

# FCC Part 15C

## Measurement and Test Report

For

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

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

**FCC ID: 2ATY4-U4040500**

<b>FCC Rule(s):</b>	<u>FCC Part 15.247</u>
<b>Product Description:</b>	<u>Water leakage monitor</u>
<b>Tested Model:</b>	<u>U4040500</u>
<b>Report No.:</b>	<u>WTX19X07044485W-1</u>
<b>Sample Receipt Date:</b>	<u>2019-07-02</u>
<b>Tested Date:</b>	<u>2019-07-02 to 2019-07-22</u>
<b>Issued Date:</b>	<u>2019-07-23</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 permitted by Shenzhen SEM Test Technology Co., Ltd.

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## Report version

Version No.	Date of issue	Description
Rev.00	2019-07-23	Original

## 1. GENERAL INFORMATION

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

#### Client Information

Applicant: SHANGHAI UNISPLENDOR LELIAN INTERNET OF THINGS TECHNOLOGY CO.,LTD.  
Address of applicant: Building C, 888 huanhu west 2nd road, nanhui new town, pudong new area, Shanghai

Manufacturer: HENAN ULTRAMODERN INTERNET OF THINGS TECHNOLOGIES COMPANY LIMITED.  
Address of manufacturer: Building 3, no.67 dongqing street, high-tech industrial development zone, zhengzhou

General Description of EUT	
Product Name:	Water leakage monitor
Trade Name:	UIOT® Full House Smart Home System
Model No.:	U4040500
Adding Model(s):	/
Rated Voltage:	DC3V
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	IEEE802.15.4
Frequency Range:	2405-2475MHz
RF Output Power:	8.25dBm (Conducted)
Type of Modulation:	OQPSK
Quantity of Channels:	15
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	2.0dBi

## 1.2 Test Standards

The tests were performed according to following standards:

**FCC Rules Part 15.247**: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

**558074 D01 DTS Meas Guidance v05r02**: GUIDANCE FOR PERFORMING COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEMS (DTS) OPERATING UNDER SECTION 15.247

**ANSI C63.10-2013**: American National Standard for Testing Unlicensed Wireless Devices.

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

## 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB 558074 D01 DTS Meas Guidance v05r02.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

## 1.4 Test Facility

### **FCC – Registration No.: 125990**

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

### **Industry Canada (IC) Registration No.: 11464A**

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

## 1.5 EUT Setup and Test Mode

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

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

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

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

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

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

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

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



## 2. SUMMARY OF TEST RESULTS

<b>FCC Rules</b>	<b>Description of Test Item</b>	<b>Result</b>
§ 2.1091	RF Exposure	Compliant
§15.203; §15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	N/A
§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 §2.1091, the mobile transmitter must comply the RF exposure requirements.

#### **3.2 Test Result**

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

## **4. Antenna Requirement**

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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

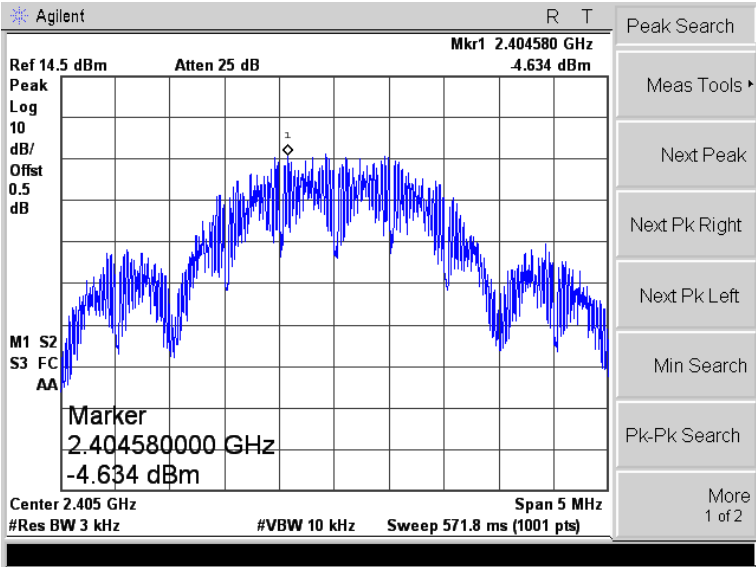
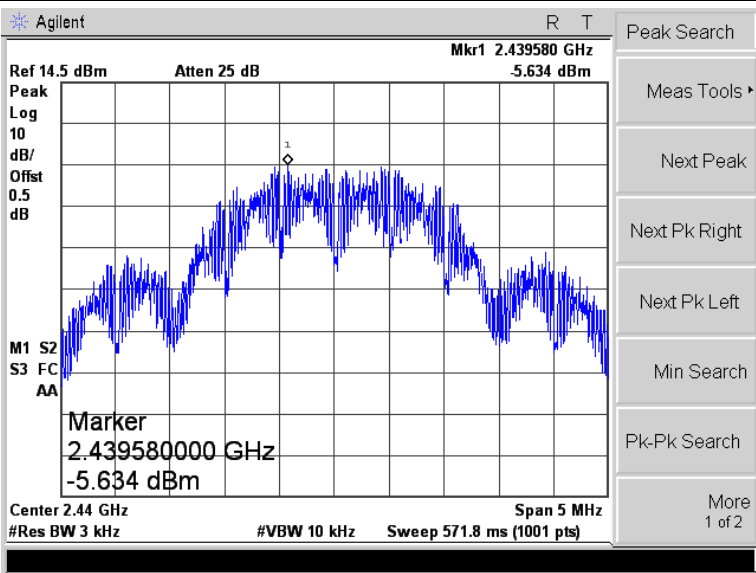
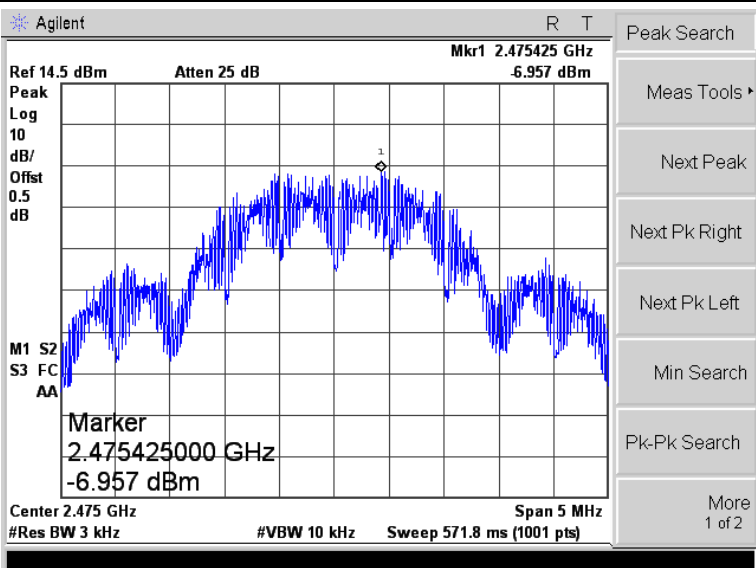
According to the KDB 558074, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

- 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	-4.63	8
	Middle	-5.63	8
	High	-6.96	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

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### 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.

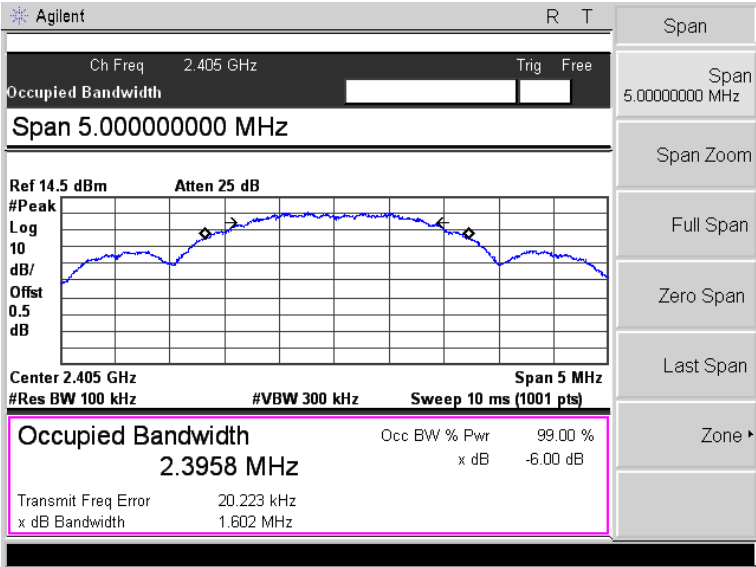
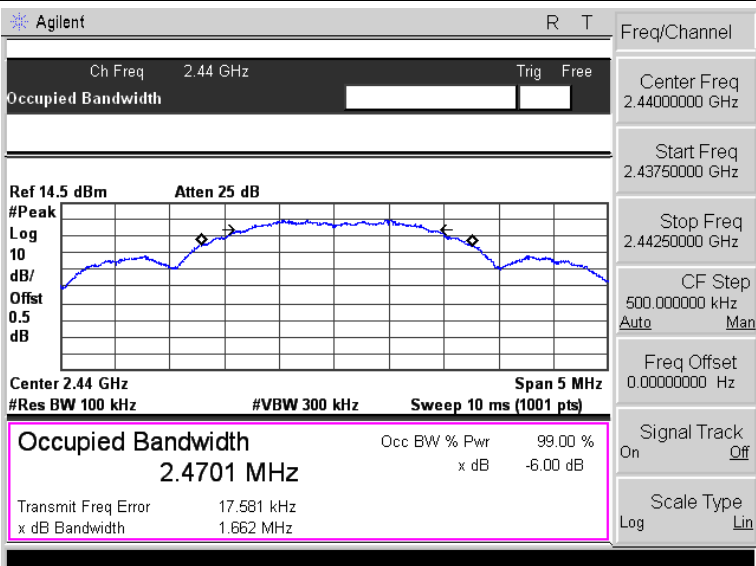
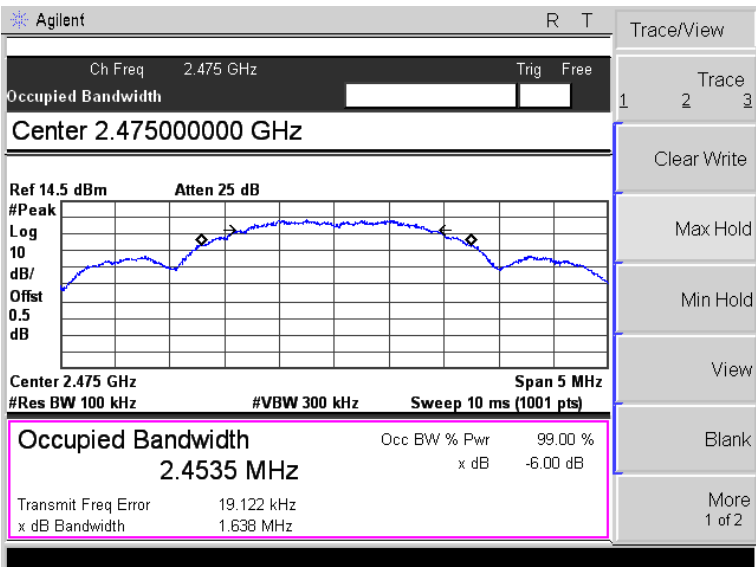
### 6.2 Test Procedure

- 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	1.602	$\geq 500$
	Middle	1.662	$\geq 500$
	High	1.638	$\geq 500$

Please refer to the following test plots:

<p>Low</p>	 <p>Agilent R T</p> <p>Ch Freq 2.405 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Span 5.00000000 MHz</p> <p>Ref 14.5 dBm Atten 25 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 2.405 GHz Span 5 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 2.3958 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error 20.223 kHz x dB Bandwidth 1.602 MHz</p> <p>Span 5.00000000 MHz</p> <p>Span Zoom</p> <p>Full Span</p> <p>Zero Span</p> <p>Last Span</p> <p>Zone ▶</p>
<p>Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 2.44 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 2.44 GHz Span 5 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 2.4701 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error 17.581 kHz x dB Bandwidth 1.662 MHz</p> <p>Span 5 MHz</p> <p>Freq/Channel</p> <p>Center Freq 2.44000000 GHz</p> <p>Start Freq 2.43750000 GHz</p> <p>Stop Freq 2.44250000 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>High</p>	 <p>Agilent R T</p> <p>Ch Freq 2.475 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 2.47500000 GHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 2.4535 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error 19.122 kHz x dB Bandwidth 1.638 MHz</p> <p>Span 5 MHz</p> <p>Trace/View</p> <p>Trace 1 2 3</p> <p>Clear Write</p> <p>Max Hold</p> <p>Min Hold</p> <p>View</p> <p>Blank</p> <p>More 1 of 2</p>

## 7. RF Output Power

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### 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.

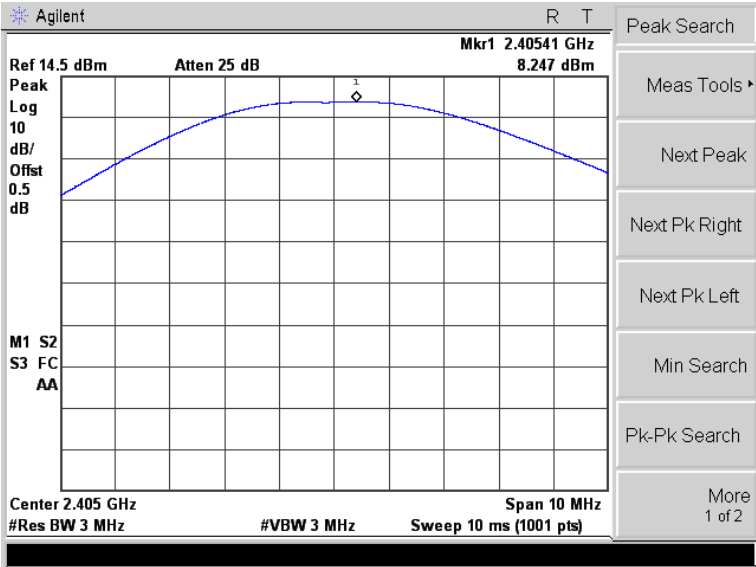
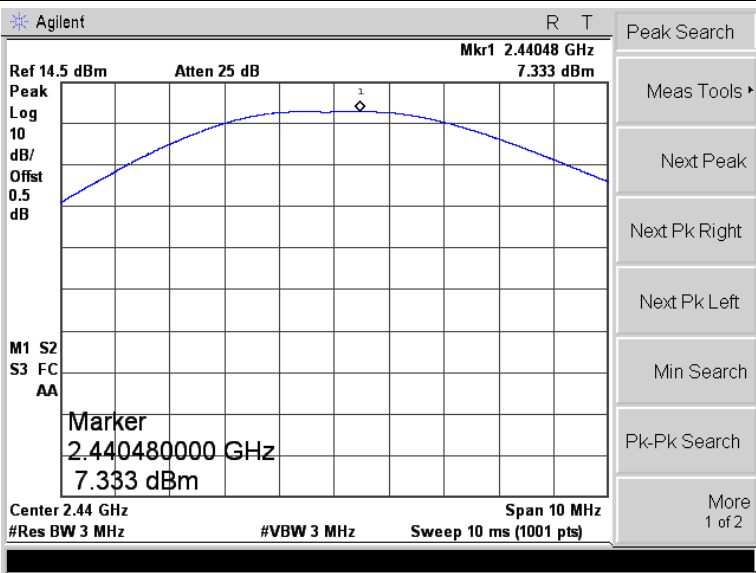
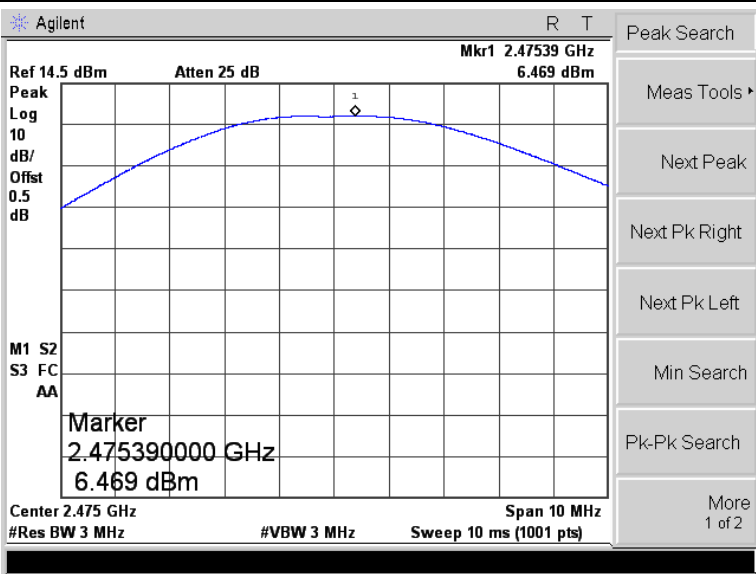
### 7.2 Test Procedure

- 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	8.25	6.68	1000
	Middle	7.33	5.41	1000
	High	6.47	4.44	1000



<p>Low</p>	 <p>Agilent R T          Ref 14.5 dBm Atten 25 dB Mkr1 2.40541 GHz 8.247 dBm          Peak Search          Meas Tools ▶          Next Peak          Next Pk Right          Next Pk Left          Min Search          Pk-Pk Search          More 1 of 2</p> <p>Center 2.405 GHz Span 10 MHz          #Res BW 3 MHz #VBW 3 MHz Sweep 10 ms (1001 pts)</p>
<p>Middle</p>	 <p>Agilent R T          Ref 14.5 dBm Atten 25 dB Mkr1 2.44048 GHz 7.333 dBm          Peak Search          Meas Tools ▶          Next Peak          Next Pk Right          Next Pk Left          Min Search          Pk-Pk Search          More 1 of 2</p> <p>Center 2.44 GHz Span 10 MHz          #Res BW 3 MHz #VBW 3 MHz Sweep 10 ms (1001 pts)</p> <p>Marker          2.440480000 GHz          7.333 dBm</p>
<p>High</p>	 <p>Agilent R T          Ref 14.5 dBm Atten 25 dB Mkr1 2.47539 GHz 6.469 dBm          Peak Search          Meas Tools ▶          Next Peak          Next Pk Right          Next Pk Left          Min Search          Pk-Pk Search          More 1 of 2</p> <p>Center 2.475 GHz Span 10 MHz          #Res BW 3 MHz #VBW 3 MHz Sweep 10 ms (1001 pts)</p> <p>Marker          2.475390000 GHz          6.469 dBm</p>

## 8. Field Strength of Spurious Emissions

### 8.1 Standard Applicable

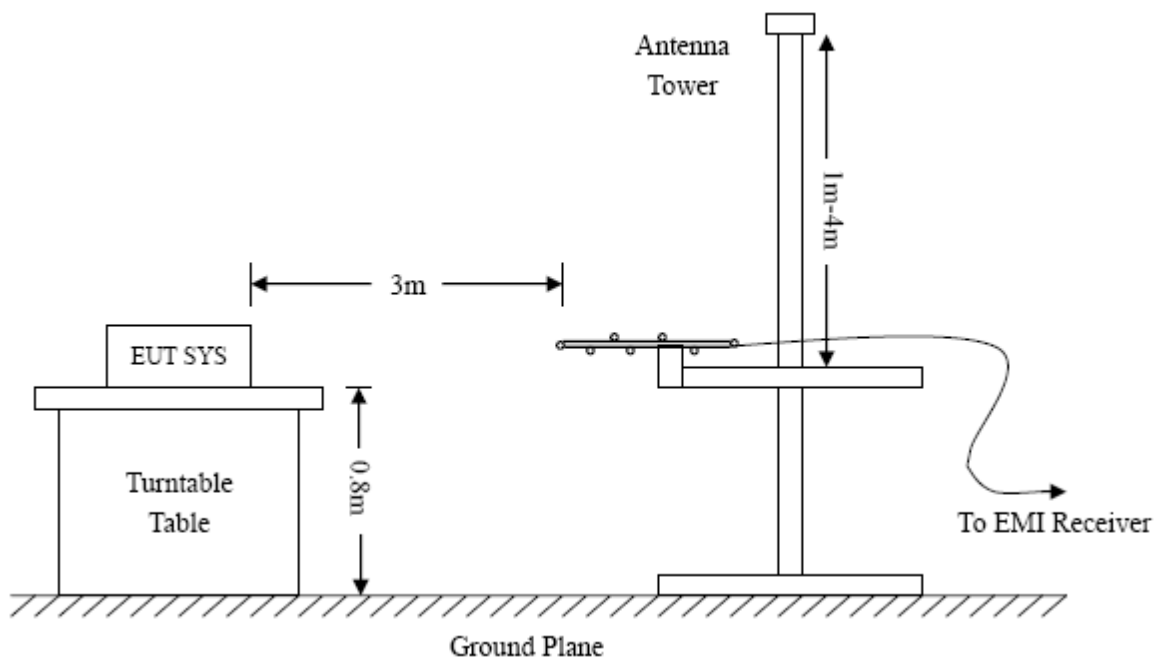
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within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

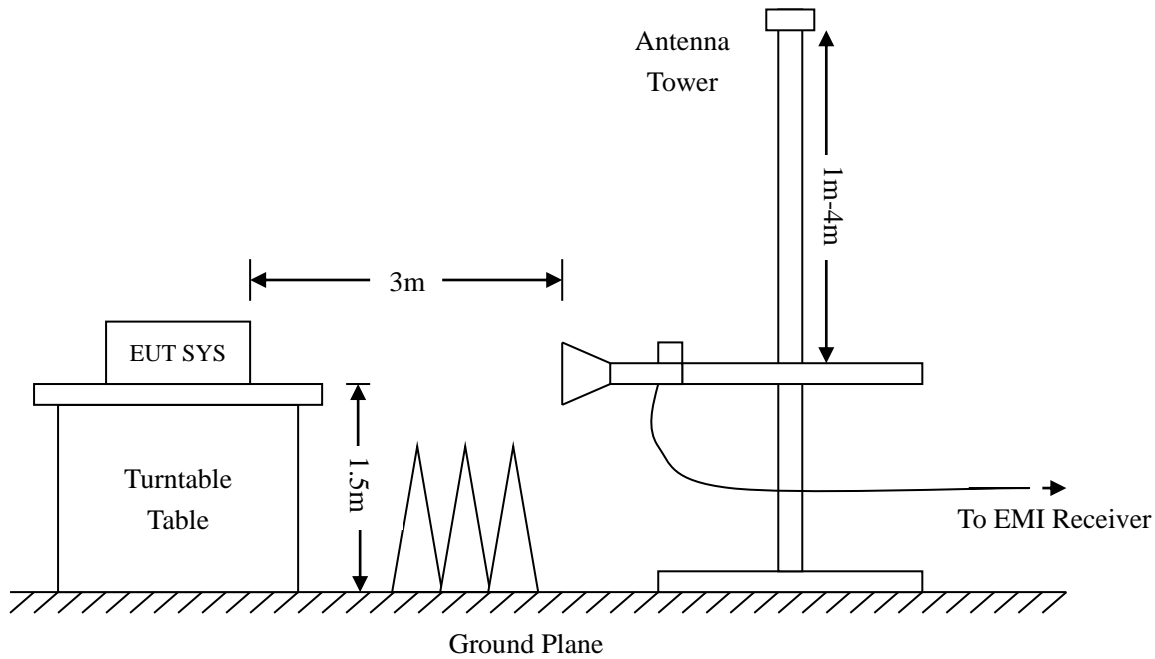
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

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

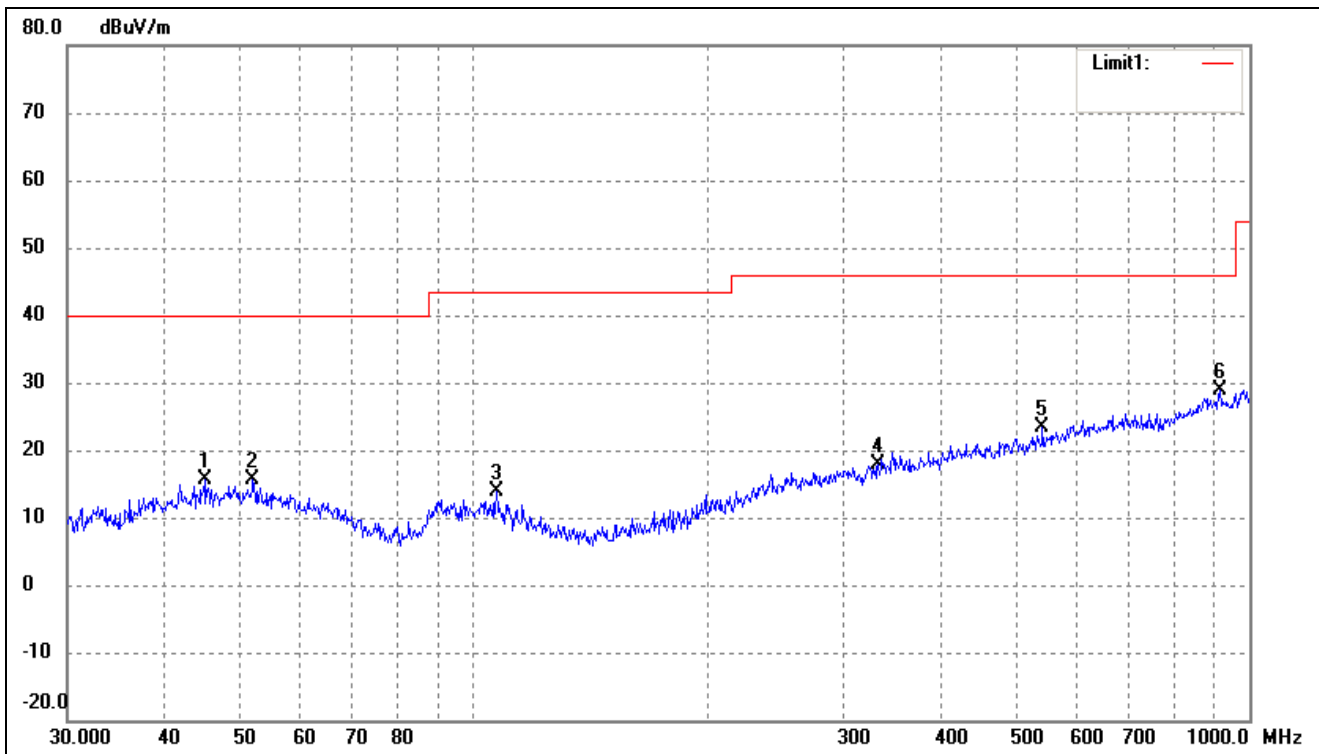
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

### 8.4 Summary of Test Results/Plots

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

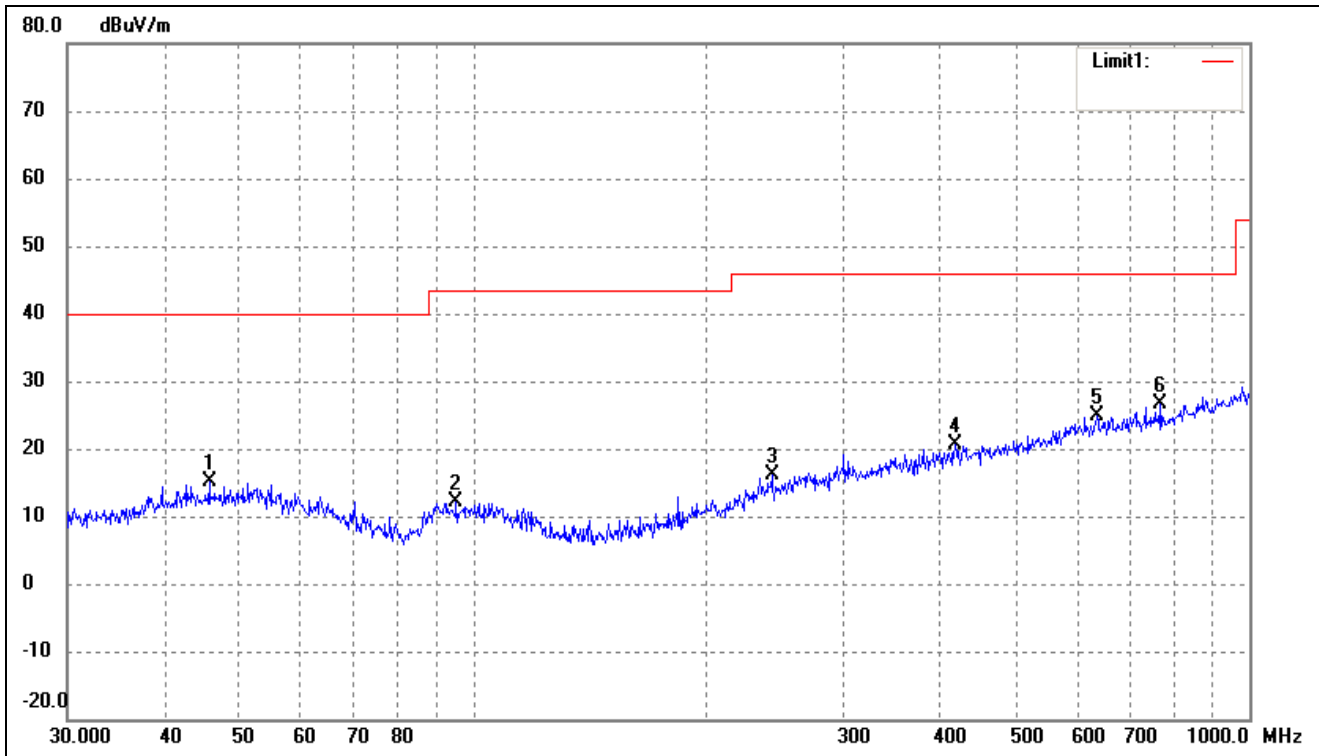
## ➤ Spurious Emissions Below 1GHz

Test Channel	Low	Polarity:	Horizontal
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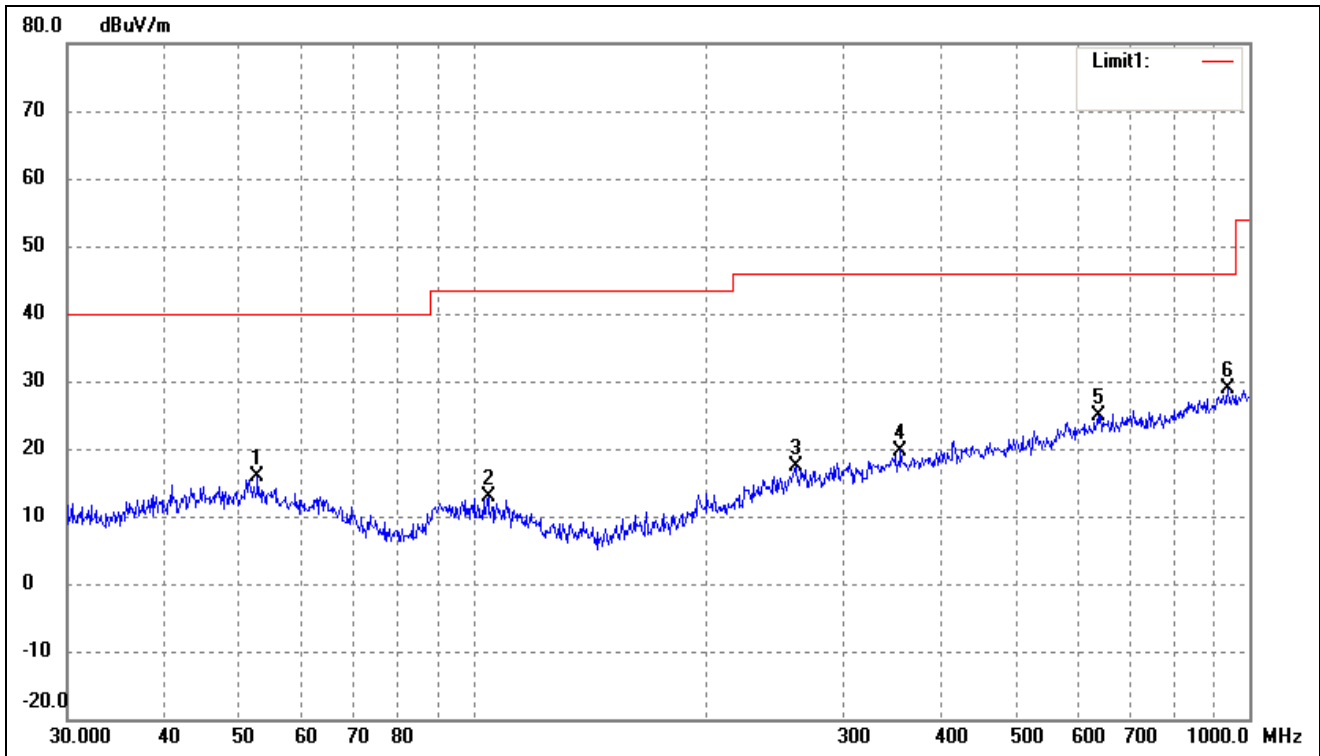
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	45.0583	27.68	-11.93	15.75	40.00	-24.25	215	100	peak
2	52.0251	27.21	-11.59	15.62	40.00	-24.38	100	100	peak
3	107.1337	27.53	-13.58	13.95	43.50	-29.55	111	100	peak
4	332.5187	25.37	-7.56	17.81	46.00	-28.19	114	100	peak
5	541.3725	28.27	-4.94	23.33	46.00	-22.67	291	100	peak
6	916.0687	27.54	1.37	28.91	46.00	-17.09	239	100	peak

Test Channel	Low	Polarity:	Vertical
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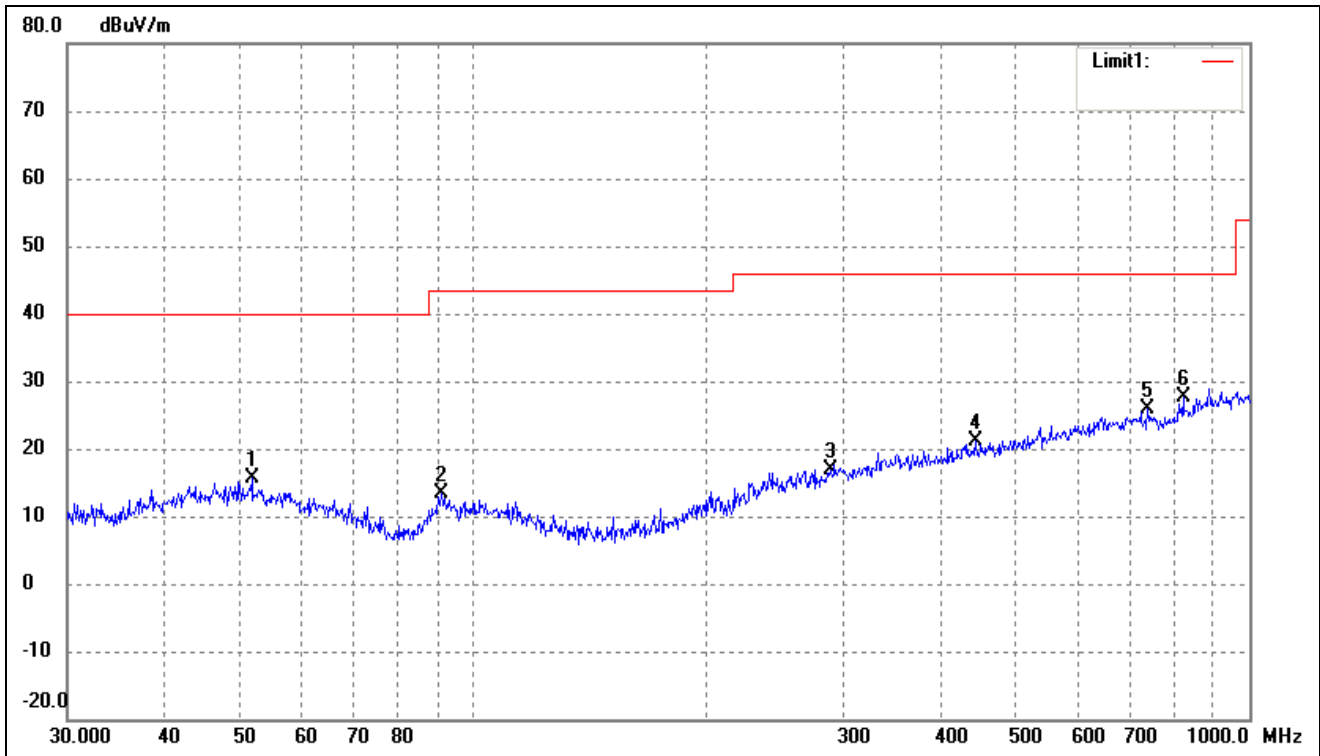
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	45.6948	26.92	-11.85	15.07	40.00	-24.93	82	100	peak
2	95.0930	26.56	-14.39	12.17	43.50	-31.33	185	100	peak
3	242.5253	26.31	-10.06	16.25	46.00	-29.75	52	100	peak
4	417.6411	26.97	-6.36	20.61	46.00	-25.39	207	100	peak
5	636.1340	27.51	-2.70	24.81	46.00	-21.19	271	100	peak
6	768.7482	28.26	-1.72	26.54	46.00	-19.46	336	100	peak

Test Channel	Middle	Polarity:	Horizontal
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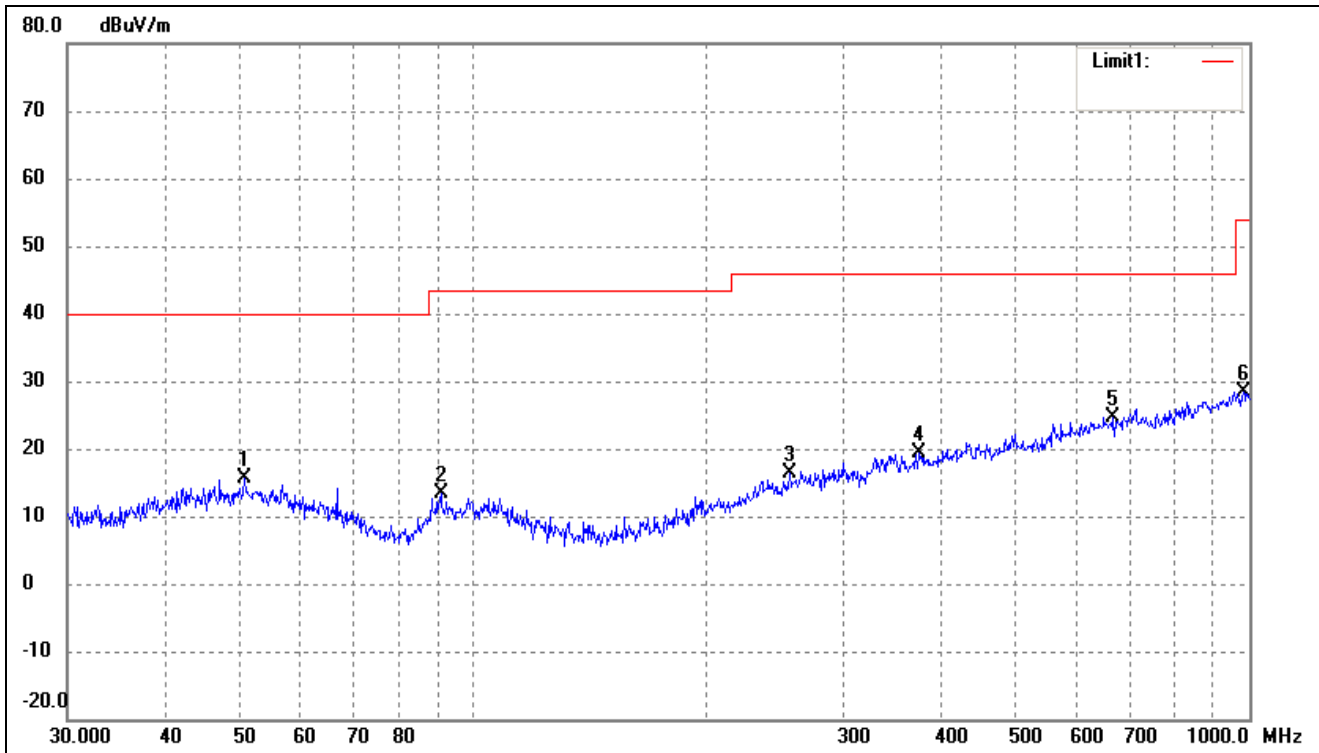
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	52.7600	27.55	-11.69	15.86	40.00	-24.14	96	100	peak
2	104.5361	26.20	-13.42	12.78	43.50	-30.72	125	100	peak
3	260.1444	26.73	-9.34	17.39	46.00	-28.61	143	100	peak
4	355.4273	26.78	-7.03	19.75	46.00	-26.25	129	100	peak
5	638.3686	27.53	-2.69	24.84	46.00	-21.16	81	100	peak
6	938.8326	27.48	1.40	28.88	46.00	-17.12	339	100	peak

Test Channel	Middle	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	51.8430	27.12	-11.59	15.53	40.00	-24.47	278	100	peak
2	91.1746	27.01	-13.63	13.38	43.50	-30.12	91	100	peak
3	289.0021	25.54	-8.56	16.98	46.00	-29.02	173	100	peak
4	443.2943	27.18	-6.13	21.05	46.00	-24.95	93	100	peak
5	739.6605	27.82	-1.92	25.90	46.00	-20.10	192	100	peak
6	821.7104	28.08	-0.35	27.73	46.00	-18.27	317	100	peak

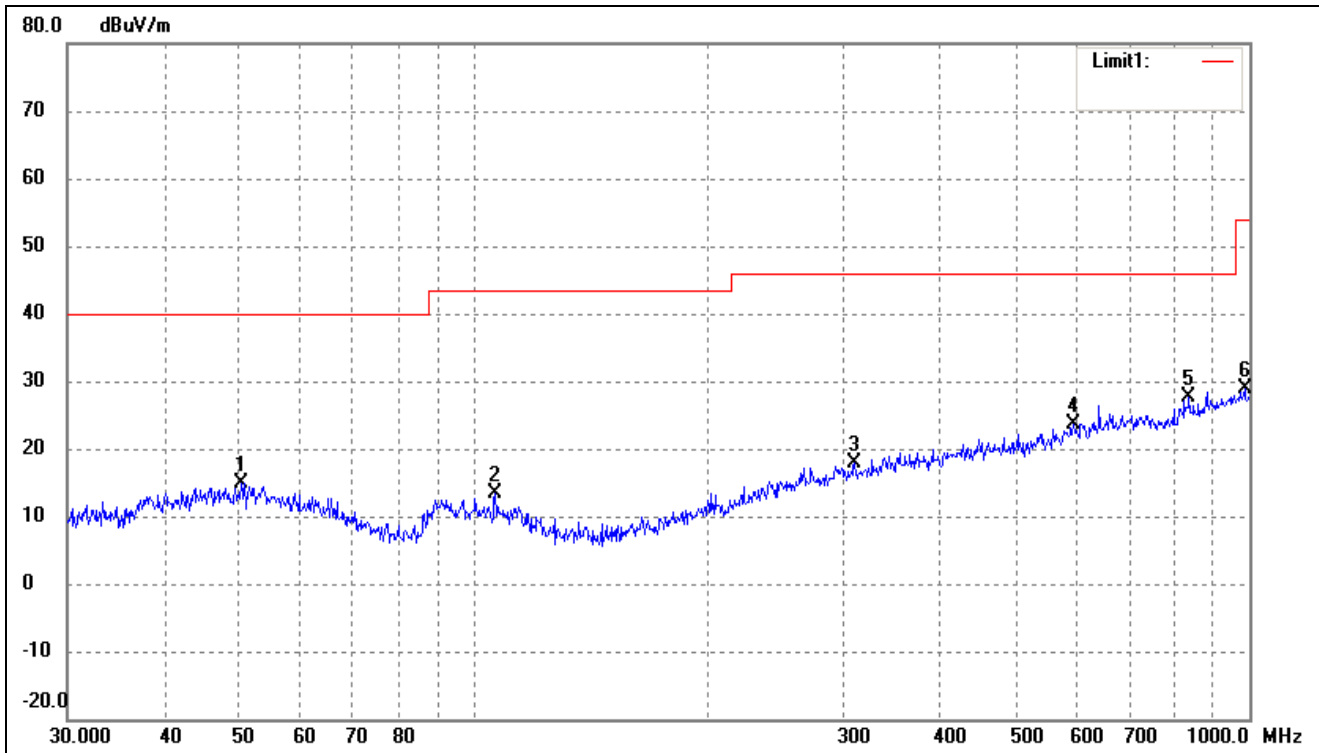
Test Channel	High	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.7637	27.17	-11.59	15.58	40.00	-24.42	103	100	peak
2	90.8554	26.91	-13.57	13.34	43.50	-30.16	103	100	peak
3	255.6231	25.81	-9.55	16.26	46.00	-29.74	55	100	peak
4	375.9385	26.39	-7.11	19.28	46.00	-26.72	234	100	peak
5	668.1423	27.33	-2.58	24.75	46.00	-21.25	122	100	peak
6	982.6200	26.26	2.23	28.49	54.00	-25.51	288	100	peak



Test Channel	High	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.2325	26.56	-11.60	14.96	40.00	-25.04	99	100	peak
2	106.7587	26.81	-13.55	13.26	43.50	-30.24	121	100	peak
3	309.9977	26.14	-8.31	17.83	46.00	-28.17	106	100	peak
4	593.0497	26.89	-3.35	23.54	46.00	-22.46	94	100	peak
5	836.2443	27.88	-0.31	27.57	46.00	-18.43	71	100	peak
6	986.0717	26.80	2.16	28.96	54.00	-25.04	145	100	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-2405MHz							
4810	60.55	-3.53	56.14	74	-17.86	H	PK
4810	39.69	-3.53	35.28	54	-18.72	H	AV
7215	60.79	-0.5	60.37	74	-13.63	H	PK
7215	39.53	-0.5	39.11	54	-14.89	H	AV
4810	58.42	-3.53	55.01	74	-18.99	V	PK
4810	40.35	-3.53	36.94	54	-17.06	V	AV
7215	59.24	-0.5	58.82	74	-15.18	V	PK
7215	42.97	-0.5	42.55	54	-11.45	V	AV
Middle Channel-2440MHz							
4880	59.44	-3.41	56.03	74	-17.97	H	PK
4880	38.33	-3.41	34.92	54	-19.08	H	AV
7320	62.27	-0.42	61.85	74	-12.15	H	PK
7320	40.94	-0.42	40.52	54	-13.48	H	AV
4880	57.83	-3.41	54.42	74	-19.58	V	PK
4880	39.95	-3.41	36.54	54	-17.46	V	AV
7320	59.42	-0.42	59.00	74	-15.00	V	PK
7320	42.78	-0.42	42.36	54	-11.64	V	AV
High Channel-2475MHz							
4950	59.44	-3.38	56.06	74	-17.94	H	PK
4950	39.15	-3.38	35.77	54	-18.23	H	AV
7425	59.53	-0.35	59.18	74	-14.82	H	PK
7425	40.73	-0.35	40.38	54	-13.62	H	AV
4950	59.44	-3.38	56.06	74	-17.94	V	PK
4950	39.91	-3.38	36.53	54	-17.47	V	AV
7425	59.87	-0.35	59.52	74	-14.48	V	PK
7425	41.56	-0.35	41.21	54	-12.79	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, 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.

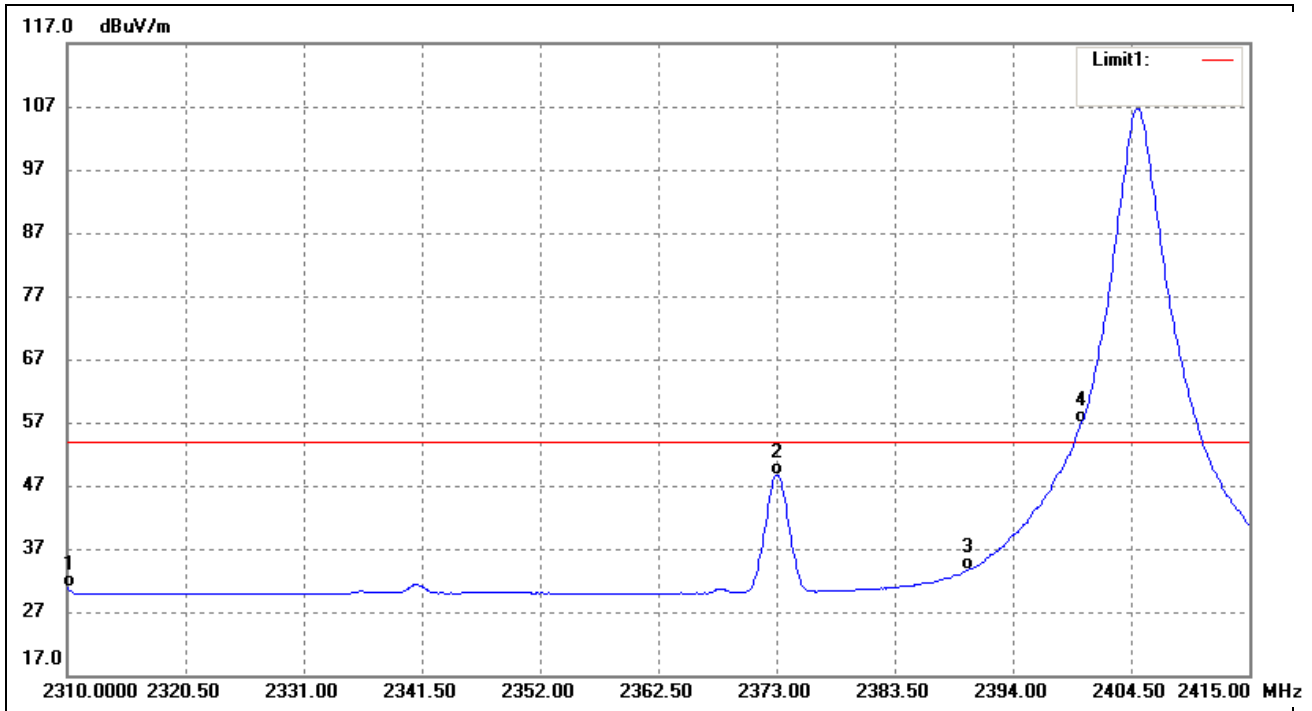
According to the KDB 558074, the conducted spurious emissions test method as follows:

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.

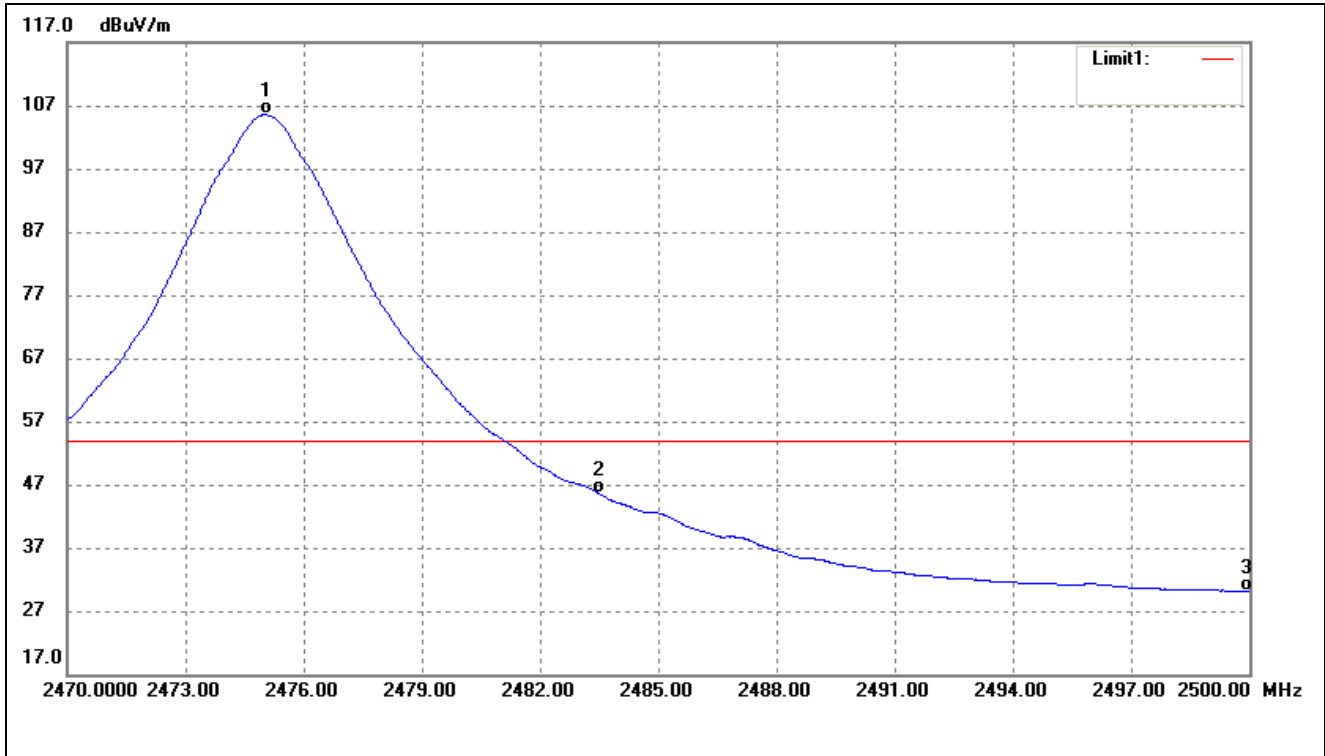
### 9.3 Summary of Test Results/Plots

Test Channel	Low	Polarity:	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	2310.000	40.32	-9.35	30.97	54.00	-23.03	Average Detector
		51.45	-9.35	42.10	74.00	-31.90	Peak Detector
2	2373.000	57.97	-9.25	48.72	54.00	-5.28	Average Detector
		61.75	-9.25	52.50	74.00	-21.50	Peak Detector
3	2390.000	42.96	-9.22	33.74	54.00	-20.26	Average Detector
		54.15	-9.22	44.93	74.00	-29.07	Peak Detector
4	2400.000	66.07	-9.20	56.87	Delta =49.798dBc		Average Detector
5	2405.025	115.85	-9.19	106.66			Average Detector

Test Channel	High	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	2475.040	114.62	-9.07	105.55	/	/	Average Detector
	2474.500	117.27	-9.08	108.19	/	/	Peak Detector
2	2483.500	54.68	-9.07	45.61	54.00	-8.39	Average Detector
	2483.500	66.79	-9.07	57.72	74.00	-16.28	Peak Detector
3	2500.000	39.19	-9.03	30.16	54.00	-23.84	Average Detector
	2500.000	51.53	-9.03	42.50	74.00	-31.50	Peak Detector

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