

APPLICATION CERTIFICATION FCC Part 15C

On Behalf of

Shenzhen Mingzong Technology Co., Ltd

Digital Video Recorders

Model No.: MS-580, MS-588

FCC ID: 2AOPG-MS-580

Prepared for : Shenzhen Mingzong Technology Co., Ltd.
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Test Report Certification

Applicant	:	Shenzhen Mingzong Technology Co., Ltd
Address	:	3rd Yangwu Road, Liantangmian, Huinan Avenue, Huiyang Economic Development Zone, Huizhou, Guangdong Province, China
Manufacturer	:	Huizou Miangshang Technology Co., Ltd
Address	:	3rd Yangwu Road, Liantangmian, Huinan Avenue, Huiyang Economic Development Zone, Huizhou, Guangdong Province, China
Product	:	Digital Video Recorders
Model No.	:	MS-580, MS-588
Trade name	:	MINGSHANG

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

The EUT was tested according to DTS test procedure of Apr 05, 2017 KDB558074 D01 DTS Meas Guidance v04 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : January 1- January 6, 2018
Date of Report : January 13, 2018

Prepared by :



1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Digital Video Recorders
Model Number	:	MS-580, MS-588 (Note: We hereby state that these models are identical in interior structure, electrical circuits and components, Just Model name is different. Therefore only model MS-580 is for tests.)
Frequency Range	:	802.11b/g/n(20MHz): 2412-2462MHz 802.11n(40MHz): 2422-2452MHz
Number of Channels	:	802.11b/g/n (20MHz):11 802.11n (40MHz): 7
Data Rate	:	802.11b: 11, 5.5, 2, 1 Mbps 802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps 802.11n: 6.5 up to 135Mbps
Modulation Type	:	DSSS, OFDM
Antenna Gain	:	5dBi
Type of Antenna	:	Integral antenna
Power Supply	:	DC 7-36V

1.2.Carrier Frequency of Channels

802.11b, 802.11g, 802.11n (20MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---

802.11n (40MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
---	---	07	2442
---	---	08	2447
03	2422	09	2452
04	2427	---	---
05	2432	---	---
06	2437	---	---

1.3.Accessory and Auxiliary Equipment

PC

Manufacturer: LENOVO

M/N: 4290-RT8

S/N: R9-FW93G 11/08

1.4. Description of Test Facility

EMC Lab	: Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	: Shenzhen Accurate Technology Co., Ltd.
Site Location	: 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5. Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 07, 2017	1 Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 07, 2017	1 Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 07, 2017	1 Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 07, 2017	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 07, 2017	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 13, 2017	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 13, 2017	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 13, 2017	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 13, 2017	1 Year
Open Switch and Control Unit	Rohde&Schwarz	OSP120 + OSP-B157	101244 + 100866	Jan. 07, 2017	1 Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 07, 2017	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 07, 2017	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 07, 2017	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 07, 2017	1 Year

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: **1.802.11b Transmitting mode**

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

2.802.11g Transmitting mode

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

3.802.11n (20MHz) Transmitting mode

Low Channel: 2412MHz

Middle Channel: 2437MHz

High Channel: 2462MHz

4.802.11n (40MHz) Transmitting mode

Low Channel: 2422MHz

Middle Channel: 2437MHz

High Channel: 2452MHz

Note: The WiFi has been tested under continuous transmission mode.

3.2.Configuration and peripherals

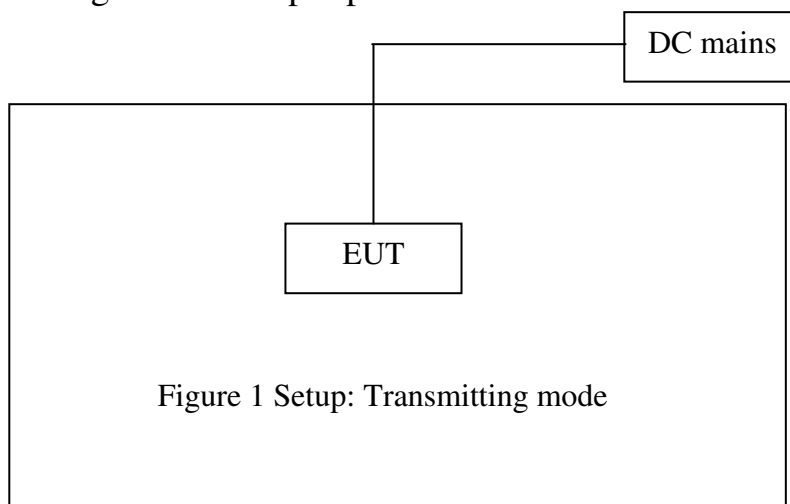


Figure 1 Setup: Transmitting mode

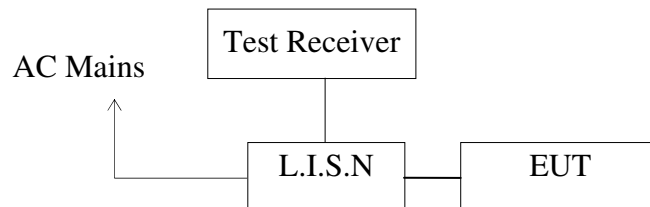
4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Power Line Conducted Emission	N/A
Section 15.247(a)(2)	6dB Bandwidth Test	Compliant
KDB558074 D01 DTS Meas Guidance v04	Duty cycle	Compliant
KDB558074 D01 DTS Meas Guidance v04	OBW	Compliant
Section 15.247(e)	Power Spectral Density Test	Compliant
Section 15.247(b)(3)	Maximum Peak Output Power Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.247(d) Section 15.209	Radiated Spurious Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

Note: The EUT is powered by the DC 7-36V, so the conducted emission test is not applicable and skipped.

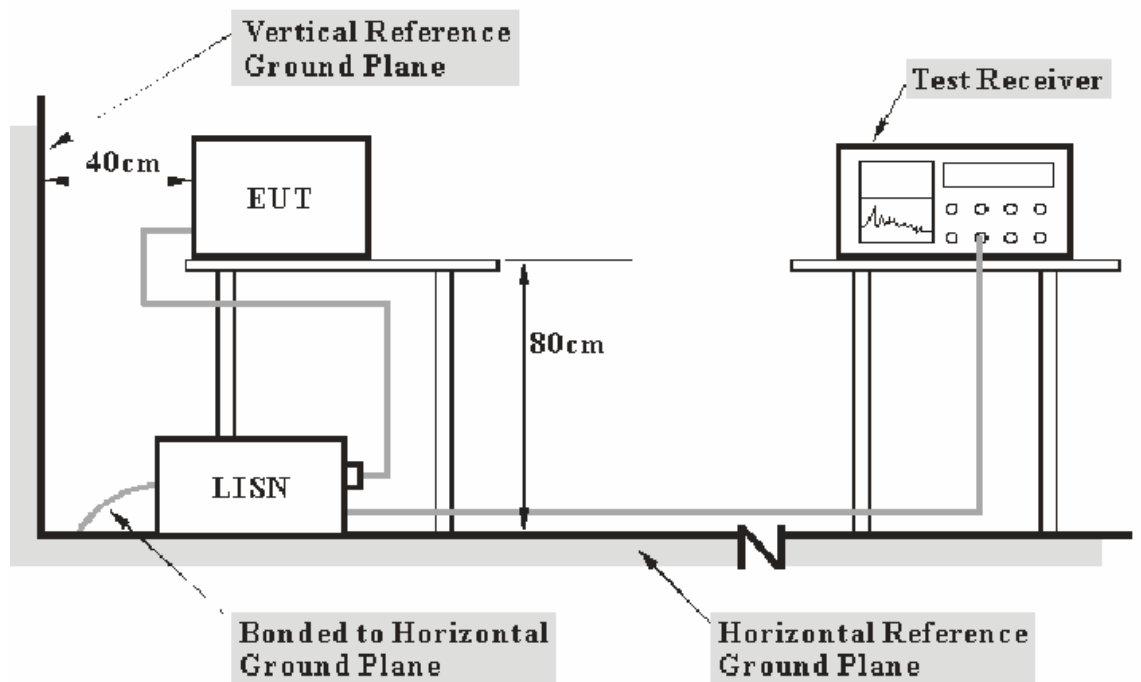
5. POWER LINE CONDUCTED MEASUREMENT

5.1. Block Diagram of Test Setup



(EUT: Digital Video Recorders)

5.1.1. Test System Setup



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

5.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies.		
NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

5.3.Configuration of EUT on Measurement

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.4.Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in test mode and measure it.

5.5.Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

5.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

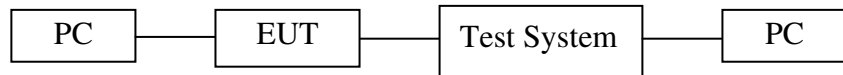
5.7.Power Line Conducted Emission Measurement Results

N/A.

Note: The power supply mode of the EUT is DC 7-36V, The test is not applicable and skipped

6. 6DB BANDWIDTH MEASUREMENT

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

6.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

6.5. Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ 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) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.6. Test Result

The test was performed with 802.11b			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	10.075	> 0.5MHz
Middle	2437	10.095	> 0.5MHz
High	2462	10.085	> 0.5MHz

The test was performed with 802.11g			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	16.455	> 0.5MHz
Middle	2437	16.405	> 0.5MHz
High	2462	16.345	> 0.5MHz

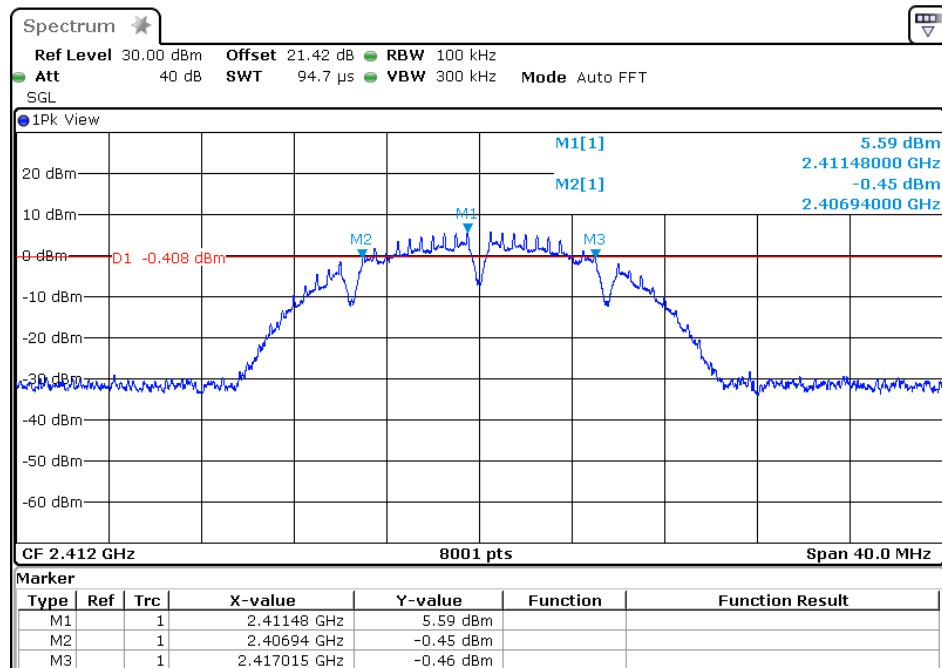
The test was performed with 802.11n (Bandwidth: 20 MHz)			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2412	17.570	> 0.5MHz
Middle	2437	17.585	> 0.5MHz
High	2462	17.765	> 0.5MHz

The test was performed with 802.11n (Bandwidth: 40 MHz)			
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
Low	2422	36.050	> 0.5MHz
Middle	2437	35.730	> 0.5MHz
High	2452	35.450	> 0.5MHz

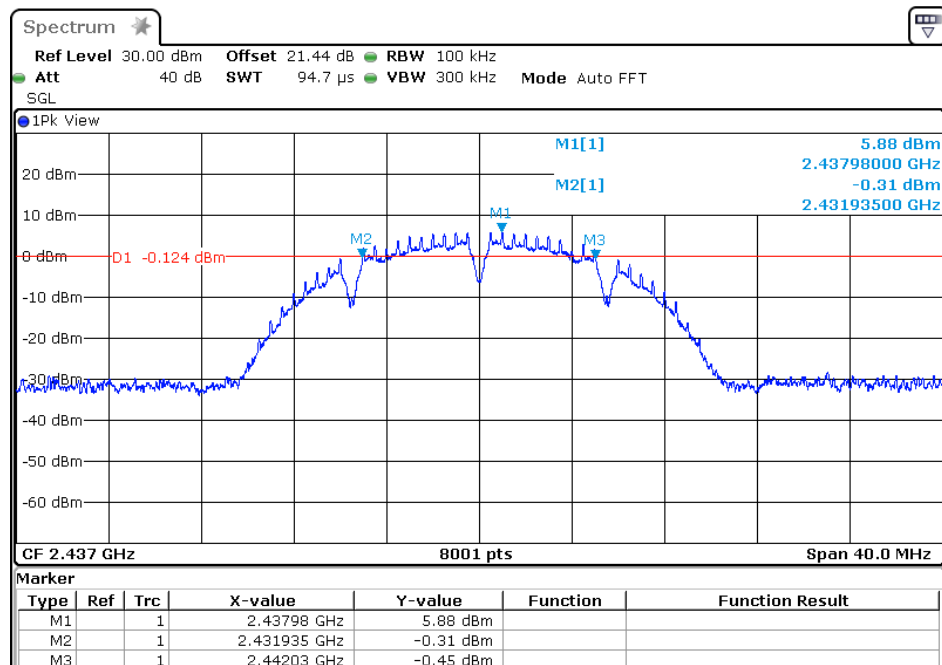
Note: We tested 802.11b/g/n20/n40 mode the all data rate and recorded the worst case data for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and MCS0 for 802.11n mode.

The spectrum analyzer plots are attached as below.

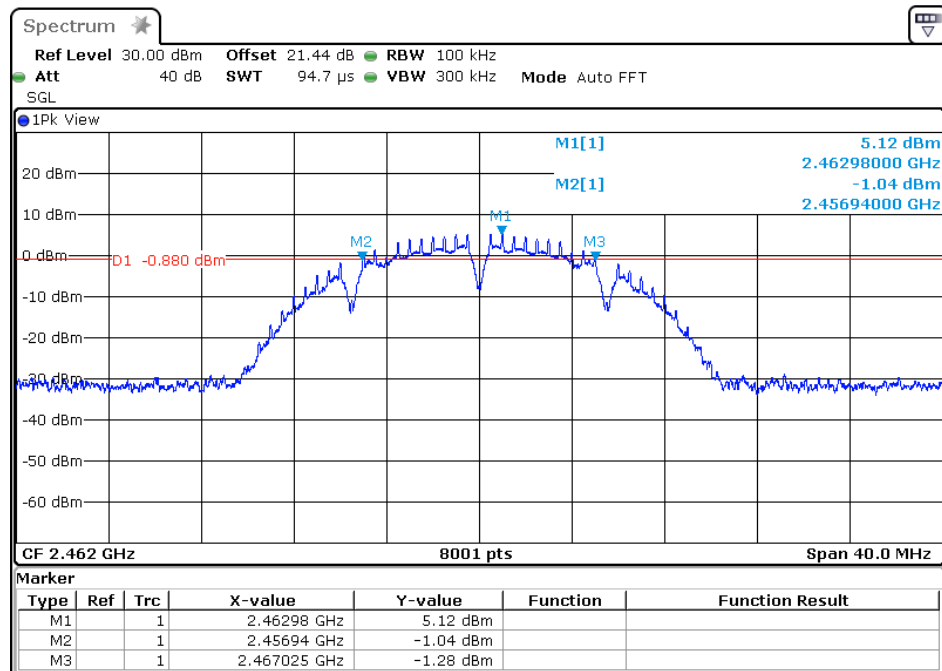
802.11b Channel Low 2412MHz



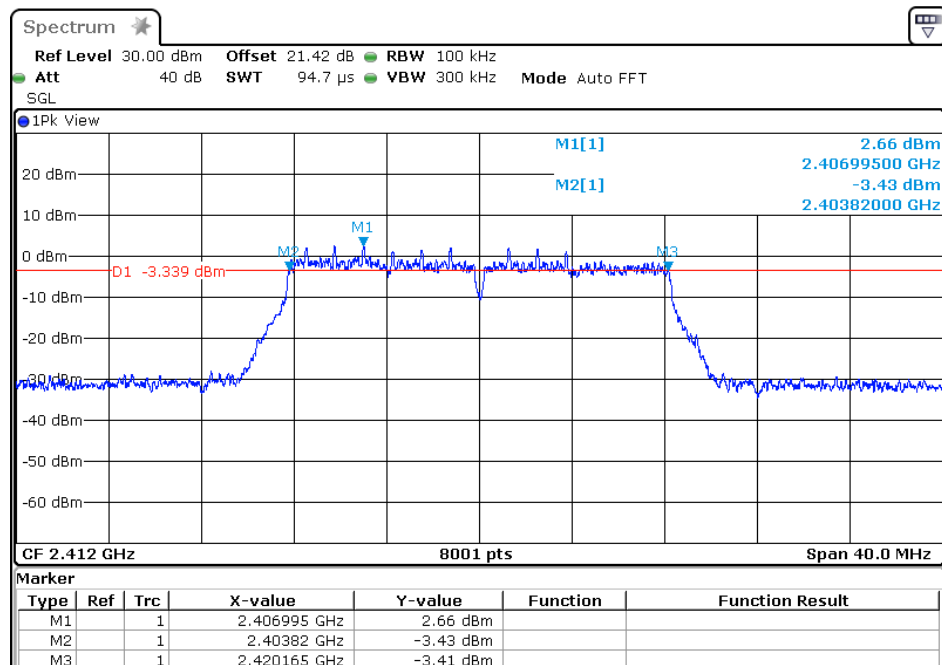
802.11b Channel Middle 2437MHz



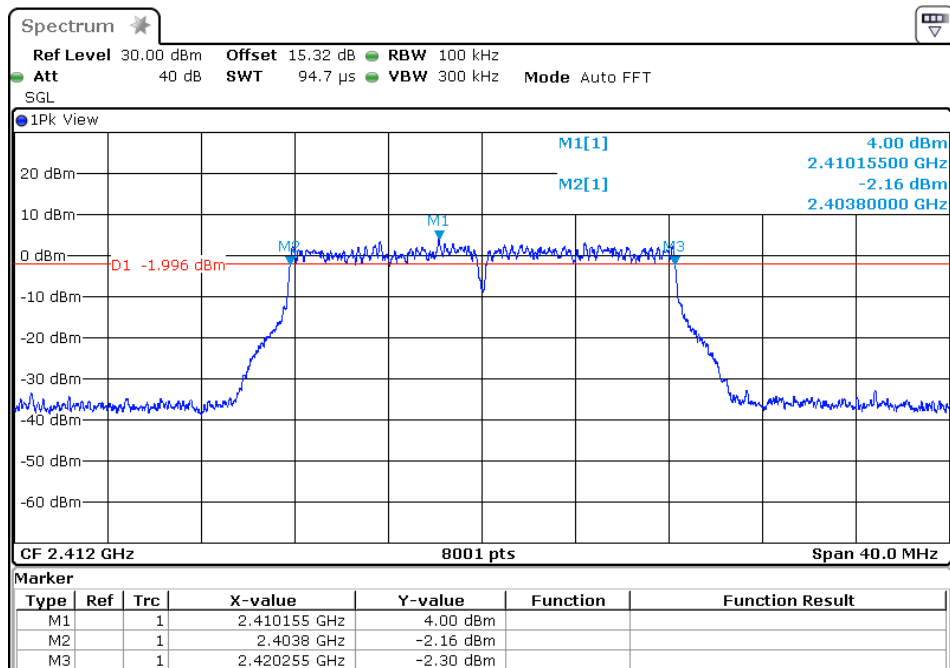
802.11b Channel High 2462MHz



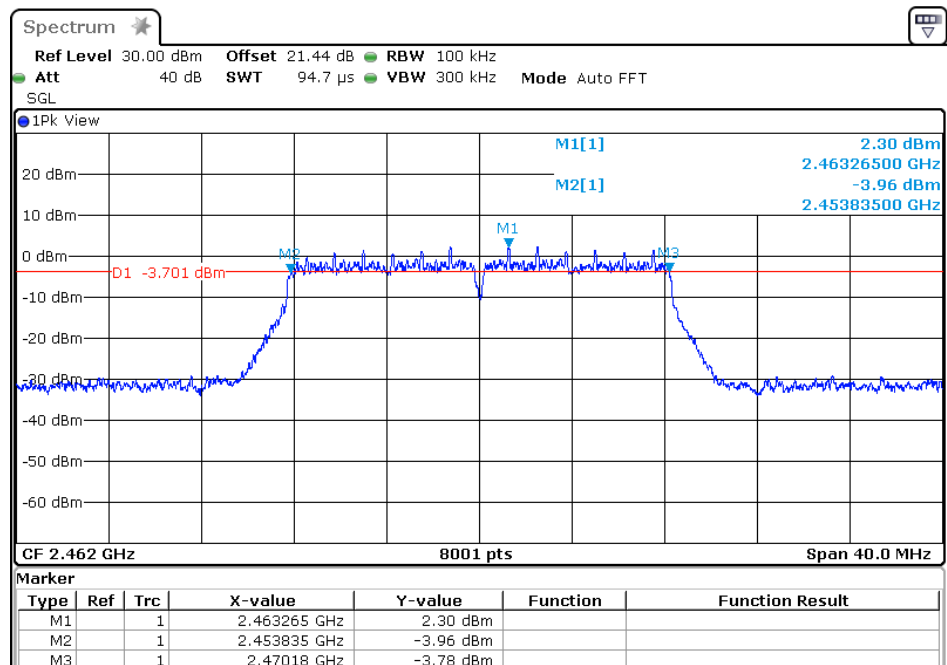
802.11g Channel Low 2412MHz



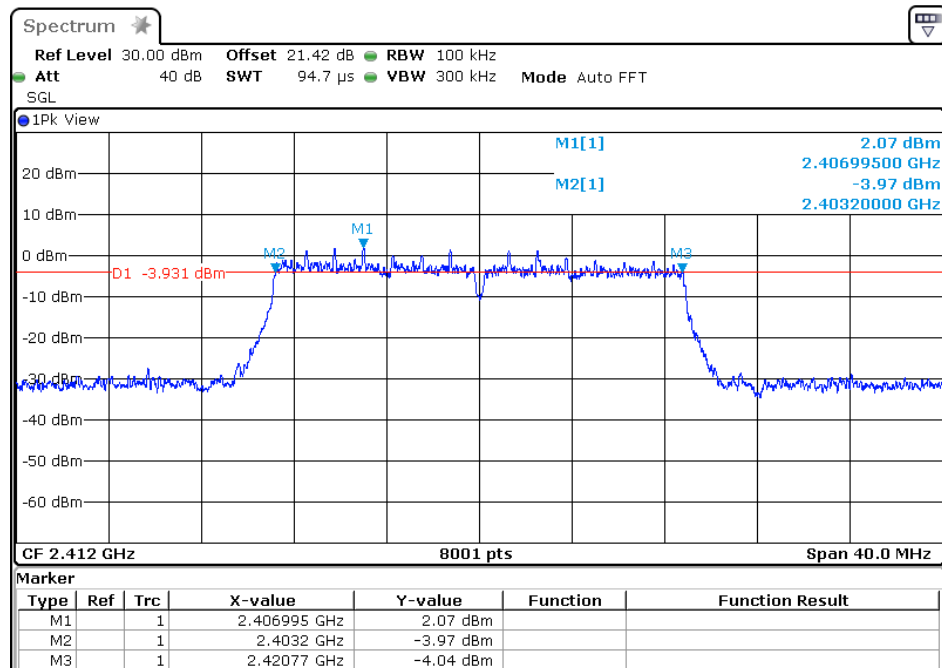
802.11g Channel Middle 2437MHz



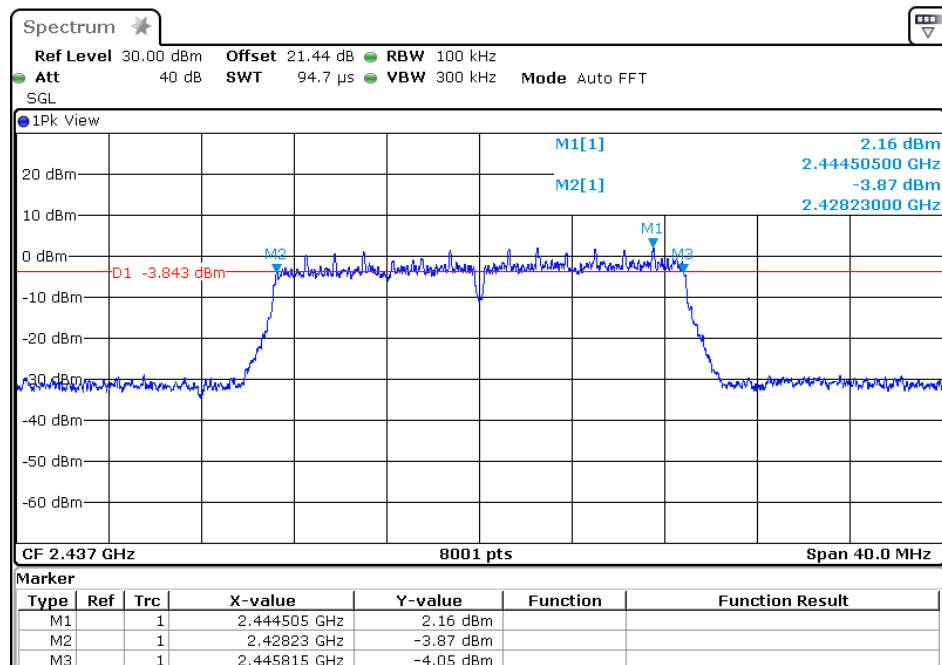
802.11g Channel High 2462MHz



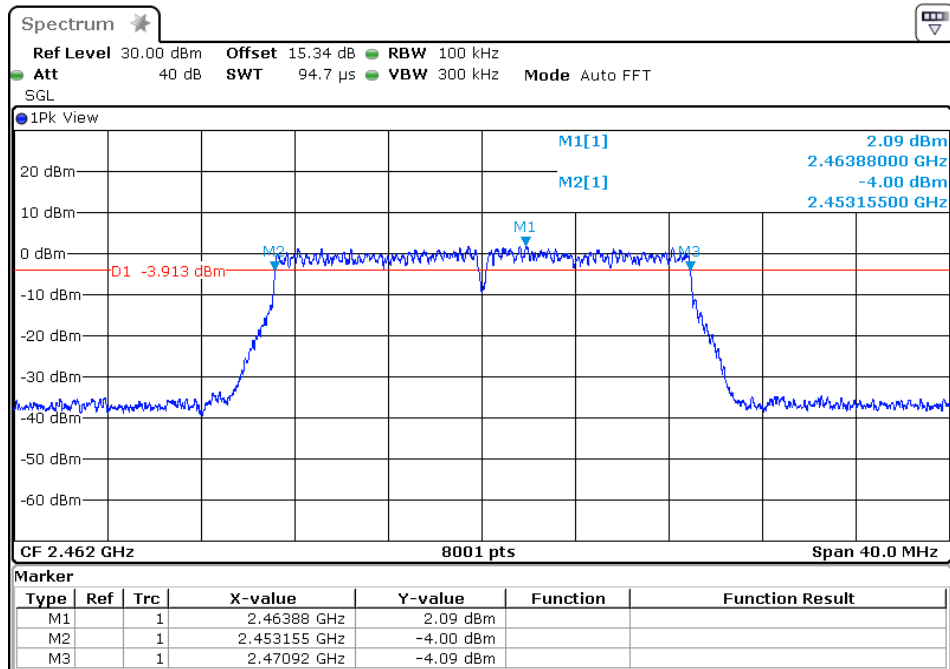
802.11n Channel Low 2412MHz (20MHz)



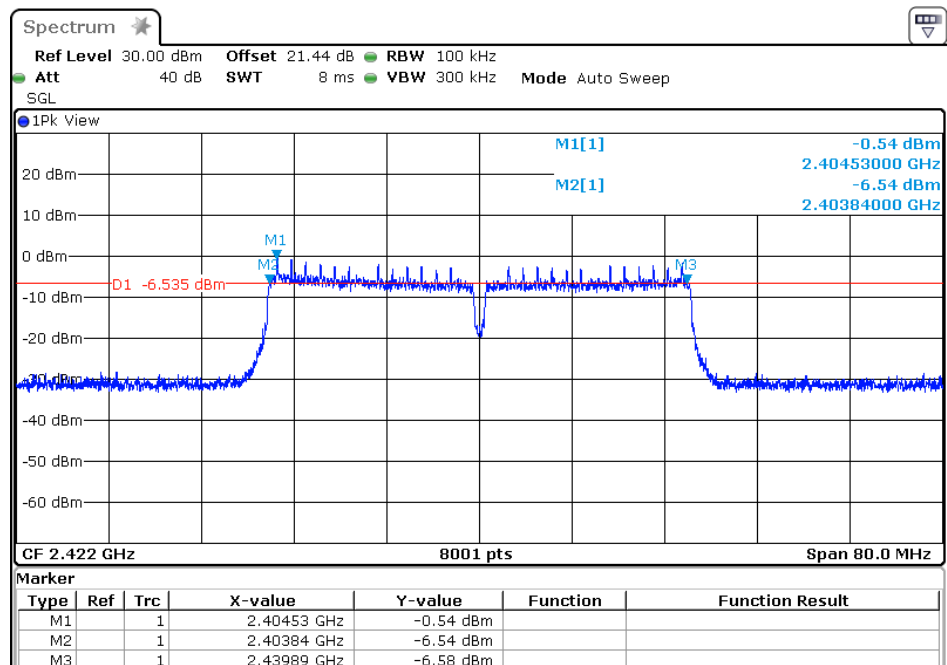
802.11n Channel Middle 2437MHz(20MHz)



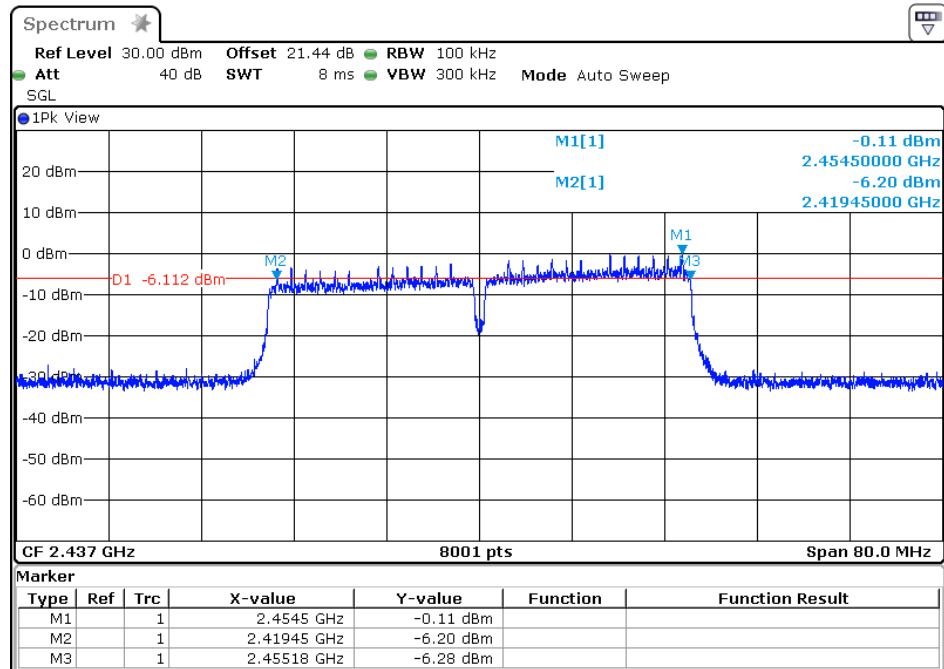
802.11n Channel High 2462MHz(20MHz)



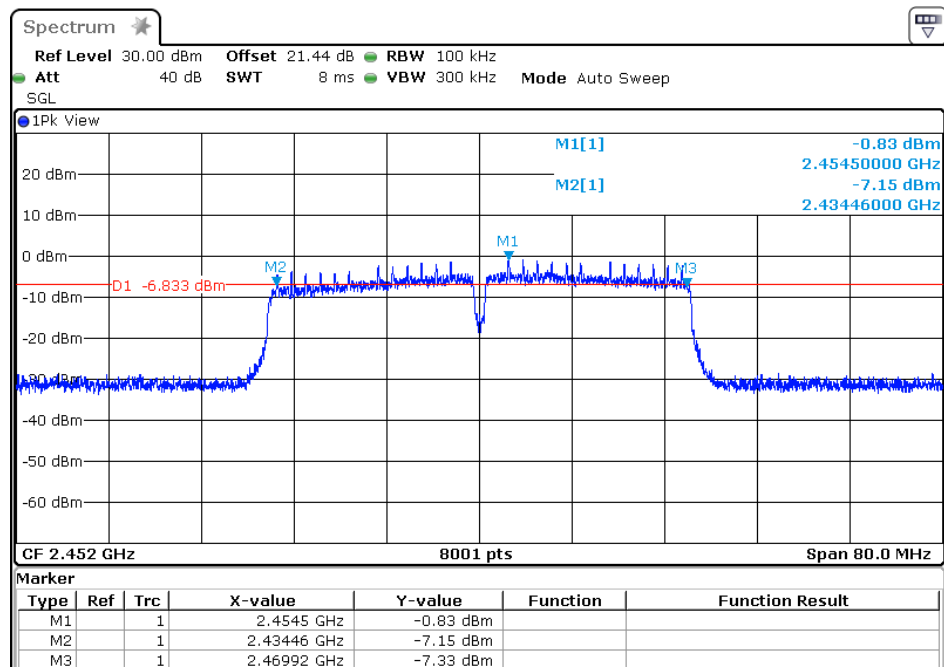
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz(40MHz)

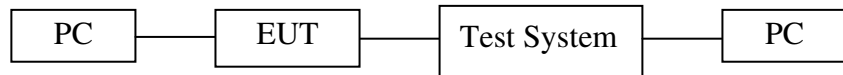


802.11n Channel High 2452MHz(40MHz)



7. DUTY CYCLE MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.3. Operating Condition of EUT

7.3.1. Setup the EUT and simulator as shown as Section 7.1.

7.3.2. Turn on the power of all equipment.

7.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

7.4. Test Procedure

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

1. A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on- and off-times of the transmitted signal.
2. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on- and off-times of the transmitted signal
 - a. Set the center frequency of the instrument to the centre frequency of the transmission
 - b. Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value(10MHz).
 - c. Set detector = Peak or average.
 - d. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100.
(For example, if VBW and/or RBW are limited to 3MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

7.5.Test Result

The test was performed with 802.11b			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	97.68%	0.10

The test was performed with 802.11g			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	97.20%	0.12

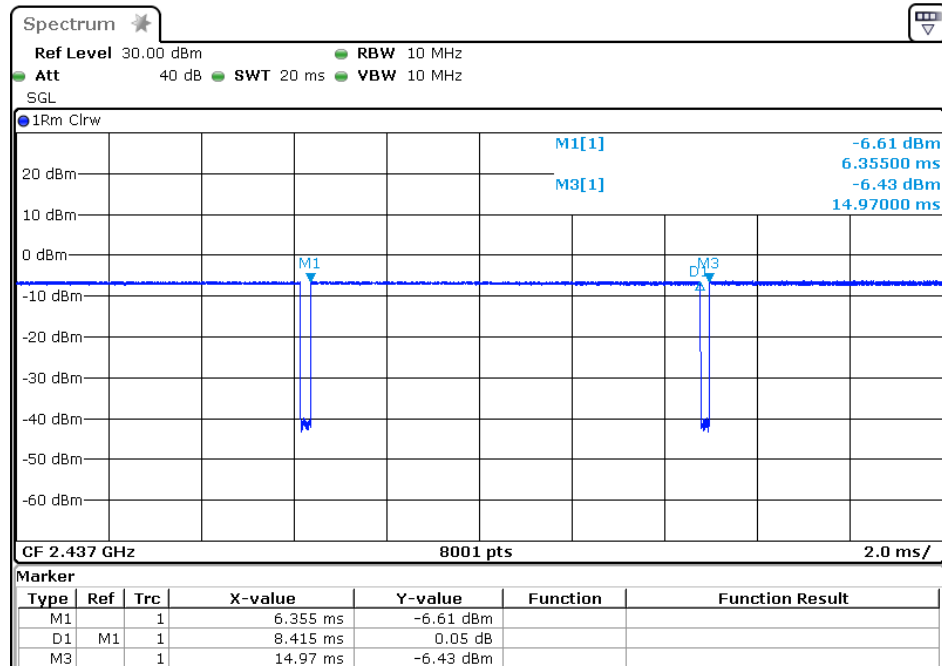
The test was performed with 802.11n (Bandwidth: 20 MHz)			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	97.00%	0.13

The test was performed with 802.11n (Bandwidth: 40 MHz)			
Channel	Frequency (MHz)	duty cycle(x)	10log(1/x)
Middle	2437	94.14%	0.26

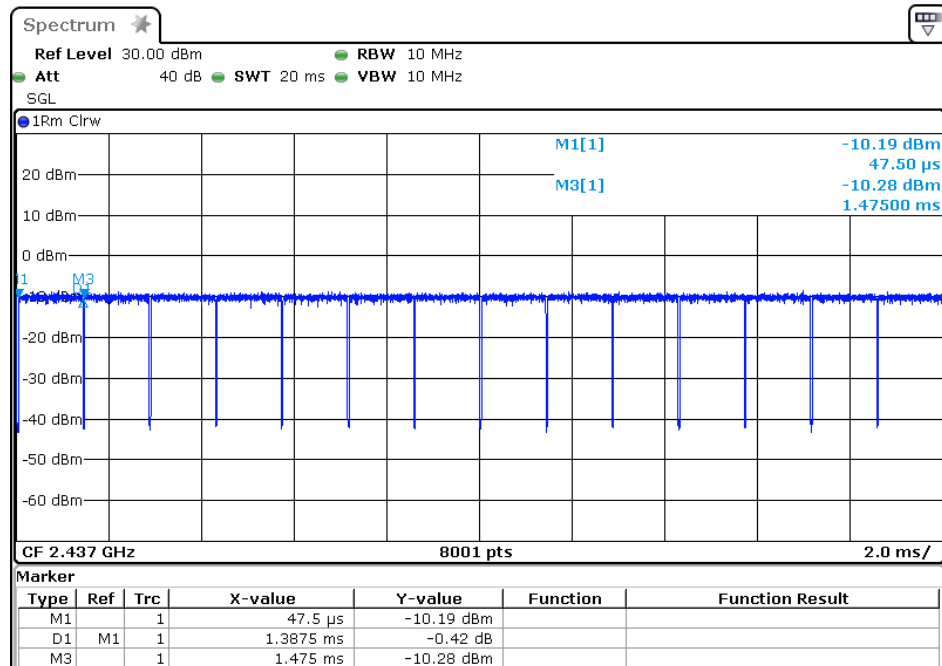
Note: We tested 802.11b/g/n20/n40 mode the all data rate and recorded the worst case data for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and MCS0 for 802.11n mode.

The spectrum analyzer plots are attached as below.

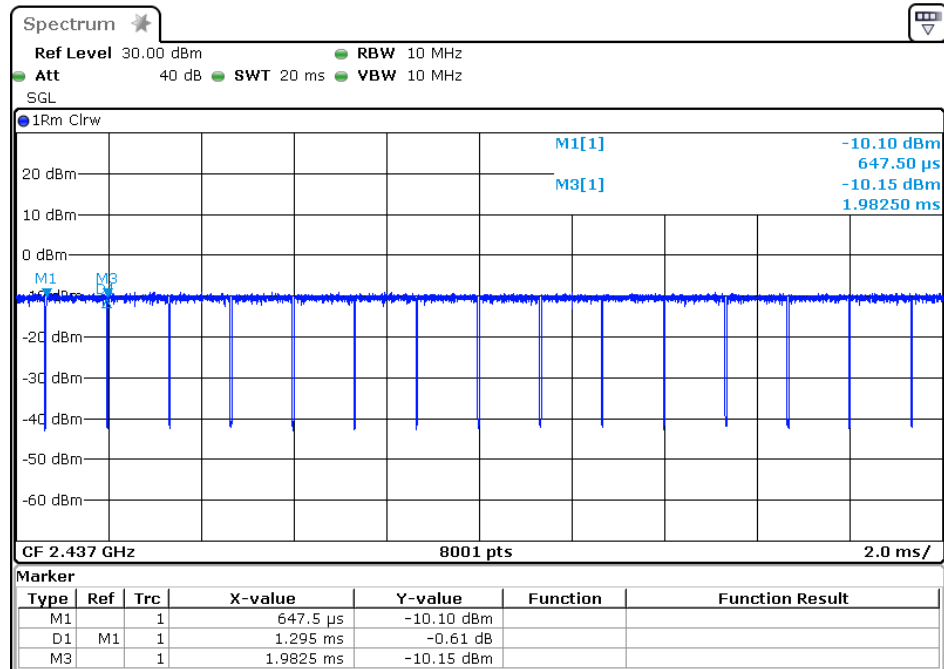
802.11b Channel Middle 2437MHz



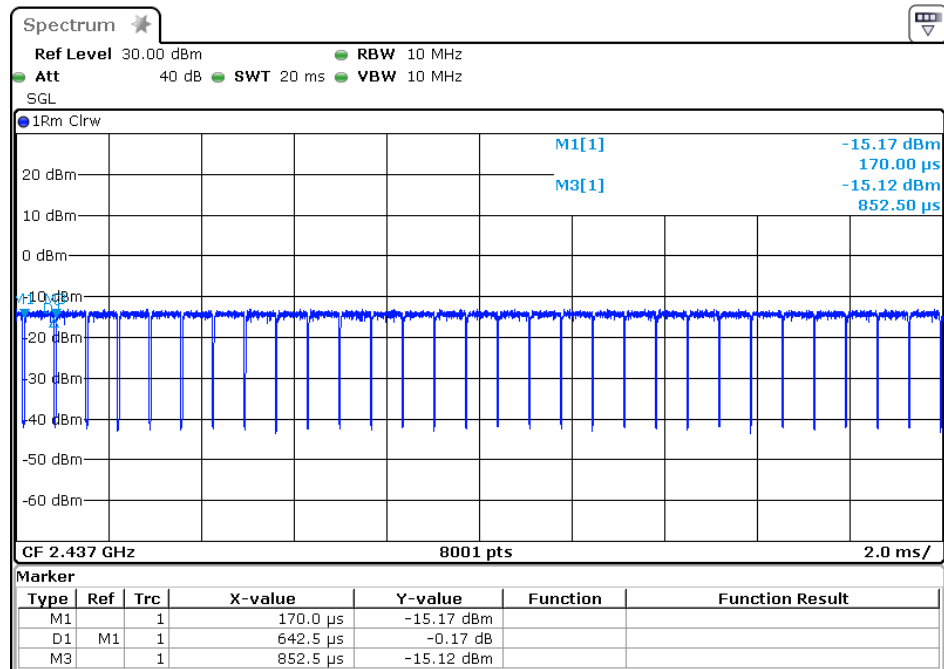
802.11g Channel Middle 2437MHz



802.11n Channel Middle 2437MHz(20MHz)

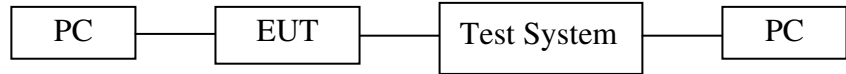


802.11n Channel Middle 2437MHz(40MHz)



8. MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

8.3. EUT Configuration on Measurement

The equipment is installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

8.5. Test Procedure

8.5.1. The EUT was tested according to DTS test procedure of Apr 05, 2017 KDB5580 74 D01 DTS Meas Guidance v04 for compliance to FCC 47CFR 15.247 requirements.

8.5.2. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.3. Set RBW = 1-5% of the OBW, not to exceed 1 MHz, VBW $\geq 3 \times$ RBW, Sweep time = auto, Set span to at least 1.5 times the OBW, Detector = RMS.

8.5.4. Measurement the Maximum conducted (average) output power.

8.6.Test Result

Final power= Ave output power+10log(1/ duty cycle)

The test was performed with 802.11b						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (mW)	Limits dBm / W
Low	2412	15.78	0.10	15.88	38.73	30 dBm / 1 W
Middle	2437	16.28	0.10	16.38	43.45	30 dBm / 1 W
High	2462	15.09	0.10	15.19	33.04	30 dBm / 1 W

The test was performed with 802.11g						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (mW)	Limits dBm / W
Low	2412	14.19	0.12	14.31	26.98	30 dBm / 1 W
Middle	2437	13.92	0.12	14.04	25.35	30 dBm / 1 W
High	2462	14.21	0.12	14.33	27.10	30 dBm / 1 W

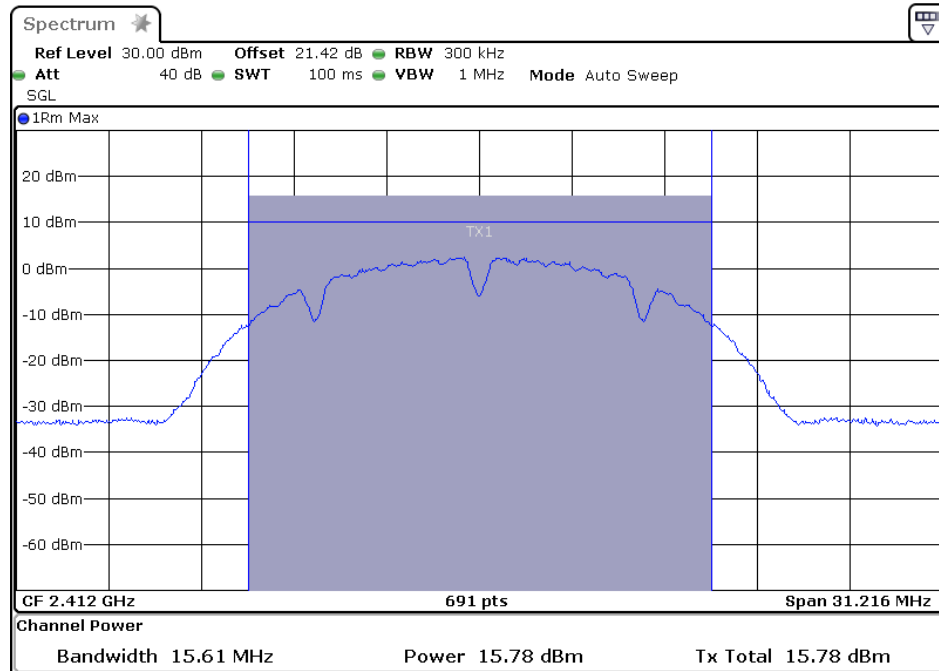
The test was performed with 802.11n (20MHz)						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (mW)	Limits dBm / W
Low	2412	13.49	0.13	13.63	23.07	30 dBm / 1 W
Middle	2437	13.95	0.13	14.08	25.59	30 dBm / 1 W
High	2462	13.35	0.13	13.48	22.28	30 dBm / 1 W

The test was performed with 802.11n (40MHz)						
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/ duty cycle)	Final power (dBm)	Final power (mW)	Limits dBm / W
Low	2422	12.87	0.26	13.13	20.59	30 dBm / 1 W
Middle	2437	13.20	0.26	13.46	22.18	30 dBm / 1 W
High	2452	13.16	0.26	13.42	21.98	30 dBm / 1 W

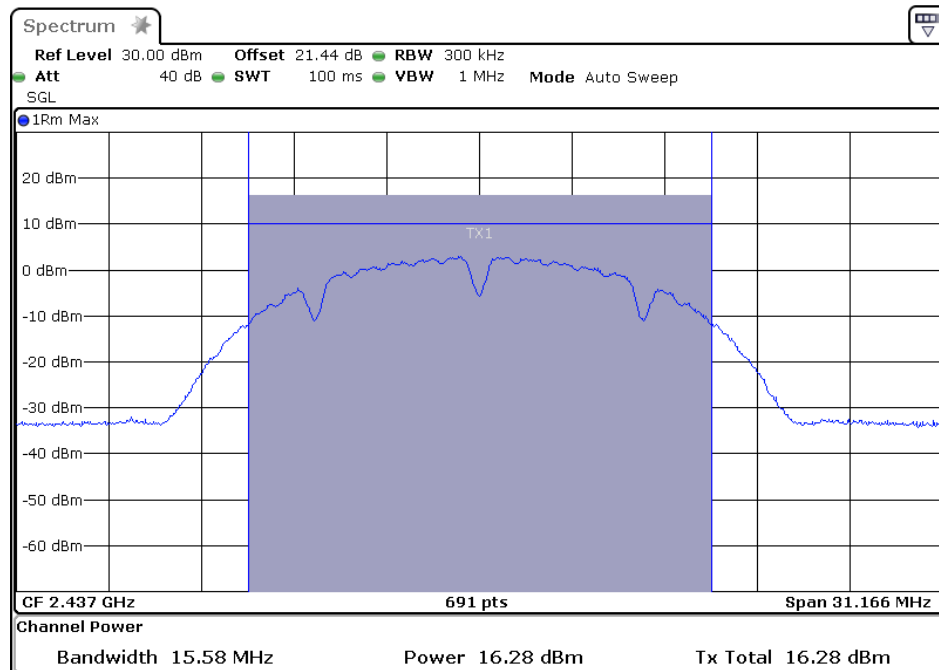
Note: We tested 802.11b/g/n20/n40 mode the all data rate and recorded the worst case data for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and MCS0 for 802.11n mode.

The spectrum analyzer plots are attached as below.

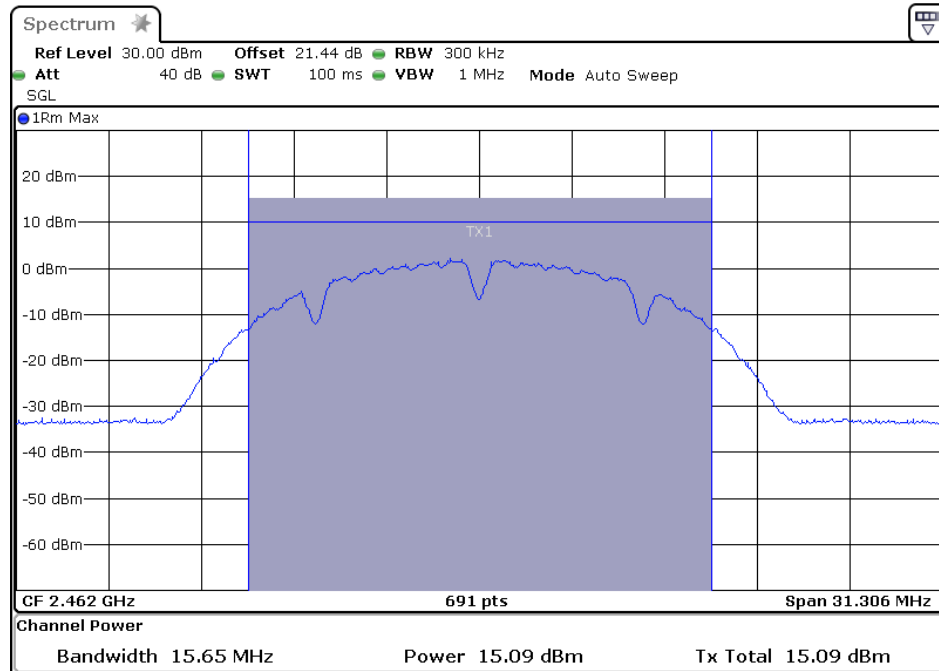
802.11b Channel Low 2412MHz



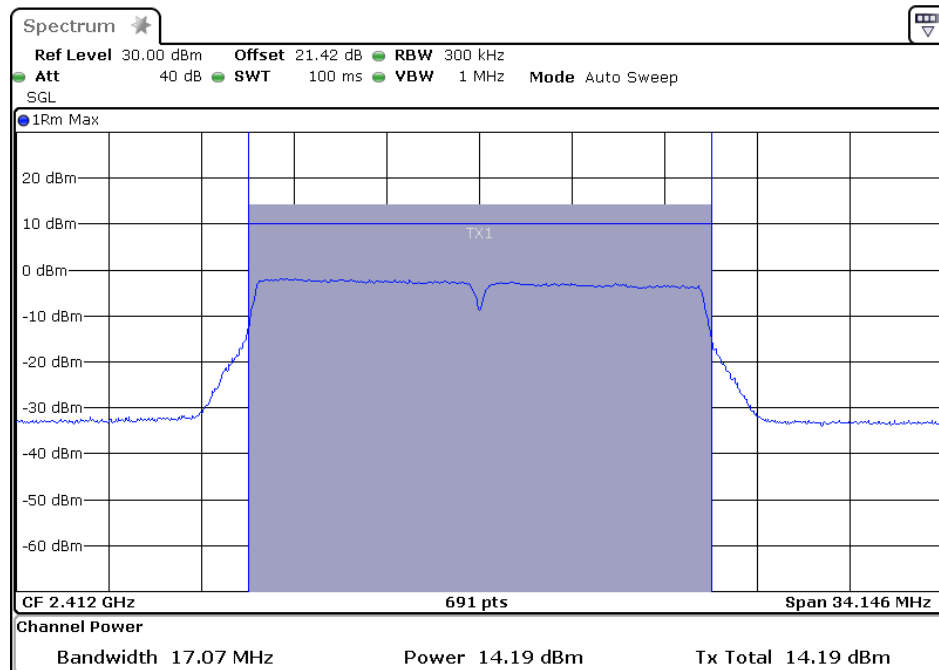
802.11b Channel Middle 2437MHz



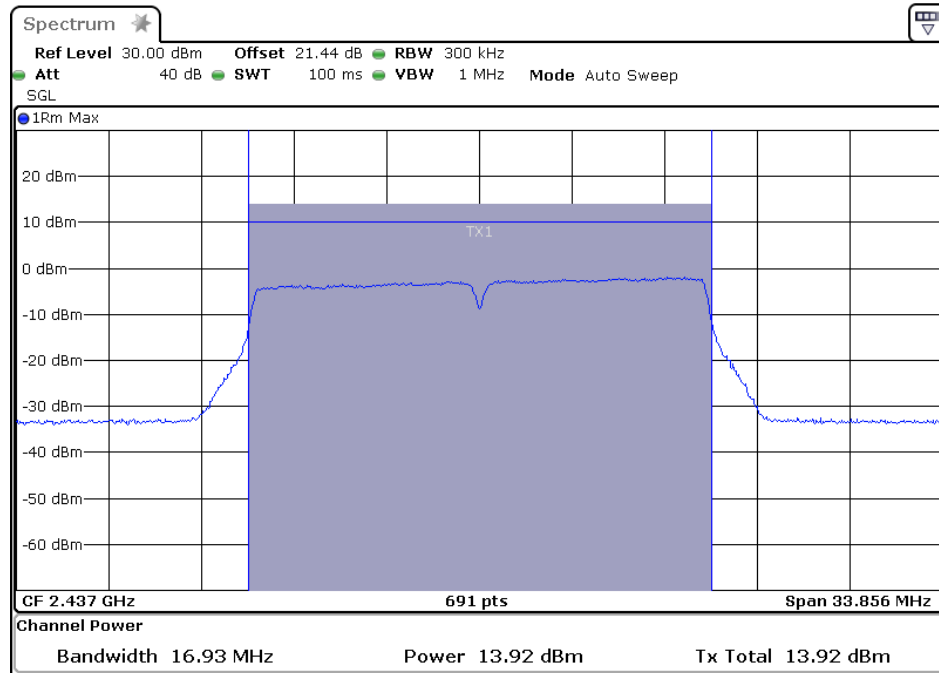
802.11b Channel High 2462MHz



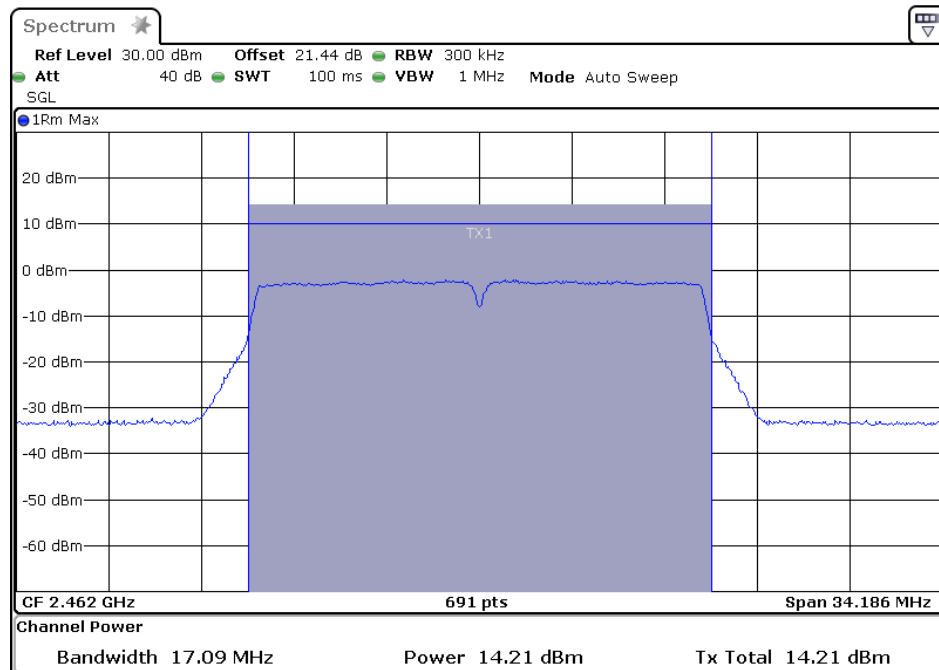
802.11g Channel Low 2412MHz



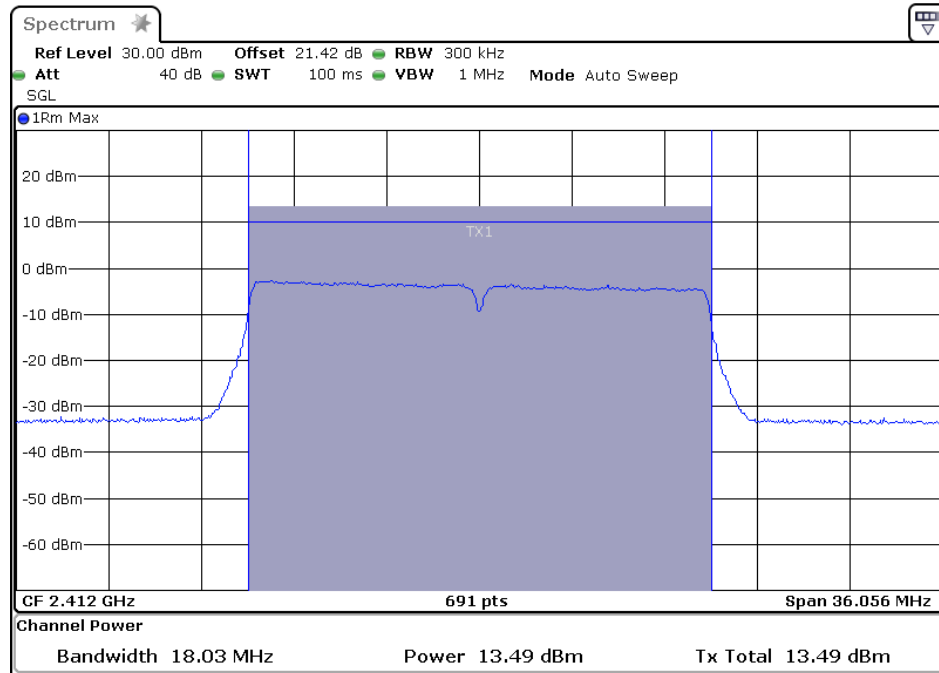
802.11g Channel Middle 2437MHz



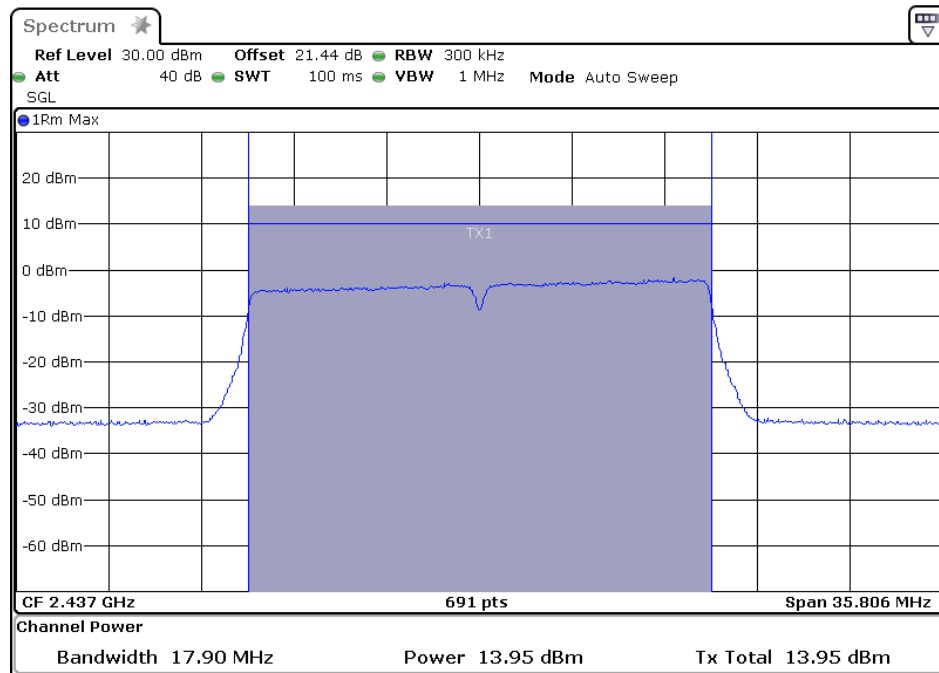
802.11g Channel High 2462MHz



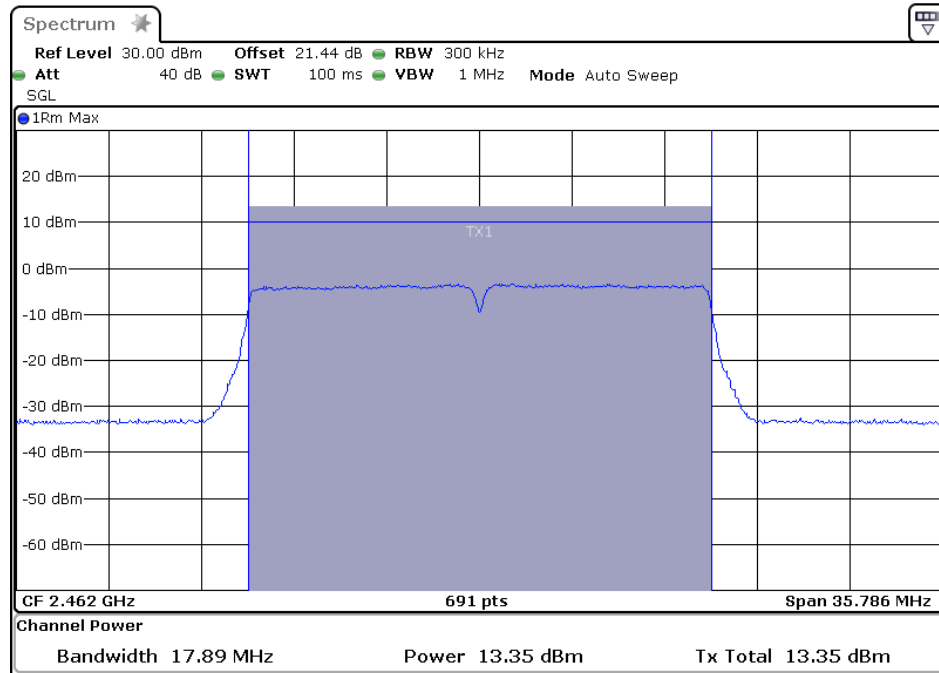
802.11n Channel Low 2412MHz (20MHz)



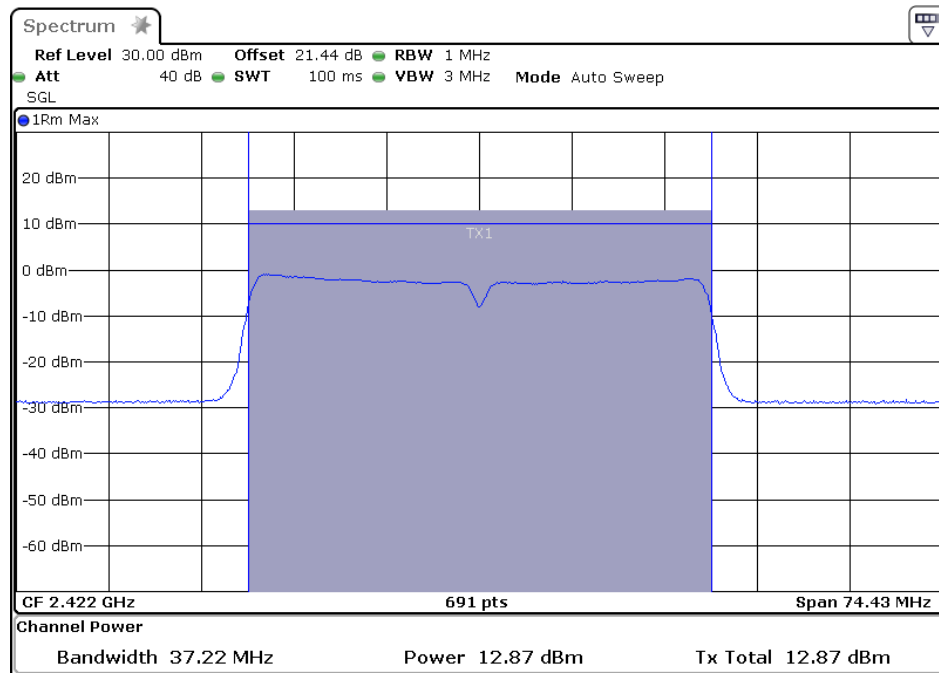
802.11n Channel Middle 2437MHz (20MHz)



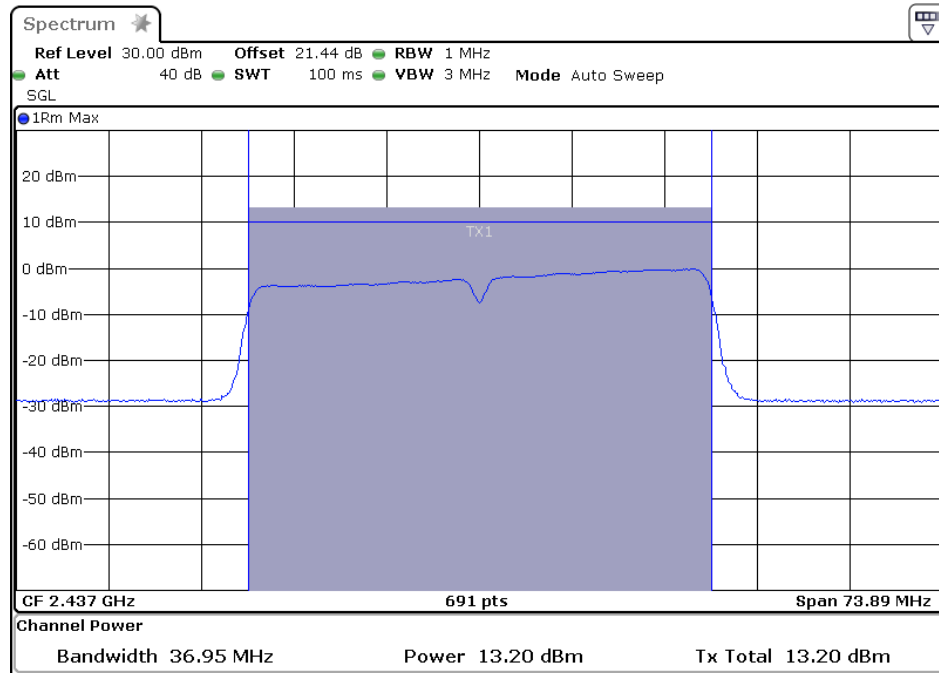
802.11n Channel High 2462MHz (20MHz)



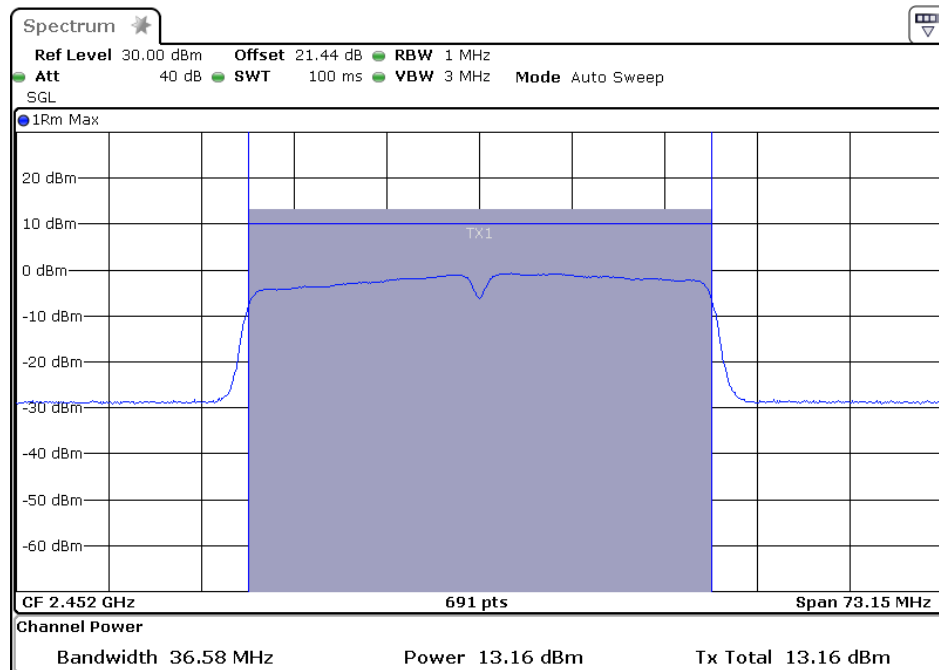
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz (40MHz)

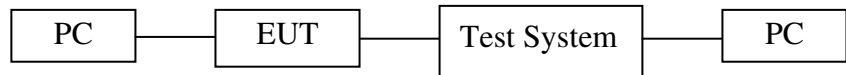


802.11n Channel High 2452MHz (40MHz)



9. POWER SPECTRAL DENSITY MEASUREMENT

9.1. Block Diagram of Test Setup



9.2. The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Measurement Procedure AVGPSD-2:

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98%), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty is constant (i.e., duty cycle variations are less than $\pm 2\%$):

Measure the duty cycle(x) of the transmitter output signal as described in Section 6.0.

Set instrument center frequency to DTS channel center frequency.

Set span to at least $1.5 \times \text{OBW}$.

Set RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$.

Set VBW $\geq 3 \times \text{RBW}$

Detector=power averaging(RMS) or sample detector(when RMS not available).

Ensure that the number of measurement points in sweep $\geq 2 \times \text{span/RBW}$.

Sweep time=auto couple.

Do not use sweep triggering. Allow sweep to “free run”.

Employ trace averaging(RMS) mode over a minimum of 100 traces.

Use the peak maker function to determine the maximum amplitude level.

Add $10\log(1/x)$, where x is the duty cycle measured in step(a, to the measured PSD to compute the average PSD during the actual transmission time.

If resultant value exceeds the limit, then reduce RBW(no less than 3kHz) and repeat(note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

9.6.Test Result

The test was performed with 802.11b					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm)	$10\log(1/\text{duty cycle})$	Final Power Spectral Density (dBm)	Limits (dBm)
Low	2412	-8.40	0.10	-8.30	8 dBm
Middle	2437	-8.63	0.10	-8.53	8 dBm
High	2462	-9.97	0.10	-9.87	8 dBm

The test was performed with 802.11g					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm)	$10\log(1/\text{duty cycle})$	Final Power Spectral Density (dBm)	Limits (dBm)
Low	2412	-11.74	0.12	-11.62	8 dBm
Middle	2437	-10.67	0.12	-10.55	8 dBm
High	2462	-12.42	0.12	-12.30	8 dBm

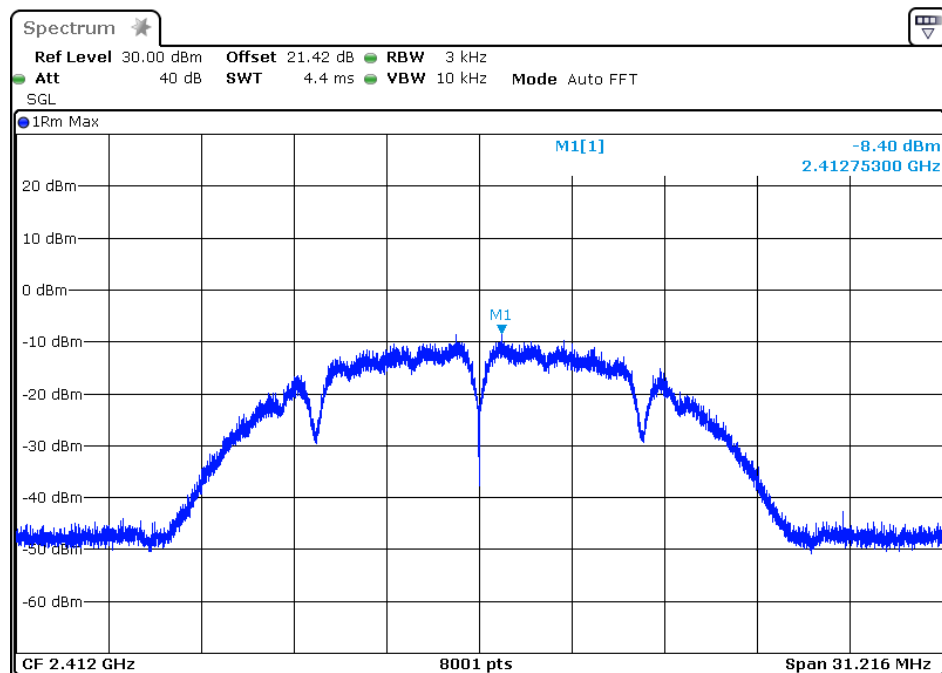
The test was performed with 802.11n (20MHz)					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm)	$10\log(1/\text{duty cycle})$	Final Power Spectral Density (dBm)	Limits (dBm)
Low	2412	-13.28	0.13	-13.15	8 dBm
Middle	2437	-12.84	0.13	-12.71	8 dBm
High	2462	-12.91	0.13	-12.78	8 dBm

The test was performed with 802.11n (40MHz)					
Channel	Frequency (MHz)	AVG Power Spectral Density (dBm)	10log(1/ duty cycle)	Final Power Spectral Density (dBm)	Limits (dBm)
Low	2422	-18.12	0.26	-17.86	8 dBm
Middle	2437	-16.34	0.26	-17.08	8 dBm
High	2452	-16.57	0.26	-17.31	8 dBm

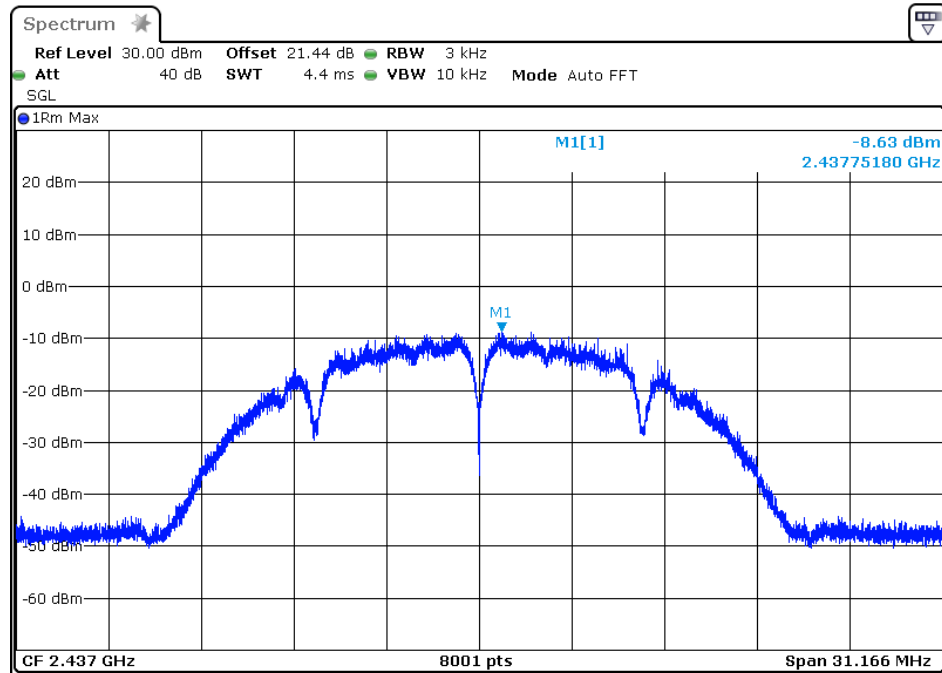
Note: We tested 802.11b/g/n20/n40 mode the all data rate and recorded the worst case data for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and MCS0 for 802.11n mode.

The spectrum analyzer plots are attached as below.

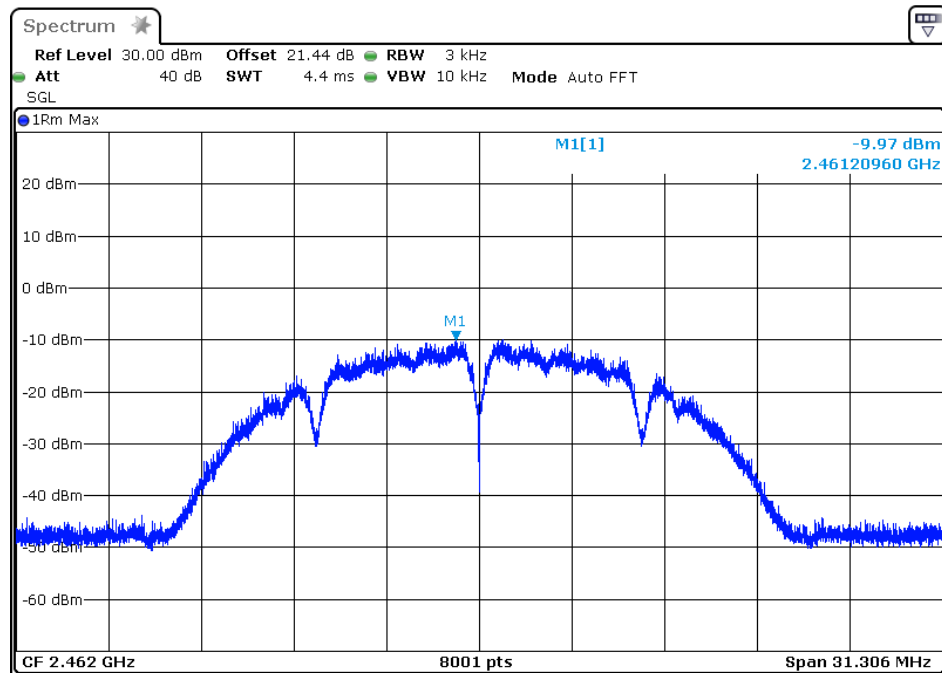
802.11b Channel Low 2412MHz



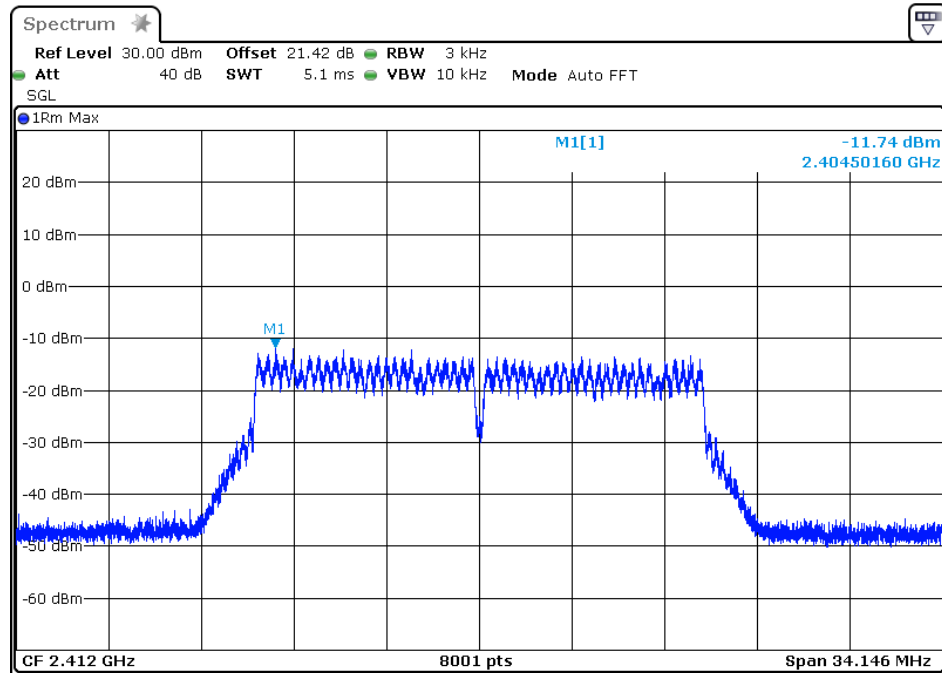
802.11b Channel Middle 2437MHz



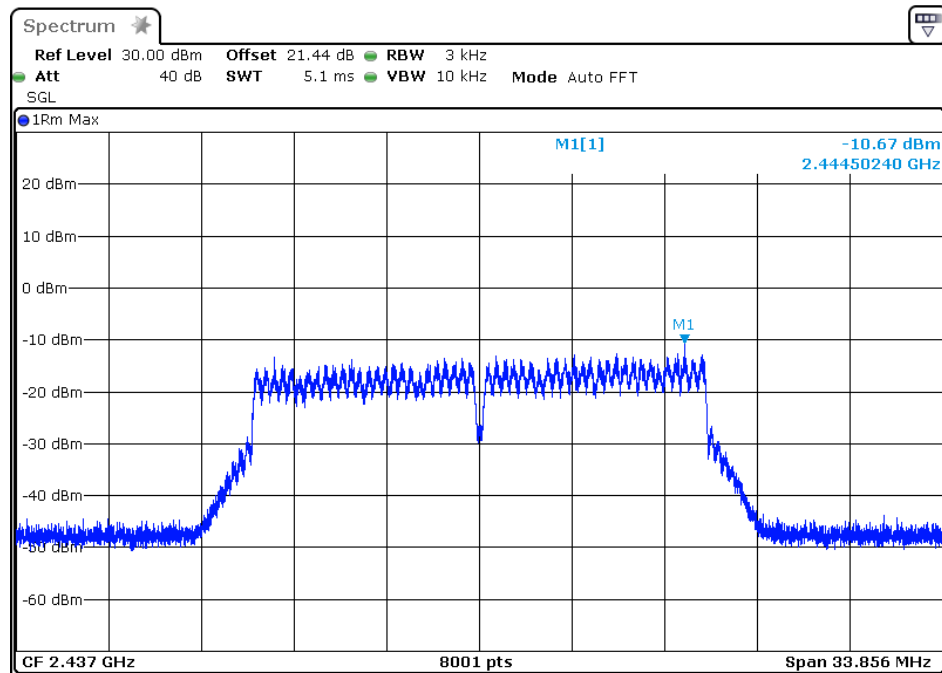
802.11b Channel High 2462MHz



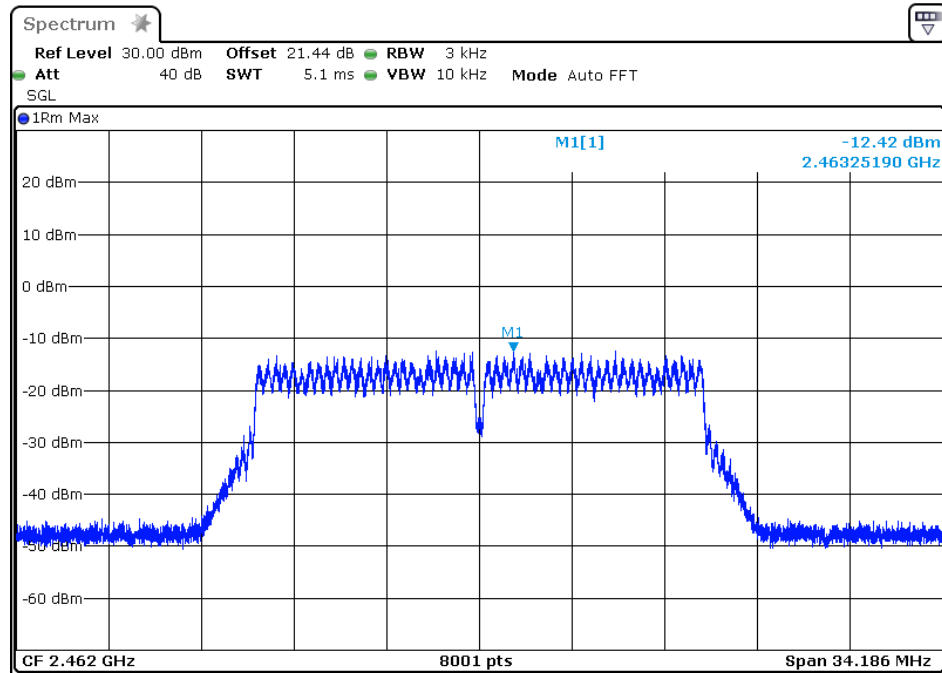
802.11g Channel Low 2412MHz



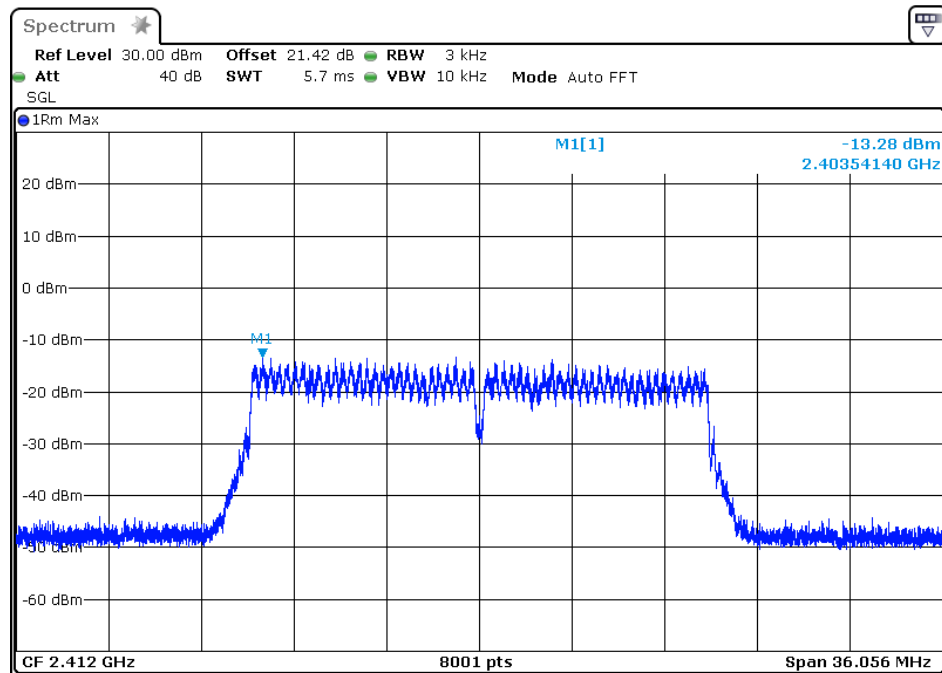
802.11g Channel Middle 2437MHz



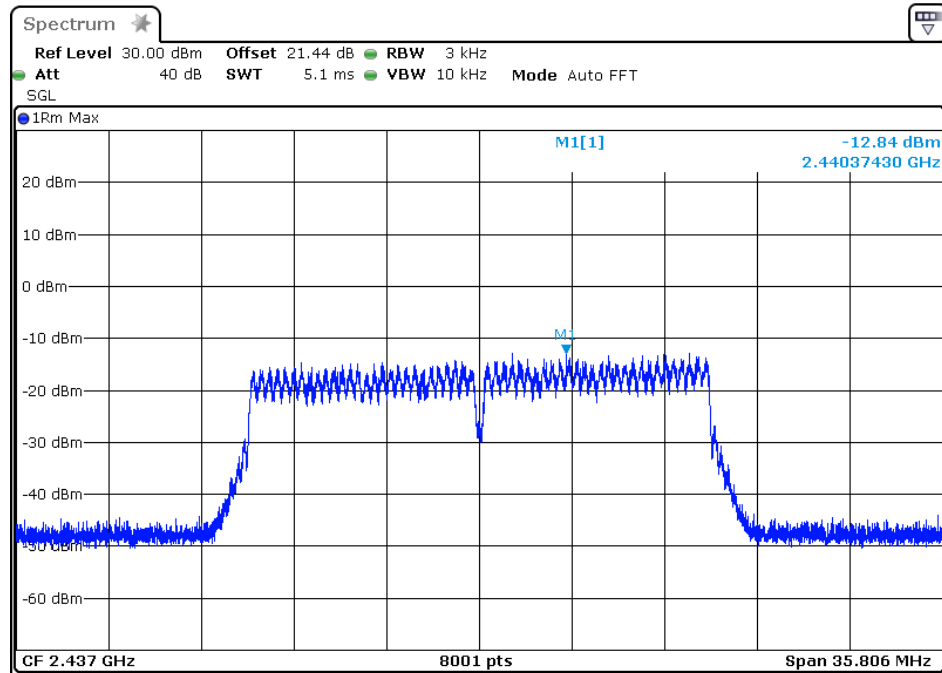
802.11g Channel High 2462MHz



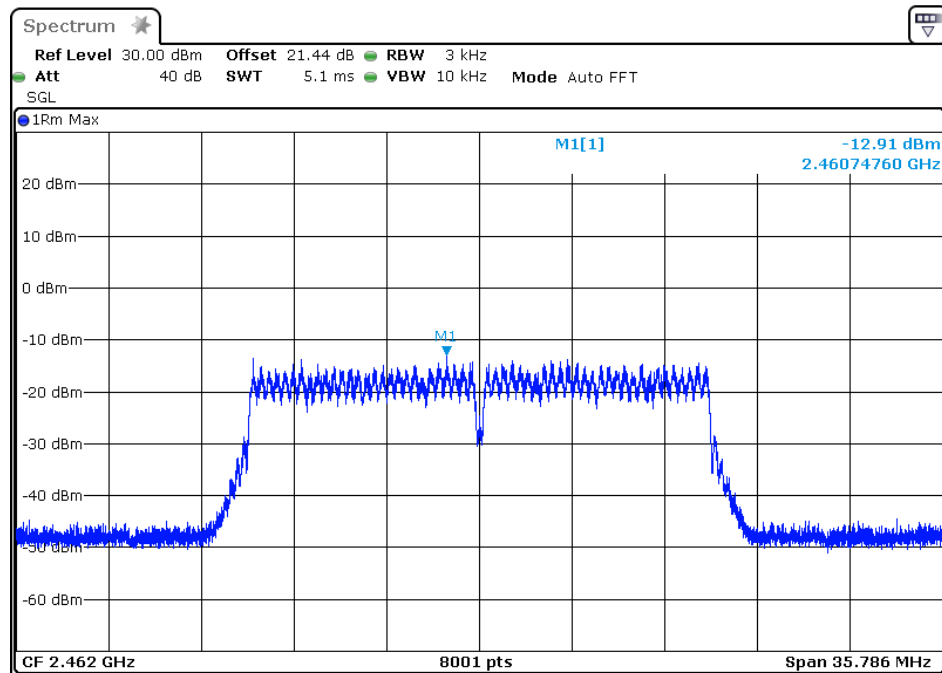
802.11n Channel Low 2412MHz (20MHz)



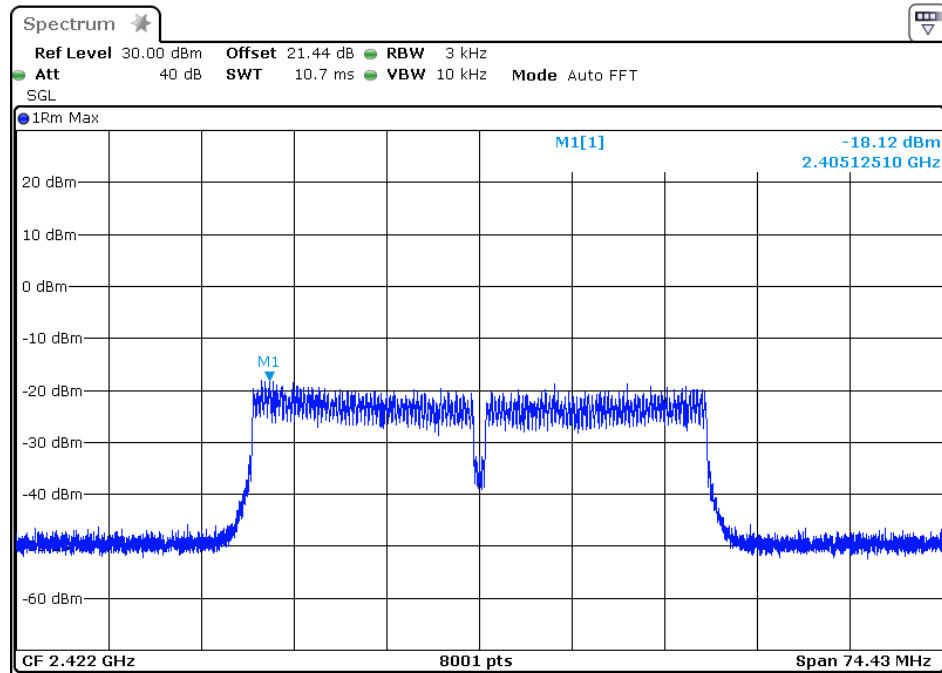
802.11n Channel Middle 2437MHz (20MHz)



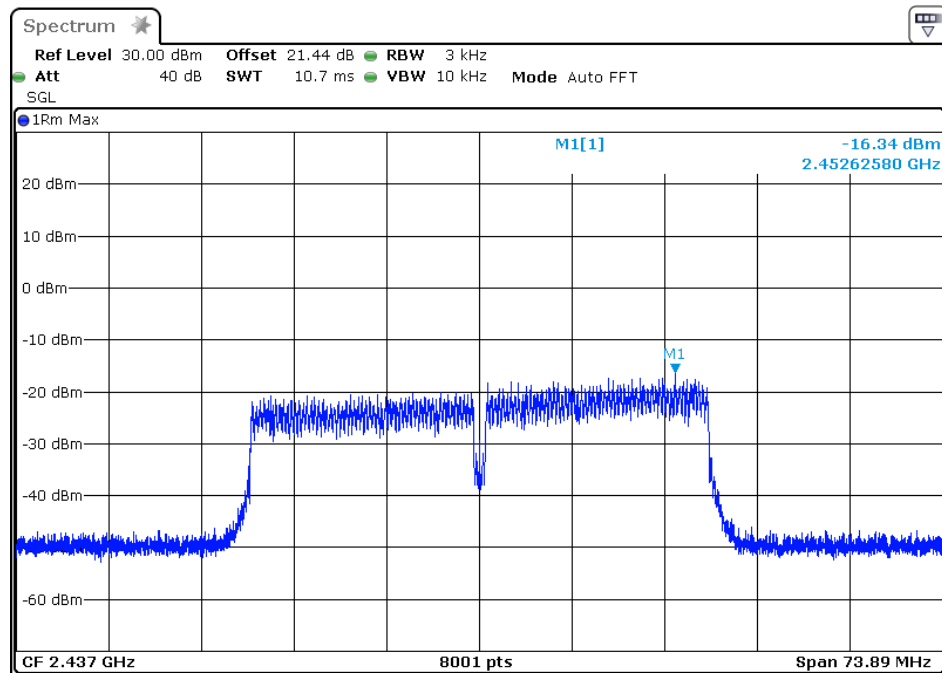
802.11n Channel High 2462MHz(20MHz)



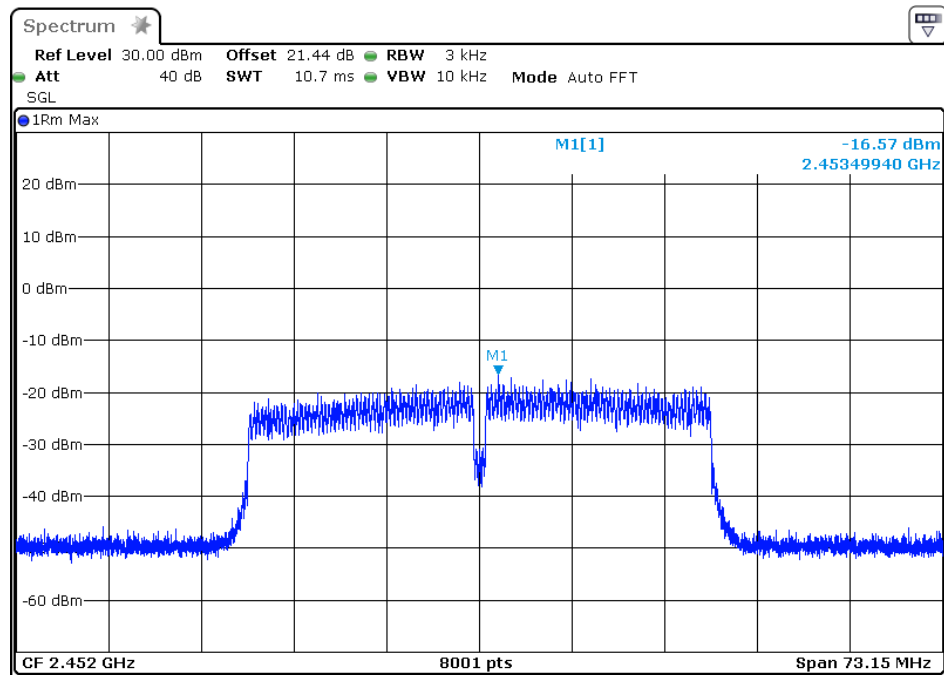
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz(40MHz)

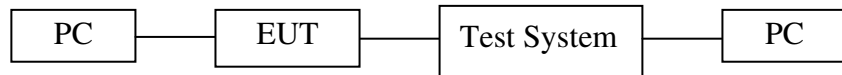


802.11n Channel High 2452MHz(40MHz)



10.BAND EDGE COMPLIANCE TEST

10.1.Block Diagram of Test Setup



10.2.The Requirement For Section 15.247(d)

Section 15.247(d): 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

10.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.4.Operating Condition of EUT

10.4.1.Setup the EUT and simulator as shown as Section 9.1.

10.4.2.Turn on the power of all equipment.

10.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz MHz. We select 2412MHz, 2462MHz and 2422MHz, 2452MHz TX frequency to transmit.

10.5.Test Procedure

Conducted Band Edge:

10.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.

10.5.2.Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz.

Radiate Band Edge:

10.5.3.The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.

10.5.4.The turntable was rotated for 360 degrees to determine the position of maximum emission level.

10.5.5.EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

10.5.6.Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

10.5.7.RBW=1MHz, VBW=1MHz

10.5.8.The band edges was measured and recorded.

10.6.Test Result

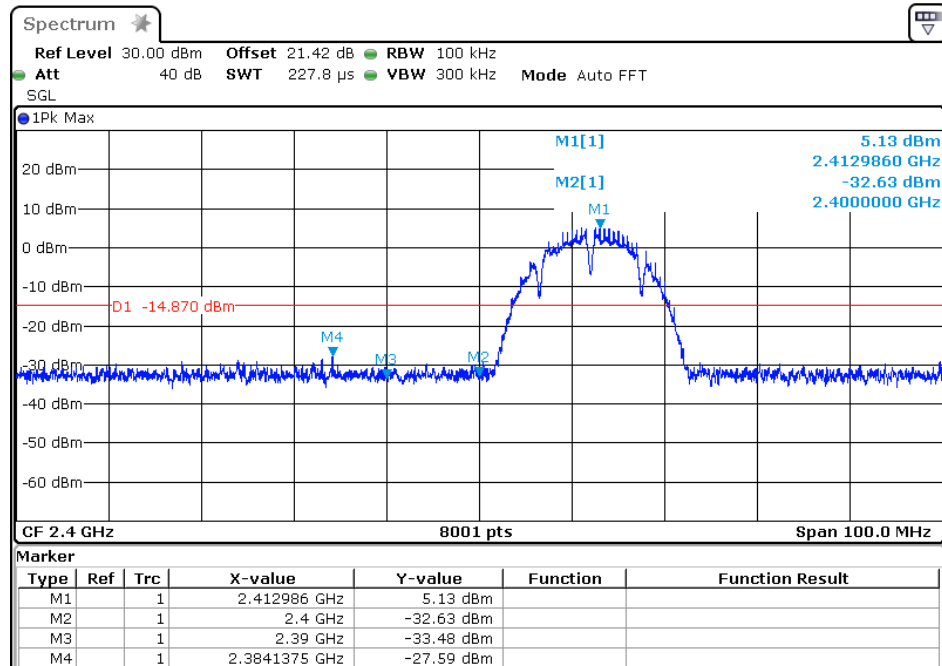
The test was performed with 802.11b		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	37.76	> 30dBc
2483.5	37.03	> 30dBc

The test was performed with 802.11g		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	34.94	> 30dBc
2483.5	35.06	> 30dBc

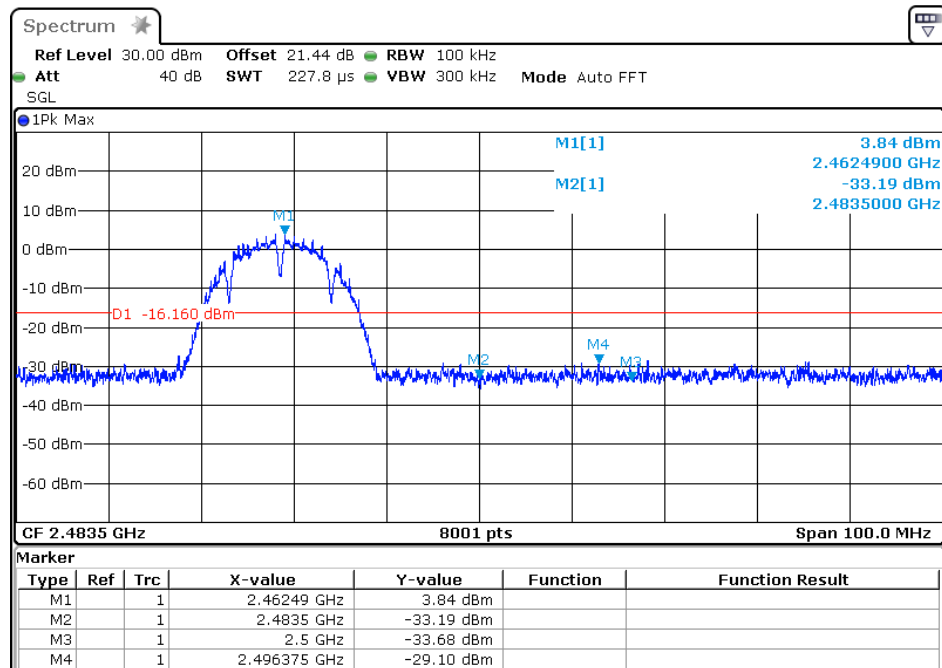
The test was performed with 802.11n (20MHz)		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	37.55	> 30dBc
2483.5	36.72	> 30dBc

The test was performed with 802.11n (40MHz)		
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2400	31.58	> 30dBc
2483.5	31.86	> 30dBc

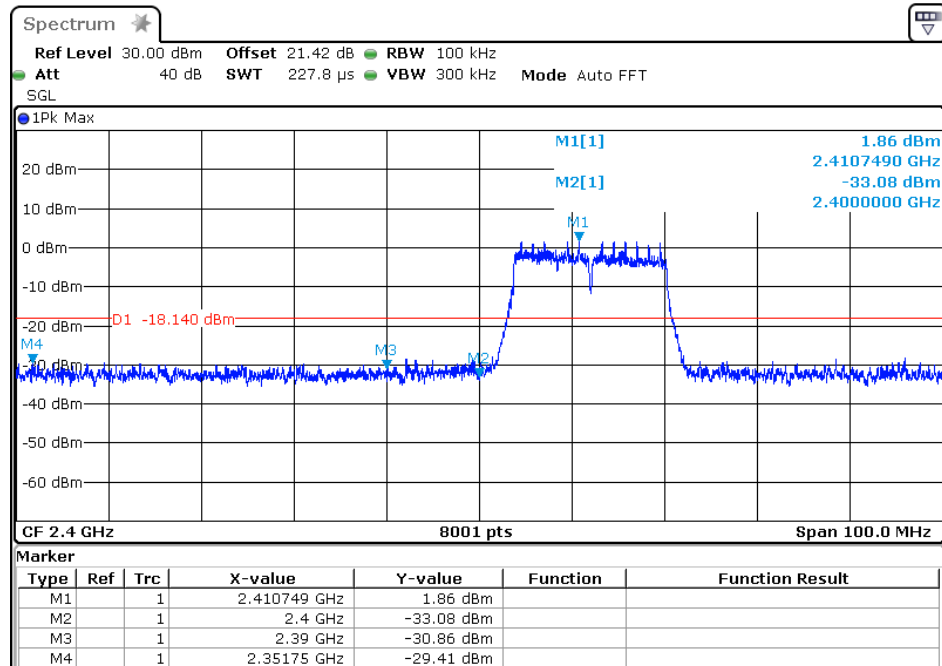
802.11b Channel Low 2412MHz



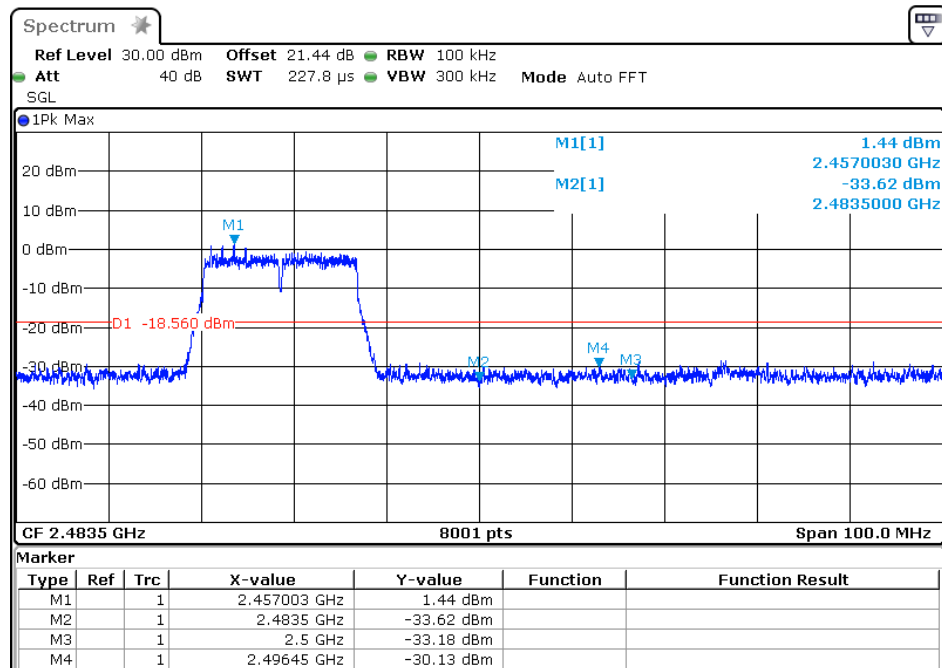
802.11b Channel High 2462MHz



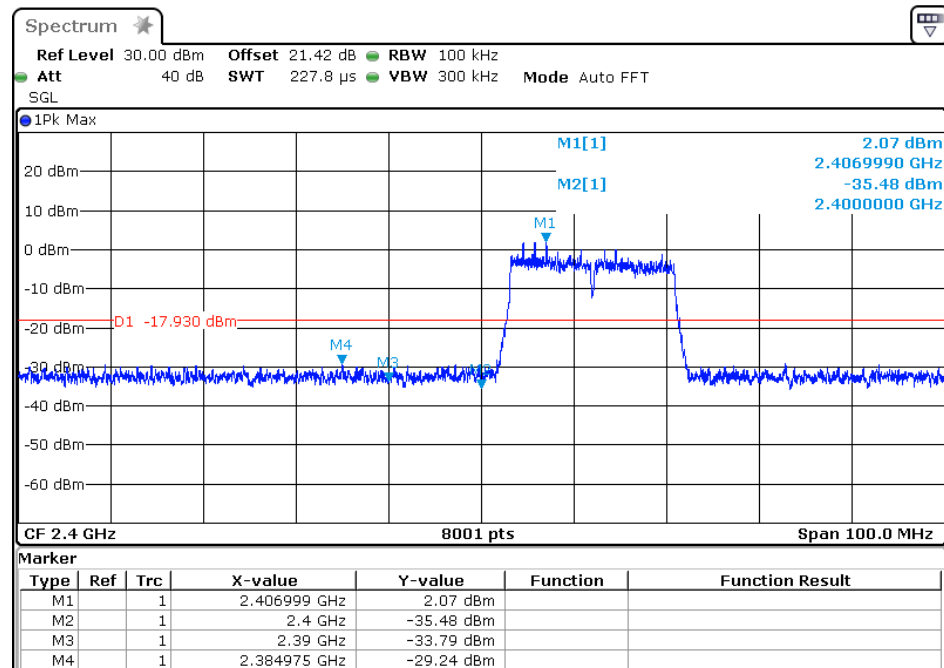
802.11g Channel Low 2412MHz



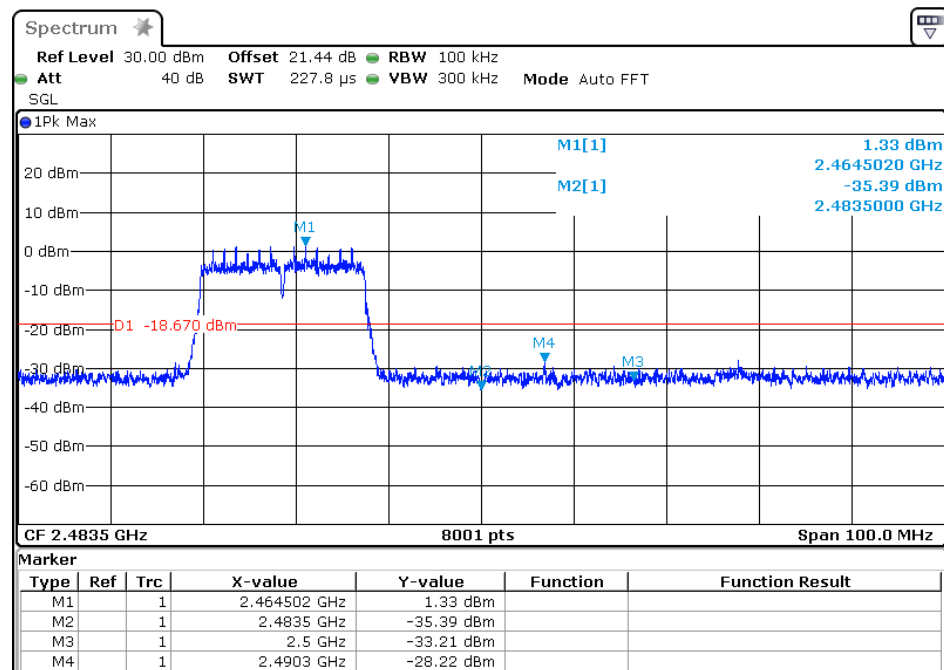
802.11g Channel High 2462MHz



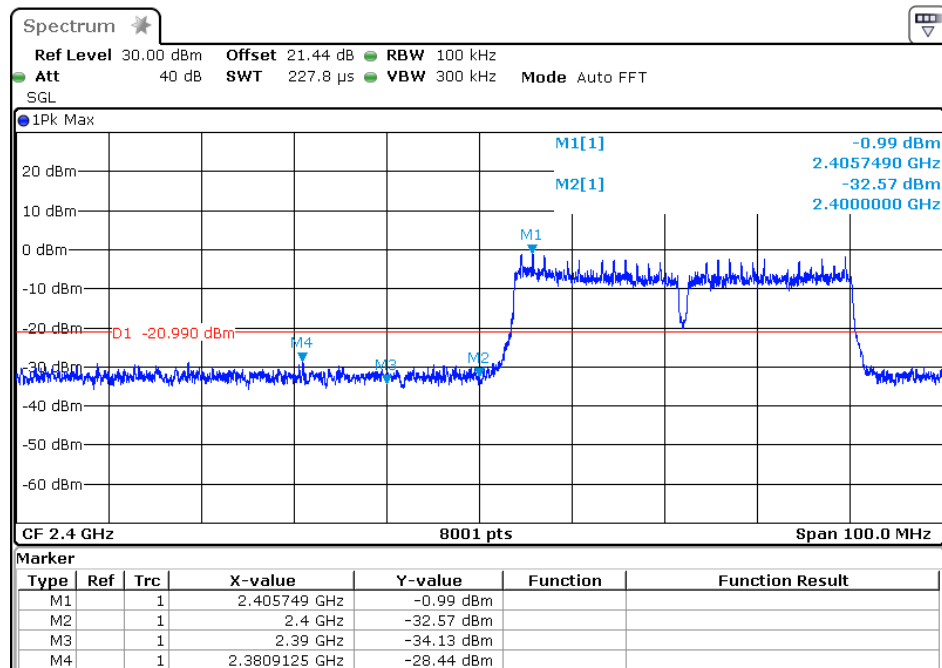
802.11n Channel Low 2412MHz (20MHz)



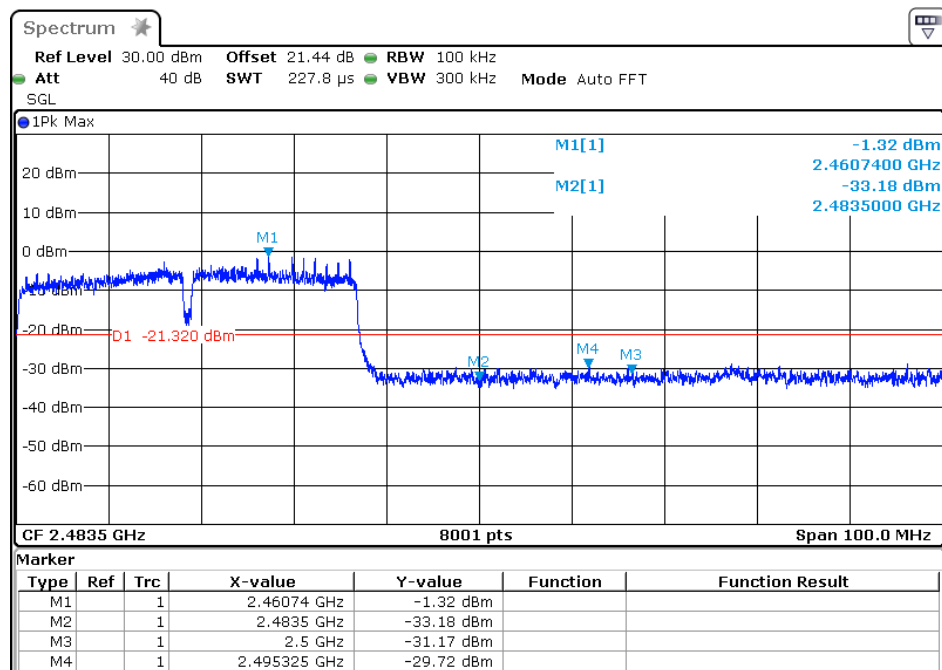
802.11n Channel High 2462MHz (20MHz)



802.11n Channel Low 2422MHz (40MHz)



802.11n Channel High 2452MHz (40MHz)



Radiated Band Edge Result

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:
$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$
3. Display the measurement of peak values.

Test Procedure:

The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Let the EUT work in TX modes then measure it.

We select 2412MHz, 2462MHz TX frequency to transmit(802.11b/g/n20 mode).

We select 2422MHz, 2452MHz TX frequency to transmit(802.11n40 mode).

During the radiated emission test, the spectrum analyzer was set with the following configurations:

- 1.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
- 2.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- 3.All modes of operation were investigated and the worst-case emissions are reported.

Note: We tested 802.11b/g/n20/n40 mode the all data rate and recorded the worst case data for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and MCS0 for 802.11n mode.

Under normal conditions, we tested the data of two voltages(7V and 36Vdc) and recorded the worst mode values.



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Site: 1# Chamber

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Job No.: star2017 #885

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 1(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Horizontal

Power Source: DC 36V

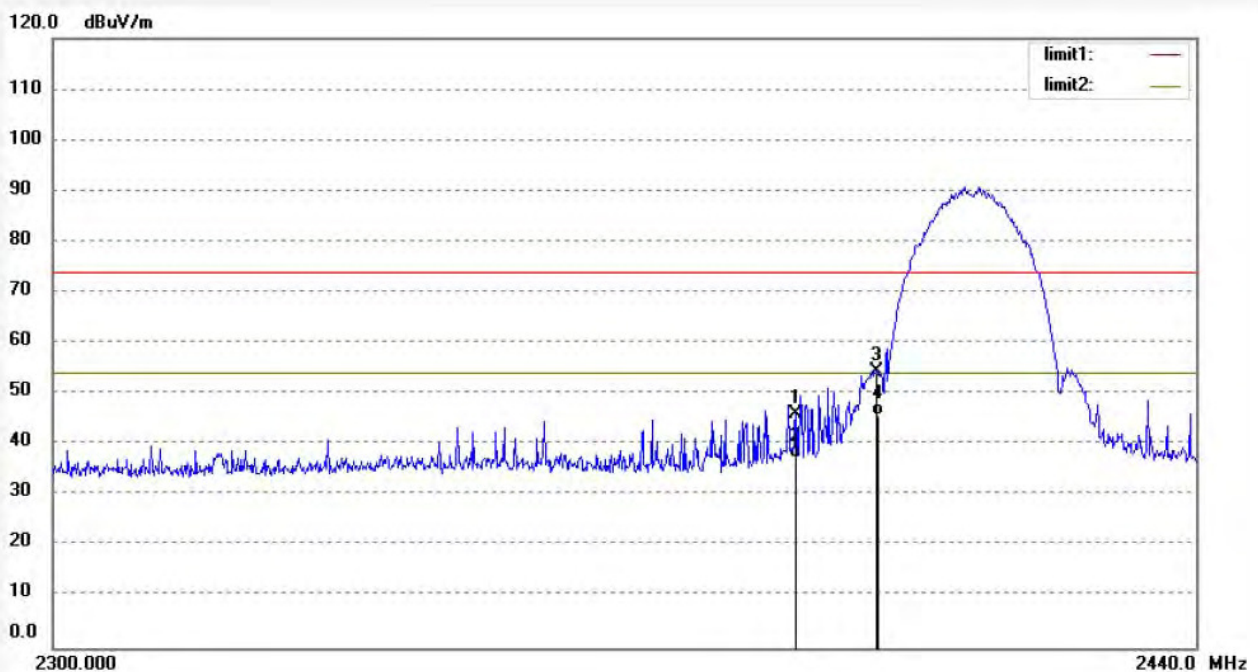
Date: 18/01/06/

Time: 15/34/24

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	52.31	-6.32	45.99	74.00	-28.01	peak	200	247	
2	2390.000	43.67	-6.32	37.35	54.00	-16.65	AVG	200	193	
3	2400.000	60.68	-6.27	54.41	74.00	-19.59	peak	200	230	
4	2400.000	52.14	-6.27	45.87	54.00	-8.13	AVG	200	185	



ACCURATE TECHNOLOGY CO., LTD.

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Site: 1# Chamber

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Job No.: star2017 #886

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 1(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Vertical

Power Source: DC 36V

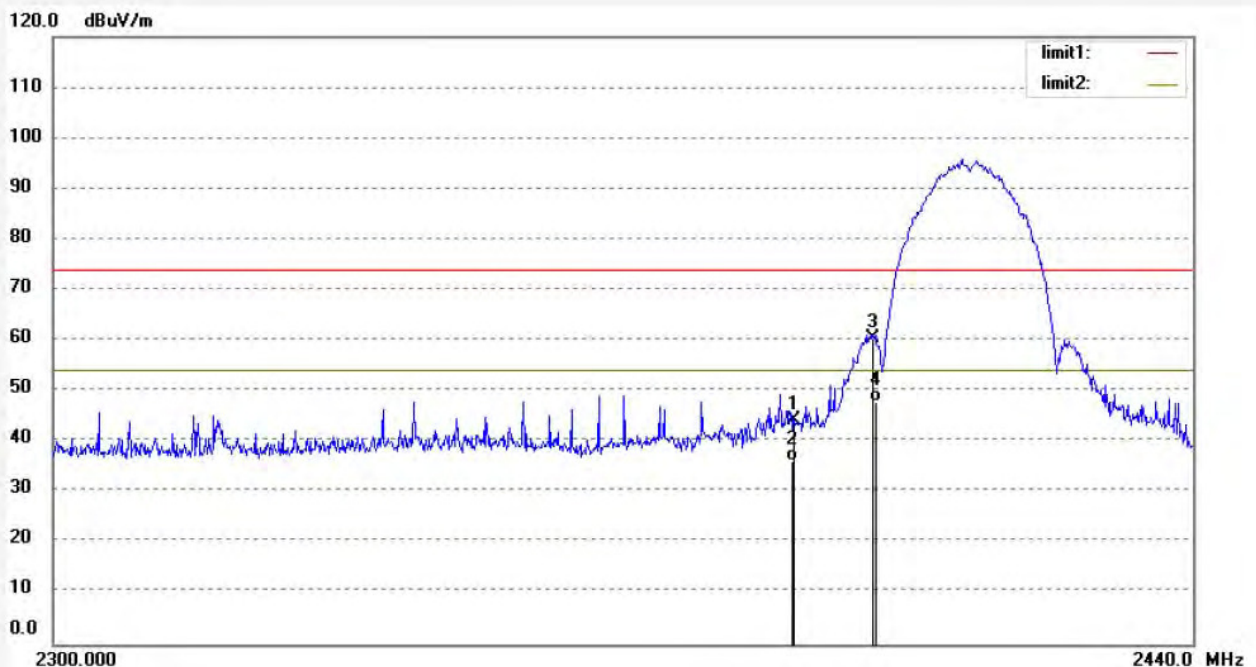
Date: 18/01/06/

Time: 15/35/48

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	50.43	-6.32	44.11	74.00	-29.89	peak	150	26	
2	2390.000	42.36	-6.32	36.04	54.00	-17.96	AVG	150	162	
3	2400.000	66.80	-6.27	60.53	74.00	-13.47	peak	150	134	
4	2400.000	54.10	-6.27	47.83	54.00	-6.17	AVG	150	168	



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Site: 1# Chamber

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Fax:+86-0755-26503396

Job No.: star2017 #887

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 11(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Horizontal

Power Source: DC 36V

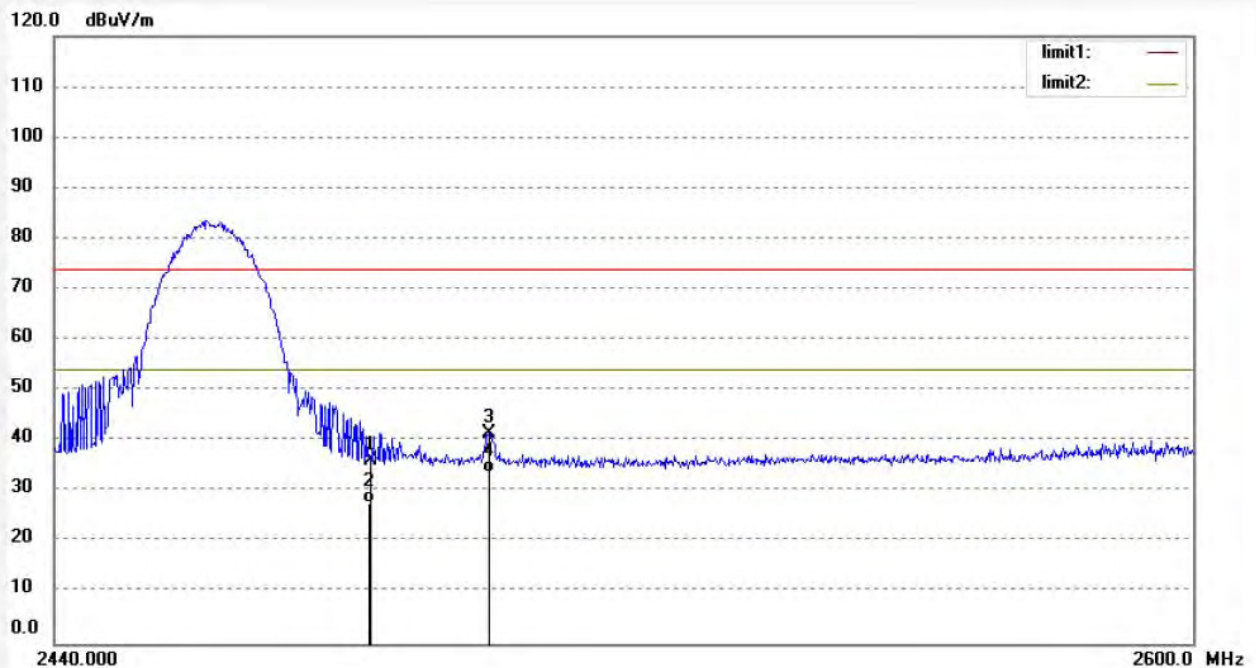
Date: 18/01/06/

Time: 15/38/59

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	41.99	-5.89	36.10	74.00	-37.90	peak	200	169	
2	2483.500	33.54	-5.89	27.65	54.00	-26.35	AVG	200	177	
3	2500.000	47.25	-5.81	41.44	74.00	-32.56	peak	200	189	
4	2500.000	39.50	-5.81	33.69	54.00	-20.31	AVG	200	234	



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Site: 1# Chamber

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Fax:+86-0755-26503396

Job No.: star2017 #888

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 11(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Vertical

Power Source: DC 36V

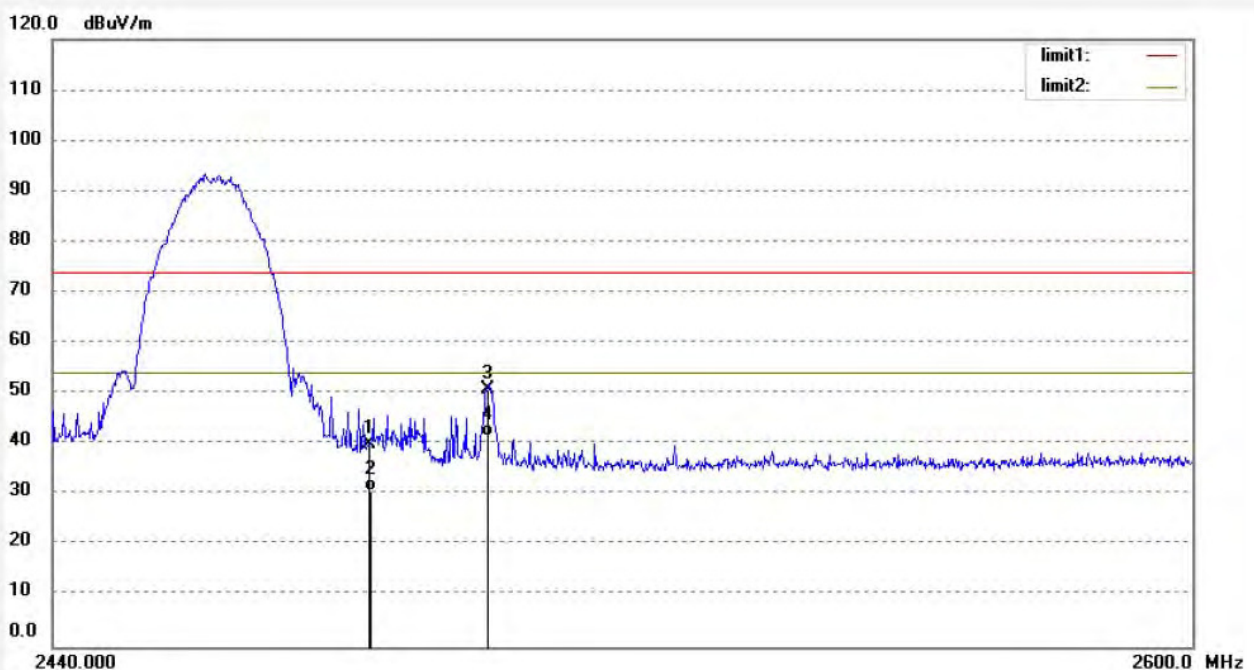
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Time: 15/40/19

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471

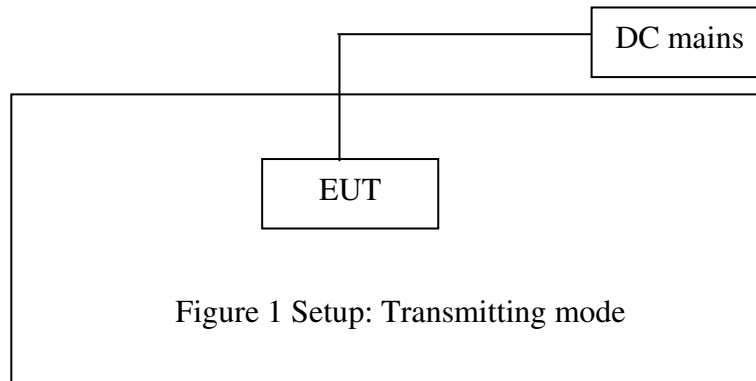


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	45.81	-5.89	39.92	74.00	-34.08	peak	200	143	
2	2483.500	36.57	-5.89	30.68	54.00	-23.32	AVG	200	317	
3	2500.000	56.81	-5.81	51.00	74.00	-23.00	peak	200	306	
4	2500.000	47.26	-5.81	41.45	54.00	-12.55	AVG	200	291	

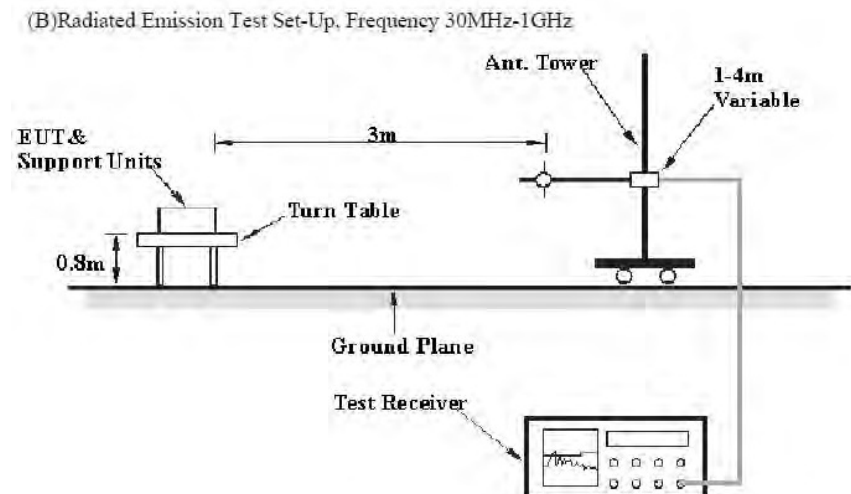
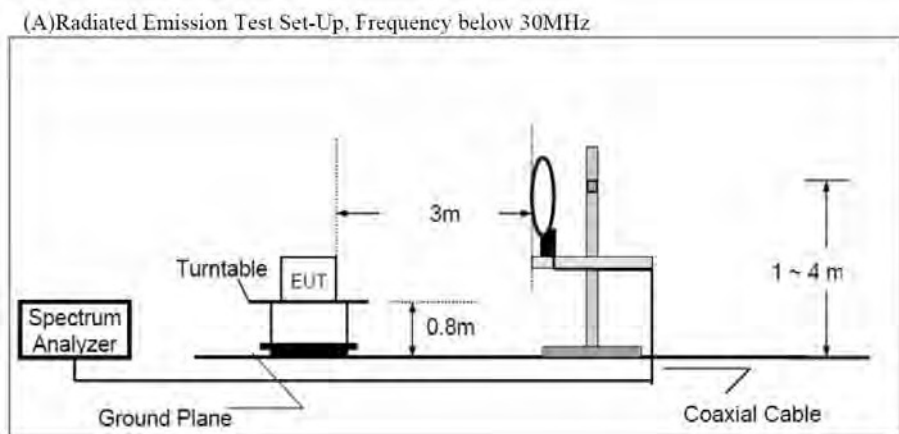
11.RADIATED SPURIOUS EMISSION TEST

11.1.Block Diagram of Test Setup

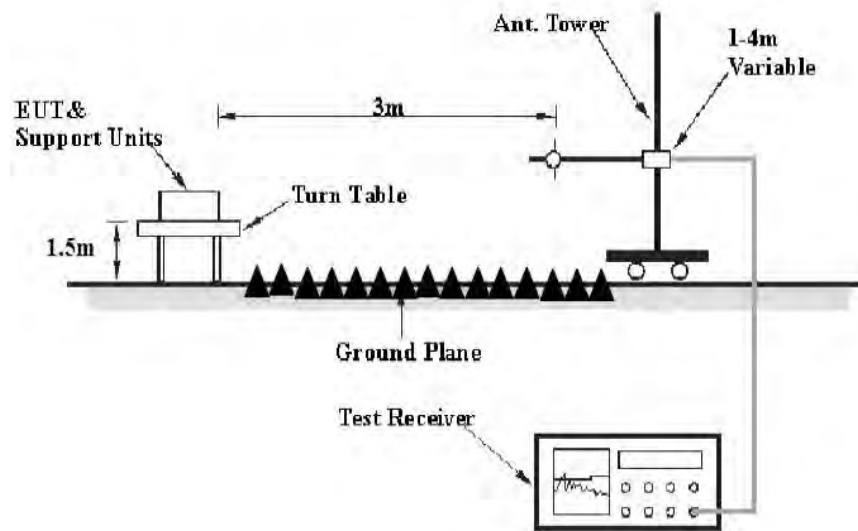
11.1.1.Block diagram of connection between the EUT and peripherals



11.1.2.Semi-Anechoic Chamber Test Setup Diagram



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



11.2.The Limit For Section 15.247(d)

Section 15.247(d): 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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3.Restricted bands of operation

11.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

11.4.Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.5. Operating Condition of EUT

11.5.1. Setup the EUT and simulator as shown as Section 10.1.

11.5.2. Turn on the power of all equipment.

11.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

11.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground (Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground (Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

The frequency range from 30MHz to 26500MHz is checked.

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

11.7.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	48.69	-13.35	35.34	46	-10.66	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

11.8.The Field Strength of Radiation Emission Measurement Results

- Note:
1. Emissions attenuated more than 20 dB below the permissible value are not reported.
 2. *: Denotes restricted band of operation.
 3. The EUT is tested radiation emission at each test mode (802.11 b/g/n) in three axes. The worst emissions are reported in all test mode and channels.
 4. The radiation emissions from 9KHz-30MHz and 18-26.5GHz are not reported, because the test values lower than the limits of 20dB.
 - 5.We tested 802.11b/g/n mode the all data rate and recorded the worst case data(802.11b) for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and MCS0 for 802.11n mode.
 - 6.Under normal conditions, we tested the data of two voltages(7V and 36Vdc) and recorded the worst mode values.

Below 1G



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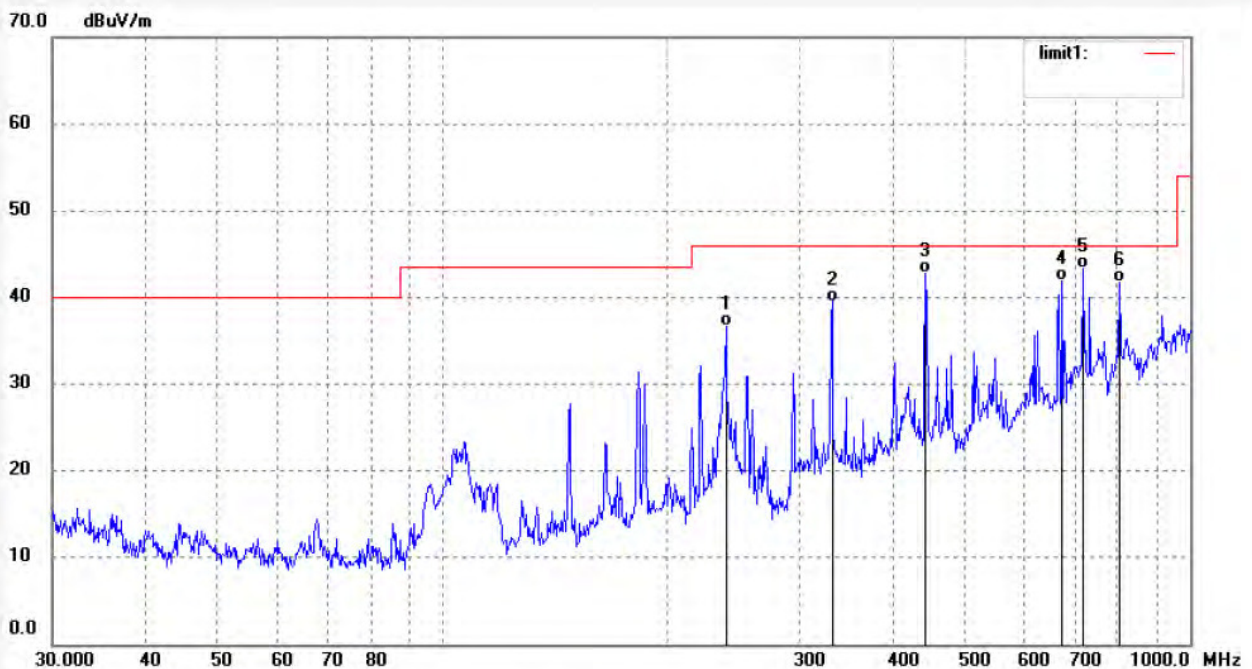
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2017 #1432
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Digital Video Recorders
Mode: TX Channel 1(802.11b)
Model: MS-580
Manufacturer: Mingshang

Polarization: Horizontal
Power Source: DC 36V
Date: 18/01/05/
Time: 9/59/54
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	239.3019	60.40	-23.73	36.67	46.00	-9.33	QP	200	145	
2	331.7857	59.62	-20.07	39.55	46.00	-6.45	QP	200	227	
3	442.5722	60.16	-17.45	42.71	46.00	-3.29	QP	200	193	
4	674.6767	53.89	-12.05	41.84	46.00	-4.16	QP	200	105	
5	718.7246	54.41	-11.05	43.36	46.00	-2.64	QP	200	245	
6	804.2522	50.57	-8.89	41.68	46.00	-4.32	QP	200	222	



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Site: 1# Chamber

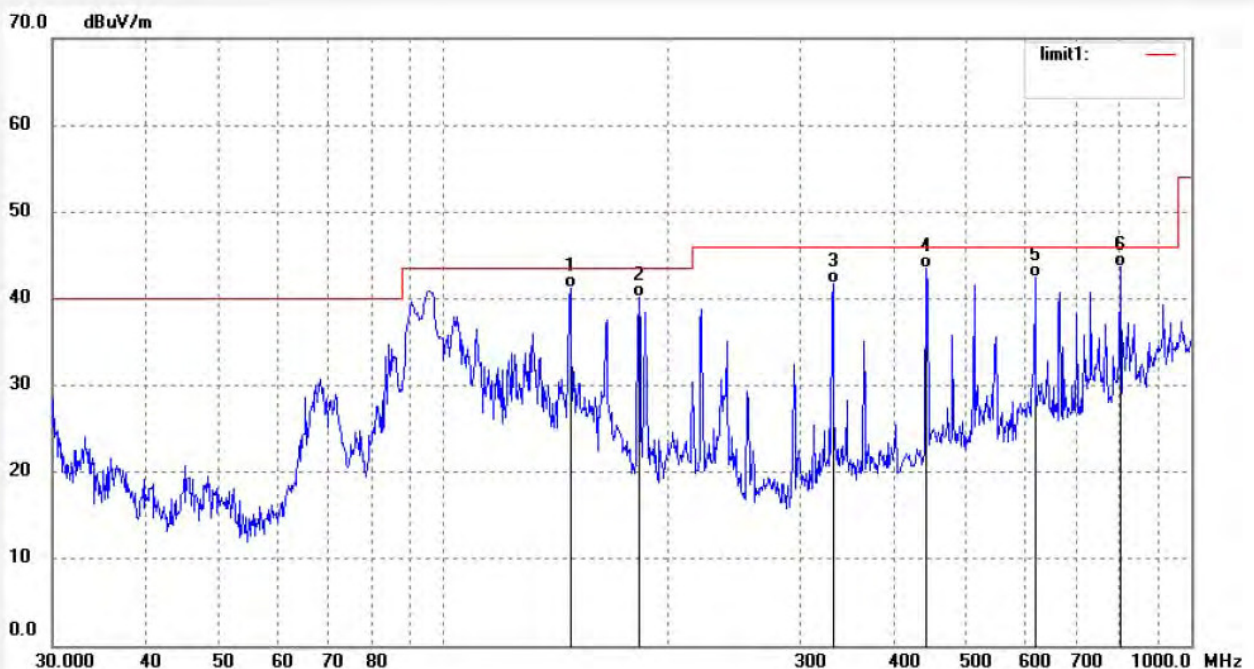
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2017 #1431
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Digital Video Recorders
Mode: TX Channel 1(802.11b)
Model: MS-580
Manufacturer: Mingshang

Polarization: Vertical
Power Source: DC 36V
Date: 18/01/05/
Time: 9/58/47
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	147.8747	69.31	-28.05	41.26	43.50	-2.24	QP	100	145	
2	182.5785	65.90	-25.78	40.12	43.50	-3.38	QP	100	254	
3	331.7858	61.87	-20.07	41.80	46.00	-4.20	QP	100	77	
4	442.5722	61.02	-17.45	43.57	46.00	-2.43	QP	100	203	
5	617.9417	55.76	-13.30	42.46	46.00	-3.54	QP	100	255	
6	804.2523	52.59	-8.89	43.70	46.00	-2.30	QP	100	198	



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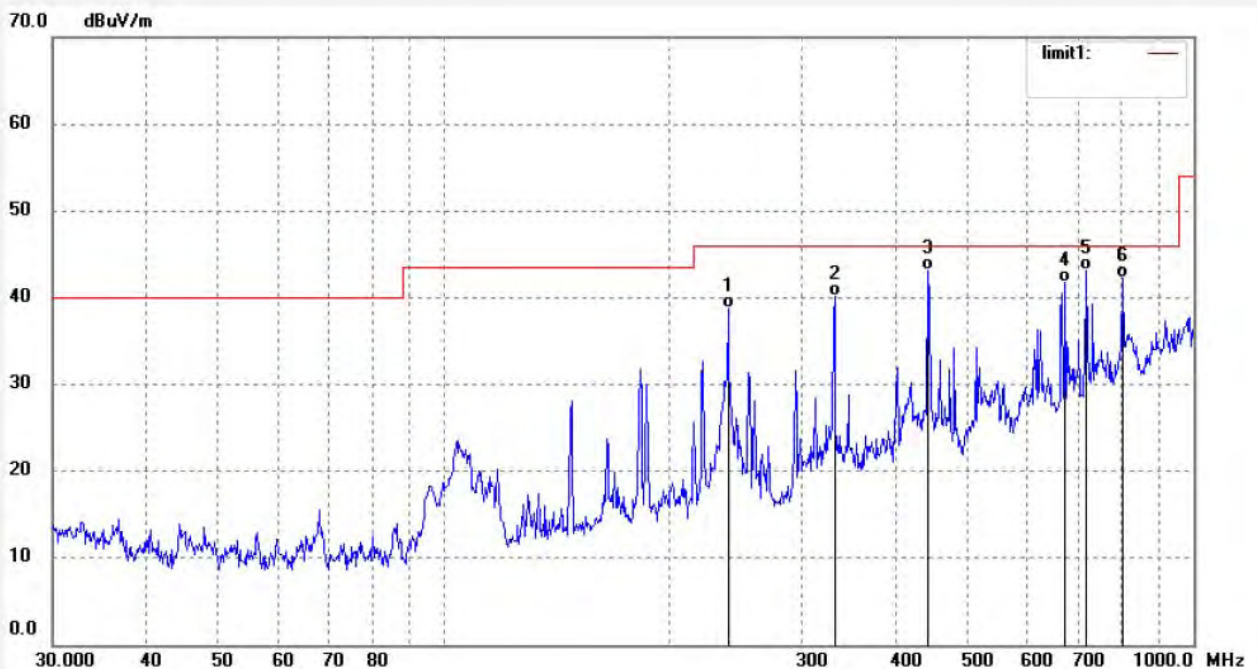
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2017 #1433
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Digital Video Recorders
Mode: TX Channel 6(802.11b)
Model: MS-580
Manufacturer: Mingshang

Polarization: Horizontal
Power Source: DC 36V
Date: 18/01/05/
Time: 10/00/25
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	239.3019	62.53	-23.73	38.80	46.00	-7.20	QP	200	163	
2	331.7857	60.27	-20.07	40.20	46.00	-5.80	QP	200	97	
3	442.5722	60.58	-17.45	43.13	46.00	-2.87	QP	200	54	
4	674.6767	53.85	-12.05	41.80	46.00	-4.20	QP	200	116	
5	718.7246	54.20	-11.05	43.15	46.00	-2.85	QP	200	147	
6	804.2522	51.09	-8.89	42.20	46.00	-3.80	QP	200	210	



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Site: 1# Chamber

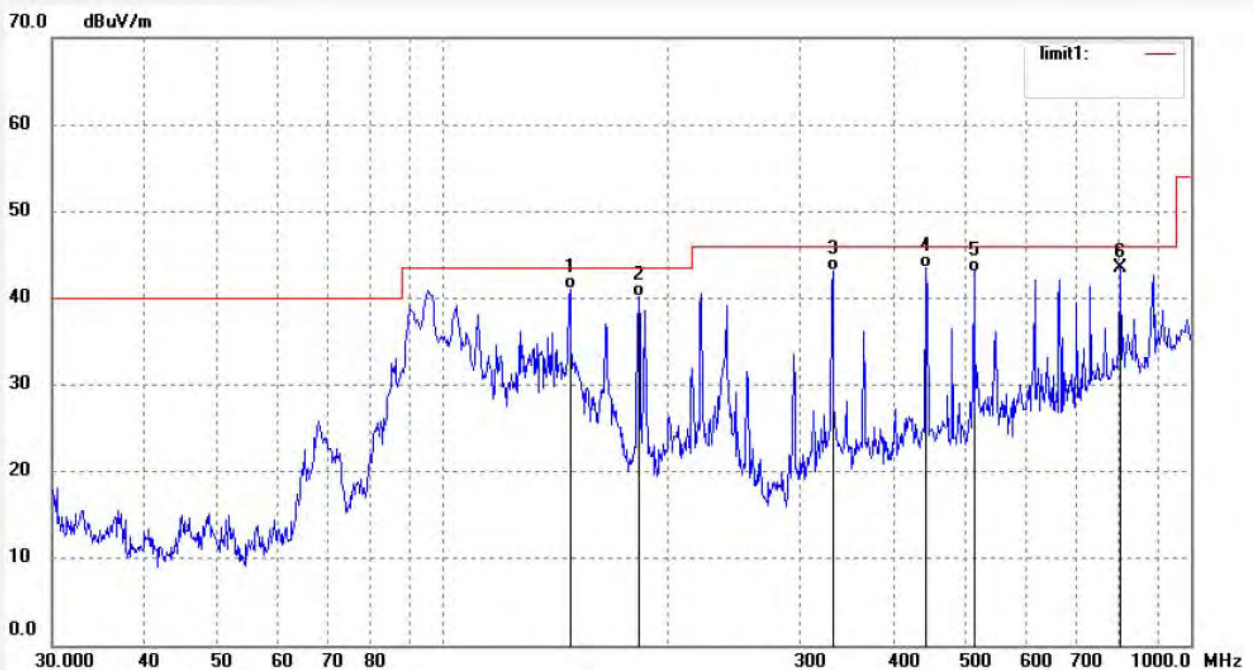
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2017 #1434
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Digital Video Recorders
Mode: TX Channel 6(802.11b)
Model: MS-580
Manufacturer: Mingshang

Polarization: Vertical
Power Source: DC 36V
Date: 18/01/05/
Time: 10/01/04
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	147.8746	69.12	-28.05	41.07	43.50	-2.43	QP	100	142	
2	182.5784	65.94	-25.78	40.16	43.50	-3.34	QP	100	170	
3	331.7857	63.25	-20.07	43.18	46.00	-2.82	QP	100	32	
4	442.5722	60.97	-17.45	43.52	46.00	-2.48	QP	100	269	
5	512.9477	58.96	-15.91	43.05	46.00	-2.95	QP	100	132	
6	804.2522	52.32	-8.89	43.43	46.00	-2.57	QP	100	139	



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Site: 1# Chamber

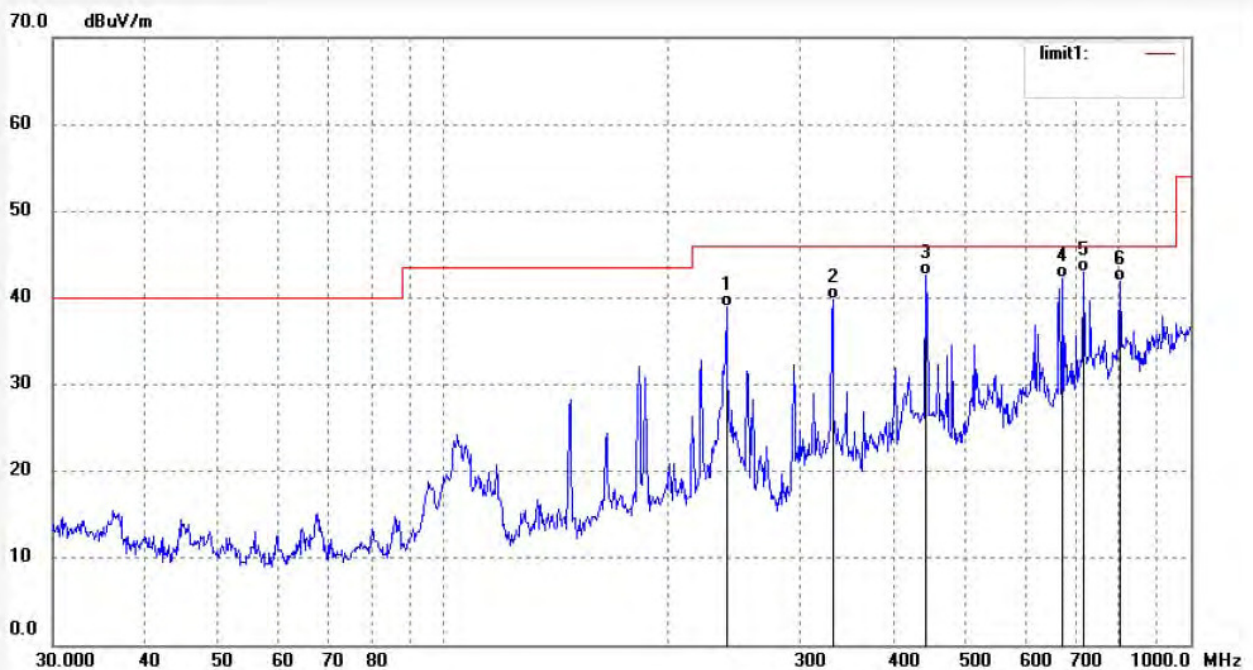
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2017 #1436
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Digital Video Recorders
Mode: TX Channel 11(802.11b)
Model: MS-580
Manufacturer: Mingshang

Polarization: Horizontal
Power Source: DC 36V
Date: 18/01/05/
Time: 10/03/21
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	239.3019	62.71	-23.73	38.98	46.00	-7.02	QP	200	146	
2	331.7857	59.96	-20.07	39.89	46.00	-6.11	QP	200	158	
3	442.5722	60.10	-17.45	42.65	46.00	-3.35	QP	200	133	
4	674.6767	54.31	-12.05	42.26	46.00	-3.74	QP	200	105	
5	718.7246	54.04	-11.05	42.99	46.00	-3.01	QP	200	198	
6	804.2522	50.82	-8.89	41.93	46.00	-4.07	QP	200	120	



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Site: 1# Chamber

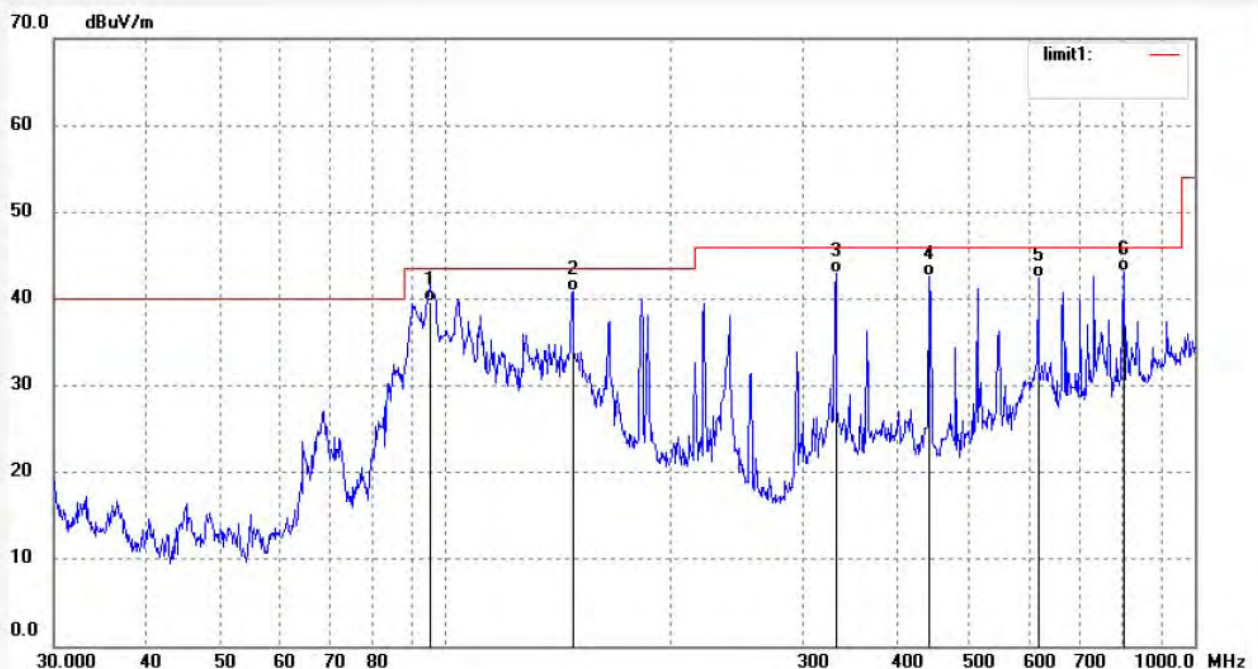
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2017 #1435
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Digital Video Recorders
Mode: TX Channel 11(802.11b)
Model: MS-580
Manufacturer: Mingshang

Polarization: Vertical
Power Source: DC 36V
Date: 18/01/05/
Time: 10/02/18
Engineer Signature: star
Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	95.3131	67.14	-27.46	39.68	43.50	-3.82	QP	100	174	
2	147.8747	68.87	-28.05	40.82	43.50	-2.68	QP	100	236	
3	331.7858	62.95	-20.07	42.88	46.00	-3.12	QP	100	206	
4	442.5722	60.05	-17.45	42.60	46.00	-3.40	QP	100	200	
5	617.9417	55.80	-13.30	42.50	46.00	-3.50	QP	100	158	
6	804.2523	51.96	-8.89	43.07	46.00	-2.93	QP	100	163	

Above 1G



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Job No.: star2017 #861

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 1(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Horizontal

Power Source: DC 36V

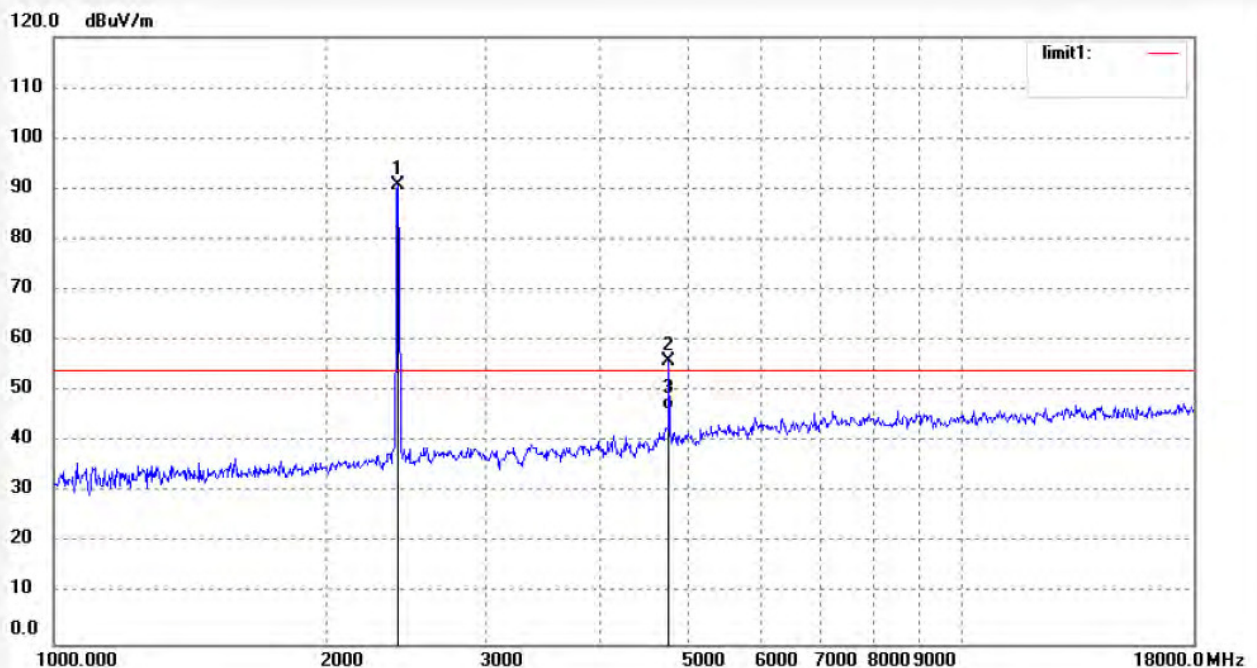
Date: 18/01/06/

Time: 14/32/17

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2412.019	97.01	-6.29	90.72			peak	200	39	
2	4824.584	55.11	0.82	55.93	74.00	-18.07	peak	200	142	
3	4824.584	45.64	0.82	46.46	54.00	-7.54	AVG	200	231	



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Fax:+86-0755-26503396

Job No.: star2017 #860

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 1(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Vertical

Power Source: DC 36V

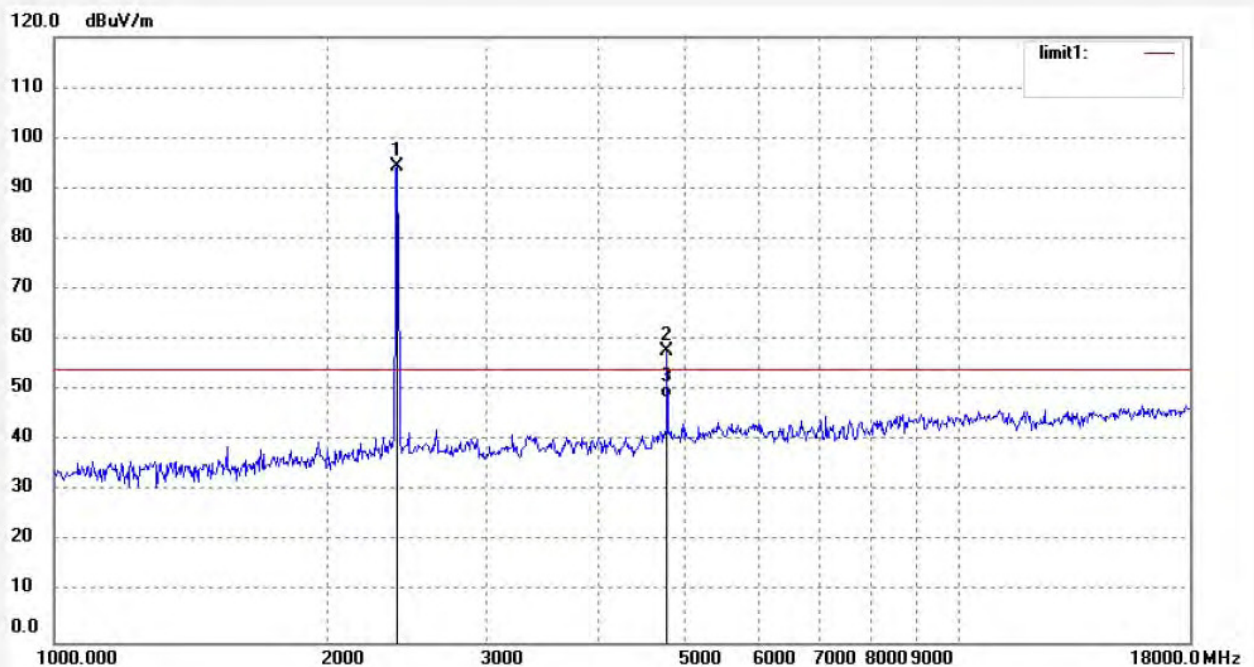
Date: 18/01/06/

Time: 14/30/21

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2412.019	100.57	-6.29	94.28			peak	150	344	
2	4824.584	56.89	0.82	57.71	74.00	-16.29	peak	150	249	
3	4824.584	47.67	0.82	48.49	54.00	-5.51	AVG	150	191	



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Site: 1# Chamber

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Fax:+86-0755-26503396

Job No.: star2017 #862

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 6(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Horizontal

Power Source: DC 36V

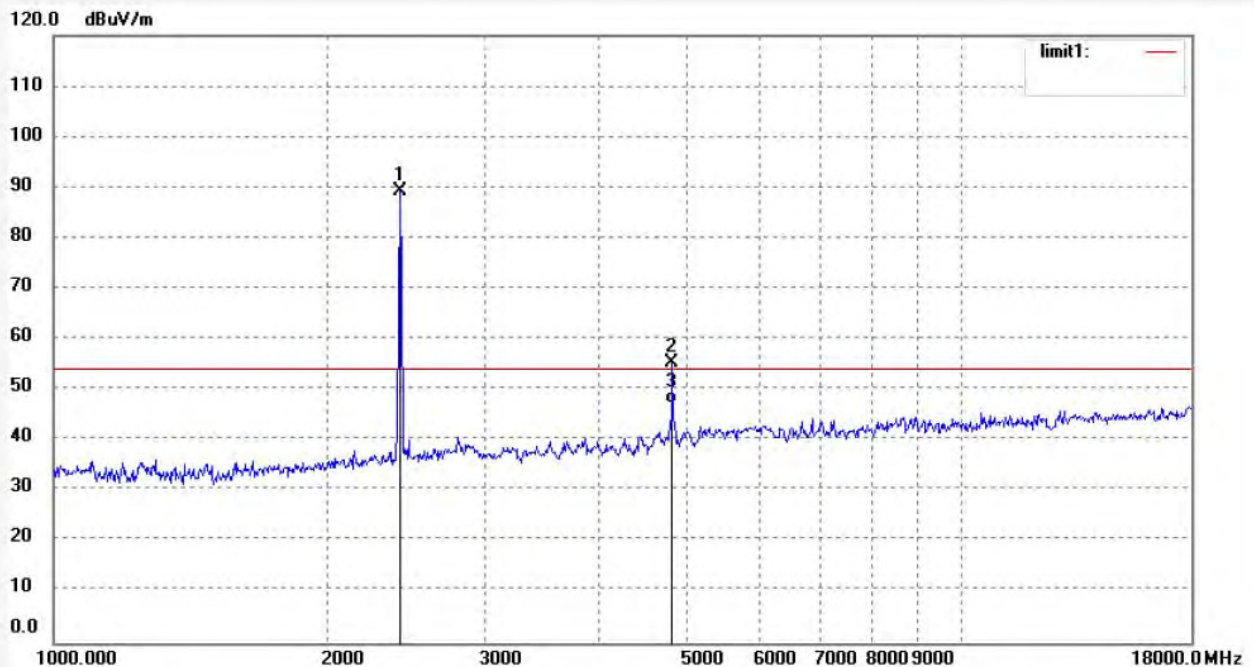
Date: 18/01/06/

Time: 14/34/49

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2437.021	95.39	-6.20	89.19			peak	200	46	
2	4874.324	54.42	1.07	55.49	74.00	-18.51	peak	200	100	
3	4874.324	46.10	1.07	47.17	54.00	-6.83	AVG	200	143	



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Job No.: star2017 #863

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 6(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Vertical

Power Source: DC 36V

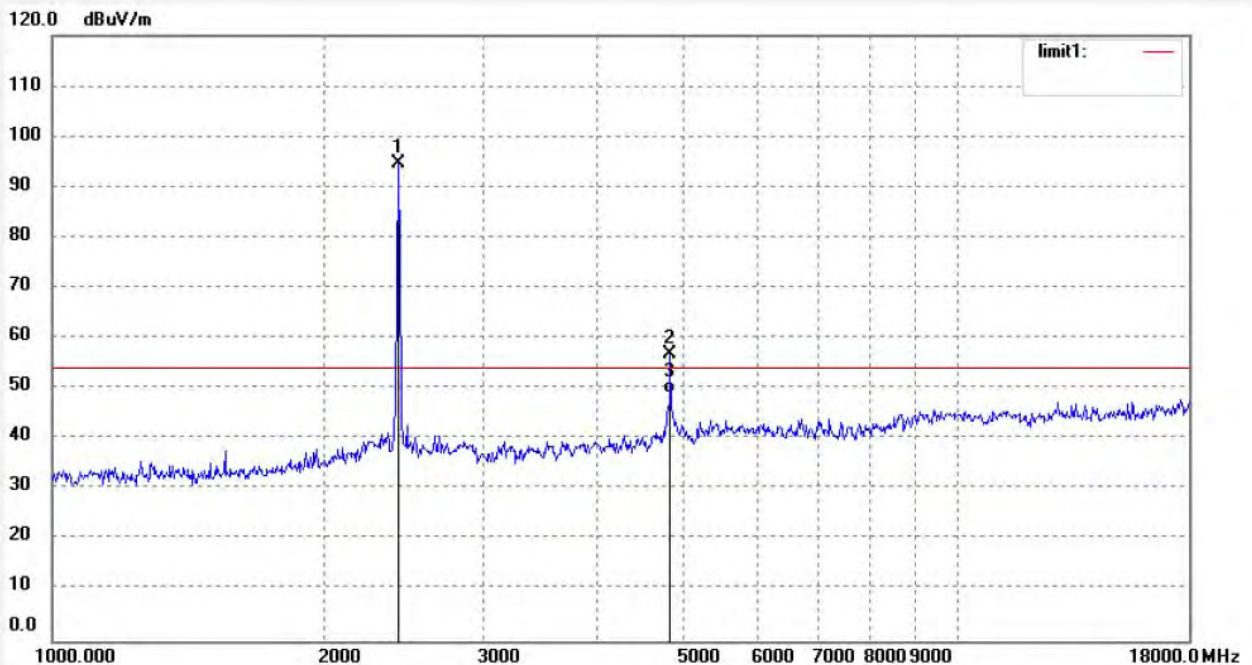
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Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2408.600	100.86	-6.24	94.62			peak	150	111	
2	4815.324	55.75	1.07	56.82	74.00	-17.18	peak	150	214	
3	4815.324	48.10	1.07	49.17	54.00	-4.83	AVG	150	207	



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Job No.: star2017 #865

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 11(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Horizontal

Power Source: DC 36V

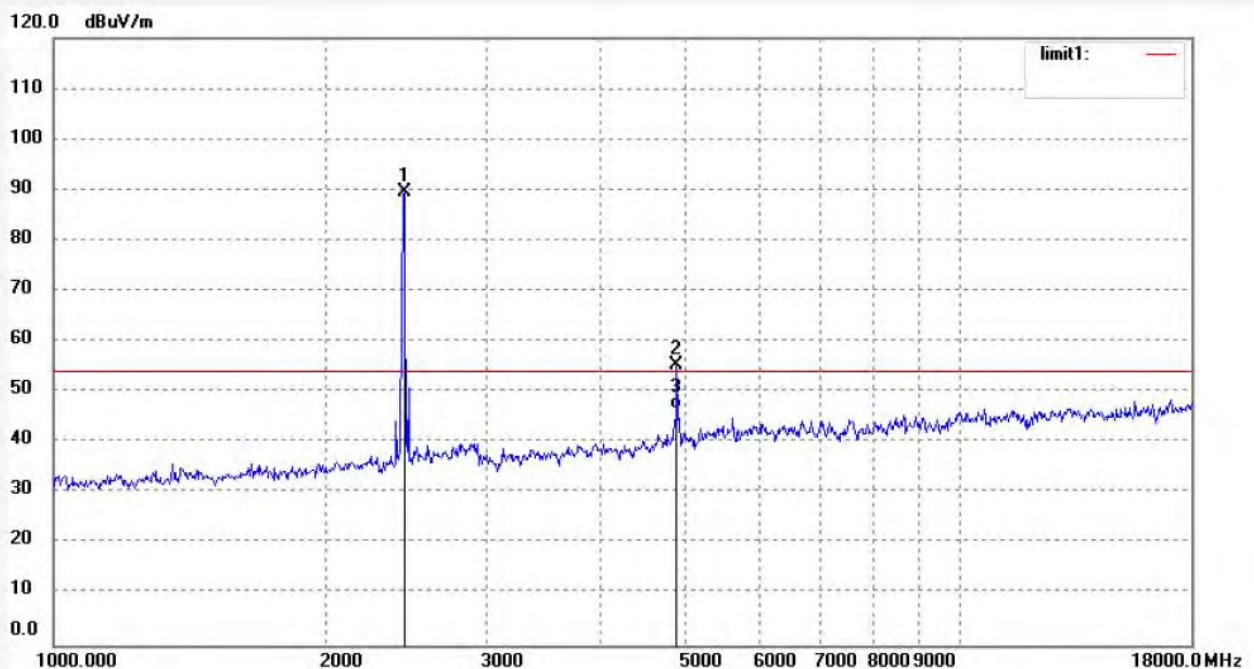
Date: 18/01/06/

Time: 14/39/14

Engineer Signature: star

Distance: 3m

Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2462.007	95.55	-6.10	89.45			peak	200	119	
2	4924.017	53.90	1.32	55.22	74.00	-18.78	peak	200	123	
3	4924.017	45.31	1.32	46.63	54.00	-7.37	AVG	200	104	



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Fax:+86-0755-26503396

Job No.: star2017 #864

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: Digital Video Recorders

Mode: TX Channel 11(802.11b)

Model: MS-580

Manufacturer: Mingshang

Polarization: Vertical

Power Source: DC 36V

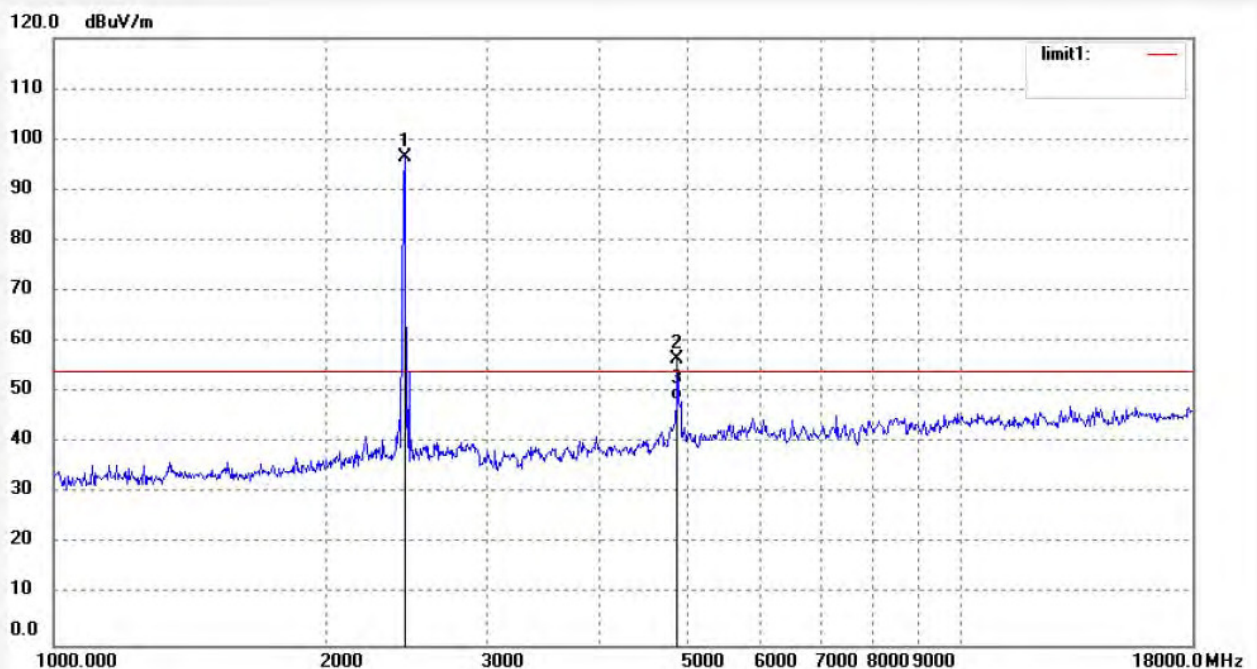
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Time: 14/37/39

Engineer Signature: star

Distance: 3m

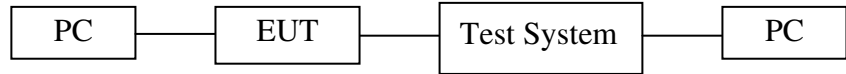
Note: Report No.:ATE20172471



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2462.007	102.41	-6.10	96.31			peak	150	112	
2	4924.017	55.29	1.32	56.61	74.00	-17.39	peak	150	263	
3	4924.017	47.00	1.32	48.32	54.00	-5.68	AVG	150	208	

12.99% OCCUPIED BANDWIDTH

12.1. Block Diagram of Test Setup



12.2. EUT Configuration on Measurement

The following equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.3. Operating Condition of EUT

12.3.1. Setup the EUT and simulator as shown as Section 12.1.

12.3.2. Turn on the power of all equipment.

12.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 2412-2462 and 2422-2452MHz. We select 2412MHz, 2437MHz, 2462MHz and 2422MHz, 2437MHz, 2452MHz TX frequency to transmit.

12.4. Test Procedure

12.4.1. The transmitter output was connected to the spectrum analyzer through a low loss cable. The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

12.4.2. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

12.4.3. A peak, or peak hold, may be used in place of the sampling detector as this may produce a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold may be necessary to determine the occupied bandwidth if the device is not transmitting continuously.

12.4.4. Set SPA “Meas” function, Select “Occupied Bandwidth” function, Select “99% Power Bandwidth”. The frequency of the upper and lower markers indicating the edges of the transmitters “99% Power” emission bandwidth shall be recorded to automate by SPA.

12.5.Measurement Result

The test was performed with 802.11b		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2412	15.608
Middle	2437	15.583
High	2462	15.653

The test was performed with 802.11g		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2412	17.073
Middle	2437	16.928
High	2462	17.093

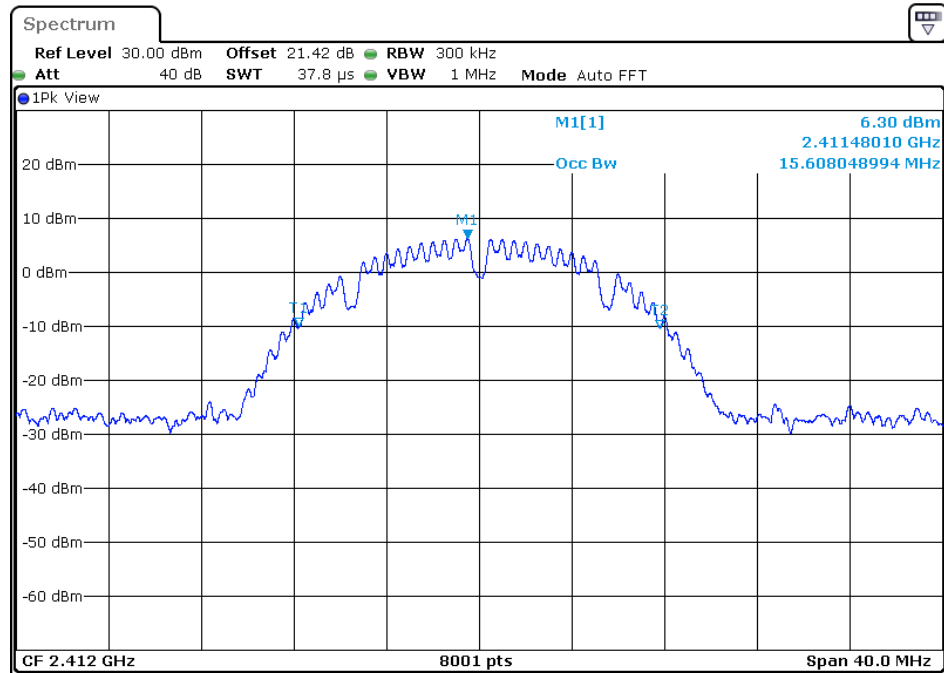
The test was performed with 802.11n (Bandwidth: 20 MHz)		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2412	18.028
Middle	2437	17.903
High	2462	17.893

The test was performed with 802.11n (Bandwidth: 40 MHz)		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
Low	2422	37.215
Middle	2437	36.945
High	2452	36.575

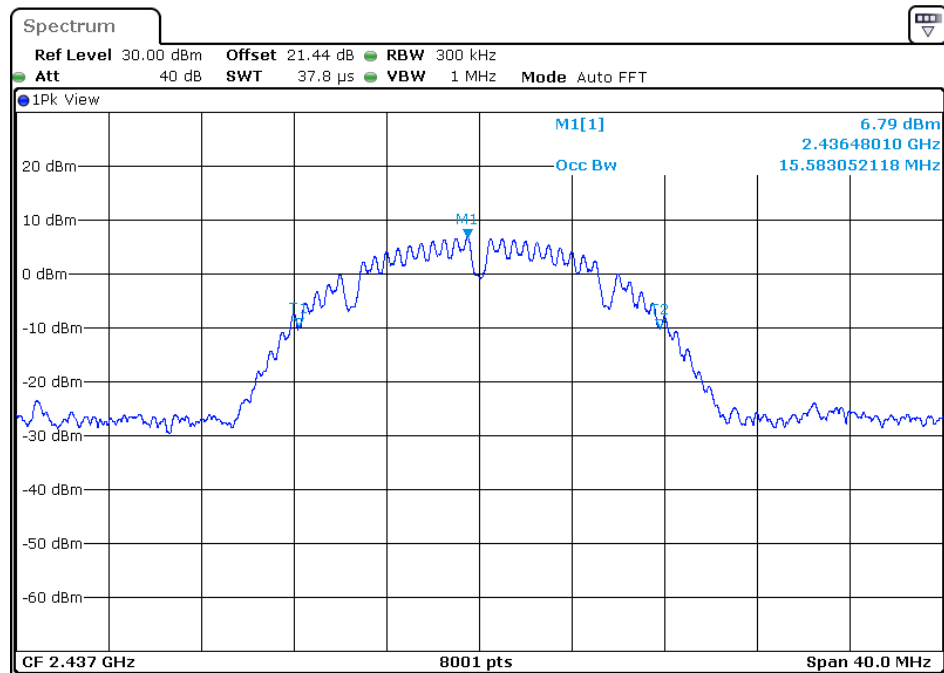
Note: We tested 802.11b/g/n20/n40 mode the all data rate and recorded the worst case data for this channel to be 1Mbps for 802.11b mode and 6Mbps for 802.11g mode and MCS0 for 802.11n mode.

The spectrum analyzer plots are attached as below.

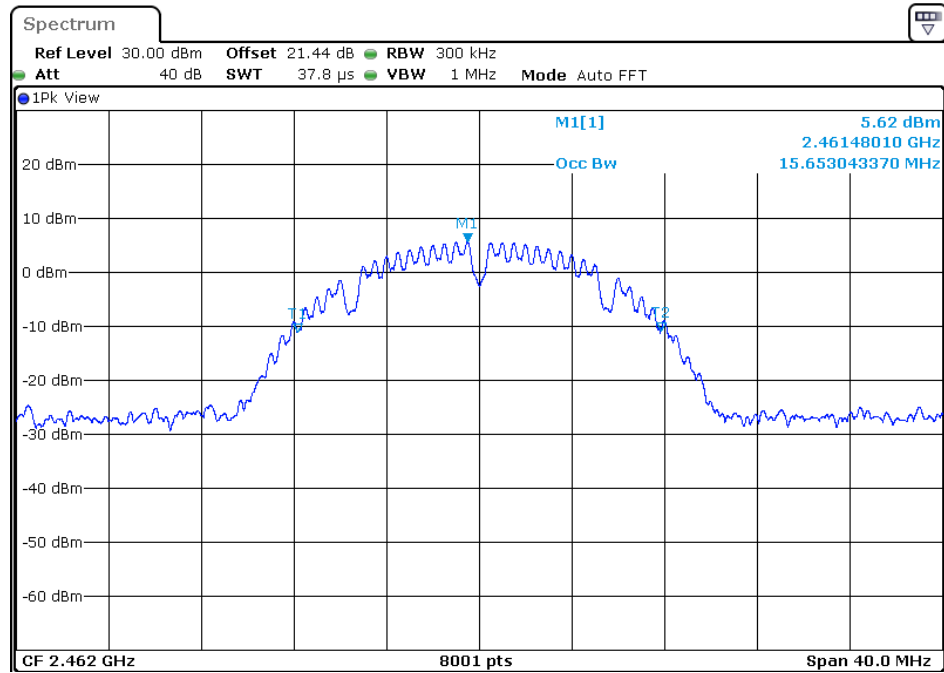
802.11b Channel Low 2412MHz



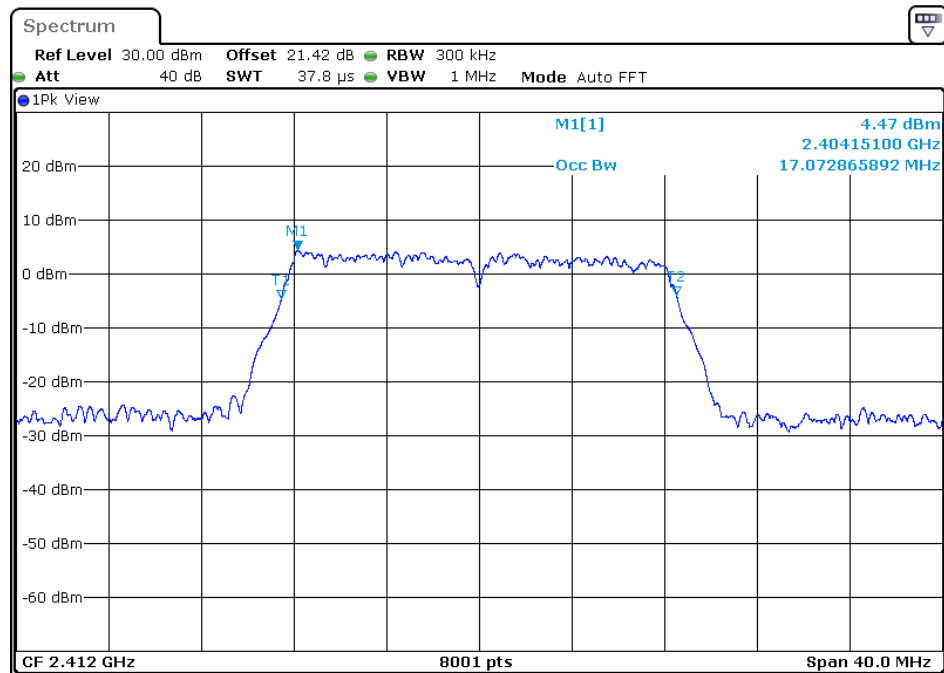
802.11b Channel Middle 2437MHz



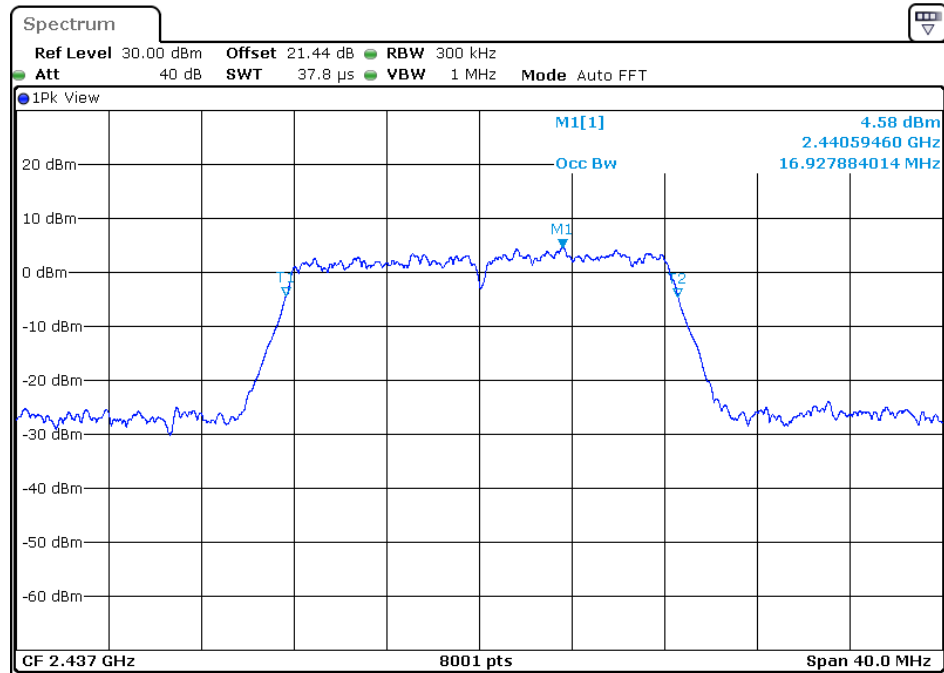
802.11b Channel High 2462MHz



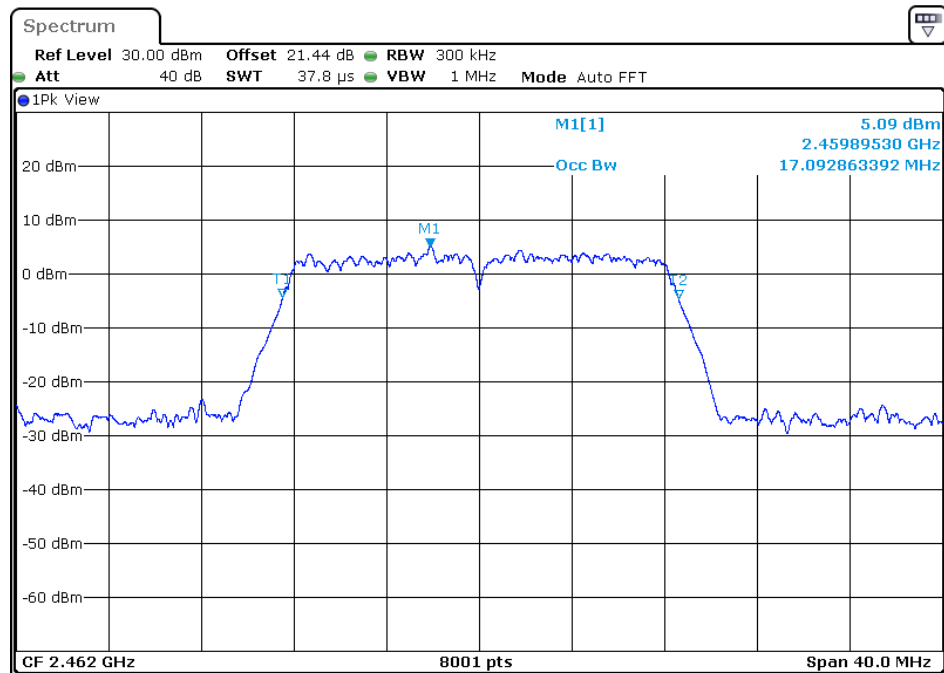
802.11g Channel Low 2412MHz



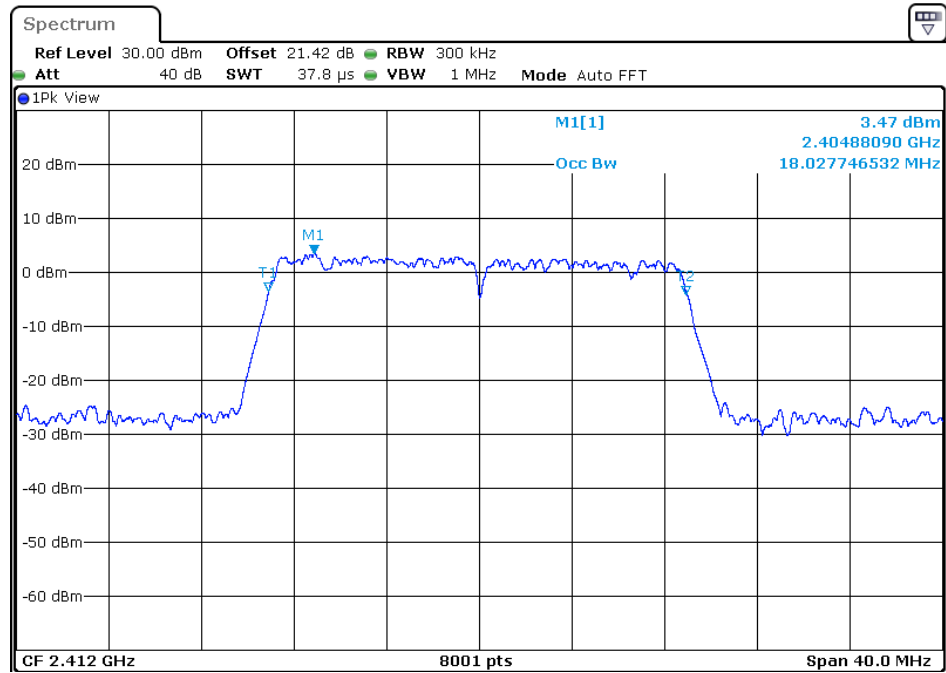
802.11g Channel Middle 2437MHz



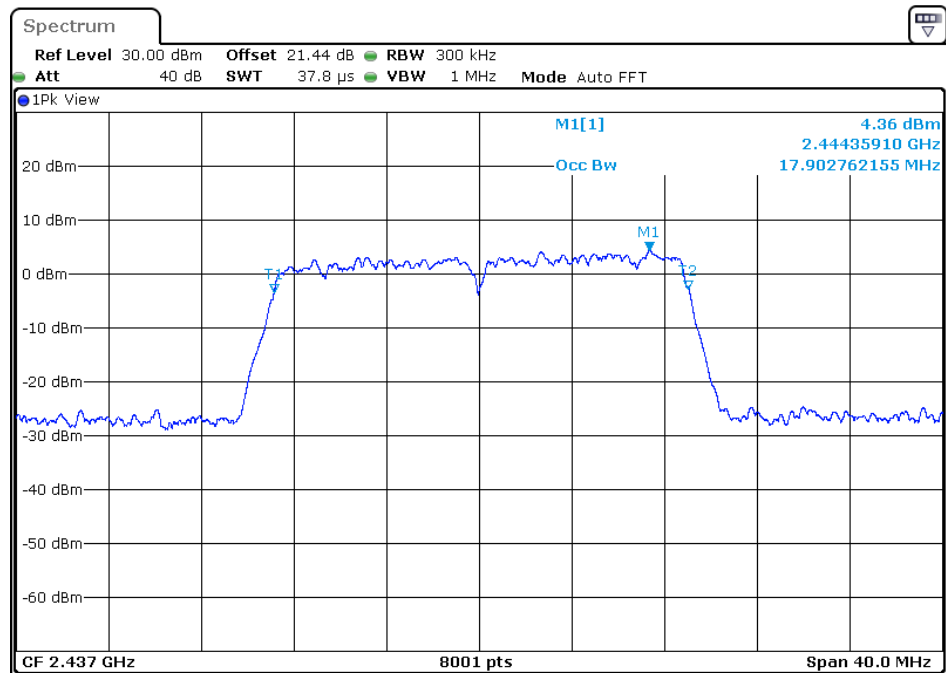
802.11g Channel High 2462MHz



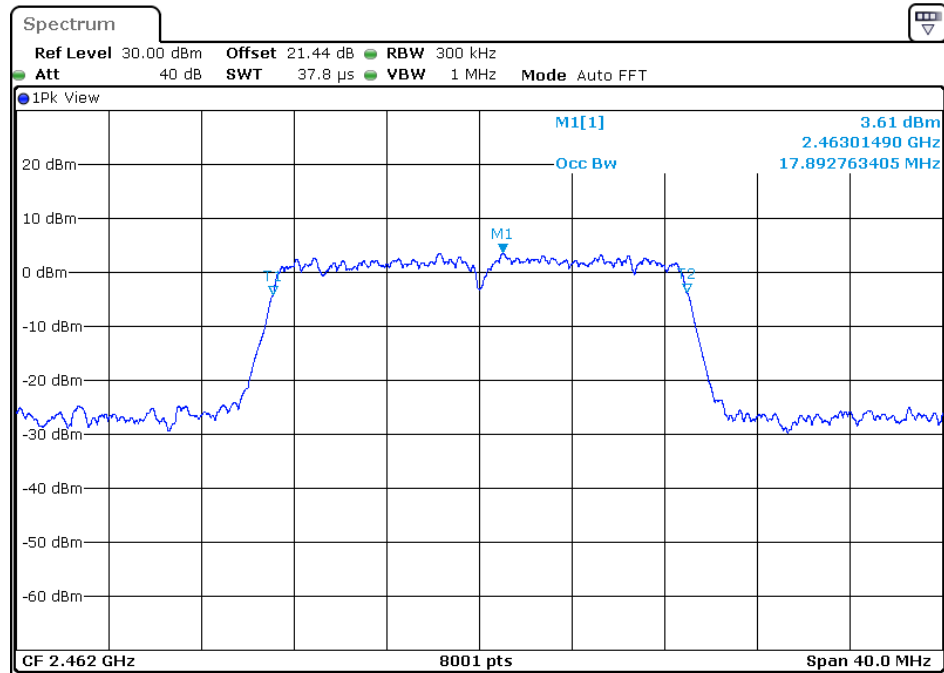
802.11n Channel Low 2412MHz (20MHz)



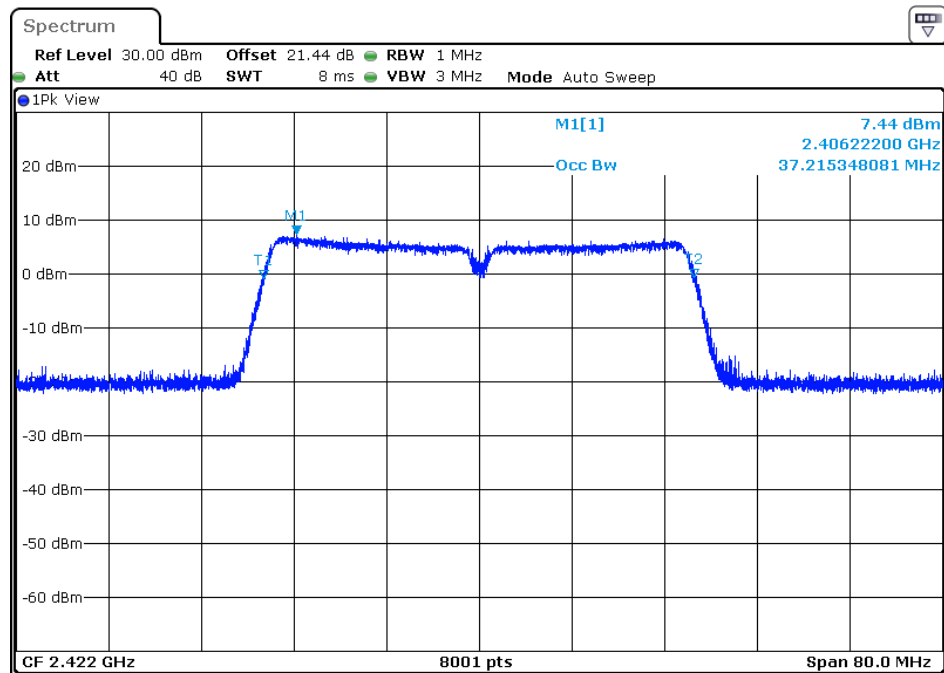
802.11n Channel Middle 2437MHz(20MHz)



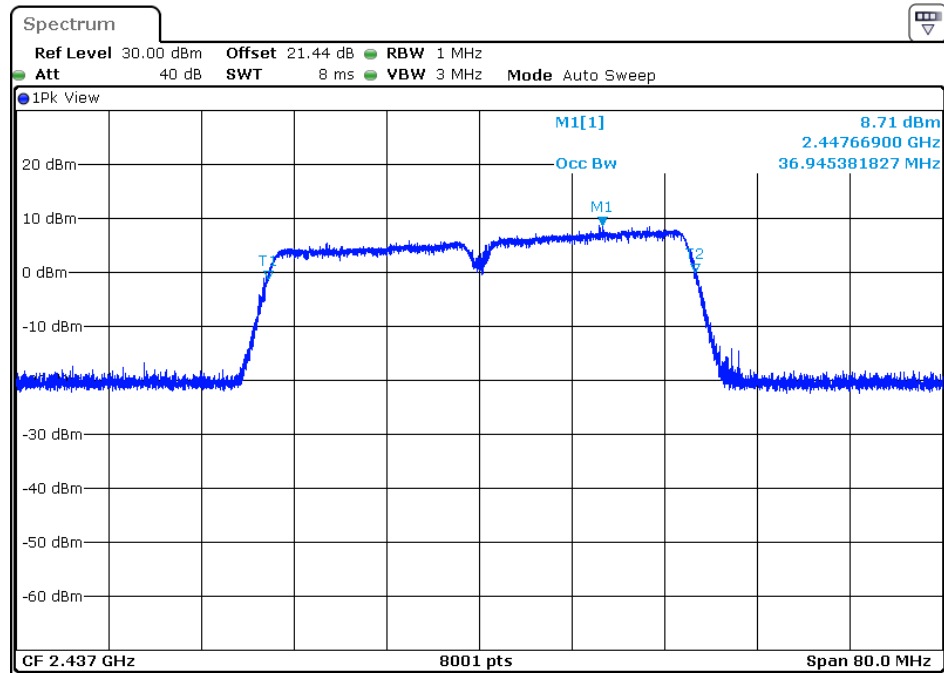
802.11n Channel High 2462MHz(20MHz)



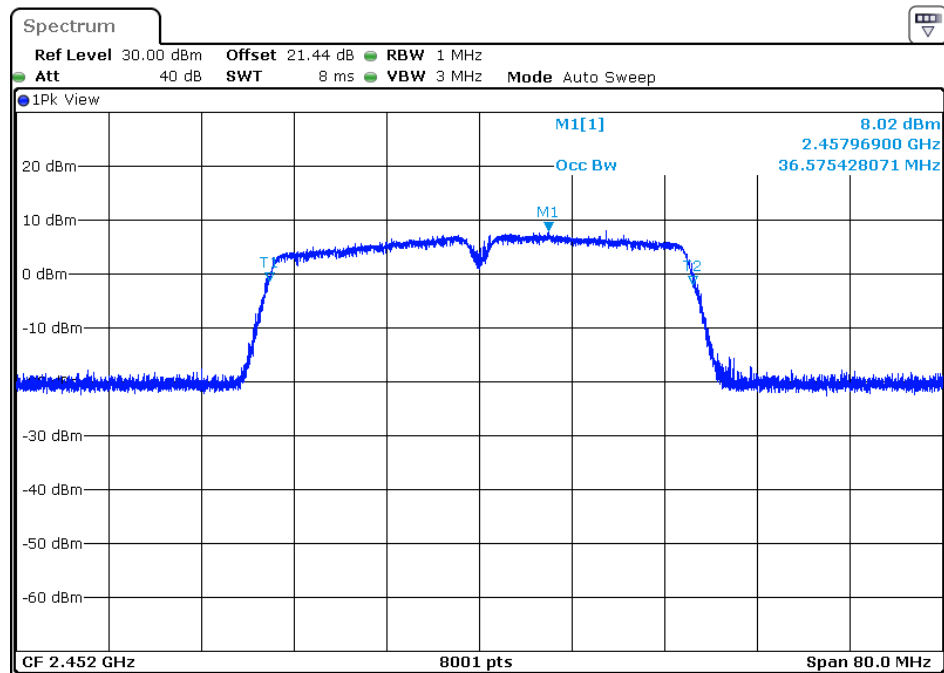
802.11n Channel Low 2422MHz (40MHz)



802.11n Channel Middle 2437MHz(40MHz)



802.11n Channel High 2452MHz(40MHz)



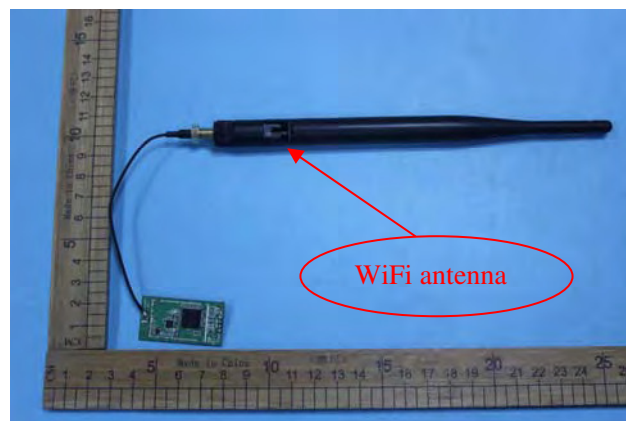
13.ANTENNA REQUIREMENT

13.1.The Requirement

According to Section 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.

13.2.Antenna Construction

The antenna use a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The antenna jack of EUT correspond to the standard. The Antenna gain of EUT is 5dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



----- THE END OF TEST REPORT -----