



FCC Test Report

Product Name: WLAN Mini-PCI Adapter

Model Number: MPC1-B4322L-AGN

Report No: SYBH(R)004122009EB-3
FCC ID: QISHSMPCIAGN01

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REPORT ON FCC 47CFR Part 15 subpart C Test of WLAN Mini-PCI Adapter
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REGULATION **FCC 47CFR Part 2: Subpart J**
FCC 47CFR Part 15: Subpart C

CONCLUSION **PASS**

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1 Summary

The table below summarizes the measurements and results for the WLAN Mini-PCI Adapter - MPCl-B4322L-AGN (EUT). Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	Description	Result
15.247(a)(2)	6dB bandwidth measurement	PASS
15.247(b)(3)	Conducted Peak output power	PASS
15.247(d)	Band edge compliance measurement	PASS
15.247(d)	Conducted RF spurious	PASS
15.247(e)	Power spectral density	PASS
15.247(d) / 15.205 & 15.209	Radiated spurious emission & Radiated restricted band measurement	PASS
15.207	Conducted emission test for power port	PASS

2 Product Description

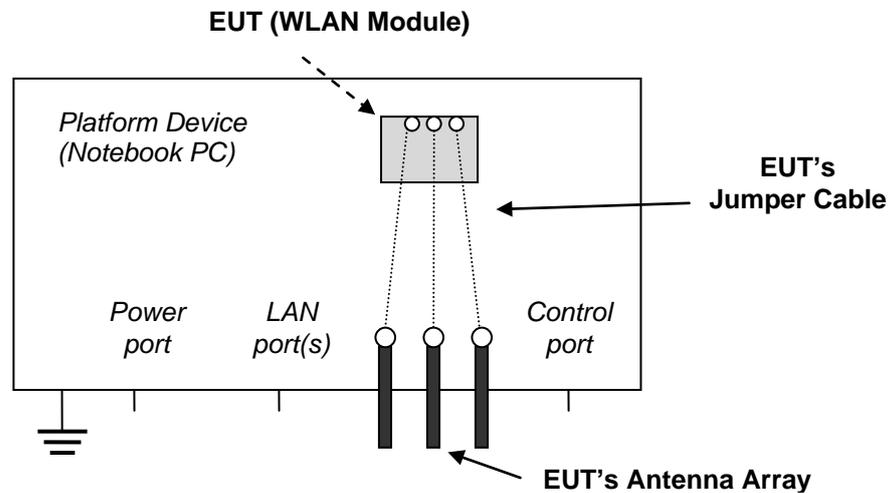
2.1 Production Information

2.1.1 General Description

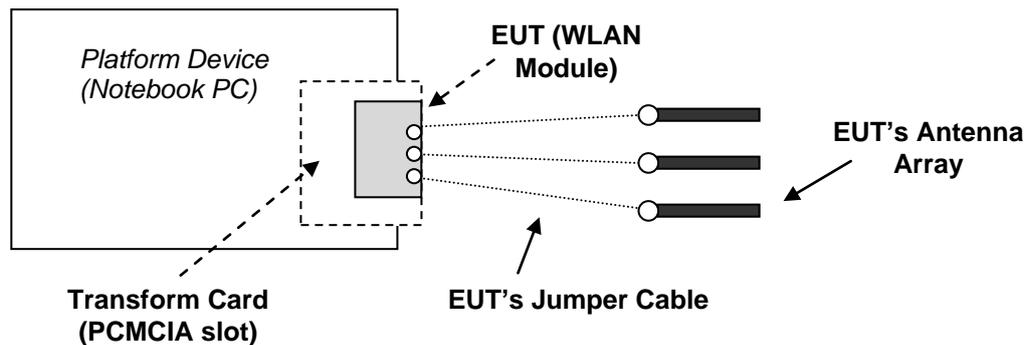
This model is compliant with mini PCI standard Adapter. The Broadcom 802.11b/g/n technique delivers up to 54Mbps (802.11b/g) or 300Mbps 11n data rate, the bandwidth support 20MHz and 40MHz for legacy WLAN standard and also fulfilled high throughput data rate requirement on 11n defined draft 2.0 specification, it is used 2sets of 2.4 Tx / Rx antenna's combinations, since the IEEE802.11g is CCK & OFDM modulation scheme and used CCK modulation to follow backward compatible with IEEE802.11b, up to 54Mbps on single 2.4GHz frequency band and also complies with IEEE802.11g standard on this dual band single chip client solution.

2.1.2 Special Notification

For Conducted Tests:



For Radiated Tests:





It should be noted that:

- (1) The EUT is a WLAN module (according to IEEE 802.11) card which can be installed within several types of Platform Devices of the applicant or of Notebook PC. The EUT is powered by and can interoperation with the Platform Device through the MINI-PCI slot. The Antenna(s) are connected to antenna port(s) of the EUT with Jumper Cable(s).
- (2) This report is ONLY applied to the EUT (WLAN module) excluding Antenna(s), Jumper Cable(s), Platform Devices and other units/devices. Dedicated Antenna(s) and Jumper Cable(s) are required and will be supplied by applicant when the whole device is put into service. For different Platform Devices, the length of Jumper Cables may be different, while the Antennas are unchanged. During tests and within this report, a typical Platform Device, the dedicated Antennas and typical Jumper cables (if applicable) are used.
- (3) The EUT (WLAN module) can be produced by different manufacturers, complying with the nominal identical functions and specifications. This report is based on one sample supplied by one manufacturer, more information can be get from testing lab.

2.1.3 Support function and Service

The EUT support the function and service as follows:

Table 2 Service and Test mode List

Service Name	mode	Characteristic	Note
Data	11b	IEEE 802.11b with data rate of 1 Mbps	/
Data	11g	IEEE 802.11g with data rate of 6 Mbps	/
Data	11n20	IEEE 802.11n with 20 MHz bandwidth and data rate of MCS-0, not using MIMO	/
Data	11n40	IEEE 802.11n with 40 MHz bandwidth and data rate of MCS-0, not using MIMO	/
Data	11n20-mimo	IEEE 802.11n with 20 MHz bandwidth and data rate of MCS-8, using MIMO	/
Data	11n40-mimo	IEEE 802.11n with 40 MHz bandwidth and data rate of MCS-8, using MIMO	/

2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information
Not applicable!				
Not applicable!				
Not applicable!				



3 Test Site Description

The test site of:

***Huawei Technologies Co. Ltd.
P.O. Box 518129
Huawei base, bantian,
Longgang District, Shenzhen, China***

3.1 Testing Period

The test have been performed during the period of

Oct. 16, 2009 to April 26, 2010



4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

Uplink band:	2400 to 2483.5 MHz
Downlink band:	2400 to 2483.5 MHz

4.1.2 Channel Separation/Bandwidth

Table 5 Frequency Interval and Channel Separation

Channel raster:	5 MHz
Channel spacing/bandwidth:	IEEE 802.11 b/g/n(20M):20MHz IEEE 802.11n(40M):40MHz

4.1.3 Output Power

Table 6 Output Power

Transmitter Output Power (per Antenna Port, Mean power):	802.11b:< 15.5 dBm 802.11g:< 13.0 dBm 802.11n:< 13.5 dBm (20 MHz bandwidth, no MIMO used), < 14.0 dBm (40 MHz bandwidth, no MIMO used), < 10.5 dBm (20 MHz bandwidth, MIMO used) < 11.0 dBm (40 MHz bandwidth, MIMO used)
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4.1.4 Type of Emission

Refer to FCC part 2.201 and 2.202.

Table 7 Type of Emission

Emission Designation:	---
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4.1.5 Antenna Information

Table 8 Antenna Information

Antenna Description:	External and Dedicated
Antenna Number:	3 (Ant 1, Ant 2 and Ant 3)
Antenna Type:	Omni directional



Antenna Frequency Range:	2.4GHz to 2.5GHz, 4.9GHz to 5.9GHz
Antenna Gain:	< 2 dBi
Jumper Cable Loss:	< 1 dB

4.1.6 Environmental Requirements

Table 9 Environmental Requirements

Minimum temperature:	0 °C
Maximum temperature:	40 °C
Relative Humidity:	10% to 90% RH

4.1.7 Power Source

Table 10 Power Source

Power Supply Type	Powered by Platform Device via MINI-PCI slot
Input to EUT (DC power)	DC Voltage Nominal:  3.3 V Rated Current: < 800 mA

Note: Several stages of voltage stabilization circuits are used in the Platform Device, which results in a constant voltage input to the EUT (WLAN module).

4.1.8 Tune-up Procedure

Refer to FCC 2.1033(c)(9).

Please reference the document Tune-up Procedure in TCF.

4.1.9 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8).

The voltage and current in the final RF stage is:

Table 11 Applied RF module DC Voltages and Currents

Voltage:	(See power source)
Current:	(See power source)



4.2 EUT Identification List

4.2.1 Board Information

Table 1 Sub-assembly identity of EUT

Module Name	Qty.	Hardware Version	Serial number	Description
WLAN Unit	1	Ver.A	MAC Addr.: 0030AB2949D4	WLAN module

Table 2 Sub-assembly identity of Ancillary Equipments

Module Name	Qty.	Hardware Version	Serial number	Description
FWF2DB1M	1	Ver.A	02G1991098800015	WIFI/MIC2 Convert Card (Conversion board on Platform Device directly supporting working of WLAN unit)
FWF2MPUA	1	Ver.A	02G198Z09B000025	Main Board (Platform Device)
Notebook PC	1	---	3105085478 (internal numbering)	PC for radiated tests as Platform (DELL E6400)
Antennas	3	---	---	Antennas of WLAN unit
Jumper Cables	3	---	---	Jumper Cables of WLAN unit

4.2.2 Adapter Technical Data

(Not applicable)

4.2.3 FCC Identification

Grantee Code: QIS
 Product Code: HSMPCIAGN01
 FCC Identification: QISHSMPCIAGN01



5 Main Test Instruments

Table 12 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
EMI Test receiver	R&S	ESMI	829179/008	May.05, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2536	Aug.22, 2010
Horn Antenna	ETS- LINDGREN	3117	00062549	Sep. 20, 2010
Horn Antenna	ETS- LINDGREN	3160-9	00060008	Sep. 20, 2010
EMI Test receiver	R&S	ESCS30	830245/018	May.05, 2011
Artificial Mains Network	R&S	ENV4200	100046	May.12, 2010
Signal Analyzer	R&S	FSQ40	100025	Oct. 10, 2010
20 dB Attenuator	Aeroflex / Weinschel	49-20-33	PA294	---



6 Transmitter Measurements

6.1 6dB bandwidth measurement

6.1.1 Test Conditions

Table 13 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	20-23 °C
Relative humidity:	54-66%
Test Configurations:	11b, 11g, 11n20, 11n40, 11n20-mimo, 11n40-mimo at channel No. B, M, T

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 15.247 (a) (2) and KDB 558074

6.1.2.2 Supporting Standards

Table 14 Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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6.1.2.3 Limits

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

Table 15 Limits

Limits	≥ 500kHz
--------	----------

6.1.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power at 2.4GHz, then set the measured frequency number and test the 6dB bandwidth with spectrum analyzer.

Test setup

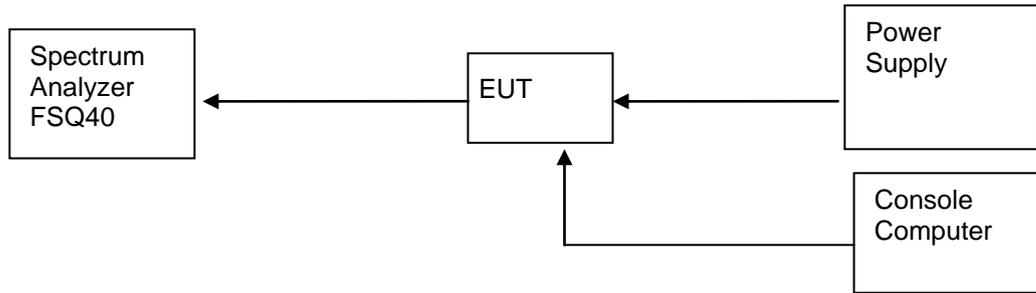


Figure 1. Test Set-up

6.1.4 Measurement Results

NOTE: The result under MIMO mode is that for each chain.

Table 16 Measurement Results

Test condition	Chain	Channel Position	Channel Number	Frequency [GHz]	Measured Bandwidth [MHz]	Limit [MHz]	Result
11b	1	B	1	2.412	10.17	≥ 0.5	Pass
		M	6	2.437	10.15	≥ 0.5	Pass
		T	11	2.462	10.17	≥ 0.5	Pass
11g	1	B	1	2.412	16.32	≥ 0.5	Pass
		M	6	2.437	16.32	≥ 0.5	Pass
		T	11	2.462	16.32	≥ 0.5	Pass
11n20	1	B	1	2.412	17.06	≥ 0.5	Pass
		M	6	2.437	17.06	≥ 0.5	Pass
		T	11	2.462	17.10	≥ 0.5	Pass
11n40	1	B	3	2.422	35.96	≥ 0.5	Pass
		M	6	2.437	36.19	≥ 0.5	Pass
		T	9	2.452	36.26	≥ 0.5	Pass
11n20-mimo	1	B	1	2.412	17.06	≥ 0.5	Pass
		M	6	2.437	17.10	≥ 0.5	Pass
		T	11	2.462	16.90	≥ 0.5	Pass
	2	B	1	2.412	17.64	≥ 0.5	Pass
		M	6	2.437	17.64	≥ 0.5	Pass
11n40-mimo	1	B	3	2.422	35.26	≥ 0.5	Pass
		M	6	2.437	35.27	≥ 0.5	Pass
		T	9	2.452	35.85	≥ 0.5	Pass
	2	B	3	2.422	36.40	≥ 0.5	Pass
		M	6	2.437	36.44	≥ 0.5	Pass
		T	9	2.452	36.42	≥ 0.5	Pass

6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to [appendix A](#).



6.2 Peak output power

6.2.1 Test Conditions

Table 17 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	20-23°C
Relative humidity:	54-66 %
Test Configurations:	11b, 11g, 11n20, 11n40, 11n20-mimo, 11n40-mimo at channel No. B, M, T

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 15.247 (b) (3) and KDB 558074

6.2.2.2 Supporting Standards

Table 18 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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6.2.2.3 Limits

Compliance with part 15.247 (b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level.

Table 19 Limits

2.4GHz and 5.8GHz system using digital modulation	1 Watt / 30 dBm
---	-----------------

6.2.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power.
- (c) Then set the mobile phone to transmit at high, middle and low frequency and measure the conducted output power separately.

Test setup

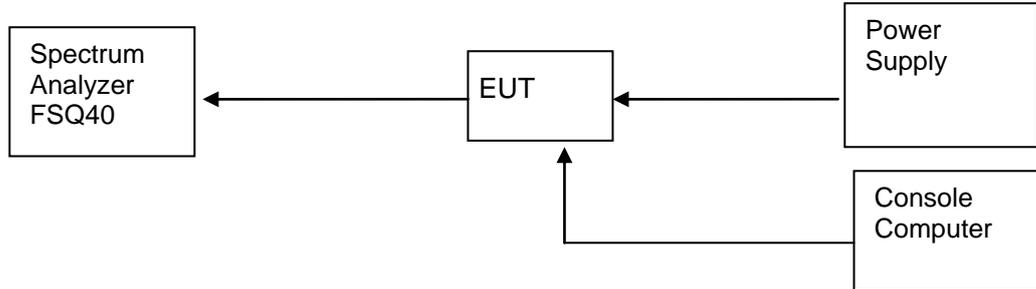


Figure 2. Test Set-up

6.2.4 Measurement Results

NOTE: The result under MIMO mode is the sum of each chain, and the sum is calculated.

Table 20 Measurement Results

Test condition	Chain	Channel Position	Channel Number	Frequency [MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
11b	1	B	1	2412	24.42	< 30	Pass
		M	7	2442	24.24	< 30	Pass
		T	11	2462	24.33	< 30	Pass
11g	1	B	1	2412	25.24	< 30	Pass
		M	7	2442	25.21	< 30	Pass
		T	11	2462	25.03	< 30	Pass
11n20	1	B	1	2412	25.22	< 30	Pass
		M	7	2442	25.29	< 30	Pass
		T	11	2462	25.04	< 30	Pass
11n40	1	B	3	2422	24.14	< 30	Pass
		M	6	2437	25.56	< 30	Pass
		T	9	2452	25.47	< 30	Pass
11n20-mimo	1	B	1	2412	23.48	---	---
		M	7	2442	23.79	---	---
		T	11	2462	23.13	---	---
	2	B	1	2412	22.10	---	---
		M	7	2442	22.07	---	---
		T	11	2462	22.11	---	---
	1+2	B	1	2412	25.85	< 30	Pass
		M	7	2442	26.02	< 30	Pass
		T	11	2462	25.66	< 30	Pass
11n40-mimo	1	B	3	2422	22.41	---	---
		M	6	2437	22.71	---	---
		T	9	2452	21.80	---	---
	2	B	3	2422	21.98	---	---
		M	6	2437	22.22	---	---
		T	9	2452	22.14	---	---
	1+2	B	3	2422	25.21	< 30	Pass



		M	6	2437	25.48	< 30	Pass
		T	9	2452	24.98	< 30	Pass

6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.

6.3 Band edge spurious emission

6.3.1 Test Conditions

Table 21 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	20-23°C
Relative humidity:	54-66 %
Test Configurations:	T11b, 11g, 11n20, 11n40, 11n20-mimo, 11n40-mimo at channel No. B, T

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 15.247(d) and KDB 558074

6.3.2.2 Supporting Standards

Table 22 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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6.3.2.3 Limits

Compliance with part 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

Table 23 Limits

Band edge spurious:	20 dBc/100kHz
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6.3.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz
- (c) Then set the EUT to transmit at high, low frequency and measure the conducted band edge spurious separately.

Test setup

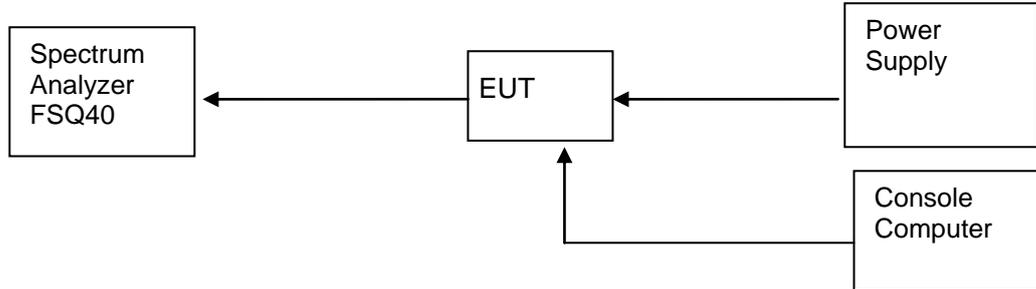


Figure 3. Test Set-up

6.3.4 Measurement Results

NOTE: The result under MIMO mode is that for each chain based on that the limit is relative to carrier.

Table 24 Measurement Results

Test condition	Chain	Channel Position	Channel Number	Frequency [MHz]	0dBc Level [dBm]	Max. Spurious Level [dBm]	-20dBc Limit [dBm]	Result
11b	1	B	1	2412	8.22	-30.91	< -11.78	Pass
		T	11	2462	8.06	-41.55	< -11.94	Pass
11g	1	B	1	2412	8.06	-17.17	< -11.94	Pass
		T	11	2462	7.37	-32.33	< -12.63	Pass
11n20	1	B	1	2412	8.04	-17.92	< -11.96	Pass
		T	11	2462	6.67	-29.5	< -13.33	Pass
11n40	1	B	3	2422	4.57	-21.84	< -15.43	Pass
		T	9	2452	5.15	-27.81	< -14.85	Pass
11n20-mimo	1	B	1	2412	5.35	-21.83	< -14.65	Pass
		T	11	2462	6.11	-38.23	< -13.89	Pass
	2	B	1	2412	3.89	-21.71	< -16.11	Pass
		T	11	2462	3.71	-36.98	< -16.29	Pass
11n40-mimo	1	B	3	2422	2.3	-26.39	< -17.7	Pass
		T	9	2452	2.09	-34.15	< -17.91	Pass
	2	B	3	2422	0.54	-25.35	< -19.46	Pass
		T	9	2452	0.78	-31.53	< -19.22	Pass

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to [appendix C](#).



6.4 Conducted Spurious Emissions

6.4.1 Test Conditions

Table 25 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	20-23°C
Relative humidity:	54-66 %
Test Configurations:	T11b, 11g, 11n20, 11n40, 11n20-mimo, 11n40-mimo at channel No. B, M, T

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 15.247 (d) and KDB 558074

6.4.2.2 Supporting Standards

Table 26 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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6.4.2.3 Limits

Compliance with part 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

Table 27 Limits

Band edge spurious:	20 dBc/100kHz
---------------------	---------------

6.4.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz and.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted band edge spurious separately.

Test setup

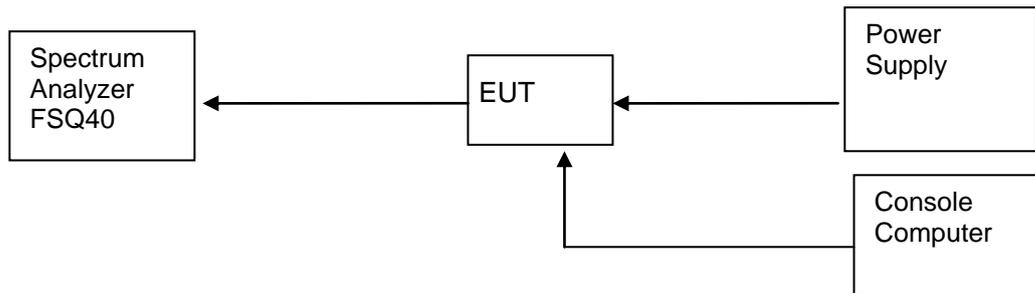


Figure 4. Test Set-up

6.4.4 Measurement Results

NOTE: The result under MIMO mode is that for each chain based on that the limit is relative to carrier.

Table 28 Measurement Results

Test condition	Chain	Channel Position	Channel Number	Frequency [MHz]	0dBc Level [dBm]	Meas. Level (Cond.) [dBm]	-20dBc Limit [dBm]	Result
11b	1	B	1	2412	7.2	-30.27	< -12.8	Pass
		M	7	2442	8.22	-29.84	< -11.78	Pass
		T	11	2462	6.94	-30.27	< -13.06	Pass
11g	1	B	1	2412	6.55	-30.41	< -13.45	Pass
		M	7	2442	6.01	-30.21	< -13.99	Pass
		T	11	2462	5.67	-30.48	< -14.33	Pass
11n20	1	B	1	2412	4.03	-30.24	< -15.97	Pass
		M	7	2442	4.58	-30.24	< -15.42	Pass
		T	11	2462	5.15	-29.71	< -14.85	Pass
11n40	1	B	3	2422	2.65	-30.64	< -17.35	Pass
		M	6	2437	0.4	-30.78	< -19.6	Pass
		T	9	2452	2.19	-30.57	< -17.81	Pass
11n20-mimo	1	B	1	2412	2.37	-30.24	< -17.63	Pass
		M	7	2442	3.04	-30.74	< -16.96	Pass
		T	11	2462	3.09	-31.02	< -16.91	Pass
	2	B	1	2412	2.7	-30.92	< -17.3	Pass
		M	7	2442	2.06	-30.88	< -17.94	Pass
		T	11	2462	2.78	-30.95	< -17.22	Pass
11n40-mimo	1	B	3	2422	-0.95	-30.34	< -20.95	Pass
		M	6	2437	-0.96	-30.57	< -20.96	Pass
		T	9	2452	-0.71	-31.09	< -20.71	Pass
	2	B	3	2422	-0.28	-30.88	< -20.28	Pass
		M	6	2437	0.3	-30.5	< -19.7	Pass
		T	9	2452	-0.28	-31.17	< -20.28	Pass

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to [appendix D](#).

6.5 Power spectral density

6.5.1 Test Conditions

Table 29 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	20-23°C
Relative humidity:	54-66 %
Test Configurations:	T11b, 11g, 11n20, 11n40, 11n20-mimo, 11n40-mimo at channel No. B, M, T

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 15.247 (e) and KDB 558074

6.5.2.2 Supporting Standards

Table 30 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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6.5.2.3 Limits

Compliance with part 15.247 (e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. The same method of determining the conducted output power shall be used to determine the power spectral density.

Table 31 Limits

Band edge spurious:	8 dBm/3kHz
---------------------	------------

6.5.3 Test Method and Setup

- Connect test port of EUT to spectrum analyzer
- Set the EUT to transmit maximum output power at 2.4GHz and.
- Then set the EUT to transmit at high, middle and low frequency and measure the conducted band edge spurious separately.

Test setup

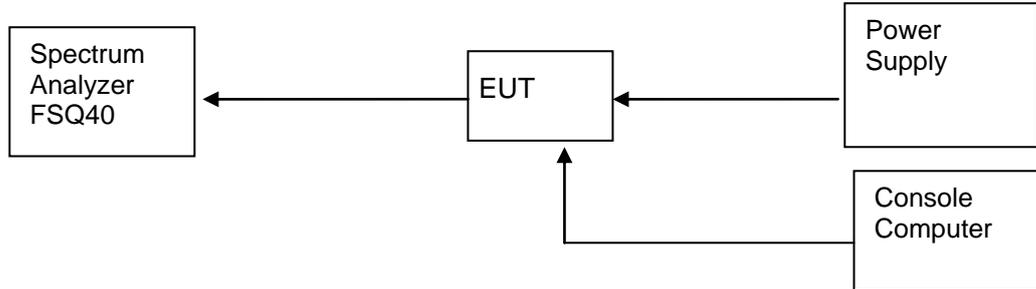


Figure 5. Test Set-up

6.5.4 Measurement Results

NOTE: The result under MIMO mode is the sum of each chain, and the sum is calculated.

Table 32 Measurement Results

Test condition	Chain	Channel Position	Channel Number	Frequency [MHz]	Measured Power spectral density [dBm]	Limit [dBm/3kHz]	Result
11b	1	B	1	2412	5.12	< 8	Pass
		M	7	2442	1.63	< 8	Pass
		T	11	2462	3.05	< 8	Pass
11g	1	B	1	2412	4.31	< 8	Pass
		M	7	2442	2.40	< 8	Pass
		T	11	2462	4.93	< 8	Pass
11n20	1	B	1	2412	5.32	< 8	Pass
		M	7	2442	5.10	< 8	Pass
		T	11	2462	4.87	< 8	Pass
11n40	1	B	3	2422	1.70	< 8	Pass
		M	6	2437	4.18	< 8	Pass
		T	9	2452	-5.18	< 8	Pass
11n20-mimo	1	B	1	2412	2.60	---	---
		M	7	2442	1.25	---	---
		T	11	2462	1.87	---	---
	2	B	1	2412	-8.77	---	---
		M	7	2442	-9.47	---	---
		T	11	2462	-8.65	---	---
	1+2	B	1	2412	2.91	< 8	Pass
		M	7	2442	1.60	< 8	Pass
		T	11	2462	2.24	< 8	Pass
11n40-mimo	1	B	3	2422	-13.94	---	---
		M	6	2437	-13.88	---	---
		T	9	2452	-13.99	---	---
	2	B	3	2422	-12.28	---	---
		M	6	2437	-13.06	---	---
		T	9	2452	-11.45	---	---



	1+2	B	3	2422	-10.02	< 8	Pass
		M	6	2437	-10.44	< 8	Pass
		T	9	2452	-9.53	< 8	Pass

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix E.

6.6 Radiated spurious emission & spurious in restricted band

6.6.1 Test Conditions

Table 33 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	20-23°C
Relative humidity:	54-66 %
Test Configurations:	T11b, 11g, 11n20, 11n40, 11n20-mimo, 11n40-mimo at channel No. B, M, T

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 15.247 (d), 15.205 & 15.209 and KDB 558074

6.6.2.2 Supporting Standards

Table 34 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

6.6.2.3 Limits

According to part 15.247 (d) / 15.205 & 15.209, all spurious emission in the frequency range from 30MHz to 10th harmonics of carrier frequency should be meet the requirement of following table.

Table 35 Limits

Frequency (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)	Detector
0.009 - 0.490	2400/F(kHz)	20*lg(2400/F(kHz))	300	QP
0.490 - 1.705	24000/F(kHz)	20*lg(24000/F(kHz))	30	QP
1.705 - 30	30	29.5	30	QP
30 – 88	100	40	3	QP
88 – 216	150	43.5	3	QP
216 – 960	200	46	3	QP
960 -1000	500	54	3	QP
Above 1000	500	54	3	PK

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table 42).

6.6.3 Test Method and Setup

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the

standards: ANSI C63.4 (2003). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4. The Radiated Disturbance measurements were made using a Rohde and Schwarz Test Receiver and control software.

A preliminary scan and a final scan of the emissions were made by using test script of software; the emissions were measured using a Quasi-Peak Detector below 1GHz, and AV detector above 1GHz. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0° to 360°, The receive antenna has two polarizations V and H.

The EUT was communicated with the BTS simulator through Air interface. The EUT operated on the typical channel.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 kHz

Measurement bandwidth: 1000 MHz – 10th Carrier Frequency: 1 MHz

Test set up

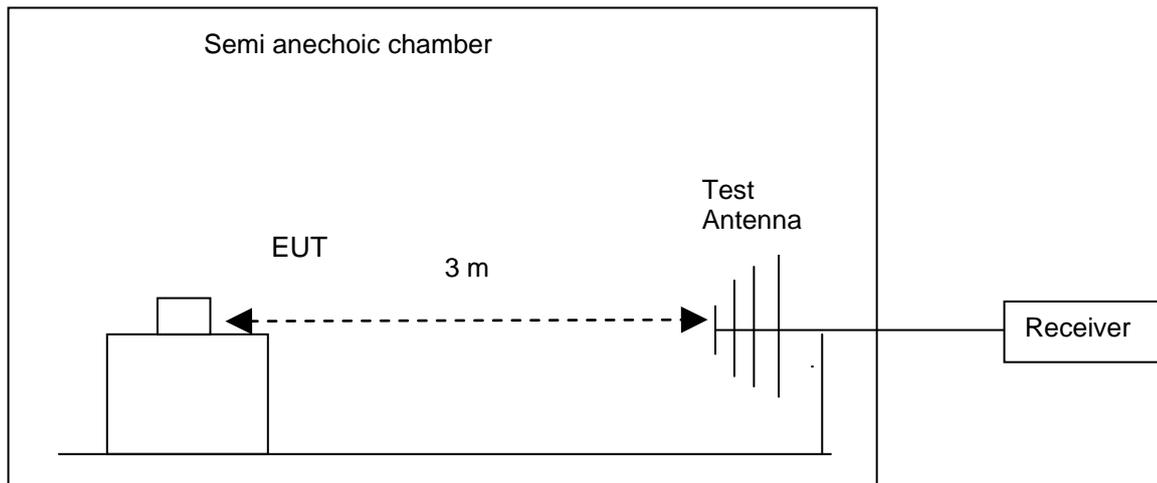


Figure 6. Test Set up

6.6.4 Measurement Results

NOTE 1: The result under MIMO mode is the combination of each chain, and the combination is directly measured.

NOTE 2: This test was carried out in all the test modes. Here, (a) only the worst test results were shown for test range of 30M-1GHz and 18G-26.5GHz; (b) while the whole results were shown for test range of 1G-3GHz and 3G-18GHz.

(1) Test Range of 30M-1GHz:

Table 36 Measurement Results

Test Mode	Chain	Channel Position	Channel Number	Frequency [MHz]	Maximum Spurious Emissions	Result
Worst of all modes	--	--	--	--	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass

(2) Test Range of 1GHz-3GHz:



Table 37 Measurement Results

Test Mode	Chain	Channel Position	Channel Number	Frequency [MHz]	Maximum Spurious Emissions	Result
11b	1	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11g	1	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n20	1	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n40	1	B	3	2422	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	6	2437	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	9	2452	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n20-mimo	1+2	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n40-mimo	1+2	B	3	2422	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	6	2437	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	9	2452	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass

(3) Test Range of 3GHz-18GHz:

Table 38 Measurement Results

Test Mode	Chain	Channel Position	Channel Number	Frequency [MHz]	Maximum Spurious Emissions	Result
11b	1	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11g	1	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass



Test Mode	Chain	Channel Position	Channel Number	Frequency [MHz]	Maximum Spurious Emissions	Result
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n20	1	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n40	1	B	3	2422	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	6	2437	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	9	2452	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n20-mimo	1+2	B	1	2412	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	7	2442	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	11	2462	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
11n40-mimo	1+2	B	3	2422	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		M	6	2437	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass
		T	9	2452	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass

(4) Test Range of 18GHz-26.5GHz:

Table 39 Measurement Results

Test Mode	Chain	Channel Position	Channel Number	Frequency [MHz]	Maximum Spurious Emissions	Result
Worst of all modes	--	--	--	--	(not found obvious spikes, or see spikes table list below plots in Appendix)	Pass

6.6.5 Conclusion

The equipment PASSED the requirement of this clause. For the measurement results refer to appendix F.



6.7 Conducted Emission at Power Port

6.7.1 Test Conditions

Table 40 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Power port
Ambient temperature:	20-23°C
Relative humidity:	54-66 %
Test Configurations:	The default 802.11 mode when the EUT is powered up.

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 15.207 and KDB 558074

6.7.2.2 Supporting Standards

Table 41 Supporting Standards:

ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
------------------	--

6.7.2.3 Limits

Compliance with part15.207, conducted emission must meet the requirement of following table.

Table 42 Limits

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

Note: * Decreases with the logarithm of the frequency.

6.7.3 Test Method and Setup

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4: 2003.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Mobile phone was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Phone to transmitter the maximum power which defined in specification of product. The Mobile Phone operated on the typical channel.

Measurement bandwidth (RBW) for 150kHz to 30 MHz: 9 kHz;

Test Set-up

The EUT (installed in the platform device) was setup in the screened chamber and operated under nominal conditions.

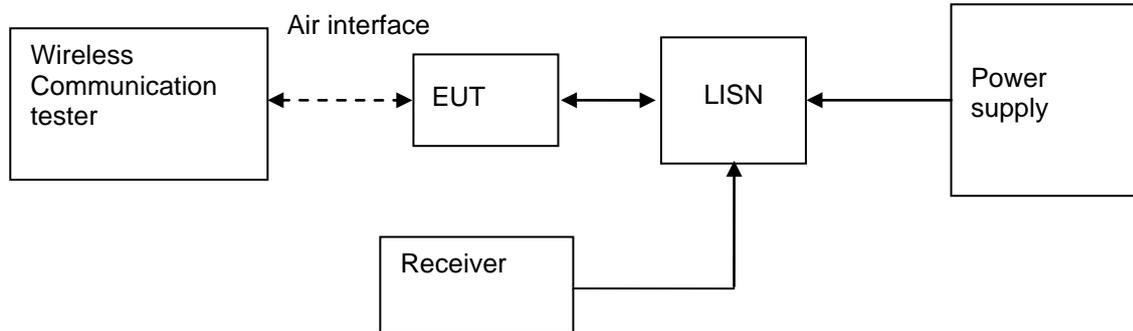


Figure 7. Test Set-up

6.7.4 Measurement Results

Table 43 MEASUREMENT RESULT:QP DECTER

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.1545	33	10	65.9	32.9	QP	N	GND
3.8895	32.2	10.1	56	23.8	QP	L3	GND
12.255	24.8	10.2	60	35.2	QP	N	GND
12.3405	31.2	10.2	60	28.8	QP	N	GND

Table 44 MEASUREMENT RESULT:AV DECTER

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
3.894	35.2	10.1	46	10.8	AV	L3	GND
12.345	34.3	10.2	50	15.7	AV	N	GND
16.1565	29.9	10.3	50	20.1	AV	N	GND

6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to [appendix G](#).



7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Table 45 System Measurement Uncertainty

Items		Extended Uncertainty
20dB bandwidth measurement	Magnitude (%)	U=0.2%; k=2
Peak output power	Power(dBm)	U=0.39dB; k=2
Band edge compliance measurement	Disturbance Power(dBm)	U= 2.0dB; k=2
Conducted RF spurious	Disturbance Power(dBm)	U= 0.4dB; k=2
Power spectral density	Disturbance Power(dBm)	U= 0.4dB; k=2
Radiated spurious emission & Radiated restricted band measurement	Field strength (dBμV/m)	U=2.2dB; k=2
		U=5dB; k=2
Conducted emission test for power port	Disturbance Voltage(dBμV)	U=4dB; k=2



8 Appendices

Appendix A	Measurement Results 6dB bandwidth measurement	25 pages
Appendix B	Measurement Results Peak output power	25 pages
Appendix C	Measurement Results Band edge compliance measurement	17 pages
Appendix D	Measurement Results Conducted RF spurious	25 pages
Appendix E	Measurement Results Power spectral density	49 pages
Appendix F	Measurement Results Radiated spurious emission	76 pages
Appendix G	Measurement Results Conducted emission test for power port	3 pages
Appendix H	Photos of Test Setup	5 pages

(END OF REPORT)