

FCC Part 15C Measurement and Test Report




For

ShengYibao Sound&Light Technology Co.,Ltd.

Dongfeng town, zhongshan city of guangdong province, 101

dongfeng road south, zhongshan, China

FCC ID: 2ASIR-LY686

FCC Rule(s):	<u>FCC Part 15.247</u>
Product Description:	<u>Bluetooth Outdoor Rock Speaker</u>
Tested Model:	<u>LY-686</u>
Report No.:	<u>WTG19G01001872W-2</u>
Sample Receipt Date:	<u>2019-01-11</u>
Tested Date:	<u>2019-01-11 to 2019-02-23</u>
Issued Date:	<u>2019-02-23</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 permission by Shenzhen SEM Test Technology Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
1.2 TEST STANDARDS	4
1.3 TEST METHODOLOGY	4
1.4 TEST FACILITY	4
1.5 EUT SETUP AND TEST MODE	5
1.6 MEASUREMENT UNCERTAINTY	5
1.7 TEST EQUIPMENT LIST AND DETAILS	6
2. SUMMARY OF TEST RESULTS	8
3. RF EXPOSURE	9
3.1 STANDARD APPLICABLE	9
3.2 TEST RESULT	9
4. ANTENNA REQUIREMENT	10
4.1 STANDARD APPLICABLE	10
4.2 EVALUATION INFORMATION	10
5. POWER SPECTRAL DENSITY	11
5.1 STANDARD APPLICABLE	11
5.2 TEST PROCEDURE	11
5.3 SUMMARY OF TEST RESULTS/PLOTS	11
6. 6DB BANDWIDTH	13
6.1 STANDARD APPLICABLE	13
6.2 TEST PROCEDURE	13
6.3 SUMMARY OF TEST RESULTS/PLOTS	13
7. RF OUTPUT POWER	15
7.1 STANDARD APPLICABLE	15
7.2 TEST PROCEDURE	15
7.3 SUMMARY OF TEST RESULTS/PLOTS	15
8. FIELD STRENGTH OF SPURIOUS EMISSIONS	17
8.1 STANDARD APPLICABLE	17
8.2 TEST PROCEDURE	17
8.3 CORRECTED AMPLITUDE & MARGIN CALCULATION	18
8.4 SUMMARY OF TEST RESULTS/PLOTS	18
9. OUT OF BAND EMISSIONS	26
9.1 STANDARD APPLICABLE	26
9.2 TEST PROCEDURE	26
9.3 SUMMARY OF TEST RESULTS/PLOTS	27
10. CONDUCTED EMISSIONS	34
10.1 TEST PROCEDURE	34
10.2 BASIC TEST SETUP BLOCK DIAGRAM	34
10.3 TEST RECEIVER SETUP	34
10.4 SUMMARY OF TEST RESULTS/PLOTS	34

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: ShengYibao Sound&Light Technology Co.,Ltd.
Address of applicant: Dongfeng town, zhongshan city of guangdong province, 101 dongfeng road south, zhongshan, China

Manufacturer: ShengYibao Sound&Light Technology Co.,Ltd.
Address of manufacturer: Dongfeng town, zhongshan city of guangdong province, 101 dongfeng road south, zhongshan, China

General Description of EUT	
Product Name:	Bluetooth Outdoor Rock Speaker
Brand Name:	Sang Yip Boom
Model No.:	LY-686
Adding Model(s):	LY-687
Rated Voltage:	N/A
Power Adapter:	Input: 100-240V, 50/60Hz Output: 24V, 2500mA, 60W
Software Version:	V2.5.1
Hardware Version:	V1.1
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Bluetooth Version:	V4.2(BLE mode)
FrequencyRange:	2402-2480MHz
RF Output Power:	-9.559dBm (Conducted)
Data Rate:	1Mbps
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	Inverted F Antenna
Antenna Gain:	0dBi
Lowest Internal Frequency of EUT:	24MHz

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 v04: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 v04

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	2402MHz
TM2	Middle	2440MHz
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	±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	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-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	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-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2018-05-22	2019-05-21
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2018-05-22	2019-05-21
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2018-05-22	2019-05-21
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2018-03-19	2021-03-18
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)	/	2018-03-19	2019-03-18

SEMT-C00 2	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2018-03-1 9	2019-03-1 8
SEMT-C00 3	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5 M	/	2018-03-1 9	2019-03-1 8
SEMT-C00 4	Cable	Zheng DI	2M0RFC	/	2018-03-1 9	2019-03-1 8
SEMT-C00 5	Cable	Zheng DI	1M0RFC	/	2018-03-1 9	2019-03-1 8
SEMT-C00 6	Cable	Zheng DI	1M0RFC	/	2018-03-1 9	2019-03-1 8

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 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

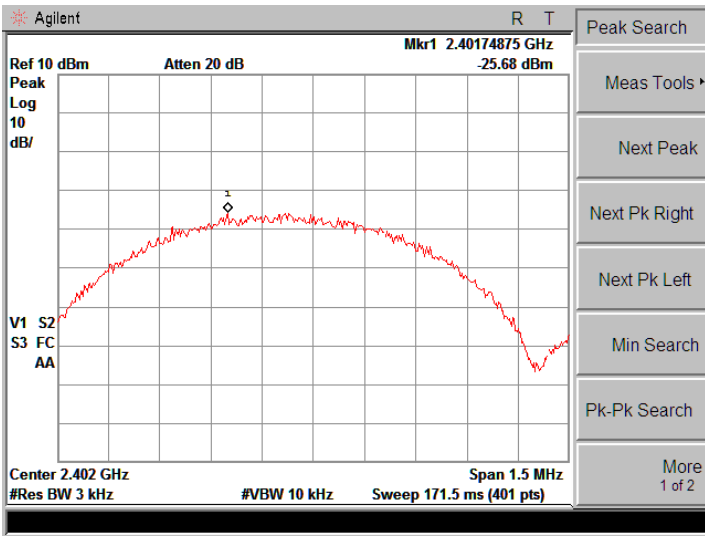
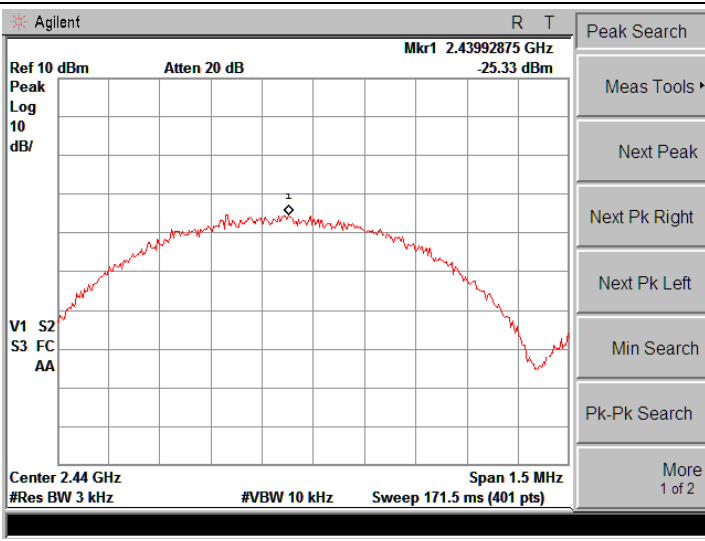
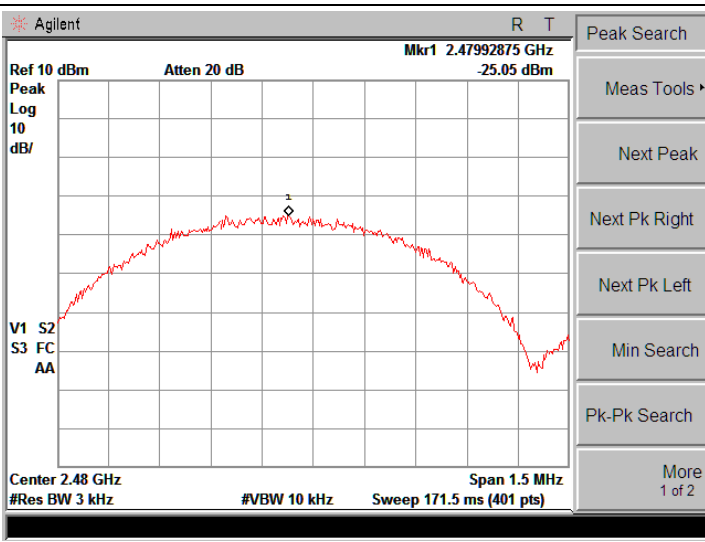
According to the KDB 558074, the test method of power spectral density as below:

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set the VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3 Summary of Test Results/Plots

Test Mode	Test Channel	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
GFSK(BLE)	Low	-25.68	8
	Middle	-25.33	8
	High	-25.05	8

Please refer to the following test plots:

<p>Low</p>	
<p>Middle</p>	
<p>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.

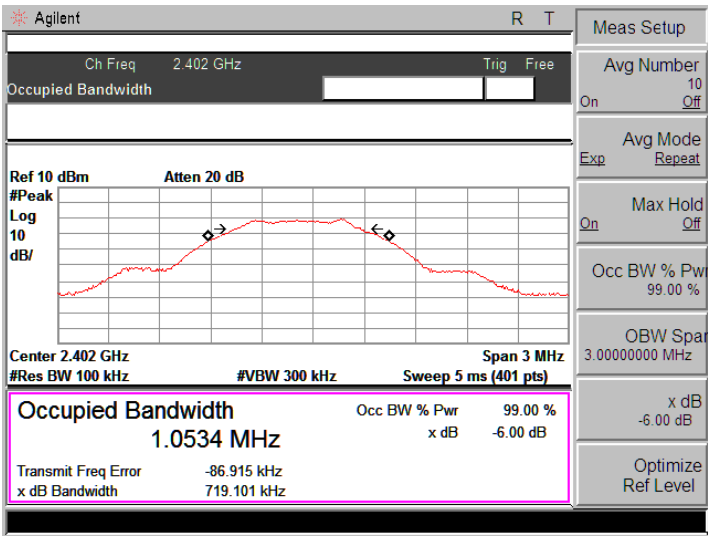
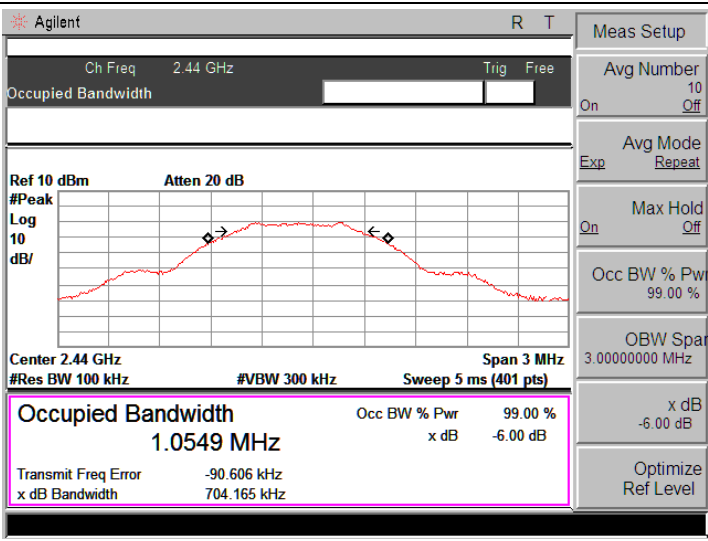
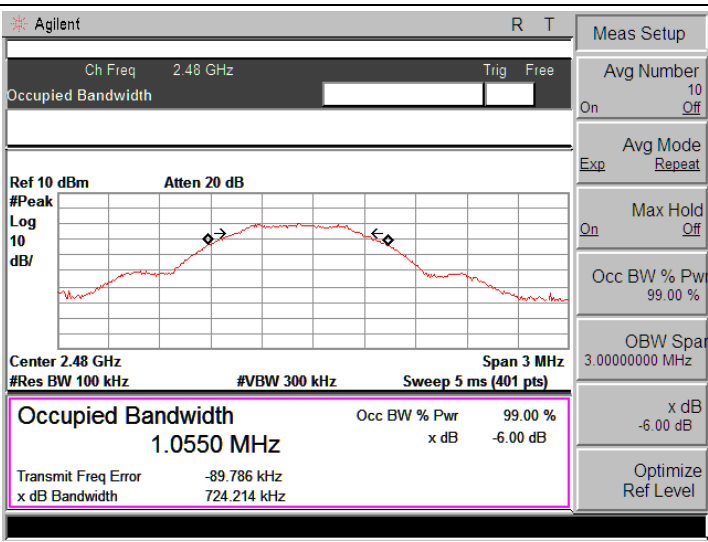
6.2 Test Procedure

- 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 kHz	Limit kHz
GFSK(BLE)	Low	719.101	≥ 500
	Middle	704.165	≥ 500
	High	724.214	≥ 500

Please refer to the following test plots:

<p>Low</p>	 <p>Agilent R T</p> <p>Ch Freq 2.402 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 20 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.402 GHz Span 3 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 5 ms (401 pts)</p> <p>Occupied Bandwidth 1.0534 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -86.915 kHz</p> <p>x dB Bandwidth 719.101 kHz</p> <p>Meas Setup</p> <p>Avg Number 10 On Off</p> <p>Avg Mode Repeat Exp</p> <p>Max Hold On Off</p> <p>Occ BW % Pwr 99.00 %</p> <p>OBW Spar 3.00000000 MHz</p> <p>x dB -6.00 dB</p> <p>Optimize Ref Level</p>
<p>Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 2.44 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 20 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.44 GHz Span 3 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 5 ms (401 pts)</p> <p>Occupied Bandwidth 1.0549 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -90.606 kHz</p> <p>x dB Bandwidth 704.165 kHz</p> <p>Meas Setup</p> <p>Avg Number 10 On Off</p> <p>Avg Mode Repeat Exp</p> <p>Max Hold On Off</p> <p>Occ BW % Pwr 99.00 %</p> <p>OBW Spar 3.00000000 MHz</p> <p>x dB -6.00 dB</p> <p>Optimize Ref Level</p>
<p>High</p>	 <p>Agilent R T</p> <p>Ch Freq 2.48 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 10 dBm Atten 20 dB</p> <p>#Peak Log 10 dB/</p> <p>Center 2.48 GHz Span 3 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 5 ms (401 pts)</p> <p>Occupied Bandwidth 1.0550 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -6.00 dB</p> <p>Transmit Freq Error -89.786 kHz</p> <p>x dB Bandwidth 724.214 kHz</p> <p>Meas Setup</p> <p>Avg Number 10 On Off</p> <p>Avg Mode Repeat Exp</p> <p>Max Hold On Off</p> <p>Occ BW % Pwr 99.00 %</p> <p>OBW Spar 3.00000000 MHz</p> <p>x dB -6.00 dB</p> <p>Optimize Ref Level</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

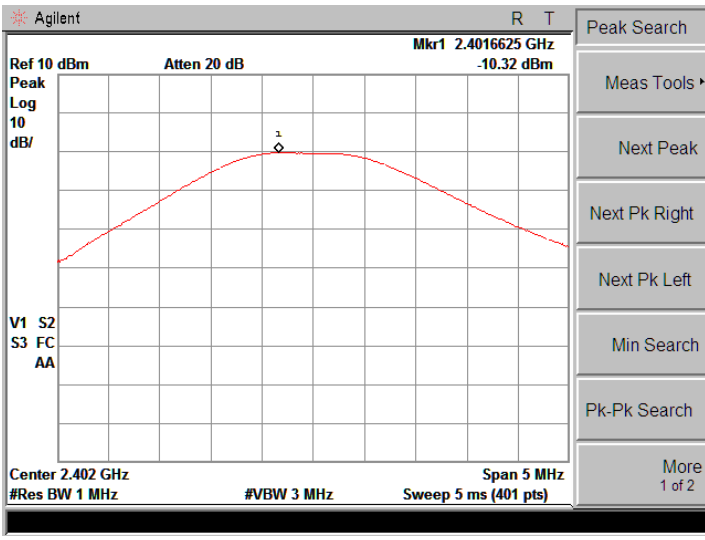
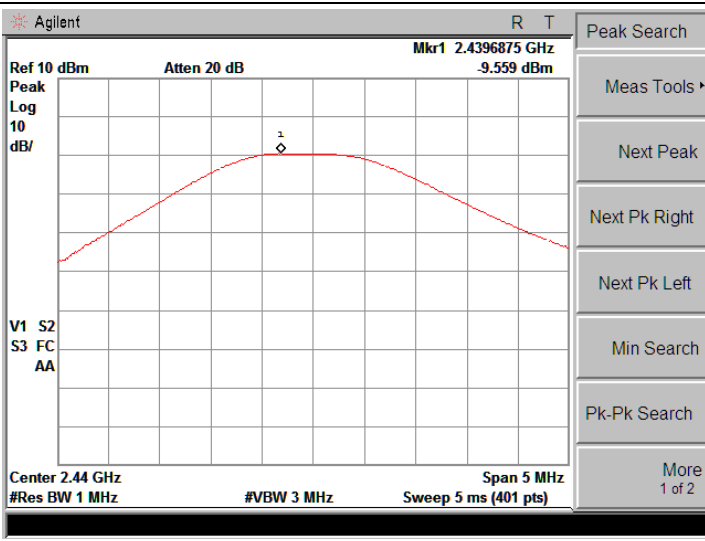
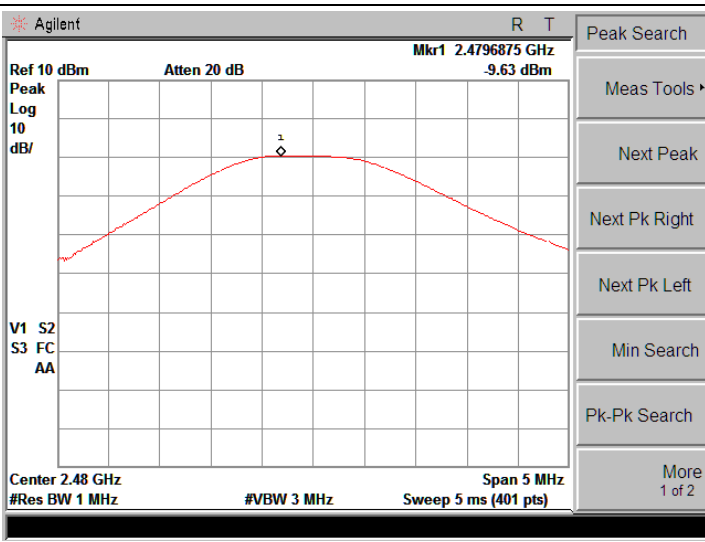
According to section KDB-558074 D01 v04 section 9.1.1, this procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the RBW \geq DTS bandwidth.
- b) Set VBW $\geq 3 \times$ RBW.
- c) Set span $\geq 3 \times$ 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
GFSK(BLE)	Low	-10.32	0.093	1000
	Middle	-9.559	0.111	1000
	High	-9.63	0.109	1000

Note: the antenna gain of 0dBi less than 6dBi maximum permission antenna gain value based on 1 watt peak output power limit.

<p>Low</p>	
<p>Middle</p>	
<p>High</p>	

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).

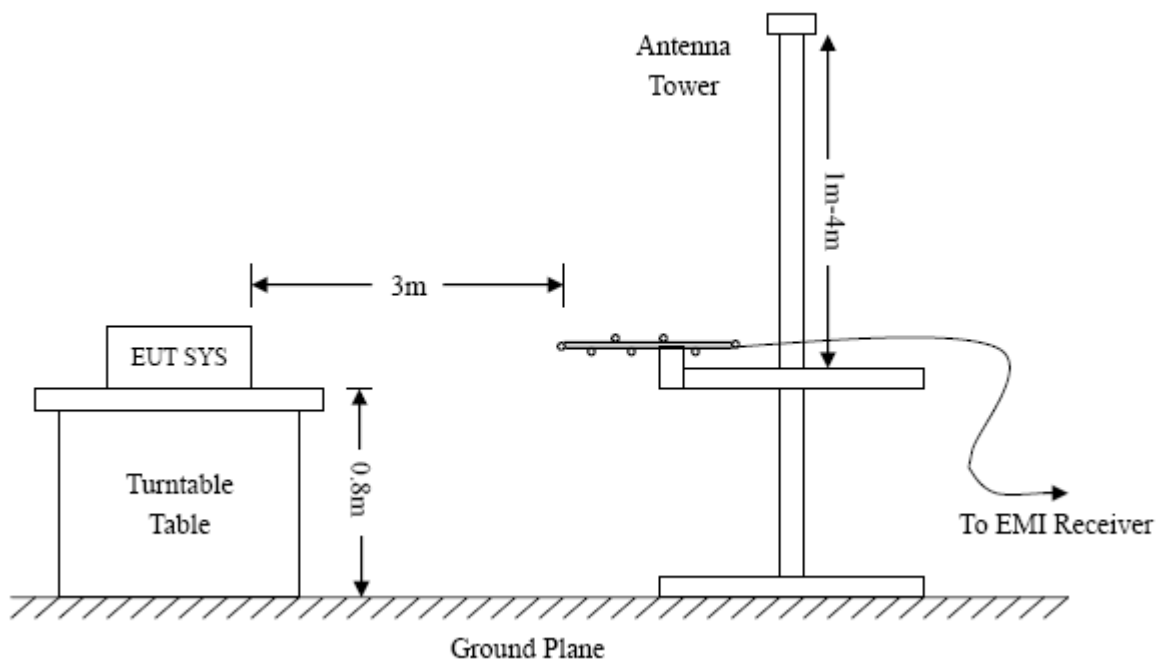
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

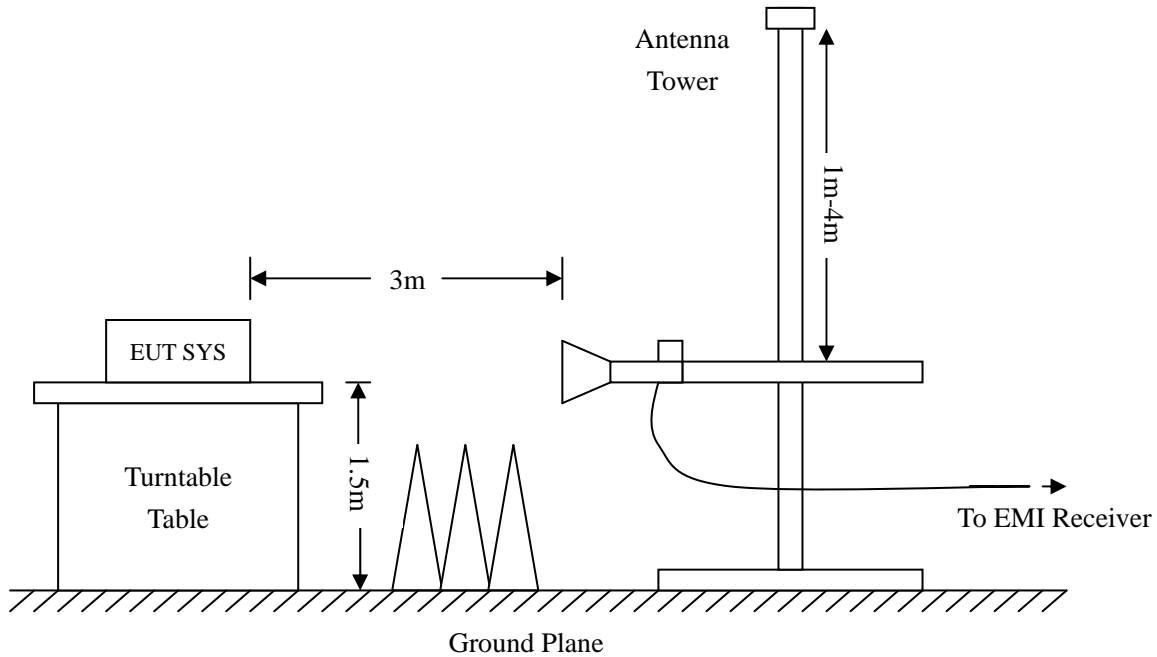
8.2 Test Procedure

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
 AV

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,

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:

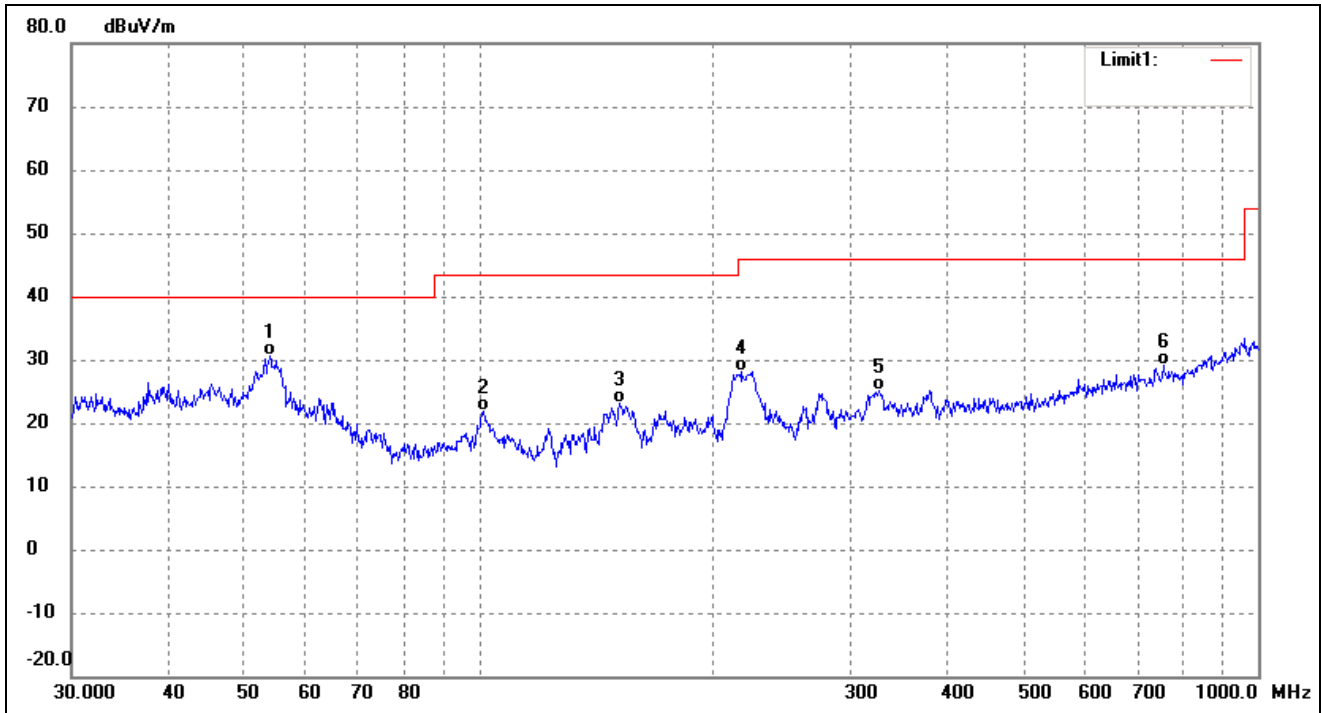
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

8.4 Summary of Test Results/Plots

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

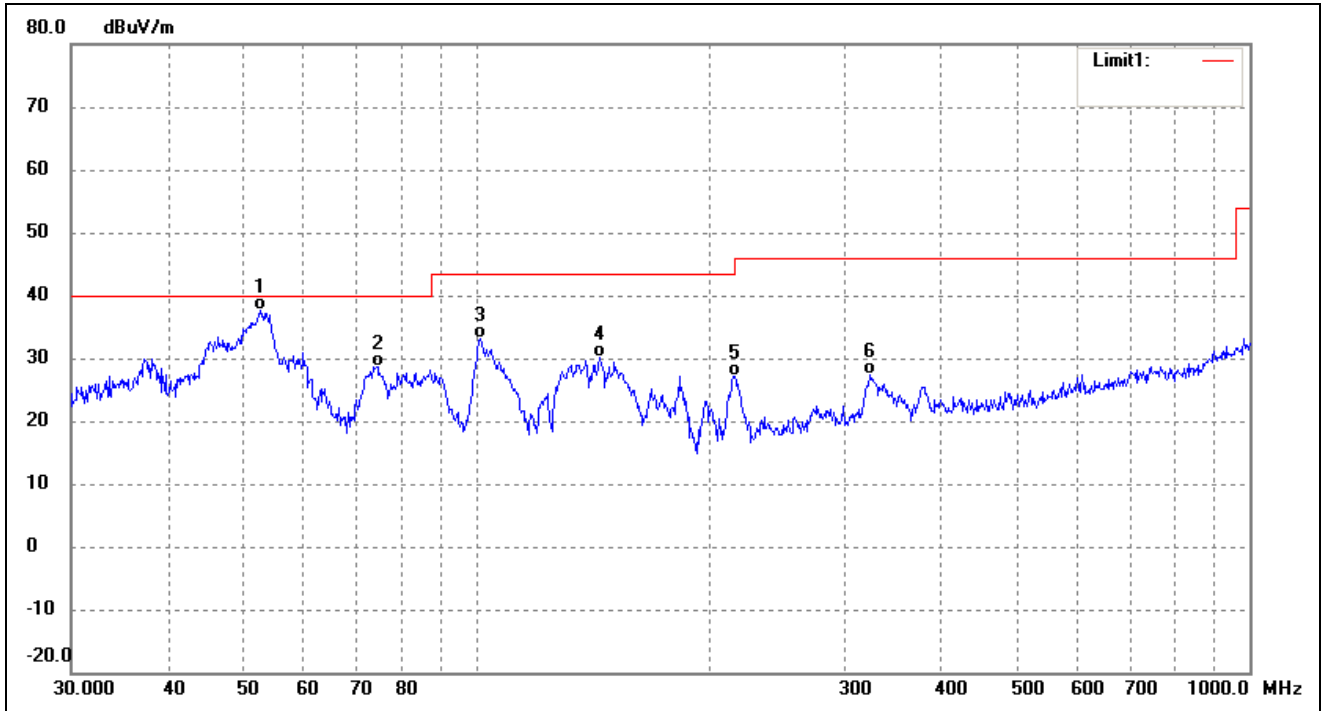
➤ Spurious Emissions Below 1GHz

Test Channel	Low	Polarity:	Horizontal
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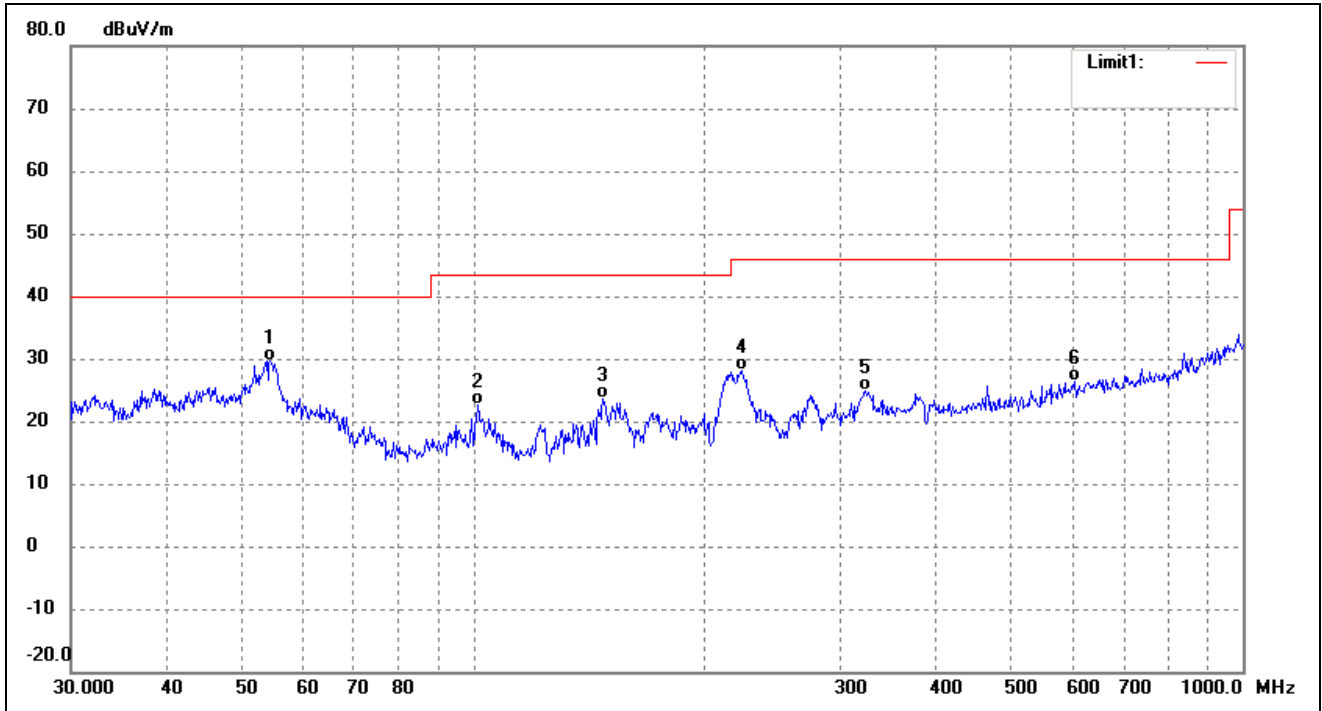
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	53.8818	39.58	-8.92	30.66	40.00	-9.34	QP
2	101.2885	36.71	-14.81	21.90	43.50	-21.60	QP
3	151.5972	40.40	-17.36	23.04	43.50	-20.46	QP
4	216.7828	40.81	-12.76	28.05	46.00	-17.95	QP
5	325.5958	33.78	-8.65	25.13	46.00	-20.87	QP
6	755.3873	30.77	-1.66	29.11	46.00	-16.89	QP

Test Channel	Low	Polarity:	Vertical
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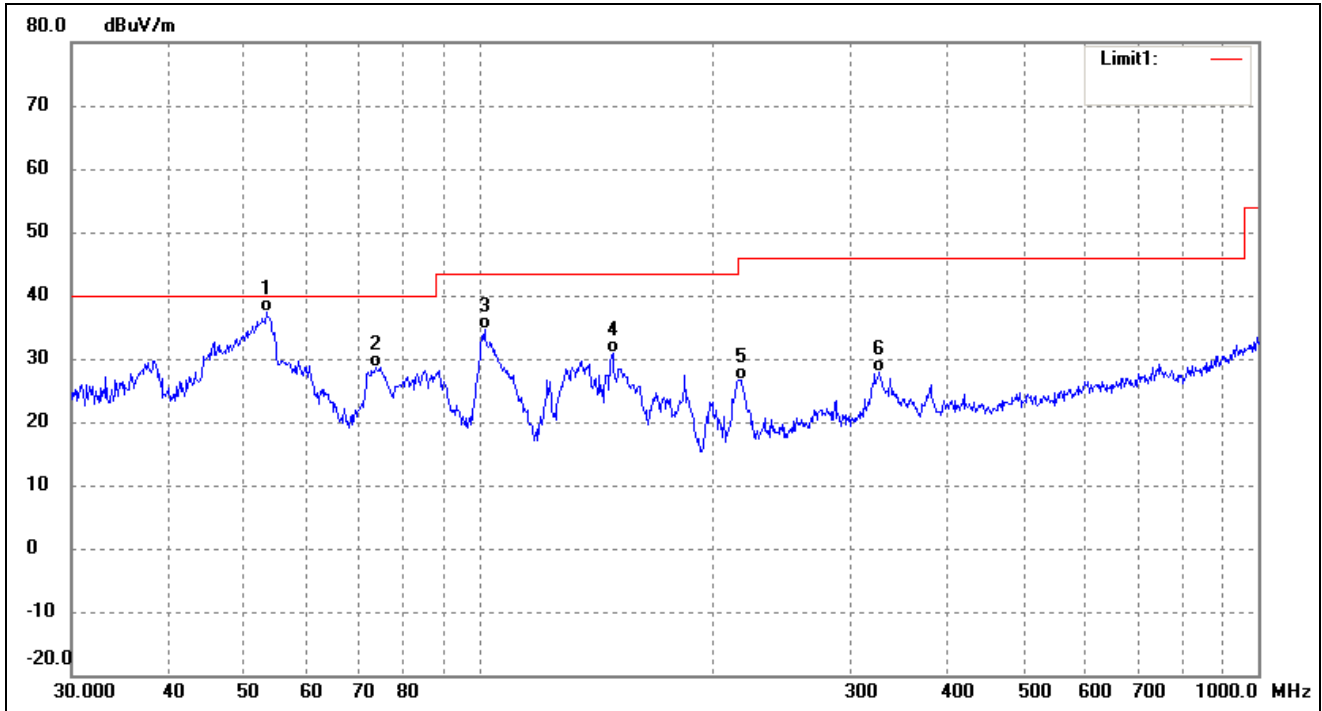
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	52.5753	46.29	-8.69	37.60	40.00	-2.40	QP
2	74.6569	44.86	-16.31	28.55	40.00	-11.45	QP
3	101.2885	47.99	-14.81	33.18	43.50	-10.32	QP
4	144.3348	47.82	-17.75	30.07	43.50	-13.43	QP
5	216.0240	39.99	-12.83	27.16	46.00	-18.84	QP
1	323.3204	36.18	-8.75	27.43	46.00	-18.57	QP

Test Channel	Middle	Polarity:	Horizontal
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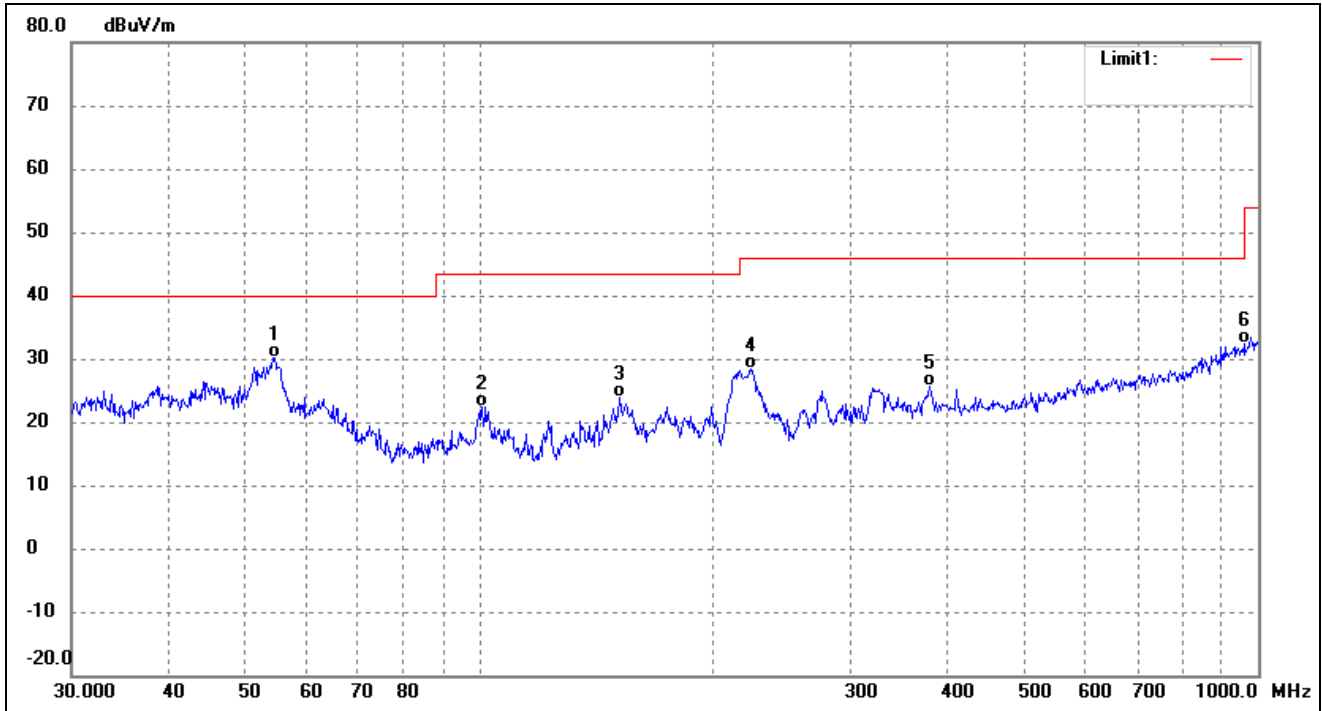
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	54.4516	38.80	-9.09	29.71	40.00	-10.29	QP
2	101.2885	37.36	-14.81	22.55	43.50	-20.95	QP
3	147.4036	41.21	-17.62	23.59	43.50	-19.91	QP
4	223.7334	40.57	-12.40	28.17	46.00	-17.83	QP
5	323.3204	33.70	-8.75	24.95	46.00	-21.05	QP
6	605.6592	30.29	-3.93	26.36	46.00	-19.64	QP

Test Channel	Middle	Polarity:	Vertical
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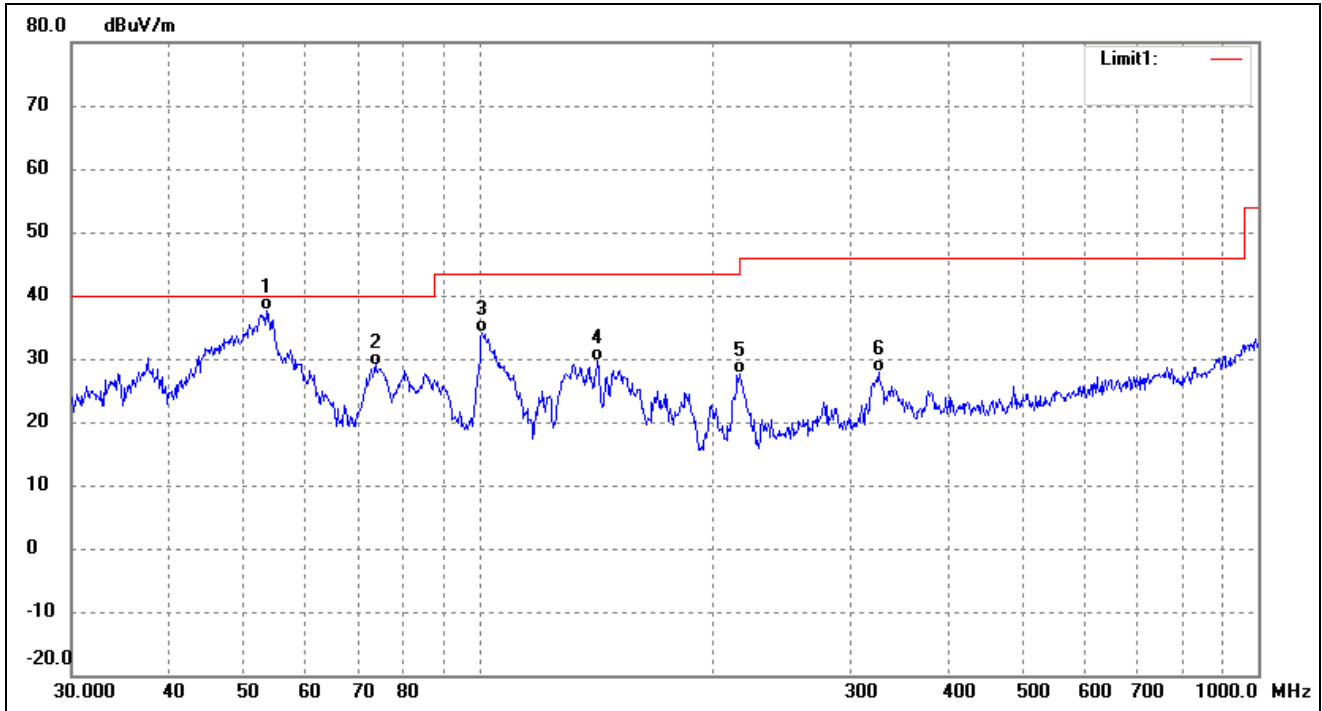
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	53.3179	46.13	-8.82	37.31	40.00	-2.69	QP
2	73.6170	44.58	-15.91	28.67	40.00	-11.33	QP
3	101.6443	49.53	-14.79	34.74	43.50	-8.76	QP
4	148.4410	48.42	-17.56	30.86	43.50	-12.64	QP
5	216.7828	39.48	-12.76	26.72	46.00	-19.28	QP
6	326.7395	36.52	-8.60	27.92	46.00	-18.08	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)	Remark
1	54.6429	39.37	-9.14	30.23	40.00	-9.77	QP
2	100.9340	37.13	-14.84	22.29	43.50	-21.21	QP
3	151.5972	41.17	-17.36	23.81	43.50	-19.69	QP
4	222.9502	40.71	-12.41	28.30	46.00	-17.70	QP
5	378.5843	33.53	-7.83	25.70	46.00	-20.30	QP
6	958.7943	29.27	3.09	32.36	46.00	-13.64	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)	Remark
1	53.3179	46.47	-8.82	37.65	40.00	-2.35	QP
2	73.6170	44.91	-15.91	29.00	40.00	-11.00	QP
3	100.9340	48.92	-14.84	34.08	43.50	-9.42	QP
4	141.8262	47.33	-17.66	29.67	43.50	-13.83	QP
5	216.0240	40.40	-12.83	27.57	46.00	-18.43	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-2402MHz							
4804	61.96	-3.59	58.37	74	-15.63	H	PK
4804	39.60	-3.59	36.01	54	-17.99	H	AV
7206	59.71	-0.52	59.19	74	-14.81	H	PK
7206	42.03	-0.52	41.51	54	-12.49	H	AV
4804	59.42	-3.59	55.83	74	-18.17	V	PK
4804	39.95	-3.59	36.36	54	-17.64	V	AV
7206	62.08	-0.52	61.56	74	-12.44	V	PK
7206	39.31	-0.52	38.79	54	-15.21	V	AV
Middle Channel-2440MHz							
4880	58.47	-3.49	54.98	74	-19.02	H	PK
4880	42.93	-3.49	39.44	54	-14.56	H	AV
7320	63.01	-0.47	62.54	74	-11.46	H	PK
7320	38.97	-0.47	38.50	54	-15.50	H	AV
4880	61.65	-3.49	58.16	74	-15.84	V	PK
4880	38.77	-3.49	35.28	54	-18.72	V	AV
7320	60.47	-0.47	60.00	74	-14.00	V	PK
7320	42.04	-0.47	41.57	54	-12.43	V	AV
High Channel-2480MHz							
4960	60.21	-3.41	56.80	74	-17.20	H	PK
4960	40.82	-3.41	37.41	54	-16.59	H	AV
7440	58.63	-0.42	58.21	74	-15.79	H	PK
7440	40.81	-0.42	40.39	54	-13.61	H	AV
4960	59.61	-3.41	56.20	74	-17.80	V	PK
4960	40.16	-3.41	36.75	54	-17.25	V	AV
7440	59.43	-0.42	59.01	74	-14.99	V	PK
7440	42.47	-0.42	42.05	54	-11.95	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 D01 v04, 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 D01 v04, 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.

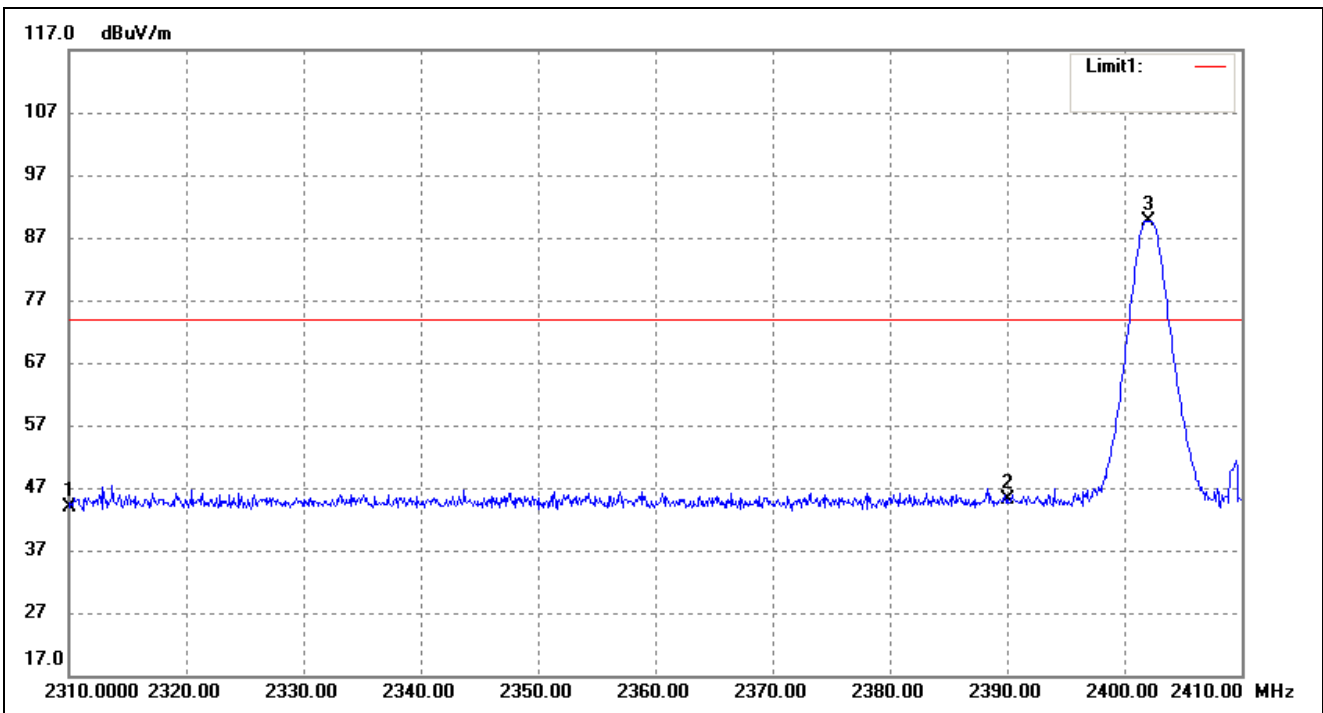
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1.

Report the three highest emissions relative to the limit.

9.3 Summary of Test Results/Plots

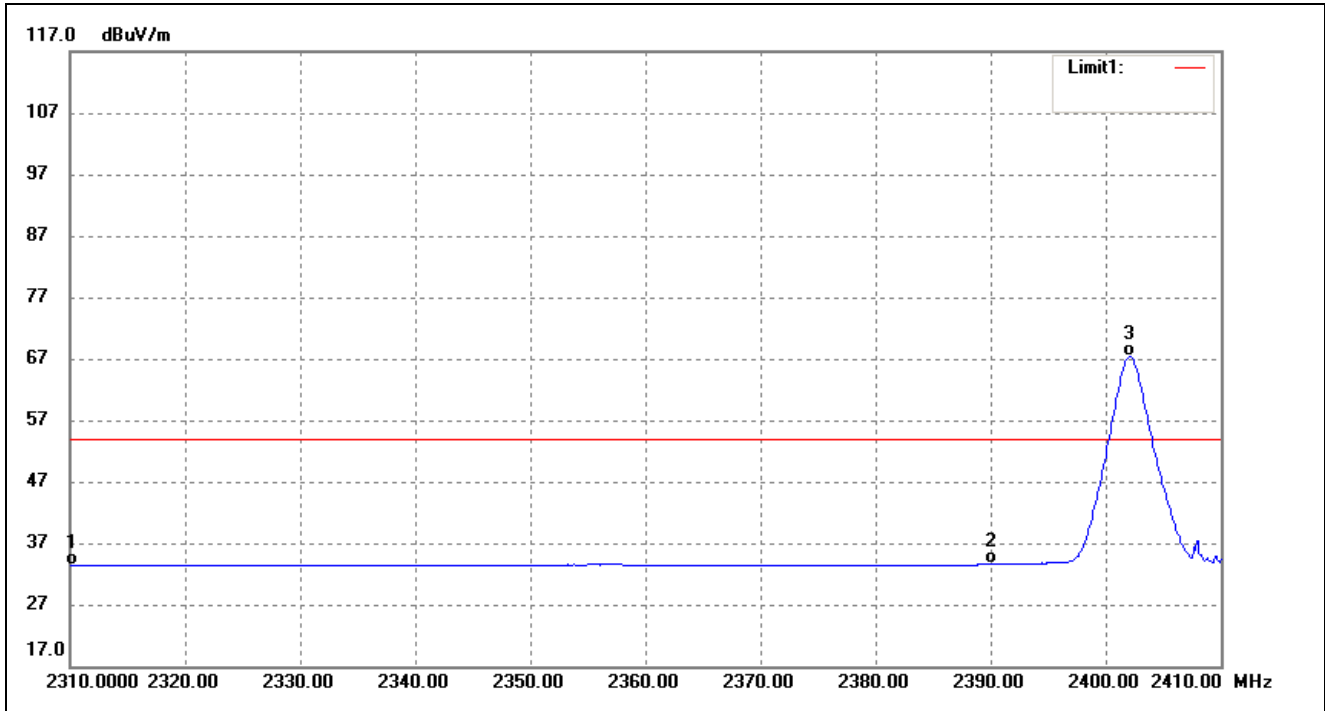
➤ Radiated test

Test Channel	Low	Polarity:	Horizontal(worst case)
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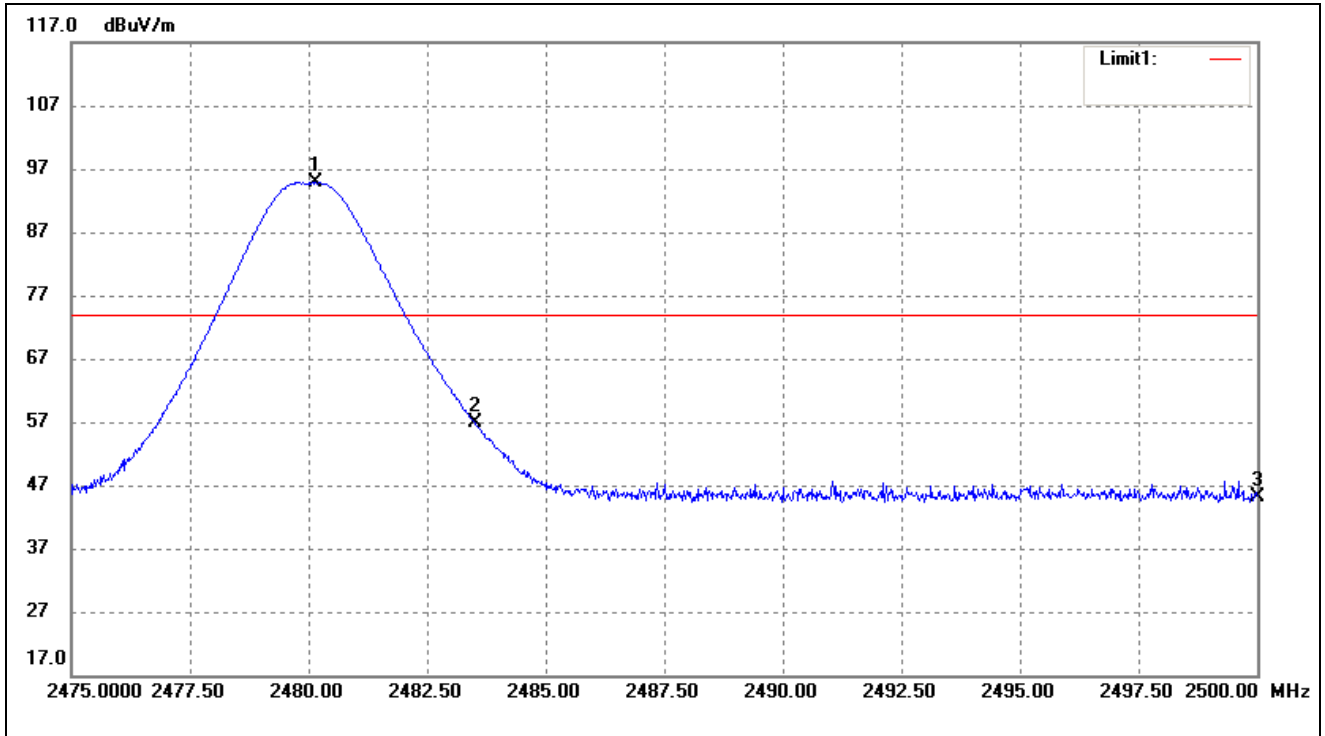
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	51.54	-7.78	43.76	74.00	-30.24	peak
2	2390.000	52.39	-7.32	45.07	74.00	-28.93	peak
3	2402.100	96.84	-7.25	89.59	74.00	15.59	peak

Test Channel	Low	Polarity:	Horizontal(worst case)
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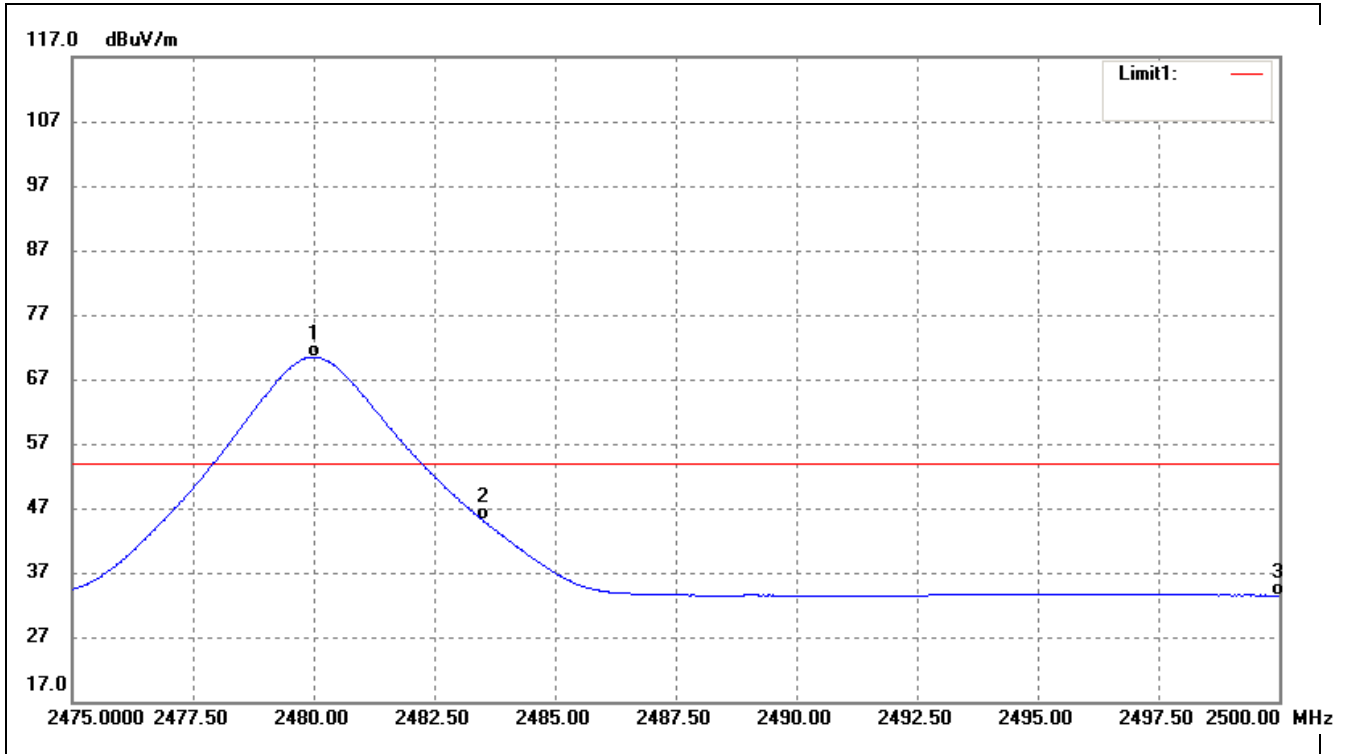
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	41.19	-7.78	33.41	54.00	-20.59	AVG
2	2390.000	40.89	-7.32	33.57	54.00	-20.43	AVG
3	2402.100	74.63	-7.25	67.38	54.00	13.38	AVG

Test Channel	High	Polarity:	Horizontal(worst case)
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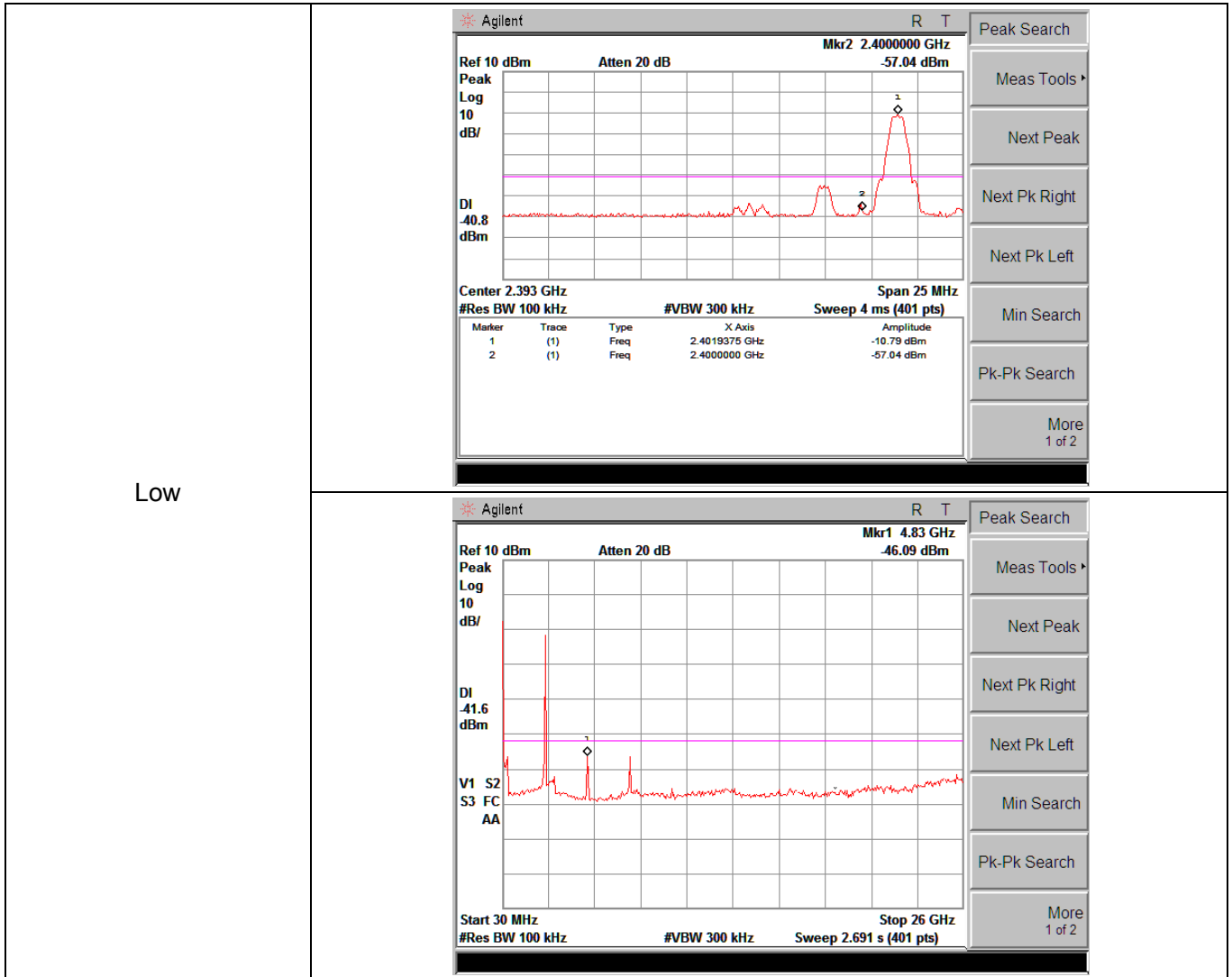
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.150	101.58	-6.78	94.80	74.00	20.80	peak
2	2483.500	63.68	-6.77	56.91	74.00	-17.09	peak
3	2500.000	51.84	-6.67	45.17	74.00	-28.83	peak

Test Channel	High	Polarity:	Horizontal(worst case)
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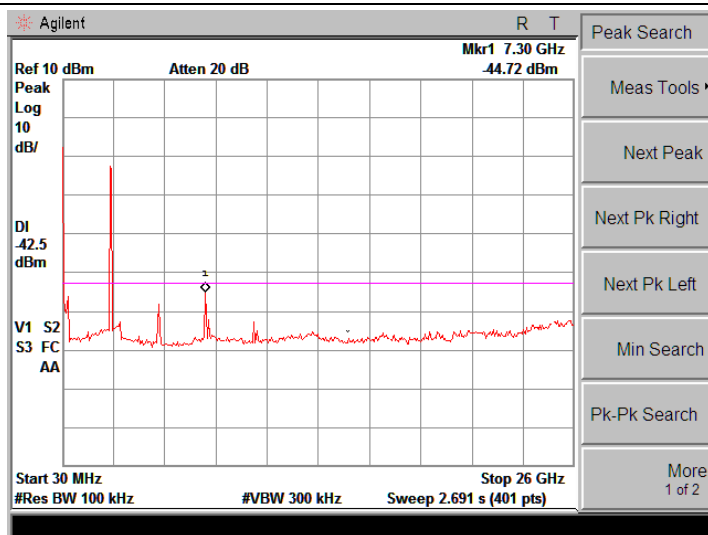
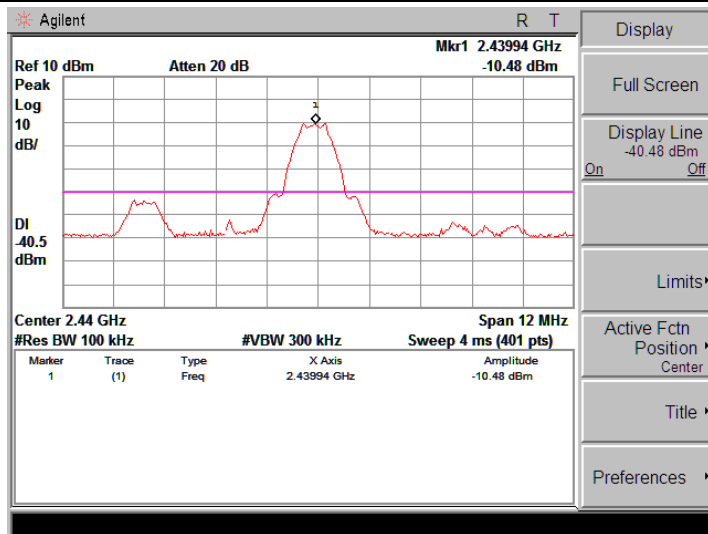


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.025	77.26	-6.79	70.47	54.00	16.47	peak
2	2483.500	51.91	-6.77	45.14	54.00	-8.86	peak
3	2500.000	40.14	-6.67	33.47	54.00	-20.53	peak

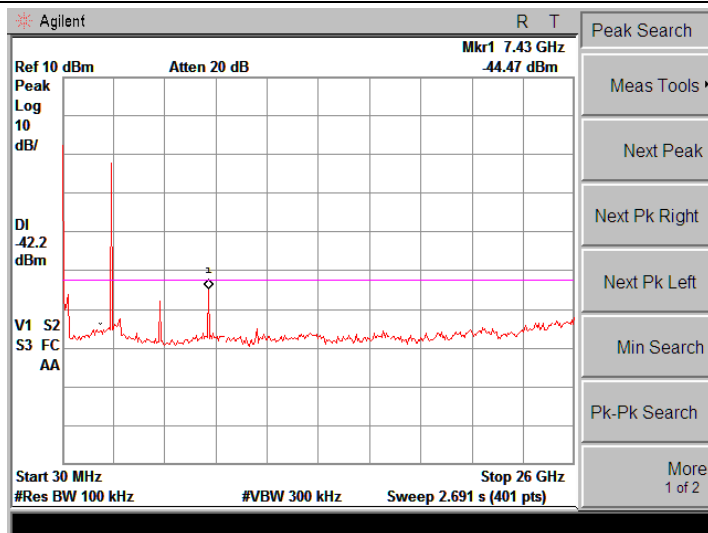
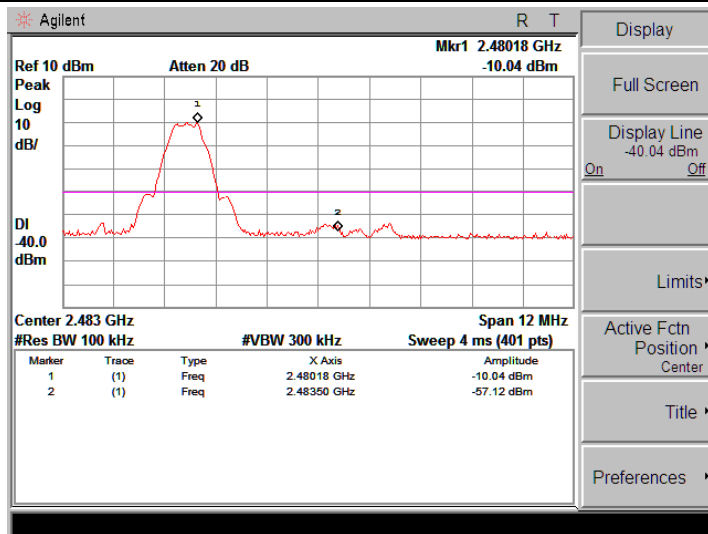
➤ Conducted test



Middle



High



10. Conducted Emissions

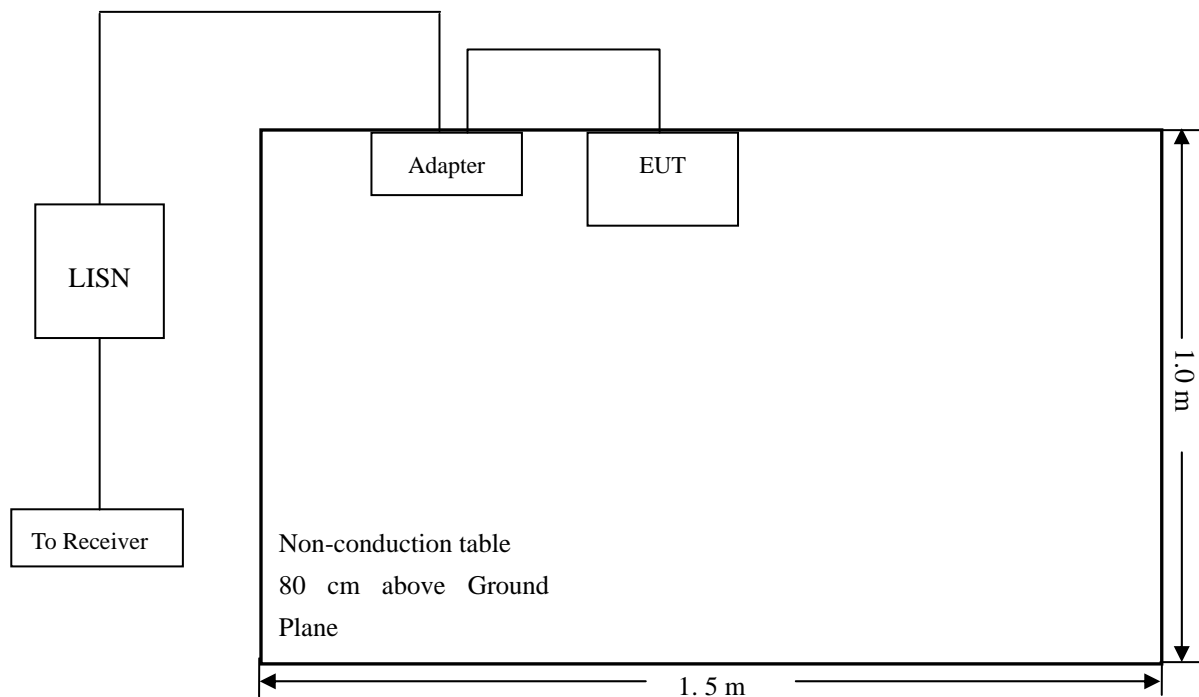
10.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 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



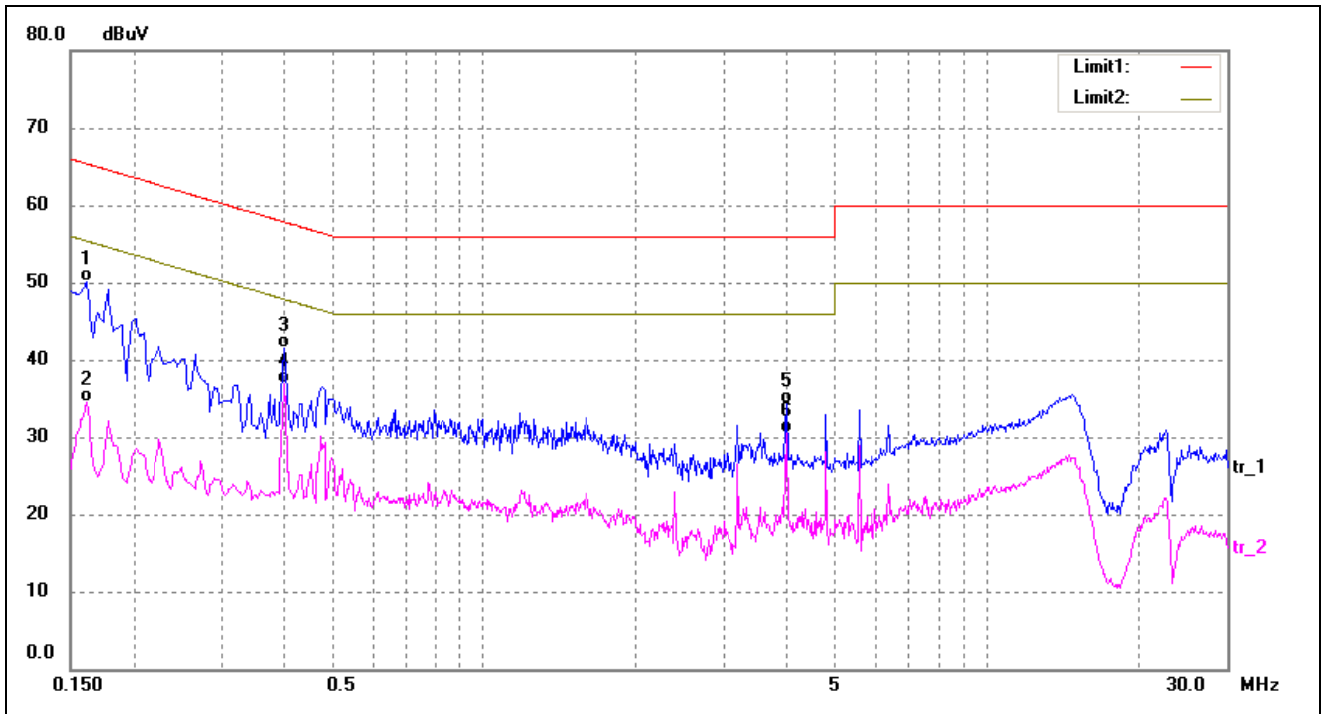
10.3 Test Receiver Setup

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

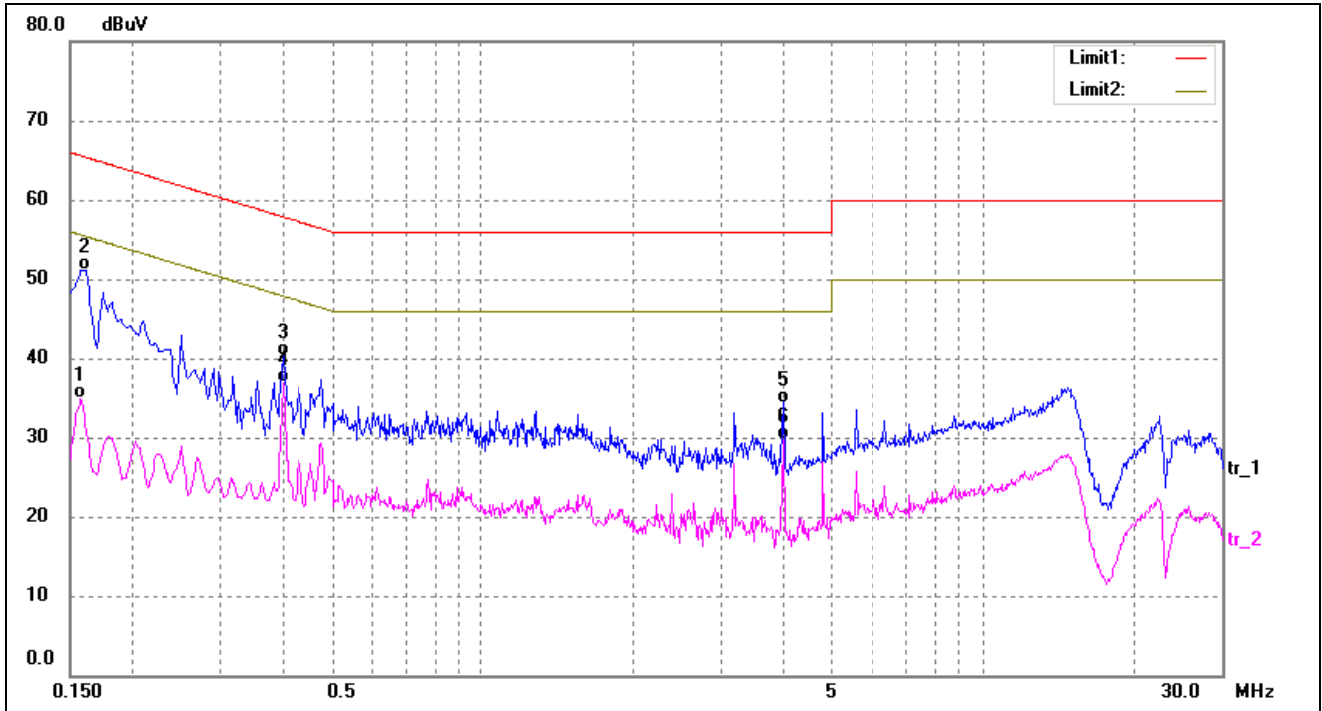
10.4 Summary of Test Results/Plots

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	0.1620	39.95	10.10	50.05	65.36	-15.31	QP
2	0.1620	24.45	10.10	34.55	55.36	-20.81	AVG
3	0.3980	31.23	10.25	41.48	57.90	-16.42	QP
4	0.3980	26.71	10.25	36.96	47.90	-10.94	AVG
5	3.9860	23.69	10.71	34.40	56.00	-21.60	QP
6*	3.9860	19.78	10.71	30.49	46.00	-15.51	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*	0.1580	24.78	10.10	34.88	55.57	-20.69	AVG
2	0.1620	41.09	10.10	51.19	65.36	-14.17	QP
3	0.3980	30.02	10.25	40.27	57.90	-17.63	QP
4	0.3980	26.71	10.25	36.96	47.90	-10.94	AVG
5	3.9860	23.69	10.71	34.40	56.00	-21.60	QP
6	3.9860	19.07	10.71	29.78	46.00	-16.22	AVG

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