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FCC TEST REPORT

REPORT NO.: RF120529C25
MODEL NO.: NVG589
FCC ID: GZ5NVG589
RECEIVED: May 30, 2012
TESTED: Jun. 15 ~ Jun. 20, 2012
ISSUED: Jun. 22, 2012

APPLICANT: Motorola, Inc

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(H.K.) Ltd., Taoyuan Branch

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120529C25	Original release	Jun. 22, 2012



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1. CERTIFICATION

PRODUCT: VDSL Gateway
MODEL NO.: NVG589
BRAND: Motorola
APPLICANT: Motorola, Inc
TESTED: Jun. 15 ~ Jun. 20, 2012
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (model: NVG589) 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 : Andrea Hsia , DATE : Jun. 22, 2012
Andrea Hsia / Specialist

APPROVED BY : Gary Chang , DATE : Jun. 22, 2012
Gary Chang / Technical 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 -9.90dB at 0.17580MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 2390.00MHz.
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	No antenna connector is used.

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	150kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 200MHz	3.19dB
	200MHz ~1000MHz	3.21dB
	1GHz ~ 18GHz	2.26dB
	18GHz ~ 40GHz	1.94dB

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



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	VDSL Gateway
MODEL NO.	NVG589
POWER SUPPLY	12Vdc
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b:11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 130.0Mbps
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11
OUTPUT POWER	395.0mW
ANTENNA TYPE	PIFA antenna with 2.5dBi gain
ANTENNA CONNECTOR	NA
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter, Battery Backup

NOTE:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	1TX
802.11n (20MHz)	2TX

2. The EUT consumes power from the following adapter & Battery Backup.

ADAPTER	
BRAND:	MOTOROLA
MODEL:	NBSA36120300HU
INPUT:	100-120Vac, 50/60Hz, 1.2A
OUTPUT:	12Vdc, 3.0A
POWER LINE:	1.8m non-shielded cable without core

Battery Backup	
BRAND:	BELKIN
MODEL:	BU3DC001-12V
INPUT:	120Vac, 45-65Hz, 1A
OUTPUT:	12Vdc, 3.0A Max
POWER LINE:	1.8m non-shielded cable without core

3. 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

11 channels are provided for 802.11b, 802.11g and 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		

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A1	√	√	√	√	Power from AC adapter & EUT with X-Plane
A2	-	√	-	-	Power from AC adapter & EUT with Z-Plane
B1	-	√	√	-	Power from Battery Backup & EUT with X-Plan
B2	-	√	-	-	Power from Battery Backup & EUT with Z-Plan

Where **RE≥1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: “-” means no effect.

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)	AXIS
A1	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	X
A1	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0	X
A1	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	X

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)	AXIS
A1	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	X
A2	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	Z
B1	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	X
B2	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	Z



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)	AXIS
A1	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	X
B1	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	6.5	X

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)
A1	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
A1	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
A1	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).
- 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)
A1	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A1	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A1	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5



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TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	21deg. C, 68%RH	120Vac, 60Hz	Haru Yang
RE $<$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Haru Yang
PLC	23deg. C, 65%RH	120Vac, 60Hz	Felix Chen
APCM	21deg. C, 68%RH	120Vac, 60Hz	Haru Yang

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	D820	21498926752	NA
2	TELEPHONE	WONDER	WD-303	3C17IA03847	NA
3	USB Dongle	Transcend	V85	569992-8271	NA

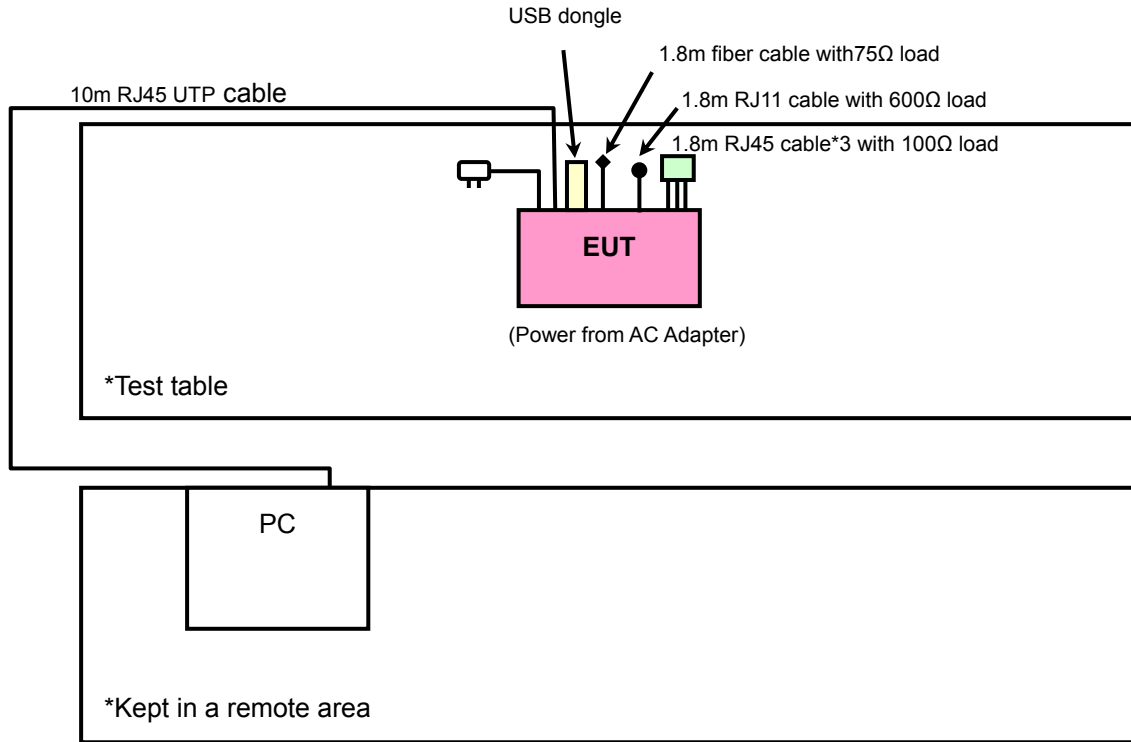
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8m RJ45 cable
2	1.8m RJ11 cable
3	NA

NOTE:

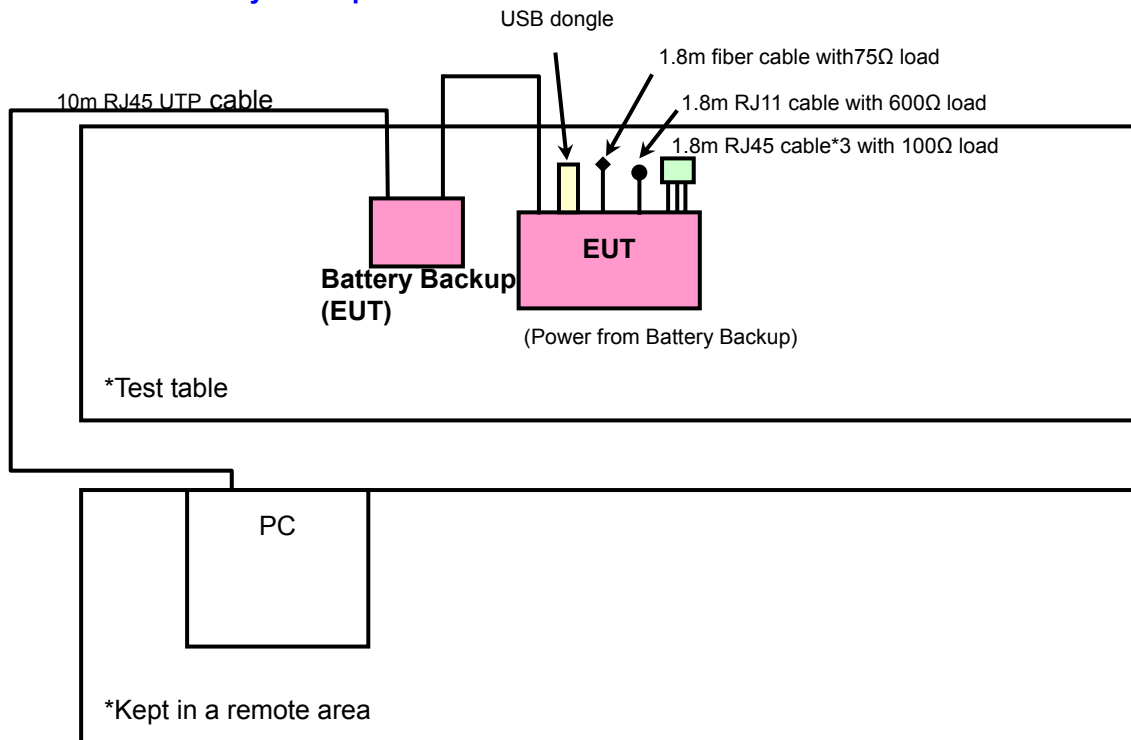
1. All power cords of the above support units are non shielded (1.8m).
2. Item 1 acted as communication partner to transfer data.

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST

POWER FROM ADAPTER



POWER FROM Battery Backup





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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 v01

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

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 30dB 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.



4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	Aug. 02, 2011	Aug. 01, 2012
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Jul. 21, 2011	Jul. 20, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Apr. 06, 2012	Apr. 05, 2013
HORN Antenna SCHWARZBECK	9120D	209	Aug. 25, 2011	Aug. 24, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 20, 2011	Jul. 19, 2012
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8449B	3008A01964	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 30, 2011	Aug. 29, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 30, 2011	Aug. 29, 2012
Software ADT.	ADT_Radiated_ V7.6.15.9.2	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 ADT.	TT100	TT93021703	NA	NA
Turn Table Controller ADT.	SC100	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Aug. 04, 2011	Aug. 03, 2012
Power Sensor	MA2411B	0738171	Aug. 04, 2011	Aug. 03, 2012

- 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. Height of receiving antenna 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.

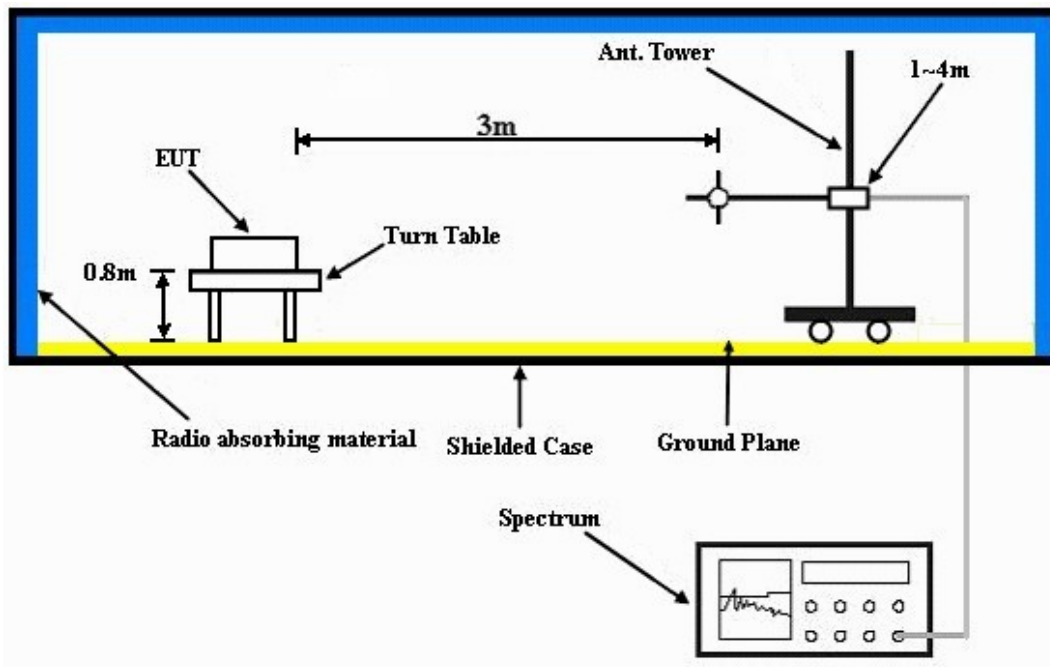
NOTE:

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 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 10Hz 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. Placed the EUT on the testing table.
- b. Prepared PC to act as communication partner and placed it outside of testing area.
- c. The communication partner connected with EUT via a RJ45 cable and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- d. The communication partner sent data to EUT by command "PING".
- e. The necessary accessories enable the system in full functions.



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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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	65.2 PK	74.0	-8.8	1.10 H	0	33.90	31.30
2	2390.00	52.7 AV	54.0	-1.3	1.10 H	0	21.40	31.30
3	*2412.00	118.6 PK			1.10 H	0	87.20	31.40
4	*2412.00	114.9 AV			1.10 H	0	83.50	31.40
5	4824.00	46.5 PK	74.0	-27.5	1.07 H	351	9.30	37.20
6	4824.00	36.1 AV	54.0	-17.9	1.07 H	351	-1.10	37.20
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	58.6 PK	74.0	-15.4	1.71 V	84	27.30	31.30
2	2390.00	46.7 AV	54.0	-7.3	1.71 V	84	15.40	31.30
3	*2412.00	111.8 PK			1.71 V	84	80.40	31.40
4	*2412.00	107.8 AV			1.71 V	84	76.40	31.40
5	4824.00	46.3 PK	74.0	-27.7	1.64 V	308	9.10	37.20
6	4824.00	35.3 AV	54.0	-18.7	1.64 V	308	-1.90	37.20

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).
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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	66.6 PK	74.0	-7.4	1.09 H	6	35.30	31.30
2	2390.00	52.9 AV	54.0	-1.1	1.09 H	6	21.60	31.30
3	*2437.00	120.1 PK			1.08 H	6	88.60	31.50
4	*2437.00	116.0 AV			1.08 H	6	84.50	31.50
5	4874.00	46.9 PK	74.0	-27.1	1.03 H	0	9.60	37.30
6	4874.00	37.0 AV	54.0	-17.0	1.03 H	0	-0.30	37.30
7	7311.00	54.2 PK	74.0	-19.8	1.48 H	0	10.70	43.50
8	7311.00	44.9 AV	54.0	-9.1	1.48 H	0	1.40	43.50
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	2390.00	60.0 PK	74.0	-14.0	2.11 V	89	28.70	31.30
2	2390.00	48.3 AV	54.0	-5.7	2.11 V	89	17.00	31.30
3	*2437.00	112.1 PK			2.11 V	89	80.60	31.50
4	*2437.00	108.1 AV			2.11 V	89	76.60	31.50
5	4874.00	46.2 PK	74.0	-27.8	1.59 V	304	8.90	37.30
6	4874.00	36.1 AV	54.0	-17.9	1.59 V	304	-1.20	37.30
7	7311.00	54.7 PK	74.0	-19.3	1.83 V	193	11.20	43.50
8	7311.00	46.0 AV	54.0	-8.0	1.83 V	193	2.50	43.50

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.



A D T

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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	118.8 PK			1.07 H	358	87.20	31.60
2	*2462.00	115.0 AV			1.07 H	358	83.40	31.60
3	2483.50	64.4 PK	74.0	-9.6	1.07 H	358	32.80	31.60
4	2483.50	52.2 AV	54.0	-1.8	1.07 H	358	20.60	31.60
5	4924.00	46.8 PK	74.0	-27.2	1.04 H	354	9.40	37.40
6	4924.00	34.3 AV	54.0	-19.7	1.04 H	354	-3.10	37.40
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	*2462.00	112.0 PK			2.09 V	89	80.40	31.60
2	*2462.00	108.0 AV			2.09 V	89	76.40	31.60
3	2483.50	59.8 PK	74.0	-14.2	2.09 V	89	28.20	31.60
4	2483.50	47.4 AV	54.0	-6.6	2.09 V	89	15.80	31.60
5	4924.00	46.3 PK	74.0	-27.7	1.84 V	306	8.90	37.40
6	4924.00	33.8 AV	54.0	-20.2	1.84 V	306	-3.60	37.40

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.



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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	72.4 PK	74.0	-1.6	1.08 H	354	41.10	31.30
2	2390.00	52.9 AV	54.0	-1.1	1.08 H	354	21.60	31.30
3	*2412.00	118.8 PK			1.12 H	360	87.40	31.40
4	*2412.00	105.9 AV			1.12 H	360	74.50	31.40
5	4824.00	45.7 PK	74.0	-28.3	1.03 H	337	8.50	37.20
6	4824.00	32.6 AV	54.0	-21.4	1.03 H	337	-4.60	37.20

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	62.1 PK	74.0	-11.9	1.70 V	83	30.80	31.30
2	2390.00	46.5 AV	54.0	-7.5	1.70 V	83	15.20	31.30
3	*2412.00	111.9 PK			1.70 V	83	80.50	31.40
4	*2412.00	98.4 AV			1.70 V	83	67.00	31.40
5	4824.00	46.3 PK	74.0	-27.7	1.85 V	310	9.10	37.20
6	4824.00	33.1 AV	54.0	-20.9	1.85 V	310	-4.10	37.20

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).
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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	66.9 PK	74.0	-7.1	1.05 H	12	35.60	31.30
2	2390.00	52.7 AV	54.0	-1.3	1.05 H	12	21.40	31.30
3	*2437.00	123.8 PK			1.09 H	3	92.30	31.50
4	*2437.00	110.4 AV			1.09 H	3	78.90	31.50
5	4874.00	45.5 PK	74.0	-28.5	1.04 H	12	8.20	37.30
6	4874.00	33.2 AV	54.0	-20.8	1.04 H	12	-4.10	37.30
7	7311.00	55.6 PK	74.0	-18.4	1.48 H	8	12.10	43.50
8	7311.00	43.4 AV	54.0	-10.6	1.48 H	8	-0.10	43.50
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	2390.00	59.9 PK	74.0	-14.1	2.10 V	90	28.60	31.30
2	2390.00	48.2 AV	54.0	-5.8	2.10 V	90	16.90	31.30
3	*2437.00	116.3 PK			2.10 V	90	84.80	31.50
4	*2437.00	102.7 AV			2.10 V	90	71.20	31.50
5	4874.00	46.4 PK	74.0	-27.6	1.55 V	284	9.10	37.30
6	4874.00	33.6 AV	54.0	-20.4	1.55 V	284	-3.70	37.30
7	7311.00	56.9 PK	74.0	-17.1	1.80 V	194	13.40	43.50
8	7311.00	44.3 AV	54.0	-9.7	1.80 V	194	0.80	43.50

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.



A D T

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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	118.9 PK			1.08 H	1	87.30	31.60
2	*2462.00	105.9 AV			1.08 H	1	74.30	31.60
3	2483.50	72.7 PK	74.0	-1.3	1.06 H	5	41.10	31.60
4	2483.50	52.7 AV	54.0	-1.3	1.06 H	5	21.10	31.60
5	4924.00	46.1 PK	74.0	-27.9	1.04 H	342	8.70	37.40
6	4924.00	33.3 AV	54.0	-20.7	1.04 H	342	-4.10	37.40
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	*2462.00	111.6 PK			2.06 V	90	80.00	31.60
2	*2462.00	98.9 AV			2.06 V	90	67.30	31.60
3	2483.50	66.6 PK	74.0	-7.4	2.06 V	90	35.00	31.60
4	2483.50	48.4 AV	54.0	-5.6	2.06 V	90	16.80	31.60
5	4924.00	46.8 PK	74.0	-27.2	1.88 V	307	9.40	37.40
6	4924.00	33.7 AV	54.0	-20.3	1.88 V	307	-3.70	37.40

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.



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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	66.5 PK	74.0	-7.5	1.11 H	325	35.20	31.30
2	2390.00	52.8 AV	54.0	-1.2	1.11 H	325	21.50	31.30
3	*2412.00	115.5 PK			1.11 H	325	84.10	31.40
4	*2412.00	102.3 AV			1.11 H	325	70.90	31.40
5	4824.00	46.5 PK	74.0	-27.5	1.04 H	328	9.30	37.20
6	4824.00	32.7 AV	54.0	-21.3	1.04 H	328	-4.50	37.20

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	58.4 PK	74.0	-15.6	1.71 V	85	27.10	31.30
2	2390.00	46.1 AV	54.0	-7.9	1.71 V	85	14.80	31.30
3	*2412.00	108.7 PK			1.71 V	85	77.30	31.40
4	*2412.00	95.9 AV			1.71 V	85	64.50	31.40
5	4824.00	53.6 PK	74.0	-20.4	1.77 V	302	16.40	37.20
6	4824.00	33.3 AV	54.0	-20.7	1.77 V	302	-3.90	37.20

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).
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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	64.0 PK	74.0	-10.0	1.10 H	1	32.70	31.30
2	2390.00	51.7 AV	54.0	-2.3	1.10 H	1	20.40	31.30
3	*2437.00	119.5 PK			1.10 H	1	88.00	31.50
4	*2437.00	106.7 AV			1.10 H	1	75.20	31.50
5	4874.00	45.7 PK	74.0	-28.3	1.07 H	149	8.40	37.30
6	4874.00	33.5 AV	54.0	-20.5	1.07 H	149	-3.80	37.30
7	7311.00	55.8 PK	74.0	-18.2	1.50 H	11	12.30	43.50
8	7311.00	43.2 AV	54.0	-10.8	1.50 H	11	-0.30	43.50
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	2390.00	59.6 PK	74.0	-14.4	1.12 V	83	28.30	31.30
2	2390.00	48.2 AV	54.0	-5.8	1.12 V	83	16.90	31.30
3	*2437.00	113.6 PK			1.12 V	83	82.10	31.50
4	*2437.00	100.8 AV			1.12 V	83	69.30	31.50
5	4874.00	46.8 PK	74.0	-27.2	1.52 V	276	9.50	37.30
6	4874.00	33.5 AV	54.0	-20.5	1.52 V	276	-3.80	37.30
7	7311.00	56.6 PK	74.0	-17.4	1.83 V	191	13.10	43.50
8	7311.00	44.2 AV	54.0	-9.8	1.83 V	191	0.70	43.50

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).
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	21deg. C, 68%RH	TESTED BY	Haru Yang

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	115.2 PK			1.08 H	1	83.60	31.60
2	*2462.00	102.9 AV			1.08 H	1	71.30	31.60
3	2483.50	69.0 PK	74.0	-5.0	1.10 H	21	37.40	31.60
4	2483.50	52.7 AV	54.0	-1.3	1.10 H	21	21.10	31.60
5	4924.00	46.3 PK	74.0	-27.7	1.00 H	318	8.90	37.40
6	4924.00	33.2 AV	54.0	-20.8	1.00 H	318	-4.20	37.40
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	*2462.00	111.2 PK			1.07 V	83	79.60	31.60
2	*2462.00	98.3 AV			1.07 V	83	66.70	31.60
3	2483.50	64.5 PK	74.0	-9.5	1.07 V	83	32.90	31.60
4	2483.50	49.2 AV	54.0	-4.8	1.07 V	83	17.60	31.60
5	4924.00	47.1 PK	74.0	-26.9	1.87 V	296	9.70	37.40
6	4924.00	34.2 AV	54.0	-19.8	1.87 V	296	-3.20	37.40

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.



A D T

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TEST MODE	A1
TESTED BY	Haru Yang		

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	249.60	34.5 QP	46.0	-11.5	1.24 H	161	21.50	13.00
2	374.04	35.1 QP	46.0	-10.9	1.00 H	116	18.20	16.90
3	560.69	36.8 QP	46.0	-9.2	1.50 H	187	15.60	21.20
4	624.85	39.0 QP	46.0	-7.0	1.24 H	178	16.70	22.30
5	720.12	34.8 QP	46.0	-11.2	1.00 H	196	11.30	23.50
6	875.67	37.2 QP	46.0	-8.8	1.00 H	148	10.70	26.50

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	55.40	35.0 QP	40.0	-5.0	1.02 V	304	21.30	13.70
2	105.73	33.1 QP	43.5	-10.4	1.25 V	107	23.00	10.10
3	374.04	37.2 QP	46.0	-8.8	1.25 V	161	20.30	16.90
4	479.03	36.0 QP	46.0	-10.0	1.00 V	167	16.60	19.40
5	640.41	36.7 QP	46.0	-9.3	1.50 V	159	14.20	22.50
6	799.84	37.2 QP	46.0	-8.8	1.00 V	142	11.60	25.60

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TEST MODE	A2
TESTED BY	Haru Yang		

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	125.17	33.8 QP	43.5	-9.7	1.50 H	66	21.50	12.30
2	374.04	38.8 QP	46.0	-7.2	1.00 H	118	21.90	16.90
3	560.69	37.2 QP	46.0	-8.8	1.24 H	114	16.00	21.20
4	640.41	39.4 QP	46.0	-6.6	1.00 H	118	16.90	22.50
5	720.12	37.0 QP	46.0	-9.0	1.00 H	120	13.50	23.50
6	799.84	38.3 QP	46.0	-7.7	1.00 H	130	12.70	25.60
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	55.68	35.5 QP	40.0	-4.5	1.03 V	344	21.80	13.70
2	125.17	34.2 QP	43.5	-9.3	1.00 V	6	21.90	12.30
3	374.04	37.2 QP	46.0	-8.8	1.00 V	188	20.30	16.90
4	624.85	38.4 QP	46.0	-7.6	1.75 V	167	16.10	22.30
5	799.84	36.9 QP	46.0	-9.1	1.25 V	60	11.30	25.60
6	875.67	36.7 QP	46.0	-9.3	1.00 V	95	10.20	26.50

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TEST MODE	B1
TESTED BY	Haru Yang		

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	96.01	30.4 QP	43.5	-13.1	1.99 H	220	21.50	8.90
2	239.88	31.7 QP	46.0	-14.3	1.00 H	257	19.10	12.60
3	374.04	36.7 QP	46.0	-9.3	1.00 H	119	19.80	16.90
4	479.03	37.1 QP	46.0	-8.9	1.74 H	121	17.70	19.40
5	640.41	39.2 QP	46.0	-6.8	1.24 H	132	16.70	22.50
6	799.84	39.5 QP	46.0	-6.5	1.00 H	140	13.90	25.60
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	55.30	34.5 QP	40.0	-5.5	1.47 V	4	20.80	13.70
2	374.04	36.1 QP	46.0	-9.9	1.24 V	181	19.20	16.90
3	479.03	36.9 QP	46.0	-9.1	1.00 V	202	17.50	19.40
4	640.41	38.3 QP	46.0	-7.7	1.50 V	163	15.80	22.50
5	799.84	36.8 QP	46.0	-9.2	1.99 V	153	11.20	25.60
6	875.67	36.6 QP	46.0	-9.4	1.74 V	157	10.10	26.50

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TEST MODE	B2
TESTED BY	Haru Yang		

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	125.17	33.0 QP	43.5	-10.5	1.50 H	75	20.70	12.30
2	319.60	34.3 QP	46.0	-11.7	1.00 H	85	18.80	15.50
3	374.04	40.7 QP	46.0	-5.3	1.00 H	128	23.80	16.90
4	560.69	37.2 QP	46.0	-8.8	1.24 H	134	16.00	21.20
5	640.41	39.1 QP	46.0	-6.9	1.00 H	123	16.60	22.50
6	799.84	40.2 QP	46.0	-5.8	1.00 H	129	14.60	25.60
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	43.58	35.5 QP	40.0	-4.5	1.77 V	203	21.60	13.90
2	125.17	34.1 QP	43.5	-9.4	1.00 V	19	21.80	12.30
3	374.04	36.8 QP	46.0	-9.2	1.25 V	197	19.90	16.90
4	479.03	35.5 QP	46.0	-10.5	1.00 V	233	16.10	19.40
5	624.85	36.6 QP	46.0	-9.4	1.75 V	154	14.30	22.30
6	799.84	36.1 QP	46.0	-9.9	1.25 V	150	10.50	25.60

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).
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. 19, 2011	Nov. 18, 2012
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 29, 2011	Dec. 28, 2012
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 30, 2011	Dec. 29, 2012
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 07, 2011	Jul. 06, 2012
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 2.
 3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

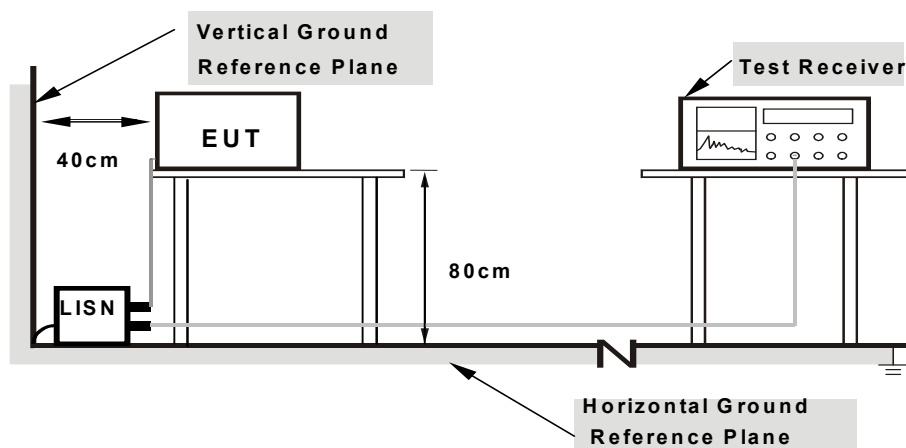
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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:**
- Support units were connected to second LISN.
 - Both of LISNs (AMN) are 80 cm from EUT and at least 80 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.

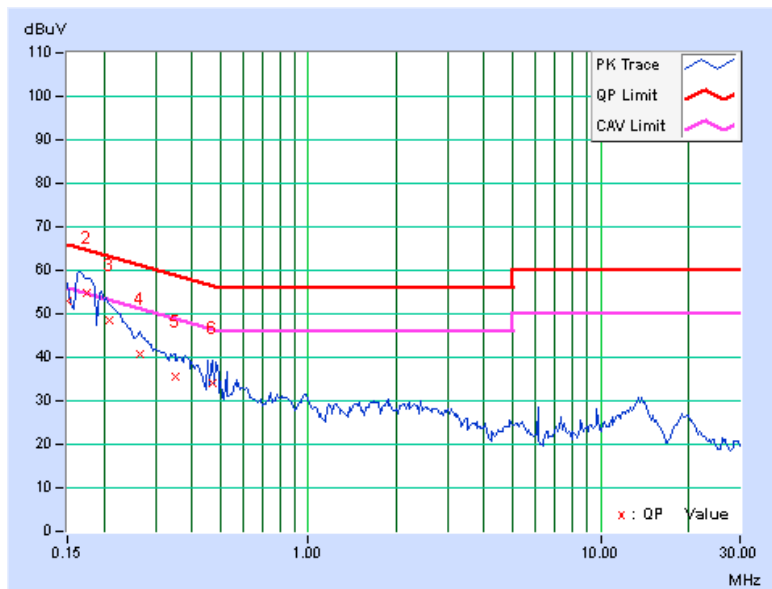
4.2.7 TEST RESULTS

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

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A1		

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	0.15000	0.17	52.73	24.48	52.90	24.65	66.00	56.00	-13.10	-31.35
2	0.17580	0.17	54.61	36.35	54.78	36.52	64.68	54.68	-9.90	-18.16
3	0.20958	0.17	48.26	31.30	48.43	31.47	63.22	53.22	-14.79	-21.75
4	0.26719	0.18	40.44	22.21	40.62	22.39	61.20	51.20	-20.58	-28.81
5	0.34922	0.19	35.47	17.69	35.66	17.88	58.98	48.98	-23.32	-31.10
6	0.47031	0.20	33.80	22.79	34.00	22.99	56.51	46.51	-22.50	-23.51

- 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
TEST MODE	A1		

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	0.15391	0.17	50.80	24.01	50.97	24.18	65.79	55.79	-14.82	-31.61
2	0.17344	0.16	53.64	35.55	53.80	35.71	64.79	54.79	-10.99	-19.08
3	0.20469	0.15	47.57	29.24	47.72	29.39	63.42	53.42	-15.70	-24.03
4	0.23966	0.16	42.17	23.77	42.33	23.93	62.11	52.11	-19.78	-28.18
5	0.28281	0.16	38.37	22.83	38.53	22.99	60.73	50.73	-22.20	-27.74
6	0.48203	0.18	31.43	16.74	31.61	16.92	56.30	46.30	-24.69	-29.38

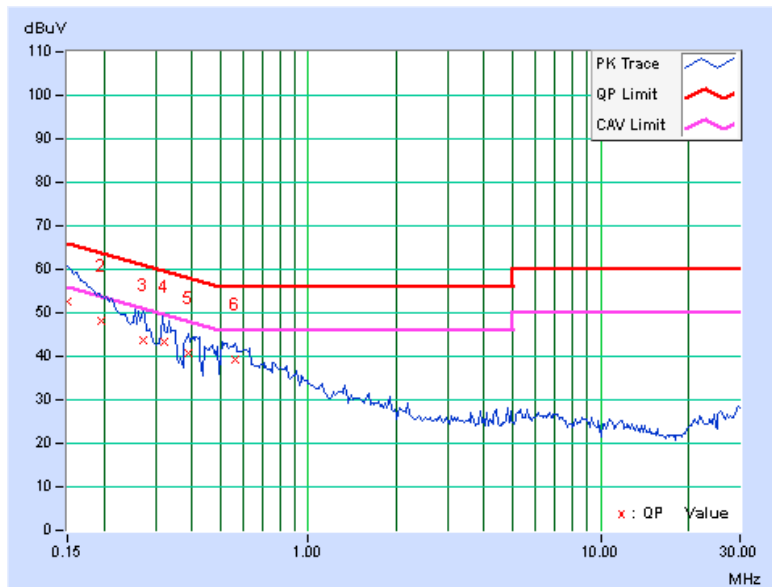
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. The emission levels of other frequencies were very low against the limit.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor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



PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B1		

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	0.15000	0.15	52.35	29.48	52.50	29.63	66.00	56.00	-13.50	-26.37
2	0.19552	0.15	48.12	39.78	48.27	39.93	63.80	53.80	-15.53	-13.87
3	0.27109	0.16	43.65	36.98	43.81	37.14	61.08	51.08	-17.28	-13.95
4	0.32179	0.16	43.22	34.70	43.38	34.86	59.66	49.66	-16.28	-14.80
5	0.38828	0.17	40.73	31.92	40.90	32.09	58.10	48.10	-17.20	-16.01
6	0.56406	0.18	39.04	28.19	39.22	28.37	56.00	46.00	-16.78	-17.63

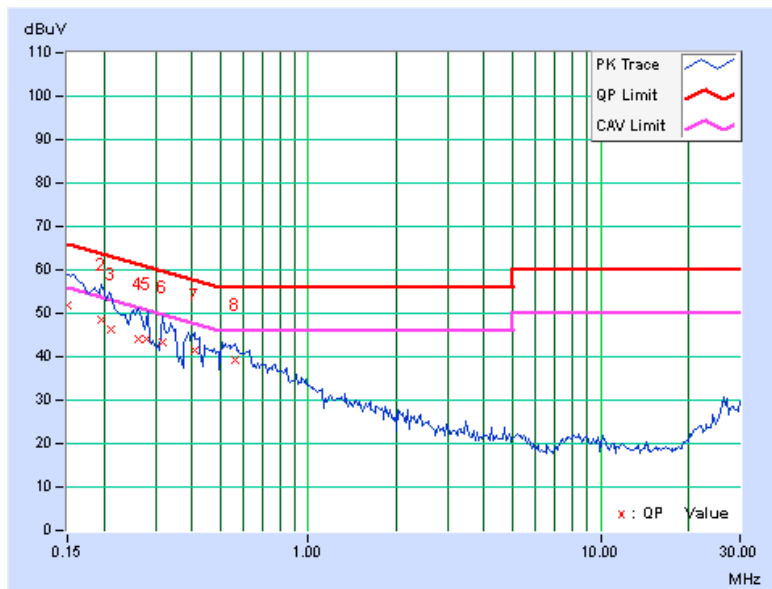
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. The emission levels of other frequencies were very low against the limit.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor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



PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B1		

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	0.15000	0.13	51.87	27.98	52.00	28.11	66.00	56.00	-14.00	-27.89
2	0.19687	0.14	48.38	40.02	48.52	40.16	63.74	53.74	-15.22	-13.58
3	0.21250	0.14	46.03	34.20	46.17	34.34	63.11	53.11	-16.94	-18.77
4	0.26328	0.15	44.05	36.91	44.20	37.06	61.33	51.33	-17.13	-14.27
5	0.28026	0.15	43.87	33.88	44.02	34.03	60.81	50.81	-16.79	-16.78
6	0.31797	0.15	43.31	33.94	43.46	34.09	59.76	49.76	-16.30	-15.67
7	0.40781	0.16	41.18	32.39	41.34	32.55	57.69	47.69	-16.35	-15.14
8	0.56406	0.17	39.06	28.23	39.23	28.40	56.00	46.00	-16.77	-17.60

- 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.

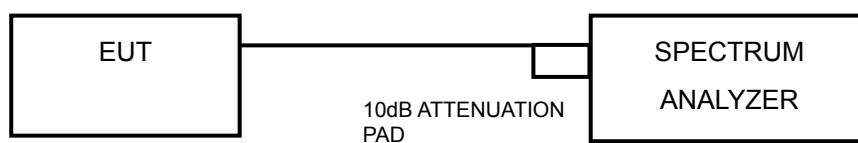


4.3 6dB BANDWIDTH MEASUREMENT

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) = approximately 1% of the emission bandwidth
- 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.



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4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.12	0.5	PASS
6	2437	8.11	0.5	PASS
11	2462	8.14	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.52	0.5	PASS
6	2437	16.57	0.5	PASS
11	2462	16.56	0.5	PASS

802.11n (20MHz)

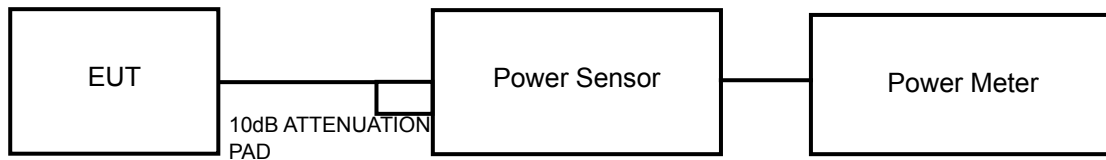
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	17.78	17.76	0.5	PASS
6	2437	17.48	17.76	0.5	PASS
11	2462	17.75	17.77	0.5	PASS

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

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

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



4.4.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	311.2	24.93	30	PASS
6	2437	341.2	25.33	30	PASS
11	2462	331.9	25.21	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	144.9	21.61	30	PASS
6	2437	351.6	25.46	30	PASS
11	2462	141.3	21.50	30	PASS

802.11n (20MHz)

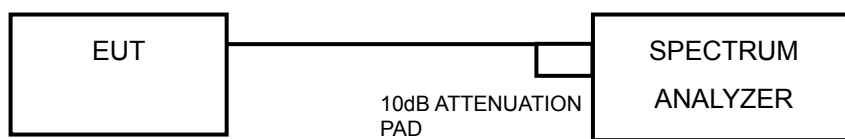
CHAN.	FREQ. (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	17.65	17.93	120.3	20.8	30	PASS
6	2437	23.00	22.91	395.0	26.0	30	PASS
11	2462	19.43	19.11	169.2	22.3	30	PASS

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

- a. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = average.
- b. Sweep time = 26s, Trace mode = max hold, allow trace to fully stabilize.
- c. Use the average marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- d. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3\text{ kHz}/100\text{kHz})$

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6



4.5.7 TEST RESULTS

802.11b

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	8.00	-7.23	8	PASS
6	2437	8.39	-6.84	8	PASS
11	2462	8.09	-7.14	8	PASS

802.11g

Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	1.76	-13.47	8	PASS
6	2437	5.57	-9.66	8	PASS
11	2462	1.58	-13.65	8	PASS

802.11n (20MHz)

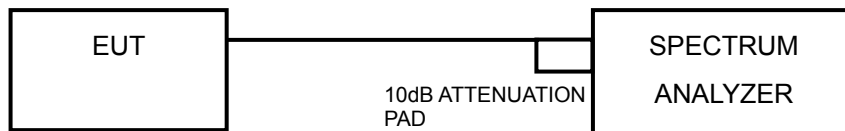
TX chain	Channel	FREQ. (MHz)	PSD (dBm/100kHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-2.38	-17.61	3.01	-14.60	8	PASS
	6	2437	2.94	-12.29	3.01	-9.28	8	PASS
	11	2462	-0.76	-15.99	3.01	-12.98	8	PASS
1	1	2412	-2.41	-17.64	3.01	-14.63	8	PASS
	6	2437	2.46	-12.77	3.01	-9.76	8	PASS
	11	2462	-1.00	-16.23	3.01	-13.22	8	PASS

4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below -30dB 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

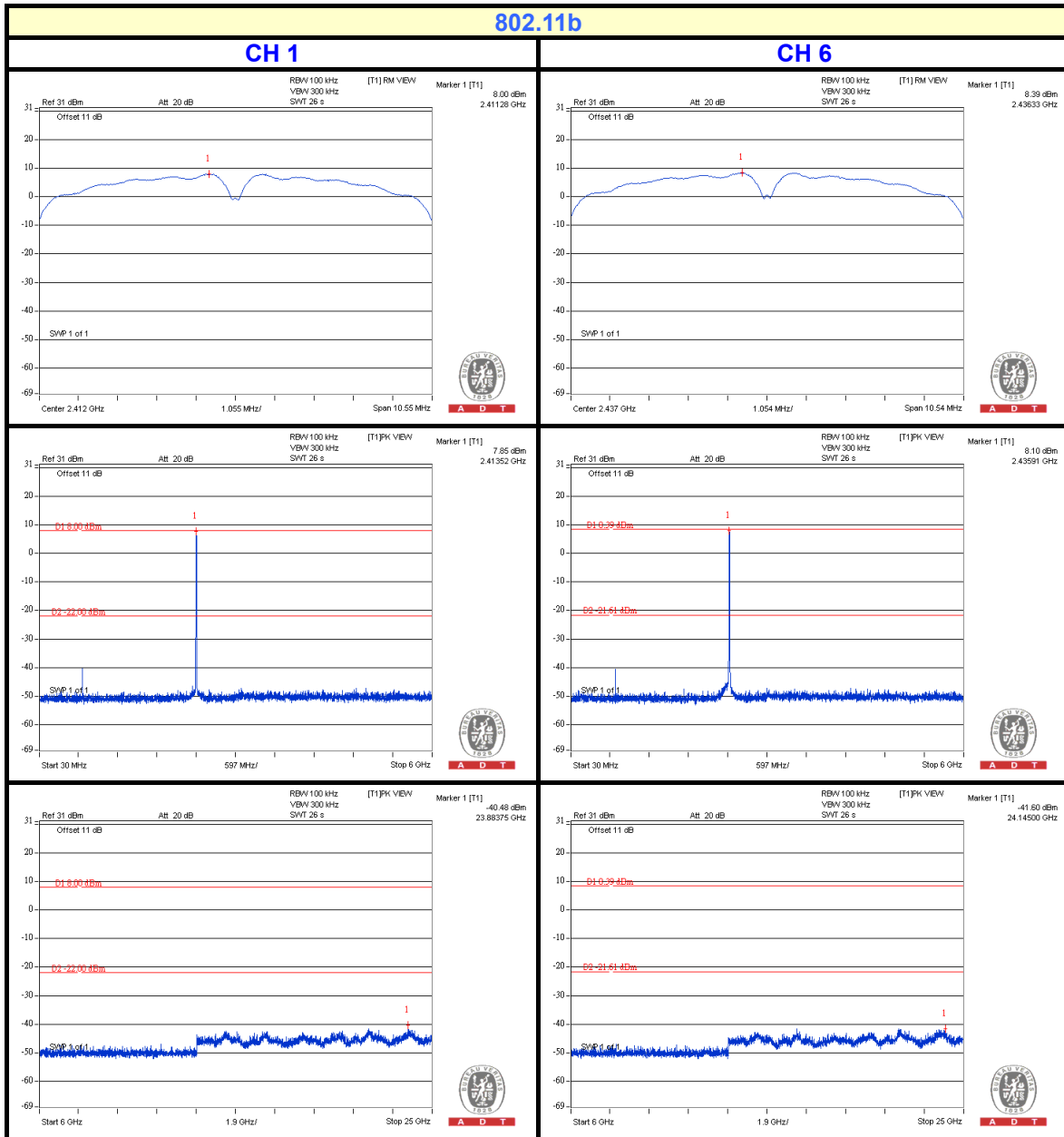
4.6.7 TEST RESULTS

The conducted emission test is performed on each TX port of operating mode without summing or adding $10\log(N)$ since the limit is relative emission limit. Only worst data of each operating mode is presented.

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

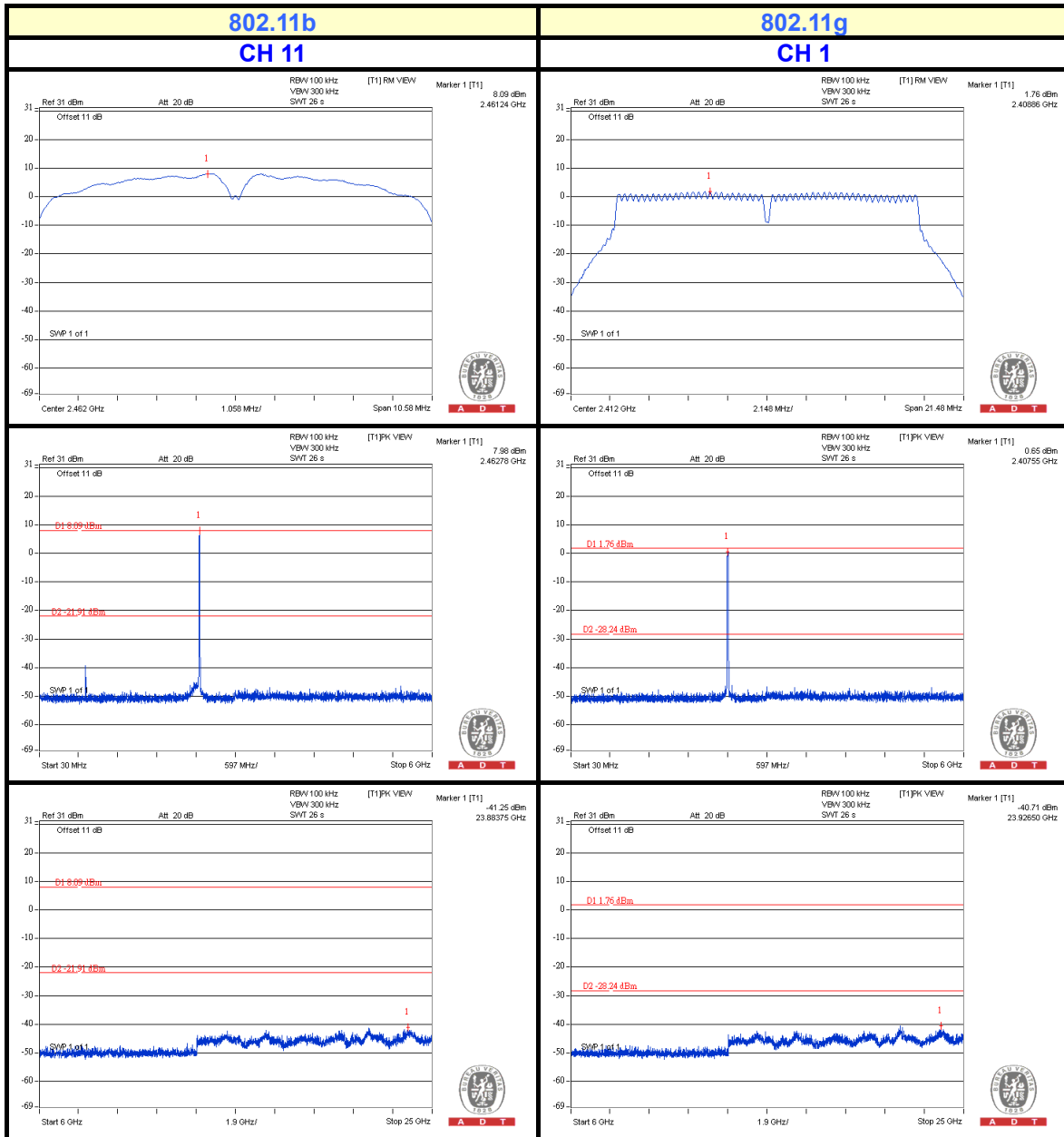


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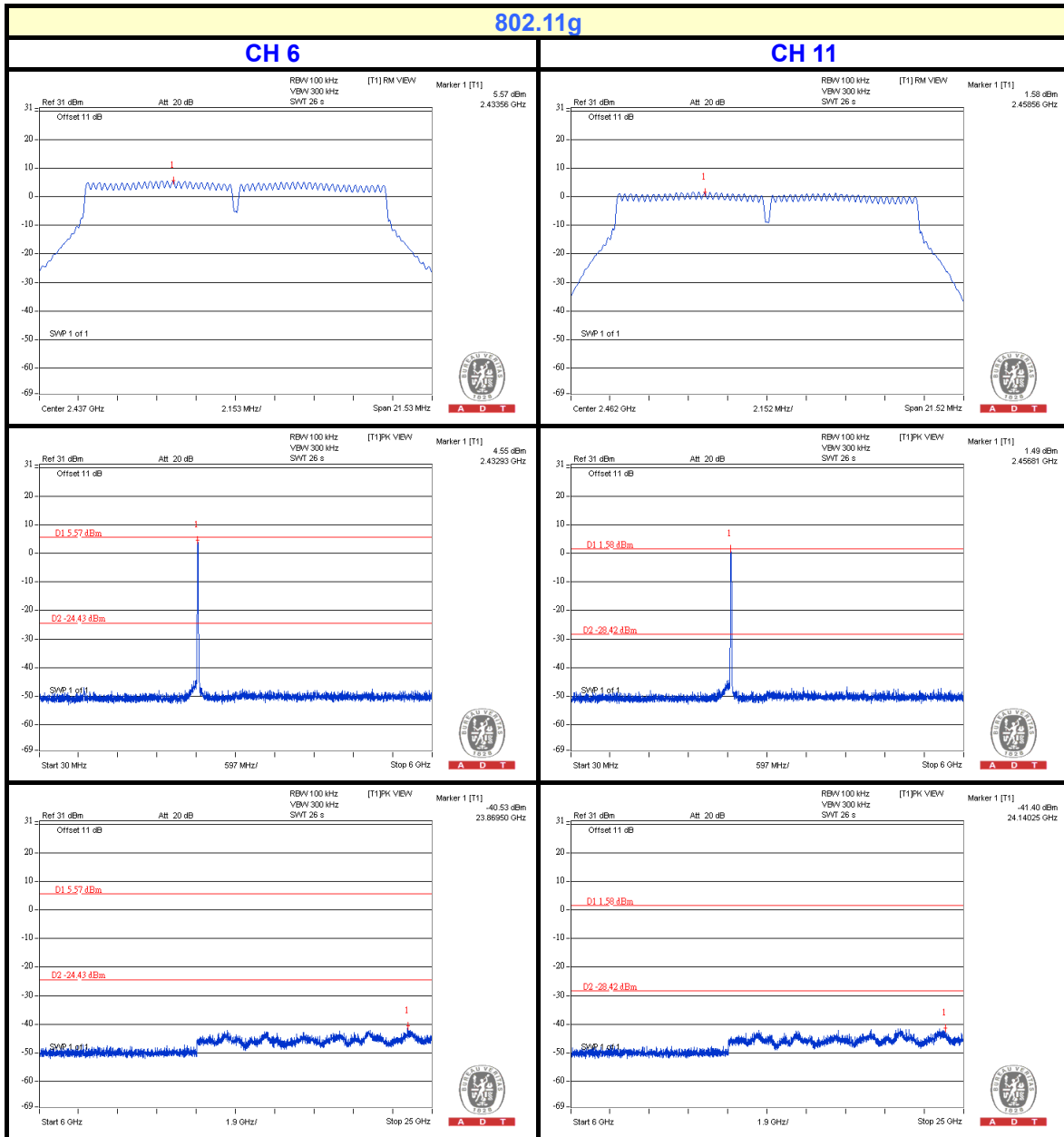


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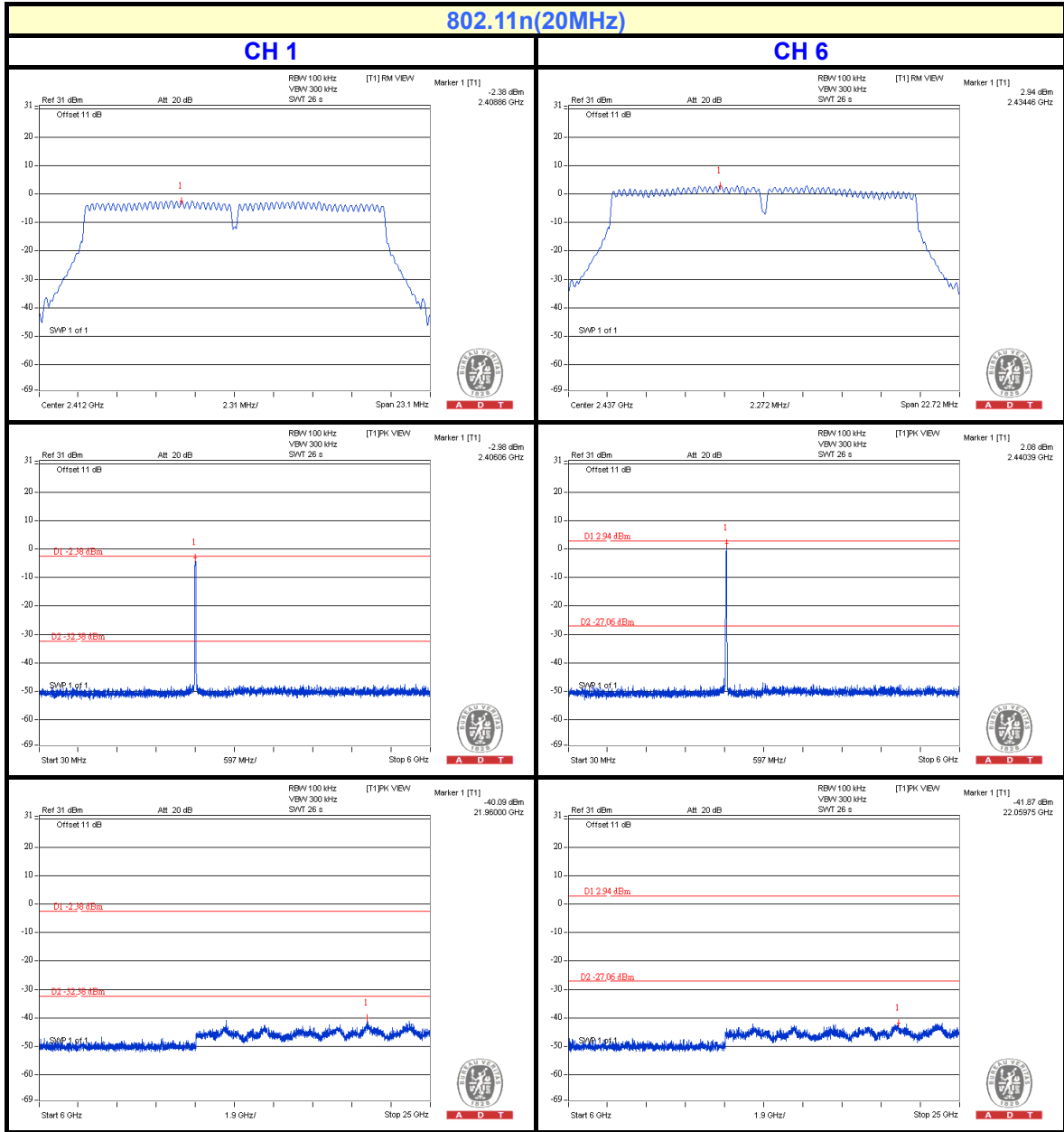


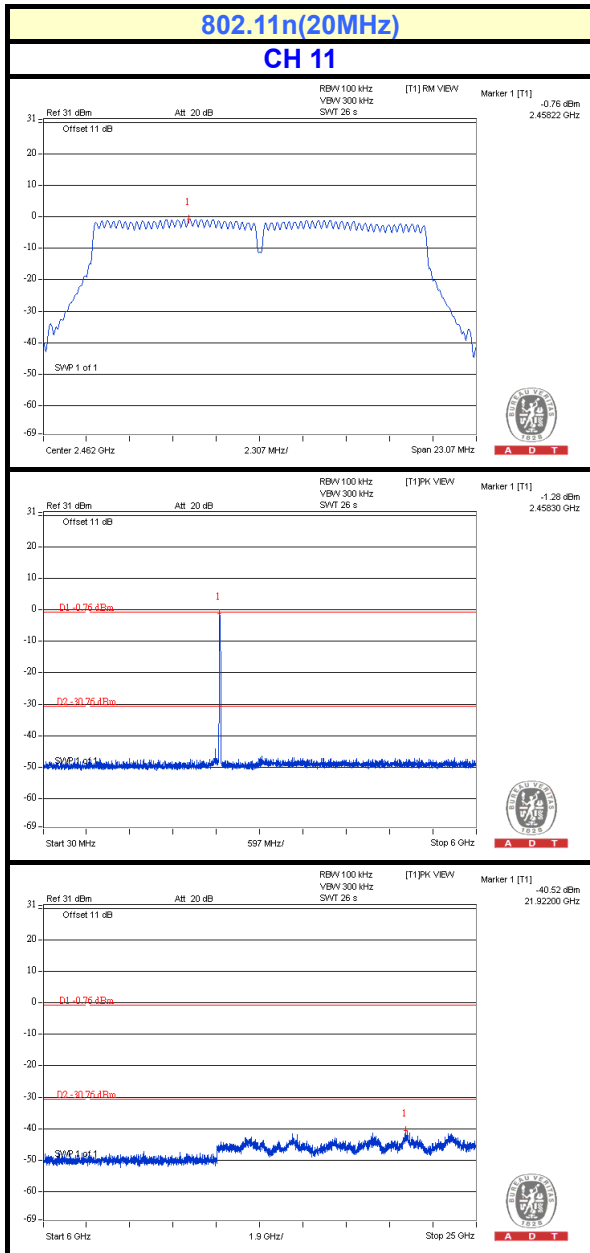
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5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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6. 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:

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Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

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



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7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

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