FCC Part 15.247
RSS-247, ISSUE 3, August 2023
RSS-GEN, ISSUE 5, February 2021 Amendment 2
TEST REPORT

For

YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.

No.666 Hu'an Rd,Huli District Xiamen City, Fujian, P.R. China

FCC ID: T2C-T44
IC: 10741A-T44W

Report Type:	**Product Type:**
Original Report	Ultra-elegant Gigabit IP Phone

Report Producer : Coco Lin

Report Number : RXZ231115070RF01

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
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1. General Information

1.1. Product Description for Equipment under Test (EUT)

Applicant	YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.
	No.666 Hu'an Rd,Huli District Xiamen City, Fujian, P.R. China
Brand Name	Yealink
Product (Equipment) / PMN	Ultra-elegant Gigabit IP Phone
Main Model Name	SIP-T44W
HVIN	T44W
Frequency Range	2402~2480 MHz
Modulation Technique	BR Mode: GFSK EDR Mode: π/4-DQPSK, 8DPSK
Peak Conducted Output Power	BR(GFSK) Mode: 10.33 dBm EDR(π/4-DQPSK) Mode: 10.85 dBm EDR(8DPSK) Mode: 10.88 dBm
Transmit Data Rate	BR(GFSK) Mode: 1 Mbps EDR(π/4-DQPSK) Mode: 2 Mbps EDR(8DPSK) Mode: 3 Mbps
Power Operation (Voltage Range)	☒ AC 120V/60Hz ☒ Adapter I/P: 100-240V 50/60Hz 0.5A , O/P: 5Vdc, 2.0A ☐ By AC Power Cord ☒ PoE: DC 48V
Received Date	2023/11/16
Date of Test	2023/12/01 ~ 2023/12/22

*All measurement and test data in this report was gathered from production sample serial number: RXZ231115070-01 (Assigned by BACL, New Taipei Laboratory.).

1.2. Objective

This report is prepared on behalf of *YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules and RSS-247, Issue 3, August 2023, RSS-Gen, Issue 5, February 2021 Amendment 2 of the Innovation, Science and Economic Development Canada.

1.3. 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. And RSS-247, Issue 3, August 2023, RSS-Gen, Issue 5, February 2021 Amendment 2 of the Innovation, Science and Economic Development Canada.

1.4. Statement

Decision Rule: No, (The test results do not include MU judgment)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.5. Measurement Uncertainty

Parameter		Uncertainty
AC Mains		±2.53 dB
RF output power, conducted		±3.74 dB
Occupied Bandwidth		±0.09 %
Unwanted Emissions, conducted		±1.13 dB
Emissions, radiated	30MHz~1GHz	+/- 5.46 dB
	1GHz~18 GHz	+/- 5.24 dB
	18GHz~40 GHz	+/- 5.62 dB
Temperature		±0.79 ℃
Humidity		±0.44 %

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.

1.6. Environmental Conditions

Test Site	Test Date	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2023/12/08	19.9	67	1010	Jing
Radiation Spurious Emissions	2023/12/01~2023/12/22	16.8~22.6	65~77	1010	Aaron
Conducted Spurious Emissions	2023/12/01	24.1	51	1010	Jing
Emission Bandwidth	2023/12/01~2023/12/05	24.1~25.1	51~57	1010	Jing
Channel Separation Test	2023/12/01	24.1	51	1010	Jing
Time of Occupancy	2023/12/01	24.1	51	1010	Jing
Quantity of hopping channel	2023/12/01~2023/12/04	24.1~24.4	51~56	1010	Jing
Maximum Output Power	2023/12/01	24.1	51	1010	Jing
100 kHz Bandwidth of Frequency Band Edge	2023/12/05	25.1	57	1010	Jing

1.7. Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) to collect test data is located on

☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: TW3732.

2. System Test Configuration

2.1. Description of Test Configuration

For BT mode, 79 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	40	2442
1	2403	--	--
2	2404	76	2478
3	2405	77	2479
--	--	78	2480
39	2441	/	/

For BT Modes were tested with channel 0, 39 and 78.

2.2. Equipment Modifications

No modification was made to the EUT.

2.3. EUT Exercise Software

The test software was used "AuthenticTool_1.2.21.0".

The system was configured for testing in engineering mode, which was provided by manufacturer.

Test Frequency		2402MHz	2441MHz	2480MHz
Power Level Setting	GFSK	Default	Default	Default
	π/4-DQPSK	Default	Default	Default
	8DPSK	Default	Default	Default

2.4. Support Equipment List and Details

Description	Manufacturer	Model Number
Adapter	Yealink	YLPS052000B1-US
Adapter	Yealink	YLPS052000C1-US
Adapter	Yealink	YLPS052000E1-US
NB	DELL	E6410
AP Router	NETGEAR	R7800
Handset	Yealink	N/A
Handset	Yealink	N/A
USB Storage	Transcend	8GB
USB Storage	Transcend	8GB
POE Adapter	Cisco	SB-PWR-INJ2

2.5. External Cable List and Details

Description	Manufacturer	Model Number
RJ-45 Cable	BACL	8m
RJ-45 Cable	BACL	8m
RJ-11 Cable	BACL	0.5m
RJ-11 Cable	BACL	0.5m

2.6. Test Mode

Pre-scan

AC Line Conducted Emissions and Radiated Spurious Emissions

Mode 1: SIP-T44W + Adapter (YLPS052000E1-US)

Mode 2: SIP-T44W + Adapter (YLPS052000C1-US)

Mode 3: SIP-T44W + Adapter (YLPS052000B1-US)

Mode 4: SIP-T44W + PoE

Worst case is the SIP-T44W + Adapter (YLPS052000E1-US)

Mode 1: SIP-T44W + Adapter (YLPS052000E1-US) tested all measure item.

Mode 4: SIP-T44W + PoE test Below 1GHz Radiated Spurious Emissions and AC Line Conducted Emissions.

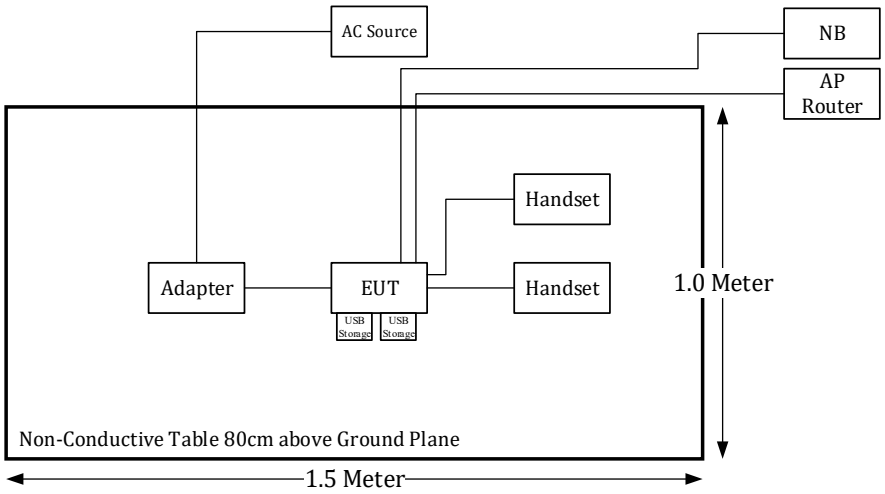
2.7. Block Diagram of Test Setup

See test photographs attached in setup photos for the actual connections between EUT and support equipment.

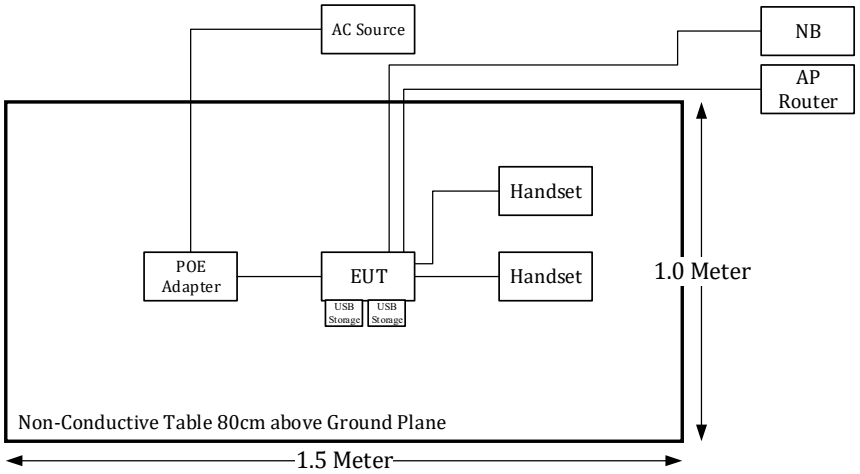
Radiation:

Below 1GHz:

Adapter Mode:

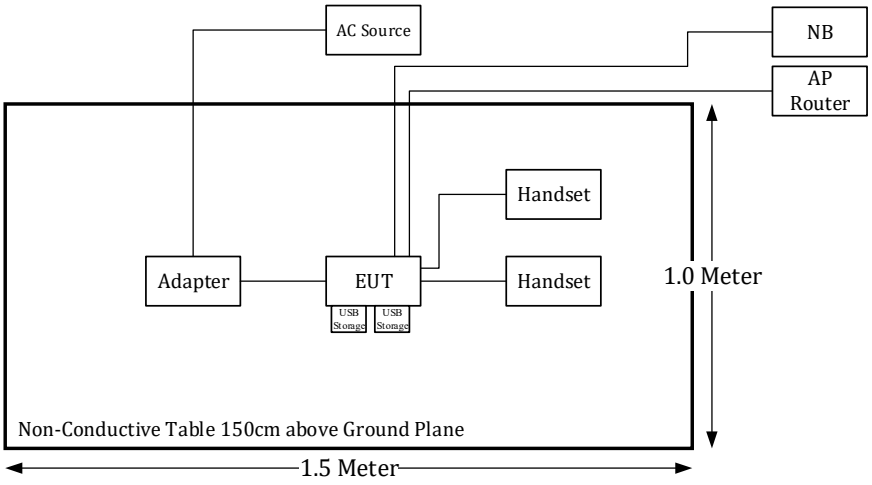


PoE Mode:

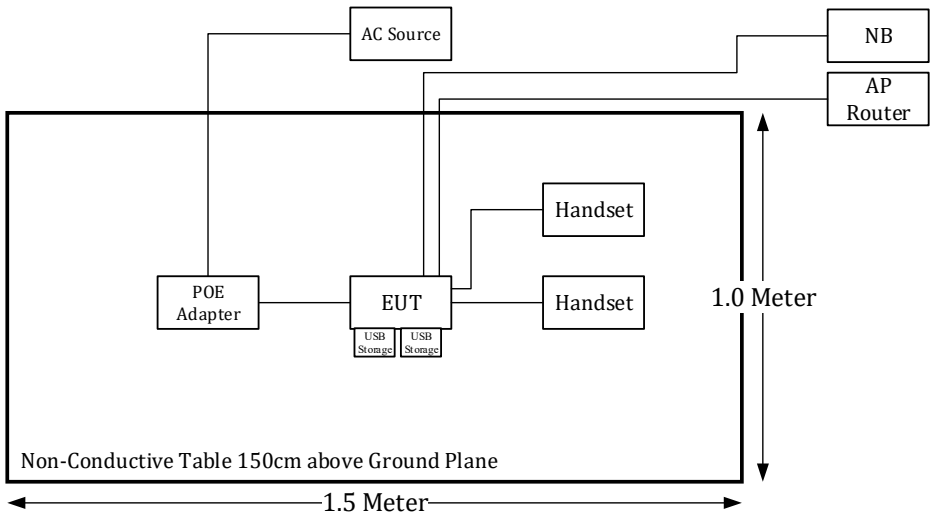


Above 1GHz:

Adapter Mode:

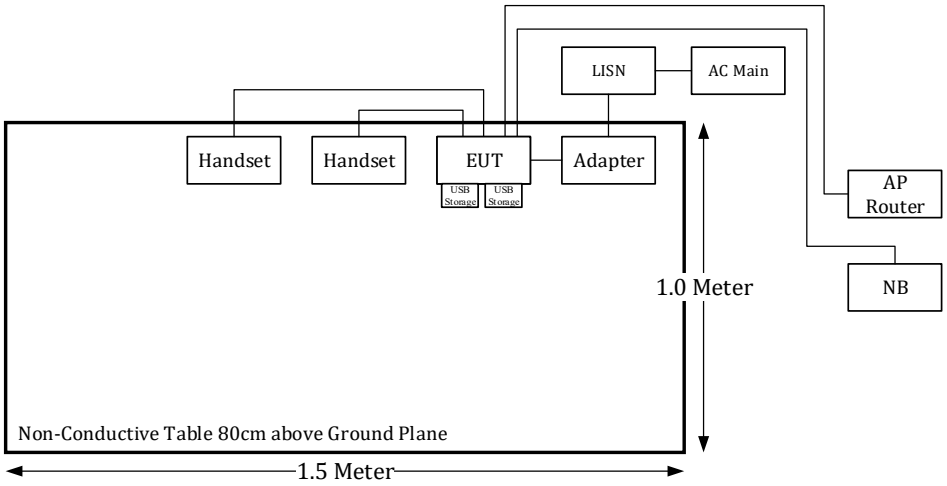


PoE Mode:

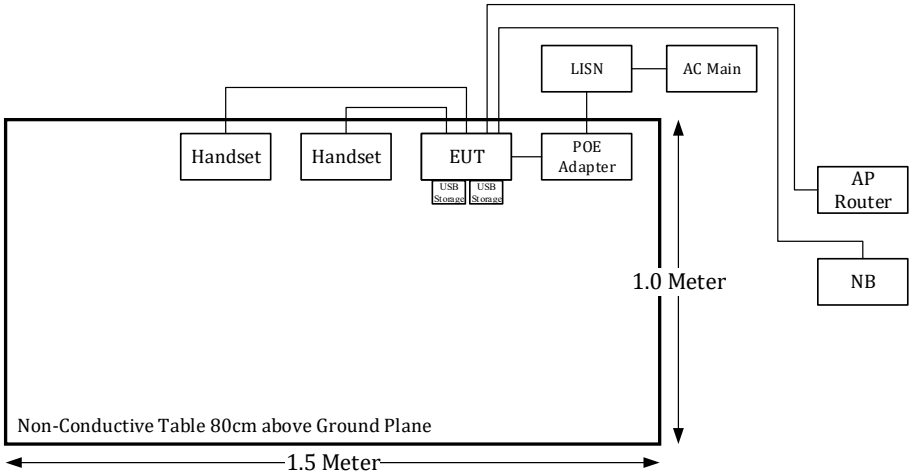


Conduction:

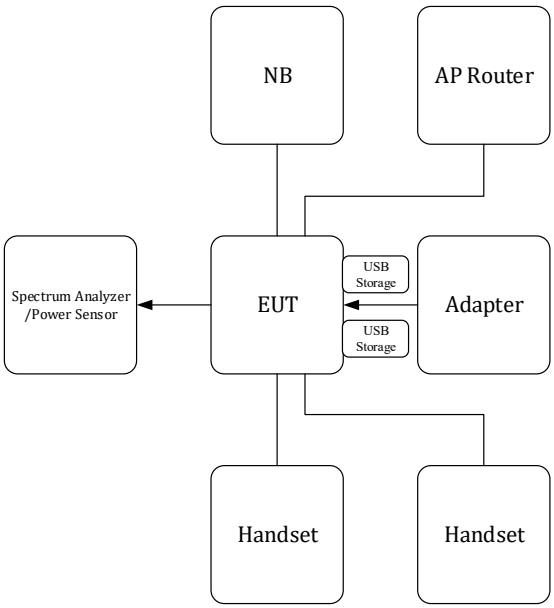
Adapter Mode:



PoE Mode:



Conducted:



3. Summary of Test Results

Rules	Description of Test	Results
FCC §15.247(i), §1.1307(b)(3), §2.1091	RF Exposure	Compliance
RSS-102 §4	Exposure Limit	Compliance
FCC §15.203 RSS-GEN §6.8	Antenna Requirement	Compliance
FCC §15.207(a) RSS-GEN §8.8	AC Line Conducted Emissions	Compliance
FCC §15.205, §15.209, §15.247(d) RSS-247 §5.5 RSS-GEN §8.9 RSS-GEN §8.10	Spurious Emissions	Compliance
FCC §15.247(a)(1) RSS-247 §5.1 (b) RSS-GEN §6.7	Emission Bandwidth	Compliance
FCC §15.247 (a)(1) RSS-247 §5.1 (b)	Channel Separation Test	Compliance
FCC §15.247(a)(1)(iii) RSS-247 §5.1 (d)	Time of Occupancy (Dwell Time)	Compliance
FCC §15.247(a)(1)(iii) RSS-247 §5.1 (d)	Quantity of hopping channel Test	Compliance
FCC §15.247(b)(1) RSS-247 §5.1 (b)	Maximum Peak Output Power	Compliance
FCC §15.247(d) RSS-247 §5.5	100 kHz Bandwidth of Frequency Band Edge	Compliance

4. Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2023/2/2	2024/2/1
EMI Test Receiver	Rohde & Schwarz	ESW8	100947	2023/5/22	2024/5/20
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2023/5/18	2024/5/16
RF Cable	EMEC	EM-CB5D	1	2023/6/6	2024/6/4
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiation 3M Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2023/2/2	2024/2/1
Horn Antenna	EMCO	SAS-571	1020	2023/5/18	2024/5/17
Horn Antenna	ETS-Lindgren	3116	62638	2023/8/25	2024/8/24
Preamplifier	Sonoma	310N	130602	2023/6/16	2024/6/15
Preamplifier	Channel	ERA-100M-18G-01D1748	EC2300051	2023/04/01	2024/03/31
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2023/1/6	2024/1/5
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2023/2/1	2024/1/31
EMI Test Receiver	Rohde & Schwarz	ESR3	102099	2023/6/16	2024/6/15
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2023/1/24	2024/1/23
Coaxial Cable	COMMATE	PEWC	8Dr	2022/12/24	2023/12/23
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2023/1/24	2024/1/23
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2022/12/24	2023/12/23
Cable	EMC	EMC105-SM-SM-10000	201003	2023/1/24	2024/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2023/1/24	2024/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-50CM	15120-1	2023/2/2	2024/2/1
Attenuator	MCL	BW-S10W5+	605	2023/1/18	2024/1/17
Band-stop filter	Woken	STI15-9831	STI15-9831-1	2023/10/20	2024/10/19
High-pass filter	XINGBOKEJI	XBLBQ-GTA54	200108-3-2	2023/10/20	2024/10/19
Software	AUDIX	E3	18621a	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2023/2/10	2024/2/9
Cable	UTIFLEX	UFA210A	9435	2023/10/2	2024/9/30
Power Sensor	Boonton	RTP5006	11037	2023/5/23	2024/5/21
Attenuator	MCL	BW-S10W5+	1419	2023/2/1	2024/1/31

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements.

5. FCC §15.247(i), §1.1307(b)(3), §2.1091 - RF Exposure

5.1. Applicable Standard

According to subpart 15.247(i) and subpart §2.1091, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

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.

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:

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

5.2. RF Exposure Evaluation Result

Project info

Band	Freq (MHz)	Tune-up Power (dBm)	Ant Gain (dBi)	Distances (mm)	Tune-up Power (mW)	ERP (dBm)	ERP (mW)
BT	2402-2480	11	4.94	200	12.59	13.79	23.93
WIFI 2.4GHz	2412-2462	19	4.94	200	79.43	21.79	151.01
WIFI 5GHz	5180-5825	16.5	3.43	200	44.67	17.78	59.98

§ 1.1307(b)(3)(i)(A) method is not applicable.

§ 1.1307(b)(3)(i)(C)

Band	Freq (MHz)	λ/2π (mm)	Distances applies	ERP Limit (mW)	Result Option C
BT	2402	19.88	apply	768.00	exempt
WIFI 2.4GHz	2412	19.8	apply	768.00	exempt
WIFI 5GHz	5180	9.22	apply	768.00	exempt

The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates
ERP (watts) is no more than the calculated value prescribed for that frequency
R must be at least $\lambda/2\pi$
λ is the free-space operating wavelength in meters

The BT and Wi-Fi can transmit simultaneously.

Simultaneous transmitting consideration (worst case):

The ratio=ERP_{BT}/limit + $ERP_{Wi\text{-}Fi}$/limit=23.93/768+151.01/768=0.23 < 1.0

So simultaneous exposure is compliant.

Result: The device compliant the MPE-Based Exemption at 20cm distances.

6 RSS-102 §4 – EXPOSURE LIMIT

6.1 Applicable Standard

According to RSS-102 §4:

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

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	$0.158\ f^{0.5}$	$4.21 \times 10^{-4}\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000/f^{1.2}$

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

Calculated Formulary:

$S = PG/4\pi R^2$ = 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:

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

6.2 RF Exposure Evaluation Result

Mode	Frequency Range (MHz)	Antenna Gain		Tune-up Power		Distances (mm)	Power Density (W/m^2)	RF Exp. Limit (W/m^2)
		(dBi)	(numeric)	(dBm)	(W)			
BT	2402-2480	4.94	3.119	11	0.013	200	0.0781	5.35
WIFI 2.4GHz	2412-2462	4.94	3.119	19	0.079	200	0.4929	5.37
WIFI 5GHz	5180-5825	3.43	2.203	16.5	0.045	200	0.1958	9.05

The BT and Wi-Fi can transmit simultaneously.

Simultaneous transmitting consideration (worst case):

The ratio=MPE_{BT}/limit + $MPE_{Wi\text{-}Fi}$/limit=0.0781/5.35+0.4929/5.37=0.11 < 1.0

So simultaneous exposure is compliant.

Result: The device compliant the MPE-Based Exemption at 20cm distances.

7 FCC §15.203 & RSS-Gen §6.8– Antenna Requirements

7.1 Applicable Standard

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.

According to RSS-Gen 6.8:

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.

7.2 Antenna Information

Manufacturer	Model	Type	Antenna Gain	Impedance
YEALINK(XIAMEN) NETWORK TECHNOLOGY CO.,LTD.	T44WHOOKV11A	PCB Antenna	4.94 dBi	50Ω

The antenna is permanently connected to the EUT.

Result: Compliance

8. FCC §15.207(a) & RSS-Gen §8.8– AC Line Conducted Emissions

8.1. Applicable Standard

According to §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

According to RSS-GEN §8.8

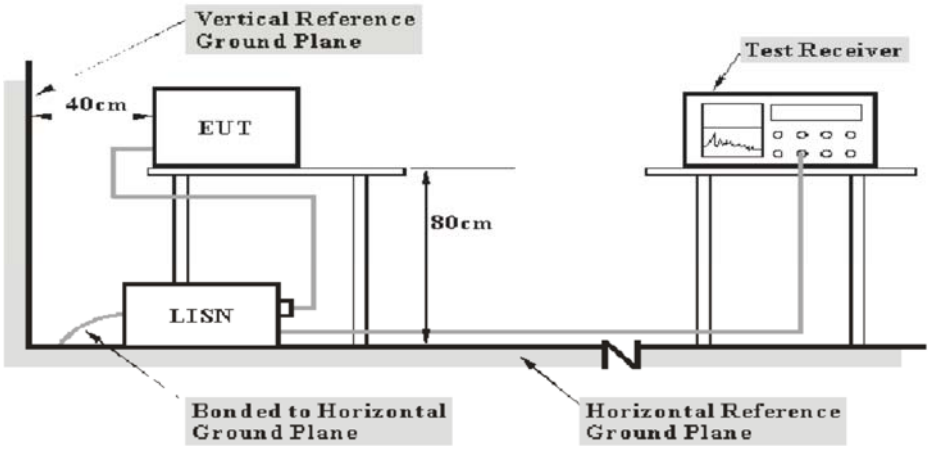
Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the 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.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

8.2. 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 and RSS-GEN limits.

8.3. EMI Test Receiver Setup

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

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

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

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

8.5. Corrected Factor & Margin Calculation

The factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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 Over Limit calculation is as follows:

Over Limit = Level – Limit Line

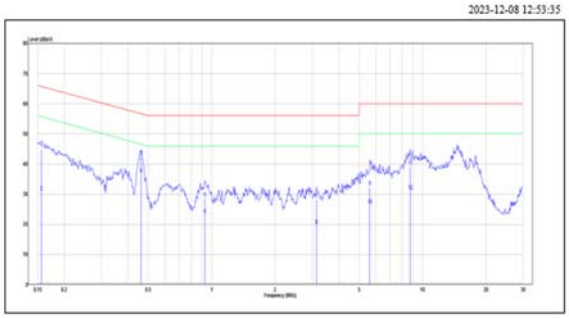
8.6. Test Results

Test Mode: Transmitting

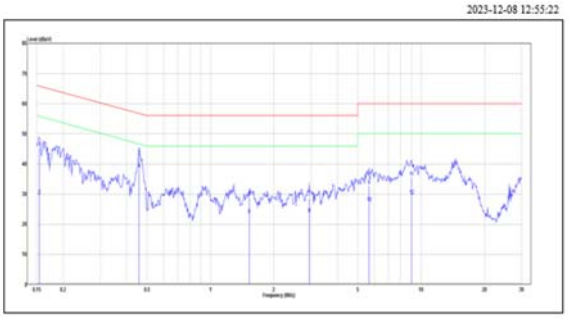
Main: AC120 V, 60 Hz **(**Worst case is BR(GFSK) mode High channel)

Adapter Mode:

Line	Neutral



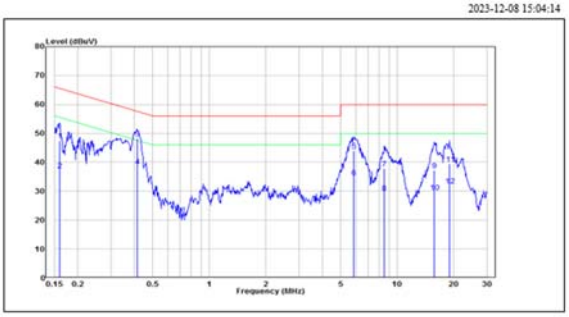
No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.156	25.38	19.50	44.88	65.69	-20.81	QP	Line
2	0.156	11.28	19.50	30.78	55.69	-24.91	Average	Line
3	0.461	22.65	19.60	42.25	56.67	-14.42	QP	Line
4	0.461	17.21	19.60	36.82	46.67	-9.85	Average	Line
5	0.928	8.78	19.83	28.62	56.00	-27.38	QP	Line
6	0.928	3.28	19.83	23.11	46.00	-22.89	Average	Line
7	3.140	8.17	20.10	28.27	56.00	-27.73	QP	Line
8	3.140	-0.46	20.10	19.64	46.00	-26.36	Average	Line
9	5.623	12.30	20.15	32.45	60.00	-27.55	QP	Line
10	5.623	6.21	20.15	26.35	50.00	-23.65	Average	Line
11	8.729	19.02	20.12	39.14	60.00	-20.86	QP	Line
12	8.729	10.89	20.12	31.02	50.00	-18.98	Average	Line



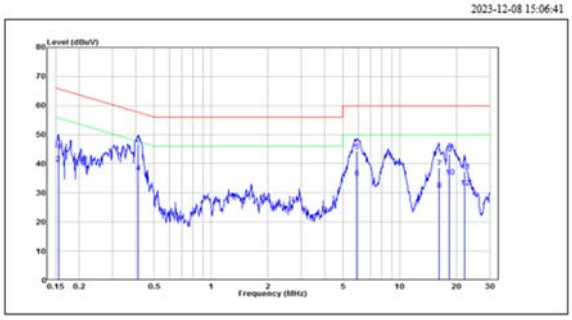
No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.154	25.83	19.50	45.33	65.78	-20.45	QP	Neutral
2	0.154	9.93	19.50	29.43	55.78	-26.35	Average	Neutral
3	0.459	22.62	19.61	42.24	56.71	-14.48	QP	Neutral
4	0.459	18.68	19.61	38.29	46.71	-8.42	Average	Neutral
5	1.527	9.02	19.98	29.00	56.00	-27.00	QP	Neutral
6	1.527	3.16	19.98	23.13	46.00	-22.87	Average	Neutral
7	2.946	8.50	20.10	28.60	56.00	-27.40	QP	Neutral
8	2.946	3.32	20.10	23.42	46.00	-22.58	Average	Neutral
9	5.653	12.65	20.16	32.81	60.00	-27.19	QP	Neutral
10	5.653	6.86	20.16	27.02	50.00	-22.98	Average	Neutral
11	9.011	15.29	20.14	35.43	60.00	-24.57	QP	Neutral
12	9.011	9.28	20.14	29.42	50.00	-20.58	Average	Neutral

PoE Mode:

Line	Neutral



No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.160	27.90	19.50	47.40	65.47	-18.07	QP	Line
2	0.160	17.80	19.50	37.30	55.47	-18.17	Average	Line
3	0.413	28.79	19.58	48.38	57.59	-9.22	QP	Line
4	0.413	19.05	19.58	38.63	47.59	-8.96	Average	Line
5	5.836	23.77	20.14	43.92	60.00	-16.08	QP	Line
6	5.836	14.72	20.14	34.86	50.00	-15.14	Average	Line
7	8.501	17.75	20.13	37.87	60.00	-22.13	QP	Line
8	8.501	9.42	20.13	29.54	50.00	-20.46	Average	Line
9	15.718	16.94	20.30	37.24	60.00	-22.76	QP	Line
10	15.718	9.27	20.30	29.58	50.00	-20.42	Average	Line
11	18.920	19.12	20.43	39.55	60.00	-20.45	QP	Line
12	18.920	11.57	20.43	32.00	50.00	-18.00	Average	Line



No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.155	27.61	19.50	47.11	65.74	-18.62	QP	Neutral
2	0.155	20.51	19.50	40.01	55.74	-15.72	Average	Neutral
3	0.410	27.29	19.59	46.88	57.64	-10.76	QP	Neutral
4	0.410	17.38	19.59	36.97	47.64	-10.67	Average	Neutral
5	5.898	24.33	20.16	44.48	60.00	-15.52	QP	Neutral
6	5.898	15.08	20.16	35.24	50.00	-14.76	Average	Neutral
7	16.055	18.30	20.37	38.66	60.00	-21.34	QP	Neutral
8	16.055	10.66	20.37	31.03	50.00	-18.97	Average	Neutral
9	18.232	22.81	20.46	43.28	60.00	-16.72	QP	Neutral
10	18.232	15.23	20.46	35.69	50.00	-14.31	Average	Neutral
11	22.063	16.73	20.61	37.34	60.00	-22.66	QP	Neutral
12	22.063	11.41	20.61	32.02	50.00	-17.98	Average	Neutral

Note:

Result = Read Level + Factor

Over Limit = Result – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

9. FCC §15.209, §15.205 , §15.247(d) & RSS-247 §5.5, RSS-GEN §8.9, §8.10 – Spurious Emissions

9.1. Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As per RSS-Gen 8.10,

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

(a)The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).

(b)Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.

(c)Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	608 – 614	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	960 – 1240	5. 35 – 5. 46
2.1735 – 2.1905	16.80425 – 16.80475	1300 – 1427	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1435 – 1626.5	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1645.5 – 1646.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1660 – 1710	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1718.8 – 1722.2	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	2200 – 2300	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2310 – 2390	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2483.5 – 2500	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2690 – 2900	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	3260 – 3267	22.01 – 23.12
8.41425 – 8.41475	162.0125 –167.17	3.332 – 3.339	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3 3458 – 3 358	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3.600 – 4.400	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4		Above 38.6
13.36 – 13.41	399.9 – 410		

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

According to ANSI C63.10-2013, section 5.3.3
Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field, and the emissions to be measured can be detected by the measurement equipment (see 4.3.4). Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. Measurements from 18 GHz to 40 GHz are typically made at distances significantly less than 3 m from the EUT. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade of distance (inverse of linear distance for field-strength measurements or inverse of linear distance-squared for power-density measurements).

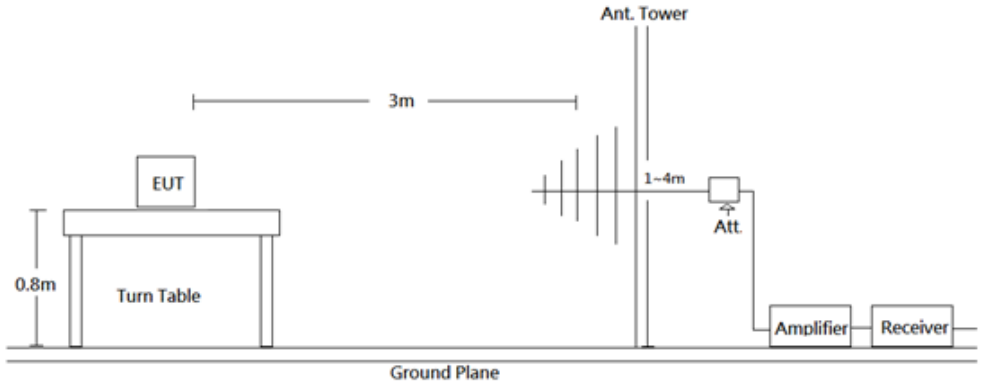
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the 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).

As per RSS-247 5.5,
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a

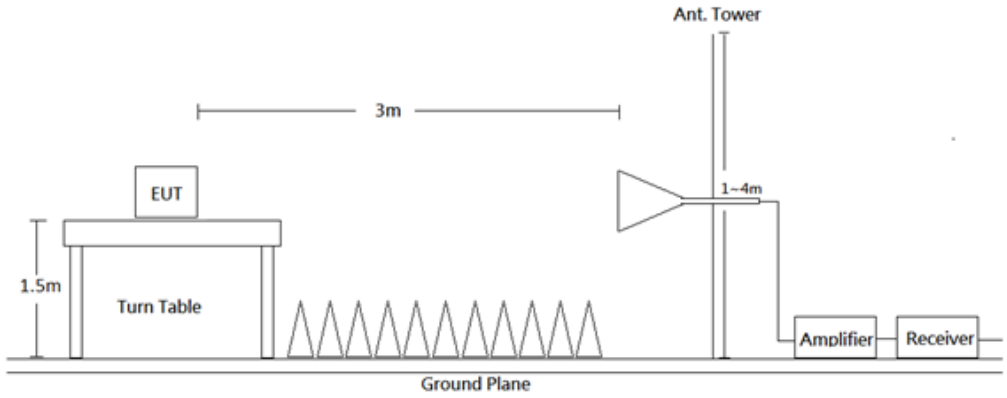
radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

9.2. EUT Setup

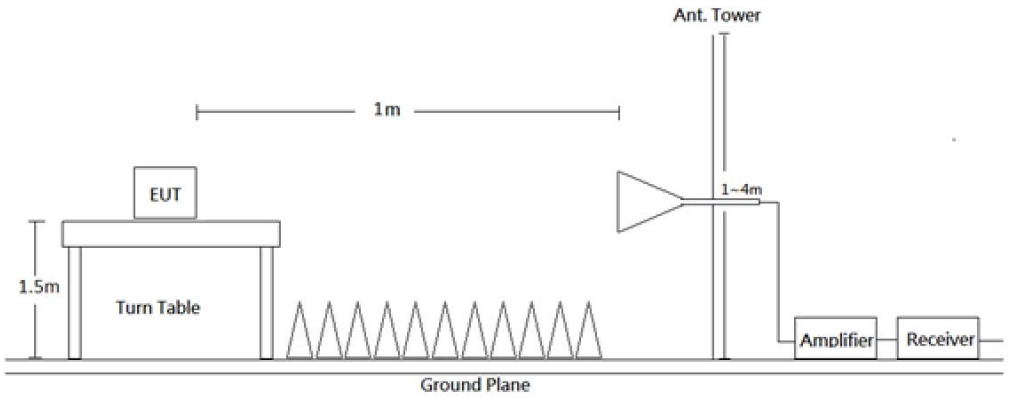
Below 1 GHz:



1-18 GHz:



18-26.5 GHz:



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

9.3. EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Measurement method
30-1000 MHz	100 kHz	300 kHz	QP
Above 1 GHz	1 MHz	3 MHz	PK
	1 MHz	10 Hz	Ave

9.4. Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

9.5. Corrected Factor & Margin Calculation

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

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Level – Limit

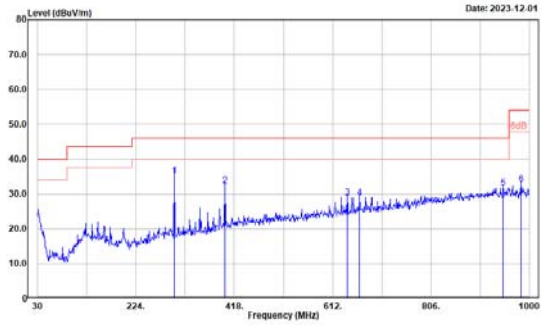
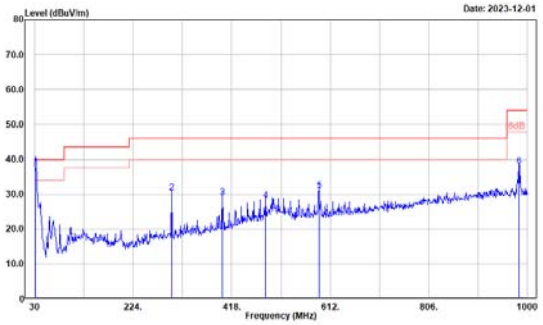
9.6. Test Results

Test Mode: Transmitting

30MHz-1GHz:

(worst case is BR(GFSK) mode High channel)

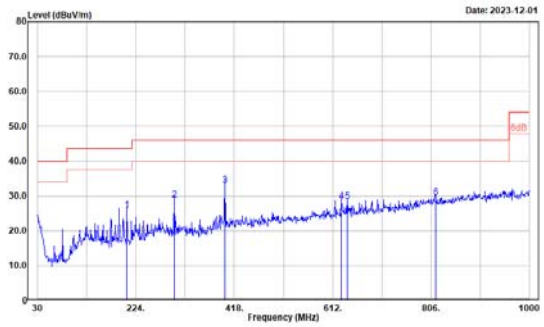
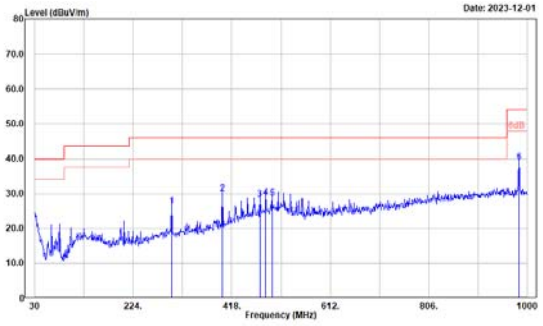
Adapter Mode:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
299.660	44.32	-9.14	35.18	46.00	-10.82	100	168	QP
399.570	39.35	-7.02	32.33	46.00	-13.67	100	212	QP
641.100	31.73	-2.79	28.94	46.00	-17.06	100	360	QP
665.350	31.21	-2.34	28.87	46.00	-17.13	100	19	QP
948.590	28.97	2.74	31.71	46.00	-14.29	100	320	QP
983.510	30.22	2.59	32.81	54.00	-21.19	100	343	QP

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
30.970	41.62	-3.87	37.75	40.00	-2.25	100	281	QP
299.660	39.43	-9.14	30.29	46.00	-15.71	100	111	QP
399.570	36.03	-7.02	29.01	46.00	-16.99	100	72	QP
484.930	33.22	-5.04	28.18	46.00	-17.82	100	176	QP
589.690	34.56	-3.48	31.08	46.00	-14.92	100	84	QP
983.510	35.42	2.59	38.01	54.00	-15.99	100	320	QP

PoE Mode:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
206.540	38.13	-12.27	25.86	43.50	-17.64	100	360	QP
299.660	38.02	-9.14	28.88	46.00	-17.12	100	339	QP
399.570	40.01	-7.02	32.99	46.00	-13.01	100	200	QP
629.460	31.46	-3.15	28.31	46.00	-17.69	100	3	QP
641.100	31.13	-2.79	28.34	46.00	-17.66	100	360	QP
814.730	29.11	0.38	29.49	46.00	-16.51	100	2	QP

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
299.660	35.50	-9.14	26.36	46.00	-19.64	100	65	QP
399.570	36.96	-7.02	29.94	46.00	-16.06	100	236	QP
473.290	33.69	-5.28	28.41	46.00	-17.59	100	140	QP
484.930	33.92	-5.04	28.88	46.00	-17.12	100	151	QP
497.540	33.39	-4.78	28.61	46.00	-17.39	100	140	QP
983.510	36.52	2.59	39.11	54.00	-14.89	100	68	QP

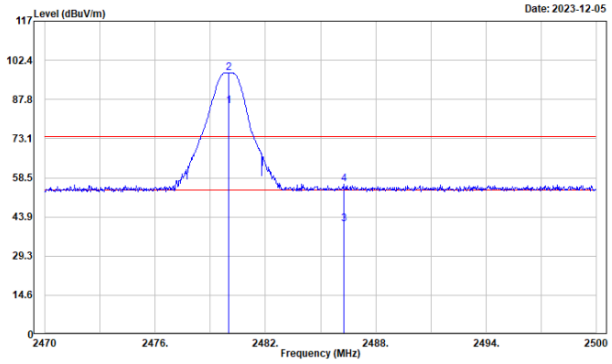
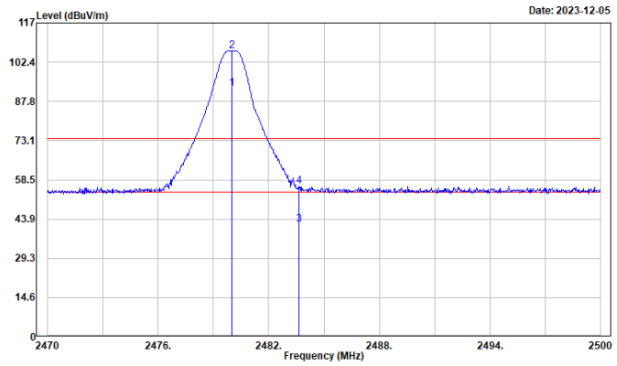
Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

(worst case is BR(GFSK) mode High channel)

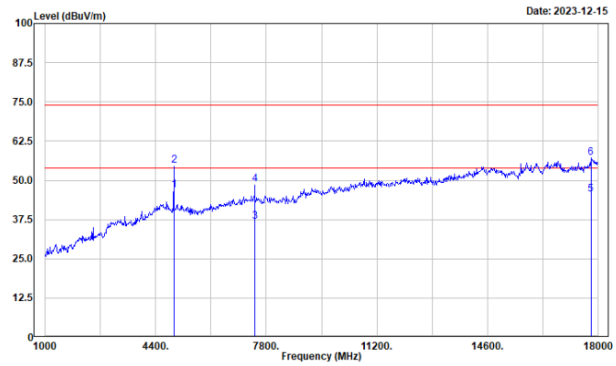
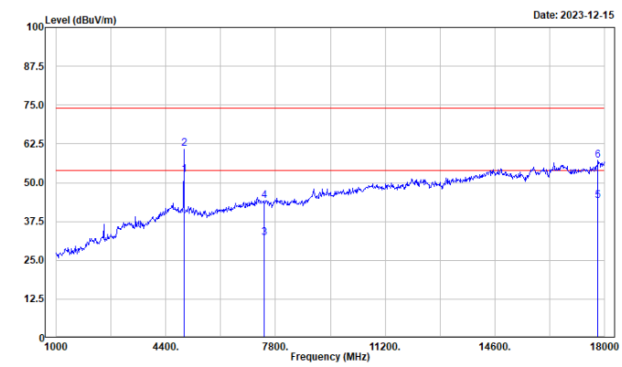
Band-Edge:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	95.86	-10.53	85.33			165	162	Average
2480.000	108.34	-10.53	97.81			165	162	Peak
2486.260	51.76	-10.44	41.32	54.00	-12.68	165	162	Average
2486.260	66.66	-10.44	56.22	74.00	-17.78	165	162	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	103.01	-10.53	92.48			143	0	Average
2480.000	117.20	-10.53	106.67			143	0	Peak
2483.620	52.38	-10.48	41.90	54.00	-12.10	143	0	Average
2483.620	66.75	-10.48	56.27	74.00	-17.73	143	0	Peak

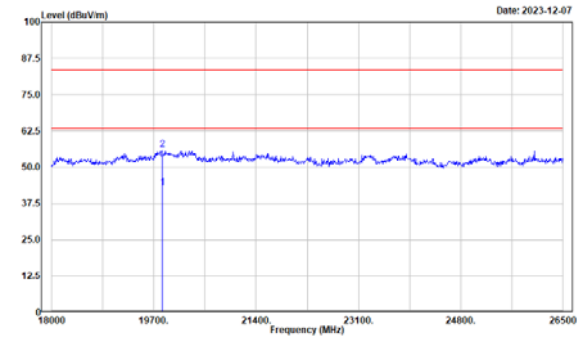
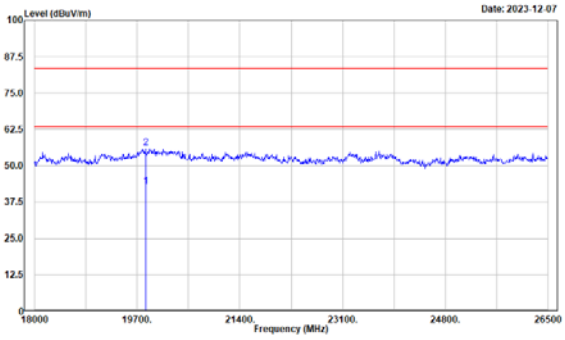
1GHz-18GHz:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	50.73	-3.77	46.96	54.00	-7.04	148	173	Average
4960.000	58.54	-3.77	54.77	74.00	-19.23	148	173	Peak
7440.000	36.14	0.61	36.75	54.00	-17.25	234	188	Average
7440.000	48.06	0.61	48.67	74.00	-25.33	234	188	Peak
17779.000	32.66	12.79	45.45	54.00	-8.55	150	44	Average
17779.000	44.49	12.79	57.28	74.00	-16.72	150	44	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	56.31	-3.77	52.54	54.00	-1.46	134	71	Average
4960.000	64.70	-3.77	60.93	74.00	-13.07	134	71	Peak
7440.000	31.69	0.61	32.30	54.00	-21.70	158	183	Average
7440.000	43.57	0.61	44.18	74.00	-29.82	158	183	Peak
17796.000	31.41	12.85	44.26	54.00	-9.74	150	44	Average
17796.000	44.28	12.85	57.13	74.00	-16.87	150	44	Peak

18GHz-26.5GHz:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19840.000	41.05	1.72	42.77	63.50	-20.73	157	240	Average
19840.000	54.45	1.72	56.17	83.50	-27.33	157	240	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19840.000	41.15	1.72	42.87	63.50	-20.63	153	237	Average
19840.000	54.25	1.72	55.97	83.50	-27.53	153	237	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Above 1GHz

BR (GFSK)

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2336.600	51.62	-11.36	40.26	54.00	-13.74	152	166	Average
2336.600	66.87	-11.36	55.51	74.00	-18.49	152	166	Peak
2402.000	97.42	-10.96	86.46			152	166	Average
2402.000	109.90	-10.96	98.94			152	166	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	45.06	-3.70	41.36	54.00	-12.64	118	185	Average
4804.000	53.52	-3.70	49.82	74.00	-24.18	118	185	Peak
7206.000	41.48	0.23	41.71	54.00	-12.29	197	193	Average
7206.000	51.87	0.23	52.10	74.00	-21.90	197	193	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2376.300	51.94	-11.10	40.84	54.00	-13.16	134	161	Average
2376.300	66.82	-11.10	55.72	74.00	-18.28	134	161	Peak
2402.000	104.10	-10.96	93.14			134	161	Average
2402.000	118.28	-10.96	107.32			134	161	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	50.63	-3.70	46.93	54.00	-7.07	152	75	Average
4804.000	58.17	-3.70	54.47	74.00	-19.53	152	75	Peak
7206.000	37.76	0.23	37.99	54.00	-16.01	187	347	Average
7206.000	49.30	0.23	49.53	74.00	-24.47	187	347	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2441.000	96.94	-10.93	86.01			195	163	Average
2441.000	109.46	-10.93	98.53			195	163	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4882.000	48.55	-3.89	44.66	54.00	-9.34	139	189	Average
4882.000	56.53	-3.89	52.64	74.00	-21.36	139	189	Peak
7323.000	39.78	0.23	40.01	54.00	-13.99	220	170	Average
7323.000	50.28	0.23	50.51	74.00	-23.49	220	170	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2441.000	104.18	-10.93	93.25			196	1	Average
2441.000	118.59	-10.93	107.66			196	1	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4882.000	54.18	-3.89	50.29	54.00	-3.71	122	75	Average
4882.000	62.06	-3.89	58.17	74.00	-15.83	122	75	Peak
7323.000	35.44	0.23	35.67	54.00	-18.33	195	289	Average
7323.000	48.08	0.23	48.31	74.00	-25.69	195	289	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	95.86	-10.53	85.33			165	162	Average
2480.000	108.34	-10.53	97.81			165	162	Peak
2486.260	51.76	-10.44	41.32	54.00	-12.68	165	162	Average
2486.260	66.66	-10.44	56.22	74.00	-17.78	165	162	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	50.73	-3.77	46.96	54.00	-7.04	148	173	Average
4960.000	58.54	-3.77	54.77	74.00	-19.23	148	173	Peak
7440.000	36.14	0.61	36.75	54.00	-17.25	234	188	Average
7440.000	48.06	0.61	48.67	74.00	-25.33	234	188	Peak
17779.000	32.66	12.79	45.45	54.00	-8.55	150	44	Average
17779.000	44.49	12.79	57.28	74.00	-16.72	150	44	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	103.01	-10.53	92.48			143	0	Average
2480.000	117.20	-10.53	106.67			143	0	Peak
2483.620	52.38	-10.48	41.90	54.00	-12.10	143	0	Average
2483.620	66.75	-10.48	56.27	74.00	-17.73	143	0	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	56.31	-3.77	52.54	54.00	-1.46	134	71	Average
4960.000	64.70	-3.77	60.93	74.00	-13.07	134	71	Peak
7440.000	31.69	0.61	32.30	54.00	-21.70	158	183	Average
7440.000	43.57	0.61	44.18	74.00	-29.82	158	183	Peak
17796.000	31.41	12.85	44.26	54.00	-9.74	150	44	Average
17796.000	44.28	12.85	57.13	74.00	-16.87	150	44	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

EDR (π/4-DQPSK)

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2348.800	51.64	-11.27	40.37	54.00	-13.63	151	168	Average
2348.800	66.96	-11.27	55.69	74.00	-18.31	151	168	Peak
2402.000	95.14	-10.96	84.18			151	168	Average
2402.000	110.15	-10.96	99.19			151	168	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	41.71	-3.70	38.01	54.00	-15.99	117	186	Average
4804.000	52.96	-3.70	49.26	74.00	-24.74	117	186	Peak
7206.000	37.39	0.23	37.62	54.00	-16.38	207	186	Average
7206.000	49.78	0.23	50.01	74.00	-23.99	207	186	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2370.500	51.81	-11.14	40.67	54.00	-13.33	132	162	Average
2370.500	66.49	-11.14	55.35	74.00	-18.65	132	162	Peak
2402.000	101.50	-10.96	90.54			132	162	Average
2402.000	118.17	-10.96	107.21			132	162	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	47.78	-3.70	44.08	54.00	-9.92	120	67	Average
4804.000	58.09	-3.70	54.39	74.00	-19.61	120	67	Peak
7206.000	36.99	0.23	37.22	54.00	-16.78	169	253	Average
7206.000	48.42	0.23	48.65	74.00	-25.35	169	253	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2441.000	94.44	-10.93	83.51			196	164	Average
2441.000	109.06	-10.93	98.13			196	164	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4882.000	44.30	-3.89	40.41	54.00	-13.59	140	188	Average
4882.000	54.64	-3.89	50.75	74.00	-23.25	140	188	Peak
7323.000	36.33	0.23	36.56	54.00	-17.44	214	160	Average
7323.000	48.94	0.23	49.17	74.00	-24.83	214	160	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2441.000	101.66	-10.93	90.73			196	0	Average
2441.000	118.32	-10.93	107.39			196	0	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4882.000	49.88	-3.89	45.99	54.00	-8.01	120	75	Average
4882.000	60.59	-3.89	56.70	74.00	-17.30	120	75	Peak
7323.000	34.23	0.23	34.46	54.00	-19.54	163	79	Average
7323.000	45.33	0.23	45.56	74.00	-28.44	163	79	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	92.48	-10.53	81.95			148	82	Average
2480.000	106.70	-10.53	96.17			148	82	Peak
2488.330	52.16	-10.43	41.73	54.00	-12.27	148	82	Average
2488.330	66.90	-10.43	56.47	74.00	-17.53	148	82	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	47.20	-3.77	43.43	54.00	-10.57	162	172	Average
4960.000	57.14	-3.77	53.37	74.00	-20.63	162	172	Peak
7440.000	34.40	0.61	35.01	54.00	-18.99	196	180	Average
7440.000	48.24	0.61	48.85	74.00	-25.15	196	180	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	100.17	-10.53	89.64			145	0	Average
2480.000	117.16	-10.53	106.63			145	0	Peak
2483.560	54.47	-10.48	43.99	54.00	-10.01	145	0	Average
2483.560	70.59	-10.48	60.11	74.00	-13.89	145	0	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	52.62	-3.77	48.85	54.00	-5.15	133	73	Average
4960.000	63.00	-3.77	59.23	74.00	-14.77	133	73	Peak
7440.000	33.61	0.61	34.22	54.00	-19.78	159	232	Average
7440.000	43.45	0.61	44.06	74.00	-29.94	159	232	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

EDR (8DPSK)

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2386.100	51.66	-11.04	40.62	54.00	-13.38	153	166	Average
2386.100	66.21	-11.04	55.17	74.00	-18.83	153	166	Peak
2402.000	95.14	-10.96	84.18			153	166	Average
2402.000	110.12	-10.96	99.16			153	166	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	41.29	-3.70	37.59	54.00	-16.41	119	186	Average
4804.000	52.69	-3.70	48.99	74.00	-25.01	119	186	Peak
7206.000	36.89	0.23	37.12	54.00	-16.88	229	186	Average
7206.000	50.07	0.23	50.30	74.00	-23.70	229	186	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2379.200	51.70	-11.08	40.62	54.00	-13.38	139	158	Average
2379.200	66.09	-11.08	55.01	74.00	-18.99	139	158	Peak
2402.000	101.12	-10.96	90.16			139	158	Average
2402.000	117.87	-10.96	106.91			139	158	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4804.000	47.45	-3.70	43.75	54.00	-10.25	108	71	Average
4804.000	58.03	-3.70	54.33	74.00	-19.67	108	71	Peak
7206.000	34.88	0.23	35.11	54.00	-18.89	109	264	Average
7206.000	48.60	0.23	48.83	74.00	-25.17	109	264	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2441.000	94.20	-10.93	83.27			196	165	Average
2441.000	108.96	-10.93	98.03			196	165	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4882.000	43.67	-3.89	39.78	54.00	-14.22	140	184	Average
4882.000	54.45	-3.89	50.56	74.00	-23.44	140	184	Peak
7323.000	35.29	0.23	35.52	54.00	-18.48	196	185	Average
7323.000	48.66	0.23	48.89	74.00	-25.11	196	185	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2441.000	101.73	-10.93	90.80			196	0	Average
2441.000	118.25	-10.93	107.32			196	0	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4882.000	49.41	-3.89	45.52	54.00	-8.48	121	66	Average
4882.000	60.66	-3.89	56.77	74.00	-17.23	121	66	Peak
7323.000	34.81	0.23	35.04	54.00	-18.96	158	149	Average
7323.000	48.55	0.23	48.78	74.00	-25.22	158	149	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	93.62	-10.53	83.09			165	163	Average
2480.000	108.03	-10.53	97.50			165	163	Peak
2483.620	52.29	-10.48	41.81	54.00	-12.19	165	163	Average
2483.620	66.29	-10.48	55.81	74.00	-18.19	165	163	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	47.15	-3.77	43.38	54.00	-10.62	161	169	Average
4960.000	57.17	-3.77	53.40	74.00	-20.60	161	169	Peak
7440.000	35.17	0.61	35.78	54.00	-18.22	225	177	Average
7440.000	48.38	0.61	48.99	74.00	-25.01	225	177	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2480.000	100.88	-10.53	90.35			143	3	Average
2480.000	117.13	-10.53	106.60			143	3	Peak
2483.501	54.44	-10.48	43.96	54.00	-10.04	143	3	Average
2483.501	71.20	-10.48	60.72	74.00	-13.28	143	3	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	52.45	-3.77	48.68	54.00	-5.32	134	79	Average
4960.000	63.24	-3.77	59.47	74.00	-14.53	134	79	Peak
7440.000	34.18	0.61	34.79	54.00	-19.21	158	91	Average
7440.000	47.30	0.61	47.91	74.00	-26.09	158	91	Peak

Level = Reading + Factor.

Margin = Level – Limit.

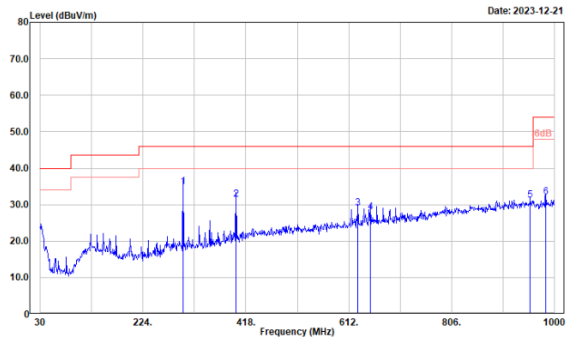
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Transmitting simultaneously test:

The worst case of WIFI 2.4GHz and BT mode transmitting simultaneously:

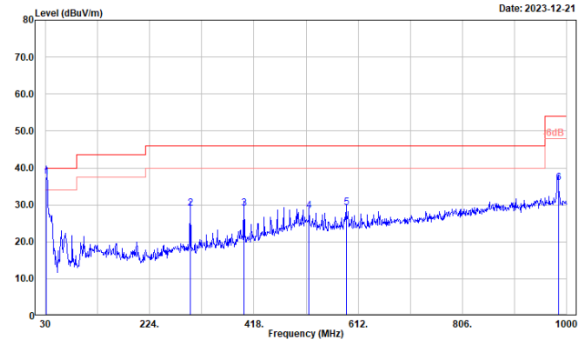
30MHz-1GHz

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
299.660	44.06	-9.14	34.92	46.00	-11.08	100	173	QP
399.570	38.40	-7.02	31.38	46.00	-14.62	100	188	QP
629.460	32.27	-3.15	29.12	46.00	-16.88	100	15	QP
652.740	30.47	-2.56	27.91	46.00	-18.09	100	15	QP
954.410	28.52	2.79	31.31	46.00	-14.69	100	46	QP
983.510	29.46	2.59	32.05	54.00	-21.95	100	205	QP

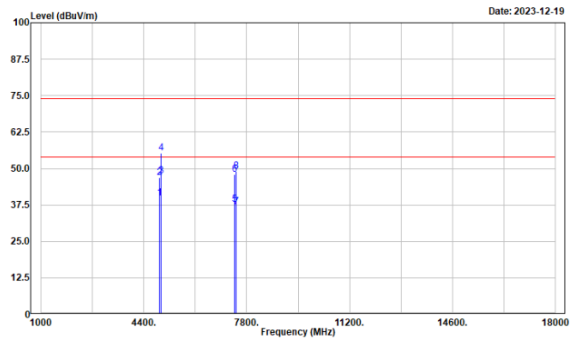
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
31.940	41.91	-4.45	37.46	40.00	-2.54	100	191	QP
299.660	38.16	-9.14	29.02	46.00	-16.98	100	106	QP
399.570	36.01	-7.02	28.99	46.00	-17.01	100	5	QP
520.820	32.88	-4.50	28.38	46.00	-17.62	100	241	QP
589.690	32.72	-3.48	29.24	46.00	-16.76	100	276	QP
984.480	33.48	2.59	36.07	54.00	-17.93	100	180	QP

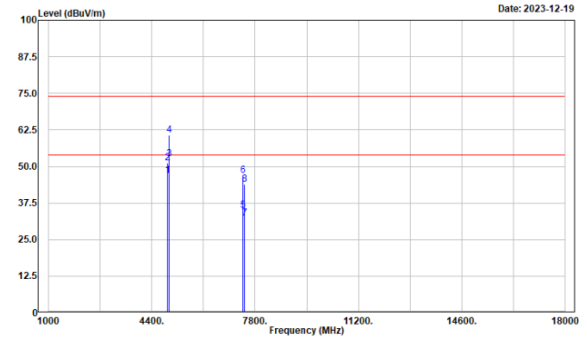
Above 1GHz

Horizontal



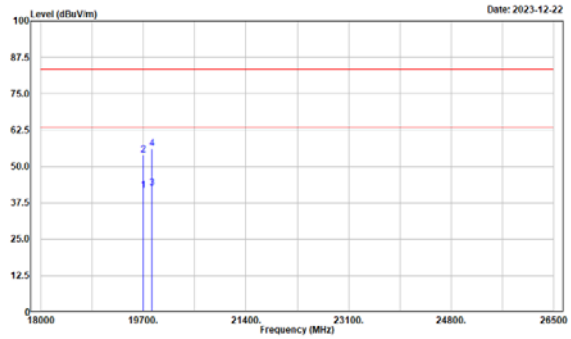
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	43.69	-3.84	39.85	54.00	-14.15	164	177	Average
4924.000	50.64	-3.84	46.80	74.00	-27.20	164	177	Peak
4960.000	51.22	-3.77	47.45	54.00	-6.55	142	0	Average
4960.000	59.01	-3.77	55.24	74.00	-18.76	142	0	Peak
7386.000	37.10	0.45	37.55	54.00	-16.45	146	67	Average
7386.000	47.57	0.45	48.02	74.00	-25.98	146	67	Peak
7440.000	36.31	0.61	36.92	54.00	-17.08	211	173	Average
7440.000	48.51	0.61	49.12	74.00	-24.88	211	173	Peak

Vertical

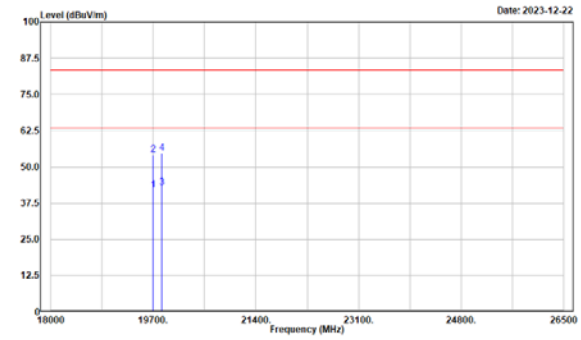


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	50.74	-3.84	46.90	54.00	-7.10	201	67	Average
4924.000	55.05	-3.84	51.21	74.00	-22.79	201	67	Peak
4960.000	56.28	-3.77	52.51	54.00	-1.49	121	130	Average
4960.000	64.51	-3.77	60.74	74.00	-13.26	121	130	Peak
7386.000	34.57	0.45	35.02	54.00	-18.98	151	235	Average
7386.000	46.32	0.45	46.77	74.00	-27.23	151	235	Peak
7440.000	31.51	0.61	32.12	54.00	-21.88	147	153	Average
7440.000	43.38	0.61	43.99	74.00	-30.01	147	153	Peak

18GHz-26.5GHz	
Horizontal	**Vertical**



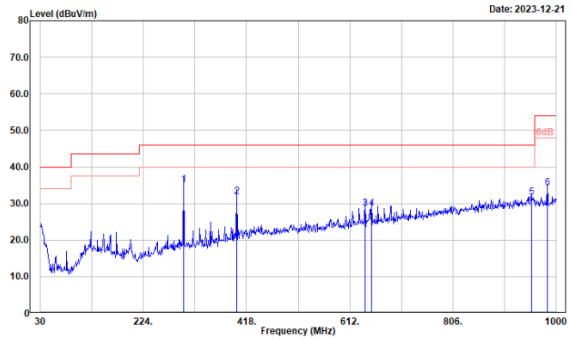
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19696.000	40.10	1.64	41.74	63.50	-21.76	151	53	Average
19696.000	52.38	1.64	54.02	83.50	-29.48	151	53	Peak
19840.000	40.90	1.72	42.62	63.50	-20.88	156	360	Average
19840.000	54.34	1.72	56.06	83.50	-27.44	156	360	Peak



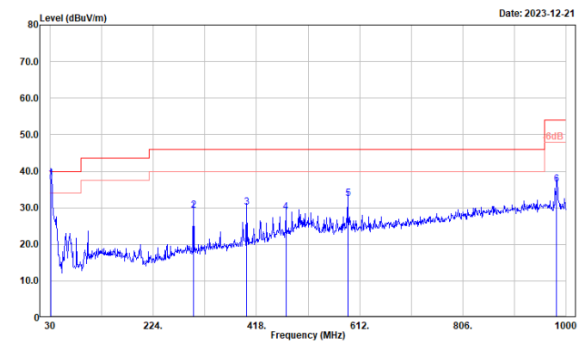
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19696.000	40.25	1.64	41.89	63.50	-21.61	152	338	Average
19696.000	52.53	1.64	54.17	83.50	-29.33	152	338	Peak
19840.000	40.97	1.72	42.69	63.50	-20.81	155	276	Average
19840.000	52.95	1.72	54.67	83.50	-28.83	155	276	Peak

The worst case of WIFI 5GHz and BT mode transmitting simultaneously:

30MHz-1GHz	
Horizontal	**Vertical**



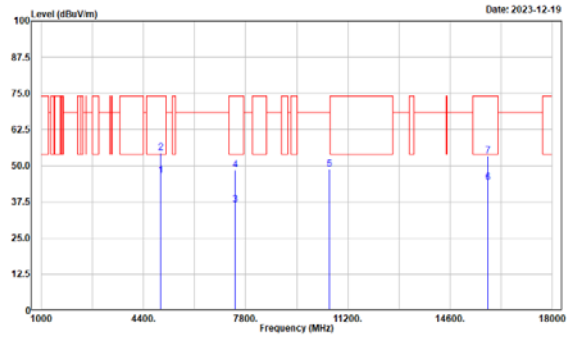
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
299.660	44.20	-9.14	35.06	46.00	-10.94	100	161	QP
399.570	38.86	-7.02	31.84	46.00	-14.16	100	195	QP
641.100	31.48	-2.79	28.69	46.00	-17.31	100	11	QP
652.740	31.10	-2.56	28.54	46.00	-17.46	100	0	QP
953.440	28.90	2.79	31.69	46.00	-14.31	100	30	QP
983.510	31.77	2.59	34.36	54.00	-19.64	100	301	QP



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
31.940	42.31	-4.45	37.86	40.00	-2.14	100	218	QP
299.660	38.50	-9.14	29.36	46.00	-16.64	100	103	QP
399.570	37.23	-7.02	30.21	46.00	-15.79	100	25	QP
473.290	34.11	-5.28	28.83	46.00	-17.17	100	167	QP
589.690	35.94	-3.48	32.46	46.00	-13.54	100	14	QP
982.540	33.76	2.58	36.34	54.00	-17.66	100	0	QP

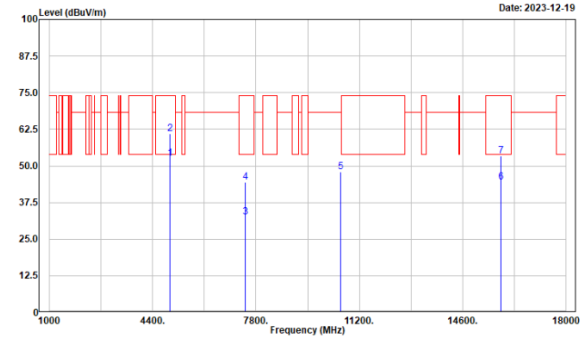
1GHz-18GHz

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	50.41	-3.77	46.64	54.00	-7.36	147	2	Average
4960.000	58.34	-3.77	54.57	74.00	-19.43	147	2	Peak
7440.000	36.08	0.61	36.69	54.00	-17.31	151	357	Average
7440.000	47.94	0.61	48.55	74.00	-25.45	151	357	Peak
10580.000	42.45	6.26	48.71	68.20	-19.49	158	311	Peak
15870.000	34.17	10.03	44.20	54.00	-9.80	156	69	Average
15870.000	43.48	10.03	53.51	74.00	-20.49	156	69	Peak

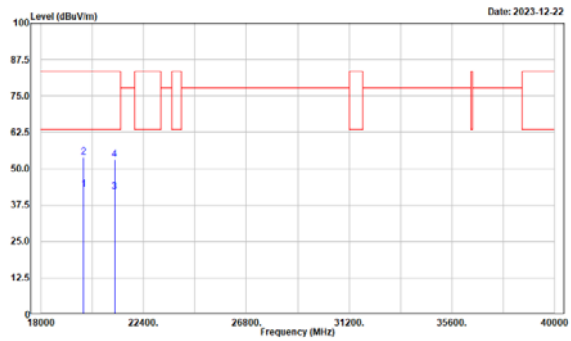
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4960.000	56.40	-3.77	52.63	54.00	-1.37	132	44	Average
4960.000	64.85	-3.77	61.08	74.00	-12.92	132	44	Peak
7440.000	31.78	0.61	32.39	54.00	-21.61	147	235	Average
7440.000	43.89	0.61	44.50	74.00	-29.50	147	235	Peak
10580.000	41.67	6.26	47.93	68.20	-20.27	156	345	Peak
15870.000	34.31	10.03	44.34	54.00	-9.66	151	348	Average
15870.000	43.25	10.03	53.28	74.00	-20.72	151	348	Peak

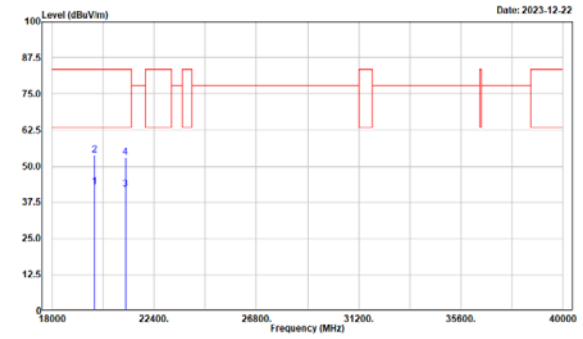
18GHz-40GHz

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19840.000	41.10	1.72	42.82	63.50	-20.68	152	64	Average
19840.000	52.11	1.72	53.83	83.50	-29.67	152	64	Peak
21160.000	39.91	2.11	42.02	63.50	-21.48	156	57	Average
21160.000	50.91	2.11	53.02	83.50	-30.48	156	57	Peak

Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19840.000	41.13	1.72	42.85	63.50	-20.65	151	284	Average
19840.000	52.17	1.72	53.89	83.50	-29.61	151	284	Peak
21160.000	39.97	2.11	42.08	63.50	-21.42	154	338	Average
21160.000	50.92	2.11	53.03	83.50	-30.47	154	338	Peak

Note:

Level = Reading + Factor.

Margin = Level – Limit.

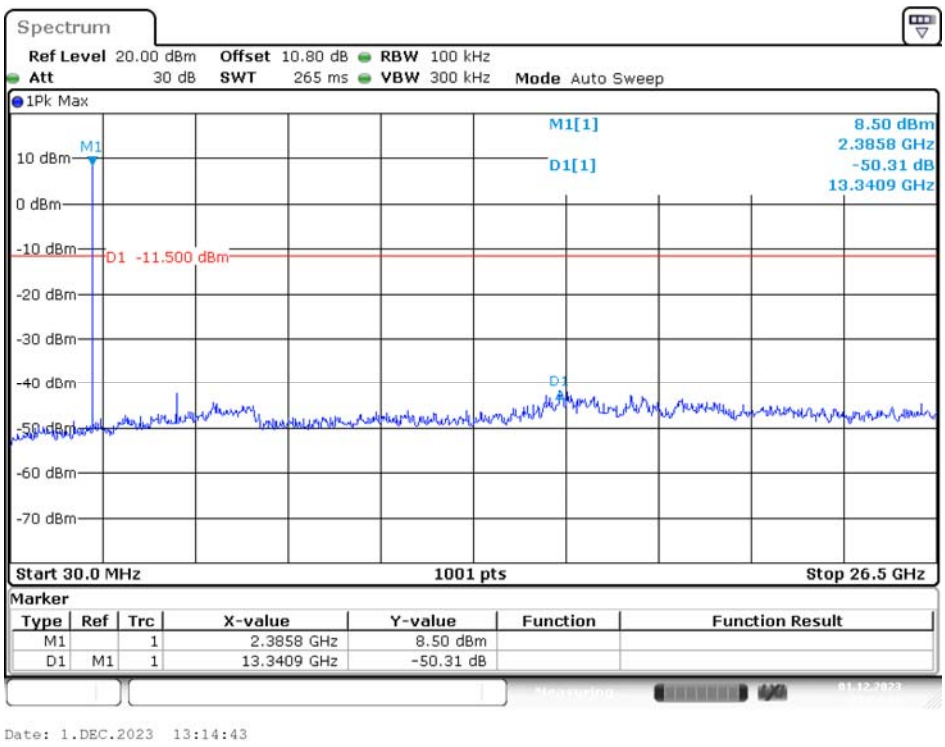
Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Conducted Spurious Emissions:

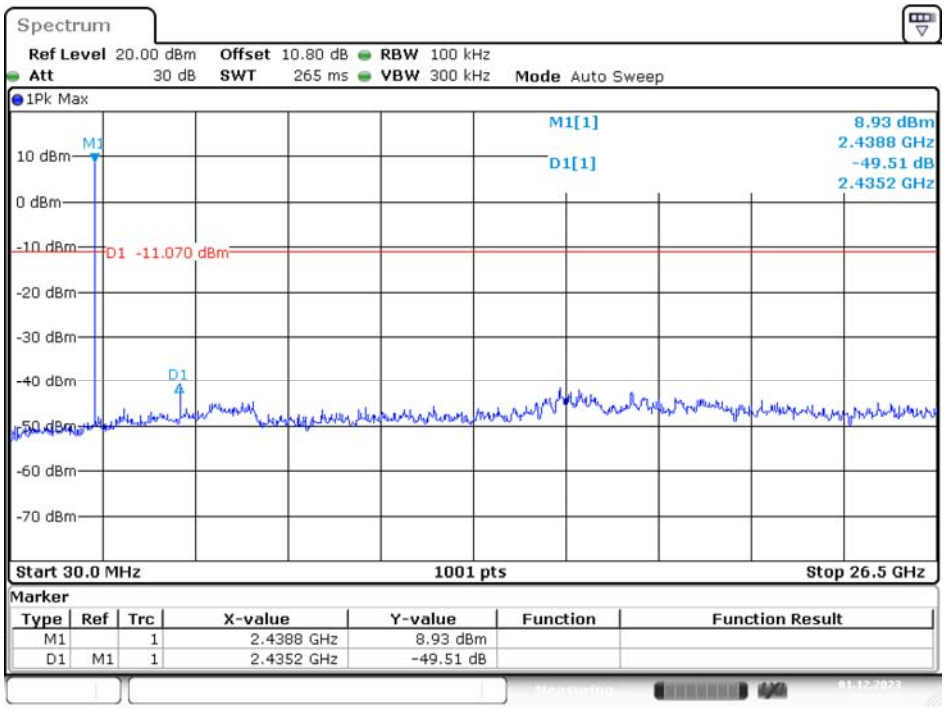
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
BR Mode (GFSK)				
Low	2402	50.31	≥ 20	PASS
Mid	2441	49.51	≥ 20	PASS
High	2480	50.95	≥ 20	PASS
EDR Mode (π/4-DQPSK)				
Low	2402	47.05	≥ 20	PASS
Mid	2441	48.61	≥ 20	PASS
High	2480	47.71	≥ 20	PASS
EDR Mode (8DPSK)				
Low	2402	47.43	≥ 20	PASS
Mid	2441	48.53	≥ 20	PASS
High	2480	49.28	≥ 20	PASS

BR Mode (GFSK)

Low Channel

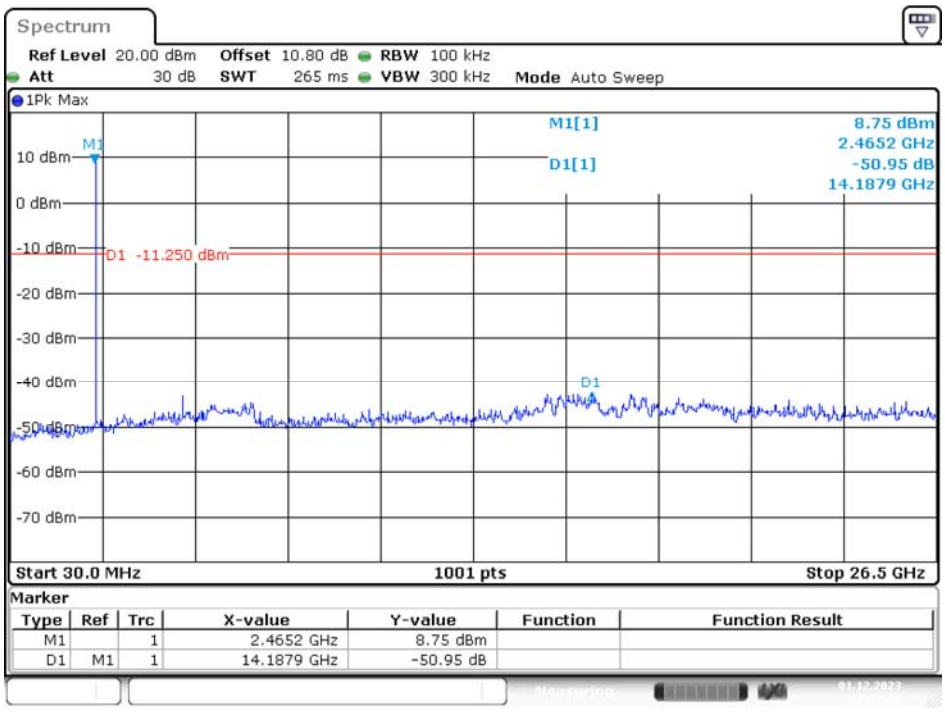


Middle Channel



Date: 1.DEC.2023 13:20:33

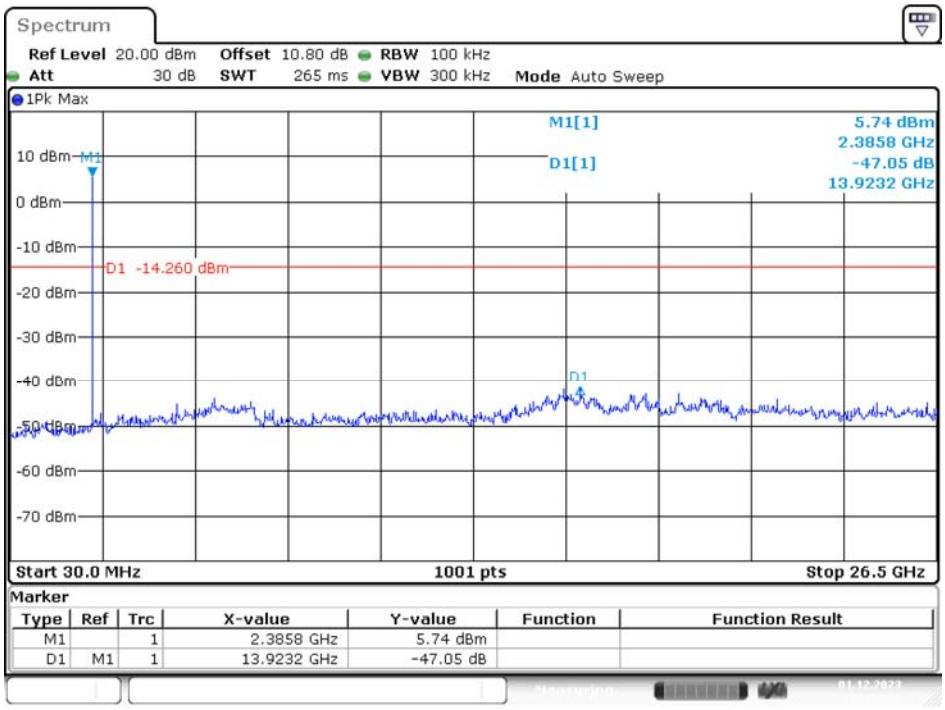
High Channel



Date: 1.DEC.2023 13:22:26

EDR Mode (π/4-DQPSK)

Low Channel



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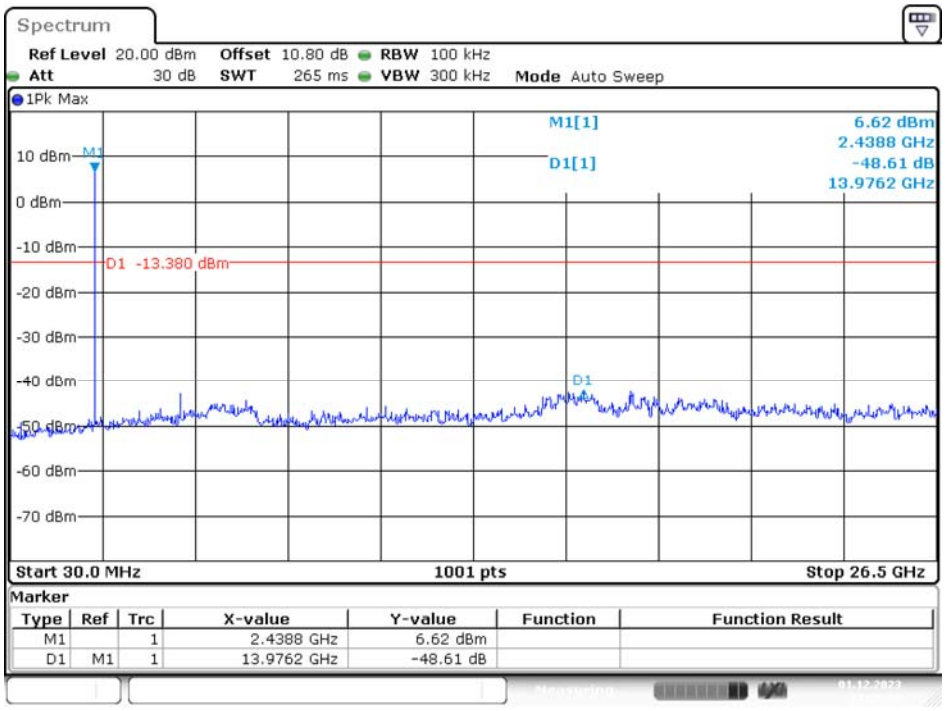
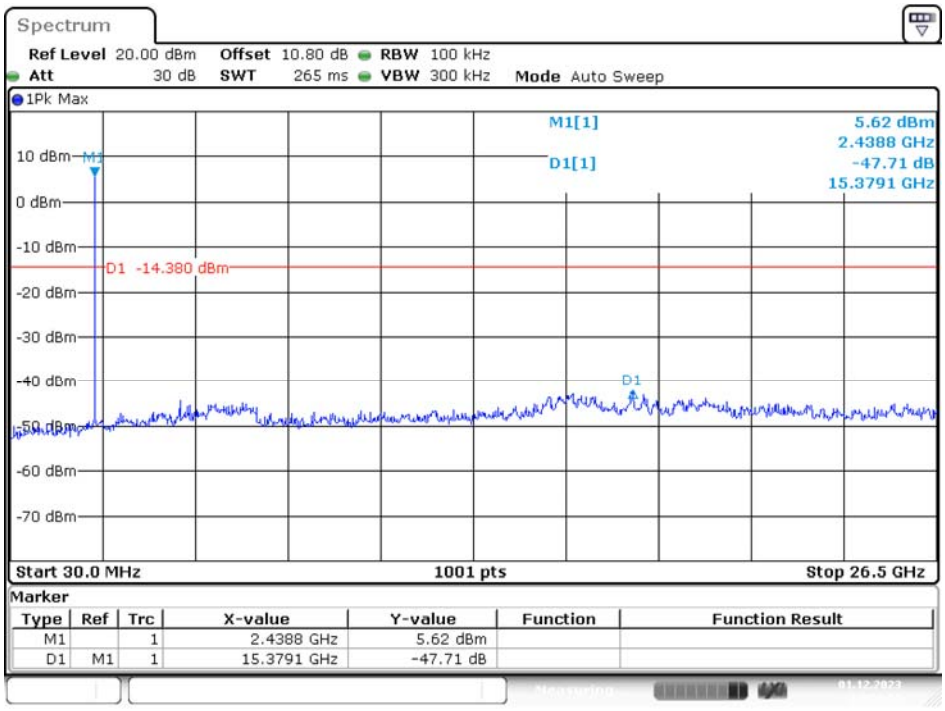
Middle Channel



Date: 1.DEC.2023 13:26:29

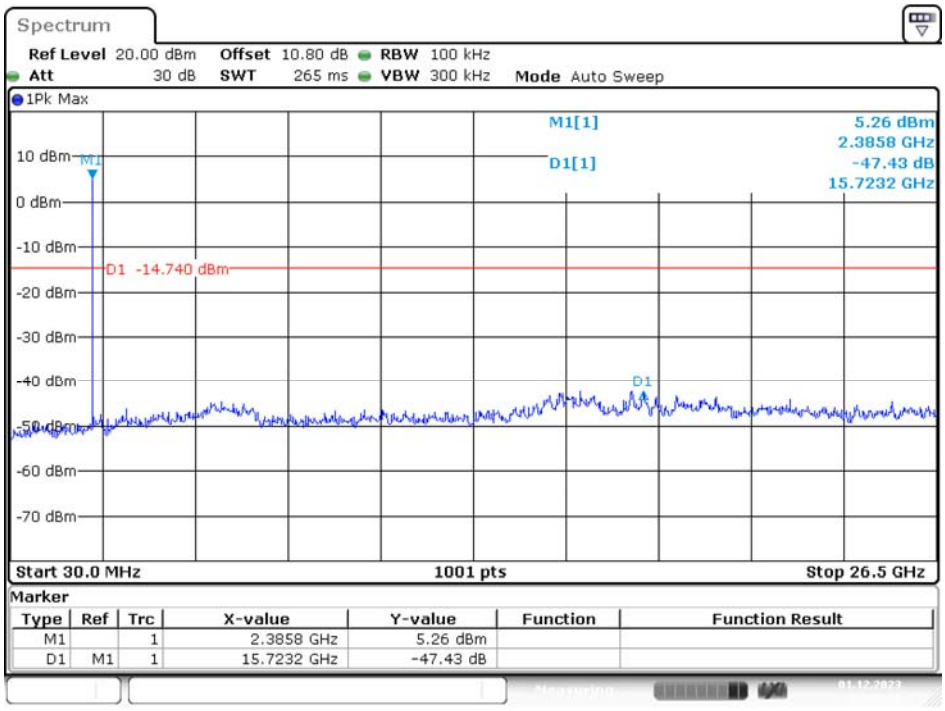
High Channel



Date: 1.DEC.2023 14:24:31

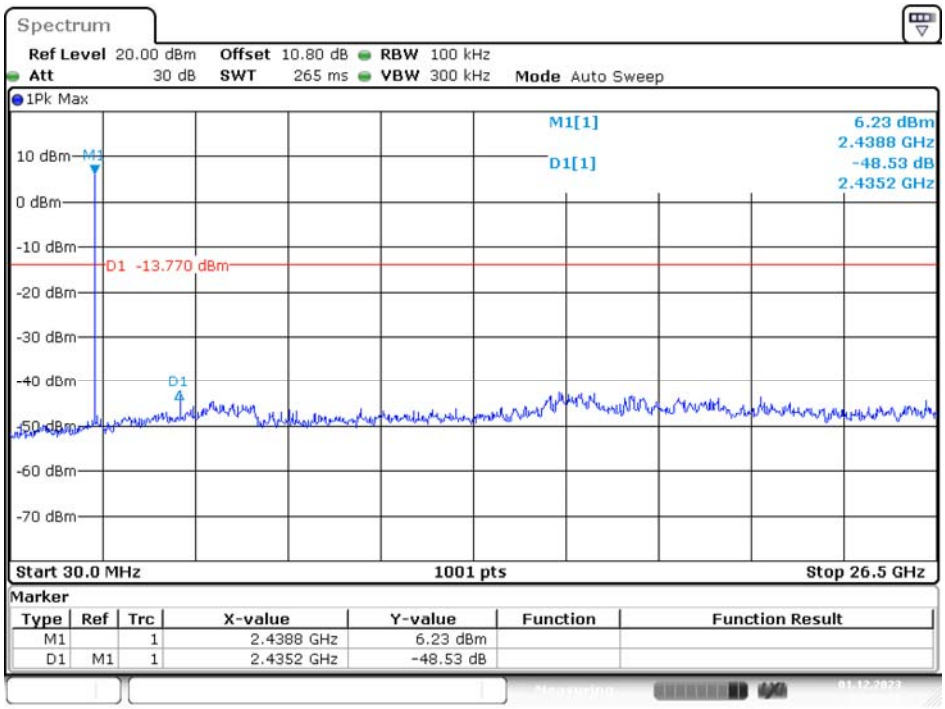
EDR Mode (8DPSK)

Low Channel



Date: 1.DEC.2023 14:26:46

Middle Channel



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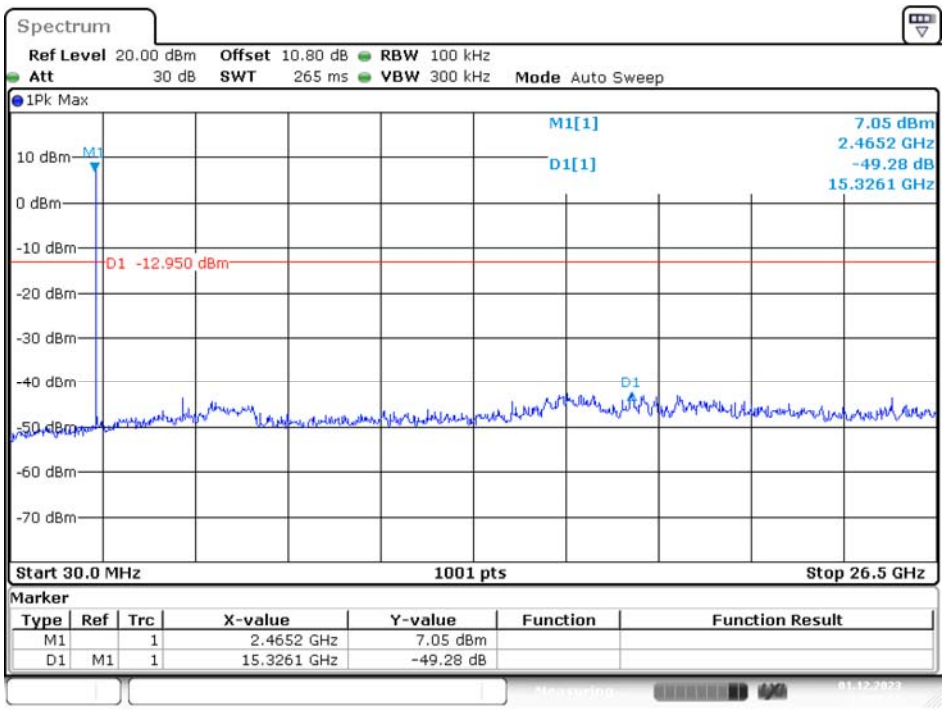
High Channel



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