FCC RF Test Report

APPLICANT	:	BLU Products, Inc.
EQUIPMENT	:	mobile phone
BRAND NAME	:	BLU
MODEL NAME	:	VIVO 5R
MARKETING NAME	:	VIVO 5R
FCC ID	:	YHLBLUVIVO5R
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on May 31, 2016 and testing was completed on Jun. 27, 2016. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

Prepared by: Ken Chen / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory 2353

SPORTON INTERNATIONAL (SHENZHEN) INC.
1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR653106C	Rev. 01	Initial issue of report	Jul. 04, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.2	15.247(b)	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
		Conducted Spurious Emission		Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.84 dB at 47.460 MHz
3.6	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 11.39 dB at 0.560 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

BLU Products, Inc.
10814 NW 33rd St # 100 Doral, FL 33172

1.2 Manufacturer

BLU Products, Inc.
10814 NW 33rd St # 100 Doral, FL 33172

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	mobile phone
Brand Name	BLU
Model Name	VIVO 5R
Marketing Name	VIVO 5R
FCC ID	YHLBLUVIVO5R
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/HSPA+/LTE/ WLAN 2.4GHz 802.11b/g/n HT20/HT40/ Bluetooth v3.0 + EDR/Bluetooth v4.0 LE
IMEI Code	Conducted: 354147042136532/354147043136531 Radiation: 354147042138330/354147043138339 Conduction: 354147042138348/354147043138347
HW Version	VIVO 5R_MAINBOARD_P4
SW Version	VIVO 5R_0403_V5528
EUT Stage	Pre-Production

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 19.89 dBm (0.0975 W) 802.11g : 23.76 dBm (0.2377 W) 802.11n HT20 : 23.65 dBm (0.2317 W) 802.11n HT40 : 23.83 dBm (0.2415 W)
Antenna Type / Gain	PIFA Antenna with gain -4.45 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595	
Test Site No.	**Sporton Site No.**	
	TH01-SZ	CO01-SZ

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.	
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: +86-755- 3320-2398	
Test Site No.	**Sporton Site No.**	**FCC Registration No.**
	03CH03-SZ	565805

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz) and radiated emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and data rate associated with the highest power were chosen for full test shown in the following tables.

2.4GHz 802.11b RF Output Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate 1Mbps	Channel	2Mbps	5.5Mbps	11Mbps
CH 01	2412	19.33	CH 06	19.87	19.84	19.85
CH 06	2437	**19.89**				
CH 11	2462	19.75				

2.4GHz 802.11g RF Output Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate 6Mbps	Channel	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	23.26	CH 06	23.61	23.56	23.47	23.54	23.48	23.71	23.73
CH 06	2437	**23.76**								
CH 11	2462	23.36								

2.4GHz 802.11n HT20 RF Output Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	23.17	CH 06	23.45	23.34	23.31	23.29	23.56	23.51	23.62
CH 06	2437	**23.65**								
CH 11	2462	23.26								

2.4GHz 802.11n HT40 RF Output Power (dBm)										
Power vs. Channel			Power vs. MCS Index							
Channel	Frequency (MHz)	MCS Index MCS0	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	23.72	CH 09	23.65	23.23	23.12	22.85	23.65	23.58	23.72
CH 06	2437	23.77								
CH 09	2452	**23.83**								

2.3 Test Mode

Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates from the power table described in section 2.2.

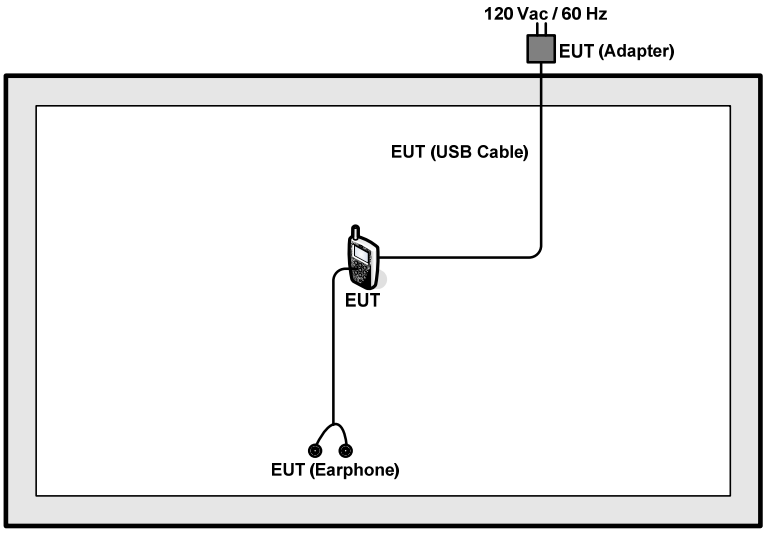
<2.4GHz>

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

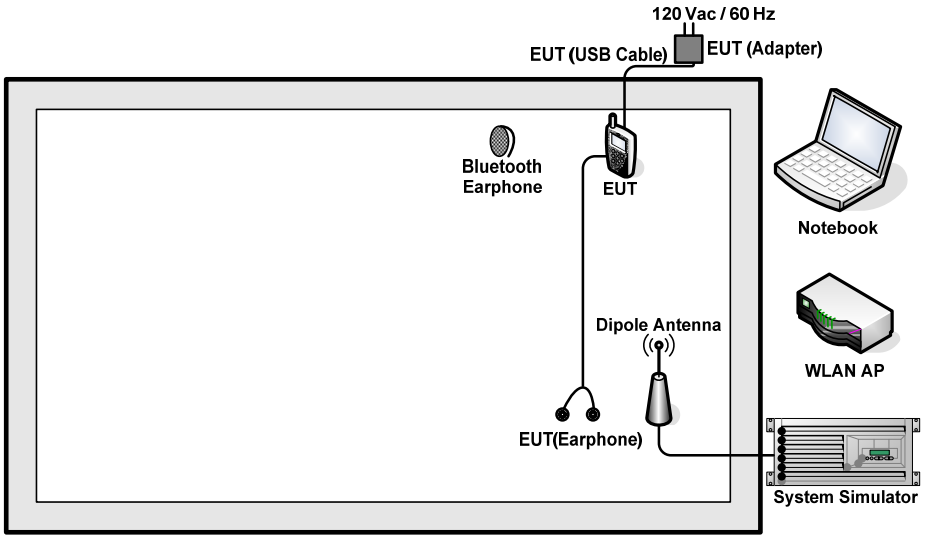
Test Cases	
AC Conducted Emission	Mode 1 : WCDMA Band V Idle + Bluetooth Link + WLAN Link + Camera (Rear) + Earphone + Battery + USB Cable (Charging from Adapter)
Remark: For radiated test cases, the tests were performed with adapter, battery, earphone and USB cable.	

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	E540	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-108	PYAHS-107W	N/A	N/A
5.	SD Card	SanDisk	4G class 4	FCC DoC	N/A	N/A

2.6 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

For AC power line conducted emissions, the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.7 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5.0 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 5.0 + 10 = 15.0 (dB)

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

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

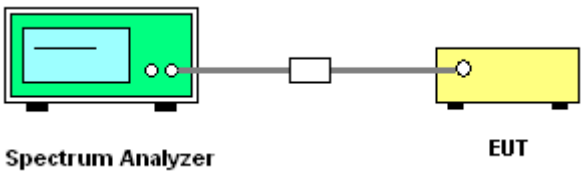
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. Measure and record the results in the test report.

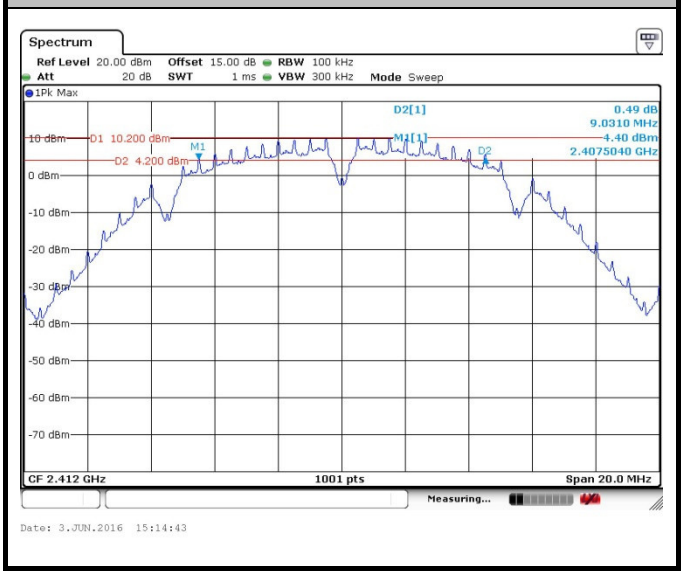
3.1.4 Test Setup



3.1.5 Test Result of 6dB Bandwidth

Please refer to Appendix A of this test report.

Minimum 6dB Bandwidth



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting Antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the Antenna exceeds 6dBi.

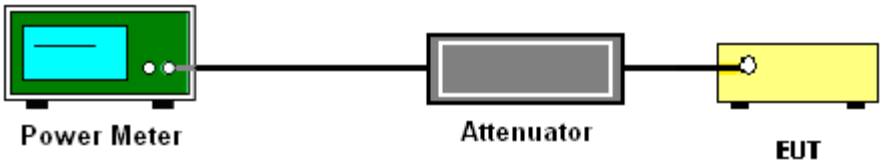
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05 section 9.1.2 PKPM1 Peak power meter method.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Please refer to Appendix A of this test report.

3.2.6 Test Result of Average output Power (Reporting Only)

Please refer to Appendix A of this test report.

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

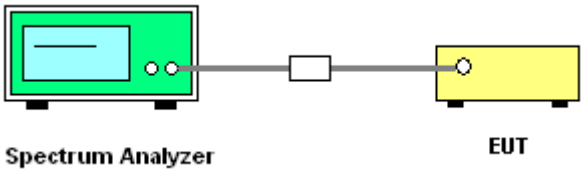
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

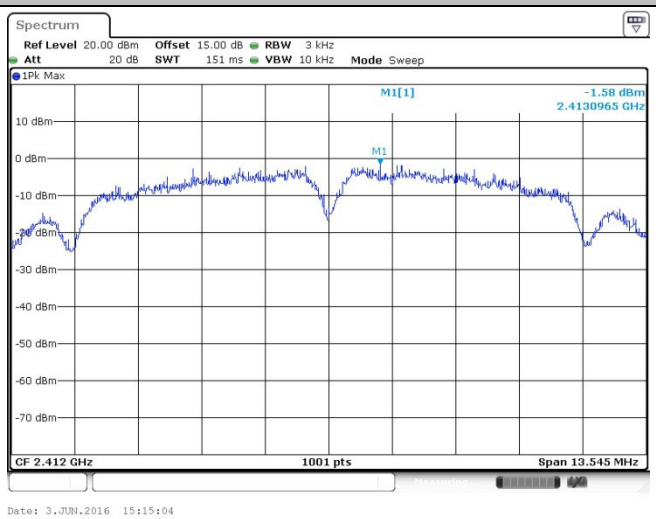
3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A of this test report.

Worst Case Power Density (dBm/3kHz)



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and 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).

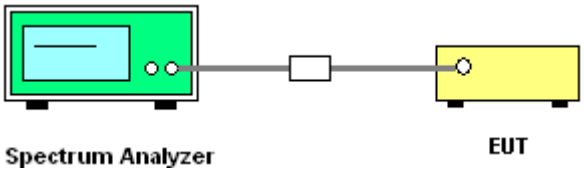
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup

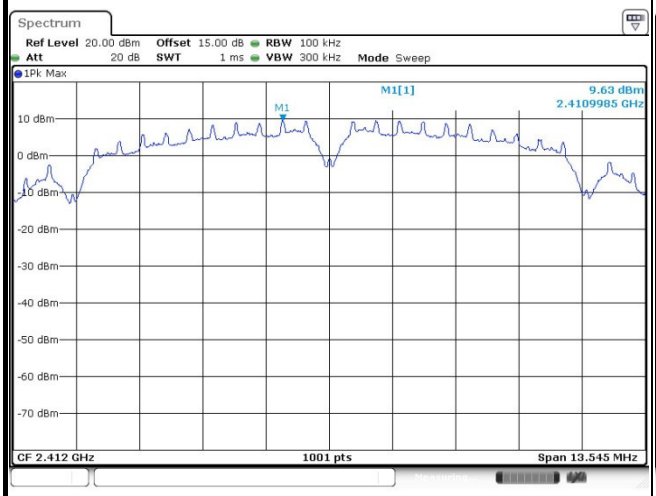


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

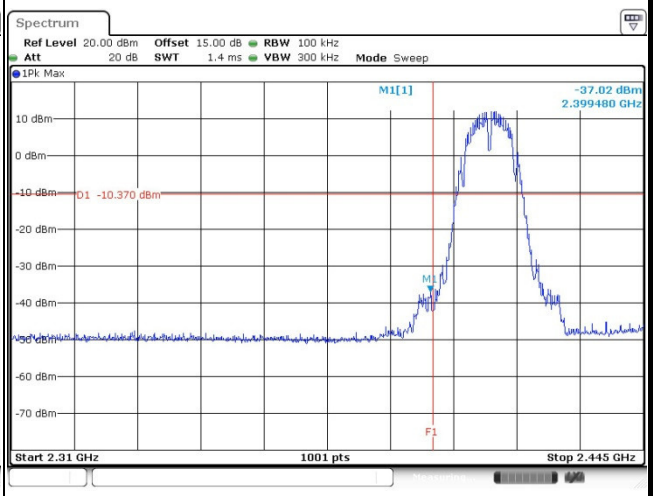
Test Mode :	802.11b	**Temperature :**	Bruce Huang
Test Band :	2.4GHz Low	**Relative Humidity :**	24~26℃
Test Channel :	01	**Test Engineer :**	50~53%

WLAN 802.11b Channel 01

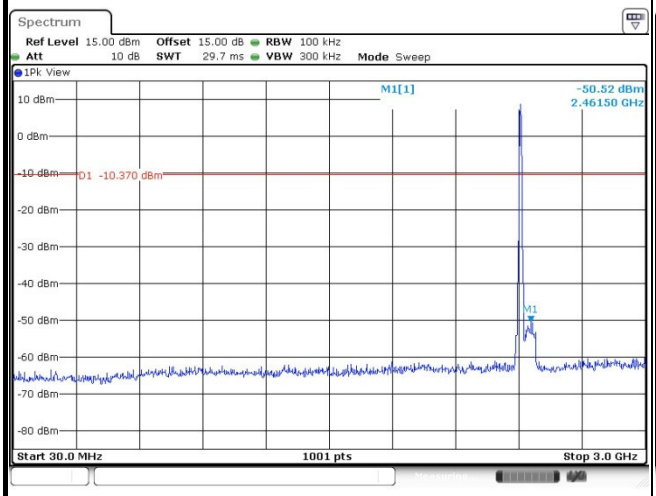
100kHz PSD reference Level



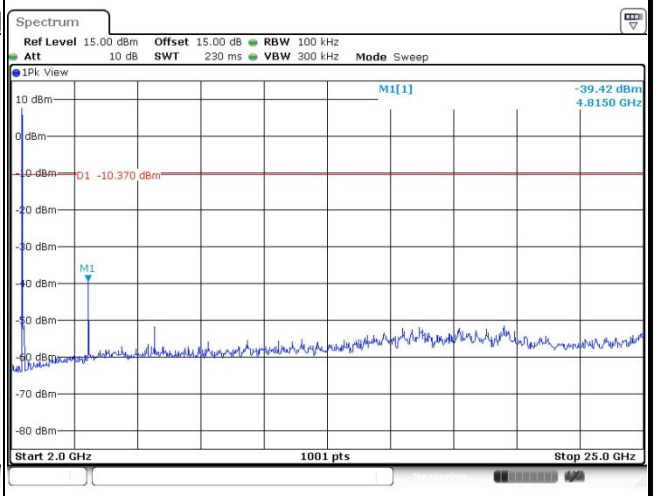
Low Channel Plot



Spurious Emission 30MHz~3GHz



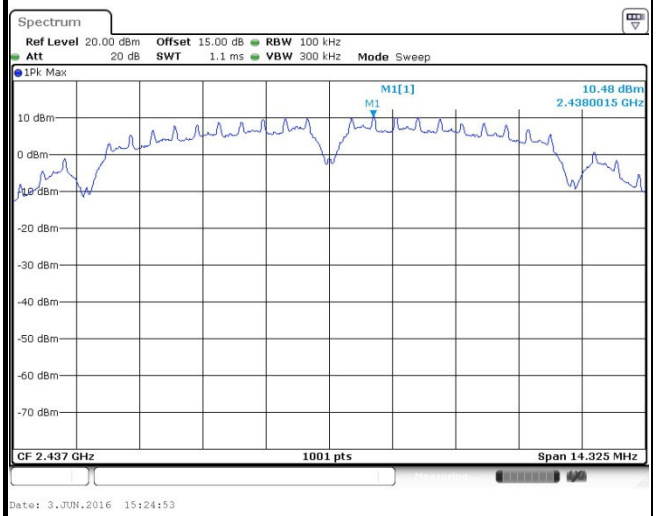
Spurious Emission 2GHz~25GHz



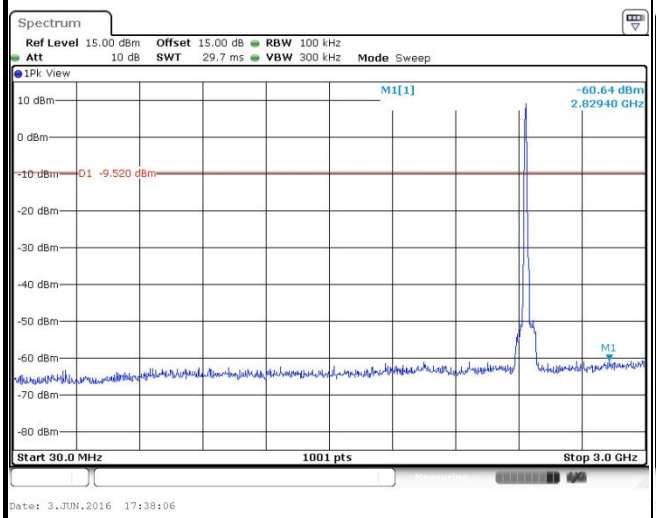
Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Bruce Huang

WLAN 802.11b Channel 06

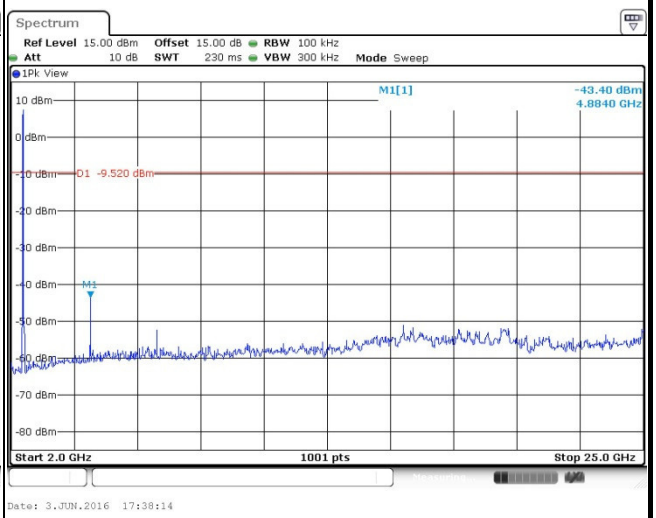
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



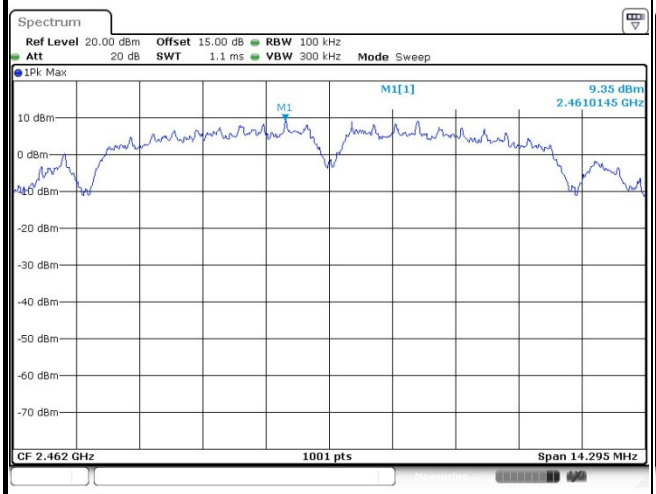
Spurious Emission 2GHz~25GHz



Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	11	**Test Engineer :**	Bruce Huang

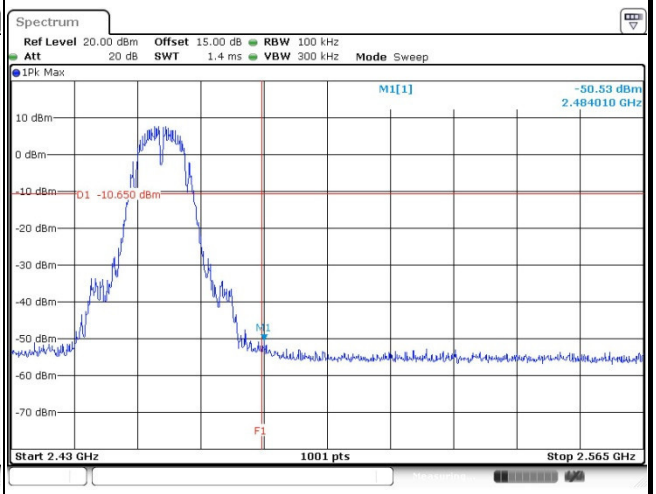
WLAN 802.11b Channel 11

100kHz PSD reference Level



Date: 27.JUN.2016 16:04:38

High Channel Plot



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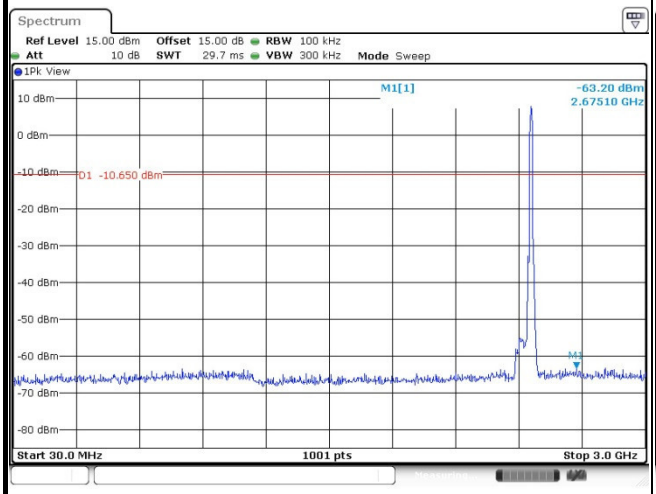
Spurious Emission 30MHz~3GHz



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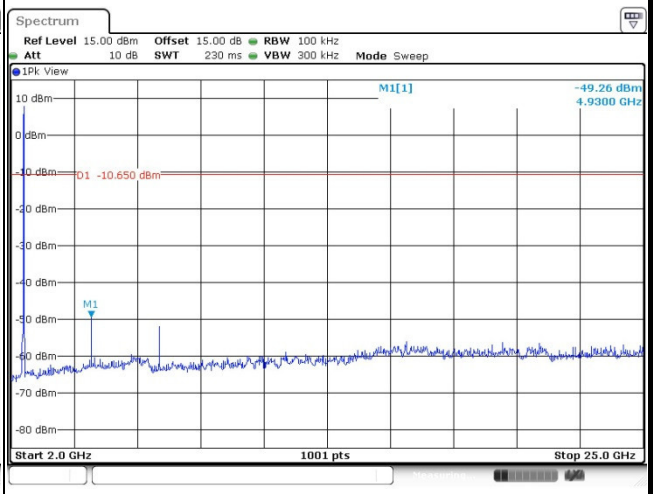
Spurious Emission 2GHz~25GHz

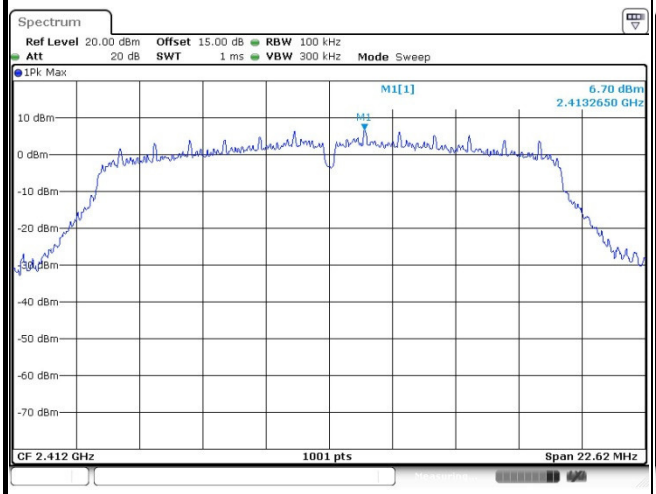


Date: 27.JUN.2016 16:06:33

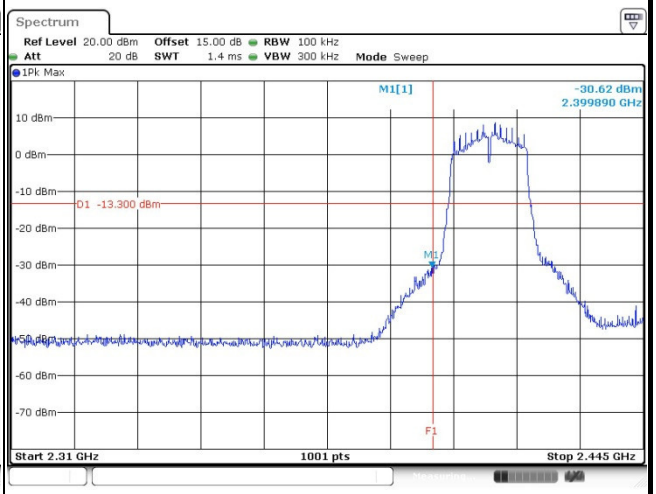
Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	50~53%
Test Channel :	01	**Test Engineer :**	Bruce Huang

WLAN 802.11g Channel 01

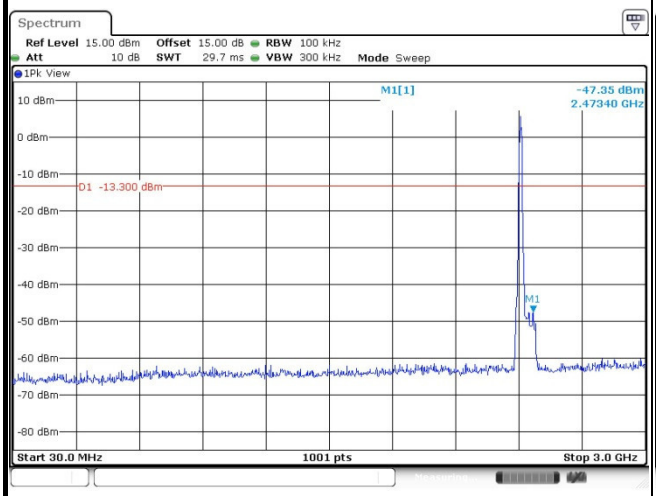
100kHz PSD reference Level



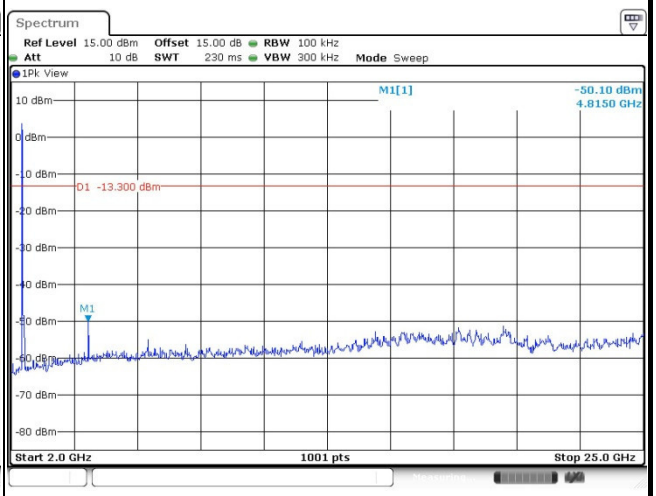
Low Channel Plot



Spurious Emission 30MHz~3GHz



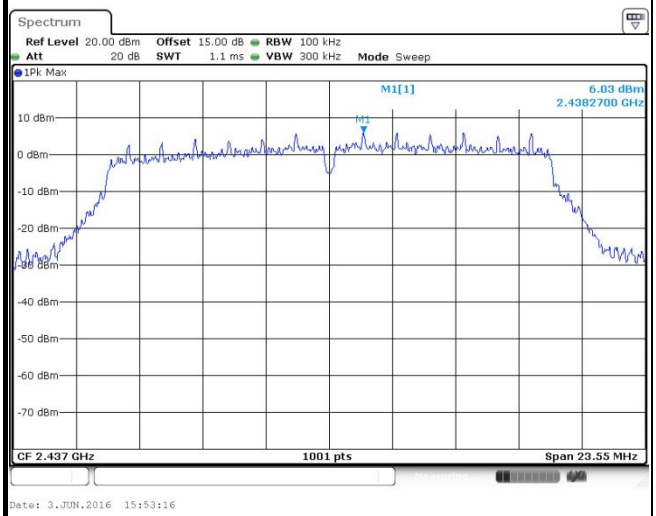
Spurious Emission 2GHz~25GHz



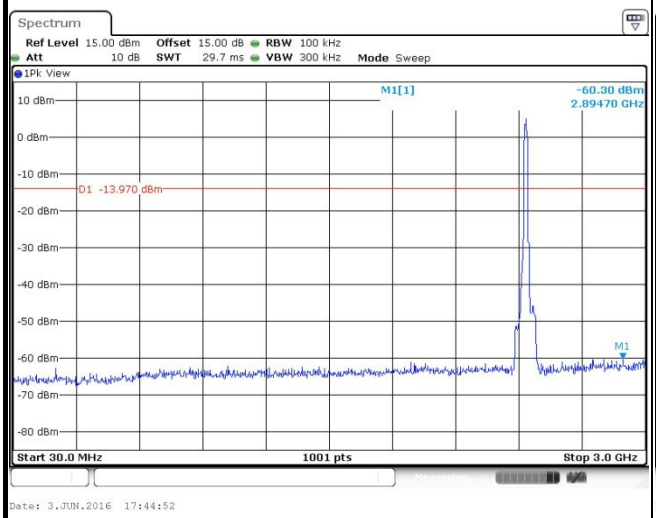
Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Bruce Huang

WLAN 802.11g Channel 06

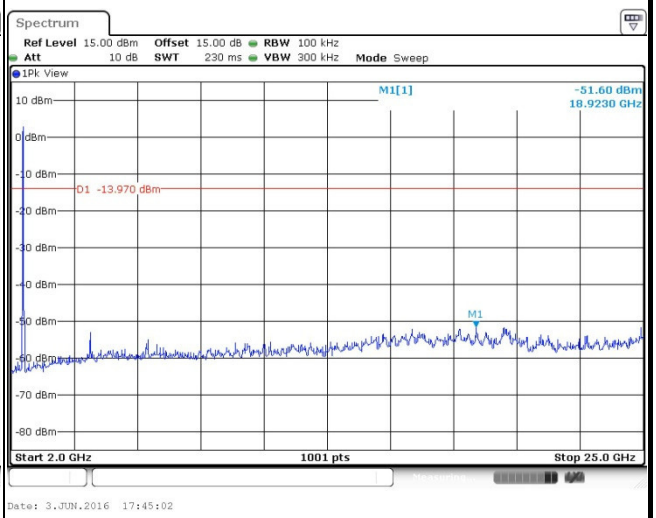
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



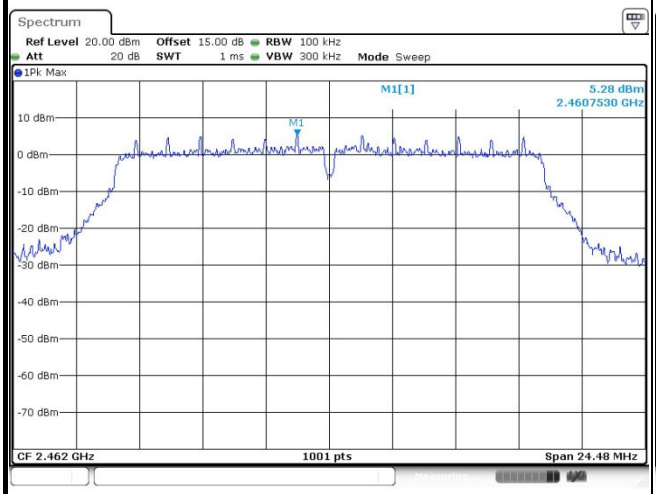
Spurious Emission 2GHz~25GHz



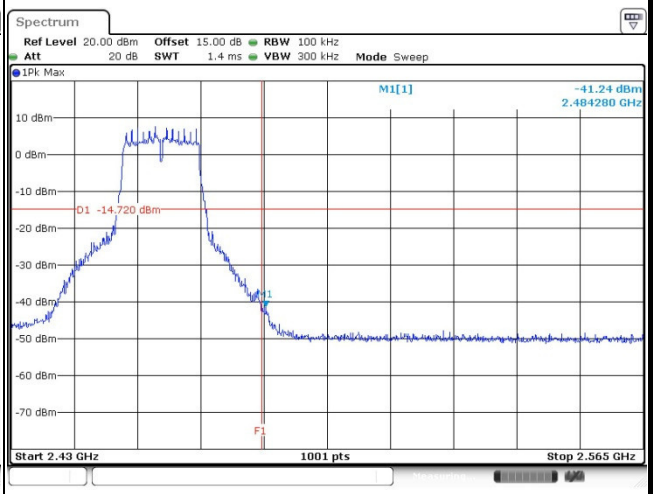
Test Mode :	802.11g	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	11	**Test Engineer :**	Bruce Huang

WLAN 802.11g Channel 11

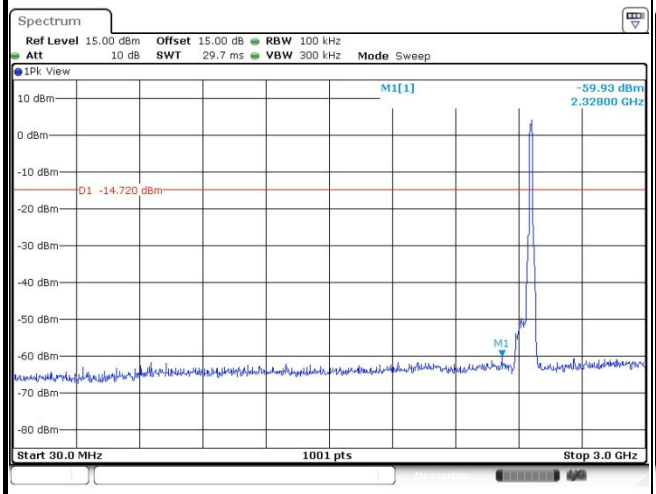
100kHz PSD reference Level



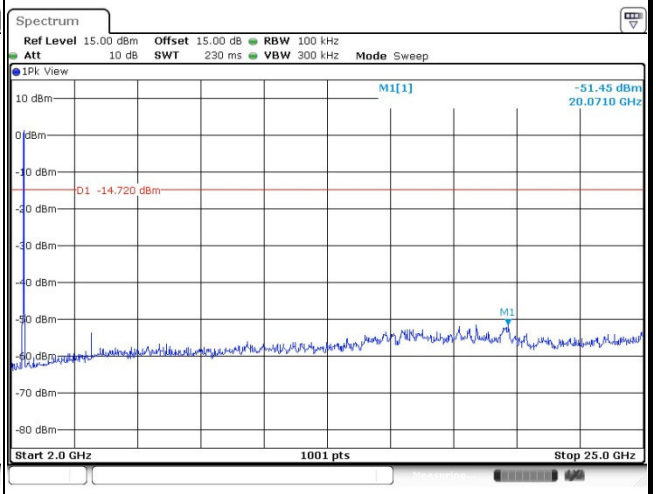
High Channel Plot



Spurious Emission 30MHz~3GHz



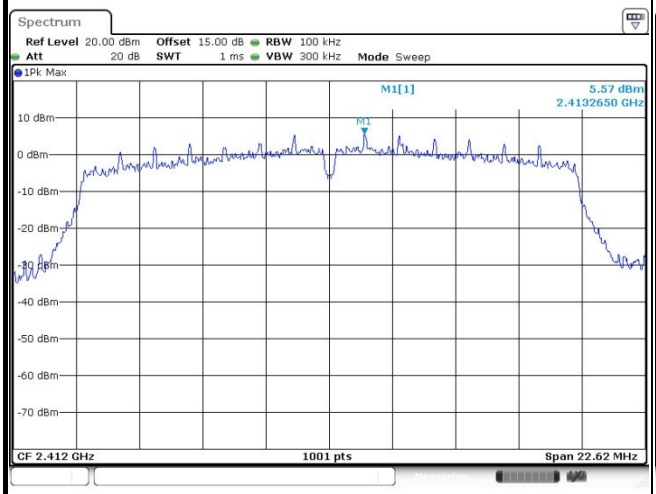
Spurious Emission 2GHz~25GHz



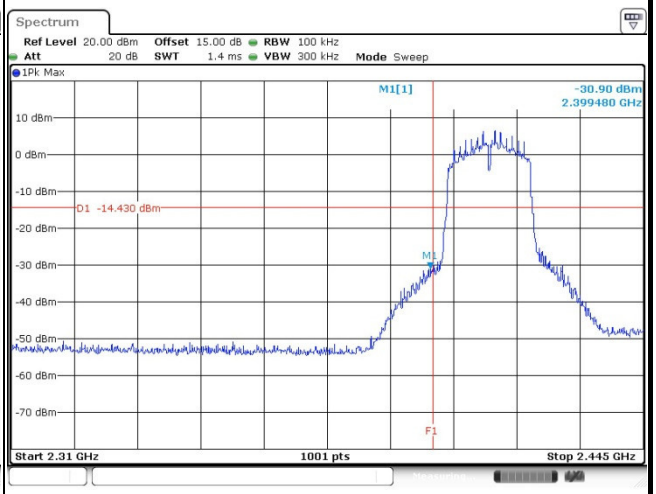
Test Mode :	802.11n HT20	**Temperature :**	24~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	50~53%
Test Channel :	01	**Test Engineer :**	Bruce Huang

WLAN 802.11n HT20 Channel 01

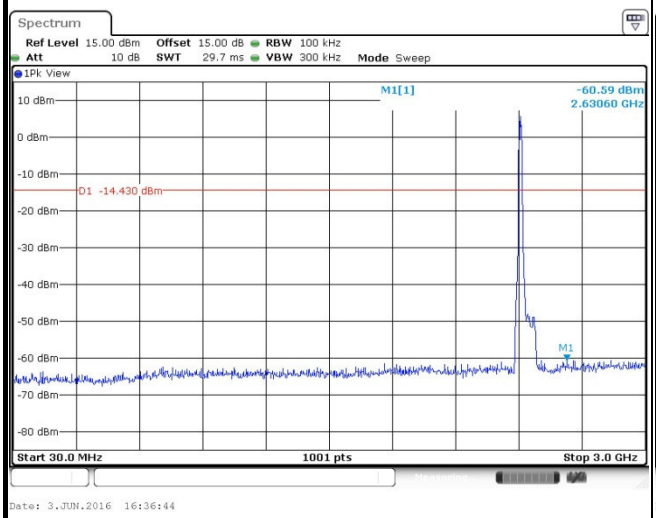
100kHz PSD reference Level



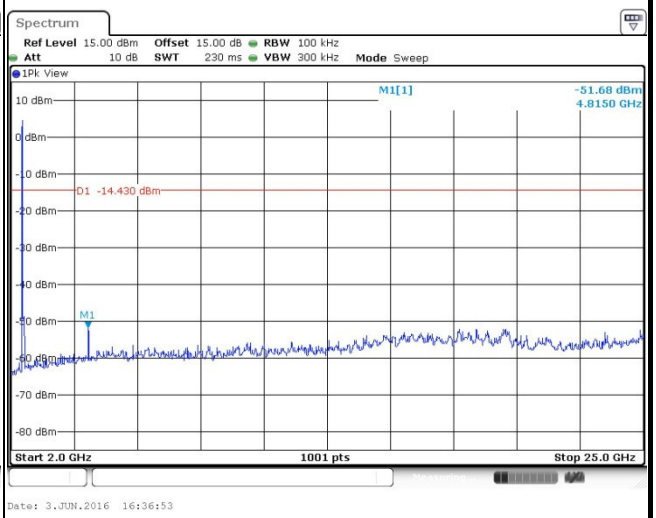
Low Channel Plot



Spurious Emission 30MHz~3GHz



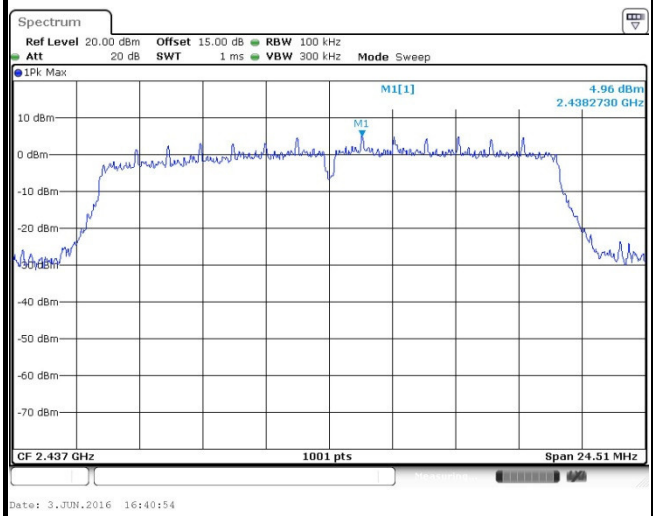
Spurious Emission 2GHz~25GHz



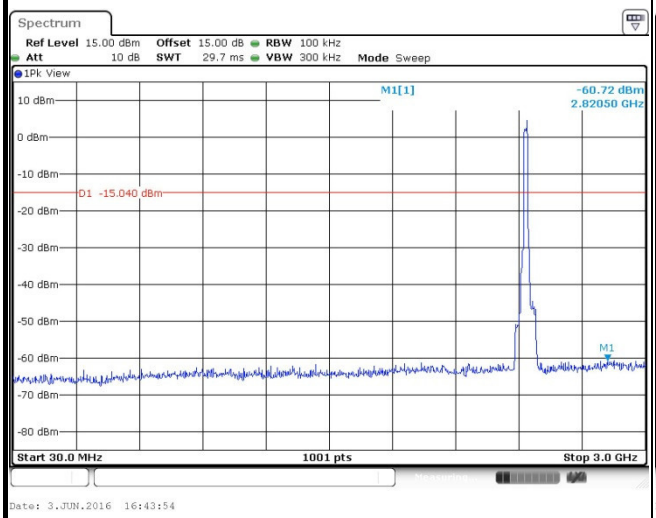
Test Mode :	802.11n HT20	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Bruce Huang

WLAN 802.11n HT20 Channel 06

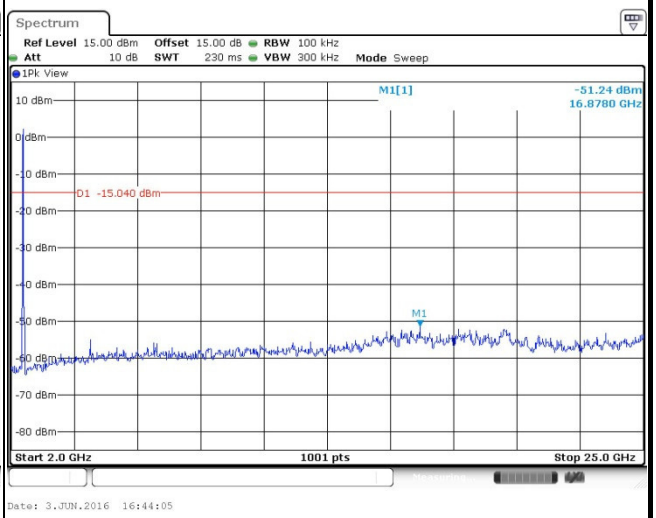
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



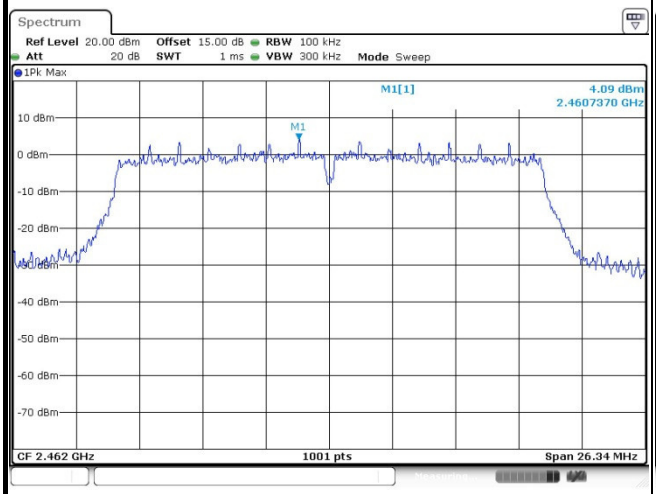
Spurious Emission 2GHz~25GHz



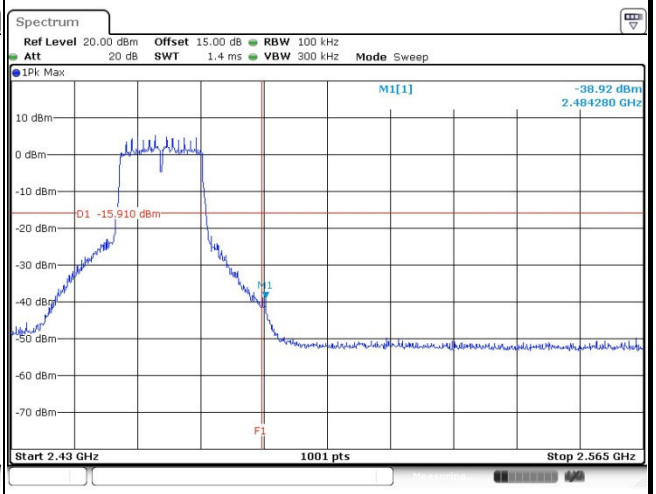
Test Mode :	802.11n HT20	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	11	**Test Engineer :**	Bruce Huang

WLAN 802.11n HT20 Channel 11

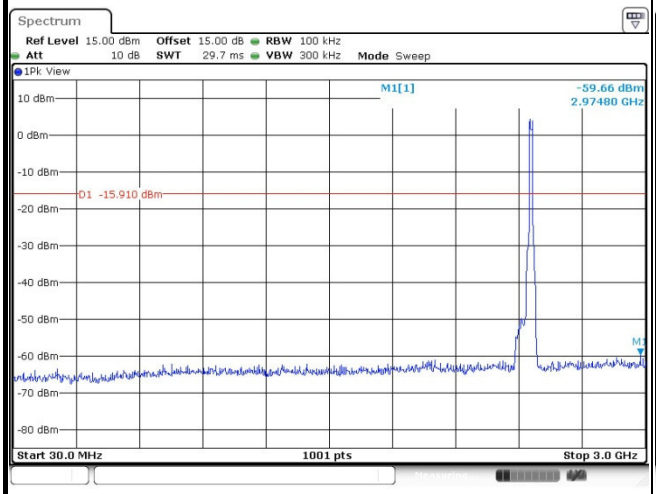
100kHz PSD reference Level



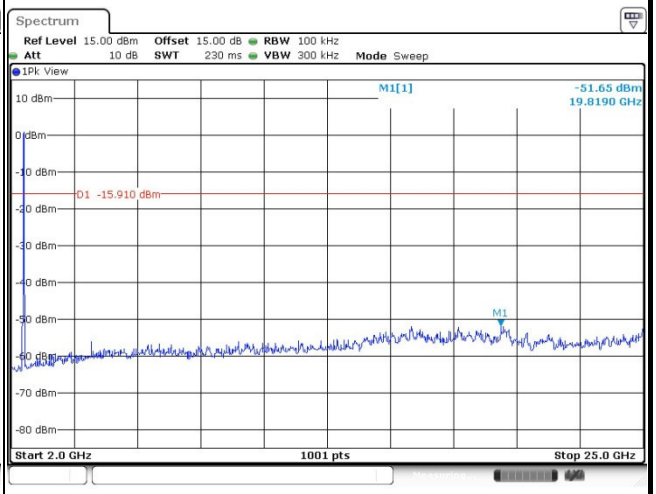
High Channel Plot



Spurious Emission 30MHz~3GHz



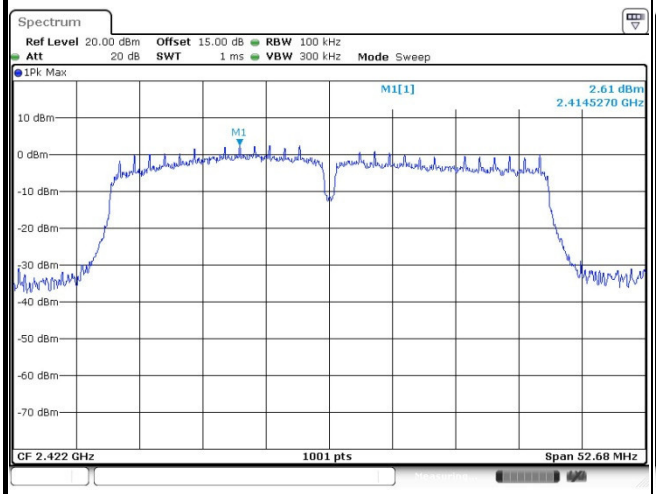
Spurious Emission 2GHz~25GHz



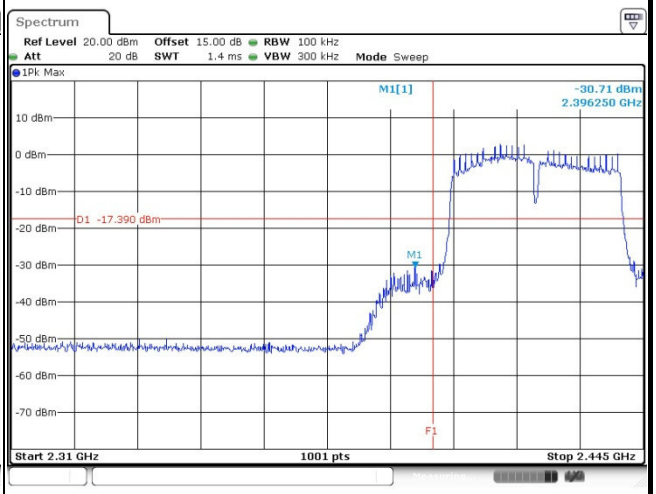
Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	2.4GHz Low	**Relative Humidity :**	50~53%
Test Channel :	03	**Test Engineer :**	Bruce Huang

WLAN 802.11n HT40 Channel 03

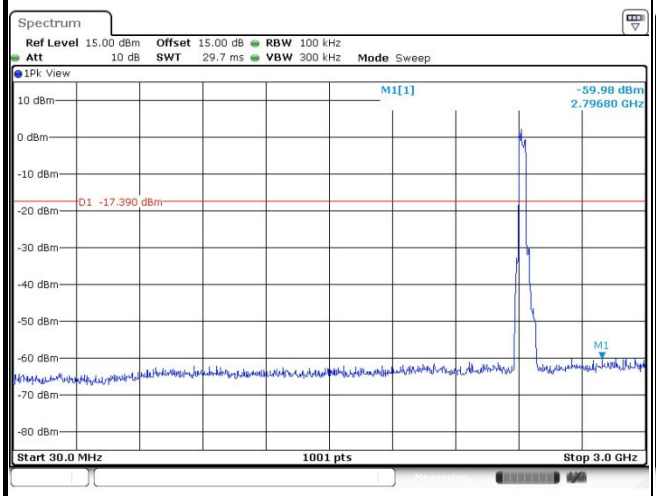
100kHz PSD reference Level



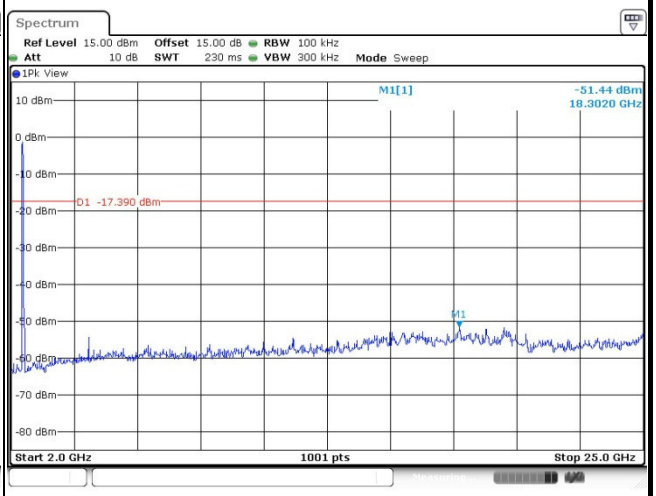
Low Channel Plot



Spurious Emission 30MHz~3GHz



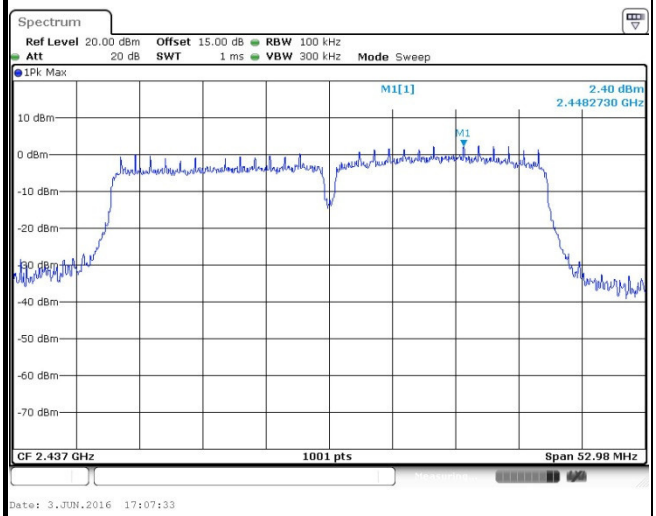
Spurious Emission 2GHz~25GHz



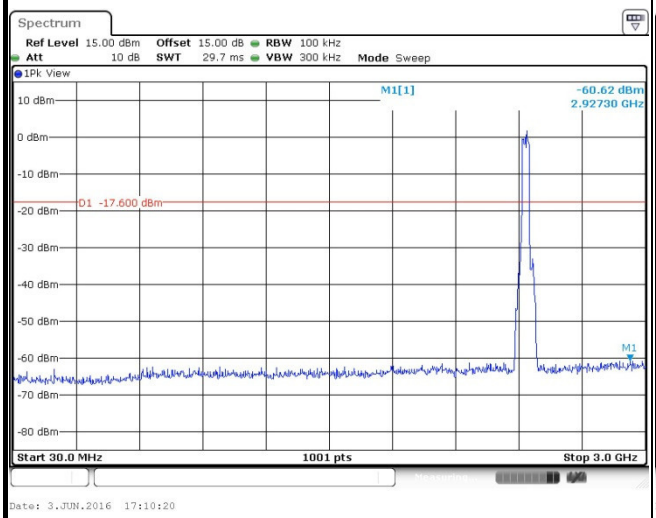
Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	2.4GHz Mid	**Relative Humidity :**	50~53%
Test Channel :	06	**Test Engineer :**	Bruce Huang

WLAN 802.11n HT40 Channel 06

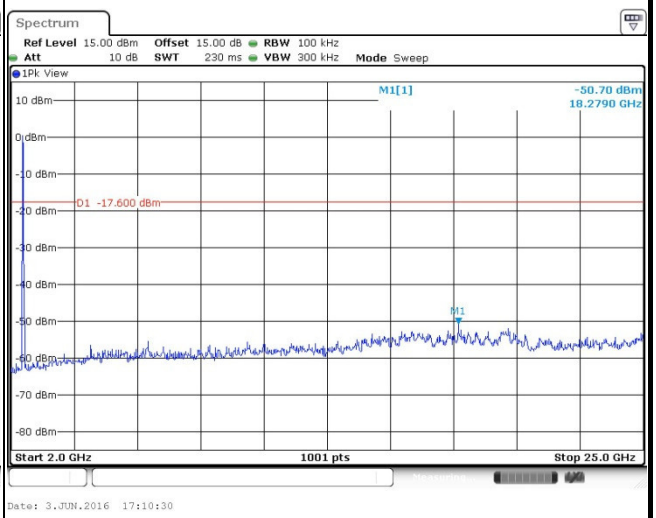
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



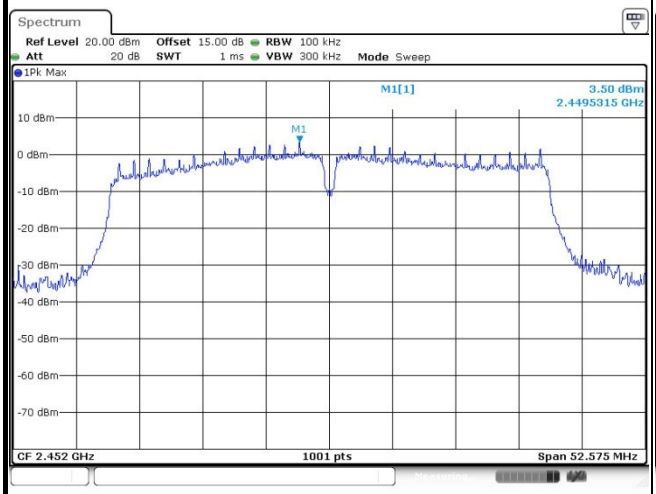
Spurious Emission 2GHz~25GHz



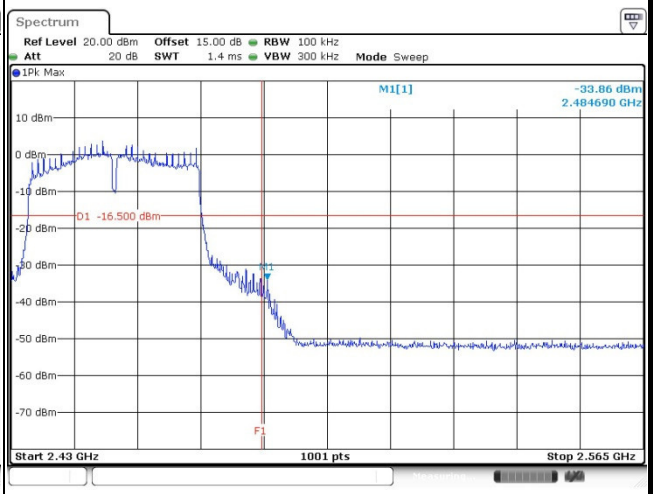
Test Mode :	802.11n HT40	**Temperature :**	24~26℃
Test Band :	2.4GHz High	**Relative Humidity :**	50~53%
Test Channel :	09	**Test Engineer :**	Bruce Huang

WLAN 802.11n HT40 Channel 09

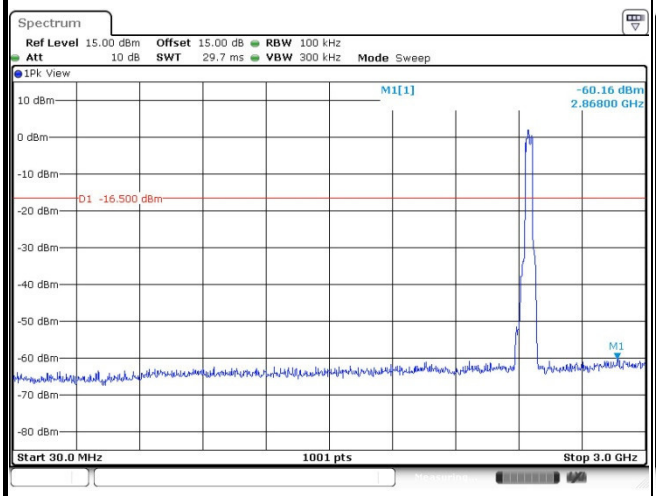
100kHz PSD reference Level



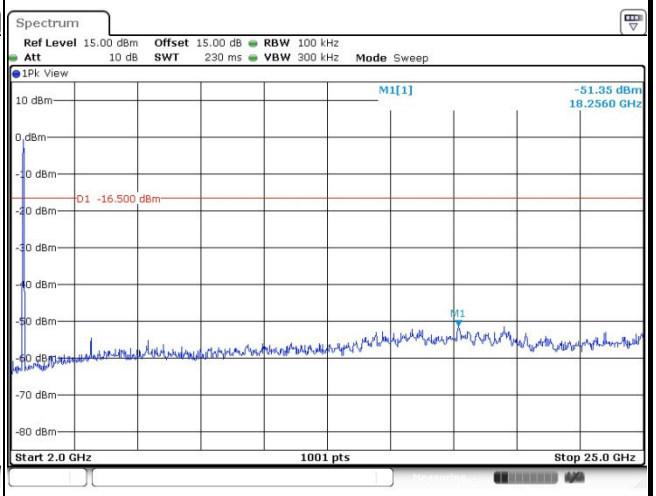
High Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/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

3.5.2 Measuring Instruments

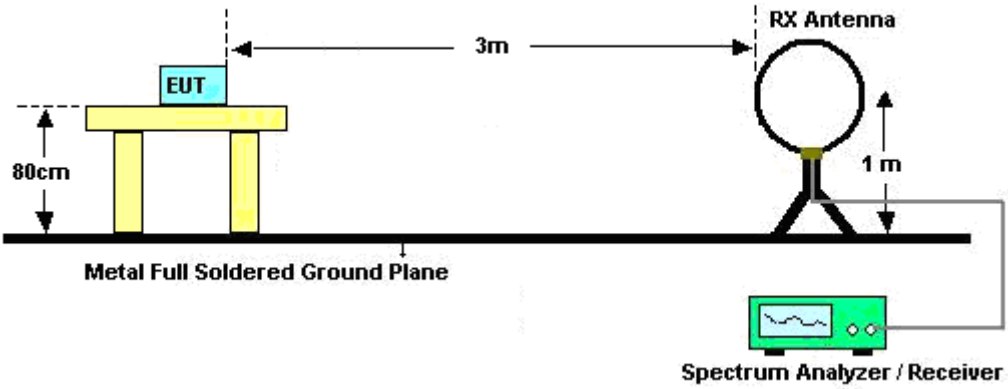
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

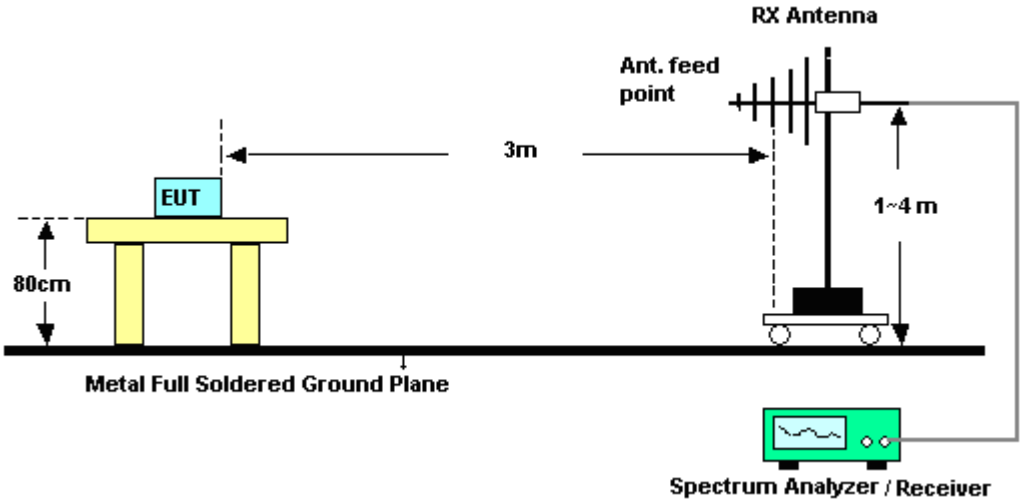
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

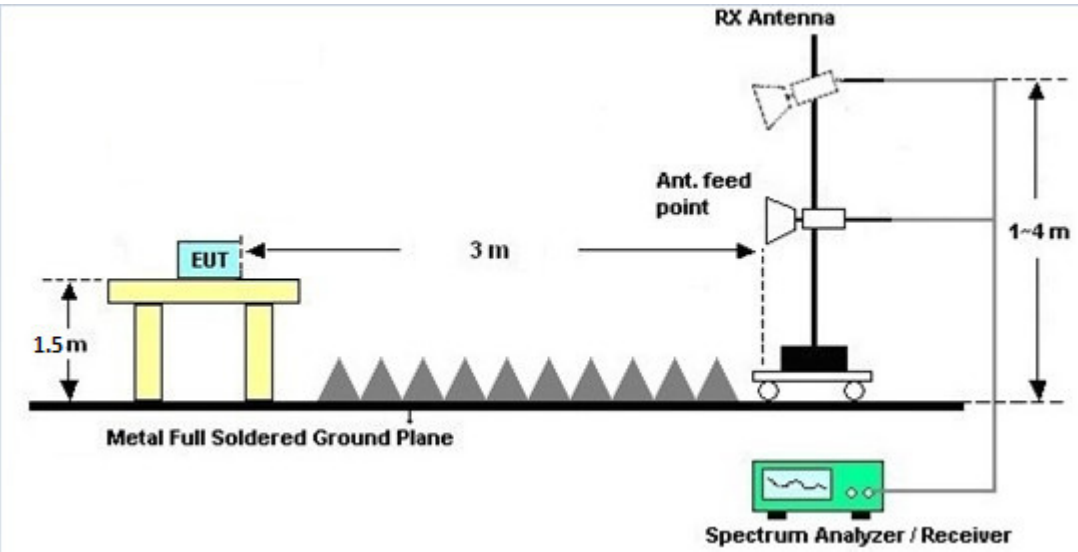
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B.

3.5.7 Duty Cycle

Please refer to Appendix C.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

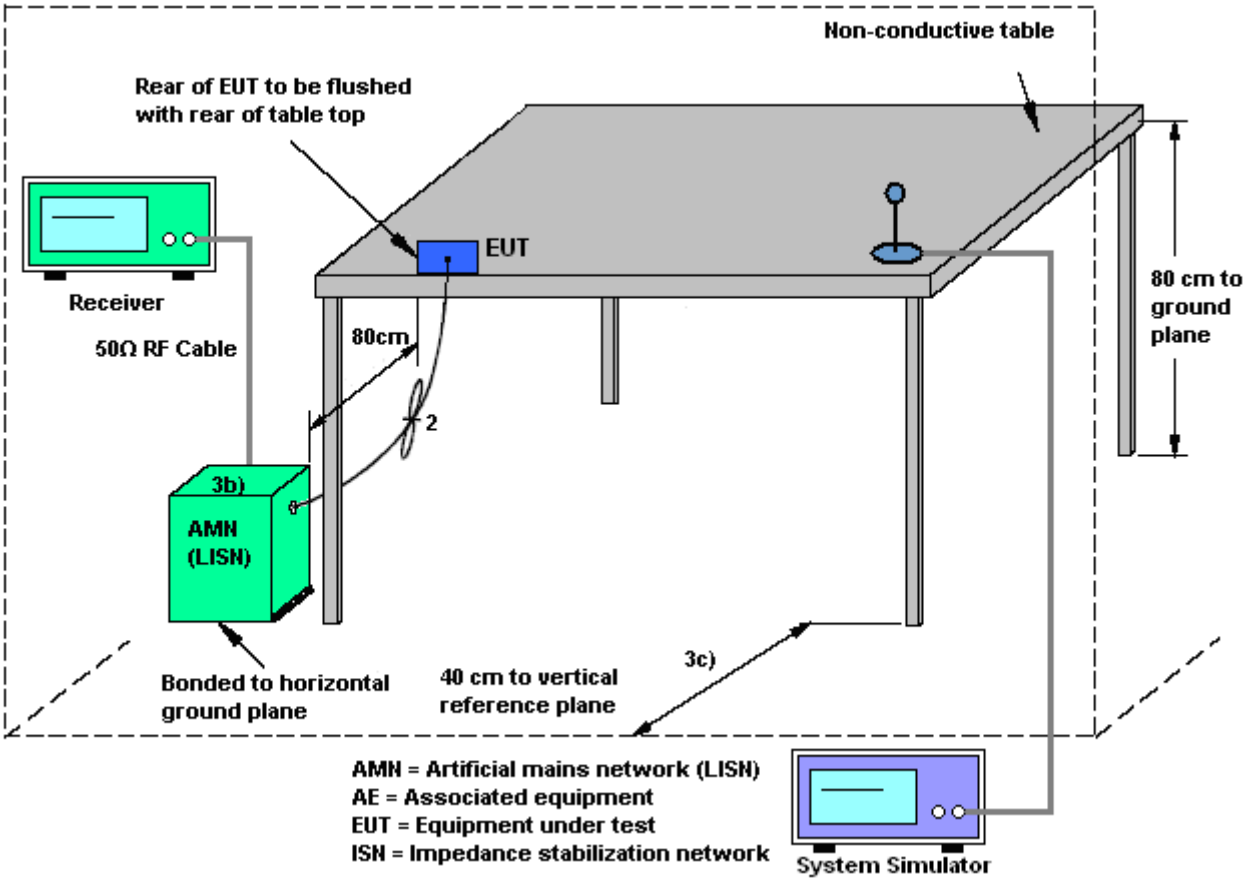
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

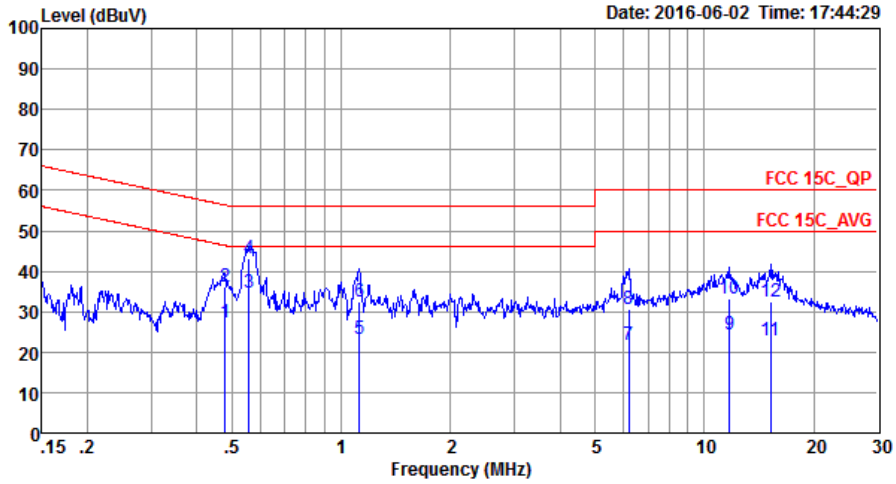
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Tao Cheng	**Relative Humidity :**	41~43%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN Link + Camera (Rear) + Earphone + Battery + USB Cable (Charging from Adapter)		

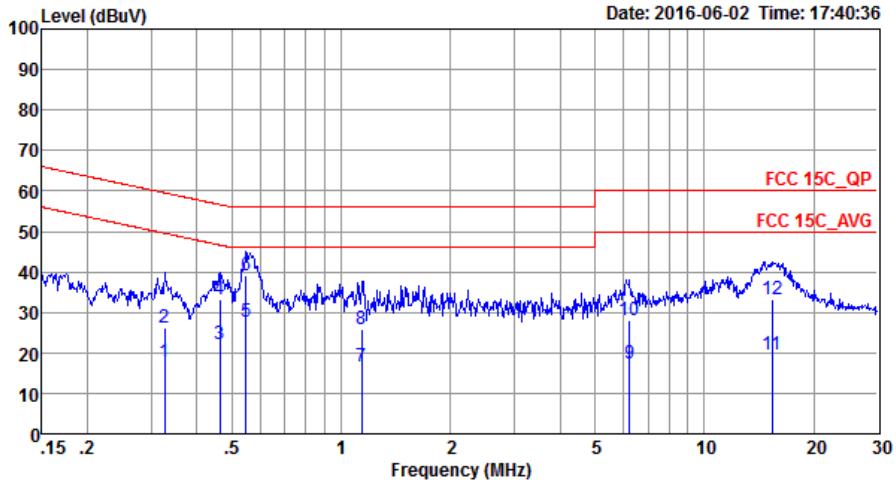


Site : CO01-SZ
Condition: FCC 15C_QP LISN_20160509 LINE

Mode : Mode 1
IMEI : 354147042138348/354147043138347

		Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
		MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1		0.48	27.44	-18.92	46.36	17.10	0.11	10.23	Average
2		0.48	36.24	-20.12	56.36	25.90	0.11	10.23	QP
3	*	0.56	34.61	-11.39	46.00	24.30	0.11	10.20	Average
4		0.56	43.11	-12.89	56.00	32.80	0.11	10.20	QP
5		1.12	23.37	-22.63	46.00	13.10	0.11	10.16	Average
6		1.12	32.37	-23.63	56.00	22.10	0.11	10.16	QP
7		6.19	21.74	-28.26	50.00	11.30	0.16	10.28	Average
8		6.19	30.64	-29.36	60.00	20.20	0.16	10.28	QP
9		11.74	24.27	-25.73	50.00	13.60	0.30	10.37	Average
10		11.74	33.07	-26.93	60.00	22.40	0.30	10.37	QP
11		15.23	22.71	-27.29	50.00	12.01	0.29	10.41	Average
12		15.23	32.31	-27.69	60.00	21.61	0.29	10.41	QP

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Tao Cheng	Relative Humidity :	41~43%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN Link + Camera (Rear) + Earphone + Battery + USB Cable (Charging from Adapter)		



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20160509 NEUTRAL

Mode : Mode 1
IMEI : 354147042138348/354147043138347

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.33	17.78	-31.75	49.53	7.30	0.11	10.37	Average
2	0.33	26.28	-33.25	59.53	15.80	0.11	10.37	QP
3	0.46	22.24	-24.39	46.63	11.90	0.11	10.23	Average
4	0.46	33.14	-23.49	56.63	22.80	0.11	10.23	QP
5	0.55	27.71	-18.29	46.00	17.40	0.11	10.20	Average
6 *	0.55	39.21	-16.79	56.00	28.90	0.11	10.20	QP
7	1.14	16.47	-29.53	46.00	6.20	0.11	10.16	Average
8	1.14	25.67	-30.33	56.00	15.40	0.11	10.16	QP
9	6.22	17.44	-32.56	50.00	7.00	0.16	10.28	Average
10	6.22	28.14	-31.86	60.00	17.70	0.16	10.28	QP
11	15.39	19.62	-30.38	50.00	8.90	0.30	10.42	Average
12	15.39	33.12	-26.88	60.00	22.40	0.30	10.42	QP

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	May 07, 2016	Jun. 03, 2016~ Jun. 27, 2016	May 06, 2017	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1207253	30MHz~40GHz	Jan. 12, 2016	Jun. 03, 2016~ Jun. 27, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Jan. 12, 2016	Jun. 03, 2016~ Jun. 27, 2016	Jan. 11, 2017	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	May 07, 2016	Jun. 22, 2016~ Jun. 27, 2016	May 06, 2017	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	May 07, 2016	Jun. 22, 2016~ Jun. 27, 2016	May 06, 2017	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 07, 2016	Jun. 22, 2016~ Jun. 27, 2016	May 06, 2017	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz~2GHz	May 21, 2016	Jun. 22, 2016~ Jun. 27, 2016	May 20, 2017	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	May 07, 2016	Jun. 22, 2016~ Jun. 27, 2016	May 06, 2017	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Aug. 19, 2015	Jun. 22, 2016~ Jun. 27, 2016	Aug. 18, 2016	Radiation (03CH03-SZ)
Amplifier	PREAMPLIFIER	BPA-530	102210	0.01Hz ~3000MHz	Oct. 20, 2015	Jun. 22, 2016~ Jun. 27, 2016	Oct. 19, 2016	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Jan. 12, 2016	Jun. 22, 2016~ Jun. 27, 2016	Jan. 11, 2017	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 20, 2015	Jun. 22, 2016~ Jun. 27, 2016	Oct. 19, 2016	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 18, 2015	Jun. 22, 2016~ Jun. 27, 2016	Jul. 17, 2016	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Jun. 22, 2016~ Jun. 27, 2016	NCR	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jun. 22, 2016~ Jun. 27, 2016	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jun. 22, 2016~ Jun. 27, 2016	NCR	Radiation (03CH03-SZ)
EMI Test Receiver	R&S	ESR7	101404	9kHz~7GHz;Max 30dBm	Oct. 20, 2015	Jun. 02, 2016	Oct. 19, 2016	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103892	9kHz~30MHz	Jan. 12, 2016	Jun. 02, 2016	Jan. 11, 2017	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103912	9kHz~30MHz	Jan. 12, 2016	Jun. 02, 2016	Jan. 11, 2017	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Aug. 07, 2015	Jun. 02, 2016	Aug. 06, 2016	Conduction (CO01-SZ)
Pulse Limiter	COM-POWER	LIT-153 Transient Limiter	53139	150kHz~30MHz	Oct. 20, 2015	Jun. 02, 2016	Oct. 19, 2016	Conduction (CO01-SZ)

NCR: No Calibration Required

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.3dB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.8dB

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

Appendix A. Conducted Test Results

Report Number : FR653106C

A1 - DTS Part

Test Engineer:	Bruce Huang	Temperature:	24~26	°C
Test Date:	2016/6/3~2016/6/27	Relative Humidity:	50~53	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	1Mbps	1	1	2412	12.14	9.03	0.50	Pass
11b	1Mbps	1	6	2437	12.79	9.55	0.50	Pass
11b	1Mbps	1	11	2462	12.89	9.53	0.50	Pass
11g	6Mbps	1	1	2412	17.23	15.08	0.50	Pass
11g	6Mbps	1	6	2437	17.93	15.70	0.50	Pass
11g	6Mbps	1	11	2462	17.93	16.32	0.50	Pass
HT20	MCS0	1	1	2412	18.23	15.08	0.50	Pass
HT20	MCS0	1	6	2437	18.53	16.34	0.50	Pass
HT20	MCS0	1	11	2462	18.63	17.56	0.50	Pass
HT40	MCS0	1	3	2422	36.16	35.12	0.50	Pass
HT40	MCS0	1	6	2437	36.56	35.32	0.50	Pass
HT40	MCS0	1	9	2452	36.26	35.05	0.50	Pass

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	1Mbps	1	1	2412	19.33	30.00	-4.45	14.88	36.00	Pass
11b	1Mbps	1	6	2437	19.89	30.00	-4.45	15.44	36.00	Pass
11b	1Mbps	1	11	2462	19.75	30.00	-4.45	15.30	36.00	Pass
11g	6Mbps	1	1	2412	23.26	30.00	-4.45	18.81	36.00	Pass
11g	6Mbps	1	6	2437	23.76	30.00	-4.45	19.31	36.00	Pass
11g	6Mbps	1	11	2462	23.36	30.00	-4.45	18.91	36.00	Pass
HT20	MCS0	1	1	2412	23.17	30.00	-4.45	18.72	36.00	Pass
HT20	MCS0	1	6	2437	23.65	30.00	-4.45	19.20	36.00	Pass
HT20	MCS0	1	11	2462	23.26	30.00	-4.45	18.81	36.00	Pass
HT40	MCS0	1	3	2422	23.72	30.00	-4.45	19.27	36.00	Pass
HT40	MCS0	1	6	2437	23.77	30.00	-4.45	19.32	36.00	Pass
HT40	MCS0	1	9	2452	23.83	30.00	-4.45	19.38	36.00	Pass

TEST RESULTS DATA
Average Power Table
(Reporting Only)

2.4GHz Band						
Mod.	Data Rate	N_{TX}	CH.	Freq. (MHz)	Duty Factor (dB)	Average Conducted Power (dBm)
11b	1Mbps	1	1	2412	0.00	16.39
11b	1Mbps	1	6	2437	0.00	16.95
11b	1Mbps	1	11	2462	0.00	16.88
11g	6Mbps	1	1	2412	0.11	14.32
11g	6Mbps	1	6	2437	0.11	14.86
11g	6Mbps	1	11	2462	0.11	14.44
HT20	MCS0	1	1	2412	0.14	14.27
HT20	MCS0	1	6	2437	0.14	14.84
HT20	MCS0	1	11	2462	0.14	14.43
HT40	MCS0	1	3	2422	0.21	13.63
HT40	MCS0	1	6	2437	0.21	13.72
HT40	MCS0	1	9	2452	0.21	13.82

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	1Mbps	1	1	2412	-1.58	-4.45	8.00	Pass
11b	1Mbps	1	6	2437	-1.67	-4.45	8.00	Pass
11b	1Mbps	1	11	2462	-4.13	-4.45	8.00	Pass
11g	6Mbps	1	1	2412	-4.69	-4.45	8.00	Pass
11g	6Mbps	1	6	2437	-5.03	-4.45	8.00	Pass
11g	6Mbps	1	11	2462	-5.35	-4.45	8.00	Pass
HT20	MCS0	1	1	2412	-7.28	-4.45	8.00	Pass
HT20	MCS0	1	6	2437	-7.14	-4.45	8.00	Pass
HT20	MCS0	1	11	2462	-9.25	-4.45	8.00	Pass
HT40	MCS0	1	3	2422	-11.78	-4.45	8.00	Pass
HT40	MCS0	1	6	2437	-11.00	-4.45	8.00	Pass
HT40	MCS0	1	9	2452	-12.28	-4.45	8.00	Pass

Appendix B. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2366.79	49.19	-24.81	74	52.26	27.13	4.82	35.02	164	67	P	H
		2390	37.72	-16.28	54	40.61	27.25	4.86	35	164	67	A	H
	*	2412	94.36	-	-	97.17	27.31	4.88	35	164	67	P	H
	*	2412	91.29	-	-	94.1	27.31	4.88	35	164	67	A	H
		2342.94	48.6	-25.40	74	51.76	27.07	4.82	35.05	165	87	P	V
		2390	38.06	-15.94	54	40.95	27.25	4.86	35	165	87	A	V
	*	2412	99.29	-	-	102.1	27.31	4.88	35	165	87	P	V
	*	2412	94.84	-	-	97.65	27.31	4.88	35	165	87	A	V
802.11b CH 06 2437MHz		2373	48.38	-25.62	74	51.35	27.19	4.86	35.02	154	71	P	H
		2389.65	37.65	-16.35	54	40.56	27.25	4.86	35.02	154	71	A	H
	*	2437	95.57	-	-	98.24	27.42	4.88	34.97	154	71	P	H
	*	2437	92.5	-	-	95.17	27.42	4.88	34.97	154	71	A	H
		2488.36	49.94	-24.06	74	52.34	27.6	4.92	34.92	154	71	P	H
		2484.52	38.28	-15.72	54	40.76	27.54	4.9	34.92	154	71	A	H
		2327.91	49.63	-24.37	74	52.9	27.01	4.79	35.07	164	129	P	V
		2389.65	38	-16.00	54	40.91	27.25	4.86	35.02	164	129	A	V
	*	2437	99.92	-	-	102.59	27.42	4.88	34.97	164	129	P	V
	*	2437	96.86	-	-	99.53	27.42	4.88	34.97	164	129	A	V
		2484.52	49.03	-24.97	74	51.51	27.54	4.9	34.92	164	129	P	V
		2483.68	39.12	-14.88	54	41.6	27.54	4.9	34.92	164	129	A	V

802.11b CH 11 2462MHz	*	2462	94.8	-	-	97.37	27.48	4.9	34.95	150	64	P	H
	*	2462	91.7	-	-	94.27	27.48	4.9	34.95	150	64	A	H
		2487.64	48.92	-25.08	74	51.34	27.6	4.9	34.92	150	64	P	H
		2483.56	38.35	-15.65	54	40.83	27.54	4.9	34.92	150	64	A	H
	*	2462	99.94	-	-	102.51	27.48	4.9	34.95	150	109	P	V
	*	2462	96.7	-	-	99.27	27.48	4.9	34.95	150	109	A	V
		2490.72	49.71	-24.29	74	52.11	27.6	4.92	34.92	150	109	P	V
		2483.52	39.14	-14.86	54	41.62	27.54	4.9	34.92	150	109	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	40.03	-33.97	74	60.4	31.05	6.97	58.39	250	0	P	H
		4824	42.36	-31.64	74	62.73	31.05	6.97	58.39	250	0	P	V
802.11b CH 06 2437MHz		4874	39.49	-34.51	74	60.04	31.12	6.99	58.66	250	0	P	H
		7311	46.83	-27.17	74	60.56	35.96	8.93	58.62	150	0	P	H
		4874	43.32	-30.68	74	63.87	31.12	6.99	58.66	250	0	P	V
		7311	47.2	-26.80	74	60.93	35.96	8.93	58.62	150	0	P	V
802.11b CH 11 2462MHz		4924	41.06	-32.94	74	61.39	31.19	7	58.52	250	0	P	H
		7386	46.98	-27.02	74	60.29	36.08	9.15	58.54	150	0	P	H
		4924	43.56	-30.44	74	63.89	31.19	7	58.52	250	0	P	V
		7386	47.05	-26.95	74	60.36	36.08	9.15	58.54	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.83	51.63	-22.37	74	54.52	27.25	4.86	35	239	118	P	H
		2389.74	40.97	-13.03	54	43.88	27.25	4.86	35.02	239	118	A	H
	*	2412	97.99	-	-	100.8	27.31	4.88	35	239	118	P	H
	*	2412	90.28	-	-	93.09	27.31	4.88	35	239	118	A	H
		2389.74	56.1	-17.90	74	59.01	27.25	4.86	35.02	226	84	P	V
		2390	42.35	-11.65	54	45.24	27.25	4.86	35	226	84	A	V
	*	2412	100.54	-	-	103.35	27.31	4.88	35	226	84	P	V
	*	2412	92.83	-	-	95.64	27.31	4.88	35	226	84	A	V
802.11g CH 06 2437MHz		2385.24	48.85	-25.15	74	51.82	27.19	4.86	35.02	208	77	P	H
		2389.92	38.58	-15.42	54	41.47	27.25	4.86	35	208	77	A	H
	*	2438	97.34	-	-	100.01	27.42	4.88	34.97	208	77	P	H
	*	2438	89.64	-	-	92.31	27.42	4.88	34.97	208	77	A	H
		2484.08	50.26	-23.74	74	52.74	27.54	4.9	34.92	208	77	P	H
		2483.8	40.34	-13.66	54	42.82	27.54	4.9	34.92	208	77	A	H
		2389.29	49.71	-24.29	74	52.62	27.25	4.86	35.02	175	60	P	V
		2389.83	39.81	-14.19	54	42.7	27.25	4.86	35	175	60	A	V
	*	2437	100.06	-	-	102.73	27.42	4.88	34.97	175	60	P	V
	*	2437	92.98	-	-	95.65	27.42	4.88	34.97	175	60	A	V
		2483.72	50.11	-23.89	74	52.59	27.54	4.9	34.92	175	60	P	V
		2483.56	41.16	-12.84	54	43.64	27.54	4.9	34.92	175	60	A	V

802.11g CH 11 2462MHz	*	2462	97.56	-	-	100.13	27.48	4.9	34.95	201	66	P	H
	*	2462	89.68	-	-	92.25	27.48	4.9	34.95	201	66	A	H
		2483.56	54.45	-19.55	74	56.93	27.54	4.9	34.92	201	66	P	H
		2483.6	41.47	-12.53	54	43.95	27.54	4.9	34.92	201	66	A	H
	*	2462	100.04	-	-	102.61	27.48	4.9	34.95	161	90	P	V
	*	2462	92.59	-	-	95.16	27.48	4.9	34.95	161	90	A	V
		2483.84	57.55	-16.45	74	60.03	27.54	4.9	34.92	161	90	P	V
		2483.52	43.53	-10.47	54	46.01	27.54	4.9	34.92	161	90	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	38.36	-35.64	74	58.73	31.05	6.97	58.39	250	0	P	H
		4824	39.86	-34.14	74	60.23	31.05	6.97	58.39	250	0	P	V
802.11g CH 06 2437MHz		4874	39.01	-34.99	74	59.56	31.12	6.99	58.66	250	0	P	H
		7311	46.59	-27.41	74	60.32	35.96	8.93	58.62	150	0	P	H
		4874	39.01	-34.99	74	59.56	31.12	6.99	58.66	250	0	P	V
		7311	45.53	-28.47	74	59.26	35.96	8.93	58.62	150	0	P	V
802.11g CH 11 2462MHz		4924	40.15	-33.85	74	60.48	31.19	7	58.52	250	0	P	H
		7386	46.45	-27.55	74	59.76	36.08	9.15	58.54	150	0	P	H
		4924	40.33	-33.67	74	60.66	31.19	7	58.52	250	0	P	V
		7386	48.18	-25.82	74	61.49	36.08	9.15	58.54	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.83	56.38	-17.62	74	59.27	27.25	4.86	35	237	123	P	H
		2389.83	42.45	-11.55	54	45.34	27.25	4.86	35	237	123	A	H
	*	2412	97.47	-	-	100.28	27.31	4.88	35	237	123	P	H
	*	2412	89.87	-	-	92.68	27.31	4.88	35	237	123	A	H
		2389.65	60.93	-13.07	74	63.84	27.25	4.86	35.02	150	107	P	V
		2390	44.39	-9.61	54	47.28	27.25	4.86	35	150	107	A	V
	*	2412	99.53	-	-	102.34	27.31	4.88	35	150	107	P	V
	*	2412	91.76	-	-	94.57	27.31	4.88	35	150	107	A	V
802.11n HT20 CH 06 2437MHz		2389.47	49.36	-24.64	74	52.27	27.25	4.86	35.02	185	126	P	H
		2389.38	39.41	-14.59	54	42.32	27.25	4.86	35.02	185	126	A	H
	*	2437	97.25	-	-	99.92	27.42	4.88	34.97	185	126	P	H
	*	2437	89.91	-	-	92.58	27.42	4.88	34.97	185	126	A	H
		2483.92	49.46	-24.54	74	51.94	27.54	4.9	34.92	185	126	P	H
		2483.52	40.48	-13.52	54	42.96	27.54	4.9	34.92	185	126	A	H
		2389.47	49.45	-24.55	74	52.36	27.25	4.86	35.02	167	88	P	V
		2389.74	40.09	-13.91	54	43	27.25	4.86	35.02	167	88	A	V
	*	2437	100.64	-	-	103.31	27.42	4.88	34.97	167	88	P	V
	*	2437	93.04	-	-	95.71	27.42	4.88	34.97	167	88	A	V
		2483.64	51.66	-22.34	74	54.14	27.54	4.9	34.92	167	88	P	V
		2483.52	42.01	-11.99	54	44.49	27.54	4.9	34.92	167	88	A	V

802.11n HT20 CH 11 2462MHz	*	2462	97.95	-	-	100.52	27.48	4.9	34.95	224	70	P	H
	*	2462	90.23	-	-	92.8	27.48	4.9	34.95	224	70	A	H
		2483.68	60.04	-13.96	74	62.52	27.54	4.9	34.92	224	70	P	H
		2483.52	42.92	-11.08	54	45.4	27.54	4.9	34.92	224	70	A	H
	*	2462	100.41	-	-	102.98	27.48	4.9	34.95	150	91	P	V
	*	2462	92.94	-	-	95.51	27.48	4.9	34.95	150	91	A	V
		2484.08	61.26	-12.74	74	63.74	27.54	4.9	34.92	150	91	P	V
		2483.52	45.73	-8.27	54	48.21	27.54	4.9	34.92	150	91	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	38.24	-35.76	74	58.61	31.05	6.97	58.39	250	0	P	H
		4824	39.34	-34.66	74	59.71	31.05	6.97	58.39	250	0	P	V
802.11n HT20 CH 06 2437MHz		4874	37.91	-36.09	74	58.46	31.12	6.99	58.66	250	0	P	H
		7311	46.29	-27.71	74	60.02	35.96	8.93	58.62	150	0	P	H
		4874	39.09	-34.91	74	59.64	31.12	6.99	58.66	250	0	P	V
		7311	46.3	-27.70	74	60.03	35.96	8.93	58.62	150	0	P	V
802.11n HT20 CH 11 2462MHz		4924	38.92	-35.08	74	59.25	31.19	7	58.52	150	360	P	H
		7386	46.53	-27.47	74	59.84	36.08	9.15	58.54	150	0	P	H
		4924	40.27	-33.73	74	60.6	31.19	7	58.52	150	360	P	V
		7386	46.18	-27.82	74	59.49	36.08	9.15	58.54	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.83	59.34	-14.66	74	62.23	27.25	4.86	35	150	75	P	H
		2390	45.34	-8.66	54	48.23	27.25	4.86	35	150	75	A	H
	*	2422	93.99	-	-	96.71	27.37	4.88	34.97	150	75	P	H
	*	2422	86.77	-	-	89.49	27.37	4.88	34.97	150	75	A	H
		2486.6	49.79	-24.21	74	52.27	27.54	4.9	34.92	150	75	P	H
		2483.68	39.95	-14.05	54	42.43	27.54	4.9	34.92	150	75	A	H
		2389.65	62.8	-11.20	74	65.71	27.25	4.86	35.02	165	85	P	V
		2389.56	49	-5.00	54	51.91	27.25	4.86	35.02	165	85	A	V
	*	2422	98.03	-	-	100.75	27.37	4.88	34.97	165	85	P	V
	*	2422	90.58	-	-	93.3	27.37	4.88	34.97	165	85	A	V
		2483.68	49.27	-24.73	74	51.75	27.54	4.9	34.92	165	85	P	V
		2484.4	40.85	-13.15	54	43.33	27.54	4.9	34.92	165	85	A	V
802.11n HT40 CH 06 2437MHz		2389.83	49.89	-24.11	74	52.78	27.25	4.86	35	235	146	P	H
		2390	40.48	-13.52	54	43.37	27.25	4.86	35	235	146	A	H
	*	2437	92.11	-	-	94.78	27.42	4.88	34.97	235	146	P	H
	*	2437	84.81	-	-	87.48	27.42	4.88	34.97	235	146	A	H
		2484	54.6	-19.40	74	57.08	27.54	4.9	34.92	235	146	P	H
		2483.6	41.5	-12.50	54	43.98	27.54	4.9	34.92	235	146	A	H
		2389.65	55.89	-18.11	74	58.8	27.25	4.86	35.02	150	106	P	V
		2389.65	41.55	-12.45	54	44.46	27.25	4.86	35.02	150	106	A	V
	*	2437	97.08	-	-	99.75	27.42	4.88	34.97	150	106	P	V
	*	2437	88.7	-	-	91.37	27.42	4.88	34.97	150	106	A	V
		2483.76	58.07	-15.93	74	60.55	27.54	4.9	34.92	150	106	P	V
		2483.56	44.32	-9.68	54	46.8	27.54	4.9	34.92	150	106	A	V

802.11n HT40 CH 09 2452MHz		2329.17	48.99	-25.01	74	52.23	27.01	4.82	35.07	238	138	P	H
		2357.7	39.39	-14.61	54	42.49	27.13	4.82	35.05	238	138	A	H
	*	2452	97.2	-	-	99.83	27.42	4.9	34.95	238	138	P	H
	*	2452	89.7	-	-	92.33	27.42	4.9	34.95	238	138	A	H
		2483.6	62.92	-11.08	74	65.4	27.54	4.9	34.92	238	138	P	H
		2483.64	47.23	-6.77	54	49.71	27.54	4.9	34.92	238	138	A	H
		2351.22	48.76	-25.24	74	51.92	27.07	4.82	35.05	150	110	P	V
		2389.11	39.28	-14.72	54	42.19	27.25	4.86	35.02	150	110	A	V
	*	2452	98.21	-	-	100.84	27.42	4.9	34.95	150	110	P	V
	*	2452	90.7	-	-	93.33	27.42	4.9	34.95	150	110	A	V
		2483.6	64.14	-9.86	74	66.62	27.54	4.9	34.92	150	110	P	V
		2483.64	48.87	-5.13	54	51.35	27.54	4.9	34.92	150	110	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4844	38.66	-35.34	74	59.1	31.07	6.97	58.48	250	0	P	H
HT40		7266	46.18	-27.82	74	59.85	35.91	8.95	58.53	178	360	P	H
CH 03		4844	38.63	-35.37	74	59.07	31.07	6.97	58.48	150	0	P	V
2422MHz		7266	46.1	-27.90	74	59.77	35.91	8.95	58.53	150	360	P	V
802.11n		4874	38.59	-35.41	74	59.14	31.12	6.99	58.66	150	0	P	H
HT40		7311	45.79	-28.21	74	59.52	35.96	8.93	58.62	150	360	P	H
CH 06		4874	38.09	-35.91	74	58.64	31.12	6.99	58.66	150	360	P	V
2437MHz		7311	46.17	-27.83	74	59.9	35.96	8.93	58.62	150	0	P	V
802.11n		4904	38.55	-35.45	74	59.02	31.17	7	58.64	250	0	P	H
HT40		7356	45.92	-28.08	74	59.42	36.03	9.04	58.57	150	0	P	H
CH 09		4904	39.04	-34.96	74	59.51	31.17	7	58.64	250	0	P	V
2452MHz		7356	46.16	-27.84	74	59.66	36.03	9.04	58.57	150	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
2.4GHz 802.11n HT40 LF		30.97	24.05	-15.95	40	31.54	23.67	0.62	31.78	-	-	P	H
		109.54	22.86	-20.64	43.5	35.33	18.09	0.99	31.55	-	-	P	H
		224.97	22.58	-23.42	46	35.42	17.03	1.4	31.27	-	-	P	H
		254.07	38.31	-7.69	46	49.99	18.11	1.5	31.29	100	200	P	H
		416.06	27.06	-18.94	46	33.67	22.73	1.89	31.23	-	-	P	H
		573.2	28.48	-17.52	46	32.89	24.56	2.25	31.22	-	-	P	H
		47.46	36.16	-3.84	40	51.28	15.99	0.62	31.73	100	200	P	V
		178.41	23.31	-20.19	43.5	36.78	16.57	1.28	31.32	-	-	P	V
		214.3	22.2	-21.30	43.5	35.42	16.64	1.4	31.26	-	-	P	V
		257.95	29.39	-16.61	46	40.93	18.26	1.5	31.3	-	-	P	V
		373.38	31.64	-14.36	46	39.29	21.79	1.82	31.26	-	-	P	V
		412.18	30.7	-15.30	46	37.37	22.67	1.89	31.23	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

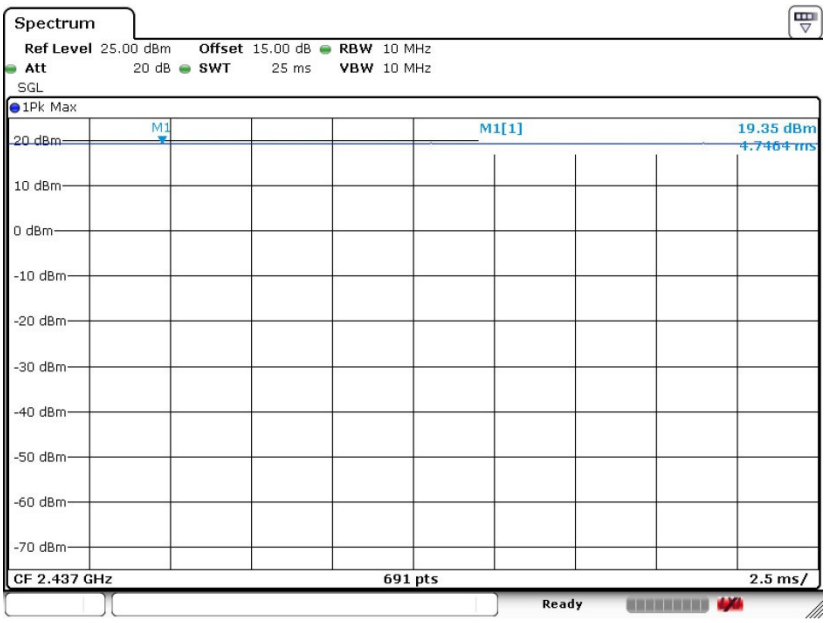
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.

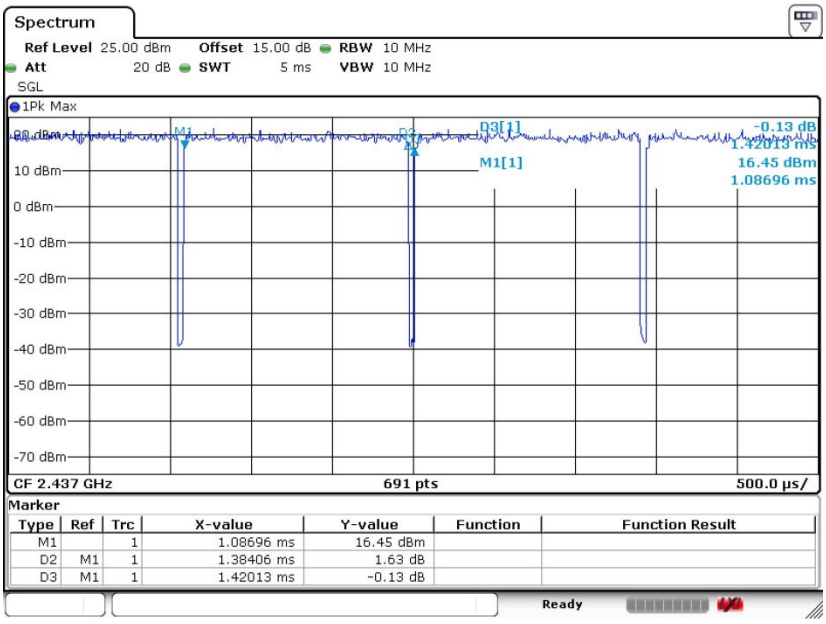
Appendix C. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	97.46	1.38	0.72	1kHz
2.4GHz 802.11n HT20	96.74	1.30	0.77	1kHz
2.4GHz 802.11n HT40	95.33	0.65	1.54	3kHz

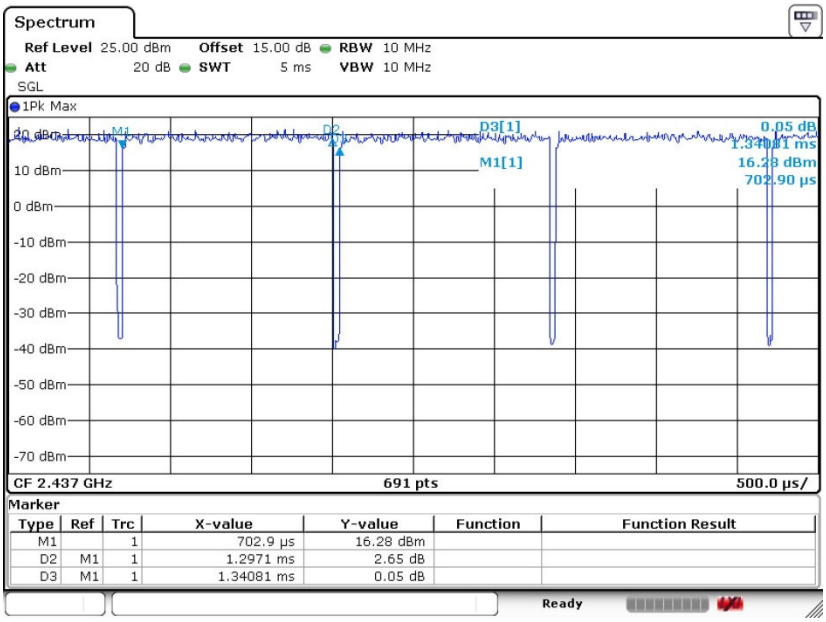
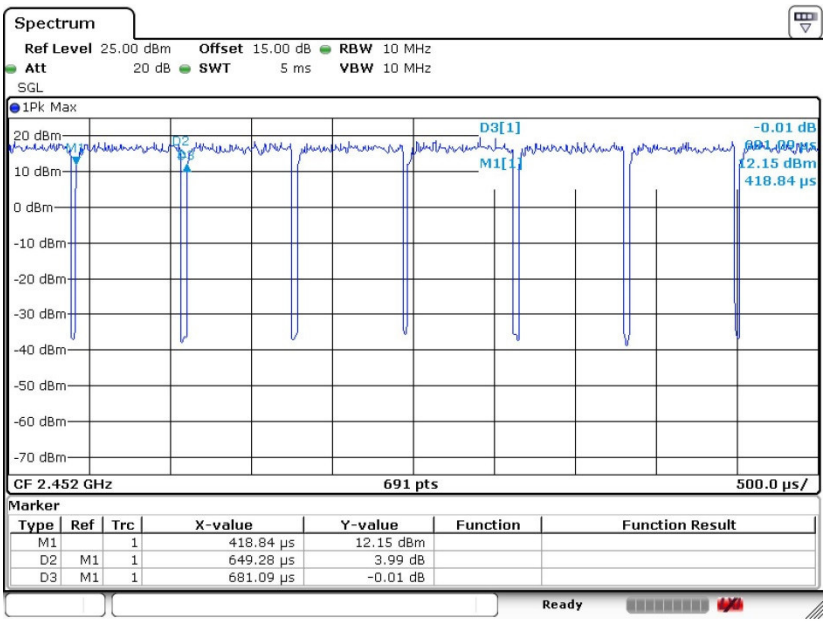
802.11b



802.11g



802.11n HT20



802.11n HT40