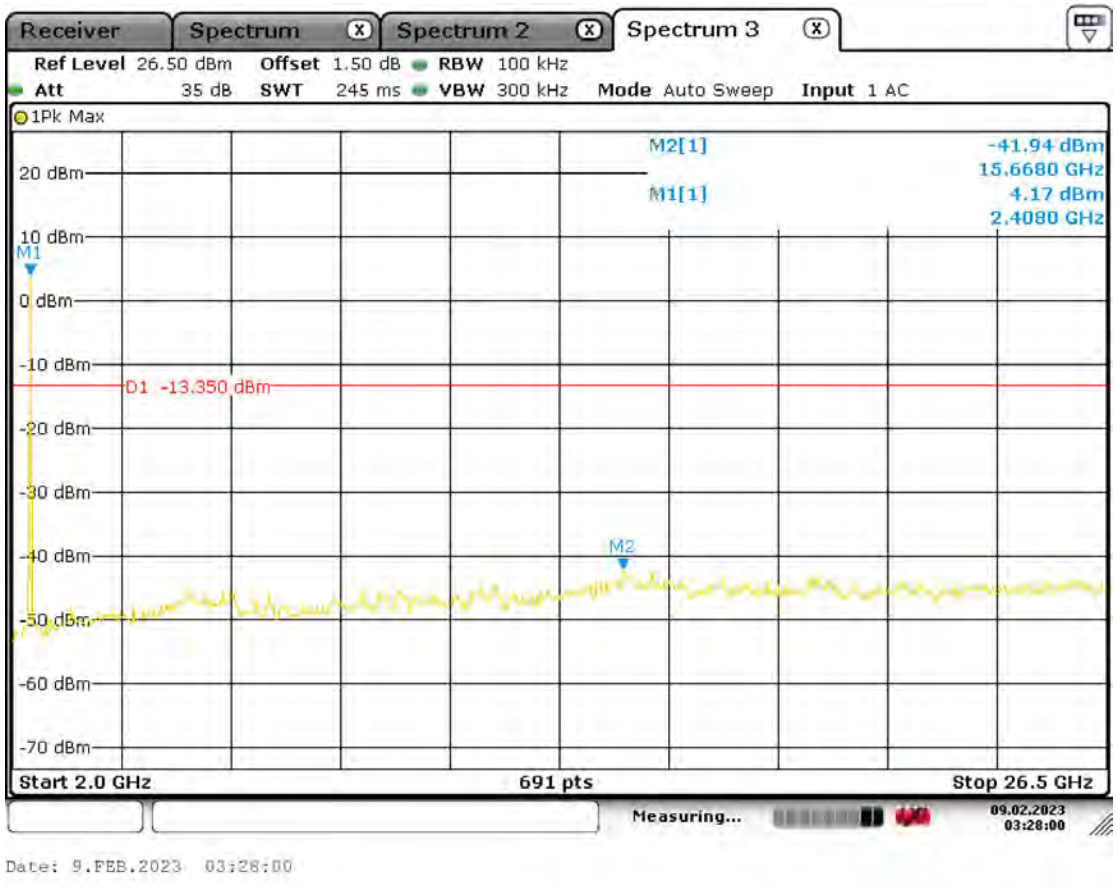
11G_Ant0_2462_2000~26500



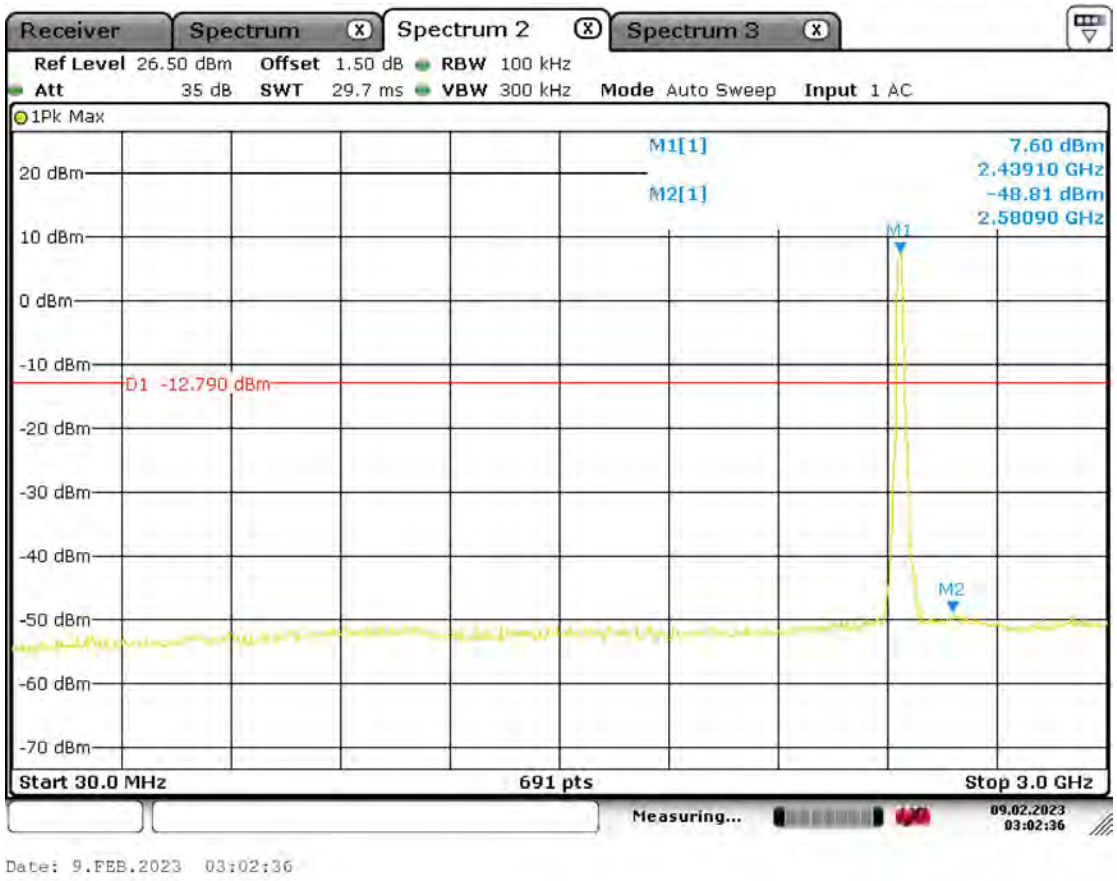
11N20_Ant0_2412_30~3000



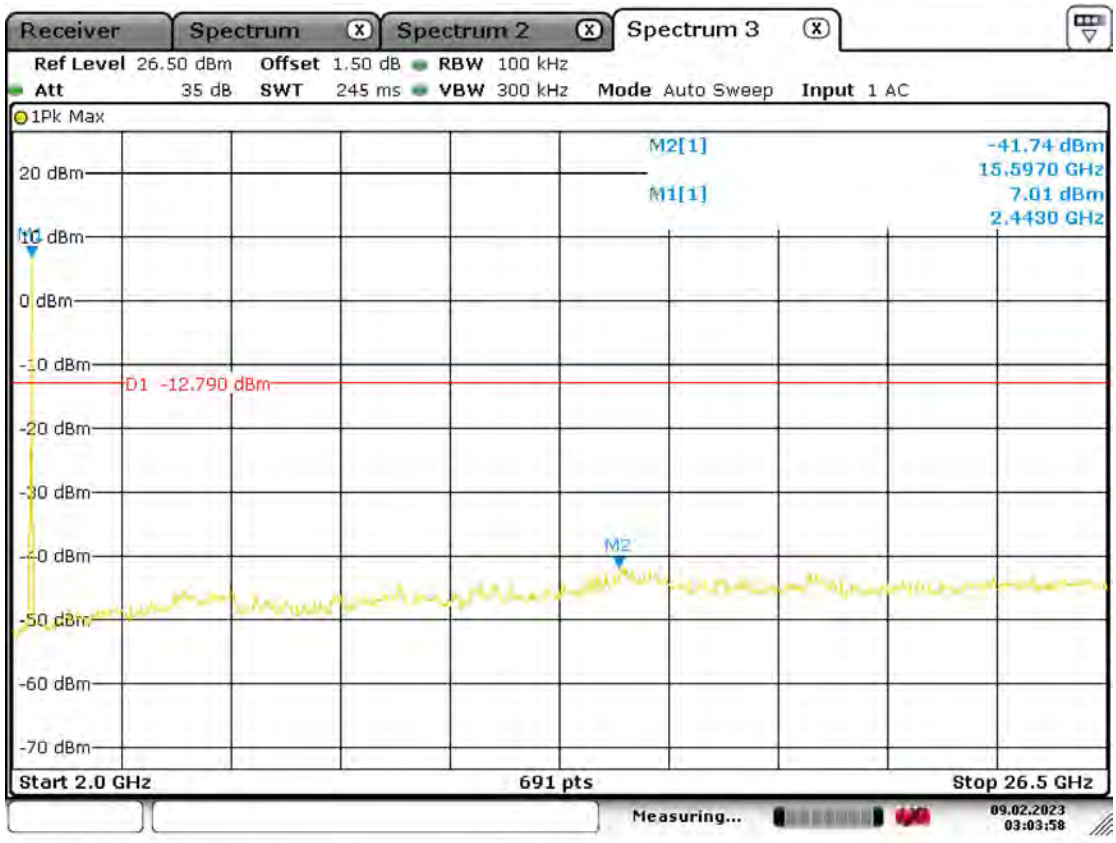
11N20_Ant0_2412_2000~26500



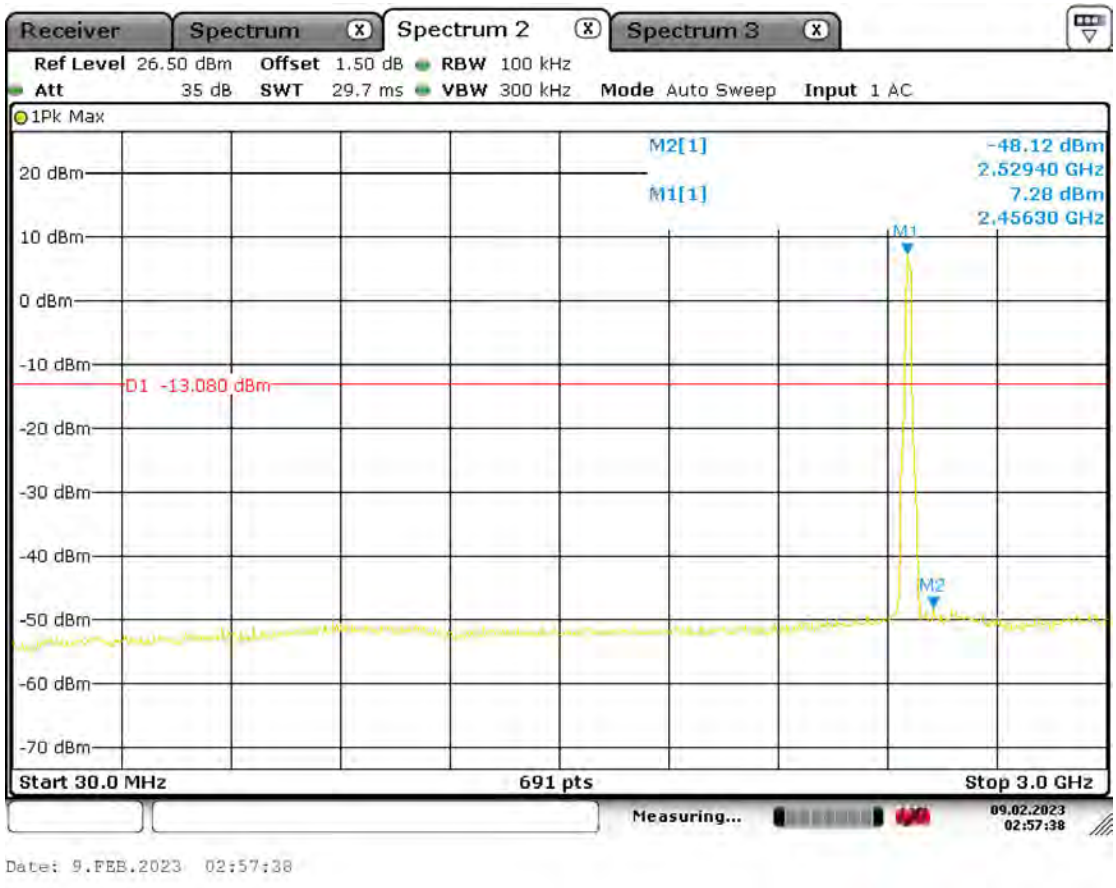
11N20_Ant0_2437_30~3000



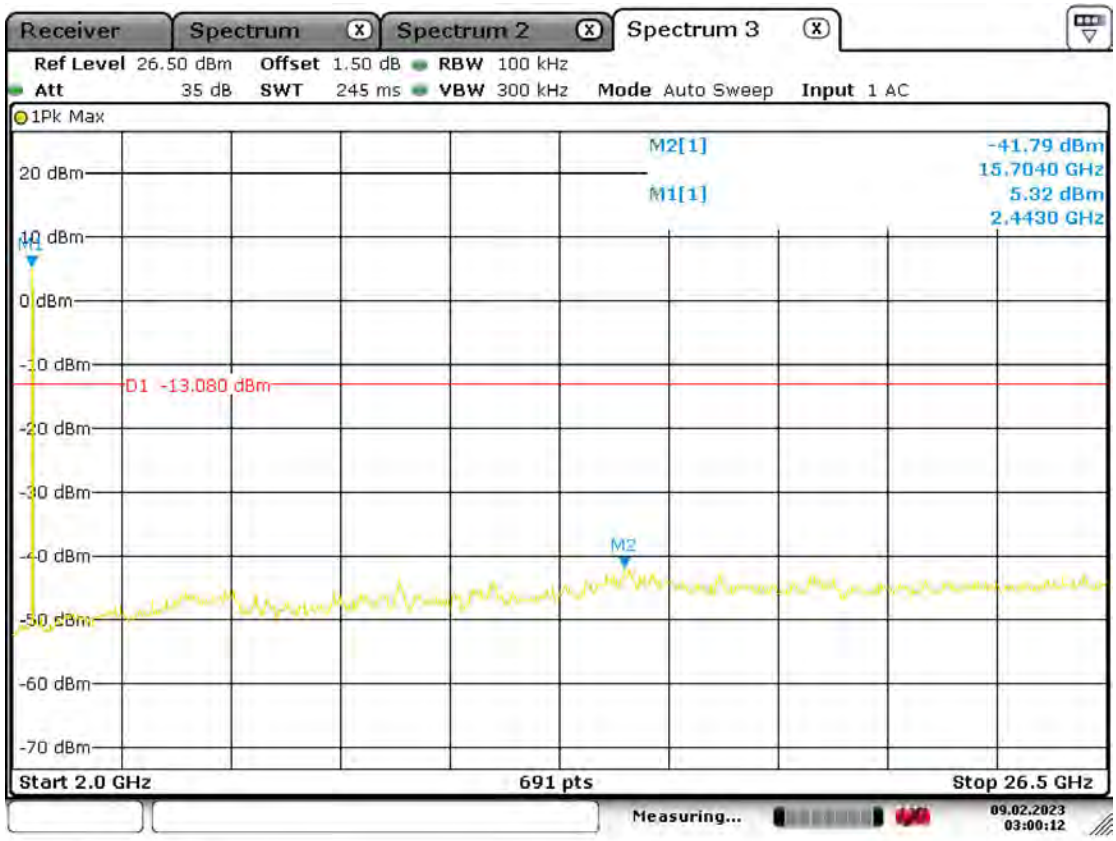
11N20_Ant0_2437_2000~26500



11N20_Ant0_2462_30~3000



11N20_Ant0_2462_2000~26500


Receiver
Spectrum
Spectrum 2
Spectrum 3
Ref Level 26.50 dBm Offset 1.50 dB RBW 100 kHz
Att 35 dB SWT 245 ms VBW 300 kHz Mode Auto Sweep Input 1 AC
1Pk Max
M2[1] -41.79 dBm
15.7040 GHz
M1[1] 5.32 dBm
2.4430 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
D1 -13.080 dBm
M1
M2
Start 2.0 GHz
691 pts
Stop 26.5 GHz
Measuring...
09.02.2023
03:00:12
Date: 9.FEB.2023 03:00:11

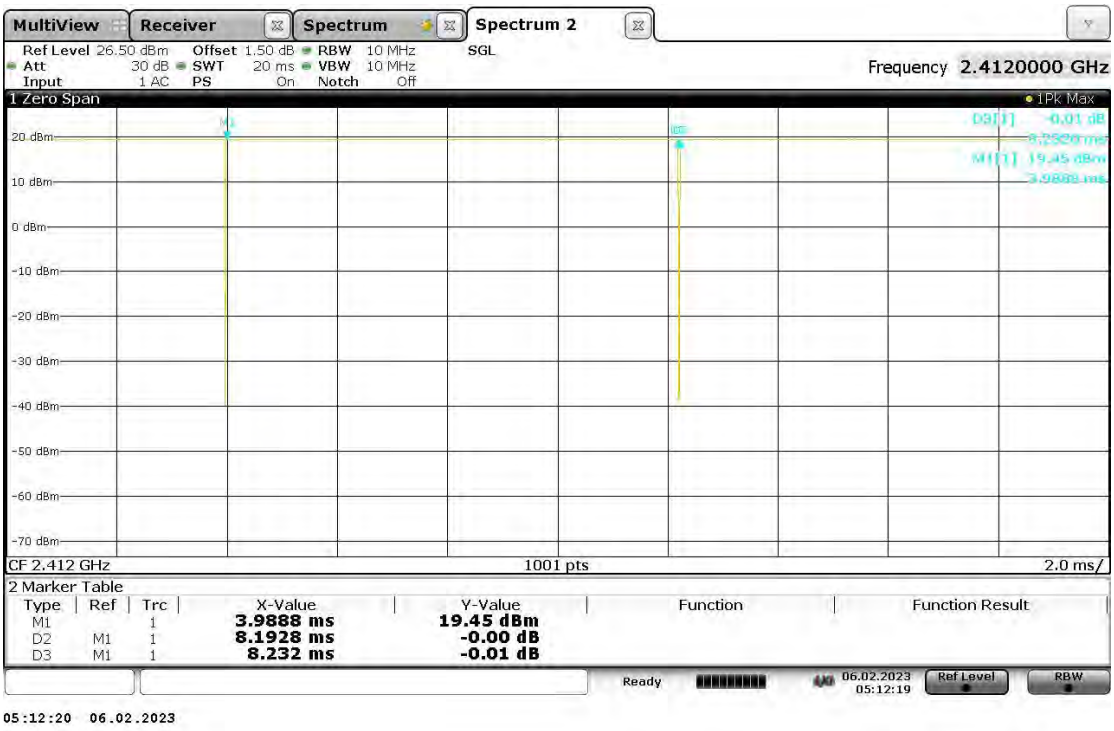
DUTY CYCLE

TEST RESULT

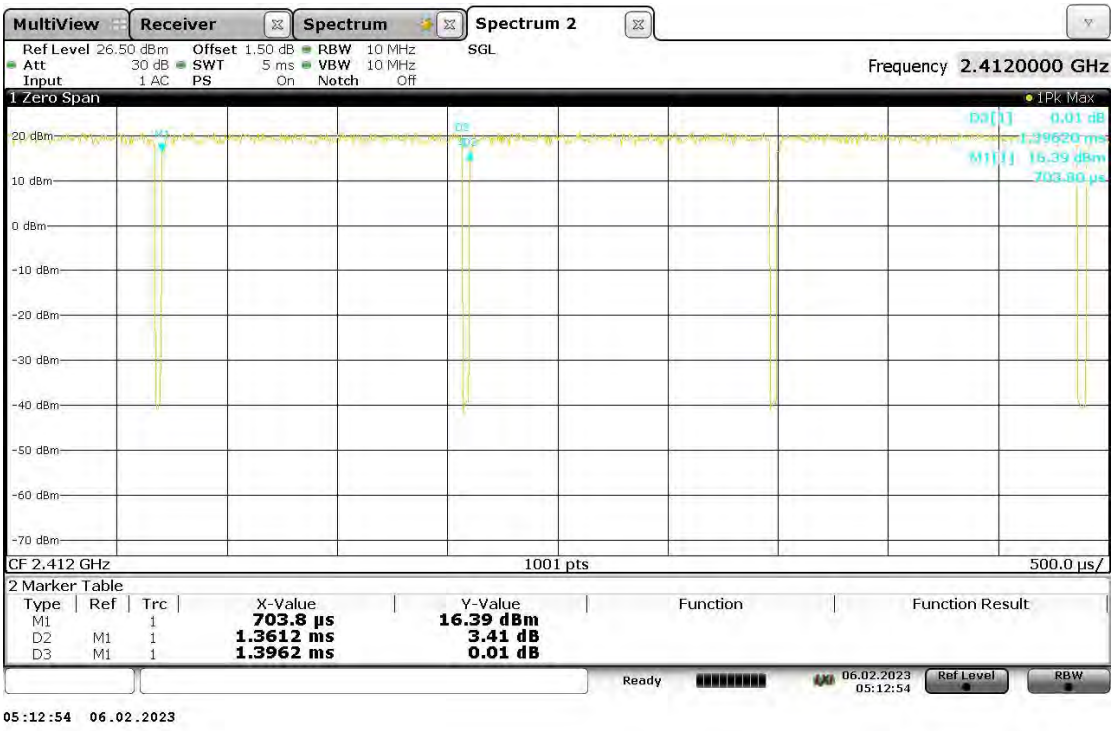
TestMode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant0	2412	8.193	8.232	99.52
11G	Ant0	2412	1.361	1.396	97.49
11N20	Ant0	2412	1.276	1.321	96.59

TEST GRAPHS

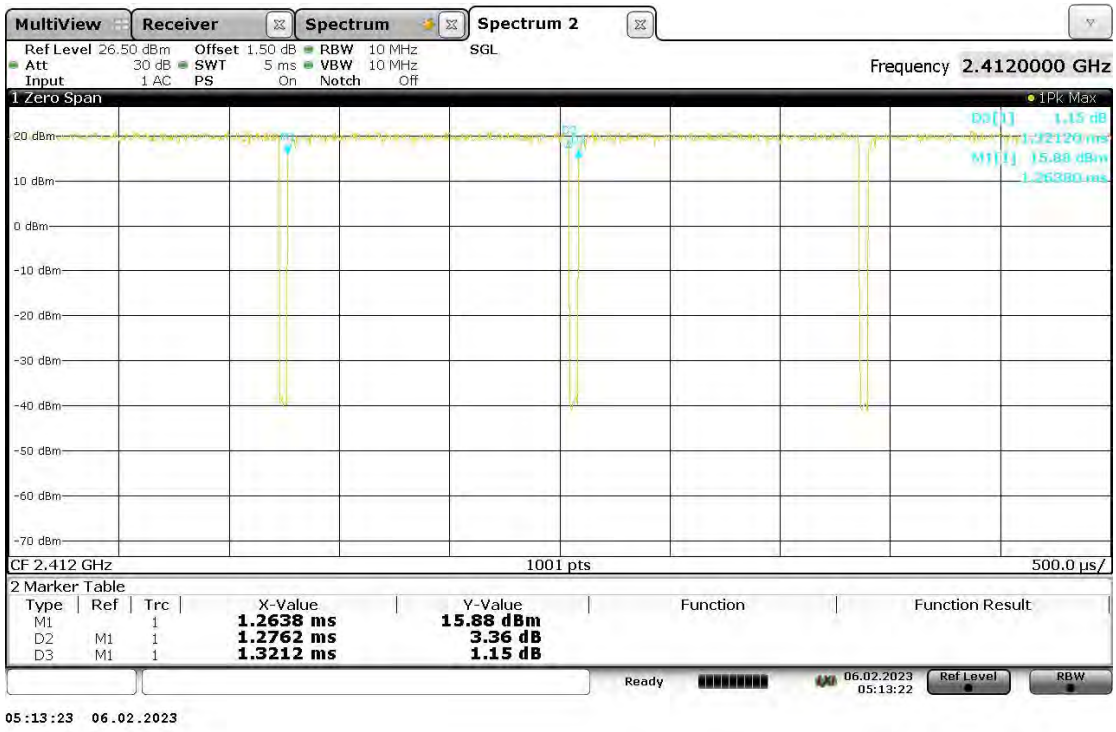
11B_Ant0_2412



11G_Ant0_2412



11N20_Ant0_2412


MultiView
Receiver
Spectrum
Spectrum 2
Ref Level 26.50 dBm
Offset 1.50 dB
RBW 10 MHz
SGL
Att 30 dB
SWT 5 ms
VBW 10 MHz
Input 1 AC
PS On
Notch Off
Frequency 2.4120000 GHz
1 Zero Span
1Pk Max
D3[1] 1.15 dB
1.32120 ms
M1[1] 15.88 dBm
1.26380 ms
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.412 GHz
1001 pts
500.0 µs/
2 Marker Table
Type Ref Trc X-Value Y-Value Function Function Result
M1 1 1.2638 ms 15.88 dBm
D2 M1 1 1.2762 ms 3.36 dB
D3 M1 1 1.3212 ms 1.15 dB
Ready
06.02.2023
05:13:22
Ref Level
RBW
05:13:23 06.02.2023

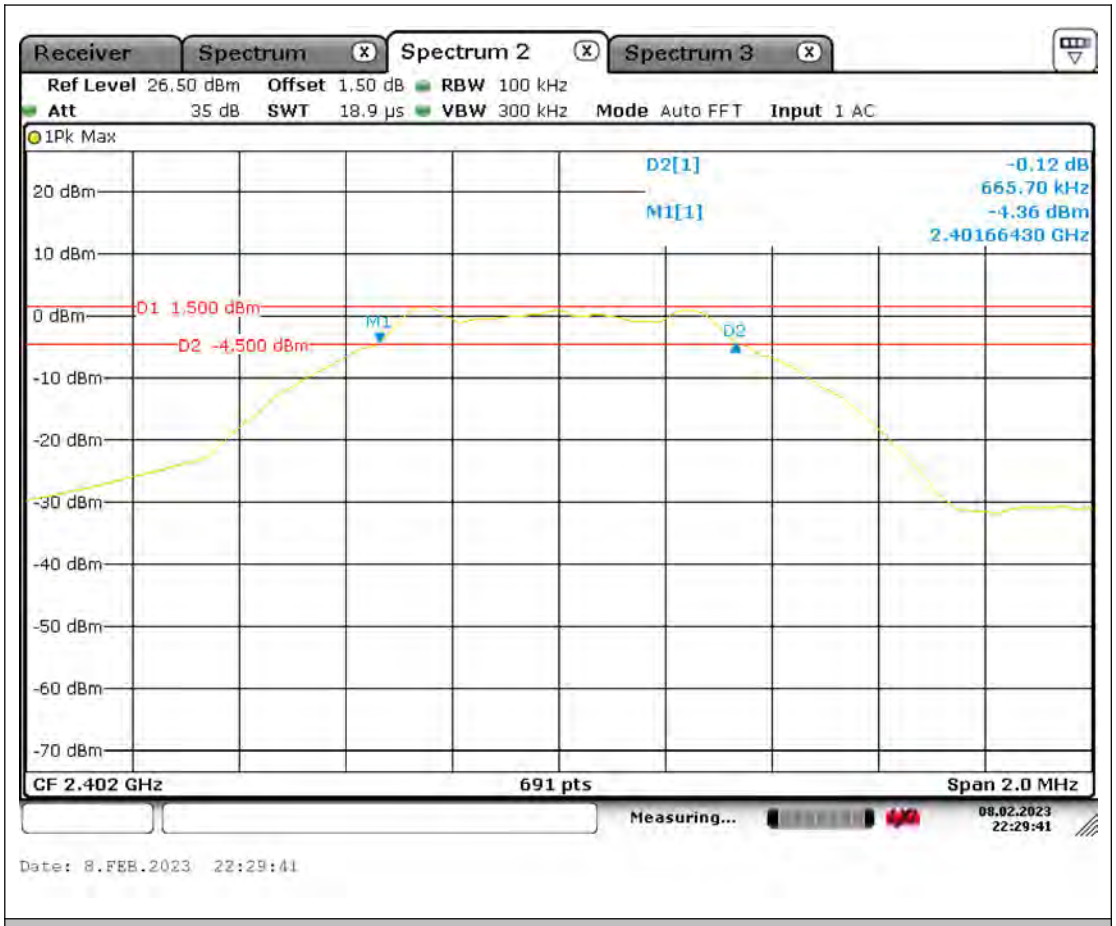
7 Appendix 2 BLE

DTS BANDWIDTH

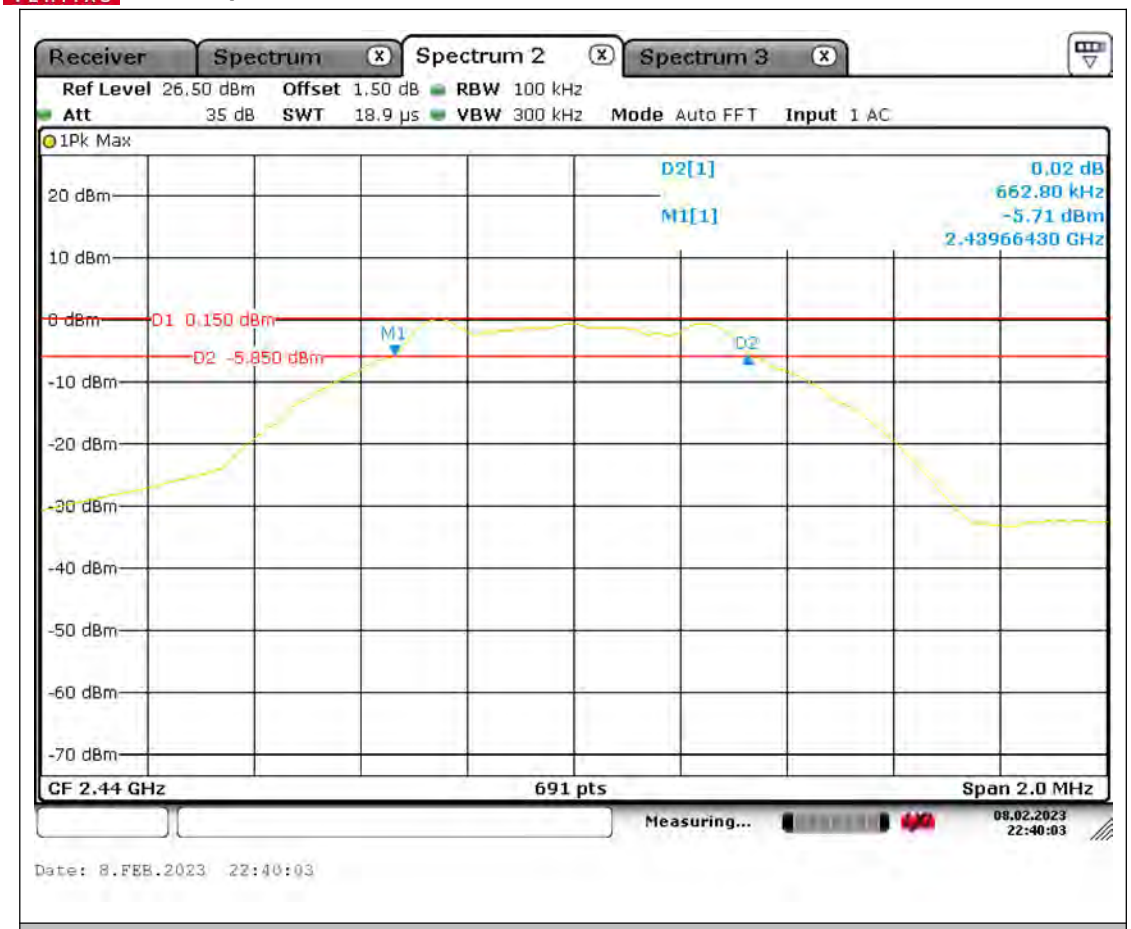
TEST RESULT

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.666	2401.664	2402.330	0.5	PASS
		2440	0.663	2439.664	2440.327	0.5	PASS
		2480	0.666	2479.661	2480.327	0.5	PASS

TEST GRAPHS



BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

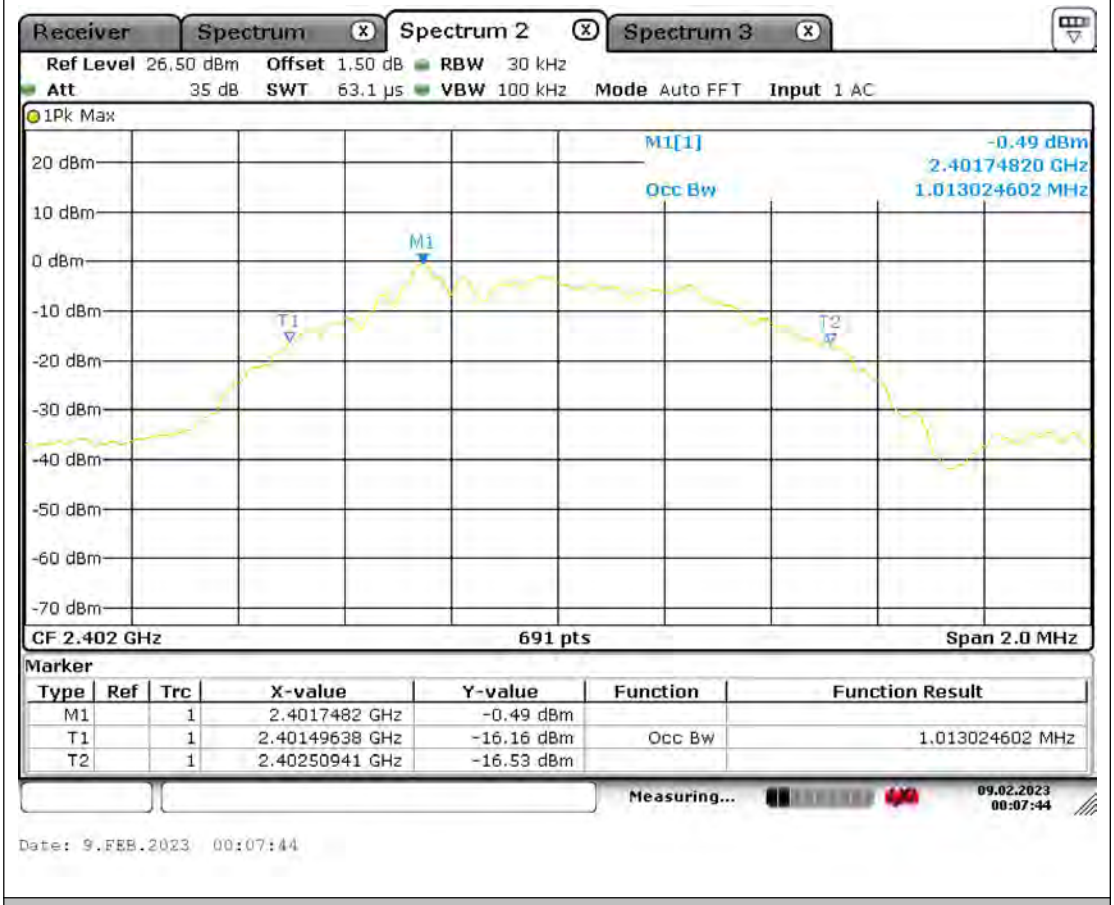
BLE_1M_Ant1_2480

OCCUPIED CHANNEL BANDWIDTH

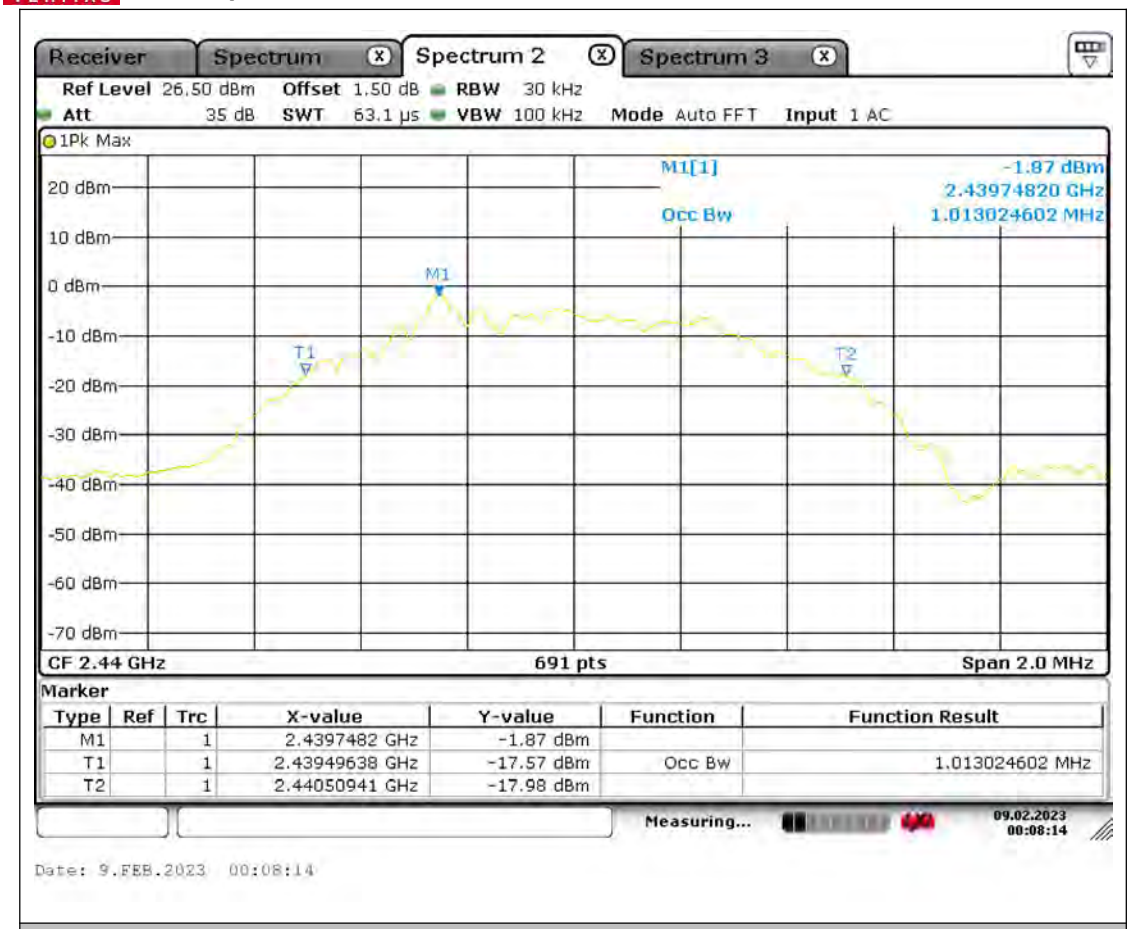
TEST RESULT

TestMode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.0130	2401.496	2402.509	---	PASS
		2440	1.0130	2439.496	2440.509	---	PASS
		2480	1.0130	2479.496	2480.509	---	PASS

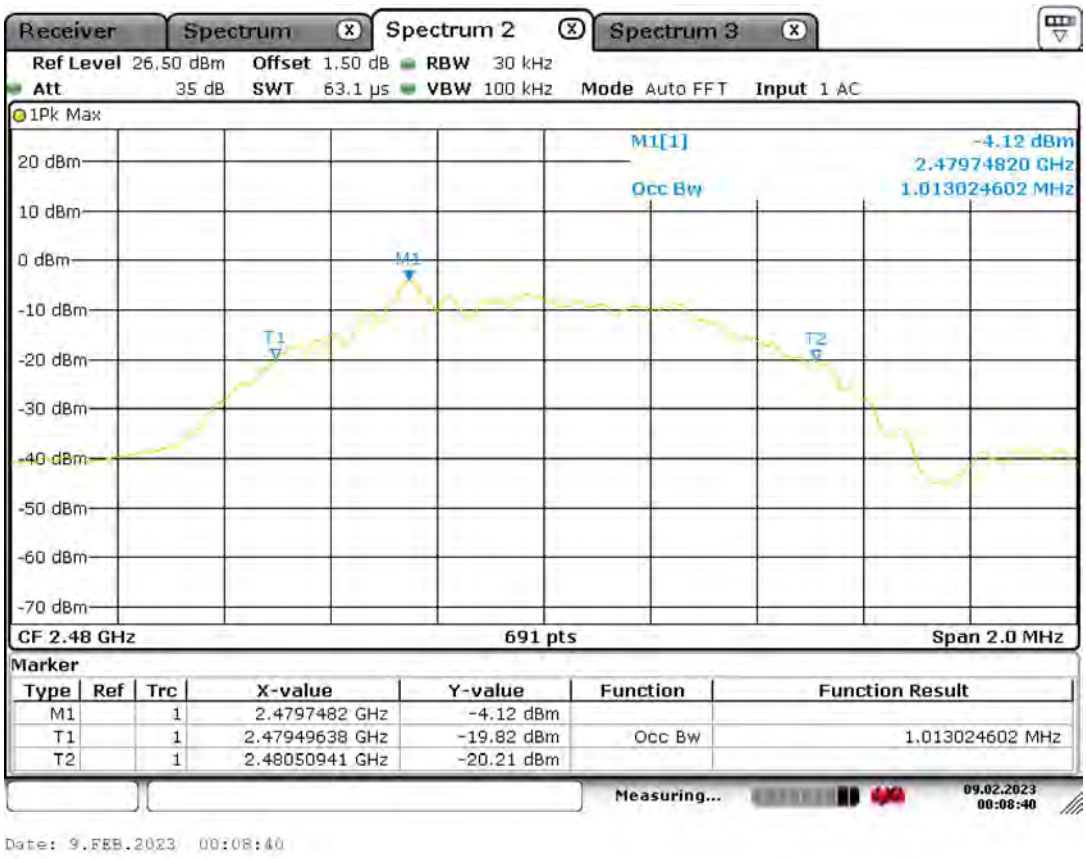
TEST GRAPHS



BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480

MAXIMUM CONDUCTED OUTPUT POWER

TEST RESULT PEAK

TestMode	Antenna	Channel	Peak Powert[dBm]	Peak Powert[mw]	Conducted Limit[dBm]	Verdict	Power setting
1M	Ant1	2402	0.86	1.22	≤30	PASS	Defult
		2440	0.37	1.09	≤30	PASS	Defult
		2480	-0.94	0.81	≤30	PASS	Defult

TEST RESULT AVERAGE

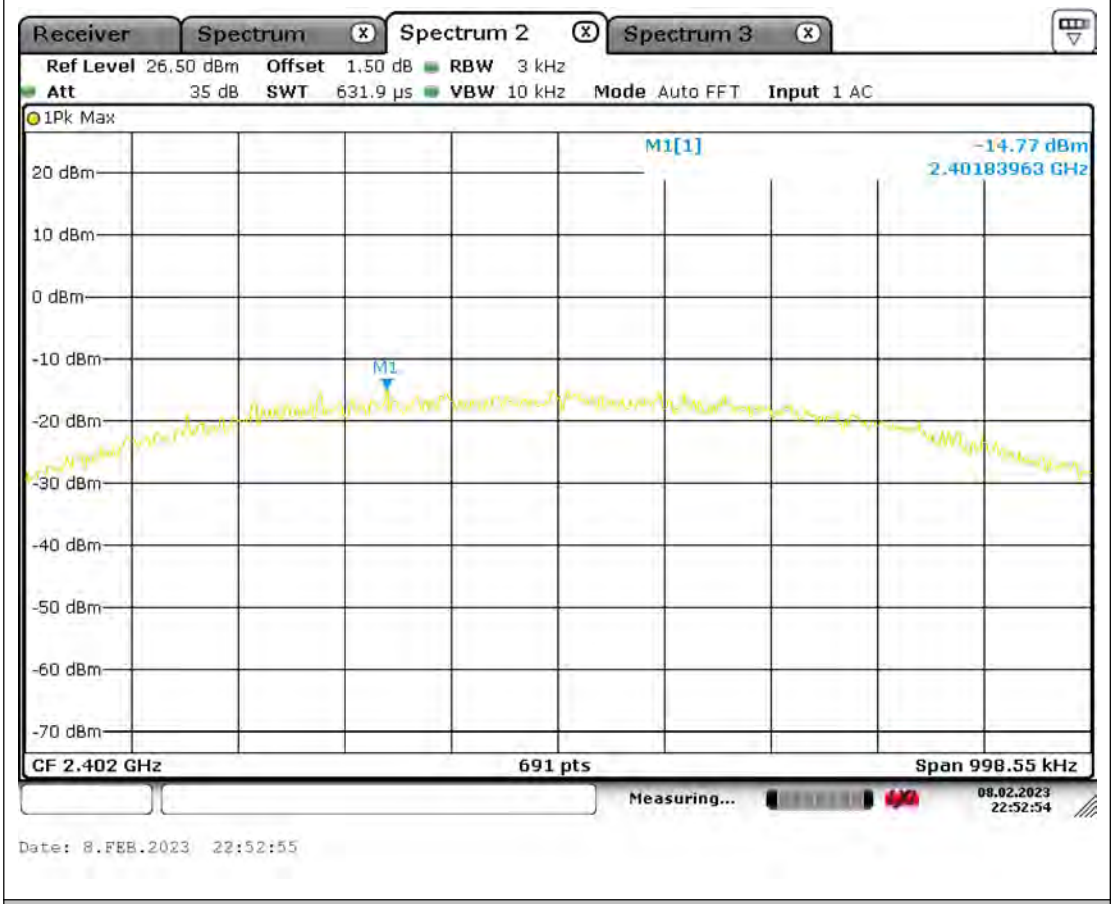
TestMode	Antenna	Channel	Average Power	Conducted Limit[dBm]	Verdict	Power setting
1M	Ant1	2402	0.57	/	PASS	Defult
		2440	-0.14	/	PASS	Defult
		2480	-1.21	/	PASS	Defult

MAXIMUM POWER SPECTRAL DENSITY

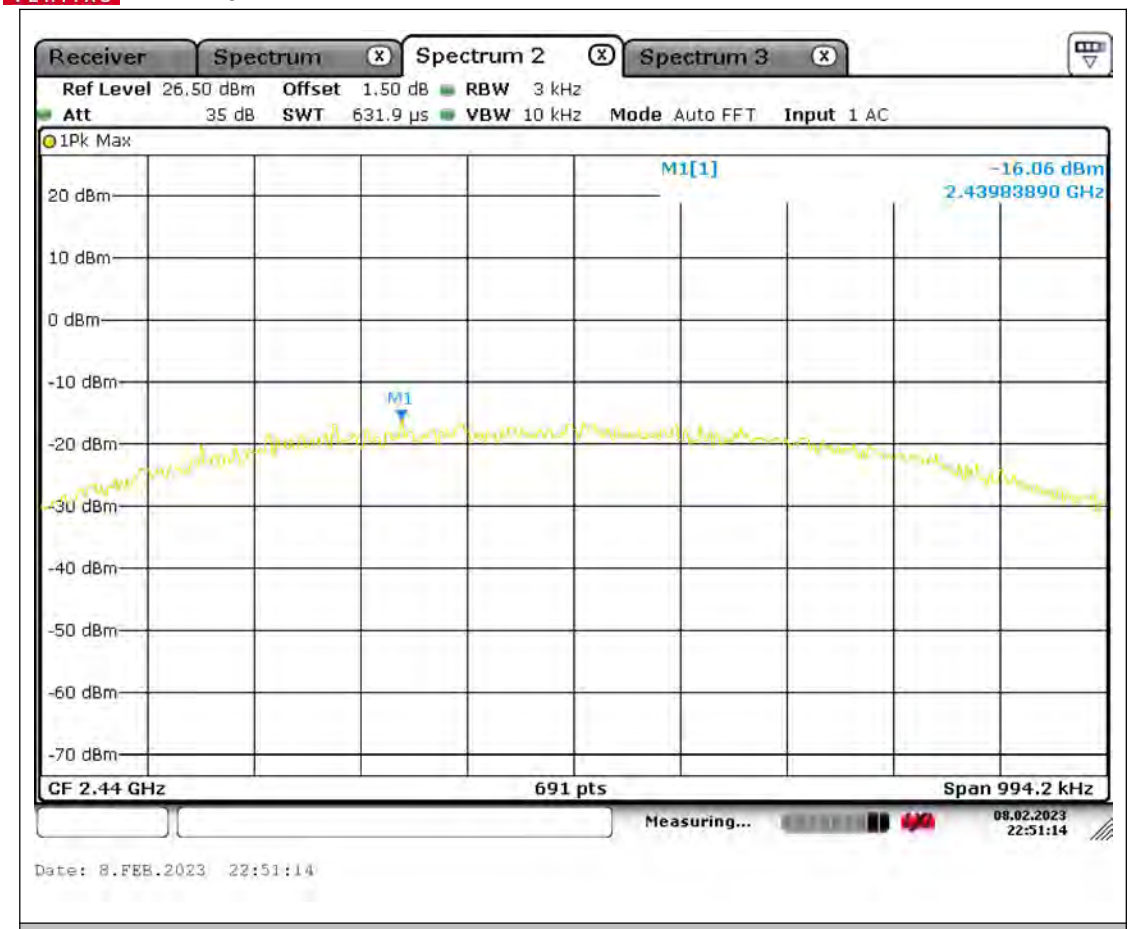
TEST RESULT

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-14.77	≤8	PASS
		2440	-16.06	≤8	PASS
		2480	-18.42	≤8	PASS

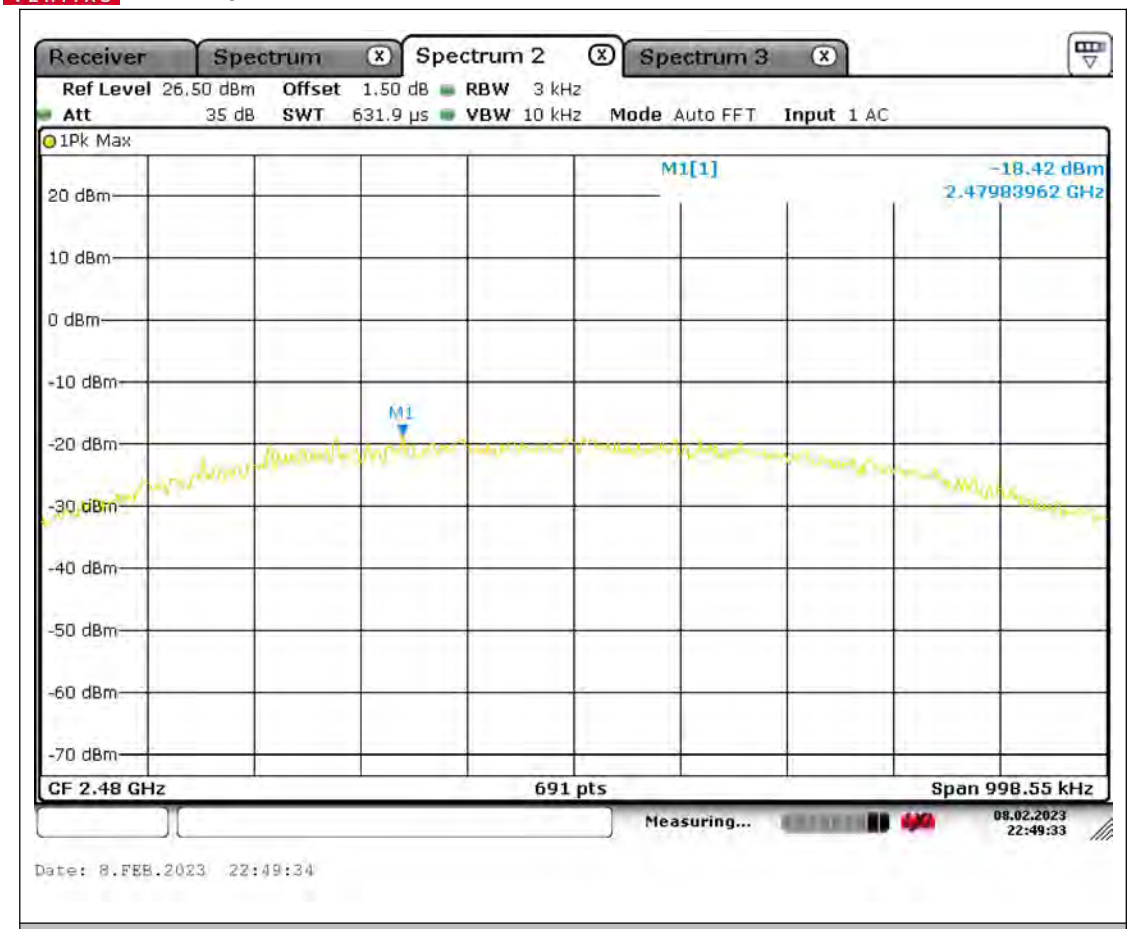
TEST GRAPHS



BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



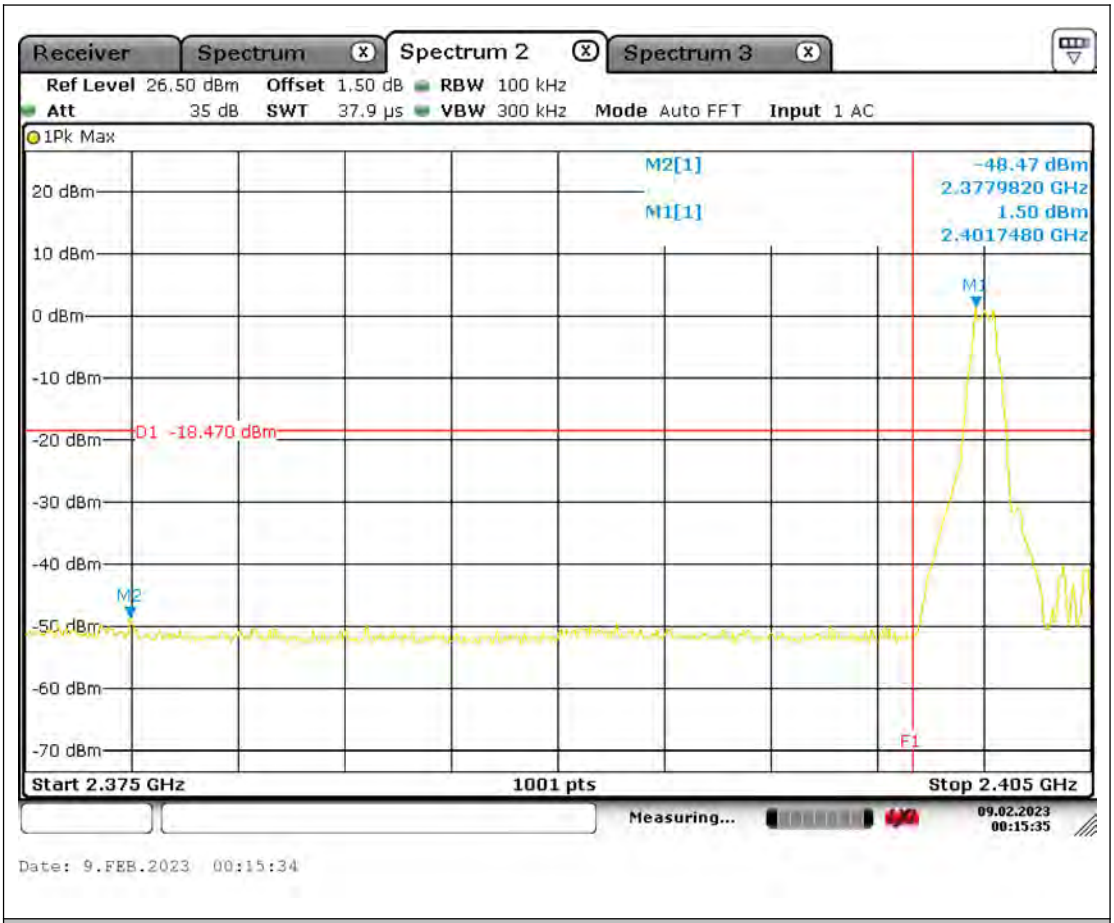
BLE_1M_Ant1_2480

BAND EDGE MEASUREMENTS

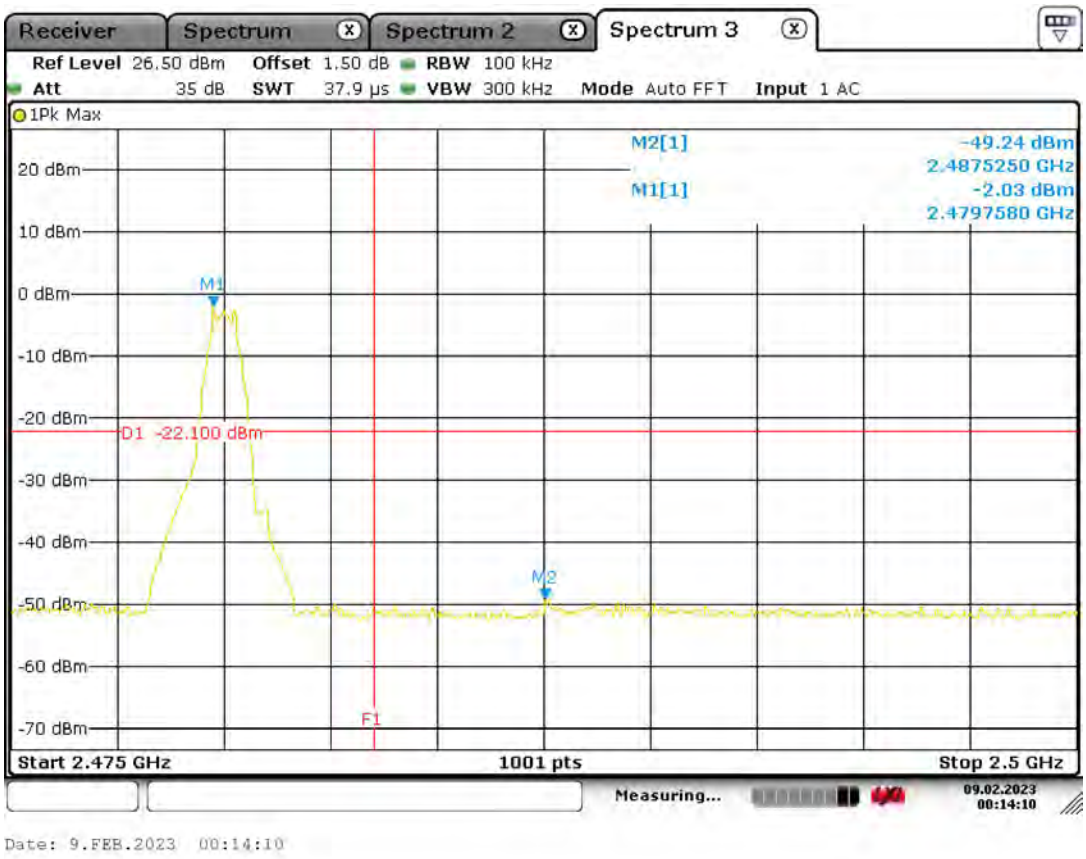
TEST RESULT

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	1.53	-48.47	≤-18.47	PASS
		High	2480	-2.10	-49.24	≤-22.10	PASS

TEST GRAPHS



BLE_1M_Ant1_Low_2402



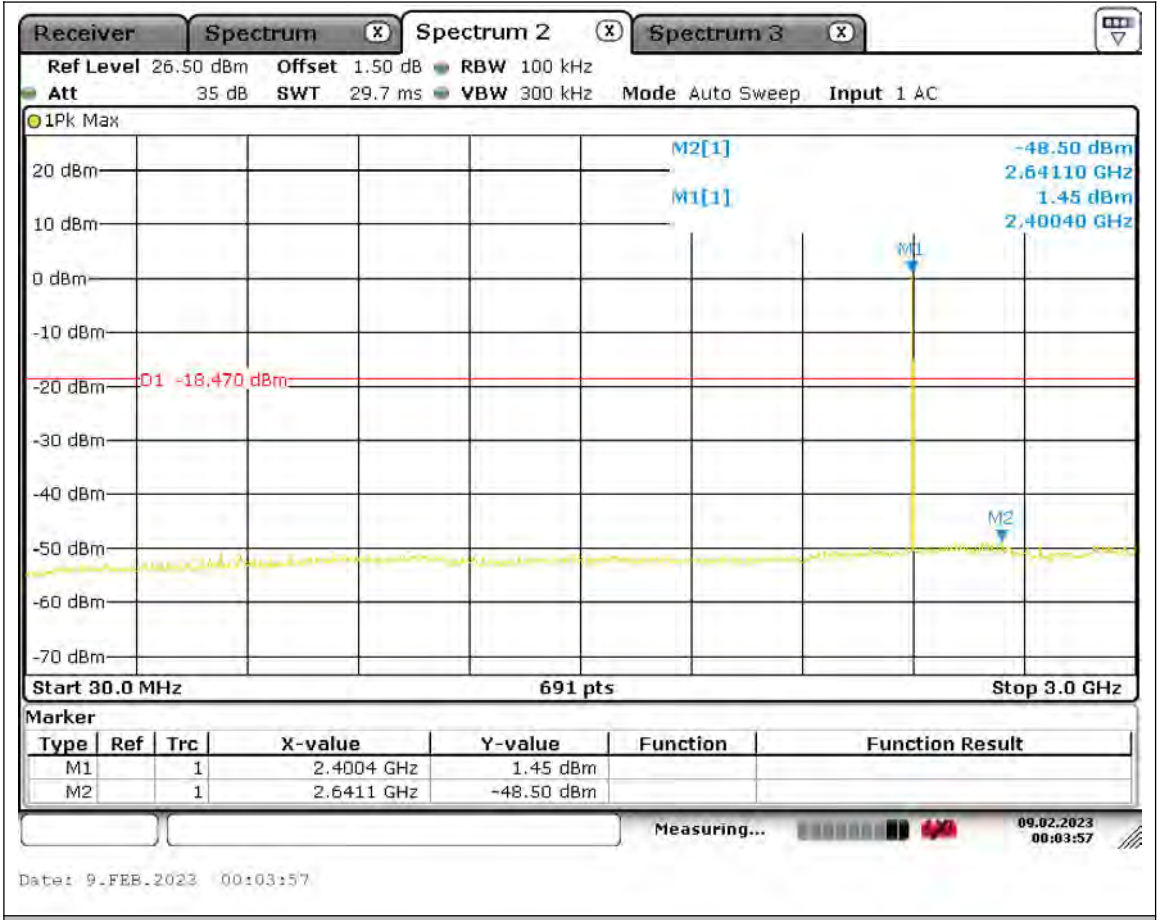
BLE_1M_Ant1_High_2480

CONDUCTED SPURIOUS EMISSION

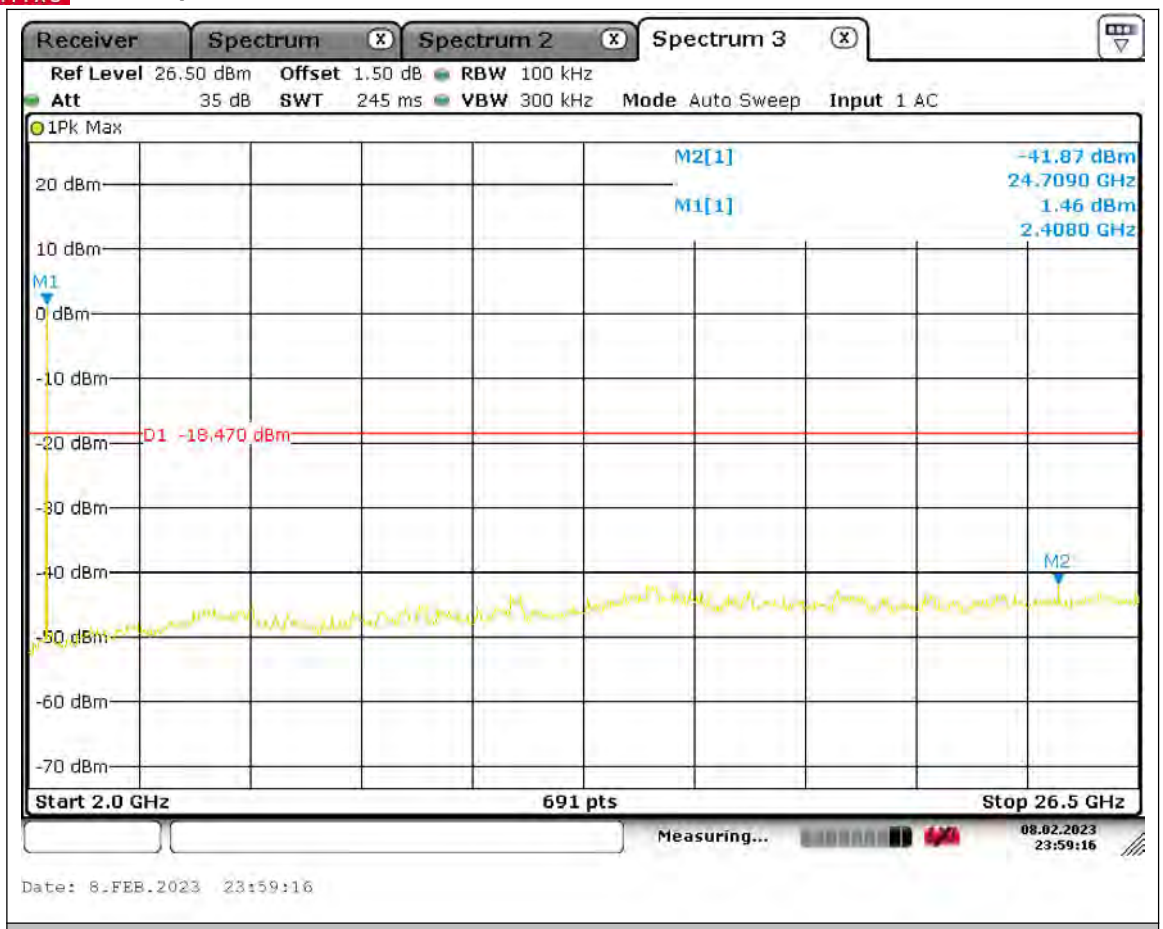
TEST RESULT

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	30~3000	1.53	-48.50	≤-18.47	PASS
			2000~26500	1.53	-41.87	≤-18.47	PASS
		2440	30~3000	0.14	-49.59	≤-19.86	PASS
			2000~26500	0.14	-42.20	≤-19.86	PASS
		2480	30~3000	-2.10	-49.15	≤-22.10	PASS
			2000~26500	-2.10	-42.01	≤-22.10	PASS

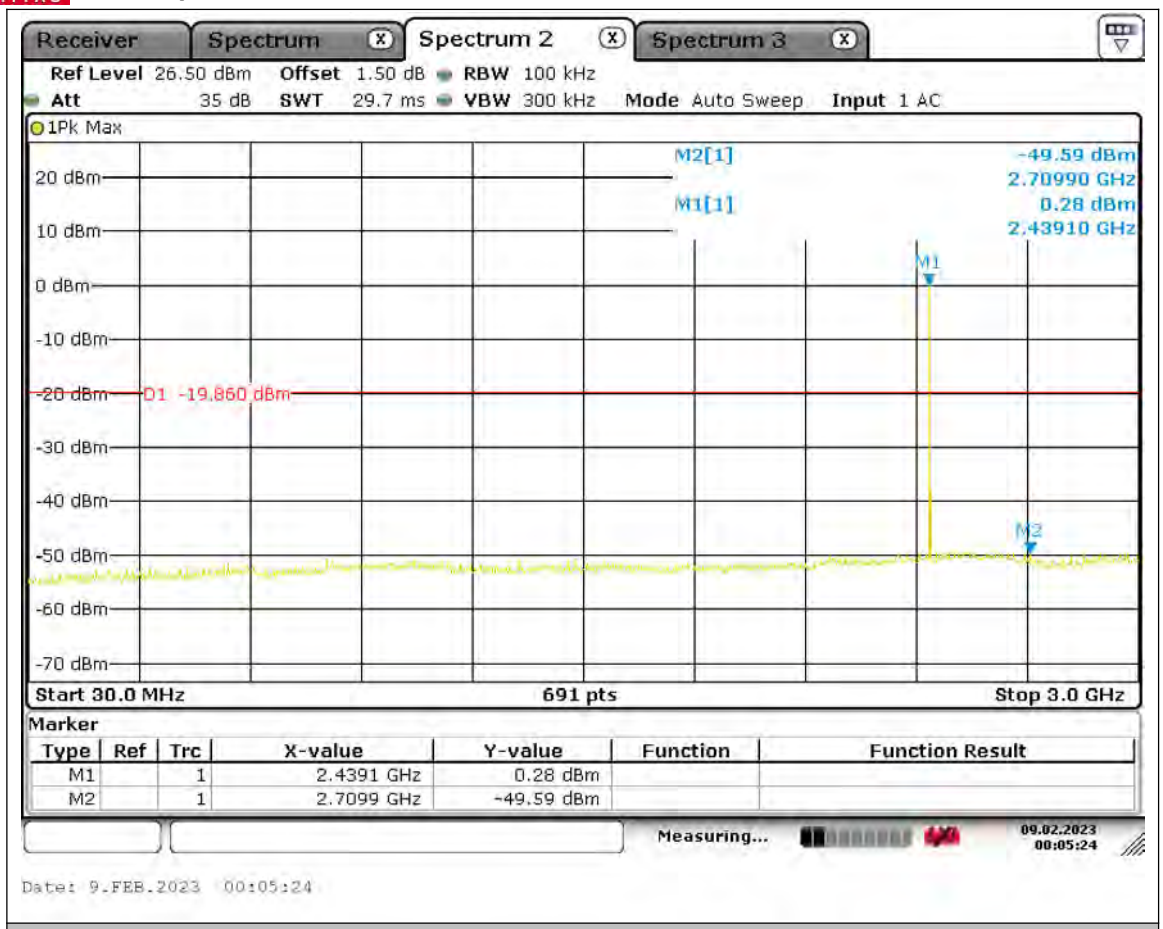
TEST GRAPHS



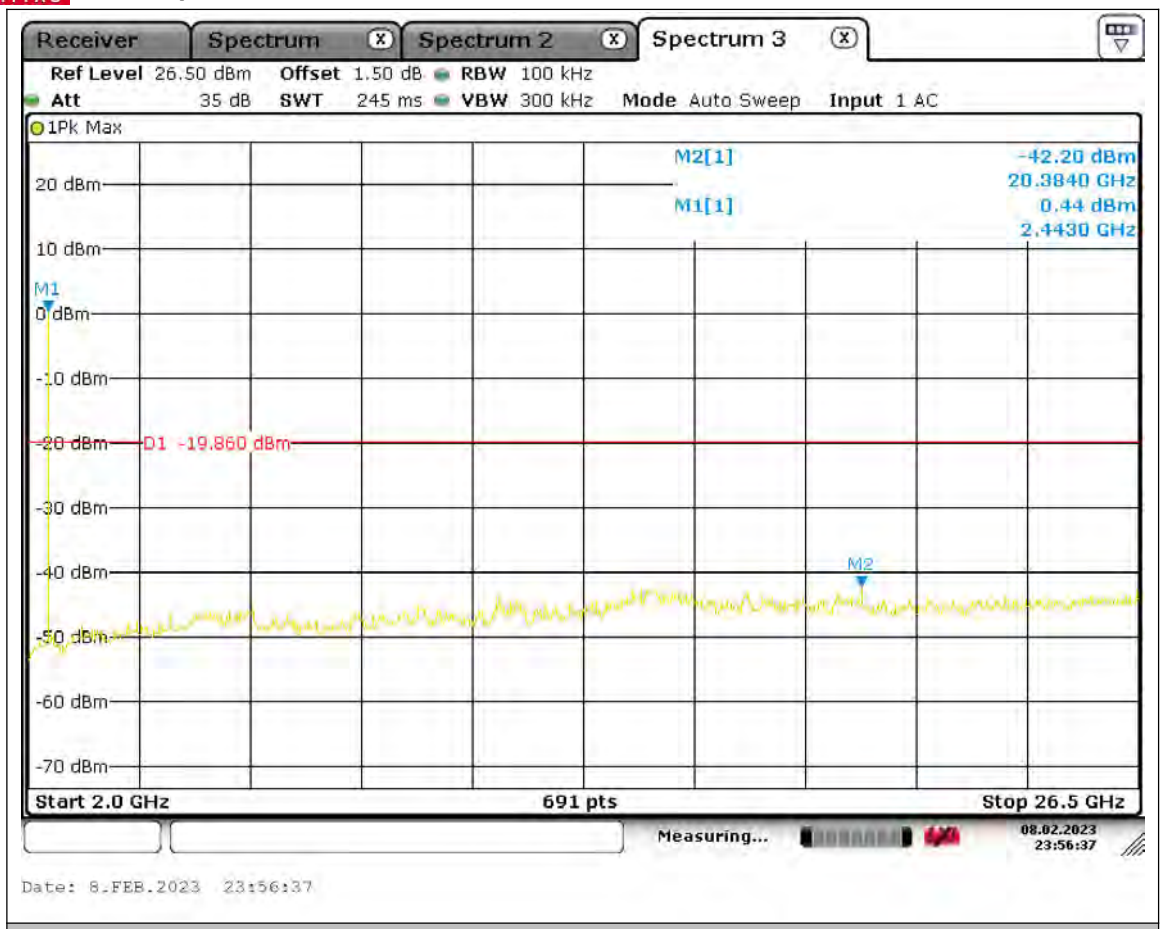
BLE_1M_Ant1_2402_30~3000



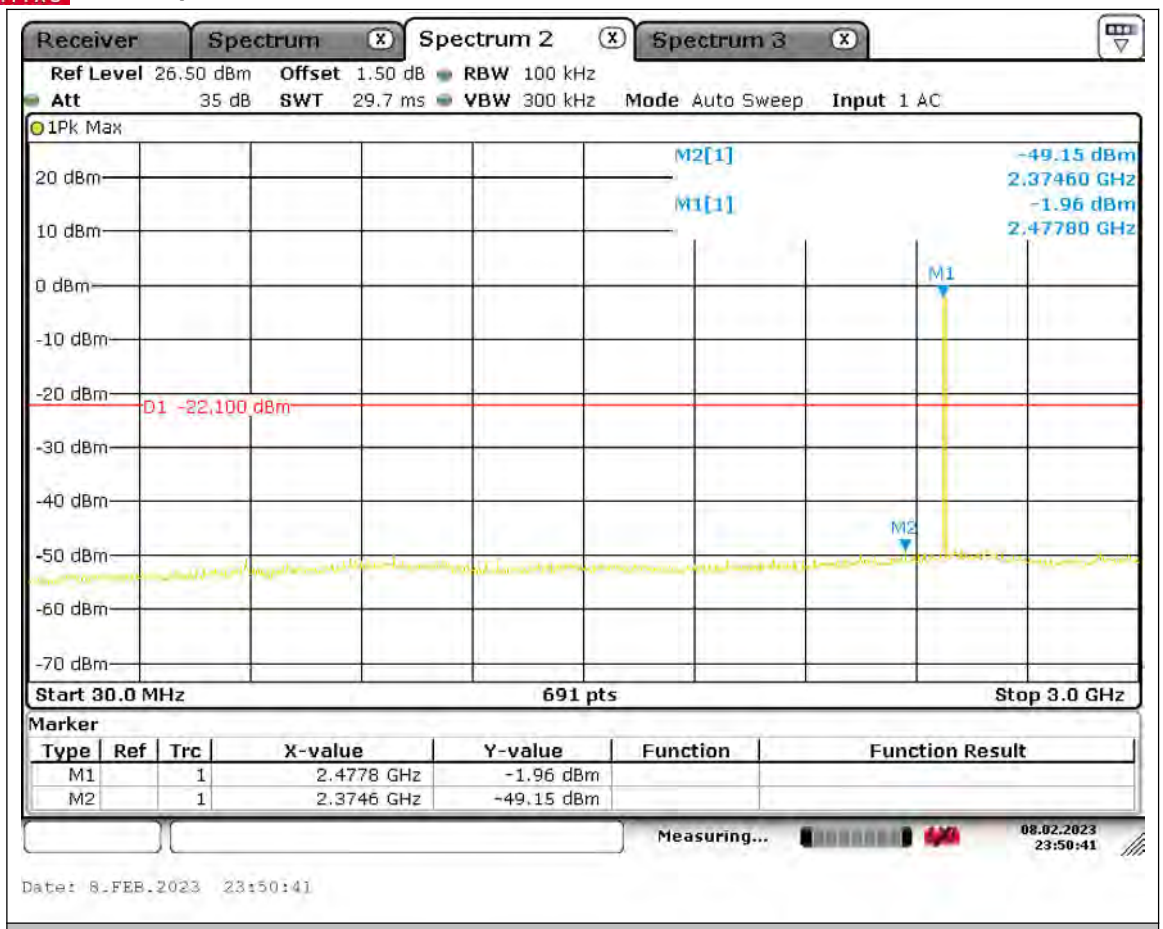
BLE_1M_Ant1_2402_2000~26500



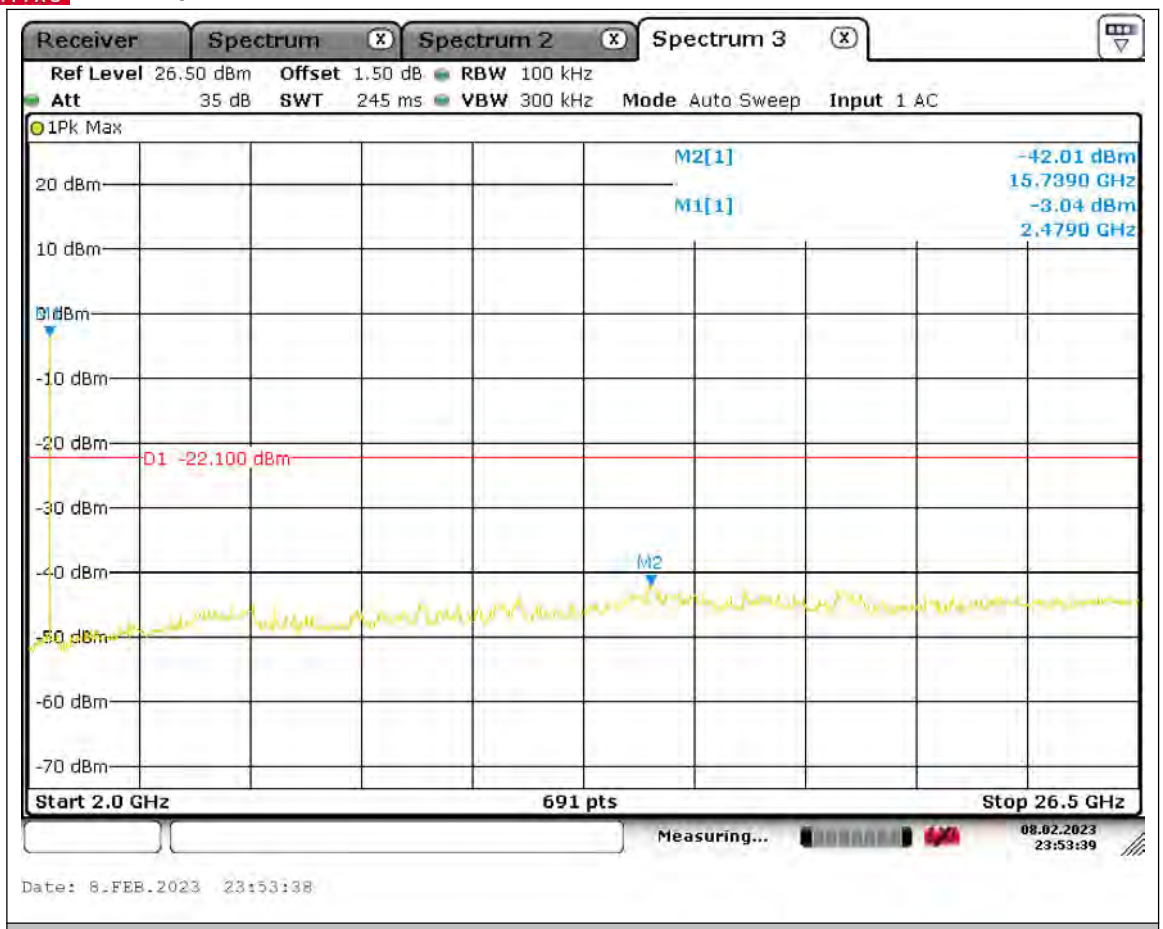
BLE_1M_Ant1_2440_30~3000



BLE_1M_Ant1_2440_2000~26500



BLE_1M_Ant1_2480_30~3000



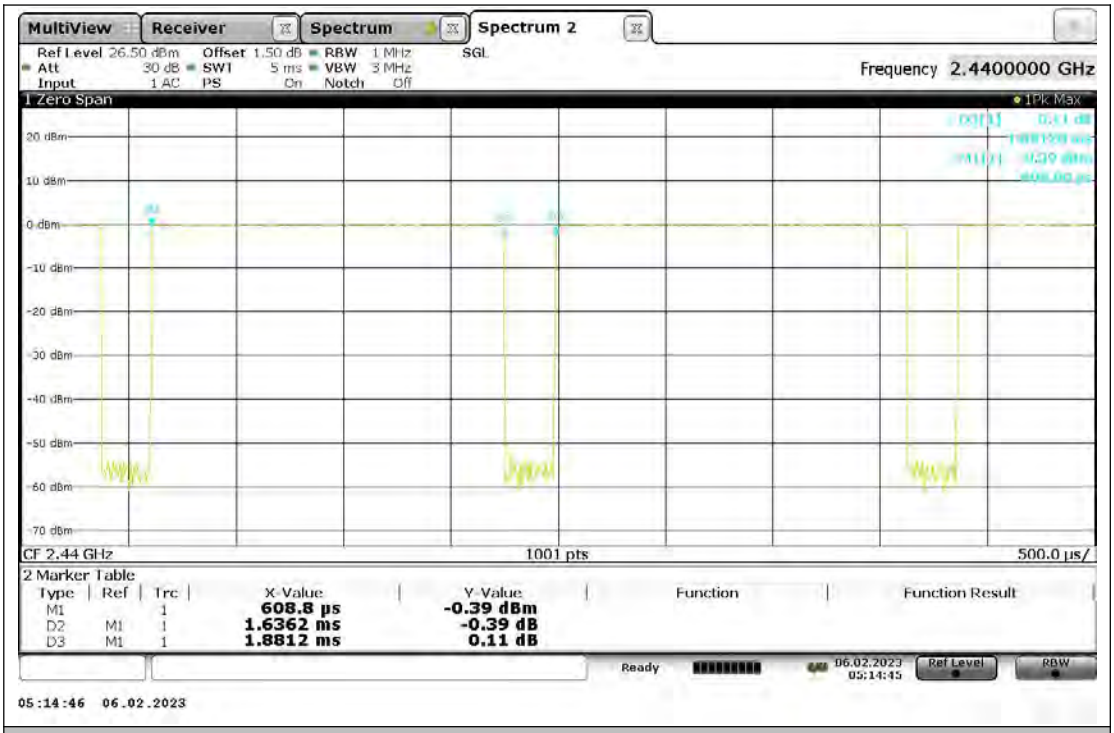
BLE_1M_Ant1_2480_2000~26500

DUTY CYCLE

TEST RESULT

TestMode	Antenna	Channel	ON Time [ms]	Period [ms]	X	DC [%]	xFactor	Limit	Verdict
BLE_1M	Ant1	2440	1.636	1.88	0.8698	86.98	0.61	---	PASS

TEST GRAPHS



BLE_1M_Ant1_2440