

FCC Part 15C Measurement and Test Report

For

LEEDARSON LIGHTING CO., LTD.

Xingda Road, Xingtai Industrial Zone, Changtai County,

Zhangzhou, Fujian, China

FCC ID: 2AB2QA9A19A60WESDZ2

FCC Rule(s):	<u>FCC Part 15.247</u>
Product Description:	<u>LED lamp</u>
Tested Model:	<u>A9A19A60WESDZ02</u>
Report No.:	<u>WTX19X05034158W-1</u>
Sample Receipt Date:	<u>2019-05-28</u>
Tested Date:	<u>2019-05-28 to 2019-06-05</u>
Issued Date:	<u>2019-06-05</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

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: LEEDARSON LIGHTING CO., LTD.
 Address of applicant: Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

Manufacturer: LEEDARSON LIGHTING CO., LTD.
 Address of manufacturer: Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

General Description of EUT	
Product Name:	LED lamp
Trade Name:	/
Model No.:	A9A19A60WESDZ02
Rated Voltage:	AC120V/60Hz
Adding Model(s):	9aZy-A800ST-Q4Z-xx; A9A19A60WESDZxx
	Where "y" may be "A"- "Z" for different enclosure appearance;
	"xx" may be "00" to "99", which designates for different beam angle, color of eyelet contact, color of enclosure, CCT and
	Package style.
<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 A9A19A60WESDZ02, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	IEEE802.15.4
Frequency Range:	2405-2480MHz
RF Output Power:	10.42dBm (Conducted)
Type of Modulation:	OQPSK
Quantity of Channels:	16
Channel Separation:	5MHz
Type of Antenna:	PCB
Antenna Gain:	-2.42dBi

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	2445MHz
TM3	High	2480MHz

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
/	/	/	/

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	Conducted	$\pm 1.5\%$
Power Spectral Density	Conducted	$\pm 1.8\text{dB}$
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	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)*	CCS	EZ-EMC	V1.0
EMI Test Software (Conducted Emission)*	CCS	EZ-EMC	V1.0

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

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	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 §2.1093, the portable 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 a PCB 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

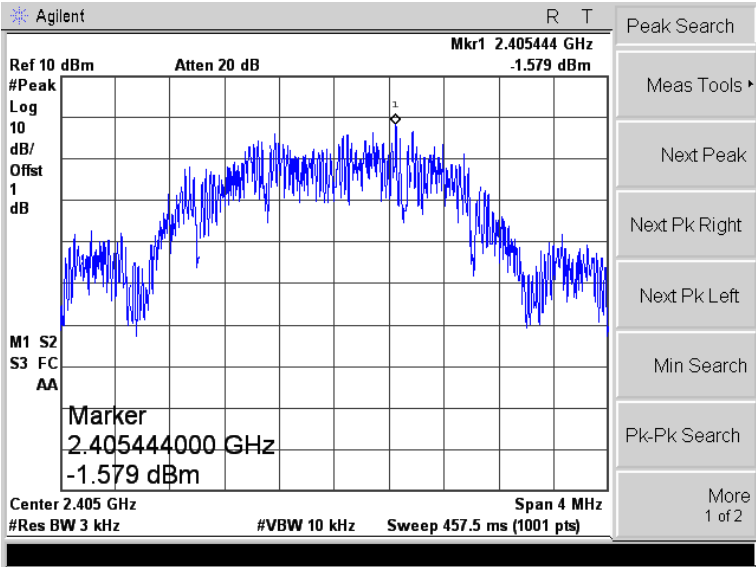
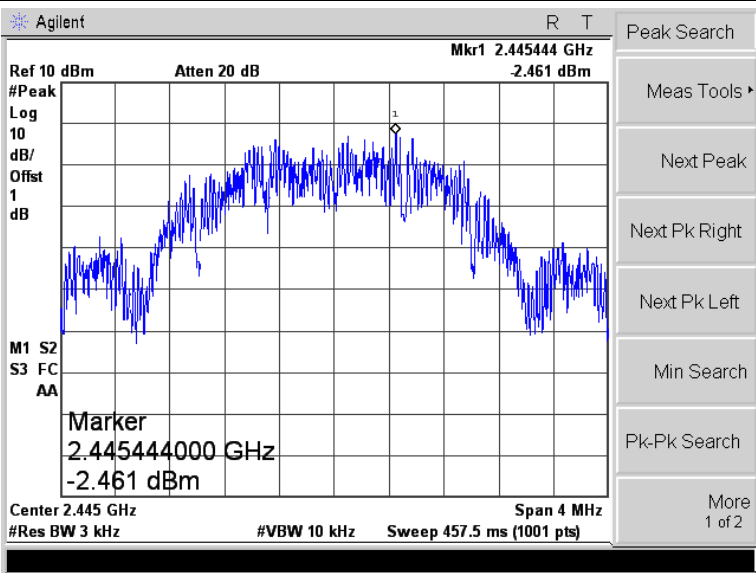
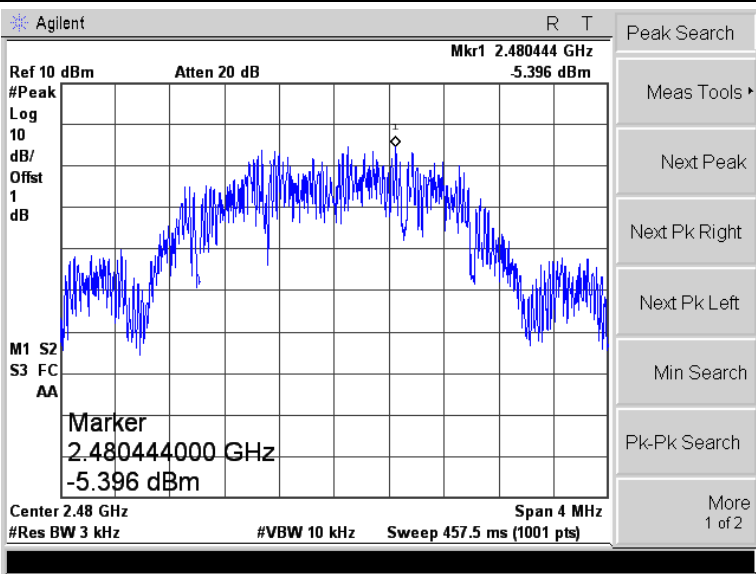
According to the KDB 558074, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

- 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: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set VBW $\geq 3 \times \text{RBW}$.
- e) Detector = power averaging (RMS) or sample detector (when RMS not available).
- f) Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- 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	-1.579	8
	Middle	-2.461	8
	High	-5.396	8

Please refer to the following test plots:

<p style="text-align: center;">Low</p>	
<p style="text-align: center;">Middle</p>	
<p style="text-align: center;">High</p>	

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.

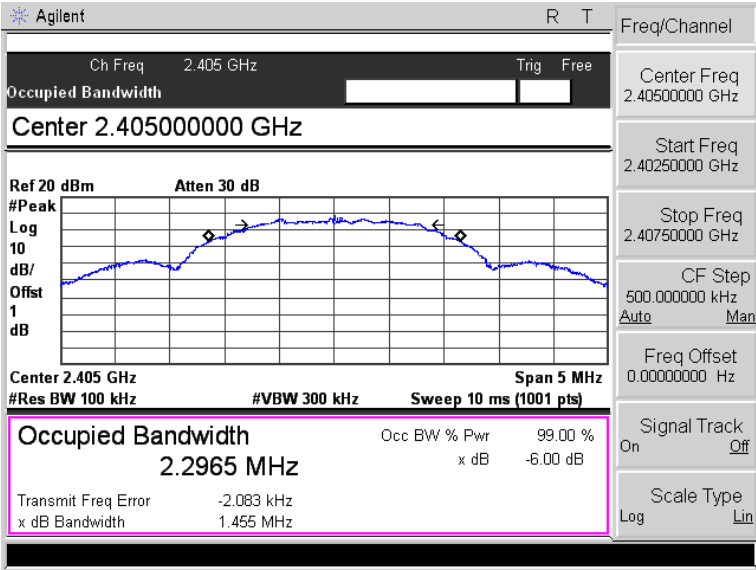
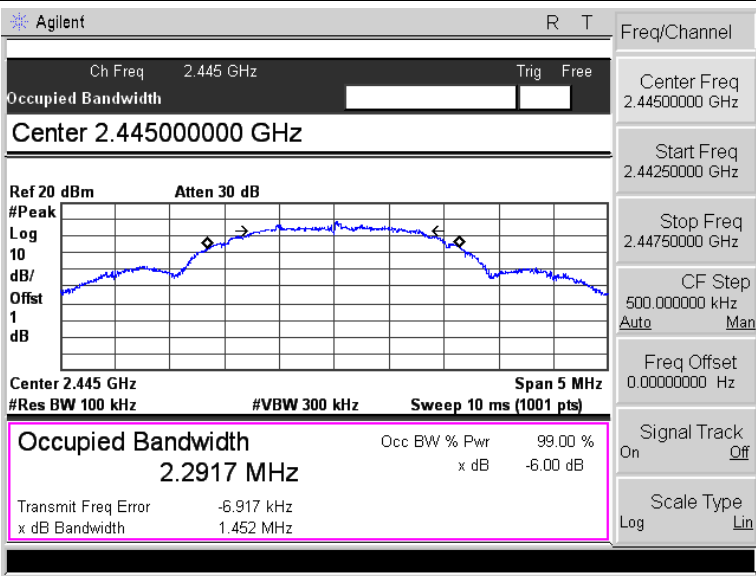
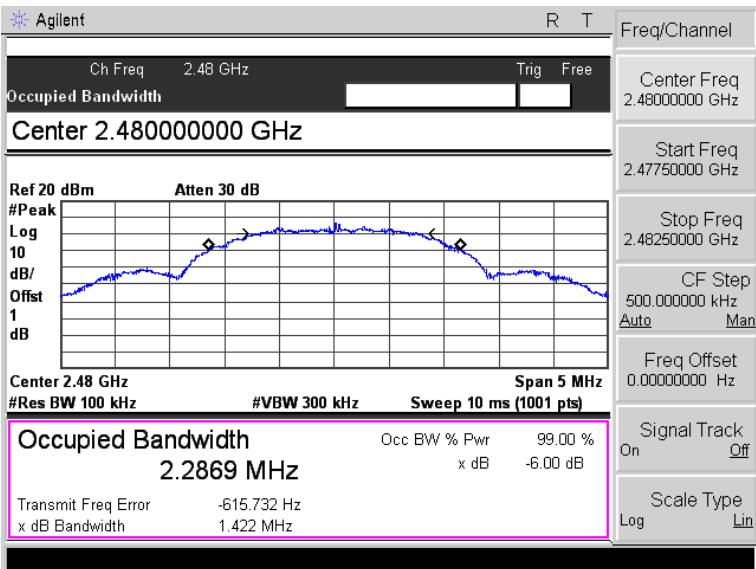
6.2 Test Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ 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	1.455	≥ 500
	Middle	1.452	≥ 500
	High	1.422	≥ 500

Please refer to the following test plots:

<p style="text-align: center;">Low</p>	 <p>Agilent R T</p> <p>Ch Freq 2.405 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 2.40500000 GHz</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/Offst 1 dB</p> <p>Center 2.405 GHz Span 5 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p>Occupied Bandwidth 2.2965 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -2.083 kHz x dB Bandwidth 1.455 MHz</p> <p>Freq/Channel</p> <p>Center Freq 2.40500000 GHz</p> <p>Start Freq 2.40250000 GHz</p> <p>Stop Freq 2.40750000 GHz</p> <p>CF Step 500.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p style="text-align: center;">Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 2.445 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 2.44500000 GHz</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/Offst 1 dB</p> <p>Center 2.445 GHz Span 5 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p>Occupied Bandwidth 2.2917 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -6.917 kHz x dB Bandwidth 1.452 MHz</p> <p>Freq/Channel</p> <p>Center Freq 2.44500000 GHz</p> <p>Start Freq 2.44250000 GHz</p> <p>Stop Freq 2.44750000 GHz</p> <p>CF Step 500.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p style="text-align: center;">High</p>	 <p>Agilent R T</p> <p>Ch Freq 2.48 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 2.48000000 GHz</p> <p>Ref 20 dBm Atten 30 dB</p> <p>#Peak Log 10 dB/Offst 1 dB</p> <p>Center 2.48 GHz Span 5 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p>Occupied Bandwidth 2.2869 MHz</p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -615.732 Hz x dB Bandwidth 1.422 MHz</p> <p>Freq/Channel</p> <p>Center Freq 2.48000000 GHz</p> <p>Start Freq 2.47750000 GHz</p> <p>Stop Freq 2.48250000 GHz</p> <p>CF Step 500.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

7. RF Output Power

7.1 Standard Applicable

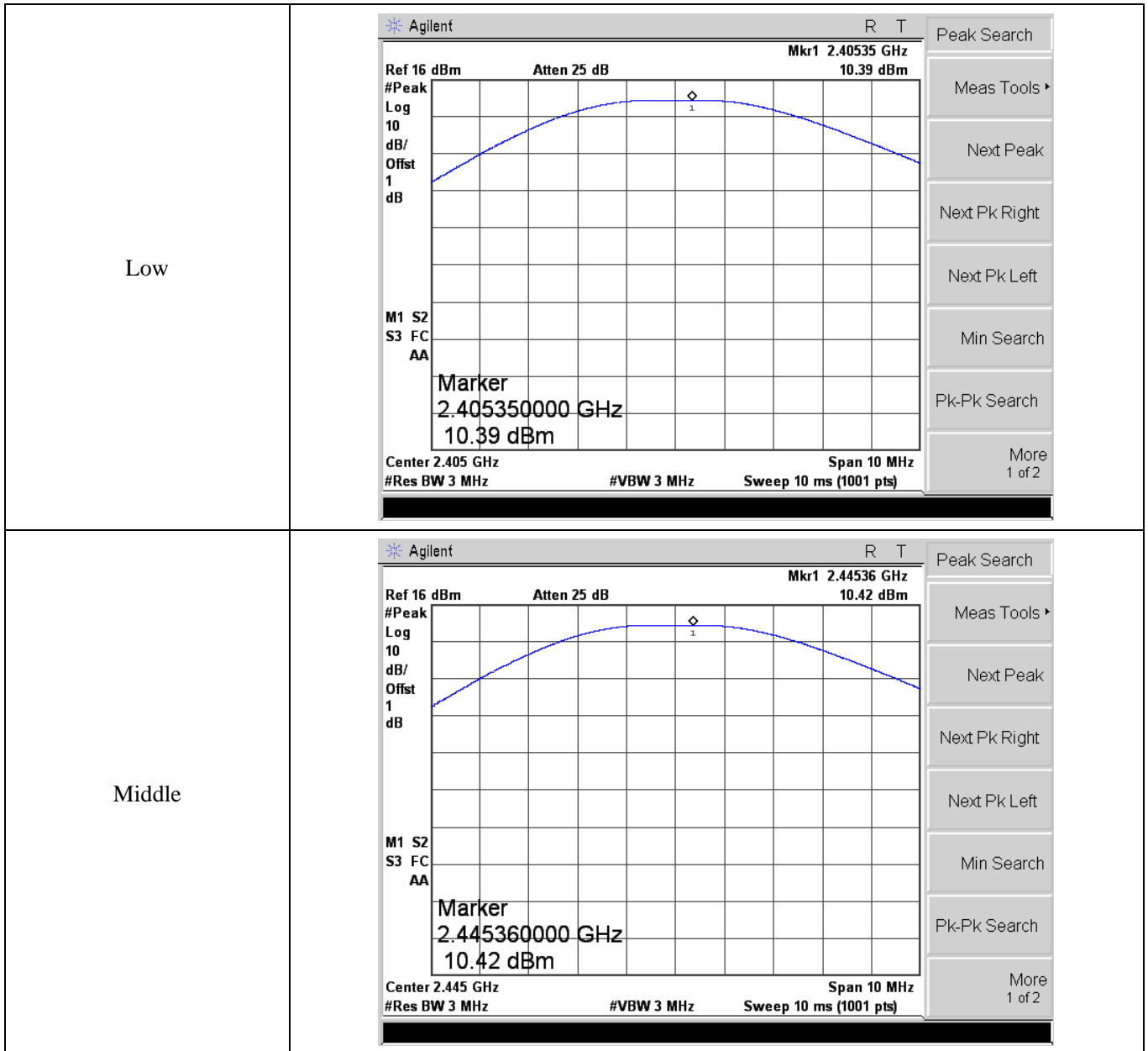
According to 15.247(b)(3), for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

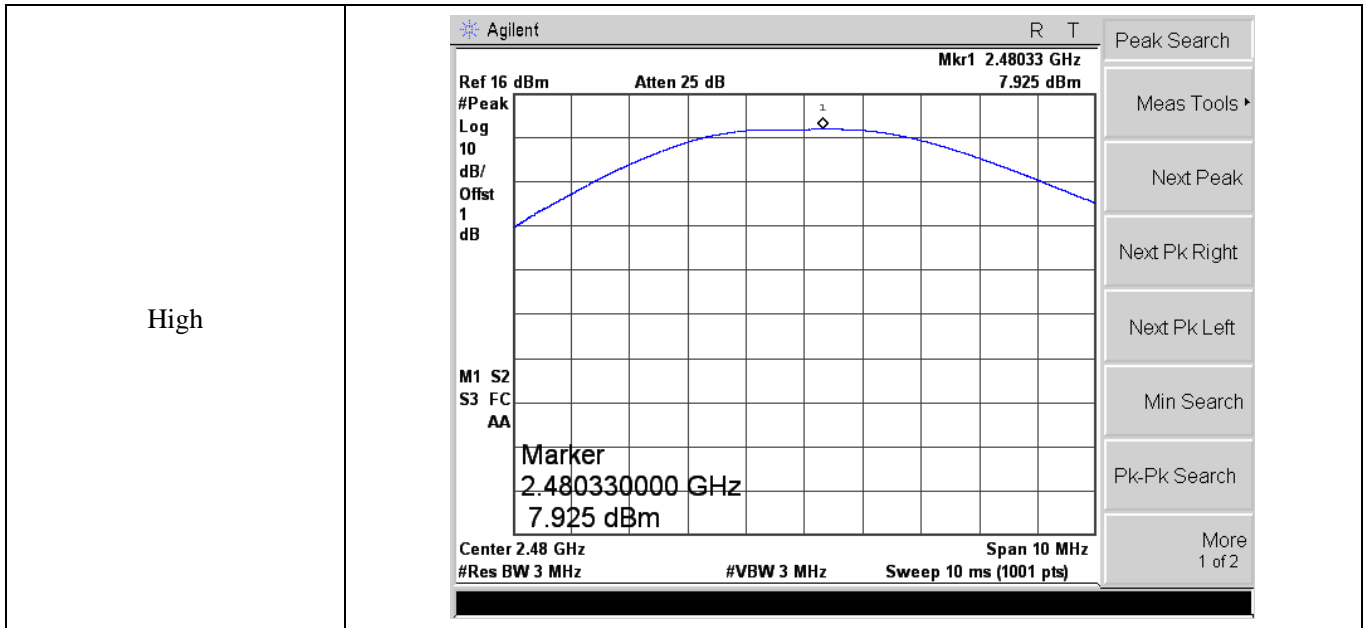
7.2 Test Procedure

- a) Set the RBW \geq DTS bandwidth.
- b) Set VBW \geq 3 RBW.
- c) Set span \geq 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	10.39	10.94	1000
	Middle	10.42	11.02	1000
	High	7.93	6.21	1000





8. Field Strength of Spurious Emissions

8.1 Standard Applicable

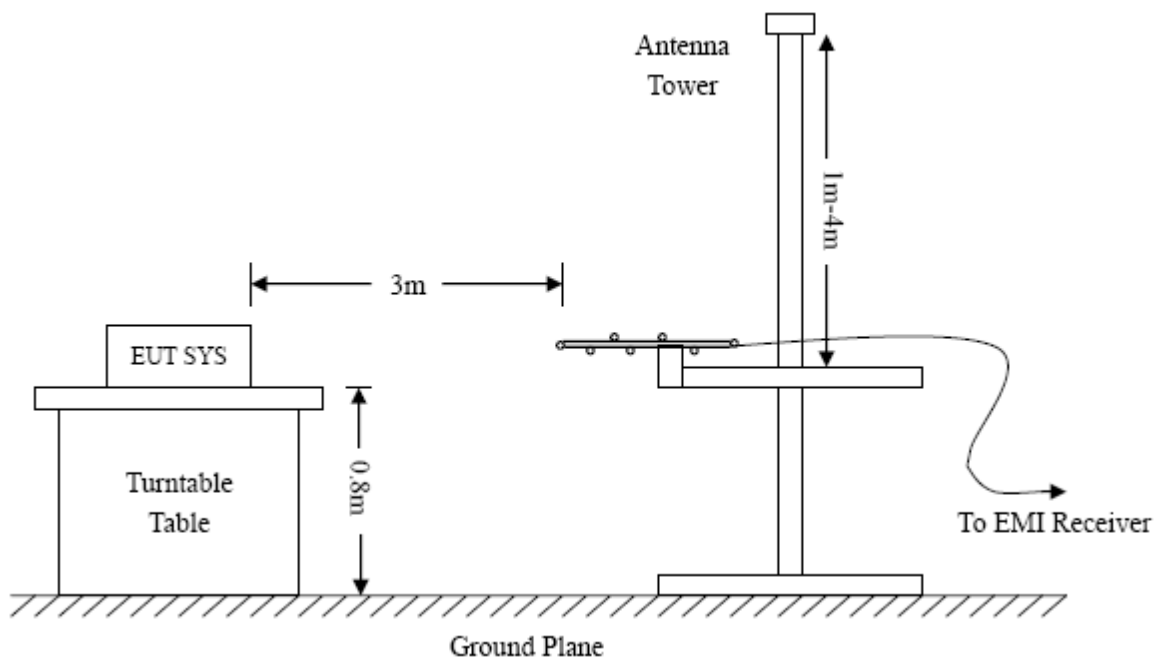
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within 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).

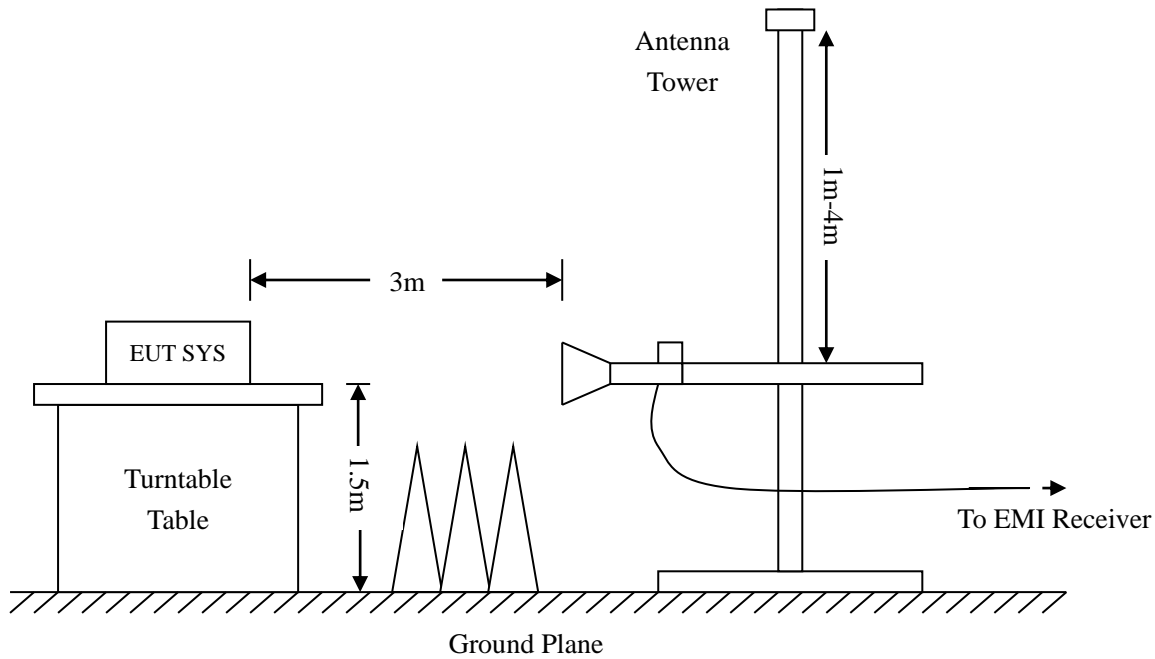
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

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
 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

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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

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

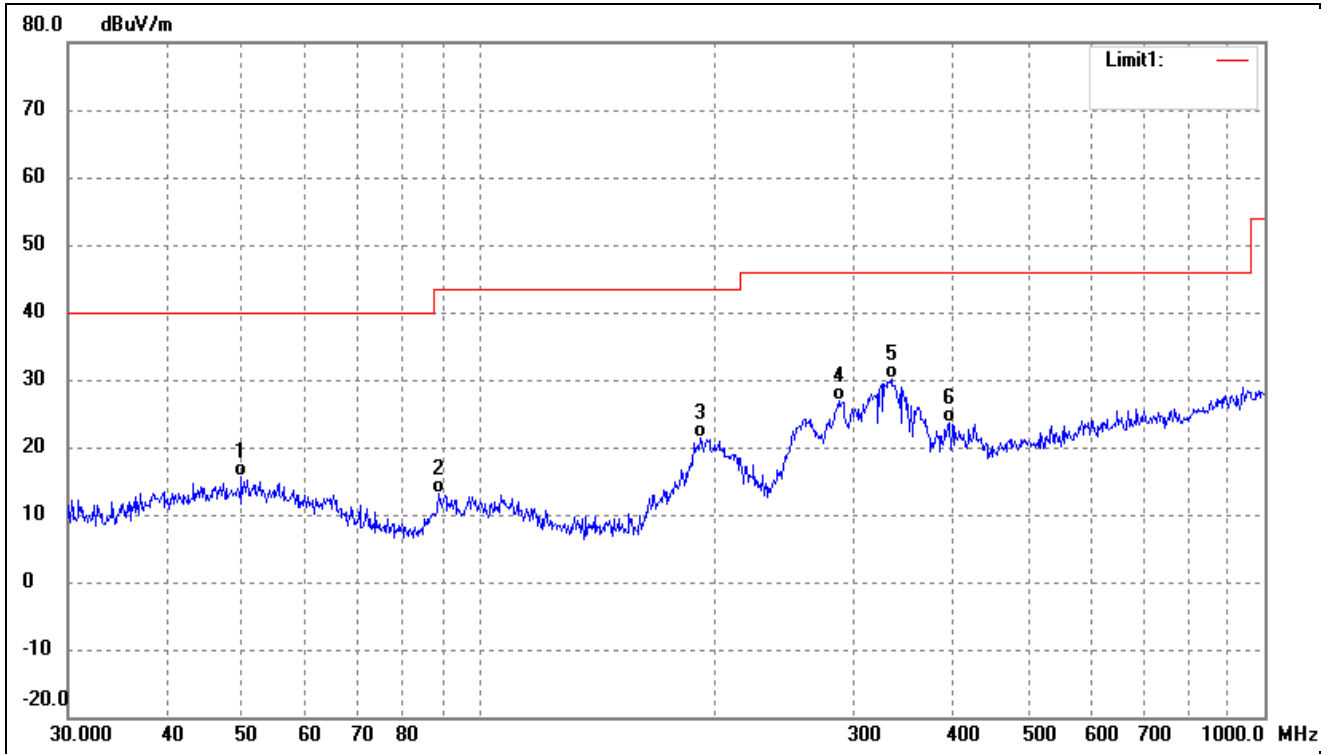
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

8.4 Summary of Test Results/Plots

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

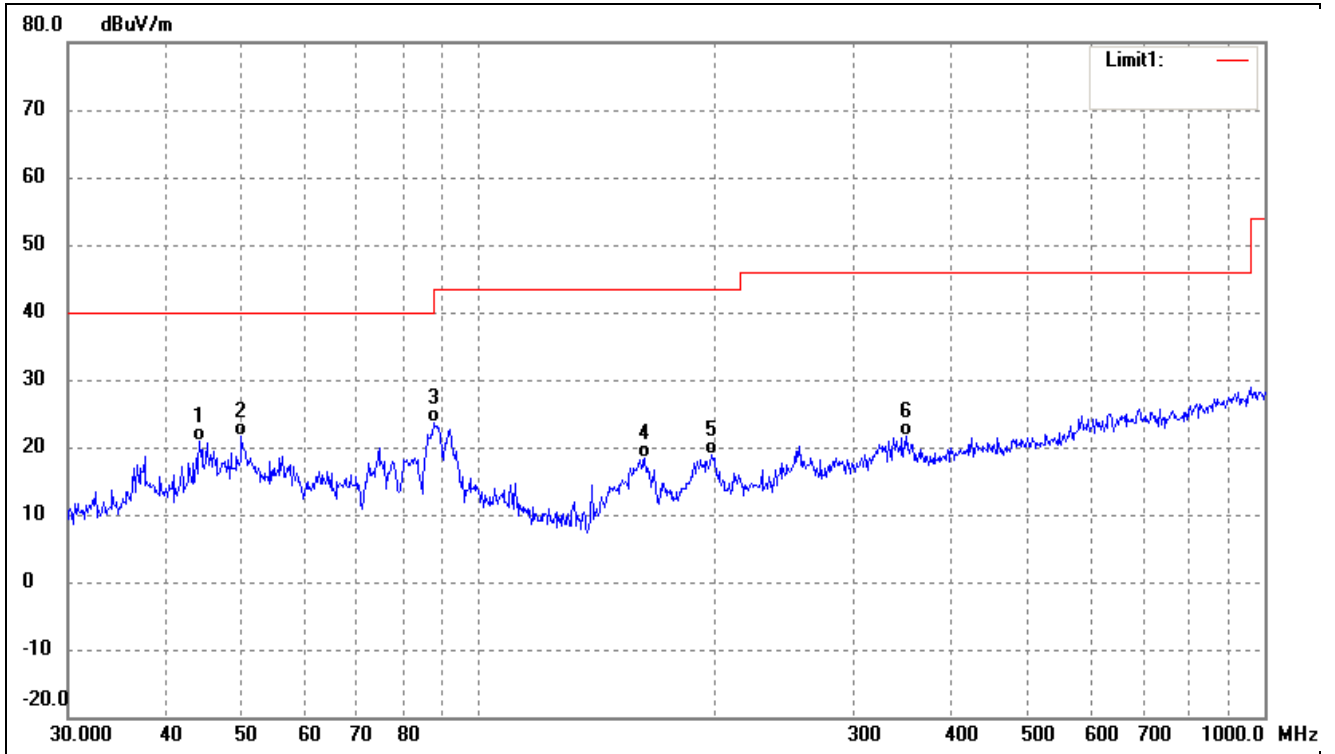
➤ Spurious Emissions Below 1GHz

Test Channel	Low	Polarity:	Horizontal
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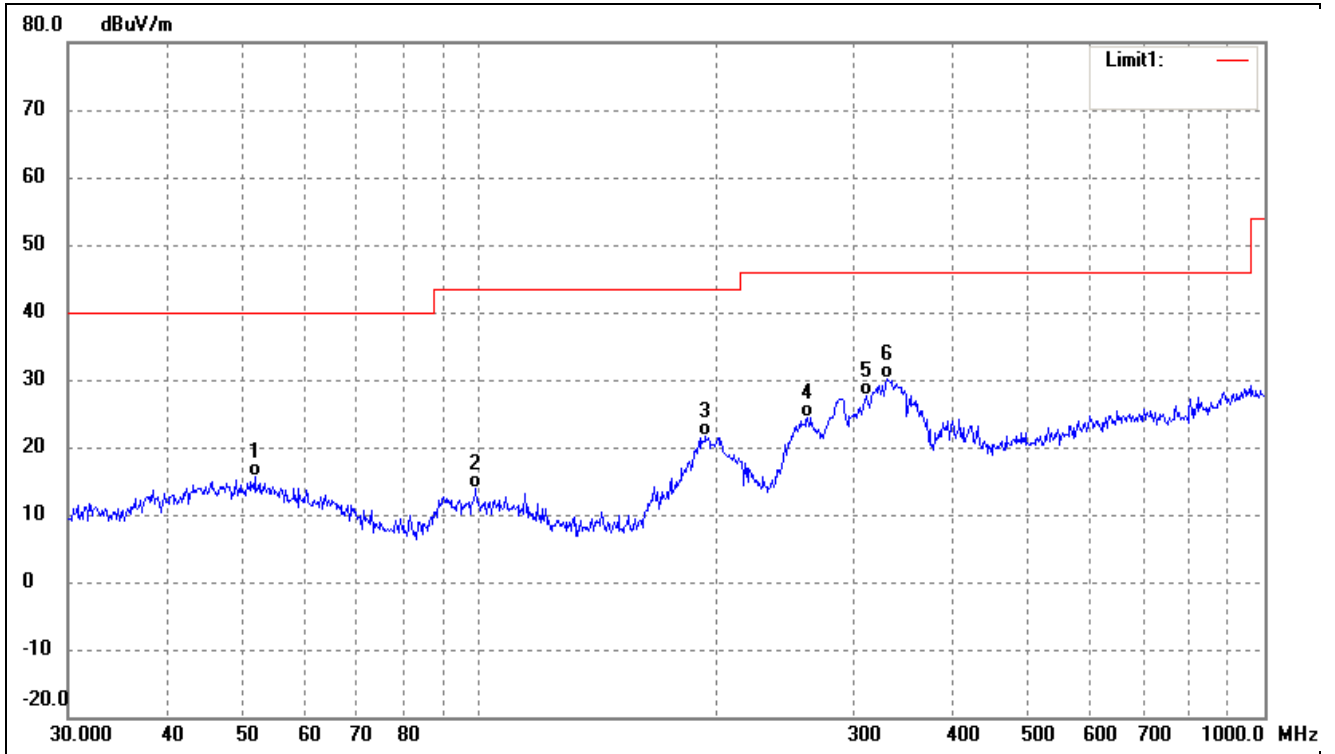
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	49.8814	27.26	-11.60	15.66	40.00	-24.34	294	100	QP
2	88.9639	27.43	-14.21	13.22	43.50	-30.28	95	100	QP
3	191.0738	35.67	-14.26	21.41	43.50	-22.09	321	100	QP
4	286.9823	35.62	-8.69	26.93	46.00	-19.07	102	100	QP
5	334.8589	37.51	-7.49	30.02	46.00	-15.98	128	100	QP
6	397.6334	30.56	-6.85	23.71	46.00	-22.29	223	100	QP

Test Channel	Low	Polarity:	Vertical
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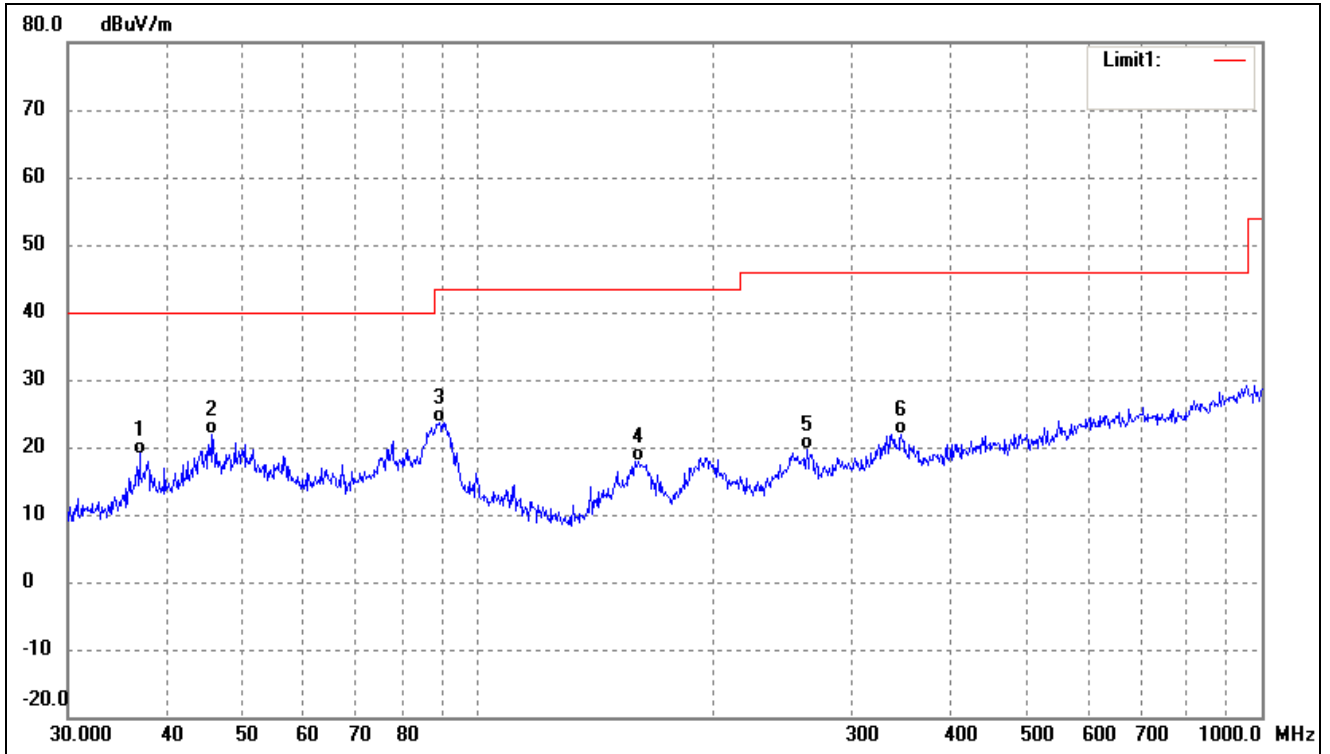
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	44.1202	32.80	-12.03	20.77	40.00	-19.23	205	100	QP
2	49.8814	33.21	-11.60	21.61	40.00	-18.39	93	100	QP
3	87.7248	38.69	-15.17	23.52	40.00	-16.48	110	100	QP
4	162.6106	34.62	-16.36	18.26	43.50	-25.24	92	100	QP
5	197.8928	32.31	-13.43	18.88	43.50	-24.62	117	100	QP
6	350.4768	28.52	-6.89	21.63	46.00	-24.37	149	100	QP

Test Channel	Middle	Polarity:	Horizontal
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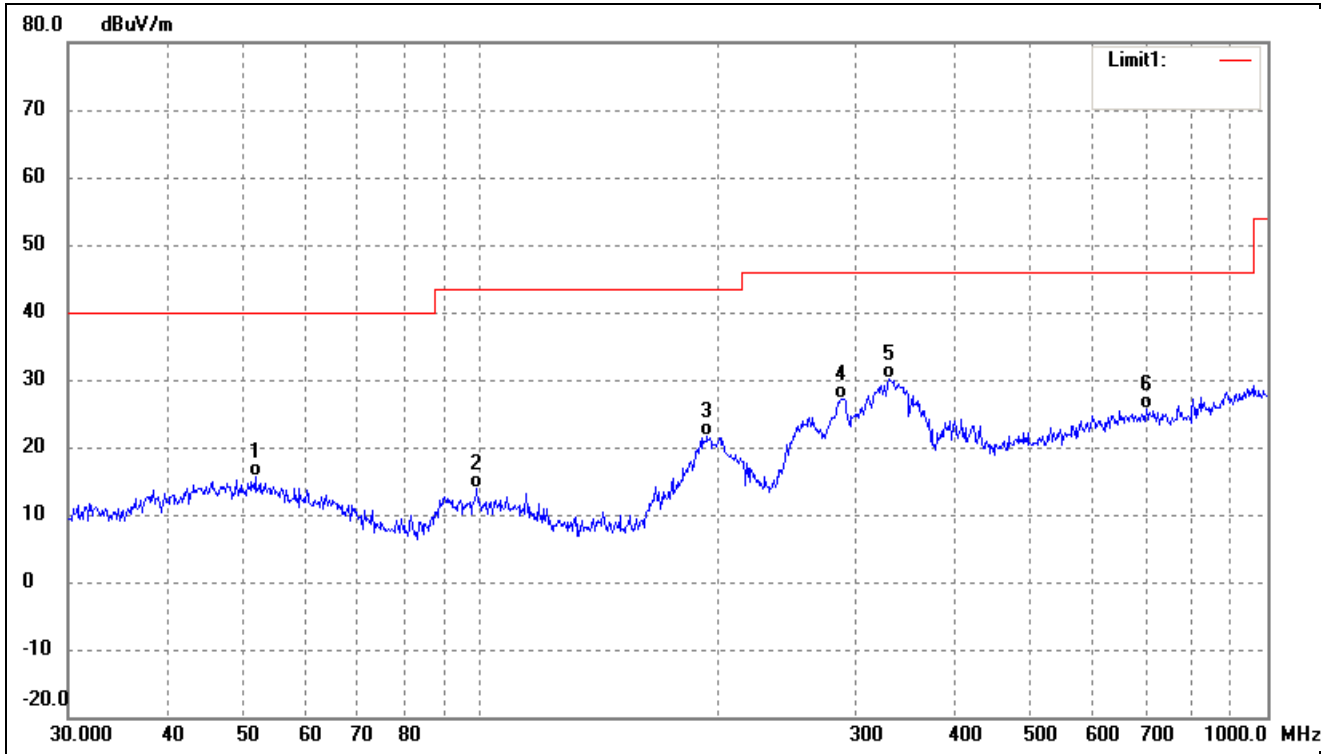
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	51.8430	27.14	-11.59	15.55	40.00	-24.45	343	100	QP
2	99.1797	27.89	-13.90	13.99	43.50	-29.51	122	100	QP
3	194.4534	35.41	-13.82	21.59	43.50	-21.91	70	100	QP
4	261.9753	33.51	-9.18	24.33	46.00	-21.67	97	100	QP
5	311.0867	35.88	-8.30	27.58	46.00	-18.42	60	100	QP
6	331.3547	37.82	-7.61	30.21	46.00	-15.79	270	100	QP

Test Channel	Middle	Polarity:	Vertical
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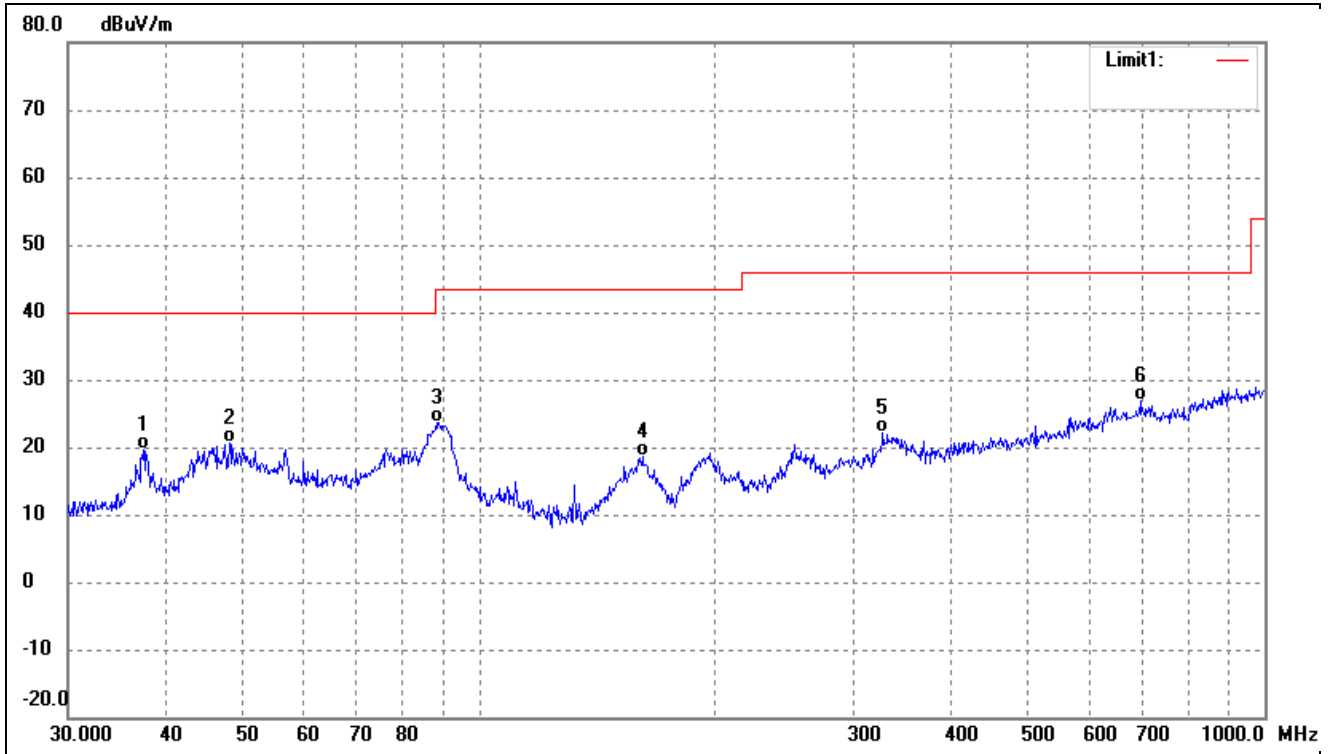
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	37.0249	32.64	-13.64	19.00	40.00	-21.00	79	100	QP
2	45.8553	33.73	-11.82	21.91	40.00	-18.09	103	100	QP
3	89.2764	37.55	-13.96	23.59	43.50	-19.91	90	100	QP
4	160.3457	34.57	-16.57	18.00	43.50	-25.50	159	100	QP
5	262.8955	28.78	-9.11	19.67	46.00	-26.33	144	100	QP
6	346.8092	28.98	-7.01	21.97	46.00	-24.03	147	100	QP

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	51.8430	27.14	-11.59	15.55	40.00	-24.45	100	100	QP
2	99.1797	27.89	-13.90	13.99	43.50	-29.51	125	100	QP
3	194.4534	35.41	-13.82	21.59	43.50	-21.91	55	100	QP
4	287.9904	35.82	-8.63	27.19	46.00	-18.81	113	100	QP
5	331.3547	37.82	-7.61	30.21	46.00	-15.79	79	100	QP
6	701.7610	27.49	-1.77	25.72	46.00	-20.28	152	100	QP

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	37.4165	33.01	-13.45	19.56	40.00	-20.44	62	100	QP
2	48.1626	32.23	-11.65	20.58	40.00	-19.42	178	100	QP
3	88.3421	38.21	-14.69	23.52	43.50	-19.98	69	100	QP
4	161.4742	35.16	-16.46	18.70	43.50	-24.80	117	100	QP
5	326.7395	29.93	-7.82	22.11	46.00	-23.89	219	100	QP
6	694.4174	28.79	-1.90	26.89	46.00	-19.11	239	100	QP

➤ Spurious Emissions Below 1GHz

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2405MHz							
4810	62.26	-3.53	58.73	74	-15.27	H	PK
4810	39.05	-3.53	35.52	54	-18.48	H	AV
7215	62.95	-0.50	62.45	74	-11.55	H	PK
7215	40.89	-0.50	40.39	54	-13.61	H	AV
4810	60.48	-3.53	56.95	74	-17.05	V	PK
4810	40.41	-3.53	36.88	54	-17.12	V	AV
7215	61.57	-0.50	61.07	74	-12.93	V	PK
7215	40.81	-0.50	40.31	54	-13.69	V	AV
Middle Channel-2445MHz							
4890	57.75	-3.43	54.32	74	-19.68	H	PK
4890	42.18	-3.43	38.75	54	-15.25	H	AV
7335	61.47	-0.44	61.03	74	-12.97	H	PK
7335	40.89	-0.44	40.45	54	-13.55	H	AV
4890	62.09	-3.43	58.66	74	-15.34	V	PK
4890	40.65	-3.43	37.22	54	-16.78	V	AV
7335	63.71	-0.44	63.27	74	-10.73	V	PK
7335	42.31	-0.44	41.87	54	-12.13	V	AV
High Channel-2480MHz							
4960	59.81	-3.41	56.40	74	-17.60	H	PK
4960	38.47	-3.41	35.06	54	-18.94	H	AV
7440	60.85	-0.42	60.43	74	-13.57	H	PK
7440	40.79	-0.42	40.37	54	-13.63	H	AV
4960	59.83	-3.41	56.42	74	-17.58	V	PK
4960	39.56	-3.41	36.15	54	-17.85	V	AV
7440	60.25	-0.42	59.83	74	-14.17	V	PK
7440	43.21	-0.42	42.79	54	-11.21	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.

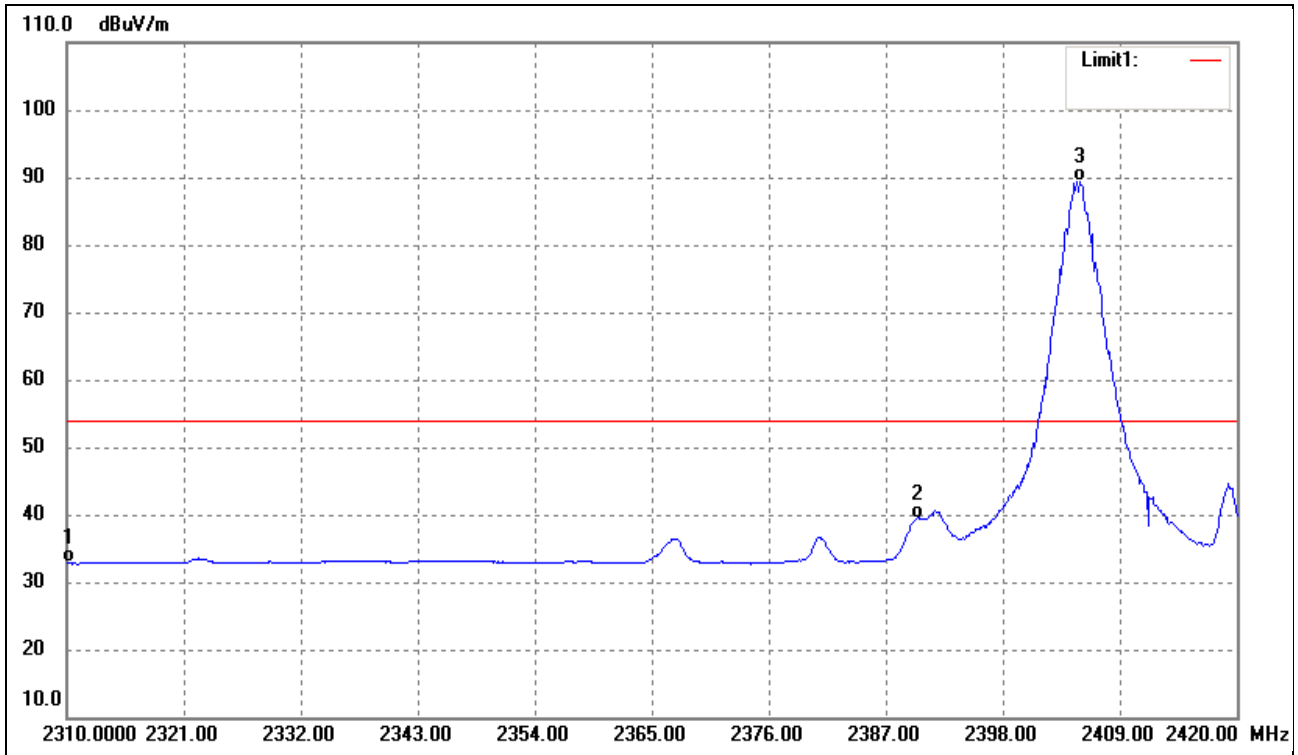
According to the KDB 558074, the conducted spurious emissions test method as follows:

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 \geq 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.

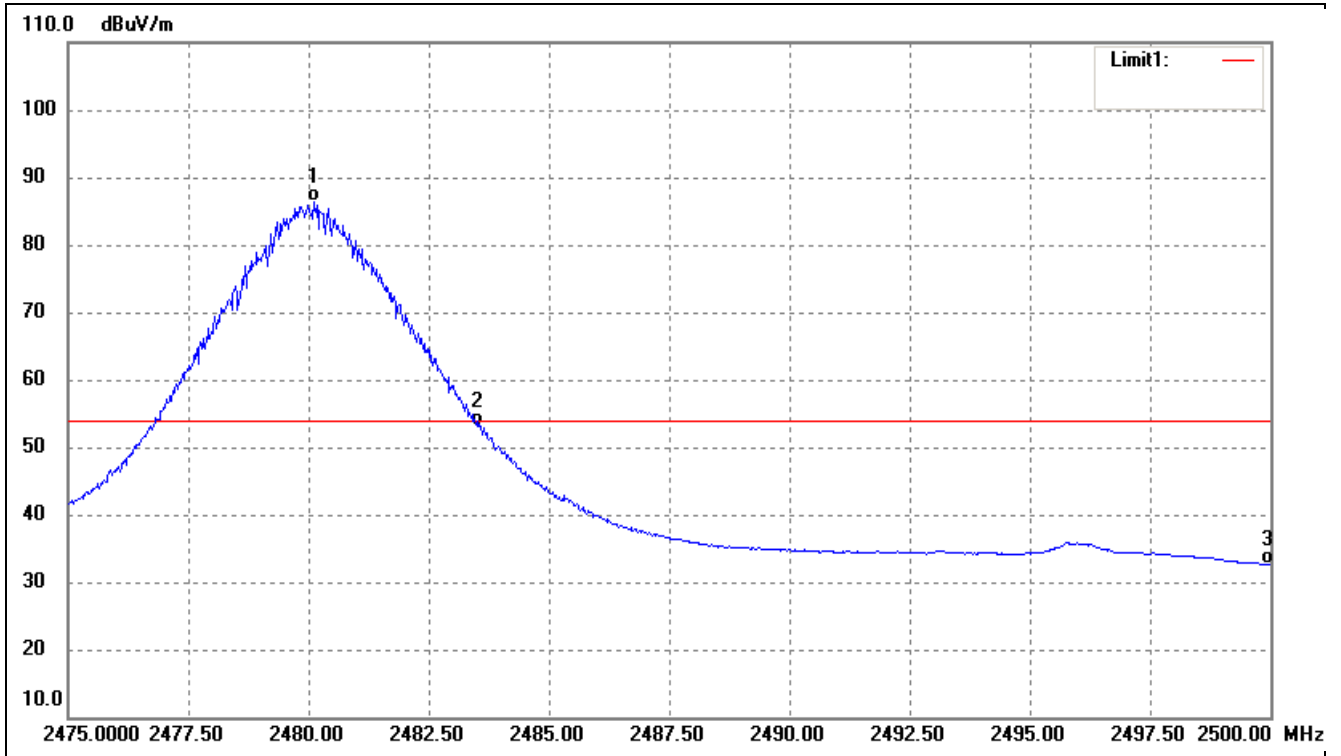
9.3 Summary of Test Results/Plots

Test Channel	Low	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	40.62	-7.78	32.84	54.00	-21.16	Average Detector
	2310.000	53.82	-7.78	46.04	74.00	-27.96	Peak Detector
2	2390.000	46.76	-7.32	39.44	54.00	-14.56	Average Detector
	2390.000	59.66	-7.32	52.34	74.00	-21.66	Peak Detector
3	2405.260	96.68	-7.22	89.46	/	/	Average Detector
	2405.700	114.17	-7.22	106.95	/	/	Peak Detector

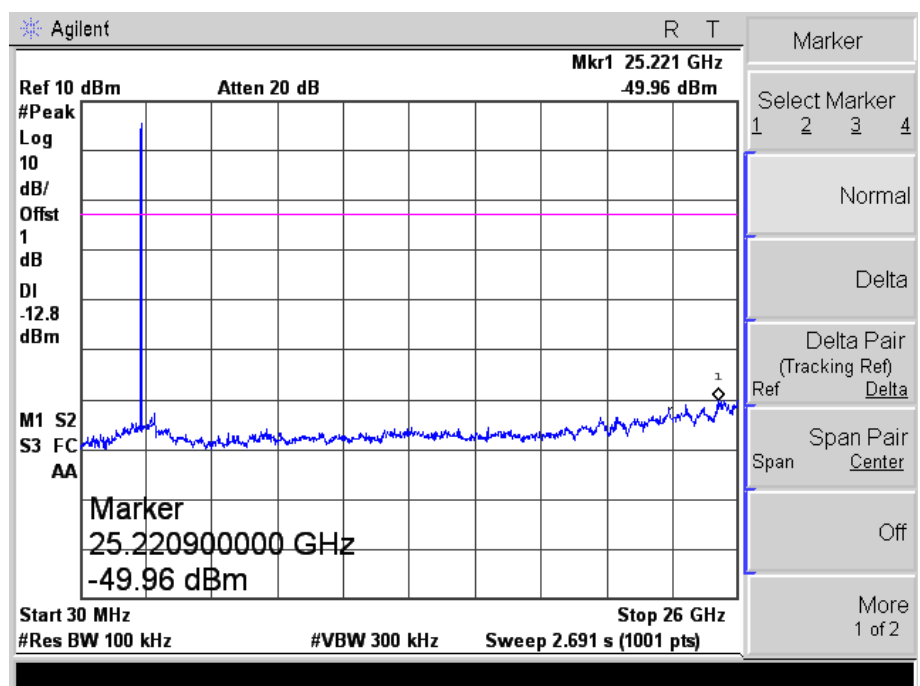
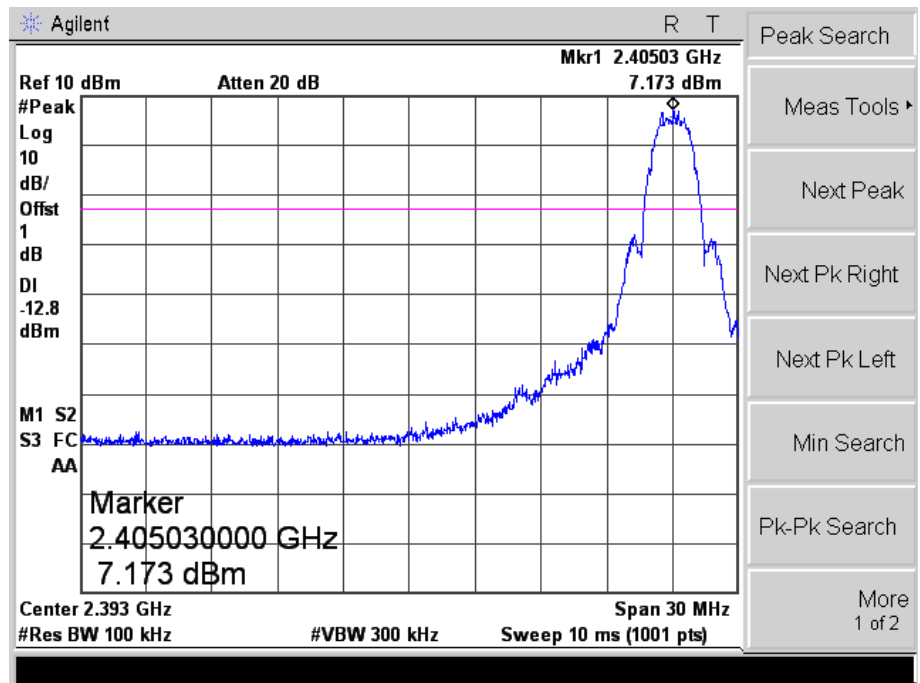
Test Channel	High	Polarity:	Vertical(worst case)
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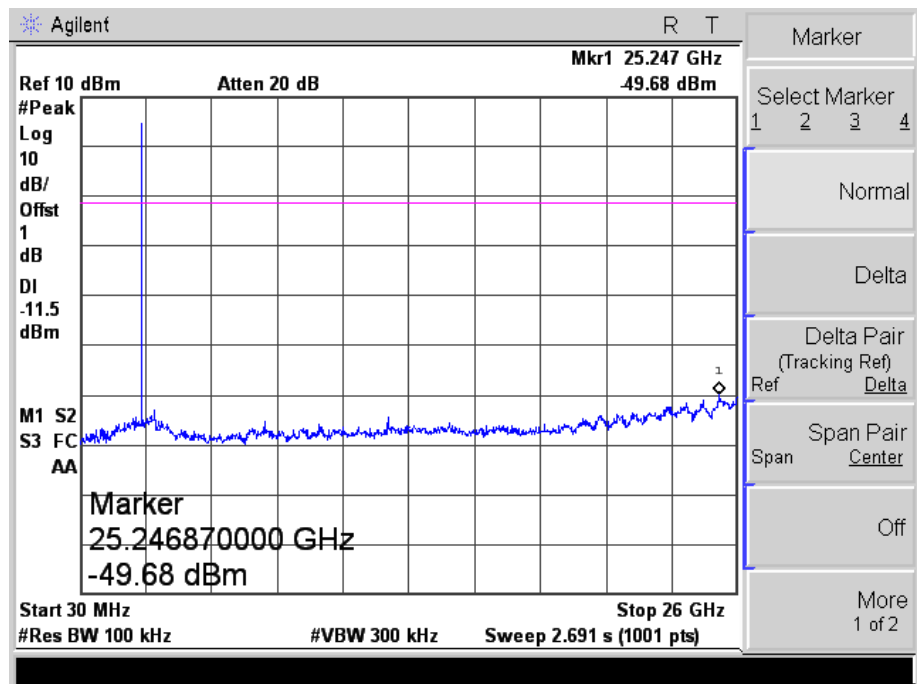
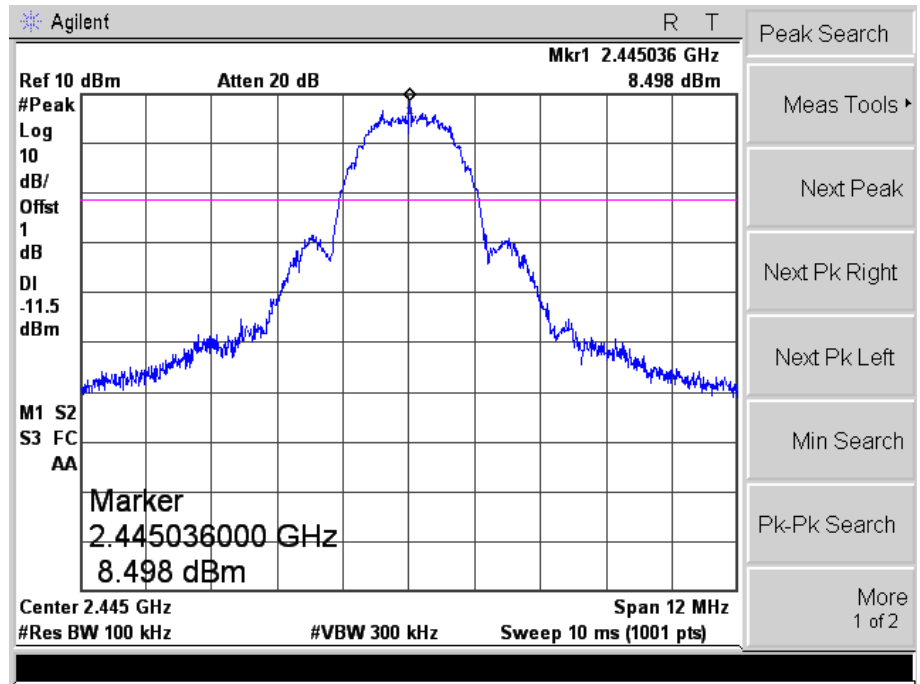
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.100	93.21	-6.78	86.43	/	/	Average Detector
	2480.500	106.75	-6.78	99.97	/	/	Peak Detector
2	2483.500	59.98	-6.77	53.21	54.00	-0.79	Average Detector
	2483.500	74.63	-6.77	67.86	74.00	-6.14	Peak Detector
3	2500.000	39.39	-6.67	32.72	54.00	-21.28	Average Detector
	2500.000	52.42	-6.67	45.75	74.00	-28.25	Peak Detector

➤ Conducted test

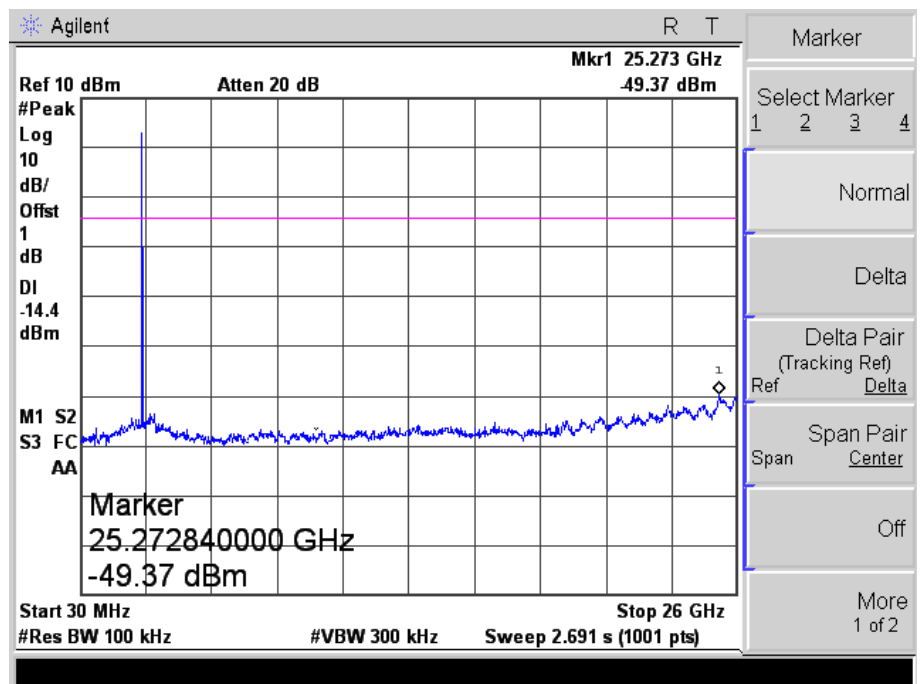
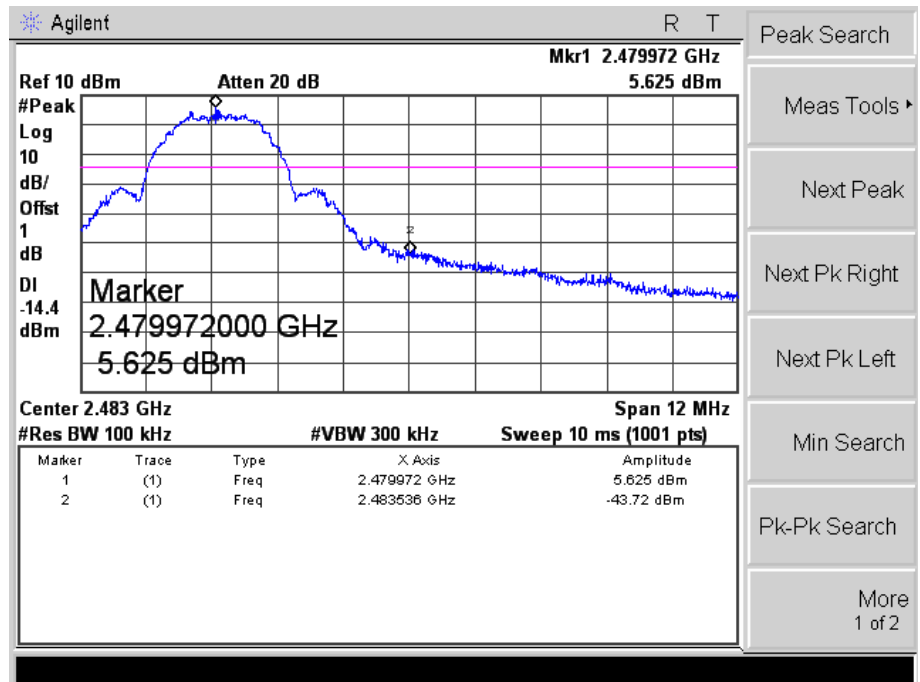
Low



Middle



High



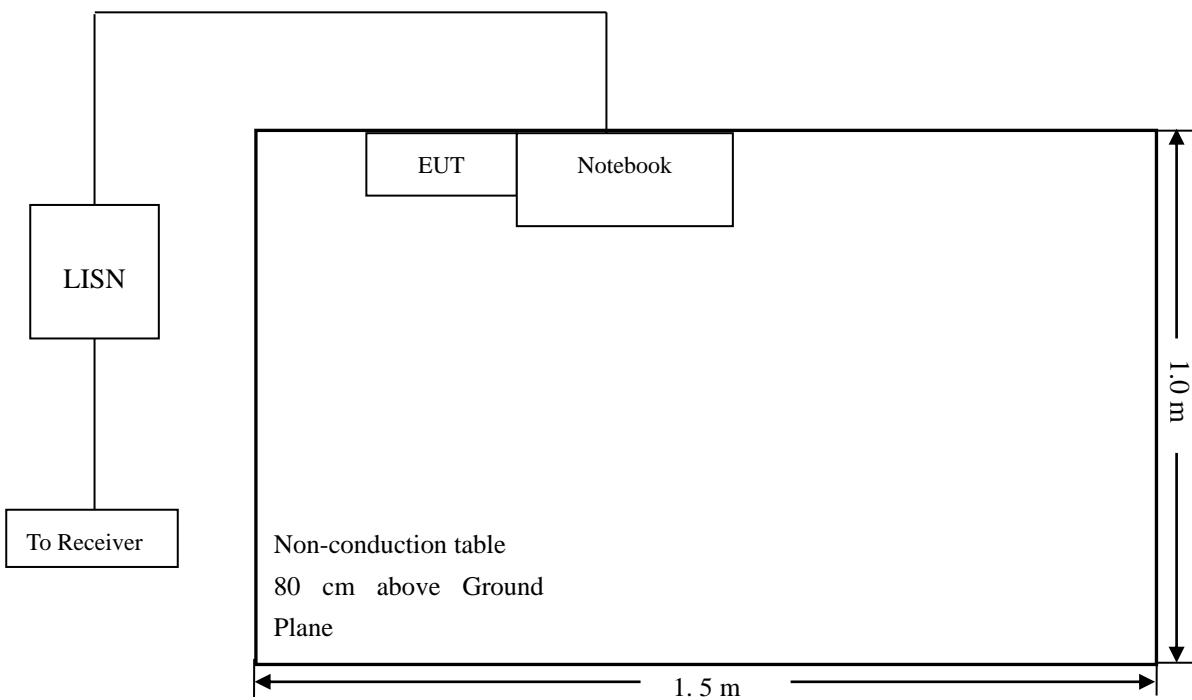
10. Conducted Emissions

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



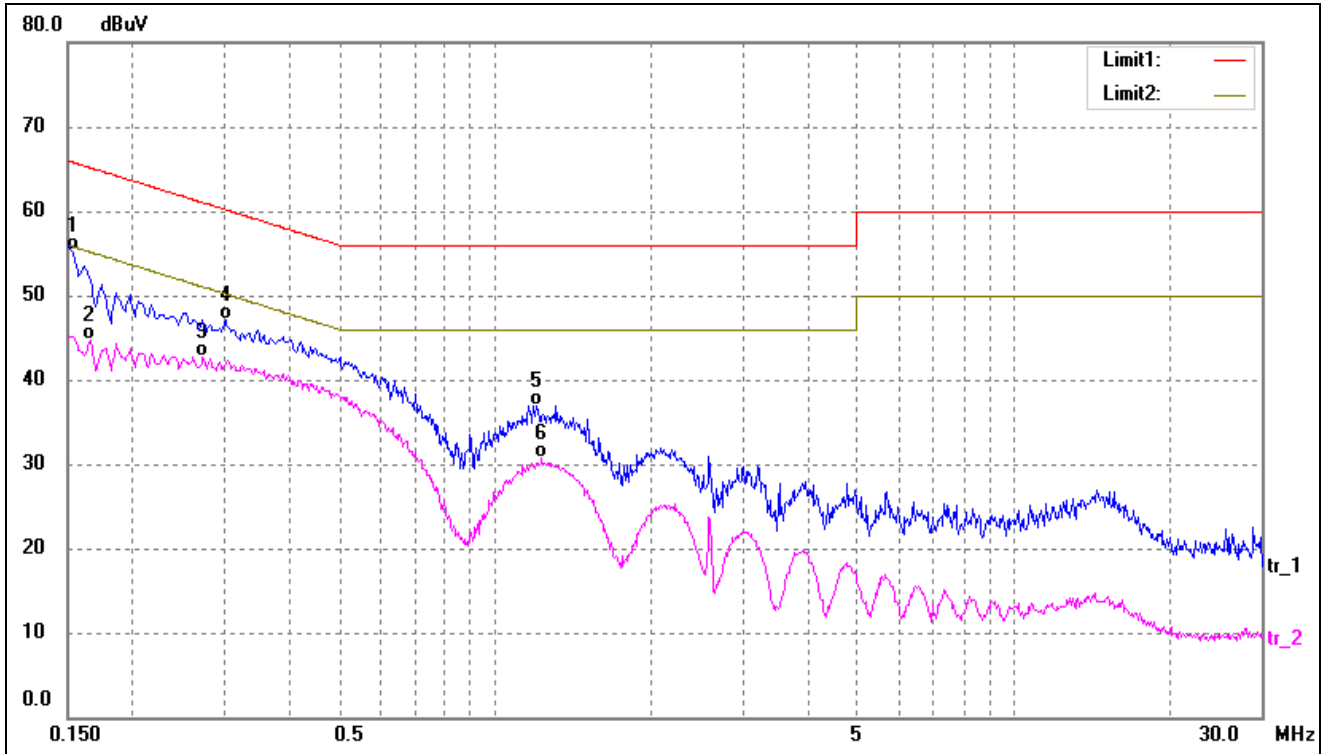
10.3 Test Receiver Setup

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

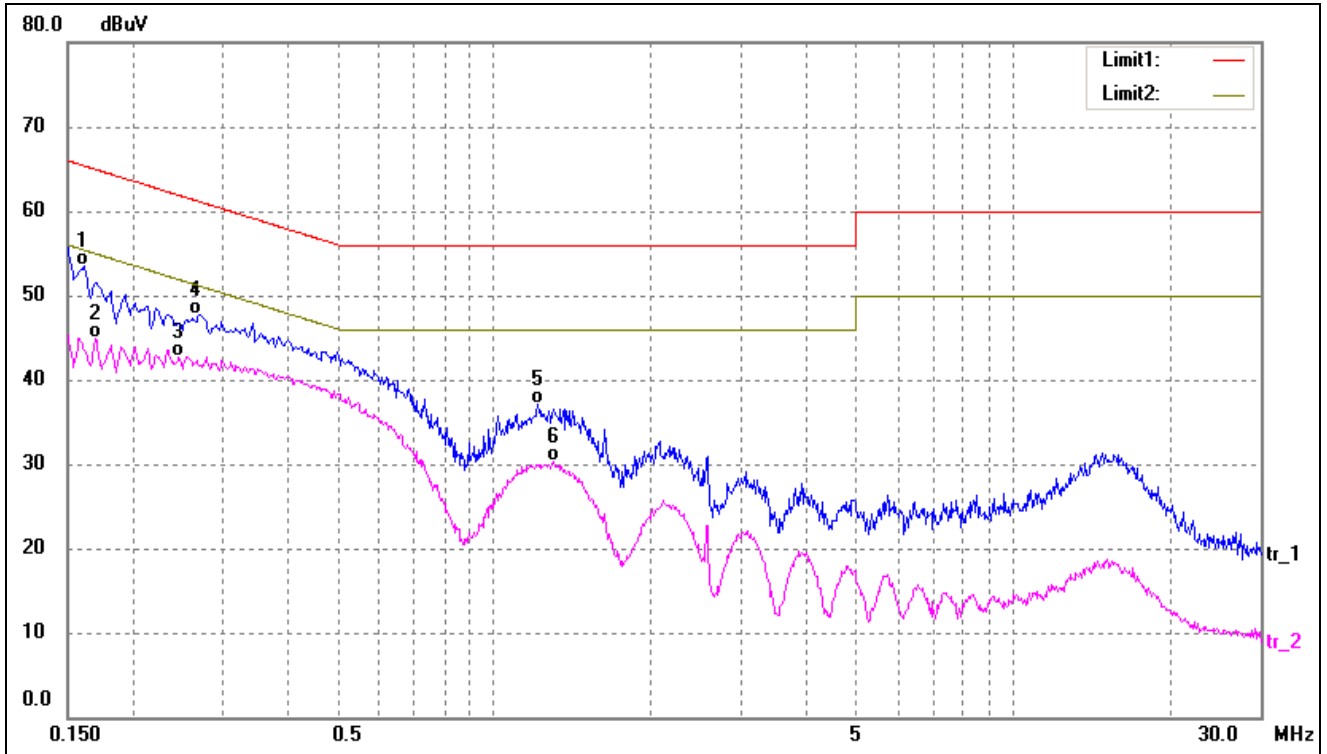
10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1524	45.15	10.10	55.25	65.86	-10.61	QP
2	0.1660	34.61	10.11	44.72	55.15	-10.43	AVG
3*	0.2740	32.51	10.17	42.68	50.99	-8.31	AVG
4	0.3020	36.96	10.19	47.15	60.19	-13.04	QP
5	1.1980	26.47	10.52	36.99	56.00	-19.01	QP
6	1.2300	20.24	10.53	30.77	46.00	-15.23	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Line
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1620	43.33	10.10	53.43	65.36	-11.93	QP
2	0.1700	34.78	10.11	44.89	54.96	-10.07	AVG
3*	0.2460	32.65	10.15	42.80	51.89	-9.09	AVG
4	0.2700	37.56	10.17	47.73	61.12	-13.39	QP
5	1.2100	26.57	10.53	37.10	56.00	-18.90	QP
6	1.2980	19.67	10.54	30.21	46.00	-15.79	AVG

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