FCC Test Report

Applicant	:	**Thien Thanh Dat JSC**
Address	:	**32 Binh Long str.,Phu Thanh ward,Tan Phu district, Ho Chi Minh city, Vietnam**
Product Name	:	**Wireless Microphone**
Report Date	:	**Nov. 02, 2023**

Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT

Applicant	:	Thien Thanh Dat JSC
Manufacturer	:	Thien Thanh Dat JSC
Product Name	:	Wireless Microphone
Test Model No.	:	TX2
Reference Model No.	:	N/A
Trade Mark	:	Dalton
Rating(s)	:	Input: DC 3V (Battery 1.5VDC *2 , size AA)

Test Standard(s)	**:**	**FCC Part15 Subpart C, Section 15.236**
Test Method(s)	**:**	**ANSI C63.10: 2020**

The device described above is tested by Shenzhen Anbotek 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 Anbotek 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 Part15 Subpart C requirements.

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

Date of receipt	Sept. 08, 2023
Date of Test	Sept. 08~20, 2023
Prepared By	(TuTu Hong)
Approved & Authorized Signer	(Kingkong Jin)

Revision History

Report Version	Description	Issued Date
R00	Original Issue.	Nov. 02, 2023

1. General Information

1.1. Client Information

Applicant	:	Thien Thanh Dat JSC
Address	:	32 Binh Long str.,Phu Thanh ward,Tan Phu district, Ho Chi Minh city, Vietnam
Manufacturer	:	Thien Thanh Dat JSC
Address	:	32 Binh Long str.,Phu Thanh ward,Tan Phu district, Ho Chi Minh city, Vietnam
Factory	:	Thien Thanh Dat JSC
Address	:	32 Binh Long str.,Phu Thanh ward,Tan Phu district, Ho Chi Minh city, Vietnam

1.2. Description of Device (EUT)

Product Name	:	Wireless Microphone
Model No.	:	TX2
Reference Model No.	:	N/A
Trade Mark	:	Dalton
Test Power Supply	:	DC 3V battery
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Adapter	:	N/A
RF Specification		
Operation Frequency	:	657.00-659.85MHz, 660.00-662.85MHz
Number of Channel	:	40 Channels
Modulation Type	:	Digital Modulation
Antenna Type	:	PCB Antenna
Antenna Gain(Peak)	:	-0.58 dBi
Remark: 1) All of the RF specification are provided by customer.2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

1.3. Auxiliary Equipment Used During Test

Description	Rating(s)
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1.4. Description of Test Configuration

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	**657.00**	11	658.50	**21**	**660.00**	31	661.50
02	657.15	12	658.65	22	660.15	32	661.65
03	657.30	13	658.80	23	660.30	33	661.80
04	657.45	14	658.95	24	660.45	34	661.95
05	657.60	15	659.10	25	660.60	35	662.10
06	657.75	16	659.25	26	660.75	36	662.25
07	657.90	17	659.40	27	660.90	37	662.40
08	658.05	18	659.55	28	661.05	38	662.55
09	658.20	19	659.70	29	661.20	39	662.70
10	**658.35**	**20**	**659.85**	**30**	**661.35**	**40**	**662.85**

Note:

1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

1.5. Description Of Test Setup

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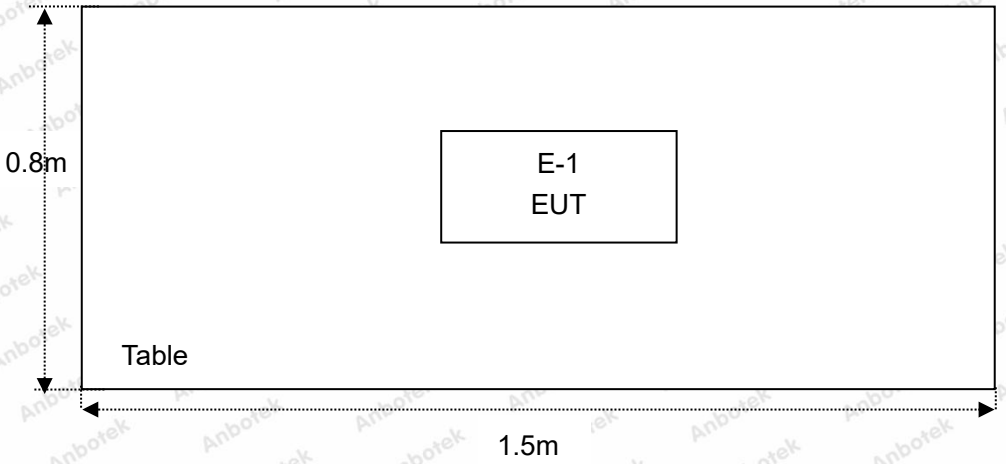


1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 23, 2022	1 Year
2.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040DT001	Jul. 05, 2023	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 13, 2022	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 23, 2022	1 Year
5.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 13, 2022	1 Year
6.	EMI Preamplifier	SKET Electronic	LNPA-0118G -45	SKET-PA-002	Oct. 13, 2022	1 Year
7.	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	Oct. 16, 2022	3 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 23, 2022	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Oct. 23, 2022	1 Year
10.	Horn Antenna	A-INFO	LB-180400-K F	J211060628	Oct. 23, 2022	1 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 23, 2022	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY53280032	Oct. 13, 2022	1 Year
14.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 13, 2022	1 Year
15.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 13, 2022	1 Year
16.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 22, 2022	1 Year
17.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80 B	N/A	Oct. 19, 2022	1 Year
18.	Power Meter	Agilent	N1914A	MY50001102	Oct. 26, 2022	1 Year

1.7. Measurement Uncertainty

Parameter	Uncertainty
Conducted emissions (AMN 150kHz~30MHz)	3.8dB
Occupied Bandwidth	925Hz
Conducted Output Power	0.76dB
Conducted Spurious Emission	1.24dB
Radiated spurious emissions (Below 30MHz)	3.53dB
Radiated spurious emissions (30MHz~1GHz)	Horizontal: 3.92dB; Vertical: 4.52dB
Radiated spurious emissions (above 1GHz)	1G-6GHz: 4.78dB; 6G-18GHz: 4.88dB 18G-40GHz: 5.68dB
The measurement uncertainty and decision risk evaluated according to AB/WI-RF-F-032. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek 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

Shenzhen Anbotek 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 Anbotek Compliance Laboratory Limited.

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

1.9. Disclaimer

1. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
2. The test report is invalid if there is any evidence and/or falsification.
3. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
4. This document may not be altered or revised in any way unless done so by Anbotek and all revisions are duly noted in the revisions section.
5. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
6. The authenticity of the information provided by the customer is the responsibility of the customer and the laboratory is not responsible for its authenticity.

The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2. Summary of Test Results

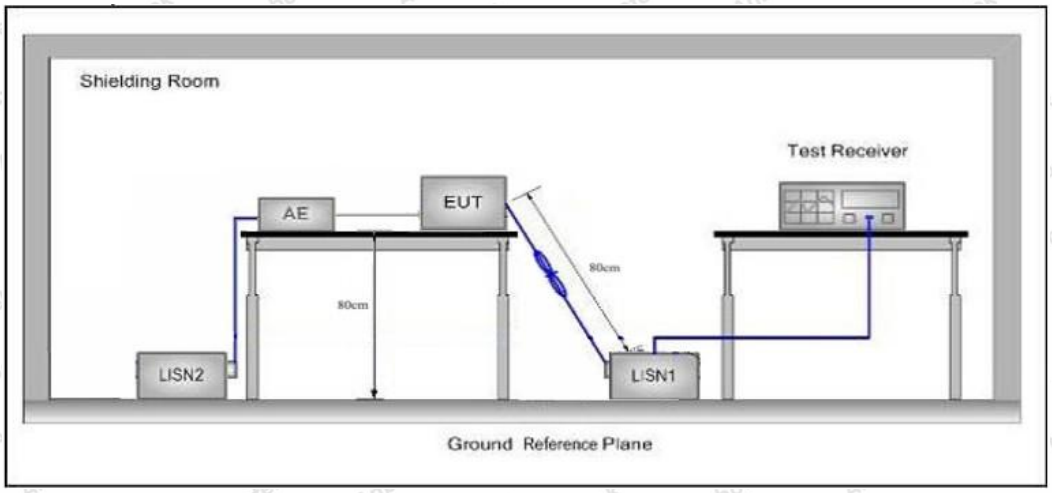
Standard Section	Test Item	Result
15.207	Conducted Emission	N/A
15.236(d)	RF Output Power	PASS
15.236(f)(3)	Frequency Stability	PASS
15.236(f)(g)	Operating Bandwidth & Emission Mask	PASS
15.236(g)	Radiated Spurious Emissions	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

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 receiver (ESCI) set at 9kHz.

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

3.4. Test Data

Not applicable.

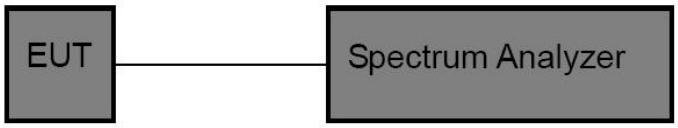
The EUT is powered by DC 3V, so there is no need to conduct this test.

4. RF Output Power Test

4.1. Test Standard and Limit

Test Standard	FCC Part15 Subpart C, §15.236(d)
Test Limit	In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW (17dBm) EIRP. In the 600 MHz guard band and the 600 MHz duplex gap: 20 mW (13dBm) EIRP.

4.2. Test Setup



4.3. Test Procedure

1. The EUT was connected to a spectrum analyzer for the output power test.
2. The output power was set to 50 mW.
3. The modulated output power was measured using a QP detector per ANSI C63.10: 2020 section 4.1.4.2.1.
4. The output power was measured at the low, middle, and high frequencies of the passband.
5. The cable loss from the EUT output to the spectrum analyzer input were input to the spectrum analyzer as correction factor before recording the output power.
6. RBW = 120 kHz, VBW = 3 x RBW, Detector = QP

4.4. Test Data

Test Item	:	Output Power	Test Mode	:	CH 01 ~ CH 40
Test Voltage	:	DC 3V battery	Temperature	:	23.6℃
Test Result	:	PASS	Humidity	:	53 %

Channel	Peak Power output (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Results
01	11.632	11.052	13	PASS
10	11.663	11.083	13	PASS
20	11.623	11.043	13	PASS
21	11.652	11.072	13	PASS
30	11.581	11.001	13	PASS
40	11.379	10.799	13	PASS

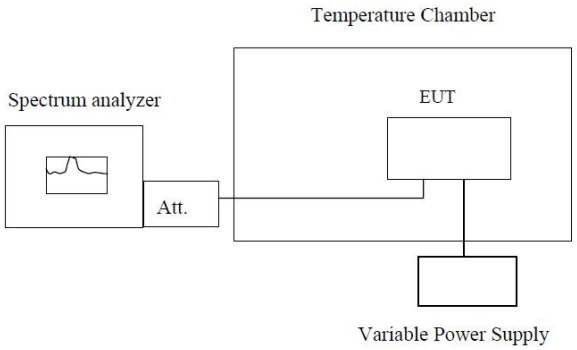
Note: EIRP=Peak Power+ Antenna gain (dBi)

5. Frequency Stability Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 Subpart C, 15.236(f)(3)
Test Limit	The frequency tolerance of the transmitter shall be ±0.005 percent.

5.2. Test Setup



Note : Measurement setup for testing on Antenna connector

5.3. Test Procedure

1. The EUT was placed in an environmental test chamber and the RF output was connected to a spectrum analyzer.
2. The temperature was varied from -20°C to 50°C in 10°C increments. After a sufficient time for temperature stabilization the RF output frequency was measured.
3. At 20°C the power supply voltage to the EUT was varied from 85% to 115% of the nominal value and the RF output wasmeasured.

5.4. Test Data

Test Item	:	Frequency Stability	Test Mode	:	CH 01 ~ CH 40
Test Voltage	:	DC 3V battery	Temperature	:	23.6℃
Test Result	:	PASS	Humidity	:	53 %

657.00MHz				
Temperature (℃)	Power Supplied (VDC)	Measured frequency (MHz)	Error (ppm)	Limit (ppm)
-20	3.0	657.006933	10.55	±50
-10		657.006416	9.76	±50
0		657.006087	9.26	±50
10		657.006956	10.59	±50
20		657.006604	10.05	±50
30		657.005523	8.41	±50
40		657.005382	8.19	±50
50		657.005828	8.87	±50
20	2.7	657.005499	8.37	±50
20	3.3	657.004348	6.62	±50

658.35MHz				
Temperature (℃)	Power Supplied (VDC)	Measured frequency (MHz)	Error (ppm)	Limit (ppm)
-20	3.0	658.356933	10.53	±50
-10		658.356416	9.74	±50
0		658.356087	9.25	±50
10		658.356956	10.57	±50
20		658.356604	10.03	±50
30		658.355523	8.39	±50
40		658.355382	8.17	±50
50		658.355828	8.85	±50
20	2.7	658.355499	8.35	±50
20	3.3	658.354348	6.60	±50

659.85MHz				
Temperature (℃)	Power Supplied (VDC)	Measured frequency (MHz)	Error (ppm)	Limit (ppm)
-20	3.0	659.856933	10.51	±50
-10		659.856416	9.72	±50
0		659.856087	9.22	±50
10		659.856956	10.54	±50
20		659.856604	10.01	±50
30		659.855523	8.37	±50
40		659.855382	8.16	±50
50		659.855828	8.83	±50
20	2.7	659.855499	8.33	±50
20	3.3	659.854348	6.59	±50

660.00MHz				
Temperature (℃)	Power Supplied (VDC)	Measured frequency (MHz)	Error (ppm)	Limit (ppm)
-20	3.0	660.006933	10.50	±50
-10		660.006416	9.72	±50
0		660.006087	9.22	±50
10		660.006956	10.54	±50
20		660.006604	10.01	±50
30		660.005523	8.37	±50
40		660.005382	8.15	±50
50		660.005828	8.83	±50
20	2.7	660.005499	8.33	±50
20	3.3	660.004348	6.59	±50

661.35MHz				
Temperature (℃)	Power Supplied (VDC)	Measured frequency (MHz)	Error (ppm)	Limit (ppm)
-20	3.0	661.356933	10.48	±50
-10		661.356416	9.70	±50
0		661.356087	9.20	±50
10		661.356956	10.52	±50
20		661.356604	9.98	±50
30		661.355523	8.35	±50
40		661.355382	8.14	±50
50		661.355828	8.81	±50
20	2.7	661.355499	8.31	±50
20	3.3	661.354348	6.57	±50

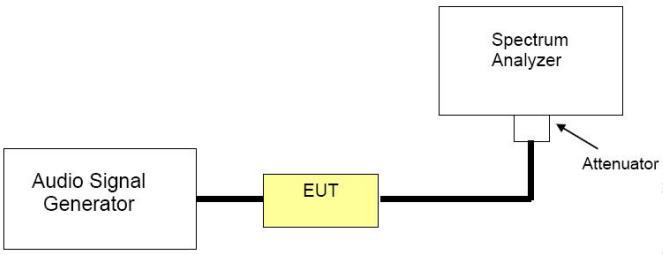
662.85MHz				
Temperature (℃)	Power Supplied (VDC)	Measured frequency (MHz)	Error (ppm)	Limit (ppm)
-20	3.0	662.856933	10.46	±50
-10		662.856416	9.68	±50
0		662.856087	9.18	±50
10		662.856956	10.49	±50
20		662.856604	9.96	±50
30		662.855523	8.33	±50
40		662.855382	8.12	±50
50		662.855828	8.79	±50
20	2.7	662.855499	8.30	±50
20	3.3	662.854348	6.56	±50

6. Operating Bandwidth & Emission Mask Test

6.1. Test Standard and Limit

Test Standard	FCC Part15 Subpart C, §15.236 (f)(g)
Test Limit	The operating bandwidth shall not exceed 200 kHz. Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in § 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement. Emissions outside of this band shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 V1.4.2 (2011-08).

6.2. Test Setup



6.3. Test Procedure

The OBW is according to ANSI C63.10: 2020

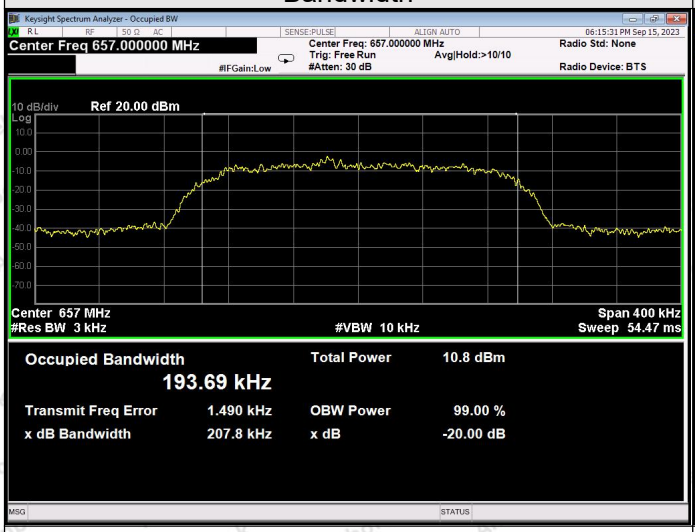
The Emission Mask is according to section 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08).

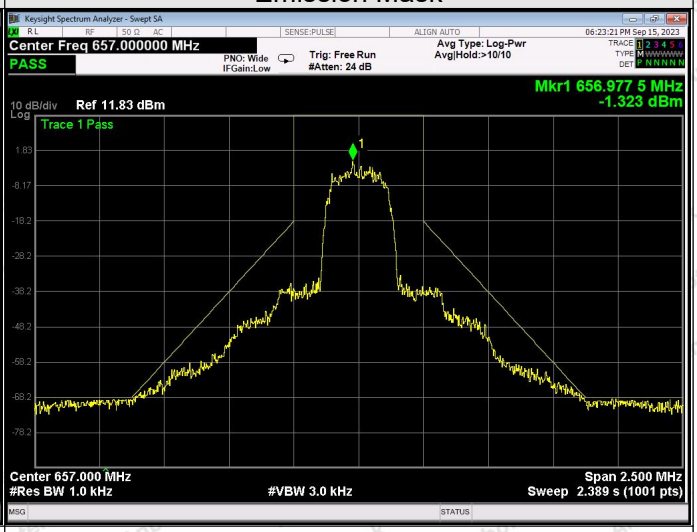
6.4. Test Data

Test Item	:	Bandwidth	Test Mode	:	CH 01 ~ CH 40
Test Voltage	:	DC 3V battery	Temperature	:	23.6℃
Test Result	:	PASS	Humidity	:	53 %

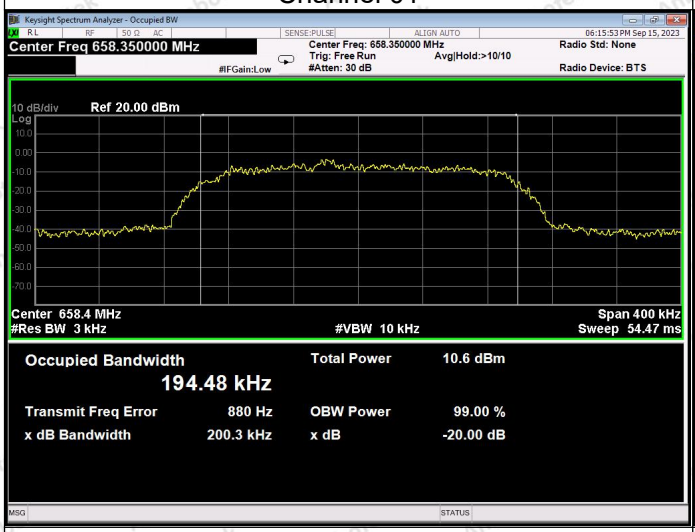
Test Channel	Bandwidth (kHz)	Limit (kHz)	Test Result
01	193.69	200	Pass
10	194.48	200	Pass
20	193.49	200	Pass
21	194.78	200	Pass
30	193.91	200	Pass
40	193.70	200	Pass

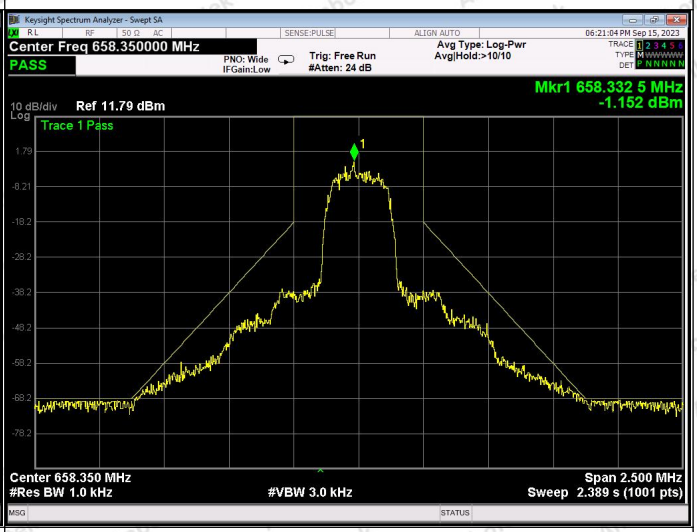
Bandwidth	Emission Mask



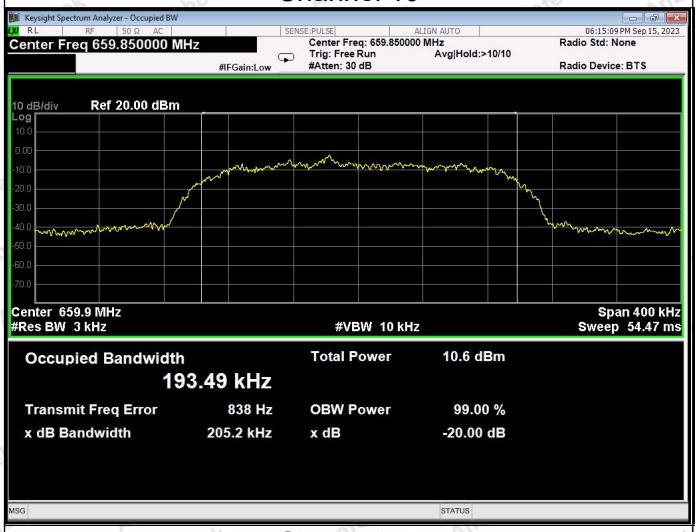


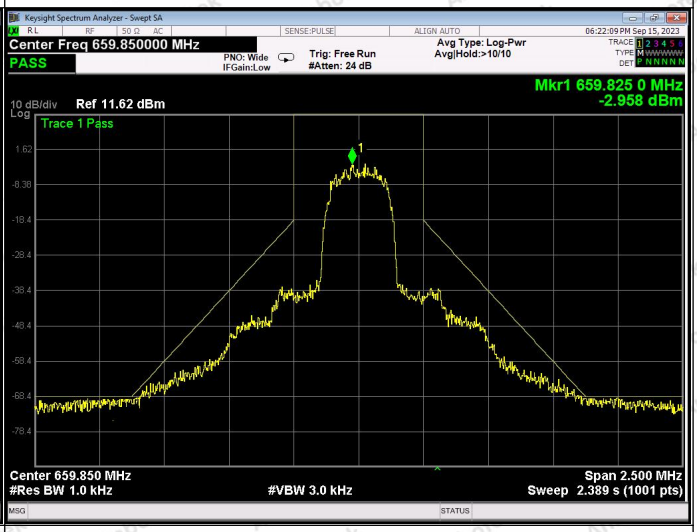
Channel 01



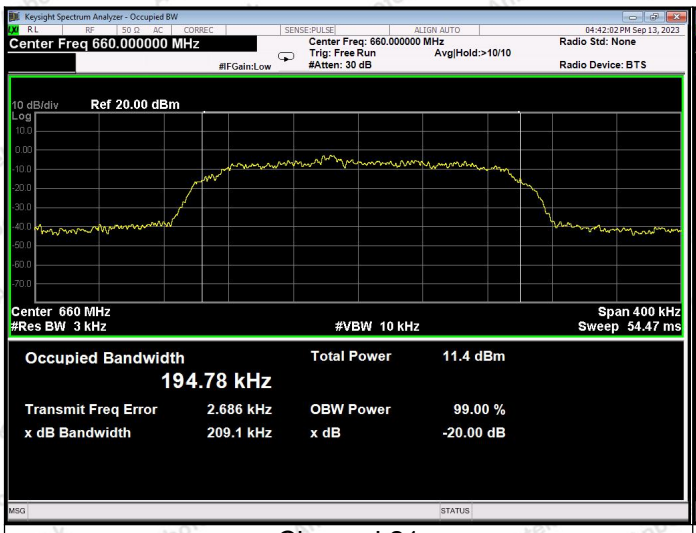


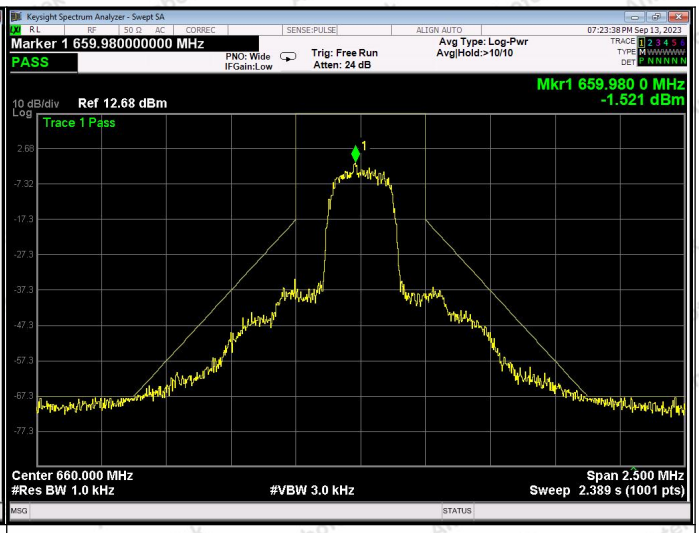
Channel 10



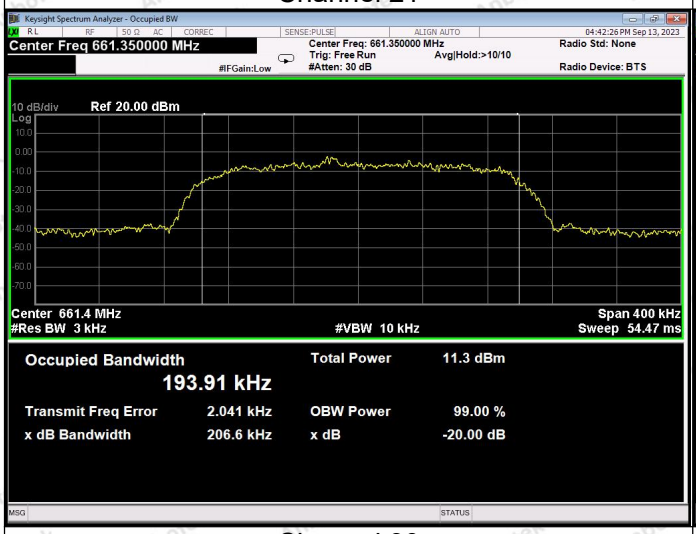


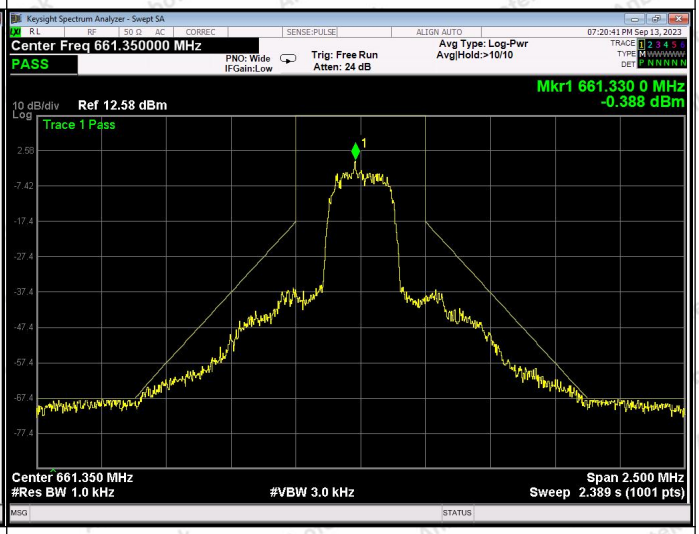
Channel 20



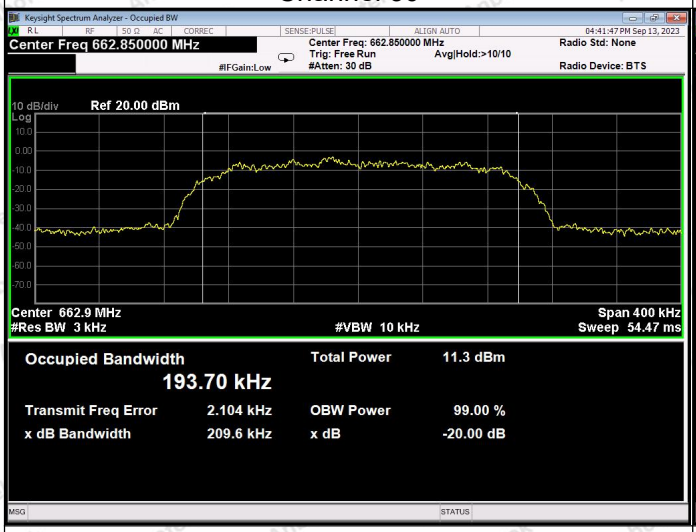


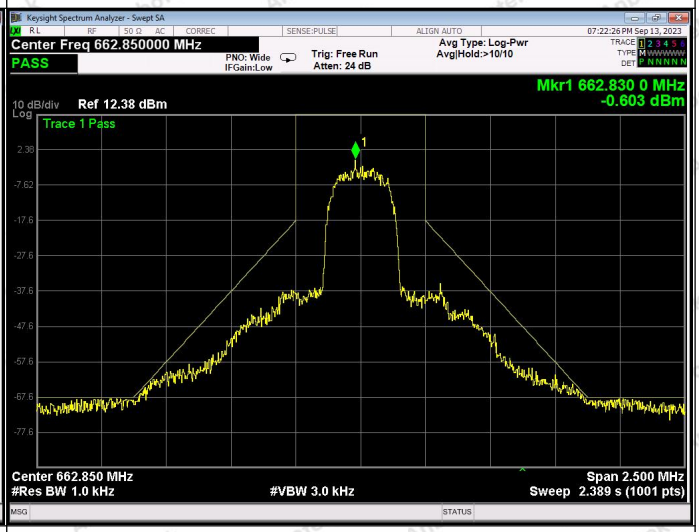
Channel 21





Channel 30





Channel 40

7. Radiation Spurious Emission Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 Subpart C, §15.236(g)
Test Limit	The operating bandwidth shall not exceed 200 kHz. Emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in § 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement. Emissions outside of this band shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 V1.4.2 (2011-08).

7.2. Test Setup

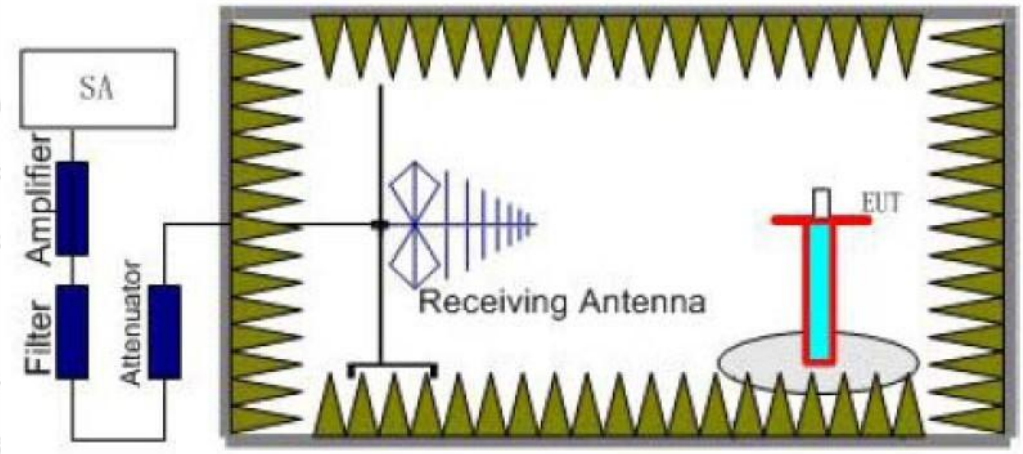


Figure 1

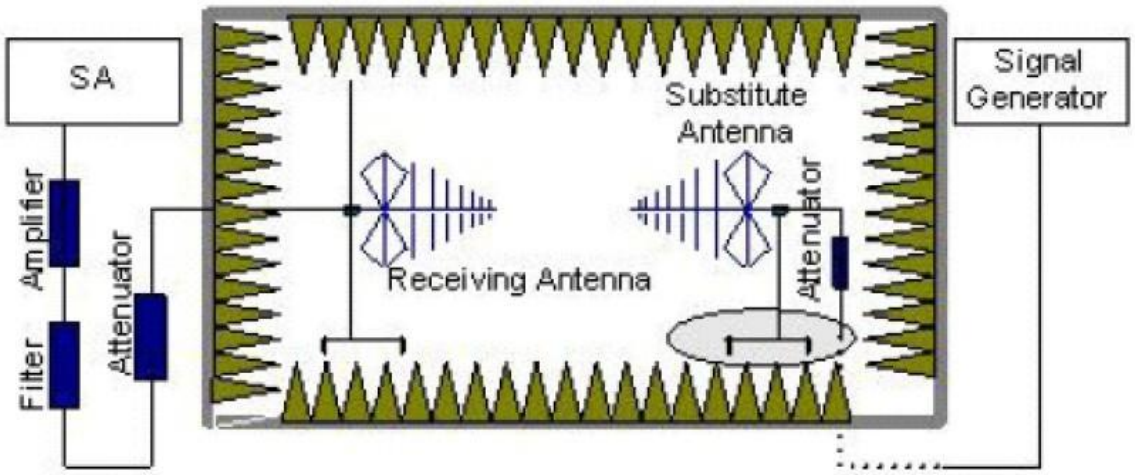


Figure 2

7.3. Test Procedure

1. EUT was placed on a 0.8 meter for below 1GHz and 1.5 meter for above 1GHz high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.0m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest isconnected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
7. Power(EIRP)=PMea- PAg - Pcl + Ga
8. We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below:
9. Power(EIRP)=PMea- Pcl + Ga
10. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
11. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

7.4. Test Data

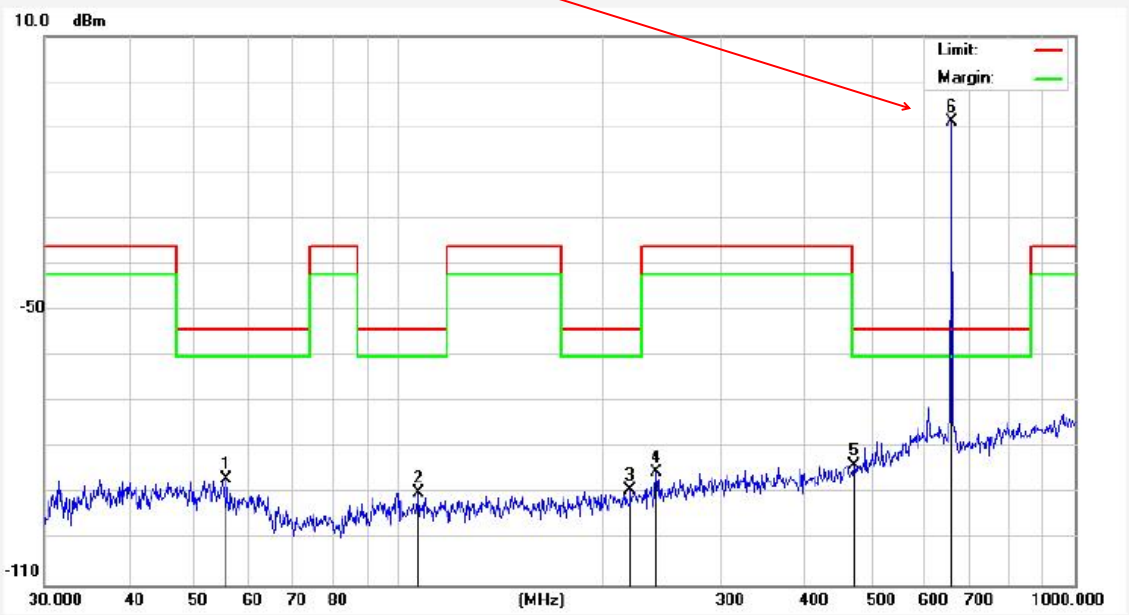
PASS

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

Test Results:

Test Site:	2# Shielded Room
Operating Condition:	Channel 10
Test Specification:	DC 3V battery
Polarization	Vertical
Temp.(℃)/Hum.(%RH):	23.5℃/49%RH

Fundamental



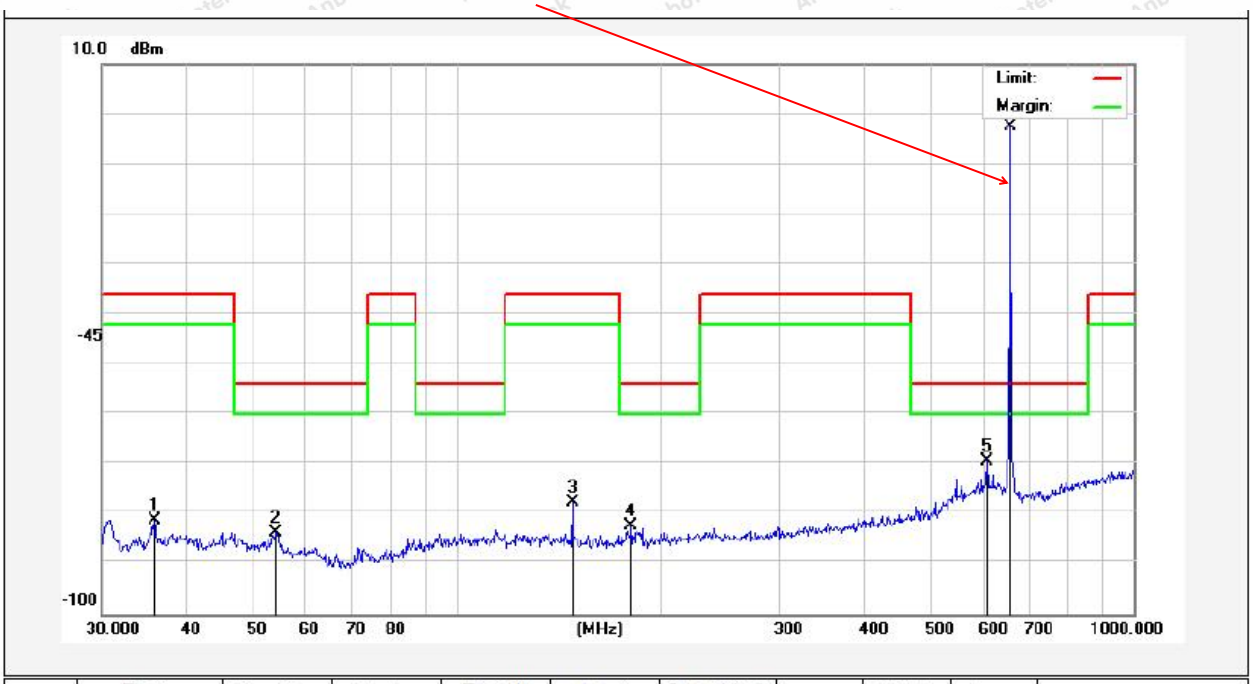
No.	Freq. (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	55.8046	-77.68	-9.05	-86.73	-54.00	-32.73	QP			
2	107.1337	-76.52	-13.11	-89.63	-54.00	-35.63	QP			
3	220.6169	-78.36	-10.82	-89.18	-54.00	-35.18	QP			
4	240.8302	-74.41	-10.84	-85.25	-36.00	-49.25	QP			
5	472.1759	-78.16	-5.62	-83.78	-54.00	-29.78	QP			
6	658.3561	-8.10	-0.73	-8.83	/	/	peak			

Note: Result = Reading + Factor Over Limit = Result - Limit

Test Site: 2# Shielded Room
Operating Condition: Channel 10
Test Specification: DC 3V battery
Polarization Horizontal

Temp.(℃)/Hum.(%RH): 23.5℃/49%RH

Fundamental



No.	Freq. (MHz)	Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	35.8746	-72.40	-8.67	-81.07	-36.00	-45.07	QP			
2	54.2610	-74.77	-8.75	-83.52	-54.00	-29.52	QP			
3	148.4410	-65.96	-11.68	-77.64	-36.00	-41.64	QP			
4	181.2834	-72.73	-9.43	-82.16	-54.00	-28.16	QP			
5	607.7867	-69.77	0.42	-69.35	-54.00	-15.35	QP			
6	658.3562	-1.78	-0.73	-2.51	/	/	peak			

Note: Result = Reading + Factor Over Limit = Result - Limit

Above 1GHz:

Test Channel: Channel 10				
Frequency MHz	Measurement (dBm)	Limit (dBm)	Margin (dB)	Antenna Polar (H/V)
1975.05	-32.05	-30.00	-2.05	H
2113.30	-46.85	-30.00	-16.85	H
2633.40	-53.97	-30.00	-23.97	H
2113.30	-34.41	-30.00	-4.41	V
1975.05	-46.76	-30.00	-16.76	V
2633.40	-52.38	-30.00	-22.38	V

Remark: Margin = Measurement - Limit

Note: During the test, pre-scan all modes, only the worst case(CH10) is recorded in the report.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph

APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

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