

FCC PART 15C

Measurement and Test Report

For

ShenZhen SHIDU Digital Co.,Ltd

F6, Zhaofeng, Hangkong Rd, Bao'an, Shenzhen, China

FCC ID: 2AN03-U10

FCC Rules:	<u>FCC Part 15.236</u>
Product Description:	<u>Wireless Microphone</u>
Tested Model:	<u>U10</u>
Report No.:	<u>WTE19X03012050W-1</u>
Sample Receipt Date:	<u>2019-03-06</u>
Tested Date:	<u>2019-03-06 to 2019-03-15</u>
Issued Date:	<u>2019-04-09</u>
Tested By:	<u>Mike Shi / Engineer</u>
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd

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1. GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Client Information

Applicant: ShenZhen SHIDU Digital Co.,Ltd
 Address of applicant: F6, Zhaofeng, Hangkong Rd, Bao'an, Shenzhen, China

Manufacturer: ShenZhen SHIDU Digital Co.,Ltd
 Address of manufacturer: F6, Zhaofeng, Hangkong Rd, Bao'an, Shenzhen, China

General Description of EUT	
Product Name:	Wireless Microphone
Trade Name:	/
Model No.:	U10
Adding Model(s):	U2, U3, U5, U6, U7, U8, U9, U11, U20, U30, DGMC30W, DGMC80W, S615, ZW-S615
Rated Voltage:	DC1.5V*2
<p><i>Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model U10, but the circuit and the electronic construction do not change, declared by the manufacturer.</i></p>	

Items	Description
RF Output Power:	Max. 6.66dBm (Conducted)
Frequency Range:	520MHz - 526MHz
Modulation:	FM
Antenna Type:	Integral Antenna
Antenna Gain:	0 dBi
For more information refer to the circuit diagram form and the user's manual.	

Frequency List			
No.	Frequency(MHz)	No.	Frequency(MHz)
1	520	5	524MHz
2	521	6	525MHz
3	522	7	526MHz
4	523	/	/

1.2 Test Standards

The following report is prepared on behalf of the ShenZhen SHIDU Digital Co.,Ltd in accordance with Part 15.236 of the Federal Communication Commissions rules.

The objective is to determine compliance with the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

Measurements contained in this report were also conducted with ANSI/TIA-603-D: 2010, Telecommunications Industry Association Land Mobile FM or PM Communications Equipment Measurement and Performance Standards, ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted with Low Channel, Middle Channel and High Channel, accordingly in reference to the Operating Instructions.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	520MHz
TM2	Middle Channel	523MHz
TM3	High Channel	526MHz

Test Conditions					
	Normal	LTLV	LTHV	HTHV	HTLV
Temperature (°C)	20	-30	-30	50	50
Voltage (V)	3.0	2.6	3.4	2.6	3.4

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	---	$\pm 1 \times 10^{-7}$
Frequency Stability	2.3%	$\pm 5\%$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-18GHz $\pm 3.92\text{dB}$

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2018-05-22	2019-05-21
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2018-05-22	2019-05-21
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2018-05-22	2019-05-21
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2018-05-22	2019-05-21
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2018-05-22	2019-05-21
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2020-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2020-06-07
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2020-06-07
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2018-05-22	2019-05-21
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2018-05-22	2019-05-21
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2018-05-22	2019-05-21
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2018-05-22	2019-05-21
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2018-05-22	2019-05-21
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2018-05-22	2019-05-21
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2018-03-18	2019-03-17
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2018-03-18	2019-03-17
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2018-03-18	2019-03-17
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2018-03-18	2019-03-17
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2018-03-18	2019-03-17
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2018-03-18	2019-03-17

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.236(d)(1)	Output Power Measurement	Compliant
§15.236(f)(2)	Occupied Bandwidth Emission	Compliant
§15.236(d)(2)	Radiated Spurious Emission	Compliant
§15.236(d)(2)	Spurious Emission at Antenna Port	Compliant
§15.236(f)(3)	Frequency Stability	Compliant

3. RF OUTPUT POWER

3.1 Standard Applicable

According to FCC 15.236(d)(1), for low power auxiliary station operating in the 470-608, and 614-698 MHz bands, In the bands allocated and assigned for broadcast television and in the 600 MHz service band: 50 mW EIRP

3.2 Test Procedure

1. The maximum peak output power was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in unmodulated situation.
2. Power was supplied to the battery input connector a power supply. The power supply was set for +3.0VDC. The Spectrum Analyzer was connected at antenna terminal to measure RF power of the carrier.
3. A Multimeter was connected in series with final RF Stage to measure the current; A Multimeter was used to measure final RF Stage supply voltage. Then the voltage v.s. current of the final RF Stage can be showed.

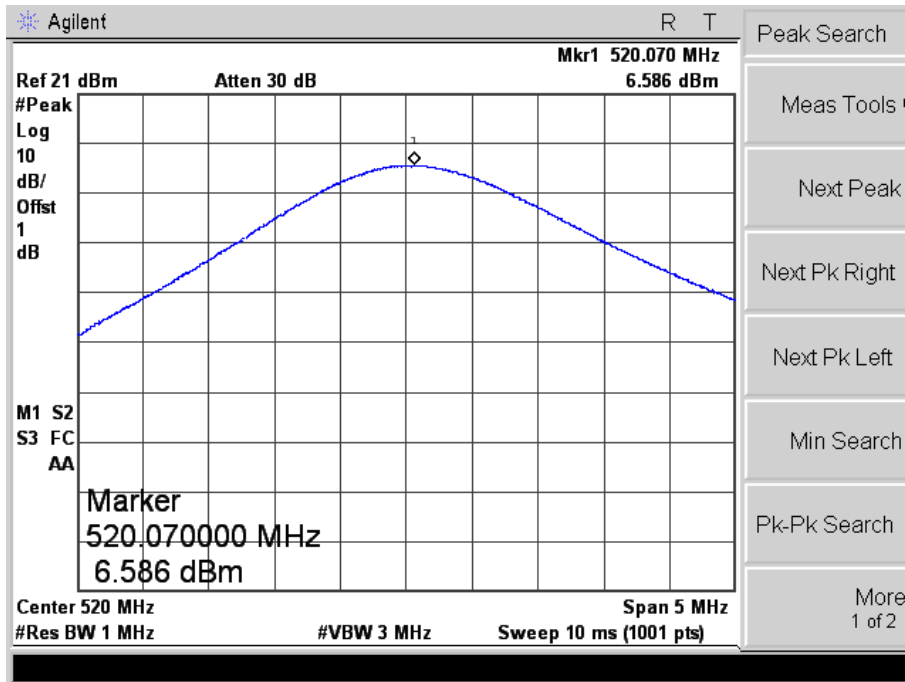
3.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

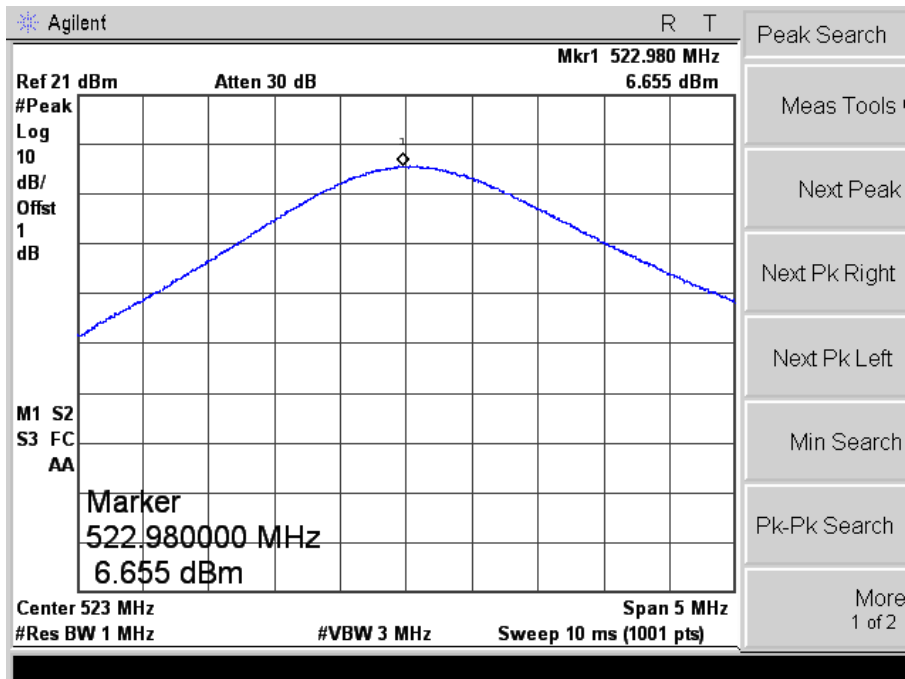
3.4 Test Result/Plots

Channel	Frequency (MHz)	Measured Value (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)
Low	520	6.59	0	6.59	17
Middle	523	6.66	0	6.66	17
High	526	6.58	0	6.58	17

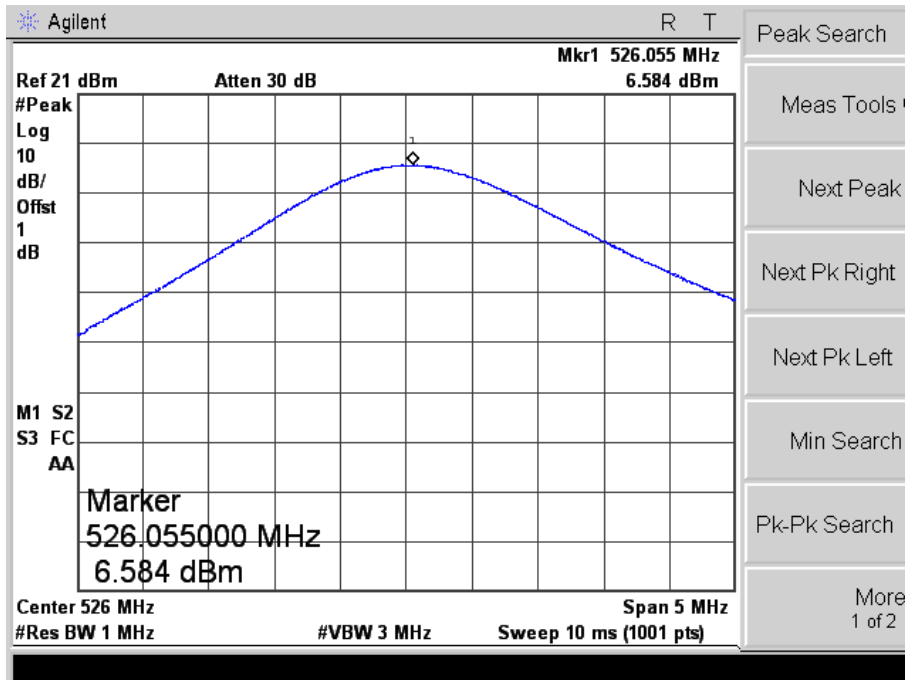
Low Channel (520MHz)



Middle Channel (523MHz)



High Channel (526MHz)



4. OCCUPIED BANDWIDTH

4.1 Standard Applicable

According to FCC 15.236(f), The operating frequency within a permissible band of operation as defined in paragraph (c) must comply with the following requirements.

- (1) The frequency selection shall be offset from the upper or lower band limits by 25 kHz or an integral multiple thereof.
- (2) One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. 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 Section 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08) (incorporated by reference, see §15.38). Emissions outside this band shall comply with the limit specified at the edges of the ETSI mask

4.2 Test Procedure

According to TIA-603 for additional Test Set-Up procedures, the occupied bandwidth of emission was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. Then mark the -26dB Bandwidth and record it.

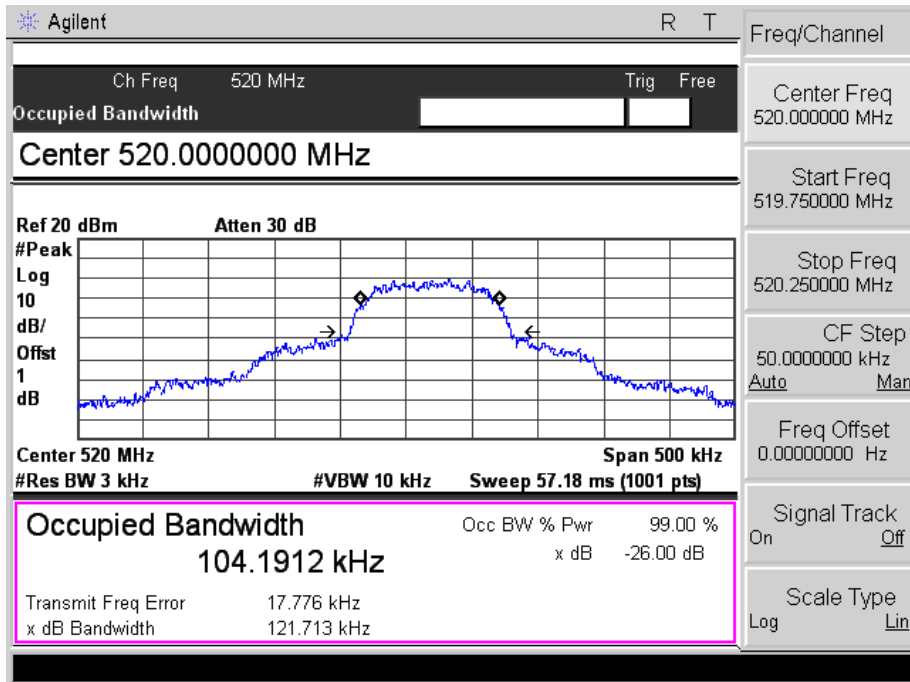
4.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

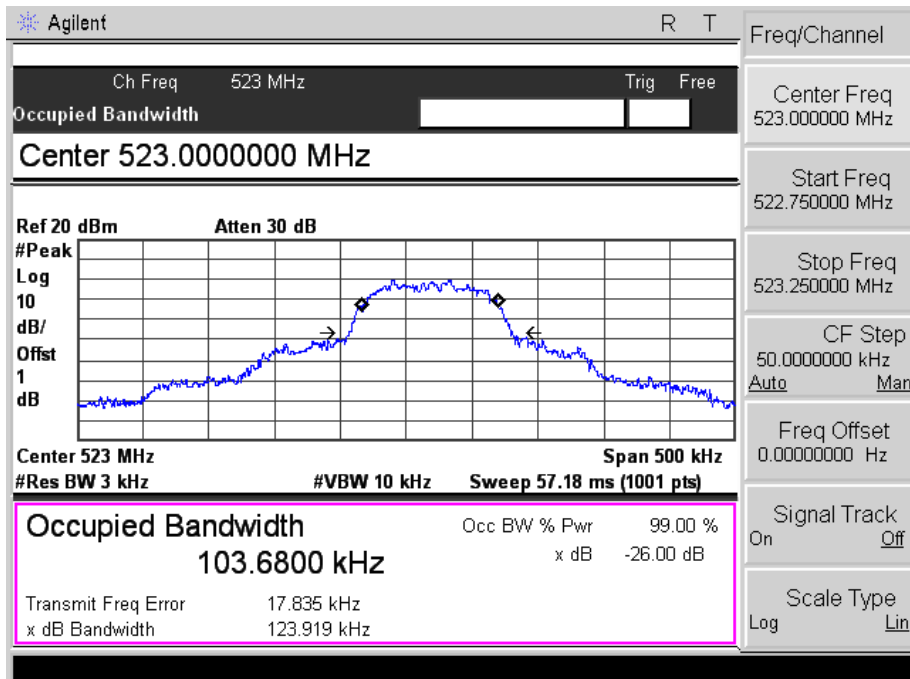
4.4 Test Results/Plots

Test Channel	Frequency (MHz)	-26dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (kHz)
Low	520	121.713	104.1912	200
Middle	523	123.919	103.6800	200
High	526	123.525	104.9543	200

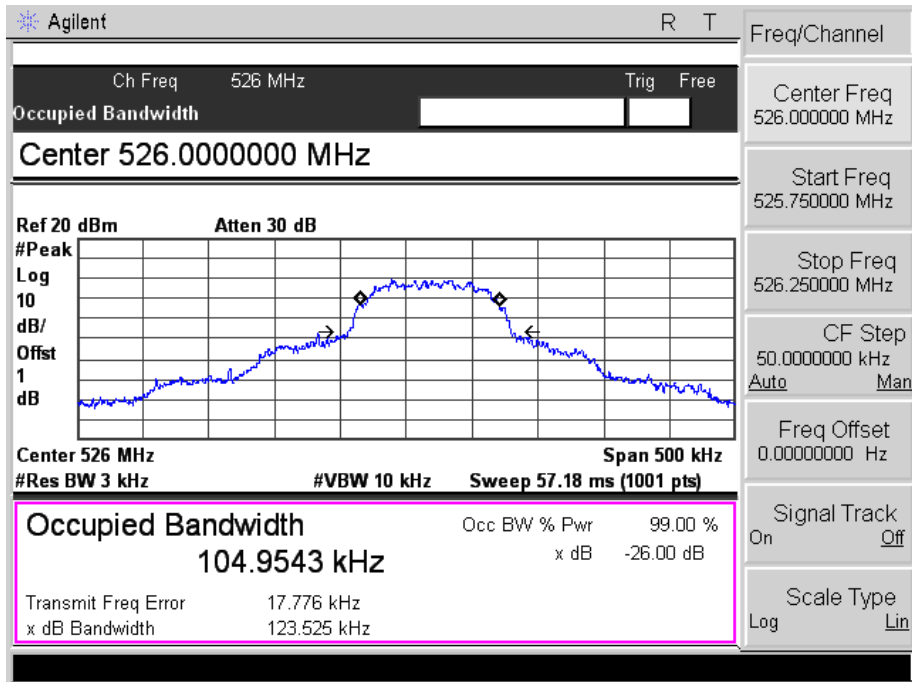
Low Channel (520MHz)



Middle Channel (523MHz)



High Channel (526MHz)



5. RADIATED SPURIOUS EMISSION

5.1 Standard Applicable

According to FCC 15.236(d)(2), In the 600 MHz guard bands including the duplex gap: 20 mW EIRP

5.2 Test Procedure

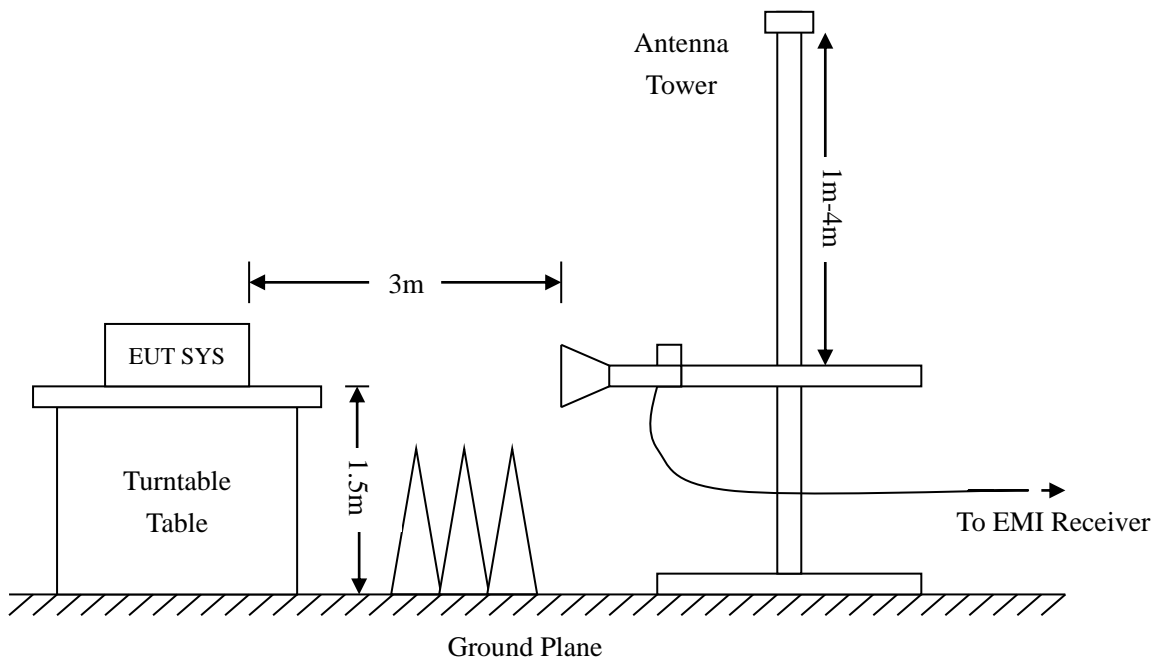
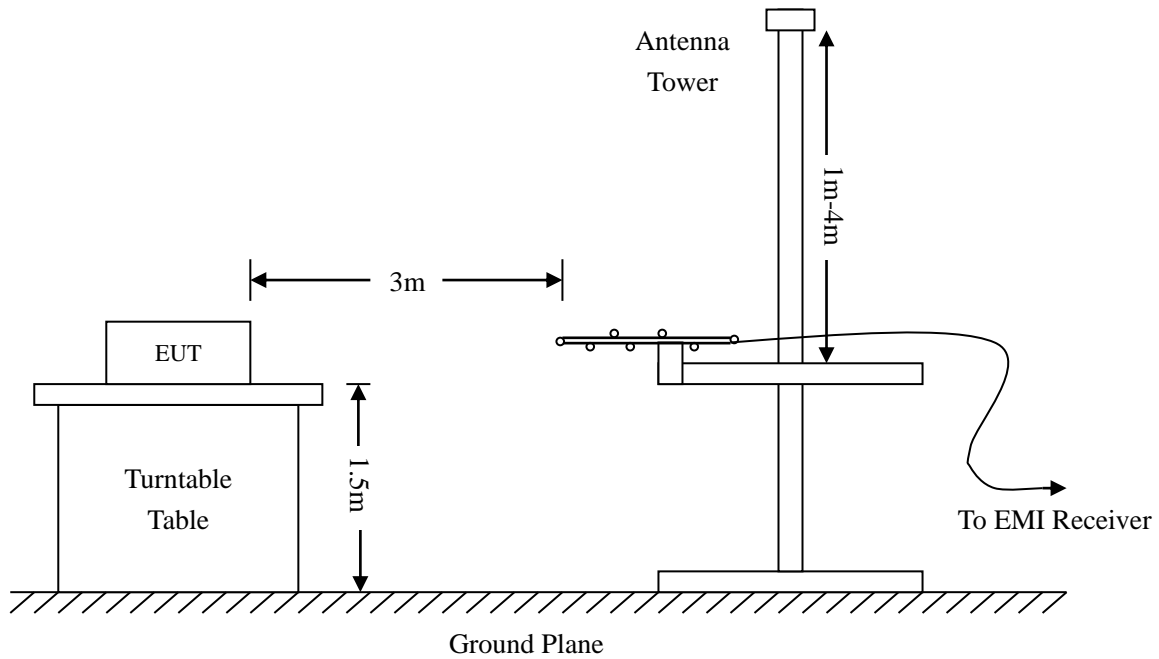
The setup of EUT is according with per TIA/EIA Standard 603 and ANSI C63.4-2014 measurement procedure.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB = $43 + 10 \text{Log}_{10}$ (power in Watts)



Frequency :9kHz-30MHz
 RBW=10KHz,
 VBW =30KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak

Frequency :30MHz-1GHz
 RBW=120KHz,
 VBW=300KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, QP

Frequency :Above 1GHz
 RBW=1MHz,
 VBW=3MHz(Peak), 10Hz(AV)
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, AV

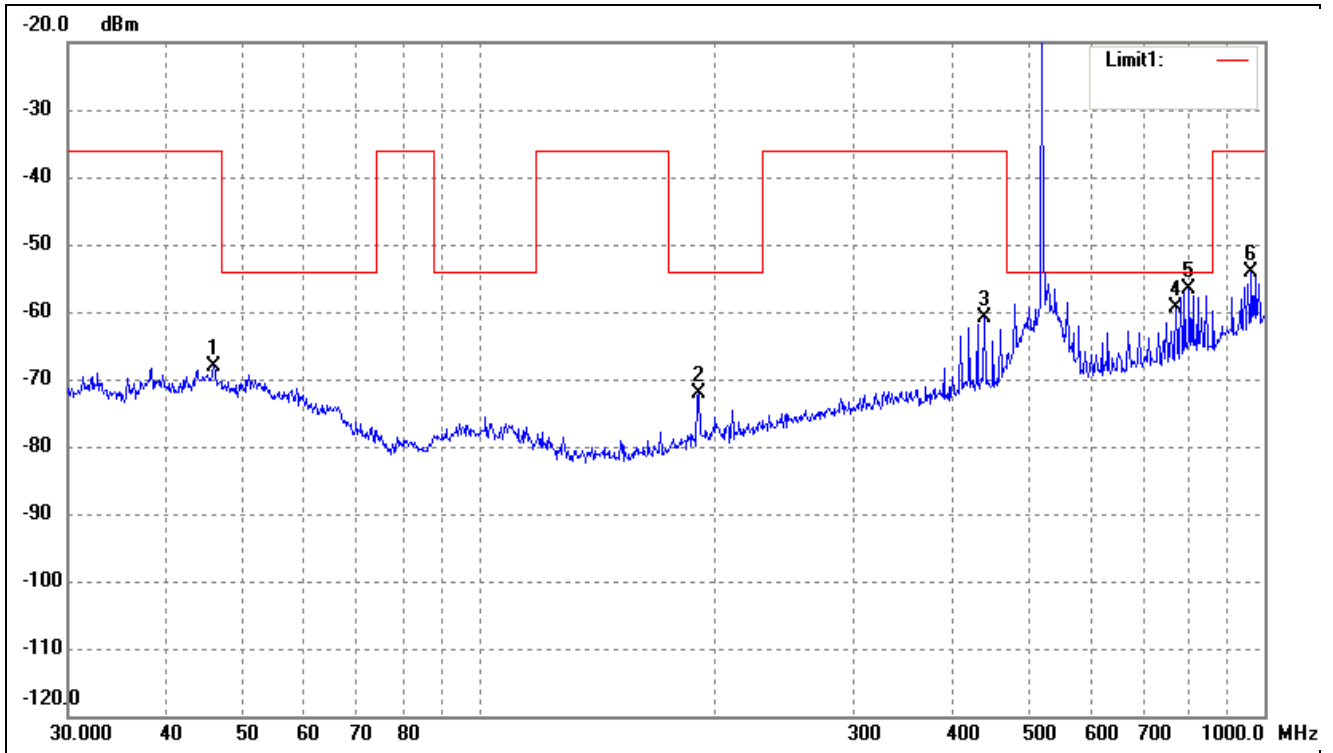
5.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	52%
ATM Pressure:	1022 mbar

5.4 Summary of Test Results/Plots

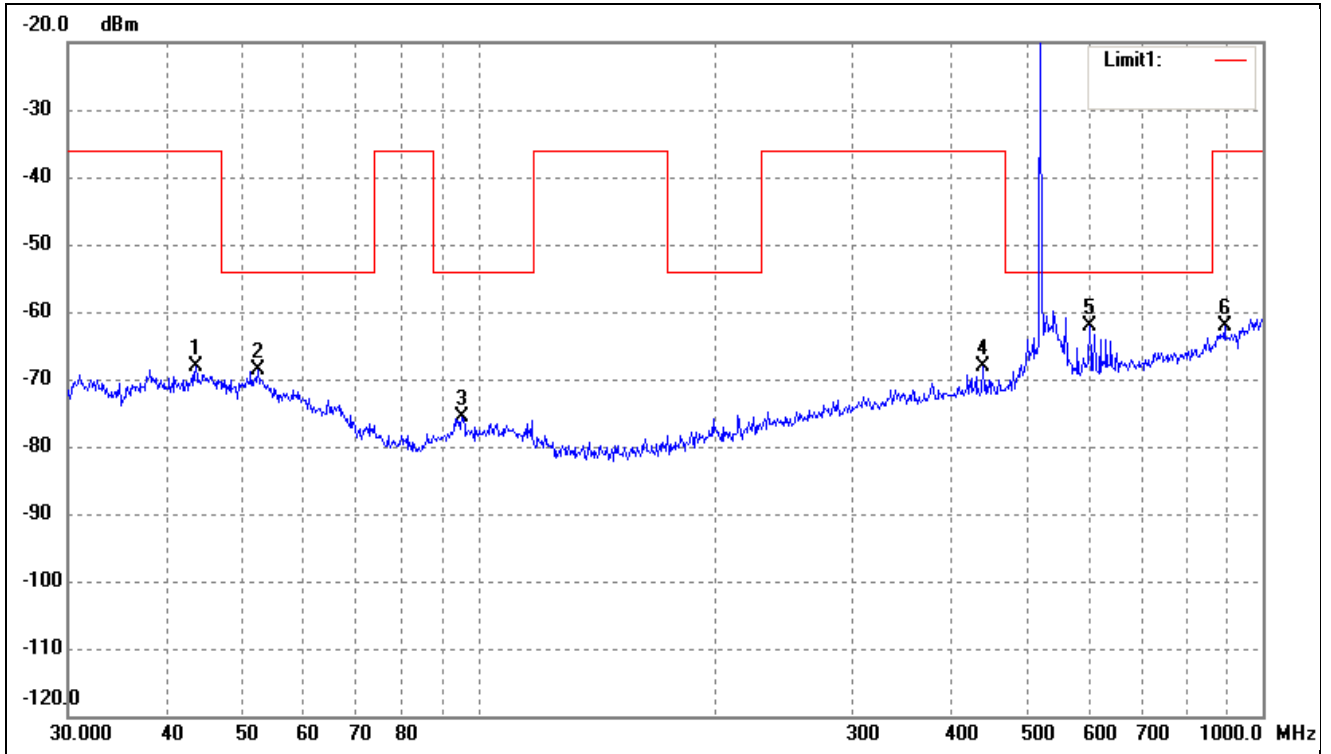
According to the data below, the FCC Part 15.236 standards, and had the worst margin of:

Test Channel	Low	Polarity:	Horizontal
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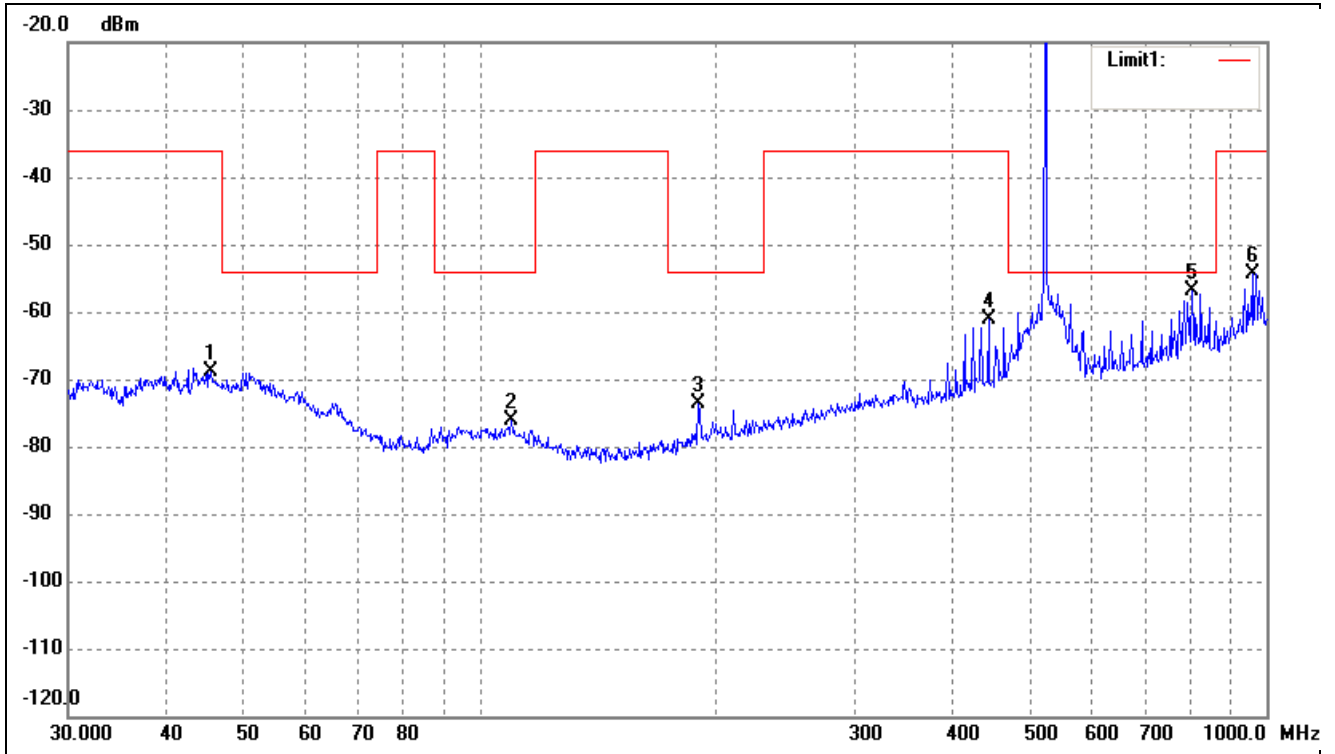
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	46.0164	-71.80	3.71	-68.09	-36.00	-32.09	355	100	peak
2	190.4050	-69.87	-2.33	-72.20	-54.00	-18.20	98	100	peak
3	440.1963	-65.72	4.86	-60.86	-36.00	-24.86	134	100	peak
4	771.4486	-69.40	9.94	-59.46	-54.00	-5.46	117	100	peak
5	801.7863	-66.74	10.23	-56.51	-54.00	-2.51	194	100	peak
6	962.1623	-69.05	14.94	-54.11	-36.00	-18.11	178	100	peak

Test Channel	Low	Polarity:	Vertical
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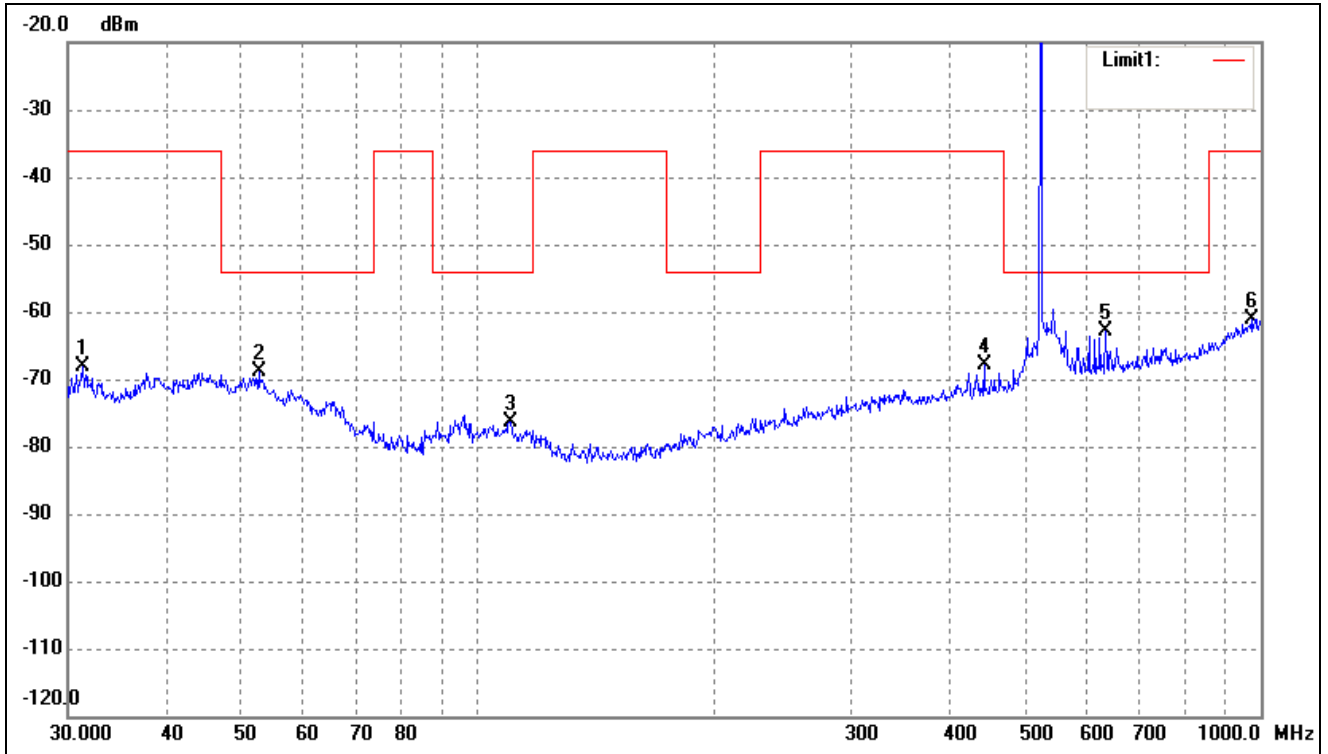
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.6585	-71.85	3.79	-68.06	-36.00	-32.06	262	100	peak
2	52.3913	-71.81	3.14	-68.67	-54.00	-14.67	91	100	peak
3	95.4270	-72.39	-3.28	-75.67	-54.00	-21.67	190	100	peak
4	440.1963	-72.99	4.86	-68.13	-36.00	-32.13	121	100	peak
5	601.4265	-70.02	7.82	-62.20	-54.00	-8.20	325	100	peak
6	893.8567	-74.96	12.95	-62.01	-36.00	-26.01	87	100	peak

Test Channel	Middle	Polarity:	Horizontal
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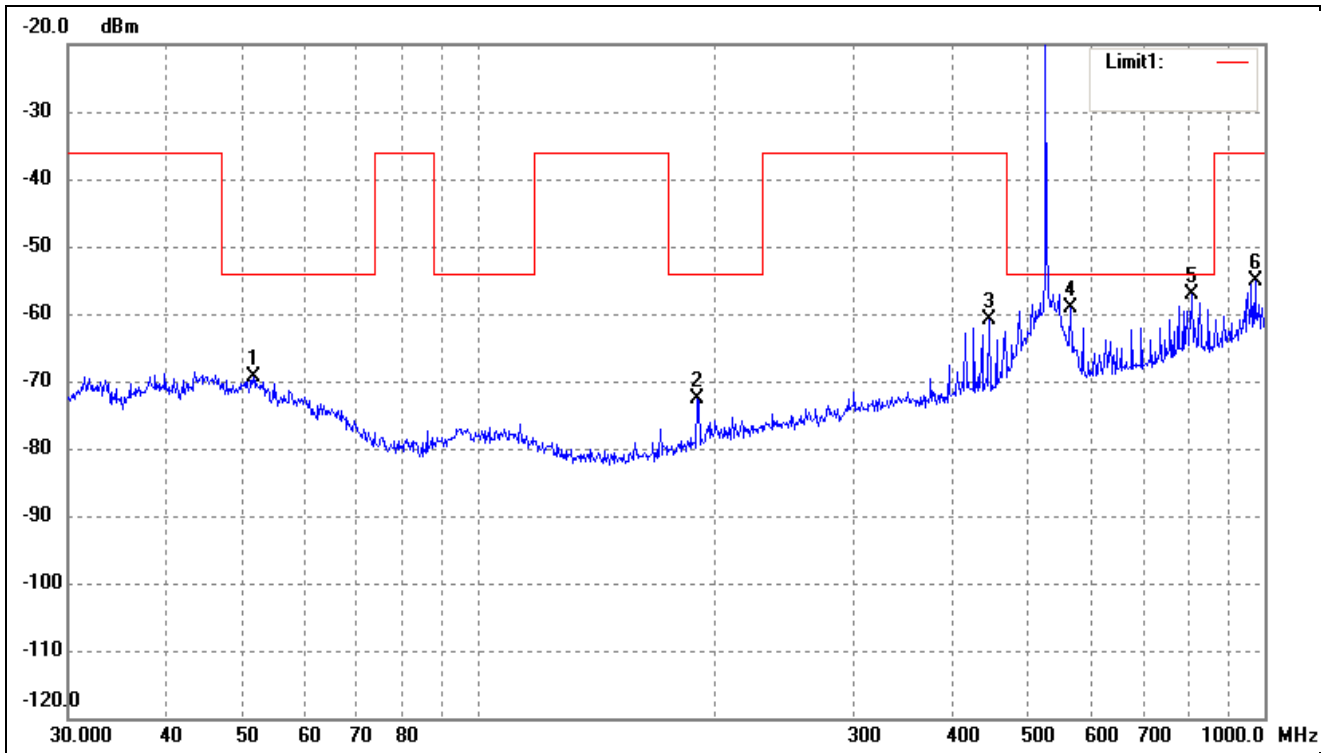
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	45.5348	-72.62	3.73	-68.89	-36.00	-32.89	79	100	peak
2	109.7960	-73.40	-2.62	-76.02	-54.00	-22.02	260	100	peak
3	189.7385	-71.26	-2.41	-73.67	-54.00	-19.67	76	100	peak
4	443.2943	-65.97	4.85	-61.12	-36.00	-25.12	166	100	peak
5	804.6028	-67.22	10.37	-56.85	-54.00	-2.85	248	100	peak
6	958.7943	-69.29	14.89	-54.40	-36.00	-18.40	130	100	peak

Test Channel	Middle	Polarity:	Vertical
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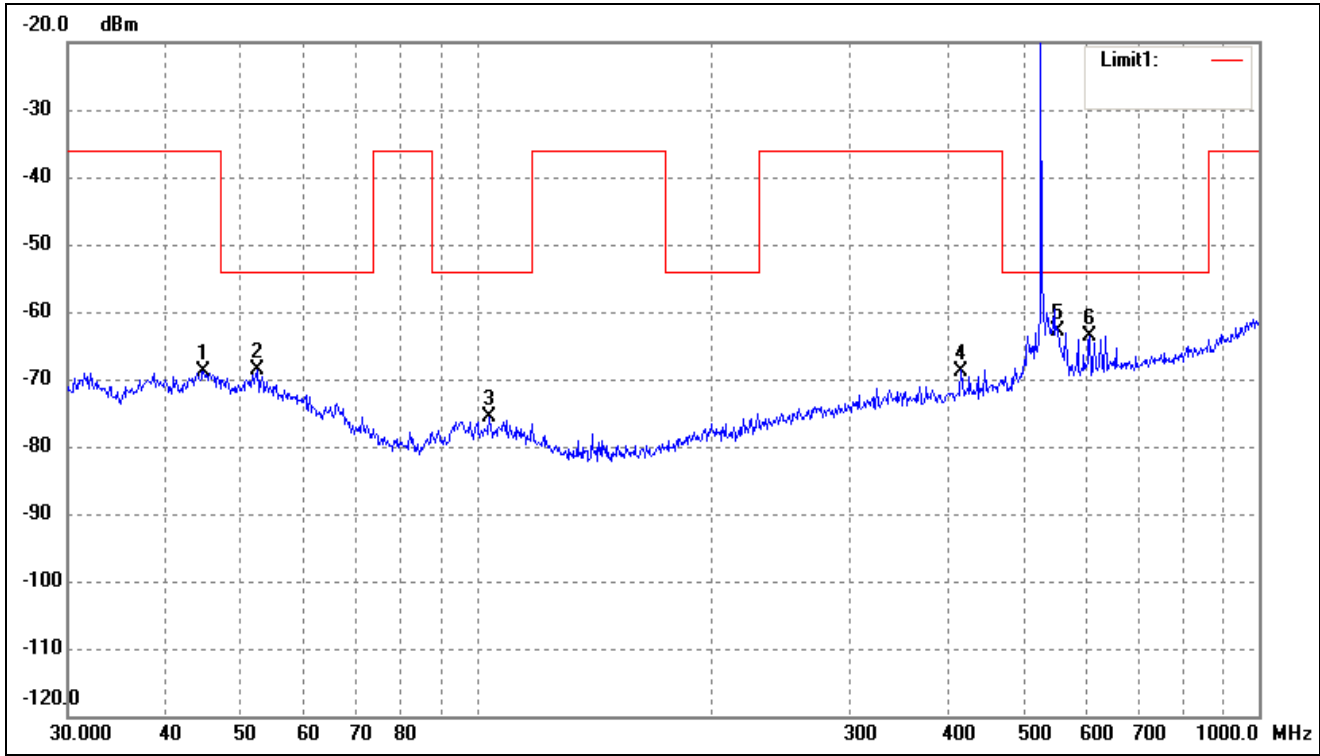
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	31.2893	-70.44	2.21	-68.23	-36.00	-32.23	314	100	peak
2	52.5753	-71.86	3.11	-68.75	-54.00	-14.75	131	100	peak
3	110.1816	-73.72	-2.65	-76.37	-54.00	-22.37	80	100	peak
4	443.2943	-72.69	4.85	-67.84	-36.00	-31.84	212	100	peak
5	633.9073	-70.95	8.16	-62.79	-54.00	-8.79	126	100	peak
6	975.7529	-76.37	15.33	-61.04	-36.00	-25.04	98	100	peak

Test Channel	High	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	51.6616	-72.59	3.22	-69.37	-54.00	-15.37	178	100	peak
2	189.7385	-70.21	-2.41	-72.62	-54.00	-18.62	190	100	peak
3	446.4141	-65.67	4.83	-60.84	-36.00	-24.84	141	100	peak
4	566.6223	-66.19	7.00	-59.19	-54.00	-5.19	93	100	peak
5	807.4291	-67.58	10.50	-57.08	-54.00	-3.08	339	100	peak
6	972.3374	-70.30	15.18	-55.12	-36.00	-19.12	132	100	peak

Test Channel	High	Polarity:	Vertical
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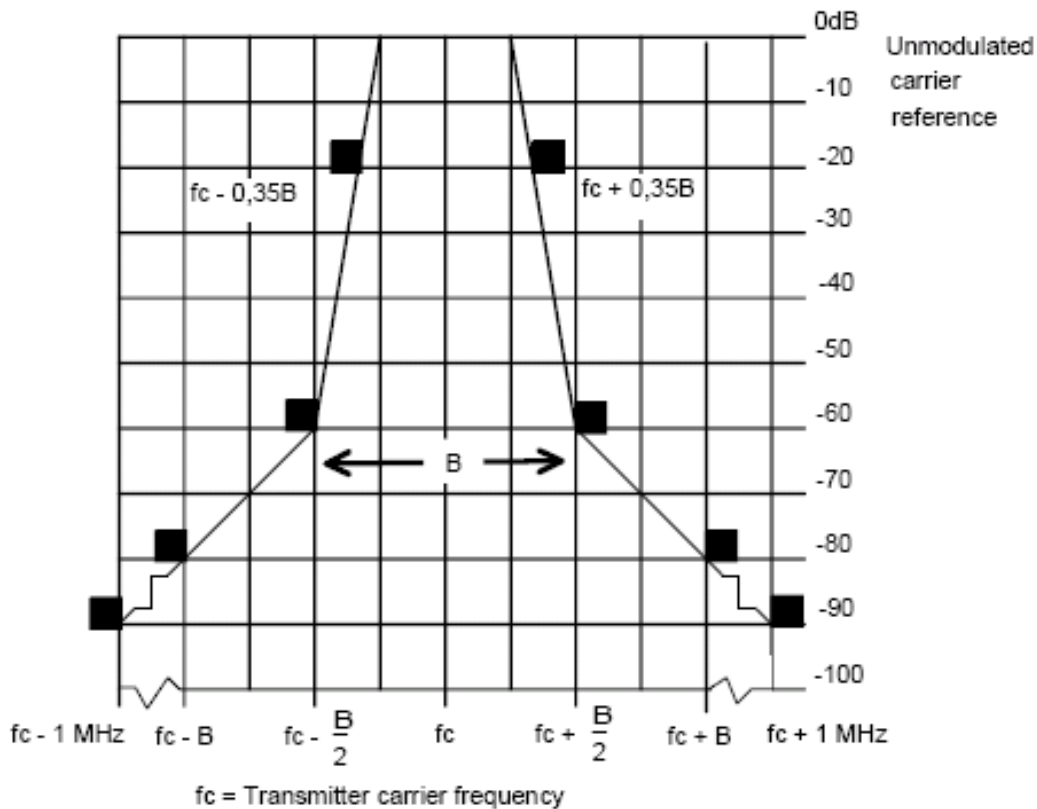
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	44.7434	-72.63	3.77	-68.86	-36.00	-32.86	60	100	peak
2	52.3913	-71.64	3.14	-68.50	-54.00	-14.50	146	100	peak
3	103.8055	-72.88	-2.81	-75.69	-54.00	-21.69	147	100	peak
4	416.1791	-73.56	4.81	-68.75	-36.00	-32.75	113	100	peak
5	552.8833	-69.47	6.58	-62.89	-54.00	-8.89	242	100	peak
6	607.7867	-71.45	7.89	-63.56	-54.00	-9.56	148	100	peak

6. Necessary bandwidth

6.1 Standard Applicable

According to §15.236 (g) 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).

According to ETSI EN 300 422-2 V2.1.1 section 8.3, the transmitter output spectrum shall be within the mask defined in the following figure.



6.2 Test Procedure

Please refer to ETSI EN 300 422-2 V2.1.1 section 8.3

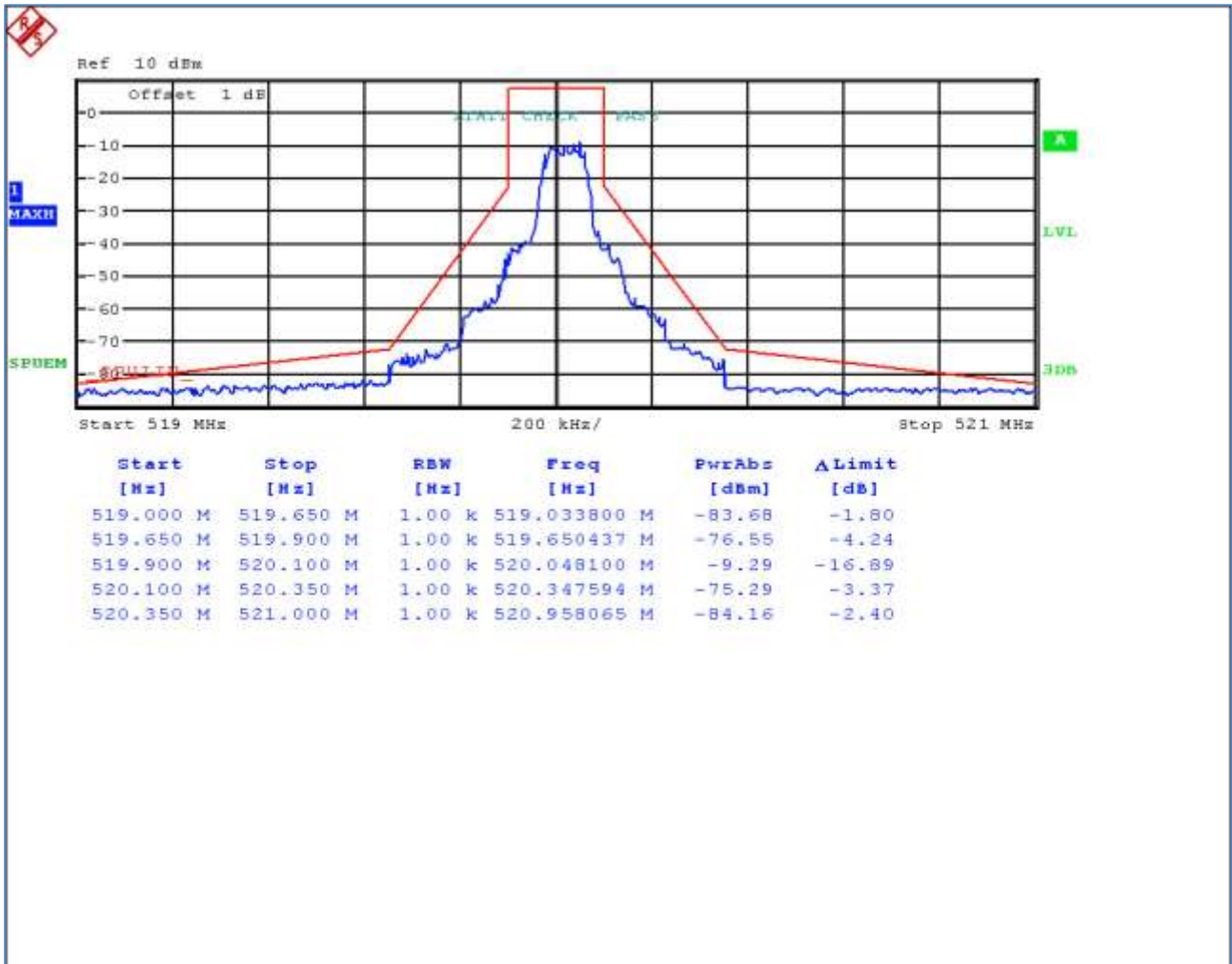
6.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

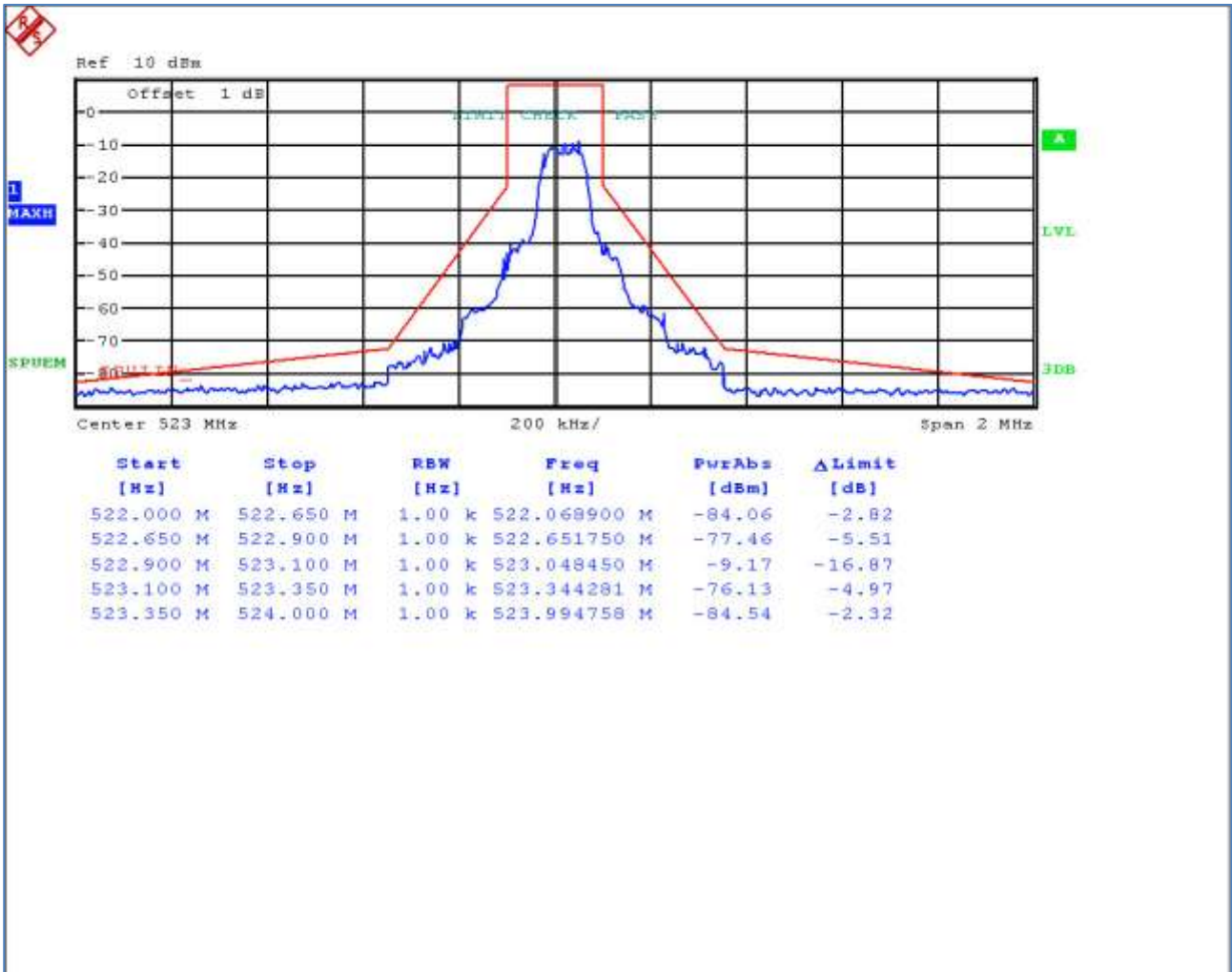
6.4 Summary of Test Results/Plots

Refer to the attached plots.

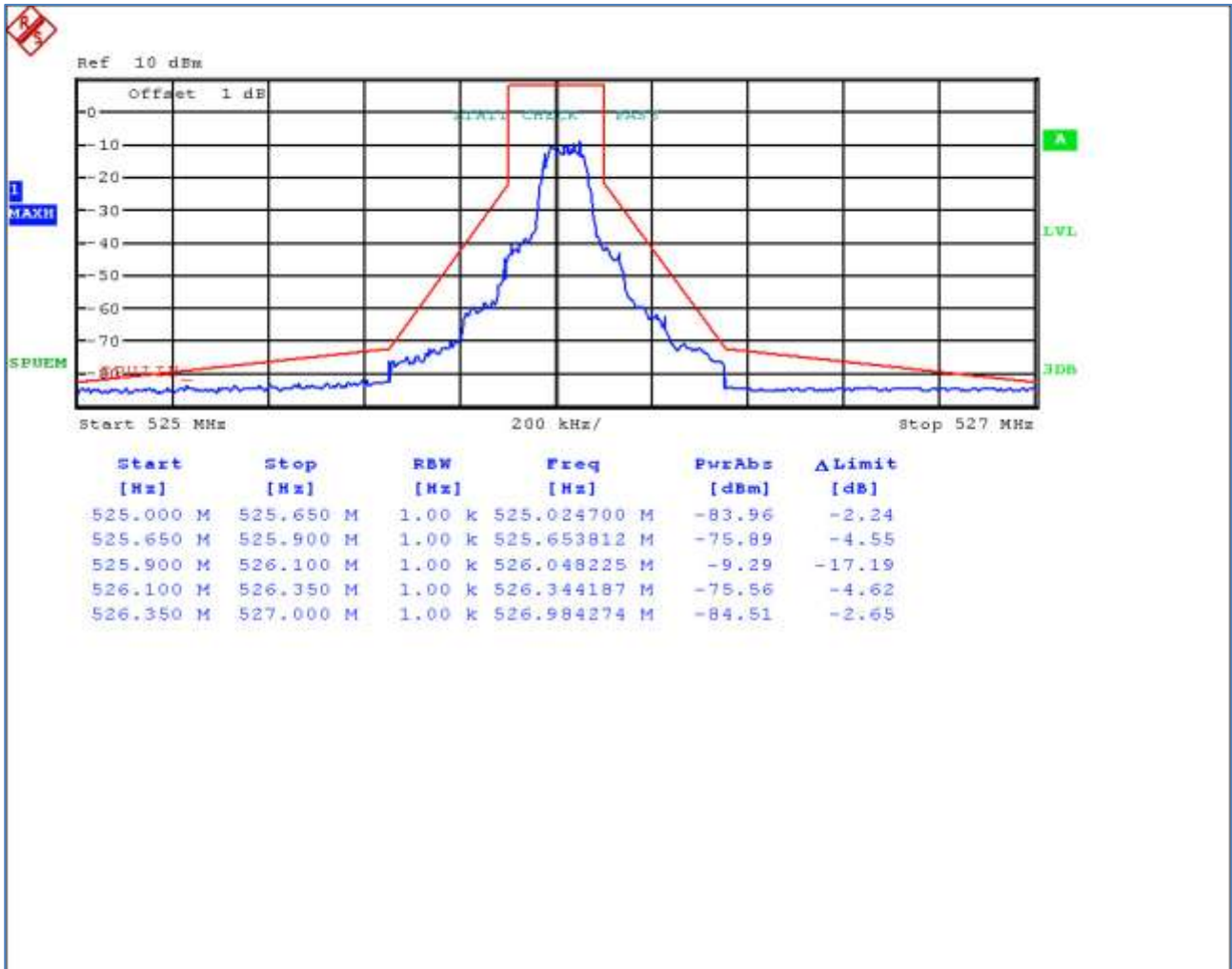
Low Channel



Middle Channel



High Channel



7. FREQUENCY STABILITY

7.1 Standard Applicable

According to FCC 15.236(f)(3), The frequency tolerance of the carrier signal shall be maintained within $\pm 0.005\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Battery operated equipment shall be tested using a new battery.

7.2 Test Procedure

1. Setup the configuration of the ambient temperature form -20°C to 50°C with sufficient time. And measure the different power of the EUT with an artificial power from highest to end point voltage.
2. Set frequency counter center frequency to the right frequency needs to be measured.

7.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

7.4 Test Results/Plots

Test conditions		Frequency Error		
		520MHz	523MHz	526MHz
T _{min} (20°C)	V _{min} (2.55V)	520.0145	523.0059	526.0061
	V _{max} (3.45V)	520.0148	523.0070	526.0083
T(-20°C)	V _{nom} (3.0V)	520.0063	523.0120	526.0071
T(-10°C)	V _{nom} (3.0V)	520.0060	523.0130	526.0133
T(0°C)	V _{nom} (3.0V)	520.0145	523.0135	526.0139
T(10°C)	V _{nom} (3.0V)	520.0138	523.0143	526.0080
T _{nom} (20°C)	V _{nom} (3.0V)	520.0113	523.0056	526.0131
T(30°C)	V _{nom} (3.0V)	520.0063	523.0065	526.0101
T(40°C)	V _{nom} (3.0V)	520.0120	523.0053	526.0108
T(50°C)	V _{nom} (3.0V)	520.0090	523.0129	526.0103
T _{max} (20°C)	V _{min} (2.55V)	520.0107	523.0061	526.0150
	V _{max} (3.45V)	520.0090	523.0137	526.0134
Max. frequency error (ppm)		28.46	28.50	27.30
Limit (ppm)		±50ppm		
End Point		DC 3.0V		

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