FCC Part 15C
Measurement and Test Report

For

SHANGHAI UNISPLENDOR LELIAN INTERNET OF THINGS TECHNOLOGY CO.,LTD.

Building C, 888 huanhu west 2nd road, nanhui new town, pudong new area, Shanghai

FCC ID: 2ATY4-U4041200

FCC Rule(s):	FCC Part 15.247
Product Description:	Gas leakage monitor
Tested Model:	U4041200
Report No.:	WTX19X07044487W-1
Sample Receipt Date:	2019-07-02
Tested Date:	2019-07-02 to 2019-09-19
Issued Date:	2019-09-19
Tested By:	Mike Shi / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

Shenzhen SEM Test Technology Co., Ltd.
1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

TABLE OF CONTENTS

1. GENERAL INFORMATION 4
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
1.2 TEST STANDARDS 5
1.3 TEST METHODOLOGY 5
1.4 TEST FACILITY 5
1.5 EUT SETUP AND TEST MODE 6
1.6 MEASUREMENT UNCERTAINTY 7
1.7 TEST EQUIPMENT LIST AND DETAILS 8
2. SUMMARY OF TEST RESULTS 10
3. RF EXPOSURE 11
3.1 STANDARD APPLICABLE 11
3.2 TEST RESULT 11
4. ANTENNA REQUIREMENT 12
4.1 STANDARD APPLICABLE 12
4.2 EVALUATION INFORMATION 12
5. POWER SPECTRAL DENSITY 13
5.1 STANDARD APPLICABLE 13
5.2 TEST PROCEDURE 13
5.3 SUMMARY OF TEST RESULTS/PLOTS 13
6. 6DB BANDWIDTH 15
6.1 STANDARD APPLICABLE 15
6.2 TEST PROCEDURE 15
6.3 SUMMARY OF TEST RESULTS/PLOTS 15
7. RF OUTPUT POWER 17
7.1 STANDARD APPLICABLE 17
7.2 TEST PROCEDURE 17
7.3 SUMMARY OF TEST RESULTS/PLOTS 17
8. FIELD STRENGTH OF SPURIOUS EMISSIONS 19
8.1 STANDARD APPLICABLE 19
8.2 TEST PROCEDURE 19
8.3 CORRECTED AMPLITUDE & MARGIN CALCULATION 20
8.4 SUMMARY OF TEST RESULTS/PLOTS 20
9. OUT OF BAND EMISSIONS 28
9.1 STANDARD APPLICABLE 28
9.2 TEST PROCEDURE 28
9.3 SUMMARY OF TEST RESULTS/PLOTS 29
10. CONDUCTED EMISSIONS 31
10.1 TEST PROCEDURE 31
10.2 BASIC TEST SETUP BLOCK DIAGRAM 31
10.3 TEST RECEIVER SETUP 31
10.4 SUMMARY OF TEST RESULTS/PLOTS 31

Report version

Version No.	Date of issue	Description
Rev.00	2019-09-19	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	SHANGHAI UNISPLENDOR LELIAN INTERNET OF THINGS TECHNOLOGY CO.,LTD.
Address of applicant:	Building C, 888 huanhu west 2nd road, nanhui new town, pudong new area, Shanghai
Manufacturer:	HENAN ULTRAMODERN INTERNET OF THINGS TECHNOLOGIES COMPANY LIMITED.
Address of manufacturer:	Building 3, no.67 dongqing street, high-tech industrial development zone, zhengzhou

General Description of EUT	
Product Name:	Gas leakage monitor
Trade Name:	UIOT
Model No.:	U4041200
Adding Model(s):	/
Rated Voltage:	AC120V
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	IEEE802.15.4
Frequency Range:	2405-2475MHz
RF Output Power:	15.06dBm (Conducted)
Type of Modulation:	OQPSK
Quantity of Channels:	15
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	3.0dBi

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
558074 D01 DTS Meas Guidance v05r02: GUIDANCE FOR PERFORMING COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEMS (DTS) OPERATING UNDER SECTION 15.247
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

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

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB 558074 D01 DTS Meas Guidance v05r02.
The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted 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 Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low	2405MHz
TM2	Middle	2440MHz
TM3	High	2475MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

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
AC CABLE	1.2	Unshielded	Without Ferrite
AUX CABLE	1.2	Unshielded	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	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	9-150kHz ±3.74dB
		0.15-30MHz ±3.34dB
Transmitter Spurious Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-18GHz ±3.92dB

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2019-04-30	2020-04-29
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2019-04-30	2020-04-29
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-04-30	2020-04-29
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2019-04-30	2020-04-29
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2019-04-30	2020-04-29
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2019-04-30	2020-04-29
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2019-04-30	2020-04-29
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2019-04-30	2020-04-29
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2019-04-30	2020-04-29
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2019-04-30	2020-04-29
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2019-04-30	2020-04-29
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2019-04-30	2020-04-29
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2019-04-30	2020-04-29
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2019-04-30	2020-04-29
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2019-03-18	2020-03-17
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2019-03-18	2020-03-17
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2019-03-18	2020-03-17
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2019-03-18	2020-03-17
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17

Software List			
Description	**Manufacturer**	**Model**	**Version**
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1091	RF Exposure	Compliant
§15.203; §15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(a)(2)	6 dB Bandwidth	Compliant
§15.247(b)(3)	RF Output Power	Compliant
§15.209(a)	Radiated Emission	Compliant
§15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to §1.1307 and §2.1091, the Mobile transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, 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 shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has an Integral antenna, fulfill the requirement of this section.

5. Power Spectral Density

5.1 Standard Applicable

According to 15.247(a)(1)(iii), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.2 Test Procedure

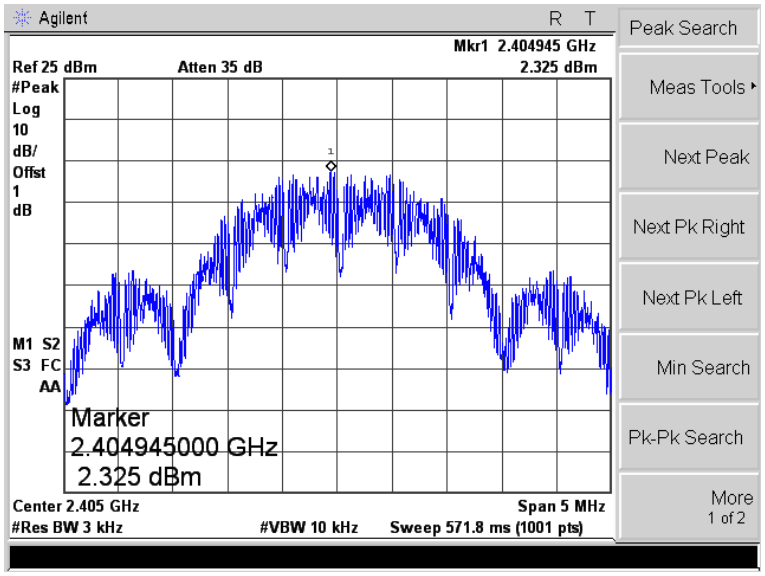
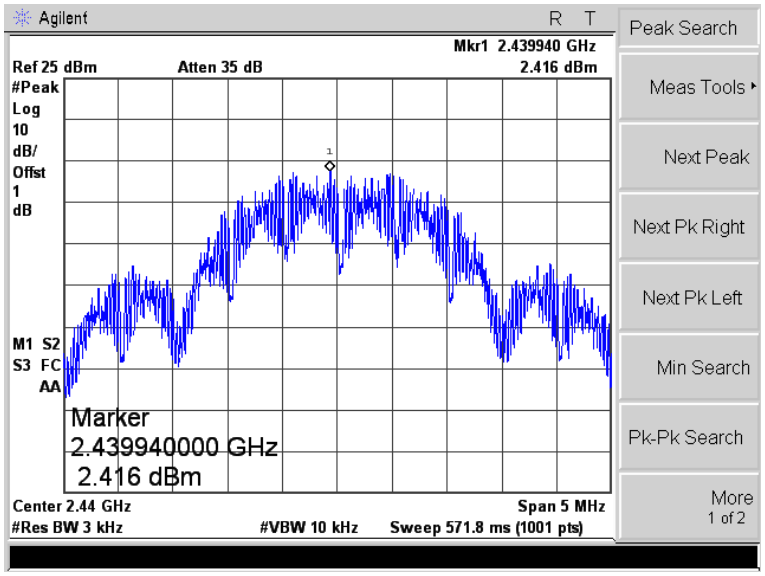
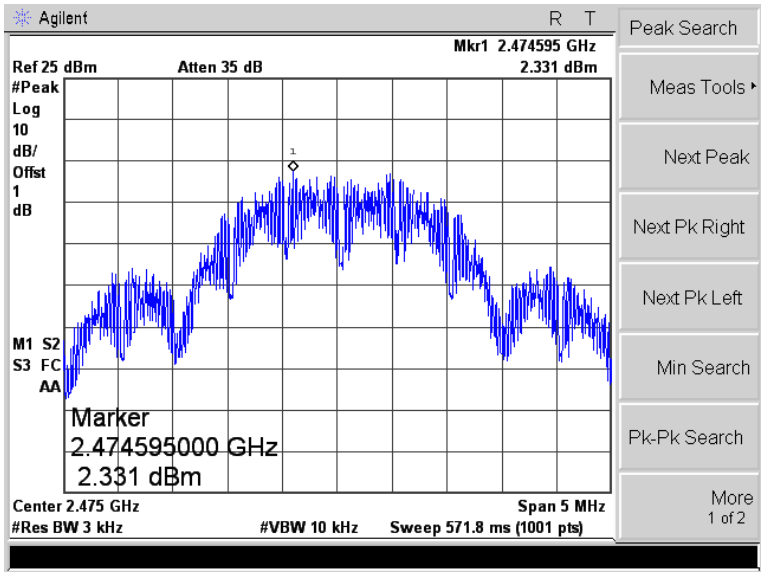
According to the KDB 558074, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.3 Summary of Test Results/Plots

Test Mode	Test Channel	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
ZigBee	Low	2.33	8
	Middle	2.42	8
	High	2.33	8

Please refer to the following test plots:

Low	
Middle	
High	

6. 6dB Bandwidth

6.1 Standard Applicable

According to 15.247(a)(2), systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

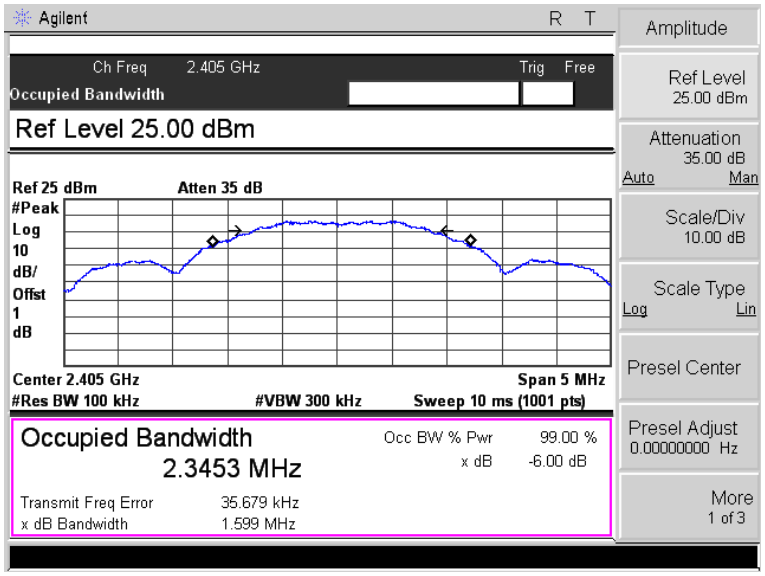
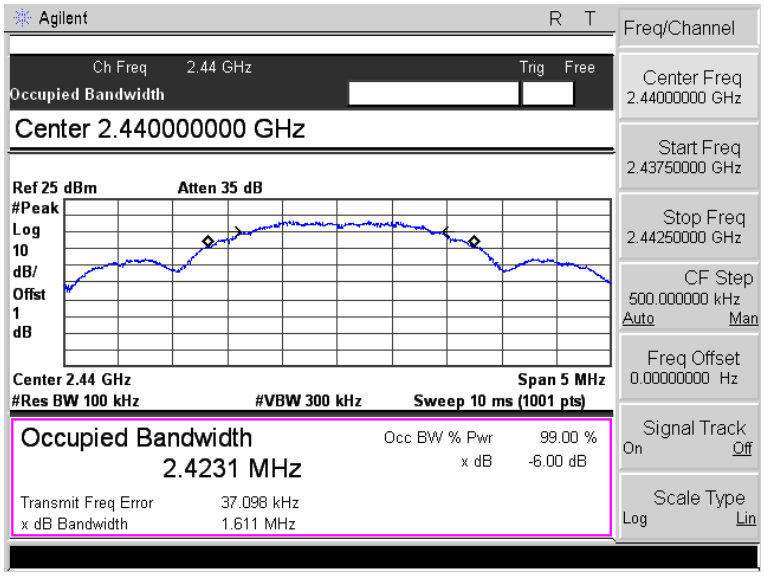
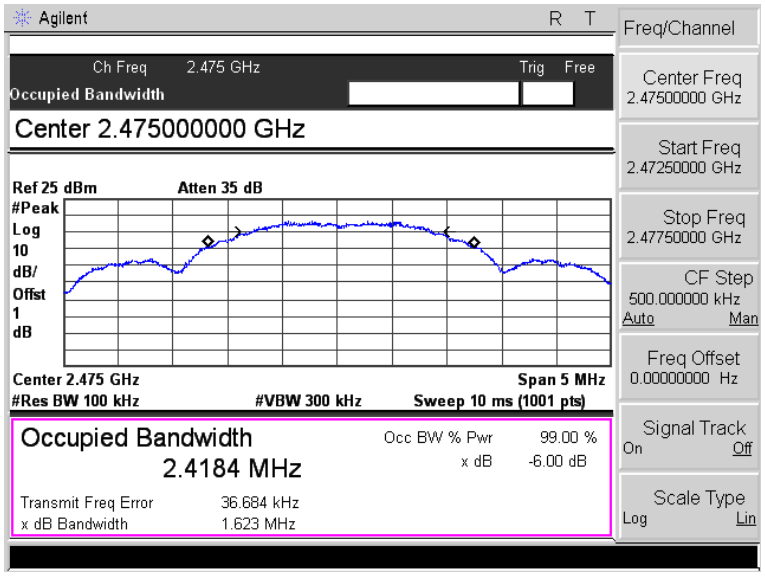
6.2 Test Procedure

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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.

6.3 Summary of Test Results/Plots

Test Mode	Test Channel	6 dB Bandwidth MHz	Limit kHz
ZigBee	Low	1.599	≥500
	Middle	1.611	≥500
	High	1.623	≥500

Please refer to the following test plots:

Low	
Middle	
High	

7. RF Output Power

7.1 Standard Applicable

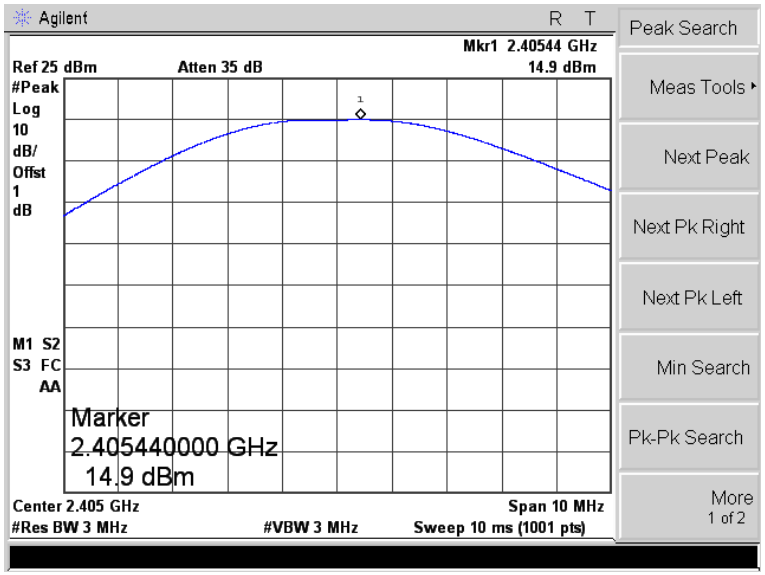
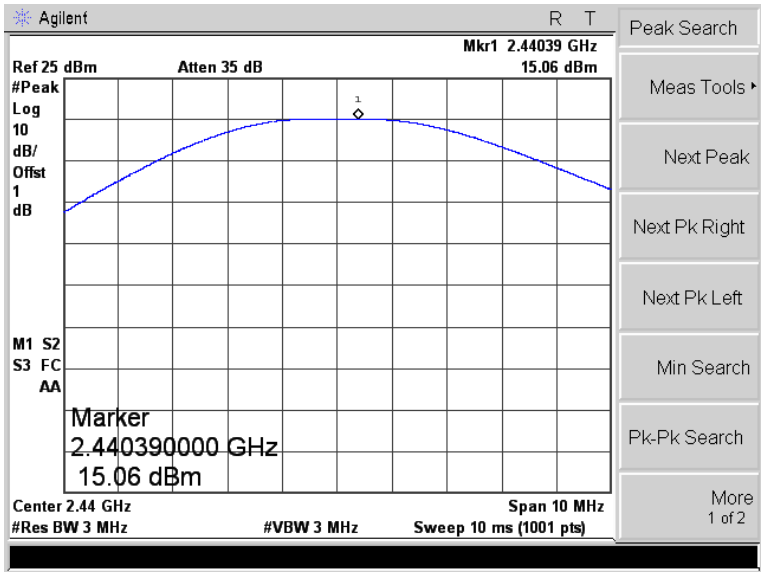
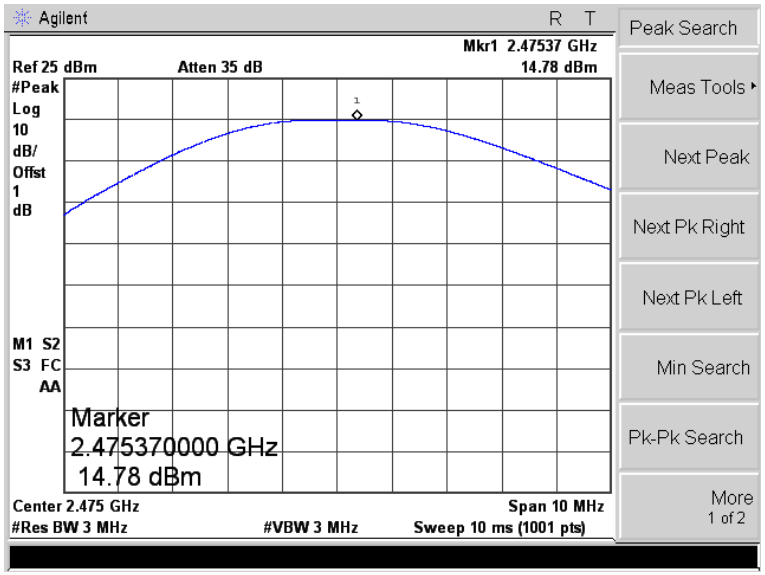
According to 15.247(b)(3), for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

7.2 Test Procedure

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 RBW.
c) Set span ≥ 3 RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

7.3 Summary of Test Results/Plots

Test Mode	Test Channel	Reading dBm	Output Power mW	Limit mW
ZigBee	Low	14.90	30.90	1000
	Middle	15.06	32.06	1000
	High	14.78	30.06	1000

Low	
Middle	
High	

8. Field Strength of Spurious Emissions

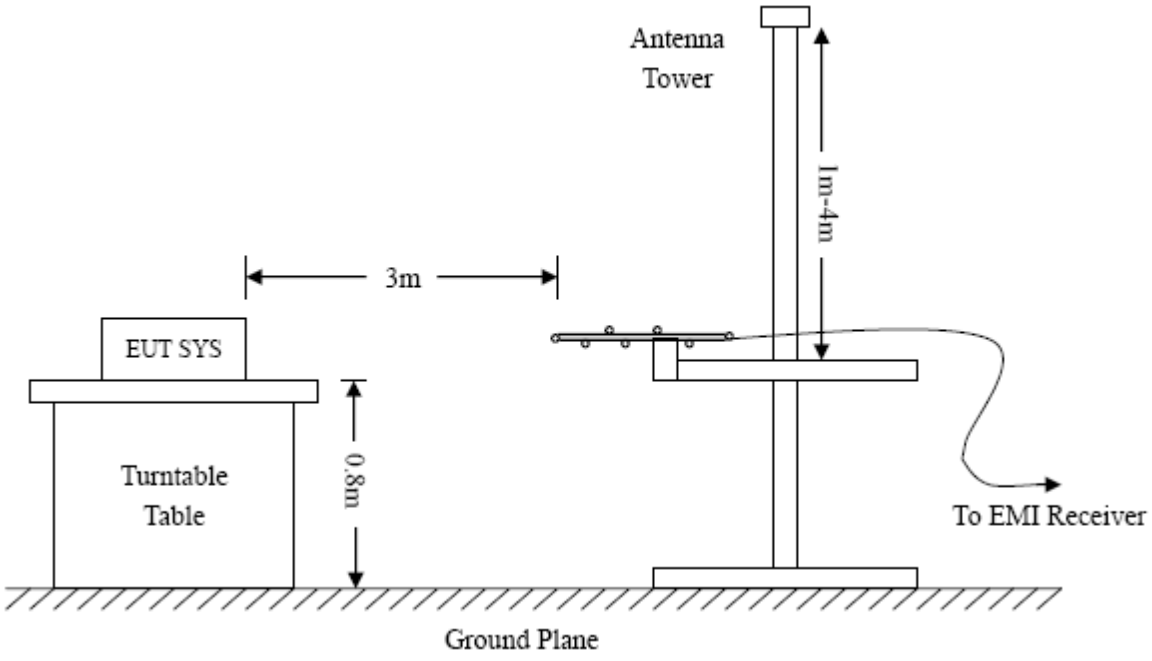
8.1 Standard Applicable

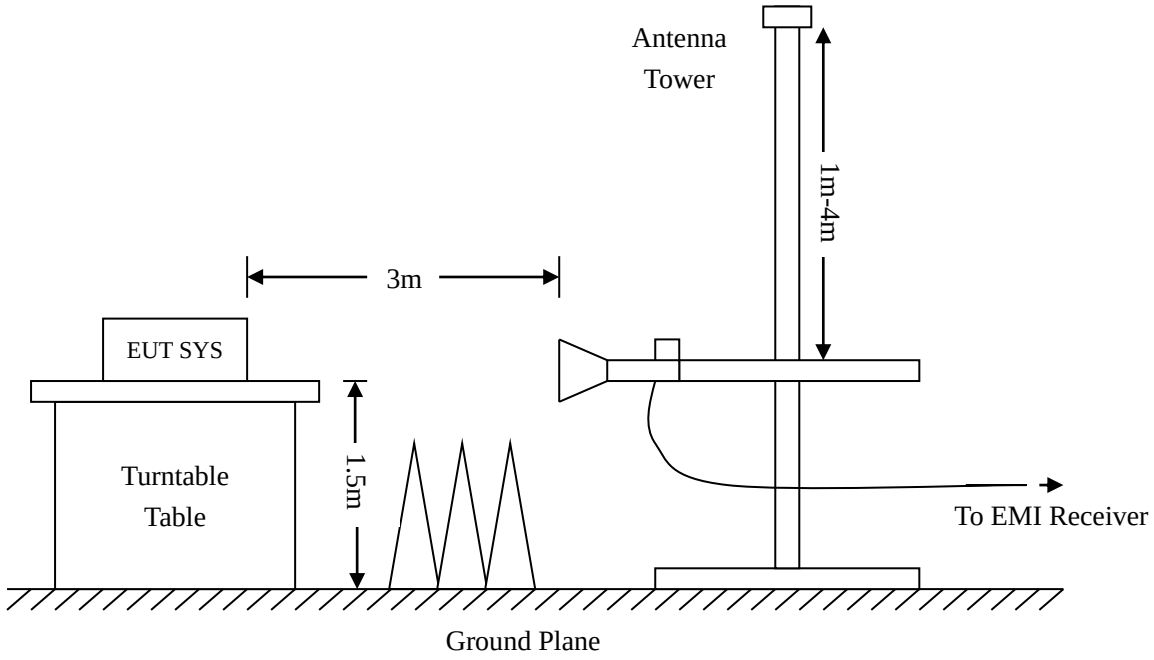
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

8.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.





Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10KHz,	RBW=120KHz,	RBW=1MHz,
VBW =30KHz	VBW=300KHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold
Detector function = peak	Detector function = peak, QP	Detector function = peak, AV

8.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

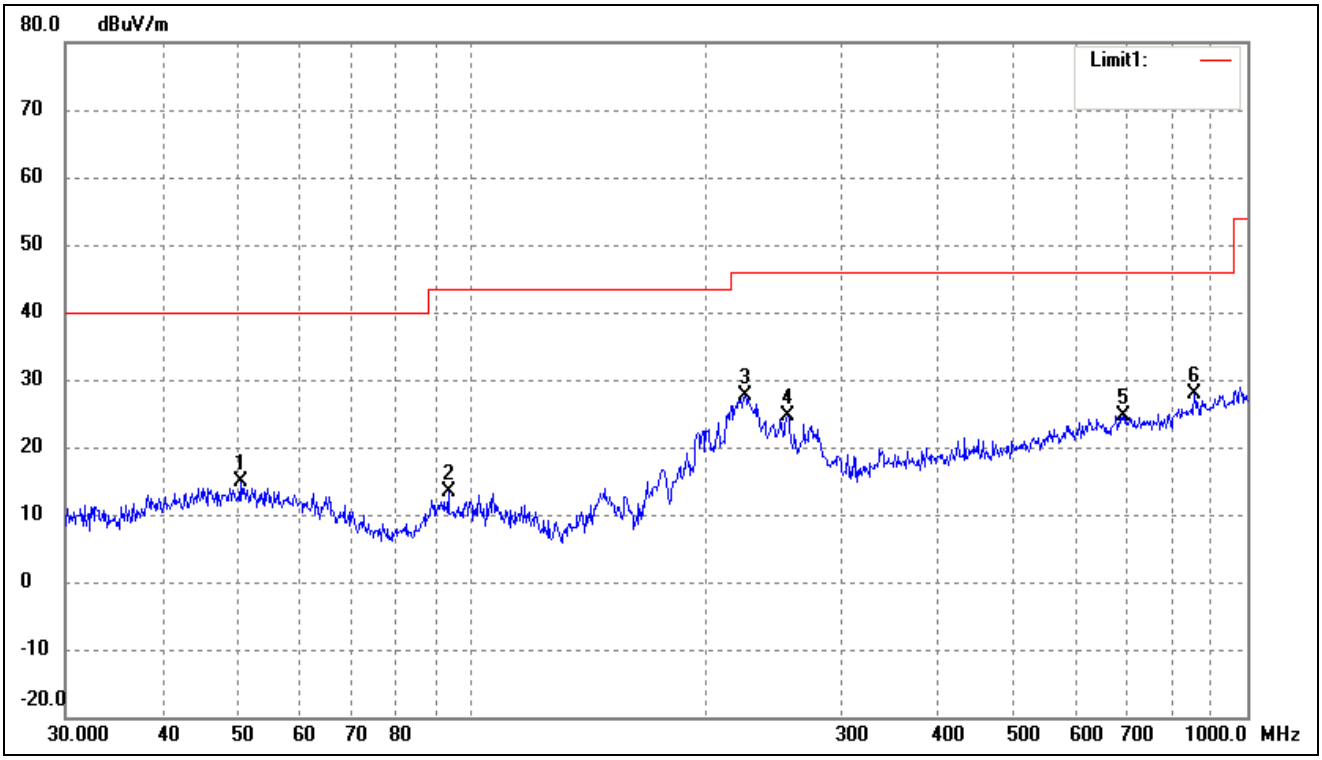
Margin = Corr. Ampl. – FCC Part 15 Limit

8.4 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

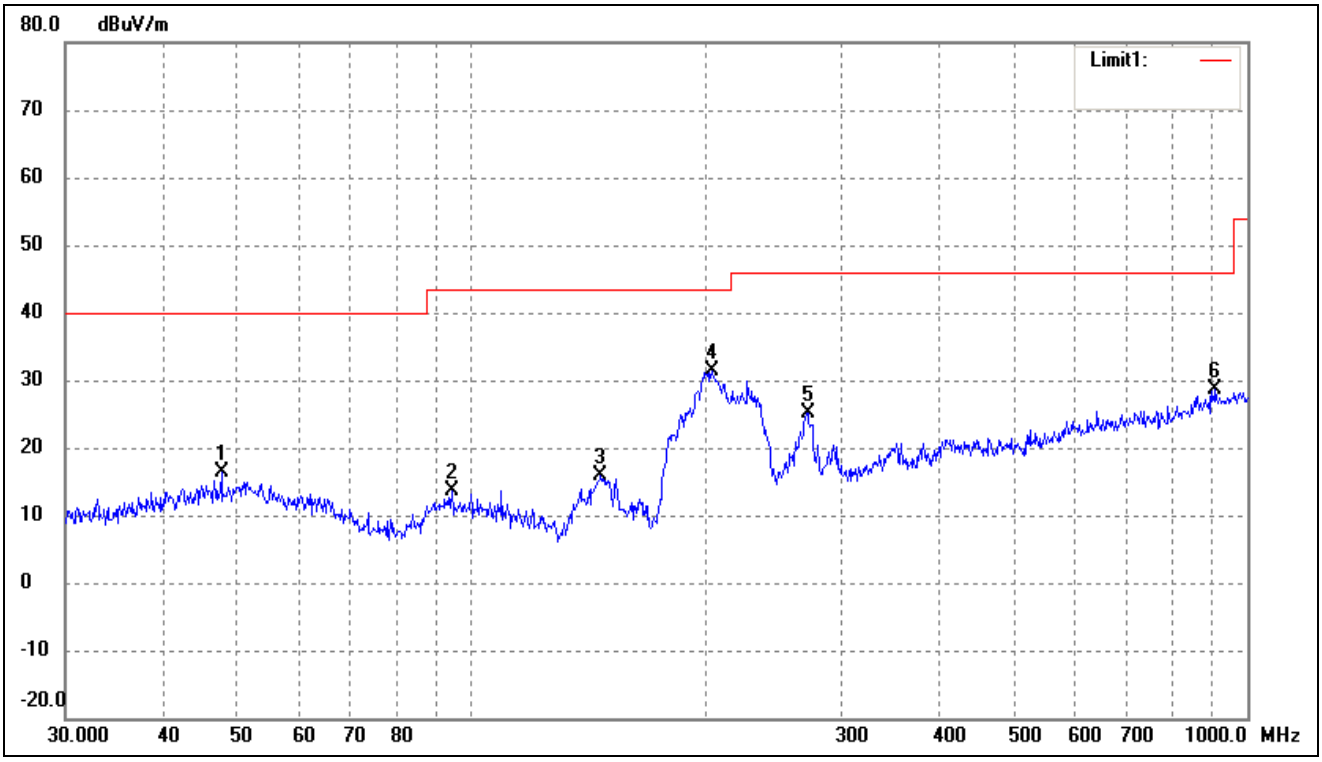
➢ Spurious Emissions Below 1GHz

Test Channel	Low	Polarity:	Horizontal



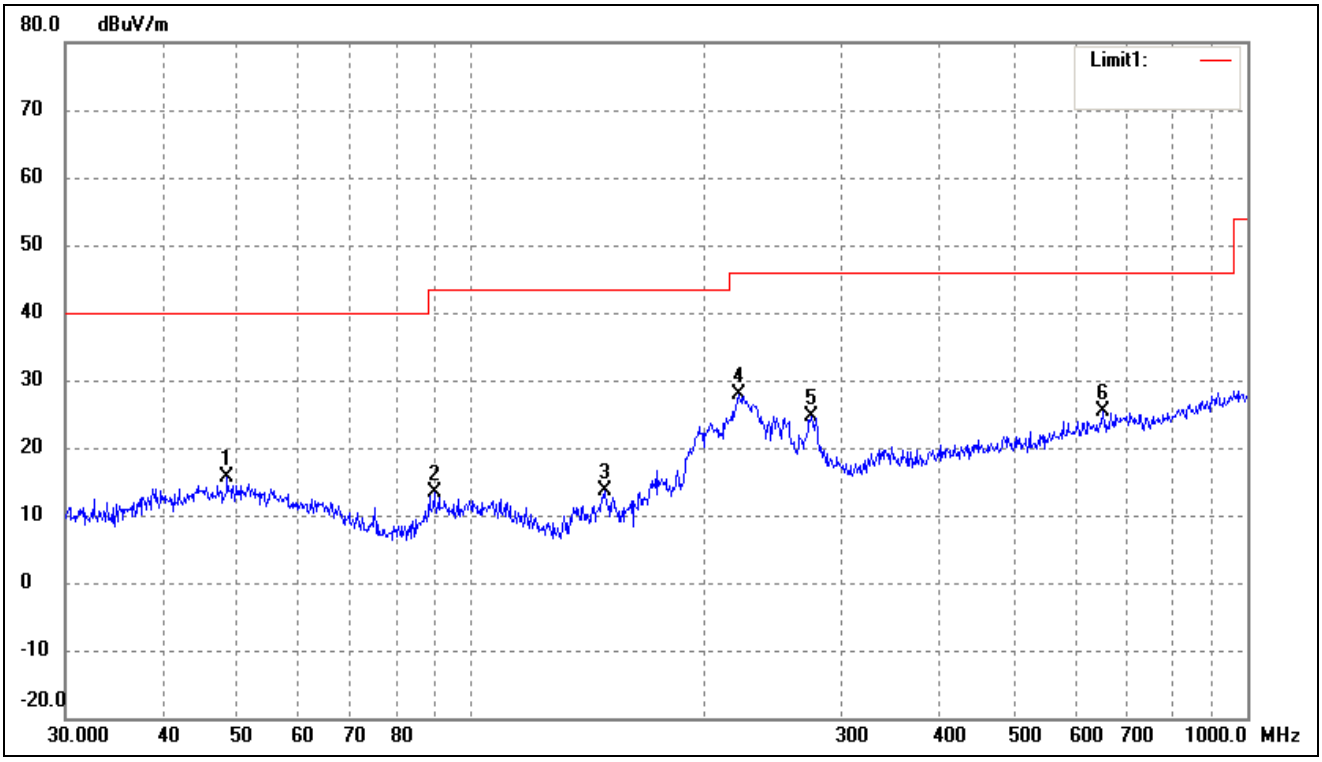
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	50.4089	26.51	-11.60	14.91	40.00	-25.09	61	100	peak
2	93.4402	27.42	-14.09	13.33	43.50	-30.17	212	100	peak
3	225.3080	39.30	-11.76	27.54	46.00	-18.46	74	100	peak
4	255.6231	34.11	-9.55	24.56	46.00	-21.44	175	100	peak
5	691.9867	26.63	-1.96	24.67	46.00	-21.33	193	100	peak
6	854.0247	27.86	-0.10	27.76	46.00	-18.24	92	100	peak

Test Channel	Low	Polarity:	Vertical



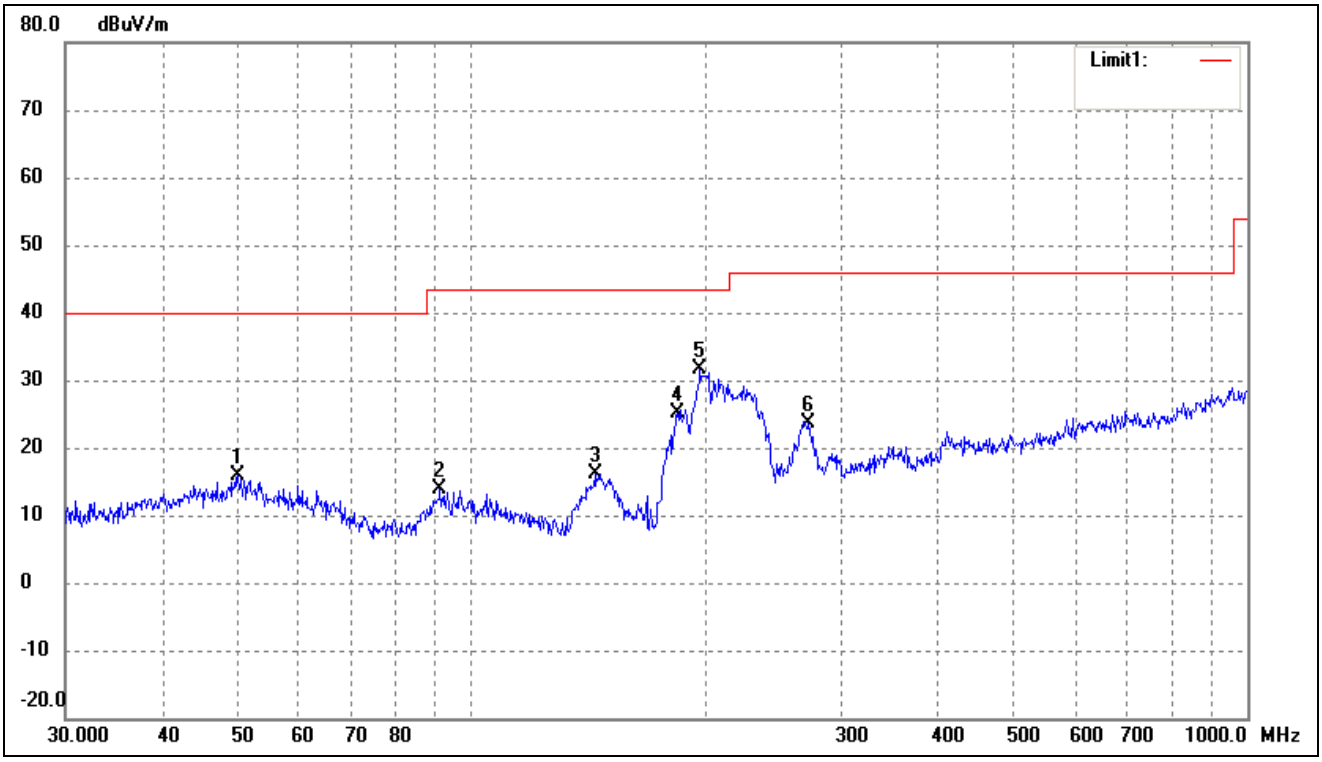
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	47.6586	27.95	-11.69	16.26	40.00	-23.74	40	100	peak
2	94.4284	27.97	-14.29	13.68	43.50	-29.82	162	100	peak
3	146.8877	33.25	-17.47	15.78	43.50	-27.72	145	100	peak
4	204.2377	44.42	-13.07	31.35	43.50	-12.15	104	100	peak
5	271.3246	34.18	-9.06	25.12	46.00	-20.88	205	100	peak
6	909.6667	27.29	1.35	28.64	46.00	-17.36	250	100	peak

Test Channel	Middle	Polarity:	Horizontal



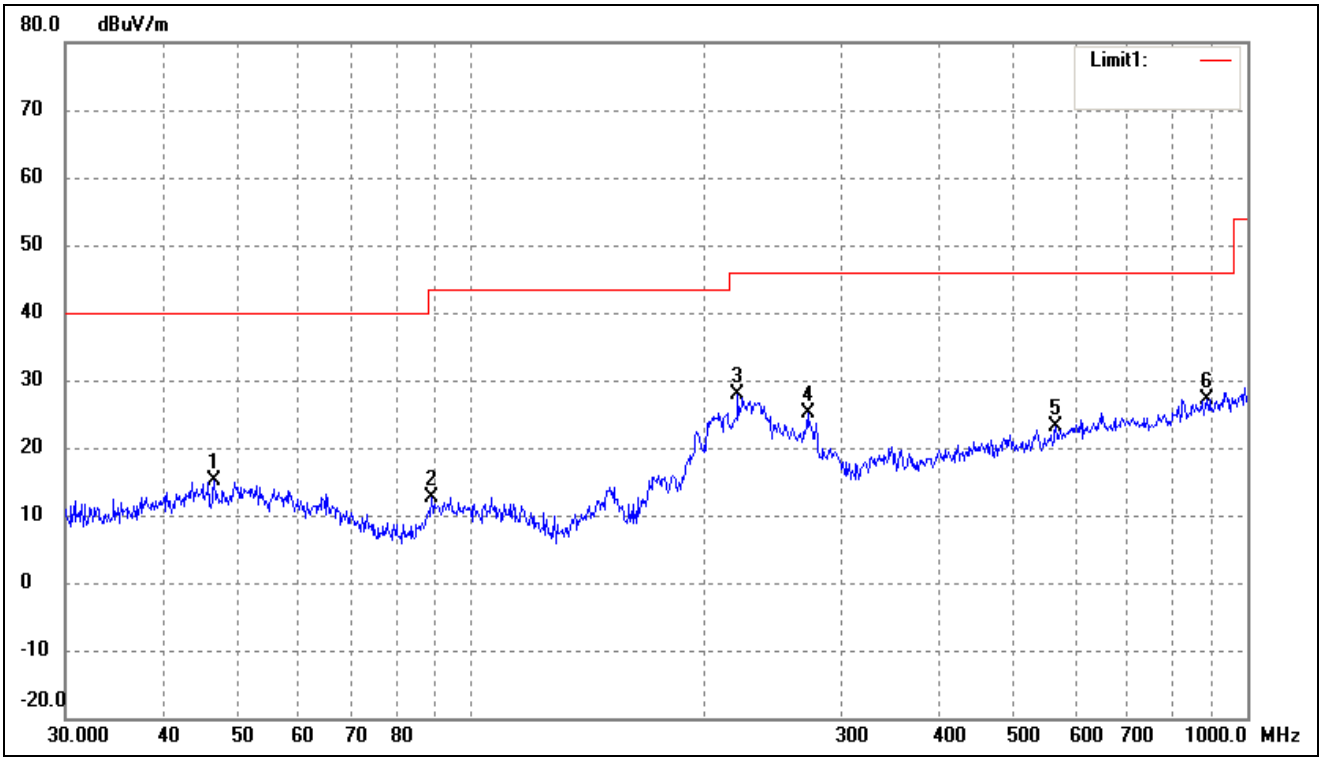
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	48.5016	27.23	-11.64	15.59	40.00	-24.41	319	100	peak
2	89.5900	27.10	-13.72	13.38	43.50	-30.12	96	100	peak
3	148.4410	31.02	-17.44	13.58	43.50	-29.92	238	100	peak
4	221.3921	39.95	-12.04	27.91	46.00	-18.09	97	100	peak
5	274.1939	33.55	-9.00	24.55	46.00	-21.45	271	100	peak
6	651.9417	27.87	-2.49	25.38	46.00	-20.62	316	100	peak

Test Channel	Middle	Polarity:	Vertical



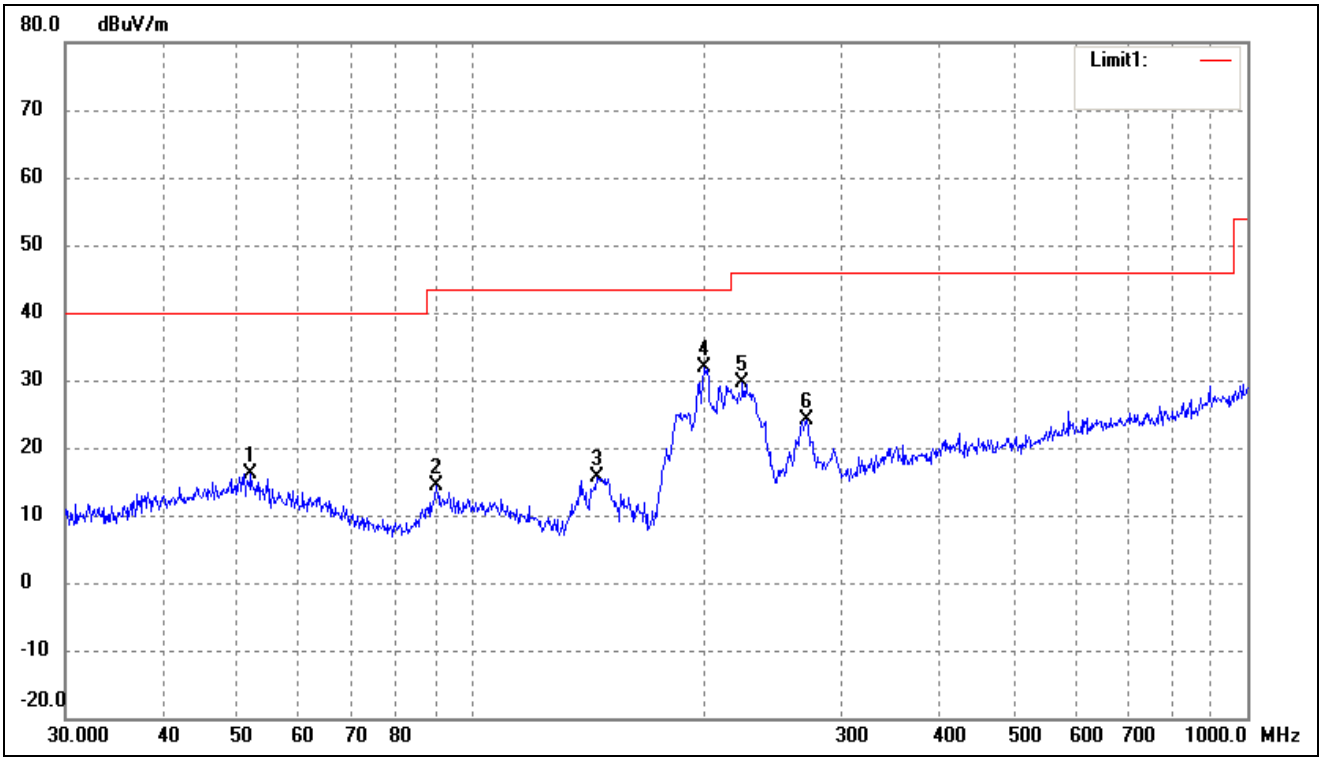
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	50.0566	27.47	-11.60	15.87	40.00	-24.13	290	100	peak
2	91.1746	27.55	-13.63	13.92	43.50	-29.58	96	100	peak
3	144.3348	33.53	-17.48	16.05	43.50	-27.45	91	100	peak
4	184.4898	40.13	-14.99	25.14	43.50	-18.36	116	100	peak
5	197.2001	45.14	-13.51	31.63	43.50	-11.87	82	100	peak
6	272.2776	32.68	-9.04	23.64	46.00	-22.36	214	100	peak

Test Channel	High	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	46.6664	26.83	-11.77	15.06	40.00	-24.94	146	100	peak
2	88.9639	26.78	-14.21	12.57	43.50	-30.93	112	100	peak
3	220.6171	39.87	-12.10	27.77	46.00	-18.23	78	100	peak
4	271.3246	34.24	-9.06	25.18	46.00	-20.82	95	100	peak
5	566.6223	27.48	-4.33	23.15	46.00	-22.85	124	100	peak
6	887.6099	26.59	0.64	27.23	46.00	-18.77	334	100	peak

Test Channel	High	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.0251	27.75	-11.59	16.16	40.00	-23.84	87	100	peak
2	90.2205	27.80	-13.44	14.36	43.50	-29.14	109	100	peak
3	145.3506	33.17	-17.51	15.66	43.50	-27.84	103	100	peak
4	199.9856	45.04	-13.20	31.84	43.50	-11.66	108	100	peak
5	223.7334	41.54	-11.90	29.64	46.00	-16.36	288	100	peak
6	270.3748	33.33	-9.09	24.24	46.00	-21.76	96	100	peak

➢ Spurious Emissions above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2405MHz							
4810	63.65	-3.53	60.12	74	-13.88	H	PK
4810	40.20	-3.53	36.67	54	-17.33	H	AV
7215	60.03	-0.50	59.53	74	-14.47	H	PK
7215	38.59	-0.50	38.09	54	-15.91	H	AV
4810	58.40	-3.53	54.87	74	-19.13	V	PK
4810	41.37	-3.53	37.84	54	-16.16	V	AV
7215	60.55	-0.50	60.05	74	-13.95	V	PK
7215	42.05	-0.50	41.55	54	-12.45	V	AV
Middle Channel-2440MHz							
4880	59.03	-3.41	55.62	74	-18.38	H	PK
4880	39.18	-3.41	35.77	54	-18.23	H	AV
7320	61.47	-0.42	61.05	74	-12.95	H	PK
7320	41.98	-0.42	41.56	54	-12.44	H	AV
4880	59.25	-3.41	55.84	74	-18.16	V	PK
4880	40.99	-3.41	37.58	54	-16.42	V	AV
7320	60.38	-0.42	59.96	74	-14.04	V	PK
7320	45.74	-0.42	45.32	54	-8.68	V	AV
High Channel-2475MHz							
4950	61.38	-3.38	58.00	74	-16.00	H	PK
4950	39.75	-3.38	36.37	54	-17.63	H	AV
7425	57.21	-0.35	56.86	74	-17.14	H	PK
7425	40.56	-0.35	40.21	54	-13.79	H	AV
4950	59.98	-3.38	56.60	74	-17.40	V	PK
4950	41.01	-3.38	37.63	54	-16.37	V	AV
7425	60.13	-0.35	59.78	74	-14.22	V	PK
7425	40.80	-0.35	40.45	54	-13.55	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

9. Out of Band Emissions

9.1 Standard Applicable

According to §15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

9.2 Test Procedure

According to the KDB 558074, the band-edge radiated test method as follows:

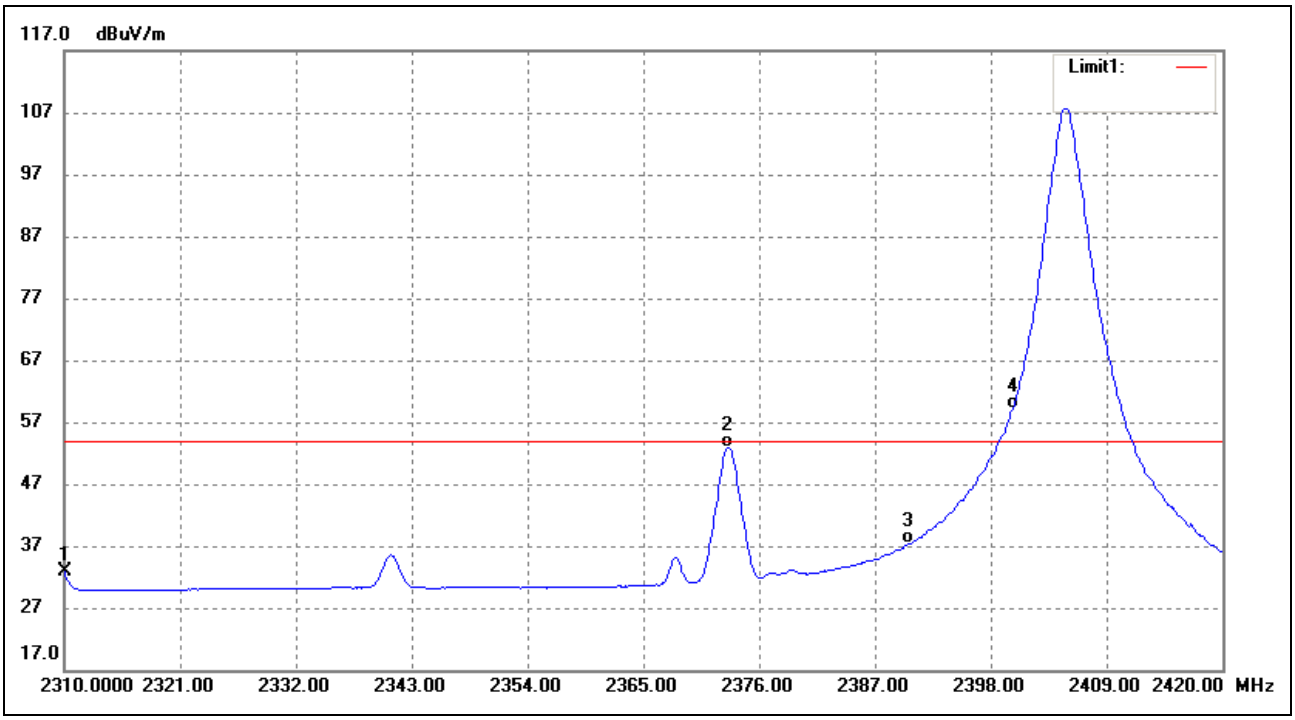
Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)
RBW = 1MHz, VBW = 1MHz for peak value measured
RBW = 1MHz, VBW = 10Hz for average value measured
Sweep = auto; Detector function = peak/average; Trace = max hold
All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074, the conducted spurious emissions test method as follows:
1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW ≥ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

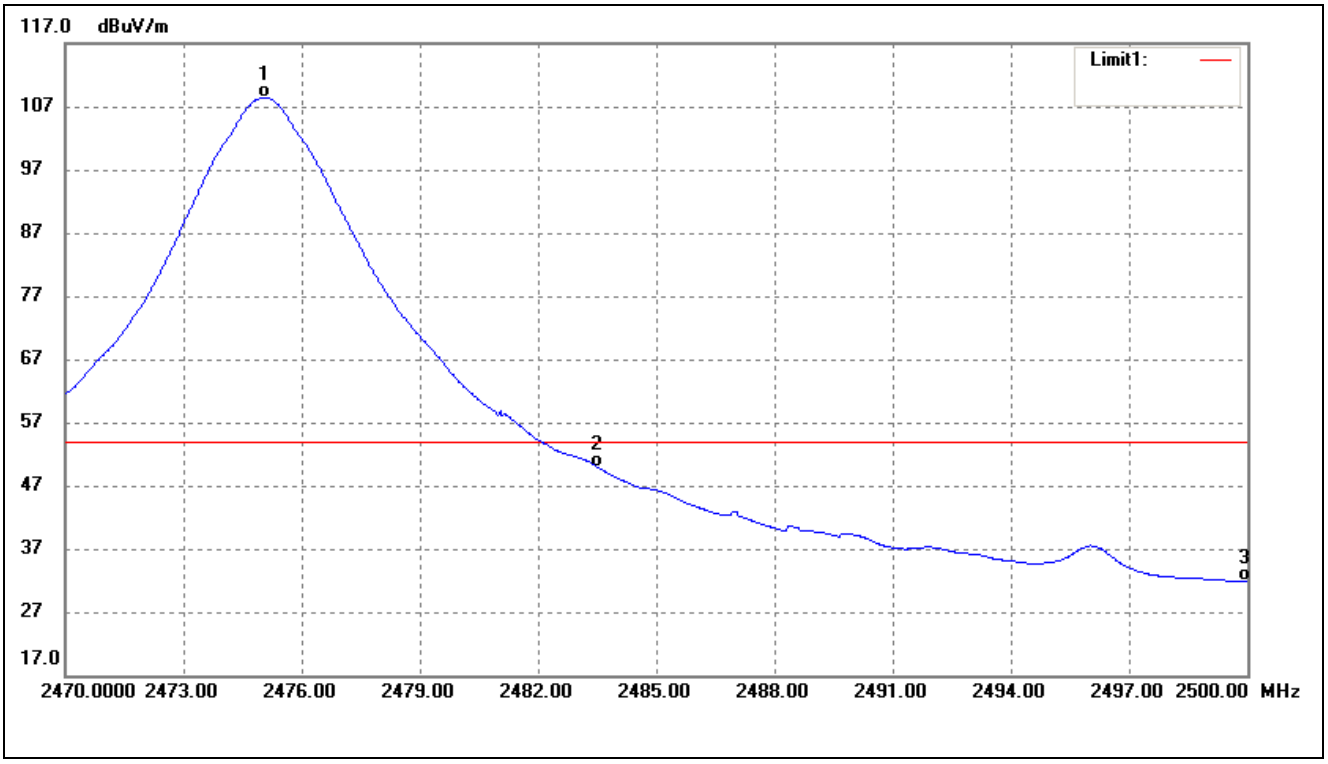
9.3 Summary of Test Results/Plots

Test Channel	Low	Polarity:	Vertical(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	42.51	-9.66	32.85	54.00	-21.15	Average Detector
	2310.000	54.50	-9.66	44.84	74.00	-29.16	Peak Detector
2	2373.030	62.42	-9.54	52.88	54.00	-1.12	Average Detector
	2373.470	66.41	-9.54	56.87	74.00	-17.13	Peak Detector
3	2390.000	46.77	-9.50	37.27	54.00	-16.73	Average Detector
	2390.000	59.60	-9.50	50.10	74.00	-23.90	Peak Detector
4	2400.000	68.69	-9.48	59.21	Delta=48.54dB		Average Detector
5	2405.150	117.23	-9.48	107.75			Average Detector

Test Channel	High	Polarity:	Vertical(worst case)



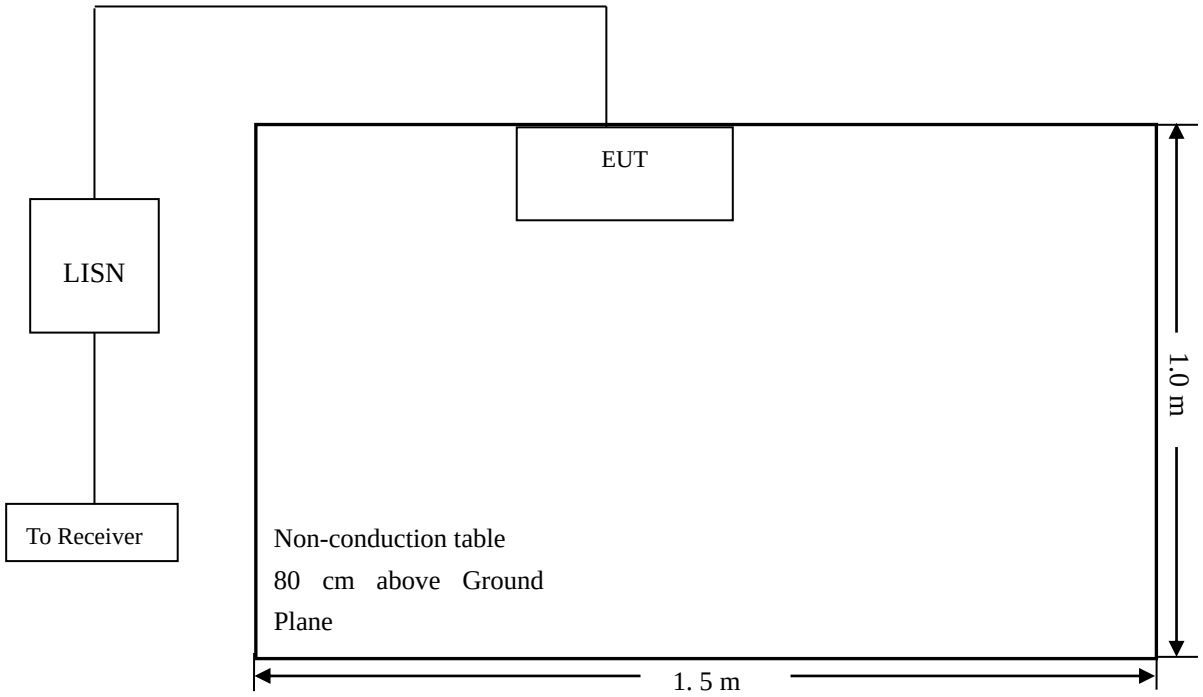
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2475.040	117.53	-9.07	108.46	/	/	Average Detector
	2475.490	117.48	-9.07	108.41	/	/	Peak Detector
2	2483.500	59.06	-9.07	49.99	54.00	-4.01	Average Detector
	2483.500	68.51	-9.07	59.44	74.00	-14.56	Peak Detector
3	2500.000	40.82	-9.03	31.79	54.00	-22.21	Average Detector
	2500.000	53.36	-9.03	44.33	74.00	-29.67	Peak Detector

10. Conducted Emissions

10.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.

10.2 Basic Test Setup Block Diagram



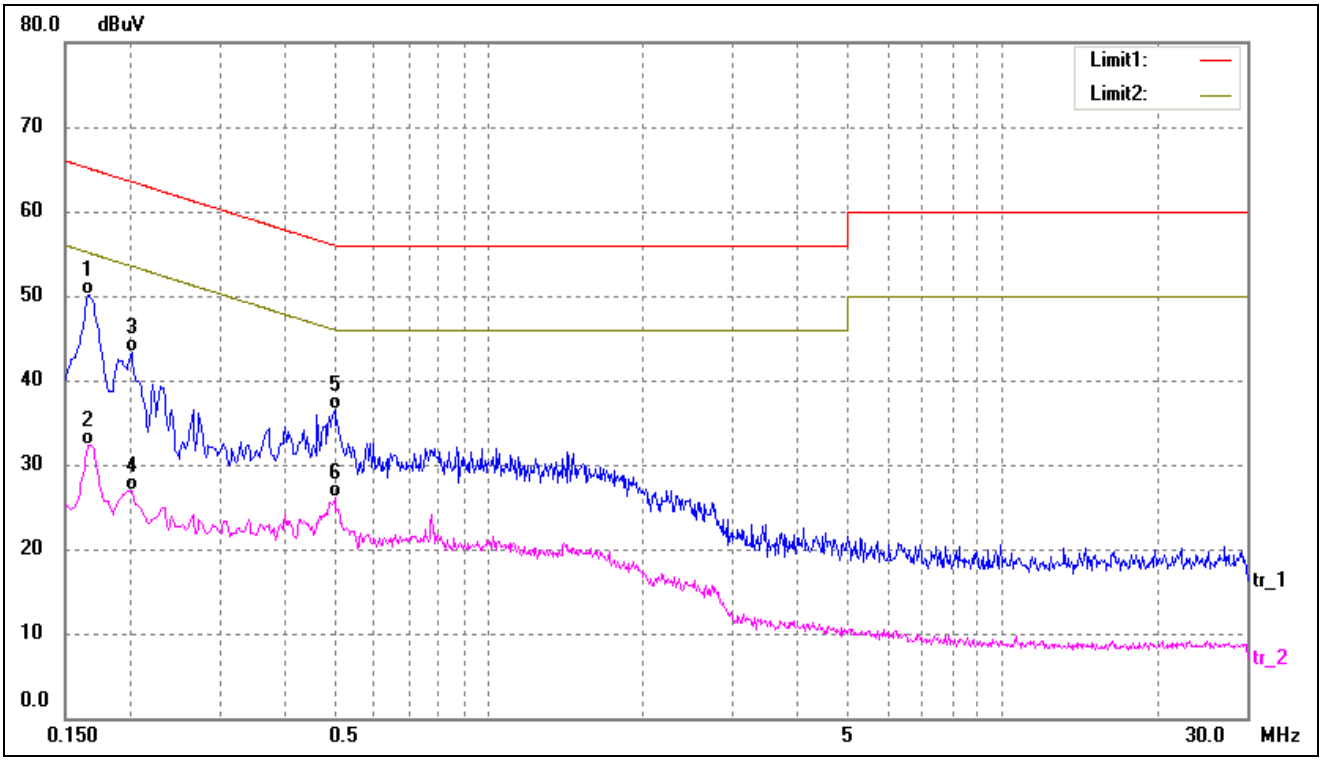
10.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency ..... 150 kHz
Stop Frequency ..... 30 MHz
Sweep Speed ..... Auto
IF Bandwidth..... 10 kHz
Quasi-Peak Adapter Bandwidth ..... 9 kHz
Quasi-Peak Adapter Mode ..... Normal

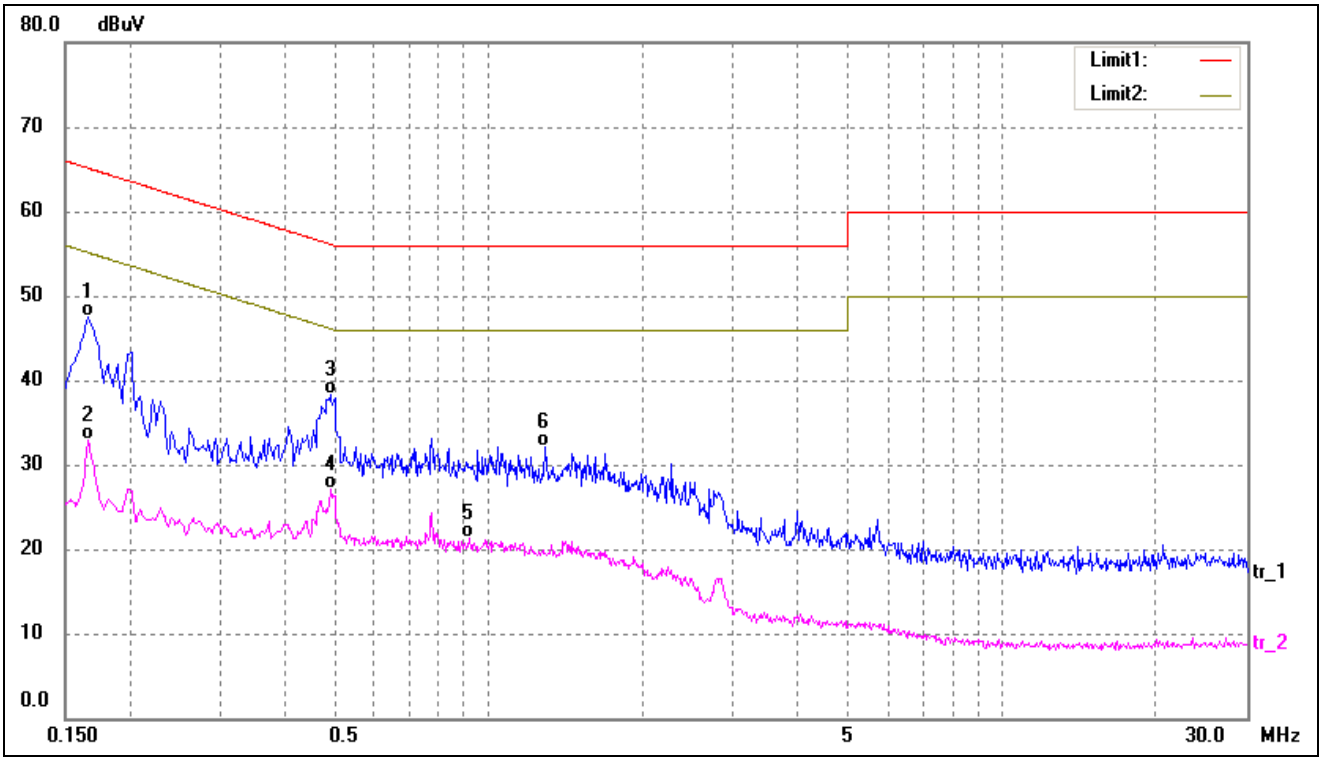
10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1660	40.08	10.11	50.19	65.16	-14.97	QP
2	0.1660	22.23	10.11	32.34	55.16	-22.82	AVG
3	0.2020	33.23	10.12	43.35	63.53	-20.18	QP
4	0.2020	16.88	10.12	27.00	53.53	-26.53	AVG
5	0.5020	26.26	10.29	36.55	56.00	-19.45	QP
6	0.5020	15.89	10.29	26.18	46.00	-19.82	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1*	0.1660	37.36	10.11	47.47	65.16	-17.69	QP
2	0.1660	22.77	10.11	32.88	55.16	-22.28	AVG
3	0.4940	27.92	10.29	38.21	56.10	-17.89	QP
4	0.4940	16.80	10.29	27.09	46.10	-19.01	AVG
5	0.9220	10.80	10.47	21.27	46.00	-24.73	AVG
6	1.2940	21.51	10.54	32.05	56.00	-23.95	QP

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