

FCC TEST REPORT

Client Name : Autel Intelligent Technology Corp., Ltd.

Address : 7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili,
Nanshan Shenzhen China

Product Name : Smart Watch

Date : Jan. 26, 2022

Shenzhen Anbotech Compliance Laboratory Limited



Shenzhen Anbotech Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community,
Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.

Tel: (86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotech.com

Code: AB-RF-05-a



Hotline

400-003-0500

www.anbotech.com

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TEST REPORT

Applicant : Autel Intelligent Technology Corp., Ltd.
Manufacturer : Autel Intelligent Technology Corp., Ltd.
Product Name : Smart Watch
Model No. : SW2101
Trade Mark : OTOFIX
Rating(s) : Input: DC 5V, 0.5A(with DC 3.85V, 300mAh, 1.15Wh battery inside)

Test Standard(s) : FCC Part15 Subpart C, Section 15.231

Test Method(s) : ANSI C63.10: 2020

The device described above is tested by Shenzhen Anbotech Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotech Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotech Compliance Laboratory Limited.

Date of Receipt

Dec. 14, 2021

Date of Test

Dec. 14, 2021~Jan. 20, 2022

Prepared by

Nianxiu Chen

(Nianxiu Chen)

Approved & Authorized Signer

Kingkong Jin

(Kingkong Jin)



1. General Information

1.1. Client Information

Applicant	:	Autel Intelligent Technology Corp., Ltd.
Address	:	7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan Shenzhen China
Manufacturer	:	Autel Intelligent Technology Corp., Ltd.
Address	:	7th-8th, 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan Shenzhen China
Factory	:	Jiaxing Yongrui Electronic Technology Co., Ltd.
Address	:	No.777,Ya Zhong Road,Daqiao Town, Nan Hu district,Jiaxing city

1.2. Description of Device (EUT)

Product Name	:	Smart Watch
Model No.	:	SW2101
Trade Mark	:	OTOFIX
Test Power Supply	:	AC 120V, 60Hz for adapter/ DC 3.85V battery inside
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Product Description	Operation Frequency:	BLE: 2402~2480MHz SRD: 315MHz, 434MHz
	Number of Channel:	BLE: 40 Channels SRD: 2 Channels
	Modulation Type:	BLE: GFSK SRD: FSK, OOK
	Antenna Type:	BLE/SRD: FPC Antenna
	Antenna Gain(Peak):	BLE: -10.17 dBi (Provided by customer) SRD: 0 dBi (Provided by customer)
	Adapter:	N/A
Remark: 1)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2) This report is for SRD module.		

1.3. Auxiliary Equipment Used During Test

Adapter	:	M/N: A2023 Input: AC 100-240V, 0.7A, 50-60Hz USB1 Output: DC 5V, 2.4A USB2 Output: DC 5V, 2.4A
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1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Charging
Mode 2	315 MHz(TX)
Mode 3	434 MHz(TX)

For Radiated Emission	
Final Test Mode	Description
Mode 1	Charging

For Radiated Emission	
Final Test Mode	Description
Mode 2	315 MHz(TX)
Mode 3	434 MHz(TX)

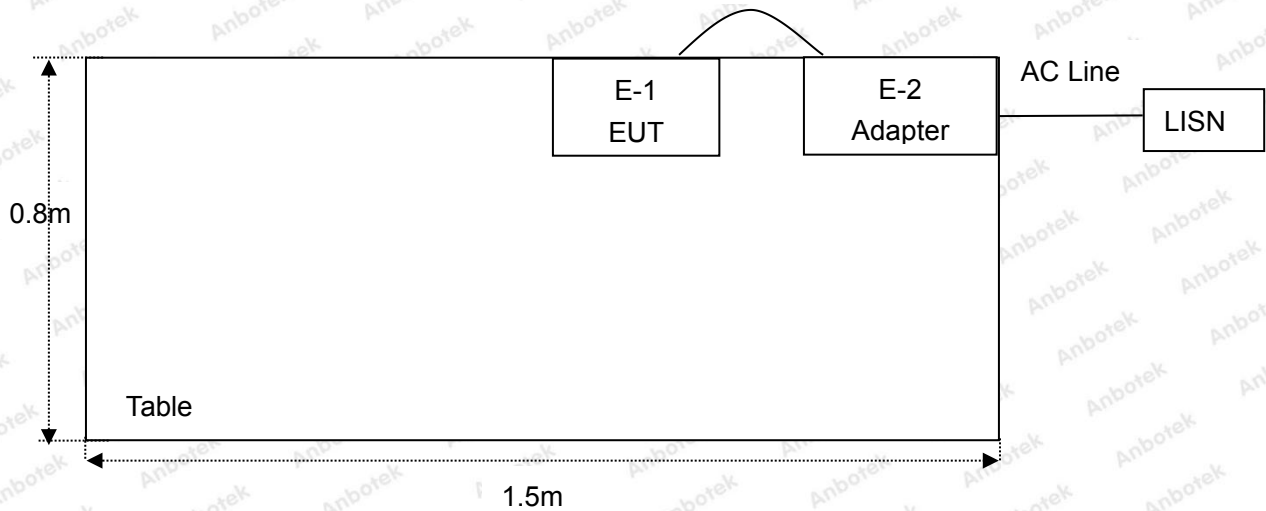
Note: During the test, the EUT was keeping continuous transmission, Duty cycle $\geq 98\%$.

1.5. List of Channels

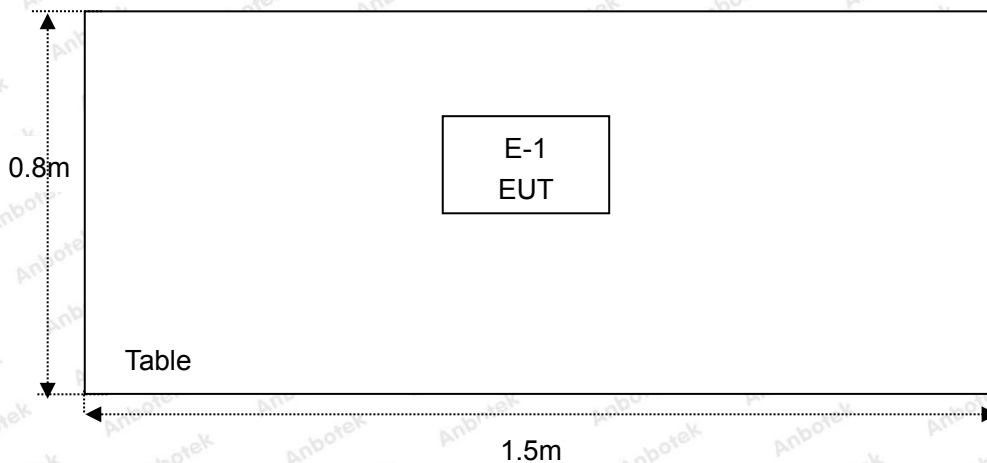
Channels	Frequency
01	315 MHz
02	434 MHz

1.6. Description of Test Setup

CE



RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040DT001	Jul 05, 2021	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 22, 2021	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 22, 2021	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2021	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 22, 2021	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 22, 2021	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Oct. 22, 2021	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 22, 2021	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Oct. 22, 2021	2 Year
10.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Oct. 22, 2021	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 22, 2021	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 22, 2021	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 22, 2021	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 22, 2021	1 Year
16.	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY53280032	Oct. 22, 2021	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 22, 2021	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 22, 2021	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 22, 2021	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 22, 2021	1 Year

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotech Compliance Laboratory Limited, 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. Registration No. 184111.

ISED-Registration No.: 8058A-1

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotech Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China. 518102



2. Summary of Test Results

Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209/15.231(b)	Spurious Emission	PASS
15.231(c)	20dB Occupied Bandwidth	PASS
15.231(e)	Dwell time	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

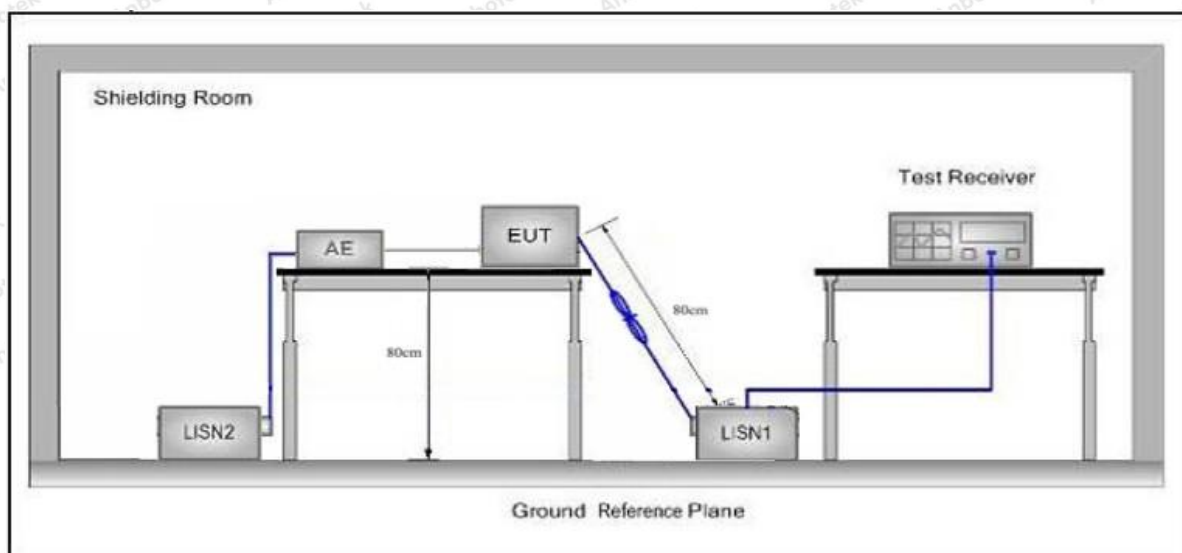
3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50

Remark: (1) *Decreasing linearly with logarithm of the frequency.
 (2) The lower limit shall apply at the transition frequency.

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10: 2020 on Conducted Emission Measurement.

The bandwidth of test CAR REMOTE (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

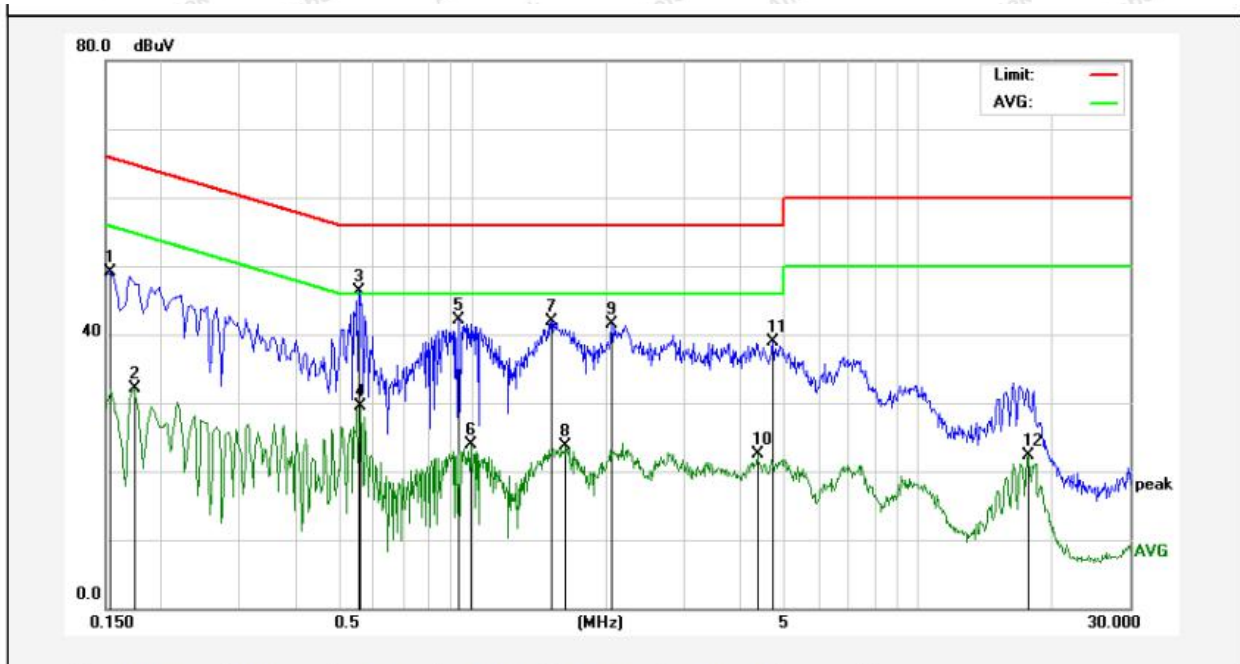
3.4. Test Data

Only the worst case data was showed in the report, please to see the following pages.



Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 120V, 60Hz for adapter
 Comment: Live Line
 Tem.: 22.8°C Hum.: 47%

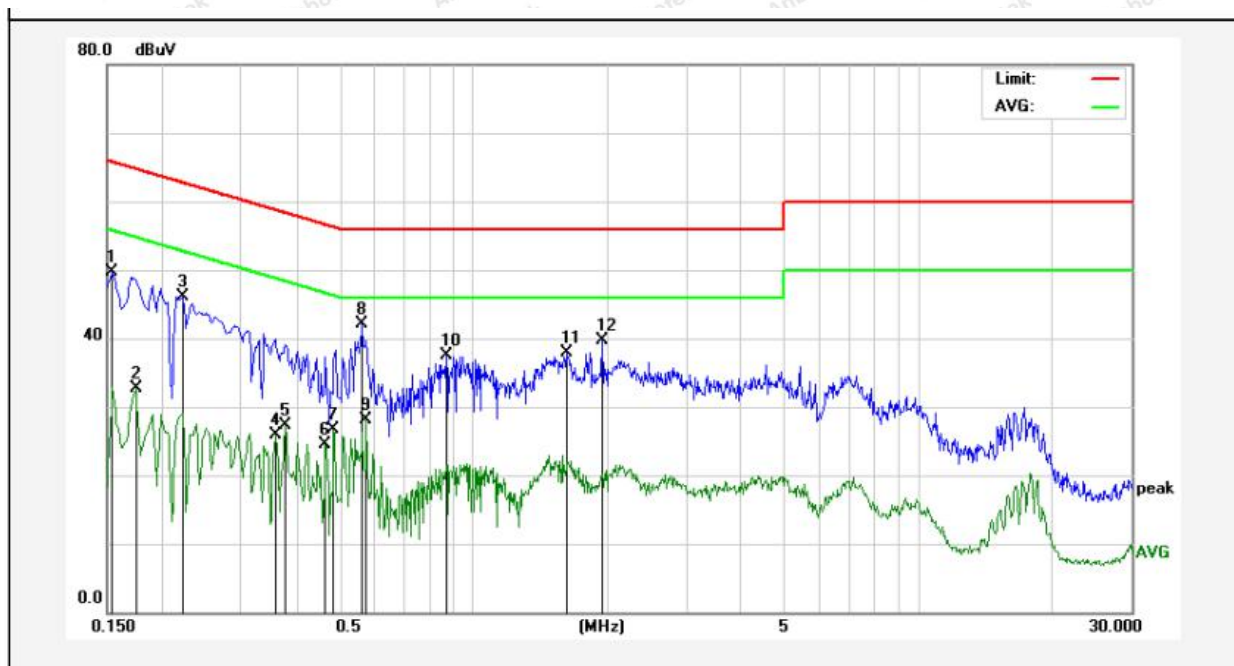


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1539	49.08	0.12	49.20	65.78	-16.58	QP	
2	0.1740	32.05	0.12	32.17	54.76	-22.59	AVG	
3	0.5580	46.12	0.15	46.27	56.00	-9.73	QP	
4	0.5620	29.26	0.15	29.41	46.00	-16.59	AVG	
5	0.9300	41.91	0.15	42.06	56.00	-13.94	QP	
6	0.9940	23.66	0.15	23.81	46.00	-22.19	AVG	
7	1.5060	41.86	0.13	41.99	56.00	-14.01	QP	
8	1.6260	23.55	0.13	23.68	46.00	-22.32	AVG	
9	2.0620	41.40	0.12	41.52	56.00	-14.48	QP	
10	4.3739	22.43	0.11	22.54	46.00	-23.46	AVG	
11	4.7419	38.84	0.11	38.95	56.00	-17.05	QP	
12	17.6699	22.09	0.19	22.28	50.00	-27.72	AVG	



Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: AC 120V, 60Hz for adapter
 Comment: Neutral Line
 Tem.: 22.8℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1539	49.66	0.12	49.78	65.78	-16.00	QP	
2	0.1740	32.60	0.12	32.72	54.76	-22.04	AVG	
3	0.2220	45.97	0.12	46.09	62.74	-16.65	QP	
4	0.3580	25.69	0.12	25.81	48.77	-22.96	AVG	
5	0.3780	27.11	0.11	27.22	48.32	-21.10	AVG	
6	0.4660	24.29	0.14	24.43	46.58	-22.15	AVG	
7	0.4860	26.54	0.14	26.68	46.24	-19.56	AVG	
8	0.5620	41.88	0.15	42.03	56.00	-13.97	QP	
9	0.5740	27.99	0.15	28.14	46.00	-17.86	AVG	
10	0.8700	37.40	0.15	37.55	56.00	-18.45	QP	
11	1.6140	37.70	0.13	37.83	56.00	-18.17	QP	
12	1.9420	39.61	0.12	39.73	56.00	-16.27	QP	

4. Radiated Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209, 15.205 and 15.231(b)				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

(1) The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level

Emission Level (dBuV/m) = $20 \log$ Emission Level ($\mu\text{V/m}$)

The field strength of emission limits have been calculated in below table:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)@3m
315	75.62 (AVG)
315	95.62 (Peak)
434	80.83 (AVG)
434	100.83 (Peak)

4.2. Test Setup

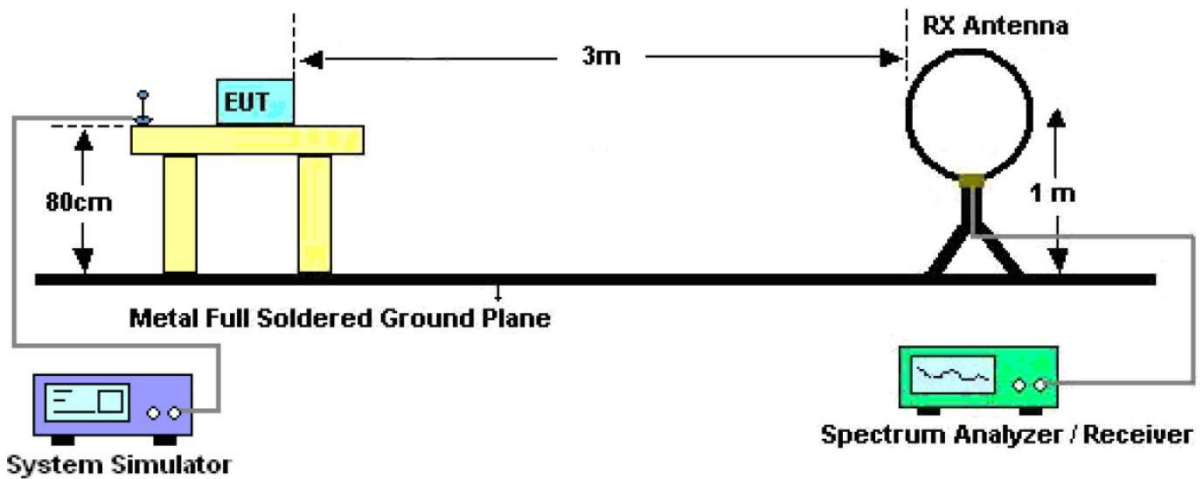


Figure 1. Below 30MHz

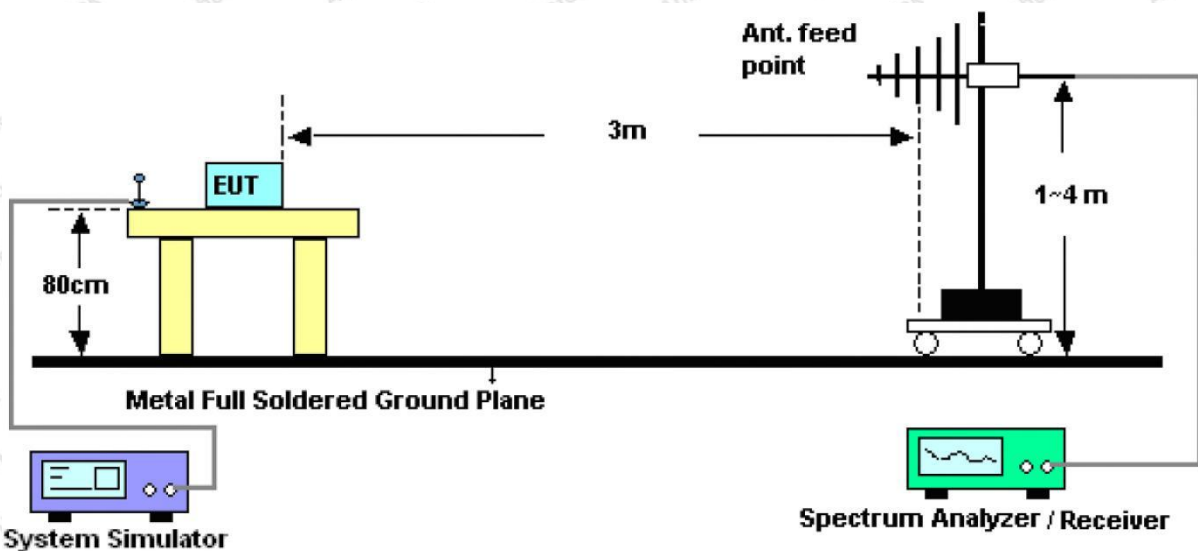


Figure 2. 30MHz to 1GHz

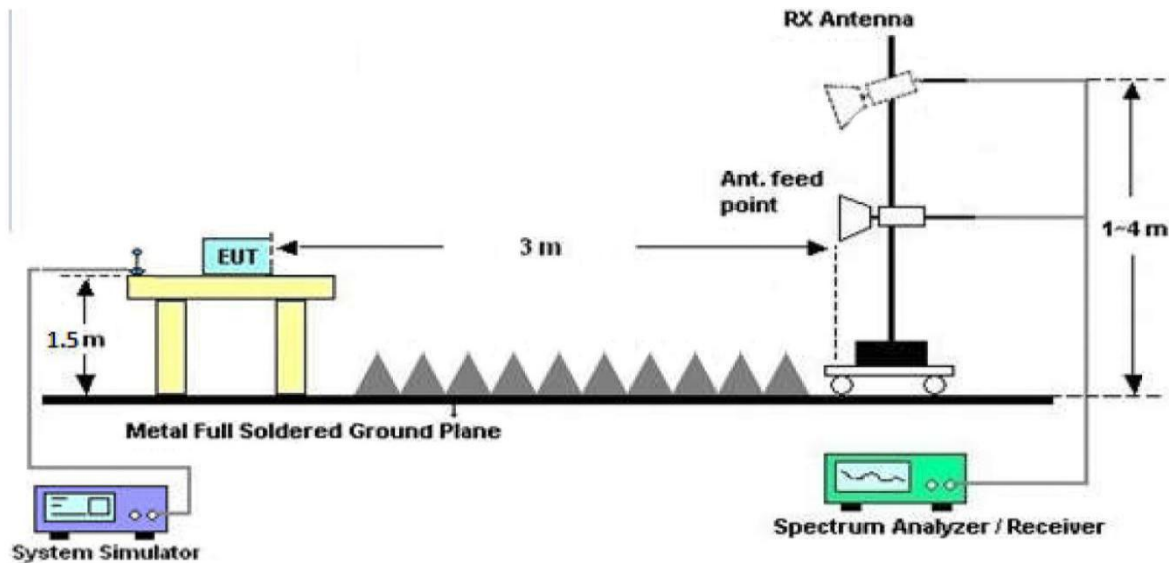


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz, Set the spectrum analyzer as:

RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

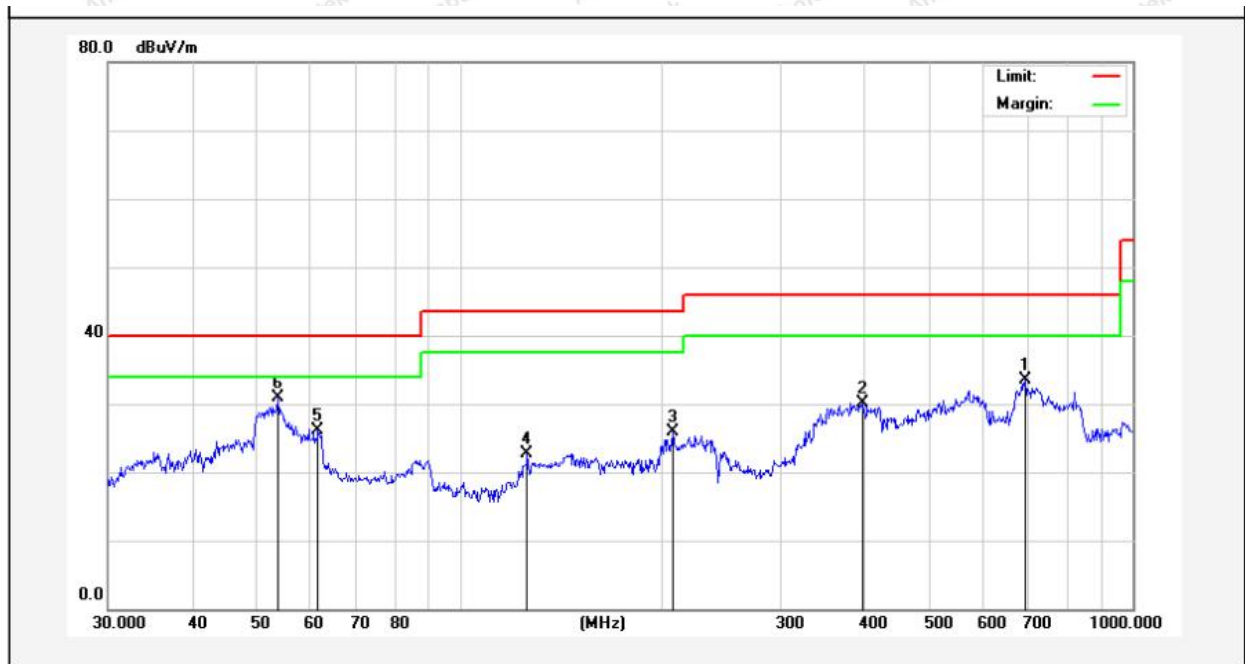
The test results of 9kHz-30MHz are attenuated more than 20dB below the permissible limits, so the results don't record in the report.

During the test, pre-scan all modes, only the worst case is recorded in the report.



Test Results (30~1000MHz)

Test Mode: Mode 2 (FSK)
Power Source: DC 3.85V battery inside
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 23.4°C/50%RH

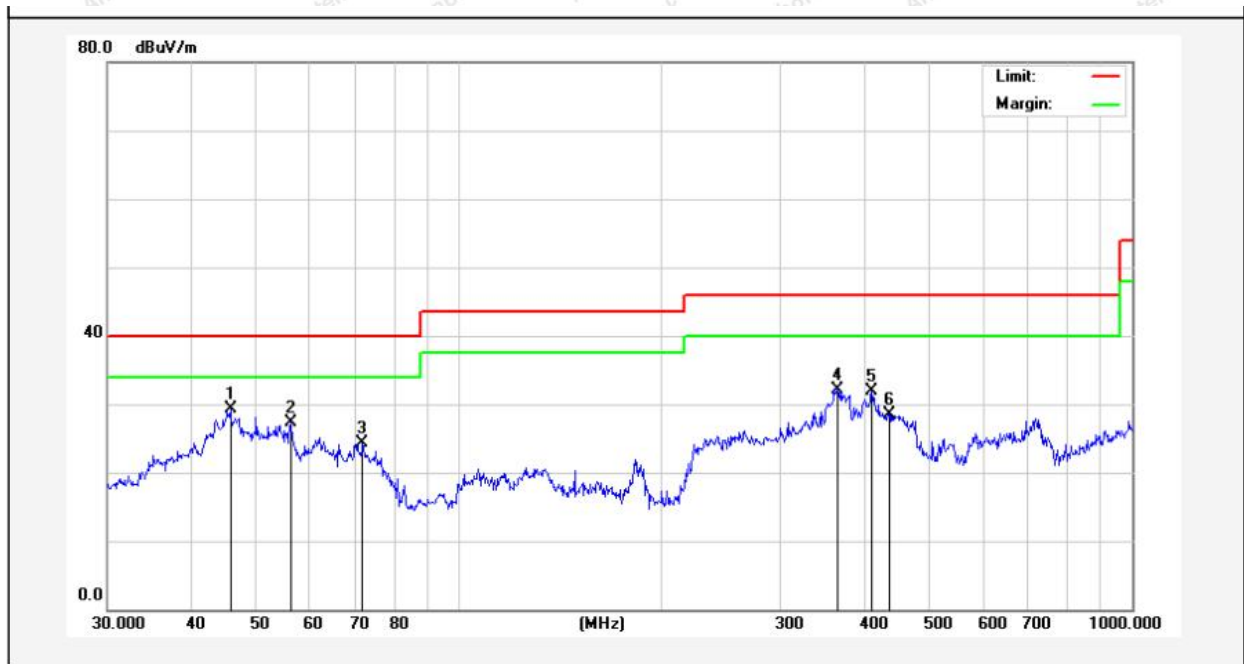


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	691.9867	43.49	-10.03	33.46	46.00	-12.54	QP			
2	396.2412	46.22	-16.13	30.09	46.00	-15.91	QP			
3	207.1226	48.10	-22.21	25.89	43.50	-17.61	QP			
4	125.8863	45.74	-23.10	22.64	43.50	-20.86	QP			
5	61.5617	44.19	-18.06	26.13	40.00	-13.87	QP			
6	53.6931	48.03	-17.15	30.88	40.00	-9.12	QP			



Test Results (30~1000MHz)

Test Mode: Mode 2 (FSK)
Power Source: DC 3.85V battery inside
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 23.4°C/50%RH

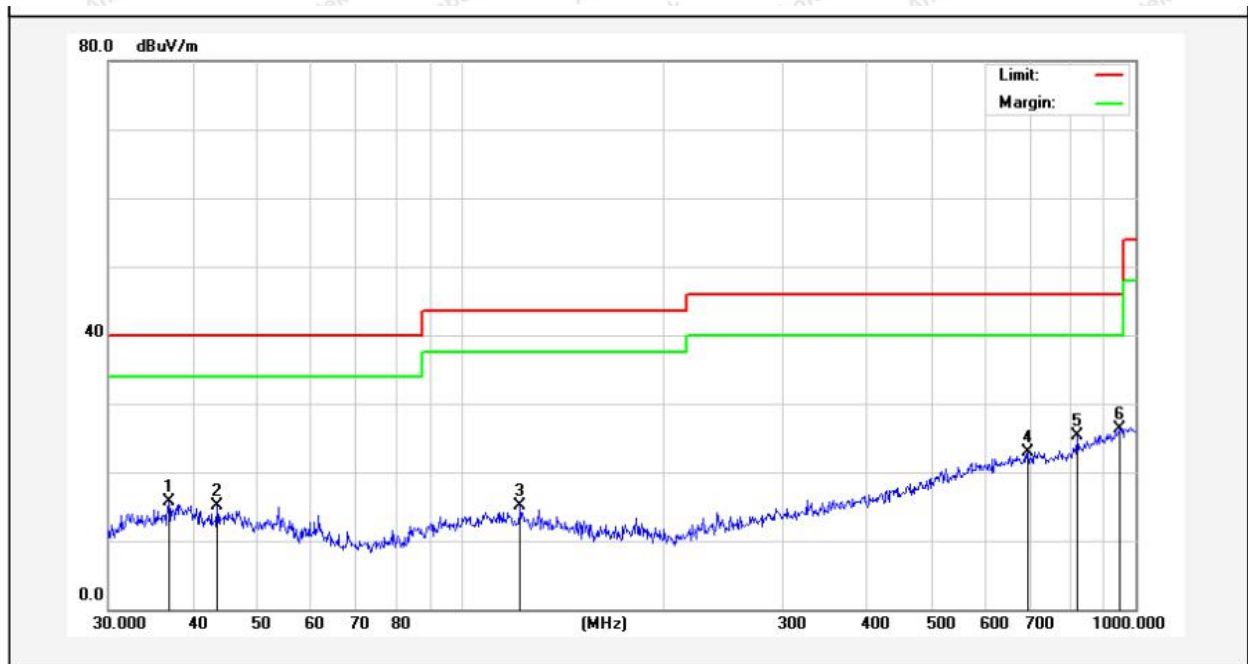


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	45.6948	44.51	-15.15	29.36	40.00	-10.64	QP			
2	56.1974	44.85	-17.60	27.25	40.00	-12.75	QP			
3	71.8319	44.24	-19.94	24.30	40.00	-15.70	QP			
4	365.5391	46.98	-14.83	32.15	46.00	-13.85	QP			
5	410.3824	46.22	-14.29	31.93	46.00	-14.07	QP			
6	435.5898	42.45	-13.89	28.56	46.00	-17.44	QP			



Test Results (30~1000MHz)

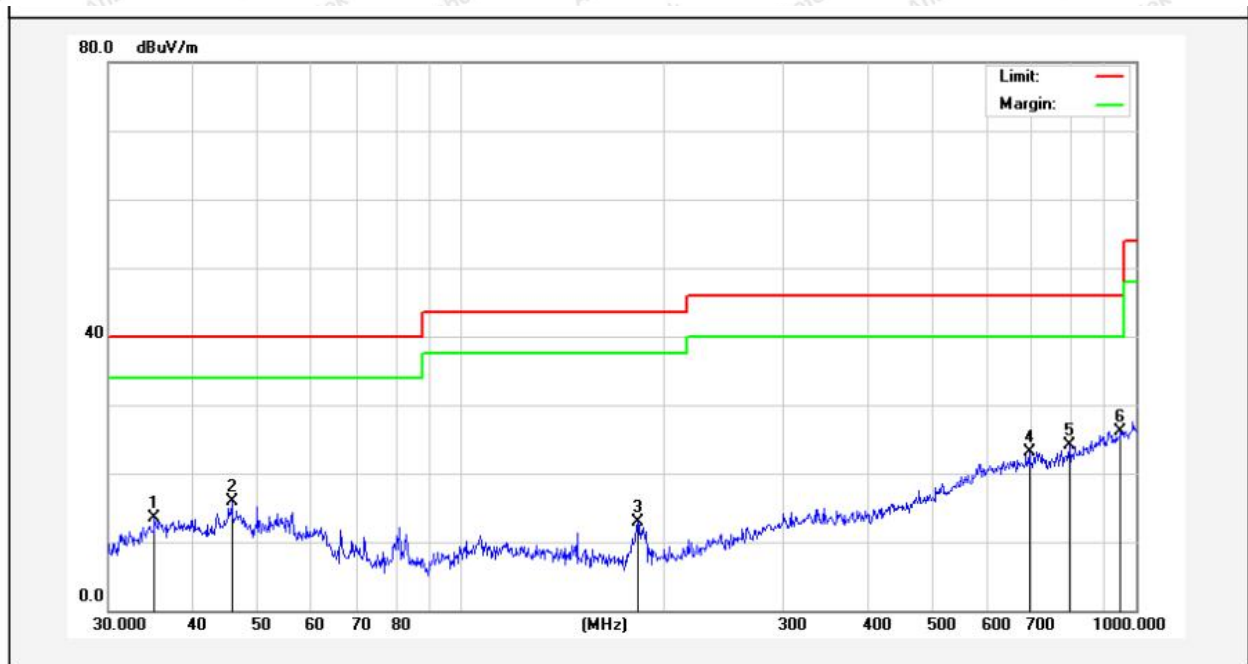
Test Mode: Mode 2 (OOK)
Power Source: DC 3.85V battery inside
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 23.4°C/50%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	36.8952	33.18	-17.53	15.65	40.00	-24.35	QP			
2	43.5056	30.48	-15.45	15.03	40.00	-24.97	QP			
3	122.4039	38.62	-23.60	15.02	43.50	-28.48	QP			
4	691.9867	32.99	-10.03	22.96	46.00	-23.04	QP			
5	818.8341	33.27	-7.97	25.30	46.00	-20.70	QP			
6	945.4397	32.03	-5.69	26.34	46.00	-19.66	QP			

Test Results (30~1000MHz)

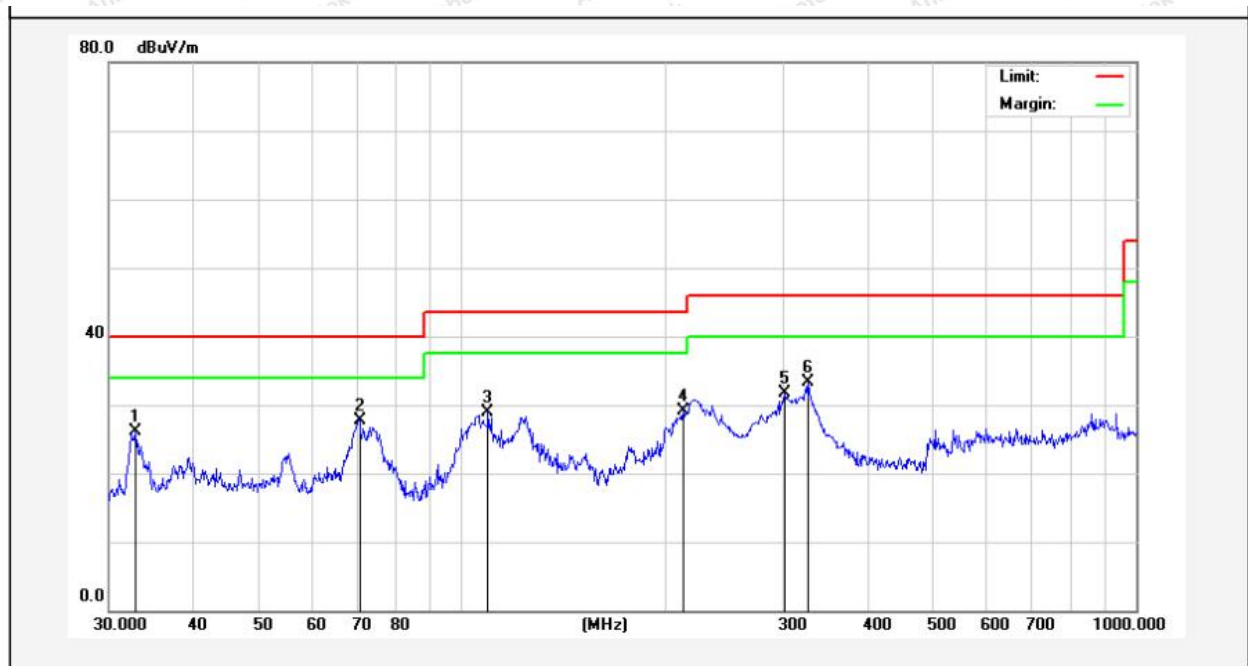
Test Mode: Mode 2 (OOK)
Power Source: DC 3.85V battery inside
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 23.4°C/50%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	35.1278	30.61	-17.07	13.54	40.00	-26.46	QP			
2	45.6948	31.01	-15.15	15.86	40.00	-24.14	QP			
3	182.5592	33.45	-20.48	12.97	43.50	-30.53	QP			
4	694.4174	33.08	-10.00	23.08	46.00	-22.92	QP			
5	796.1830	32.43	-8.33	24.10	46.00	-21.90	QP			
6	948.7608	31.77	-5.65	26.12	46.00	-19.88	QP			

Test Results (30~1000MHz)

Test Mode: Mode 3 (FSK)
Power Source: DC 3.85V battery inside
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 23.4°C/50%RH

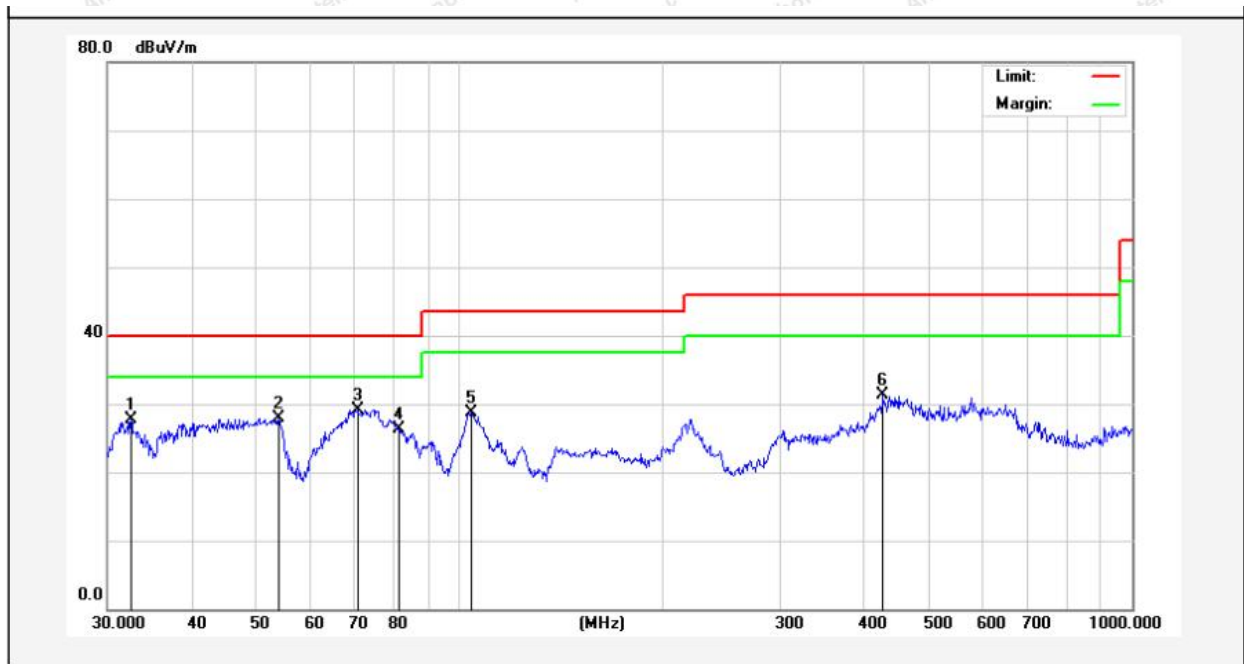


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	32.8637	45.34	-19.22	26.12	40.00	-13.88	QP			
2	70.5836	50.02	-22.23	27.79	40.00	-12.21	QP			
3	109.4116	52.01	-23.09	28.92	43.50	-14.58	QP			
4	213.0149	51.12	-22.11	29.01	43.50	-14.49	QP			
5	301.4223	48.88	-17.12	31.76	46.00	-14.24	QP			
6	326.7395	49.92	-16.54	33.38	46.00	-12.62	QP			



Test Results (30~1000MHz)

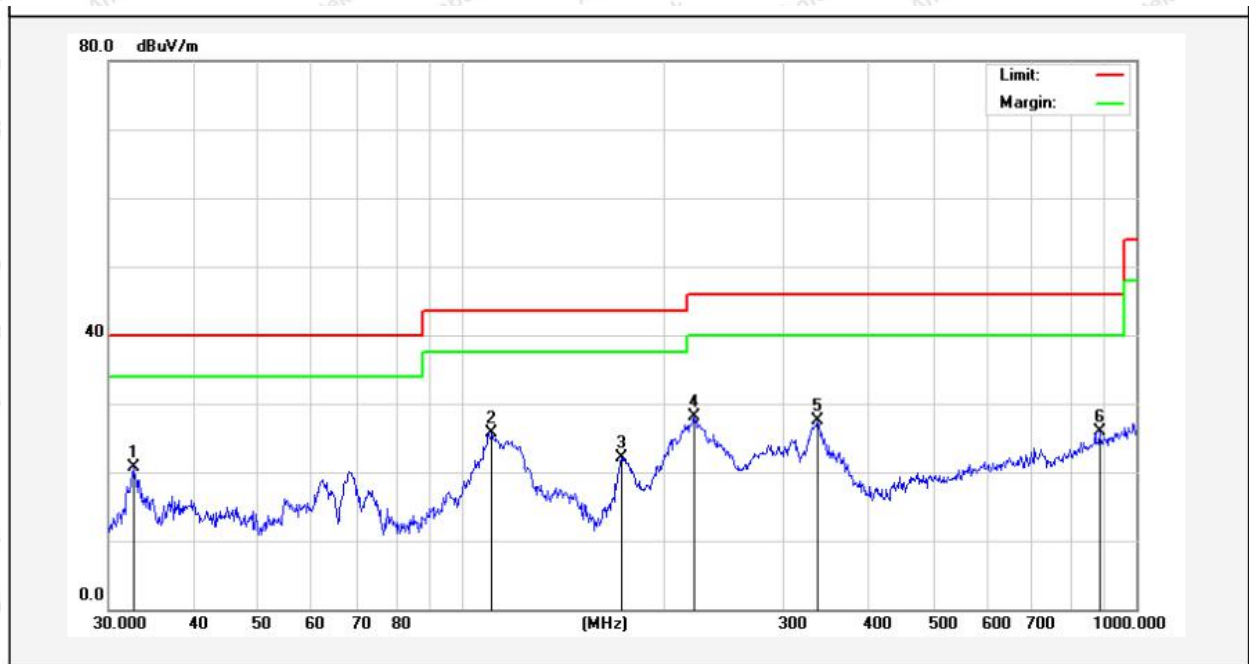
Test Mode: Mode 3 (FSK)
Power Source: DC 3.85V battery inside
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 23.4°C/50%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	32.5197	45.28	-17.54	27.74	40.00	-12.26	QP			
2	53.8817	45.10	-17.21	27.89	40.00	-12.11	QP			
3	70.5836	49.03	-19.96	29.07	40.00	-10.93	QP			
4	81.4967	45.44	-19.07	26.37	40.00	-13.63	QP			
5	104.1701	46.03	-17.24	28.79	43.50	-14.71	QP			
6	426.5210	45.27	-14.03	31.24	46.00	-14.76	QP			

Test Results (30~1000MHz)

Test Mode: Mode 3 (OOK)
Power Source: DC 3.85V battery inside
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 23.4 °C/50%RH

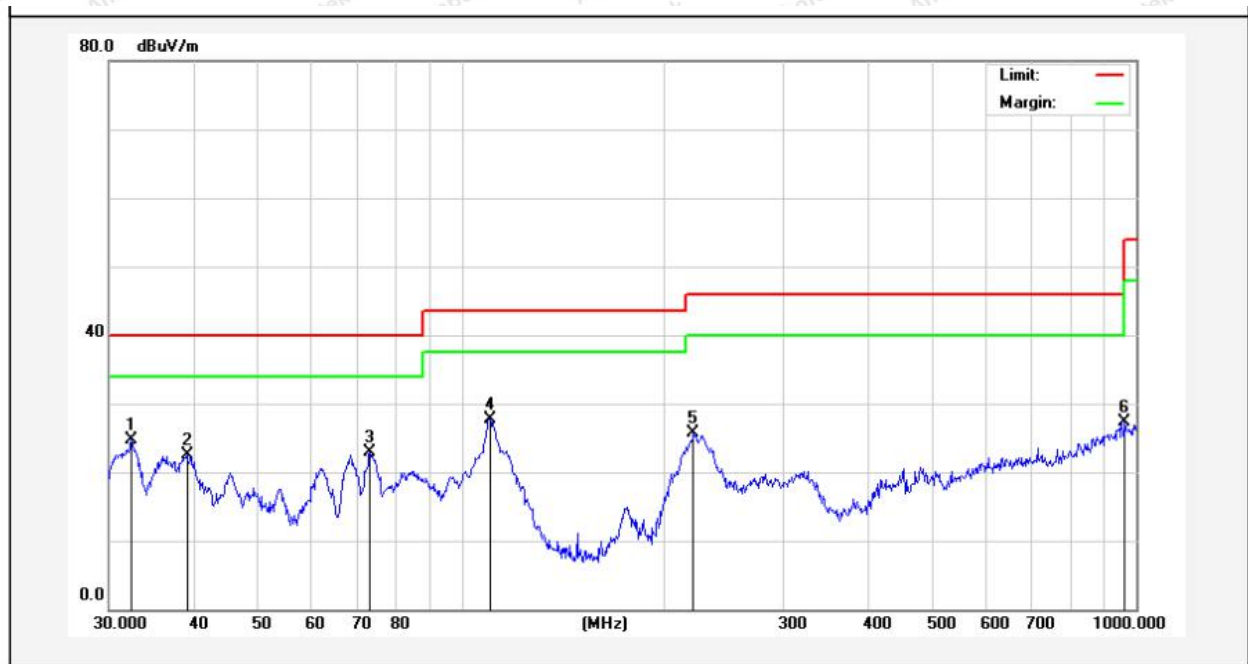


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	32.6340	39.97	-19.30	20.67	40.00	-19.33	QP			
2	110.9571	49.02	-23.26	25.76	43.50	-17.74	QP			
3	172.5988	45.56	-23.50	22.06	43.50	-21.44	QP			
4	221.3921	49.98	-21.97	28.01	46.00	-17.99	QP			
5	337.2155	43.72	-16.30	27.42	46.00	-18.58	QP			
6	881.4067	32.62	-6.68	25.94	46.00	-20.06	QP			



Test Results (30~1000MHz)

Test Mode: Mode 3 (OOK)
Power Source: DC 3.85V battery inside
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 23.4°C/50%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	32.4059	42.24	-17.57	24.67	40.00	-15.33	QP			
2	39.1616	37.55	-14.99	22.56	40.00	-17.44	QP			
3	73.1025	42.78	-19.92	22.86	40.00	-17.14	QP			
4	110.1816	45.94	-18.21	27.73	43.50	-15.77	QP			
5	220.6171	44.58	-18.95	25.63	46.00	-20.37	QP			
6	962.1623	32.68	-5.44	27.24	54.00	-26.76	QP			

Remark:

1. Results = Reading + Cable Loss +Ant Factor –Amplifier



Test Results (Fundamental)

Mode	Freq.	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Results	Limits	Det.
	(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
TX Mode (FSK)	315.00	H	92.72	1.52	12.64	31.45	75.43	87.66	PK
	315.00	H	84.74	1.52	12.64	31.45	67.45	67.66	AV
	315.00	V	97.17	1.52	12.64	31.45	79.88	87.66	PK
	315.00	V	82.51	1.52	12.64	31.45	65.22	67.66	AV
TX Mode (OOK)	315.00	H	94.16	1.52	12.64	31.45	76.87	87.66	PK
	315.00	H	84.38	1.52	12.64	31.45	67.09	67.66	AV
	315.00	V	96.12	1.52	12.64	31.45	78.83	87.66	PK
	315.00	V	84.87	1.52	12.64	31.45	67.58	67.66	AV
TX Mode (FSK)	434.00	H	93.04	1.52	12.64	31.45	75.75	92.87	PK
	434.00	H	87.02	1.52	12.64	31.45	69.73	72.97	AV
	434.00	V	96.82	1.52	12.64	31.45	79.53	92.87	PK
	434.00	V	89.33	1.52	12.64	31.45	72.04	72.97	AV
TX Mode (OOK)	434.00	H	93.74	1.52	12.64	31.45	76.45	92.87	PK
	434.00	H	87.42	1.52	12.64	31.45	70.13	72.97	AV
	434.00	V	96.44	1.52	12.64	31.45	79.15	92.87	PK
	434.00	V	89.16	1.52	12.64	31.45	71.87	72.97	AV

Remark:

1. Result = Reading + Cable Loss + Ant Factor – Amplifier

Mode	Freq.(MHz)	Pulse Width (ms)	2/Pulse Width(kHz)
TX Mode	315(FSK)	1000.000	0.002
TX Mode	315(OOK)	1000.000	0.002
TX Mode	434(FSK)	1000.000	0.002
TX Mode	434(OOK)	1000.000	0.002

2. Pulse Desensitization Correction Factor

 $RBW(1000kHz) > 2/Pulse\ Width$

Therefore PDCF is not needed.

Test Results (Harmonics Emissions+Radiated Emissions from 1G-4G)**315MHz(FSK)**

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
630.00	H	66.84	1.92	12.71	31.72	49.75	67.66	PK
630.00	H	62.08	1.92	12.71	31.72	44.99	47.66	AV
630.00	V	65.42	1.92	12.71	31.72	48.33	67.66	PK
630.00	V	61.19	1.92	12.71	31.72	44.10	47.66	AV
945.00	H	59.26	1.92	12.71	31.72	42.17	67.66	PK
945.00	H	53.24	1.92	12.71	31.72	36.15	47.66	AV
945.00	V	57.85	1.92	12.71	31.72	40.76	67.66	PK
945.00	V	52.87	1.92	12.71	31.72	35.78	47.66	AV

315MHz(OOK)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
630.00	H	68.46	1.92	12.71	31.72	51.37	67.66	PK
630.00	H	62.27	1.92	12.71	31.72	45.18	47.66	AV
630.00	V	67.76	1.92	12.71	31.72	50.67	67.66	PK
630.00	V	62.28	1.92	12.71	31.72	45.19	47.66	AV
945.00	H	60.97	2.38	21.43	32.45	52.33	67.66	PK
945.00	H	53.11	2.38	21.43	32.45	44.47	47.66	AV
945.00	V	59.68	2.38	18.56	32.45	48.17	67.66	PK
945.00	V	51.63	2.38	18.56	32.45	40.12	47.66	AV



434MHz(FSK)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
868.00	H	69.14	1.92	12.71	31.72	52.05	72.87	PK
868.00	H	62.03	1.92	12.71	31.72	44.94	52.87	AV
868.00	V	66.53	1.92	12.71	31.72	49.44	72.87	PK
868.00	V	60.56	1.92	12.71	31.72	43.47	52.87	AV
1302.00	H	60.32	2.38	21.43	32.45	51.68	72.87	PK
1302.00	H	53.57	2.38	21.43	32.45	44.93	52.87	AV
1302.00	V	58.53	2.38	18.56	32.45	47.02	72.87	PK
1302.00	V	51.71	2.38	18.56	32.45	40.20	52.87	AV

434MHz(OOK)

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Results	Limits	Det
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	Mode
868.00	H	67.56	1.92	12.71	31.72	50.47	72.87	PK
868.00	H	61.94	1.92	12.71	31.72	44.85	52.87	AV
868.00	V	68.11	1.92	12.71	31.72	51.02	72.87	PK
868.00	V	61.58	1.92	12.71	31.72	44.49	52.87	AV
1302.00	H	60.55	2.38	21.43	32.45	51.91	72.87	PK
1302.00	H	53.52	2.38	21.43	32.45	44.88	52.87	AV
1302.00	V	59.88	2.38	18.56	32.45	48.37	72.87	PK
1302.00	V	52.32	2.38	18.56	32.45	40.81	52.87	AV

Remark:

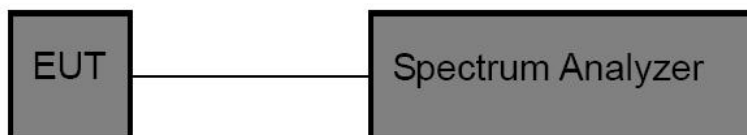
1. Result = Reading + Cable Loss + Ant Factor – Amplifier

5. 20DB Occupy Bandwidth Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.231 (c)
Test Limit	According to FCC Part 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

5.2. Test Setup



5.3. Test Procedure

1. Place the EUT on the table and set it in the continuously transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
RBW = 1% to 5% of the OBW, $VBW \geq 3 \times RBW$,
Span = $2 \times OBW \sim 5 \times OBW$
Detector = Peak
Trace mode = Max hold.
Sweep = auto couple.
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

5.4. Test Data

Test Item	: 20dB Bandwidth
Test Voltage	: DC 3.85V battery inside
Test Result	: PASS

Test Mode	: Continuously transmitting
Temperature	: 22.7°C
Humidity	: 55%RH

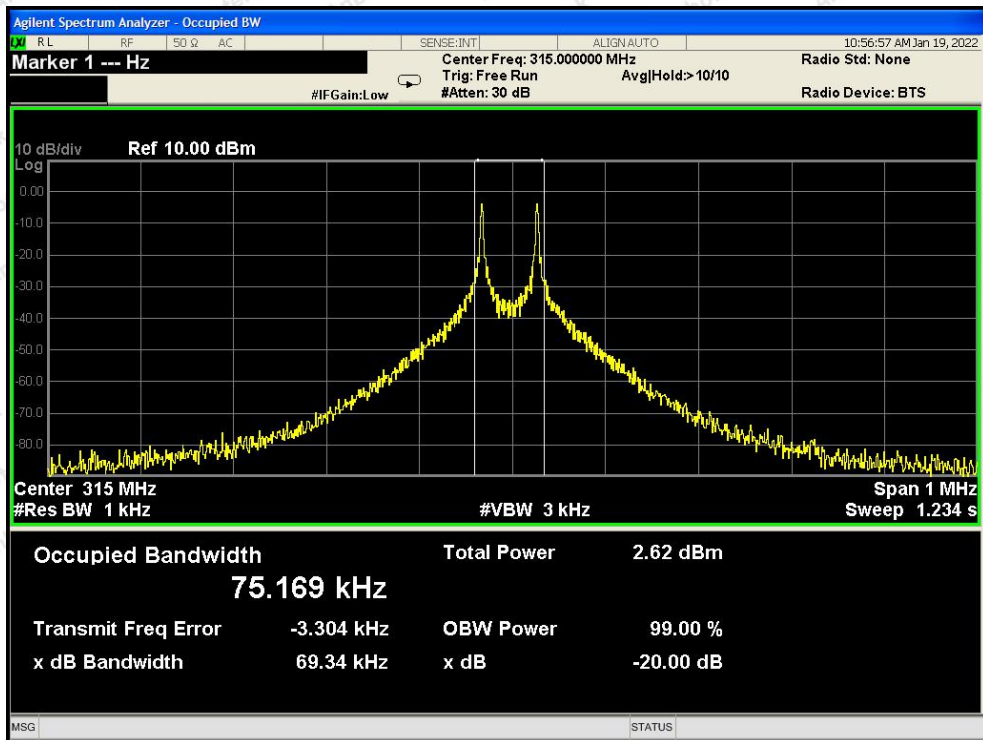
Mode	Freq. (MHz)	Modulation Type	20DB Bandwidth (kHz)	Limit (kHz)	Results
TX Mode	315	FSK	69.34	≤ 787.5	PASS
TX Mode	315	OOK	9.066	≤ 787.5	PASS
TX Mode	434	FSK	68.97	≤ 1085	PASS
TX Mode	434	OOK	18.10	≤ 1085	PASS

Note: Limit=0.0025*Freq.



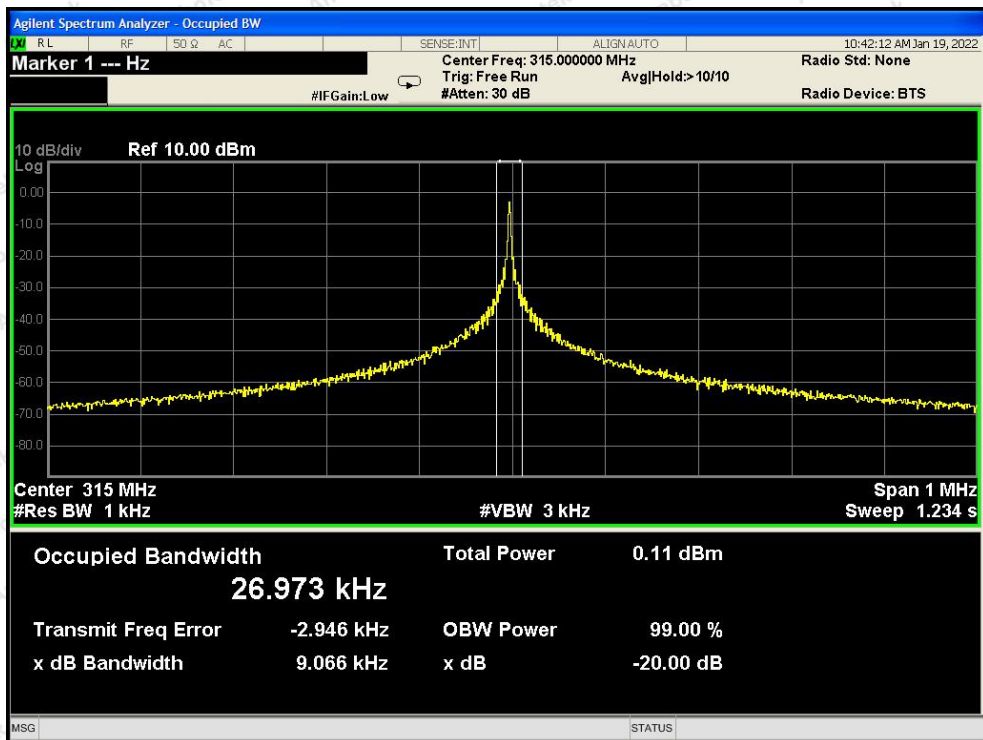
315 MHz(FSK)

Plot of 20DB Bandwidth



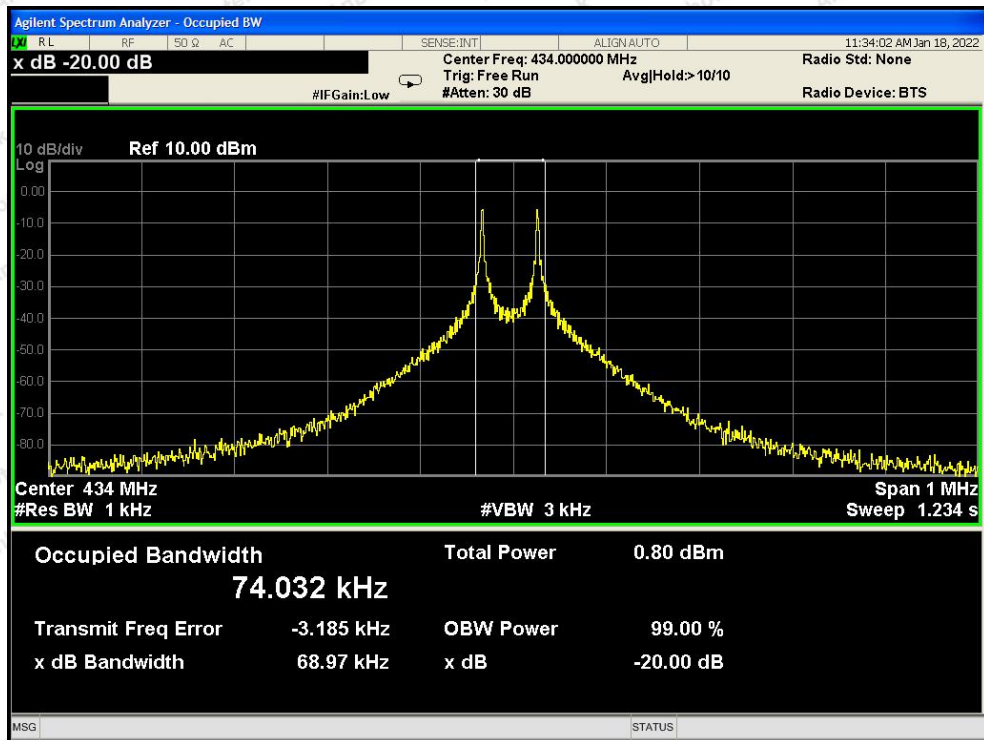
315 MHz(OOK)

Plot of 20DB Bandwidth



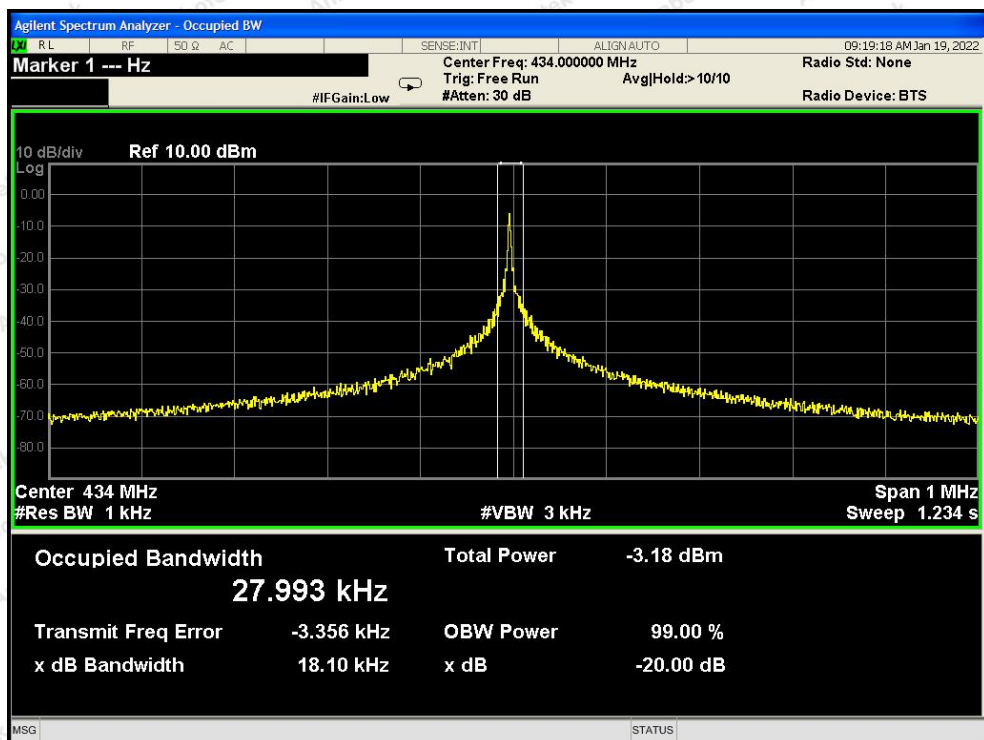
434MHz(FSK)

Plot of 20DB Bandwidth



434MHz(OOK)

Plot of 20DB Bandwidth

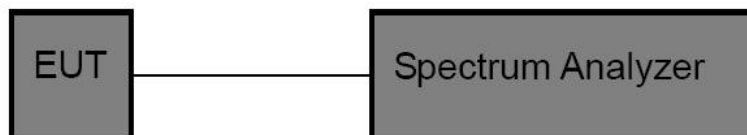


6. Dwell Time Test

6.1. Test Standard and Limit

Test Standard	FCC Part 15.231(e)
Test Limit	Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

6.2. Test Setup



6.3. Test Procedure

1. Place the EUT on the table and set it in continuously transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as
RBW=1000kHz, VBW= 1000 kHz, Span= 0Hz, Sweep Time= 20 Seconds.
3. Record the Delta mark time.

6.4. Test Data

Test Item : Dwell Time

Test Voltage : DC 3.85V battery inside

Test Result : PASS

Test Mode : Continuously transmitting

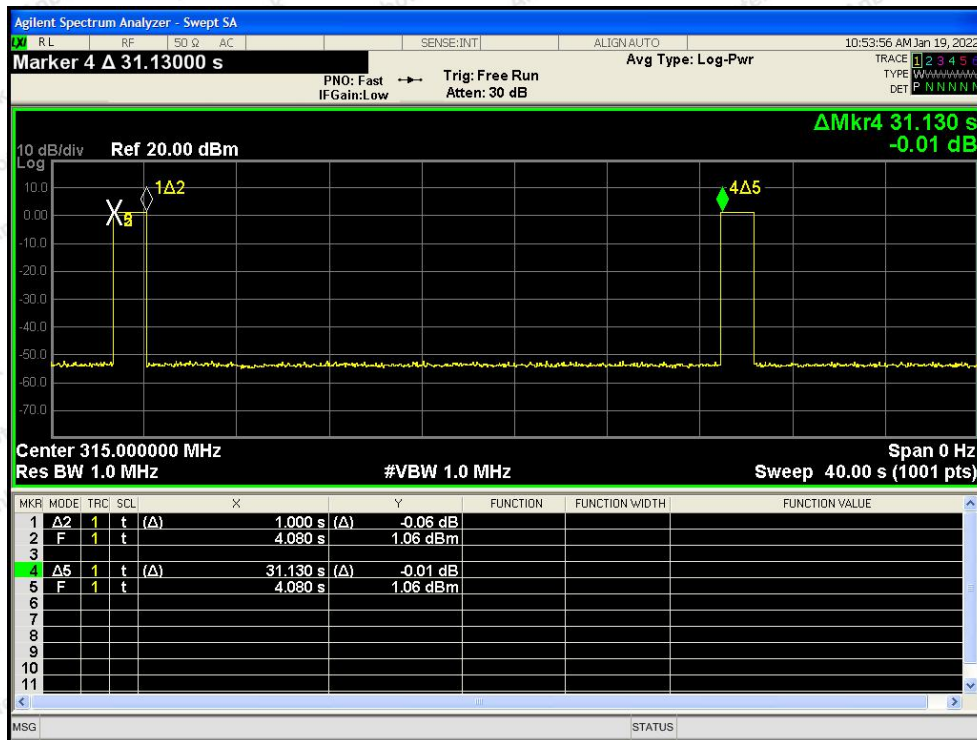
Temperature : 22.7℃

Humidity : 55%RH

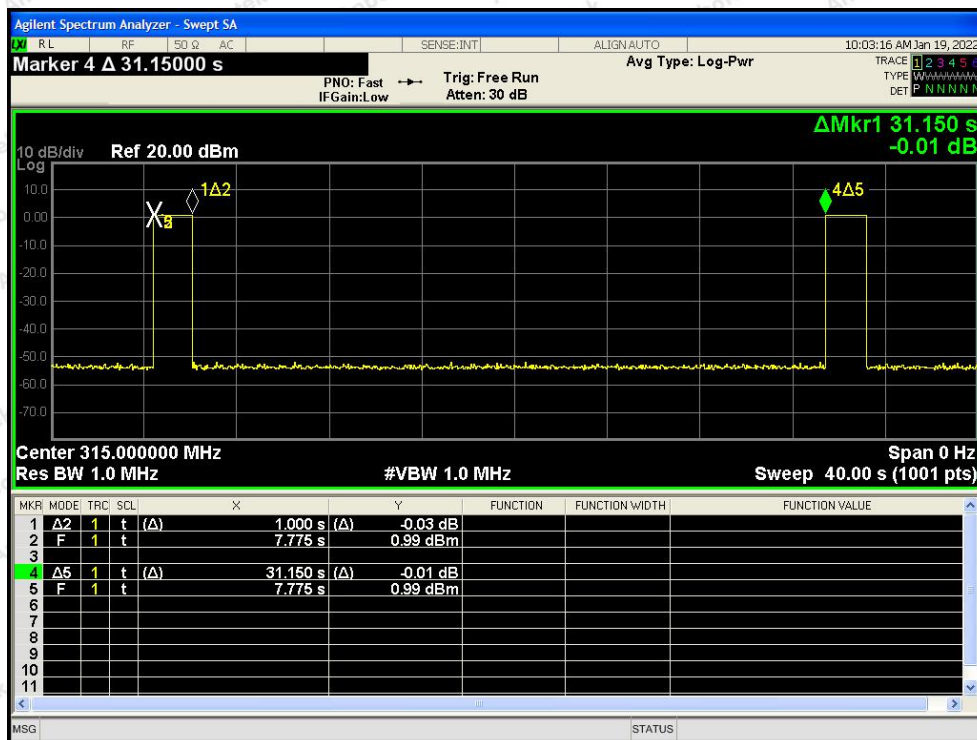
Mode	Freq. (MHz)	Modulation Type	Transmitting time(s)	Limit(s)	T-off time(s)	T-off Limit(s)	Results
TX Mode	315	FSK	1	<1	30.130	>30	PASS
TX Mode	315	OOK	1	<1	30.150	>30	PASS
TX Mode	434	FSK	1	<1	30.075	>30	PASS
TX Mode	434	OOK	1	<1	30.130	>30	PASS

Please refer the following plot.

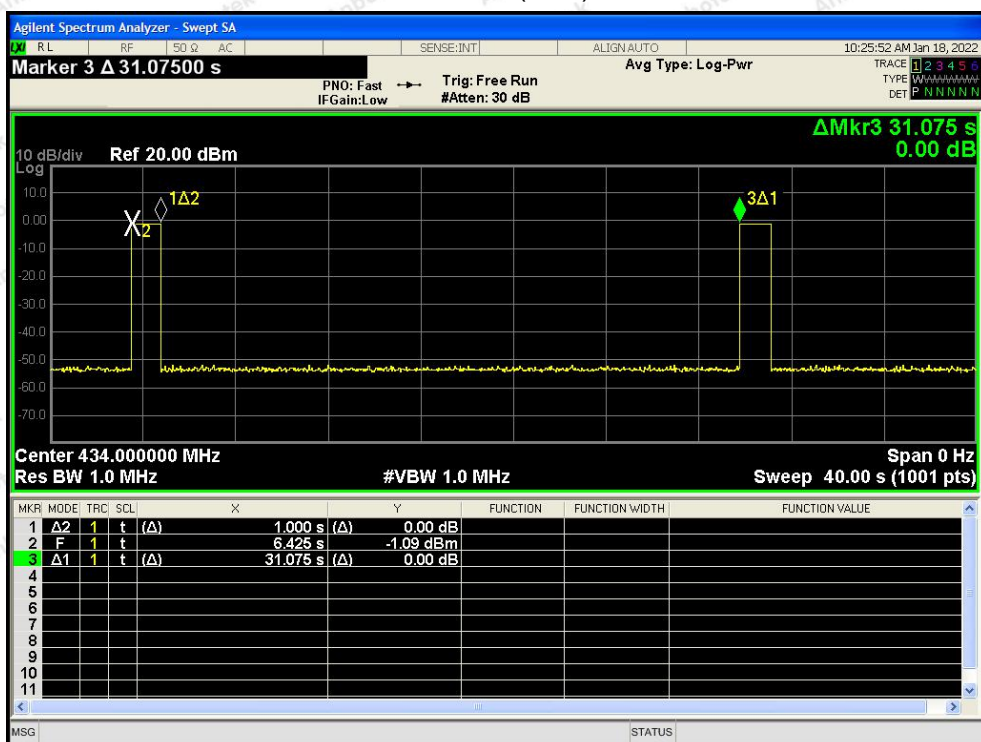
315 MHz(FSK)



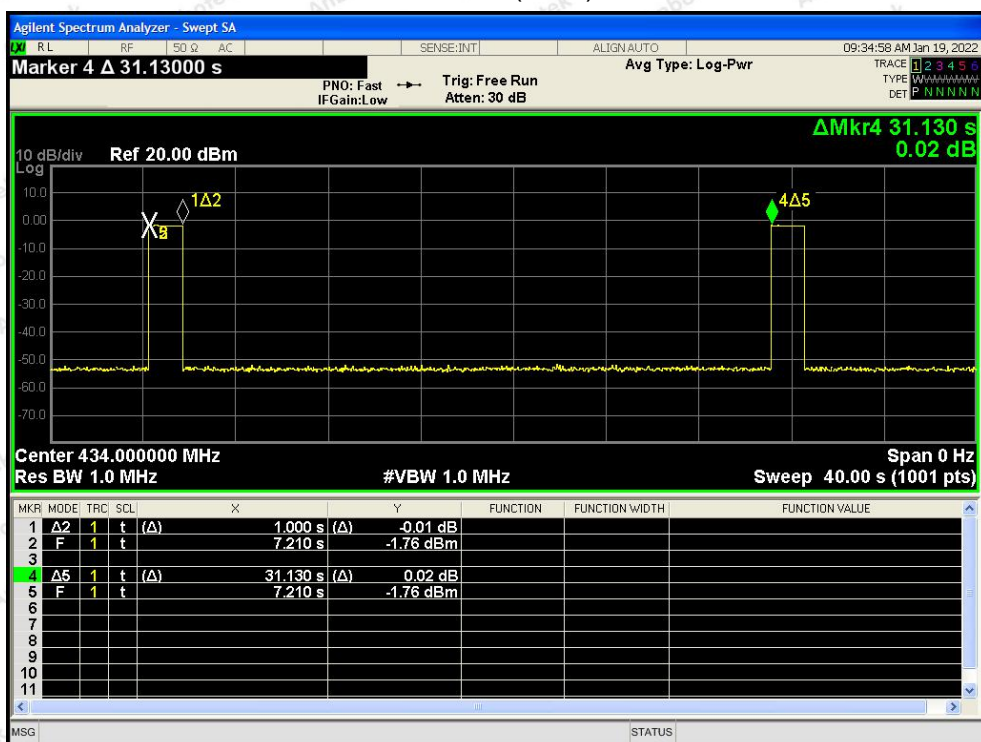
315 MHz(OOK)



434 MHz(FSK)



434 MHz(OOK)



7. Antenna Requirement

7.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 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. Antenna requirement must meet at least one of the following: 1) Antenna must be permanently attached to device. 2) The antenna must use a unique type of connector to attach to the device. 3) Device must be professionally installed. The installer shall be responsible for ensuring that the correct antenna is employed by the device.

7.2. Antenna Connected Construction

The antenna is a FPC antenna which permanently attached, and the best case gain of the antenna is 0dBi. It complies with the standard requirement.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement



Photo of Radiation Emission Test





APPENDIX II -- EXTERNAL PHOTOGRAPH

Reference to the test report 18220WC10274001.

APPENDIX III -- INTERNAL PHOTOGRAPH

Reference to the test report 18220WC10274001.

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

