TEST REPORT

Applicant Name:	Shenzhen Xin Yuan Electronic Technology Co., Ltd.
Address:	Room 801-803, Yousuowei Building, No.2000 JiaXian Road, Bantian Street, Longgang District, Shenzhen, Guangdong China
Report Number:	SZ1240319-13904E-RF-00A
FCC ID:	2ASYE-T-BEAM-S3

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type:	T-BEAM-S3
Model No.:	T-BEAM-S3
Multiple Model(s) No.:	T-BEAM-S3(L76K GPS)
Trade Mark:	LILYGO
Date Received:	2024/03/19
Issue Date:	2024/08/07

Test Result:	Pass▲

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

Prepared and Checked By:

Wills Yu
RF Engineer

Approved By:

Nancy Wang
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.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ1240319-13904E-RF-00A	Original Report	2024/08/07

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	T-BEAM-S3
Tested Model	T-BEAM-S3
Multiple Model(s)	T-BEAM-S3(L76K GPS)
Frequency Range	BLE: 2402-2480MHz Wi-Fi: 2412-2462MHz
Maximum Conducted Output Peak Power	BLE: -1.70dBm Wi-Fi: 19.14dBm(802.11b), 19.25dBm(802.11g), 18.03dBm(802.11n20) 17.95dBm(802.11n40)
Modulation Technique	BLE: GFSK Wi-Fi: DSSS, OFDM
Antenna Specification#	4dBi (provided by the applicant)
Voltage Range	DC 5V from USB Port
Sample serial number	For Model: T-BEAM-S3: 2IUJ-4 for Conducted and Radiated Emissions Test 2IUJ-1 for RF Conducted Test For Model: T-BEAM-S3(L76K GPS): 2IUJ-10 for Conducted and Radiated Emissions Test (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A
Note: The Multiple models are electrically identical with the test model except for GPS module. Please refer to the declaration letter# for more detail, which was provided by manufacturer.	

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's 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 Compliance Testing of Unlicensed Wireless Devices.

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 output power, conducted		0.72 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz~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.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 2.4GHz Wi-Fi mode, total 11 channels are provided to testing:

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

802.11b, 802.11g and 802.11n-HT20 mode was tested with Channel 1, 6 and 11.
802.11n-HT40 mode was tested with Channel 3, 6 and 9.

For BLE 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

"EspRFTESTTOOL_V3.6_Mannual"[#] 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	20	20	20
802.11g	6Mbps	20	20	20
802.11n-HT20	MCS0	20	20	20
802.11n-HT40	MCS0	20	20	20
BLE	1Mbps/2Mbps	8	8	8

Note: the software and power level was provided by applicant.

Support Equipment List and Details

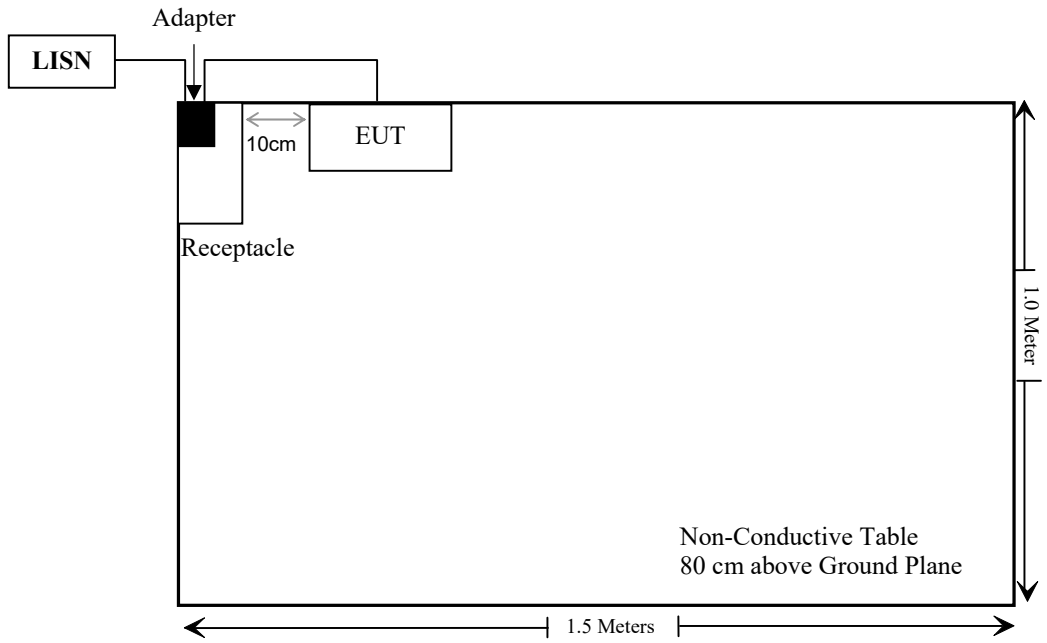
Manufacturer	Description	Model	Serial Number
Lenovo	Notebook	DESKOP-9V9AN6E	1062222901869
HUAWEI	Adapter	HW-100400C01	Unknown

External I/O Cable

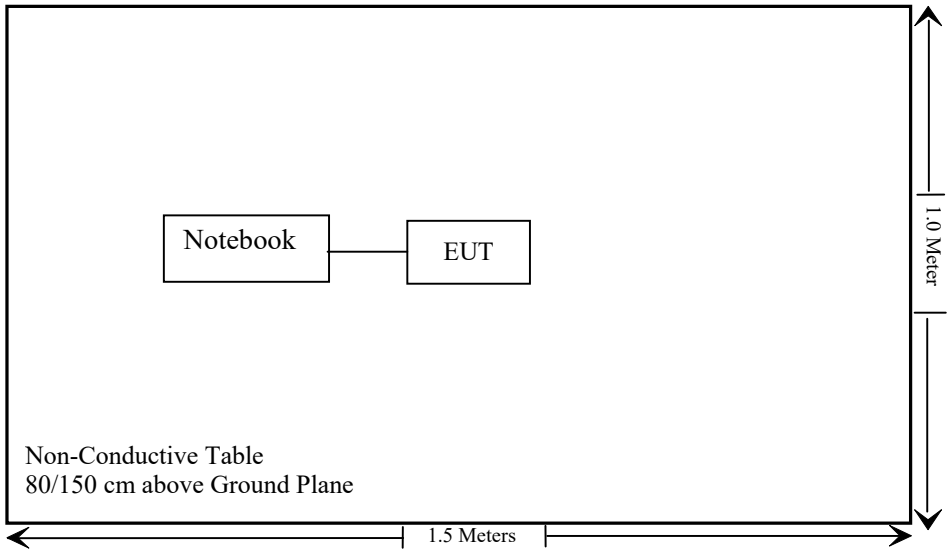
Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	1.0	EUT	Notebook
Un-shielding Detachable USB Cable	1.0	EUT	Adapter
Un-shielding Un-Detachable AC Cable	1.2	Receptacle	LISN

Block Diagram of Test Setup

For Conducted Emissions:



For Radiated Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §1.1307 ,§2.1091	MPE-Based Exemption	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	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
BACL	Active Loop Antenna	1313-1A	4031911	2024/03/21	2025/03/20
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	2024/03/27	2025/03/26
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
SNSD	2.4G Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	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

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
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
ANRITSU	Microwave peak power sensor	MA24418A	12622	2023/08/08	2024/08/07

*** 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 §1.1307 (B) & §2.1091- MPE-BASED EXEMPTION

Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(3)(i)(C)] to support an exemptionfrom further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

R is the minimum separation distance in meters
f = frequency in MHz

Result

Mode	Frequency (MHz)	Tune up conducted power# (dBm)	Antenna Gain#		ERP		Evaluation Distance (m)	ERP Limit (mW)
			(dBi)	(dBd)	(dBm)	(mW)		
Lora	915	22.0	2.0	-0.15	21.85	153.11	0.2	468
BLE	2402-2480	-1.5	4.0	1.85	0.35	1.08	0.2	768
2.4G Wi-Fi	2412-2462	19.5	4.0	1.85	21.35	136.46	0.2	768

Note: 1. The tune up conducted power and antenna gain was declared by the applicant.
2. The Lora, BLE and 2.4G Wi-Fi cannot transmit at same time.
3. 0dBd=2.15dBi

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

FCC §15.203 - 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.
c. 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.

Antenna Connector Construction

The EUT has a SMD antenna arrangement, which was permanently attached, the antenna gain[#] is 4dBi, fulfill the requirement of this section. Please refer to the EUT photos.

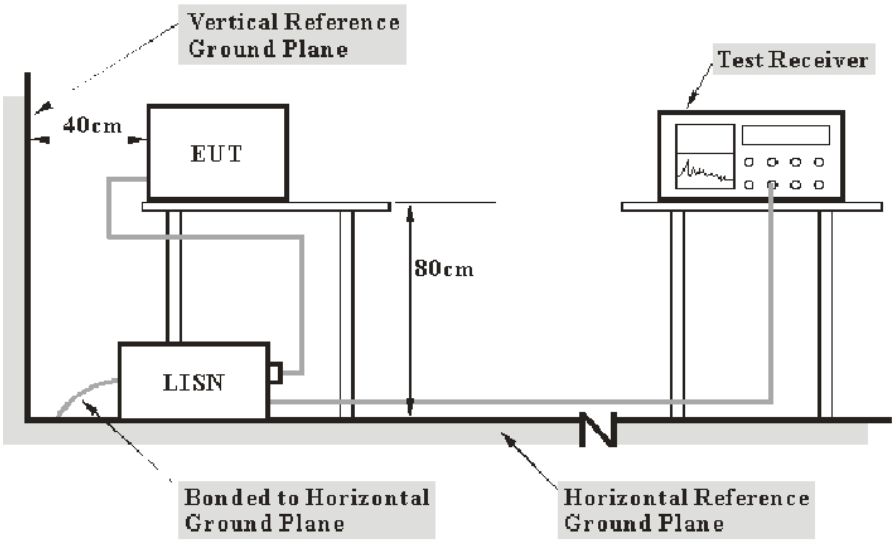
Result: Compliant

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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 limits.

The spacing between the peripherals was 10 cm.

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

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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:	25~26 ℃
Relative Humidity:	70~71 %
ATM Pressure:	101 kPa

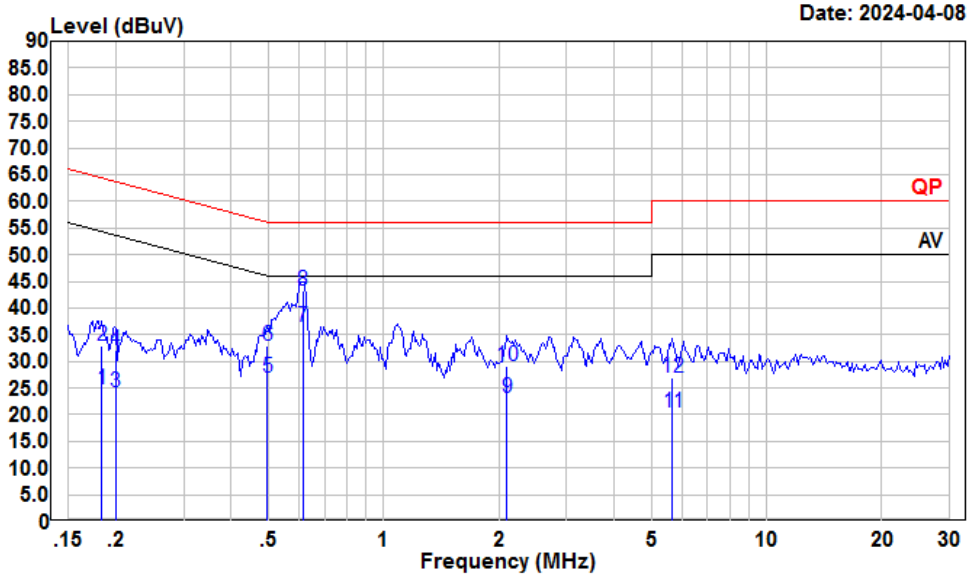
The testing was performed by Macy Shi from 2024-04-08 to 2024-04-26.

EUT operation mode: Transmitting

For model: T-BEAM-S3

BLE: *(maximum output power mode, BLE 1M High channel)*

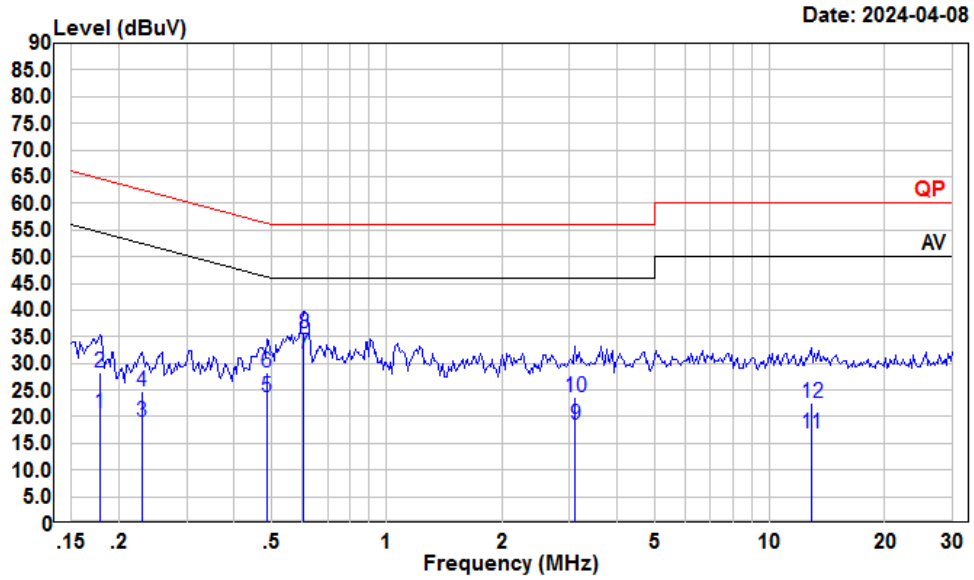
AC 120V/60 Hz, Line



Condition: Line
Project : SZ1240319-13904E-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	0.18	3.85	24.80	10.83	10.12	54.33	-29.53	Average
2	0.18	11.85	32.80	10.83	10.12	64.33	-31.53	QP
3	0.20	3.35	24.24	10.80	10.09	53.62	-29.38	Average
4	0.20	11.08	31.97	10.80	10.09	63.62	-31.65	QP
5	0.50	6.34	26.99	10.50	10.15	46.05	-19.06	Average
6	0.50	12.34	32.99	10.50	10.15	56.05	-23.06	QP
7	0.61	15.73	36.45	10.50	10.22	46.00	-9.55	Average
8	0.61	22.61	43.33	10.50	10.22	56.00	-12.67	QP
9	2.10	2.30	23.07	10.58	10.19	46.00	-22.93	Average
10	2.10	8.46	29.23	10.58	10.19	56.00	-26.77	QP
11	5.68	-0.23	20.42	10.43	10.22	50.00	-29.58	Average
12	5.68	6.38	27.03	10.43	10.22	60.00	-32.97	QP

AC 120V/60 Hz, Neutral

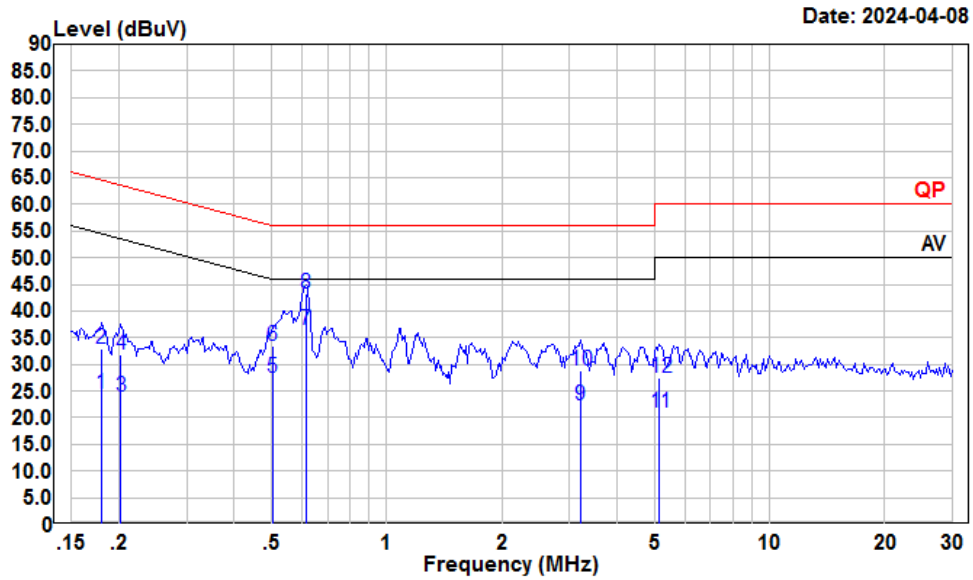


Condition: Neutral
Project : SZ1240319-13904E-RF
Tester : Macy shi
Note : BLE

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.18	-0.03	20.58	10.48	10.13	54.59	-34.01	Average
2	0.18	7.58	28.19	10.48	10.13	64.59	-36.40	QP
3	0.23	-1.69	18.91	10.44	10.16	52.48	-33.57	Average
4	0.23	4.06	24.66	10.44	10.16	62.48	-37.82	QP
5	0.49	2.79	23.64	10.69	10.16	46.23	-22.59	Average
6	0.49	7.54	28.39	10.69	10.16	56.23	-27.84	QP
7	0.61	10.78	31.70	10.70	10.22	46.00	-14.30	Average
8	0.61	14.80	35.72	10.70	10.22	56.00	-20.28	QP
9	3.11	-2.14	18.53	10.40	10.27	46.00	-27.47	Average
10	3.11	2.91	23.58	10.40	10.27	56.00	-32.42	QP
11	12.85	-4.10	16.87	10.80	10.17	50.00	-33.13	Average
12	12.85	1.64	22.61	10.80	10.17	60.00	-37.39	QP

2.4G Wi-Fi: *(maximum output power mode, 802.11g Low channel)*

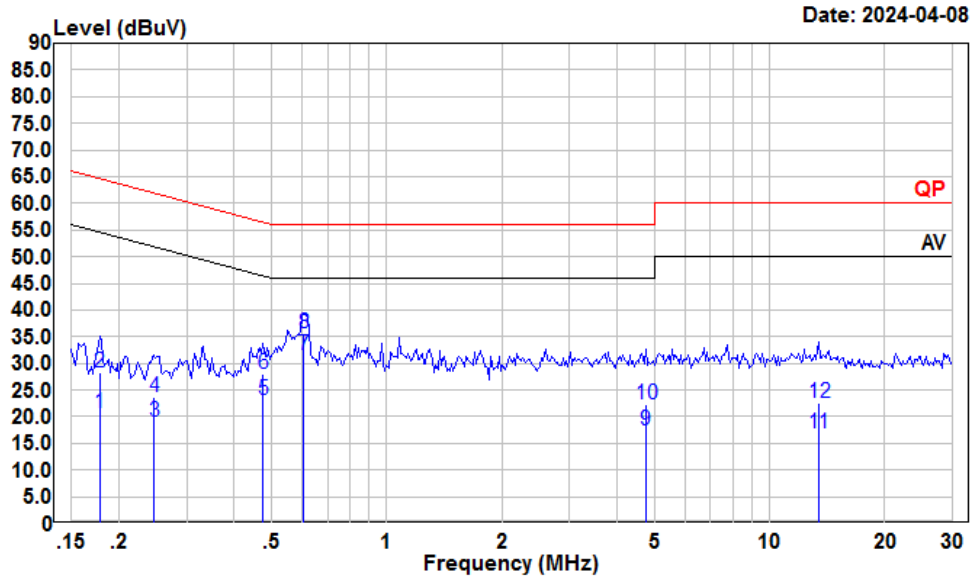
AC 120V/60 Hz, Line



Condition: Line
Project : SZ1240319-13904E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.18	3.64	24.61	10.84	10.13	54.50	-29.89	Average
2	0.18	11.95	32.92	10.84	10.13	64.50	-31.58	QP
3	0.20	3.17	24.06	10.80	10.09	53.54	-29.48	Average
4	0.20	11.06	31.95	10.80	10.09	63.54	-31.59	QP
5	0.50	6.85	27.50	10.50	10.15	46.00	-18.50	Average
6	0.50	12.76	33.41	10.50	10.15	56.00	-22.59	QP
7	0.61	15.66	36.38	10.50	10.22	46.00	-9.62	Average
8	0.61	22.53	43.25	10.50	10.22	56.00	-12.75	QP
9	3.21	1.62	22.29	10.40	10.27	46.00	-23.71	Average
10	3.21	8.08	28.75	10.40	10.27	56.00	-27.25	QP
11	5.17	0.40	21.01	10.39	10.22	50.00	-28.99	Average
12	5.17	6.97	27.58	10.39	10.22	60.00	-32.42	QP

AC 120V/60 Hz, Neutral



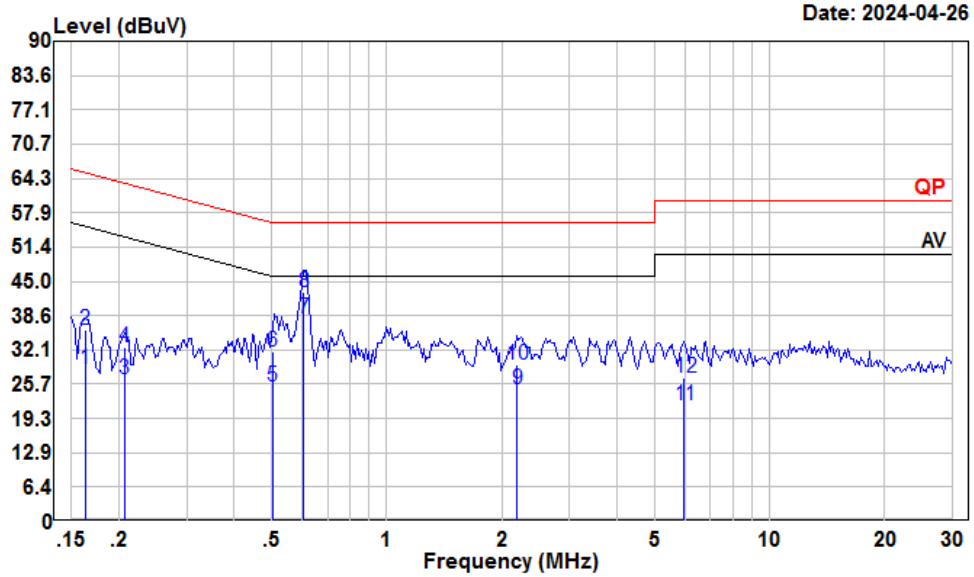
Condition: Neutral
Project : SZ1240319-13904E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.18	0.07	20.68	10.48	10.13	54.59	-33.91	Average
2	0.18	7.76	28.37	10.48	10.13	64.59	-36.22	QP
3	0.25	-1.70	18.97	10.47	10.20	51.86	-32.89	Average
4	0.25	2.87	23.54	10.47	10.20	61.86	-38.32	QP
5	0.48	2.19	23.04	10.68	10.17	46.41	-23.37	Average
6	0.48	7.26	28.11	10.68	10.17	56.41	-28.30	QP
7	0.61	10.74	31.66	10.70	10.22	46.00	-14.34	Average
8	0.61	14.67	35.59	10.70	10.22	56.00	-20.41	QP
9	4.75	-3.30	17.42	10.49	10.23	46.00	-28.58	Average
10	4.75	1.48	22.20	10.49	10.23	56.00	-33.80	QP
11	13.41	-4.18	16.77	10.80	10.15	50.00	-33.23	Average
12	13.41	1.73	22.68	10.80	10.15	60.00	-37.32	QP

For model: T-BEAM-S3(L76K GPS)

BLE: *(maximum output power mode, BLE 1M High channel)*

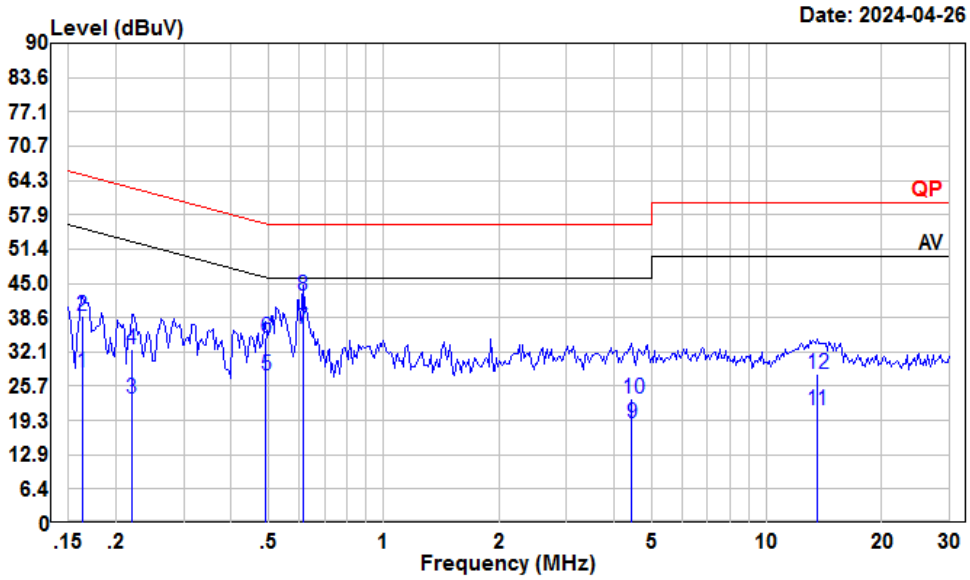
AC 120V/60 Hz, Line



Condition: Line
Project : SZ1240319-13904E-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	0.16	7.42	28.44	10.87	10.15	55.30	-26.86	Average
2	0.16	14.84	35.86	10.87	10.15	65.30	-29.44	QP
3	0.21	5.76	26.65	10.79	10.10	53.36	-26.71	Average
4	0.21	11.73	32.62	10.79	10.10	63.36	-30.74	QP
5	0.50	4.62	25.27	10.50	10.15	46.00	-20.73	Average
6	0.50	11.26	31.91	10.50	10.15	56.00	-24.09	QP
7	0.61	17.44	38.16	10.50	10.22	46.00	-7.84	Average
8	0.61	22.28	43.00	10.50	10.22	56.00	-13.00	QP
9	2.19	3.87	24.63	10.56	10.20	46.00	-21.37	Average
10	2.19	8.61	29.37	10.56	10.20	56.00	-26.63	QP
11	5.99	1.22	21.88	10.44	10.22	50.00	-28.12	Average
12	5.99	6.24	26.90	10.44	10.22	60.00	-33.10	QP

AC 120V/60 Hz, Neutral

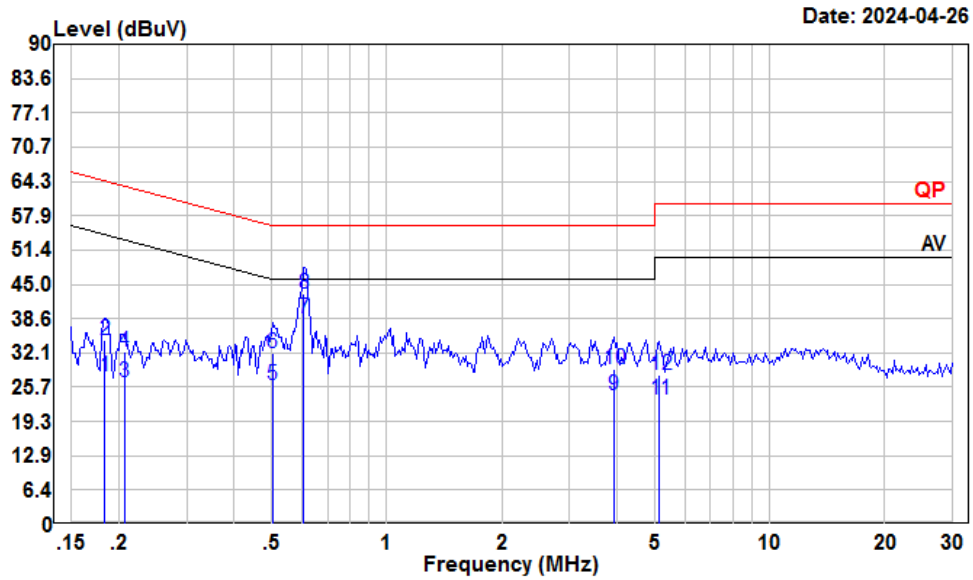


Condition: Neutral
Project : SZ1240319-13904E-RF
Tester : Macy shi
Note : BLE

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	7.68	28.37	10.54	10.15	55.30	-26.93	Average
2	0.16	18.31	39.00	10.54	10.15	65.30	-26.30	QP
3	0.22	2.89	23.46	10.43	10.14	52.83	-29.37	Average
4	0.22	12.19	32.76	10.43	10.14	62.83	-30.07	QP
5	0.49	6.87	27.72	10.69	10.16	46.14	-18.42	Average
6	0.49	13.99	34.84	10.69	10.16	56.14	-21.30	QP
7	0.61	15.54	36.46	10.70	10.22	46.00	-9.54	Average
8	0.61	21.91	42.83	10.70	10.22	56.00	-13.17	QP
9	4.45	-2.02	18.68	10.46	10.24	46.00	-27.32	Average
10	4.45	2.79	23.49	10.46	10.24	56.00	-32.51	QP
11	13.55	0.31	21.26	10.80	10.15	50.00	-28.74	Average
12	13.55	7.02	27.97	10.80	10.15	60.00	-32.03	QP

2.4G Wi-Fi: *(maximum output power mode, 802.11g Low channel)*

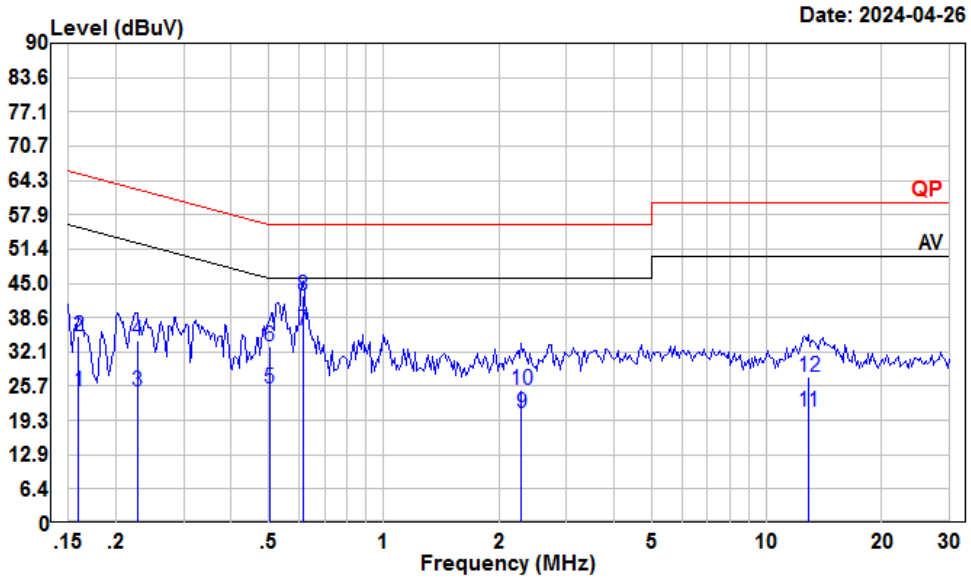
AC 120V/60 Hz, Line



Condition: Line
Project : SZ1240319-13904E-RF
Tester : Macy shi
Note : 2.4G WIFI

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.18	6.84	27.79	10.83	10.12	54.33	-26.54	Average
2	0.18	13.60	34.55	10.83	10.12	64.33	-29.78	QP
3	0.21	5.72	26.61	10.79	10.10	53.36	-26.75	Average
4	0.21	11.54	32.43	10.79	10.10	63.36	-30.93	QP
5	0.50	5.33	25.98	10.50	10.15	46.00	-20.02	Average
6	0.50	11.38	32.03	10.50	10.15	56.00	-23.97	QP
7	0.61	17.78	38.50	10.50	10.22	46.00	-7.50	Average
8	0.61	22.61	43.33	10.50	10.22	56.00	-12.67	QP
9	3.92	3.68	24.25	10.31	10.26	46.00	-21.75	Average
10	3.92	8.41	28.98	10.31	10.26	56.00	-27.02	QP
11	5.17	2.71	23.32	10.39	10.22	50.00	-26.68	Average
12	5.17	7.52	28.13	10.39	10.22	60.00	-31.87	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : SZ1240319-13904E-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	4.02	24.73	10.56	10.15	55.47	-30.74	Average
2	0.16	14.24	34.95	10.56	10.15	65.47	-30.52	QP
3	0.23	4.08	24.67	10.44	10.15	52.57	-27.90	Average
4	0.23	13.69	34.28	10.44	10.15	62.57	-28.29	QP
5	0.50	4.57	25.42	10.70	10.15	46.00	-20.58	Average
6	0.50	12.27	33.12	10.70	10.15	56.00	-22.88	QP
7	0.61	15.35	36.27	10.70	10.22	46.00	-9.73	Average
8	0.61	21.79	42.71	10.70	10.22	56.00	-13.29	QP
9	2.28	0.07	20.67	10.40	10.20	46.00	-25.33	Average
10	2.28	4.29	24.89	10.40	10.20	56.00	-31.11	QP
11	12.85	-0.15	20.82	10.80	10.17	50.00	-29.18	Average
12	12.85	6.57	27.54	10.80	10.17	60.00	-32.46	QP

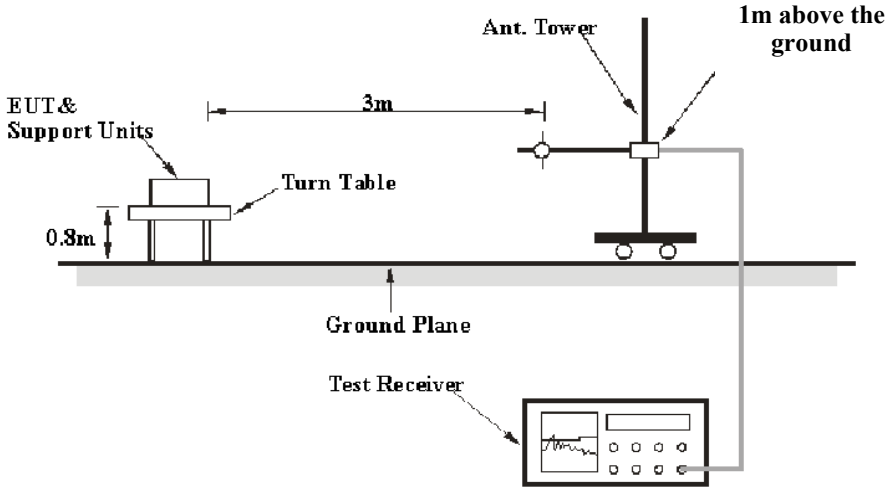
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

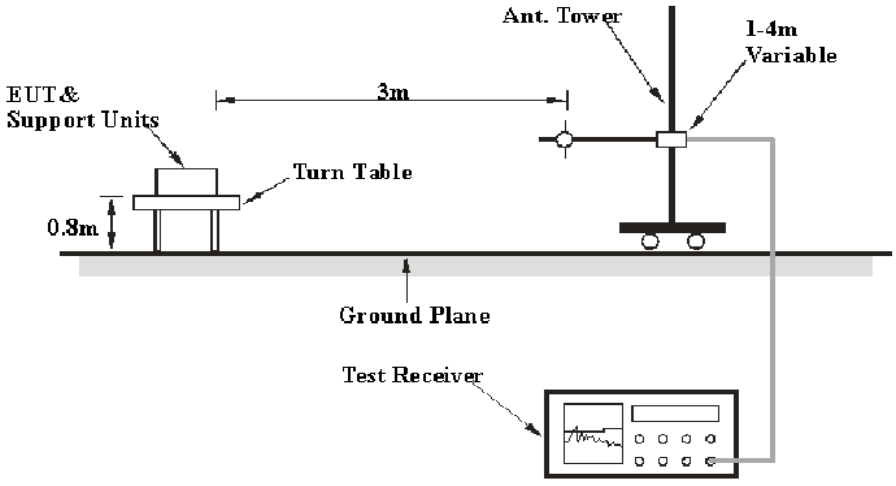
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

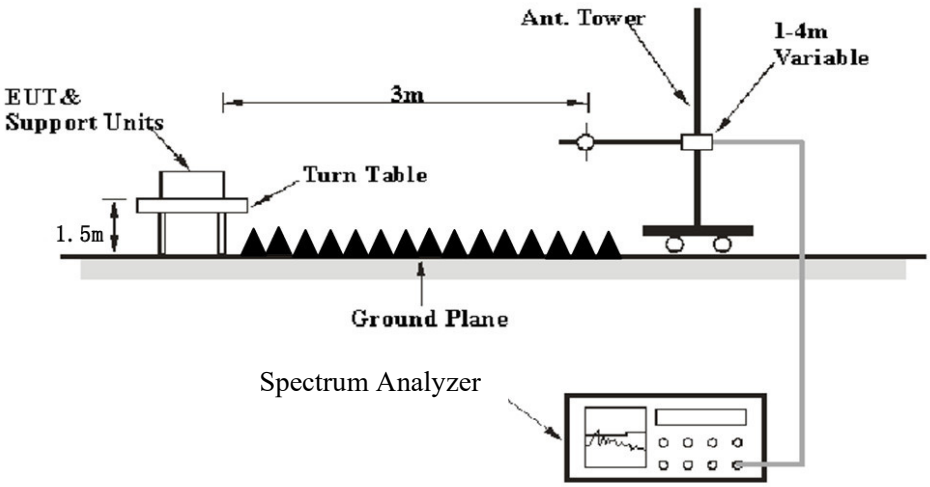
9 kHz-30MHz:



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. The specification used was the FCC 15.209, and FCC 15.247 limits.

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.

All emissions under the average limit and under the noise floor have not recorded in the report.

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:	24~25.2 ℃
Relative Humidity:	50~54 %
ATM Pressure:	101 kPa

The testing was performed by Warren Huang from 2024-04-11 to 2024-04-29 for below 1GHz and Tyler Wu and Sadow Tan on 2024-04-16 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.

9 kHz-30MHz: *(maximum output power mode, 802.11g Low channel)*

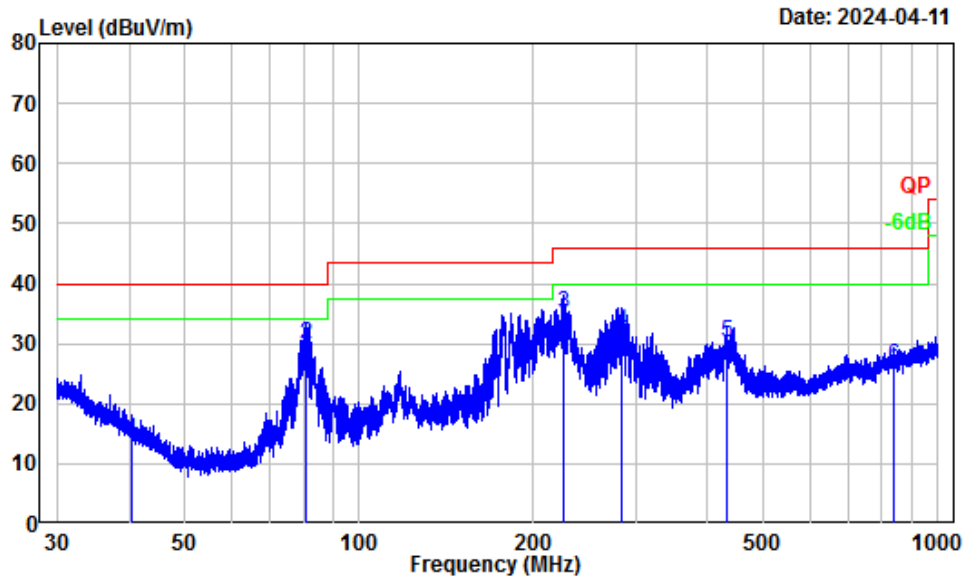
The amplitude of spurious emissions attenuated more than 20 dB below the limit was not recorded.

30MHz-1GHz:

For model: T-BEAM-S3

BLE *(maximum output power mode, BLE 1M High channel)*

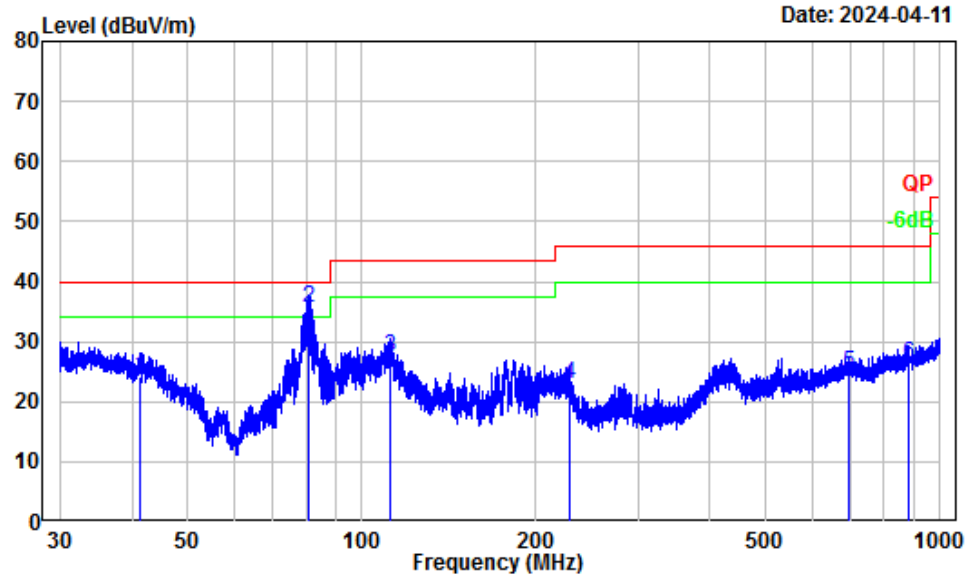
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: SZ1240319-13904E-RF
Note : BLE
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.29	-10.57	24.58	14.01	40.00	-25.99	QP
2	81.11	-16.70	46.45	29.75	40.00	-10.25	QP
3	225.70	-11.45	46.39	34.94	46.00	-11.06	QP
4	284.98	-10.53	42.50	31.97	46.00	-14.03	QP
5	432.17	-6.25	36.43	30.18	46.00	-15.82	QP
6	838.45	0.02	26.10	26.12	46.00	-19.88	QP

Vertical

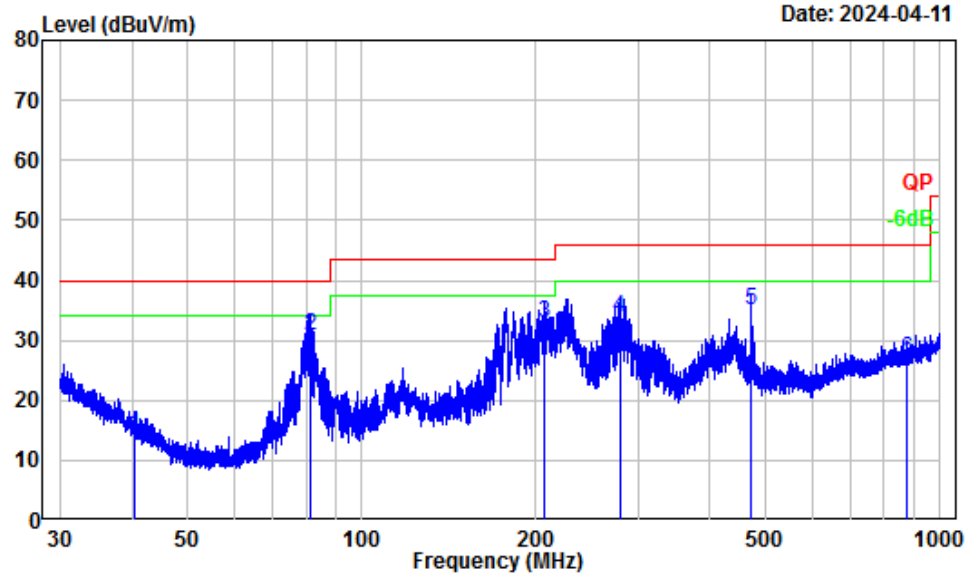


Site : Chamber A
Condition : 3m Vertical
Project Number: SZ1240319-13904E-RF
Note : BLE
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	41.28	-12.61	36.78	24.17	40.00	-15.83	QP
2	81.11	-17.23	52.89	35.66	40.00	-4.34	QP
3	111.59	-12.09	39.44	27.35	43.50	-16.15	QP
4	229.29	-12.24	35.28	23.04	46.00	-22.96	QP
5	694.72	-2.01	26.76	24.75	46.00	-21.25	QP
6	885.28	0.40	25.74	26.14	46.00	-19.86	QP

2.4G Wi-Fi *(maximum output power mode, 802.11g Low channel)*

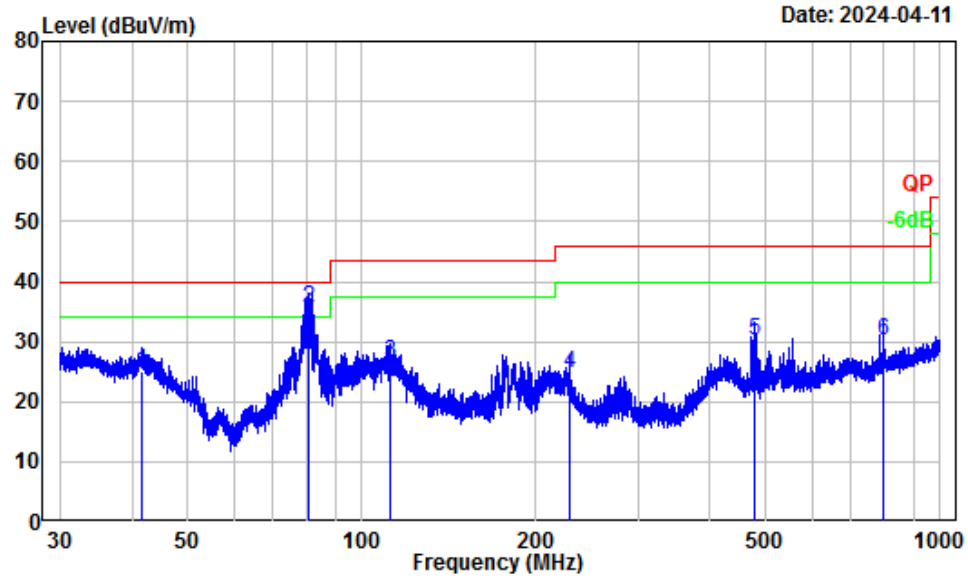
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: SZ1240319-13904E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.35	-10.61	24.75	14.14	40.00	-25.86	QP
2	81.18	-16.70	47.43	30.73	40.00	-9.27	QP
3	206.31	-11.14	44.09	32.95	43.50	-10.55	QP
4	279.04	-10.75	44.68	33.93	46.00	-12.07	QP
5	469.90	-5.39	40.41	35.02	46.00	-10.98	QP
6	878.32	0.65	26.27	26.92	46.00	-19.08	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number: SZ1240319-13904E-RF
Note : 2.4G WIFI
Tester : Warren Huang

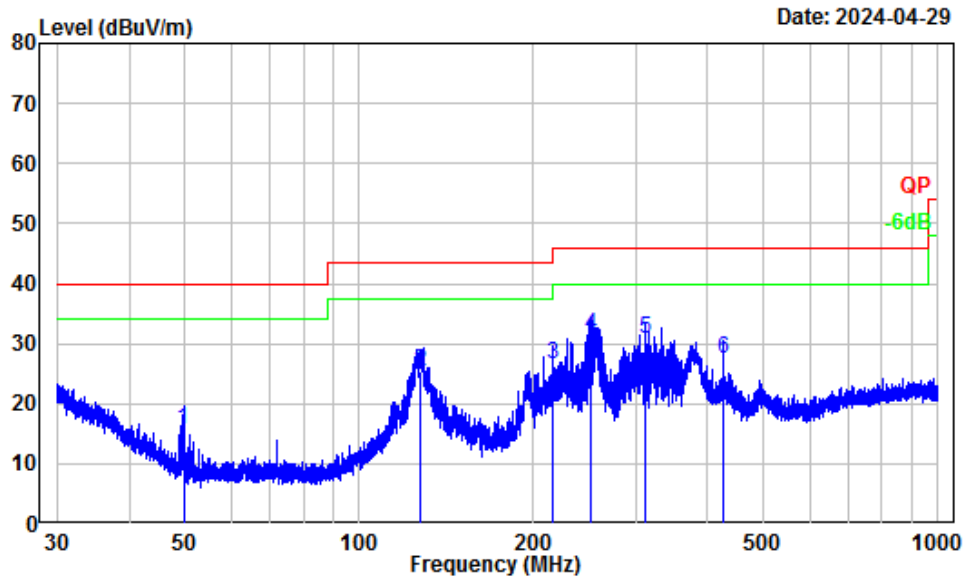
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	41.57	-12.78	37.71	24.93	40.00	-15.07	QP
2	81.07	-17.23	53.00	35.77	40.00	-4.23	QP
3	111.69	-12.07	38.59	26.52	43.50	-16.98	QP
4	229.29	-12.24	36.94	24.70	46.00	-21.30	QP
5	478.85	-5.62	35.82	30.20	46.00	-15.80	QP
6	798.63	-0.69	31.02	30.33	46.00	-15.67	QP

For model: T-BEAM-S3(L76K GPS)

30MHz-1GHz:

BLE*(maximum output power mode, BLE 1M High channel)*

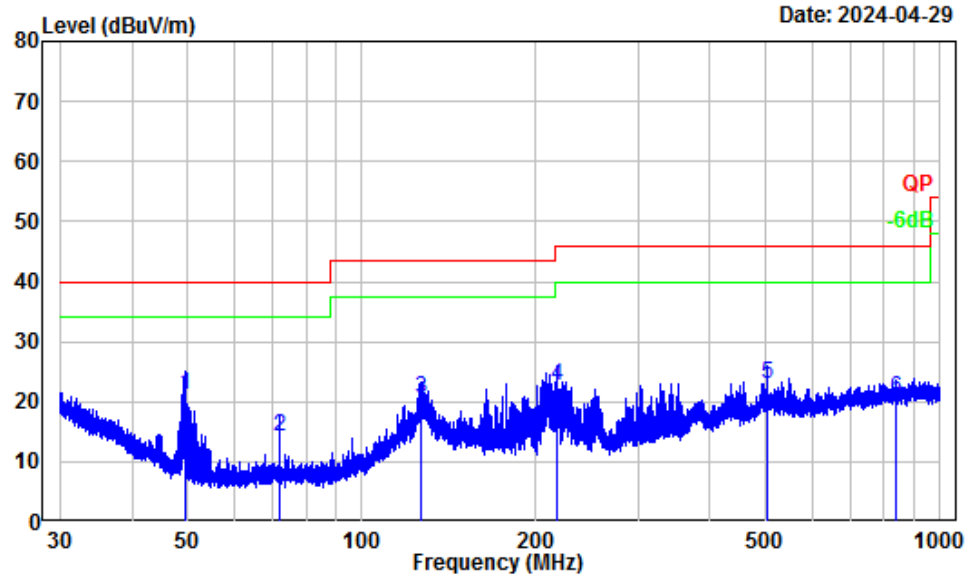
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: SZ1240319-13904E-RF
Note : BLE
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	49.66	-17.65	33.27	15.62	40.00	-24.38	QP
2	127.89	-12.12	37.49	25.37	43.50	-18.13	QP
3	215.55	-13.80	40.28	26.48	43.50	-17.02	QP
4	251.84	-14.46	45.87	31.41	46.00	-14.59	QP
5	312.18	-12.59	43.30	30.71	46.00	-15.29	QP
6	426.90	-10.05	37.66	27.61	46.00	-18.39	QP

Vertical

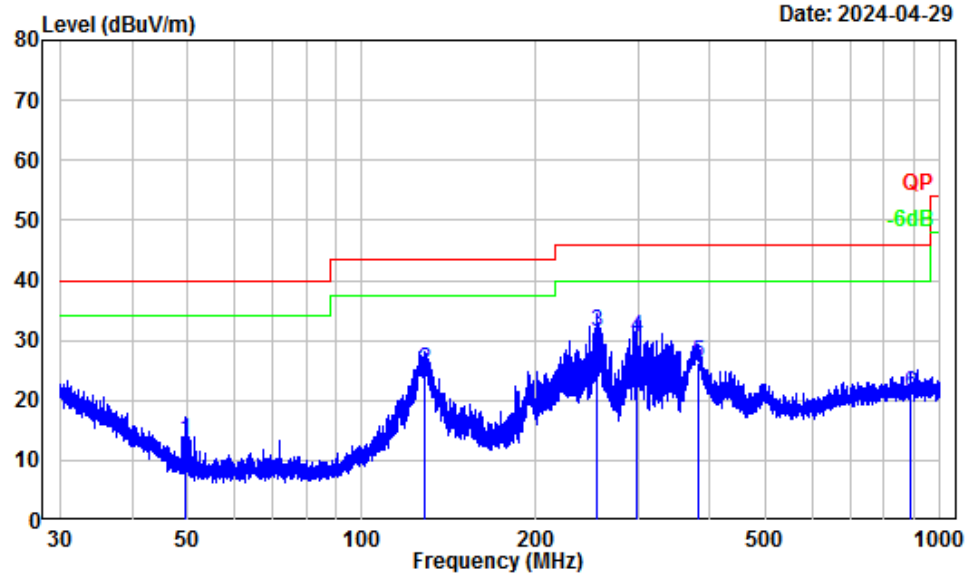


Site : Chamber A
Condition : 3m Vertical
Project Number: SZ1240319-13904E-RF
Note : BLE
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	49.58	-18.42	39.44	21.02	40.00	-18.98	QP
2	72.02	-18.67	32.73	14.06	40.00	-25.94	QP
3	126.66	-12.63	33.10	20.47	43.50	-23.03	QP
4	218.12	-14.76	37.49	22.73	46.00	-23.27	QP
5	504.04	-8.46	31.52	23.06	46.00	-22.94	QP
6	837.34	-5.19	25.57	20.38	46.00	-25.62	QP

2.4G Wi-Fi *(maximum output power mode, 802.11g Low channel)*

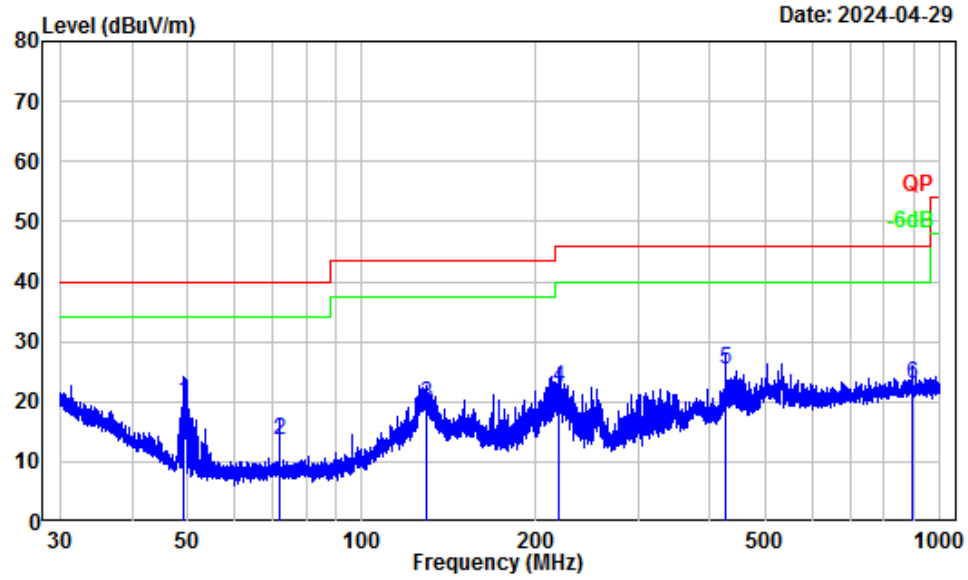
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: SZ1240319-13904E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	49.62	-17.62	30.86	13.24	40.00	-26.76	QP
2	128.73	-12.10	37.15	25.05	43.50	-18.45	QP
3	254.51	-14.37	45.78	31.41	46.00	-14.59	QP
4	299.71	-12.79	43.20	30.41	46.00	-15.59	QP
5	382.09	-11.10	37.50	26.40	46.00	-19.60	QP
6	890.34	-4.52	25.77	21.25	46.00	-24.75	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number: SZ1240319-13904E-RF
Note : 2.4G WIFI
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	49.19	-18.20	38.25	20.05	40.00	-19.95	QP
2	71.99	-18.67	32.16	13.49	40.00	-26.51	QP
3	129.47	-12.57	32.20	19.63	43.50	-23.87	QP
4	219.56	-14.77	37.16	22.39	46.00	-23.61	QP
5	427.08	-10.42	35.70	25.28	46.00	-20.72	QP
6	896.21	-4.86	27.83	22.97	46.00	-23.03	QP

1-25 GHz:

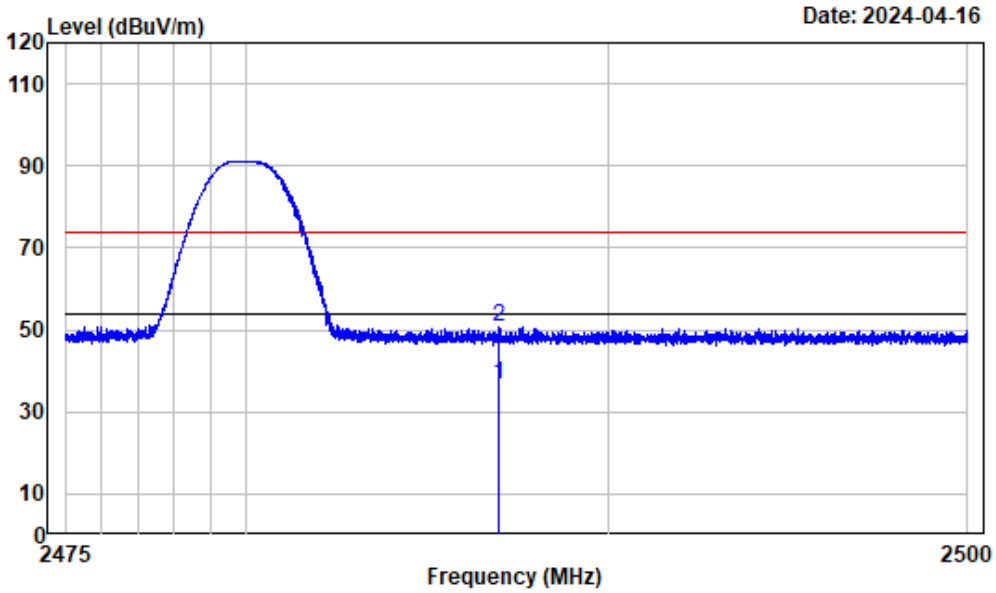
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
BLE 1M							
Low Channel 2402MHz							
2375.71	55.26	PK	H	-2.93	52.33	74	-21.67
2375.71	40.17	AV	H	-2.93	37.24	54	-16.76
2389.72	55.43	PK	V	-2.93	52.50	74	-21.50
2389.72	40.85	AV	V	-2.93	37.92	54	-16.08
4804.00	52.63	PK	H	2.42	55.05	74	-18.95
4804.00	46.58	AV	H	2.42	49.00	54	-5.00
4804.00	53.49	PK	V	2.42	55.91	74	-18.09
4804.00	47.45	AV	V	2.42	49.87	54	-4.13
Middle Channel 2440MHz							
4880.00	51.49	PK	H	2.58	54.07	74	-19.93
4880.00	45.82	AV	H	2.58	48.40	54	-5.60
4880.00	52.73	PK	V	2.58	55.31	74	-18.69
4880.00	46.67	AV	V	2.58	49.25	54	-4.75
High Channel 2480MHz							
4960.00	50.63	PK	H	2.68	53.31	74	-20.69
4960.00	44.34	AV	H	2.68	47.02	54	-6.98
4960.00	51.72	PK	V	2.68	54.40	74	-19.60
4960.00	45.49	AV	V	2.68	48.17	54	-5.83

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
BLE 2M							
Low Channel 2402MHz							
2360.87	55.25	PK	H	-2.93	52.32	74	-21.68
2360.87	40.33	AV	H	-2.93	37.40	54	-16.60
2389.25	55.62	PK	V	-2.93	52.69	74	-21.31
2389.25	40.76	AV	V	-2.93	37.83	54	-16.17
4804.00	56.42	PK	H	2.42	58.84	74	-15.16
4804.00	47.54	AV	H	2.42	49.96	54	-4.04
4804.00	57.28	PK	V	2.42	59.70	74	-14.30
4804.00	48.39	AV	V	2.42	50.81	54	-3.19
Middle Channel 2440MHz							
4880.00	55.49	PK	H	2.58	58.07	74	-15.93
4880.00	46.65	AV	H	2.58	49.23	54	-4.77
4880.00	56.13	PK	V	2.58	58.71	74	-15.29
4880.00	47.82	AV	V	2.58	50.40	54	-3.60
High Channel 2480MHz							
4960.00	54.83	PK	H	2.68	57.51	74	-16.49
4960.00	45.91	AV	H	2.68	48.59	54	-5.41
4960.00	55.42	PK	V	2.68	58.10	74	-15.90
4960.00	46.79	AV	V	2.68	49.47	54	-4.53

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):

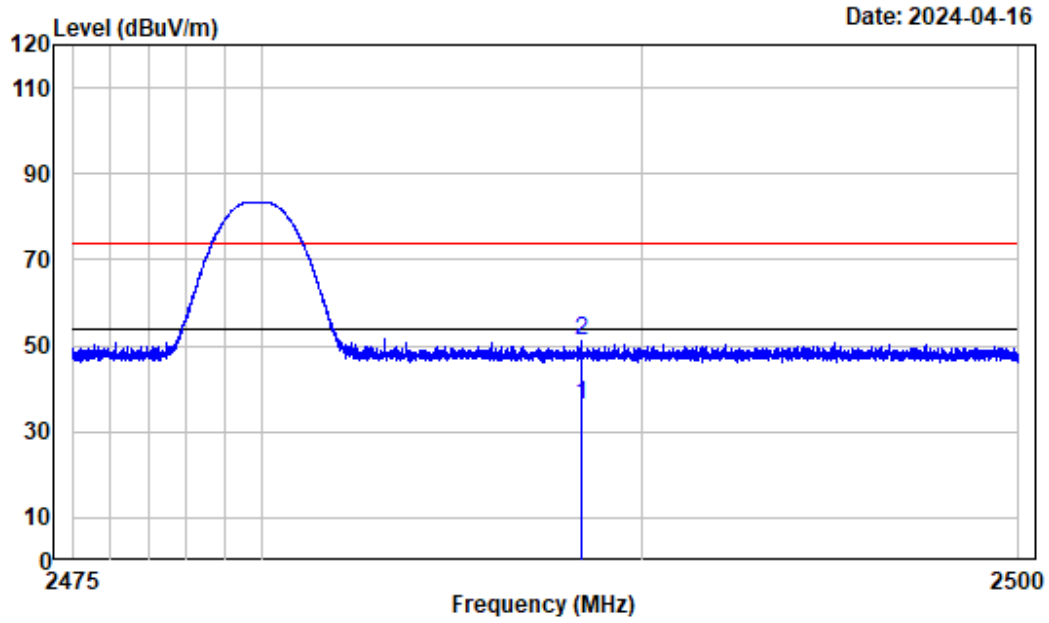
BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1240319-13904E-RF
Tester : Sadow Tan
Note : BLE 1M_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2487.000	-3.17	39.67	36.50	54.00	-17.50	Average
2	2487.000	-3.17	54.10	50.93	74.00	-23.07	peak

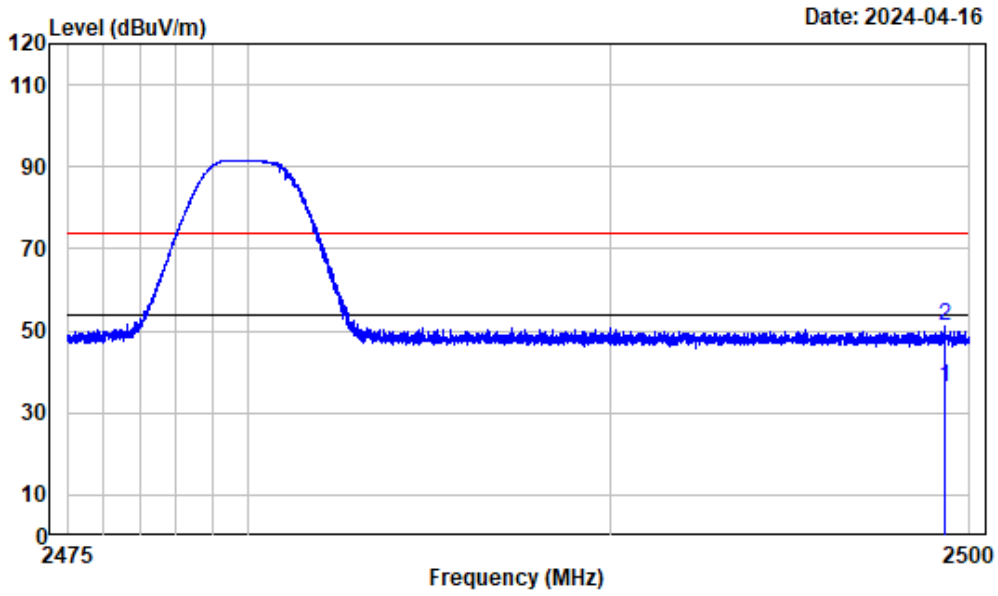
BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1240319-13904E-RF
Tester : Sadow Tan
Note : BLE 1M_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2488.410	-3.18	39.56	36.38	54.00	-17.62	Average
2	2488.410	-3.18	54.49	51.31	74.00	-22.69	peak

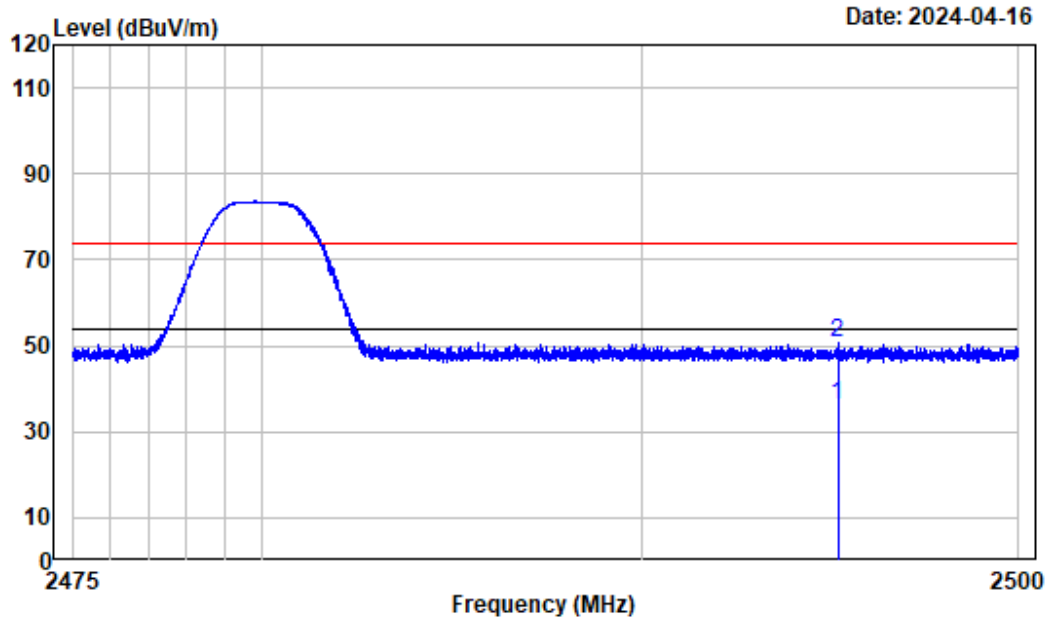
BLE 2M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1240319-13904E-RF
Tester : Sadow Tan
Note : BLE 2M_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2499.300	-3.20	39.53	36.33	54.00	-17.67	Average
2	2499.300	-3.20	54.15	50.95	74.00	-23.05	peak

BLE 2M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1240319-13904E-RF
Tester : Sadow Tan
Note : BLE 2M_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2495.205	-3.19	39.57	36.38	54.00	-17.62	Average
2	2495.205	-3.19	54.10	50.91	74.00	-23.09	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							
2373.97	55.53	PK	H	-2.93	52.60	74	-21.40
2373.97	40.68	AV	H	-2.93	37.75	54	-16.25
2386.24	55.17	PK	V	-2.93	52.24	74	-21.76
2386.24	40.25	AV	V	-2.93	37.32	54	-16.68
4824.00	54.63	PK	H	2.45	57.08	74	-16.92
4824.00	47.26	AV	H	2.45	49.71	54	-4.29
4824.00	55.79	PK	V	2.45	58.24	74	-15.76
4824.00	48.51	AV	V	2.45	50.96	54	-3.04
Middle Channel 2437MHz							
4874.00	54.72	PK	H	2.56	57.28	74	-16.72
4874.00	47.05	AV	H	2.56	49.61	54	-4.39
4874.00	55.38	PK	V	2.56	57.94	74	-16.06
4874.00	48.16	AV	V	2.56	50.72	54	-3.28
High Channel 2462MHz							
4924.00	54.83	PK	H	2.63	57.46	74	-16.54
4924.00	46.57	AV	H	2.63	49.20	54	-4.80
4924.00	55.12	PK	V	2.63	57.75	74	-16.25
4924.00	47.31	AV	V	2.63	49.94	54	-4.06

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11g							
Low Channel 2412MHz							
2389.94	58.31	PK	H	-2.93	55.38	74	-18.62
2389.94	42.27	AV	H	-2.93	39.34	54	-14.66
2389.25	57.35	PK	V	-2.93	54.42	74	-19.58
2389.25	42.06	AV	V	-2.93	39.13	54	-14.87
4824.00	62.31	PK	H	2.45	64.76	74	-9.24
4824.00	47.57	AV	H	2.45	50.02	54	-3.98
4824.00	63.45	PK	V	2.45	65.90	74	-8.10
4824.00	48.34	AV	V	2.45	50.79	54	-3.21
Middle Channel 2437MHz							
4874.00	62.35	PK	H	2.56	64.91	74	-9.09
4874.00	47.13	AV	H	2.56	49.69	54	-4.31
4874.00	63.04	PK	V	2.56	65.60	74	-8.40
4874.00	48.36	AV	V	2.56	50.92	54	-3.08
High Channel 2462MHz							
2483.63	58.35	PK	H	-3.10	55.25	74	-18.75
2483.63	41.34	AV	H	-3.10	38.24	54	-15.76
2483.65	57.13	PK	V	-3.10	54.03	74	-19.97
2483.65	40.52	AV	V	-3.10	37.42	54	-16.58
4924.00	61.53	PK	H	2.63	64.16	74	-9.84
4924.00	46.38	AV	H	2.63	49.01	54	-4.99
4924.00	62.49	PK	V	2.63	65.12	74	-8.88
4924.00	47.16	AV	V	2.63	49.79	54	-4.21

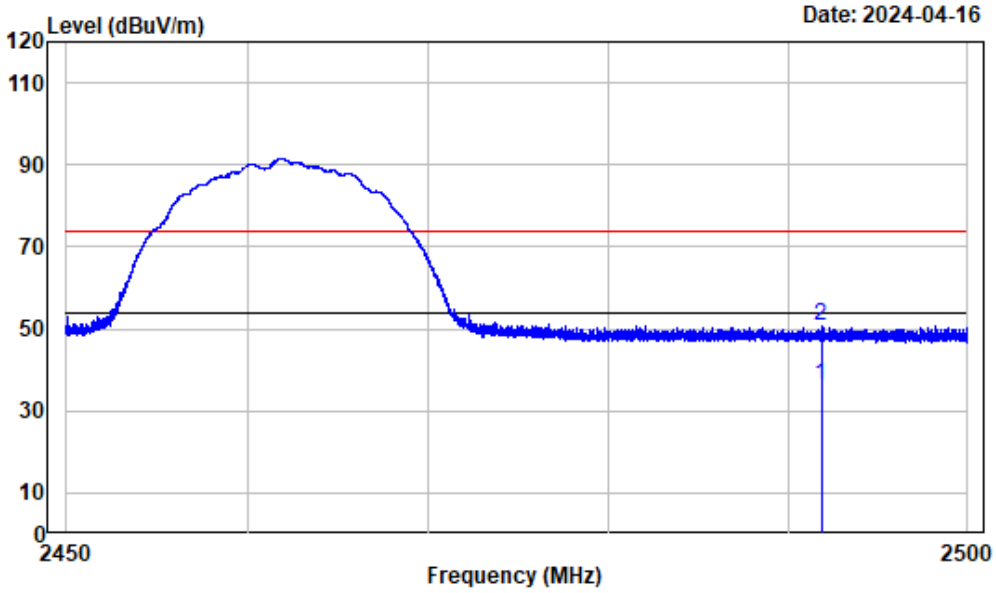
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11n20							
Low Channel 2412MHz							
2389.94	56.16	PK	H	-2.93	53.23	74	-20.77
2389.94	41.03	AV	H	-2.93	38.10	54	-15.90
2389.72	56.87	PK	V	-2.93	53.94	74	-20.06
2389.72	41.39	AV	V	-2.93	38.46	54	-15.54
4824.00	59.73	PK	H	2.45	62.18	74	-11.82
4824.00	44.25	AV	H	2.45	46.70	54	-7.30
4824.00	60.24	PK	V	2.45	62.69	74	-11.31
4824.00	45.76	AV	V	2.45	48.21	54	-5.79
Middle Channel 2437MHz							
4874.00	59.38	PK	H	2.56	61.94	74	-12.06
4874.00	45.74	AV	H	2.56	48.30	54	-5.70
4874.00	60.57	PK	V	2.56	63.13	74	-10.87
4874.00	46.36	AV	V	2.56	48.92	54	-5.08
High Channel 2462MHz							
2498.77	55.34	PK	H	-3.10	52.24	74	-21.76
2498.77	40.59	AV	H	-3.10	37.49	54	-16.51
2494.63	55.12	PK	V	-3.10	52.02	74	-21.98
2494.63	40.23	AV	V	-3.10	37.13	54	-16.87
4924.00	58.16	PK	H	2.63	60.79	74	-13.21
4924.00	44.35	AV	H	2.63	46.98	54	-7.02
4924.00	59.23	PK	V	2.63	61.86	74	-12.14
4924.00	45.24	AV	V	2.63	47.87	54	-6.13

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
802.11n40							
Low Channel 2422MHz							
2386.12	56.72	PK	H	-2.93	53.79	74	-20.21
2386.12	43.26	AV	H	-2.93	40.33	54	-13.67
2389.59	55.38	PK	V	-2.93	52.45	74	-21.55
2389.59	42.75	AV	V	-2.93	39.82	54	-14.18
4844.00	55.49	PK	H	2.47	57.96	74	-16.04
4844.00	42.15	AV	H	2.47	44.62	54	-9.38
4844.00	56.64	PK	V	2.47	59.11	74	-14.89
4844.00	43.07	AV	V	2.47	45.54	54	-8.46
Middle Channel 2437MHz							
4874.00	56.24	PK	H	2.56	58.80	74	-15.20
4874.00	43.31	AV	H	2.56	45.87	54	-8.13
4874.00	57.59	PK	V	2.56	60.15	74	-13.85
4874.00	44.58	AV	V	2.56	47.14	54	-6.86
High Channel 2452MHz							
2485.32	55.34	PK	H	-3.10	52.24	74	-21.76
2485.32	41.38	AV	H	-3.10	38.28	54	-15.72
2494.63	55.19	PK	V	-3.10	52.09	74	-21.91
2494.63	41.05	AV	V	-3.10	37.95	54	-16.05
4904.00	56.39	PK	H	2.64	59.03	74	-14.97
4904.00	42.63	AV	H	2.64	45.27	54	-8.73
4904.00	57.54	PK	V	2.64	60.18	74	-13.82
4904.00	43.57	AV	V	2.64	46.21	54	-7.79

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):

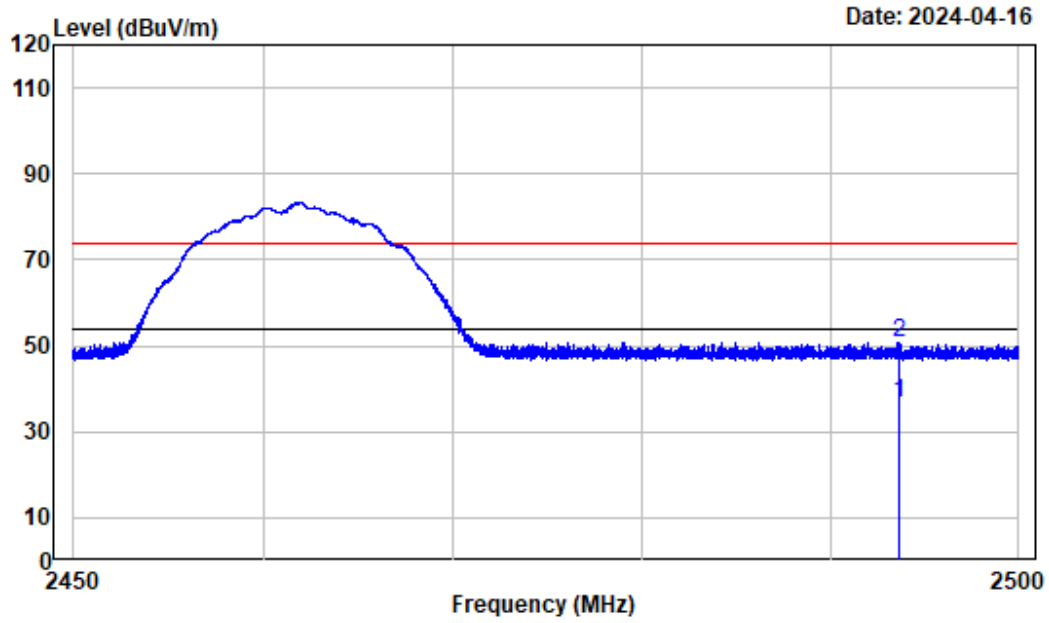
802.11b			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ1240319-13904E-RF
Tester : Sadow Tan
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	2491.819	-3.18	39.61	36.43	54.00	-17.57	Average
2	2491.819	-3.18	53.76	50.58	74.00	-23.42	peak

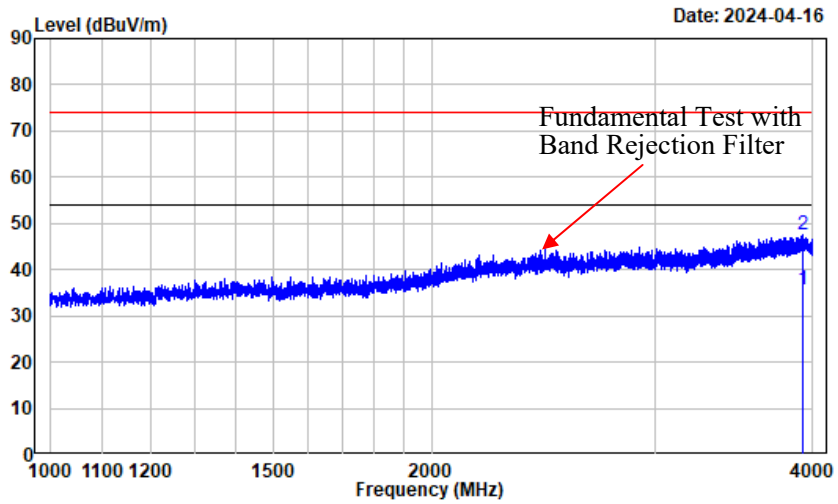
802.11b			
Test Channel:	**2462MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ1240319-13904E-RF
Tester : Sadow Tan
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	2493.663	-3.19	39.72	36.53	54.00	-17.47	Average
2	2493.663	-3.19	53.90	50.71	74.00	-23.29	peak

Test plots for Harmonic Measurements:

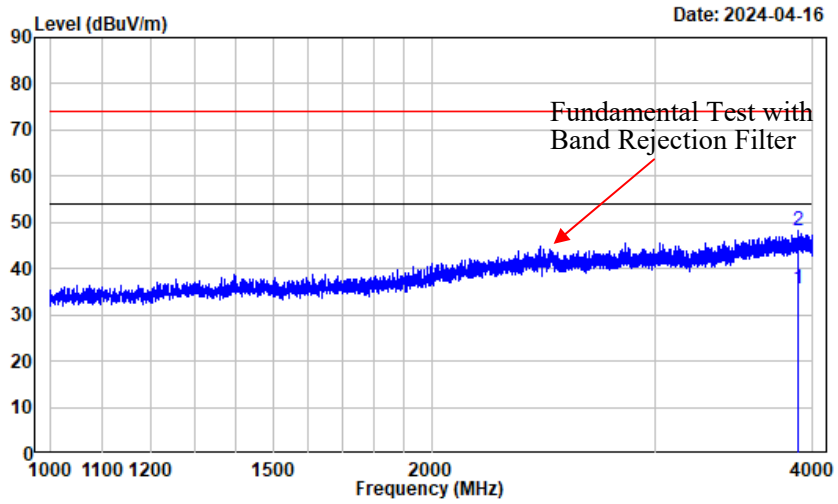
Horizontal	
1-4GHz	

Condition : Horizontal
Project No.: SZ1240319-13904E
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	3934.375	-0.28	36.07	35.79	54.00	-18.21	Average
2	3934.375	-0.28	47.92	47.64	74.00	-26.36	Peak

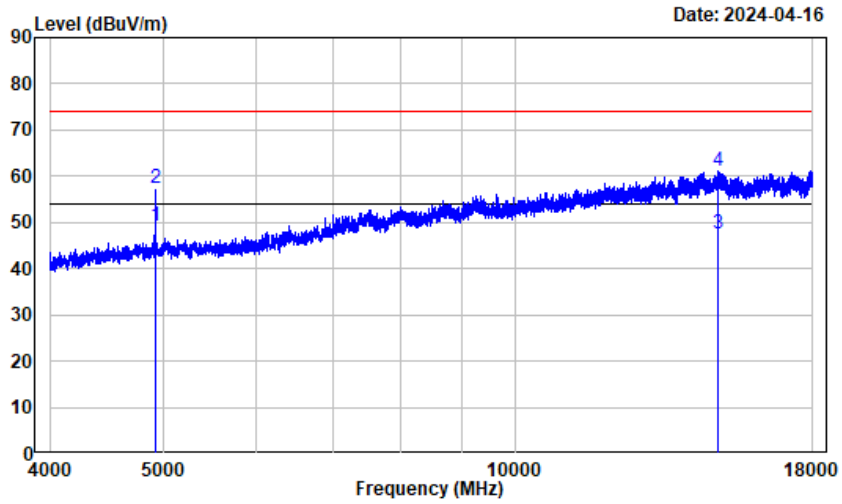
Vertical

1-4GHz



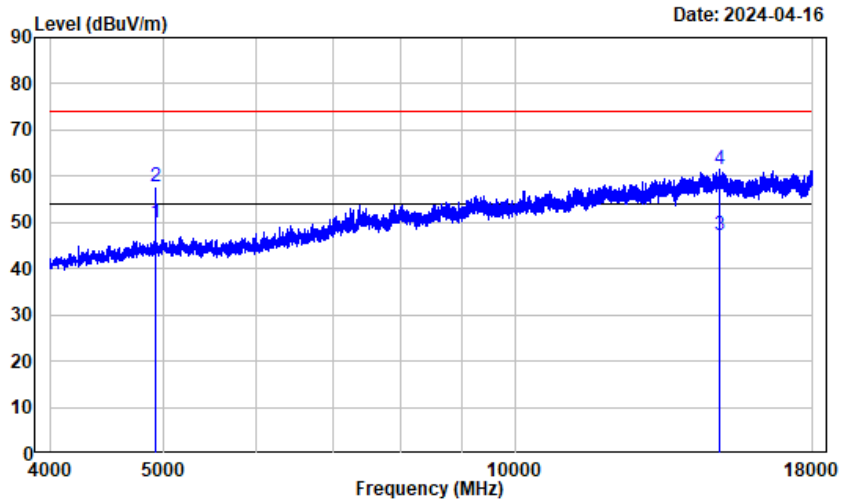
Condition : Vertical
Project No.: SZ1240319-13904E
Tester : Tyler
Note : 2.4G WiFi_B_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3899.875	-0.53	36.25	35.72	54.00	-18.28	Average
2	3899.875	-0.53	48.79	48.26	74.00	-25.74	Peak

Horizontal	
4-18GHz	 Condition : Horizontal Project No.: SZ1240319-13904E 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 4924.000 2.63 46.57 49.20 54.00 -4.80 Average 2 4924.000 2.63 54.83 57.46 74.00 -16.54 Peak 3 14935.750 16.49 30.89 47.38 54.00 -6.62 Average 4 14935.750 16.49 44.57 61.06 74.00 -12.94 Peak

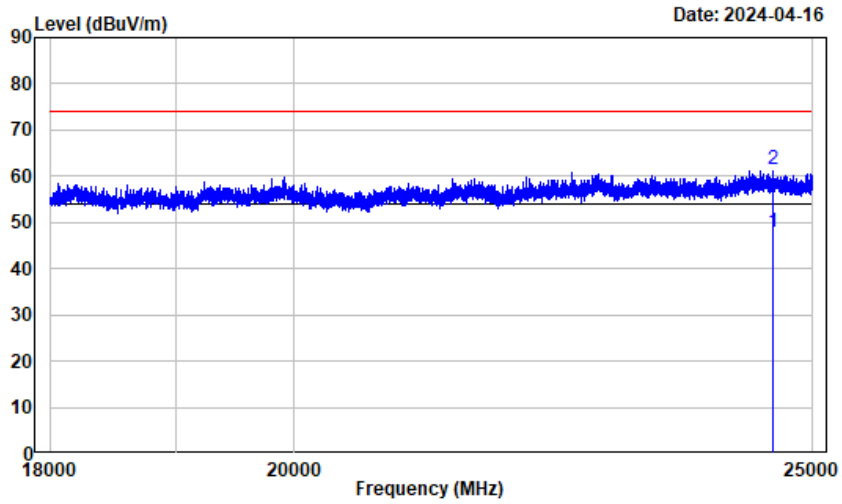
Vertical

4-18GHz



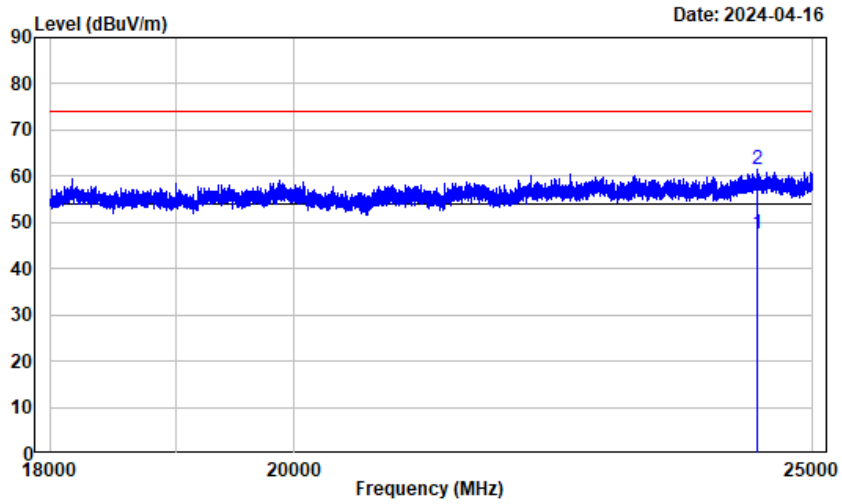
Condition : Vertical
Project No.: SZ1240319-13904E
Tester : Tyler
Note : 2.4G WiFi_B_2462

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4924.000	2.63	47.31	49.94	54.00	-4.06	Average
2	4924.000	2.63	55.12	57.75	74.00	-16.25	Peak
3	14981.250	16.38	30.91	47.29	54.00	-6.71	Average
4	14981.250	16.38	44.96	61.34	74.00	-12.66	Peak

Horizontal	
18-25GHz	 Condition : Horizontal Project No.: SZ1240319-13904E 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 24574.780 18.90 28.82 47.72 54.00 -6.28 Average 2 24574.780 18.90 42.46 61.36 74.00 -12.64 Peak

Vertical

18-25GHz



Condition : Vertical
Project No.: SZ1240319-13904E
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	24408.530	18.79	28.83	47.62	54.00	-6.38	Average
2	24408.530	18.79	42.75	61.54	74.00	-12.46	Peak

FCC §15.247(a) (2) - 6 dB EMISSION BANDWIDTH

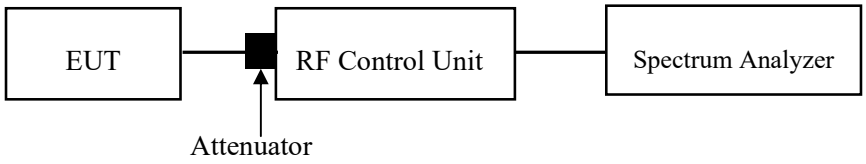
Applicable Standard

According to FCC §15.247(a) (2)
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.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.8.1 & 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.



Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Lee Li on 2024-04-12.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

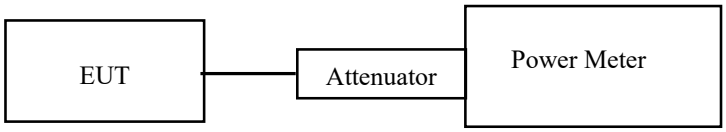
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted 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.

Test Procedure

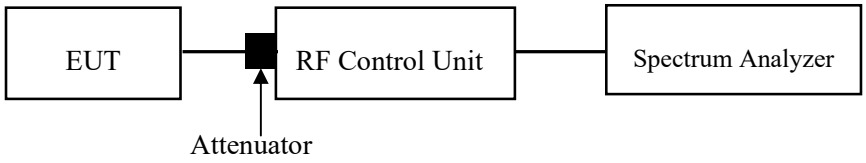
Test Method: ANSI C63.10-2013 Clause 11.9.1.1 for BLE & Clause 11.9.1.3 for Wi-Fi

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:	26 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Lee Li on 2024-04-12.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(d) - 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

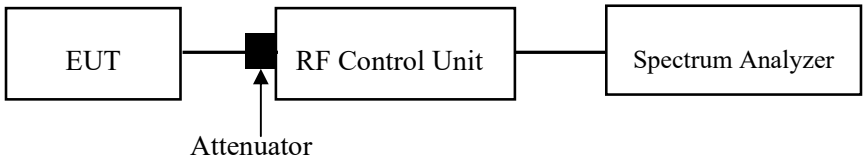
Applicable Standard

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:	26 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Lee Li on 2024-04-12.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

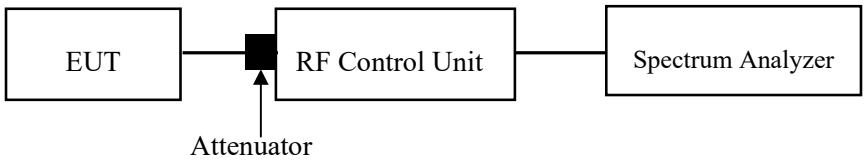
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of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

Test Procedure

Test Method: ANSI C63.10-2013 Clause 11.10.2

Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.

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



Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Lee Li on 2024-04-12.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix.

EUT PHOTOGRAPHS

Please refer to the attachment SZ1240319-13904E-RF External photo and SZ1240319-13904E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ1240319-13904E-RFA Test Setup photo.

APPENDIX

BLE

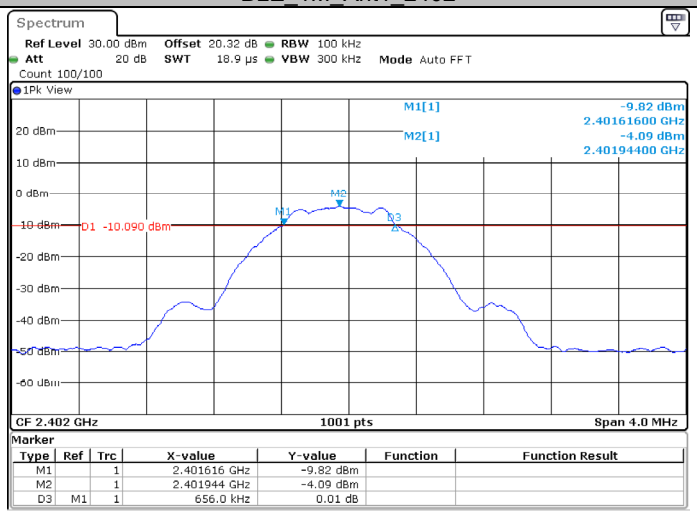
Appendix A1: DTS Bandwidth

Test Result

Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.656	2401.62	2402.27	0.5	PASS
		2440	0.660	2439.61	2440.27	0.5	PASS
		2480	0.660	2479.61	2480.27	0.5	PASS
BLE_2M	Ant1	2402	1.340	2401.27	2402.61	0.5	PASS
		2440	1.332	2439.27	2440.60	0.5	PASS
		2480	1.324	2479.27	2480.59	0.5	PASS

Test Graphs

BLE_1M_Ant1_2402

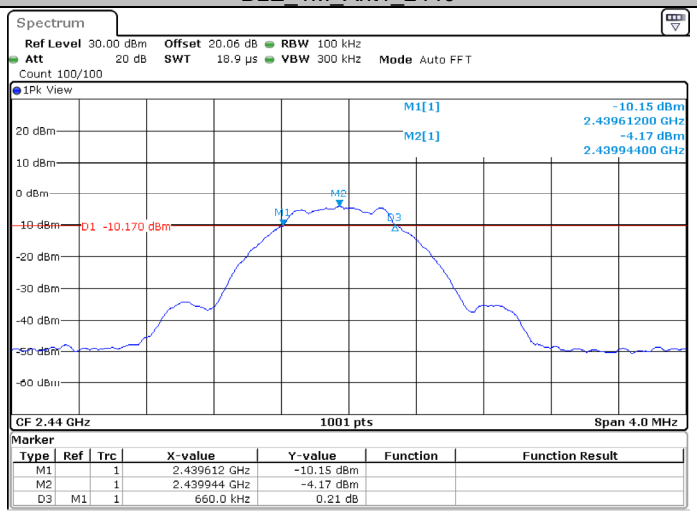


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.401616 GHz	-9.82 dBm		
M2		1	2.401944 GHz	-4.09 dBm		
D3	M1	1	656.0 kHz	0.01 dB		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:35:10

BLE_1M_Ant1_2440

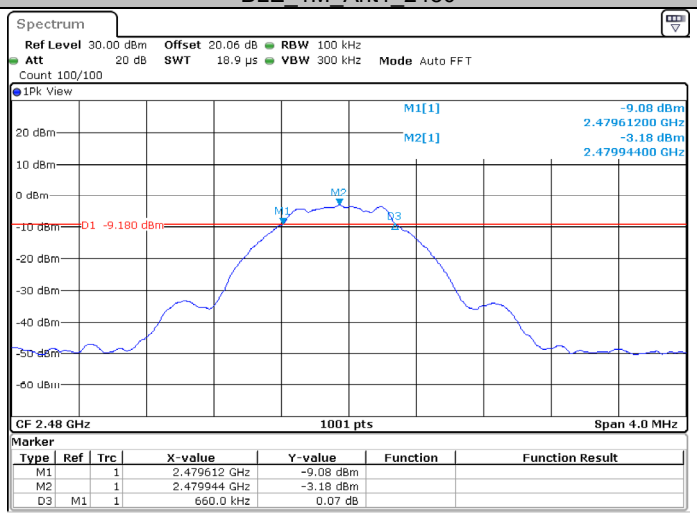


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.439612 GHz	-10.15 dBm		
M2		1	2.439944 GHz	-4.17 dBm		
D3	M1	1	660.0 kHz	0.21 dB		

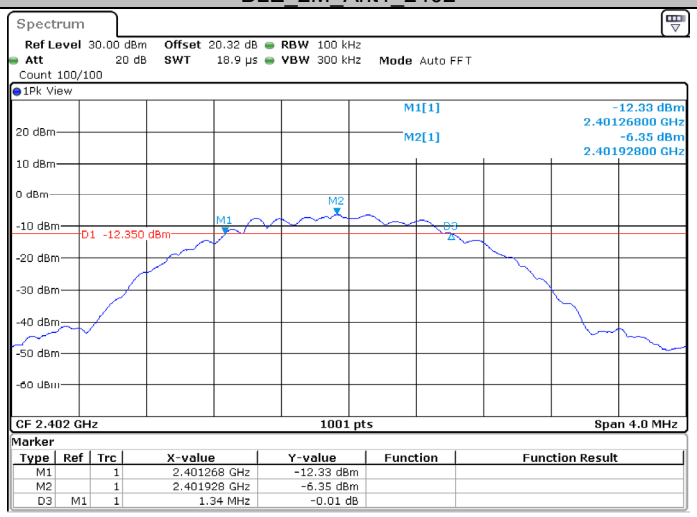
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:40:23

BLE_1M_Ant1_2480



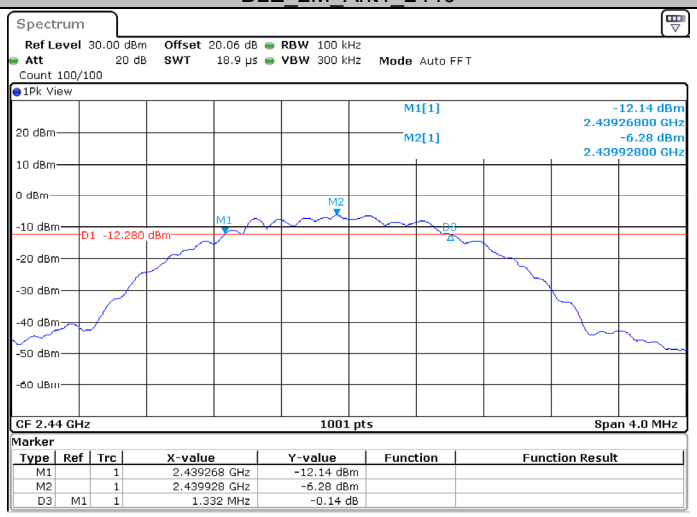
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:41:26

BLE_2M_Ant1_2402



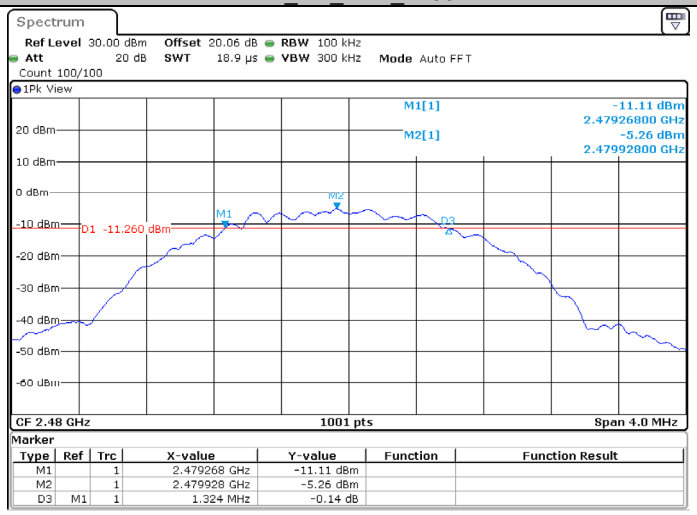
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:42:45

BLE_2M_Ant1_2440



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:45:06

BLE_2M_Ant1_2480



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:46:05

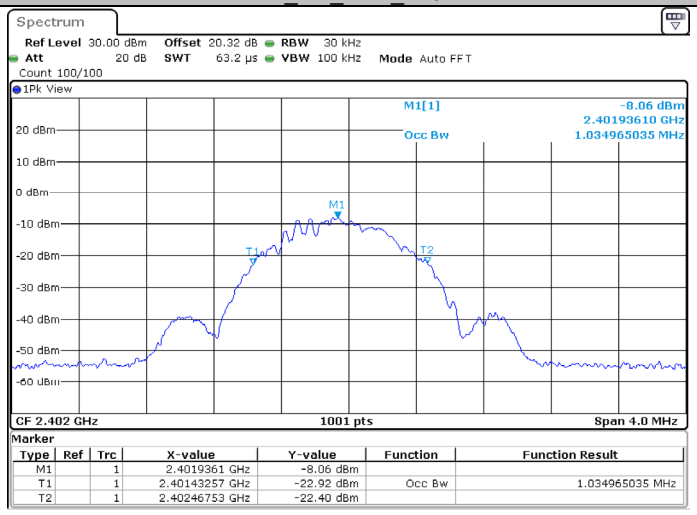
Appendix B1: Occupied Channel Bandwidth

Test Result

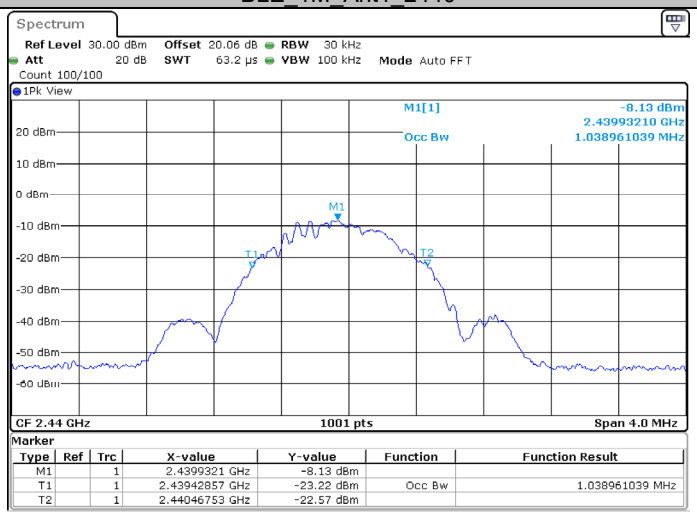
Test Mode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.035	2401.4326	2402.4675	---	---
		2440	1.039	2439.4286	2440.4675	---	---
		2480	1.039	2479.4286	2480.4675	---	---
BLE_2M	Ant1	2402	2.050	2400.9331	2402.9830	---	---
		2440	2.050	2438.9291	2440.9790	---	---
		2480	2.050	2478.9291	2480.9790	---	---

Test Graphs

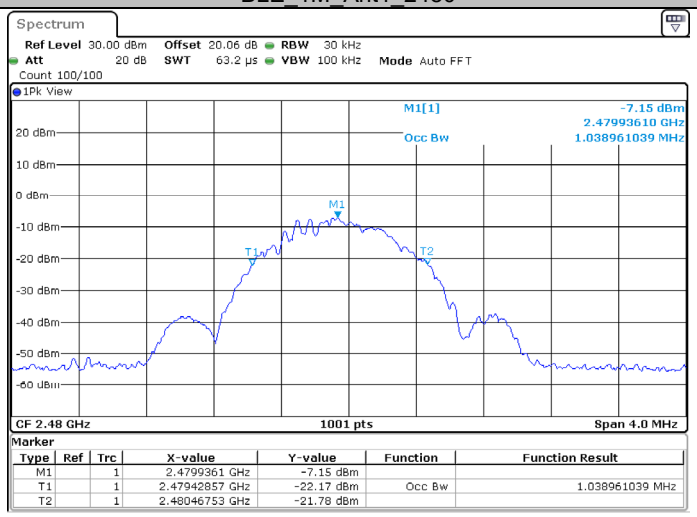
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

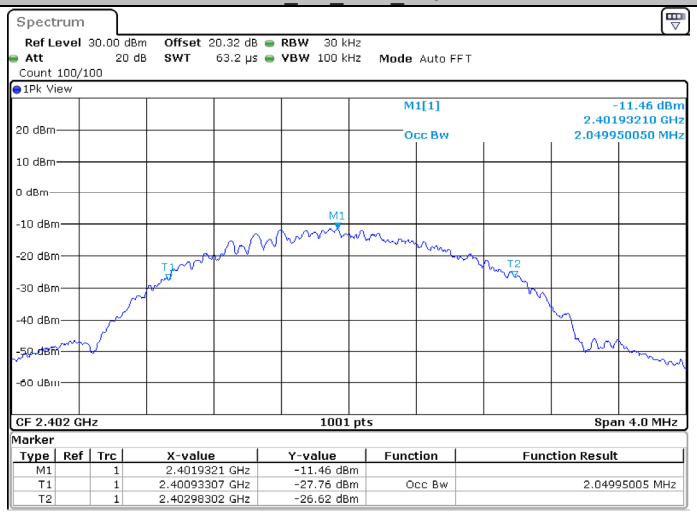


BLE_1M_Ant1_2480



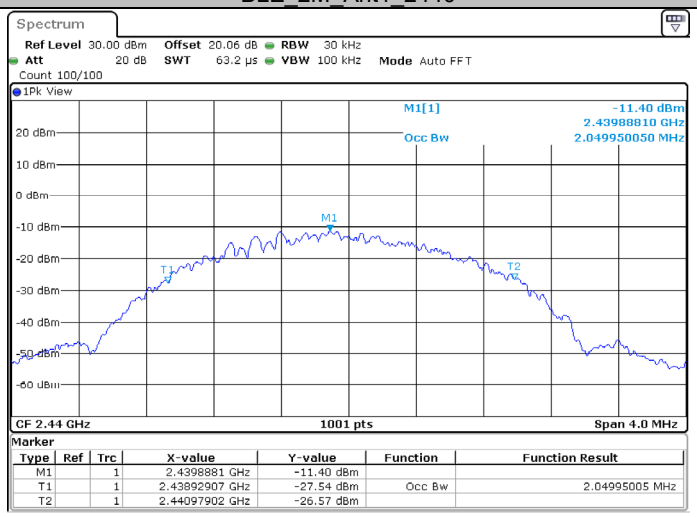
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:41:32

BLE_2M_Ant1_2402



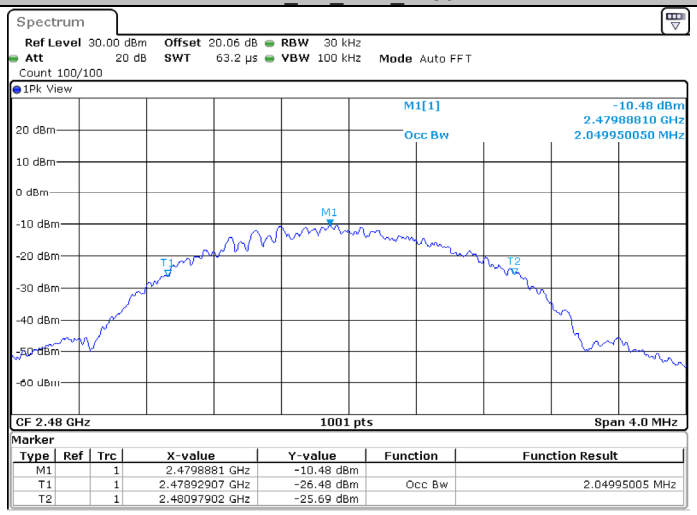
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:42:51

BLE_2M_Ant1_2440



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:45:12

BLE_2M_Ant1_2480



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:46:11

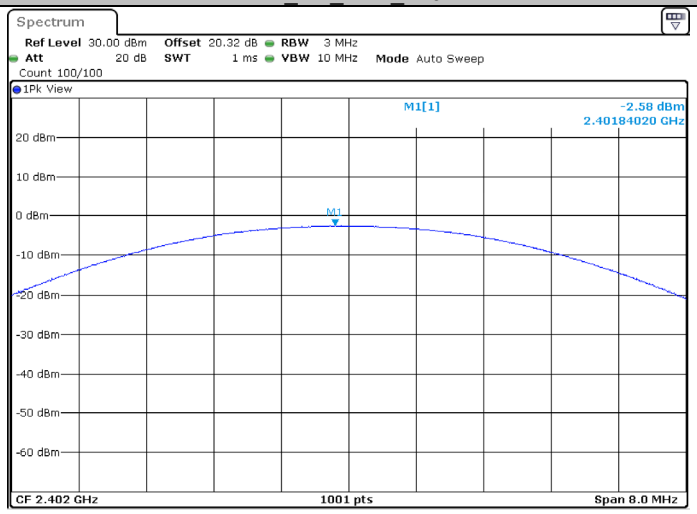
Appendix C1: Maximum conducted output power

Test Result

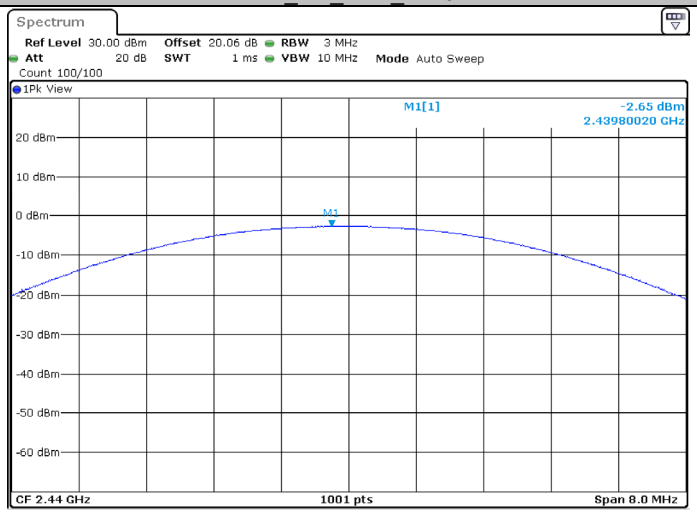
Test Mode	Antenna	Frequency[MHz]	Conducted Peak Power[dBm]	Conducted Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-2.58	≤30	PASS
		2440	-2.65	≤30	PASS
		2480	-1.70	≤30	PASS
BLE_2M	Ant1	2402	-2.92	≤30	PASS
		2440	-2.80	≤30	PASS
		2480	-1.89	≤30	PASS

Test Graphs

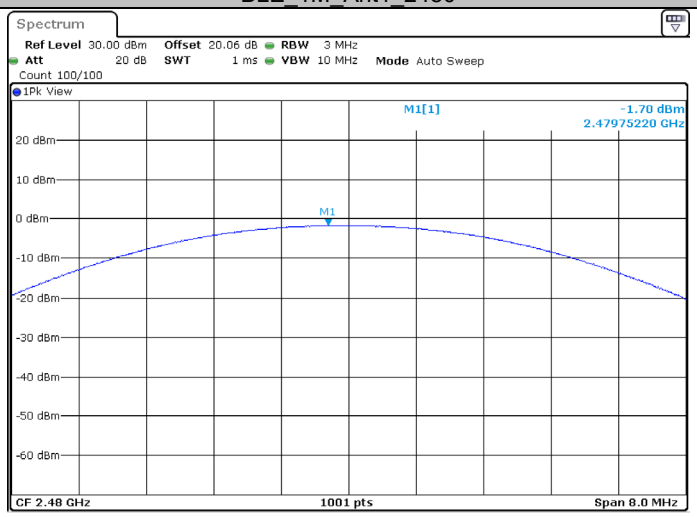
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

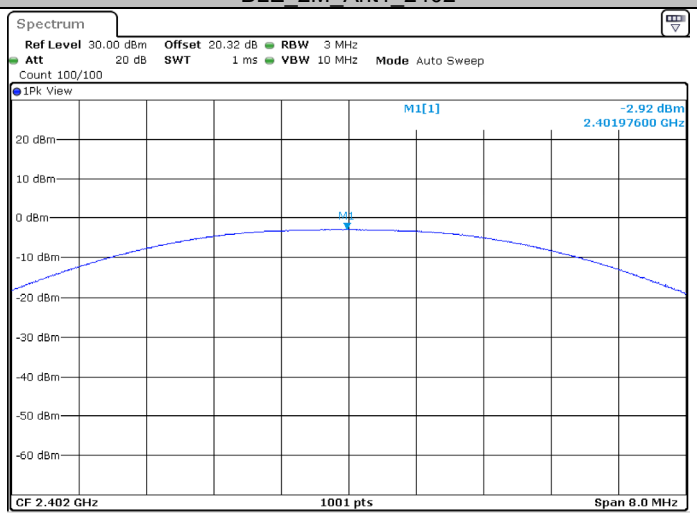


BLE_1M_Ant1_2480



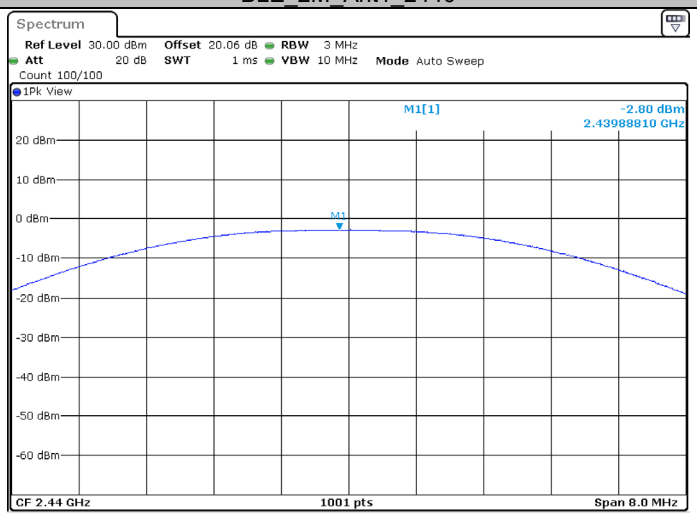
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:41:38

BLE_2M_Ant1_2402

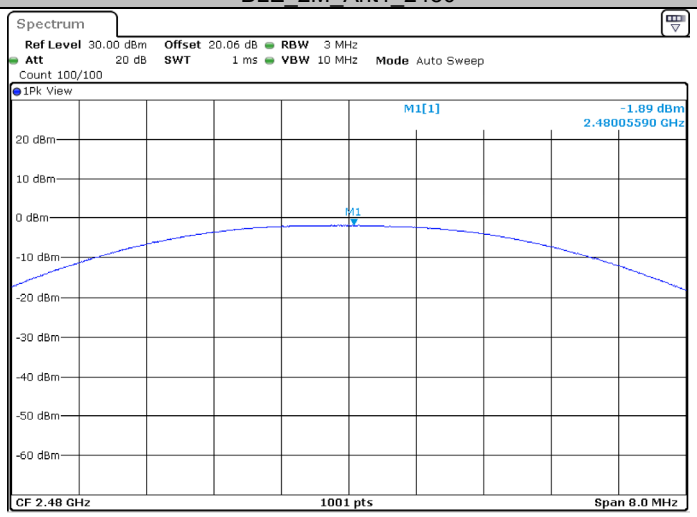


ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:42:57

BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



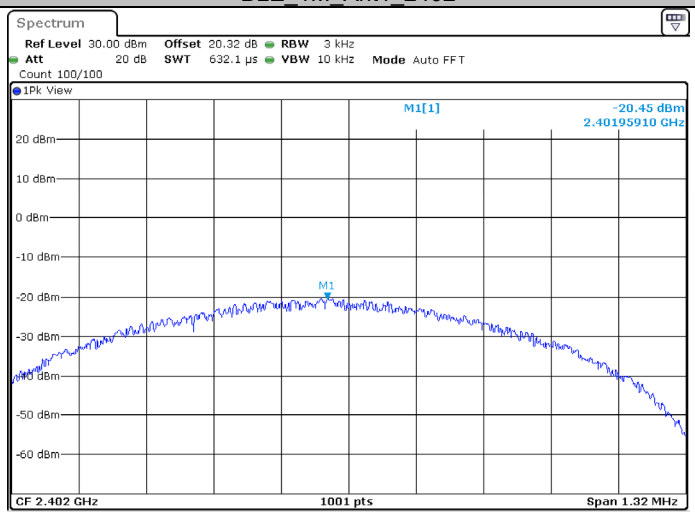
Appendix D1: Maximum power spectral density

Test Result

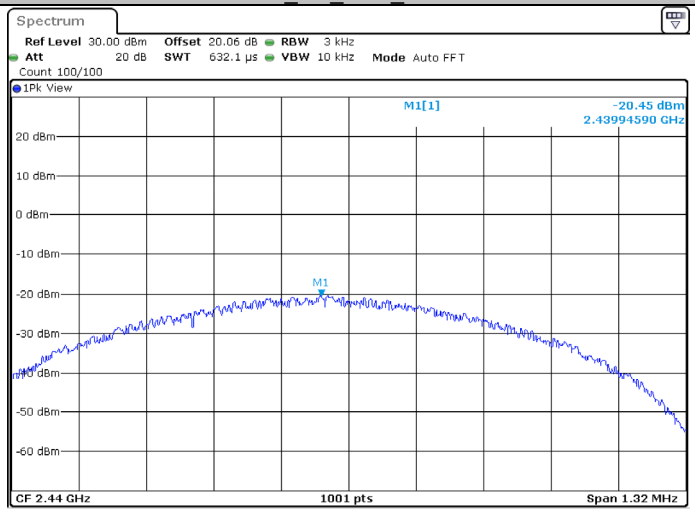
Test Mode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-20.45	≤8.00	PASS
		2440	-20.45	≤8.00	PASS
		2480	-19.40	≤8.00	PASS
BLE_2M	Ant1	2402	-25.73	≤8.00	PASS
		2440	-25.28	≤8.00	PASS
		2480	-24.54	≤8.00	PASS

Test Graphs

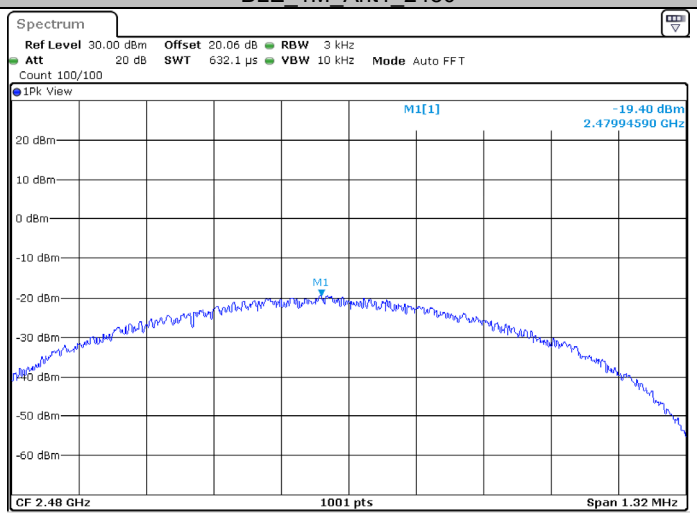
BLE_1M_Ant1_2402



BLE_1M_Ant1_2440

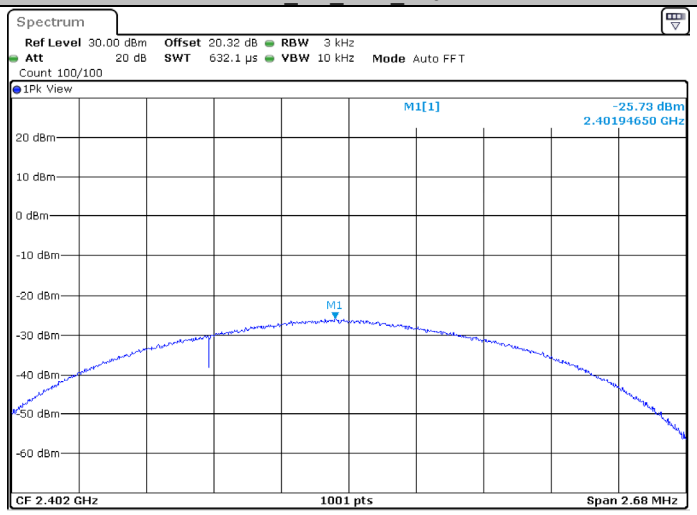


BLE_1M_Ant1_2480



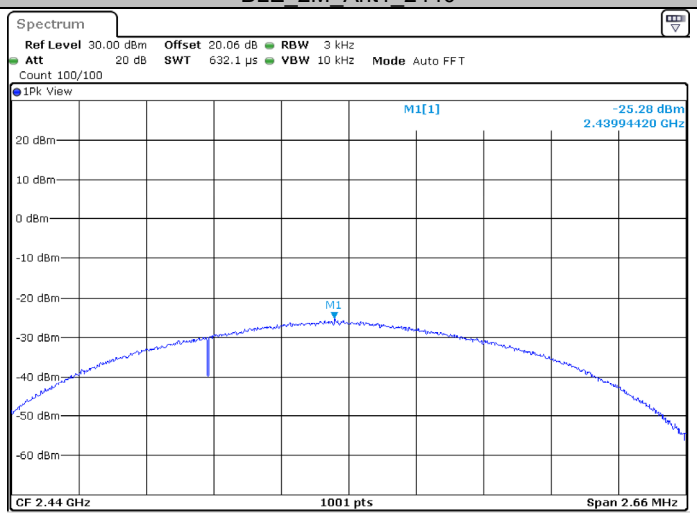
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:41:44

BLE_2M_Ant1_2402



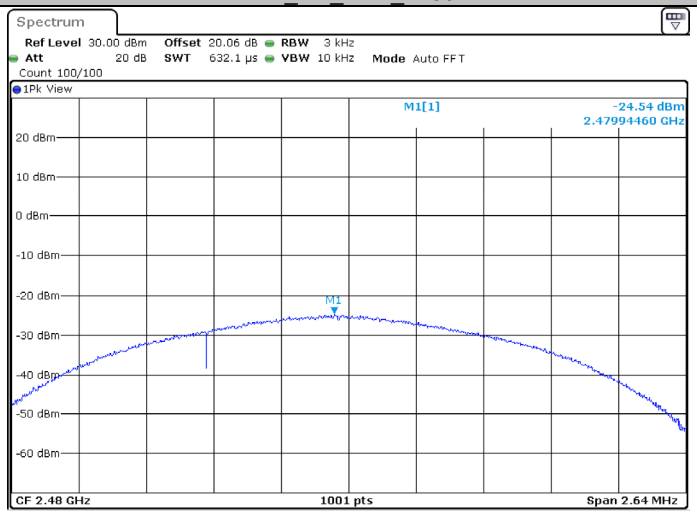
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:43:03

BLE_2M_Ant1_2440



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:45:24

BLE_2M_Ant1_2480

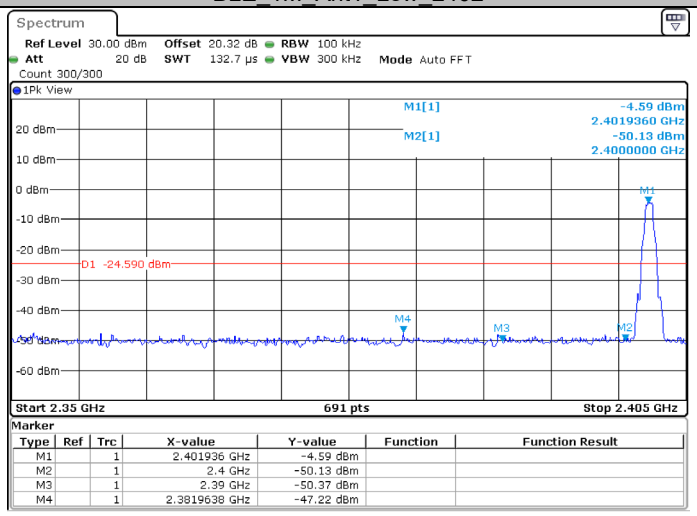


ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:46:23

Appendix E1: Band edge measurements

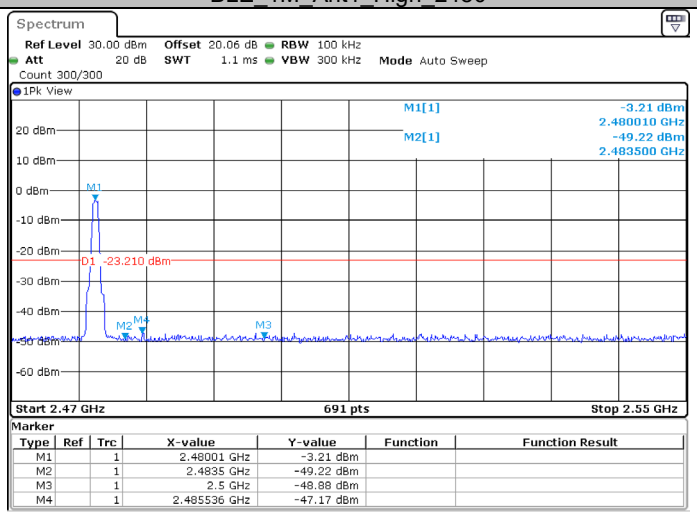
Test Graphs

BLE_1M_Ant1_Low_2402



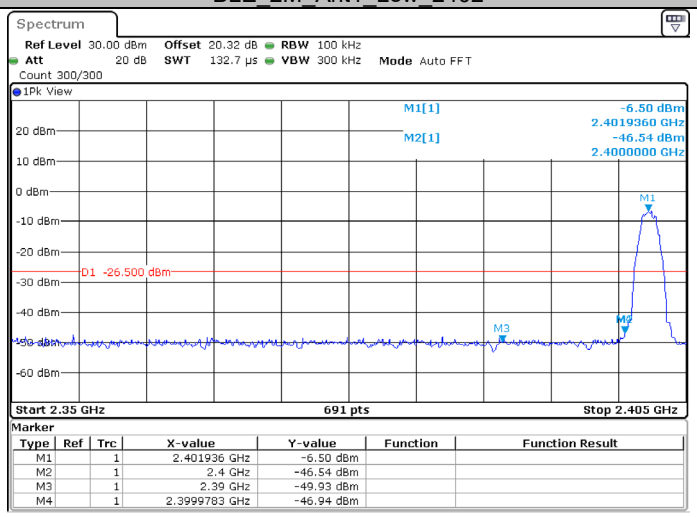
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:38:03

BLE_1M_Ant1_High_2480



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:41:52

BLE_2M_Ant1_Low_2402

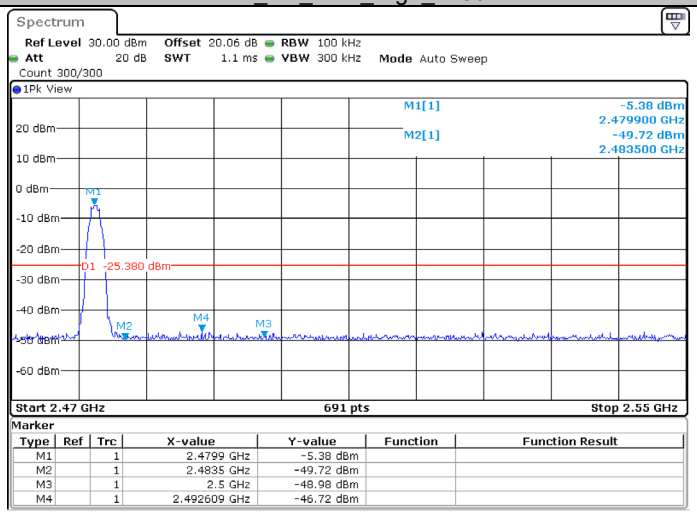


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.401936 GHz	-6.50 dBm		
M2		1	2.4 GHz	-46.54 dBm		
M3		1	2.39 GHz	-49.93 dBm		
M4		1	2.3999783 GHz	-46.94 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:43:12

BLE_2M_Ant1_High_2480



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4799 GHz	-5.38 dBm		
M2		1	2.4835 GHz	-49.72 dBm		
M3		1	2.5 GHz	-48.98 dBm		
M4		1	2.492609 GHz	-46.72 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:46:32

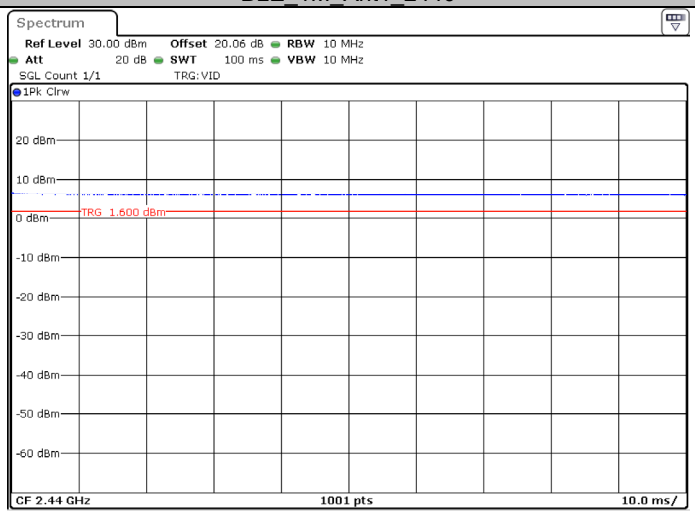
Appendix F1: Duty Cycle

Test Result

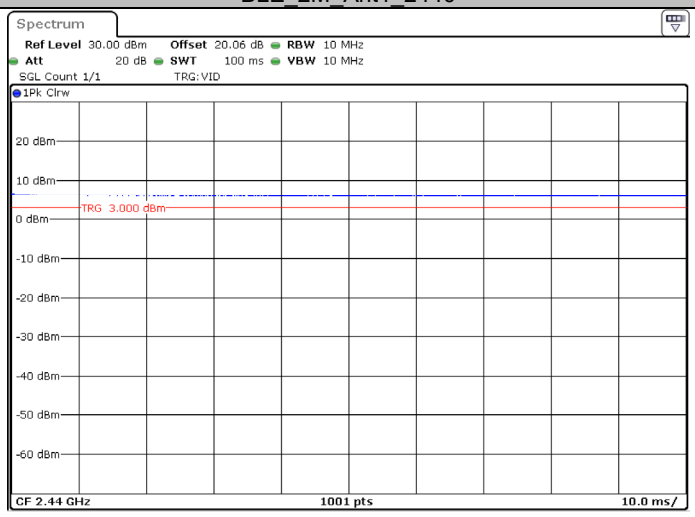
Test Mode	Antenna	Frequency[MHz]	ON Time [ms]	Period [ms]	Duty Cycle [%]	1/T [Hz]	VBW Setting [Hz]
BLE_1M	Ant1	2440	100	100	100	/	10
BLE_2M	Ant1	2440	100	100	100	/	10

Test Graphs

BLE_1M_Ant1_2440



BLE_2M_Ant1_2440



2.4G Wi-Fi

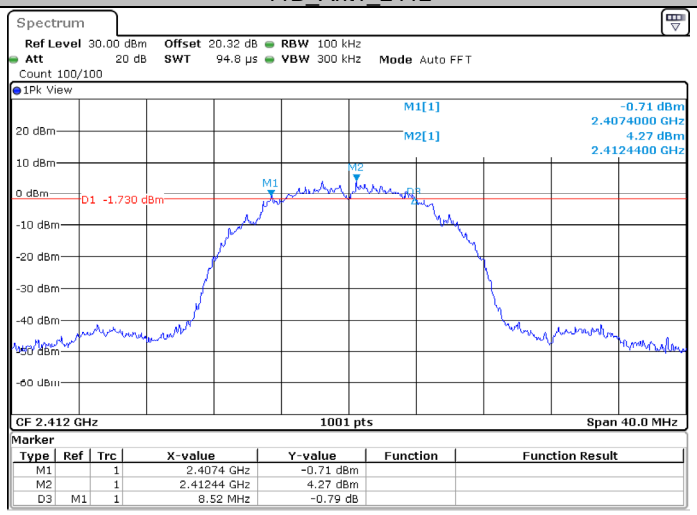
Appendix A2: DTS Bandwidth

Test Result

Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.52	2407.40	2415.92	0.5	PASS
		2437	9.56	2431.92	2441.48	0.5	PASS
		2462	8.24	2458.24	2466.48	0.5	PASS
11G	Ant1	2412	16.28	2403.80	2420.08	0.5	PASS
		2437	16.28	2428.80	2445.08	0.5	PASS
		2462	16.04	2453.80	2469.84	0.5	PASS
11N20SISO	Ant1	2412	16.32	2403.80	2420.12	0.5	PASS
		2437	17.08	2428.40	2445.48	0.5	PASS
		2462	16.04	2453.80	2469.84	0.5	PASS
11N40SISO	Ant1	2422	35.12	2404.40	2439.52	0.5	PASS
		2437	35.04	2419.48	2454.52	0.5	PASS
		2452	35.12	2434.40	2469.52	0.5	PASS

Test Graphs

11B_Ant1_2412

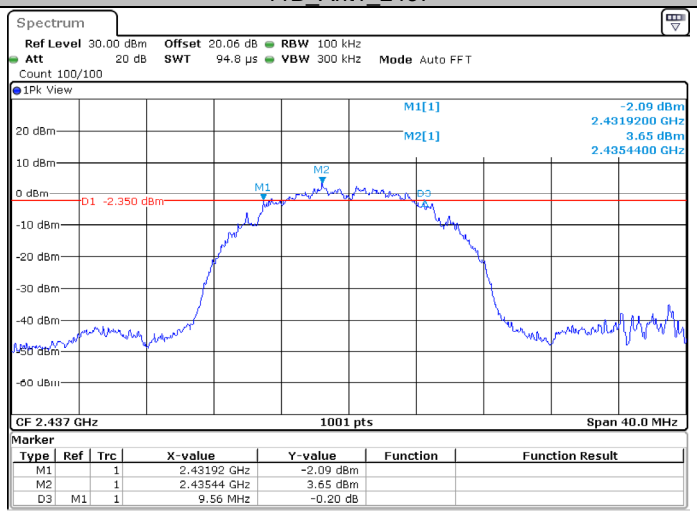


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4074 GHz	-0.71 dBm		
M2		1	2.41244 GHz	4.27 dBm		
D3	M1	1	8.52 MHz	-0.79 dB		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:56:23

11B_Ant1_2437

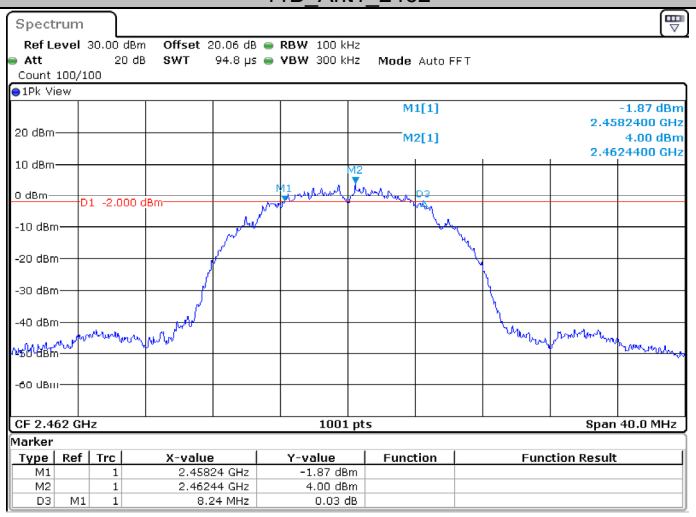


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.43192 GHz	-2.09 dBm		
M2		1	2.43544 GHz	3.65 dBm		
D3	M1	1	9.56 MHz	-0.20 dB		

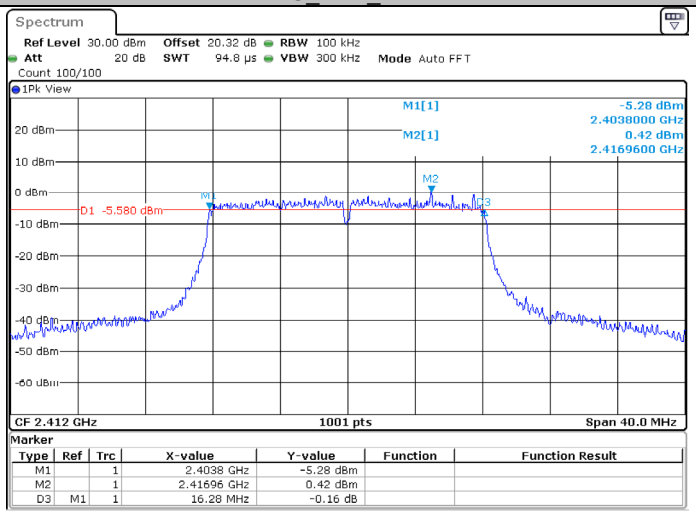
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:59:02

11B_Ant1_2462



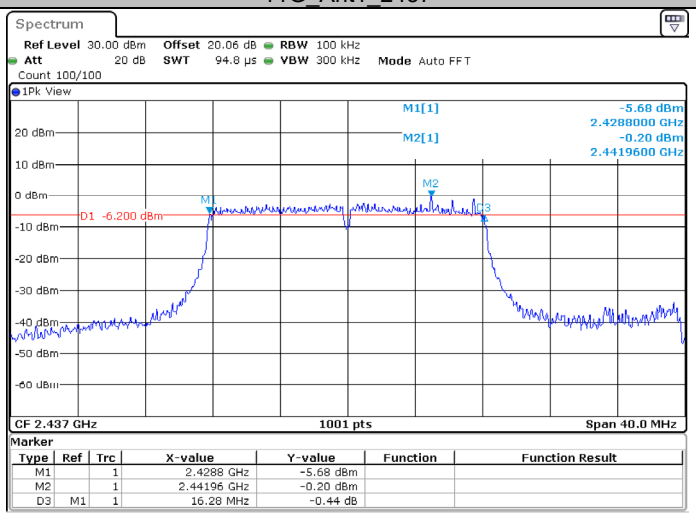
ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 14:01:33

11G_Ant1_2412



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 14:03:21

11G_Ant1_2437



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 14:04:56

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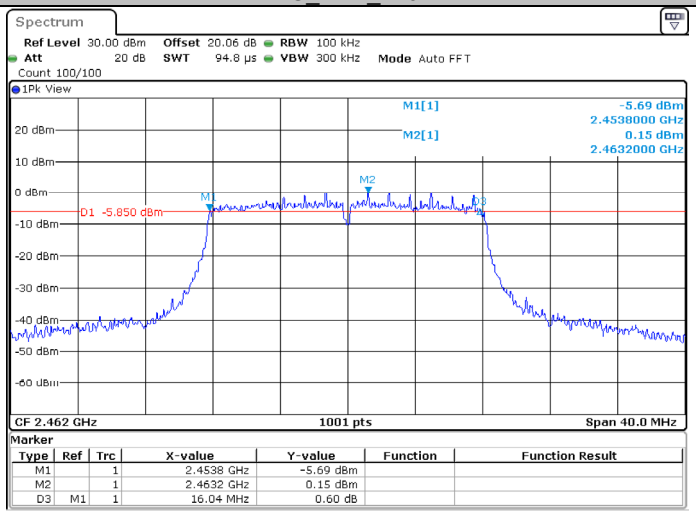

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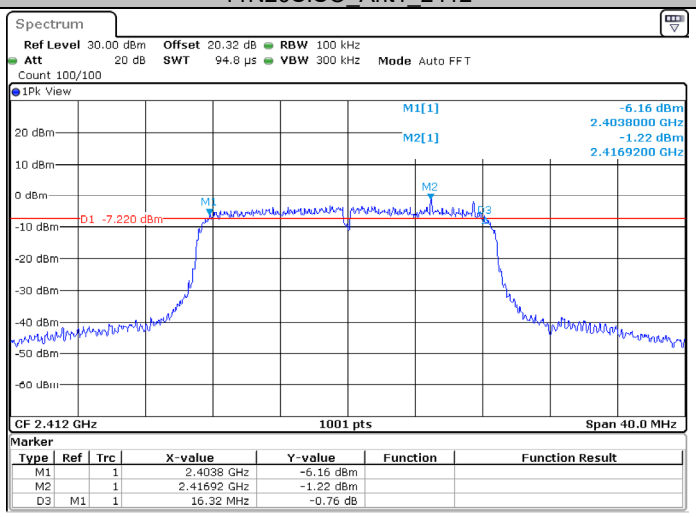
Date: 12.APR.2024 14:06:27

11N20SISO_Ant1_2412



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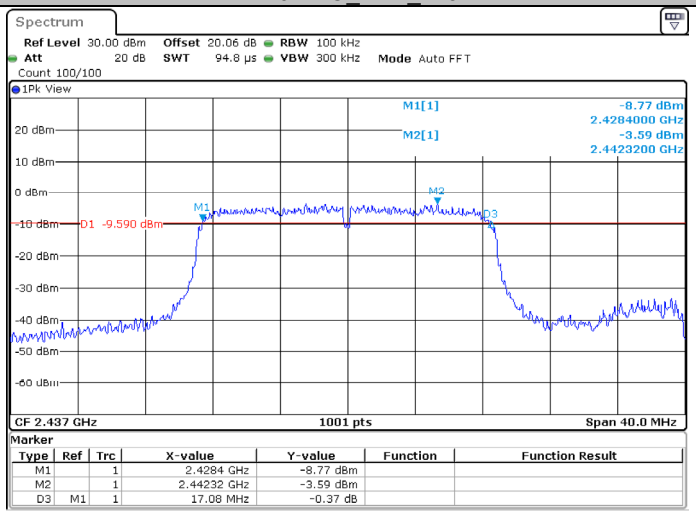

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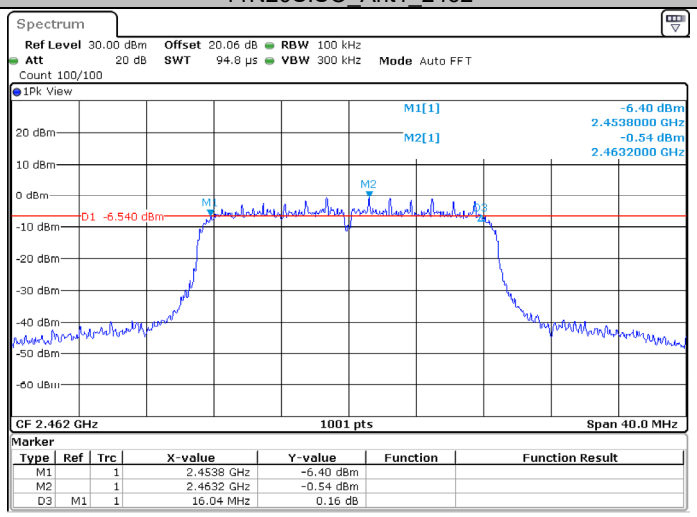

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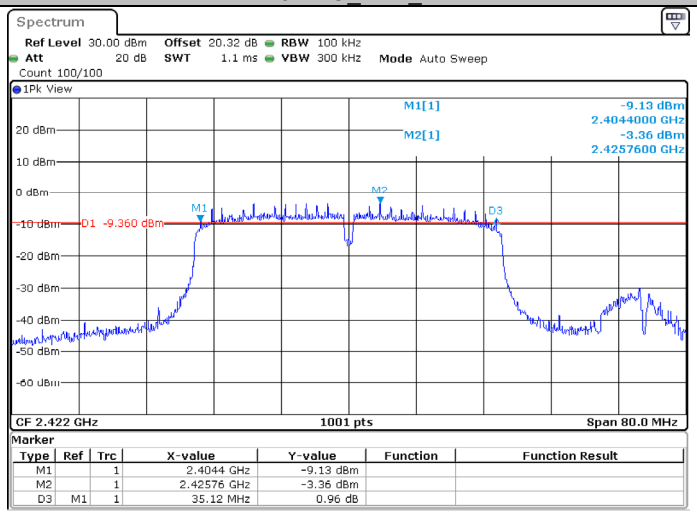
Date: 12.APR.2024 15:11:01

11N40SISO_Ant1_2422



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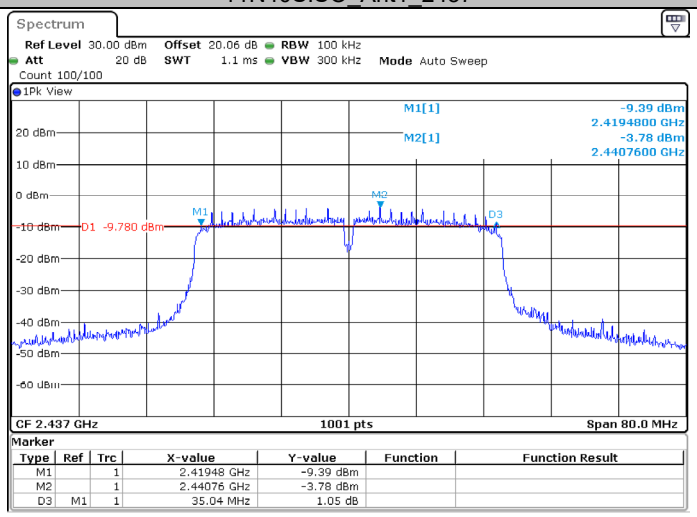
Date: 12.APR.2024 15:13:07

11N40SISO_Ant1_2437



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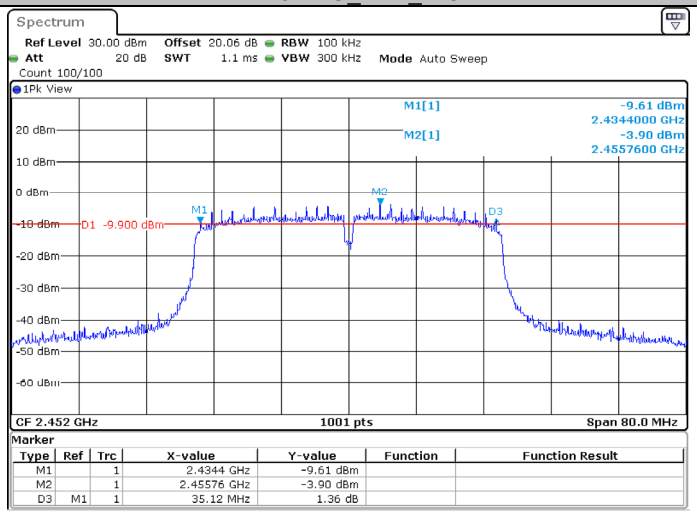
Date: 12.APR.2024 15:14:41

11N40SISO_Ant1_2452



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:16:07

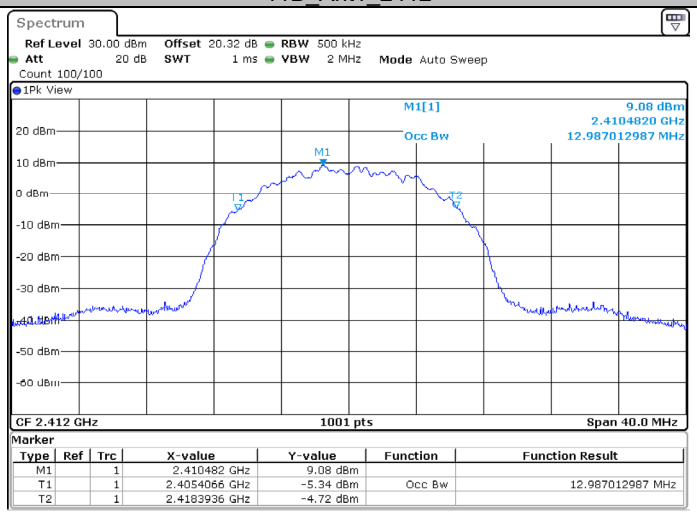
Appendix B2: Occupied Channel Bandwidth

Test Result

Test Mode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit [MHz]	Verdict
11B	Ant1	2412	12.987	2405.4066	2418.3936	---	---
		2437	13.067	2430.3666	2443.4336	---	---
		2462	12.987	2455.4066	2468.3936	---	---
11G	Ant1	2412	16.623	2403.6484	2420.2717	---	---
		2437	16.623	2428.6484	2445.2717	---	---
		2462	16.623	2453.6484	2470.2717	---	---
11N20SISO	Ant1	2412	17.343	2403.2887	2420.6314	---	---
		2437	17.343	2428.2887	2445.6314	---	---
		2462	17.343	2453.2887	2470.6314	---	---
11N40SISO	Ant1	2422	35.804	2404.0979	2439.9021	---	---
		2437	35.884	2419.0180	2454.9021	---	---
		2452	35.804	2434.0979	2469.9021	---	---

Test Graphs

11B_Ant1_2412

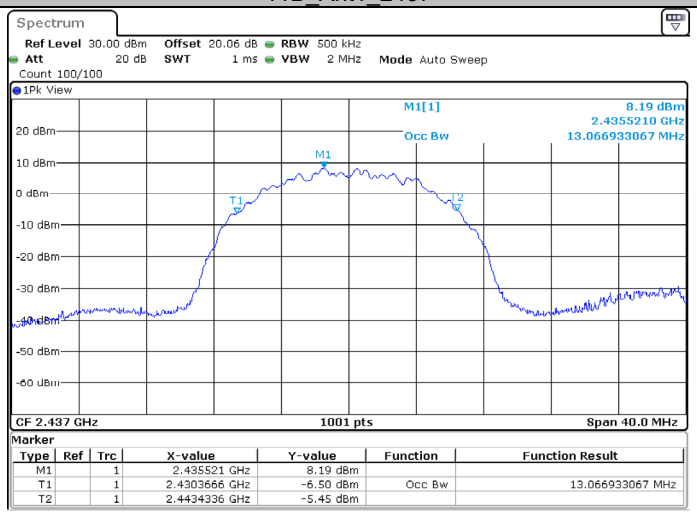


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.410482 GHz	9.08 dBm		
T1		1	2.4054066 GHz	-5.34 dBm	Occ Bw	12.987012987 MHz
T2		1	2.4183936 GHz	-4.72 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:56:29

11B_Ant1_2437

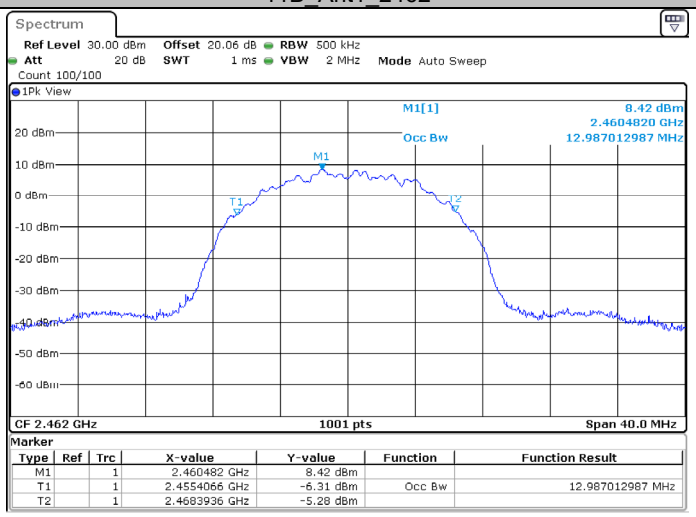


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.435521 GHz	8.19 dBm		
T1		1	2.4303666 GHz	-6.50 dBm	Occ Bw	13.066933067 MHz
T2		1	2.4434336 GHz	-5.45 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:59:08

11B_Ant1_2462



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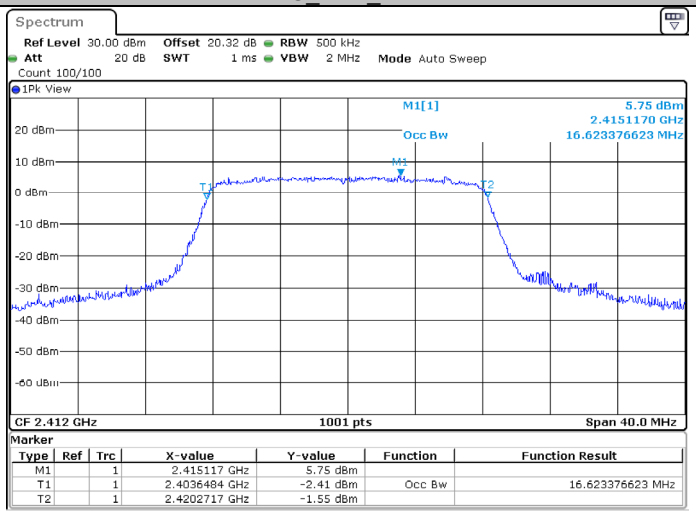
11G_Ant1_2412



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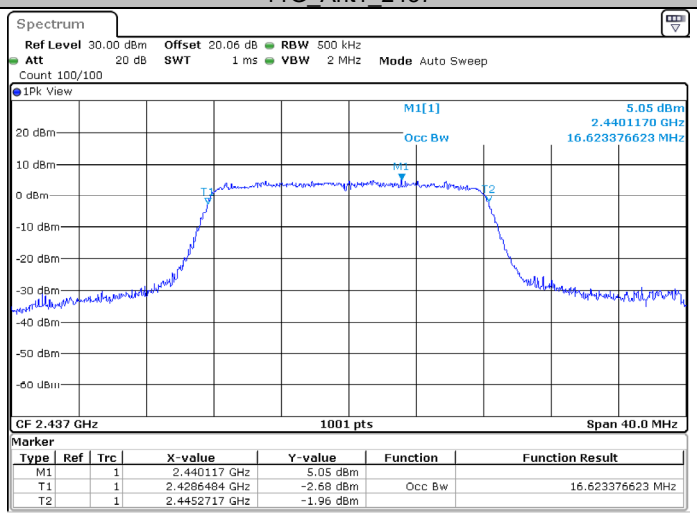
Date: 12.APR.2024 14:03:27

11G_Ant1_2437



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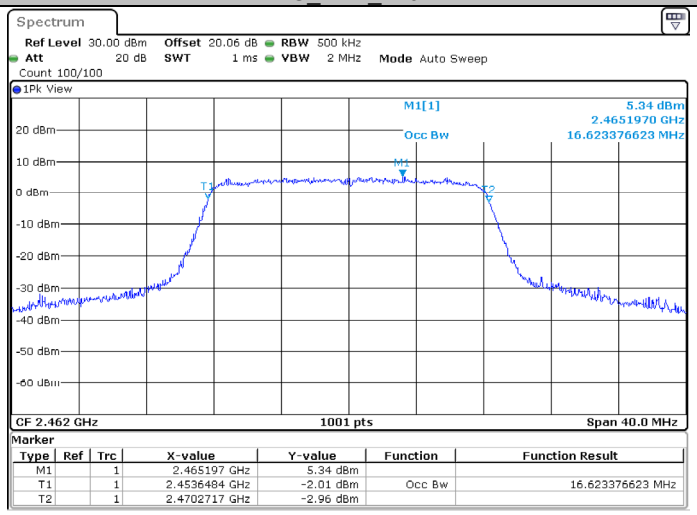
11G_Ant1_2462



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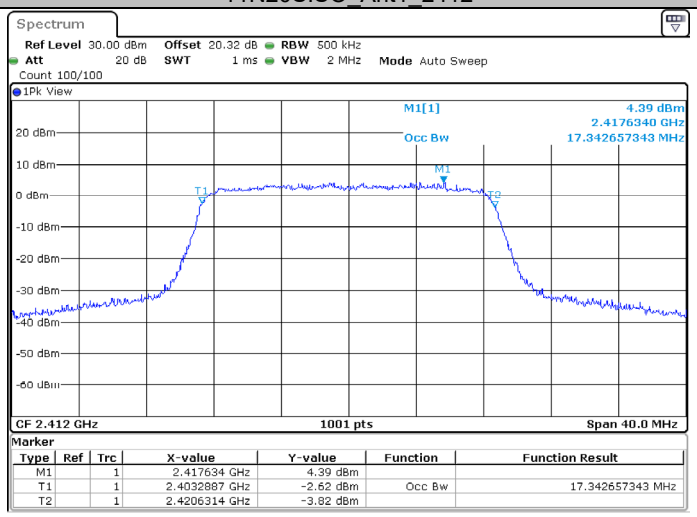
11N20SISO_Ant1_2412



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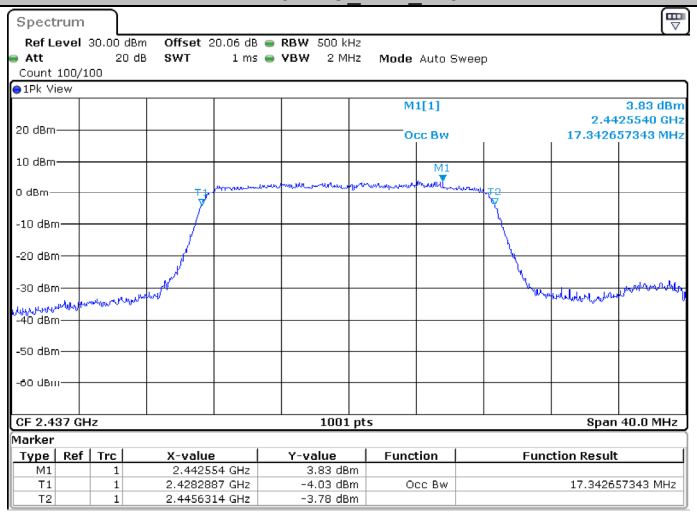

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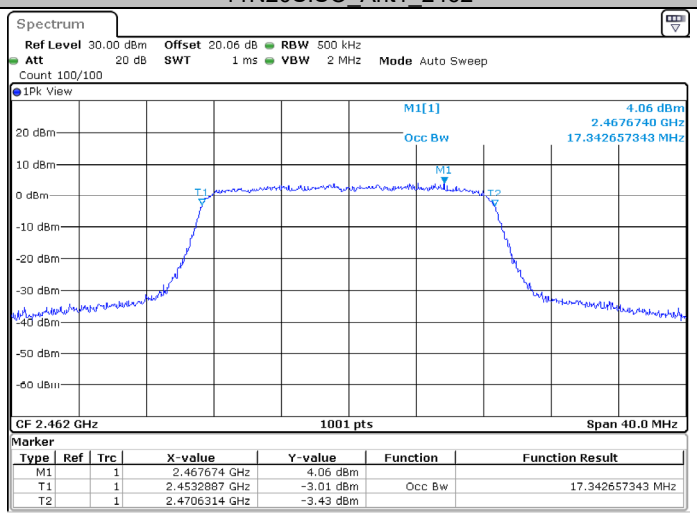

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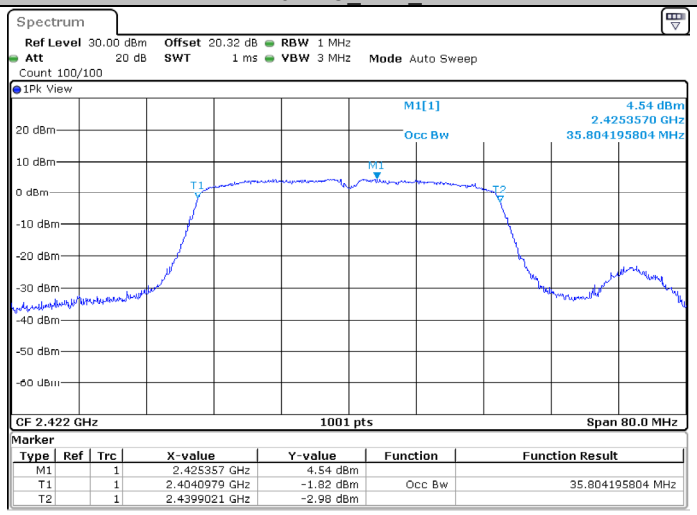
11N40SISO_Ant1_2422



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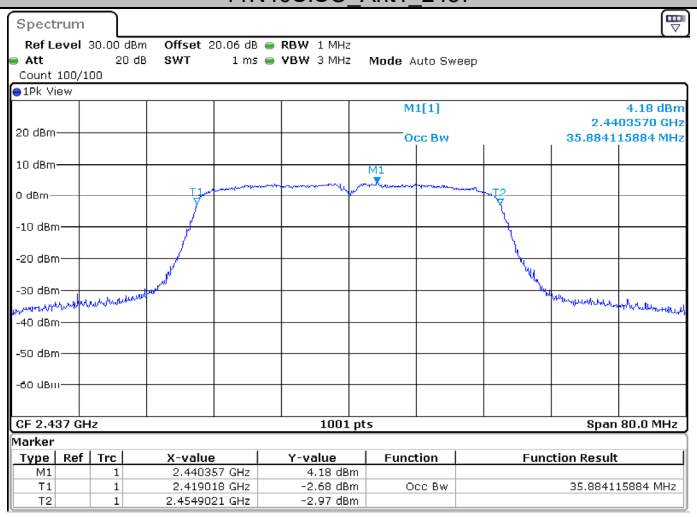
11N40SISO_Ant1_2437



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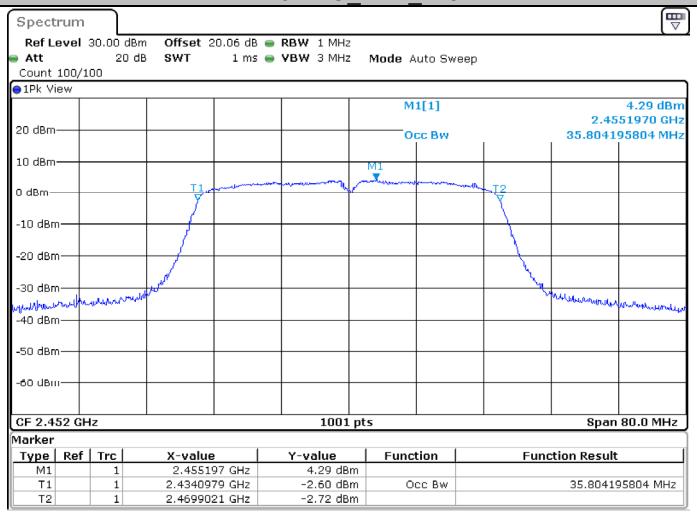
11N40SISO_Ant1_2452



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:16:13

Appendix C2: Maximum conducted output power

Test Result

Test Mode	Antenna	Frequency [MHz]	Peak Power [dBm]	Conducted Limit [dBm]	Verdict
11B	Ant1	2412	19.14	≤30.00	PASS
		2437	18.29	≤30.00	PASS
		2462	18.53	≤30.00	PASS
11G	Ant1	2412	19.25	≤30.00	PASS
		2437	18.65	≤30.00	PASS
		2462	18.88	≤30.00	PASS
11N20SISO	Ant1	2412	18.03	≤30.00	PASS
		2437	17.46	≤30.00	PASS
		2462	17.72	≤30.00	PASS
11N40SISO	Ant1	2422	17.95	≤30.00	PASS
		2437	17.57	≤30.00	PASS
		2452	17.51	≤30.00	PASS

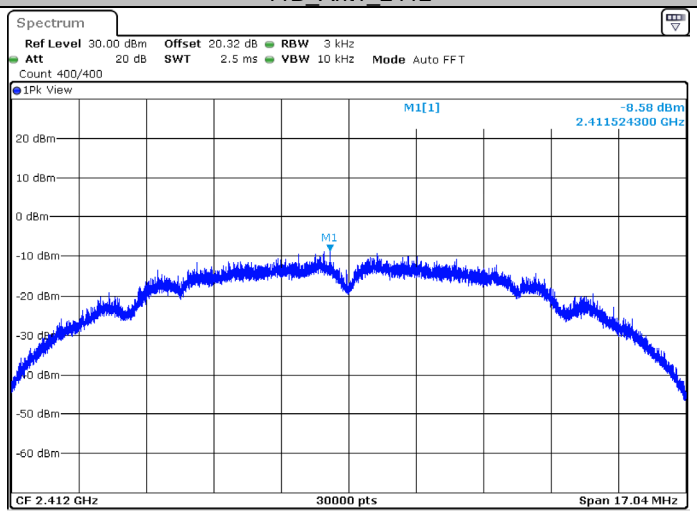
Appendix D2: Maximum power spectral density

Test Result

Test Mode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-8.58	≤8.00	PASS
		2437	-9.31	≤8.00	PASS
		2462	-9.07	≤8.00	PASS
11G	Ant1	2412	-13.52	≤8.00	PASS
		2437	-14.19	≤8.00	PASS
		2462	-13.82	≤8.00	PASS
11N20SISO	Ant1	2412	-13.67	≤8.00	PASS
		2437	-14.26	≤8.00	PASS
		2462	-13.97	≤8.00	PASS
11N40SISO	Ant1	2422	-16.90	≤8.00	PASS
		2437	-17.32	≤8.00	PASS
		2452	-17.36	≤8.00	PASS

Test Graphs

11B_Ant1_2412



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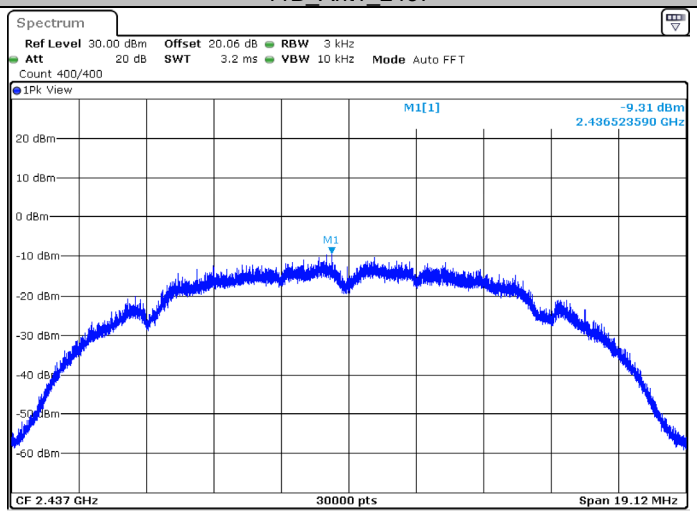
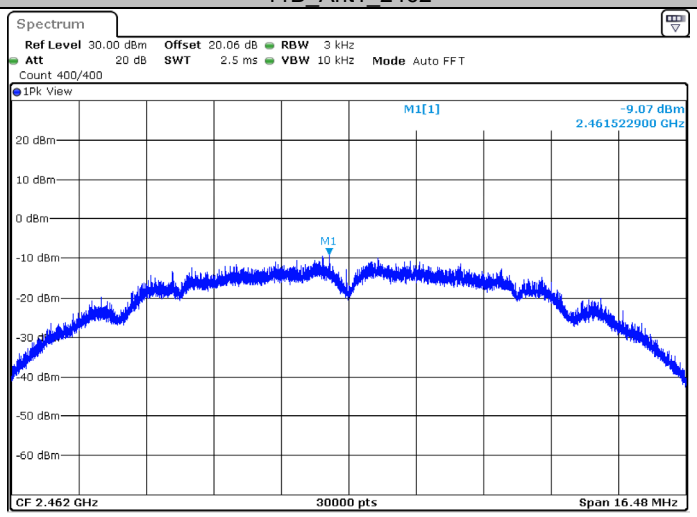
11B_Ant1_2437



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:59:27

11B_Ant1_2462



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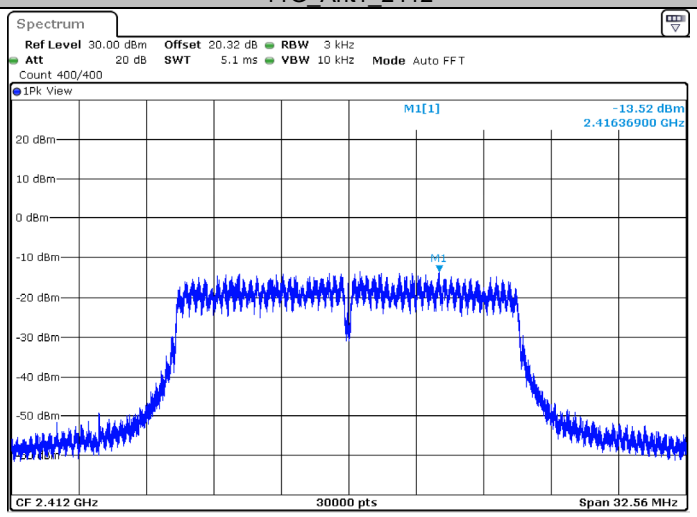
11G_Ant1_2412



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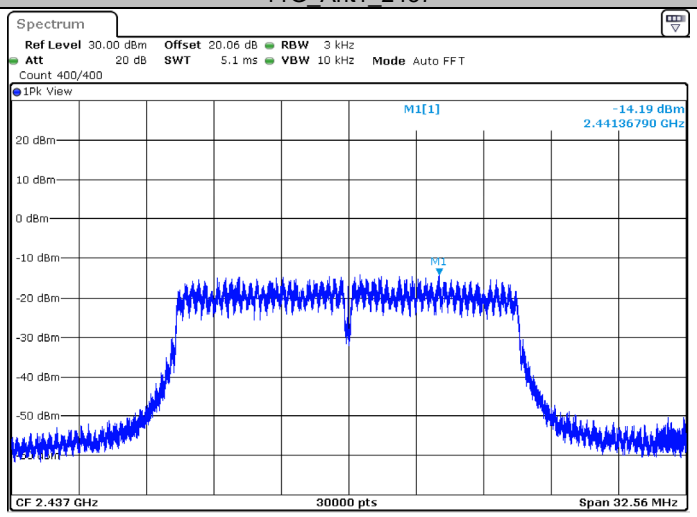

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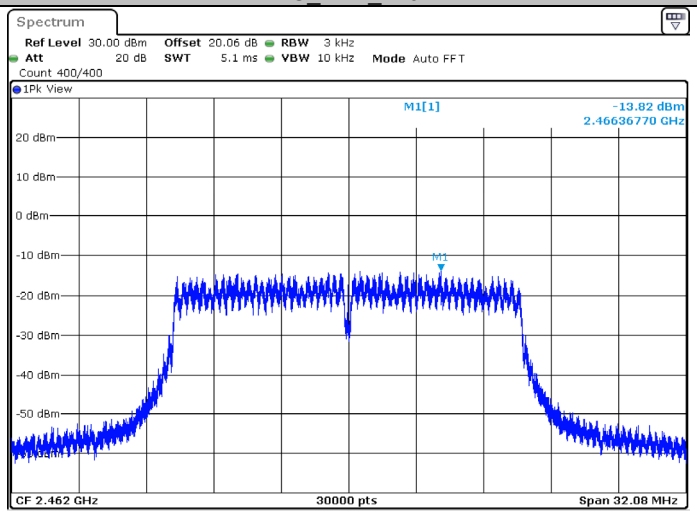

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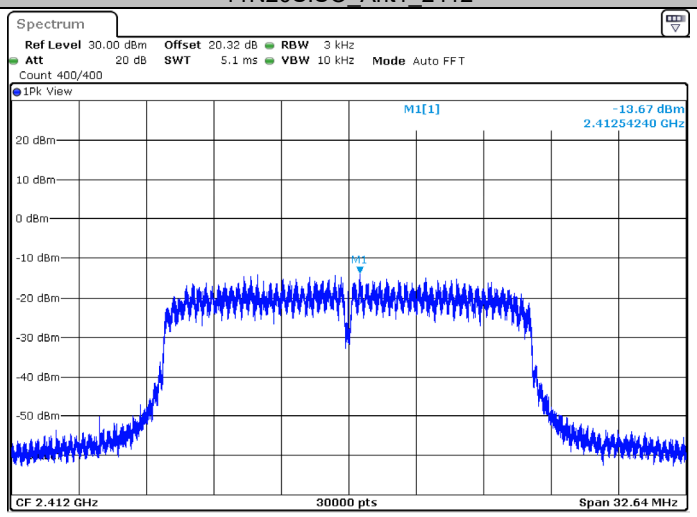

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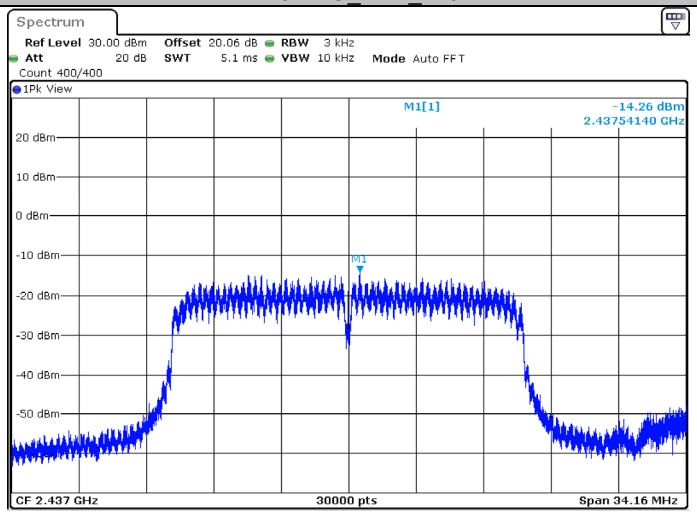

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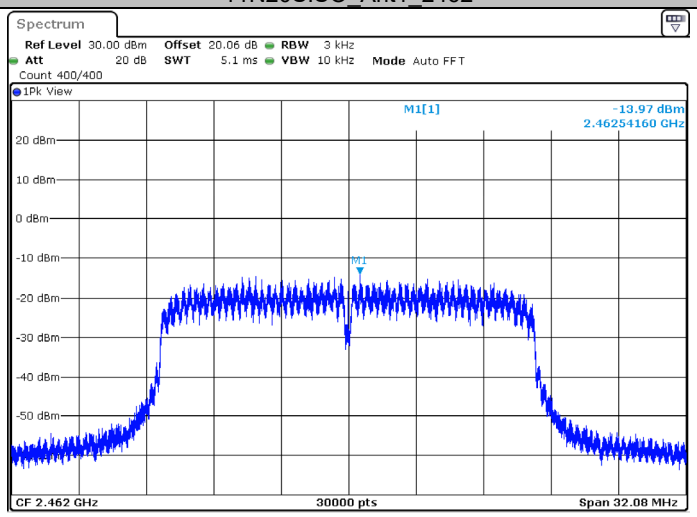
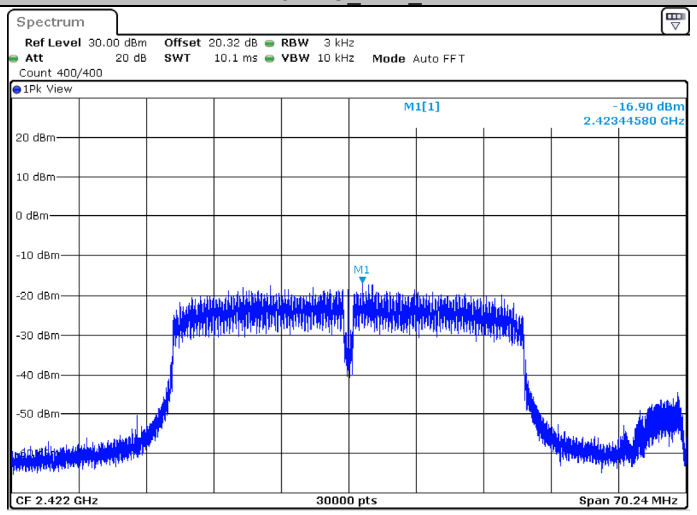


ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:11:27

11N40SISO_Ant1_2422



ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:22:56

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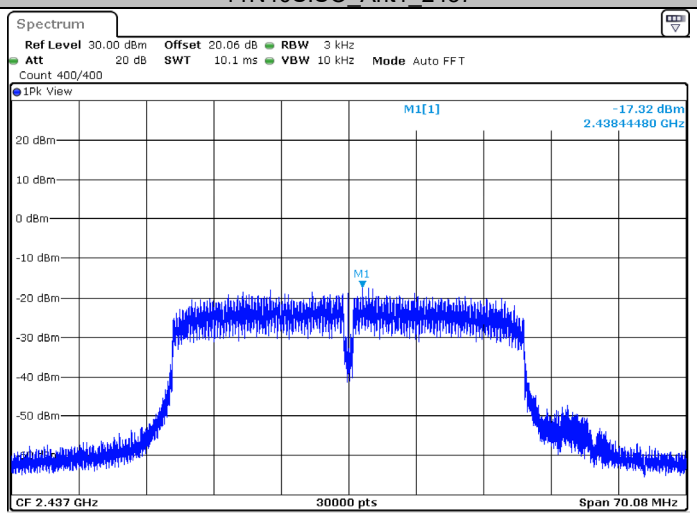
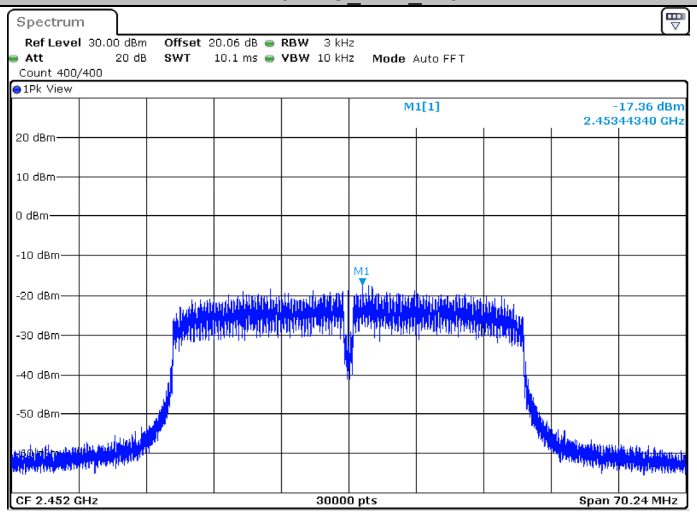


ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:22:12

11N40SISO_Ant1_2452

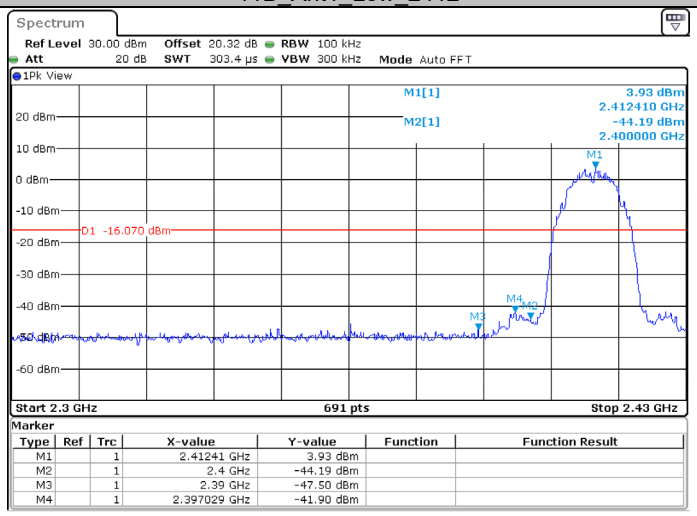


ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:21:13

Appendix E2: Band edge measurements

Test Graphs

11B_Ant1_Low_2412

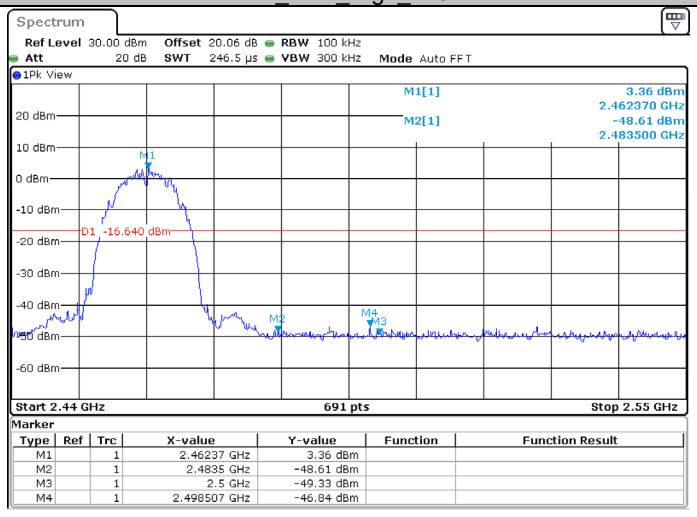


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41241 GHz	3.93 dBm		
M2		1	2.4 GHz	-44.19 dBm		
M3		1	2.39 GHz	-47.50 dBm		
M4		1	2.397029 GHz	-41.90 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 13:58:03

11B_Ant1_High_2462

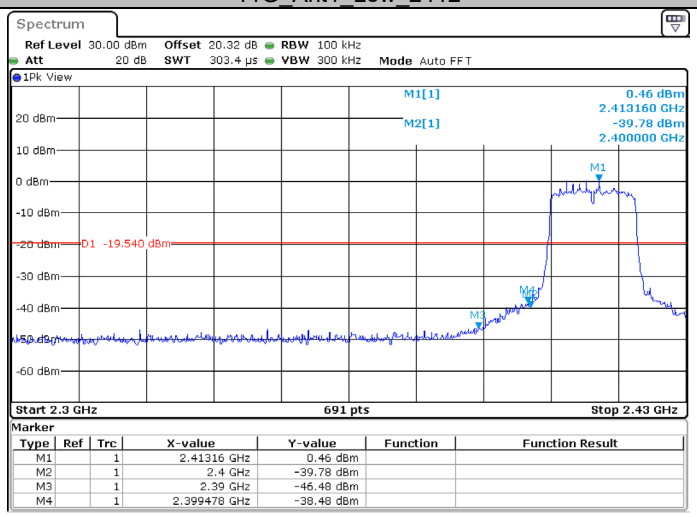


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46237 GHz	3.36 dBm		
M2		1	2.4835 GHz	-48.61 dBm		
M3		1	2.5 GHz	-49.33 dBm		
M4		1	2.498507 GHz	-46.84 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 14:02:07

11G_Ant1_Low_2412

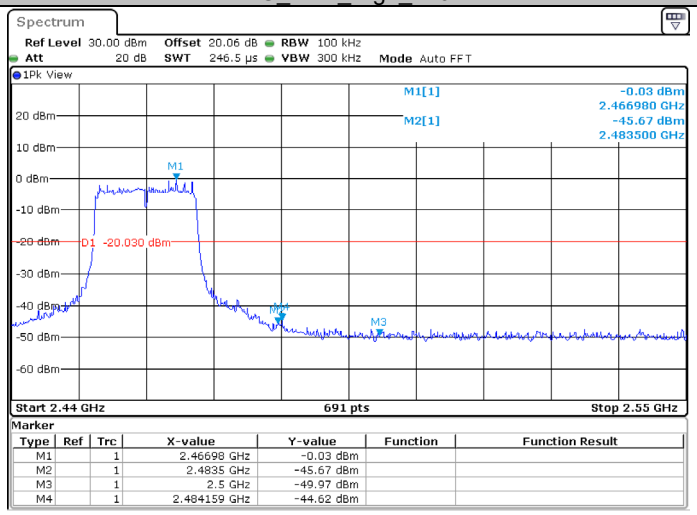


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41316 GHz	0.46 dBm		
M2		1	2.4 GHz	-39.78 dBm		
M3		1	2.39 GHz	-46.48 dBm		
M4		1	2.399478 GHz	-38.48 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 14:03:56

11G_Ant1_High_2462

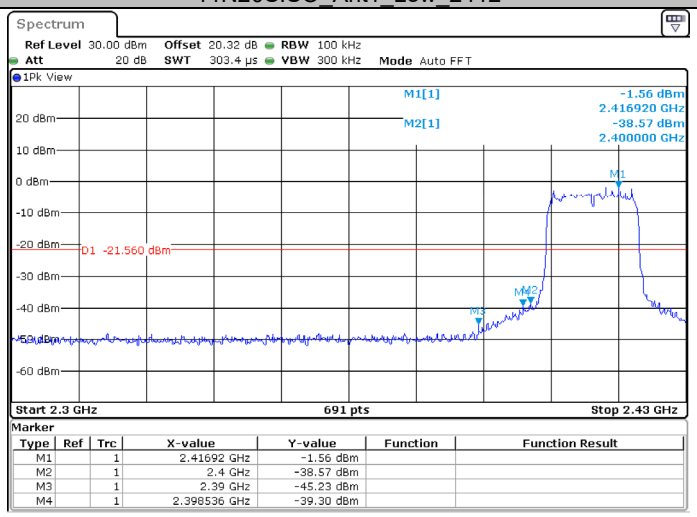


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46698 GHz	-0.03 dBm		
M2		1	2.4835 GHz	-45.67 dBm		
M3		1	2.5 GHz	-49.97 dBm		
M4		1	2.484159 GHz	-44.62 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 14:07:01

11N20SISO_Ant1_Low_2412

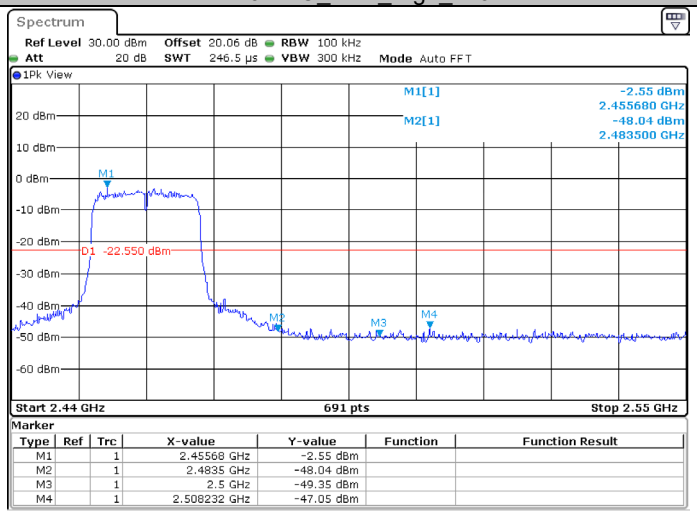


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41692 GHz	-1.56 dBm		
M2		1	2.4 GHz	-38.57 dBm		
M3		1	2.39 GHz	-45.23 dBm		
M4		1	2.398536 GHz	-39.30 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:08:05

11N20SISO_Ant1_High_2462

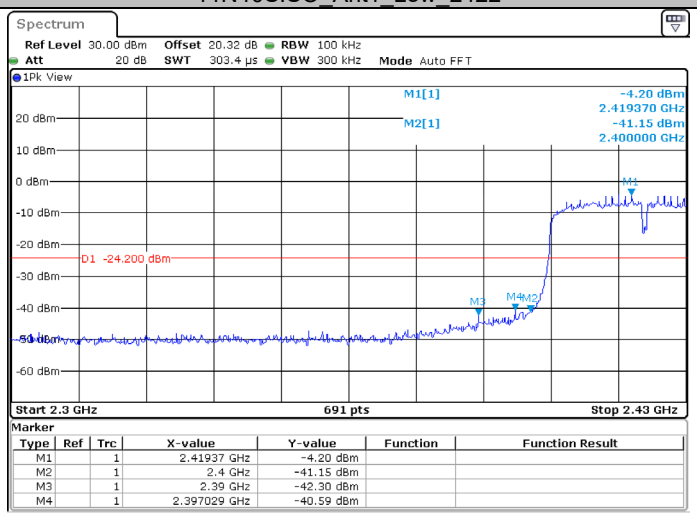


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45568 GHz	-2.55 dBm		
M2		1	2.4835 GHz	-48.04 dBm		
M3		1	2.5 GHz	-49.35 dBm		
M4		1	2.508232 GHz	-47.05 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:11:36

11N40SISO_Ant1_Low_2422

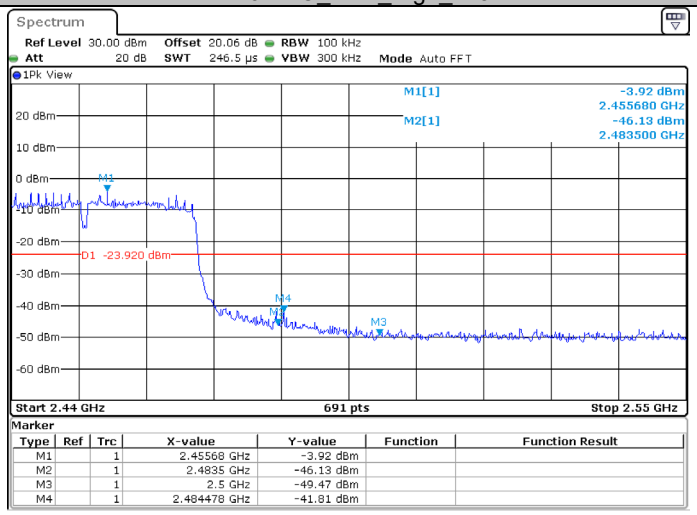


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41937 GHz	-4.20 dBm		
M2		1	2.4 GHz	-41.15 dBm		
M3		1	2.39 GHz	-42.30 dBm		
M4		1	2.397029 GHz	-40.59 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:13:42

11N40SISO_Ant1_High_2452



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45568 GHz	-3.92 dBm		
M2		1	2.4835 GHz	-46.13 dBm		
M3		1	2.5 GHz	-49.47 dBm		
M4		1	2.484478 GHz	-41.81 dBm		

ProjectNo.:SZ1240319-13904E-RF Tester:Lee.Li
Date: 12.APR.2024 15:16:42

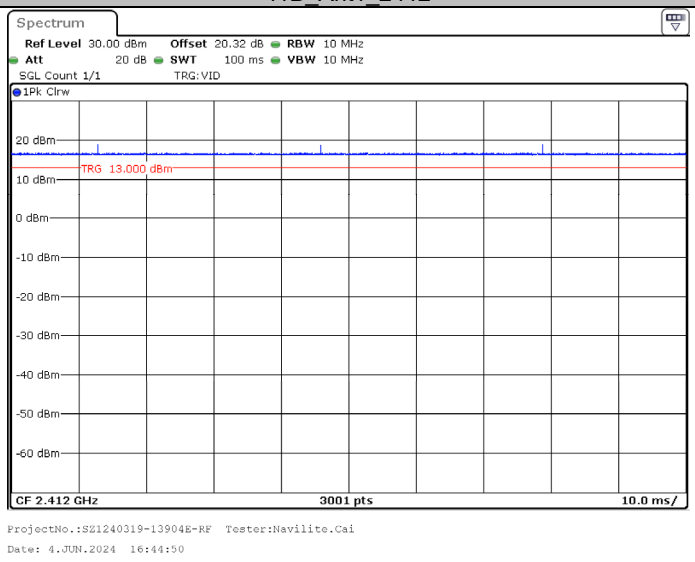
Appendix F2: Duty Cycle

Test Result

Test Mode	Antenna	Frequency[MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	1/T [Hz]	VBW Setting [Hz]
11B	Ant1	2412	100	100	100.00	/	10
11G	Ant1	2462	5.48	5.51	99.46	/	10
11N20SISO	Ant1	2412	5.08	5.11	99.41	/	10
11N40SISO	Ant1	2422	2.46	2.49	98.80	/	10

Test Graphs

11B_Ant1_2412



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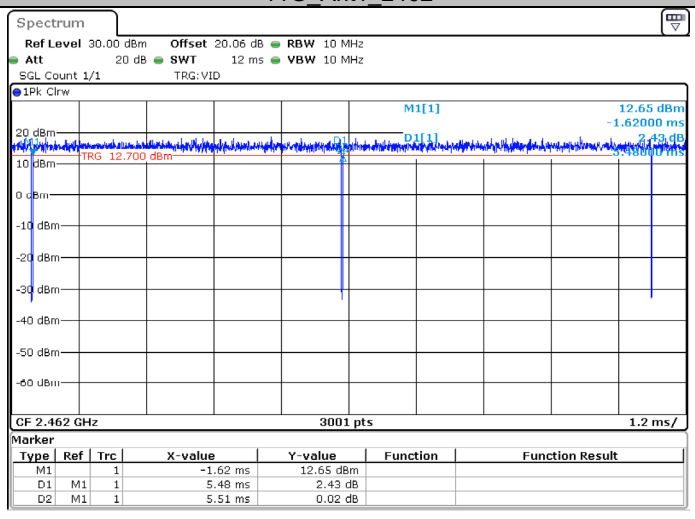

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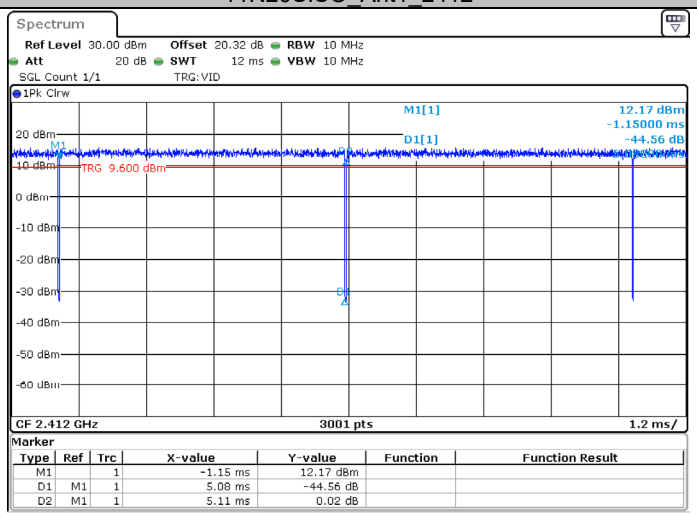

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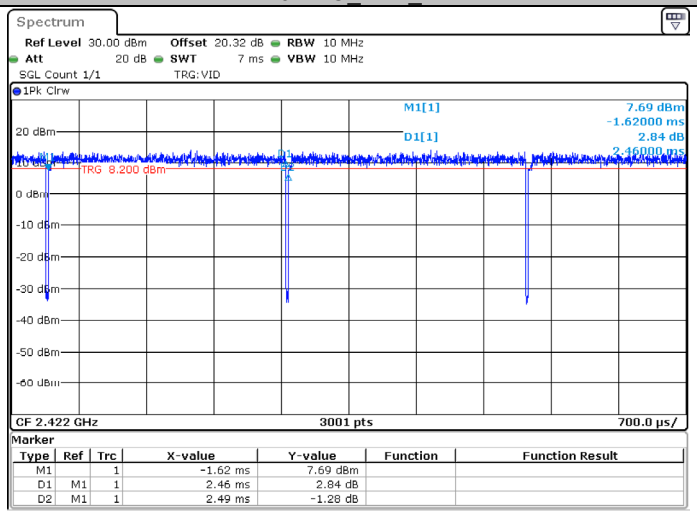

******* END OF REPORT *******