

# FCC Part 15C Measurement and Test Report




For

**Ever Sparkle Technologies Ltd.**

**Unit 403, Nan Fung Commercial Centre, 19 Lam Lok St., Kowloon Bay,**

**Kowloon, Hongkong**

**FCC ID: SQOKTW029**

<b>FCC Rule(s):</b>	<u>FCC Part 15.247</u>
<b>Product Description:</b>	<u>Knitwarm</u>
<b>Tested Model:</b>	<u>KTW-029</u>
<b>Report No.:</b>	<u>WTG19G02009525W</u>
<b>Sample Receipt Date:</b>	<u>2019-02-27</u>
<b>Tested Date:</b>	<u>2019-02-27 to 2019-03-15</u>
<b>Issued Date:</b>	<u>2019-03-15</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.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Ever Sparkle Technologies Ltd.  
Address of applicant: Unit 403, Nan Fung Commercial Centre, 19 Lam Lok St.,  
Kowloon Bay, Kowloon, Hongkong

Manufacturer: Ever Sparkle Technologies Ltd.  
Address of manufacturer: Unit 403, Nan Fung Commercial Centre, 19 Lam Lok St.,  
Kowloon Bay, Kowloon, Hongkong

General Description of EUT	
Product Name:	Knitwarm
Brand Name:	Knitwarm
Model No.:	KTW-029
Adding Model(s):	N/A
Rated Voltage:	USB 5V
Power Adapter:	N/A
Software Version:	1.02
Hardware Version:	VER B
<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)
Frequency Range:	2402-2480MHz
RF Output Power:	-4.924dBm (Conducted)
Data Rate:	1Mbps
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	PCB Antenna
Antenna Gain:	0dBi
Lowest Internal Frequency of EUT:	32.768KHZ

## 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	$\pm 0.42\text{dB}$
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	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)	/	2018-05-22	2019-05-21
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2018-05-22	2019-05-21
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2018-05-22	2019-05-21
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2018-05-22	2019-05-21
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2018-05-22	2019-05-21
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2018-05-22	2019-05-21

## 2. SUMMARY OF TEST RESULTS

<b>FCC Rules</b>	<b>Description of Test Item</b>	<b>Result</b>
§ 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**

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#### **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**

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### **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

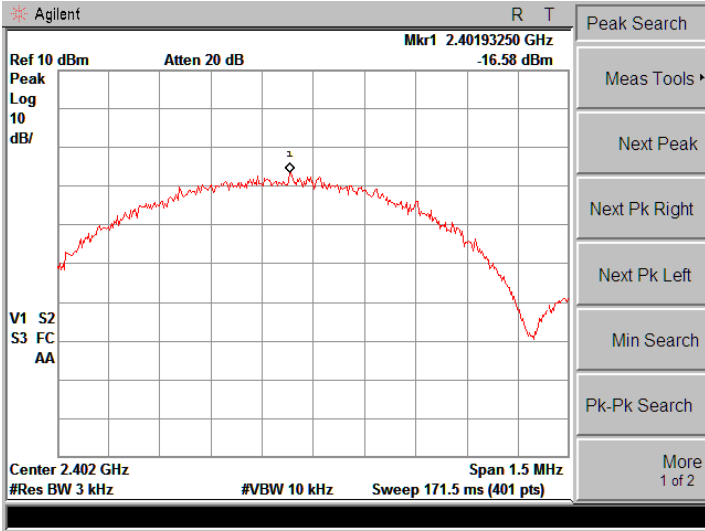
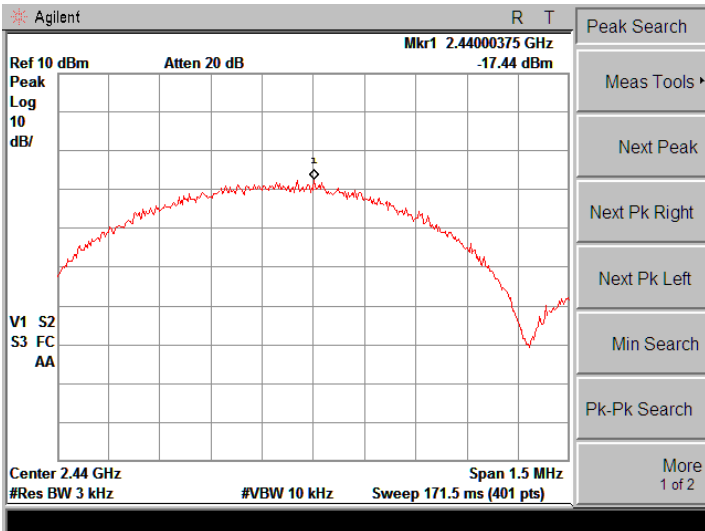
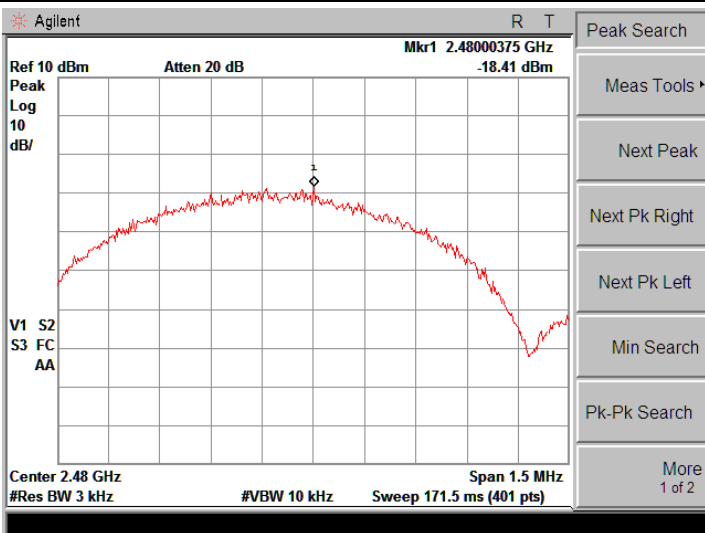
According to the KDB 558074, the test method of power spectral density as below:

- 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	-16.58	8
	Middle	-17.44	8
	High	-18.41	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.

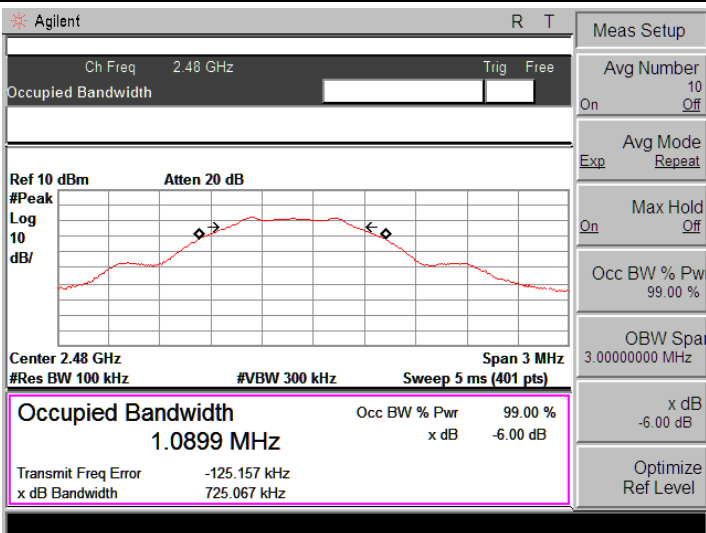
### 6.2 Test Procedure

- 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	724.528	$\geq 500$
	Middle	716.860	$\geq 500$
	High	725.067	$\geq 500$

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><b>Occupied Bandwidth 1.0912 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -107.823 kHz</p> <p>x dB Bandwidth 724.528 kHz</p> <p>Sweep: Sweep Time 5.000 ms, Auto, Man, Sweep Cont, Auto Sweep Coupling SA, Points 401, Segmented</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><b>Occupied Bandwidth 1.0904 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -108.612 kHz</p> <p>x dB Bandwidth 716.860 kHz</p> <p>Sweep: Sweep Time 5.000 ms, Auto, Man, Sweep Cont, Auto Sweep Coupling SA, Points 401, Segmented</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><b>Occupied Bandwidth 1.0899 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -125.157 kHz</p> <p>x dB Bandwidth 725.067 kHz</p> <p>Meas Setup: Avg Number 10, On, Off, Avg Mode Exp, Repeat, Max Hold On, Off, Occ BW % Pwr 99.00 %, OBW Spar 3.00000000 MHz, x dB -6.00 dB, 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

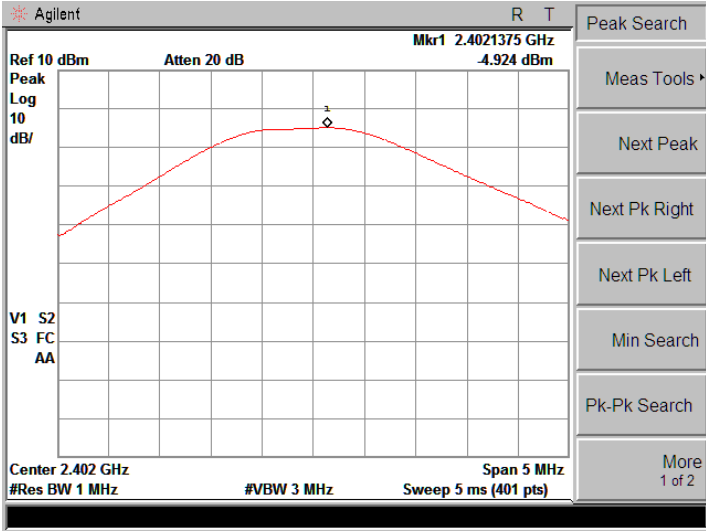
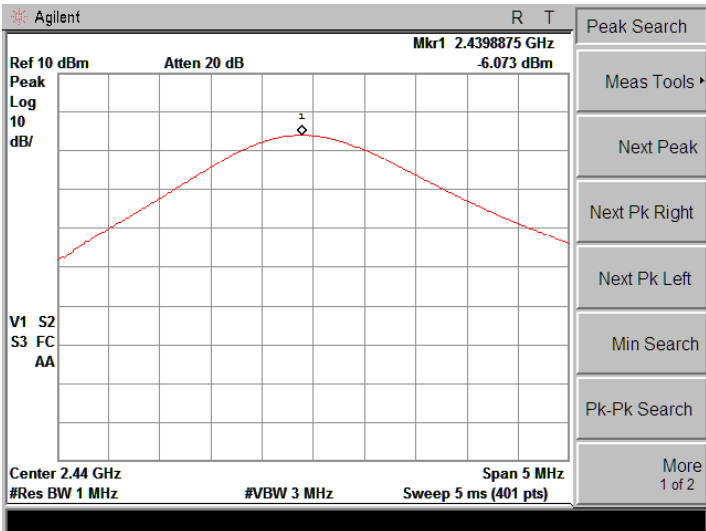
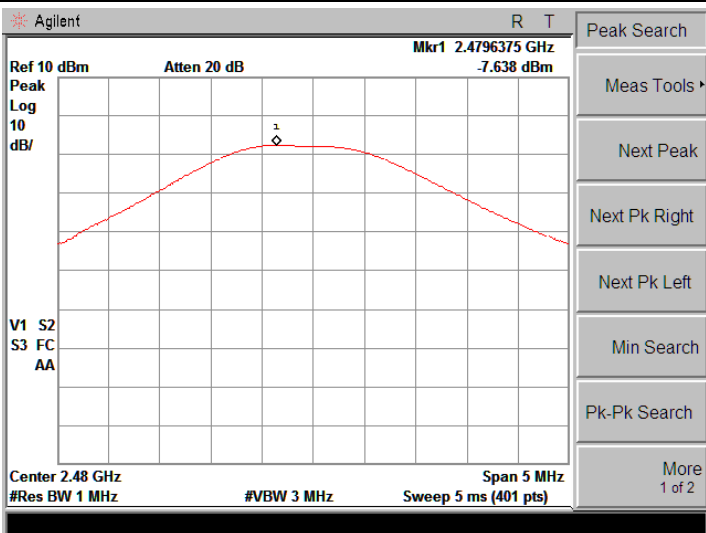
According to section KDB-558074 D01 v04 section 9.1.1, this procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- 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	-4.924	0.0003	1000
	Middle	-6.073	0.0002	1000
	High	-7.638	0.0002	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

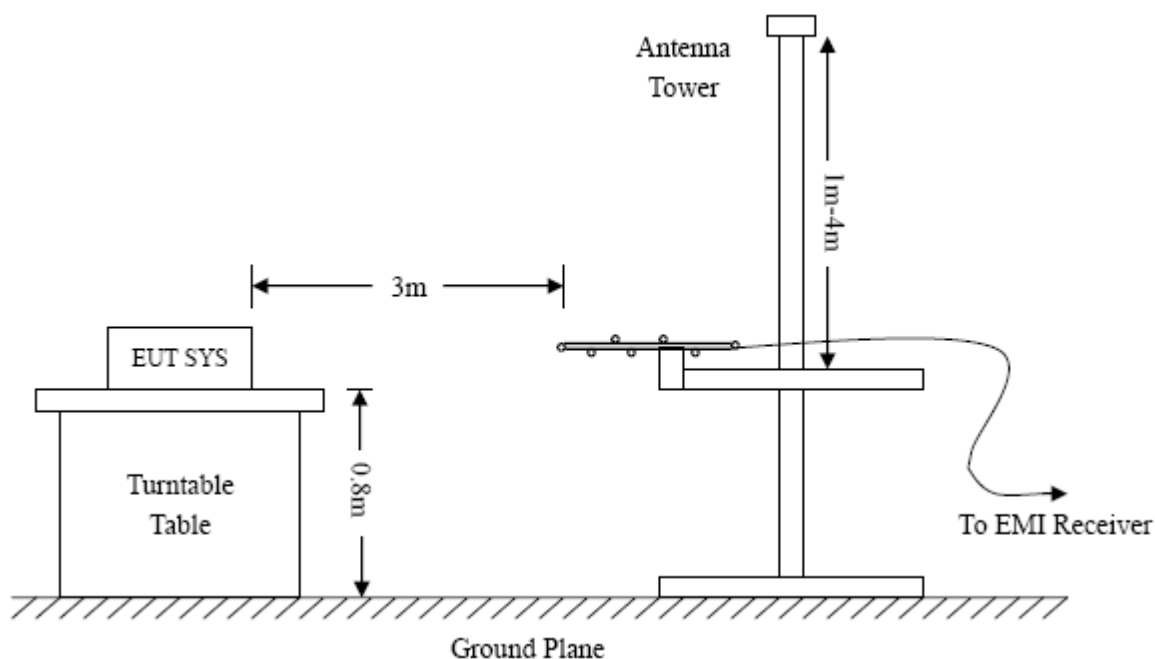
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within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

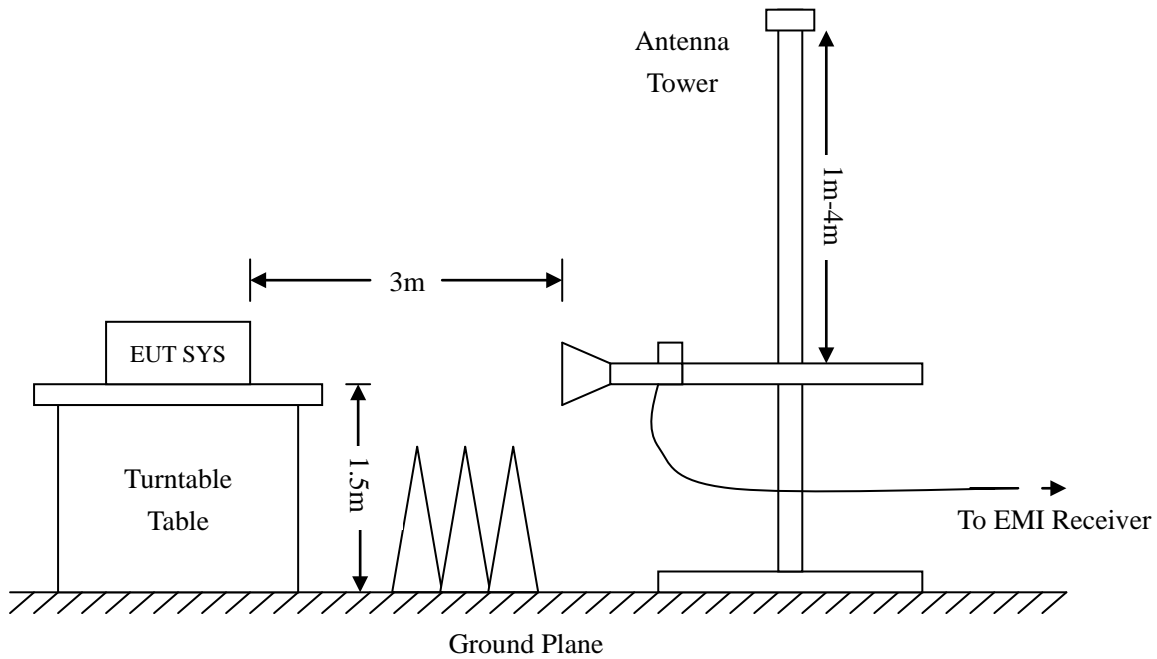
### 8.2 Test Procedure

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

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  $-6\text{dB}\mu\text{V}$  means the emission is  $6\text{dB}\mu\text{V}$  below the maximum limit. The equation for margin calculation is as follows:

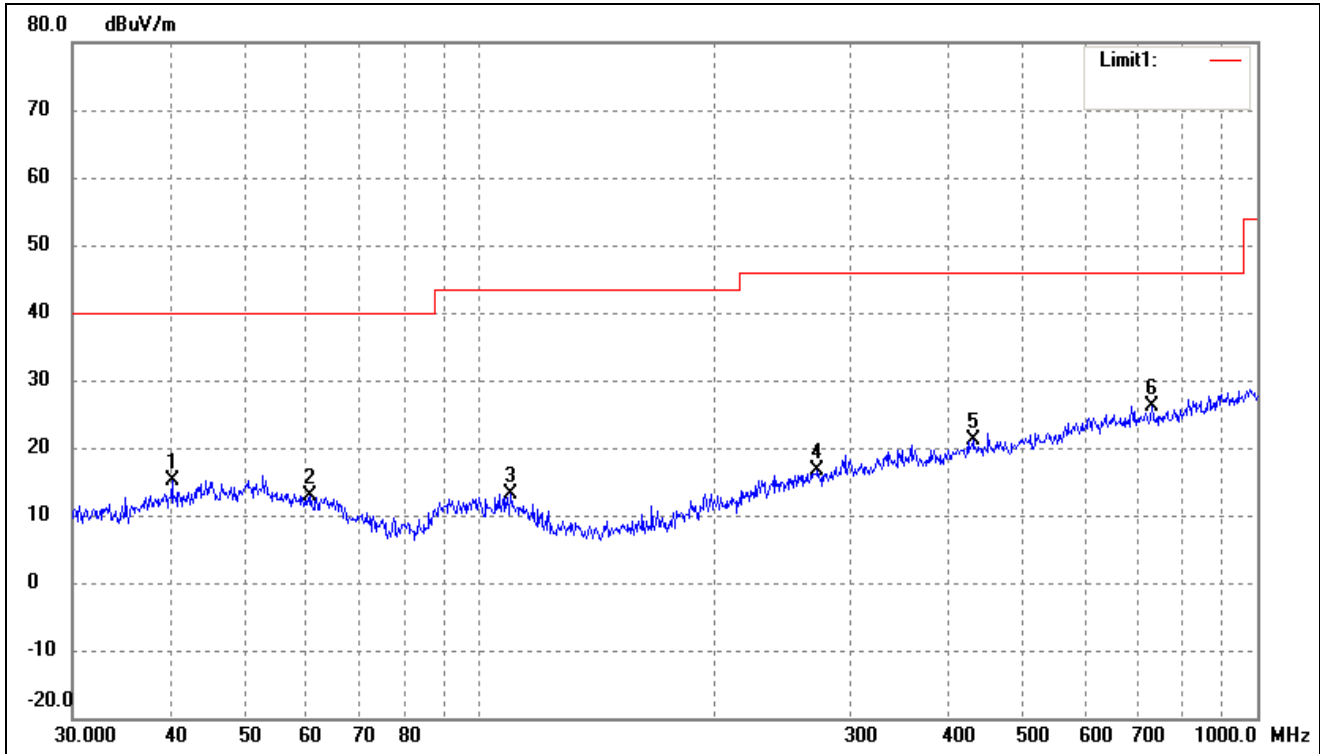
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

### 8.4 Summary of Test Results/Plots

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

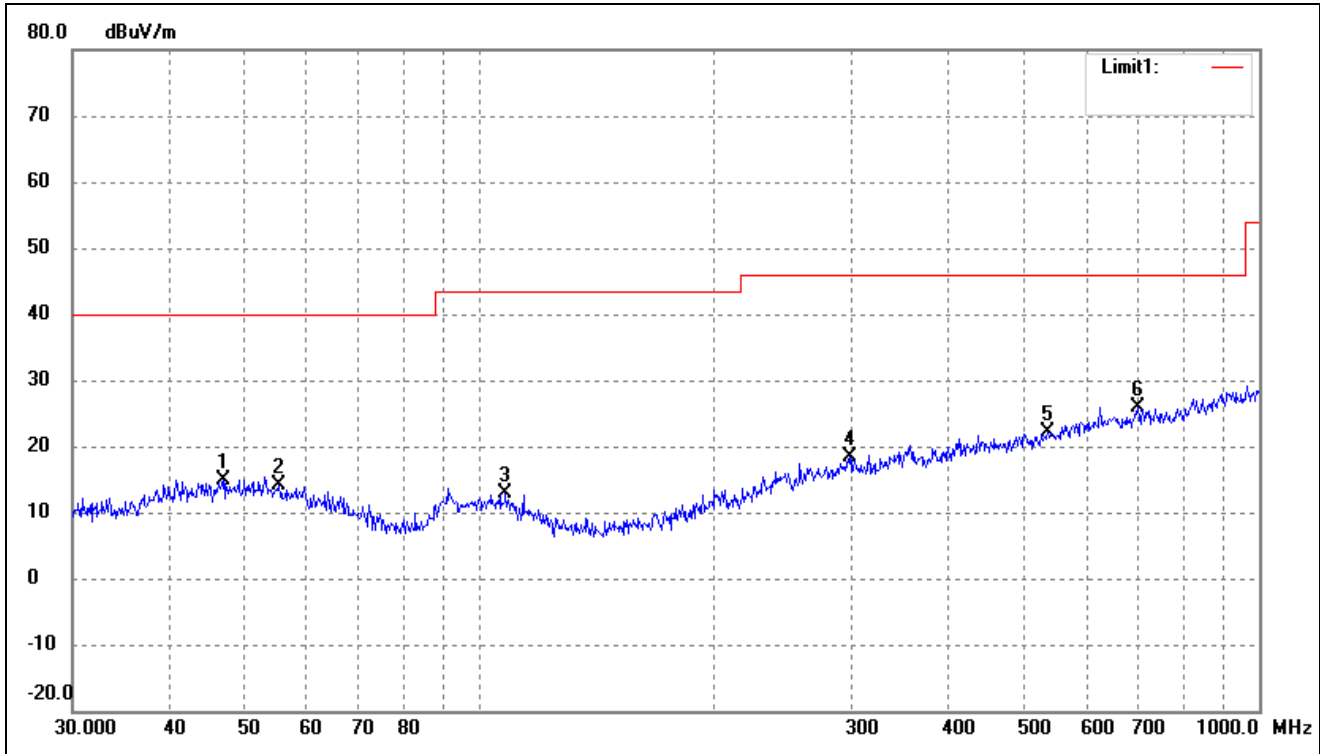
➤ Spurious Emissions Below 1GHz

Test Channel	Low	Polarity:	Horizontal
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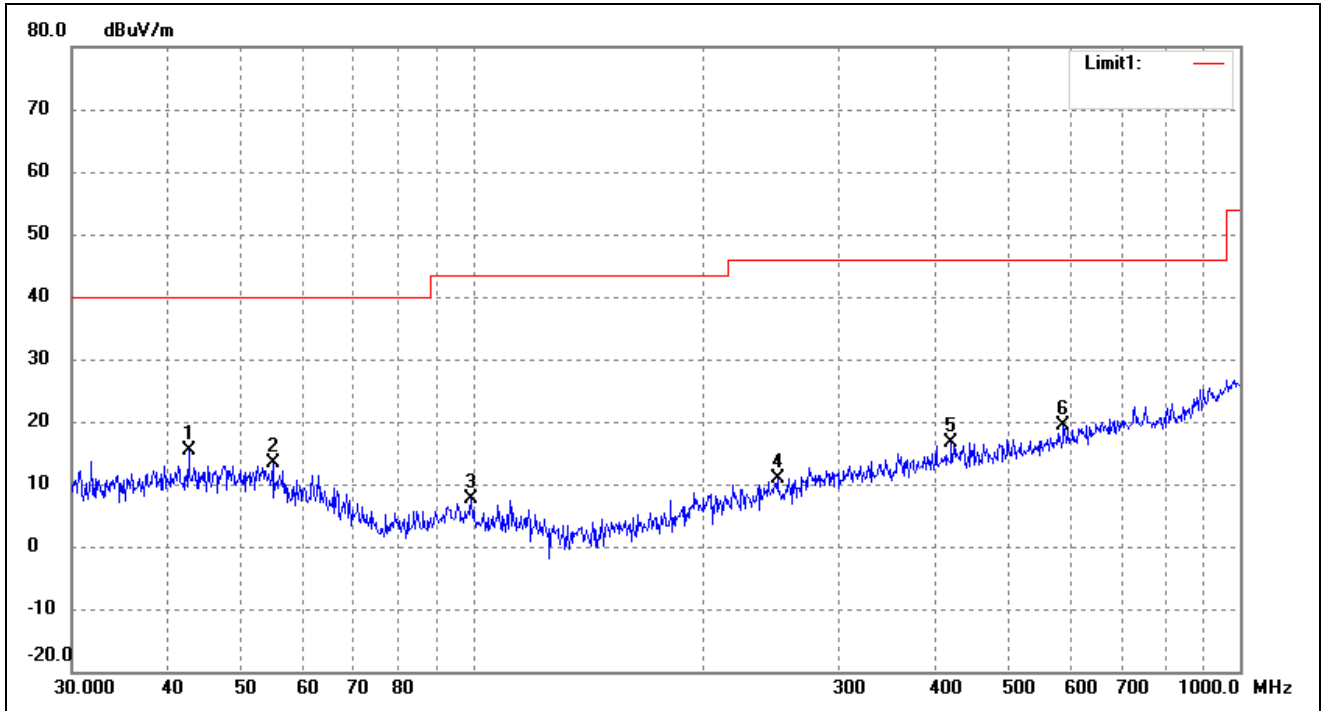
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	40.2757	27.74	-12.61	15.13	40.00	-24.87	Peak
2	60.7044	26.39	-13.43	12.96	40.00	-27.04	Peak
3	109.7960	27.05	-13.84	13.21	43.50	-30.29	Peak
4	272.2776	25.77	-9.04	16.73	46.00	-29.27	Peak
5	431.0316	27.18	-6.06	21.12	46.00	-24.88	Peak
6	731.9203	28.22	-2.02	26.20	46.00	-19.80	Peak

Test Channel	Low	Polarity:	Vertical
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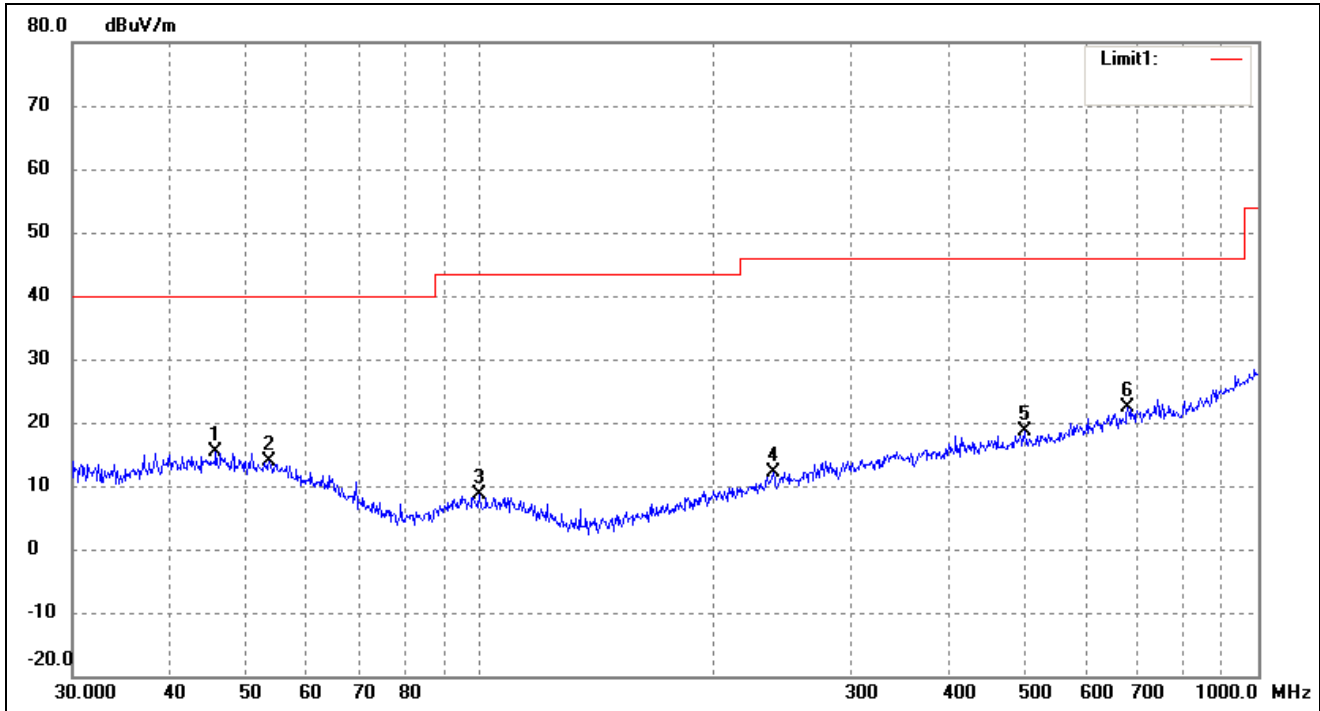
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	46.8303	26.68	-11.74	14.94	40.00	-25.06	Peak
2	55.2207	26.43	-12.18	14.25	40.00	-25.75	Peak
3	107.8877	26.59	-13.66	12.93	43.50	-30.57	Peak
4	298.2681	26.45	-8.16	18.29	46.00	-27.71	Peak
5	535.7073	27.15	-4.93	22.22	46.00	-23.78	Peak
6	699.3046	27.70	-1.78	25.92	46.00	-20.08	Peak

Test Channel	Middle	Polarity:	Horizontal
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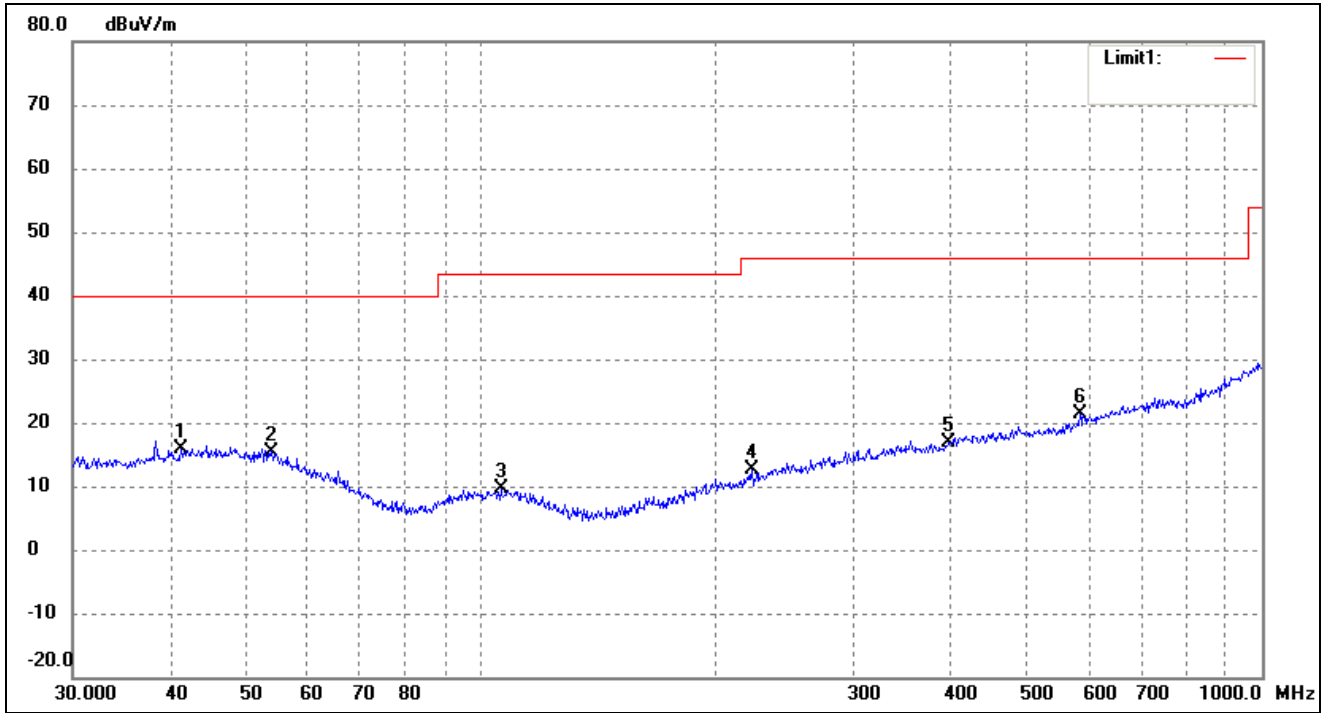
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	42.6000	23.33	-8.03	15.30	40.00	-24.70	Peak
2	54.8348	22.65	-9.21	13.44	40.00	-26.56	Peak
3	99.5281	22.56	-14.94	7.62	43.50	-35.88	Peak
4	249.4250	22.13	-11.26	10.87	46.00	-35.13	Peak
5	420.5803	23.53	-6.90	16.63	46.00	-29.37	Peak
6	588.9051	23.49	-4.04	19.45	46.00	-26.55	Peak

Test Channel	Middle	Polarity:	Vertical
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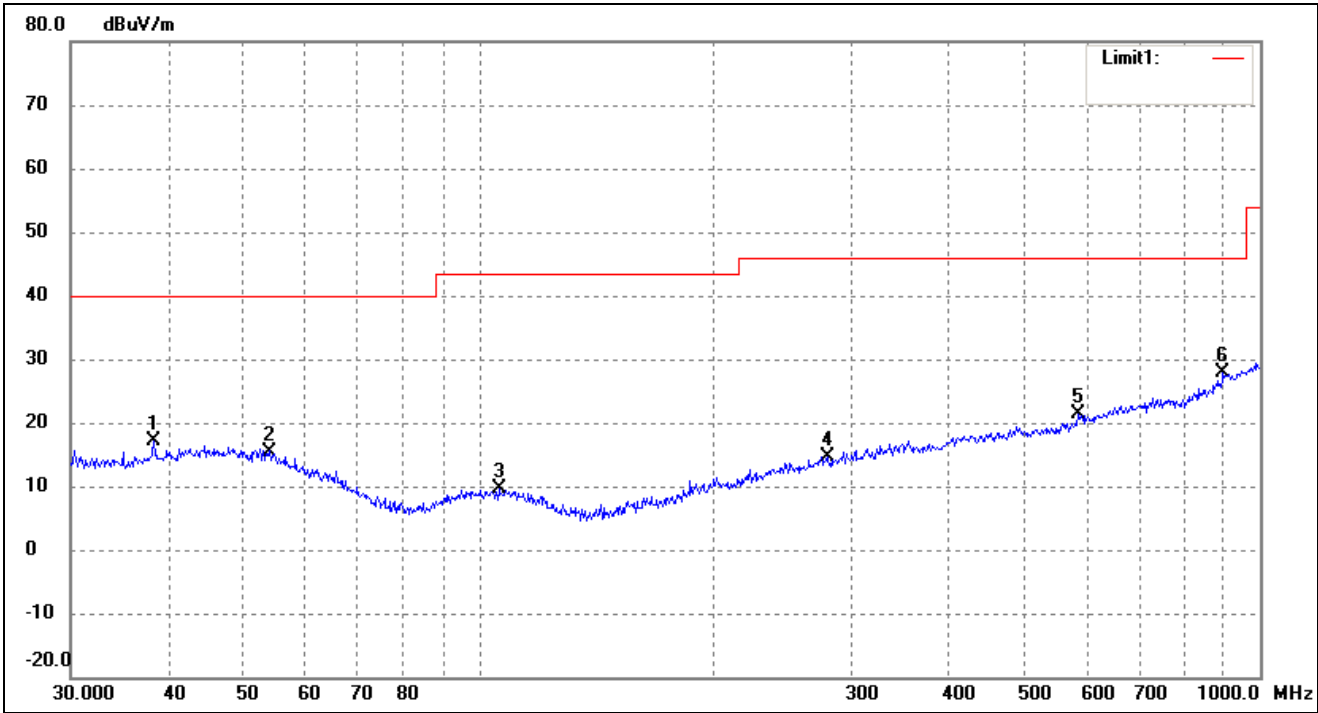
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	45.8553	23.55	-8.08	15.47	40.00	-24.53	Peak
2	53.6932	22.66	-8.88	13.78	40.00	-26.22	peak
3	99.8777	23.59	-14.92	8.67	43.50	-34.83	peak
4	238.3102	23.77	-11.55	12.22	46.00	-33.78	peak
5	501.1790	24.62	-5.98	18.64	46.00	-27.36	peak
6	679.9600	25.22	-2.93	22.29	46.00	-23.71	peak

Test Channel	High	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	41.2765	24.04	-8.22	15.82	40.00	-24.18	peak
2	53.8818	24.42	-8.92	15.50	40.00	-24.50	peak
3	106.0126	24.04	-14.49	9.55	43.50	-33.95	peak
4	222.1698	25.08	-12.43	12.65	46.00	-33.35	peak
5	397.6334	24.41	-7.55	16.86	46.00	-29.14	peak
6	584.7895	25.52	-4.21	21.31	46.00	-24.69	peak

Test Channel	High	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	38.3462	25.77	-8.72	17.05	40.00	-22.95	peak
2	53.8818	24.42	-8.92	15.50	40.00	-24.50	peak
3	106.0126	24.04	-14.49	9.55	43.50	-33.95	peak
4	279.0436	24.74	-10.11	14.63	46.00	-31.37	peak
5	584.7895	25.52	-4.21	21.31	46.00	-24.69	peak
6	896.9965	26.51	1.27	27.78	46.00	-18.22	peak

## ➤ 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	59.36	-3.59	55.77	74	-18.23	H	PK
4804	39.85	-3.59	36.26	54	-17.74	H	AV
7206	60.57	-0.52	60.05	74	-13.95	H	PK
7206	41.87	-0.52	41.35	54	-12.65	H	AV
4804	61.99	-3.59	58.4	74	-15.6	V	PK
4804	38.55	-3.59	34.96	54	-19.04	V	AV
7206	61.92	-0.52	61.4	74	-12.6	V	PK
7206	40.63	-0.52	40.11	54	-13.89	V	AV
Middle Channel-2440MHz							
4882	61.35	-3.49	57.86	74	-16.14	H	PK
4882	41.83	-3.49	38.34	54	-15.66	H	AV
7323	58.46	-0.47	57.99	74	-16.01	H	PK
7323	39.66	-0.47	39.19	54	-14.81	H	AV
4882	59.56	-3.49	56.07	74	-17.93	V	PK
4882	39.22	-3.49	35.73	54	-18.27	V	AV
7323	58.13	-0.47	57.66	74	-16.34	V	PK
7323	40.12	-0.47	39.65	54	-14.35	V	AV
High Channel-2480MHz							
4960	58.23	-3.41	54.82	74	-19.18	H	PK
4960	41.98	-3.41	38.57	54	-15.43	H	AV
7440	59.01	-0.42	58.59	74	-15.41	H	PK
7440	41.28	-0.42	40.86	54	-13.14	H	AV
4960	60.95	-3.41	57.54	74	-16.46	V	PK
4960	39.37	-3.41	35.96	54	-18.04	V	AV
7440	61.41	-0.42	60.99	74	-13.01	V	PK
7440	38.94	-0.42	38.52	54	-15.48	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.



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## 9. Out of Band Emissions

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### 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:

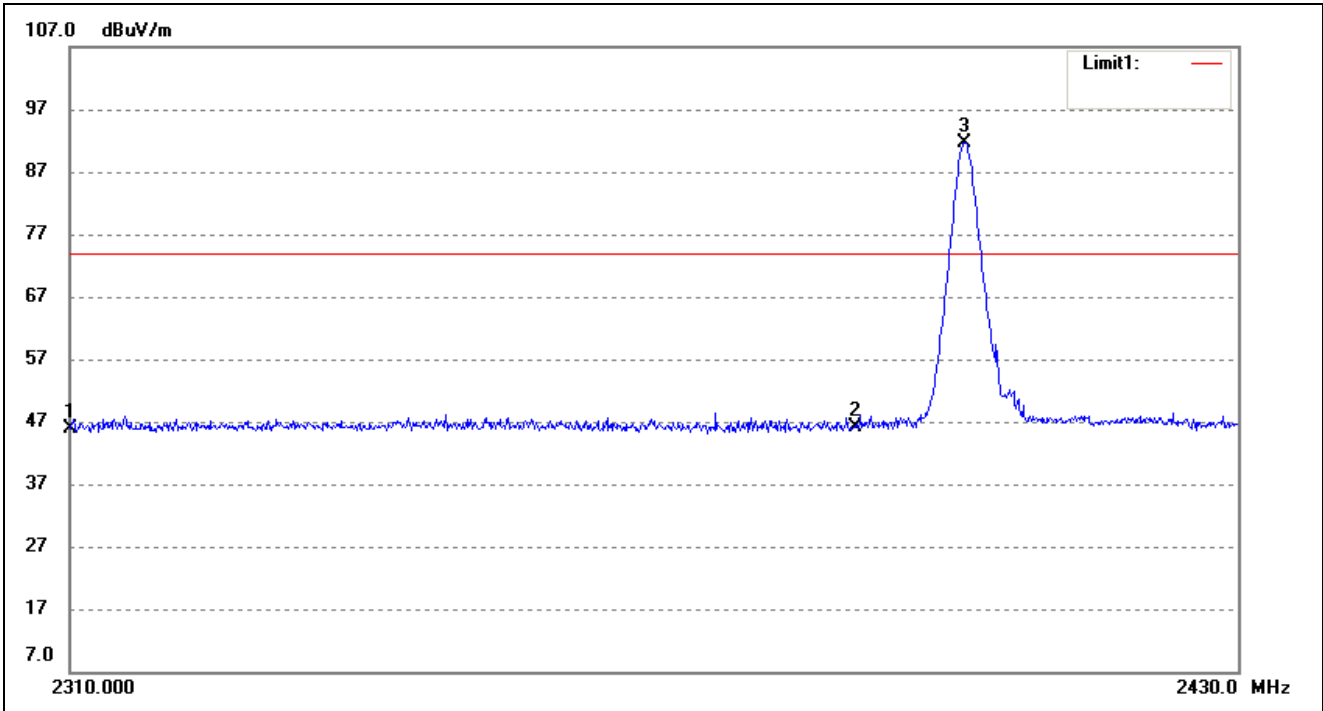
1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW  $\geq$  300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, 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

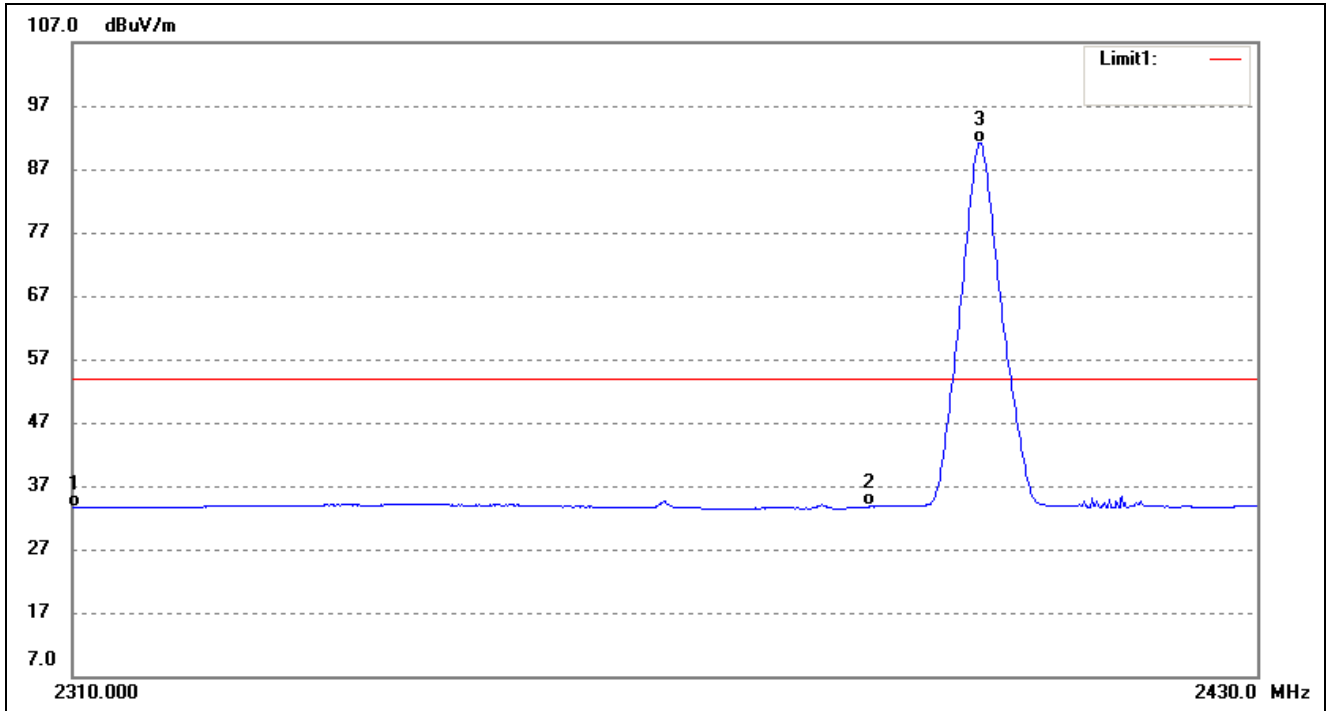
➤ Radiated test

Test Channel	Low	Polarity:	Vertical(worst case)
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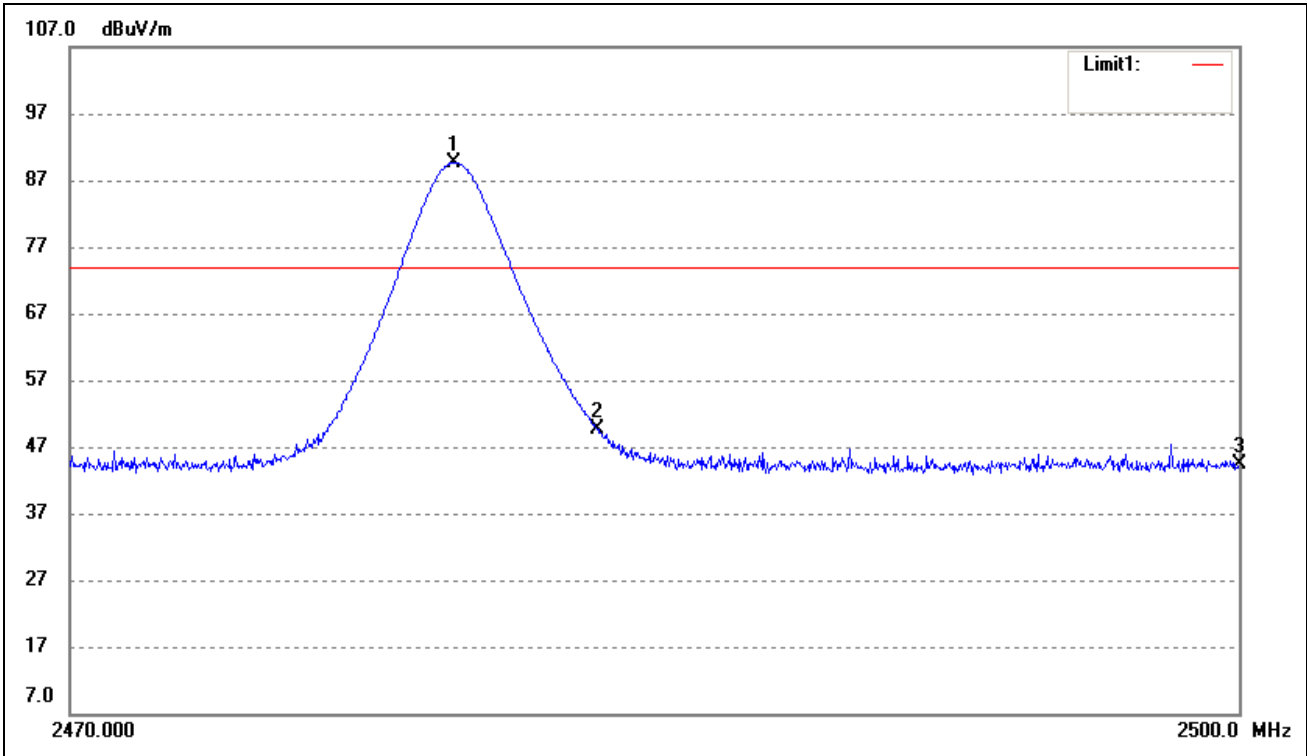
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	53.66	-7.78	45.88	74.00	-28.12	peak
2	2390.000	53.49	-7.32	46.17	74.00	-27.83	peak
3	2401.373	98.96	-7.25	91.71	74.00	17.71	peak

Test Channel	Low	Polarity:	Vertical(worst case)
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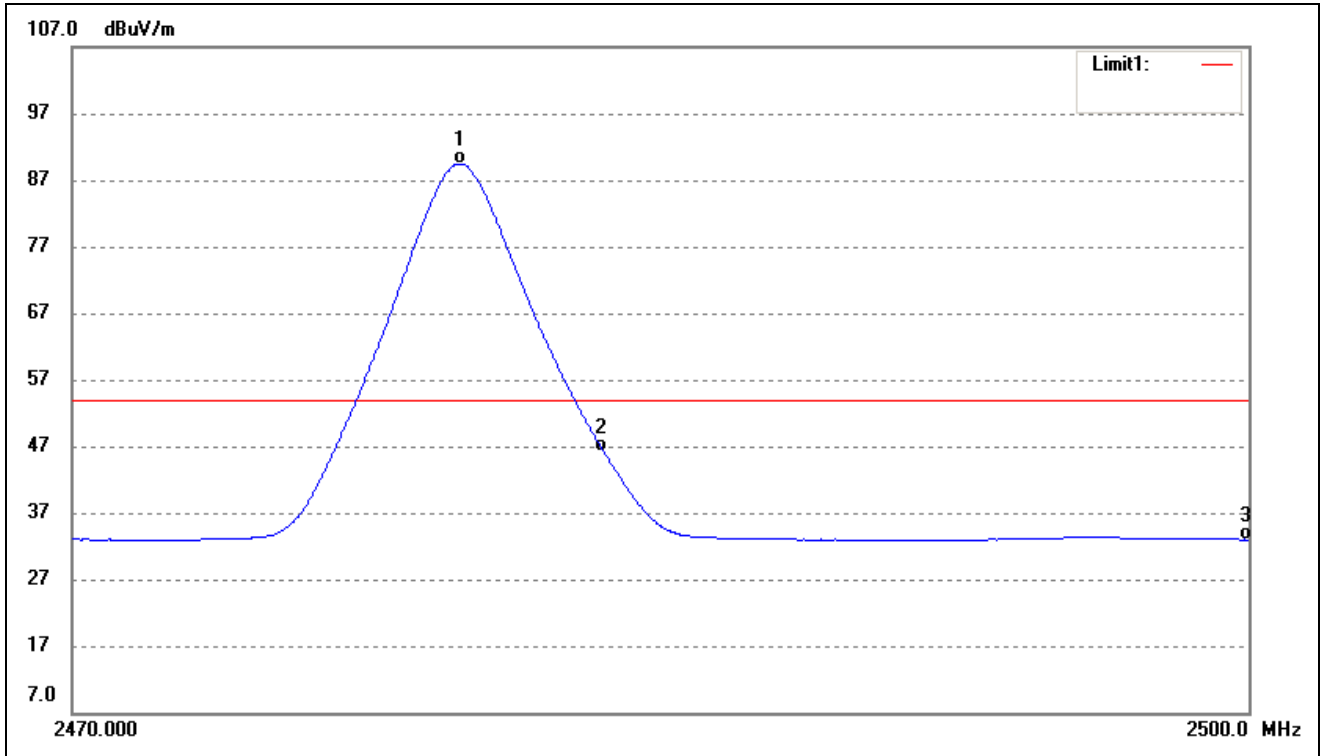
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	41.44	-7.78	33.66	54.00	-20.34	AVG
2	2390.000	41.08	-7.32	33.76	54.00	-20.24	AVG
3	2401.373	98.48	-7.25	91.23	54.00	37.23	AVG

Test Channel	High	Polarity:	Vertical(worst case)
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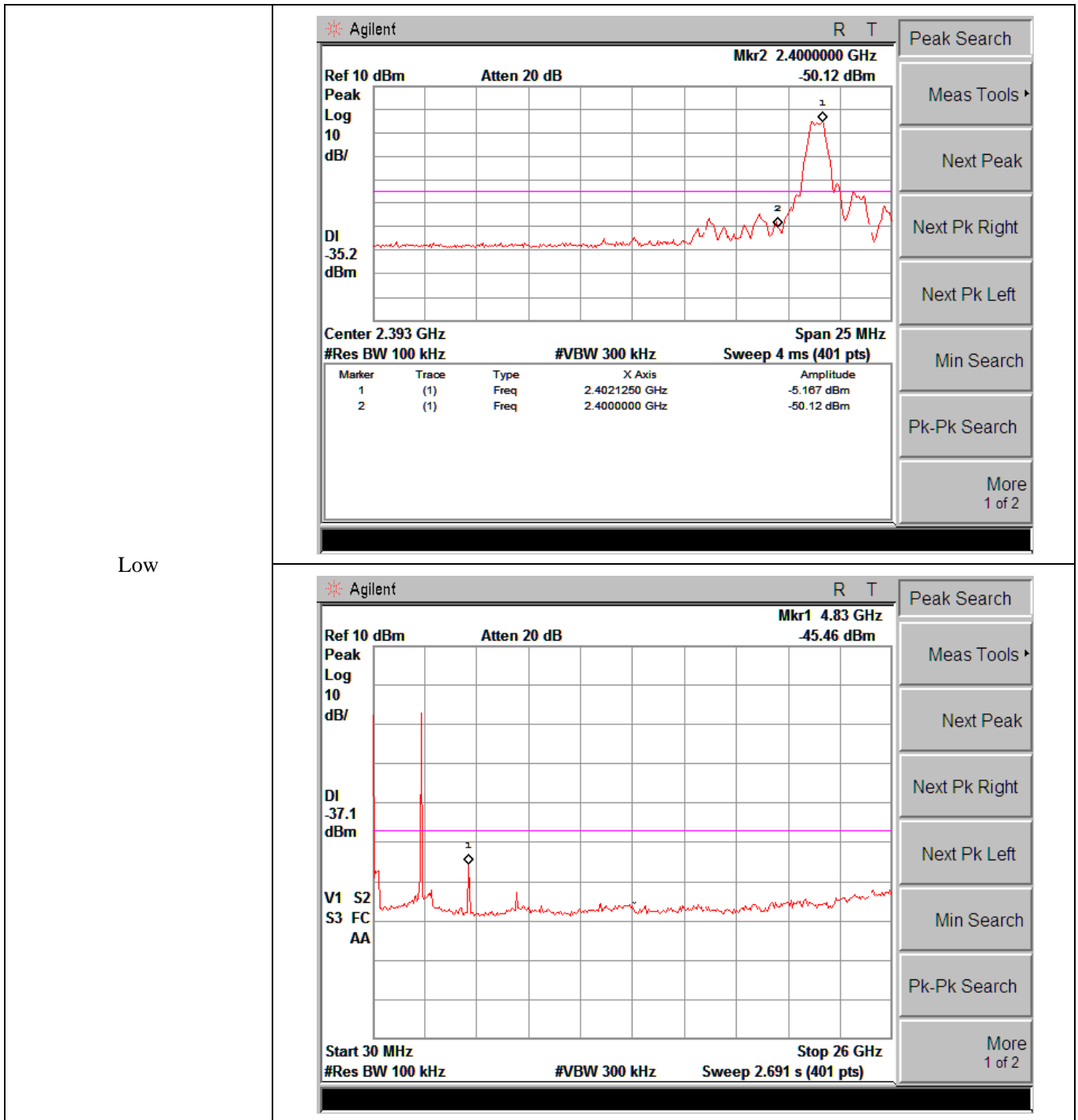
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2479.830	96.42	-6.79	89.63	74.00	15.63	peak
2	2483.500	56.31	-6.77	49.54	74.00	-24.46	peak
3	2500.000	51.00	-6.67	44.33	74.00	-29.67	peak

Test Channel	High	Polarity:	Vertical(worst case)
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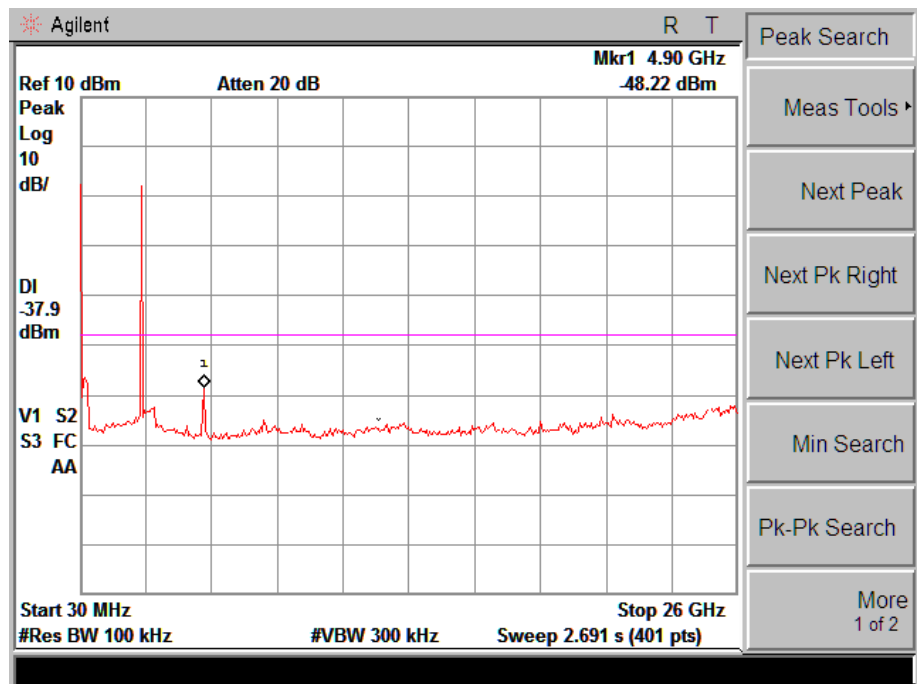
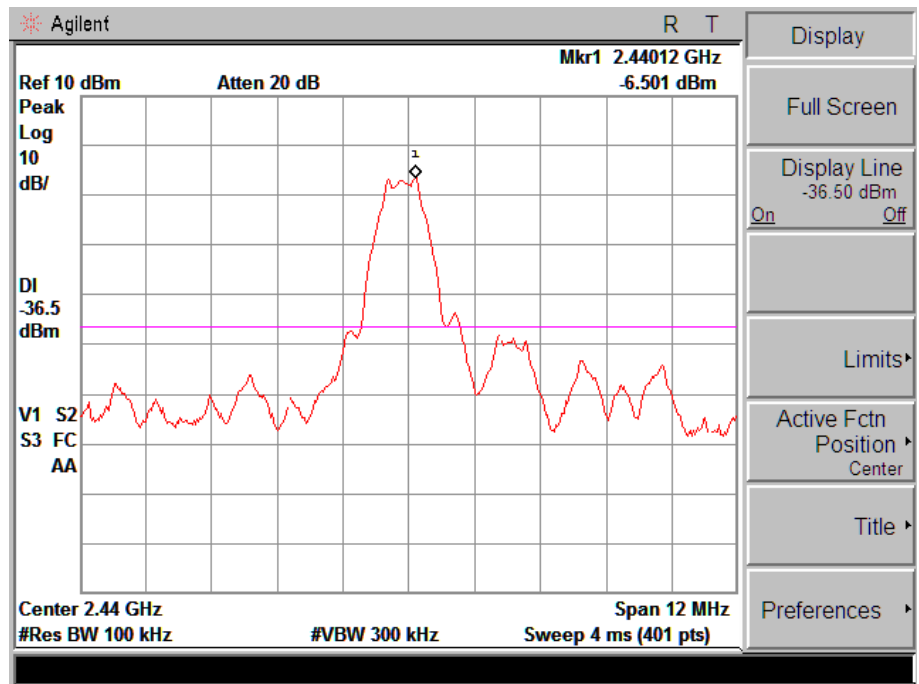


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2479.860	96.26	-6.79	89.47	54.00	35.47	AVG
2	2483.500	52.96	-6.77	46.19	54.00	-7.81	AVG
3	2500.000	39.67	-6.67	33.00	54.00	-21.00	AVG

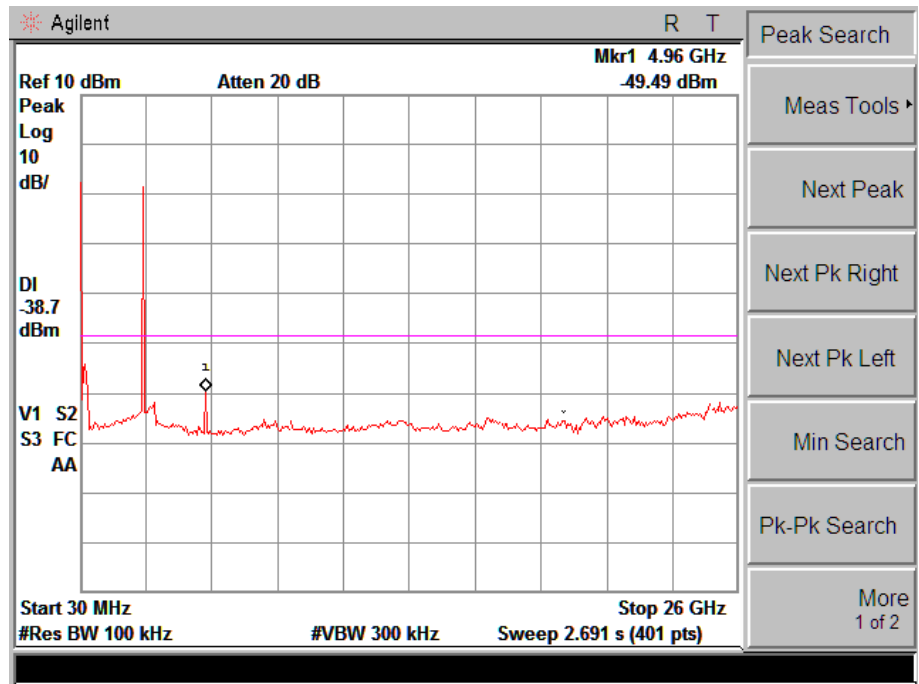
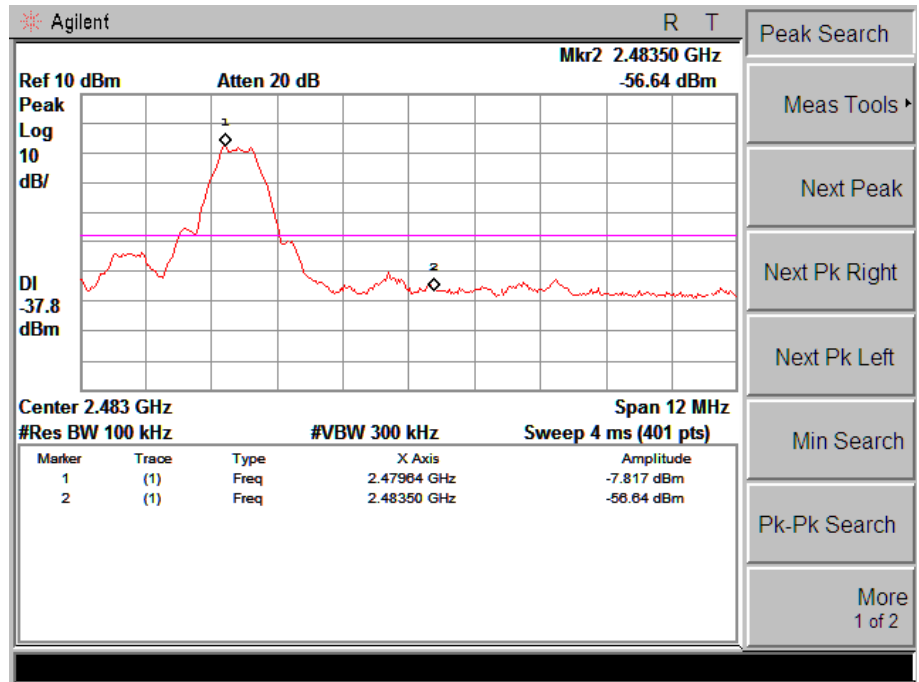
➤ Conducted test



Middle



High





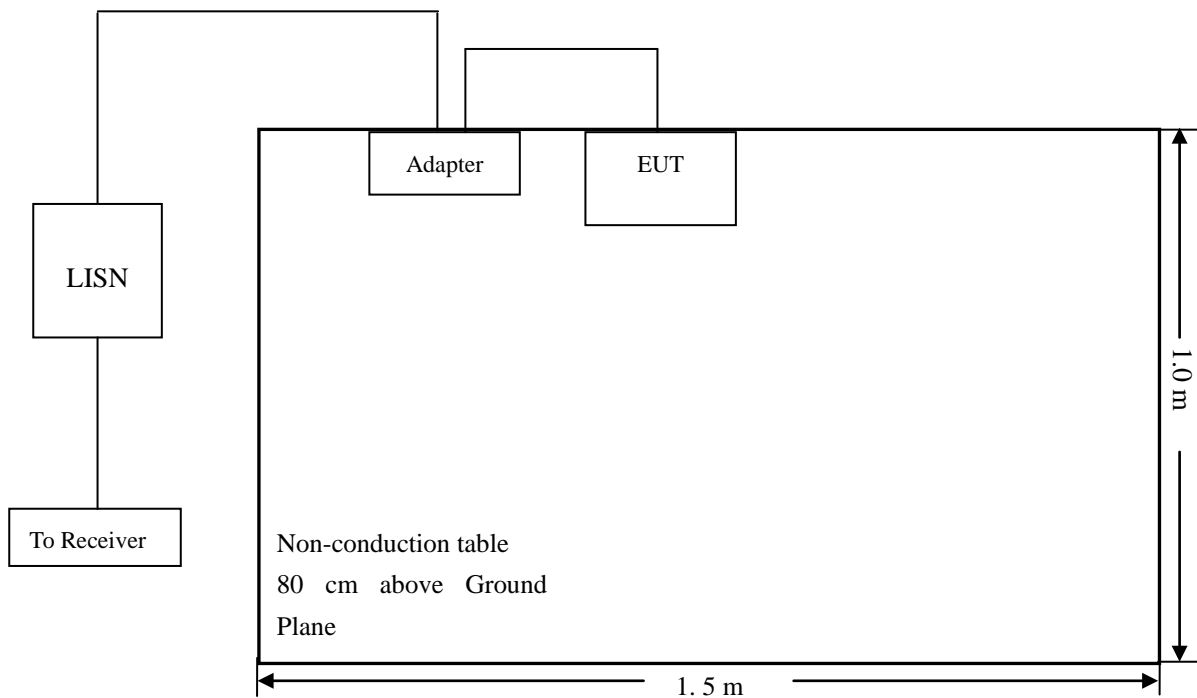
## 10. Conducted Emissions

### 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



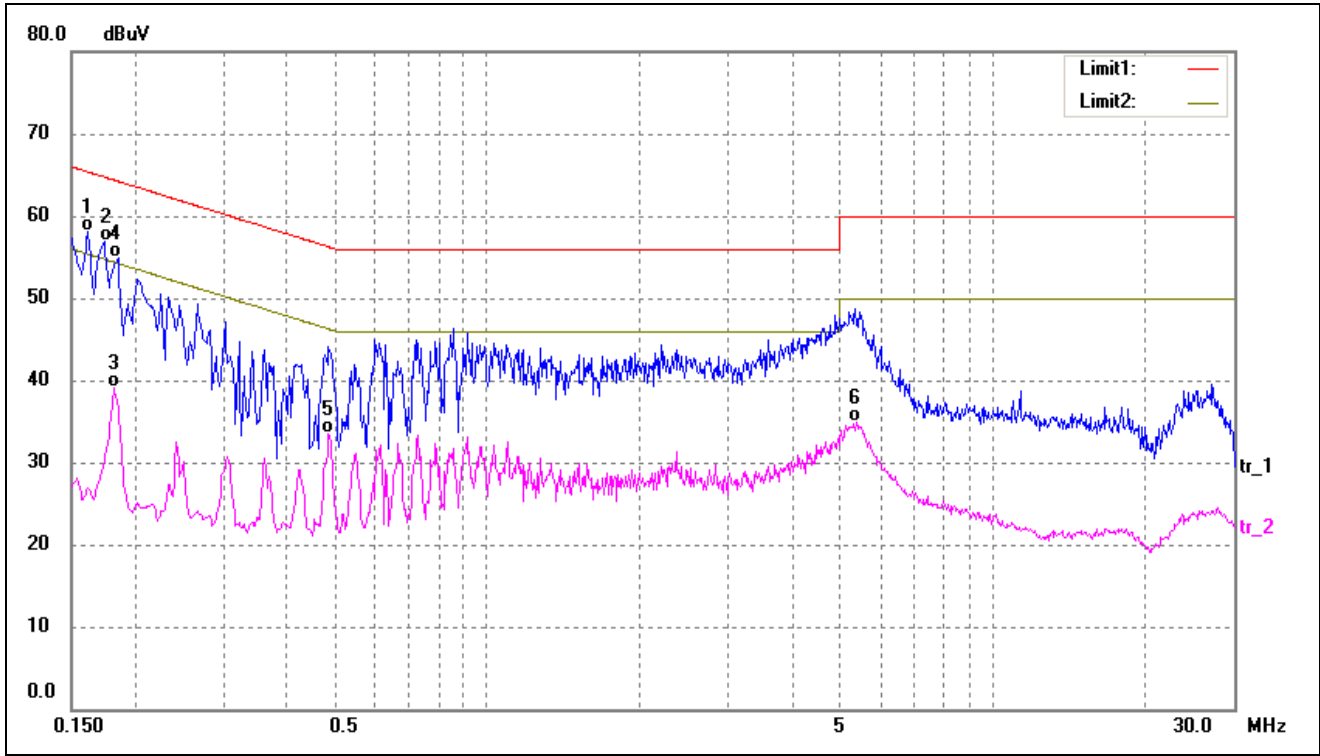
### 10.3 Test Receiver Setup

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

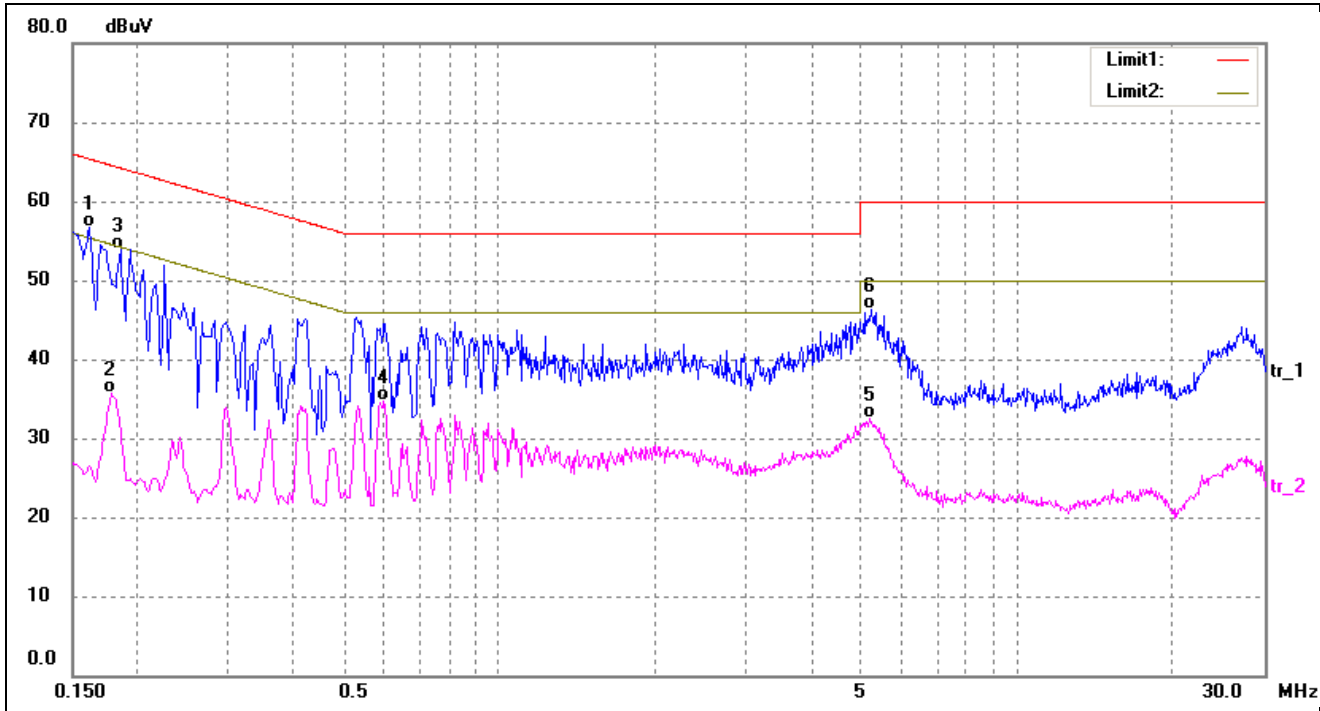
### 10.4 Summary of Test Results/Plots

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	48.01	10.10	58.11	65.36	-7.25	QP
2	0.1740	46.87	10.11	56.98	64.77	-7.79	QP
3	0.1820	28.95	10.11	39.06	54.39	-15.33	AVG
4	0.1860	44.71	10.11	54.82	64.21	-9.39	QP
5	0.4860	23.17	10.28	33.45	46.24	-12.79	AVG
6	5.3860	24.11	10.78	34.89	50.00	-15.11	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	46.61	10.10	56.71	65.36	-8.65	QP
2	0.1780	25.64	10.11	35.75	54.58	-18.83	AVG
3	0.1860	43.77	10.11	53.88	64.21	-10.33	QP
4	0.5980	24.40	10.34	34.74	46.00	-11.26	AVG
5	5.1700	21.76	10.77	32.53	50.00	-17.47	AVG
6	5.2460	35.50	10.77	46.27	60.00	-13.73	QP

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