MEASUREMENT REPORT
FCC PART 15.249

FCC ID:	GDDR340
APPLICANT:	ZF Friedrichshafen AG
Application Type:	Certification
Product:	2.4G Wireless Receiver
Model No.:	R340
Brand Name:	CHERRY
FCC Classification:	Low Power Communication Device Transmitter (DXX)
FCC Rule Part(s):	Part 15.249
Test Procedure(s):	ANSI C63.10-2009
Test Date:	May 07 ~ 11, 2014

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2009. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date
1405RSU00103	Rev. 01	Initial report	05-12-2014

CONTENTS

Description Page

§2.1033 General Information

Applicant:	ZF Friedrichshafen AG
Applicant Address:	Cherrystrasse, 91275 Auerbach, Germany
Manufacturer:	DongGuan Togran Electronic Technology Co. Ltd
Manufacturer Address:	262 Shijie Rd., 3rd Industrial Area, Juzhou, Shijie Town, Dongguan City, Guangdong, China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
MRT Registration No.:	809388
FCC Rule Part(s):	Part 15.249
Model No.:	R340
FCC ID:	GDDR340
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Low Power Communication Device Transmitter (DXX)
Date(s) of Test:	May 07 ~ 11, 2014
Test Report S/N:	1405RSU00103

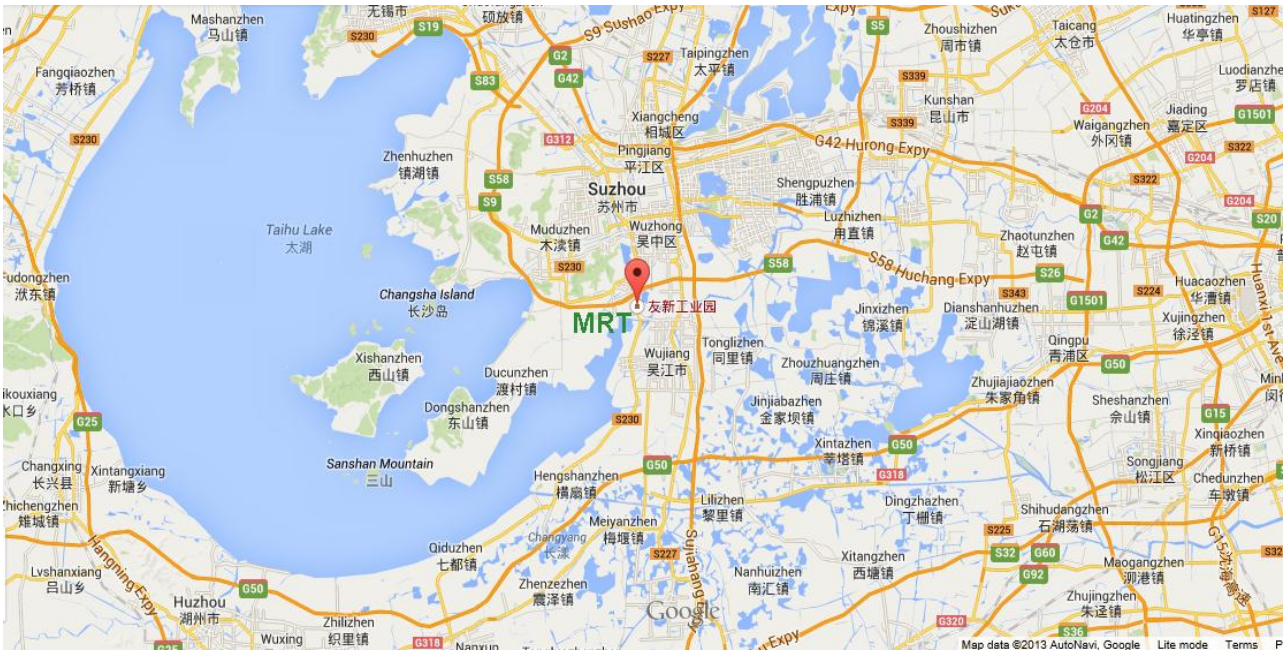
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, Youxin Industrial Park, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	2.4G Wireless Receiver
Model No.	R340
Working Voltage	DC 5.0V
Frequency Range	2403~2478 MHz
Channel Number	20
Type of Modulation	GFSK
Channel Control	Auto
Antenna Type	PCB Antenna
Antenna Gain	-1.0dBi

Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2403 MHz	01	2404 MHz	02	2405 MHz
03	2406 MHz	04	2413 MHz	05	2415 MHz
06	2416 MHz	07	2424 MHz	08	2436 MHz
09	2444 MHz	10	2445 MHz	11	2453 MHz
12	2456 MHz	13	2464 MHz	14	2465 MHz
15	2466 MHz	16	2474 MHz	17	2475 MHz
18	2476 MHz	19	2478 MHz	N/A	N/A

2.2. Mode of Operation

All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit

Note: Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

2.3. Test Configuration

The **2.4G Wireless Receiver FCC ID: GDDR340** was tested as described in this report is in compliance with the requirements limits of FCC Rules Part 15.207,15.209, 15.215 and 15.249. ANSI C63.10-2009 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.4. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.5. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

2.6. Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
Notebook	Lenovo	TP00007A

2.7. Test Software

The test utility software used during testing was “NanoDongle”.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2009), and the requirements provided in FCC 15.207, 15.209, 15.215 and 15.249 were performed in the report of the **2.4G Wireless Receiver FCC ID: GDDR340.**
Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.
The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2009 at Clause 4.3.
Line conducted emissions test results are shown in Section 7.2.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GH absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB BeamWidth of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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."

- The antenna of the **2.4G Wireless Receiver** is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The **2.4G Wireless Receiver FCC ID: GDDR340** unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATA

Conducted Emissions

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	101209	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101683	1 year	2014/11/08
Two-Line V-Network	R&S	ENV216	101684	1 year	2014/11/08
Temperature/ Meter Humidity	Anymetre	TH101B	SR2-01	1 year	2014/11/15

Radiated Emission

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Preamplifier	MRT	AP01G18	1310002	1 year	2014/12/14
Loop Antenna	Schwarzbeck	FMZB1519	1519-041	1 year	2014/11/24
TRILOG Antenna	Schwarzbeck	VULB9162	9162-047	1 year	2014/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1167	1 year	2014/11/24
Broadband Horn Antenna	Schwarzbeck	BBHA9170	9170-549	1 year	2014/12/11
Temperature/Humidity Meter	Anymetre	TH101B	AC1-01	1 year	2014/11/15

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Serial No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MY5144016A	1 year	2015/01/04
Power Sensor	Agilent	U2021XA	MY52450003	1 year	2014/12/14
Temperature/Humidity Meter	Anymetre	TH101B	TR3-01	1 year	2014/11/15

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: ± 3.46dB
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: ± 4.18dB 1GHz ~ 40GHz: ± 4.76dB

7. TEST RESULT

7.1. Summary

Company Name: **ZF Friedrichshafen AG**

FCC ID: **GDDR340**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.2
15.209 15.249	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 7.3
15.215(c)	Band Edge / Out-of-Band Emissions	≥ 20dBc(Peak)	Conducted	Pass	Section 7.4

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. Conducted Emission

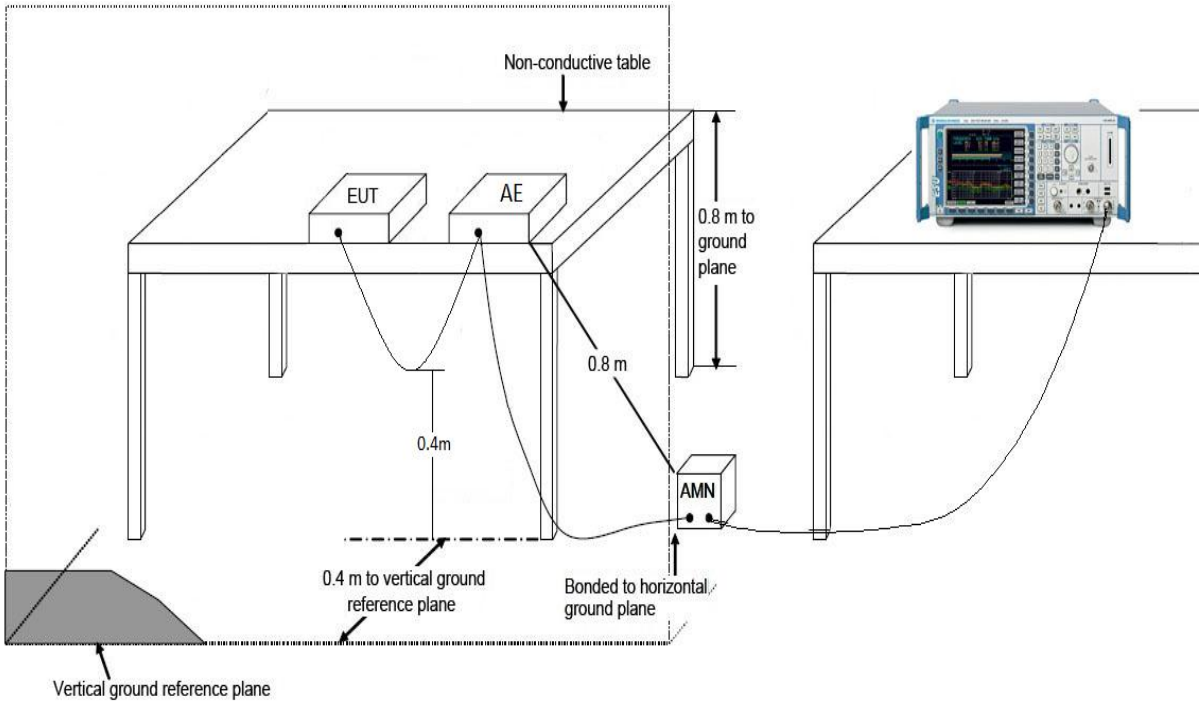
7.2.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

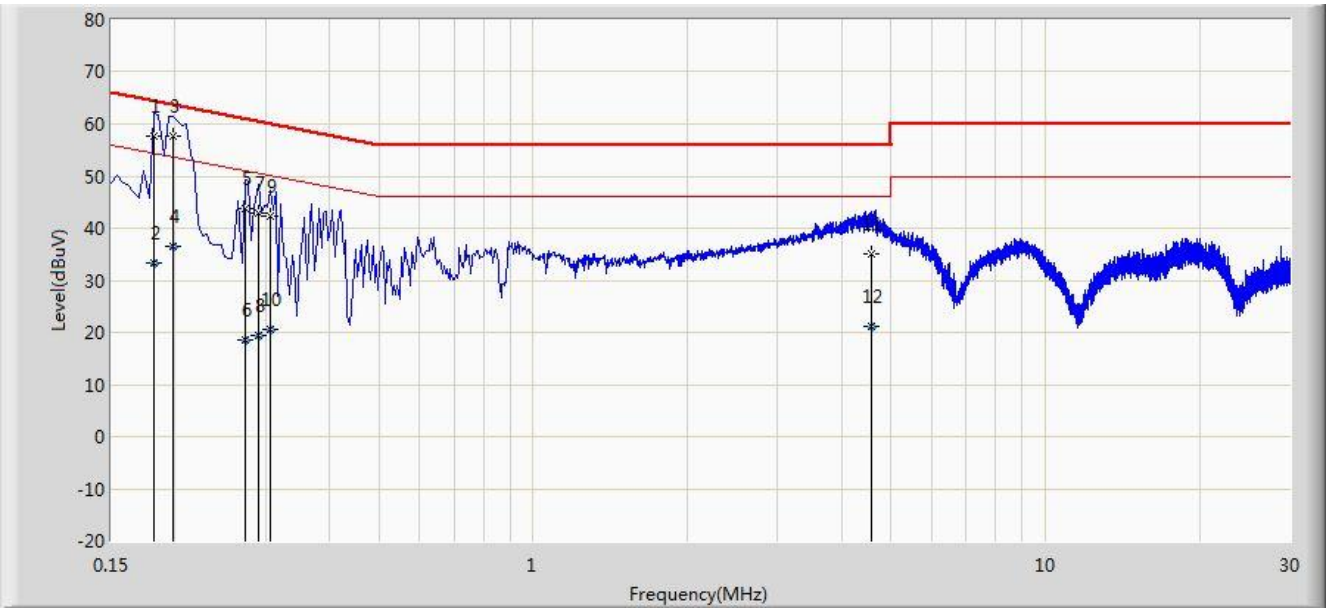
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

7.2.2. Test Setup



7.2.3. Test Result

Engineer: Milo Li	
Site: SR2	Time: 2014/05/11 - 14:26
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: 2.4G Wireless Receiver	Power: AC 120V/60Hz
Note: Normal Operation	

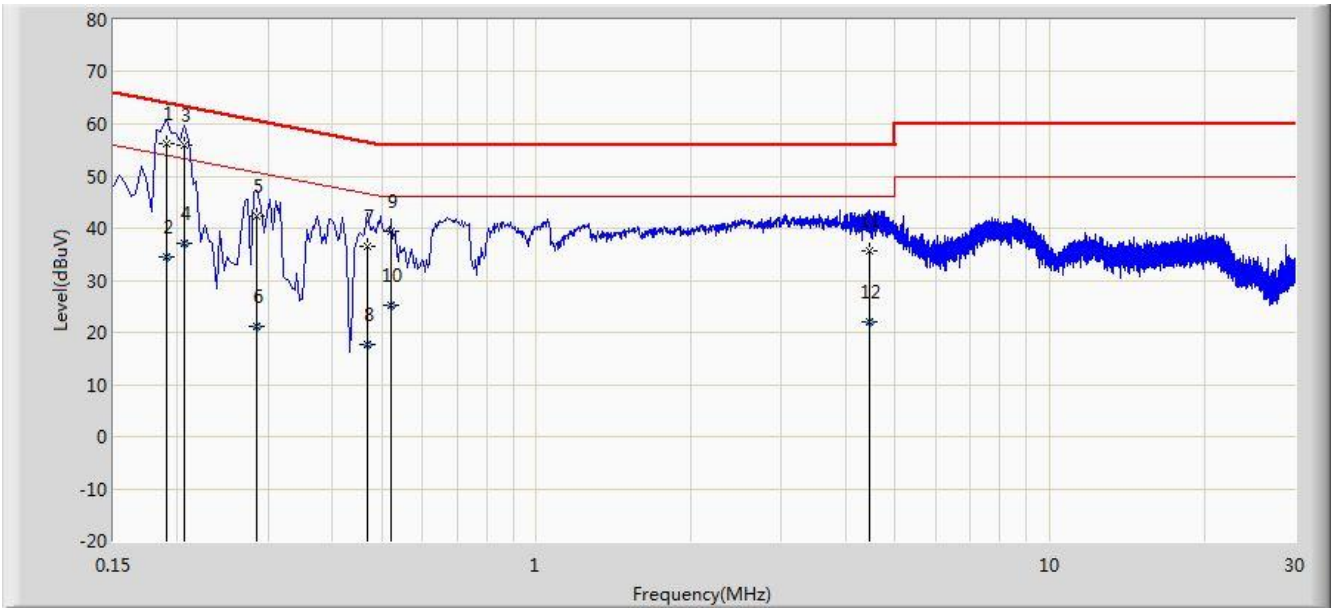


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.182	57.753	47.705	-6.641	64.394	10.048	QP
2			0.182	33.273	23.224	-21.121	54.394	10.048	AV
3		*	0.198	57.667	47.662	-6.027	63.694	10.005	QP
4			0.198	36.604	26.599	-17.091	53.694	10.005	AV
5			0.274	43.817	33.833	-17.179	60.996	9.983	QP
6			0.274	18.495	8.512	-32.501	50.996	9.983	AV
7			0.290	42.910	32.913	-17.615	60.524	9.996	QP
8			0.290	19.340	9.344	-31.185	50.524	9.996	AV
9			0.306	42.270	32.261	-17.809	60.078	10.009	QP
10			0.306	20.505	10.496	-29.574	50.078	10.009	AV
11			4.566	34.936	24.941	-21.064	56.000	9.995	QP
12			4.566	21.141	11.146	-24.859	46.000	9.995	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

Engineer: Milo Li	
Site: SR2	Time: 2014/05/11 - 14:36
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: 2.4G Wireless Receiver	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1			0.190	56.283	46.255	-7.754	64.037	10.028	QP
2			0.190	34.506	24.478	-19.531	54.037	10.028	AV
3		*	0.206	55.913	45.912	-7.452	63.365	10.001	QP
4			0.206	37.027	27.026	-16.338	53.365	10.001	AV
5			0.286	42.191	32.164	-18.449	60.640	10.027	QP
6			0.286	21.016	10.988	-29.624	50.640	10.027	AV
7			0.470	36.508	26.343	-20.006	56.514	10.164	QP
8			0.470	17.708	7.544	-28.805	46.514	10.164	AV
9			0.522	39.407	29.233	-16.593	56.000	10.174	QP
10			0.522	25.346	15.172	-20.654	46.000	10.174	AV
11			4.446	35.586	25.591	-20.414	56.000	9.995	QP
12			4.446	22.015	12.020	-23.985	46.000	9.995	AV

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB)

7.3. Radiated Emission

7.3.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (uV/m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-80	100**	3
80-216	150**	3
216-960	200**	3
Above 960	500	3

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m).

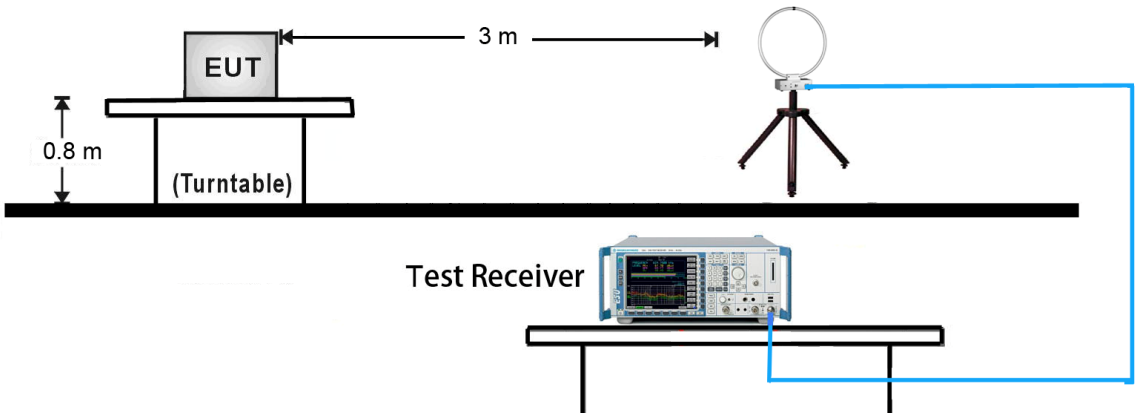
FCC Part 15 Subpart C Paragraph 15.249		
Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928(MHz)	50	500
2400-2483.5(MHz)	50	500
5725-5875(MHz)	50	500
24.0-24.25(GHz)	250	2500

FCC Part 15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general

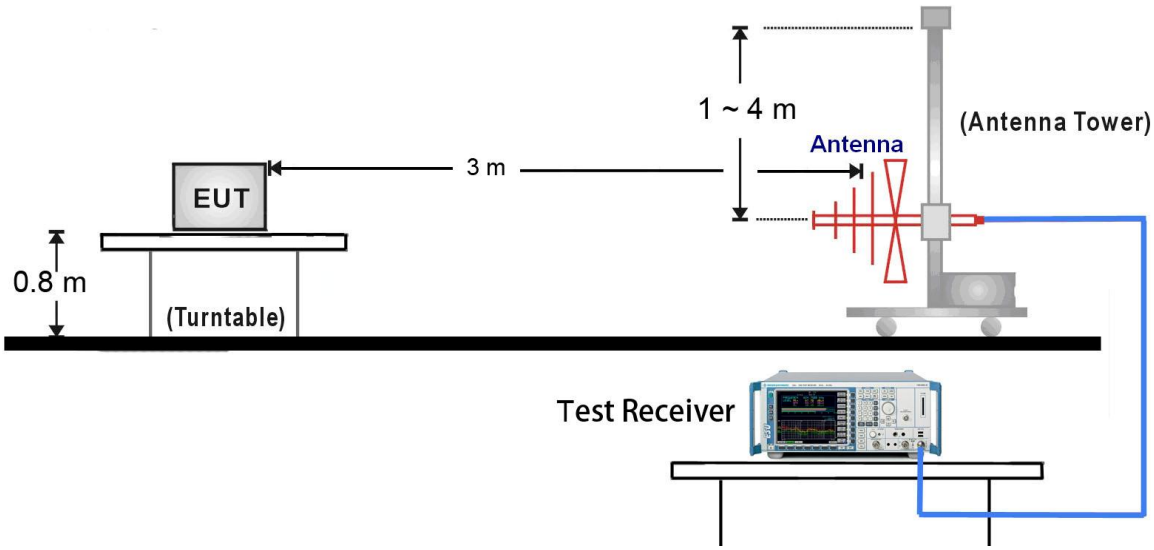
radiated emission limits in §15.209, whichever is the lesser attenuation.

7.3.2. Test Setup

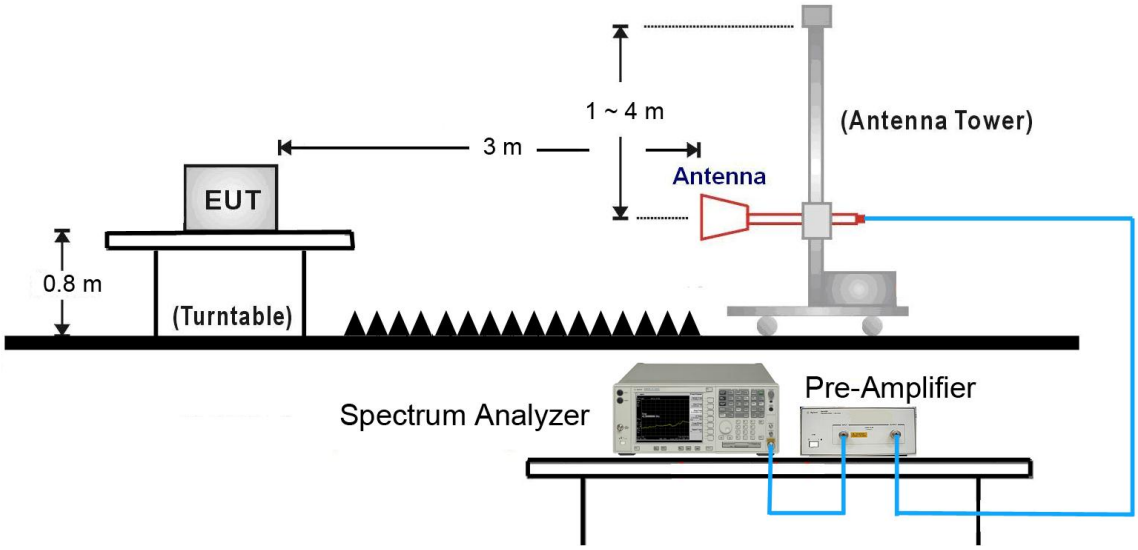
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:



7.3.3. Test Result

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	00-19	Test Engineer:	Milo Li
Remark:	**Fundamental** Radiated Emission		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
2403	48.23	30.66	78.89	114.0	-35.11	Peak	Horizontal
	47.60	30.66	78.26	94.0	-15.74	AV	Horizontal
	54.96	30.66	85.62	114.0	-28.38	Peak	Vertical
	54.48	30.66	85.14	94.0	-8.86	AV	Vertical
2453	49.35	30.60	79.95	114.0	-34.05	Peak	Horizontal
	48.88	30.60	79.48	94.0	-14.52	AV	Horizontal
	57.91	30.60	88.51	114.0	-25.49	Peak	Vertical
	57.64	30.60	88.24	94.0	-5.76	AV	Vertical
2478	48.96	30.66	79.62	114.0	-34.38	Peak	Horizontal
	48.52	30.66	79.18	94.0	-14.82	AV	Horizontal
	58.95	30.66	89.61	114.0	-24.39	Peak	Vertical
	58.16	30.66	88.82	94.0	-5.18	AV	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	00	Test Engineer:	Milo Li
Remark:	**Harmonic** Radiated Emission		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
4808.0	37.08	6.37	43.45	74.0	-30.55	PK	Horizontal
4806.2	31.42	6.36	37.78	54.0	-16.22	AV	Horizontal
4808.0	37.12	6.37	43.49	74.0	-30.51	PK	Vertical
4806.4	32.22	6.36	38.58	54.0	-15.42	AV	Vertical
7209.0	33.13	13.66	46.79	74.0	-27.21	PK	Horizontal
7209.1	27.56	13.66	41.22	54.0	-12.78	AV	Horizontal
7209.0	33.24	13.66	46.90	74.0	-27.10	PK	Vertical
7209.1	26.37	13.66	40.03	54.0	-13.97	AV	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre Amplifier Gain (dB)

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	11	Test Engineer:	Roy Cheng
Remark:	**Harmonic** Radiated Emission		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
4910.0	35.64	6.72	42.36	74.0	-31.64	PK	Horizontal
4910.3	29.69	6.72	36.41	54.0	-17.59	AV	Horizontal
4910.0	40.30	6.72	47.02	74.0	-26.98	PK	Vertical
4915.9	35.84	6.72	42.56	54.0	-11.44	AV	Vertical
7359.0	32.28	14.03	46.31	74.0	-27.69	PK	Horizontal
7359.1	28.69	14.03	42.72	54.0	-11.28	AV	Horizontal
7359.0	32.51	14.03	46.54	74.0	-27.46	PK	Vertical
7359.0	28.77	14.03	42.80	54.0	-11.20	AV	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre Amplifier Gain (dB)

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	19	Test Engineer:	Roy Cheng
Remark:	**Harmonic** Radiated Emission		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
4956.0	34.31	6.78	41.09	74.0	-32.91	PK	Horizontal
4956.2	30.17	6.78	36.95	54.0	-17.05	AV	Horizontal
4952.5	39.62	6.77	46.39	74.0	-27.61	PK	Vertical
4956.5	34.81	6.78	41.59	54.0	-12.41	AV	Vertical
7434.0	31.69	14.17	45.86	74.0	-28.14	PK	Horizontal
7434.2	24.24	14.17	38.41	54.0	-15.59	AV	Horizontal
7434.0	32.00	14.17	46.17	74.0	-27.83	PK	Vertical
7434.0	24.37	14.17	38.54	54.0	-15.46	AV	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre Amplifier Gain (dB)

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	00	Test Engineer:	Roy Cheng
Remark:	**The worst case of General Radiated Emission**		

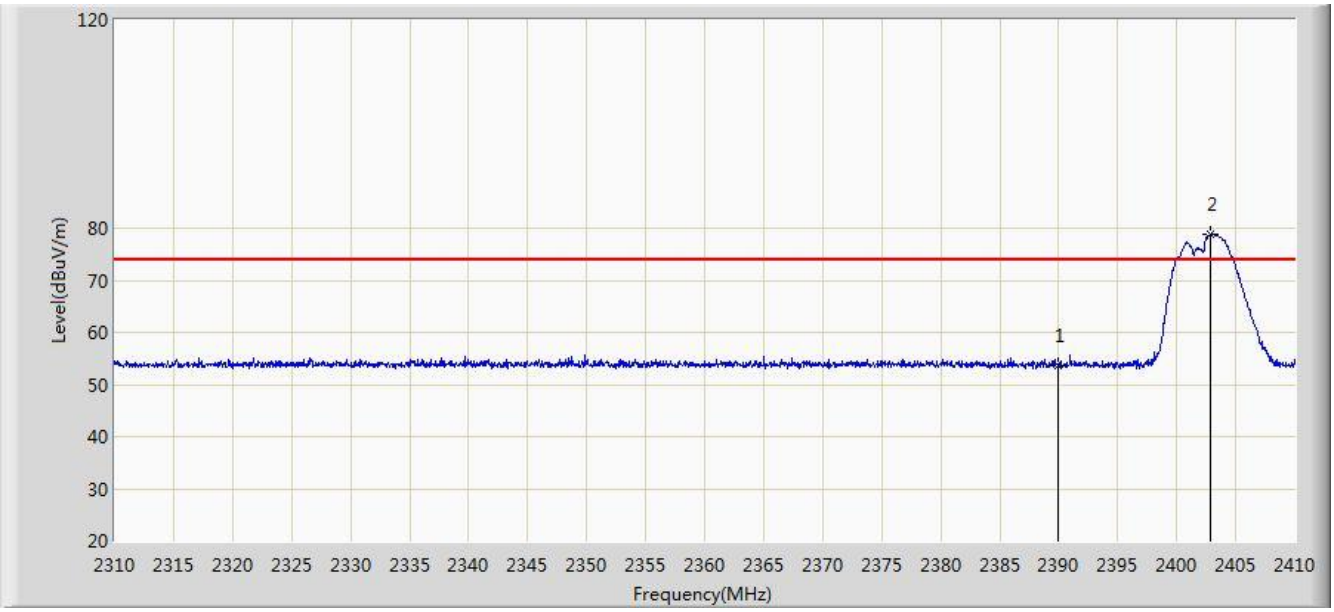
Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
250.2	19.06	13.28	32.34	46.0	-13.66	QP	Horizontal
251.2	13.34	13.31	26.65	46.0	-19.35	QP	Vertical
390.8	17.00	16.04	33.04	46.0	-12.96	QP	Horizontal
390.8	10.18	16.04	26.22	46.0	-19.78	QP	Vertical
3482.0	33.32	3.78	37.10	74.0	-36.90	PK	Horizontal
3507.5	32.33	3.90	36.23	74.0	-37.77	PK	Vertical
8199.5	33.38	14.63	48.01	74.0	-25.99	PK	Horizontal
8063.5	33.64	15.22	48.86	74.0	-25.14	PK	Vertical

Note 1: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) – Pre Amplifier Gain (dB)

Note 2: The test trace is same as the ambient noise (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 18:58
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: 2.4G Wireless Receiver	Power: DC 5V
Note: Transmit at low channel 2403MHz	

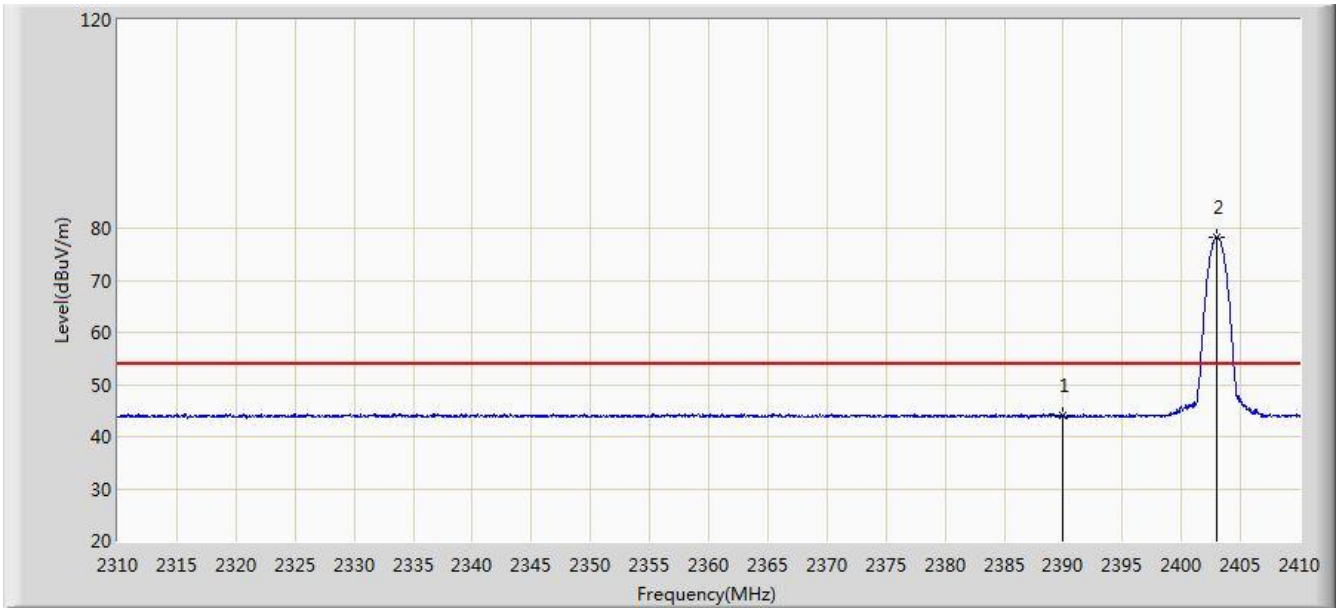


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	53.753	23.069	-20.247	74.000	30.684	PK
2		*	2402.850	78.890	48.230	N/A	N/A	30.660	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 19:10
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: 2.4G Wireless Receiver	Power: DC 5V
Note: Transmit at low channel 2403MHz	

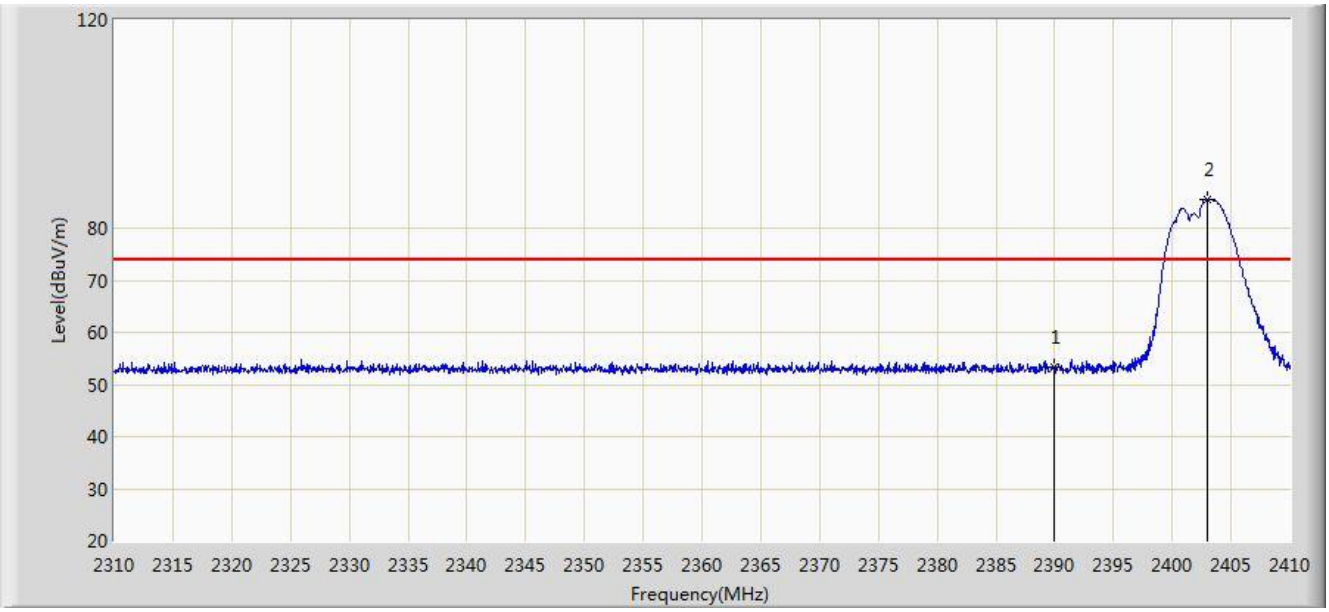


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	44.085	13.401	-9.915	54.000	30.684	AV
2		*	2402.950	78.263	47.603	N/A	N/A	30.659	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 19:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: 2.4G Wireless Receiver	Power: DC 5V
Note: Transmit at low channel 2403MHz	

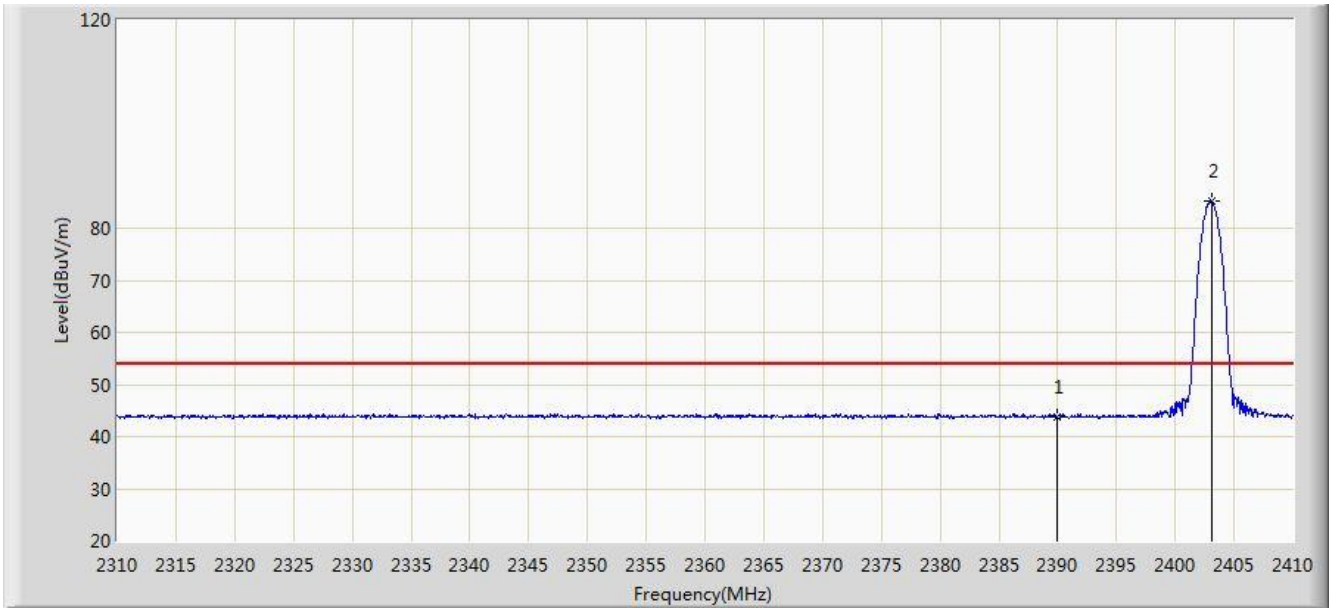


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	53.255	22.571	-20.745	74.000	30.684	PK
2		*	2402.950	85.619	54.959	N/A	N/A	30.659	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 19:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: 2.4G Wireless Receiver	Power: DC 5V:
Note: Transmit at low channel 2403MHz	

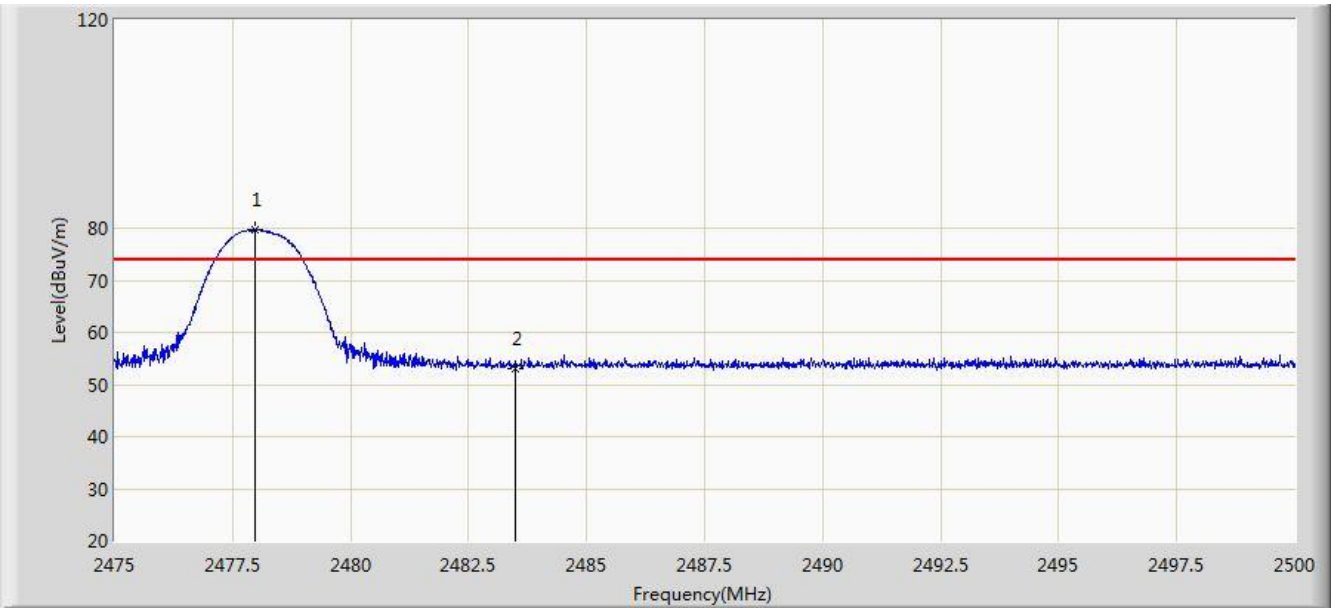


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1			2390.000	43.888	13.204	-10.112	54.000	30.684	AV
2		*	2403.100	85.141	54.482	N/A	N/A	30.659	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 19:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: 2.4G Wireless Receiver	Power: DC 5V
Note: Transmit at high channel 2478MHz	

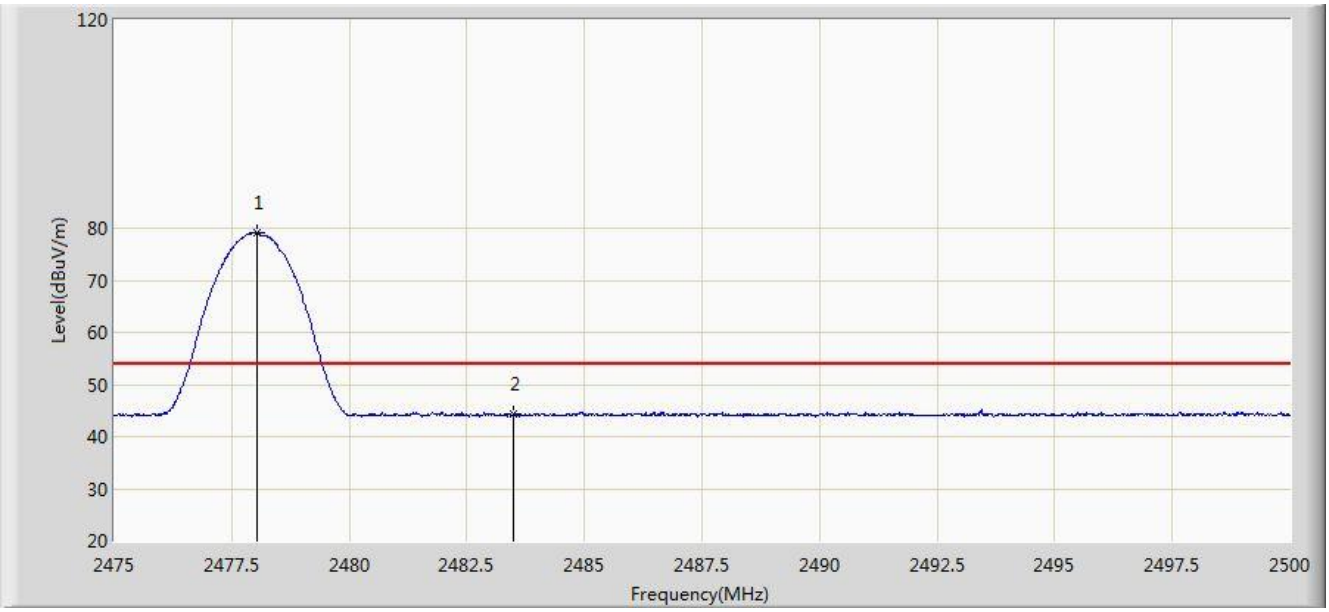


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2477.975	79.617	48.961	N/A	N/A	30.657	PK
2			2483.500	52.998	22.325	-21.002	74.000	30.673	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 19:46
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: 2.4G Wireless Receiver	Power: DC 5V
Note: Transmit at high channel 2478MHz	

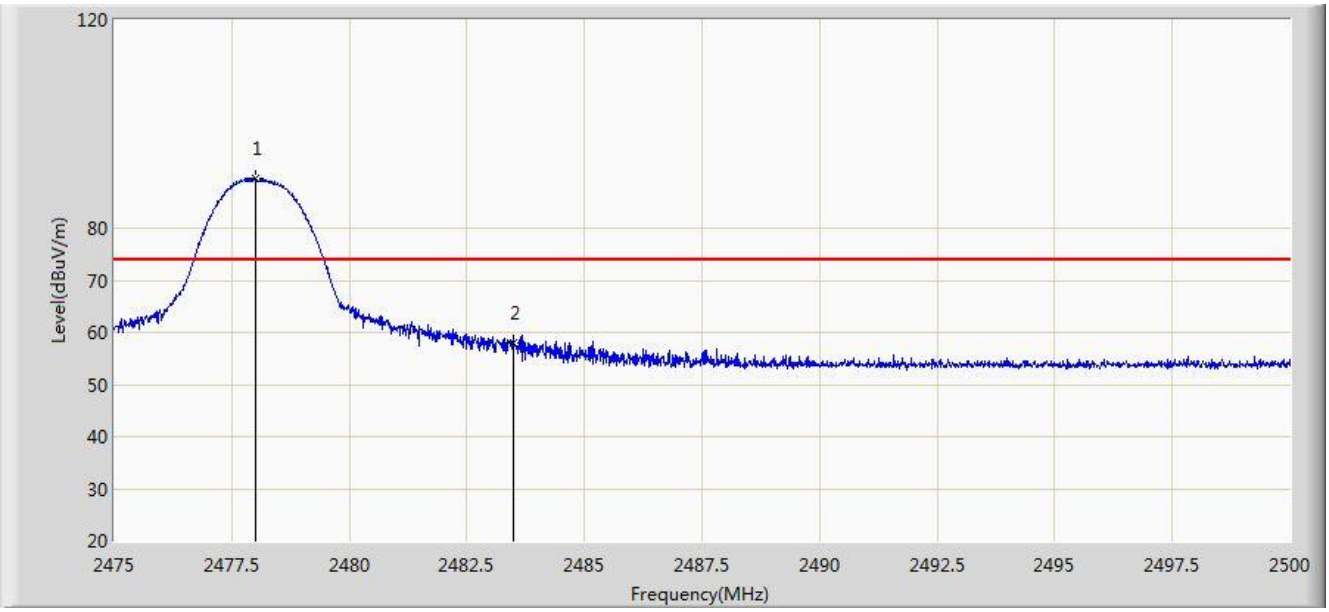


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2478.025	79.180	48.523	N/A	N/A	30.657	AV
2			2483.500	44.458	13.785	-9.542	54.000	30.673	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 19:48
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: 2.4G Wireless Receiver	Power: DC 5V
Note: Transmit at high channel 2478MHz	

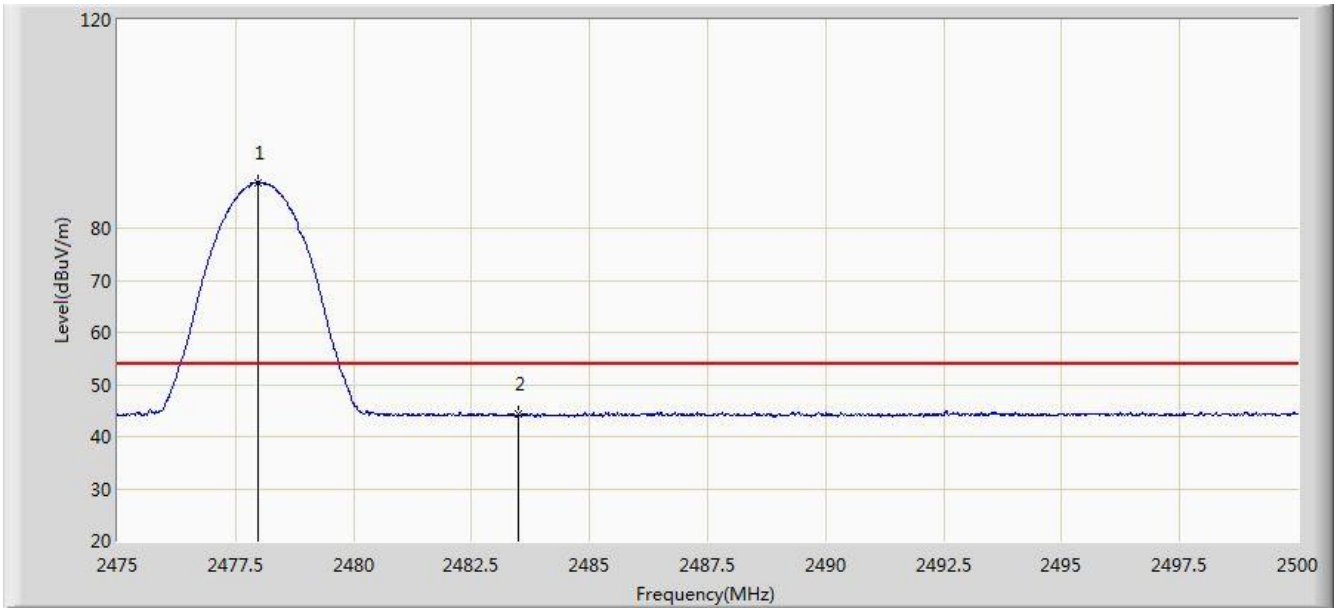


No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2478.000	89.609	58.952	N/A	N/A	30.657	PK
2			2483.500	58.067	27.394	-15.933	74.000	30.673	PK

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Engineer: Milo Li	
Site: AC1	Time: 2014/05/08 - 19:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: 2.4G Wireless Receiver	Power: DC 5V
Note: Transmit at high channel 2478MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		*	2477.975	88.816	58.160	N/A	N/A	30.657	AV
2			2483.500	44.221	13.548	-9.779	54.000	30.673	AV

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

7.4. Band-edge Compliance of RF Conducted Emissions

7.4.1. Test Limit

FCC Part 15.215 (c), Intentional radiators operating under the alternative provisions to the general emission limits as contained in 15.217 through 15.257 and in Subpart E of FCC part 15, must be designed to ensure that 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

7.4.2. Test Procedure

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation.

RBW ≧ 1% of the span

VBW ≧ RBW

Sweep = auto

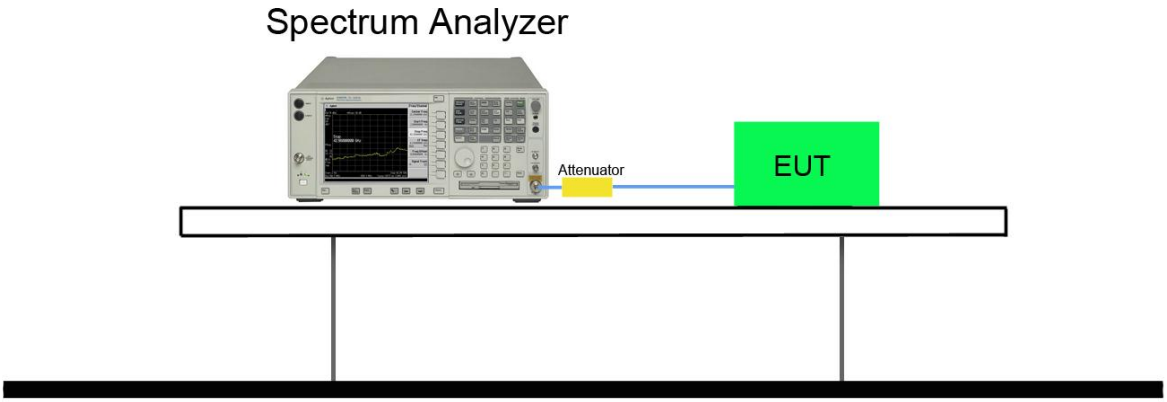
Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is greater than that at the band-edge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

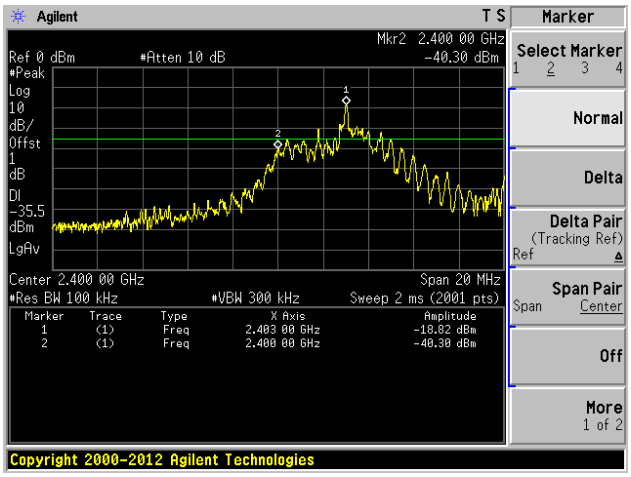
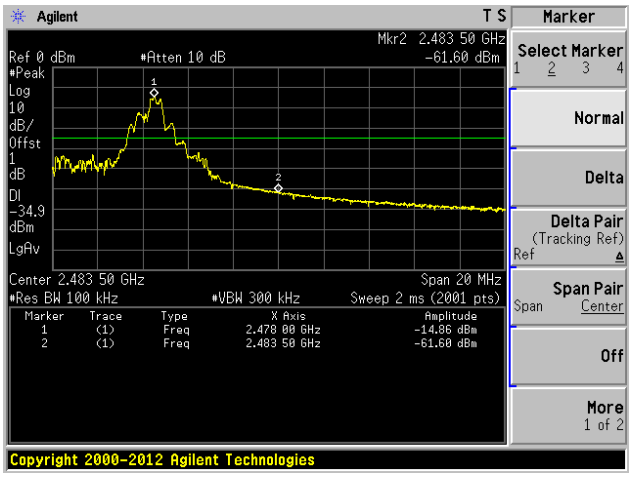
Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

7.4.3. Test Setup



7.4.4. Test Result

Product:	2.4G Wireless Receiver	Test Site:	AC1
Test Channel:	00	Test Engineer:	Milo Li
Test Item:	**Band-edge Compliance of RF Conducted Emissions for FCC Part15.215**		

Band-edge Compliance of RF Conducted Emissions	
Channel 00 (2403MHz)	**Channel 19 (2478MHz)**
	

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **2.4G Wireless Receiver FCC ID: GDDR340** is in compliance with Part 15C of the FCC Rules.

The End