



Test Report

FCC Part15 Subpart C

Product Name : Q TV Engine
Model No. : QP-168
FCC ID : 2AA45-QP168

Applicant : Q-Point Technology Inc
Address : 6F.-17, No.73, Sec. 2, Xinsheng N. Rd.,
Zhongshan Dist., Taipei City 104, Taiwan

Date of Receipt : 13/09/2013
Test Date : 13/09/2013~29/09/2013
Issued Date : 11/10/2013
Report No. : 139S041R-RF-US-P06V01
Report Version : V2.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF, CNAS or any agency of the Government.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

Test Report Certification

Issued Date : 11/10/2013

Report No. : 139S041R-RF-US-P06V01



Product Name : Q TV Engine

Applicant : Q-Point Technology Inc

Address : 6F.-17, No.73, Sec. 2, Xinsheng N. Rd., Zhongshan Dist.,
Taipei City 104, Taiwan

Manufacturer : Kunshan Heisei Electronics Co.,Ltd.

Address : No.758 Zhenchuan East Rd.,Kunshan City, China

Model No. : QP-168

FCC ID : 2AA45-QP168

EUT Voltage : 5V --- 2A

Brand Name : Q-Point

Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2012
ANSI C63.4: 2009
KDB 558074 D01 DTS Meas Guidance v03r01

Test Result : Complied

Performed Location : Suzhou EMC Laboratory
No.99 Hongye Rd., Suzhou Industrial Park Loufeng
Hi-Tech Development Zone., Suzhou, China
TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
FCC Registration Number: 800392

Documented By : Alice Li

Reviewed By : Jack Zhang

Approved By : Jame Yuan

Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	:	BSMI, NCC, TAF
Germany	:	TUV Rheinland
Norway	:	Nemko, DNV
USA	:	FCC
Japan	:	VCCI
China	:	CNAS

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site :<http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

HsinChu Testing Laboratory :

No.75-2, 3rd Lin, Wangye Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : service@quietek.com

Linkou Testing Laboratory :

No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

Suzhou Testing Laboratory :

No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., SuZhou, China
TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : service@quietek.com

TABLE OF CONTENTS

Description	Page
1. General Information	6
1.1. EUT Description	6
1.2. Mode of Operation	9
1.3. Tested System Details	10
1.4. Configuration of Tested System	11
1.5. EUT Exercise Software	12
2. Technical Test	13
2.1. Summary of Test Result	13
2.2. Test Environment	14
3. Conducted Emission	15
3.1. Test Equipment	15
3.2. Test Setup	15
3.3. Limit	16
3.4. Test Procedure	16
3.5. Uncertainty	16
3.6. Test Result	17
4. Radiated Emission	17
4.1. Test Equipment	19
4.2. Test Setup	20
4.3. Limit	21
4.4. Test Procedure	21
4.5. Uncertainty	22
4.6. Test Result	23
5. RF Antenna Conducted Spurious	29
5.1. Test Equipment	29
5.2. Test Setup	29
5.3. Limit	29
5.4. Test Procedure	30
5.5. Uncertainty	30
5.6. Test Result	31
6. Radiated Emission Band Edge	35
6.1. Test Equipment	35
6.2. Test Setup	36
6.3. Limit	36
6.4. Test Procedure	36
6.5. Uncertainty	36
6.6. Test Result	37

7.	Operation Frequency Range of 20dB Bandwidth	37
7.1.	Test Equipment.....	69
7.2.	Test Setup.....	69
7.3.	Limit.....	69
7.4.	Test Procedure	69
7.5.	Uncertainty	69
7.6.	Test Result.....	70
8.	Occupied Bandwidth.....	74
8.1.	Test Equipment.....	74
8.2.	Test Setup.....	74
8.3.	Limit.....	74
8.4.	Test Procedure	74
8.5.	Uncertainty	74
8.6.	Test Result.....	75
9.	Power Output.....	83
9.1.	Test Equipment.....	83
9.2.	Test Setup.....	83
9.3.	Limit.....	83
9.4.	Test Procedure	84
9.5.	Uncertainty	84
9.6.	Test Result.....	85
10.	Power Spectral Density	89
10.1.	Test Equipment.....	89
10.2.	Test Setup.....	89
10.3.	Limit.....	89
10.4.	Test Procedure	90
10.5.	Uncertainty	90
10.6.	Test Result.....	91

1. General Information

1.1. EUT Description

Product Name	Q TV Engine
Model No.	QP-168
Device Category	Portable
RF Exposure Environment	Uncontrolled
Antenna Type	PCB
Wi-Fi	
Wi-Fi Frequency	802.11g/n: OFDM
Type of modulation	802.11g: 6/9/12/18/24/36/48/54 Mbps
Data Rate	802.11b: 1/2/5.5/11 Mbps
	802.11n: up to 150 Mbps
	802.11g/n: OFDM
Peak Antenna Gain	2.23dBi
Bluetooth	
Bluetooth Frequency	2402~2480MHz
Bluetooth Version	V3.0 + HS+V4.0
Type of modulation	V3.0+HS: GFSK, Pi/4 DQPSK, 8DPSK V4.0: GFSK
Data Rate	V3.0+HS: 1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK) V4.0: 1Mbps(GFSK)
Antenna Gain	2.23dBi
Components	
Battery	M/N: BX0502000 Input: 100V-240V-50/60Hz Output: 5V 2000mA DC

For 2.4GHz Band

802.11b/g/n(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz	04	2427 MHz
05	2432 MHz	06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	10	2457 MHz	11	2462 MHz	N/A	N/A
802.11b/g/n(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
N/A	N/A	N/A	N/A	03	2422 MHz	04	2427 MHz
05	2432 MHz	06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	N/A	N/A	N/A	N/A	N/A	N/A

Power Parameter Value of the test software

Test Mode	Test Channel	Power Setting Value	Duty Cycle
802.11b	2412	47	99%
	2437	46	99%
	2462	46	99%
802.11g	2412	41	98%
	2437	44	98%
	2462	40	98%
802.11n(20MHz)	2412	39	98%
	2437	44	98%
	2462	38	98%
802.11n(40MHz)	2422	39	95%
	2437	38	95%
	2452	38	95%

1.2. Mode of Operation

Quietek has verified the construction and function in typical 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 by 802.11b
Mode 2: Transmit by 802.11g
Mode 3: Transmit by 802.11n (20MHz)
Mode 4: Transmit by 802.11n (40MHz)

Note:

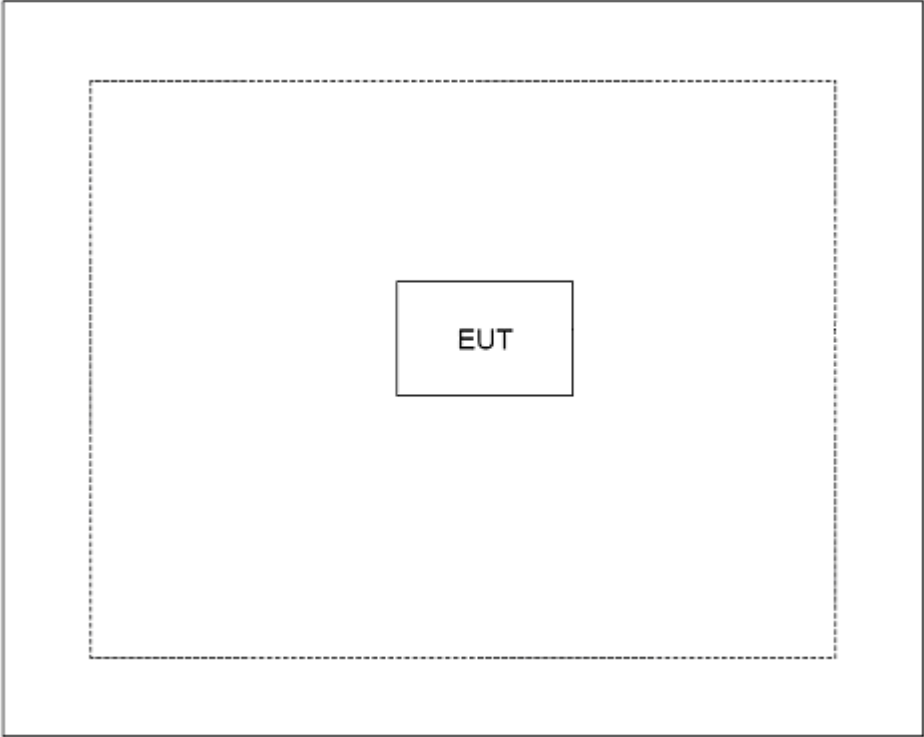
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. This device is a composite device in accordance with Part 15 Subpart B regulations. The function for the receiver was measured and made a test report that the report number is 139S041R-IT-US-P01V02.

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

1.4. Configuration of Tested System

Connection Diagram	
	
Signal Cable Type	Signal cable Description

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Run the RF test software, and set the test mode and channel, then start continue transmit.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
- ☐ Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.207	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.209	Yes	No
RF Antenna Conducted Spurious	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(d)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2012 15.247(d)	Yes	No
Operation Frequency Range of 20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2012 15.215(c)	Yes	No
Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(a)(2)	Yes	No
Power Output	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(b)(3)	Yes	No
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(e)	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

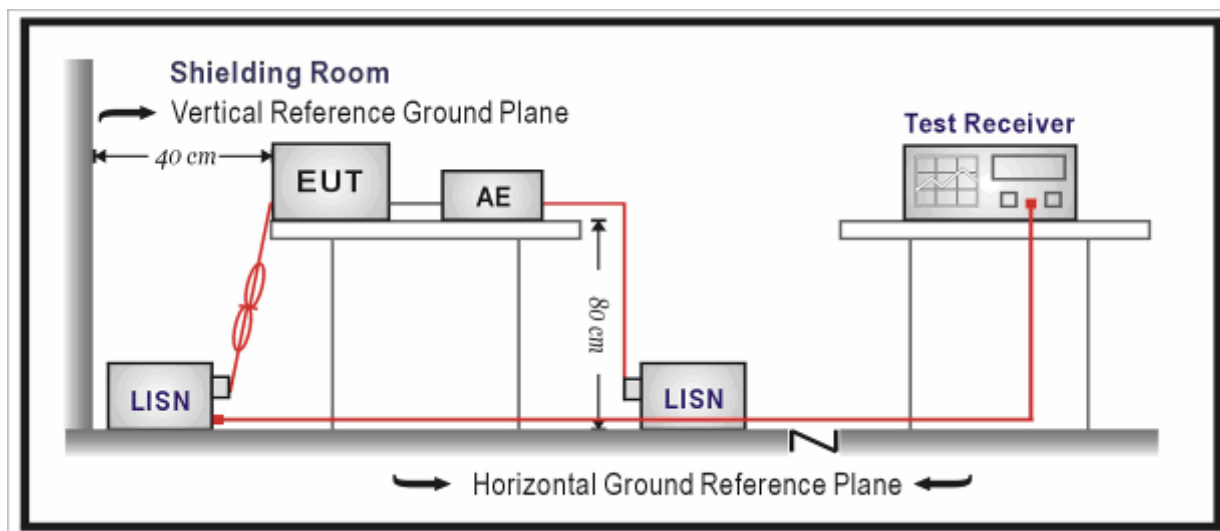
3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2014.03.30
Two-Line V-Network	R&S	ENV216	100043	2014.03.30
Two-Line V-Network	R&S	ENV216	100044	2014.09.16
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2014.03.01
50ohm Termination	SHX	TF2	07081401	2014.09.16
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2014.01.10

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. 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.

3.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

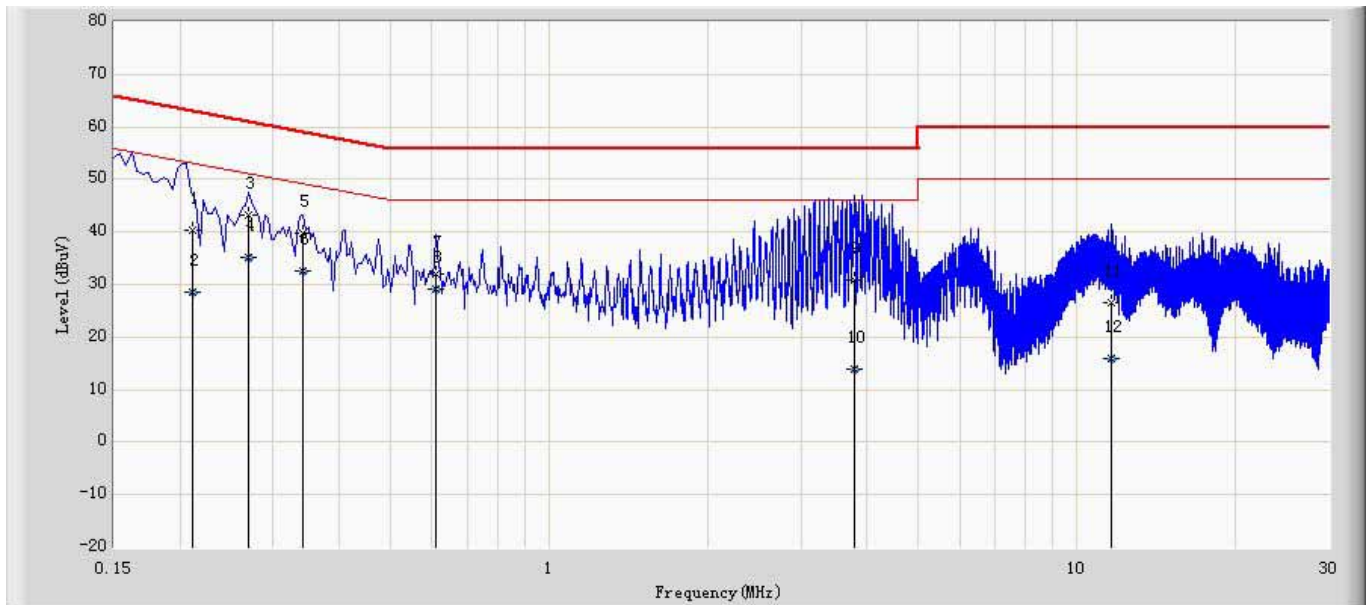
The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

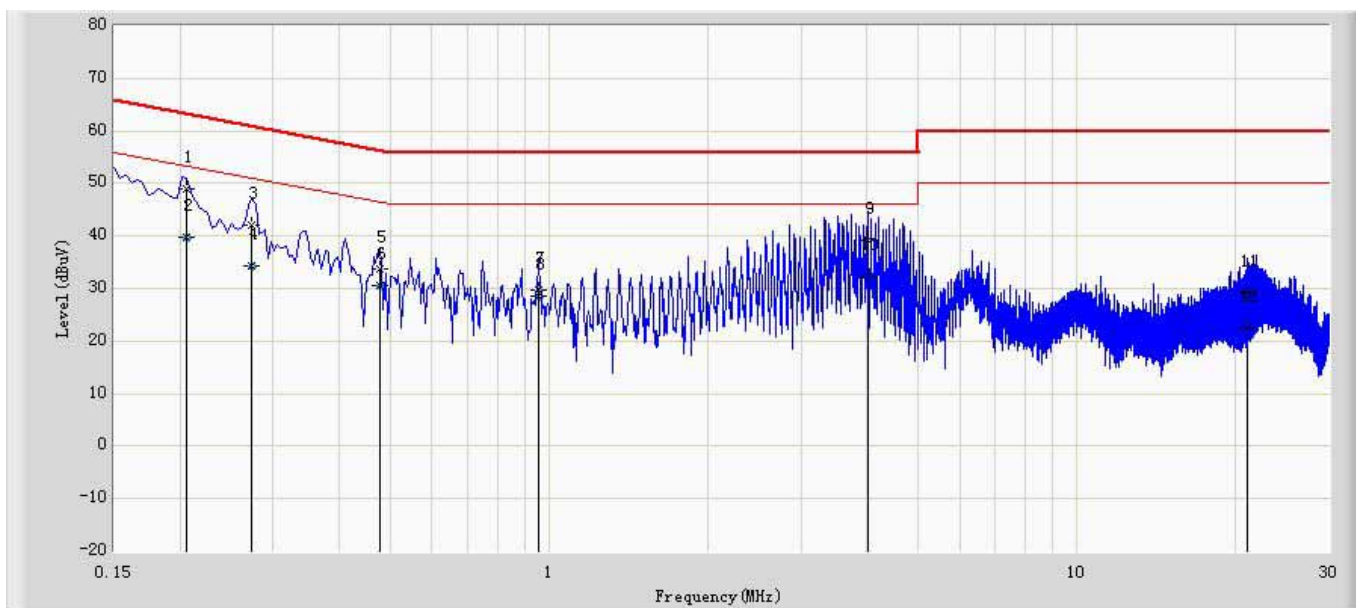
3.6. Test Result

Engineer: Milo	
Site: TR1	Time: 2013/09/29 - 17:03
Limit: FCC_Part15.207_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.211	40.362	30.448	-22.804	63.166	9.914	QP
2		0.211	28.462	18.548	-24.704	53.166	9.914	AV
3		0.270	43.254	33.319	-17.864	61.118	9.935	QP
4	*	0.270	35.266	25.331	-15.852	51.118	9.935	AV
5		0.342	39.632	29.661	-19.523	59.155	9.971	QP
6		0.342	32.666	22.695	-16.489	49.155	9.971	AV
7		0.610	31.992	22.031	-24.008	56.000	9.961	QP
8		0.610	29.021	19.060	-16.979	46.000	9.961	AV
9		3.790	30.849	20.805	-25.151	56.000	10.044	QP
10		3.790	13.960	3.916	-32.040	46.000	10.044	AV
11		11.650	26.444	16.126	-33.556	60.000	10.318	QP
12		11.650	15.914	5.596	-34.086	50.000	10.318	AV

Engineer: Milo	
Site: TR1	Time: 2013/09/29 - 17:04
Limit: FCC_Part15.207_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.206	48.911	39.050	-14.454	63.365	9.861	QP
2	*	0.206	39.811	29.950	-13.554	53.365	9.861	AV
3		0.274	42.118	32.248	-18.878	60.996	9.870	QP
4		0.274	34.422	24.552	-16.574	50.996	9.870	AV
5		0.478	33.676	23.768	-22.698	56.374	9.908	QP
6		0.478	30.472	20.564	-15.902	46.374	9.908	AV
7		0.954	29.832	20.016	-26.168	56.000	9.816	QP
8		0.954	28.693	18.877	-17.307	46.000	9.816	AV
9		4.014	39.079	29.242	-16.921	56.000	9.837	QP
10		4.014	32.263	22.426	-13.737	46.000	9.837	AV
11		20.954	29.008	18.473	-30.992	60.000	10.535	QP
12		20.954	22.607	12.072	-27.393	50.000	10.535	AV

4. Radiated Emission

4.1. Test Equipment

Radiated Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100573	2014.04.30
Loop Antenna	R&S	HFH2-Z2	833799/003	2013.11.17
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2013.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2014.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2014.01.09

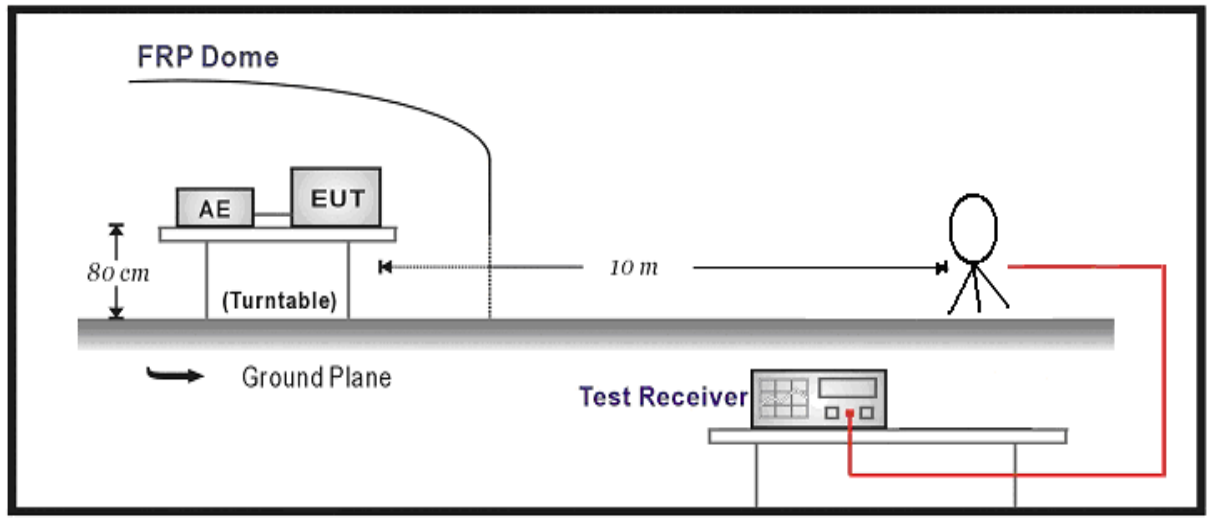
Radiated Emission / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2014.03.30
Preamplifier	Miteq	NSP1800-25	1364185	2014.05.03
Preamplifier	Quietek	AP-040G	CHM-0906001	2014.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2013.10.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2014.06.08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2013.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2014.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2014.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2014.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2014.01.11

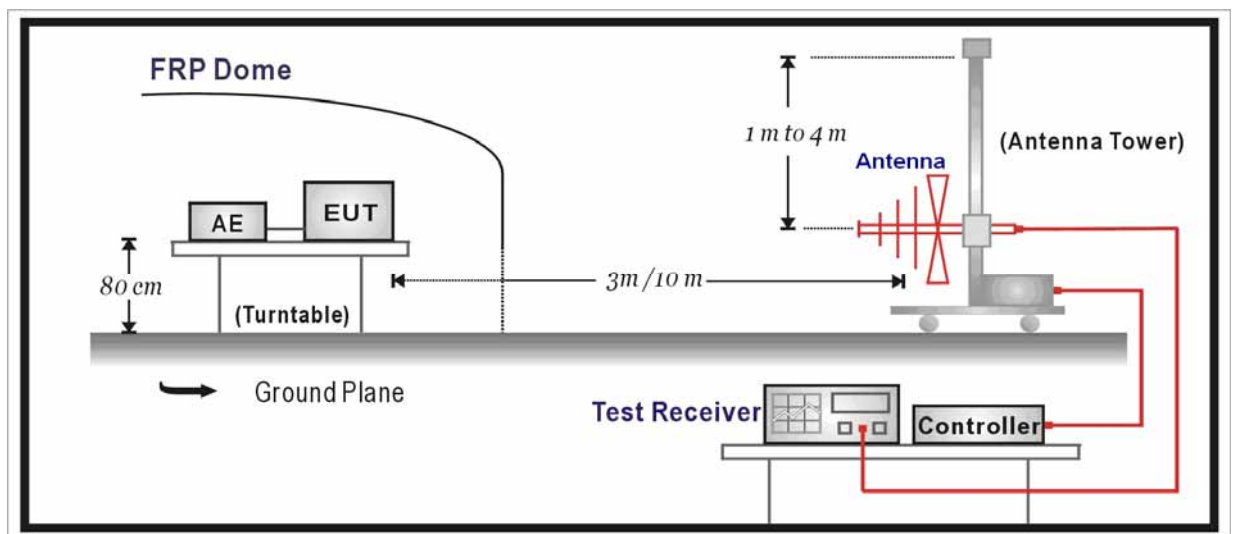
Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

4.2. Test Setup

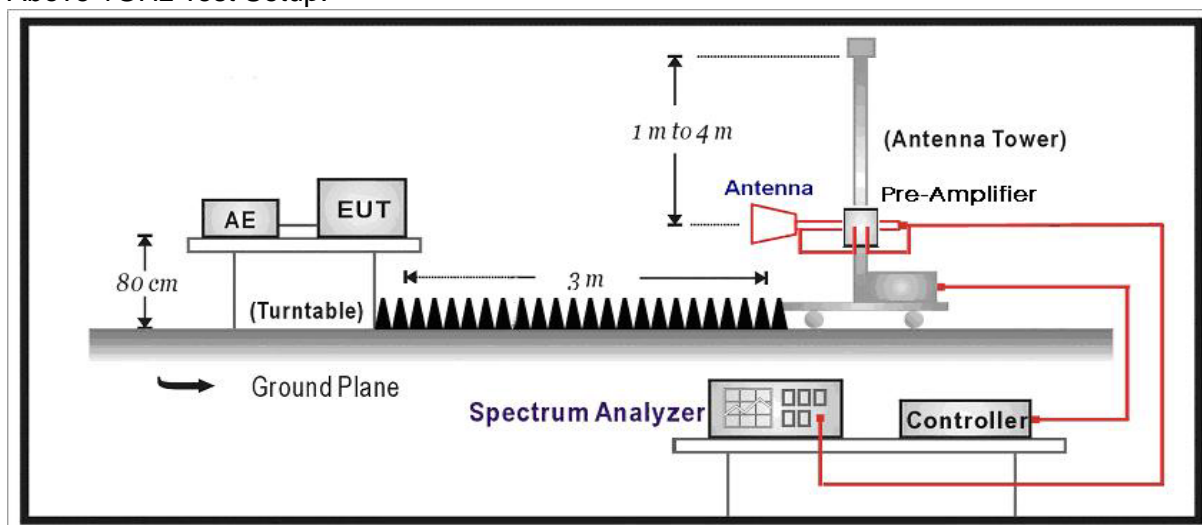
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

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)

4.4. Test Procedure

The EUT was setup according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the

maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 60 degrees for H-plane and 90 degrees for E-plane.

4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB

below 1G is defined as ± 3.8 dB

4.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor - Preamplifier Gain

Mode1: Transmit at 802.11b

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	4825.0	50.7	-6.2	44.5	54(note3)	-9.5	PK
	V	4825.0	50.0	-6.2	43.8	54(note3)	-10.2	PK
	H	7239.0	45.5	-1.6	43.9	54(note3)	-10.1	PK
	V	7239.0	46.4	-1.6	44.8	54(note3)	-9.2	PK
	H	9648.0	34.0	4.9	38.9	54(note3)	-15.1	PK
	V	9648.0	34.1	4.9	39.0	54(note3)	-15.0	PK
6	H	4876.0	48.8	-6.2	42.6	54(note3)	-11.4	PK
	V	4876.0	52.5	-6.2	46.3	54(note3)	-7.7	PK
	H	7307.0	46.1	-1.4	44.7	54(note3)	-9.3	PK
	V	7307.0	48.5	-1.4	47.1	54(note3)	-6.9	PK
	H	9748.0	34.8	5.0	39.8	54(note3)	-14.2	PK
	V	9748.0	33.8	5.1	38.9	54(note3)	-15.1	PK
11	H	4927.0	46.4	-6.2	40.2	54(note3)	-13.8	PK
	V	4927.0	51.9	-6.1	45.8	54(note3)	-8.2	PK
	H	7383.5	44.9	-1.1	43.8	54(note3)	-10.2	PK
	V	7383.5	48.5	-1.1	47.4	54(note3)	-6.6	PK
	H	9848.0	35.2	5.2	40.4	54(note3)	-13.6	PK
	V	9848.0	33.8	5.3	39.1	54(note3)	-14.9	PK

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.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode2: Transmit at 802.11g

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	4824.0	43.9	-6.2	37.7	54(note3)	-16.3	PK
	V	4824.0	47.2	-6.2	41.0	54(note3)	-13.0	PK
	H	7236.0	39.5	-1.6	37.9	54(note3)	-16.1	PK
	V	7236.0	40.4	-1.6	38.8	54(note3)	-15.2	PK
	H	9648.0	33.4	4.9	38.3	54(note3)	-15.7	PK
	V	9648.0	33.9	4.9	38.8	54(note3)	-15.2	PK
6	H	4874.0	44.0	-6.2	37.8	54(note3)	-16.2	PK
	V	4874.0	45.7	-6.2	39.5	54(note3)	-14.5	PK
	H	7311.0	41.5	-1.4	40.1	54(note3)	-13.9	PK
	V	7315.5	44.4	-1.4	43.0	54(note3)	-11.0	PK
	H	9748.0	34.1	5.0	39.1	54(note3)	-14.9	PK
	V	9748.0	34.1	5.1	39.2	54(note3)	-14.8	PK
11	H	4924.0	42.6	-6.2	36.4	54(note3)	-17.6	PK
	V	4924.0	43.6	-6.1	37.5	54(note3)	-16.5	PK
	H	7386.0	39.8	-1.0	38.8	54(note3)	-15.2	PK
	V	7386.0	40.7	-1.0	39.7	54(note3)	-14.3	PK
	H	9848.0	35.8	5.2	41.0	54(note3)	-13.0	PK
	V	9848.0	34.0	5.3	39.3	54(note3)	-14.7	PK

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.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode3: Transmit at 802.11n (20MHz)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	4824.0	46.2	-6.2	40.0	54(note3)	-14.0	PK
	V	4824.0	45.6	-6.2	39.4	54(note3)	-14.6	PK
	H	7236.0	41.6	-1.6	40.0	54(note3)	-14.0	PK
	V	7236.0	40.1	-1.6	38.5	54(note3)	-15.5	PK
	H	9648.0	34.4	4.9	39.3	54(note3)	-14.7	PK
	V	9648.0	34.5	4.9	39.4	54(note3)	-14.6	PK
6	H	4874.0	46.2	-6.2	40.0	54(note3)	-14.0	PK
	V	4874.0	47.0	-6.2	40.8	54(note3)	-13.2	PK
	H	7311.0	44.8	-1.4	43.4	54(note3)	-10.6	PK
	V	7307.0	49.5	-1.4	48.1	54(note3)	-5.9	PK
	H	9748.0	35.7	5.0	40.7	54(note3)	-13.3	PK
	V	9748.0	35.8	5.1	40.9	54(note3)	-13.1	PK
11	H	4924.0	44.4	-6.2	38.2	54(note3)	-15.8	PK
	V	4924.0	45.0	-6.1	38.9	54(note3)	-15.1	PK
	H	7386.0	41.0	-1.0	40.0	54(note3)	-14.0	PK
	V	7386.0	41.7	-1.0	40.7	54(note3)	-13.3	PK
	H	9848.0	35.8	5.2	41.0	54(note3)	-13.0	PK
	V	9848.0	36.0	5.3	41.3	54(note3)	-12.7	PK

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.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode4: Transmit at 802.11n (40MHz)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
3	H	4844.0	44.6	-6.1	38.5	54(note3)	-15.5	PK
	V	4844.0	47.5	-6.2	41.3	54(note3)	-12.7	PK
	H	7266.0	40.8	-1.6	39.2	54(note3)	-14.8	PK
	V	7266.0	40.8	-1.6	39.2	54(note3)	-14.8	PK
	H	9688.0	35.5	5.0	40.5	54(note3)	-13.5	PK
	V	9688.0	35.4	5.1	40.5	54(note3)	-13.5	PK
6	H	4874.0	45.6	-6.2	39.4	54(note3)	-14.6	PK
	V	4874.0	45.7	-6.2	39.5	54(note3)	-14.5	PK
	H	7311.0	42.3	-1.4	40.9	54(note3)	-13.1	PK
	V	7311.0	43.1	-1.4	41.7	54(note3)	-12.3	PK
	H	9748.0	35.7	5.0	40.7	54(note3)	-13.3	PK
	V	9748.0	35.3	5.1	40.4	54(note3)	-13.6	PK
9	H	4904.0	44.1	-6.2	37.9	54(note3)	-16.1	PK
	V	4904.0	44.2	-6.2	38.0	54(note3)	-16.0	PK
	H	7356.0	42.6	-1.2	41.4	54(note3)	-12.6	PK
	V	7356.0	42.0	-1.2	40.8	54(note3)	-13.2	PK
	H	9818.0	36.5	5.1	41.6	54(note3)	-12.4	PK
	V	9818.0	36.1	5.1	41.2	54(note3)	-12.8	PK

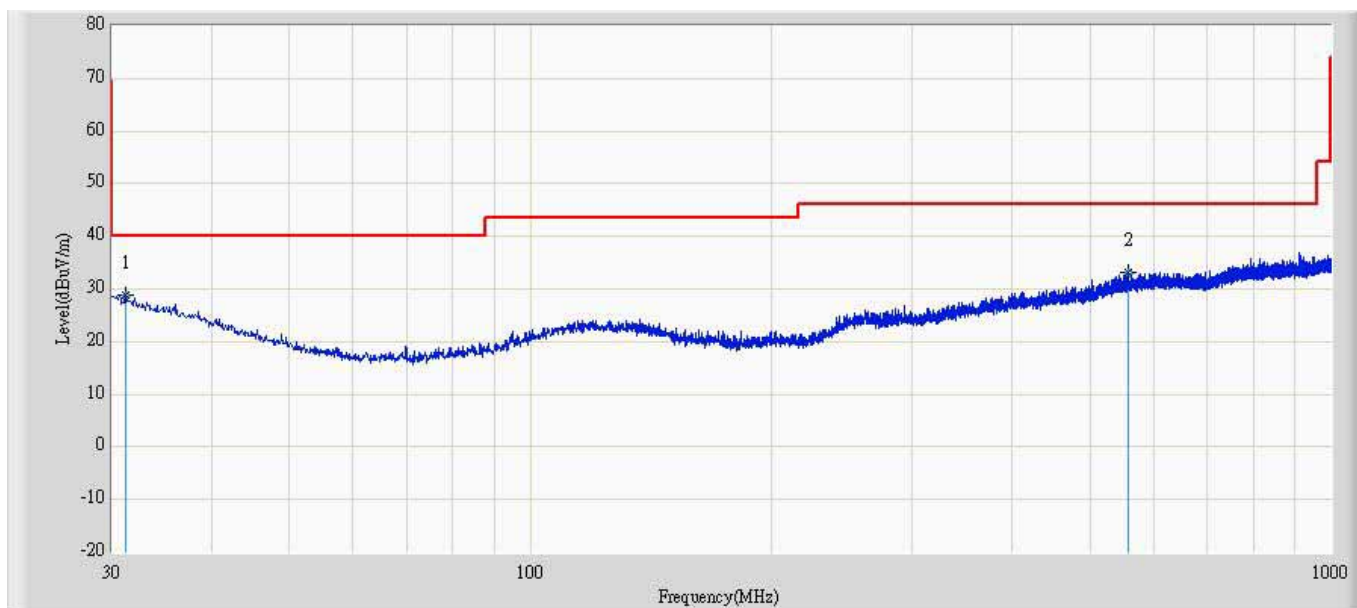
Note: 1. Measure Level = Reading Level + Factor.

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.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

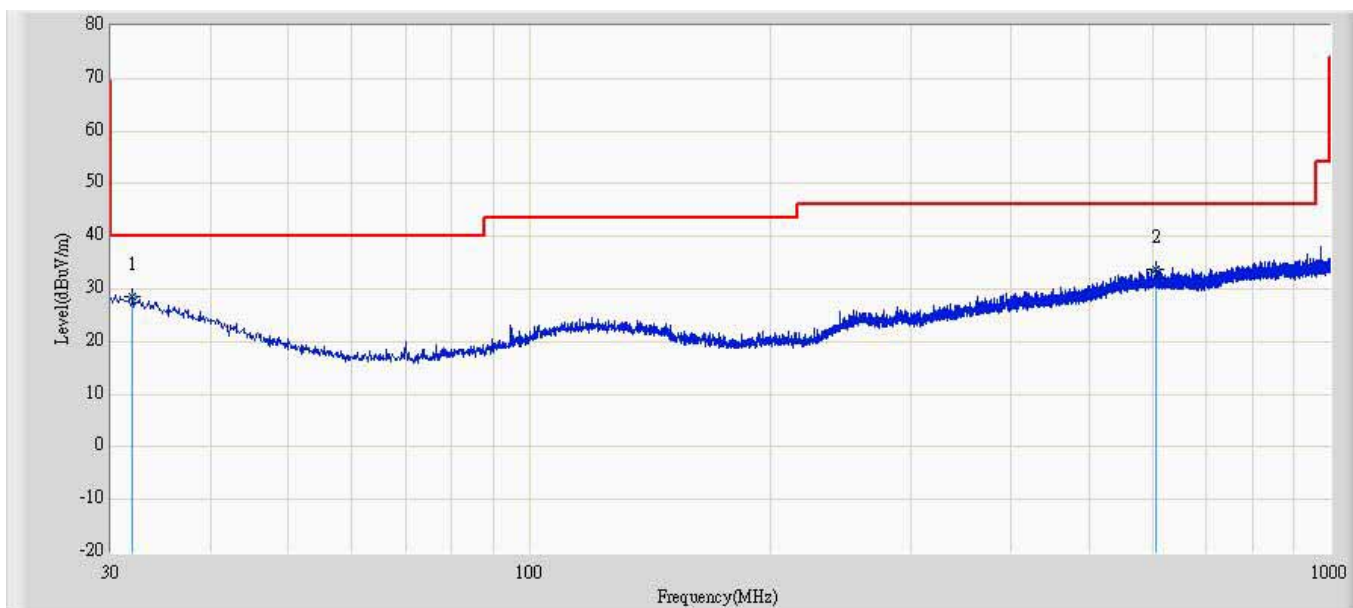
The worst case of Radiated Emission below 1GHz:

Engineer: Toms	
Site: AC2	Time: 2013/09/24 - 14:28
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2437MHz by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1	*	31.212	28.971	5.443	-11.029	40.000	23.527	QP
2		558.165	33.069	5.614	-12.931	46.000	27.455	QP

Engineer: Toms	
Site: AC2	Time: 2013/09/24 - 14:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2437MHz by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1	*	31.940	28.574	5.364	-11.426	40.000	23.210	QP
2		606.544	33.618	5.910	-12.382	46.000	27.709	QP

5. RF Antenna Conducted Spurious

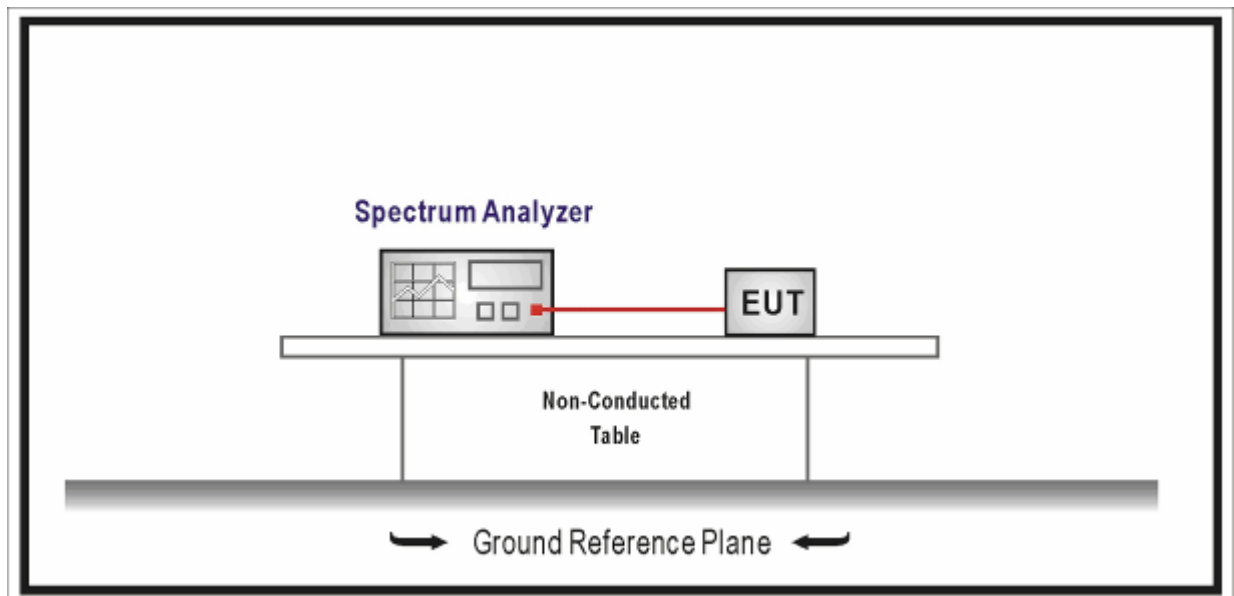
5.1. Test Equipment

RF Antenna Conducted Spurious / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9020A	MY49100159	2014.03.30
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2014.05.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

5.2. Test Setup



5.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

5.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW >3* RBW, scan up through 10th harmonic.

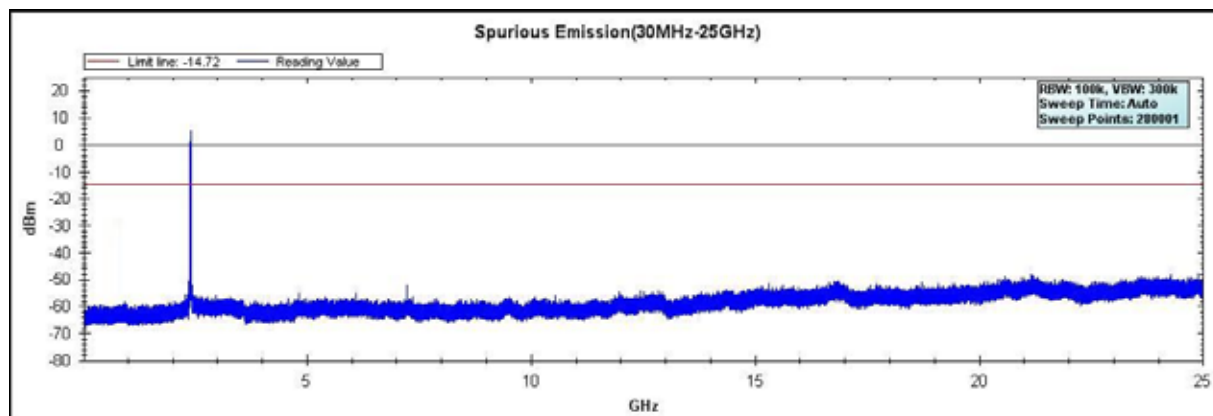
5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

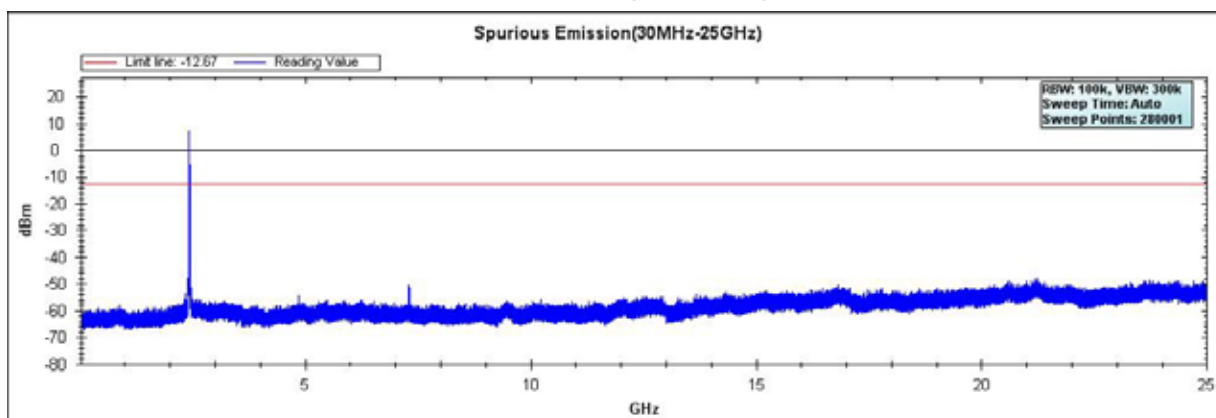
5.6. Test Result

Product	:	Q TV Engine
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

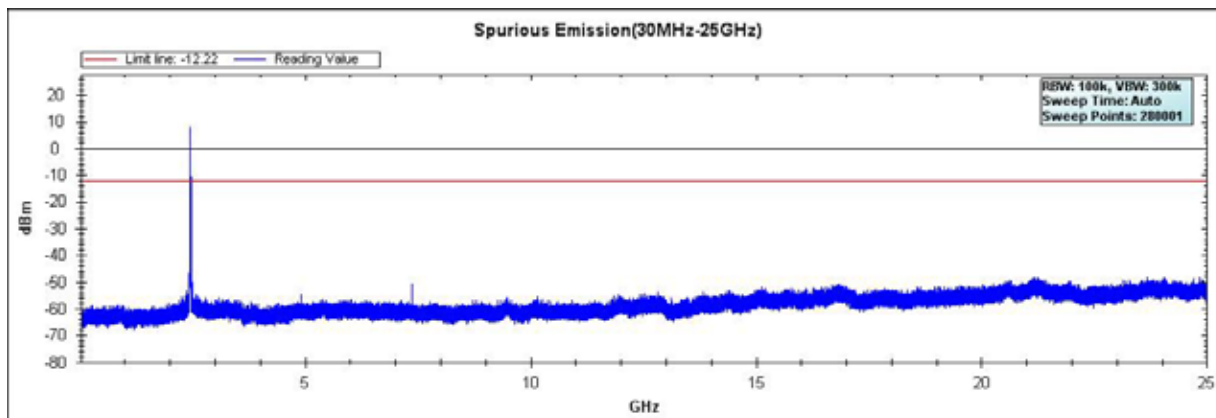
Channel 01 (2412MHz)



Channel 06 (2437MHz)

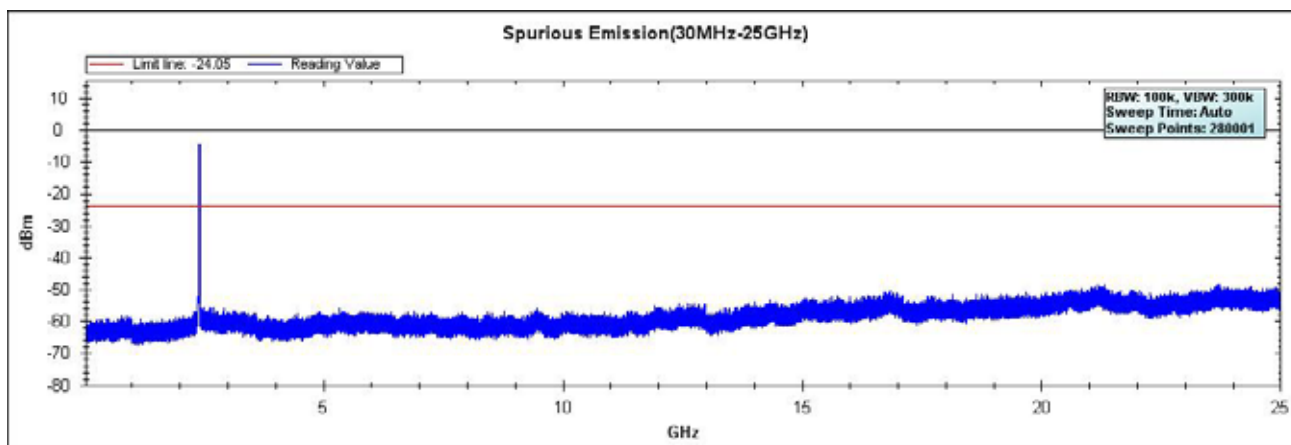


Channel 11 (2462MHz)

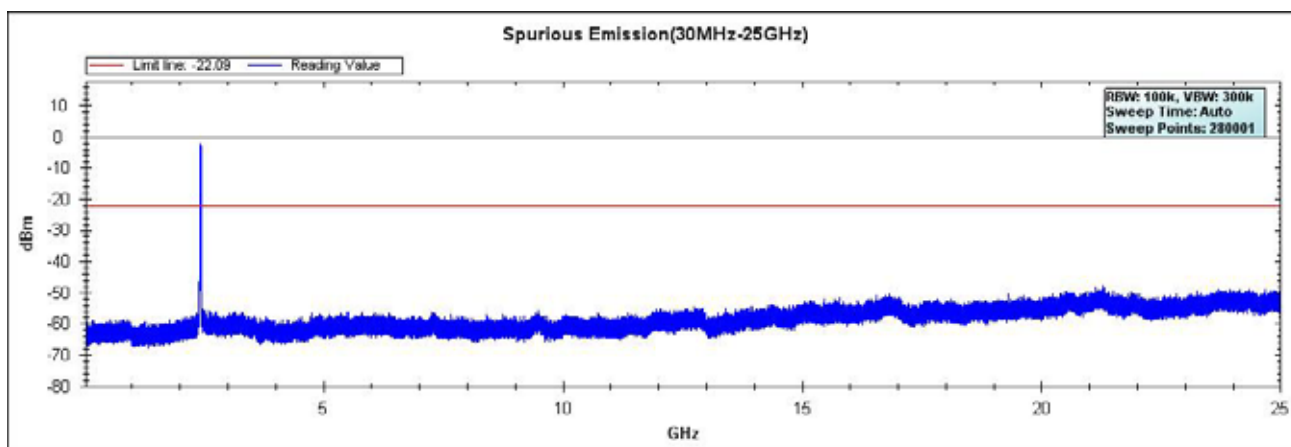


Product	:	Q TV Engine
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

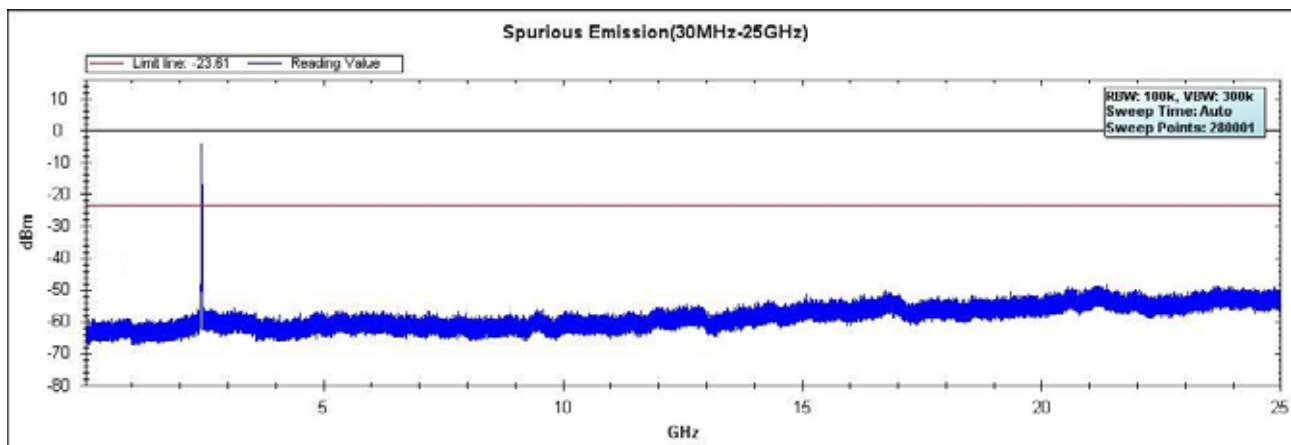
Channel 01 (2412MHz)



Channel 06 (2437MHz)

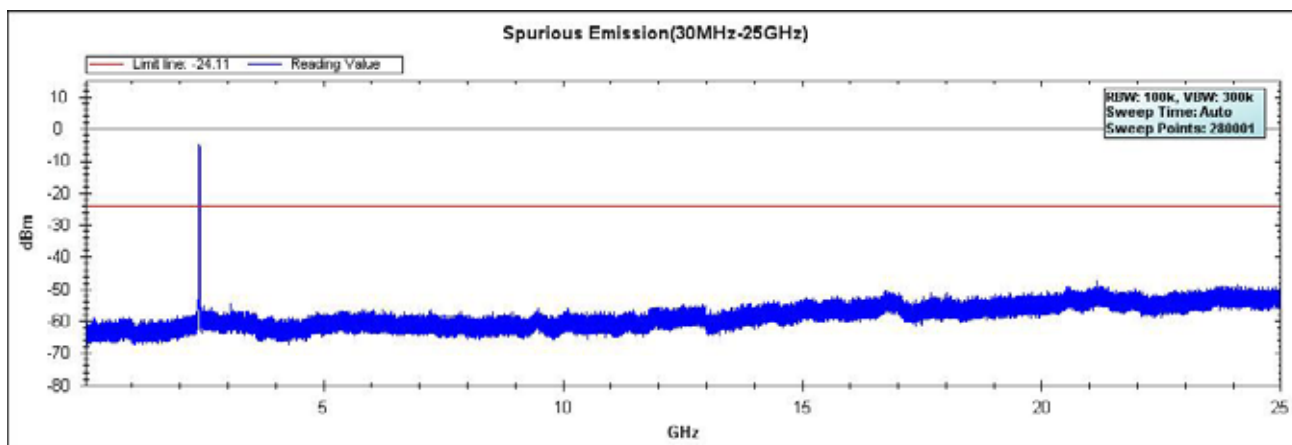


Channel 11 (2462MHz)

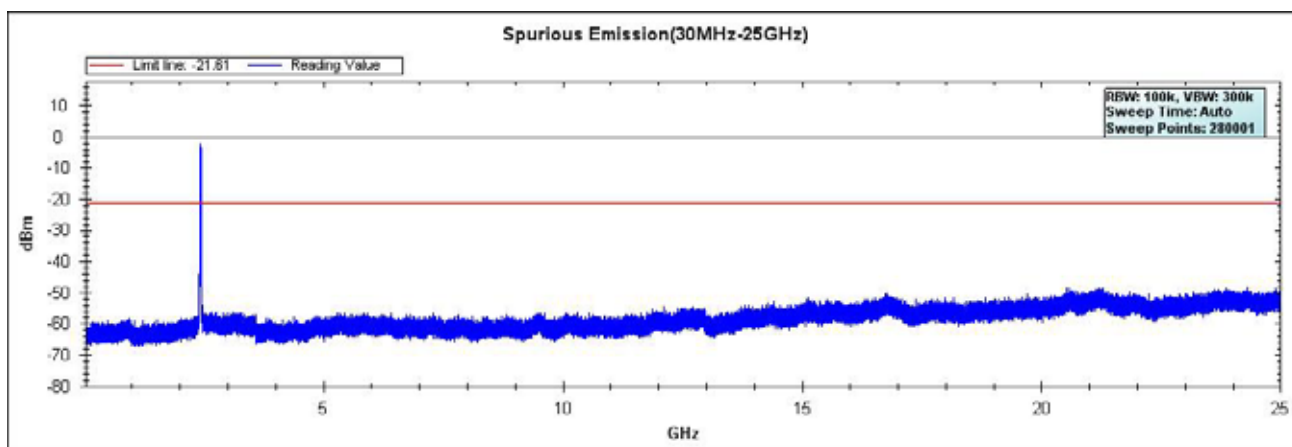


Product	:	Q TV Engine
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n (20MHz)

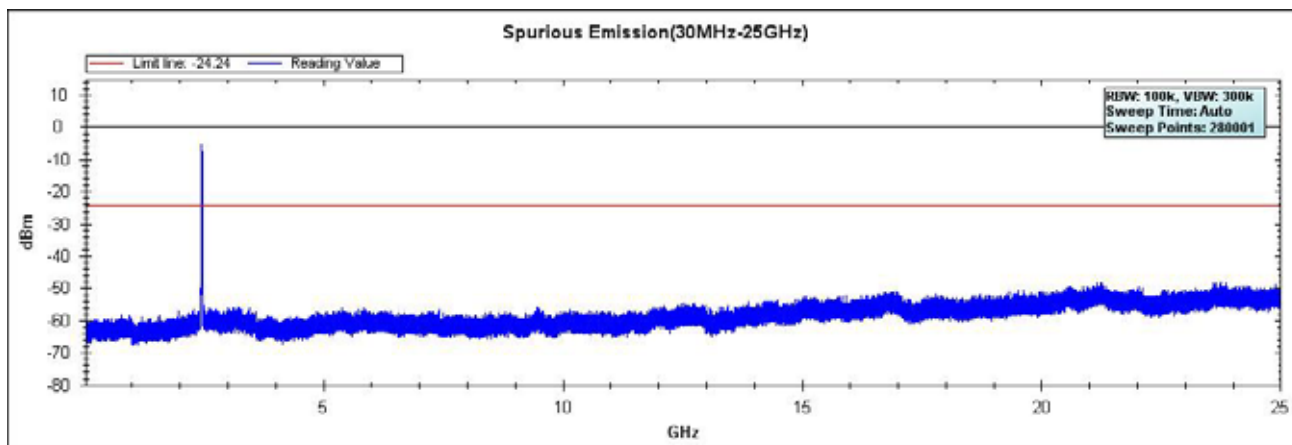
Channel 01 (2412MHz)



Channel 06 (2437MHz)

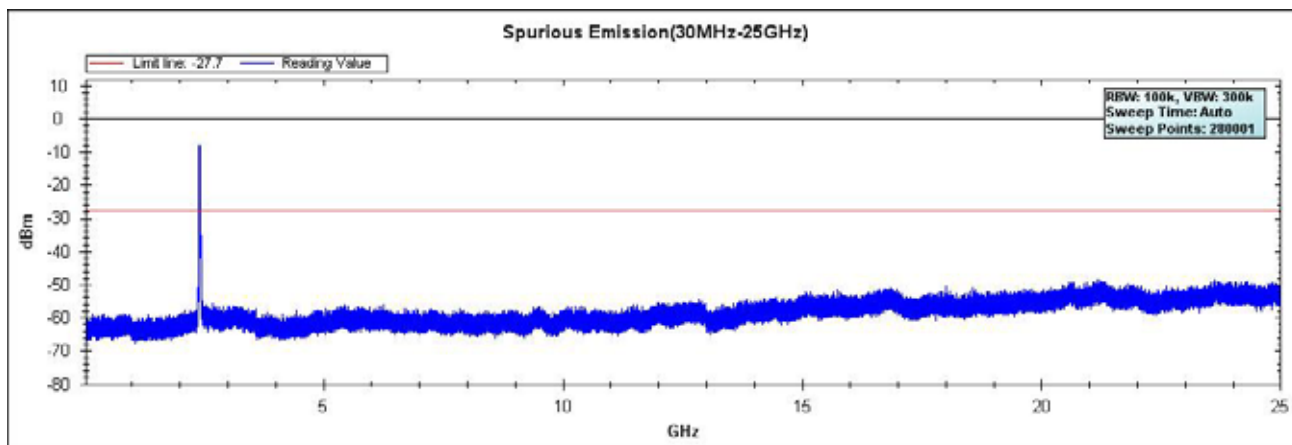


Channel 11 (2462MHz)

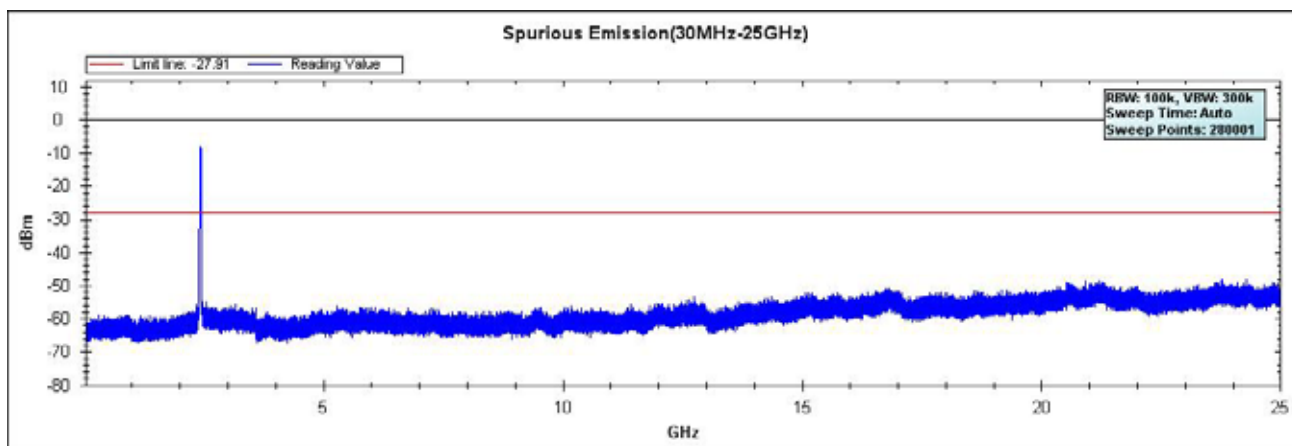


Product	:	Q TV Engine
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 4: Transmit by 802.11n (40MHz)

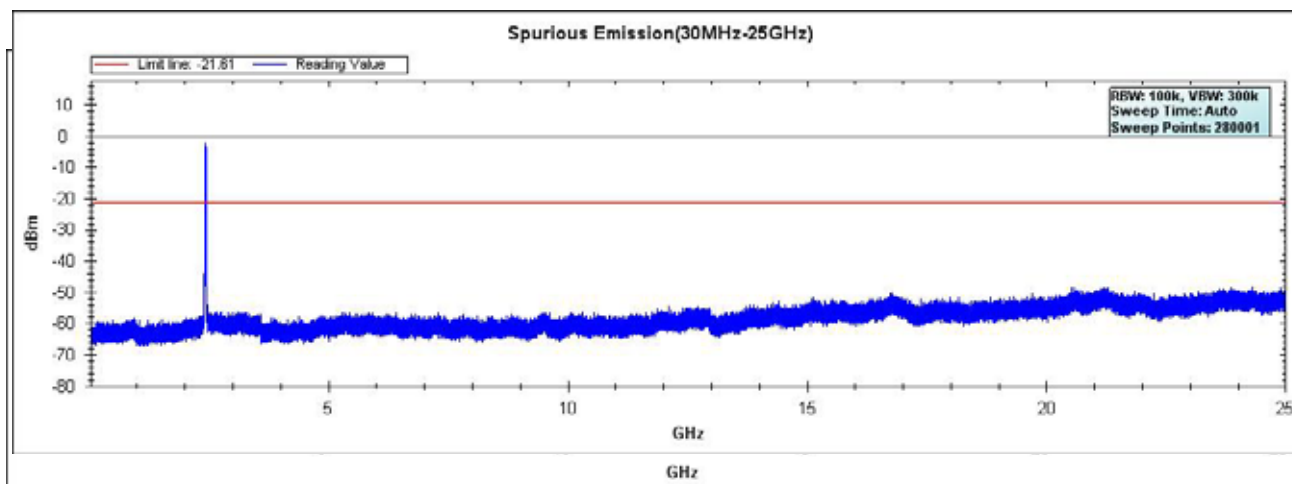
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



6. Radiated Emission Band Edge

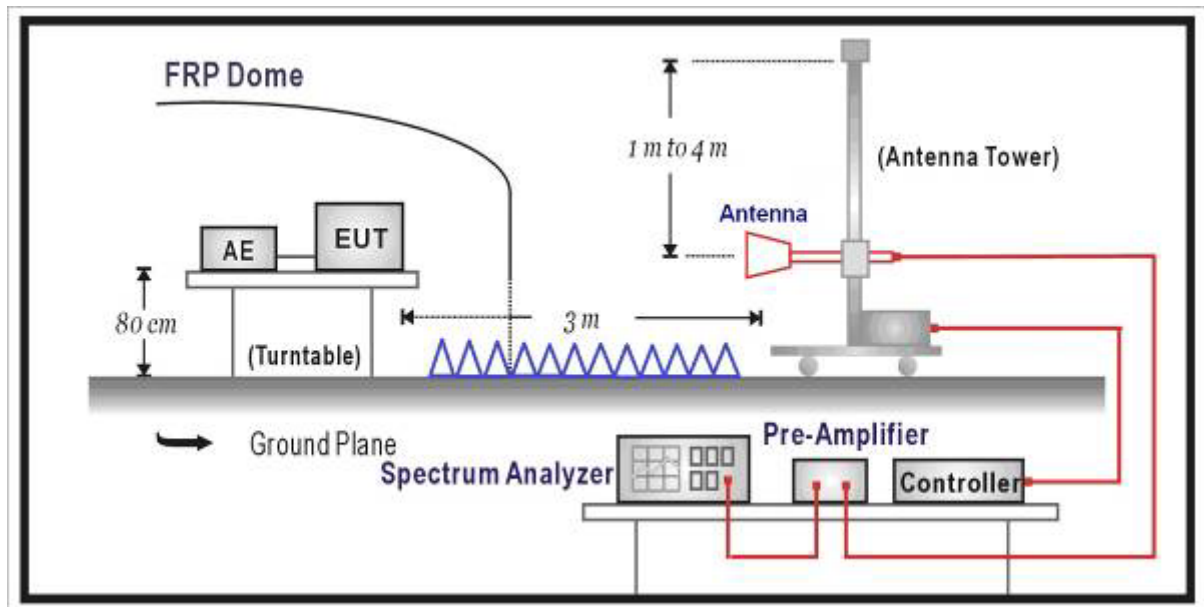
6.1. Test Equipment

☒ Radiated Emission Band Edge / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cali. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2014.01.21
EMI Test Receiver	R&S	ESCI	100573	2014.01.21
Preamplifier	Miteq	NSP1800-25	1364185	2014.05.03
Preamplifier	Quietek	AP-040G	CHM-0906001	2014.05.03
Bilog Type Antenna	Schaffner	CBL6112B	2932	2013.10.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2014.06.08
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2014.03.01
Temperature/Humidity Meter	zhicheng	ZC1-2	AC5-TH	2014.01.10

Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

6.2. Test Setup



6.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.4. Test Procedure

The EUT was setup according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 on radiated measurement.

6.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB

6.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

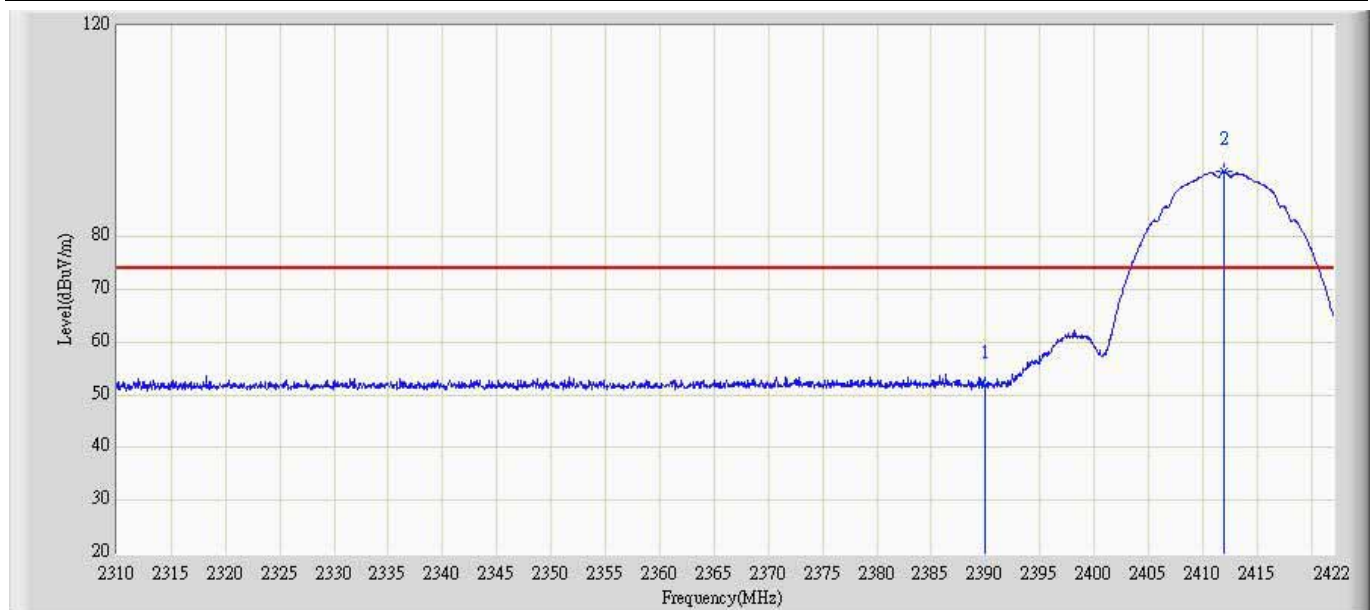
Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor - Preamplifier Gain

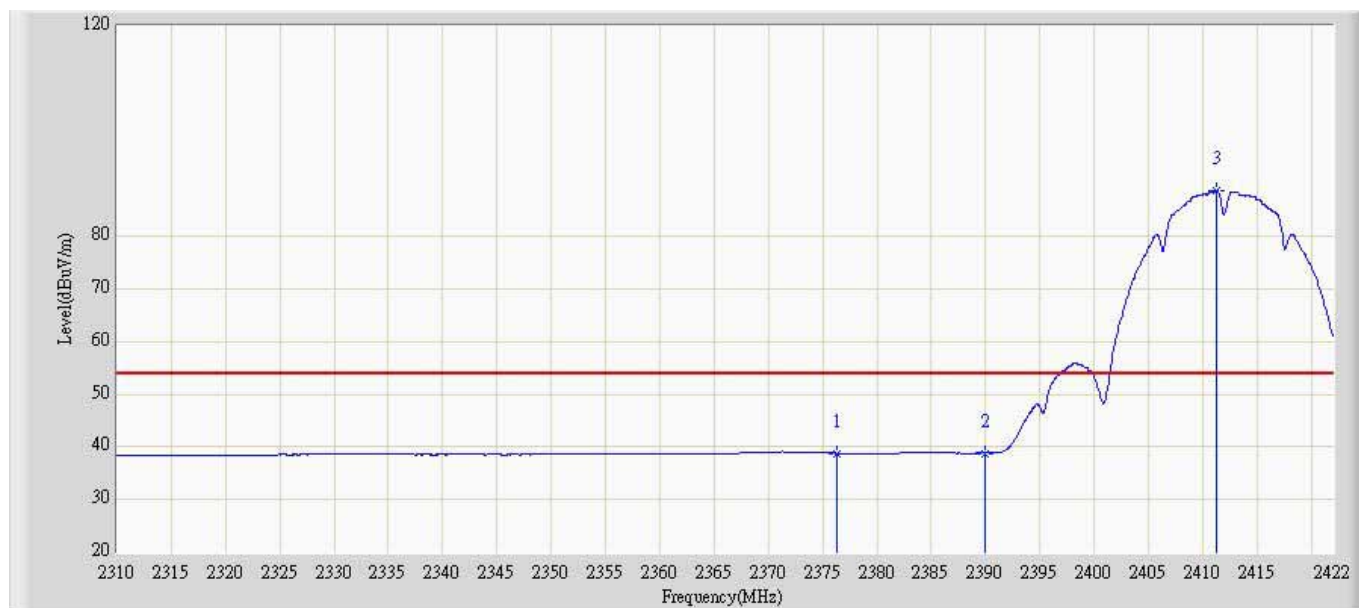
In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice will be followed.

Engineer: Toms	
Site:AC5	Time: 2013/09/17 - 10:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



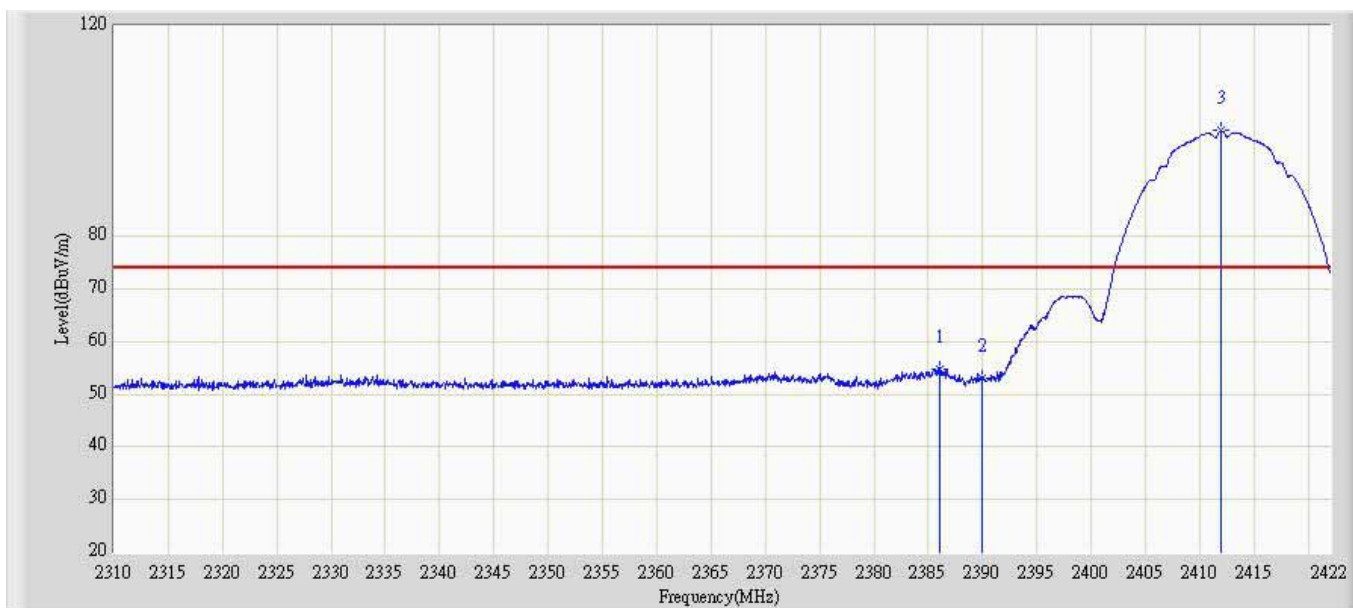
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	51.925	24.243	-22.075	74.000	27.682	PK
2	*	2411.976	92.524	64.754	N/A	N/A	27.770	PK

Engineer: Toms	
Site:AC5	Time: 2013/09/17 - 11:25
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



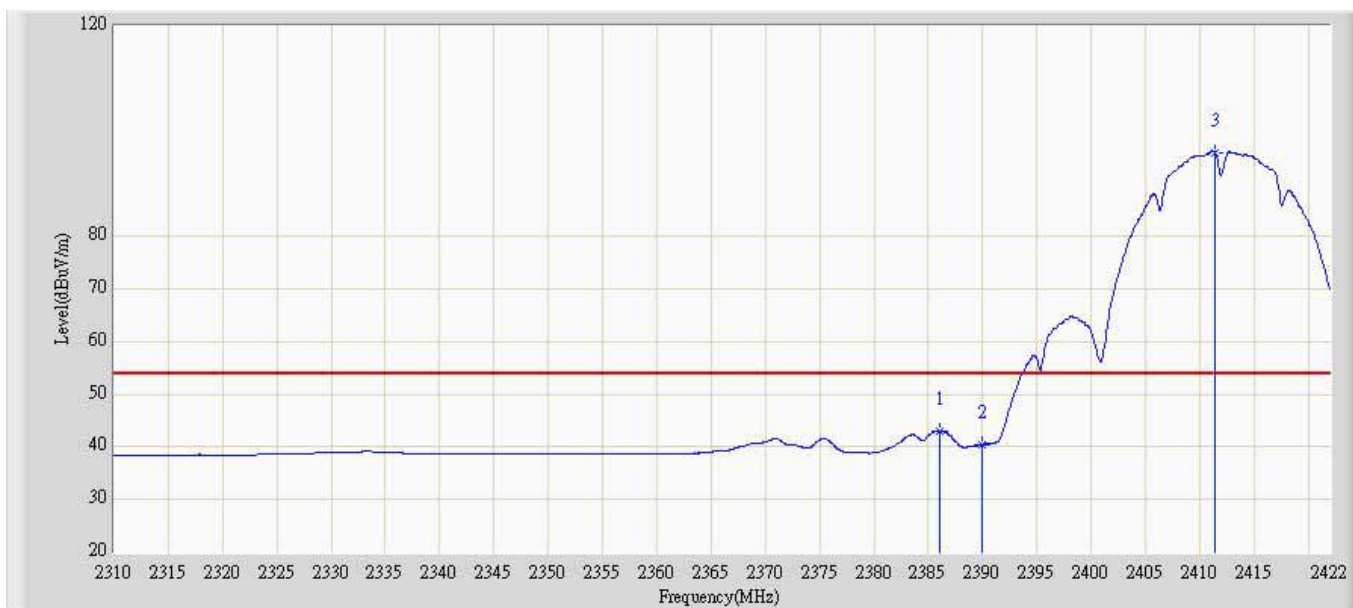
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2376.360	38.796	11.165	-15.204	54.000	27.631	AV
2		2390.000	38.818	11.136	-15.182	54.000	27.682	AV
3	*	2411.248	88.790	61.023	N/A	N/A	27.767	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



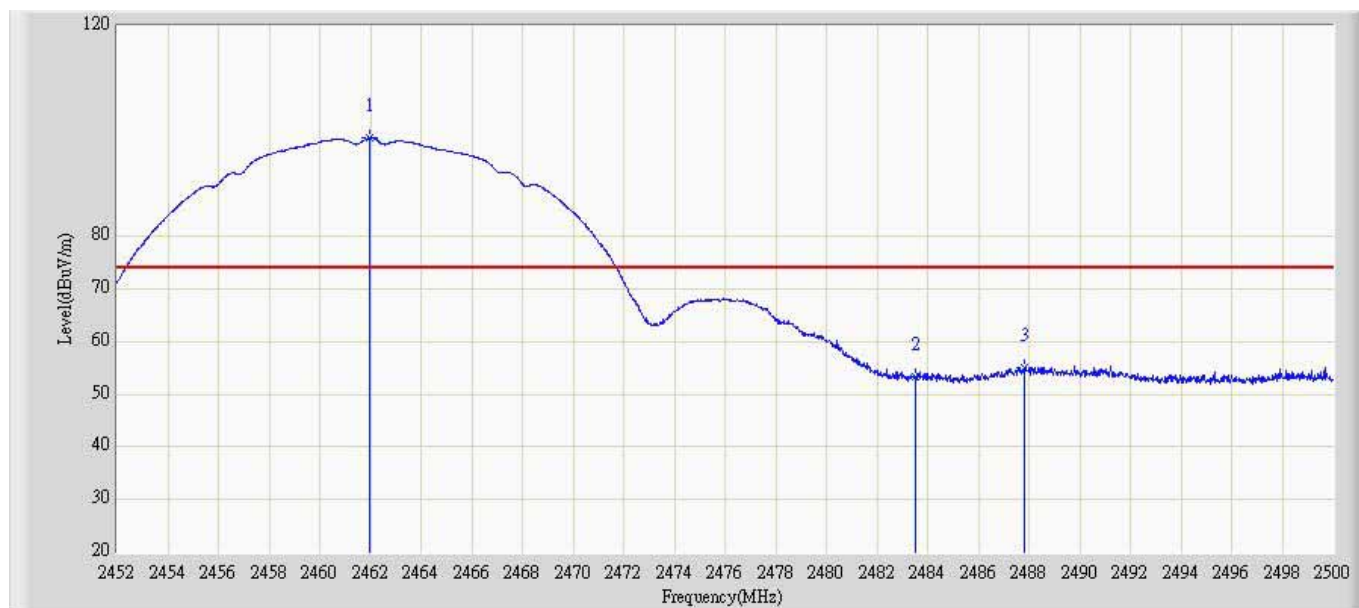
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2385.992	54.772	27.105	-19.228	74.000	27.667	PK
2		2390.000	53.176	25.494	-20.824	74.000	27.682	PK
3	*	2411.976	100.030	72.260	N/A	N/A	27.770	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2385.992	43.057	15.390	-10.943	54.000	27.667	AV
2		2390.000	40.433	12.751	-13.567	54.000	27.682	AV
3	*	2411.416	95.967	68.199	N/A	N/A	27.768	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:36
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2462MHz by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.960	98.691	70.715	N/A	N/A	27.976	PK
2		2483.500	53.355	25.298	-20.645	74.000	28.057	PK
3		2487.832	55.171	27.097	-18.829	74.000	28.074	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:40
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2462MHz by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.144	95.087	67.114	N/A	N/A	27.973	AV
2		2483.500	40.719	12.662	-13.281	54.000	28.057	AV
3		2487.952	43.670	15.596	-10.330	54.000	28.074	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2462MHz by 802.11b	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.960	103.845	75.869	N/A	N/A	27.976	PK
2		2483.500	55.193	27.136	-18.807	74.000	28.057	PK
3		2487.976	57.844	29.770	-16.156	74.000	28.074	PK

Engineer: Toms

Site: AC5

Time: 2013/09/17 - 11:44

Limit: FCC_Part15.209_RE(3m)

Margin: 0

Probe:Horn_3117_988(1-18GHz)

Polarity: Horizontal

EUT: Q TV Engine

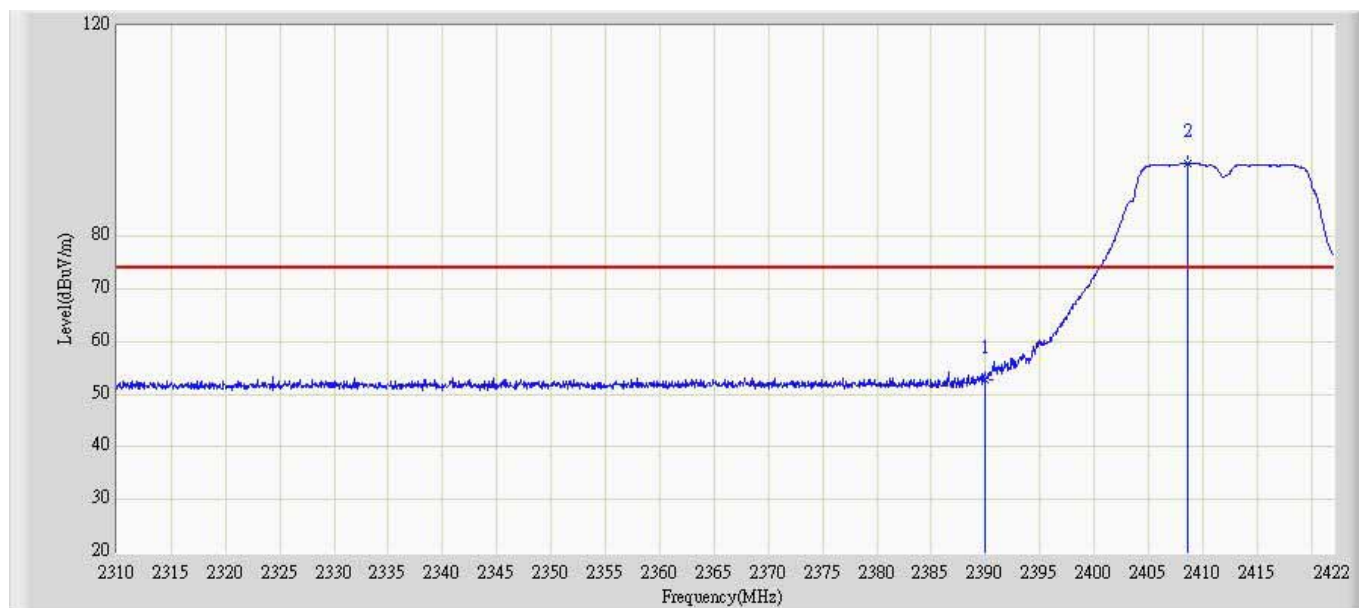
Power: AC 120V/60Hz

Note: Mode1: Transmit at channel 2462MHz by 802.11b



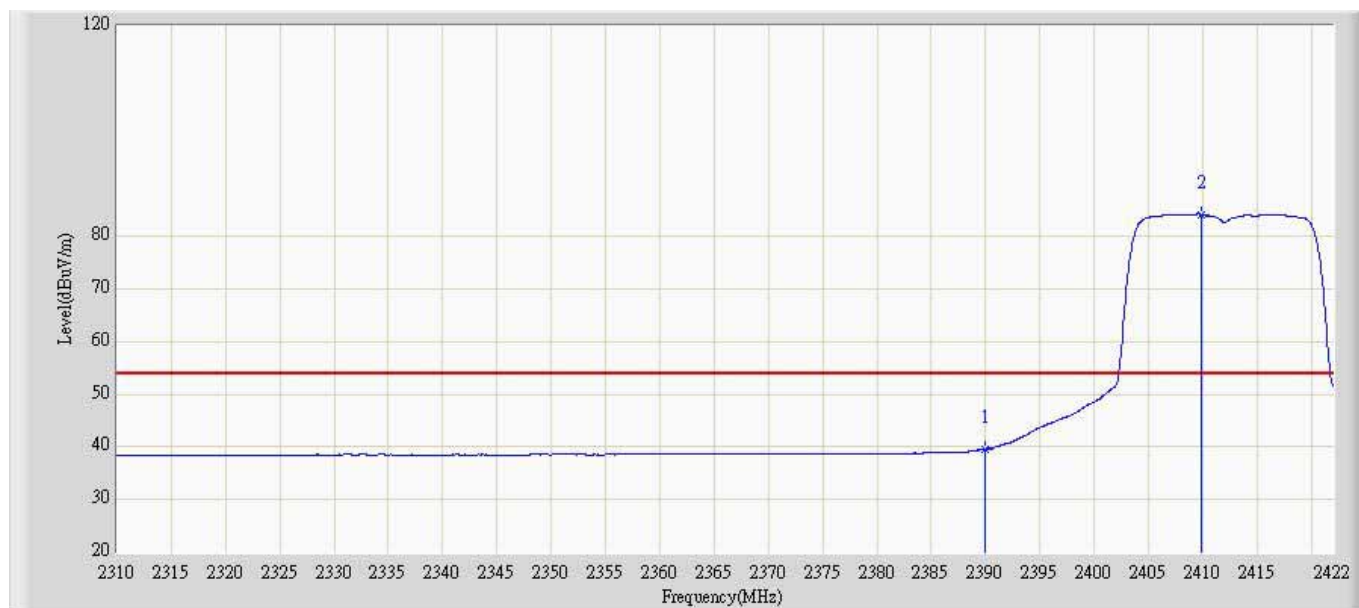
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.360	100.071	72.098	N/A	N/A	27.974	AV
2		2483.500	44.011	15.954	-9.989	54.000	28.057	AV
3		2488.792	48.818	20.741	-5.182	54.000	28.077	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:46
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	52.722	25.040	-21.278	74.000	27.682	PK
2	*	2408.616	93.798	66.042	N/A	N/A	27.756	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



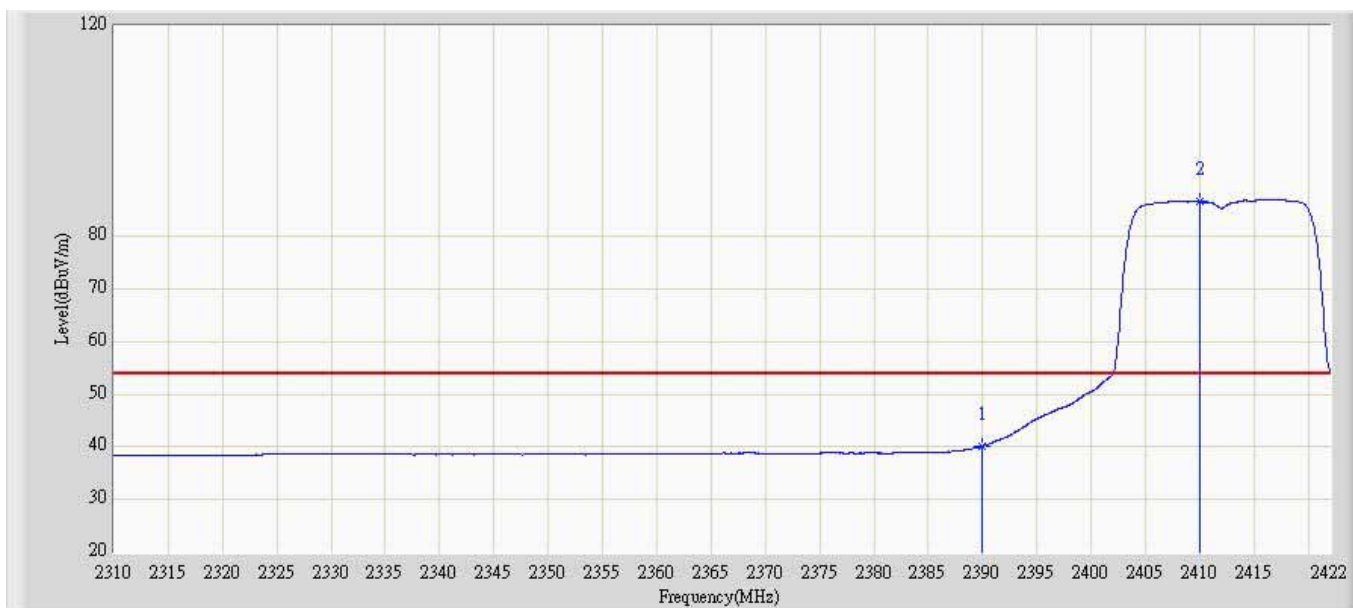
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.587	11.905	-14.413	54.000	27.682	AV
2	*	2409.848	84.169	56.408	N/A	N/A	27.762	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



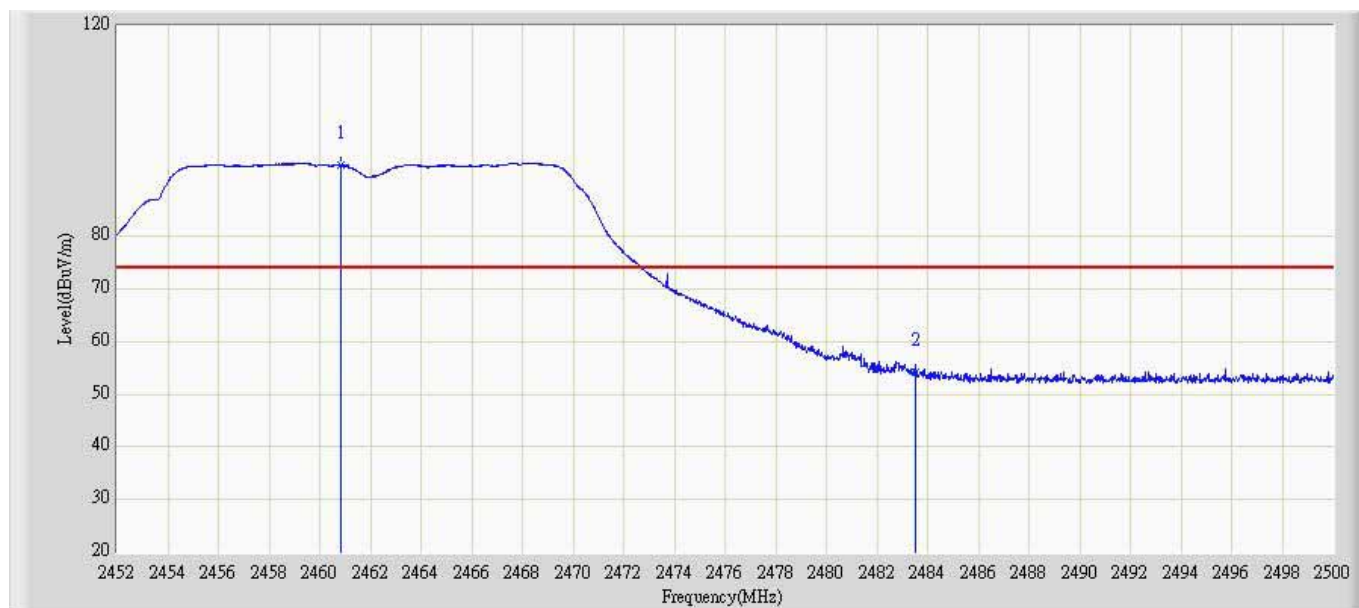
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	55.024	27.342	-18.976	74.000	27.682	PK
2	*	2409.064	96.554	68.796	N/A	N/A	27.759	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 11:56
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



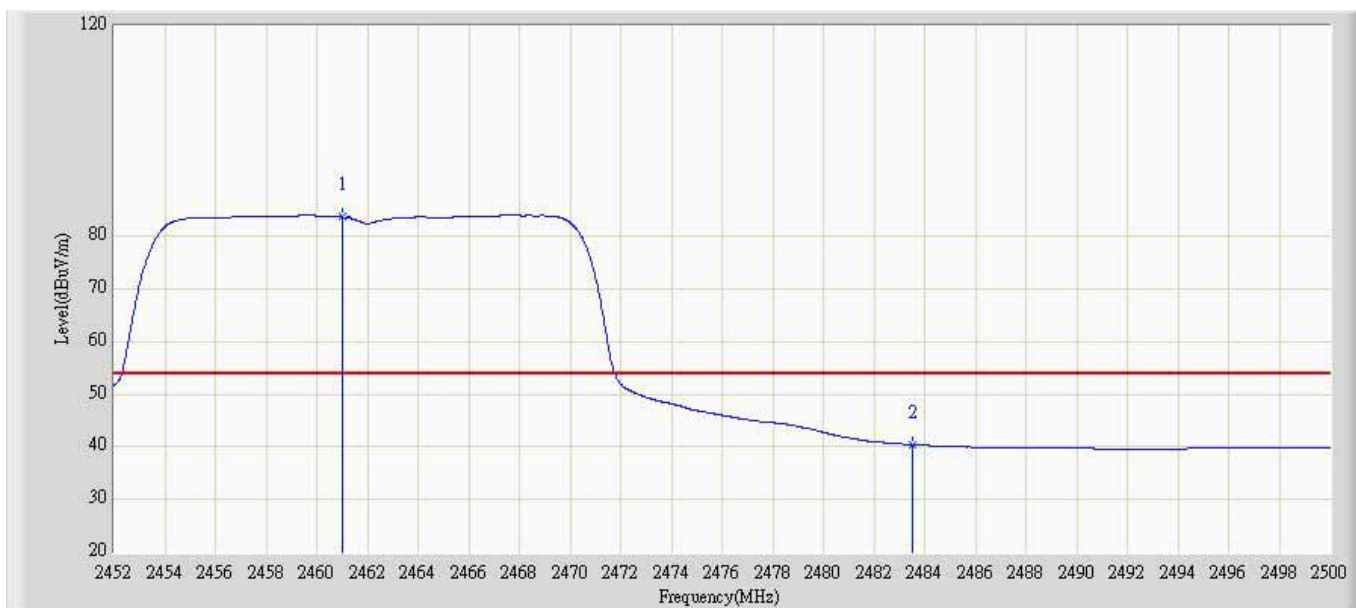
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	40.159	12.477	-13.841	54.000	27.682	AV
2	*	2410.016	86.636	58.874	N/A	N/A	27.762	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.832	93.530	65.559	N/A	N/A	27.972	PK
2		2483.500	54.091	26.034	-19.909	74.000	28.057	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



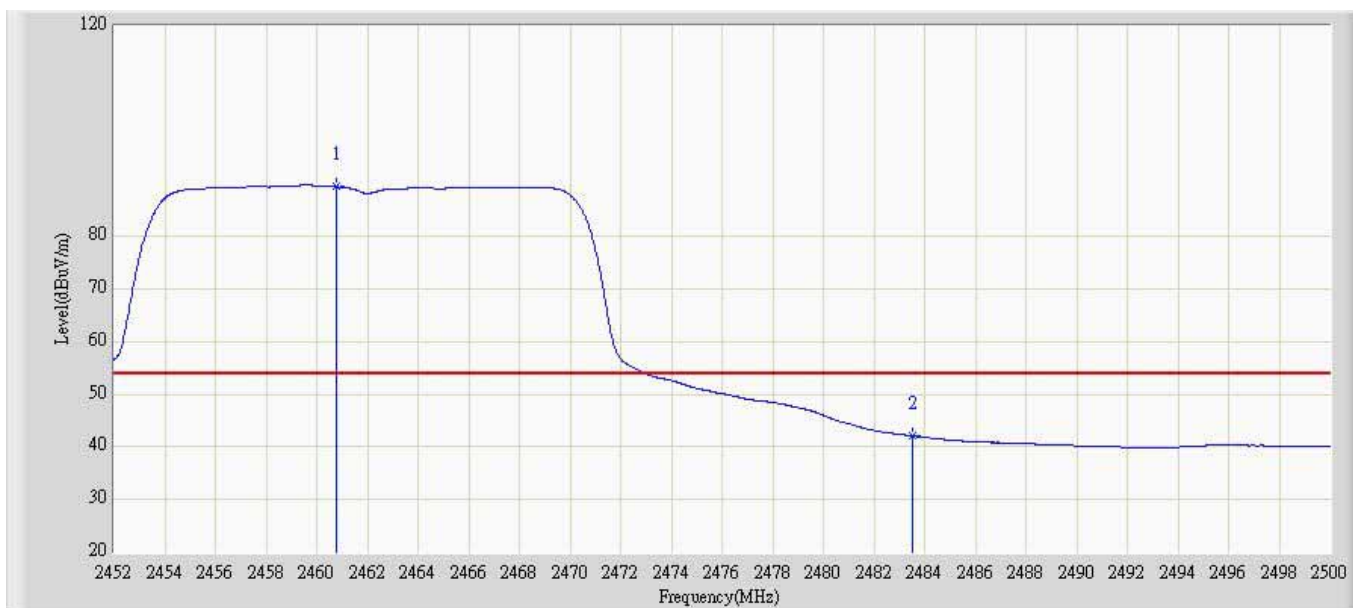
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.000	83.662	55.690	N/A	N/A	27.972	AV
2		2483.500	40.419	12.362	-13.581	54.000	28.057	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:19
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



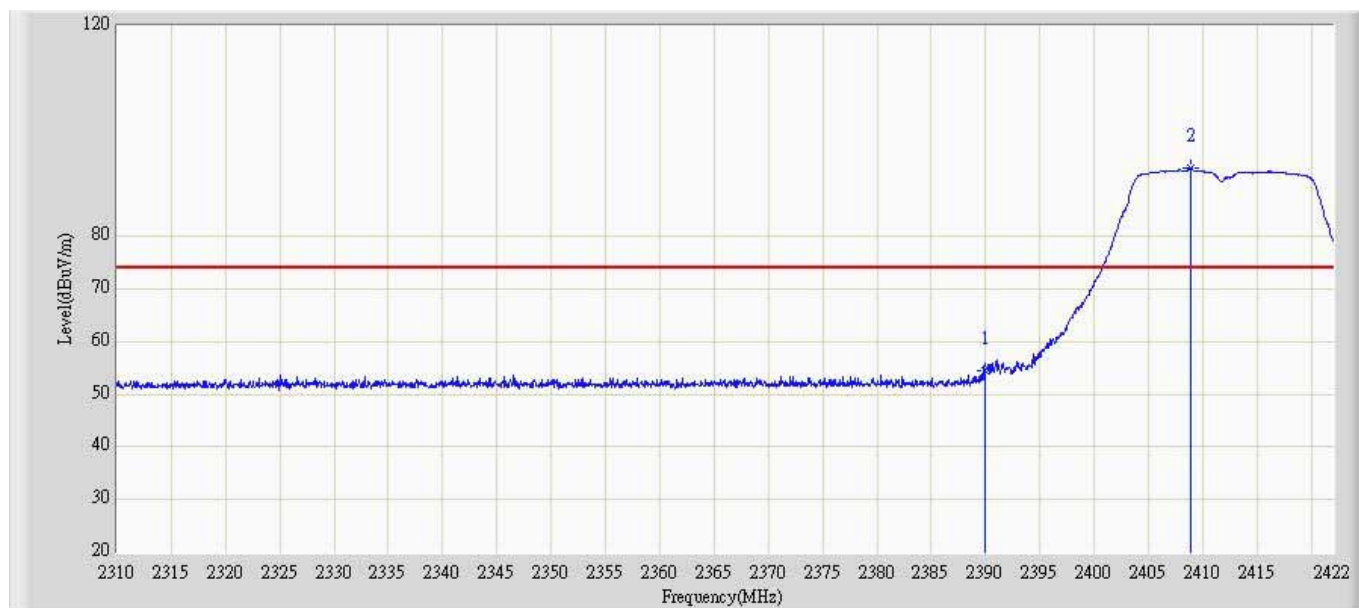
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.688	99.119	71.148	N/A	N/A	27.971	PK
2		2483.500	57.689	29.632	-16.311	74.000	28.057	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:22
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.760	89.411	61.440	N/A	N/A	27.971	AV
2		2483.500	42.145	14.088	-11.855	54.000	28.057	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:23
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode3: Transmit at channel 2412MHz by 802.11n20	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	54.552	26.870	-19.448	74.000	27.682	PK
2	*	2408.952	92.962	65.204	N/A	N/A	27.758	PK

Engineer: Toms

Site: AC5

Time: 2013/09/17 - 13:27

Limit: FCC_Part15.209_RE(3m)

Margin: 0

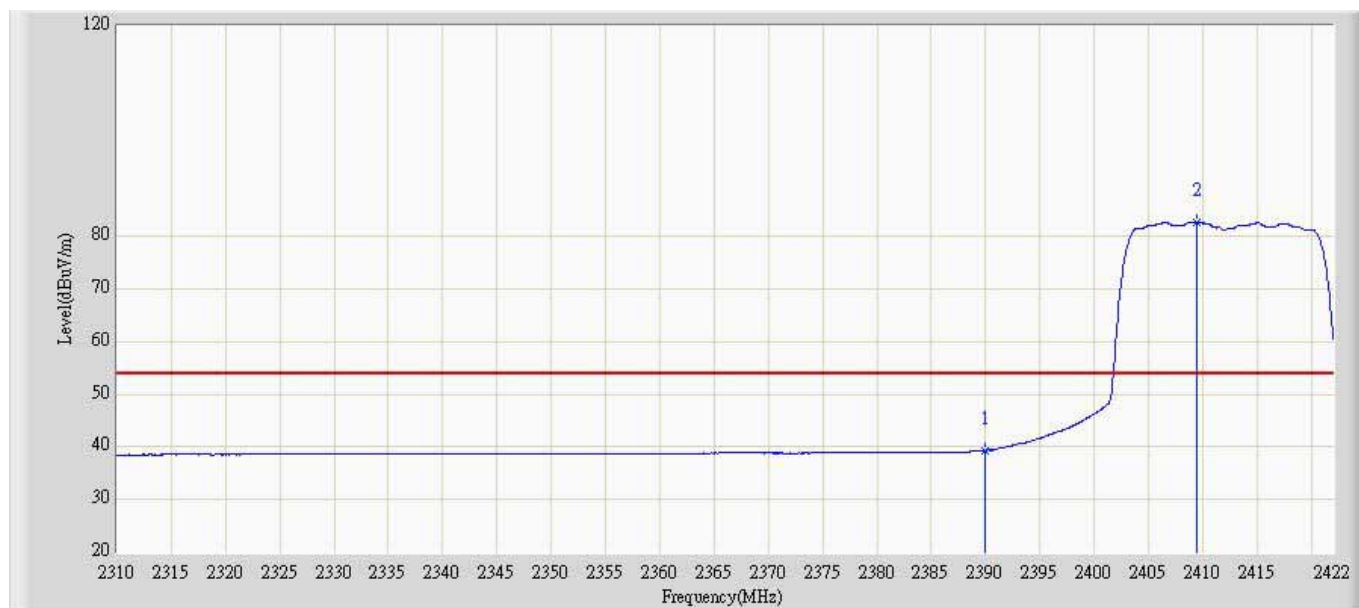
Probe:Horn_3117_988(1-18GHz)

Polarity: Vertical

EUT: Q TV Engine

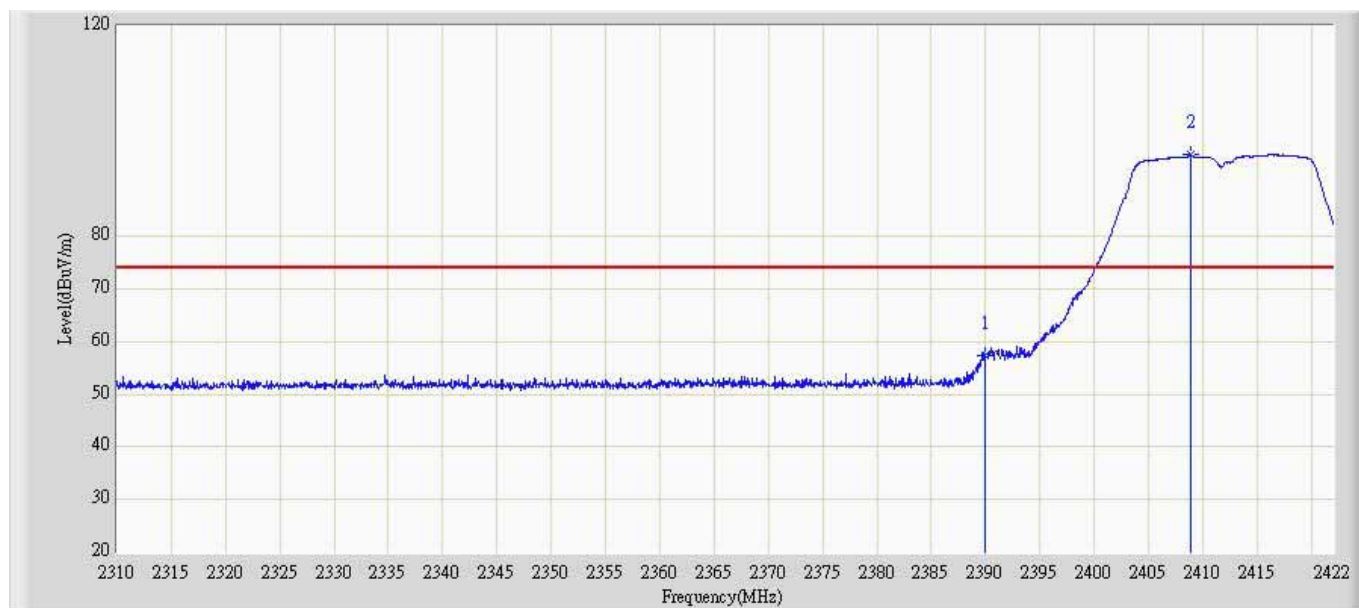
Power: AC 120V/60Hz

Note: Mode3: Transmit at channel 2412MHz by 802.11n20



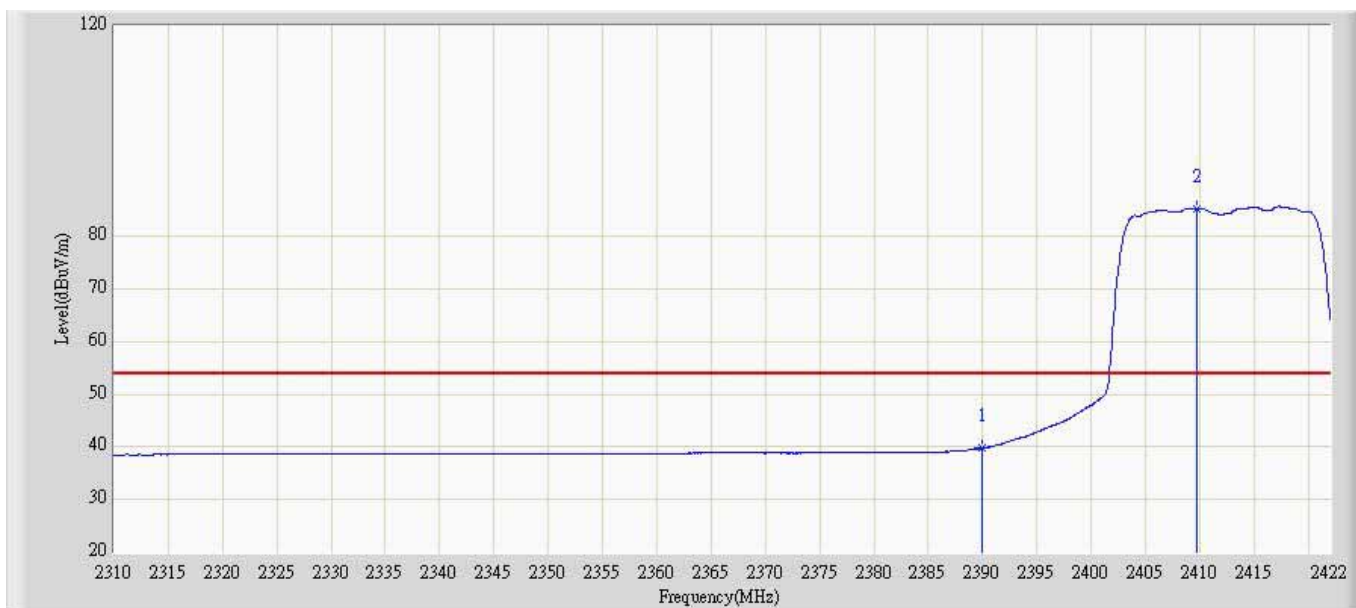
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.367	11.685	-14.633	54.000	27.682	AV
2	*	2409.512	82.605	54.845	N/A	N/A	27.760	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:29
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode3: Transmit at channel 2412MHz by 802.11n20	



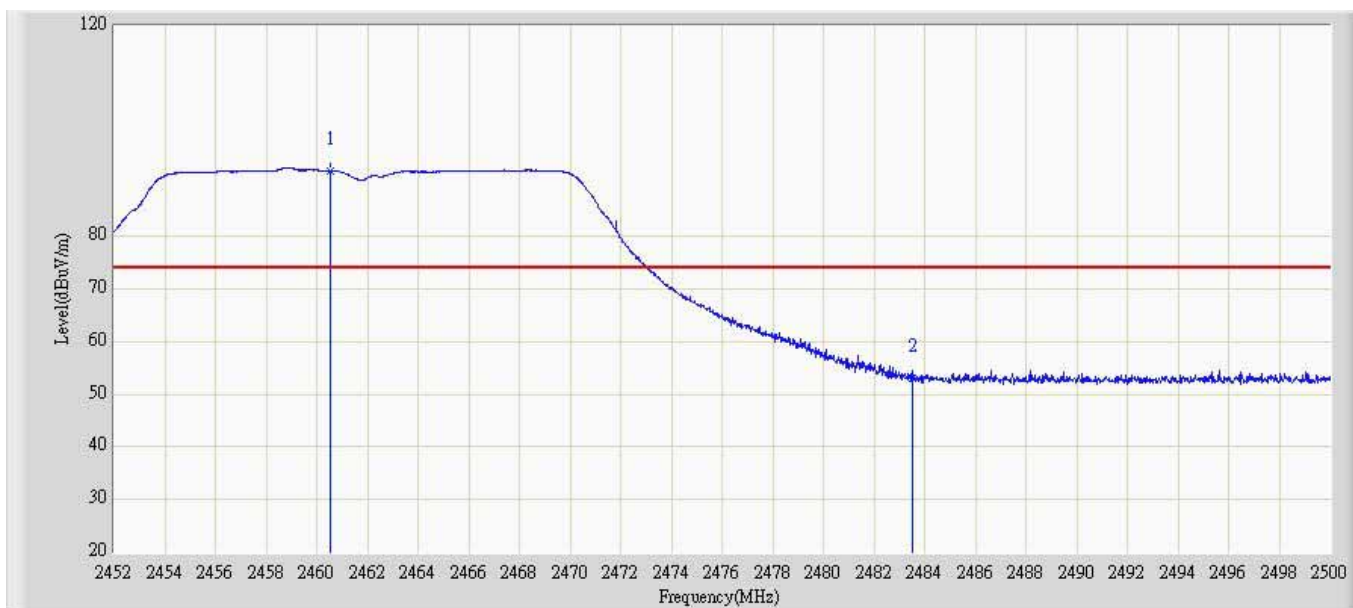
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	57.285	29.603	-16.715	74.000	27.682	PK
2	*	2408.952	95.542	67.784	N/A	N/A	27.758	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode3: Transmit at channel 2412MHz by 802.11n20	



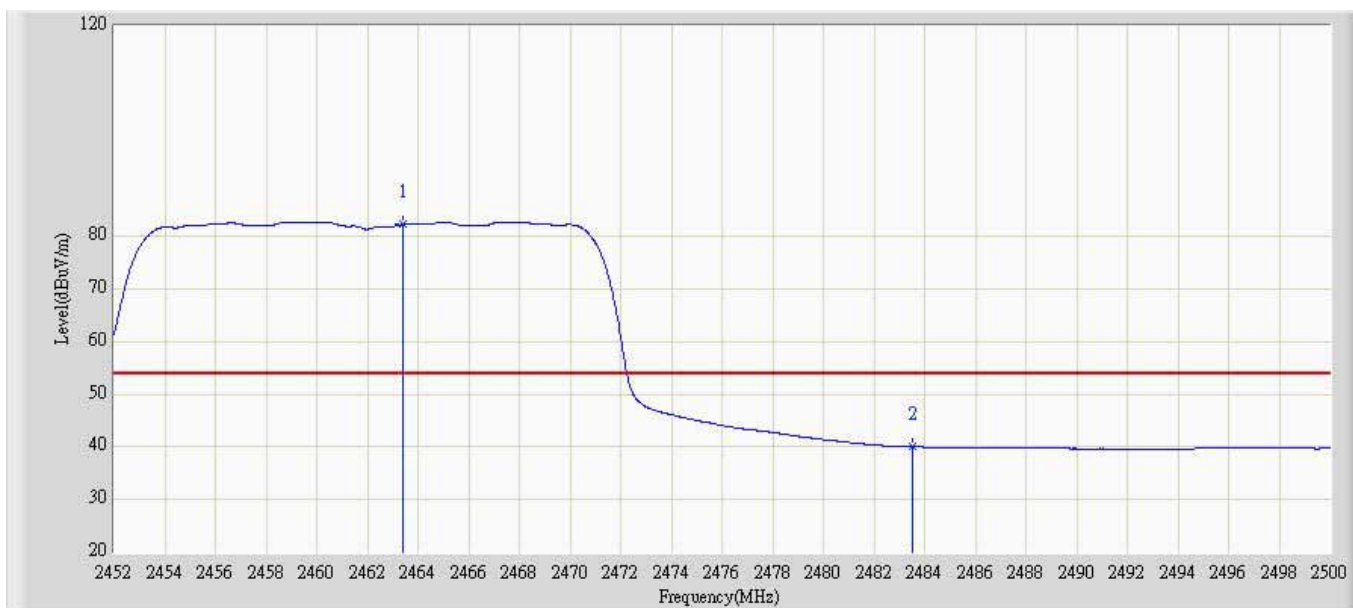
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.793	12.111	-14.207	54.000	27.682	AV
2	*	2409.680	85.213	57.452	N/A	N/A	27.761	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode3: Transmit at channel 2462MHz by 802.11n20	



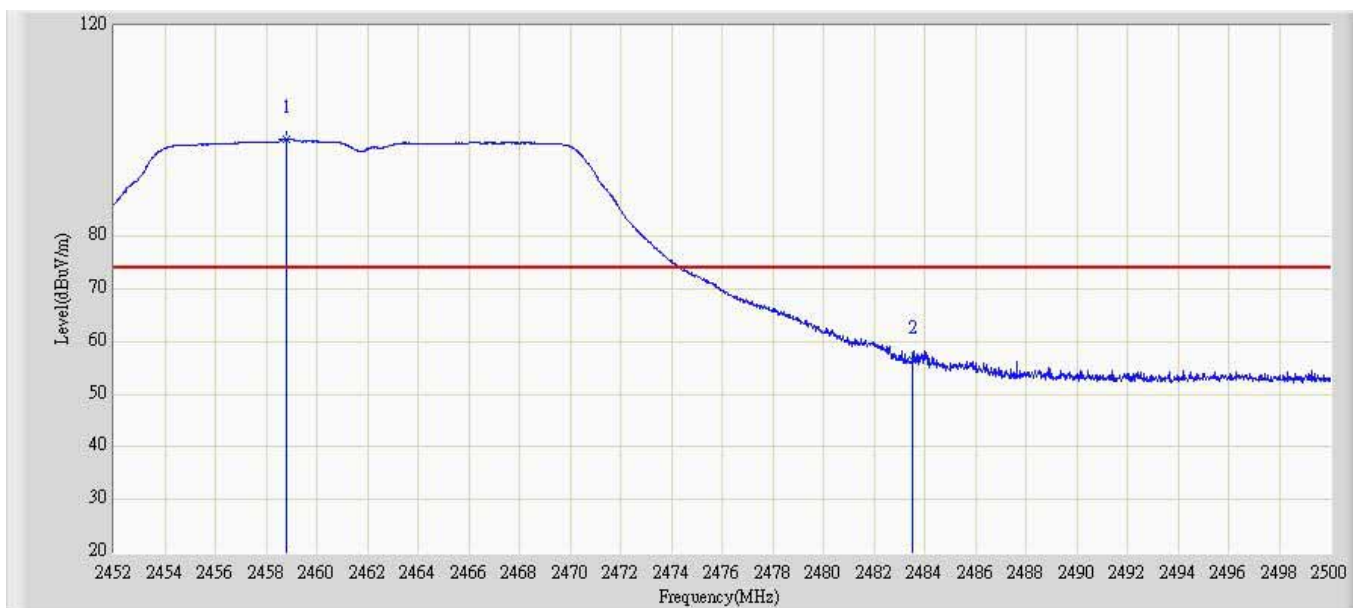
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2460.544	92.480	64.510	N/A	N/A	27.970	PK
2		2483.500	53.122	25.065	-20.878	74.000	28.057	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:36
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode3: Transmit at channel 2462MHz by 802.11n20	



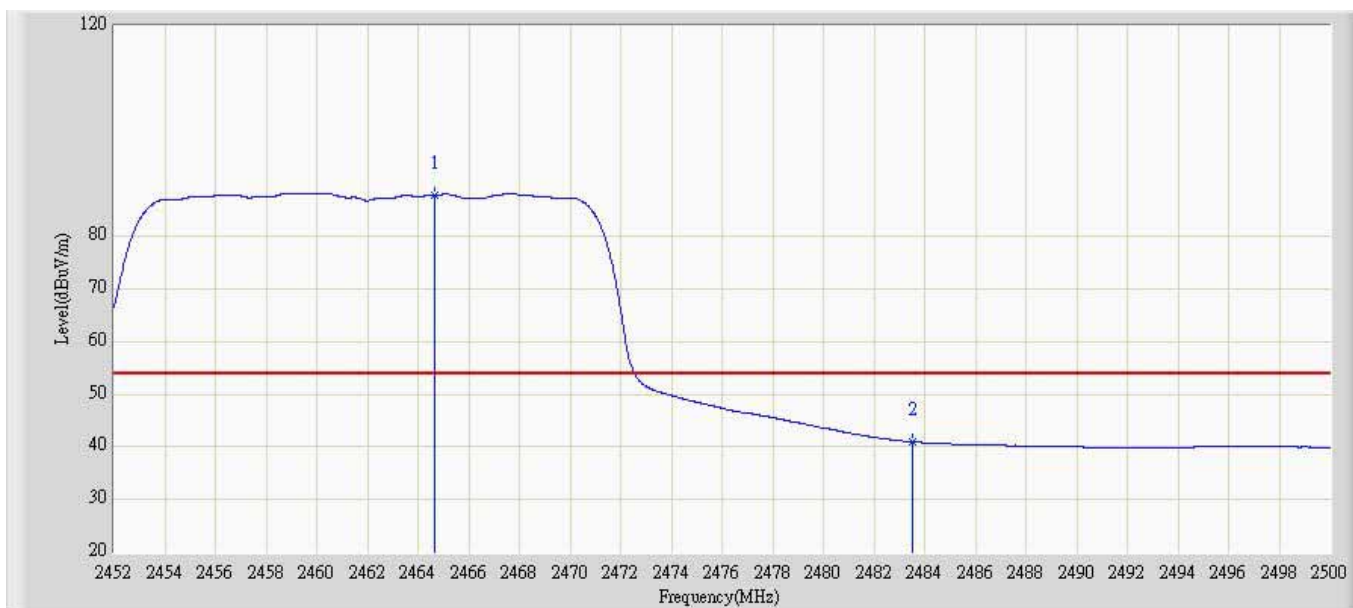
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2463.424	82.269	54.288	N/A	N/A	27.981	AV
2		2483.500	40.038	11.981	-13.962	54.000	28.057	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:37
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode3: Transmit at channel 2462MHz by 802.11n20	



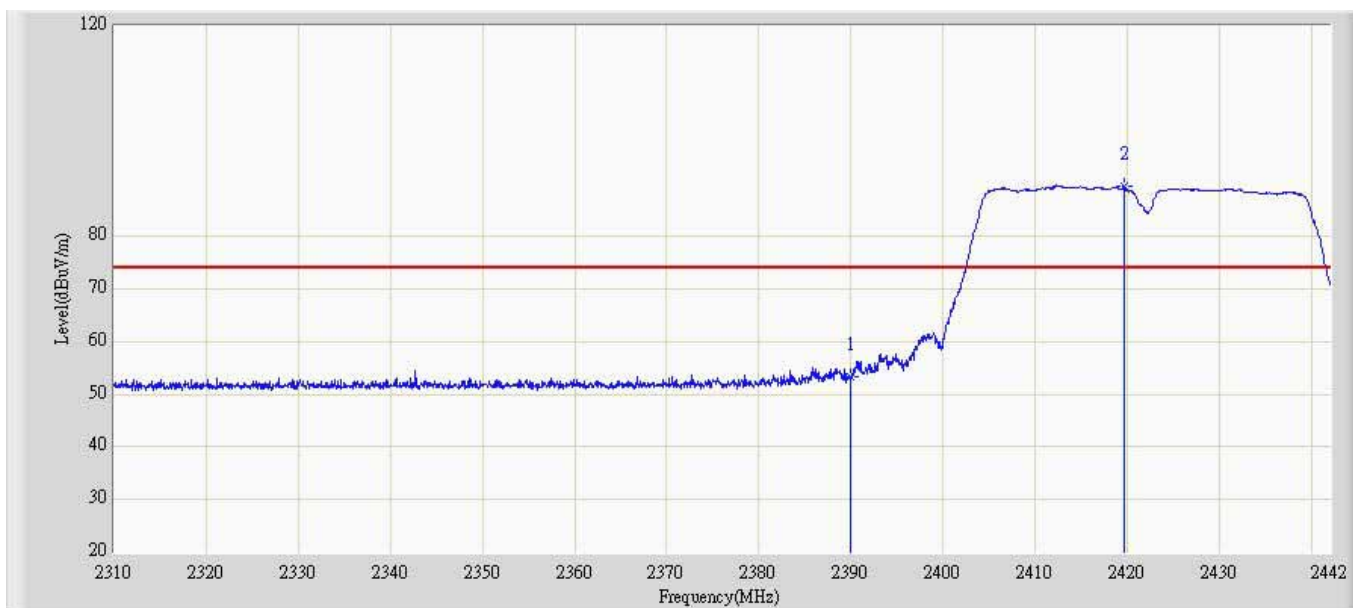
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2458.816	98.557	70.594	N/A	N/A	27.964	PK
2		2483.500	56.413	28.356	-17.587	74.000	28.057	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:40
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode3: Transmit at channel 2462MHz by 802.11n20	



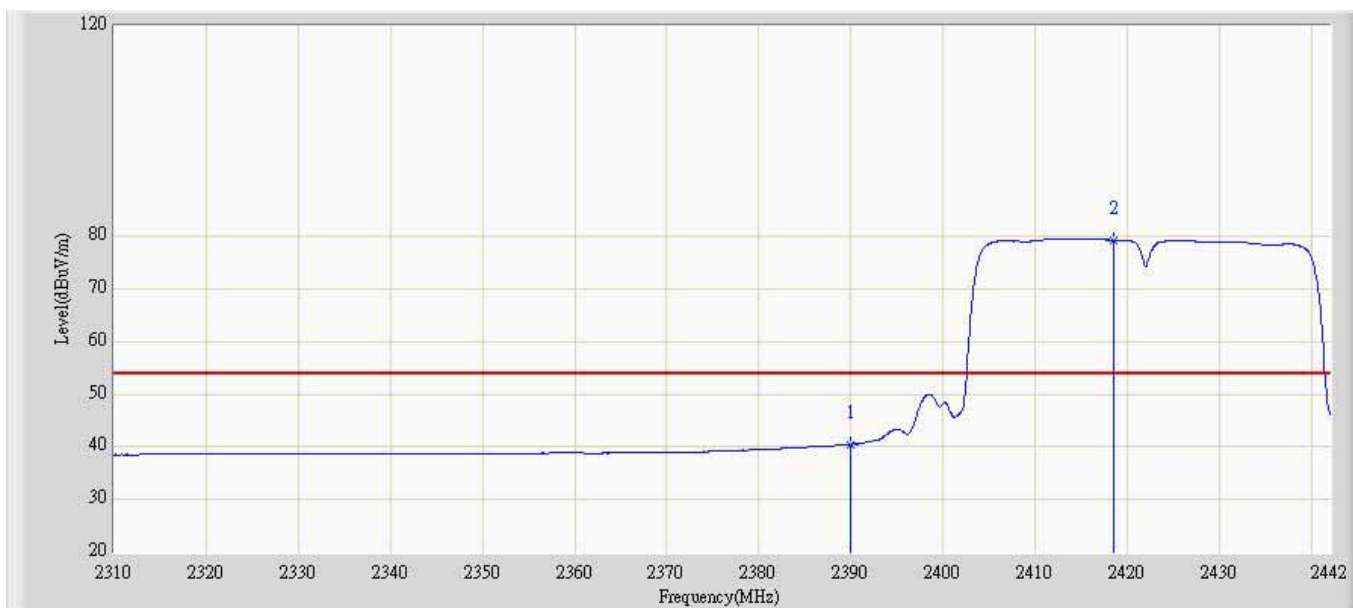
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2464.672	87.840	59.854	N/A	N/A	27.986	AV
2		2483.500	40.987	12.930	-13.013	54.000	28.057	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2422MHz by 802.11n40	



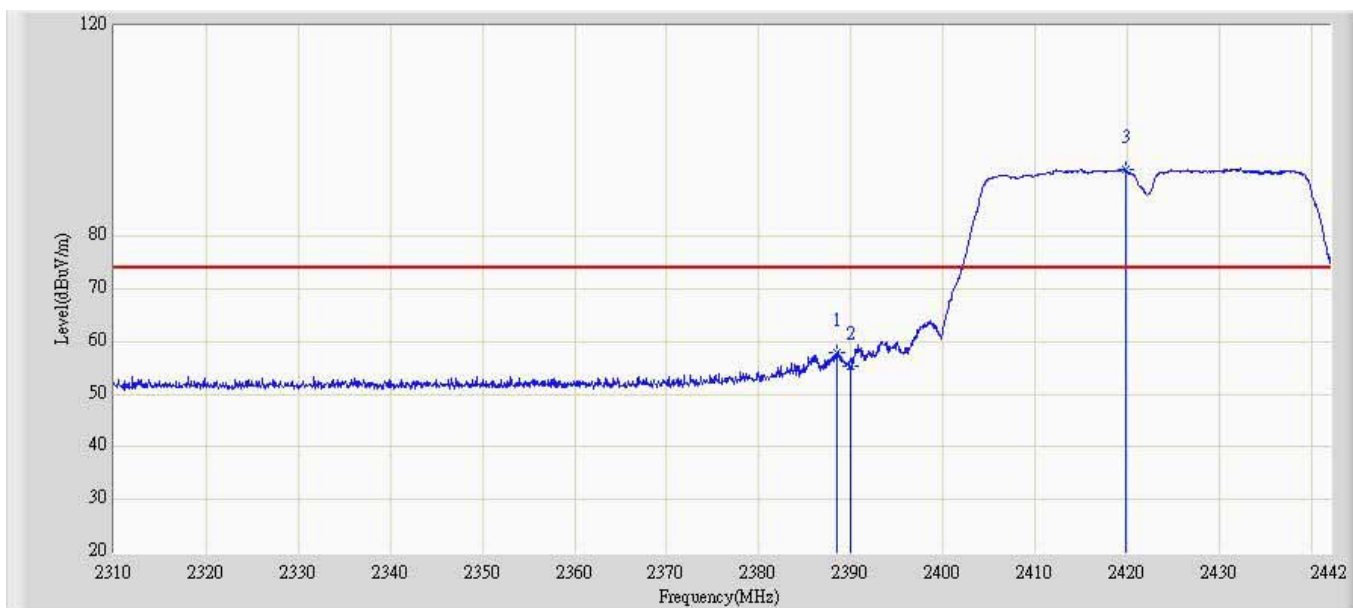
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	53.412	25.730	-20.588	74.000	27.682	PK
2	*	2419.626	89.477	61.675	N/A	N/A	27.802	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:45
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2422MHz by 802.11n40	



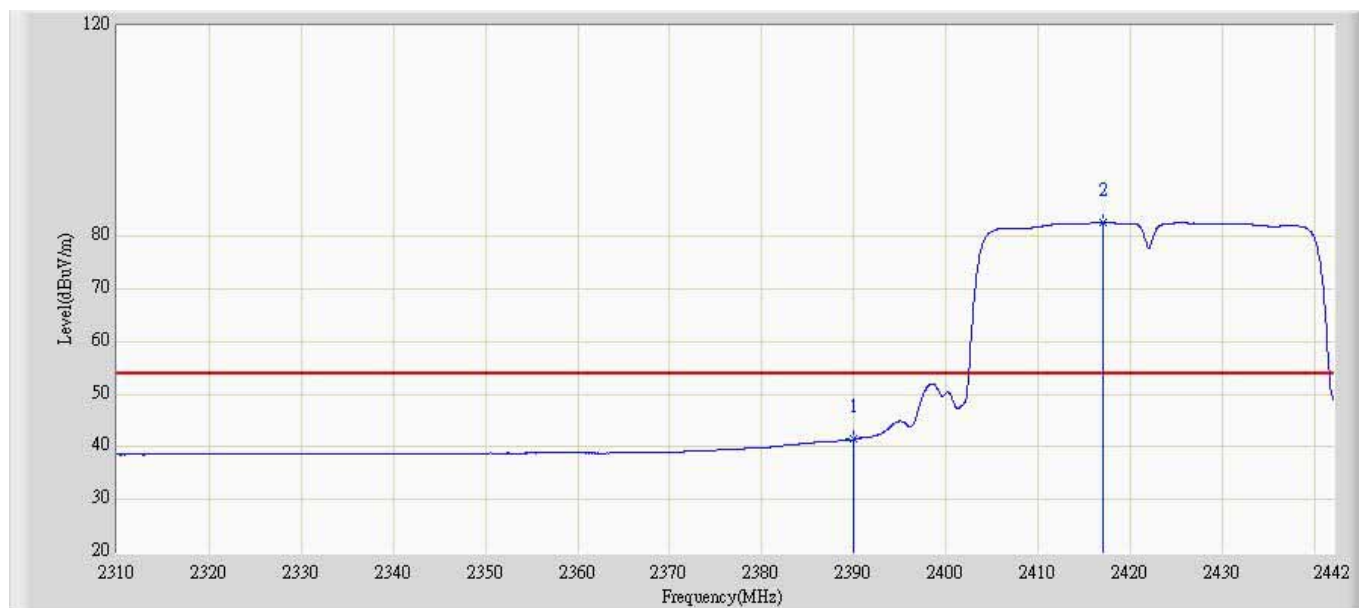
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	40.493	12.811	-13.507	54.000	27.682	AV
2	*	2418.570	79.170	51.372	N/A	N/A	27.797	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:46
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2422MHz by 802.11n40	



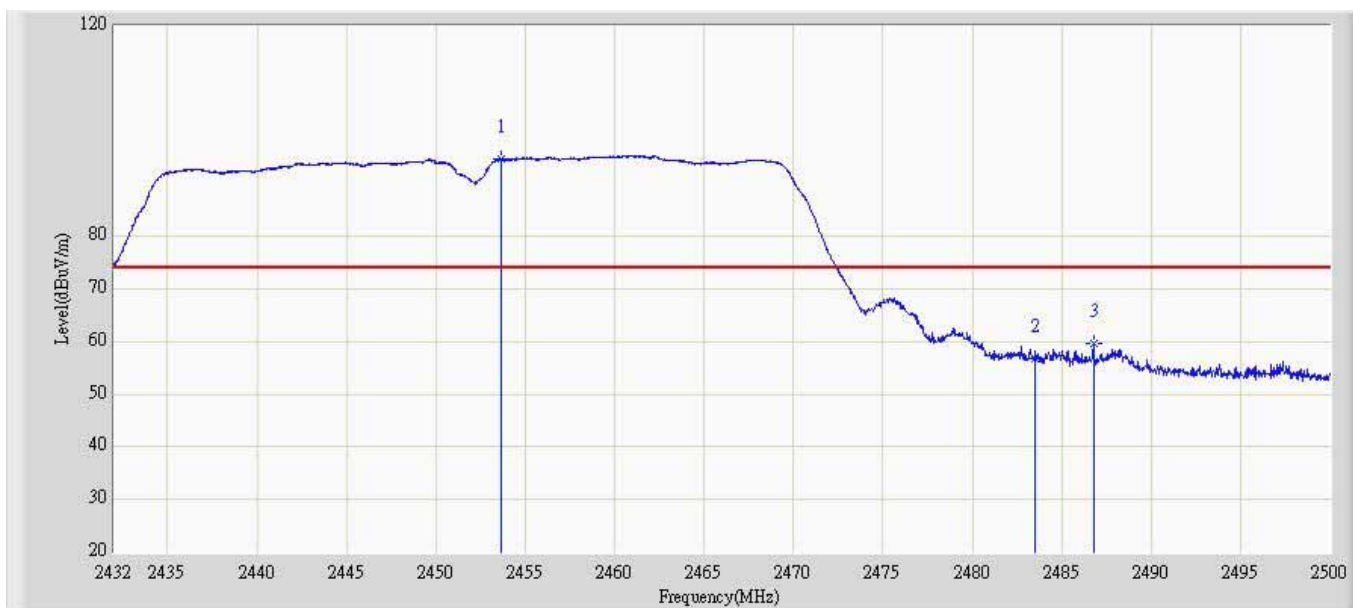
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2388.540	57.913	30.237	-16.087	74.000	27.676	PK
2		2390.000	55.301	27.619	-18.699	74.000	27.682	PK
3	*	2419.824	92.683	64.880	N/A	N/A	27.803	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2422MHz by 802.11n40	



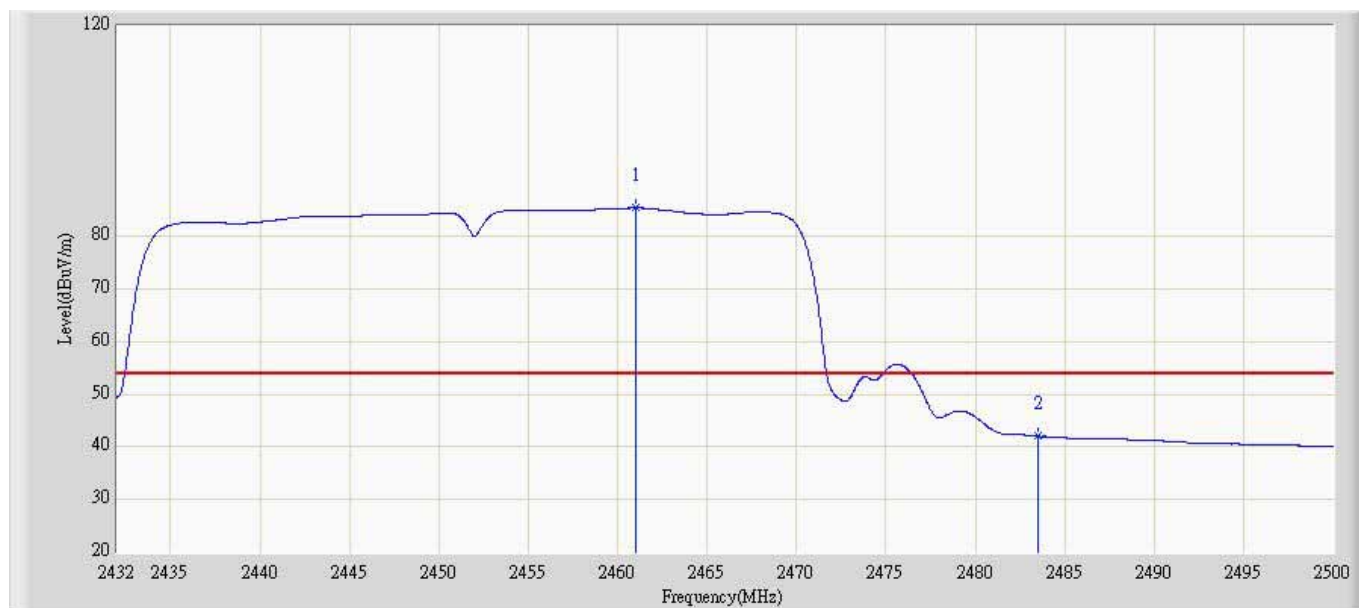
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	41.436	13.754	-12.564	54.000	27.682	AV
2	*	2417.118	82.625	54.833	N/A	N/A	27.792	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2452MHz by 802.11n40	



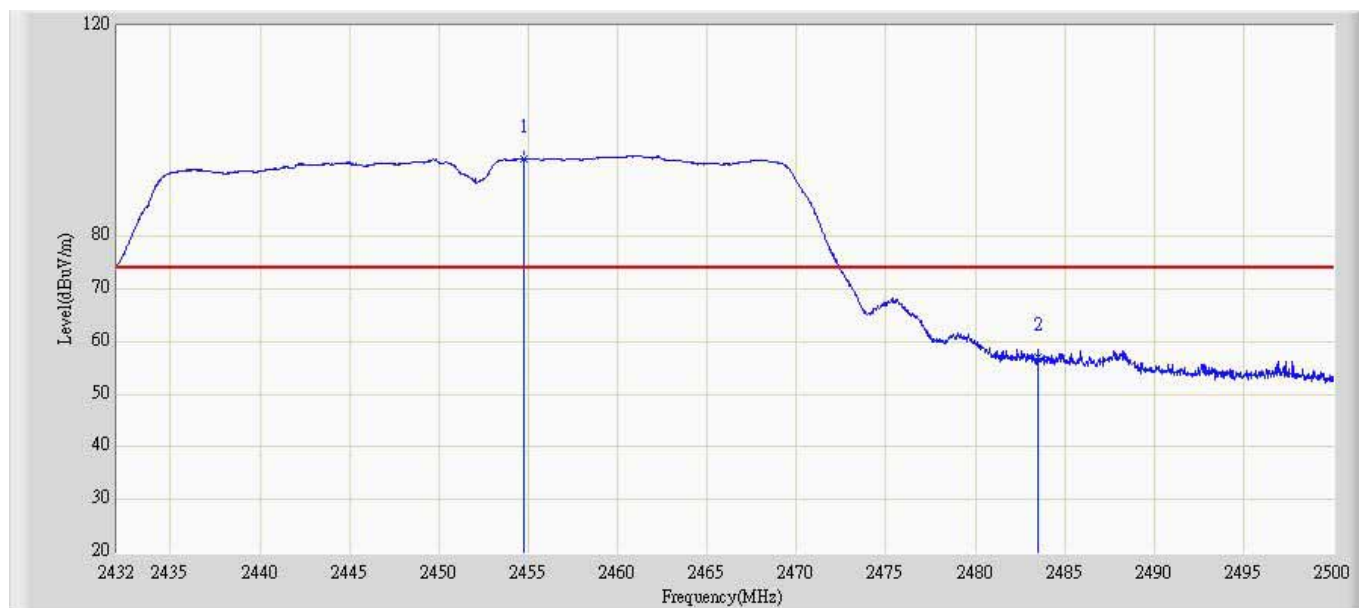
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2453.692	94.718	66.775	N/A	N/A	27.943	PK
2		2483.500	56.659	28.602	-17.341	74.000	28.057	PK
3		2486.774	59.660	31.590	-14.340	74.000	28.070	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:56
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2452MHz by 802.11n40	



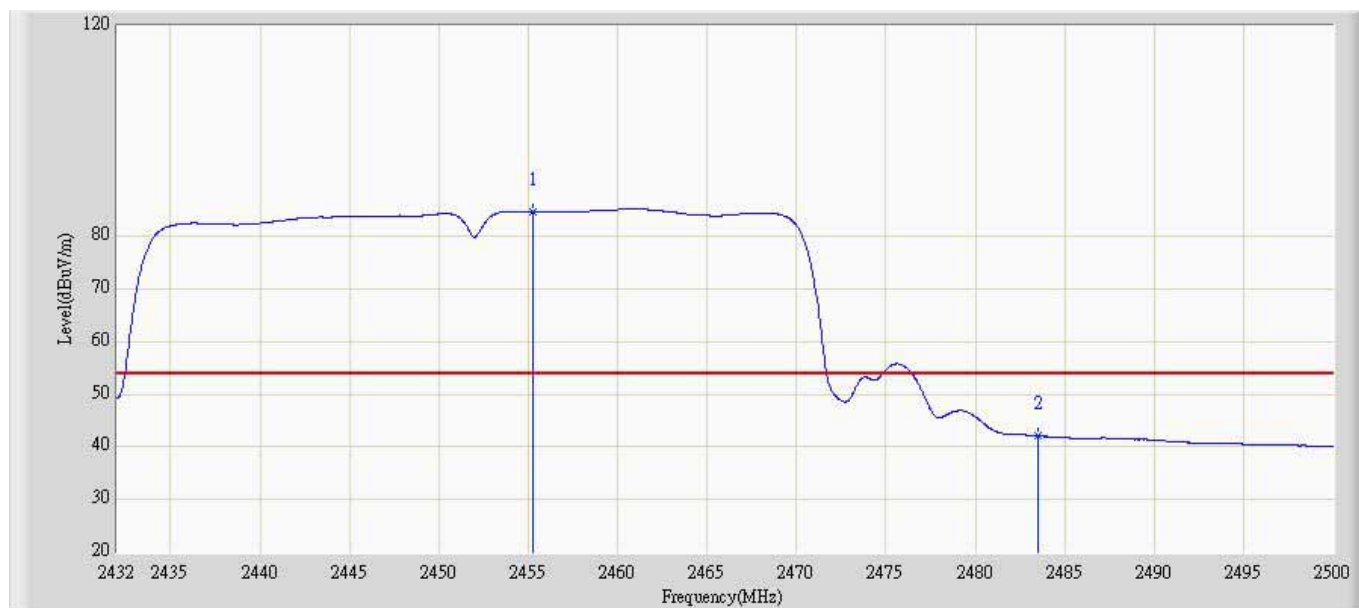
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2461.002	85.415	57.443	N/A	N/A	27.972	AV
2		2483.500	42.003	13.946	-11.997	54.000	28.057	AV

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 13:57
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2452MHz by 802.11n40	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2454.746	94.786	66.839	N/A	N/A	27.947	PK
2		2483.500	56.951	28.894	-17.049	74.000	28.057	PK

Engineer: Toms	
Site: AC5	Time: 2013/09/17 - 14:01
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe:Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Q TV Engine	Power: AC 120V/60Hz
Note: Mode4: Transmit at channel 2452MHz by 802.11n40	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2455.256	84.764	56.815	N/A	N/A	27.949	AV
2		2483.500	42.075	14.018	-11.925	54.000	28.057	AV

7. Operation Frequency Range of 20dB Bandwidth

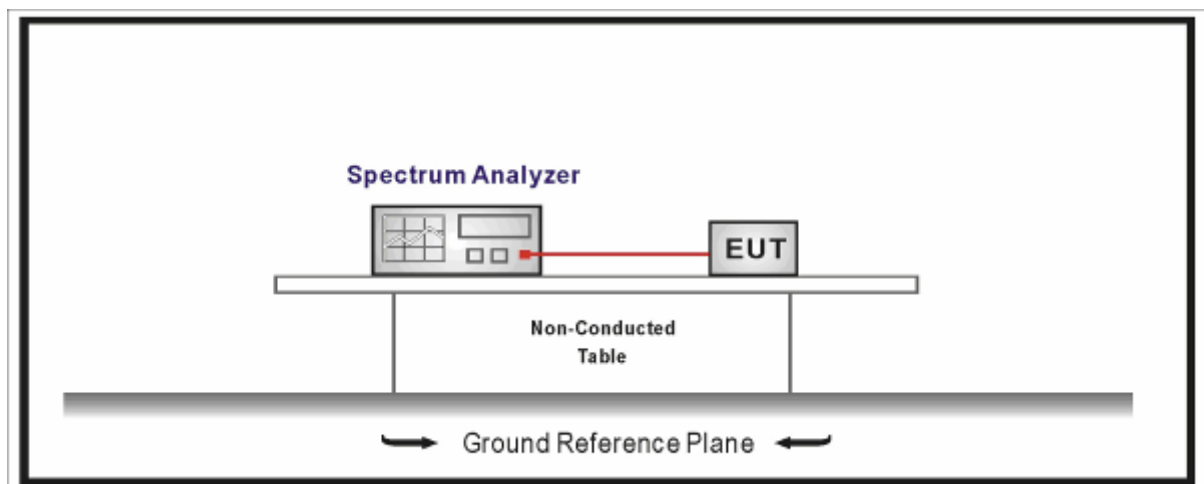
7.1. Test Equipment

Operation Frequency Range of 20dB Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2014.05.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7.2. Test Setup



7.3. Limit

20 dB bandwidth of the emission is contained within the operation frequency band.

7.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

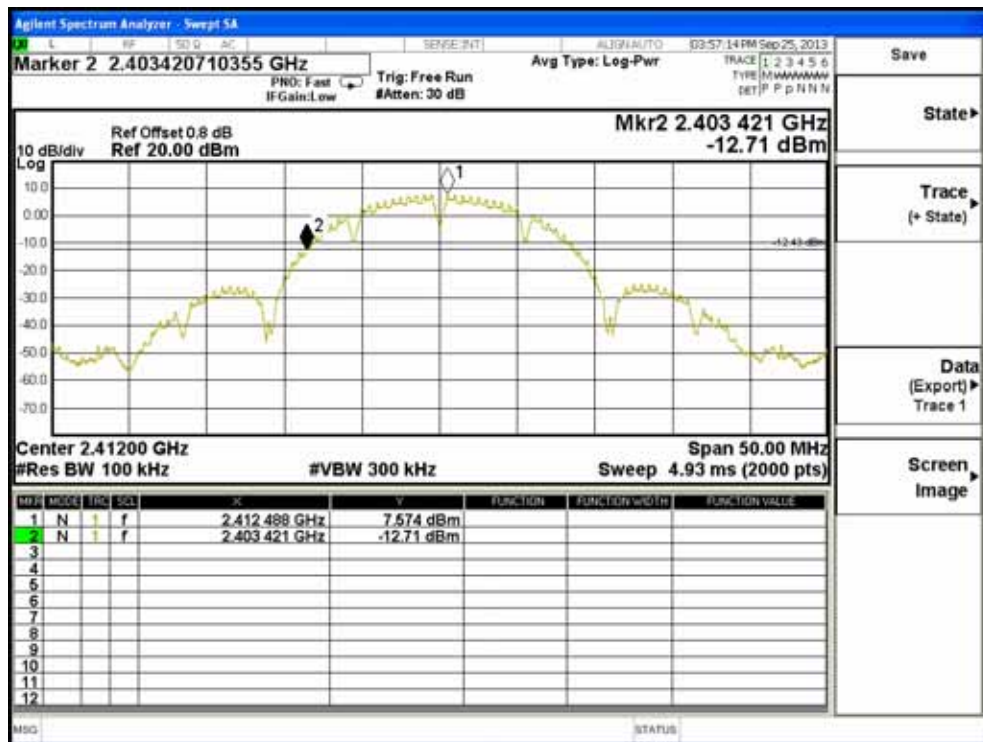
7.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

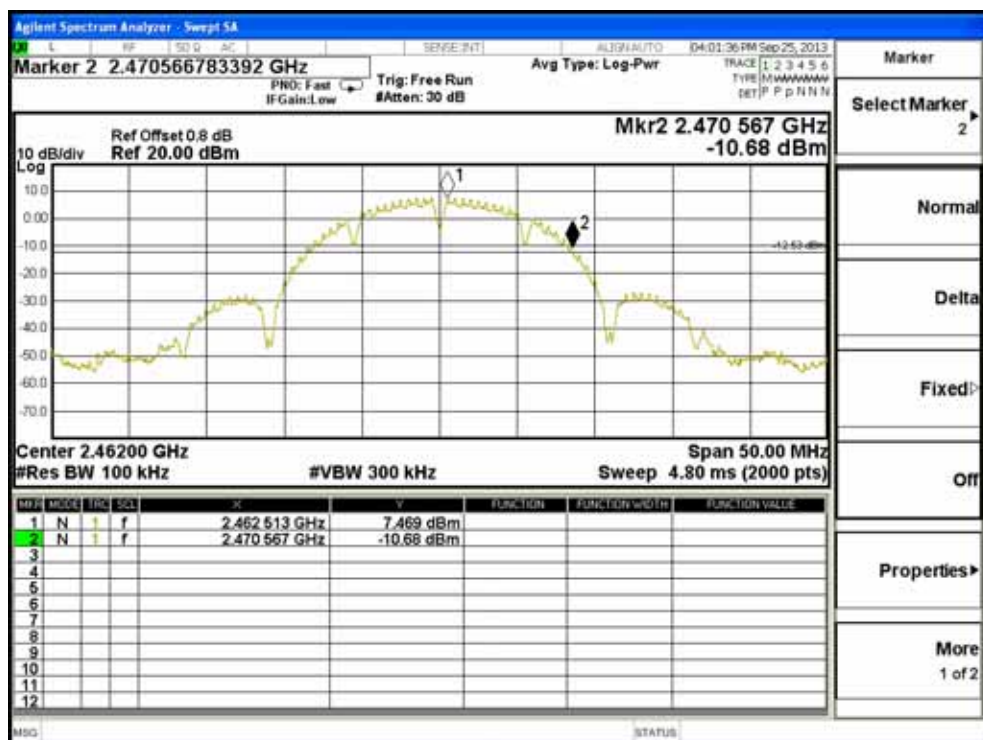
7.6. Test Result

Product	:	Q TV Engine
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel 01 (2412MHz)

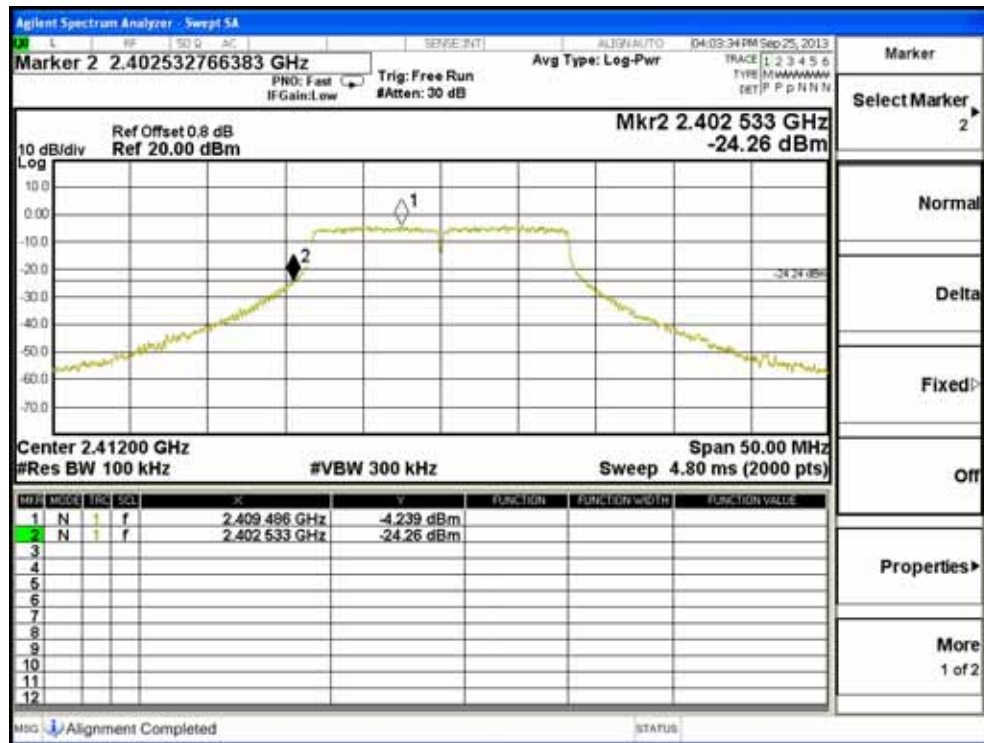


Channel 11 (2462MHz)

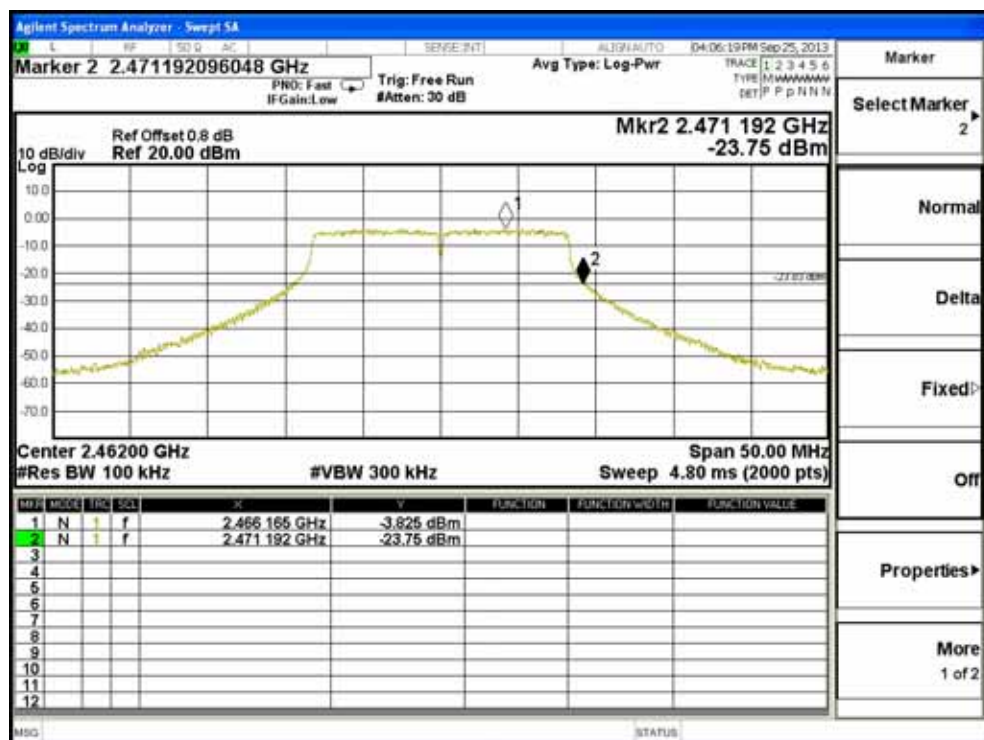


Product	:	Q TV Engine
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel 01 (2412MHz)

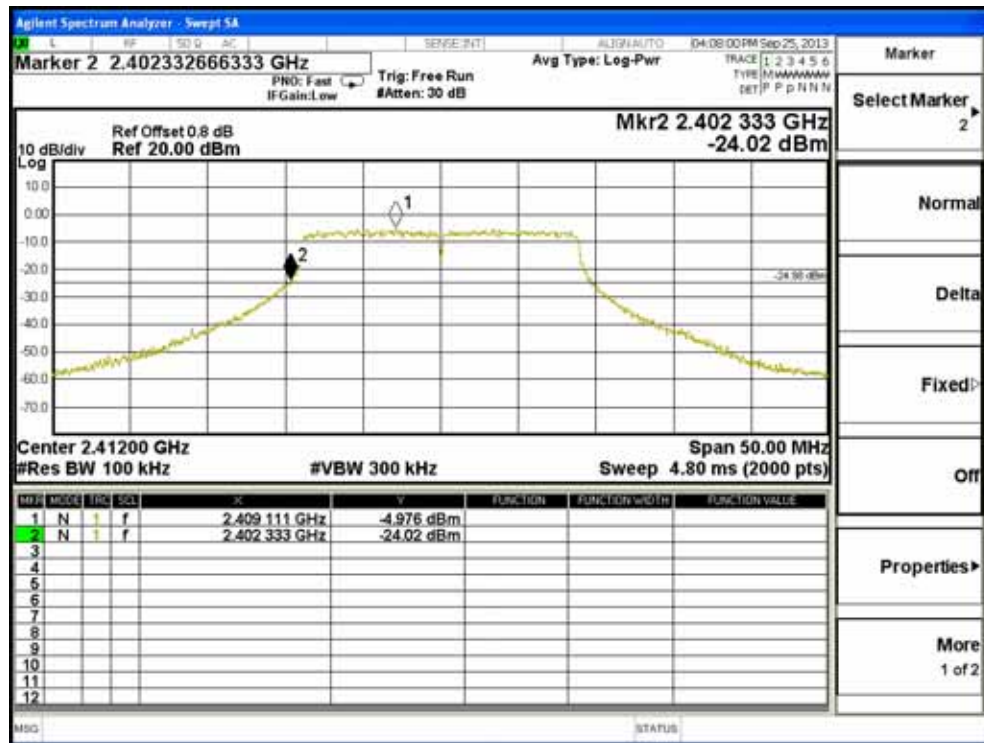


Channel 11 (2462MHz)

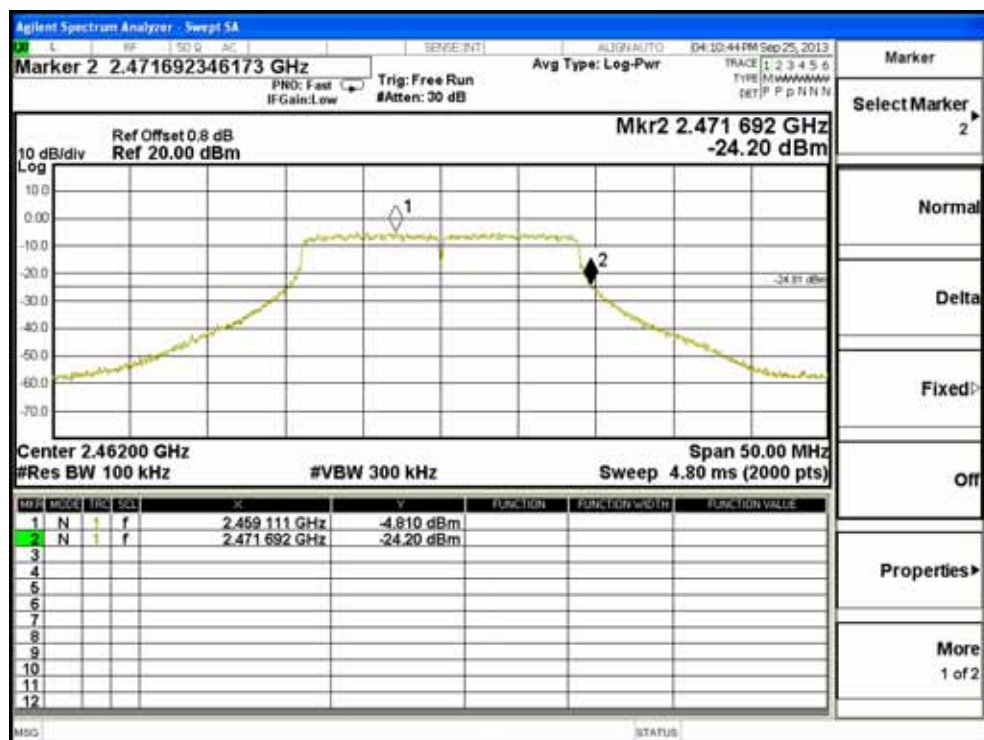


Product	:	Q TV Engine
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n (20MHz)

Channel 01 (2412MHz)

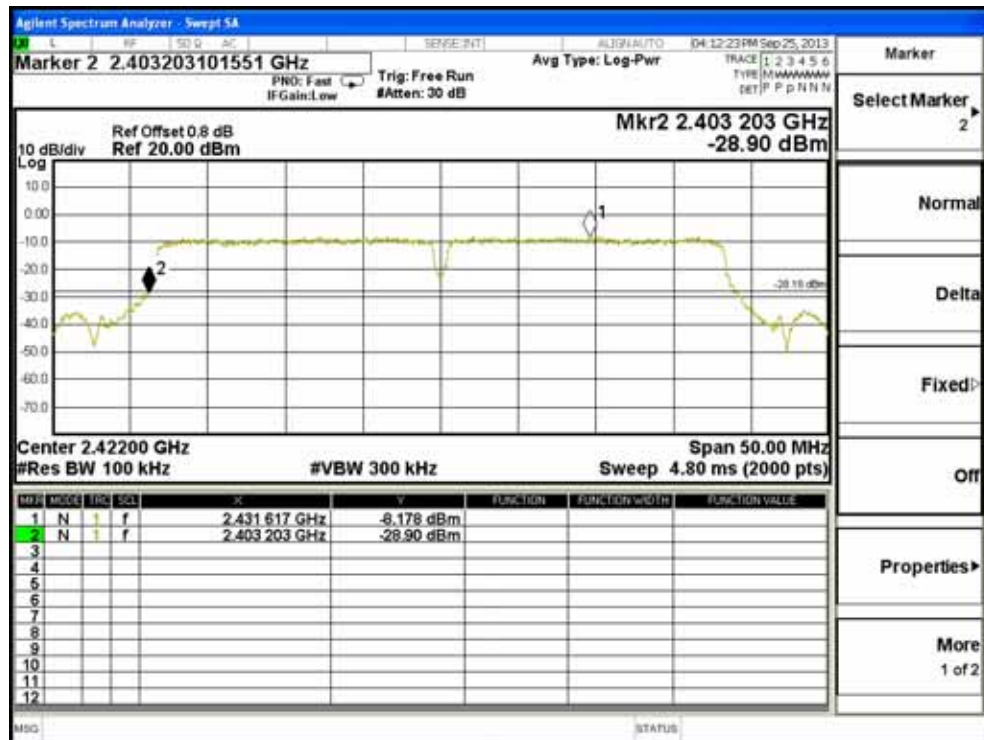


Channel 11 (2462MHz)

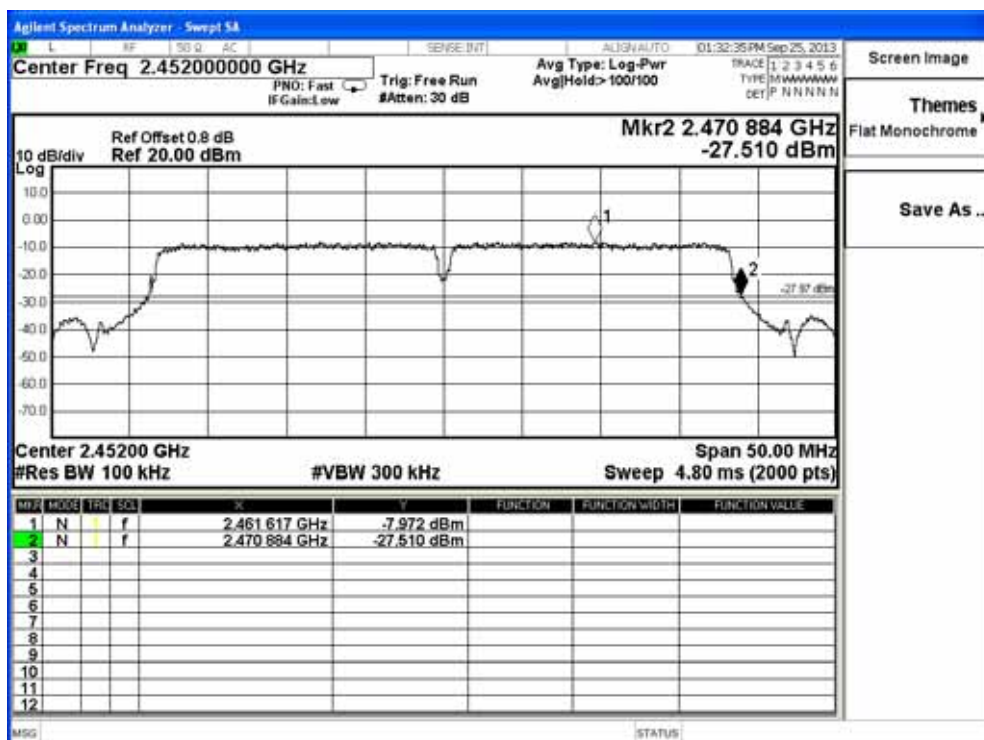


Product	:	Q TV Engine
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 4: Transmit by 802.11n (40MHz)

Channel 03 (2422MHz)



Channel 09 (2452MHz)



8. Occupied Bandwidth

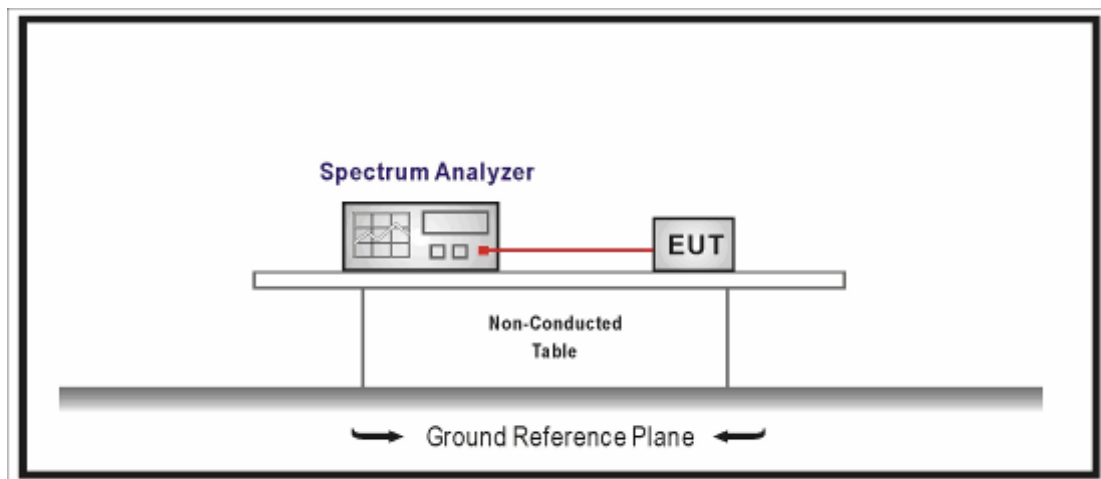
8.1. Test Equipment

Occupied Bandwidth / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2014.05.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

8.2. Test Setup



8.3. Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

8.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Span greater than RBW.

8.5. Uncertainty

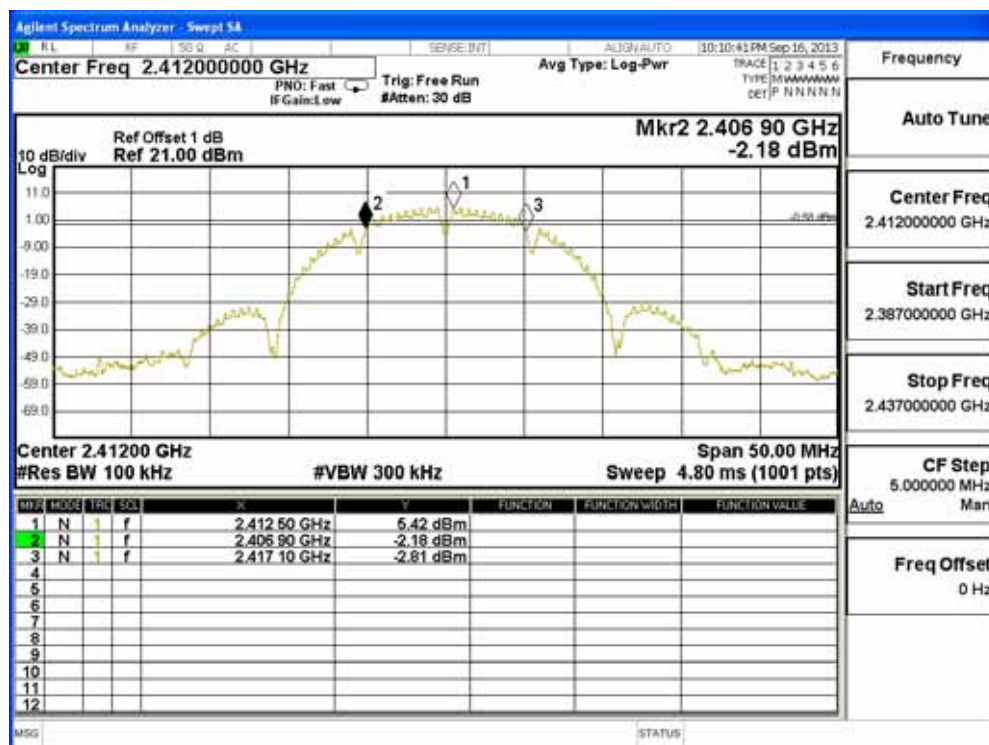
The measurement uncertainty is defined as ± 1 kHz

8.6. Test Result

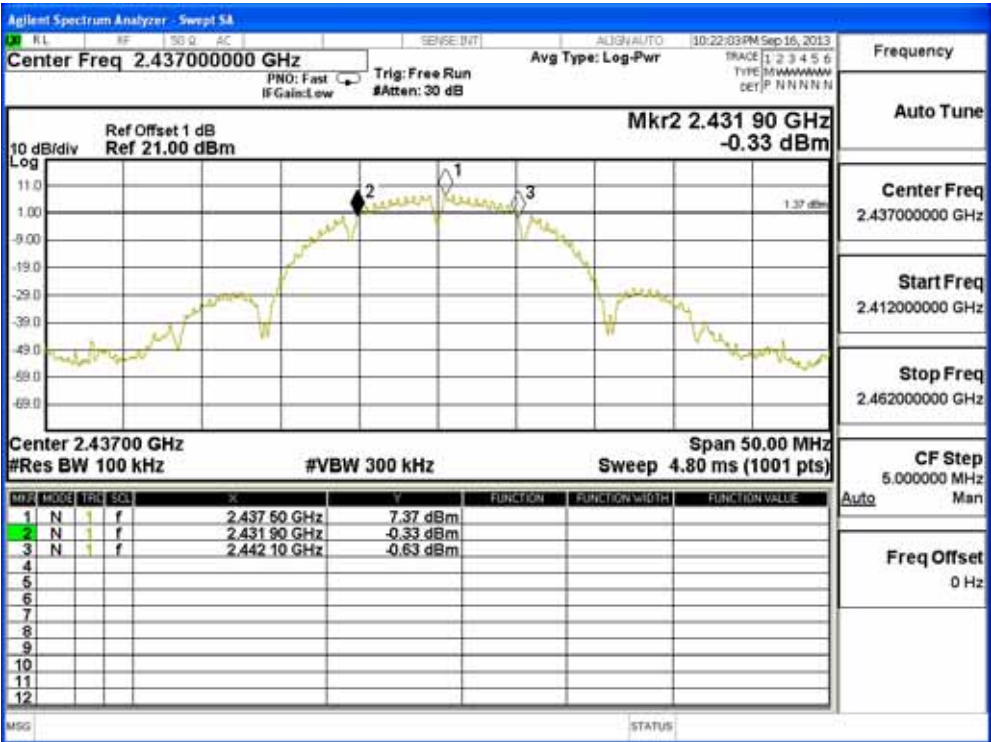
Product	:	Q TV Engine
Test Item	:	6dB Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	10200.0	500	Pass
06	2437	10200.0	500	Pass
11	2462	10200.0	500	Pass

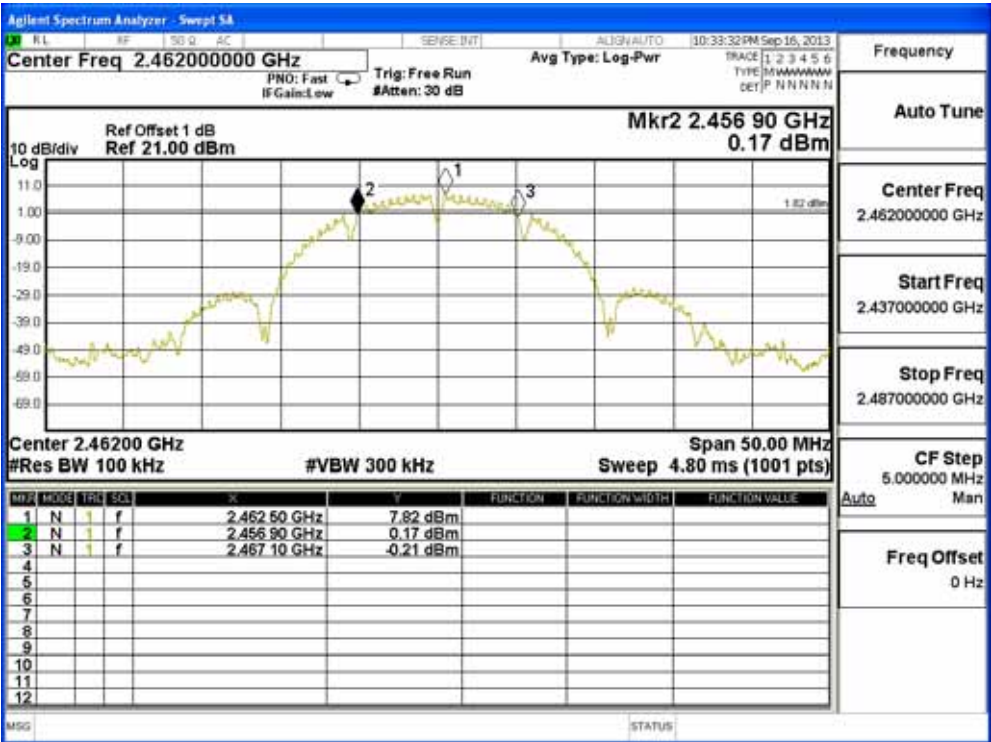
Channel 01 (2412MHz)



Channel 06 (2437MHz)



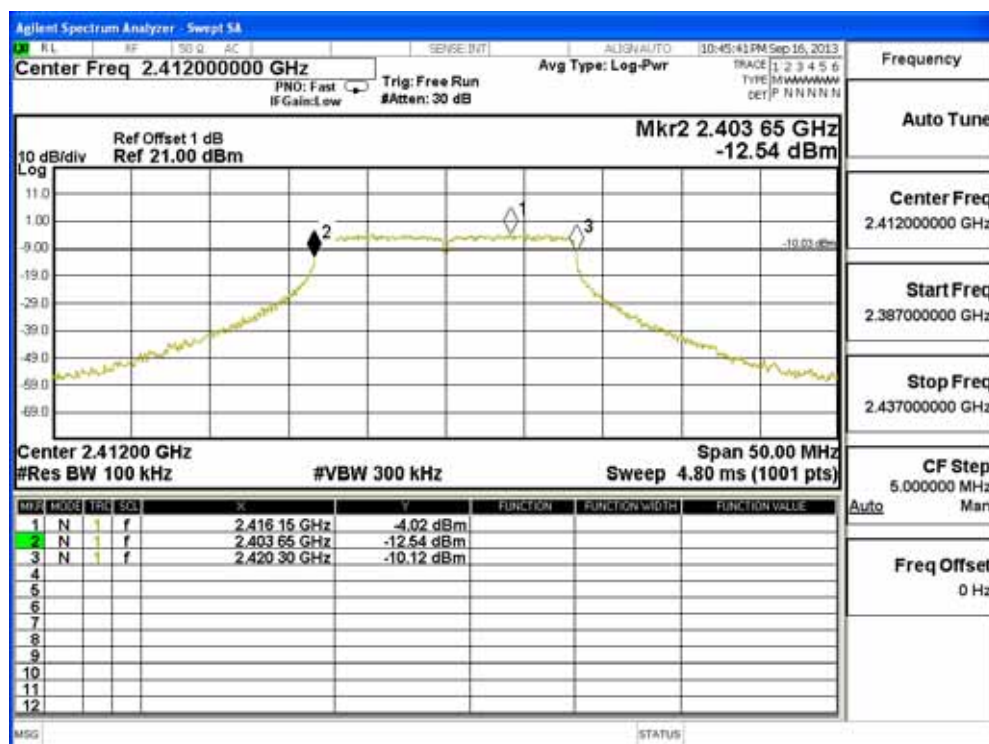
Channel 11 (2462MHz)



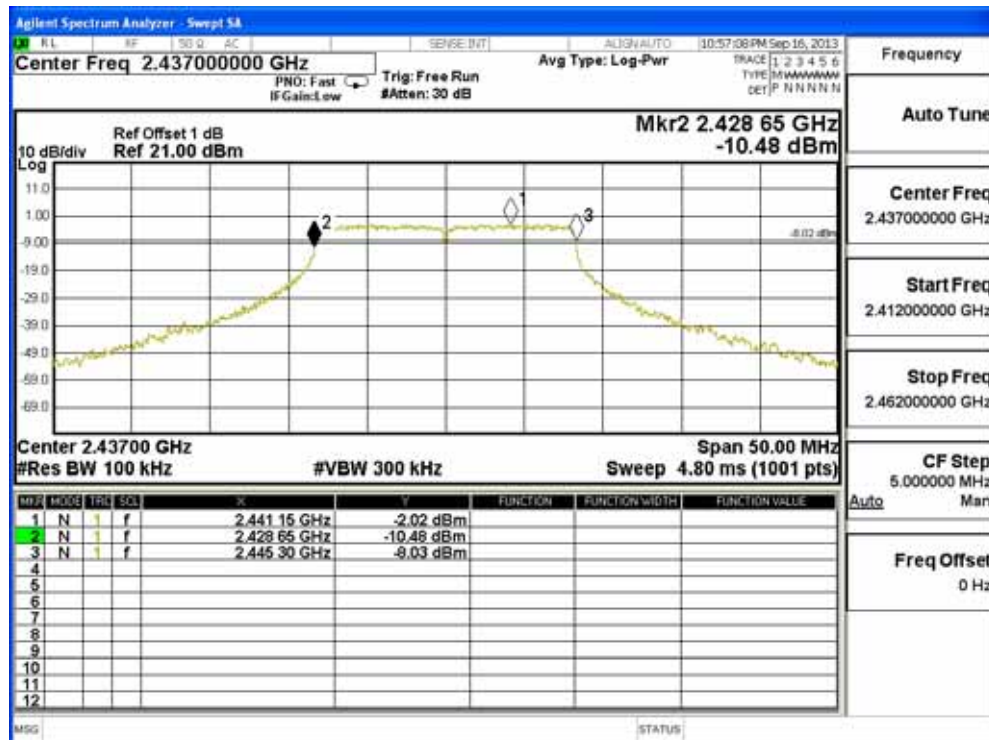
Product	:	Q TV Engine
Test Item	:	6dB Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	16650.0	500	Pass
06	2437	16650.0	500	Pass
11	2462	16650.0	500	Pass

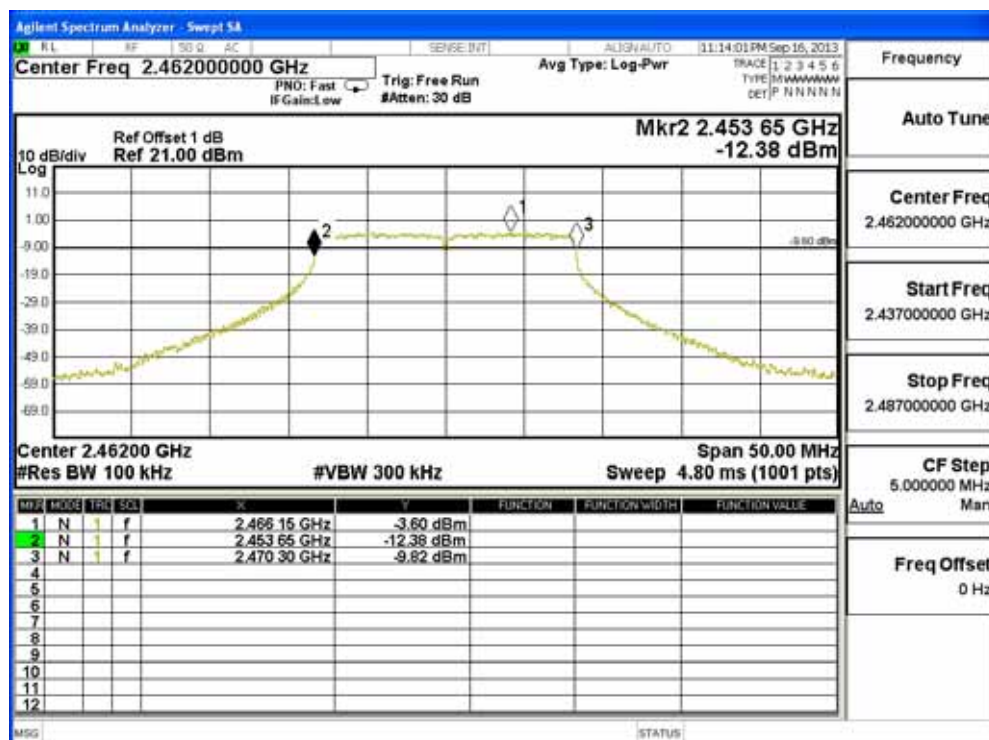
Channel 01 (2412MHz)



Channel 06 (2437MHz)



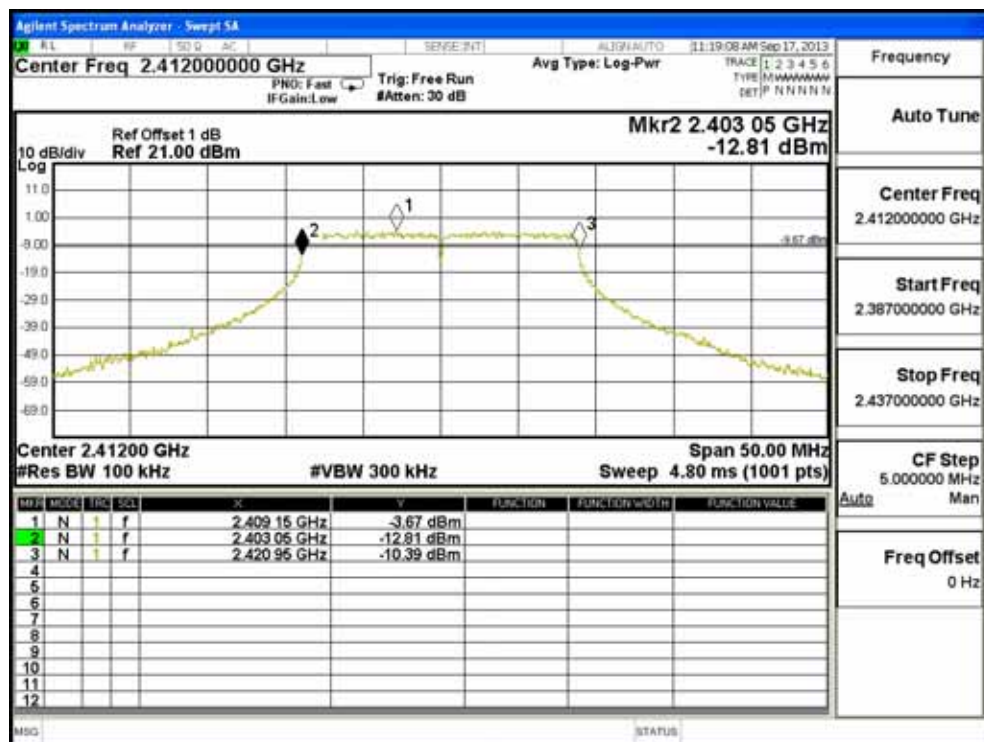
Channel 11 (2462MHz)



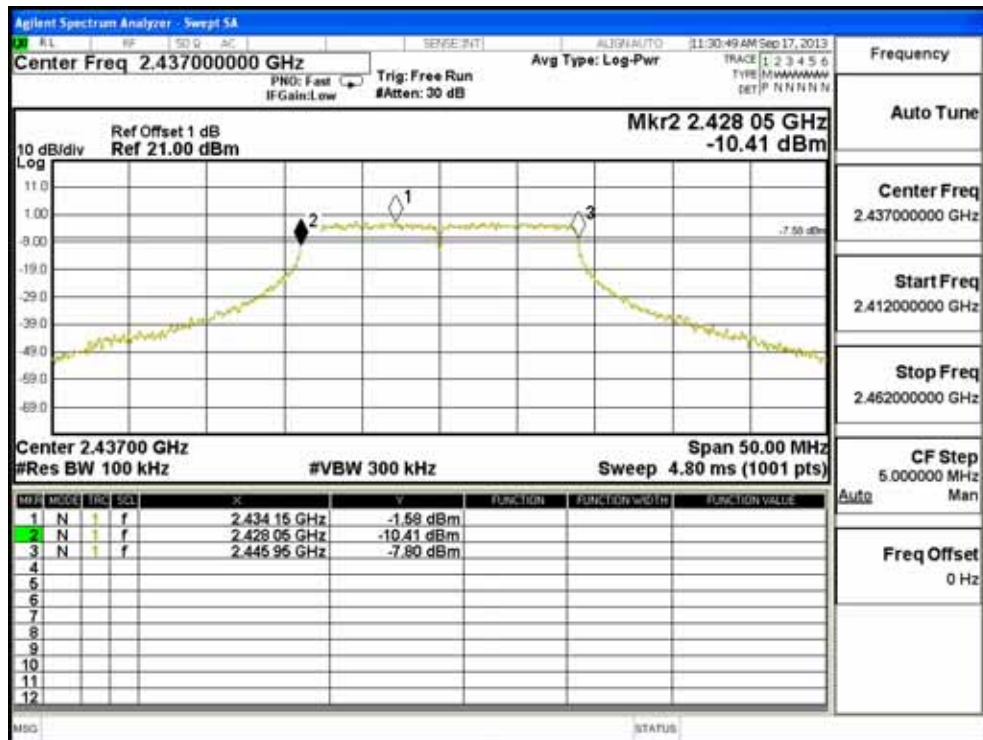
Product	:	Q TV Engine
Test Item	:	6dB Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Channel No.	Frequency (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	17900.0	500	Pass
06	2437	17900.0	500	Pass
11	2462	17850.0	500	Pass

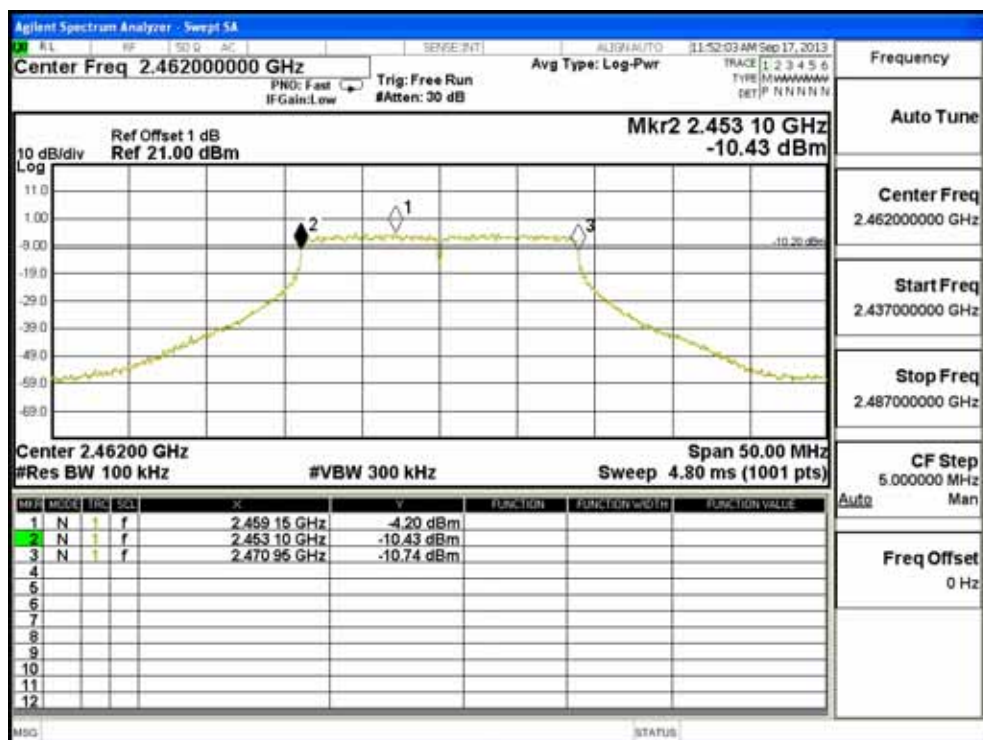
Channel 01 (2412MHz)



Channel 06 (2437MHz)



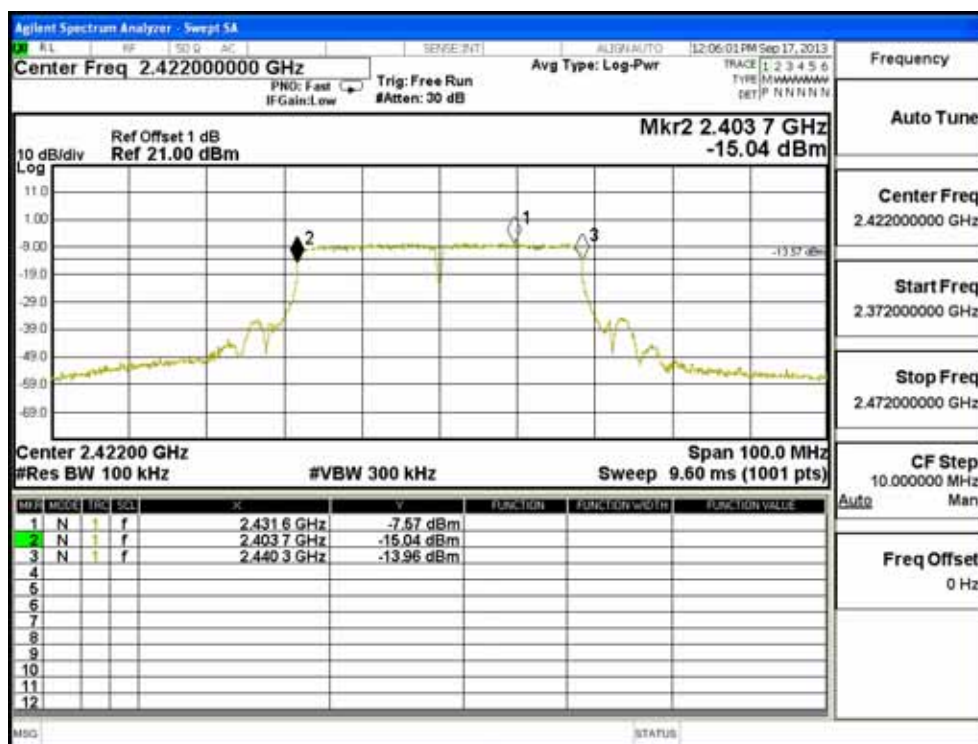
Channel 11 (2462MHz)



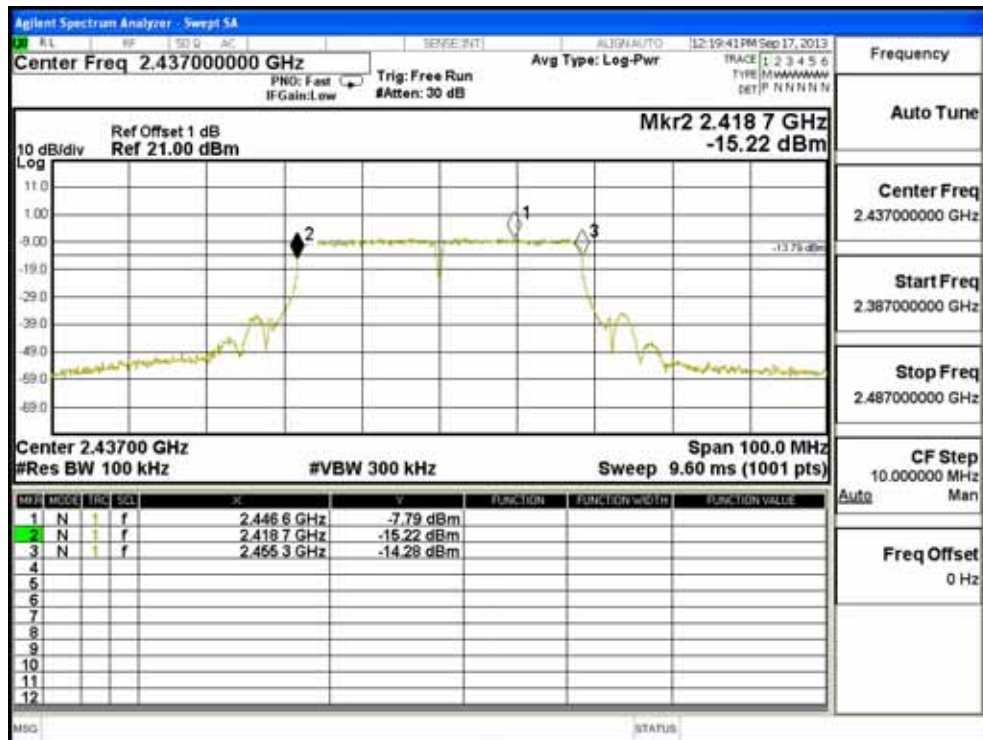
Product	:	Q TV Engine
Test Item	:	6dB Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz)

Channel No.	Frequency (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
03	2422	36600.0	500	Pass
06	2437	36600.0	500	Pass
09	2452	36600.0	500	Pass

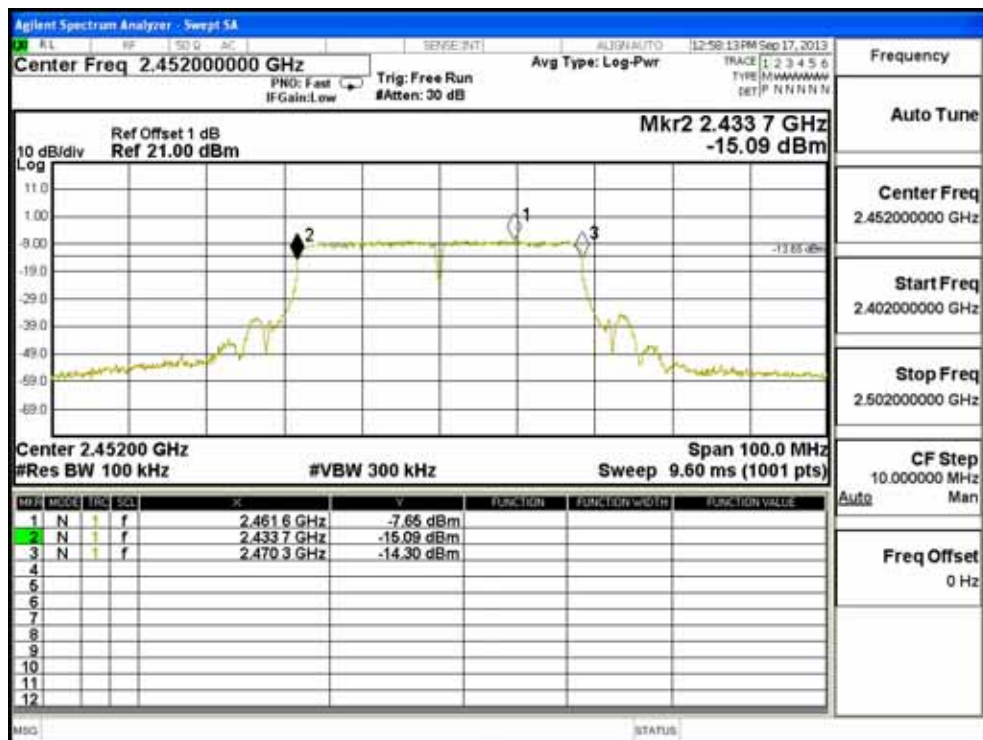
Channel 01 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



9. Power Output

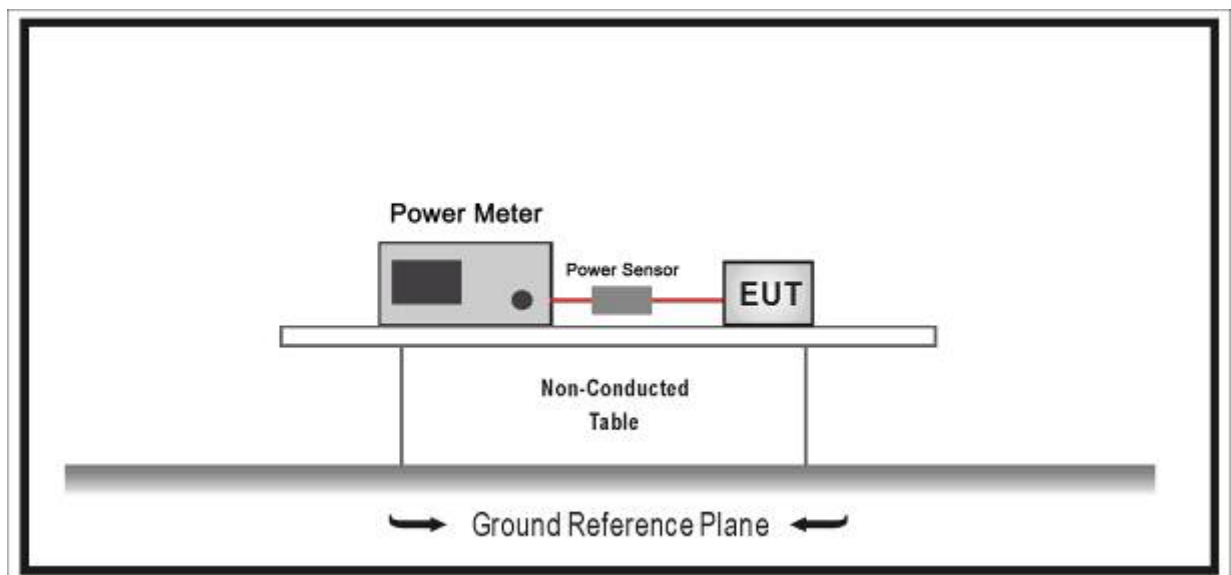
9.1. Test Equipment

Power Output / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2013.11.10
Power Sensor	Anritsu	MA2411B	0846014	2013.11.10
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2014.05.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

9.2. Test Setup



9.3. Limit

The maximum peak power shall be less 1 Watt (30dBm).

Note: the conducted output power limit specified above is based on the use the antennas with directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

9.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Use the wideband power meter to test peak power and record the result.

9.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

9.6. Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (blue marker) for final test of each channel.

MCS Index for 802.11n	Spatial Streams	Data Rate (Mbps)					
		802.11b	802.11g	20MHz Bandwidth		40MHz Bandwidth	
				800ns GI	400ns GI	800ns GI	400ns GI
0	1	1	6	6.5	7.2	13.5	15.0
1	1	2	9	13.0	14.4	27.0	30.0
0	1	5.5	12	19.5	21.7	40.5	45.0
1	1	11	18	26.0	28.9	54.0	60.0
4	1	---	24	39.0	43.3	81.0	90.0
5	1	---	36	52.0	57.8	108.0	120.0
6	1	---	48	58.5	65.0	121.5	135.0
7	1	---	54	65.0	72.2	135.0	150.0

Power output at various data rates:

Test Mode	Bandwidth	Frequency (MHz)	Channel	Data Rate	Peak Power (dBm)
802.11b	20	2437	6	1	19.03
				5.5	18.92
				11	18.75
802.11g	20	2437	6	6	19.02
				24	18.96
				54	18.87
802.11n20	20	2437	6	MCS0	17.85
				MCS4	17.47
				MCS7	17.33
802.11n40	40	2437	6	MCS0	17.92
				MCS4	17.85
				MCS7	17.67

Product	:	Q TV Engine
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
1	2412	19.26	30.00	Pass
6	2437	19.03	30.00	Pass
11	2462	19.74	30.00	Pass

Product	:	Q TV Engine
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
1	2412	19.02	30.00	Pass
6	2437	20.70	30.00	Pass
11	2462	19.74	30.00	Pass

Product	:	Q TV Engine
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 3: Transmit by 802.11n(20MHz)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
1	2412	17.85	30.00	Pass
6	2437	20.12	30.00	Pass
11	2462	18.22	30.00	Pass

Product	:	Q TV Engine
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 4: Transmit by 802.11n(40MHz)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
3	2422	17.92	30.00	Pass
6	2437	17.80	30.00	Pass
9	2452	18.22	30.00	Pass

10. Power Spectral Density

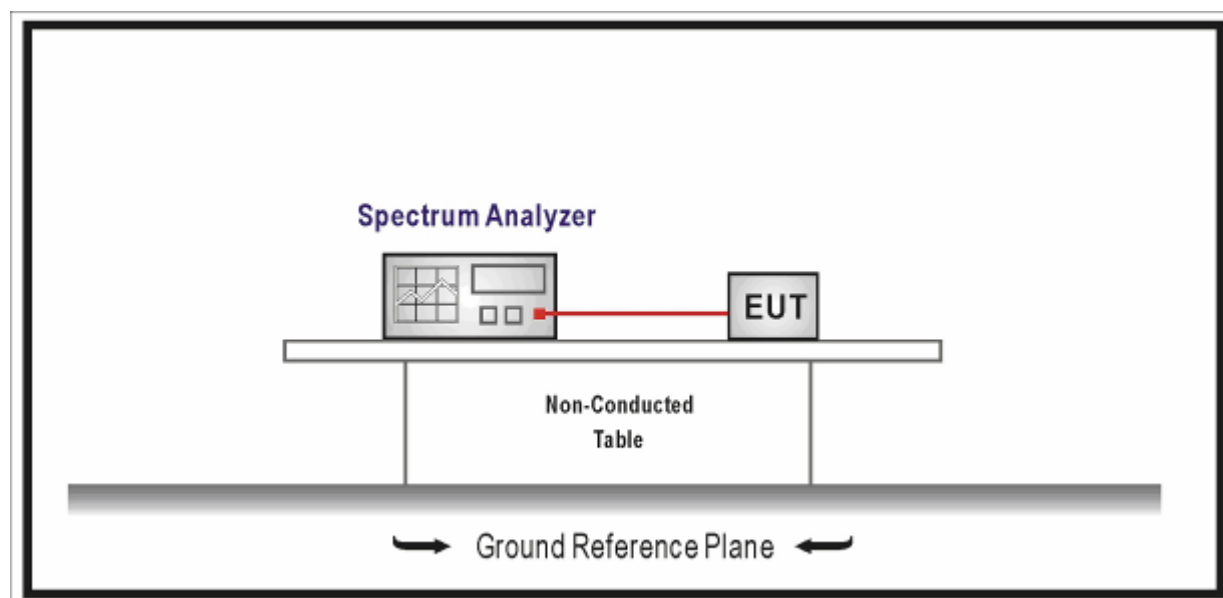
10.1. Test Equipment

Power Spectral Density / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2014.05.08

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

10.2. Test Setup



10.3. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiated to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

10.4. Test Procedure

The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Set the Span to 1.5 times the DTS channel bandwidth, $RBW \geq 3 \text{ kHz}$, $VBW \geq 3*RBW$, Sweep time = auto couple, detector = Peak, trace mode = max hold, allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level.

10.5. Uncertainty

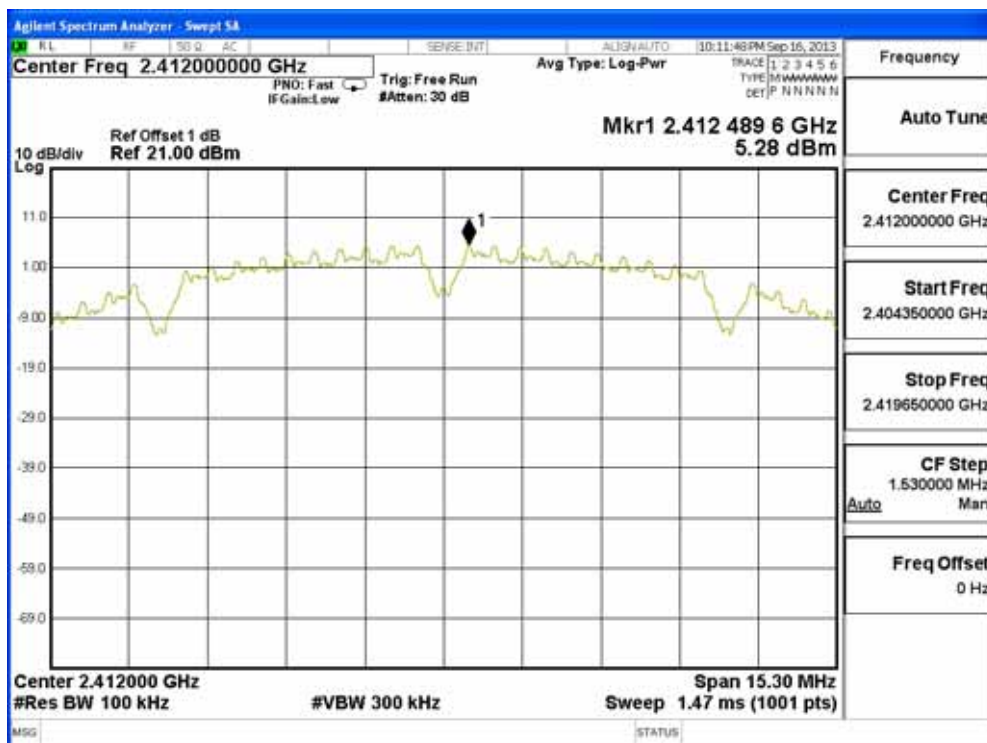
The measurement uncertainty is defined as $\pm 1.27 \text{ dB}$

10.6. Test Result

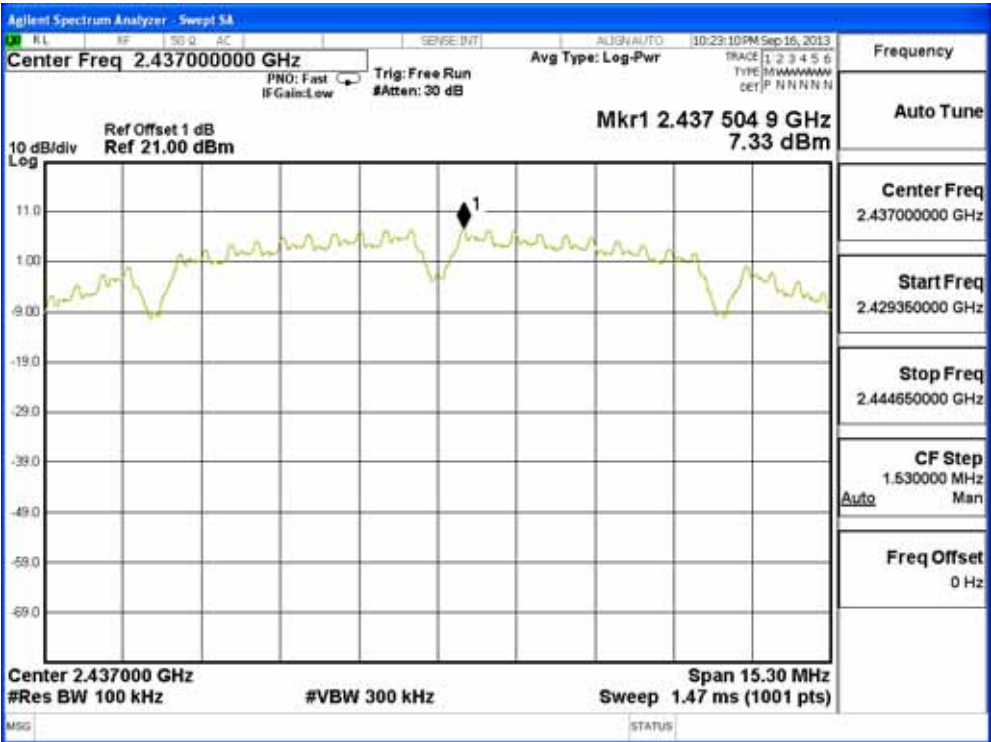
Product	:	Q TV Engine
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Result
01	2412	5.28	8	Pass
06	2437	7.33	8	Pass
11	2462	7.77	8	Pass

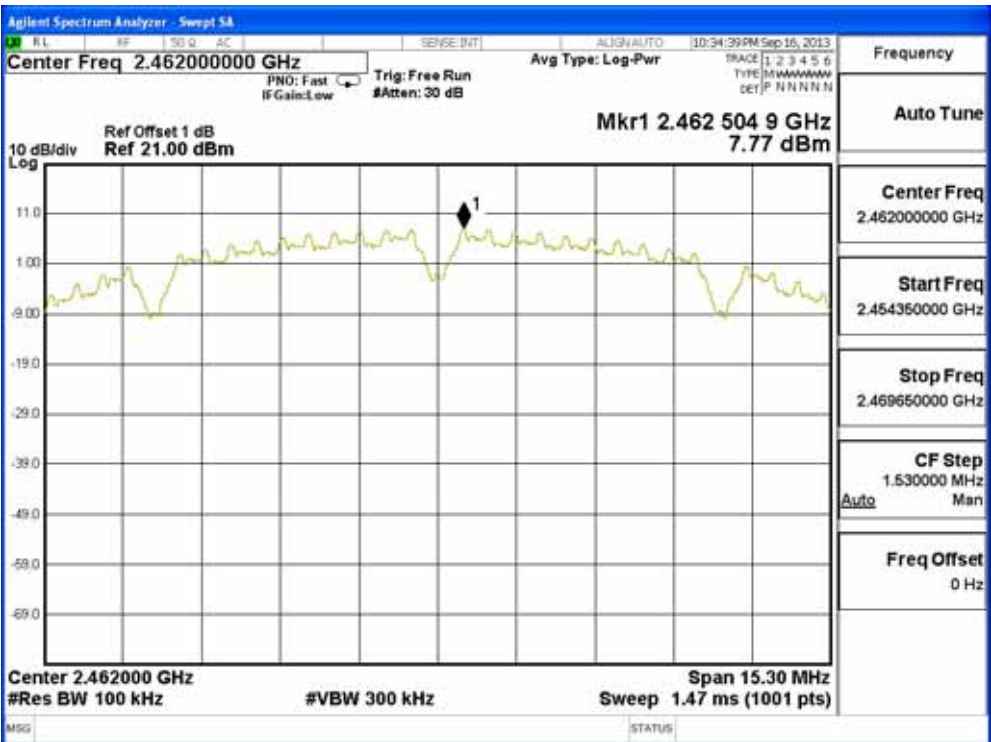
Channel 01 (2412MHz)



Channel 06 (2437MHz)



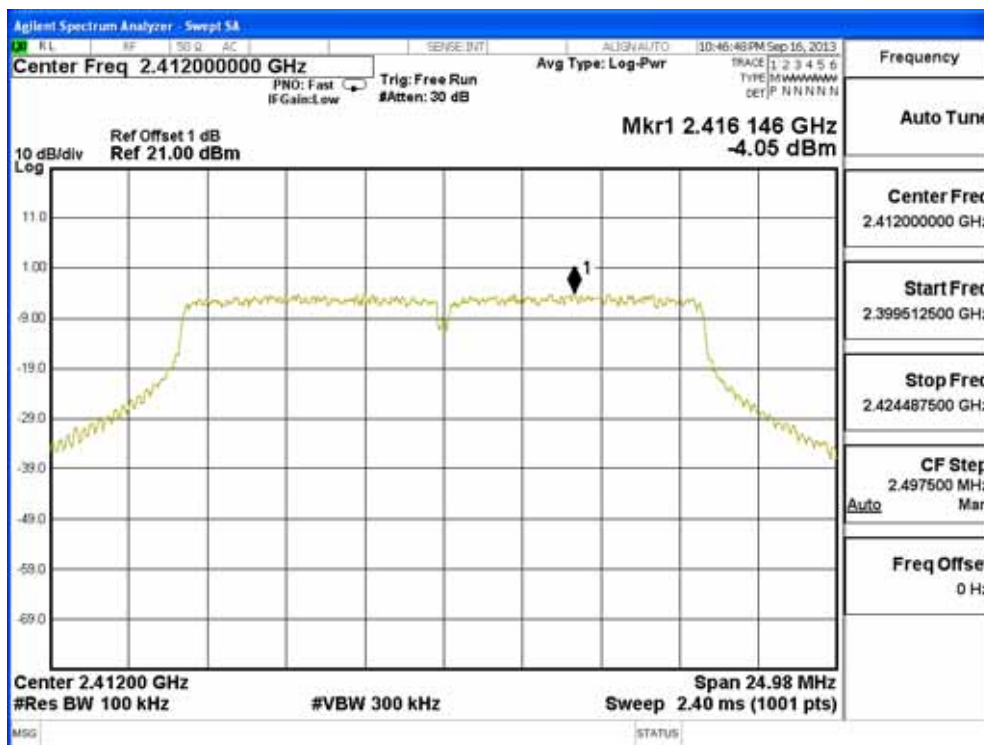
Channel 11 (2462MHz)



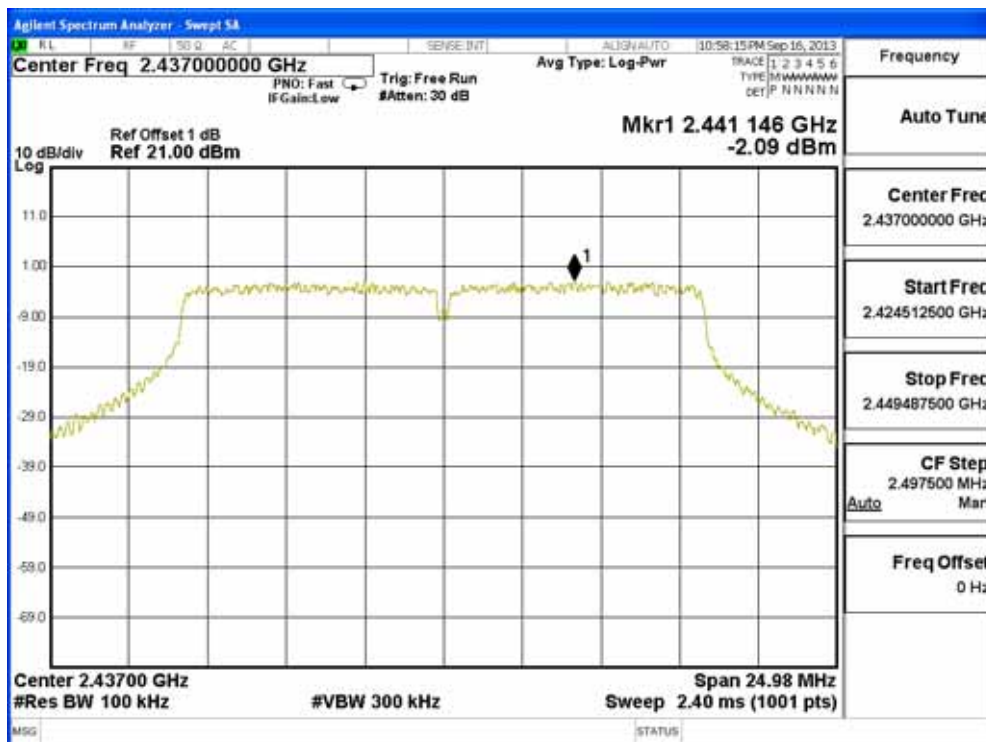
Product	:	Q TV Engine
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Reading Value (dBm)	Limit (dBm)	Result
01	2412	-4.05	8	Pass
06	2437	-2.09	8	Pass
11	2462	-3.61	8	Pass

Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)



Product	:	Q TV Engine
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmit by 802.11n (20MHz)

Channel No.	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Result
01	2412	-4.10	8	Pass
06	2437	-1.61	8	Pass
11	2462	-4.23	8	Pass

Channel 01 (2412MHz)



Channel 06 (2437MHz)



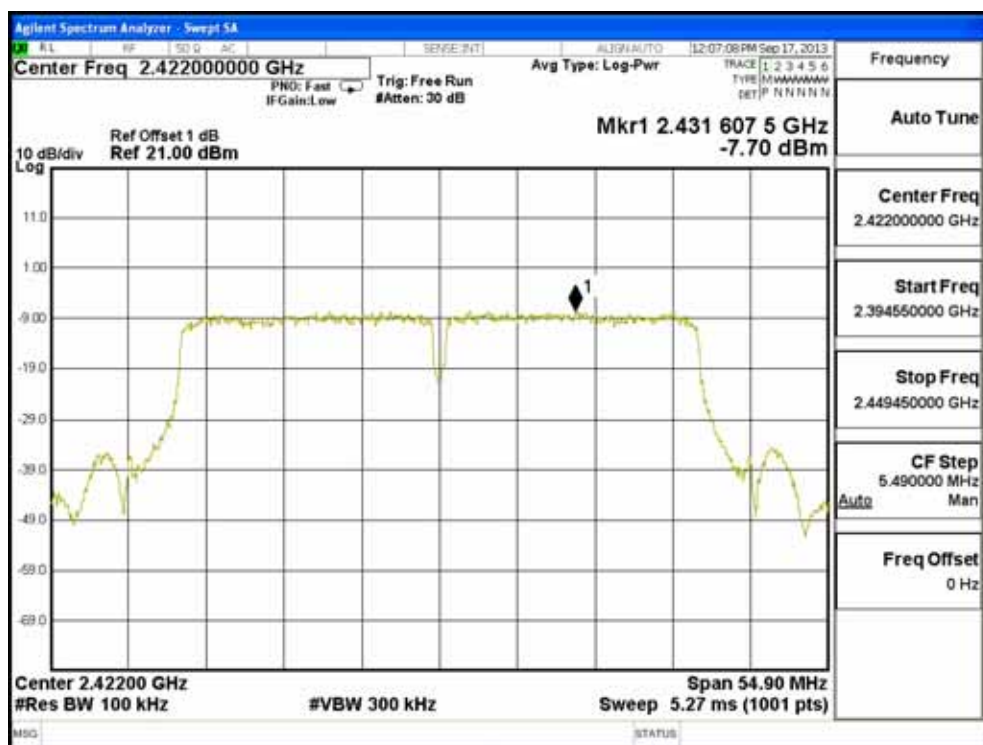
Channel 11 (2462MHz)



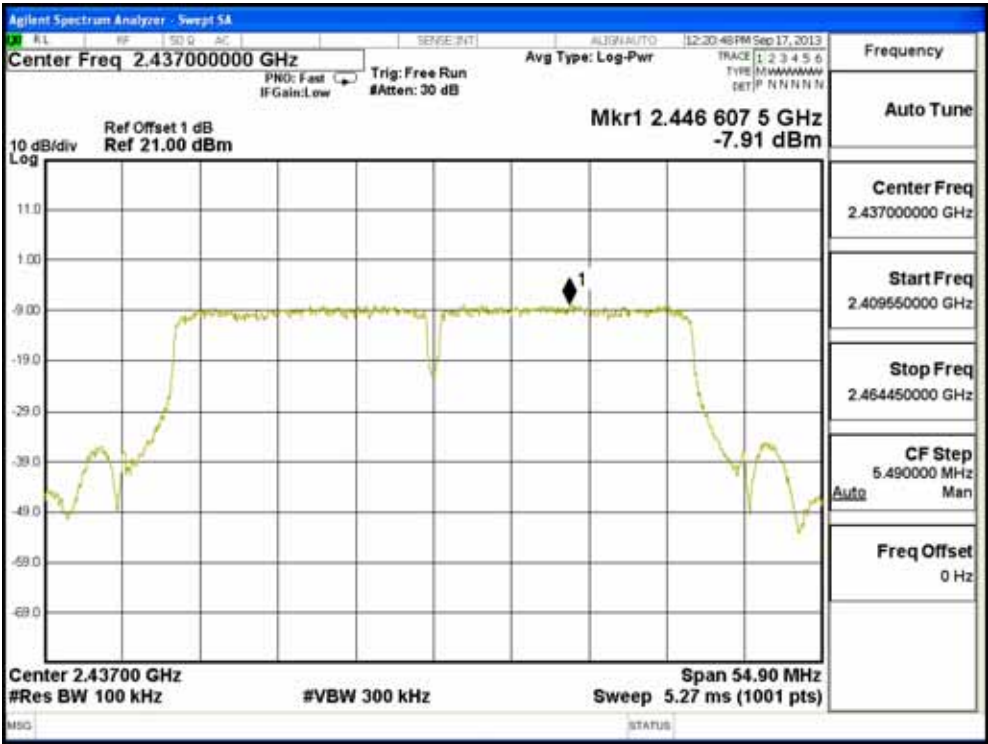
Product	:	Q TV Engine
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 4: Transmit by 802.11n (40MHz)

Channel No.	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Result
03	2422	-7.70	8	Pass
06	2437	-7.91	8	Pass
09	2452	-7.65	8	Pass

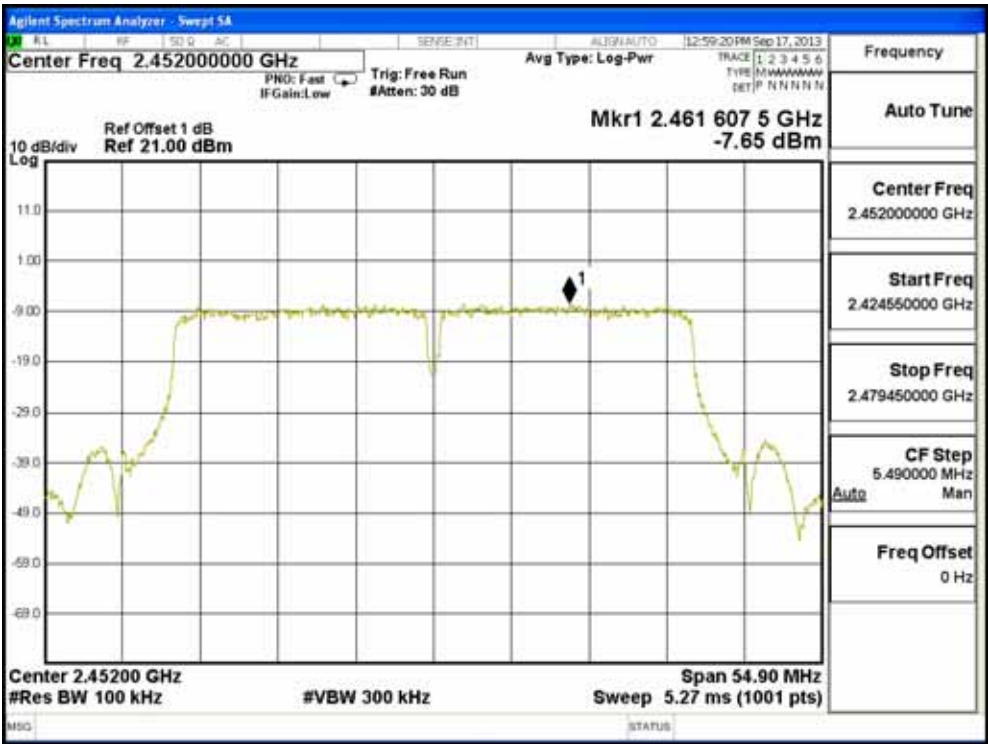
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



The End