

FCC TEST REPORT

REPORT NO.: RF141007E05

MODEL NO.: F7C029V2

FCC ID: K7SF7C029V2

RECEIVED: Oct. 07, 2014

TESTED: Oct. 15 to 29, 2014

ISSUED: Nov. 12, 2014

APPLICANT: Belkin, International Inc.,

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

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R.O.C.

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Table of Contents

RELEASE CONTROL RECORD	4
1. CERTIFICATION	5
2. SUMMARY OF TEST RESULTS	6
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 GENERAL DESCRIPTION OF APPLIED STANDARDS	14
3.4 DUTY CYCLE OF TEST SIGNAL	15
3.5 DESCRIPTION OF SUPPORT UNITS	16
3.6 CONFIGURATION OF SYSTEM UNDER TEST	16
4. TEST TYPES AND RESULTS	17
4.1 CONDUCTED EMISSION MEASUREMENT	17
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	17
4.1.2 TEST INSTRUMENTS	17
4.1.3 TEST PROCEDURES	18
4.1.4 DEVIATION FROM TEST STANDARD	18
4.1.5 TEST SETUP	18
4.1.6 EUT OPERATING CONDITIONS	19
4.1.7 TEST RESULTS	20
4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT	22
4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT	22
4.2.2 TEST INSTRUMENTS	23
4.2.3 TEST PROCEDURES	25
4.2.4 DEVIATION FROM TEST STANDARD	25
4.2.5 TEST SETUP	26
4.2.6 EUT OPERATING CONDITIONS	26
4.2.7 TEST RESULTS	27
4.3 6dB BANDWIDTH MEASUREMENT	40
4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT	40
4.3.2 TEST INSTRUMENTS	40
4.3.3 TEST PROCEDURE	40
4.3.4 DEVIATION FROM TEST STANDARD	40
4.3.5 TEST SETUP	40
4.3.6 EUT OPERATING CONDITIONS	40
4.3.7 TEST RESULTS	41
4.4 CONDUCTED OUTPUT POWER MEASUREMENT	43
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT	43
4.4.2 INSTRUMENTS	43
4.4.3 TEST PROCEDURES	43
4.4.4 DEVIATION FROM TEST STANDARD	43
4.4.5 TEST SETUP	43
4.4.6 EUT OPERATING CONDITIONS	43
4.4.7 TEST RESULTS	44
4.5 POWER SPECTRAL DENSITY MEASUREMENT	46
4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	46
4.5.2 TEST INSTRUMENTS	46
4.5.3 TEST PROCEDURE	46
4.5.4 DEVIATION FROM TEST STANDARD	46



A D T

4.5.5	TEST SETUP	46
4.5.6	EUT OPERATING CONDITION	46
4.5.7	TEST RESULTS	47
4.6	CONDUCTED OUT-BAND EMISSION MEASUREMENT	49
4.6.1	LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT	49
4.6.2	TEST INSTRUMENTS	49
4.6.3	TEST PROCEDURE	49
4.6.4	DEVIATION FROM TEST STANDARD	50
4.6.5	TEST SETUP	50
4.6.6	EUT OPERATING CONDITION	50
4.6.7	TEST RESULTS	50
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION	55
6.	INFORMATION ON THE TESTING LABORATORIES	56
7.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	57



RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141007E05	Original release	Nov. 12, 2014



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1. CERTIFICATION

PRODUCT: WeMo Insight
BRAND NAME: Belkin
MODEL NO.: F7C029V2
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: Belkin, International Inc.,
TESTED: Oct. 15 to 29, 2014
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (Model: F7C029V2) 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 : *Elsie Hsu* , **Date:** Nov. 12, 2014
(Elsie Hsu, Specialist)

Approved By : *May Chen* , **Date:** Nov. 12, 2014
(May Chen, 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 -16.35dB at 0.39609MHz
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -6.1dB at 600.00MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -7.20dB at 2483.500MHz.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output 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:

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

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.43 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	WeMo Insight
MODEL NO.	F7C029V2
POWER SUPPLY	AC Input: 120V, 15A, 60Hz AC Output: 120V, 15A
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 150Mbps
OPERATING FREQUENCY	2.412 ~ 2.462GHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
MAXIMUM OUTPUT POWER	802.11b: 78.705mW 802.11g: 157.036mW 802.11n (HT20): 187.068mW 802.11n (HT40): 163.682mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. The antenna provided to the EUT, please refer to the following table:

Gain (dBi)	Antenna Type	Connector Type	Frequency range (MHz to MHz)	Cable Loss (dB)
1.85	PCB	NA	2400~2483.5	NA

2. The EUT has an internal power board inside as following table:

Brand	Model No.	Spec.
CWT	2FAL0052	AC Input: 120V, 0.2A, 50/60Hz DC Output: 5V, 1A / 3.3V, 0.01A

3. The EUT incorporates a SISO function.

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX diversity/1RX
802.11g	1TX diversity/1RX
802.11n (HT20)	1TX diversity/1RX
802.11n (HT40)	1TX diversity/1RX

4. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7.
5. The above EUT information was declared by the 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, 802.11n (HT20):

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		

7 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	APCM	OB	
-	√	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz
RE ³ 1G: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement
OB: Conducted Out-Band Emission Measurement

NOTE: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on X-plane.

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

RADIATED EMISSION TEST (BELOW 1 GHz):

- ☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATIO N TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

RADIATED EMISSION TEST (ABOVE 1 GHz):

- ☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

ANTENNA PORT CONDUCTED 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

CONDUCTED OUT-BAND EMISSION 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	30deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Tim Ho
RE ³ 1G	24deg. C, 68%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan
OB	25deg. C, 60%RH	120Vac, 60Hz	James Chan

3.3 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 v03r02

ANSI C63.10-2009

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

3.4 DUTY CYCLE OF TEST SIGNAL

If duty cycle of test signal is < 98%, duty factor shall be considered.

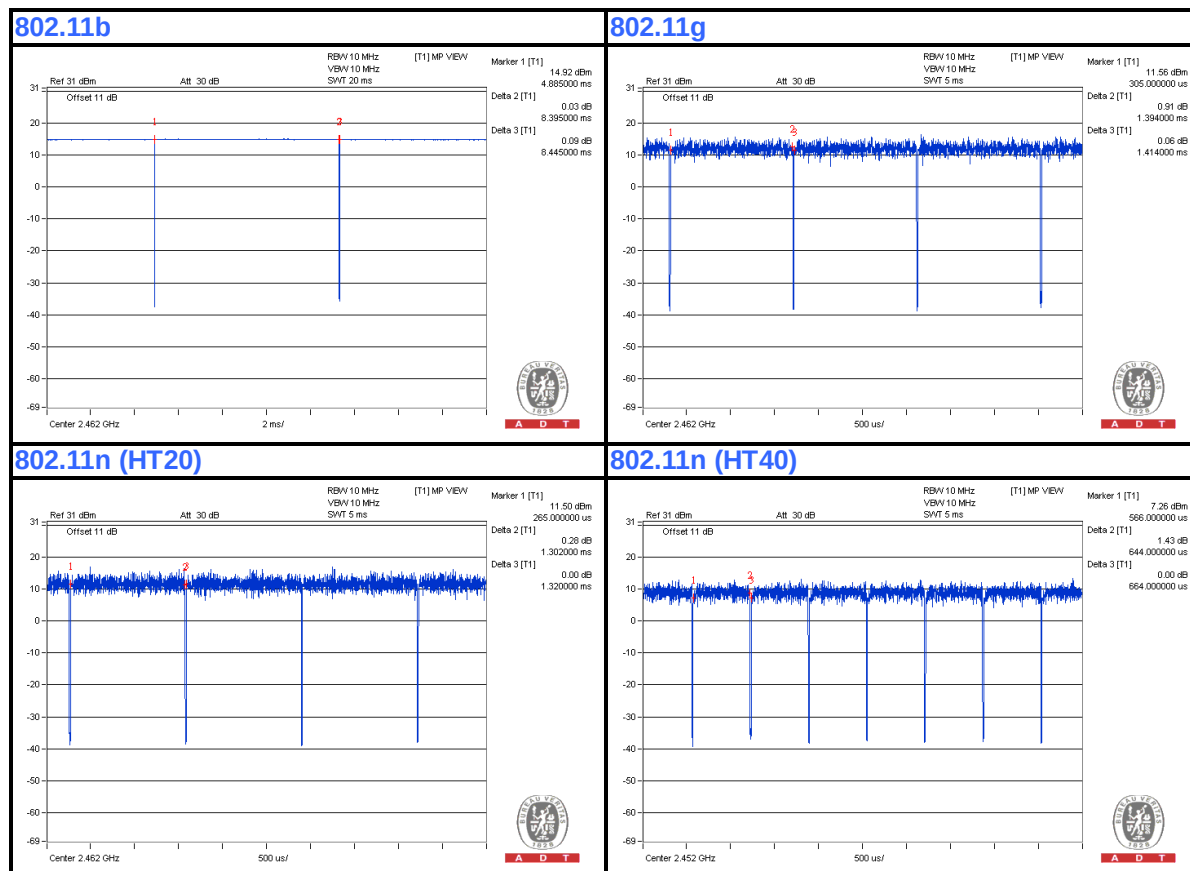
If duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11b: Duty cycle = 8.395 ms/8.445 ms = 0.994

802.11g: Duty cycle = 1.394 ms/1.414 ms = 0.986

802.11n (HT20): Duty cycle = 1.302 ms/1.32 ms = 0.986

802.11n (HT40): Duty cycle = 0.644 ms/0.664 ms = 0.97, Duty factor = $10 * \log(1/0.97) = 0.1$



3.5 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.

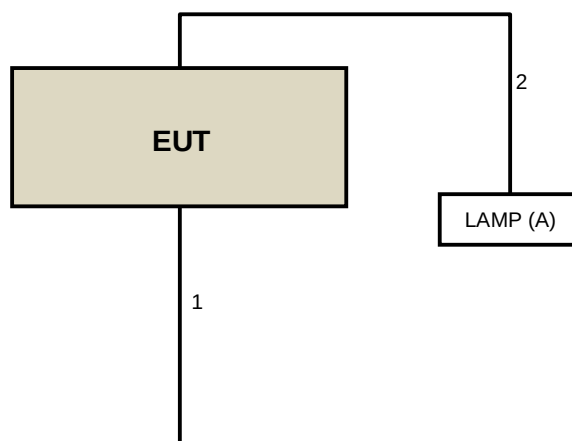
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	LAMP	NA	NA	NA	NA	Provided by Lab

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1.	Micro USB	1	1.3	No	0	Provided by Lab
2.	Power core	1	1.8	No	0	Provided by Lab

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 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 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10, 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
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 Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Oct. 23, 2014

4.1.3 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) were not recorded.

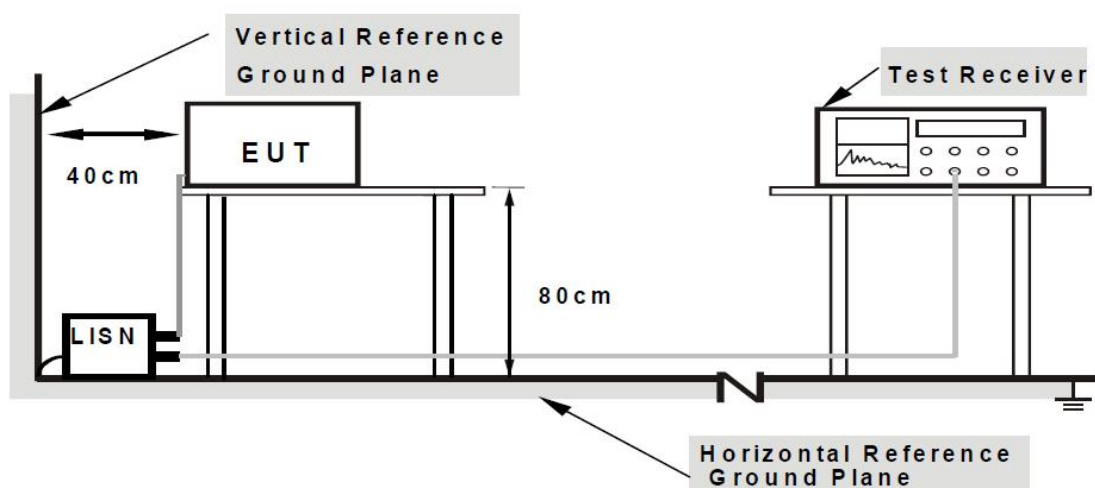
NOTE:

- The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Controlling software (ManuTest RaLink.exe) has been activated to set the EUT under transmission/receiving condition continuously.

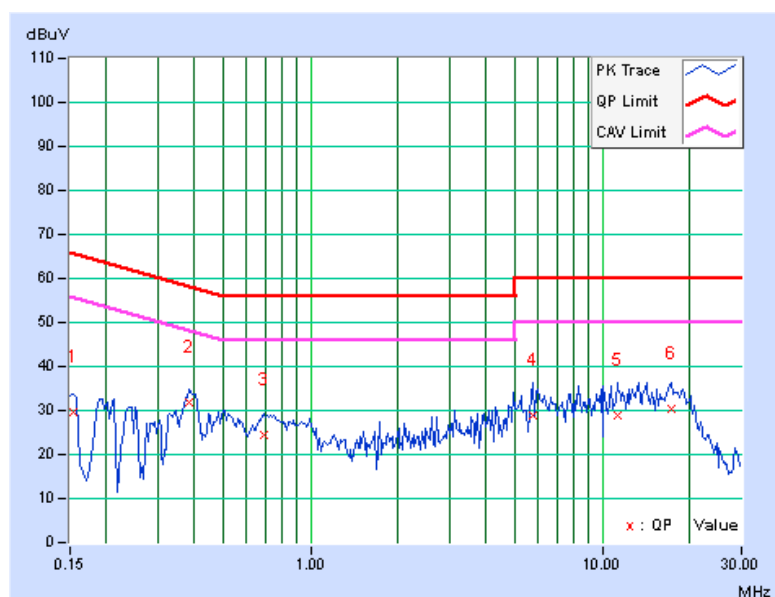
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.07	29.63	14.09	29.70	14.16	65.79	55.79	-36.09	-41.63
2	0.38438	0.09	31.93	23.03	32.02	23.12	58.18	48.18	-26.17	-25.07
3	0.68906	0.11	24.26	13.38	24.37	13.49	56.00	46.00	-31.63	-32.51
4	5.78516	0.31	28.65	16.38	28.96	16.69	60.00	50.00	-31.04	-33.31
5	11.23438	0.48	28.49	18.96	28.97	19.44	60.00	50.00	-31.03	-30.56
6	17.35156	0.64	29.55	24.03	30.19	24.67	60.00	50.00	-29.81	-25.33
1	0.15391	0.07	29.63	14.09	29.70	14.16	65.79	55.79	-36.09	-41.63

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

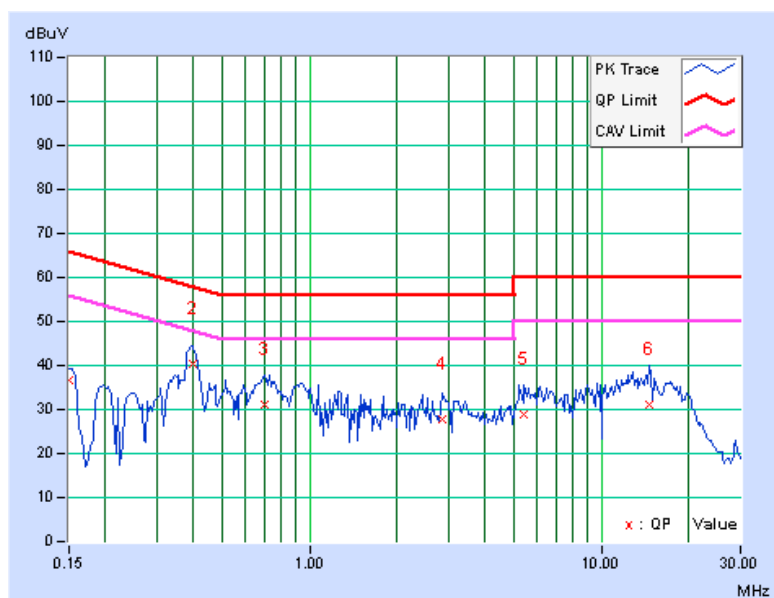


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor [dB]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]	[dB (uV)]
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.07	36.67	30.98	36.74	31.05	66.00	56.00	-29.26	-24.95
2	0.39609	0.09	40.26	31.50	40.35	31.59	57.93	47.93	-17.59	-16.35
3	0.70469	0.11	31.14	19.46	31.25	19.57	56.00	46.00	-24.75	-26.43
4	2.86719	0.21	27.70	18.74	27.91	18.95	56.00	46.00	-28.09	-27.05
5	5.44922	0.31	28.57	17.87	28.88	18.18	60.00	50.00	-31.12	-31.82
6	14.64844	0.60	30.56	22.82	31.16	23.42	60.00	50.00	-28.84	-26.58

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



4.2 RADIATED EMISSION AND BANDEGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEGE 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.

4.2.2 TEST INSTRUMENTS

For Below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
- 5 The CANADA Site Registration No. is IC 7450H-3.
- 6 Tested Date: Oct. 29, 2014



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For Above 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Antenna Tower & Turn Table CT	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
- 5 The VCCI Site Registration No. is G-137.
- 6 The CANADA Site Registration No. is IC 7450H-2.
- 7 Tested Date: Oct. 15, 2014

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. 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 height of 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

NOTE:

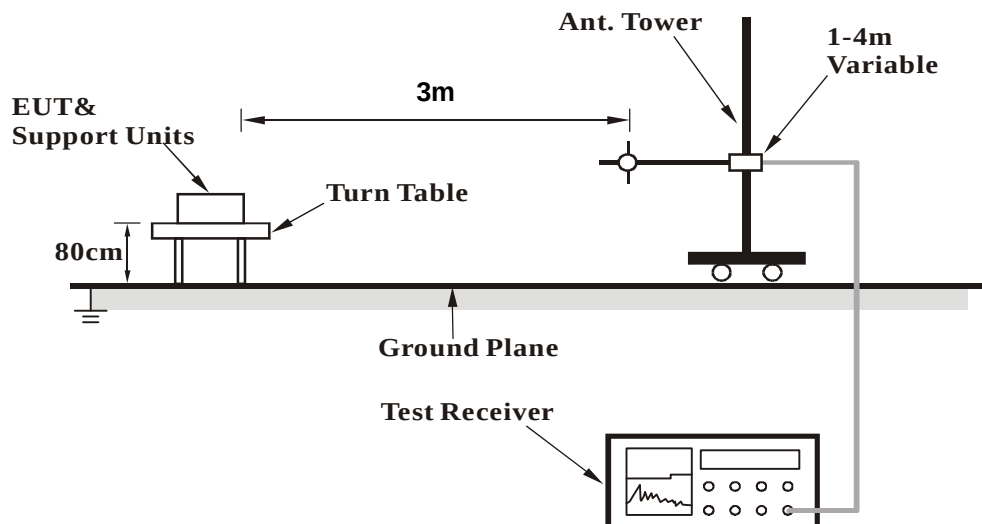
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

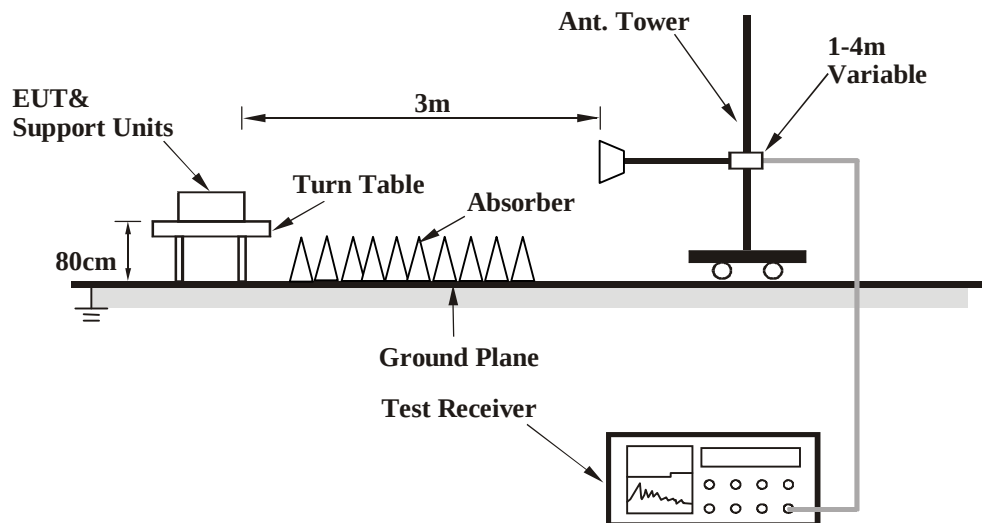
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11n (20MHz)

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

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	147.71	34.0 QP	43.5	-9.5	1.50 H	226	46.95	-12.94
2	500.01	38.0 QP	46.0	-8.0	1.00 H	147	45.21	-7.19
3	540.03	35.7 QP	46.0	-10.3	1.50 H	167	42.27	-6.56
4	600.02	37.8 QP	46.0	-8.2	1.50 H	158	42.55	-4.79
5	640.03	37.7 QP	46.0	-8.3	1.50 H	113	41.76	-4.02
6	720.01	39.1 QP	46.0	-6.9	1.26 H	248	42.30	-3.17
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	147.66	32.4 QP	43.5	-11.1	1.00 V	258	45.36	-12.94
2	500.02	38.6 QP	46.0	-7.5	1.00 V	223	45.74	-7.19
3	539.98	38.9 QP	46.0	-7.1	1.00 V	249	45.42	-6.56
4	600.00	39.9 QP	46.0	-6.1	1.56 V	175	44.72	-4.79
5	639.99	38.8 QP	46.0	-7.2	1.00 V	311	42.81	-4.02
6	720.01	39.3 QP	46.0	-6.7	1.00 V	223	42.50	-3.17

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

ABOVE 1GHz DATA

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	52.1 PK	74.0	-21.9	1.08 H	350	54.57	-2.47
2	2390.00	42.6 AV	54.0	-11.4	1.08 H	350	45.07	-2.47
3	*2412.00	101.0 PK			1.08 H	350	103.37	-2.37
4	*2412.00	98.4 AV			1.08 H	350	100.77	-2.37
5	4824.00	48.4 PK	74.0	-25.6	1.02 H	19	42.69	5.71
6	4824.00	37.1 AV	54.0	-16.9	1.02 H	19	31.39	5.71

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	58.0 PK	74.0	-16.0	1.30 V	311	60.47	-2.47
2	2390.00	37.6 AV	54.0	-16.4	1.30 V	311	40.07	-2.47
3	*2412.00	99.0 PK			1.32 V	320	101.37	-2.37
4	*2412.00	95.8 AV			1.32 V	320	98.17	-2.37
5	4824.00	51.2 PK	74.0	-22.8	1.01 V	272	45.49	5.71
6	4824.00	43.4 AV	54.0	-10.6	1.01 V	272	37.69	5.71

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	50.1 PK	74.0	-23.9	1.05 H	354	52.57	-2.47
2	2390.00	39.3 AV	54.0	-14.7	1.05 H	354	41.77	-2.47
3	*2437.00	101.2 PK			1.05 H	354	103.45	-2.25
4	*2437.00	98.3 AV			1.05 H	354	100.55	-2.25
5	2492.00	50.3 PK	74.0	-23.7	1.05 H	354	52.30	-2.00
6	2492.00	38.1 AV	54.0	-15.9	1.05 H	354	40.10	-2.00
7	4874.00	48.5 PK	74.0	-25.5	1.05 H	18	42.60	5.90
8	4874.00	37.1 AV	54.0	-16.9	1.05 H	18	31.20	5.90
9	7311.00	51.6 PK	74.0	-22.4	1.00 H	167	38.43	13.17
10	7311.00	38.8 AV	54.0	-15.2	1.00 H	167	25.63	13.17
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	1.30 V	311	56.97	-2.47
2	2390.00	35.7 AV	54.0	-18.3	1.30 V	311	38.17	-2.47
3	*2437.00	98.7 PK			1.30 V	311	100.95	-2.25
4	*2437.00	95.6 AV			1.30 V	311	97.85	-2.25
5	4874.00	51.4 PK	74.0	-22.6	1.02 V	266	45.50	5.90
6	4874.00	43.5 AV	54.0	-10.5	1.02 V	266	37.60	5.90
7	7311.00	51.7 PK	74.0	-22.3	1.10 V	221	38.53	13.17
8	7311.00	38.9 AV	54.0	-15.1	1.10 V	221	25.73	13.17

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	101.3 PK			1.04 H	360	103.44	-2.14
2	*2462.00	98.1 AV			1.04 H	360	100.24	-2.14
3	2483.50	51.3 PK	74.0	-22.7	1.04 H	360	53.33	-2.03
4	2483.50	41.2 AV	54.0	-12.8	1.04 H	360	43.23	-2.03
5	4924.00	48.7 PK	74.0	-25.3	1.01 H	26	42.59	6.11
6	4924.00	37.4 AV	54.0	-16.6	1.01 H	26	31.29	6.11
7	7386.00	52.1 PK	74.0	-21.9	1.00 H	180	38.92	13.18
8	7386.00	39.2 AV	54.0	-14.8	1.00 H	180	26.02	13.18
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	98.6 PK			1.38 V	314	100.74	-2.14
2	*2462.00	95.4 AV			1.38 V	314	97.54	-2.14
3	2483.50	57.6 PK	74.0	-16.4	1.38 V	314	59.63	-2.03
4	2483.50	37.7 AV	54.0	-16.3	1.38 V	314	39.73	-2.03
5	4924.00	51.0 PK	74.0	-23.0	1.04 V	263	44.89	6.11
6	4924.00	43.3 AV	54.0	-10.7	1.04 V	263	37.19	6.11
7	7386.00	51.8 PK	74.0	-22.2	1.14 V	208	38.62	13.18
8	7386.00	39.1 AV	54.0	-14.9	1.14 V	208	25.92	13.18

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.

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	2359.00	55.9 PK	74.0	-18.1	1.05 H	347	58.50	-2.60
2	2359.00	41.7 AV	54.0	-12.3	1.05 H	347	44.30	-2.60
3	*2412.00	101.6 PK			1.05 H	347	103.97	-2.37
4	*2412.00	91.3 AV			1.05 H	347	93.67	-2.37
5	4824.00	45.2 PK	74.0	-28.8	1.00 H	195	39.49	5.71
6	4824.00	32.6 AV	54.0	-21.4	1.00 H	195	26.89	5.71
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	2359.00	58.5 PK	74.0	-15.5	1.33 V	330	61.10	-2.60
2	2359.00	37.8 AV	54.0	-16.2	1.33 V	330	40.40	-2.60
3	*2412.00	98.4 PK			1.33 V	330	100.77	-2.37
4	*2412.00	88.5 AV			1.33 V	330	90.87	-2.37
5	4824.00	46.6 PK	74.0	-27.4	1.00 V	75	40.89	5.71
6	4824.00	34.1 AV	54.0	-19.9	1.00 V	75	28.39	5.71

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	51.6 PK	74.0	-22.4	1.04 H	353	54.07	-2.47
2	2390.00	41.0 AV	54.0	-13.0	1.04 H	353	43.47	-2.47
3	*2437.00	101.4 PK			1.04 H	353	103.65	-2.25
4	*2437.00	91.4 AV			1.04 H	353	93.65	-2.25
5	2483.50	53.5 PK	74.0	-20.5	1.04 H	353	55.53	-2.03
6	2483.50	41.7 AV	54.0	-12.3	1.04 H	353	43.73	-2.03
7	4874.00	46.5 PK	74.0	-27.5	1.00 H	182	40.60	5.90
8	4874.00	33.5 AV	54.0	-20.5	1.00 H	182	27.60	5.90
9	7311.00	49.5 PK	74.0	-24.5	1.06 H	187	36.33	13.17
10	7311.00	37.5 AV	54.0	-16.5	1.06 H	187	24.33	13.17
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	98.1 PK			1.31 V	328	100.35	-2.25
2	*2437.00	88.1 AV			1.31 V	328	90.35	-2.25
3	2483.50	56.4 PK	74.0	-17.6	1.31 V	328	58.43	-2.03
4	2483.50	36.4 AV	54.0	-17.6	1.31 V	328	38.43	-2.03
5	4874.00	46.3 PK	74.0	-27.7	1.00 V	85	40.40	5.90
6	4874.00	33.9 AV	54.0	-20.1	1.00 V	85	28.00	5.90
7	7311.00	49.4 PK	74.0	-24.6	1.06 V	302	36.23	13.17
8	7311.00	37.4 AV	54.0	-16.6	1.06 V	302	24.23	13.17

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	101.9 PK			1.04 H	353	104.04	-2.14
2	*2462.00	91.3 AV			1.04 H	353	93.44	-2.14
3	2483.50	55.6 PK	74.0	-18.4	1.04 H	353	57.63	-2.03
4	2483.50	38.7 AV	54.0	-15.3	1.04 H	353	40.73	-2.03
5	4924.00	45.7 PK	74.0	-28.3	1.03 H	172	39.59	6.11
6	4924.00	33.0 AV	54.0	-21.0	1.03 H	172	26.89	6.11
7	7386.00	48.9 PK	74.0	-25.1	1.01 H	175	35.72	13.18
8	7386.00	37.0 AV	54.0	-17.0	1.01 H	175	23.82	13.18
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	98.3 PK			1.28 V	331	100.44	-2.14
2	*2462.00	88.2 AV			1.28 V	331	90.34	-2.14
3	2483.50	58.2 PK	74.0	-15.8	1.28 V	331	60.23	-2.03
4	2483.50	38.2 AV	54.0	-15.8	1.28 V	331	40.23	-2.03
5	4924.00	45.8 PK	74.0	-28.2	1.00 V	75	39.69	6.11
6	4924.00	33.3 AV	54.0	-20.7	1.00 V	75	27.19	6.11
7	7386.00	49.4 PK	74.0	-24.6	1.05 V	294	36.22	13.18
8	7386.00	37.4 AV	54.0	-16.6	1.05 V	294	24.22	13.18

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.

802.11n (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	57.8 PK	74.0	-16.2	1.04 H	349	60.27	-2.47
2	2390.00	42.5 AV	54.0	-11.5	1.04 H	349	44.97	-2.47
3	*2412.00	102.6 PK			1.04 H	349	104.97	-2.37
4	*2412.00	91.5 AV			1.04 H	349	93.87	-2.37
5	4824.00	46.2 PK	74.0	-27.8	1.04 H	194	40.49	5.71
6	4824.00	33.6 AV	54.0	-20.4	1.04 H	194	27.89	5.71
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	57.5 PK	74.0	-16.5	1.29 V	316	59.97	-2.47
2	2390.00	37.5 AV	54.0	-16.5	1.29 V	316	39.97	-2.47
3	*2412.00	98.8 PK			1.29 V	316	101.17	-2.37
4	*2412.00	87.4 AV			1.29 V	316	89.77	-2.37
5	4824.00	46.1 PK	74.0	-27.9	1.00 V	80	40.39	5.71
6	4824.00	33.2 AV	54.0	-20.8	1.00 V	80	27.49	5.71

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	2385.00	52.2 PK	74.0	-21.8	1.04 H	353	54.69	-2.49
2	2385.00	38.4 AV	54.0	-15.6	1.04 H	353	40.89	-2.49
3	*2437.00	102.5 PK			1.04 H	353	104.75	-2.25
4	*2437.00	91.3 AV			1.04 H	353	93.55	-2.25
5	2488.00	54.2 PK	74.0	-19.8	1.04 H	353	56.21	-2.01
6	2488.00	39.4 AV	54.0	-14.6	1.04 H	353	41.41	-2.01
7	4874.00	45.8 PK	74.0	-28.2	1.01 H	179	39.90	5.90
8	4874.00	33.1 AV	54.0	-20.9	1.01 H	179	27.20	5.90
9	7311.00	49.5 PK	74.0	-24.5	1.07 H	160	36.33	13.17
10	7311.00	37.5 AV	54.0	-16.5	1.07 H	160	24.33	13.17
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	99.1 PK			1.38 V	330	101.35	-2.25
2	*2437.00	87.6 AV			1.38 V	330	89.85	-2.25
3	2488.00	52.8 PK	74.0	-21.2	1.38 V	330	54.81	-2.01
4	2488.00	36.6 AV	54.0	-17.4	1.38 V	330	38.61	-2.01
5	4874.00	45.7 PK	74.0	-28.3	1.03 V	89	39.80	5.90
6	4874.00	33.8 AV	54.0	-20.2	1.03 V	89	27.90	5.90
7	7311.00	48.3 PK	74.0	-25.7	1.06 V	297	35.13	13.17
8	7311.00	36.4 AV	54.0	-17.6	1.06 V	297	23.23	13.17

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	102.4 PK			1.02 H	351	104.54	-2.14
2	*2462.00	91.2 AV			1.02 H	351	93.34	-2.14
3	2483.50	60.8 PK	74.0	-13.2	1.02 H	351	62.83	-2.03
4	2483.50	40.9 AV	54.0	-13.1	1.02 H	351	42.93	-2.03
5	4924.00	46.0 PK	74.0	-28.0	1.02 H	178	39.89	6.11
6	4924.00	33.2 AV	54.0	-20.8	1.02 H	178	27.09	6.11
7	7386.00	49.1 PK	74.0	-24.9	1.00 H	199	35.92	13.18
8	7386.00	37.2 AV	54.0	-16.8	1.00 H	199	24.02	13.18
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	99.4 PK			1.31 V	321	101.54	-2.14
2	*2462.00	87.8 AV			1.31 V	321	89.94	-2.14
3	2483.50	58.4 PK	74.0	-15.6	1.31 V	321	60.43	-2.03
4	2483.50	38.4 AV	54.0	-15.6	1.31 V	321	40.43	-2.03
5	4924.00	45.6 PK	74.0	-28.4	1.00 V	92	39.49	6.11
6	4924.00	33.3 AV	54.0	-20.7	1.00 V	92	27.19	6.11
7	7386.00	49.3 PK	74.0	-24.7	1.03 V	303	36.12	13.18
8	7386.00	37.7 AV	54.0	-16.3	1.03 V	303	24.52	13.18

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.

802.11n (HT40)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	65.8 PK	74.0	-8.2	1.04 H	356	68.27	-2.47
2	2390.00	46.7 AV	54.0	-7.3	1.04 H	356	49.17	-2.47
3	*2422.00	99.3 PK			1.04 H	356	101.62	-2.32
4	*2422.00	88.2 AV			1.04 H	356	90.52	-2.32
5	4844.00	45.5 PK	74.0	-28.5	1.01 H	187	39.72	5.78
6	4844.00	32.9 AV	54.0	-21.1	1.01 H	187	27.12	5.78
7	7266.00	49.7 PK	74.0	-24.3	1.02 H	187	36.50	13.20
8	7266.00	37.9 AV	54.0	-16.1	1.02 H	187	24.70	13.20
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	58.3 PK	74.0	-15.7	1.34 V	325	60.77	-2.47
2	2390.00	38.0 AV	54.0	-16.0	1.34 V	325	40.47	-2.47
3	*2422.00	95.4 PK			1.34 V	325	97.72	-2.32
4	*2422.00	84.5 AV			1.34 V	325	86.82	-2.32
5	4844.00	45.3 PK	74.0	-28.7	1.00 V	73	39.52	5.78
6	4844.00	32.8 AV	54.0	-21.2	1.00 V	73	27.02	5.78
7	7266.00	48.6 PK	74.0	-25.4	1.05 V	290	35.40	13.20
8	7266.00	36.8 AV	54.0	-17.2	1.05 V	290	23.60	13.20

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) – 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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	57.6 PK	74.0	-16.4	1.05 H	356	60.07	-2.47
2	2390.00	40.3 AV	54.0	-13.7	1.05 H	356	42.77	-2.47
3	*2437.00	99.1 PK			1.05 H	356	101.35	-2.25
4	*2437.00	88.1 AV			1.05 H	356	90.35	-2.25
5	2483.50	54.8 PK	74.0	-19.2	1.05 H	356	56.83	-2.03
6	2483.50	39.5 AV	54.0	-14.5	1.05 H	356	41.53	-2.03
7	4874.00	45.8 PK	74.0	-28.2	1.02 H	189	39.90	5.90
8	4874.00	33.0 AV	54.0	-21.0	1.02 H	189	27.10	5.90
9	7311.00	49.8 PK	74.0	-24.2	1.00 H	182	36.63	13.17
10	7311.00	37.9 AV	54.0	-16.1	1.00 H	182	24.73	13.17
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	57.8 PK	74.0	-16.2	1.27 V	310	60.27	-2.47
2	2390.00	37.9 AV	54.0	-16.1	1.27 V	310	40.37	-2.47
3	*2437.00	95.1 PK			1.27 V	310	97.35	-2.25
4	*2437.00	84.3 AV			1.27 V	310	86.55	-2.25
5	4874.00	46.1 PK	74.0	-27.9	1.00 V	84	40.20	5.90
6	4874.00	33.3 AV	54.0	-20.7	1.00 V	84	27.40	5.90
7	7311.00	48.9 PK	74.0	-25.1	1.10 V	287	35.73	13.17
8	7311.00	37.4 AV	54.0	-16.6	1.10 V	287	24.23	13.17

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.

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	*2452.00	99.2 PK			1.02 H	352	101.38	-2.18
2	*2452.00	88.3 AV			1.02 H	352	90.48	-2.18
3	2483.50	64.9 PK	74.0	-9.1	1.02 H	352	66.93	-2.03
4	2483.50	46.8 AV	54.0	-7.2	1.02 H	352	48.83	-2.03
5	4904.00	45.6 PK	74.0	-28.4	1.00 H	195	39.58	6.02
6	4904.00	32.9 AV	54.0	-21.1	1.00 H	195	26.88	6.02
7	7356.00	48.9 PK	74.0	-25.1	1.00 H	190	35.72	13.18
8	7356.00	37.2 AV	54.0	-16.8	1.00 H	190	24.02	13.18
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	*2452.00	94.5 PK			1.27 V	310	96.68	-2.18
2	*2452.00	84.8 AV			1.27 V	310	86.98	-2.18
3	2483.50	57.5 PK	74.0	-16.5	1.27 V	310	59.53	-2.03
4	2483.50	37.5 AV	54.0	-16.5	1.27 V	310	39.53	-2.03
5	4904.00	46.7 PK	74.0	-27.3	1.00 V	97	40.68	6.02
6	4904.00	33.9 AV	54.0	-20.1	1.00 V	97	27.88	6.02
7	7356.00	49.1 PK	74.0	-24.9	1.05 V	291	35.92	13.18
8	7356.00	37.8 AV	54.0	-16.2	1.05 V	291	24.62	13.18

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.

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 2015

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. Tested date : Oct. 16, 2014

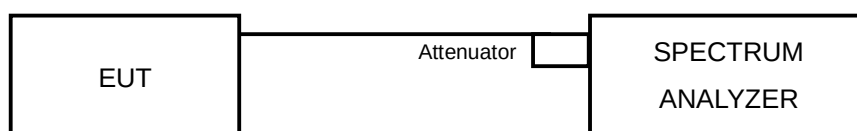
4.3.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100kHz
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. 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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



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	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	12.13	0.5	PASS
6	2437	12.13	0.5	PASS
11	2462	12.14	0.5	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.41	0.5	PASS
6	2437	16.42	0.5	PASS
11	2462	16.42	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.35	0.5	PASS
6	2437	17.20	0.5	PASS
11	2462	17.20	0.5	PASS

802.11n (HT40)

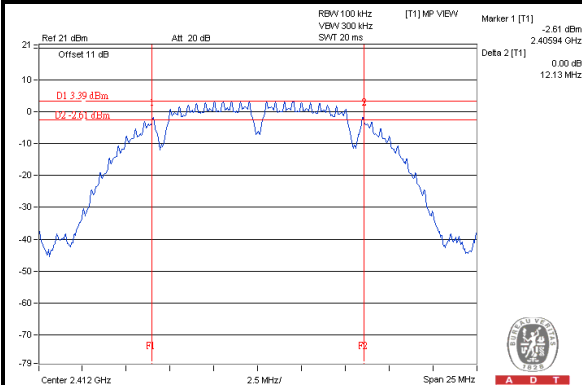
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	35.70	0.5	PASS
6	2437	35.84	0.5	PASS
9	2452	35.88	0.5	PASS



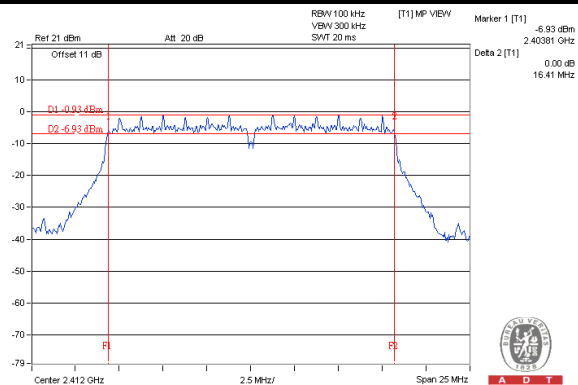
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SPECTRUM PLOT OF WORST VALUE

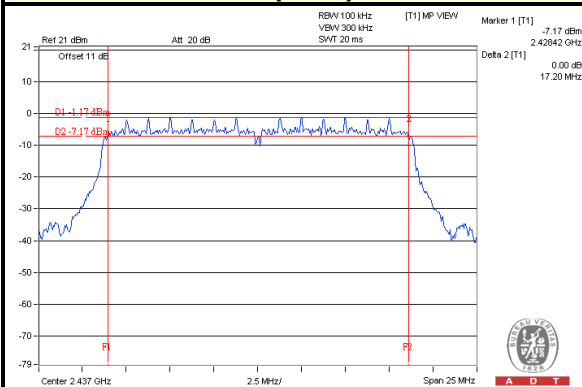
802.11b / CH1



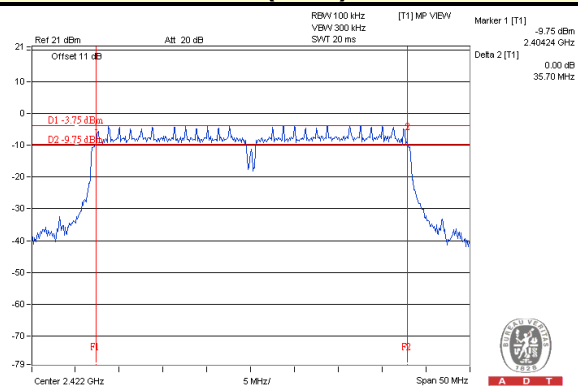
802.11g / CH1



802.11n (HT20) / CH6



802.11n (HT40) / CH3



4.4 CONDUCTED OUTPUT POWER MEASUREMENT

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter Anritsu	ML2495A	1014008	Apr. 30, 2014	Apr. 29, 2015
Power Sensor Anritsu	MA2411B	0917122	Apr. 30, 2014	Apr. 29, 2015

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. Tested date : Oct. 16, 2014

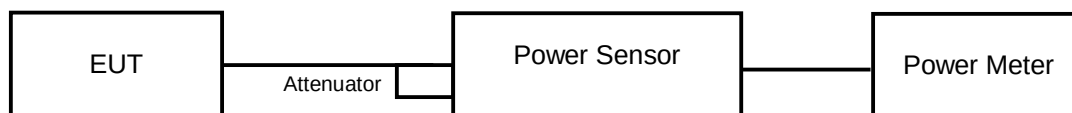
4.4.3 TEST PROCEDURES

The peak / average power sensor was 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

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	78.705	18.96	30	PASS
6	2437	77.983	18.92	30	PASS
11	2462	76.56	18.84	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	138.676	21.42	30	PASS
6	2437	148.594	21.72	30	PASS
11	2462	157.036	21.96	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	181.134	22.58	30	PASS
6	2437	185.353	22.68	30	PASS
11	2462	187.068	22.72	30	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
3	2422	157.398	21.97	30	PASS
6	2437	161.065	22.07	30	PASS
9	2452	163.682	22.14	30	PASS

FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	46.989	16.72
6	2437	45.920	16.62
11	2462	44.875	16.52

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	20.512	13.12
6	2437	21.478	13.32
11	2462	21.627	13.35

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	20.464	13.11
6	2437	21.330	13.29
11	2462	21.478	13.32

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
3	2422	21.827	13.39
6	2437	21.979	13.42
9	2452	22.284	13.48

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 2015

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. Tested date : Oct. 16, 2014

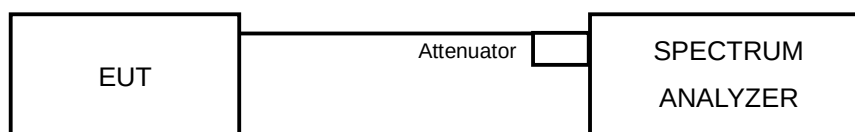
4.5.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-12.89	8	PASS
6	2437	-13.32	8	PASS
11	2462	-13.08	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-16.25	8	PASS
6	2437	-16.64	8	PASS
11	2462	-16.21	8	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-14.66	8	PASS
6	2437	-14.05	8	PASS
11	2462	-13.47	8	PASS

802.11n (HT40)

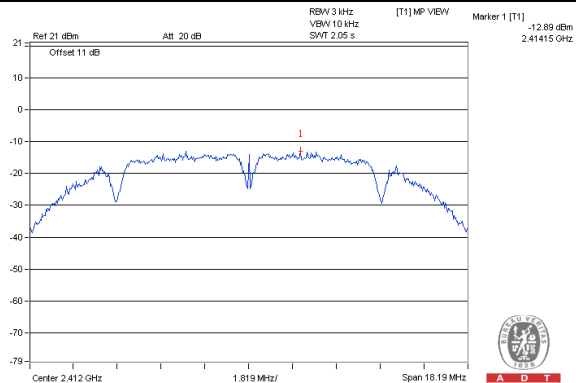
CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
3	2422	-14.52	8	PASS
6	2437	-14.70	8	PASS
9	2452	-14.07	8	PASS



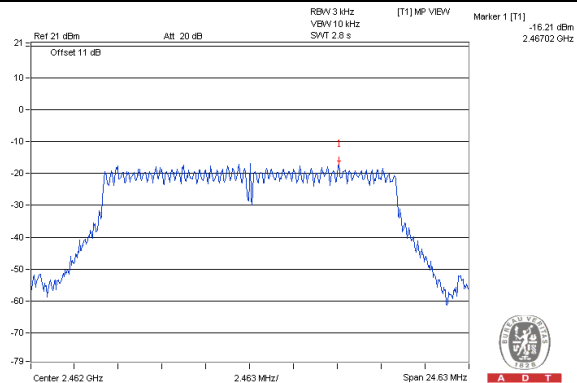
A D T

SPECTRUM PLOT OF WORST VALUE

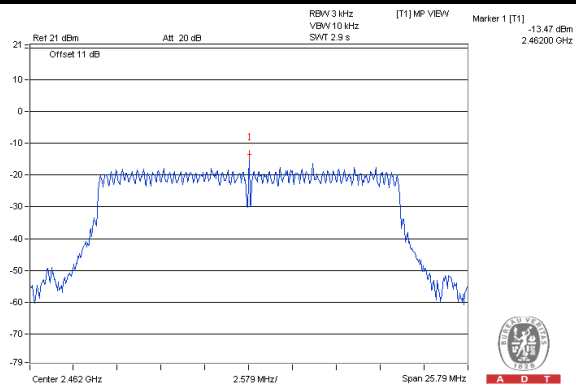
802.11b / CH1



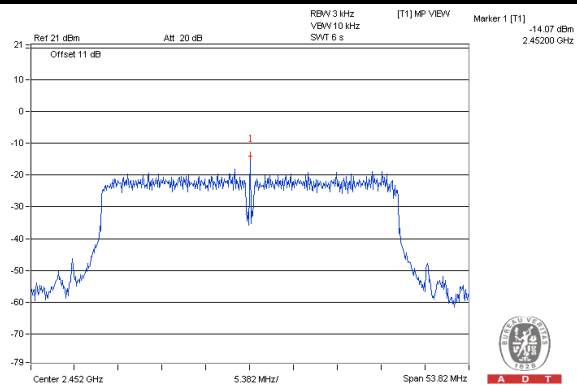
802.11g / CH11



802.11n (HT20) / CH11



802.11n (HT40) / CH9





A D T

4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 2015

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. Tested date : Oct. 16, 2014

4.6.3 TEST PROCEDURE

Measurement Procedure - Reference Level

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.

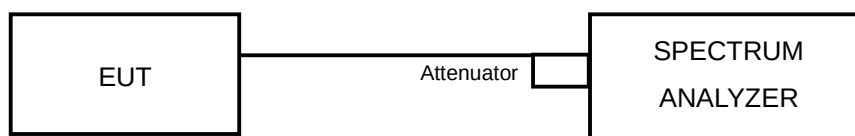
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

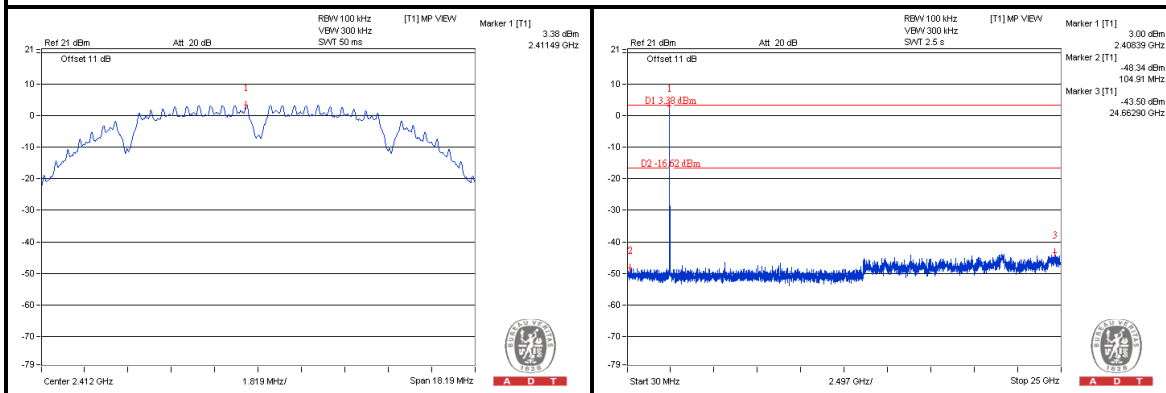
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



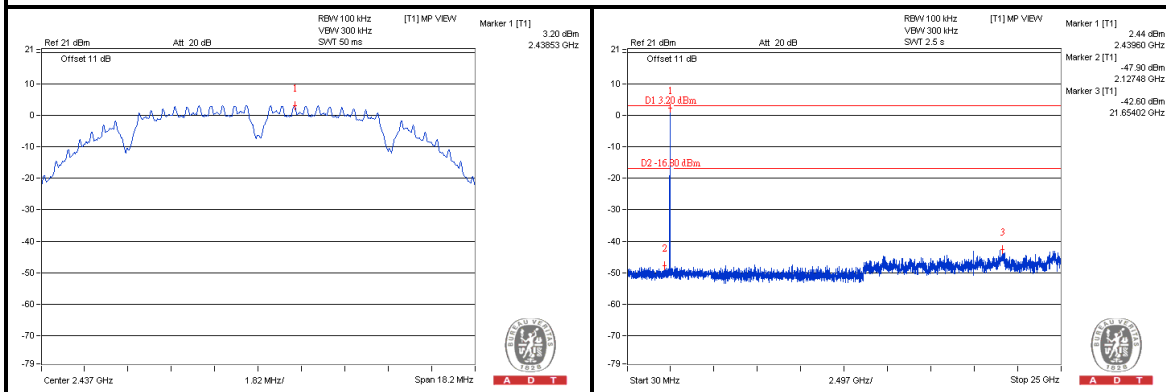
A D T

802.11b:

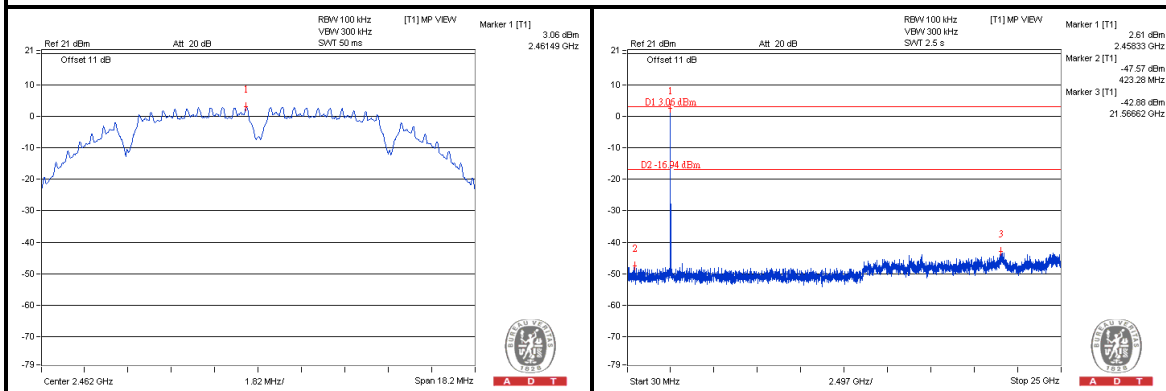
CH 1



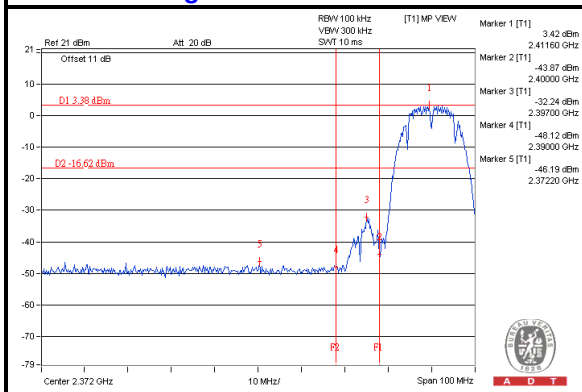
CH 6



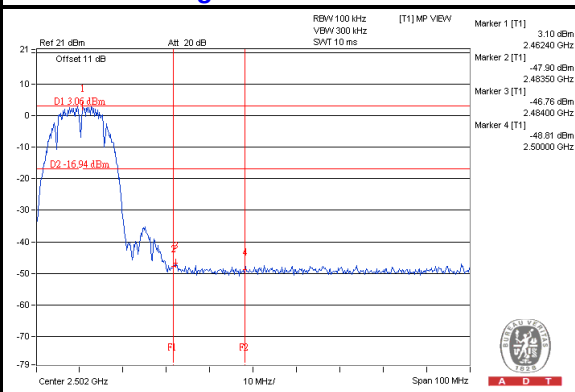
CH 11



CH 1 Band edge

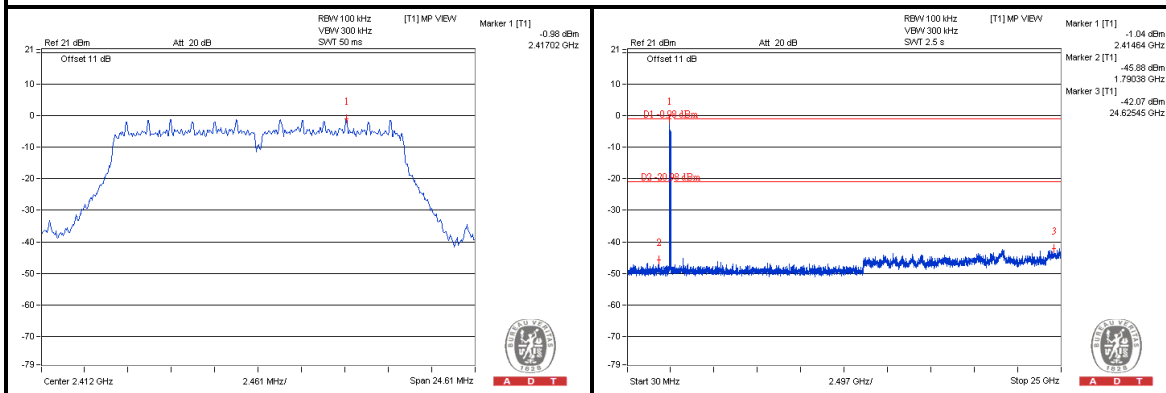


CH 11 Band edge

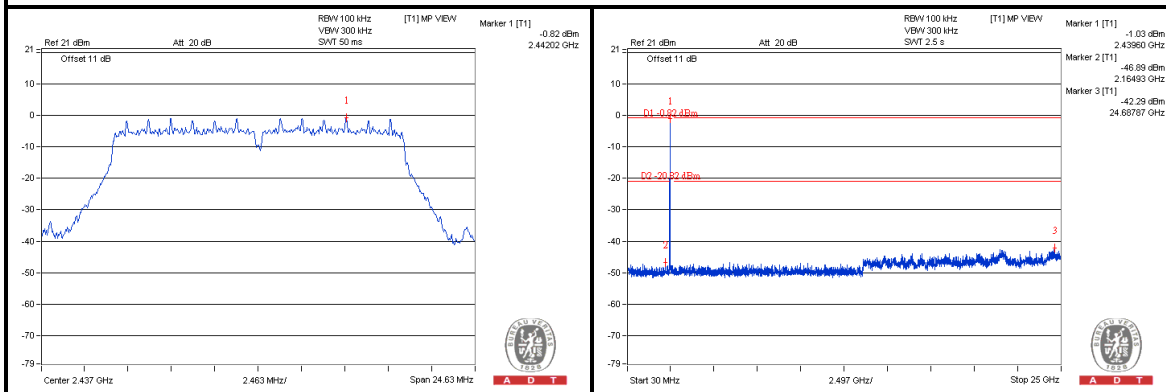


802.11g:

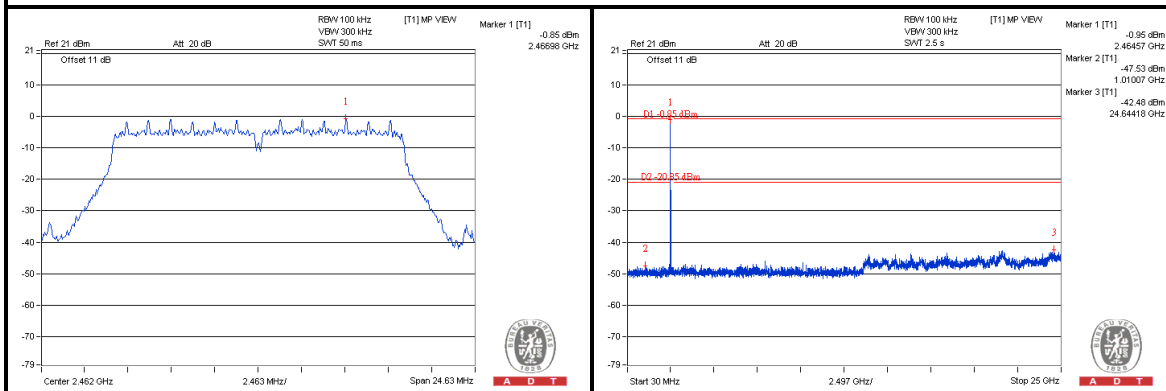
CH 1



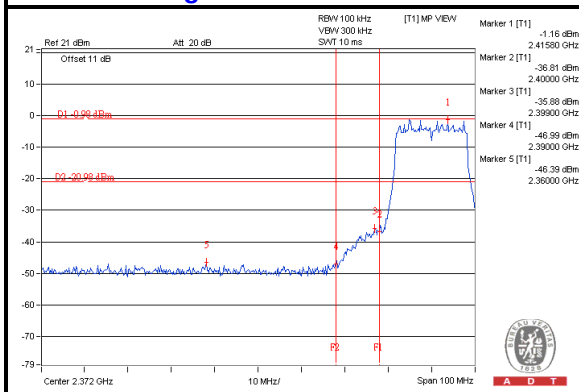
CH 6



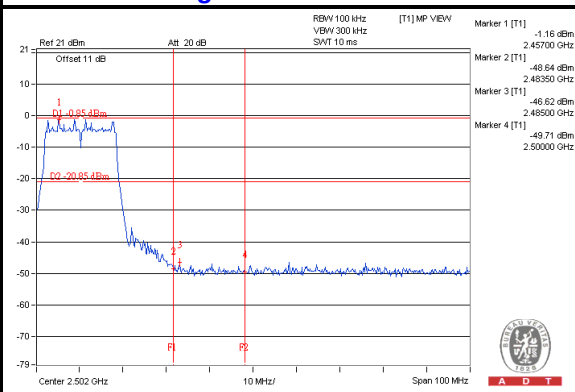
CH 11



CH 1 Band edge

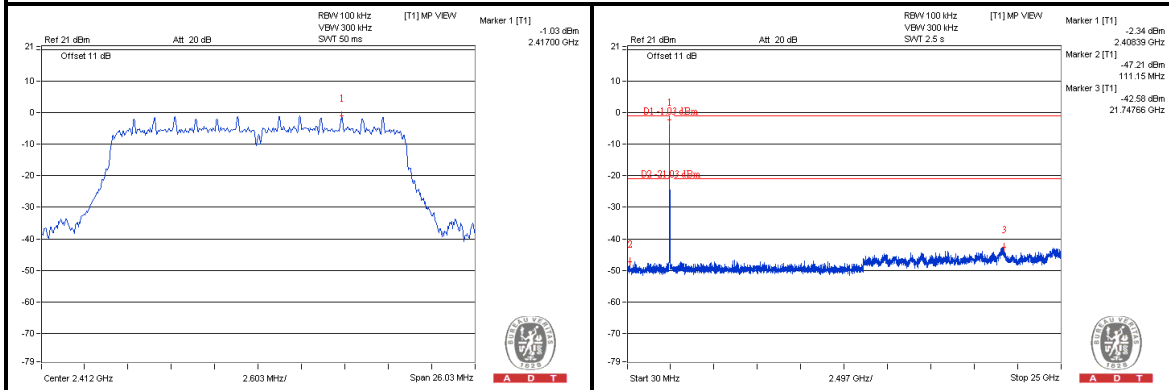


CH 11 Band edge

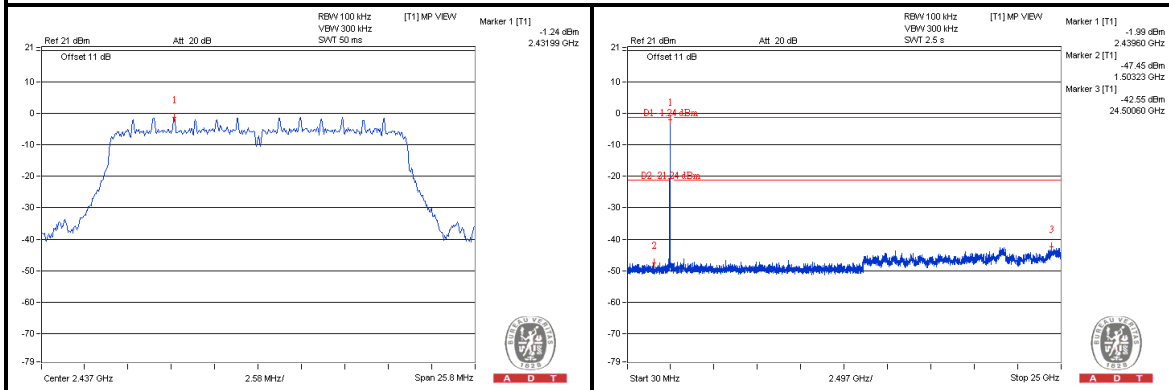


802.11n (HT20):

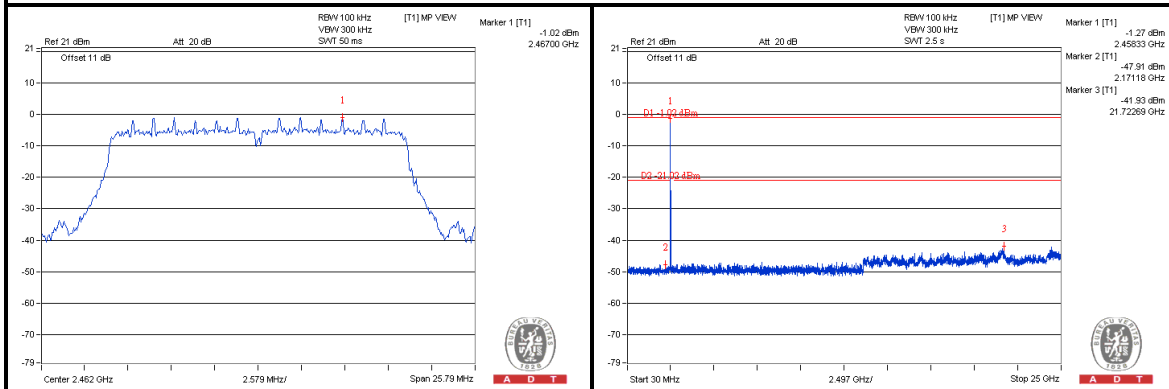
CH 1



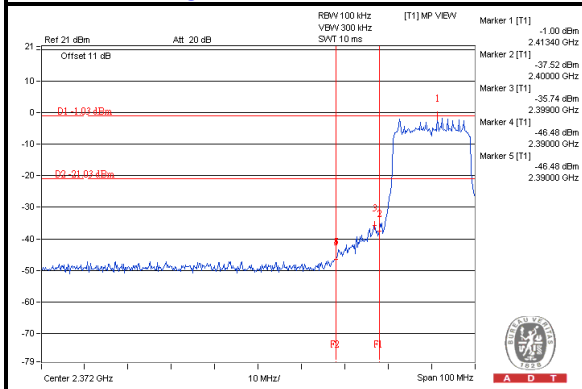
CH 6



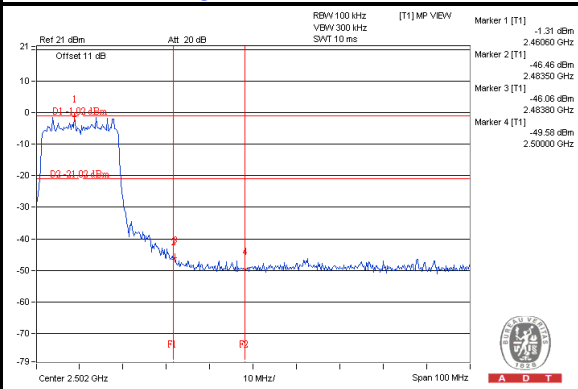
CH 11



CH 1 Band edge



CH 11 Band edge

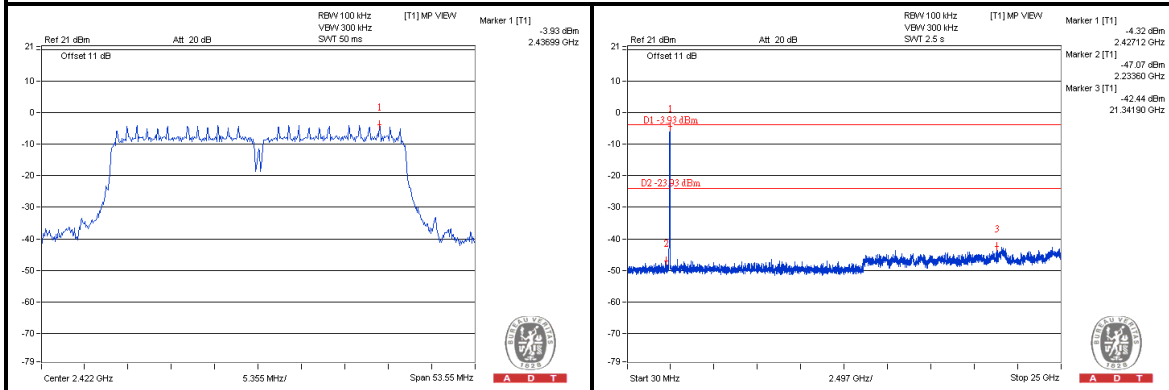




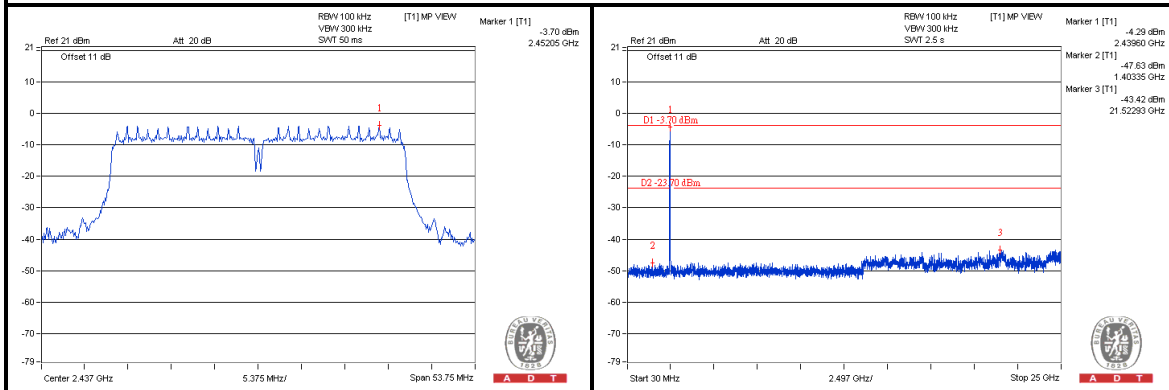
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802.11n (HT40):

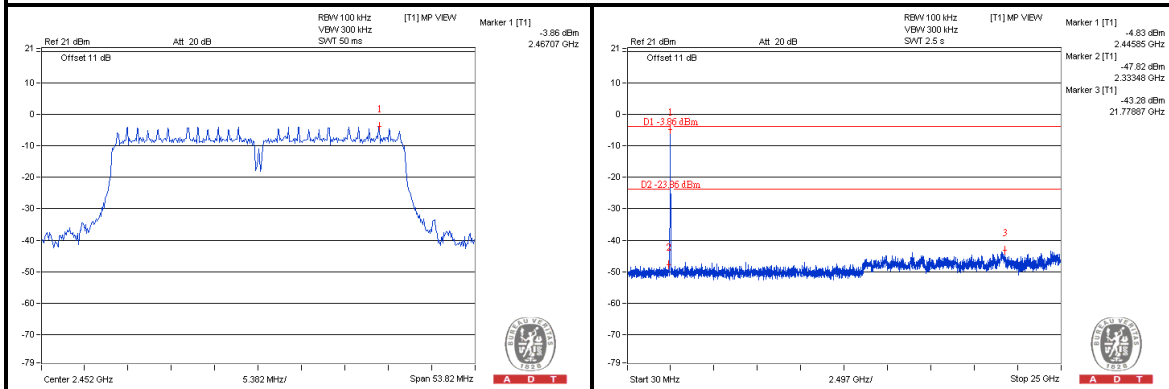
CH 3



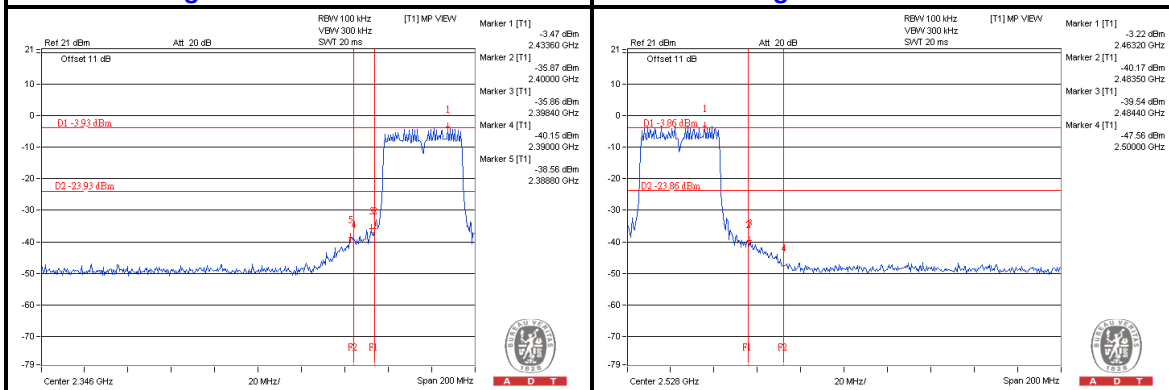
CH 6



CH 9



CH 3 Band edge



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

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:

Linko 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.



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7. 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 ---