TEST REPORT

Applicant Name:	Tractive GmbH
Address:	Poststrasse 4, 4061 Pasching, Austria
Report Number:	SZ2240105-01314E-RF
FCC ID:	2AVE6TG5B
IC:	25970-TG5B

Test Standard (s)

FCC PART 15.247; RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT 2;
RSS-247 ISSUE 3, AUGUST 2023

Sample Description

Product Type:	Tractive CAT Mini
Model No.:	TG5
Multiple Model(s) No.:	N/A
Trade Mark:	N/A
Date Received:	2024/01/05
Issue Date:	2024/05/06

Test Result:	Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

April Zhang

April Zhang
RF Engineer

Approved By:

Jimmy Xiao

Jimmy Xiao
RF Supervisor

Note: The information marked# is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ2240105-01314E-RF	Original Report	2024/05/06

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

HVIN	TG5B
FVIN	N/A
Product	Tractive CAT Mini
Tested Model	TG5
Multiple Model(s)	N/A
Frequency Range	BLE: 2402-2480MHz Wi-Fi: 2412-2462MHz
Maximum Conducted Peak Output Power	BLE: -6.33dBm Wi-Fi:16.41dBm
Modulation Technique	BLE: GFSK Wi-Fi: DSSS, OFDM
Antenna Specification#	2.29dBi (provided by the applicant)
Voltage Range	DC 3.8V from battery or DC 5V from USB port
Sample serial number	For BLE: 2G6B-4 for Conducted and Radiated Emissions Test 2G6B-3 for RF Conducted Test For Wi-Fi: 2G6B-8 for Conducted and Radiated Emissions Test 2G6B-7 for RF Conducted Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A

Objective

This report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules and RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247 Issue 3, August 2023 of the Innovation, Science and Economic Development Canada rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliant Testing of Unlicensed Wireless Devices and RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247 Issue 3, August 2023.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Frequency		213.55 Hz(k=2, 95% level of confidence)
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.75 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9 kHz~150 KHz	3.94dB(k=2, 95% level of confidence)
	150 kHz ~30MHz	3.84dB(k=2, 95% level of confidence)
Radiated Emissions	9kHz - 30MHz	3.30dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.35dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.44dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.16dB(k=2, 95% level of confidence)
Temperature		±1℃
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0023.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For Wi-Fi mode, total 11 channels are provided to testing:

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

For 802.11b, 802.11g, 802.11n-HT20, EUT was tested with Channel 1, 6 and 11.

For 802.11n40, EUT was tested with Channel 3, 6 and 9.

For BLE 1M mode, 40 channels are provided to testing:

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

EUT was tested with Channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

"EspRFTest Tool_v3.6_Manual.exe #" exercise software was used .The device was tested with the worst case was performed as below:

Mode	Data rate	Power Level#		
		Low Channel	Middle Channel	High Channel
802.11b	1Mbps	40	40	40
802.11g	6Mbps	40	40	40
802.11n20	MCS0	40	40	40
802.11n40	MCS0	40	40	40
BLE	1Mbps	15	15	15

The software and power level was provided by the applicant.

Duty cycle

The test data and plots Please refer to the Appendix BLE& Appendix Wifi

Support Equipment List and Details

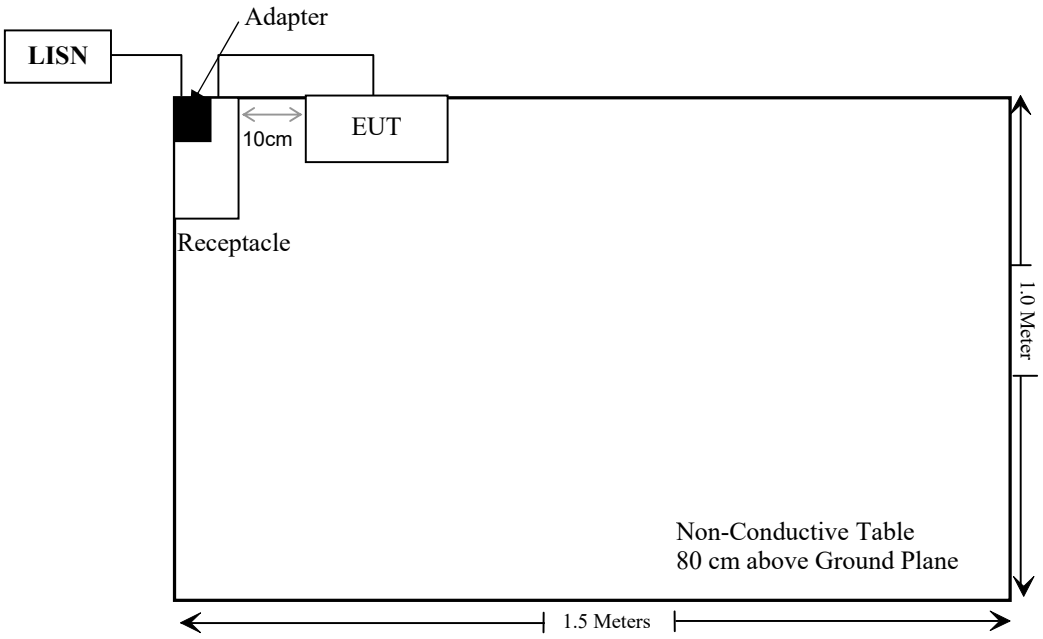
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

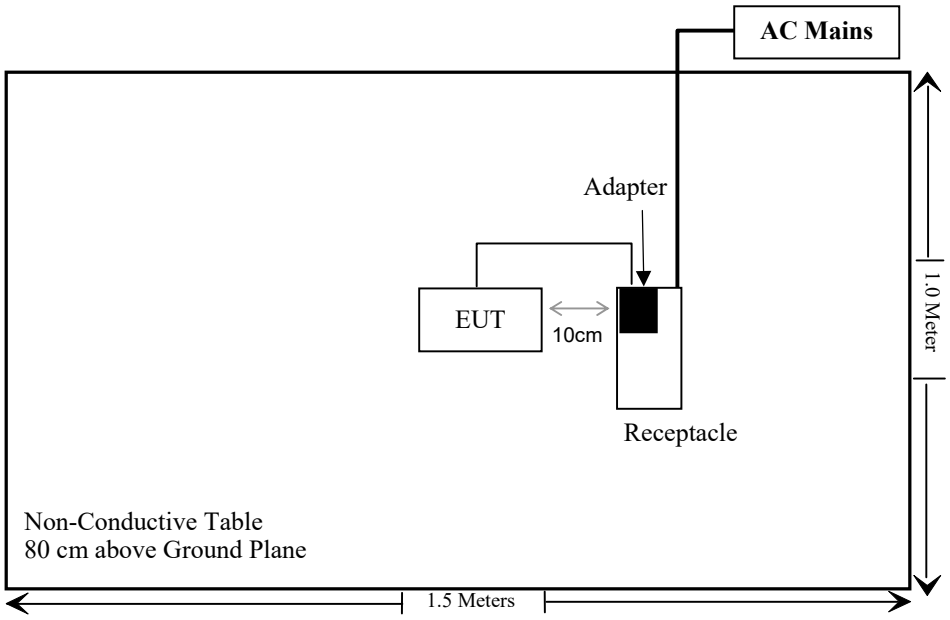
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

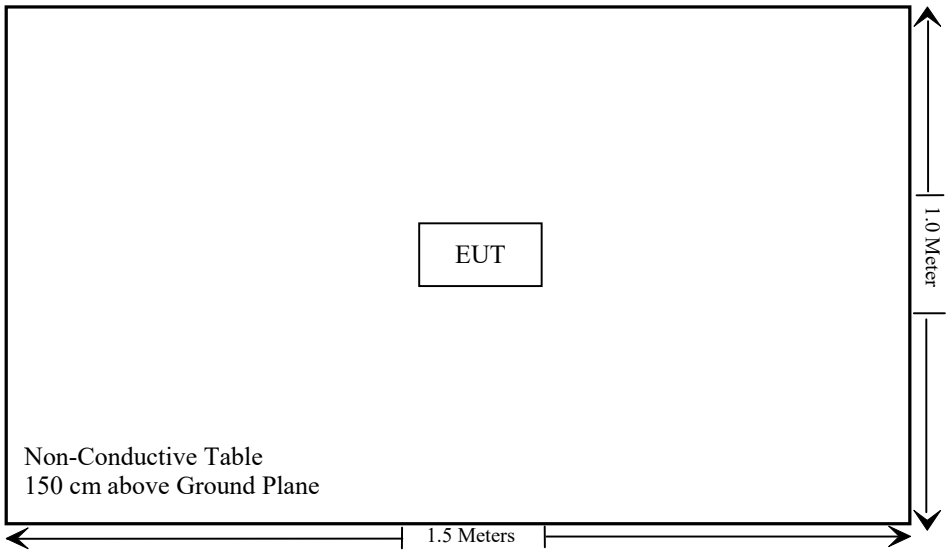
For Conducted Emissions:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	RSS Rules	Description of Test	Result
§15.247 (i),§2.1093	RSS-102 § 2.5.1	RF Exposure & Exemption Limits For Routine Evaluation-SAR evaluation	Compliant
§15.203	RSS-Gen §6.8	Antenna Requirement	Compliant
§15.207 (a)	RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	RSS-GEN § 8.10 & RSS-247 § 5.5	Spurious Emissions	Compliant
§15.247 (a)(2)	RSS- Gen§6.7 RSS-247 § 5.2 (a)	99% Occupied Bandwidth & 6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	RSS-247 § 5.4(d)	Maximum Conducted Output Power	Compliant
§15.247(d)	RSS-247 § 5.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	RSS-247 § 5.2 (b)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/01/16	2025/01/15
Rohde & Schwarz	LISN	ENV216	101613	2024/01/16	2025/01/15
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2023/08/03	2024/08/02
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2023/06/08	2024/06/07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2024/07/19
ETS	Passive Loop Antenna	6512	29604	2023/07/07	2024/07/06
Unknown	Cable	Chamber Cable 1	F-03-EM236	2023/08/03	2024/08/02
Unknown	Cable	Chamber Cable 4	EC-007	2023/08/03	2024/08/02
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2023/04/18	2024/04/17
COM-POWER	Pre-amplifier	PA-122	181919	2023/06/29	2024/06/28
Schwarzbeck	Horn Antenna	BBHA9120D (1201)	1143	2023/07/26	2024/07/25
Unknown	RF Cable	KMSE	0735	2023/10/08	2024/10/07
Unknown	RF Cable	UFA147	219661	2023/10/08	2024/10/07
MICRO-TRONICS	2.8G Passband filter	HPM50111	F-03-EM217	2023/08/03	2024/08/02
A.H.System	Pre-amplifier	PAM-1840VH	190	2023/08/03	2024/08/02
Electro-Mechanics Co	Horn Antenna	3116	2026	2023/09/18	2026/09/17
UTIFLEX	RF Cable	NO. 13	232308-001	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
RF Conducted Test					
Tonscend	RF control Unit	JS0806-2	19D8060154	2023/09/06	2024/09/05
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2024/01/16	2025/01/15
Unknown	10dB Attenuator	Unknown	F-03-EM190	2023/07/04	2024/07/03

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (I) & §2.1093- RF EXPOSURE EVALUATETION

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Measurement Result

For worst case:

Mode	Frequency (MHz)	Max tune-up conducted power# (dBm)	Max tune-up conducted power# (mW)	Distance (mm)	Calculated value	Threshold (1-g SAR)	SAR Test Exclusion
BLE	2402-2480	-6.0	0.25	5	0.1	3	Yes

Result: So the stand-alone SAR test is not required.

For Wi-Fi, please refer to the SAR report: SZ2240105-01314E-20A.

RSS-102 § 2.5.1 –EXEMPTION LIMITS FOR ROUTINE EVALUATION-SAR EVALUATION

Applicable Standard

According to RSS-102 Issue 5§ (2.5.1), SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance[4,5]

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

4. The exemption limits in Table 1 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.
5. Transmitters operating between 0.003-10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4.

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

Test Result:

For worst case:

For BLE mode:

The higher of the conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power:

(2480-2450)/(3500-2450)= (4-P)/(4-2)

The exemption limit of 2480MHz is P= 3.94mW

The maximum tune up conducted power is -6.0dBm

The antenna gain[#] is 2.29dBi

So the maximum e.i.r.p. is -6.0+2.29dBm=-3.71dBm (0.43mW), which less than 3.94mW@2480MHz exemption limit

So the stand-alone SAR test is not required.

For Wi-Fi, please refer to the SAR report: SZ2240105-01314E-20B.

§15.203 & RSS-Gen §6.8 ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has one internal antenna arrangement which was permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

Antenna Type	Antenna Gain#	Impedance
Chip	2.29dBi	50Ω

Result: Compliant.

§15.207 (a) & RSS-GEN §8.8 AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207 (a) & RSS-GEN §8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 - AC Power Lines Conducted Emission Limits

Frequency range (MHz)	Conducted limit (dBμV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

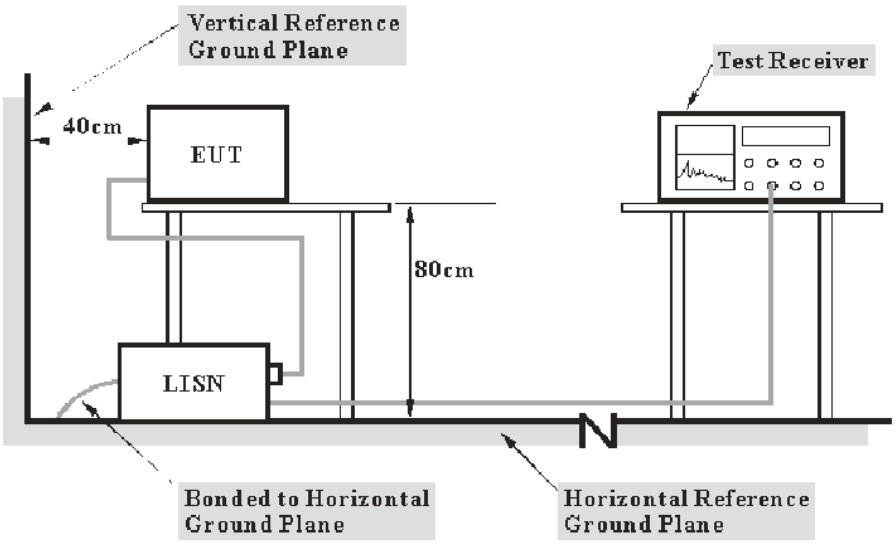
Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

EUT Setup



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

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 & RSS-247/RSS-Gen limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

Environmental Conditions

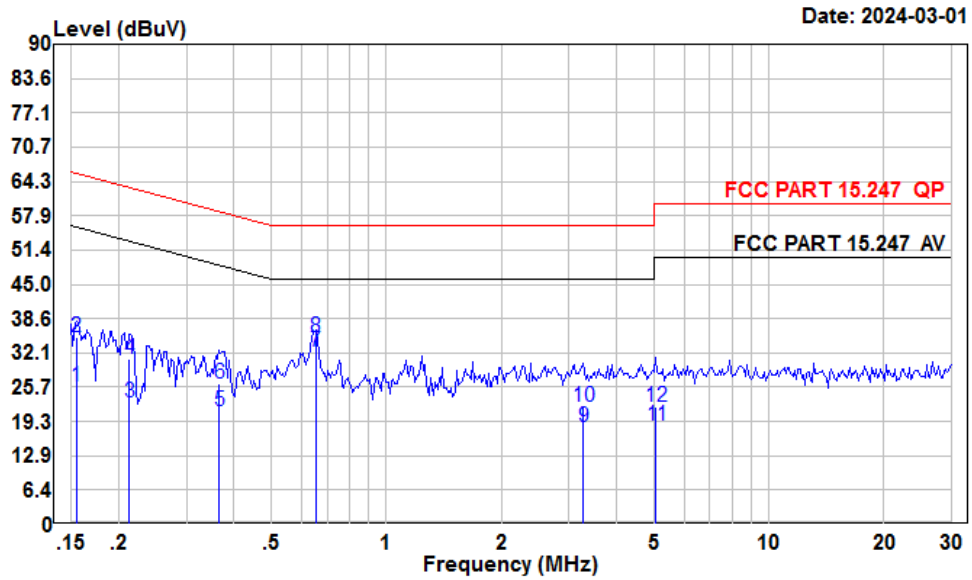
Temperature:	26 ℃
Relative Humidity:	45 %
ATM Pressure:	101 %

The testing was performed by Macy Shi on 2024-03-01.

EUT operation mode: Transmitting (Maximum output power mode)

BLE:

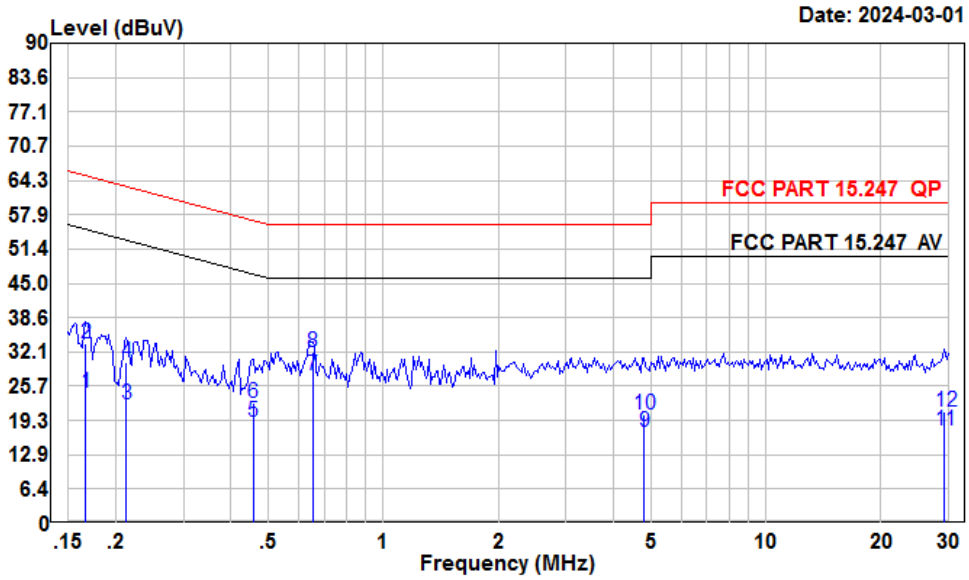
AC 120V/60 Hz, Line



Condition: Line
Project : SZ2240105-01314E-RF
Tester : Macy shi
Note : BLE

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.15	5.00	25.75	10.60	10.15	55.74	-29.99	Average
2	0.15	14.40	35.15	10.60	10.15	65.74	-30.59	QP
3	0.21	1.99	22.72	10.61	10.12	53.10	-30.38	Average
4	0.21	10.19	30.92	10.61	10.12	63.10	-32.18	QP
5	0.37	0.41	21.26	10.67	10.18	48.61	-27.35	Average
6	0.37	5.53	26.38	10.67	10.18	58.61	-32.23	QP
7	0.65	11.54	32.45	10.70	10.21	46.00	-13.55	Average
8	0.65	14.09	35.00	10.70	10.21	56.00	-21.00	QP
9	3.28	-2.61	18.32	10.66	10.27	46.00	-27.68	Average
10	3.28	1.06	21.99	10.66	10.27	56.00	-34.01	QP
11	5.06	-2.52	18.38	10.68	10.22	50.00	-31.62	Average
12	5.06	1.13	22.03	10.68	10.22	60.00	-37.97	QP

AC 120V/60 Hz, Neutral

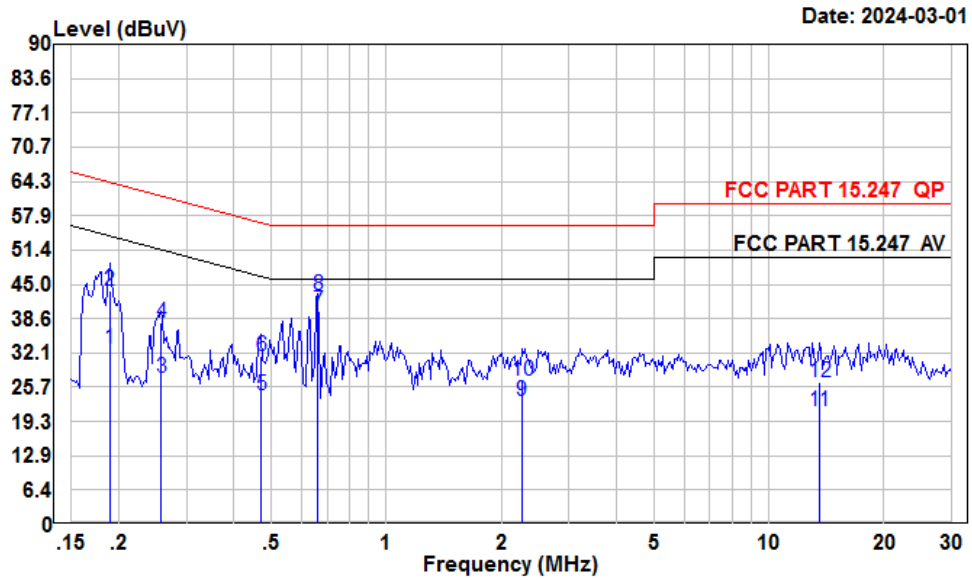


Condition: Neutral
Project : SZ2240105-01314E-RF
Tester : Macy shi
Note : BLE

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.17	3.86	24.54	10.53	10.15	55.12	-30.58	Average
2	0.17	13.02	33.70	10.53	10.15	65.12	-31.42	QP
3	0.21	1.75	22.29	10.42	10.12	53.10	-30.81	Average
4	0.21	9.55	30.09	10.42	10.12	63.10	-33.01	QP
5	0.46	-1.81	19.04	10.67	10.18	46.76	-27.72	Average
6	0.46	1.74	22.59	10.67	10.18	56.76	-34.17	QP
7	0.65	6.93	27.84	10.70	10.21	46.00	-18.16	Average
8	0.65	11.31	32.22	10.70	10.21	56.00	-23.78	QP
9	4.80	-3.70	17.03	10.50	10.23	46.00	-28.97	Average
10	4.80	-0.35	20.38	10.50	10.23	56.00	-35.62	QP
11	29.37	-3.29	17.48	10.51	10.26	50.00	-32.52	Average
12	29.37	0.28	21.05	10.51	10.26	60.00	-38.95	QP

Wi-Fi:

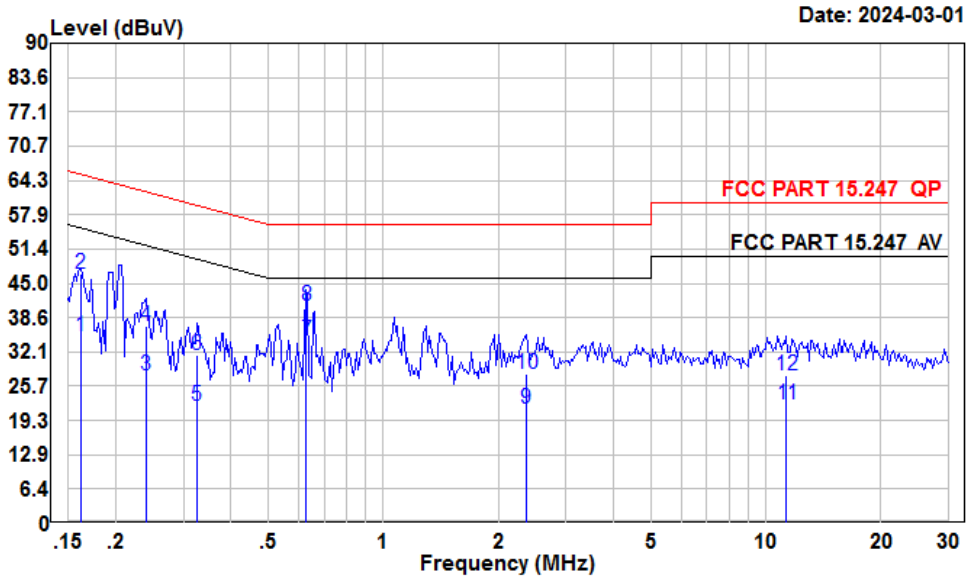
AC 120V/60 Hz, Line



Condition: Line
Project : SZ2240105-01314E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.19	12.07	33.00	10.82	10.11	54.06	-21.06	Average
2	0.19	22.97	43.90	10.82	10.11	64.06	-20.16	QP
3	0.26	6.49	27.41	10.72	10.20	51.51	-24.10	Average
4	0.26	16.95	37.87	10.72	10.20	61.51	-23.64	QP
5	0.47	3.54	24.23	10.52	10.17	46.49	-22.26	Average
6	0.47	10.78	31.47	10.52	10.17	56.49	-25.02	QP
7	0.66	19.37	40.08	10.50	10.21	46.00	-5.92	Average
8	0.66	22.25	42.96	10.50	10.21	56.00	-13.04	QP
9	2.26	2.24	22.99	10.55	10.20	46.00	-23.01	Average
10	2.26	6.28	27.03	10.55	10.20	56.00	-28.97	QP
11	13.55	0.57	21.32	10.60	10.15	50.00	-28.68	Average
12	13.55	5.86	26.61	10.60	10.15	60.00	-33.39	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : SZ2240105-01314E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	14.48	35.18	10.55	10.15	55.38	-20.20	Average
2	0.16	26.13	46.83	10.55	10.15	65.38	-18.55	QP
3	0.24	7.10	27.74	10.46	10.18	52.13	-24.39	Average
4	0.24	16.47	37.11	10.46	10.18	62.13	-25.02	QP
5	0.33	1.40	22.10	10.56	10.14	49.57	-27.47	Average
6	0.33	10.91	31.61	10.56	10.14	59.57	-27.96	QP
7	0.63	13.48	34.40	10.70	10.22	46.00	-11.60	Average
8	0.63	19.76	40.68	10.70	10.22	56.00	-15.32	QP
9	2.36	0.89	21.49	10.40	10.20	46.00	-24.51	Average
10	2.36	7.34	27.94	10.40	10.20	56.00	-28.06	QP
11	11.32	1.26	22.28	10.80	10.22	50.00	-27.72	Average
12	11.32	6.74	27.76	10.80	10.22	60.00	-32.24	QP

§15.205, §15.209, §15.247(d) & RSS-GEN § 8.10 & RSS-247 § 5.5 SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

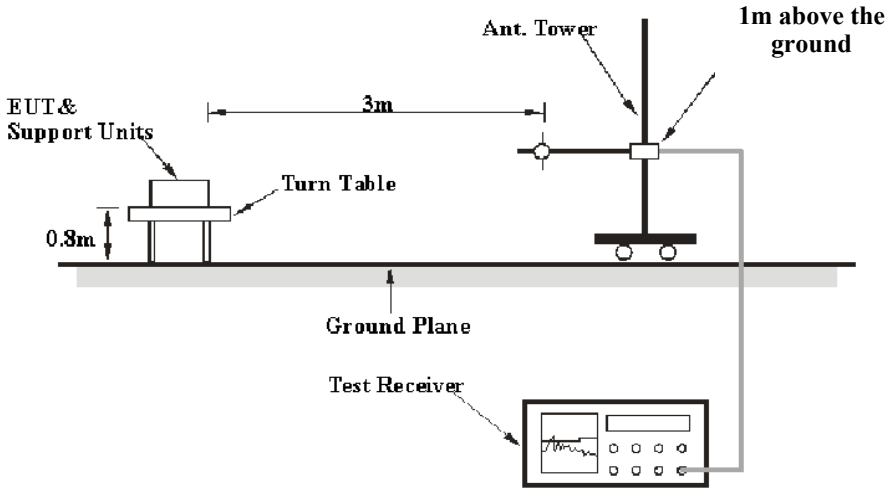
According to RSS-GEN § 8.10 & RSS-247 § 5.5

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:(a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.(c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

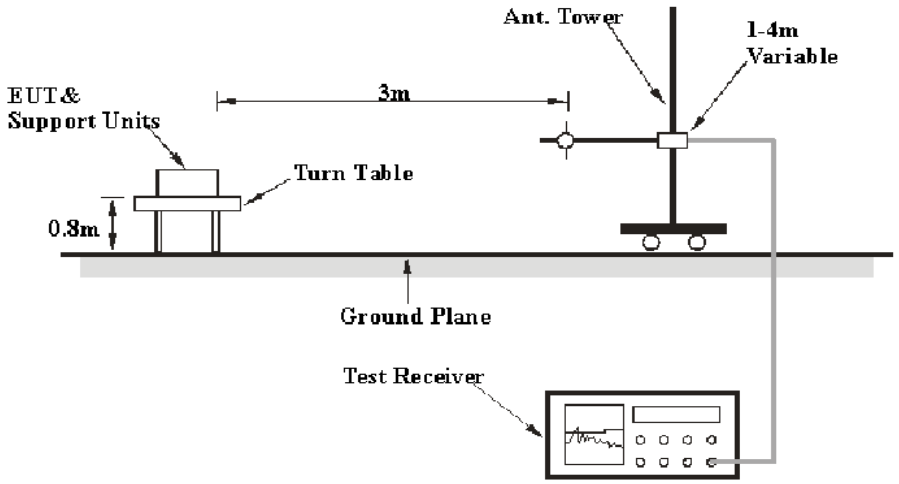
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

EUT Setup

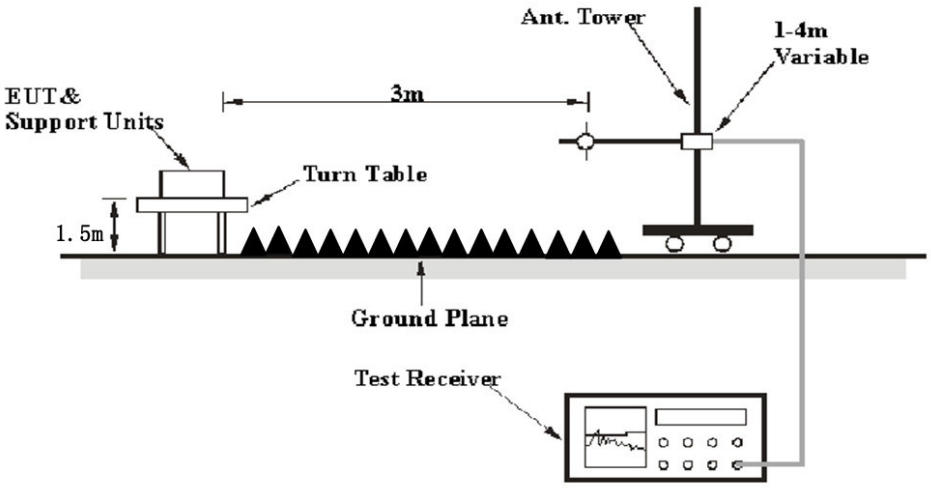
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013 & RSS-Gen. The specification used was the FCC 15.209, and FCC 15.247 & RSS-Gen limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

9 kHz-1GHz:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	/	/	200 Hz	QP
	300 Hz	1 kHz	/	PK
150 kHz – 30 MHz	/	/	9 kHz	QP
	10 kHz	30 kHz	/	PK
30 MHz – 1000 MHz	/	/	120 kHz	QP
	100 kHz	300 kHz	/	PK

1-25GHz:

Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
AV	>98%	1MHz	10 Hz
	<98%	1MHz	≥1/Ton

Note: Ton is minimum transmission duration

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, the report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB.

Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

Repeat above procedures until all measured frequencies were complete.

Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level/Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	22~25.5℃
Relative Humidity:	50~54 %
ATM Pressure:	101 %

The testing was performed by Anson Su on 2024-03-06 for below 1GHz; Zenos Qiao on 2024-03-26 and Tyler from 2024-03-26 to 2024-03-27 for above 1GHz.

EUT operation mode: Transmitting

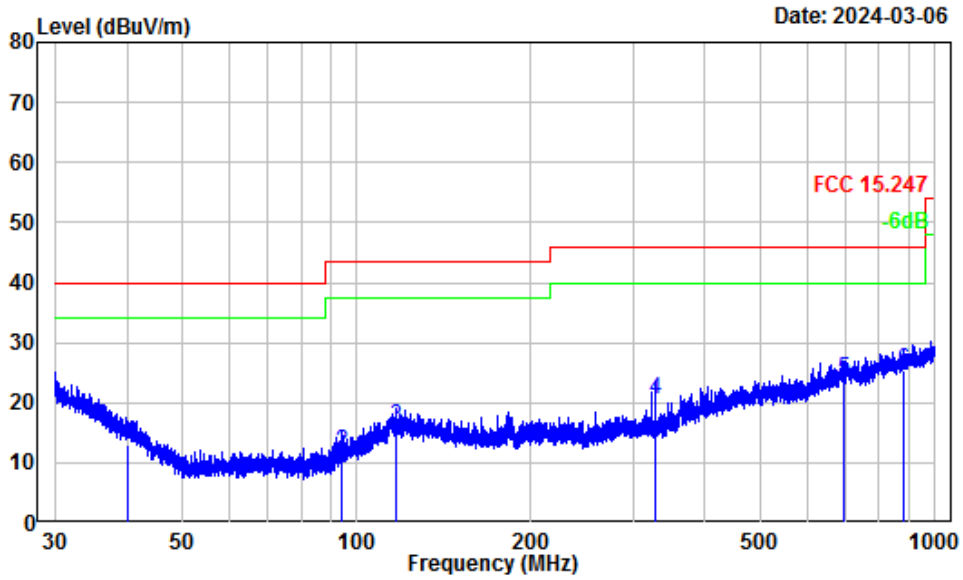
Note: Pre-scan in the X, Y and Z axes of orientation, the worst case X-axis of orientation was recorded.

For the radiated spurious emission in the 9kHz-30MHz, the emissions are 20dB below the limit which are not recorded for the BLE and Wi-Fi maximum output power mode.

30MHz-1GHz: (Maximum output power mode)

BLE:

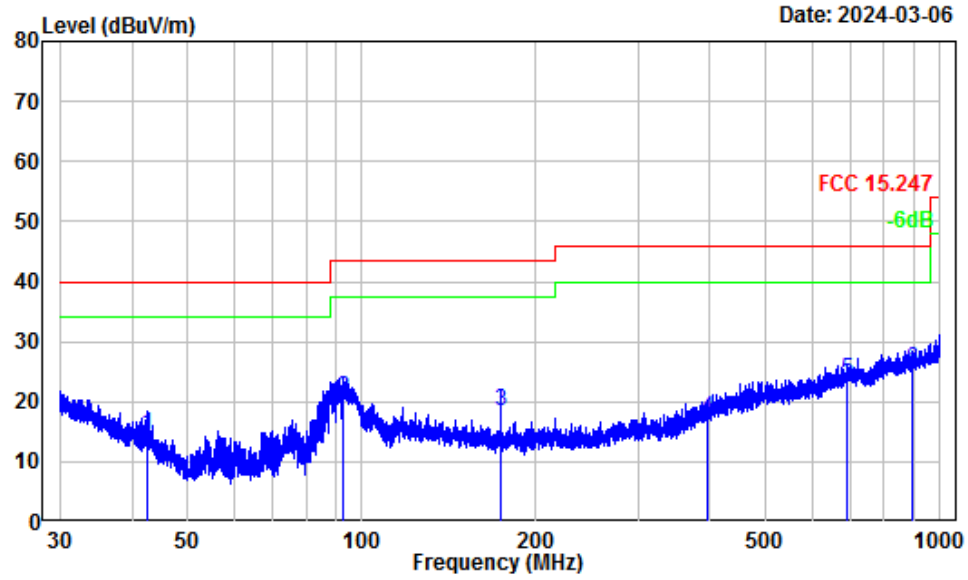
Horizontal



Site : chamber
Condition : 3m Horizontal
Project Number: SZ2240105-01314E-RF
Note : BLE
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.05	-10.42	23.31	12.89	40.00	-27.11	QP
2	94.02	-15.43	27.30	11.87	43.50	-31.63	QP
3	117.21	-10.58	26.60	16.02	43.50	-27.48	QP
4	328.03	-9.90	30.29	20.39	46.00	-25.61	QP
5	694.42	-1.61	25.60	23.99	46.00	-22.01	QP
6	881.02	0.70	24.80	25.50	46.00	-20.50	QP

Vertical

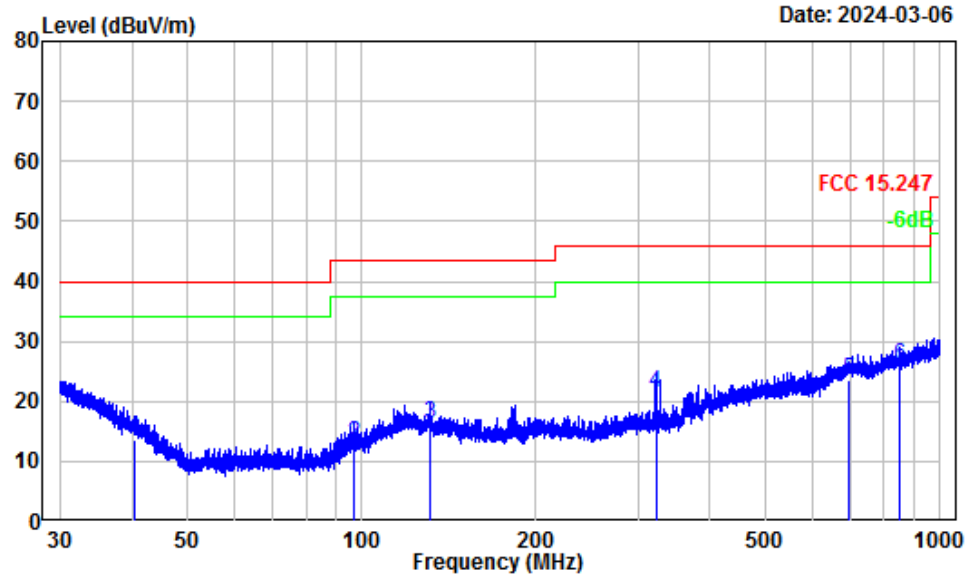


Site : chamber
Condition : 3m Vertical
Project Number: SZ2240105-01314E-RF
Note : BLE
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	42.60	-13.37	27.90	14.53	40.00	-25.47	QP
2	92.50	-16.83	37.30	20.47	43.50	-23.03	QP
3	173.97	-12.47	31.03	18.56	43.50	-24.94	QP
4	396.59	-7.74	25.00	17.26	46.00	-28.74	QP
5	688.66	-2.12	25.67	23.55	46.00	-22.45	QP
6	896.60	0.56	24.75	25.31	46.00	-20.69	QP

Wi-Fi:

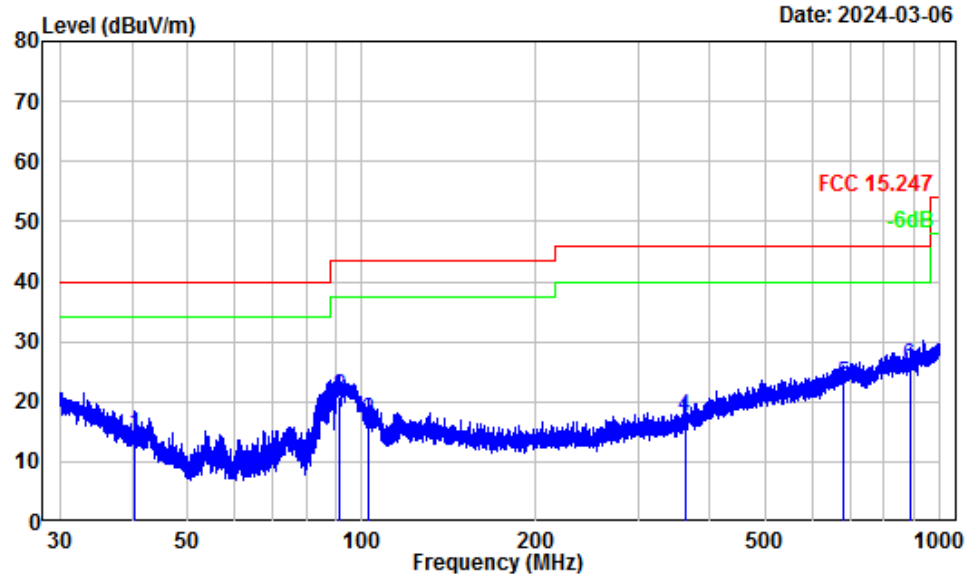
Horizontal



Site : chamber
Condition : 3m Horizontal
Project Number: SZ2240105-01314E-RF
Note : 2.4G WIFI
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.31	-10.59	24.09	13.50	40.00	-26.50	QP
2	96.86	-14.62	27.56	12.94	43.50	-30.56	QP
3	130.95	-10.33	26.67	16.34	43.50	-27.16	QP
4	322.33	-9.91	31.33	21.42	46.00	-24.58	QP
5	695.03	-1.60	25.22	23.62	46.00	-22.38	QP
6	849.17	0.18	25.79	25.97	46.00	-20.03	QP

Vertical



Site : chamber
Condition : 3m Vertical
Project Number: SZ2240105-01314E-RF
Note : 2.4G WIFI
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.38	-12.10	26.58	14.48	40.00	-25.52	QP
2	91.33	-17.07	37.80	20.73	43.50	-22.77	QP
3	102.94	-14.37	31.39	17.02	43.50	-26.48	QP
4	361.87	-9.54	27.06	17.52	46.00	-28.48	QP
5	682.65	-2.24	25.24	23.00	46.00	-23.00	QP
6	886.06	0.41	25.47	25.88	46.00	-20.12	QP

BLE:

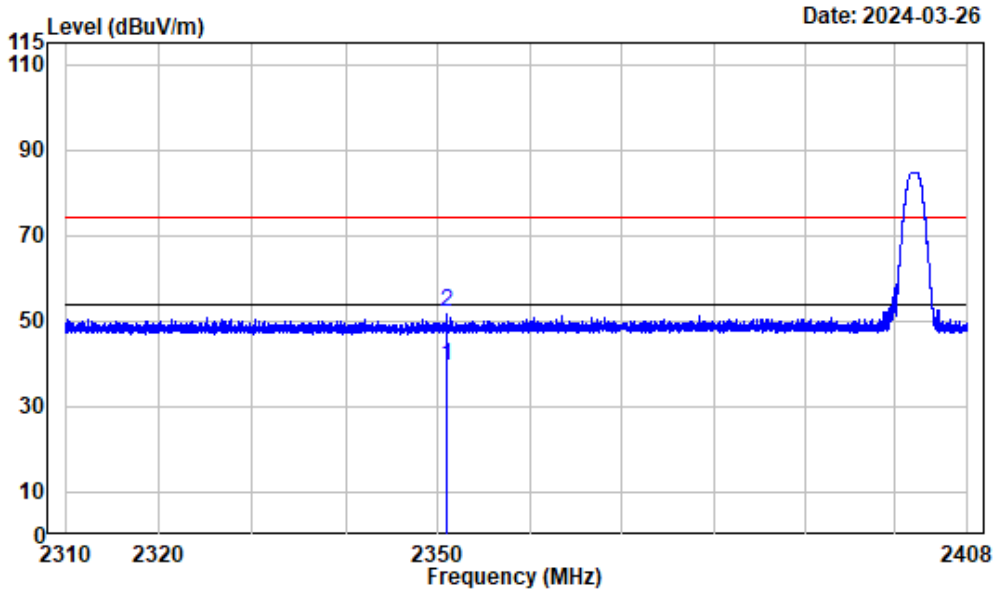
1-25 GHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
Low Channel 2402MHz							
4804.00	46.72	PK	H	2.42	49.14	74	-24.86
4804.00	33.69	AV	H	2.42	36.11	54	-17.89
4804.00	46.45	PK	V	2.42	48.87	74	-25.13
4804.00	33.51	AV	V	2.42	35.93	54	-18.07
Middle Channel 2440MHz							
4880.00	47.05	PK	H	2.58	49.63	74	-24.37
4880.00	33.96	AV	H	2.58	36.54	54	-17.46
4880.00	46.83	PK	V	2.58	49.41	74	-24.59
4880.00	33.72	AV	V	2.58	36.30	54	-17.70
High Channel 2480MHz							
4960.00	47.48	PK	H	2.68	50.16	74	-23.84
4960.00	34.36	AV	H	2.68	37.04	54	-16.96
4960.00	47.23	PK	V	2.68	49.91	74	-24.09
4960.00	33.97	AV	V	2.68	36.65	54	-17.35

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is in the noise floor level was not recorded.

Test plots for Band Edge Measurements (Radiated):

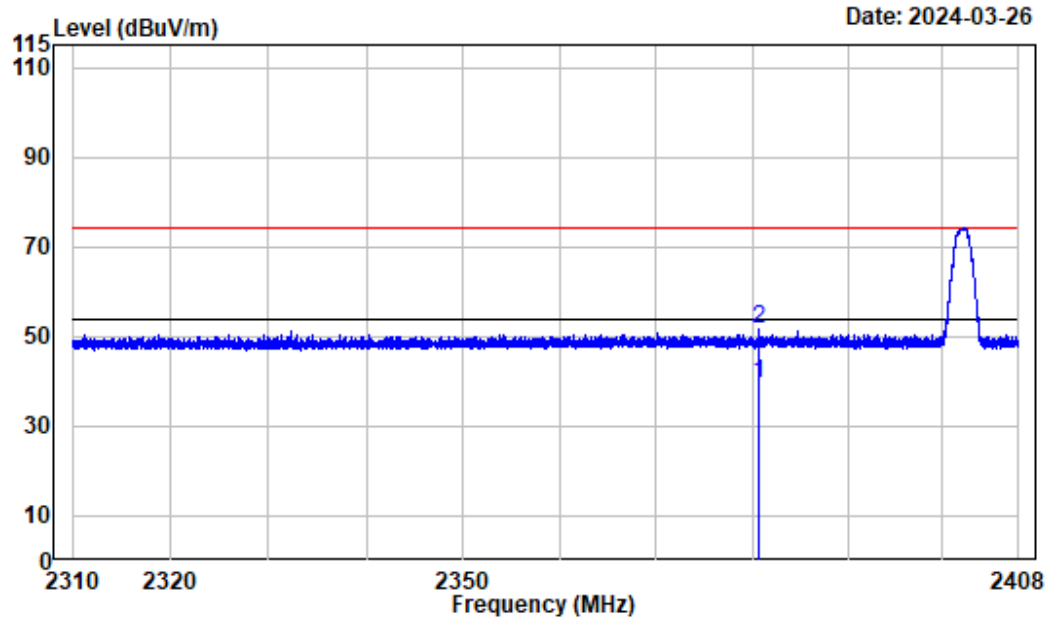
BLE 1M			
Test Channel:	**2402MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Zenos Qiao
Note : BLE1M-2402

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2350.863	-3.15	42.75	39.60	54.00	-14.40	Average
2	2350.863	-3.15	55.09	51.94	74.00	-22.06	Peak

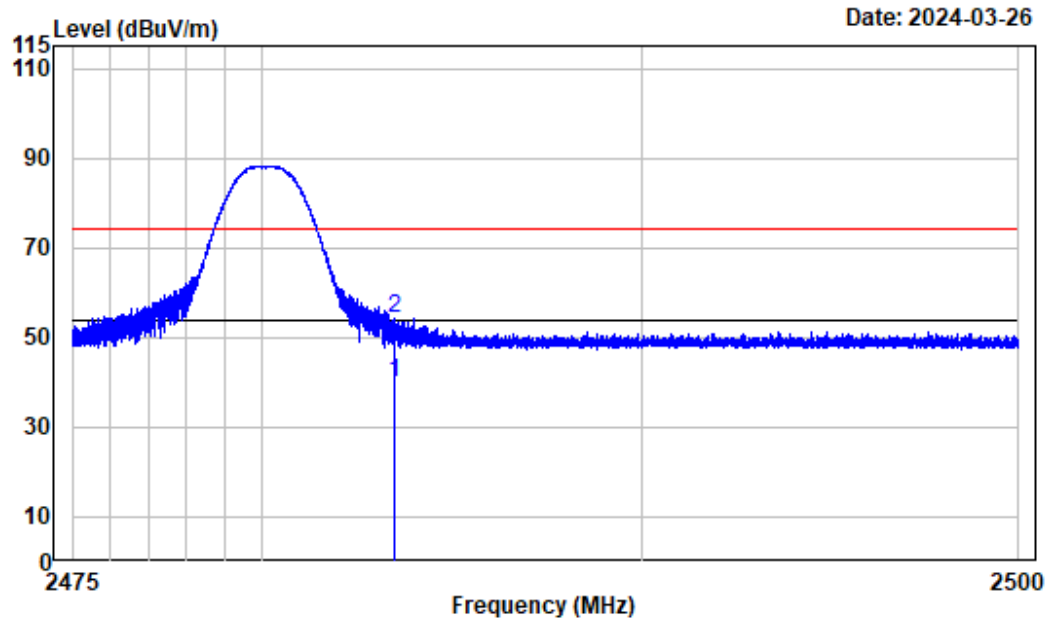
BLE 1M			
Test Channel:	**2402MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Zenos Qiao
Note : BLE1M-2402

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2380.775	-3.19	42.56	39.37	54.00	-14.63	Average
2	2380.775	-3.19	54.75	51.56	74.00	-22.44	Peak

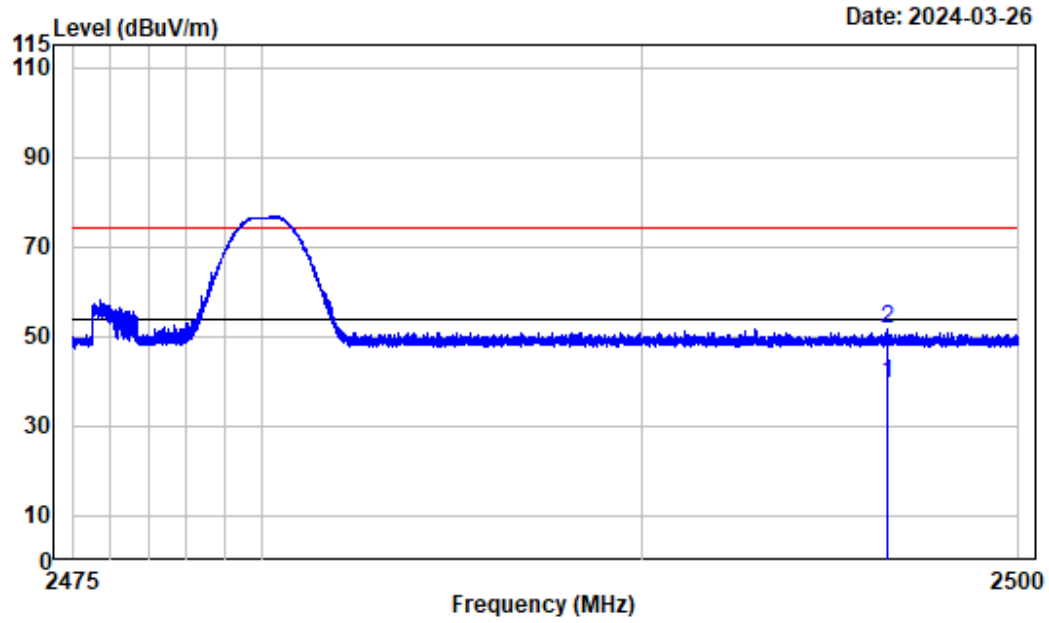
BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Zenos Qiao
Note : BLE1M-2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.506	-3.17	43.27	40.10	54.00	-13.90	Average
2	2483.506	-3.17	57.32	54.15	74.00	-19.85	Peak

BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Zenos Qiao
Note : BLE1M-2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2496.516	-3.19	42.90	39.71	54.00	-14.29	Average
2	2496.516	-3.19	55.03	51.84	74.00	-22.16	Peak

2.4G Wi-Fi

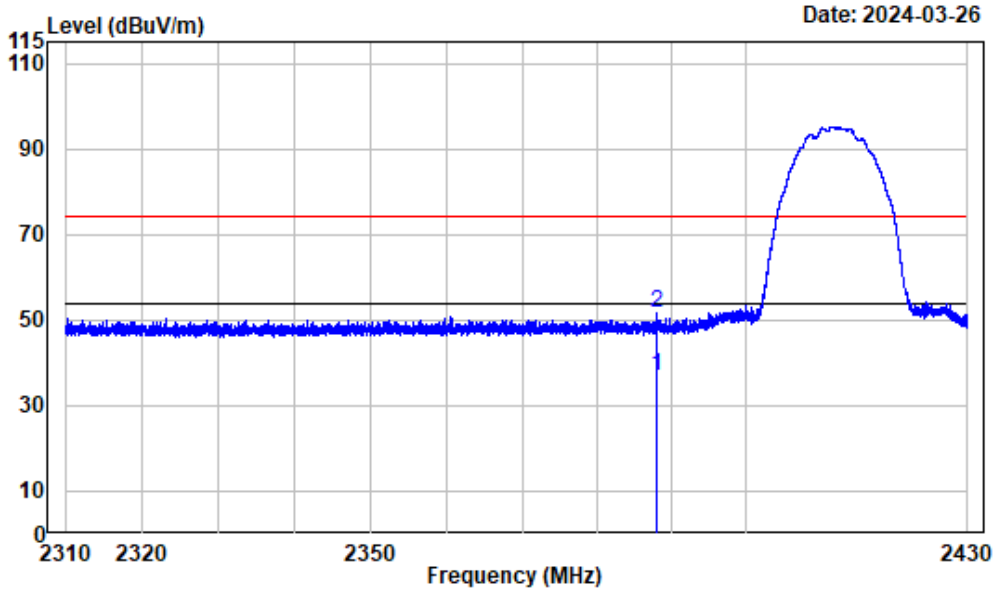
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11b							
Low Channel 2412MHz							
4824.00	56.21	PK	H	2.45	58.66	74	-15.34
4824.00	47.47	AV	H	2.45	49.92	54	-4.08
4824.00	55.83	PK	V	2.45	58.28	74	-15.72
4824.00	47.02	AV	V	2.45	49.47	54	-4.53
Middle Channel 2437MHz							
4874.00	56.82	PK	H	2.56	59.38	74	-14.62
4874.00	48.07	AV	H	2.56	50.63	54	-3.37
4874.00	55.36	PK	V	2.56	57.92	74	-16.08
4874.00	47.15	AV	V	2.56	49.71	54	-4.29
High Channel 2462MHz							
4924.00	56.41	PK	H	2.63	59.04	74	-14.96
4924.00	47.63	AV	H	2.63	50.26	54	-3.74
4924.00	55.92	PK	V	2.63	58.55	74	-15.45
4924.00	47.24	AV	V	2.63	49.87	54	-4.13
802.11g							
Low Channel 2412MHz							
4824.00	58.86	PK	H	2.45	61.31	74	-12.69
4824.00	44.75	AV	H	2.45	47.20	54	-6.80
4824.00	57.63	PK	V	2.45	60.08	74	-13.92
4824.00	43.32	AV	V	2.45	45.77	54	-8.23
Middle Channel 2437MHz							
4874.00	60.41	PK	H	2.56	62.97	74	-11.03
4874.00	46.92	AV	H	2.56	49.48	54	-4.52
4874.00	59.73	PK	V	2.56	62.29	74	-11.71
4874.00	45.36	AV	V	2.56	47.92	54	-6.08
High Channel 2462MHz							
4924.00	62.15	PK	H	2.63	64.78	74	-9.22
4924.00	44.43	AV	H	2.63	47.06	54	-6.94
4924.00	61.57	PK	V	2.63	64.20	74	-9.80
4924.00	43.62	AV	V	2.63	46.25	54	-7.75

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11n20							
Low Channel 2412MHz							
4824.00	52.56	PK	H	2.45	55.01	74	-18.99
4824.00	43.79	AV	H	2.45	46.24	54	-7.76
4824.00	51.73	PK	V	2.45	54.18	74	-19.82
4824.00	42.81	AV	V	2.45	45.26	54	-8.74
Middle Channel 2437MHz							
4874.00	58.96	PK	H	2.56	61.52	74	-12.48
4874.00	45.69	AV	H	2.56	48.25	54	-5.75
4874.00	57.43	PK	V	2.56	59.99	74	-14.01
4874.00	44.17	AV	V	2.56	46.73	54	-7.27
High Channel 2462MHz							
4924.00	57.45	PK	H	2.63	60.08	74	-13.92
4924.00	43.81	AV	H	2.63	46.44	54	-7.56
4924.00	56.62	PK	V	2.63	59.25	74	-14.75
4924.00	42.19	AV	V	2.63	44.82	54	-9.18
802.11n40							
Low Channel 2422MHz							
4844.00	53.78	PK	H	2.47	56.25	74	-17.75
4844.00	41.03	AV	H	2.47	43.50	54	-10.50
4844.00	52.64	PK	V	2.47	55.11	74	-18.89
4844.00	40.51	AV	V	2.47	42.98	54	-11.02
Middle Channel 2437MHz							
4874.00	55.27	PK	H	2.56	57.83	74	-16.17
4874.00	42.06	AV	H	2.56	44.62	54	-9.38
4874.00	54.74	PK	V	2.56	57.30	74	-16.70
4874.00	41.58	AV	V	2.56	44.14	54	-9.86
High Channel 2452MHz							
4904.00	55.69	PK	H	2.64	58.33	74	-15.67
4904.00	42.39	AV	H	2.64	45.03	54	-8.97
4904.00	54.83	PK	V	2.64	57.47	74	-16.53
4904.00	41.65	AV	V	2.64	44.29	54	-9.71

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is in the noise floor level was not recorded.

Test plots for Band Edge Measurements (Radiated):

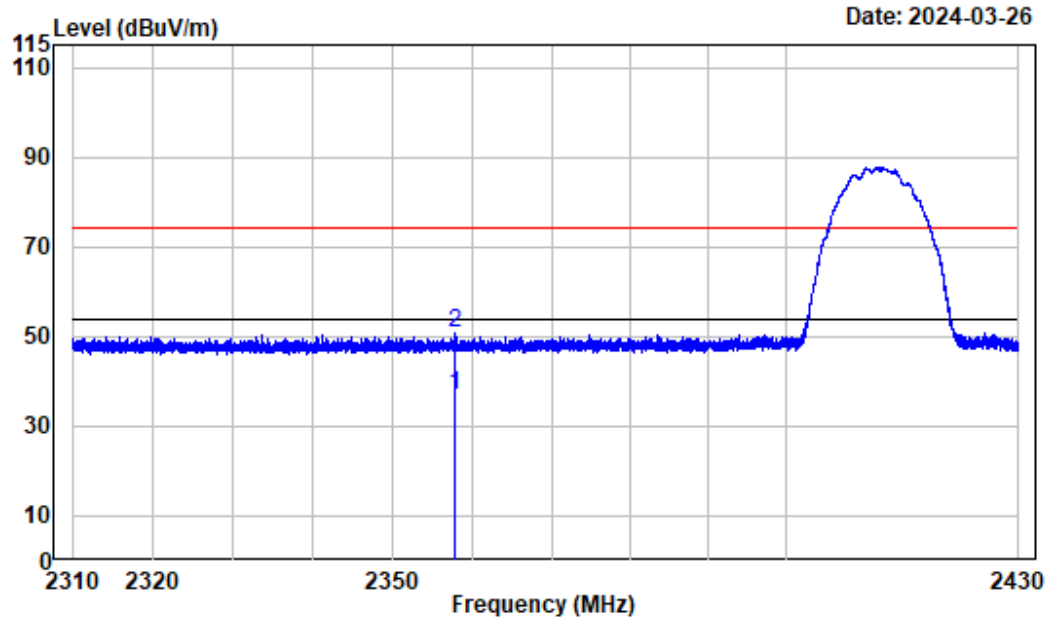
802.11b			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_B_2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2388.045	-3.20	40.13	36.93	54.00	-17.07	Average
2	2388.045	-3.20	54.64	51.44	74.00	-22.56	peak

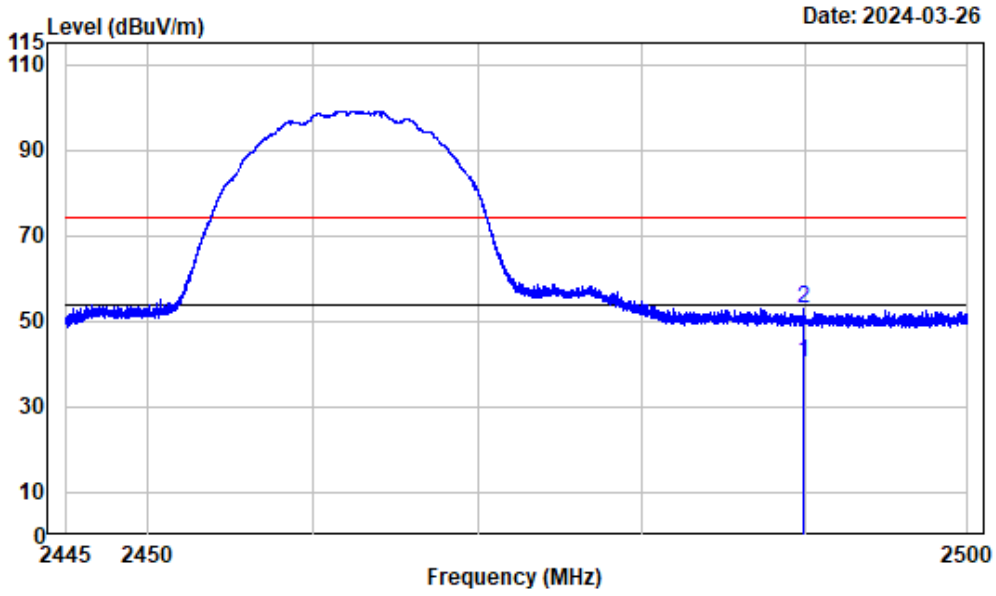
802.11b			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_B_2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2357.730	-3.16	40.05	36.89	54.00	-17.11	Average
2	2357.730	-3.16	53.76	50.60	74.00	-23.40	peak

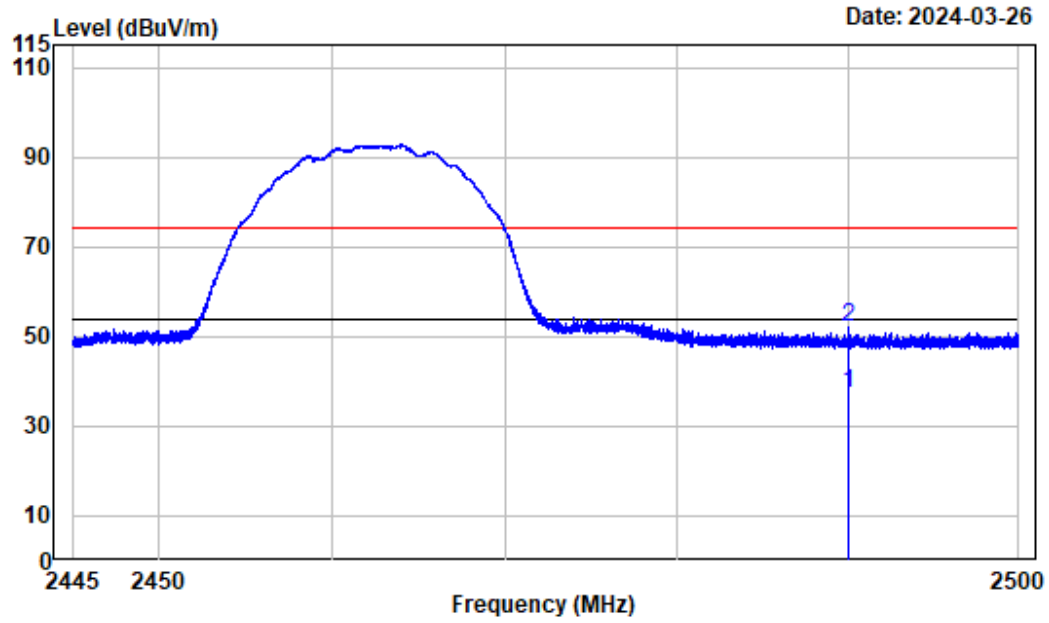
802.11b			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_B_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2489.928	-3.18	43.34	40.16	54.00	-13.84	Average
2	2489.928	-3.18	56.00	52.82	74.00	-21.18	peak

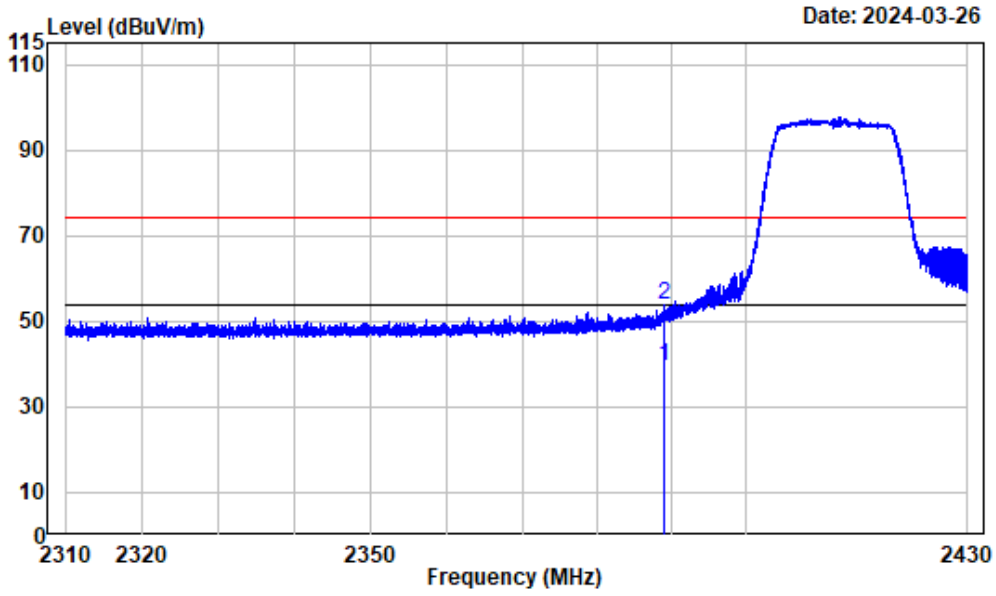
802.11b			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_B_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2490.059	-3.18	40.68	37.50	54.00	-16.50	Average
2	2490.059	-3.18	55.16	51.98	74.00	-22.02	peak

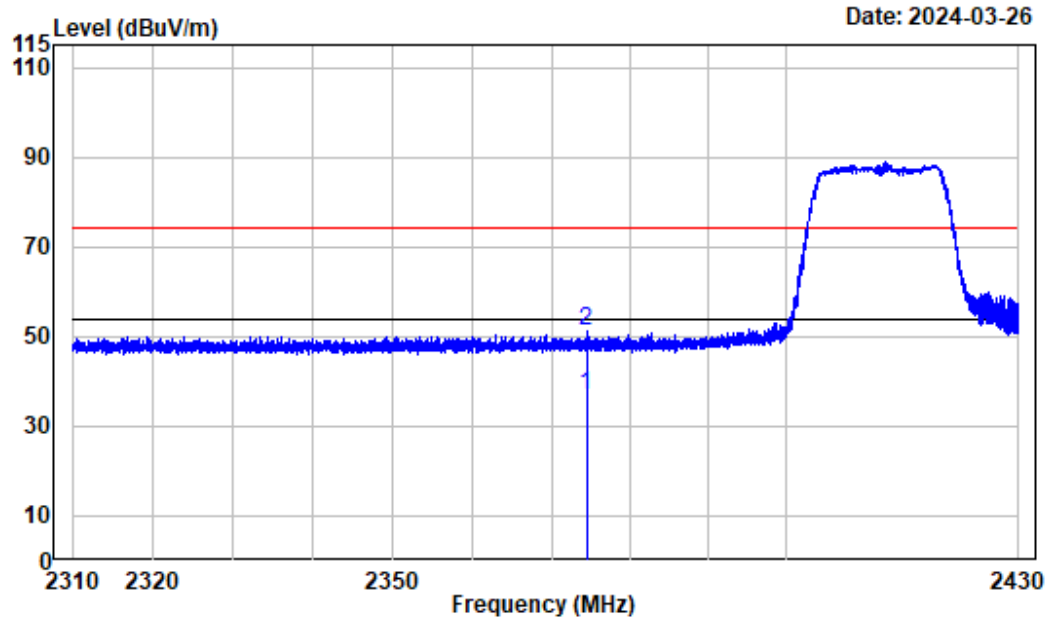
802.11g			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_G_2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2388.960	-3.20	42.52	39.32	54.00	-14.68	Average
2	2388.960	-3.20	56.86	53.66	74.00	-20.34	peak

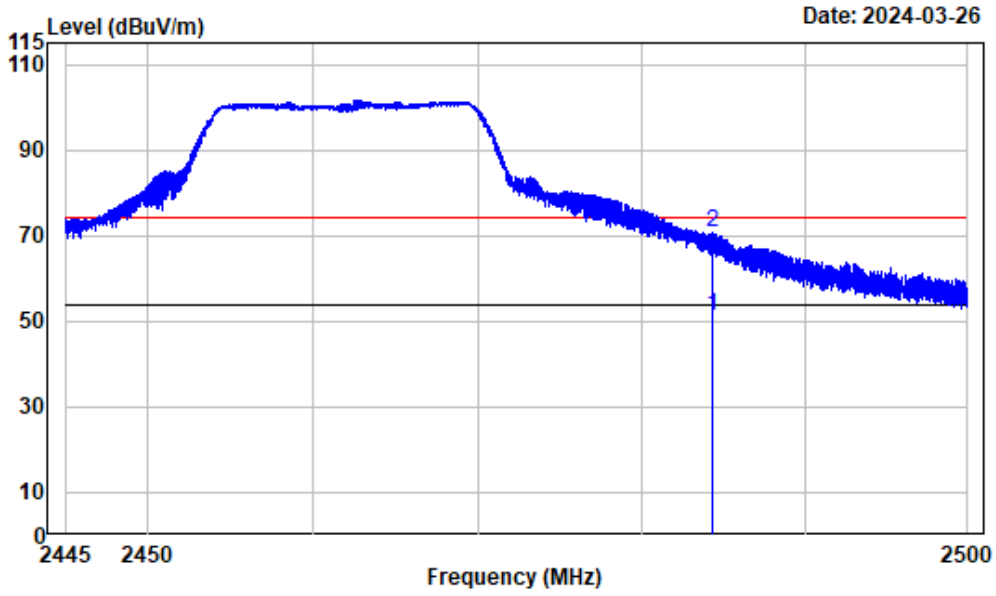
802.11g			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_G_2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2374.440	-3.18	40.25	37.07	54.00	-16.93	Average
2	2374.440	-3.18	54.51	51.33	74.00	-22.67	peak

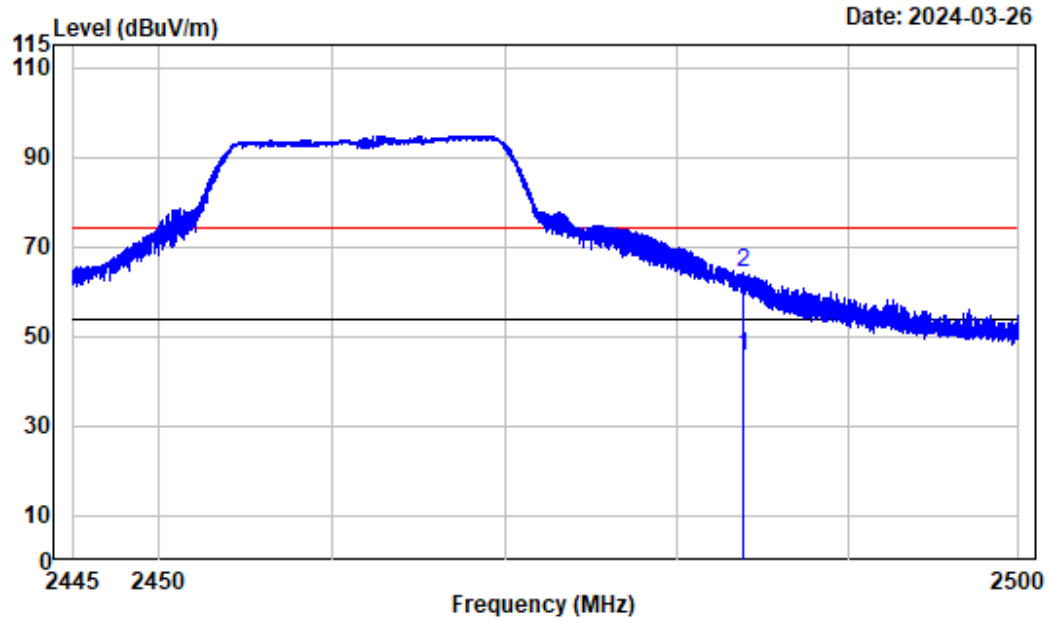
802.11g			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_G_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2484.284	-3.17	54.17	51.00	54.00	-3.00	Average
2	2484.284	-3.17	73.77	70.60	74.00	-3.40	peak

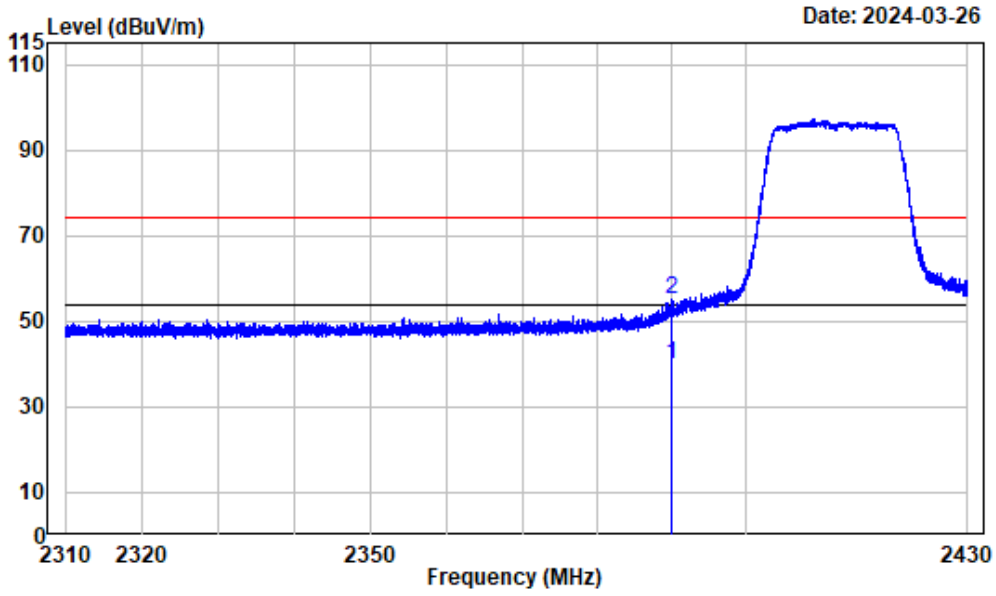
802.11g			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_G_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.823	-3.17	48.86	45.69	54.00	-8.31	Average
2	2483.823	-3.17	67.20	64.03	74.00	-9.97	peak

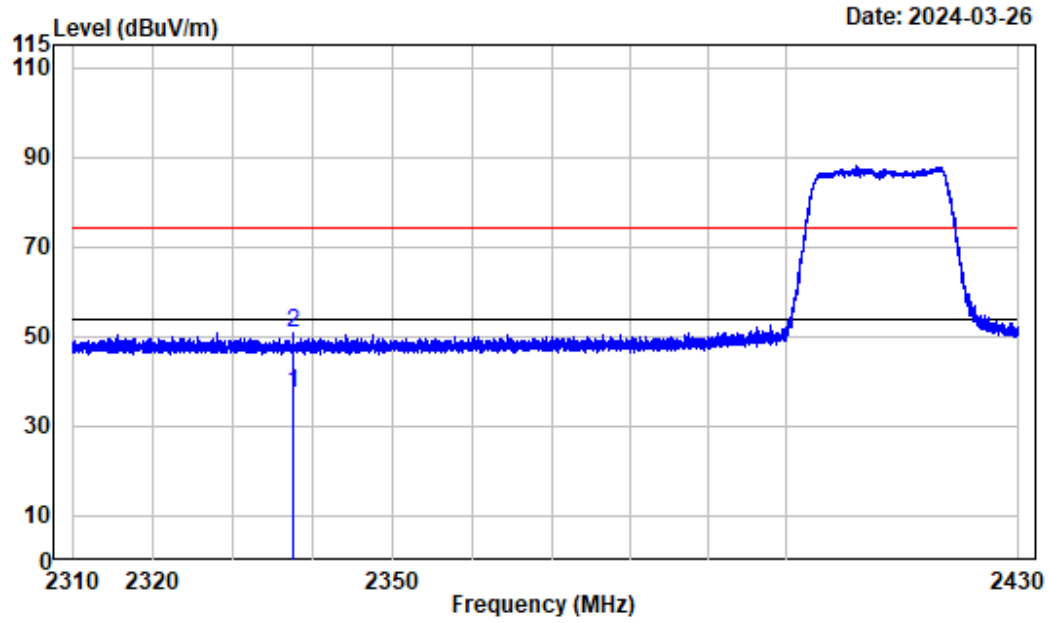
802.11n20			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N20_2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2389.980	-3.20	42.94	39.74	54.00	-14.26	Average
2	2389.980	-3.20	58.24	55.04	74.00	-18.96	peak

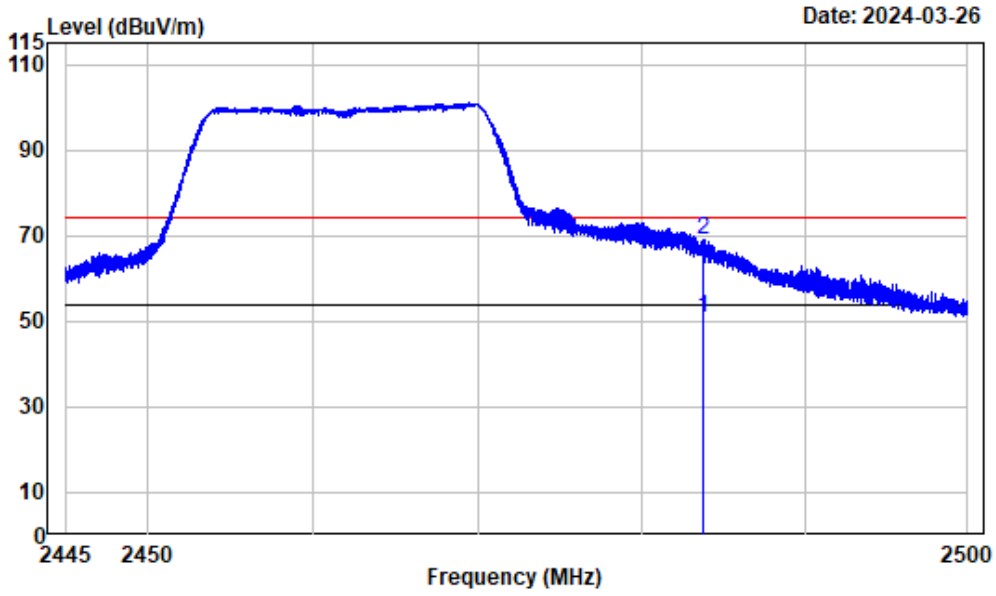
802.11n20			
Test Channel:	**2412MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N20_2412

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2337.555	-3.14	40.41	37.27	54.00	-16.73	Average
2	2337.555	-3.14	54.05	50.91	74.00	-23.09	peak

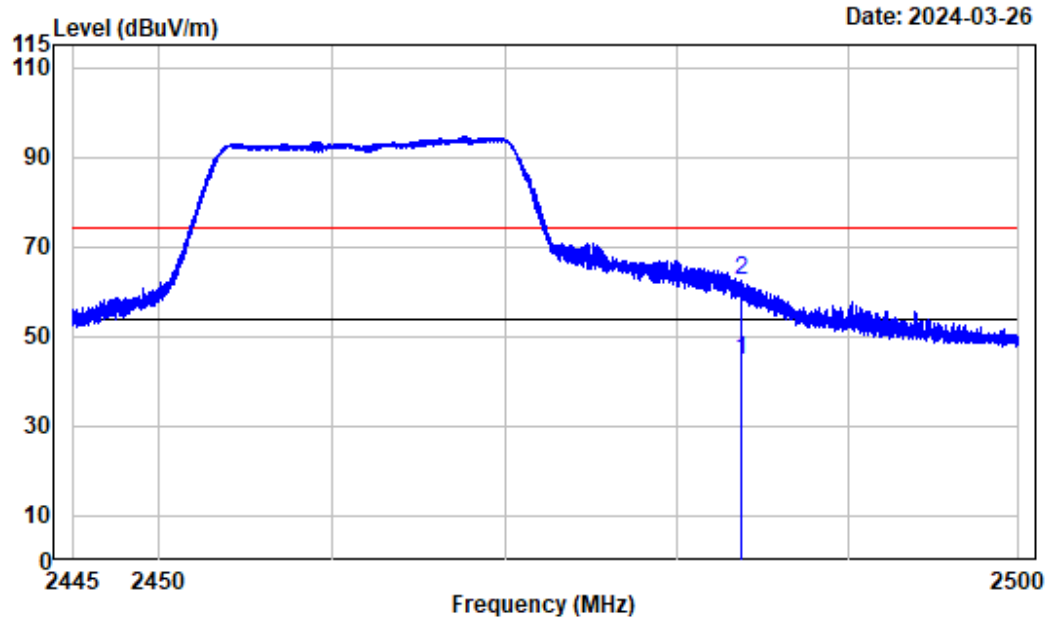
802.11n20			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N20_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.768	-3.17	53.82	50.65	54.00	-3.35	Average
2	2483.768	-3.17	72.24	69.07	74.00	-4.93	peak

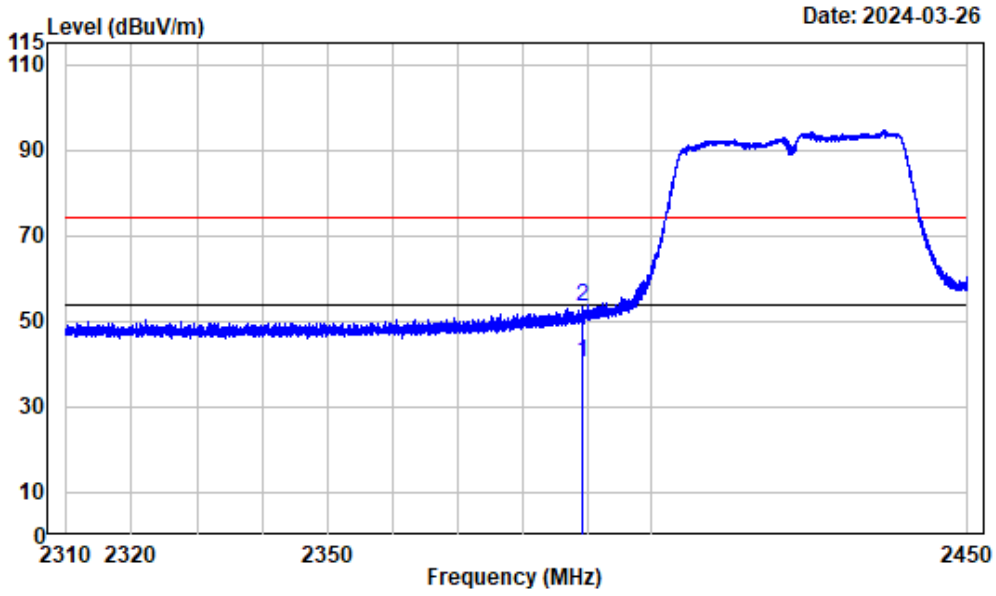
802.11n20			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N20_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.741	-3.17	47.79	44.62	54.00	-9.38	Average
2	2483.741	-3.17	65.74	62.57	74.00	-11.43	peak

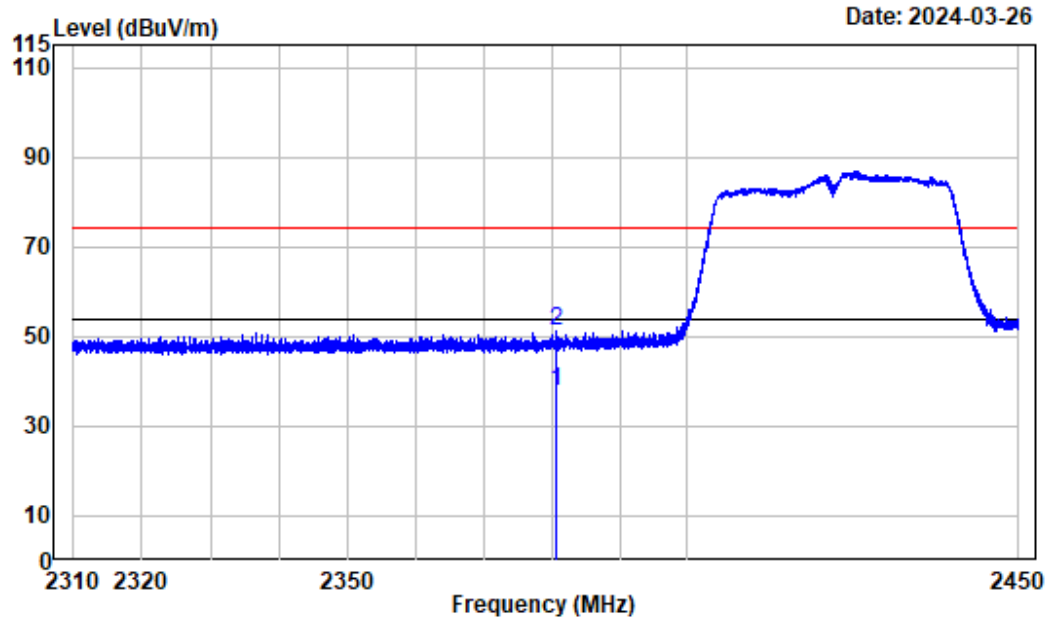
802.11n40			
Test Channel:	**2422MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N40_2422

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2389.100	-3.20	43.43	40.23	54.00	-13.77	Average
2	2389.100	-3.20	56.75	53.55	74.00	-20.45	peak

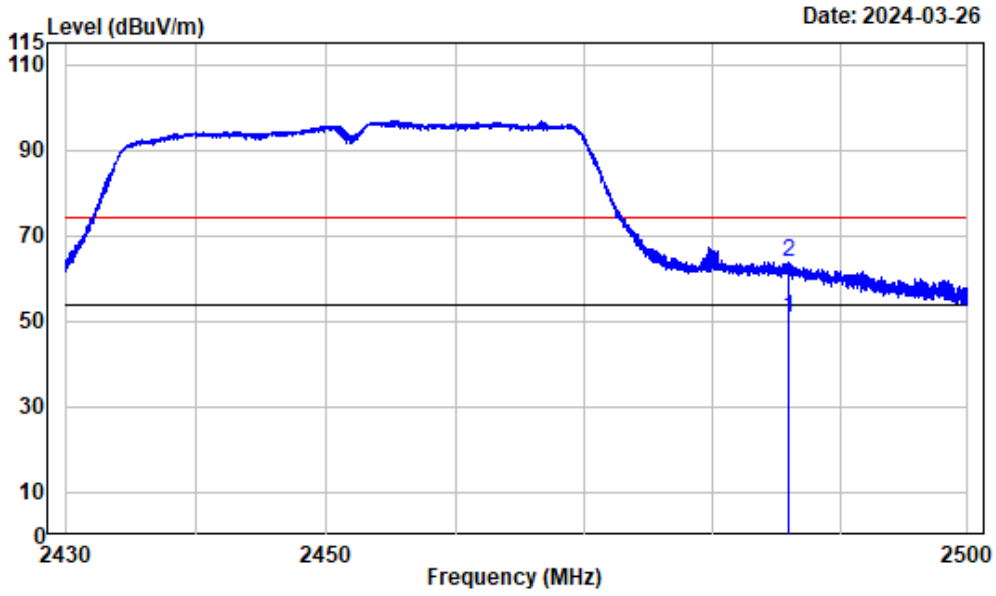
802.11n40			
Test Channel:	**2422MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N40_2422

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2380.560	-3.19	41.03	37.84	54.00	-16.16	Average
2	2380.560	-3.19	54.26	51.07	74.00	-22.93	peak

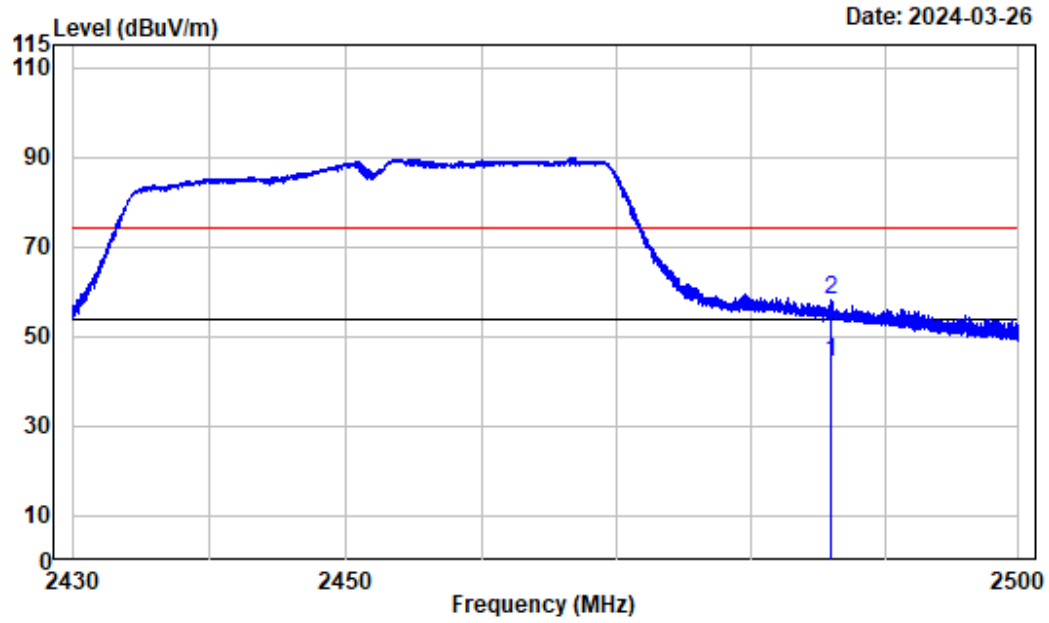
802.11n40			
Test Channel:	**2452MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N40_2452

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2485.895	-3.17	53.78	50.61	54.00	-3.39	Average
2	2485.895	-3.17	66.94	63.77	74.00	-10.23	peak

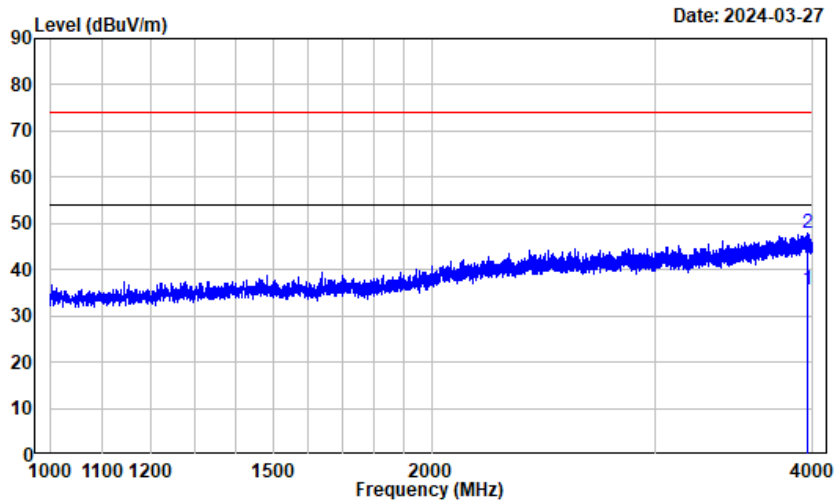
802.11n40			
Test Channel:	**2452MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_N40_2452

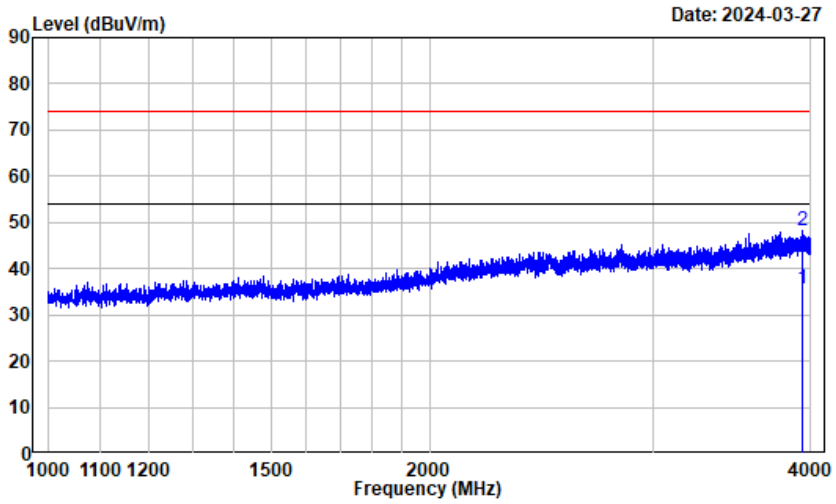
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2485.991	-3.17	47.56	44.39	54.00	-9.61	Average
2	2485.991	-3.17	61.31	58.14	74.00	-15.86	peak

Listed with the worst harmonic margin test plot:

Horizontal	
1-4GHz	 Condition : Horizontal Project No.: SZ2240105-01314E Tester : Tyler Note : 2.4G WiFi_B_2437 Freq / Factor / Read Level / Limit Level / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 3959.125 -0.18 35.96 35.78 54.00 -18.22 Average 2 3959.125 -0.18 48.15 47.97 74.00 -26.03 Peak

Vertical

1-4GHz

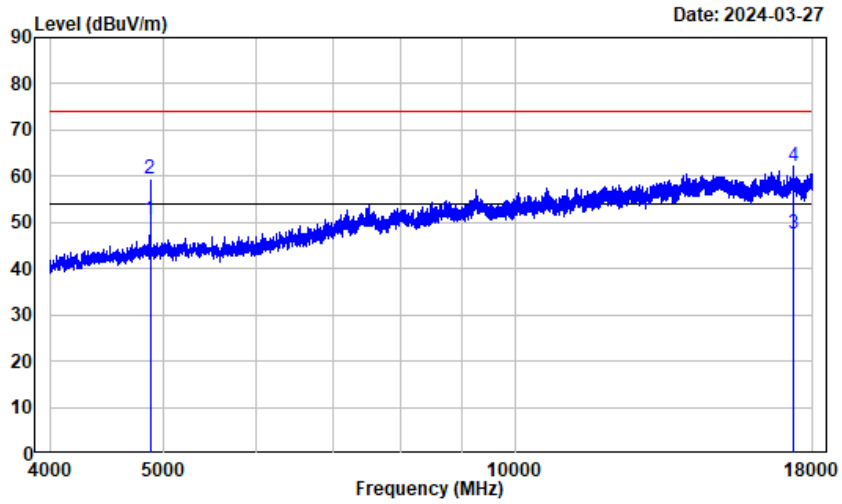


Condition : Vertical
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_B_2437

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3936.250	-0.26	35.95	35.69	54.00	-18.31	Average
2	3936.250	-0.26	48.42	48.16	74.00	-25.84	Peak

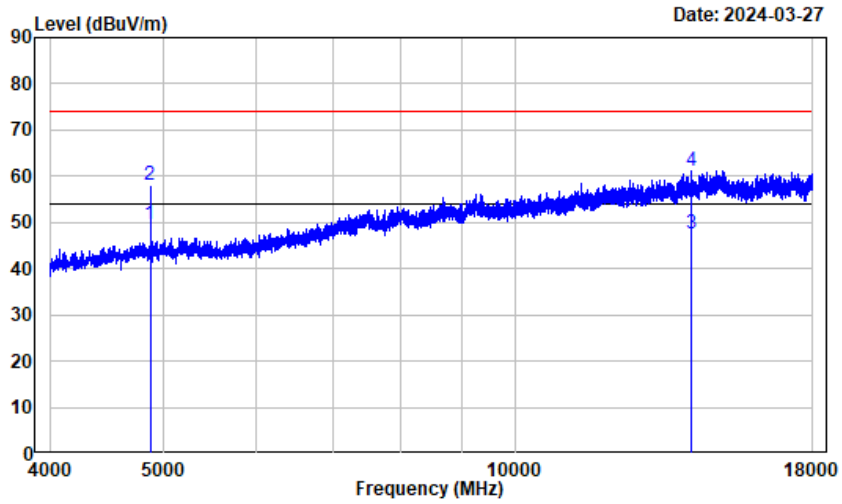
Horizontal

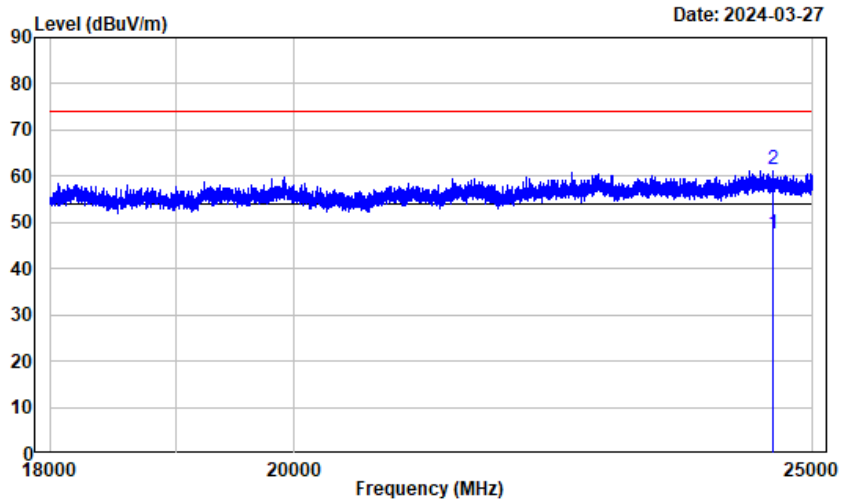
4-18GHz

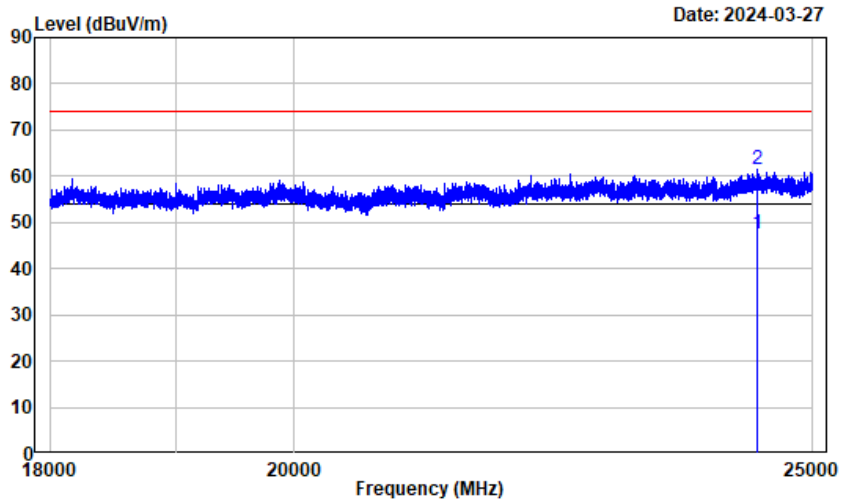


Condition : Horizontal
Project No.: SZ2240105-01314E
Tester : Tyler
Note : 2.4G WiFi_B_2437

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4874.000	2.56	48.07	50.63	54.00	-3.37	Average
2	4874.000	2.56	56.82	59.38	74.00	-14.62	Peak
3	17307.000	19.38	28.18	47.56	54.00	-6.44	Average
4	17307.000	19.38	42.63	62.01	74.00	-11.99	Peak

Vertical	
4-18GHz	 Condition : Vertical Project No.: SZ2240105-01314E Tester : Tyler Note : 2.4G WiFi_B_2437 Freq / Factor / Read Level / Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 4874.000 2.56 47.15 49.71 54.00 -4.29 Average 2 4874.000 2.56 55.36 57.92 74.00 -16.08 Peak 3 14171.000 17.12 30.34 47.46 54.00 -6.54 Average 4 14171.000 17.12 44.10 61.22 74.00 -12.78 Peak

Horizontal	
18-25GHz	 Condition : Horizontal Project No.: SZ2240105-01314E Tester : Tyler Note : 2.4G WiFi_B_2437 Freq / Factor / Read Level / Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 24574.750 18.90 28.75 47.65 54.00 -6.35 Average 2 24574.750 18.90 42.42 61.32 74.00 -12.68 Peak

Vertical	
18-25GHz	 Condition : Vertical Project No.: SZ2240105-01314E Tester : Tyler Note : 2.4G WiFi_B_2437 Freq / Factor / Read Level / Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 24408.500 18.79 28.78 47.57 54.00 -6.43 Average 2 24408.500 18.79 42.67 61.46 74.00 -12.54 Peak

§15.247 (a)(2) & RSS-Gen§6.7 RSS-247 § 5.2 (a) 99% OCCUPIED BANDWIDTH & 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the "6 dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated 6 dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.8.1 and Clause 6.9.3

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

The following conditions shall be observed for measuring the occupied bandwidth and 6 dB bandwidth:
• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

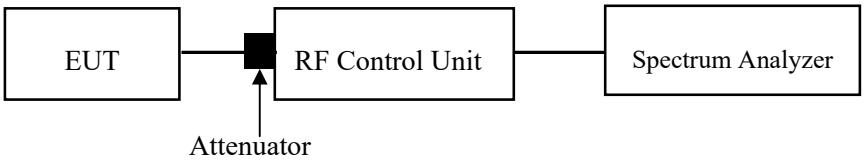
• The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / 6 dB bandwidth if the device is not transmitting continuously.

• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / 6 dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed

in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).



Test Data

Environmental Conditions

Temperature:	25~27 ℃
Relative Humidity:	48~57 %
ATM Pressure:	101 %

The testing was performed by Tom Tan on 2024-03-27.

EUT operation mode: Transmitting

Test Result: Compliant.The test data and plots Please refer to the Appendix BLE& Appendix Wifi.

§15.247(b)(3) & RSS-247 § 5.4(d) MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

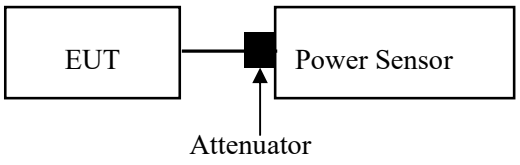
As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

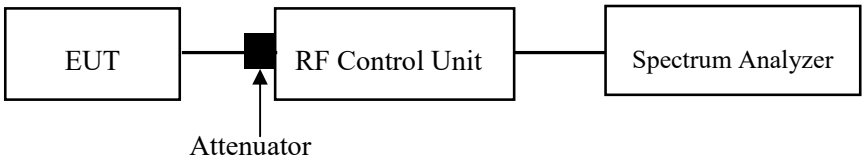
Test Method: ANSI C63.10-2013 Clause 11.9.1.1 for BLE and 11.9.1.3 for Wi-Fi

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.

For Wi-Fi mode:



For BLE mode:



Test Data

Environmental Conditions

Temperature:	25~27 ℃
Relative Humidity:	48~57 %
ATM Pressure:	101 %

The testing was performed by Tom Tan on 2024-03-27.

EUT operation mode: Transmitting

Test Result: Compliant.The test data and plots please refer to the Appendix BLE& Appendix Wifi

§15.247(d) & RSS-247 § 5.5 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

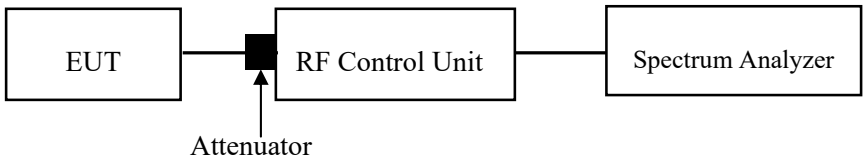
Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.11

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data

Environmental Conditions

Temperature:	25~27 ℃
Relative Humidity:	48~57 %
ATM Pressure:	101 %

The testing was performed by Tom Tan on 2024-03-27.

EUT operation mode: Transmitting

Test Result: Compliant. The test data and plots please refer to the Appendix BLE& Appendix Wifi

§15.247(e) & RSS-247 § 5.2 (b) POWER SPECTRAL DENSITY

Applicable Standard

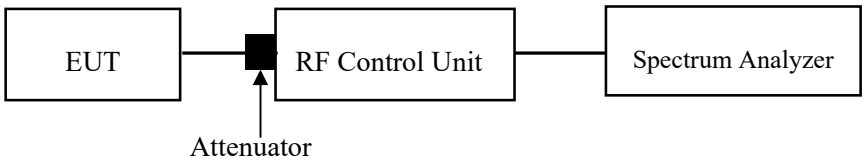
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.10.2

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	25~27 ℃
Relative Humidity:	48~57 %
ATM Pressure:	101 %

The testing was performed by Tom Tan on 2024-03-27.

EUT operation mode: Transmitting

Test Result: Compliant.The test data and plots please refer to the Appendix BLE& Appendix Wifi

EUT PHOTOGRAPHS

Please refer to the attachment SZ2240105-01314E-RF External photo and SZ2240105-01314E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ2240105-01314E-RF Test Setup photo.

APPENDIX BLE

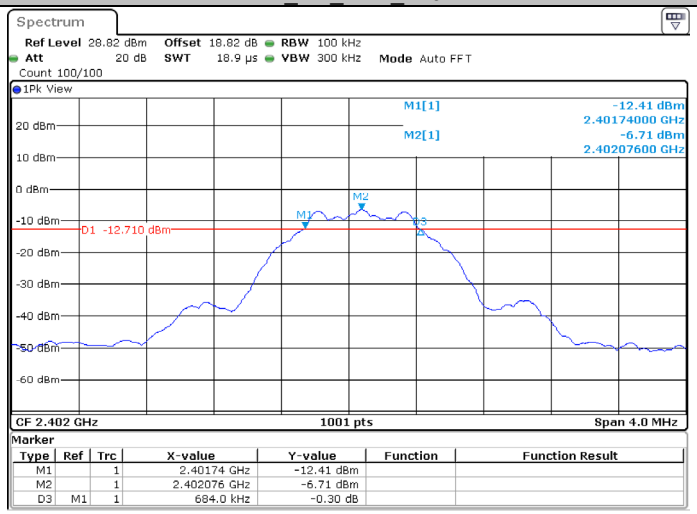
Appendix A: DTS Bandwidth

Test Result

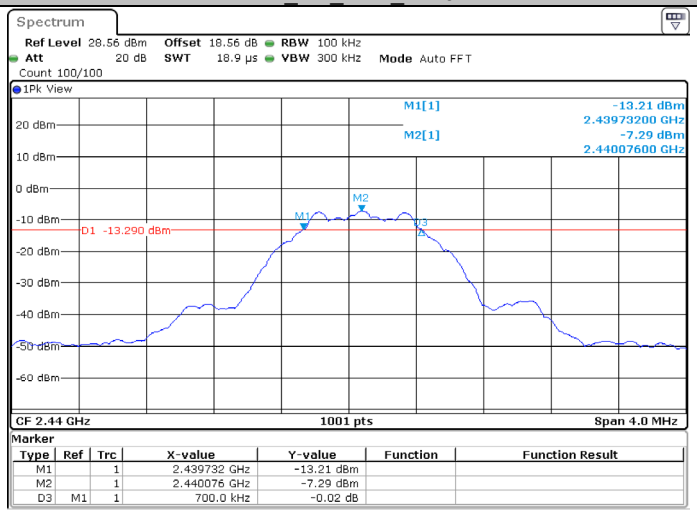
TestMode	Antenna	Frequency [MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.68	2401.74	2402.42	0.5	PASS
		2440	0.70	2439.73	2440.43	0.5	PASS
		2480	0.70	2479.73	2480.43	0.5	PASS

Test Graphs

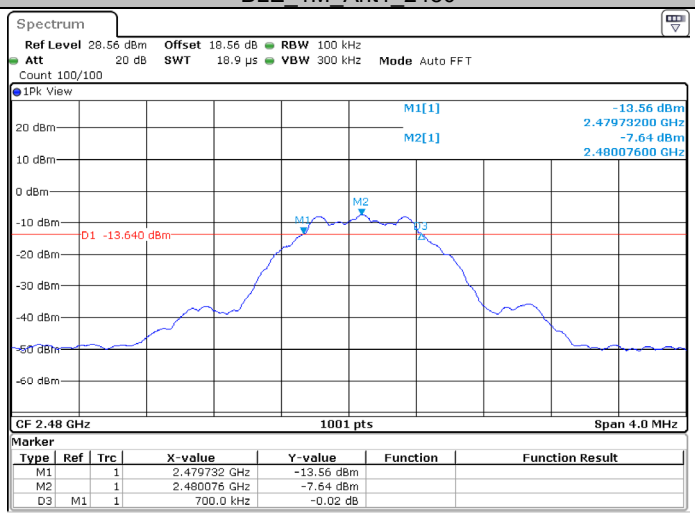
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



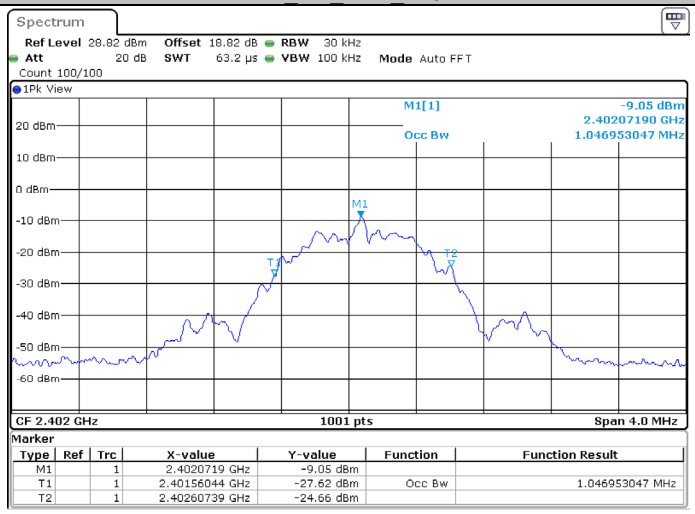
Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.047	2401.5604	2402.6074	---	---
		2440	1.047	2439.5644	2440.6114	---	---
		2480	1.051	2479.5644	2480.6154	---	---

Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

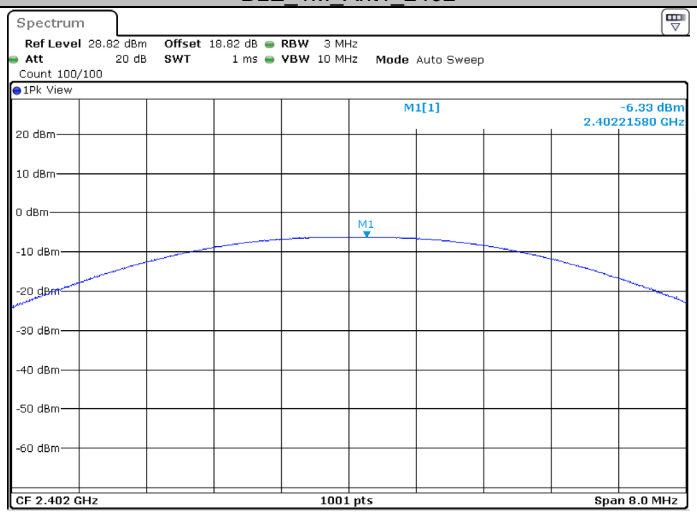
BLE_1M_Ant1_2480

Appendix C: Maximum peak conducted output power

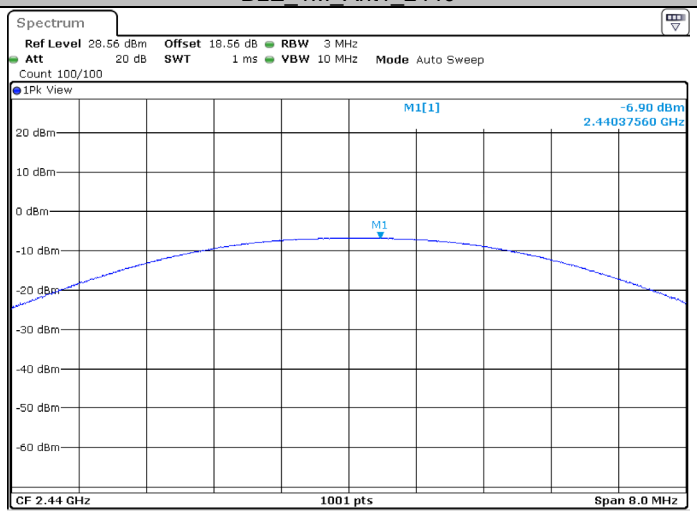
TestMode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Limit [dBm]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
BLE_1M	Ant1	2402	-6.33	≤30	-4.04	≤36	PASS
		2440	-6.90	≤30	-4.61	≤36	PASS
		2480	-7.22	≤30	-4.93	≤36	PASS

Test Graphs Peak

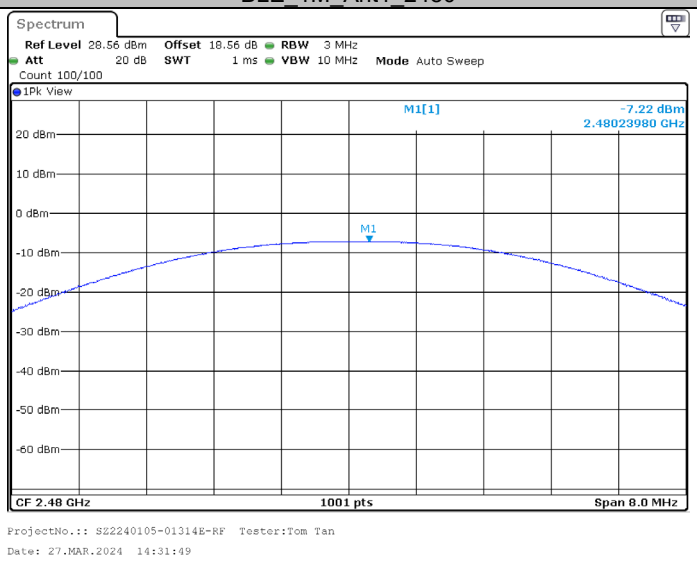
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



BLE_1M_Ant1_2480



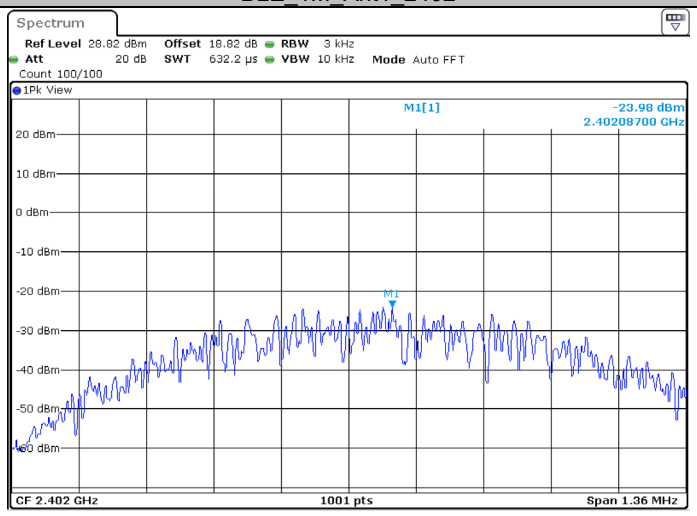
Appendix D: Maximum power spectral density

Test Result

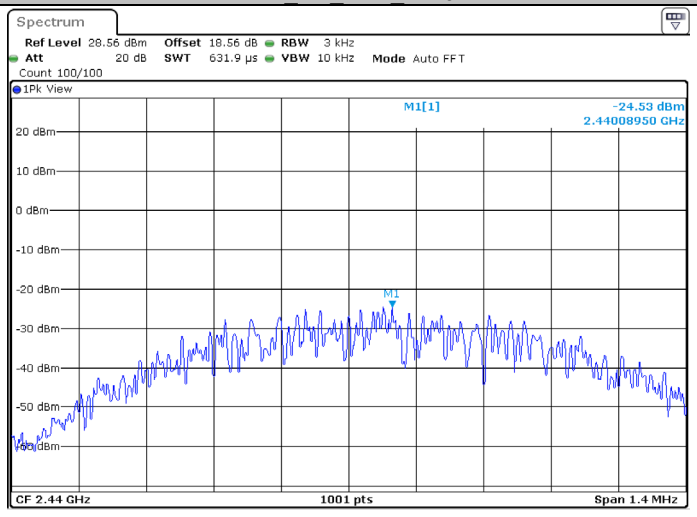
TestMode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-23.98	≤8.00	PASS
		2440	-24.53	≤8.00	PASS
		2480	-24.89	≤8.00	PASS

Test Graphs

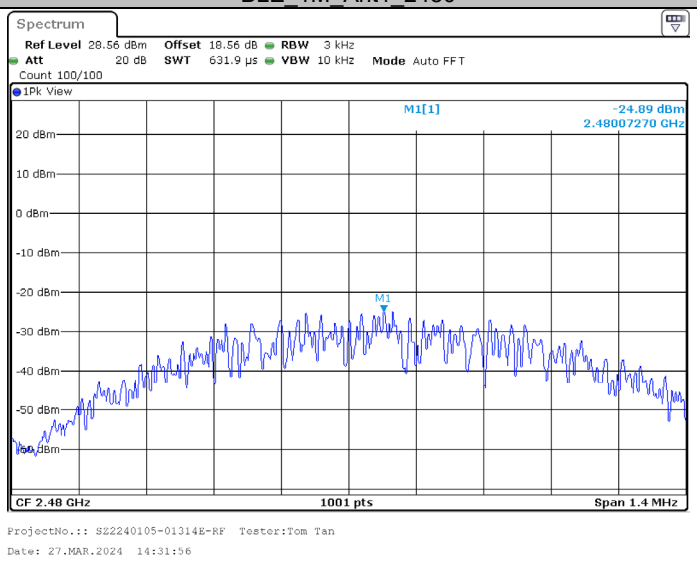
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440



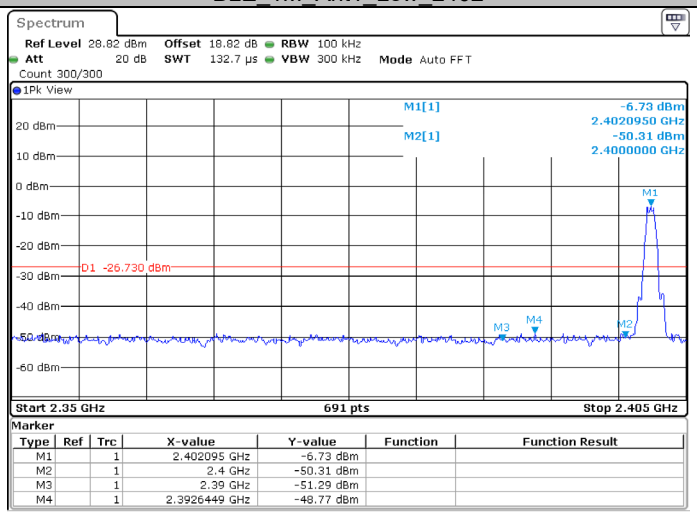
BLE_1M_Ant1_2480



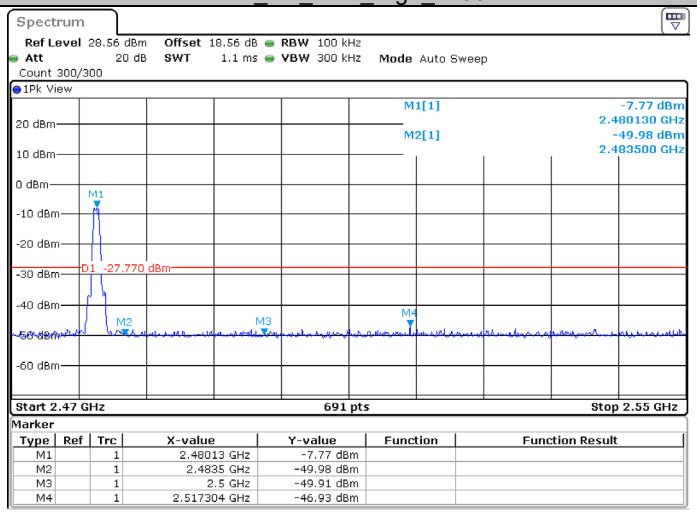
Appendix E: Band edge measurements

Test Graphs

BLE_1M_Ant1_Low_2402



BLE_1M_Ant1_High_2480



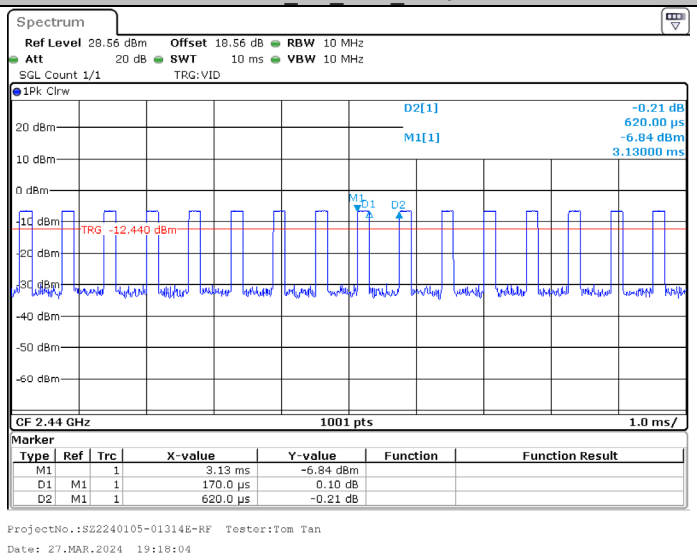
Appendix F: Duty Cycle

Test Result

TestMode	Antenna	Frequency[MHz]	Ton [ms]	Period [ms]	Duty Cycle [%]	1/T (kHz)	VBW setting (kHz)
BLE_1M	Ant1	2440	0.17	0.62	27.4	5.88	10

Test Graphs

BLE_1M_Ant1_2440



APPENDIX WI-FI

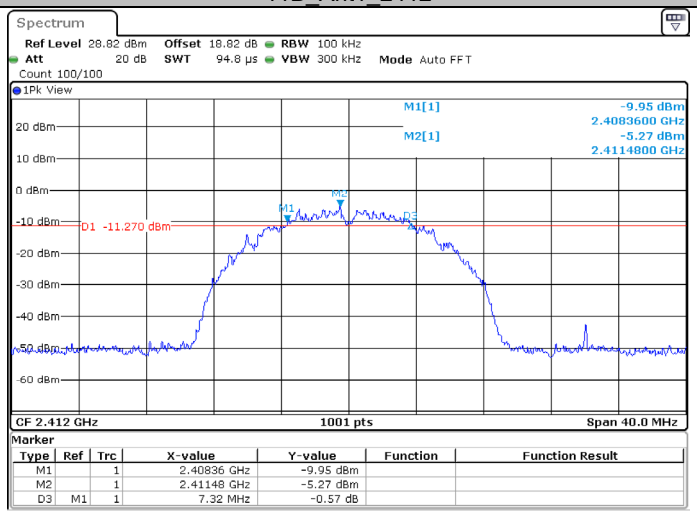
Appendix A: DTS Bandwidth

Test Result

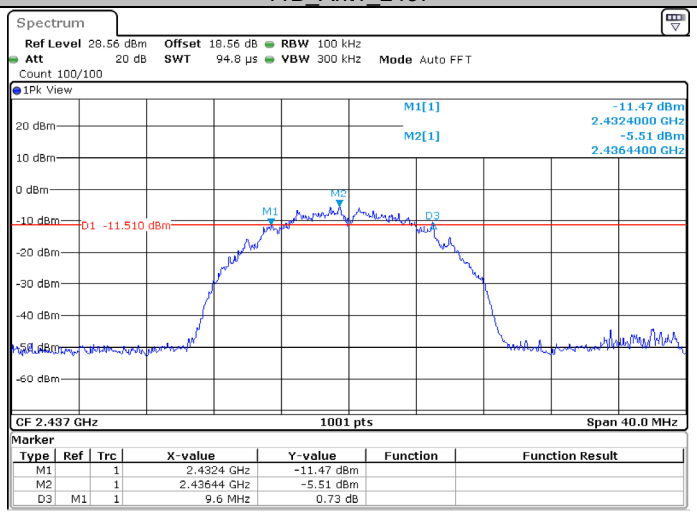
TestMode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	7.32	0.5	PASS
		2437	9.60	0.5	PASS
		2462	8.92	0.5	PASS
11G	Ant1	2412	16.56	0.5	PASS
		2437	16.56	0.5	PASS
		2462	16.40	0.5	PASS
11N20SISO	Ant1	2412	17.60	0.5	PASS
		2437	17.12	0.5	PASS
		2462	17.04	0.5	PASS
11N40SISO	Ant1	2422	35.12	0.5	PASS
		2437	35.12	0.5	PASS
		2452	35.12	0.5	PASS

Test Graphs

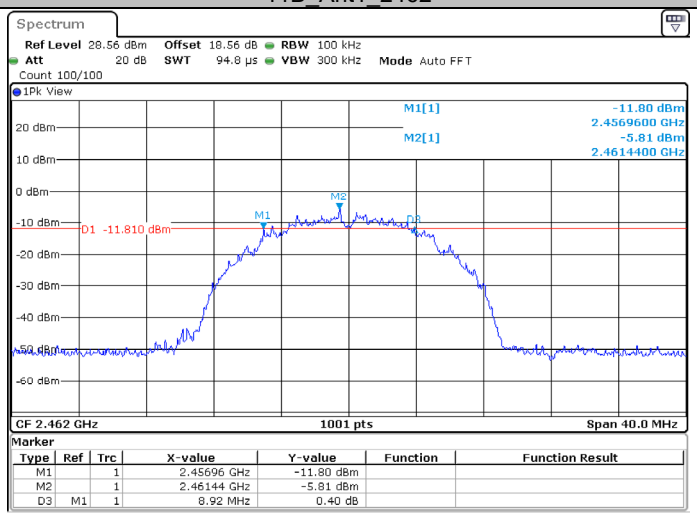
11B_Ant1_2412



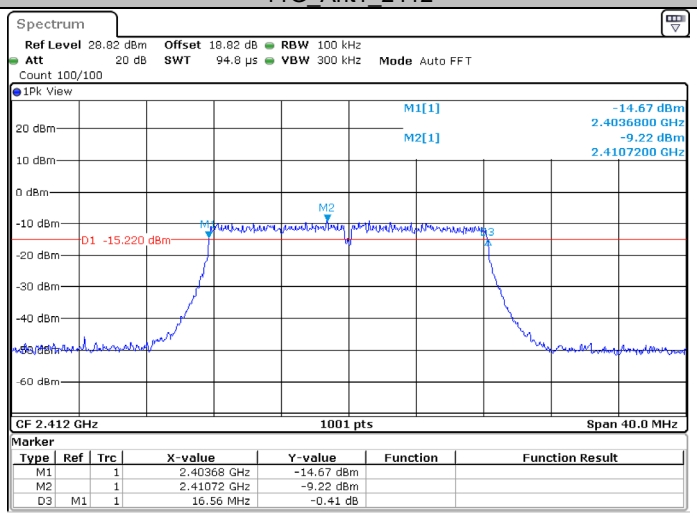
11B_Ant1_2437



11B_Ant1_2462

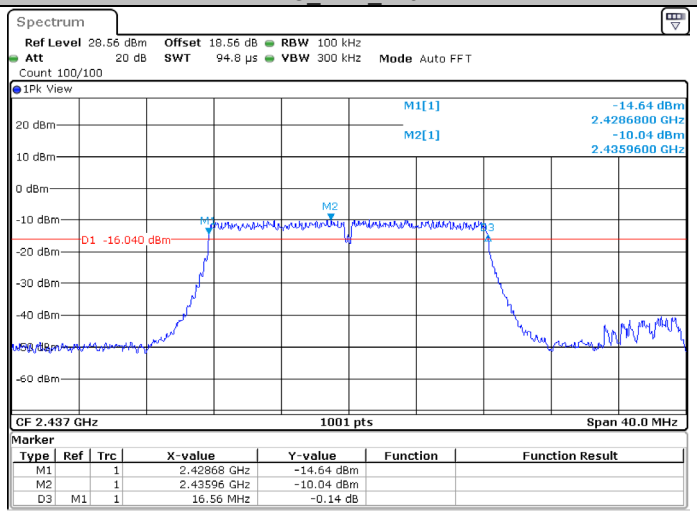


11G_Ant1_2412



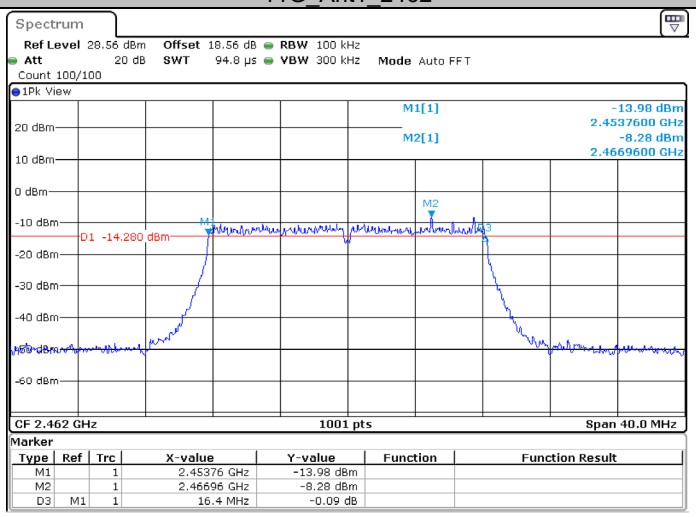
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:28:09

11G_Ant1_2437



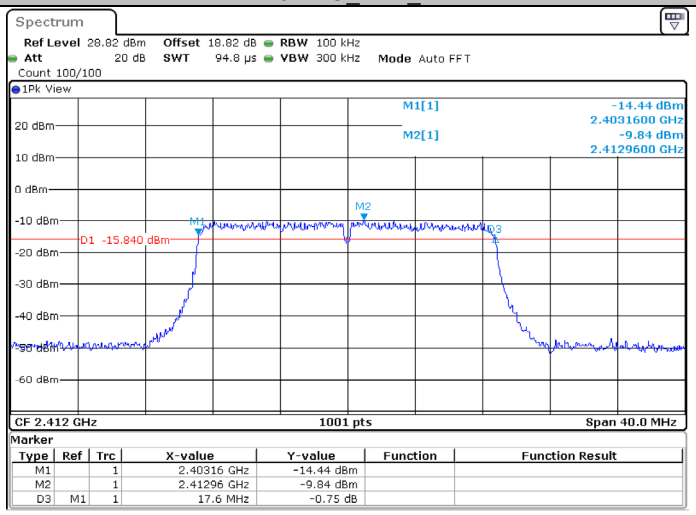
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:29:25

11G_Ant1_2462



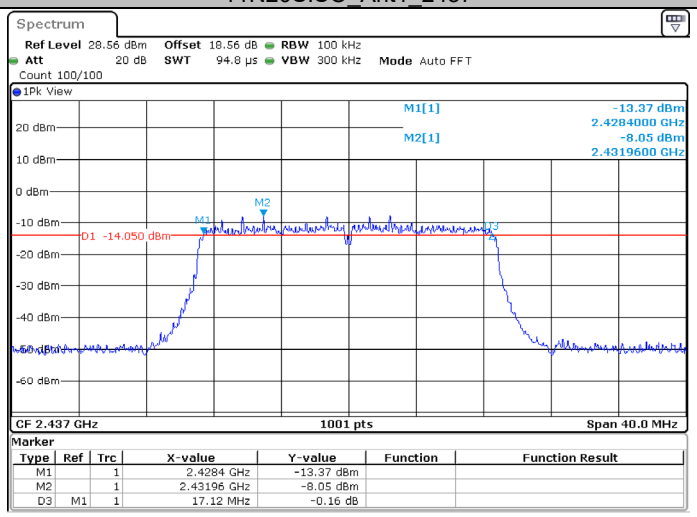
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:31:19

11N20SISO_Ant1_2412



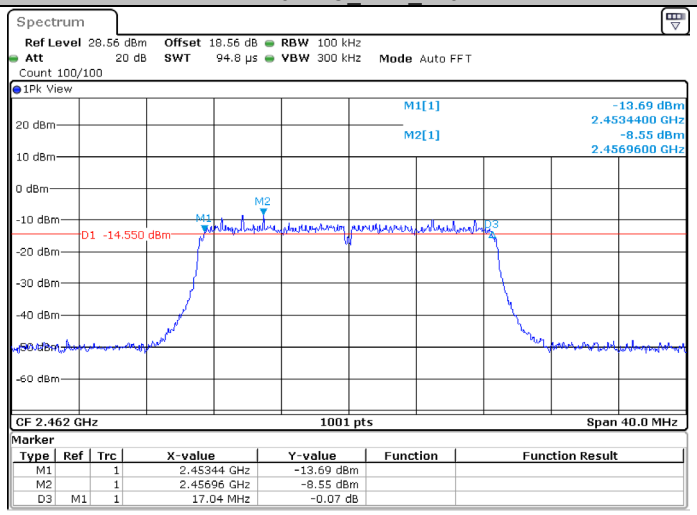
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:39:47

11N20SISO_Ant1_2437



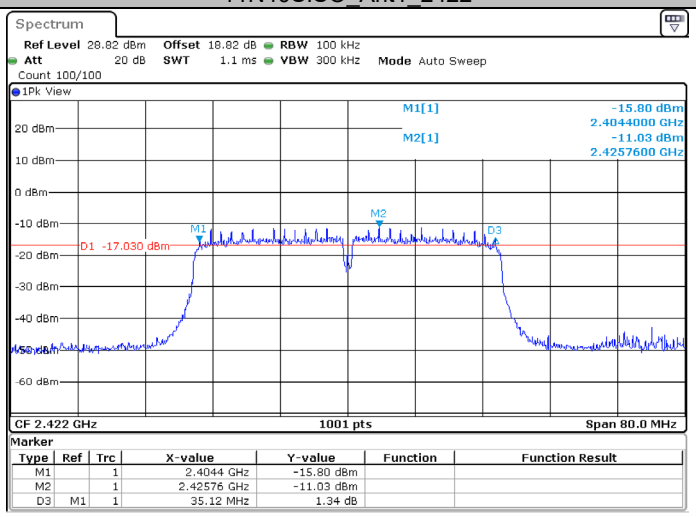
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:40:58

11N20SISO_Ant1_2462



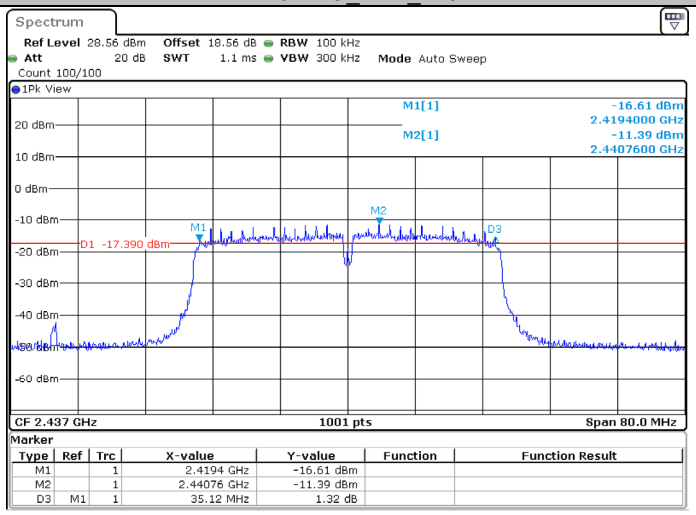
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:42:05

11N40SISO_Ant1_2422



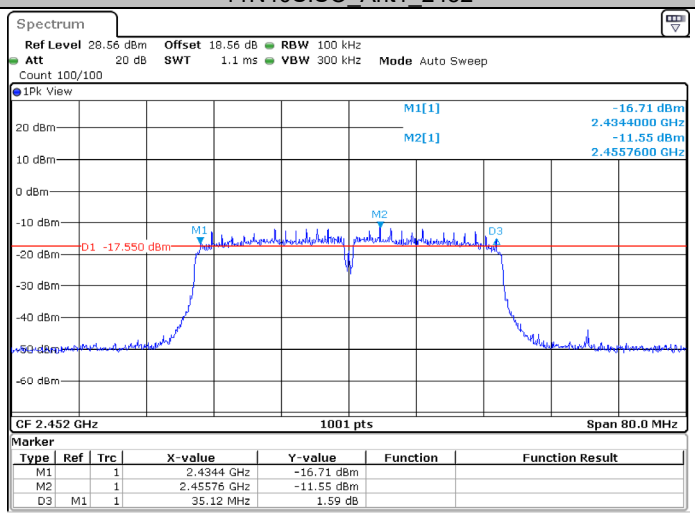
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:43:53

11N40SISO_Ant1_2437



ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:46:16

11N40SISO_Ant1_2452



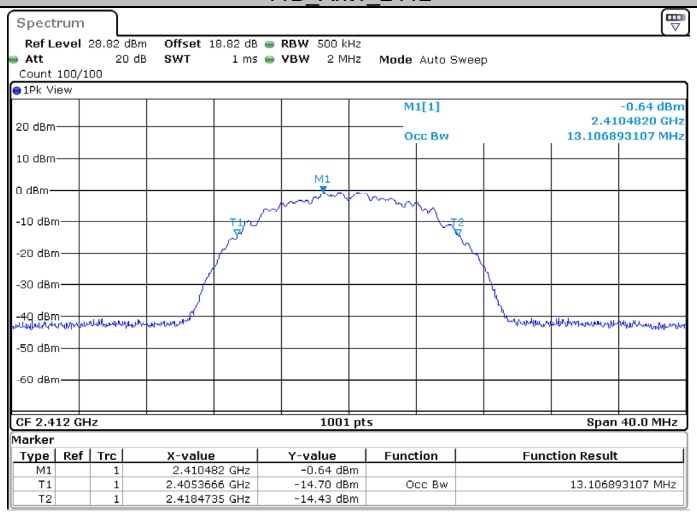
Appendix B: Occupied Channel Bandwidth

Test Result

TestMode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	13.107	---	---
		2437	13.067	---	---
		2462	13.067	---	---
11G	Ant1	2412	16.983	---	---
		2437	16.943	---	---
		2462	16.983	---	---
11N20SISO	Ant1	2412	17.662	---	---
		2437	17.622	---	---
		2462	17.622	---	---
11N40SISO	Ant1	2422	36.124	---	---
		2437	36.044	---	---
		2452	36.044	---	---

Test Graphs

11B_Ant1_2412

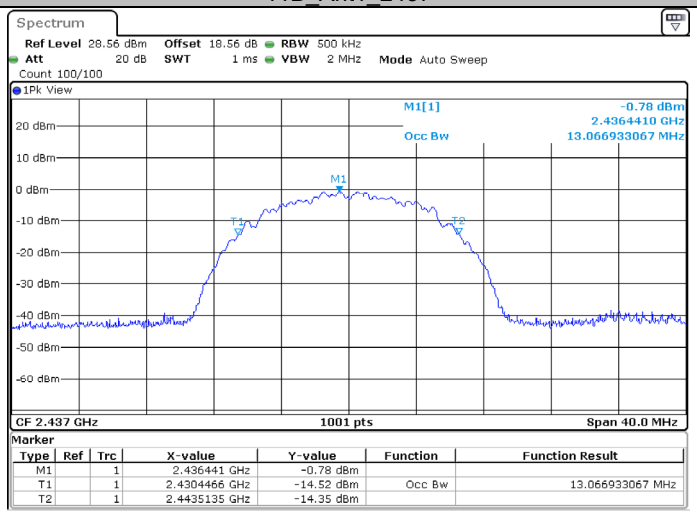


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.410482 GHz	-0.64 dBm		
T1		1	2.4053666 GHz	-14.70 dBm	Occ Bw	13.106893107 MHz
T2		1	2.4184735 GHz	-14.43 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:23:10

11B_Ant1_2437

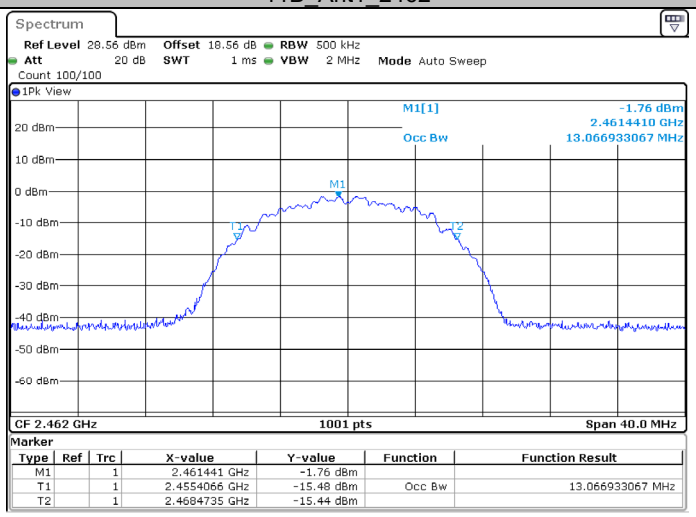


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.436441 GHz	-0.78 dBm		
T1		1	2.4304466 GHz	-14.52 dBm	Occ Bw	13.066933067 MHz
T2		1	2.4435135 GHz	-14.35 dBm		

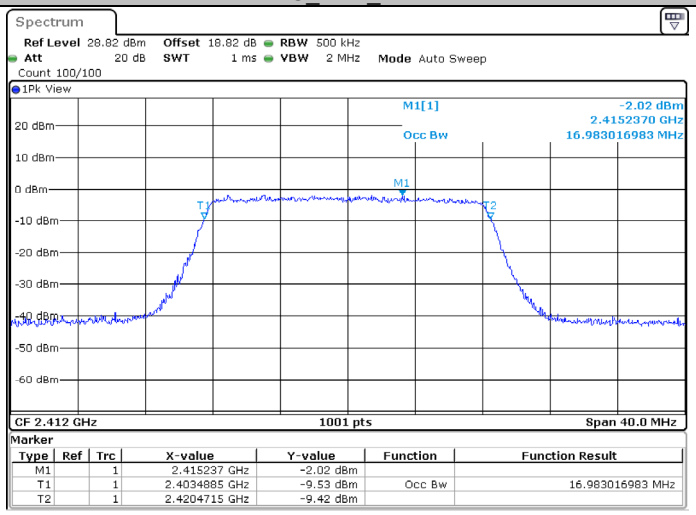
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:24:55

11B_Ant1_2462



ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:26:04

11G_Ant1_2412



ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:28:15

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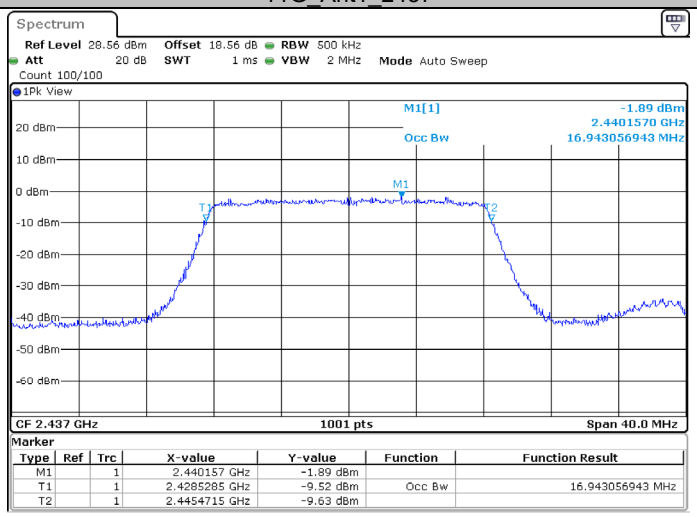

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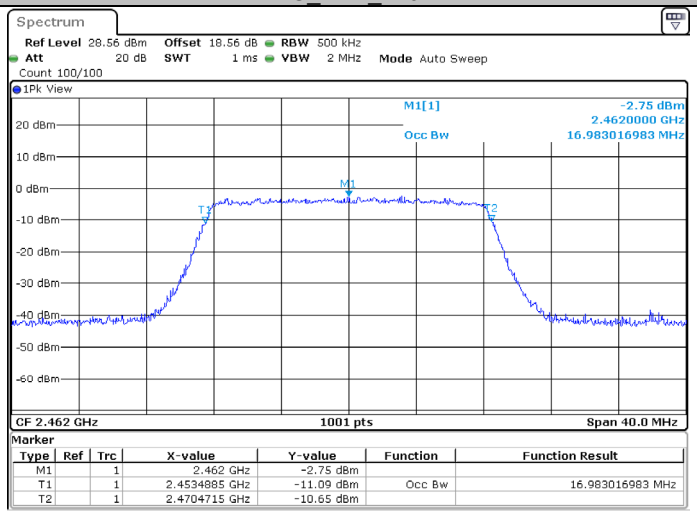
Date: 27.MAR.2024 13:29:31

11G_Ant1_2462



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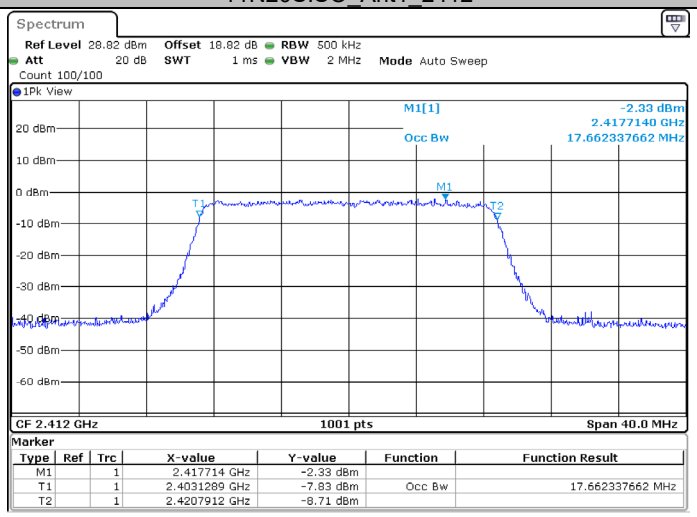
Date: 27.MAR.2024 13:31:25

11N20SISO_Ant1_2412



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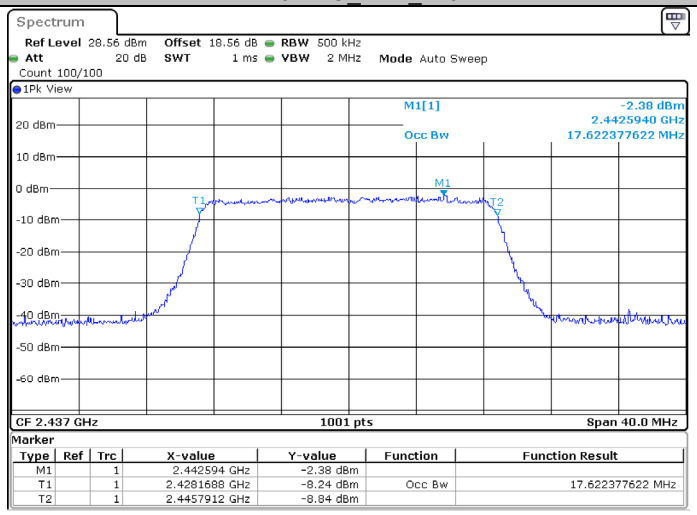
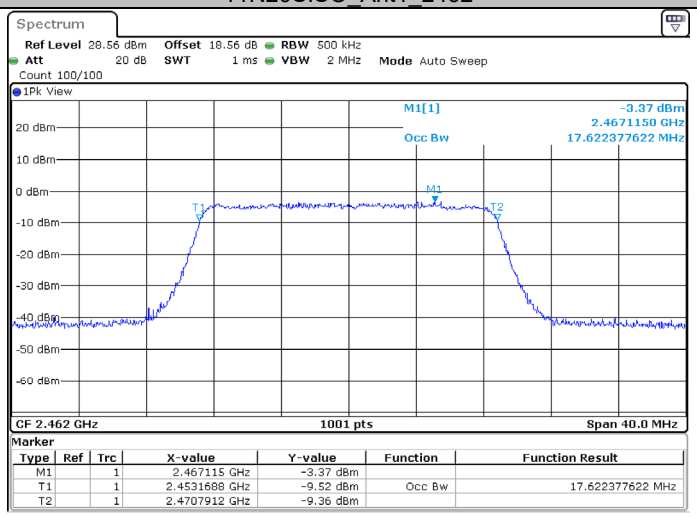
11N20SISO_Ant1_2437



ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:41:04

11N20SISO_Ant1_2462



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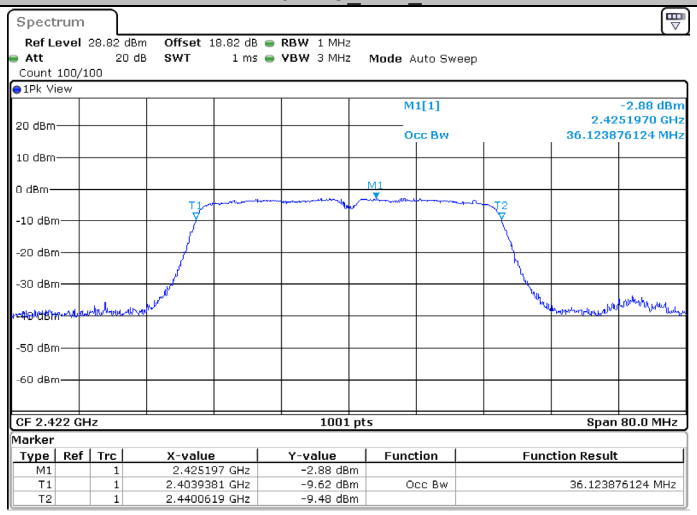
Date: 27.MAR.2024 13:42:10

11N40SISO_Ant1_2422



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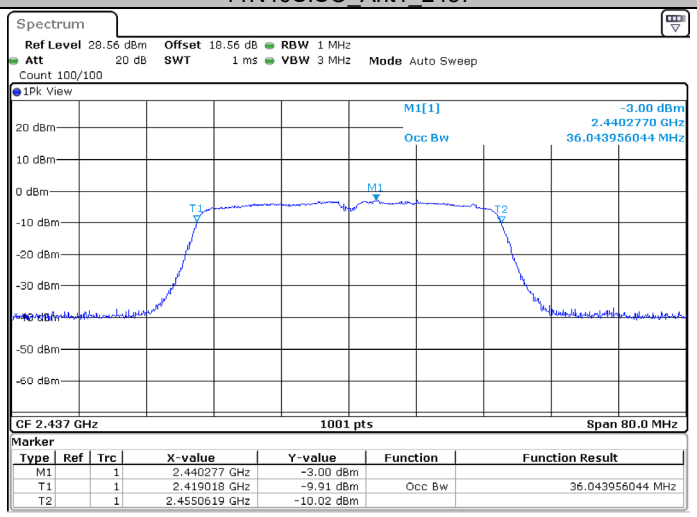
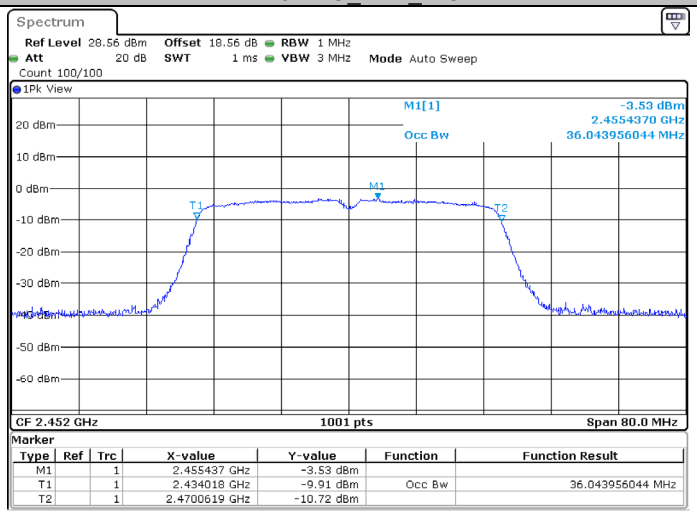
11N40SISO_Ant1_2437



ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:46:22

11N40SISO_Ant1_2452



ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:47:15

Appendix C: Maximum conducted output power

Peak Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
11B	Ant1	2412	13.52	≤30.00	15.81	≤36	PASS
		2437	13.12	≤30.00	15.41	≤36	PASS
		2462	12.85	≤30.00	15.14	≤36	PASS
11G	Ant1	2412	16.41	≤30.00	18.70	≤36	PASS
		2437	16.32	≤30.00	18.61	≤36	PASS
		2462	15.90	≤30.00	18.19	≤36	PASS
11N20SISO	Ant1	2412	15.97	≤30.00	18.26	≤36	PASS
		2437	15.87	≤30.00	18.16	≤36	PASS
		2462	15.52	≤30.00	17.81	≤36	PASS
11N40SISO	Ant1	2422	14.86	≤30.00	17.15	≤36	PASS
		2437	14.49	≤30.00	16.78	≤36	PASS
		2452	14.32	≤30.00	16.61	≤36	PASS

Average Test Result

TestMode	Antenna	Channel	Result [dBm]	Limit[dBm]	EIRP[dBm]	EIRP Limit[dBm]	Verdict
11B	Ant1	2412	7.01	≤30.00	9.30	≤36	PASS
		2437	7.08	≤30.00	9.37	≤36	PASS
		2462	7.22	≤30.00	9.51	≤36	PASS
11G	Ant1	2412	6.12	≤30.00	8.41	≤36	PASS
		2437	6.15	≤30.00	8.44	≤36	PASS
		2462	6.42	≤30.00	8.71	≤36	PASS
11N20SISO	Ant1	2412	5.08	≤30.00	7.37	≤36	PASS
		2437	5.12	≤30.00	7.41	≤36	PASS
		2462	5.23	≤30.00	7.52	≤36	PASS
11N40SISO	Ant1	2422	4.81	≤30.00	7.10	≤36	PASS
		2437	4.62	≤30.00	6.91	≤36	PASS
		2452	4.87	≤30.00	7.16	≤36	PASS

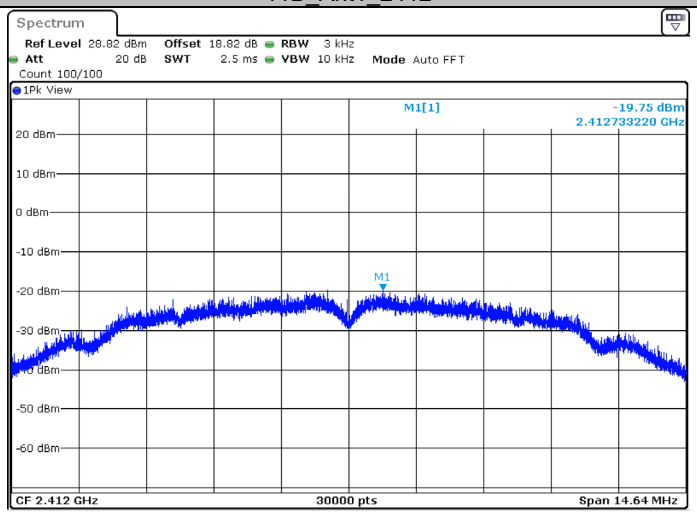
Appendix D: Maximum power spectral density

Test Result

TestMode	Antenna	Channel	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-19.75	≤8.00	PASS
		2437	-19.82	≤8.00	PASS
		2462	-20.31	≤8.00	PASS
11G	Ant1	2412	-20.82	≤8.00	PASS
		2437	-20.97	≤8.00	PASS
		2462	-21.6	≤8.00	PASS
11N20SISO	Ant1	2412	-20.34	≤8.00	PASS
		2437	-20.59	≤8.00	PASS
		2462	-20.79	≤8.00	PASS
11N40SISO	Ant1	2422	-23.74	≤8.00	PASS
		2437	-23.7	≤8.00	PASS
		2452	-24.14	≤8.00	PASS

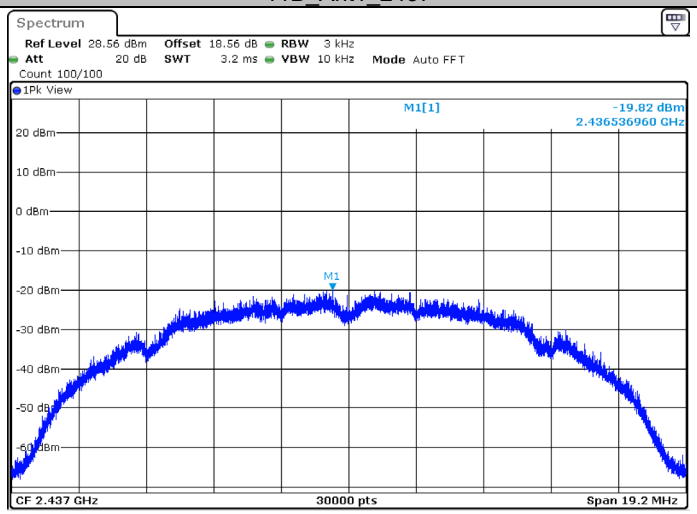
Test Graphs

11B_Ant1_2412



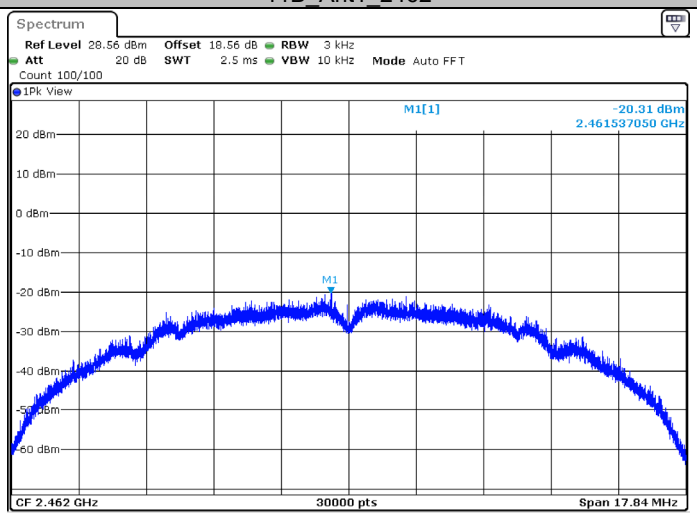
ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:23:23

11B_Ant1_2437

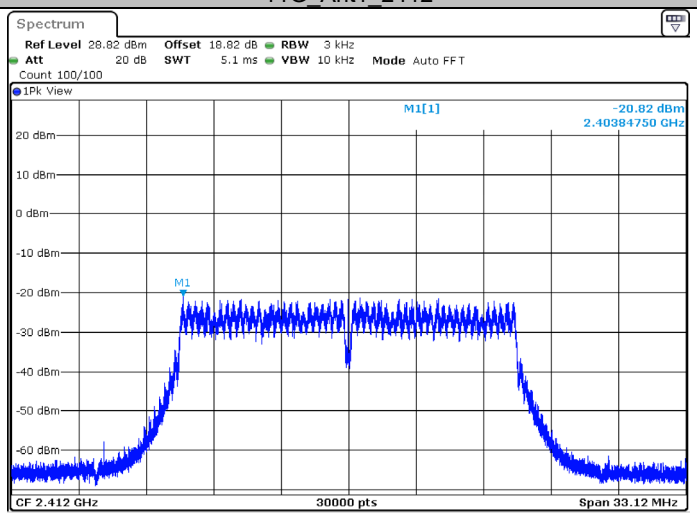


ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:25:07

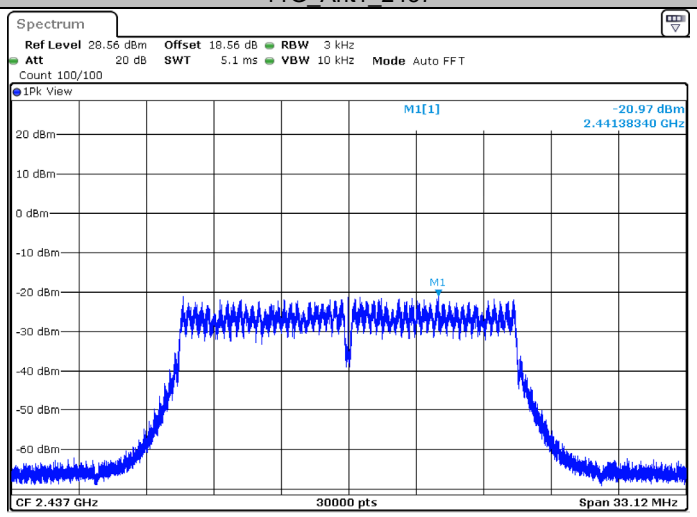
11B_Ant1_2462



11G_Ant1_2412



11G_Ant1_2437



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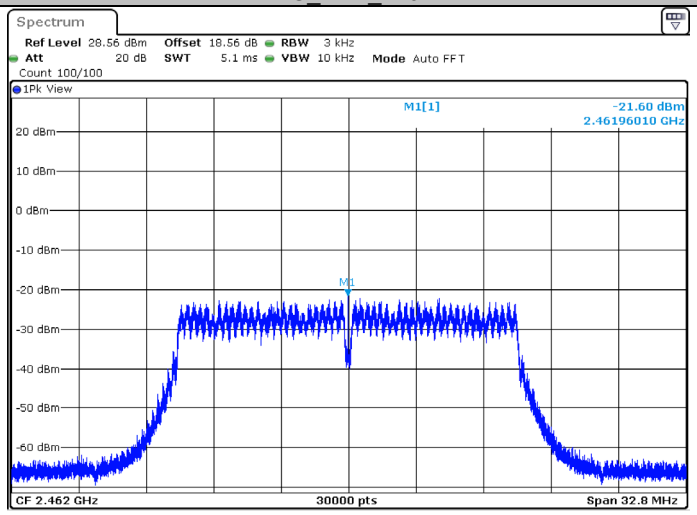

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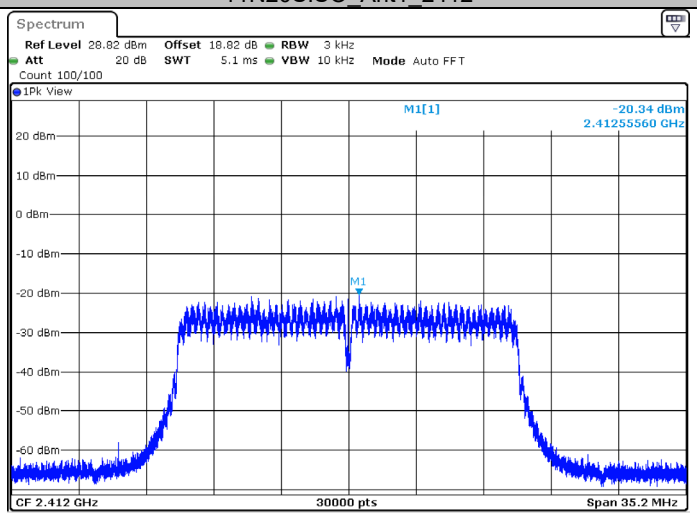

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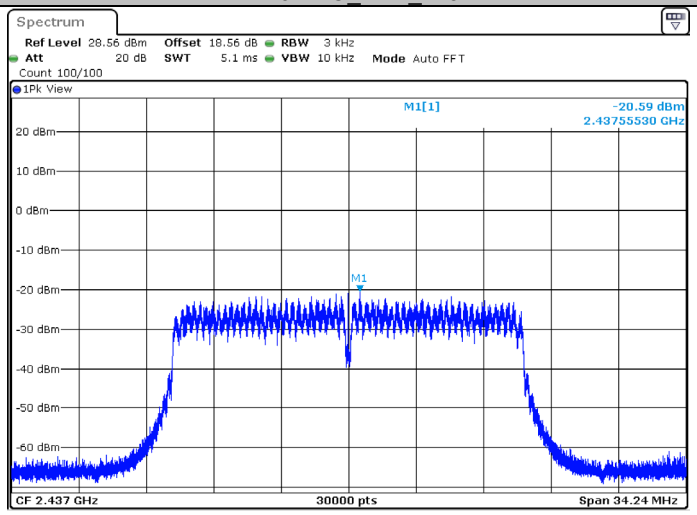

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Date: 27.MAR.2024 13:41:16

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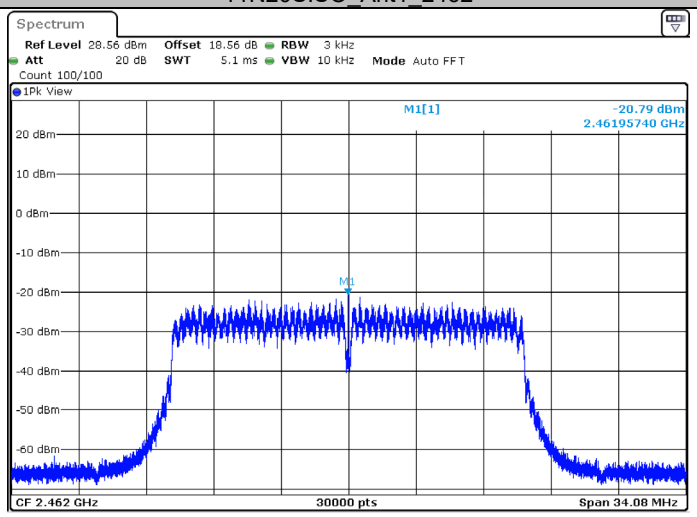
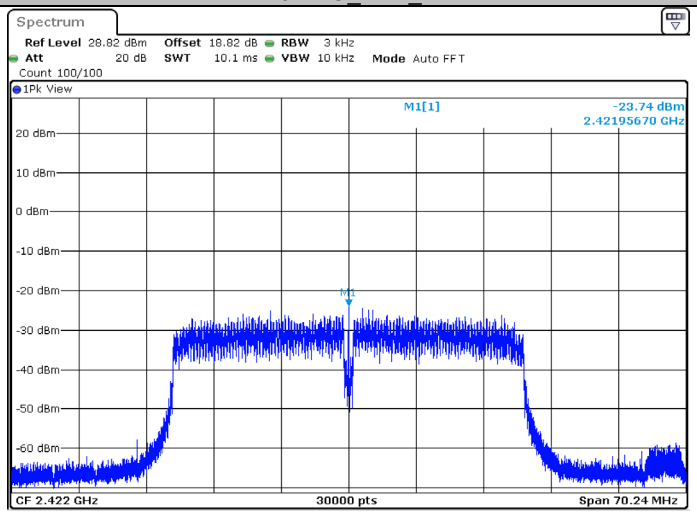


11N40SISO_Ant1_2422



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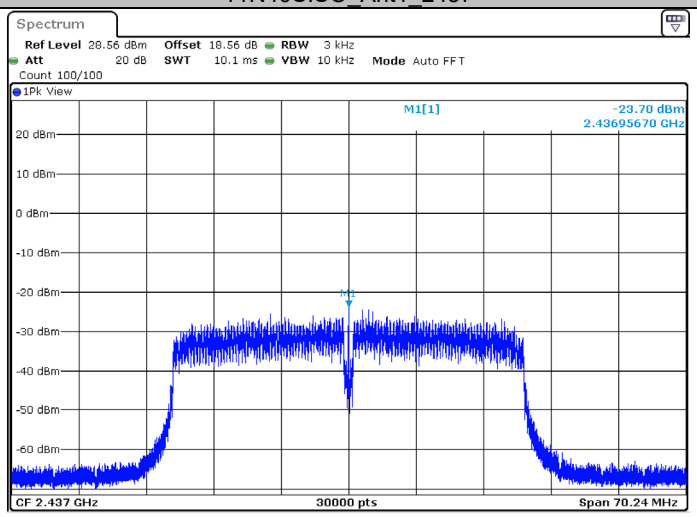

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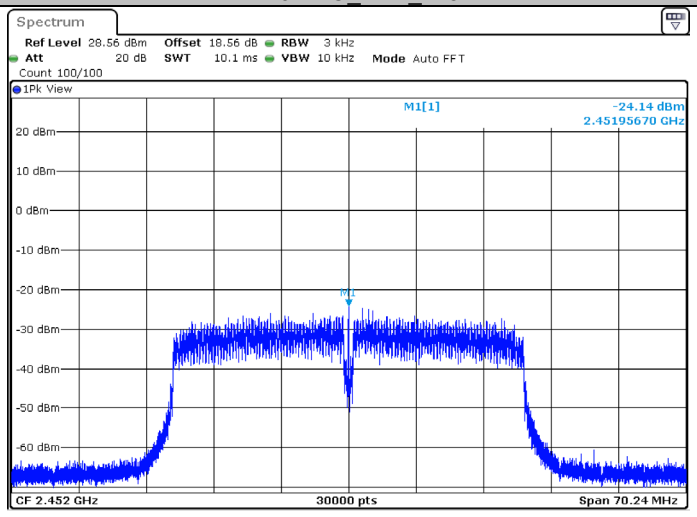
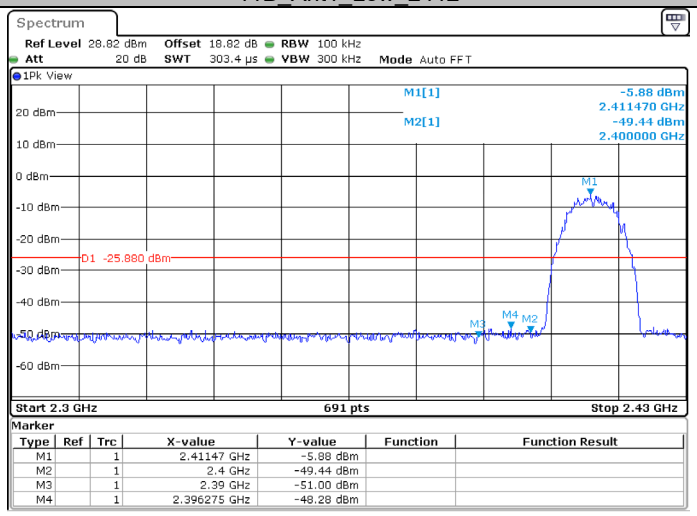


Appendix E: Band edge measurements

Test Graphs

11B_Ant1_Low_2412

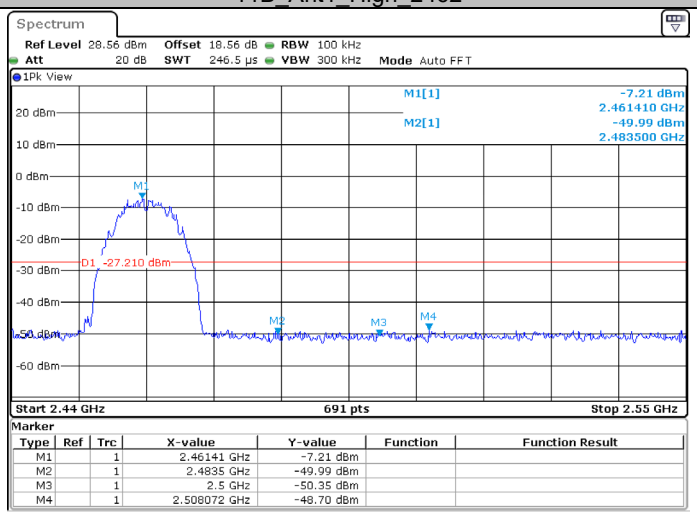


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41147 GHz	-5.88 dBm		
M2		1	2.4 GHz	-49.44 dBm		
M3		1	2.39 GHz	-51.00 dBm		
M4		1	2.396275 GHz	-48.28 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:23:32

11B_Ant1_High_2462



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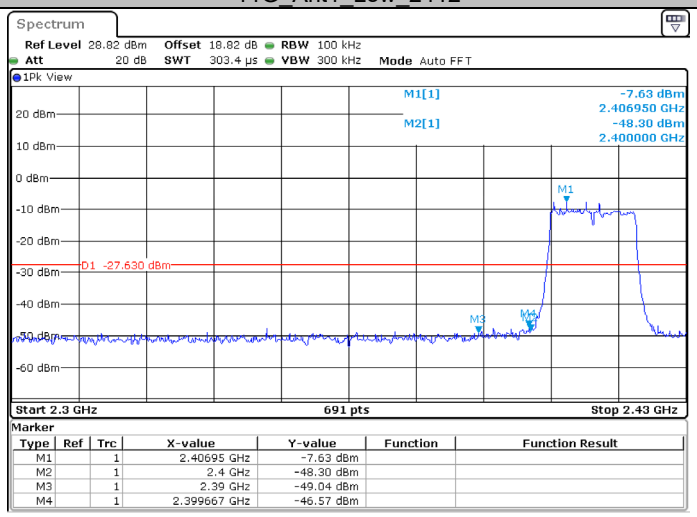
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46141 GHz	-7.21 dBm		
M2		1	2.4835 GHz	-49.99 dBm		
M3		1	2.5 GHz	-50.35 dBm		
M4		1	2.508072 GHz	-48.70 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:26:25

11G_Ant1_Low_2412

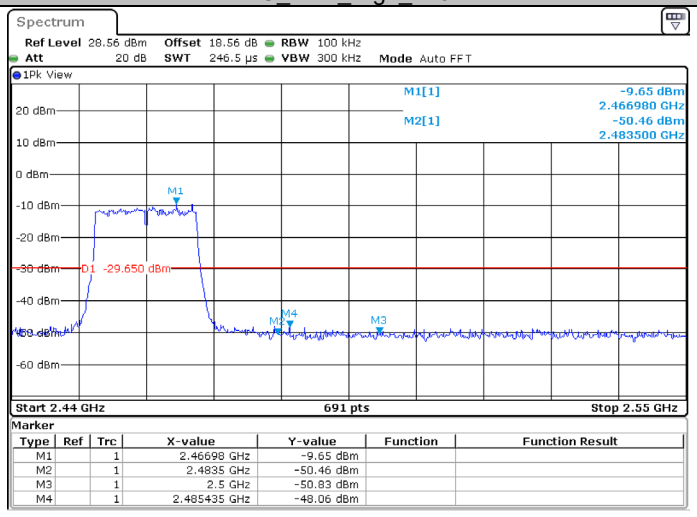


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40695 GHz	-7.63 dBm		
M2		1	2.4 GHz	-48.30 dBm		
M3		1	2.39 GHz	-49.04 dBm		
M4		1	2.399667 GHz	-46.57 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:28:36

11G_Ant1_High_2462

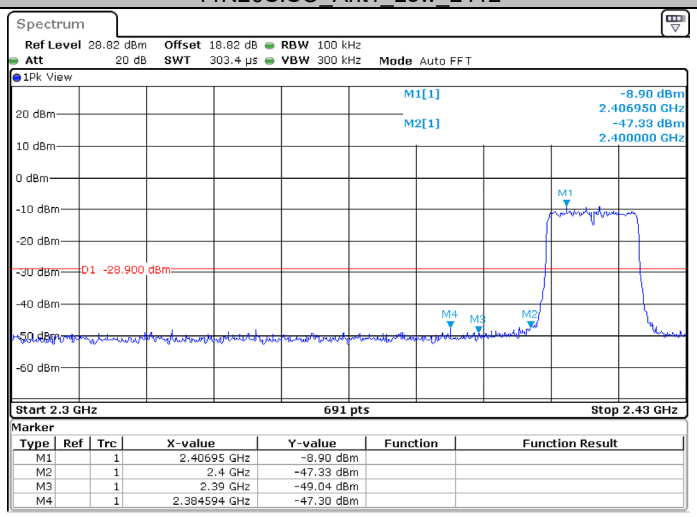


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46698 GHz	-9.65 dBm		
M2		1	2.4835 GHz	-50.46 dBm		
M3		1	2.5 GHz	-50.83 dBm		
M4		1	2.485435 GHz	-48.06 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:31:46

11N20SISO_Ant1_Low_2412

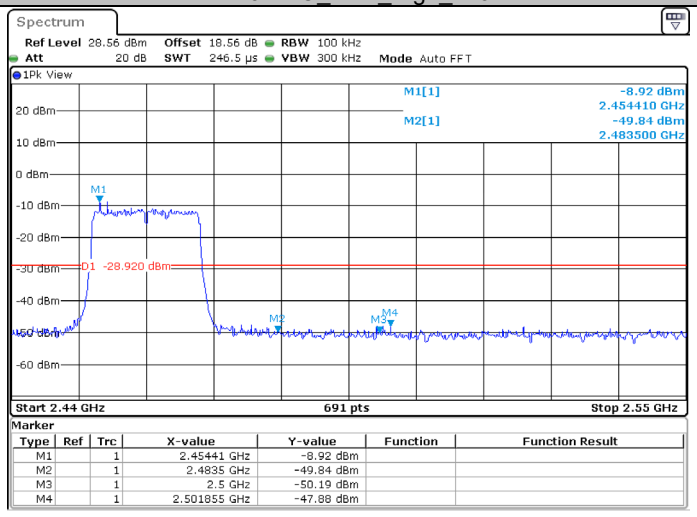


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40695 GHz	-8.90 dBm		
M2		1	2.4 GHz	-47.33 dBm		
M3		1	2.39 GHz	-49.04 dBm		
M4		1	2.384594 GHz	-47.30 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:40:15

11N20SISO_Ant1_High_2462

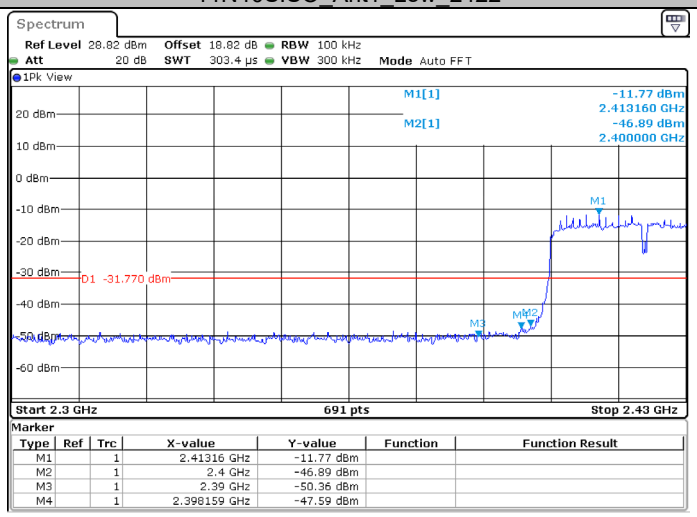


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45441 GHz	-8.92 dBm		
M2		1	2.4835 GHz	-49.84 dBm		
M3		1	2.5 GHz	-50.19 dBm		
M4		1	2.501855 GHz	-47.88 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:42:32

11N40SISO_Ant1_Low_2422

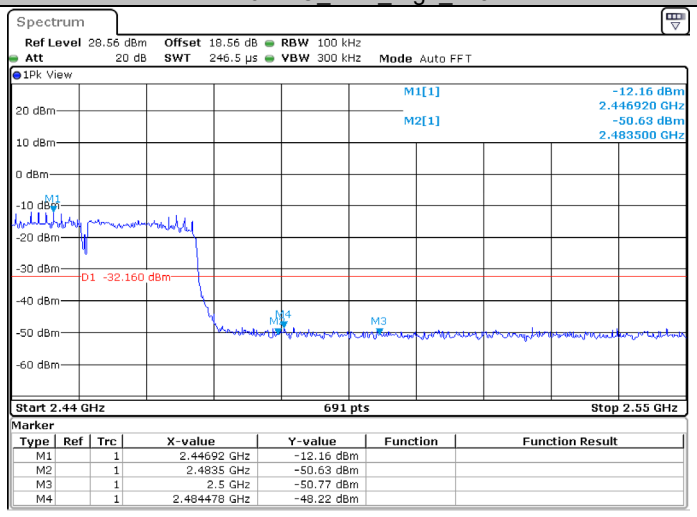


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41316 GHz	-11.77 dBm		
M2		1	2.4 GHz	-46.89 dBm		
M3		1	2.39 GHz	-50.36 dBm		
M4		1	2.398159 GHz	-47.59 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:44:20

11N40SISO_Ant1_High_2452



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.44692 GHz	-12.16 dBm		
M2		1	2.4835 GHz	-50.63 dBm		
M3		1	2.5 GHz	-50.77 dBm		
M4		1	2.484478 GHz	-48.22 dBm		

ProjectNo.:: SZ2240105-01314E-RF Tester:Tom Tan
Date: 27.MAR.2024 13:47:37

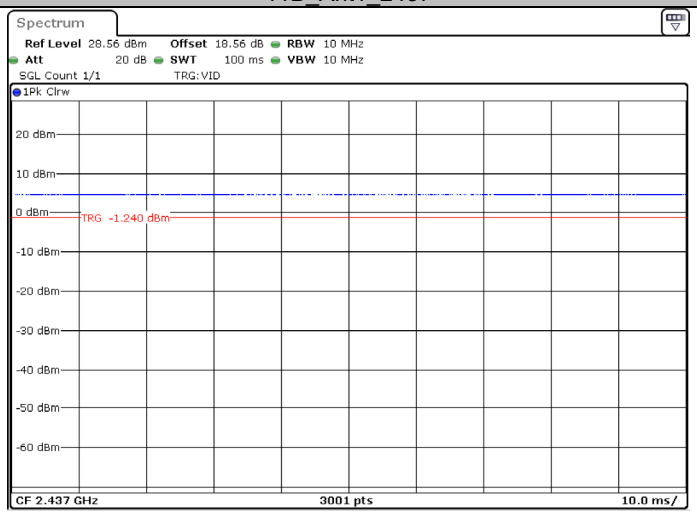
Appendix F: Duty Cycle

Test Result

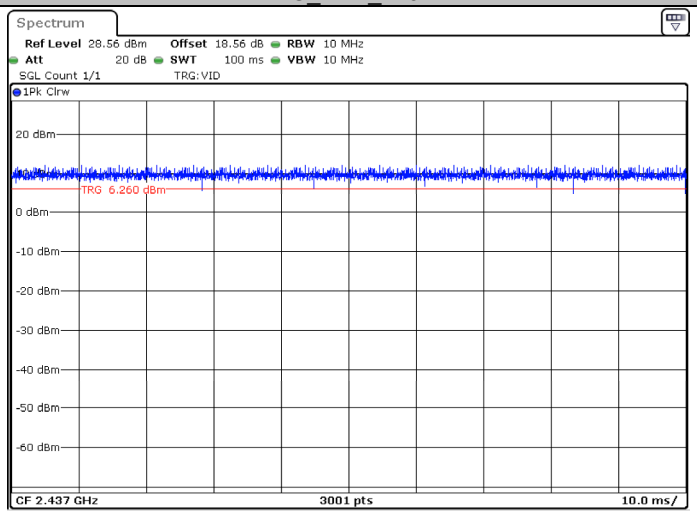
Test Mode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	VBW Setting (Hz)
11B	Ant1	2437	100.00	100.00	100.00	10
11G	Ant1	2437	100.00	100.00	100.00	10
11N20SISO	Ant1	2437	100.00	100.00	100.00	10
11N40SISO	Ant1	2437	100.00	100.00	100.00	10

Test Graphs

11B_Ant1_2437



11G_Ant1_2437



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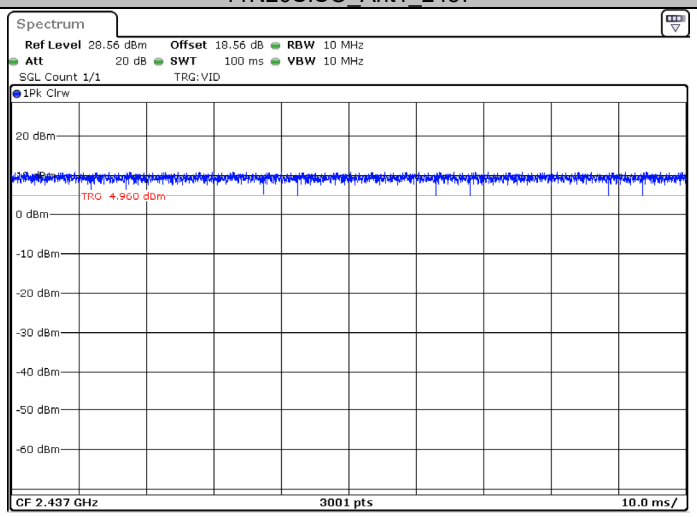

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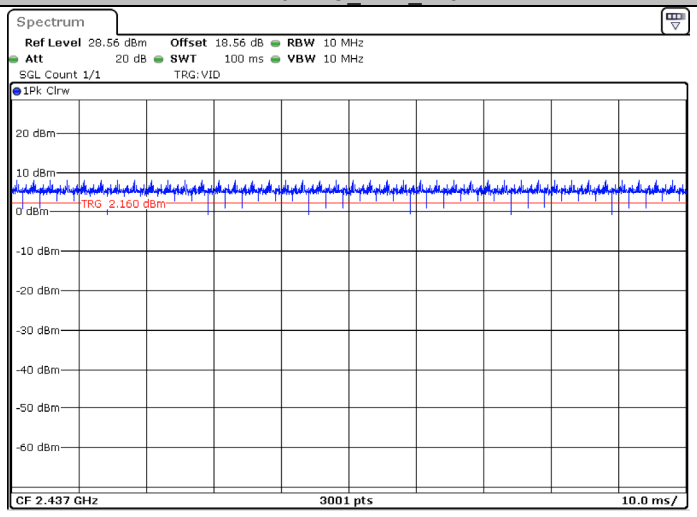

******* END OF REPORT *******