FCC TEST REPORT
FCC ID:2AURZ-SP300

Report Number..... :	ZKT-210625L2940-02
Date of Test.....	Jun. 15, 2021 -- Jul. 10, 2021
Date of issue ..... :	Jul. 10, 2021
Total number of pages	43
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 Kaisuda Technology Co., Ltd.
Address ..... :	laimengshuixiechuntian6qiAqu1dong12E longhuaxinquminzhijiedaomintanglu shenzhenshi, China
Manufacturer's name ..... :	DONGGUAN KAIJING ELECTRONIC TECHNOLOGY Co., LTD
Address ..... :	1-2 / F, building 2, Qihua Industrial, Xinyuan Road, Wulian village, Fenggang town, Dongguan
Test specification:	
Standard..... :	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10:2013 &KDB 558074 D01 15.247 Meas Guidance v05r02
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.
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Product name..... :	Speakerphone
Trademark ..... :	kaysuda
Model/Type reference ..... :	SP300
Ratings..... :	DC 3.7V from battery DC 5V ADAPTER

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).....:	Alen He
Reviewer (name + signature).....:	Joe Liu
Approved (name + signature).....:	Lake Xie

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1.VERSION

Report No.	Version	Description	Approved
ZKT-210625L2940-02	Rev.01	Initial issue of report	Jul. 10, 2021

2.1SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Result	Remark
FCC part 15.203/15.247 (c)	Antenna req irement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part 15.247 (b)	Conducted Peak Output Power	PASS	
FCC part 15.247 (a)(2)	6dB Bandwidth & 99% Bandwidth	PASS	
FCC part 15.247 (e)	Power Spectral Density	PASS	
FCC part 15.247(d)	Band Edge	PASS	
FCC Part 15.247(d)	Spurious Emission	PASS	

NOTE:

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

2.1TEST 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 ± 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 %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power conducted	±0.16dB
3	Spurious emissions conducted	±0.21dB
4	All emissions radiated(<1G)	±4.68dB
5	All emissions radiated(>1G)	±4.89dB
6	Temperature	±0.5℃
7	Humidity	±2%

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	Speakerphone
Model No.:	SP300
Model Different.:	/
Serial No.:	N/A
Hardware Version:	V1.0
Software Version:	V1.8
Sample(s) Status:	Engineer sample
Channel numbers:	40
Channel separation:	2402MHz~2480MHz
Modulation technology:	GFSK
Antenna Type:	Chip Antenna
Antenna gain:	1.5 dBi
Power supply:	DC 3.7V from battery DC 5V ADAPTER
SWITCHING POWER ADAPTER:	MODEL: FJ-SW1260502500UN INPUT:100-240 50/60Hz 0.4A Max OUTPUT:5V 1500mA

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402	11	2422	21	2442	31	2462
2	2404	12	2424	22	2444	32	2464
3	2406	13	2426	23	2446	33	2466
4	2408	14	2428	24	2448	34	2468
5	2410	15	2430	25	2450	35	2470
6	2412	16	2432	26	2452	36	2472
7	2414	17	2434	27	2454	37	2474
8	2416	18	2436	28	2456	38	2476
9	2418	19	2438	29	2458	39	2478
10	2420	20	2440	30	2460	40	2480

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:

Test channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

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.	

Test Software	Test Tool
Power level setup	<0dBm

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission

ADAPTER EUT

Radiated Emission

EUT

Conducted Spurious

EUT

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	ADAPTER	N/A	MODEL: FJ-SW1260502500UN INPUT:100-240 50/60Hz 0.4A Max OUTPUT:5V 1500mA	N/A	EUT

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	MY45109572	Sep. 22, 2020	Sep. 21, 2021
2	Spectrum Analyzer (1GHz-40GHz)	Agilent	E4446A	100363	Sep. 22, 2020	Sep. 21, 2021
3	Test Receiver (9kHz-7GHz)	R&S	ESCI7	101169	Sep. 22, 2020	Sep. 21, 2021
4	Bilog Antenna (30MHz-1400MHz)	Schwarzbeck	VULB9168	00877	Sep. 22, 2020	Sep. 21, 2021
5	Horn Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA9120D	1541	Sep. 22, 2020	Sep. 21, 2021
6	Horn Antenna (18GHz-40GHz)	A.H. System	SAS-574	588	Sep. 22, 2020	Sep. 21, 2021
7	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	N/A	Sep. 22, 2020	Sep. 21, 2021
8	Amplifier (1GHz-40GHz)	全聚达	DLE-161	097	Sep. 22, 2020	Sep. 21, 2021
9	Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	014	Sep. 22, 2020	Sep. 21, 2021
10	RF cables1 (9kHz-30MHz)	N/A	9kHz-30MHz	N/A	Sep. 22, 2020	Sep. 21, 2021
11	RF cables2 (30MHz-1GHz)	N/A	30MHz-1GHz	N/A	Sep. 22, 2020	Sep. 21, 2021
12	RF cables3 (1GHz-40GHz)	N/A	1GHz-40GHz	N/A	Sep. 22, 2020	Sep. 21, 2021
13	CMW500 Test	R&S	CMW500	106504	Sep. 22, 2020	Sep. 21, 2021
14	ESG Signal Generator	Agilent	E4421B	GB40051203	Sep. 22, 2020	Sep. 21, 2021
15	Signal Generator	Agilent	N5182A	MY47420215	Sep. 22, 2020	Sep. 21, 2021
16	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
17	Software	Frad	EZ-EMC	FA-03A2 RE	\	\

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Sep. 22, 2020	Sep. 21, 2021
2	LISN	CYBERTEK	EM5040A	E1850400149	Sep. 22, 2020	Sep. 21, 2021
3	Test Cable	N/A	C01	N/A	Sep. 22, 2020	Sep. 21, 2021
4	Test Cable	N/A	C02	N/A	Sep. 22, 2020	Sep. 21, 2021
5	EMI Test Receiver	R&S	ESRP3	101946	Sep. 22, 2020	Sep. 21, 2021
6	Absorbing Clamp	DZ	ZN23201	N/A	Sep. 22, 2020	Sep. 21, 2021

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.

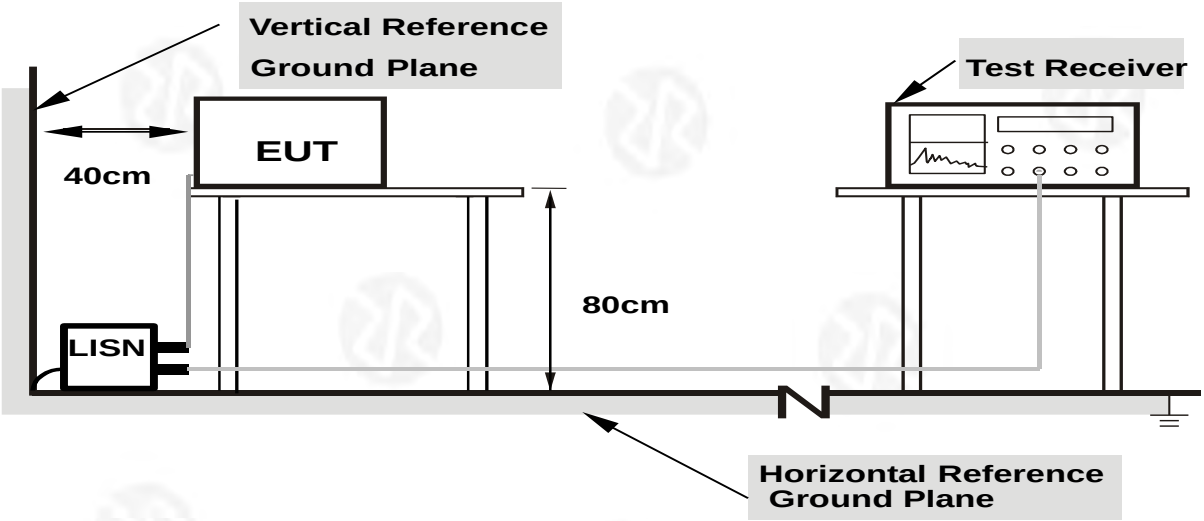
4.1.2 TEST PROCEDURE

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 from other units and other metal planes

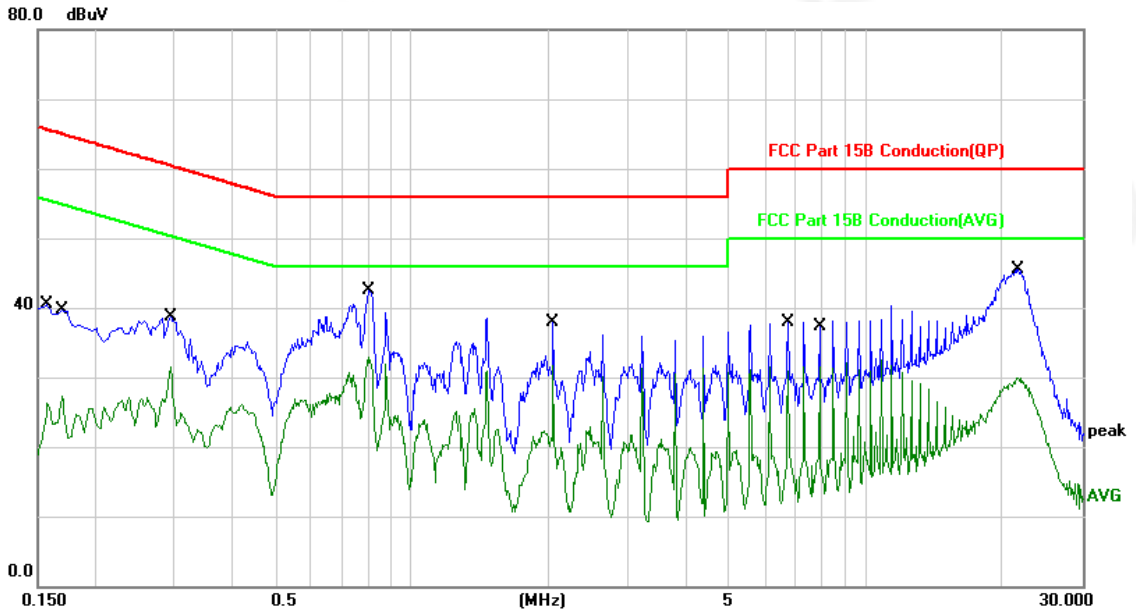
4.1.5 EUT OPERATING CONDITIONS

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

4.1.6 TEST RESULTS

Worst test mode and test results recorded in report ZKT-210625L2940-01

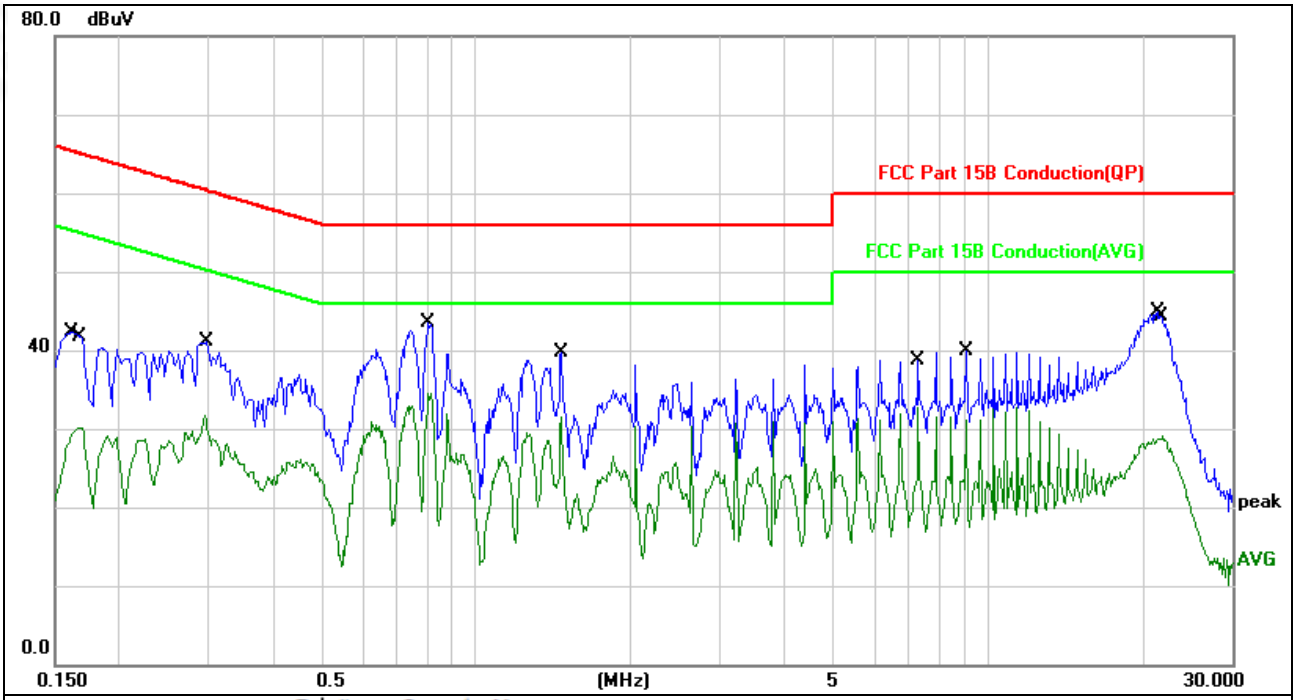
Temperature :	26℃	Relative Humidity :	54%
Pressure :	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test mode	Charging



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1580	40.55	-0.13	40.42	65.56	-25.14	QP	
2		0.1700	27.39	-0.13	27.26	54.96	-27.70	AVG	
3		0.2940	38.72	-0.01	38.71	60.41	-21.70	QP	
4		0.2940	31.54	-0.01	31.53	50.41	-18.88	AVG	
5		0.8059	42.58	-0.07	42.51	56.00	-13.49	QP	
6	*	0.8059	32.96	-0.07	32.89	46.00	-13.11	AVG	
7		2.0500	38.11	-0.23	37.88	56.00	-18.12	QP	
8		2.0500	31.87	-0.23	31.64	46.00	-14.36	AVG	
9		6.7380	38.16	-0.27	37.89	60.00	-22.11	QP	
10		7.9100	31.74	-0.22	31.52	50.00	-18.48	AVG	
11		21.6980	45.90	-0.39	45.51	60.00	-14.49	QP	
12		21.6980	30.35	-0.39	29.96	50.00	-20.04	AVG	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

Temperature :	26℃	Relative Humidity :	54%
Pressure :	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test mode	Charging



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure-ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1620	42.45	-0.13	42.32	65.36	-23.04	QP	
2		0.1700	30.30	-0.13	30.17	54.96	-24.79	AVG	
3		0.2940	31.76	-0.01	31.75	50.41	-18.66	AVG	
4		0.2980	41.20	-0.01	41.19	60.30	-19.11	QP	
5		0.8059	43.48	-0.07	43.41	56.00	-12.59	QP	
6	*	0.8059	34.66	-0.07	34.59	46.00	-11.41	AVG	
7		1.4660	39.95	-0.19	39.76	56.00	-16.24	QP	
8		1.4660	31.74	-0.19	31.55	46.00	-14.45	AVG	
9		7.3220	32.91	-0.28	32.63	50.00	-17.37	AVG	
10		9.0780	40.02	-0.19	39.83	60.00	-20.17	QP	
11		21.5620	45.20	-0.39	44.81	60.00	-15.19	QP	
12		22.0020	29.57	-0.40	29.17	50.00	-20.83	AVG	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.209
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	100KHz	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

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

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

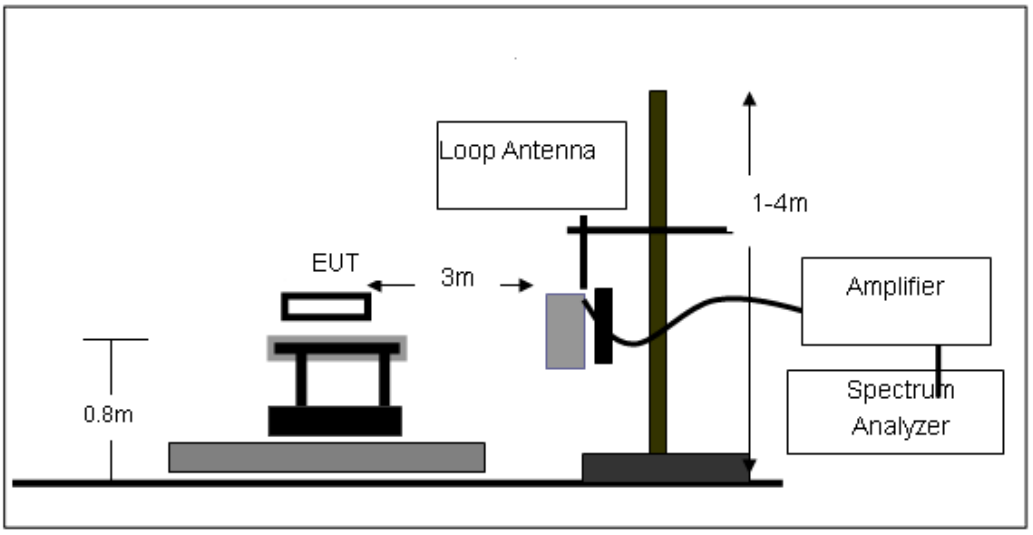
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-chamber test. The table was rotated 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

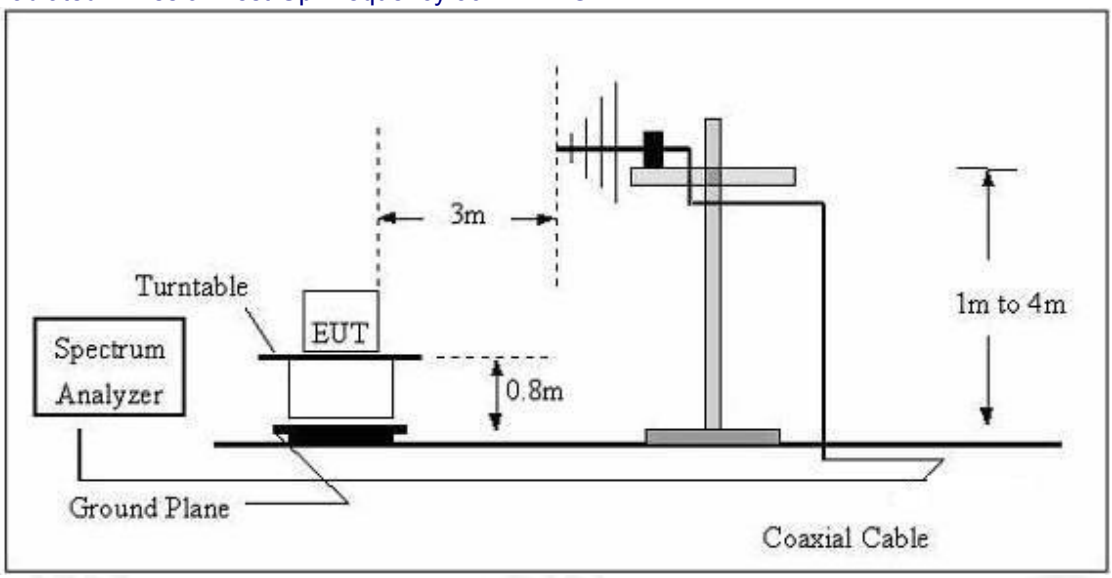
No deviation

4.2.4 TEST SETUP

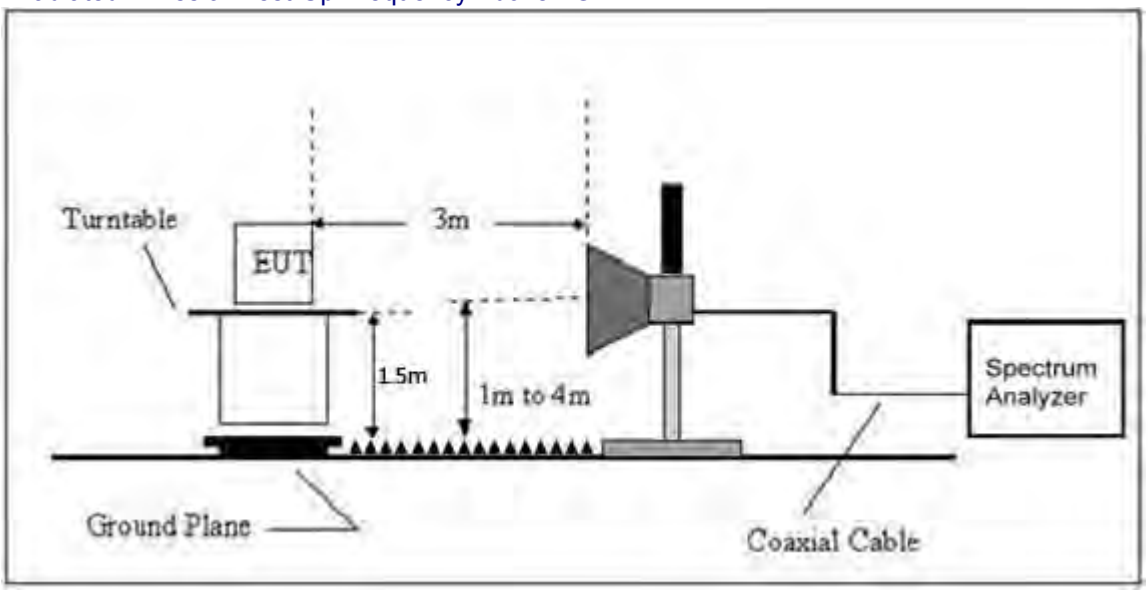
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.2.5 EUT OPERATING CONDITIONS

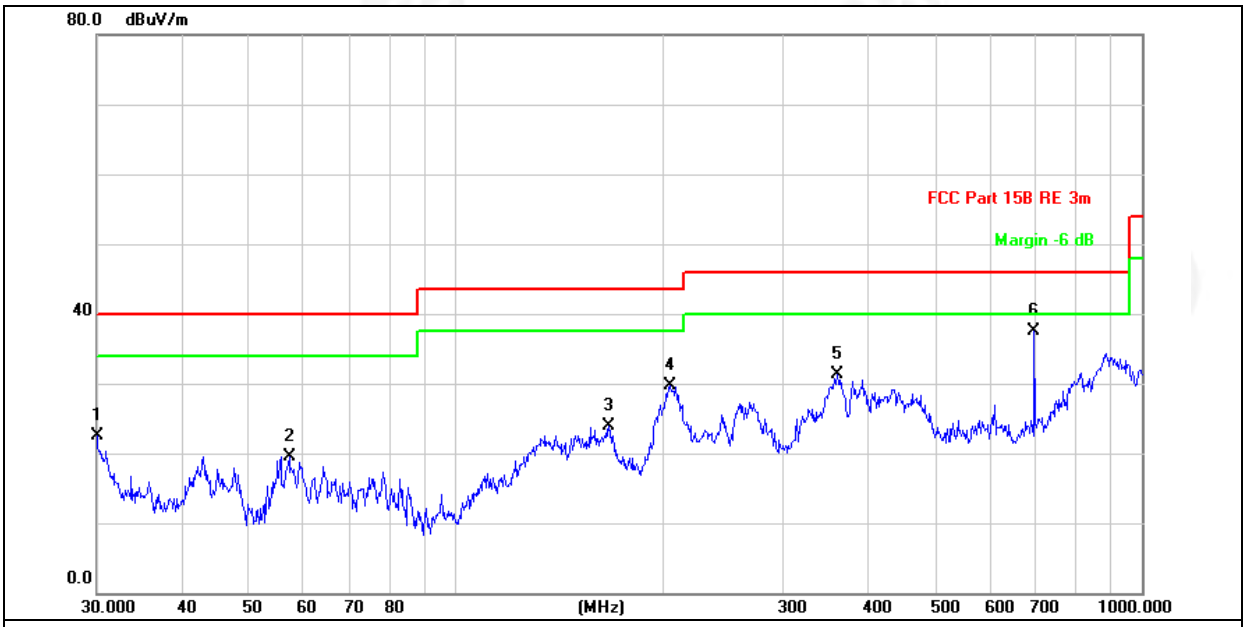
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

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.

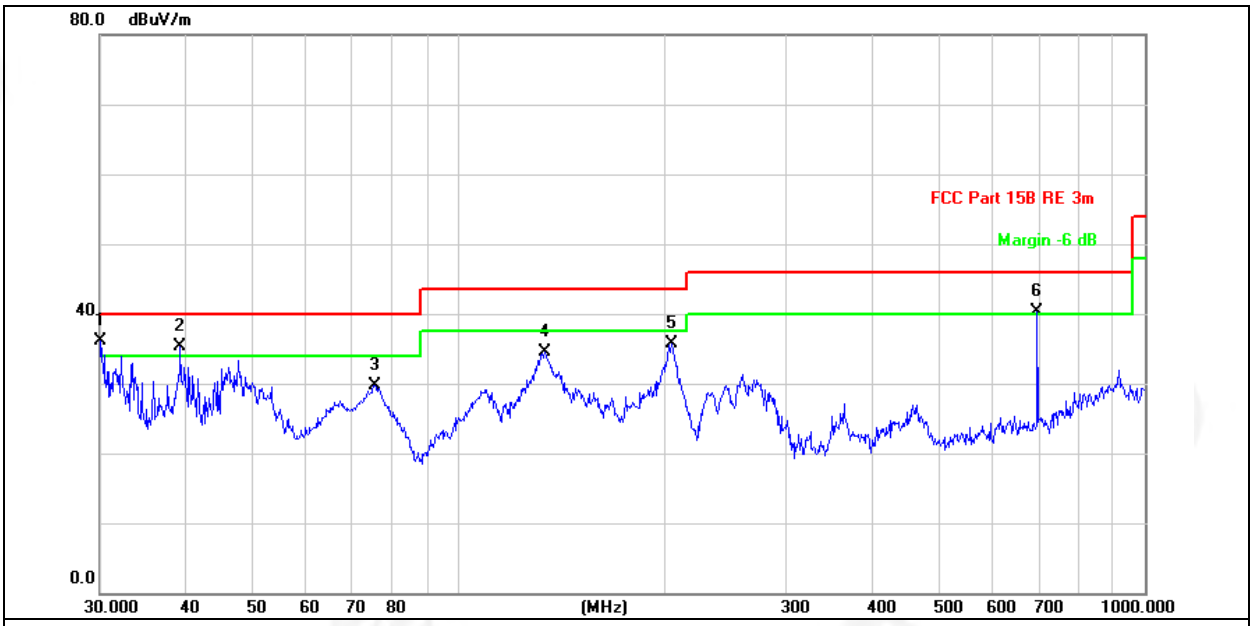
Between 30MHz – 1GHz

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz	Test mode	Charging+BT



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		30.0000	20.93	1.62	22.55	40.00	-17.45	QP			
2		57.1914	36.04	-16.49	19.55	40.00	-20.45	QP			
3		167.2368	30.24	-6.24	24.00	43.50	-19.50	QP			
4		204.9551	36.49	-6.78	29.71	43.50	-13.79	QP			
5		360.4476	33.98	-2.73	31.25	46.00	-14.75	QP			
6	*	696.8567	36.26	1.16	37.42	46.00	-8.58	QP			

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz	Test mode	Charging+BT



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	30.1054	34.60	1.43	36.03	40.00	-3.97	QP			
2	!	39.2991	44.11	-8.85	35.26	40.00	-4.74	QP			
3		75.4464	43.36	-13.59	29.77	40.00	-10.23	QP			
4		133.6188	39.71	-5.26	34.45	43.50	-9.05	QP			
5		204.2377	42.38	-6.68	35.70	43.50	-7.80	QP			
6	!	696.8567	39.06	1.16	40.22	46.00	-5.78	QP			

Remarks:
1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier 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

1GHz~25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2402MHz									
V	4807.7	54.61	30.55	5.77	24.66	54.49	74.00	-19.51	Pk
V	4807.7	45.20	30.55	5.77	24.66	45.08	54.00	-8.92	AV
V	7211.55	57.45	30.33	6.32	24.55	57.99	74.00	-16.01	Pk
V	7211.55	47.26	30.33	6.32	24.55	47.80	54.00	-6.20	AV
V	9615.4	45.35	30.85	7.45	24.69	46.64	74.00	-27.36	Pk
V	9615.4	46.37	30.85	7.45	24.69	47.66	54.00	-6.34	AV
V	12019.25	44.92	31.02	8.99	25.57	48.46	74.00	-25.54	Pk
V	12019.25	45.02	31.02	8.99	25.57	48.56	54.00	-5.44	AV
H	4807.7	44.65	30.55	5.77	24.66	44.53	74.00	-29.47	Pk
H	4807.7	44.38	30.55	5.77	24.66	44.26	54.00	-9.74	AV
H	7211.55	44.86	30.33	6.32	24.55	45.40	74.00	-28.60	Pk
H	7211.55	45.49	30.33	6.32	24.55	46.03	54.00	-7.97	AV
H	9615.4	45.50	30.85	7.45	24.69	46.79	74.00	-27.21	Pk
H	9615.4	44.32	30.85	7.45	24.69	45.61	54.00	-8.39	AV
H	12019.25	45.58	31.02	8.99	25.57	49.12	74.00	-24.88	Pk
H	12019.25	46.54	31.02	8.99	25.57	50.08	54.00	-3.92	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2440MHz									
V	4883.7	55.01	30.55	5.77	24.66	54.89	74.00	-19.11	Pk
V	4883.7	44.88	30.55	5.77	24.66	44.76	54.00	-9.24	AV
V	7325.55	57.00	30.33	6.32	24.55	57.54	74.00	-16.46	Pk
V	7325.55	45.89	30.33	6.32	24.55	46.43	54.00	-7.57	AV
V	9767.4	43.68	30.85	7.45	24.69	44.97	74.00	-29.03	Pk
V	9767.4	44.08	30.85	7.45	24.69	45.37	54.00	-8.63	AV
V	12209.25	45.76	31.02	8.99	25.57	49.30	74.00	-24.70	Pk
V	12209.25	43.87	31.02	8.99	25.57	47.41	54.00	-6.59	AV
H	4883.7	43.61	30.55	5.77	24.66	43.49	74.00	-30.51	Pk
H	4883.7	44.42	30.55	5.77	24.66	44.30	54.00	-9.70	AV
H	7325.55	44.77	30.33	6.32	24.55	45.31	74.00	-28.69	Pk
H	7325.55	44.75	30.33	6.32	24.55	45.29	54.00	-8.71	AV
H	9767.4	46.40	30.85	7.45	24.69	47.69	74.00	-26.31	Pk
H	9767.4	44.01	30.85	7.45	24.69	45.30	54.00	-8.70	AV
H	12209.25	45.59	31.02	8.99	25.57	49.13	74.00	-24.87	Pk
H	12209.25	45.40	31.02	8.99	25.57	48.94	54.00	-5.06	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2480MHz									
V	4959.7	53.25	30.55	5.77	24.66	53.13	74.00	-20.87	Pk
V	4959.7	43.62	30.55	5.77	24.66	43.50	54.00	-10.50	AV
V	7439.55	55.99	30.33	6.32	24.55	56.53	74.00	-17.47	Pk
V	7439.55	46.99	30.33	6.32	24.55	47.53	54.00	-6.47	AV
V	9919.4	45.06	30.85	7.45	24.69	46.35	74.00	-27.65	Pk

V	9919.4	44.71	30.85	7.45	24.69	46.00	54.00	-8.00	AV
V	12399.25	44.45	31.02	8.99	25.57	47.99	74.00	-26.01	Pk
V	12399.25	45.66	31.02	8.99	25.57	49.20	54.00	-4.80	AV
H	4959.7	44.07	30.55	5.77	24.66	43.95	74.00	-30.05	Pk
H	4959.7	45.21	30.55	5.77	24.66	45.09	54.00	-8.91	AV
H	7439.55	43.91	30.33	6.32	24.55	44.45	74.00	-29.55	Pk
H	7439.55	43.63	30.33	6.32	24.55	44.17	54.00	-9.83	AV
H	9919.4	43.65	30.85	7.45	24.69	44.94	74.00	-29.06	Pk
H	9919.4	45.28	30.85	7.45	24.69	46.57	54.00	-7.43	AV
H	12399.25	46.20	31.02	8.99	25.57	49.74	74.00	-24.26	Pk
H	12399.25	45.72	31.02	8.99	25.57	49.26	54.00	-4.74	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 EMISSIONMEASUREMENT

5.1 TEST REQUIREMENT:

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
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

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation

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:

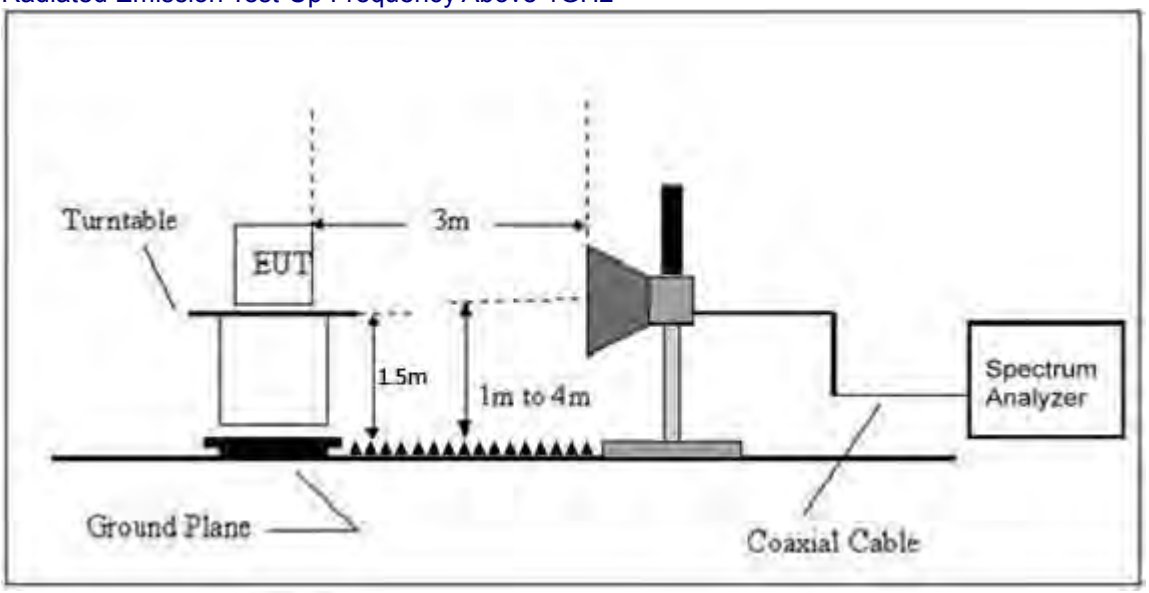
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

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)	Detector Type	Result
GFSK	Low Channel: 2402MHz									
	H	2390.00	55.84	30.22	4.85	23.98	54.45	74.00	PK	PASS
	H	2390.00	43.47	30.22	4.85	23.98	42.08	54.00	AV	PASS
	H	2400.00	55.09	30.22	4.85	23.98	53.70	74.00	PK	PASS
	H	2400.00	47.22	30.22	4.85	23.98	45.83	54.00	AV	PASS
	V	2390.00	57.28	30.22	4.85	23.98	55.89	74.00	PK	PASS
	V	2390.00	43.28	30.22	4.85	23.98	41.89	54.00	AV	PASS
	V	2400.00	56.96	30.22	4.85	23.98	55.57	74.00	PK	PASS
	V	2400.00	45.94	30.22	4.85	23.98	44.55	54.00	AV	PASS
	High Channel: 2480MHz									
	H	2483.50	54.89	30.22	4.85	23.98	53.50	74.00	PK	PASS
	H	2485.50	44.08	30.22	4.85	23.98	42.69	54.00	AV	PASS
	H	2483.50	54.88	30.22	4.85	23.98	53.49	74.00	PK	PASS
	H	2485.50	45.69	30.22	4.85	23.98	44.30	54.00	AV	PASS
	V	2483.50	53.33	30.22	4.85	23.98	51.94	74.00	PK	PASS
	V	2485.50	45.14	30.22	4.85	23.98	43.75	54.00	AV	PASS
	V	2483.50	56.53	30.22	4.85	23.98	55.14	74.00	PK	PASS
	V	2485.50	47.50	30.22	4.85	23.98	46.11	54.00	AV	PASS

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit

6. POWER SPECTRAL DENSITY TEST

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB558074 D0115.247 Meas Guidance v 05r02

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8dBm/3kHz	2400-2483.5	PASS

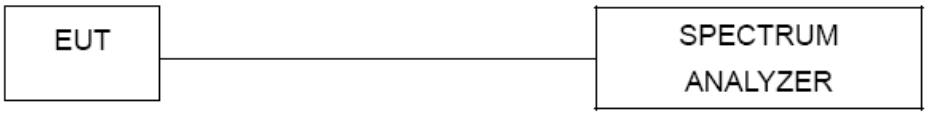
6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ 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.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

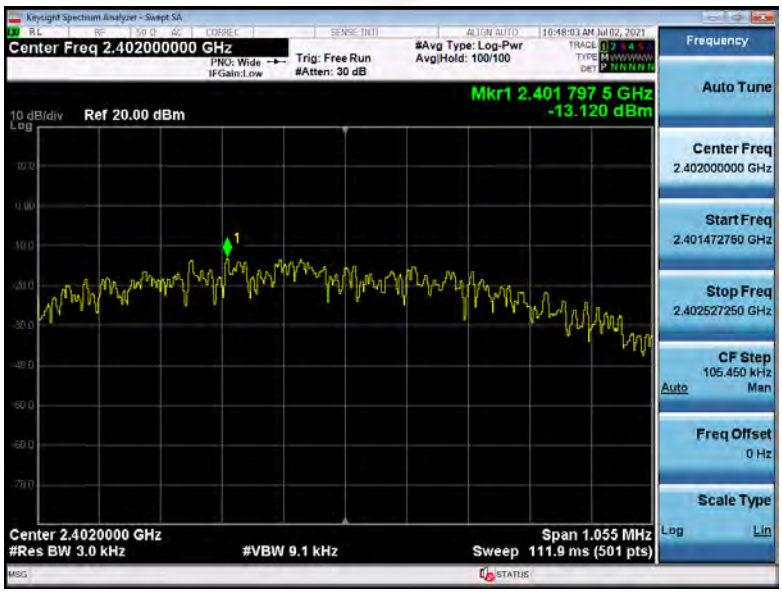
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

Temperature :	26℃	Relative Humidity :	54%
Test Mode :	GFSK	Test Voltage :	DC 3.7V

Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2402 MHz	-13.120	8	PASS
2440 MHz	-11.972	8	PASS
2480 MHz	-10.367	8	PASS

TX CH01



TX CH20

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.440000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: Log-Pwr
Avg|Hold: 100/100
10:53:45 AM Jul 02, 2021
Mkr1 2.439 796 6 GHz
-11.972 dBm
10 dB/div
Ref 20.00 dBm
Center 2.4400000 GHz
#Res BW 3.0 kHz
#VBW 9.1 kHz
Span 1.028 MHz
Sweep 109.0 ms (501 pts)
Frequency
Auto Tune
Center Freq
2.440000000 GHz
Start Freq
2.439486250 GHz
Stop Freq
2.440513750 GHz
CF Step
102.750 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

TX CH40

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: Log-Pwr
Avg|Hold: 100/100
11:00:17 AM Jul 02, 2021
Mkr1 2.479 796 4 GHz
-10.367 dBm
10 dB/div
Ref 20.00 dBm
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 9.1 kHz
Span 1.008 MHz
Sweep 107.0 ms (501 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479496000 GHz
Stop Freq
2.480504000 GHz
CF Step
100.800 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

7. CHANNEL BANDWIDTH& 99% OCCUPY BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	KDB558074 D0115.247 Meas Guidance v05r02

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

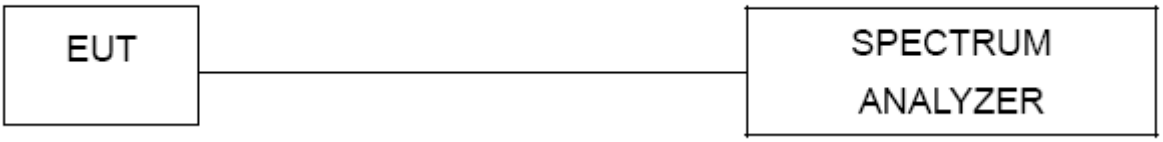
7.2 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 xRBW.
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 6 dB relative to the maximum level measured in the fundamental emission.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

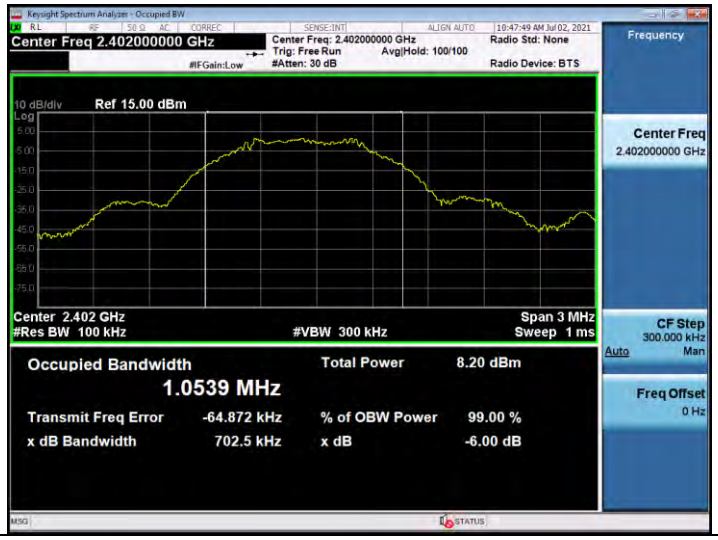
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.6 TEST RESULT

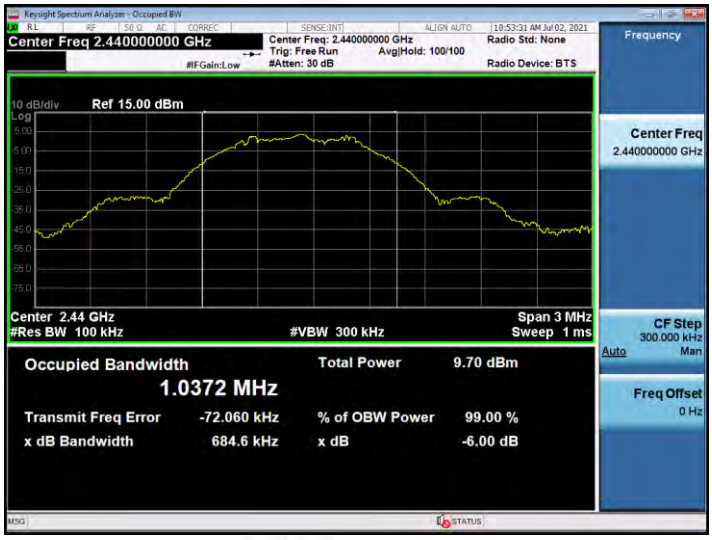
Temperature :	26℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 3.7V
Test Mode :	GFSK		

Test channel	Channel Bandwidth (MHz)	Result
Lowest	0.703	Pass
Middle	0.685	
Highest	0.672	

CH 01



CH20



CH40

Keysight Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 10.00 dBm
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.0526 MHz
Total Power
11.3 dBm
Transmit Freq Error
-69.233 kHz
% of OBW Power
99.00 %
x dB Bandwidth
671.6 kHz
x dB
-6.00 dB
Freq Offset
0 Hz

8. MAXIMUM OUTPUT POWER MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.247 (b)
Test Method:	KDB558074 D0115.247 Meas Guidance v05r02

8.1 APPLIED PROCEDURES/LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

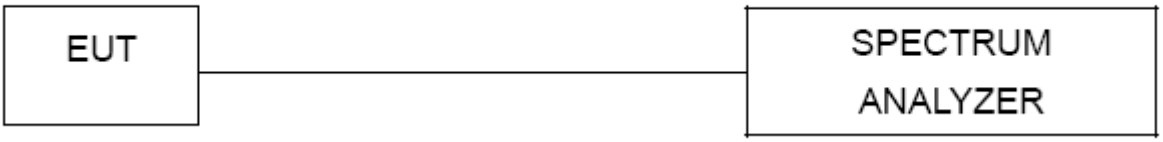
8.2 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

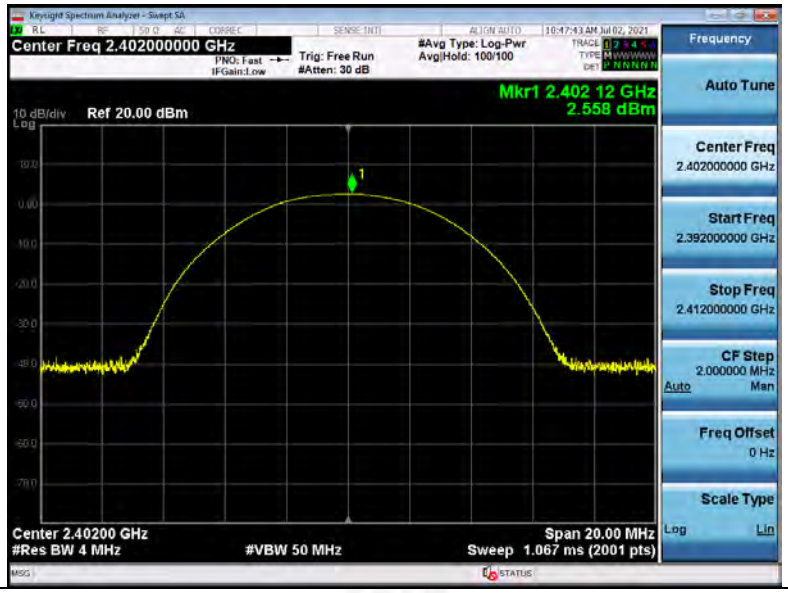
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULT

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 3.7V

Test CH	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	2.558	30.00	Pass
Middle	3.617		
Highest	5.114		

CH 01



CH20

CH40

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: Log-Pwr
Avg|Hold: 100/100
10:58:36 AM Jul 02, 2021
Mkr1 2.479 54 GHz
5.114 dBm
10 dB/div
Ref 20.00 dBm
Log
Center 2.48000 GHz
#Res BW 4 MHz
#VBW 50 MHz
Span 20.00 MHz
Sweep 1.067 ms (2001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.470000000 GHz
Stop Freq
2.490000000 GHz
CF Step
2.000000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS

9. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

Test Requirement:	FCC Part15 C Section 15.249
Test Method:	ANSI C63.10: 2013

9.1 APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

9.2 TEST PROCEDURE

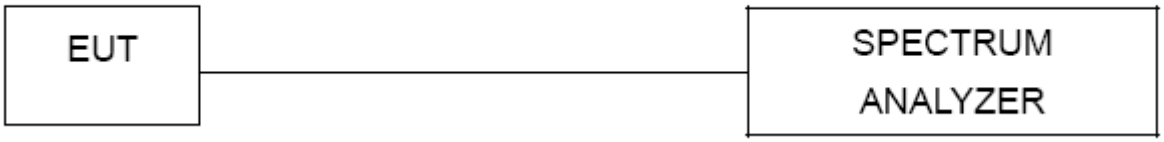
Using the following spectrum analyzer setting:

A) Set the RBW = 100KHz.
B) Set the VBW = 300KHz.
C) Sweep time = auto couple.
D) Detector function = peak.
E) Trace mode = max hold.
F) Allow trace to fully stabilize.

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP

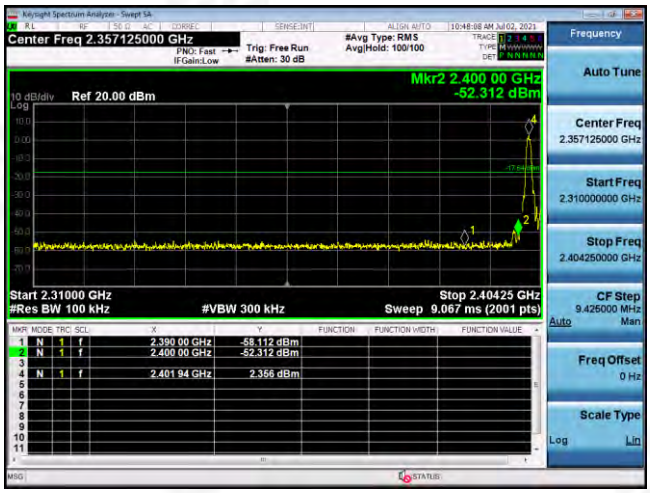


9.5 EUT OPERATION CONDITIONS

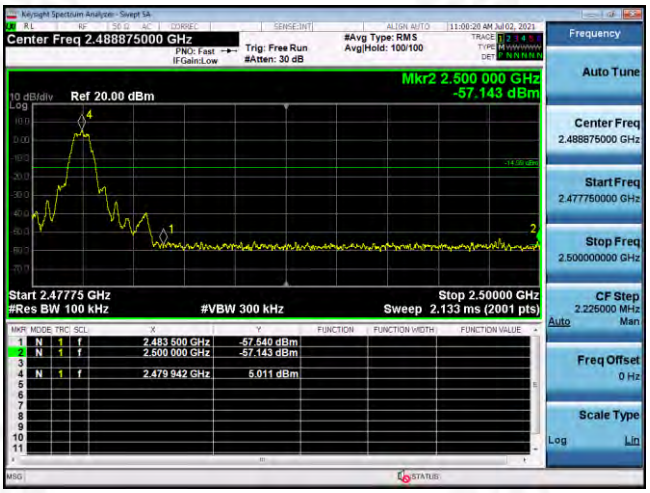
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.6 TEST RESULTS

Test mode:	GFSK

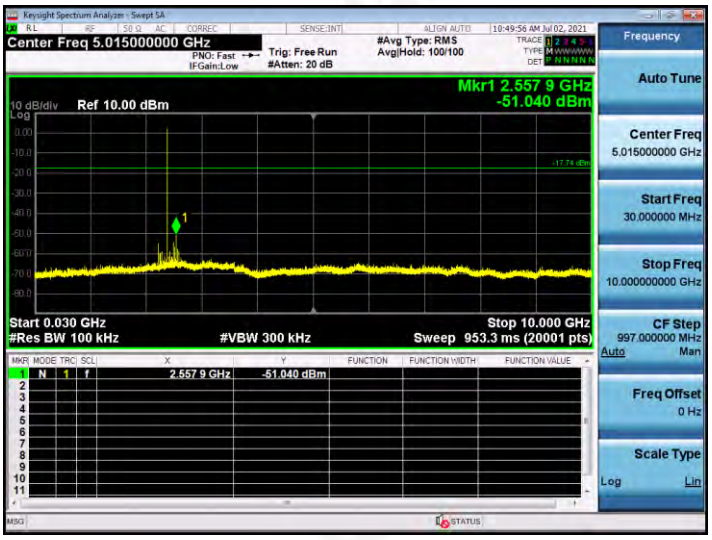


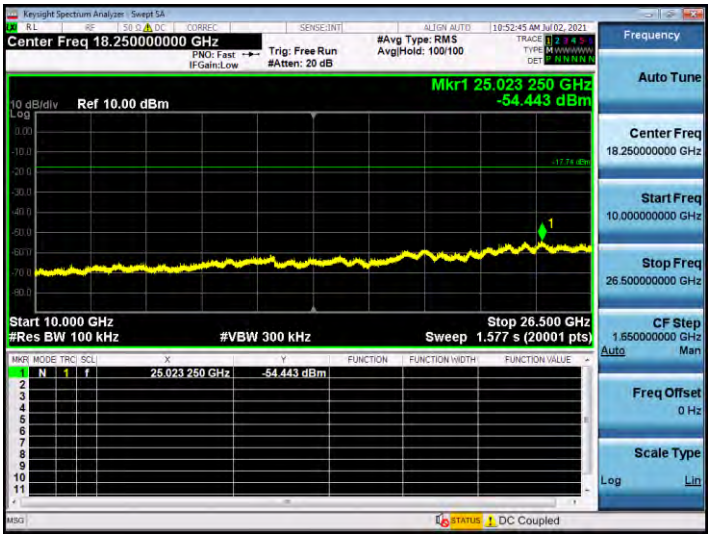
Lowest channel



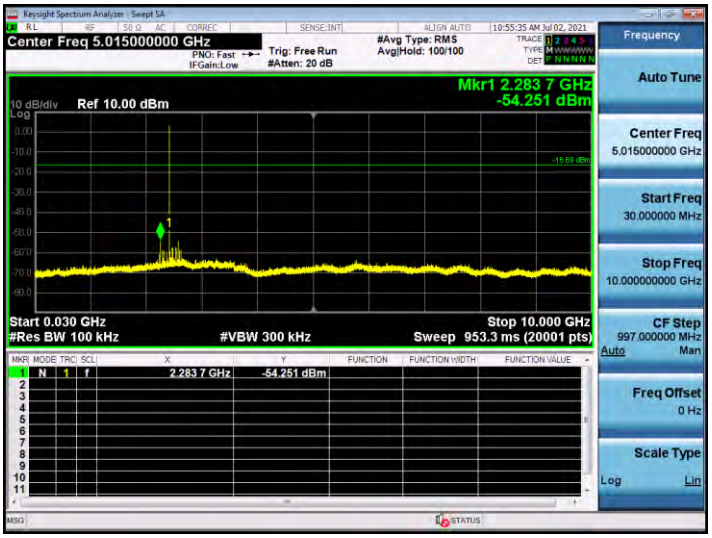
Highest channel

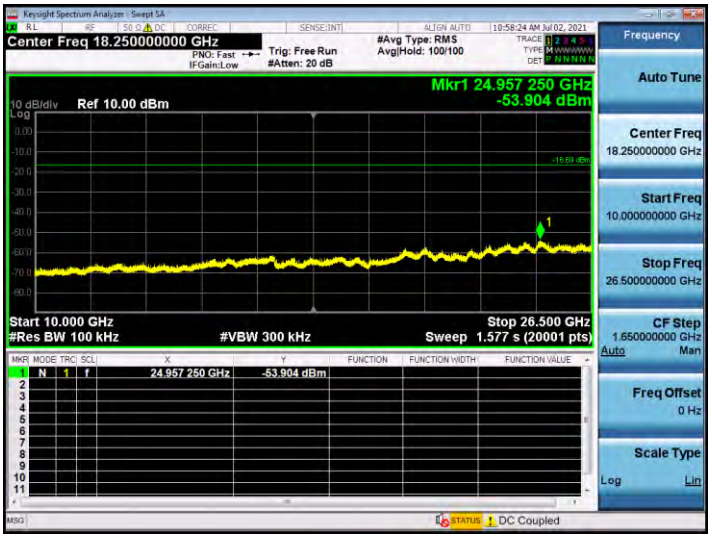
Lowest channel



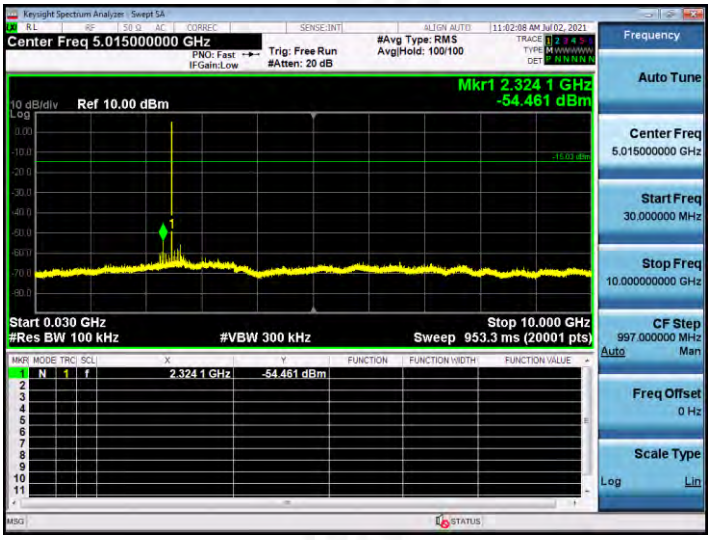


Middle channel





Highest channel



10.ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

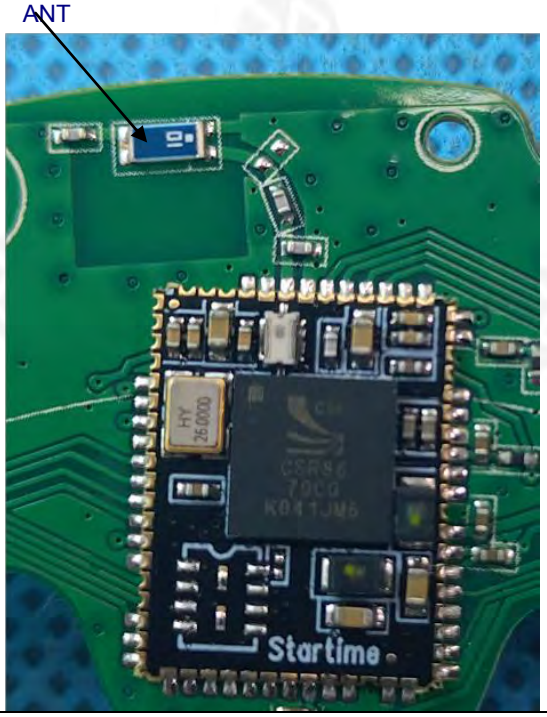
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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(c) (1)(i) requirement:

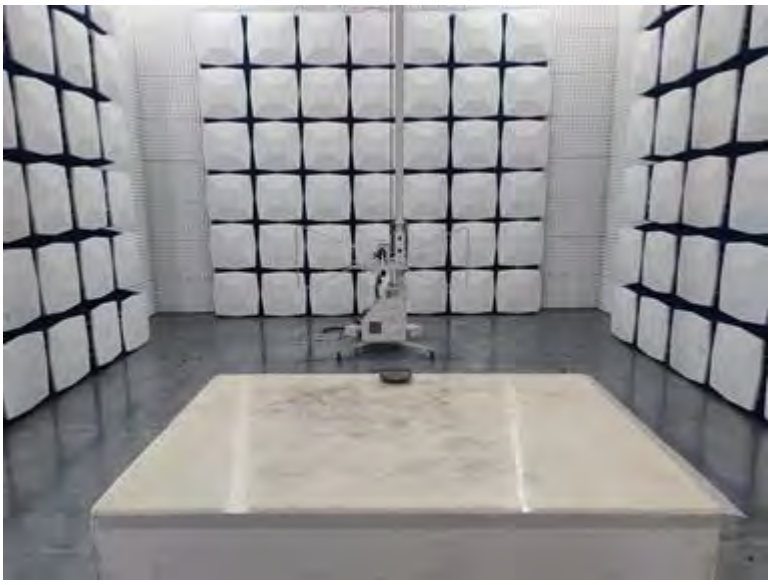
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

EUT Antenna:

The antenna is chip antenna, the best case gain of the antennas are 1.5dBi, reference to the below photo for details



11. TEST SETUP PHOTO



12. EUT CONSTRUCTIONAL DETAILS

Reference to the external photos file and internal photos file for details.

※※※※※ **END OF REPORT** ※※※※※