TEST REPORT

Applicant Name:	YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.
Address:	No.666 Hu'an Rd. Huli District Xiamen City, Fujian, P.R. China
Report Number:	2401S35623-RFD
FCC ID:	T2C-A40
IC:	10741A-A40

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:	Video Conferencing Endpoint
Model No.:	MeetingBar A40
Multiple Model(s) No.:	N/A
Trade Mark:	Yealink
Date Received:	2024/04/03
Issue Date:	2024/07/24

Test Result:	Pass▲

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

Prepared and Checked By:

Gala Liu
RF Engineer

Approved By:

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	2401S35623-RFD	Original Report	2024/07/24

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

HVIN	A40
FVIN	A40
Product	Video Conferencing Endpoint
Tested Model	MeetingBar A40
Multiple Model(s)	N/A
Frequency Range	BLE: 2402-2480MHz
Maximum Conducted Peak Output Power	BLE: 7.17dBm
Modulation Technique	BLE: GFSK
Antenna Specification#	3.08dBi (provided by the applicant)
Voltage Range	DC 48V from adapter
Sample serial number	2JJ1-1 (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Model: YLPS482000C Input: AC 100-240V~50/60Hz 1.5A Output: DC 48.0V, 2.0A 96.0W

Objective

This report is in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209, 15.247 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.

Test Methodology

All tests and measurements indicated in this document were performed in accordance ANSI C63.10-2013, 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 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.

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 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

"Authentic Tool _1.2.24.0"[#] software was used to test and power level is Default[#]. The software and power level was provided by the applicant.

Support Equipment List and Details

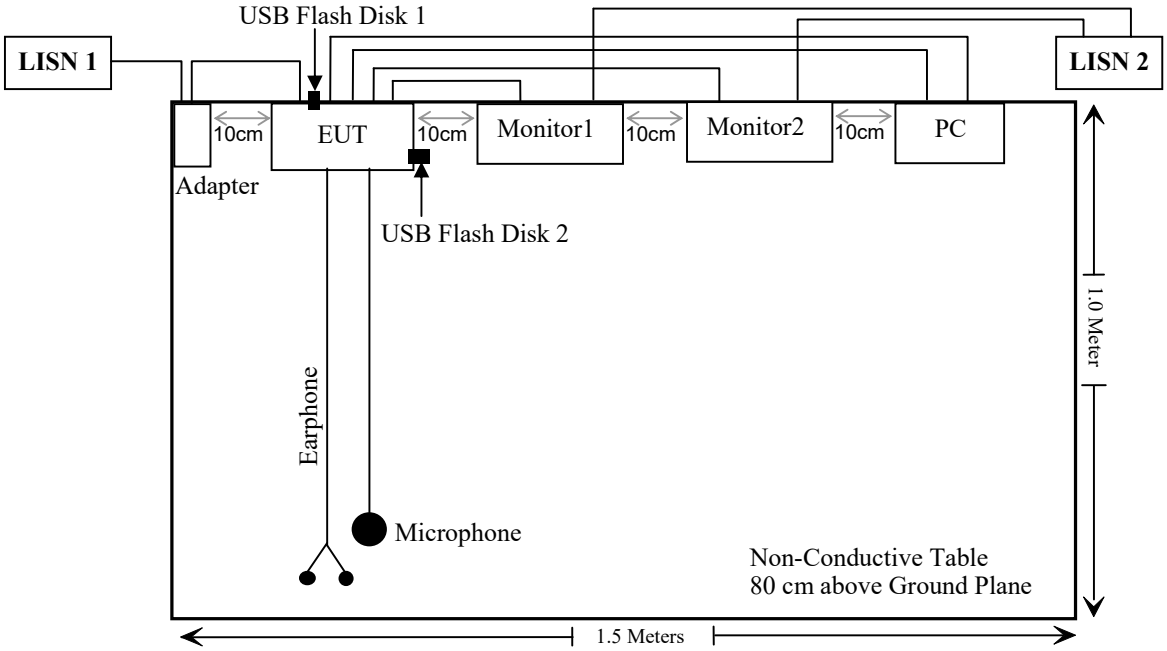
Manufacturer	Description	Model	Serial Number
DELL	PC	Latitude E5430	JG3NLV1
Unknown	Earphone	Unknown	Unknown
Yealink	Microphone	VCM35	803144F060100283
Redmi	Monitor1	24B1	QVGP3HA038953
Redmi	Monitor2	202TE6QB/93	UHBA1414013624
Kingston	USB Flash Disk 1	Unknown	Unknown
Kingston	USB Flash Disk 2	DT100G3(32G)	0622631

External I/O Cable

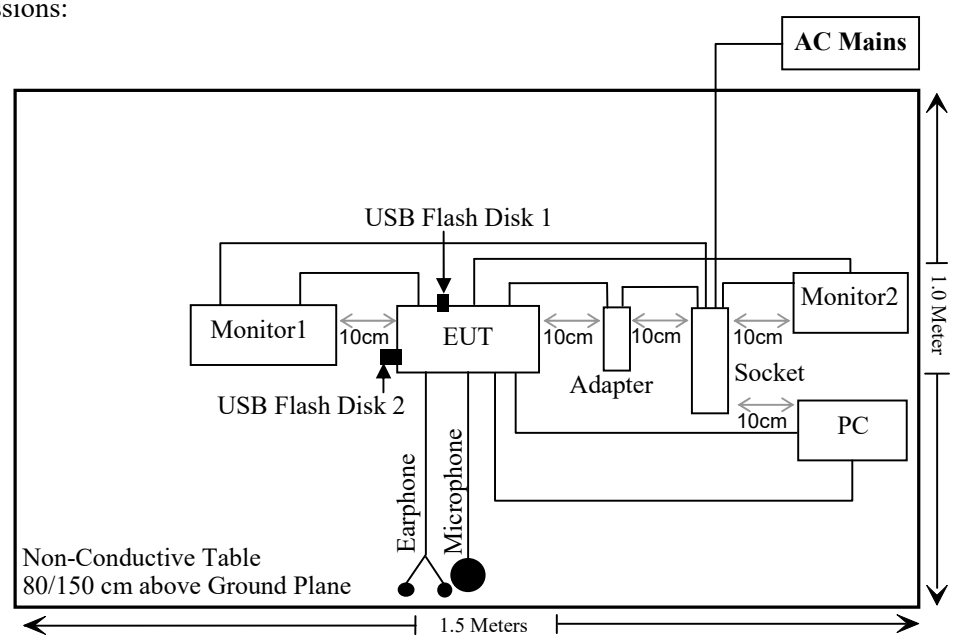
Cable Description	Length (m)	From/Port	To
Un-shielded Un-Detachable AC Cable	1.5	AC Mains	Socket
Un-shielded Detachable AC Cable	1.5	Adapter	LISN1/Socket
Shielded Un-Detachable DC Cable	1.5	EUT_DC Port	Adapter
Un-shielded Detachable AC Cable*2	1.5	Monitor1/2	LISN2/Socket
Shielded Detachable HDMI Cable*2	1.5	EUT_HDMI1/2 Port	Monitor1/2
Unshielded Detachable USB Cable	2.5	EUT_USB Port	PC
Unshielded Detachable RJ45 Cable	2.5	EUT_ Internet Port	PC
Unshielded Detachable Audio Cable	1.0	EUT_ VCH Port	Microphone
Unshielded Detachable Audio Cable	1.2	EUT_ Line In/Out Port	Earphone

Block Diagram of Test Setup

For Conducted Emissions:



For Radiated Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	RSS-247 & RSS-Gen Rules	Description of Test	Result	Remark
§15.247 (i), §1.1307 (b) (3) & §2.1091	RSS-102 §4	RF Exposure & Exposure Limits	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	-	See Note
§15.247(b)(3)	RSS-247 § 5.4(d)	Maximum Conducted Output Power	-	See Note
§15.247(d)	RSS-247 § 5.5	100 kHz Bandwidth of Frequency Band Edge	-	See Note
§15.247(e)	RSS-247 § 5.2 (b)	Power Spectral Density	-	See Note
-	-	Duty Cycle	-	See Note

Note:
1: The manufacturer declared certified WLAN module installed in EUT, model YL43752 (FCC ID: T2C-YL43752, IC: 10741A-YL43752)

2: The test data are referred to the module report SZNS220511-19727E-RFB, the reference of each test item and the data of reference module report as below:

Test item	Reference data of module report
	SZNS220511-19727E-RFB
99% Occupied Bandwidth & 6 dB Emission Bandwidth	Page 87-90
Maximum Conducted Output Power	Page 91-92
100 kHz Bandwidth of Frequency Band Edge	Page 95
Power Spectral Density	Page 93-94
Duty Cycle	Page 96

3: The BACL is responsible for all the information provided in this report, except when information is provided by the customer as identified in this report.

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	2024/05/21	2025/05/20
Unknown	CE Cable	Unknown	UF A210B-1-0720-504504	2024/05/21	2025/05/20
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber A Cable 1	N/A	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
COM-POWER	Pre-amplifier	PA-122	181919	2024/06/18	2025/06/17
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	735	2024/06/18	2025/06/17
Unknown	RF Cable	UFA147	219661	2024/06/18	2025/06/17
SNSD	2.4G Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	2024/06/27	2025/06/26
A.H.System	Pre-amplifier	PAM-1840VH	190	2024/06/18	2025/06/17
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR

*** 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) & §1.1307 (b) (3) & §2.1091- RF EXPOSURE

Applicable Standard

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

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.

f = frequency in MHz;
R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Result

For worst case:

For Module YL43752:

Mode	Frequency (MHz)	Tune up conducted power#	Antenna Gain#		ERP		Evaluation Distance (m)	ERP Limit (mW)
		(dBm)	(dBi)	(dBd)	(dBm)	(mW)		
BT	2402-2480	8.5	3.08	0.93	9.43	8.77	0.2	768
BLE	2402-2480	8.0	3.08	0.93	8.93	7.82	0.2	768
2.4G Wi-Fi	2412-2462	18.5	3.08	0.93	19.43	87.70	0.2	768
5G Wi-Fi	5180-5240	12.0	4.17	2.02	14.02	25.23	0.2	768
	5260-5280	13.0	4.17	2.02	15.02	31.77	0.2	768
	5500-5700	12.0	4.17	2.02	14.02	25.23	0.2	768
	5745-5825	14.5	4.17	2.02	16.52	44.87	0.2	768

For Module YL43456:

Mode	Frequency (MHz)	Maximum power#	Antenna Gain#		ERP		Evaluation Distance (m)	ERP Limit (mW)
		(dBm)	(dBi)	(dBd)	(dBm)	(mW)		
2.4G Wi-Fi	2412-2462	20.71	3.22	1.07	21.78	150.66	0.2	768
5G Wi-Fi	5150-5850	16.28	4.17	2.02	18.30	67.61	0.2	768

Note 1: The tune-up power was refer the module report
Note 2: The antenna gain was declared by the applicant.
Note 3: 0dBd=2.15dBi.

Simultaneous transmitting consideration:

According to applicant, the BT can transmit at the same time with the Wi-Fi, the 2.4G Wi-Fi and 5G Wi-Fi cannot transmit at same time, the two Wi-Fi module cannot transmit as same time.

For worst case:

The ratio= ERP_{BT}/limit+ $ERP_{Wi\text{-}Fi}$/limit= 8.77/768+ 87.70/768= 0.126＜1.0

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

Result: Compliant

RSS-102 § 4 –EXPOSURE LIMITS

Applicable Standard

According to RSS-102 §4:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous˙
0.1-10	-	0.73/ f	-	6¨
1.1-10	87/ $f^{0.5}$	-	-	6¨
10-20	27.46	0.0728	-2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10^{-4} $f^{0.5}$	6.67 x 10^{-5} f	616000/f

Note: f is frequency in MHz.
˙ Based on nerve stimulation (NS).
¨ Based on specific absorption rate (SAR).

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. W/m^2)
P = power input to the antenna (in appropriate units, e.g., W).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator,the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., m)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

For worst case:

For Module YL43752:

Mode	Frequency (MHz)	Antenna Gain#		Max Tune-up Power#		Evaluation Distance (m)	Power Density (W/m^2)	MPE Limit (W/m^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BT	2402-2480	3.08	2.03	8.5	7.08	0.2	0.029	5.35
BLE	2402-2480	3.08	2.03	8.0	6.31	0.2	0.025	5.35
2.4G Wi-Fi	2412-2462	3.08	2.03	18.5	70.79	0.2	0.286	5.37
5G Wi-Fi	5150-5250	4.17	2.61	12.0	15.85	0.2	0.082	9.01
	5250-5350	4.17	2.61	13.0	19.95	0.2	0.104	9.13
	5470-5725	4.17	2.61	12.0	15.85	0.2	0.082	9.39
	5725-5850	4.17	2.61	14.5	28.18	0.2	0.146	9.69

For Module YL43456:

Mode	Frequency (MHz)	Antenna Gain#		Max Tune-up Power#		Evaluation Distance (m)	Power Density (W/m^2)	MPE Limit (W/m^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G Wi-Fi	2412-2462	3.22	2.10	20.71	117.76	0.2	0.492	5.37
5G Wi-Fi	5150-5850	4.17	2.61	16.28	42.46	0.2	0.220	9.01

Note: The tune up conducted power and antenna gain was declared by the applicant.

Simultaneous transmitting consideration:

According to applicant, the BT can transmit at the same time with the Wi-Fi, the 2.4G Wi-Fi and 5G Wi-Fi cannot transmit at same time, the two Wi-Fi module cannot transmit as same time.

For worst case:

The ratio= MPE_{BT}/limit+ $MPE_{Wi\text{-}Fi}$/limit= 0.029/5.35+0.286/5.37= 0.059＜1.0

Result: Compliant.

Note: To maintain compliance with the RF exposure guidelines, place the equipment at least 0.2 m from nearby persons.

FCC §15.203 & RSS-GEN §6.8 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 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 use of a standard antenna jack or electrical connector is prohibited.

According to FCC § 15.203, 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.

ANT	Type	Antenna Gain#	Impedance
Module YL43752 ANT1	PCB	3.08dBi	50Ω

Result: Compliant

FCC § 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

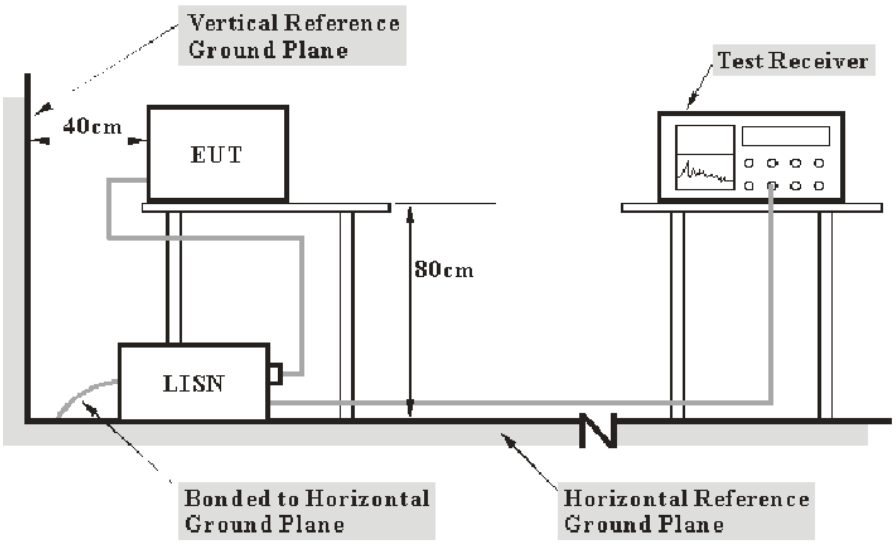
Note 1: The level decreases linearly with the logarithm of the frequency.

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

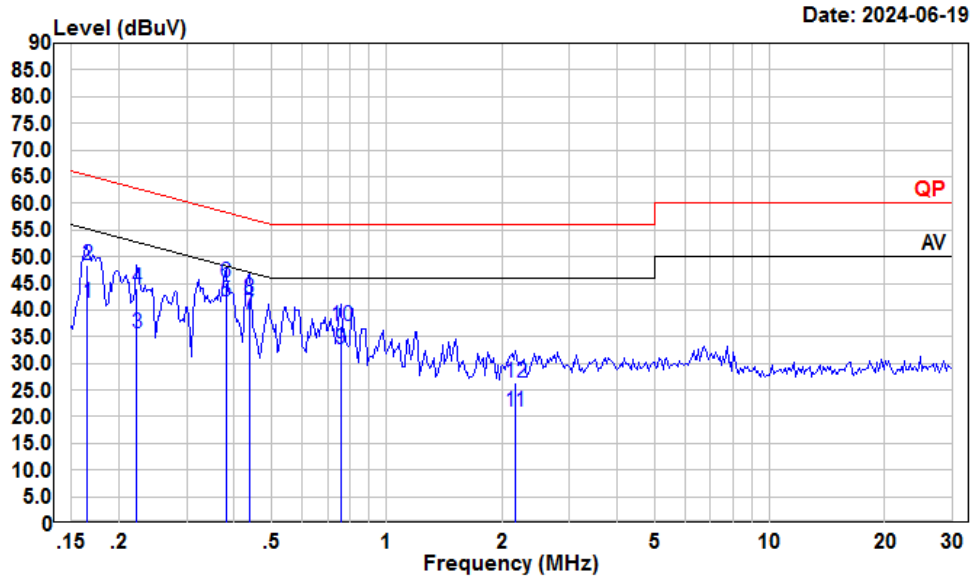
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	67 %
ATM Pressure:	101.0 kPa

The testing was performed by Macy Shi on 2024-06-19.

EUT operation mode: Transmitting (Maximum output power mode, Low Channel)

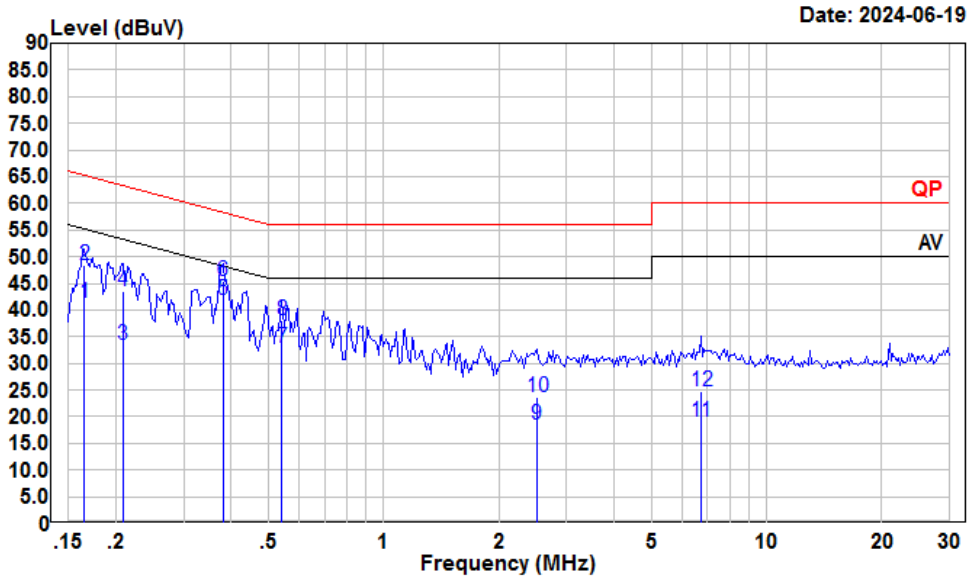
AC 120V/60 Hz, Line



Condition: Line
Project : 2401S35623-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	0.17	20.90	41.41	10.40	10.11	55.21	-13.80	Average
2	0.17	28.02	48.53	10.40	10.11	65.21	-16.68	QP
3	0.22	15.29	35.76	10.38	10.09	52.74	-16.98	Average
4	0.22	23.59	44.06	10.38	10.09	62.74	-18.68	QP
5	0.38	21.19	41.56	10.26	10.11	48.25	-6.69	Average
6	0.38	24.86	45.23	10.26	10.11	58.25	-13.02	QP
7	0.44	18.90	39.24	10.23	10.11	47.11	-7.87	Average
8	0.44	21.90	42.24	10.23	10.11	57.11	-14.87	QP
9	0.76	12.19	32.77	10.45	10.13	46.00	-13.23	Average
10	0.76	16.50	37.08	10.45	10.13	56.00	-18.92	QP
11	2.17	0.54	21.03	10.31	10.18	46.00	-24.97	Average
12	2.17	5.84	26.33	10.31	10.18	56.00	-29.67	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : 2401S35623-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	0.17	20.99	41.43	10.33	10.11	55.21	-13.78	Average
2	0.17	27.87	48.31	10.33	10.11	65.21	-16.90	QP
3	0.21	12.80	33.50	10.61	10.09	53.27	-19.77	Average
4	0.21	22.79	43.49	10.61	10.09	63.27	-19.78	QP
5	0.38	21.03	41.88	10.74	10.11	48.25	-6.37	Average
6	0.38	24.57	45.42	10.74	10.11	58.25	-12.83	QP
7	0.54	12.09	32.95	10.73	10.13	46.00	-13.05	Average
8	0.54	17.27	38.13	10.73	10.13	56.00	-17.87	QP
9	2.51	-2.00	18.37	10.20	10.17	46.00	-27.63	Average
10	2.51	3.28	23.65	10.20	10.17	56.00	-32.35	QP
11	6.73	-1.66	18.93	10.40	10.19	50.00	-31.07	Average
12	6.73	4.20	24.79	10.40	10.19	60.00	-35.21	QP

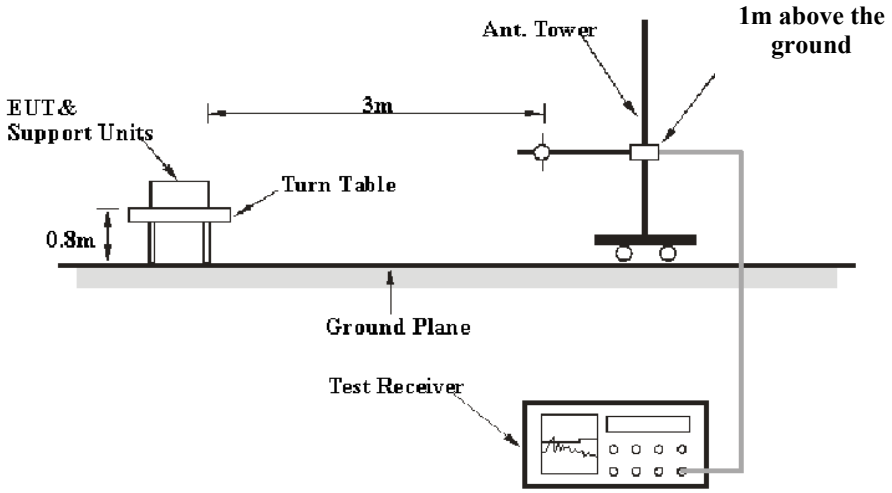
FCC §15.209, §15.205 & §15.247(D), RSS-GEN § 8.10 & RSS-247 § 5.5 - UNWANTED EMISSION FREQUENCIES AND RESTRICTED BANDS

Applicable Standard

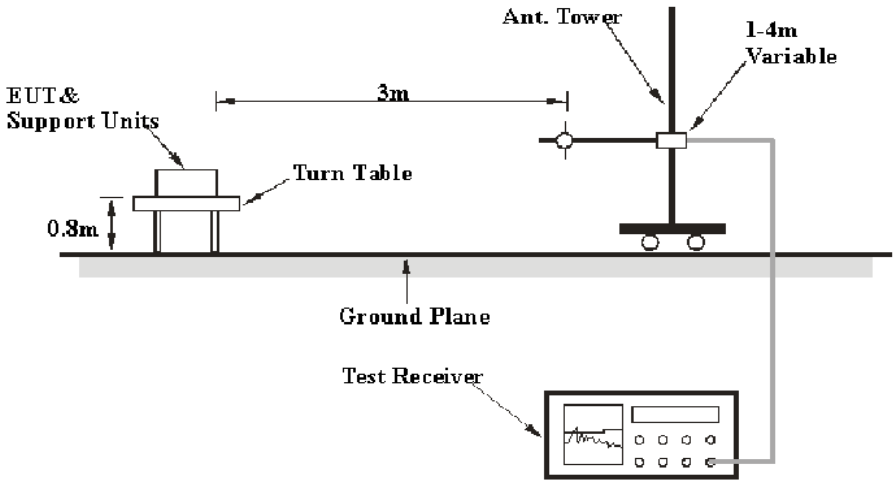
FCC §15.247 (d); §15.209; §15.205; RSS-247 §5.5, RSS-GEN §8.10.

EUT Setup

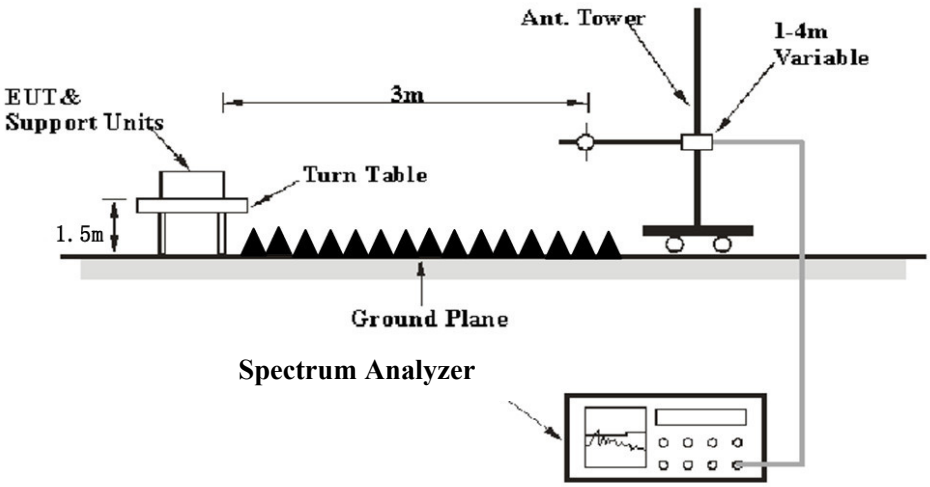
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.205, FCC 15.209, FCC 15.247, RSS-Gen and RSS-247 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

1-25 GHz:

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 Results Summary

According to the data in the following table, the EUT complied with the FCC 15.205, FCC 15.209, FCC 15.247, RSS-Gen and RSS-247.

Test Data

Environmental Conditions

Temperature:	25~25.6 ℃
Relative Humidity:	50~54 %
ATM Pressure:	101.0 kPa

The testing was performed by Anson Su on 2024-06-19 for below 1GHz and Sadow Tan on 2024-07-10 and 2024-07-18 for above 1GHz.

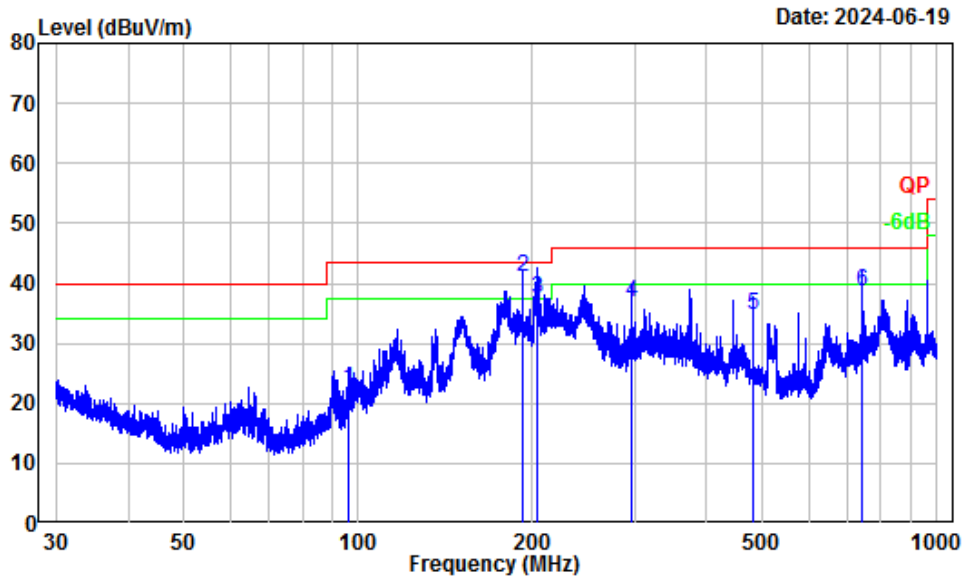
EUT operation mode: Transmitting

9 kHz-30MHz: *(Maximum output power mode, Low Channel)*

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

30MHz-1GHz: *(Maximum output power mode, Low Channel)*

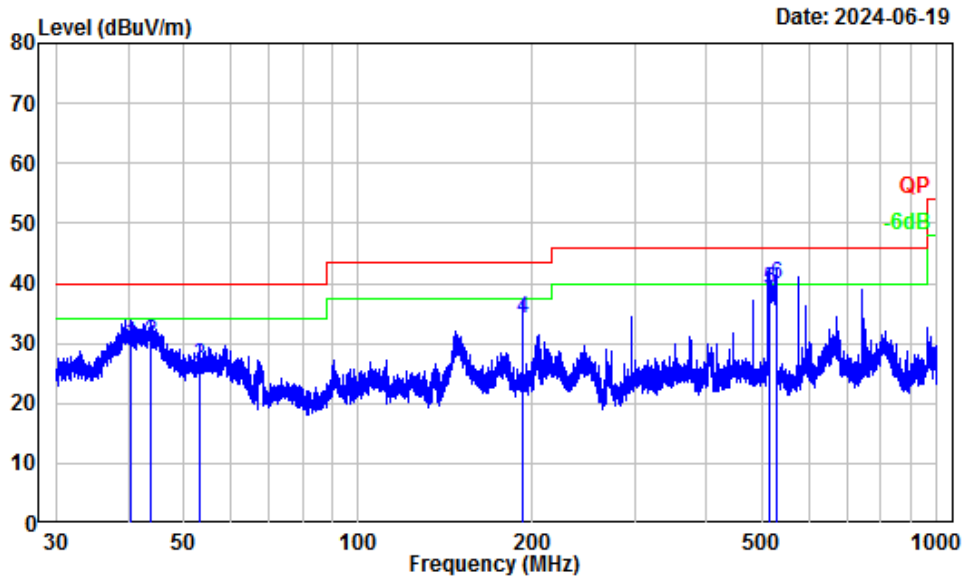
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: 2401S35623-RF
Test Mode : BLE 1M
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	95.97	-16.51	38.98	22.47	43.50	-21.03	QP
2	191.91	-14.45	55.50	41.05	43.50	-2.45	QP
3	204.33	-13.58	50.90	37.32	43.50	-6.18	QP
4	296.70	-12.89	49.60	36.71	46.00	-9.29	QP
5	480.11	-8.80	43.59	34.79	46.00	-11.21	QP
6	742.58	-5.63	44.41	38.78	46.00	-7.22	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number: 2401S35623-RF
Test Mode : BLE 1M
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.51	-13.30	43.20	29.90	40.00	-10.10	QP
2	43.87	-15.21	45.50	30.29	40.00	-9.71	QP
3	53.06	-18.69	44.83	26.14	40.00	-13.86	QP
4	192.00	-15.16	49.14	33.98	43.50	-9.52	QP
5	512.28	-8.42	47.50	39.08	46.00	-6.92	QP
6	527.78	-8.36	48.15	39.79	46.00	-6.21	QP

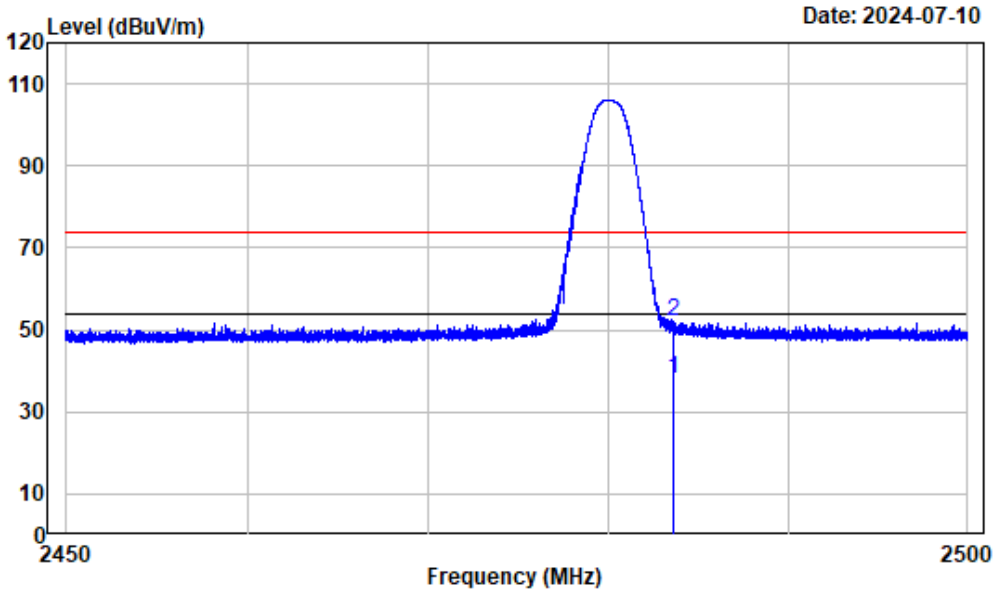
1-25 GHz:

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							
2383.57	54.90	PK	H	-3.17	51.73	74	-22.27
2383.57	41.25	AV	H	-3.17	38.08	54	-15.92
2388.55	54.99	PK	V	-3.17	51.82	74	-22.18
2388.55	52.06	AV	V	-3.17	48.89	54	-5.11
4804.00	54.46	PK	H	2.42	56.88	74	-17.12
4804.00	50.99	AV	H	2.42	53.41	54	-0.59
4804.00	56.67	PK	V	2.42	59.09	74	-14.91
4804.00	50.42	AV	V	2.42	52.84	54	-1.16
Middle Channel 2440MHz							
4880.00	52.22	PK	H	2.58	54.80	74	-19.20
4880.00	46.86	AV	H	2.58	49.44	54	-4.56
4880.00	54.32	PK	V	2.58	56.90	74	-17.10
4880.00	50.69	AV	V	2.58	53.27	54	-0.73
High Channel 2480MHz							
2483.63	55.07	PK	H	-3.17	51.90	74	-22.10
2483.63	41.33	AV	H	-3.17	38.16	54	-15.84
2483.86	55.25	PK	V	-3.17	52.08	74	-21.92
2483.86	41.10	AV	V	-3.17	37.93	54	-16.07
4960.00	51.41	PK	H	2.77	54.18	74	-19.82
4960.00	46.53	AV	H	2.77	49.30	54	-4.70
4960.00	54.86	PK	V	2.77	57.63	74	-16.37
4960.00	51.05	AV	V	2.77	53.82	54	-0.18

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):

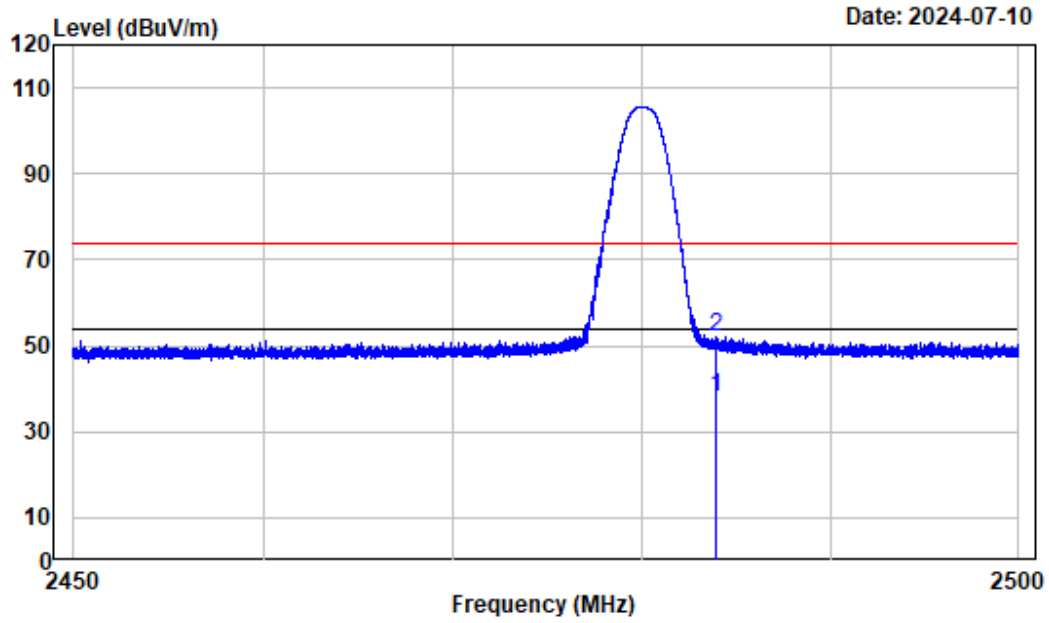
BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: 2401S35623-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	2483.625	-3.17	41.33	38.16	54.00	-15.84	Average
2	2483.625	-3.17	55.07	51.90	74.00	-22.10	peak

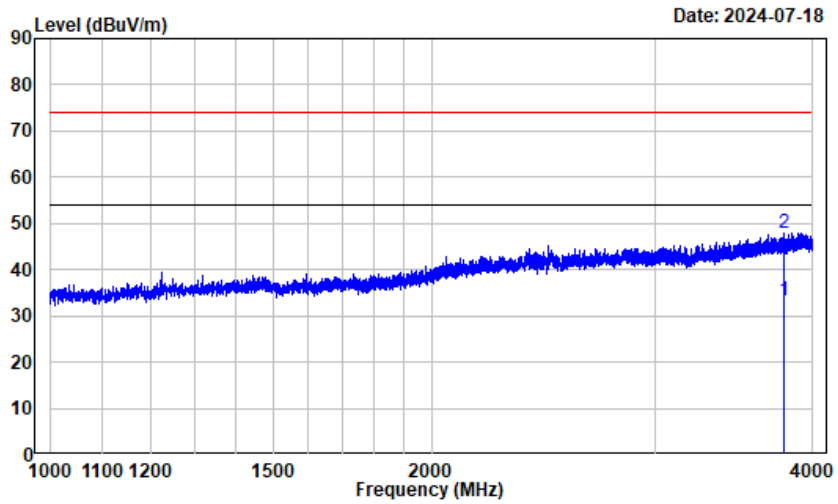
BLE 1M			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Vertical**

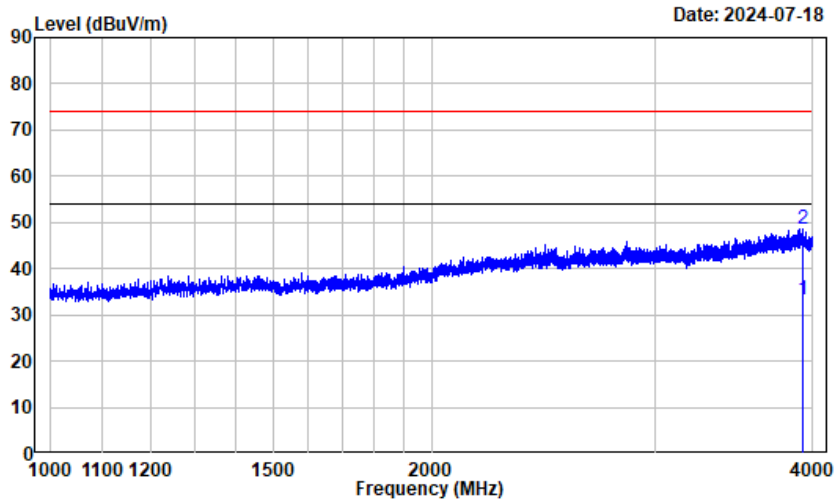


Condition : Vertical
Project No.: 2401S35623-RF
Tester : Sadow Tan
Note : BLE 1M_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.863	-3.17	41.10	37.93	54.00	-16.07	Average
2	2483.863	-3.17	55.25	52.08	74.00	-21.92	peak

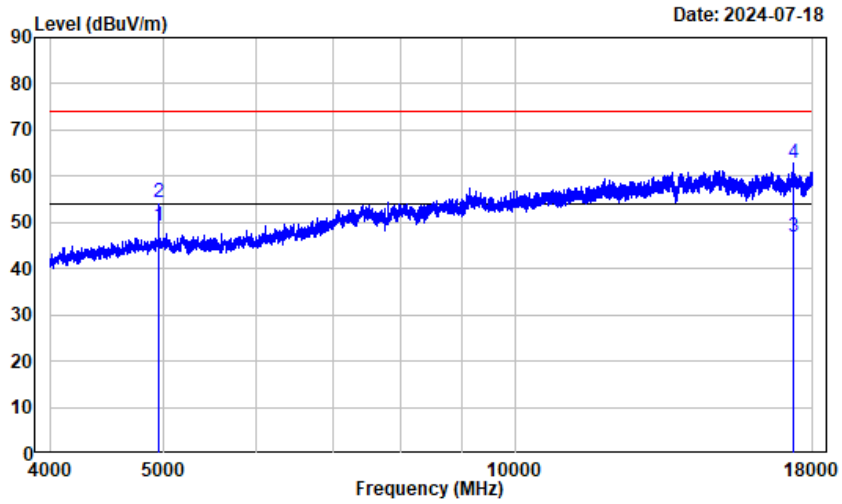
Test plots for Harmonic and Emissions Measurements:

Horizontal	
1-4GHz	 Condition : Horizontal Project No.: 2401S35623-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 3799.000 -0.74 34.00 33.26 54.00 -20.74 Average 2 3799.000 -0.74 48.70 47.96 74.00 -26.04 Peak

Vertical	
1-4GHz	 Condition : Vertical Project No.: 2401S35623-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 | 3929.875 | -0.31 | 33.67 | 33.36 | 54.00 | -20.64 | Average | | 2 | 3929.875 | -0.31 | 48.90 | 48.59 | 74.00 | -25.41 | Peak |

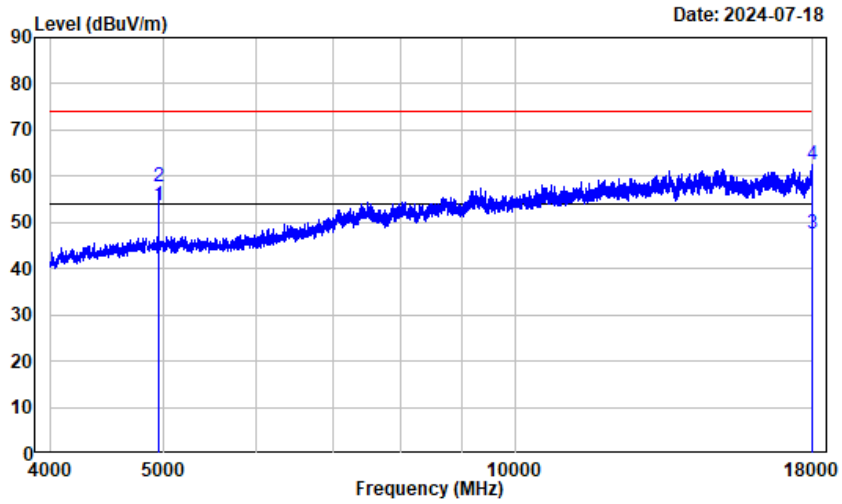
Horizontal

4-18GHz



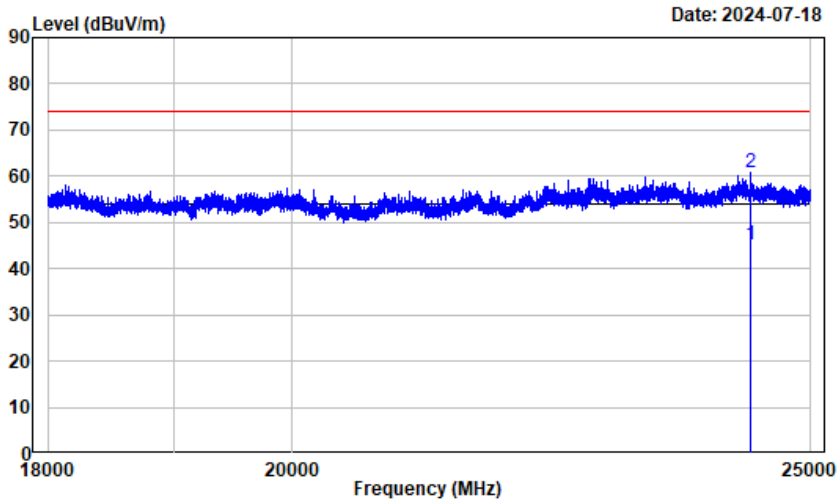
Condition : Horizontal
Project No.: 2401S35623-RF
Tester : Sadow Tan
Note : BLE 1M_2480

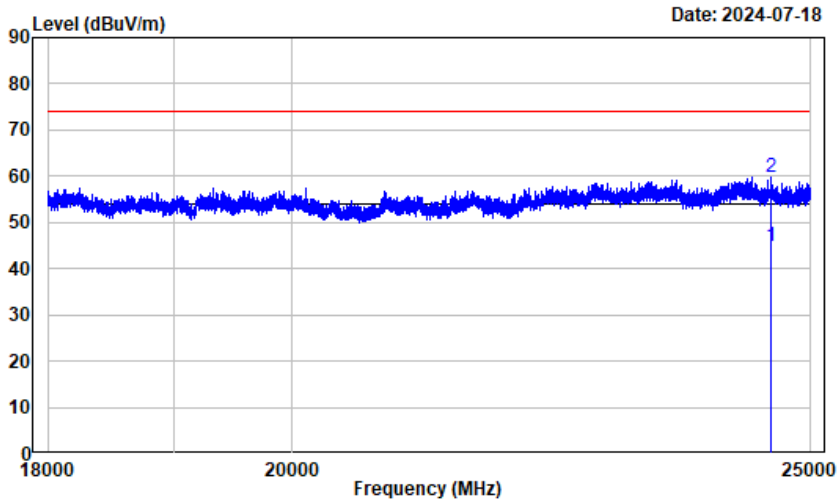
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4960.000	2.77	46.53	49.30	54.00	-4.70	Average
2	4960.000	2.77	51.41	54.18	74.00	-19.82	Peak
3	17324.500	19.47	27.45	46.92	54.00	-7.08	Average
4	17324.500	19.47	43.34	62.81	74.00	-11.19	Peak

Vertical	
4-18GHz	

Condition : Vertical
Project No.: 2401S35623-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	4960.000	2.77	51.05	53.82	54.00	-0.18	Average
2	4960.000	2.77	54.86	57.63	74.00	-16.37	Peak
3	17996.500	24.60	22.81	47.41	54.00	-6.59	Average
4	17996.500	24.60	37.76	62.36	74.00	-11.64	Peak

Horizontal	
18-25GHz	 Condition : Horizontal Project No.: 2401S35623-RF Tester : Sadow Tan Note : BLE 1M_2480 Freq / Factor / Read Level / Level / Limit Line / Over Limit / Remark 1 24367.380 MHz 18.69 dB/m 26.53 dBuV 45.22 dBuV/m 54.00 dBuV/m -8.78 dB Average 2 24367.380 MHz 18.69 dB/m 41.94 dBuV 60.63 dBuV/m 74.00 dBuV/m -13.37 dB peak

Vertical	
18-25GHz	 Condition : Vertical Project No.: 2401S35623-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 24573.880 18.90 25.79 44.69 54.00 -9.31 Average 2 24573.880 18.90 40.90 59.80 74.00 -14.20 peak

EUT PHOTOGRAPHS

Please refer to the attachment 2401S35623-RF External photo and 2401S35623-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401S35623-RFC Test Setup photo.

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