FCC Part 15C Test Report

FCC ID: 2AHWWW3202

Product Name:	**Digital Signage**
Trademark:	Liulink
Model Name :	W3202
Prepared For : Address :	**Beijing Liulink Technology Co., Ltd.** Room 1015, Office Building of Jiamei Centre, No.16 Guangshun South Street, Chaoyang District, Beijing 100102, China
Prepared By : Address :	**Shenzhen BCTC Technology Co., Ltd.** No.101,Yousong Road,Longhua New District, Shenzhen,China
Test Date:	**Jan. 21 – Jan. 25, 2016**
Date of Report :	**Jan. 26, 2016**
Report No.:	**BCTC-160101395E**

TEST RESULT CERTIFICATION

Applicant's name ..... : Beijing Liulink Technology Co., Ltd.

Address ..... : Room 1015, Office Building of Jiamei Centre, No.16 Guangshun South Street, Chaoyang District, Beijing 100102, China

Manufacture's Name..... : Beijing Liulink Technology Co., Ltd.

Address ..... : Room 1015, Office Building of Jiamei Centre, No.16 Guangshun South Street, Chaoyang District, Beijing 100102, China

Product description

Product name ..... : Digital Signage

Trademark ..... : Liulink

Model and/or type reference : W3202

Standards ..... : FCC Part15.247

Test procedure ..... ANSI C63.10-2013

This device described above has been tested by BCTC, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Testing Engineer : Eric Yang

(Eric Yang)

Technical Manager : Sophie Lee

(Sophia Lee)

Authorized Signatory : Casey Wang

SHENZHEN BCTC TECHNOLOGY CO., LTD. APPROVED

(Casey Wang)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

Shenzhen BCTC Technology Co., Ltd.
Add. : No.101,Yousong Road,Longhua New District, Shenzhen,China
FCC Registered No.: 187086

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Digital Signage
Trade Name	Liulink
Model Name	W3202
Model Difference	N/A
Product Description	The EUT is a Digital Signage Operation Frequency: 802.11b/g/n20MHz:2412~2462 MHz; 802.11n40MHz:2422~2452 MHz Modulation Type: WIFI: OFDM/DSSS Bit Rate of Transmitter: 802.11b:11/5.5/2/1 Mbps; 802.11g:54/48/36/24/18/12/9/6Mbps; 802.11n Up to 150Mbps Number Of Channel: 802.11b/g/n20MHz:11 CH; 802.11n40MHz: 7 CH Antenna Designation: Please see Note 3. Antenna Gain (dBi): 1.5dbi Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Power	AC 100~240V 50/60Hz
hardware version	--
Software version	--
Serial number	--
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Channel List for 802.11b/g/n(20)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

Channel List for 802.11n(40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	05	2432	07	2442	09	2452
04	2427	06	2437	08	2447		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
	N/A	N/A	External Antenna	N/A	2.1	

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH9
Mode 5	Link Mode
For Conducted Emission	
Final Test Mode	Description
Mode 5	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH9

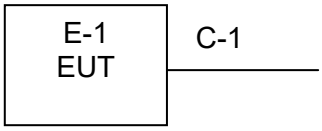
Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

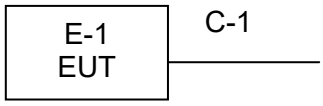
(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Digital Signage	N/A	W3202	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C1	NO	NO	0.8M	Unshielded

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer	Agilent	E4407B	MY45109572	2015.08.25	2016.08.24
2	Test Receiver	R&S	ESPI	101396	2015.08.25	2016.08.24
3	Bilog Antenna	SCHWARZBECK	VULB9160	VULB9160-3369	2015.08.25	2016.08.24
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.07.06	2016.07.05
5	Spectrum Analyzer	Agilent	N9020A	MY5051041	2015.07.06	2016.07.05
6	Horn Antenna	SCHWARZBECK	9120D	9120D-1275	2015.08.25	2016.08.24
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05
8	Amplifier	SCHWARZBECK	BBV9718	9718-270	2015.08.25	2016.08.24
9	Amplifier	SCHWARZBECK	BBV9743	9743-119	2015.08.25	2016.08.24
10	Loop Antenna	ARA	PLW320230/B	1029	2015.07.06	2016.07.05
11	Power Meter	R&S	NRVS	100696	2015.07.06	2016.07.05
12	Power Sensor	R&S	URV5-Z4	0395.1619.05	2015.07.06	2016.07.05
13	RF cables	R&S	N/A	N/A	2015.07.06	2016.07.05

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Test Receiver	R&S	ESCI	1166.5950K03-101165-ha	2015.06.06	2016.06.05
2	LISN	R&S	NSLK8126	8126466	2015.08.24	2016.08.23
3	LISN	R&S	NSLK8126	8126487	2015.08.24	2016.08.23
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.07	2016.06.06
5	RF cables	R&S	R204	R20X	2015.07.06	2016.07.05

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

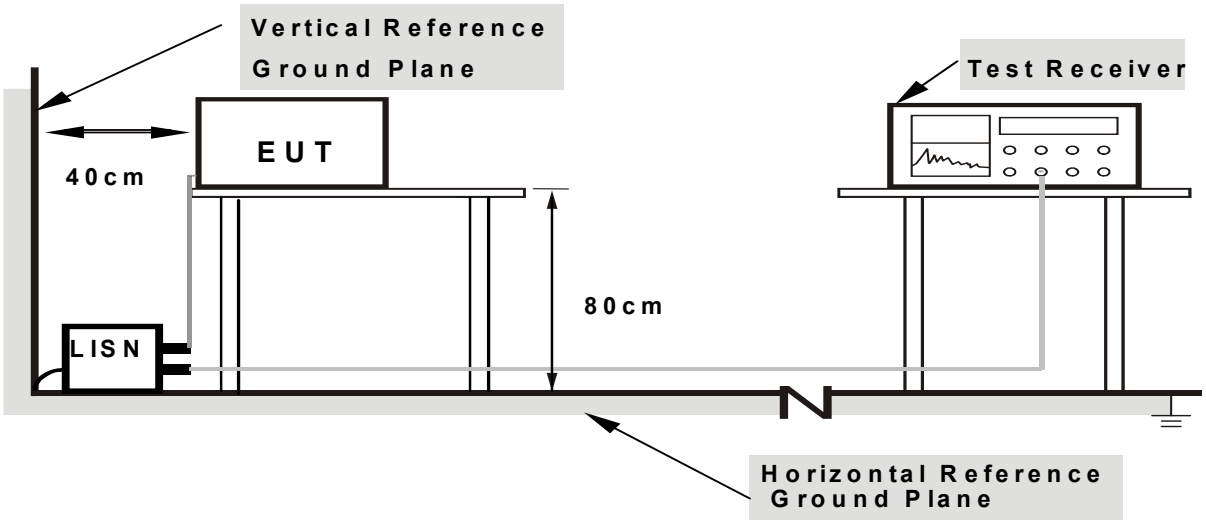
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

3.1.6 TEST RESULTS

EUT :	Digital Signage	Model Name. :	W3202
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5

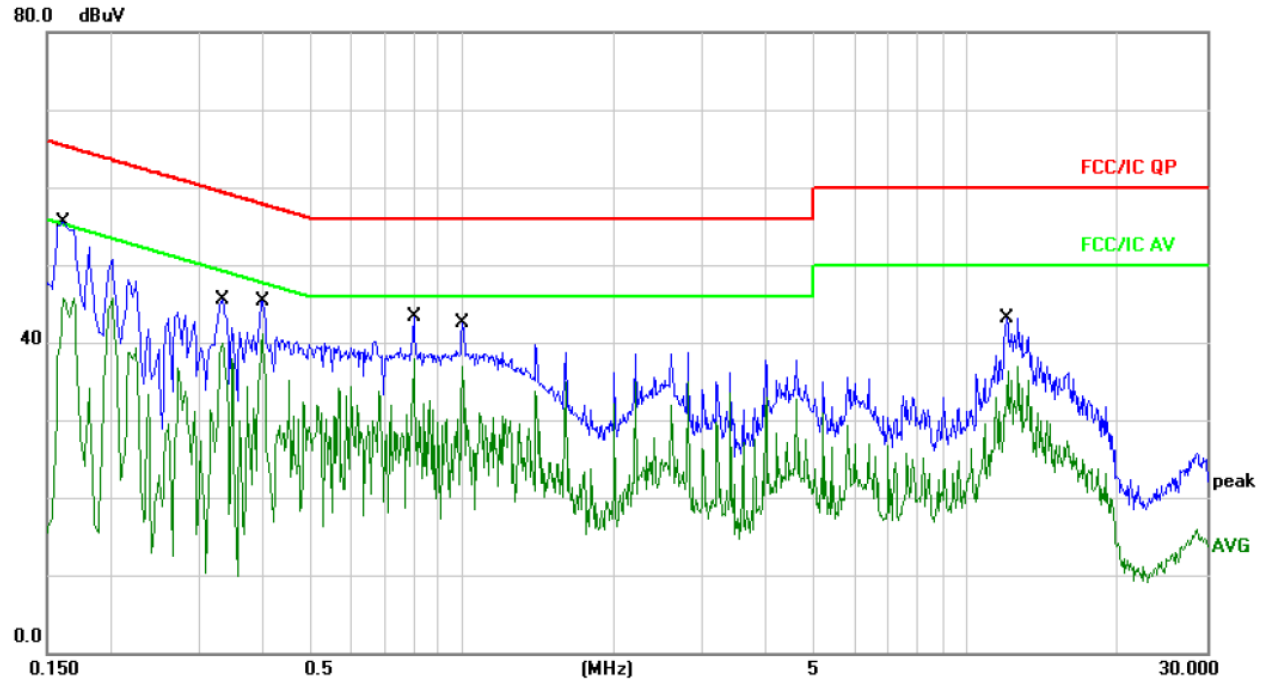
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1700	44.93	10.06	54.99	64.96	-9.97	QP	
2		0.1700	35.45	10.06	45.51	54.96	-9.45	AVG	
3		0.2020	42.12	10.07	52.19	63.52	-11.33	QP	
4		0.2028	35.31	10.07	45.38	53.49	-8.11	AVG	
5		0.4020	36.24	10.10	46.34	57.81	-11.47	QP	
6	*	0.4020	31.56	10.10	41.66	47.81	-6.15	AVG	
7		1.0020	32.67	10.17	42.84	56.00	-13.16	QP	
8		1.0020	27.46	10.17	37.63	46.00	-8.37	AVG	
9		4.0100	29.00	10.16	39.16	56.00	-16.84	QP	
10		4.0100	25.29	10.16	35.45	46.00	-10.55	AVG	
11		12.6819	35.16	10.14	45.30	60.00	-14.70	QP	
12		12.6819	28.11	10.14	38.25	50.00	-11.75	AVG	

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

EUT :	Digital Signage	Model Name. :	W3202
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 5

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	45.51	10.05	55.56	65.36	-9.80	QP	
2		0.1620	35.71	10.05	45.76	55.36	-9.60	AVG	
3		0.3339	35.45	10.10	45.55	59.35	-13.80	QP	
4		0.3339	29.86	10.10	39.96	49.35	-9.39	AVG	
5	*	0.3996	29.60	10.10	39.70	47.86	-8.16	AVG	
6		0.4020	35.18	10.10	45.28	57.81	-12.53	QP	
7		0.8020	33.23	10.15	43.38	56.00	-12.62	QP	
8		0.8059	22.97	10.15	33.12	46.00	-12.88	AVG	
9		1.0020	32.26	10.17	42.43	56.00	-13.57	QP	
10		1.0020	26.64	10.17	36.81	46.00	-9.19	AVG	
11		12.0259	33.01	10.13	43.14	60.00	-16.86	QP	
12		12.0259	22.82	10.13	32.95	50.00	-17.05	AVG	

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

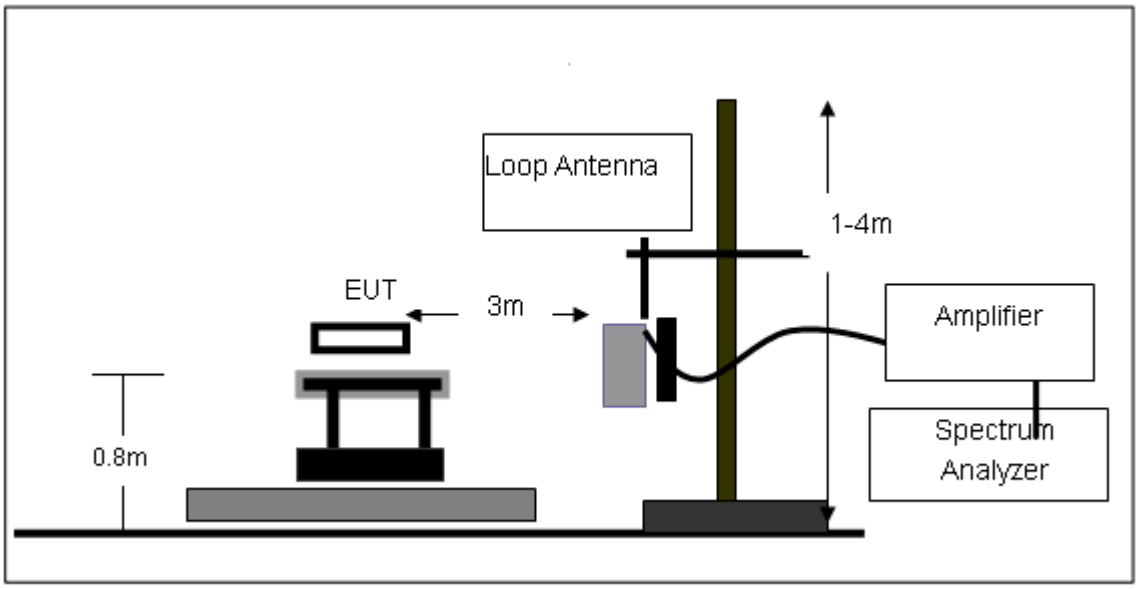
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported
We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in t he report.

3.2.3 DEVIATION FROM TEST STANDARD

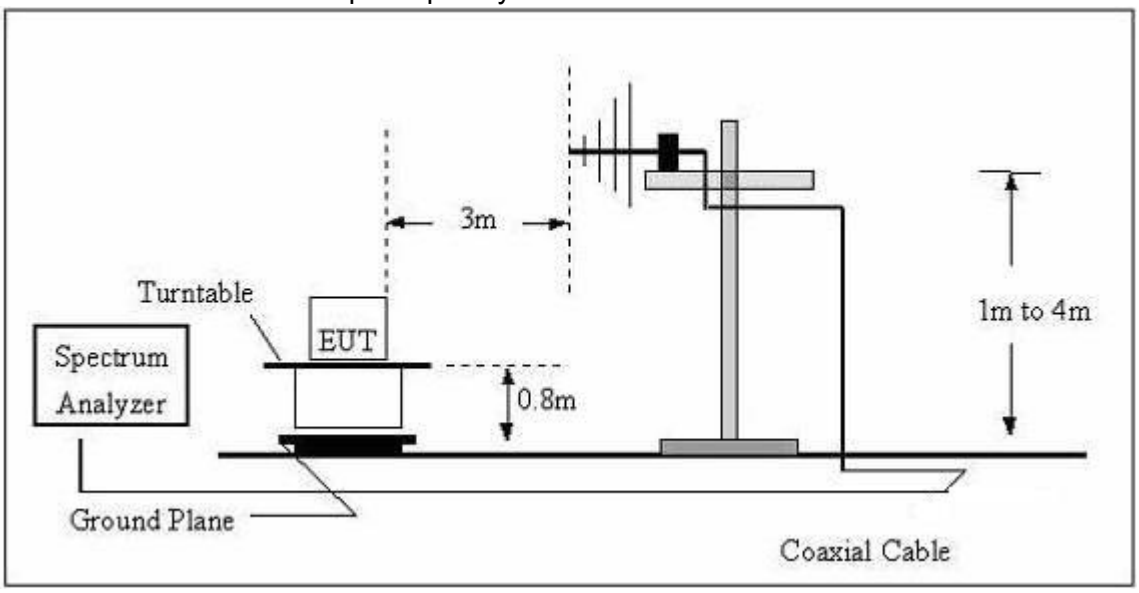
No deviation

3.2.4 TEST SETUP

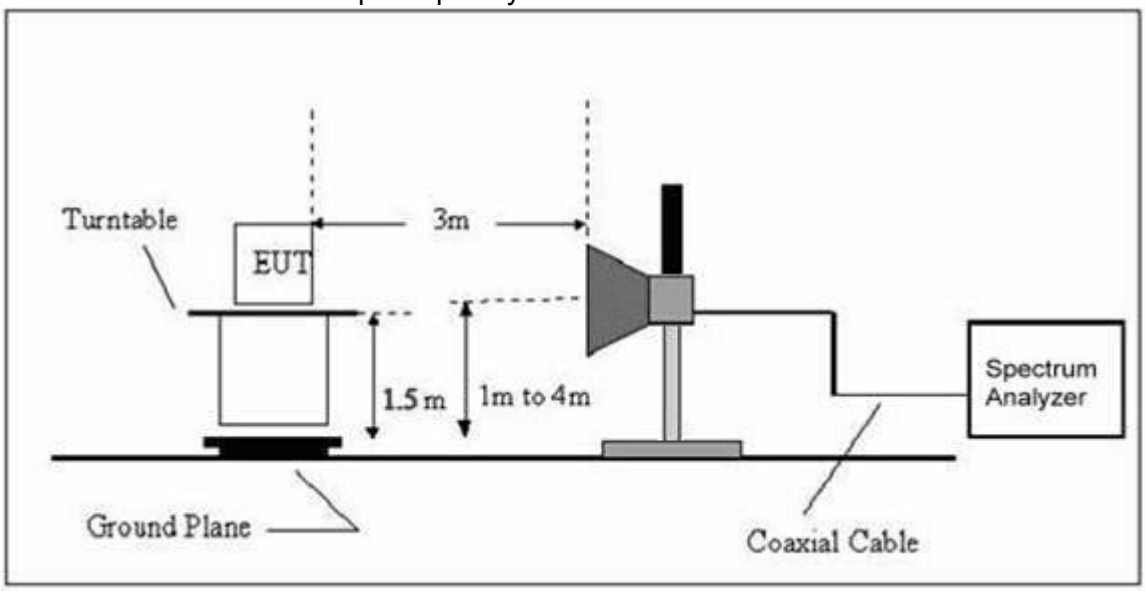
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT：	Digital Signage	Model Name. ：	W3202
Temperature：	20℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	AC 120V/60Hz
Test Mode ：	Mode 5	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

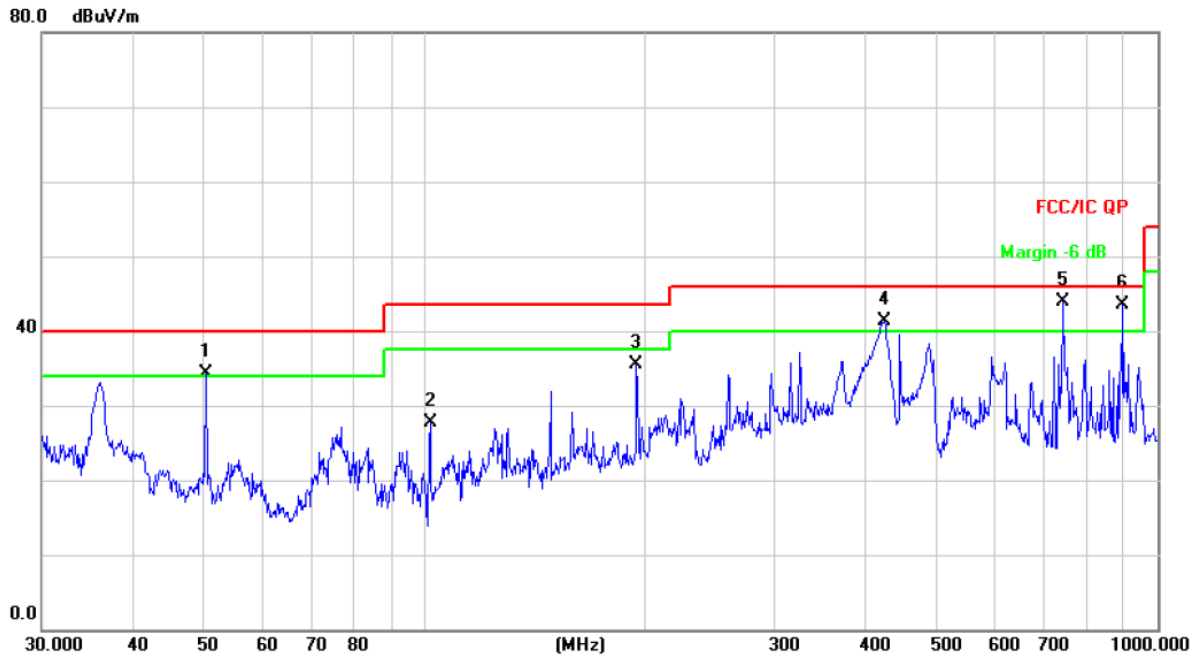
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	Digital Signage	Model Name :	W3202
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 5 BT		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	!	50.2324	44.61	-10.33	34.28	40.00	-5.72	QP			
2		101.6443	43.94	-16.33	27.61	43.50	-15.89	QP			
3		194.4534	51.28	-15.86	35.42	43.50	-8.08	QP			
4	!	423.5403	50.99	-9.65	41.34	46.00	-4.66	QP			
5	*	742.2587	47.37	-3.54	43.83	46.00	-2.17	QP			
6	!	896.9965	45.12	-1.52	43.60	46.00	-2.40	QP			

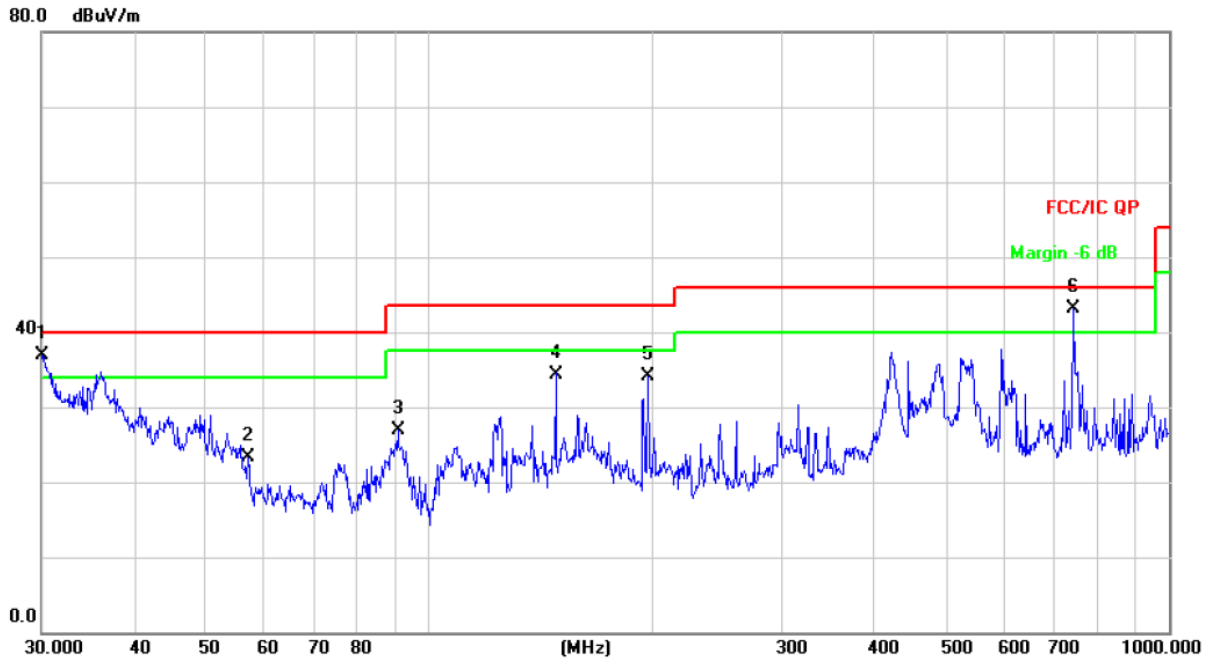
Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All interfaces was connected, and BT TX mode was link.



EUT :	Digital Signage	Model Name :	W3202
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 5 BT		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	!	30.0000	44.95	-8.02	36.93	40.00	-3.07	QP			
2		56.9912	34.53	-11.28	23.25	40.00	-16.75	QP			
3		90.8554	44.41	-17.41	27.00	43.50	-16.50	QP			
4		148.4410	47.33	-12.93	34.40	43.50	-9.10	QP			
5		197.8928	50.11	-16.07	34.04	43.50	-9.46	QP			
6	*	742.2587	46.36	-3.30	43.06	46.00	-2.94	QP			

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All interfaces was connected, and BT TX mode was link.



3.2.8 TEST RESULTS (1GHZ~25GHZ)

802.11b

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2412							
V	4825.166	65.25	-3.64	61.61	74	-12.39	Pk
V	4825.166	46.91	-3.64	43.27	54	-10.73	AV
H	4825.215	64.76	-3.64	61.12	74	-12.88	Pk
H	4825.215	45.62	-3.64	41.98	54	-12.02	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11b

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2437							
V	4876.053	63.03	-3.63	59.40	74	-14.60	Pk
V	4876.053	44.93	-3.63	41.30	54	-12.70	AV
H	4876.211	63.97	-3.64	60.33	74	-13.67	Pk
H	4876.211	44.60	-3.64	40.96	54	-13.04	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11b

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2462							
V	4913.115	65.66	-3.64	62.02	74	-11.98	Pk
V	4913.115	46.60	-3.64	42.96	74	-11.04	AV
H	4912.732	64.44	-3.66	60.78	54	-13.22	Pk
H	4912.732	45.43	-3.66	41.77	54	-12.23	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11g

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2412							
V	4821.224	68.23	-3.6	64.63	74	-9.37	Pk
V	4821.224	46.49	-3.6	42.89	54	-11.11	AV
H	4821.527	66.40	-3.6	62.80	74	-11.20	Pk
H	4821.527	46.21	-3.6	42.61	54	-11.39	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11g

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2437							
V	4874.354	65.76	-3.63	62.13	74	-11.87	Pk
V	4874.354	46.98	-3.63	43.35	54	-10.65	AV
H	4874.145	66.33	-3.64	62.69	74	-11.31	Pk
H	4874.145	46.09	-3.64	42.45	54	-11.55	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11g

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2462							
V	4914.103	65.44	-3.62	61.82	74	-12.18	Pk
V	4914.103	47.96	-3.62	44.34	74	-9.66	AV
H	4914.032	64.23	-3.62	60.61	74	-13.39	Pk
H	4914.032	47.13	-3.62	43.51	74	-10.49	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n(20MHz)

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2412							
V	4822.217	65.05	-3.58	61.47	74	-12.53	Pk
V	4822.217	46.74	-3.58	43.16	54	-10.84	AV
H	4822.322	65.22	-3.6	61.62	74	-12.38	Pk
H	4822.322	45.99	-3.6	42.39	54	-11.61	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11n(20MHz)

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2437							
V	4874.054	66.86	-3.63	63.23	74	-10.77	Pk
V	4874.054	46.43	-3.63	42.80	54	-11.20	AV
H	4874.312	65.43	-3.64	61.79	74	-12.21	Pk
H	4874.312	45.66	-3.64	42.02	54	-11.98	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11n(20MHz)

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2462							
V	4922.213	64.21	-3.64	60.57	74	-13.43	Pk
V	4922.213	43.65	-3.64	40.01	54	-13.99	AV
H	4923.144	59.30	-3.66	55.64	74	-18.36	Pk
H	4923.144	42.96	-3.66	39.30	54	-14.70	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n(40MHz)

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2422							
V	4844.058	64.85	-3.58	61.27	74	-12.73	Pk
V	4844.058	46.59	-3.58	43.01	54	-10.99	AV
H	4844.174	65.02	-3.6	61.42	74	-12.58	Pk
H	4844.174	45.85	-3.6	42.25	54	-11.75	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11n(40MHz)

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2437							
V	4874.314	66.65	-3.63	63.02	74	-10.98	Pk
V	4874.314	46.28	-3.63	42.65	54	-11.35	AV
H	4874.674	65.22	-3.64	61.58	74	-12.42	Pk
H	4874.674	45.52	-3.64	41.88	54	-12.12	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

802.11n(40MHz)

Normal Voltage

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2452							
V	4904.631	64.00	-3.64	60.36	74	-13.64	Pk
V	4904.631	43.51	-3.64	39.87	54	-14.13	AV
H	4904.517	59.11	-3.66	55.45	74	-18.55	Pk
H	4904.517	42.98	-3.66	39.32	54	-14.68	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

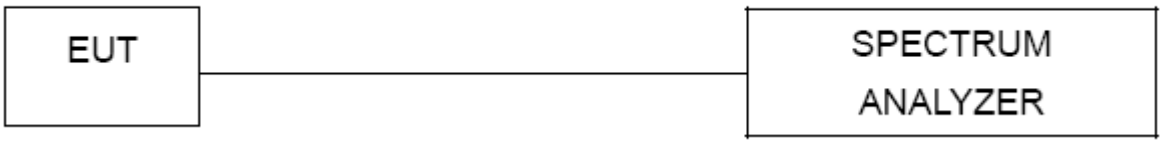
4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

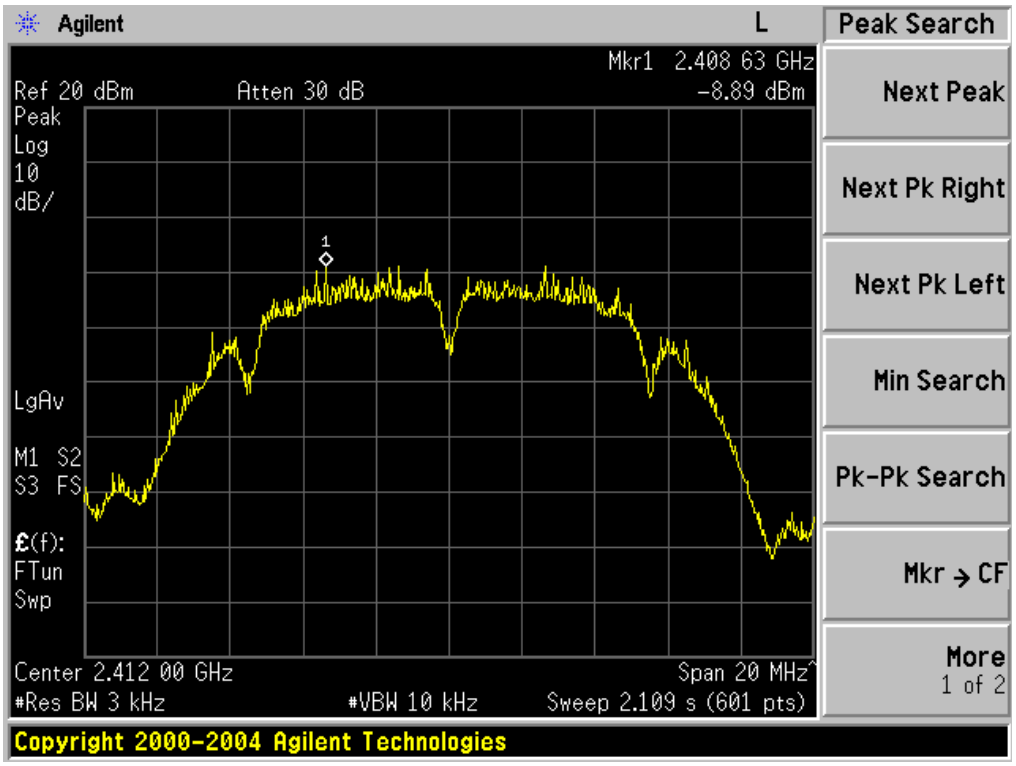
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

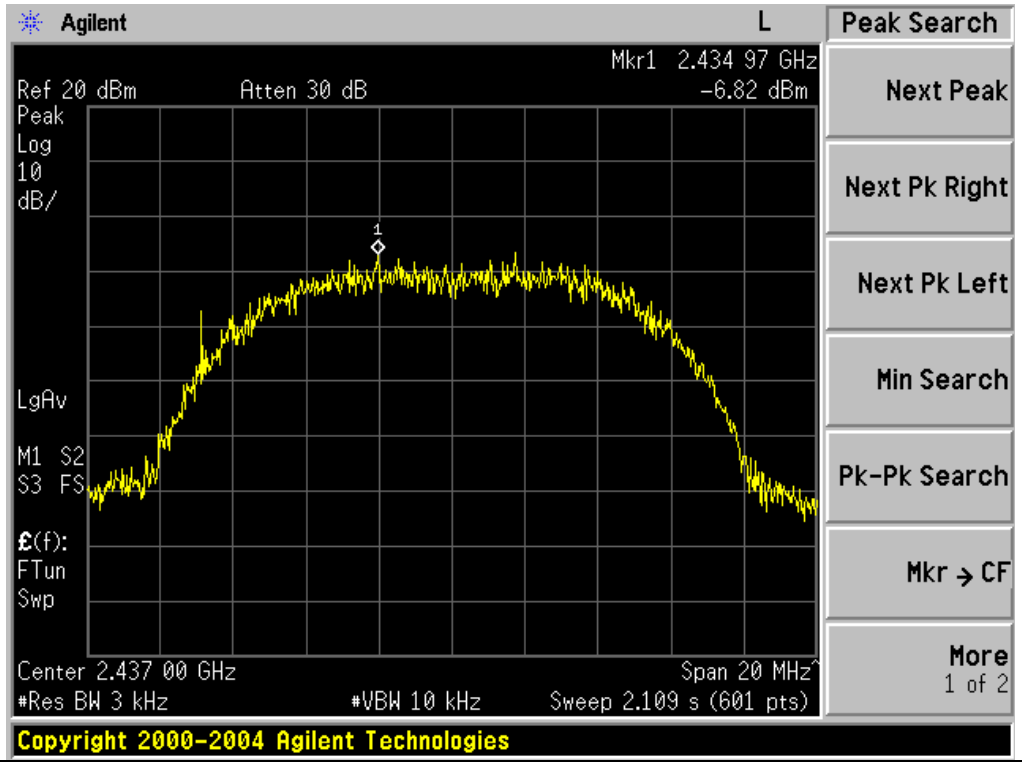
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX b Mode /CH01, CH06, CH11		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-8.89	8	PASS
2437 MHz	-6.82	8	PASS
2462 MHz	-7.96	8	PASS

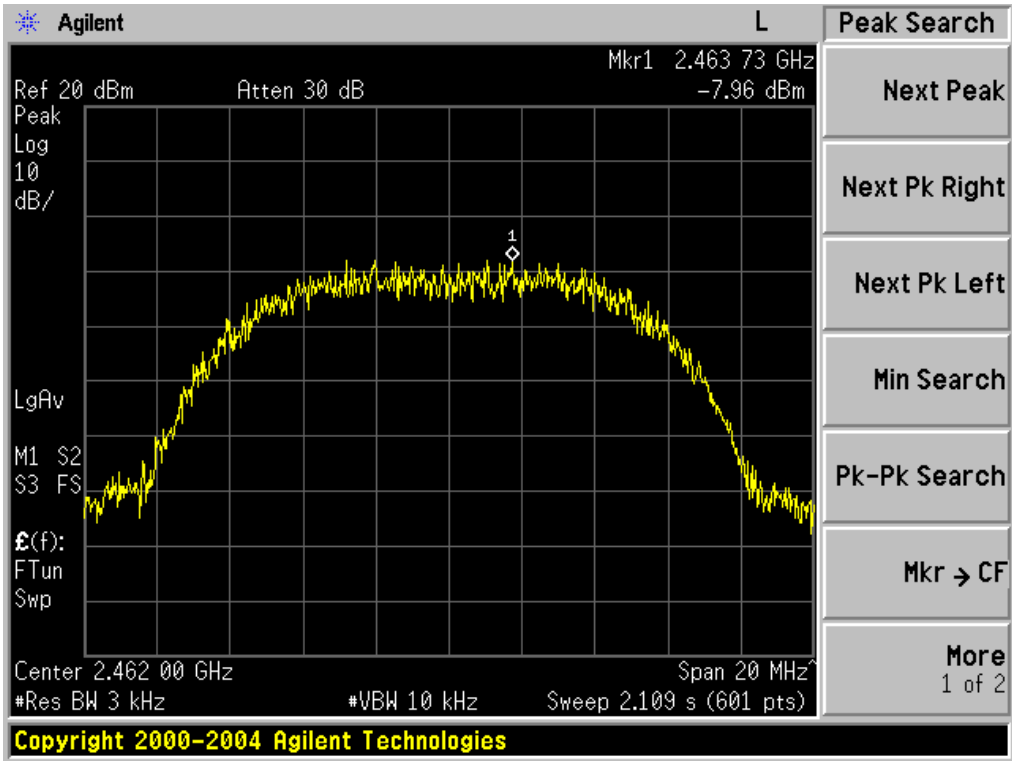
TX CH01



TX CH06



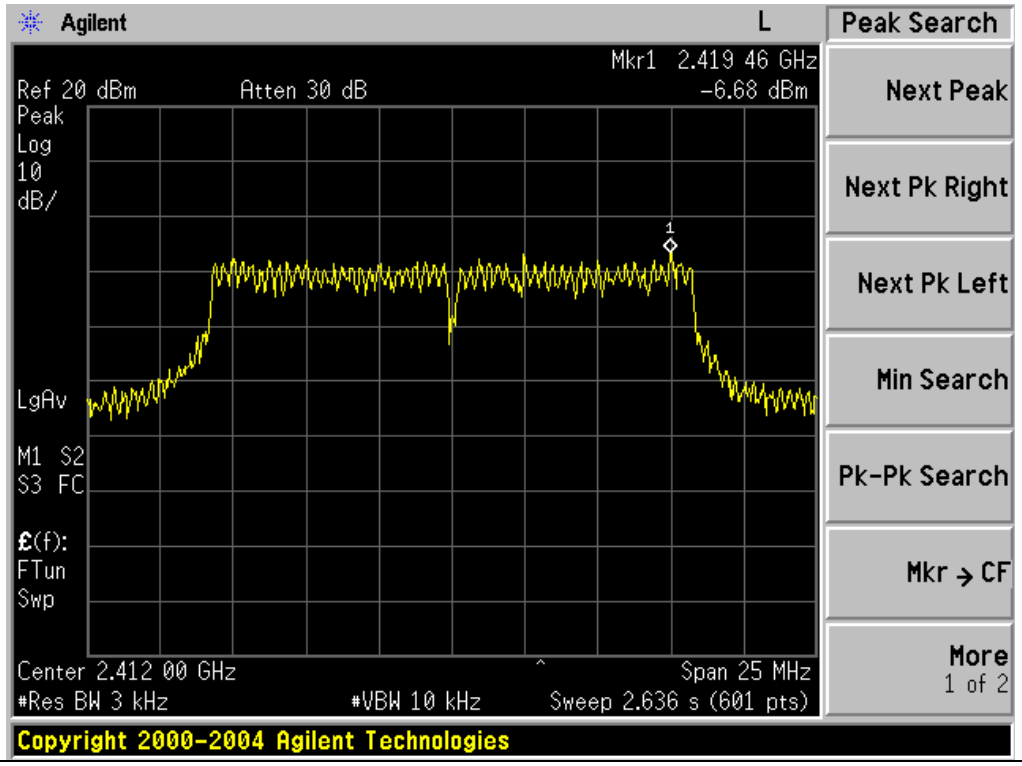
TX CH11



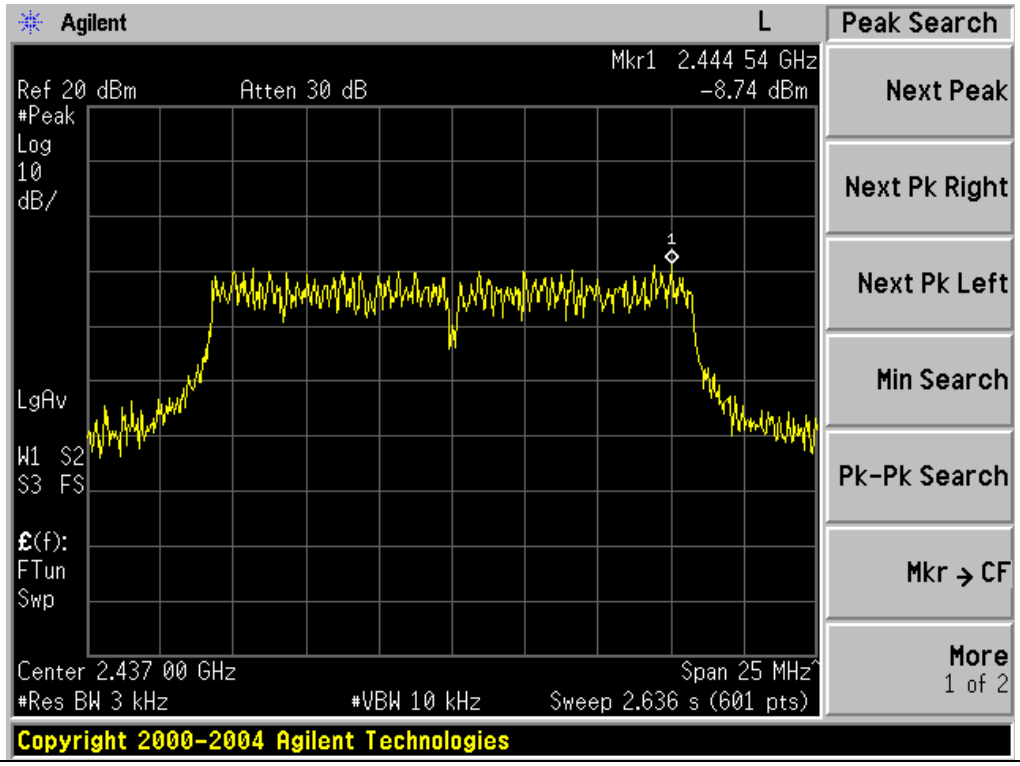
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX g Mode /CH01, CH06, CH11		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-6.68	8	PASS
2437 MHz	-8.74	8	PASS
2462 MHz	-7.56	8	PASS

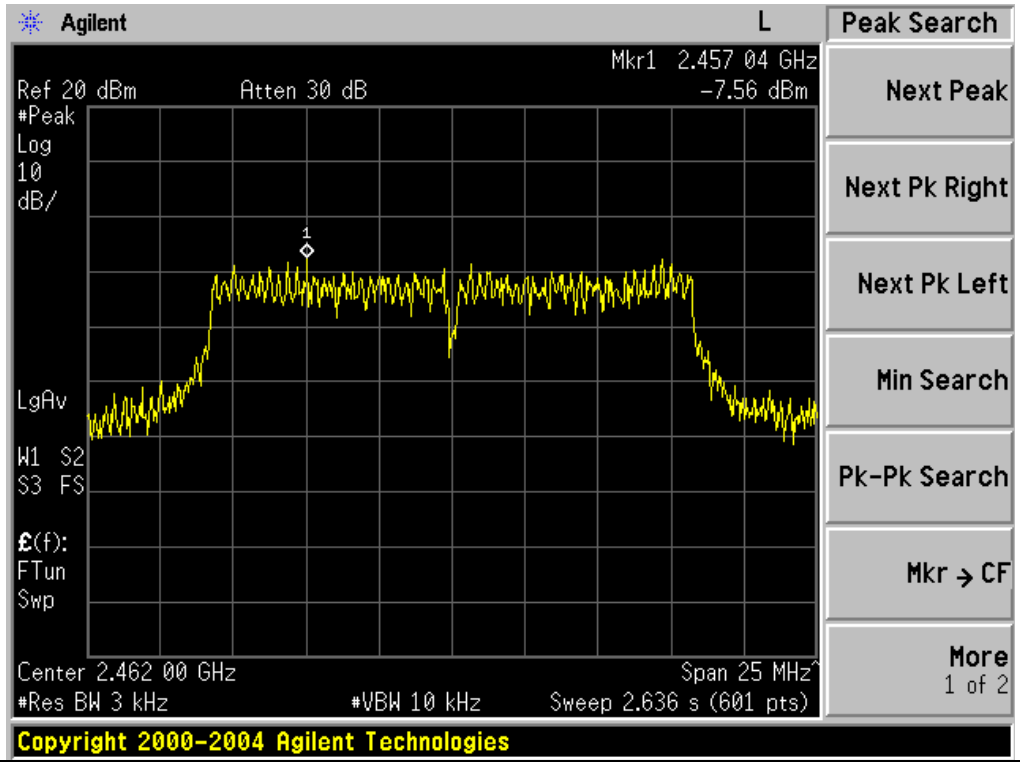
TX CH01



TX CH06



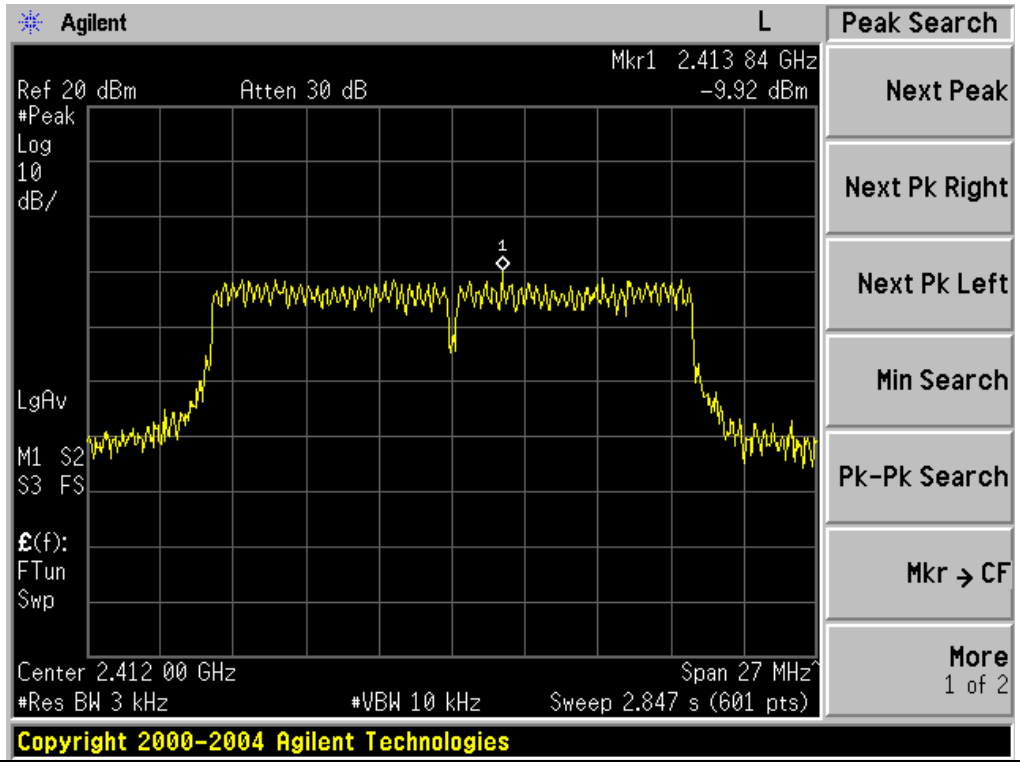
TX CH11



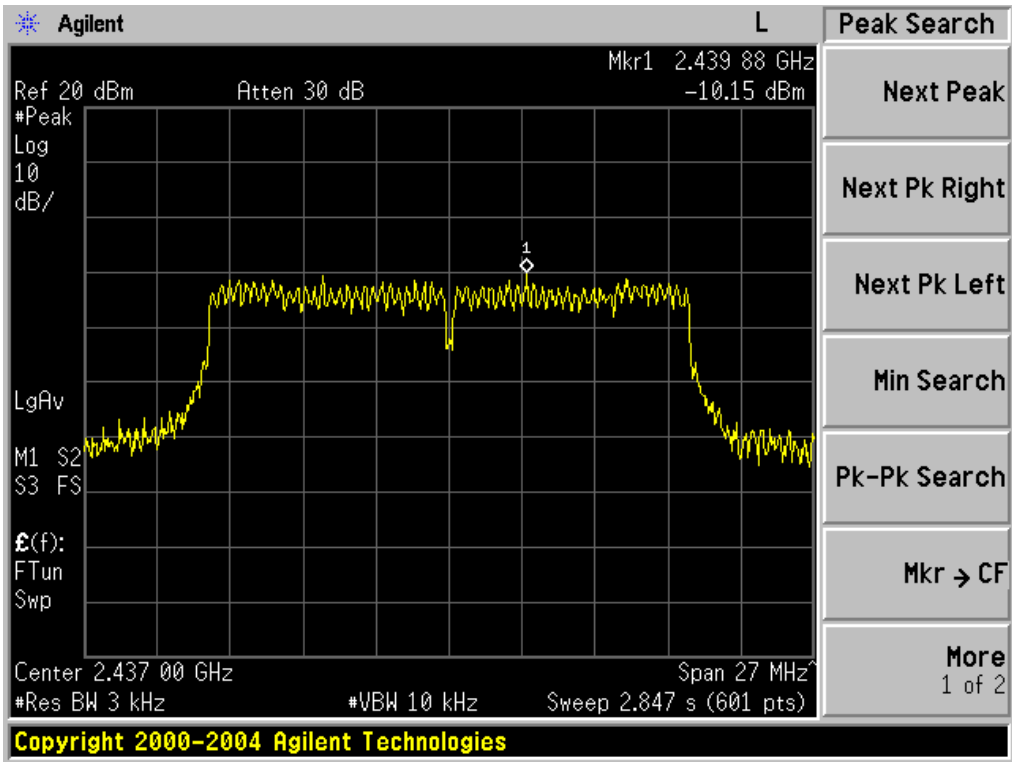
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-10.25	8	PASS
2437 MHz	-11.53	8	PASS
2462 MHz	-11.37	8	PASS

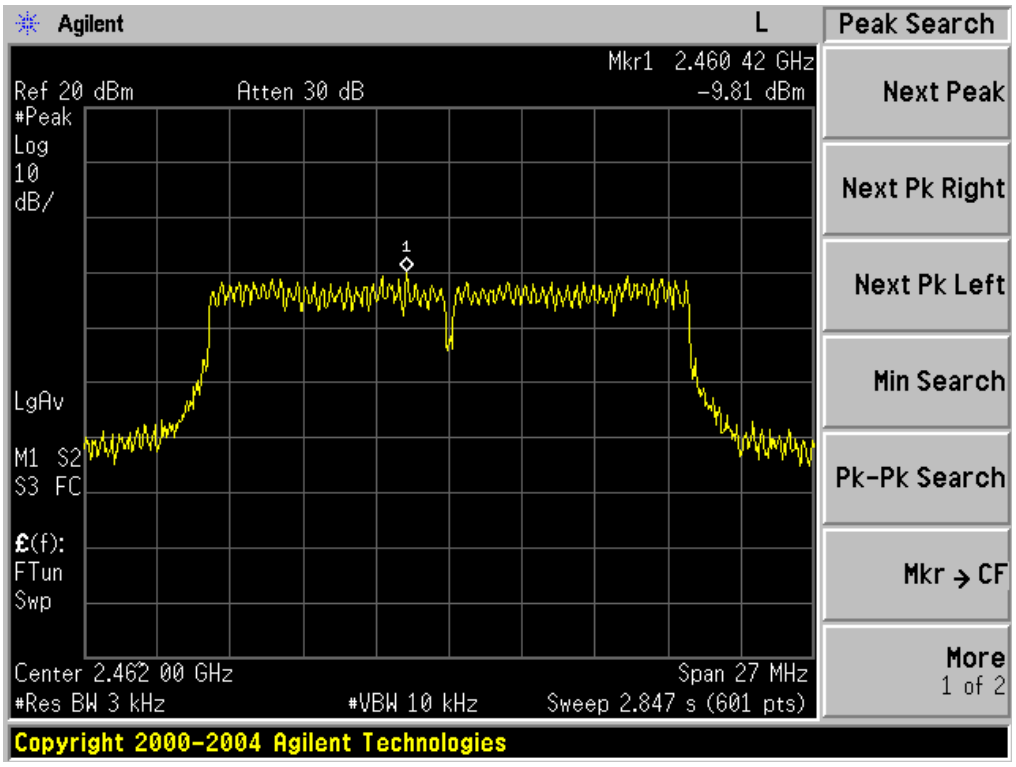
TX CH01



TX CH06



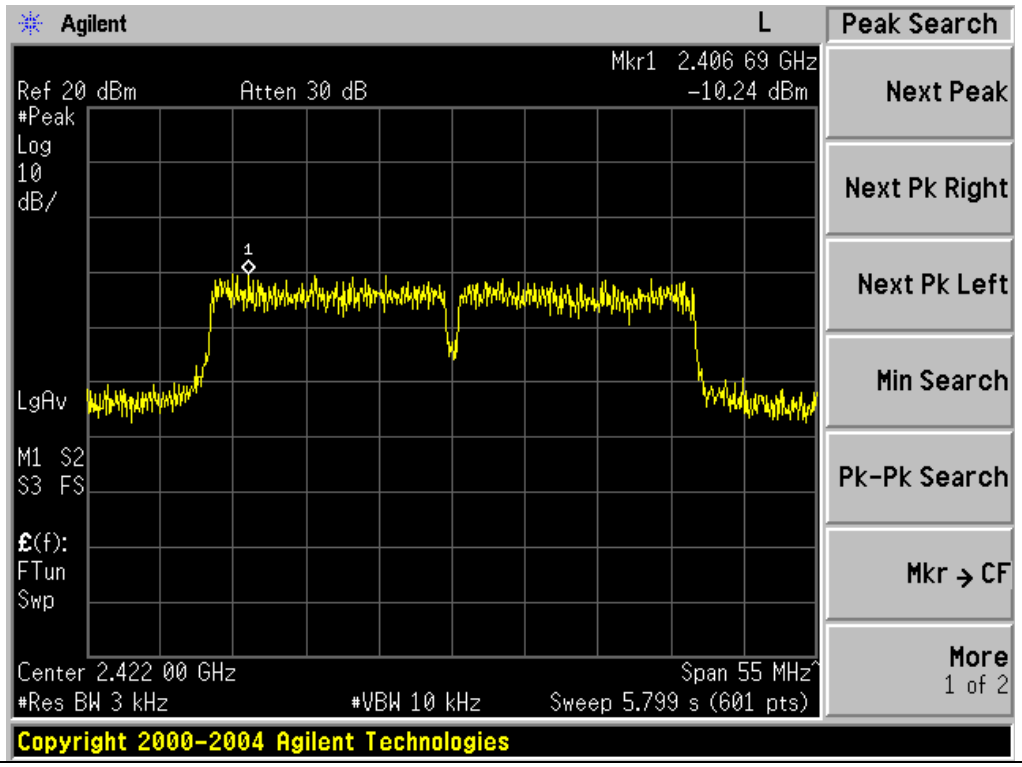
TX CH11



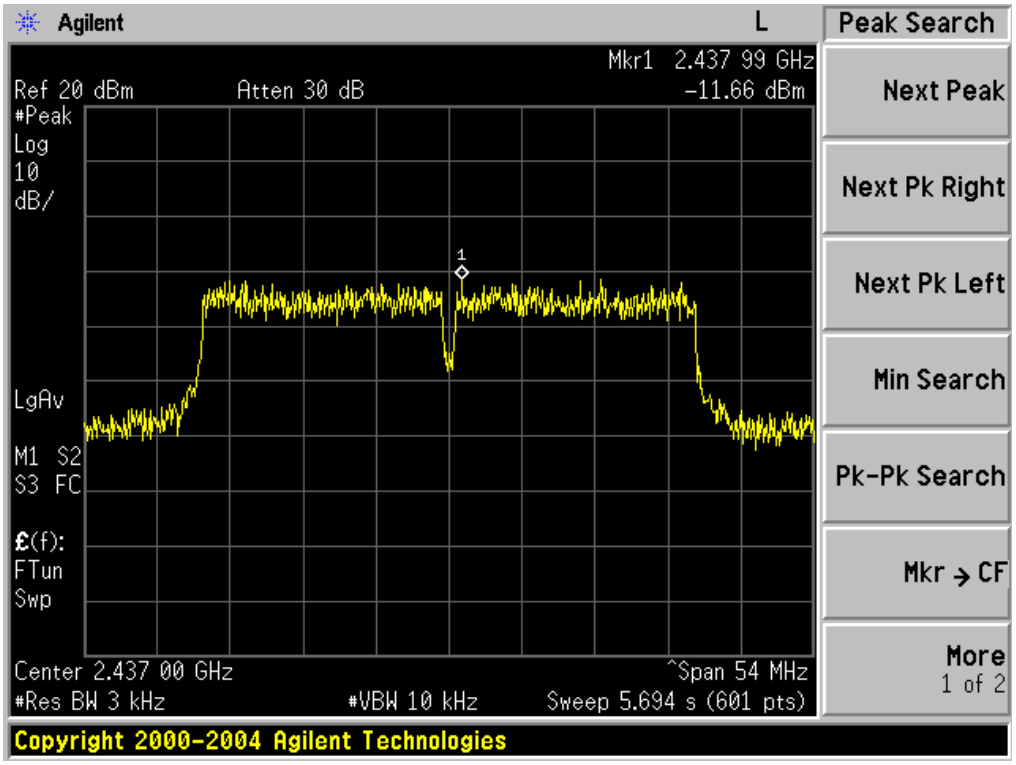
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX n Mode(40M) /CH03, CH06, CH9		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2422 MHz	-10.24	8	PASS
2437 MHz	-12.86	8	PASS
2452 MHz	-10.40	8	PASS

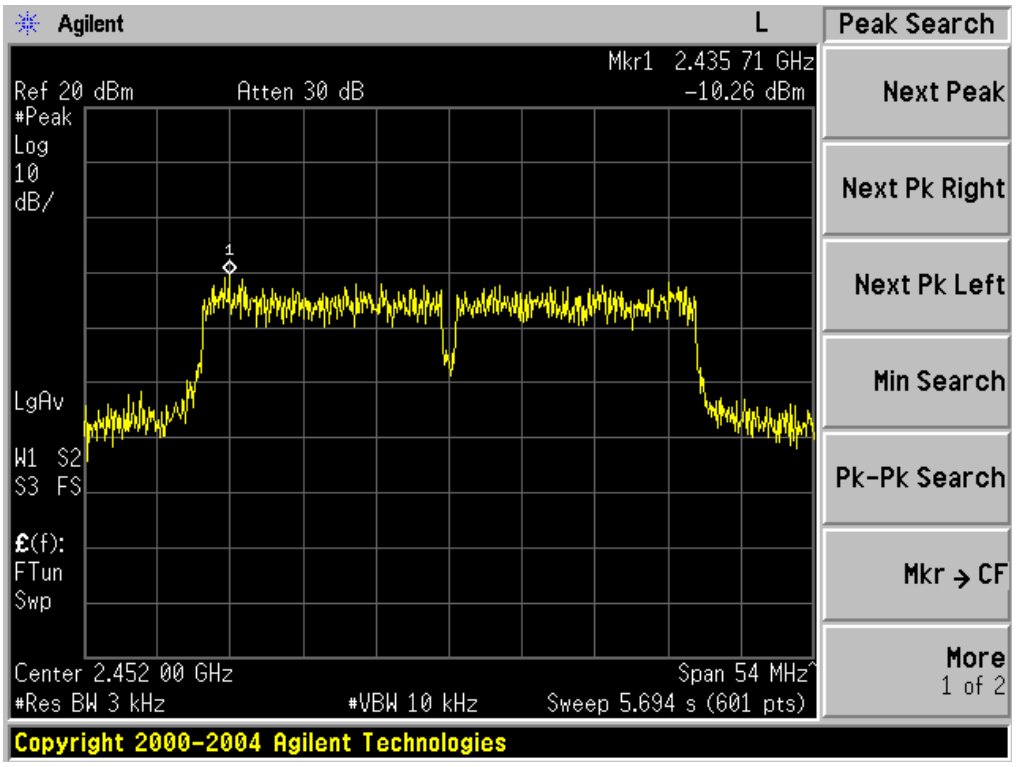
TX CH03



TX CH06



TX CH09



5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

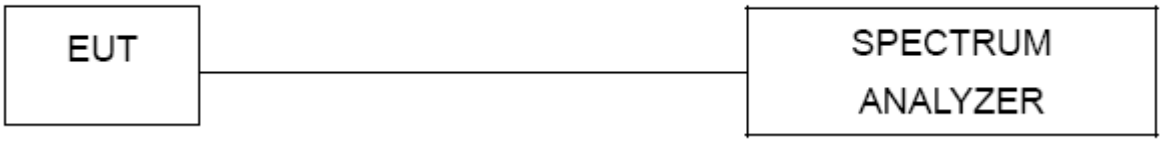
5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

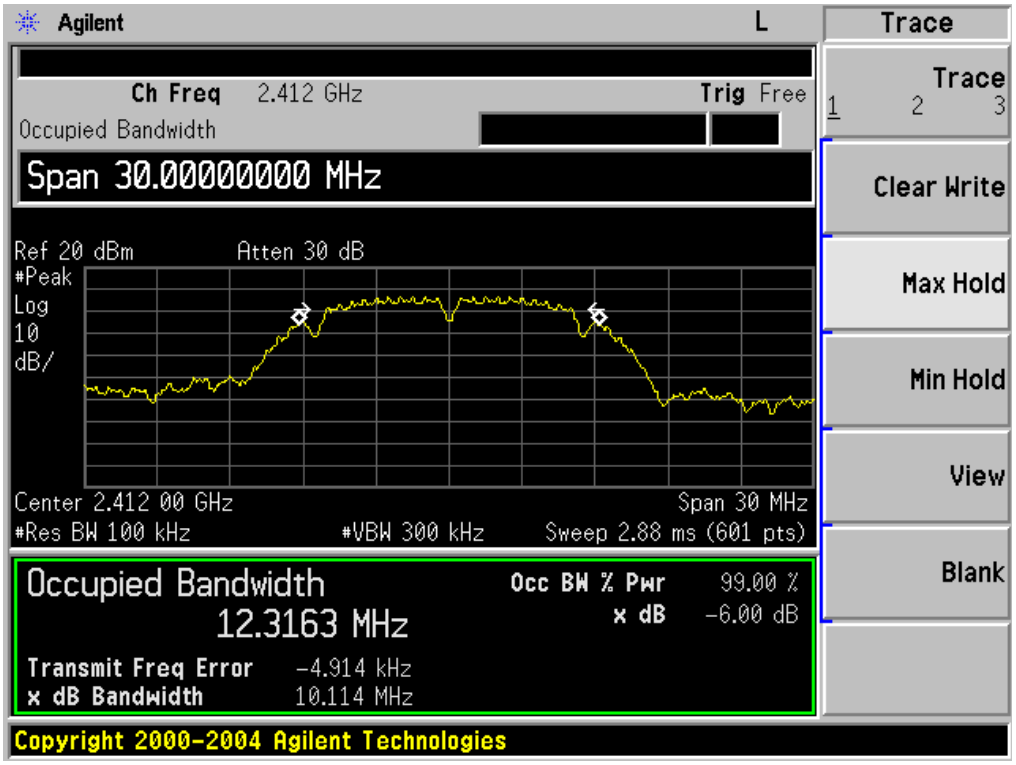
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

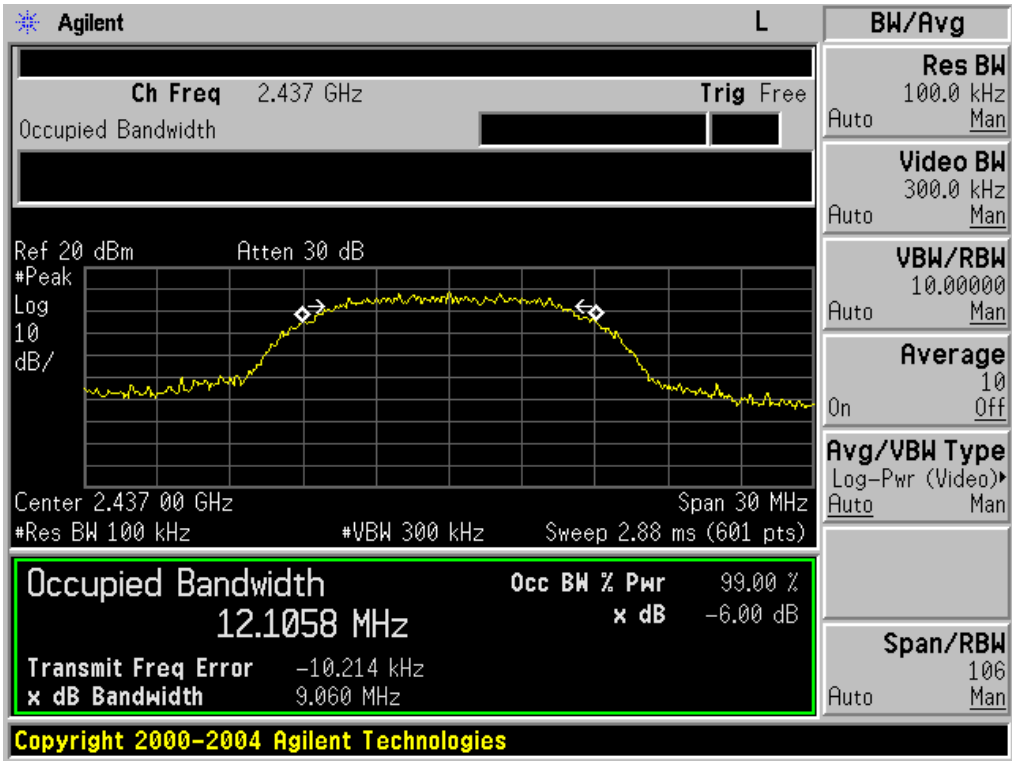
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX b Mode /CH01, CH06, CH11		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.114	500	Pass
Middle	2437	9.060	500	Pass
High	2462	9.053	500	Pass

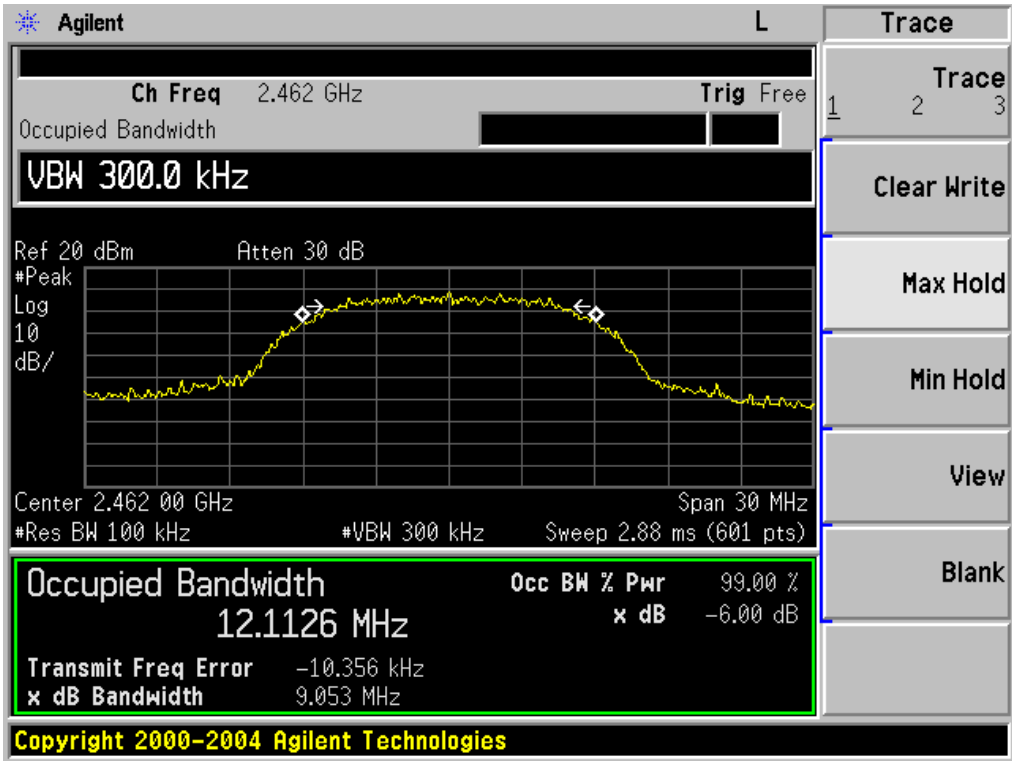
TX CH 01



TX CH 06



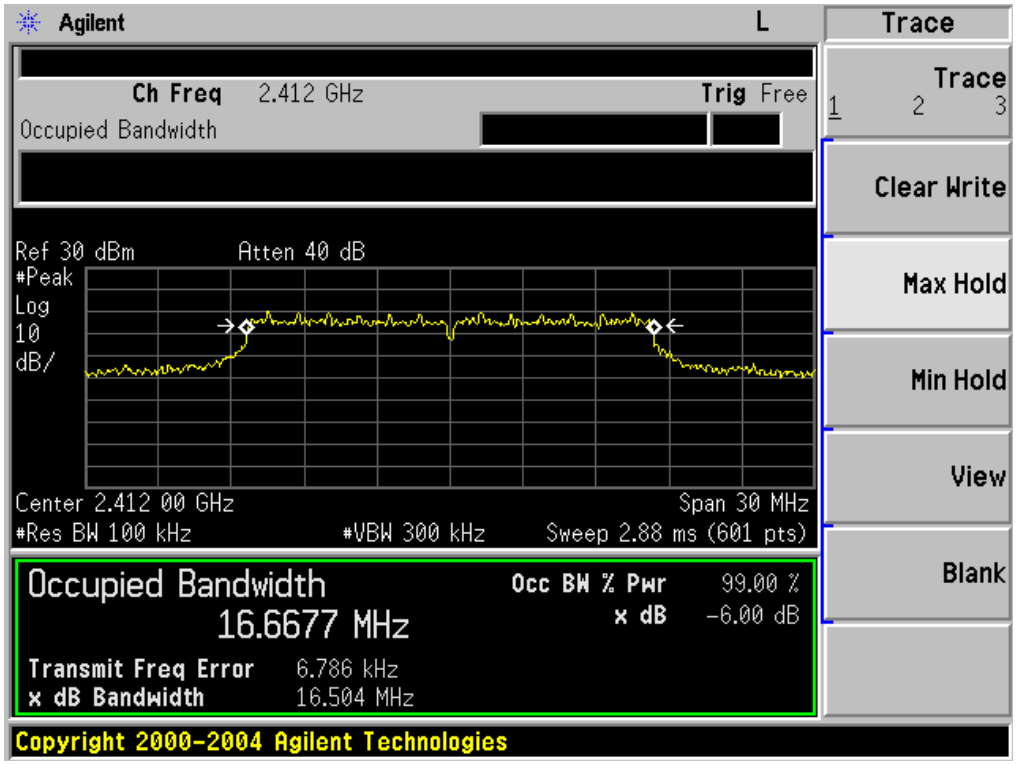
TX CH 11



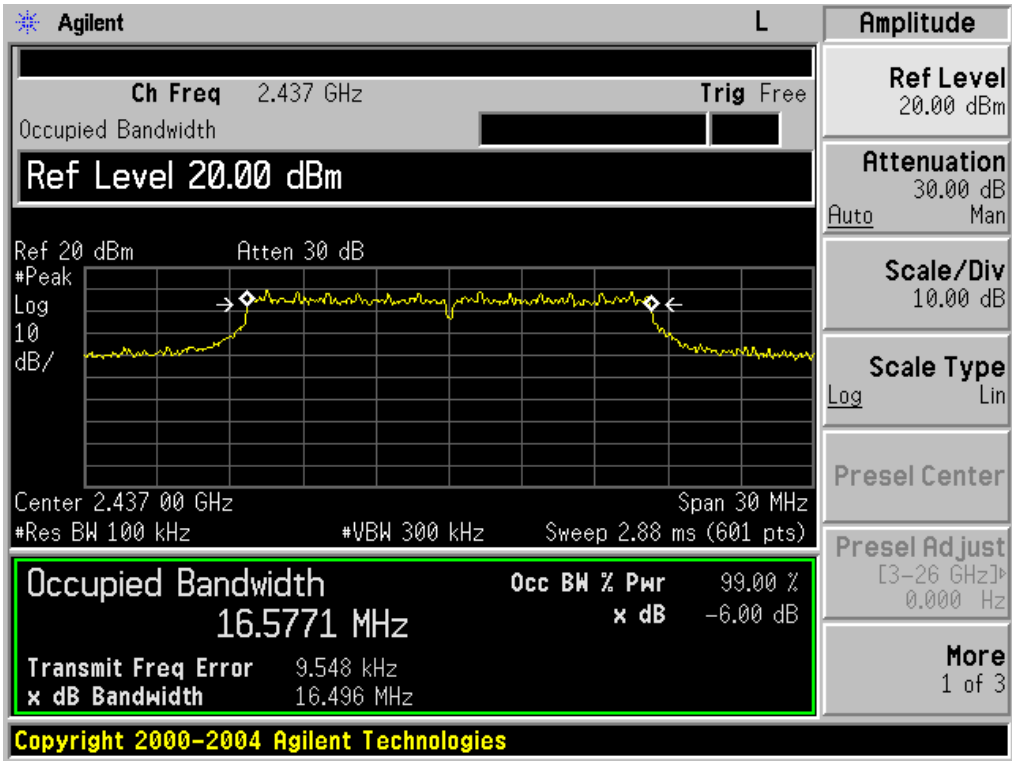
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX g Mode /CH01, CH06, CH11		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.504	500	Pass
Middle	2437	16.496	500	Pass
High	2462	16.514	500	Pass

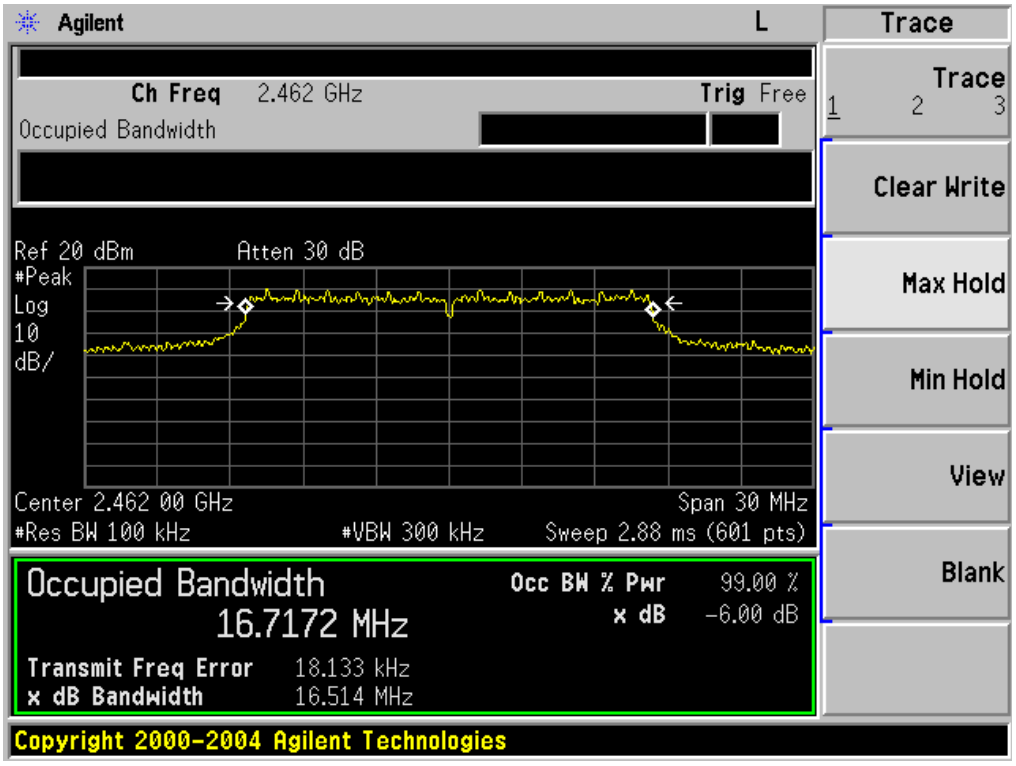
TX CH 01



TX CH 06



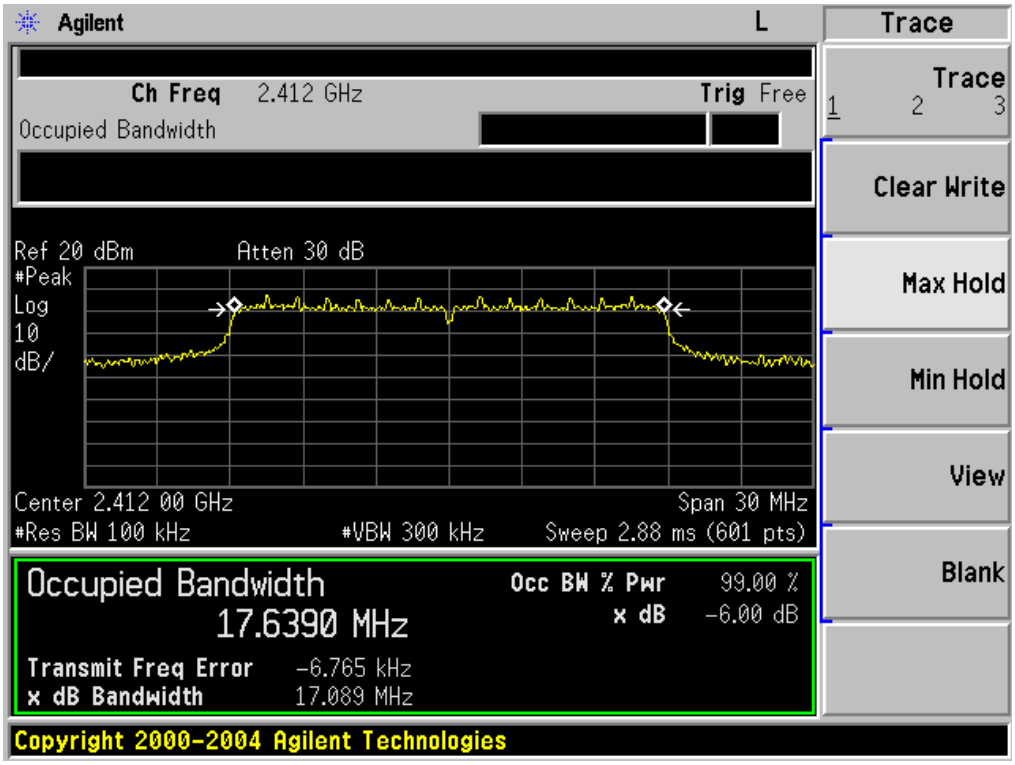
TX CH 11



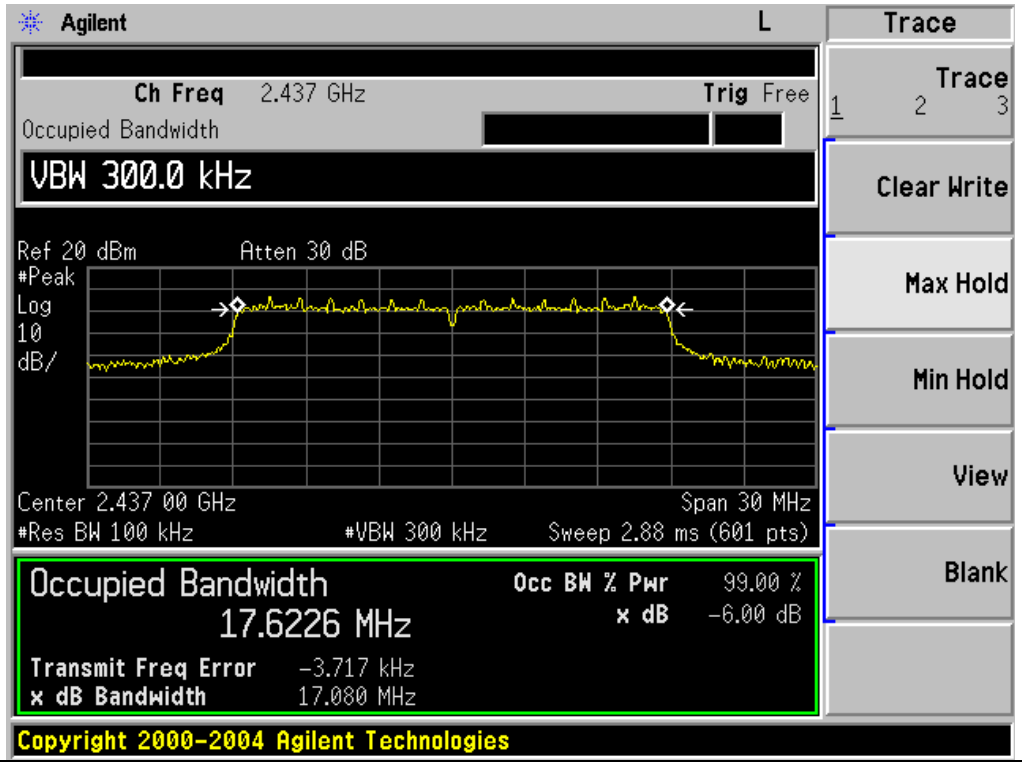
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.639	500	Pass
Middle	2437	17.623	500	Pass
High	2462	17.624	500	Pass

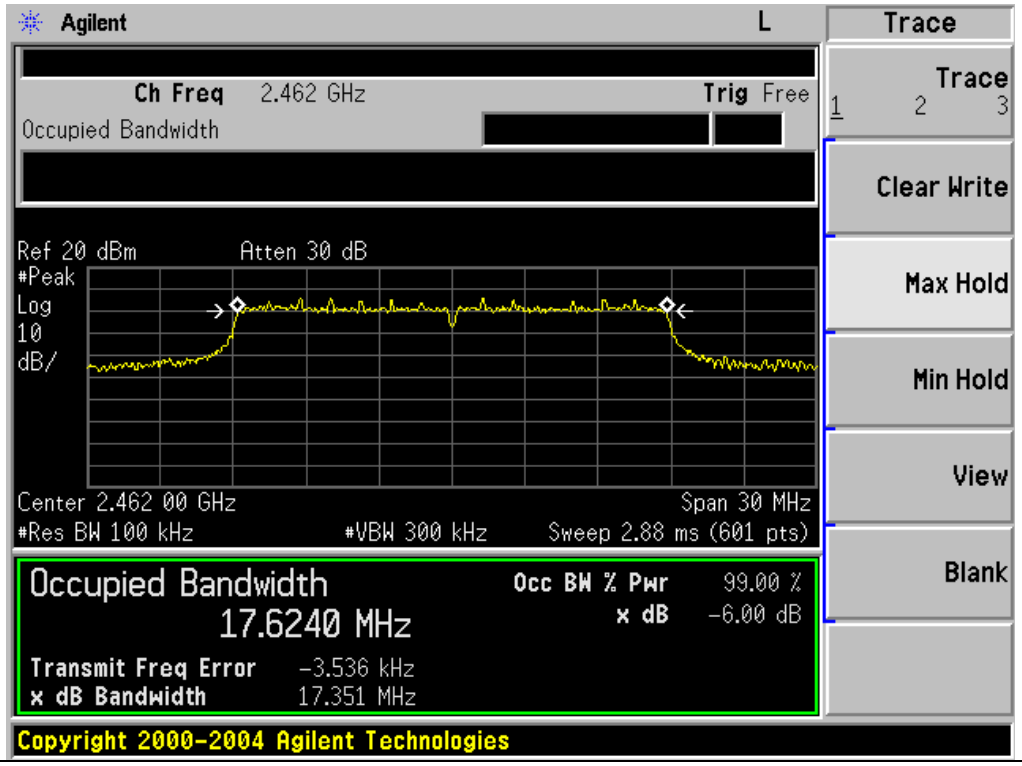
TX CH 01



TX CH 06



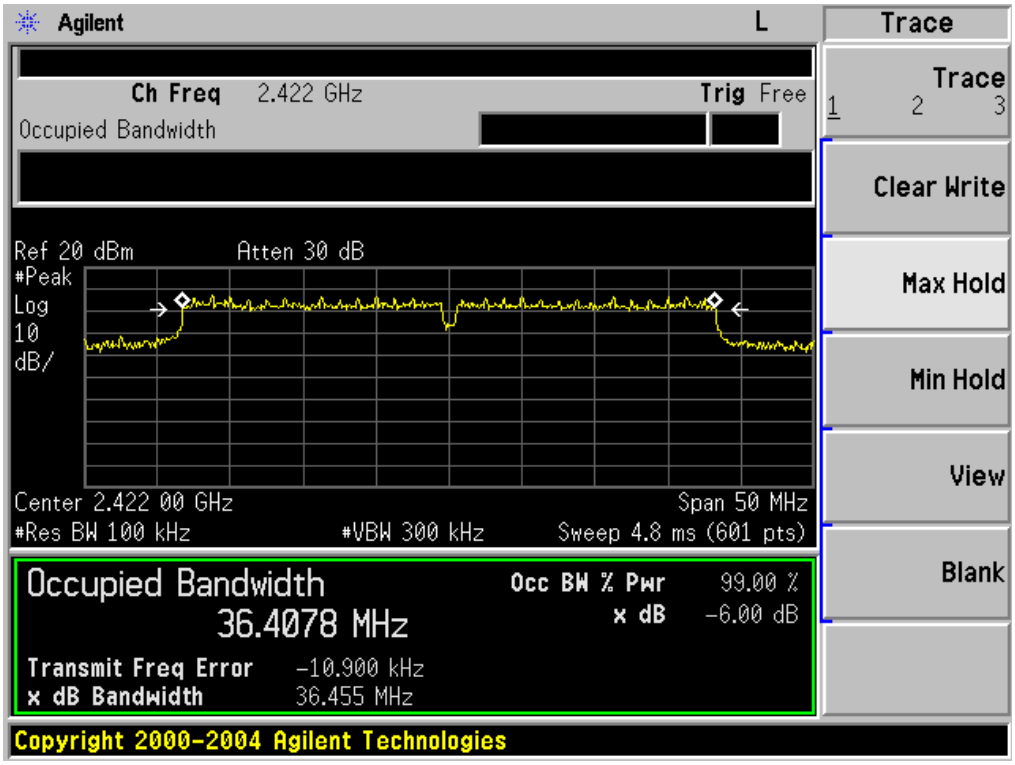
TX CH 11



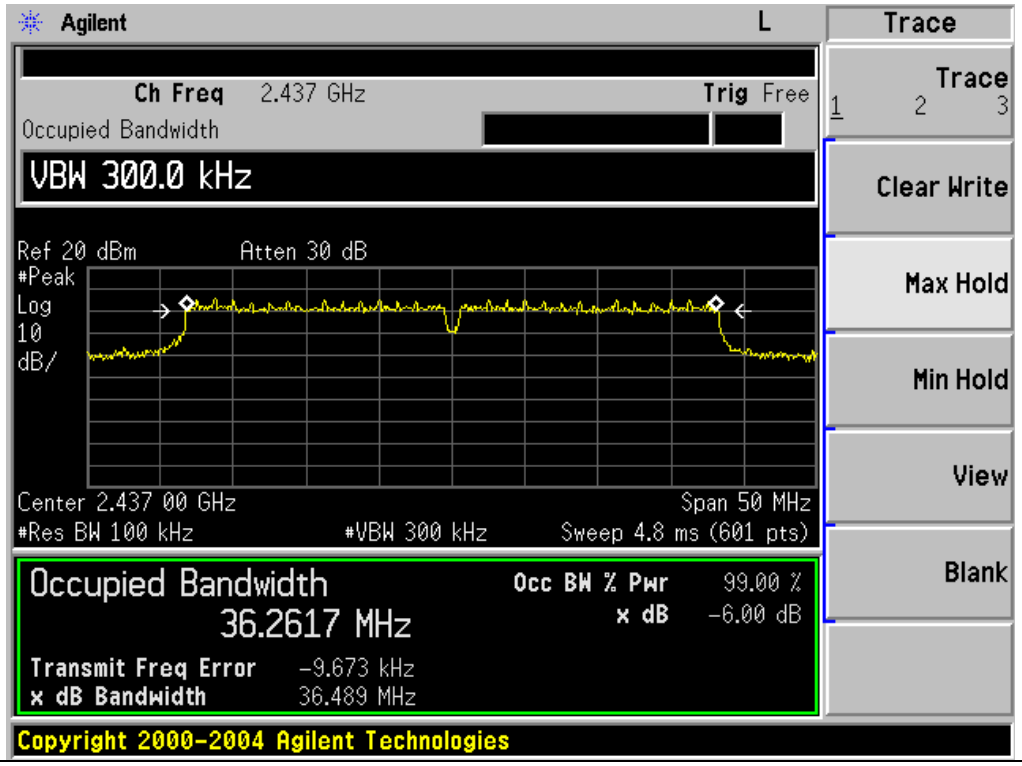
EUT :	Digital Signage	Model Name :	W3202
Temperature :	25℃	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX n Mode(40M) /CH03, CH06, CH09		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.455	500	Pass
Middle	2437	36.489	500	Pass
High	2452	36.452	500	Pass

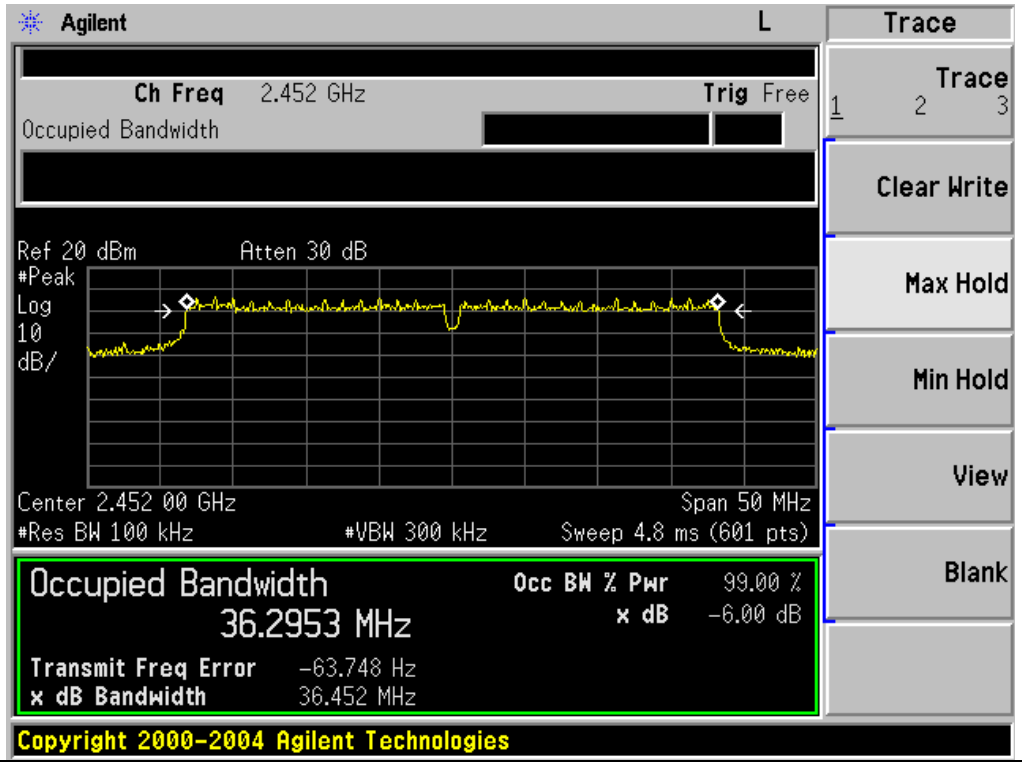
TX CH 03



TX CH 06



TX CH 09



6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

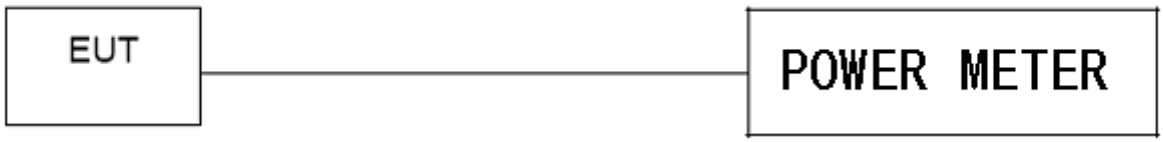
6.1.1 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

EUT：	Digital Signage	Model Name ：	W3202
Temperature：	25℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	AC 120V/60Hz
Test Mode ：	TX b/g/n(20M)		

TX 802.11b Mode			
Test Channe	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
CH01	2412	17.27	30
CH06	2437	17.33	30
CH11	2462	17.25	30
TX 802.11g Mode			
CH01	2412	14.31	30
CH06	2437	14.25	30
CH11	2462	14.19	30
TX 802.11n-HT20 Mode			
CH01	2412	13.25	30
CH06	2437	13.22	30
CH11	2462	13.27	30
TX 802.11n-HT40 Mode			
CH03	2422	12.38	30
CH06	2437	12.34	30
CH09	2452	12.37	30

7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

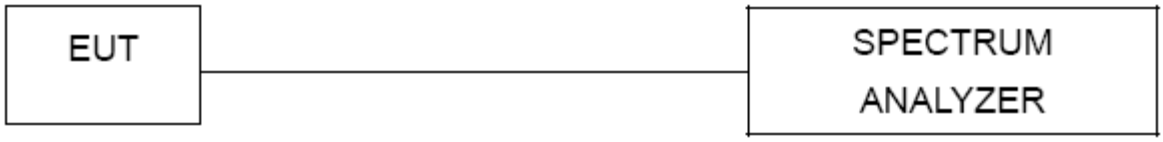
TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.4 TEST RESULTS

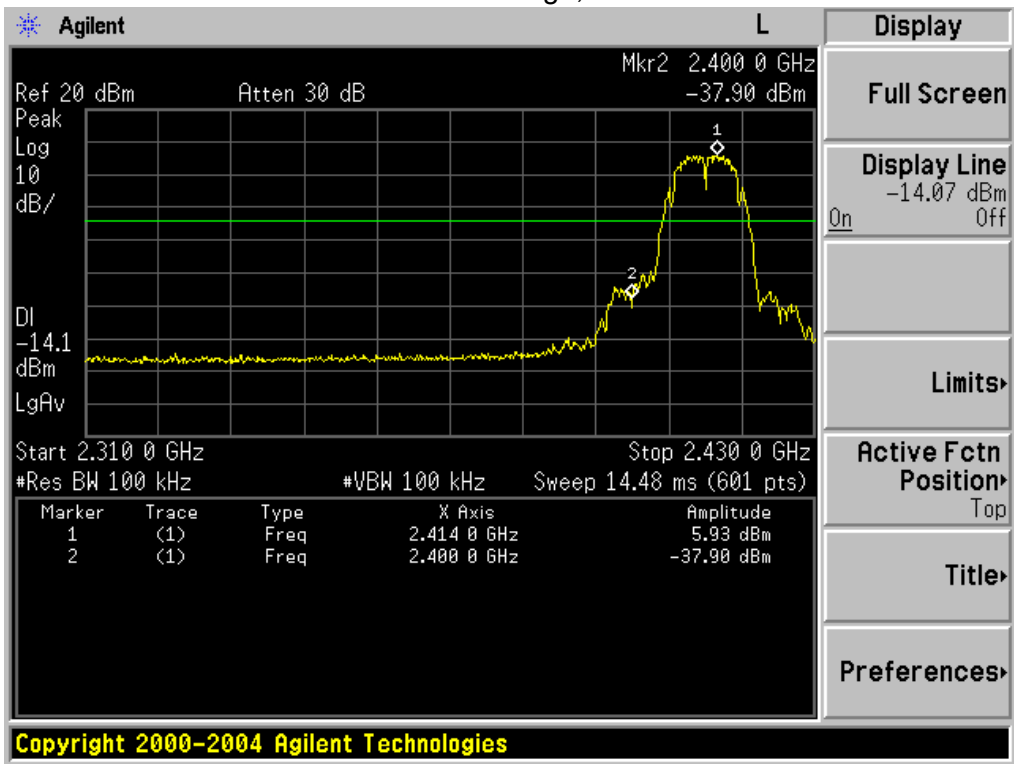
EUT：	Digital Signage	Model Name ：	W3202
Temperature：	25℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	AC 120V/60Hz

Radiated

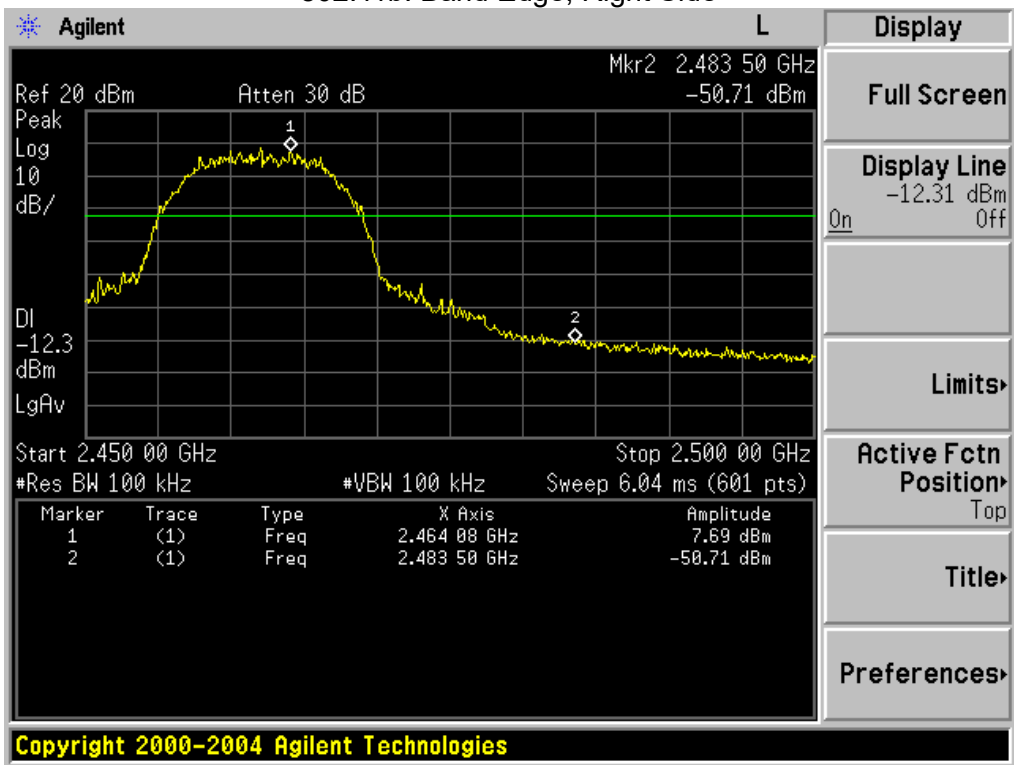
Modulation Type:	Frequency (MHz)	Antenna polarization (H/V)	Factor (dB)	Emission (dBuV/m)	Band edge Limit (dBuV/m)		Result
				PK	PK	AV	Pass
802.11b	<2400	H	1.42	50.26	74.00	54.00	Pass
	<2400	V	1.39	49.46	74.00	54.00	Pass
	>2483.5	H	1.62	49.30	74.00	54.00	Pass
	>2483.5	V	1.75	49.91	74.00	54.00	Pass
802.11g	<2400	H	1.42	49.52	74.00	54.00	Pass
	<2400	V	1.39	49.24	74.00	54.00	Pass
	>2483.5	H	1.62	49.56	74.00	54.00	Pass
	>2483.5	V	1.75	49.98	74.00	54.00	Pass
802.11n20	<2400	H	1.42	50.03	74.00	54.00	Pass
	<2400	V	1.39	49.51	74.00	54.00	Pass
	>2483.5	H	1.62	49.35	74.00	54.00	Pass
	>2483.5	V	1.75	50.04	74.00	54.00	Pass
802.11n40	<2400	H	1.42	49.82	74.00	54.00	Pass
	<2400	V	1.39	49.45	74.00	54.00	Pass
	>2483.5	H	1.62	49.50	74.00	54.00	Pass
	>2483.5	V	1.75	50.09	74.00	54.00	Pass

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
If peak level below the average limit, the average level was no recording.

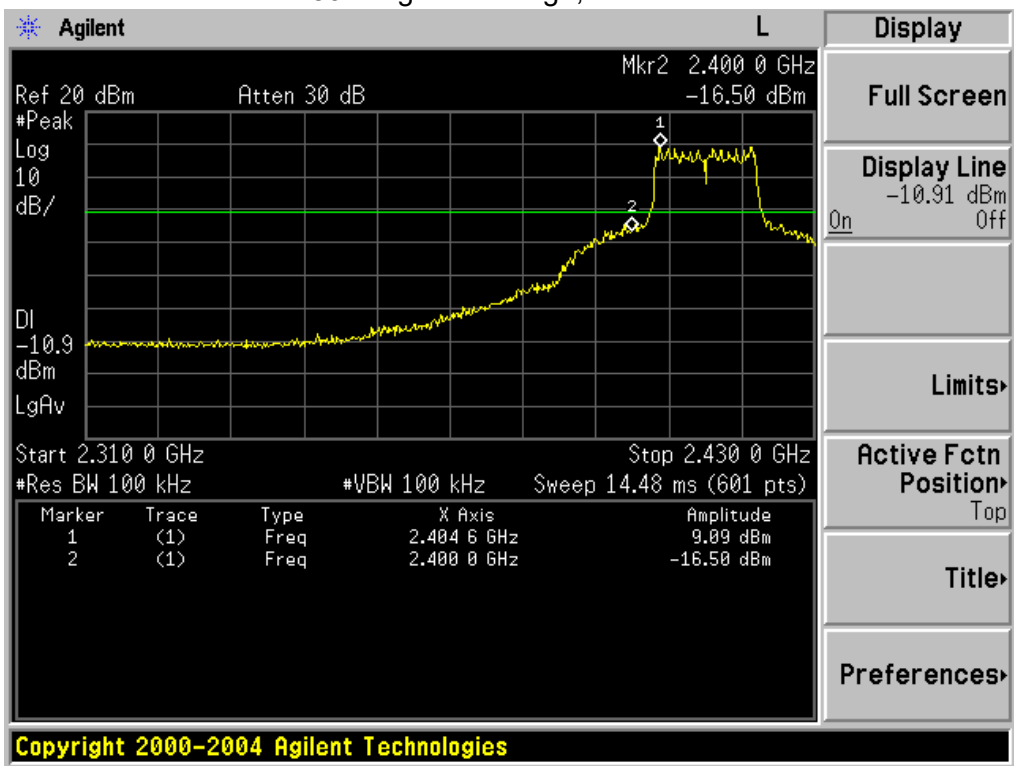
802.11b: Band Edge, Left Side



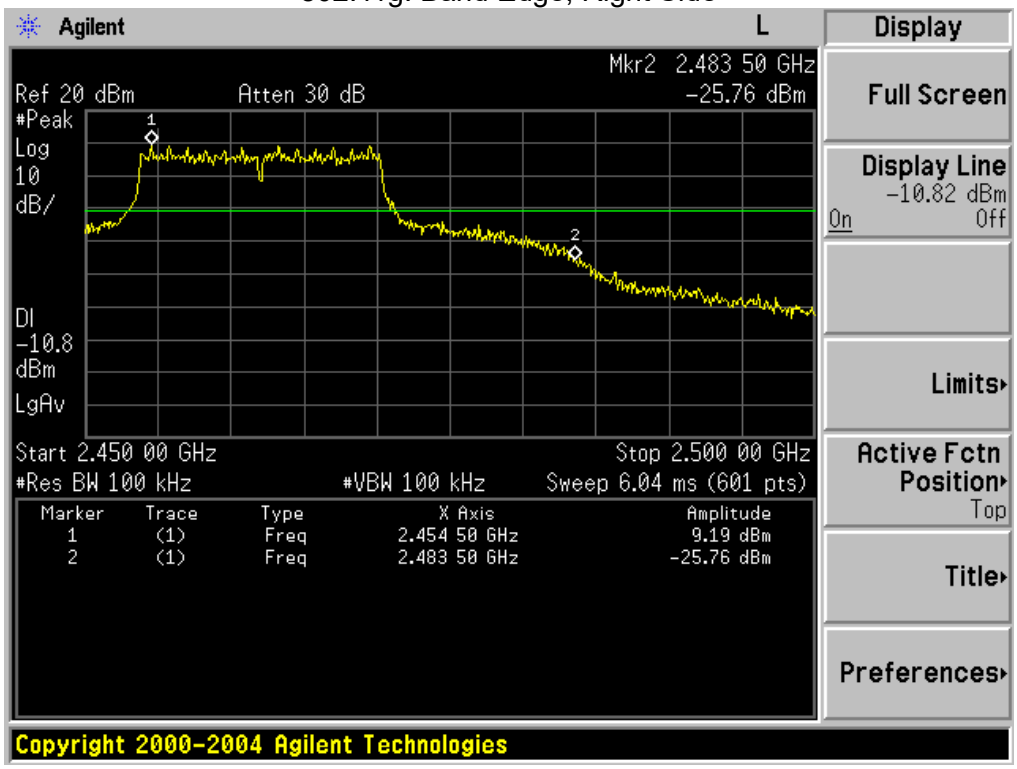
802.11b: Band Edge, Right Side



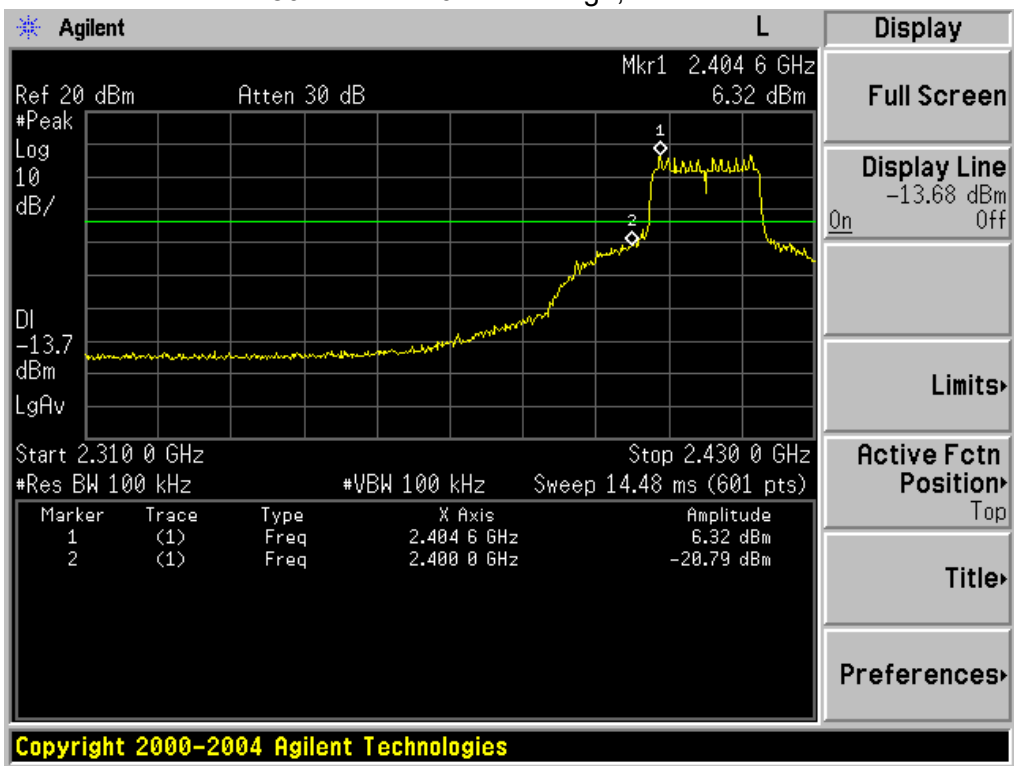
802.11g: Band Edge, Left Side



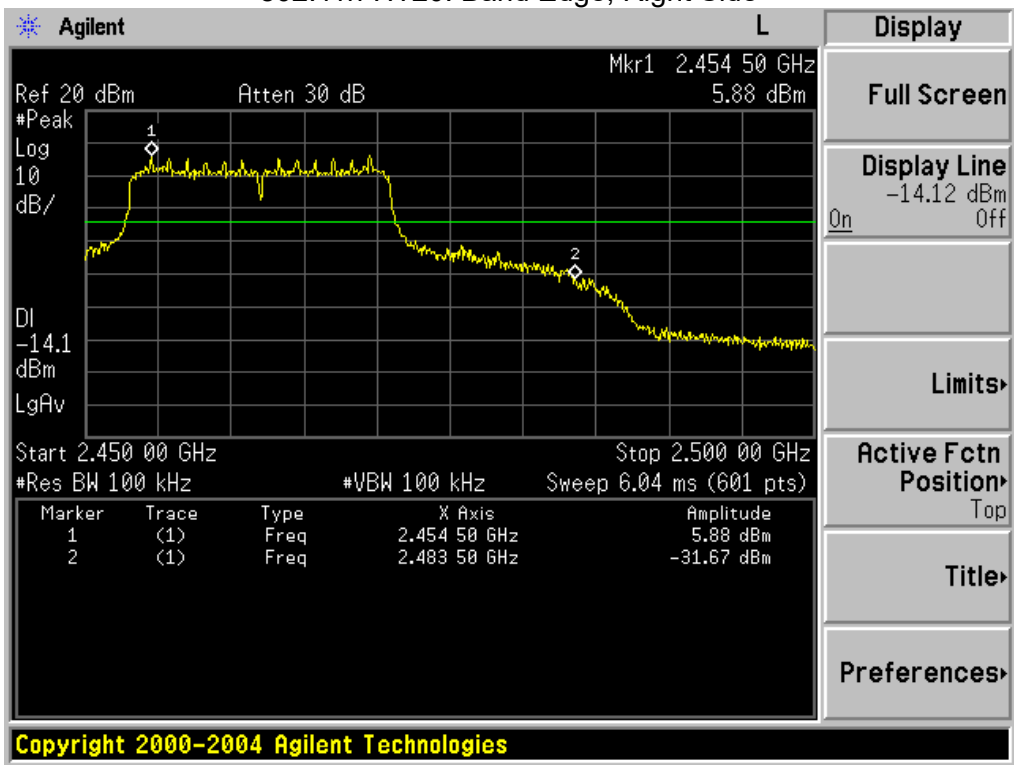
802.11g: Band Edge, Right Side



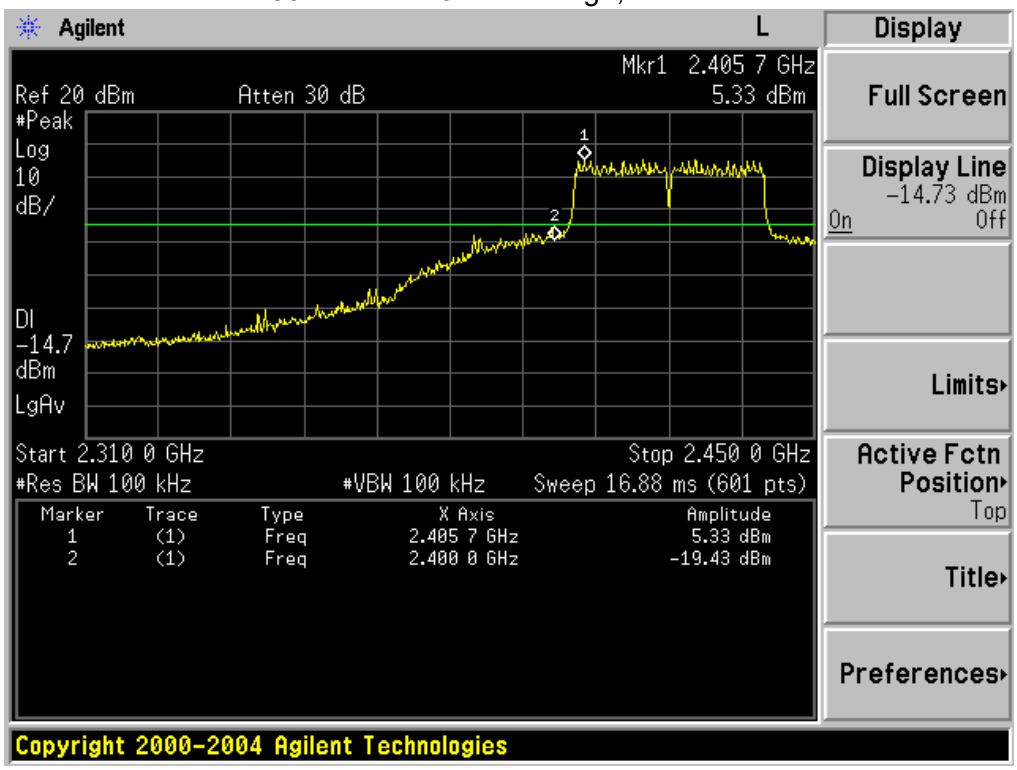
802.11n-HT20: Band Edge, Left Side



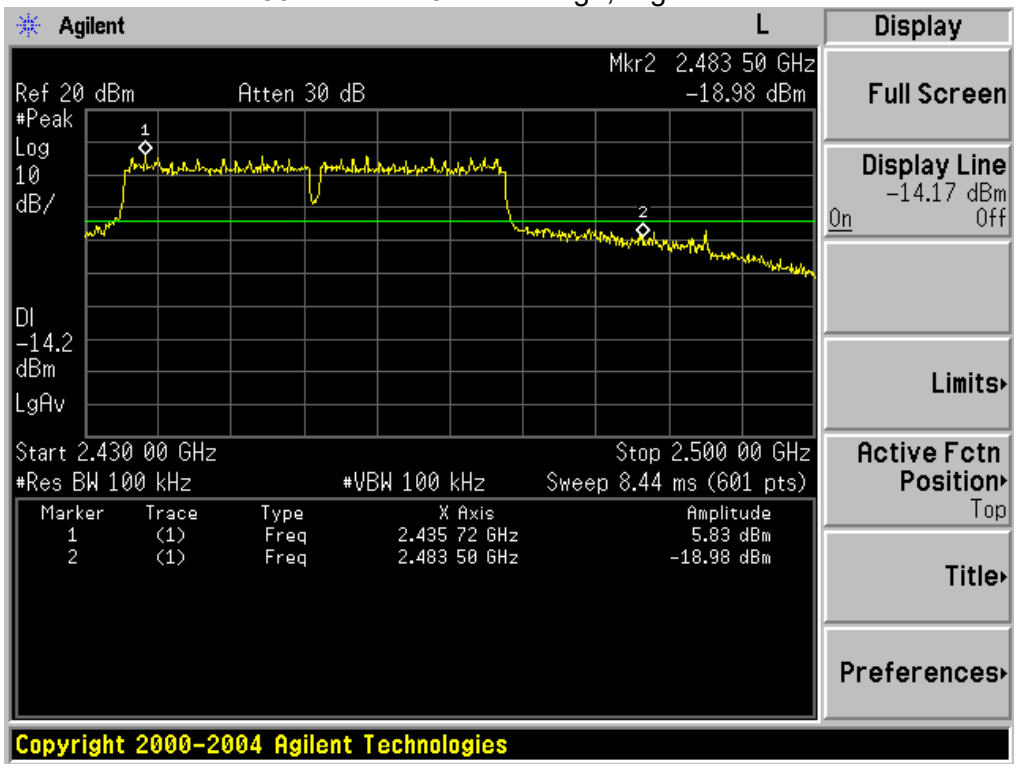
802.11n-HT20: Band Edge, Right Side



802.11n-HT40: Band Edge, Left Side



802.11n-HT40: Band Edge, Right Side



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

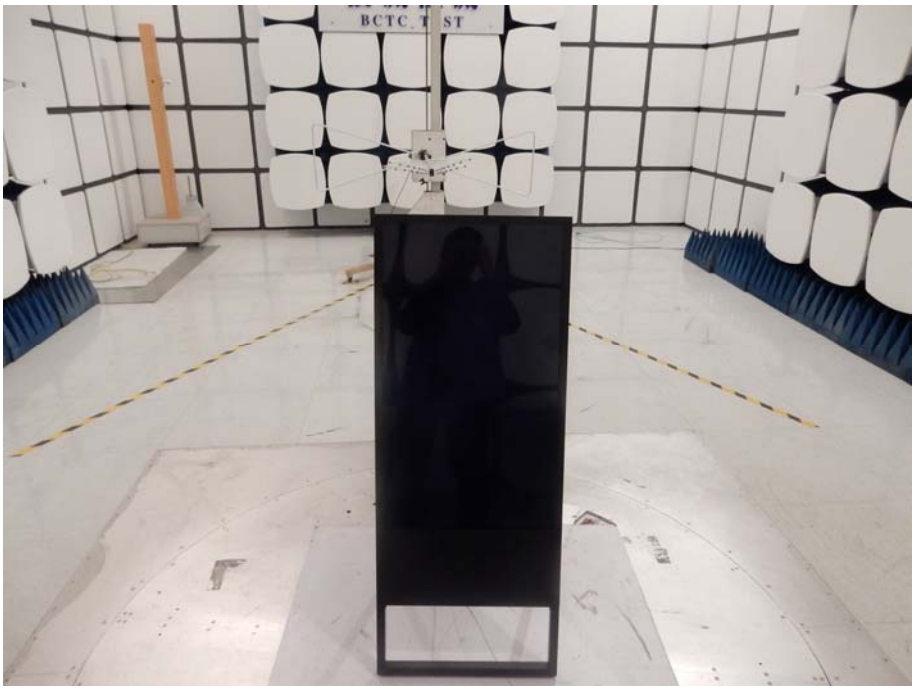
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 EUT ANTENNA

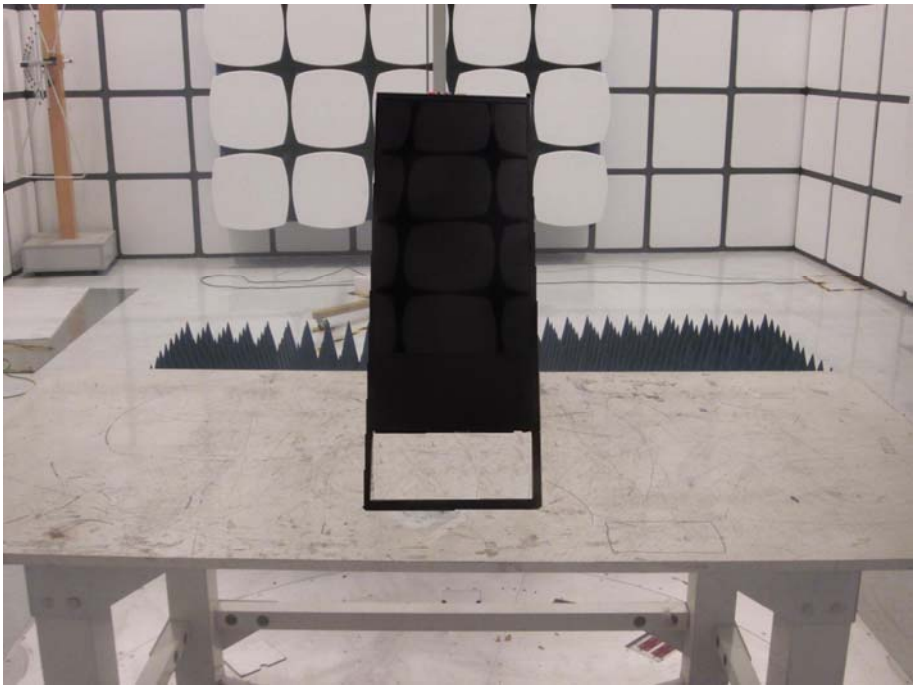
The EUT antenna is external antenna and used reverse spiral SMA antenna. It comply with the standard requirement.

9. EUT TEST PHOTO

Radiated Measurement Photos



Radiated Measurement Photos



Conducted Measurement Photos

10. EUT PHOTO

※ ※ ※ ※ ※ **END OF REPORT** ※ ※ ※ ※ ※