

# FCC Part 15C

## Measurement and Test Report

For

**Shen Zhen WFLY Technology Development Co., Ltd.**

**C2 Building, 4th Floor, Xiang Li Industrial Park, He Ping Hao Ye Road,  
Fuyong Street, Bao'an District, Shenzhen City, Guangdong Province, China**

**FCC ID: TZVX4**

**FCC Rule(s):** FCC Part 15C

**Product Description:** Digital proportional remote controller

**Tested Model:** X4

**Report No.:** STR13118311I

**Tested Date:** 2013-11-26 to 2013-12-12

**Issued Date:** 2013-12-16

**Tested By:** Susan Su / Engineer

*Susan Su*

**Reviewed By:** Lahm Peng / EMC Manager

*Lahm peng*

**Approved & Authorized By:** Jandy so / PSQ Manager

*Jandyso*

**Prepared By:**

**Shenzhen SEM.Test Technology Co., Ltd.**

1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,  
Bao'an District, Shenzhen, P.R.C. (518101)

Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: [www.semtest.com.cn](http://www.semtest.com.cn)

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.

**TABLE OF CONTENTS**

<b>1. GENERAL INFORMATION.....</b>	<b>3</b>
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
<b>2. SUMMARY OF TEST RESULTS .....</b>	<b>6</b>
<b>3. RF EXPOSURE .....</b>	<b>7</b>
3.1 STANDARD APPLICABLE.....	7
3.2 TEST RESULT.....	7
<b>4. ANTENNA REQUIREMENT .....</b>	<b>8</b>
4.1 STANDARD APPLICABLE.....	8
4.2 EVALUATION INFORMATION .....	8
<b>5. POWER SPECTRAL DENSITY .....</b>	<b>9</b>
5.1 STANDARD APPLICABLE.....	9
5.2 TEST EQUIPMENT LIST AND DETAILS .....	9
5.3 TEST PROCEDURE.....	9
5.4 ENVIRONMENTAL CONDITIONS .....	9
5.5 SUMMARY OF TEST RESULTS/PLOTS .....	10
<b>6. 6DB BANDWIDTH .....</b>	<b>12</b>
6.1 STANDARD APPLICABLE.....	12
6.2 TEST EQUIPMENT LIST AND DETAILS .....	12
6.3 TEST PROCEDURE.....	12
6.4 ENVIRONMENTAL CONDITIONS .....	12
6.5 SUMMARY OF TEST RESULTS/PLOTS .....	13
<b>7. RF OUTPUT POWER.....</b>	<b>15</b>
7.1 STANDARD APPLICABLE.....	15
7.2 TEST EQUIPMENT LIST AND DETAILS .....	15
7.3 TEST PROCEDURE.....	15
7.4 ENVIRONMENTAL CONDITIONS .....	15
7.5 SUMMARY OF TEST RESULTS/PLOTS .....	16
<b>8. FIELD STRENGTH OF SPURIOUS EMISSIONS .....</b>	<b>18</b>
8.1 MEASUREMENT UNCERTAINTY .....	18
8.2 STANDARD APPLICABLE.....	18
8.3 TEST EQUIPMENT LIST AND DETAILS .....	18
8.4 TEST PROCEDURE.....	19
8.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	19
8.6 ENVIRONMENTAL CONDITIONS .....	20
8.7 SUMMARY OF TEST RESULTS/PLOTS .....	20
<b>9. OUT OF BAND EMISSIONS.....</b>	<b>28</b>
9.1 STANDARD APPLICABLE.....	28
9.2 TEST EQUIPMENT LIST AND DETAILS .....	28
9.3 TEST PROCEDURE.....	28
9.4 ENVIRONMENTAL CONDITIONS .....	29
9.5 SUMMARY OF TEST RESULTS/PLOTS .....	29

## 1. GENERAL INFORMATION

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

#### Client Information

Applicant: Shen Zhen WFLY Technology Development Co., Ltd.  
Address of applicant: C2 Building, 4th Floor, Xiang Li Industrial Park, He Ping Hao Ye Road, Fuyong Street, Bao'an District, Guangdong Province, China  
Manufacturer: Shen Zhen WFLY Technology Development Co., Ltd.  
Address of manufacturer: C2 Building, 4th Floor, Xiang Li Industrial Park, He Ping Hao Ye Road, Fuyong Street, Bao'an District, Guangdong Province, China

General Description of EUT	
Product Name:	Digital proportional remote controller
Trade Name:	WFLY
Model No.:	X4
Adding Model(s):	/
Rated Voltage:	DC 6V battery
Power Adapter Model:	/
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT	
Frequency Range:	2405-2475MHz
RF Output Power:	11.76 dBm (Conducted)
Type of Modulation:	DSSS
Data Rate:	1Mbps
Quantity of Channels:	71
Channel Separation:	1MHz
Type of Antenna:	Integral
Antenna Gain:	2dBi
Lowest Internal Frequency	12MHz

## 1.2 Test Standards

The following report is prepared on behalf of the Shen Zhen WFLY Technology Development Co., Ltd. in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

**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 C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The public notice KDB 558074 D01 V03 for digital transmission systems shall be performed also.

## 1.4 Test Facility

### **FCC – Registration No.: 934118**

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

### **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.

### **CNAS Registration No.: L4062**

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2<sup>nd</sup> Road, Bao'an District, Shenzhen, P.R.C (518101).

## 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, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Transmitting	2405MHz, 2442MHz, 2475MHz

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
/	/	/	/

## 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
§ 15.207(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**

---

#### **3.1 Standard Applicable**

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

#### **3.2 Test Result**

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

## **4. Antenna Requirement**

---

### **4.1 Standard Applicable**

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

### **4.2 Evaluation Information**

This product has a 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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

### 5.3 Test Procedure

According to the KDB 558074 D01 V03, the test method of power spectral density as below:

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set analyzer center frequency to DTS channel center frequency.
3. Set the span to 1.5 times the DTS channel bandwidth.
4. Set the RBW  $\geq 3$  kHz.
5. Set the VBW  $\geq 3 \times$  RBW.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum amplitude level.
11. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 5.4 Environmental Conditions

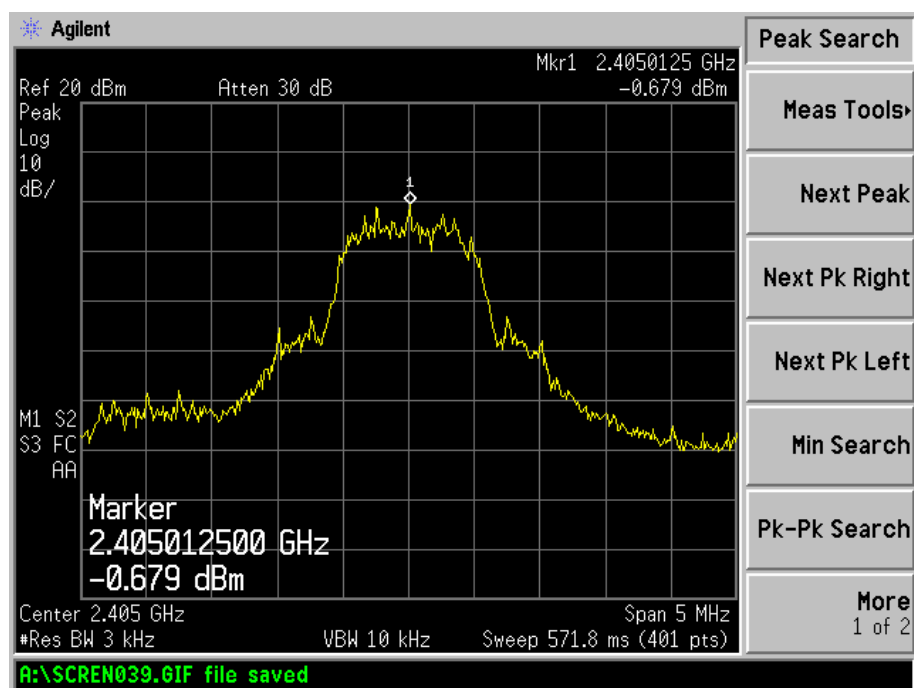
Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

## 5.5 Summary of Test Results/Plots

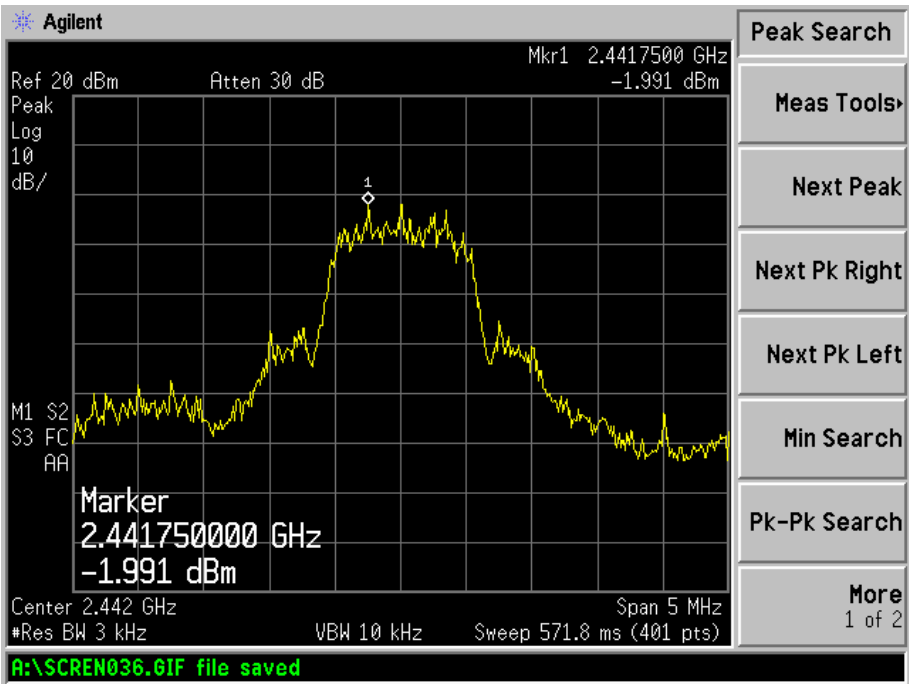
Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
2405	-0.679	8
2442	-1.991	8
2475	-2.835	8

Please refer to the following test plots:

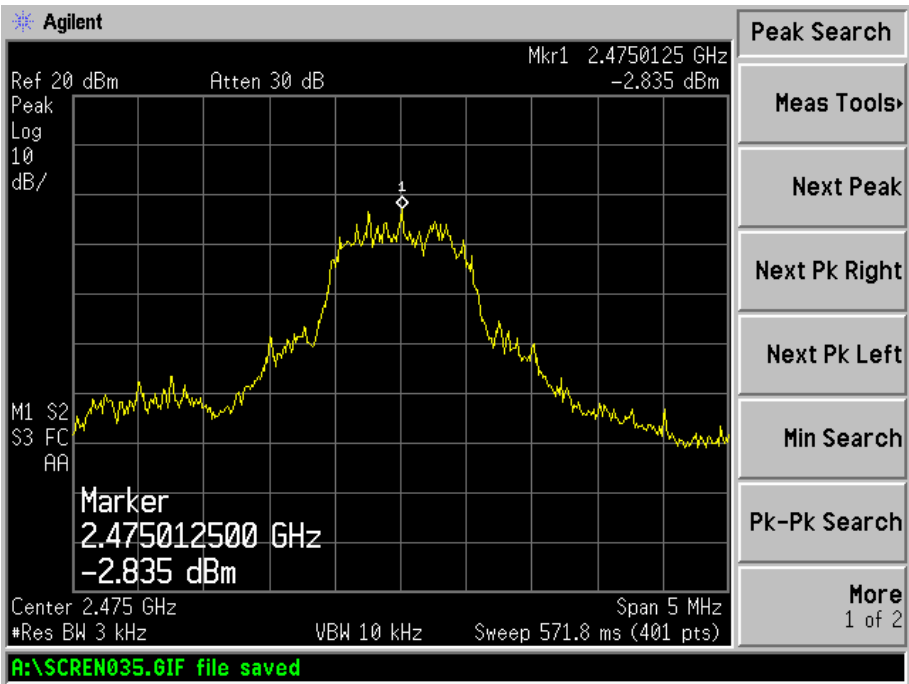
Low Channel



Middle Channel



High Channel



## 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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

### 6.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.
3. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission..

### 6.4 Environmental Conditions

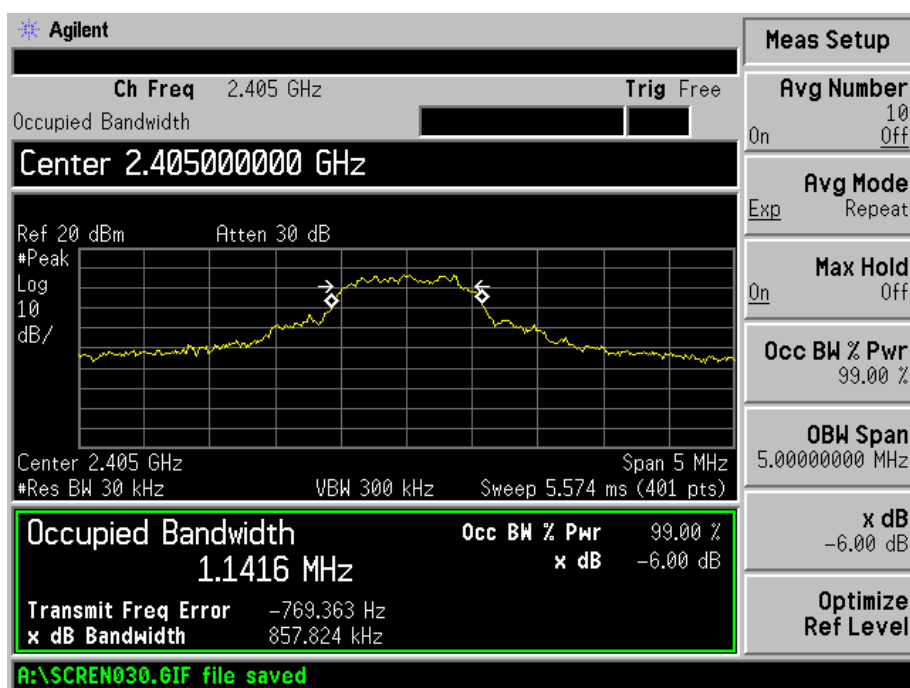
Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

## 6.5 Summary of Test Results/Plots

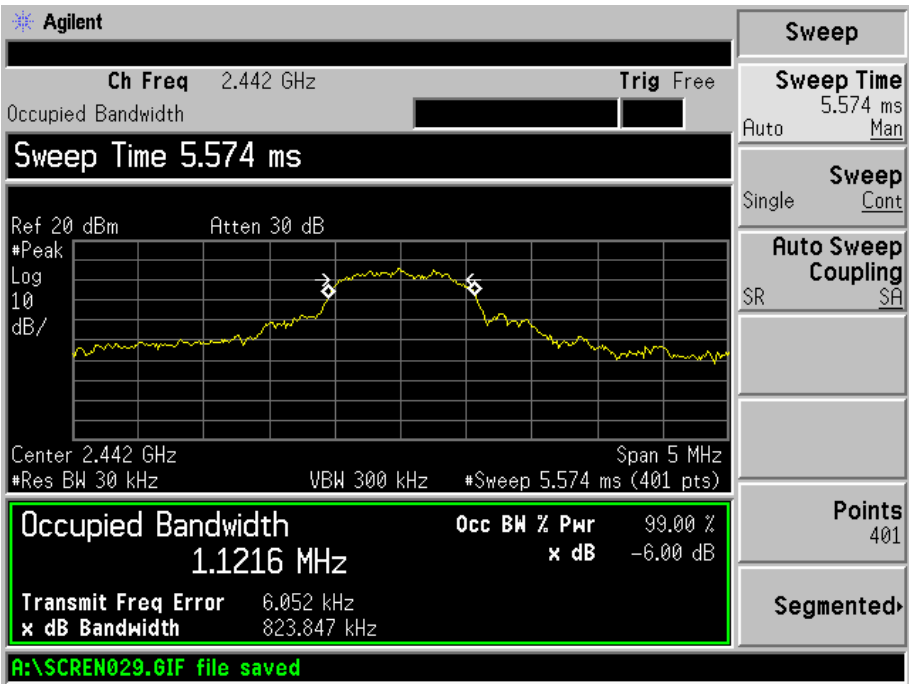
Test Channel MHz	6 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz
2405	857.824	1141.6	500
2442	823.847	1121.6	500
2475	874.899	1203.5	500

Please refer to the following test plots:

Low Channel



Middle Channel



High Channel



## 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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2013-05-07	2014-05-06
Attenuator	ATTEN	ATS100-4-20	/	2013-05-07	2014-05-06

### 7.3 Test Procedure

According to section 15.247(b)-power output of the KDB-558074 D01 V03 (2013), 8.1.2 Option 2 (channel integration method) this procedure should only be used when the maximum available RBW of the spectrum/signal analyzer is less than the DTS bandwidth.

1. Set the RBW = maximum available (at least 1 MHz).
2. Set the VBW = 3 x RBW or maximum available setting (must be  $\geq$  RBW).
3. Set the span to fully encompass the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector).

### 7.4 Environmental Conditions

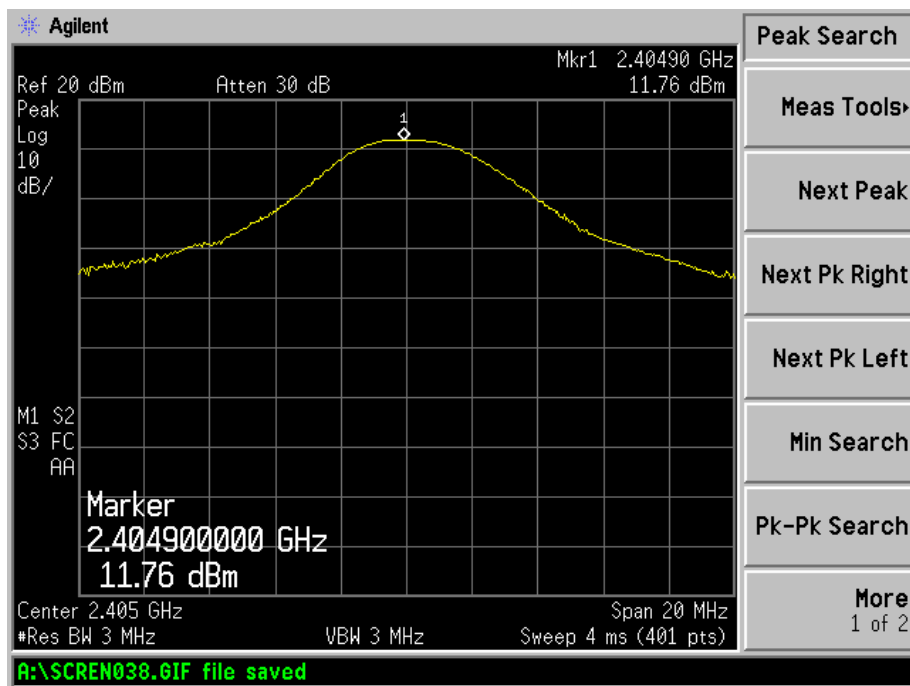
Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

## 7.5 Summary of Test Results/Plots

Frequency MHz	Reading dBm	Output Power mW	Limit mW
2405	11.76	14.9968	1000
2442	10.53	11.2980	1000
2475	9.164	8.2490	1000

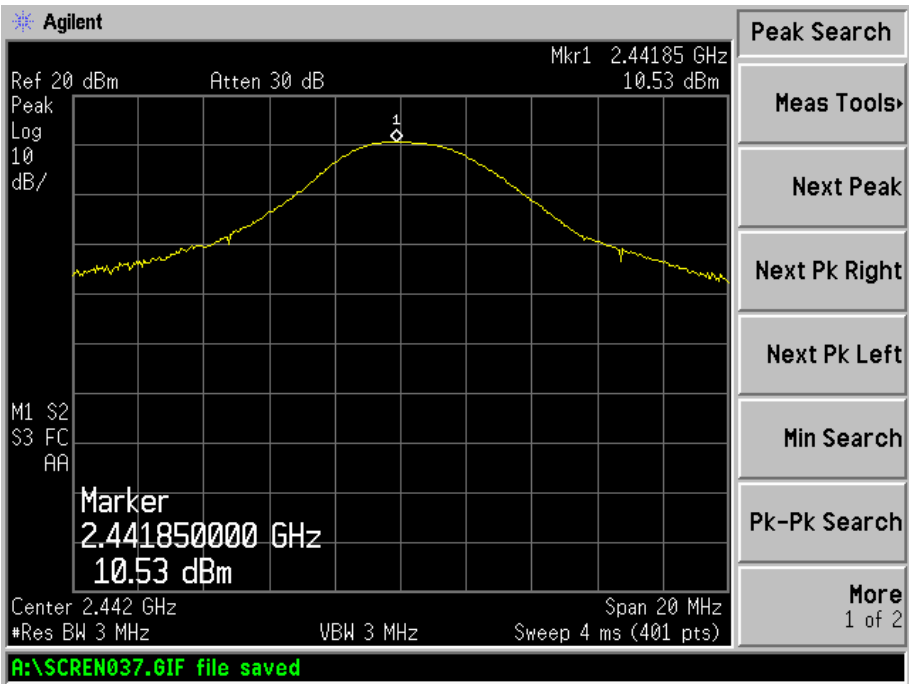
Please refer to the following test plots:

Low Channel

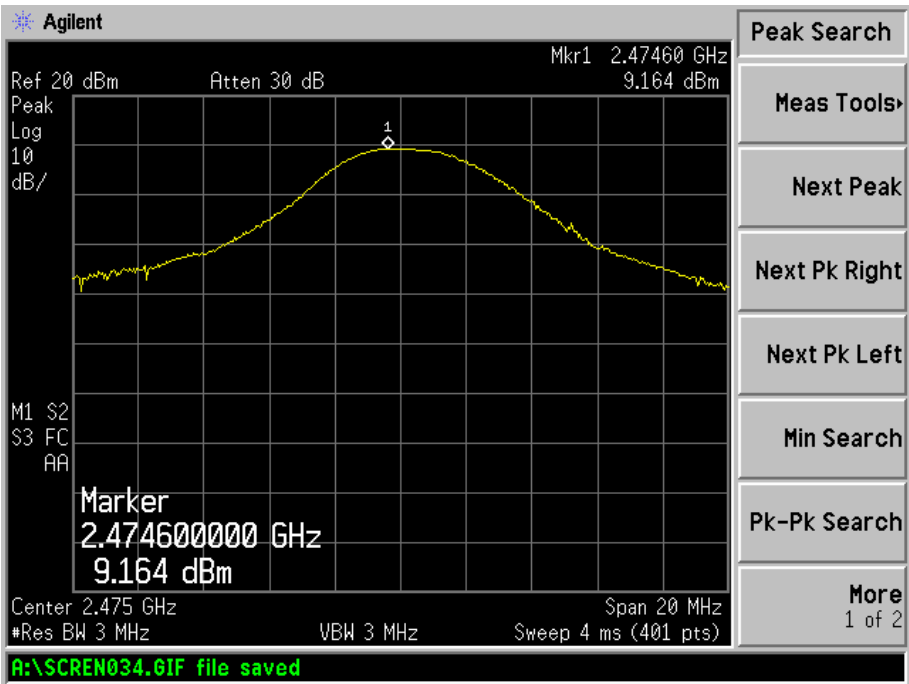




Middle Channel



High Channel



## 8. Field Strength of Spurious Emissions

### 8.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 5.10$  dB.

### 8.2 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.

### 8.3 Test Equipment List and Details

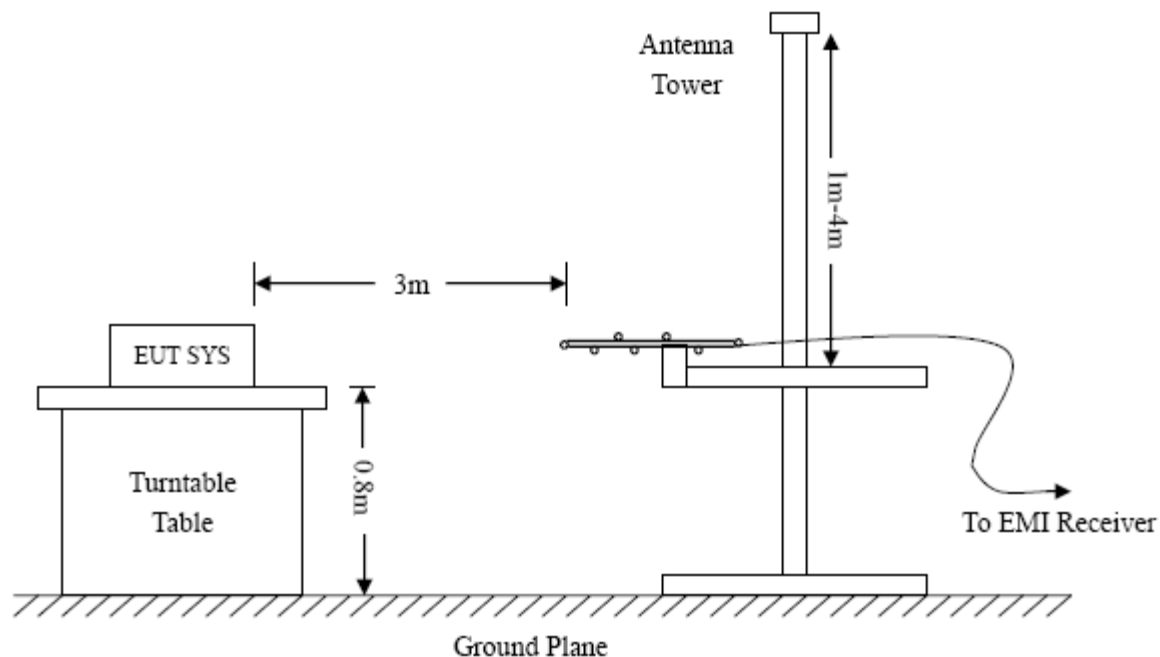
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-05-07	2014-05-06
EMI Test Receiver	R&S	ESVB	825471/005	2013-05-07	2014-05-06
Pre-amplifier	Agilent	8447F	3113A06717	2013-05-07	2014-05-06
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-05-07	2014-05-06
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-04-20	2014-04-19
Horn Antenna	ETS	3117	00086197	2013-04-20	2014-04-19
Horn Antenna	ETS	3116B	00088203	2013-04-20	2014-04-19
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2013-04-20	2014-04-19

## 8.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 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

## 8.5 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 -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

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

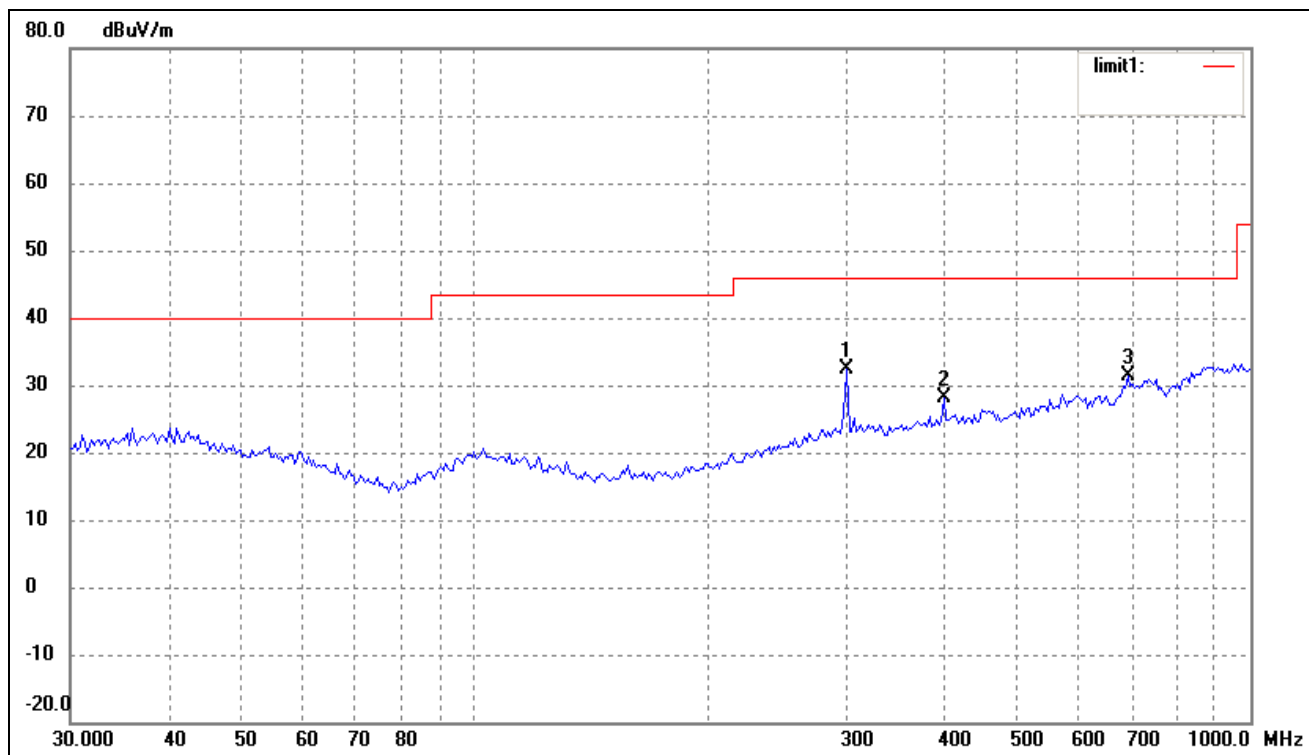
## 8.6 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

## 8.7 Summary of Test Results/Plots

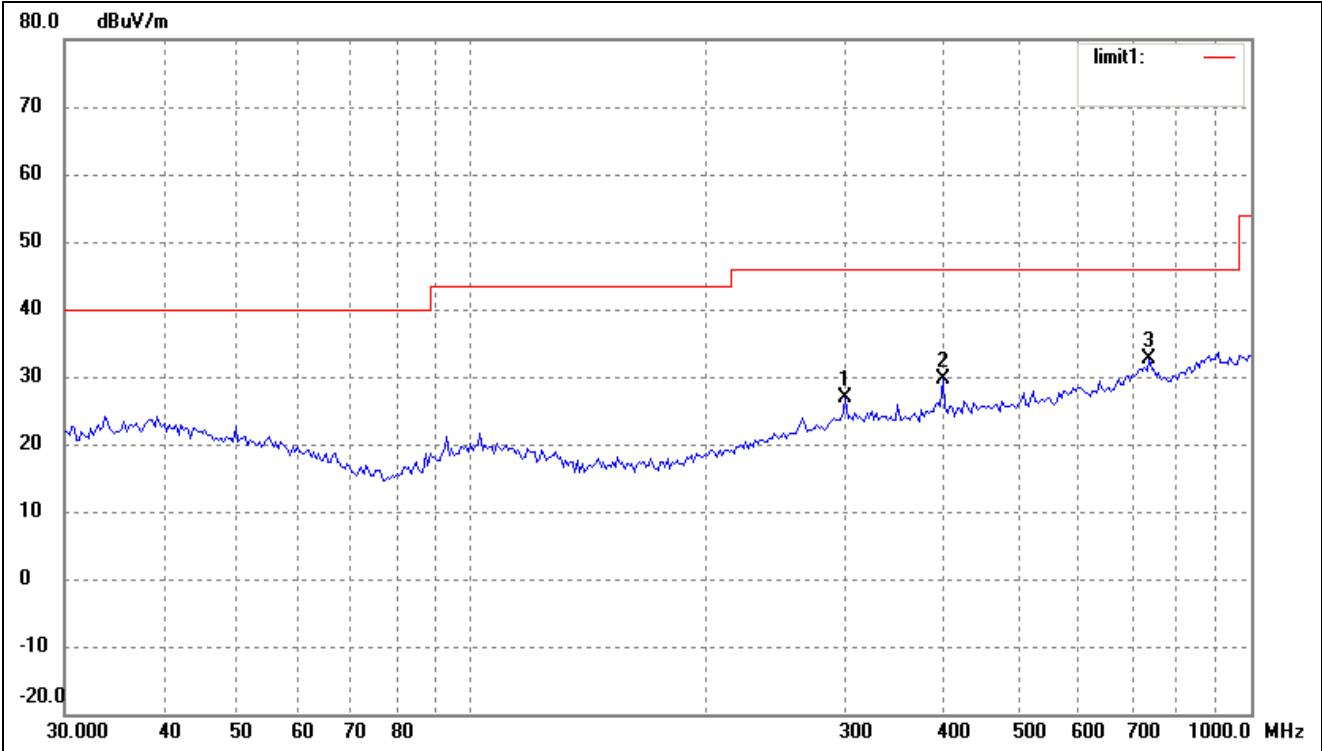
According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst cases:

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

**Plot of Radiated Emissions Test Data (30MHz to 1GHz)***EUT:* Digital proportional remote controller*Tested Model:* X4*Operating Condition:* Low Channel-2405MHz*Comment:* DC 6V*Test Specification:* Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	( ° )	(cm)	
1	301.4224	23.22	9.18	32.40	46.00	-13.60	178	100	peak
2	401.8385	18.13	10.06	28.19	46.00	-17.81	224	100	peak
3	694.4174	17.67	13.64	31.31	46.00	-14.69	160	100	peak

Test Specification: Vertical

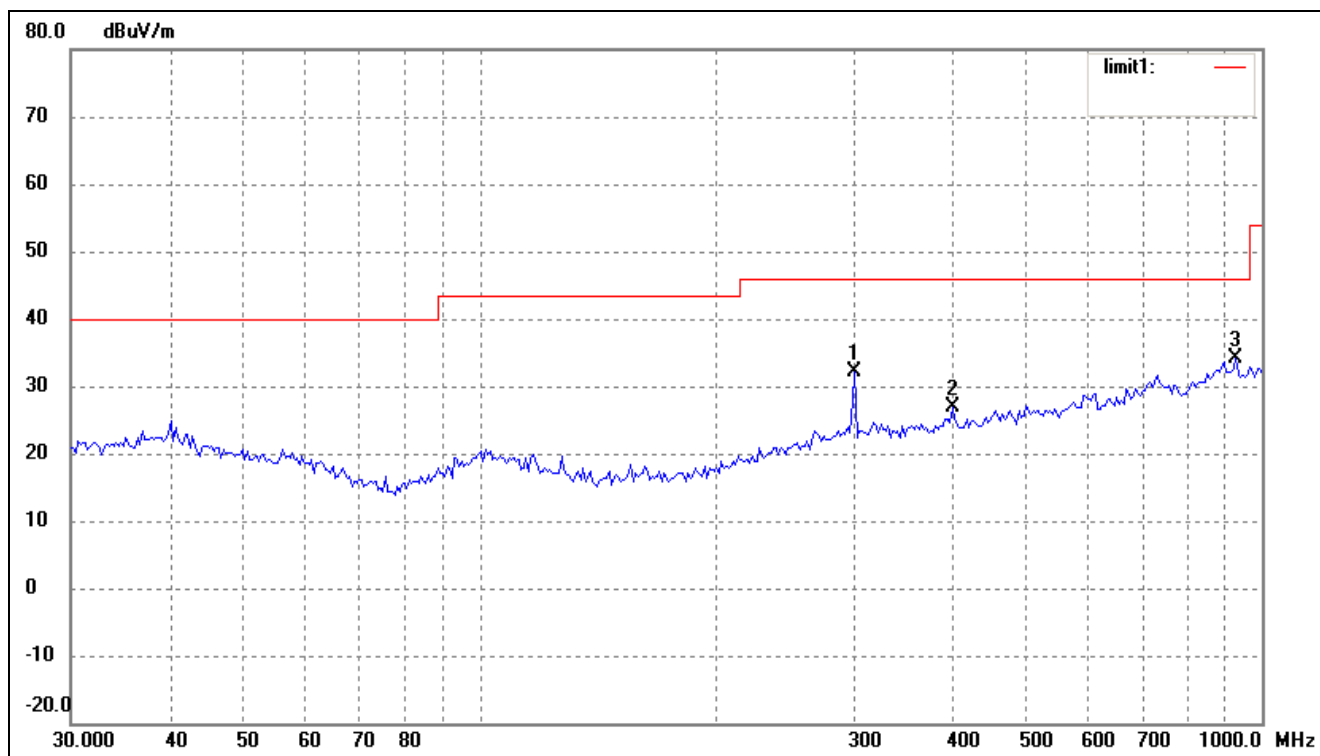


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	( ° )	(cm)	
1	301.4224	17.82	9.18	27.00	46.00	-19.00	114	100	peak
2	401.8385	19.60	10.06	29.66	46.00	-16.34	270	100	peak
3	739.6605	17.06	15.53	32.59	46.00	-13.41	360	100	peak

Operating Condition: Middle Channel-2442MHz

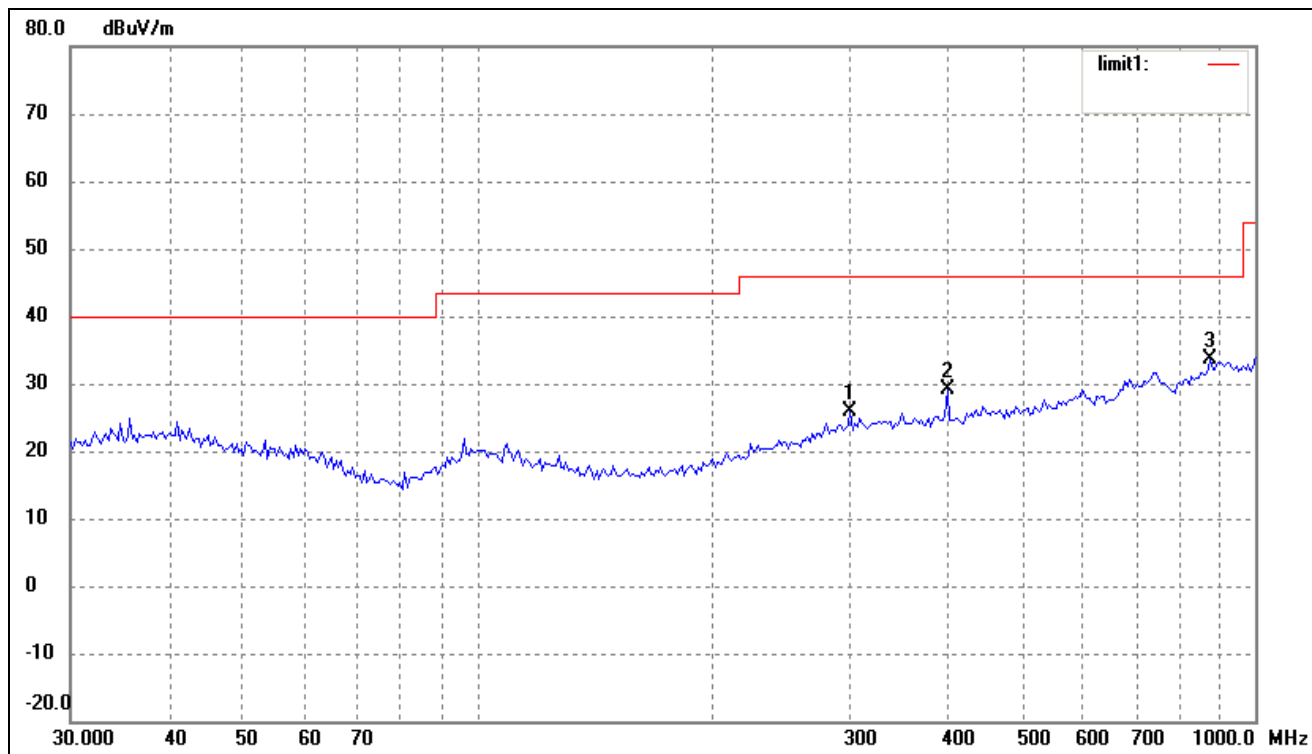
Comment: DC 6V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	301.4224	23.07	9.18	32.25	46.00	-13.75	256	100	peak
2	401.8385	16.87	10.06	26.93	46.00	-19.07	360	100	peak
3	925.7563	17.70	16.40	34.10	46.00	-11.90	360	100	peak

Test Specification: Vertical



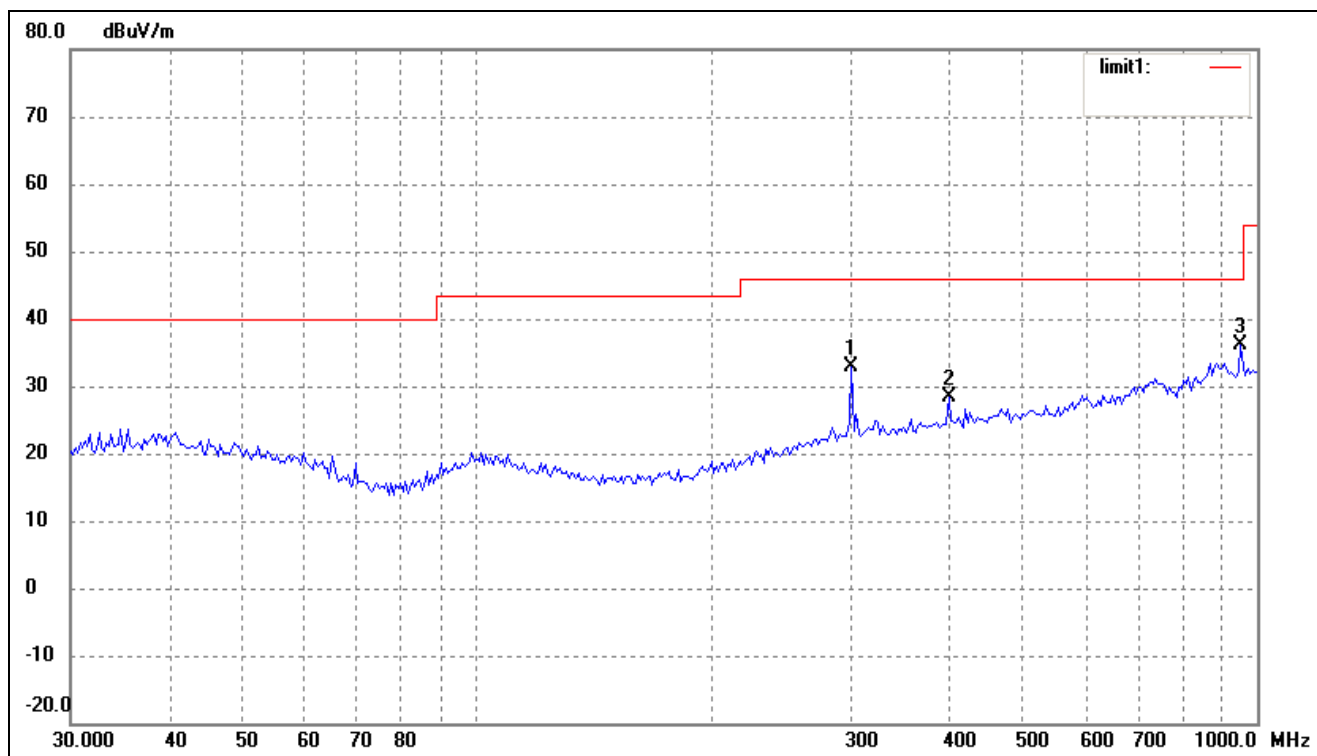
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	301.4224	16.63	9.18	25.81	46.00	-20.19	176	100	peak
2	401.8385	19.07	10.06	29.13	46.00	-16.87	255	100	peak
3	875.2470	17.02	16.70	33.72	46.00	-12.28	360	100	peak



Operating Condition: High Channel-2475MHz

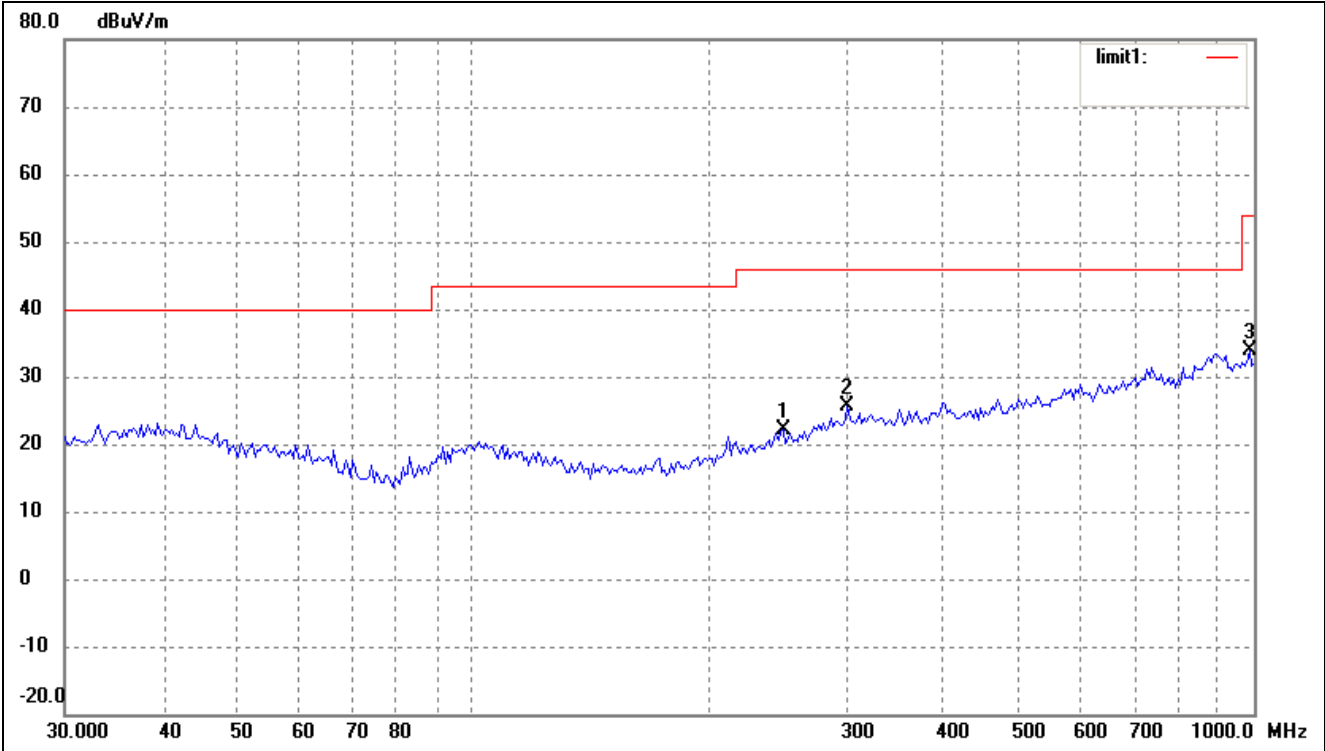
Comment: DC 6V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	301.4224	23.72	9.18	32.90	46.00	-13.10	360	100	peak
2	401.8385	18.23	10.06	28.29	46.00	-17.71	225	100	peak
3	952.0937	19.87	16.29	36.16	46.00	-9.84	160	100	peak

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	( ° )	(cm)	
1	249.4250	15.50	6.68	22.18	46.00	-23.82	174	100	peak
2	301.4224	16.37	9.18	25.55	46.00	-20.45	160	100	peak
3	986.0717	17.05	16.90	33.95	54.00	-20.05	320	100	peak

*Spurious Emissions Above 1GHz*

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2405MHz							
4810.000	61.04	0.54	60.50	74.00	-13.50	H	PK
4810.000	44.16	0.54	43.62	54.00	-10.38	H	AV
7215.000	68.00	3.66	64.34	74.00	-9.66	H	PK
7215.000	47.69	3.66	44.03	54.00	-9.97	H	AV
4810.000	61.99	0.54	61.45	74.00	-12.55	V	PK
4810.000	43.18	0.54	42.64	54.00	-11.36	V	AV
7215.000	69.87	3.66	66.21	74.00	-7.79	V	PK
7215.000	51.80	3.66	48.14	54.00	-5.86	V	AV
Middle Channel-2442MHz							
4884.000	61.64	0.64	61.00	74.00	-13.00	H	PK
4884.000	42.89	0.64	42.25	54.00	-11.75	H	AV
7326.000	66.01	3.77	62.24	74.00	-11.76	H	PK
7326.000	48.34	3.77	44.57	54.00	-9.43	H	AV
4884.000	63.87	0.64	63.23	74.00	-10.77	V	PK
4884.000	42.79	0.64	42.15	54.00	-11.85	V	AV
7326.000	69.22	3.77	65.45	74.00	-8.55	V	PK
7326.000	50.32	3.77	46.55	54.00	-7.45	V	AV
High Channel-2475MHz							
4950.000	61.00	0.77	60.23	74.00	-13.77	H	PK
4950.000	43.94	0.77	43.17	54.00	-10.83	H	AV
7425.000	65.94	3.77	62.17	74.00	-11.83	H	PK
7425.000	46.39	3.77	42.62	54.00	-11.38	H	AV
4950.000	62.12	0.77	61.35	74.00	-12.65	V	PK
4950.000	43.22	0.77	42.45	54.00	-11.55	V	AV
7425.000	67.55	3.77	63.78	74.00	-10.22	V	PK
7425.000	45.74	3.77	41.97	54.00	-12.03	V	AV

*Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3<sup>th</sup> Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*The measurements greater than 20dB below the limit from 9kHz to 30MHz.*

## 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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2013-05-07	2014-05-06
EMI Test Receiver	R&S	ESVB	825471/005	2013-05-07	2014-05-06
Pre-amplifier	Agilent	8447F	3113A06717	2013-05-07	2014-05-06
Pre-amplifier	Compliance Direction	PAP-0118	24002	2013-05-07	2014-05-06
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2013-04-20	2014-04-19
Horn Antenna	ETS	3117	00086197	2013-04-20	2014-04-19

### 9.3 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 D01 V03, 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.

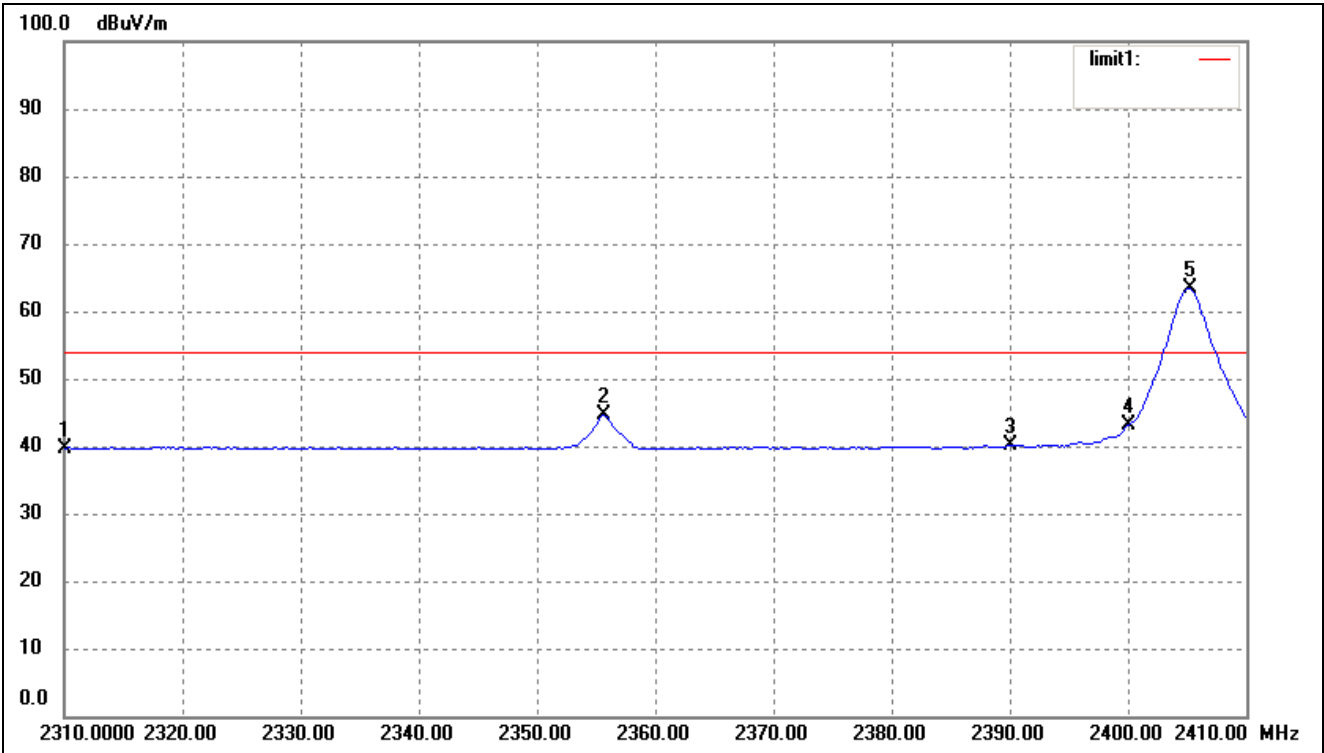
#### 9.4 Environmental Conditions

Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

#### 9.5 Summary of Test Results/Plots

Please refer to the test plots as below.

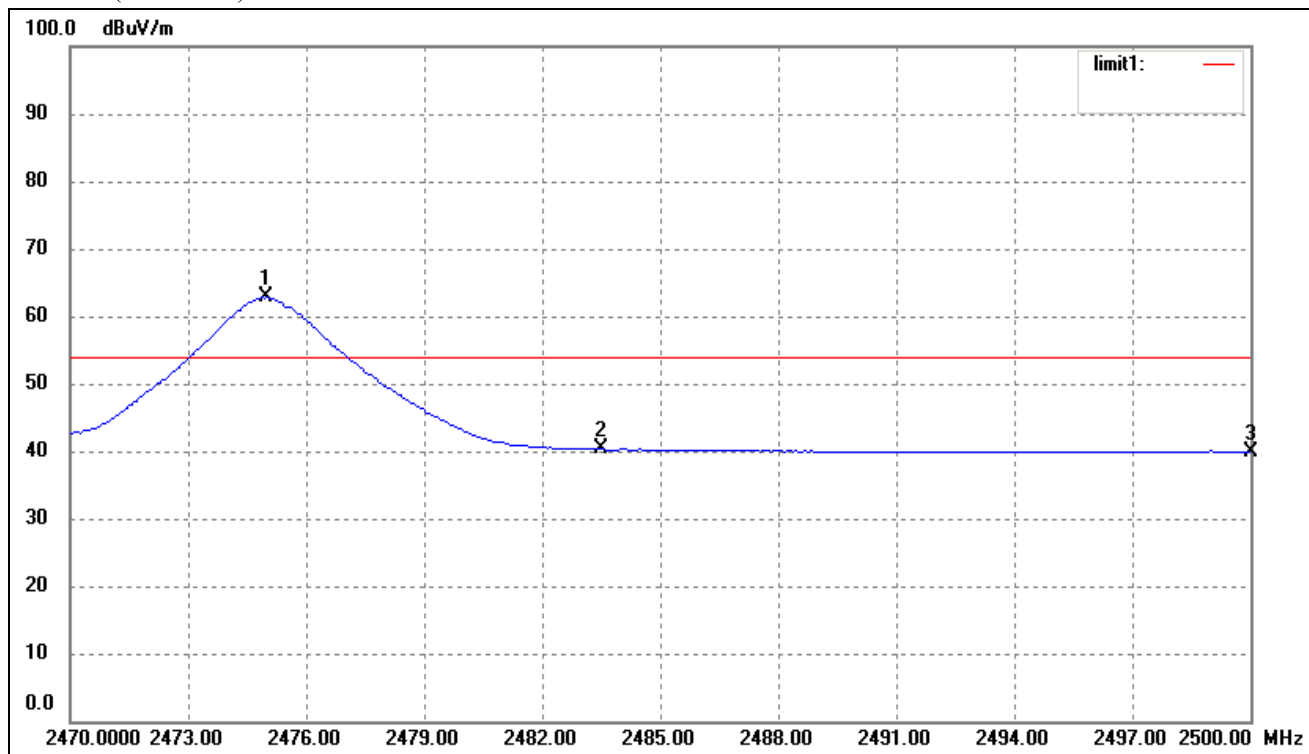
Lowest Bandedge  
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	43.36	-3.71	39.65	54.00	-14.35	Average Detector
	2310.000	56.43	-3.71	52.72	74.00	-21.28	Peak Detector
2	2355.600	48.19	-3.61	44.58	54.00	-9.42	Average Detector
	2355.600	68.19	-3.61	64.58	74.00	-9.42	Peak Detector
3	2390.000	43.64	-3.54	40.10	54.00	-13.90	Average Detector
	2390.000	75.66	-3.54	72.12	74.00	-1.88	Peak Detector
4	2400.000	46.62	-3.51	43.11	Delta=20.36dBc		Average Detector
5	2405.000	66.97	-3.50	63.47			Average Detector

Highest Bandedge

Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2475.000	66.09	-3.33	62.76	/	/	Average Detector
	2475.000	107.91	-3.33	104.58	/	/	Peak Detector
2	2483.500	Delta=51.29dBc		40.30	54.00	-13.70	Average Detector
	2483.500			74.59	74.00	0.59	Peak Detector
3	2500.000	43.18	-3.28	39.90	54.00	-14.10	Average Detector
	2500.000	66.81	-3.28	63.53	74.00	-10.47	Peak Detector

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