



**CENTRE OF TESTING SERVICE  
INTERNATIONAL**

**OPERATE ACCORDING TO ISO/IEC 17025**

# **FCC ID/IC TEST REPORT**

**TEST REPORT NUMBER : CGZ3140617-00630-EFI**



**CENTRE OF TESTING SERVICE CO., LTD.**

A101, No.65, Zhuji Highway, Tianhe District, Guangzhou, Guangdong, China.



<b>TEST REPORT For FCC ID</b>	
<b>47 CFR PART 15 OCT, 2013</b>	
<b>RSS-210 Issue 8</b>	
Report Reference No. ....	CGZ3140617-00630-EFI
Date of issue .....	20 June 2014
<b>Testing Laboratory Name .....</b> CENTRE OF TESTING SERVICE CO., LTD.	
Address..... A101, No.65, Zhuji Highway, Tianhe District, Guangzhou, Guangdong, China	
Testing location/ procedure ..... Full application of Harmonised standards <input checked="" type="checkbox"/>	
Partial application of Harmonised standards <input type="checkbox"/>	
Other standard testing method <input type="checkbox"/>	
<b>Applicant's name .....</b> Horizon Hobby	
Address..... 4105 Fieldstone Road, Champaign, IL 61822, USA	
<b>Test specification .....</b>	
Standard ..... <b>47 CFR PART 15 OCT, 2013, RSS-210 Issue 8, RSS-Gen Issue 3</b>	
<b>Test Report Form No. ....</b> CTSEMC-1.0	
TRF Originator..... CENTRE OF TESTING SERVICE CO., LTD.	
Master TRF..... Dated 2009-01	
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<b>Test item description.....</b> : RECEIVER	
Trade Mark..... /	
Manufacturer..... Horizon Hobby	
Model/Type reference..... SPMSR310	
Ratings..... Battery 5V	
Operating Frequency ..... 2402MHz ~2478MHz	
Result ..... <b>PASSED</b>	

Compiled by:

Kate zhang / Fileadministrators

Supervised by:

Duke yang / Technique principal

Approved by:

Vincent yao / Manager

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## FCC ID -- T E S T R E P O R T

<b>Test Report No. :</b>	<b>CGZ3140617-00630-EFI</b>	<u>20 June 2014</u> Date of issue
--------------------------	-----------------------------	--------------------------------------

Type / Model.....	SPMSR310
EUT.....	RECEIVER
<b>Applicant.....</b>	Horizon Hobby
Address.....	4105 Fieldstone Road, Champaign, IL 61822, USA
Telephone.....	+1-2174033542
Fax.....	/
Contact.....	Mr.Henry Lin
<b>Manufacturer.....</b>	Horizon Hobby
Address.....	4105 Fieldstone Road, Champaign, IL 61822, USA
Telephone.....	+1-2174033542
Fax.....	/
Contact.....	Mr.Henry Lin
<b>Test report holder.....</b>	Horizon Hobby
Address.....	4105 Fieldstone Road, Champaign, IL 61822, USA
Telephone.....	+1-2174033542
Fax.....	/
Contact.....	Mr.Henry Lin

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## 1. TEST STANDARDS

The tests were performed according to following standards:

- 47 CFR PART 15 OCT, 2013
- RSS-210 Issue 8
- RSS-Gen Issue 3
- ANSI C63.4-2009

## 2. SUMMARY

### 2.1 GENERAL REMARKS

Date of receipt of test sample	17 June 2014
Testing commenced on	17~ 20 June 2014
Testing concluded on	20 June 2014

### 2.2 FINAL ASSESSMENT

The FCC requirements pertaining to the technical standards and tested operation modes are

- - fulfilled.
- - **not** fulfilled.

The equipment under test

- - fulfils the FCC requirements cited on page 1.
- - **does not** fulfil the FCC requirements cited on page 1.

## 3. EQUIPMENT UNDER TEST

### 3.1 Power supply system utilised

Power supply voltage : ■ Battery 5V

### 3.2 Short description of the Equipment under Test (EUT)

Number of tested samples: 1

Serial number: Prototype

### 3.3 EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

- - Standby
- TX- Y position
- TX- Z position
- TX- X position
- RX Mode

Operation mode 1: TX-X Position Low (2402MHz) , TX-X Position Middle (2440MHz) ,  
TX-X Position High (2478MHz)

Operation mode 2: RX Mode

Note: TX -X position of EUT is the worst case, so only these test results be recorded in the test report.

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### 3.4 EUT configuration

#### 3.4.1. Description of configuration (EUT)

Description	:	RECEIVER
Model Number	:	SPMSR310
Operation frequency	:	2402~ 2478 MHz ISM Band
Radio Technology	:	GFSK
Modulation Technology	:	GFSK modulation
Antenna	:	External antenna, met requirement of FCC 15.203

#### 3.4.2. Tested Supporting System Details

N/A

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## 4. TEST ENVIRONMENT

### 4.1 Address of the test laboratory

A101, No.65, Zhuji Highway, Tianhe District, Guangzhou, Guangdong, China

Tel: +86-20-85543113 (32 lines)

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### 4.2 Test facility

The test facility is recognized, certified, or accredited by the following organizations:

#### **CNAS-Lab Code: L3394**

CENTRE OF TESTING SERVICE CO., LTD has been assessed and proved to be in compliance with CNAS-CL01: 2006 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### **IC-Registration No.: 8374A**

The 3m Alternate Test Site of CENTRE OF TESTING SERVICE CO., LTD has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 8374A on May 22, 2014.

#### **FCC-Registration No.: 971995**

CENTRE OF TESTING SERVICE 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. Registration No.791995, July 21, 2012.

### 4.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35 ° C
Humidity:	25~75 %
Atmospheric pressure:	86~106 kPa

### 4.4 Definitions of symbols used in this test report

- - The black square indicates that the listed condition, standard or equipment is applicable for this report.
- - The empty square indicates that the listed condition, standard or equipment is **not** applicable for this report.

### 4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the CTS quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.





## 4.6 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conduction disturbance	150kHz~30MHz	$\pm 1.22\text{dB}$	(1)
Power disturbance	30MHz~300MHz	$\pm 1.38\text{dB}$	(1)
Radiation emission (3m)	30MHz~300MHz	$\pm 3.14\text{dB}$	(1)
	300MHz~1000MHz	$\pm 3.18\text{dB}$	(1)
	1GHz~26.5GHz	$\pm 3.54\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## 5. Summary of standards and results

### 5.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	Standard	Results
Radiated Emission Test	RSS-Gen:7.2 RSS-210 A2.9 FCC Part 15 C: 15.249 FCC Part 15 : 209 ANSI C63.4-2009	PASSED
Receiver Spurious Emissions	RSS-Gen Issue 3:4.10 ANSI C63.4-2009	PASSED
Band Edge Compliance Test	RSS-210 Annex 8 FCC Part 15 C: 15.249 ANSI C63.4-2009	PASSED
99% Bandwidth	RSS-210 Annex 8 RSS-Gen 4.6.1	PASSED
N/A is an abbreviation for Not Applicable.		

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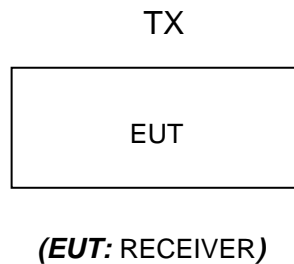
## 6. Radiated disturbance (electric field)

### 6.1. Test Equipment

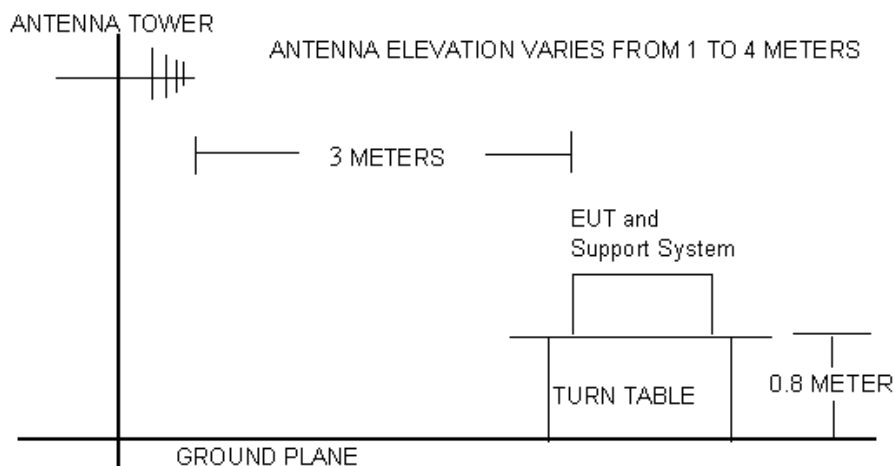
6.1					
Radiated disturbance (Electric field)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Signal analyzer	ROHDE & SCHWARZ	FSIQ26	100311	2014/03
2	EMI Test Receiver	ROHDE & SCHWARZ	ESVS 10	842885/001	2013/11
3	Biconical Antenna	ROHDE & SCHWARZ	HK116	100221	2014/03
4	Log per Antenna	ROHDE & SCHWARZ	HL223	100226	2014/03
5	Log per Antenna	ROHDE & SCHWARZ	HL050	100186	2014/03
6	Loop Antenna	A.R.A	PLA-1030/B	1030	2014/03
7	EMI Test Software	Farad	EZ-EMC	N/A	N/A

### 6.2. Block Diagram of Test Setup

#### 6.2.1 Block Diagram of connection between EUT and simulators



#### 6.2.2 Anechoic Chamber Setup Diagram



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### 6.3.Radiated Emission Limit :

**Standard:FCC 15.249 , FCC 15.209, RSS-Gen:7.2,RSS-210 A2.9**

Except as provided in paragraph (a) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (mV/m)	Field Strength of Harmonics (μV/m)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	----
0.490 ~ 1.705	30	24000/F(KHz)	----
1.705 ~ 30	3	30	----
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

- Remark: (1) Emission level  $\text{dB}\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$   
(2) The smaller limit shall apply at the cross point between two frequency bands.  
(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

### 6.4.Test Procedure

The EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2009on radiated emission Test.

The frequency range from 30MHz to 1000MHz and above 1GHz. is investigated. Please see the following pages.

All measurements for radiated emissions within the restricted bands were performed using a Quasi-Peak detector with 120kHz RBW below 1GHz and a Peak and Average detector with 1MHz RBW above 1GHz,

All measurements for radiated emissions within the restricted bands were performed using a Quasi-Peak detector with 300kHz VBW below 1GHz and a Peak detector with 1MHz VBW above 1GHz, A average detector with 10Hz VBW above 1GHz

Pretest x, y, z position of EUT, final, select the worst case x position test and record the test results in the report.

The test modes (TX Mode and RX Mode ) is tested in Anechoic Chamber and all the scanning waveforms are reported on section 7.5

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## 6.5.Radiated Emission Test Results

### **PASSED.**

The frequency range from 9KHz~30MHz,30MHz to 230MHz, 230MHz to 1000MHz and above 1GHz. is investigated. Please see the following pages.

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Test Mode:	TX –X Position Mode	Result:	<input checked="" type="checkbox"/> - passed
Frequency range:	9KHz~30MHz		<input type="checkbox"/> - not passed

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBµV/m)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.
Remark:Other frequency no specific emission form the EUT (Margin > 10dB form the applicable Limit)							

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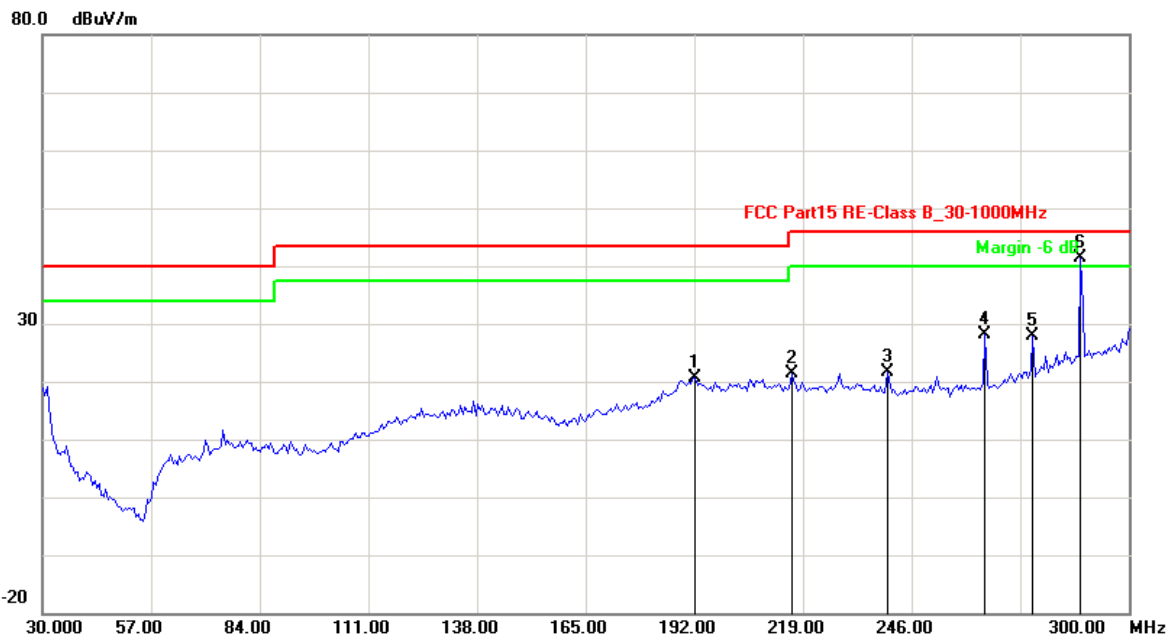
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Test Mode:	TX	Result:	■ - passed
Test point:	Horizontal		□ - not passed
Frequency range:	30MHz~1GHz		

EUT	RECEIVER
Firm Name	Horizon Hobby
Operating Condition	BATTERY 5V
Test Condition	Ambient Temperature: 26°C Humidity: 60%
Test distance	3 Meter
Test Date:	17~20 June 2014
Operator	Duke
MODEL NO	SPMSR310



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	192.3246	-12.16	32.79	20.63	43.50	-22.87	QP
2	216.1323	-12.29	33.74	21.45	46.00	-24.55	QP
3	239.9399	-13.13	34.69	21.56	46.00	-24.44	QP
4	264.2886	-12.25	40.32	28.07	46.00	-17.93	QP
5	276.1924	-10.26	38.13	27.87	46.00	-18.13	QP
6	288.0962	-7.50	48.84	41.34	46.00	-4.66	QP

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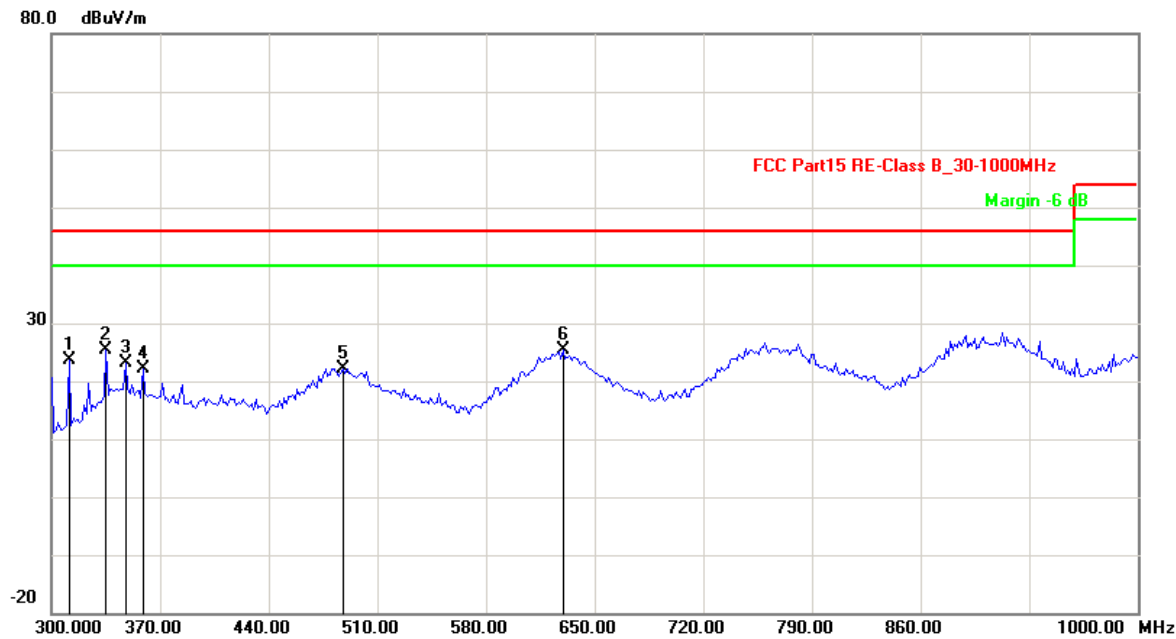
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	311.2224	-19.29	42.94	23.65	46.00	-22.35	QP
2	335.0701	-14.31	39.64	25.33	46.00	-20.67	QP
3	347.6954	-13.41	36.61	23.20	46.00	-22.80	QP
4	358.9178	-13.85	35.93	22.08	46.00	-23.92	QP
5	487.9760	-9.88	32.01	22.13	46.00	-23.87	QP
6	629.6593	-7.33	32.81	25.48	46.00	-20.52	QP

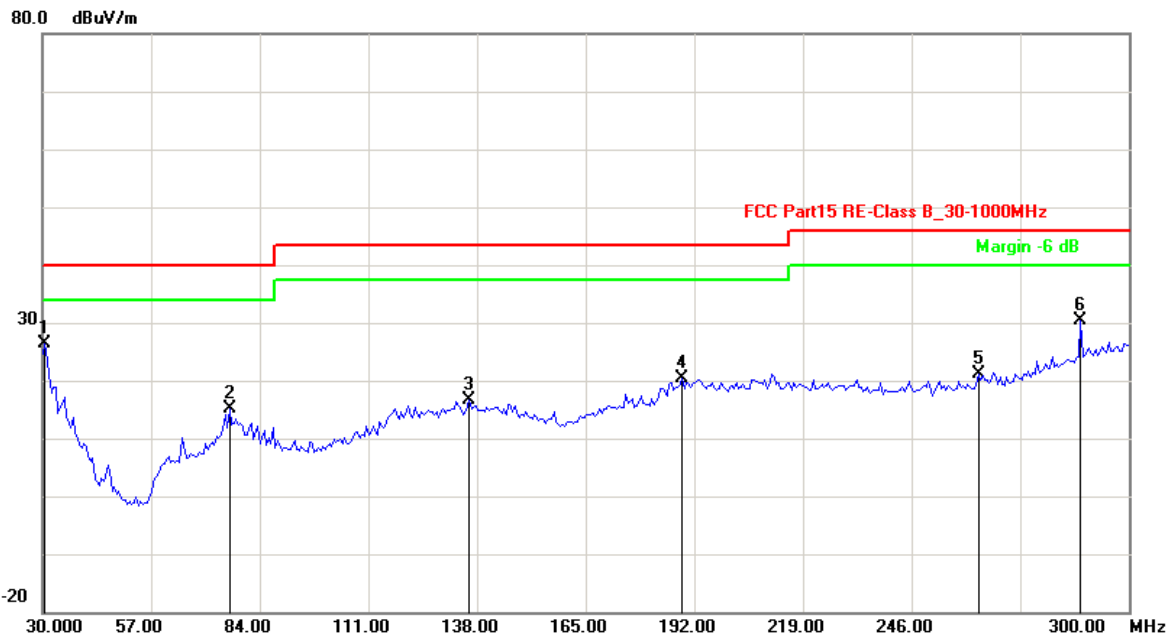
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Test Mode:	TX	Result:	■ - passed
Test point:	Vertical		□ - not passed
Frequency range:	30MHz~1GHz		

EUT	RECEIVER
Firm Name	Horizon Hobby
Operating Condition	BATTERY 5V
Test Condition	Ambient Temperature: 26°C Humidity: 60%
Test distance	3 Meter
Test Date:	17~20 June 2014
Operator	Duke
MODEL NO	SPMSR310



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	30.5411	-18.94	45.28	26.34	40.00	-13.66	QP
2	76.5331	-21.44	36.67	15.23	40.00	-24.77	QP
3	136.0520	-16.65	33.34	16.69	43.50	-26.81	QP
4	189.0782	-12.34	32.60	20.26	43.50	-23.24	QP
5	262.6653	-12.39	33.49	21.10	46.00	-24.90	QP
6	288.0962	-7.50	37.93	30.43	46.00	-15.57	QP

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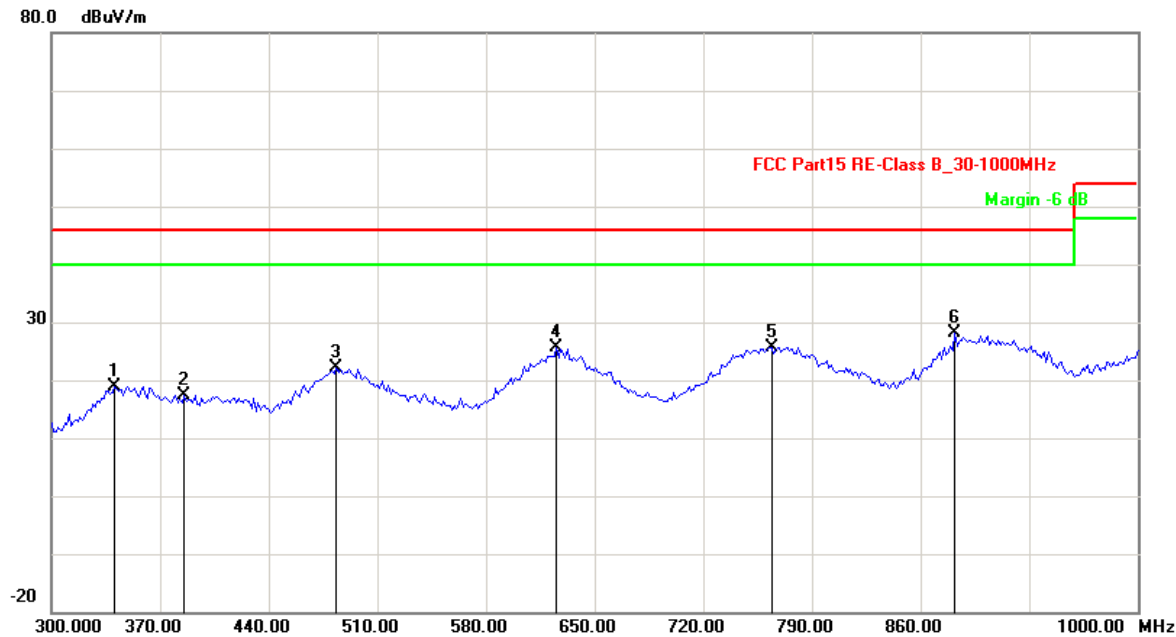
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	340.6814	-13.14	32.08	18.94	46.00	-27.06	QP
2	385.5711	-14.91	32.35	17.44	46.00	-28.56	QP
3	483.7675	-9.78	32.00	22.22	46.00	-23.78	QP
4	625.4509	-7.22	32.81	25.59	46.00	-20.41	QP
5	764.3287	-5.59	31.33	25.74	46.00	-20.26	QP
6	882.1643	-4.84	32.99	28.15	46.00	-17.85	QP

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Channel:	TX Low Channel	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Horizontal		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	2402.00	2.81	87.42	90.23	114.00	-23.77	peak
2	2402.00	2.81	84.71	87.52	94.00	-6.48	AVG

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	3689.379	8.81	40.78	49.59	74.00	-24.41	peak
2	3689.379	8.81	25.34	34.15	54.00	-19.85	AVG
3	4615.230	11.26	37.84	49.10	74.00	-24.90	peak
4	4615.230	11.26	22.76	34.02	54.00	-19.98	AVG
5	5871.743	14.97	40.15	55.12	74.00	-18.88	peak
6	5871.743	14.97	25.41	40.38	54.00	-13.62	AVG

Remark: Others spurious emission margin all >6dB of the limit.

Channel:	TX Middle Channel	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Horizontal		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	2440.00	3.22	86.79	90.01	114.00	-23.99	peak
2	2440.00	3.22	84.13	87.35	94.00	-6.65	AVG

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	1639.279	-1.32	42.39	41.07	74.00	-32.93	peak
2	1639.279	-1.32	27.90	26.58	54.00	-27.42	AVG
3	4438.878	10.84	38.57	49.41	74.00	-24.59	peak
4	4438.878	10.84	23.32	34.16	54.00	-19.84	AVG
5	7238.477	18.13	37.51	55.64	74.00	-18.36	peak
6	7238.477	18.13	22.11	40.24	54.00	-13.76	AVG

Remark: Others spurious emission margin all >6dB of the limit.



Channel:	TX High Channel	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Horizontal		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBµV/m)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.
1	2478.00	3.57	84.59	88.16	114.00	-25.84	peak
2	2478.00	3.57	80.79	84.36	94.00	-9.64	AVG

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBµV/m)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Det.
1	4196.393	10.27	38.19	48.46	74.00	-25.54	peak
2	4196.393	10.27	22.97	33.24	54.00	-20.76	AVG
3	5210.421	12.84	36.61	49.45	74.00	-24.55	peak
4	5210.421	12.84	21.73	34.57	54.00	-19.43	AVG
5	7436.874	18.41	36.79	55.20	74.00	-18.80	peak
6	7436.874	18.41	21.75	40.16	54.00	-13.84	AVG

Remark: Others spurious emission margin all >6dB of the limit.



Channel:	TX Low Channel	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	2402.00	2.81	84.70	87.51	114.00	-26.49	peak
2	2402.00	2.81	82.44	85.25	94.00	-8.75	AVG

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	1639.279	-1.32	45.97	44.65	74.00	-29.35	peak
2	1639.279	-1.32	31.46	30.14	54.00	-23.86	AVG
3	4108.216	10.06	39.32	49.38	74.00	-24.62	peak
4	4108.216	10.06	24.52	34.58	54.00	-19.42	AVG
5	5563.126	13.97	38.48	52.45	74.00	-21.55	peak
6	5563.126	13.97	23.69	37.66	54.00	-16.34	AVG

Remark: Others spurious emission margin all >6dB of the limit.

Channel:	TX Middle Channel	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	2440.00	3.22	83.94	87.16	114.00	-26.84	peak
2	2440.00	3.22	81.97	85.19	94.00	-8.81	AVG

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	1639.279	-1.32	45.55	44.23	74.00	-29.77	peak
2	1639.279	-1.32	31.58	30.26	54.00	-23.74	AVG
3	4482.966	10.94	38.24	49.18	74.00	-24.82	peak
4	4482.966	10.94	23.65	34.59	54.00	-19.41	AVG
5	5452.906	13.62	39.76	53.38	74.00	-20.62	peak
6	5452.906	13.62	24.54	38.16	54.00	-15.84	AVG

Remark: Others spurious emission margin all >6dB of the limit.

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Channel:	TX High Channel	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	2478.00	3.57	81.71	85.28	114.00	-28.72	peak
2	2478.00	3.57	79.70	83.37	94.00	-10.63	AVG

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	1969.940	-1.16	41.12	39.96	74.00	-34.04	peak
2	1969.940	-1.16	26.42	25.26	54.00	-28.74	AVG
3	4615.230	11.26	36.64	47.90	74.00	-26.10	peak
4	4615.230	11.26	21.43	32.69	54.00	-21.31	AVG
5	5629.258	14.19	38.59	52.78	74.00	-21.22	peak
6	5629.258	14.19	23.22	37.41	54.00	-16.59	AVG

Remark: Others spurious emission margin all >6dB of the limit.

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## 7. Receiver Spurious Emission

### 7.1 LIMIT

According to RSS-Gen Issue 3:4.10. Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other: 74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

### 7.2 TEST EQUIPMENT

Radiated disturbance (electric field)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100868	2013/11
2	Biconical Antenna	ROHDE & SCHWARZ	HK116	100221	2014/03
3	Log per Antenna	ROHDE & SCHWARZ	HL223	100226	2014/03
4	Log per Antenna	ROHDE & SCHWARZ	HL050	100186	2014/03
5	Signal analyzer	ROHDE & SCHWARZ	FSIQ26	100311	2014/03
6	Loop Antenna	A.R.A	PLA-1030/B	1030	2013/11
7	EMI Test Software	EZ-EMC	Farad	N/A	N/A

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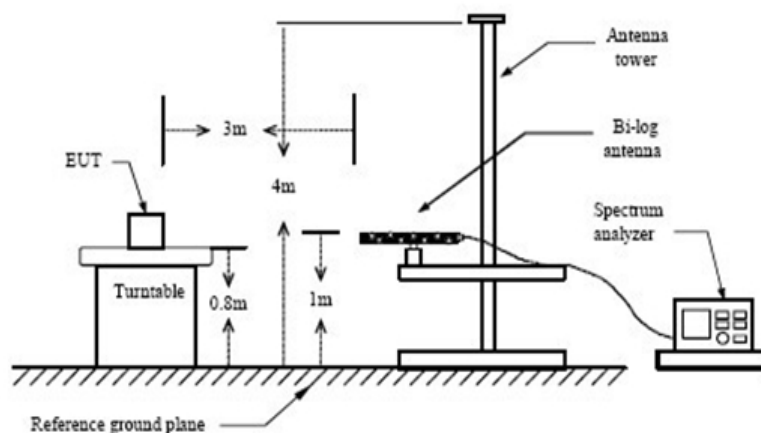
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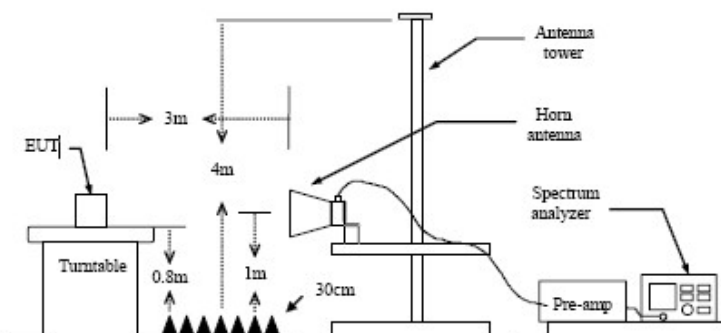
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## 7.3 TEST CONFIGURATION

Below 1 GHz



Above 1 GHz



## 7.4 TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

## 7.5 TEST RESULTS

The frequency range from 30MHz to 230MHz, 230MHz to 1000MHz and above 1GHz. is investigated. Please see the following pages.

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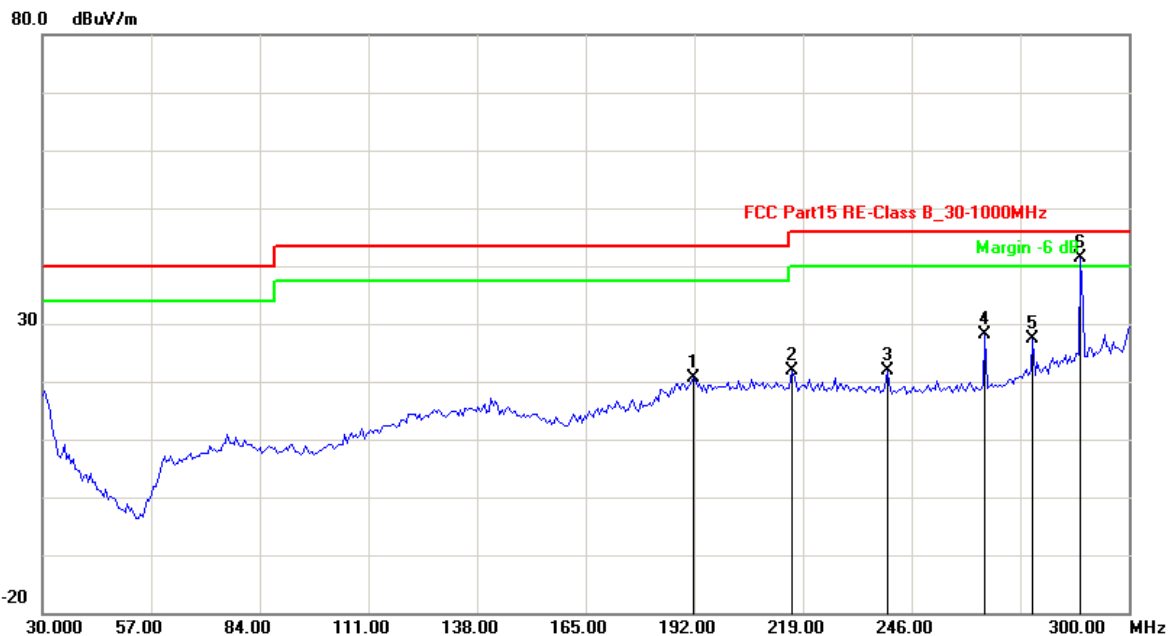
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Test Mode:	RX	Result:	■ - passed
Test point:	Horizontal		□ - not passed
Frequency range:	30MHz~1GHz		

EUT	RECEIVER
Firm Name	Horizon Hobby
Operating Condition	BATTERY 5V
Test Condition	Ambient Temperature: 26°C Humidity: 60%
Test distance	3 Meter
Test Date:	17~20 June 2014
Operator	Duke
MODEL NO	SPMSR310



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	191.7836	-12.13	32.82	20.69	43.50	-22.81	QP
2	216.1323	-12.29	34.27	21.98	46.00	-24.02	QP
3	239.9399	-13.13	34.99	21.86	46.00	-24.14	QP
4	264.2886	-12.25	40.37	28.12	46.00	-17.88	QP
5	276.1924	-10.26	37.68	27.42	46.00	-18.58	QP
6	288.0962	-7.50	48.97	41.47	46.00	-4.53	QP

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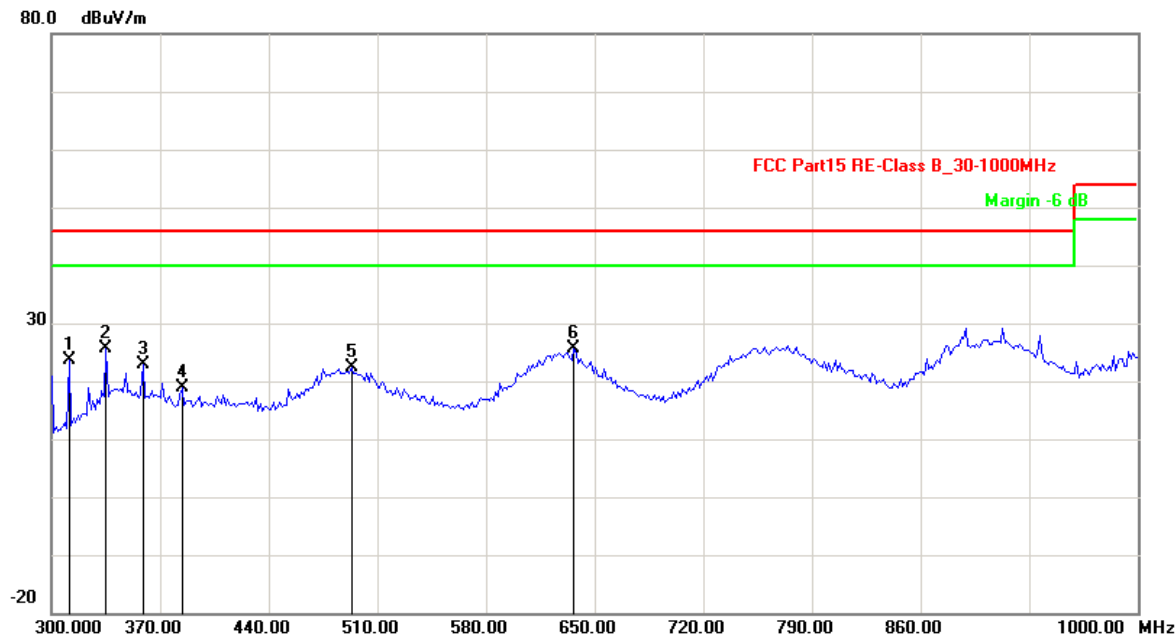
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	311.2224	-19.29	42.88	23.59	46.00	-22.41	QP
2	335.0701	-14.31	39.87	25.56	46.00	-20.44	QP
3	358.9178	-13.85	36.70	22.85	46.00	-23.15	QP
4	384.1683	-14.90	33.70	18.80	46.00	-27.20	QP
5	493.5872	-10.02	32.42	22.40	46.00	-23.60	QP
6	636.6733	-7.52	33.21	25.69	46.00	-20.31	QP

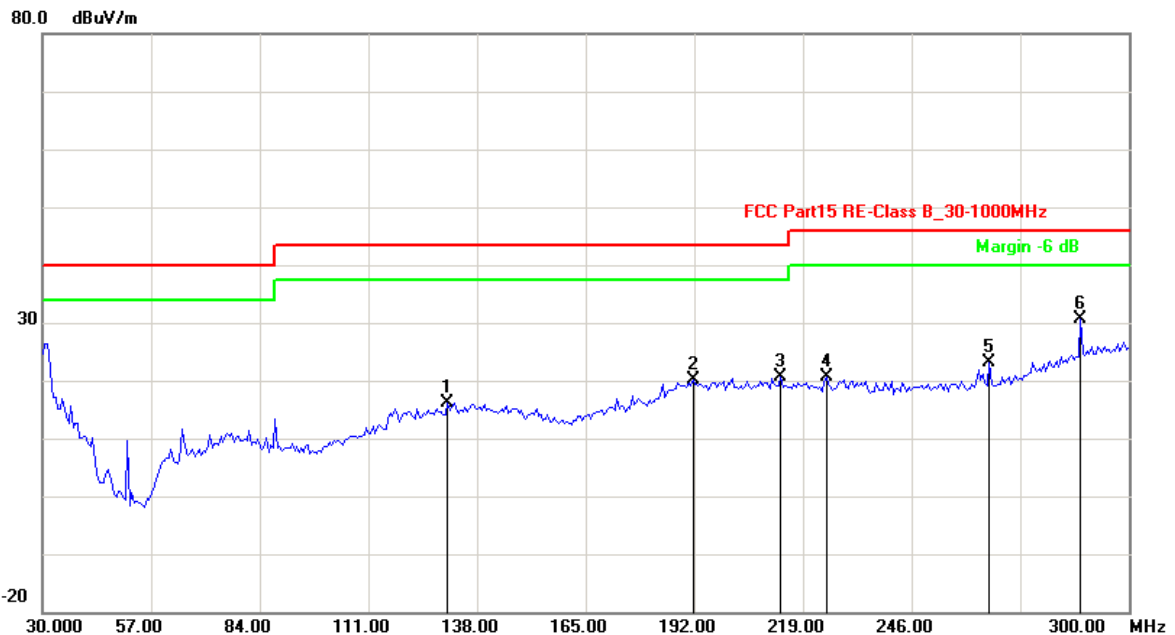
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Test Mode:	RX	Result:	■ - passed
Test point:	Vertical		□ - not passed
Frequency range:	30MHz~1GHz		

EUT	RECEIVER
Firm Name	Horizon Hobby
Operating Condition	BATTERY 5V
Test Condition	Ambient Temperature: 26°C Humidity: 60%
Test distance	3 Meter
Test Date:	17~20 June 2014
Operator	Duke
MODEL NO	SPMSR310



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	130.6413	-17.02	33.22	16.20	43.50	-27.30	QP
2	191.7836	-12.13	32.30	20.17	43.50	-23.33	QP
3	213.4269	-12.19	32.86	20.67	43.50	-22.83	QP
4	224.7896	-12.39	33.11	20.72	46.00	-25.28	QP
5	265.3707	-12.15	35.17	23.02	46.00	-22.98	QP
6	288.0962	-7.50	38.17	30.67	46.00	-15.33	QP

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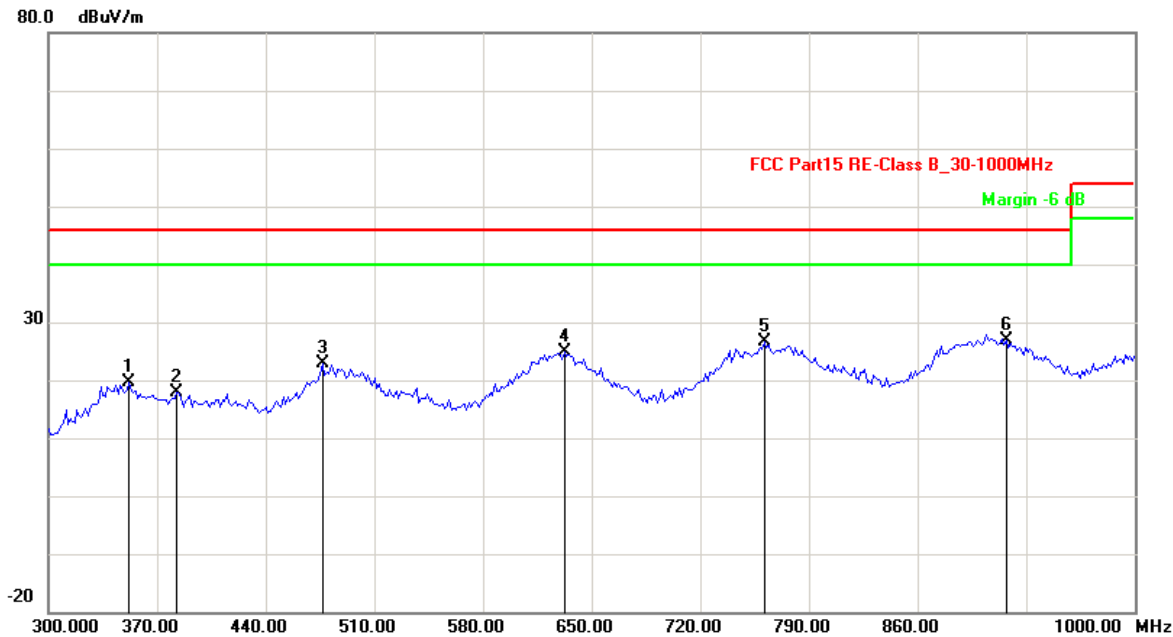
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	351.9038	-13.57	33.17	19.60	46.00	-26.40	QP
2	382.7655	-14.88	32.67	17.79	46.00	-28.21	QP
3	476.7535	-10.28	33.09	22.81	46.00	-23.19	QP
4	632.4649	-7.41	32.37	24.96	46.00	-21.04	QP
5	761.5230	-5.53	32.08	26.55	46.00	-19.45	QP
6	917.2345	-4.44	31.40	26.96	46.00	-19.04	QP

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Test Mode:	RX	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Horizontal		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	3689.379	8.81	41.91	50.72	74.00	-23.28	peak
2	3689.379	8.81	26.47	35.28	54.00	-18.72	AVG
3	5122.244	12.55	37.52	50.07	74.00	-23.93	peak
4	5122.244	12.55	23.07	35.62	54.00	-18.38	AVG
5	6092.184	15.60	40.18	55.78	74.00	-18.22	peak
6	6092.184	15.60	24.59	40.19	54.00	-13.81	AVG

Remark: Others spurious emission margin all >6dB of the limit.

Test Mode:	RX	Result:	<input checked="" type="checkbox"/> - passed
Test point:	Vertical		<input type="checkbox"/> - not passed
Frequency range:	1GHz~26.5GHz		

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBμV/m)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Det.
1	2080.160	-0.36	41.73	41.37	74.00	-32.63	peak
2	2080.160	-0.36	26.74	26.38	54.00	-27.62	AVG
3	4681.363	11.41	37.32	48.73	74.00	-25.27	peak
4	4681.363	11.41	21.88	33.29	54.00	-20.71	AVG
5	5408.818	13.48	38.34	51.82	74.00	-22.18	peak
6	5408.818	13.48	22.99	36.47	54.00	-17.53	AVG

Remark: Others spurious emission margin all >6dB of the limit.

Note:Level=Reading+Factor. Margin=Level-Limit.

## 8. Band Edge Compliance test

### 8.1. Test Equipment

Band Edge Compliance test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Log per Antenna	ROHDE & SCHWARZ	HL050	100186	2014/03
2	Signal analyzer	ROHDE & SCHWARZ	FSIQ26	100311	2014/03

### 8.2. Test Information

EUT	RECEIVER
Firm Name	Horizon Hobby
Operating Condition	BATTERY 5V
Test Condition	Ambient Temperature: 26°C Humidity: 60%
Test distance	3 Meter
Test Date:	17~20 June 2014
Operator	Duke
MODEL NO	SPMSR310

### 8.3. Test procedure

- 1、 The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
- 2、 Max hold the trace of the setp 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.
- 3、 Set the RBW and VBW 1MHz for Peak , RBW 1MHz and VBW 3KHz(1/On time) for Average.

### 8.4. Test Results

#### PASSED.

The EUT operates at hopping-off test mode. The lowest and highest channels are tested to verify the band edge emissions.

Test Mode	Channel Marked Frequency	Test Result Highest Emission (dBuv/m)			
		Horizontal		Vertical	
		Peak	Average	Peak	Average
Low Channel	2390MHz	51.76	20.29	55.39	21.20
	2400MHz	70.64	58.51	73.57	60.20
High Channel	2483.5MHz	55.55	25.91	59.62	26.59
	2500MHz	43.54	18.76	47.53	18.96

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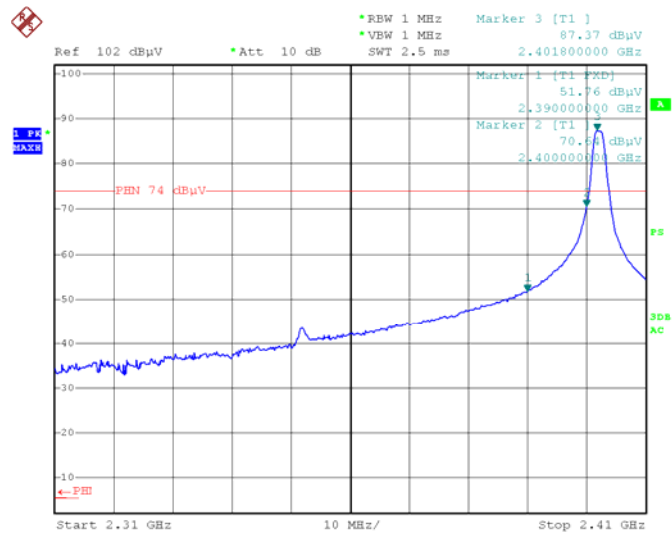
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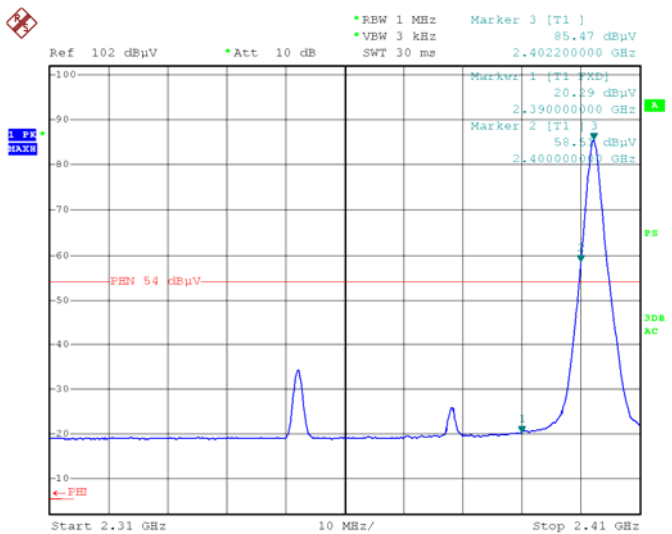


Band Edges(CH Low)  
Detector mode:Peak  
Polarity:Horizontal



Date: 18.JUN.2014 14:42:19

Band Edges(CH Low)  
Detector mode:Average  
Polarity:Horizontal



Date: 18.JUN.2014 15:12:27

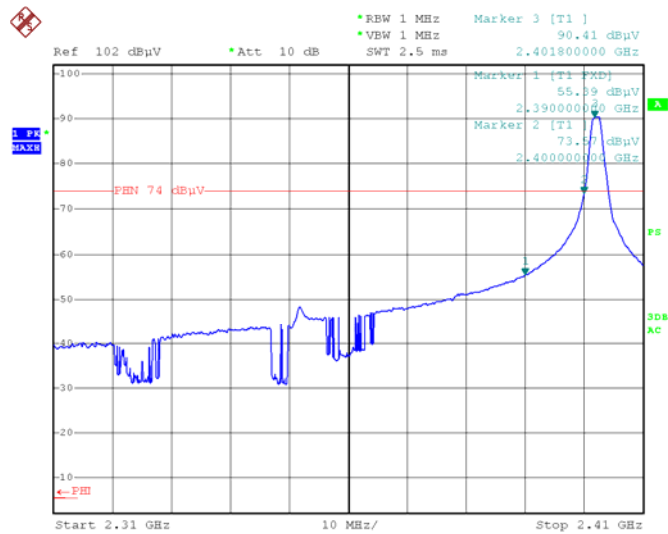
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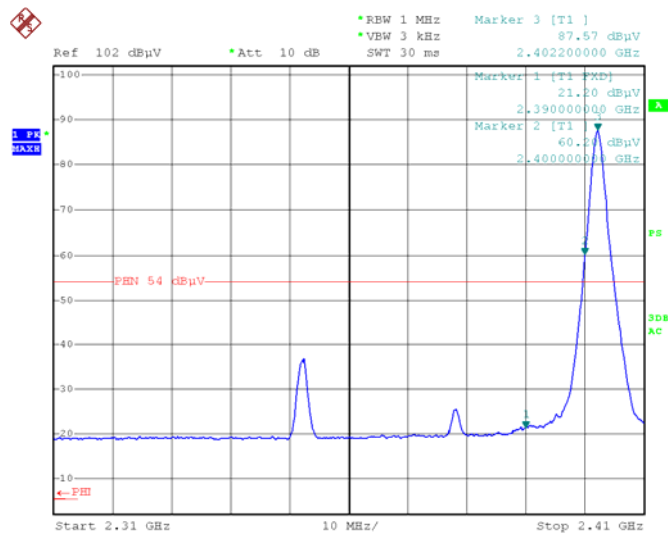


Band Edges(CH Low)  
Detector mode:Peak                      Polarity:Vertical



Date: 18.JUN.2014 14:59:42

Band Edges(CH Low)  
Detector mode:Average                      Polarity:Vertical



Date: 18.JUN.2014 15:11:29

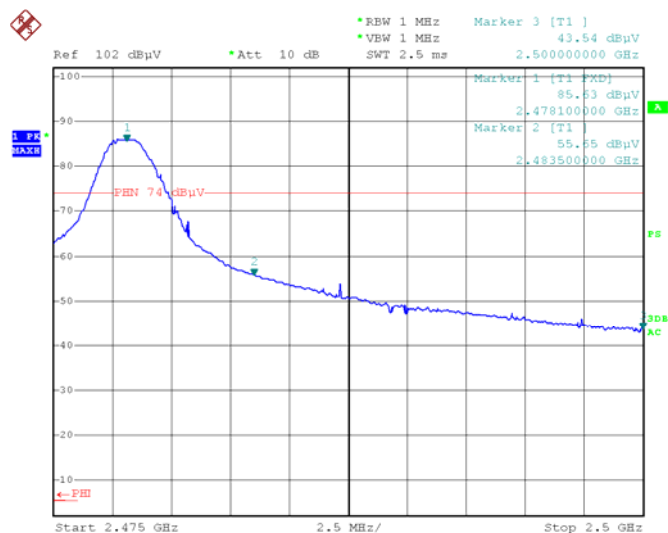
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**Band Edges(CH High)**  
**Detector mode:Peak**

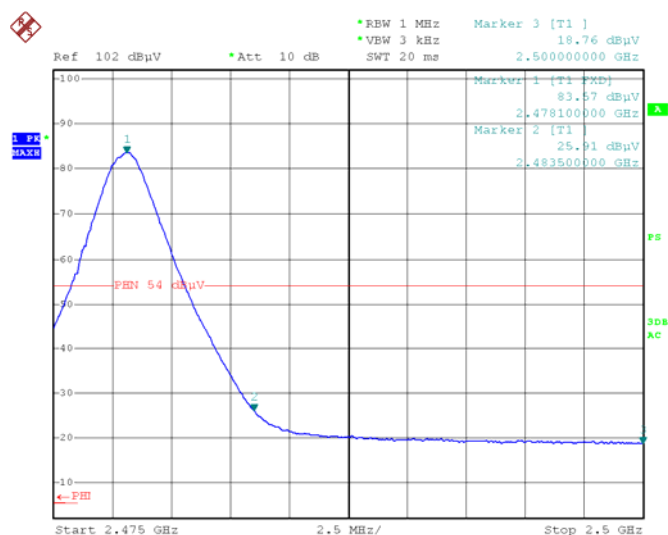
**Polarity:Horizontal**



Date: 18.JUN.2014 15:34:46

**Band Edges(CH High)**  
**Detector mode:Average**

**Polarity:Horizontal**



Date: 18.JUN.2014 15:15:09

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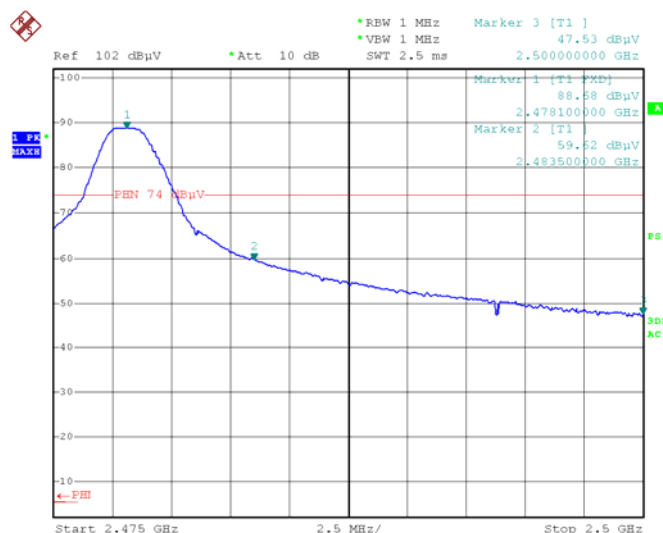
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**Band Edges(CH High)**  
**Detector mode:Peak**

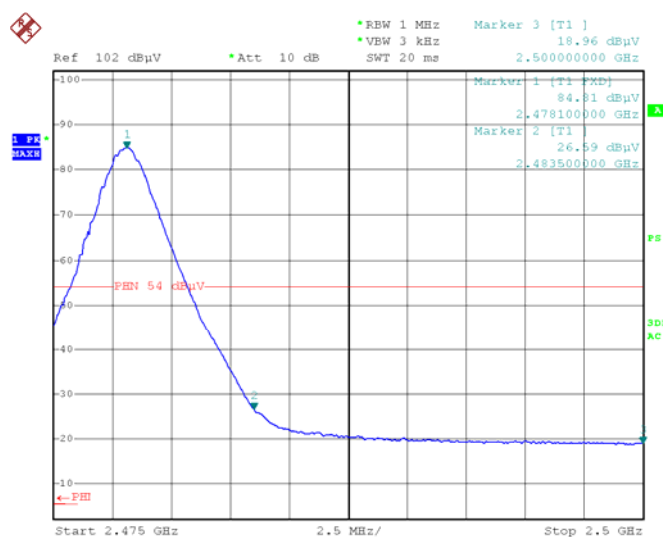
**Polarity: Vertical**



Date: 18.JUN.2014 15:27:28

**Band Edges(CH High)**  
**Detector mode:Average**

**Polarity:Vertical**



Date: 18.JUN.2014 15:14:30

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## 9. 99% bandwidth

### 9.1 Test procedure

According to RSS-210 Annex 8 and RSS-Gen 4.6.1 The transmitter output is connected to the spectrum analyzer. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual. The sweep time is coupled.

### 9.2. Test Equipment

Band Edge Compliance test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Log per Antenna	ROHDE & SCHWARZ	HL050	100186	2014/03
2	Signal analyzer	ROHDE & SCHWARZ	FSIQ26	100311	2014/03

### 9.3. Test Information

EUT	RECEIVER
Firm Name	Horizon Hobby
Operating Condition	BATTERY 5V
Test Condition	Ambient Temperature: 26°C Humidity: 60%
Test Date:	17~20 June 2014
Operator	Duke
MODEL NO	SPMSR310

### 9.4. Test Results

PASSED.

Channel	Frequency (MHz)	Bandwidth (MHz)
Low	2402	1.19
Middle	2440	1.35
High	2478	1.69

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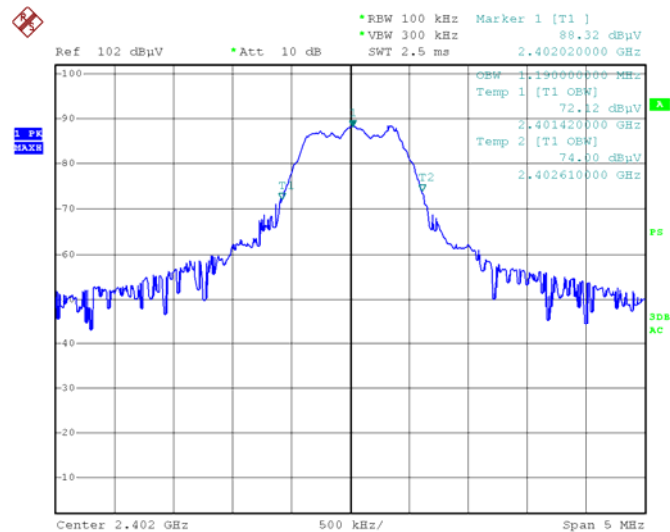
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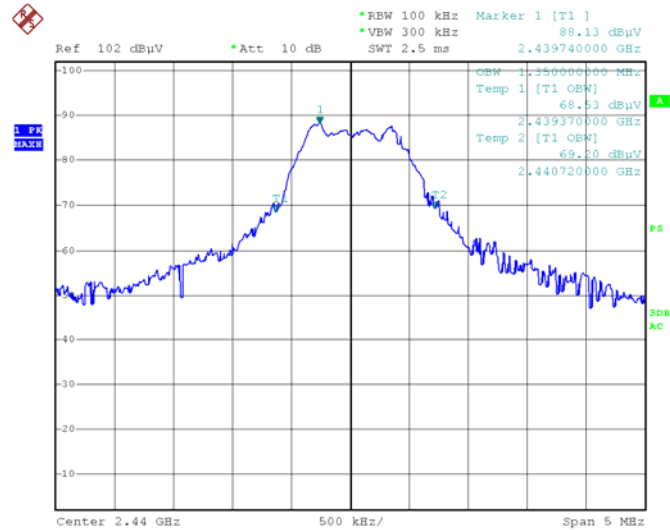


99% Bandwidth 2402MHz



Date: 18.JUN.2014 15:45:04

99% Bandwidth 2440 MHz



Date: 18.JUN.2014 15:47:50

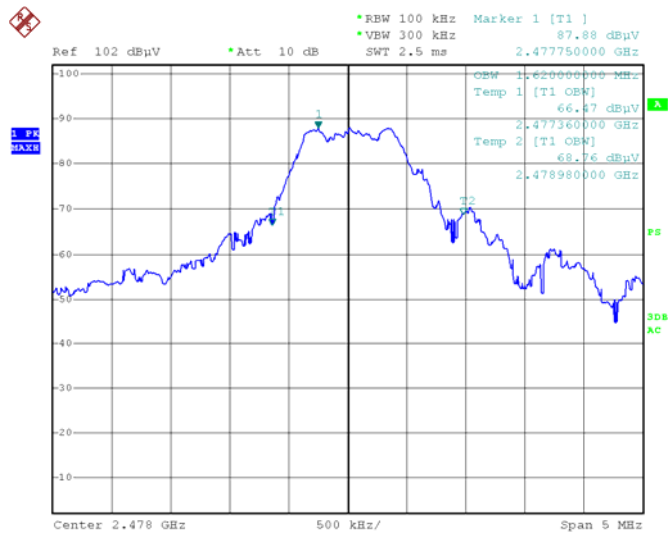
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99% Bandwidth 2478 MHz



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## 10.Deviation to test specifications

[ NONE]

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