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Report No.: 1404RSU01601
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MEASUREMENT REPORT

FCC PART 15.249

FCC ID: 2ABUYBHA-WN402

APPLICANT: EMW Co., Ltd.

Application Type: Certification

Product: NVR (Network Video Recorder)

Model No.: BHA-WN402

Brand Name: ARNIX

FCC Classification: Low Power Communication Device Transmitter (DXX)

FCC Rule Part(s): Part 15.249

Test Procedure(s): ANSI C63.10-2009

Test Date: April 17 ~ 22, 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.

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Revision History

Report No.	Version	Description	Issue Date
1404RSU01601	Rev. 01	Initial report	04-23-2014

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§2.1033 General Information

Applicant:	EMW Co., Ltd.
Applicant Address:	80B-4L, 680-3, Gojan-Dong, Namdong-Gu, Incheon, Korea
Manufacturer:	EMW Co., Ltd.
Manufacturer Address:	80B-4L, 680-3, Gojan-Dong, Namdong-Gu, Incheon, Korea
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.:	BHA-WN402
FCC ID:	2ABUYBHA-WN402
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Low Power Communication Device Transmitter (DXX)
Date(s) of Test:	April 17 ~ 22 2014
Test Report S/N:	1404RSU01601

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	NVR (Network Video Recorder)
Model No.	TAB-9160K
Working Voltage	DC 12.0V
Frequency Range	2410 - 2474 MHz, 5733 – 5845 MHz
Channel Number	13
Type of Modulation	QPSK
Channel Control	Auto
Antenna Type	Dipole Antenna
Antenna Gain	5.0dBi
Type of Modulation	QPSK

Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2410 MHz	01	2426 MHz	02	2442 MHz
03	2458 MHz	04	2474 MHz	12	5733 MHz
13	5749 MHz	14	5765 MHz	15	5781 MHz
16	5797 MHz	17	5813 MHz	18	5829 MHz
19	5845 MHz	N/A	N/A	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 NVR (Network Video Recorder) FCC ID: 2ABUYBHA-WN402 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.
AC/DC Adapter	RoHS	PF-120400

2.7. Test Software

The test utility software used during testing was engineering order by applicant.

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 **NVR (Network Video Recorder) FCC ID: 2ABUYBHA-WN402.**

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. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to 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 spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. 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 resolution, clock or data exchange speed, scrolling H pattern to the EUT and/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.

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 1GHz 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.”

- IPC (IP Camera) has an inverted connector to an external antenna.

Conclusion:

The **NVR (Network Video Recorder) FCC ID: 2ABUYBHA-WN402** 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	E4447A	MY45300136	1 year	2014/11/08
Preamplifier	MRT	AP01G18	1310002	1 year	2014/12/14
Preamplifier	MRT	AP18G40	1310003	1 year	2014/10/07
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: $\pm 3.46\text{dB}$
Radiated Emission Measurement
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz ~ 1GHz: $\pm 4.18\text{dB}$ 1GHz ~ 40GHz: $\pm 4.76\text{dB}$

7. TEST RESULT

7.1. Summary

Company Name: EMW Co., Ltd.

FCC ID: 2ABUYBHA-WN402

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	$\geq 20\text{dBc(Peak)}$	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

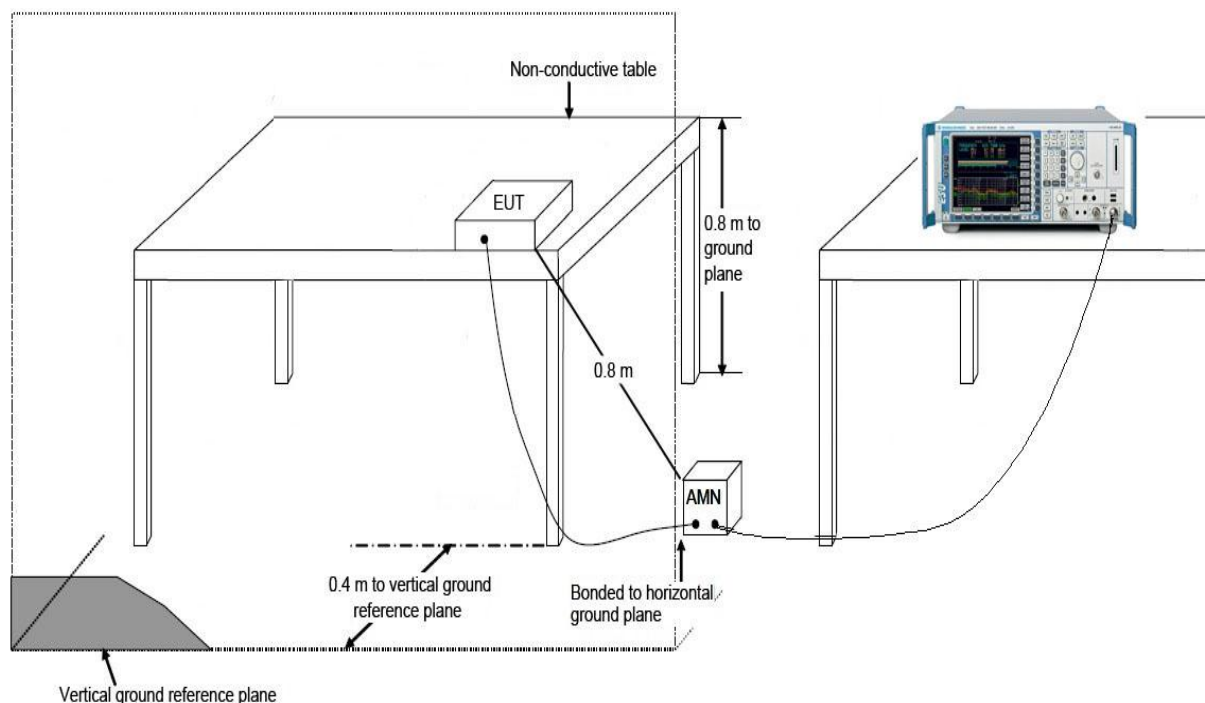
7.2.1. Test Limit

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.

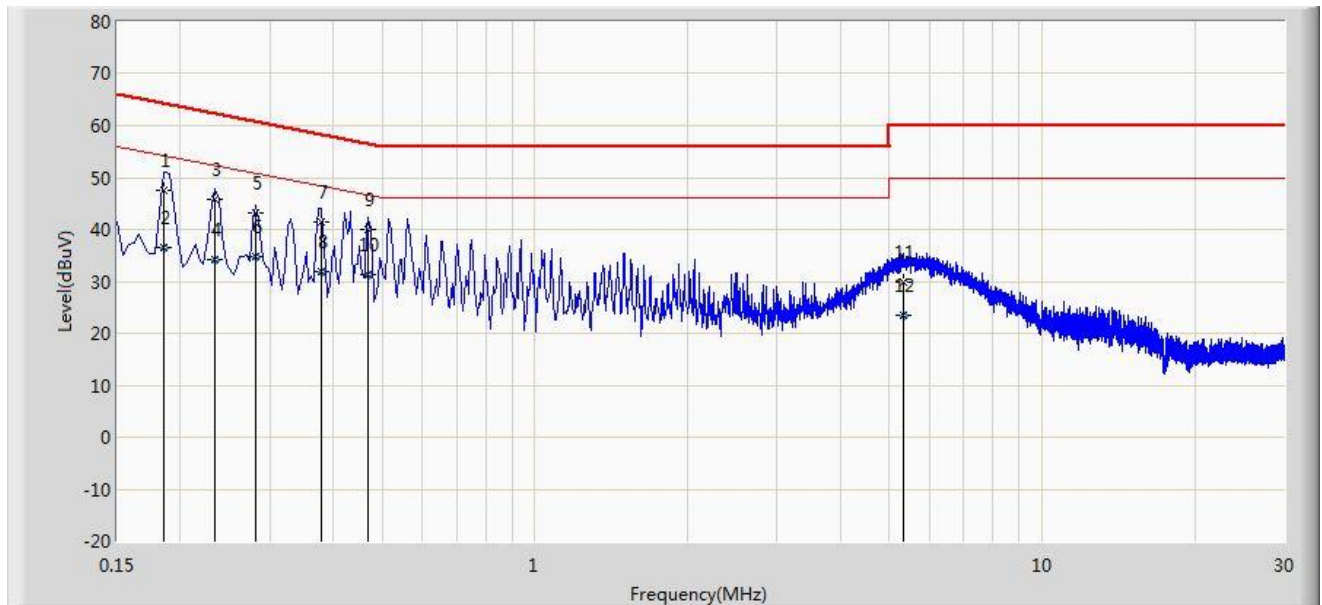
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

7.2.2. Test Setup



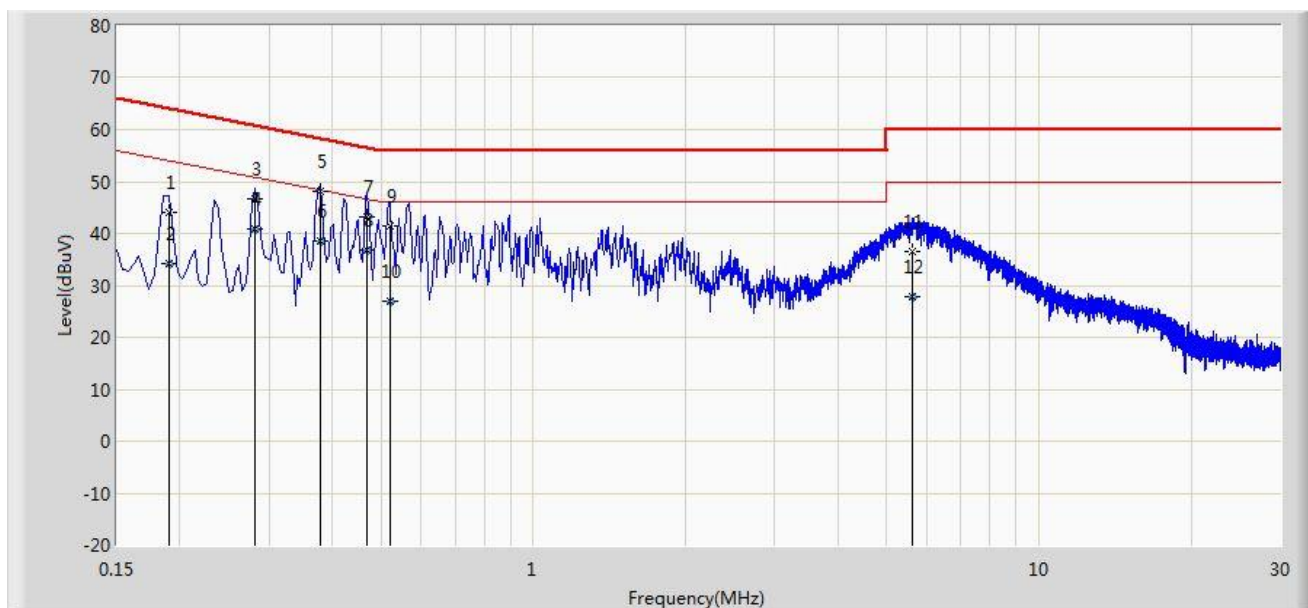
7.2.3. Test Result

Engineer: Roy Cheng	
Site: SR2	Time: 2014/04/23 - 13:11
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Line
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor	Type
1			0.186	47.606	37.567	-16.608	64.213	10.039	QP
2			0.186	36.644	26.605	-17.570	54.213	10.039	AV
3			0.234	45.693	35.742	-16.613	62.307	9.951	QP
4			0.234	34.140	24.189	-18.166	52.307	9.951	AV
5			0.282	43.093	33.103	-17.664	60.757	9.990	QP
6			0.282	34.764	24.774	-15.993	50.757	9.990	AV
7			0.378	41.352	31.284	-16.971	58.323	10.067	QP
8			0.378	32.005	21.938	-16.318	48.323	10.067	AV
9			0.470	40.029	29.886	-16.485	56.514	10.142	QP
10		*	0.470	31.430	21.288	-15.084	46.514	10.142	AV
11			5.338	29.823	19.764	-30.177	60.000	10.058	QP
12			5.338	23.505	13.447	-26.495	50.000	10.058	AV

Engineer: Roy Cheng	
Site: SR2	Time: 2014/04/23 - 13:18
Limit: FCC_Part15.207_CE_AC Power	Margin: 0
Probe: ENV216_101683_Filter On	Polarity: Neutral
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Normal Operation	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor	Type
1			0.190	43.966	33.938	-20.070	64.037	10.028	QP
2			0.190	34.290	24.262	-19.747	54.037	10.028	AV
3			0.282	46.791	36.766	-13.966	60.757	10.025	QP
4			0.282	40.979	30.955	-9.777	50.757	10.025	AV
5			0.378	48.244	38.148	-10.079	58.323	10.096	QP
6			0.378	38.487	28.391	-9.836	48.323	10.096	AV
7			0.470	43.265	33.100	-13.249	56.514	10.164	QP
8		*	0.470	36.938	26.773	-9.576	46.514	10.164	AV
9			0.522	41.390	31.216	-14.610	56.000	10.174	QP
10			0.522	26.966	16.792	-19.034	46.000	10.174	AV
11			5.614	36.594	26.500	-23.406	60.000	10.094	QP
12			5.614	27.937	17.843	-22.063	50.000	10.094	AV

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.

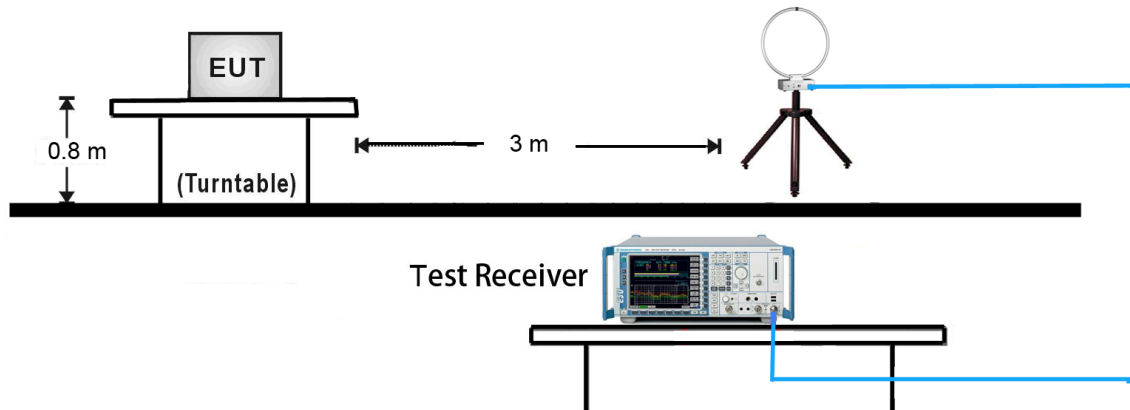
Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m).

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

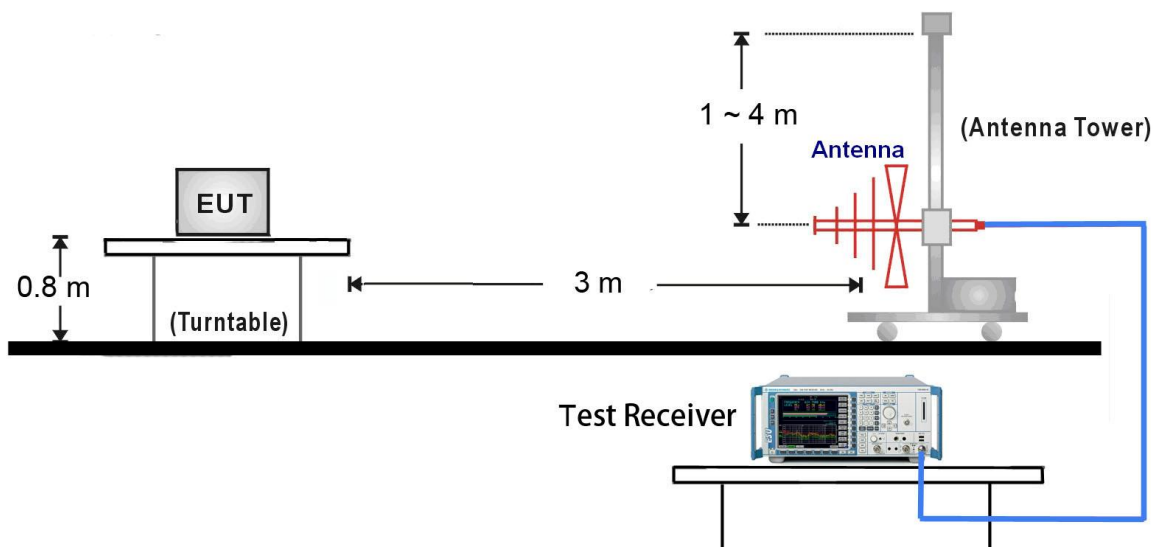
FCC Part 15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

7.3.2. Test Setup

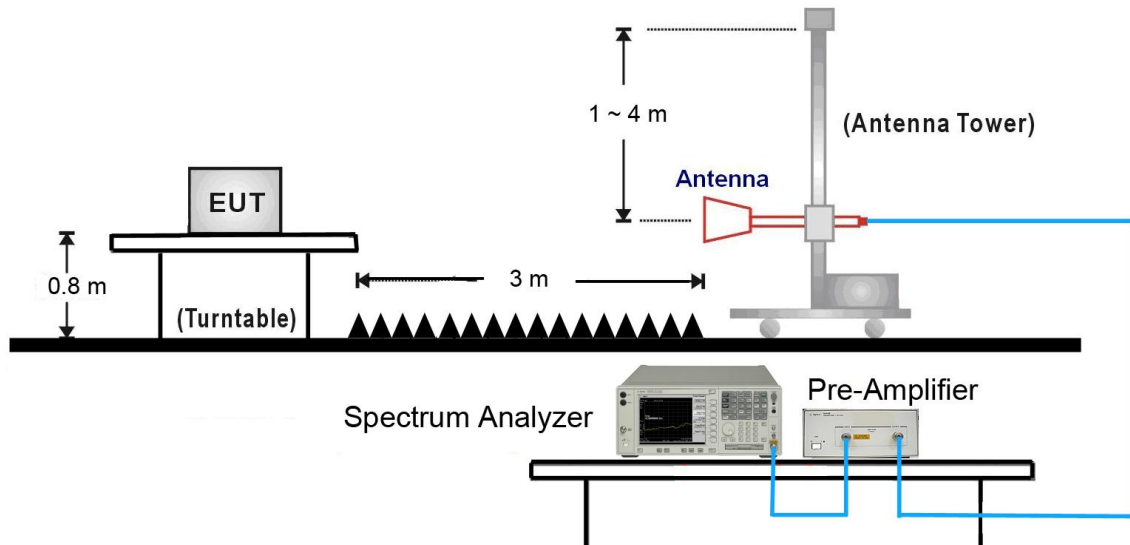
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:



7.3.3. Test Result

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	00-04, 12-19	Test Engineer:	Roy Cheng
Remark:	Fundamental Radiated Emission		

Frequency (MHz)	Reading Level (dBμV/m)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
2410	103.43	2.69	106.12	114	-7.88	Peak	Horizontal
	110.16	2.69	112.85	114	-1.15	Peak	Vertical
2426	104.96	2.67	107.63	114	-6.37	Peak	Horizontal
	110.23	2.67	112.90	114	-1.10	Peak	Vertical
2442	104.62	2.64	107.26	114	-6.74	Peak	Horizontal
	110.64	2.64	113.28	114	-0.72	Peak	Vertical
2453	103.41	2.64	106.05	114	-7.95	Peak	Horizontal
	110.00	2.64	112.64	114	-1.36	Peak	Vertical
2474	103.42	2.65	106.07	114	-7.93	Peak	Horizontal
	109.68	2.65	112.33	114	-1.67	Peak	Vertical
5733	98.64	7.81	106.45	114	-7.55	Peak	Horizontal
	104.89	7.81	112.70	114	-1.30	Peak	Vertical
5749	99.28	7.85	107.13	114	-6.87	Peak	Horizontal
	103.93	7.85	111.78	114	-2.22	Peak	Vertical
5765	100.67	7.89	108.56	114	-5.44	Peak	Horizontal
	104.20	7.89	112.09	114	-1.91	Peak	Vertical
5781	100.66	7.94	108.60	114	-5.40	Peak	Horizontal
	104.99	7.94	112.93	114	-1.07	Peak	Vertical
5797	99.33	8.00	107.33	114	-6.67	Peak	Horizontal
	104.28	8.00	112.28	114	-1.72	Peak	Vertical
5813	98.89	8.04	106.93	114	-7.07	Peak	Horizontal
	105.15	8.04	113.19	114	-0.81	Peak	Vertical
5829	99.30	8.07	107.37	114	-6.63	Peak	Horizontal
	104.41	8.07	112.48	114	-1.52	Peak	Vertical
5845	98.29	8.12	106.41	114	-7.59	Peak	Horizontal
	104.12	8.12	112.24	114	-1.76	Peak	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	00-04, 12-19	Test Engineer:	Roy Cheng
Remark:	Fundamental Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
2410	83.06	2.70	85.76	94	-8.24	AV	Horizontal
	89.78	2.70	92.48	94	-1.52	AV	Vertical
2426	84.58	2.66	87.24	94	-6.76	AV	Horizontal
	89.86	2.67	92.53	94	-1.47	AV	Vertical
2442	84.25	2.65	86.90	94	-7.10	AV	Horizontal
	90.26	2.64	92.90	94	-1.10	AV	Vertical
2453	83.04	2.64	85.68	94	-8.32	AV	Horizontal
	90.43	2.64	93.07	94	-0.93	AV	Vertical
2474	83.05	2.66	85.71	94	-8.29	AV	Horizontal
	89.31	2.66	91.97	94	-2.03	AV	Vertical
5733	78.26	7.81	86.07	94	-7.93	AV	Horizontal
	85.12	7.81	92.93	94	-1.07	AV	Vertical
5749	78.90	7.85	86.75	94	-7.25	AV	Horizontal
	83.56	7.84	91.40	94	-2.60	AV	Vertical
5765	80.29	7.88	88.17	94	-5.83	AV	Horizontal
	83.83	7.88	91.71	94	-2.29	AV	Vertical
5781	80.29	7.96	88.25	94	-5.75	AV	Horizontal
	84.61	7.96	92.57	94	-1.43	AV	Vertical
5797	78.96	7.99	86.95	94	-7.05	AV	Horizontal
	84.91	7.98	92.89	94	-1.11	AV	Vertical
5813	78.51	8.04	86.55	94	-7.45	AV	Horizontal
	85.08	8.04	93.12	94	-0.88	AV	Vertical
5829	78.93	8.05	86.98	94	-7.02	AV	Horizontal
	85.04	8.07	93.11	94	-0.89	AV	Vertical
5845	77.91	8.10	86.01	94	-7.99	AV	Horizontal
	83.74	8.10	91.84	94	-2.16	AV	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	00	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
4816.5	49.60	6.39	55.99	74	-18.01	PK	Horizontal
4816.5	58.89	6.39	65.28	74	-8.72	PK	Vertical
7230.0	35.18	13.76	48.94	74	-25.06	PK	Horizontal
7230.0	36.12	13.76	49.88	74	-24.12	PK	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	00	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
4816.5	45.69	6.40	52.09	54	-1.91	AV	Horizontal
4816.5	46.25	6.40	52.65	54	-1.35	AV	Vertical
7230.0	30.46	13.76	44.22	54	-9.78	AV	Horizontal
7230.0	32.41	13.76	46.17	54	-7.83	AV	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	02	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
4884.5	50.10	6.65	56.75	74	-17.25	PK	Horizontal
4884.5	57.23	6.65	63.88	74	-10.12	PK	Vertical
7326.0	36.13	14.02	50.15	74	-23.85	PK	Horizontal
7326.0	34.80	14.02	48.82	74	-25.18	PK	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	02	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
4884.5	40.14	6.65	46.79	54	-7.21	AV	Horizontal
4884.5	44.56	6.65	51.21	54	-2.79	AV	Vertical
7326.0	30.45	14.02	44.47	54	-9.53	AV	Horizontal
7326.0	30.12	14.02	44.14	54	-9.86	AV	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	04	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
4952.5	40.78	6.77	47.55	74	-26.45	PK	Horizontal
4944.0	53.97	6.76	60.73	74	-13.27	PK	Vertical
7422.0	34.14	14.17	48.31	74	-25.69	PK	Horizontal
7422.0	34.22	14.17	48.39	74	-25.61	PK	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	04	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
4952.5	36.84	6.77	43.61	54	-10.39	AV	Horizontal
4952.5	42.43	6.76	49.19	54	-4.81	AV	Vertical
7422.0	28.54	14.17	42.71	54	-11.29	AV	Horizontal
7422.0	28.95	14.17	43.12	54	-10.88	AV	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	12	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dBμV/m)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
11472.0	41.61	19.37	60.98	74	-13.02	PK	Horizontal
11466.0	36.27	19.36	55.63	74	-18.37	PK	Vertical
17199.0	33.81	23.82	57.63	74	-16.37	PK	Horizontal
17199.0	34.14	23.82	57.96	74	-16.04	PK	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	12	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dBμV/m)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
11472.0	33.52	19.37	52.89	54.00	-1.11	AV	Horizontal
11466.0	30.13	19.37	49.50	54.00	-4.50	AV	Vertical
17199.0	27.54	23.82	51.36	54.00	-2.64	AV	Horizontal
17199.0	26.35	23.82	50.17	54.00	-3.83	AV	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	15	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
11562.0	35.44	19.42	54.86	74.00	-19.14	PK	Horizontal
11565.5	43.33	19.43	62.76	74.00	-11.24	PK	Vertical
17343.0	32.92	24.80	57.72	74.00	-16.28	PK	Horizontal
17343.0	32.48	24.80	57.28	74.00	-16.72	PK	Vertical

Test Mode:	Transmission	Test Site:	AC1
Test Channel:	15	Test Engineer:	Roy Cheng
Remark:	Harmonic Radiated Emission		

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
11562.0	30.12	19.42	49.54	54.00	-4.46	AV	Horizontal
11565.5	33.45	19.43	52.88	54.00	-1.12	AV	Vertical
17343.0	26.43	24.80	51.23	54.00	-2.77	AV	Horizontal
17343.0	25.35	24.80	50.15	54.00	-3.85	AV	Vertical

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

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
11690.0	35.10	19.49	54.59	74.00	-19.41	PK	Horizontal
11690.0	35.08	19.49	54.57	74.00	-19.43	PK	Vertical
17535.0	32.70	25.96	58.66	74.00	-15.34	PK	Horizontal
17535.0	32.49	25.96	58.45	74.00	-15.55	PK	Vertical

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

Frequency (MHz)	Reading Level (dB μ V/m)	Factor (dB)	Measure Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector	Polarization
11690.0	26.76	19.49	46.25	54.00	-7.75	AV	Horizontal
11690.0	26.45	19.49	45.94	54.00	-8.06	AV	Vertical
17535.0	24.75	25.96	50.71	54.00	-3.29	AV	Horizontal
17535.0	26.72	25.96	52.68	54.00	-1.32	AV	Vertical

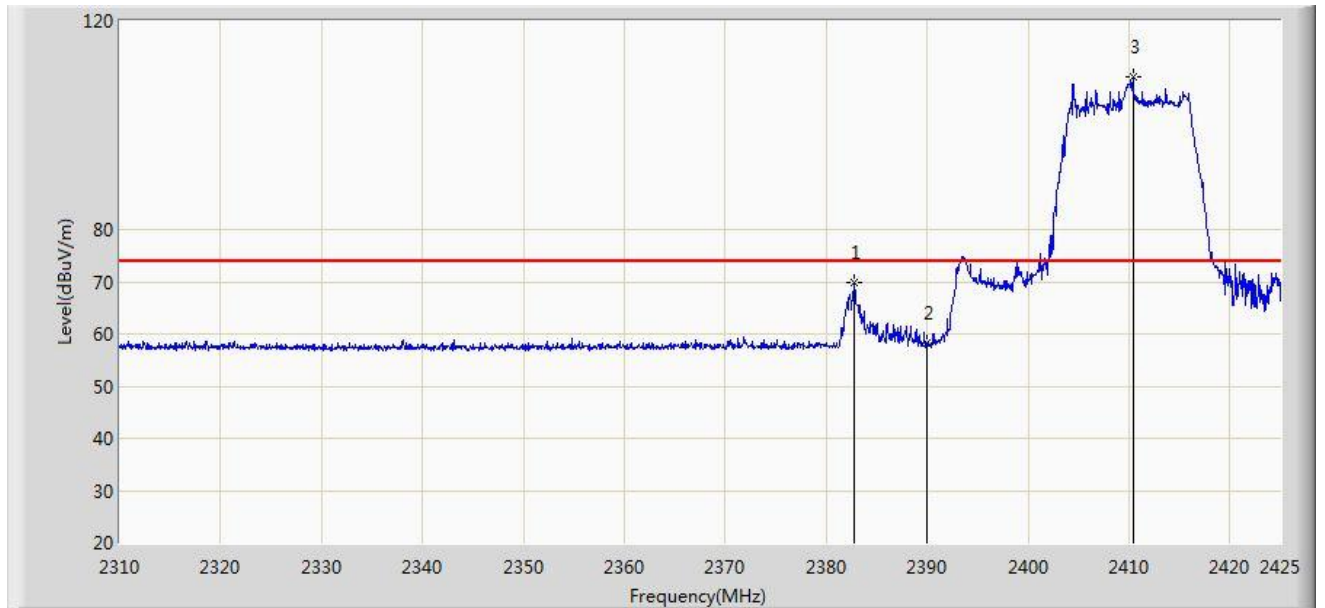
Test Mode:	Transmission	Test Site:	AC1
Test Channel:	04	Test Engineer:	Roy Cheng
Remark:	The worst case of General Radiated Emission.		

Frequency (MHz)	Reading Level (dBμV/m)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
483.96	4.17	18.11	22.28	46	-23.72	QP	Horizontal
412.18	4.96	17.12	22.08	46	-23.92	QP	Vertical
730.34	4.38	21.59	25.97	46	-20.03	QP	Horizontal
634.31	3.32	20.23	23.55	46	-22.45	QP	Vertical
4179.46	35.63	4.69	40.32	74	-33.68	PK	Horizontal
4237.39	36.75	4.95	41.70	74	-32.30	PK	Vertical
4804.00	35.21	6.36	41.57	74	-32.43	PK	Horizontal
6184.76	35.92	9.07	44.99	74	-29.01	PK	Vertical

Note:

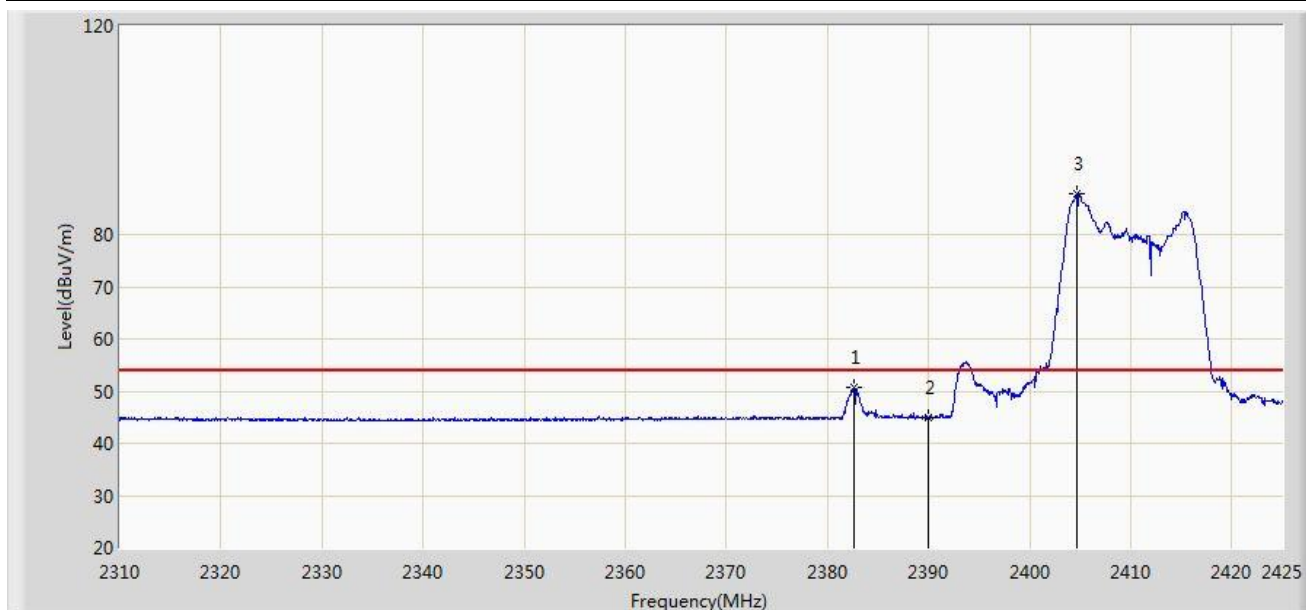
1. Measure Level = Reading Level + Factor.
2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 12:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Test Mode : CH0 2410MHz	



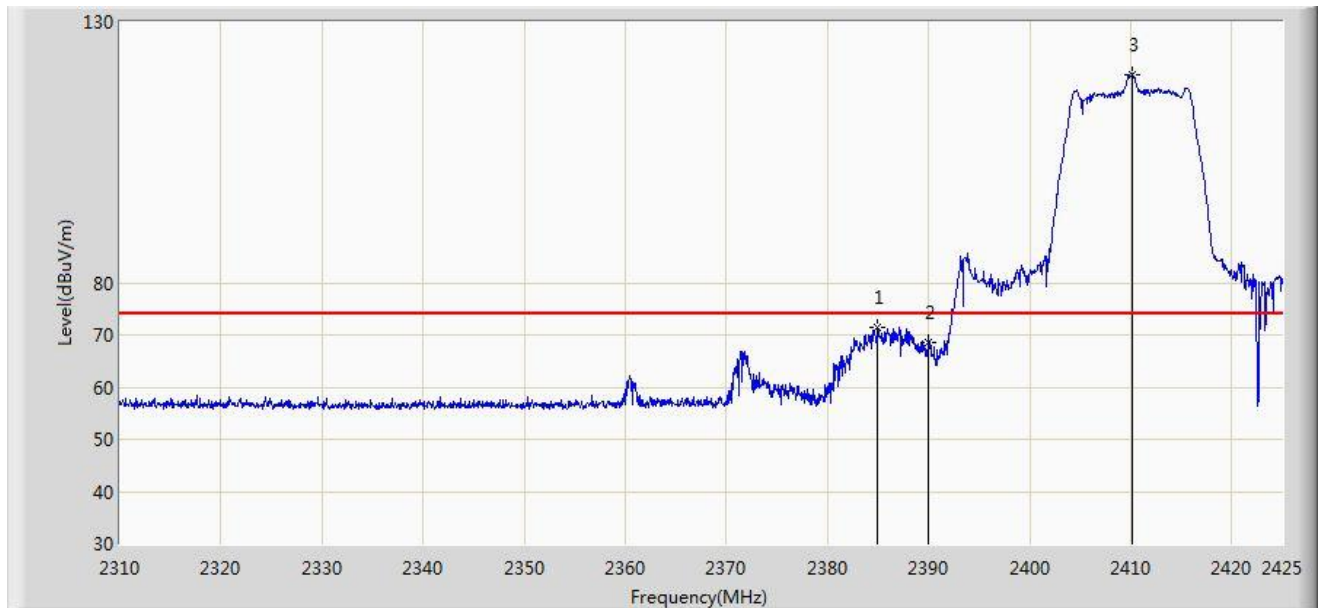
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2382.795	69.999	39.299	-4.001	74.000	30.701	PK
2			2390.000	58.142	27.458	-15.858	74.000	30.684	PK
3		*	2410.395	109.350	78.703	N/A	N/A	30.648	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 13:03
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Test Mode : CH0 2410MHz	



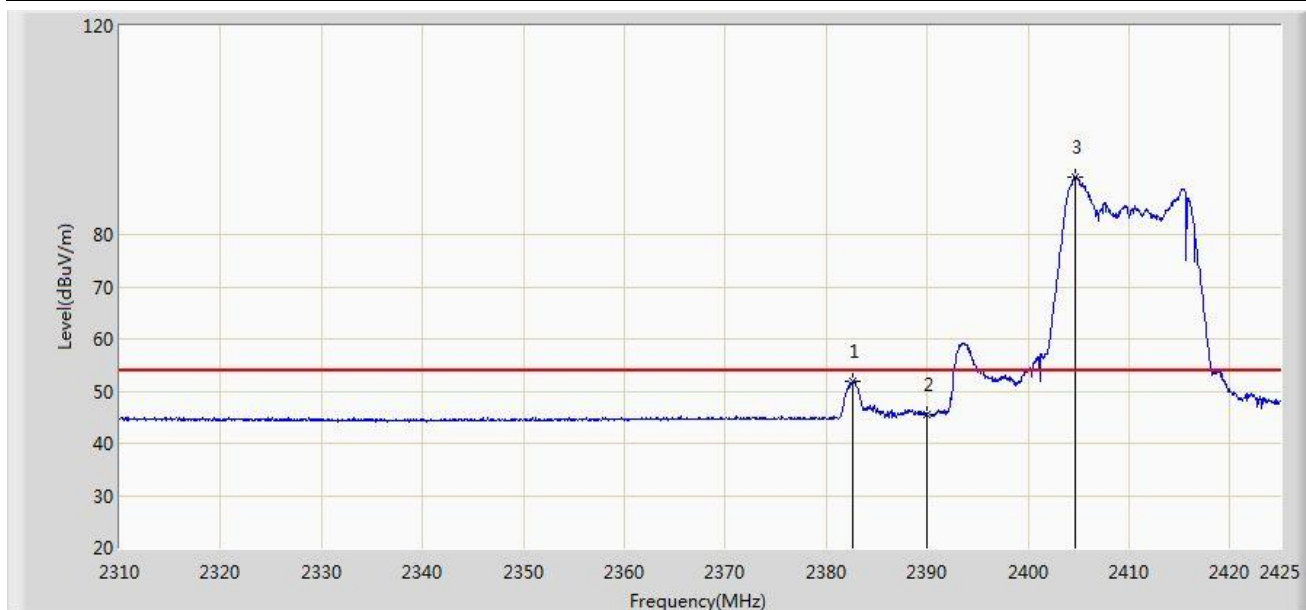
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2382.565	50.661	19.960	-3.339	54.000	30.701	AV
2			2390.000	44.884	14.200	-9.116	54.000	30.684	AV
3		*	2404.702	87.910	57.253	N/A	N/A	30.657	AV

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 13:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Test Mode : CH0 2410MHz	



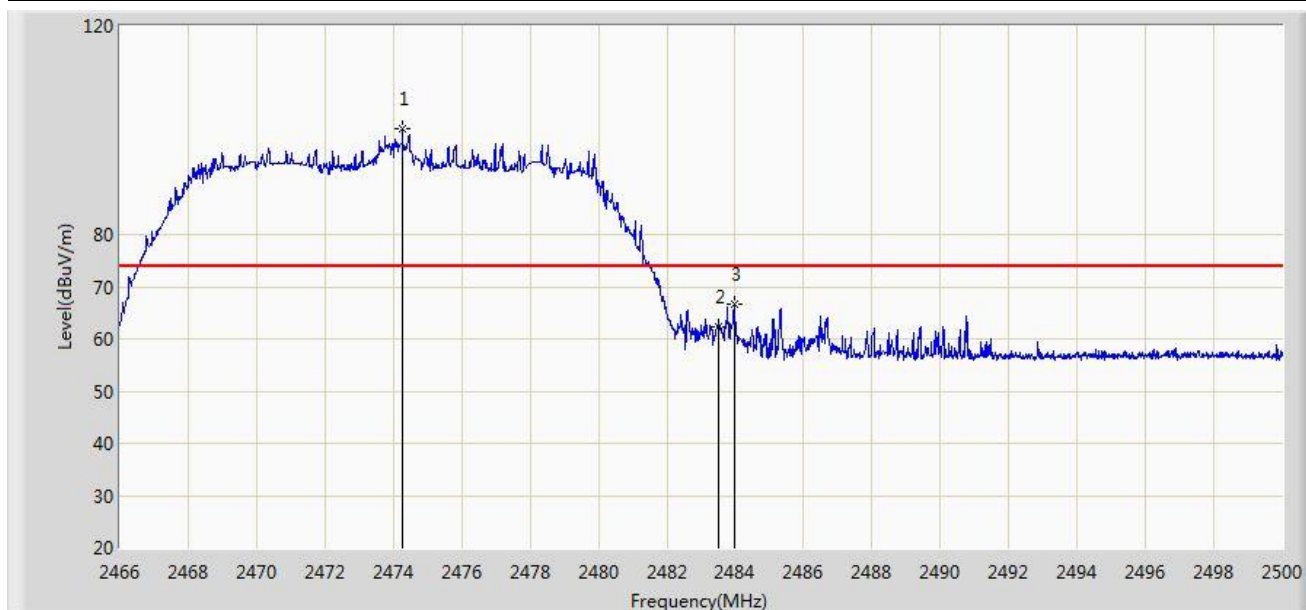
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2384.980	71.484	40.789	-2.516	74.000	30.695	PK
2			2390.000	68.545	37.861	-5.455	74.000	30.684	PK
3		*	2410.107	119.959	89.311	N/A	N/A	30.647	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 13:08
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Test Mode : CH0 2410MHz	



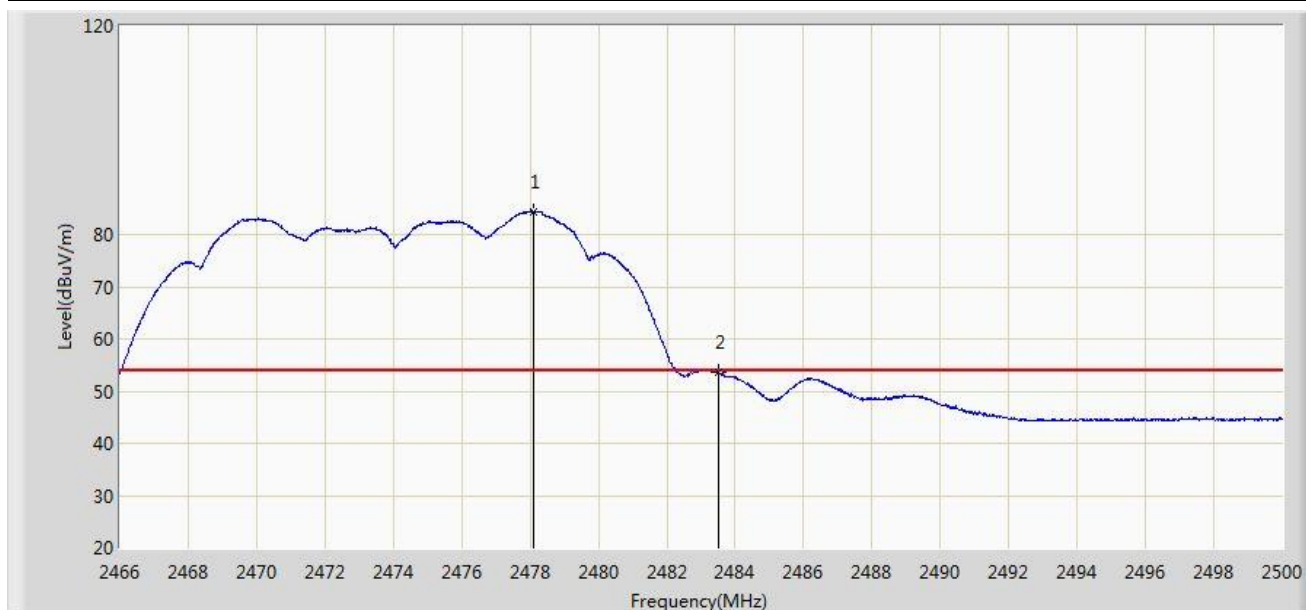
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2382.565	51.849	21.148	-2.151	54.000	30.701	AV
2			2390.000	45.443	14.759	-8.557	54.000	30.684	AV
3		*	2404.702	91.084	60.427	N/A	N/A	30.657	AV

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 13:56
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Test Mode : CH04 2474MHz	



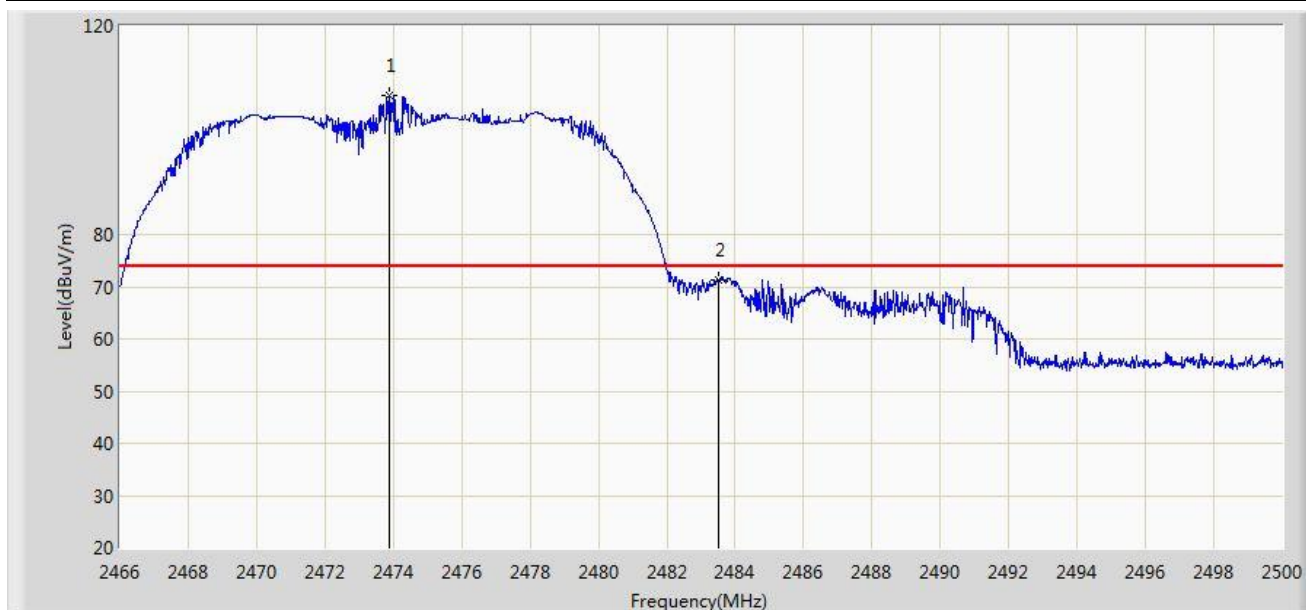
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2474.262	100.161	69.515	N/A	N/A	30.646	PK
2			2483.500	62.210	31.537	-11.790	74.000	30.673	PK
3			2483.969	66.553	35.879	-7.447	74.000	30.674	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 14:03
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Horizontal
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Test Mode : CH04 2474MHz	



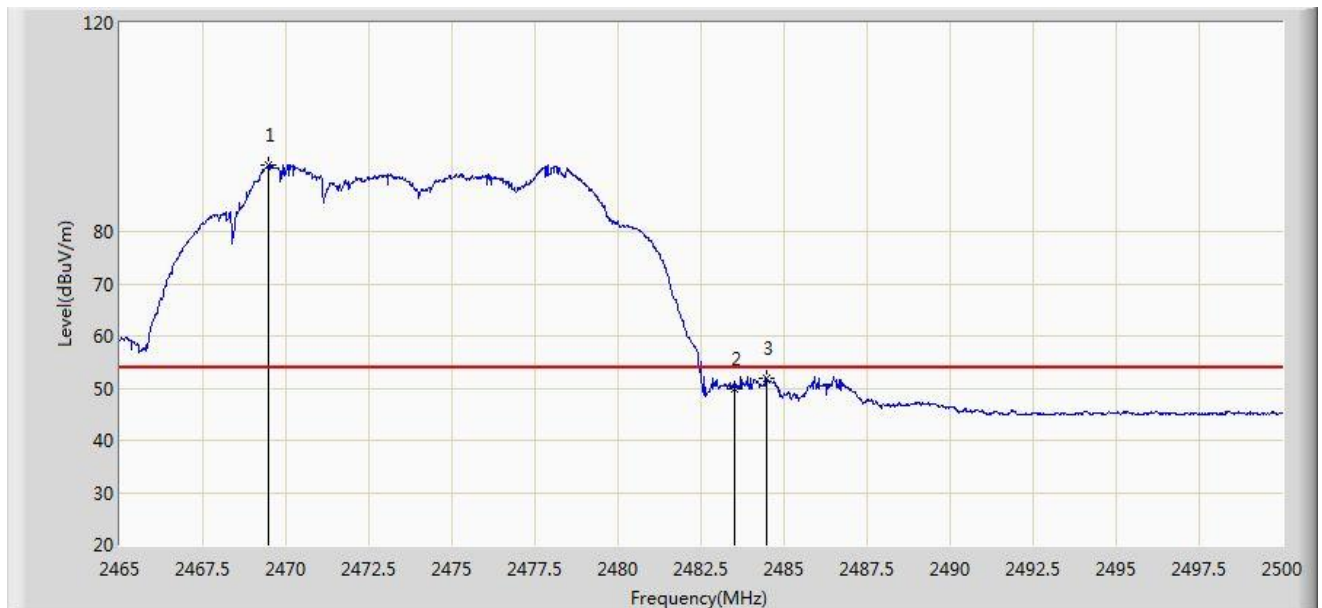
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2478.121	84.472	53.815	N/A	N/A	30.657	AV
2			2483.500	53.574	22.901	-0.426	54.000	30.673	AV

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 15:00
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: NVR (Network Video Recorder)	Power: AC 120V/60Hz
Note: Test Mode : CH04 2474MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2473.888	106.626	75.981	N/A	N/A	30.644	PK
2			2483.500	71.310	40.637	-2.690	74.000	30.673	PK

Engineer: Roy Cheng	
Site: AC1	Time: 2014/04/17 - 15:10
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_1-18GHz	Polarity: Vertical
EUT: BHA-WC102	Power: AC 120V/60Hz
Note: Test Mode : CH4 2474MHz	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2469.480	92.636	62.004	N/A	N/A	30.631	AV
2			2483.500	49.953	19.280	-4.047	54.000	30.673	AV
3			2484.495	51.890	21.214	-2.110	54.000	30.675	AV

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 $\geq$ 1% of the span

VBW $\geq$ RBW

Sweep = auto

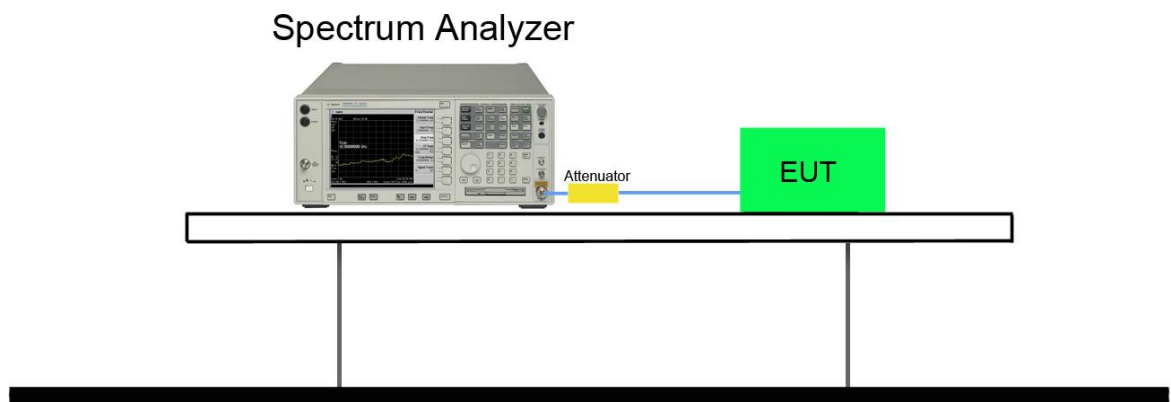
Detector function = peak

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	:	NVR (Network Video Recorder)
Test Item	:	Band-edge Compliance of RF Conducted Emissions for FCC Part15.215
Test Mode	:	Mode 1

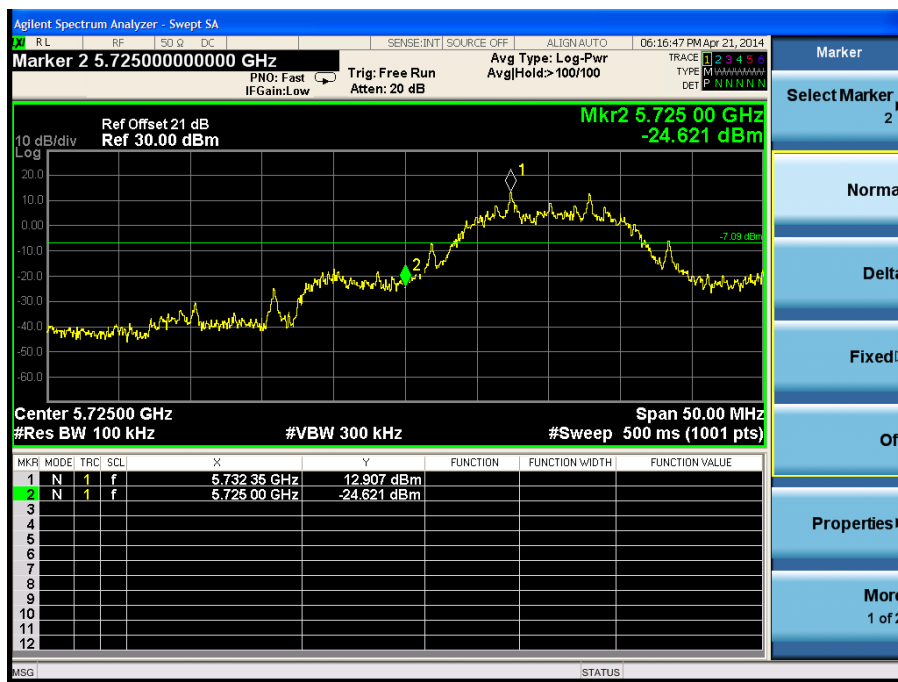
Channel 00 (2410MHz)



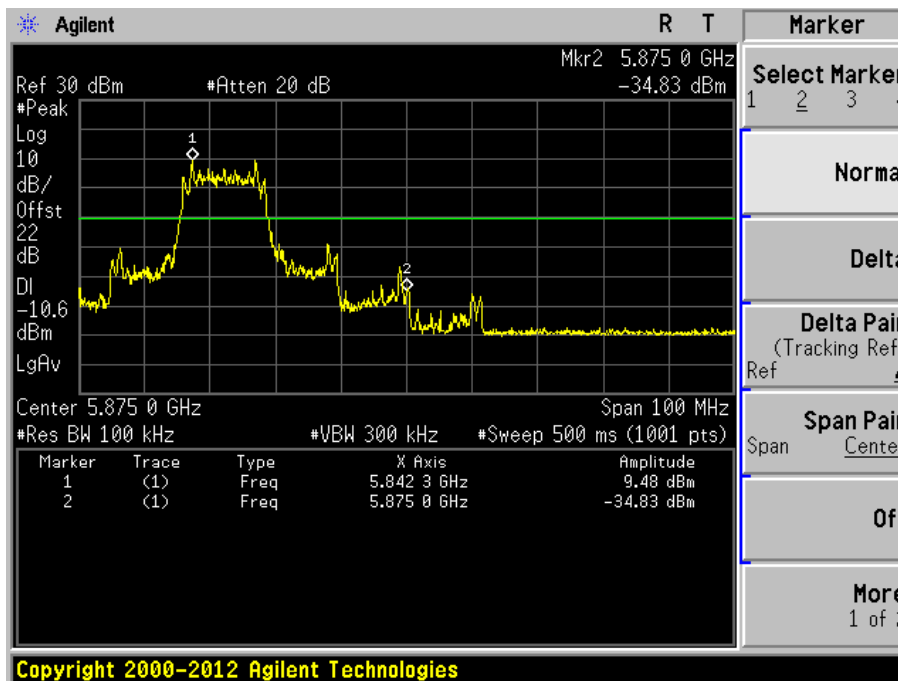
Channel 04 (2474MHz)



Channel 12 (5733MHz)



Channel 19 (5845MHz)



8. CONCLUSION

The data collected relate only the item(s) tested and show that the **NVR (Network Video Recorder)** **FCC ID: 2ABUYBHA-WN402** is in compliance with Part 15C of the FCC Rules.

The End