FCC Test Report

Report No.: AGC16215231206FR01

FCC ID	:	2BERM-JP1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Keyboard receiver
BRAND NAME	:	MCHOSE
MODEL NAME	:	JP1
APPLICANT	:	Shenzhen Zhishi intelligent Technology Co., LTD
DATE OF ISSUE	:	Jan. 16, 2024
STANDARD(S)	:	FCC Part 15 Subpart C §15.247
REPORT VERSION	:	V1.0

Attestation Of Global Compliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan. 16, 2024	Valid	Initial Release

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1. General Information

Applicant	Shenzhen Zhishi intelligent Technology Co., LTD
Address	A3401 Rongde Times Square, Huaqiao Xincun Community, Henggang Street, Longgang District, Shenzhen, China
Manufacturer	Zhishi intelligent Technology (Dongguan) Co., LTD
Address	Room 102, Building 1, No.21, Xiewu Industrial Road, Hengshan, Shipai Town, Dongguan City, Guangdong Province, China
Factory	Zhishi intelligent Technology (Dongguan) Co., LTD
Address	Room 102, Building 1, No.21, Xiewu Industrial Road, Hengshan, Shipai Town, Dongguan City, Guangdong Province, China
Product Designation	Keyboard receiver
Brand Name	MCHOSE
Test Model	JP1
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Jan. 05, 2024
Date of Test	Jan. 05, 2024 - Jan. 16, 2024
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-2.4G-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By	Thea Huang	
	Thea Huang (Project Engineer)	Jan. 16, 2024
Reviewed By	Calvin Liu	
	Calvin Liu (Reviewer)	Jan. 16, 2024
Approved By	Max Zhang	
	Max Zhang (Authorized Officer)	Jan. 16, 2024

2. Product Information

2.1 Product Technical Description

Frequency Band	2400MHz-2483.5MHz
Operation Frequency Range	2405MHz-2475MHz
Modulation Type	GFSK
Number of channels	16
Channel Separation	3MHz
Maximum Transmitter Power	-0.195dBm
Hardware Version	BK2635 V1 20230516
Software Version	V1.0
Antenna Designation	PCB Antenna
Antenna Gain	-1.66dBi
Power Supply	DC 5V by PC
Adapter Information	N/A

2.2 Test Frequency List

Frequency Band	Channel Number	Frequency	Channel Number	Frequency
2400~2483.5MHz	01	2405 MHz	09	2441 MHz
	02	2408 MHz	10	2445 MHz
	03	2414 MHz	11	2453 MHz
	04	2419 MHz	12	2459 MHz
	05	2422 MHz	13	2463 MHz
	06	2426 MHz	14	2466 MHz
	07	2436 MHz	15	2471 MHz
	08	2439 MHz	16	2475 MHz

2.3 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2BERM-JP1, filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

2.4 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules

2.5 Special Accessories

Not available for this EUT intended for grant.

2.6 Equipment Modifications

Not available for this EUT intended for grant.

2.7 Antenna Requirement

Standard Requirement
15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. **15.247(b) (4) requirement:** The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi
EUT Antenna:
The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna is -1.66dBi.

3. Test Environment

3.1 Address of the Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories).

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 Environmental Conditions

	Normal Conditions
Temperature range (℃)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106
Power supply	DC 5V by PC

3.4 Measurement Uncertainty

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	U_c = ±2.9 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±3.9 dB
Uncertainty of Radiated Emission above 1GHz	U_c = ±4.9 dB
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2 %

3.5 List of Equipment Use

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2023-06-01	2024-05-31
☒	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2023-03-03	2024-03-02
☒	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2023-03-03	2024-03-02
☒	AGC-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
☒	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2023-06-01	2024-05-31
☒	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2023-02-18	2024-02-17
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2023-06-03	2024-06-02
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2023-06-01	2024-05-31
☒	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2022-03-12	2024-03-11
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2023-03-23	2024-03-22
☒	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2022-08-04	2024-08-03
☒	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2023-06-01	2024-05-31
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
☐	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2023-06-03	2024-06-02
☒	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2024-06-08
☒	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2023-06-03	2024-06-02

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S003	RE Test System	FARA	EZ-EMC	V.RA-03A
☒	AGC-EM-S011	RSE Test System	Tonscend	TS$^+$ Ver2.1(JS36-RSE)	4.0.0.0
☒	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
☒	AGC-ER-S009	BT/WIFI Test System	Tonscend	JS1120-3	2.6.77.0518

4.System Test Configuration

4.1 EUT Configuration

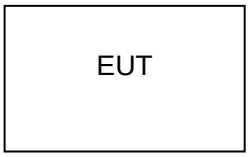
The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT Exercise

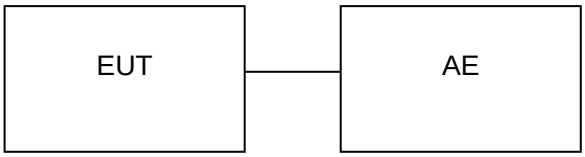
The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System

Radiated Emission Configure:



Conducted Emission Configure:



4.4 Equipment Used In Tested System

The following peripheral devices and interface cables were connected during the measurement:

☒ Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	Redmi Notebook Adapter	AD100G	Redmi	--	--
2	Redmi Notebook PC	XMA2002-AB	Redmi	--	--

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203&15.247(b)(4)	Antenna Equipment	Pass
2	§15.247 (b)(3)	RF Output Power	Pass
3	§15.247 (a)(2)	6 dB Bandwidth	Pass
4	§15.247 (e)	Power Spectral Density	Pass
4	§15.247 (d)	Conducted Band Edge and Out-of-Band Emissions	Pass
5	§15.209	Radiated Emission& Band Edge	Pass
6	§15.207	AC Power Line Conducted Emission	Pass

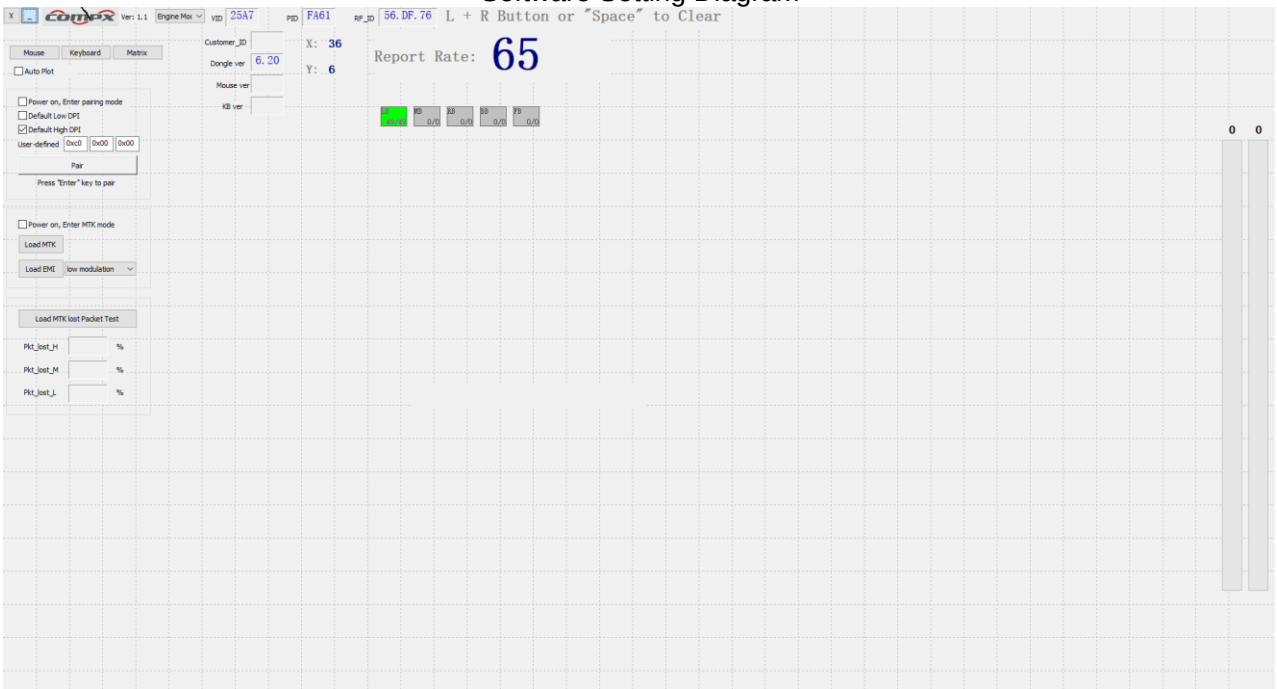
5. Description of Test Modes

Summary Table of Test Cases	
Test Item	Data Rate / Modulation
	2.4G / GFSK
Radiated & Conducted Test Cases	Mode 1: 2.4G Tx CH01_2405 MHz (powered by PC) Mode 2: 2.4G Tx CH09_2441 MHz (powered by PC) Mode 3: 2.4G Tx CH16_2475 MHz (powered by PC)
AC Conducted Emission	2.4G Tx(powered by PC)

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

Software Setting Diagram



6. Duty Cycle Measurement

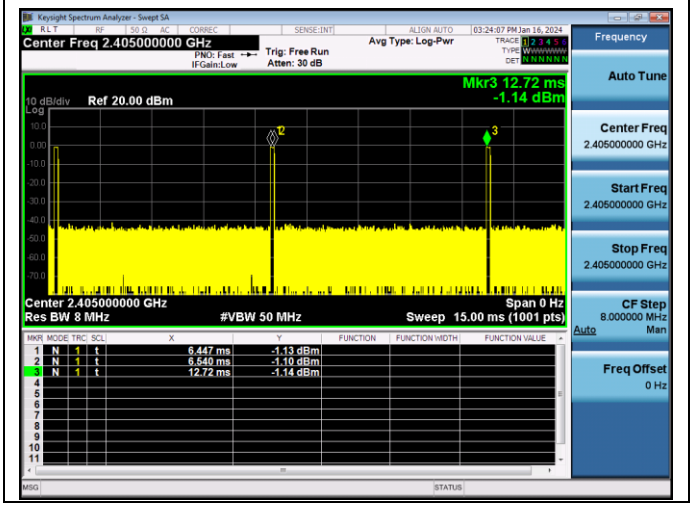
The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Operating mode	T(μs)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)
2.4G	93	1.48	18.3	10.75

Remark:
1. Duty Cycle factor = 10 * log (1/ Duty cycle)
2. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value

The test plots as follows:

2.4G



7. RF Output Power Measurement

7.1 Provisions Applicable

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W.

7.2 Measurement Procedure

☒ For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.1 Method Max peak power:

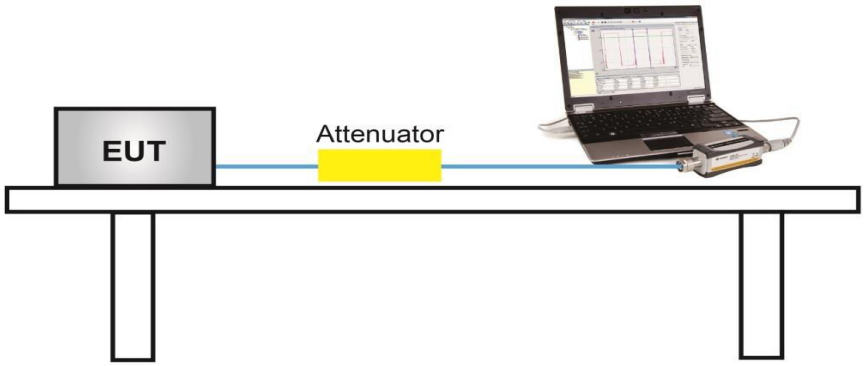
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the RBW≥DTS bandwidth
3. Set the VBW≥[3 × RBW].
4. Span≥[3 × RBW].
5. Sweep= auto couple.
6. Detector Function= Peak.
7. Trace mode= Max hold.
8. Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

☐ For Average power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G:

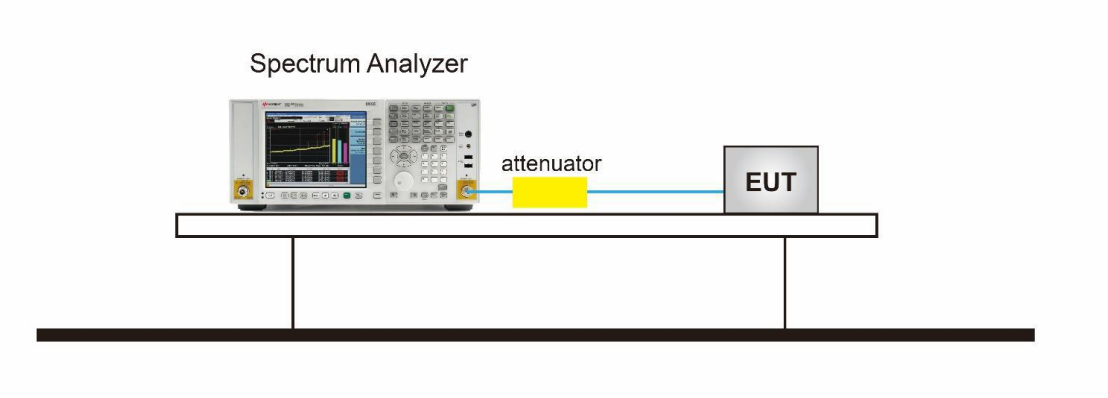
1. The RF output of EUT was connected to the power meter by RF cable and attenuator.
2. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the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

7.3 Measurement Setup (Block Diagram of Configuration)

☐For Average power test setup



☒For peak power test setup



7.4 Measurement Result

Test Data of Conducted Output Power				
Test Mode	Test Frequency (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK	2405	-0.825	⩽30	Pass
	2441	-0.325	⩽30	Pass
	2475	-0.195	⩽30	Pass

Test Graphs of Conducted Output Power

Test_Graph_GFSK_ANT1_2405_Peak Power

Test_Graph_GFSK_ANT1_2441_Peak Power

Test_Graph_GFSK_ANT1_2475_Peak Power

8. 6dB Bandwidth Measurement

8.1 Provisions Applicable

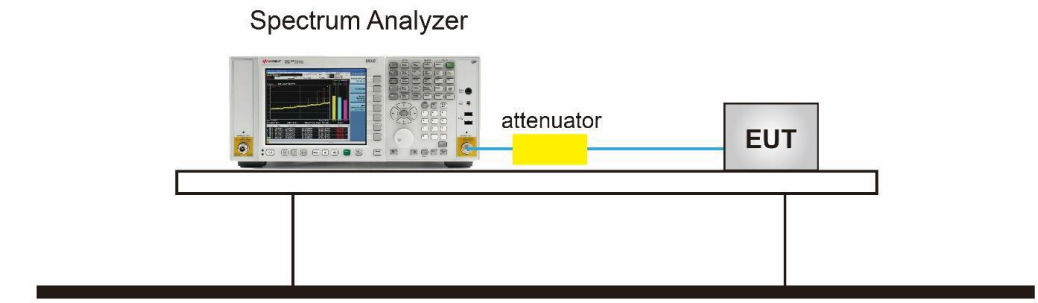
The minimum 6 dB bandwidth shall be 500 kHz.

8.2 Measurement Procedure

The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. 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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
4. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the OBW and set the Video bandwidth (VBW) ≥ 3 * RBW.
5. Measure and record the results in the test report.

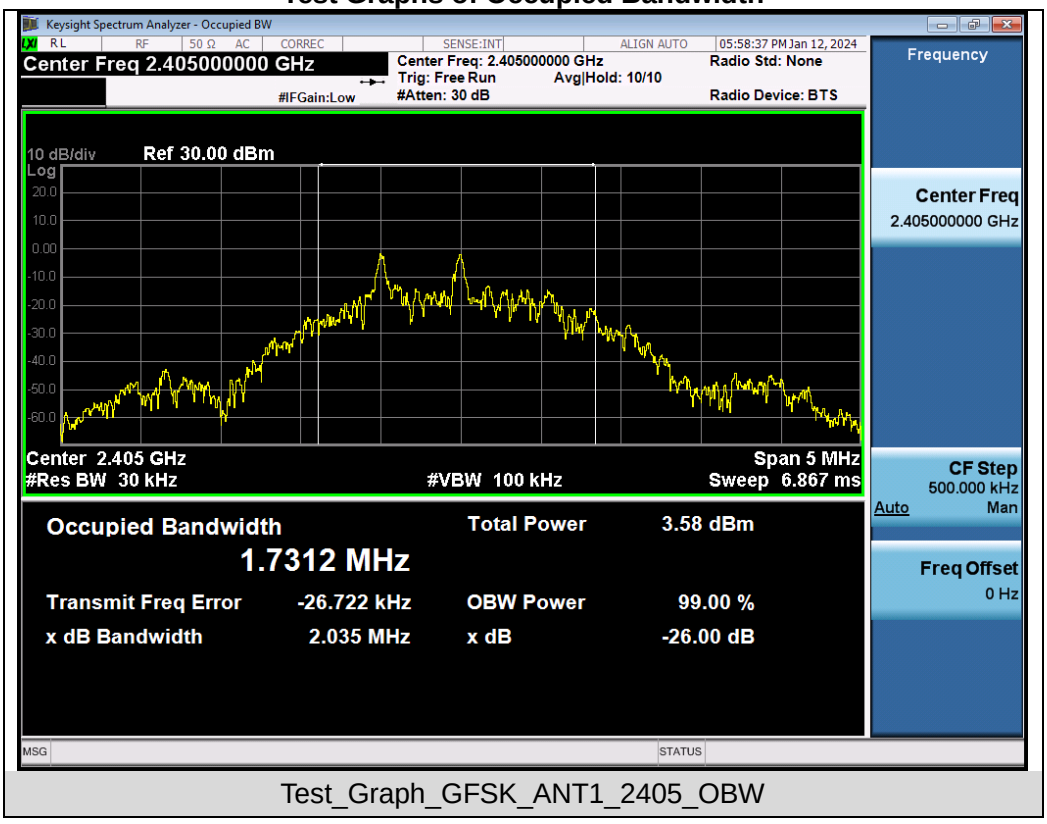
8.3 Measurement Setup (Block Diagram of Configuration)



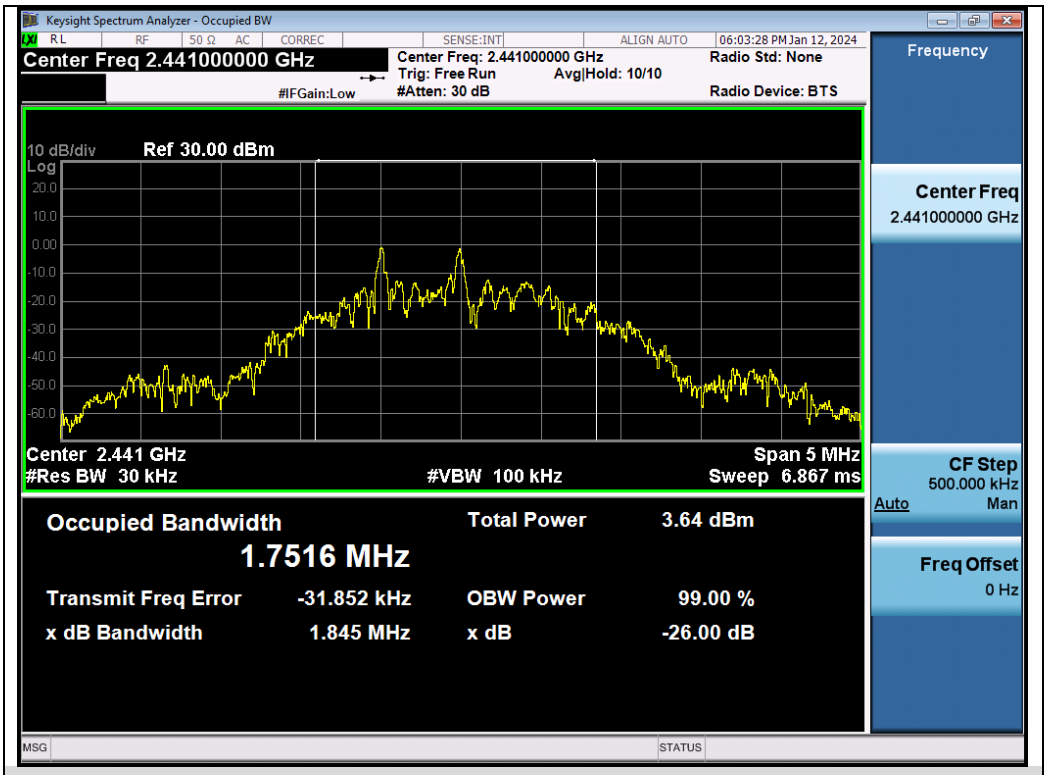
8.4 Measurement Results

Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Frequency (MHz)	Occupied Bandwidth (MHz)	DTS BW (MHz)	DTS BW Limits	Pass or Fail
GFSK	2405	1.731	0.968	⩾0.5	Pass
	2441	1.752	0.960	⩾0.5	Pass
	2475	1.672	0.984	⩾0.5	Pass

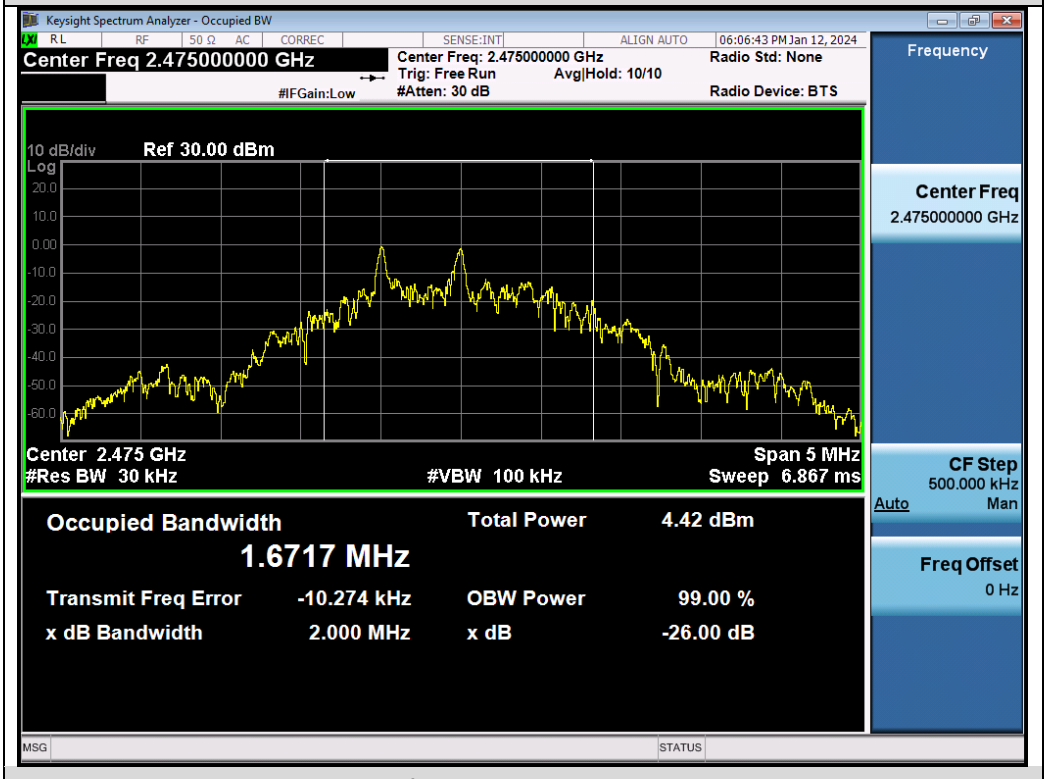
Test Graphs of Occupied Bandwidth



Test_Graph_GFSK_ANT1_2405_OBW



Test_Graph_GFSK_ANT1_2441_OBW

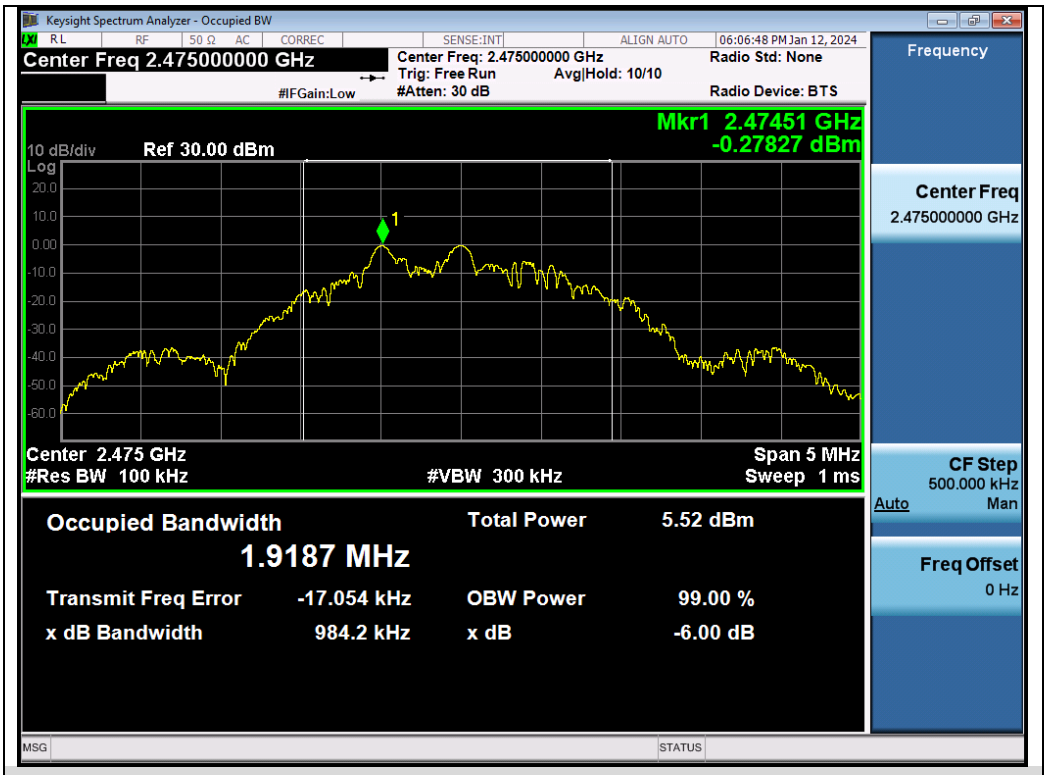


Test_Graph_GFSK_ANT1_2475_OBW

Test Graphs of DTS Bandwidth

Test_Graph_GFSK_ANT1_2405_DTSBW

Test_Graph_GFSK_ANT1_2441_DTSBW



Test_Graph_GFSK_ANT1_2475_DTSBW

9. Power Spectral Density Measurement

9.1 Provisions Applicable

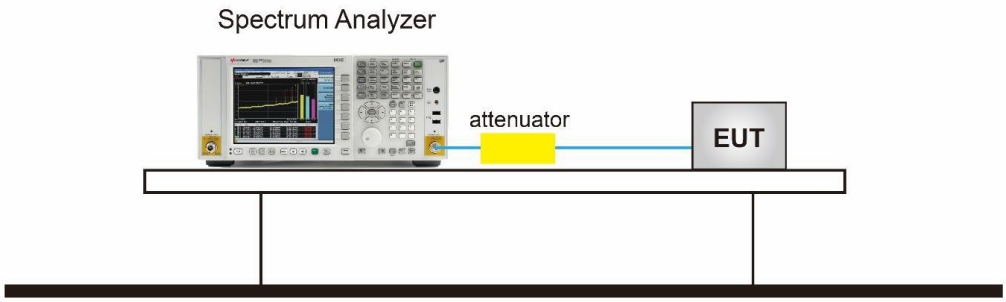
The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.2 Measurement Procedure

The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. 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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz in order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
4. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
5. Measure and record the results in the test report.
6. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

9.3 Measurement Setup (Block Diagram of Configuration)



9.4 Measurement Results

Test Data of Conducted Output Power Spectral Density				
Test Mode	Test Frequency (MHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
GFSK	2405	-14.866	≤8	Pass
	2441	-14.553	≤8	Pass
	2475	-14.291	≤8	Pass

Test Graphs of Conducted Output Power Spectral Density

Test_Graph_GFSK_ANT1_2405_PSD

Test_Graph_GFSK_ANT1_2441_PSD

Test_Graph_GFSK_ANT1_2475_PSD

10. Conducted Band Edge and Out-of-Band Emissions

10.1 Provisions Applicable

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure.

10.2 Measurement Procedure

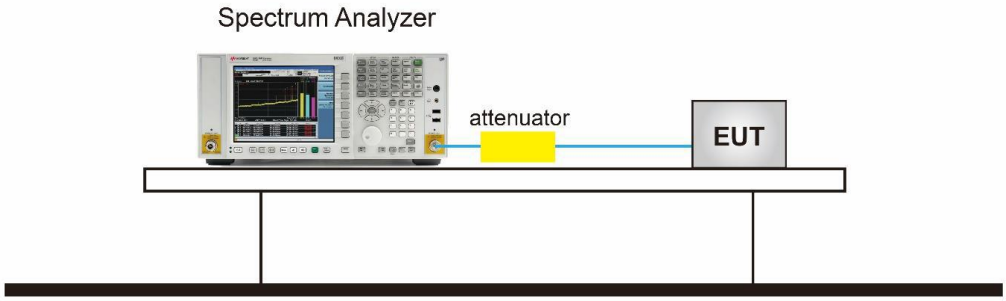
- Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

- Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

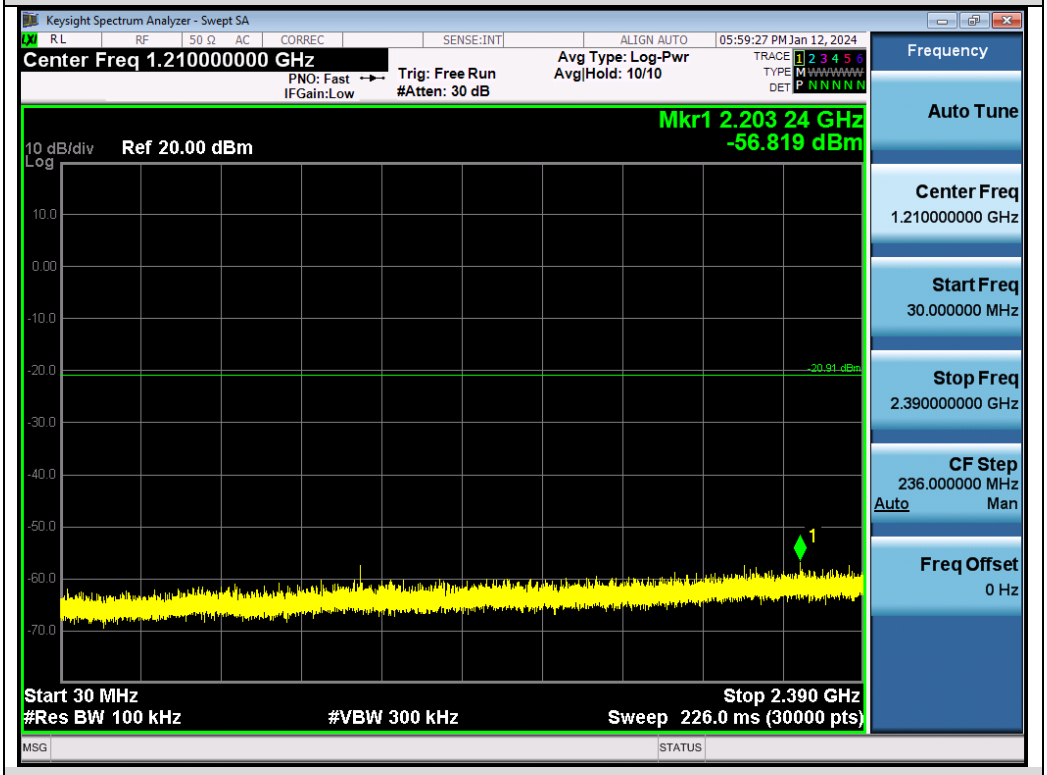
10.3 Measurement Setup (Block Diagram of Configuration)



10.4 Measurement Results

Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

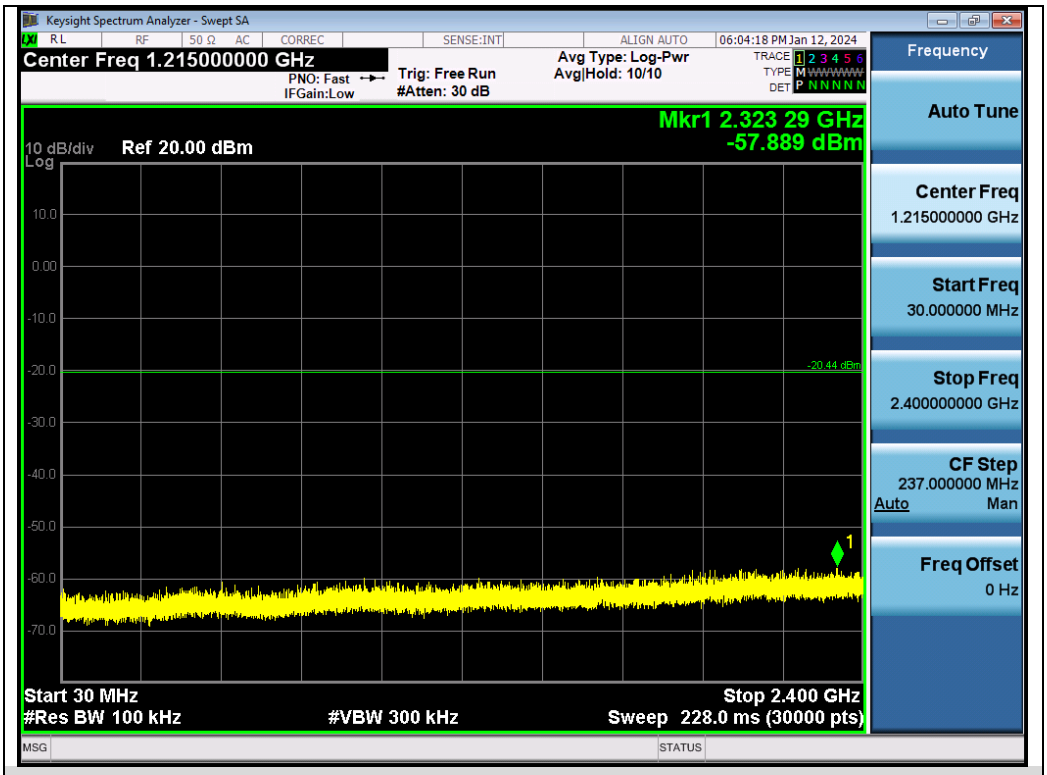
Test_Graph_GFSK_ANT1_2405_Reference Level



Test_Graph_GFSK_ANT1_2405_Lower Band Emissions

Test_Graph_GFSK_ANT1_2405_Higher Band Emissions

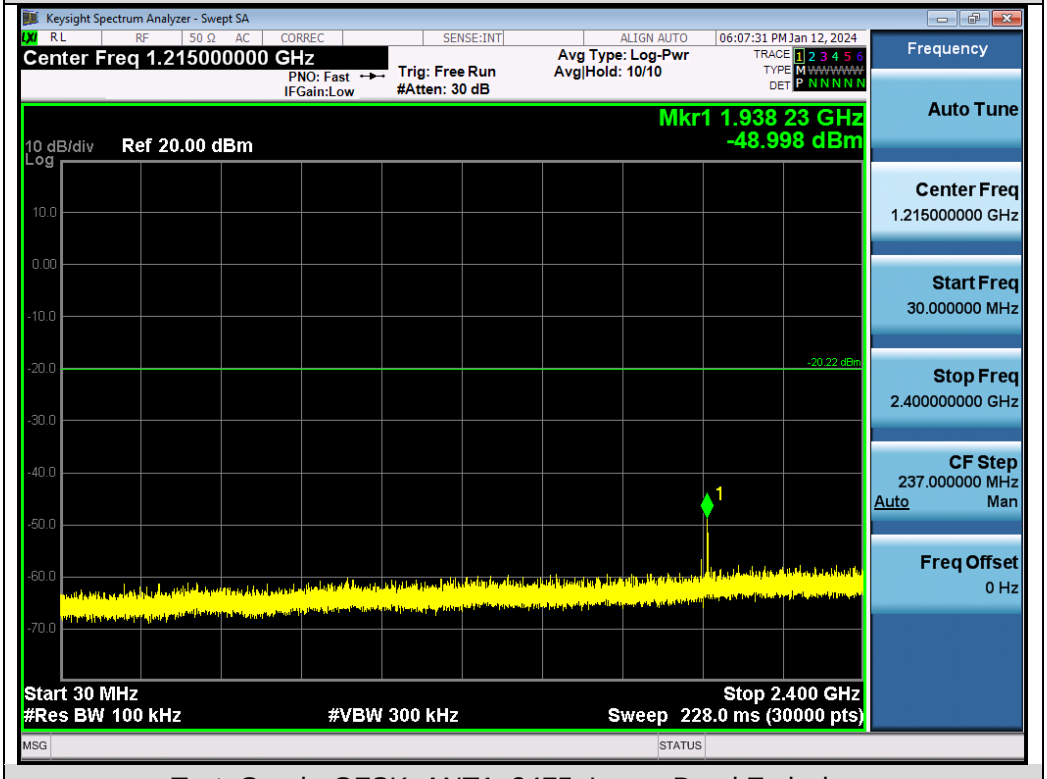
Test_Graph_GFSK_ANT1_2441_Reference Level



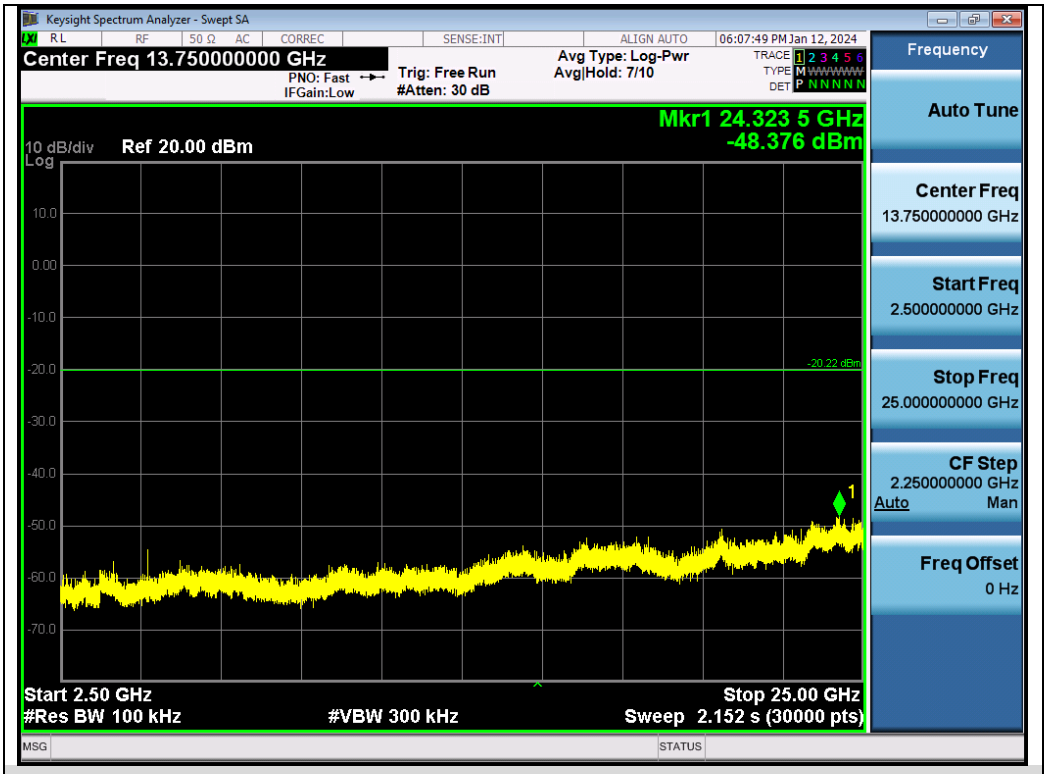
Test_Graph_GFSK_ANT1_2441_Lower Band Emissions

Test_Graph_GFSK_ANT1_2441_Higher Band Emissions

Test_Graph_GFSK_ANT1_2475_Reference Level



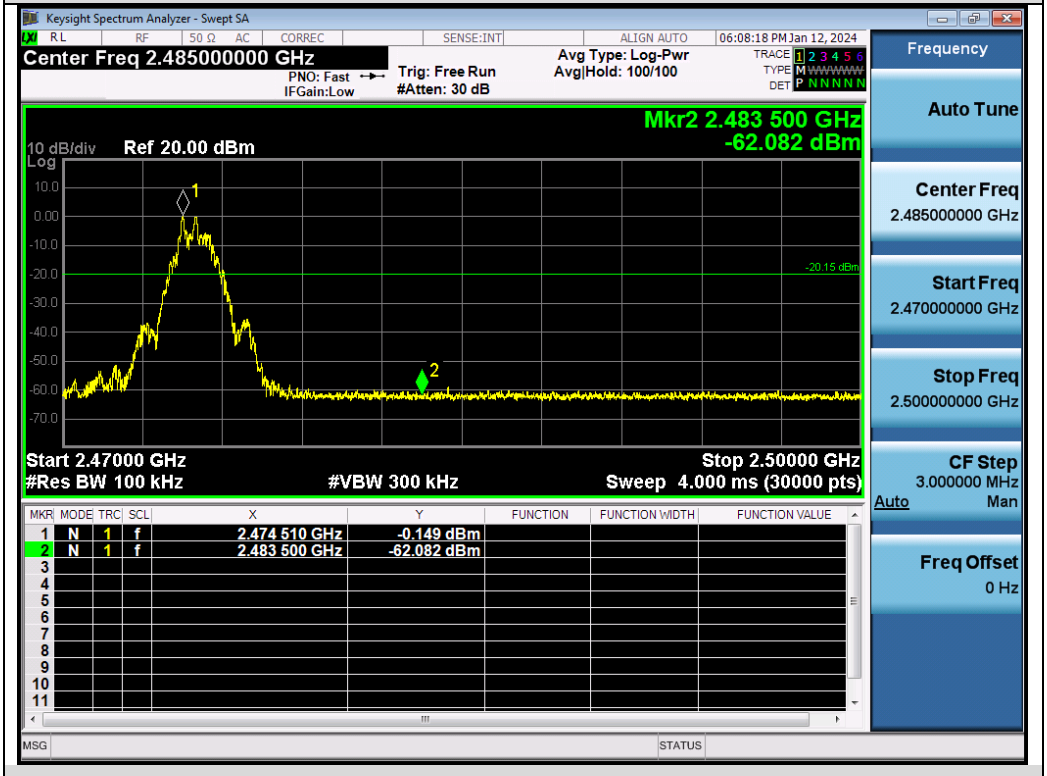
Test_Graph_GFSK_ANT1_2475_Lower Band Emissions



Test_Graph_GFSK_ANT1_2475_Higher Band Emissions

Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands

Test_Graph_GFSK_ANT1_2405_Lower Band Edge Emissions



Test_Graph_GFSK_ANT1_2475_Higher Band Edge Emissions

11. Radiated Spurious Emission

11.1 Measurement Limit

FCC Part 15.209 Limit in the below table to be followed

Frequencies (MHz)	Field Strength (microvolts/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

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

11.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the

pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.

8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9kHz~150kHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9kHz~150kHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP

- **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

- **Peak Measurements above 1GHz**

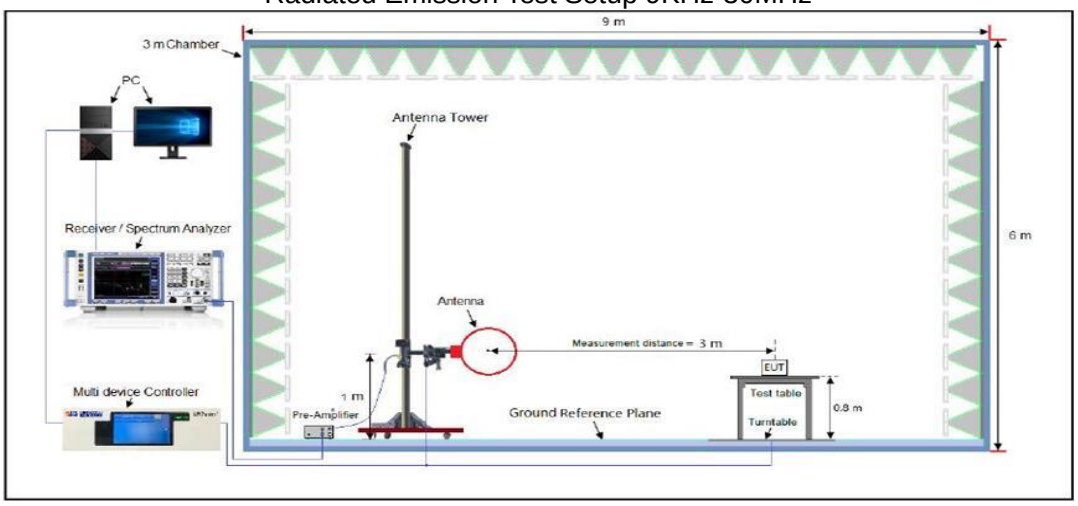
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

- **Average Measurements above 1GHz (Method VB)**

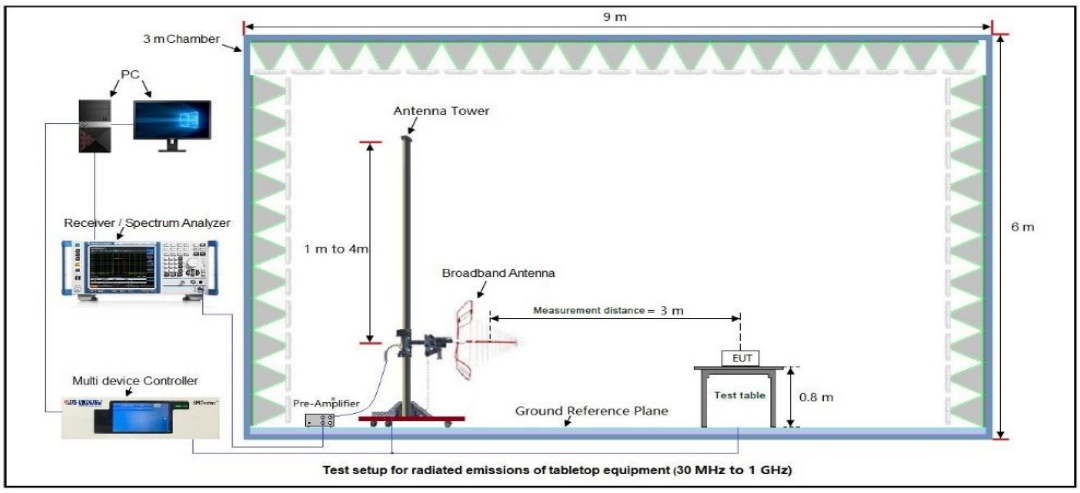
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW setting requirements are as follows:
4. If the EUT is configured to transmit with duty cycle ≥ 98%, set VBW = 10 Hz.
5. If the EUT duty cycle is < 98%, set VBW ≥ 1/T. T is the minimum transmission duration.
6. Detector = Peak
7. Sweep time = auto
8. Trace mode = max hold
8. Trace was allowed to stabilize

11.3 Measurement Setup (Block Diagram of Configuration)

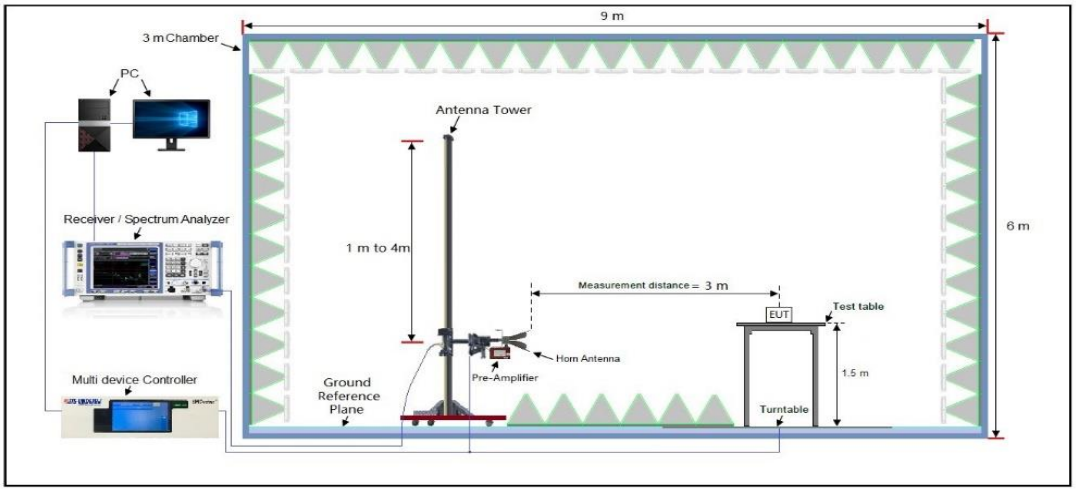
Radiated Emission Test Setup 9KHz-30MHz



Radiated Emission Test Setup 30MHz-1000MHz



Radiated Emission Test Setup Above 1000MHz

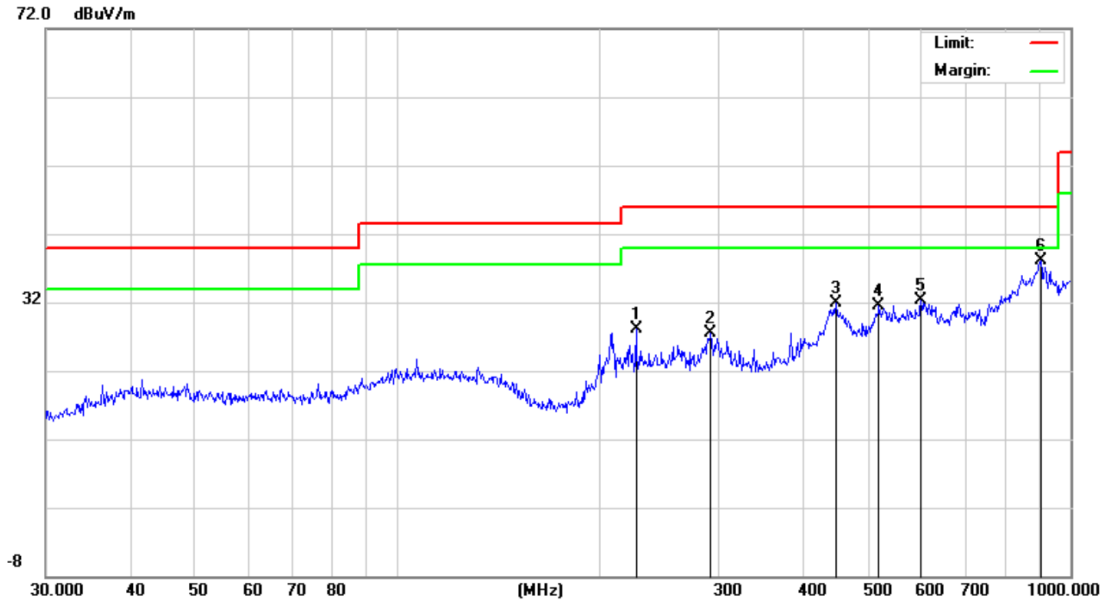


11.4 Measurement Result

Radiated Emission Below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

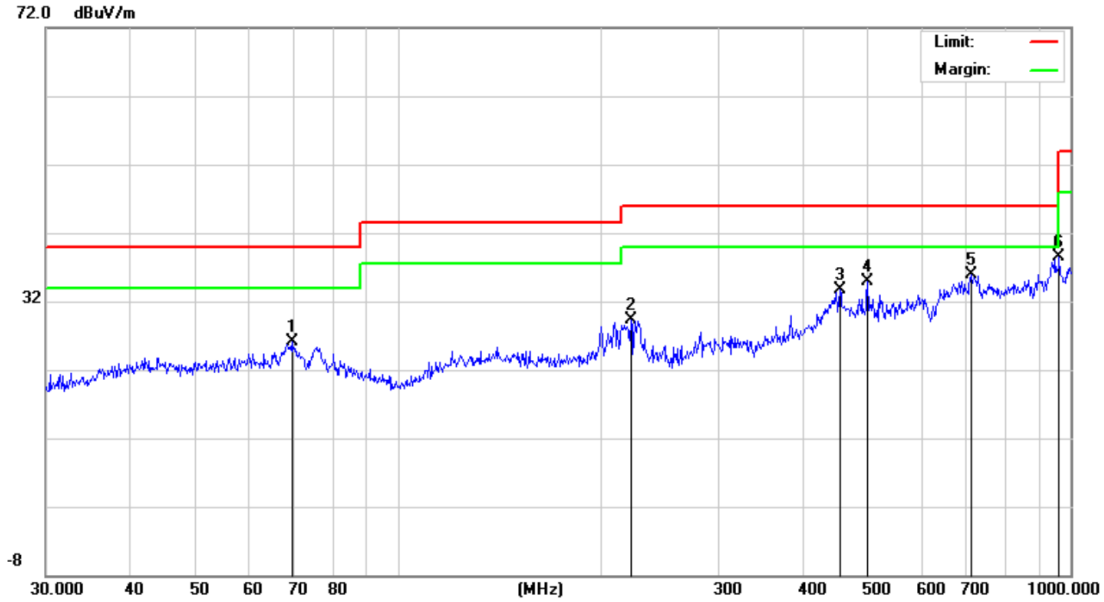
Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 3	**Antenna Polarity**	Horizontal



Final Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	226.0994	28.03	14.70	46.00	17.97	100	142	Horizontal
2	292.0582	27.50	15.86	46.00	18.5	100	165	Horizontal
3	447.9821	31.97	24.82	46.00	14.03	100	85	Horizontal
4	519.0648	31.42	25.05	46.00	14.58	100	241	Horizontal
5	599.3212	32.24	25.07	46.00	13.76	100	124	Horizontal
6	903.3093	38.16	31.34	46.00	7.84	100	190	Horizontal

Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 3	**Antenna Polarity**	Vertical



Final Data List

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	69.6005	26.02	17.00	40.00	13.98	100	142	Vertical
2	222.1698	29.24	16.38	46.00	16.76	100	165	Vertical
3	454.3100	33.69	25.46	46.00	12.31	100	85	Vertical
4	499.4247	34.92	24.09	46.00	11.08	100	241	Vertical
5	711.6734	35.81	28.51	46.00	10.19	100	124	Vertical
6	962.1623	38.45	30.10	54.00	15.55	100	190	Vertical

RESULT: Pass

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

Radiated Emissions Test Results for Above 1GHz

EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 1	**Antenna Polarity**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4810.000	48.31	0.08	48.39	74	-25.61	peak
4810.000	37.42	0.08	37.5	54	-16.5	AVG
7215.000	42.59	2.21	44.8	74	-29.2	peak
7215.000	31.54	2.21	33.75	54	-20.25	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 1	**Antenna Polarity**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4810.000	48.62	0.08	48.7	74	-25.3	peak
4810.000	37.54	0.08	37.62	54	-16.38	AVG
7215.000	42.16	2.21	44.37	74	-29.63	peak
7215.000	31.24	2.21	33.45	54	-20.55	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: Pass

Radiated Emissions Test Results for Above 1GHz

EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 2	**Antenna Polarity**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.000	48.61	0.14	48.75	74	-25.25	peak
4882.000	37.54	0.14	37.68	54	-16.32	AVG
7323.000	42.15	2.36	44.51	74	-29.49	peak
7323.000	31.64	2.36	34	54	-20	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 2	**Antenna Polarity**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.000	47.62	0.14	47.76	74	-26.24	peak
4882.000	38.42	0.14	38.56	54	-15.44	AVG
7323.000	42.28	2.36	44.64	74	-29.36	peak
7323.000	32.74	2.36	35.1	54	-18.9	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

RESULT: Pass

Radiated Emissions Test Results for Above 1GHz

EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 3	**Antenna Polarity**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4950.000	48.61	0.22	48.83	74	-25.17	peak
4950.000	38.54	0.22	38.76	54	-15.24	AVG
7425.000	42.34	2.64	44.98	74	-29.02	peak
7425.000	31.65	2.64	34.29	54	-19.71	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT Name	Keyboard receiver	**Model Name**	JP1
Temperature	22.9℃	**Relative Humidity**	58.7%
Pressure	960hPa	**Test Voltage**	DC 5V by PC
Test Mode	Mode 3	**Antenna Polarity**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4950.000	48.64	0.22	48.86	74	-25.14	peak
4950.000	38.52	0.22	38.74	54	-15.26	AVG
7425.000	41.94	2.64	44.58	74	-29.42	peak
7425.000	31.29	2.64	33.93	54	-20.07	AVG

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

RESULT: Pass

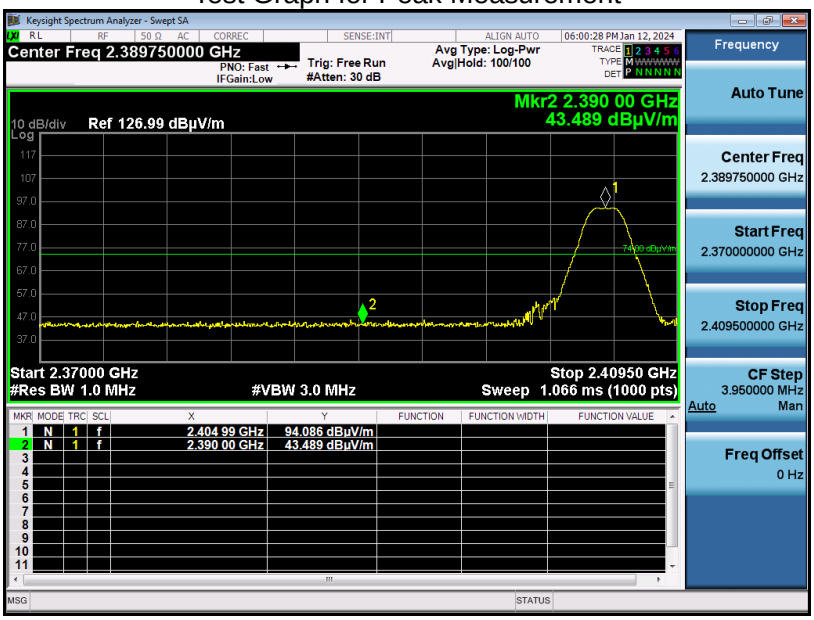
Note:

1. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
2. Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin =Emission Level-Limit.
3. The “Factor” value can be calculated automatically by software of measurement system.

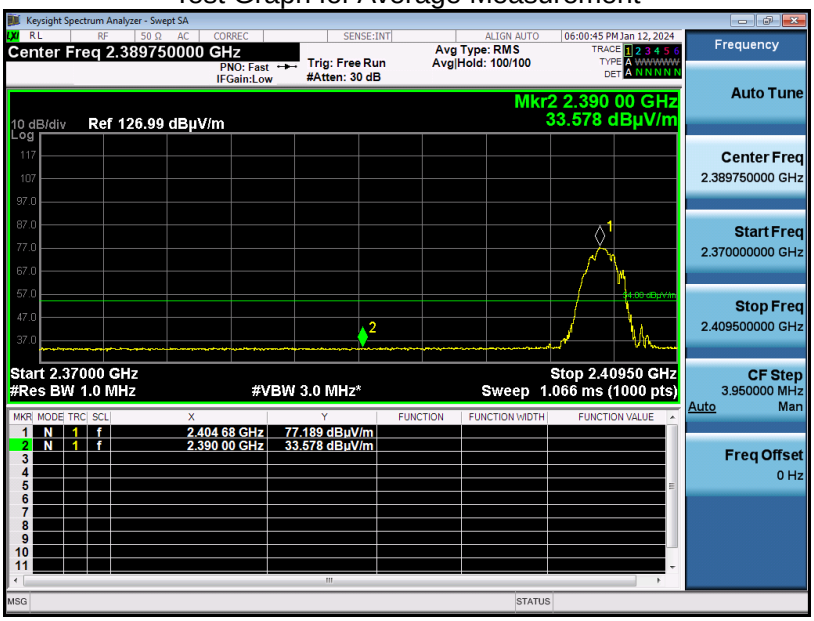
Band Edge Emission Test Results for Restricted Bands

EUT Name	Keyboard receiver	Model Name	JP1
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 5V by PC
Test Mode	Mode 1	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement

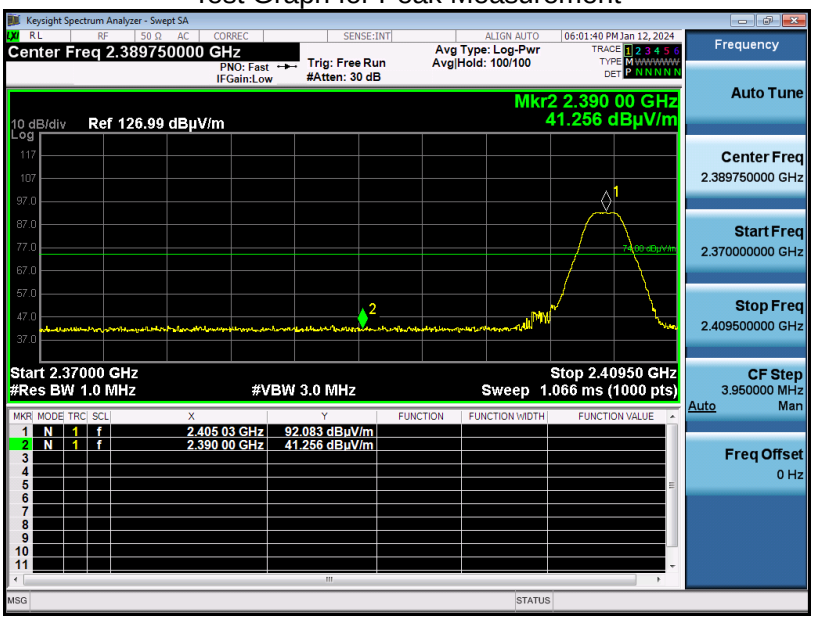


RESULT: Pass

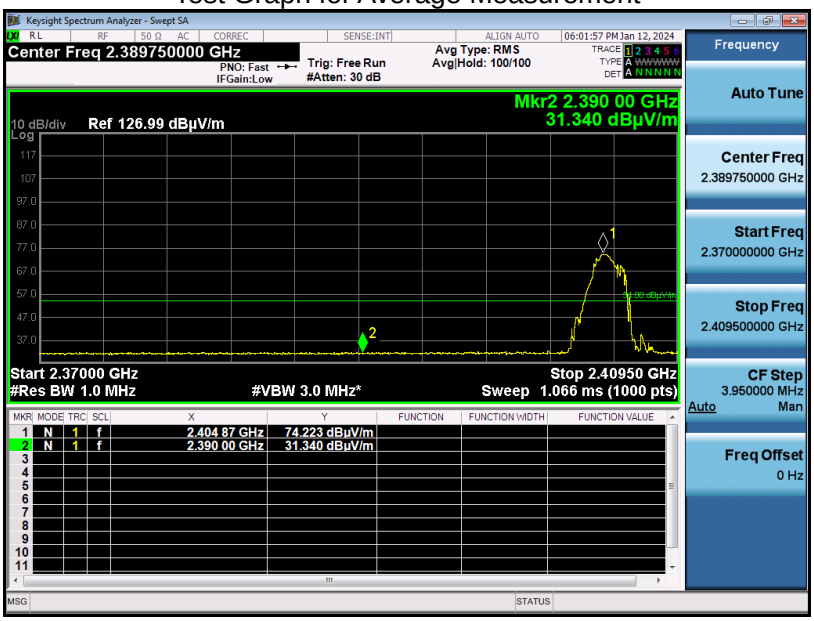
Band Edge Emission Test Results for Restricted Bands

EUT Name	Keyboard receiver	Model Name	JP1
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 5V by PC
Test Mode	Mode 1	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement

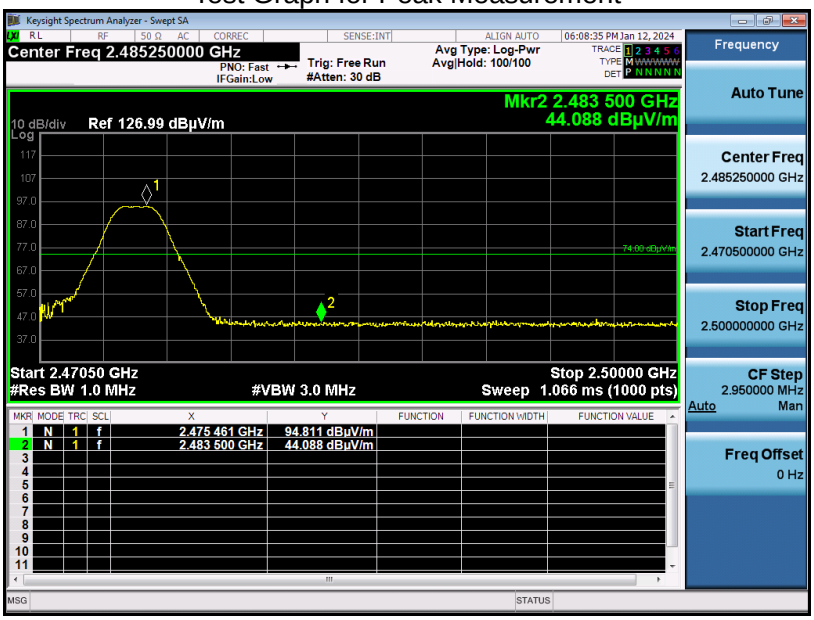


RESULT: Pass

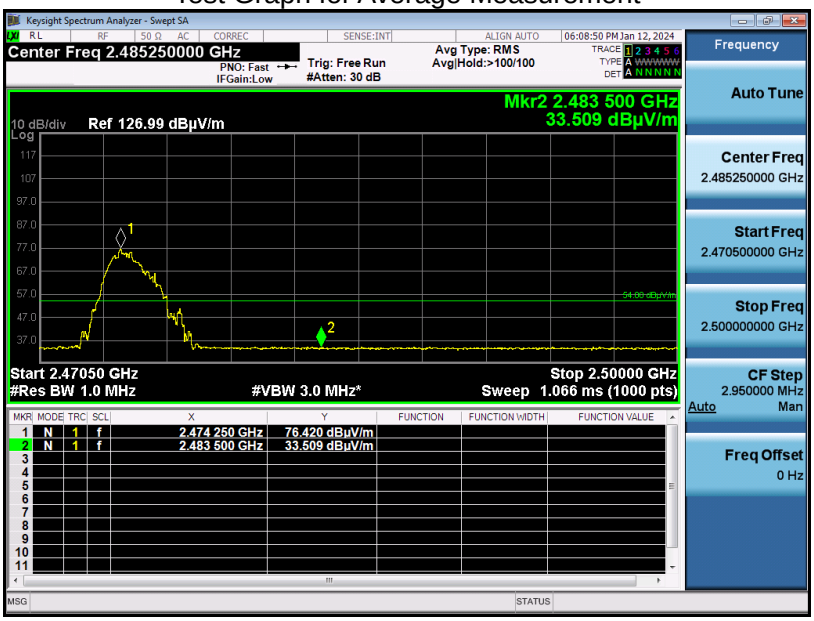
Band Edge Emission Test Results for Restricted Bands

EUT Name	Keyboard receiver	Model Name	JP1
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 5V by PC
Test Mode	Mode 3	Antenna Polarity	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement

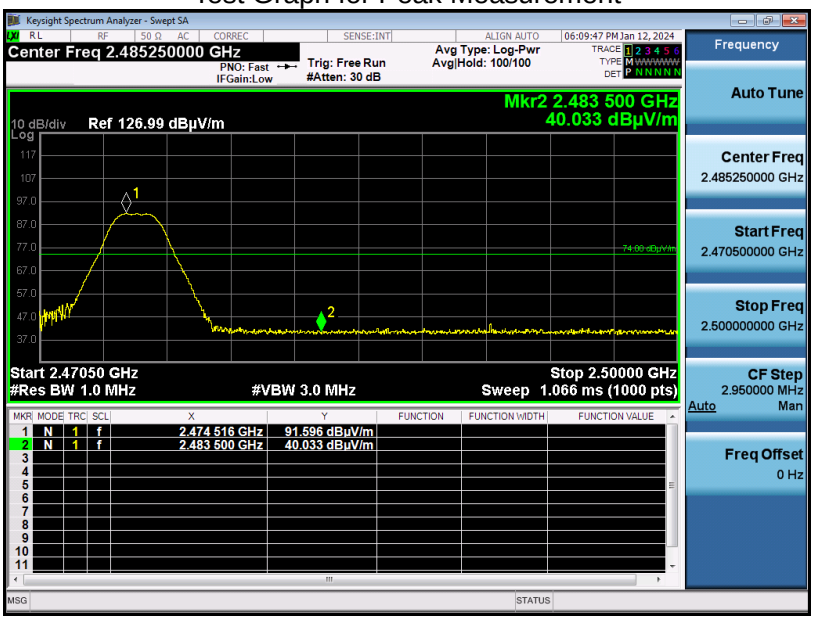


RESULT: Pass

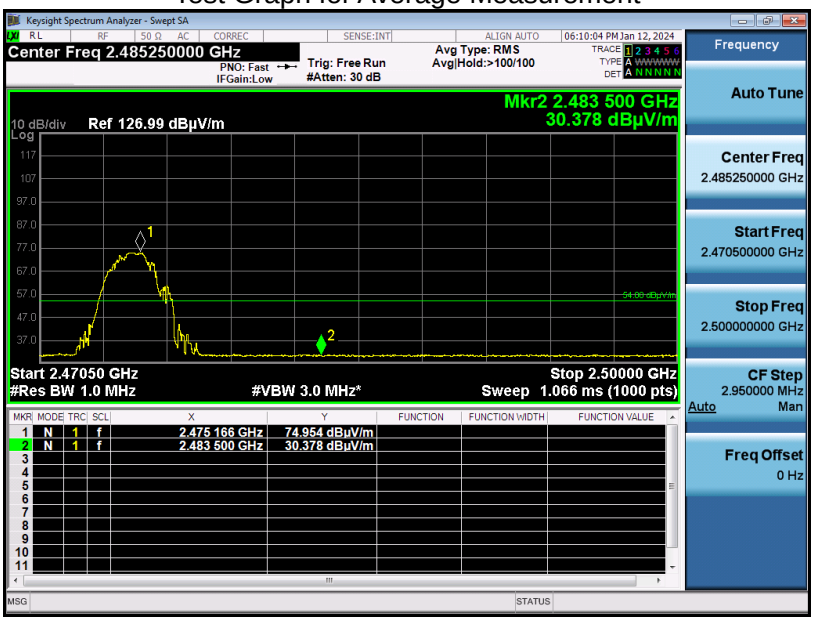
Band Edge Emission Test Results for Restricted Bands

EUT Name	Keyboard receiver	Model Name	JP1
Temperature	25℃	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	DC 5V by PC
Test Mode	Mode 3	Antenna Polarity	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: Pass

Note: The factor had been edited in the “Input Correction” of the Spectrum Analyzer.

12. AC Power Line Conducted Emission Test

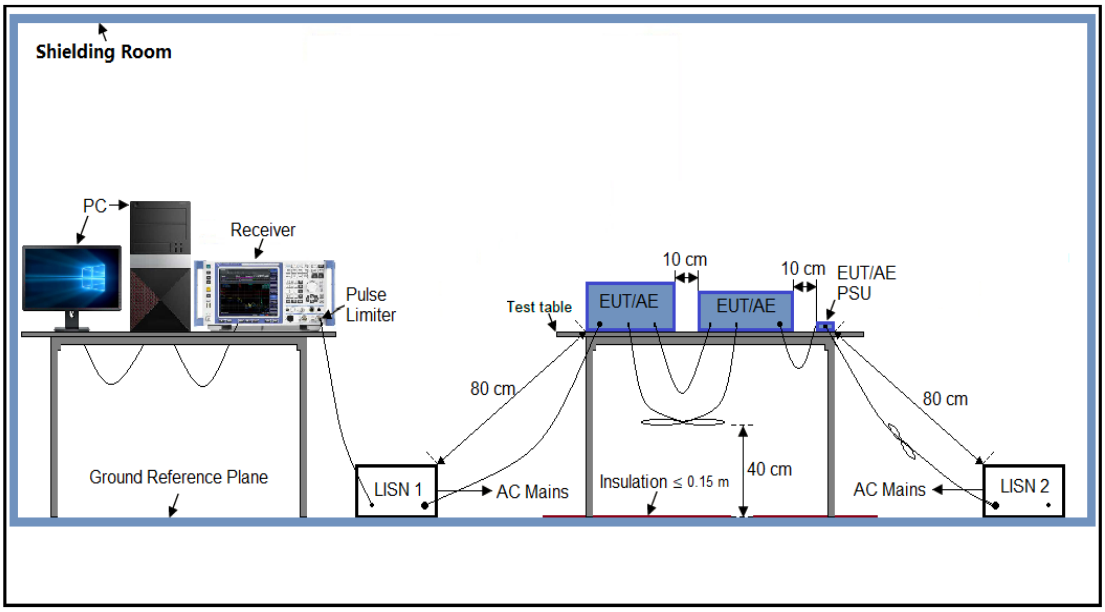
12.1 Measurement Limit

Frequency	Maximum RF Line Voltage	
	Q.P. (dBμV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

12.2 Measurement Setup (Block Diagram of Configuration)



12.3 Preliminary Procedure of Line Conducted Emission Test

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

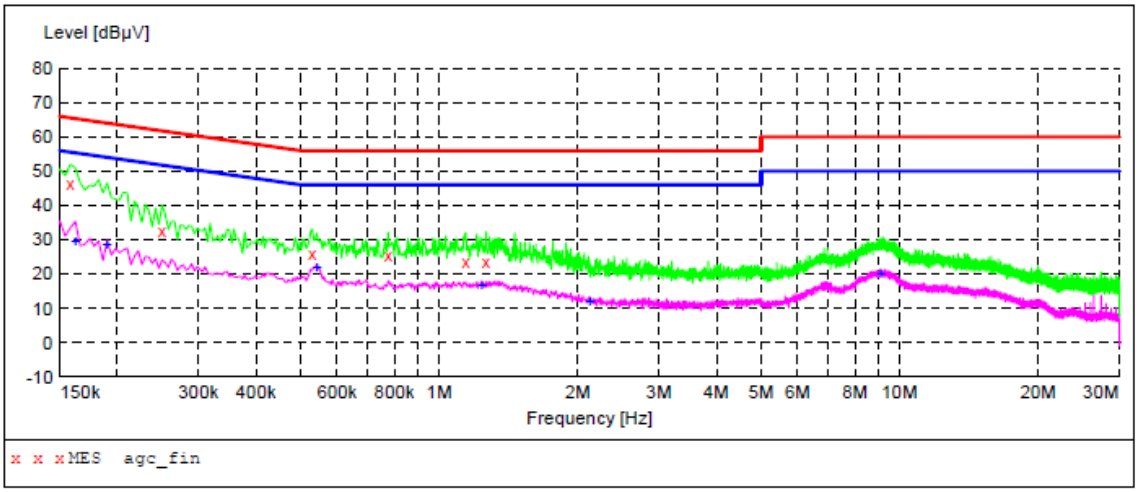
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

12.4 Final Procedure of Line Conducted Emission Test

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, 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. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

12.5 Measurement Results

AC Power Line Conducted Emission Test			
Test Mode	Mode 1	LISN Line	Hot Side



MEASUREMENT RESULT: "agc_fin"

2024/1/8 11:17

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.158000	46.40	6.1	66	19.2	QP	L1
0.250000	32.60	6.1	62	29.2	QP	L1
0.530000	25.80	6.2	56	30.2	QP	L1
0.774000	25.40	6.2	56	30.6	QP	L1
1.142000	23.50	6.2	56	32.5	QP	L1
1.262000	23.50	6.2	56	32.5	QP	L1

MEASUREMENT RESULT: "agc_fin2"

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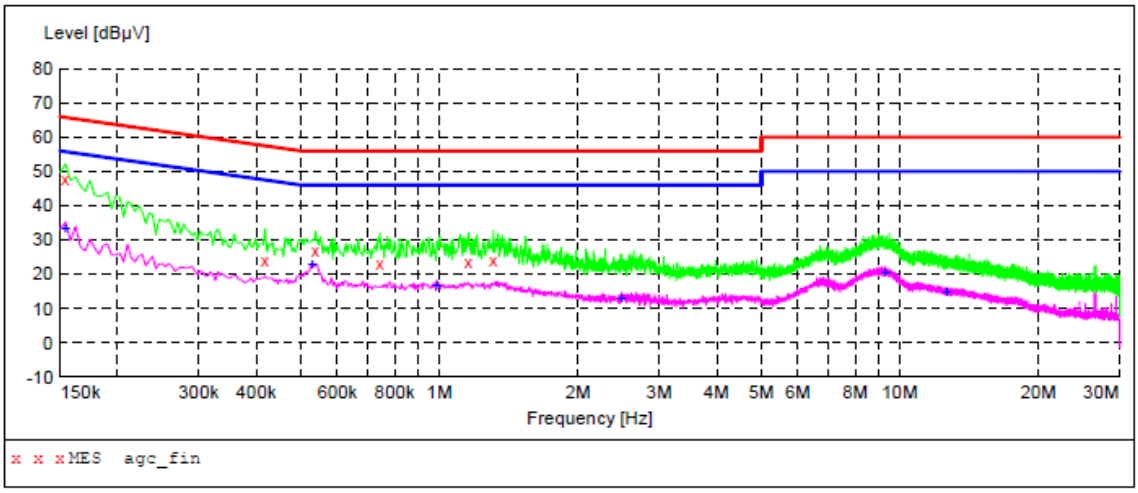
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.162000	29.80	6.1	55	25.6	AV	L1
0.190000	28.80	6.1	54	25.2	AV	L1
0.542000	22.30	6.2	46	23.7	AV	L1
1.238000	17.00	6.2	46	29.0	AV	L1
2.126000	12.10	6.2	46	33.9	AV	L1
9.094000	20.20	6.6	50	29.8	AV	L1

RESULT: Pass

AC Power Line Conducted Emission Test			
Test Mode	Mode 1	LISN Line	Neutral Side



MEASUREMENT RESULT: "agc_fin"

2024/1/8 11:22

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.154000	47.70	6.1	66	18.1	QP	N
0.418000	23.80	6.1	58	33.7	QP	N
0.538000	26.70	6.2	56	29.3	QP	N
0.742000	23.10	6.2	56	32.9	QP	N
1.154000	23.70	6.2	56	32.3	QP	N
1.310000	24.00	6.2	56	32.0	QP	N

MEASUREMENT RESULT: "agc_fin2"

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Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.154000	33.60	6.1	56	22.2	AV	N
0.530000	23.10	6.2	46	22.9	AV	N
0.986000	16.80	6.2	46	29.2	AV	N
2.486000	13.10	6.3	46	32.9	AV	N
9.294000	20.90	6.6	50	29.1	AV	N
12.626000	15.10	6.8	50	34.9	AV	N

RESULT: PASS

Appendix I: Photographs of Test Setup

Refer to the Report No.: AGC16215231206AP01

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC16215231206AP02

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

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

7.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.