



FCC RF Test Report

APPLICANT : BlackBerry Ltd.
EQUIPMENT : GSM Quad-band/HSPA-UMTS Penta-band/
LTE Deca-band mobile phone
BRAND NAME : BlackBerry
MODEL NAME : BBA100-1
MARKETING NAME : DTEK60
FCC ID : L6ABBA1001
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Jul. 20, 2016 and testing was completed on Aug. 19, 2016. We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

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FCC ID : L6ABBA1001

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR672002C	Rev. 01	Initial issue of report	Aug. 23, 2016

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	RSS-247 5.2(1)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.1	-	RSS-Gen 6.6	99% Bandwidth	-	Pass	-
3.2	15.247(b)	RSS-247 A5.4(4)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(e)	RSS-247 5.2(2)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
3.4	15.247(d)	RSS-247 5.5	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	RSS-247 5.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.31 dB at 2389.905 MHz
3.6	15.207	RSS-GEN 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 6.02 dB at 15.970 MHz
3.7	15.203 & 15.247(b)	N/A	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

BlackBerry Ltd.

2200 University Ave E., Waterloo, ON, CAN. N2K0A7

1.2 Manufacturer

TCL Communication Ltd.

5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	GSM Quad-band/HSPA-UMTS Penta-band/ LTE Deca-band mobile phone
Brand Name	BlackBerry
Model Name	BBA100-1
Marketing Name	DTEK60
FCC ID	L6ABBA1001
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/HSPA/DC-HSDPA/ HSPA+(16QAM uplink is not supported)/LTE/NFC/ WLAN 2.4GHz 802.11b/g/n HT20/ WLAN 5GHz 802.11a/n HT20/HT40/ WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/ Bluetooth v3.0+EDR/ Bluetooth v4.0 LE/ Bluetooth v4.2 LE
IMEI Code	Conducted: 004402243144338 Conduction: 004402243144106 Radiation: 004402243143991/004402243144411
HW Version	PIO
SW Version	AAF884
EUT Stage	Identical Prototype

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	802.11b/g/n : 2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to Antenna	802.11b : 20.81 dBm (0.1205 W) 802.11g : 25.34 dBm (0.3420 W) 802.11n HT20 : 24.97 dBm (0.3141 W)
99% Occupied Bandwidth	802.11b : 13.19MHz 802.11g : 17.73MHz 802.11n HT20 : 18.93MHz
Antenna Type / Gain	LDS Antenna with gain 0.30 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.5 Specification of Accessory

Specification of Accessory				
AC Adapter 1	Brand Name	N/A	Model Name	QC10US
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5Vdc, 2000mA/9Vdc, 1670mA		
	Manufacturer	BYD	S/N	CBA0060AGHC1
AC Adapter 2	Brand Name	N/A	Model Name	QC10EU
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5Vdc, 2000mA/9Vdc, 1670mA		
	Manufacturer	BYD	S/N	CBA0060AAHC1
AC Adapter 3	Brand Name	N/A	Model Name	QC10UK
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5Vdc, 2000mA/9Vdc, 1670mA		
	Manufacturer	BYD	S/N	CBA0060ABHC1
AC Adapter 4	Brand Name	N/A	Model Name	QC10AU
	Power Rating	I/P: 100-240Vac, 500mA, O/P: 5Vdc, 2000mA/9Vdc, 1670mA		
	Manufacturer	BYD	S/N	CBA0060ACHC1
Battery 1	Brand Name	N/A	Model Name	TLp030F2
	Power Rating	3.84Vdc, 3000mAh		
	Manufacturer	SCUD	S/N	CAC3000027C2
Battery 2	Brand Name	N/A	Model Name	TLp030F1
	Power Rating	3.84Vdc, 3000mAh		
	Manufacturer	BYD	S/N	CAC3000026C1
USB Cable	Brand Name	N/A	Model Name	CDA0000078CF
	Signal Line Type	1.00m shielded without core		
Earphone	Brand Name	N/A	Model Name	CCB0045A16C3
	Signal Line Type	1.24m non-shielded without core		

1.6 Modification of EUT

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

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-3273456 FAX: +886-3-3284978	
Test Site No.	Sporton Site No.	FCC/IC Registration No.
	03CH07-HY	TW1022/4086B

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.	
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958	
Test Site No.	Sporton Site No.	
	TH01-KS	CO01-KS

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

1.8 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
- ♦ IC RSS-247 Issue 1
- ♦ IC RSS-Gen Issue 4

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.

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	20.45	CH 01	20.55	20.69	20.81
CH 06	2437	20.36				20.55
CH 11	2462	19.95				20.14

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	21.91	CH 06	22.90	23.16	22.89	25.22	24.96	24.25	24.29
CH 06	2437	22.80					25.34			
CH 11	2462	22.44					25.26			

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	20.78	CH 06	22.26	22.19	24.01	24.24	24.13	24.56	23.47
CH 06	2437	22.85							24.97	
CH 11	2462	22.52							24.76	

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.

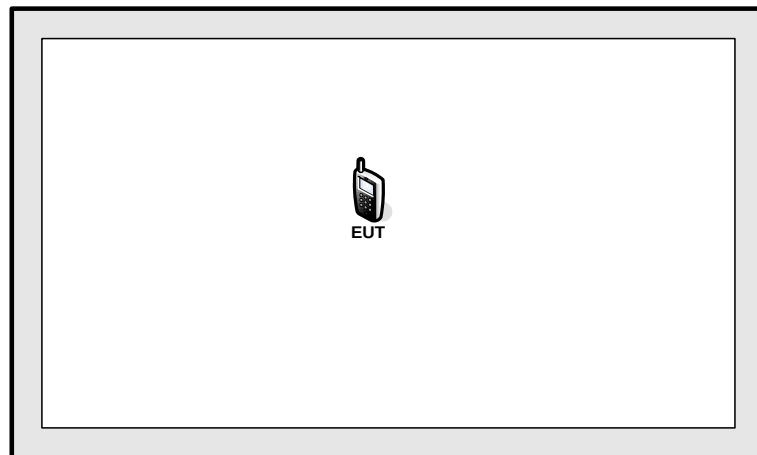
<2.4GHz>

Modulation	Data Rate
802.11b	11 Mbps
802.11g	24 Mbps
802.11n HT20	MCS6

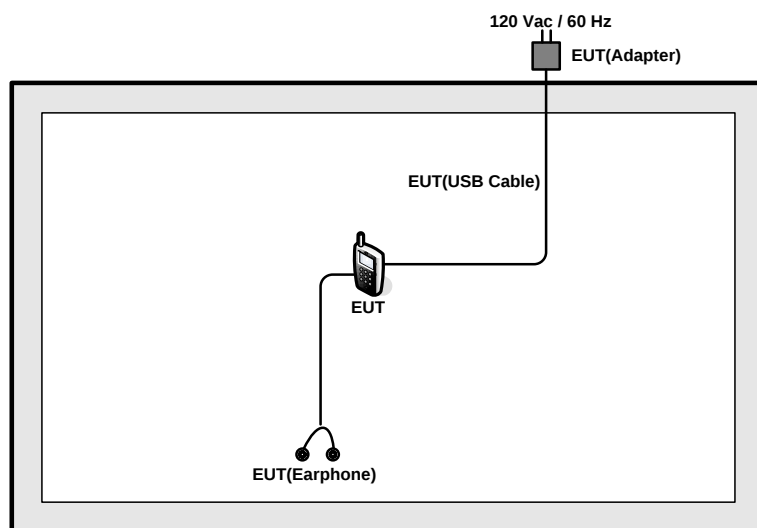
Test Cases	
AC Conducted Emission	Mode 1: GSM850 Idle + Bluetooth Link + WLAN Link(2.4G) + Earphone + Battery 1 + USB Cable (Charging from Adapter)
Remark: For Radiated Test Cases, The tests were performed with Battery 1; And adapter, Earphone, Battery 2 and USB Cable only verified the worst case of Battery 1.	

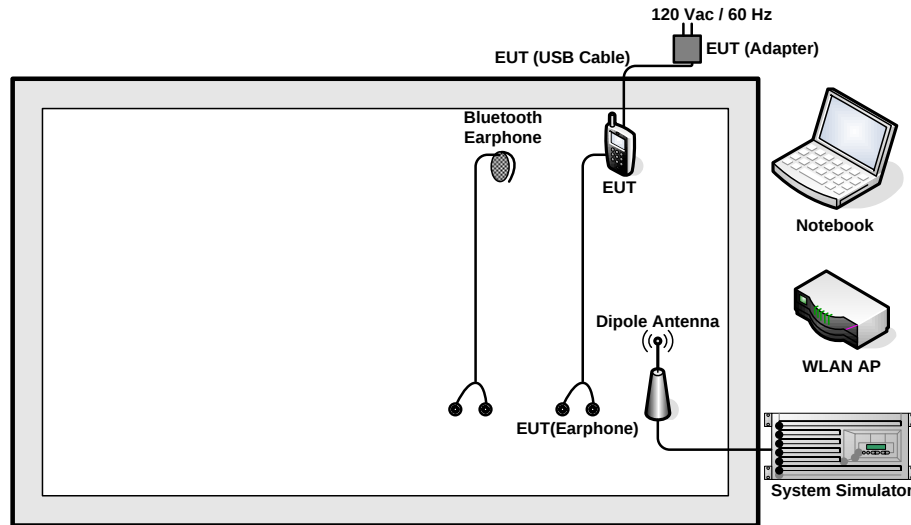
2.4 Connection Diagram of Test System

<WLAN Tx Mode: Battery 1>



<WLAN Tx Mode: Battery 2>



<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	Anritus	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	LINKSYS	WRT600N	Q87-WRT600NV11	N/A	Unshielded, 1.8 m
3.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-106	QTLBH-106	Unshielded, 0.5 m	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 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.

Offset = RF cable loss

Following shows an offset computation example with cable loss 5.5 dB.

$$\begin{aligned}\text{Offset (dB)} &= \text{RF cable loss(dB)}. \\ &= 5.5 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

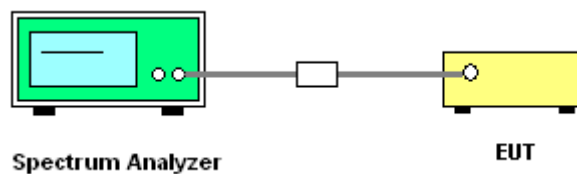
3.1.2 Measuring Instruments

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. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

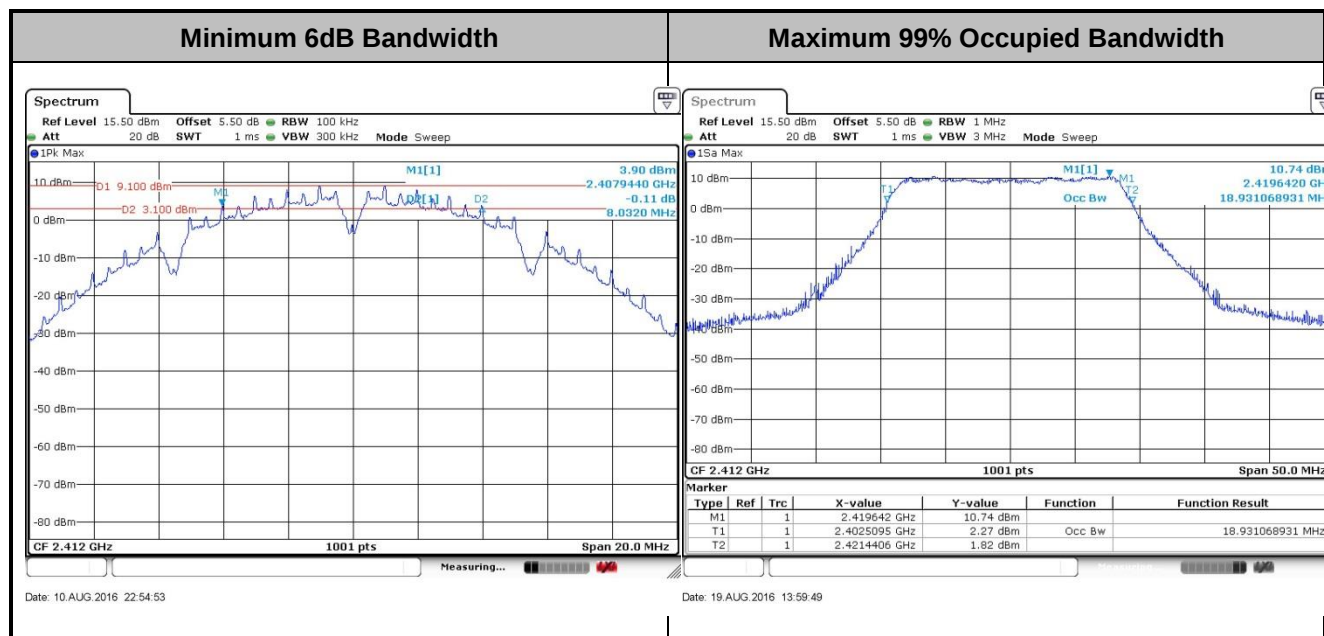
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A of this test report.



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.

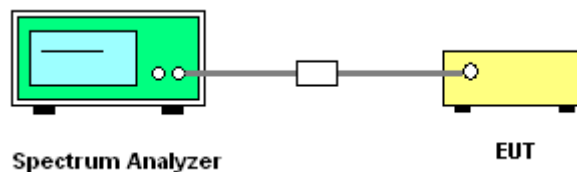
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

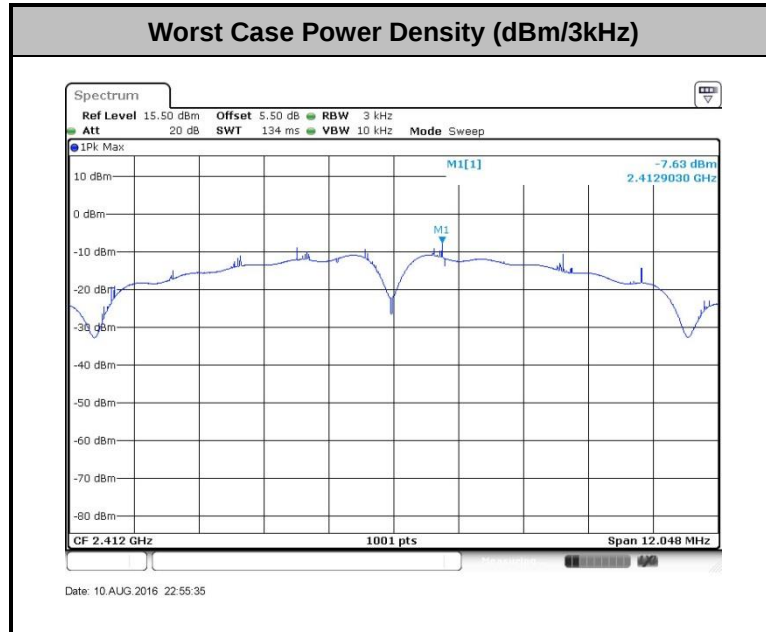
1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum 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.



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).

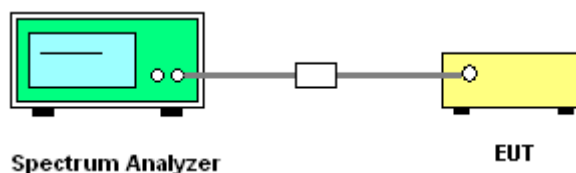
3.4.2 Measuring Instruments

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.

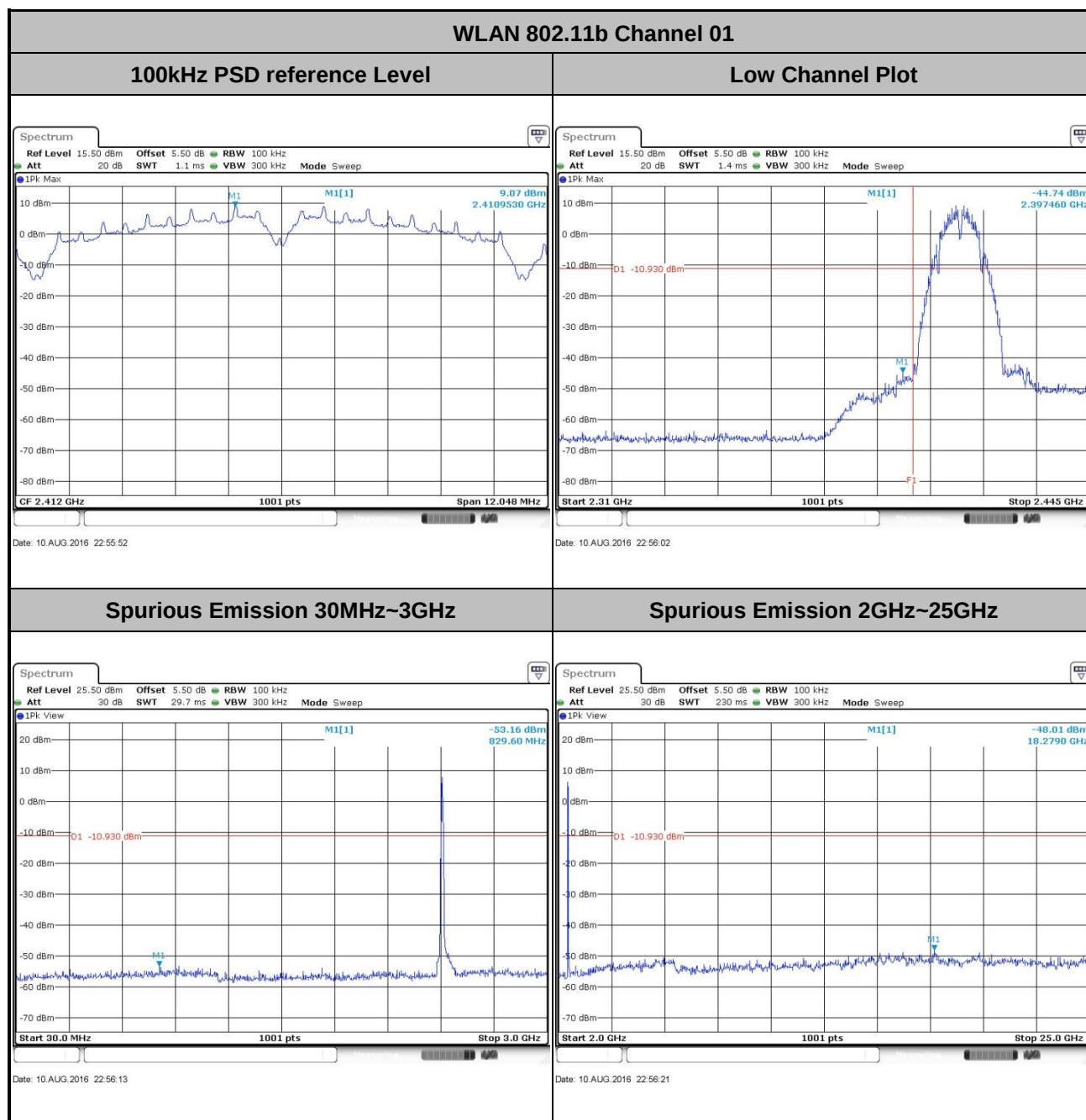
3.4.4 Test Setup





3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Mode :	802.11b	Temperature :	24~25℃
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Chen

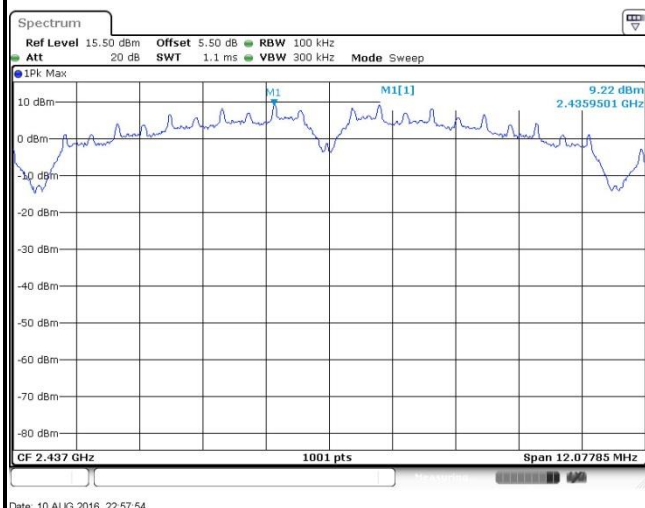




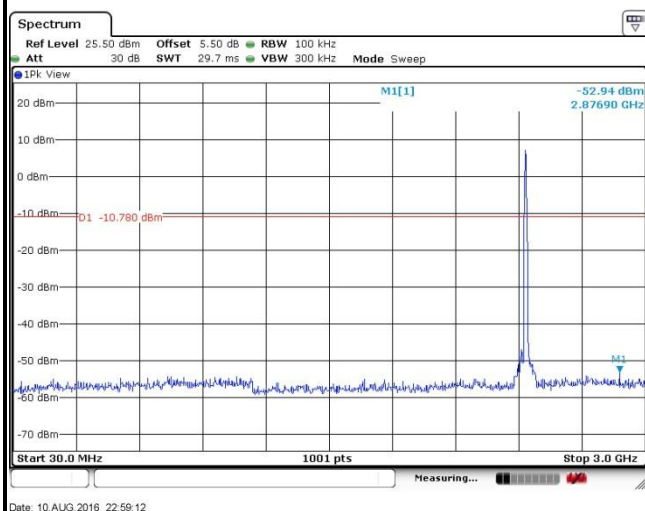
Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Chen

WLAN 802.11b Channel 06

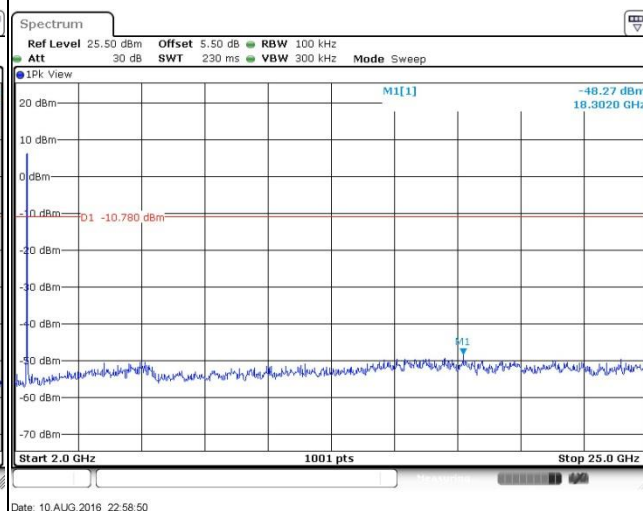
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

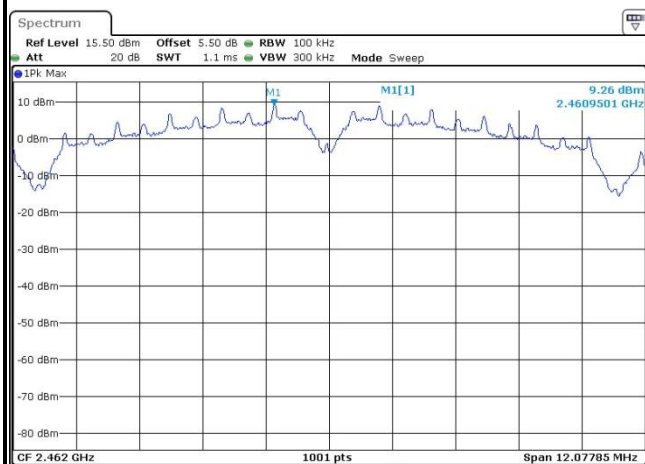




Test Mode :	802.11b	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Chen

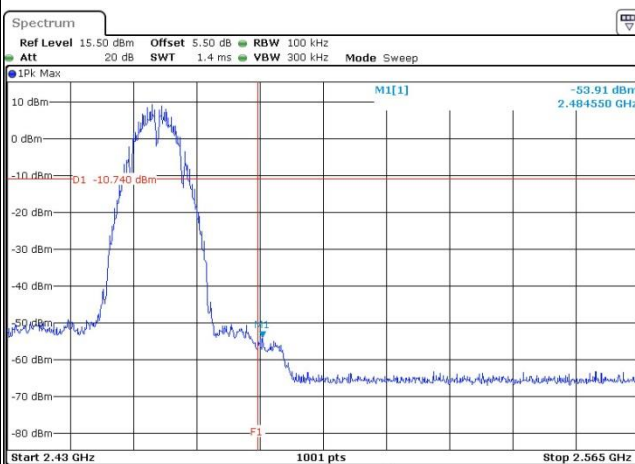
WLAN 802.11b Channel 11

100kHz PSD reference Level



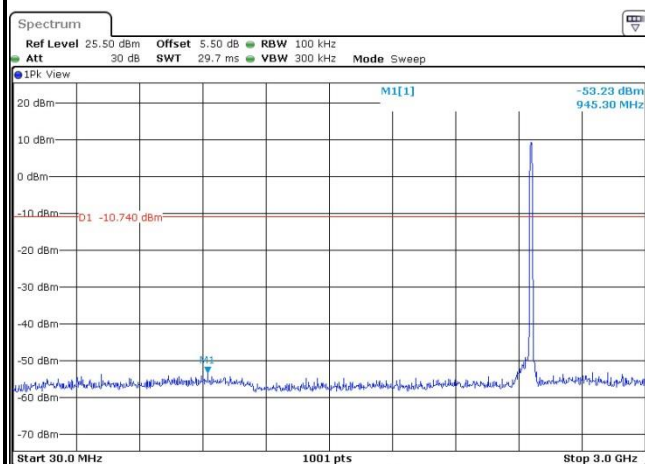
Date: 10.AUG.2016 23:01:15

High Channel Plot



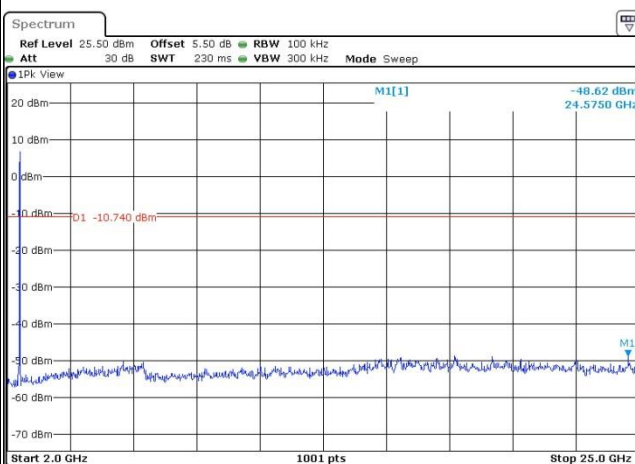
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Spurious Emission 30MHz~3GHz



Date: 10.AUG.2016 23:02:12

Spurious Emission 2GHz~25GHz



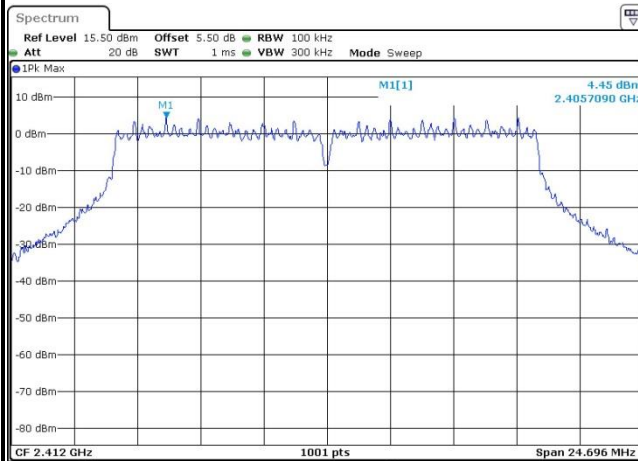
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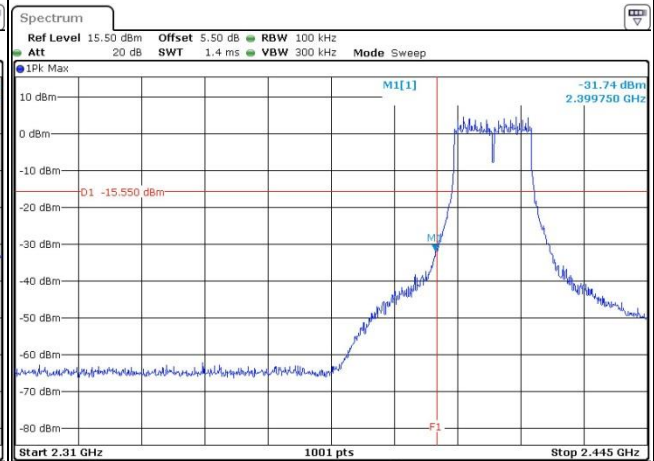
Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Chen

WLAN 802.11g Channel 01

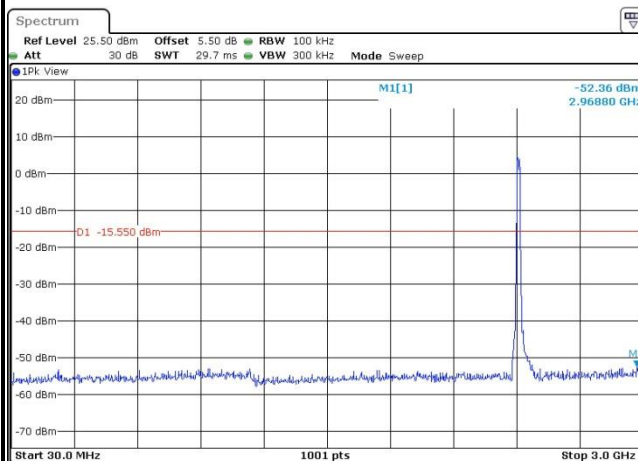
100kHz PSD reference Level



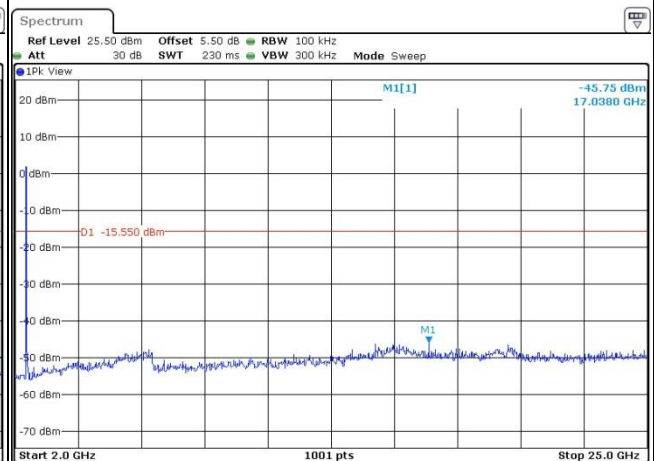
Low Channel Plot



Spurious Emission 30MHz~3GHz

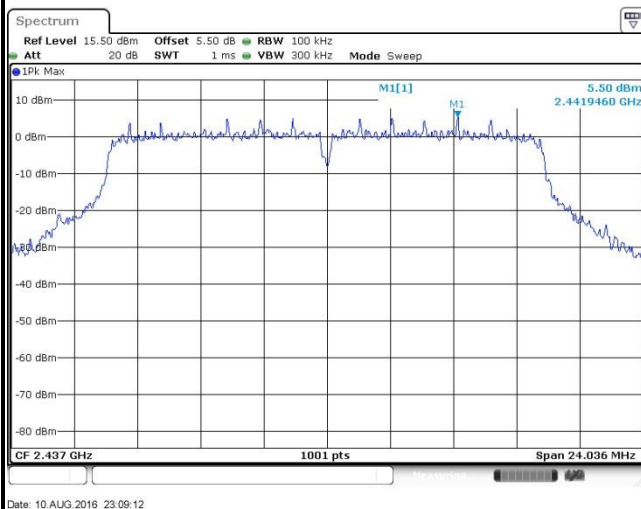
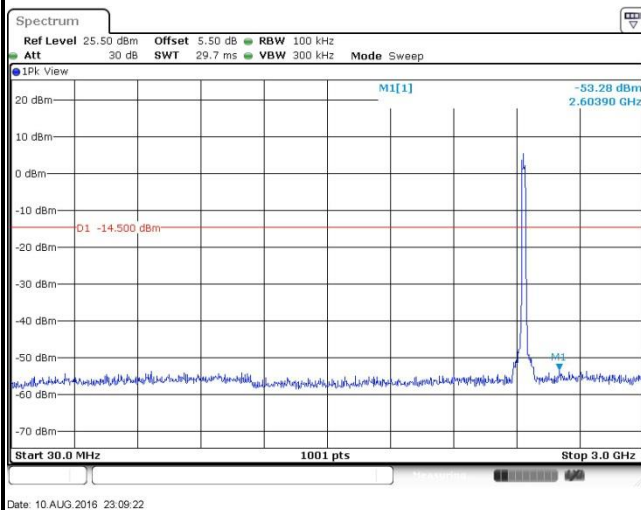
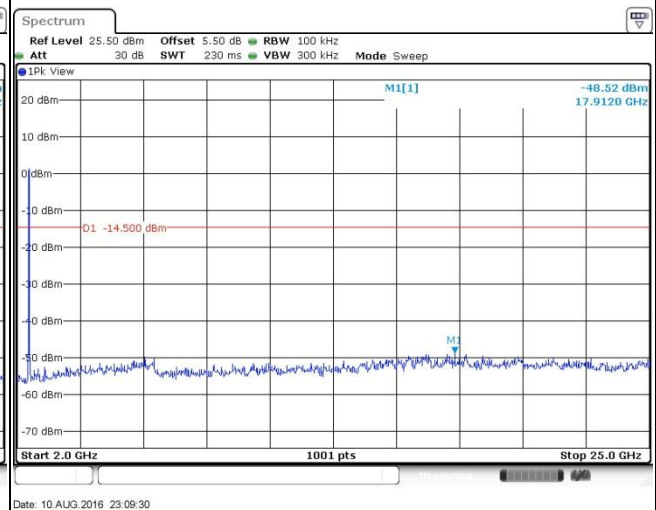


Spurious Emission 2GHz~25GHz





Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Chen

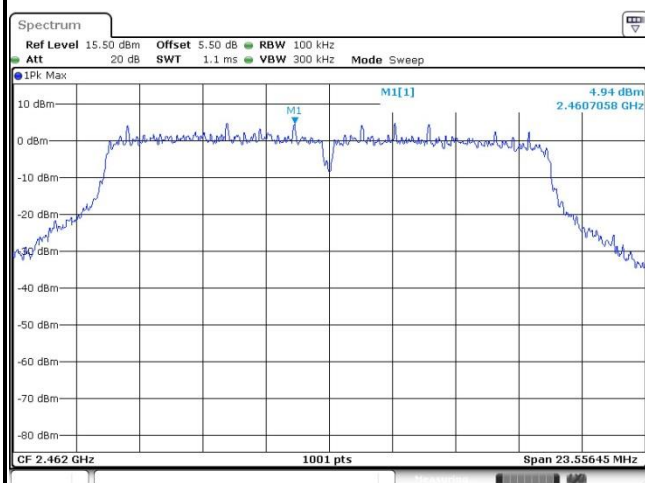
WLAN 802.11g Channel 06**100kHz PSD reference Level****Spurious Emission 30MHz~3GHz****Spurious Emission 2GHz~25GHz**



Test Mode :	802.11g	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Chen

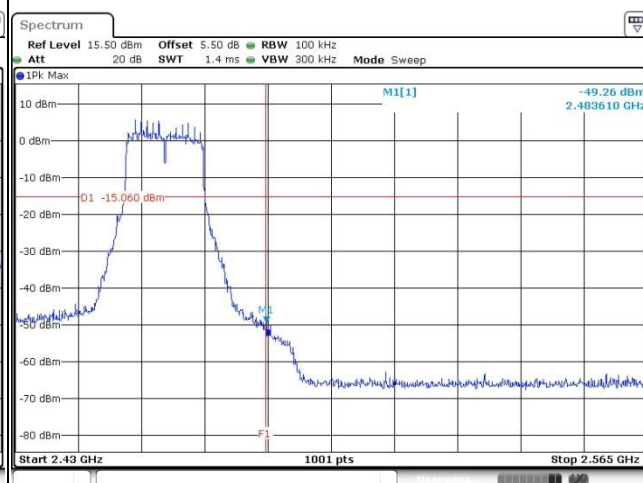
WLAN 802.11g Channel 11

100kHz PSD reference Level



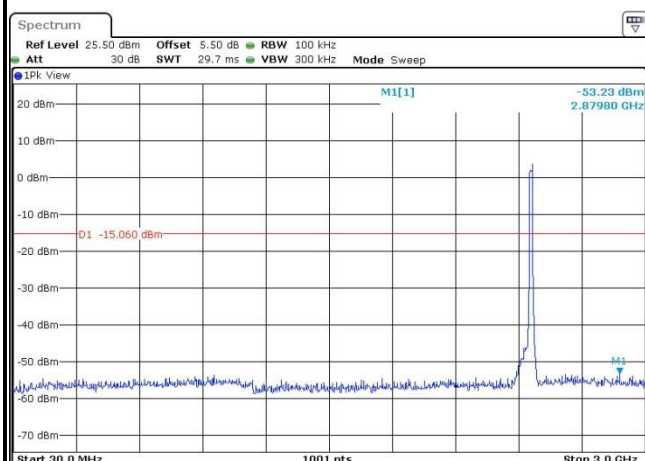
Date: 10.AUG.2016 23:10:57

High Channel Plot



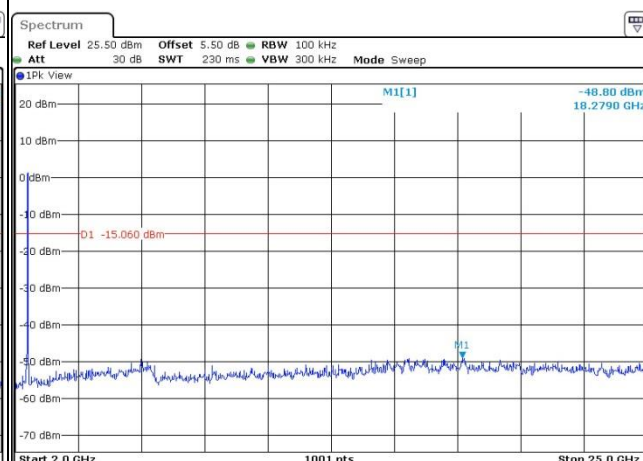
Date: 10.AUG.2016 23:11:06

Spurious Emission 30MHz~3GHz



Date: 10.AUG.2016 23:11:35

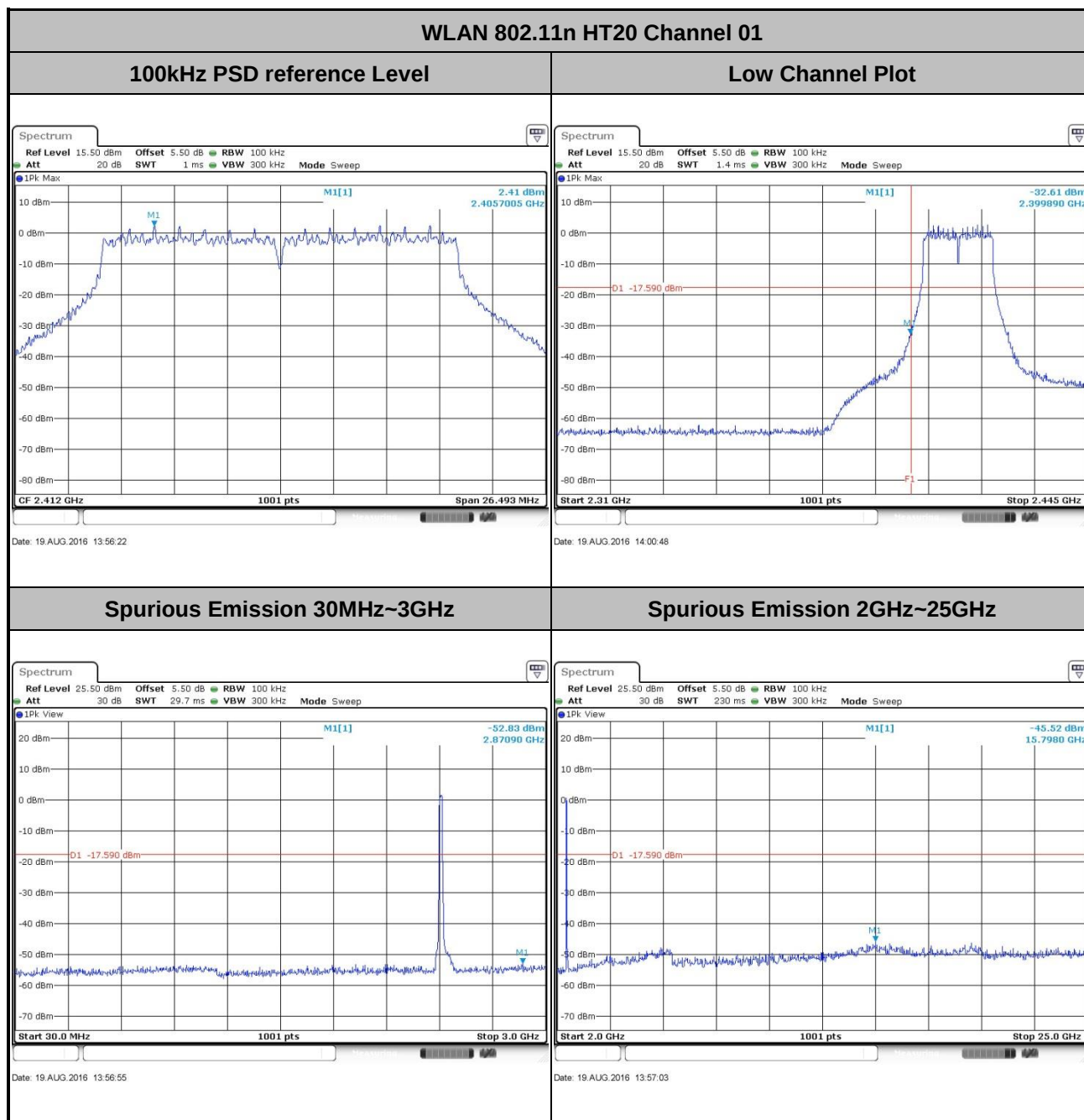
Spurious Emission 2GHz~25GHz



Date: 10.AUG.2016 23:11:44



Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Low	Relative Humidity :	54~55%
Test Channel :	01	Test Engineer :	Ivan Chen

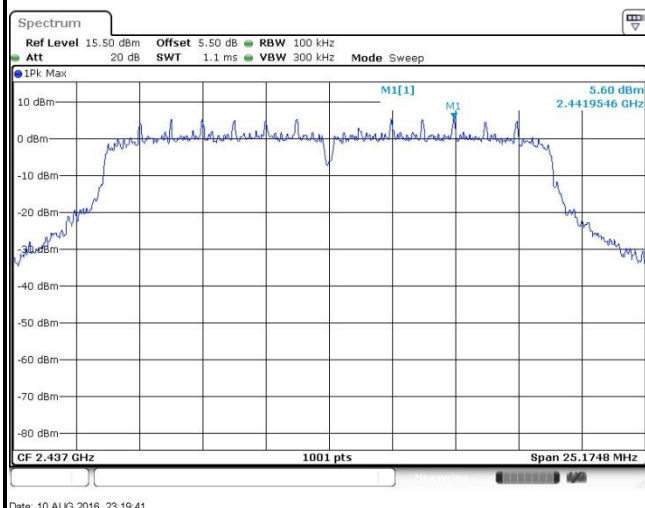




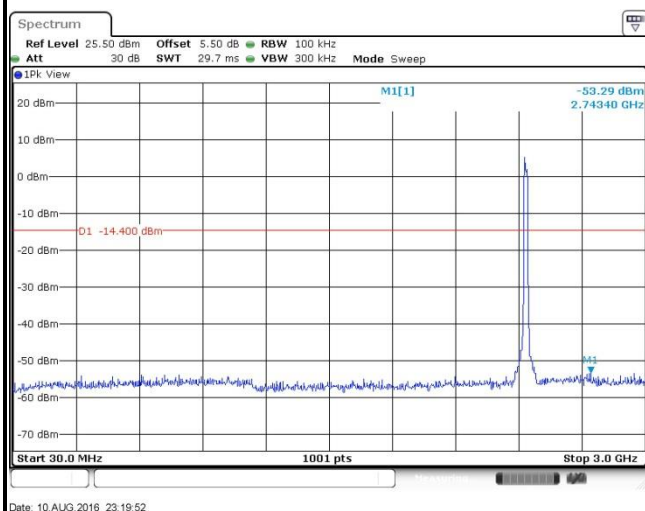
Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz Mid	Relative Humidity :	54~55%
Test Channel :	06	Test Engineer :	Ivan Chen

WLAN 802.11n HT20 Channel 06

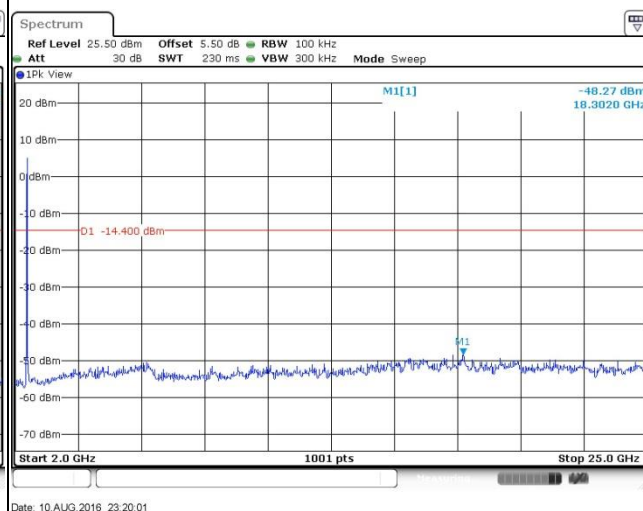
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

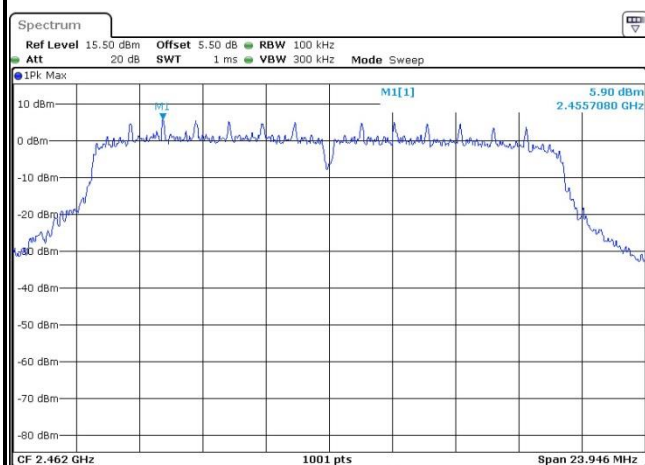




Test Mode :	802.11n HT20	Temperature :	24~25°C
Test Band :	2.4GHz High	Relative Humidity :	54~55%
Test Channel :	11	Test Engineer :	Ivan Chen

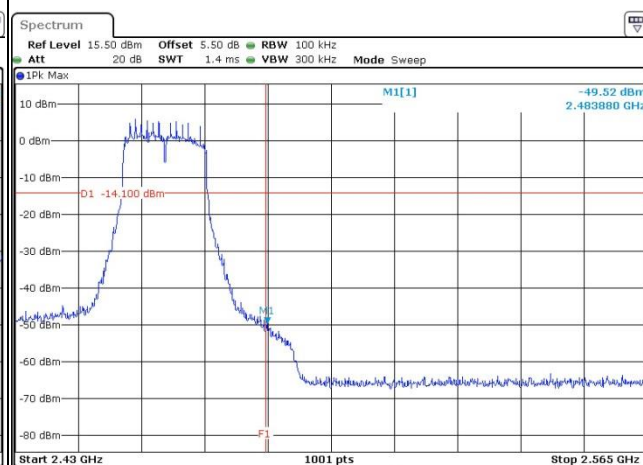
WLAN 802.11n HT20 Channel 11

100kHz PSD reference Level



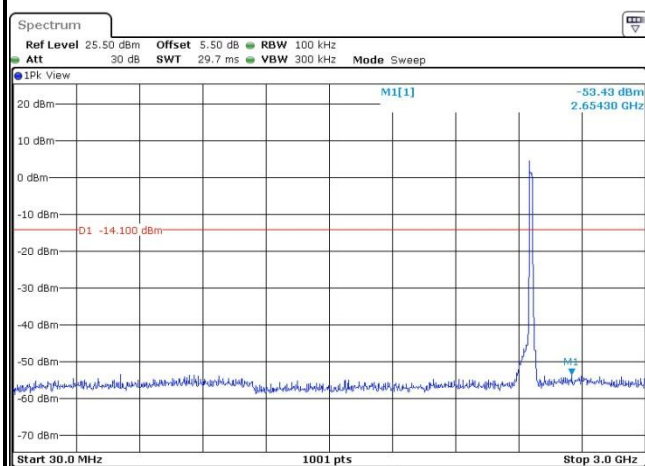
Date: 10.AUG.2016 23:22:13

High Channel Plot



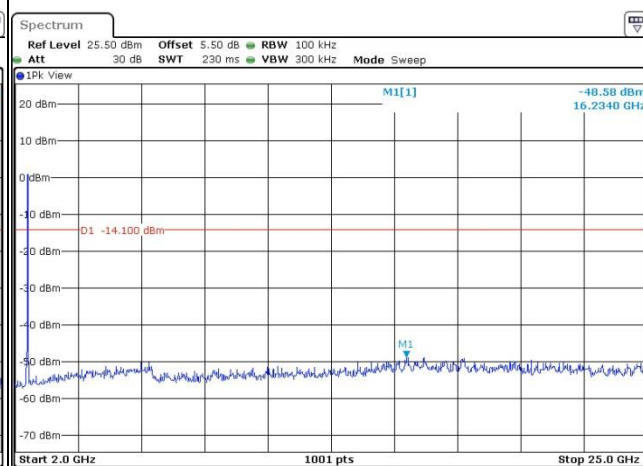
Date: 10.AUG.2016 23:23:29

Spurious Emission 30MHz~3GHz



Date: 10.AUG.2016 23:23:49

Spurious Emission 2GHz~25GHz



Date: 10.AUG.2016 23:23:58

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

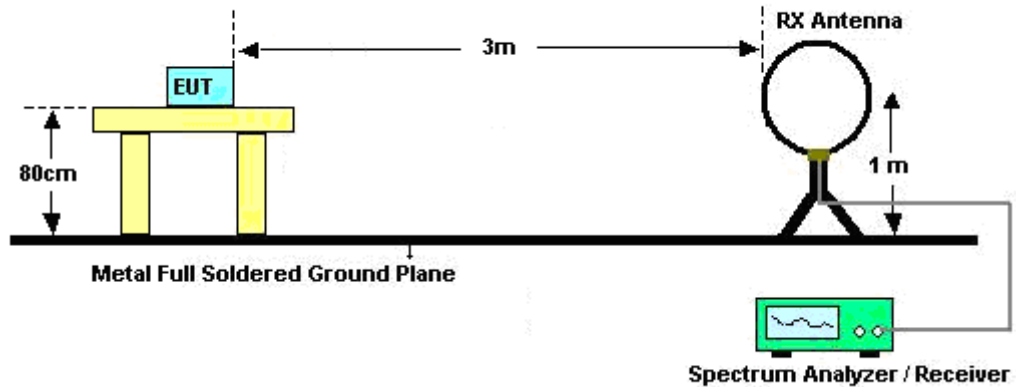
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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 $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

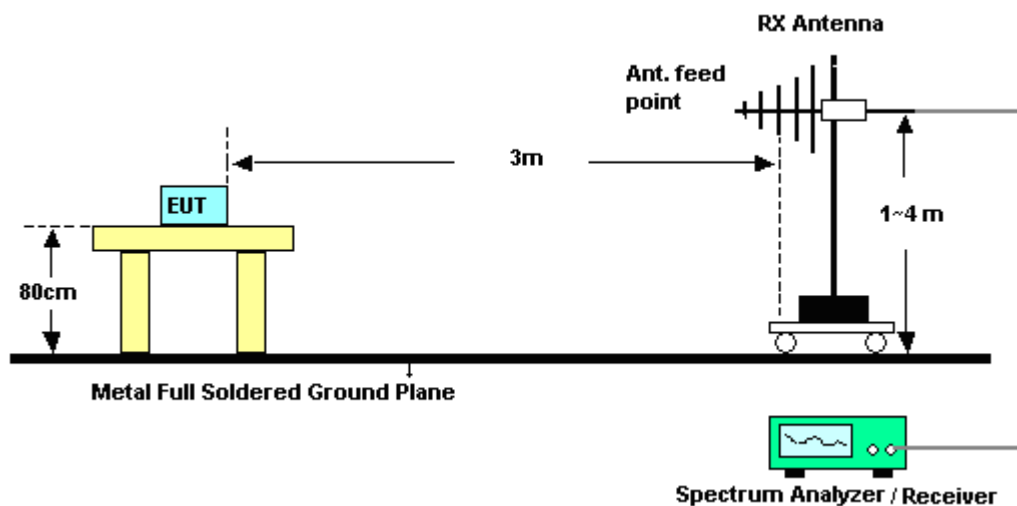
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

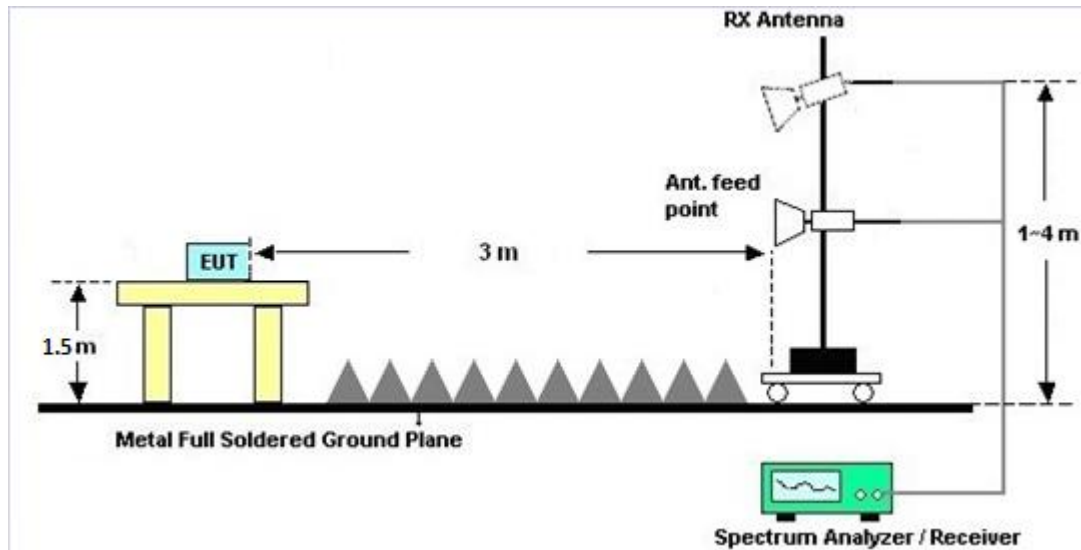
For radiated emissions below 30MHz



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 (dB μ V)	
	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.

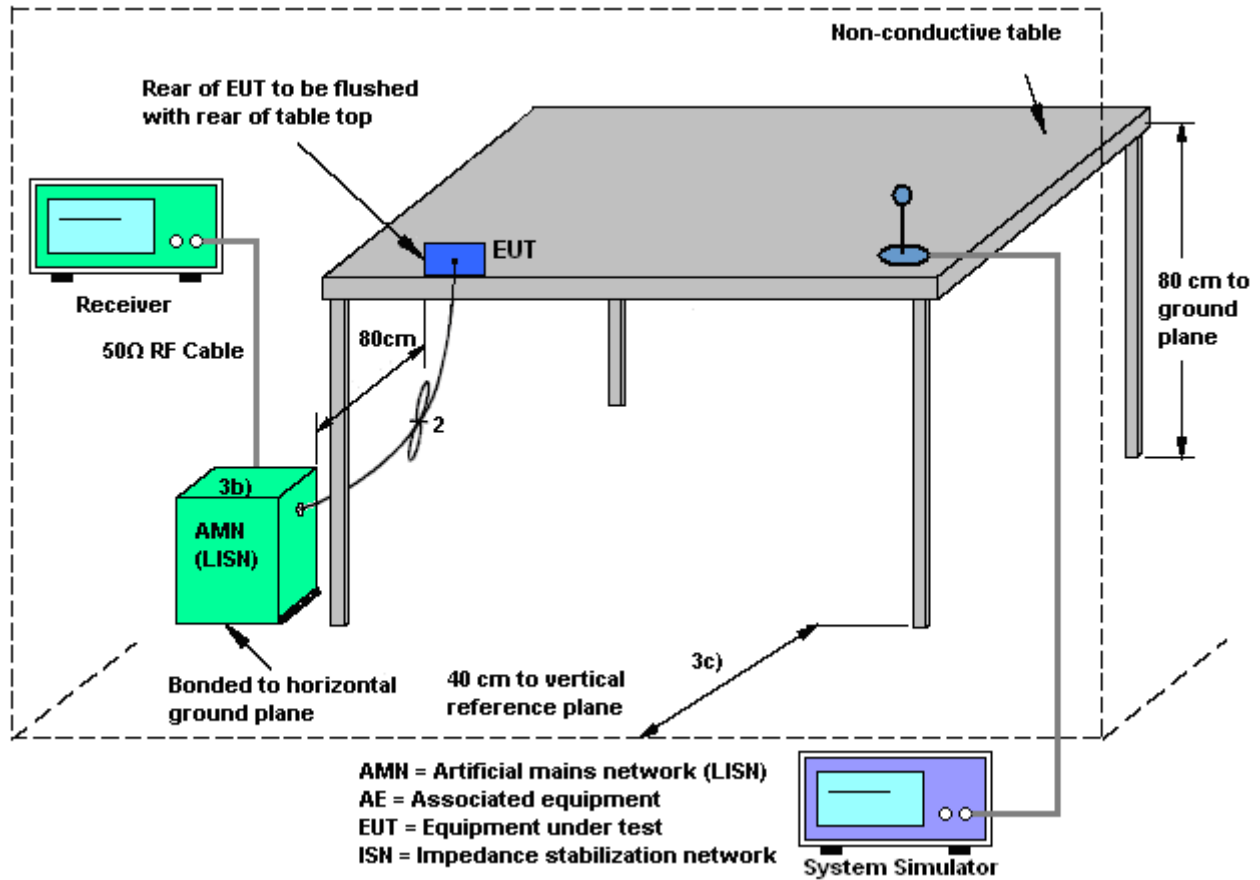
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

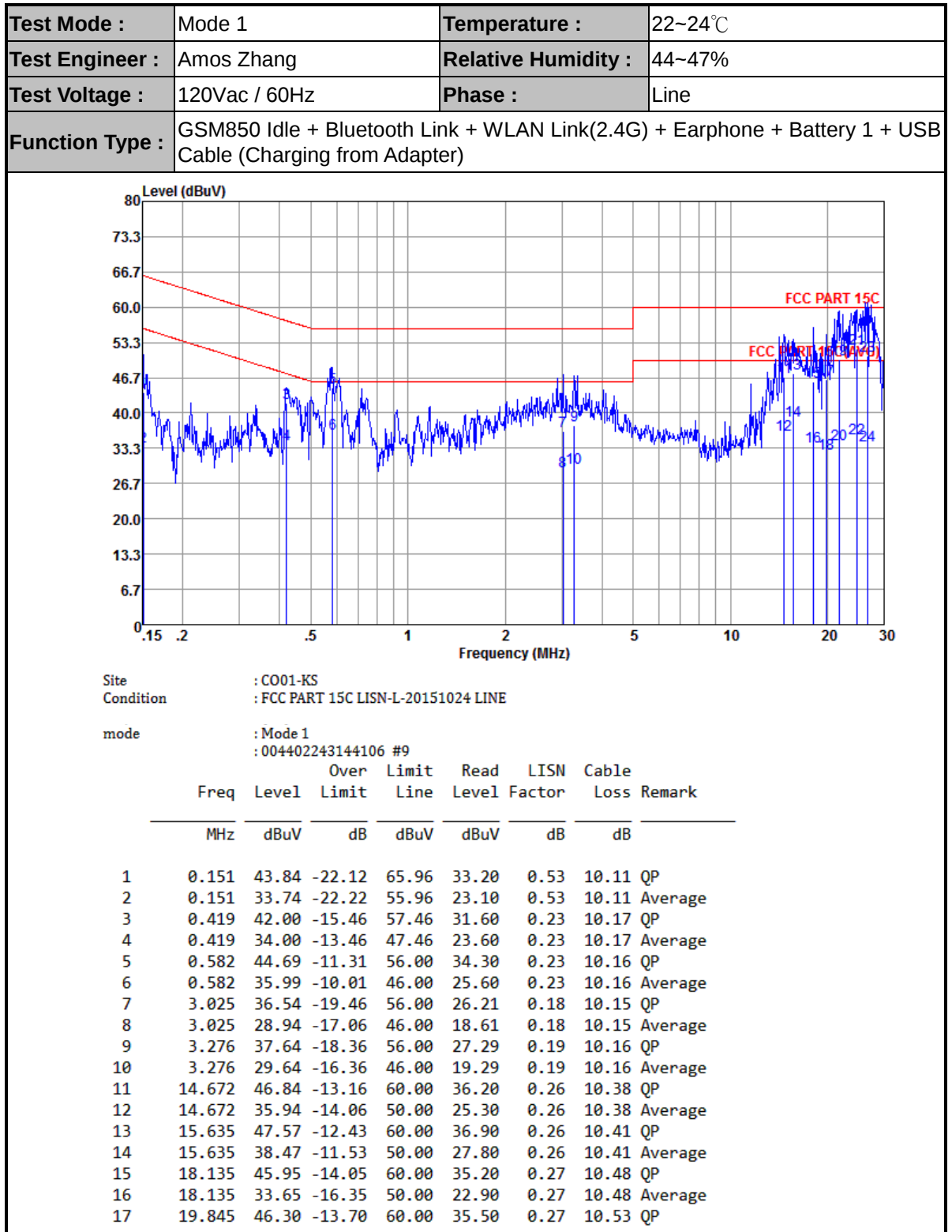
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other 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



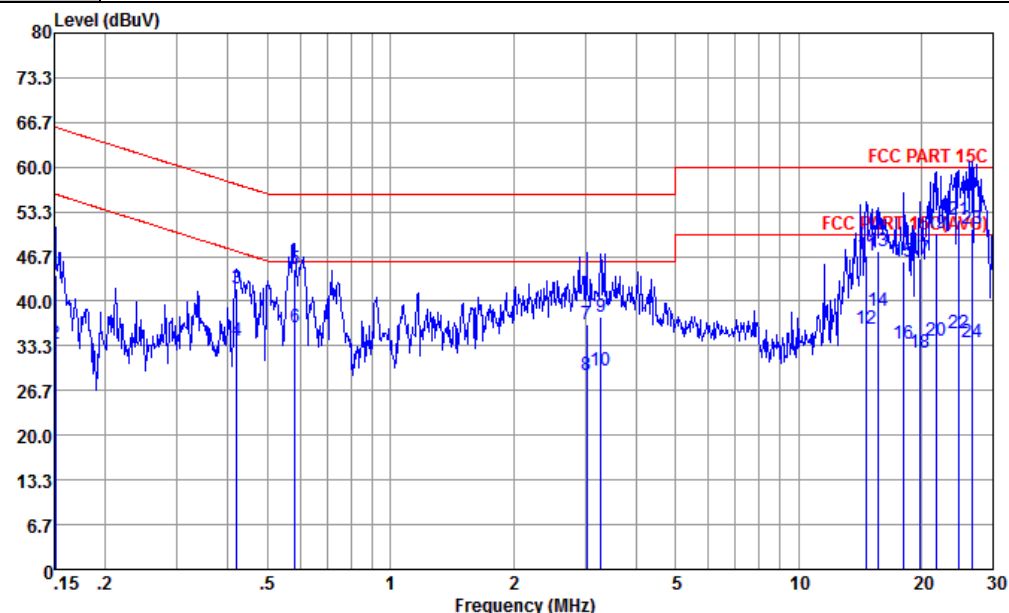


3.6.5 Test Result of AC Conducted Emission





Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link(2.4G) + Earphone + Battery 1 + USB Cable (Charging from Adapter)		



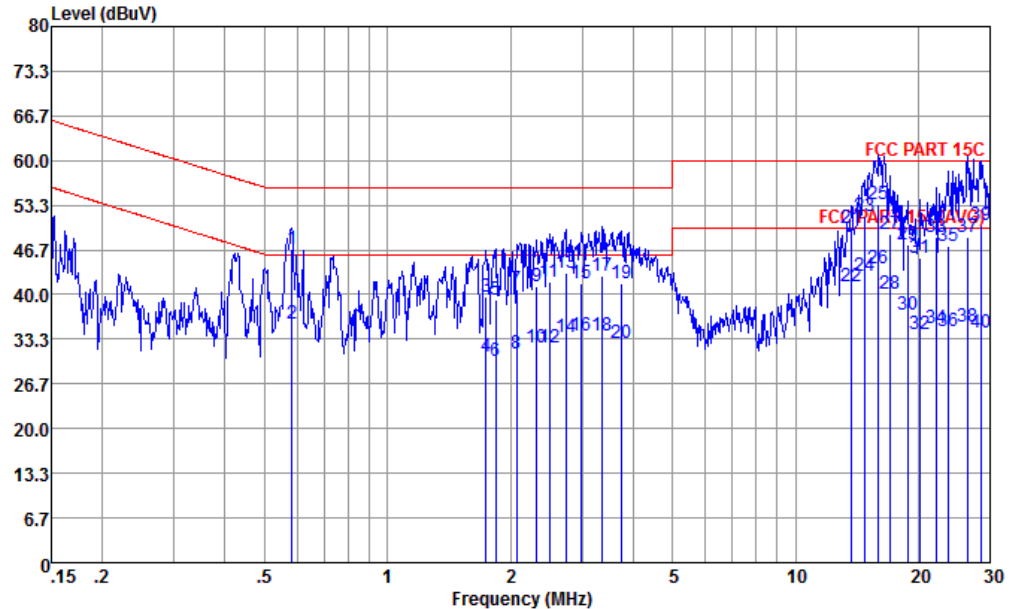
Site : CO01-KS
Condition : FCC PART 15C LISN-L-20151024 LINE

mode : Mode 1
: 004402243144106 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	19.845	32.40	-17.60	50.00	21.60	0.27	10.53	Average
19	21.830	50.04	-9.96	60.00	39.20	0.25	10.59	QP
20	21.830	34.04	-15.96	50.00	23.20	0.25	10.59	Average
21 *	24.659	52.10	-7.90	60.00	41.20	0.22	10.68	QP
22	24.659	35.10	-14.90	50.00	24.20	0.22	10.68	Average
23	26.558	50.87	-9.13	60.00	39.91	0.22	10.74	QP
24	26.558	33.87	-16.13	50.00	22.91	0.22	10.74	Average



Test Mode :	Mode 1	Temperature :	22~24°C
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link(2.4G) + Earphone + Battery 1 + USB Cable (Charging from Adapter)		



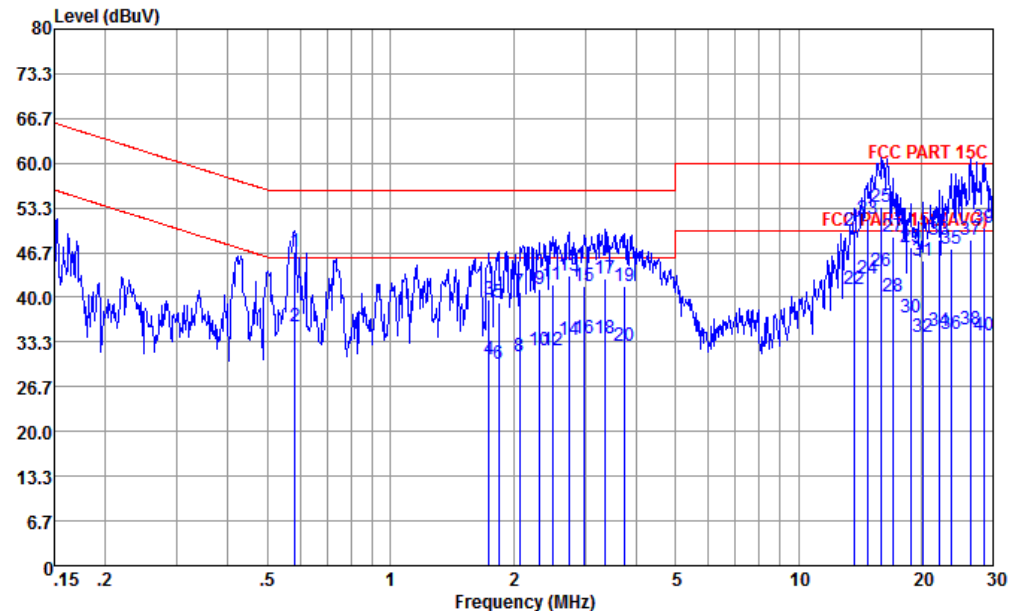
Site : CO01-KS
Condition : FCC PART 15C LISN-N-20151024 NEUTRAL

mode : Mode 1
: 004402243144106 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.582	46.69	-9.31	56.00	36.20	0.33	10.16	QP
2	0.582	35.59	-10.41	46.00	25.10	0.33	10.16	Average
3	1.744	39.72	-16.28	56.00	29.20	0.38	10.14	QP
4	1.744	30.82	-15.18	46.00	20.30	0.38	10.14	Average
5	1.839	39.32	-16.68	56.00	28.80	0.38	10.14	QP
6	1.839	30.12	-15.88	46.00	19.60	0.38	10.14	Average
7	2.077	40.72	-15.28	56.00	30.20	0.38	10.14	QP
8	2.077	31.12	-14.88	46.00	20.60	0.38	10.14	Average
9	2.321	41.12	-14.88	56.00	30.59	0.38	10.15	QP
10	2.321	32.12	-13.88	46.00	21.59	0.38	10.15	Average
11	2.500	41.82	-14.18	56.00	31.29	0.38	10.15	QP
12	2.500	32.12	-13.88	46.00	21.59	0.38	10.15	Average
13	2.736	43.12	-12.88	56.00	32.60	0.37	10.15	QP
14	2.736	33.72	-12.28	46.00	23.20	0.37	10.15	Average
15	2.978	41.63	-14.37	56.00	31.11	0.37	10.15	QP
16	2.978	33.83	-12.17	46.00	23.31	0.37	10.15	Average
17	3.364	42.73	-13.27	56.00	32.20	0.37	10.16	QP



Test Mode :	Mode 1	Temperature :	22~24℃
Test Engineer :	Amos Zhang	Relative Humidity :	44~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link(2.4G) + Earphone + Battery 1 + USB Cable (Charging from Adapter)		



Site : CO01-KS
Condition : FCC PART 15C LISN-N-20151024 NEUTRAL

mode : Mode 1
: 004402243144106 #9

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
18	3.364	33.83	-12.17	46.00	23.30	0.37	10.16	Average
19	3.759	41.63	-14.37	56.00	31.10	0.37	10.16	QP
20	3.759	32.83	-13.17	46.00	22.30	0.37	10.16	Average
21	13.695	49.93	-10.07	60.00	39.30	0.27	10.36	QP
22	13.695	41.23	-8.77	50.00	30.60	0.27	10.36	Average
23	14.750	51.75	-8.25	60.00	41.10	0.27	10.38	QP
24	14.750	42.85	-7.15	50.00	32.20	0.27	10.38	Average
25	15.970	53.58	-6.42	60.00	42.89	0.27	10.42	QP
26 *	15.970	43.98	-6.02	50.00	33.29	0.27	10.42	Average
27	17.018	49.01	-10.99	60.00	38.30	0.26	10.45	QP
28	17.018	40.21	-9.79	50.00	29.50	0.26	10.45	Average
29	18.820	47.35	-12.65	60.00	36.60	0.25	10.50	QP
30	18.820	36.95	-13.05	50.00	26.20	0.25	10.50	Average
31	20.270	45.39	-14.61	60.00	34.60	0.25	10.54	QP
32	20.270	34.09	-15.91	50.00	23.30	0.25	10.54	Average
33	22.180	48.65	-11.35	60.00	37.80	0.25	10.60	QP
34	22.180	34.95	-15.05	50.00	24.10	0.25	10.60	Average
35	23.636	47.19	-12.81	60.00	36.30	0.24	10.65	QP
36	23.636	34.49	-15.51	50.00	23.60	0.24	10.65	Average
37	26.418	48.58	-11.42	60.00	37.60	0.24	10.74	QP
38	26.418	35.18	-14.82	50.00	24.20	0.24	10.74	Average
39	28.603	50.26	-9.74	60.00	39.20	0.24	10.82	QP
40	28.603	34.36	-15.64	50.00	23.30	0.24	10.82	Average

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	101040	10Hz~40GHz	Sep. 10, 2015	Aug. 08, 2016~ Aug. 19, 2016	Sep. 09, 2016	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 20, 2016	Aug. 08, 2016~ Aug. 19, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 20, 2016	Aug. 08, 2016~ Aug. 19, 2016	Jan. 19, 2017	Conducted (TH01-KS)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Aug. 08, 2016~ Aug. 15, 2016	Sep. 01, 2016	Radiation (03CH07-HY)
Bilog Antenna	TESEQ	CBL 6111D	35419	30MHz to 1GHz	Jan. 13, 2016	Aug. 08, 2016~ Aug. 15, 2016	Jan. 12, 2017	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 21, 2015	Aug. 08, 2016~ Aug. 15, 2016	Aug. 20, 2016	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 02, 2015	Aug. 08, 2016~ Aug. 15, 2016	Nov. 01, 2016	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz-1GHz	Mar. 18, 2016	Aug. 08, 2016~ Aug. 15, 2016	Mar. 17, 2017	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz ~ 18GHz	Apr. 15, 2016	Aug. 08, 2016~ Aug. 15, 2016	Apr. 14, 2017	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Oct. 19, 2015	Aug. 08, 2016~ Aug. 15, 2016	Oct. 18, 2016	Radiation (03CH07-HY)
Preamplifier	MITEQ	JS44-180040 00-33-8P	1840917	18GHz ~ 40GHz	Jun. 14, 2016	Aug. 08, 2016~ Aug. 15, 2016	Jun. 13, 2017	Radiation (03CH07-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20Hz ~ 8.4GHz	Nov. 04, 2015	Aug. 08, 2016~ Aug. 15, 2016	Nov. 03, 2016	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Feb. 27, 2016	Aug. 08, 2016~ Aug. 15, 2016	Feb. 26, 2017	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF780208368	Control Ant Mast	NCR	Aug. 08, 2016~ Aug. 15, 2016	NCR	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	NCR	Aug. 08, 2016~ Aug. 15, 2016	NCR	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	NCR	Aug. 08, 2016~ Aug. 15, 2016	NCR	Radiation (03CH07-HY)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Sep. 10, 2015	Aug. 17, 2016	Sep. 09, 2016	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 24, 2015	Aug. 17, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Oct. 24, 2015	Aug. 17, 2016	Oct. 23, 2016	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 24, 2015	Aug. 17, 2016	Oct. 23, 2016	Conduction (CO01-KS)

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% ($U = 2Uc(y)$)	5.7dB
--	-------

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.5dB
--	-------

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2dB
--	-------



Appendix A. Conducted Test Results

A1 - DTS Part

Test Engineer:	Ivan Chen	Temperature:	24~25	°C
Test Date:	2016/8/8 ~ 2016/8/19	Relative Humidity:	54~55	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	99% Occupied BW (MHz)	6dB BW (MHz)	6dB BW Limit (MHz)	Pass/Fail
11b	11Mbps	1	1	2412	12.99	8.03	0.50	Pass
11b	11Mbps	1	6	2437	13.19	8.05	0.50	Pass
11b	11Mbps	1	11	2462	13.09	8.05	0.50	Pass
11g	24Mbps	1	1	2412	17.73	16.46	0.50	Pass
11g	24Mbps	1	6	2437	17.08	16.02	0.50	Pass
11g	24Mbps	1	11	2462	17.03	15.70	0.50	Pass
HT20	MCS6	1	1	2412	18.93	17.66	0.50	Pass
HT20	MCS6	1	6	2437	18.08	16.78	0.50	Pass
HT20	MCS6	1	11	2462	18.08	15.96	0.50	Pass

TEST RESULTS DATA
Peak Power Table

2.4GHz Band										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail
11b	11Mbps	1	1	2412	20.81	30.00	0.30	21.11	36.00	Pass
11b	11Mbps	1	6	2437	20.55	30.00	0.30	20.85	36.00	Pass
11b	11Mbps	1	11	2462	20.14	30.00	0.30	20.44	36.00	Pass
11g	24Mbps	1	1	2412	25.22	30.00	0.30	25.52	36.00	Pass
11g	24Mbps	1	6	2437	25.34	30.00	0.30	25.64	36.00	Pass
11g	24Mbps	1	11	2462	25.26	30.00	0.30	25.56	36.00	Pass
HT20	MCS6	1	1	2412	24.56	30.00	0.30	24.86	36.00	Pass
HT20	MCS6	1	6	2437	24.97	30.00	0.30	25.27	36.00	Pass
HT20	MCS6	1	11	2462	24.76	30.00	0.30	25.06	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	11Mbps	1	1	2412	0.32	17.93
11b	11Mbps	1	6	2437	0.32	17.78
11b	11Mbps	1	11	2462	0.32	17.35
11g	24Mbps	1	1	2412	0.80	15.51
11g	24Mbps	1	6	2437	0.80	16.85
11g	24Mbps	1	11	2462	0.80	16.62
HT20	MCS6	1	1	2412	1.56	13.79
HT20	MCS6	1	6	2437	1.56	15.42
HT20	MCS6	1	11	2462	1.56	15.09

TEST RESULTS DATA
Peak Power Density

2.4GHz Band								
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Peak PSD (dBm /3kHz)	DG (dBi)	Peak PSD Limit (dBm /3kHz)	Pass/Fail
11b	11Mbps	1	1	2412	-7.63	0.30	8.00	Pass
11b	11Mbps	1	6	2437	-9.65	0.30	8.00	Pass
11b	11Mbps	1	11	2462	-8.64	0.30	8.00	Pass
11g	24Mbps	1	1	2412	-10.55	0.30	8.00	Pass
11g	24Mbps	1	6	2437	-10.86	0.30	8.00	Pass
11g	24Mbps	1	11	2462	-10.35	0.30	8.00	Pass
HT20	MCS6	1	1	2412	-12.27	0.30	8.00	Pass
HT20	MCS6	1	6	2437	-11.20	0.30	8.00	Pass
HT20	MCS6	1	11	2462	-11.82	0.30	8.00	Pass



Appendix B. Radiated Spurious Emission

For Battery 1

2.4GHz 2400~2483.5MHz

WIFI 802.11b (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)
802.11b CH 01 2412MHz		2387.7	55.98	-18.02	74	51.08	31.93	7.31	34.34	290	123	P	H
		2389.695	47.04	-6.96	54	42.13	31.93	7.31	34.33	290	123	A	H
	*	2412	113.22	-	-	108.23	31.98	7.31	34.3	290	123	P	H
	*	2412	106.99	-	-	102	31.98	7.31	34.3	290	123	A	H
		2388.96	55.94	-18.06	74	51.03	31.93	7.31	34.33	300	223	P	V
		2390	46.58	-7.42	54	41.67	31.93	7.31	34.33	300	223	A	V
	*	2412	111.24	-	-	106.25	31.98	7.31	34.3	300	223	P	V
	*	2412	104.97	-	-	99.98	31.98	7.31	34.3	300	223	A	V
802.11b CH 06 2437MHz		2389.8	55.12	-18.88	74	50.21	31.93	7.31	34.33	273	123	P	H
		2389.94	46.57	-7.43	54	41.66	31.93	7.31	34.33	273	123	A	H
	*	2437	112.49	-	-	107.31	32.07	7.36	34.25	273	123	P	H
	*	2437	106.94	-	-	101.76	32.07	7.36	34.25	273	123	A	H
		2498.04	55.31	-18.69	74	49.86	32.2	7.4	34.15	273	123	P	H
		2483.83	45.89	-8.11	54	40.51	32.16	7.4	34.18	273	123	A	H
		2350.74	55.2	-18.8	74	50.56	31.8	7.24	34.4	300	263	P	V
		2389.24	45.47	-8.53	54	40.56	31.93	7.31	34.33	300	263	A	V
	*	2437	110.95	-	-	105.77	32.07	7.36	34.25	300	263	P	V
	*	2437	104.78	-	-	99.6	32.07	7.36	34.25	300	263	A	V
		2490.83	56.61	-17.39	74	51.18	32.2	7.4	34.17	300	263	P	V
		2487.89	45.82	-8.18	54	40.39	32.2	7.4	34.17	300	263	A	V



802.11b CH 11 2462MHz	*	2462	111.86	-	-	106.56	32.11	7.4	34.21	276	124	P	H
	*	2462	105.96	-	-	100.66	32.11	7.4	34.21	276	124	A	H
		2489.16	56.39	-17.61	74	50.96	32.2	7.4	34.17	276	124	P	H
		2487.44	46.58	-7.42	54	41.19	32.16	7.4	34.17	276	124	A	H
	*	2462	111.05	-	-	105.75	32.11	7.4	34.21	295	314	P	V
	*	2462	105.32	-	-	100.02	32.11	7.4	34.21	295	314	A	V
		2484.96	56.24	-17.76	74	50.85	32.16	7.4	34.17	295	314	P	V
		2483.52	46.08	-7.92	54	40.7	32.16	7.4	34.18	295	314	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	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		4824	42.14	-31.86	74	55.3	34.2	11.68	59.04	100	0	P	H
CH 01		4824	41.17	-32.83	74	54.33	34.2	11.68	59.04	100	0	P	V
2412MHz													
802.11b		4872	40.59	-33.41	74	53.77	34.23	11.53	58.94	100	0	P	H
CH 06		7308	41.24	-32.76	74	49.76	35.6	13.81	57.93	100	0	P	H
2437MHz		4872	40.81	-33.19	74	53.99	34.23	11.53	58.94	100	0	P	V
		7308	44.36	-29.64	74	52.88	35.6	13.81	57.93	100	0	P	V
802.11b		4924	40.82	-33.18	74	54.03	34.26	11.37	58.84	100	0	P	H
CH 11		7386	40.73	-33.27	74	49.24	35.6	13.95	58.06	100	0	P	H
2462MHz		4924	41.51	-32.49	74	54.72	34.26	11.37	58.84	100	0	P	V
		7386	43.66	-30.34	74	52.17	35.6	13.95	58.06	100	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	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)
802.11g CH 01 2412MHz		2389.38	65.59	-8.41	74	60.68	31.93	7.31	34.33	252	124	P	H
		2390	52.86	-1.14	54	47.95	31.93	7.31	34.33	252	124	A	H
	*	2412	109.59	-	-	104.6	31.98	7.31	34.3	252	124	P	H
	*	2412	102.36	-	-	97.37	31.98	7.31	34.3	252	124	A	H
		2390	61.75	-12.25	74	56.84	31.93	7.31	34.33	362	224	P	V
		2390	50.91	-3.09	54	46	31.93	7.31	34.33	362	224	A	V
	*	2412	109	-	-	104.01	31.98	7.31	34.3	362	224	P	V
	*	2412	100.93	-	-	95.94	31.98	7.31	34.3	362	224	A	V
802.11g CH 06 2437MHz		2389.66	60.93	-13.07	74	56.02	31.93	7.31	34.33	262	123	P	H
		2389.38	50.03	-3.97	54	45.12	31.93	7.31	34.33	262	123	A	H
	*	2437	110.54	-	-	105.36	32.07	7.36	34.25	262	123	P	H
	*	2437	102.64	-	-	97.46	32.07	7.36	34.25	262	123	A	H
		2483.55	61.08	-12.92	74	55.7	32.16	7.4	34.18	262	123	P	H
		2483.9	48.24	-5.76	54	42.86	32.16	7.4	34.18	262	123	A	H
		2389.24	58.11	-15.89	74	53.2	31.93	7.31	34.33	350	278	P	V
		2387.98	47.78	-6.22	54	42.88	31.93	7.31	34.34	350	278	A	V
	*	2437	110.67	-	-	105.49	32.07	7.36	34.25	350	278	P	V
	*	2437	101.85	-	-	96.67	32.07	7.36	34.25	350	278	A	V
		2483.62	58.91	-15.09	74	53.53	32.16	7.4	34.18	350	278	P	V
		2484.39	46.45	-7.55	54	41.07	32.16	7.4	34.18	350	278	A	V



802.11g CH 11 2462MHz	*	2462	110.64	-	-	105.34	32.11	7.4	34.21	275	123	P	H
	*	2462	102.57	-	-	97.27	32.11	7.4	34.21	275	123	A	H
		2483.52	64.98	-9.02	74	59.6	32.16	7.4	34.18	275	123	P	H
		2483.88	53.43	-0.57	54	48.05	32.16	7.4	34.18	275	123	A	H
	*	2462	110.91	-	-	105.61	32.11	7.4	34.21	295	311	P	V
	*	2462	102.66	-	-	97.36	32.11	7.4	34.21	295	311	A	V
		2483.68	63.71	-10.29	74	58.33	32.16	7.4	34.18	295	311	P	V
		2483.56	51.87	-2.13	54	46.49	32.16	7.4	34.18	295	311	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	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)
802.11g CH 01 2412MHz		4824	40.75	-33.25	74	53.91	34.2	11.68	59.04	100	0	P	H
		4824	41.3	-32.7	74	54.46	34.2	11.68	59.04	100	0	P	V
802.11g CH 06 2437MHz		4874	40.46	-33.54	74	53.64	34.23	11.53	58.94	100	0	P	H
		7311	40.47	-33.53	74	48.99	35.6	13.81	57.93	100	0	P	H
		4874	40.04	-33.96	74	53.22	34.23	11.53	58.94	100	0	P	V
		7311	42.81	-31.19	74	51.33	35.6	13.81	57.93	100	0	P	V
802.11g CH 11 2462MHz		4924	40.32	-33.68	74	53.53	34.26	11.37	58.84	100	0	P	H
		7386	40.44	-33.56	74	48.95	35.6	13.95	58.06	100	0	P	H
		4924	40.98	-33.02	74	54.19	34.26	11.37	58.84	100	0	P	V
		7386	42.43	-31.57	74	50.94	35.6	13.95	58.06	100	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	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)
802.11n HT20 CH 01 2412MHz		2388.855	63.21	-10.79	74	58.3	31.93	7.31	34.33	254	123	P	H
		2389.905	53.69	-0.31	54	48.78	31.93	7.31	34.33	254	123	A	H
	*	2412	108.67	-	-	103.68	31.98	7.31	34.3	254	123	P	H
	*	2412	101.79	-	-	96.8	31.98	7.31	34.3	254	123	A	H
		2389.065	63.21	-10.79	74	58.3	31.93	7.31	34.33	290	223	P	V
		2389.38	53.27	-0.73	54	48.36	31.93	7.31	34.33	290	223	A	V
	*	2412	107.45	-	-	102.46	31.98	7.31	34.3	290	223	P	V
	*	2412	100.8	-	-	95.81	31.98	7.31	34.3	290	223	A	V
802.11n HT20 CH 06 2437MHz		2388.4	55.48	-18.52	74	50.58	31.93	7.31	34.34	269	124	P	H
		2386.58	49	-5	54	44.1	31.93	7.31	34.34	269	124	A	H
	*	2437	108.06	-	-	102.88	32.07	7.36	34.25	269	124	P	H
	*	2437	101.71	-	-	96.53	32.07	7.36	34.25	269	124	A	H
		2489.36	55.72	-18.28	74	50.29	32.2	7.4	34.17	269	124	P	H
		2484.95	48.44	-5.56	54	43.05	32.16	7.4	34.17	269	124	A	H
		2386.16	55.1	-18.9	74	50.2	31.93	7.31	34.34	279	360	P	V
		2388.4	48.05	-5.95	54	43.15	31.93	7.31	34.34	279	360	A	V
	*	2437	107.92	-	-	102.74	32.07	7.36	34.25	279	360	P	V
	*	2437	100.25	-	-	95.07	32.07	7.36	34.25	279	360	A	V
		2484.25	55.87	-18.13	74	50.49	32.16	7.4	34.18	279	360	P	V
		2483.83	48.42	-5.58	54	43.04	32.16	7.4	34.18	279	360	A	V



802.11n HT20 CH 11 2462MHz	*	2462	108.34	-	-	103.04	32.11	7.4	34.21	274	124	P	H
	*	2462	101.49	-	-	96.19	32.11	7.4	34.21	274	124	A	H
		2484.52	61.59	-12.41	74	56.21	32.16	7.4	34.18	274	124	P	H
		2483.6	51.83	-2.17	54	46.45	32.16	7.4	34.18	274	124	A	H
	*	2462	107.77	-	-	102.47	32.11	7.4	34.21	290	310	P	V
	*	2462	101.32	-	-	96.02	32.11	7.4	34.21	290	310	A	V
		2484.64	58.21	-15.79	74	52.83	32.16	7.4	34.18	290	310	P	V
		2483.52	51	-3	54	45.62	32.16	7.4	34.18	290	310	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	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)
802.11n HT20 CH 01 2412MHz		4824	41.76	-32.24	74	54.92	34.2	11.68	59.04	100	0	P	H
		4824	41.25	-32.75	74	54.41	34.2	11.68	59.04	100	0	P	V
802.11n HT20 CH 06 2437MHz		4874	40.07	-33.93	74	53.25	34.23	11.53	58.94	100	0	P	H
		7311	40.65	-33.35	74	49.17	35.6	13.81	57.93	100	0	P	H
		4874	39.77	-34.23	74	52.95	34.23	11.53	58.94	100	0	P	V
		7311	41.2	-32.8	74	49.72	35.6	13.81	57.93	100	0	P	V
802.11n HT20 CH 11 2462MHz		4924	40.22	-33.78	74	53.43	34.26	11.37	58.84	100	0	P	H
		7386	40.02	-33.98	74	48.53	35.6	13.95	58.06	100	0	P	H
		4924	40	-34	74	53.21	34.26	11.37	58.84	100	0	P	V
		7386	40.89	-33.11	74	49.4	35.6	13.95	58.06	100	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 HT20 (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 HT20 LF		30	31.37	-8.63	40	35.65	26	1.07	31.35	100	19	P	H
		138.81	25.73	-17.77	43.5	37.65	18.03	1.55	31.5	-	-	P	H
		233.31	25.93	-20.07	46	37.75	17.52	2.07	31.41	-	-	P	H
		835.5	31.61	-14.39	46	29.67	28.41	4.1	30.57	-	-	P	H
		895	32.39	-13.61	46	29.79	28.97	4.17	30.54	-	-	P	H
		926.5	33.46	-12.54	46	30.23	29.64	4.12	30.53	-	-	P	H
		33.24	29.35	-10.65	40	35.29	24.38	1.07	31.39	100	78	P	V
		159.33	22.62	-20.88	43.5	35.27	17.07	1.78	31.5	-	-	P	V
		196.32	26.96	-16.54	43.5	40.77	15.8	1.87	31.48	-	-	P	V
		878.9	32.74	-13.26	46	30.25	28.87	4.17	30.55	-	-	P	V
		913.9	32.17	-13.83	46	29.26	29.33	4.12	30.54	-	-	P	V
		946.1	33.38	-12.62	46	29.73	30.11	4.07	30.53	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



For Battery 2

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		2389.275	63.92	-10.08	74	59.01	31.93	7.31	34.33	201	178	P	H
		2389.8	53.11	-0.89	54	48.2	31.93	7.31	34.33	201	178	A	H
	*	2412	107.09	-	-	102.1	31.98	7.31	34.3	201	178	P	H
	*	2412	99.23	-	-	94.24	31.98	7.31	34.3	201	178	A	H
		2389.38	62.77	-11.23	74	57.86	31.93	7.31	34.33	354	275	P	V
		2389.905	52.64	-1.36	54	47.73	31.93	7.31	34.33	354	275	A	V
	*	2412	106.86	-	-	101.87	31.98	7.31	34.3	354	275	P	V
	*	2412	99.43	-	-	94.44	31.98	7.31	34.3	354	275	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	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)
802.11n HT20		4824	40.75	-33.25	74	53.91	34.2	11.68	59.04	100	0	P	H
CH 01 2412MHz		4824	41.98	-32.02	74	55.14	34.2	11.68	59.04	100	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 HT20 (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 HT20 LF		30.27	31.93	-8.07	40	36.21	26	1.07	31.35	100	218	P	H
		123.15	25.09	-18.41	43.5	37.03	18.02	1.55	31.51	-	-	P	H
		139.35	26.87	-16.63	43.5	38.82	18	1.55	31.5	-	-	P	H
		909.7	32.7	-13.3	46	29.88	29.24	4.12	30.54	-	-	P	H
		937	33.04	-12.96	46	29.56	29.89	4.12	30.53	-	-	P	H
		953.1	33.59	-12.41	46	29.84	30.21	4.07	30.53	-	-	P	H
		30	30.66	-9.34	40	34.94	26	1.07	31.35	100	77	P	V
		195.51	28.06	-15.44	43.5	41.87	15.8	1.87	31.48	-	-	P	V
		209.82	26.42	-17.08	43.5	39.74	16.27	1.87	31.46	-	-	P	V
		909.7	32.29	-13.71	46	29.47	29.24	4.12	30.54	-	-	P	V
		929.3	33.05	-12.95	46	29.75	29.71	4.12	30.53	-	-	P	V
		944.7	34	-12	46	30.38	30.08	4.07	30.53	-	-	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 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		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01 2412MHz		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)

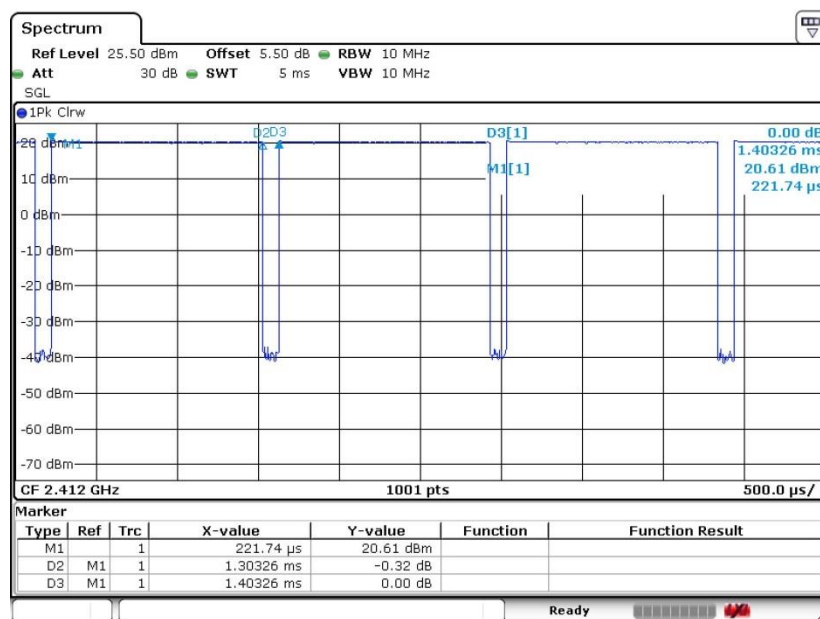
= -10.46(dB)

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	92.87	1.30	0.77	1kHz
802.11g	83.23	0.53	1.89	3kHz
2.4GHz 802.11n HT20	69.86	0.25	4.00	10kHz

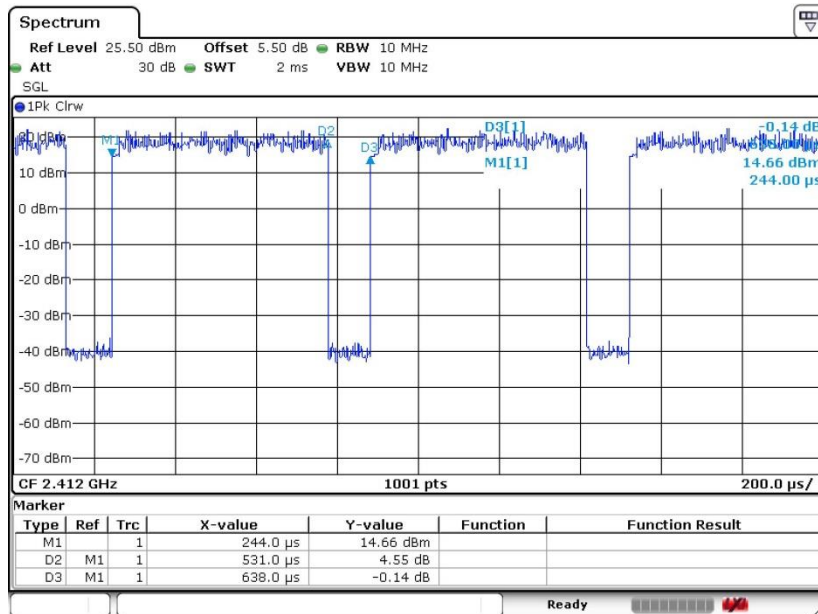
802.11b



Date: 8.AUG.2016 18:28:30

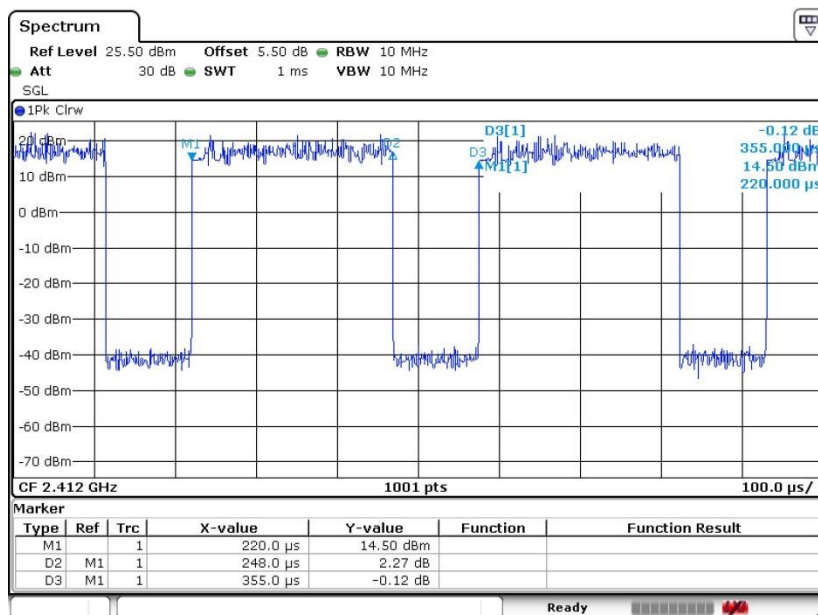


802.11g



Date: 8.AUG.2016 18:33:57

2.4GHz 802.11n HT20



Date: 8.AUG.2016 18:45:29