

FCC TEST REPORT (15.247)

REPORT NO.: RF150318C29
MODEL NO.: SHC-2000
FCC ID: ASU-SHC2000
RECEIVED: Mar. 18, 2015
TESTED: Apr. 03, 2015 ~ Apr. 07, 2015
ISSUED: Apr. 13, 2015

APPLICANT: Savant Systems LLC

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF150318C29	Original release	Apr. 13, 2015

1. CERTIFICATION

PRODUCT: Smart Host Controller
MODEL NO.: SHC-2000
BRAND: Savant
APPLICANT: Savant Systems LLC
TESTED: Apr. 03, 2015 ~ Apr. 07, 2015
TEST SAMPLE: Production Unit
STANDARDS: FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2013

The above equipment (model: SHC-2000) 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 : Gina Liu , **DATE** : Apr. 13, 2015
Gina Liu / Specialist
APPROVED BY : Sam Chen , **DATE** : Apr. 13, 2015
Sam Chen / Senior Project Engineer

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 -16.43dB at 0.30294MHz.
15.205 & 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.01dB at 2484MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	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	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Smart Host Controller
MODEL NO.	SHC-2000
POWER SUPPLY	5.0Vdc (adapter)
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 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz)
OUTPUT POWER	127.94mW for 2412 ~ 2462MHz
ANTENNA TYPE	PIFA antenna with 3.34dBi gain
ANTENNA CONNECTOR	NA
DATA CABLE	Refer to Note as below
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Refer to Note as below

NOTE:

- The EUT contains following accessory devices.

ITEM	BRAND	MODEL	SPECIFICATION
Adapter 1	ASIAN POWER DEVICES INC.	WA-15I05RUGKN-AAAA	I/P: 100-240Vac, 50/60Hz, 0.5A O/P: 5Vdc, 3A
Adapter 2	ASIAN POWER DEVICES INC.	WA-15I05RUKGN-HAAA	I/P: 100-240Vac, 50/60Hz, 0.5A O/P: 5Vdc, 3A
WLAN Chip	Qualcomm Atheros	QCA6234X	--

- 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)	1TX, 2TX

- The above EUT information is 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

FOR 2.4GHz:

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

WLAN 2.4GHz:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Chain 0
B	√	-	-	-	Chain 1
C	√	-	-	√	Chain 0 + Chain 1

Where **RE $\geq$ 1G:** Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

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

RADIATED EMISSION TEST (ABOVE 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
B			1, 11			
A, C	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
B			1, 11			

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)
A	802.11n (20MHz)	1 to 11	11	OFDM	BPSK	MCS0

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)
A	802.11n (20MHz)	1 to 11	11	OFDM	BPSK	MCS0

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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A, C	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0

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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A, C	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0

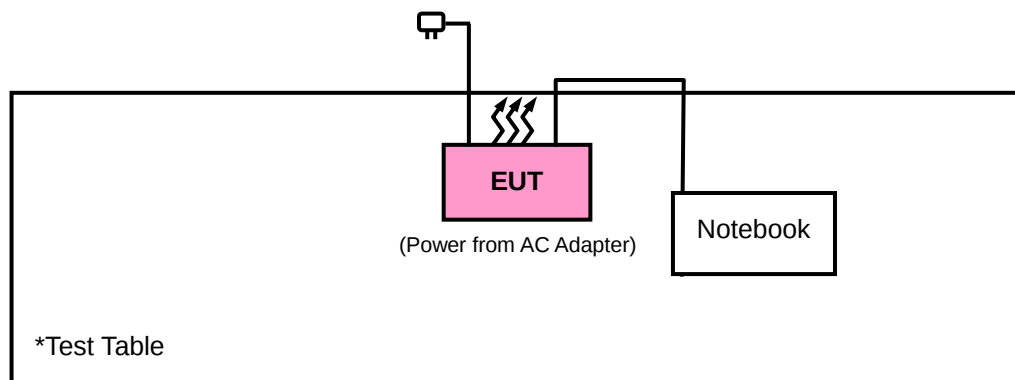
TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Karl Lee, Will Chen
RE $<$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Charles Hsiao
PLC	25deg. C, 65%RH	120Vac, 60Hz	Toby Tian
APCM	25deg. C, 65%RH	120Vac, 60Hz	Taylor Liu

3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST



3.4 DUTY CYCLE TEST SIGNAL

WLAN 2.4GHz

MODE A

802.11b: Duty cycle of test signal is 100 %

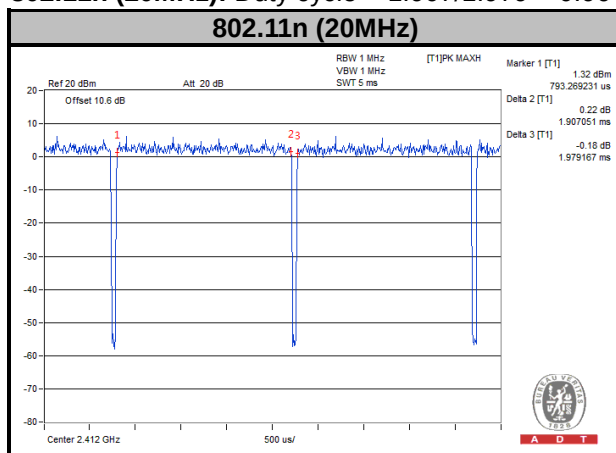
802.11g: Duty cycle = $2.050/2.125 = 0.965$, Duty factor = $10 * \log(1/0.965) = 0.15$

802.11n (20MHz): Duty cycle = $1.916/1.983 = 0.966$, Duty factor = $10 * \log(1/0.966) = 0.15$



MODE C

802.11n (20MHz): Duty cycle = $1.907/1.979 = 0.964$, Duty factor = $10 * \log(1/0.964) = 0.16$



3.5 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

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

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

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver Agilent	N9038A	MY51210203	Jan.21, 2015	Jan.21, 2016
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep.03, 2014	Sep.02, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Loop Antenna	EM-6879	269	Aug.13, 2014	Aug.12, 2015
Preamplifier EMCI	EMC 012645	980115	Dec. 12, 2014	Dec. 11, 2015
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2014	Dec. 26, 2015
Power Meter Anritsu	ML2495A	1232002	Sep. 17, 2014	Sep. 16, 2015
Power Sensor Anritsu	MA2411B	1207325	Sep. 17, 2014	Sep. 16, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2014	Oct. 17, 2015
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Nov. 07, 2014	Nov. 06, 2015
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	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 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 10.
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 690701.
6. The IC Site Registration No. is IC 7450F-10.

4.1.3 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:

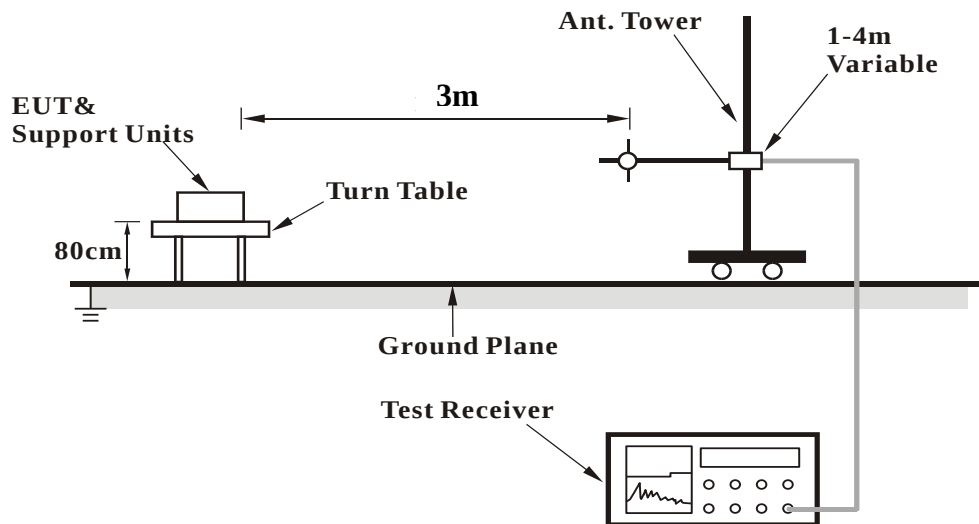
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10 Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

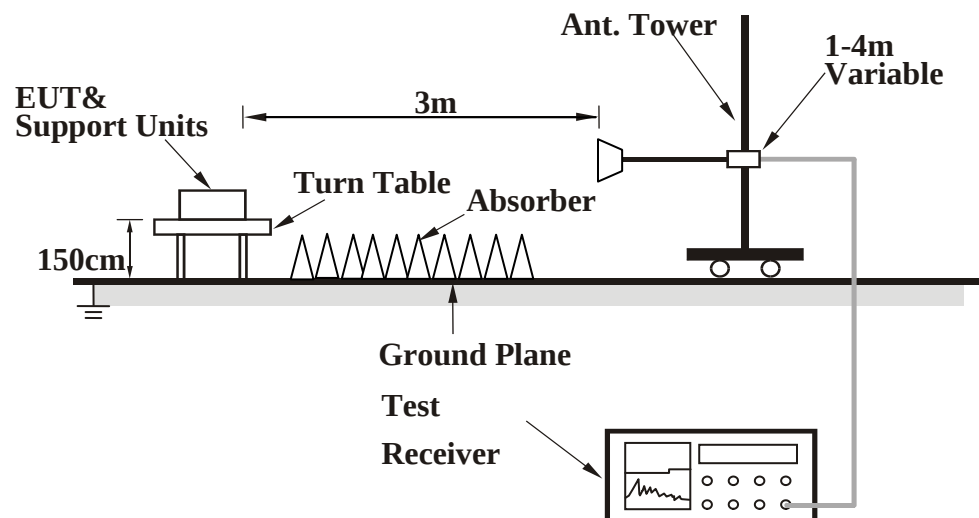
No deviation.

4.1.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT OPERATING CONDITIONS

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA

MODE A

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.63	48.9	54	-3.37	31.8	5.4	35.47	173	140	Average
2390	58.96	57.23	74	-15.04	31.8	5.4	35.47	173	140	Peak
2412	112.76	110.99			31.81	5.43	35.47	173	140	Average
2412	115.45	113.68			31.81	5.43	35.47	173	140	Peak
2498	40.48	38.46	54	-13.52	31.9	5.53	35.41	173	140	Average
2498	56.16	54.14	74	-17.84	31.9	5.53	35.41	173	140	Peak
7236	48.77	38.24	92.76	-43.99	35.55	9.94	34.96	199	112	Average
7236	55.23	44.7	95.45	-40.22	35.55	9.94	34.96	199	112	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	47.96	46.25	54	-6.04	31.8	5.4	35.49	100	57	Average
2386	57.97	56.26	74	-16.03	31.8	5.4	35.49	100	57	Peak
2412	108.45	106.68			31.81	5.43	35.47	100	57	Average
2412	111.15	109.38			31.81	5.43	35.47	100	57	Peak
2496	40.53	38.51	54	-13.47	31.9	5.53	35.41	100	57	Average
2496	57.09	55.07	74	-16.91	31.9	5.53	35.41	100	57	Peak
4824	49.88	41.75	54	-4.12	33.97	8.26	34.1	169	238	Average
4824	53.44	45.31	74	-20.56	33.97	8.26	34.1	169	238	Peak
7236	51.39	40.86	88.45	-37.06	35.55	9.94	34.96	207	231	Average
7236	56.72	46.19	91.15	-34.43	35.55	9.94	34.96	207	231	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.
- 7236MHz: Out of restricted band

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	40.94	39.21	54	-13.06	31.8	5.4	35.47	275	117	Average
2390	56.19	54.46	74	-17.81	31.8	5.4	35.47	275	117	Peak
2437	112.81	110.96			31.85	5.46	35.46	275	117	Average
2437	115.4	113.55			31.85	5.46	35.46	275	117	Peak
2500	40.78	38.76	54	-13.22	31.9	5.53	35.41	275	117	Average
2500	55.82	53.8	74	-18.18	31.9	5.53	35.41	275	117	Peak
4874	45.78	37.59	54	-8.22	33.98	8.27	34.06	118	114	Average
4874	51.9	43.71	74	-22.1	33.98	8.27	34.06	118	114	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2384	41.4	39.71	54	-12.6	31.78	5.4	35.49	100	61	Average
2384	55.29	53.6	74	-18.71	31.78	5.4	35.49	100	61	Peak
2437	108.85	107			31.85	5.46	35.46	100	61	Average
2437	111.49	109.64			31.85	5.46	35.46	100	61	Peak
2490	41.84	39.83	54	-12.16	31.9	5.53	35.42	100	61	Average
2490	55.93	53.92	74	-18.07	31.9	5.53	35.42	100	61	Peak
4874	51.6	43.41	54	-2.4	33.98	8.27	34.06	172	224	Average
4874	54.5	46.31	74	-19.5	33.98	8.27	34.06	172	224	Peak
7311	46.14	35.65	54	-7.86	35.54	9.95	35	203	241	Average
7311	53.87	43.38	74	-20.13	35.54	9.95	35	203	241	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2360	40.08	38.45	54	-13.92	31.76	5.37	35.5	270	125	Average
2360	55.08	53.45	74	-18.92	31.76	5.37	35.5	270	125	Peak
2462	113.27	111.34			31.87	5.5	35.44	270	125	Average
2462	115.89	113.96			31.87	5.5	35.44	270	125	Peak
2484	49.16	47.2	54	-4.84	31.88	5.5	35.42	270	125	Average
2484	60.14	58.18	74	-13.86	31.88	5.5	35.42	270	125	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	39.87	38.14	54	-14.13	31.8	5.4	35.47	112	57	Average
2390	55.74	54.01	74	-18.26	31.8	5.4	35.47	112	57	Peak
2462	108.76	106.83			31.87	5.5	35.44	112	57	Average
2462	111.36	109.43			31.87	5.5	35.44	112	57	Peak
2484	43.36	41.4	54	-10.64	31.88	5.5	35.42	112	57	Average
2484	57.39	55.43	74	-16.61	31.88	5.5	35.42	112	57	Peak
4924	51.7	43.45	54	-2.3	33.99	8.28	34.02	173	214	Average
4924	54.38	46.13	74	-19.62	33.99	8.28	34.02	173	214	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.43	50.7	54	-1.57	31.8	5.4	35.47	173	140	Average
2390	65.95	64.22	74	-8.05	31.8	5.4	35.47	173	140	Peak
2412	100.91	99.14			31.81	5.43	35.47	173	140	Average
2412	109.32	107.55			31.81	5.43	35.47	173	140	Peak
2496	41.33	39.31	54	-12.67	31.9	5.53	35.41	173	140	Average
2496	56.05	54.03	74	-17.95	31.9	5.53	35.41	173	140	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.27	48.54	54	-3.73	31.8	5.4	35.47	100	57	Average
2390	62.29	60.56	74	-11.71	31.8	5.4	35.47	100	57	Peak
2412	96.96	95.19			31.81	5.43	35.47	100	57	Average
2412	104.4	102.63			31.81	5.43	35.47	100	57	Peak
2486	41.24	39.25	54	-12.76	31.88	5.53	35.42	100	57	Average
2486	55.13	53.14	74	-18.87	31.88	5.53	35.42	100	57	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2376	43.56	41.9	54	-10.44	31.78	5.37	35.49	276	125	Average
2376	56.43	54.77	74	-17.57	31.78	5.37	35.49	276	125	Peak
2437	107.07	105.22			31.85	5.46	35.46	276	125	Average
2437	114.71	112.86			31.85	5.46	35.46	276	125	Peak
2484	43.32	41.36	54	-10.68	31.88	5.5	35.42	276	125	Average
2484	57.49	55.53	74	-16.51	31.88	5.5	35.42	276	125	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	41.99	40.26	54	-12.01	31.8	5.4	35.47	112	57	Average
2390	55.92	54.19	74	-18.08	31.8	5.4	35.47	112	57	Peak
2437	102.26	100.41			31.85	5.46	35.46	112	57	Average
2437	109.97	108.12			31.85	5.46	35.46	112	57	Peak
2500	42.31	40.29	54	-11.69	31.9	5.53	35.41	112	57	Average
2500	56.25	54.23	74	-17.75	31.9	5.53	35.41	112	57	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2334	40.21	38.67	54	-13.79	31.73	5.33	35.52	270	125	Average
2334	55.61	54.07	74	-18.39	31.73	5.33	35.52	270	125	Peak
2462	100.46	98.53			31.87	5.5	35.44	270	125	Average
2462	108.67	106.74			31.87	5.5	35.44	270	125	Peak
2484	52.92	50.96	54	-1.08	31.88	5.5	35.42	270	125	Average
2484	63.6	61.64	74	-10.4	31.88	5.5	35.42	270	125	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2382	40.24	38.55	54	-13.76	31.78	5.4	35.49	112	57	Average
2382	55.11	53.42	74	-18.89	31.78	5.4	35.49	112	57	Peak
2462	96.1	94.17			31.87	5.5	35.44	112	57	Average
2462	103.88	101.95			31.87	5.5	35.44	112	57	Peak
2484	45.15	43.19	54	-8.85	31.88	5.5	35.42	112	57	Average
2484	59.81	57.85	74	-14.19	31.88	5.5	35.42	112	57	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.63	50.9	54	-1.37	31.8	5.4	35.47	173	140	Average
2390	65.19	63.46	74	-8.81	31.8	5.4	35.47	173	140	Peak
2412	100.24	98.47			31.81	5.43	35.47	173	140	Average
2412	108.38	106.61			31.81	5.43	35.47	173	140	Peak
2500	40.81	38.79	54	-13.19	31.9	5.53	35.41	173	140	Average
2500	55.77	53.75	74	-18.23	31.9	5.53	35.41	173	140	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	47.9	46.17	54	-6.1	31.8	5.4	35.47	100	57	Average
2390	58.68	56.95	74	-15.32	31.8	5.4	35.47	100	57	Peak
2412	95.68	93.91			31.81	5.43	35.47	100	57	Average
2412	103.3	101.53			31.81	5.43	35.47	100	57	Peak
2500	41.19	39.17	54	-12.81	31.9	5.53	35.41	100	57	Average
2500	55.42	53.4	74	-18.58	31.9	5.53	35.41	100	57	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2344	41.69	40.12	54	-12.31	31.74	5.33	35.5	275	117	Average
2344	55.8	54.23	74	-18.2	31.74	5.33	35.5	275	117	Peak
2437	106.15	104.3			31.85	5.46	35.46	275	117	Average
2437	113.77	111.92			31.85	5.46	35.46	275	117	Peak
2500	41.85	39.83	54	-12.15	31.9	5.53	35.41	275	117	Average
2500	56.37	54.35	74	-17.63	31.9	5.53	35.41	275	117	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2368	40.9	39.26	54	-13.1	31.76	5.37	35.49	112	57	Average
2368	55.84	54.2	74	-18.16	31.76	5.37	35.49	112	57	Peak
2437	101.14	99.29			31.85	5.46	35.46	112	57	Average
2437	108.98	107.13			31.85	5.46	35.46	112	57	Peak
2492	41.42	39.4	54	-12.58	31.9	5.53	35.41	112	57	Average
2492	57.2	55.18	74	-16.8	31.9	5.53	35.41	112	57	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2330	41.03	39.49	54	-12.97	31.73	5.33	35.52	270	125	Average
2330	55.57	54.03	74	-18.43	31.73	5.33	35.52	270	125	Peak
2462	99.71	97.78			31.87	5.5	35.44	270	125	Average
2462	108.06	106.13			31.87	5.5	35.44	270	125	Peak
2484	52.99	51.03	54	-1.01	31.88	5.5	35.42	270	125	Average
2484	65.54	63.58	74	-8.46	31.88	5.5	35.42	270	125	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2366	40.62	38.98	54	-13.38	31.76	5.37	35.49	112	57	Average
2366	55.8	54.16	74	-18.2	31.76	5.37	35.49	112	57	Peak
2462	96.26	94.33			31.87	5.5	35.44	112	57	Average
2462	103.62	101.69			31.87	5.5	35.44	112	57	Peak
2484	46.92	44.96	54	-7.08	31.88	5.5	35.42	112	57	Average
2484	58.68	56.72	74	-15.32	31.88	5.5	35.42	112	57	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

MODE B

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.33	50.6	54	-1.67	31.8	5.4	35.47	191	286	Average
2390	65.31	63.58	74	-8.69	31.8	5.4	35.47	191	286	Peak
2412	100.52	98.75			31.81	5.43	35.47	191	286	Average
2412	108.2	106.43			31.81	5.43	35.47	191	286	Peak
2486	40.93	38.94	54	-13.07	31.88	5.53	35.42	191	286	Average
2486	56.3	54.31	74	-17.7	31.88	5.53	35.42	191	286	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.47	47.74	54	-4.53	31.8	5.4	35.47	186	2	Average
2390	61.76	60.03	74	-12.24	31.8	5.4	35.47	186	2	Peak
2412	95.45	93.68			31.81	5.43	35.47	186	2	Average
2412	103.75	101.98			31.81	5.43	35.47	186	2	Peak
2494	40.79	38.77	54	-13.21	31.9	5.53	35.41	186	2	Average
2494	55.3	53.28	74	-18.7	31.9	5.53	35.41	186	2	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2372	40.86	39.2	54	-13.14	31.78	5.37	35.49	106	287	Average
2372	55.98	54.32	74	-18.02	31.78	5.37	35.49	106	287	Peak
2462	101.24	99.31			31.87	5.5	35.44	106	287	Average
2462	108.78	106.85			31.87	5.5	35.44	106	287	Peak
2484	52.79	50.83	54	-1.21	31.88	5.5	35.42	106	287	Average
2484	65.78	63.82	74	-8.22	31.88	5.5	35.42	106	287	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2362	40.17	38.54	54	-13.83	31.76	5.37	35.5	184	2	Average
2362	55.52	53.89	74	-18.48	31.76	5.37	35.5	184	2	Peak
2462	95.61	93.68			31.87	5.5	35.44	184	2	Average
2462	103.34	101.41			31.87	5.5	35.44	184	2	Peak
2484	47.02	45.06	54	-6.98	31.88	5.5	35.42	184	2	Average
2484	60.74	58.78	74	-13.26	31.88	5.5	35.42	184	2	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.62	50.89	54	-1.38	31.8	5.4	35.47	191	286	Average
2390	65.71	63.98	74	-8.29	31.8	5.4	35.47	191	286	Peak
2412	98.31	96.54			31.81	5.43	35.47	191	286	Average
2412	106.44	104.67			31.81	5.43	35.47	191	286	Peak
2494	40.83	38.81	54	-13.17	31.9	5.53	35.41	191	286	Average
2494	56.32	54.3	74	-17.68	31.9	5.53	35.41	191	286	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.99	49.26	54	-3.01	31.8	5.4	35.47	186	2	Average
2390	63	61.27	74	-11	31.8	5.4	35.47	186	2	Peak
2412	93.07	91.3			31.81	5.43	35.47	186	2	Average
2412	101.43	99.66			31.81	5.43	35.47	186	2	Peak
2500	40.82	38.8	54	-13.18	31.9	5.53	35.41	186	2	Average
2500	56.52	54.5	74	-17.48	31.9	5.53	35.41	186	2	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	40.92	39.19	54	-13.08	31.8	5.4	35.47	106	287	Average
2390	56.31	54.58	74	-17.69	31.8	5.4	35.47	106	287	Peak
2462	98.89	96.96			31.87	5.5	35.44	106	287	Average
2462	106.59	104.66			31.87	5.5	35.44	106	287	Peak
2484	52.48	50.52	54	-1.52	31.88	5.5	35.42	106	287	Average
2484	65.92	63.96	74	-8.08	31.88	5.5	35.42	106	287	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2346	40.2	38.63	54	-13.8	31.74	5.33	35.5	184	2	Average
2346	55.39	53.82	74	-18.61	31.74	5.33	35.5	184	2	Peak
2462	93.97	92.04			31.87	5.5	35.44	184	2	Average
2462	101.84	99.91			31.87	5.5	35.44	184	2	Peak
2484	47.46	45.5	54	-6.54	31.88	5.5	35.42	184	2	Average
2484	61.19	59.23	74	-12.81	31.88	5.5	35.42	184	2	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

MODE C

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.41	50.68	54	-1.59	31.8	5.4	35.47	107	148	Average
2390	64.61	62.88	74	-9.39	31.8	5.4	35.47	107	148	Peak
2412	98.83	97.06			31.81	5.43	35.47	107	127	Average
2412	107.06	105.29			31.81	5.43	35.47	107	127	Peak
2486	41.16	39.17	54	-12.84	31.88	5.53	35.42	107	127	Average
2486	56.28	54.29	74	-17.72	31.88	5.53	35.42	107	127	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.84	44.11	54	-8.16	31.8	5.4	35.47	104	357	Average
2390	58.48	56.75	74	-15.52	31.8	5.4	35.47	104	357	Peak
2412	94.93	93.16			31.81	5.43	35.47	104	357	Average
2412	102.55	100.78			31.81	5.43	35.47	104	357	Peak
2496	40.8	38.78	54	-13.2	31.9	5.53	35.41	104	357	Average
2496	56.47	54.45	74	-17.53	31.9	5.53	35.41	104	357	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2368	42.88	41.24	54	-11.12	31.76	5.37	35.49	107	127	Average
2368	55.94	54.3	74	-18.06	31.76	5.37	35.49	107	127	Peak
2437	105.35	103.5			31.85	5.46	35.46	107	127	Average
2437	112.81	110.96			31.85	5.46	35.46	107	127	Peak
2496	42.06	40.04	54	-11.94	31.9	5.53	35.41	107	127	Average
2496	56.37	54.35	74	-17.63	31.9	5.53	35.41	107	127	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	40.96	39.23	54	-13.04	31.8	5.4	35.47	101	355	Average
2390	55.64	53.91	74	-18.36	31.8	5.4	35.47	101	355	Peak
2437	99.9	98.05			31.85	5.46	35.46	101	355	Average
2437	107.33	105.48			31.85	5.46	35.46	101	355	Peak
2490	41.01	39	54	-12.99	31.9	5.53	35.42	101	355	Average
2490	55.62	53.61	74	-18.38	31.9	5.53	35.42	101	355	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	41.38	39.67	54	-12.62	31.8	5.4	35.49	106	144	Average
2386	56.63	54.92	74	-17.37	31.8	5.4	35.49	106	144	Peak
2462	100.53	98.6			31.87	5.5	35.44	106	144	Average
2462	108.55	106.62			31.87	5.5	35.44	106	144	Peak
2484	52.17	50.21	54	-1.83	31.88	5.5	35.42	104	127	Average
2484	64.76	62.8	74	-9.24	31.88	5.5	35.42	104	127	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2348	40.35	38.78	54	-13.65	31.74	5.33	35.5	103	358	Average
2348	56.37	54.8	74	-17.63	31.74	5.33	35.5	103	358	Peak
2462	95.95	94.02			31.87	5.5	35.44	103	358	Average
2462	103.61	101.68			31.87	5.5	35.44	103	358	Peak
2484	46.76	44.8	54	-7.24	31.88	5.5	35.42	103	358	Average
2484	59.91	57.95	74	-14.09	31.88	5.5	35.42	103	358	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

BELOW 1GHz WORST-CASE DATA:

MODE A

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Charles Hsiao

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
160.14	31.82	51.77	43.5	-11.68	10.8	1.52	32.27	182	318	Peak
212.52	29.3	48.5	43.5	-14.2	11.4	1.65	32.25	148	50	Peak
250.05	27.86	45.11	46	-18.14	13	1.85	32.1	151	24	Peak
400.1	40.04	51.82	46	-5.96	18.1	2.34	32.22	121	154	Peak
700.4	39.05	44.93	46	-6.95	23.1	3.11	32.09	130	310	Peak
899.9	37.43	40.42	46	-8.57	25	3.49	31.48	142	143	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
30	26.06	39.79	40	-13.94	17.8	0.74	32.27	105	93	Peak
97.23	24.18	45.54	43.5	-19.32	9.46	1.28	32.1	172	176	Peak
142.86	26.42	47.76	43.5	-17.08	9.55	1.38	32.27	186	226	Peak
599.6	39.19	47.41	46	-6.81	21.1	2.87	32.19	141	259	Peak
700.4	37.91	43.79	46	-8.09	23.1	3.11	32.09	131	231	Peak
899.9	34.66	37.65	46	-11.34	25	3.49	31.48	185	248	Peak

REMARKS: Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

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	ESCI	100613	Nov. 11, 2014	Nov. 10, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 02, 2015	Mar. 01, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 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 HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

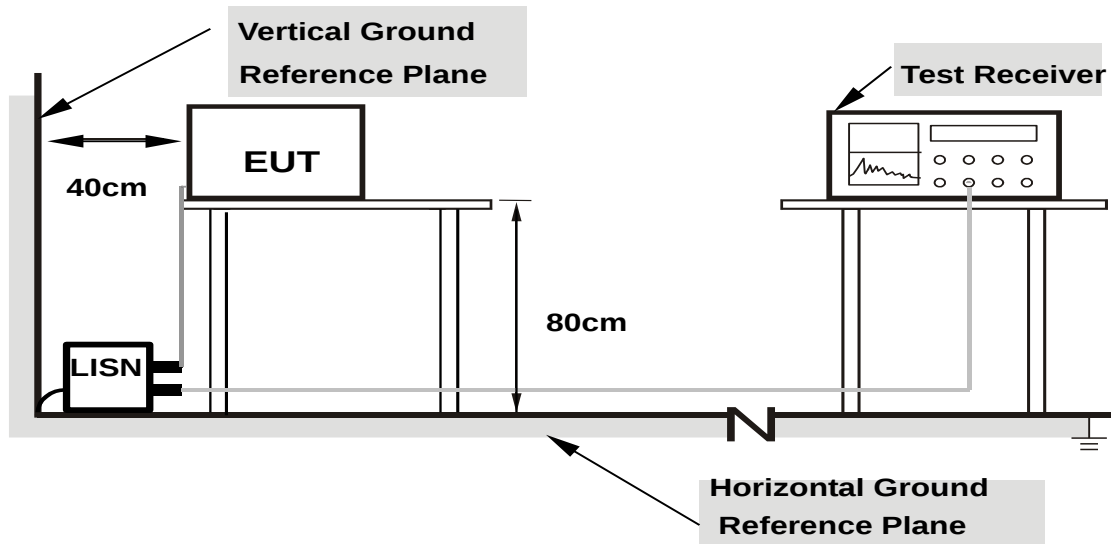
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



- Note:**
- 1.Support units were connected to second LISN.
 - 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 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 section 4.1.6.

4.2.7 TEST RESULTS

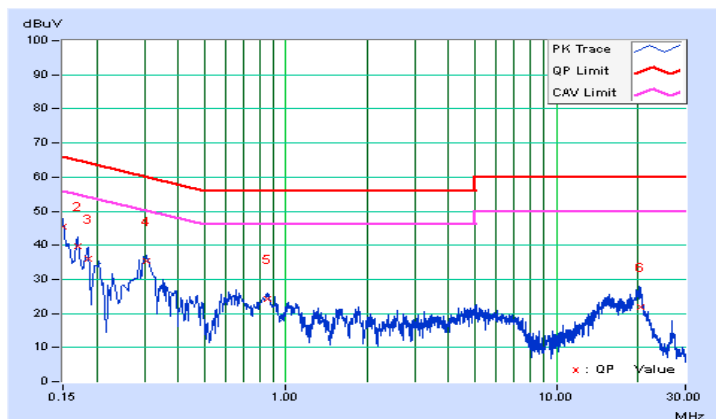
CONDUCTED WORST-CASE DATA :

PHASE	Line 1	6dB BANDWIDTH	9kHz
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Phase Of Power : Line (L)										
No	Frequency	Correction	Reading Value		Emission Level		Limit		Margin	
	(MHz)	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	45.39	35.62	45.44	35.67	66.00	56.00	-20.56	-20.33
2	0.16955	0.05	39.52	28.04	39.57	28.09	64.98	54.98	-25.41	-26.89
3	0.18508	0.06	35.97	23.85	36.03	23.91	64.25	54.25	-28.23	-30.35
4	0.30615	0.06	35.18	27.68	35.24	27.74	60.07	50.07	-24.83	-22.33
5	0.85775	0.08	24.13	17.23	24.21	17.31	56.00	46.00	-31.79	-28.69
6	20.45463	0.91	20.91	13.67	21.82	14.58	60.00	50.00	-38.18	-35.42

Remarks:

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

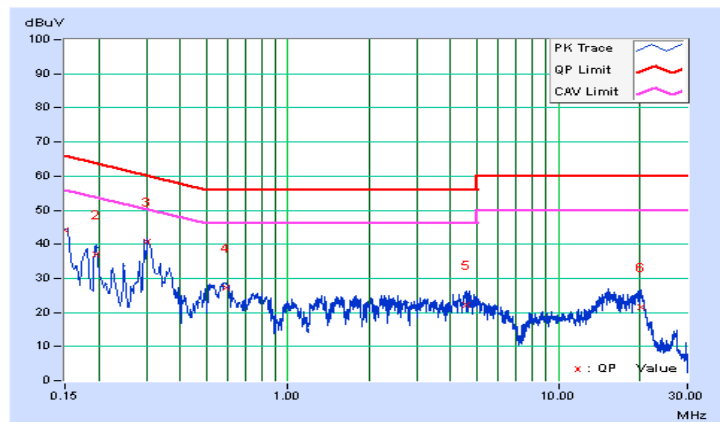


PHASE	Line 2	6dB BANDWIDTH	9kHz
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	44.12	35.00	44.17	35.05	66.00	56.00	-21.83	-20.95
2	0.19613	0.05	37.13	24.87	37.18	24.92	63.77	53.77	-26.59	-28.85
3	0.30294	0.06	40.62	33.68	40.68	33.74	60.16	50.16	-19.49	-16.43
4	0.59158	0.07	27.25	20.26	27.32	20.33	56.00	46.00	-28.68	-25.67
5	4.54875	0.21	22.04	10.83	22.25	11.04	56.00	46.00	-33.75	-34.96
6	20.22785	0.73	20.81	13.23	21.54	13.96	60.00	50.00	-38.46	-36.04

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

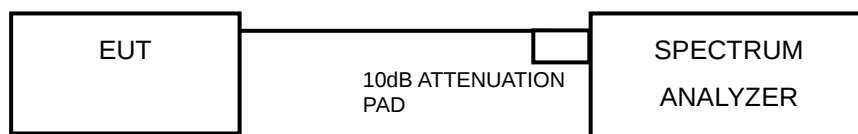


4.3 6dB BANDWIDTH MEASUREMENT

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

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

MODE A

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	7.11	0.5	PASS
6	2437	7.15	0.5	PASS
11	2462	7.12	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.34	0.5	PASS
6	2437	16.34	0.5	PASS
11	2462	16.34	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.92	0.5	PASS
6	2437	17.20	0.5	PASS
11	2462	17.23	0.5	PASS

MODE C

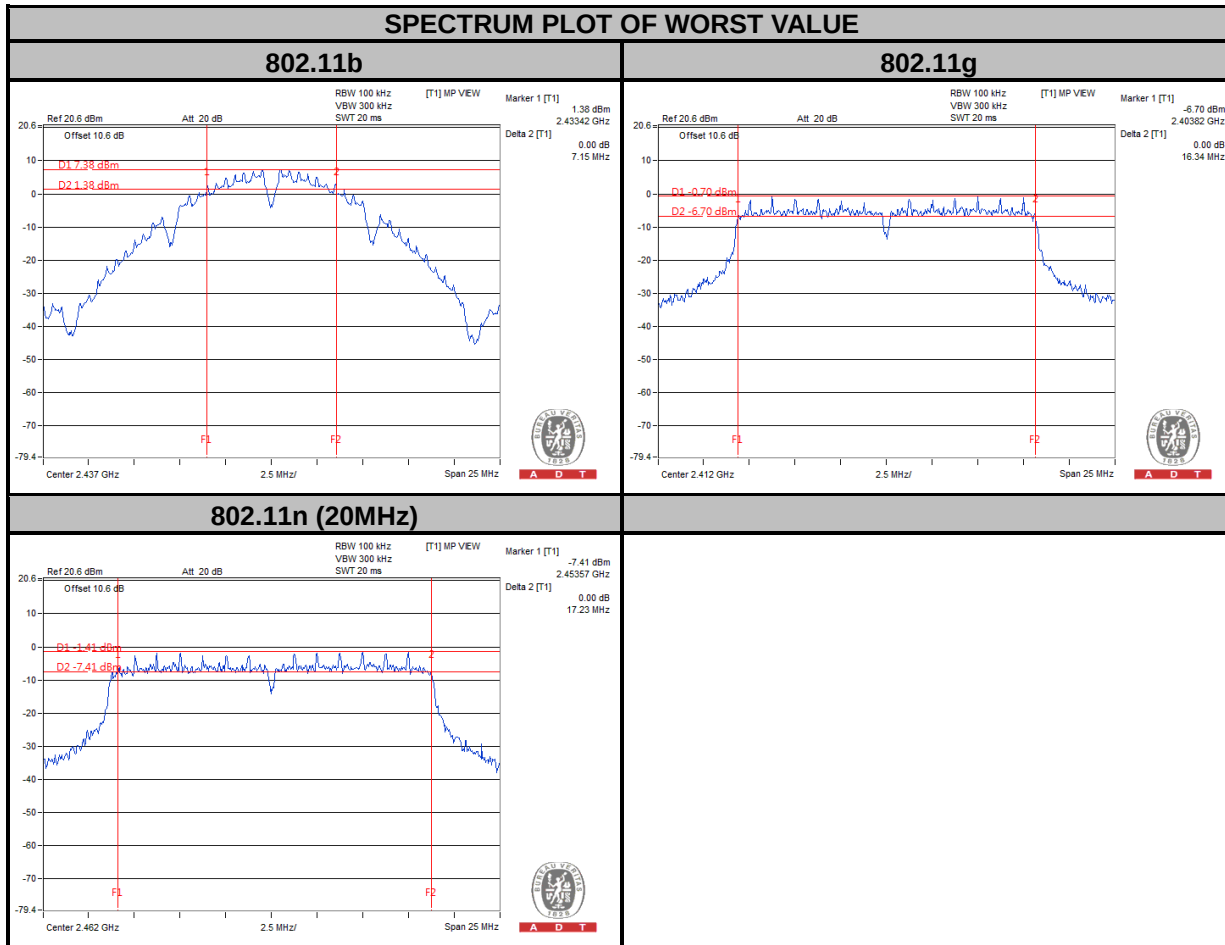
802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	16.98	17.22	0.5	PASS
6	2437	17.20	16.87	0.5	PASS
11	2462	17.23	17.58	0.5	PASS



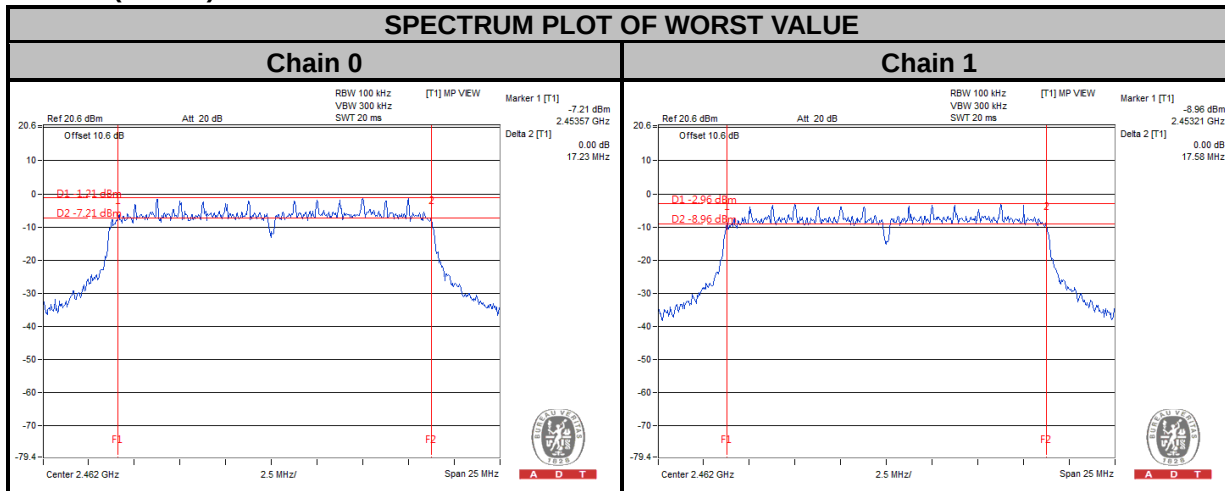
A D T

MODE A



MODE C

802.11n (20MHz)



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)

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

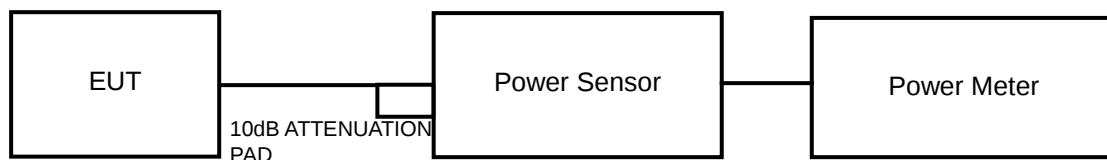
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less for 20-MHz channel widths with $NANT \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(NANT/NSS)$ dB.

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

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

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as section 4.3.6.

4.4.7 TEST RESULTS

MODE A

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	95.06	19.78	30	PASS
6	2437	97.05	19.87	30	PASS
11	2462	96.16	19.83	30	PASS

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	49.20	16.92	30	PASS
6	2437	50.00	16.99	30	PASS
11	2462	49.32	16.93	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	37.24	15.71	30	PASS
6	2437	127.94	21.07	30	PASS
11	2462	44.57	16.49	30	PASS

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	10.19	10.08	30	PASS
6	2437	39.72	15.99	30	PASS
11	2462	11.59	10.64	30	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	24.27	13.85	30	PASS
6	2437	111.17	20.46	30	PASS
11	2462	36.14	15.58	30	PASS

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	6.18	7.91	30	PASS
6	2437	30.76	14.88	30	PASS
11	2462	8.55	9.32	30	PASS



A D T

MODE C

802.11n (20MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	12.17	13.00	36.434	15.62	30	PASS
6	2437	17.88	17.81	121.771	20.86	30	PASS
11	2462	15.30	13.69	57.273	17.58	30	PASS

802.11n (20MHz)

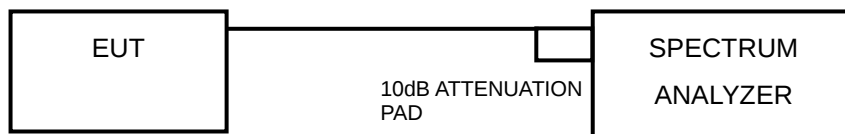
CHAN.	FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	5.86	6.97	8.83	9.46	30	PASS
6	2437	12.14	11.71	31.19	14.94	30	PASS
11	2462	8.69	7.49	13.00	11.14	30	PASS

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

- Set the RBW = 3 kHz, VBW = 10 kHz, Detector = peak.
- Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as section 4.3.6.

4.5.7 TEST RESULTS

MODE A

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS / FAIL
1	2412	-6.53	8	PASS
6	2437	-7.11	8	PASS
11	2462	-6.82	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS / FAIL
1	2412	-18.22	8	PASS
6	2437	-12.18	8	PASS
11	2462	-16.96	8	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS / FAIL
1	2412	-19.06	8	PASS
6	2437	-12.93	8	PASS
11	2462	-18.31	8	PASS

MODE C

802.11n (20MHz)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-22.12	3.01	-19.11	7.65	PASS
	6	2437	-14.11	3.01	-11.10	7.65	PASS
	11	2462	-18.39	3.01	-15.38	7.65	PASS
1	1	2412	-18.51	3.01	-15.50	7.65	PASS
	6	2437	-17.40	3.01	-14.39	7.65	PASS
	11	2462	-19.83	3.01	-16.82	7.65	PASS

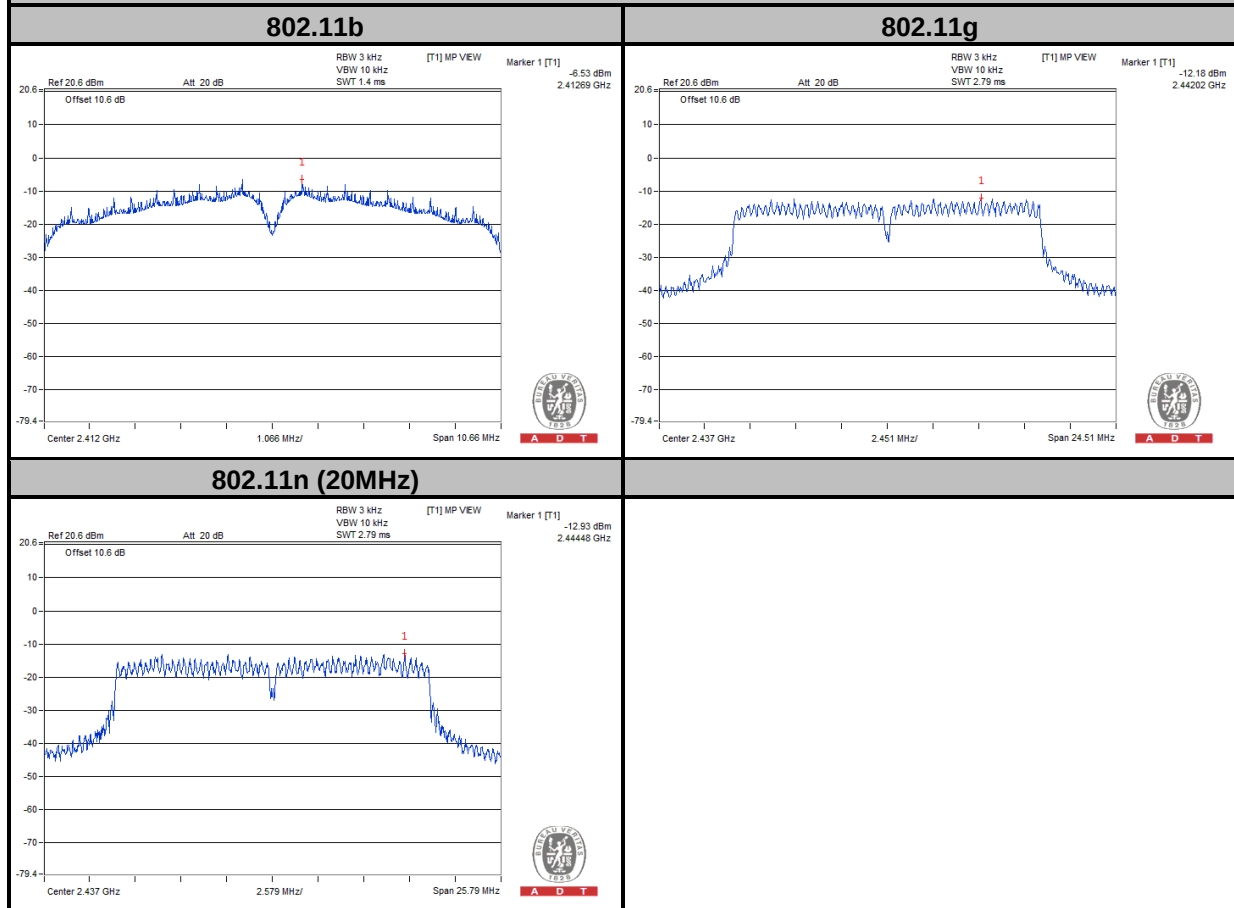
NOTE: Directional gain = $3.34\text{dBi} + 10\log(2) = 6.35\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(6.35-6) = 7.65\text{dBm}$.



A D T

MODE A

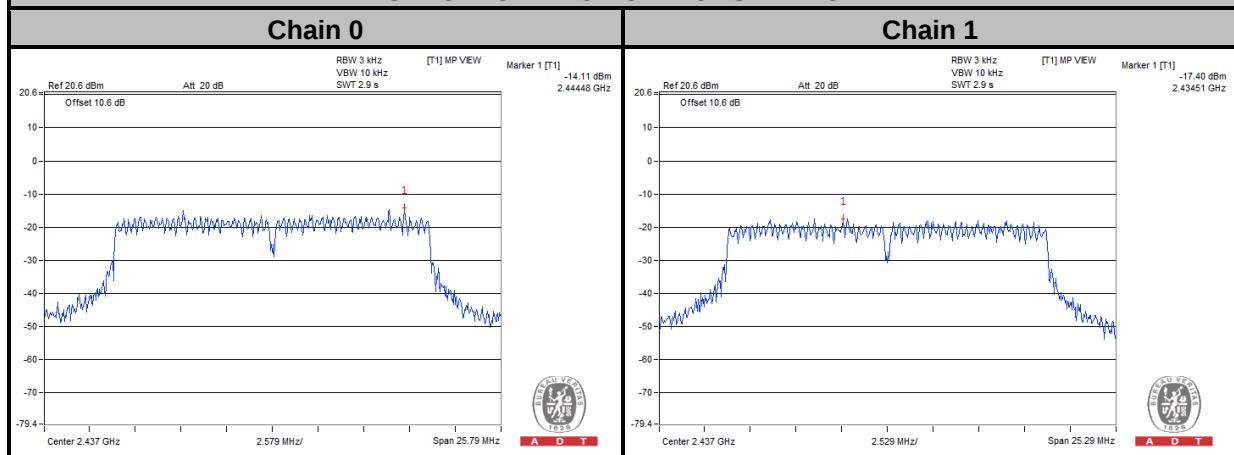
SPECTRUM PLOT OF WORST VALUE



MODE C

802.11n (20MHz)

SPECTRUM PLOT OF WORST VALUE

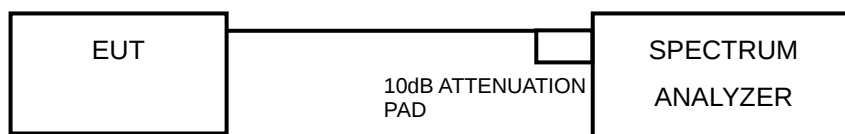


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

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.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as section 4.3.6.

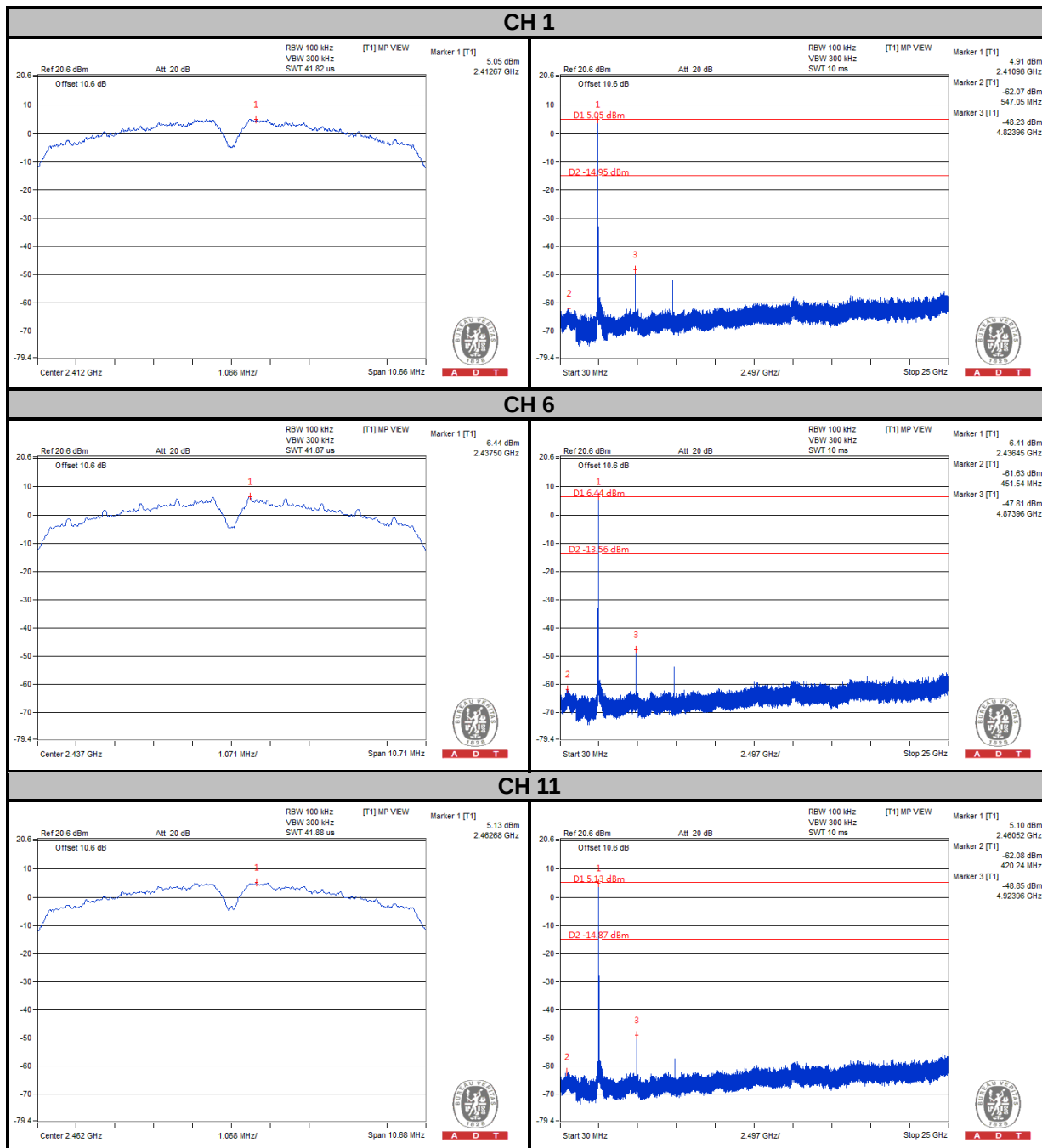
4.6.7 TEST RESULTS

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.

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

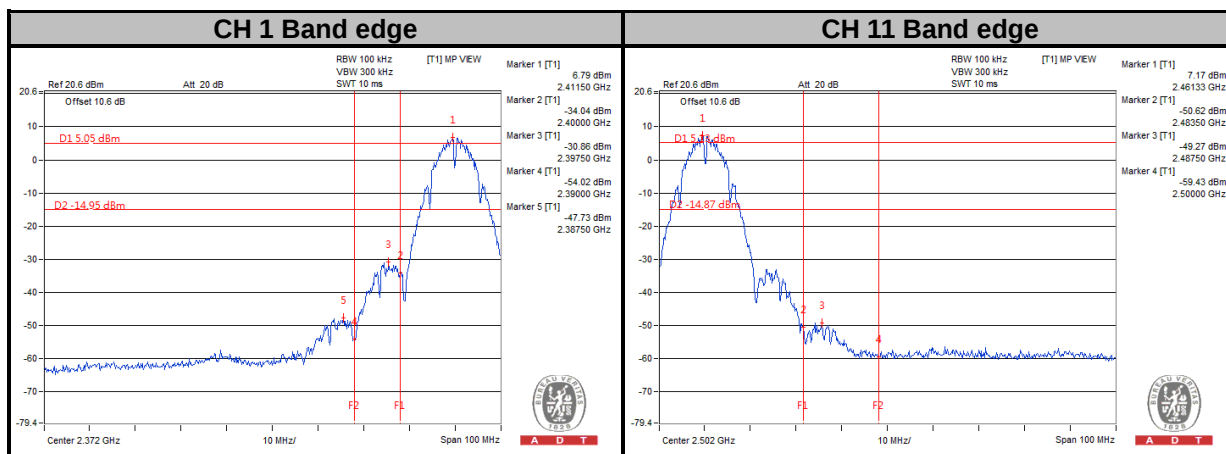
MODE A

802.11b





A D T

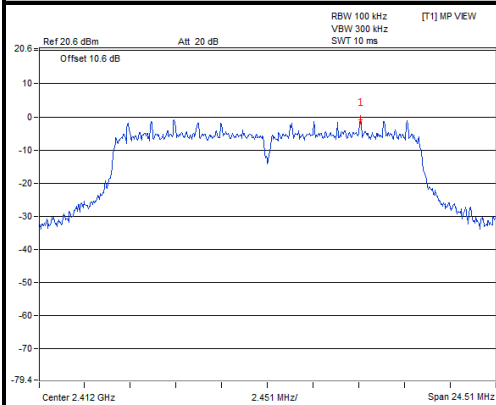




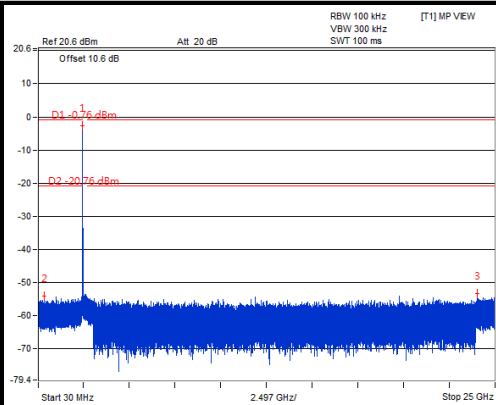
A D T

802.11g

CH 1

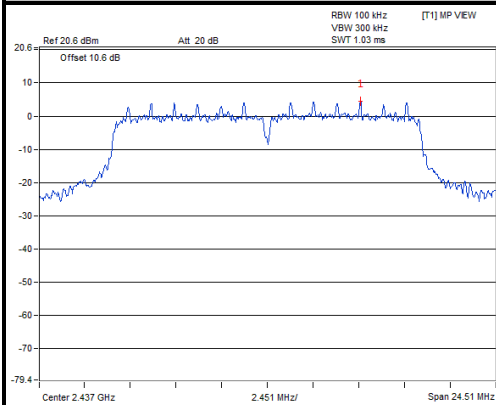


A D T

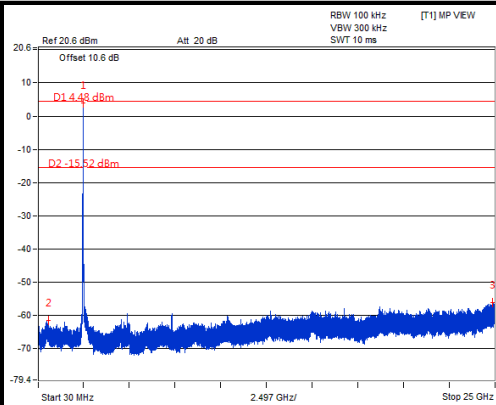


A D T

CH 6

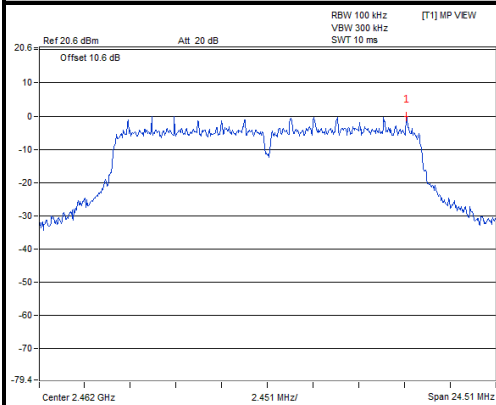


A D T

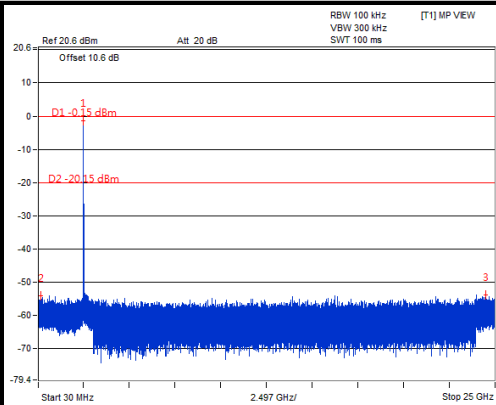


A D T

CH 11



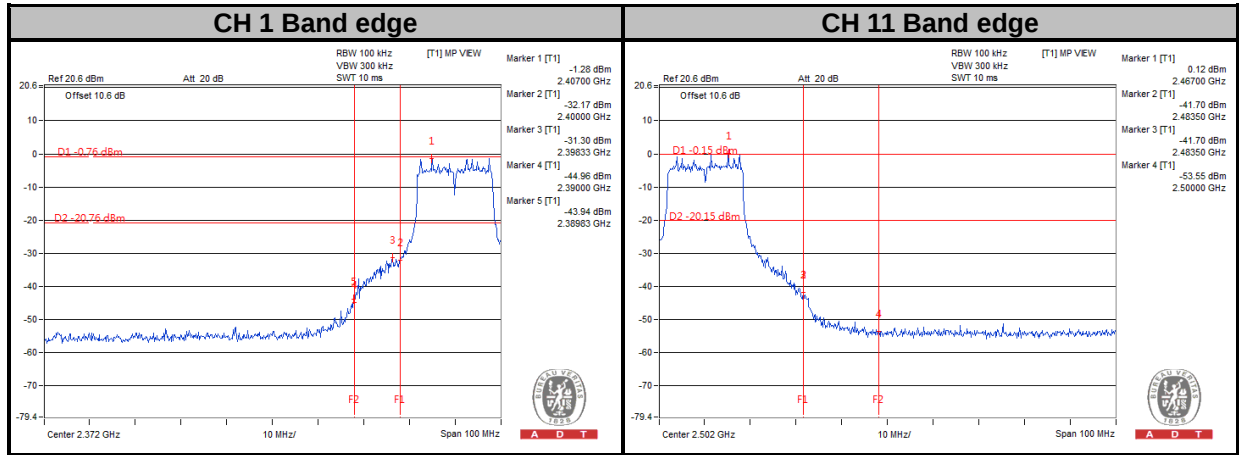
A D T



A D T



A D T

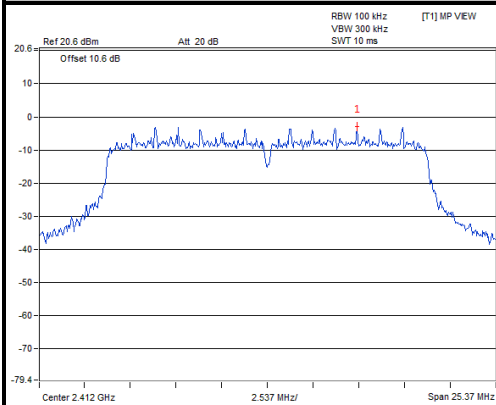




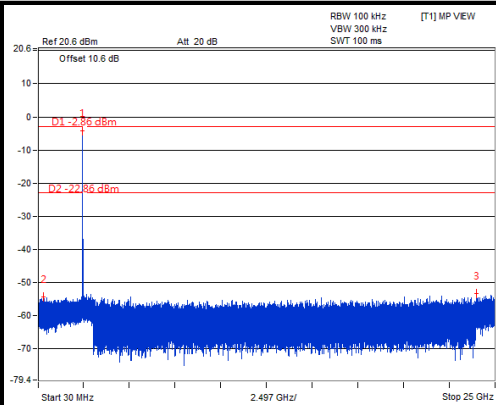
A D T

802.11n (20MHz)

CH 1

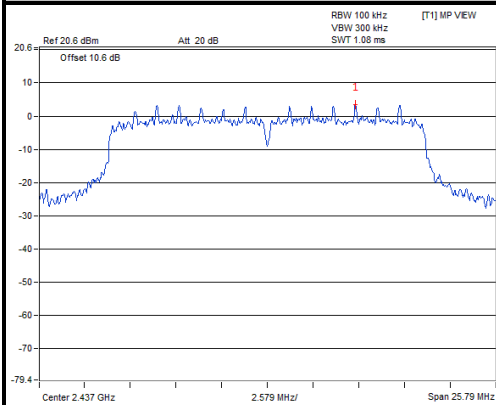


A D T

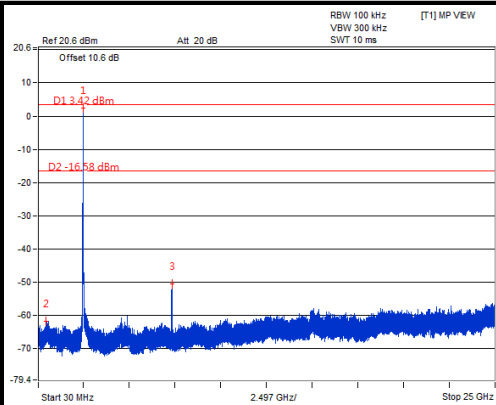


A D T

CH 6

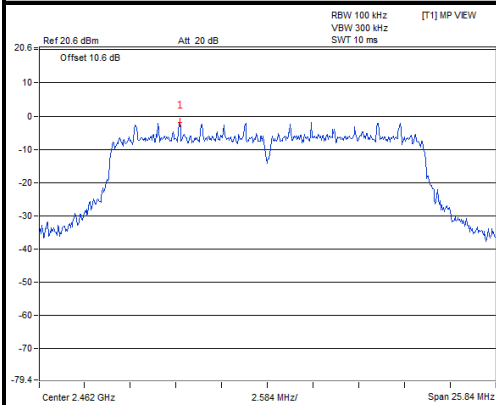


A D T

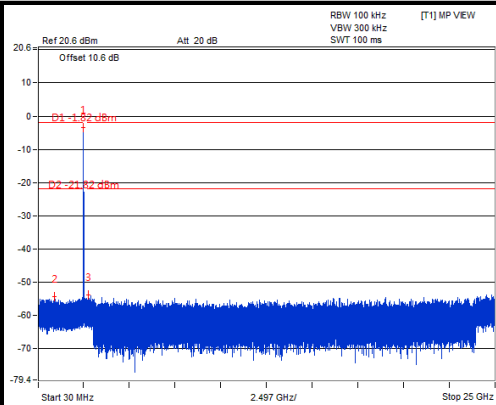


A D T

CH 11



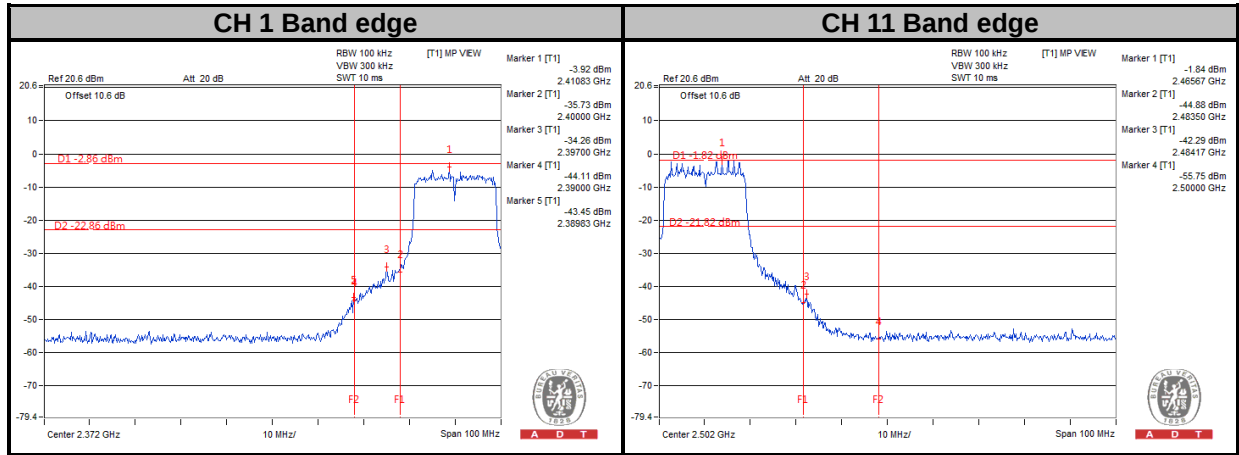
A D T



A D T



A D T





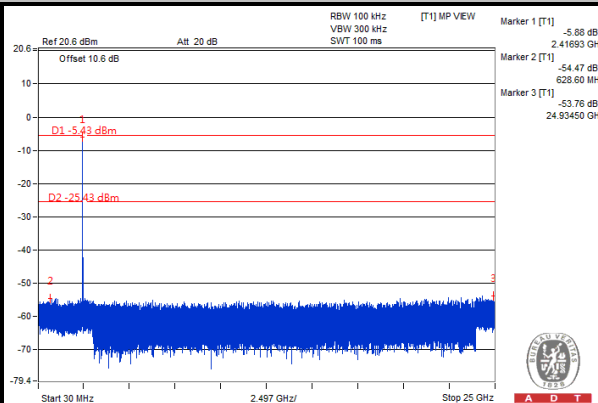
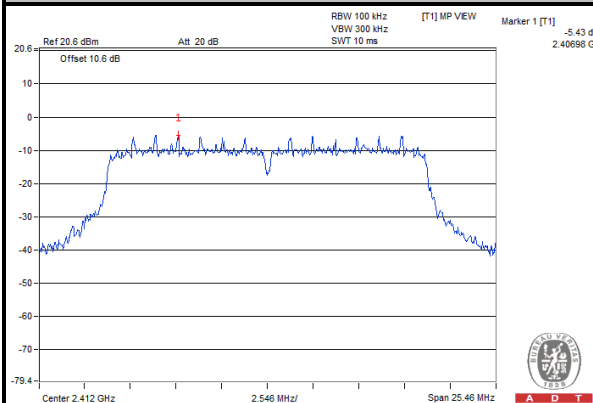
A D T

MODE C

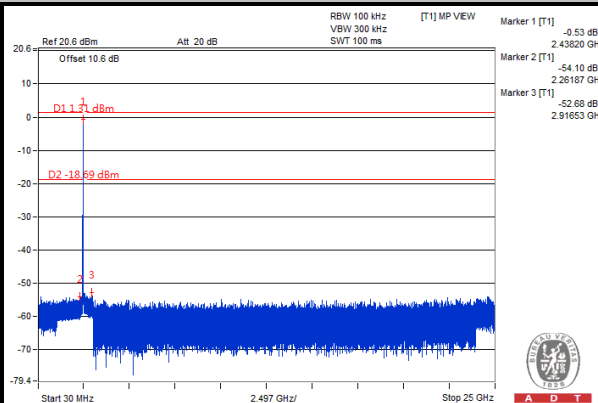
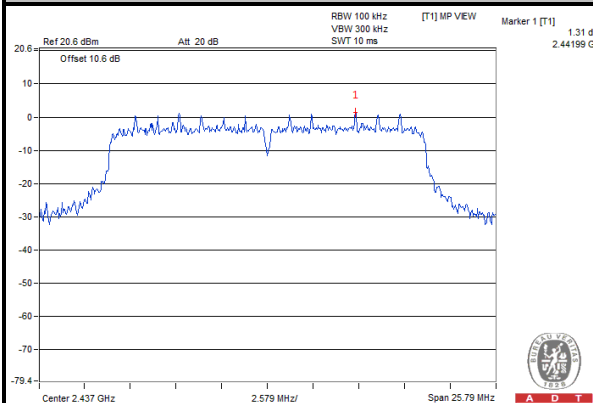
802.11n (20MHz)

CHAIN 0

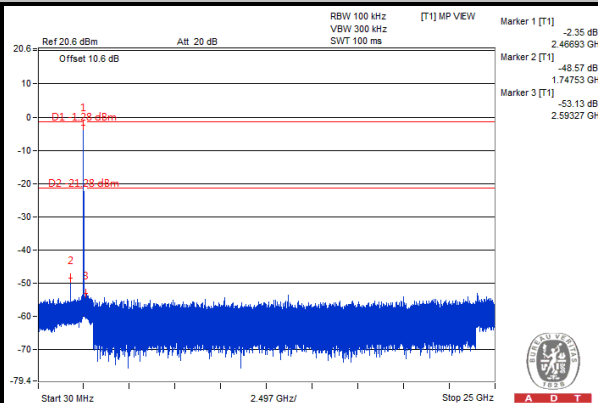
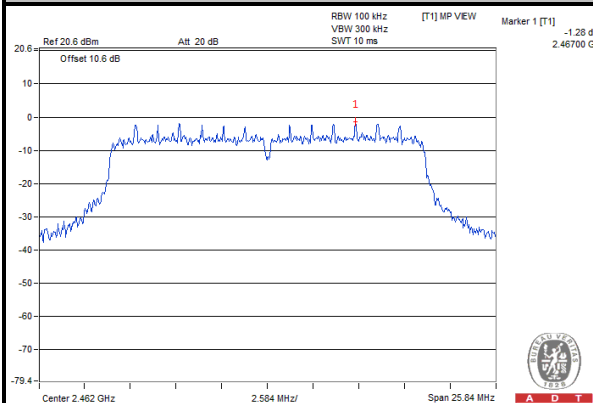
CH 1



CH 6

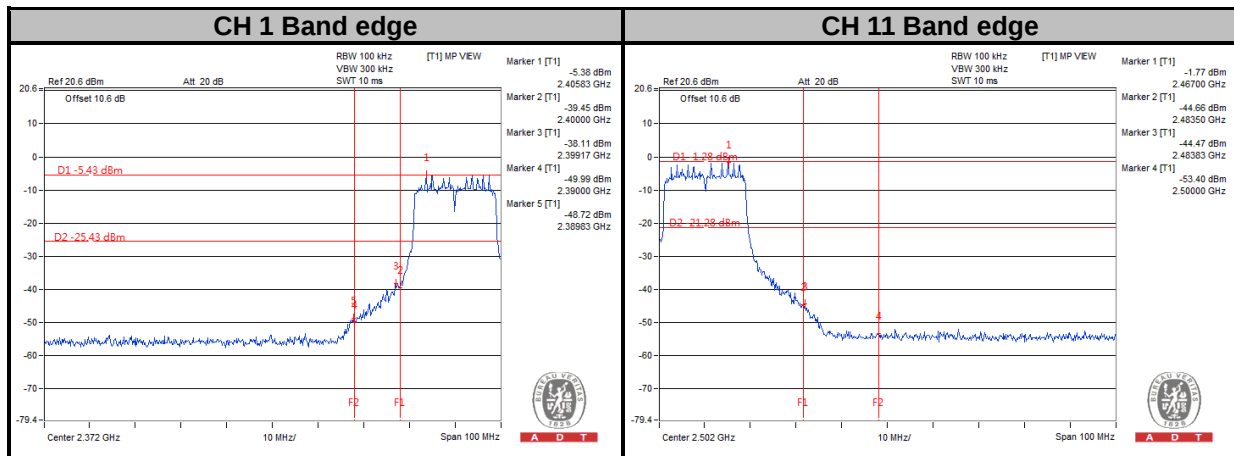


CH 11





A D T

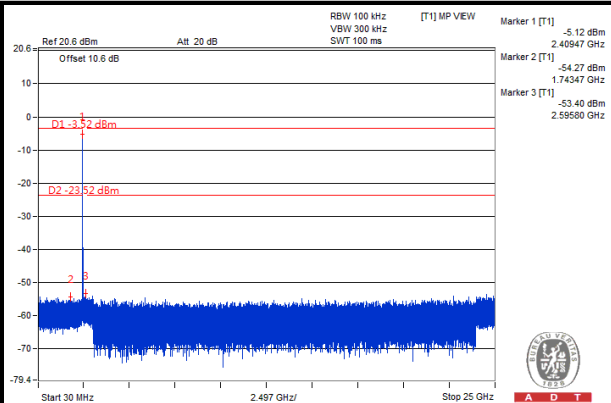
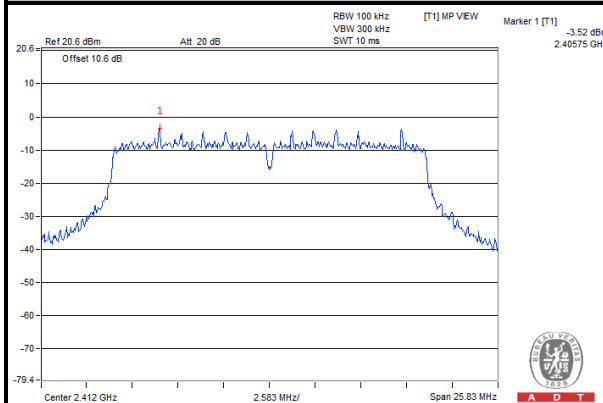




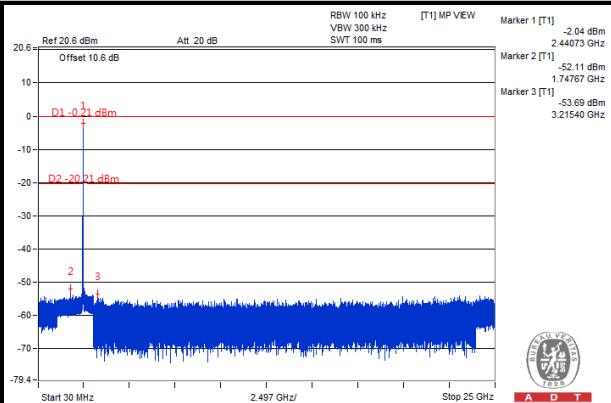
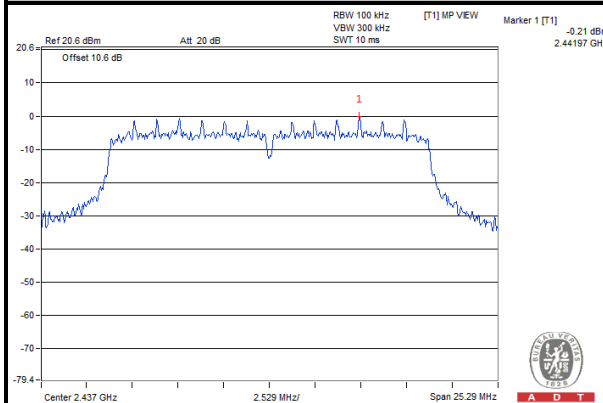
A D T

CHAIN 1

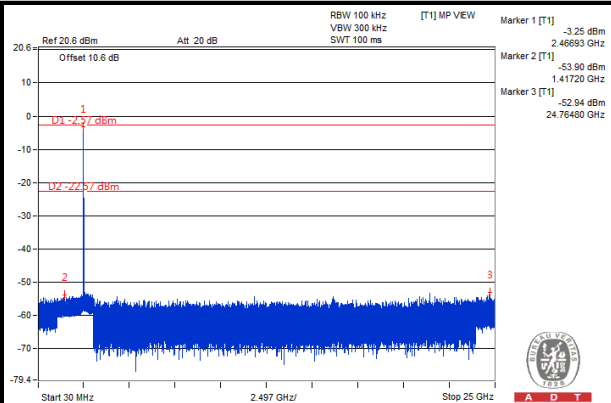
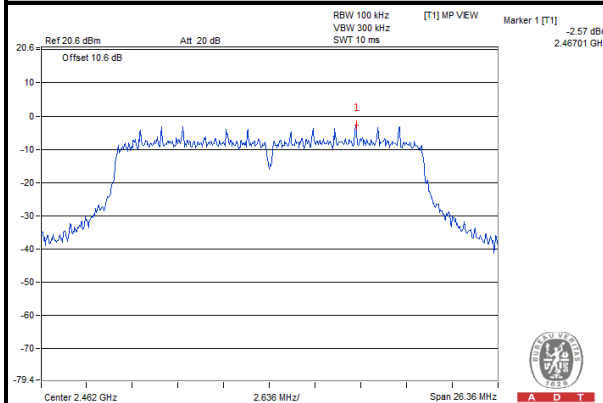
CH 1



CH 6

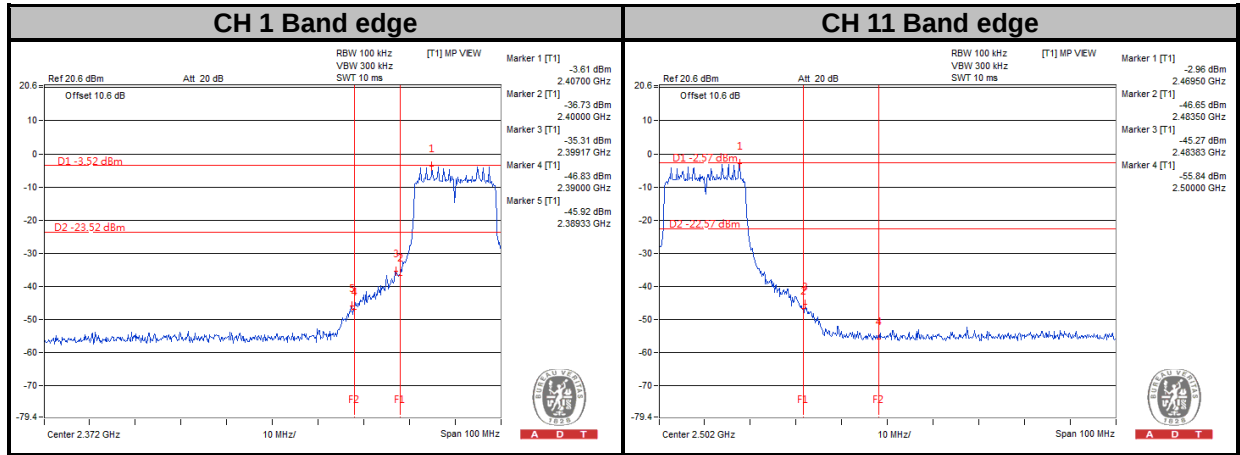


CH 11





A D T



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:

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab:

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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 any modifications are made to the EUT by the lab during the test.

---END---