

Test Report

Verified code: 388877

Report No.: E20240407651301-5

Customer: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District,
Nanshan District, Shenzhen, China

Sample Name: Presence Sensor FP1E

Sample Model: PS-S03D

Receive Sample Date: Apr.08,2024

Test Date: Apr.09,2024 ~ Apr.19,2024

Reference Document: 47 CFR Part 15 Subpart C
RADIO FREQUENCY DEVICES: Subpart C—Intentional Radiators

Test Result: Pass

Prepared by: Lu Wei
Lu Wei

Reviewed by: Wu Haoting
Wu Haoting

Approved by: Xiao Liang
Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-05-08

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2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20240407651301-5	Original Issue	2024-04-22

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1. TEST RESULT SUMMARY

Technical Requirements		
47 CFR Part 15 Subpart C 15.247 ANSI C63.10-2020 KDB 558074 D01 15.247 measurement guidance v05r02		
Limit / Severity	Item	Result
§15.203	Antenna Requirement	Pass
§15.207(a)	Conducted Emission	Pass
§15.247(d)&15.205& 15.209	Radiated Spurious Emission	Pass
§15.247(b)(3)	Maximum Peak Output Power	Pass
§15.247(e)	Power Spectral Density	Pass
§15.247(a)(2)	6dB bandwidth	Pass
§15.247(d)	Conducted band edges and Spurious Emission	Pass
§15.247(d)&15.205& 15.209	Restricted bands of operation	Pass

Note:

1. The EUT antenna is PIFA antenna. The max gain of Antenna is 2.0dBi which accordance 15.203 is considered sufficient to comply with the provisions of this section.

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2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd

Address: B1, Chongwen Park, Nanshan iPark, Liuxian Avenue, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Presence Sensor FP1E

Model No.: PS-S03D

Adding Model: PS-S03E

Model different description: PS-S03D and PS-S03E have the same technical construction including circuit diagram, PCB LAYOUT, hardware version and software version identical, except sales area and packaging are different.

Trade Name: Aqara

FCC ID: 2AKIT-PSS03

Power supply: DC 5V, 1A

Frequency Band: 2405MHz – 2480MHz

Transmit Power: 7.34dBm

Modulation type: O-QPSK

Channel space: 2MHz

Antenna Specification: PIFA antenna 2.0dBi gain (Max.)

Temperature Range: -10 °C ~ +40 °C

Hardware Version: T1

Software Version: V.1

Sample No: E20240407651301-0001, E20240407651301-0002, E20240407651301-0003

Note: The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.

2.4 CHANNELIST

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
*11	2405	12	2410	13	2415	14	2420
15	2425	16	2430	17	2435	*18	2440
19	2445	20	2450	21	2455	22	2460
23	2465	24	2470	25	2475	*26	2480

* is the test frequency

2.5 TEST OPERATION MODE

Mode No.	Description of the modes
1	ZigBee Transmitting Mode

2.6 LOCAL SUPPORTIVE

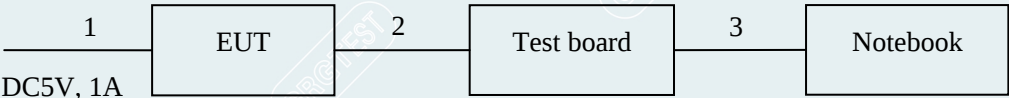
No.	Name of equipment	Manufacturer	Model	Serial number	Note
A	Notebook	DELL	Latitude3400	CY0GJW2	2#
B	Test board	/	/	/	/
C	Laptop	DELL	Latitude3490	2095LR2	3#
D	Adapter	/	/	/	/

Note: The notebook is just used to produce fixed frequency transmitting. The Laptop and Adapter is just used to auxiliary test Conducted Emissions.

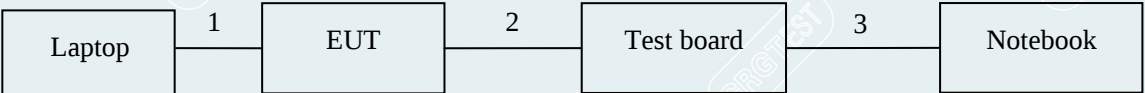
No.	Name of Equipment	Manufacturer	Model	Serial Number	Note
1	DC cable	1	No	0	1.5m
2	Serial cable	1	No	0	0.2m
3	USB-MINI cable	1	No	0	0.5m

2.7 CONFIGURATION OF SYSTEM UNDER TEST

Radiated Spurious Emission & Maximum Peak Output Power Power & Spectral Density & 6dB bandwidth & Conducted band edges and Spurious Emission & Restricted bands of operation:



Conducted Emissions:



Test software:

Software version	Test level
QCOM_V1.0	2405MHz: 8 2440MHz: 8 2480MHz: 4

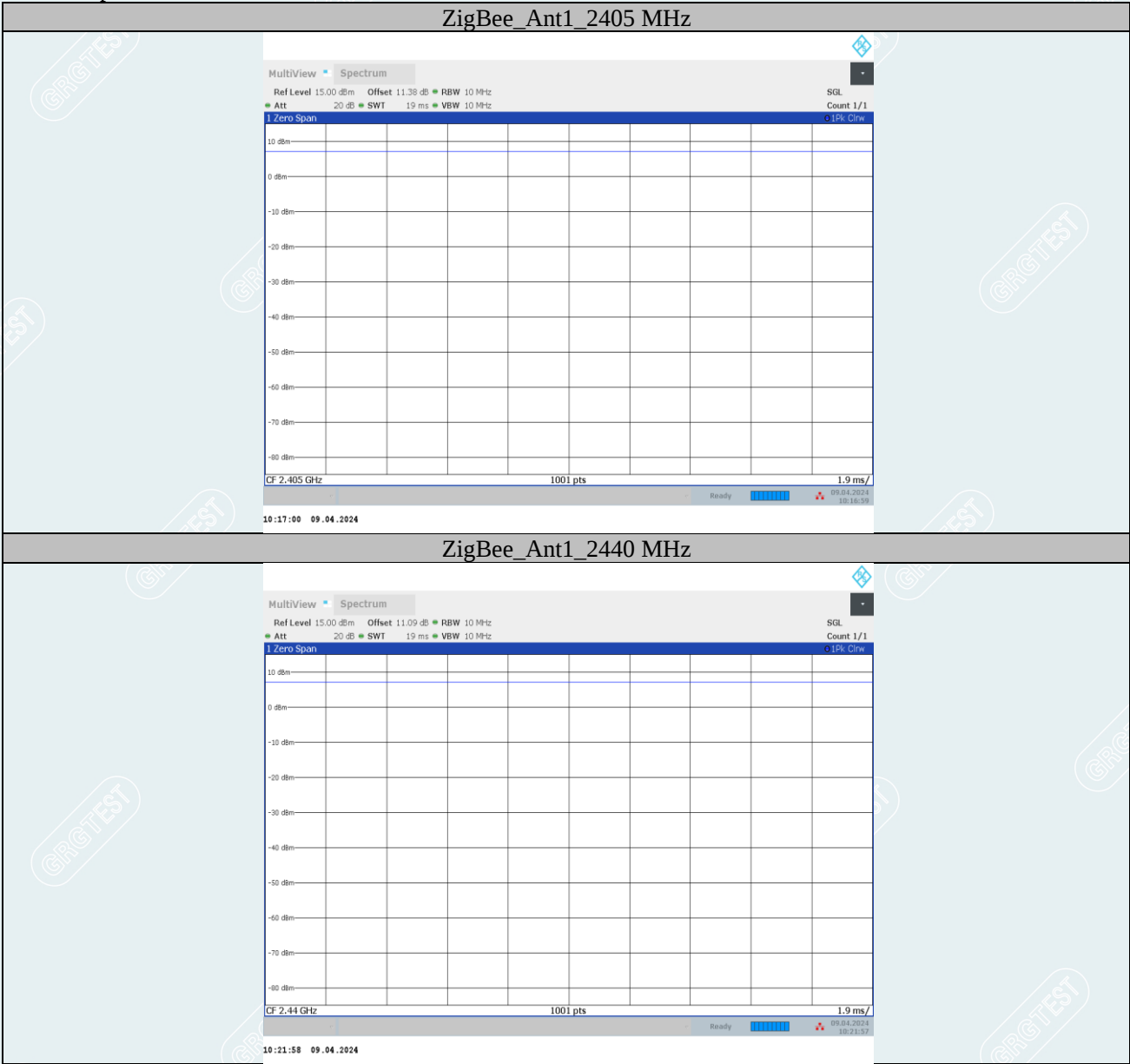
2.8 DUTY CYCLE

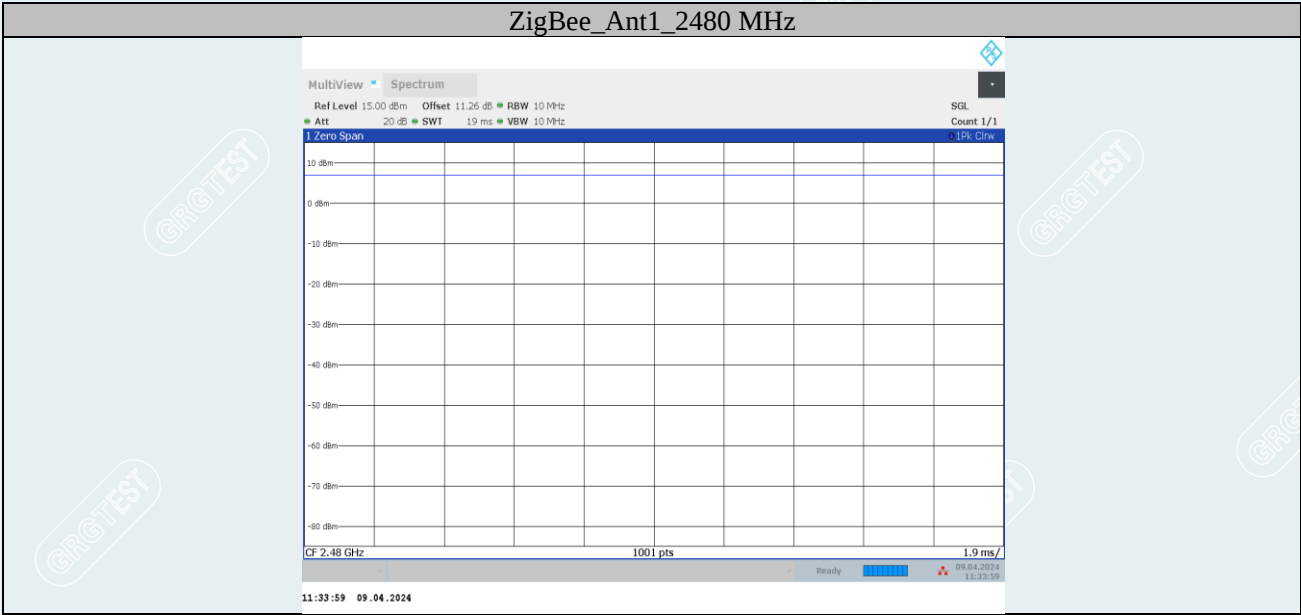
Environment: 24.2°C/64%RH/101.0kPa
Tested By: Qin Tingting

Voltage: DC 5V
Date: 2024-04-09

Test Mode	Antenna	Freq[MHz]	ON Time [ms]	Period [ms]	DC[%]	T[s]
ZigBee	Ant1	2405	0.00	0.00	100	0.00000
		2440	0.00	0.00	100	0.00000
		2480	0.00	0.00	100	0.00000

Test Graphs





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3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

Add : No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District
Shenzhen, 518110, People's Republic of China

P.C. : 518110

Tel : 0755-61180008

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3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,
<http://www.grgtest.com>

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3.3 MEASUREMENT UNCERTAINTY

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

Measurement		Frequency	Uncertainty
Radiated Emission	X	9kHz~30MHz	4.4dB ¹⁾
	Y	9kHz~30MHz	4.4dB ¹⁾
	Z	9kHz~30MHz	4.4dB ¹⁾
	Horizontal	30MHz~200MHz	4.6dB ¹⁾
		200MHz~1000MHz	4.8dB ¹⁾
		1GHz~18GHz	5.0dB ¹⁾
		18GHz~26.5GHz	5.2dB ¹⁾
	Vertical	30MHz~200MHz	4.7dB ¹⁾
		200MHz~1000MHz	4.7dB ¹⁾
		1GHz~18GHz	5.1dB ¹⁾
18GHz~26.5GHz		5.4dB ¹⁾	
Conduction Emission		150kHz~30MHz	3.4dB ¹⁾

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.78dB
Power spectral density	0.78dB
Occupied channel bandwidth	0.4dB
Unwanted emission, conducted	0.68dB
Humidity	6%
Temperature	2°C

Note:

- ¹⁾ This uncertainty represents an expanded uncertainty expressed at approximately the 95%.
This uncertainty represents an expanded uncertainty factor of $k=2$.

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4. LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
6dB Bandwidth&Conducted band edges and Spurious Emission&Power Spectral Density				
Spectrum Analyzer	R&S	FSW43	102072	2024-07-09
Automatic power measuring unit	TONSCEND	JS0806-2	21B8060365	2024-12-28
BT/WIFI System	TONSCEND	JS1120-3		
Radiated Spurious Emission&Restricted bands of operation				
Test Receiver	R&S	ESR26	101758	2024-09-22
Spectrum Analyzer	R&S	FSW43	102072	2024-07-09
Horn Antenna	Schwarzbeck	BBHA9120D	02143	2024-09-23
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	BBHA 9170-497	2024-09-18
Bi-log Antenna	Schwarzbeck	VULB 9160	VULB9160-3402	2024-10-06
Loop Antenna	Schwarzbeck	FMZB 1513-60	1513-60-56	2024-07-15
Amplifier	Tonscend	TAP01018048	AP20E8060075	2025-03-01
Amplifier	Tonscend	TAP184050	AP20E806071	2025-03-01
Amplifier	SHIRONG ELECTRONIC	DLNA-30M1G-G41	20200928002	2024-10-24
Amplifier	SHIRONG ELECTRONIC	DLNA-1G18G-G40	20200928005	2024-08-17
Test S/W	Tonscend	JS36-RE		
Maximum Peak Output Power				
Pulse power sensor	Anritsu	MA2411B	1126150	2025-01-11
Power meter	Anritsu	ML2495A	1204003	2025-01-11
Conducted Emission				
EZ-EMC	EZ	CCS-3A1-CE	/	/
EMI Receiver	R&S	ESCI	100783	2024-08-11
LISN	R&S	ENV216	101543	2024-09-10

Note: The calibration interval of the above test instruments is 12 months.

5. CONDUCTED EMISSION MEASUREMENT

5.1 LIMITS

Frequency range	Limits (dBμV)	
	Quasi-peak	Average
150kHz~0.5MHz	66~56	56~46
0.5MHz~5MHz	56	46
5MHz~30MHz	60	50

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

(2) The limit decreases in line with the logarithm of the frequency in the range of 150 kHz to 0.5MHz.

5.2 TEST PROCEDURES

Procedure of Preliminary Test

Test procedures follow ANSI C63.10:2020.

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

– Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

– All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

– The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

– Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

– I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

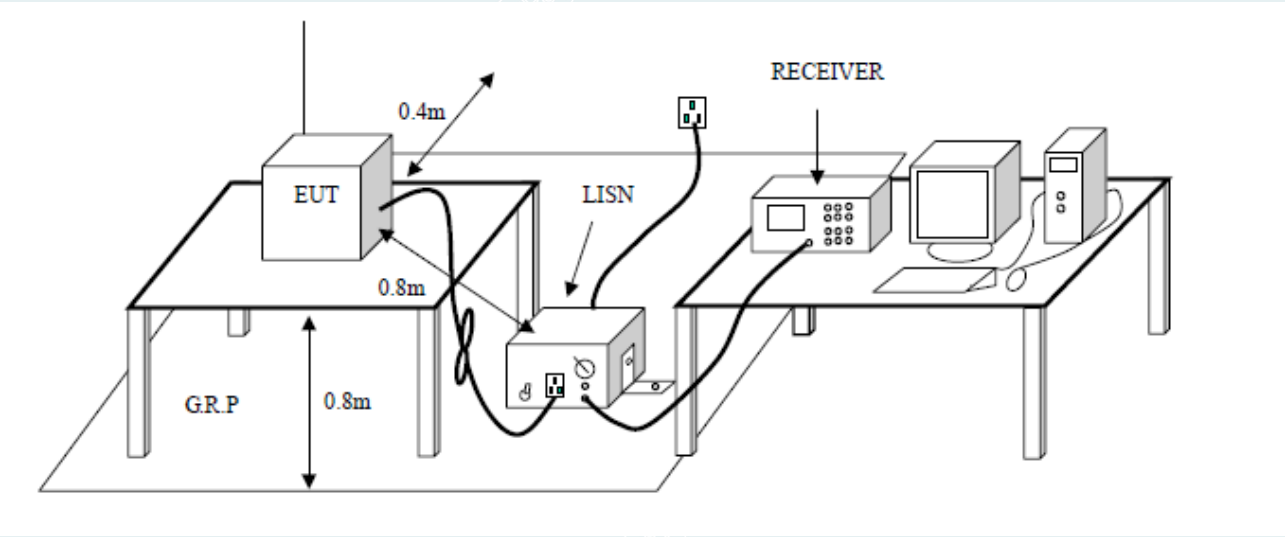
– Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

The test mode(s) described in Item 2.6 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.6 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

5.3 TEST SETUP



5.4 DATA SAMPLE

Frequency (MHz)	QuasiPeak Reading (dBuV)	Average Reading (dBuV)	Correction Factor (dB)	QuasiPeak Result (dBuV)	Average Result (dBuV)	QuasiPeak Limit (dBuV)	Average Limit (dBuV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XXXX	32.69	25.65	11.52	44.21	37.17	65.78	55.79	-21.57	-18.62	Pass

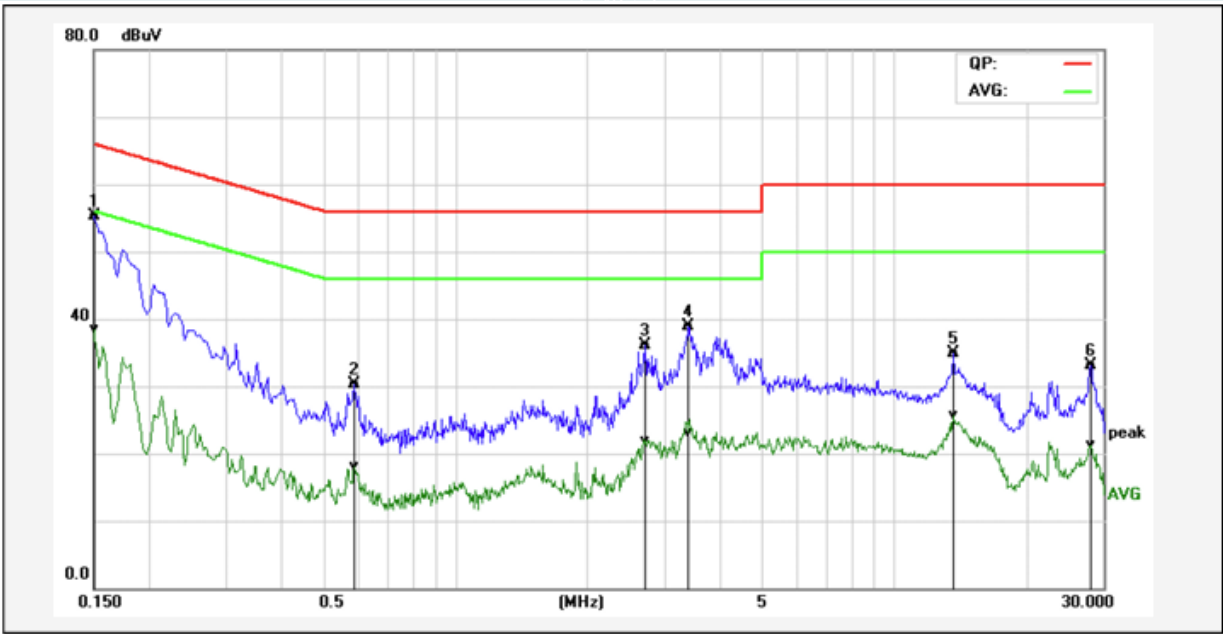
- Factor = Insertion loss of LISN + Cable Loss
- Result = Quasi-peak Reading/ Average Reading + Factor
- Limit = Limit stated in standard
- Margin = Result (dBuV) – Limit (dBuV)

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5.5 TEST RESULTS

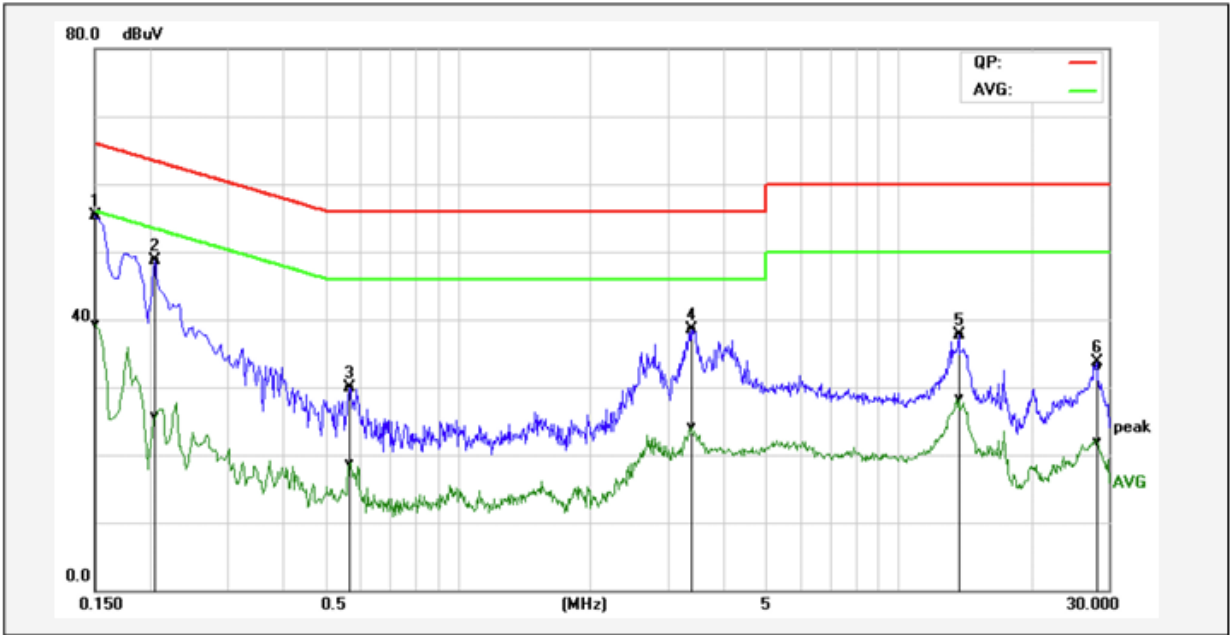
All modes were pretested and only the worst modes and channels were recorded in this report(Zigbee 2405MHz). The EUT is a USB DC power supply. As such, the device is to be tested with each type of power source that is typically used to provide power via a USB connection (Laptop and adapters).

EUT Name:	Presence Sensor FP1E	Test Mode:	Mode 1
Model:	PS-S03D	Sample No:	E20240407651301-0003
Power supply:	AC 120V/60Hz(Laptop)	Environmental Conditions:	25.5℃/67%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-04-19
Channel	Lowest channel (2405MHz)	Line:	L



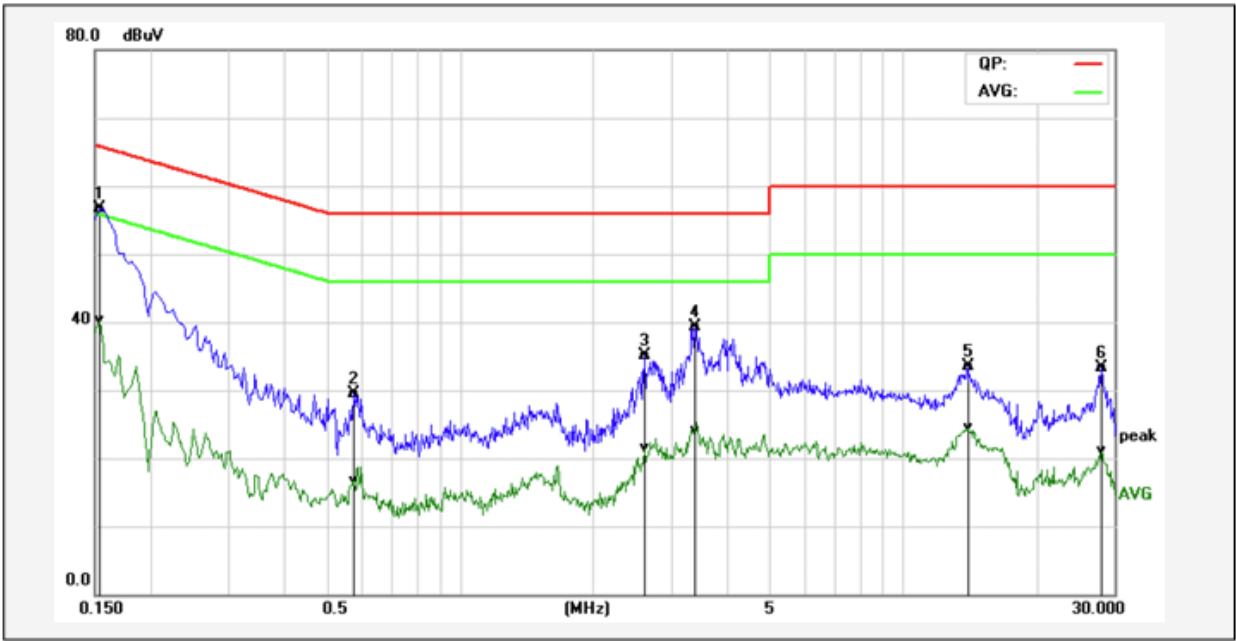
No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1500	45.70	28.86	9.70	55.40	38.56	65.99	56.00	-10.59	-17.44	Pass
2	0.5899	20.55	8.45	9.68	30.23	18.13	56.00	46.00	-25.77	-27.87	Pass
3	2.7180	26.17	11.93	9.89	36.06	21.82	56.00	46.00	-19.94	-24.18	Pass
4	3.4020	29.07	13.17	9.89	38.96	23.06	56.00	46.00	-17.04	-22.94	Pass
5	13.6380	24.84	15.64	10.00	34.84	25.64	60.00	50.00	-25.16	-24.36	Pass
6	28.1260	22.75	10.91	10.30	33.05	21.21	60.00	50.00	-26.95	-28.79	Pass

EUT Name:	Presence Sensor FP1E	Test Mode:	Mode 1
Model:	PS-S03D	Sample No:	E20240407651301-0003
Power supply:	AC 120V/60Hz(Laptop)	Environmental Conditions:	25.5℃/67%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-04-19
Channel	Lowest channel (2405MHz)	Line:	N



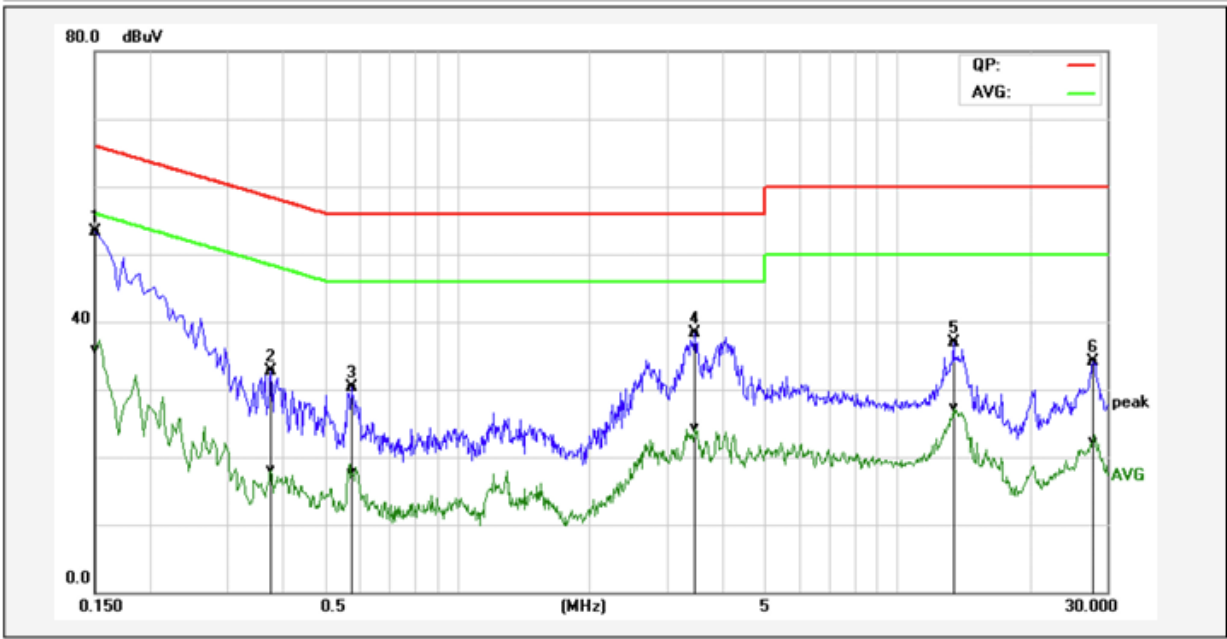
No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1500	45.53	29.69	9.70	55.23	39.39	65.99	56.00	-10.76	-16.61	Pass
2	0.2060	39.03	16.05	9.67	48.70	25.72	63.36	53.37	-14.66	-27.65	Pass
3	0.5700	20.24	8.95	9.68	29.92	18.63	56.00	46.00	-26.08	-27.37	Pass
4	3.3860	28.61	14.18	9.89	38.50	24.07	56.00	46.00	-17.50	-21.93	Pass
5	13.7340	27.77	18.29	10.00	37.77	28.29	60.00	50.00	-22.23	-21.71	Pass
6	27.7500	22.88	11.65	10.30	33.18	21.95	60.00	50.00	-26.82	-28.05	Pass

EUT Name:	Presence Sensor FP1E	Test Mode:	Mode 1
Model:	PS-S03D	Sample No:	E20240407651301-0003
Power supply:	AC 120V/60Hz(Adapter)	Environmental Conditions:	25.5℃/67%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-04-19
Channel	Lowest channel (2405MHz)	Line:	L



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1539	46.98	30.52	9.69	56.67	40.21	65.78	55.79	-9.11	-15.58	Pass
2	0.5780	19.81	7.02	9.68	29.49	16.70	56.00	46.00	-26.51	-29.30	Pass
3	2.6099	25.24	11.61	9.86	35.10	21.47	56.00	46.00	-20.90	-24.53	Pass
4	3.3900	29.48	14.23	9.89	39.37	24.12	56.00	46.00	-16.63	-21.88	Pass
5	14.0580	23.53	14.51	10.02	33.55	24.53	60.00	50.00	-26.45	-25.47	Pass
6	28.1420	23.03	10.73	10.30	33.33	21.03	60.00	50.00	-26.67	-28.97	Pass

EUT Name:	Presence Sensor FP1E	Test Mode:	Mode 1
Model:	PS-S03D	Sample No:	E20240407651301-0003
Power supply:	AC 120V/60Hz(Adapter)	Environmental Conditions:	25.5℃/67%RH/101.0kPa
Test Engineer:	Chen Zexin	Test Date:	2024-04-19
Channel	Lowest channel (2405MHz)	Line:	N



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1500	43.70	26.29	9.70	53.40	35.99	65.99	56.00	-12.59	-20.01	Pass
2	0.3780	23.09	8.46	9.68	32.77	18.14	58.32	48.32	-25.55	-30.18	Pass
3	0.5780	20.70	7.94	9.68	30.38	17.62	56.00	46.00	-25.62	-28.38	Pass
4	3.4900	28.38	14.37	9.86	38.24	24.23	56.00	46.00	-17.76	-21.77	Pass
5	13.4540	26.91	17.40	9.99	36.90	27.39	60.00	50.00	-23.10	-22.61	Pass
6	27.9540	23.79	12.04	10.30	34.09	22.34	60.00	50.00	-25.91	-27.66	Pass

6. RADIATED SPURIOUS EMISSIONS

6.1 LIMITS

In any 100kHz 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 100kHz 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 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required.

Frequency (MHz)	Quasi-peak($\mu\text{V/m}$)	Measurement distance(m)	Quasi-peak(dB $\mu\text{V/m}$)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30~88	100	3	40
88~216	150	3	43.5
216~960	200	3	46
Above 960	500	3	54

NOTE:

- (1) The emission limits for the ranges 9-90kHz and 110-490kHz are based on measurements employing a linear average detector.
- (2) The lower limit shall apply at the transition frequencies.
- (3) Above 18GHz test distance is 1m, so the Peak Limit= $74+20*\log(3/1)=83.54$ (dB $\mu\text{V/m}$).
The Avg Limit= $54+20*\log(3/1)=63.54$ (dB $\mu\text{V/m}$).

6.2 TEST PROCEDURES

1) Sequence of testing 9kHz to 30MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

--- The EUT is placed on a desktop position in the center of the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna height is 1.0 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the pre measurement the software maximizes by rotating the turntable position (0 °to 360 °) and by rotating the elevation axes (0 °to 360 °).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QP detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement and the limit will be stored.

2) Sequence of testing 30MHz to 1GHz**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.

--- The EUT is placed on a desktop position in the center of the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Pre measurement:

--- The turntable rotates from 0 °to 360 °.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 4 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1GHz to 18GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.
- The EUT is placed on a desktop position in the center of the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

Pre measurement:

- The turntable rotates from 0 °to 360 °.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the pre measurement with marked maximum final measurements and the limit will be stored.

4) Sequence of testing above 18GHz

Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Use serial board or connecting line to make EUT and notebook to communicate, according to the actual need to make EUT send constant frequency signal continuously.
- The EUT is placed on a desktop position in the center of the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

Pre measurement:

- The pre measurement distance is 1 meter.
- The turntable rotates from 0 °to 360 °.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 4 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak detector.
- The final measurement distance is 3 meter.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable rotates from 0 °to 360 °and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

NOTE:

- (a).The frequency from 9kHz to 150kHz, Set RBW=300Hz(for Peak&AVG), RBW=300Hz(for Peak&AVG). the frequency from 150kHz to 30MHz, Set RBW=9kHz, RBW=9kHz,(for QP Detector).
- (b).The frequency from 30MHz to 1GHz, Set RBW=120kHz, RBW=300kHz,(for QP Detector).
- (c).The frequency above 1GHz, for Peak detector: Set RBW=1MHz, RBW=3MHz.
- (d).The frequency above 1GHz, for Avg detector: Set RBW=1MHz, if the EUT is configured to transmit with duty cycle $\geq 98\%$, set $VBW \leq RBW/100$ (i.e.,10kHz) but not less than 10Hz. if the EUT duty cycle is $< 98\%$, set $VBW \geq 1/T$, Where T is defined in section 2.8.

----- The following blanks -----

6.3 TEST SETUP

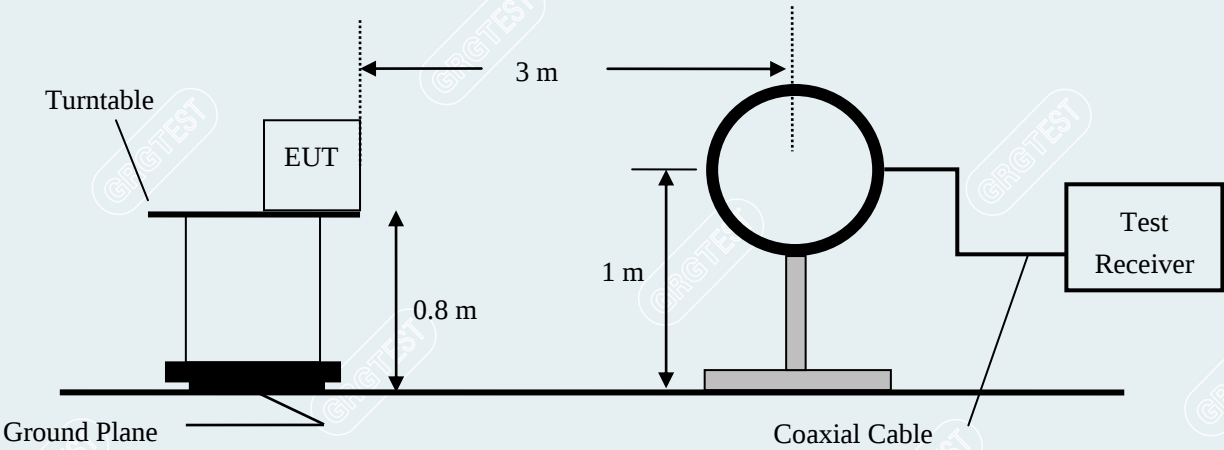


Figure 1. 9kHz to 30MHz radiated emissions test configuration

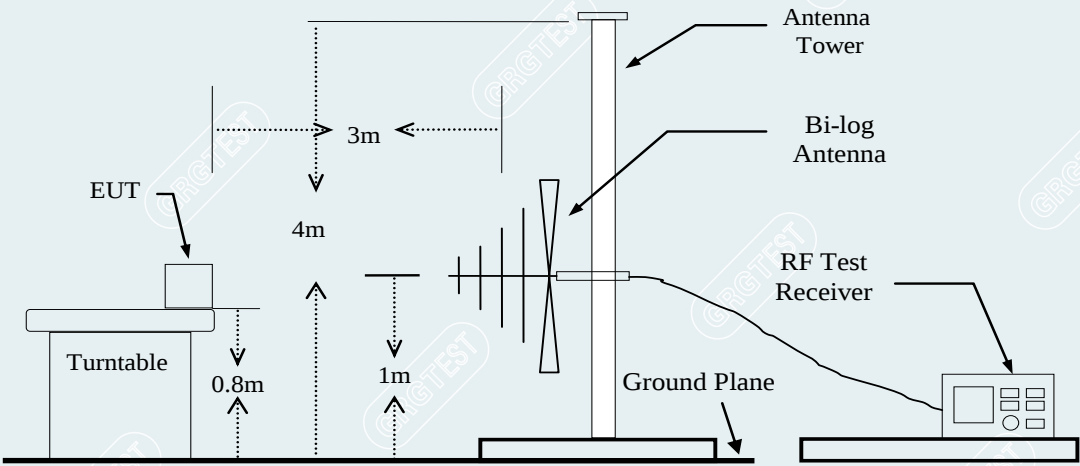


Figure 2. 30MHz to 1GHz radiated emissions test configuration

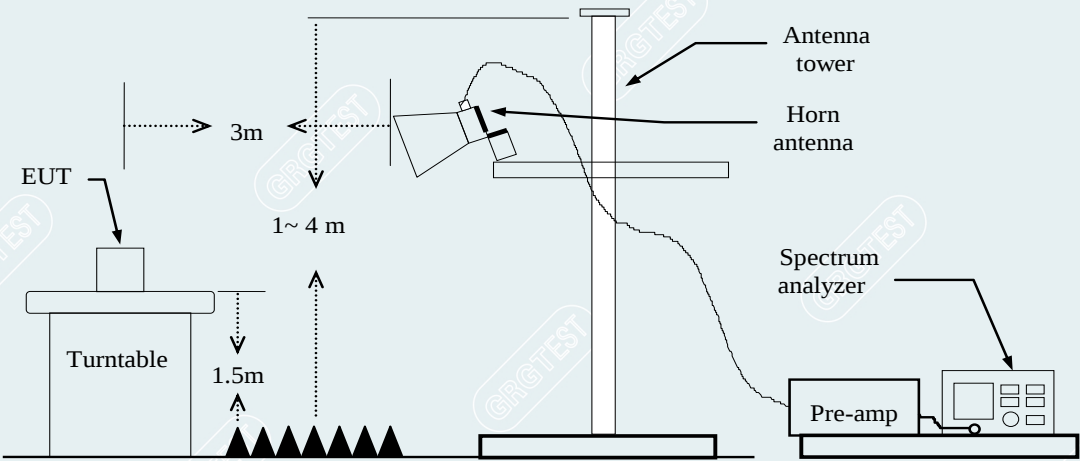


Figure 3. 1GHz to 18GHz radiated emissions test configuration

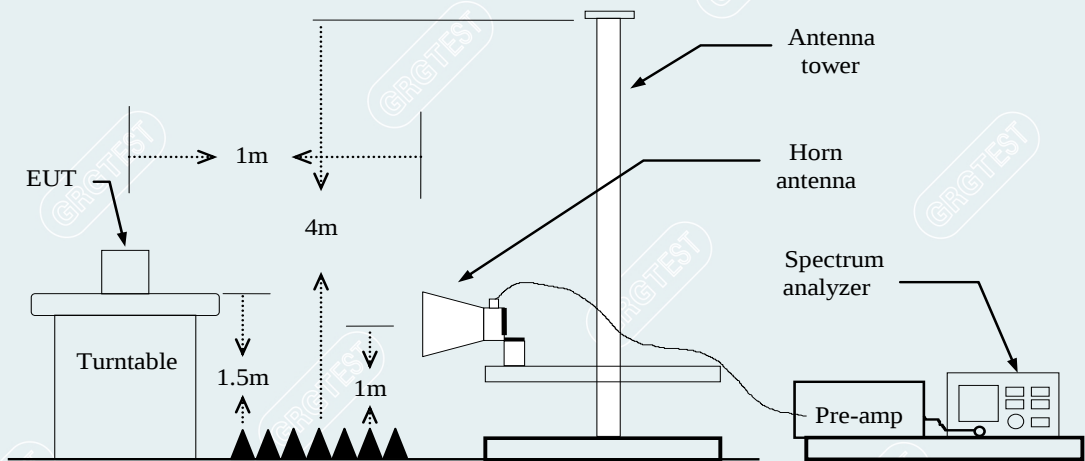


Figure 4. 18GHz to 26.5GHz radiated emissions test configuration

6.4 DATA SAMPLE

30MHz to 1GHz

No.	Freq. [MHz]	Reading [dBuV/m]	Level [dBuV/m]	Factor [dB]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
xxx	XXXX	63.53	36.38	-27.15	43.50	7.12	0	100	Horizontal

- Frequency (MHz)

Reading (dBuV/m)

Level (dBuV/m)

Limit (dBuV/m)

Margin (dB)

Polarity
- = Emission frequency in MHz

= Uncorrected Analyzer / Receiver reading

= Reading (dBuV) + Factor (dB)

= Limit stated in standard

= Limit(dBuV/m) – Level (dBuV/m)

= Antenna polarization

----- The following blanks -----

1GHz-18GHz

No.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
xxx	xxxx	78.01	55.30	-22.71	74.00	18.70	100	50	Horizontal	Peak
xxx	xxxx	66.37	43.66	-22.71	54.00	10.34	100	50	Horizontal	AVG

Above 18GHz

No.	Freq. [MHz]	Reading [dB μ V/m]	Level [dB μ V/m]	Factor [dB]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity	Remark
xxx	xxxx	54.49	42.38	-12.11	83.54	41.16	100	211	Vertical	Peak
xxx	xxxx	43.99	31.88	-12.11	63.54	31.66	100	211	Vertical	AVG

Frequency (MHz)	= Emission frequency in MHz
Reading (dB μ V/m)	= Uncorrected Analyzer / Receiver reading
Level (dB μ V/m)	= Reading (dB μ V/m) + Factor (dB)
Limit (dB μ V/m)	= Limit stated in standard
Margin (dB)	= Limit (dB μ V/m) – Level (dB μ V/m)
Polarity	= Antenna polarization
Peak	= Peak Reading
AVG	= Average Reading

----- The following blanks -----

6.5 TEST RESULTS

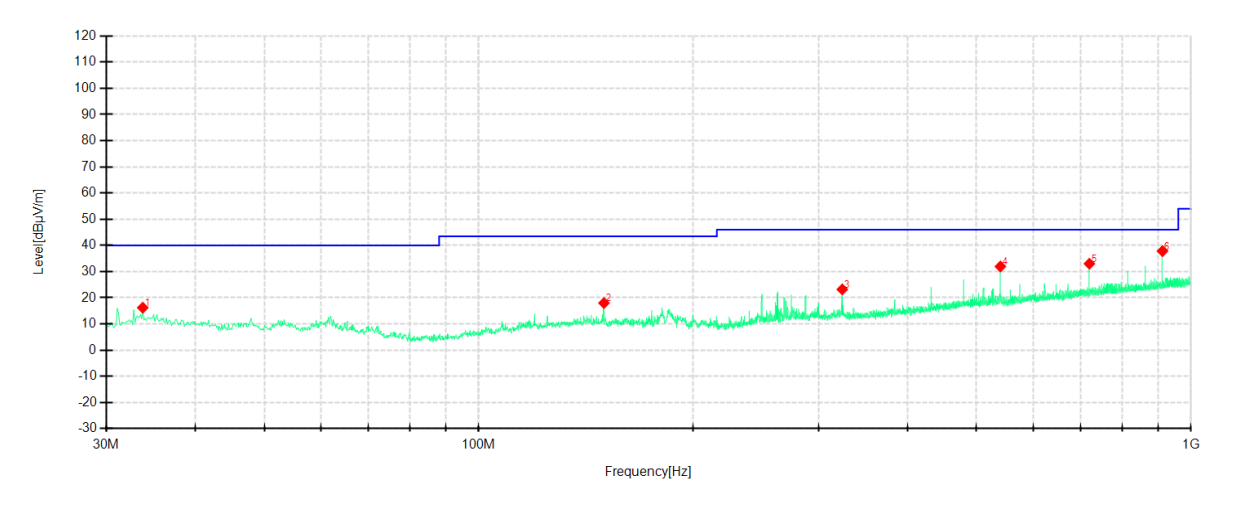
According to the user manual, EUT has three typical installation methods, namely wall installation, desktop installation and ceiling installation. All three installation methods have been tested and validated, with the worst configuration being the desktop installation mode, which is recorded in this report.

9kHz to 1GHz

Pre-scan all mode and recorded the worst case results in this report (Middle Channel).

EUT Name	Presence Sensor FP1E	Model	PS-S03D
Environmental Conditions	24.5℃/51%RH/101.0kPa	Test Voltage	DC 5V
Test Mode	TX/ ZigBee (2440MHz)	Polarity	Horizontal
Tested By	Zhang Zishan	Tested Date	2024-04-19

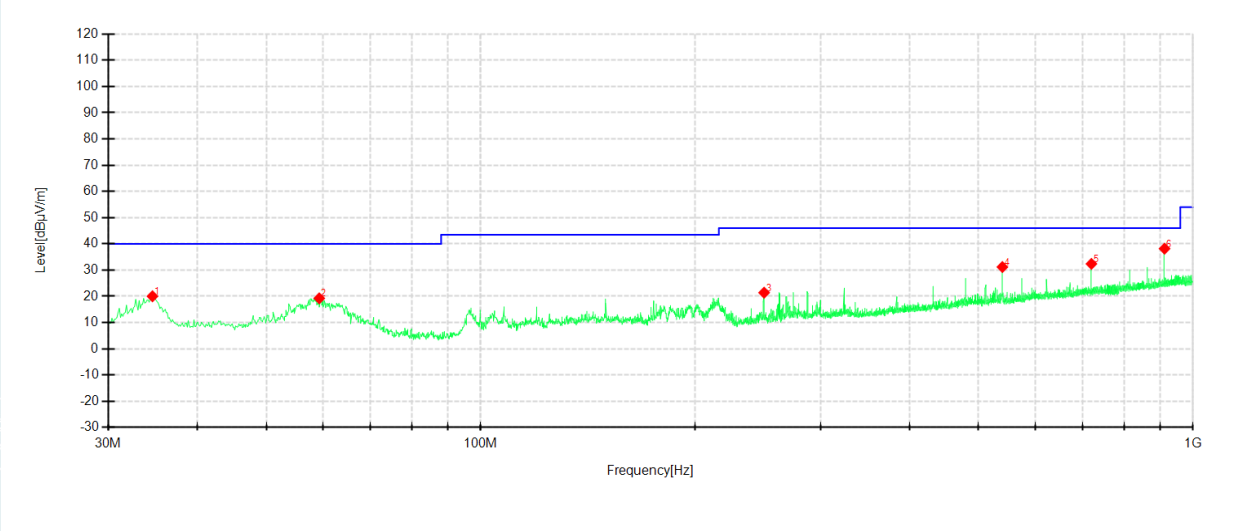
Test Graph



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	33.7592	45.90	16.20	-29.70	40.00	23.80	200	292	Horizontal
2	149.9312	46.16	18.00	-28.16	43.50	23.55	200	305	Horizontal
3	323.9467	49.90	23.21	-26.69	46.00	22.71	200	123	Horizontal
4	540.0413	52.45	31.95	-20.50	46.00	14.05	200	188	Horizontal
5	720.1200	50.55	33.01	-17.54	46.00	12.99	200	360	Horizontal
6	912.0828	53.15	37.84	-15.31	46.00	8.16	100	338	Horizontal

EUT Name	Presence Sensor FP1E	Model	PS-S03D
Environmental Conditions	24.5℃/51%RH/101.0kPa	Test Voltage	DC 5V
Test Mode	TX/ ZigBee (2440MHz)	Polarity	Vertical
Tested By	Zhang Zishan	Tested Date	2024-04-19

Test Graph



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1		49.68	20.03	-29.65	40.00	19.97	200	340	Vertical
2	59.3462	48.71	19.24	-29.47	40.00	20.76	100	241	Vertical
3	249.9750	50.82	21.40	-29.42	46.00	24.60	100	86	Vertical
4	540.0413	51.68	31.18	-20.50	46.00	14.82	100	304	Vertical
5	720.1200	49.92	32.38	-17.54	46.00	13.62	100	18	Vertical
6	912.0828	53.49	38.18	-15.31	46.00	7.82	100	18	Vertical

Remark:

- 1 No emission found between lowest internal used/generated frequency to 30MHz.
- 2 Radiated emissions measured in frequency range from 9kHz to 1GHz were made with an instrument using Quasi-peak detector mode.
- 3 Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 The IF bandwidth of Receiver between 30MHz to 1GHz was 120 kHz.
- 5 The results of prescan with a peak margin greater than 6dB are also considered to meet the requirements of the Quasi-peak detector mode. No need to test with Quasi-peak detector mode.

1GHz-18GHz:

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Mode: TX/ ZigBee

Lowest Frequency (2405MHz)

Environment: 24.5°C/51%RH/101.0kPa

Tested By:Zhang Zishan

Voltage: DC 5V

Date: 2024-04-19

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1742.4000	54.63	47.82	-6.81	74.00	26.18	100	276	Horizontal
2	2289.2000	51.66	48.53	-3.13	74.00	25.47	100	209	Horizontal
3	2596.6000	52.28	49.90	-2.38	74.00	24.10	100	194	Horizontal
4	4809.0000	50.21	43.08	-7.13	74.00	30.92	200	204	Horizontal
5	7258.5000	43.91	45.08	1.17	74.00	28.92	100	111	Horizontal
6	12150.0000	35.98	50.17	14.19	74.00	23.83	100	85	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2277.7710	-3.13	42.49	39.36	54.00	14.64	112	206	Horizontal
2	2597.0130	-2.38	44.43	42.05	54.00	11.95	101	198	Horizontal
3	12210.1300	14.19	24.24	38.43	54.00	15.57	184	67	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1161.2000	54.08	44.08	-10.00	74.00	29.92	200	182	Vertical
2	1659.4000	53.83	45.55	-8.28	74.00	28.45	100	170	Vertical
3	2518.4000	51.02	49.74	-1.28	74.00	24.26	100	305	Vertical
4	5989.5000	47.87	44.28	-3.59	74.00	29.72	100	151	Vertical
5	13959.0000	38.86	51.52	12.66	74.00	22.48	100	70	Vertical
6	18000.0000	38.57	52.04	13.47	74.00	21.96	100	41	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2519.0560	-1.28	38.82	37.54	54.00	16.46	100	350	Vertical
2	13918.7950	12.66	23.65	36.31	54.00	17.69	193	32.5	Vertical
3	17999.8700	13.47	26.16	39.63	54.00	14.37	100	32.1	Vertical

Mode: TX/ ZigBee

Middle Frequency (2440MHz)

Environment: 24.5°C/51%RH/101.0kPa

Tested By:Zhang Zishan

Voltage: DC 5V

Date: 2024-04-19

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1332.0000	54.39	45.97	-8.42	74.00	28.03	100	168	Horizontal
2	2248.0000	53.06	49.87	-3.19	74.00	24.13	100	210	Horizontal
3	3987.0000	54.67	44.28	-10.39	74.00	29.72	100	85	Horizontal
4	6499.5000	45.64	44.53	-1.11	74.00	29.47	100	153	Horizontal
5	13150.5000	35.64	50.64	15.00	74.00	23.36	100	72	Horizontal
6	17962.5000	37.76	49.42	11.66	74.00	24.58	100	126	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2248.0000	-3.19	46.79	43.60	54.00	10.40	162	218.7	Horizontal
2	13189.7075	15.00	23.59	38.59	54.00	15.41	200	116.6	Horizontal
3	17999.3550	11.66	26.12	37.78	54.00	16.22	173	134.4	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1163.4000	56.65	46.70	-9.95	74.00	27.30	200	86	Vertical
2	1658.8000	56.04	47.76	-8.28	74.00	26.24	200	220	Vertical
3	2658.6000	50.69	48.00	-2.69	74.00	26.00	100	100	Vertical
4	3985.5000	53.42	42.65	-10.77	74.00	31.35	100	139	Vertical
5	6649.5000	47.44	46.40	-1.04	74.00	27.60	100	166	Vertical
6	13120.5000	36.62	50.66	14.04	74.00	23.34	100	259	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	13182.5875	14.04	23.62	37.66	54.00	16.34	200	238	Vertical

Mode: TX/ ZigBee

Highest Frequency (2480MHz)

Environment: 24.5°C/51%RH/101.0kPa

Tested By:Zhang Zishan

Voltage: DC 5V

Date: 2024-04-19

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1329.2000	53.95	45.51	-8.44	74.00	28.49	100	231	Horizontal
2	1819.0000	53.93	48.42	-5.51	74.00	25.58	200	151	Horizontal
3	2283.4000	53.84	50.71	-3.13	74.00	23.29	100	205	Horizontal
4	3316.5000	52.18	38.79	-13.39	74.00	35.21	100	72	Horizontal
5	4948.5000	48.84	42.45	-6.39	74.00	31.55	200	222	Horizontal
6	15649.5000	37.07	50.02	12.95	74.00	23.98	200	35	Horizontal

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1810.3660	-5.51	40.02	34.51	54.00	19.49	200	124.8	Horizontal
2	2283.0370	-3.13	48.15	45.02	54.00	8.98	120	213.1	Horizontal
3	15685.7325	12.95	26.29	39.24	54.00	14.76	198	207.2	Horizontal

Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1199.6000	54.61	45.61	-9.00	74.00	28.39	200	85	Vertical
2	1330.2000	53.40	44.95	-8.45	74.00	29.05	100	166	Vertical
3	1895.4000	50.44	47.05	-3.39	74.00	26.95	200	43	Vertical
4	6646.5000	47.23	46.19	-1.04	74.00	27.81	100	168	Vertical
5	9898.5000	41.02	49.49	8.47	74.00	24.51	100	195	Vertical
6	17998.5000	37.67	51.14	13.47	74.00	22.86	200	360	Vertical

AV Final Data List									
NO.	Freq. [MHz]	Factor [dB]	AV Reading [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Polarity
1	9901.9375	8.47	32.71	41.18	54.00	12.82	100	188.5	Vertical
2	17999.3450	13.47	26.11	39.58	54.00	14.42	188	287.6	Vertical

Remark:

- 1 Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- 2 Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
- 3 Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
- 4 Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.

18GHz to 26.5GHz

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Pre-scan all modes and recorded the worst case results in this report (ZigBee). The peak test results is less than the average limits, so the average test results had not reported.

Mode: TX/ ZigBee
Lowest Frequency (2405MHz)
Environment: 25.5°C/54%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 5V
Date: 2024-04-19

Suspected Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18874.2250	44.93	27.81	18.27	-17.12	74.00	55.73	100	249	Horizontal
2	19791.3750	43.14	26.46	16.92	-16.68	74.00	57.08	100	78	Horizontal
3	21501.1500	43.18	27.34	17.80	-15.84	74.00	56.20	100	249	Horizontal
4	23641.4500	44.66	29.92	20.38	-14.74	74.00	53.62	100	142	Horizontal
5	25023.5500	44.19	30.34	20.80	-13.85	74.00	53.20	100	338	Horizontal
6	25959.8250	45.79	31.38	21.84	-14.41	74.00	52.16	100	34	Horizontal

Suspected Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18397.8000	43.49	25.74	16.20	-17.75	74.00	57.80	100	62	Vertical
2	18865.3000	43.77	26.64	17.10	-17.13	74.00	56.90	100	18	Vertical
3	19446.7000	44.37	27.25	17.71	-17.12	74.00	56.29	100	360	Vertical
4	21200.2500	42.97	26.90	17.36	-16.07	74.00	56.64	100	82	Vertical
5	23776.6000	44.82	30.24	20.70	-14.58	74.00	53.30	100	18	Vertical
6	25924.1250	45.57	31.21	21.67	-14.36	74.00	52.33	100	254	Vertical

Note: Above 18G test distance is 1m, so the Level for 3m= Level for 1m + 20*log(1/3). The pre measurement result margin is greater than 20dB, and final measurement is not required.

----- The following blanks -----

Mode: TX/ ZigBee
Middle Frequency (2440MHz)
Environment: 25.5°C/54%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 5V
Date: 2024-04-19

Suspected Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18407.5750	43.26	25.52	15.98	-17.74	74.00	58.02	100	20	Horizontal
2	19297.9500	44.58	27.68	18.14	-16.90	74.00	55.86	100	191	Horizontal
3	22720.0500	43.91	29.08	19.54	-14.83	74.00	54.46	100	236	Horizontal
4	23897.7250	45.19	30.78	21.24	-14.41	74.00	52.76	100	346	Horizontal
5	24988.2750	44.51	30.67	21.13	-13.84	74.00	52.87	100	346	Horizontal
6	25969.6000	45.14	30.72	21.18	-14.42	74.00	52.82	100	64	Horizontal

Suspected Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18373.5750	43.76	25.95	16.41	-17.81	74.00	57.59	100	20	Vertical
2	19043.3750	44.00	26.90	17.36	-17.10	74.00	56.64	100	191	Vertical
3	21306.5000	42.44	26.44	16.90	-16.00	74.00	57.10	100	236	Vertical
4	24071.5500	44.52	29.99	20.45	-14.53	74.00	53.55	100	346	Vertical
5	25029.5000	44.32	30.36	20.82	-13.96	74.00	53.18	100	346	Vertical
6	25797.4750	44.82	30.58	21.04	-14.24	74.00	52.96	100	64	Vertical

Note: Above 18G test distance is 1m, so the Level for 3m= Level for 1m + 20*log(1/3). The pre measurement result margin is greater than 20dB, and final measurement is not required.

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Mode: TX/ ZigBee
Highest Frequency (2480MHz)
Environment: 25.5℃/54%RH/101.0kPa
Tested By:Zhang Zishan

Voltage: DC 5V
Date: 2024-04-19

Suspected Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	18864.4500	44.13	26.99	17.45	-17.14	74.00	56.55	100	253	Horizontal
2	20742.9500	42.20	25.74	16.20	-16.46	74.00	57.80	100	0	Horizontal
3	22352.0000	43.11	27.71	18.17	-15.40	74.00	55.83	100	296	Horizontal
4	23947.4500	44.70	30.38	20.84	-14.32	74.00	53.16	100	274	Horizontal
5	24980.2000	44.33	30.48	20.94	-13.85	74.00	53.06	100	317	Horizontal
6	25932.6250	45.33	30.93	21.39	-14.40	74.00	52.61	100	317	Horizontal

Suspected Data List										
NO.	Freq. [MHz]	Reading [dBμV/m]	Level for 1m [dBμV/m]	Level for 3m [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	19004.7000	44.87	27.81	18.27	-17.06	74.00	55.73	100	62	Vertical
2	19474.7500	43.53	26.44	16.90	-17.09	74.00	57.10	100	21	Vertical
3	22743.8500	44.11	28.93	19.39	-15.18	74.00	54.61	100	239	Vertical
4	24094.9250	44.58	30.08	20.54	-14.50	74.00	53.46	100	218	Vertical
5	25841.6750	45.18	30.90	21.36	-14.28	74.00	52.64	100	347	Vertical
6	26468.9750	44.57	30.41	20.87	-14.16	74.00	53.13	100	261	Vertical

Note: Above 18G test distance is 1m, so the Level for 3m= Level for 1m + 20*log(1/3). The pre measurement result margin is greater than 20dB, and final measurement is not required.

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7. 6dB BANDWIDTH

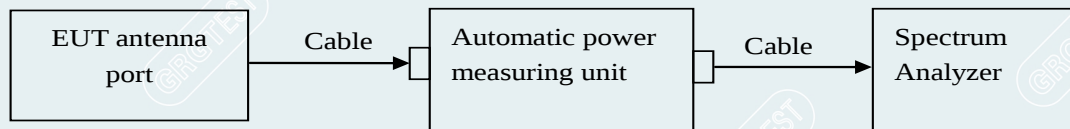
7.1 LIMITS

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

7.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Set resolution bandwidth (RBW) = 100kHz. Set the video bandwidth (VBW) $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold. Sweep = auto couple. Allow the trace to stabilize, record 6dB bandwidth value.
- 3) Repeat above procedures until all frequencies measured were complete.

7.3 TEST SETUP



----- The following blanks -----

7.4 TEST RESULTS

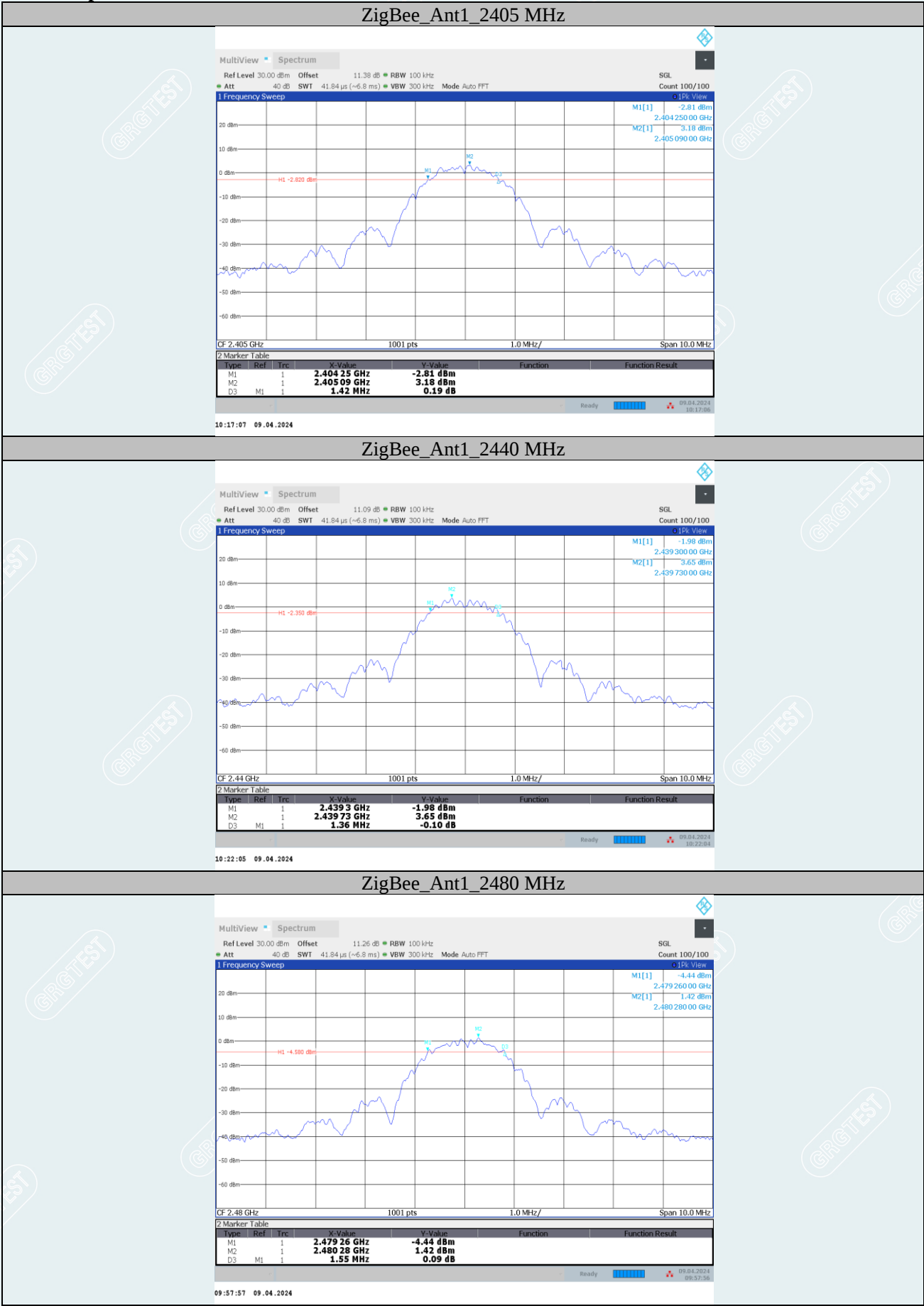
Environment: 24.2℃/64%RH/101.0kPa
Tested By: Qin Tingting

Voltage: DC 5V
Date: 2024-04-09

Test Mode	Antenna	Freq(MHz)	Bandwidth[kHz]	Limit[kHz]	Verdict
ZigBee	Ant1	2405	1420	≥500	PASS
		2440	1360		PASS
		2480	1550		PASS

----- The following blanks -----

Test Graphs



8. MAXIMUM PEAK OUTPUT POWER

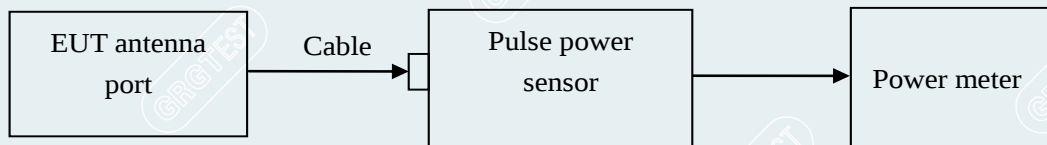
8.1 LIMITS

The maximum Peak output power measurement is 1W

8.2 TEST PROCEDURES

- 1) RF output of EUT was connected to the broadband peak RF power meter by RF cable. The path loss was compensated to the results for each measurement.
- 2) Set to the maximum power setting and enable the EUT transmit continuously.
- 3) Measure the conducted output power and record the results in the test report.

8.3 TEST SETUP



----- The following blanks -----

8.4 TEST RESULTS

Environment: 24.2℃/64%RH/101.0kPa
Tested By: Qin Tingting

Voltage: DC 5V
Date: 2024-04-09

ZigBee

Channel	Frequency (MHz)	Measured Channel Power (dBm)	Limit	Peak/ Average	Result
Lowest	2405	7.20	1W (30dBm)	Peak	Pass
Middle	2440	7.34			Pass
Highest	2480	3.69			Pass

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9. POWER SPECTRAL DENSITY

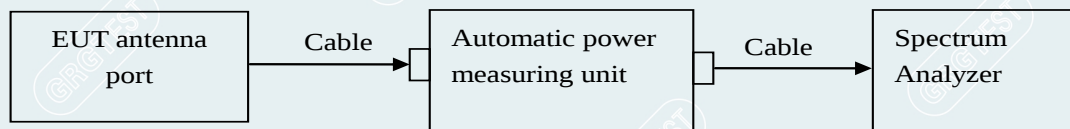
9.1 LIMITS

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

9.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3) Set the analyzer span to 1.5 times the DTS bandwidth. Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$. Set the VBW $\geq [3 \times \text{RBW}]$. Detector = peak. Sweep time = auto couple. Trace mode = max hold. Allow trace to fully stabilize. Use the peak marker function to determine the maximum amplitude level within the RBW. If measured value exceeds requirement, then reduce RBW (but no less than 3kHz) and repeat.
- 4) Repeat above procedures until all frequencies measured were complete.

9.3 TEST SETUP



----- The following blanks -----

9.4 TEST RESULTS

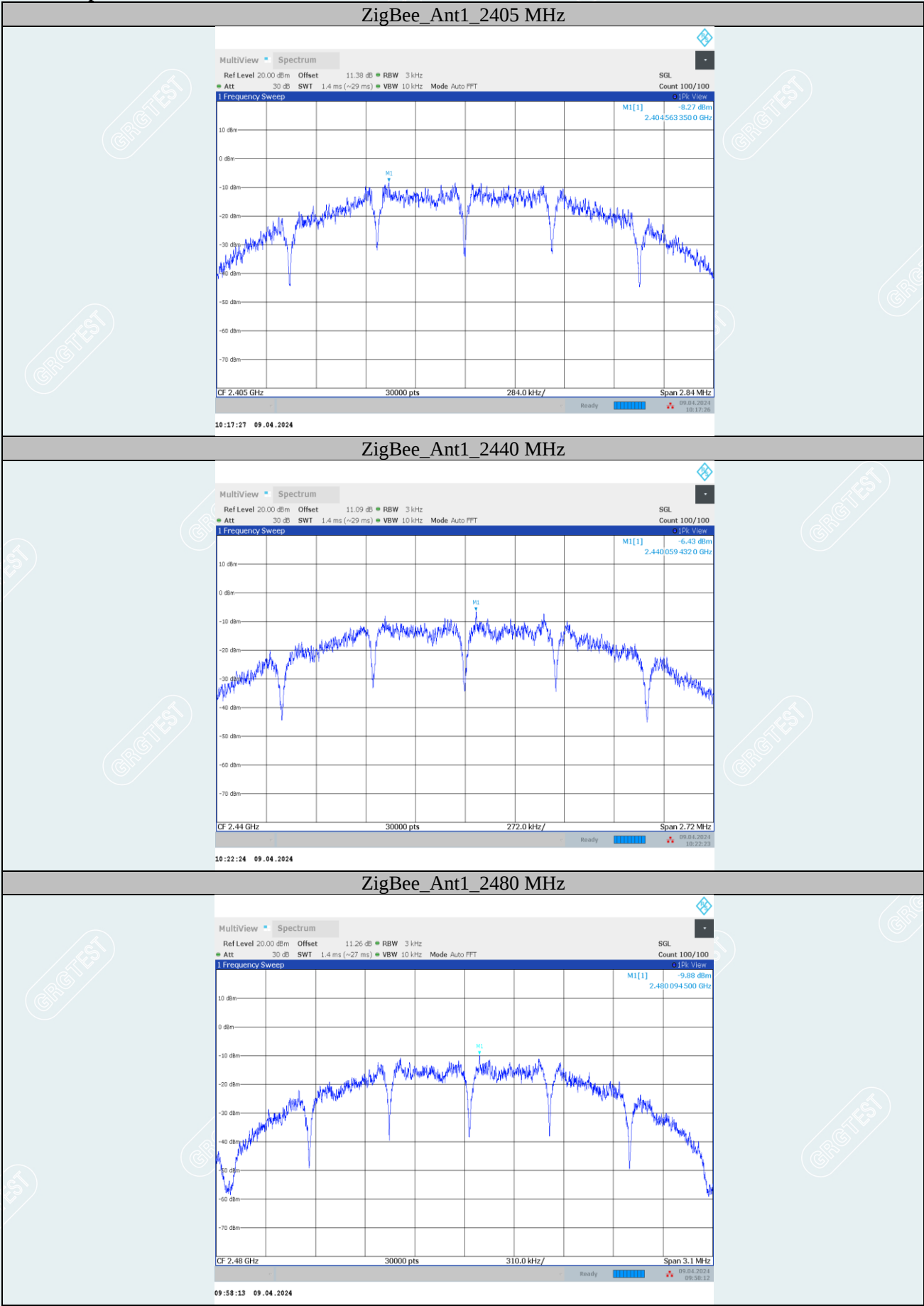
Environment: 24.2℃/64%RH/101.0kPa
Tested By: Qin Tingting

Voltage: DC 5V
Date: 2024-04-09

Test Mode	Antenna	Freq(MHz)	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
ZigBee	Ant1	2405	-8.27	≤8.00	PASS
		2440	-6.43	≤8.00	PASS
		2480	-9.88	≤8.00	PASS

----- The following blanks -----

Test Graphs



10. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

10.1 LIMITS

In any 100kHz 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 20dB below that in the 100kHz 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 30dB instead of 20dB.

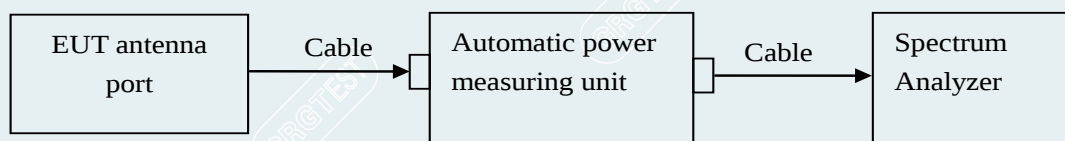
10.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 15.247 Measurement Guidance v05r02.

Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.

- 1) Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
- 2) Set the spectrum analyzer: RBW =100kHz; VBW =300kHz, Frequency range = 30MHz to 26.5GHz; Sweep = auto; Detector Function = Peak. Trace = Max, hold.
- 3) Measure and record the results in the test report.
- 4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

10.3 TEST SETUP



10.4 TEST RESULTS

Environment: 24.2℃/64%RH/101.0kPa

Voltage: DC 5V

Tested By: Qin Tingting

Date: 2024-04-09

Band edge

Test Mode	Antenna	Ch Name	Freq(MHz)	Ref Level[dBm]	Result[dBm]	Limit[dBm]	Verdict
ZigBee	Ant1	Low	2405	2.09	-47.58	≤-17.91	PASS
		High	2480	0.03	-42.99	≤-19.97	PASS

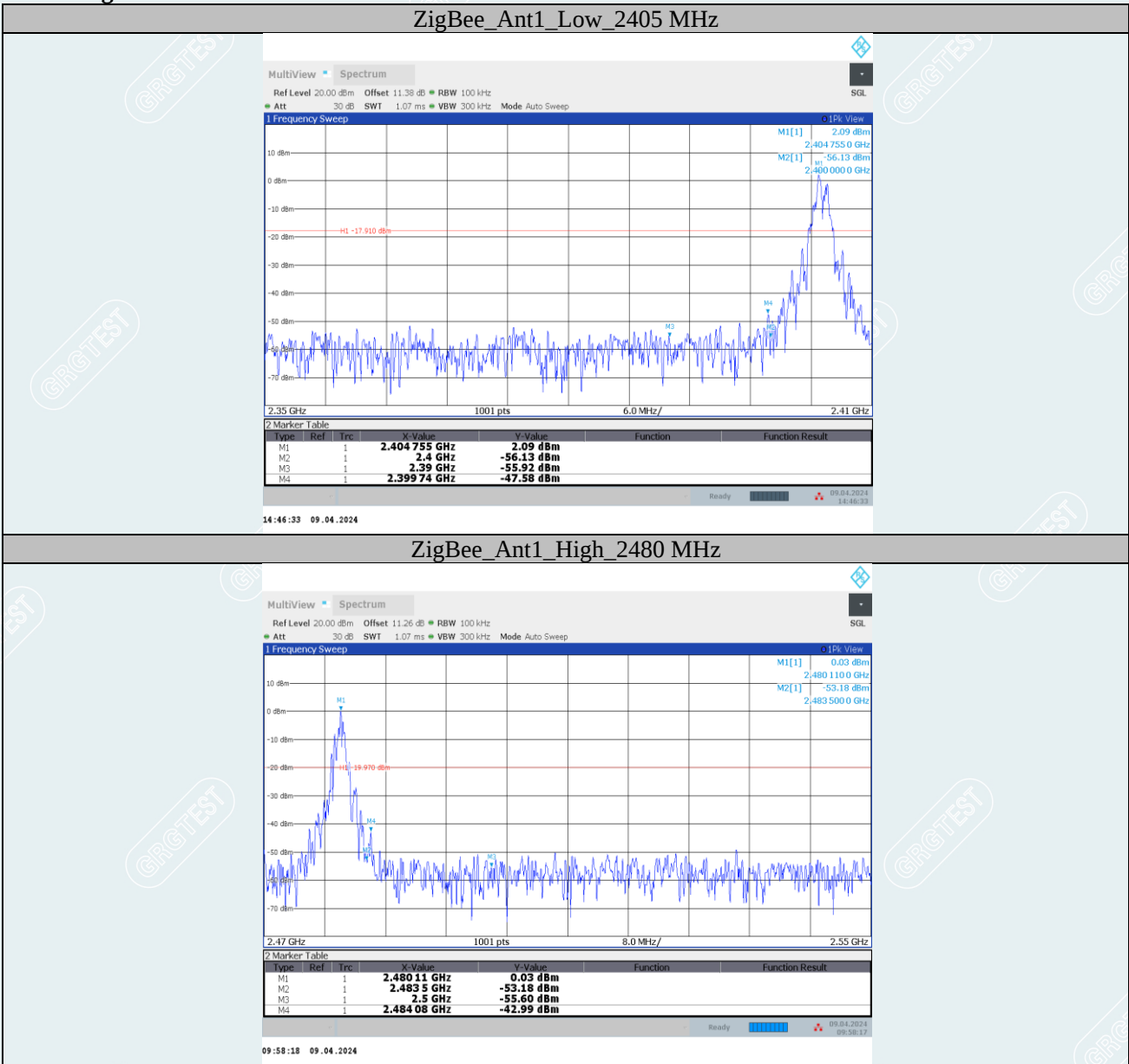
Conducted Spurious Emission

Test Mode	Antenna	Freq(MHz)	Freq Range [MHz]	Ref Level [dBm]	Result[dBm]	Limit[dBm]	Verdict
ZigBee	Ant1	2405	Reference	2.54	2.54	---	PASS
			30~1000	2.54	-57.5	≤-17.46	PASS
			1000~26500	2.54	-42.97	≤-17.46	PASS
		2440	Reference	2.68	2.68	---	PASS
			30~1000	2.68	-57.48	≤-17.32	PASS
			1000~26500	2.68	-43.78	≤-17.32	PASS
		2480	Reference	-0.27	-0.27	---	PASS
			30~1000	-0.27	-57.31	≤-20.27	PASS
			1000~26500	-0.27	-43.71	≤-20.27	PASS

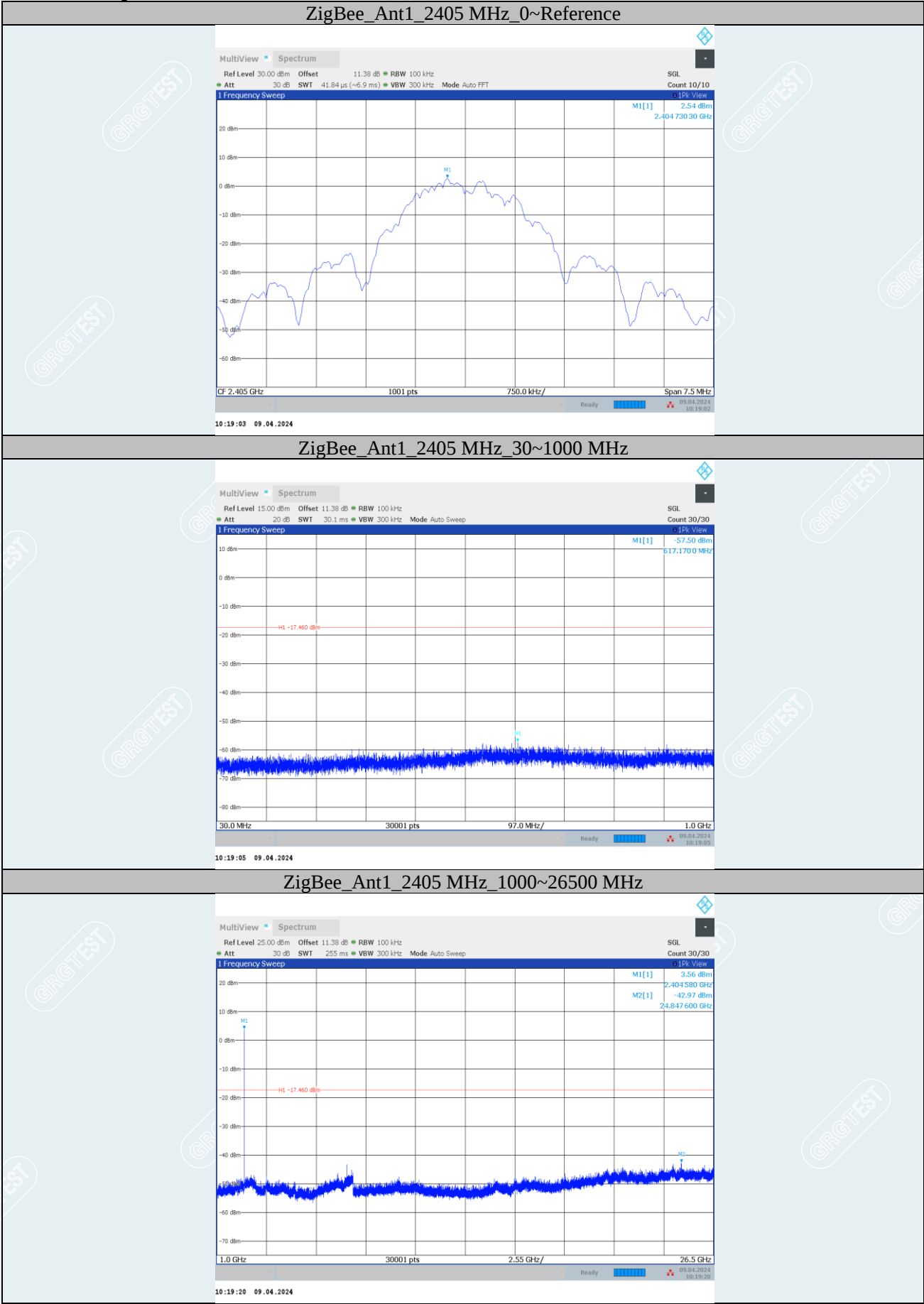
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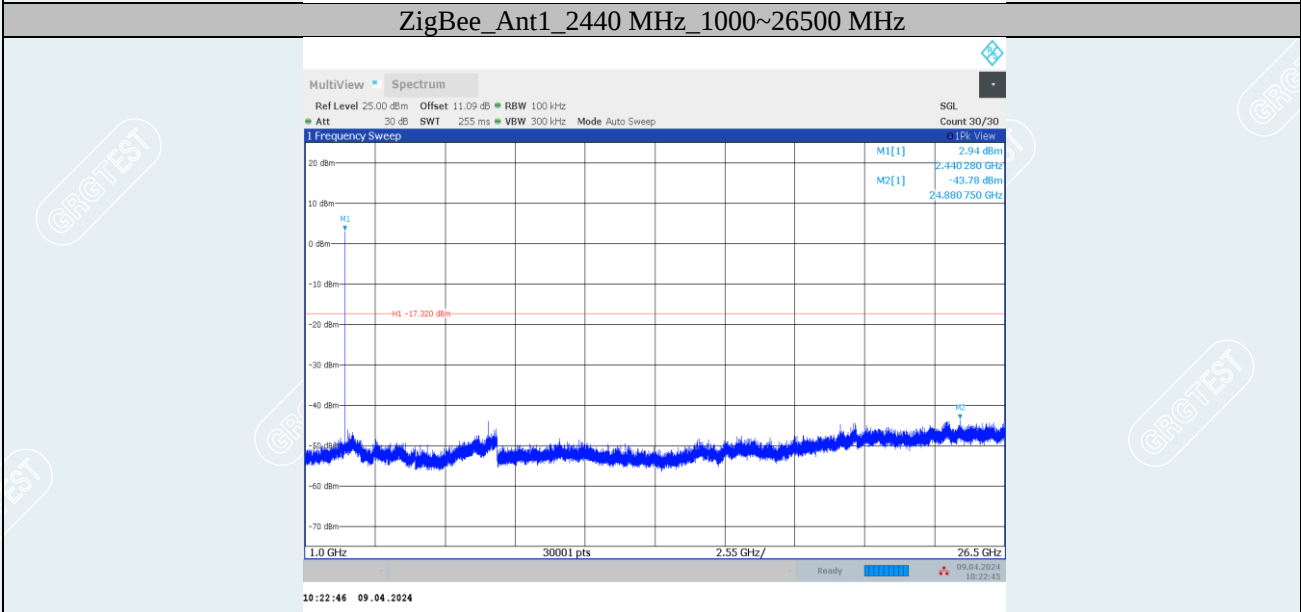
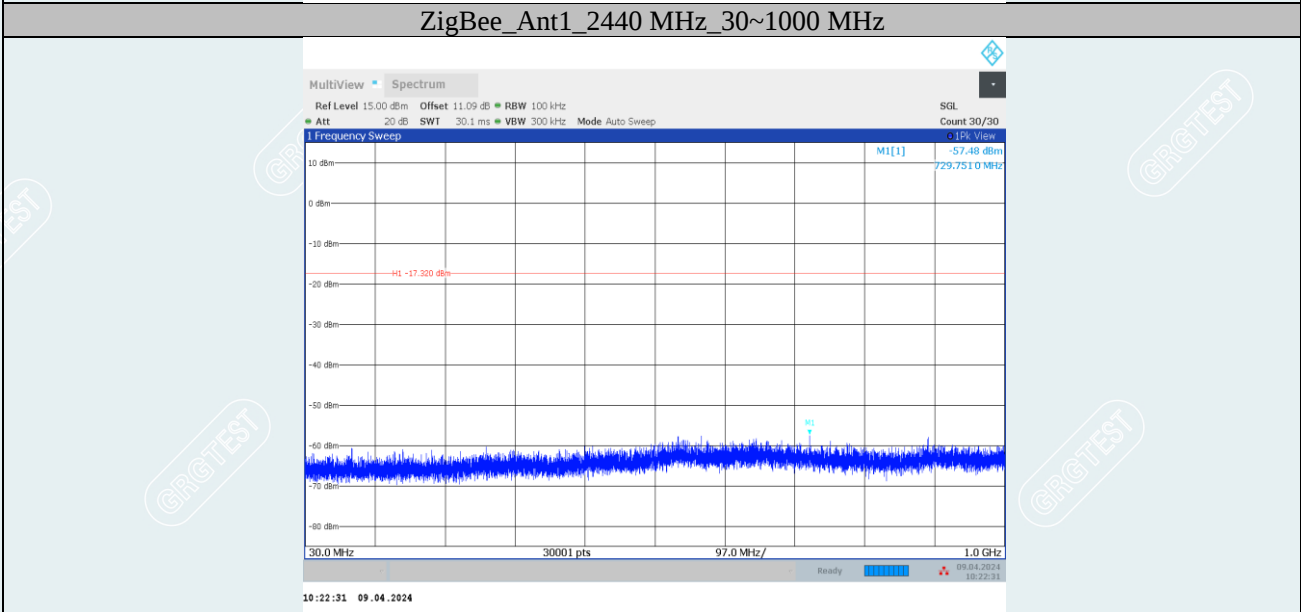
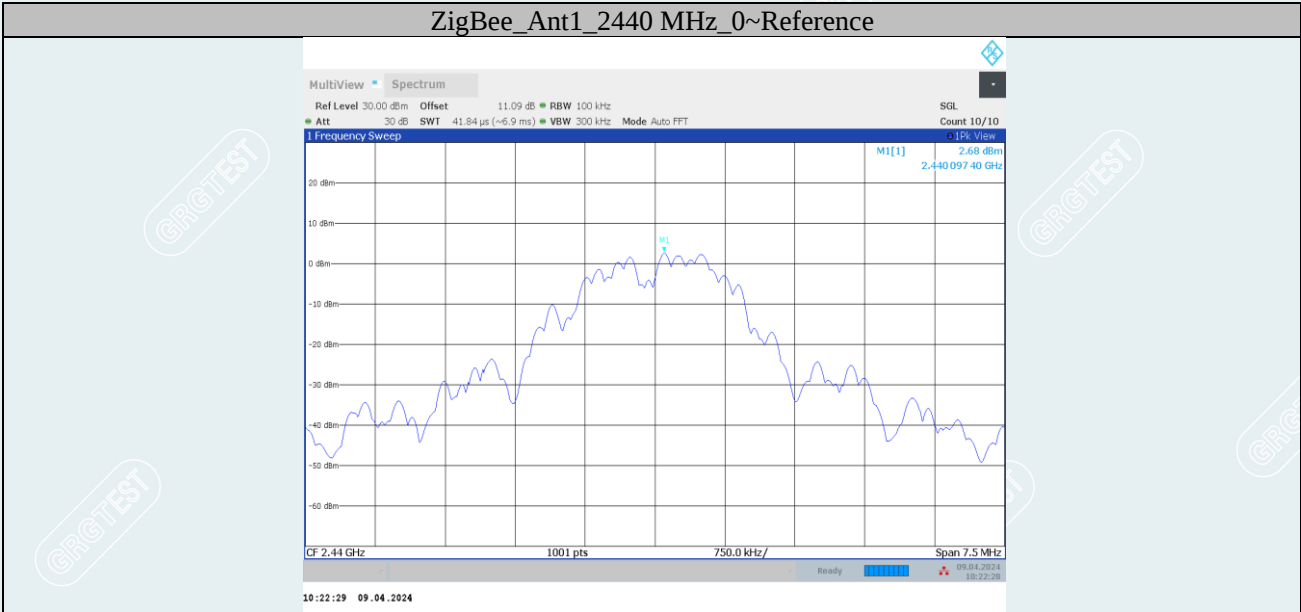
Test Graphs

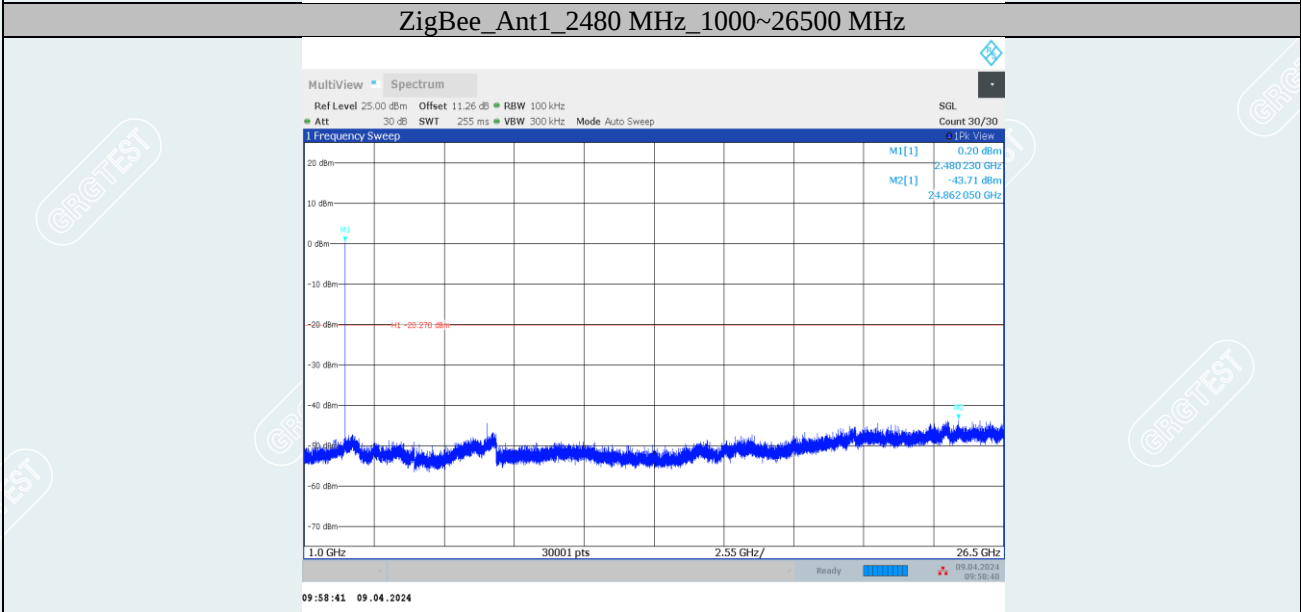
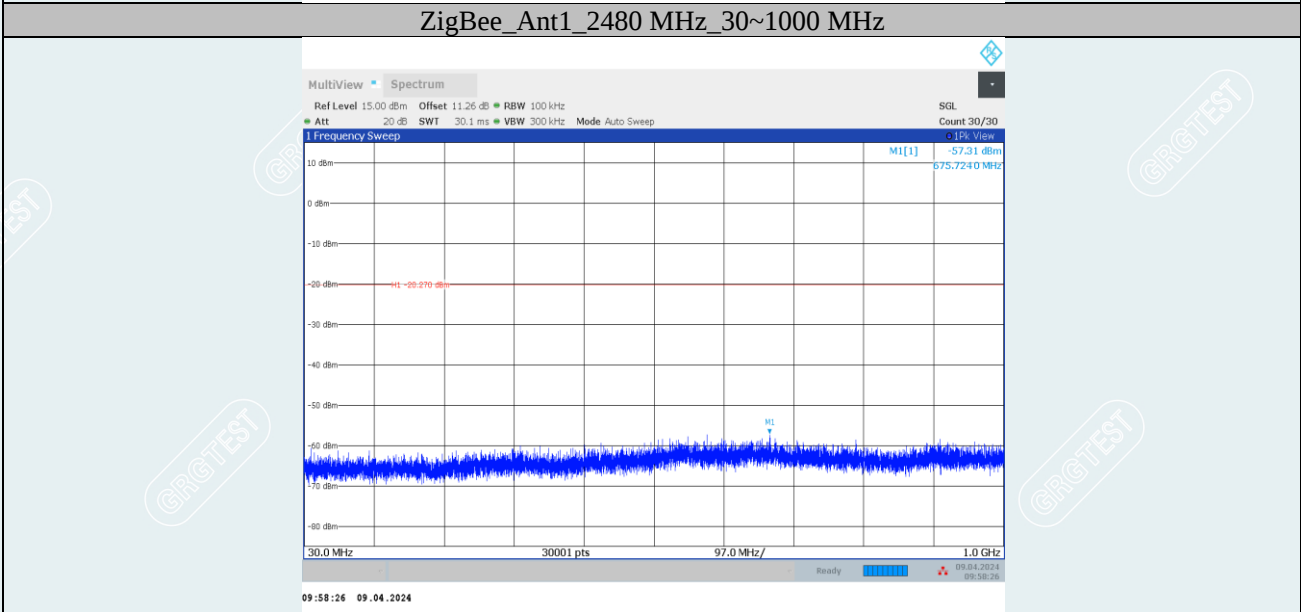
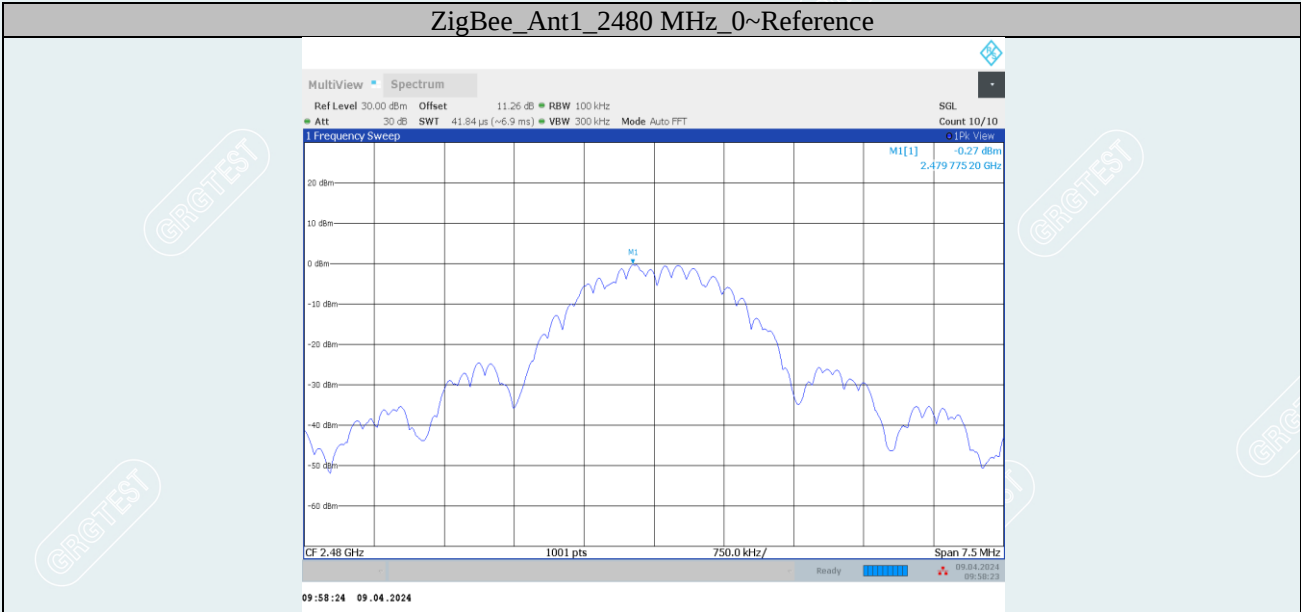
Band edge



Conducted Spurious Emission







11. RESTRICTED BANDS OF OPERATION

11.1 LIMITS

Section 15.247(d) 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)).

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36 - 13.41			

Frequency (MHz)	Quasi-peak(μ V/m)	Measurement distance(m)	Quasi-peak(dB μ V/m)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30 ~ 88	100	3	40
88~216	150	3	43.5
216 ~ 960	200	3	46
Above 960	500	3	54

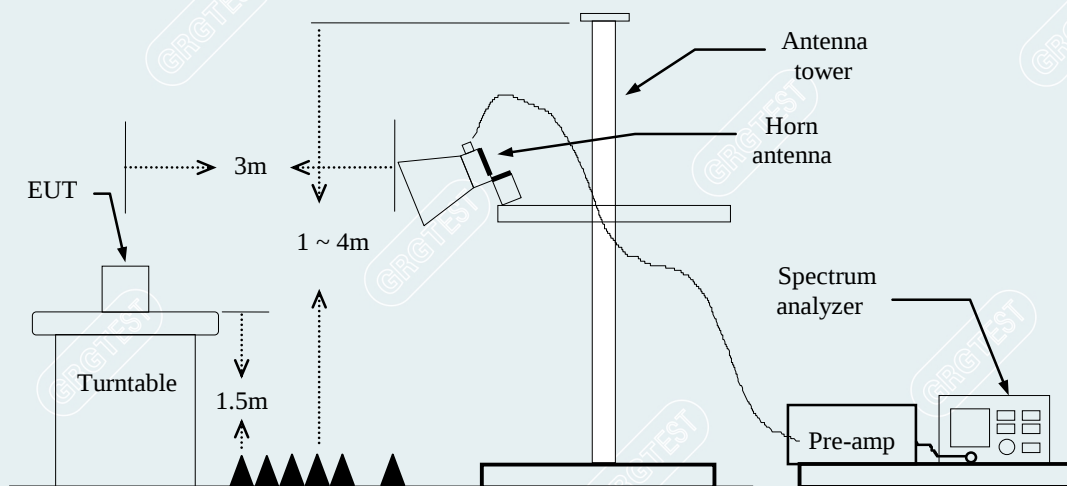
11.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 15.247 Meas Guidance v05r02.

- 1) The EUT is placed on a turntable, which is 1.5m above the ground plane.
- 2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4) Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - a) PEAK: RBW=1MHz / VBW=1MHz / Sweep=AUTO.
 - b) AVERAGE: RBW=1MHz / VBW=1/T / Sweep=AUTO.

If the EUT is configured to transmit with duty cycle $\geq 98\%$, set $VBW \leq RBW/100$ (i.e., 10kHz) but not less than 10 Hz. If the EUT duty cycle is $< 98\%$, set $VBW \geq 1/T$, Where T is defined in section 2.8.
- 5) Repeat the procedures until all the PEAK and AVERAGE versus polarization are measured.

11.3 TEST SETUP



11.4 TEST RESULTS

According to the user manual, EUT has three typical installation methods, namely wall installation, desktop installation and ceiling installation. All three installation methods have been tested and validated, with the worst configuration being the desktop installation mode, which is recorded in this report.

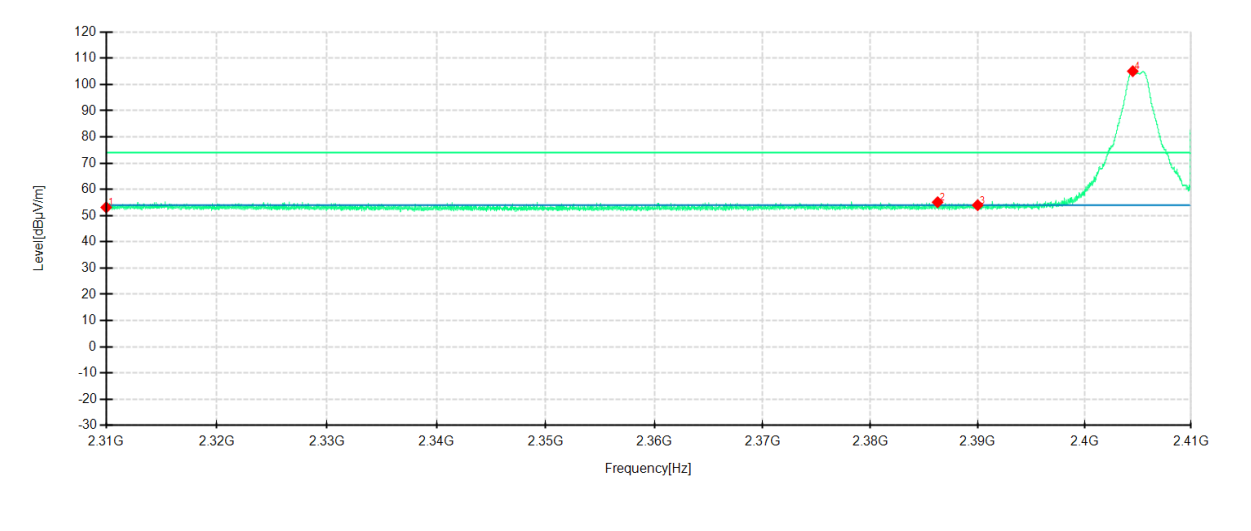
Equipment:	Presence Sensor FP1E	Test Date	2024-04-19
Model No.:	PS-S03D	Test Engineer:	Zhang Zishan
Test Voltage:	DC 5V	Environmental Conditions	24.5℃/51%RH/101.0kPa

Lowest Channel

Channel 2405MHz

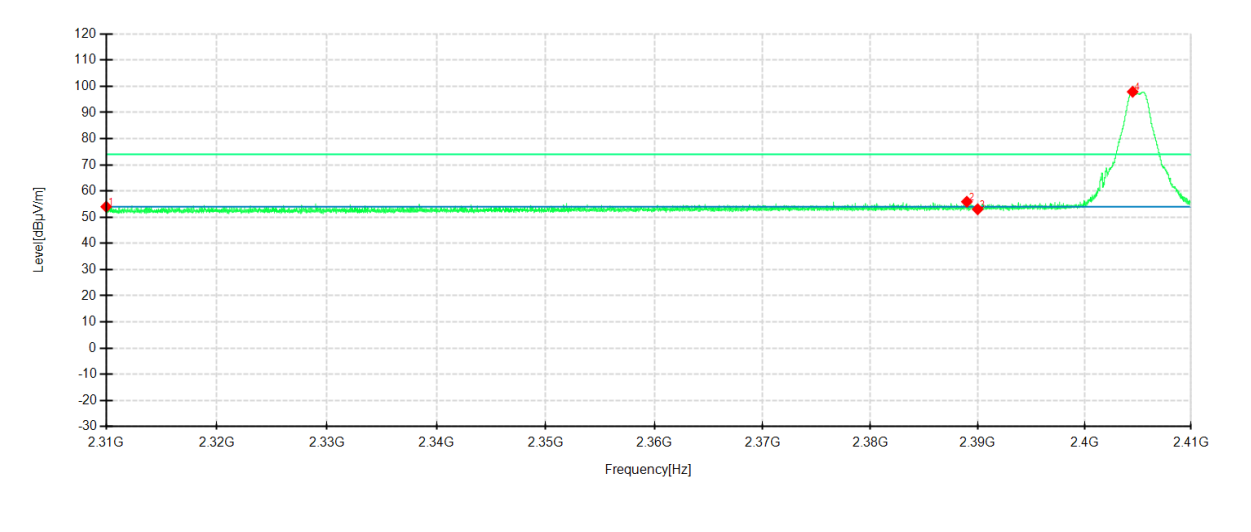
Detector mode: Peak

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310.0000	58.11	53.15	-4.96	74.00	20.85	200	0	Horizontal	/
2	2386.2625	60.96	55.14	-5.82	74.00	18.86	100	203	Horizontal	/
3	2390.0000	59.83	54.00	-5.83	74.00	20.00	200	315	Horizontal	
4	2404.5250	110.92	105.06	-5.86	--	--	100	203	Horizontal	No limit
1	2310.0000	59.67	54.01	-5.66	74.00	19.99	200	215	Vertical	/
2	2388.9875	61.34	55.93	-5.41	74.00	18.07	200	150	Vertical	/
3	2390.0000	58.46	53.05	-5.41	74.00	20.95	100	55	Vertical	/
4	2404.5125	103.27	97.92	-5.35	--	--	200	162	Vertical	No limit

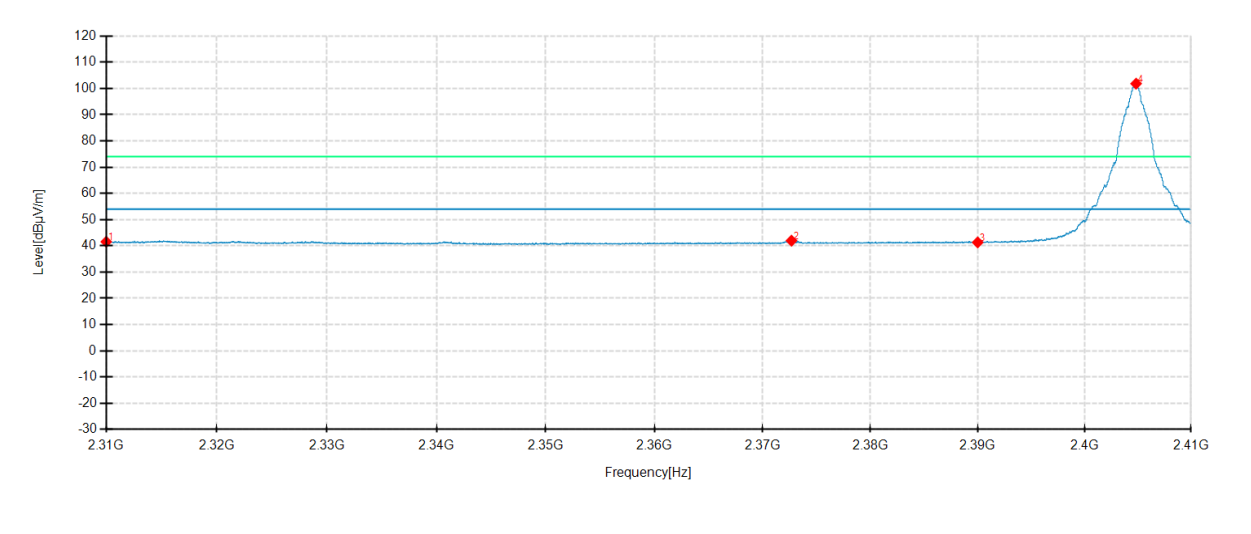
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Lowest Channel

Channel 2405MHz

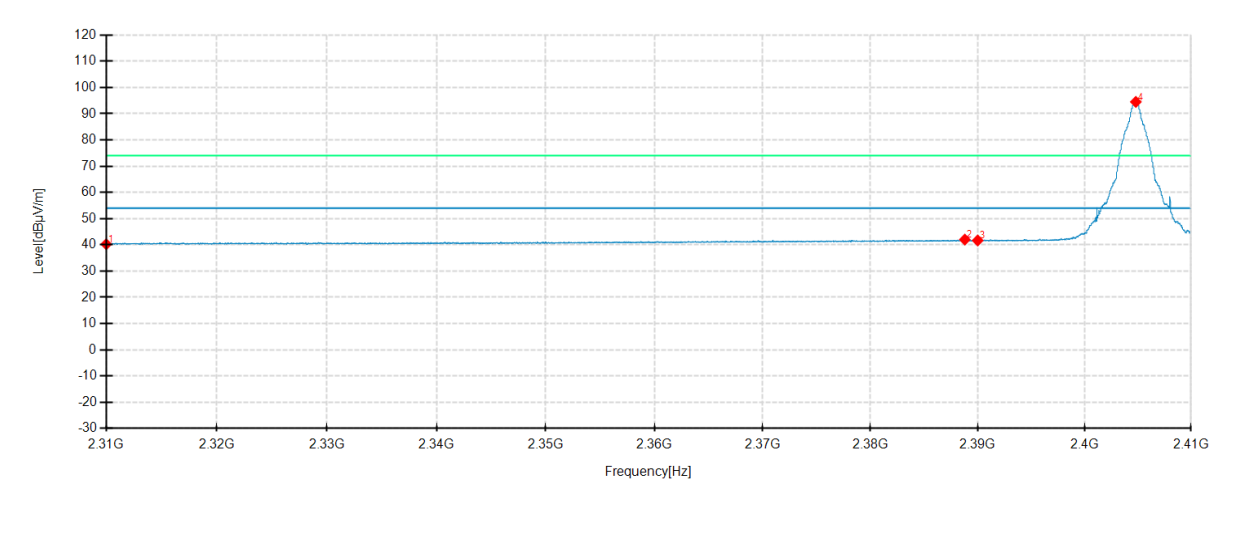
Detector mode: Average

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



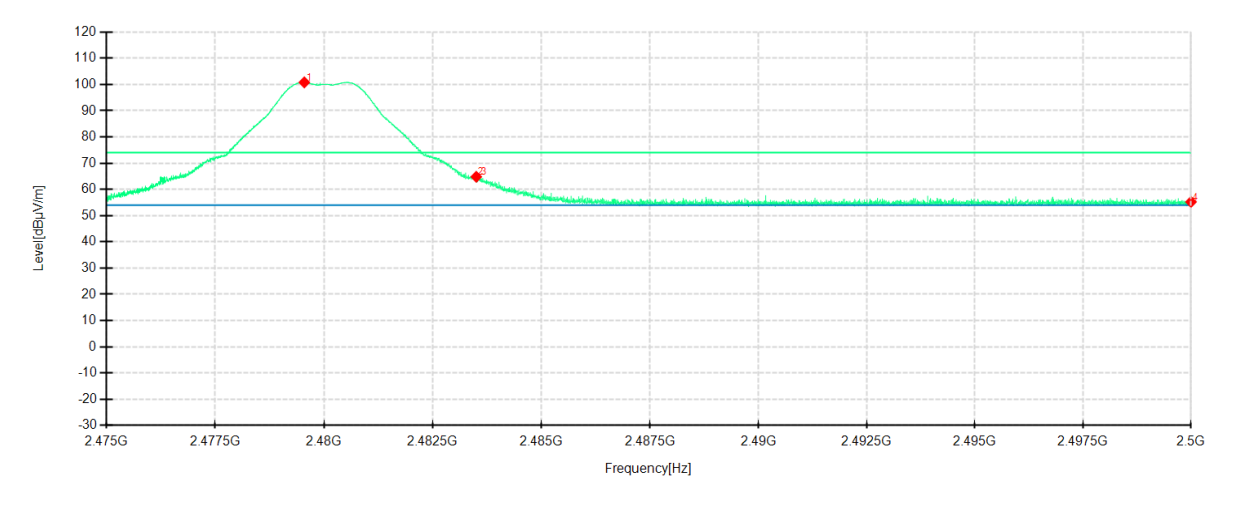
No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310.0000	46.52	41.56	-4.96	54.00	12.44	100	201	Horizontal	/
2	2372.6750	47.74	41.98	-5.76	54.00	12.02	100	201	Horizontal	/
3	2390.0000	47.16	41.33	-5.83	54.00	12.67	100	342	Horizontal	/
4	2404.8375	107.71	101.85	-5.86	--	--	100	201	Horizontal	No limit
1	2310.0000	45.91	40.25	-5.66	54.00	13.75	100	326	Vertical	/
2	2388.8000	47.43	42.02	-5.41	54.00	11.98	200	228	Vertical	/
3	2390.0000	47.09	41.68	-5.41	54.00	12.32	100	261	Vertical	/
4	2404.8125	99.87	94.52	-5.35	--	--	200	163	Vertical	No limit

Highest Channel

Channel 2480MHz

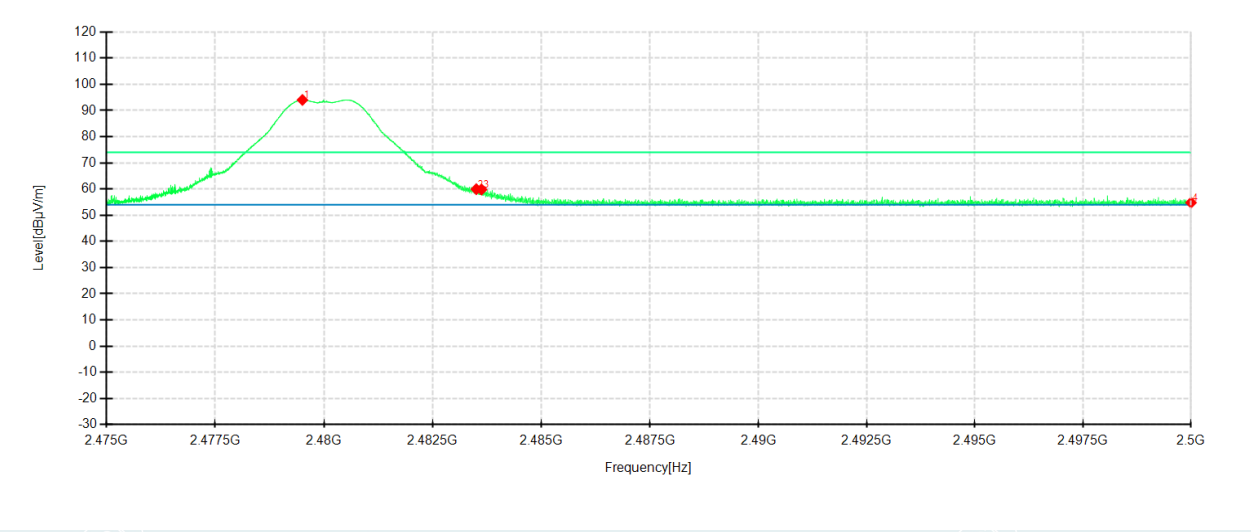
Detector mode: Peak

Polarity: Horizontal



Detector mode: Peak

Polarity: Vertical



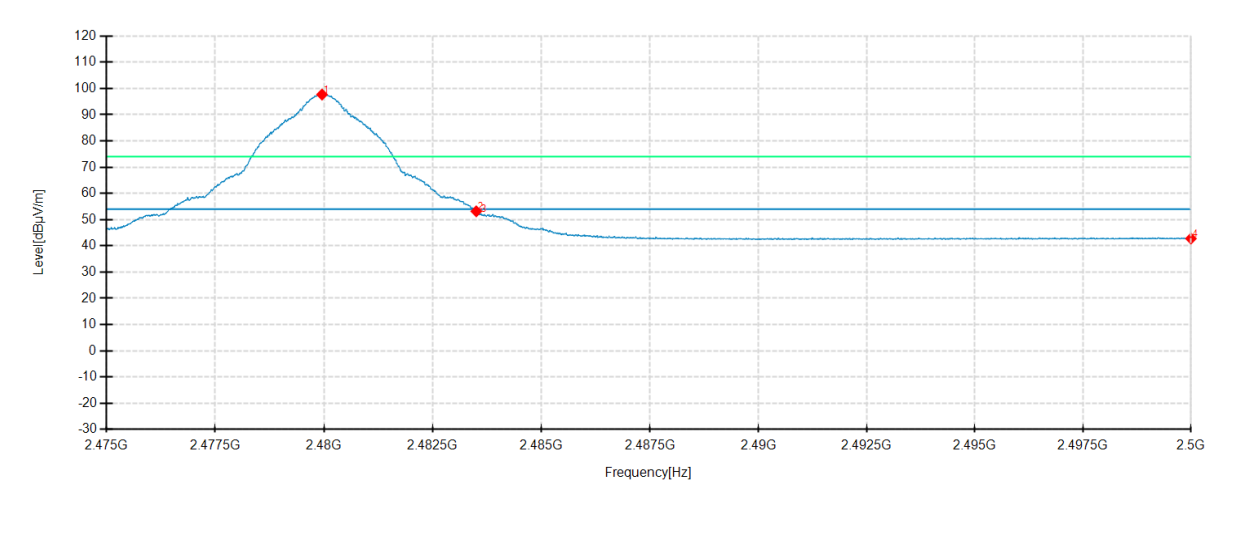
No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2479.5469	105.99	100.81	-5.18	--	--	100	223	Horizontal	No limit
2	2483.5000	69.91	64.81	-5.10	74.00	9.19	100	211	Horizontal	/
3	2483.5719	69.96	64.86	-5.10	74.00	9.14	100	223	Horizontal	/
4	2500.0000	60.03	55.24	-4.79	74.00	18.76	200	164	Horizontal	/
1	2479.5031	99.09	94.04	-5.05	--	--	100	294	Vertical	No limit
2	2483.5000	64.98	59.95	-5.03	74.00	14.05	100	305	Vertical	/
3	2483.6219	64.84	59.81	-5.03	74.00	14.19	200	145	Vertical	/
4	2500.0000	59.80	54.81	-4.99	74.00	19.19	100	294	Vertical	/

Highest Channel

Channel 2480MHz

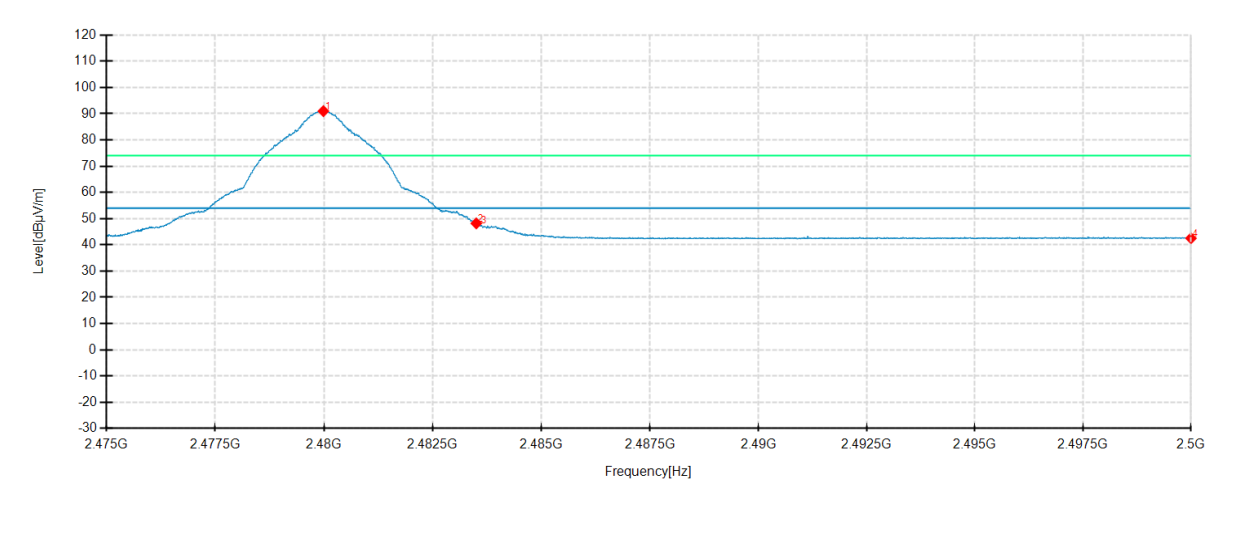
Detector mode: Average

Polarity: Horizontal



Detector mode: Average

Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2479.9531	102.87	97.70	-5.17	--	--	100	222	Horizontal	No limit
2	2483.5000	58.27	53.17	-5.10	54.00	0.83	100	209	Horizontal	/
3	2483.5625	57.44	52.34	-5.10	54.00	1.66	100	222	Horizontal	/
4	2500.0000	47.58	42.79	-4.79	54.00	11.21	200	150	Horizontal	/
1	2479.9844	96.04	90.99	-5.05	--	--	100	220	Vertical	No limit
2	2483.5000	53.23	48.20	-5.03	54.00	5.80	100	297	Vertical	/
3	2483.5625	52.68	47.65	-5.03	54.00	6.35	100	220	Vertical	/
4	2500.0000	47.51	42.52	-4.99	54.00	11.48	100	359	Vertical	/

Remark: Max field strength in 3m distance. No any other emission which falls in restricted bands can be detected and be reported.

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM

Please refer to the attached document E20240407651301-FCC Test Photo.

APPENDIX B. PHOTOGRAPH OF THE EUT

Please refer to the attached document E20240407651301-EUT Photo.

----- End of Report -----