



FCC TEST REPORT

FCC ID: 2AK8Q-TKMS006

Report Number.....: ZKT-221115L8540E

Date of Test.....: November 17, 2022 to December 19, 2022

Date of issue.....: December 19, 2022

Total number of pages.....: 27

Test Result: PASS

Testing Laboratory.....: Shenzhen ZKT Technology Co., Ltd.

Address: 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name: Shenzhen Unichain Technology Co., Ltd

Address: 201, 111-3, Huangjinshan District, Bantian Community, Bantian Street, Longgang District, Shenzhen, China

Manufacturer's name: Shenzhen Unichain Technology Co., Ltd

Address: 201, 111-3, Huangjinshan District, Bantian Community, Bantian Street, Longgang District, Shenzhen, China

Test specification:

Standard.....: FCC CFR Title 47 Part 15 Subpart C Section 15.249
ANSI C63.10:2013

Test procedure.....: /

Non-standard test method: N/A

Test Report Form No.....: TRF-EL-111_V0

Test Report Form(s) Originator.....: ZKT Testing

Master TRF: Dated: 2020-01-06

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of ZKT, this document may be altered or revised by ZKT, personal only, and shall be noted in the revision of the document.

Product name.....: Wireless Mouse

Trademark: TECKNET

Model/Type reference.....: TK-MS006

Ratings.....: 1.5V by AA



Testing procedure and testing location:

Testing Laboratory.....: **Shenzhen ZKT Technology Co., Ltd.**

Address.....: 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Tested by (name + signature).....: Jim Liu

Reviewer (name + signature).....: Tom Zou

Approved (name + signature).....: Lake Xie





Table of Contents		Page
1. VERSION		4
2. SUMMARY OF TEST RESULTS		5
2.1 TEST FACILITY		6
2.2 MEASUREMENT UNCERTAINTY		6
3. GENERAL INFORMATION		7
3.1 GENERAL DESCRIPTION OF EUT		7
3.2 DESCRIPTION OF TEST MODES		8
3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED		8
3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)		8
3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS		9
4. EMC EMISSION TEST		11
4.1 CONDUCTED EMISSION MEASUREMENT		11
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS		11
4.1.2 TEST PROCEDURE		11
4.1.3 DEVIATION FROM TEST STANDARD		11
4.1.4 TEST SETUP		12
4.1.5 EUT OPERATING CONDITIONS		12
4.2 RADIATED EMISSION MEASUREMENT		13
4.2.1 RADIATED EMISSION LIMITS		13
4.2.2 TEST PROCEDURE		14
4.2.3 DEVIATION FROM TEST STANDARD		14
4.2.4 TEST SETUP		15
4.2.5 EUT OPERATING CONDITIONS		16
5. RADIATED BAND EMISSION MEASUREMENT		21
5.1 TEST REQUIREMENT:		21
5.2 TEST PROCEDURE		21
5.3 DEVIATION FROM TEST STANDARD		21
5.4 TEST SETUP		22
5.5 EUT OPERATING CONDITIONS		22
5.6 TEST RESULT		23
6. BANDWIDTH TEST		24
7. ANTENNA REQUIREMENT		26
8. TEST SETUP PHOTO		27
9. EUT CONSTRUCTIONAL DETAILS		27



1.VERSION

Report No.	Version	Description	Approved
ZKT-221115L8540E	Rev.01	Initial issue of report	December 19, 2022



2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.249) , Subpart C			
Standard Section	Test Item	Judgment	Remark
FCC part 15.203	Antenna requirement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	N/A	
FCC part 15.249(d)	Band Edge	PASS	
FCC part 15.205/15.209/ 15.249	Spurious Emission	PASS	
FCC part 15.215(c)	20 dB Bandwidth	PASS	

NOTE:

(1)“N/A” denotes test is not applicable in this Test Report



2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.

Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225

Designation Number: CN1299

IC Registered No.: 27033

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$ · where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$ · providing a level of confidence of approximately 95 % .

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.68dB
7	RF power conducted	U=1.86dB
8	RF conducted Spurious Emission	U=2.2dB
9	RF Occupied Bandwidth	U=1.8dB
10	RF Power Spectral Density	U=1.75dB
11	humidity uncertainty	U=5.3%
12	Temperature uncertainty	U=0.59°C



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	Wireless Mouse
Model No.:	TK-MS006
Model Different.:	N/A
Serial No.:	ZKT-221115L8540E
Hardware Version:	V1.0
Software Version:	V1.0
Sample(s) Status:	Engineer sample
Operation Frequency:	2402.85MHz~2480.85MHz
Channel Numbers:	16
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
Antenna gain:	2.34dBi
Power supply:	1.5V by AA
SWITCHING POWER ADAPTER:	N/A

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402.85 MHz	5	2422.85 MHz	9	2441.85 MHz	13	2463.85 MHz
2	2407.85 MHz	6	2426.85 MHz	10	2445.85 MHz	14	2466.85 MHz
3	2414.85 MHz	7	2436.85 MHz	11	2453.85 MHz	15	2473.85 MHz
4	2419.85 MHz	8	2439.85 MHz	12	2459.85 MHz	16	2480.85 MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402.85MHz
The middle channel	2441.85MHz
The Highest channel	2480.85MHz



3.2 DESCRIPTION OF TEST MODES

Transmitting mode	Keep the EUT in continuously transmitting mode
--	--
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Emission



3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Wireless Mouse	TECKNET	TK-MS006	N/A	EUT
A-1	Note Book	Lenovo	ThinkPad E15 Gen 2	SPPOP39975	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.



3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	Oct. 28, 2022	Oct. 27, 2023
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSQ	100363	Oct. 28, 2022	Oct. 27, 2023
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	101169	Oct. 28, 2022	Oct. 27, 2023
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	N/A	Nov. 02, 2022	Nov. 01, 2023
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	Nov. 01, 2022	Oct. 31, 2023
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	Oct. 28, 2022	Oct. 27, 2023
7	Loop Antenna	TESEQ	HLA6121	58357	Nov. 01, 2022	Oct. 31, 2023
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	060747	Nov. 15, 2022	Nov. 14, 2023
9	Amplifier (1GHz-26.5GHz)	Agilent	8449B	3008A00315	Oct. 28, 2022	Oct. 27, 2023
10	Amplifier (500MHz-40GHz)	全聚达	DLE-161	097	Oct. 28, 2022	Oct. 27, 2023
11	Test Cable	N/A	R-01	N/A	Oct. 28, 2022	Oct. 27, 2023
12	Test Cable	N/A	R-02	N/A	Oct. 28, 2022	Oct. 27, 2023
13	Test Cable	N/A	R-03	N/A	Oct. 28, 2022	Oct. 27, 2023
14	Test Cable	N/A	RF-01	N/A	Oct. 28, 2022	Oct. 27, 2023
15	Test Cable	N/A	RF-02	N/A	Oct. 28, 2022	Oct. 27, 2023
16	Test Cable	N/A	RF-03	N/A	Oct. 28, 2022	Oct. 27, 2023
17	ESG Signal Generator	Agilent	E4421B	N/A	Oct. 21, 2022	Oct. 20, 2023
18	Signal Generator	Agilent	N5182A	N/A	Oct. 21, 2022	Oct. 20, 2023
19	Magnetic Field Probe Tester	Narda	ELT-400	0-0344	Nov. 15, 2022	Nov. 14, 2023
20	Wideband Radio Communication Test	R&S	CMW500	106504	Oct. 28, 2022	Oct. 27, 2023
21	RF Power Meter Test system	N/A	MW100-RPCB	N/A	Oct. 21, 2022	Oct. 20, 2023
22	D.C. Power Supply	LongWei	TPR-6405D	N/A	\	\
23	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	\	\
24	RF Software	MW	MTS8310	V2.0.0.0	\	\
25	Turntable	MF	MF-7802BS	N/A	\	\
26	Antenna tower	MF	MF-7802BS	N/A	\	\



Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Oct. 21, 2022	Oct. 20, 2023
2	LISN	CYBERTEK	EM5040A	E1850400149	Oct. 21, 2022	Oct. 20, 2023
3	Test Cable	N/A	C-01	N/A	Oct. 21, 2022	Oct. 20, 2023
4	Test Cable	N/A	C-02	N/A	Oct. 21, 2022	Oct. 20, 2023
5	Test Cable	N/A	C-03	N/A	Oct. 21, 2022	Oct. 20, 2023
6	EMI Test Receiver	R&S	ESCI3	101393	Oct. 28, 2022	Oct. 27, 2023
7	EMC Software	Frad	EZ-EMC	Ver.EMC-CO N 3A1.1	\	\



4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quas-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) *Decreases with the logarithm of the frequency.

4.1.2 TEST PROCEDURE

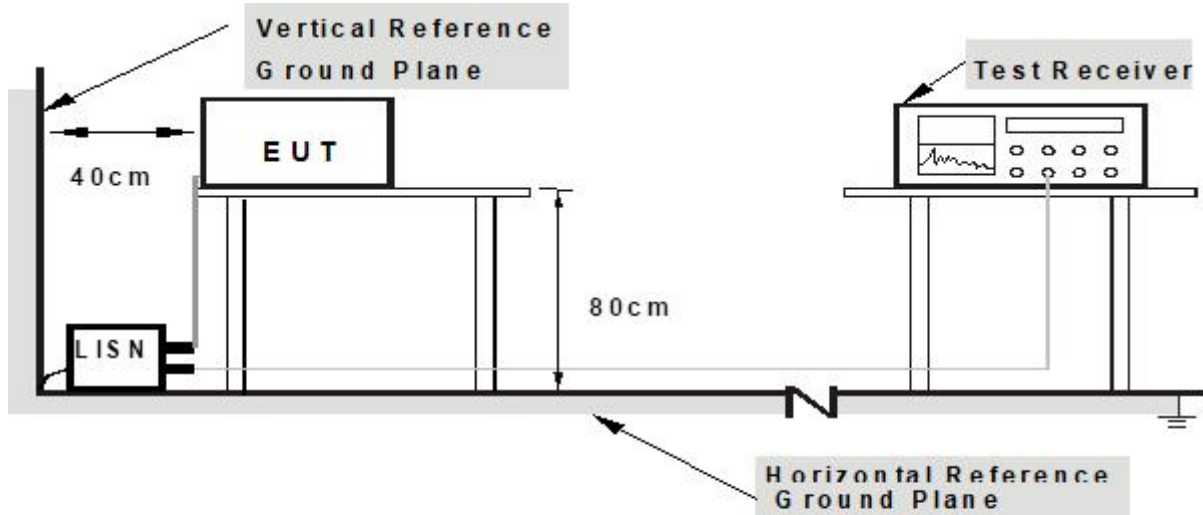
- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation



4.1.4 TEST SETUP



- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to Charging during test. This operating condition was tested and used to collect the included data.

The test mode is the 2.4G operating mode in the charging state, and the worst data of 2402.85MHz was reported.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

4.1.6 Test Result

The EUT is powered by the AA only, the test item is not applicable



4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.209 and 15.249				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	

4.2.1 RADIATED EMISSION LIMITS

Frequencies (MHz)	Field Strength (micorvolts/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

FCC Part 15.249 (a)

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500



LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

4.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
- g. For the radiated emission test above 1GHz:
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.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

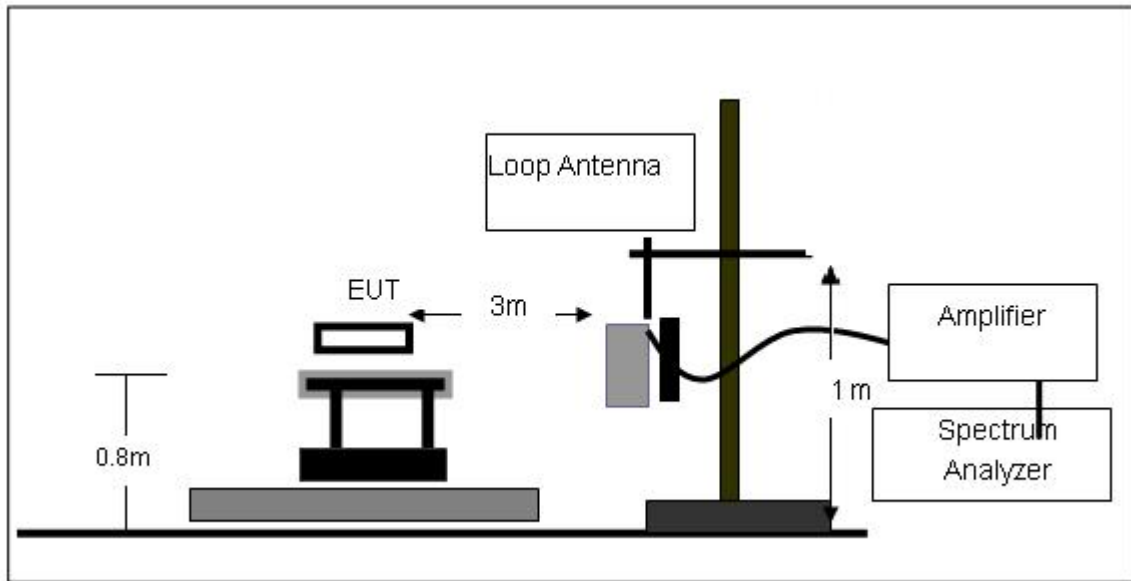
4.2.3 DEVIATION FROM TEST STANDARD

No deviation

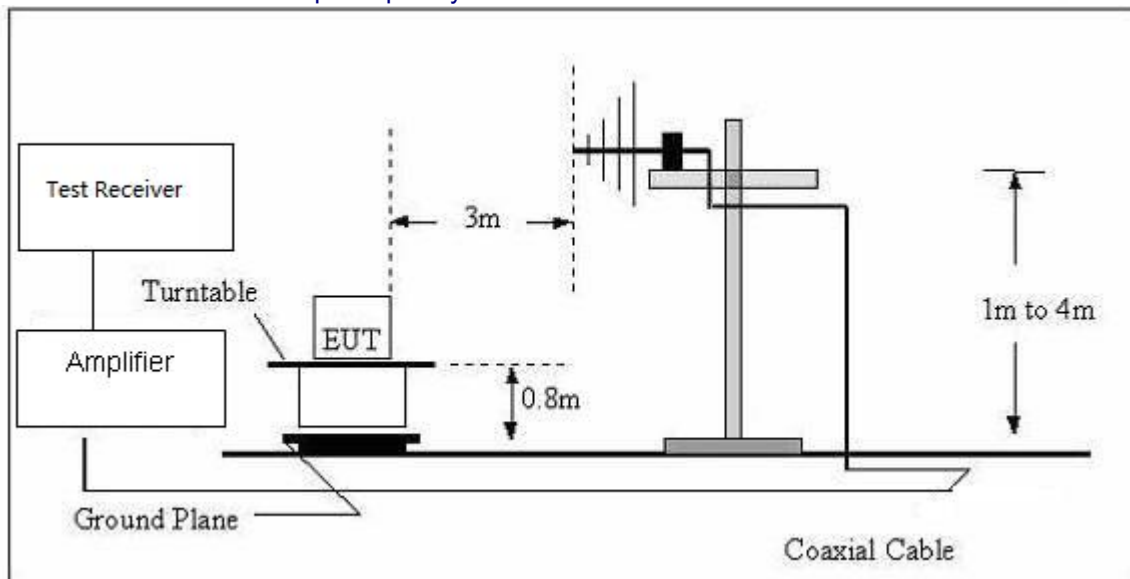


4.2.4 TEST SETUP

(A) Radiated Emission Test-Up Frequency Below 30MHz

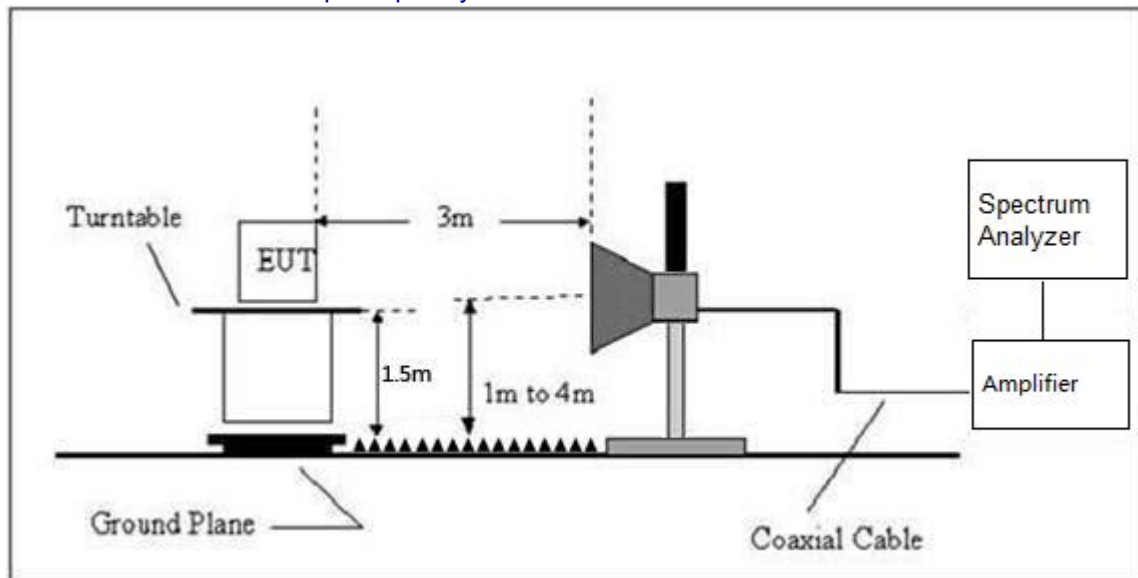


(B) Radiated Emission Test-Up Frequency 30MHz~1GHz





(C) Radiated Emission Test-Up Frequency Above 1GHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

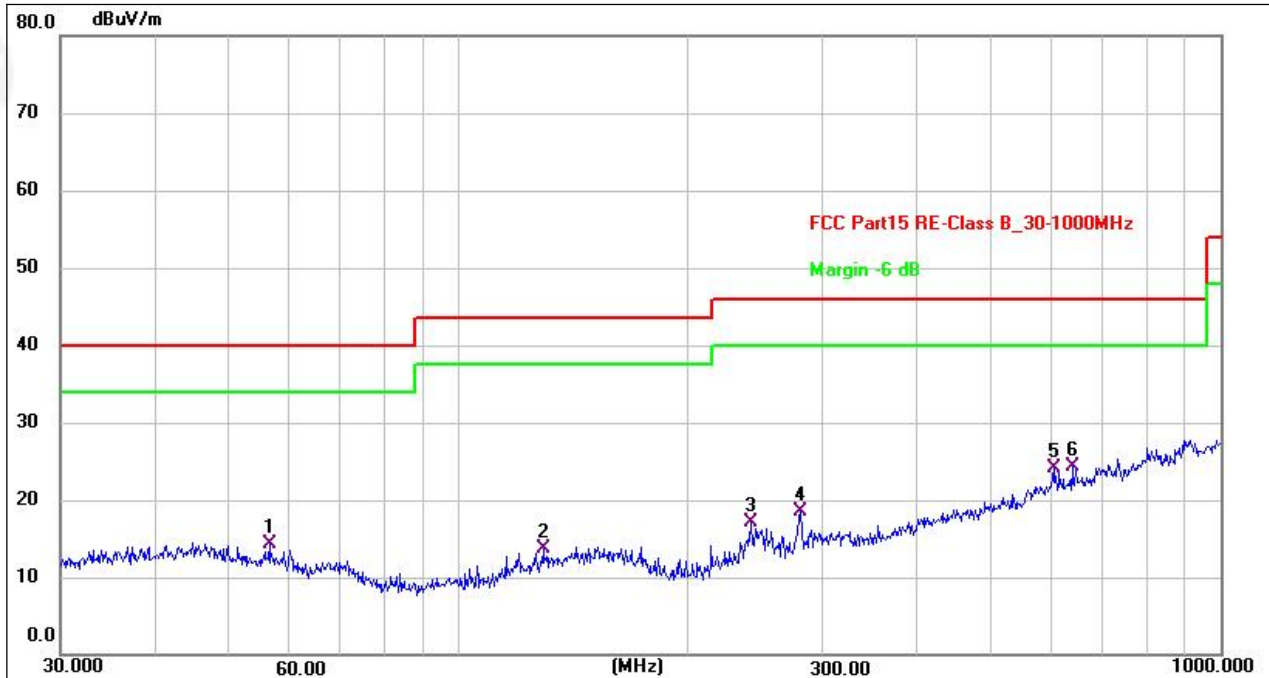
4.2.6 TEST RESULTS (Between 9KHz – 30 MHz)

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.



Between 30MHz – 1GHz

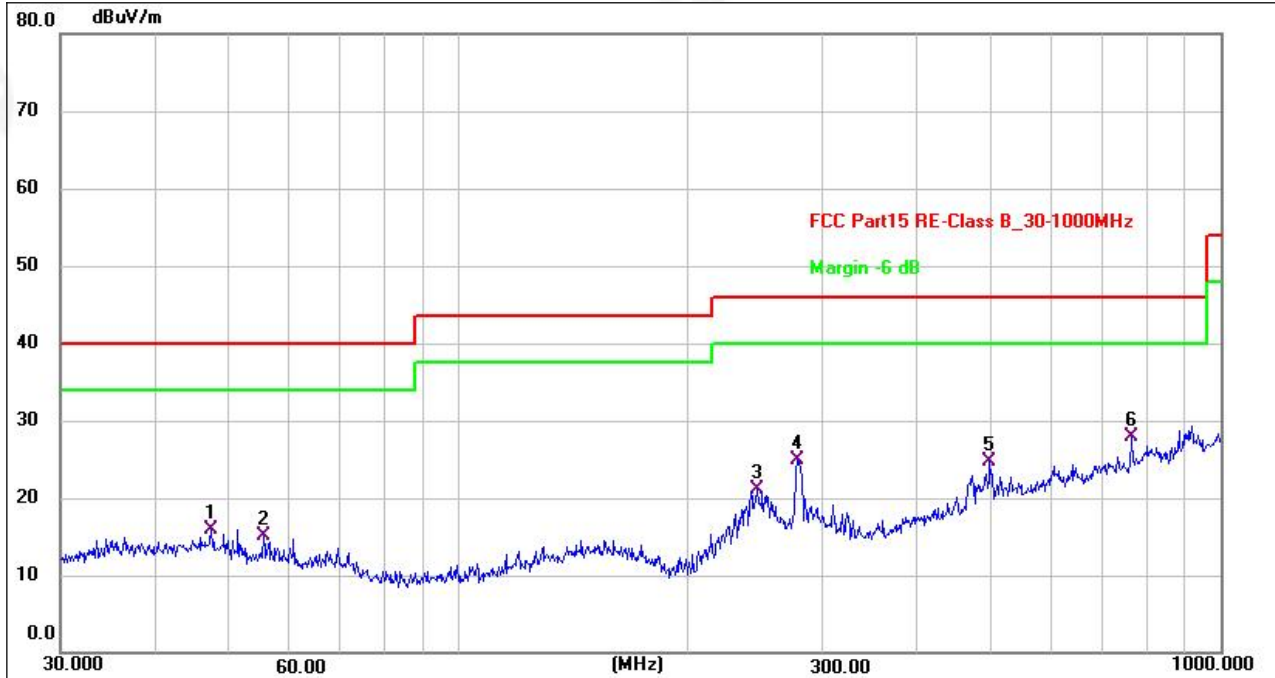
Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	DC 1.5V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	56.3948	23.93	-9.61	14.32	40.00	-25.68	QP	99	17	P	
2	129.0146	23.85	-10.21	13.64	43.50	-29.86	QP	99	91	P	
3	241.6763	27.27	-10.19	17.08	46.00	-28.92	QP	99	312	P	
4	281.0075	27.46	-8.91	18.55	46.00	-27.45	QP	99	350	P	
5	603.5392	25.19	-1.10	24.09	46.00	-21.91	QP	99	116	P	
6 *	638.3686	25.14	-0.78	24.36	46.00	-21.64	QP	99	61	P	



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 1.5V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	47.3255	25.20	-9.22	15.98	40.00	-24.02	QP	99	350	P	
2	55.4147	24.54	-9.49	15.05	40.00	-24.95	QP	99	279	P	
3	246.8149	31.22	-10.03	21.19	46.00	-24.81	QP	99	275	P	
4	278.0668	33.88	-9.03	24.85	46.00	-21.15	QP	99	321	P	
5	497.6765	28.44	-3.75	24.69	46.00	-21.31	QP	99	360	P	
6 *	763.3757	26.76	1.12	27.88	46.00	-18.12	QP	99	333	P	

Remarks:

- 1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
- 2.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3.The test data shows only the worst case GFSK mode and worst channel 2402.85MHz.



1GHz~25GHz

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel:2402.85MHz									
V	2402.85	87.10	30.22	4.85	23.98	85.71	114.00	-28.29	Pk
V	2402.85	84.61	30.22	4.85	23.98	83.22	94.00	-10.78	AV
V	4805.70	56.14	30.55	5.77	24.66	56.02	74.00	-17.98	Pk
V	4805.70	46.19	30.55	5.77	24.66	46.07	54.00	-7.93	AV
V	7208.55	54.04	30.33	6.32	24.55	54.58	74.00	-19.42	Pk
V	7208.55	43.62	30.33	6.32	24.55	44.16	54.00	-9.84	AV
H	2402.85	92.66	30.22	4.85	23.98	91.27	114.00	-22.73	Pk
H	2402.85	90.20	30.22	4.85	23.98	88.81	94.00	-5.19	AV
H	4805.70	59.05	30.55	5.77	24.66	58.93	74.00	-15.07	Pk
H	4805.70	46.61	30.55	5.77	24.66	46.49	54.00	-7.51	AV
H	7208.55	55.50	30.33	6.32	24.55	56.04	74.00	-17.96	Pk
H	7208.55	45.47	30.33	6.32	24.55	46.01	54.00	-7.99	AV

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:2441.85MHz									
V	2441.85	86.15	30.22	4.85	23.98	84.76	114.00	-29.24	Pk
V	2441.85	84.11	30.22	4.85	23.98	82.72	94.00	-11.28	AV
V	4883.70	55.50	30.55	5.77	24.66	55.38	74.00	-18.62	Pk
V	4883.70	46.48	30.55	5.77	24.66	46.36	54.00	-7.64	AV
V	7325.55	55.13	30.33	6.32	24.55	55.67	74.00	-18.33	Pk
V	7325.55	43.85	30.33	6.32	24.55	44.39	54.00	-9.61	AV
H	2441.85	91.79	30.22	4.85	23.98	90.4	114.00	-23.60	Pk
H	2441.85	88.46	30.22	4.85	23.98	87.07	94.00	-6.93	AV
H	4883.70	58.45	30.55	5.77	24.66	58.33	74.00	-15.67	Pk
H	4883.70	46.85	30.55	5.77	24.66	46.73	54.00	-7.27	AV
H	7325.55	57.18	30.33	6.32	24.55	57.72	74.00	-16.28	Pk
H	7325.55	45.17	30.33	6.32	24.55	45.71	54.00	-8.29	AV



Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel:2480.85MHz									
V	2480.85	86.48	30.22	4.85	23.98	85.09	114.00	-28.91	Pk
V	2480.85	86.56	30.22	4.85	23.98	85.17	94.00	-8.83	AV
V	4961.70	55.61	30.55	5.77	24.66	55.49	74.00	-18.51	Pk
V	4961.70	45.68	30.55	5.77	24.66	45.56	54.00	-8.44	AV
V	7442.55	55.12	30.33	6.32	24.55	55.66	74.00	-18.34	Pk
V	7442.55	44.37	30.33	6.32	24.55	44.91	54.00	-9.09	AV
H	2480.85	92.52	30.22	4.85	23.98	91.13	114.00	-22.87	Pk
H	2480.85	88.46	30.22	4.85	23.98	87.07	94.00	-6.93	AV
H	4961.70	57.78	30.55	5.77	24.66	57.66	74.00	-16.34	Pk
H	4961.70	47.77	30.55	5.77	24.66	47.65	54.00	-6.35	AV
H	7442.55	55.98	30.33	6.32	24.55	56.52	74.00	-17.48	Pk
H	7442.55	45.95	30.33	6.32	24.55	46.49	54.00	-7.51	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.



5. RADIATED BAND EMISSION MEASUREMENT

5.1 TEST REQUIREMENT:

Test Requirement:	FCC Part15 C Section 15.209, 15.205 and 15.249				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Average	1MHz	3MHz	Average

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

5.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

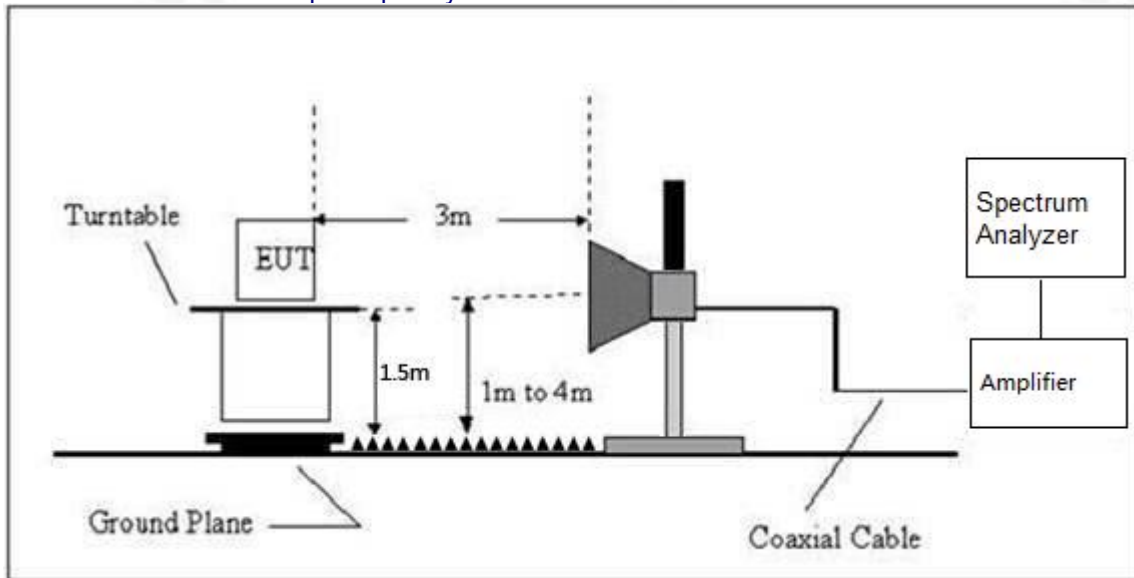
5.3 DEVIATION FROM TEST STANDARD

No deviation



5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



5.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



5.6 TEST RESULT

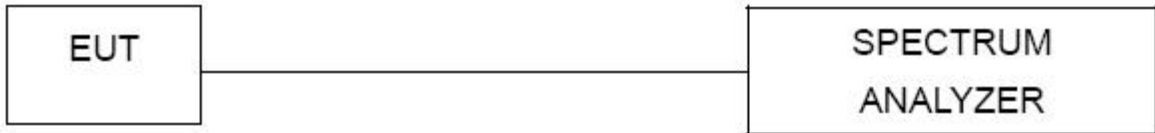
	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
GFSK	Low Channel: 2402.85MHz										
	H	2390.00	55.29	30.22	4.85	23.98	53.9	74.00	-20.1	PK	PASS
	H	2390.00	45.18	30.22	4.85	23.98	43.79	54.00	-10.21	AV	PASS
	H	2400.00	52.5	30.22	4.85	23.98	51.11	74.00	-22.89	PK	PASS
	H	2400.00	45.01	30.22	4.85	23.98	43.62	54.00	-10.38	AV	PASS
	V	2390.00	56.62	30.22	4.85	23.98	55.23	74.00	-18.77	PK	PASS
	V	2390.00	45.4	30.22	4.85	23.98	44.01	54.00	-9.99	AV	PASS
	V	2400.00	57.31	30.22	4.85	23.98	55.92	74.00	-18.08	PK	PASS
	V	2400.00	45.7	30.22	4.85	23.98	44.31	54.00	-9.69	AV	PASS
	High Channel: 2480.85MHz										
	H	2483.50	56.64	30.22	4.85	23.98	55.25	74.00	-18.75	PK	PASS
	H	2483.50	46.14	30.22	4.85	23.98	44.75	54.00	-9.25	AV	PASS
	H	2500.00	56.99	30.22	4.85	23.98	55.6	74.00	-18.4	PK	PASS
	H	2500.00	46.5	30.22	4.85	23.98	45.11	54.00	-8.89	AV	PASS
	V	2483.50	53.7	30.22	4.85	23.98	52.31	74.00	-21.69	PK	PASS
	V	2483.50	44.35	30.22	4.85	23.98	42.96	54.00	-11.04	AV	PASS
	V	2500.00	56.42	30.22	4.85	23.98	55.03	74.00	-18.97	PK	PASS
	V	2500.00	44.55	30.22	4.85	23.98	43.16	54.00	-10.84	AV	PASS
Remark:											
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit											



6. BANDWIDTH TEST

1. Set RBW = 30 KHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP

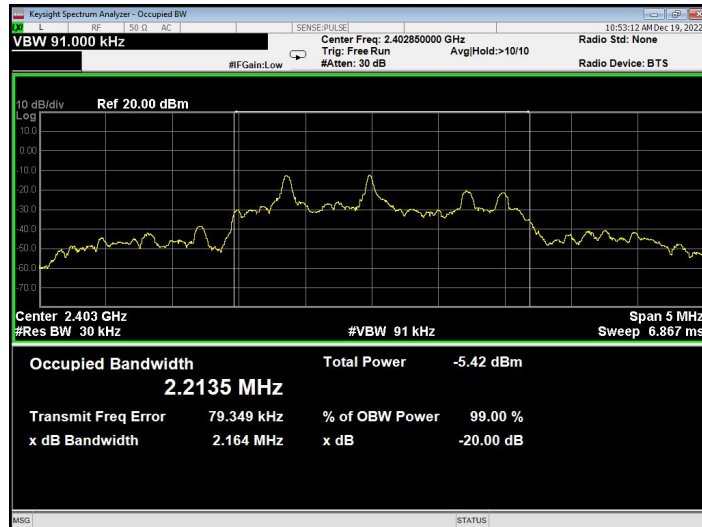


Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa		

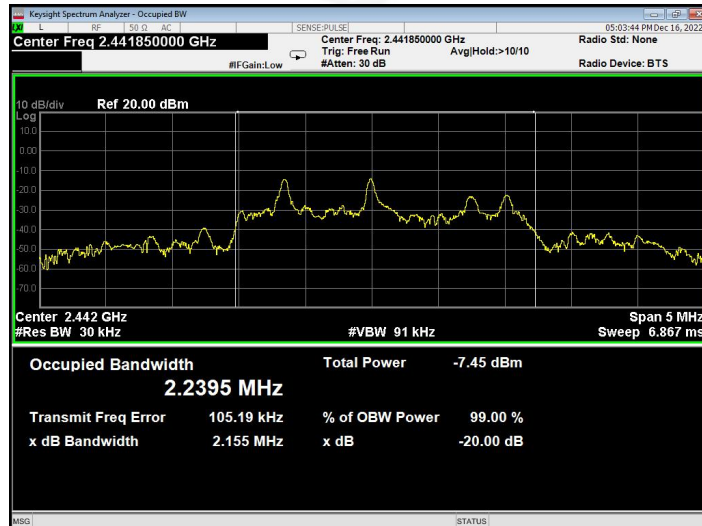
Frequency (MHz)	20dB bandwidth (KHz)	99% bandwidth (KHz)	Result
2402.85	2164	2213.5	Pass
2441.85	2155	2239.5	Pass
2480.85	2147	2707.0	Pass



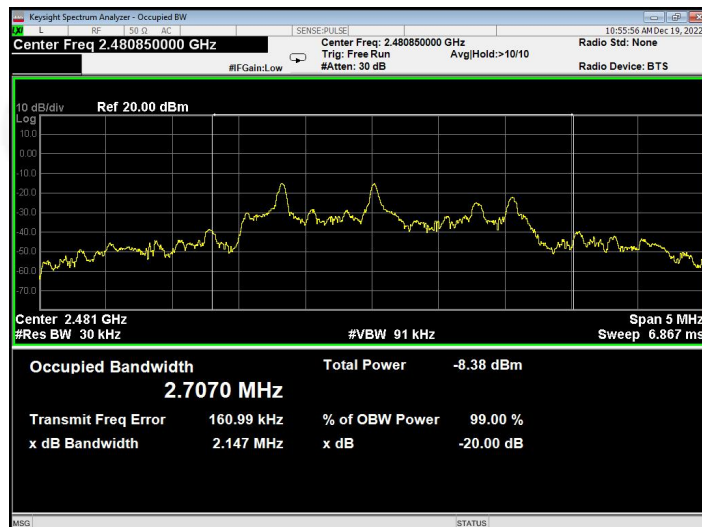
2402.85MHz



2441.85MHz



2480.85MHz





7. ANTENNA REQUIREMENT

Standard requirement:	FCC Part15.203
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.	
EUT Antenna:	
The antenna is PCB ANT, the best case gain of the antennas is 2.34dBi, reference to the Internal Photos for details	



8. TEST SETUP PHOTO

Reference to the appendix Test Setup Photos for details.

9. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix External Photos and Internal Photos for details.

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