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FCC TEST REPORT (15.247)

REPORT NO.: RF130307C04C

MODEL NO.: 9200C

FCC ID: Q3N-9200C

RECEIVED: Mar. 07, 2013

TESTED: Aug. 01 ~ Aug. 10, 2013

ISSUED: Aug. 13, 2013

APPLICANT: CIPHERLAB CO., LTD

ADDRESS: 12F, 333 Dunhua S. Rd., Sec.2 Taipei, Taiwan 106

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
Ltd., Taoyuan Branch

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Taipei City, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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A D T

TABLE OF CONTENTS

RELEASE CONTROL RECORD.....	5
1. CERTIFICATION.....	6
2. SUMMARY OF TEST RESULTS.....	7
2.1 MEASUREMENT UNCERTAINTY.....	7
3. GENERAL INFORMATION.....	8
3.1 GENERAL DESCRIPTION OF EUT.....	8
3.2 DESCRIPTION OF TEST MODES.....	10
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL.....	11
3.3 DESCRIPTION OF SUPPORT UNITS.....	15
3.3.1 CONFIGURATION OF SYSTEM UNDER TEST.....	15
3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	16
4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND).....	17
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT.....	17
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT.....	17
4.1.2 TEST INSTRUMENTS.....	18
4.1.3 TEST PROCEDURES.....	19
4.1.4 DEVIATION FROM TEST STANDARD.....	19
4.1.5 TEST SETUP.....	20
4.1.6 EUT OPERATING CONDITIONS.....	20
4.1.7 TEST RESULTS.....	21
4.2 CONDUCTED EMISSION MEASUREMENT.....	31
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	31
4.2.2 TEST INSTRUMENTS.....	31
4.2.3 TEST PROCEDURES.....	32
4.2.4 DEVIATION FROM TEST STANDARD.....	32
4.2.5 TEST SETUP.....	32
4.2.6 EUT OPERATING CONDITIONS.....	32
4.2.7 TEST RESULTS.....	33
4.3 6dB BANDWIDTH MEASUREMENT.....	35
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT.....	35
4.3.2 TEST SETUP.....	35
4.3.3 TEST INSTRUMENTS.....	35
4.3.4 TEST PROCEDURE.....	35
4.3.5 DEVIATION FROM TEST STANDARD.....	35
4.3.6 EUT OPERATING CONDITIONS.....	35
4.3.7 TEST RESULTS.....	36
4.4 CONDUCTED OUTPUT POWER.....	37
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT.....	37
4.4.2 TEST SETUP.....	37



A D T

4.4.3	TEST INSTRUMENTS	37
4.4.4	TEST PROCEDURES.....	37
4.4.5	DEVIATION FROM TEST STANDARD.....	37
4.4.6	EUT OPERATING CONDITIONS	37
4.4.7	TEST RESULTS.....	38
4.5	POWER SPECTRAL DENSITY MEASUREMENT	40
4.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	40
4.5.2	TEST SETUP	40
4.5.3	TEST INSTRUMENTS	40
4.5.4	TEST PROCEDURE	40
4.5.5	DEVIATION FROM TEST STANDARD.....	40
4.5.6	EUT OPERATING CONDITION.....	40
4.5.7	TEST RESULTS.....	41
4.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT.....	42
4.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT	42
4.6.2	TEST SETUP	42
4.6.3	TEST INSTRUMENTS	42
4.6.4	TEST PROCEDURE	42
4.6.5	DEVIATION FROM TEST STANDARD.....	43
4.6.6	EUT OPERATING CONDITION.....	43
4.6.7	TEST RESULTS.....	43
4.6.8	TEST RESULTS.....	44
5.	TEST TYPES AND RESULTS (FOR 5.0GHz BAND)	47
5.1	RADIATED EMISSION MEASUREMENT	47
5.1.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	47
5.1.2	TEST INSTRUMENTS	48
5.1.3	TEST PROCEDURES.....	48
5.1.4	DEVIATION FROM TEST STANDARD.....	48
5.1.5	TEST SETUP	48
5.1.6	EUT OPERATING CONDITIONS	48
5.1.7	TEST RESULTS.....	49
5.2	CONDUCTED EMISSION MEASUREMENT	56
5.2.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	56
5.2.2	TEST INSTRUMENTS	56
5.2.3	TEST PROCEDURES.....	56
5.2.4	DEVIATION FROM TEST STANDARD.....	56
5.2.5	TEST SETUP	56
5.2.6	EUT OPERATING CONDITIONS	56
5.2.7	TEST RESULTS.....	57
5.3	6dB BANDWIDTH MEASUREMENT	59
5.3.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	59



A D T

5.3.2	TEST SETUP	59
5.3.3	TEST INSTRUMENTS	59
5.3.4	TEST PROCEDURE	59
5.3.5	DEVIATION FROM TEST STANDARD	59
5.3.6	EUT OPERATING CONDITIONS	59
5.3.7	TEST RESULTS	60
5.4	CONDUCTED OUTPUT POWER	61
5.4.1	LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT	61
5.4.2	TEST SETUP	61
5.4.3	INSTRUMENTS	61
5.4.4	TEST PROCEDURES	61
5.4.5	DEVIATION FROM TEST STANDARD	61
5.4.6	EUT OPERATING CONDITIONS	61
5.4.7	TEST RESULTS	62
5.5	POWER SPECTRAL DENSITY MEASUREMENT	64
5.5.1	LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	64
5.5.2	TEST SETUP	64
5.5.3	TEST INSTRUMENTS	64
5.5.4	TEST PROCEDURE	64
5.5.5	DEVIATION FROM TEST STANDARD	64
5.5.6	EUT OPERATING CONDITION	64
5.5.7	TEST RESULTS	65
5.6	CONDUCTED OUT OF BAND EMISSION MEASUREMENT	66
5.6.1	LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT	66
5.6.2	TEST SETUP	66
5.6.3	TEST INSTRUMENTS	66
5.6.4	TEST PROCEDURE	66
5.6.5	DEVIATION FROM TEST STANDARD	66
5.6.6	EUT OPERATING CONDITION	66
5.6.7	TEST RESULTS	66
6.	PHOTOGRAPHS OF THE TEST CONFIGURATION	69
7.	INFORMATION ON THE TESTING LABORATORIES	70
8.	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	71



A D T

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130307C04C	Original release.	Aug. 13, 2013



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1. CERTIFICATION

PRODUCT: Mobile Computer
MODEL NO.: 9200C
BRAND: CIPHERLAB
APPLICANT: CIPHERLAB CO., LTD
TESTED: Aug. 01 ~ Aug. 10, 2013
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (model: 9200C) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Sun Li , **DATE :** Aug. 13, 2013
Suntee Liu / Specialist

APPROVED BY : Ken Liu , **DATE :** Aug. 13, 2013
Ken Liu / Senior Manager



2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -5.50dB at 0.61094MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.6dB at 2483.50MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is solder not a standard connector.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Mobile Computer
MODEL NO.	9200C
POWER SUPPLY	5Vdc (host equipment / adapter) 3.7Vdc (Battery)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: 11/5.5/2/1Mbps 802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 72.2Mbps
OPERATING FREQUENCY	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5745 ~ 5825MHz
NUMBER OF CHANNEL	2.4GHz: 802.11b, 802.11g, 802.11n (20MHz): 11 5.0GHz: 802.11a, 802.11n (20MHz): 5
OUTPUT POWER	2.4GHz: 146.893mW 5.0GHz: 56.494mW
ANTENNA TYPE	2.4GHz: PIFA antenna with 3.22dBi gain 5.0GHz: PIFA antenna with 5.48dBi gain
ANTENNA CONNECTOR	Solder
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter, Battery, EDA charger, Touch Pen



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NOTE:

1. The EUT provides 1 completed transmitter and 1 receiver.

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	1TX
802.11a	1TX
802.11n (20MHz)	1TX

2. The EUT consumes power from the following battery & adapter.

Adapter	
Brand	ADAPTER TECH.
Model	STD-05040T
Input	100-240Vac, 47-63Hz, 0.58A MAX
Output	5Vdc, 4A, 20W MAX
Power Line	1.85m non-shielded AC cable without core 1.5m shielded DC cable with 1 core

Battery	
Brand	Cipherlab
Model	BA-0053A3
Rating	3.7Vdc, 3300mAh, 12.21Wh; min.: 3.6Vdc, max.: 4.2Vdc

3. The EUT uses the following accessory device:

EDA Charger	
Brand	Cipherlab
Model	SNP-9200-USB
Cable	1.9m shielded cable with 1 core

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

11 channels are provided for 802.11b, 802.11g, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

FOR 5.0GHz (5745 ~ 5825MHz):

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE \geq 1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

RADIATED EMISSION TEST (ABOVE 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

RADIATED EMISSION TEST (BELOW 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	1 to 11	1	OFDM	BPSK	6.5

POWER LINE CONDUCTED EMISSION TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	1 to 11	1	OFDM	BPSK	6.5



BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	6.5

ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
PLC	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui



FOR 5.0GHz (5745 ~ 5825MHz):

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

RADIATED EMISSION TEST (ABOVE 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	6.5

RADIATED EMISSION TEST (BELOW 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149	OFDM	BPSK	6.0

POWER LINE CONDUCTED EMISSION TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149	OFDM	BPSK	6.0



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BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 165	OFDM	BPSK	6.5

ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 165	149, 157, 165	OFDM	BPSK	6.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
PLC	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

3.3 DESCRIPTION OF SUPPORT UNITS

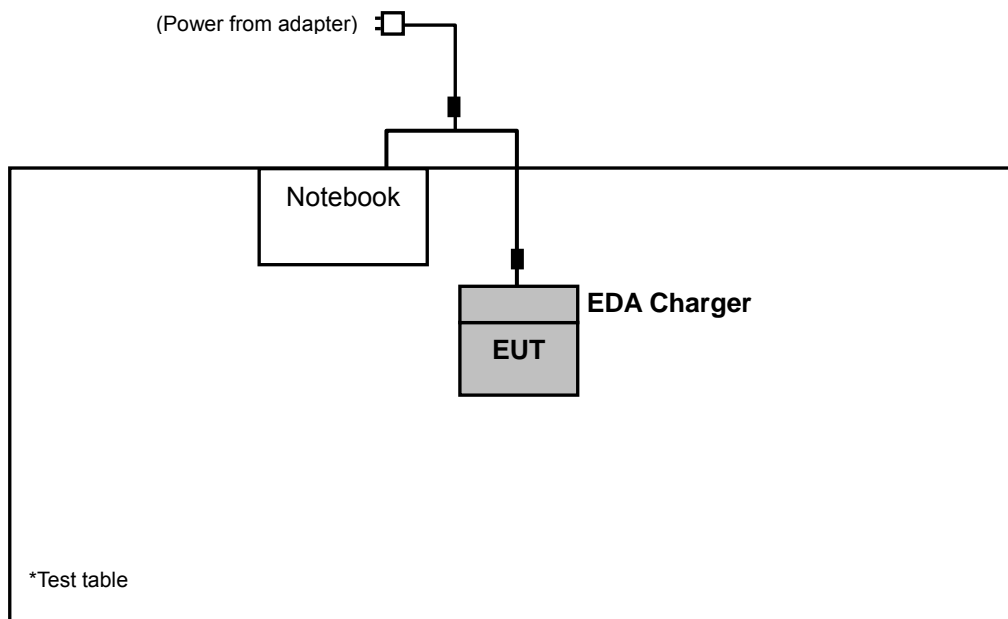
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

NOTE: All power cords of the above support units are non-shielded (1.8m).

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST





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3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r01

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



4. TEST TYPES AND RESULTS (FOR 2.4GHz BAND)

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

FREQUENCIES (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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 25, 2012	Dec. 24, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jan. 31, 2013	Jan. 30, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Mar. 20, 2013	Mar. 19, 2014
HORN Antenna SCHWARZBECK	9120D	209	Sep. 03, 2012	Sep. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8449B	3008A01964	Oct. 25, 2012	Oct. 24, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 28, 2012	Aug. 27, 2013
Software BV ADT	ADT_Radiated_V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 25, 2012	Oct. 24, 2013
High Speed Peak Power Meter	ML2495A	0842014	Apr. 25, 2013	Apr. 26, 2014
Power Sensor	MA2411B	0738404	Apr. 24, 2013	Apr. 23, 2014

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. The test was performed in HwaYa Chamber 3.
 4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 5. The FCC Site Registration No. is 988962.
 6. The IC Site Registration No. is IC 7450F-3.



4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

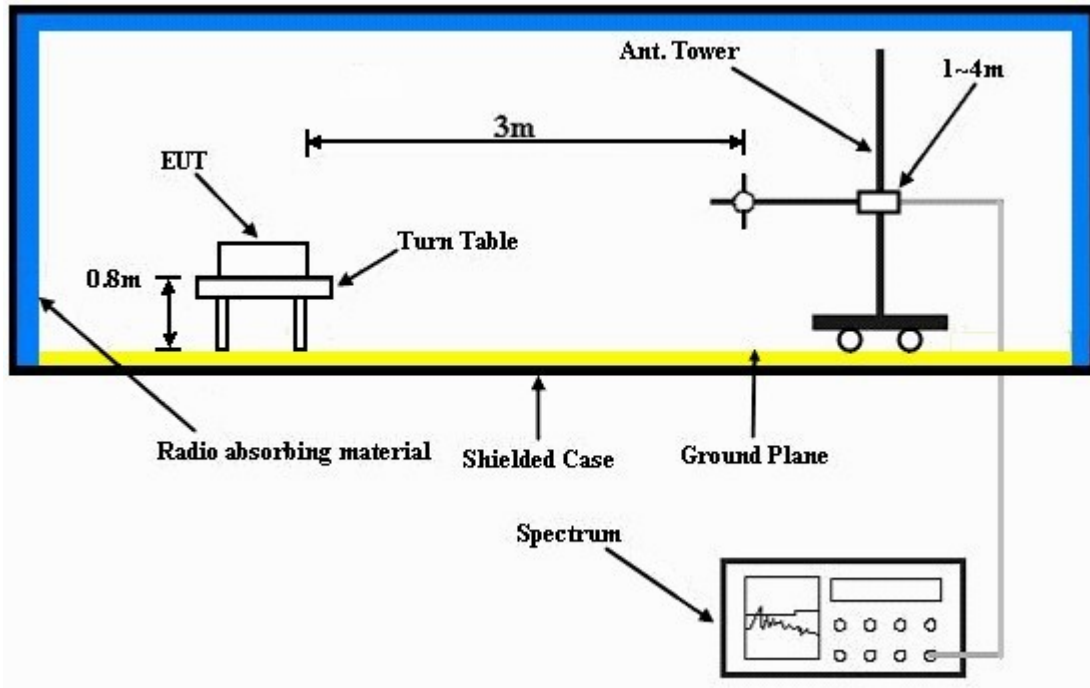
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 1kHz (Duty cycle < 98%) or 10Hz (Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

- a. Connected the EUT with the notebook and placed on a testing table.
- b. The notebook ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.



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4.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA :

802.11b

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.3 PK	74.0	-17.7	1.10 H	181	25.50	30.80
2	2390.00	44.8 AV	54.0	-9.2	1.10 H	181	14.00	30.80
3	*2412.00	106.0 PK			1.11 H	181	75.10	30.90
4	*2412.00	102.3 AV			1.11 H	181	71.40	30.90
5	4824.00	51.2 PK	74.0	-22.8	1.00 H	59	48.10	3.10
6	4824.00	47.3 AV	54.0	-6.7	1.00 H	59	44.20	3.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.4 PK	74.0	-18.6	1.00 V	238	24.60	30.80
2	2390.00	43.1 AV	54.0	-10.9	1.00 V	238	12.30	30.80
3	*2412.00	93.1 PK			1.00 V	239	62.20	30.90
4	*2412.00	89.6 AV			1.00 V	239	58.70	30.90
5	4824.00	52.8 PK	74.0	-21.2	1.00 V	354	49.70	3.10
6	4824.00	49.4 AV	54.0	-4.6	1.00 V	354	46.30	3.10

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level - Limit value
5. " * ": Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.8 PK			1.10 H	180	75.80	31.00
2	*2437.00	103.0 AV			1.10 H	180	72.00	31.00
3	4874.00	51.2 PK	74.0	-22.8	1.41 H	44	47.90	3.30
4	4874.00	47.0 AV	54.0	-7.0	1.41 H	44	43.70	3.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	94.5 PK			1.69 V	189	63.50	31.00
2	*2437.00	90.7 AV			1.69 V	189	59.70	31.00
3	4874.00	51.7 PK	74.0	-22.3	1.10 V	360	48.40	3.30
4	4874.00	47.9 AV	54.0	-6.1	1.10 V	360	44.60	3.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	109.0 PK			1.07 H	180	77.90	31.10
2	*2462.00	105.3 AV			1.07 H	180	74.20	31.10
3	2483.50	58.8 PK	74.0	-15.2	1.07 H	181	27.60	31.20
4	2483.50	48.2 AV	54.0	-5.8	1.07 H	181	17.00	31.20
5	4924.00	53.1 PK	74.0	-20.9	1.00 H	293	49.60	3.50
6	4924.00	48.5 AV	54.0	-5.5	1.00 H	293	45.00	3.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	98.9 PK			1.06 V	131	67.80	31.10
2	*2462.00	95.0 AV			1.06 V	131	63.90	31.10
3	2483.50	56.2 PK	74.0	-17.8	1.05 V	130	25.00	31.20
4	2483.50	44.5 AV	54.0	-9.5	1.05 V	130	13.30	31.20
5	4924.00	51.9 PK	74.0	-22.1	1.23 V	352	48.40	3.50
6	4924.00	47.7 AV	54.0	-6.3	1.23 V	352	44.20	3.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.4 PK	74.0	-13.6	1.11 H	180	29.60	30.80
2	2390.00	46.0 AV	54.0	-8.0	1.11 H	180	15.20	30.80
3	*2412.00	105.3 PK			1.18 H	180	74.40	30.90
4	*2412.00	94.7 AV			1.18 H	180	63.80	30.90
5	4824.00	52.7 PK	74.0	-21.3	1.62 H	21	49.60	3.10
6	4824.00	36.6 AV	54.0	-17.4	1.62 H	21	33.50	3.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.5 PK	74.0	-19.5	1.70 V	140	23.70	30.80
2	2390.00	43.3 AV	54.0	-10.7	1.70 V	140	12.50	30.80
3	*2412.00	99.1 PK			1.72 V	140	68.20	30.90
4	*2412.00	88.2 AV			1.72 V	140	57.30	30.90
5	4824.00	54.8 PK	74.0	-19.2	1.41 V	118	51.70	3.10
6	4824.00	38.3 AV	54.0	-15.7	1.41 V	118	35.20	3.10

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	108.7 PK			1.10 H	178	77.70	31.00
2	*2437.00	97.4 AV			1.10 H	178	66.40	31.00
3	4874.00	52.8 PK	74.0	-21.2	1.52 H	227	49.50	3.30
4	4874.00	37.9 AV	54.0	-16.1	1.52 H	227	34.60	3.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	96.5 PK			1.00 V	360	65.50	31.00
2	*2437.00	86.0 AV			1.00 V	360	55.00	31.00
3	4874.00	55.8 PK	74.0	-18.2	1.66 V	208	52.50	3.30
4	4874.00	39.1 AV	54.0	-14.9	1.66 V	208	35.80	3.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	109.5 PK			1.09 H	180	78.40	31.10
2	*2462.00	98.2 AV			1.09 H	180	67.10	31.10
3	2483.50	67.2 PK	74.0	-6.8	1.09 H	180	36.00	31.20
4	2483.50	50.4 AV	54.0	-3.6	1.09 H	180	19.20	31.20
5	4924.00	51.0 PK	74.0	-23.0	1.92 H	174	47.50	3.50
6	4924.00	38.3 AV	54.0	-15.7	1.92 H	174	34.80	3.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	97.3 PK			1.00 V	4	66.20	31.10
2	*2462.00	86.9 AV			1.00 V	4	55.80	31.10
3	2483.50	57.8 PK	74.0	-16.2	1.00 V	5	26.60	31.20
4	2483.50	44.4 AV	54.0	-9.6	1.00 V	5	13.20	31.20
5	4924.00	56.7 PK	74.0	-17.3	1.59 V	55	53.20	3.50
6	4924.00	39.1 AV	54.0	-14.9	1.59 V	55	35.60	3.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.1 PK	74.0	-10.9	1.12 H	174	32.30	30.80
2	2390.00	47.4 AV	54.0	-6.6	1.12 H	174	16.60	30.80
3	*2412.00	103.9 PK			1.12 H	174	73.00	30.90
4	*2412.00	93.7 AV			1.12 H	174	62.80	30.90
5	4824.00	52.6 PK	74.0	-21.4	1.57 H	159	49.50	3.10
6	4824.00	37.6 AV	54.0	-16.4	1.57 H	159	34.50	3.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.3 PK	74.0	-19.7	1.02 V	114	23.50	30.80
2	2390.00	44.3 AV	54.0	-9.7	1.02 V	114	13.50	30.80
3	*2412.00	98.1 PK			1.03 V	247	67.20	30.90
4	*2412.00	87.0 AV			1.03 V	247	56.10	30.90
5	4824.00	54.1 PK	74.0	-19.9	1.09 V	62	51.00	3.10
6	4824.00	36.7 AV	54.0	-17.3	1.09 V	62	33.60	3.10

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	107.4 PK			1.01 H	185	76.40	31.00
2	*2437.00	97.1 AV			1.01 H	185	66.10	31.00
3	4874.00	50.8 PK	74.0	-23.2	1.69 H	211	47.50	3.30
4	4874.00	37.9 AV	54.0	-16.1	1.69 H	211	34.60	3.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	96.3 PK			1.00 V	6	65.30	31.00
2	*2437.00	85.8 AV			1.00 V	6	54.80	31.00
3	4874.00	55.5 PK	74.0	-18.5	1.84 V	159	52.20	3.30
4	4874.00	37.0 AV	54.0	-17.0	1.84 V	159	33.70	3.30

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	108.4 PK			1.08 H	166	77.30	31.10
2	*2462.00	96.9 AV			1.08 H	166	65.80	31.10
3	2483.50	66.6 PK	74.0	-7.4	1.02 H	149	35.40	31.20
4	2483.50	49.5 AV	54.0	-4.5	1.02 H	149	18.30	31.20
5	4924.00	51.3 PK	74.0	-22.7	1.01 H	244	47.80	3.50
6	4924.00	38.0 AV	54.0	-16.0	1.01 H	244	34.50	3.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	96.3 PK			1.00 V	14	65.20	31.10
2	*2462.00	85.9 AV			1.00 V	14	54.80	31.10
3	2483.50	57.2 PK	74.0	-16.8	1.00 V	18	26.00	31.20
4	2483.50	43.8 AV	54.0	-10.2	1.00 V	18	12.60	31.20
5	4924.00	49.1 PK	74.0	-24.9	1.06 V	23	45.60	3.50
6	4924.00	36.0 AV	54.0	-18.0	1.06 V	23	32.50	3.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.



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BELOW 1GHz WORST-CASE DATA : 802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	31.3 QP	40.0	-8.7	2.00 H	10	45.90	-14.60
2	156.28	22.3 QP	43.5	-21.2	1.50 H	95	36.20	-13.90
3	255.44	22.4 QP	46.0	-23.6	1.25 H	204	36.40	-14.00
4	430.42	19.9 QP	46.0	-26.1	1.50 H	110	29.40	-9.50
5	547.08	29.2 QP	46.0	-16.8	1.50 H	94	36.70	-7.50
6	704.57	26.6 QP	46.0	-19.4	1.00 H	259	31.00	-4.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.68	26.2 QP	40.0	-13.8	1.00 V	147	41.30	-15.10
2	57.12	28.6 QP	40.0	-11.4	1.00 V	320	43.20	-14.60
3	255.44	19.4 QP	46.0	-26.6	1.99 V	47	33.40	-14.00
4	447.92	23.5 QP	46.0	-22.5	1.24 V	259	32.60	-9.10
5	640.41	25.4 QP	46.0	-20.6	1.50 V	164	30.70	-5.30
6	704.57	25.8 QP	46.0	-20.2	1.24 V	256	30.20	-4.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 16, 2012	Nov. 15, 2013
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 28, 2012	Dec. 27, 2013
V-LISN SCHWARZBECK (Peripheral)	NNBL 8226-2	8226-142	Jun. 27, 2013	Jun. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 04, 2013	Feb. 03, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 TEST PROCEDURES

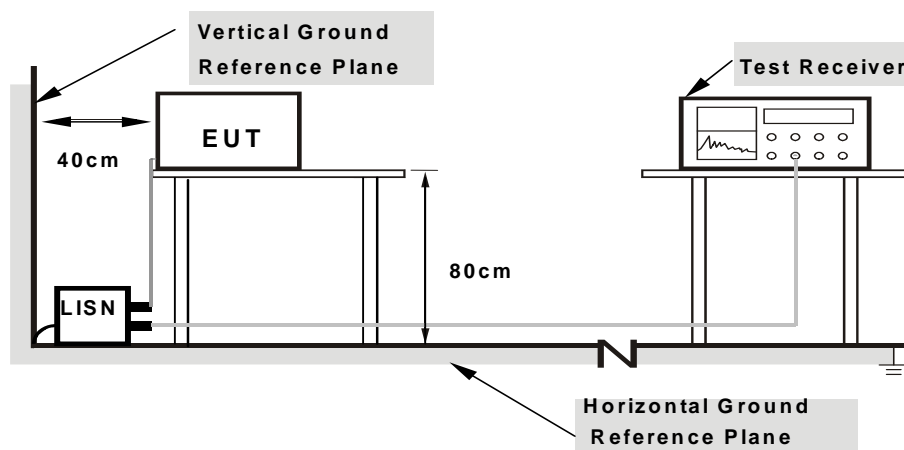
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

4.2.7 TEST RESULTS

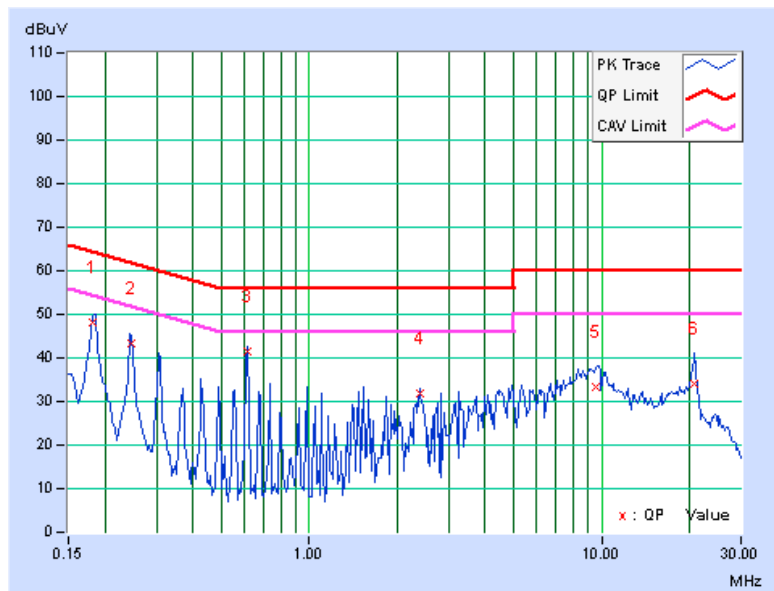
CONDUCTED WORST-CASE DATA : 802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18516	0.16	48.41	38.90	48.57	39.06	64.25	54.25	-15.68	-15.19
2	0.24766	0.18	43.40	36.26	43.58	36.44	61.84	51.84	-18.26	-15.40
3	0.60703	0.24	36.09	29.39	36.33	29.63	56.00	46.00	-19.67	-16.37
4	2.38672	0.31	31.38	23.40	31.69	23.71	56.00	46.00	-24.31	-22.29
5	9.15234	0.67	33.70	19.88	34.37	20.55	60.00	50.00	-25.63	-29.45
6	20.78516	1.27	35.22	27.71	36.49	28.98	60.00	50.00	-23.51	-21.02

REMARKS:

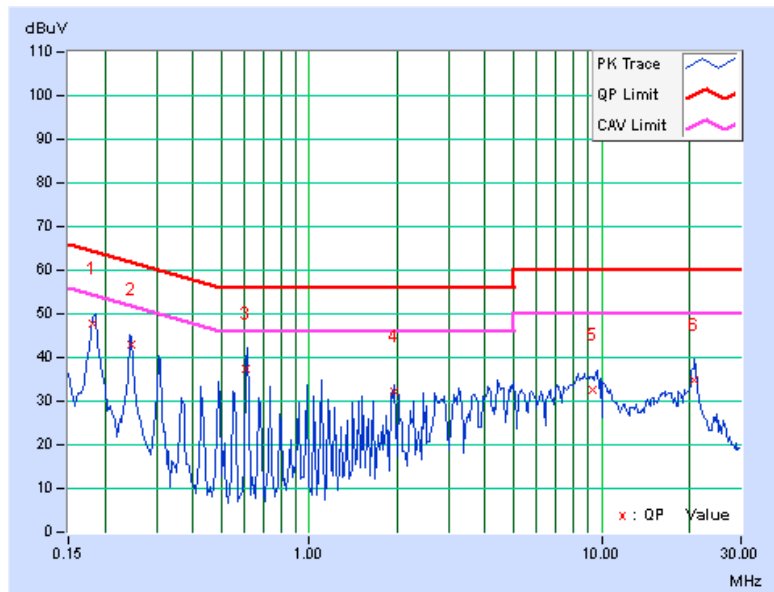
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	0.17	47.75	37.27	47.92	37.44	64.43	54.43	-16.51	-16.99
2	0.24766	0.19	42.66	34.85	42.85	35.04	61.84	51.84	-18.99	-16.80
3	0.60703	0.24	37.12	31.50	37.36	31.74	56.00	46.00	-18.64	-14.26
4	1.95703	0.28	32.04	25.34	32.32	25.62	56.00	46.00	-23.68	-20.38
5	9.29297	0.57	31.95	20.68	32.52	21.25	60.00	50.00	-27.48	-28.75
6	20.62891	0.95	33.73	26.13	34.68	27.08	60.00	50.00	-25.32	-22.92

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.

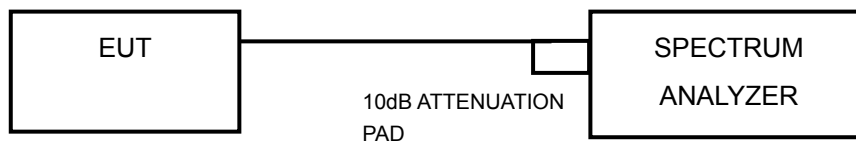


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

- a. Set resolution bandwidth (RBW) = 100kHz.
- b. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	9.08	0.5	PASS
6	2437	8.62	0.5	PASS
11	2462	9.08	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.19	0.5	PASS
6	2437	13.94	0.5	PASS
11	2462	15.17	0.5	PASS

802.11n (20MHz)

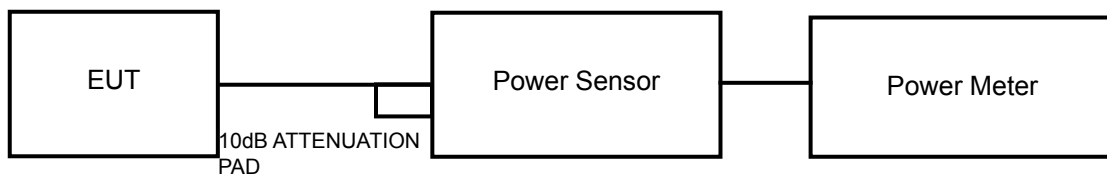
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.07	0.5	PASS
6	2437	13.96	0.5	PASS
11	2462	15.52	0.5	PASS

4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

A peak / average power sensor were used on the output port of the EUT. A power meter was used to read the response of the peak / average power sensor. Record the peak power level.

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



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4.4.7 TEST RESULTS

FOR PEAK POWER

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	65.163	18.14	30	PASS
6	2437	78.524	18.95	30	PASS
11	2462	77.268	18.88	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	138.357	21.41	30	PASS
6	2437	138.038	21.40	30	PASS
11	2462	134.896	21.30	30	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	146.893	21.67	30	PASS
6	2437	116.950	20.68	30	PASS
11	2462	139.316	21.44	30	PASS



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FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	33.651	15.27
6	2437	36.224	15.59
11	2462	36.224	15.59

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	21.928	13.41
6	2437	24.434	13.88
11	2462	24.155	13.83

802.11n (20MHz)

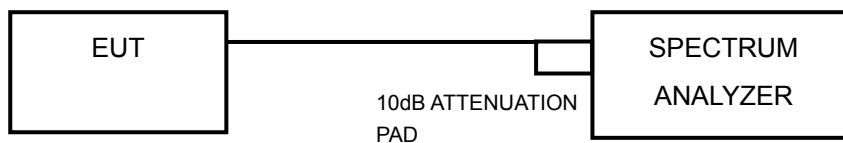
CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	24.946	13.97
6	2437	26.363	14.21
11	2462	25.468	14.06

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

- Set the RBW = 3 kHz, VBW = 10 kHz, 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 in any 100 kHz band segment within the fundamental EBW.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6.



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4.5.7 TEST RESULTS

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-6.81	8	PASS
6	2437	-6.39	8	PASS
11	2462	-6.59	8	PASS

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-10.96	8	PASS
6	2437	-10.24	8	PASS
11	2462	-10.60	8	PASS

802.11n (20MHz)

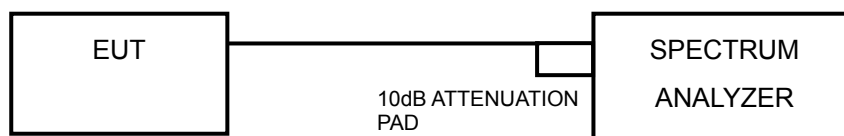
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-11.88	8	PASS
6	2437	-9.38	8	PASS
11	2462	-10.71	8	PASS

4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.



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MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Set span to encompass the spectrum to be examined.
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6.

4.6.7 TEST RESULTS

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

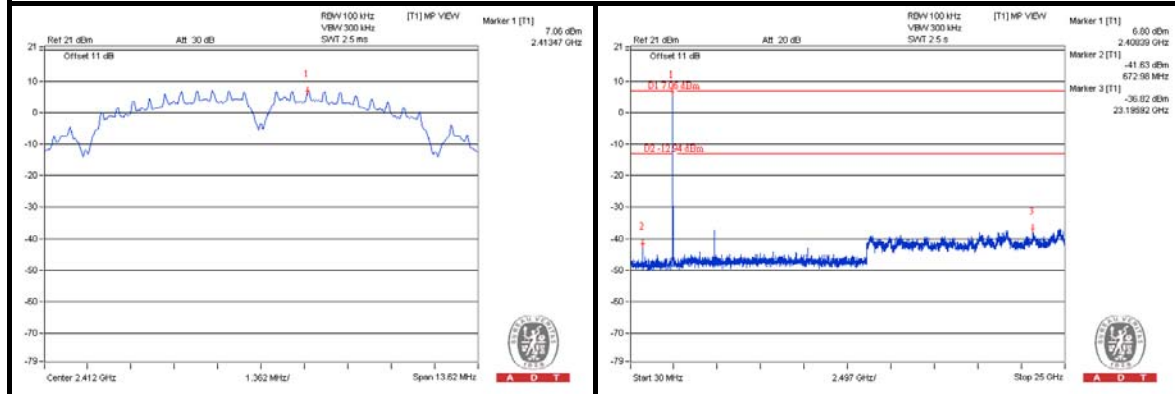


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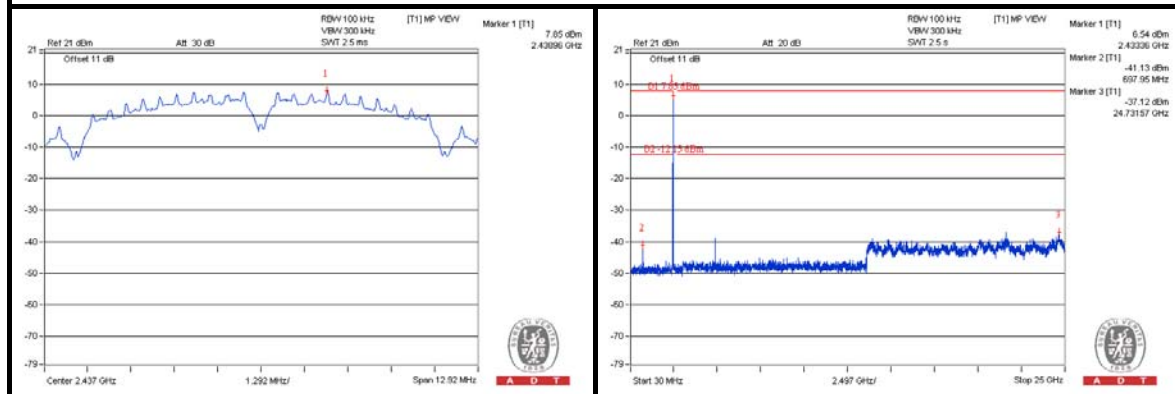
4.6.8 TEST RESULTS

802.11b

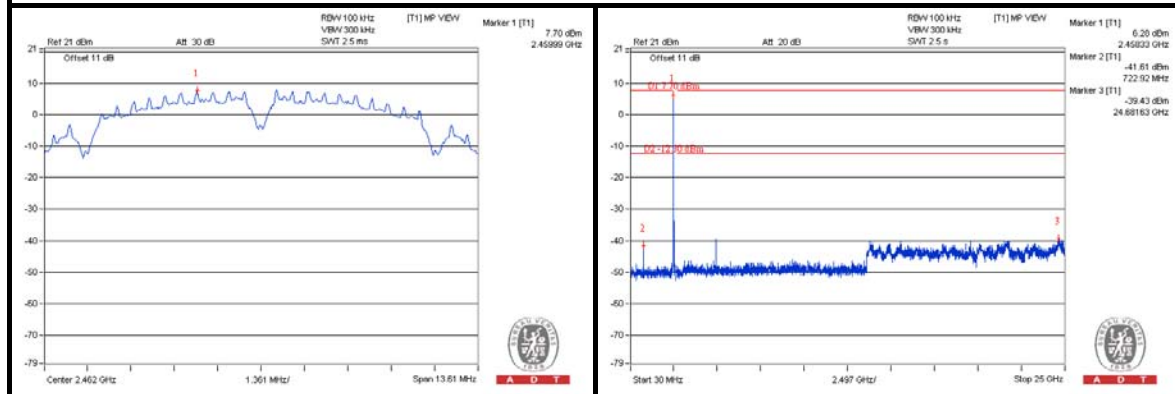
CH 1



CH 6

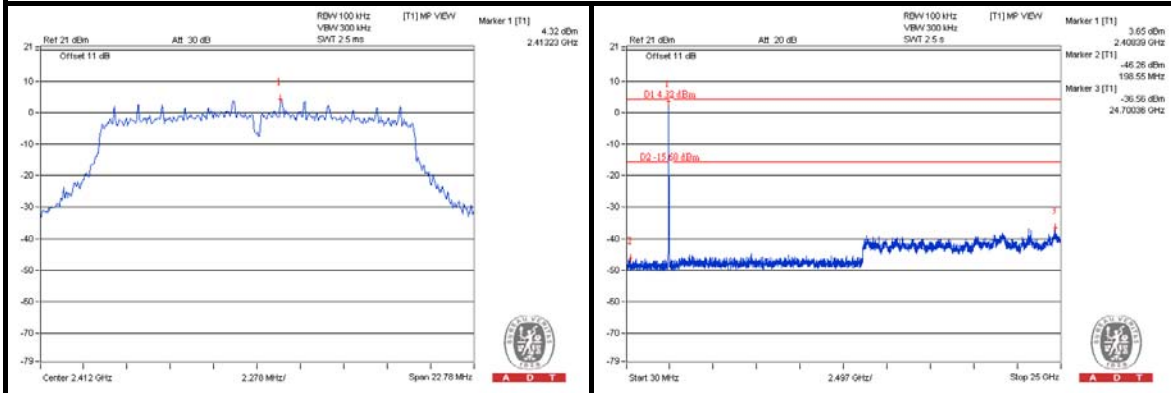


CH 11

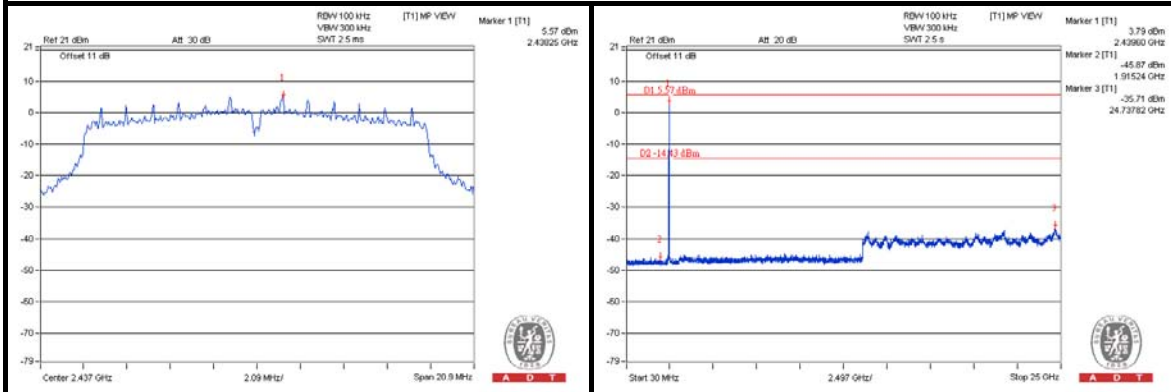


802.11g

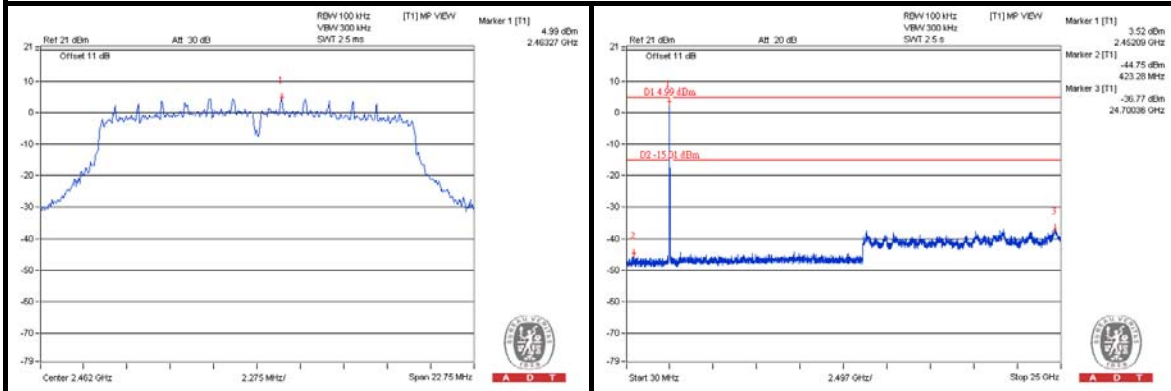
CH 1



CH 6

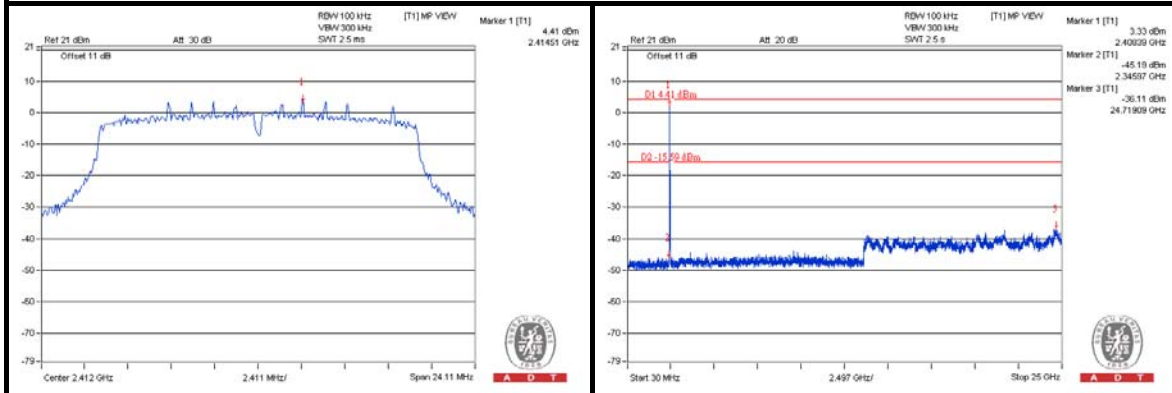


CH 11

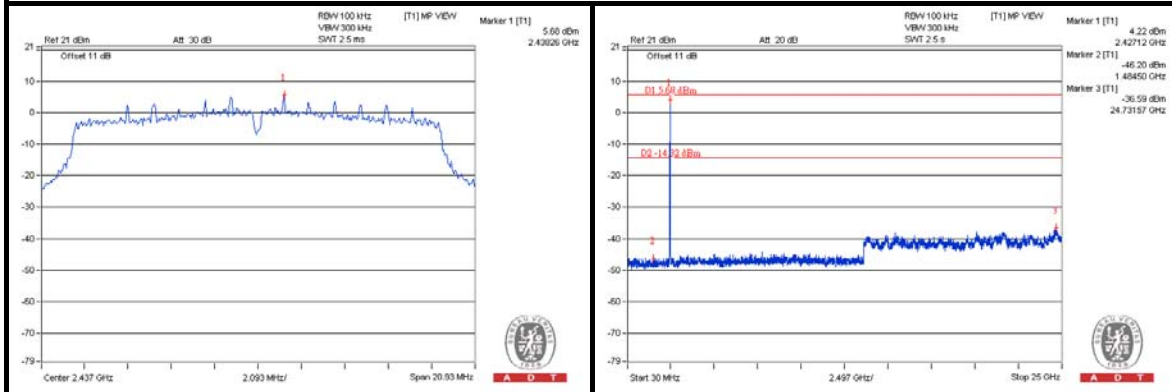


802.11n (20MHz)

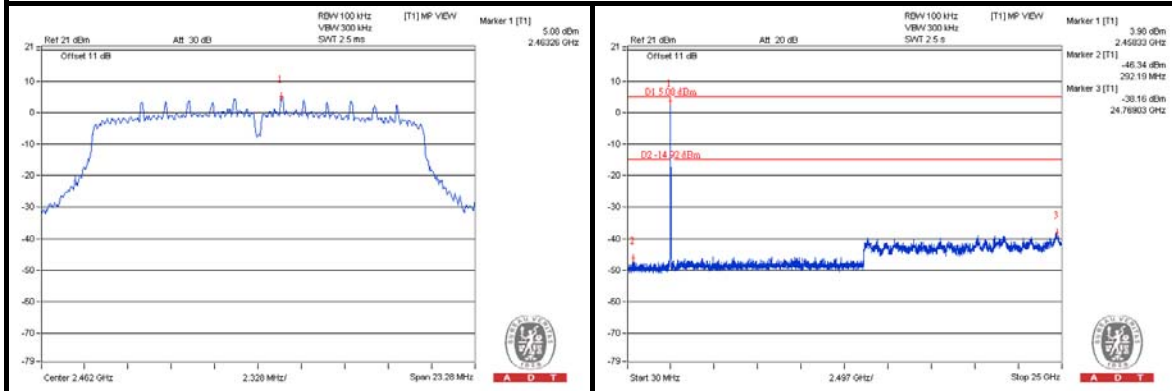
CH 1



CH 6



CH 11





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5. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

5.1 RADIATED EMISSION MEASUREMENT

5.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

FREQUENCIES (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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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5.1.2 TEST INSTRUMENTS

Same as item 4.1.2.

5.1.3 TEST PROCEDURES

Same as item 4.1.3.

5.1.4 DEVIATION FROM TEST STANDARD

No deviation.

5.1.5 TEST SETUP

Same as item 4.1.5.

5.1.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



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5.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA :

802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	68.0 PK	83.0	-15.0	1.05 H	343	29.30	38.70
2	#5725.00	57.3 AV	72.3	-15.0	1.05 H	343	18.60	38.70
3	*5745.00	103.0 PK			1.07 H	343	64.30	38.70
4	*5745.00	92.3 AV			1.07 H	343	53.60	38.70
5	11490.00	59.5 PK	74.0	-14.5	1.04 H	159	43.60	15.90
6	11490.00	46.4 AV	54.0	-7.6	1.04 H	159	30.50	15.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	63.1 PK	78.1	-15.0	1.05 V	343	24.40	38.70
2	#5725.00	51.6 AV	66.6	-15.0	1.05 V	343	12.90	38.70
3	*5745.00	98.1 PK			1.32 V	32	59.40	38.70
4	*5745.00	86.6 AV			1.32 V	32	47.90	38.70
5	11490.00	64.8 PK	74.0	-9.2	1.09 V	247	48.90	15.90
6	11490.00	49.4 AV	54.0	-4.6	1.09 V	247	33.50	15.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	101.0 PK			1.06 H	326	62.30	38.70
2	*5785.00	90.8 AV			1.06 H	326	52.10	38.70
3	11570.00	60.2 PK	74.0	-13.8	1.09 H	249	44.50	15.70
4	11570.00	46.2 AV	54.0	-7.8	1.09 H	249	30.50	15.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	97.7 PK			1.33 V	101	59.00	38.70
2	*5785.00	86.7 AV			1.33 V	101	48.00	38.70
3	11570.00	64.6 PK	74.0	-9.4	1.22 V	248	48.90	15.70
4	11570.00	49.4 AV	54.0	-4.6	1.22 V	248	33.70	15.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	99.9 PK			1.06 H	358	61.00	38.90
2	*5825.00	89.6 AV			1.06 H	358	50.70	38.90
3	#5850.00	60.5 PK	79.9	-19.4	1.06 H	358	21.60	38.90
4	#5850.00	50.2 AV	69.6	-19.4	1.06 H	358	11.30	38.90
5	11650.00	59.0 PK	74.0	-15.0	1.06 H	288	43.60	15.40
6	11650.00	45.9 AV	54.0	-8.1	1.06 H	288	30.50	15.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	95.3 PK			1.54 V	33	56.40	38.90
2	*5825.00	84.6 AV			1.54 V	33	45.70	38.90
3	#5850.00	55.9 PK	75.3	-19.4	1.06 V	358	17.00	38.90
4	#5850.00	45.2 AV	64.6	-19.4	1.06 V	358	6.30	38.90
5	11650.00	65.9 PK	74.0	-8.1	1.59 V	66	50.50	15.40
6	11650.00	49.0 AV	54.0	-5.0	1.59 V	66	33.60	15.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.



A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	66.9 PK	82.5	-15.6	1.06 H	341	28.20	38.70
2	#5725.00	56.2 AV	71.8	-15.6	1.06 H	341	17.50	38.70
3	*5745.00	102.5 PK			1.04 H	340	63.80	38.70
4	*5745.00	91.8 AV			1.04 H	340	53.10	38.70
5	11490.00	59.0 PK	74.0	-15.0	1.09 H	274	43.10	15.90
6	11490.00	47.3 AV	54.0	-6.7	1.09 H	274	31.40	15.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	62.0 PK	77.6	-15.6	1.06 V	341	23.30	38.70
2	#5725.00	50.5 AV	66.1	-15.6	1.06 V	341	11.80	38.70
3	*5745.00	97.6 PK			1.30 V	54	58.90	38.70
4	*5745.00	86.1 AV			1.30 V	54	47.40	38.70
5	11490.00	64.8 PK	74.0	-9.2	1.78 V	303	48.90	15.90
6	11490.00	48.6 AV	54.0	-5.4	1.78 V	303	32.70	15.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	100.4 PK			1.06 H	330	61.70	38.70
2	*5785.00	90.2 AV			1.06 H	330	51.50	38.70
3	11570.00	59.3 PK	74.0	-14.7	1.92 H	62	43.60	15.70
4	11570.00	46.7 AV	54.0	-7.3	1.92 H	62	31.00	15.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	97.1 PK			1.33 V	105	58.40	38.70
2	*5785.00	86.1 AV			1.33 V	105	47.40	38.70
3	11570.00	63.1 PK	74.0	-10.9	1.21 V	314	47.40	15.70
4	11570.00	48.9 AV	54.0	-5.1	1.21 V	314	33.20	15.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. The limit value is defined as per 15.247.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	99.5 PK			1.07 H	326	60.60	38.90
2	*5825.00	89.1 AV			1.07 H	326	50.20	38.90
3	#5850.00	59.6 PK	79.5	-19.9	1.05 H	325	20.70	38.90
4	#5850.00	49.2 AV	69.1	-19.9	1.05 H	325	10.30	38.90
5	11650.00	60.1 PK	74.0	-13.9	1.62 H	24	44.70	15.40
6	11650.00	45.7 AV	54.0	-8.3	1.62 H	24	30.30	15.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	94.8 PK			1.56 V	35	55.90	38.90
2	*5825.00	84.1 AV			1.56 V	35	45.20	38.90
3	#5850.00	54.9 PK	74.8	-19.9	1.05 V	325	16.00	38.90
4	#5850.00	44.2 AV	64.1	-19.9	1.05 V	325	5.30	38.90
5	11650.00	62.6 PK	74.0	-11.4	1.01 V	162	47.20	15.40
6	11650.00	48.0 AV	54.0	-6.0	1.01 V	162	32.60	15.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.
7. The limit value is defined as per 15.247.



A D T

BELOW 1GHz WORST-CASE DATA : 802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Ted Chang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	26.8 QP	40.0	-13.2	1.00 H	13	41.40	-14.60
2	125.17	21.7 QP	43.5	-21.8	1.24 H	240	37.40	-15.70
3	255.44	20.1 QP	46.0	-25.9	1.24 H	356	34.10	-14.00
4	319.60	20.7 QP	46.0	-25.3	1.00 H	54	32.50	-11.80
5	494.58	20.2 QP	46.0	-25.8	1.00 H	249	28.80	-8.60
6	609.30	24.6 QP	46.0	-21.4	1.50 H	264	30.50	-5.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	28.9 QP	40.0	-11.1	1.99 V	318	43.50	-14.60
2	132.95	20.1 QP	43.5	-23.4	1.00 V	52	35.10	-15.00
3	292.38	14.4 QP	46.0	-31.6	1.24 V	325	26.80	-12.40
4	447.92	21.8 QP	46.0	-24.2	1.00 V	106	30.90	-9.10
5	615.13	24.1 QP	46.0	-21.9	1.50 V	193	29.80	-5.70
6	757.06	24.3 QP	46.0	-21.7	1.00 V	13	27.20	-2.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



A D T

5.2 CONDUCTED EMISSION MEASUREMENT

5.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

5.2.2 TEST INSTRUMENTS

Same as item 4.2.2.

5.2.3 TEST PROCEDURES

Same as item 4.2.3.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP

Same as item 4.2.5.

5.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

5.2.7 TEST RESULTS

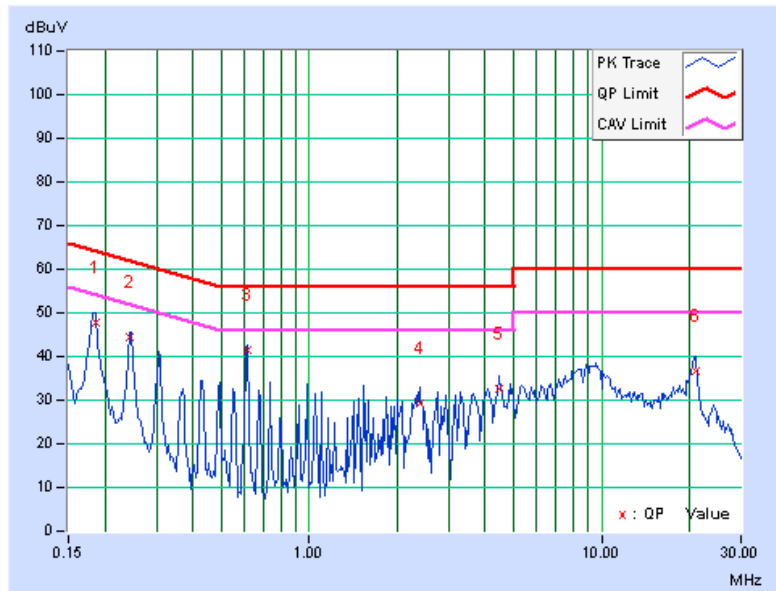
CONDUCTED WORST-CASE DATA : 802.11a

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18516	0.16	47.70	38.27	47.86	38.43	64.25	54.25	-16.39	-15.82
2	0.24375	0.18	44.24	37.02	44.42	37.20	61.97	51.97	-17.55	-14.77
3	0.61094	0.24	41.29	40.26	41.53	40.50	56.00	46.00	-14.47	-5.50
4	2.38672	0.31	28.81	20.67	29.12	20.98	56.00	46.00	-26.88	-25.02
5	4.47656	0.43	32.30	20.57	32.73	21.00	56.00	46.00	-23.27	-25.00
6	20.90234	1.28	35.49	28.02	36.77	29.30	60.00	50.00	-23.23	-20.70

REMARKS:

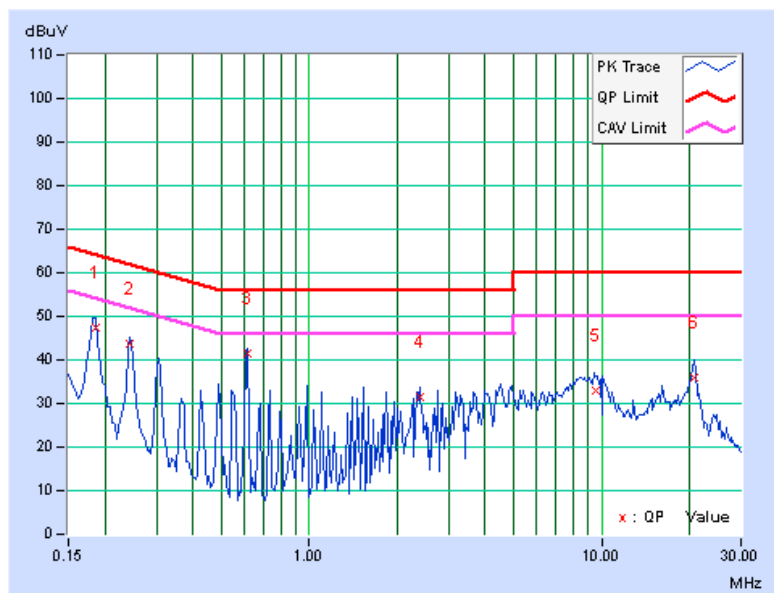
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18516	0.17	47.40	37.73	47.57	37.90	64.25	54.25	-16.68	-16.35
2	0.24375	0.19	43.68	35.85	43.87	36.04	61.97	51.97	-18.10	-15.93
3	0.61094	0.24	41.11	40.00	41.35	40.24	56.00	46.00	-14.65	-5.76
4	2.38281	0.30	31.26	22.21	31.56	22.51	56.00	46.00	-24.44	-23.49
5	9.55859	0.58	32.35	20.26	32.93	20.84	60.00	50.00	-27.07	-29.16
6	20.84375	0.96	34.95	27.39	35.91	28.35	60.00	50.00	-24.09	-21.65

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.





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5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

5.3.2 TEST SETUP

Same as item 4.3.2.

5.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.3.4 TEST PROCEDURE

Same as item 4.3.4.

5.3.5 DEVIATION FROM TEST STANDARD

No deviation.

5.3.6 EUT OPERATING CONDITIONS

Same as item 4.3.6.



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5.3.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.15	0.5	PASS
157	5785	15.18	0.5	PASS
165	5825	15.15	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	15.18	0.5	PASS
157	5785	15.15	0.5	PASS
165	5825	15.19	0.5	PASS



A D T

5.4 CONDUCTED OUTPUT POWER

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 MHz bands: 1 Watt (30dBm)

5.4.2 TEST SETUP

Same as Item 4.4.2.

5.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.4.4 TEST PROCEDURES

Same as Item 4.4.4.

5.4.5 DEVIATION FROM TEST STANDARD

No deviation.

5.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



A D T

5.4.7 TEST RESULTS

FOR PEAK POWER

802.11a

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	56.494	17.52	30	PASS
157	5785	53.703	17.30	30	PASS
165	5825	47.643	16.78	30	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	55.335	17.43	30	PASS
157	5785	52.602	17.21	30	PASS
165	5825	44.875	16.52	30	PASS



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FOR AVERAGE POWER

802.11a

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
149	5745	24.717	13.93
157	5785	22.029	13.43
165	5825	19.275	12.85

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
149	5745	24.266	13.85
157	5785	21.478	13.32
165	5825	17.947	12.54



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5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 TEST SETUP

Same as item 4.5.2.

5.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.5.4 TEST PROCEDURE.

Same as item 4.5.4.

5.5.5 DEVIATION FROM TEST STANDARD

No deviation.

5.5.6 EUT OPERATING CONDITION

Same as item 4.3.6.



A D T

5.5.7 TEST RESULTS

802.11a

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
149	5745	-9.52	8	PASS
157	5785	-9.00	8	PASS
165	5825	-9.12	8	PASS

802.11n (20MHz)

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
149	5745	-9.40	8	PASS
157	5785	-10.46	8	PASS
165	5825	-10.02	8	PASS



A D T

5.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

5.6.2 TEST SETUP

Same as Item 4.6.2

5.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

5.6.4 TEST PROCEDURE

Same as Item 4.6.4

5.6.5 DEVIATION FROM TEST STANDARD

No deviation.

5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.6.7 TEST RESULTS

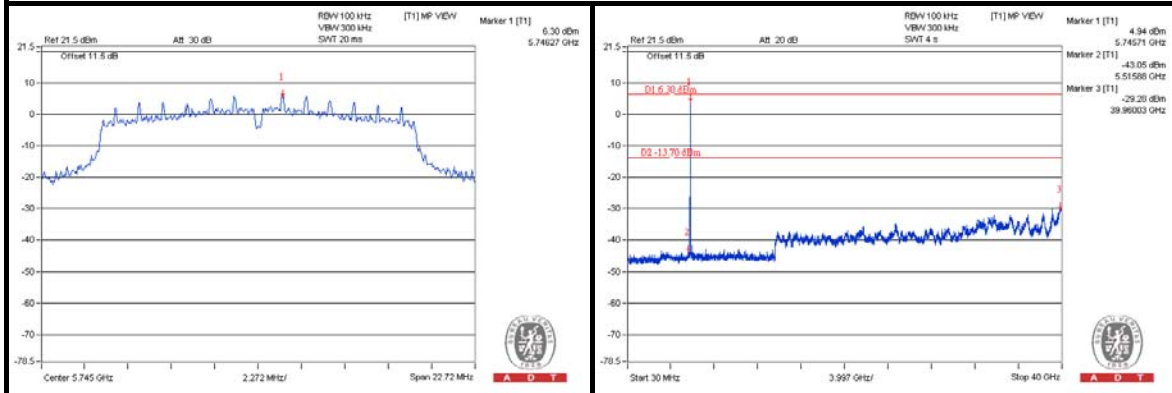
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



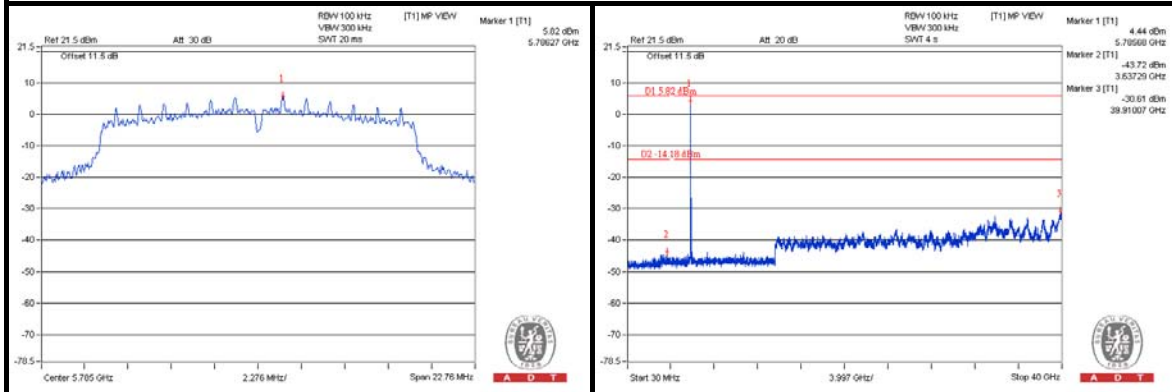
A D T

802.11a

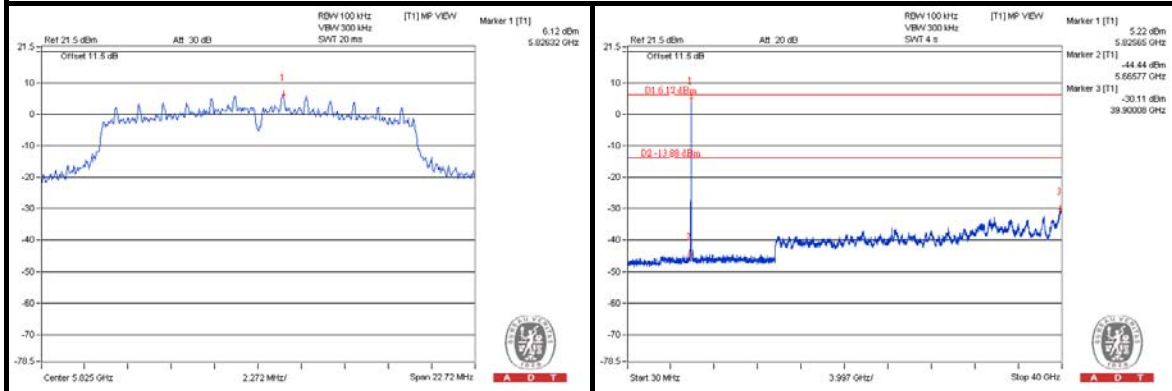
CH 149



CH 157



CH 165

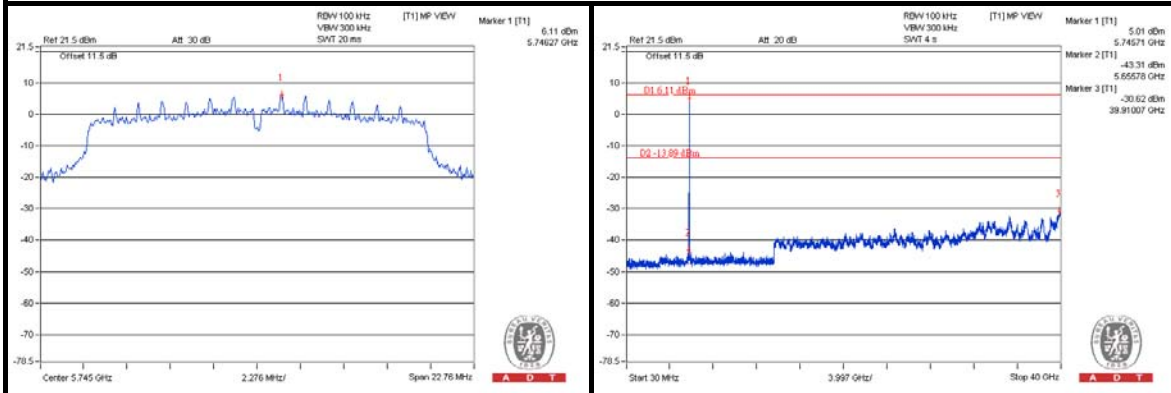




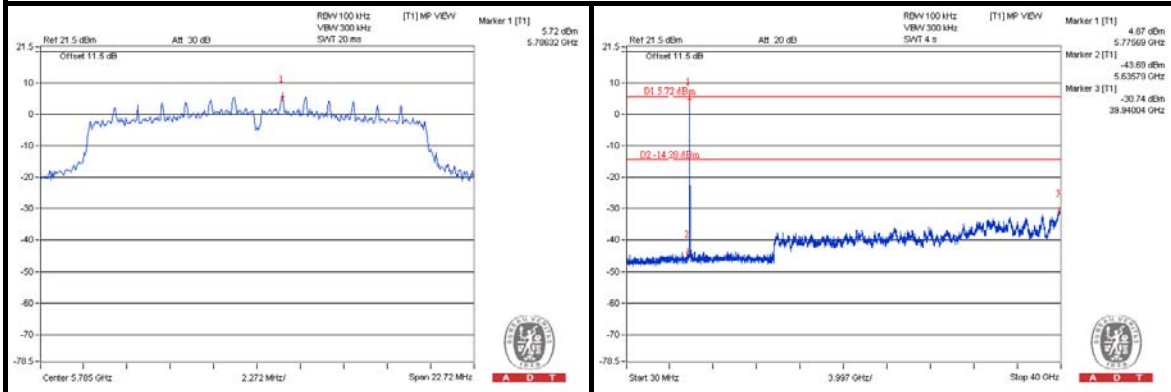
A D T

802.11n (20MHz)

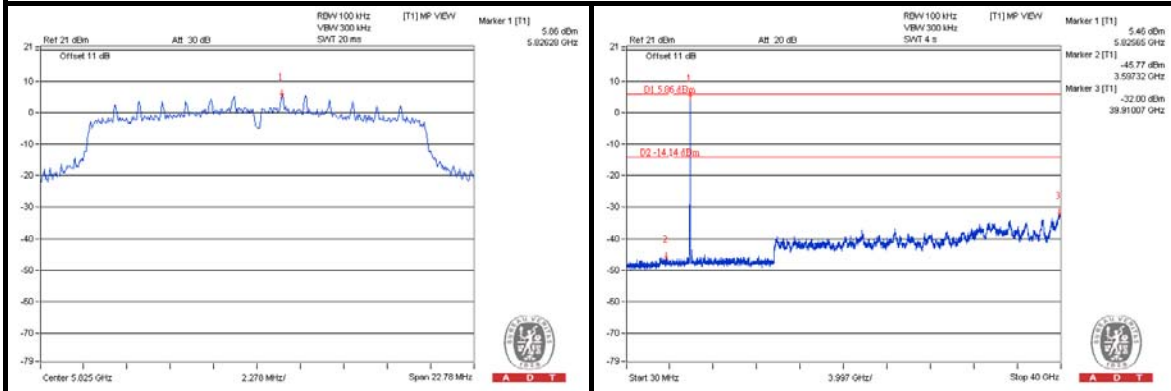
CH 149



CH 157



CH 165





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6. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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7. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.



A D T

8. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---